STORMWATER MANAGEMENT BRIEF
HABITAT FOR HUMANITY
22/24 UNIVERSITY AVENUE
TOWN OF COBOURG

Dobri Engineering Ltd.
PO Box 441
Port Hope, Ontario
L1A 3Z3
Phone No. 905-885-2881
E-mail dobrieng@bellnet.ca

REVISED SEPTEMBER 1, 2019

The report has been revised to address review comments received from the Ganaraska Region Conservation Authority.

INTRODUCTION

Dobri Engineering Ltd. has been retained to prepare the engineering site servicing and grading plan for the proposed building addition and associated site modifications at 22/24 University Avenue. As part of the application, a Stormwater Management Brief has been prepared.

The property covers a total area of 1,381sq.m and is presently occupied by the residential duplex. The driveway is located on the east side of the property and is shared with the neighbour. The proposed site alterations include a building addition, alterations to the front yard, and additional parking in the rear yard. The building addition will add 2 units to the site.

STORMWATER MANAGEMENT

The analysis completed for the surface water runoff is based on the following:

1. Use Yarnell Equation, I=a/(T+b),
   where I=rainfall Intensity (mm/hr) and T=time of concentration (minutes)

Return Period	*Regression constants*	
	a	*b*
2-yr	*1778*	*13*
5-yr	*2464*	*16*
10-yr	*2819*	*16*
25-yr	*3886*	*18*
50-yr	*4750*	*24*
100-yr	*5588*	*28*

   Please note that the catchment is in the Midtown Creek Drainage area, however the storm sewer in the Town of Cobourg is sized using the Yarnell Equation.

2. Rational Method $Q_p = 0.0028CIA$
3. MTO Drainage Manual
4. MOE – Stormwater Management Planning & Design Manual, 2003
5. Low Impact Development Stormwater Planning And Design Guideline prepared by the Credit Valley Conservation Authority and The Toronto and Region Conservation Authority.
6. Runoff Coefficient of 0.25 for open field and landscaped areas (Pre-Development)
7. Runoff Coefficient of 0.90 for paved surface, concrete and building roof
8. Runoff Coefficient of 0.90 for gravel surface, (allowed C=0.60)
9. Geotechnical Investigation Report prepared by GHD, dated December 11, 2018

EXISTING DEVELOPMENT CONDITIONS

The existing site conditions are illustrated on Drawing No. 18-593-Existing. The total site area is 1,381 sq.m. Surface water runoff is via sheet flow with runoff generally towards University Avenue. The low point on the property is at the SW corner of the site. Surface water runoff from the rear yard will also collect in the NW corner of the site, where it naturally discharges into the neighbouring lot prior to being directed south along the west property line.

The Geotechnical Report concluded that the native soil is till with an estimated percolation rate of 5-10 mm/hr. Although the groundwater elevation was not determined. groundwater seepage was encountered at a depth of 0.8m (estimated elevation of 84.7m) at TP-5 which was located near the NW corner of the property.

The peak runoff flows were calculated for the pre-development and post-development conditions for the 2-yr through the 100-yr storm events.

Calculate C, the runoff coefficient for the site under existing conditions.

Surface material		Area (sq.m)	C	A x C
Building		270	0.9	243
Sidewalk		28	0.9	25.2
Grass		922	0.25	230.5
Gravel		161	0.9	144.9
	TOTAL	1381		643.6
	Weighted C		0.47	

Calculate the peak discharge from the site for the existing conditions. The Time of concentration is 15 minutes (the minimum).

t=	*15.0 min*	*C=*	*0.466*	*A=*	*0.138ha*	
Storm event	*2-yr*	*5-yr*	*10-yr*	*25-yr*	*50-yr*	*100-yr*
I(mm/hr)=	*63.50*	*79.48*	*90.94*	*117.76*	*121.79*	*129.95*
Q(cms)=	*0.011*	*0.014*	*0.016*	*0.021*	*0.022*	*0.023*

POST DEVELOPMENT CONDITION

Calculate C, the runoff coefficient for the entire site under Post-Development conditions.

