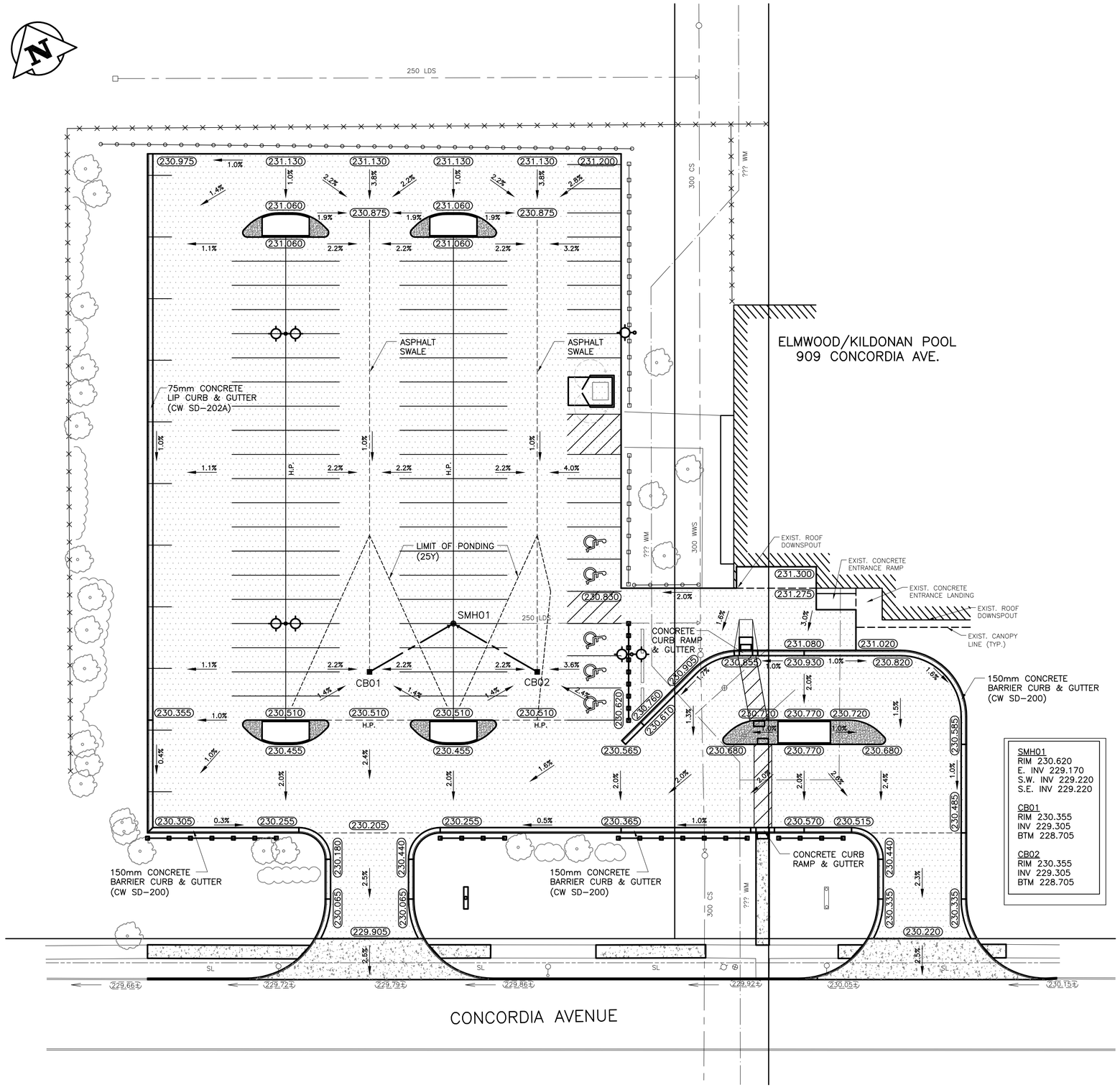

STORM WATER DISCHARGE CRITERIA

– NO SEPERATE LAND DRAINAGE SYSTEM ON CONCORDIA AVENUE IN FRONT OF PARKING LOT.

