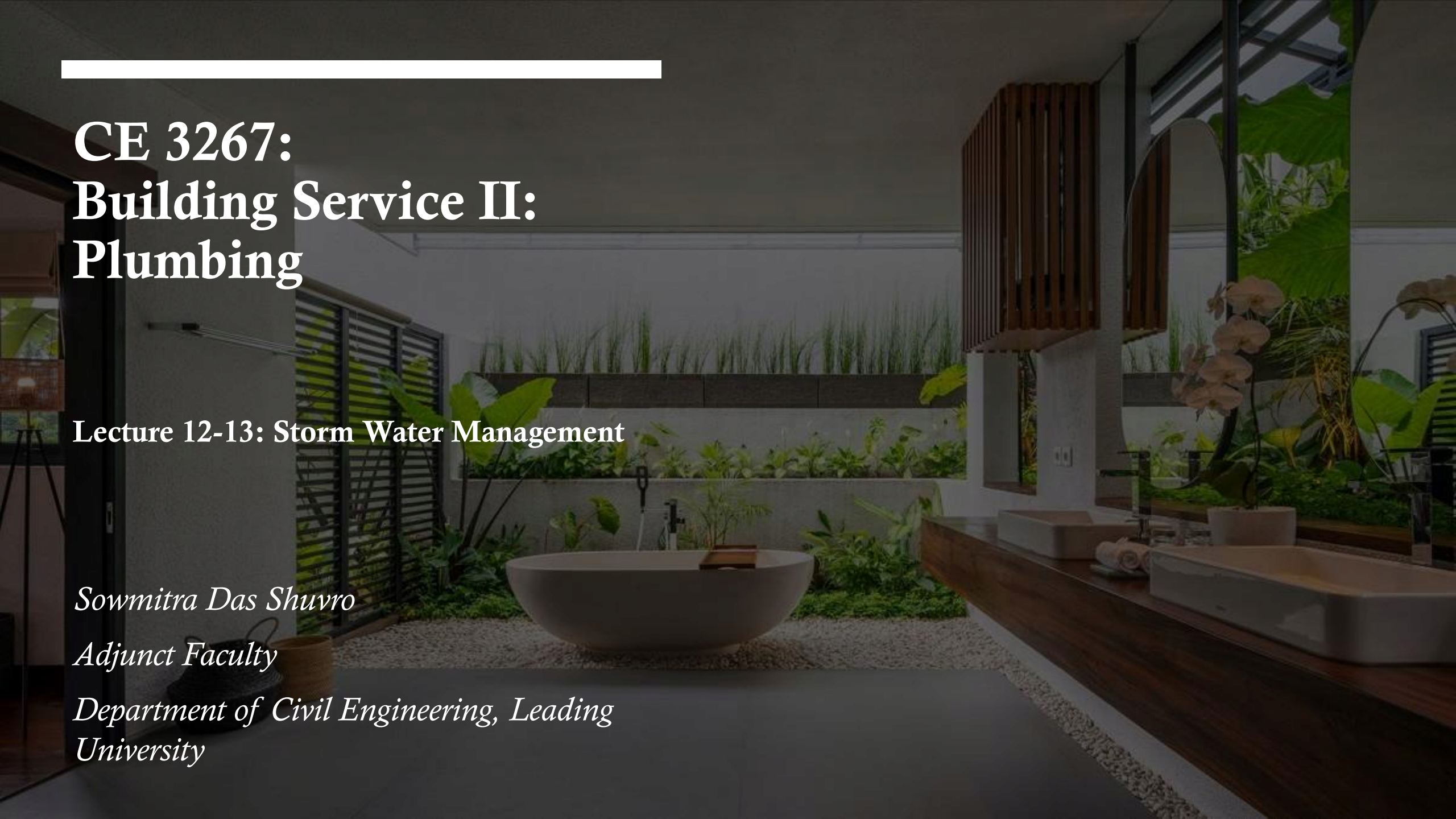

CE 3267: Building Service II: Plumbing

Lecture 12-13: Storm Water Management

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Department of Civil Engineering, Leading University