Surface material		Area (sq.m)	C	A x C	
Building		366	0.9	329	*Includes Deck*
Sidewalk		16	0.9	14	
Grass		482	0.25	121	
Asphalt		517	0.9	465	
	Total	1381		930	
	Weighted C		0.67		

Calculate the peak discharge from the site for Post-Development conditions.

t=	*15.00 min*	*C=*	*0.67*	*A=*	*0.138ha*	
Storm event	*2-yr*	*5-yr*	*10-yr*	*25-yr*	*50-yr*	*100-yr*
I(mm/hr)=	*63.50*	*79.48*	*90.94*	*117.76*	*121.79*	*129.95*
Q(cms)=	*0.017*	*0.021*	*0.024*	*0.031*	*0.032*	*0.034*

If no stormwater quantity controls are implemented, the re-development will result in a 48% increase in the peak discharge off site.

The site will be graded such that surface water runoff in the rear yard will be directed to an infiltration trench. The trench will include a subdrain which will discharge into the private storm sewer system, and convey storm water to the existing municipal storm sewer system on University Avenue.

The proposed infiltration trench will be 5.4m x 5.4m x 1.2m deep. Using 50mm clear stone (40% void ratio), the infiltration trench will provide 11.7 cu.m of runoff storage (5.4 x 5.4 x 1.0 x 0.4, 1 m is the stone depth below the subdrain). The trench will capture all the runoff in the rear yard during a 25mm rainfall event. This is the majority of rainfall events (80% of rainfall events) occurring in any given year. The infiltration trench will capture the runoff from the rear yard during the minor storm event.

The site can be further split into 2 drainage areas. The north portion of 722 sq.m directing surface runoff to the infiltration trench, and the south portion of 659 sq.m directing surface runoff into the private storm sewer or onto University Avenue.

NORTH DRAINAGE AREA

Calculate C, the runoff coefficient for the north drainage area under Post-Development conditions.

Surface material		Area (sq.m)	C	A x C	
Building		152	0.9	136.8	*Includes Deck*
Sidewalk		7	0.9	6.3	
Grass		287	0.25	71.8	
Asphalt		276	0.9	247.4	
	Total	722		436.3	
	Weighted C		0.64		

Calculate the peak discharge from the north drainage area for Post-Development conditions.

t=	*15.00 min*	*C=*	*0.64*	*A=*	*0.072ha*	
Storm event	*2-yr*	*5-yr*	*10-yr*	*25-yr*	*50-yr*	*100-yr*
I(mm/hr)=	*63.50*	*79.48*	*90.94*	*117.76*	*121.79*	*129.95*
Q(cms)=	*0.008*	*0.010*	*0.012*	*0.015*	*0.016*	*0.017*

The infiltration trench (11.7 cu.m storage capacity) will capture all the runoff during the 5-yr storm event presented (0.010 cms X 15 min X 60 sec = 9.0 cu.m). During the 100-yr storm event, the runoff totals 15.3 cu.m (0.017cms X 15 min X 60 sec = 15.3 cu.m). The infiltration trench will capture 11.7 cu.m, with the remaining 3.6 cu.m discharging into the storm sewer system. The runoff from the rear yard will average 0.004 cms during the 100-yr storm event.

SOUTH DRAINAGE AREA

Calculate C, the runoff coefficient for the south drainage area under Post-Development conditions.

Surface material		Area (sq.m)	C	A x C	
Building		214	0.9	193.5	*Includes Deck*
Sidewalk		9	0.9	8.1	
Grass		195	0.25	48.8	
Asphalt		241	0.9	216.9	
	Total	659		466.3	
	Weighted C		0.71		

Calculate the peak discharge from the south drainage area for Post-Development conditions.

t=	*15.00 min*	*C=*	*0.71*	*A=*	*0.066ha*	
Storm event	*2-yr*	*5-yr*	*10-yr*	*25-yr*	*50-yr*	*100-yr*
I(mm/hr)=	*63.50*	*79.48*	*90.94*	*117.76*	*121.79*	*129.95*
Q(cms)=	*0.008*	*0.010*	*0.012*	*0.015*	*0.016*	*0.017*

During the minor storm event, the peak discharge off site either via the storm sewer or surface runoff will be 0.010 cms since all the runoff from the rear yard will be captured by the infiltration trench. The peak discharge off site will be less than the existing peak flow of 0.014cms. During the major storm event, the peak discharge will be 0.021 cms (0.017 + 0.004). This is less than the existing peak flow of 0.023 cms. Stormwater quantity controls will be provided.

