	City Utilities Design Standard Manual	Exhibit SW5-1 Time of Concentration Worksheet
		Created: May 2012 Revised:

Project _____ By _____ Date _____

Location _____ Checked _____ Date _____

Circle one: Present Developed

Circle one: T_c T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.
Include a map, schematic, or description of flow segments.

Overland (Sheet) flow (Applicable as part of T_c computation only)	Segment ID	
1. Surface description: paved or unpaved		
2. Manning's roughness coeff., n		
3. Flow length , L (total L≤ 300 for unpaved, L≤ 100 for paved) ft		
4. Two-yr 24-hr rainfall, P_2 in		
5. Land slope, s ft/ft		
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\, s^{0.4}}$ Compute T_t hr		+ =

Shallow concentrated flow	Segment ID	
7. Surface description: paved or unpaved		
8. Flow length, L ft		
9. Watercourse slope, s ft/ft		
10. Average velocity, $V_{unpaved} = 16.1345(s)^{0.5}$, or $V_{paved} = 20.3282(s)^{0.5}$ ft/s		
11. $T_t = \frac{L}{3600\ V}$ Compute T_t hr		+ =

Channel flow	Segment ID	
12. Cross sectional flow area, a ft^2		
13. Wetted perimeter, p_w ft		
14. Hydraulic radius, $r_H = \frac{a}{p_w}$ Compute r ft		
15. Channel slope, s ft/ft		
16. Manning's roughness coeff., n (Exhibit 205.3.1)		
17. $V = \frac{1.49\, r^{2/3}\, s^{1/2}}{n}$ Compute V ft/s		
18. Flow length, L ft		
19. $T_t = \frac{L}{3600\ V}$ Compute T_t hr		+ =

20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) hr