

Volume 11
 Peak Hour Factor, PHF 0.91
 Hourly Flow Rate, HFR 12
 Percent Heavy Vehicles 0
 Percent Grade (%) 0 / 0
 Flared Approach: Exists?/Storage / /
 Lanes 1
 Configuration L

Delay, Queue Length, and Level of Service									
Approach	EB	WB	Northbound				Southbound		
Movement	1	4	7	8	9	10	11	12	
Lane Config		LT	L						
v (vph)		20	12						
C(m) (vph)		1597	224						
v/c		0.01	0.05						
95% queue length		0.04	0.17						
Control Delay		7.3	22.0						
LOS		A	C						
Approach Delay				22.0					
Approach LOS				C					

HCS+: Unsignalized Intersections Release 5.6

Phone:
E-Mail:

Fax:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: J
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA
 East/West Street: M2-M10
 North/South Street: M9
 Intersection Orientation: EW
 Study period (hrs): 1.00

Vehicle Volumes and Adjustments						
Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume				19	1987	
Peak-Hour Factor, PHF				0.91	0.91	
Peak-15 Minute Volume				5	546	
Hourly Flow Rate, HFR				20	2183	
Percent Heavy Vehicles		--	--	6	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes				0	2	
Configuration				LT	T	
Upstream Signal?		No			No	
Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	11					
Peak Hour Factor, PHF	0.91					
Peak-15 Minute Volume	3					
Hourly Flow Rate, HFR	12					
Percent Heavy Vehicles	0					
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized						

Lanes 1
Configuration L

Pedestrian Volumes and Adjustments				
Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

Upstream Signal Data							
	Prog. Flow	Sat Flow	Arrival Type	Green Time	Cycle Length	Prog. Speed	Distance to Signal
	vph	vph		sec	sec	kph	meters
S2 Left-Turn Through							
S5 Left-Turn Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		0
Shared ln volume, major rt vehicles:		0
Sat flow rate, major th vehicles:		1700
Sat flow rate, major rt vehicles:		1700
Number of major street through lanes:		2

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)		4.1	7.1					
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		6	0					
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70					
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage		4.2	6.4					
2-stage								

Follow-Up Time Calculations								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)		2.20	3.50					
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		6	0					
t(f)		2.3	3.5					

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				
Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from Exhibit 16-11)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)

alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p		0.000		0.000

Computation 3-Platoon Event Periods Result

p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
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p(1)			
p(4)			
p(7)			
p(8)			
p(9)			
p(10)			
p(11)			
p(12)			

Computation 4 and 5
Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c,x		0	1131					
s								
Px								
V c,u,x								

C r,x								
C plat,x								

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2

V(c,x)								
s		3000						
P(x)								
V(c,u,x)								

C(r,x)								
C(plat,x)								

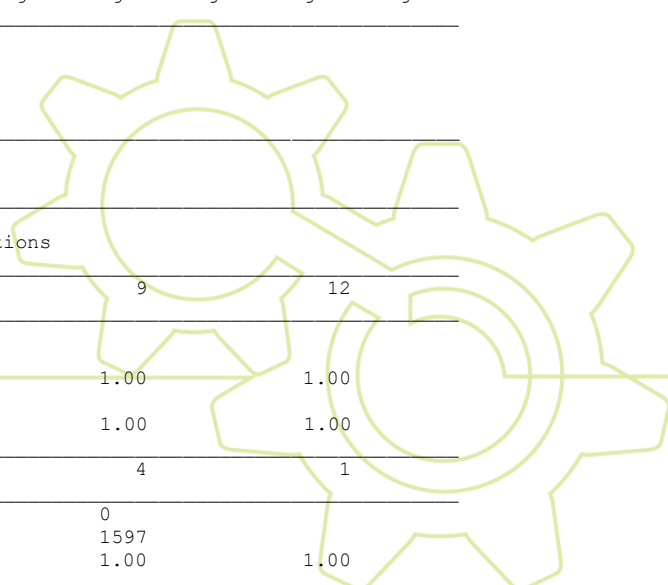
Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.		9		12
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Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor		1.00		1.00
Movement Capacity				
Probability of Queue free St.		1.00		1.00

Step 2: LT from Major St.		4		1
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Conflicting Flows		0		
Potential Capacity		1597		
Pedestrian Impedance Factor		1.00		1.00



Movement Capacity	1597	
Probability of Queue free St.	0.99	1.00
Maj L-Shared Prob Q free St.	0.99	

Step 3: TH from Minor St.	8	11
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Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.99	0.99
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
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Conflicting Flows	1131	
Potential Capacity	227	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.99
Maj. L, Min T Adj. Imp Factor.		0.99
Cap. Adj. factor due to Impeding mvmnt	0.99	0.99
Movement Capacity	224	

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
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Part 1 - First Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		

Part 2 - Second Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 3 - Single Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.99	0.99
Movement Capacity		

Result for 2 stage process:

a

Y

C t

Probability of Queue free St.	1.00	1.00
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Step 4: LT from Minor St.	7	10
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Part 1 - First Stage

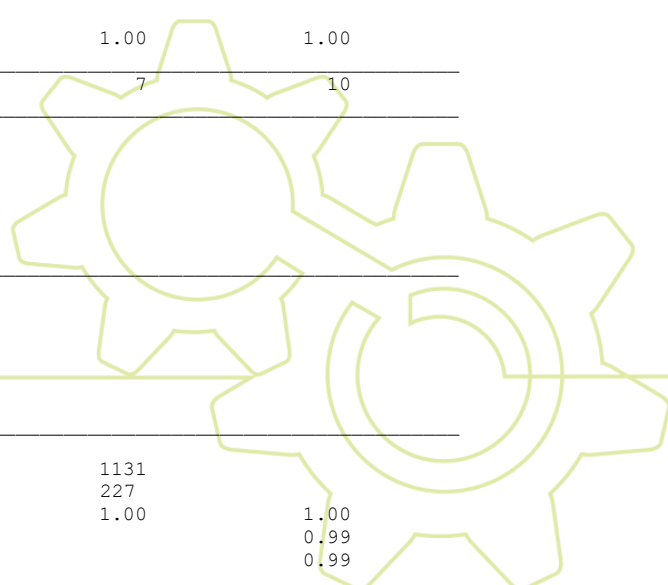
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 2 - Second Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 3 - Single Stage

Conflicting Flows	1131	
Potential Capacity	227	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.99
Maj. L, Min T Adj. Imp Factor.		0.99



Cap. Adj. factor due to Impeding mvmnt 0.99
Movement Capacity 224

Results for Two-stage process:

a
y
C t 224

Worksheet 8-Shared Lane Calculations

Movement	7 L	8 T	9 R	10 L	11 T	12 R
Volume (vph)	12					
Movement Capacity (vph)	224					
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

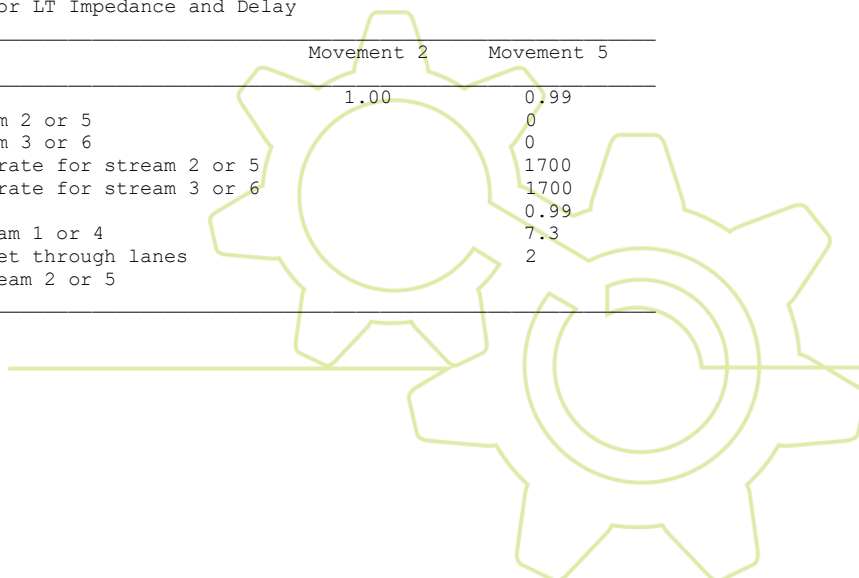
Movement	7 L	8 T	9 R	10 L	11 T	12 R
C sep	224					
Volume	12					
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config		LT	L					
v (vph)		20	12					
C(m) (vph)		1597	224					
v/c		0.01	0.05					
95% queue length		0.04	0.17					
Control Delay		7.3	22.0					
LOS		A	C					
Approach Delay				22.0				
Approach LOS				C				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(i1), Volume for stream 2 or 5		0
v(i2), Volume for stream 3 or 6		0
s(i1), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)		0.99
d(M,LT), Delay for stream 1 or 4		7.3
N, Number of major street through lanes		2
d(rank,1) Delay for stream 2 or 5		



1.1.4 Memória de cálculo da análise de capacidade e níveis de serviço – Cenário FUTURO Com empreendimento em funcionamento e com acréscimo de área – USO COMERCIAL

1.1.4.1 Interseção A – Pico Manhã

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Manha
 Intersection: A
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: MOV01-MOV04
 North/South Street: MOV04
 Intersection Orientation: EW
 Study period (hrs): 1.00

		Vehicle Volumes and Adjustments					
Major Street:	Approach Movement	Eastbound			Westbound		
		1 L	2 T	3 R	4 L	5 T	6 R
	Volume		1819	48			
	Peak-Hour Factor, PHF		0.91	1.00			
	Hourly Flow Rate, HFR		1998	48			
	Percent Heavy Vehicles		--	--		--	--
	Median Type/Storage		Undivided		/		
	RT Channelized?						
	Lanes		2	0			
	Configuration		T	TR			
	Upstream Signal?		No			No	

		Northbound			Southbound		
Minor Street:	Approach Movement	7	8	9	10	11	12
		L	T	R	L	T	R
	Volume			15			
	Peak Hour Factor, PHF			0.91			
	Hourly Flow Rate, HFR			16			
	Percent Heavy Vehicles			0			
	Percent Grade (%)		0			0	
	Flared Approach: Exists?/Storage			/		/	
	Lanes			1			
	Configuration			R			

		Delay, Queue Length, and Level of Service							
Approach Movement	Lane Config	EB	WB	Northbound			Southbound		
		1	4	7	8	9	10	11	12
	v (vph)					16			
	C(m) (vph)					289			
	v/c					0.06			
	95% queue length					0.18			
	Control Delay					18.2			
	LOS					C			
	Approach Delay				18.2				
	Approach LOS				C				

HCS+: Unsignalized Intersections Release 5.6

Phone:

Fax:

E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Manha
 Intersection: A
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: MOV01-MOV04
 North/South Street: MOV04
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments						
Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1819	48			
Peak-Hour Factor, PHF		0.91	1.00			
Peak-15 Minute Volume		500	12			
Hourly Flow Rate, HFR		1998	48			
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		2	0			
Configuration		T	TR			
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			15			
Peak Hour Factor, PHF			0.91			
Peak-15 Minute Volume			4			
Hourly Flow Rate, HFR			16			
Percent Heavy Vehicles			0			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized			No			
Lanes			1			
Configuration			R			

Pedestrian Volumes and Adjustments				
Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

Upstream Signal Data							
	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2 Left-Turn Through							
S5 Left-Turn Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)					6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)					0			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)					0.00			
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage					6.2			
2-stage								

Follow-Up Time Calculations								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)					3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)					0			
t(f)					3.3			

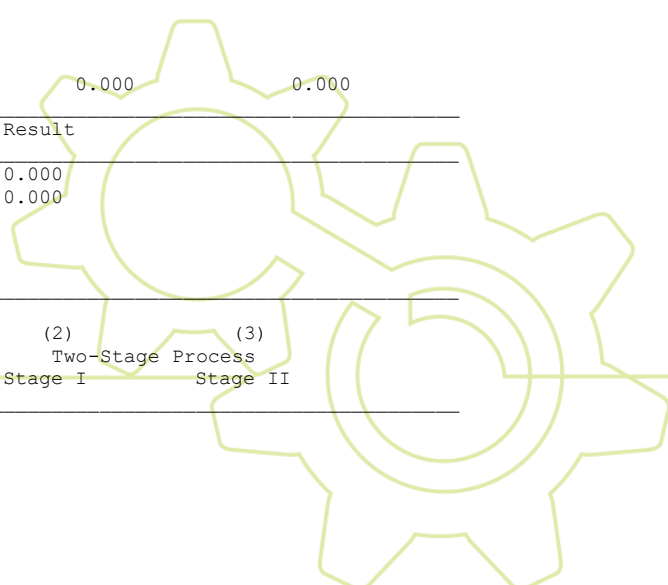
Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				
Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from Exhibit 16-11)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				

Computation 2-Proportion of TWSC Intersection Time blocked				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p		0.000		0.000

Computation 3-Platoon Event Periods		Result
p(2)		0.000
p(5)		0.000
p(dom)		
p(subo)		
Constrained or unconstrained?		

Proportion unblocked for minor movements, p(x)	(1)	(2)	(3)
	Single-stage Process	Two-Stage Process Stage I	Two-Stage Process Stage II
p(1)			
p(4)			
p(7)			
p(8)			
p(9)			
p(10)			
p(11)			



p(12)

Computation 4 and 5
Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c,x	1023							
s								
Px								
V c,u,x								

C r,x								
C plat,x								

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2

V(c,x)								
s								
P(x)								
V(c,u,x)								

C(r,x)								
C(plat,x)								

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
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Conflicting Flows	1023	
Potential Capacity	289	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	289	
Probability of Queue free St.	0.94	1.00

Step 2: LT from Major St.	4	1
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Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Maj L-Shared Prob Q free St.		

Step 3: TH from Minor St.	8	11
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Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00

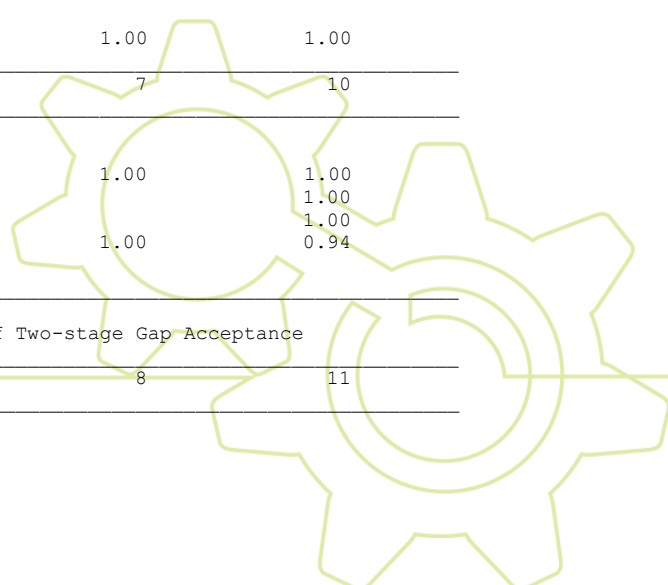
Step 4: LT from Minor St.	7	10
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Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		1.00
Maj. L, Min T Adj. Imp Factor.		1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	0.94
Movement Capacity		

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
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Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		



Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor 1.00 1.00
 Cap. Adj. factor due to Impeding mvmnt 1.00 1.00
 Movement Capacity

Result for 2 stage process:

a
 y
 C t
 Probability of Queue free St. 1.00 1.00

Step 4: LT from Minor St. 7 10

Part 1 - First Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor 1.00 1.00
 Maj. L, Min T Impedance factor 1.00
 Maj. L, Min T Adj. Imp Factor. 1.00
 Cap. Adj. factor due to Impeding mvmnt 1.00 0.94
 Movement Capacity

Results for Two-stage process:

a
 y
 C t

Worksheet 8-Shared Lane Calculations

Movement	7 L	8 T	9 R	10 L	11 T	12 R
Volume (vph)			16			
Movement Capacity (vph)			289			
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7 L	8 T	9 R	10 L	11 T	12 R
C sep			289			
Volume			16			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						

C act

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config					R			
v (vph)					16			
C(m) (vph)					289			
v/c					0.06			
95% queue length					0.18			
Control Delay					18.2			
LOS					C			
Approach Delay				18.2				
Approach LOS				C				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	1.00
v(i1), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(i1), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

1.1.4.2 Interseção A – Pico Tarde

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: A
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID:
 East/West Street: MOV01-MOV04
 North/South Street: MOV04
 Intersection Orientation: EW

Study period (hrs): 1.00

		Vehicle Volumes and Adjustments					
Major Street:	Approach Movement	Eastbound			Westbound		
		1 L	2 T	3 R	4 L	5 T	6 R
	Volume		731	154			
	Peak-Hour Factor, PHF		0.91	0.91			
	Hourly Flow Rate, HFR		803	169			
	Percent Heavy Vehicles		--	--		--	--
	Median Type/Storage		Undivided		/		
	RT Channelized?						
	Lanes		2	0			
	Configuration		T	TR			
	Upstream Signal?		No		No		
Minor Street:	Approach Movement	Northbound			Southbound		
		7 L	8 T	9 R	10 L	11 T	12 R
	Volume			164			
	Peak Hour Factor, PHF			0.91			
	Hourly Flow Rate, HFR			180			
	Percent Heavy Vehicles			0			
	Percent Grade (%)		0			0	
	Flared Approach: Exists?/Storage			/		/	

Lanes 1
Configuration R

Delay, Queue Length, and Level of Service									
Approach	EB	WB	Northbound				Southbound		
Movement	1	4	7	8	9	10	11	12	
Lane Config					R				
v (vph)					180				
C(m) (vph)					585				
v/c					0.31				
95% queue length					1.32				
Control Delay					13.9				
LOS					B				
Approach Delay					13.9				
Approach LOS					B				

HCS+: Unsignalized Intersections Release 5.6

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL (TWSC) ANALYSIS

Analyst: Progeplan
Agency/Co.:
Date Performed: 05/06/2023
Analysis Time Period: Pico Tarde
Intersection: A
Jurisdiction: DER/DF
Units: U. S. Metric
Analysis Year: 2023
Project ID:
East/West Street: MOV01-MOV04
North/South Street: MOV04
Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments						
Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		731	154			
Peak-Hour Factor, PHF		0.91	0.91			
Peak-15 Minute Volume		201	42			
Hourly Flow Rate, HFR		803	169			
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		2	0			
Configuration		T	TR			
Upstream Signal?		No		No		
Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			164			
Peak Hour Factor, PHF			0.91			
Peak-15 Minute Volume			45			
Hourly Flow Rate, HFR			180			
Percent Heavy Vehicles			0			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage			/	/		
RT Channelized			No			
Lanes			1			
Configuration			R			

Pedestrian Volumes and Adjustments				
Movements	13	14	15	16

Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

		Upstream Signal Data					
	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2	Left-Turn						
	Through						
S5	Left-Turn						
	Through						

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation									
Movement	1	4	7	8	9	10	11	12	
	L	L	L	T	R	L	T	R	
t(c,base)					6.2				
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
P(hv)					0				
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10	
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)					0.00				
t(c,T):	1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c)	1-stage				6.2				
	2-stage								

Follow-Up Time Calculations									
Movement	1	4	7	8	9	10	11	12	
	L	L	L	T	R	L	T	R	
t(f,base)					3.30				
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	
P(HV)					0				
t(f)					3.3				

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				
Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from Exhibit 16-11)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				

Computation 2-Proportion of TWSC Intersection Time blocked				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				

beta
 Travel time, t(a) (sec)
 Smoothing Factor, F
 Proportion of conflicting flow, f
 Max platooned flow, V(c,max)
 Min platooned flow, V(c,min)
 Duration of blocked period, t(p)
 Proportion time blocked, p 0.000 0.000

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Process Stage II
p(1)			
p(4)			
p(7)			
p(8)			
p(9)			
p(10)			
p(11)			
p(12)			

Computation 4 and 5 Single-Stage Process									
Movement	1	4	7	8	9	10	11	12	
	L	L	L	T	R	L	T	R	

V c,x	486
s	
Px	
V c,u,x	

C r,x	
C plat,x	

Two-Stage Process								
	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2

V(c,x)	
s	
P(x)	
V(c,u,x)	

C(r,x)	
C(plat,x)	

