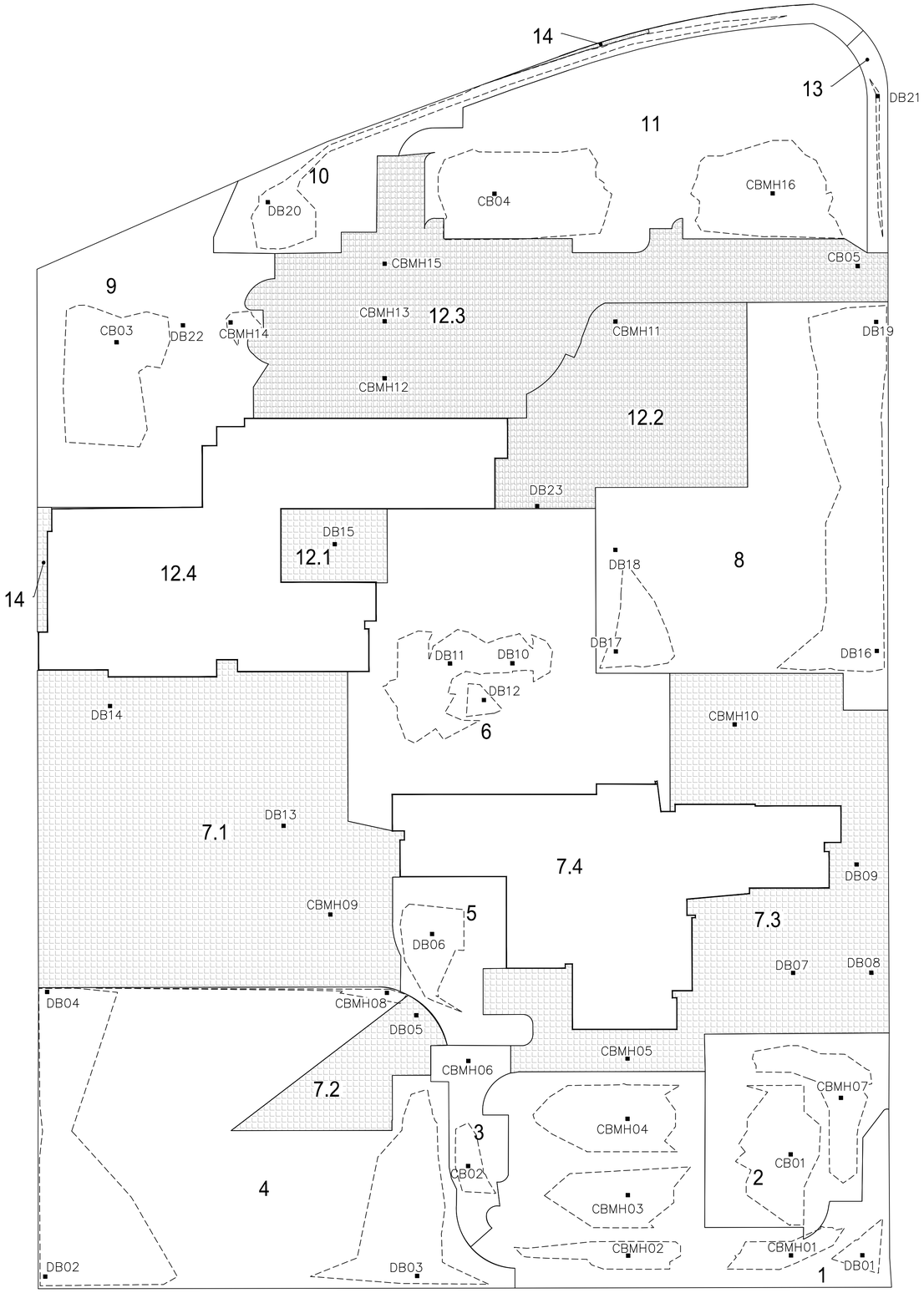

CATCHMENT AREA KEYPLAN

NTS

SITE STORMWATER RUNOFF & STORAGE CRITERIA

RATIONAL FORMULA USED FOR OUTFLOW RATE:

Q = kCiA

k = CONVERSION FACTOR = 2.78
Q = FLOW IN L/s
i = RAINFALL INTENSITY IN mm/HR
A = AREA IN HECTARES

FOR A STORM WITH A TIME OF 10 MINUTES
i = 109.5 mm/HR (5 YEAR STORM)
i = 154.4 mm/HR (25 YEAR STORM)

ALLOWABLE STORMWATER OUTFLOW:

ALLOWABLE RUNOFF COEFFICIENT, C = 0.60
5 YEAR STORM INTENSITY, i = 109.5 mm/HR
SITE AREA = 8.647 HECTARES
ALLOWABLE PEAK OUTFLOW = 1,564.9 L/s

POST-DEVELOPMENT STORMWATER RUNOFF:

WEIGHTED RUNOFF COEFFICIENT (TABLE 1), C = 0.51
25 YEAR STORM INTENSITY, i = 154.4 mm/HR
SITE AREA = 8.647 HECTARES
TOTAL GENERATED 25-YEAR PEAK FLOW = 1,892.9 L/s
USING ISOCHRONE METHOD,
TOTAL ON-SITE STORAGE REQUIREMENT = 1,231.7 cu. m.

