

Time of Concentration Worksheet

Project: _____

Location: _____

Circle One: Existing Conditions, Proposed Conditions

Designer Name: _____ Date: _____

Checker Name: _____ Date: _____

Sheet Flow

1. Surface description (vegetation (type, density), pavement, etc.) _____
2. Manning's roughness coefficient, n, (see Table 5 of Section 4A-5) _____
3. Flow length (≤ 100 ft.), L _____ ft
4. Average slope, S _____ ft/ft
5. $T_{c \text{ sheet}} = \frac{K_u}{1^{0.4}} \left(\frac{nL}{\sqrt{S}} \right)^{0.6}$ (Equation 4A-5_4 of Section 4A-5) _____ min.

Shallow Concentrated Flow

6. Surface description (vegetation (type, density), pavement, etc.) _____
7. Intercept coefficient, k, (see Table 7 of Section 4A-5) _____
8. Flow length, L _____ ft
9. Average slope, S _____ ft/ft
10. Average Velocity, $V = K_u k \sqrt{S}$ (Equation 4A-5_5 of Section 4A-5) _____ ft/s
11. $T_{c \text{ shallow}} = \frac{L}{60V}$ (Equation 4A-6 of Section 4A-5) _____ min.

Open Channel Flow

12. Cross sectional flow area, A _____ ft²
13. Wetted perimeter, P_{wetted} _____ ft
14. Pipe diameter, D _____ ft
15. Flow length, L _____ ft
16. Slope, S _____ ft/ft
17. Manning's coefficient, n (see Table 2 of Section 4A-6 for gutters, Table 8 of Section 4A-5 for drainage swales, or Table 1 of Section 4A-10 for pipe flow) _____
18. Velocity in gutter (Equation 4A-5_7 of Section 4A-5):
 $V = \frac{2Q}{T^2 S_x}$ (uniform cross section) _____ ft/s
 $V = \frac{2Q}{T^2 S_x + W^2 (S_w - S_x)}$ (for composite gutter section) _____ ft/s
19. Velocity in drainage swale:
 $V = \frac{K_u}{n} \left(\frac{A}{P_{\text{wetted}}} \right)^{0.67} \sqrt{S}$ (Equation 4A-5_8 of Section 4A-5) _____ ft/s
20. Velocity in pipe (assuming full flow):
 $V = \left(\frac{K_u}{n} \right) \left(\frac{D}{4} \right)^{0.67} \sqrt{S}$ (Equation 2 of Section 4A-10) _____ ft/s
21. $T_c = \frac{L}{60V}$ (Equation 3 of Section 4A-5) _____ min.
22. Total T_c :
 $T_c = T_{c \text{ sheet}} + T_{c \text{ shallow}} + T_{c \text{ gutter}} + T_{c \text{ swale}} + T_{c \text{ pipe}}$ _____ min.