

CÁLCULO DA CAPACIDADE TWO WAY STOP-CONTROLLED INTERSECTION

Worksheet 1												
General Information						Site Information						
Analyst	Reilly Algoal					Intersection	R. Tertuliana					
Agency or Company	Agari Engenharia					Jurisdiction	Paranaguá					
Date Performed	27-Mar-18					Analysis Year	2018					
Analysis Time Period												
Worksheet 2												
Vehicle Volumes and Adjustment												
Movement	Vehicle Volumes and Adjustments											
	1	2	3	4	5	6	7	8	9	10	11	12
Volume (veh/h), V	35	445	4	10	395	66	3	4	3	44	1	43
Peak-hour factor, PHF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Hourly flow rate, v (veh/hr)	35.0	445.0	4.0	10.0	395.0	66.0	3.0	4.0	3.0	44.0	1.0	43.0
Proportion of heavy vehicles, P _{HV}	0.34	0.47	0.00	0.80	0.20	0.12	0.00	0.50	0.67	0.09	0.00	0.09
Pedestrian Volumes and Adjustments												
Movement	13			14			15			16		
Flow, V _p (ped/h)	28			28			85			85		
Lane width, w (m)	3.60			3.60			3.60			3.60		
Walking speed ¹ , S _w (m/s)	1.2			1.2			1.2			1.2		
Percent blockage, fp (Eq 17-11)	0.023			0.023			0.071			0.071		
	9.5962682			0.49			10.3542			0.18		
	A			B			D			D		

Worksheet 3									
Lane Designation: Here, Lane 1 is the lane closest to the centerline, etc.									
Movements	Lane 1	Lane 2	Lane 3	Grade, G	Channel RT				
1, 2, 3	1,2,3			0.00	No				
4, 5, 6	4,5,6			0.00	No				
7, 8, 9	7,8,9			0.00	No				
10, 11, 12	10,11,12			0.00	No				
Flared Minor Street Approach									
Movement 9	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Storage space, veh	0					
Movement 12	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Storage space, veh	0					
Median Storage*									
*Includes raised median or striped median (RM) or two-way left-turn lane (TWLTL)									
Movements 7 and 8	<input type="checkbox"/> Yes	Type Raised Curb <input checked="" type="checkbox"/> No	Storage space, veh	0					
Movements 10 and 11	<input type="checkbox"/> Yes	Type Raised Curb <input checked="" type="checkbox"/> No	Storage space, veh	0					
Upstream Signals									
	Mvmts	D(m)	Sprog (km/h)	Cycle (s)	GrnEff (s)	ArrType	SatFlw, s (veh/hg)	Vprog (veh/h)	Factor f
S ₂	Pro-LT								
	TH								
S ₅	Pro-LT								
	TH								
Delay to Major Street Vehicles: These data are for the subject unsignalized intersection									
Shared lane volume, major street through vehicles, v ₁₁			Movement 2		Movement 5				
			445		395				
Shared lane volume, major street right vehicles, v ₂			4		66				
Saturation flow rate, major street through vehicles, s ₁₁			3400		3400				
Saturation flow rate, major street right vehicles, s ₂			1700		1700				
Number of major street through lanes			1		1				
Length of study period, T (h)			34.00						

Worksheet 10								
Control Delay, Queue Length, Level of Service								
Lane	Movement	v (veh/h)	cm (veh/h)	v/c	Queue Length (Eq 17-37)	Control Delay (Eq 17-38)	LOS (Exhibit 17-2)	Delay and LOS
1	7,8,9	10	162	0.062	0.2	28.7	D	28.7
2								D
3								
1	10,11,12	88	216	0.407	2.1	33.0	D	33.0
2								D
3								
Movement		v (veh/h)	cm (veh/h)	v/c	Queue Length (Eq 17-37)	Control Delay (Eq 17-38)	LOS (Exhibit 17-2)	
1		35	818	0.043	0.1	9.6	A	
4		10	682	0.015	0.0	10.4	B	