TABLE 1: FULL SITE POST-DEVELOPMENT WEIGHTED RUNOFF COEFFICIENT

SURFACE	AREA	C	C X A
BUILDING & PAVEMENT	4.119 ha	0.90	3.707
GRASS	4.528 ha	0.15	0.679
SUM TOTAL	8.647 ha		4.386
WEIGHTED RUNOFF COEFFICIENT		0.51	

TABLE 2: CATCHMENT AREA 7 DIRECT RUNOFF AREA WEIGHTED RUNOFF COEFFICIENT EXCLUDING BUILDING

SURFACE	AREA	C	C X A
BUILDING	0 ha	0.90	0
PAVEMENT	0.729 ha	0.90	0.656
GRASS	0.939 ha	0.15	0.141
SUM TOTAL	1.668 ha		0.797
WEIGHTED RUNOFF COEFFICIENT		0.48	

TABLE 3: CATCHMENT AREA 13 DIRECT RUNOFF AREA WEIGHTED RUNOFF COEFFICIENT EXCLUDING BUILDING

SURFACE	AREA	C	C X A
BUILDING	0 ha	0.90	0
PAVEMENT	0.534 ha	0.90	0.481
GRASS	0.637 ha	0.15	0.096
SUM TOTAL	1.171 ha		0.577
WEIGHTED RUNOFF COEFFICIENT		0.49	

TABLE 4: DIRECT RUNOFF AREA WEIGHTED RUNOFF COEFFICIENT

SURFACE	AREA	C	C X A
BUILDING	0 ha	0.90	0
PAVEMENT	0 ha	0.90	0
GRASS	0.015 ha	0.15	0.0023
SUM TOTAL	0.015 ha		0.0023
WEIGHTED RUNOFF COEFFICIENT		0.15	

FULL SITE SUMMARY

TOTAL OUTFLOW FROM SITE BASED ON 13 CATCHMENTS AND DIRECT RUNOFF
Q = 1,315.3 L/s
TOTAL AVAILABLE ON-SITE STORAGE = 1,970.6 cu. m.

POST-DEVELOPMENT DESIGN FLOW AND ON-SITE STORAGE CONDITIONS AS INDICATED ON CATCHMENT AREA KEYPLAN

CATCHMENT AREA 1 – DB01, CBMH01–CBMH04
RESTRICTED OUTFLOW C/W 170mm ORIFICE = 92.3 L/s
25 YEAR PONDING VOLUME AT EL. 32.55 = 163.2 cu. m.
CATCHMENT AREA 2 – CB01, CBMH07
RESTRICTED OUTFLOW C/W 125mm ORIFICE = 50.7 L/s
25 YEAR PONDING VOLUME AT EL. 32.52 = 176.7 cu. m.
CATCHMENT AREA 3 – CB02, CBMH06
RESTRICTED OUTFLOW C/W 100mm ORIFICE = 27.6 L/s
25 YEAR PONDING VOLUME AT EL. 32.72 = 14.6 cu. m.
CATCHMENT AREA 4 – DB02–DB04, CBMH08
RESTRICTED OUTFLOW C/W 90mm ORIFICE = 24.2 L/s
25 YEAR PONDING VOLUME AT EL. 32.83 = 375.7 cu. m.
CATCHMENT AREA 5 – DB06
RESTRICTED OUTFLOW C/W 75mm ORIFICE = 16.1 L/s
25 YEAR PONDING VOLUME AT EL. 32.81 = 33.3 cu. m.
CATCHMENT AREA 6 – DB10–DB12
RESTRICTED OUTFLOW C/W 200mm ORIFICE = 125.1 L/s
25 YEAR PONDING VOLUME AT EL. 32.59 = 94.6 cu. m.
CATCHMENT AREA 7 – DB05, DB07–DB09, DB13–DB14, CBMH09
CATCHMENT AREA 7.4 – RESTRICTED OUTFLOW FROM ELEMENTARY SCHOOL ROOF (REFER TO MECHANICAL) = 26.0 L/s
25 YEAR ROOF PONDING VOLUME = 177.0 cu. m.
REFER TO TABLE 2 FOR DIRECT RUNOFF AREAS
WEIGHTED RUNOFF COEFFICIENT (TABLE 2) C = 0.48
25 YEAR STORM INTENSITY i = 154.4 mm/HR
DIRECT RUNOFF AREA = 1.668 HECTARES
DIRECT RUNOFF FROM REMAINING CATCHMENT AREA = 372.3 L/s
TOTAL CATCHMENT 7 25-YEAR OUTFLOW = 398.3 L/S