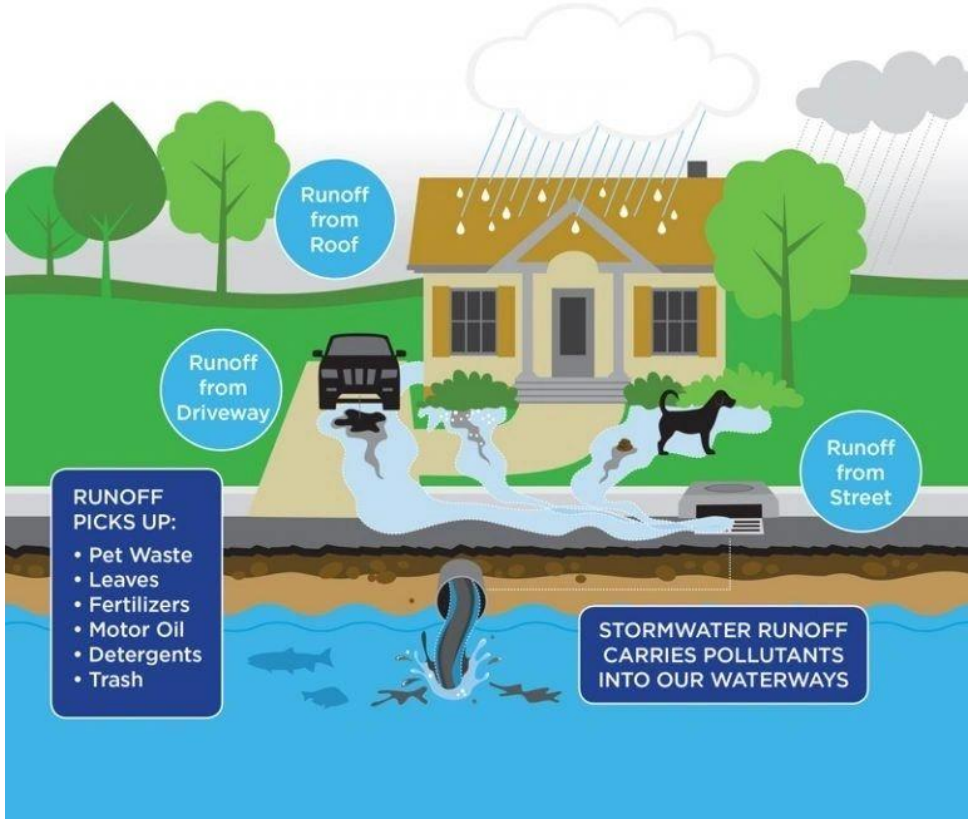
Fate of Storm Water

Storm Water

Storage For Domestic Use

Underground Infiltration

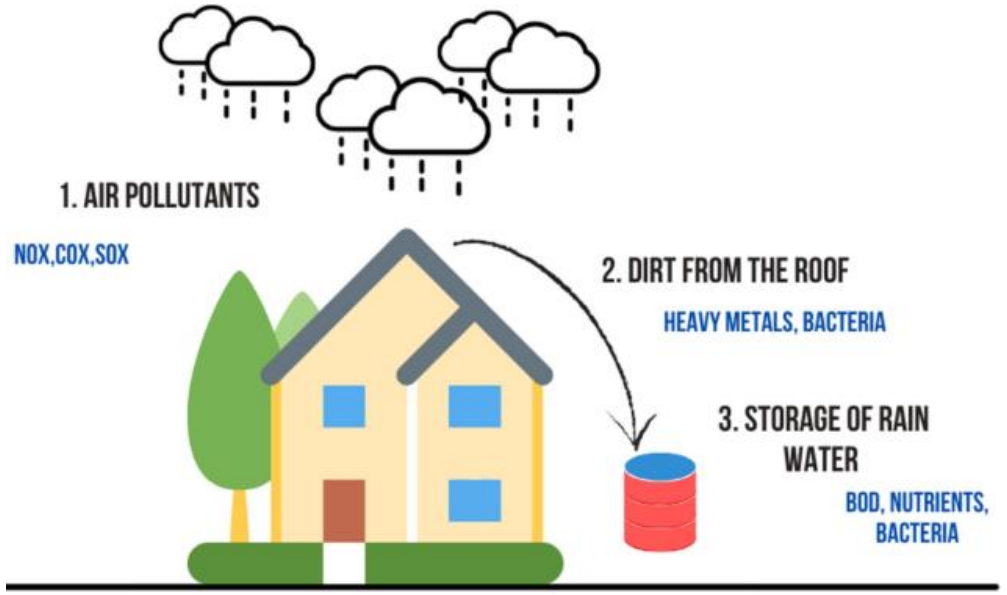
Storm Drain



Storage of Storm Water

Rainwater Quality

- Airborne dust, soot, and pollen contaminate stored rainwater quality over time.
- Industrial emissions and acidic gases lower the pH of collected rainwater.
- Stagnation concentrates these pollutants, promoting microbial and algal growth.



Storage of Storm Water

Treatment of Rainwater depending on the use

Rainwater Use	Treatment Required
