

Rational Method for Calculation of Drainage

Step 1:

Determine the total land area in square feet that requires drainage.

$$\text{Area (A)} = \text{Length} \times \text{Width}$$

Step 2:

Locate your soil texture below to determine your Coefficient of Runoff. (C)

Soil Texture	Coefficient of Runoff
Concrete or Asphalt	1.00
Clay - Bare	0.75
Clay - Light Vegetation	0.60
Clay - Dense Vegetation	0.50
Gravel - Compact	0.70
Gravel - Bare	0.65
Gravel - Light Vegetation	0.50
Gravel - Dense Vegetation	0.40
Loam - Bare	0.60
Loam - Light Vegetation	0.45
Loam - Dense Vegetation	0.35
Sand - Bare	0.50
Sand - Light Vegetation	0.40
Sand - Dense Vegetation	0.30
Grass Areas	0.35

Step 3:

Compute the total gallons per minute of runoff using the following formula:

$$\text{Rational Formula: } Q = C i A / 96.23$$

Where:

Q = the runoff from an area, in gallons per minute

A = the total land area in square feet to be drained (step 1)

C = the coefficient of runoff (step 2)

i = the intensity of rainfall, in inches per hour (refer to rainfall map below)

100 year Rainfall Map



i = Intensity of Rainfall in 1 Hour.

Step 4:

Select the pipe size you need by using the following table.

- | |
|--------------------------|
| 3" Pipe < 46 gal/minute |
| 4" Pipe < 79 gal/minute |
| 6" Pipe < 180 gal/minute |
| 8" Pipe < 316 gal/minute |

Note: The table assumes a flow velocity of 2 feet per second and is based on smooth wall sewer and drain pipe or co-extruded dual wall corrugated pipe.

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Step 5:

Select your NDS grate part number below based on your gallon per minute requirement.

Area Drain Grates

G.P.M. Inlet	Plastic Grate Part No.				Load Rating
	Black	Gray	Green	Sand	
3.41	14	15	16	16S	A
4.52	2	3	1		A
5.04	11	12	13	13S	A
5.24		270			atrium
5.57	8	9	7		A
11.92	40	60	50	60S	A
12.31	74	72	70	74S	atrium
13.62	4	6	5	06S	A
15.07	10	20	30	30S	A
17.83	771	773	772		A
	640	642	641		
	637	639	638	773S	
22.27	78	76	75	78S	atrium
22.48	881	883	882	883S	A
22.87	1040	1060	1050	1060S	A
37.20	90	81	80	90S	A
	970	960	950	970S	
41.27	981		991		atrium
51.75	980	999	990	999S	B
60.26	1240	1260	1250		B
66.29	1290		1280		atrium
66.50	1211	1210	1212	1212S	B
112.14	1511	1512			B
117.11	1881		1891		atrium
136.24	1811	1810	1812		B
303.51	2411		2412		B

G.P.M. Inlet	Brass, Chrome, Bronze Part No.			Load Rating
	Brass	Chrome	Bronze	
3.20	909B	915SC		A
	905PB	907PC		
3.93	913B			A
	914B			
6.88	910B	917SC		A
	906PB	908SC		
17.23	918B			A
	919PB			
22.27	78B			atrium
30.08	920B			A
	923PB			
	921B			
	922PB			
37.20	90B			atrium
48.14			1214	A
51.75	930B			A
77.95	1230B			A

G.P.M. Inlet	Cast Iron & Galvanized Steel Part No.		Load Rating
	Cast Iron	Galvanized Steel	
46.77	913		C
77.95	1213		C
85.15		915	D
138.53	1813		C
160.21		1215	C
244.97	2413		C
381.21		1815	C
435.00		2415	C

Load Rating

- Class A : Pedestrians, bicycles, wheel chairs
- Class B : Autos and light trucks
- Class C : Pneumatic tire fork lifts and tractor trailers
- Class D : Heavy-duty hard tire forklifts

Rational Method for Calculation of Drainage

Step 5 continued:

Select your NDS channel grate part number below based on your gallon per minute requirement.

Dura Slope Standard Grates

G.P.M. Inlet Per Lineal Foot	Material	Pattern	Part No.	Load Rating
9.60	Stainless/Galvanized Steel	Holes	DS-226, DS-228	A
11.30	Polyolefin	Holes	DS-670, DS-671	B
22.60	Cast/Ductile Iron	Slots	DS-231, DS-232	D
27.00	Polyolefin	Slots	660, 661, 661LG, 662, 663 664, 665	B
31.40	Galvanized Steel	Slots	DS-221	C

Dura Slope Decorative Grates

G.P.M. Inlet Per Lineal Foot	Pattern	Black Part No.	Raw Iron Part No.	Load Rating
8.85	Weave	DS-601	DS-601R	C
10.40	Tile	DS-603	DS-603R	C
12.50	Diamond	DS-602	DS-602R	C
14.85	Brick	DS-604	DS-604R	C
21.95	Deco	DS-609	DS-609R	C

Channel Drain Grates

G.P.M. Inlet Per Lineal Foot	Material	Part No.	Load Rating
3.28	Polyolefin	8001, 8002 8003	A
10.39	Polyolefin	826	A
13.10	Brass	552B, 553PB	A
14.80	Polyolefin	510, 511, 512, 513, 514	B
15.33	Polyolefin	836	A
20.36	Nylon	828	D
25.28	Polyolefin	240, 241, 242, 243, 244, 251	B
26.77	Polyolefin	714	B
32.79	Cast Iron	823	B
32.91	Polyolefin	814, 815, 816, 817, 818, 819	C
35.29	Polyolefin	837	B
40.41	Nylon	838	C
50.54	Cast Iron	845	C
54.04	Cast Iron	888	C
63.89	PVC	847	B

Load Rating

- Class A : Pedestrians, bicycles, wheel chairs
- Class B : Autos and light trucks
- Class C : Pneumatic tire fork lifts and tractor trailers
- Class D : Heavy-duty hard tire forklifts