

Appendix B
Stormwater Quality Best Management Practice
Design Handbook

Infiltration Basin Example

Design Procedure for BMP Design Volume

85th percentile runoff event

Designer:	Benjie Cho
Company:	Riverside County Flood Control and Water Conservation District
Date:	3/1/04
Project:	BMP Example
Location:	Township 6 South & Range 4 West Section 22

<p>1. Create Unit Storage Volume Graph</p> <p>a. Site location (Township, Range and Section)</p> <p>b. Slope value from the Design Volume Curve in Appendix A.</p> <p>c. Plot this value on the Unit Storage Volume Graph shown on Figure 2.</p> <p>d. Draw a straight line form this point to the origin, to create the graph</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center;"><u>T</u> 6S &R 4W</td> <td style="width: 50px;"></td> </tr> <tr> <td style="text-align: center;"><u>Section 22</u></td> <td style="text-align: right;">(1)</td> </tr> <tr> <td style="padding-top: 10px;">Slope = <u>1.148</u></td> <td style="text-align: right;">(2)</td> </tr> <tr> <td colspan="2" style="padding-top: 10px;">Is this graph attached? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></td> </tr> </table>	<u>T</u> 6S &R 4W		<u>Section 22</u>	(1)	Slope = <u>1.148</u>	(2)	Is this graph attached? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
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<u>Section 22</u>	(1)								
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Is this graph attached? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>									

<p>2. Determine Runoff Coefficient</p> <p>a. Determine total impervious area</p> <p>b. Determine total tributary area</p> <p>c. Determine Impervious fraction $i = (5) / (6)$</p> <p>d. Use (7) in Figure 1 to find Runoff OR $C = .858i^3 - .78i^2 + .774i + .04$</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding-top: 10px;">$A_{\text{impervious}} =$ <u>1.143</u> acres</td> <td style="text-align: right;">(5)</td> </tr> <tr> <td style="padding-top: 5px;">$A_{\text{total}} =$ <u>1.27</u> acres</td> <td style="text-align: right;">(6)</td> </tr> <tr> <td style="padding-top: 10px;">$i =$ <u>.90</u></td> <td style="text-align: right;">(7)</td> </tr> <tr> <td style="padding-top: 10px;">$C =$ <u>.73</u></td> <td style="text-align: right;">(8)</td> </tr> </table>	$A_{\text{impervious}} =$ <u>1.143</u> acres	(5)	$A_{\text{total}} =$ <u>1.27</u> acres	(6)	$i =$ <u>.90</u>	(7)	$C =$ <u>.73</u>	(8)
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<p>3. Determine 85% Unit Storage Volume</p> <p>a. Use (8) in Figure 1 Draw a Vertical line from (8) to the graph, then a Horizontal line to the desired V_u value.</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding-top: 10px;">$V_u =$ <u>0.88</u> $\frac{\text{in-acre}}{\text{acre}}$</td> <td style="text-align: right;">(9)</td> </tr> </table>	$V_u =$ <u>0.88</u> $\frac{\text{in-acre}}{\text{acre}}$	(9)
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<p>4. Determine Design Storage Volume</p> <p>a. $V_{\text{BMP}} = (9) \times (6)$ [in- acres]</p> <p>b. $V_{\text{BMP}} = (10) / 12$ [ft- acres]</p> <p>c. $V_{\text{BMP}} = (11) \times 43560$ [ft³]</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding-top: 10px;">$V_{\text{BMP}} =$ <u>1.12</u> in-acre</td> <td style="text-align: right;">(10)</td> </tr> <tr> <td style="padding-top: 5px;">$V_{\text{BMP}} =$ <u>0.093</u> ft-acre</td> <td style="text-align: right;">(11)</td> </tr> <tr> <td style="padding-top: 10px;">$V_{\text{BMP}} =$ <u>4051</u> ft³</td> <td style="text-align: right;">(12)</td> </tr> </table>	$V_{\text{BMP}} =$ <u>1.12</u> in-acre	(10)	$V_{\text{BMP}} =$ <u>0.093</u> ft-acre	(11)	$V_{\text{BMP}} =$ <u>4051</u> ft ³	(12)
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Notes: _____

