LIST OF APPENDICES

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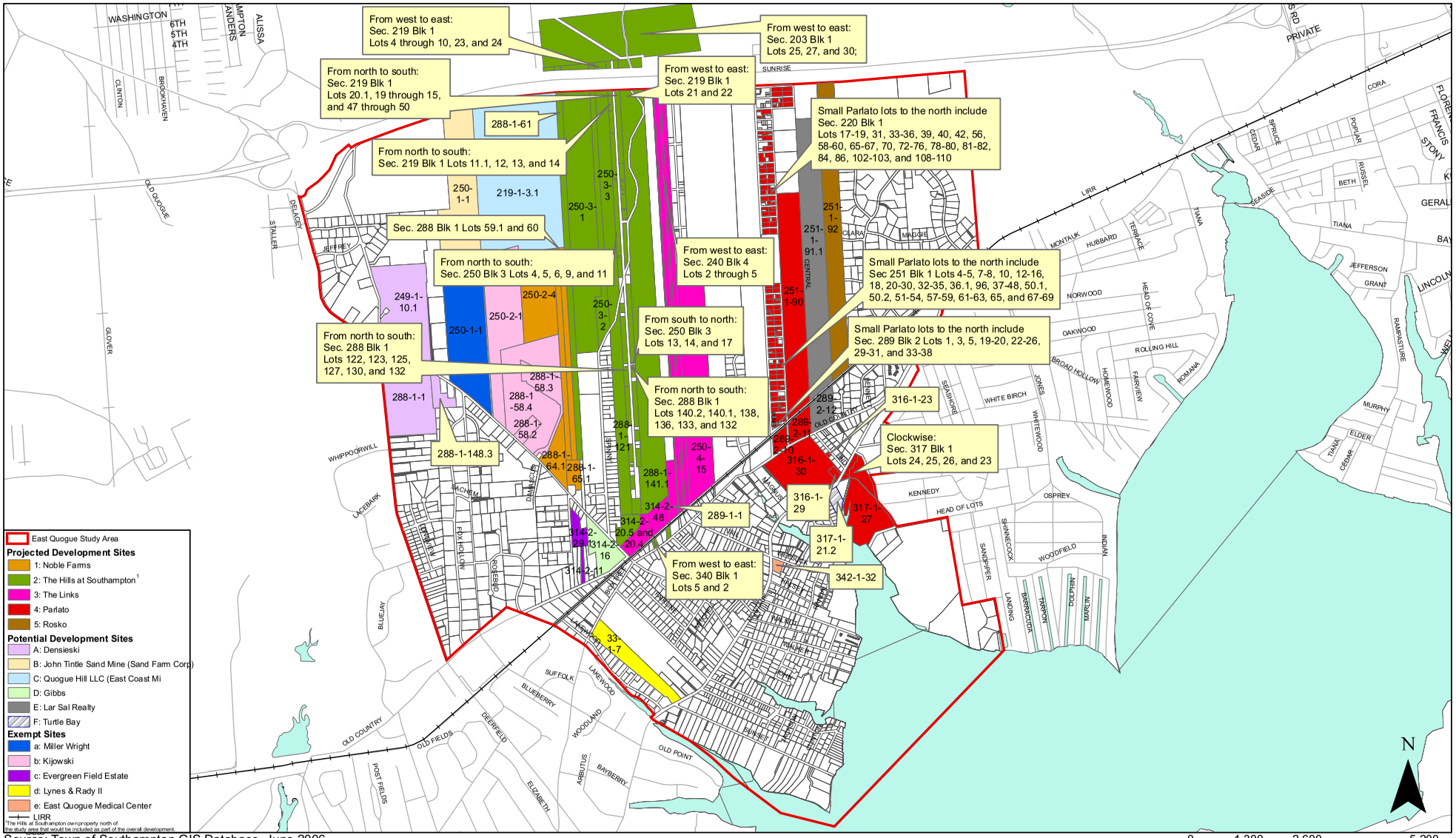
APPENDIX A

Projected and Potential Development Site Tax Lots



Source: Town of Southampton GIS Database, June 2006

East Quogue Generic Environmental Impact Statement

Projected and Potential Development Site Tax Lots

APPENDIX B

Natural Resources

- Ranking System for Ecological Communities of New York State
- Birds

APPENDIX A: HERITAGE PROGRAM ELEMENT RANKS

Explanation of ranks and codes used in Natural Heritage database reports.
Each element has a global and state rank as determined by the NY Natural Heritage Program. These ranks carry no legal weight but are believed to accurately reflect the relative rarity given of the species. The global rank reflects the rarity of the element throughout the world and the state rank reflects the rarity within New York State. Infraspecific taxa are also assigned a taxon rank to reflect the infraspecific taxon's rank throughout the world. The Taxon or T-ranks (T1 - T5) are defined like the Global ranks (G1 - G5), but the T-rank *only* refers to the rarity of the subspecific taxon of the species.

GLOBAL RANK

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences), or very few remaining acres, or miles of stream) or especially vulnerable to extinction because of some factor of its biology.

G2 = Imperiled globally because of rarity (6 - 20 occurrences, or few remaining acres, or miles of stream) or very vulnerable to extinction throughout its range because of other factors.

G3 = Either rare and local throughout its range (21 to 100 occurrences), or found locally (even abundantly at some of its locations) in a restricted range (e.g., a physiographic region), or vulnerable to extinction throughout its range because of other factors.

G4 = Apparently secure globally, though it may be quite rare in parts of its range, especially at the periphery.

G5 = Demonstrably secure globally, though it may be quite rare in parts of its range, especially at the periphery.

GH = Historically known, with the expectation that it might be rediscovered.

GX = Species believed to be extinct.

GU = Status unknown.

STATE RANK

S1 = Typically 5 or fewer occurrences, very few remaining individuals, acres, or miles of stream, or some factor of its biology making it especially vulnerable in New York State.

S2 = Typically 6 to 20 occurrences, few remaining individuals, acres, or miles of stream, or factors demonstrably making it very vulnerable in New York State.

S3 = Typically 21 to 100 occurrences, limited acreage, or miles of stream in New York State.

S4 = Apparently secure in New York State.

S5 = Demonstrably secure in New York State.

SH = Historically known from New York State, but not seen in the past 15 years.

SX = Apparently extirpated from New York State.

SE = Exotic, not native to New York State.

SR = State report only, no verified specimens known from New York State.

SU = Status unknown.

TAXON RANK

T1 - T5 = indicates a rank assigned to a subspecies following the Global Rank definitions above.

Q = indicates a question exists whether or not the taxon is a good taxonomic entity.

? = indicates a question exists about the rank.

Bird Species Identified During the 2000 Atlas Survey in the Study Area						
		Behavior Code[1]				
Common Name	Scientific Name	Block 6952 B	Block 6952 D	Block 7052 A	Block 7052 C	NY Legal Status[2]
Acadian Flycatcher	Empidonax virescens	X1				Protected
American Crow	Corvus brachyrhynchos	FL	ON	FY	NY	Game Species
American Bittern	Botaurus lentiginosus				X1	Special Concern
American Black Duck	Anas rubripes	FL	NY	X1	FL	Game Species
American Goldfinch	Carduelis tristis	P2	FY	FL	FY	Protected
American Oystercatcher	Haematopus palliatus		N2		NY	Protected
American Redstart	Setophaga ruticilla	S2				Protected
American Robin	Turdus migratorius	NY	NY	FY	NY	Protected
American Woodcock	Scolopax minor		S2			Game Species
Baltimore Oriole	Icterus galbula	ON	FY	FY	NY	Protected
Bank Swallow	Riparia riparia			P2		Protected
Barn Swallow	Hirundo rustica	FY	NY	ON	NY	Protected
Belted Kingfisher	Ceryle alcyon	X1	P2	X1	FL	Protected
Black-and-white Warbler	Mniotilta varia	S2	T2	FY		Protected
Black-billed Cuckoo	Coccyzus ertyropthalmus	S2		X1	S2	Protected
Black-capped Chickadee	Poecile atricapillus	ON	NE	FY	NY	Protected
Black-crowned Night-heron	Nycticorax nycticorax		P2	FL	P2	Protected
Black Skimmer	Rynchops niger				NE	Special Concern
Blue Jay	Cyanocitta cristata	P2	FY	FY	NE	Protected
Blue-gray Gnatcatcher	Polioptila caerulea	ON	FY	FL		Protected
Blue-winged Warbler	Vermivora pinus	S2	FY			Protected
Broad-winged Hawk	Buteo platypterus	X1				Protected
Boat-tailed Grackle	Quiscalus major		X1		FY	Protected
Brown Creeper	Certhia americana	X1		P2		Protected
Brown Thrasher	Toxostoma rufum	S2	N2	FY		Protected
Brown-headed Cowbird	Molothrus ater	FY	FY	FL	FY	Protected
Canada Goose	Branta Canadensis	FL	NY	FL	FL	Game Species
Canada Warbler	Wilsonia canadensis	X1				Protected
Carolina Wren	Thryothorus ludovicianus	S2	NY	FY	NY	Protected
Cedar Waxwing	Bombycilla cedrorum	T2	D2	FL		Protected
Chestnut-sided Warbler	Dendroica pensylvanica	S2				Protected
Chimney Swift	Chaetura pelagica	ON	P2	P2		Protected
Chipping Sparrow	Spizella passerina	FY	FY	FY		Protected

Bird Species Identified During the 2000 Atlas Survey in the Study Area (continued)						
		Behavior Code[1]				
Common Name	Scientific Name	Block 6952 B	Block 6952 D	Block 7052 A	Block 7052 C	NY Legal Status[2]
Chuck-will's-widow	Caprimulgus carolinensis		S2			Protected
Clapper Rail	Rallus longirostris		FL		FL	Protected
Common Grackle	Quiscalus quiscula	FY	FY	FY	NE	Protected
Common Moorhen	Gallinula chloropus				X1	Game Species
Common Tern	Sterna hirundo		FY		NY	Threatened
Common Yellowthroat	Geothlypis trichas	S2	FY	FY	FL	Protected
Cooper's Hawk	Accipiter cooperii		FY			Special Concern
Downy Woodpecker	Picoides pubescens	D2	ON	FY	FY	Protected
Eastern Kingbird	Tyrannus tyrannus	FY	FY	FY	T2	Protected
Eastern Phoebe	Sayornis phoebe	NY	NY	ON	FY	Protected
Eastern Screech-Owl	Megascops asio		FL	FL	S2	Protected
Eastern Towhee	Pipilo erythrophthalmus	FL	FY	FY		Protected
Eastern Wood-Pewee	Contopus virens	S2	FY	FY	S2	Protected
European Starling	Sturnus vulgaris	NY	NY	FY	FY	Unprotected
Field Sparrow	Spizella pusilla		N2	S2		Protected
Fish Crow	Corvus ossifragus	X1	N2	FL	X1	Protected
Forster's Tern	Sterna forsteri				ON	Protected
Gadwall	Anas Strepera				FL	Game Species
Glossy Ibis	Plegadis falcinellus				P2	Protected
Grasshopper Sparrow	Ammodramus savannarum		S2			Special Concern
Gray Catbird	Dumetella carolinensis	P2	FY	FY	FY	Protected
Great Black-backed Gull	Larus marinus				NE	Protected
Great Crested Flycatcher	Myiarchus crintus	FY	FY	FY	NY	Protected
Great Egret	Ardea alba				ON	Protected
Great Horned Owl	Bubo virginianus		FL	FL		Protected
Green Heron	Butorides virescens		P2	X1	UN	Protected
Hairy Woodpecker	Picoides villosus	NY	B2	FY		Protected
Hermit Thrush	Catharus guttatus	T2		FL		Protected
Herring Gull	Larus argentatus				NE	Protected
Hooded Warbler	Wilsonia citrina	X1				Protected
Horned Lark	Eremophila alpestris		D2		S2	Special Concern
House Finch	Carpodacus mexicanus	T2	FY	FY	FY	Protected
House Sparrow	Passer domesticus	ON	FY	FY	P2	Unprotected
House Wren	Troglodytes aedon	FY	FY	FY	NY	Protected
Indigo Bunting	Passerina cyanea	S2				Protected
Killdeer	Charadrius vociferous		NE		FL	Protected

Bird Species Identified During the 2000 Atlas Survey in the Study Area (continued)						
		Behavior Code[1]				
Common Name	Scientific Name	Block 6952 B	Block 6952 D	Block 7052 A	Block 7052 C	NY Legal Status[2]
Least Tern	Sterna antillarum		NE		NE	Threatened
Little Blue Heron	Egretta caerulea				P2	Protected
Mallard	Anas platyrhynchos	FL	FL	FL	FL	Game Species
Mallard x Am. Black Duck Hybrid	Anas platyrhynchos x A. rubripes		T2			Game Species
Marsh Wren	Cistothorus palustris		T2			Protected
Mourning Dove	Zenaida macroura	FL	NY	ON	NE	Protected
Mute Swan	Cygnus olor		NY	FL	NY	Protected
Northern Bobwhite	Colinus virginianus		T2	S2	S2	Game Species
Northern Cardinal	Cardinalis cardinalis	FY	FY	FY	NY	Protected
Northern Flicker	Colaptes auratus	P2	ON	FS	NY	Protected
Northern Harrier	Circus cyaneus		X1			Threatened
Northern Mockingbird	Mimus polyglottos	S2	NY	FY	D2	Protected
Northern Parula	Parula americana	S2				Protected
Northern Rough-winged Swallow	Stelgidopteryx serripennis	X1	FY	P2		Protected
Orchard Oriole	Icterus spurious	T2	NY	FY		Protected
Osprey	Pandion haliaetus	X1	NY	ON	NE	Special Concern
Ovenbird	Seiurus aurocapilla	FY	FY	FY		Protected
Pine Warbler	Dendroica pinus	FY	FY	FY	S2	Protected
Piping Plover	Charadrius melodus		NE		NY	Endangered
Prairie Warbler	Dendroica discolor	S2	FY			Protected
Prothonotary Warbler	Protonotaria citrea	X1				Protected
Purple Martin	Progne subis	X1	NY			Protected
Red-bellied Woodpecker	Melanerpes carolinus	N2	ON	FY	NY	Protected
Red-breasted Merganser	Mergu serrator				FL	Game Species
Red-breasted Nuthatch	Sitta canadensis		S2			Protected
Red-eyed Vireo	Vireo olivaceus	FY	NE	T2		Protected
Red-tailed Hawk	Buteo jamaicensis	P2	T2	FL		Protected
Red-winged Blackbird	Agelaius phoeniceus	FY	FY	FY	FS	Protected
Ring-necked Pheasant	Phasianus colchicus		T2	S2	S2	Game Species
Rock Pigeon	Columba livia	NY	ON	ON	P2	Unprotected
Rose-breasted Grosbeak	Pheucticus ludovicianus	X1				Protected
Roseate Tern	Sterna dougallii				NE	Endangered
Ruby-throated Hummingbird	Archilochus colubris	NE	T2	T2		Protected
Saltmarsh Sharptailed Sparrow	Ammodramus caudacutus		N2		FL	Protected
Scarlet Tanager	Piranga olivacea	S2		N2		Protected

Bird Species Identified During the 2000 Atlas Survey in the Study Area (continued)						
		Behavior Code[1]				
Common Name	Scientific Name	Block 6952 B	Block 6952 D	Block 7052 A	Block 7052 C	NY Legal Status[2]
Seaside Sparrow	Ammodramus maritimus		N2		FL	Special Concern
Snowy Egret	Egretta thula				P2	Protected
Song Sparrow	Melospiza melodia	P2	FY	FY	FY	Protected
Spotted Sandpiper	Actitis macularia		X1		T2	Protected
Summer Tanager	Piranga rubra	X1				Protected
Swamp Sparrow	Melospiza Georgiana				FL	Protected
Tree Swallow	Tachycineta bicolor	ON	NE	ON	NY	Protected
Tufted Titmouse	Baeolophus bicolor	FL	FY	FY	NY	Protected
Upland Sandpiper	Bartramia longicauda		T2			Threatened
Veery	Catharus fuscescens	T2		S2		Protected
Whip-poor-will	Caprimulgus vociferous	S2	S2	T2		Special Concern
White-breasted Nuthatch	Sitta carolinensis	FY	X1	X1		Protected
White-eyed Vireo	Vireo griseus		T2			Protected
Wild Turkey	Meleagris gallopavo	X1	T2	X1		Game Species
Willet	Catoptrophorus semipalmatus		FL		NE	Protected
Willow Flycatcher	Empidonas traillii		T2		S2	Protected
Wood Duck	Aix sponsa	ON	P2	P2		Game Species
Wood Thrush	Hylocichla mustelina	B2	FY	FY		Protected
Worm-eating Warbler	Helmitheros vermivorus	X1				Protected
Yellow Warbler	Dendroica petechia	S2	FY	FY	S2	Protected
Yellow-billed Cuckoo	Coccyzus americanus	FY	T2		P2	Protected
Yellow-crowned Night-heron	Nyctanassa violacea		ON	X1	P2	Protected
Yellow-throated Vireo	Vireo flavifrons	T2				Protected
Yellow-throated Warbler	Dendroica dominica	X1				Protected

Notes: [1] **Behavior Codes**

Possible Breeding (PO)

X1-Species observed in possible nesting habitat or singing male(s) present in breeding season.

Probable Breeding (PO)

S2-Singing male present on more than one date in the same place.

P2-Pair observed in suitable habitat in breeding season.

T2-Bird (or pair) apparently holding territory.

D-Courtship and display, agitated behavior or anxiety calls from adults suggesting probable presence nearby of a nest or young; well-developed brood-patch or cloacal protruberance on trapped adult. Includes copulation.

N-Visiting probable nest site. Nest building by wrens and woodpeckers. Wrens may build many nests. Woodpeckers, although they usually drill only one nest cavity, also drill holes just for roosting.

NY-Nest with young.

NE-Nest and eggs, bird on nest or egg, or eggshells beneath nest.

B-Nest building or excavation of a nest hole.

Confirmed Breeding (CO)

UN-Used nest found.

FL--Recently fledged young.

ON-Adult(s) entering or leaving nest site indicating occupied nest.

FS-Adult carrying fecal sac.

FY-Adult(s) with food for young or feeding young.

[2] **NY Legal Status**

Protected Species are defined in ECL 11-0103 as all wild birds except those named as unprotected. Some of these birds, such as waterfowl and gallinaceous birds, are also listed as game species with seasons set, while others may not be taken at any time.

Game Species are defined as "big game," "small game," or "game bird" species in ECL 11-0103. For some species, there are seasons set when they may be legally hunted. For those species, there are no seasons set and the species may not be hunted or taken at any time in New York.

Endangered Species are determined by the New York State Department of Environmental Conservation (DEC) to be in imminent danger of extinction or extirpation in New York State, or are federally listed as endangered. All such species are fully protected under New York State ECL 11-0535.

Threatened Species are determined by the DEC as likely to become endangered within the foreseeable future in New York State, or are federally listed as threatened. All such species are fully protected under the New York State ECL 11-0535.

Special Concern Species are those native species which are not yet recognized as endangered or threatened, but for which documented evidence exists relating to their continued welfare in New York State. The Special Concern category exists within DEC rules and regulations, but such designation does not in itself provide any additional protection. However, Special Concern species may be protected under other laws.

Unprotected Species are those that may be taken at any time without limit. However, a license to take may be required.

Sources: New York State Breeding Bird Atlas 2000.

APPENDIX C

Traffic Analysis

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Box Tree Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: The Hills at Southampton TIS
East/West Street: Box Tree Road/Old Country Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	5	80	10	220	60	10
Peak-Hour Factor, PHF	0.82	0.82	0.82	0.86	0.86	0.86
Hourly Flow Rate, HFR	6	97	12	255	69	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	5	5	330	20	25	5
Peak Hour Factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75
Hourly Flow Rate, HFR	6	6	440	26	33	6
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
Lanes	0	1	0	0	1	0

Configuration LTR LTR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR	
v (vph)	6	255		452			65	
C(m) (vph)	1518	1481		895			188	
v/c	0.00	0.17		0.51			0.35	
95% queue length	0.01	0.62		2.91			1.45	
Control Delay	7.4	7.9		13.1			33.9	
LOS	A	A		B			D	
Approach Delay				13.1			33.9	
Approach LOS				B			D	

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Box Tree Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: The Hills at Southampton TIS
East/West Street: Box Tree Road/Old Country Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	5	80	10	220	60	10
Peak-Hour Factor, PHF	0.82	0.82	0.82	0.86	0.86	0.86
Peak-15 Minute Volume	2	24	3	64	17	3
Hourly Flow Rate, HFR	6	97	12	255	69	11
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	5	5	330	20	25	5
Peak Hour Factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75
Peak-15 Minute Volume	2	2	110	7	8	2
Hourly Flow Rate, HFR	6	6	440	26	33	6
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/		No	/
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	97	69
Shared ln volume, major rt vehicles:	12	11
Sat flow rate, major th vehicles:	1700	1700
Sat flow rate, major rt vehicles:	1700	1700
Number of major street through lanes:	1	1

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	4.1	7.1	6.5	6.2	7.1	6.5	6.2
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2	2	2	2	2	2	2	2
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	4.1	4.1	7.1	6.5	6.2	7.1	6.5	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)	2.20	2.20	3.50	4.00	3.30	3.50	4.00	3.30
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2	2	2	2	2	2	2	2
t(f)	2.2	2.2	3.5	4.0	3.3	3.5	4.0	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	(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	80	109	719	705	103	922	705	74
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	1500		1500		1500		1500	
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	103	74
Potential Capacity	952	988
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	952	988
Probability of Queue free St.	0.54	0.99

Step 2: LT from Major St.	4	1

Conflicting Flows	109	80
Potential Capacity	1481	1518
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1481	1518
Probability of Queue free St.	0.83	1.00
Maj L-Shared Prob Q free St.	0.82	1.00

Step 3: TH from Minor St.	8	11

Conflicting Flows	705	705
Potential Capacity	361	361
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.82	0.82
Movement Capacity	295	295
Probability of Queue free St.	0.98	0.89

Step 4: LT from Minor St.	7	10

Conflicting Flows	719	922
Potential Capacity	344	251
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.72	0.80
Maj. L, Min T Adj. Imp Factor.	0.79	0.85
Cap. Adj. factor due to Impeding mvmnt	0.78	0.45
Movement Capacity	269	114

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

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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	705	705
Potential Capacity	361	361
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.82	0.82
Movement Capacity	295	295

Result for 2 stage process:
a
y

C t	295	295
Probability of Queue free St.	0.98	0.89

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	719	922
Potential Capacity	344	251
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.72	0.80
Maj. L, Min T Adj. Imp Factor.	0.79	0.85
Cap. Adj. factor due to Impeding mvmnt	0.78	0.45
Movement Capacity	269	114

Results for Two-stage process:
a
y
C t 269 114

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	6	6	440	26	33	6
Movement Capacity (vph)	269	295	952	114	295	988
Shared Lane Capacity (vph)	895			188		

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	269	295	952	114	295	988
Volume	6	6	440	26	33	6
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	895			188		
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	LTR		LTR		LTR			LTR
v (vph)	6	255		452			65	
C(m) (vph)	1518	1481		895			188	
v/c	0.00	0.17		0.51			0.35	

95% queue length	0.01	0.62	2.91	1.45			
Control Delay	7.4	7.9	13.1	33.9			
LOS	A	A	B	D			
Approach Delay			13.1	33.9			
Approach LOS			B	D			

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.83
v(il), Volume for stream 2 or 5	97	69
v(i2), Volume for stream 3 or 6	12	11
s(il), 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	0.82
d(M,LT), Delay for stream 1 or 4	7.4	7.9
N, Number of major street through lanes	1	1
d(rank,1) Delay for stream 2 or 5	0.0	1.4

HCS+: Signalized Intersections Release 5.21

Analyst: AA Inter.: Montauk Hwy. & Central Avenue
Agency: AKRF, Inc. Area Type: All other areas
Date: 11/6/2006 Jurisd:
Period: AM Peak Hour Year : Existing 2006
Project ID: East Quogue GIES
E/W St: Montauk Highway N/S St: Central Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
LGConfig		LT			TR						LR	
Volume	30	585			550	115				95	55	
Lane Width		12.7			12.2						12.2	
RTOR Vol					0						0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left			
Thru	P				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	P		
Thru	P				Thru			
Right	P				Right	P		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	92.0				20.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

Cycle Length: 122.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	1085	1439	0.62	0.75	9.5	A	9.5	A

Westbound

TR 1105 1465 0.62 0.75 9.6 A 9.6 A

Northbound

Southbound

LR 282 1721 0.80 0.16 70.3 E 70.3 E

Intersection Delay = 18.3 (sec/veh) Intersection LOS = B

HCS+: Signalized Intersections Release 5.21

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/6/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Central Avenue
Area Type: All other areas
Jurisdiction:
Analysis Year: Existing 2006
Project ID: East Quogue GIES
E/W St: Montauk Highway N/S St: Central Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	30	585		550	115					95	55	
% Heavy Veh	2	2		2	2					2	2	

PHF	0.92 0.92	0.97 0.97		0.66 0.66
PK 15 Vol	8 159	142 30		36 21
Hi Ln Vol				
% Grade	0	0		0
Ideal Sat	1900	1900		1900
ParkExist	X	X		
NumPark	20	20		
No. Lanes	0 1 0	0 1 0	0 0 0	0 0 0
LGConfig	LT	TR		LR
Lane Width	12.7	12.2		12.2
RTOR Vol		0		0
Adj Flow	669	686		227
%InSharedLn				
Prop LTs	0.049	0.000		0.634
Prop RTs	0.000	0.173		0.366
Peds Bikes		0	0	0
Buses	1	0		1
%InProtPhase				

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0			0.0						0.0	
Arriv. Type		3			3						3	
Unit Ext.		3.0			3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0			2.0						2.0	
Ext of g		2.0			2.0						2.0	
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left			
Thru	P				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	P		
Thru	P				Thru			
Right	P				Right	P		
Peds					Peds			

NB Right	EB Right	
SB Right	WB Right	
Green	92.0	20.0
Yellow	3.0	3.0
All Red	2.0	2.0

Cycle Length: 122.0 secs

_____VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET_____

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	30	585		550	115					95	55	
PHF	0.92	0.92		0.97	0.97					0.66	0.66	
Adj flow	33	636		567	119					144	83	
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
Lane group		LT			TR						LR	
Adj flow		669			686						227	
Prop LTs		0.049			0.000						0.634	
Prop RTs		0.000			0.173						0.366	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG		LT			TR						LR	
So		1900			1900						1900	
Lanes	0	1	0	0	1	0	0	0	0	0	0	0
fW		1.023			1.007						1.007	
fHV		0.980			0.980						0.980	
fG		1.000			1.000						1.000	
fP		0.800			0.800						1.000	
fBB		0.996			1.000						0.996	
fA		1.000			1.000						1.000	
fLU		1.000			1.000						1.000	
fRT		1.000			0.977						0.951	
fLT		0.948			1.000						0.969	
Sec.												
fLpb		1.000			1.000						1.000	
fRpb		1.000			1.000						1.000	
S		1439			1465						1721	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	(v/s)	Green Ratio (g/C)	--Lane Group-- Ratio (c)	Capacity	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	669	1439	0.46	0.75	1085	0.62	
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	686	1465	# 0.47	0.75	1105	0.62	
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LR	227	1721	# 0.13	0.16	282	0.80	
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.60
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.65

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Res Del d2	d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS

Eastbound

LT 0.62 0.75 6.9 1.000 1085 0.50 2.6 0.0 9.5 A 9.5 A

Westbound

TR 0.62 0.75 6.9 1.000 1105 0.50 2.6 0.0 9.6 A 9.6 A

Northbound

Southbound

LR 0.80 0.16 49.1 1.000 282 0.50 21.2 0.0 70.3 E 70.3 E

Intersection delay = 18.3 (sec/veh) Intersection LOS = B

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____

for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	122.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				

gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts
Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach	S			
Cycle length, C	122.0 sec			
Total actual green time for LT lane group, G (s)	92.0			
Effective permitted green time for LT lane group, g(s)	92.0			
Opposing effective green time, go (s)	92.0			
Number of lanes in LT lane group, N	1			
Number of lanes in opposing approach, No	1			
Adjusted LT flow rate, VLT (veh/h)	33			
Proportion of LT in LT lane group, PLT	0.049	0.000	0.634	
Proportion of LT in opposing flow, PLTo	0.00			
Adjusted opposing flow rate, Vo (veh/h)	686			
Lost time for LT lane group, tL	5.00			

Computation

LT volume per cycle, LTC=VLTC/3600	1.12		
Opposing lane util. factor, fLUo	1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)	23.25		
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g	31.6		
Opposing platoon ratio, Rpo (refer Exhibit 16-11)	1.00		
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]	0.25		
gq, (see Exhibit C16-4,5,6,7,8)	7.27		
gu=g-gq if gq>=gf, or = g-gf if gq<gf	60.43		

n=Max(gq-gf)/2,0) 0.00
PTHo=1-PLTo 1.00
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)] 0.05
EL1 (refer to Exhibit C16-3) 2.76
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g 0.02
gdiff=max(gq-gf,0) 0.00
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00) 0.95
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT 0.948

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				

OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	122.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Dur. Unmet Demand Q veh	Uniform Delay Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0				0.0			
LT	0.0	0.00	15.0	6.9	0.00	0.0	0.0	9.5
	0.0				0.0			
Westbound								
	0.0				0.0			
TR	0.0	0.00	15.0	6.9	0.00	0.0	0.0	9.6
	0.0				0.0			

Northbound
0.0 0.0
0.0 0.0
0.0 0.0

Southbound
0.0 0.0
LR 0.0 0.00 51.0 49.1 0.00 0.0 0.0 70.3
0.0 0.0

Intersection Delay 18.3 sec/veh Intersection LOS B

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	LT	TR		LR
Init Queue	0.0	0.0		0.0
Flow Rate	669	686		227
So	1900	1900		1900
No.Lanes	0 1 0	0 1 0	0 0 0	0 0 0
SL	1439	1465		1721
LnCapacity	1085	1105		282
Flow Ratio	0.5	0.5		0.1
v/c Ratio	0.62	0.62		0.80
Grn Ratio	0.75	0.75		0.16
I Factor	1.000	1.000		1.000
AT or PVG	3	3		3
Pltn Ratio	1.00	1.00		1.00
PF2	1.00	1.00		1.00
Q1	10.4	10.7		7.4
kB	1.5	1.5		0.6
Q2	2.3	2.4		1.9
Q Average	12.7	13.1		9.3
Q Spacing	25.0	25.0		25.0
Q Storage	0	0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2		1.2
BOQ	15.4	15.8		11.3
QSRatio				
85th Percentile Output:				
fB%	1.4	1.4		1.4
BOQ	18.1	18.7		13.4
QSRatio				
90th Percentile Output:				

fB%	1.5	1.5		1.6
BOQ	19.6	20.2		14.7
QSRatio				

95th Percentile Output:

fB%	1.7	1.7		1.8
BOQ	21.4	21.9		16.3
QSRatio				

98th Percentile Output:

fB%	1.8	1.8		1.9
BOQ	23.1	23.7		18.0
QSRatio				

ERROR MESSAGES

No errors to report.