STORMWATER QUALITY CONTROLS

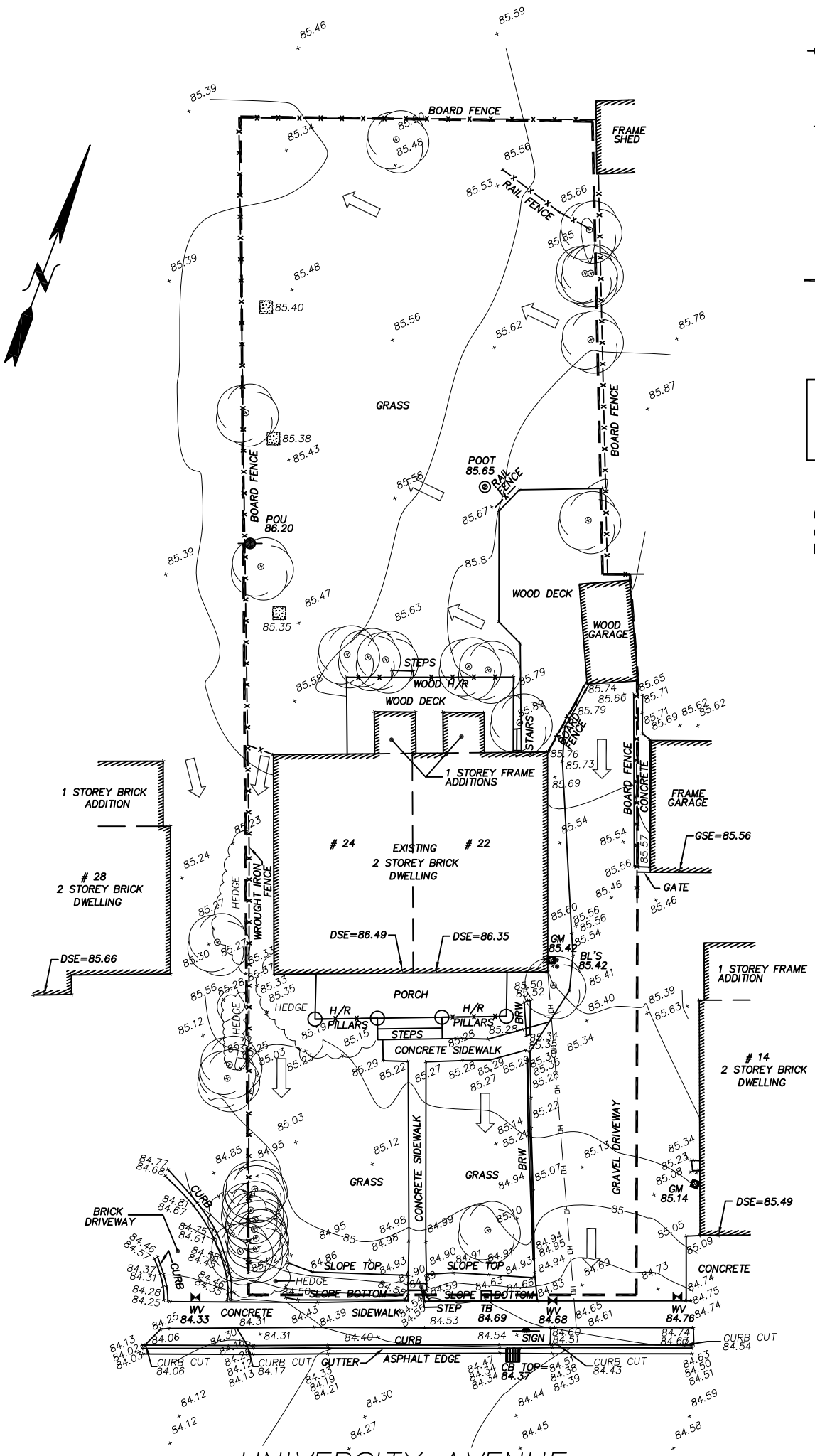
Temporary stormwater quality control will be provided by installing a silt fence along the west property plan as noted on the plan and by placing filter fabric c/w clear stone over the grate on the front yard catchbasin/manhole. Permanent stormwater quality control in the rear yard will be provided by the grassed yard and infiltration trench.

Prepared by: Bruno Dobri, P. Eng.

