Time of Concentration Calculations

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: **Present** Developed
Circle one: **Tc** T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SB-10

Date:
Date:

Sheet flow (applicable to T_c only)

Segment ID		**A-B**		
1. Surface description (Table 3-1)		woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.600		
3. Flow Length, L (< 300ft)	ft.	300.0		
4. Two-year 24-hr rainfall, P_2	in.	3.30		
5. Land slope, s	ft./ft.	0.023		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	1.104	=	1.104

Shallow concentrated flow (assume hyd. radius = depth of flow)

Segment ID		**B-C**							
7. Surface description		woods							
8. Manning's roughness coeff., n		0.120							
9. Paved or unpaved		unpaved							
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.	0.40							
11. Flow Length, L	ft.	3530							
12. Watercourse slope, s	ft./ft.	0.008							
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	0.62		0.00		0.00		0.00	
14. $T_t = \frac{L}{3600 * V}$	hr.	1.578	+	0.000	+	0.000	+	0.000	= 1.578

Channel flow

Segment ID		**C-D**							
15. Channel Bottom width, b	ft.	4.00							
16. Horizontal side slope component, z (z horiz:1 vert)		1.00							
17. Depth of flow, d	ft.	0.50							
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$	2.25		0.00		0.00		0.00	
19. Wetted perimeter, P_w	ft.	5.41		0.00		0.00		0.00	
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.	0.42		0.00		0.00		0.00	
21. Channel slope, s	ft./ft.	0.018							
22. Manning's roughness coeff., n		0.050							
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.	2.21		0.00		0.00		0.00	
24. Flow length, L	ft.	3280							
25. $T_t = \frac{L}{3600 * V}$	hr.	0.413	+	0.000	+	0.000	+	0.000	= 0.413
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr. 3.095

Minimum Tc used in TR-55 = 0.100 hrs

Milone & MacBroom Inc.

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SB-20

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.600		
3. Flow Length, L (< 300ft)	ft.		300.0		
4. Two-year 24-hr rainfall, P_2	in.		3.30		
5. Land slope, s	ft./ft.		0.017		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.		1.263	=	1.263

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C								
7. Surface description			woods								
8. Manning's roughness coeff., n			0.100								
9. Paved or unpaved			unpaved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.		0.40								
11. Flow Length, L	ft.		260.0								
12. Watercourse slope, s	ft./ft.		0.058								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.		1.94		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$	hr.		0.037	+	0.000	+	0.000	+	0.000	=	0.037

Channel flow

		Segment ID	C-D		D-E						
15. Channel Bottom width, b	ft.		6		8.00						
16. Horizontal side slope component, z (z horiz:1 vert)			1		1.00						
17. Depth of flow, d	ft.		0.5		0.60						
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$		3.25		5.16		0.00		0.00		
19. Wetted perimeter, P_w	ft.		7.41		9.70		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.		0.44		0.53		0.00		0.00		
21. Channel slope, s	ft./ft.		0.032		0.014						
22. Manning's roughness coeff., n			0.055		0.052						
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.		2.80		2.24		0.00		0.00		
24. Flow length, L	ft.		2000.0		850.0						
25. $T_t = \frac{L}{3600 * V}$	hr.		0.199	+	0.106	+	0.000	+	0.000	=	0.304
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr.		1.604

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SB-31

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woodsf		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.400		
3. Flow Length, L (< 300ft)	ft.		270.0		
4. Two-year 24-hr rainfall, P_2	in.		3.30		
5. Land slope, s	ft./ft.		0.085		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.		0.437	=	0.437

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C								
7. Surface description			woods								
8. Manning's roughness coeff., n			0.090								
9. Paved or unpaved			unpaved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.		0.40								
11. Flow Length, L	ft.		1310.0								
12. Watercourse slope, s	ft./ft.		0.063								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.		2.25		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$	hr.		0.162	+	0.000	+	0.000	+	0.000	=	0.162

Channel flow

		Segment ID	C-D		D-E		E-F		F-G		
15. Channel Bottom width, b	ft.		6.00		9.00						
16. Horizontal side slope component, z (z horiz:1 vert)			1.00		1.00						
17. Depth of flow, d	ft.		0.50		0.70						
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$		3.25		6.79		0.00		0.00		
19. Wetted perimeter, P_w	ft.		7.41		10.98		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.		0.44		0.62		0.00		0.00		
21. Channel slope, s	ft./ft.		0.010		0.009						
22. Manning's roughness coeff., n			0.055		0.052						
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.		1.55		1.94		0.00		0.00		
24. Flow length, L	ft.		1330.0		3090						
25. $T_t = \frac{L}{3600 * V}$	hr.		0.239	+	0.441	+	0.000	+	0.000	=	0.681
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										hr.	1.279

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SB-35

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			grass		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.240		
3. Flow Length, L (< 300ft)		ft.	300.0		
4. Two-year 24-hr rainfall, P_2		in.	3.30		
5. Land slope, s		ft./ft.	0.027		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	0.503	=	0.503

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C		C-D						
7. Surface description			grass		woods						
8. Manning's roughness coeff., n			0.080		0.100						
9. Paved or unpaved			unpaved		unpaved						
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)		ft.	0.40		0.40						
11. Flow Length, L		ft.	300.0		190.0						
12. Watercourse slope, s		ft./ft.	0.053		0.158						
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	2.34		3.21		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$		hr.	0.036	+	0.016	+	0.000	+	0.000	=	0.052

Channel flow

		Segment ID	C-D		D-E						
15. Channel Bottom width, b		ft.	6.00		8.00						
16. Horizontal side slope component, z (z horiz:1 vert)			1.00		1.00						
17. Depth of flow, d		ft.	0.50		0.60						
18. Cross sectional flow area, A (assume trapazoidal)		$ft.^2$	3.25		5.16		0.00		0.00		
19. Wetted perimeter, P_w		ft.	7.41		9.70		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.	0.44		0.53		0.00		0.00		
21. Channel slope, s		ft./ft.	0.020		0.007						
22. Manning's roughness coeff., n			0.060		0.060						
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.	2.04		1.32		0.00		0.00		
24. Flow length, L		ft.	740.0		2140.0						
25. $T_t = \frac{L}{3600 * V}$		hr.	0.101	+	0.451	+	0.000	+	0.000	=	0.551
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										hr.	1.106

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SB-38

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			grass		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.240		
3. Flow Length, L (< 300ft)	ft.		300.0		
4. Two-year 24-hr rainfall, P_2	in.		3.30		
5. Land slope, s	ft./ft.		0.007		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.		0.875	=	0.875

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C								
7. Surface description			woods								
8. Manning's roughness coeff., n			0.090								
9. Paved or unpaved			unpaved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.		0.40								
11. Flow Length, L	ft.		420.0								
12. Watercourse slope, s	ft./ft.		0.060								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.		2.19		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$	hr.		0.053	+	0.000	+	0.000	+	0.000	=	0.053