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Emmett Drive
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Emmett Drive
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	20	460			460	10
Peak-Hour Factor, PHF	0.79	0.79			0.81	0.81
Hourly Flow Rate, HFR	25	582			567	12
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				20		40
Peak Hour Factor, PHF				0.72		0.72
Hourly Flow Rate, HFR				27		55
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	25					82		
C(m) (vph)	995					338		
v/c	0.03					0.24		
95% queue length	0.08					0.93		
Control Delay	8.7					19.0		
LOS	A					C		
Approach Delay						19.0		
Approach LOS						C		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Emmett Drive
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Emmett Drive

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	20	460			460	10
Peak-Hour Factor, PHF	0.79	0.79			0.81	0.81
Peak-15 Minute Volume	6	146			142	3
Hourly Flow Rate, HFR	25	582			567	12
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				No

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				20		40
Peak Hour Factor, PHF				0.72		0.72
Peak-15 Minute Volume				7		14
Hourly Flow Rate, HFR				27		55
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	582	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	579				1205		573	
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				1500				
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	573	
Potential Capacity	519	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		519	
Probability of Queue free St.	1.00	0.89	

Step 2: LT from Major St.	4	1	

Conflicting Flows		579	
Potential Capacity		995	
Pedestrian Impedance Factor	1.00	1.00	
Movement Capacity		995	
Probability of Queue free St.	1.00	0.97	
Maj L-Shared Prob Q free St.		0.96	

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	0.96	0.96	
Movement Capacity			
Probability of Queue free St.	1.00	1.00	

Step 4: LT from Minor St.	7	10	

Conflicting Flows		1205	
Potential Capacity		203	
Pedestrian Impedance Factor	1.00	1.00	
Maj. L, Min T Impedance factor	0.96		
Maj. L, Min T Adj. Imp Factor.	0.97		
Cap. Adj. factor due to Impeding mvmnt	0.87	0.97	
Movement Capacity		198	

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

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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 0.96 0.96
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 1205
Potential Capacity 203
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.96
Maj. L, Min T Adj. Imp Factor. 0.97
Cap. Adj. factor due to Impeding mvmnt 0.87 0.97
Movement Capacity 198

Results for Two-stage process:
a
y
C t 198

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				27		55
Movement Capacity (vph)					198	519
Shared Lane Capacity (vph)					338	

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				198		519
Volume				27		55
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				338		
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						LR	
v (vph)	25					82		
C(m) (vph)	995						338	
v/c	0.03					0.24		

95% queue length	0.08	0.93
Control Delay	8.7	19.0
LOS	A	C
Approach Delay		19.0
Approach LOS		C

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.97	1.00
v(il), Volume for stream 2 or 5	582	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.96	
d(M,LT), Delay for stream 1 or 4	8.7	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.3	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & J. Fosters Path
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Josiah Fosters Path
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		490	40	5	435	
Peak-Hour Factor, PHF		0.96	0.96	0.92	0.92	
Hourly Flow Rate, HFR		510	41	5	472	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	115		10			
Peak Hour Factor, PHF	0.83		0.83			
Hourly Flow Rate, HFR	138		12			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/		/	
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		5		150				
C(m) (vph)		1019		275				
v/c		0.00		0.55				
95% queue length		0.01		3.02				
Control Delay		8.6		32.7				
LOS		A		D				
Approach Delay				32.7				
Approach LOS				D				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & J. Fosters Path
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Josiah Fosters Path

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	490	40	5	435		
Peak-Hour Factor, PHF		0.96	0.96	0.92	0.92	
Peak-15 Minute Volume		128	10	1	118	
Hourly Flow Rate, HFR		510	41	5	472	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	115		10			
Peak Hour Factor, PHF	0.83		0.83			
Peak-15 Minute Volume	35		3			
Hourly Flow Rate, HFR	138		12			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	472	
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:	1	

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(1) Single-stage	(2) Two-Stage Process	(3)

movements, p(x) Process Stage I 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	551	1012			530			
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	1500							
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	530	
Potential Capacity	549	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	549	
Probability of Queue free St.	0.98	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	551	
Potential Capacity	1019	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1019	
Probability of Queue free St.	1.00	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	1012	
Potential Capacity	265	
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	1.00	0.97
Movement Capacity	264	

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

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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 1012
Potential Capacity 265
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 1.00 0.97
Movement Capacity 264

Results for Two-stage process:
a
y
C t 264

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	138		12			
Movement Capacity (vph)		264			549	
Shared Lane Capacity (vph)			275			

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	264		549			
Volume	138		12			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	275					
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		LR				
v (vph)	5		150					
C(m) (vph)		1019		275				
v/c	0.00		0.55					

95% queue length	0.01	3.02
Control Delay	8.6	32.7
LOS	A	D
Approach Delay		32.7
Approach LOS		D

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	1.00
v(il), Volume for stream 2 or 5		472
v(i2), Volume for stream 3 or 6		0
s(il), 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		8.6
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.1

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Lewis Road
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Lewis Road
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	25	540			510	95
Peak-Hour Factor, PHF	0.91	0.91			0.85	0.85
Hourly Flow Rate, HFR	27	593			599	111
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				Yes

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				60		20
Peak Hour Factor, PHF				0.72		0.72
Hourly Flow Rate, HFR				83		27
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

_____Delay, Queue Length, and Level of Service_____

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	27					110		
C(m) (vph)	874					323		
v/c	0.03					0.34		
95% queue length	0.10					1.47		
Control Delay	9.3					21.8		
LOS	A					C		
Approach Delay						21.8		
Approach LOS						C		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

_____TWO-WAY STOP CONTROL(TWSC) ANALYSIS_____

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Lewis Road
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Lewis Road

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	25	540			510	95
Peak-Hour Factor, PHF	0.91	0.91			0.85	0.85
Peak-15 Minute Volume	7	148			150	28
Hourly Flow Rate, HFR	27	593			599	111
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				Yes

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				60		20
Peak Hour Factor, PHF				0.72		0.72
Peak-15 Minute Volume				21		7
Hourly Flow Rate, HFR				83		27
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
S2	Left-Turn						
	Through						
S5	Left-Turn	0	1700	3	0	122	35	625
	Through	550	1700	3	105	122	35	625

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

	Movement 2	Movement 5
Shared ln volume, major th vehicles:	593	
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:	1	

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				5.5*		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		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	4.1				4.8		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	550	0		
Total Saturation Flow Rate, s (vph)			1700	1700
Arrival Type	3	3		
Effective Green, g (sec)			105	0
Cycle Length, C (sec)			122	122
Rp (from Exhibit 16-11)			1.000	1.000
Proportion vehicles arriving on green P			0.861	0.000
g(q1)	5.5	0.0		
g(q2)	2.6	0.0		
g(q)	8.1	0.0		

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha	0.550			
beta	0.645			
Travel time, t(a) (sec)			12.148	
Smoothing Factor, F			0.188	
Proportion of conflicting flow, f			1.000	1.000
Max platooned flow, V(c,max)			1388	0
Min platooned flow, V(c,min)			1000	1000
Duration of blocked period, t(p)			6.9	0.0
Proportion time blocked, p	0.000		0.056	

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.056
p(dom)	0.056
p(subo)	0.000
Constrained or unconstrained?	U

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

movements, p(x)	Process	Stage I	Stage II
p(1)	0.944		
p(4)			
p(7)			
p(8)			
p(9)			
p(10)	0.944		
p(11)			
p(12)	0.944		

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	710				1301		654	
s	1500				1500		1500	
Px	0.944				0.944		0.944	
V c,u,x	663				1289		604	
C r,x	926				320		498	
C plat,x	874				302		470	

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s			1500	1500				
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	654	
Potential Capacity	470	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		470		
Probability of Queue free St.	1.00		0.94	

Step 2: LT from Major St.	4		1	

Conflicting Flows		710		
Potential Capacity		874		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		874		
Probability of Queue free St.	1.00		0.97	
Maj L-Shared Prob Q free St.			0.95	

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		0.95		0.95
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1301		
Potential Capacity		302		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.95			
Maj. L, Min T Adj. Imp Factor.	0.96			
Cap. Adj. factor due to Impeding mvmnt		0.91		0.97
Movement Capacity		293		

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

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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 0.95 0.95
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 1301
Potential Capacity 302
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.95
Maj. L, Min T Adj. Imp Factor. 0.96
Cap. Adj. factor due to Impeding mvmnt 0.91 0.97
Movement Capacity 293

Results for Two-stage process:
a
y
C t 293

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				83		27
Movement Capacity (vph)					293	470
Shared Lane Capacity (vph)					323	

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				293		470
Volume				83		27
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				323		
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						LR	
v (vph)	27					110		
C(m) (vph)	874						323	
v/c	0.03					0.34		

95% queue length	0.10	1.47
Control Delay	9.3	21.8
LOS	A	C
Approach Delay		21.8
Approach LOS		C

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.97	1.00
v(il), Volume for stream 2 or 5	593	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.95	
d(M,LT), Delay for stream 1 or 4	9.3	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.4	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Old Country Rd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Old Country Road
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	35	445		260	240	
Peak-Hour Factor, PHF	0.79	0.79		0.81	0.81	
Hourly Flow Rate, HFR	44	563		320	296	
Percent Heavy Vehicles	2	--	--	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1		1	0	
Configuration	LT			TR		
Upstream Signal?	No			No		

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			35		65	
Peak Hour Factor, PHF			0.72		0.72	
Hourly Flow Rate, HFR			48		90	
Percent Heavy Vehicles			2		2	
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/		No	/
Lanes			0		0	

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	44					138		
C(m) (vph)	964					373		
v/c	0.05					0.37		
95% queue length	0.14					1.67		
Control Delay	8.9					20.2		
LOS	A					C		
Approach Delay						20.2		
Approach LOS						C		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Old Country Rd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Old Country Road

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	35	445		260	240	
Peak-Hour Factor, PHF	0.79	0.79			0.81	0.81
Peak-15 Minute Volume	11	141			80	74
Hourly Flow Rate, HFR	44	563			320	296
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				35		65
Peak Hour Factor, PHF				0.72		0.72
Peak-15 Minute Volume				12		23
Hourly Flow Rate, HFR				48		90
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	563	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	616				1119		468	
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				1500				
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	468	
Potential Capacity	595	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		595		
Probability of Queue free St.	1.00		0.85	

Step 2: LT from Major St.	4		1	

Conflicting Flows		616		
Potential Capacity		964		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		964		
Probability of Queue free St.	1.00		0.95	
Maj L-Shared Prob Q free St.			0.93	

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		0.93		0.93
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1119		
Potential Capacity		229		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.93			
Maj. L, Min T Adj. Imp Factor.	0.95			
Cap. Adj. factor due to Impeding mvmnt		0.80		0.95
Movement Capacity		219		

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

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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 0.93 0.93
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 1119
Potential Capacity 229
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.93
Maj. L, Min T Adj. Imp Factor. 0.95
Cap. Adj. factor due to Impeding mvmnt 0.80 0.95
Movement Capacity 219

Results for Two-stage process:
a
y
C t 219

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				48		90
Movement Capacity (vph)					219	595
Shared Lane Capacity (vph)					373	

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			219		595	
Volume			48		90	
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				373		
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						LR	
v (vph)	44					138		
C(m) (vph)	964						373	
v/c	0.05					0.37		

95% queue length	0.14	1.67
Control Delay	8.9	20.2
LOS	A	C
Approach Delay		20.2
Approach LOS		C

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.95	1.00
v(il), Volume for stream 2 or 5	563	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.93	
d(M,LT), Delay for stream 1 or 4	8.9	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.6	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Squires Avenue
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Squires Avenue
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		475	25	5	320	
Peak-Hour Factor, PHF		0.92	0.92	0.84	0.84	
Hourly Flow Rate, HFR		516	27	5	380	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	120		5			
Peak Hour Factor, PHF	0.78		0.78			
Hourly Flow Rate, HFR	153		6			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		5		159				
C(m) (vph)		1026		305				
v/c		0.00		0.52				
95% queue length		0.01		2.83				
Control Delay		8.5		29.0				
LOS		A		D				
Approach Delay				29.0				
Approach LOS				D				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Squires Avenue
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Squires Avenue

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	475	25	5	320		
Peak-Hour Factor, PHF		0.92	0.92	0.84	0.84	
Peak-15 Minute Volume		129	7	1	95	
Hourly Flow Rate, HFR		516	27	5	380	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	120		5			
Peak Hour Factor, PHF	0.78		0.78			
Peak-15 Minute Volume	38		2			
Hourly Flow Rate, HFR	153		6			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	380	
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:	1	

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(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	543	920			530			
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	1500							
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	530	
Potential Capacity	549	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	549	
Probability of Queue free St.	0.99	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	543	
Potential Capacity	1026	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1026	
Probability of Queue free St.	1.00	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	920	
Potential Capacity	301	
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	0.98
Movement Capacity	300	

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

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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 920
Potential Capacity 301
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 0.98
Movement Capacity 300

Results for Two-stage process:
a
y
C t 300

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	153		6			
Movement Capacity (vph)		300			549	
Shared Lane Capacity (vph)			305			

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	300		549			
Volume	153		6			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	305					
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		LR				
v (vph)	5		159					
C(m) (vph)		1026		305				
v/c	0.00		0.52					

95% queue length	0.01	2.83
Control Delay	8.5	29.0
LOS	A	D
Approach Delay		29.0
Approach LOS		D

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	1.00
v(il), Volume for stream 2 or 5		380
v(i2), Volume for stream 3 or 6		0
s(il), 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		8.5
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.1

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd. & Central Ave.
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Central Avenue
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		185	70	40	310	
Peak-Hour Factor, PHF		0.83	0.83	0.83	0.83	
Hourly Flow Rate, HFR		222	84	48	373	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30		25			
Peak Hour Factor, PHF	0.73		0.73			
Hourly Flow Rate, HFR	41		34			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		48		75				
C(m) (vph)		1255		488				
v/c		0.04		0.15				
95% queue length		0.12		0.54				
Control Delay		8.0		13.7				
LOS		A		B				
Approach Delay				13.7				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd. & Central Ave.
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Central Avenue

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	185	70	40	310		
Peak-Hour Factor, PHF		0.83	0.83	0.83	0.83	
Peak-15 Minute Volume		56	21	12	93	
Hourly Flow Rate, HFR		222	84	48	373	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30		25			
Peak Hour Factor, PHF	0.73		0.73			
Peak-15 Minute Volume	10		9			
Hourly Flow Rate, HFR	41		34			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		373
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(1) Single-stage	(2) Two-Stage Process	(3)

movements, p(x) Process Stage I 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	306	733		264				
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	1500							
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	264	
Potential Capacity	775	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	775	
Probability of Queue free St.	0.96	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	306	
Potential Capacity	1255	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1255	
Probability of Queue free St.	0.96	1.00
Maj L-Shared Prob Q free St.	0.95	

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	0.95	0.95
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	733	
Potential Capacity	388	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.95
Maj. L, Min T Adj. Imp Factor.		0.96
Cap. Adj. factor due to Impeding mvmnt	0.96	0.92
Movement Capacity	373	

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

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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 0.95 0.95
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 733
Potential Capacity 388
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.95
Maj. L, Min T Adj. Imp Factor. 0.96
Cap. Adj. factor due to Impeding mvmnt 0.96 0.92
Movement Capacity 373

Results for Two-stage process:
a
y
C t 373

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	41		34			
Movement Capacity (vph)		373			775	
Shared Lane Capacity (vph)			488			

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	373		775			
Volume	41		34			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	488					
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		LR				
v (vph)		48		75				
C(m) (vph)		1255		488				
v/c		0.04		0.15				

95% queue length	0.12	0.54
Control Delay	8.0	13.7
LOS	A	B
Approach Delay		13.7
Approach LOS		B

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.96
v(il), Volume for stream 2 or 5		373
v(i2), Volume for stream 3 or 6		0
s(il), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)	0.95	
d(M,LT), Delay for stream 1 or 4		8.0
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.4

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd. & Quogue-Rvrhd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Quogue-Riverhead Road (Rt 104)
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	20	80	15	50	125	85
Peak-Hour Factor, PHF	0.78	0.78	0.78	0.85	0.85	0.85
Hourly Flow Rate, HFR	25	102	19	58	147	99
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	15	45	20	70	50	10
Peak Hour Factor, PHF	0.80	0.80	0.80	0.89	0.89	0.89
Hourly Flow Rate, HFR	18	56	24	78	56	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
Lanes	0	1	0	0	1	0

Configuration LTR LTR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound		Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR
v (vph)	25	58		98			145
C(m) (vph)	1320	1467		488			432
v/c	0.02	0.04		0.20			0.34
95% queue length	0.06	0.12		0.74			1.46
Control Delay	7.8	7.6		14.2			17.5
LOS	A	A		B			C
Approach Delay				14.2			17.5
Approach LOS				B			C

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd. & Quogue-Rvrhd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Quogue-Riverhead Road (Rt 104)

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	20	80	15	50	125	85
Peak-Hour Factor, PHF	0.78	0.78	0.78	0.85	0.85	0.85
Peak-15 Minute Volume	6	26	5	15	37	25
Hourly Flow Rate, HFR	25	102	19	58	147	99
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	15	45	20	70	50	10
Peak Hour Factor, PHF	0.80	0.80	0.80	0.89	0.89	0.89
Peak-15 Minute Volume	5	14	6	20	14	3
Hourly Flow Rate, HFR	18	56	24	78	56	11
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	102	147
Shared ln volume, major rt vehicles:	19	99
Sat flow rate, major th vehicles:	1700	1700
Sat flow rate, major rt vehicles:	1700	1700
Number of major street through lanes:	1	1

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	4.1	7.1	6.5	6.2	7.1	6.5	6.2
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2	2	2	2	2	2	2	2
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	4.1	4.1	7.1	6.5	6.2	7.1	6.5	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)	2.20	2.20	3.50	4.00	3.30	3.50	4.00	3.30
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2	2	2	2	2	2	2	2
t(f)	2.2	2.2	3.5	4.0	3.3	3.5	4.0	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	(1) Single-stage	(2)	(3) Two-Stage Process

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	246	121	508	524	112	514	483	196
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	1500		1500		1500		1500	
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	112	196
Potential Capacity	941	845
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	941	845
Probability of Queue free St.	0.97	0.99

Step 2: LT from Major St.	4	1

Conflicting Flows	121	246
Potential Capacity	1467	1320
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1467	1320
Probability of Queue free St.	0.96	0.98
Maj L-Shared Prob Q free St.	0.95	0.98

Step 3: TH from Minor St.	8	11

Conflicting Flows	524	483
Potential Capacity	458	483
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.93	0.93
Movement Capacity	428	451
Probability of Queue free St.	0.87	0.88

Step 4: LT from Minor St.	7	10

Conflicting Flows	508	514
Potential Capacity	475	471
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.82	0.81
Maj. L, Min T Adj. Imp Factor.	0.86	0.86
Cap. Adj. factor due to Impeding mvmnt	0.85	0.83
Movement Capacity	403	393

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

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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	524	483
Potential Capacity	458	483
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.93	0.93
Movement Capacity	428	451

Result for 2 stage process:
a
y

C t	428	451
Probability of Queue free St.	0.87	0.88

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	508	514
Potential Capacity	475	471
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.82	0.81
Maj. L, Min T Adj. Imp Factor.	0.86	0.86
Cap. Adj. factor due to Impeding mvmnt	0.85	0.83
Movement Capacity	403	393

Results for Two-stage process:

a		
y		
C t	403	393

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	18	56	24	78	56	11
Movement Capacity (vph)	403	428	941	393	451	845
Shared Lane Capacity (vph)	488			432		

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	403	428	941	393	451	845
Volume	18	56	24	78	56	11
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	488			432		
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	LTR		LTR		LTR			LTR
v (vph)	25	58		98			145	
C(m) (vph)	1320	1467		488			432	
v/c	0.02	0.04		0.20			0.34	

95% queue length	0.06	0.12	0.74	1.46
Control Delay	7.8	7.6	14.2	17.5
LOS	A	A	B	C
Approach Delay			14.2	17.5
Approach LOS			B	C

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.98	0.96
v(il), Volume for stream 2 or 5	102	147
v(i2), Volume for stream 3 or 6	19	99
s(il), Saturation flow rate for stream 2 or 5	1700	1700
s(i2), Saturation flow rate for stream 3 or 6	1700	1700
P*(oj)	0.98	0.95
d(M,LT), Delay for stream 1 or 4	7.8	7.6
N, Number of major street through lanes	1	1
d(rank,1) Delay for stream 2 or 5	0.2	0.3

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TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: The Hills at Southampton TIS
East/West Street: Old Country Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	50	380			225	5
Peak-Hour Factor, PHF	0.75	0.75			0.85	0.85
Hourly Flow Rate, HFR	66	506			264	5
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				5		65
Peak Hour Factor, PHF				0.75		0.75
Hourly Flow Rate, HFR				6		86
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	66					92		
C(m) (vph)	1295					698		
v/c	0.05					0.13		
95% queue length	0.16					0.45		
Control Delay	7.9					10.9		
LOS	A					B		
Approach Delay						10.9		
Approach LOS						B		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: The Hills at Southampton TIS
East/West Street: Old Country Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	50	380			225	5
Peak-Hour Factor, PHF	0.75	0.75			0.85	0.85
Peak-15 Minute Volume	17	127			66	1
Hourly Flow Rate, HFR	66	506			264	5
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				5		65
Peak Hour Factor, PHF				0.75		0.75
Peak-15 Minute Volume				2		22
Hourly Flow Rate, HFR				6		86
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/		No	/
RT Channelized?						
Lanes				0	0	
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	506	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	269				904		266	
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				1500				
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	266	
Potential Capacity	773	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		773		
Probability of Queue free St.	1.00		0.89	

Step 2: LT from Major St.	4		1	

Conflicting Flows		269		
Potential Capacity		1295		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		1295		
Probability of Queue free St.	1.00		0.95	
Maj L-Shared Prob Q free St.			0.93	

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		0.93		0.93
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		904		
Potential Capacity		307		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.93			
Maj. L, Min T Adj. Imp Factor.	0.94			
Cap. Adj. factor due to Impeding mvmnt		0.84		0.95
Movement Capacity		291		

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

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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 0.93 0.93
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 904
Potential Capacity 307
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.93
Maj. L, Min T Adj. Imp Factor. 0.94
Cap. Adj. factor due to Impeding mvmnt 0.84 0.95
Movement Capacity 291

Results for Two-stage process:

a	
y	
C t	291

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)			6		86	
Movement Capacity (vph)				291		773
Shared Lane Capacity (vph)					698	

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			291		773	
Volume			6		86	
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh			698			
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						LR	
v (vph)	66					92		
C(m) (vph)	1295						698	
v/c	0.05					0.13		

95% queue length	0.16	0.45
Control Delay	7.9	10.9
LOS	A	B
Approach Delay		10.9
Approach LOS		B

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.95	1.00
v(il), Volume for stream 2 or 5	506	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.93	
d(M,LT), Delay for stream 1 or 4	7.9	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.6	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Quogue-Riverhead Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID:
East/West Street: Lewis Road
North/South Street: Quogue-Riverhead Road (CR 104)
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume			105	10	170	205
Peak-Hour Factor, PHF			0.75	0.75	0.70	0.70
Hourly Flow Rate, HFR			140	13	242	292
Percent Heavy Vehicles			--	--	2	-- --
Median Type/Storage			Undivided		/	
RT Channelized?						
Lanes			1	0	1	1
Configuration			TR		L	T
Upstream Signal?			No		No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10			400		
Peak Hour Factor, PHF	0.78			0.78		
Hourly Flow Rate, HFR	12			512		
Percent Heavy Vehicles	2			2		
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1			1		

Configuration L R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		242	12		512			
C(m) (vph)		1428	249		901			
v/c		0.17	0.05		0.57			
95% queue length		0.61	0.15		3.67			
Control Delay		8.0	20.2		14.1			
LOS		A	C		B			
Approach Delay				14.3				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Quogue-Riverhead Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID:
East/West Street: Lewis Road
North/South Street: Quogue-Riverhead Road (CR 104)