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	486	
Potential Capacity	585	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	585	
Probability of Queue free St.	0.69	1.00
Step 2: LT from Major St.	4	1
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Maj L-Shared Prob Q free St.		
Step 3: TH from Minor St.	8	11

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
---------------------------	---	----

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		1.00
Maj. L, Min T Adj. Imp Factor.		1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	0.69
Movement Capacity		

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
---------------------------	---	----

Part 1 - First Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		

Part 2 - Second Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 3 - Single Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		

Result for 2 stage process:

a		
y		
C t		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
---------------------------	---	----

Part 1 - First Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 2 - Second Stage

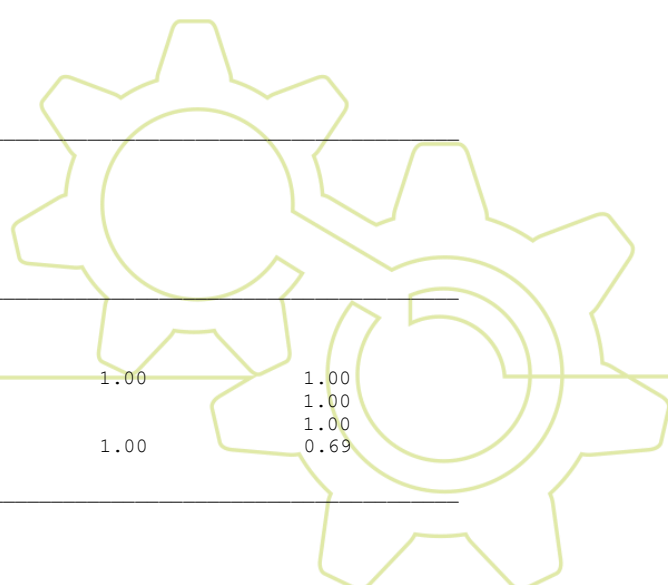
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 3 - Single Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		1.00
Maj. L, Min T Adj. Imp Factor.		1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	0.69
Movement Capacity		

Results for Two-stage process:

a		
y		



C t

Worksheet 8-Shared Lane Calculations

Movement	7 L	8 T	9 R	10 L	11 T	12 R
Volume (vph)			180			
Movement Capacity (vph)			585			
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7 L	8 T	9 R	10 L	11 T	12 R
C sep			585			
Volume			180			
Delay						
Q sep						
Q sep +1 round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config					R			
v (vph)					180			
C(m) (vph)					585			
v/c					0.31			
95% queue length					1.32			
Control Delay					13.9			
LOS					B			
Approach Delay				13.9				
Approach LOS				B				

Worksheet 11-Shared Major LT Impedance and Delay

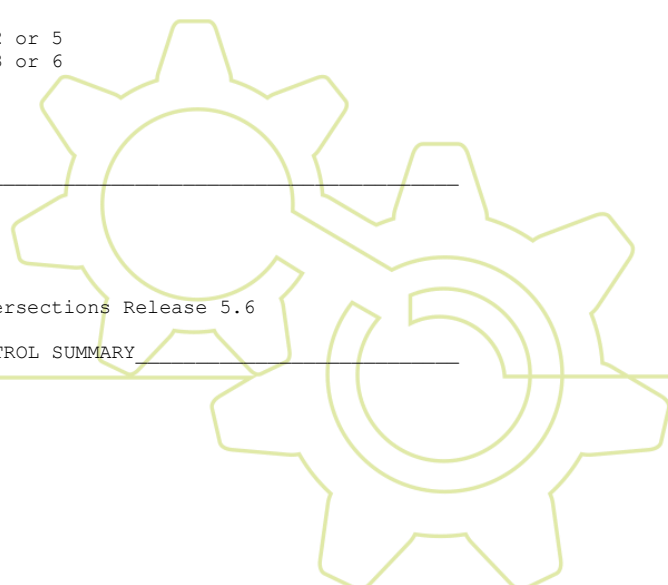
	Movement 2	Movement 5
p(oj)	1.00	1.00
v(i1), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(i1), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

1.1.4.3 Interseção B – Pico Manhã

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Manha
 Intersection: B
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL



East/West Street: M2
 North/South Street: M7
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments							
Major Street: Approach Movement	Eastbound				Westbound		
	1 L	2 T	3 R	4 L	5 T	6 R	
Volume					24		
Peak-Hour Factor, PHF					0.91	0.91	
Hourly Flow Rate, HFR					26	795	
Percent Heavy Vehicles		--	--		12	--	--
Median Type/Storage	Undivided			/			
RT Channelized?							
Lanes					0	2	
Configuration					LT	T	
Upstream Signal?		No				No	

Minor Street: Approach Movement	Northbound				Southbound		
	7 L	8 T	9 R	10 L	11 T	12 R	
Volume	13						
Peak Hour Factor, PHF	0.91						
Hourly Flow Rate, HFR	14						
Percent Heavy Vehicles	0						
Percent Grade (%)		0				0	
Flared Approach: Exists?/Storage				/			/
Lanes	1						
Configuration	L						

Approach Movement	Delay, Queue Length, and Level of Service							
	EB 1	WB 4	Northbound 7 8 9			Southbound 10 11 12		
Lane Config	LT	L						
v (vph)	26	14						
C(m) (vph)	1560	561						
v/c	0.02	0.02						
95% queue length	0.05	0.08						
Control Delay	7.3	11.6						
LOS	A	B						
Approach Delay			11.6					
Approach LOS			B					

HCS+: Unsignalized Intersections Release 5.6

Phone:
E-Mail:

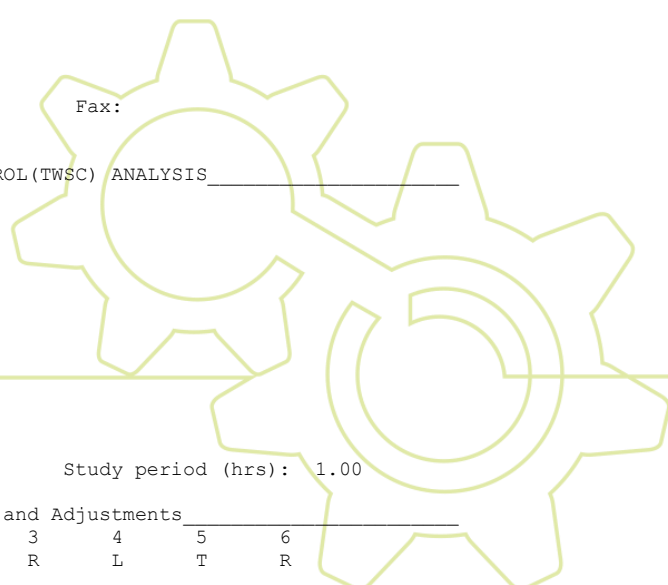
Fax:

_____ TWO-WAY STOP CONTROL (TWSC) ANALYSIS _____

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Manha
 Intersection: B
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M2
 North/South Street: M7
 Intersection Orientation: EW

Study period (hrs): 1.00

Vehicle Volumes and Adjustments						
Major Street Movements	1 L	2 T	3 R	4 L	5 T	6 R



Volume	24					
Peak-Hour Factor, PHF	0.91		0.91			
Peak-15 Minute Volume	7		199			
Hourly Flow Rate, HFR	26		795			
Percent Heavy Vehicles	--	--	12	--	--	--
Median Type/Storage	Undivided		/			
RT Channelized?	No					
Lanes	0		2			
Configuration			LT		T	
Upstream Signal?	No		No			

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R

Volume	13					
Peak Hour Factor, PHF	0.91					
Peak-15 Minute Volume	4					
Hourly Flow Rate, HFR	14					
Percent Heavy Vehicles	0					
Percent Grade (%)	0		0			
Flared Approach: Exists?/Storage			/		/	
RT Channelized	No					
Lanes	1					
Configuration	L					

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2 Left-Turn Through							
S5 Left-Turn Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2		Movement 5	
Shared ln volume, major th vehicles:			0	
Shared ln volume, major rt vehicles:			0	
Sat flow rate, major th vehicles:			1700	
Sat flow rate, major rt vehicles:			1700	
Number of major street through lanes:			2	

Worksheet 4-Critical Gap and Follow-up Time Calculation

<u>Critical Gap Calculation</u>								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)		4.1	7.1					
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		12	0					
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70					
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage		4.2	6.4					
2-stage								

<u>Follow-Up Time Calculations</u>								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

t(f,base)		2.20	3.50					
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		12	0					
t(f)		2.3	3.5					

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

Movement 2		Movement 5	
V(t)	V(l,prot)	V(t)	V(l,prot)

V prog
Total Saturation Flow Rate, s (vph)
Arrival Type
Effective Green, g (sec)
Cycle Length, C (sec)
Rp (from Exhibit 16-11)
Proportion vehicles arriving on green P
g(q1)
g(q2)
g(q)

Computation 2-Proportion of TWSC Intersection Time blocked

Movement 2		Movement 5	
V(t)	V(l,prot)	V(t)	V(l,prot)

alpha
beta
Travel time, t(a) (sec)
Smoothing Factor, F
Proportion of conflicting flow, f
Max platooned flow, V(c,max)
Min platooned flow, V(c,min)
Duration of blocked period, t(p)
Proportion time blocked, p

	0.000	0.000
--	-------	-------

Computation 3-Platoon Event Periods Result

p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1)	(3)	
	Single-stage Process	Two-Stage Process Stage I	Stage II

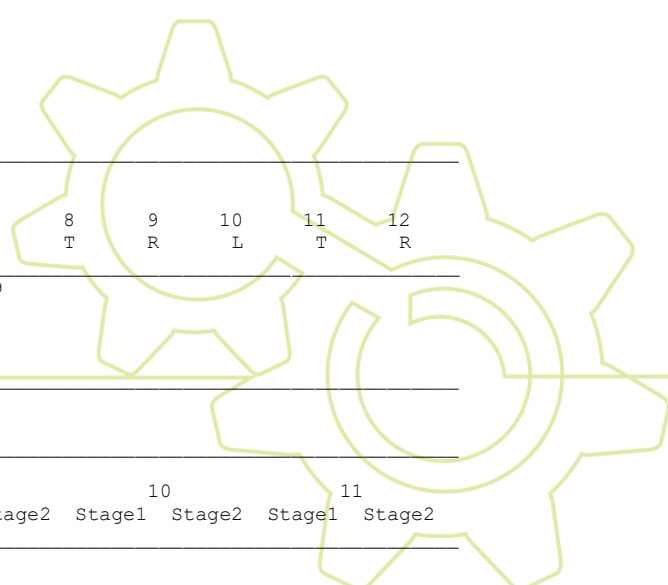
p(1)
p(4)
p(7)
p(8)
p(9)
p(10)
p(11)
p(12)

Computation 4 and 5
Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
V c, x		0	449					
s								
Px								
V c, u, x								
C r, x								
C plat, x								

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c, x)								



s 3000
P(x)
V(c,u,x)

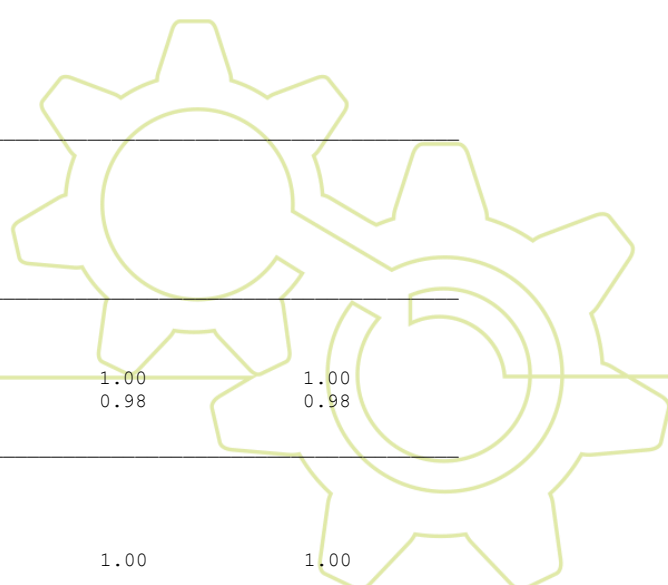
C(r,x)
C(plat,x)

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 2: LT from Major St.	4	1
Conflicting Flows	0	
Potential Capacity	1560	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1560	
Probability of Queue free St.	0.98	1.00
Maj L-Shared Prob Q free St.	0.98	
Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Conflicting Flows	449	
Potential Capacity	571	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.98
Maj. L, Min T Adj. Imp Factor.		0.99
Cap. Adj. factor due to Impeding mvmnt	0.98	0.99
Movement Capacity	561	

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		
Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98
Movement Capacity		
Result for 2 stage process:		
a		
y		
C t		
Probability of Queue free St.	1.00	1.00



Step 4: LT from Minor St.	7	10
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Part 3 - Single Stage		
Conflicting Flows	449	
Potential Capacity	571	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.98
Maj. L, Min T Adj. Imp Factor.		0.99
Cap. Adj. factor due to Impeding mvmnt	0.98	0.99
Movement Capacity	561	
Results for Two-stage process:		
a		
y		
C t	561	

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	14					
Movement Capacity (vph)	561					
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep	561					
Volume	14					
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config		LT	L					
v (vph)		26	14					
C(m) (vph)		1560	561					
v/c		0.02	0.02					
95% queue length		0.05	0.08					
Control Delay		7.3	11.6					
LOS		A	B					
Approach Delay				11.6				
Approach LOS				B				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.98
v(i1), Volume for stream 2 or 5		0
v(i2), Volume for stream 3 or 6		0
s(i1), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)		0.98
d(M,LT), Delay for stream 1 or 4		7.3
N, Number of major street through lanes		2
d(rank,1) Delay for stream 2 or 5		

1.1.4.4 Interseção B – Pico Tarde

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: B
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M2
 North/South Street: M7
 Intersection Orientation: EW
 Study period (hrs): 1.00

		Vehicle Volumes and Adjustments					
Major Street:	Approach Movement	Eastbound			Westbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume					12	2153	
Peak-Hour Factor, PHF					0.91	0.91	
Hourly Flow Rate, HFR					13	2365	
Percent Heavy Vehicles		--	--	0	--	--	
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes					0	2	
Configuration					LT	T	
Upstream Signal?		No				No	

		Vehicle Volumes and Adjustments					
Minor Street:	Approach Movement	Northbound			Southbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		171					
Peak Hour Factor, PHF		0.91					
Hourly Flow Rate, HFR		187					
Percent Heavy Vehicles		20					
Percent Grade (%)			0			0	
Flared Approach: Exists?/Storage				/		/	
Lanes		1					
Configuration		L					

		Delay, Queue Length, and Level of Service					
Approach Movement	EB 1	Northbound			Southbound		
		WB 4	7	8	9	10	11
Lane Config		LT	L			L	
v (vph)		13	187				
C(m) (vph)		1636	185				
v/c		0.01	1.01				
95% queue length		0.02	17.26				
Control Delay		7.2	222.6				
LOS		A	F				
Approach Delay				222.6			
Approach LOS				F			

HCS+: Unsignalized Intersections Release 5.6

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E-Mail: _____

TWO-WAY STOP CONTROL(TWSC) ANALYSIS _____

Analyst: Progeplan
Agency/Co.: _____
Date Performed: 05/06/2023
Analysis Time Period: Pico Tarde
Intersection: B
Jurisdiction: DER/DF
Units: U. S. Metric
Analysis Year: 2023
Project ID: FUTURA COMERCIAL
East/West Street: M2
North/South Street: M7
Intersection Orientation: EW Study period (hrs): 1.00

Major Street Movements	Vehicle Volumes and Adjustments					
	1 L	2 T	3 R	4 L	5 T	6 R
Volume				12	2153	
Peak-Hour Factor, PHF				0.91	0.91	
Peak-15 Minute Volume				3	591	
Hourly Flow Rate, HFR				13	2365	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes				0	2	
Configuration				LT	T	
Upstream Signal?	No			No		

Minor Street Movements	7 L	8 T	9 R	10 L	11 T	12 R
Volume	171					
Peak Hour Factor, PHF	0.91					
Peak-15 Minute Volume	47					
Hourly Flow Rate, HFR	187					
Percent Heavy Vehicles	20					
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/	0	/
RT Channelized						
Lanes	1					
Configuration	L					

Movements	Pedestrian Volumes and Adjustments			
	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

	Upstream Signal Data						
	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2 Left-Turn Through							
S5 Left-Turn Through							

Movement 2 Movement 5

Shared ln volume, major th vehicles:	0
Shared ln volume, major rt vehicles:	0
Sat flow rate, major th vehicles:	1700
Sat flow rate, major rt vehicles:	1700
Number of major street through lanes:	2

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)		4.1	7.1					
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		0	20					
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70					
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage		4.1	6.6					
2-stage								

Follow-Up Time Calculations

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)		2.20	3.50					
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		0	20					
t(f)		2.2	3.7					

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
V(t)	V(l,prot)	V(t)	V(l,prot)	

V prog
Total Saturation Flow Rate, s (vph)
Arrival Type
Effective Green, g (sec)
Cycle Length, C (sec)
Rp (from Exhibit 16-11)
Proportion vehicles arriving on green P
g(q1)
g(q2)
g(q)

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
V(t)	V(l,prot)	V(t)	V(l,prot)	

alpha
beta
Travel time, t(a) (sec)
Smoothing Factor, F
Proportion of conflicting flow, f
Max platooned flow, V(c,max)
Min platooned flow, V(c,min)
Duration of blocked period, t(p)
Proportion time blocked, p

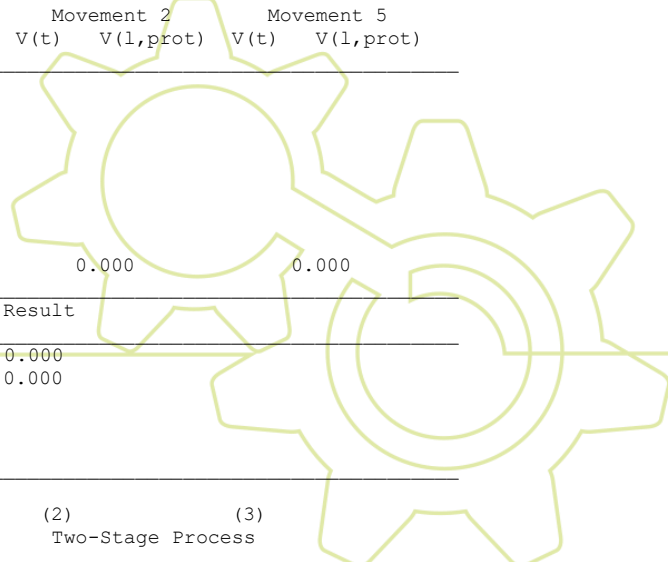
	0.000	0.000
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Computation 3-Platoon Event Periods Result

p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	

Constrained or unconstrained?

Proportion unblocked for minor	(1) Single-stage	(2) Two-Stage Process	(3)
--------------------------------	---------------------	--------------------------	-----



movements, p(x)	Process		Stage I		Stage II			
p(1)								
p(4)								
p(7)								
p(8)								
p(9)								
p(10)								
p(11)								
p(12)								

Computation 4 and 5
Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
V c,x		0	1208					
s								
Px								
V c,u,x								

C r,x
C plat,x

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s		3000						
P(x)								
V(c,u,x)								

C(r,x)
C(plat,x)

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.					9		12
Conflicting Flows							
Potential Capacity							
Pedestrian Impedance Factor					1.00		1.00
Movement Capacity							
Probability of Queue free St.					1.00		1.00
Step 2: LT from Major St.					4		1
Conflicting Flows					0		
Potential Capacity					1636		
Pedestrian Impedance Factor					1.00		1.00
Movement Capacity					1636		
Probability of Queue free St.					0.99		1.00
Maj L-Shared Prob Q free St.					0.99		
Step 3: TH from Minor St.					8		11
Conflicting Flows							
Potential Capacity							
Pedestrian Impedance Factor					1.00		1.00
Cap. Adj. factor due to Impeding mvmnt					0.99		0.99
Movement Capacity							
Probability of Queue free St.					1.00		1.00
Step 4: LT from Minor St.					7		10
Conflicting Flows					1208		
Potential Capacity					186		
Pedestrian Impedance Factor					1.00		1.00
Maj. L, Min T Impedance factor							0.99
Maj. L, Min T Adj. Imp Factor.							0.99
Cap. Adj. factor due to Impeding mvmnt					0.99		0.99
Movement Capacity					185		

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St. 8 11

Part 1 - First Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity
 Probability of Queue free St.

Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor 1.00 1.00
 Cap. Adj. factor due to Impeding mvmnt 0.99 0.99
 Movement Capacity

Result for 2 stage process:
 a
 Y
 C t
 Probability of Queue free St. 1.00 1.00

Step 4: LT from Minor St. 7 10

Part 1 - First Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage
 Conflicting Flows 1208
 Potential Capacity 186
 Pedestrian Impedance Factor 1.00 1.00
 Maj. L, Min T Impedance factor 0.99
 Maj. L, Min T Adj. Imp Factor. 0.99
 Cap. Adj. factor due to Impeding mvmnt 0.99 0.99
 Movement Capacity 185

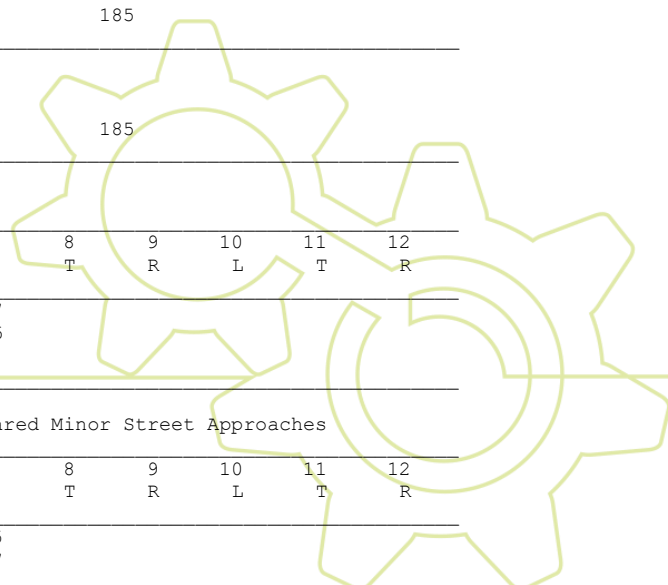
Results for Two-stage process:
 a
 Y
 C t 185

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	187					
Movement Capacity (vph)	185					
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep	185					
Volume	187					



Delay
Q sep
Q sep +1
round (Qsep +1)

n max
C sh
SUM C sep
n
C act

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config		LT	L					
v (vph)		13	187					
C (m) (vph)		1636	185					
v/c		0.01	1.01					
95% queue length		0.02	17.26					
Control Delay		7.2	222.6					
LOS		A	F					
Approach Delay				222.6				
Approach LOS				F				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(i1), Volume for stream 2 or 5		0
v(i2), Volume for stream 3 or 6		0
s(i1), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)		0.99
d(M,LT), Delay for stream 1 or 4		7.2
N, Number of major street through lanes		2
d(rank,1) Delay for stream 2 or 5		

1.1.4.5 Interseção C – Pico Manhã

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
Agency/Co.:
Date Performed: 05/06/2023
Analysis Time Period: Pico Manha
Intersection: C
Jurisdiction: DER/DF
Units: U. S. Metric
Analysis Year: 2023
Project ID: FUTURA COMERCIAL
East/West Street: MOV01-MOV05-MOV07
North/South Street: MOV08
Intersection Orientation: EW

Study period (hrs): 1.00

Major Street: Approach Movement	Vehicle Volumes and Adjustments					
	Eastbound			Westbound		
	1 L	2 T	3 R	4 L	5 T	6 R
Volume	39	1812				
Peak-Hour Factor, PHF	0.91	0.91				
Hourly Flow Rate, HFR	42	1991				
Percent Heavy Vehicles	0	--	--	--	--	--
Median Type/Storage RT Channelized?	Undivided /					
Lanes	0	2				
Configuration	LT T					
Upstream Signal?	No			No		
Minor Street: Approach	Northbound			Southbound		

Movement	7 L	8 T	9 R	10 L	11 T	12 R
Volume				9		
Peak Hour Factor, PHF				0.91		
Hourly Flow Rate, HFR				9		
Percent Heavy Vehicles				12		
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
Lanes				1		
Configuration				L		

Approach Movement Lane Config	Delay, Queue Length, and Level of Service							
	EB	WB	Northbound			Southbound		
	1	4	7	8	9	10	11	12
	LT						L	
v (vph)	42					9		
C (m) (vph)	1636					225		
v/c	0.03					0.04		
95% queue length	0.08					0.12		
Control Delay	7.3					21.7		
LOS	A					C		
Approach Delay							21.7	
Approach LOS							C	

HCS+: Unsignalized Intersections Release 5.6

Phone:
E-Mail:

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TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Manha
 Intersection: C
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: MOV01-MOV05-MOV07
 North/South Street: MOV08
 Intersection Orientation: EW

Study period (hrs): 1.00

Major Street Movements	Vehicle Volumes and Adjustments					
	1 L	2 T	3 R	4 L	5 T	6 R
Volume	39	1812				
Peak-Hour Factor, PHF	0.91	0.91				
Peak-15 Minute Volume	11	498				
Hourly Flow Rate, HFR	42	1991				
Percent Heavy Vehicles	0	--	--		--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	0	2				
Configuration	LT	T				
Upstream Signal?	No			No		

Minor Street Movements	7 L	8 T	9 R	10 L	11 T	12 R
Volume				9		
Peak Hour Factor, PHF				0.91		
Peak-15 Minute Volume				2		
Hourly Flow Rate, HFR				9		
Percent Heavy Vehicles				12		

Percent Grade (%) 0 0
 Flared Approach: Exists?/Storage / /
 RT Channelized
 Lanes 1
 Configuration L

Pedestrian Volumes and Adjustments				
Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

Upstream Signal Data							
	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2 Left-Turn Through							
S5 Left-Turn Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:	0	
Shared ln volume, major rt vehicles:	0	
Sat flow rate, major th vehicles:	1700	
Sat flow rate, major rt vehicles:	1700	
Number of major street through lanes:	2	

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)	4.1					7.1		
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	0					12		
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00					0.70		
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1					6.5		
2-stage								

Follow-Up Time Calculations								
Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)	2.20					3.50		
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	0					12		
t(f)	2.2					3.6		

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal			
	Movement 2	Movement 5	
	V(t)	V(l,prot)	V(t) V(l,prot)

V prog
 Total Saturation Flow Rate, s (vph)
 Arrival Type
 Effective Green, g (sec)
 Cycle Length, C (sec)
 Rp (from Exhibit 16-11)
 Proportion vehicles arriving on green P

g(q1)
g(q2)
g(q)

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)

alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p		0.000		0.000

Computation 3-Platoon Event Periods Result

p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1)	(2)	(3)
	Single-stage Process	Two-Stage Process Stage I	Process Stage II

p(1)
p(4)
p(7)
p(8)
p(9)
p(10)
p(11)
p(12)

Computation 4 and 5
Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c, x	0					1079		
s								
Px								
V c, u, x								

C r, x
C plat, x

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2

V(c, x)								
s						3000		
P(x)								
V(c, u, x)								

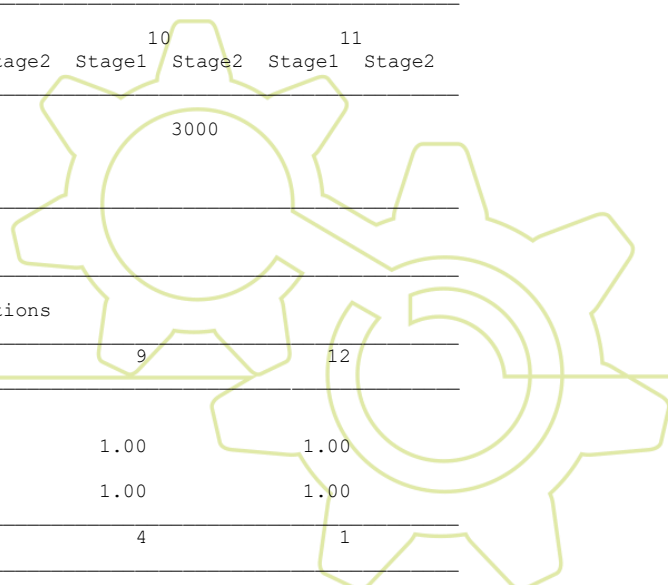
C(r, x)
C(plat, x)

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.		9		12
---------------------------	--	---	--	----

Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor		1.00		1.00
Movement Capacity				
Probability of Queue free St.		1.00		1.00

Step 2: LT from Major St.		4		1
---------------------------	--	---	--	---



Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.97	
Maj. L, Min T Adj. Imp Factor.	0.98	
Cap. Adj. factor due to Impeding mvmnt	0.98	0.97
Movement Capacity		225

Results for Two-stage process:

a	
Y	
C t	225

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				9		
Movement Capacity (vph)				225		
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep				225		
Volume				9		
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config	LT					L		
v (vph)	42					9		
C (m) (vph)	1636					225		
v/c	0.03					0.04		
95% queue length	0.08					0.12		
Control Delay	7.3					21.7		
LOS	A					C		
Approach Delay							21.7	
Approach LOS							C	

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.97	1.00
v(i1), Volume for stream 2 or 5	0	
v(i2), Volume for stream 3 or 6	0	
s(i1), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.97	
d(M,LT), Delay for stream 1 or 4	7.3	
N, Number of major street through lanes	2	
d(rank,1) Delay for stream 2 or 5		

1.1.4.6 Interseção C – Pico Tarde

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: C
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTUR COMERCIAL
 East/West Street: MOV01-MOV05-MOV07
 North/South Street: MOV08
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments								
Major Street:	Approach Movement	Eastbound			Westbound			
		1 L	2 T	3 R	4 L	5 T	6 R	
Volume		29	855					
Peak-Hour Factor, PHF		0.91	0.91					
Hourly Flow Rate, HFR		31	939					
Percent Heavy Vehicles		21	--	--		--	--	
Median Type/Storage		Undivided			/			
RT Channelized?								
Lanes		0	2					
Configuration		LT T						
Upstream Signal?		No				No		

Minor Street:	Approach Movement	Northbound			Southbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume					12		
Peak Hour Factor, PHF					0.91		
Hourly Flow Rate, HFR					13		
Percent Heavy Vehicles					0		
Percent Grade (%)		0				0	
Flared Approach: Exists?/Storage					/		/
Lanes					1		
Configuration					L		

Delay, Queue Length, and Level of Service								
Approach Movement	EB	WB	Northbound			Southbound		
			4	7	8	9	10	11
Lane Config	LT							L
v (vph)	31							13
C(m) (vph)	1507							501
v/c	0.02							0.03
95% queue length	0.06							0.08
Control Delay	7.4							12.4
LOS	A							B
Approach Delay								12.4
Approach LOS								B

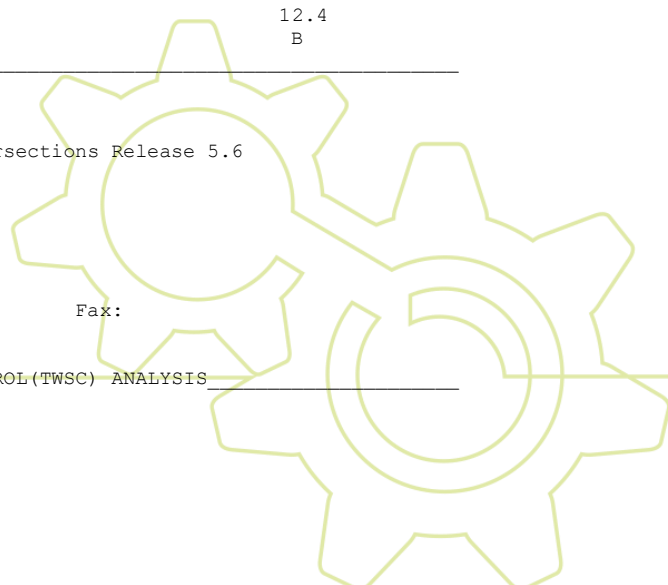
HCS+: Unsignalized Intersections Release 5.6

Phone:
E-Mail:

Fax:

TWO-WAY STOP CONTROL (TWSC) ANALYSIS

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: C
 Jurisdiction: DER/DF
 Units: U. S. Metric



t(3,lt)	0.00					0.70		
t(c,T):	1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00
t(c)	1-stage	4.3				6.4		
	2-stage							

Follow-Up Time Calculations

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)	2.20					3.50		
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	21					0		
t(f)	2.4					3.5		

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
V(t)	V(l,prot)	V(t)	V(l,prot)	

V prog

Total Saturation Flow Rate, s (vph)

Arrival Type

Effective Green, g (sec)

Cycle Length, C (sec)

Rp (from Exhibit 16-11)

Proportion vehicles arriving on green P

g(q1)

g(q2)

g(q)

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
V(t)	V(l,prot)	V(t)	V(l,prot)	

alpha

beta

Travel time, t(a) (sec)

Smoothing Factor, F

Proportion of conflicting flow, f

Max platooned flow, V(c,max)

Min platooned flow, V(c,min)

Duration of blocked period, t(p)

Proportion time blocked, p 0.000 0.000

Computation 3-Platoon Event Periods Result

p(2) 0.000

p(5) 0.000

p(dom)

p(subo)

Constrained or unconstrained?

Proportion

unblocked

for minor
movements, p(x)

(1)
Single-stage
Process

(2) (3)
Two-Stage Process
Stage I Stage II

p(1)

p(4)

p(7)

p(8)

p(9)

p(10)

p(11)

p(12)

Computation 4 and 5

Single-Stage Process

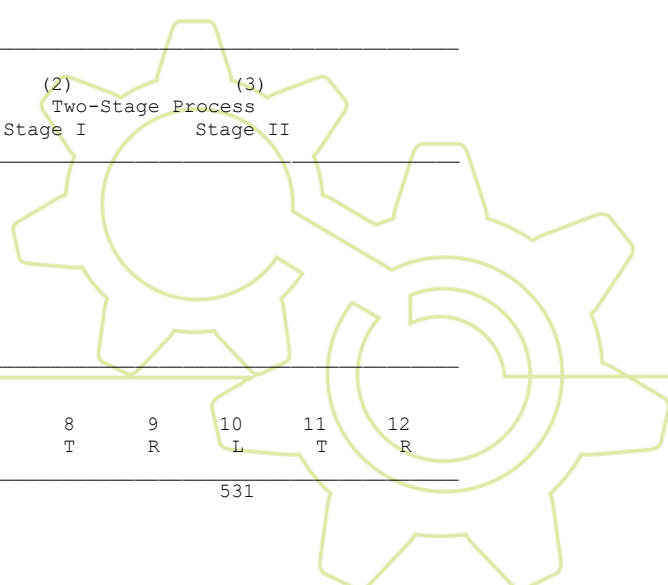
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c, x 0 531

s

Px

V c, u, x



C r,x
C plat,x

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s						3000		
P(x)								
V(c,u,x)								

C(r,x)
C(plat,x)

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St. 9 12

Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor 1.00 1.00
Movement Capacity
Probability of Queue free St. 1.00 1.00

Step 2: LT from Major St. 4 1

Conflicting Flows 0
Potential Capacity 1507
Pedestrian Impedance Factor 1.00 1.00
Movement Capacity 1507
Probability of Queue free St. 1.00 0.98
Maj L-Shared Prob Q free St. 0.98

Step 3: TH from Minor St. 8 11

Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor 1.00 1.00
Cap. Adj. factor due to Impeding mvmnt 0.98 0.98
Movement Capacity
Probability of Queue free St. 1.00 1.00

Step 4: LT from Minor St. 7 10

Conflicting Flows 531
Potential Capacity 512
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.98
Maj. L, Min T Adj. Imp Factor. 0.98
Cap. Adj. factor due to Impeding mvmnt 0.98 0.98
Movement Capacity 501

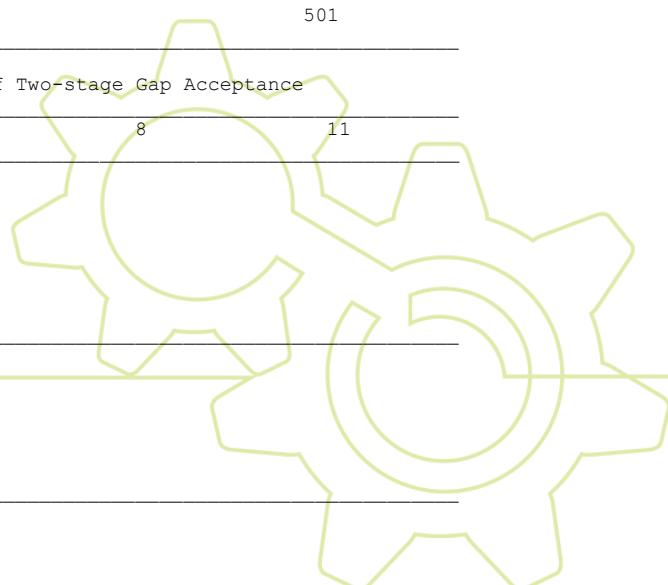
Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St. 8 11

Part 1 - First Stage
Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor
Cap. Adj. factor due to Impeding mvmnt
Movement Capacity
Probability of Queue free St.

Part 2 - Second Stage
Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor
Cap. Adj. factor due to Impeding mvmnt
Movement Capacity

Part 3 - Single Stage
Conflicting Flows
Potential Capacity



Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98
Movement Capacity		

Result for 2 stage process:

a		
Y		
C t		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
---------------------------	---	----

Part 1 - First Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 2 - Second Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 3 - Single Stage

Conflicting Flows		531
Potential Capacity		512
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.98	
Maj. L, Min T Adj. Imp Factor.	0.98	
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98
Movement Capacity		501

Results for Two-stage process:

a		
Y		
C t		501

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				13		
Movement Capacity (vph)				501		
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep				501		
Volume				13		
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config	LT					L		
v (vph)	31					13		
C (m) (vph)	1507					501		
v/c	0.02					0.03		

v (vph)	16
C (m) (vph)	253
v/c	0.06
95% queue length	0.20
Control Delay	20.2
LOS	C
Approach Delay	20.2
Approach LOS	C

HCS+: Unsignalized Intersections Release 5.6

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL (TWSC) ANALYSIS

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Manha
 Intersection: D
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: MOV01-MOV05-MOV07
 North/South Street: MOV06
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments						
Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		1790	48			
Peak-Hour Factor, PHF		0.91	0.91			
Peak-15 Minute Volume		492	13			
Hourly Flow Rate, HFR		1967	52			
Percent Heavy Vehicles		--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		2	0			
Configuration		T	TR			
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			15			
Peak Hour Factor, PHF			0.91			
Peak-15 Minute Volume			4			
Hourly Flow Rate, HFR			16			
Percent Heavy Vehicles			34			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/		/	
RT Channelized			No			
Lanes		1				
Configuration		R				

Pedestrian Volumes and Adjustments				
Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)					6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)					34			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)					0.00			
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage					6.5			
2-stage								

Follow-Up Time Calculations								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)					3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)					34			
t(f)					3.6			

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				
Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from Exhibit 16-11)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				

Computation 2-Proportion of TWSC Intersection Time blocked				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p		0.000		0.000

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Process Stage II
p(1)			
p(4)			
p(7)			
p(8)			
p(9)			
p(10)			
p(11)			
p(12)			

Computation 4 and 5 Single-Stage Process Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
---	--------	--------	--------	--------	--------	---------	---------	---------

V c,x					1010			
s								
Px								
V c,u,x								

C r,x								
C plat,x								

Two-Stage Process	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2

V(c,x)								
s								
P(x)								
V(c,u,x)								

C(r,x)								
C(plat,x)								

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.		9					12
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Conflicting Flows					1010		
Potential Capacity					253		
Pedestrian Impedance Factor					1.00		1.00
Movement Capacity					253		
Probability of Queue free St.					0.94		1.00

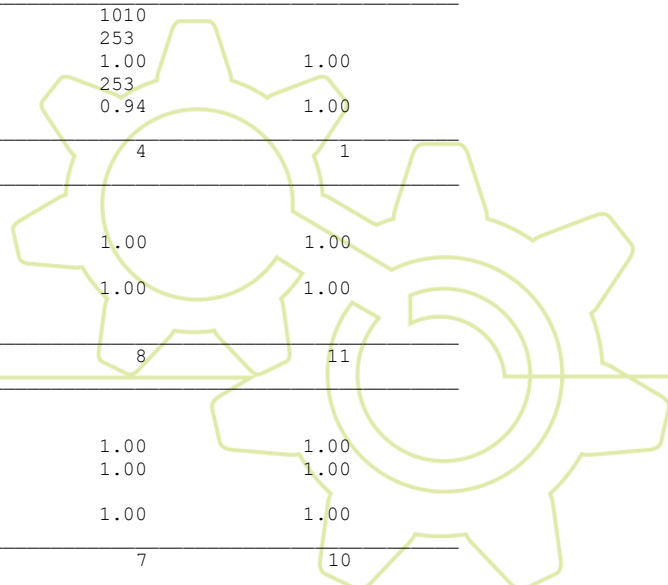
Step 2: LT from Major St.			4				1
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Conflicting Flows							
Potential Capacity							
Pedestrian Impedance Factor					1.00		1.00
Movement Capacity							
Probability of Queue free St.					1.00		1.00
Maj L-Shared Prob Q free St.							