Drinking, cooking, washing utensils, bathing in pool	Disinfection + Filtration
Bathing, ablution, clothes washing, fountains	Filtration + Hygienic Treatment
Sprinkler irrigation, firefighting, cooling water (AC), car washing	Sedimentation
Toilet flushing, gardening, cleaning, artificial ground recharge, parking lots	Screening

Storage of Storm Water

Factors Effecting Location of Rainwater Reservoir

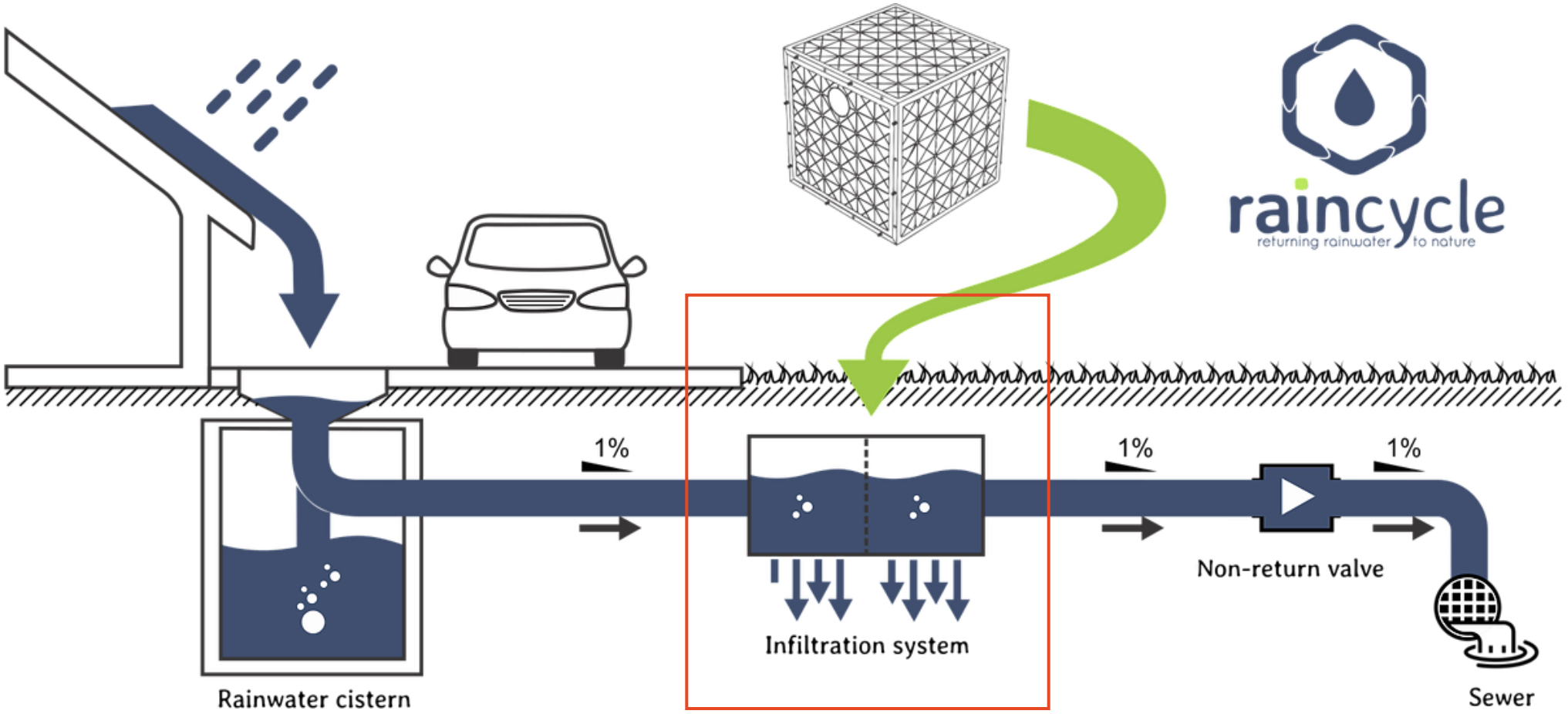
Ground-Level Placement: Ideal for buildings with ample space; place tanks outside near a side wall for easy access.