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	105	10		170	205	
Peak-Hour Factor, PHF		0.75	0.75	0.70	0.70	
Peak-15 Minute Volume		35	3	61	73	
Hourly Flow Rate, HFR		140	13	242	292	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0		1	1	
Configuration		TR		L	T	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	10		400			
Peak Hour Factor, PHF	0.78		0.78			
Peak-15 Minute Volume	3		128			
Hourly Flow Rate, HFR	12		512			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
RT Channelized?			No			
Lanes	1		1			
Configuration		L	R			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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)		4.1	7.1		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		2	2		2			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		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		4.1	6.4		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)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		2	2		2			
t(f)		2.2	3.5		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	(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	153	922			146			
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	1500							
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	146	
Potential Capacity	901	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	901	
Probability of Queue free St.	0.43	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	153	
Potential Capacity	1428	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1428	
Probability of Queue free St.	0.83	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	0.83	0.83
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	922	
Potential Capacity	300	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.83
Maj. L, Min T Adj. Imp Factor.		0.87
Cap. Adj. factor due to Impeding mvmnt	0.83	0.38
Movement Capacity	249	

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

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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 0.83 0.83
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 922
Potential Capacity 300
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.83
Maj. L, Min T Adj. Imp Factor. 0.87
Cap. Adj. factor due to Impeding mvmnt 0.83 0.38
Movement Capacity 249

Results for Two-stage process:
a
y
C t 249

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	12			512		
Movement Capacity (vph)		249			901	
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		249			901	
Volume		12			512	
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		L	L		R			
v (vph)		242	12		512			
C(m) (vph)		1428	249		901			
v/c		0.17	0.05		0.57			

95% queue length	0.61	0.15	3.67
Control Delay	8.0	20.2	14.1
LOS	A	C	B
Approach Delay		14.3	
Approach LOS		B	

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.83
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), 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		8.0
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

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TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Spinney Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: The Hills at Southampton TIS
East/West Street: Spinney Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		380	5	5	215	
Peak-Hour Factor, PHF		0.78	0.78	0.78	0.78	
Hourly Flow Rate, HFR		487	6	6	275	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	15		5			
Peak Hour Factor, PHF	0.75		0.75			
Hourly Flow Rate, HFR	20		6			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

_____Delay, Queue Length, and Level of Service_____

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		6		26				
C(m) (vph)		1071		397				
v/c		0.01		0.07				
95% queue length		0.02		0.21				
Control Delay		8.4		14.7				
LOS		A		B				
Approach Delay				14.7				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

_____TWO-WAY STOP CONTROL(TWSC) ANALYSIS_____

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Spinney Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: The Hills at Southampton TIS
East/West Street: Spinney Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		380	5	5	215	
Peak-Hour Factor, PHF		0.78	0.78	0.78	0.78	
Peak-15 Minute Volume		122	2	2	69	
Hourly Flow Rate, HFR		487	6	6	275	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	15		5			
Peak Hour Factor, PHF	0.75		0.75			
Peak-15 Minute Volume	5		2			
Hourly Flow Rate, HFR	20		6			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0		0			
Configuration			LR			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		275
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(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	493	777		490				
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	1500							
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	490	
Potential Capacity	578	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	578			
Probability of Queue free St.		0.99		1.00

Step 2: LT from Major St.		4		1

Conflicting Flows	493			
Potential Capacity	1071			
Pedestrian Impedance Factor		1.00		1.00
Movement Capacity		1071		
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	777			
Potential Capacity	365			
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		0.98
Movement Capacity	363			

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 777
Potential Capacity 365
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 0.98
Movement Capacity 363

Results for Two-stage process:
a
y
C t 363

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	20		6			
Movement Capacity (vph)		363			578	
Shared Lane Capacity (vph)			397			

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	363		578			
Volume	20		6			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	397					
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		LR				
v (vph)	6		26					
C(m) (vph)		1071		397				
v/c	0.01		0.07					

95% queue length	0.02	0.21
Control Delay	8.4	14.7
LOS	A	B
Approach Delay		14.7
Approach LOS		B

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(il), Volume for stream 2 or 5		275
v(i2), Volume for stream 3 or 6		0
s(il), 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		8.4
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.1

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Box Tree Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: The Hills at Southampton TIS
East/West Street: Box Tree Road/Old Country Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	5	105	15	345	100	30
Peak-Hour Factor, PHF	0.81	0.81	0.81	0.86	0.86	0.86
Hourly Flow Rate, HFR	6	129	18	401	116	34
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	5	40	250	20	10	5
Peak Hour Factor, PHF	0.87	0.87	0.87	0.75	0.75	0.75
Hourly Flow Rate, HFR	5	45	287	26	13	6
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
Lanes	0	1	0	0	1	0

Configuration LTR LTR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR	
v (vph)	6	401		337			45	
C(m) (vph)	1431	1435		510			85	
v/c	0.00	0.28		0.66			0.53	
95% queue length	0.01	1.15		4.79			2.31	
Control Delay	7.5	8.5		24.8			87.4	
LOS	A	A		C			F	
Approach Delay				24.8			87.4	
Approach LOS				C			F	

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Box Tree Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: The Hills at Southampton TIS
East/West Street: Box Tree Road/Old Country Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	5	105	15	345	100	30
Peak-Hour Factor, PHF	0.81	0.81	0.81	0.86	0.86	0.86
Peak-15 Minute Volume	2	32	5	100	29	9
Hourly Flow Rate, HFR	6	129	18	401	116	34
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	5	40	250	20	10	5
Peak Hour Factor, PHF	0.87	0.87	0.87	0.75	0.75	0.75
Peak-15 Minute Volume	1	11	72	7	3	2
Hourly Flow Rate, HFR	5	45	287	26	13	6
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	129	116
Shared ln volume, major rt vehicles:	18	34
Sat flow rate, major th vehicles:	1700	1700
Sat flow rate, major rt vehicles:	1700	1700
Number of major street through lanes:	1	1

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	4.1	7.1	6.5	6.2	7.1	6.5	6.2
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2	2	2	2	2	2	2	2
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	4.1	4.1	7.1	6.5	6.2	7.1	6.5	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)	2.20	2.20	3.50	4.00	3.30	3.50	4.00	3.30
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2	2	2	2	2	2	2	2
t(f)	2.2	2.2	3.5	4.0	3.3	3.5	4.0	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	(1) Single-stage	(2) Two-Stage Process	(3)

movements, p(x) Process Stage I 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	150	147	1094	1102	138	1251	1094	133
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	1500		1500		1500		1500	
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	138	133
Potential Capacity	910	916
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	910	916
Probability of Queue free St.	0.68	0.99

Step 2: LT from Major St.	4	1

Conflicting Flows	147	150
Potential Capacity	1435	1431
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1435	1431
Probability of Queue free St.	0.72	1.00
Maj L-Shared Prob Q free St.	0.69	1.00

Step 3: TH from Minor St.	8	11

Conflicting Flows	1102	1094
Potential Capacity	212	214
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.69	0.69
Movement Capacity	146	148
Probability of Queue free St.	0.69	0.91

Step 4: LT from Minor St.	7	10

Conflicting Flows	1094	1251
Potential Capacity	191	149
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.63	0.48
Maj. L, Min T Adj. Imp Factor.	0.71	0.59
Cap. Adj. factor due to Impeding mvmnt	0.71	0.40
Movement Capacity	135	60

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

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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	1102	1094
Potential Capacity	212	214
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.69	0.69
Movement Capacity	146	148

Result for 2 stage process:
a
y

C t	146	148
Probability of Queue free St.	0.69	0.91

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	1251
Potential Capacity	191	149
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.63	0.48
Maj. L, Min T Adj. Imp Factor.	0.71	0.59
Cap. Adj. factor due to Impeding mvmnt	0.71	0.40
Movement Capacity	135	60

Results for Two-stage process:

a		
y		
C t	135	60

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	5	45	287	26	13	6
Movement Capacity (vph)	135	146	910	60	148	916
Shared Lane Capacity (vph)	510			85		

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	135	146	910	60	148	916
Volume	5	45	287	26	13	6
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	510			85		
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	LTR		LTR		LTR			LTR
v (vph)	6	401		337			45	
C(m) (vph)	1431	1435		510			85	
v/c	0.00	0.28		0.66			0.53	

95% queue length	0.01	1.15	4.79	2.31
Control Delay	7.5	8.5	24.8	87.4
LOS	A	A	C	F
Approach Delay			24.8	87.4
Approach LOS			C	F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.72
v(il), Volume for stream 2 or 5	129	116
v(i2), Volume for stream 3 or 6	18	34
s(il), 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	0.69
d(M,LT), Delay for stream 1 or 4	7.5	8.5
N, Number of major street through lanes	1	1
d(rank,1) Delay for stream 2 or 5	0.0	2.6

HCS+: Signalized Intersections Release 5.21

Analyst: AA Inter.: Montauk Hwy. & Central Avenue
Agency: AKRF, Inc. Area Type: All other areas
Date: 11/6/2006 Jurisd:
Period: PM Peak Hour Year : Existing 2006
Project ID: East Quogue GIES
E/W St: Montauk Highway N/S St: Central Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
LGConfig		LT			TR						LR	
Volume	50	720			670	50				145	55	
Lane Width		12.7			12.2						12.2	
RTOR Vol					0						0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left			
Thru	P				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	P		
Thru	P				Thru			
Right	P				Right	P		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	92.0				20.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

Cycle Length: 122.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	1044	1384	0.78	0.75	14.9	B	14.9	B

Westbound

TR 1121 1486 0.70 0.75 11.4 B 11.4 B

Northbound

Southbound

LR 285 1736 1.06 0.16 122.0 F 122.0 F

Intersection Delay = 30.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.21

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/6/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Central Avenue
Area Type: All other areas
Jurisdiction:
Analysis Year: Existing 2006
Project ID: East Quogue GIES
E/W St: Montauk Highway N/S St: Central Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	50	720			670	50				145		55
% Heavy Veh	2	2			2	2				2		2

PHF	0.94 0.94	0.92 0.92	0.66	0.66
PK 15 Vol	13 191	182 14	55	21
Hi Ln Vol				
% Grade	0	0	0	
Ideal Sat	1900	1900	1900	
ParkExist	X	X		
NumPark	20	20		
No. Lanes	0 1 0	0 1 0	0 0 0	0 0 0
LGConfig	LT	TR	LR	
Lane Width	12.7	12.2	12.2	
RTOR Vol		0	0	
Adj Flow	819	782	303	
%InSharedLn				
Prop LTs	0.065	0.000	0.726	
Prop RTs	0.000	0.069	0.274	
Peds Bikes	0	0	0	
Buses	1	0	1	
%InProtPhase				

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0			0.0						0.0		
Arriv. Type	3			3						3		
Unit Ext.	3.0			3.0						3.0		
I Factor	1.000			1.000						1.000		
Lost Time	2.0			2.0						2.0		
Ext of g	2.0			2.0						2.0		
Ped Min g				3.2			3.2			3.2		

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left			
Thru	P				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	P		
Thru	P				Thru			
Right	P				Right	P		
Peds					Peds			

NB Right	EB Right	
SB Right	WB Right	
Green	92.0	20.0
Yellow	3.0	3.0
All Red	2.0	2.0

Cycle Length: 122.0 secs

_____VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET_____

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	50	720		670	50					145	55	
PHF	0.94	0.94		0.92	0.92					0.66	0.66	
Adj flow	53	766		728	54					220	83	
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
Lane group		LT			TR						LR	
Adj flow		819			782						303	
Prop LTs		0.065			0.000						0.726	
Prop RTs		0.000			0.069						0.274	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG		LT			TR						LR	
So		1900			1900						1900	
Lanes	0	1	0	0	1	0	0	0	0	0	0	0
fW		1.023			1.007						1.007	
fHV		0.980			0.980						0.980	
fG		1.000			1.000						1.000	
fP		0.800			0.800						1.000	
fBB		0.996			1.000						0.996	
fA		1.000			1.000						1.000	
fLU		1.000			1.000						1.000	
fRT		1.000			0.991						0.963	
fLT		0.911			1.000						0.965	
Sec.												
fLpb		1.000			1.000						1.000	
fRpb		1.000			1.000						1.000	
S		1384			1486						1736	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	(v/s)	Green Ratio (g/C)	--Lane Group-- Ratio (c)	Capacity	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	819	1384	# 0.59	0.75	1044	0.78	
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	782	1486	0.53	0.75	1121	0.70	
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LR	303	1736	# 0.17	0.16	285	1.06	
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.77
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.83

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Res Del d2	d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS

Eastbound

LT 0.78 0.75 9.0 1.000 1044 0.50 5.9 0.0 14.9 B 14.9 B

Westbound

TR 0.70 0.75 7.8 1.000 1121 0.50 3.6 0.0 11.4 B 11.4 B

Northbound

Southbound

LR 1.06 0.16 51.0 1.000 285 0.50 71.0 0.0 122.0 F 122.0 F

Intersection delay = 30.5 (sec/veh) Intersection LOS = C

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____

for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	122.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				

gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts
Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach			S	
Cycle length, C	122.0 sec			
Total actual green time for LT lane group, G (s)	92.0			
Effective permitted green time for LT lane group, g(s)	92.0			
Opposing effective green time, go (s)	92.0			
Number of lanes in LT lane group, N	1			
Number of lanes in opposing approach, No	1			
Adjusted LT flow rate, VLT (veh/h)	53			
Proportion of LT in LT lane group, PLT	0.065	0.000	0.726	
Proportion of LT in opposing flow, PLTo	0.00			
Adjusted opposing flow rate, Vo (veh/h)	782			
Lost time for LT lane group, tL	5.00			
Computation				
LT volume per cycle, LTC=VLTC/3600	1.80			
Opposing lane util. factor, fLUo	1.000	1.000	1.000	
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)	26.50			
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g	21.5			
Opposing platoon ratio, Rpo (refer Exhibit 16-11)	1.00			
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]	0.25			
gq, (see Exhibit C16-4,5,6,7,8)	8.56			
gu=g-gq if gq>=gf, or = g-gf if gq<gf	70.46			

n=Max(gq-gf)/2,0) 0.00
PTHo=1-PLTo 1.00
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)] 0.06
EL1 (refer to Exhibit C16-3) 3.03
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g 0.02
gdiff=max(gq-gf,0) 0.00
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00) 0.91
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT 0.911

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				

OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	122.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Dur. Unmet Demand Q veh	Uniform Delay Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Initial Queue Unmet Demand Q veh	Final Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0				0.0			
LT	0.0	0.00	15.0	9.0	0.00	0.0	0.0	14.9
	0.0				0.0			
Westbound								
	0.0				0.0			
TR	0.0	0.00	15.0	7.8	0.00	0.0	0.0	11.4
	0.0				0.0			

Northbound
0.0 0.0
0.0 0.0
0.0 0.0

Southbound
0.0 0.0
LR 0.0 0.00 51.0 51.0 0.00 4.5 0.0 122.0
0.0 0.0

Intersection Delay 30.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	LT	TR		LR
Init Queue	0.0	0.0		0.0
Flow Rate	819	782		303
So	1900	1900		1900
No.Lanes	0 1 0	0 1 0	0 0 0	0 0 0
SL	1384	1486		1736
LnCapacity	1044	1121		285
Flow Ratio	0.6	0.5		0.2
v/c Ratio	0.78	0.70		1.06
Grn Ratio	0.75	0.75		0.16
I Factor	1.000	1.000		1.000
AT or PVG	3	3		3
Pltn Ratio	1.00	1.00		1.00
PF2	1.00	1.00		1.00
Q1	16.7	13.7		10.3
kB	1.5	1.5		0.6
Q2	4.6	3.3		6.0
Q Average	21.3	17.0		16.2
Q Spacing	25.0	25.0		25.0
Q Storage	0	0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2		1.2
BOQ	25.6	20.5		19.5
QSRatio				
85th Percentile Output:				
fB%	1.4	1.4		1.4
BOQ	29.9	24.0		22.9
QSRatio				
90th Percentile Output:				

fB%	1.5	1.5		1.5
BOQ	32.1	25.8		24.7
QSRatio				

95th Percentile Output:

fB%	1.6	1.6		1.6
BOQ	34.3	27.8		26.6
QSRatio				

98th Percentile Output:

fB%	1.7	1.7		1.8
BOQ	36.6	29.8		28.6
QSRatio				

ERROR MESSAGES

No errors to report.

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Emmett Drive
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Emmett Drive
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	25	555			550	35
Peak-Hour Factor, PHF	0.88	0.88			0.93	0.93
Hourly Flow Rate, HFR	28	630			591	37
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				No

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				30		25
Peak Hour Factor, PHF				0.80		0.80
Hourly Flow Rate, HFR				37		31
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

_____

_____Delay, Queue Length, and Level of Service_____

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	28					68		
C(m) (vph)	954					247		
v/c	0.03					0.28		
95% queue length	0.09					1.09		
Control Delay	8.9					25.0+		
LOS	A					D		
Approach Delay						25.0+		
Approach LOS						D		

_____

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

_____TWO-WAY STOP CONTROL(TWSC) ANALYSIS_____

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Emmett Drive
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Emmett Drive

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	25	555			550	35
Peak-Hour Factor, PHF	0.88	0.88			0.93	0.93
Peak-15 Minute Volume	7	158			148	9
Hourly Flow Rate, HFR	28	630			591	37
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				No

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				30		25
Peak Hour Factor, PHF				0.80		0.80
Peak-15 Minute Volume				9		8
Hourly Flow Rate, HFR				37		31
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	630	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	628				1296		610	
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				1500				
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	610	
Potential Capacity	494	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		494		
Probability of Queue free St.	1.00		0.94	

Step 2: LT from Major St.	4		1	

Conflicting Flows		628		
Potential Capacity		954		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		954		
Probability of Queue free St.	1.00		0.97	
Maj L-Shared Prob Q free St.			0.95	

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		0.95		0.95
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1296		
Potential Capacity		179		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.95			
Maj. L, Min T Adj. Imp Factor.	0.96			
Cap. Adj. factor due to Impeding mvmnt		0.90		0.97
Movement Capacity		174		

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

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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 0.95 0.95
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 1296
Potential Capacity 179
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.95
Maj. L, Min T Adj. Imp Factor. 0.96
Cap. Adj. factor due to Impeding mvmnt 0.90 0.97
Movement Capacity 174

Results for Two-stage process:
a
y
C t 174

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				37		31
Movement Capacity (vph)					174	494
Shared Lane Capacity (vph)					247	

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				174		494
Volume				37		31
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				247		
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						LR	
v (vph)	28					68		
C(m) (vph)	954						247	
v/c	0.03					0.28		

95% queue length	0.09	1.09
Control Delay	8.9	25.0+
LOS	A	D
Approach Delay		25.0+
Approach LOS		D

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.97	1.00
v(il), Volume for stream 2 or 5	630	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.95	
d(M,LT), Delay for stream 1 or 4	8.9	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.4	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & J. Fosters Path
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Josiah Fosters Path
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		590	125	5	500	
Peak-Hour Factor, PHF		0.86	0.86	0.78	0.78	
Hourly Flow Rate, HFR		686	145	6	641	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		10			
Peak Hour Factor, PHF	0.75		0.75			
Hourly Flow Rate, HFR	66		13			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/		/	
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		6		79				
C(m) (vph)		801		168				
v/c		0.01		0.47				
95% queue length		0.02		2.22				
Control Delay		9.5		44.1				
LOS		A		E				
Approach Delay				44.1				
Approach LOS				E				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & J. Fosters Path
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Josiah Fosters Path

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		590	125	5	500	
Peak-Hour Factor, PHF		0.86	0.86	0.78	0.78	
Peak-15 Minute Volume		172	36	2	160	
Hourly Flow Rate, HFR		686	145	6	641	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	50		10			
Peak Hour Factor, PHF	0.75		0.75			
Peak-15 Minute Volume	17		3			
Hourly Flow Rate, HFR	66		13			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		641
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(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	831	1411			758			
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	1500							
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	758	
Potential Capacity	407	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	407	
Probability of Queue free St.	0.97	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	831	
Potential Capacity	801	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	801	
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	1411	
Potential Capacity	152	
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	0.96
Movement Capacity	151	

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

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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 1411
Potential Capacity 152
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 0.96
Movement Capacity 151

Results for Two-stage process:
a
y
C t 151

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	66		13			
Movement Capacity (vph)		151			407	
Shared Lane Capacity (vph)			168			

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	151		407			
Volume	66		13			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	168					
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		LR				
v (vph)	6		79					
C(m) (vph)		801		168				
v/c	0.01		0.47					

95% queue length	0.02	2.22
Control Delay	9.5	44.1
LOS	A	E
Approach Delay		44.1
Approach LOS		E

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(il), Volume for stream 2 or 5		641
v(i2), Volume for stream 3 or 6		0
s(il), 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		9.5
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.1

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Lewis Road
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Lewis Road
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	25	620			610	110
Peak-Hour Factor, PHF	0.93	0.93			0.94	0.94
Hourly Flow Rate, HFR	26	666			648	117
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				Yes

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				100		25
Peak Hour Factor, PHF				0.87		0.87
Hourly Flow Rate, HFR				114		28
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	26					142		
C(m) (vph)	820					272		
v/c	0.03					0.52		
95% queue length	0.10					2.80		
Control Delay	9.5					31.8		
LOS	A					D		
Approach Delay						31.8		
Approach LOS						D		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Lewis Road
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Lewis Road

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	25	620			610	110
Peak-Hour Factor, PHF	0.93	0.93			0.94	0.94
Peak-15 Minute Volume	7	167			162	29
Hourly Flow Rate, HFR	26	666			648	117
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				Yes

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				100		25
Peak Hour Factor, PHF				0.87		0.87
Peak-15 Minute Volume				29		7
Hourly Flow Rate, HFR				114		28
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet	
S2 Left-Turn							
Through							
S5 Left-Turn	0	1700	3	0	122	35	625
Through	670	1700	3	105	122	35	625

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

	Movement 2	Movement 5
Shared ln volume, major th vehicles:	666	
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:	1	

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				5.5*		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00				0.70		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	4.1				4.8		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	670	0		
Total Saturation Flow Rate, s (vph)			1700	1700
Arrival Type	3	3		
Effective Green, g (sec)			105	0
Cycle Length, C (sec)			122	122
Rp (from Exhibit 16-11)			1.000	1.000
Proportion vehicles arriving on green P			0.861	0.000
g(q1)	6.7	0.0		
g(q2)	4.4	0.0		
g(q)	11.1	0.0		

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha	0.550			
beta	0.645			
Travel time, t(a) (sec)			12.148	
Smoothing Factor, F			0.188	
Proportion of conflicting flow, f			1.000	1.000
Max platooned flow, V(c,max)			1531	0
Min platooned flow, V(c,min)			1000	1000
Duration of blocked period, t(p)			11.4	0.0
Proportion time blocked, p	0.000		0.093	

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.093
p(dom)	0.093
p(subo)	0.000
Constrained or unconstrained?	U

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

movements, p(x)	Process	Stage I	Stage II
p(1)	0.907		
p(4)			
p(7)			
p(8)			
p(9)			
p(10)	0.907		
p(11)			
p(12)	0.907		

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	765					1424		706
s	1500					1500		1500
Px	0.907					0.907		0.907
V c,u,x	689					1416		624
C r,x	905					284		485
C plat,x	820					257		440

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s				1500		1500		
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	706	
Potential Capacity	440	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		440		
Probability of Queue free St.	1.00		0.94	

Step 2: LT from Major St.	4		1	

Conflicting Flows		765		
Potential Capacity		820		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		820		
Probability of Queue free St.	1.00		0.97	
Maj L-Shared Prob Q free St.			0.95	

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		0.95		0.95
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1424		
Potential Capacity		257		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.95			
Maj. L, Min T Adj. Imp Factor.	0.96			
Cap. Adj. factor due to Impeding mvmnt		0.90		0.97
Movement Capacity		249		

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

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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 0.95 0.95
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 1424
Potential Capacity 257
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.95
Maj. L, Min T Adj. Imp Factor. 0.96
Cap. Adj. factor due to Impeding mvmnt 0.90 0.97
Movement Capacity 249

Results for Two-stage process:
a
y
C t 249

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				114		28
Movement Capacity (vph)					249	440
Shared Lane Capacity (vph)					272	

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				249		440
Volume				114		28
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				272		
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						LR	
v (vph)	26					142		
C(m) (vph)	820						272	
v/c	0.03					0.52		

95% queue length	0.10	2.80
Control Delay	9.5	31.8
LOS	A	D
Approach Delay		31.8
Approach LOS		D

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.97	1.00
v(il), Volume for stream 2 or 5	666	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.95	
d(M,LT), Delay for stream 1 or 4	9.5	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.5	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Old Country Rd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Old Country Road
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	35	480		380	195	
Peak-Hour Factor, PHF	0.88	0.88		0.93	0.93	
Hourly Flow Rate, HFR	39	545		408	209	
Percent Heavy Vehicles	2	--	--	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				100	50	
Peak Hour Factor, PHF				0.80	0.80	
Hourly Flow Rate, HFR				124	62	
Percent Heavy Vehicles				2	2	
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/	No	/
Lanes				0	0	

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	39					186		
C(m) (vph)	963					271		
v/c	0.04					0.69		
95% queue length	0.13					4.59		
Control Delay	8.9					43.0		
LOS	A					E		
Approach Delay						43.0		
Approach LOS						E		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Old Country Rd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Old Country Road

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	35	480			380	195
Peak-Hour Factor, PHF	0.88	0.88			0.93	0.93
Peak-15 Minute Volume	10	136			102	52
Hourly Flow Rate, HFR	39	545			408	209
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				No

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				100		50
Peak Hour Factor, PHF				0.80		0.80
Peak-15 Minute Volume				31		16
Hourly Flow Rate, HFR				124		62
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	545	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	617				1135		512	
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				1500				
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	512	
Potential Capacity	562	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		562		
Probability of Queue free St.	1.00		0.89	

Step 2: LT from Major St.	4		1	

Conflicting Flows		617		
Potential Capacity		963		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		963		
Probability of Queue free St.	1.00		0.96	
Maj L-Shared Prob Q free St.			0.94	

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		0.94		0.94
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1135		
Potential Capacity		224		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.94			
Maj. L, Min T Adj. Imp Factor.	0.95			
Cap. Adj. factor due to Impeding mvmnt		0.85		0.96
Movement Capacity		215		

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 0.94 0.94
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 1135
Potential Capacity 224
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.94
Maj. L, Min T Adj. Imp Factor. 0.95
Cap. Adj. factor due to Impeding mvmnt 0.85 0.96
Movement Capacity 215

Results for Two-stage process:

a	
y	
C t	215

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				124		62
Movement Capacity (vph)					215	562
Shared Lane Capacity (vph)					271	

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				215		562
Volume				124		62
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				271		
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						LR	
v (vph)	39					186		
C(m) (vph)	963						271	
v/c	0.04					0.69		

95% queue length	0.13	4.59
Control Delay	8.9	43.0
LOS	A	E
Approach Delay		43.0
Approach LOS		E

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.96	1.00
v(il), Volume for stream 2 or 5	545	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.94	
d(M,LT), Delay for stream 1 or 4	8.9	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.5	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Squires Avenue
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Squires Avenue
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		515	85	5	445	
Peak-Hour Factor, PHF		0.85	0.85	0.76	0.76	
Hourly Flow Rate, HFR		605	99	6	585	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	60		5			
Peak Hour Factor, PHF	0.85		0.85			
Hourly Flow Rate, HFR	70		5			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		6		75				
C(m) (vph)		894		197				
v/c		0.01		0.38				
95% queue length		0.02		1.66				
Control Delay		9.1		34.1				
LOS		A		D				
Approach Delay				34.1				
Approach LOS				D				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Squires Avenue
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Squires Avenue

