

Table 2-2a.-Runoff curve numbers for urban areas<sup>1</sup> (SCS, 1986)

Cover description	Average percent impervious area <sup>2</sup>	Curve numbers for hydrologic soil group			
		A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.) <sup>3</sup> :					
Poor condition (grass cover < 50%) .....	68	79	86	89	
Fair condition (grass cover 50% to 75%) .....	49	69	79	84	
Good condition (grass cover > 75%) .....	39	61	74	80	
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way) .....	98	98	98	98	
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way) .....	98	98	98	98	
Paved; open ditches (including right-of-way) .....	83	89	92	93	
Gravel (including right-of-way) .....	76	85	89	91	
Dirt (including right-of-way) .....	72	82	87	89	
Western desert urban areas:					
Natural desert landscaping (pervious areas only) <sup>4</sup> .....	63	77	85	88	
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders) .....	96	96	96	96	
Urban districts:					
Commercial and business .....	85	89	92	94	95
Industrial .....	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses) .....	65	77	85	90	92
1/4 acre .....	38	61	75	83	87
1/3 acre .....	30	57	72	81	86
1/2 acre .....	25	54	70	80	85
1 acre .....	20	51	68	79	84
2 acres .....	12	46	65	77	82
<i>Developing urban areas</i>					
Newly graded areas (pervious areas only, no vegetation) <sup>5</sup> .....	77	86	91	94	
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

Table 2-2b.-Runoff curve numbers for cultivated agricultural lands<sup>1</sup> (SCS, 1986)

Cover description			Curve numbers for hydrologic soil group-			
Cover type	Treatment <sup>2</sup>	Hydrologic condition <sup>3</sup>	A	B	C	D
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T + CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T + CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

# SMAF 1

# SMAF 2



i: Map of 95<sup>th</sup> percentile 24-hour rainfall event



Figure 5: Map of 90<sup>th</sup> percentile 24-hour rainfall event

SMAF Detention and Retention: Stage 1 Eastern Car Park Input Output

Total Site Area	8053 m <sup>2</sup>				
Pre Development		Post Development			
Existing Impervious Area	0 m <sup>2</sup>	New/Redeveloped Impervious Area	8053 m <sup>2</sup>	100%	
Existing Pervious Area	8053 m <sup>2</sup>	Untouched Impervious Area	0 m <sup>2</sup>		
		Pervious Area	0 m <sup>2</sup>		
		New/Redeveloped Impervious Area > 50% Area of Mitigation Required	Yes	Total Site Area	
Parameters					
Rainfall Depth (P24)	35 mm (SMAF1)				
CN, Impervious, pre	98	CN, Impervious, post	98		
CN, Pervious, pre	74	CN, Pervious, post	74	(Group C - Alluvial but low permeability)	
Storage (S)	89.24 mm	Storage (S)	5.18 mm	Storage (S)	89.24 mm
Initial Abstraction (Ia)	5	Initial Abstraction (Ia)	0	Initial Abstraction (Ia)	5
Runoff Depth (Q24)	7.55 mm	Runoff Depth (Q24)	30.49 mm	Runoff Depth (Q24)	7.55 mm
Results					
Runoff Volume, pre	60.78 m <sup>3</sup>	Runoff Volume, post	245.50 m <sup>3</sup>	Rainsmart Height	0.44 m
Total Mitigation Volume	184.72 m <sup>3</sup>	Flow over 24 hours (DET+RET)	0.00213791 m <sup>3</sup> /s	Allowance for overflow pipe	0.3 m
Required Detention Volume	144.45 m <sup>3</sup>			Dead storage (default)	0 m
Required Retention Volume	40.27 m <sup>3</sup>			Available head (full EDV)	0.12 m
				Orifice diameter	0.02 m
				Actual Q achieved (m <sup>3</sup> /s)	0.000286146 m <sup>3</sup> /s



RAINSMART MODULE SIZING

	L (m)	W (m)	H (m)	Modules per m <sup>3</sup>
4 Plate, Single	0.715	0.4	0.44	8.37
Double	0.715	0.4	0.86	4.28
Triple	0.715	0.4	1.28	2.88
Quad	0.715	0.4	1.7	2.16
Penta	0.715	0.4	2.12	1.74