Step 3: TH from Minor St.				8			11
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Conflicting Flows							
Potential Capacity							
Pedestrian Impedance Factor					1.00		1.00
Cap. Adj. factor due to Impeding mvmnt					1.00		1.00
Movement Capacity							
Probability of Queue free St.					1.00		1.00

Step 4: LT from Minor St.					7		10
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Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		1.00
Maj. L, Min T Adj. Imp Factor.		1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	0.94
Movement Capacity		

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
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Part 1 - First Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		

Part 2 - Second Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 3 - Single Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		

Result for 2 stage process:

a		
Y		
C t		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
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Part 1 - First Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 2 - Second Stage

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 3 - Single Stage

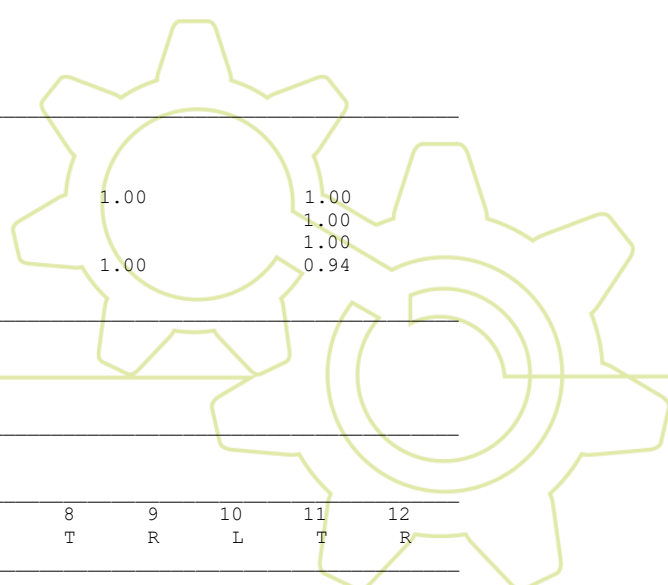
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		1.00
Maj. L, Min T Adj. Imp Factor.		1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	0.94
Movement Capacity		

Results for Two-stage process:

a		
Y		
C t		

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R



Volume (vph) 16
 Movement Capacity (vph) 253
 Shared Lane Capacity (vph)

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7 L	8 T	9 R	10 L	11 T	12 R
C sep			253			
Volume			16			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config					R			
v (vph)					16			
C (m) (vph)					253			
v/c					0.06			
95% queue length					0.20			
Control Delay					20.2			
LOS					C			
Approach Delay				20.2				
Approach LOS				C				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	1.00
v(i1), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(i1), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		
d(M,LT), Delay for stream 1 or 4		
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

1.1.4.8 Interseção D – Pico Tarde

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: D
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: MOV01-MOV05-MOV07
 North/South Street: MOV06
 Intersection Orientation: EW

Study period (hrs): 1.00

Major Street: Approach	Vehicle Volumes and Adjustments					
	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R

Volume	703	154				
Peak-Hour Factor, PHF	0.91	0.91				
Hourly Flow Rate, HFR	772	169				
Percent Heavy Vehicles	--	--			--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	2	0				
Configuration	T	TR				
Upstream Signal?	No				No	

Minor Street: Approach		Northbound				Southbound		
Movement	7	8	9		10	11	12	
	L	T	R		L	T	R	

Volume		164				
Peak Hour Factor, PHF		0.91				
Hourly Flow Rate, HFR		180				
Percent Heavy Vehicles		0				
Percent Grade (%)	0				0	
Flared Approach: Exists?/Storage			/			/
Lanes		1				
Configuration		R				

Delay, Queue Length, and Level of Service										
Approach	EB	WB	Northbound			Southbound				
Movement	1	4		7	8	9		10	11	12
Lane Config						R				

v (vph)		180
C (m) (vph)		598
v/c		0.30
95% queue length		1.28
Control Delay		13.6
LOS		B
Approach Delay		13.6
Approach LOS		B

HCS+: Unsignalized Intersections Release 5.6

Phone: _____ Fax: _____
E-Mail: _____

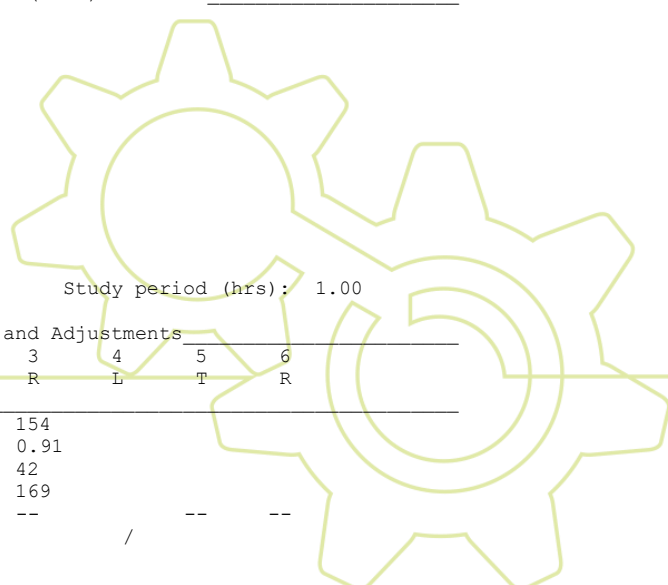
TWO-WAY STOP CONTROL (TWSC) ANALYSIS

Analyst: Progeplan
Agency/Co.: _____
Date Performed: 05/06/2023
Analysis Time Period: Pico Tarde
Intersection: D
Jurisdiction: DER/DF
Units: U. S. Metric
Analysis Year: 2023
Project ID: FUTURA COMERCIAL
East/West Street: MOV01-MOV05-MOV07
North/South Street: MOV06
Intersection Orientation: EW

Study period (hrs): 1.00

Vehicle Volumes and Adjustments						
Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R

Volume	703	154				
Peak-Hour Factor, PHF	0.91	0.91				
Peak-15 Minute Volume	193	42				
Hourly Flow Rate, HFR	772	169				
Percent Heavy Vehicles	--	--			--	--
Median Type/Storage	Undivided		/			
RT Channelized?						



Lanes	2		0			
Configuration	T		TR			
Upstream Signal?	No				No	
Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			164			
Peak Hour Factor, PHF			0.91			
Peak-15 Minute Volume			45			
Hourly Flow Rate, HFR			180			
Percent Heavy Vehicles			0			
Percent Grade (%)	0				0	
Flared Approach: Exists?/Storage					/ /	
RT Channelized			No			
Lanes			1			
Configuration			R			

Pedestrian Volumes and Adjustments				
Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

Upstream Signal Data							
	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		
Shared ln volume, major rt vehicles:		
Sat flow rate, major th vehicles:		
Sat flow rate, major rt vehicles:		
Number of major street through lanes:		

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)					6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)					0			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)					0.00			
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage					6.2			
2-stage								
Follow-Up Time Calculations								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)					3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)					0			
t(f)					3.3			

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

Movement 2		Movement 5	
V(t)	V(l,prot)	V(t)	V(l,prot)

V prog
 Total Saturation Flow Rate, s (vph)
 Arrival Type
 Effective Green, g (sec)
 Cycle Length, C (sec)
 Rp (from Exhibit 16-11)
 Proportion vehicles arriving on green P
 g(q1)
 g(q2)
 g(q)

Computation 2-Proportion of TWSC Intersection Time blocked

Movement 2		Movement 5	
V(t)	V(l,prot)	V(t)	V(l,prot)

alpha
 beta
 Travel time, t(a) (sec)
 Smoothing Factor, F
 Proportion of conflicting flow, f
 Max platooned flow, V(c,max)
 Min platooned flow, V(c,min)
 Duration of blocked period, t(p)
 Proportion time blocked, p

	0.000	0.000
--	-------	-------

Computation 3-Platoon Event Periods Result

p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
--	-----------------------------	-------------------------------------	--------------------------------------

p(1)
 p(4)
 p(7)
 p(8)
 p(9)
 p(10)
 p(11)
 p(12)

Computation 4 and 5
 Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c,x 470
 s
 Px
 V c,u,x

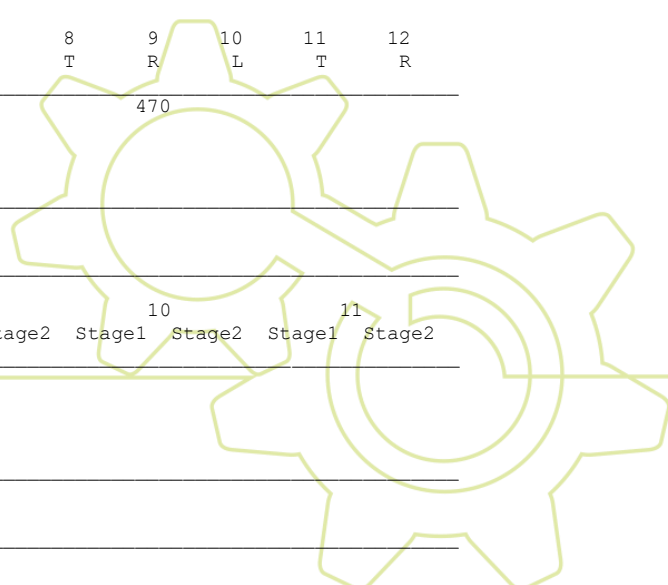
C r,x
 C plat,x

Two-Stage Process

	7	8	10	11
	Stage1	Stage2	Stage1	Stage2

V(c,x)
 s
 P(x)
 V(c,u,x)

C(r,x)
 C(plat,x)

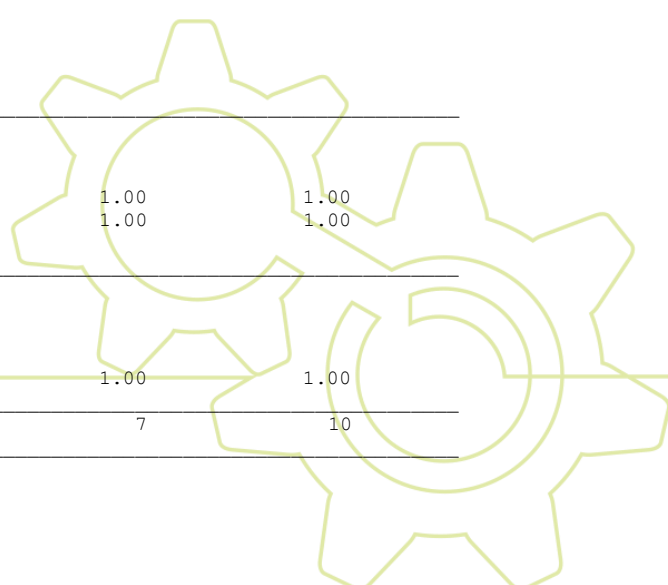


Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows	470	
Potential Capacity	598	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	598	
Probability of Queue free St.	0.70	1.00
Step 2: LT from Major St.	4	1
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Maj L-Shared Prob Q free St.		
Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		1.00
Maj. L, Min T Adj. Imp Factor.		1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	0.70
Movement Capacity		

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		
Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		
Result for 2 stage process:		
a		
Y		
C t		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		



Movement Capacity

Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor 1.00 1.00
 Maj. L, Min T Impedance factor 1.00
 Maj. L, Min T Adj. Imp Factor. 1.00
 Cap. Adj. factor due to Impeding mvmnt 1.00 0.70
 Movement Capacity

Results for Two-stage process:

a
 Y
 C t

Worksheet 8-Shared Lane Calculations

Movement	7 L	8 T	9 R	10 L	11 T	12 R
Volume (vph)			180			
Movement Capacity (vph)			598			
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

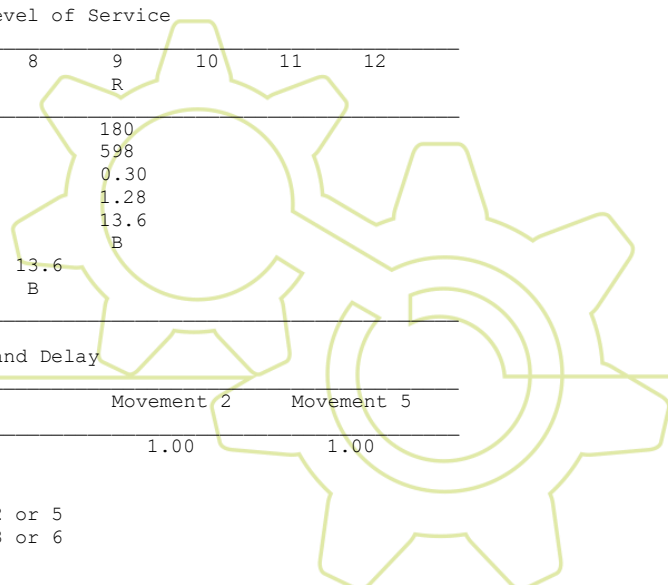
Movement	7 L	8 T	9 R	10 L	11 T	12 R
C sep			598			
Volume			180			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9 R	10	11	12
Lane Config								
v (vph)					180			
C(m) (vph)					598			
v/c					0.30			
95% queue length					1.28			
Control Delay					13.6			
LOS					B			
Approach Delay				13.6				
Approach LOS				B				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	1.00
v(i1), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(i1), Saturation flow rate for stream 2 or 5		
s(i2), Saturation flow rate for stream 3 or 6		
P*(oj)		



d(M,LT), Delay for stream 1 or 4
N, Number of major street through lanes
d(rank,1) Delay for stream 2 or 5

1.1.4.9 Interseção E – Pico Manhã

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
Agency/Co.:
Date Performed: 05/06/2023
Analysis Time Period: Pico Manha
Intersection:
Jurisdiction: DER/DF
Units: U. S. Metric
Analysis Year: 2023
Project ID: FUTURA COMERCIAL
East/West Street: M2-M7+M8-M11+M12-M13
North/South Street: M13
Intersection Orientation: EW Study period (hrs): 1.00

		Vehicle Volumes and Adjustments					
Major Street: Approach Movement	Eastbound			Westbound			
	1 L	2 T	3 R	4 L	5 T	6 R	
Volume				5	733		
Peak-Hour Factor, PHF				0.91	0.91		
Hourly Flow Rate, HFR				5	805		
Percent Heavy Vehicles		--	--	0	--	--	
Median Type/Storage	Undivided			/			
RT Channelized?							
Lanes				0	2		
Configuration					LT T		
Upstream Signal?		No			No		

Minor Street: Approach Movement		Northbound			Southbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		21					
Peak Hour Factor, PHF		0.91					
Hourly Flow Rate, HFR		23					
Percent Heavy Vehicles		11					
Percent Grade (%)			0			0	
Flared Approach: Exists?/Storage				/		0	/
Lanes		1					
Configuration		L					

		Delay, Queue Length, and Level of Service						
Approach Movement	EB	WB	Northbound			Southbound		
	1	4 LT	7 L	8	9	10	11 T	12 R
v (vph)		5	23					
C(m) (vph)		1636	577					
v/c		0.00	0.04					
95% queue length		0.01	0.12					
Control Delay		7.2	11.5					
LOS		A	B					
Approach Delay				11.5				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.6

Phone:
E-Mail:

Fax:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Manha
 Intersection:
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M2-M7+M8-M11+M12-M13
 North/South Street: M13
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume				5	733	
Peak-Hour Factor, PHF				0.91	0.91	
Peak-15 Minute Volume				1	201	
Hourly Flow Rate, HFR				5	805	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes				0	2	
Configuration				LT	T	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	21					
Peak Hour Factor, PHF	0.91					
Peak-15 Minute Volume	6					
Hourly Flow Rate, HFR	23					
Percent Heavy Vehicles	11					
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized						
Lanes	1					
Configuration	L					

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2 Left-Turn Through							
S5 Left-Turn Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		0
Shared ln volume, major rt vehicles:		0
Sat flow rate, major th vehicles:		1700
Sat flow rate, major rt vehicles:		1700
Number of major street through lanes:		2

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)		4.1	7.1					
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		0	11					
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70					
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage		4.1	6.5					
2-stage								

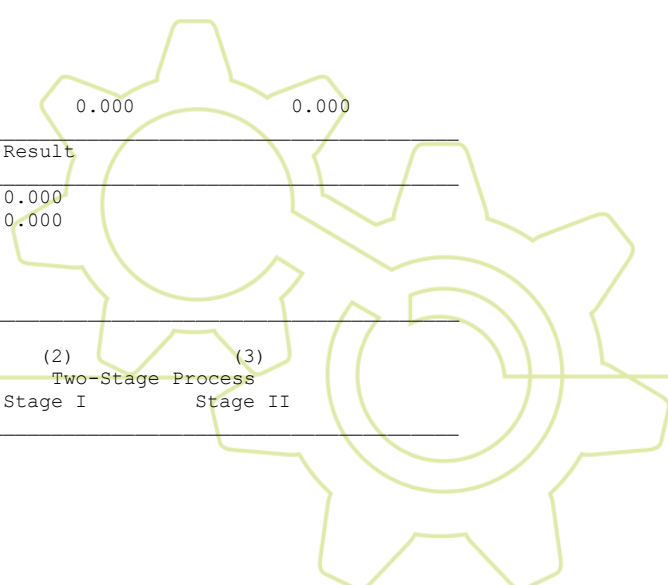
Follow-Up Time Calculations								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)		2.20	3.50					
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		0	11					
t(f)		2.2	3.6					

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				
Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from Exhibit 16-11)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				

Computation 2-Proportion of TWSC Intersection Time blocked				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p		0.000		0.000

Computation 3-Platoon Event Periods		Result
p(2)		0.000
p(5)		0.000
p(dom)		
p(subo)		
Constrained or unconstrained?		
Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I
		(3) Stage II
p(1)		
p(4)		
p(7)		
p(8)		
p(9)		
p(10)		



p(11)
p(12)

Computation 4 and 5
Single-Stage Process
Movement

	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c,x		0	412					
s								
Px								
V c,u,x								

C r,x
C plat,x

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2

V(c,x)								
s		3000						
P(x)								
V(c,u,x)								

C(r,x)
C(plat,x)

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.		9		12
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Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor		1.00		1.00
Movement Capacity				
Probability of Queue free St.		1.00		1.00

Step 2: LT from Major St.		4		1
---------------------------	--	---	--	---

Conflicting Flows		0		
Potential Capacity		1636		
Pedestrian Impedance Factor		1.00		1.00
Movement Capacity		1636		
Probability of Queue free St.		1.00		1.00
Maj L-Shared Prob Q free St.		1.00		

Step 3: TH from Minor St.		8		11
---------------------------	--	---	--	----

Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor		1.00		1.00
Cap. Adj. factor due to Impeding mvmnt		1.00		1.00
Movement Capacity				
Probability of Queue free St.		1.00		1.00

Step 4: LT from Minor St.		7		10
---------------------------	--	---	--	----

Conflicting Flows		412		
Potential Capacity		579		
Pedestrian Impedance Factor		1.00		1.00
Maj. L, Min T Impedance factor				1.00
Maj. L, Min T Adj. Imp Factor.				1.00
Cap. Adj. factor due to Impeding mvmnt		1.00		1.00
Movement Capacity		577		

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.		8		11
---------------------------	--	---	--	----

Part 1 - First Stage

Conflicting Flows				
Potential Capacity				
Pedestrian Impedance Factor				
Cap. Adj. factor due to Impeding mvmnt				
Movement Capacity				

Probability of Queue free St.

Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor 1.00 1.00
 Cap. Adj. factor due to Impeding mvmnt 1.00 1.00
 Movement Capacity

Result for 2 stage process:

a
 Y
 C t
 Probability of Queue free St. 1.00 1.00

Step 4: LT from Minor St. 7 10

Part 1 - First Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage
 Conflicting Flows 412
 Potential Capacity 579
 Pedestrian Impedance Factor 1.00 1.00
 Maj. L, Min T Impedance factor 1.00
 Maj. L, Min T Adj. Imp Factor. 1.00
 Cap. Adj. factor due to Impeding mvmnt 1.00 1.00
 Movement Capacity 577

Results for Two-stage process:

a
 Y
 C t 577

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	23					
Movement Capacity (vph)	577					
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep	577					
Volume	23					
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						

n
C act

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config		LT	L					
v (vph)		5	23					
C(m) (vph)		1636	577					
v/c		0.00	0.04					
95% queue length		0.01	0.12					
Control Delay		7.2	11.5					
LOS		A	B					
Approach Delay				11.5				
Approach LOS				B				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	1.00
v(i1), Volume for stream 2 or 5		0
v(i2), Volume for stream 3 or 6		0
s(i1), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)		1.00
d(M,LT), Delay for stream 1 or 4		7.2
N, Number of major street through lanes		2
d(rank,1) Delay for stream 2 or 5		

1.1.4.10 Interseção E – Pico Tarde

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: E
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M2-M7+M8-M11
 North/South Street: M11
 Intersection Orientation: EW

Study period (hrs): 1.00

		Vehicle Volumes and Adjustments					
Major Street: Approach Movement	Eastbound			Westbound			
	1 L	2 T	3 R	4 L	5 T	6 R	
Volume				4	2120		
Peak-Hour Factor, PHF				0.91	0.91		
Hourly Flow Rate, HFR				4	2329		
Percent Heavy Vehicles		--	--	0	--	--	
Median Type/Storage	Undivided			/			
RT Channelized?							
Lanes				0	2		
Configuration				LT	T		
Upstream Signal?	No				No		
Minor Street: Approach Movement		Northbound			Southbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		164					
Peak Hour Factor, PHF							
Hourly Flow Rate, HFR		180					
Percent Heavy Vehicles		0					
Percent Grade (%)			0			0	

Flared Approach: Exists?/Storage / /
 Lanes 1
 Configuration L

Delay, Queue Length, and Level of Service								
Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT	L					
v (vph)		4	180					
C(m) (vph)		1636	214					
v/c		0.00	0.84					
95% queue length		0.01	10.00					
Control Delay		7.2	93.1					
LOS		A	F					
Approach Delay				93.1				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

Phone: Fax:
 E-Mail:

TWO-WAY STOP CONTROL (TWSC) ANALYSIS

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: E
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M2-M7+M8-M11
 North/South Street: M11
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments						
Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume				4	2120	
Peak-Hour Factor, PHF				0.91	0.91	
Peak-15 Minute Volume				1	582	
Hourly Flow Rate, HFR				4	2329	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	0 2					
Configuration	LT T					
Upstream Signal?	No					
Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	164					
Peak Hour Factor, PHF						
Peak-15 Minute Volume	45					
Hourly Flow Rate, HFR	180					
Percent Heavy Vehicles	0					
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized						
Lanes		1				
Configuration		L				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

Upstream Signal Data							
	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		0
Shared ln volume, major rt vehicles:		0
Sat flow rate, major th vehicles:		1700
Sat flow rate, major rt vehicles:		1700
Number of major street through lanes:		2

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)		4.1	7.1					
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		0	0					
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70					
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage		4.1	6.4					
2-stage								

Follow-Up Time Calculations								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)		2.20	3.50					
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		0	0					
t(f)		2.2	3.5					

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				
Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from Exhibit 16-11)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				
Computation 2-Proportion of TWSC Intersection Time blocked				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)

alpha
beta
Travel time, t(a) (sec)
Smoothing Factor, F
Proportion of conflicting flow, f
Max platooned flow, V(c,max)
Min platooned flow, V(c,min)
Duration of blocked period, t(p)
Proportion time blocked, p 0.000 0.000

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Stage I	(3) Process Stage II
p(1)			
p(4)			
p(7)			
p(8)			
p(9)			
p(10)			
p(11)			
p(12)			

Computation 4 and 5 Single-Stage Process Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
---	--------	--------	--------	--------	--------	---------	---------	---------

V_{c,x} 0 1172
s
P_x
V_{c,u,x}

C_{r,x}
C_{plat,x}

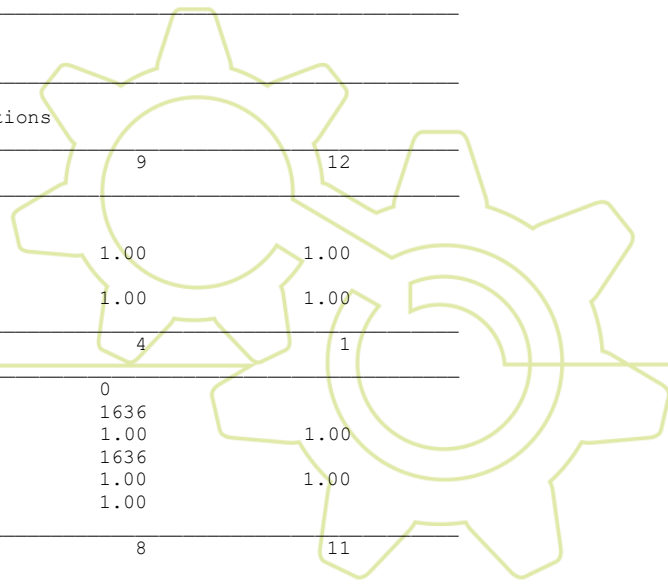
Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V _{c,x}								
s		3000						
P(x)								
V _{c,u,x}								

C_{r,x}
C_(plat,x)

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 2: LT from Major St.	4	1
Conflicting Flows	0	
Potential Capacity	1636	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1636	
Probability of Queue free St.	1.00	1.00
Maj L-Shared Prob Q free St.	1.00	
Step 3: TH from Minor St.	8	11



Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
<hr/>		
Step 4: LT from Minor St.	7	10

Conflicting Flows	1172	
Potential Capacity	215	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		1.00
Maj. L, Min T Adj. Imp Factor.		1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity	214	

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
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Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		

Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		

Result for 2 stage process:		
a		
Y		
C t		
Probability of Queue free St.	1.00	1.00

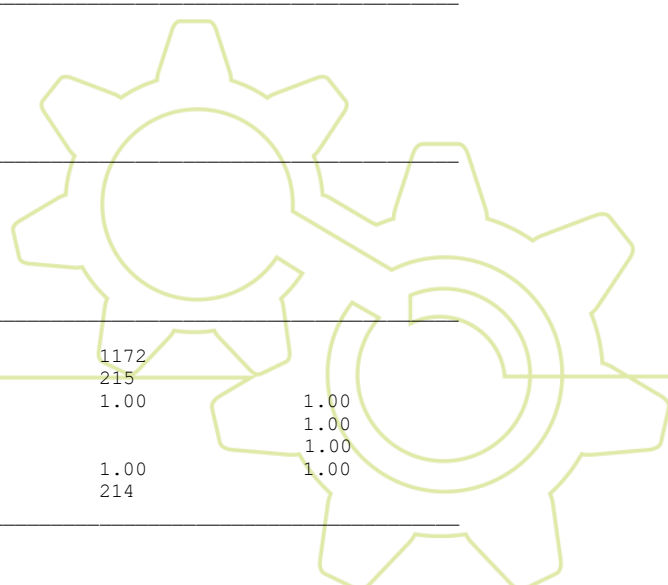
Step 4: LT from Minor St.	7	10
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Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 3 - Single Stage		
Conflicting Flows	1172	
Potential Capacity	215	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		1.00
Maj. L, Min T Adj. Imp Factor.		1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity	214	

Results for Two-stage process:		
a		



Y
C t 214

Worksheet 8-Shared Lane Calculations

Movement	7 L	8 T	9 R	10 L	11 T	12 R
Volume (vph)	180					
Movement Capacity (vph)	214					
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7 L	8 T	9 R	10 L	11 T	12 R
C sep	214					
Volume	180					
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config		LT	L					
v (vph)		4	180					
C(m) (vph)		1636	214					
v/c		0.00	0.84					
95% queue length		0.01	10.00					
Control Delay		7.2	93.1					
LOS		A	F					
Approach Delay				93.1				
Approach LOS				F				

Worksheet 11-Shared Major LT Impedance and Delay

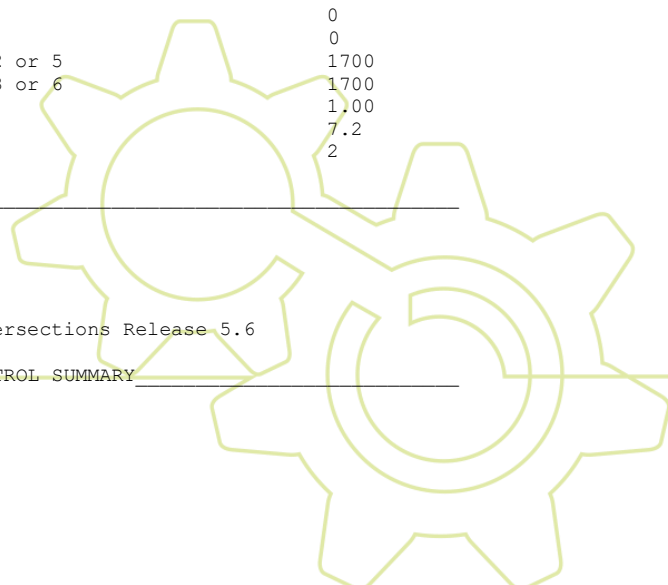
	Movement 2	Movement 5
p(oj)	1.00	1.00
v(i1), Volume for stream 2 or 5		0
v(i2), Volume for stream 3 or 6		0
s(i1), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)		1.00
d(M,LT), Delay for stream 1 or 4		7.2
N, Number of major street through lanes		2
d(rank,1) Delay for stream 2 or 5		

1.1.4.11 Interseção F – Pico Manhã

HCS+: Unsignalized Intersections Release 5.6

~~TWO-WAY STOP CONTROL SUMMARY~~

Analyst: Progeplan
Agency/Co.:
Date Performed: 05/06/2023
Analysis Time Period: Pico Manha
Intersection: F
Jurisdiction: DER/DF
Units: U. S. Metric
Analysis Year: 2023



Project ID: FUTURA COMERCIAL
 East/West Street: M01-M05-M07+M08+M06-M11
 North/South Street: M12
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments							
Major Street: Approach Movement	Eastbound				Westbound		
	1 L	2 T	3 R	4 L	5 T	6 R	
Volume	9	1959					
Peak-Hour Factor, PHF	0.91	0.91					
Hourly Flow Rate, HFR	9	2152					
Percent Heavy Vehicles	12	--	--		--	--	
Median Type/Storage	Undivided			/			
RT Channelized?							
Lanes	0 2						
Configuration	LT T						
Upstream Signal?	No				No		

Minor Street: Approach Movement	Northbound				Southbound		
	7 L	8 T	9 R	10 L	11 T	12 R	
Volume				5			
Peak Hour Factor, PHF				0.91			
Hourly Flow Rate, HFR				5			
Percent Heavy Vehicles				0			
Percent Grade (%)	0				0		
Flared Approach: Exists?/Storage				/			/
Lanes					1		
Configuration					L		

Delay, Queue Length, and Level of Service									
Approach Movement	EB	WB	Northbound				Southbound		
	1	4	7	8	9	10	11	12	
Lane Config	LT						L		
v (vph)	9						5		
C(m) (vph)	1560						238		
v/c	0.01						0.02		
95% queue length	0.02						0.06		
Control Delay	7.3						20.5		
LOS	A						C		
Approach Delay								20.5	
Approach LOS								C	

HCS+: Unsignalized Intersections Release 5.6

Phone:
E-Mail:

Fax:

TWO-WAY STOP CONTROL (TWSC) ANALYSIS

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Manha
 Intersection: F
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M01-M05-M07+M08+M06-M11
 North/South Street: M12
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments						
Major Street Movements	1	2	3	4	5	6

	L	L	L	T	R	L	T	R
t (f,base)	2.20					3.50		
t (f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P (HV)	12					0		
t (f)	2.3					3.5		

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				
Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from Exhibit 16-11)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p		0.000		0.000

Computation 3-Platoon Event Periods

	Result
p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion

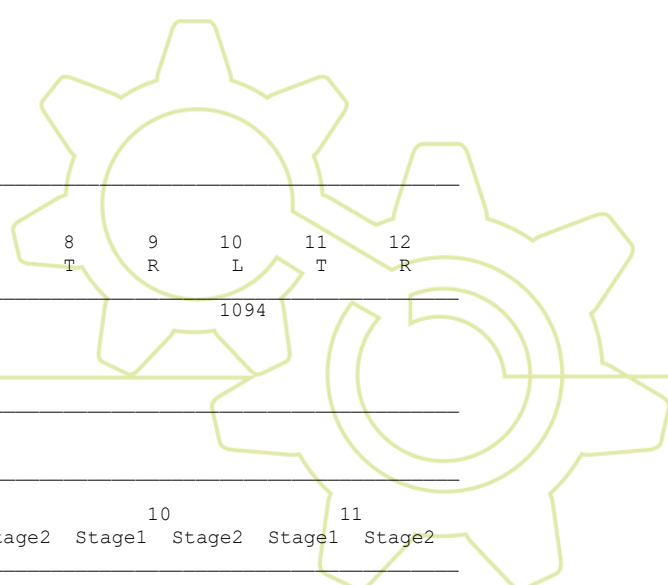
unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
p(1)			
p(4)			
p(7)			
p(8)			
p(9)			
p(10)			
p(11)			
p(12)			

Computation 4 and 5
Single-Stage Process

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
V c,x	0					1094		
s								
Px								
V c,u,x								
C r,x								
C plat,x								

Two-Stage Process

	7 Stage1	8 Stage2	10 Stage1	11 Stage2
--	-------------	-------------	--------------	--------------



V(c, x)
s 3000
P(x)
V(c, u, x)

C(r, x)
C(plat, x)

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St. 9 12

Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor 1.00 1.00
Movement Capacity
Probability of Queue free St. 1.00 1.00

Step 2: LT from Major St. 4 1

Conflicting Flows 0
Potential Capacity 1560
Pedestrian Impedance Factor 1.00 1.00
Movement Capacity 1560
Probability of Queue free St. 1.00 0.99
Maj L-Shared Prob Q free St. 0.99

Step 3: TH from Minor St. 8 11

Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor 1.00 1.00
Cap. Adj. factor due to Impeding mvmnt 0.99 0.99
Movement Capacity
Probability of Queue free St. 1.00 1.00

Step 4: LT from Minor St. 7 10

Conflicting Flows 1094
Potential Capacity 239
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.99
Maj. L, Min T Adj. Imp Factor. 1.00
Cap. Adj. factor due to Impeding mvmnt 1.00 0.99
Movement Capacity 238

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St. 8 11

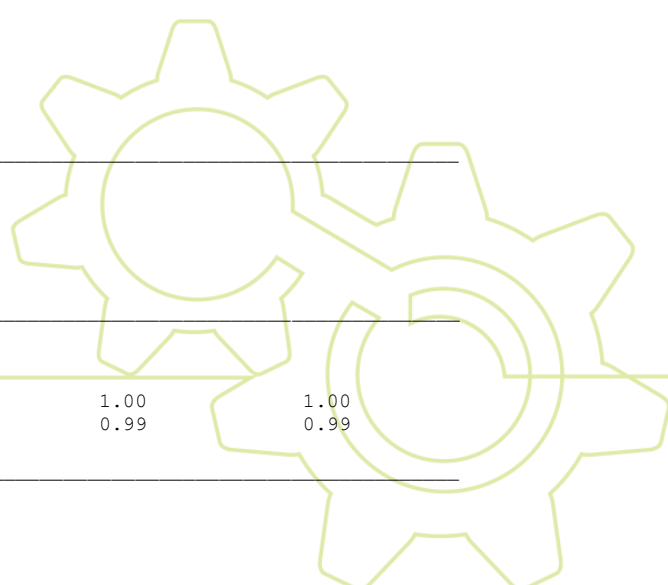
Part 1 - First Stage
Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor
Cap. Adj. factor due to Impeding mvmnt
Movement Capacity
Probability of Queue free St.

Part 2 - Second Stage
Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor
Cap. Adj. factor due to Impeding mvmnt
Movement Capacity

Part 3 - Single Stage
Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor 1.00 1.00
Cap. Adj. factor due to Impeding mvmnt 0.99 0.99
Movement Capacity

Result for 2 stage process:

a
y
C t



Probability of Queue free St. 1.00 1.00

Step 4: LT from Minor St. 7 10

Part 1 - First Stage

Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor
Cap. Adj. factor due to Impeding mvmnt
Movement Capacity

Part 2 - Second Stage

Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor
Cap. Adj. factor due to Impeding mvmnt
Movement Capacity

Part 3 - Single Stage

Conflicting Flows 1094
Potential Capacity 239
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.99
Maj. L, Min T Adj. Imp Factor. 1.00
Cap. Adj. factor due to Impeding mvmnt 1.00 0.99
Movement Capacity 238

Results for Two-stage process:

a
y
C t 238

Worksheet 8-Shared Lane Calculations

Movement	7 L	8 T	9 R	10 L	11 T	12 R
Volume (vph)				5		
Movement Capacity (vph)				238		
Shared Lane Capacity (vph)						

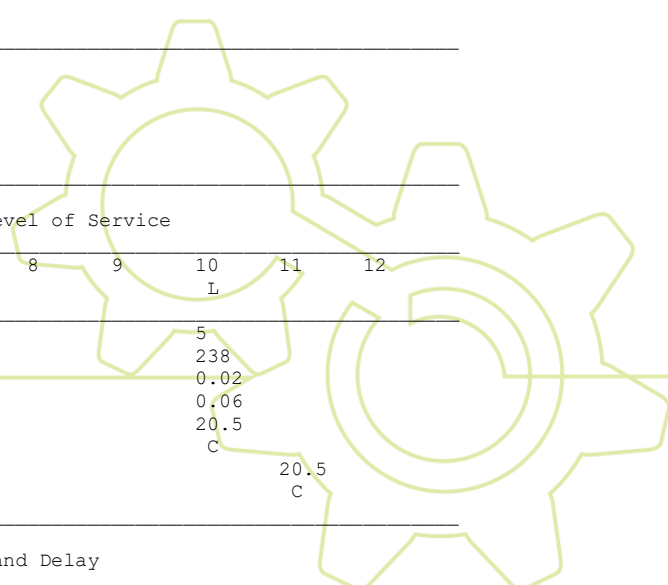
Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7 L	8 T	9 R	10 L	11 T	12 R
C sep				238		
Volume				5		
Delay						
Q sep						
Q sep +1 round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1 LT	4	7	8	9	10 L	11	12
Lane Config	LT					L		
v (vph)	9					5		
C(m) (vph)	1560					238		
v/c	0.01					0.02		
95% queue length	0.02					0.06		
Control Delay	7.3					20.5		
LOS	A					C		
Approach Delay							20.5	
Approach LOS							C	

Worksheet 11-Shared Major LT Impedance and Delay



HCS+: Unsignalized Intersections Release 5.6

Phone: _____ Fax: _____
E-Mail: _____

_____ TWO-WAY STOP CONTROL(TWSC) ANALYSIS _____

Analyst: Progeplan
Agency/Co.:
Date Performed: 05/06/2023
Analysis Time Period: Pico Tarde
Intersection: F
Jurisdiction: DER/DF
Units: U. S. Metric
Analysis Year: 2023
Project ID: FUTURA COMERCIAL
East/West Street: M01-M05-M07+M08+M06-M11
North/South Street: M12
Intersection Orientation: EW Study period (hrs): 1.00

_____ Vehicle Volumes and Adjustments _____

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	6	861				
Peak-Hour Factor, PHF	0.91	0.91				
Peak-15 Minute Volume	2	237				
Hourly Flow Rate, HFR	6	946				
Percent Heavy Vehicles	0	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	2				
Configuration		LT T				
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R