Multistory Buildings: Locate storage reservoirs under the building, close to the pump house for efficient operation.

Basement Availability: Utilize the lowest basement floor near the pump house for centralized storage and pumping.

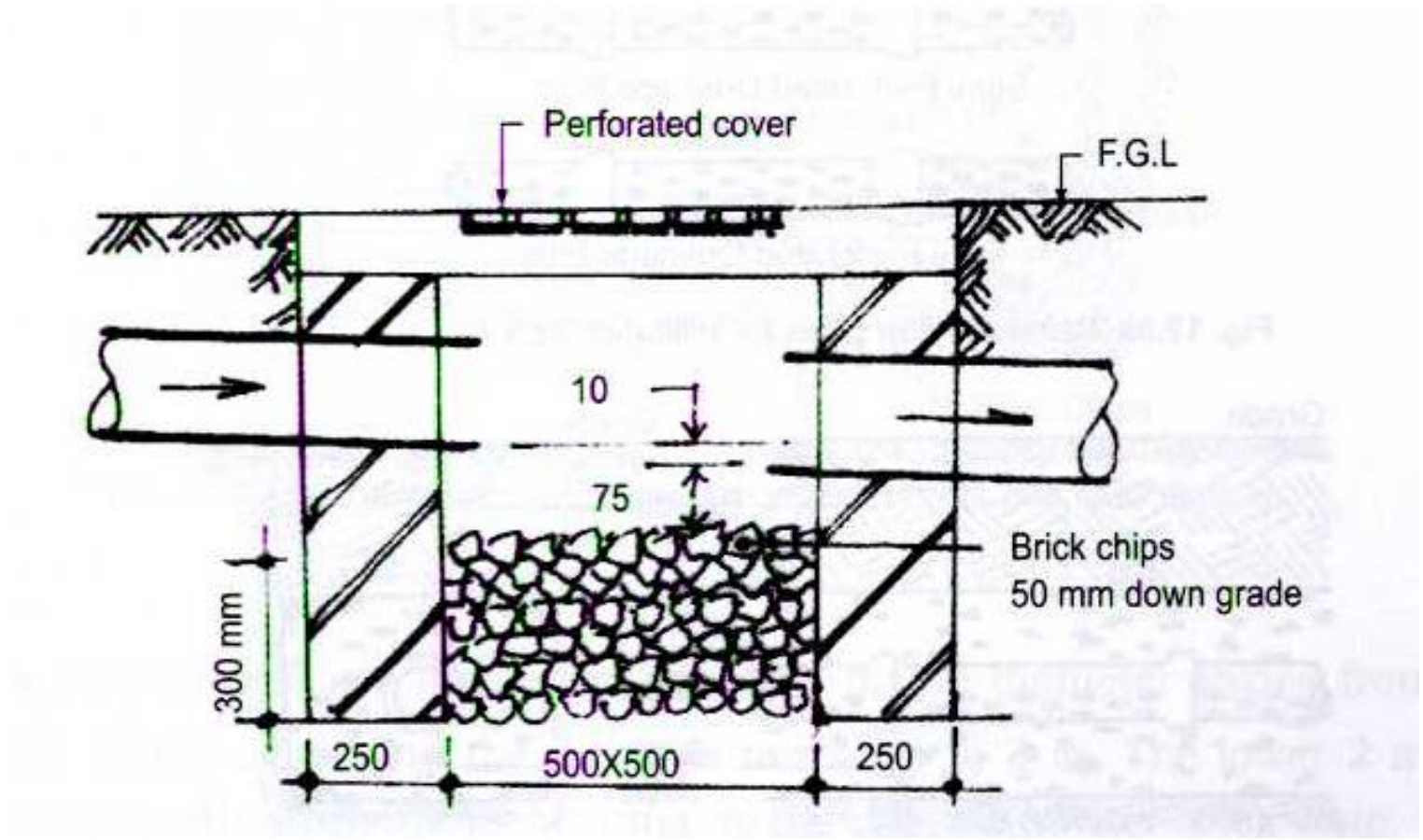
Limited Non-Potable Use: For toilets, cleaning, or gardening, smaller tanks can be placed on rooftops under the slab.