Worksheet 11			
Delay to Rank 1 Vehicles			
		S ₂ Approach	S ₅ Approach
p _{0,j} (Equation 17-5)		p _{0,1} = 0.96	p _{0,4} = 0.99
V _{i1} , volume for stream 2 or 5		445.00	395
V _{i2} , volume for stream 3 or 6		4	66
S _{i1} , saturation flow rate for stream 2 or 5		3400	3400
S _{i2} , saturation flow rate for stream 3 or 6		1700	1700
p* _{0,j} (Equation 17-16)		p* _{0,1} = 0.9494	p* _{0,4} = 0.9831
d _{major left} , delay for stream 1 or 4		9.60	10.35
N, number of major street through lanes		1	1
d _{rank 1} , delay for stream 2 or 5 (Equation 17-39)		0.49	0.18

CÁLCULO DA CAPACIDADE SEM O EMPREENDIMENTO

TWO WAY STOP-CONTROLLED INTERSECTION

Worksheet 1												
General Information						Site Information						
Analyst	Reilly Algodual					Intersection	R. Tertuliana					
Agency or Company	Agari Engenharia					Jurisdiction	Paranaguá					
Date Performed	27-Mar-18					Analysis Year	2018					
Analysis Time Period												
Worksheet 2												
Vehicle Volumes and Adjustment												
Movement	Vehicle Volumes and Adjustments											
	1	2	3	4	5	6	7	8	9	10	11	12
Volume (veh/h), V	35	445	4	10	395	62	3	4	3	40	1	43
Peak-hour factor, PHF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Hourly flow rate, v (veh/hr)	35.0	445.0	4.0	10.0	395.0	62.0	3.0	4.0	3.0	40.0	1.0	43.0
Proportion of heavy vehicles, P _{HV}	0.34	0.47	0.00	0.80	0.20	0.12	0.00	0.50	0.67	0.09	0.00	0.09
Pedestrian Volumes and Adjustments												
Movement	13			14			15			16		
Flow, V _p (ped/h)	28			28			85			85		
Lane width, w (m)	3.60			3.60			3.60			3.60		
Walking speed, S _w (m/s)	1.2			1.2			1.2			1.2		
Percent blockage, I _p (Eq 17-11)	0.023			0.023			0.071			0.071		
	9.5788785	0.48	10.3542	0.18	28.5599	0.071	30.94429652					
	A		B		D		D					

Worksheet 3									
Lane Designation: Here, Lane 1 is the lane closest to the centerline, etc.									
Movements	Lane 1	Lane 2	Lane 3	Grade, G	Channel RT				
1, 2, 3	1,2,3			0.00	No				
4, 5, 6	4,5,6			0.00	No				
7, 8, 9	7,8,9			0.00	No				
10, 11, 12	10,11,12			0.00	No				
Flared Minor Street Approach									
Movement 9	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Storage space, veh	0					
Movement 12	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Storage space, veh	0					
Median Storage*									
*includes raised median or striped median (RM) or two-way left-turn lane (TWLTL)									
	Type								
Movements 7 and 8	<input type="checkbox"/> Yes	Raised Curb	<input checked="" type="checkbox"/> No	Storage space, veh	0				
Movements 10 and 11	<input type="checkbox"/> Yes	Raised Curb	<input checked="" type="checkbox"/> No	Storage space, veh	0				
Upstream Signals									
	Mvmts	D(m)	Sprog (km/h)	Cycle (s)	GrnEff (s)	ArrType	SatFlw, s (veh/hg)	Vprog (veh/h)	Factor f
S ₂	Pro-LT								
	TH								
S ₅	Pro-LT								
	TH								
Delay to Major Street Vehicles: These data are for the subject unsignalized intersection									
				Movement 2	Movement 5				
Shared lane volume, major street through vehicles, V ₁				445	395				
Shared lane volume, major street right vehicles, V ₂				4	62				
Saturation flow rate, major street through vehicles, S ₁				3400	3400				
Saturation flow rate, major street right vehicles, S ₂				1700	1700				
Number of major street through lanes				1	1				
Length of study period, T (h)				34.00					