Channel flow

		Segment ID	C-D		D-E		E-F		F-G		
15. Channel Bottom width, b	ft.		7.00								
16. Horizontal side slope component, z (z horiz:1 vert)			1.00								
17. Depth of flow, d	ft.		0.50								
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$		3.75		0.00		0.00		0.00		
19. Wetted perimeter, P_w	ft.		8.41		0.00		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.		0.45		0.00		0.00		0.00		
21. Channel slope, s	ft./ft.		0.020								
22. Manning's roughness coeff., n			0.060								
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.		2.07		0.00		0.00		0.00		
24. Flow length, L	ft.		590.0								
25. $T_t = \frac{L}{3600 * V}$	hr.		0.079	+	0.000	+	0.000	+	0.000	=	0.079
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										hr.	1.008

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SB-40

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID		
		A-B		
1. Surface description (Table 3-1)		woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.550		
3. Flow Length, L (< 300ft)	ft.	140.0		
4. Two-year 24-hr rainfall, P_2	in.	3.30		
5. Land slope, s	ft./ft.	0.018		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.623	=	0.623

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID								
		B-C								
7. Surface description		woods								
8. Manning's roughness coeff., n		0.100								
9. Paved or unpaved		unpaved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.	0.40								
11. Flow Length, L	ft.	100.0								
12. Watercourse slope, s	ft./ft.	0.060								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	1.98		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$	hr.	0.014	+	0.000	+	0.000	+	0.000	=	0.014

Channel flow

		Segment ID								
		C-D								
15. Channel Bottom width, b	ft.	6.00								
16. Horizontal side slope component, z (z horiz:1 vert)		1.00								
17. Depth of flow, d	ft.	0.50								
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$	3.25		0.00		0.00		0.00		
19. Wetted perimeter, P_w	ft.	7.41		0.00		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.	0.44		0.00		0.00		0.00		
21. Channel slope, s	ft./ft.	0.006								
22. Manning's roughness coeff., n		0.060								
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.	1.07		0.00		0.00		0.00		
24. Flow length, L	ft.	890.0								
25. $T_t = \frac{L}{3600 * V}$	hr.	0.230	+	0.000	+	0.000	+	0.000	=	0.230
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr.	0.867

Minimum Tc used in TR-55 = 0.100 hrs

Milone & MacBroom Inc.

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SB-50

Date:
Date:

Sheet flow (applicable to T_c only)

Segment ID		A-B		
1. Surface description (Table 3-1)		grass		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.400		
3. Flow Length, L (< 300ft)	ft.	300.0		
4. Two-year 24-hr rainfall, P_2	in.	3.30		
5. Land slope, s	ft./ft.	0.023		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.798	=	0.798

Shallow concentrated flow (assume hyd. radius = depth of flow)

Segment ID		B-C							
7. Surface description		woods							
8. Manning's roughness coeff., n		0.090							
9. Paved or unpaved		paved							
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.	0.20							
11. Flow Length, L	ft.	1545.0							
12. Watercourse slope, s	ft./ft.	0.025							
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	0.90		0.00		0.00		0.00	
14. $T_t = \frac{L}{3600 * V}$	hr.	0.477	+	0.000	+	0.000	+	0.000	= 0.477

Channel flow

Segment ID		C-D							
15. Channel Bottom width, b	ft.	12.00							
16. Horizontal side slope component, z (z horiz:1 vert)		0.80							
17. Depth of flow, d	ft.	0.60							
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$	7.49		0.00		0.00		0.00	
19. Wetted perimeter, P_w	ft.	13.54		0.00		0.00		0.00	
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.	0.55		0.00		0.00		0.00	
21. Channel slope, s	ft./ft.	0.003							
22. Manning's roughness coeff., n		0.060							
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.	0.98		0.00		0.00		0.00	
24. Flow length, L	ft.	2340.0							
25. $T_t = \frac{L}{3600 * V}$	hr.	0.664	+	0.000	+	0.000	+	0.000	= 0.664
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr. 1.939

Minimum Tc used in TR-55 = 0.100 hrs

Milone & MacBroom Inc.

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
By: WM
Date:
Location: Darien
Checked:
Date:
Circle one: Present Developed
Watershed: Stony Brook
Circle one: Tc T_t
Subwatershed: SB-60

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.600		
3. Flow Length, L (< 300ft)		ft.	300.0		
4. Two-year 24-hr rainfall, P_2		in.	3.30		
5. Land slope, s		ft./ft.	0.020		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	1.174	=	1.174

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C		C-D					
7. Surface description			woods		woods					
8. Manning's roughness coeff., n			0.090		0.090					
9. Paved or unpaved			unpaved		unpaved					
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)		ft.	0.40		0.30					
11. Flow Length, L		ft.	983.0		690.0					
12. Watercourse slope, s		ft./ft.	0.024		0.013					
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	1.40		0.85		0.00		0.00	
14. $T_t = \frac{L}{3600 * V}$		hr.	0.194	+	0.226	+	0.000	+	0.000	= 0.421

Channel flow

		Segment ID	D-E							
15. Channel Bottom width, b		ft.	13.00							
16. Horizontal side slope component, z (z horiz:1 vert)			1.00							
17. Depth of flow, d		ft.	1.00							
18. Cross sectional flow area, A (assume trapazoidal)		$ft.^2$	14.00		0.00		0.00		0.00	
19. Wetted perimeter, P_w		ft.	15.83		0.00		0.00		0.00	
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.	0.88		0.00		0.00		0.00	
21. Channel slope, s		ft./ft.	0.003							
22. Manning's roughness coeff., n			0.065							
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.	1.24		0.00		0.00		0.00	
24. Flow length, L		ft.	580.0							
25. $T_t = \frac{L}{3600 * V}$		hr.	0.130	+	0.000	+	0.000	+	0.000	= 0.130
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										1.724
									hr.	

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SB-70

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID		
		A-B		
1. Surface description (Table 3-1)		woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.600		
3. Flow Length, L (< 300ft)	ft.	300.0		
4. Two-year 24-hr rainfall, P_2	in.	3.30		
5. Land slope, s	ft./ft.	0.070		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.711	=	0.711

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID								
		B-C								
7. Surface description										
8. Manning's roughness coeff., n										
9. Paved or unpaved										
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.									
11. Flow Length, L	ft.									
12. Watercourse slope, s	ft./ft.									
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	0.00		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$	hr.	0.000	+	0.000	+	0.000	+	0.000	=	0.000

Channel flow

		Segment ID								
		B-C								
15. Channel Bottom width, b	ft.	13.00								
16. Horizontal side slope component, z (z horiz:1 vert)		1.00								
17. Depth of flow, d	ft.	0.70								
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$	9.59		0.00		0.00		0.00		
19. Wetted perimeter, P_w	ft.	14.98		0.00		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.	0.64		0.00		0.00		0.00		
21. Channel slope, s	ft./ft.	0.031								
22. Manning's roughness coeff., n		0.055								
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.	3.54		0.00		0.00		0.00		
24. Flow length, L	ft.	1485.0								
25. $T_t = \frac{L}{3600 * V}$	hr.	0.116	+	0.000	+	0.000	+	0.000	=	0.116
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										0.828
									hr.	

Minimum Tc used in TR-55 = 0.100 hrs

Milone & MacBroom Inc.

