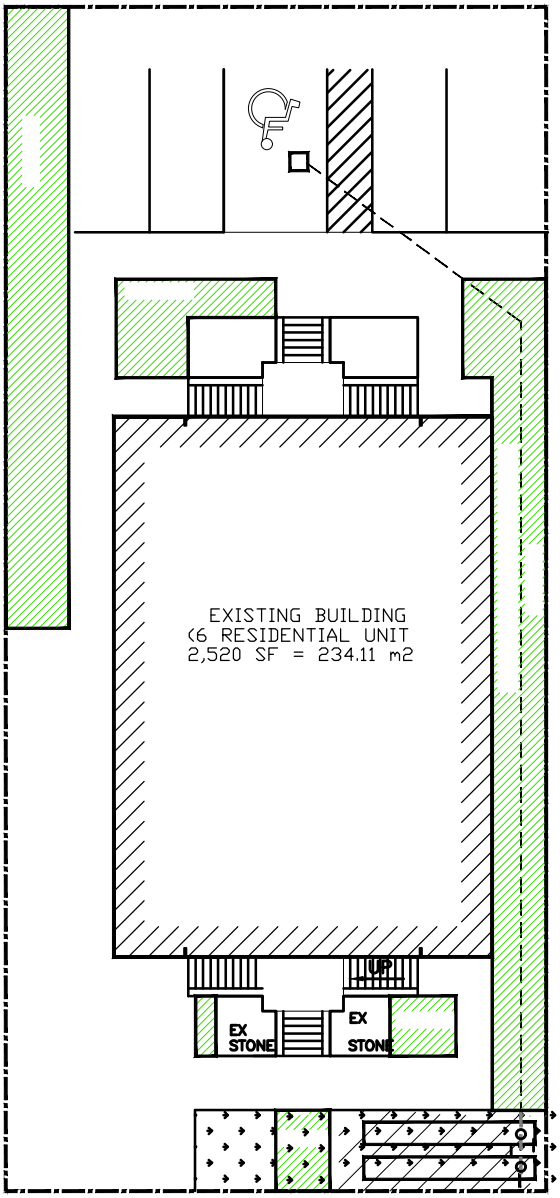
1044-1054 HOWARD
WINDSOR, ON

DRAINAGE REPORT



KEY PLAN

COVER SHEET

DATE : JUL.20.2025

ZIAD EL-BABA P.E., ENGINEERING
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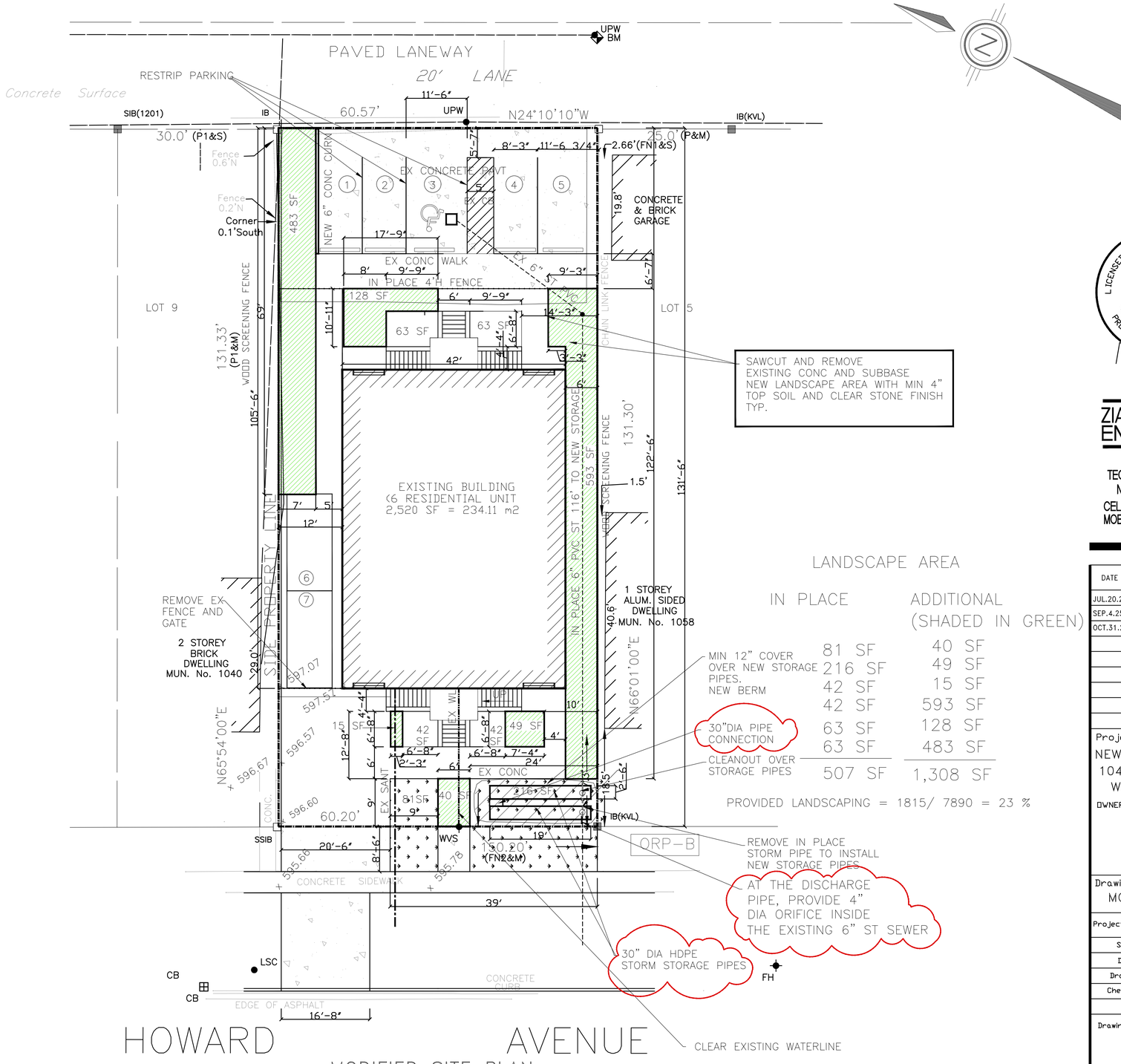