Worksheet 10								
Control Delay, Queue Length, Level of Service								
Lane	Movement	v (veh/h)	cm (veh/h)	v/c	Queue Length (Eq 17-37)	Control Delay (Eq 17-38)	LOS (Exhibit 17-2)	Delay and LOS
1	7,8,9	10	163	0.061	0.2	28.6	D	28.6
2								D
3								
1	10,11,12	84	223	0.377	1.8	30.9	D	30.9
2								D
3								
Movement		v (veh/h)	cm (veh/h)	v/c	Queue Length (Eq 17-37)	Control Delay (Eq 17-38)	LOS (Exhibit 17-2)	
1		35	821	0.043	0.1	9.6	A	
4		10	682	0.015	0.0	10.4	B	

Worksheet 11				
Delay to Rank 1 Vehicles				
		S ₂ Approach		S ₅ Approach
p _{0,j} (Equation 17-5)		p _{0,1} =		p _{0,4} =
V ₁₁ , volume for stream 2 or 5		445.00		395
V ₁₂ , volume for stream 3 or 6		4		62
S ₁₁ , saturation flow rate for stream 2 or 5		3400		3400
S ₁₂ , saturation flow rate for stream 3 or 6		1700		1700
p* _{0,j} (Equation 17-16)		p* _{0,1} =		p* _{0,4} =
d _{major left} , delay for stream 1 or 4		9.58		10.35
N, number of major street through lanes		1		1
d _{rank 1} , delay for stream 2 or 5 (Equation 17-39)		0.48		0.18

PROJEÇÃO DA CAPACIDADE +5 ANOS

TWO WAY STOP-CONTROLLED INTERSECTION

General Information		Site Information	
Analyst	Reilly Algodual	Intersection	R. Tertuliana
Agency or Company	Agari Engenharia	Jurisdiction	Paranaguá
Date Performed	27-Mar-18	Analysis Year	2018
Analysis Time Period			

Vehicle Volumes and Adjustment												
Movement	Vehicle Volumes and Adjustments											
	1	2	3	4	5	6	7	8	9	10	11	12
Volume (veh/h), V	37	472	4	11	419	70	3	4	3	47	1	46
Peak-hour factor, PHF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Hourly flow rate, v (veh/hr)	37.0	472.0	4.0	11.0	419.0	70.0	3.0	4.0	3.0	47.0	1.0	46.0
Proportion of heavy vehicles, P _{HV}	0.34	0.47	0.00	0.80	0.20	0.12	0.00	0.50	0.67	0.09	0.00	0.09

Pedestrian Volumes and Adjustments				
Movement	13	14	15	16
Flow, V _p (ped/h)	28	28	85	85
Lane width, w (m)	3.60	3.60	3.60	3.60
Walking speed ¹ , S _w (m/s)	1.2	1.2	1.2	1.2
Percent blockage, fp (Eq 17-11)	0.023	0.023	0.071	0.071
	9.7324395 A	0.54 B	10.5092 D	31.21641 E

Worksheet 3						
Lane Designation: Here, Lane 1 is the lane closest to the centerline, etc.						
Movements	Lane 1	Lane 2	Lane 3	Grade, G	Channel RT	
1, 2, 3	1,2,3			0.00	No	
4, 5, 6	4,5,6			0.00	No	
7, 8, 9	7,8,9			0.00	No	
10, 11, 12	10,11,12			0.00	No	

Flared Minor Street Approach						
Movement 9	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Storage space, veh	0		
Movement 12	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Storage space, veh	0		

Median Storage ¹						
¹ Includes raised median or striped median (RM) or two-way left-turn lane (TWLTL)						
Movements 7 and 8	<input type="checkbox"/> Yes	Type Raised Curb <input checked="" type="checkbox"/> No	Storage space, veh	0		
Movements 10 and 11	<input type="checkbox"/> Yes	Type Raised Curb <input checked="" type="checkbox"/> No	Storage space, veh	0		