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	515	85	5	445		
Peak-Hour Factor, PHF		0.85	0.85	0.76	0.76	
Peak-15 Minute Volume		151	25	2	146	
Hourly Flow Rate, HFR		605	99	6	585	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	60		5			
Peak Hour Factor, PHF	0.85		0.85			
Peak-15 Minute Volume	18		1			
Hourly Flow Rate, HFR	70		5			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		585
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		2	2		2			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		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		4.1	6.4		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)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		2	2		2			
t(f)		2.2	3.5		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	(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	704	1251			654			
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	1500							
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	654	
Potential Capacity	467	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	467	
Probability of Queue free St.	0.99	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	704	
Potential Capacity	894	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	894	
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	1251	
Potential Capacity	190	
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	0.98
Movement Capacity	189	

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

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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 1251
Potential Capacity 190
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 0.98
Movement Capacity 189

Results for Two-stage process:
a
y
C t 189

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	70		5			
Movement Capacity (vph)		189			467	
Shared Lane Capacity (vph)			197			

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	189		467			
Volume	70		5			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	197					
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		LR				
v (vph)	6		75					
C(m) (vph)		894		197				
v/c	0.01		0.38					

95% queue length	0.02	1.66
Control Delay	9.1	34.1
LOS	A	D
Approach Delay		34.1
Approach LOS		D

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(il), Volume for stream 2 or 5		585
v(i2), Volume for stream 3 or 6		0
s(il), 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		9.1
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.1

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd. & Central Ave.
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Central Avenue
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		300	70	40	255	
Peak-Hour Factor, PHF		0.92	0.92	0.93	0.93	
Hourly Flow Rate, HFR		326	76	43	274	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		50			
Peak Hour Factor, PHF	0.91		0.91			
Hourly Flow Rate, HFR	43		54			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		43		97				
C(m) (vph)		1157		502				
v/c		0.04		0.19				
95% queue length		0.12		0.71				
Control Delay		8.2		13.9				
LOS		A		B				
Approach Delay				13.9				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd. & Central Ave.
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Central Avenue

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	300	70	40	255		
Peak-Hour Factor, PHF		0.92	0.92	0.93	0.93	
Peak-15 Minute Volume		82	19	11	69	
Hourly Flow Rate, HFR		326	76	43	274	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	40		50			
Peak Hour Factor, PHF	0.91		0.91			
Peak-15 Minute Volume	11		14			
Hourly Flow Rate, HFR	43		54			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	274	
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:	1	

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(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	402	724		364				
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	1500							
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	364	
Potential Capacity	681	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	681	
Probability of Queue free St.	0.92	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	402	
Potential Capacity	1157	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1157	
Probability of Queue free St.	0.96	1.00
Maj L-Shared Prob Q free St.	0.96	

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	0.96	0.96
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	724	
Potential Capacity	393	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.96
Maj. L, Min T Adj. Imp Factor.		0.97
Cap. Adj. factor due to Impeding mvmnt	0.96	0.89
Movement Capacity	378	

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 0.96 0.96
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 724
Potential Capacity 393
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.96
Maj. L, Min T Adj. Imp Factor. 0.97
Cap. Adj. factor due to Impeding mvmnt 0.96 0.89
Movement Capacity 378

Results for Two-stage process:
a
y
C t 378

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	43		54			
Movement Capacity (vph)		378			681	
Shared Lane Capacity (vph)			502			

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	378		681			
Volume	43		54			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	502					
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		LR				
v (vph)		43		97				
C(m) (vph)		1157		502				
v/c		0.04		0.19				

95% queue length	0.12	0.71
Control Delay	8.2	13.9
LOS	A	B
Approach Delay		13.9
Approach LOS		B

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.96
v(il), Volume for stream 2 or 5		274
v(i2), Volume for stream 3 or 6		0
s(il), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)	0.96	
d(M,LT), Delay for stream 1 or 4		8.2
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.4

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd. & Quogue-Rvrhd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Quogue-Riverhead Road (Rt 104)
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	15	125	5	25	85	55
Peak-Hour Factor, PHF	0.80	0.80	0.80	0.78	0.78	0.78
Hourly Flow Rate, HFR	18	156	6	32	108	70
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	1	75	15	100	55	10
Peak Hour Factor, PHF	0.88	0.88	0.88	0.77	0.77	0.77
Hourly Flow Rate, HFR	1	85	17	129	71	12
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
Lanes	0	1	0	0	1	0

Configuration LTR LTR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound		Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR
v (vph)	18	32		103			212
C(m) (vph)	1398	1417		531			467
v/c	0.01	0.02		0.19			0.45
95% queue length	0.04	0.07		0.71			2.32
Control Delay	7.6	7.6		13.4			19.0
LOS	A	A		B			C
Approach Delay				13.4			19.0
Approach LOS				B			C

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd. & Quogue-Rvrhd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Quogue-Riverhead Road (Rt 104)

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	15	125	5	25	85	55
Peak-Hour Factor, PHF	0.80	0.80	0.80	0.78	0.78	0.78
Peak-15 Minute Volume	5	39	2	8	27	18
Hourly Flow Rate, HFR	18	156	6	32	108	70
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	1	75	15	100	55	10
Peak Hour Factor, PHF	0.88	0.88	0.88	0.77	0.77	0.77
Peak-15 Minute Volume	0	21	4	32	18	3
Hourly Flow Rate, HFR	1	85	17	129	71	12
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	156	108
Shared ln volume, major rt vehicles:	6	70
Sat flow rate, major th vehicles:	1700	1700
Sat flow rate, major rt vehicles:	1700	1700
Number of major street through lanes:	1	1

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	4.1	7.1	6.5	6.2	7.1	6.5	6.2
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2	2	2	2	2	2	2	2
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	4.1	4.1	7.1	6.5	6.2	7.1	6.5	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)	2.20	2.20	3.50	4.00	3.30	3.50	4.00	3.30
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2	2	2	2	2	2	2	2
t(f)	2.2	2.2	3.5	4.0	3.3	3.5	4.0	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	(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	178	162	443	437	159	453	405	143
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	1500		1500		1500		1500	
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	159	143
Potential Capacity	886	905
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	886	905
Probability of Queue free St.	0.98	0.99

Step 2: LT from Major St.	4	1

Conflicting Flows	162	178
Potential Capacity	1417	1398
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1417	1398
Probability of Queue free St.	0.98	0.99
Maj L-Shared Prob Q free St.	0.97	0.99

Step 3: TH from Minor St.	8	11

Conflicting Flows	437	405
Potential Capacity	513	535
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.96	0.96
Movement Capacity	493	514
Probability of Queue free St.	0.83	0.86

Step 4: LT from Minor St.	7	10

Conflicting Flows	443	453
Potential Capacity	525	517
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.83	0.80
Maj. L, Min T Adj. Imp Factor.	0.87	0.84
Cap. Adj. factor due to Impeding mvmnt	0.86	0.83
Movement Capacity	450	427

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	437	405
Potential Capacity	513	535
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.96	0.96
Movement Capacity	493	514

Result for 2 stage process:
a
y

C t	493	514
Probability of Queue free St.	0.83	0.86

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	443	453
Potential Capacity	525	517
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.83	0.80
Maj. L, Min T Adj. Imp Factor.	0.87	0.84
Cap. Adj. factor due to Impeding mvmnt	0.86	0.83
Movement Capacity	450	427

Results for Two-stage process:

a		
y		
C t	450	427

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	1	85	17	129	71	12
Movement Capacity (vph)	450	493	886	427	514	905
Shared Lane Capacity (vph)	531			467		

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	450	493	886	427	514	905
Volume	1	85	17	129	71	12
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	531			467		
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	LTR		LTR		LTR			LTR
v (vph)	18	32		103			212	
C(m) (vph)	1398	1417		531			467	
v/c	0.01	0.02		0.19			0.45	

95% queue length	0.04	0.07	0.71	2.32
Control Delay	7.6	7.6	13.4	19.0
LOS	A	A	B	C
Approach Delay			13.4	19.0
Approach LOS			B	C

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.99	0.98
v(il), Volume for stream 2 or 5	156	108
v(i2), Volume for stream 3 or 6	6	70
s(il), Saturation flow rate for stream 2 or 5	1700	1700
s(i2), Saturation flow rate for stream 3 or 6	1700	1700
P*(oj)	0.99	0.97
d(M,LT), Delay for stream 1 or 4	7.6	7.6
N, Number of major street through lanes	1	1
d(rank,1) Delay for stream 2 or 5	0.1	0.2

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: The Hills at Southampton TIS
East/West Street: Old Country Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	65	310			410	15
Peak-Hour Factor, PHF	0.98	0.98			0.91	0.91
Hourly Flow Rate, HFR	66	316			450	16
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				5		65
Peak Hour Factor, PHF				0.75		0.75
Hourly Flow Rate, HFR				6		86
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	66					92		
C(m) (vph)	1095					563		
v/c	0.06					0.16		
95% queue length	0.19					0.58		
Control Delay	8.5					12.6		
LOS	A					B		
Approach Delay						12.6		
Approach LOS						B		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: The Hills at Southampton TIS
East/West Street: Old Country Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	65	310		410	15	
Peak-Hour Factor, PHF	0.98	0.98			0.91	0.91
Peak-15 Minute Volume	17	79			113	4
Hourly Flow Rate, HFR	66	316			450	16
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			5		65	
Peak Hour Factor, PHF				0.75		0.75
Peak-15 Minute Volume				2		22
Hourly Flow Rate, HFR				6		86
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes			0		0	
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	316	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	466				906		458	
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				1500				
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	458	
Potential Capacity	603	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		603		
Probability of Queue free St.	1.00		0.86	

Step 2: LT from Major St.	4		1	
Conflicting Flows		466		
Potential Capacity		1095		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		1095		
Probability of Queue free St.	1.00		0.94	
Maj L-Shared Prob Q free St.			0.93	

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		0.93		0.93
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	
Conflicting Flows		906		
Potential Capacity		307		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.93			
Maj. L, Min T Adj. Imp Factor.	0.94			
Cap. Adj. factor due to Impeding mvmnt		0.81		0.94
Movement Capacity		288		

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 0.93 0.93
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 906
Potential Capacity 307
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.93
Maj. L, Min T Adj. Imp Factor. 0.94
Cap. Adj. factor due to Impeding mvmnt 0.81 0.94
Movement Capacity 288

Results for Two-stage process:

a	
y	
C t	288

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)			6		86	
Movement Capacity (vph)				288		603
Shared Lane Capacity (vph)					563	

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			288		603	
Volume			6		86	
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				563		
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						LR	
v (vph)	66					92		
C(m) (vph)	1095						563	
v/c	0.06					0.16		

95% queue length	0.19	0.58
Control Delay	8.5	12.6
LOS	A	B
Approach Delay		12.6
Approach LOS		B

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.94	1.00
v(il), Volume for stream 2 or 5	316	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.93	
d(M,LT), Delay for stream 1 or 4	8.5	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.6	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Quogue-Riverhead Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID:
East/West Street: Lewis Road
North/South Street: Quogue-Riverhead Road (CR 104)
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume			195	30	325	165
Peak-Hour Factor, PHF			0.75	0.75	0.79	0.79
Hourly Flow Rate, HFR			260	40	411	208
Percent Heavy Vehicles			--	--	2	-- --
Median Type/Storage			Undivided		/	
RT Channelized?						
Lanes			1	0	1	1
Configuration			TR		L	T
Upstream Signal?			No		No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	25		275			
Peak Hour Factor, PHF	0.83		0.83			
Hourly Flow Rate, HFR	30		331			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1		1			

Configuration L R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		411	30		331			
C(m) (vph)		1261	118		759			
v/c		0.33	0.25		0.44			
95% queue length		1.43	0.94		2.23			
Control Delay		9.2	45.6		13.4			
LOS		A	E		B			
Approach Delay				16.0				
Approach LOS				C				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Quogue-Riverhead Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID:
East/West Street: Lewis Road
North/South Street: Quogue-Riverhead Road (CR 104)

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	195	30	325	165		
Peak-Hour Factor, PHF	0.75	0.75	0.79	0.79		
Peak-15 Minute Volume	65	10	103	52		
Hourly Flow Rate, HFR	260	40	411	208		
Percent Heavy Vehicles	--	--	2	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	1	1		
Configuration	TR		L	T		
Upstream Signal?	No		No			

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	25		275			
Peak Hour Factor, PHF	0.83		0.83			
Peak-15 Minute Volume	8		83			
Hourly Flow Rate, HFR	30		331			
Percent Heavy Vehicles	2		2			
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage			/			/
RT Channelized?			No			
Lanes	1		1			
Configuration	L		R			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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)		4.1	7.1		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		2	2		2			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		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		4.1	6.4		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)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		2	2		2			
t(f)		2.2	3.5		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	(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	300	1310			280			
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	1500							
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	280	
Potential Capacity	759	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	759	
Probability of Queue free St.	0.56	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	300	
Potential Capacity	1261	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1261	
Probability of Queue free St.	0.67	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	0.67	0.67
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	1310	
Potential Capacity	175	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.67
Maj. L, Min T Adj. Imp Factor.		0.75
Cap. Adj. factor due to Impeding mvmnt	0.67	0.42
Movement Capacity	118	

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

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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 0.67 0.67
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 1310
Potential Capacity 175
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.67
Maj. L, Min T Adj. Imp Factor. 0.75
Cap. Adj. factor due to Impeding mvmnt 0.67 0.42
Movement Capacity 118

Results for Two-stage process:
a
y
C t 118

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	30		331			
Movement Capacity (vph)		118		759		
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	118		759			
Volume	30		331			
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		L	L		R			
v (vph)	411	30		331				
C(m) (vph)	1261	118		759				
v/c	0.33	0.25		0.44				

95% queue length	1.43	0.94	2.23
Control Delay	9.2	45.6	13.4
LOS	A	E	B
Approach Delay		16.0	
Approach LOS		C	

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.67
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), 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		9.2
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Spinney Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: The Hills at Southampton TIS
East/West Street: Spinney Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	295	20		15	420	
Peak-Hour Factor, PHF		0.94	0.94	0.97	0.97	
Hourly Flow Rate, HFR		313	21	15	432	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0		0	1	
Configuration		TR			LT	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	5			10		
Peak Hour Factor, PHF	0.75			0.75		
Hourly Flow Rate, HFR	6			13		
Percent Heavy Vehicles	2			2		
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0			0		

Configuration LR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		15		19				
C(m) (vph)		1225		544				
v/c		0.01		0.03				
95% queue length		0.04		0.11				
Control Delay		8.0		11.9				
LOS		A		B				
Approach Delay				11.9				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Spinney Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: Existing 2006
Project ID: The Hills at Southampton TIS
East/West Street: Spinney Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	295	20	15	420		
Peak-Hour Factor, PHF	0.94	0.94	0.97	0.97		
Peak-15 Minute Volume	78	5	4	108		
Hourly Flow Rate, HFR	313	21	15	432		
Percent Heavy Vehicles	--	--	2	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	0	1		
Configuration	TR		LT			
Upstream Signal?	No		No			

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	5		10			
Peak Hour Factor, PHF	0.75		0.75			
Peak-15 Minute Volume	2		3			
Hourly Flow Rate, HFR	6		13			
Percent Heavy Vehicles	2		2			
Percent Grade (%)	0		0			
Flared Approach: Exists?/Storage	No	/			/	
RT Channelized?						
Lanes	0	0				
Configuration	LR					

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	432	
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:	1	

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(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	334	786		324				
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	1500							
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	324	
Potential Capacity	717	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	717	
Probability of Queue free St.	0.98	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	334	
Potential Capacity	1225	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1225	
Probability of Queue free St.	0.99	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	786	
Potential Capacity	361	
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	0.99	0.97
Movement Capacity	357	

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 786
Potential Capacity 361
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 0.99 0.97
Movement Capacity 357

Results for Two-stage process:
a
y
C t 357

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	6		13			
Movement Capacity (vph)		357			717	
Shared Lane Capacity (vph)			544			

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	357		717			
Volume	6		13			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh		544				
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		LR				
v (vph)		15		19				
C(m) (vph)		1225		544				
v/c		0.01		0.03				

95% queue length	0.04	0.11
Control Delay	8.0	11.9
LOS	A	B
Approach Delay		11.9
Approach LOS		B

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(il), Volume for stream 2 or 5		432
v(i2), Volume for stream 3 or 6		0
s(il), 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		8.0
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.1

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Box Tree Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Box Tree Road/Old Country Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	6	96	12	264	73	14
Peak-Hour Factor, PHF	0.82	0.82	0.82	0.86	0.86	0.86
Hourly Flow Rate, HFR	7	117	14	306	84	16
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	6	6	392	28	31	6
Peak Hour Factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75
Hourly Flow Rate, HFR	8	8	522	37	41	8
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
Lanes	0	1	0	0	1	0

Configuration LTR LTR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR	
v (vph)	7	306		538			86	
C(m) (vph)	1493	1454		842			115	
v/c	0.00	0.21		0.64			0.75	
95% queue length	0.01	0.80		4.72			4.15	
Control Delay	7.4	8.1		16.5			96.8	
LOS	A	A		C			F	
Approach Delay				16.5			96.8	
Approach LOS				C			F	

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: AKRF
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Box Tree Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Box Tree Road/Old Country Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	6	96	12	264	73	14
Peak-Hour Factor, PHF	0.82	0.82	0.82	0.86	0.86	0.86
Peak-15 Minute Volume	2	29	4	77	21	4
Hourly Flow Rate, HFR	7	117	14	306	84	16
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	6	6	392	28	31	6
Peak Hour Factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75
Peak-15 Minute Volume	2	2	131	9	10	2
Hourly Flow Rate, HFR	8	8	522	37	41	8
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	117	84
Shared ln volume, major rt vehicles:	14	16
Sat flow rate, major th vehicles:	1700	1700
Sat flow rate, major rt vehicles:	1700	1700
Number of major street through lanes:	1	1

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	4.1	7.1	6.5	6.2	7.1	6.5	6.2
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2	2	2	2	2	2	2	2
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	4.1	4.1	7.1	6.5	6.2	7.1	6.5	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)	2.20	2.20	3.50	4.00	3.30	3.50	4.00	3.30
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2	2	2	2	2	2	2	2
t(f)	2.2	2.2	3.5	4.0	3.3	3.5	4.0	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

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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	100	131	866	850	124	1107	849	92
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	1500		1500		1500		1500	
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	124	92
Potential Capacity	927	965
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	927	965
Probability of Queue free St.	0.44	0.99

Step 2: LT from Major St.	4	1

Conflicting Flows	131	100
Potential Capacity	1454	1493
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1454	1493
Probability of Queue free St.	0.79	1.00
Maj L-Shared Prob Q free St.	0.78	0.99

Step 3: TH from Minor St.	8	11

Conflicting Flows	850	849
Potential Capacity	298	298
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.77	0.77
Movement Capacity	230	230
Probability of Queue free St.	0.97	0.82

Step 4: LT from Minor St.	7	10

Conflicting Flows	866	1107
Potential Capacity	274	188
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.63	0.75
Maj. L, Min T Adj. Imp Factor.	0.72	0.80
Cap. Adj. factor due to Impeding mvmnt	0.71	0.35
Movement Capacity	195	66

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

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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	850	849
Potential Capacity	298	298
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.77	0.77
Movement Capacity	230	230

Result for 2 stage process:
a
y

C t	230	230
Probability of Queue free St.	0.97	0.82

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	866	1107
Potential Capacity	274	188
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.63	0.75
Maj. L, Min T Adj. Imp Factor.	0.72	0.80
Cap. Adj. factor due to Impeding mvmnt	0.71	0.35
Movement Capacity	195	66

Results for Two-stage process:

a		
y		
C t	195	66

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	8	8	522	37	41	8
Movement Capacity (vph)	195	230	927	66	230	965
Shared Lane Capacity (vph)	842			115		

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	195	230	927	66	230	965
Volume	8	8	522	37	41	8
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	842			115		
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		LTR		LTR		LTR		LTR
v (vph)	7	306		538		86		
C(m) (vph)		1493		1454		842		115
v/c	0.00	0.21		0.64		0.75		

95% queue length	0.01	0.80	4.72	4.15
Control Delay	7.4	8.1	16.5	96.8
LOS	A	A	C	F
Approach Delay			16.5	96.8
Approach LOS			C	F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.79
v(il), Volume for stream 2 or 5	117	84
v(i2), Volume for stream 3 or 6	14	16
s(il), Saturation flow rate for stream 2 or 5	1700	1700
s(i2), Saturation flow rate for stream 3 or 6	1700	1700
P*(oj)	0.99	0.78
d(M,LT), Delay for stream 1 or 4	7.4	8.1
N, Number of major street through lanes	1	1
d(rank,1) Delay for stream 2 or 5	0.0	1.8

HCS+: Signalized Intersections Release 5.21

Analyst: AC Inter.: Montauk Hwy. & Central Avenue
Agency: AKRF, Inc. Area Type: All other areas
Date: 11/6/2006 Jurisd:
Period: AM Peak Hour Year : 2015 No Build
Project ID: East Quogue GIES
E/W St: Montauk Highway N/S St: Central Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
LGConfig		LT			TR						LR	
Volume	36	695		652	137					113	65	
Lane Width		12.7			12.2						12.2	
RTOR Vol					0						0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left			
Thru	P				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	P		
Thru	P				Thru			
Right	P				Right	P		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	92.0				20.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

Cycle Length: 122.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	1070	1419	0.74	0.75	13.0	B	13.0	B

Westbound

TR 1105 1465 0.74 0.75 12.7 B 12.7 B

Northbound

Southbound

LR 282 1721 0.95 0.16 93.5 F 93.5 F

Intersection Delay = 24.4 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.21

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/6/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Central Avenue
Area Type: All other areas
Jurisdiction:
Analysis Year: 2015 No Build
Project ID: East Quogue GIES
E/W St: Montauk Highway N/S St: Central Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	36	695		652	137					113	65	
% Heavy Veh	2	2		2	2					2	2	

PHF	0.92 0.92	0.97 0.97		0.66 0.66
PK 15 Vol	10 189	168 35		43 25
Hi Ln Vol				
% Grade	0	0		0
Ideal Sat	1900	1900		1900
ParkExist	X	X		
NumPark	20	20		
No. Lanes	0 1 0	0 1 0	0 0 0	0 0 0
LGConfig	LT	TR		LR
Lane Width	12.7	12.2		12.2
RTOR Vol		0		0
Adj Flow	794	813		269
%InSharedLn				
Prop LTs	0.049	0.000		0.636
Prop RTs	0.000	0.173		0.364
Peds Bikes		0	0	0
Buses	1	0		1
%InProtPhase				

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0			0.0						0.0	
Arriv. Type		3			3						3	
Unit Ext.		3.0			3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0			2.0						2.0	
Ext of g		2.0			2.0						2.0	
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left			
Thru	P				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	P		
Thru	P				Thru			
Right	P				Right	P		
Peds					Peds			

NB Right	EB Right	
SB Right	WB Right	
Green	92.0	20.0
Yellow	3.0	3.0
All Red	2.0	2.0

Cycle Length: 122.0 secs

_____VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET_____

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	36	695		652	137			113	65			
PHF	0.92	0.92		0.97	0.97			0.66	0.66			
Adj flow	39	755		672	141			171	98			
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
Lane group		LT			TR						LR	
Adj flow		794			813						269	
Prop LTs		0.049			0.000						0.636	
Prop RTs		0.000			0.173						0.364	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG		LT			TR						LR	
So		1900			1900						1900	
Lanes	0	1	0	0	1	0	0	0	0	0	0	0
fW		1.023			1.007						1.007	
fHV		0.980			0.980						0.980	
fG		1.000			1.000						1.000	
fP		0.800			0.800						1.000	
fBB		0.996			1.000						0.996	
fA		1.000			1.000						1.000	
fLU		1.000			1.000						1.000	
fRT		1.000			0.977						0.951	
fLT		0.934			1.000						0.969	
Sec.												
fLpb		1.000			1.000						1.000	
fRpb		1.000			1.000						1.000	
S		1419			1465						1721	
Sec.												

_____CAPACITY AND LOS WORKSHEET_____

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Green Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LT	794	1419	# 0.56	0.75	1070	0.74
Right							
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	TR	813	1465	0.55	0.75	1105	0.74
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LR	269	1721	# 0.16	0.16	282	0.95
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.72
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.78

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Res Del d2	d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS

Eastbound

LT 0.74 0.75 8.4 1.000 1070 0.50 4.7 0.0 13.0 B 13.0 B

Westbound

TR 0.74 0.75 8.3 1.000 1105 0.50 4.4 0.0 12.7 B 12.7 B

Northbound

Southbound

LR 0.95 0.16 50.5 1.000 282 0.50 43.0 0.0 93.5 F 93.5 F

Intersection delay = 24.4 (sec/veh) Intersection LOS = C

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____

for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	122.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				

gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts
Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach	S			
Cycle length, C	122.0 sec			
Total actual green time for LT lane group, G (s)	92.0			
Effective permitted green time for LT lane group, g(s)	92.0			
Opposing effective green time, go (s)	92.0			
Number of lanes in LT lane group, N	1			
Number of lanes in opposing approach, No	1			
Adjusted LT flow rate, VLT (veh/h)	39			
Proportion of LT in LT lane group, PLT	0.049	0.000	0.636	
Proportion of LT in opposing flow, PLTo	0.00			
Adjusted opposing flow rate, Vo (veh/h)	813			
Lost time for LT lane group, tL	5.00			

Computation

LT volume per cycle, LTC=VLTC/3600	1.32		
Opposing lane util. factor, fLUo	1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)	27.55		
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g	28.0		
Opposing platoon ratio, Rpo (refer Exhibit 16-11)	1.00		
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]	0.25		
gq, (see Exhibit C16-4,5,6,7,8)	8.96		
gu=g-gq if gq>=gf, or = g-gf if gq<gf	63.99		

n=Max(gq-gf)/2,0) 0.00
PTHo=1-PLTo 1.00
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)] 0.05
EL1 (refer to Exhibit C16-3) 3.12
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g 0.02
gdiff=max(gq-gf,0) 0.00
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00) 0.93
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT 0.934

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				

OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	122.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Dur. Unmet Demand Q veh	Uniform Delay Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0				0.0			
LT	0.0	0.00	15.0	8.4	0.00	0.0	0.0	13.0
	0.0				0.0			
Westbound								
	0.0				0.0			
TR	0.0	0.00	15.0	8.3	0.00	0.0	0.0	12.7
	0.0				0.0			

Northbound
0.0 0.0
0.0 0.0
0.0 0.0

Southbound
0.0 0.0
LR 0.0 0.00 51.0 50.5 0.00 0.0 0.0 93.5
0.0 0.0

Intersection Delay 24.4 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	LT	TR		LR
Init Queue	0.0	0.0		0.0
Flow Rate	794	813		269
So	1900	1900		1900
No.Lanes	0 1 0	0 1 0	0 0 0	0 0 0
SL	1419	1465		1721
LnCapacity	1070	1105		282
Flow Ratio	0.6	0.6		0.2
v/c Ratio	0.74	0.74		0.95
Grn Ratio	0.75	0.75		0.16
I Factor	1.000	1.000		1.000
AT or PVG	3	3		3
Pltn Ratio	1.00	1.00		1.00
PF2	1.00	1.00		1.00
Q1	15.0	15.2		9.0
kB	1.5	1.5		0.6
Q2	3.8	3.8		3.7
Q Average	18.9	19.0		12.7
Q Spacing	25.0	25.0		25.0
Q Storage	0	0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2		1.2
BOQ	22.7	22.9		15.4
QSRatio				
85th Percentile Output:				
fB%	1.4	1.4		1.4
BOQ	26.5	26.8		18.1
QSRatio				
90th Percentile Output:				

fB%	1.5	1.5		1.5
BOQ	28.5	28.8		19.6
QSRatio				

95th Percentile Output:

fB%	1.6	1.6		1.7
BOQ	30.6	30.9		21.4
QSRatio				

98th Percentile Output:

fB%	1.7	1.7		1.8
BOQ	32.7	33.0		23.1
QSRatio				

ERROR MESSAGES

No errors to report.