– EXISTING PARKING LOT CATCH BASIN IS CURRENTLY CONNECTED TO A DEDICATED WASTE WATER SEWER LINE. UPON CONSULTATION WITH C.O.W. WATER WASTE, PROPOSED LAND DRAINAGE RUN–OFF TO EXISTING WASTE WATER SEWER LINE SHALL BE LIMITED TO THE EXISTING CATCH BASIN DRAINAGE AREA. REMAINING DEVELOPMENT AREA TO BE DRAINED THROUGH PARKING LOT APPROACHES.

TOTAL CATCHMENT AREA = 0.88 HA = 2.18 ACRES

INTERNAL LAND DRAINAGE CATCHMENT AREA = 0.39 HA = 0.96 ACRES

ISOCHRONE METHOD based on calculating impervious runoff based on filling depresssion storage and pervious runoff based on Horton infiltration equation

PROJECT: EKP PARKING LOT
LOCATION: 909 CONCORDIA
DATE: MARCH 24/11

i) impervious area; surface storage capacity 0.10

Horton Equation

imperial		metric used in SWMM	
fo (in/hr)	3.00	fo (mm/hr)	75
fc (in/hr)	0.118	fo (mm/hr)	3
k (1/min)	-0.069	k (1/sec)	-0.00115

Total Impervious Area	0.80	acres
Total Pervious Area	0.16	acres
Total Area	0.960	acres
Allowable runoff	3.72	cfs
Required Site Storage (ft3)	1184	ft³
Required Site Storage (m3)	33	m³

Allowable offsite runoff (5yr storm)