Upstream Signals									
	Mvmts	D(m)	Sprog (km/h)	Cycle (s)	GrnEff (s)	ArrType	SatFlw, s (veh/hg)	Vprog (veh/h)	Factor f
S ₂	Pro-LT								
	TH								
S ₅	Pro-LT								
	TH								

Delay to Major Street Vehicles: These data are for the subject unsignalized intersection			
	Movement 2	Movement 5	
Shared lane volume, major street through vehicles, v ₁	472	419	
Shared lane volume, major street right vehicles, v ₂	4	70	
Saturation flow rate, major street through vehicles, S ₁	3400	3400	
Saturation flow rate, major street right vehicles, S ₂	1700	1700	
Number of major street through lanes	1	1	
Length of study period, T (h)	34.00		

Worksheet 10								
Control Delay, Queue Length, Level of Service								
Lane	Movement	v (veh/h)	cm (veh/h)	v/c	Queue Length (Eq 17-37)	Control Delay (Eq 17-38)	LOS (Exhibit 17-2)	Delay and LOS
1	7,8,9	10	147	0.068	0.2	31.2	D	31.2 D
2								
3								
1	10,11,12	94	198	0.474	2.7	39.5	E	39.5 E
2								
3								

Movement	v (veh/h)	cm (veh/h)	v/c	Queue Length (Eq 17-37)	Control Delay (Eq 17-38)	LOS (Exhibit 17-2)
1	37	798	0.046	0.1	9.7	A
4	11	664	0.017	0.1	10.5	B

Worksheet 11			
Delay to Rank 1 Vehicles			
	S ₂ Approach	S ₅ Approach	
p _{0,j} (Equation 17-5)	p _{0,1} = 0.95	p _{0,4} =	0.98
v _{1i} , volume for stream 2 or 5	472.00		419
v _{2i} , volume for stream 3 or 6	4		70
s _{1i} , saturation flow rate for stream 2 or 5	3400		3400
s _{2i} , saturation flow rate for stream 3 or 6	1700		1700
p* _{0,j} (Equation 17-16)	p* _{0,1} = 0.9445	p* _{0,4} =	0.9807
d _{major left} , delay for stream 1 or 4	9.73		10.51
N, number of major street through lanes	1		1
d _{rank 1} , delay for stream 2 or 5 (Equation 17-39)	0.54		0.20

PROJEÇÃO DA CAPACIDADE +10 ANOS

TWO WAY STOP-CONTROLLED INTERSECTION

Worksheet 1												
General Information						Site Information						
Analyst	Reilly Algodual					Intersection	R. Tertuliana					
Agency or Company	Agari Engenharia					Jurisdiction	Paraguá					
Date Performed	27-Mar-18					Analysis Year	2018					
Analysis Time Period												
Worksheet 2												
Vehicle Volumes and Adjustments												
Movement	Vehicle Volumes and Adjustments											
	1	2	3	4	5	6	7	8	9	10	11	12
Volume (veh/h), V	39	495	4	11	440	73	3	4	3	49	1	48
Peak-hour factor, PHF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Hourly flow rate, v (veh/hr)	39.0	495.0	4.0	11.0	440.0	73.0	3.0	4.0	3.0	49.0	1.0	48.0
Proportion of heavy vehicles, P _{HV}	0.34	0.47	0.00	0.80	0.20	0.12	0.00	0.50	0.67	0.09	0.00	0.09
Pedestrian Volumes and Adjustments												
Movement	13			14			15			16		
Flow, V _p (ped/h)	31			31			95			95		
Lane width, w (m)	3.60			3.60			3.60			3.60		
Walking speed ¹ , S _w (m/s)	1.2			1.2			1.2			1.2		
Percent blockage, fp (Eq 17-11)	0.026			0.026			0.079			0.079		
	9.9485105			0.61			10.7473			0.22		
	A			B			E			F		