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TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Emmett Drive
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Emmett Drive
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	24	547		546	12	
Peak-Hour Factor, PHF	0.79	0.79		0.81	0.81	
Hourly Flow Rate, HFR	30	692		674	14	
Percent Heavy Vehicles	2	--	--	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1		1	0	
Configuration	LT			TR		
Upstream Signal?	No			No		

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				24	47	
Peak Hour Factor, PHF				0.72	0.72	
Hourly Flow Rate, HFR				33	65	
Percent Heavy Vehicles				2	2	
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/	No	/
Lanes				0	0	

Configuration LR

_____

_____Delay, Queue Length, and Level of Service_____

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	30					98		
C(m) (vph)	906					261		
v/c	0.03					0.38		
95% queue length	0.10					1.67		
Control Delay	9.1					26.9		
LOS	A					D		
Approach Delay						26.9		
Approach LOS						D		

_____

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Phone: Fax:
E-Mail:

_____TWO-WAY STOP CONTROL(TWSC) ANALYSIS_____

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Emmett Drive
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Emmett Drive

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	24	547			546	12
Peak-Hour Factor, PHF	0.79	0.79			0.81	0.81
Peak-15 Minute Volume	8	173			169	4
Hourly Flow Rate, HFR	30	692			674	14
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				No

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				24		47
Peak Hour Factor, PHF				0.72		0.72
Peak-15 Minute Volume				8		16
Hourly Flow Rate, HFR				33		65
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	692	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	688				1433		681	
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				1500				
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	681	
Potential Capacity	450	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		450	
Probability of Queue free St.	1.00	0.86	

Step 2: LT from Major St.	4	1	

Conflicting Flows		688	
Potential Capacity		906	
Pedestrian Impedance Factor	1.00	1.00	
Movement Capacity		906	
Probability of Queue free St.	1.00	0.97	
Maj L-Shared Prob Q free St.		0.94	

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	0.94	0.94	
Movement Capacity			
Probability of Queue free St.	1.00	1.00	

Step 4: LT from Minor St.	7	10	

Conflicting Flows		1433	
Potential Capacity		148	
Pedestrian Impedance Factor	1.00	1.00	
Maj. L, Min T Impedance factor	0.94		
Maj. L, Min T Adj. Imp Factor.	0.96		
Cap. Adj. factor due to Impeding mvmnt	0.82	0.97	
Movement Capacity		143	

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 0.94 0.94
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 1433
Potential Capacity 148
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.94
Maj. L, Min T Adj. Imp Factor. 0.96
Cap. Adj. factor due to Impeding mvmnt 0.82 0.97
Movement Capacity 143

Results for Two-stage process:
a
y
C t 143

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)			33		65	
Movement Capacity (vph)				143		450
Shared Lane Capacity (vph)					261	

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			143		450	
Volume			33		65	
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh			261			
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						LR	
v (vph)	30					98		
C(m) (vph)	906						261	
v/c	0.03					0.38		

95% queue length	0.10	1.67
Control Delay	9.1	26.9
LOS	A	D
Approach Delay		26.9
Approach LOS		D

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.97	1.00
v(il), Volume for stream 2 or 5	692	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.94	
d(M,LT), Delay for stream 1 or 4	9.1	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.5	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & J. Fosters Path
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Josiah Fosters Path
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		581	47	6	516	
Peak-Hour Factor, PHF		0.96	0.96	0.92	0.92	
Hourly Flow Rate, HFR		605	48	6	560	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	136		12			
Peak Hour Factor, PHF	0.83		0.83			
Hourly Flow Rate, HFR	163		14			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		6		177				
C(m) (vph)		934		213				
v/c		0.01		0.83				
95% queue length		0.02		6.20				
Control Delay		8.9		72.0				
LOS		A		F				
Approach Delay				72.0				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & J. Fosters Path
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Josiah Fosters Path

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		581	47	6	516	
Peak-Hour Factor, PHF		0.96	0.96	0.92	0.92	
Peak-15 Minute Volume		151	12	2	140	
Hourly Flow Rate, HFR		605	48	6	560	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	136		12			
Peak Hour Factor, PHF	0.83		0.83			
Peak-15 Minute Volume	41		4			
Hourly Flow Rate, HFR	163		14			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		560
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(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	653	1201			629			
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	1500							
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	629	
Potential Capacity	482	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	482	
Probability of Queue free St.	0.97	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	653	
Potential Capacity	934	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	934	
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	1201	
Potential Capacity	204	
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	0.96
Movement Capacity	203	

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

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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 1201
Potential Capacity 204
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 0.96
Movement Capacity 203

Results for Two-stage process:
a
y
C t 203

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	163		14			
Movement Capacity (vph)		203			482	
Shared Lane Capacity (vph)			213			

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	203		482			
Volume	163		14			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	213					
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		LR				
v (vph)	6		177					
C(m) (vph)		934		213				
v/c	0.01		0.83					

95% queue length	0.02	6.20
Control Delay	8.9	72.0
LOS	A	F
Approach Delay		72.0
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(il), Volume for stream 2 or 5		560
v(i2), Volume for stream 3 or 6		0
s(il), 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		8.9
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.1

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TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Lewis Road
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Lewis Road
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	639			604	113
Peak-Hour Factor, PHF	0.91	0.91			0.85	0.85
Hourly Flow Rate, HFR	32	702			710	132
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				Yes

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				73		24
Peak Hour Factor, PHF				0.72		0.72
Hourly Flow Rate, HFR				101		33
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	32					134		
C(m) (vph)	765					245		
v/c	0.04					0.55		
95% queue length	0.13					2.98		
Control Delay	9.9					36.1		
LOS	A					E		
Approach Delay						36.1		
Approach LOS						E		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Lewis Road
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Lewis Road

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	639			604	113
Peak-Hour Factor, PHF	0.91	0.91			0.85	0.85
Peak-15 Minute Volume	8	176			178	33
Hourly Flow Rate, HFR	32	702			710	132
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			Yes	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				73		24
Peak Hour Factor, PHF				0.72		0.72
Peak-15 Minute Volume				25		8
Hourly Flow Rate, HFR				101		33
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
S2 Left-Turn						
Through						
S5 Left-Turn	0	1700	3	0	122	35	625
Through	651	1700	3	105	122	35	625

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

	Movement 2	Movement 5
Shared ln volume, major th vehicles:	702	
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:	1	

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				5.5*		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		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	4.1				4.8		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	651	0		
Total Saturation Flow Rate, s (vph)			1700	1700
Arrival Type	3	3		
Effective Green, g (sec)			105	0
Cycle Length, C (sec)			122	122
Rp (from Exhibit 16-11)			1.000	1.000
Proportion vehicles arriving on green P			0.861	0.000
g(q1)	6.5	0.0		
g(q2)	4.0	0.0		
g(q)	10.6	0.0		

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha	0.550			
beta	0.645			
Travel time, t(a) (sec)			12.148	
Smoothing Factor, F			0.188	
Proportion of conflicting flow, f			1.000	1.000
Max platooned flow, V(c,max)			1512	0
Min platooned flow, V(c,min)			1000	1000
Duration of blocked period, t(p)			10.6	0.0
Proportion time blocked, p	0.000		0.087	

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.087
p(dom)	0.087
p(subo)	0.000
Constrained or unconstrained?	U

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

movements, p(x)	Process	Stage I	Stage II
p(1)	0.913		
p(4)			
p(7)			
p(8)			
p(9)			
p(10)	0.913		
p(11)			
p(12)	0.913		

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	842				1542		776	
s	1500				1500		1500	
Px	0.913				0.913		0.913	
V c,u,x	779				1546		707	
C r,x	838				250		435	
C plat,x	765				228		397	

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s			1500	1500				
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	776	
Potential Capacity	397	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		397		
Probability of Queue free St.	1.00		0.92	

Step 2: LT from Major St.	4		1	

Conflicting Flows		842		
Potential Capacity		765		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		765		
Probability of Queue free St.	1.00		0.96	
Maj L-Shared Prob Q free St.			0.93	

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		0.93		0.93
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1542		
Potential Capacity		228		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.93			
Maj. L, Min T Adj. Imp Factor.	0.95			
Cap. Adj. factor due to Impeding mvmnt		0.87		0.96
Movement Capacity		218		

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

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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 0.93 0.93
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 1542
Potential Capacity 228
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.93
Maj. L, Min T Adj. Imp Factor. 0.95
Cap. Adj. factor due to Impeding mvmnt 0.87 0.96
Movement Capacity 218

Results for Two-stage process:
a
y
C t 218

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				101		33
Movement Capacity (vph)					218	397
Shared Lane Capacity (vph)					245	

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				218		397
Volume				101		33
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				245		
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						LR	
v (vph)	32					134		
C(m) (vph)	765						245	
v/c	0.04					0.55		

95% queue length	0.13	2.98
Control Delay	9.9	36.1
LOS	A	E
Approach Delay		36.1
Approach LOS		E

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.96	1.00
v(il), Volume for stream 2 or 5	702	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.93	
d(M,LT), Delay for stream 1 or 4	9.9	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.7	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Old Country Rd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Old Country Road
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	41	527		309	284	
Peak-Hour Factor, PHF	0.79	0.79		0.81	0.81	
Hourly Flow Rate, HFR	51	667		381	350	
Percent Heavy Vehicles	2	--	--	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1		1	0	
Configuration	LT			TR		
Upstream Signal?	No			No		

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume			43		77	
Peak Hour Factor, PHF			0.72		0.72	
Hourly Flow Rate, HFR			59		106	
Percent Heavy Vehicles			2		2	
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/		No	/
Lanes			0		0	

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	51					165		
C(m) (vph)	873					293		
v/c	0.06					0.56		
95% queue length	0.19					3.22		
Control Delay	9.4					32.0		
LOS	A					D		
Approach Delay						32.0		
Approach LOS						D		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Old Country Rd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Old Country Road

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	41	527		309	284	
Peak-Hour Factor, PHF	0.79	0.79			0.81	0.81
Peak-15 Minute Volume	13	167			95	88
Hourly Flow Rate, HFR	51	667			381	350
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				43		77
Peak Hour Factor, PHF				0.72		0.72
Peak-15 Minute Volume				15		27
Hourly Flow Rate, HFR				59		106
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	667	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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

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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	731				1325		556	
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				1500				
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	556	
Potential Capacity	531	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		531		
Probability of Queue free St.	1.00		0.80	

Step 2: LT from Major St.	4		1	

Conflicting Flows		731		
Potential Capacity		873		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		873		
Probability of Queue free St.	1.00		0.94	
Maj L-Shared Prob Q free St.			0.90	

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		0.90		0.90
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1325		
Potential Capacity		172		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.90			
Maj. L, Min T Adj. Imp Factor.	0.93			
Cap. Adj. factor due to Impeding mvmnt		0.74		0.94
Movement Capacity		162		

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

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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 0.90 0.90
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 1325
Potential Capacity 172
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.90
Maj. L, Min T Adj. Imp Factor. 0.93
Cap. Adj. factor due to Impeding mvmnt 0.74 0.94
Movement Capacity 162

Results for Two-stage process:
a
y
C t 162

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				59		106
Movement Capacity (vph)					162	531
Shared Lane Capacity (vph)					293	

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				162		531
Volume				59		106
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				293		
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						LR	
v (vph)	51					165		
C(m) (vph)	873						293	
v/c	0.06					0.56		

95% queue length	0.19	3.22
Control Delay	9.4	32.0
LOS	A	D
Approach Delay		32.0
Approach LOS		D

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.94	1.00
v(il), Volume for stream 2 or 5	667	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.90	
d(M,LT), Delay for stream 1 or 4	9.4	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.9	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Squires Avenue
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Squires Avenue
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		563	30	6	380	
Peak-Hour Factor, PHF		0.92	0.92	0.84	0.84	
Hourly Flow Rate, HFR		611	32	7	452	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0		0	1	
Configuration		TR			LT	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	142		6			
Peak Hour Factor, PHF	0.78		0.78			
Hourly Flow Rate, HFR	182		7			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		7		189				
C(m) (vph)		942		240				
v/c		0.01		0.79				
95% queue length		0.02		5.81				
Control Delay		8.9		59.4				
LOS		A		F				
Approach Delay				59.4				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Squires Avenue
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Squires Avenue

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	563	30	6	380		
Peak-Hour Factor, PHF		0.92	0.92	0.84	0.84	
Peak-15 Minute Volume		153	8	2	113	
Hourly Flow Rate, HFR		611	32	7	452	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	142		6			
Peak Hour Factor, PHF	0.78		0.78			
Peak-15 Minute Volume	46		2			
Hourly Flow Rate, HFR	182		7			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		452
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(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	643	1093			627			
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	1500							
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	627	
Potential Capacity	484	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	484	
Probability of Queue free St.	0.99	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	643	
Potential Capacity	942	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	942	
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	1093	
Potential Capacity	237	
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	0.98
Movement Capacity	235	

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

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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 1093
Potential Capacity 237
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 0.98
Movement Capacity 235

Results for Two-stage process:
a
y
C t 235

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	182		7			
Movement Capacity (vph)		235			484	
Shared Lane Capacity (vph)			240			

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		235			484	
Volume		182			7	
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh		240				
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		LR				
v (vph)		7		189				
C(m) (vph)		942		240				
v/c		0.01		0.79				

95% queue length	0.02	5.81
Control Delay	8.9	59.4
LOS	A	F
Approach Delay		59.4
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(il), Volume for stream 2 or 5		452
v(i2), Volume for stream 3 or 6		0
s(il), 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		8.9
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.1

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd. & Central Ave.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Central Avenue
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		223	84	47	369	
Peak-Hour Factor, PHF		0.83	0.83	0.83	0.83	
Hourly Flow Rate, HFR		268	101	56	444	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0		0	1	
Configuration		TR			LT	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	36		30			
Peak Hour Factor, PHF	0.73		0.73			
Hourly Flow Rate, HFR	49		41			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		56		90				
C(m) (vph)		1190		414				
v/c		0.05		0.22				
95% queue length		0.15		0.82				
Control Delay		8.2		16.1				
LOS		A		C				
Approach Delay				16.1				
Approach LOS				C				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd. & Central Ave.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Central Avenue

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		223	84	47	369	
Peak-Hour Factor, PHF		0.83	0.83	0.83	0.83	
Peak-15 Minute Volume		67	25	14	111	
Hourly Flow Rate, HFR		268	101	56	444	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	36		30			
Peak Hour Factor, PHF	0.73		0.73			
Peak-15 Minute Volume	12		10			
Hourly Flow Rate, HFR	49		41			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	444	
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:	1	

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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

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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	369	874		318				
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	1500							
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	318	
Potential Capacity	723	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	723	
Probability of Queue free St.	0.94	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	369	
Potential Capacity	1190	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1190	
Probability of Queue free St.	0.95	1.00
Maj L-Shared Prob Q free St.	0.94	

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	0.94	0.94
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	874	
Potential Capacity	320	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.94
Maj. L, Min T Adj. Imp Factor.		0.95
Cap. Adj. factor due to Impeding mvmnt	0.95	0.90
Movement Capacity	305	

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

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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 0.94 0.94
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 874
Potential Capacity 320
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.94
Maj. L, Min T Adj. Imp Factor. 0.95
Cap. Adj. factor due to Impeding mvmnt 0.95 0.90
Movement Capacity 305

Results for Two-stage process:
a
y
C t 305

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	49		41			
Movement Capacity (vph)		305			723	
Shared Lane Capacity (vph)			414			

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	305		723			
Volume	49		41			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	414					
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		LR				
v (vph)		56		90				
C(m) (vph)		1190		414				
v/c		0.05		0.22				

95% queue length	0.15	0.82
Control Delay	8.2	16.1
LOS	A	C
Approach Delay		16.1
Approach LOS		C

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.95
v(il), Volume for stream 2 or 5		444
v(i2), Volume for stream 3 or 6		0
s(il), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)	0.94	
d(M,LT), Delay for stream 1 or 4		8.2
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.5

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA/AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd. & Quogue-Rvrhd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Quogue-Riverhead Road (Rt 104)
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	24	95	18	59	148	101
Peak-Hour Factor, PHF	0.78	0.78	0.78	0.85	0.85	0.85
Hourly Flow Rate, HFR	30	121	23	69	174	118
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	18	54	24	83	60	12
Peak Hour Factor, PHF	0.80	0.80	0.80	0.89	0.89	0.89
Hourly Flow Rate, HFR	22	67	29	93	67	13
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/		No	/
Lanes	0	1	0	0	1	0

Configuration LTR LTR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR	
v (vph)	30	69		118			173	
C(m) (vph)	1270	1438		422			361	
v/c	0.02	0.05		0.28			0.48	
95% queue length	0.07	0.15		1.13			2.50	
Control Delay	7.9	7.6		16.8			23.8	
LOS	A	A		C			C	
Approach Delay				16.8			23.8	
Approach LOS				C			C	

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA/AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd. & Quogue-Rvrhd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Quogue-Riverhead Road (Rt 104)

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	24	95	18	59	148	101
Peak-Hour Factor, PHF	0.78	0.78	0.78	0.85	0.85	0.85
Peak-15 Minute Volume	8	30	6	17	44	30
Hourly Flow Rate, HFR	30	121	23	69	174	118
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	18	54	24	83	60	12
Peak Hour Factor, PHF	0.80	0.80	0.80	0.89	0.89	0.89
Peak-15 Minute Volume	6	17	8	23	17	3
Hourly Flow Rate, HFR	22	67	29	93	67	13
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	121	174
Shared ln volume, major rt vehicles:	23	118
Sat flow rate, major th vehicles:	1700	1700
Sat flow rate, major rt vehicles:	1700	1700
Number of major street through lanes:	1	1

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	4.1	7.1	6.5	6.2	7.1	6.5	6.2
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2	2	2	2	2	2	2	2
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	4.1	4.1	7.1	6.5	6.2	7.1	6.5	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)	2.20	2.20	3.50	4.00	3.30	3.50	4.00	3.30
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2	2	2	2	2	2	2	2
t(f)	2.2	2.2	3.5	4.0	3.3	3.5	4.0	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	(1) Single-stage	(2) Two-Stage Process	(3)

movements, p(x) Process Stage I 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	292	144	603	622	132	611	575	233
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	1500		1500		1500		1500	
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	132	233
Potential Capacity	917	806
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	917	806
Probability of Queue free St.	0.97	0.98

Step 2: LT from Major St.	4	1

Conflicting Flows	144	292
Potential Capacity	1438	1270
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1438	1270
Probability of Queue free St.	0.95	0.98
Maj L-Shared Prob Q free St.	0.94	0.97

Step 3: TH from Minor St.	8	11

Conflicting Flows	622	575
Potential Capacity	403	429
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.92	0.92
Movement Capacity	370	394
Probability of Queue free St.	0.82	0.83

Step 4: LT from Minor St.	7	10

Conflicting Flows	603	611
Potential Capacity	411	406
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.76	0.75
Maj. L, Min T Adj. Imp Factor.	0.82	0.81
Cap. Adj. factor due to Impeding mvmnt	0.80	0.78
Movement Capacity	330	318

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	622	575
Potential Capacity	403	429
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.92	0.92
Movement Capacity	370	394

Result for 2 stage process:		
a		
y		
C t	370	394
Probability of Queue free St.	0.82	0.83

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	603	611
Potential Capacity	411	406
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.76	0.75
Maj. L, Min T Adj. Imp Factor.	0.82	0.81
Cap. Adj. factor due to Impeding mvmnt	0.80	0.78
Movement Capacity	330	318

Results for Two-stage process:

a		
y		
C t	330	318

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	22	67	29	93	67	13
Movement Capacity (vph)	330	370	917	318	394	806
Shared Lane Capacity (vph)	422			361		

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	330	370	917	318	394	806
Volume	22	67	29	93	67	13
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	422			361		
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		LTR		LTR		LTR		LTR
v (vph)	30	69		118			173	
C(m) (vph)		1270	1438		422			361
v/c	0.02	0.05		0.28			0.48	

95% queue length	0.07	0.15	1.13	2.50
Control Delay	7.9	7.6	16.8	23.8
LOS	A	A	C	C
Approach Delay			16.8	23.8
Approach LOS			C	C

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.98	0.95
v(il), Volume for stream 2 or 5	121	174
v(i2), Volume for stream 3 or 6	23	118
s(il), Saturation flow rate for stream 2 or 5	1700	1700
s(i2), Saturation flow rate for stream 3 or 6	1700	1700
P*(oj)	0.97	0.94
d(M,LT), Delay for stream 1 or 4	7.9	7.6
N, Number of major street through lanes	1	1
d(rank,1) Delay for stream 2 or 5	0.2	0.4

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Old Country Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	59	456		274	6	
Peak-Hour Factor, PHF	0.75	0.75		0.85	0.85	
Hourly Flow Rate, HFR	78	608		322	7	
Percent Heavy Vehicles	2	--	--	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1		1	0	
Configuration	LT			TR		
Upstream Signal?	No			No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				6	78	
Peak Hour Factor, PHF				0.75	0.75	
Hourly Flow Rate, HFR				8	104	
Percent Heavy Vehicles				2	2	
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/	No	/
Lanes				0	0	

Configuration LR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	78					112		
C(m) (vph)	1231					618		
v/c	0.06					0.18		
95% queue length	0.20					0.66		
Control Delay	8.1					12.1		
LOS	A					B		
Approach Delay						12.1		
Approach LOS						B		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Old Country Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	59	456		274	6	
Peak-Hour Factor, PHF	0.75	0.75			0.85	0.85
Peak-15 Minute Volume	20	152			81	2
Hourly Flow Rate, HFR	78	608			322	7
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				6		78
Peak Hour Factor, PHF				0.75		0.75
Peak-15 Minute Volume				2		26
Hourly Flow Rate, HFR				8		104
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	608	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	329				1090		326	
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				1500				
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	326	
Potential Capacity	715	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		715		
Probability of Queue free St.	1.00		0.85	

Step 2: LT from Major St.	4		1	

Conflicting Flows		329		
Potential Capacity		1231		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		1231		
Probability of Queue free St.	1.00		0.94	
Maj L-Shared Prob Q free St.			0.90	

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		0.90		0.90
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1090		
Potential Capacity		238		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.90			
Maj. L, Min T Adj. Imp Factor.	0.92			
Cap. Adj. factor due to Impeding mvmnt		0.79		0.94
Movement Capacity		223		

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

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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 0.90 0.90
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 1090
Potential Capacity 238
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.90
Maj. L, Min T Adj. Imp Factor. 0.92
Cap. Adj. factor due to Impeding mvmnt 0.79 0.94
Movement Capacity 223

Results for Two-stage process:
a
y
C t 223

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)			8		104	
Movement Capacity (vph)				223		715
Shared Lane Capacity (vph)					618	

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			223		715	
Volume			8		104	
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh			618			
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						LR	
v (vph)	78					112		
C(m) (vph)	1231						618	
v/c	0.06					0.18		

95% queue length	0.20	0.66
Control Delay	8.1	12.1
LOS	A	B
Approach Delay		12.1
Approach LOS		B

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.94	1.00
v(il), Volume for stream 2 or 5	608	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.90	
d(M,LT), Delay for stream 1 or 4	8.1	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.8	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Quogue-Riverhead Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Lewis Road
North/South Street: Quogue-Riverhead Road (CR 104)
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	125	12		208	243	
Peak-Hour Factor, PHF		0.75	0.75	0.70	0.70	
Hourly Flow Rate, HFR		166	16	297	347	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0		1	1	
Configuration		TR		L	T	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	12			482		
Peak Hour Factor, PHF	0.78			0.78		
Hourly Flow Rate, HFR	15			617		
Percent Heavy Vehicles	2			2		
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
Lanes	1			1		

Configuration L R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		297	15		617			
C(m) (vph)		1393	181		869			
v/c		0.21	0.08		0.71			
95% queue length		0.81	0.27		6.15			
Control Delay		8.3	26.7		18.6			
LOS		A	D		C			
Approach Delay					18.8			
Approach LOS					C			

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: AKRF
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Quogue-Riverhead Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Lewis Road
North/South Street: Quogue-Riverhead Road (CR 104)

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	125	12	208	243		
Peak-Hour Factor, PHF	0.75	0.75	0.70	0.70		
Peak-15 Minute Volume	42	4	74	87		
Hourly Flow Rate, HFR	166	16	297	347		
Percent Heavy Vehicles	--	--	2	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	1	1		
Configuration	TR		L	T		
Upstream Signal?	No		No			

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	12		482			
Peak Hour Factor, PHF	0.78		0.78			
Peak-15 Minute Volume	4		154			
Hourly Flow Rate, HFR	15		617			
Percent Heavy Vehicles	2		2			
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage			/			/
RT Channelized?			No			
Lanes	1		1			
Configuration	L		R			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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)		4.1	7.1		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		2	2		2			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		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		4.1	6.4		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)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		2	2		2			
t(f)		2.2	3.5		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	(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	182	1115			174			
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	1500							
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	174	
Potential Capacity	869	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	869	
Probability of Queue free St.	0.29	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	182	
Potential Capacity	1393	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1393	
Probability of Queue free St.	0.79	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	0.79	0.79
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	1115	
Potential Capacity	230	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.79
Maj. L, Min T Adj. Imp Factor.		0.84
Cap. Adj. factor due to Impeding mvmnt	0.79	0.24
Movement Capacity	181	

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

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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 0.79 0.79
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 1115
Potential Capacity 230
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.79
Maj. L, Min T Adj. Imp Factor. 0.84
Cap. Adj. factor due to Impeding mvmnt 0.79 0.24
Movement Capacity 181

Results for Two-stage process:
a
y
C t 181

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	15		617			
Movement Capacity (vph)		181		869		
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	181		869			
Volume	15		617			
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		L	L		R			
v (vph)		297	15		617			
C(m) (vph)		1393	181		869			
v/c		0.21	0.08		0.71			

95% queue length	0.81	0.27	6.15
Control Delay	8.3	26.7	18.6
LOS	A	D	C
Approach Delay		18.8	
Approach LOS		C	

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.79
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), 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		8.3
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Spinney Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Spinney Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		456	6	6	262	
Peak-Hour Factor, PHF		0.78	0.78	0.78	0.78	
Hourly Flow Rate, HFR		584	7	7	335	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	18		6			
Peak Hour Factor, PHF	0.75		0.75			
Hourly Flow Rate, HFR	24		8			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		7		32				
C(m) (vph)		985		327				
v/c		0.01		0.10				
95% queue length		0.02		0.32				
Control Delay		8.7		17.2				
LOS		A		C				
Approach Delay				17.2				
Approach LOS				C				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: AKRF
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Spinney Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Spinney Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	456	6	6	262		
Peak-Hour Factor, PHF	0.78	0.78	0.78	0.78		
Peak-15 Minute Volume	146	2	2	84		
Hourly Flow Rate, HFR	584	7	7	335		
Percent Heavy Vehicles	--	--	2	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	0	1		
Configuration	TR		LT			
Upstream Signal?	No		No			