"C" =	0.900	
Enter 5 year storm "T" =	4.300	
	A= 0.960	In Acres

C value Assigned by City of Winnipeg

Please use a Time of Concentration of **10 min** for Commercial developments

City of Wpg 25 yr storm

Pervious Flow Calculation

Time	25 yr discretized storm[2]	rainfall depth	sum of rainfall depths	Impervious runoff	infiltration[1]	net intensity after infiltration	pervious runoff	total per. + imp. flow	allowable discharge offsite	net runoff requiring storge	mass sum of storage
(min)	(in/hr)	(in)	(in)	(cfs)	(in/hr)	(in/hr)	(cfs)	(cfs)	(cfs)	(cfs)	ft³
0	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0
5	0.12	0.01	0.01	0.00	2.16	0.00	0.00	0.00	0.00	0.00	0
10	0.13	0.01	0.02	0.00	1.59	0.00	0.00	0.00	0.00	0.00	0
15	0.15	0.01	0.03	0.00	1.14	0.00	0.00	0.00	0.00	0.00	0
20	0.17	0.01	0.05	0.00	0.84	0.00	0.00	0.00	0.00	0.00	0
25	0.19	0.02	0.06	0.00	0.63	0.00	0.00	0.00	0.00	0.00	0
30	0.21	0.02	0.08	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0
35	0.23	0.02	0.10	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0
40	0.26	0.02	0.12	0.21	0.30	0.00	0.00	0.21	0.21	0.00	0
45	0.29	0.02	0.15	0.23	0.25	0.04	0.01	0.24	0.24	0.00	0
50	0.33	0.03	0.17	0.26	0.21	0.12	0.02	0.28	0.28	0.00	0
55	0.42	0.04	0.21	0.34	0.18	0.24	0.04	0.37	0.37	0.00	0
60	0.53	0.04	0.25	0.42	0.16	0.37	0.06	0.48	0.48	0.00	0
65	0.75	0.06	0.32	0.61	0.15	0.61	0.10	0.71	0.71	0.00	0
70	1.24	0.10	0.42	0.99	0.14	1.10	0.18	1.17	1.17	0.00	0
75	2.96	0.25	0.67	2.37	0.13	2.83	0.45	2.82	2.82	0.00	0
80	7.66	0.66	1.32	6.29	0.13	7.73	1.24	7.52	3.72	3.81	1143
85	3.93	0.33	1.65	3.14	0.13	3.80	0.61	3.75	3.72	0.04	1154
90	2.29	0.19	1.84	1.83	0.12	2.17	0.35	2.18	2.18	0.00	1154
95	1.54	0.13	1.97	1.23	0.12	1.42	0.23	1.46	1.46	0.00	1154
100	1.17	0.10	2.07	0.94	0.12	1.05	0.17	1.10	1.10	0.00	1154
105	0.92	0.08	2.14	0.74	0.12	0.80	0.13	0.86	0.86	0.00	1154
110	0.75	0.06	2.20	0.60	0.12	0.63	0.10	0.70	0.70	0.00	1154
115	0.65	0.05	2.25	0.52	0.12	0.53	0.08	0.60	0.60	0.00	1154
120	0.58	0.05	2.31	0.46	0.12	0.46	0.07	0.54	0.54	0.00	1154
125	0.51	0.04	2.35	0.41	0.12	0.39	0.06	0.47	0.47	0.00	1154
130	0.45	0.04	2.39	0.36	0.12	0.33	0.05	0.41	0.41	0.00	1154
135	0.40	0.03	2.42	0.32	0.12	0.28	0.05	0.37	0.37	0.00	1154
140	0.35	0.03	2.45	0.28	0.12	0.23	0.04	0.32	0.32	0.00	1154
145	0.30	0.03	2.47	0.24	0.12	0.18	0.03	0.27	0.27	0.00	1154
150	0.26	0.02	2.50	0.21	0.12	0.14	0.02	0.23	0.23	0.00	1154
155	0.22	0.02	2.51	0.18	0.12	0.10	0.02	0.18	0.18	0.00	1154
160	0.19	0.02	2.53	0.15	0.12	0.07	0.01	0.16	0.16	0.00	1154
165	0.17	0.01	2.54	0.14	0.12	0.05	0.01	0.14	0.14	0.00	1154
170	0.16	0.01	2.56	0.13	0.12	0.04	0.01	0.13	0.13	0.00	1154
175	0.15	0.01	2.57	0.12	0.12	0.03	0.01	0.13	0.13	0.00	1154
180	0.14	0.01	2.59	0.11	0.12	0.02	0.00	0.12	0.12	0.00	1154
185	0.13	0.01	2.59	0.10	0.12	0.01	0.00	0.11	0.11	0.00	1154
190	0.12	0.01	2.60	0.10	0.12	0.00	0.00	0.10	0.10	0.00	1154
195	0.12	0.01	2.61	0.10	0.12	0.00	0.00	0.10	0.10	0.00	1154
			2.61								

Notes:
1 - Isochrone Calculation Method defined in Sec 3.4.4 of MacLaren (1974)
2 - rainfall intensity from Table 3.2 MacLaren (1974), note errors in table after 135 min as demonstrated by A. Beryla (Acres, Mar 2006) - see corrections in GM copy of MacLaren report.

- **Summary of s'sheet updates:** Source old Lotus based passed on to by David Shaw who got the s'sheet from an engineer from KGS, s'sheet reformatted and calculation columns adjusted by G. Mohr (May 2006). On Jan 31, 2007 corrected formula error in Column G. Note that I am suspect of the infiltration rates of 0.52 in/hr which seems high for our clay soils. On Feb 1, 2007 I reviewed the Horton equation coefficient and have modified to reflect a SCS Class D soil and allowed these coefficients to be input. May 23, 2007 - corrected cell reference H10 to reference cell K8. On Jul 30, 2007, based on data in the Handbook of Steel Drainage and Highway Construction which discusses the Horton method, I modify the coefficients to clay loam (see table 3.8, page 113). The impact of changing Fc from 0.05 in/hr to 0.31 in/hr increases the overall infiltration rate and decreases runoff.

Sept 2, 2008 - reviewed Horton coeff used by other consultants in their SWMM modelling as well as reviewed William James SWMM textbook, f_o increased from 2.55 to 3.00 in/hr, f_c decreased from 0.39 to 0.118 in/hr, k decreased from -0.08 to -0.069 1/min. Added timestep O to analysis.