CALCULATE STORAGE CELL DIMENSIONS

L	D	W	VOL
30	1.5	4.6	207
23	1.5	6	207

CALCULATE AVERAGE DISCHARGE Q FOR SMAF STORAGE

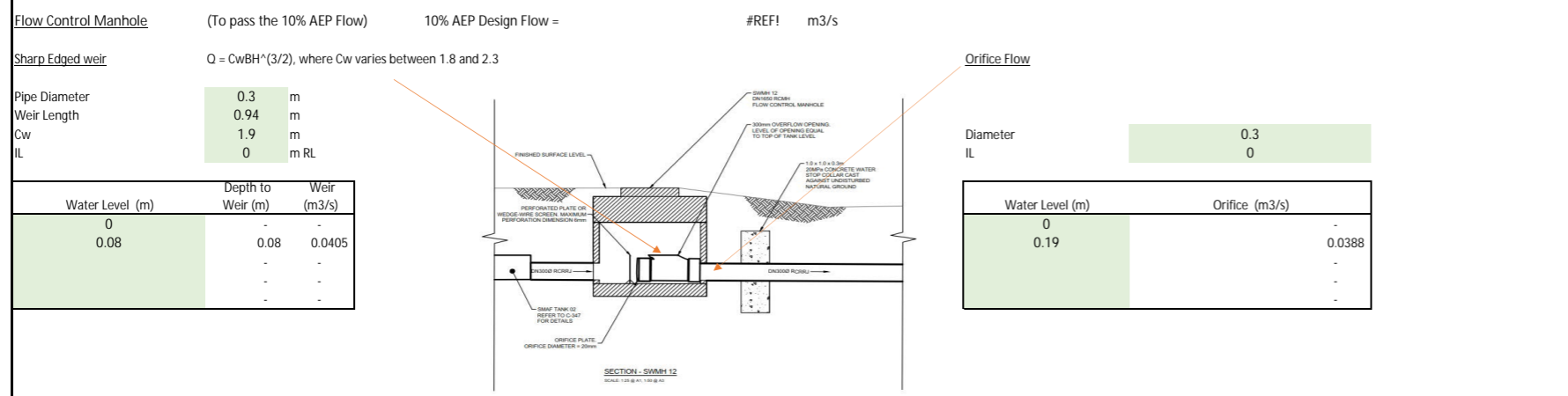
VOLUME	DRAINDOWN TIME (HRS)	AVERAGE Q (M <sup>3</sup> /S)	AVERAGE Q (L/S)
184.72	24	0.002	2.1

Use Single Layer  
 Need? 184.72 m<sup>3</sup>  
 # of Modules? 1547  
 Footprint Area: 442.442 m<sup>2</sup>

Number of Modules  
 L 16  
 W 16  
 Distance (m) 11.44 6.4

Actual Volume 184.82009 m<sup>3</sup>

- (2) Where:
- (a) a suitably qualified person has confirmed that soil infiltration rates are less than 2mm/hr or there is no area on the site of sufficient size to accommodate all required infiltration that is free of geotechnical limitations (including slope, setback from infrastructure, building structures or boundaries and water table depth); and
  - (b) rainwater reuse is not available because:
    - (i) the quality of the stormwater runoff is not suitable for on-site reuse (i.e. for non-potable water supply, garden/crop irrigation or toilet flushing); or
    - (ii) there are no activities occurring on the site that can re-use the full 5mm retention volume of water.
  - (c) the retention volume can be taken up by detention as follows:
    - (i) provide detention (temporary storage) and a drain down period of 24 hours for the difference between the pre-development and post-development runoff volumes from the 95th percentile (SMAF 1) / 90th percentile (SMAF 2), 24 hour rainfall event minus any retention volume that is achieved, over the impervious area for which hydrology mitigation is required.



tank area 146.4 m<sup>2</sup>  
 req volume 184.72 m<sup>3</sup>  
 req height for weir 1.26171479 m