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SB-80

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woodsf		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.400		
3. Flow Length, L (< 300ft)		ft.	300.0		
4. Two-year 24-hr rainfall, P_2		in.	3.30		
5. Land slope, s		ft./ft.	0.100		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	0.446	=	0.446

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C								
7. Surface description			grass								
8. Manning's roughness coeff., n			0.080								
9. Paved or unpaved			unpaved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)		ft.	0.40								
11. Flow Length, L		ft.	1300.0								
12. Watercourse slope, s		ft./ft.	0.026								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	1.62		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$		hr.	0.223	+	0.000	+	0.000	+	0.000	=	0.223

Channel flow

		Segment ID	C-D								
15. Channel Bottom width, b		ft.	15.00								
16. Horizontal side slope component, z (z horiz:1 vert)			1.00								
17. Depth of flow, d		ft.	0.80								
18. Cross sectional flow area, A (assume trapazoidal)		$ft.^2$	12.64		0.00		0.00		0.00		
19. Wetted perimeter, P_w		ft.	17.26		0.00		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.	0.73		0.00		0.00		0.00		
21. Channel slope, s		ft./ft.	0.005								
22. Manning's roughness coeff., n			0.055								
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.	1.55		0.00		0.00		0.00		
24. Flow length, L		ft.	1415.0								
25. $T_t = \frac{L}{3600 * V}$		hr.	0.254	+	0.000	+	0.000	+	0.000	=	0.254
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										hr.	0.923

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SB-90

Date:
Date:

Sheet flow (applicable to T_c only)

Segment ID		A-B		
1. Surface description (Table 3-1)		woodsf		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.400		
3. Flow Length, L (< 300ft)	ft.	220.0		
4. Two-year 24-hr rainfall, P_2	in.	3.30		
5. Land slope, s	ft./ft.	0.136		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.307	=	0.307

Shallow concentrated flow (assume hyd. radius = depth of flow)

Segment ID		B-C							
7. Surface description		grass							
8. Manning's roughness coeff., n		0.070							
9. Paved or unpaved		unpaved							
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.	0.40							
11. Flow Length, L	ft.	500.0							
12. Watercourse slope, s	ft./ft.	0.014							
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	1.37		0.00		0.00		0.00	
14. $T_t = \frac{L}{3600 * V}$	hr.	0.102	+	0.000	+	0.000	+	0.000	= 0.102

Channel flow

Segment ID		C-D							
15. Channel Bottom width, b	ft.	20.00							
16. Horizontal side slope component, z (z horiz:1 vert)		6.00							
17. Depth of flow, d	ft.	0.70							
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$	16.94		0.00		0.00		0.00	
19. Wetted perimeter, P_w	ft.	28.52		0.00		0.00		0.00	
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.	0.59		0.00		0.00		0.00	
21. Channel slope, s	ft./ft.	0.003							
22. Manning's roughness coeff., n		0.055							
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.	1.11		0.00		0.00		0.00	
24. Flow length, L	ft.	300.0							
25. $T_t = \frac{L}{3600 * V}$	hr.	0.075	+	0.000	+	0.000	+	0.000	= 0.075
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr. 0.484

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SB-100

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woodsf		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.400		
3. Flow Length, L (< 300ft)		ft.	300.0		
4. Two-year 24-hr rainfall, P_2		in.	3.30		
5. Land slope, s		ft./ft.	0.033		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	0.692	=	0.692

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C		C-D						
7. Surface description			grass		grass						
8. Manning's roughness coeff., n			0.080		0.080						
9. Paved or unpaved			unpaved		unpaved						
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)		ft.	0.40		0.40						
11. Flow Length, L		ft.	620.0		680.0						
12. Watercourse slope, s		ft./ft.	0.060		0.032						
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	2.47		1.82		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$		hr.	0.070	+	0.104	+	0.000	+	0.000	=	0.174

Channel flow

		Segment ID	B-C								
15. Channel Bottom width, b		ft.	20.00								
16. Horizontal side slope component, z (z horiz:1 vert)			6.00								
17. Depth of flow, d		ft.	0.70								
18. Cross sectional flow area, A (assume trapazoidal)		$ft.^2$	16.94		0.00		0.00		0.00		
19. Wetted perimeter, P_w		ft.	28.52		0.00		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.	0.59		0.00		0.00		0.00		
21. Channel slope, s		ft./ft.	0.004								
22. Manning's roughness coeff., n			0.050								
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.	1.39		0.00		0.00		0.00		
24. Flow length, L		ft.	230.0								
25. $T_t = \frac{L}{3600 * V}$		hr.	0.046	+	0.000	+	0.000	+	0.000	=	0.046
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										hr.	0.911

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval — By: WM — Date:
Location: Darien — Checked: — Date:
Circle one: Present Developed — Watershed: Stony Brook
Circle one: Tc T_t — Subwatershed: SB-110

Sheet flow (applicable to T_c only)

Segment ID		A-B				
1. Surface description (Table 3-1)		woodsg				
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.600				
3. Flow Length, L (< 300ft)	ft.	200.0				
4. Two-year 24-hr rainfall, P_2	in.	3.30				
5. Land slope, s	ft./ft.	0.090				
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.465	=	0.465		

Shallow concentrated flow (assume hyd. radius = depth of flow)

Segment ID		B-C								
7. Surface description		woods								
8. Manning's roughness coeff., n		0.090								
9. Paved or unpaved		unpaved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.	0.40								
11. Flow Length, L	ft.	1020.0								
12. Watercourse slope, s	ft./ft.	0.017								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	1.16		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$	hr.	0.244	+	0.000	+	0.000	+	0.000	=	0.244

Channel flow

Segment ID		C-D								
15. Channel Bottom width, b	ft.	30.00								
16. Horizontal side slope component, z (z horiz:1 vert)		1.00								
17. Depth of flow, d	ft.	1.50								
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$	47.25		0.00		0.00		0.00		
19. Wetted perimeter, P_w	ft.	34.24		0.00		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.	1.38		0.00		0.00		0.00		
21. Channel slope, s	ft./ft.	0.001								
22. Manning's roughness coeff., n		0.045								
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.	1.09		0.00		0.00		0.00		
24. Flow length, L	ft.	710.0								
25. $T_t = \frac{L}{3600 * V}$	hr.	0.181	+	0.000	+	0.000	+	0.000	=	0.181
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr.	0.890

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SBT1-10

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID		
		A-B		
1. Surface description (Table 3-1)		Woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.600		
3. Flow Length, L (< 300ft)	ft.	220.0		
4. Two-year 24-hr rainfall, P_2	in.	3.30		
5. Land slope, s	ft./ft.	0.045		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.662	=	0.662

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID								
		B-C								
7. Surface description		woods								
8. Manning's roughness coeff., n		0.100								
9. Paved or unpaved		unpaved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.	0.40								
11. Flow Length, L	ft.	505.0								
12. Watercourse slope, s	ft./ft.	0.016								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	1.02		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$	hr.	0.137	+	0.000	+	0.000	+	0.000	=	0.137