Volume				4		
Peak Hour Factor, PHF				0.91		
Peak-15 Minute Volume				1		
Hourly Flow Rate, HFR				4		
Percent Heavy Vehicles				0		
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized						
Lanes				1		
Configuration				L		

_____ Pedestrian Volumes and Adjustments _____

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

_____ Upstream Signal Data _____

	Prog.	Sat	Arrival	Green	Cycle	Prog.	Distance
	Flow	Flow	Type	Time	Length	Speed	to Signal
	vph	vph		sec	sec	kph	meters
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

	Movement 2	Movement 5
Shared ln volume, major th vehicles:	0	
Shared ln volume, major rt vehicles:	0	
Sat flow rate, major th vehicles:	1700	
Sat flow rate, major rt vehicles:	1700	
Number of major street through lanes:	2	

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)	4.1					7.1		
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	0					0		
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00					0.70		
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1					6.4		
2-stage								

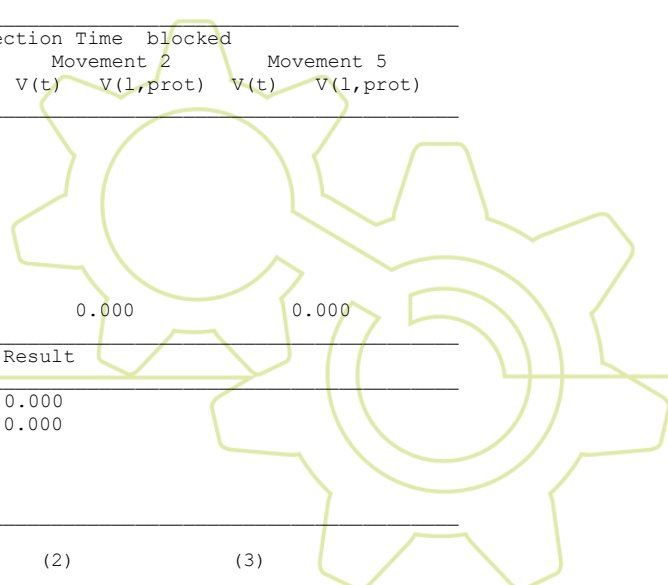
Follow-Up Time Calculations								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)	2.20					3.50		
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	0					0		
t(f)	2.2					3.5		

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				
Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from Exhibit 16-11)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				

Computation 2-Proportion of TWSC Intersection Time blocked				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p		0.000		0.000

Computation 3-Platoon Event Periods		Result
p(2)		0.000
p(5)		0.000
p(dom)		
p(subo)		
Constrained or unconstrained?		
Proportion unblocked	(1)	(2)
		(3)



for minor movements, p(x) Single-stage Process Two-Stage Process
Stage I Stage II

p(1)
p(4)
p(7)
p(8)
p(9)
p(10)
p(11)
p(12)

Computation 4 and 5
Single-Stage Process
Movement

1	4	7	8	9	10	11	12
L	L	L	T	R	L	T	R

V c,x 0 485
s
P x
V c,u,x

C r,x
C plat,x

Two-Stage Process

	7	8	10	11
	Stage1	Stage2	Stage1	Stage2

V(c,x) 3000
s
P(x)
V(c,u,x)

C(r,x)
C(plat,x)

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St. 9 12

Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor 1.00 1.00
Movement Capacity
Probability of Queue free St. 1.00 1.00

Step 2: LT from Major St. 4 1

Conflicting Flows 0
Potential Capacity 1636
Pedestrian Impedance Factor 1.00 1.00
Movement Capacity 1636
Probability of Queue free St. 1.00 1.00
Maj L-Shared Prob Q free St. 1.00

Step 3: TH from Minor St. 8 11

Conflicting Flows
Potential Capacity
Pedestrian Impedance Factor 1.00 1.00
Cap. Adj. factor due to Impeding mvmnt 1.00 1.00
Movement Capacity
Probability of Queue free St. 1.00 1.00

Step 4: LT from Minor St. 7 10

Conflicting Flows 485
Potential Capacity 545
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 1.00
Maj. L, Min T Adj. Imp Factor. 1.00
Cap. Adj. factor due to Impeding mvmnt 1.00 1.00
Movement Capacity 543

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St. 8 11

Part 1 - First Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity
 Probability of Queue free St.

Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor 1.00 1.00
 Cap. Adj. factor due to Impeding mvmnt 1.00 1.00
 Movement Capacity

Result for 2 stage process:
 a
 y
 C t
 Probability of Queue free St. 1.00 1.00

Step 4: LT from Minor St. 7 10

Part 1 - First Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage
 Conflicting Flows 485
 Potential Capacity 545
 Pedestrian Impedance Factor 1.00 1.00
 Maj. L, Min T Impedance factor 1.00
 Maj. L, Min T Adj. Imp Factor. 1.00
 Cap. Adj. factor due to Impeding mvmnt 1.00 1.00
 Movement Capacity 543

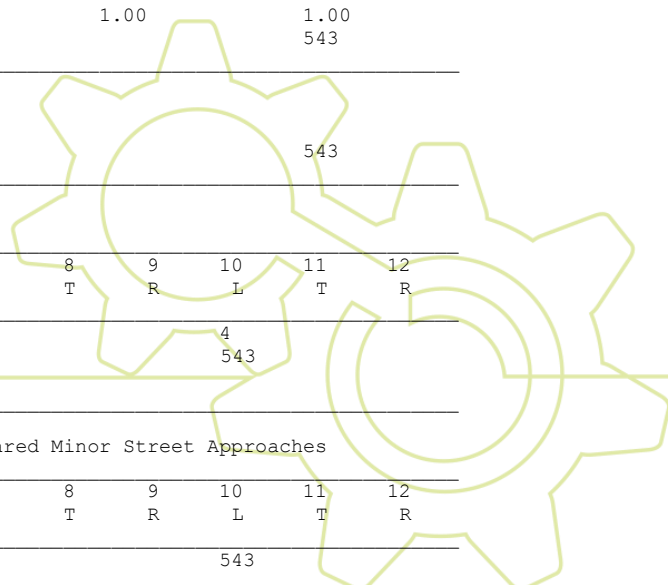
Results for Two-stage process:
 a
 y
 C t 543

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				4		
Movement Capacity (vph)				543		
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep				543		



Volume 4
 Delay
 Q sep
 Q sep +1
 round (Qsep +1)

n max
 C sh
 SUM C sep
 n
 C act

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config	LT					L		
v (vph)	6					4		
C(m) (vph)	1636					543		
v/c	0.00					0.01		
95% queue length	0.01					0.02		
Control Delay	7.2					11.7		
LOS	A					B		
Approach Delay						11.7		
Approach LOS						B		

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	1.00
v(i1), Volume for stream 2 or 5	0	
v(i2), Volume for stream 3 or 6	0	
s(i1), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	1.00	
d(M,LT), Delay for stream 1 or 4	7.2	
N, Number of major street through lanes	2	
d(rank,1) Delay for stream 2 or 5		

1.1.4.13 Interseção G – Pico Manhã

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Manhã
 Intersection: G
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M2-M7+M8-M11+M12-M13
 North/South Street: M13
 Intersection Orientation: EW
 Study period (hrs): 1.00

Major Street: Approach	Vehicle Volumes and Adjustments					
	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30			736		
Peak-Hour Factor, PHF	0.91			0.91		
Hourly Flow Rate, HFR	32			808		
Percent Heavy Vehicles	--			--		
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0			2		

Configuration						LT	T	
Upstream Signal?	No					No		
Minor Street: Approach	Northbound			Southbound				
Movement	7	8	9		10	11	12	
Lane Config	L	T	R		L	T	R	
Volume	17							
Peak Hour Factor, PHF	1.00							
Hourly Flow Rate, HFR	17							
Percent Heavy Vehicles	0							
Percent Grade (%)	0			0				
Flared Approach: Exists?/Storage				/				/
Lanes	1							
Configuration	L							

Delay, Queue Length, and Level of Service										
Approach	EB	WB	Northbound			Southbound				
Movement	1	4		7	8	9		10	11	12
Lane Config		LT		L						
v (vph)	32	17								
C (m) (vph)	1610	546								
v/c	0.02	0.03								
95% queue length	0.06	0.10								
Control Delay	7.3	11.8								
LOS	A	B								
Approach Delay					11.8					
Approach LOS					B					

HCS+: Unsignalized Intersections Release 5.6

Phone:
E-Mail:

Fax:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Manha
 Intersection: G
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M2-M7+M8-M11+M12-M13
 North/South Street: M13
 Intersection Orientation: EW
 Study period (hrs): 1.00

Vehicle Volumes and Adjustments						
Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume				30	736	
Peak-Hour Factor, PHF				0.91	0.91	
Peak-15 Minute Volume				8	202	
Hourly Flow Rate, HFR				32	808	
Percent Heavy Vehicles		--	--	4	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes			0		2	
Configuration			LT		T	
Upstream Signal?	No				No	
Minor Street Movements	7	8	9	10	11	12
Lane Config	L	T	R	L	T	R
Volume	17					

Peak Hour Factor, PHF 1.00
 Peak-15 Minute Volume 4
 Hourly Flow Rate, HFR 17
 Percent Heavy Vehicles 0
 Percent Grade (%) 0 0
 Flared Approach: Exists?/Storage / /
 RT Channelized
 Lanes 1
 Configuration L

Pedestrian Volumes and Adjustments				
Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

Upstream Signal Data							
	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2 Left-Turn Through							
S5 Left-Turn Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		0
Shared ln volume, major rt vehicles:		0
Sat flow rate, major th vehicles:		1700
Sat flow rate, major rt vehicles:		1700
Number of major street through lanes:		2

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)		4.1	7.1					
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		4	0					
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70					
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage		4.1	6.4					
2-stage								

Follow-Up Time Calculations								
Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)		2.20	3.50					
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		4	0					
t(f)		2.2	3.5					

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)

V prog
 Total Saturation Flow Rate, s (vph)
 Arrival Type

Effective Green, g (sec)
 Cycle Length, C (sec)
 R_p (from Exhibit 16-11)
 Proportion vehicles arriving on green P
 $g(q_1)$
 $g(q_2)$
 $g(q)$

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)

alpha
 beta
 Travel time, $t(a)$ (sec)
 Smoothing Factor, F
 Proportion of conflicting flow, f
 Max platooned flow, $V(c,max)$
 Min platooned flow, $V(c,min)$
 Duration of blocked period, $t(p)$
 Proportion time blocked, p

	0.000	0.000
--	-------	-------

Computation 3-Platoon Event Periods Result

$p(2)$	0.000
$p(5)$	0.000
$p(dom)$	
$p(subo)$	
Constrained or unconstrained?	

Proportion unblocked for minor movements, $p(x)$

	(1) Single-stage Process	(2) Two-Stage Stage I	(3) Two-Stage Process Stage II
--	--------------------------------	-----------------------------	--------------------------------------

$p(1)$
 $p(4)$
 $p(7)$
 $p(8)$
 $p(9)$
 $p(10)$
 $p(11)$
 $p(12)$

Computation 4 and 5
 Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

$V_{c,x}$	0	468
s		
P_x		
$V_{c,u,x}$		

$C_{r,x}$
 $C_{plat,x}$

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2

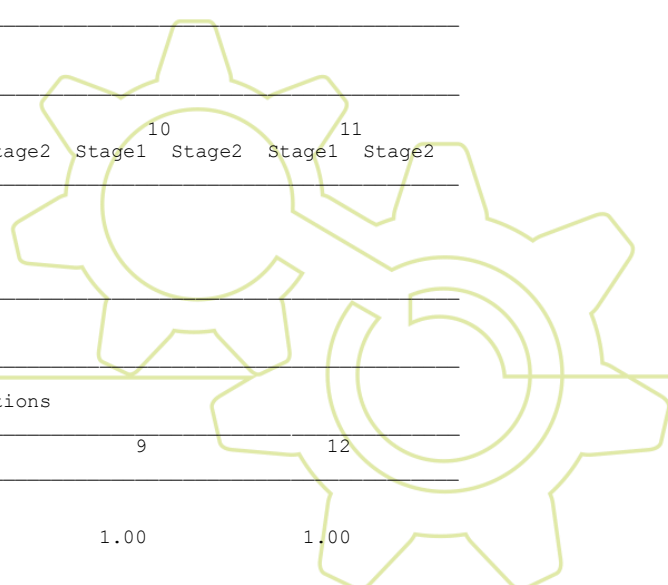
$V(c,x)$								
s	3000							
$P(x)$								
$V(c,u,x)$								

$C(r,x)$
 $C(plat,x)$

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
---------------------------	---	----

Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		



Probability of Queue free St.	1.00	1.00
Step 2: LT from Major St.	4	1
Conflicting Flows	0	
Potential Capacity	1610	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1610	
Probability of Queue free St.	0.98	1.00
Maj L-Shared Prob Q free St.	0.98	
Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Conflicting Flows	468	
Potential Capacity	557	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.98
Maj. L, Min T Adj. Imp Factor.		0.98
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98
Movement Capacity	546	

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		
Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98
Movement Capacity		

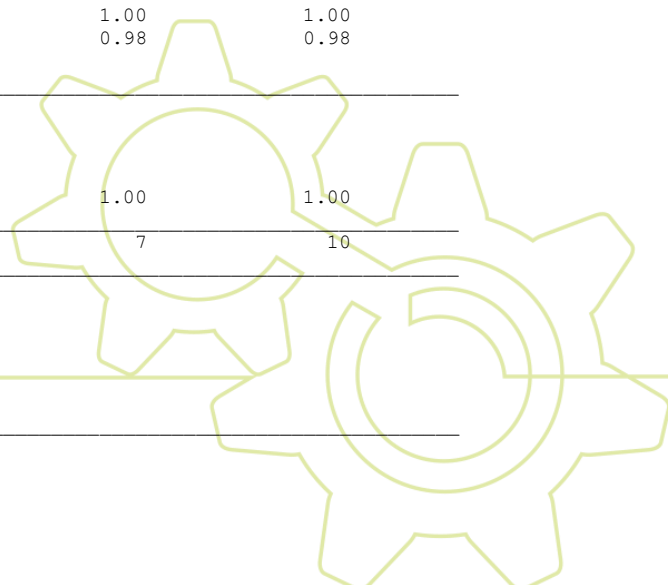
Result for 2 stage process:

a		
Y		
C t		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
---------------------------	---	----

Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		



Part 3 - Single Stage		
Conflicting Flows	468	
Potential Capacity	557	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.98
Maj. L, Min T Adj. Imp Factor.		0.98
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98
Movement Capacity	546	

Results for Two-stage process:

a	
Y	
C t	546

Worksheet 8-Shared Lane Calculations

Movement	7 L	8 T	9 R	10 L	11 T	12 R
Volume (vph)	17					
Movement Capacity (vph)	546					
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

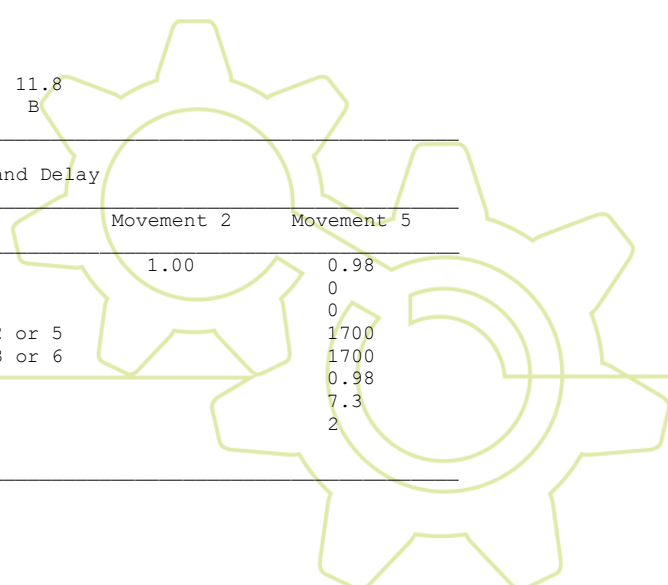
Movement	7 L	8 T	9 R	10 L	11 T	12 R
C sep	546					
Volume	17					
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config		LT	L					
v (vph)		32	17					
C(m) (vph)		1610	546					
v/c		0.02	0.03					
95% queue length		0.06	0.10					
Control Delay		7.3	11.8					
LOS		A	B					
Approach Delay				11.8				
Approach LOS				B				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.98
v(i1), Volume for stream 2 or 5		0
v(i2), Volume for stream 3 or 6		0
s(i1), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)		0.98
d(M,LT), Delay for stream 1 or 4		7.3
N, Number of major street through lanes		2
d(rank,1) Delay for stream 2 or 5		



1.1.4.14 Interseção G – Pico Tarde

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TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: G
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M2-M7+M8-M11+M12-M13
 North/South Street: M13
 Intersection Orientation: EW Study period (hrs): 1.00

		Vehicle Volumes and Adjustments					
Major Street:	Approach Movement	Eastbound			Westbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume					35	2123	
Peak-Hour Factor, PHF					0.91	0.91	
Hourly Flow Rate, HFR					38	2332	
Percent Heavy Vehicles		--	--		0	--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes					0	2	
Configuration						LT T	
Upstream Signal?		No				No	

Minor Street:	Approach Movement	Northbound			Southbound		
		7 L	8 T	9 R	10 L	11 T	12 R
Volume		170					
Peak Hour Factor, PHF		0.91					
Hourly Flow Rate, HFR		186					
Percent Heavy Vehicles		0					
Percent Grade (%)		0			0		
Flared Approach: Exists?/Storage				/		/	
Lanes		1					
Configuration		L					

		Delay, Queue Length, and Level of Service						
Approach Movement	EB 1	WB 4	Northbound			Southbound		
			7 LT	8 L	9	10 	11	12
v (vph)		38	186					
C (m) (vph)		1636	190					
v/c		0.02	0.98					
95% queue length		0.07	15.73					
Control Delay		7.3	188.7					
LOS		A	F					
Approach Delay				188.7				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.6

Phone: Fax:
 E-Mail:

TWO-WAY STOP CONTROL (TWSC) ANALYSIS

Analyst: Progeplan

Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: G
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M2-M7+M8-M11+M12-M13
 North/South Street: M13
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments						
Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume				35	2123	
Peak-Hour Factor, PHF				0.91	0.91	
Peak-15 Minute Volume				10	583	
Hourly Flow Rate, HFR				38	2332	
Percent Heavy Vehicles		--	--	0	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes				0	2	
Configuration				LT	T	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	170					
Peak Hour Factor, PHF	0.91					
Peak-15 Minute Volume	47					
Hourly Flow Rate, HFR	186					
Percent Heavy Vehicles	0					
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized						
Lanes	1					
Configuration	L					

Pedestrian Volumes and Adjustments				
Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

Upstream Signal Data							
	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2 Left-Turn Through							
S5 Left-Turn Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:		0
Shared ln volume, major rt vehicles:		0
Sat flow rate, major th vehicles:		1700
Sat flow rate, major rt vehicles:		1700
Number of major street through lanes:		2

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

t(c,base)		4.1	7.1					
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		0	0					
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70					
t(c,T):	1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2-stage	0.00	0.00	1.00	1.00	0.00	1.00	0.00
t(c)	1-stage	4.1	6.4					
	2-stage							

Follow-Up Time Calculations

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)		2.20	3.50					
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		0	0					
t(f)		2.2	3.5					

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2	Movement 5
V(t)	V(l,prot)	V(t) V(l,prot)

V prog
Total Saturation Flow Rate, s (vph)
Arrival Type
Effective Green, g (sec)
Cycle Length, C (sec)
Rp (from Exhibit 16-11)
Proportion vehicles arriving on green P
g(q1)
g(q2)
g(q)

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2	Movement 5
V(t)	V(l,prot)	V(t) V(l,prot)

alpha
beta
Travel time, t(a) (sec)
Smoothing Factor, F
Proportion of conflicting flow, f
Max platooned flow, V(c,max)
Min platooned flow, V(c,min)
Duration of blocked period, t(p)
Proportion time blocked, p 0.000 0.000

Computation 3-Platoon Event Periods Result

p(2) 0.000
p(5) 0.000
p(dom)
p(subo)
Constrained or unconstrained?