Worksheet 3									
Lane Designation: Here, Lane 1 is the lane closest to the centerline, etc.									
Movements	Lane 1	Lane 2	Lane 3	Grade, G	Channel RT				
1, 2, 3	1,2,3			0.00	No				
4, 5, 6	4,5,6			0.00	No				
7, 8, 9	7,8,9			0.00	No				
10, 11, 12	10,11,12			0.00	No				
Flared Minor Street Approach									
Movement 9	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Storage space, veh	0					
Movement 12	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Storage space, veh	0					
Median Storage*									
*Includes raised median or striped median (RM) or two-way left-turn lane (TWLTL)									
Movements 7 and 8	<input type="checkbox"/> Yes	Type	Storage space, veh	0					
Movements 10 and 11	<input type="checkbox"/> Yes	Raised Curb	Storage space, veh	0					
Upstream Signals									
	Mvmts	D(m)	Sprog (km/h)	Cycle (s)	GmEff (s)	ArrType	SatFlw, s (veh/hg)	Vprog (veh/h)	Factor f
S ₂	Pro-LT								
	TH								
S ₅	Pro-LT								
	TH								
Delay to Major Street Vehicles: These data are for the subject unsignalized intersection									
Shared lane volume, major street through vehicles, v ₁₁			Movement 2		Movement 5				
495			495		440				
Shared lane volume, major street right vehicles, v ₁₂			4		73				
3400			3400		3400				
Saturation flow rate, major street through vehicles, s ₁₁			1700		1700				
1700			1700		1700				
Number of major street through lanes			1		1				
1			1		1				
Length of study period, T (h)			34.00						

Worksheet 10								
Control Delay, Queue Length, Level of Service								
Lane	Movement	v (veh/h)	cm (veh/h)	v/c	Queue Length (Eq 17-37)	Control Delay (Eq 17-38)	LOS (Exhibit 17-2)	Delay and LOS
1	7,8,9	17	130	0.131	0.5	36.9	E	36.9
2								E
3								
1	10,11,12	98	176	0.556	3.7	50.9	F	50.9
2								F
3								
Movement		v (veh/h)	cm (veh/h)	v/c	Queue Length (Eq 17-37)	Control Delay (Eq 17-38)	LOS (Exhibit 17-2)	
1		39	766	0.051	0.2	9.9	A	
4		11	637	0.017	0.1	10.7	B	

Worksheet 11			
Delay to Rank 1 Vehicles			
	S ₂ Approach	S ₅ Approach	
p _{0,j} (Equation 17-5)	p _{0,1} =	0.95	p _{0,4} = 0.98
V _{i1} , volume for stream 2 or 5		495.00	440
V _{i2} , volume for stream 3 or 6		4	73
S _{i1} , saturation flow rate for stream 2 or 5		3400	3400
S _{i2} , saturation flow rate for stream 3 or 6		1700	1700
p* _{0,jr} (Equation 17-16)	p* _{0,1} =	0.9385	p* _{0,4} = 0.9797
d _{major left} , delay for stream 1 or 4		9.95	10.75
N, number of major street through lanes		1	1
d _{rank 1} , delay for stream 2 or 5 (Equation 17-39)		0.61	0.22

PROJEÇÃO DA CAPACIDADE +20 ANOS

TWO WAY STOP-CONTROLLED INTERSECTION

Worksheet 1												
General Information						Site Information						
Analyst	Reilly Algodual					Intersection	R. Tertuliana					
Agency or Company	Agari Engenharia					Jurisdiction	Paranaguá					
Date Performed	27-Mar-18					Analysis Year	2018					
Analysis Time Period												
Worksheet 2												
Vehicle Volumes and Adjustment												
Movement	Vehicle Volumes and Adjustments											
	1	2	3	4	5	6	7	8	9	10	11	12
Volume (veh/h), V	42	528	5	12	469	78	4	5	4	52	1	51
Peak-hour factor, PHF	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Hourly flow rate, v (veh/hr)	42.0	528.0	5.0	12.0	469.0	78.0	4.0	5.0	4.0	52.0	1.0	51.0
Proportion of heavy vehicles, P _{HV}	0.34	0.47	0.00	0.80	0.20	0.12	0.00	0.50	0.67	0.09	0.00	0.09
Pedestrian Volumes and Adjustments												
Movement	13			14			15			16		
Flow, V _p (ped/h)	33			33			101			101		
Lane width, w (m)	3.60			3.60			3.60			3.60		
Walking speed, S _w (m/s)	1.2			1.2			1.2			1.2		
Percent blockage, fp (Eq 17-11)	0.028			0.028			0.084			0.084		
	10.194329			0.71			11.0268			0.26		
	B			B			E			F		