Channel flow

		Segment ID								
15. Channel Bottom width, b	ft.	3.00		3.00		4.00				
16. Horizontal side slope component, z (z horiz:1 vert)		1.00		1.00		1.00				
17. Depth of flow, d	ft.	0.40		0.40		0.40				
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$	1.36		1.36		1.76		0.00		
19. Wetted perimeter, P_w	ft.	4.13		4.13		5.13		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.	0.33		0.33		0.34		0.00		
21. Channel slope, s	ft./ft.	0.020		0.008		0.014				
22. Manning's roughness coeff., n		0.080		0.080		0.080				
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.	1.26		0.79		1.08		0.00		
24. Flow length, L	ft.	185.0		360.0		430.0				
25. $T_t = \frac{L}{3600 * V}$	hr.	0.041	+	0.126	+	0.111	+	0.000	=	0.277
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr.	1.077

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval — By: WM — Date:
Location: Darien — Checked: — Date:
Circle one: Present Developed — Watershed: Stony Brook
Circle one: Tc T_t — Subwatershed: SBT2-10

Sheet flow (applicable to T_c only)

Segment ID		A-B			
1. Surface description (Table 3-1)		grass			
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.240			
3. Flow Length, L (< 300ft)	ft.	300.0			
4. Two-year 24-hr rainfall, P_2	in.	3.30			
5. Land slope, s	ft./ft.	0.027			
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.503	=	0.503	

Shallow concentrated flow (assume hyd. radius = depth of flow)

Segment ID		B-C								
7. Surface description		woods								
8. Manning's roughness coeff., n		0.100								
9. Paved or unpaved		unpaved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.	0.40								
11. Flow Length, L	ft.	800.0								
12. Watercourse slope, s	ft./ft.	0.068								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	2.10		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$	hr.	0.106	+	0.000	+	0.000	+	0.000	=	0.106

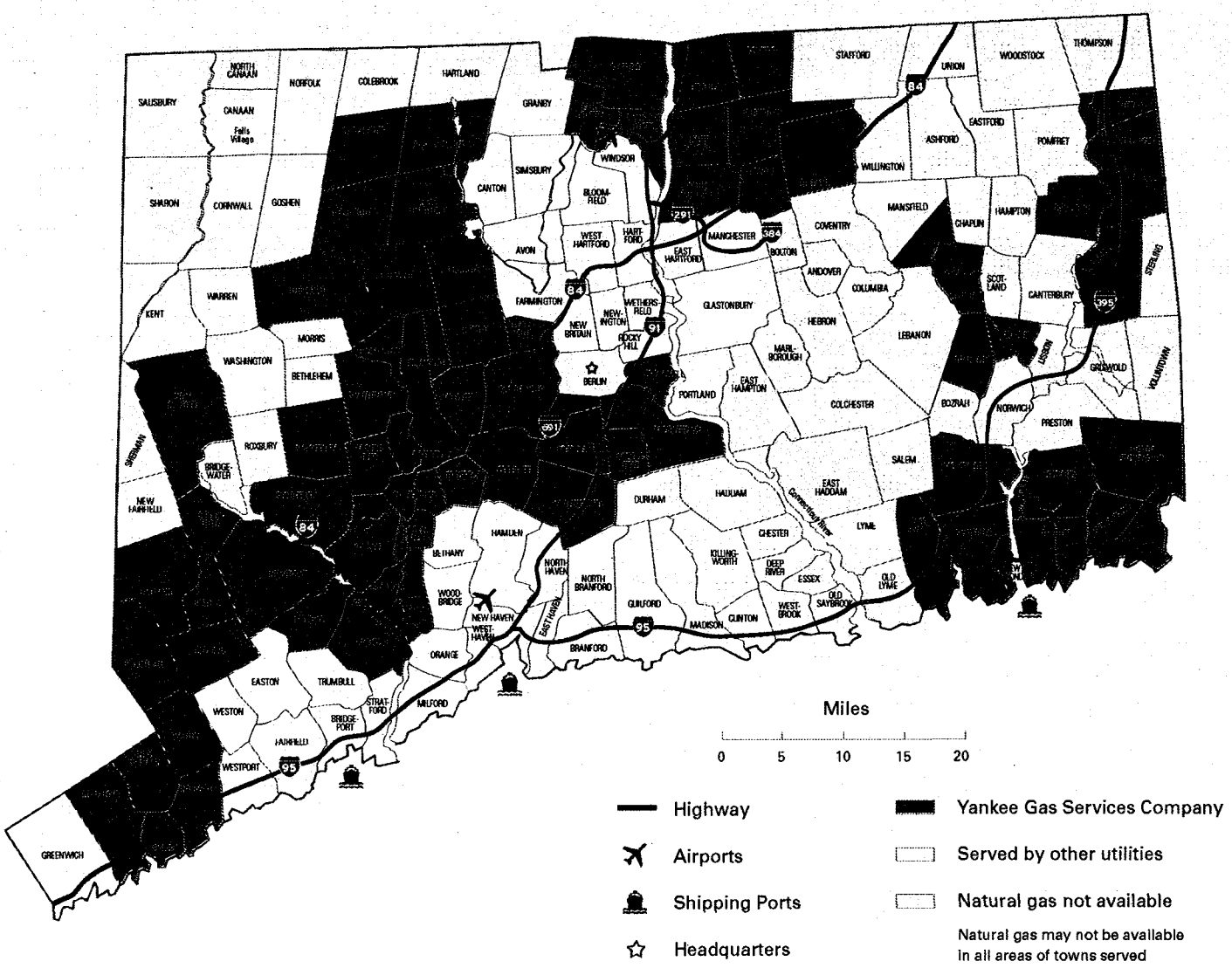
Channel flow

Segment ID		C-D		D-E						
15. Channel Bottom width, b	ft.	4.00		7.00						
16. Horizontal side slope component, z (z horiz:1 vert)		1.00		0.80						
17. Depth of flow, d	ft.	0.40		0.50						
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$	1.76		3.70		0.00		0.00		
19. Wetted perimeter, P_w	ft.	5.13		8.28		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.	0.34		0.45		0.00		0.00		
21. Channel slope, s	ft./ft.	0.014		0.016						
22. Manning's roughness coeff., n		0.075		0.065						
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.	1.16		1.67		0.00		0.00		
24. Flow length, L	ft.	423.0		580.0						
25. $T_t = \frac{L}{3600 * V}$	hr.	0.101	+	0.097	+	0.000	+	0.000	=	0.198
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr.	0.806

Minimum Tc used in TR-55 = 0.100 hrs

Yankeegas

The Northeast Utilities System



Facts and Contacts

- **Customers:** 194,000 residential and commercial
- **Communities:** 71 cities and towns
- **Service Area:** 2,088 square miles
- **Headquarters Address:**
  107 Selden Street
  Berlin, CT 06037

  Mailing Address:
  P.O. Box 270
  Hartford, CT 06141-0270
- **Customer Service:**
  1.800.989.0900

  Gas leak emergencies:
  1.800.992.3427
- **Web:** www.yankeegas.com

Directions

Directions to Yankee Gas Headquarters

TRAVELING SOUTH ON I-91

Travel I-91 to Routes 5 & 15, exit 28. Travel south on Routes 5 & 15. Proceed approximately 6.5 miles. After passing the Northeast Utilities' sign on the left, turn left, at the traffic signal, onto Selden Street and turn left up the hill to Northeast Utilities. Yankee Gas headquarters is located in NU South, the first building on your right as you come up the hill.