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	18		6			
Peak Hour Factor, PHF	0.75		0.75			
Peak-15 Minute Volume	6		2			
Hourly Flow Rate, HFR	24		8			
Percent Heavy Vehicles	2		2			
Percent Grade (%)	0		0			
Flared Approach: Exists?/Storage	No	/			/	
RT Channelized?						
Lanes	0	0				
Configuration	LR					

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		335
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(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	591	937			588			
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	1500							
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	588	
Potential Capacity	509	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	509	
Probability of Queue free St.	0.98	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	591	
Potential Capacity	985	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	985	
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	937	
Potential Capacity	294	
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	0.98
Movement Capacity	292	

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 937
Potential Capacity 294
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 0.98
Movement Capacity 292

Results for Two-stage process:
a
y
C t 292

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	24		8			
Movement Capacity (vph)		292			509	
Shared Lane Capacity (vph)			327			

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	292		509			
Volume	24		8			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	327					
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		LR				
v (vph)	7		32					
C(m) (vph)		985		327				
v/c	0.01		0.10					

95% queue length	0.02	0.32
Control Delay	8.7	17.2
LOS	A	C
Approach Delay		17.2
Approach LOS		C

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(il), Volume for stream 2 or 5		335
v(i2), Volume for stream 3 or 6		0
s(il), 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		8.7
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.1

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Box Tree Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: The Hills at Southampton TIS
East/West Street: Box Tree Road/Old Country Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	6	126	18	410	119	41
Peak-Hour Factor, PHF	0.81	0.81	0.81	0.86	0.86	0.86
Hourly Flow Rate, HFR	7	155	22	476	138	47
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	6	49	300	27	12	6
Peak Hour Factor, PHF	0.87	0.87	0.87	0.75	0.75	0.75
Hourly Flow Rate, HFR	6	56	344	36	16	8
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
Lanes	0	1	0	0	1	0

Configuration LTR LTR

_____Delay, Queue Length, and Level of Service_____

Approach	NB	SB	Westbound		Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR
v (vph)	7	476		406			60
C(m) (vph)	1390	1399		390			36
v/c	0.01	0.34		1.04			1.67
95% queue length	0.02	1.53		13.38			6.47
Control Delay	7.6	8.9		89.9			567.2
LOS	A	A		F			F
Approach Delay				89.9			567.2
Approach LOS				F			F

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

_____TWO-WAY STOP CONTROL(TWSC) ANALYSIS_____

Analyst: AC
Agency/Co.: AKRF
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Box Tree Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: The Hills at Southampton TIS
East/West Street: Box Tree Road/Old Country Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	6	126	18	410	119	41
Peak-Hour Factor, PHF	0.81	0.81	0.81	0.86	0.86	0.86
Peak-15 Minute Volume	2	39	6	119	35	12
Hourly Flow Rate, HFR	7	155	22	476	138	47
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	6	49	300	27	12	6
Peak Hour Factor, PHF	0.87	0.87	0.87	0.75	0.75	0.75
Peak-15 Minute Volume	2	14	86	9	4	2
Hourly Flow Rate, HFR	6	56	344	36	16	8
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/		No	/
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	155	138
Shared ln volume, major rt vehicles:	22	47
Sat flow rate, major th vehicles:	1700	1700
Sat flow rate, major rt vehicles:	1700	1700
Number of major street through lanes:	1	1

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	4.1	7.1	6.5	6.2	7.1	6.5	6.2
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2	2	2	2	2	2	2	2
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	4.1	4.1	7.1	6.5	6.2	7.1	6.5	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)	2.20	2.20	3.50	4.00	3.30	3.50	4.00	3.30
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2	2	2	2	2	2	2	2
t(f)	2.2	2.2	3.5	4.0	3.3	3.5	4.0	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	(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	185	177	1306	1317	166	1494	1305	162
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	1500		1500		1500		1500	
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	166	162
Potential Capacity	878	883
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	878	883
Probability of Queue free St.	0.61	0.99

Step 2: LT from Major St.	4	1

Conflicting Flows	177	185
Potential Capacity	1399	1390
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1399	1390
Probability of Queue free St.	0.66	0.99
Maj L-Shared Prob Q free St.	0.62	0.99

Step 3: TH from Minor St.	8	11

Conflicting Flows	1317	1305
Potential Capacity	157	160
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.61	0.61
Movement Capacity	97	98
Probability of Queue free St.	0.42	0.84

Step 4: LT from Minor St.	7	10

Conflicting Flows	1306	1494
Potential Capacity	137	101
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.51	0.26
Maj. L, Min T Adj. Imp Factor.	0.62	0.40
Cap. Adj. factor due to Impeding mvmnt	0.61	0.24
Movement Capacity	84	24

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	1317	1305
Potential Capacity	157	160
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.61	0.61
Movement Capacity	97	98

Result for 2 stage process:
a
y

C t	97	98
Probability of Queue free St.	0.42	0.84

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	1306	1494
Potential Capacity	137	101
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.51	0.26
Maj. L, Min T Adj. Imp Factor.	0.62	0.40
Cap. Adj. factor due to Impeding mvmnt	0.61	0.24
Movement Capacity	84	24

Results for Two-stage process:

a		
y		
C t	84	24

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	6	56	344	36	16	8
Movement Capacity (vph)	84	97	878	24	98	883
Shared Lane Capacity (vph)	390			36		

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	84	97	878	24	98	883
Volume	6	56	344	36	16	8
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	390			36		
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	LTR		LTR		LTR			LTR
v (vph)	7	476		406			60	
C(m) (vph)	1390	1399		390			36	
v/c	0.01	0.34		1.04			1.67	

95% queue length	0.02	1.53	13.38	6.47
Control Delay	7.6	8.9	89.9	567.2
LOS	A	A	F	F
Approach Delay			89.9	567.2
Approach LOS			F	F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.99	0.66
v(il), Volume for stream 2 or 5	155	138
v(i2), Volume for stream 3 or 6	22	47
s(il), Saturation flow rate for stream 2 or 5	1700	1700
s(i2), Saturation flow rate for stream 3 or 6	1700	1700
P*(oj)	0.99	0.62
d(M,LT), Delay for stream 1 or 4	7.6	8.9
N, Number of major street through lanes	1	1
d(rank,1) Delay for stream 2 or 5	0.0	3.4

HCS+: Signalized Intersections Release 5.21

Analyst: AC Inter.: Montauk Hwy. & Central Avenue
Agency: AKRF, Inc. Area Type: All other areas
Date: 11/6/2006 Jurisd:
Period: PM Peak Hour Year : 2015 No Build
Project ID: East Quogue GIES
E/W St: Montauk Highway N/S St: Central Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
LGConfig		LT			TR						LR	
Volume	59	853			796	60				172	65	
Lane Width		12.7			12.2						12.2	
RTOR Vol					0						0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left			
Thru	P				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	P		
Thru	P				Thru			
Right	P				Right	P		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	92.0				20.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

Cycle Length: 122.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	1017	1349	0.95	0.75	32.2	C	32.2	C

Westbound

TR 1121 1486 0.83 0.75 17.0 B 17.0 B

Northbound

Southbound

LR 285 1736 1.26 0.16 193.0 F 193.0 F

Intersection Delay = 51.5 (sec/veh) Intersection LOS = D

HCS+: Signalized Intersections Release 5.21

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/6/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Central Avenue
Area Type: All other areas
Jurisdiction:
Analysis Year: 2015 No Build
Project ID: East Quogue GIES
E/W St: Montauk Highway N/S St: Central Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	59	853		796	60					172	65	
% Heavy Veh	2	2		2	2					2	2	

PHF	0.94 0.94	0.92 0.92	0.66	0.66
PK 15 Vol	16 227	216 16	65	25
Hi Ln Vol				
% Grade	0	0	0	
Ideal Sat	1900	1900	1900	
ParkExist	X	X		
NumPark	20	20		
No. Lanes	0 1 0	0 1 0	0 0 0	0 0 0
LGConfig	LT	TR	LR	
Lane Width	12.7	12.2	12.2	
RTOR Vol		0	0	
Adj Flow	970	930	359	
%InSharedLn				
Prop LTs	0.065	0.000	0.727	
Prop RTs	0.000	0.070	0.273	
Peds Bikes	0	0	0	
Buses	1	0	1	
%InProtPhase				

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet	0.0			0.0						0.0		
Arriv. Type	3			3						3		
Unit Ext.	3.0			3.0						3.0		
I Factor	1.000			1.000						1.000		
Lost Time	2.0			2.0						2.0		
Ext of g	2.0			2.0						2.0		
Ped Min g				3.2			3.2			3.2		

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left			
Thru	P				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	P		
Thru	P				Thru			
Right	P				Right	P		
Peds					Peds			

NB Right		EB Right
SB Right		WB Right
Green	92.0	20.0
Yellow	3.0	3.0
All Red	2.0	2.0

Cycle Length: 122.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	59	853			796	60				172	65	
PHF	0.94	0.94			0.92	0.92				0.66	0.66	
Adj flow	63	907			865	65				261	98	
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
Lane group		LT			TR						LR	
Adj flow		970			930						359	
Prop LTs		0.065			0.000						0.727	
Prop RTs		0.000			0.070						0.273	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG		LT			TR						LR	
So		1900			1900						1900	
Lanes	0	1	0	0	1	0	0	0	0	0	0	0
fW		1.023			1.007						1.007	
fHV		0.980			0.980						0.980	
fG		1.000			1.000						1.000	
fP		0.800			0.800						1.000	
fBB		0.996			1.000						0.996	
fA		1.000			1.000						1.000	
fLU		1.000			1.000						1.000	
fRT		1.000			0.991						0.963	
fLT		0.888			1.000						0.965	
Sec.												
fLpb		1.000			1.000						1.000	
fRpb		1.000			1.000						1.000	
S		1349			1486						1736	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Green Ratio (v/s)	--Lane Group-- Green Ratio (g/C)	Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LT	970	1349	# 0.72	0.75	1017	0.95
Right							
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	TR	930	1486	0.63	0.75	1121	0.83
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LR	359	1736	# 0.21	0.16	285	1.26
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.93
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.01

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Res Del d2	d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS

Eastbound

LT 0.95 0.75 13.1 1.000 1017 0.50 19.1 0.0 32.2 C 32.2 C

Westbound

TR 0.83 0.75 9.9 1.000 1121 0.50 7.2 0.0 17.0 B 17.0 B

Northbound

Southbound

LR 1.26 0.16 51.0 1.000 285 0.50 142.0 0.0 193.0 F 193.0 F

Intersection delay = 51.5 (sec/veh) Intersection LOS = D

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____

for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	122.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				

gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts
Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				S
Cycle length, C	122.0 sec			
Total actual green time for LT lane group, G (s)	92.0			
Effective permitted green time for LT lane group, g(s)	92.0			
Opposing effective green time, go (s)	92.0			
Number of lanes in LT lane group, N	1			
Number of lanes in opposing approach, No	1			
Adjusted LT flow rate, VLT (veh/h)	63			
Proportion of LT in LT lane group, PLT	0.065	0.000	0.727	
Proportion of LT in opposing flow, PLTo	0.00			
Adjusted opposing flow rate, Vo (veh/h)	930			
Lost time for LT lane group, tL	5.00			

Computation

LT volume per cycle, LTC=VLTC/3600	2.13		
Opposing lane util. factor, fLUo	1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)	31.52		
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g	18.0		
Opposing platoon ratio, Rpo (refer Exhibit 16-11)	1.00		
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]	0.25		
gq, (see Exhibit C16-4,5,6,7,8)	10.47		
gu=g-gq if gq>=gf, or = g-gf if gq<gf	73.99		

n=Max(gq-gf)/2,0) 0.00
PTHo=1-PLTo 1.00
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)] 0.06
EL1 (refer to Exhibit C16-3) 3.49
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g 0.02
gdiff=max(gq-gf,0) 0.00
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00) 0.89
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT 0.888

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				

OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

_____SUPPLEMENTAL UNIFORM DELAY WORKSHEET_____

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	122.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

_____DELAY/LOS WORKSHEET WITH INITIAL QUEUE_____

Appr/ Lane Group	Initial Dur. Unmet Demand Q veh	Uniform Delay Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Queue Param. u	Final Unmet Demand Q veh	Initial Queue Delay d3 sec	Lane Group Delay d sec
Eastbound								
	0.0				0.0			
LT	0.0	0.00	15.0	13.1	0.00	0.0	0.0	32.2
	0.0				0.0			
Westbound								
	0.0				0.0			
TR	0.0	0.00	15.0	9.9	0.00	0.0	0.0	17.0
	0.0				0.0			

Northbound
0.0 0.0
0.0 0.0
0.0 0.0

Southbound
0.0 0.0
LR 0.0 0.00 51.0 51.0 0.00 18.5 0.0 193.0
0.0 0.0

Intersection Delay 51.5 sec/veh Intersection LOS D

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	LT	TR		LR
Init Queue	0.0	0.0		0.0
Flow Rate	970	930		359
So	1900	1900		1900
No.Lanes	0 1 0	0 1 0	0 0 0	0 0 0
SL	1349	1486		1736
LnCapacity	1017	1121		285
Flow Ratio	0.7	0.6		0.2
v/c Ratio	0.95	0.83		1.26
Grn Ratio	0.75	0.75		0.16
I Factor	1.000	1.000		1.000
AT or PVG	3	3		3
Pltn Ratio	1.00	1.00		1.00
PF2	1.00	1.00		1.00
Q1	28.8	20.7		12.2
kB	1.4	1.5		0.6
Q2	10.6	6.0		11.5
Q Average	39.3	26.7		23.7
Q Spacing	25.0	25.0		25.0
Q Storage	0	0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2		1.2
BOQ	47.2	32.0		28.5
QSRatio				
85th Percentile Output:				
fB%	1.4	1.4		1.4
BOQ	55.1	37.4		33.2
QSRatio				
90th Percentile Output:				

fB%	1.5	1.5		1.5
BOQ	59.0	40.1		35.7
QSRatio				

95th Percentile Output:

fB%	1.6	1.6		1.6
BOQ	63.0	42.8		38.1
QSRatio				

98th Percentile Output:

fB%	1.7	1.7		1.7
BOQ	66.9	45.5		40.6
QSRatio				

ERROR MESSAGES

No errors to report.

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Emmett Drive
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Emmett Drive
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	659			653	41
Peak-Hour Factor, PHF	0.88	0.88			0.93	0.93
Hourly Flow Rate, HFR	34	748			702	44
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				No

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				36		30
Peak Hour Factor, PHF				0.80		0.80
Hourly Flow Rate, HFR				44		37
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

_____

_____Delay, Queue Length, and Level of Service_____

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	34					81		
C(m) (vph)	862					181		
v/c	0.04					0.45		
95% queue length	0.12					2.08		
Control Delay	9.3					40.1		
LOS	A					E		
Approach Delay						40.1		
Approach LOS						E		

_____

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

_____TWO-WAY STOP CONTROL(TWSC) ANALYSIS_____

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Emmett Drive
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Emmett Drive

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	659			653	41
Peak-Hour Factor, PHF	0.88	0.88			0.93	0.93
Peak-15 Minute Volume	9	187			176	11
Hourly Flow Rate, HFR	34	748			702	44
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				No

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				36		30
Peak Hour Factor, PHF				0.80		0.80
Peak-15 Minute Volume				11		9
Hourly Flow Rate, HFR				44		37
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	748	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	746				1540		724	
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				1500				
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	724	
Potential Capacity	426	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		426		
Probability of Queue free St.	1.00		0.91	

Step 2: LT from Major St.	4		1	

Conflicting Flows		746		
Potential Capacity		862		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		862		
Probability of Queue free St.	1.00		0.96	
Maj L-Shared Prob Q free St.			0.93	

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		0.93		0.93
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1540		
Potential Capacity		127		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.93			
Maj. L, Min T Adj. Imp Factor.	0.95			
Cap. Adj. factor due to Impeding mvmnt		0.86		0.96
Movement Capacity		122		

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

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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 0.93 0.93
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 1540
Potential Capacity 127
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.93
Maj. L, Min T Adj. Imp Factor. 0.95
Cap. Adj. factor due to Impeding mvmnt 0.86 0.96
Movement Capacity 122

Results for Two-stage process:
a
y
C t 122

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				44		37
Movement Capacity (vph)					122	426
Shared Lane Capacity (vph)					181	

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				122		426
Volume				44		37
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				181		
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						LR	
v (vph)	34					81		
C(m) (vph)	862						181	
v/c	0.04					0.45		

95% queue length	0.12	2.08
Control Delay	9.3	40.1
LOS	A	E
Approach Delay		40.1
Approach LOS		E

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.96	1.00
v(il), Volume for stream 2 or 5	748	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.93	
d(M,LT), Delay for stream 1 or 4	9.3	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.7	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & J. Fosters Path
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Josiah Fosters Path
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		700	148	6	593	
Peak-Hour Factor, PHF		0.86	0.86	0.78	0.78	
Hourly Flow Rate, HFR		813	172	7	760	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	59		12			
Peak Hour Factor, PHF	0.75		0.75			
Hourly Flow Rate, HFR	78		16			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		7		94				
C(m) (vph)		701		118				
v/c		0.01		0.80				
95% queue length		0.03		4.62				
Control Delay		10.2		103.9				
LOS		B		F				
Approach Delay				103.9				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & J. Fosters Path
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Josiah Fosters Path

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	700	148	6	593		
Peak-Hour Factor, PHF		0.86	0.86	0.78	0.78	
Peak-15 Minute Volume		203	43	2	190	
Hourly Flow Rate, HFR		813	172	7	760	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	59		12			
Peak Hour Factor, PHF	0.75		0.75			
Peak-15 Minute Volume	20		4			
Hourly Flow Rate, HFR	78		16			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		760
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		2	2		2			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		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		4.1	6.4		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)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		2	2		2			
t(f)		2.2	3.5		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	(1) Single-stage	(2) Two-Stage Process	(3)

movements, p(x) Process Stage I 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	985	1673			899			
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	1500							
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	899	
Potential Capacity	338	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	338	
Probability of Queue free St.	0.95	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	985	
Potential Capacity	701	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	701	
Probability of Queue free St.	0.99	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	1673	
Potential Capacity	105	
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	0.99	0.94
Movement Capacity	104	

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

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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 1673
Potential Capacity 105
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 0.99 0.94
Movement Capacity 104

Results for Two-stage process:
a
y
C t 104

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	78		16			
Movement Capacity (vph)		104			338	
Shared Lane Capacity (vph)			118			

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	104		338			
Volume	78		16			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	118					
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		LR				
v (vph)	7		94					
C(m) (vph)		701		118				
v/c	0.01		0.80					

95% queue length	0.03	4.62
Control Delay	10.2	103.9
LOS	B	F
Approach Delay		103.9
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(il), Volume for stream 2 or 5		760
v(i2), Volume for stream 3 or 6		0
s(il), 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		10.2
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.2

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Lewis Road
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Lewis Road
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	734			722	133
Peak-Hour Factor, PHF	0.93	0.93			0.94	0.94
Hourly Flow Rate, HFR	32	789			768	141
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				Yes

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				119		30
Peak Hour Factor, PHF				0.87		0.87
Hourly Flow Rate, HFR				136		34
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	32					170		
C(m) (vph)	699					193		
v/c	0.05					0.88		
95% queue length	0.14					6.68		
Control Delay	10.4					86.9		
LOS	B					F		
Approach Delay						86.9		
Approach LOS						F		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Lewis Road
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Lewis Road

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	734			722	133
Peak-Hour Factor, PHF	0.93	0.93			0.94	0.94
Peak-15 Minute Volume	8	197			192	35
Hourly Flow Rate, HFR	32	789			768	141
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				Yes

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				119		30
Peak Hour Factor, PHF				0.87		0.87
Peak-15 Minute Volume				34		9
Hourly Flow Rate, HFR				136		34
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
S2 Left-Turn						
Through						
S5 Left-Turn	0	1700	3	0	122	35	625
Through	793	1700	3	105	122	35	625

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

	Movement 2	Movement 5
Shared ln volume, major th vehicles:	789	
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:	1	

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				5.5*		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		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	4.1				4.8		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	793	0		
Total Saturation Flow Rate, s (vph)			1700	1700
Arrival Type	3	3		
Effective Green, g (sec)			105	0
Cycle Length, C (sec)			122	122
Rp (from Exhibit 16-11)			1.000	1.000
Proportion vehicles arriving on green P			0.861	0.000
g(q1)	7.9	0.0		
g(q2)	6.9	0.0		
g(q)	14.9	0.0		

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha	0.550			
beta	0.645			
Travel time, t(a) (sec)			12.148	
Smoothing Factor, F			0.188	
Proportion of conflicting flow, f			1.000	1.000
Max platooned flow, V(c,max)			1623	0
Min platooned flow, V(c,min)			1000	1000
Duration of blocked period, t(p)			17.3	0.0
Proportion time blocked, p	0.000		0.142	

Computation 3-Platoon Event Periods Result

p(2)	0.000
p(5)	0.142
p(dom)	0.142
p(subo)	0.000
Constrained or unconstrained?	U

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

movements, p(x)	Process	Stage I	Stage II
p(1)	0.858		
p(4)			
p(7)			
p(8)			
p(9)			
p(10)	0.858		
p(11)			
p(12)	0.858		

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	909					1691		838
s	1500					1500		1500
Px	0.858					0.858		0.858
V c,u,x	812					1722		729
C r,x	814					211		423
C plat,x	699					181		363

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s				1500		1500		
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	838	
Potential Capacity	363	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		363		
Probability of Queue free St.	1.00		0.91	

Step 2: LT from Major St.	4		1	

Conflicting Flows		909		
Potential Capacity		699		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		699		
Probability of Queue free St.	1.00		0.95	
Maj L-Shared Prob Q free St.			0.91	

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		0.91		0.91
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1691		
Potential Capacity		181		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.91			
Maj. L, Min T Adj. Imp Factor.	0.93			
Cap. Adj. factor due to Impeding mvmnt		0.85		0.95
Movement Capacity		173		

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

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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 0.91 0.91
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 1691
Potential Capacity 181
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.91
Maj. L, Min T Adj. Imp Factor. 0.93
Cap. Adj. factor due to Impeding mvmnt 0.85 0.95
Movement Capacity 173

Results for Two-stage process:
a
y
C t 173

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				136		34
Movement Capacity (vph)					173	363
Shared Lane Capacity (vph)					193	

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				173		363
Volume				136		34
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				193		
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						LR	
v (vph)	32					170		
C(m) (vph)	699						193	
v/c	0.05					0.88		

95% queue length	0.14	6.68
Control Delay	10.4	86.9
LOS	B	F
Approach Delay		86.9
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.95	1.00
v(il), Volume for stream 2 or 5	789	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.91	
d(M,LT), Delay for stream 1 or 4	10.4	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.9	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Old Country Rd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Old Country Road
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	41	569			451	232
Peak-Hour Factor, PHF	0.88	0.88			0.93	0.93
Hourly Flow Rate, HFR	46	646			484	249
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				No

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				119		59
Peak Hour Factor, PHF				0.80		0.80
Hourly Flow Rate, HFR				148		73
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	46					221		
C(m) (vph)	872					204		
v/c	0.05					1.08		
95% queue length	0.17					10.23		
Control Delay	9.4					136.0		
LOS	A					F		
Approach Delay						136.0		
Approach LOS						F		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Old Country Rd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Old Country Road

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	41	569			451	232
Peak-Hour Factor, PHF	0.88	0.88			0.93	0.93
Peak-15 Minute Volume	12	162			121	62
Hourly Flow Rate, HFR	46	646			484	249
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				119		59
Peak Hour Factor, PHF				0.80		0.80
Peak-15 Minute Volume				37		18
Hourly Flow Rate, HFR				148		73
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	646	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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

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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	733				1346		608	
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				1500				
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	608	
Potential Capacity	496	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		496		
Probability of Queue free St.	1.00		0.85	

Step 2: LT from Major St.	4		1	

Conflicting Flows		733		
Potential Capacity		872		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		872		
Probability of Queue free St.	1.00		0.95	
Maj L-Shared Prob Q free St.			0.91	

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		0.91		0.91
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1346		
Potential Capacity		167		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.91			
Maj. L, Min T Adj. Imp Factor.	0.93			
Cap. Adj. factor due to Impeding mvmnt		0.80		0.95
Movement Capacity		158		

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

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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 0.91 0.91
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 1346
Potential Capacity 167
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.91
Maj. L, Min T Adj. Imp Factor. 0.93
Cap. Adj. factor due to Impeding mvmnt 0.80 0.95
Movement Capacity 158

Results for Two-stage process:
a
y
C t 158

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				148		73
Movement Capacity (vph)					158	496
Shared Lane Capacity (vph)					204	

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				158		496
Volume				148		73
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				204		
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						LR	
v (vph)	46					221		
C(m) (vph)	872						204	
v/c	0.05					1.08		

95% queue length	0.17	10.23
Control Delay	9.4	136.0
LOS	A	F
Approach Delay		136.0
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.95	1.00
v(il), Volume for stream 2 or 5	646	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.91	
d(M,LT), Delay for stream 1 or 4	9.4	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.8	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Squires Avenue
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Squires Avenue
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		611	101	6	528	
Peak-Hour Factor, PHF		0.85	0.85	0.76	0.76	
Hourly Flow Rate, HFR		718	118	7	694	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	71		6			
Peak Hour Factor, PHF	0.85		0.85			
Hourly Flow Rate, HFR	83		7			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		7		90				
C(m) (vph)		798		143				
v/c		0.01		0.63				
95% queue length		0.03		3.38				
Control Delay		9.6		65.5				
LOS		A		F				
Approach Delay				65.5				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Squires Avenue
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Squires Avenue

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		611	101	6	528	
Peak-Hour Factor, PHF			0.85	0.85	0.76	0.76
Peak-15 Minute Volume			180	30	2	174
Hourly Flow Rate, HFR			718	118	7	694
Percent Heavy Vehicles			--	--	2	-- --
Median Type/Storage		Undivided			/	
RT Channelized?						
Lanes	1	0		0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	71		6			
Peak Hour Factor, PHF	0.85		0.85			
Peak-15 Minute Volume	21		2			
Hourly Flow Rate, HFR	83		7			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	694	
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:	1	

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(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	836	1485		777				
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	1500							
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	777	
Potential Capacity	397	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	397	
Probability of Queue free St.	0.98	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	836	
Potential Capacity	798	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	798	
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	1485	
Potential Capacity	137	
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	0.97
Movement Capacity	136	

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

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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 1485
Potential Capacity 137
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 0.97
Movement Capacity 136

Results for Two-stage process:
a
y
C t 136

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	83		7			
Movement Capacity (vph)		136			397	
Shared Lane Capacity (vph)			143			

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	136		397			
Volume	83		7			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	143					
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		LR				
v (vph)	7		90					
C(m) (vph)		798		143				
v/c	0.01		0.63					

95% queue length	0.03	3.38
Control Delay	9.6	65.5
LOS	A	F
Approach Delay		65.5
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(il), Volume for stream 2 or 5		694
v(i2), Volume for stream 3 or 6		0
s(il), 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		9.6
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.1