MODIFIED SITE PLAN

SCALE 1": 10'-0"

LANDSCAPE AREA

	IN PLACE	ADDITIONAL (SHADED IN GREEN)
MIN 12" COVER OVER NEW STORAGE PIPES. NEW BERM	81 SF	40 SF
	216 SF	49 SF
	42 SF	15 SF
	42 SF	593 SF
30"DIA PIPE CONNECTION	63 SF	128 SF
CLEANOUT OVER STORAGE PIPES	63 SF	483 SF
	507 SF	1,308 SF

PROVIDED LANDSCAPING = 1815/ 7890 = 23 %

LICENSED PROFESSIONAL ENGINEER
Z.A.EL-BABA
PROVINCE OF ONTARIO

ZIAD EL-BABA ENGINEERING
674 GAUTHIER
TECUMSEH ONTARIO
N8N3P8 CANADA
CELL - 313-938-8767
MOBILE - 519-796-9882

DATE	REV. NO.	ISSUED FOR
JUL.20.25		PERMIT
SEP.4.25		ADD LANDSCAPE AREAS
OCT.31.25		REVISIONS

Project:
NEW MULTI DWELLING
1044-1054 HOWARD
WINDSOR ONTARIO
OWNER

Drawing Title:
MODIFIED SITE PLAN

Project Number	
Scale	AS NOTED
Date	
Drawn By	
Checked By	

Drawing No.
SP-2

THE CITY OF WINDSOR
ONTARIO, CANADA

Office of the City Engineer

November 4, 2025

Ziad El-Baba Engineering
674 Gauthier
Tecumseh, ON

Attention: Ziad El-Baba, P. Eng.

RE: 3841 Howard Avenue – SPC-2024-05
Stormwater Management

This will acknowledge receipt of the stormwater management report dated September 4, 2025 and site servicing drawing dated October 31, 2025 for the above-noted development.

We have reviewed the stormwater management report, which confirms the following:

- Storage will be provided for the 1:5 year storm event in underground storm pipes and structures and for the 1:100 year storm event by ponding above the catchbasin in the rear parking area.
- Stormwater will be restricted to the pre-development release rate by a 4" diameter orifice plate installed on the outlet pipe of the underground storage pipes.