TRAVELING NORTH ON I-91

Travel I-91 to Route 9, exit 22N-S. Take 22N Route 9 – New Britain, approximately 2.4 miles to Routes 5 & 15 north, exit 21. Travel north on Routes 5 & 15 approximately 1.7 miles to Rowley Street-Selden Street. Northeast Utilities' sign will be on the hill to the front right. Turn right onto Selden Street and turn left up the hill to Northeast Utilities. Yankee Gas headquarters is located in NU South, the first building on your right as you come up the hill.

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SBT3-10

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woodsf		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.400		
3. Flow Length, L (< 300ft)	ft.		300.0		
4. Two-year 24-hr rainfall, P_2	in.		3.30		
5. Land slope, s	ft./ft.		0.047		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.		0.605	=	0.605

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C		C-D						
7. Surface description			woods		grass						
8. Manning's roughness coeff., n			0.100		0.080						
9. Paved or unpaved			unpaved		unpaved						
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.		0.40		0.40						
11. Flow Length, L	ft.		825.0		333.0						
12. Watercourse slope, s	ft./ft.		0.016		0.006						
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.		1.02		0.78		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$	hr.		0.226	+	0.118	+	0.000	+	0.000	=	0.344

Channel flow

		Segment ID	D-E		E-F						
15. Channel Bottom width, b	ft.		3.00		4.00						
16. Horizontal side slope component, z (z horiz:1 vert)			1.00		1.00						
17. Depth of flow, d	ft.		0.40		0.40						
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$		1.36		1.76		0.00		0.00		
19. Wetted perimeter, P_w	ft.		4.13		5.13		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.		0.33		0.34		0.00		0.00		
21. Channel slope, s	ft./ft.		0.010		0.005						
22. Manning's roughness coeff., n			0.070		0.065						
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.		1.01		0.78		0.00		0.00		
24. Flow length, L	ft.		100.0		410.0						
25. $T_t = \frac{L}{3600 * V}$	hr.		0.027	+	0.145	+	0.000	+	0.000	=	0.173
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										hr.	1.121

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SBT3-20

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woodsf		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.400		
3. Flow Length, L (< 300ft)		ft.	300.0		
4. Two-year 24-hr rainfall, P_2		in.	3.30		
5. Land slope, s		ft./ft.	0.027		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	0.756	=	0.756

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C		C-D					
7. Surface description			grass		grass					
8. Manning's roughness coeff., n			0.080		0.080					
9. Paved or unpaved			unpaved		unpaved					
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)		ft.	0.40		0.40					
11. Flow Length, L		ft.	305.0		640.0					
12. Watercourse slope, s		ft./ft.	0.052		0.047					
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	2.32		2.19		0.00		0.00	
14. $T_t = \frac{L}{3600 * V}$		hr.	0.037	+	0.081	+	0.000	+	0.000	= 0.118

Channel flow

		Segment ID	D-E		E-F					
15. Channel Bottom width, b		ft.	4.00		10.00					
16. Horizontal side slope component, z (z horiz:1 vert)			1.00		0.80					
17. Depth of flow, d		ft.	0.50		1.00					
18. Cross sectional flow area, A (assume trapazoidal)		$ft.^2$	2.25		10.80		0.00		0.00	
19. Wetted perimeter, P_w		ft.	5.41		12.56		0.00		0.00	
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.	0.42		0.86		0.00		0.00	
21. Channel slope, s		ft./ft.	0.015		0.005					
22. Manning's roughness coeff., n			0.065		0.060					
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.	1.57		1.54		0.00		0.00	
24. Flow length, L		ft.	2170.0		1170.0					
25. $T_t = \frac{L}{3600 * V}$		hr.	0.383	+	0.211	+	0.000	+	0.000	= 0.594
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr.	1.468

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SBT3-30

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			grass		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.260		
3. Flow Length, L (< 300ft)		ft.	300.0		
4. Two-year 24-hr rainfall, P_2		in.	3.30		
5. Land slope, s		ft./ft.	0.033		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	0.490	=	0.490

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C		C-D					
7. Surface description			woods		woods					
8. Manning's roughness coeff., n			0.090		0.100					
9. Paved or unpaved			unpaved		unpaved					
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)		ft.	0.40		0.40					
11. Flow Length, L		ft.	733.0		492.0					
12. Watercourse slope, s		ft./ft.	0.048		0.079					
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	1.96		2.28		0.00		0.00	
14. $T_t = \frac{L}{3600 * V}$		hr.	0.104	+	0.060	+	0.000	+	0.000	= 0.164

Channel flow

		Segment ID	D-E		E-F					
15. Channel Bottom width, b		ft.	6.00		8.00					
16. Horizontal side slope component, z (z horiz:1 vert)			1.00		1.00					
17. Depth of flow, d		ft.	0.60		0.60					
18. Cross sectional flow area, A (assume trapazoidal)		$ft.^2$	3.96		5.16		0.00		0.00	
19. Wetted perimeter, P_w		ft.	7.70		9.70		0.00		0.00	
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.	0.51		0.53		0.00		0.00	
21. Channel slope, s		ft./ft.	0.022		0.006					
22. Manning's roughness coeff., n			0.065		0.065					
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.	2.16		1.14		0.00		0.00	
24. Flow length, L		ft.	510.0		610.0					
25. $T_t = \frac{L}{3600 * V}$		hr.	0.066	+	0.149	+	0.000	+	0.000	= 0.214
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr.	0.868

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SBT4-10

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.600		
3. Flow Length, L (< 300ft)	ft.		300.0		
4. Two-year 24-hr rainfall, P_2	in.		3.30		
5. Land slope, s	ft./ft.		0.123		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.		0.567	=	0.567

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C								
7. Surface description			grass								
8. Manning's roughness coeff., n			0.075								
9. Paved or unpaved			unpaved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.		0.40								
11. Flow Length, L	ft.		570.0								
12. Watercourse slope, s	ft./ft.		0.116								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.		3.67		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$	hr.		0.043	+	0.000	+	0.000	+	0.000	=	0.043

Channel flow

		Segment ID	C-D		D-E		E-F				
15. Channel Bottom width, b	ft.		7.00		8.00		9.00				
16. Horizontal side slope component, z (z horiz:1 vert)			1.00		1.00		1.00				
17. Depth of flow, d	ft.		0.50		0.60		0.70				
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$		3.75		5.16		6.79		0.00		
19. Wetted perimeter, P_w	ft.		8.41		9.70		10.98		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.		0.45		0.53		0.62		0.00		
21. Channel slope, s	ft./ft.		0.006		0.014		0.025				
22. Manning's roughness coeff., n			0.065		0.060		0.060				
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.		1.01		1.96		2.85		0.00		
24. Flow length, L	ft.		1932.0		1245.0		481.0				
25. $T_t = \frac{L}{3600 * V}$	hr.		0.532	+	0.176	+	0.047	+	0.000	=	0.755
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										hr.	1.365

Minimum Tc used in TR-55 = 0.100 hrs

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Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SBT5-10

