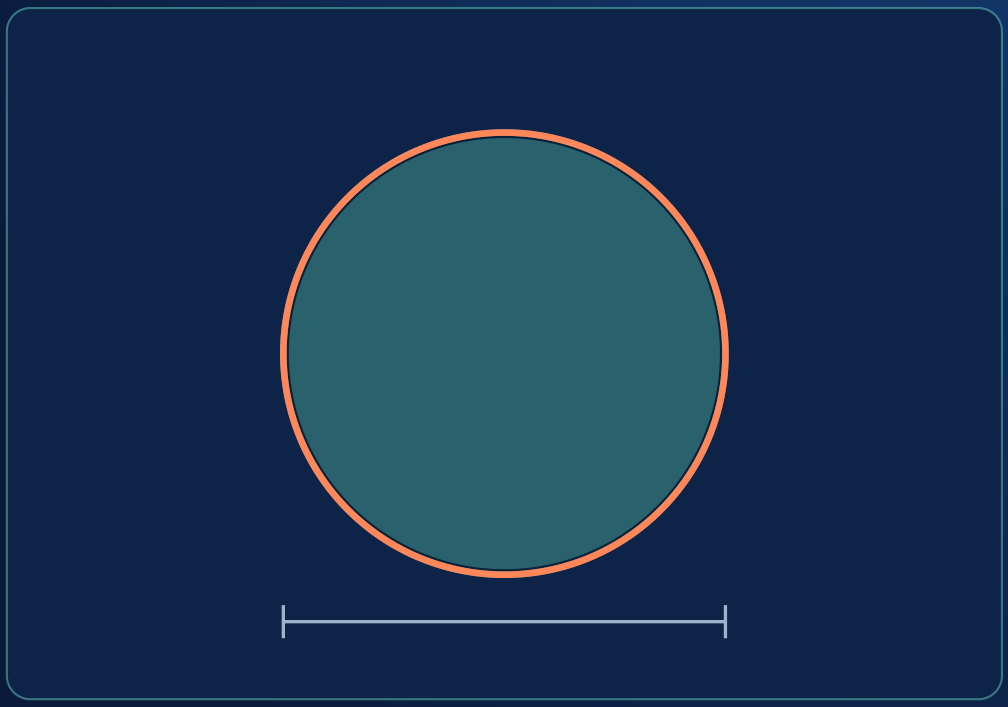
Pipe & Channel Flow Report

Capacity by Manning's equation, checked against the Rational method peak runoff.



Sample Project

Client: Urban City

PREPARED & SUBMITTED BY

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Pipe & Open Channel Flow — Manning's Equation

Design report · Rational method + Manning's equation · Generated 11/6/2026 9:30:48 AM

1. Project

Project / drain	Sample Project
Prepared by	SP Consultant
Date	11/6/2026

2. Catchment — Rational method

Unit system	Metric (SI)
Runoff coefficient C	0.60
Rainfall intensity I	50 mm/hr
Catchment area A	1.2 ha
Peak runoff Q_peak = C · I · A / 360	0.100 m³/s

3. Conveyance geometry

Cross-section	Circular pipe
Inner diameter D	0.300 m
Water depth	100 % of diameter
Bed / invert slope S	0.10 %
Manning roughness n	0.013

4. Hydraulic properties & capacity

Flow area A	0.071 m²
Wetted perimeter P	0.942 m
Hydraulic radius R = A / P	0.075 m
Water depth y	0.300 m
Top width T	0.000 m
Velocity V = (1/n) · R^(2/3) · S^(1/2)	0.433 m/s
Capacity Q_cap = V · A	0.031 m³/s
Full-flow capacity	0.031 m³/s

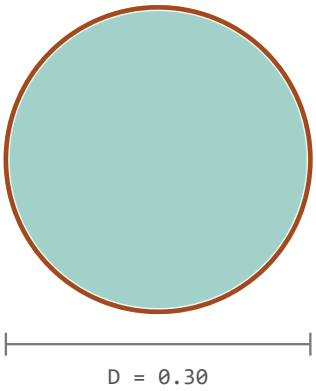
5. Capacity check

Q_{cap} = **0.031 m³/s** · Q_{peak} = **0.100 m³/s** · Ratio = **0.31×**

✗ **Capacity falls short of peak demand — increase size or slope, or reduce n.**

6. Cross-section (to scale)

Sample report: illustrative data, not for design use



7. Method & notes

Rational method Q_{peak} = C · I · A / 360 (I in mm/hr, A in ha, Q in m³/s). **Manning's equation** V = (1/n) · $R^{2/3}$ · $S^{1/2}$, with R = A / P, and Q_{cap} = V · A. The capacity check compares the conveyance capacity at the chosen water depth with the design-storm peak runoff; a ratio of 1.0 or more passes.

Uniform, steady flow is assumed. Allow for entry, exit and junction losses, surcharge, sediment and debris, and check self-cleansing and maximum velocities against your authority's drainage standard.

8. Manning roughness n — typical values

Material / lining	n
PVC / plastic pipe	0.010
Concrete pipe (smooth)	**0.013**
Concrete channel (trowel finish)	**0.013**
Vitrified clay pipe	**0.013**
Cast iron (coated)	**0.013**
Brick	0.015
Corrugated metal pipe	0.024
Earth channel, clean & straight	0.022
Earth channel, weedy	0.030
Gravel bottom, cobble sides	0.033
Natural stream, clean & straight	0.030
Grass-lined channel	0.035
Riprap lining	0.035

Highlighted = the n value used.

Generated with the Manning Equation Calculator — https://shahidpervaiz.net/EngineeringDesignTools/manningflow. Results should be checked by a qualified engineer before use.

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