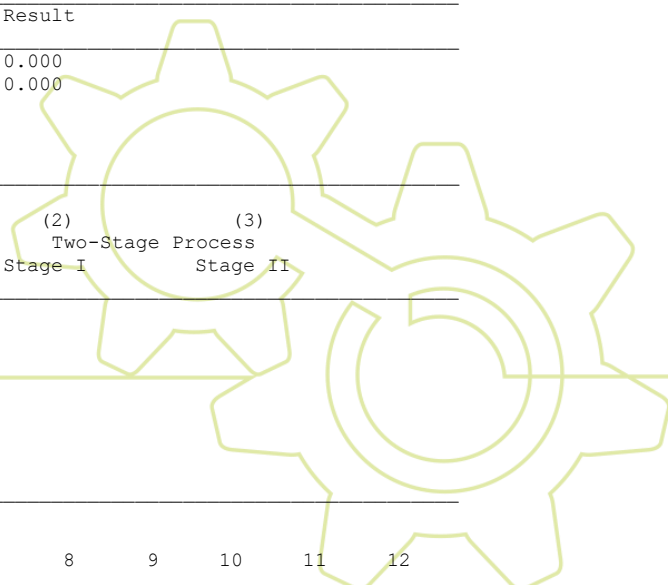
Proportion unblocked for minor movements, p(x)

(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
--------------------------	-------------------------------	--------------------------------

p(1)
p(4)
p(7)
p(8)
p(9)
p(10)
p(11)
p(12)

Computation 4 and 5 Single-Stage Process

Movement	1	4	7	8	9	10	11	12
----------	---	---	---	---	---	----	----	----



Cap. Adj. factor due to Impeding mvmnt
Movement Capacity

Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98
Movement Capacity		

Result for 2 stage process:		
a		
y		
C t		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
---------------------------	---	----

Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		

Part 3 - Single Stage		
Conflicting Flows	1242	
Potential Capacity	195	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.98
Maj. L, Min T Adj. Imp Factor.		0.98
Cap. Adj. factor due to Impeding mvmnt	0.98	0.98
Movement Capacity		

Results for Two-stage process:		
a		
y		
C t	190	

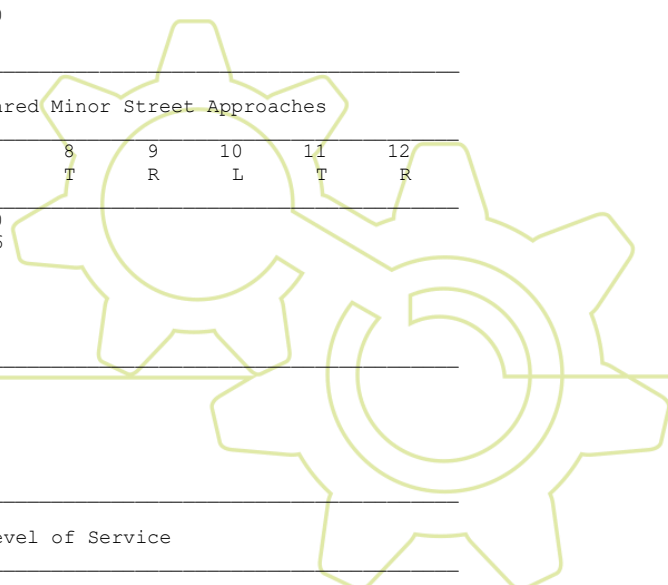
Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
<hr/>						
Volume (vph)	186					
Movement Capacity (vph)	190					
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
<hr/>						
C sep	190					
Volume	186					
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
<hr/>						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service



Movement	1	4	7	8	9	10	11	12
Lane Config		LT	L					
v (vph)		38	186					
C(m) (vph)		1636	190					
v/c		0.02	0.98					
95% queue length		0.07	15.73					
Control Delay		7.3	188.7					
LOS		A	F					
Approach Delay				188.7				
Approach LOS				F				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.98
v(i1), Volume for stream 2 or 5		0
v(i2), Volume for stream 3 or 6		0
s(i1), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)		0.98
d(M,LT), Delay for stream 1 or 4		7.3
N, Number of major street through lanes		2
d(rank,1) Delay for stream 2 or 5		

1.1.4.15 Interseção H – Pico Manhã

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Manha
 Intersection: H
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M01-M05-M07+M08+M06-M11+M12
 North/South Street: M14
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments								
Major Street:	Approach	Eastbound			Westbound			
	Movement	1	2	3	4	5	6	
		L	T	R	L	T	R	
Volume		1	1784					
Peak-Hour Factor, PHF		0.91	0.91					
Hourly Flow Rate, HFR		1	1960					
Percent Heavy Vehicles		0	--	--	--	--	--	
Median Type/Storage		Undivided			/			
RT Channelized?								
Lanes		0	2					
Configuration		LT T						
Upstream Signal?		No			No			
Minor Street:	Approach	Northbound			Southbound			
	Movement	7	8	9	10	11	12	
		L	T	R	L	T	R	
Volume					30			
Peak Hour Factor, PHF					0.91			
Hourly Flow Rate, HFR					32			
Percent Heavy Vehicles					4			
Percent Grade (%)		0				0		
Flared Approach: Exists?/Storage					/		/	
Lanes					1			
Configuration					L			

Delay, Queue Length, and Level of Service

Approach Movement Lane Config	EB 1 LT	WB 4 	Northbound 7 8 9 	Southbound 10 11 12 L
v (vph)	1			32
C(m) (vph)	1636			274
v/c	0.00			0.12
95% queue length	0.00			0.40
Control Delay	7.2			19.9
LOS	A			C
Approach Delay				19.9
Approach LOS				C

HCS+: Unsignalized Intersections Release 5.6

Phone:
E-Mail:

Fax:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Manha
 Intersection: H
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M01-M05-M07+M08+M06-M11+M12
 North/South Street: M14
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street Movements	1		2		3		4		5		6	
	L	T	L	T	R	L	T	L	T	R		
Volume	1	1784										
Peak-Hour Factor, PHF	0.91	0.91										
Peak-15 Minute Volume	0	490										
Hourly Flow Rate, HFR	1	1960										
Percent Heavy Vehicles	0	--	--					--	--			
Median Type/Storage	Undivided					/						
RT Channelized?												
Lanes	0	2										
Configuration		LT T										
Upstream Signal?		No						No				

Minor Street Movements	7		8		9		10		11		12	
	L	T	L	T	R	L	T	L	T	R		
Volume						30						
Peak Hour Factor, PHF						0.91						
Peak-15 Minute Volume						8						
Hourly Flow Rate, HFR						32						
Percent Heavy Vehicles						4						
Percent Grade (%)		0					0					
Flared Approach: Exists?/Storage		/				/						/
RT Channelized												
Lanes						1						
Configuration						L						

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

		Upstream Signal Data					
	Prog.	Sat	Arrival	Green	Cycle	Prog.	Distance
	Flow	Flow	Type	Time	Length	Speed	to Signal
	vph	vph		sec	sec	kph	meters
S2	Left-Turn						
	Through						
S5	Left-Turn						
	Through						

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:	0	
Shared ln volume, major rt vehicles:	0	
Sat flow rate, major th vehicles:	1700	
Sat flow rate, major rt vehicles:	1700	
Number of major street through lanes:	2	

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)	4.1					7.1		
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	0					4		
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00					0.70		
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1					6.4		
2-stage								

Follow-Up Time Calculations								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)	2.20					3.50		
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	0					4		
t(f)	2.2					3.5		

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
V prog				
Total Saturation Flow Rate, s (vph)				
Arrival Type				
Effective Green, g (sec)				
Cycle Length, C (sec)				
Rp (from Exhibit 16-11)				
Proportion vehicles arriving on green P				
g(q1)				
g(q2)				
g(q)				

Computation 2-Proportion of TWSC Intersection Time blocked				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				

Min platooned flow, V(c,min)
 Duration of blocked period, t(p)
 Proportion time blocked, p 0.000 0.000

Computation 3-Platoon Event Periods Result

p(2) 0.000
 p(5) 0.000
 p(dom)
 p(subo)
 Constrained or unconstrained?

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Process Stage II
--	-----------------------------	----------------------------------	-------------------------

p(1)
 p(4)
 p(7)
 p(8)
 p(9)
 p(10)
 p(11)
 p(12)

Computation 4 and 5
 Single-Stage Process
 Movement

	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c,x	0					982		
-------	---	--	--	--	--	-----	--	--

s
 Px
 V c,u,x

C r,x
 C plat,x

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2

V(c,x)								
s						3000		

P(x)
 V(c,u,x)

C(r,x)
 C(plat,x)

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
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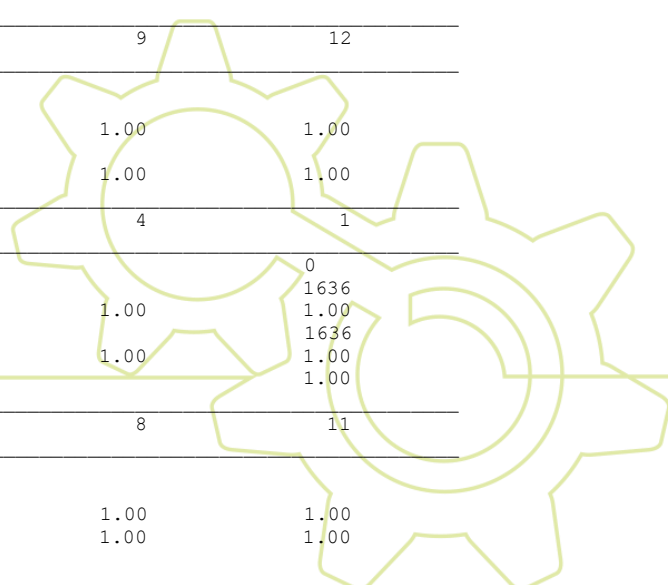
Conflicting Flows Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 2: LT from Major St.	4	1
---------------------------	---	---

Conflicting Flows Potential Capacity		0
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		1636
Probability of Queue free St.	1.00	1.00
Maj L-Shared Prob Q free St.		1636
		1.00
		1.00

Step 3: TH from Minor St.	8	11
---------------------------	---	----

Conflicting Flows Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		



Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Conflicting Flows		982
Potential Capacity		274
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	1.00	
Maj. L, Min T Adj. Imp Factor.	1.00	
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		274

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
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Part 1 - First Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity
 Probability of Queue free St.

Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		

Result for 2 stage process:

a		
y		
C t		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10
---------------------------	---	----

Part 1 - First Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

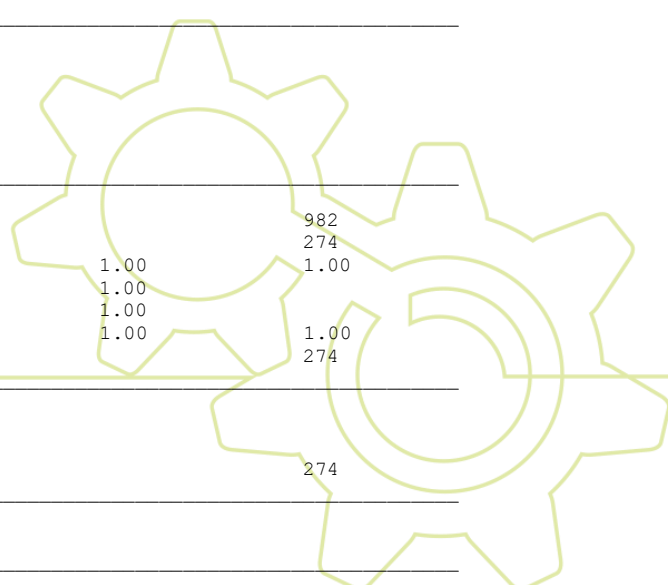
Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage		
Conflicting Flows		982
Potential Capacity		274
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	1.00	
Maj. L, Min T Adj. Imp Factor.	1.00	
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		274

Results for Two-stage process:

a		
y		
C t		274

Worksheet 8-Shared Lane Calculations



Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				32		
Movement Capacity (vph)				274		
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep				274		
Volume				32		
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config	LT					L		
v (vph)	1					32		
C(m) (vph)	1636					274		
v/c	0.00					0.12		
95% queue length	0.00					0.40		
Control Delay	7.2					19.9		
LOS	A					C		
Approach Delay							19.9	
Approach LOS							C	

Worksheet 11-Shared Major LT Impedance and Delay

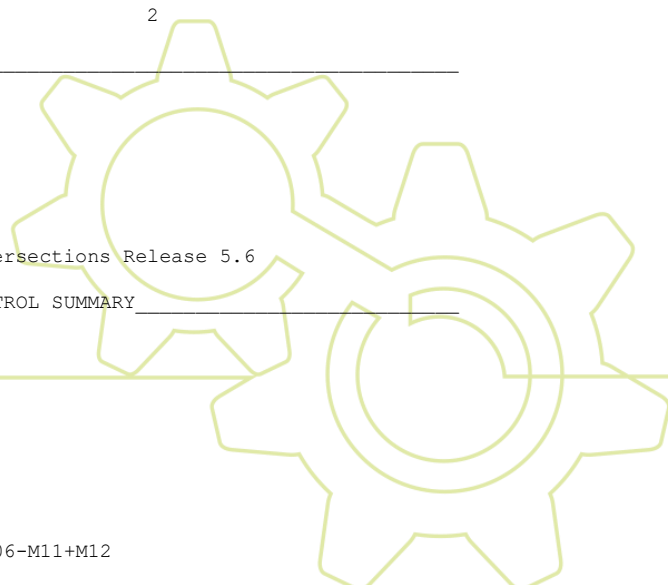
	Movement 2	Movement 5
p(oj)	1.00	1.00
v(i1), Volume for stream 2 or 5	0	0
v(i2), Volume for stream 3 or 6	0	0
s(i1), Saturation flow rate for stream 2 or 5	1700	1700
s(i2), Saturation flow rate for stream 3 or 6	1700	1700
P*(oj)	1.00	1.00
d(M,LT), Delay for stream 1 or 4	7.2	7.2
N, Number of major street through lanes	2	2
d(rank,1) Delay for stream 2 or 5		

1.1.4.16 Interseção H – Pico Tarde

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: H
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M01-M05-M07+M08+M06-M11+M12
 North/South Street: M14



Intersection Orientation: EW

Study period (hrs): 1.00

Vehicle Volumes and Adjustments										
Major Street:	Approach	Eastbound			Westbound					
Movement		1	2	3	4	5	6			
		L	T	R	L	T	R			
Volume		6	865							
Peak-Hour Factor, PHF		0.91	0.91							
Hourly Flow Rate, HFR		6	950							
Percent Heavy Vehicles		0	--	--	--	--	--			
Median Type/Storage		Undivided			/					
RT Channelized?										
Lanes		0	2							
Configuration		LT T								
Upstream Signal?		No			No					
Minor Street:	Approach	Northbound			Southbound					
Movement		7	8	9	10	11	12			
		L	T	R	L	T	R			
Volume					35					
Peak Hour Factor, PHF					0.91					
Hourly Flow Rate, HFR					38					
Percent Heavy Vehicles					0					
Percent Grade (%)		0			0					
Flared Approach: Exists?/Storage					/				/	
Lanes					1					
Configuration					L					
Delay, Queue Length, and Level of Service										
Approach	EB	WB	Northbound			Southbound				
Movement	1	4	7	8	9	10	11	12		
Lane Config	LT							L		
v (vph)	6				38					
C(m) (vph)	1636				541					
v/c	0.00				0.07					
95% queue length	0.01				0.23					
Control Delay	7.2				12.2					
LOS	A				B					
Approach Delay							12.2			
Approach LOS							B			

HCS+: Unsignalized Intersections Release 5.6

Phone:
E-Mail:

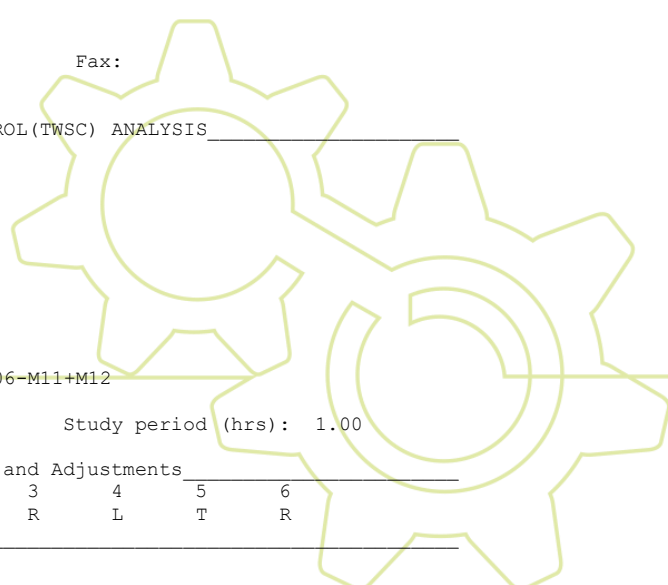
Fax:

TWO-WAY STOP CONTROL (TWSC) ANALYSIS

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: H
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: M01-M05-M07+M08+M06-M11+M12
 North/South Street: M14
 Intersection Orientation: EW

Study period (hrs): 1.00

Vehicle Volumes and Adjustments						
Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	6	865				



Peak-Hour Factor, PHF	0.91	0.91				
Peak-15 Minute Volume	2	238				
Hourly Flow Rate, HFR	6	950				
Percent Heavy Vehicles	0	--	--	--	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	2				
Configuration	LT T					
Upstream Signal?	No		No			

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R

Volume			35			
Peak Hour Factor, PHF			0.91			
Peak-15 Minute Volume			10			
Hourly Flow Rate, HFR			38			
Percent Heavy Vehicles			0			
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage			/			/
RT Channelized						
Lanes			1			
Configuration			L			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2 Left-Turn Through							
S5 Left-Turn Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:	0	
Shared ln volume, major rt vehicles:	0	
Sat flow rate, major th vehicles:	1700	
Sat flow rate, major rt vehicles:	1700	
Number of major street through lanes:	2	

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)	4.1					7.1		
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	0					0		
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00					0.70		
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1					6.4		
2-stage								

Follow-Up Time Calculations								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)	2.20					3.50		

t (f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P (HV)	0					0		
t (f)	2.2					3.5		

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)

V prog
 Total Saturation Flow Rate, s (vph)
 Arrival Type
 Effective Green, g (sec)
 Cycle Length, C (sec)
 Rp (from Exhibit 16-11)
 Proportion vehicles arriving on green P
 g(q1)
 g(q2)
 g(q)

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)

alpha
 beta
 Travel time, t(a) (sec)
 Smoothing Factor, F
 Proportion of conflicting flow, f
 Max platooned flow, V(c,max)
 Min platooned flow, V(c,min)
 Duration of blocked period, t(p)
 Proportion time blocked, p

	0.000	0.000
--	-------	-------

Computation 3-Platoon Event Periods Result

p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)

	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Two-Stage Process Stage II
--	-----------------------------	-------------------------------------	--------------------------------------

p(1)
 p(4)
 p(7)
 p(8)
 p(9)
 p(10)
 p(11)
 p(12)

Computation 4 and 5
 Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c,x	0					487		
-------	---	--	--	--	--	-----	--	--

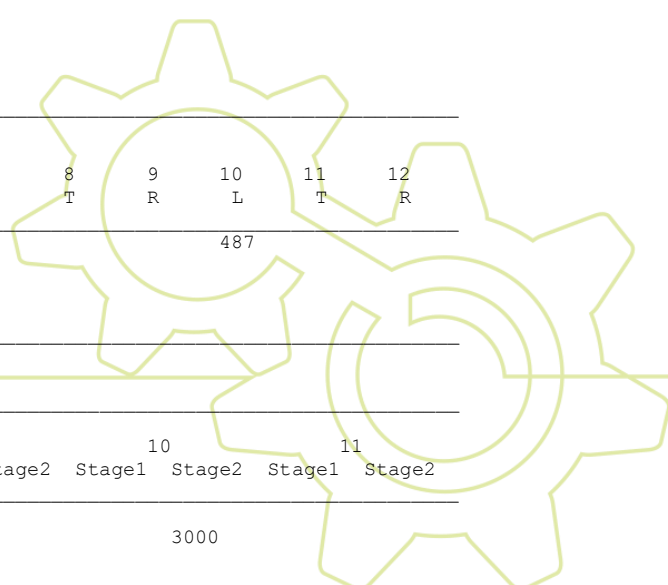
s
 Px
 V c,u,x

C r,x
 C plat,x

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2

V(c,x)								
s						3000		
P(x)								