Underground Infiltration



Underground Infiltration

Recharge Pit



Underground Infiltration

Infiltration Trench

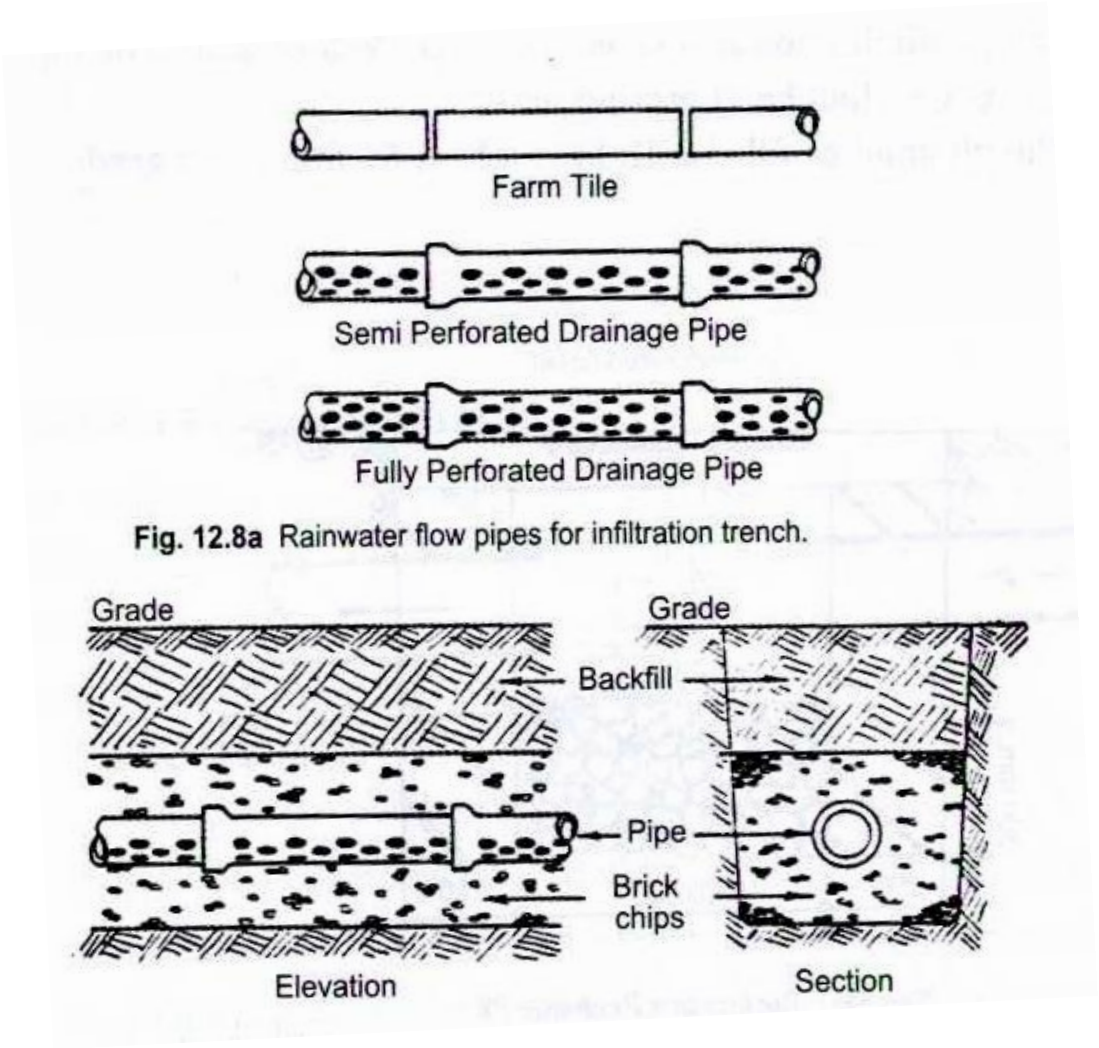
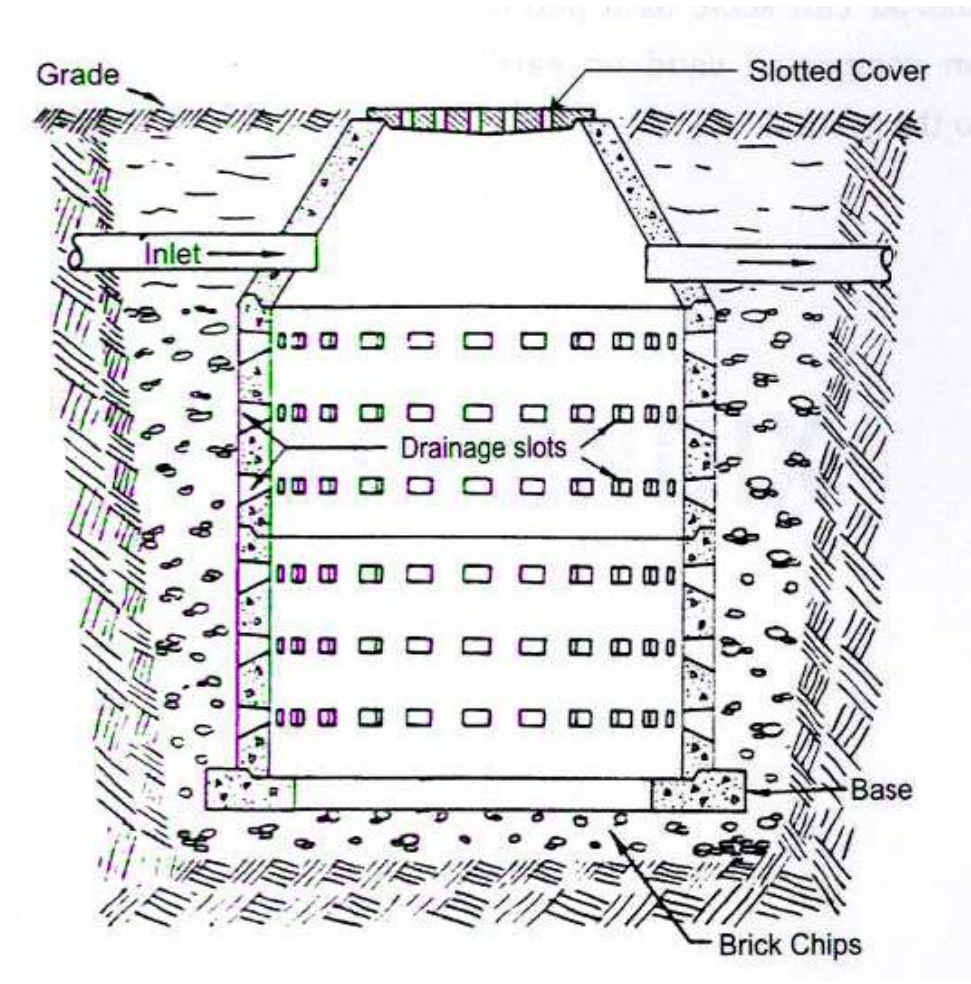