CATCHMENT AREA 8 – DB16–DB19
RESTRICTED OUTFLOW C/W 85mm ORIFICE AT DB17 AND DB19 = 21.5 L/s
25 YEAR PONDING VOLUME AT EL. 32.97 = 262.1 cu. m.
CATCHMENT AREA 9 – CB03, DB22, CBMH14
RESTRICTED OUTFLOW C/W 165mm ORIFICE = 68.3 L/s
25 YEAR PONDING VOLUME AT EL. 32.80 = 91.8 cu. m.
CATCHMENT AREA 10 – DB20
RESTRICTED OUTFLOW C/W 50mm ORIFICE = 7.5 L/s
25 YEAR PONDING VOLUME AT EL. 33.08 = 69.4 cu. m.
CATCHMENT AREA 11 – CB04, CBMH16
RESTRICTED OUTFLOW C/W 175mm ORIFICE = 109.8 L/s
25 YEAR PONDING VOLUME AT EL. 33.17 = 271.0 cu. m.
CATCHMENT AREA 12 – DB15, DB23, CBMH11–CBMH13, CBMH15
CATCHMENT AREA 13.4 – RESTRICTED OUTFLOW FROM SCHOOL ROOF (REFER TO MECHANICAL) = 56.0 L/s
25 YEAR ROOF PONDING VOLUME = 239.8 cu. m.
REFER TO TABLE 3 FOR DIRECT RUNOFF AREAS.
WEIGHTED RUNOFF COEFFICIENT (TABLE 3) C = 0.49
25 YEAR STORM INTENSITY i = 154.4 mm/HR
DIRECT RUNOFF AREA = 1.473 HECTARES
DIRECT RUNOFF FROM REMAINING CATCHMENT AREA = 309.8 L/s
TOTAL CATCHMENT 13 25-YEAR OUTFLOW = 365.8 L/s
CATCHMENT AREA 13 – DB21
RESTRICTED OUTFLOW C/W 50mm ORIFICE = 7.5 L/s
25 YEAR PONDING VOLUME AT EL. 32.70 = 1.5 cu. m.
CATCHMENT AREA 14 – DIRECT RUNOFF, OVERLAND
WEIGHTED RUNOFF COEFFICIENT (TABLE 4) C = 0.15
25 YEAR STORM INTENSITY, i = 154.4 mm/HR
DIRECT RUNOFF AREA = 0.015 HECTARES
TOTAL GENERATED 25-YEAR DIRECT RUNOFF = 1.0 L/s

DIRECT RUNOFF

CONTROLLED RUNOFF

ISSUED FOR CONSTRUCTION

METRIC

WHOLE NUMBERS INDICATE MILLIMETRES
DECIMALIZED NUMBERS INDICATE METRES

ENGINEERS GEOSCIENTISTS MANITOBA
Certificate of Authorization
WSP Canada Inc.
No. 5750

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1600 Buffalo Place, Winnipeg, Manitoba R3T 6B8
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LM Architectural Group | Environmental Space Planning
500-136 Market Avenue Winnipeg, Manitoba Canada R3B 0P4
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No.	REVISION/DESCRIPTION	BY	DATE
2	–	–	– –
1	–		– –
0	ISSUED FOR CONSTRUCTION	JD	04.07 2024

SEAL

PROVINCE OF MANITOBA
J.D.W. DUNN
Member
38563
2024-03-28
REGISTERED PROFESSIONAL ENGINEER

INIT DRAWN	INIT CHECKED	INIT DESIGNED	INIT APPROVED
DATE 2024.03.28	USER APPROVAL		

Winnipeg

THE CITY OF WINNIPEG
ASSETS & PROJECT MANAGEMENT DEPARTMENT
MUNICIPAL ACCOMMODATIONS DIVISION
3-65 GARRY STREET, R3C 4K4

PROJECT
PEMBINA TRAILS COLLEGIATE VOCATIONAL WING
TENDER NO. 954-2023B
50 FRONTIER TRAIL, WINNIPEG, MANITOBA, R3Y 2H1

SHEET TITLE
STORM CALCULATION

SCALE	PROJECT No:	SHEET No:
NTS	2020-127	C1.2