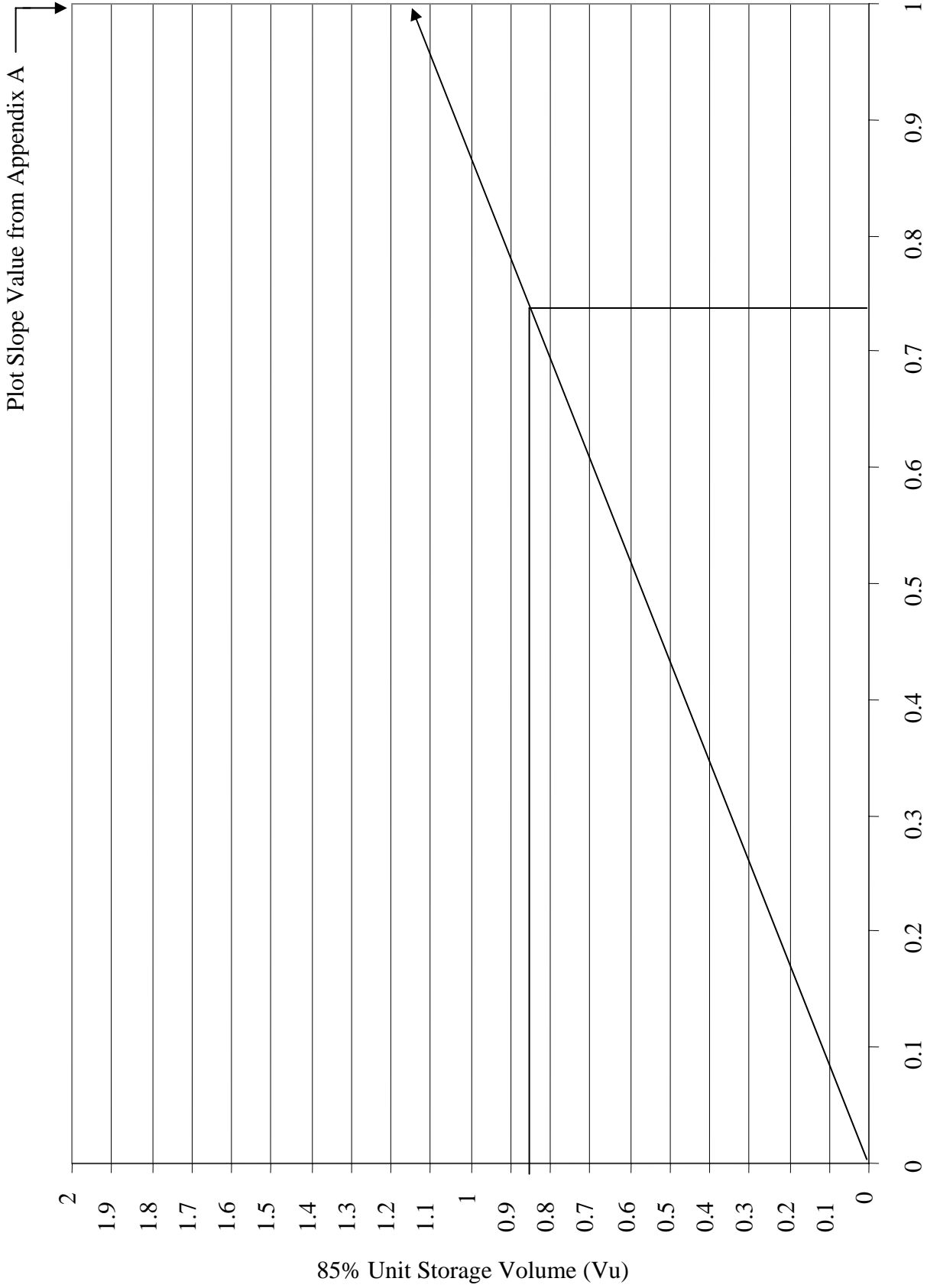


Figure 2 Runoff Coefficient (C) Unit Storage Volume Graph

Datasheet

Site Conditions

A_{total} = 1.27 acres

Land Use = Commercial

Impervious Cover = 90%

Design Assumptions

1. Design Storage Volume

V_{BMP} = 4051 ft³ (from worksheet 1)

2. Trench Water Depth

Maximum depth should not exceed 8 feet

Calculate the maximum allowable depth of water in the trench, D_m, in feet using the following equation:

$$D_m = [(t) \times (I)] / 12s$$

Where I = site infiltration rate (in/hr)

s = safety factor

t = minimum draw down time (48 hours)