Dobri Engineering Ltd.
205 Peter Street
PO Box 441
Port Hope, Ontario
L1A 3Z3

APPENDIX

TOPOGRAPHICAL SURVEY COMPLETED BY I.B.W. SURVEYORS



LEGEND

DSE	DENOTES DOOR SILL ELEVATION
GSE	DENOTES GARAGE SILL ELEVATION
GM	DENOTES GAS METER
WV	DENOTES WATER VALVE/KEY
BL	DENOTES BOLLARD
POU	DENOTES UTILITY POLE
-OH-	DENOTES OVERHEAD UTILITY WIRES
CB	DENOTES CATCH BASIN ELEVATION AT TOP CENTRE
TB	DENOTES TERMINAL BOX
	DENOTES SIGN
Ø10m	DENOTES DECIDUOUS TREE W/TRUNK DIAMETER
123.45	DENOTES SPOT ELEVATION
	DENOTES SHRUB
H/R	DENOTES HANDRAIL
BRW	DENOTES BRICK RETAINING WALL

PROPERTY LINE

DIRECTION OF OVERLAND FLOW

BOUNDARY NOTE;

BOUNDARY INFORMATION SHOWN HEREON IS IN ACCORDANCE WITH PLAN OF SURVEY BY IVAN B. WALLACE O.L.S. LTD.,

CONTOURS

CONTOURS SHOWN HEREON ARE DRAWN AT 0.20 METRE INTERVALS.

ELEVATIONS

ELEVATIONS ARE GEODETIC AND REFERRED TO TOWN OF COBOURG BENCHMARK 5 AND HAVING A GEODETIC ELEVATION OF 85.331 METRES.

DISTANCE NOTES – METRIC

DISTANCES ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 1.000227.

SURFACE AREA SUMMARY

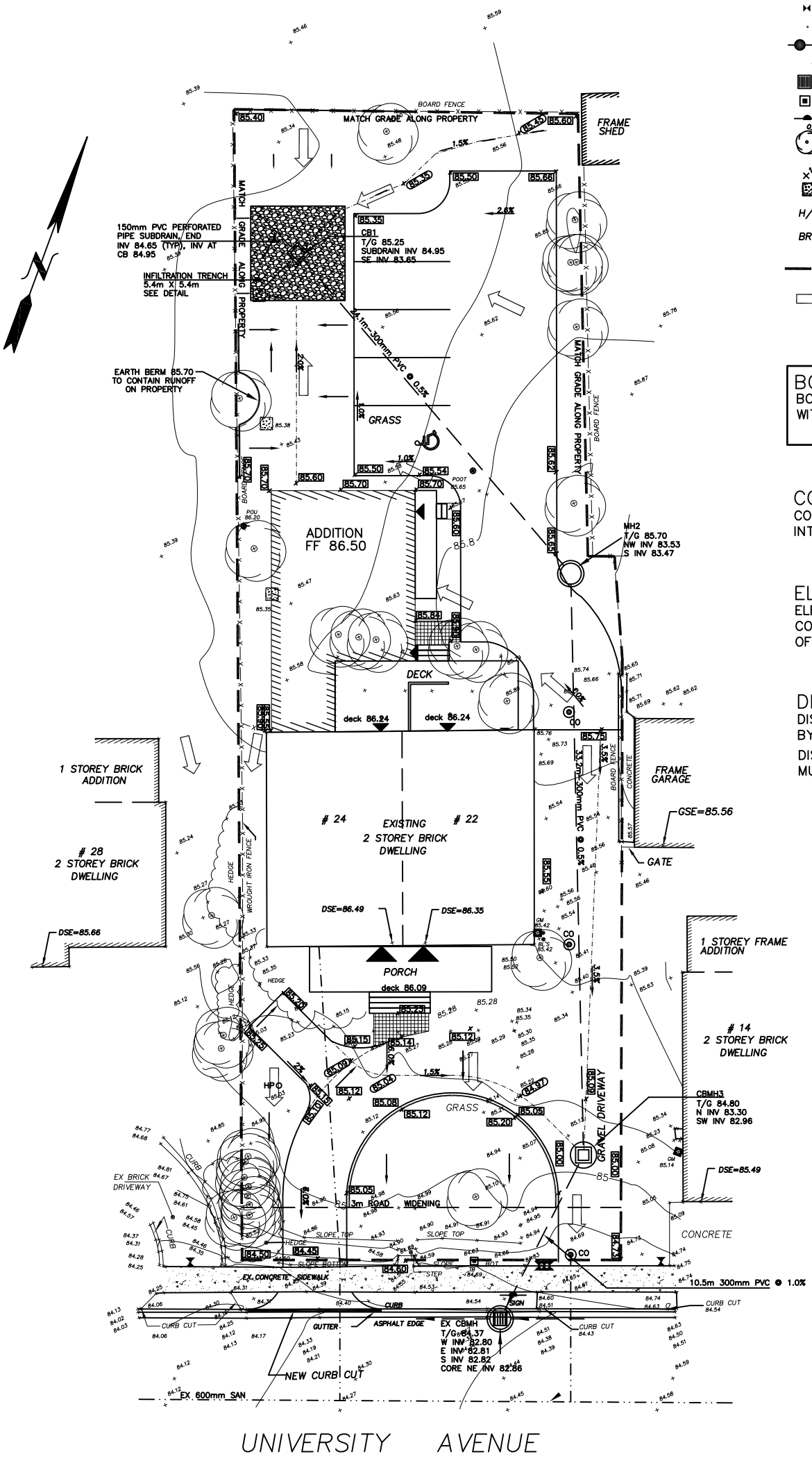
BUILDING	270sq.m
GRAVEL	161sq.m
CONCRETE	28sq.m
LANDSCAPING	922sq.m
TOTAL	1,381sq.m

