

Mobile Manor South 2nd Addition Drainage

Basin Areas

$$\text{Area 1} = 35527 \text{ ft}^2$$

$$\text{Area 2} = 37491 \text{ ft}^2$$

$$\text{Area 3} = 187018 \text{ ft}^2$$

$$\text{Area 4} = 79510 \text{ ft}^2$$

$$\text{Area 5} = 301327 \text{ ft}^2$$

$$\text{Area 6} = 99238 \text{ ft}^2$$

$$\text{Area 7} = 1502852 \text{ ft}^2$$

$$\text{Area 8} = 150364 \text{ ft}^2$$

Basin Runoff Coefficients (100 year)

$$\text{Area 1, } C = 0.93 \text{ (70\% impervious)}$$

$$\text{Area 2, } C = 0.93 \text{ (70\% impervious)}$$

$$\text{Area 3, } C = 0.93 \text{ (70\% impervious)}$$

$$\text{Area 4, } C = 0.67 \text{ (50\% impervious)}$$

$$\text{Area 5, } C = 0.67 \text{ (50\% impervious)}$$

$$\text{Area 6, } C = 0.37 \text{ (0\% impervious)}$$

$$\text{Area 7, } C = 0.61 \text{ (40\% impervious)}$$

$$\text{Area 8, } C = 0.80 \text{ (1\% storage basin)}$$

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Areas discharging off-site

Area 1

$$Q = C I A \text{ (rational formula)}$$

$$C_5 = 0.87$$

$$C_{100} = 0.93$$

$$I_5 = 4.56 \text{ "/hr}$$

$$I_{100} = 7.37 \text{ "/hr}$$

$$Q_5 = 0.87 \left(\frac{1.11}{0.67} \times 4.56 \right) = \frac{4.4}{7.6} \text{ cfs}$$

$$Q_{100} = 0.93 \left(\frac{1.11}{0.67} \times 7.37 \right) = \frac{7.6}{5.6} \text{ cfs}$$

Area 2

$$C_5 = 0.87$$

$$C_{100} = 0.93$$

$$I_5 = 4.56 \text{ "/hr}$$

$$I_{100} = 7.37 \text{ "/hr}$$

$$Q_5 = 0.87 \left(\frac{1.18}{0.67} \times 4.56 \right) = \frac{4.7}{8.1} \text{ cfs}$$

$$Q_{100} = 0.93 \left(\frac{1.18}{0.67} \times 7.37 \right) = \frac{8.1}{5.9} \text{ cfs}$$

Area 4

$$C_5 = 0.52$$

$$C_{100} = 0.67$$

$$I_5 = 4.56 \text{ "/hr}$$

$$I_{100} = 7.37 \text{ "/hr}$$

$$Q_5 = 0.52 \left(\frac{1.83}{1.83} \right) \times 4.56 = 4.4 \text{ cfs}$$

$$Q_{100} = 0.67 \left(\frac{1.83}{1.83} \right) \times 7.37 = 9.0 \text{ cfs}$$

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Areas Retained on-site

Use 100 year design storm $I = 7.80 \text{ "/hr}$

Runoff Volumes

$$\text{Area 3, } V = C(AI) = 0.93(187018) \left(\frac{7.80}{12} \right) = 113,052 \text{ ft}^3$$

$$\text{Area 5, } V = 0.67(301327) \left(\frac{7.80}{12} \right) = 131,228 \text{ ft}^3$$

$$\text{Area 6, } V = 0.37(99238) \left(\frac{7.80}{12} \right) = 23,867 \text{ ft}^3$$

$$\text{Area 7, } V = 0.61(1502852) \left(\frac{7.80}{12} \right) = 595,887 \text{ ft}^3$$

$$\text{Area 8, } V = 0.80(150364) \left(\frac{7.80}{12} \right) = 78,189 \text{ ft}^3$$

$$\text{Volume Retained} = 113,052 + 131,228 + 23,867 + 595,887 + 78,189$$

$$\text{Volume} = 942,217 \text{ ft}^3 \text{ required}$$

$$\text{Existing Pond Volume} = 834,728 \text{ ft}^3$$

$$107,489 \text{ additional volume required}$$

$$\text{Pond Section Volume } 2350.5 \text{ ft}^3/\text{ft}$$

$$L = 107489/2350.5 = 45.7 \text{ ft additional pond length}$$

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