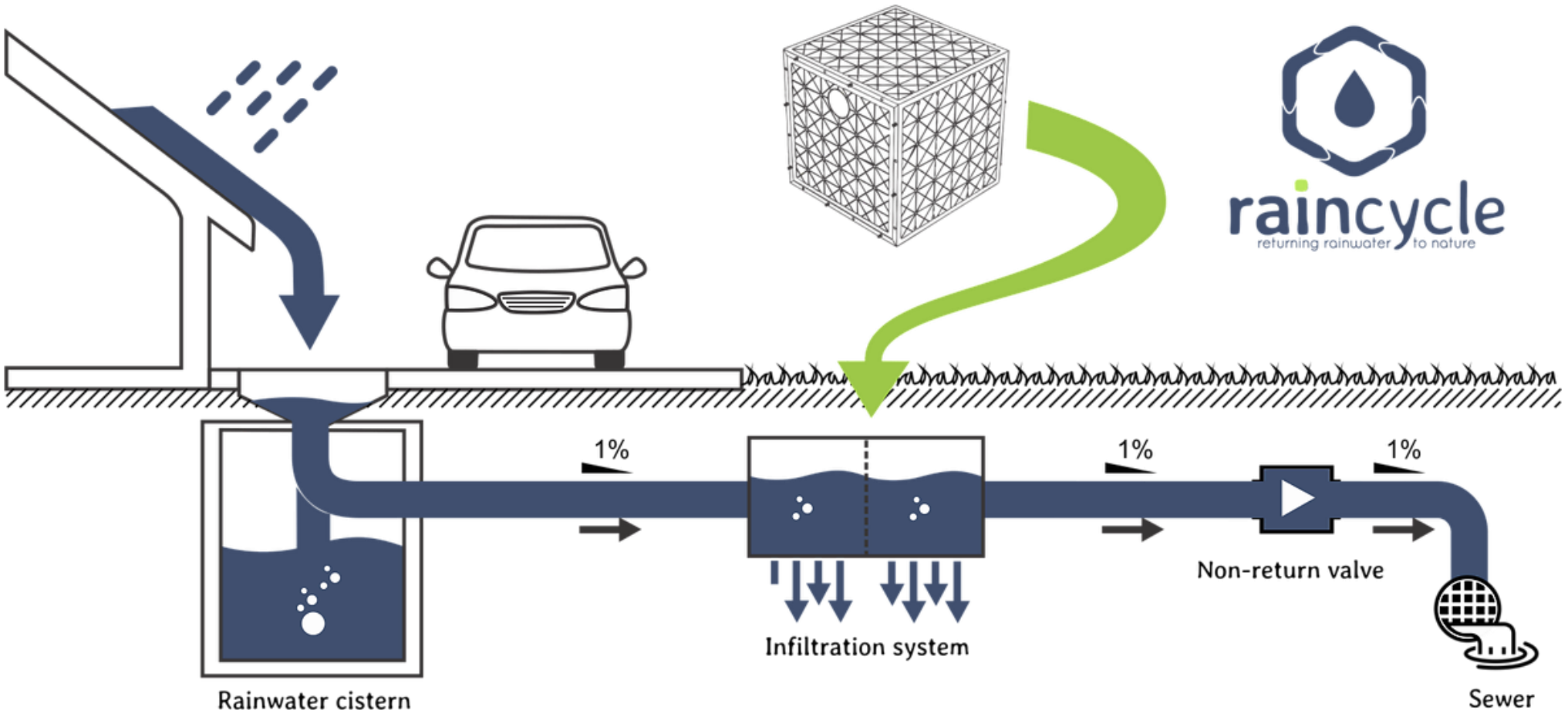
Fig. 12.8a Rainwater flow pipes for infiltration trench.