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woodsf		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.400		
3. Flow Length, L (< 300ft)		ft.	300.0		
4. Two-year 24-hr rainfall, P_2		in.	3.30		
5. Land slope, s		ft./ft.	0.020		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	0.849	=	0.849

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C		C-D		D-E			
7. Surface description			woods		impervious		grass			
8. Manning's roughness coeff., n			0.100		0.011		0.080			
9. Paved or unpaved			unpaved		paved		unpaved			
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)		ft.	0.40		0.20		0.40			
11. Flow Length, L		ft.	638.0		456.0		380.0			
12. Watercourse slope, s		ft./ft.	0.024		0.004		0.045			
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	1.24		3.07		2.14		0.00	
14. $T_t = \frac{L}{3600 * V}$		hr.	0.143	+	0.041	+	0.049	+	0.000	= 0.234

Channel flow

		Segment ID	E-F		F-G		G-H			
15. Channel Bottom width, b		ft.	7.00		12" RCP		9.00			
16. Horizontal side slope component, z (z horiz:1 vert)			1.00		---		1.00			
17. Depth of flow, d		ft.	0.50		FULL		0.50			
18. Cross sectional flow area, A (assume trapazoidal)		$ft.^2$	3.75		0.79		4.75		0.00	
19. Wetted perimeter, P_w		ft.	8.41		3.14		10.41		0.00	
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.	0.45		0.25		0.46		0.00	
21. Channel slope, s		ft./ft.	0.006		0.010		0.002			
22. Manning's roughness coeff., n			0.070		0.013		0.060			
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.	0.99		4.55		0.65		0.00	
24. Flow length, L		ft.	630.0		150.0		515.0			
25. $T_t = \frac{L}{3600 * V}$		hr.	0.177	+	0.009	+	0.221	+	0.000	= 0.407
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr.	1.489

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SBT6-10

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			grass		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.240		
3. Flow Length, L (< 300ft)		ft.	300.0		
4. Two-year 24-hr rainfall, P_2		in.	3.30		
5. Land slope, s		ft./ft.	0.020		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	0.564	=	0.564

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C		C-D		D-E		E-F		
7. Surface description			grass		woods		road		grass		
8. Manning's roughness coeff., n			0.080		0.100		0.011		0.060		
9. Paved or unpaved			unpaved		unpaved		paved		unpaved		
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)		ft.	0.40		0.40		0.20		0.40		
11. Flow Length, L		ft.	400.0		48.0		882.0		802.0		
12. Watercourse slope, s		ft./ft.	0.040		0.354		0.019		0.024		
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	2.02		4.81		6.43		2.08		
14. $T_t = \frac{L}{3600 * V}$		hr.	0.055	+	0.003	+	0.038	+	0.107	=	0.203

Channel flow

		Segment ID									
15. Channel Bottom width, b		ft.									
16. Horizontal side slope component, z (z horiz:1 vert)											
17. Depth of flow, d		ft.									
18. Cross sectional flow area, A (assume trapazoidal)		$ft.^2$	0.00		0.00		0.00		0.00		
19. Wetted perimeter, P_w		ft.	0.00		0.00		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.	0.00		0.00		0.00		0.00		
21. Channel slope, s		ft./ft.									
22. Manning's roughness coeff., n											
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.	0.00		0.00		0.00		0.00		
24. Flow length, L		ft.									
25. $T_t = \frac{L}{3600 * V}$		hr.	0.000	+	0.000	+	0.000	+	0.000	=	0.000
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										hr.	0.767

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SBT6-20

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			grass		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.240		
3. Flow Length, L (< 300ft)		ft.	300.0		
4. Two-year 24-hr rainfall, P_2		in.	3.30		
5. Land slope, s		ft./ft.	0.033		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	0.460	=	0.460

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C							
7. Surface description			grass							
8. Manning's roughness coeff., n			0.080							
9. Paved or unpaved			unpaved							
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)		ft.	0.40							
11. Flow Length, L		ft.	53.0							
12. Watercourse slope, s		ft./ft.	0.491							
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	7.08		0.00		0.00		0.00	
14. $T_t = \frac{L}{3600 * V}$		hr.	0.002	+	0.000	+	0.000	+	0.000	= 0.002

Channel flow

		Segment ID	C-D	D-E						
15. Channel Bottom width, b		ft.	24" RCP	48" RCP						
16. Horizontal side slope component, z (z horiz:1 vert)			---	---						
17. Depth of flow, d		ft.	FULL	FULL						
18. Cross sectional flow area, A (assume trapazoidal)		$ft.^2$	3.14	12.56		0.00		0.00		
19. Wetted perimeter, P_w		ft.	6.28	12.56		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.	0.50	1.00		0.00		0.00		
21. Channel slope, s		ft./ft.	0.009	0.036						
22. Manning's roughness coeff., n			0.013	0.013						
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.	6.96	21.86		0.00		0.00		
24. Flow length, L		ft.	1400.0	550.0						
25. $T_t = \frac{L}{3600 * V}$		hr.	0.056	+	0.007	+	0.000	+	0.000	= 0.063
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr.	0.525

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SBT6-30

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.600		
3. Flow Length, L (< 300ft)	ft.		300.0		
4. Two-year 24-hr rainfall, P_2	in.		3.30		
5. Land slope, s	ft./ft.		0.093		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.		0.634	=	0.634

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C		C-D						
7. Surface description			grass		road						
8. Manning's roughness coeff., n			0.080		0.011						
9. Paved or unpaved			unpaved		paved						
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.		0.40		0.20						
11. Flow Length, L	ft.		305.0		1240.0						
12. Watercourse slope, s	ft./ft.		0.033		0.015						
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.		1.83		5.73		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$	hr.		0.046	+	0.060	+	0.000	+	0.000	=	0.106

Channel flow

		Segment ID	D-E		E-F						
15. Channel Bottom width, b	ft.		9.00		6.00						
16. Horizontal side slope component, z (z horiz:1 vert)			1.00		1.00						
17. Depth of flow, d	ft.		0.60		0.60						
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$		5.76		3.96		0.00		0.00		
19. Wetted perimeter, P_w	ft.		10.70		7.70		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.		0.54		0.51		0.00		0.00		
21. Channel slope, s	ft./ft.		0.009		0.005						
22. Manning's roughness coeff., n			0.045		0.045						
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.		2.13		1.51		0.00		0.00		
24. Flow length, L	ft.		1480.0		395.0						
25. $T_t = \frac{L}{3600 * V}$	hr.		0.193	+	0.073	+	0.000	+	0.000	=	0.265
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										hr.	1.006

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: SBT6-40

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID		
		A-B		
1. Surface description (Table 3-1)		woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.600		
3. Flow Length, L (< 300ft)	ft.	300.0		
4. Two-year 24-hr rainfall, P_2	in.	3.30		
5. Land slope, s	ft./ft.	0.080		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.674	=	0.674

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID								
		B-C								
7. Surface description		road								
8. Manning's roughness coeff., n		0.011								
9. Paved or unpaved		paved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.	0.20								
11. Flow Length, L	ft.	1840.0								
12. Watercourse slope, s	ft./ft.	0.023								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	7.00		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$	hr.	0.073	+	0.000	+	0.000	+	0.000	=	0.073