V(c,u,x)

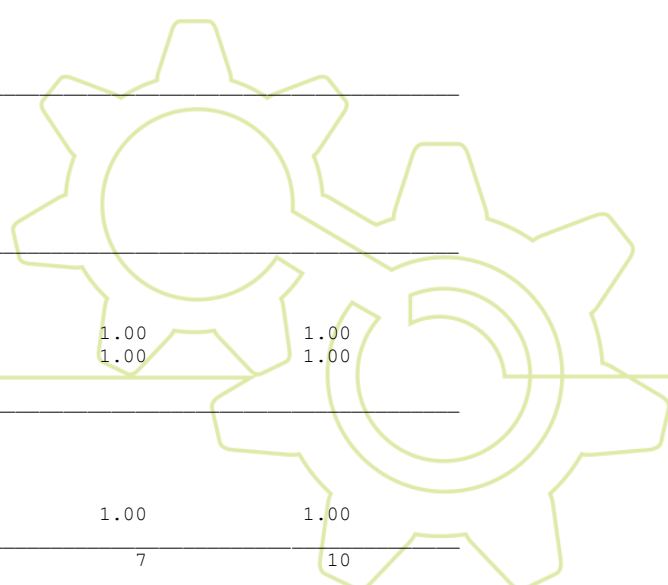
C(r,x)
C(plat,x)

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 2: LT from Major St.	4	1
Conflicting Flows		0
Potential Capacity		1636
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		1636
Probability of Queue free St.	1.00	1.00
Maj L-Shared Prob Q free St.		1.00
Step 3: TH from Minor St.	8	11
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10
Conflicting Flows		487
Potential Capacity		543
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	1.00	
Maj. L, Min T Adj. Imp Factor.	1.00	
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		541

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
Part 1 - First Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Probability of Queue free St.		
Part 2 - Second Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor		
Cap. Adj. factor due to Impeding mvmnt		
Movement Capacity		
Part 3 - Single Stage		
Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	1.00	1.00
Movement Capacity		
Result for 2 stage process:		
a		
y		
C t		
Probability of Queue free St.	1.00	1.00
Step 4: LT from Minor St.	7	10



Part 1 - First Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage
 Conflicting Flows 487
 Potential Capacity 543
 Pedestrian Impedance Factor 1.00 1.00
 Maj. L, Min T Impedance factor 1.00
 Maj. L, Min T Adj. Imp Factor. 1.00
 Cap. Adj. factor due to Impeding mvmnt 1.00 1.00
 Movement Capacity 541

Results for Two-stage process:

a
 Y
 C t 541

Worksheet 8-Shared Lane Calculations

Movement	7 L	8 T	9 R	10 L	11 T	12 R
Volume (vph)				38		
Movement Capacity (vph)				541		
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7 L	8 T	9 R	10 L	11 T	12 R
C sep				541		
Volume				38		
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh						
SUM C sep						
n						
C act						

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1 LT	4	7	8	9	10 L	11	12
v (vph)	6					38		
C (m) (vph)	1636					541		
v/c	0.00					0.07		
95% queue length	0.01					0.23		
Control Delay	7.2					12.2		
LOS	A					B		
Approach Delay							12.2	
Approach LOS							B	

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5

p(oj) 1.00 1.00
v(i1), Volume for stream 2 or 5 0
v(i2), Volume for stream 3 or 6 0
s(i1), Saturation flow rate for stream 2 or 5 1700
s(i2), Saturation flow rate for stream 3 or 6 1700
P*(oj) 1.00
d(M,LT), Delay for stream 1 or 4 7.2
N, Number of major street through lanes 2
d(rank,1) Delay for stream 2 or 5

1.1.4.17 Interseção I – Pico Manhã

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
Agency/Co.:
Date Performed: 05/06/2023
Analysis Time Period: Pico Manha
Intersection: I
Jurisdiction: DER/DF
Units: U. S. Metric
Analysis Year: 2023
Project ID: FUTURA COMERCIAL
East/West Street: MOV01-MOV04-MOV10
North/South Street: MOV10
Intersection Orientation: EW Study period (hrs): 1.00

		Vehicle Volumes and Adjustments					
Major Street:	Approach Movement	Eastbound			Westbound		
		1 L	2 T	3 R	4 L	5 T	6 R
Volume		14	1780				
Peak-Hour Factor, PHF		0.91	0.91				
Hourly Flow Rate, HFR		15	1956				
Percent Heavy Vehicles		0	--	--		--	--
Median Type/Storage		Undivided			/		
RT Channelized?							
Lanes		0	2				
Configuration		LT T					
Upstream Signal?		No				No	

		Northbound			Southbound		
Minor Street:	Approach Movement	7	8	9	10	11	12
		L	T	R	L	T	R
Volume					48		
Peak Hour Factor, PHF					0.91		
Hourly Flow Rate, HFR					52		
Percent Heavy Vehicles					17		
Percent Grade (%)		0				0	
Flared Approach: Exists?/Storage					/		/
Lanes					1		
Configuration					L		

		Delay, Queue Length, and Level of Service							
Approach Movement	EB	WB	Northbound				Southbound		
			1	4	7	8	9	10	11
Lane Config	LT						L		
v (vph)	15							52	
C (m) (vph)	1636							248	
v/c	0.01							0.21	
95% queue length	0.03							0.79	
Control Delay	7.2							23.4	
LOS	A							C	
Approach Delay									23.4
Approach LOS									C

Phone:
E-Mail:

Fax:

TWO-WAY STOP CONTROL (TWSC) ANALYSIS

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Manha
 Intersection: I
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: MOV01-MOV04-MOV10
 North/South Street: MOV10
 Intersection Orientation: EW Study period (hrs): 1.00

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	14	1780				
Peak-Hour Factor, PHF	0.91	0.91				
Peak-15 Minute Volume	4	489				
Hourly Flow Rate, HFR	15	1956				
Percent Heavy Vehicles	0	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	2				
Configuration	LT T					
Upstream Signal?	No				No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				48		
Peak Hour Factor, PHF				0.91		
Peak-15 Minute Volume				13		
Hourly Flow Rate, HFR				52		
Percent Heavy Vehicles				17		
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
RT Channelized						
Lanes				1		
Configuration				L		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

Upstream Signal Data

	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2 Left-Turn Through							
S5 Left-Turn Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5

Shared ln volume, major th vehicles: 0
 Shared ln volume, major rt vehicles: 0
 Sat flow rate, major th vehicles: 1700
 Sat flow rate, major rt vehicles: 1700
 Number of major street through lanes: 2

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(c,base)	4.1					7.1		
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	0					17		
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00					0.70		
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1					6.6		
2-stage								

Follow-Up Time Calculations

Movement	1 L	4 L	7 L	8 T	9 R	10 L	11 T	12 R
t(f,base)	2.20					3.50		
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	0					17		
t(f)	2.2					3.7		

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal

Movement 2 Movement 5
 V(t) V(l,prot) V(t) V(l,prot)

V prog
 Total Saturation Flow Rate, s (vph)
 Arrival Type
 Effective Green, g (sec)
 Cycle Length, C (sec)
 Rp (from Exhibit 16-11)
 Proportion vehicles arriving on green P
 g(q1)
 g(q2)
 g(q)

Computation 2-Proportion of TWSC Intersection Time blocked

Movement 2 Movement 5
 V(t) V(l,prot) V(t) V(l,prot)

alpha
 beta
 Travel time, t(a) (sec)
 Smoothing Factor, F
 Proportion of conflicting flow, f
 Max platooned flow, V(c,max)
 Min platooned flow, V(c,min)
 Duration of blocked period, t(p)
 Proportion time blocked, p

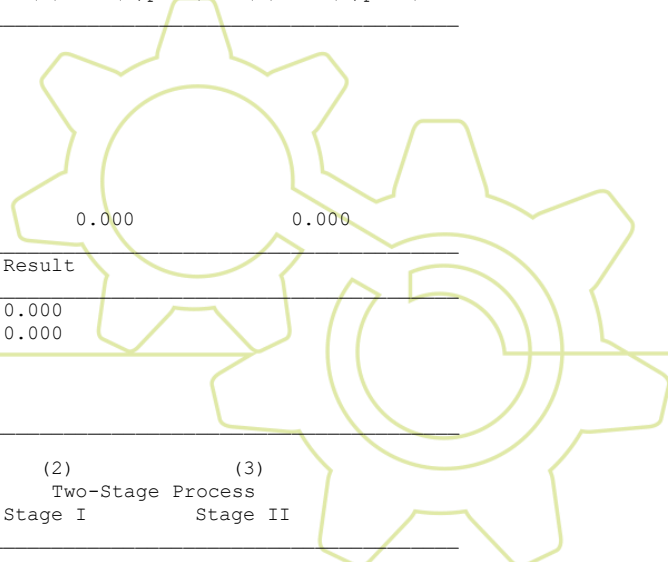
0.000 0.000

Computation 3-Platoon Event Periods Result

p(2) 0.000
 p(5) 0.000
 p(dom)
 p(subo)
 Constrained or unconstrained?

Proportion unblocked for minor movements, p(x)

	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Process Stage II



p(1)
p(4)
p(7)
p(8)
p(9)
p(10)
p(11)
p(12)

Computation 4 and 5
Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c,x	0					1008		
s								
Px								
V c,u,x								

C r,x
C plat,x

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2

V(c,x)								
s						3000		
P(x)								
V(c,u,x)								

C(r,x)
C(plat,x)

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
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Conflicting Flows

Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 2: LT from Major St.	4	1
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Conflicting Flows

Potential Capacity		0
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		1636
Probability of Queue free St.	1.00	0.99
Maj L-Shared Prob Q free St.		0.99

Step 3: TH from Minor St.	8	11
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Conflicting Flows

Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.99	0.99
Movement Capacity		
Probability of Queue free St.	1.00	1.00

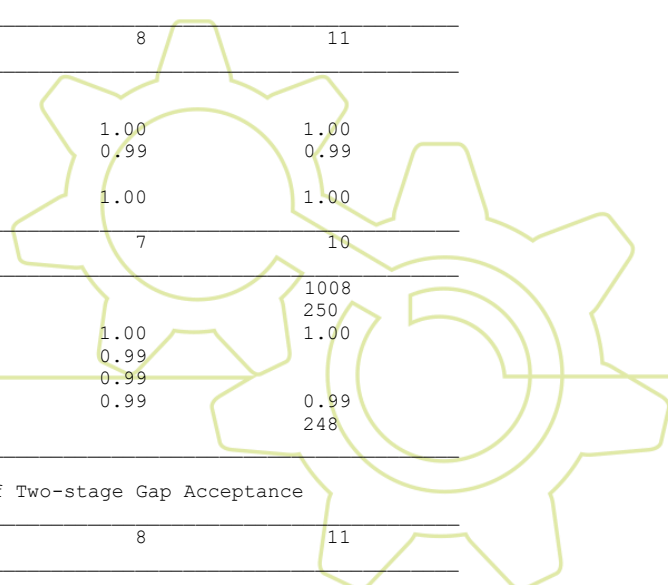
Step 4: LT from Minor St.	7	10
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Conflicting Flows

Potential Capacity		1008
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.99	
Maj. L, Min T Adj. Imp Factor.	0.99	
Cap. Adj. factor due to Impeding mvmnt	0.99	0.99
Movement Capacity		248

Worksheet 7-Computation of the Effect of Two-stage Gap Acceptance

Step 3: TH from Minor St.	8	11
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Part 1 - First Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity
 Probability of Queue free St.

Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor 1.00 1.00
 Cap. Adj. factor due to Impeding mvmnt 0.99 0.99
 Movement Capacity

Result for 2 stage process:
 a
 Y
 C t
 Probability of Queue free St. 1.00 1.00

Step 4: LT from Minor St. 7 10

Part 1 - First Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 2 - Second Stage
 Conflicting Flows
 Potential Capacity
 Pedestrian Impedance Factor
 Cap. Adj. factor due to Impeding mvmnt
 Movement Capacity

Part 3 - Single Stage
 Conflicting Flows 1008
 Potential Capacity 250
 Pedestrian Impedance Factor 1.00 1.00
 Maj. L, Min T Impedance factor 0.99
 Maj. L, Min T Adj. Imp Factor. 0.99
 Cap. Adj. factor due to Impeding mvmnt 0.99 0.99
 Movement Capacity 248

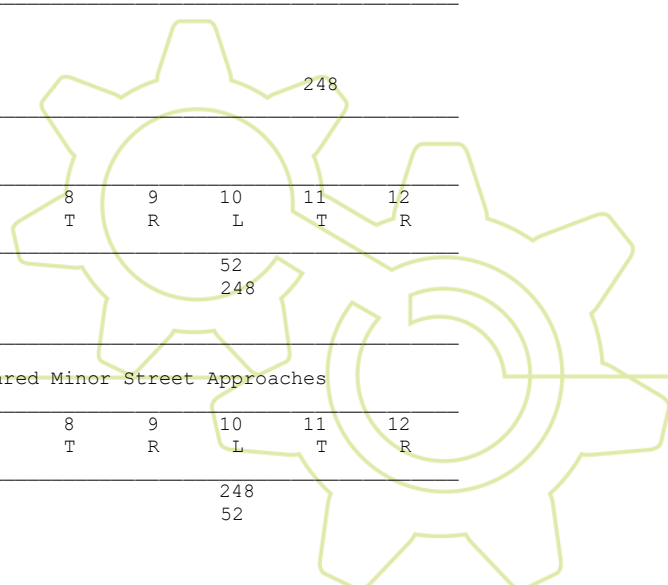
Results for Two-stage process:
 a
 Y
 C t 248

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				52		
Movement Capacity (vph)				248		
Shared Lane Capacity (vph)						

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep				248		
Volume				52		
Delay						
Q sep						



Q sep +1
round (Qsep +1)

n max
C sh
SUM C sep
n
C act

Worksheet 10-Delay, Queue Length, and Level of Service

Movement	1	4	7	8	9	10	11	12
Lane Config	LT					L		
v (vph)	15					52		
C(m) (vph)	1636					248		
v/c	0.01					0.21		
95% queue length	0.03					0.79		
Control Delay	7.2					23.4		
LOS	A					C		
Approach Delay						23.4		
Approach LOS						C		

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.99	1.00
v(i1), Volume for stream 2 or 5	0	
v(i2), Volume for stream 3 or 6	0	
s(i1), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.99	
d(M,LT), Delay for stream 1 or 4	7.2	
N, Number of major street through lanes	2	
d(rank,1) Delay for stream 2 or 5		

1.1.4.18 Interseção I – Pico Tarde

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: I
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: MOV01-MOV04-MOV10
 North/South Street: MOV10
 Intersection Orientation: EW
 Study period (hrs): 1.00

Major Street: Approach Movement	Vehicle Volumes and Adjustments					
	Eastbound			Westbound		
	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	6	707				
Peak-Hour Factor, PHF	0.91	0.91				
Hourly Flow Rate, HFR	6	776				
Percent Heavy Vehicles	0	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0 2					
Configuration	LT T					
Upstream Signal?	No			No		
Minor Street: Approach Movement	Northbound			Southbound		
	7	8	9	10	11	12

	L	T	R		L	T	R
Volume					164		
Peak Hour Factor, PHF					0.91		
Hourly Flow Rate, HFR					180		
Percent Heavy Vehicles					6		
Percent Grade (%)		0				0	
Flared Approach: Exists?/Storage				/			/
Lanes					1		
Configuration					L		

Delay, Queue Length, and Level of Service							
Approach	EB	WB	Northbound			Southbound	
Movement	1	4	7	8	9	10	11 12
Lane Config	LT						L
v (vph)	6					180	
C (m) (vph)	1636					596	
v/c	0.00					0.30	
95% queue length	0.01					1.29	
Control Delay	7.2					13.6	
LOS	A					B	
Approach Delay							13.6
Approach LOS							B

HCS+: Unsignalized Intersections Release 5.6

Phone:
E-Mail:

Fax:

TWO-WAY STOP CONTROL (TWSC) ANALYSIS

Analyst: Progeplan
 Agency/Co.:
 Date Performed: 05/06/2023
 Analysis Time Period: Pico Tarde
 Intersection: I
 Jurisdiction: DER/DF
 Units: U. S. Metric
 Analysis Year: 2023
 Project ID: FUTURA COMERCIAL
 East/West Street: MOV01-MOV04-MOV10
 North/South Street: MOV10
 Intersection Orientation: EW

Study period (hrs): 1.00

Major Street Movements	Vehicle Volumes and Adjustments					
	1 L	2 T	3 R	4 L	5 T	6 R
Volume	6	707				
Peak-Hour Factor, PHF	0.91	0.91				
Peak-15 Minute Volume	2	194				
Hourly Flow Rate, HFR	6	776				
Percent Heavy Vehicles	0	--	--	--	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	2				
Configuration	LT	T				
Upstream Signal?		No		No		
Minor Street Movements	7 L	8 T	9 R	10 L	11 T	12 R
Volume				164		
Peak Hour Factor, PHF				0.91		
Peak-15 Minute Volume				45		
Hourly Flow Rate, HFR				180		
Percent Heavy Vehicles				6		
Percent Grade (%)		0			0	

Flared Approach: Exists?/Storage / /
 RT Channelized
 Lanes 1
 Configuration L

Pedestrian Volumes and Adjustments				
Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (m)	3.6	3.6	3.6	3.6
Walking Speed (m/sec)	1.2	1.2	1.2	1.2
Percent Blockage	0	0	0	0

Upstream Signal Data							
	Prog. Flow vph	Sat Flow vph	Arrival Type	Green Time sec	Cycle Length sec	Prog. Speed kph	Distance to Signal meters
S2 Left-Turn							
Through							
S5 Left-Turn							
Through							

Worksheet 3-Data for Computing Effect of Delay to Major Street Vehicles

	Movement 2	Movement 5
Shared ln volume, major th vehicles:	0	
Shared ln volume, major rt vehicles:	0	
Sat flow rate, major th vehicles:	1700	
Sat flow rate, major rt vehicles:	1700	
Number of major street through lanes:	2	

Worksheet 4-Critical Gap and Follow-up Time Calculation

Critical Gap Calculation								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(c,base)	4.1					7.1		
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	0					6		
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Percent Grade			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00					0.70		
t(c,T): 1-stage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-stage	0.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00
t(c) 1-stage	4.1					6.5		
2-stage								

Follow-Up Time Calculations								
Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R
t(f,base)	2.20					3.50		
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	0					6		
t(f)	2.2					3.6		

Worksheet 5-Effect of Upstream Signals

Computation 1-Queue Clearance Time at Upstream Signal				
	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)

V prog
 Total Saturation Flow Rate, s (vph)
 Arrival Type
 Effective Green, g (sec)
 Cycle Length, C (sec)
 Rp (from Exhibit 16-11)
 Proportion vehicles arriving on green P
 g(q1)

g(q2)
g(q)

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)

alpha				
beta				
Travel time, t(a) (sec)				
Smoothing Factor, F				
Proportion of conflicting flow, f				
Max platooned flow, V(c,max)				
Min platooned flow, V(c,min)				
Duration of blocked period, t(p)				
Proportion time blocked, p		0.000		0.000

Computation 3-Platoon Event Periods Result

p(2)	0.000
p(5)	0.000
p(dom)	
p(subo)	
Constrained or unconstrained?	

Proportion unblocked for minor movements, p(x)	(1) Single-stage Process	(2) Two-Stage Process Stage I	(3) Process Stage II
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p(1)
p(4)
p(7)
p(8)
p(9)
p(10)
p(11)
p(12)

Computation 4 and 5
Single-Stage Process

Movement	1	4	7	8	9	10	11	12
	L	L	L	T	R	L	T	R

V c,x	0					400		
-------	---	--	--	--	--	-----	--	--

s
Px
V c,u,x

C r,x
C plat,x

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2

V(c,x)
s
P(x)
V(c,u,x)

C(r,x)
C(plat,x)

Worksheet 6-Impedance and Capacity Equations

Step 1: RT from Minor St.	9	12
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Conflicting Flows		
Potential Capacity		
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 2: LT from Major St.	4	1
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Conflicting Flows		0
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