$Q_{s\ ALLOWABLE}$ = 3.72 cfs = 0.105 cu.m.

$Q_{RESTRICTED}$ = 0.11 cu.m. (USING 225mm DIA. FLOW RESTRICTOR PLACED AT EACH CB OUTLET)

REQUIRED TOTAL ON–SITE STORAGE = 33 CU.M.
AVAILABLE TOTAL ON–SITE STORAGE = 24 CU.M.

REMAINING 8 CU.M. VOLUME TO SPILL OUT TOWARDS PARKING LOT APPROACHES ONCE 1:25 YEAR LIMIT OF PONDING REACHED.

REFER DRAWING C01 FOR GENERAL CONSTRUCTION NOTES

METRIC
WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

APEGM Certificate of Authorization GENIVAR Inc. No. 5079 Date: March 28, 2011

EXISTING	LEGEND – PLAN	PROPOSED	EXISTING	LEGEND – PLAN	PROPOSED	EXISTING	LEGEND – PROFILE	PROPOSED
150 mm WM	WATERMAIN	150 mm WM		GAS				
◇	HYDRANT	●		HYDRO				
⊗	VALVE	⧗		M.T.S.				
300 mm LDS	LAND DRAINAGE SEWER	300 mm LDS	⊠	PEDESTAL				
250 mm CS	WASTE WATER SEWER	250 mm CS	230.000	GROUND ELEVATION	230.00			
○	MANHOLE	●	(230.000)	PAVEMENT ELEVATION	(230.000)			
□	CATCH BASIN	■		PROPERTY LINE				
△	CURB INLET	▲	⊕	SURVEY BAR				
⊤	SIGN	⊤●	♂	CURB STOP				
○–○	LAMP STANDARD	●– ●	◈	TESTHOLE				
•	UTILITY POLE							

LOCATION APPROVED
UNDERGROUND STRUCTURES

SUPV. U/G STRUCTURES COMMITTEE _____ DATE _____

NOTE:

LOCATION OF UNDERGROUND STRUCTURES AS SHOWN ARE BASED ON THE BEST INFORMATION AVAILABLE BUT NO GUARANTEE IS GIVEN THAT ALL EXISTING UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONFIRMATION OF EXISTENCE AND EXACT LOCATION OF ALL SERVICES MUST BE OBTAINED FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.

C.W.B.M. 11–004..... 232.035m
N.E. CORNER OF CONCORDIA AVE. & LONDON ST., TBLT. IN S. CONC. FOUNDATION, 1m E. AND 0.2m BELOW TYNDALL STONE FROM THE S.W. CORNER OF THE MOST SLY. WALL OF KILDONAN EAST REGIONAL SCHOOL, NO. 845 CONCORDIA AVE.

NO.	REVISIONS	DATE	BY
0	ISSUED FOR REVIEW	11/03/28	R.C.

GENIVAR
10 PRAIRIE WAY WINNIPEG, MANITOBA R2J 3J8
PH: (204)–477–6650 FAX: (204)–474–2864

DESIGNED BY R.C. | CHECKED BY D.T.B.
DRAWN BY R.C. | APPROVED BY B.D.E.
HOR. SCALE: 1:250 (A1) | RELEASED FOR CONSTRUCTION
VERT. SCALE:
DATE: MARCH 2011 | DATE

ENGINEER'S SEAL
PROVINCE OF MANITOBA
R. CABIGTING
Member
24617
REGISTERED PROFESSIONAL ENGINEER

CONSULTANT DRAWING NO. 09093–C03

Winnipeg

THE CITY OF WINNIPEG
PLANNING, PROPERTY & DEVELOPMENT

ELMWOOD/KILDONAN POOL
PARKING LOT RECONSTRUCTION PROJECT
GRADING PLAN

CITY DRAWING NO. 151–2011–C03
SHEET 3 OF 5
REV. 3 0