Channel flow

		Segment ID								
		C-D		D-E						
15. Channel Bottom width, b	ft.	6.00		8.00						
16. Horizontal side slope component, z (z horiz:1 vert)		1.00		1.00						
17. Depth of flow, d	ft.	0.50		0.50						
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$	3.25		4.25		0.00		0.00		
19. Wetted perimeter, P_w	ft.	7.41		9.41		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.	0.44		0.45		0.00		0.00		
21. Channel slope, s	ft./ft.	0.007		0.002						
22. Manning's roughness coeff., n		0.065		0.035						
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.	1.14		1.19		0.00		0.00		
24. Flow length, L	ft.	270.0		440.0						
25. $T_t = \frac{L}{3600 * V}$	hr.	0.066	+	0.102	+	0.000	+	0.000	=	0.168
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr.	0.915

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval — By: WM — Date:
Location: Darien — Checked: — Date:
Circle one: Present Developed — Watershed: Stony Brook
Circle one: Tc T_t — Subwatershed: SBT7-10

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.600		
3. Flow Length, L (< 300ft)		ft.	280.0		
4. Two-year 24-hr rainfall, P_2		in.	3.30		
5. Land slope, s		ft./ft.	0.032		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	0.919	=	0.919

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C		C-D		D-E			
7. Surface description			woods		woods		woods			
8. Manning's roughness coeff., n			0.100		0.090	#	0.090		0.000	
9. Paved or unpaved			unpaved		unpaved		unpaved			
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)		ft.	0.40		0.40		0.40			
11. Flow Length, L		ft.	112.0		375.0		990.0			
12. Watercourse slope, s		ft./ft.	0.348		0.101		0.014		#DIV/0!	
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	4.77		2.86		1.07		0.00	
14. $T_t = \frac{L}{3600 * V}$		hr.	0.007	+	0.036	+	0.257	+	0.000	= 0.300

Channel flow

		Segment ID	E-F		F-G		G-H		H-I		
15. Channel Bottom width, b		ft.	5.00		12" RCP		7.00		8.00		
16. Horizontal side slope component, z (z horiz:1 vert)			1.00		---		1.00		1.00		
17. Depth of flow, d		ft.	0.30		FULL		0.40		0.50		
18. Cross sectional flow area, A (assume trapazoidal)		$ft.^2$	1.59		0.79		2.96		4.25		
19. Wetted perimeter, P_w		ft.	5.85		3.14		8.13		9.41		
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.	0.27		0.25		0.36		0.45		
21. Channel slope, s		ft./ft.	0.015		0.027		0.026		0.010		
22. Manning's roughness coeff., n			0.060		0.013		0.055		0.055		
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.	1.27		7.49		2.21		1.60		
24. Flow length, L		ft.	805.0		480.0		700.0		649.0		
25. $T_t = \frac{L}{3600 * V}$		hr.	0.176	+	0.018	+	0.088	+	0.113	=	0.394
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										hr.	1.613

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval — By: WM — Date:
Location: Darien — Checked: — Date:
Circle one: Present Developed — Watershed: Stony Brook
Circle one: Tc T_t — Subwatershed: CB-10

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woodsf		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.400		
3. Flow Length, L (< 300ft)		ft.	300.0		
4. Two-year 24-hr rainfall, P_2		in.	3.30		
5. Land slope, s		ft./ft.	0.050		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	0.588	=	0.588

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C								
7. Surface description			grass								
8. Manning's roughness coeff., n			0.080								
9. Paved or unpaved			unpaved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)		ft.	0.40								
11. Flow Length, L		ft.	1200.0								
12. Watercourse slope, s		ft./ft.	0.030								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	1.75		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$		hr.	0.190	+	0.000	+	0.000	+	0.000	=	0.190

Channel flow

		Segment ID	C-D		D-E		E-F				
15. Channel Bottom width, b		ft.	5.00		15.00						
16. Horizontal side slope component, z (z horiz:1 vert)			1.00		1.00						
17. Depth of flow, d		ft.	0.50		0.50						
18. Cross sectional flow area, A (assume trapazoidal)		$ft.^2$	2.75		7.75		0.00		0.00		
19. Wetted perimeter, P_w		ft.	6.41		16.41		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.	0.43		0.47		0.00		0.00		
21. Channel slope, s		ft./ft.	0.026		0.014						
22. Manning's roughness coeff., n			0.065		0.060						
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.	2.09		1.80		0.00		0.00		
24. Flow length, L		ft.	740.0		2720						
25. $T_t = \frac{L}{3600 * V}$		hr.	0.098	+	0.419	+	0.000	+	0.000	=	0.517
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)											1.296
									hr.		

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: CB-20

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woods f		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.400		
3. Flow Length, L (< 300ft)		ft.	280.0		
4. Two-year 24-hr rainfall, P_2		in.	3.30		
5. Land slope, s		ft./ft.	0.029		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	0.696	=	0.696

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C								
7. Surface description			woods								
8. Manning's roughness coeff., n			0.100								
9. Paved or unpaved			unpaved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)		ft.	0.40								
11. Flow Length, L		ft.	605.0								
12. Watercourse slope, s		ft./ft.	0.035								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	1.51		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$		hr.	0.112	+	0.000	+	0.000	+	0.000	=	0.112

Channel flow

		Segment ID	C-D		D-E						
15. Channel Bottom width, b		ft.	5.00		6.00						
16. Horizontal side slope component, z (z horiz:1 vert)			1.00		1.00						
17. Depth of flow, d		ft.	0.50		0.50						
18. Cross sectional flow area, A (assume trapazoidal)		$ft.^2$	2.75		3.25		0.00		0.00		
19. Wetted perimeter, P_w		ft.	6.41		7.41		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.	0.43		0.44		0.00		0.00		
21. Channel slope, s		ft./ft.	0.015		0.002						
22. Manning's roughness coeff., n			0.070		0.065						
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.	1.47		0.65		0.00		0.00		
24. Flow length, L		ft.	1630.0		415.0						
25. $T_t = \frac{L}{3600 * V}$		hr.	0.308	+	0.178	+	0.000	+	0.000	=	0.486
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										hr.	1.294

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: CB-30

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.600		
3. Flow Length, L (< 300ft)		ft.	300.0		
4. Two-year 24-hr rainfall, P_2		in.	3.30		
5. Land slope, s		ft./ft.	0.013		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$		hr.	1.381	=	1.381

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C								
7. Surface description			woods								
8. Manning's roughness coeff., n			0.100								
9. Paved or unpaved			unpaved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)		ft.	0.40								
11. Flow Length, L		ft.	534.0								
12. Watercourse slope, s		ft./ft.	0.039								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$		fps.	1.60		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$		hr.	0.092	+	0.000	+	0.000	+	0.000	=	0.092

Channel flow

		Segment ID	C-D	D-E						
15. Channel Bottom width, b		ft.	4.00	6.00						
16. Horizontal side slope component, z (z horiz:1 vert)			1.00	1.00						
17. Depth of flow, d		ft.	0.40	0.50						
18. Cross sectional flow area, A (assume trapazoidal)		$ft.^2$	1.76	3.25		0.00		0.00		
19. Wetted perimeter, P_w		ft.	5.13	7.41		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$		ft.	0.34	0.44		0.00		0.00		
21. Channel slope, s		ft./ft.	0.044	0.022						
22. Manning's roughness coeff., n			0.070	0.060						
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$		fps.	2.20	2.15		0.00		0.00		
24. Flow length, L		ft.	677.0	756.0						
25. $T_t = \frac{L}{3600 * V}$		hr.	0.086	+ 0.098	+	0.000	+	0.000	=	0.183
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)										1.657
								hr.		