Underground Infiltration

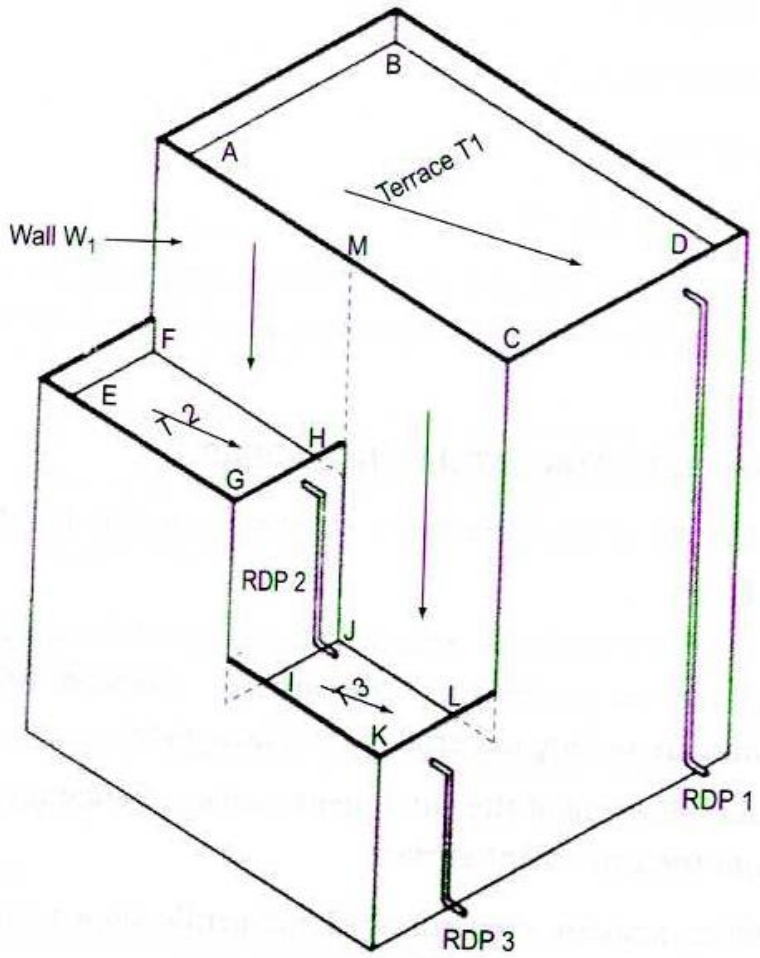
Infiltration Sock-Well



Storm Drain


raincycle
returning rainwater to nature
1%
1%
1%
Non-return valve
Infiltration system
Rainwater cistern
Sewer

Storm Drain



Rain Gutter

Storm Drain

Rain Gutter

Table 12.2 : Determining diameter of gutter based on roof area in sq.m. and intensity of rain (mm/hr). Gutter slope 200:1.

Diameter of gutter mm(in.) (Slope 200:1)	Maximum rainfall in mm/hr (in/hr)				
	50(2)	75(3)	100(4)	125(5)	150(6)
75 (3)	32	21	16	13	10
100(4)	67	45	33	27	22
125(5)	116	77	58	46	39
150(6)	178	108	89	71	59
175(7)	256	171	128	102	85
200(8)	370	247	185	148	123
250(10)	669	446	334	268	223

Storm Drain

Roof Drain

Rainwater Down Pipe

Storm Drain

Peak Discharge Calculation

The **Rational Method** is a standard formula used to estimate the peak rate of runoff from a drainage/catchment area. This method is valid when the catchment area is small.

Peak Discharge, Q = $C \times i \times A$

Q = Peak Discharge (cubic m/sec)

C = Runoff coefficient

i = Average Rainfall intensity (mm/hour)

A = Drainage area (sq m)

Divide mm/hr rainfall by 1000*3600 to convert it into m/sec.

Problem: Calculate the **Peak Discharge** using rational method for a housing complex of 800 sqm area. 20% area is *Garden a*nd 80% area Concrete Surface.

Runoff Coefficient for Garden is 0.15 and 0.90 for concrete.

Average rainfall intensity is 10 mm/hour.

Hint: Total Q = Q for Garden + Q for Concrete Surface