Worksheet 3									
Lane Designation: Here, Lane 1 is the lane closest to the centerline, etc.									
Movements	Lane 1	Lane 2	Lane 3	Grade, G	Channel RT				
1, 2, 3	1,2,3			0.00	No				
4, 5, 6	4,5,6			0.00	No				
7, 8, 9	7,8,9			0.00	No				
10, 11, 12	10,11,12			0.00	No				
Flared Minor Street Approach									
Movement 9	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No	Storage space, veh	0			
Movement 12	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No	Storage space, veh	0			
Median Storage*									
*Includes raised median or striped median (RM) or two-way left-turn lane (TWLTL)									
		Type							
Movements 7 and 8	<input type="checkbox"/>	Yes	Raised Curb	<input checked="" type="checkbox"/>	No	Storage space, veh 0			
Movements 10 and 11	<input type="checkbox"/>	Yes	Raised Curb	<input checked="" type="checkbox"/>	No	Storage space, veh 0			
Upstream Signals									
	Mvmts	D(m)	Sprog (km/h)	Cycle (s)	GrnEff (s)	ArrType	SatFlw, s (veh/hg)	Vprog (veh/h)	Factor f
S ₂	Pro-LT								
	TH								
S ₅	Pro-LT								
	TH								
Delay to Major Street Vehicles: These data are for the subject unsignalized intersection									
					Movement 2	Movement 5			
Shared lane volume, major street through vehicles, v ₁₁					528	469			
Shared lane volume, major street right vehicles, v ₂					5	78			
Saturation flow rate, major street through vehicles, s ₁₁					3400	3400			
Saturation flow rate, major street right vehicles, s ₂					1700	1700			
Number of major street through lanes					1	1			
Length of study period, T (h)					34.00				

Worksheet 10								
Control Delay, Queue Length, Level of Service								
Lane	Movement	v (veh/h)	cm (veh/h)	v/c	Queue Length (Eq 17-37)	Control Delay (Eq 17-38)	LOS (Exhibit 17-2)	Delay and LOS
1	7,8,9	13	112	0.116	0.4	41.2	E	41.2 E
2								
3								
1	10,11,12	104	152	0.685	6.5	80.2	F	80.2 F
2								
3								
Movement	v (veh/h)	cm (veh/h)	v/c	Queue Length (Eq 17-37)	Control Delay (Eq 17-38)	LOS (Exhibit 17-2)		
1	42	735	0.057	0.2	10.2	B		
4	12	609	0.020	0.1	11.0	B		

Worksheet 11			
Delay to Rank 1 Vehicles			
	S ₂ Approach		S ₅ Approach
p _{0,1} (Equation 17-5)	p _{0,1} = 0.94		p _{0,4} = 0.98
v ₁₁ , volume for stream 2 or 5	528.00		469
v ₂ , volume for stream 3 or 6	5		78
s ₁₁ , saturation flow rate for stream 2 or 5	3400		3400
s ₂ , saturation flow rate for stream 3 or 6	1700		1700
p* _{0,j} (Equation 17-16)	p* _{0,1} = 0.9300		p* _{0,4} = 0.9766
d _{major left} , delay for stream 1 or 4	10.19		11.03
N, number of major street through lanes	1		1
d _{rank 1} , delay for stream 2 or 5 (Equation 17-39)	0.71		0.26