DOBRI ENGINEERING LTD.
205 PETER ST. P.O. BOX 441,
PORT HOPE, ONTARIO L1A 3Z3
TEL. 905-885-2881 email – dobrieng@bellnet.ca

HABITAT FOR HUMANITY
EXISTING CONDITIONS PLAN
22 & 24 UNIVERSITY AVENUE
TOWN OF COBOURG

SCALE: 1:300	DATE: FEB. 28/19	BY: BD
	DWG. NO.: 18-593-EXISTING	

TOPOGRAPHICAL SURVEY COMPLETED BY I.B.W. SURVEYORS



LEGEND

DSE	DENOTES DOOR SILL ELEVATION
GSE	DENOTES GARAGE SILL ELEVATION
GM	DENOTES GAS METER
WV	DENOTES WATER VALVE/KEY
BL	DENOTES BOLLARD
POU	DENOTES UTILITY POLE
-OH-	DENOTES OVERHEAD UTILITY WIRES
CB	DENOTES CATCH BASIN ELEVATION AT TOP CENTRE
TB	DENOTES TERMINAL BOX
	DENOTES SIGN
0.10ø	DENOTES DECIDUOUS TREE W/TRUNK DIAMETER
x123.45	DENOTES SPOT ELEVATION
	DENOTES SHRUB
H/R	DENOTES HANDRAIL
BRW	DENOTES BRICK RETAINING WALL

PROPERTY LINE

DIRECTION OF OVERLAND FLOW

BOUNDARY NOTE;

BOUNDARY INFORMATION SHOWN HEREON IS IN ACCORDANCE WITH PLAN OF SURVEY BY IVAN B. WALLACE O.L.S. LTD.,

CONTOURS

CONTOURS SHOWN HEREON ARE DRAWN AT 0.20 METRE INTERVALS.

ELEVATIONS

ELEVATIONS ARE GEODETIC AND REFERRED TO TOWN OF COBOURG BENCHMARK 5 AND HAVING A GEODETIC ELEVATION OF 85.331 METRES.

DISTANCE NOTES – METRIC

DISTANCES ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.

DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR OF 1.000227.

SURFACE AREA SUMMARY DRAINAGE TO INFILTRATION

BUILDING	152sq.m
ASPHALT	276sq.m
CONCRETE	7sq.m
LANDSCAPING	287sq.m
TOTAL	722sq.m

SURFACE AREA SUMMARY DRAINAGE SOUTH

BUILDING	214sq.m
ASPHALT	241sq.m
CONCRETE	9sq.m
LANDSCAPING	195sq.m
TOTAL	659sq.m

REV	COMMENTS	DATE
3		
2		
1	IN ACCORDANCE WITH FREVIEW COMMENTS	SEPT. 1/19

DOBRI ENGINEERING LTD.
205 PETER ST. P.O. BOX 441,
PORT HOPE, ONTARIO L1A 3Z3
TEL. 905-885-2881 email – dobrieng@bellnet.ca

HABITAT FOR HUMANITY
POST DEVELOPMENT PLAN
22 & 24 UNIVERSITY AVENUE
TOWN OF COBOURG

SCALE: 1:300	DATE: FEB. 28/19	BY: BD
	DWG. NO.: 18-593-POST	