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd. & Central Ave.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Central Avenue
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		357	83	47	306	
Peak-Hour Factor, PHF		0.92	0.92	0.93	0.93	
Hourly Flow Rate, HFR		388	90	50	329	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	48		59			
Peak Hour Factor, PHF	0.91		0.91			
Hourly Flow Rate, HFR	52		64			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		50		116				
C(m) (vph)		1084		429				
v/c		0.05		0.27				
95% queue length		0.14		1.08				
Control Delay		8.5		16.5				
LOS		A		C				
Approach Delay				16.5				
Approach LOS				C				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd. & Central Ave.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Central Avenue

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	357	83	47	306		
Peak-Hour Factor, PHF		0.92	0.92	0.93	0.93	
Peak-15 Minute Volume		97	23	13	82	
Hourly Flow Rate, HFR		388	90	50	329	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	48		59			
Peak Hour Factor, PHF	0.91		0.91			
Peak-15 Minute Volume	13		16			
Hourly Flow Rate, HFR	52		64			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	329	
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:	1	

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(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	478	862			433			
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	1500							
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	433	
Potential Capacity	623	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	623	
Probability of Queue free St.	0.90	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	478	
Potential Capacity	1084	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1084	
Probability of Queue free St.	0.95	1.00
Maj L-Shared Prob Q free St.	0.94	

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	0.94	0.94
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	862	
Potential Capacity	325	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.94
Maj. L, Min T Adj. Imp Factor.		0.96
Cap. Adj. factor due to Impeding mvmnt	0.95	0.86
Movement Capacity	310	

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

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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 0.94 0.94
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 862
Potential Capacity 325
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.94
Maj. L, Min T Adj. Imp Factor. 0.96
Cap. Adj. factor due to Impeding mvmnt 0.95 0.86
Movement Capacity 310

Results for Two-stage process:
a
y
C t 310

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	52		64			
Movement Capacity (vph)		310			623	
Shared Lane Capacity (vph)			429			

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		310			623	
Volume		52			64	
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh		429				
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		LR				
v (vph)		50		116				
C(m) (vph)		1084		429				
v/c		0.05		0.27				

95% queue length	0.14	1.08
Control Delay	8.5	16.5
LOS	A	C
Approach Delay		16.5
Approach LOS		C

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.95
v(il), Volume for stream 2 or 5		329
v(i2), Volume for stream 3 or 6		0
s(il), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)	0.94	
d(M,LT), Delay for stream 1 or 4		8.5
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.5

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA/AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd. & Quogue-Rvrhd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Quogue-Riverhead Road (Rt 104)
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	18	148	6	30	101	65
Peak-Hour Factor, PHF	0.80	0.80	0.80	0.78	0.78	0.78
Hourly Flow Rate, HFR	22	184	7	38	129	83
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	90	18	118	66	12
Peak Hour Factor, PHF	0.88	0.88	0.88	0.77	0.77	0.77
Hourly Flow Rate, HFR	0	102	20	153	85	15
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
Lanes	0	1	0	0	1	0

Configuration LTR LTR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound		Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR
v (vph)	22	38		122			253
C(m) (vph)	1358	1383		476			397
v/c	0.02	0.03		0.26			0.64
95% queue length	0.05	0.08		1.01			4.26
Control Delay	7.7	7.7		15.1			28.7
LOS	A	A		C			D
Approach Delay				15.1			28.7
Approach LOS				C			D

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA/AC
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd. & Quogue-Rvrhd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Quogue-Riverhead Road (Rt 104)

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	18	148	6	30	101	65
Peak-Hour Factor, PHF	0.80	0.80	0.80	0.78	0.78	0.78
Peak-15 Minute Volume	6	46	2	10	32	21
Hourly Flow Rate, HFR	22	184	7	38	129	83
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	0	90	18	118	66	12
Peak Hour Factor, PHF	0.88	0.88	0.88	0.77	0.77	0.77
Peak-15 Minute Volume	0	26	5	38	21	4
Hourly Flow Rate, HFR	0	102	20	153	85	15
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/		No	/
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	184	129
Shared ln volume, major rt vehicles:	7	83
Sat flow rate, major th vehicles:	1700	1700
Sat flow rate, major rt vehicles:	1700	1700
Number of major street through lanes:	1	1

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	4.1	7.1	6.5	6.2	7.1	6.5	6.2
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2	2	2	2	2	2	2	2
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	4.1	4.1	7.1	6.5	6.2	7.1	6.5	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)	2.20	2.20	3.50	4.00	3.30	3.50	4.00	3.30
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2	2	2	2	2	2	2	2
t(f)	2.2	2.2	3.5	4.0	3.3	3.5	4.0	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	(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	212	191	528	520	188	538	481	170
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	1500		1500		1500		1500	
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	188	170
Potential Capacity	854	874
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	854	874
Probability of Queue free St.	0.98	0.98

Step 2: LT from Major St.	4	1

Conflicting Flows	191	212
Potential Capacity	1383	1358
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1383	1358
Probability of Queue free St.	0.97	0.98
Maj L-Shared Prob Q free St.	0.97	0.98

Step 3: TH from Minor St.	8	11

Conflicting Flows	520	481
Potential Capacity	461	485
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.95	0.95
Movement Capacity	438	461
Probability of Queue free St.	0.77	0.82

Step 4: LT from Minor St.	7	10

Conflicting Flows	528	538
Potential Capacity	461	454
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.78	0.73
Maj. L, Min T Adj. Imp Factor.	0.83	0.79
Cap. Adj. factor due to Impeding mvmnt	0.81	0.77
Movement Capacity	375	351

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	520	481
Potential Capacity	461	485
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.95	0.95
Movement Capacity	438	461

Result for 2 stage process:
a
y

C t	438	461
Probability of Queue free St.	0.77	0.82

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	528	538
Potential Capacity	461	454
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.78	0.73
Maj. L, Min T Adj. Imp Factor.	0.83	0.79
Cap. Adj. factor due to Impeding mvmnt	0.81	0.77
Movement Capacity	375	351

Results for Two-stage process:

a		
y		
C t	375	351

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	0	102	20	153	85	15
Movement Capacity (vph)	375	438	854	351	461	874
Shared Lane Capacity (vph)	476			397		

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	375	438	854	351	461	874
Volume	0	102	20	153	85	15
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	476			397		
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	LTR		LTR		LTR			LTR
v (vph)	22	38		122			253	
C(m) (vph)	1358	1383		476			397	
v/c	0.02	0.03		0.26			0.64	

95% queue length	0.05	0.08	1.01	4.26
Control Delay	7.7	7.7	15.1	28.7
LOS	A	A	C	D
Approach Delay			15.1	28.7
Approach LOS			C	D

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.98	0.97
v(il), Volume for stream 2 or 5	184	129
v(i2), Volume for stream 3 or 6	7	83
s(il), Saturation flow rate for stream 2 or 5	1700	1700
s(i2), Saturation flow rate for stream 3 or 6	1700	1700
P*(oj)	0.98	0.97
d(M,LT), Delay for stream 1 or 4	7.7	7.7
N, Number of major street through lanes	1	1
d(rank,1) Delay for stream 2 or 5	0.1	0.2

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: AKRF
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Old Country Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	78	375			493	18
Peak-Hour Factor, PHF	0.98	0.98			0.91	0.91
Hourly Flow Rate, HFR	79	382			541	19
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				No

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				6		77
Peak Hour Factor, PHF				0.75		0.75
Hourly Flow Rate, HFR				8		102
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	79					110		
C(m) (vph)	1011					484		
v/c	0.08					0.23		
95% queue length	0.25					0.87		
Control Delay	8.9					14.6		
LOS	A					B		
Approach Delay						14.6		
Approach LOS						B		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: AKRF
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Old Country Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	78	375		493	18	
Peak-Hour Factor, PHF	0.98	0.98			0.91	0.91
Peak-15 Minute Volume	20	96			135	5
Hourly Flow Rate, HFR	79	382			541	19
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				6		77
Peak Hour Factor, PHF				0.75		0.75
Peak-15 Minute Volume				2		26
Hourly Flow Rate, HFR				8		102
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	382	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	560				1090		550	
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				1500				
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	550	
Potential Capacity	535	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		535		
Probability of Queue free St.	1.00		0.81	

Step 2: LT from Major St.	4		1	

Conflicting Flows		560		
Potential Capacity		1011		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		1011		
Probability of Queue free St.	1.00		0.92	
Maj L-Shared Prob Q free St.			0.90	

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		0.90		0.90
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1090		
Potential Capacity		238		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.90			
Maj. L, Min T Adj. Imp Factor.	0.92			
Cap. Adj. factor due to Impeding mvmnt		0.75		0.92
Movement Capacity		219		

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

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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 0.90 0.90
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 1090
Potential Capacity 238
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.90
Maj. L, Min T Adj. Imp Factor. 0.92
Cap. Adj. factor due to Impeding mvmnt 0.75 0.92
Movement Capacity 219

Results for Two-stage process:

a												
y												
C t							219					

Worksheet 8-Shared Lane Calculations

Movement			7	8	9	10	11	12
		L	T	R	L	T	R	
Volume (vph)					8		102	
Movement Capacity (vph)						219		535
Shared Lane Capacity (vph)							484	

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					219		535	
Volume					8		102	
Delay								
Q sep								
Q sep +1								
round (Qsep +1)								
n max								
C sh						484		
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						LR	
v (vph)	79					110		
C(m) (vph)	1011						484	
v/c	0.08					0.23		

95% queue length	0.25	0.87
Control Delay	8.9	14.6
LOS	A	B
Approach Delay		14.6
Approach LOS		B

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.92	1.00
v(il), Volume for stream 2 or 5	382	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.90	
d(M,LT), Delay for stream 1 or 4	8.9	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.9	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Quogue-Riverhead Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Lewis Road
North/South Street: Quogue-Riverhead Road (CR 104)
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume				231	36	394
Peak-Hour Factor, PHF				0.75	0.75	0.79
Hourly Flow Rate, HFR				308	48	498
Percent Heavy Vehicles				--	--	2
Median Type/Storage	Undivided				/	
RT Channelized?						
Lanes				1	0	1
Configuration					TR	
Upstream Signal?				No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30				335	
Peak Hour Factor, PHF	0.83				0.83	
Hourly Flow Rate, HFR	36				403	
Percent Heavy Vehicles	2				2	
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		/
Lanes	1			1		

Configuration L R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		498	36		403			
C(m) (vph)		1203	71		710			
v/c		0.41	0.51		0.57			
95% queue length		2.07	2.09		3.60			
Control Delay		10.1	99.3		16.5			
LOS		B	F		C			
Approach Delay					23.3			
Approach LOS					C			

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Quogue-Riverhead Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Lewis Road
North/South Street: Quogue-Riverhead Road (CR 104)

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	231	36	394	196		
Peak-Hour Factor, PHF	0.75	0.75	0.79	0.79		
Peak-15 Minute Volume	77	12	125	62		
Hourly Flow Rate, HFR	308	48	498	248		
Percent Heavy Vehicles	--	--	2	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	1	1		
Configuration	TR		L	T		
Upstream Signal?	No		No			

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30		335			
Peak Hour Factor, PHF	0.83		0.83			
Peak-15 Minute Volume	9		101			
Hourly Flow Rate, HFR	36		403			
Percent Heavy Vehicles	2		2			
Percent Grade (%)	0		0			
Flared Approach: Exists?/Storage			/		/	
RT Channelized?			No			
Lanes	1		1			
Configuration	L		R			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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)		4.1	7.1		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		2	2		2			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		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		4.1	6.4		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)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		2	2		2			
t(f)		2.2	3.5		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	(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	356	1576			332			
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	1500							
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	332	
Potential Capacity	710	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	710	
Probability of Queue free St.	0.43	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	356	
Potential Capacity	1203	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1203	
Probability of Queue free St.	0.59	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	0.59	0.59
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	1576	
Potential Capacity	121	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.59
Maj. L, Min T Adj. Imp Factor.		0.68
Cap. Adj. factor due to Impeding mvmnt	0.59	0.29
Movement Capacity	71	

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

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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 0.59 0.59
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 1576
Potential Capacity 121
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.59
Maj. L, Min T Adj. Imp Factor. 0.68
Cap. Adj. factor due to Impeding mvmnt 0.59 0.29
Movement Capacity 71

Results for Two-stage process:
a
y
C t 71

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	36		403			
Movement Capacity (vph)		71			710	
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	71		710			
Volume	36		403			
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		L	L		R			
v (vph)	498	36			403			
C(m) (vph)		1203	71		710			
v/c	0.41	0.51			0.57			

95% queue length		2.07	2.09	3.60
Control Delay		10.1	99.3	16.5
LOS	B	F	C	
Approach Delay			23.3	
Approach LOS			C	

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.59
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), 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		10.1
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AC
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Spinney Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Spinney Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume				358	24	18	505
Peak-Hour Factor, PHF				0.94	0.94	0.97	0.97
Hourly Flow Rate, HFR				380	25	18	520
Percent Heavy Vehicles				--	--	2	--	--
Median Type/Storage				Undivided		/	
RT Channelized?							
Lanes				1	0	0	1
Configuration					TR		LT
Upstream Signal?					No		No

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				6			12
Peak Hour Factor, PHF				0.75			0.75
Hourly Flow Rate, HFR				8			16
Percent Heavy Vehicles				2			2
Percent Grade (%)				0			0
Flared Approach: Exists?/Storage				No	/		/
Lanes				0			0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		18		24				
C(m) (vph)		1154		457				
v/c		0.02		0.05				
95% queue length		0.05		0.17				
Control Delay		8.2		13.3				
LOS		A		B				
Approach Delay				13.3				
Approach LOS				B				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AC
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Spinney Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 No Build
Project ID:
East/West Street: Spinney Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	358	24	18	505		
Peak-Hour Factor, PHF		0.94	0.94	0.97	0.97	
Peak-15 Minute Volume		95	6	5	130	
Hourly Flow Rate, HFR		380	25	18	520	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	6		12			
Peak Hour Factor, PHF	0.75		0.75			
Peak-15 Minute Volume	2		4			
Hourly Flow Rate, HFR	8		16			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		520
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(1) Single-stage	(2) Two-Stage Process	(3)

movements, p(x) Process Stage I 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	405	948			392			
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	1500							
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	392	
Potential Capacity	657	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	657	
Probability of Queue free St.	0.98	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	405	
Potential Capacity	1154	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1154	
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	948	
Potential Capacity	289	
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	0.96
Movement Capacity	284	

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

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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 948
Potential Capacity 289
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 0.96
Movement Capacity 284

Results for Two-stage process:
a
y
C t 284

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	8		16			
Movement Capacity (vph)		284			657	
Shared Lane Capacity (vph)			457			

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	284		657			
Volume	8		16			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	457					
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		LR				
v (vph)	18		24					
C(m) (vph)		1154		457				
v/c	0.02		0.05					

95% queue length	0.05	0.17
Control Delay	8.2	13.3
LOS	A	B
Approach Delay		13.3
Approach LOS		B

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.98
v(il), Volume for stream 2 or 5		520
v(i2), Volume for stream 3 or 6		0
s(il), 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		8.2
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.2

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Box Tree Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: The Hills at Southampton TIS
East/West Street: Box Tree Road/Old Country Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	6	153	12	325	107	21
Peak-Hour Factor, PHF	0.82	0.82	0.82	0.86	0.86	0.86
Hourly Flow Rate, HFR	7	186	14	377	124	24
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	6	17	504	32	35	6
Peak Hour Factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75
Hourly Flow Rate, HFR	8	22	672	42	46	8
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/		No	/
Lanes	0	1	0	0	1	0

Configuration LTR LTR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound		Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR	
v (vph)	7	377		702			96	
C(m) (vph)	1434	1372		690			33	
v/c	0.00	0.27		1.02			2.91	
95% queue length	0.01	1.13		16.99			11.11	
Control Delay	7.5	8.6		63.2			1116	
LOS	A	A		F			F	
Approach Delay				63.2			1116	
Approach LOS				F			F	

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Box Tree Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: The Hills at Southampton TIS
East/West Street: Box Tree Road/Old Country Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	6	153	12	325	107	21
Peak-Hour Factor, PHF	0.82	0.82	0.82	0.86	0.86	0.86
Peak-15 Minute Volume	2	47	4	94	31	6
Hourly Flow Rate, HFR	7	186	14	377	124	24
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	6	17	504	32	35	6
Peak Hour Factor, PHF	0.75	0.75	0.75	0.75	0.75	0.75
Peak-15 Minute Volume	2	6	168	11	12	2
Hourly Flow Rate, HFR	8	22	672	42	46	8
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	186	124
Shared ln volume, major rt vehicles:	14	24
Sat flow rate, major th vehicles:	1700	1700
Sat flow rate, major rt vehicles:	1700	1700
Number of major street through lanes:	1	1

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	4.1	7.1	6.5	6.2	7.1	6.5	6.2
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2	2	2	2	2	2	2	2
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	4.1	4.1	7.1	6.5	6.2	7.1	6.5	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)	2.20	2.20	3.50	4.00	3.30	3.50	4.00	3.30
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2	2	2	2	2	2	2	2
t(f)	2.2	2.2	3.5	4.0	3.3	3.5	4.0	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	(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	148	200	1124	1109	193	1444	1104	136
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	1500		1500		1500		1500	
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	193	136
Potential Capacity	849	913
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	849	913
Probability of Queue free St.	0.21	0.99

Step 2: LT from Major St.	4	1

Conflicting Flows	200	148
Potential Capacity	1372	1434
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1372	1434
Probability of Queue free St.	0.73	1.00
Maj L-Shared Prob Q free St.	0.70	0.99

Step 3: TH from Minor St.	8	11

Conflicting Flows	1109	1104
Potential Capacity	210	211
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.70	0.70
Movement Capacity	146	147
Probability of Queue free St.	0.85	0.69

Step 4: LT from Minor St.	7	10

Conflicting Flows	1124	1444
Potential Capacity	183	110
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.48	0.59
Maj. L, Min T Adj. Imp Factor.	0.59	0.68
Cap. Adj. factor due to Impeding mvmnt	0.58	0.14
Movement Capacity	107	16

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

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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	1109	1104
Potential Capacity	210	211
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.70	0.70
Movement Capacity	146	147

Result for 2 stage process:
a
y

C t	146	147
Probability of Queue free St.	0.85	0.69

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	1124	1444
Potential Capacity	183	110
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.48	0.59
Maj. L, Min T Adj. Imp Factor.	0.59	0.68
Cap. Adj. factor due to Impeding mvmnt	0.58	0.14
Movement Capacity	107	16

Results for Two-stage process:
a
y
C t 107 16

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	8	22	672	42	46	8
Movement Capacity (vph)	107	146	849	16	147	913
Shared Lane Capacity (vph)	690			33		

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	107	146	849	16	147	913
Volume	8	22	672	42	46	8
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	690			33		
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		LTR		LTR		LTR		LTR
v (vph)	7	377		702		96		
C(m) (vph)		1434		1372		690		33
v/c	0.00	0.27		1.02		2.91		

95% queue length	0.01	1.13	16.99		11.11
Control Delay	7.5	8.6	63.2		1116
LOS	A	A	F		F
Approach Delay			63.2		1116
Approach LOS			F		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.73
v(il), Volume for stream 2 or 5	186	124
v(i2), Volume for stream 3 or 6	14	24
s(il), Saturation flow rate for stream 2 or 5	1700	1700
s(i2), Saturation flow rate for stream 3 or 6	1700	1700
P*(oj)	0.99	0.70
d(M,LT), Delay for stream 1 or 4	7.5	8.6
N, Number of major street through lanes	1	1
d(rank,1) Delay for stream 2 or 5	0.0	2.6

HCS+: Signalized Intersections Release 5.21

Analyst: AA Inter.: Montauk Hwy. & Central Avenue
Agency: AKRF, Inc. Area Type: All other areas
Date: 11/6/2006 Jurisd:
Period: AM Peak Hour Year : 2015 Build
Project ID: East Quogue GIES
E/W St: Montauk Highway N/S St: Central Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
LGConfig		LT			TR						LR	
Volume	36	725		717	137					113	65	
Lane Width		12.7			12.2						12.2	
RTOR Vol					0						0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left			
Thru	P				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	P		
Thru	P				Thru			
Right	P				Right	P		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	92.0				20.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

Cycle Length: 122.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	Ratios g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	1066	1414	0.78	0.75	14.4	B	14.4	B

Westbound

TR 1107 1468 0.79 0.75 15.1 B 15.1 B

Northbound

Southbound

LR 282 1721 0.95 0.16 93.5 F 93.5 F

Intersection Delay = 25.5 (sec/veh) Intersection LOS = C

HCS+: Signalized Intersections Release 5.21

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/6/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Central Avenue
Area Type: All other areas
Jurisdiction:
Analysis Year: 2015 Build
Project ID: East Quogue GIES
E/W St: Montauk Highway N/S St: Central Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	36	725			717	137				113	65	
% Heavy Veh	2	2			2	2				2	2	

PHF	0.92 0.92	0.97 0.97		0.66 0.66
PK 15 Vol	10 197	185 35		43 25
Hi Ln Vol				
% Grade	0	0		0
Ideal Sat	1900	1900		1900
ParkExist	X	X		
NumPark	20	20		
No. Lanes	0 1 0	0 1 0	0 0 0	0 0 0
LGConfig	LT	TR		LR
Lane Width	12.7	12.2		12.2
RTOR Vol		0		0
Adj Flow	827	880		269
%InSharedLn				
Prop LTs	0.047	0.000		0.636
Prop RTs	0.000	0.160		0.364
Peds Bikes		0	0	0
Buses	1	0		1
%InProtPhase				

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0			0.0						0.0	
Arriv. Type		3			3						3	
Unit Ext.		3.0			3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0			2.0						2.0	
Ext of g		2.0			2.0						2.0	
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination 1 2 3 4 | 5 6 7 8

EB Left	P	NB Left	
Thru	P	Thru	
Right		Right	
Peds		Peds	
WB Left		SB Left	P
Thru	P	Thru	
Right	P	Right	P
Peds		Peds	

NB Right	EB Right	
SB Right	WB Right	
Green	92.0	20.0
Yellow	3.0	3.0
All Red	2.0	2.0

Cycle Length: 122.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	36	725		717	137					113	65	
PHF	0.92	0.92		0.97	0.97					0.66	0.66	
Adj flow	39	788		739	141					171	98	
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
Lane group		LT			TR						LR	
Adj flow		827			880						269	
Prop LTs		0.047			0.000						0.636	
Prop RTs		0.000			0.160						0.364	

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG		LT			TR						LR	
So		1900			1900						1900	
Lanes	0	1	0	0	1	0	0	0	0	0	0	0
fW		1.023			1.007						1.007	
fHV		0.980			0.980						0.980	
fG		1.000			1.000						1.000	
fP		0.800			0.800						1.000	
fBB		0.996			1.000						0.996	
fA		1.000			1.000						1.000	
fLU		1.000			1.000						1.000	
fRT		1.000			0.978						0.951	
fLT		0.931			1.000						0.969	
Sec.												
fLpb		1.000			1.000						1.000	
fRpb		1.000			1.000						1.000	
S		1414			1468						1721	
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	(v/s)	Green Ratio (g/C)	--Lane Group-- Ratio (c)	Capacity	v/c Ratio
Eastbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LT	827	1414	0.58	0.75	1066		0.78
Right								
Westbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	TR	880	1468	# 0.60	0.75	1107		0.79
Right								
Northbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru								
Right								
Southbound								
Prot								
Perm								
Left								
Prot								
Perm								
Thru	LR	269	1721	# 0.16	0.16	282		0.95
Right								

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 0.76
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 0.82

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Res Del d2	d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS

Eastbound

LT 0.78 0.75 8.9 1.000 1066 0.50 5.5 0.0 14.4 B 14.4 B

Westbound

TR 0.79 0.75 9.2 1.000 1107 0.50 5.9 0.0 15.1 B 15.1 B

Northbound

Southbound

LR 0.95 0.16 50.5 1.000 282 0.50 43.0 0.0 93.5 F 93.5 F

Intersection delay = 25.5 (sec/veh) Intersection LOS = C

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____

for exclusive lefts

Input

EB WB NB SB

Opposed by Single(S) or Multiple(M) lane approach

Cycle length, C 122.0 sec

Total actual green time for LT lane group, G (s)

Effective permitted green time for LT lane group, g(s)

Opposing effective green time, go (s)

Number of lanes in LT lane group, N

Number of lanes in opposing approach, No

Adjusted LT flow rate, VLT (veh/h)

Proportion of LT in LT lane group, PLT

Proportion of LT in opposing flow, PLTo

Adjusted opposing flow rate, Vo (veh/h)

Lost time for LT lane group, tL

Computation

LT volume per cycle, LTC=VLTC/3600

Opposing lane util. factor, fLUo 1.000 1.000 1.000

Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)

gf=G[exp(- a * (LTC ** b))]-tl, gf<=g

Opposing platoon ratio, Rpo (refer Exhibit 16-11)

Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]

gq, (see Exhibit C16-4,5,6,7,8)

gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts
Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				S
Cycle length, C	122.0 sec			
Total actual green time for LT lane group, G (s)	92.0			
Effective permitted green time for LT lane group, g(s)	92.0			
Opposing effective green time, go (s)	92.0			
Number of lanes in LT lane group, N	1			
Number of lanes in opposing approach, No	1			
Adjusted LT flow rate, VLT (veh/h)	39			
Proportion of LT in LT lane group, PLT	0.047	0.000	0.636	
Proportion of LT in opposing flow, PLTo	0.00			
Adjusted opposing flow rate, Vo (veh/h)	880			
Lost time for LT lane group, tL	5.00			

Computation

LT volume per cycle, LTC=VLTC/3600	1.32		
Opposing lane util. factor, fLUo	1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)	29.82		
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g	28.0		
Opposing platoon ratio, Rpo (refer Exhibit 16-11)	1.00		
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]	0.25		
gq, (see Exhibit C16-4,5,6,7,8)	9.83		
gu=g-gq if gq>=gf, or = g-gf if gq<gf	63.99		

n=Max(gq-gf)/2,0) 0.00
PTHo=1-PLTo 1.00
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)] 0.05
EL1 (refer to Exhibit C16-3) 3.33
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g 0.02
gdiff=max(gq-gf,0) 0.00
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00) 0.93
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT 0.931

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				

OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	122.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Initial Dur. Unmet Demand Q veh	Uniform Delay Unmet Demand t hrs.	Initial Final Unadj. ds	Initial Final Adj. d1 sec	Initial Lane Param. u	Queue Unmet Demand Q veh	Queue Delay d3 sec	Group Delay d sec
Eastbound								
	0.0				0.0			
LT	0.0	0.00	15.0	8.9	0.00	0.0	0.0	14.4
	0.0				0.0			
Westbound								
	0.0				0.0			
TR	0.0	0.00	15.0	9.2	0.00	0.0	0.0	15.1
	0.0				0.0			

Northbound
0.0 0.0
0.0 0.0
0.0 0.0

Southbound
0.0 0.0
LR 0.0 0.00 51.0 50.5 0.00 0.0 0.0 93.5
0.0 0.0

Intersection Delay 25.5 sec/veh Intersection LOS C

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	LT	TR		LR
Init Queue	0.0	0.0		0.0
Flow Rate	827	880		269
So	1900	1900		1900
No.Lanes	0 1 0	0 1 0	0 0 0	0 0 0
SL	1414	1468		1721
LnCapacity	1066	1107		282
Flow Ratio	0.6	0.6		0.2
v/c Ratio	0.78	0.79		0.95
Grn Ratio	0.75	0.75		0.16
I Factor	1.000	1.000		1.000
AT or PVG	3	3		3
Pltn Ratio	1.00	1.00		1.00
PF2	1.00	1.00		1.00
Q1	16.6	18.3		9.0
kB	1.5	1.5		0.6
Q2	4.5	5.0		3.7
Q Average	21.1	23.3		12.7
Q Spacing	25.0	25.0		25.0
Q Storage	0	0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2		1.2
BOQ	25.3	28.0		15.4
QSRatio				
85th Percentile Output:				
fB%	1.4	1.4		1.4
BOQ	29.6	32.7		18.1
QSRatio				
90th Percentile Output:				

fB%	1.5	1.5		1.5
BOQ	31.7	35.1		19.6
QSRatio				

95th Percentile Output:

fB%	1.6	1.6		1.7
BOQ	34.0	37.5		21.4
QSRatio				

98th Percentile Output:

fB%	1.7	1.7		1.8
BOQ	36.3	40.0		23.1
QSRatio				

ERROR MESSAGES

No errors to report.