Step#1: For urban cover with B type soil the District uses a RI value of 56

Step#2: Using Plate E-6.2, F_p (infiltration rate) = 0.517 in/hr (for an AMC II)

Step#3: Assuming a safety factor of 3, **D_m = 0.689 feet**

3. Trench Surface Area

Calculate the minimum surface area of the trench bottom will the following equation:

$$A_m = V_{BMP} / D_m$$

$$\mathbf{A_m = 5880 \text{ ft}^2 = 0.135 \text{ Acres}}$$

Where A_m = minimum area required (ft²)

V_{BMP} = volume of the infiltration basin (ft³)

D_m = maximum allowable depth (ft)

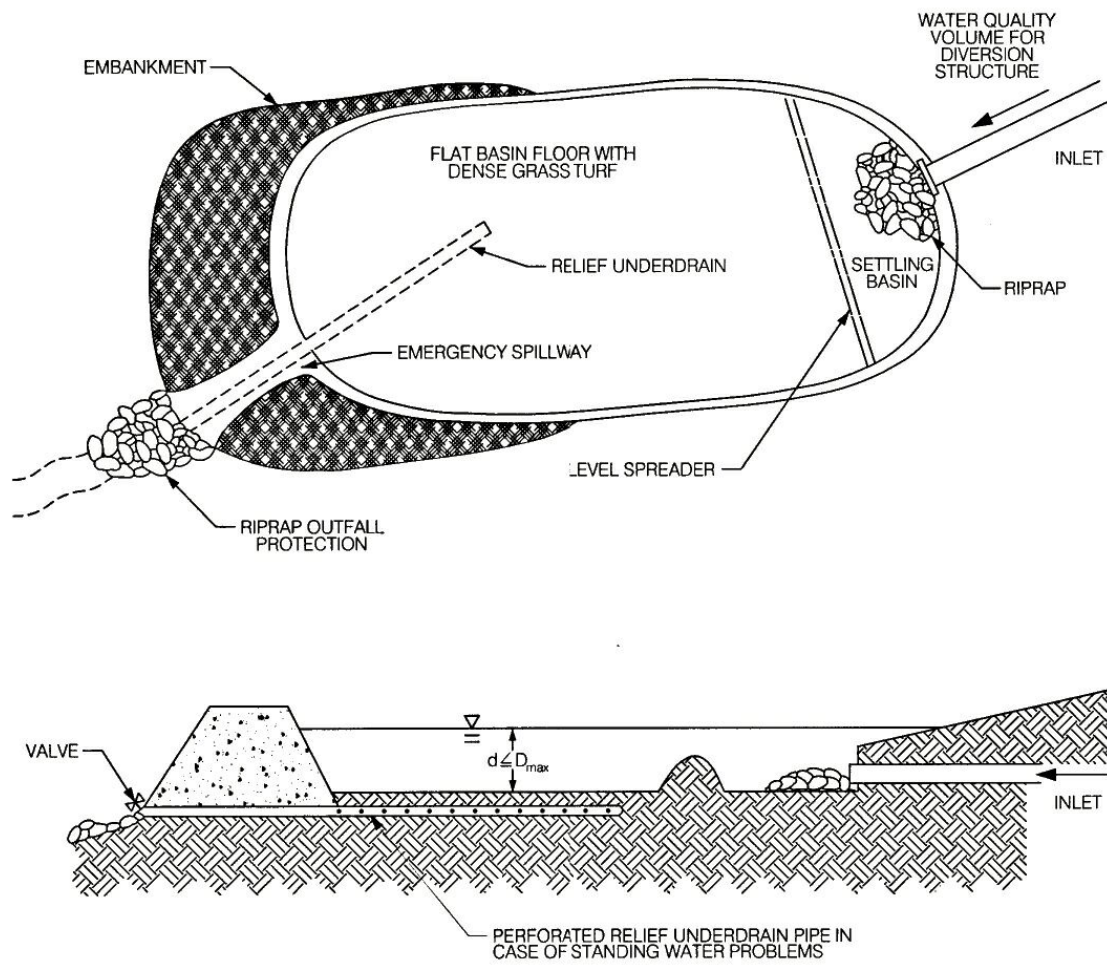


Figure 6: INFILTRATION BASIN

Source: *City of Modesto Guidance Manual*