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: CB-40

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID		
		A-B		
1. Surface description (Table 3-1)		woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.600		
3. Flow Length, L (< 300ft)	ft.	300.0		
4. Two-year 24-hr rainfall, P_2	in.	3.30		
5. Land slope, s	ft./ft.	0.043		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.862	=	0.862

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID								
		B-C								
7. Surface description		woods								
8. Manning's roughness coeff., n		0.090								
9. Paved or unpaved		unpaved								
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.	0.40								
11. Flow Length, L	ft.	675.0								
12. Watercourse slope, s	ft./ft.	0.041								
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	1.83		0.00		0.00		0.00		
14. $T_t = \frac{L}{3600 * V}$	hr.	0.102	+	0.000	+	0.000	+	0.000	=	0.102

Channel flow

		Segment ID								
		C-D		D-E						
15. Channel Bottom width, b	ft.	8.00		10.00						
16. Horizontal side slope component, z (z horiz:1 vert)		1.00		1.00						
17. Depth of flow, d	ft.	0.50		0.60						
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$	4.25		6.36		0.00		0.00		
19. Wetted perimeter, P_w	ft.	9.41		11.70		0.00		0.00		
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.	0.45		0.54		0.00		0.00		
21. Channel slope, s	ft./ft.	0.005		0.004						
22. Manning's roughness coeff., n		0.065		0.060						
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.	0.95		0.99		0.00		0.00		
24. Flow length, L	ft.	600.0		833.0						
25. $T_t = \frac{L}{3600 * V}$	hr.	0.175	+	0.233	+	0.000	+	0.000	=	0.408
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr.	1.372

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval — By: WM — Date:
Location: Darien — Checked: — Date:
Circle one: Present Developed — Watershed: Stony Brook
Circle one: Tc T_t — Subwatershed: CB-50

Sheet flow (applicable to T_c only)

Segment ID		A-B		
1. Surface description (Table 3-1)		woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)		0.600		
3. Flow Length, L (< 300ft)	ft.	300.0		
4. Two-year 24-hr rainfall, P_2	in.	3.30		
5. Land slope, s	ft./ft.	0.030		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.	0.998	=	0.998

Shallow concentrated flow (assume hyd. radius = depth of flow)

Segment ID		B-C							
7. Surface description		woods							
8. Manning's roughness coeff., n		0.100							
9. Paved or unpaved		unpaved							
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.	0.40							
11. Flow Length, L	ft.	230.0							
12. Watercourse slope, s	ft./ft.	0.074							
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.	2.20		0.00		0.00		0.00	
14. $T_t = \frac{L}{3600 * V}$	hr.	0.029	+	0.000	+	0.000	+	0.000	= 0.029

Channel flow

Segment ID		B-C		C-D		D-E			
15. Channel Bottom width, b	ft.	6.00		12" RCP		8.00			
16. Horizontal side slope component, z (z horiz:1 vert)		1.00		---		1.00			
17. Depth of flow, d	ft.	0.50		FULL		0.70			
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$	3.25		0.79		6.09		0.00	
19. Wetted perimeter, P_w	ft.	7.41		3.14		9.98		0.00	
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.	0.44		0.25		0.61		0.00	
21. Channel slope, s	ft./ft.	0.012		0.068		0.010			
22. Manning's roughness coeff., n		0.070		0.020		0.050			
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.	1.33		7.73		2.14		0.00	
24. Flow length, L	ft.	340.0		190.0		100.0			
25. $T_t = \frac{L}{3600 * V}$	hr.	0.071	+	0.007	+	0.013	+	0.000	= 0.091
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr. 1.118

Minimum Tc used in TR-55 = 0.100 hrs

Time of Concentration (T_c) or Travel Time (T_t) Worksheet

Project: Stony Brook Watershed Drainage Eval
Location: Darien
Circle one: Present Developed
Circle one: Tc T_t

By: WM
Checked:
Watershed: Stony Brook
Subwatershed: CB-60

Date:
Date:

Sheet flow (applicable to T_c only)

		Segment ID	A-B		
1. Surface description (Table 3-1)			woods		
2. Manning's roughness coeff. for sheet flow, n (Table 3-1)			0.600		
3. Flow Length, L (< 300ft)	ft.		300.0		
4. Two-year 24-hr rainfall, P_2	in.		3.30		
5. Land slope, s	ft./ft.		0.023		
6. $T_t = \frac{0.007(nL)^{0.8}}{P_2^{0.5}(s^{0.4})}$	hr.		1.104	=	1.104

Shallow concentrated flow (assume hyd. radius = depth of flow)

		Segment ID	B-C							
7. Surface description			woods							
8. Manning's roughness coeff., n			0.100							
9. Paved or unpaved			unpaved							
10. Depth of flow, d (default: d=.4 unpaved, d=.2 paved)	ft.		0.40							
11. Flow Length, L	ft.		300.0							
12. Watercourse slope, s	ft./ft.		0.033							
13. Average velocity, $V = \frac{1.49}{n}(d^{2/3})(s^{1/2})$	fps.		1.48		0.00		0.00		0.00	
14. $T_t = \frac{L}{3600 * V}$	hr.		0.056	+	0.000	+	0.000	+	0.000	= 0.056

Channel flow

		Segment ID	C-D		D-E		E-F			
15. Channel Bottom width, b	ft.		10.00		10.00		12.00			
16. Horizontal side slope component, z (z horiz:1 vert)			1.00		8.00		1.00			
17. Depth of flow, d	ft.		0.60		0.60		0.60			
18. Cross sectional flow area, A (assume trapazoidal)	$ft.^2$		6.36		8.88		7.56		0.00	
19. Wetted perimeter, P_w	ft.		11.70		19.67		13.70		0.00	
20. Hydraulic Radius, $R = \frac{A}{P_w}$	ft.		0.54		0.45		0.55		0.00	
21. Channel slope, s	ft./ft.		0.015		0.024		0.008			
22. Manning's roughness coeff., n			0.065		0.030		0.055			
23. $V = \frac{1.49}{n}(R^{2/3})(s^{1/2})$	fps.		1.87		4.52		1.63		0.00	
24. Flow length, L	ft.		1000.0		335.0		376.0			
25. $T_t = \frac{L}{3600 * V}$	hr.		0.149	+	0.021	+	0.064	+	0.000	= 0.233
26. Watershed or subarea T_c or T_t (add T_t in steps 6, 14 & 25)									hr.	1.393

Minimum Tc used in TR-55 = 0.100 hrs