STORMWATER DRAIN

[A] INPUT DATA:

(a) Site data:

(i) Max. rainfall intensity, I = 100 mm/hr

(ii) Area to be drained, A = 1200 sq.m

(iii) Site surface type: Concrete (1.00) => Run-off coeff., C = 1

(b) Drain details:

Assume rectangular c/s with width, b = 850 mm & overall depth, D = 450 mm

Free board, f = 150 mm => Water depth, d = D - f = 450 - 150 = 300 mm

Drain surface is 'Open channel lined with concrete' => Manning's coeff., N = 0.175

Drain slope of 1 in 200 => s = 1/ 200 = 0.005

[B] CALCULATIONS:

(a) Discharge (Qact):

Qact = C.I.A = 1 x 100 x 1200/ (1000 x 60 x 60) = 0.033 cu.m/s

(b) Hydraulic radius (R):

Area of c/s of flow, a = b.d

=> A = (850 x 300)/ 1000000 = 0.255 sq.m

Wetted perimeter, P = b + 2d = (850 + 2 x 300)/ 1000 = 1.45 m

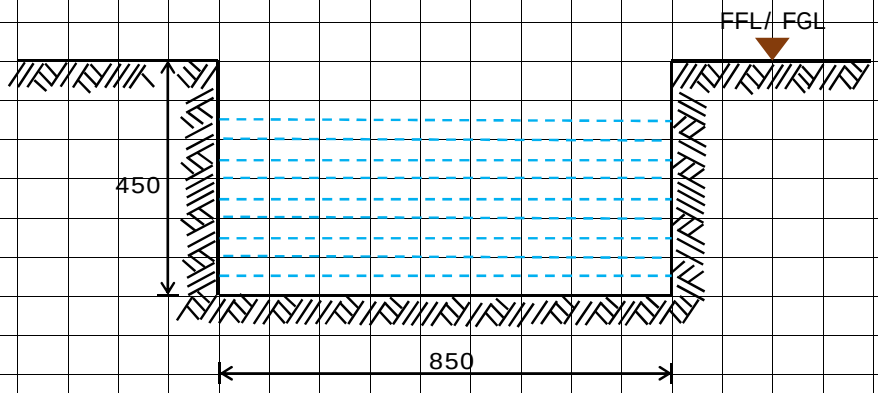
Hydraulic radius, R = A/ P = 0.255/ 1.45 = 0.176 m

(c) Velocity (V) [by Manning's formula]:

V = (1/ N) R^(2/ 3) s^(1/ 2) = (1/ 0.175) x 0.176^(2/ 3) x (0.005)^(1/ 2) = 0.13 m/s

(d) Drain capacity (Qcap):

Qcap = A.V = 0.255 x 0.13 = 0.033 cu.m/s > Qact (= 0.033), OK



DRAIN C/S (DIM IN MM)

(Scale: NTS)

epicenter Consulting Engineers Pvt. Ltd.	**Client: -**					Element: SWD
	Project:	1014	Doc. No.:	1014-CV-CA-001		Location/ Grids:
	Rev.	Ppd. by	Date	Chd. by	Date	-
Project: Building-B	2					Designation:
Structure: Infrastructure	1					-
Type: Storm water drain	0	SNR	20.08.2020	ANJ	20.08.2020	Sht. 1 of 1

STORMWATER DRAIN

[A] INPUT DATA:

(a) Site data:

(i) Max. rainfall intensity, I = 150 mm/hr

(ii) Area to be drained, A = 3750 sq.m

(iii) Site surface type: Grass (0.35) => Run-off coeff., C = 0.35

(b) Drain details:

Assume trapez. c/s with base width, a = 300 mm, overall depth, D = 450 mm & side slope (V:H) = 1:2

Free board, f = 150 mm => Water depth, d = D - f = 450 - 150 = 300 mm

Drain surface is 'Open channel earth,with grass and some weeds' => Manning's coeff., N = 0.0275

Drain slope of 1 in 250 => s = 1/ 250 = 0.004

[B] CALCULATIONS:

(a) Discharge (Qact):

Qact = C.I.A = 0.35 x 150 x 3750/ (1000 x 60 x 60) = 0.055 cu.m/s

(b) Hydraulic radius (R):

Top width, b = a + 2 (2 d) = 1500 mm; Wetted slant ht., l = {d^2 + (2 d)^2}^0.5 = 670.8204 mm

Area of c/s of flow, A = 1/ 2 {d (a + b)} = [1/ 2 {300 x (300 + 1500)}]/ 1000000 = 0.27 sq.m