The site servicing noted above is acceptable. The Corporation of the City of Windsor provided a cursory review of the information submitted and it is not to be considered a detailed comprehensive review. The Consulting Engineers are responsible for their designs, materials specified and used for the project within the City of Windsor. Any issues discovered after the acceptance of your submission are the sole responsibility of the Consulting Engineers and shall be rectified to the satisfaction of the City Engineer at no cost to the Corporation of the City of Windsor.

By copy of this letter, the Building Department is advised that we have no objection to the issuing of permits for this development, subject to any additional approval if required.

Engineering Department permits are required for all work in the right-of-way, including, but not limited to driveways, sewer connections.

I trust that the above is satisfactory, however, should you have any questions please contact Shannon Mills, of this office at swm@citywindsor.ca.

Yours truly,

Patrick Winters, P.Eng.
Manager of Development

SM

CC: Building Department, Attn: Brandon Calleja
Building Department, Attn: Jessica Barlow
Building Department, Attn: Margo Moore
Building Department, Attn: Nic Gesuale
Engineer/Plan Examiner: Attn: Philip Glos
Planning Department, Attn: Brain Nagata
Right-of-Way, Attn: Adam Pillon

Attachments:
Stormwater Management report dated September 4, 2025
Site Servicing Drawings dated October 31, 2025

SUMMARY

SUMMARY OF STORM WATER DESIGN AND STORAGE

– UNDER 5 YEAR DESIGN THE REQUIRED STORM WATER STORAGE IS 5.52 M3 (195 CU FT) WILL BE STORED IN THE NEW 750mm UNDERGROUND STORAGE PIPES AND IN THE 150 mm PIPE
STORAGE VOLUME PROVIDED IS 14.76 m3 (521 FT3)

– THE DIFFERENCE BETWEEN 100Y LESS 5Y STORM WATER EVENTS WILL BE STORED OVER THE CATCH BASIN

THE MINIMUM STORAGE REQUIRED IS 8.35 m3 (295 FT3)
STORAGE VOLUME PROVIDED IS 9.03 m3 (319 FT3)

– STORM WATER DESIGN IN REFERENCE WITH WINDSOR/ESSEX STORM MANAGEMENT STANDARDS MANUAL FOR DESIGN STANDARDS

SUMMARY

DATE : SEP.4.25

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–
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WINDSOR, ON

SK-1

STORM WATER CALCULATIONS: SITE AT BUILDING

NET SITE FOR THE DESIGN : 7,890 SF = 733 M2 =.073 HEC

PRE-DEVELOPMENT CONDITIONS

1) GRASS AREA = 4,630 SF = 430 SQ. M C = .2
2) BUILDING = 1710 SF =159 SQ. M C = .90
3) STONE= 320 SF = 30 SQ. M C = .65
4) CONCRETE= 1230 SF = 114.0 SQ. M C = .95

$$C(EX)avg = \frac{.20x\ 430 + .90x159 + .65x30 + .95x114}{733} = .49$$

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

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

Q (PRE) = 2.78 x.49 x 75.4 x.073 = 7.50 L/S = .0075 M3/S

T=20 MIN EXISTING BASED ON STORAGE. 100 YR STORM

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

Q (PRE) = 2.78 x.49 x 123.50 x .073 = 12.28 L/S = .0123

POST DEVELOPMENT - CONDITIONS

IMPERVIOUS AREA = 6831(BLDG+CONC)= 634.6 m3 OR 705/ 733(SITE) = 96% OF PROPERTY

1) GRASS AREA = 1815 SF = 168.6 SQ. M C = .2
2) BUILDING = 2520 SF = 234.10 SQ. M C = .90
3) CONCRETE = 3550 SF = 330.30 SQ. M C = .95

$$C(NEW)avg = \frac{.20x\ 168.6 + .90x\ 234.10 + .95x330.30}{733} = .76$$

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SITE CALCULATION

DATE : SEP.4.25

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SK-2

5 YEAR STORM – STORAGE VOLUME STORAGE

SITE FOR THE DESIGN : 733 M2 = .073 HEC

$$I = \frac{1259}{(Tc+8.8)^{.838}} = mm/HR$$

Q PRE RELEASE RATE :7.50 L/S = .0075 M/S

C RUNOFF COEFFICIENT = .76

Vp = VOLUME RUN OFF
Vr = VOLUME RELEASED

TIME		$\frac{2.78(C\ I\ A)}{1000}$	Vp xTx60	Vr .0075xTx60	Vp-Vr M3
MIN	INTENSITY	PEAK FLOW M3/S	RUN-OFF VOLUME	VOLUME REALEASED	STORAGE
5	139.5	.0215	6.45	2.25	4.20
10	108.5	.0167	10.04	4.5	5.54
15	88.4	.0136	12.27	6.75	5.52
20	75.4	.0116	13.96	9.0	4.96
25	65.9	.010	15.25	11.25	4.00
30	58.7	.0091	16.29	13.5	2.80
35	53	.091		15.75	
40	48				
45	44.6				
50	41.4				
55	38.7				
60	36.30				