Wetted perimeter, P = a + 2l = (300 + 2 x 670.8204)/ 1000 = 1.64 m

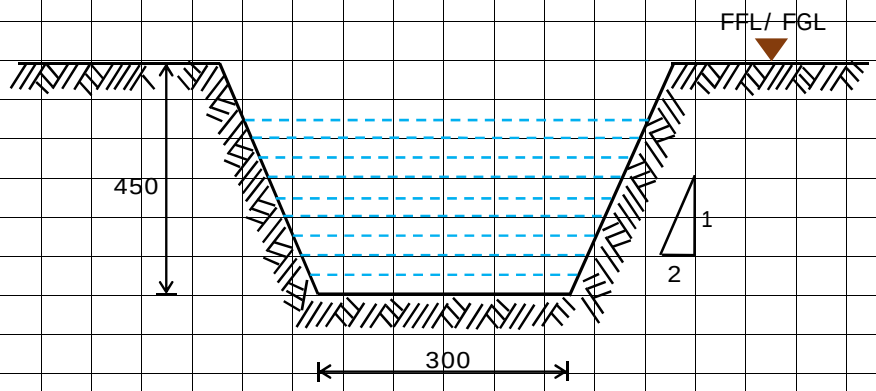
Hydraulic radius, R = A/ P = 0.27/ 1.64 = 0.165 m

(c) Velocity (V) [by Manning's formula]:

V = (1/ N) R^(2/ 3) s^(1/ 2) = (1/ 0.0275) x 0.165^(2/ 3) x (0.004)^(1/ 2) = 0.69 m/s

(d) Drain capacity (Qcap):

Qcap = A.V = 0.27 x 0.69 = 0.186 cu.m/s > Qact (= 0.055), OK



DRAIN C/S (DIM IN MM)

(Scale: NTS)

epicenter Consulting Engineers Pvt. Ltd.

Client: -

Element: SWD

Project:	1016	Doc. No.:	1016-CV-CA-001		Location/ Grids:
	Rev.	Ppd. by	Date	Chd. by	Date	-
Project: Building-C	2					Designation:
Structure: Infrastructure	1					-
Type: Storm water drain	0	MZO	25.02.2021	ANJ	25.02.2021	Sht. 1 of 1

STORMWATER DRAIN

[A] INPUT DATA:

(a) Site data:

(i) Max. rainfall intensity, I = 125 mm/hr

(ii) Area to be drained, A = 18585 sq.m

(iii) Site surface type: Concrete (1.00) => Run-off coeff., C = 1

(b) Drain details:

Assume circular c/s of dia., D = 700 mm => r = D/ 2 = 350 mm

Free board, f = 150 mm => Water depth, d = D - f = 0 - 150 = 550 mm

Drain surface is 'Concrete pipe' => Manning's coeff., N = 0.012

Drain slope of 1 in 200 => s = 1/ 200 = 0.005

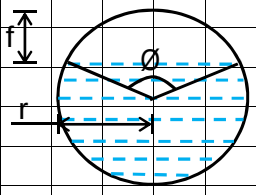


Fig-1A

[B] CALCULATIONS:

(a) Discharge (Qact):

Qact = C.I.A = 1 x 125 x 18585/ (1000 x 60 x 60) = 0.645 cu.m/s

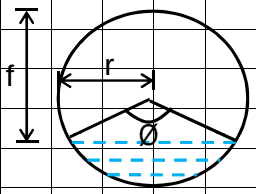


Fig-1B

(b) Hydraulic radius (R):

Since f <= r, from Fig-1A, Ø = 2 ArcCos {(r - f)/ r} = 1.925 radians

Area of c/s of flow, A = Pi.r^2 - r^2 {Ø - Sin Ø}/ 2 = 0.324 sq.m

Wetted perimeter, P = 2 Pi.r - r.Ø = 1.53 m

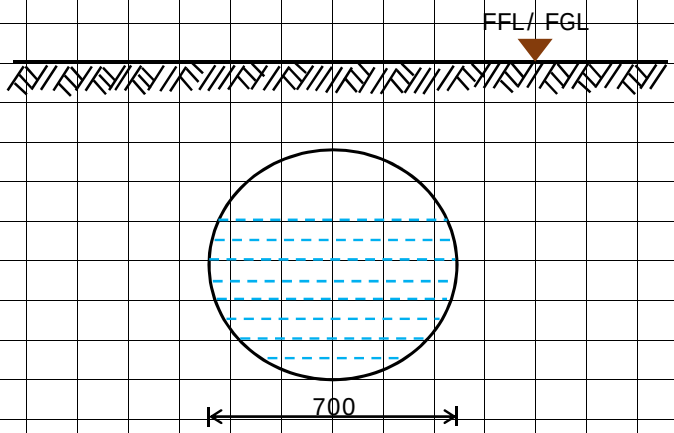
Hydraulic radius, R = A/ P = 0.324/ 1.53 = 0.212 m

(c) Velocity (V) [by Manning's formula]:

V = (1/ N) R^(2/ 3) s^(1/ 2) = (1/ 0.012) x 0.212^(2/ 3) x (0.005)^(1/ 2) = 2.1 m/s

(d) Drain capacity (Qcap):

Qcap = A.V = 0.324 x 2.1 = 0.68 cu.m/s > Qact (= 0.645), OK



DRAIN C/S (DIM IN MM)

(Scale: NTS)

epicenter Consulting Engineers Pvt. Ltd.	**Client:** -					Element: SWD
	Project:	1007	Doc. No.:	1007-CV-CA-001		Location/ Grids:
	Rev.	Ppd. by	Date	Chd. by	Date	-
Project: Building-A	2					Designation:
Structure: Infrastructure	1					-
Type: Storm water drain	0	SNR	27.12.2019	MZO	27.12.2019	Sht. 1 of 1