5 YEAR FLOOD ELEVATION = TOP OF WATER IN THE RAIN GARDEN = 589.89

SITE CALCULATION

DATE : SEP.4.25

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WINDSOR, ON

SK-3

100 YEAR STORM – STORAGE VOLUME STORAGE

SITE FOR THE DESIGN : 733 M2 = .073 HEC

$$I = \frac{1259}{(Tc+8.8)^{.838}} = mm/HR$$

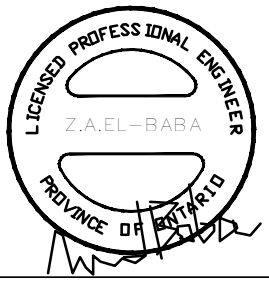
Vp = VOLUME RUN OFF
Vr = VOLUME RELEASED

Q PRE RELEASE RATE :7.68 L/S = .0077 M/S

C RUNOFF COEFFICIENT = .85

TIME		$\frac{2.78(C\ I\ A)}{1000}$	Vp xTx60	Vr .0075xTx60	Vp-Vr M3
MIN	INTENSITY	PEAK FLOW L/S	RUN-OFF VOLUME	VOLUME REALEASED	STORAGE M3
5	218.3	.0337	10.10	2.25	7.85
10	172.70	.0266	15.98	4.5	11.48
15	143.90	.0222	19.97	6.75	13.22
20	123.50	.0190	22.86	9.0	13.86
25	108.60	.0167	25.12	11.25	13.87
30	96.90	.0149	26.90	13.5	13.40
35	87.96	.0136	28.49	15.75	12.74
40					
45					
50					
55					
60					

100 YEAR FLOOD ELEVATION = TOP OF WATER IN THE RAIN GARDEN = 590.60



SITE CALCULATION

DATE : SEP.4.25

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SK-4

REQUIRED 5 YEAR STORAGE : 5.52 M3 = 195 CF FROM TABLE SHEET SK-3

REQUIRED ON GROUND 100Y-5Y STORAGE : 13.87- 5.52= 8.35 M3 SHEET SK-4

REQUIRED 5 YEAR STORAGE : 5.52 M3 =195 CF

UNDERGROUND STORAGE PROVIDED

REQUIRED UNDERGROUND STORAGE : 5.52 M3 = 195 CF

STORAGE PIPE BETWEEN EX CB AND STORAGE PIPES
VOLUME STORED IN MIN 150 mm PIPE = .0177x 35.36m (116 FT)= .63 m3

PROVIDE 30" DIA (750 mm) NHDP STORM PIPE
VOLUME STORED IN 750 mm PIPE = 5.8m(19')x.44m2(750mm PIPE)=2.552x2= 5.1m3

TOTAL UNDERGROUND VOLUME PROVIDED = .63+ 5.1 = 5.73 m3 (260 FT3) > 5.52 m3

100 YEAR STORAGE PROVIDED (DIFFERENCE 100Y - 5Y)

REQUIRED SURFACE STORAGE = 8.35 M3 = 295 FT3

STORAGE PROVIDED

SURFACE STORAGE PROVIDED
V = AREA x DEPTH/ 3 (CONICAL)
V = 178.30 M2 (1920 SF) x .152 (6") /3 = 9.03 m3 (319 CF)

TOTAL STORAGE PROVIDED = 5.73 (UNDERGROUND) + 9.03 = 14.76 m3 > 13.87 m3

Q (PRE) = .0113 M3/S

AREA: ORIFICE= $\dfrac{Q\ exe}{.62\sqrt{2gh}}$

AREA: ORIFICE= $\dfrac{.0075}{.62\sqrt{2x9.81x.76+/-}}$ = .0031 M2 , A= 0.034 FT2 D= 2.5 IN

City standard minimum orifice size 3" square or 4" dia.

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SITE CALCULATION

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SK-5