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Emmett Drive
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Emmett Drive
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	598			567	13
Peak-Hour Factor, PHF	0.79	0.79			0.81	0.81
Hourly Flow Rate, HFR	37	756			699	16
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				27		66
Peak Hour Factor, PHF				0.72		0.72
Hourly Flow Rate, HFR				37		91
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	37					128		
C(m) (vph)	885					251		
v/c	0.04					0.51		
95% queue length	0.13					2.66		
Control Delay	9.2					33.4		
LOS	A					D		
Approach Delay						33.4		
Approach LOS						D		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Emmett Drive
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Emmett Drive

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	30	598			567	13
Peak-Hour Factor, PHF	0.79	0.79			0.81	0.81
Peak-15 Minute Volume	9	189			175	4
Hourly Flow Rate, HFR	37	756			699	16
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				27		66
Peak Hour Factor, PHF				0.72		0.72
Peak-15 Minute Volume				9		23
Hourly Flow Rate, HFR				37		91
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	756	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	715				1537		707	
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				1500				
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	707	
Potential Capacity	435	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		435	
Probability of Queue free St.	1.00	0.79	

Step 2: LT from Major St.	4	1	

Conflicting Flows		715	
Potential Capacity		885	
Pedestrian Impedance Factor	1.00	1.00	
Movement Capacity		885	
Probability of Queue free St.	1.00	0.96	
Maj L-Shared Prob Q free St.		0.92	

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	0.92	0.92	
Movement Capacity			
Probability of Queue free St.	1.00	1.00	

Step 4: LT from Minor St.	7	10	

Conflicting Flows		1537	
Potential Capacity		128	
Pedestrian Impedance Factor	1.00	1.00	
Maj. L, Min T Impedance factor	0.92		
Maj. L, Min T Adj. Imp Factor.	0.94		
Cap. Adj. factor due to Impeding mvmnt	0.75	0.96	
Movement Capacity		123	

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

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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 0.92 0.92
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 1537
Potential Capacity 128
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.92
Maj. L, Min T Adj. Imp Factor. 0.94
Cap. Adj. factor due to Impeding mvmnt 0.75 0.96
Movement Capacity 123

Results for Two-stage process:
a
y
C t 123

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				37		91
Movement Capacity (vph)					123	435
Shared Lane Capacity (vph)					251	

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				123		435
Volume				37		91
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				251		
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						LR	
v (vph)	37					128		
C(m) (vph)	885						251	
v/c	0.04					0.51		

95% queue length	0.13	2.66
Control Delay	9.2	33.4
LOS	A	D
Approach Delay		33.4
Approach LOS		D

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.96	1.00
v(il), Volume for stream 2 or 5	756	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.92	
d(M,LT), Delay for stream 1 or 4	9.2	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.7	

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TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & J. Fosters Path
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Josiah Fosters Path
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		592	57	8	526	
Peak-Hour Factor, PHF		0.96	0.96	0.92	0.92	
Hourly Flow Rate, HFR		616	59	8	571	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	159		17			
Peak Hour Factor, PHF	0.83		0.83			
Hourly Flow Rate, HFR	191		20			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		8		211				
C(m) (vph)		916		204				
v/c		0.01		1.03				
95% queue length		0.03		9.34				
Control Delay		9.0		121.3				
LOS		A		F				
Approach Delay				121.3				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & J. Fosters Path
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Josiah Fosters Path

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		592	57	8	526	
Peak-Hour Factor, PHF		0.96	0.96	0.92	0.92	
Peak-15 Minute Volume		154	15	2	143	
Hourly Flow Rate, HFR		616	59	8	571	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	159		17			
Peak Hour Factor, PHF	0.83		0.83			
Peak-15 Minute Volume	48		5			
Hourly Flow Rate, HFR	191		20			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		571
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		2	2		2			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		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		4.1	6.4		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)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		2	2		2			
t(f)		2.2	3.5		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	(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	675	1233			646			
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	1500							
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	646	
Potential Capacity	472	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	472	
Probability of Queue free St.	0.96	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	675	
Potential Capacity	916	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	916	
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	1233	
Potential Capacity	195	
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	0.95
Movement Capacity	193	

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

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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 1233
Potential Capacity 195
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 0.95
Movement Capacity 193

Results for Two-stage process:
a
y
C t 193

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	191			20		
Movement Capacity (vph)		193			472	
Shared Lane Capacity (vph)			204			

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	193			472		
Volume	191			20		
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	204					
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		LR				
v (vph)		8	211					
C(m) (vph)		916		204				
v/c		0.01	1.03					

95% queue length	0.03	9.34
Control Delay	9.0	121.3
LOS	A	F
Approach Delay		121.3
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(il), Volume for stream 2 or 5		571
v(i2), Volume for stream 3 or 6		0
s(il), 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		9.0
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.1

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Lewis Road
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Lewis Road
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	33	644			614	167
Peak-Hour Factor, PHF	0.91	0.91			0.85	0.85
Hourly Flow Rate, HFR	36	707			722	196
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				Yes

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				99		32
Peak Hour Factor, PHF				0.72		0.72
Hourly Flow Rate, HFR				137		44
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	36					181		
C(m) (vph)	712					229		
v/c	0.05					0.79		
95% queue length	0.16					5.77		
Control Delay	10.3					62.0		
LOS	B					F		
Approach Delay						62.0		
Approach LOS						F		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Lewis Road
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Lewis Road

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	33	644			614	167
Peak-Hour Factor, PHF	0.91	0.91			0.85	0.85
Peak-15 Minute Volume	9	177			181	49
Hourly Flow Rate, HFR	36	707			722	196
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			Yes	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				99		32
Peak Hour Factor, PHF				0.72		0.72
Peak-15 Minute Volume				34		11
Hourly Flow Rate, HFR				137		44
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
S2 Left-Turn						
Through						
S5 Left-Turn	0	1700	3	0	122	35	625
Through	651	1700	3	105	122	35	625

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

	Movement 2	Movement 5
Shared ln volume, major th vehicles:	707	
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:	1	

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				5.5*		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		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	4.1				4.8		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	651	0		
Total Saturation Flow Rate, s (vph)			1700	1700
Arrival Type	3	3		
Effective Green, g (sec)			105	0
Cycle Length, C (sec)			122	122
Rp (from Exhibit 16-11)			1.000	1.000
Proportion vehicles arriving on green P			0.861	0.000
g(q1)	6.5	0.0		
g(q2)	4.0	0.0		
g(q)	10.6	0.0		

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha	0.550			
beta	0.645			
Travel time, t(a) (sec)			12.148	
Smoothing Factor, F			0.188	
Proportion of conflicting flow, f			1.000	1.000
Max platooned flow, V(c,max)			1512	0
Min platooned flow, V(c,min)			1000	1000
Duration of blocked period, t(p)			10.6	0.0
Proportion time blocked, p	0.000		0.087	

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.087
p(dom)	0.087
p(subo)	0.000
Constrained or unconstrained?	U

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

movements, p(x)	Process	Stage I	Stage II
p(1)	0.913		
p(4)			
p(7)			
p(8)			
p(9)			
p(10)	0.913		
p(11)			
p(12)	0.913		

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	918				1599		820	
s	1500				1500		1500	
Px	0.913				0.913		0.913	
V c,u,x	862				1608		755	
C r,x	780				236		409	
C plat,x	712				215		373	

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s			1500	1500				
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	820	
Potential Capacity	373	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		373	
Probability of Queue free St.	1.00	0.88	

Step 2: LT from Major St.	4	1	

Conflicting Flows		918	
Potential Capacity		712	
Pedestrian Impedance Factor	1.00	1.00	
Movement Capacity		712	
Probability of Queue free St.	1.00	0.95	
Maj L-Shared Prob Q free St.		0.91	

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	0.91	0.91	
Movement Capacity			
Probability of Queue free St.	1.00	1.00	

Step 4: LT from Minor St.	7	10	

Conflicting Flows		1599	
Potential Capacity		215	
Pedestrian Impedance Factor	1.00	1.00	
Maj. L, Min T Impedance factor	0.91		
Maj. L, Min T Adj. Imp Factor.	0.93		
Cap. Adj. factor due to Impeding mvmnt	0.82	0.95	
Movement Capacity		204	

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

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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 0.91 0.91
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 1599
Potential Capacity 215
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.91
Maj. L, Min T Adj. Imp Factor. 0.93
Cap. Adj. factor due to Impeding mvmnt 0.82 0.95
Movement Capacity 204

Results for Two-stage process:
a
y
C t 204

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				137		44
Movement Capacity (vph)					204	373
Shared Lane Capacity (vph)					229	

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				204		373
Volume				137		44
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				229		
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						LR	
v (vph)	36					181		
C(m) (vph)	712						229	
v/c	0.05					0.79		

95% queue length	0.16	5.77
Control Delay	10.3	62.0
LOS	B	F
Approach Delay		62.0
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.95	1.00
v(il), Volume for stream 2 or 5	707	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.91	
d(M,LT), Delay for stream 1 or 4	10.3	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.9	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Old Country Rd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Old Country Road
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	41	544		321	312	
Peak-Hour Factor, PHF	0.79	0.79		0.81	0.81	
Hourly Flow Rate, HFR	51	688		396	385	
Percent Heavy Vehicles	2	--	--	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1		1	0	
Configuration	LT			TR		
Upstream Signal?	No			No		

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				84	77	
Peak Hour Factor, PHF				0.72	0.72	
Hourly Flow Rate, HFR				116	106	
Percent Heavy Vehicles				2	2	
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/	No	/
Lanes				0	0	

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	51					222		
C(m) (vph)	837					226		
v/c	0.06					0.98		
95% queue length	0.19					8.88		
Control Delay	9.6					101.0		
LOS	A					F		
Approach Delay						101.0		
Approach LOS						F		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Old Country Rd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Old Country Road

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	41	544		321	312	
Peak-Hour Factor, PHF	0.79	0.79			0.81	0.81
Peak-15 Minute Volume	13	172			99	96
Hourly Flow Rate, HFR	51	688			396	385
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				84		77
Peak Hour Factor, PHF				0.72		0.72
Peak-15 Minute Volume				29		27
Hourly Flow Rate, HFR				116		106
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	688	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	781				1378		588	
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				1500				
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	588	
Potential Capacity	509	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		509		
Probability of Queue free St.	1.00		0.79	

Step 2: LT from Major St.	4		1	

Conflicting Flows		781		
Potential Capacity		837		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		837		
Probability of Queue free St.	1.00		0.94	
Maj L-Shared Prob Q free St.			0.90	

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		0.90		0.90
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1378		
Potential Capacity		160		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.90			
Maj. L, Min T Adj. Imp Factor.	0.92			
Cap. Adj. factor due to Impeding mvmnt		0.73		0.94
Movement Capacity		150		

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

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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 0.90 0.90
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 1378
Potential Capacity 160
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.90
Maj. L, Min T Adj. Imp Factor. 0.92
Cap. Adj. factor due to Impeding mvmnt 0.73 0.94
Movement Capacity 150

Results for Two-stage process:
a
y
C t 150

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				116		106
Movement Capacity (vph)					150	509
Shared Lane Capacity (vph)					226	

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				150		509
Volume				116		106
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				226		
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						LR	
v (vph)	51					222		
C(m) (vph)	837						226	
v/c	0.06					0.98		

95% queue length	0.19	8.88
Control Delay	9.6	101.0
LOS	A	F
Approach Delay		101.0
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.94	1.00
v(il), Volume for stream 2 or 5	688	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.90	
d(M,LT), Delay for stream 1 or 4	9.6	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	1.0	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Squires Avenue
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Squires Avenue
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		579	30	6	392	
Peak-Hour Factor, PHF		0.92	0.92	0.84	0.84	
Hourly Flow Rate, HFR		629	32	7	466	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	142		6			
Peak Hour Factor, PHF	0.78		0.78			
Hourly Flow Rate, HFR	182		7			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		7		189				
C(m) (vph)		927		229				
v/c		0.01		0.83				
95% queue length		0.02		6.28				
Control Delay		8.9		67.3				
LOS		A		F				
Approach Delay				67.3				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: AM Peak Hour
Intersection: Montauk Hwy. & Squires Avenue
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Squires Avenue

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		579	30	6	392	
Peak-Hour Factor, PHF		0.92	0.92	0.84	0.84	
Peak-15 Minute Volume		157	8	2	117	
Hourly Flow Rate, HFR		629	32	7	466	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	142		6			
Peak Hour Factor, PHF	0.78		0.78			
Peak-15 Minute Volume	46		2			
Hourly Flow Rate, HFR	182		7			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		466
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		2	2		2			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		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		4.1	6.4		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)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		2	2		2			
t(f)		2.2	3.5		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	(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	661	1125			645			
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	1500							
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	645	
Potential Capacity	472	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	472	
Probability of Queue free St.	0.99	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	661	
Potential Capacity	927	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	927	
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	1125	
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	0.98
Movement Capacity	225	

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

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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 1125
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 0.98
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)	182		7			
Movement Capacity (vph)		225			472	
Shared Lane Capacity (vph)			229			

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		472			
Volume	182		7			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	229					
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		LR				
v (vph)		7	189					
C(m) (vph)		927		229				
v/c		0.01	0.83					

95% queue length	0.02	6.28
Control Delay	8.9	67.3
LOS	A	F
Approach Delay		67.3
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(il), Volume for stream 2 or 5		466
v(i2), Volume for stream 3 or 6		0
s(il), 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		8.9
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.1

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd. & Central Ave.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Central Avenue
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		288	84	47	491	
Peak-Hour Factor, PHF		0.83	0.83	0.83	0.83	
Hourly Flow Rate, HFR		346	101	56	591	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0		0	1	
Configuration		TR			LT	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	36		30			
Peak Hour Factor, PHF	0.73		0.73			
Hourly Flow Rate, HFR	49		41			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		56		90				
C(m) (vph)		1113		319				
v/c		0.05		0.28				
95% queue length		0.16		1.13				
Control Delay		8.4		20.7				
LOS		A		C				
Approach Delay				20.7				
Approach LOS				C				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd. & Central Ave.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Central Avenue

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		288	84	47	491	
Peak-Hour Factor, PHF		0.83	0.83	0.83	0.83	
Peak-15 Minute Volume		87	25	14	148	
Hourly Flow Rate, HFR		346	101	56	591	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	36		30			
Peak Hour Factor, PHF	0.73		0.73			
Peak-15 Minute Volume	12		10			
Hourly Flow Rate, HFR	49		41			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		591
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(1) Single-stage	(2) Two-Stage Process	(3)

movements, p(x) Process Stage I 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	447	1099			396			
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	1500							
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	396	
Potential Capacity	653	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	653	
Probability of Queue free St.	0.94	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	447	
Potential Capacity	1113	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1113	
Probability of Queue free St.	0.95	1.00
Maj L-Shared Prob Q free St.	0.92	

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	0.92	0.92
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	1099	
Potential Capacity	235	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.92
Maj. L, Min T Adj. Imp Factor.		0.94
Cap. Adj. factor due to Impeding mvmnt	0.95	0.88
Movement Capacity	223	

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

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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 0.92 0.92
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 1099
Potential Capacity 235
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.92
Maj. L, Min T Adj. Imp Factor. 0.94
Cap. Adj. factor due to Impeding mvmnt 0.95 0.88
Movement Capacity 223

Results for Two-stage process:
a
y
C t 223

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	49		41			
Movement Capacity (vph)		223			653	
Shared Lane Capacity (vph)			319			

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	223		653			
Volume	49		41			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	319					
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		LR				
v (vph)		56		90				
C(m) (vph)		1113		319				
v/c		0.05		0.28				

95% queue length	0.16	1.13
Control Delay	8.4	20.7
LOS	A	C
Approach Delay		20.7
Approach LOS		C

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.95
v(il), Volume for stream 2 or 5		591
v(i2), Volume for stream 3 or 6		0
s(il), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)	0.92	
d(M,LT), Delay for stream 1 or 4		8.4
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.6

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd. & Quogue-Rvrhd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Quogue-Riverhead Road (Rt 104)
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	24	95	19	59	148	101
Peak-Hour Factor, PHF	0.78	0.78	0.78	0.85	0.85	0.85
Hourly Flow Rate, HFR	30	121	24	69	174	118
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	21	88	24	83	74	12
Peak Hour Factor, PHF	0.80	0.80	0.80	0.89	0.89	0.89
Hourly Flow Rate, HFR	26	109	29	93	83	13
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
Lanes	0	1	0	0	1	0

Configuration LTR LTR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound		Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR
v (vph)	30	69		164			189
C(m) (vph)	1270	1437		400			334
v/c	0.02	0.05		0.41			0.57
95% queue length	0.07	0.15		1.96			3.31
Control Delay	7.9	7.6		20.1			28.9
LOS	A	A		C			D
Approach Delay				20.1			28.9
Approach LOS				C			D

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd. & Quogue-Rvrhd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Quogue-Riverhead Road (Rt 104)

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	24	95	19	59	148	101
Peak-Hour Factor, PHF	0.78	0.78	0.78	0.85	0.85	0.85
Peak-15 Minute Volume	8	30	6	17	44	30
Hourly Flow Rate, HFR	30	121	24	69	174	118
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	21	88	24	83	74	12
Peak Hour Factor, PHF	0.80	0.80	0.80	0.89	0.89	0.89
Peak-15 Minute Volume	7	28	8	23	21	3
Hourly Flow Rate, HFR	26	109	29	93	83	13
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/		No	/
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	121	174
Shared ln volume, major rt vehicles:	24	118
Sat flow rate, major th vehicles:	1700	1700
Sat flow rate, major rt vehicles:	1700	1700
Number of major street through lanes:	1	1

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	4.1	7.1	6.5	6.2	7.1	6.5	6.2
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2	2	2	2	2	2	2	2
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	4.1	4.1	7.1	6.5	6.2	7.1	6.5	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)	2.20	2.20	3.50	4.00	3.30	3.50	4.00	3.30
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2	2	2	2	2	2	2	2
t(f)	2.2	2.2	3.5	4.0	3.3	3.5	4.0	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	(1) Single-stage	(2) Two-Stage Process	(3)

movements, p(x) Process Stage I 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	292	145	612	623	133	633	576	233
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	1500		1500		1500		1500	
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	133	233
Potential Capacity	916	806
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	916	806
Probability of Queue free St.	0.97	0.98

Step 2: LT from Major St.	4	1

Conflicting Flows	145	292
Potential Capacity	1437	1270
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1437	1270
Probability of Queue free St.	0.95	0.98
Maj L-Shared Prob Q free St.	0.94	0.97

Step 3: TH from Minor St.	8	11

Conflicting Flows	623	576
Potential Capacity	402	428
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.92	0.92
Movement Capacity	369	393
Probability of Queue free St.	0.70	0.79

Step 4: LT from Minor St.	7	10

Conflicting Flows	612	633
Potential Capacity	405	392
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.72	0.65
Maj. L, Min T Adj. Imp Factor.	0.79	0.73
Cap. Adj. factor due to Impeding mvmnt	0.77	0.70
Movement Capacity	313	275

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

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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	623	576
Potential Capacity	402	428
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.92	0.92
Movement Capacity	369	393

Result for 2 stage process:		
a		
y		
C t	369	393
Probability of Queue free St.	0.70	0.79

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	612	633
Potential Capacity	405	392
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.72	0.65
Maj. L, Min T Adj. Imp Factor.	0.79	0.73
Cap. Adj. factor due to Impeding mvmnt	0.77	0.70
Movement Capacity	313	275

Results for Two-stage process:

a												
y												
C t					313			275				

Worksheet 8-Shared Lane Calculations

Movement		7	8	9	10	11	12
	L	T	R	L	T	R	
Volume (vph)		26	109	29	93	83	13
Movement Capacity (vph)			313	369	916	275	393	806
Shared Lane Capacity (vph)				400		334	

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		313	369	916	275	393	806
Volume		26	109	29	93	83	13
Delay							
Q sep							
Q sep +1							
round (Qsep +1)							
n max							
C sh		400			334		
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		LTR		LTR		LTR		LTR
v (vph)	30	69		164		189		
C(m) (vph)		1270	1437		400		334	
v/c	0.02	0.05		0.41		0.57		

95% queue length	0.07	0.15	1.96	3.31
Control Delay	7.9	7.6	20.1	28.9
LOS	A	A	C	D
Approach Delay			20.1	28.9
Approach LOS			C	D

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.98	0.95
v(il), Volume for stream 2 or 5	121	174
v(i2), Volume for stream 3 or 6	24	118
s(il), Saturation flow rate for stream 2 or 5	1700	1700
s(i2), Saturation flow rate for stream 3 or 6	1700	1700
P*(oj)	0.97	0.94
d(M,LT), Delay for stream 1 or 4	7.9	7.6
N, Number of major street through lanes	1	1
d(rank,1) Delay for stream 2 or 5	0.2	0.4

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TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: The Hills at Southampton TIS
East/West Street: Old Country Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	80	609		367	22	
Peak-Hour Factor, PHF	0.75	0.75		0.85	0.85	
Hourly Flow Rate, HFR	106	812		431	25	
Percent Heavy Vehicles	2	--	--	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1		1	0	
Configuration	LT			TR		
Upstream Signal?	No			No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				13	86	
Peak Hour Factor, PHF				0.75	0.75	
Hourly Flow Rate, HFR				17	114	
Percent Heavy Vehicles				2	2	
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/	No	/
Lanes				0	0	

Configuration LR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	106					131		
C(m) (vph)	1105					410		
v/c	0.10					0.32		
95% queue length	0.32					1.36		
Control Delay	8.6					17.8		
LOS	A					C		
Approach Delay						17.8		
Approach LOS						C		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Old Country Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: The Hills at Southampton TIS
East/West Street: Old Country Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	80	609			367	22
Peak-Hour Factor, PHF	0.75	0.75			0.85	0.85
Peak-15 Minute Volume	27	203			108	6
Hourly Flow Rate, HFR	106	812			431	25
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				13		86
Peak Hour Factor, PHF				0.75		0.75
Peak-15 Minute Volume				4		29
Hourly Flow Rate, HFR				17		114
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	812	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	456				1468		444	
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				1500				
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	444	
Potential Capacity	614	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		614		
Probability of Queue free St.	1.00		0.81	

Step 2: LT from Major St.	4		1	

Conflicting Flows		456		
Potential Capacity		1105		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		1105		
Probability of Queue free St.	1.00		0.90	
Maj L-Shared Prob Q free St.			0.82	

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		0.82		0.82
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1468		
Potential Capacity		141		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.82			
Maj. L, Min T Adj. Imp Factor.	0.86			
Cap. Adj. factor due to Impeding mvmnt		0.70		0.90
Movement Capacity		127		

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

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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 0.82 0.82
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 1468
Potential Capacity 141
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.82
Maj. L, Min T Adj. Imp Factor. 0.86
Cap. Adj. factor due to Impeding mvmnt 0.70 0.90
Movement Capacity 127

Results for Two-stage process:
a
y
C t 127

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				17		114
Movement Capacity (vph)					127	614
Shared Lane Capacity (vph)					410	

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				127		614
Volume				17		114
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				410		
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						LR	
v (vph)	106					131		
C(m) (vph)	1105						410	
v/c	0.10					0.32		

95% queue length	0.32	1.36
Control Delay	8.6	17.8
LOS	A	C
Approach Delay		17.8
Approach LOS		C

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.90	1.00
v(il), Volume for stream 2 or 5	812	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.82	
d(M,LT), Delay for stream 1 or 4	8.6	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	1.6	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Quogue-Riverhead Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID:
East/West Street: Lewis Road
North/South Street: Quogue-Riverhead Road (CR 104)
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume			125	12	307	243
Peak-Hour Factor, PHF			0.75	0.75	0.70	0.70
Hourly Flow Rate, HFR			166	16	438	347
Percent Heavy Vehicles			--	--	2	-- --
Median Type/Storage			Undivided		/	
RT Channelized?						
Lanes			1	0	1	1
Configuration			TR		L	T
Upstream Signal?			No		No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	12			719		
Peak Hour Factor, PHF	0.78			0.78		
Hourly Flow Rate, HFR	15			921		
Percent Heavy Vehicles	2			2		
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage			/			/
Lanes	1			1		

Configuration L R

_____

_____Delay, Queue Length, and Level of Service_____

Approach	NB	SB	Westbound		Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R		
v (vph)		438	15		921		
C(m) (vph)		1393	106		869		
v/c		0.31	0.14		1.06		
95% queue length		1.36	0.47		22.12		
Control Delay		8.8	44.5		69.1		
LOS		A	E		F		
Approach Delay					68.7		
Approach LOS					F		

_____

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

_____TWO-WAY STOP CONTROL(TWSC) ANALYSIS_____

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Quogue-Riverhead Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID:
East/West Street: Lewis Road
North/South Street: Quogue-Riverhead Road (CR 104)

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	125	12	307	243		
Peak-Hour Factor, PHF	0.75	0.75	0.70	0.70		
Peak-15 Minute Volume	42	4	110	87		
Hourly Flow Rate, HFR	166	16	438	347		
Percent Heavy Vehicles	--	--	2	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	1	1		
Configuration	TR		L	T		
Upstream Signal?	No		No			

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	12		719			
Peak Hour Factor, PHF	0.78		0.78			
Peak-15 Minute Volume	4		230			
Hourly Flow Rate, HFR	15		921			
Percent Heavy Vehicles	2		2			
Percent Grade (%)	0		0			
Flared Approach: Exists?/Storage			/			/
RT Channelized?			No			
Lanes	1		1			
Configuration	L		R			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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)		4.1	7.1		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		2	2		2			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		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		4.1	6.4		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)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		2	2		2			
t(f)		2.2	3.5		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	(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	182	1397			174			
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	1500							
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	174	
Potential Capacity	869	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	869	
Probability of Queue free St.	0.00	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	182	
Potential Capacity	1393	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1393	
Probability of Queue free St.	0.69	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	0.69	0.69
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	1397	
Potential Capacity	155	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.69
Maj. L, Min T Adj. Imp Factor.		0.76
Cap. Adj. factor due to Impeding mvmnt	0.69	0.00
Movement Capacity	106	

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

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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 0.69 0.69
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 1397
Potential Capacity 155
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.69
Maj. L, Min T Adj. Imp Factor. 0.76
Cap. Adj. factor due to Impeding mvmnt 0.69 0.00
Movement Capacity 106

Results for Two-stage process:
a
y
C t 106

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	15		921			
Movement Capacity (vph)		106		869		
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	106		869			
Volume	15		921			
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		L	L		R			
v (vph)	438	15		921				
C(m) (vph)	1393	106		869				
v/c	0.31	0.14		1.06				

95% queue length	1.36	0.47	22.12
Control Delay	8.8	44.5	69.1
LOS	A	E	F
Approach Delay		68.7	
Approach LOS		F	

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.69
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), 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		8.8
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

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TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Spinney Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: The Hills at Southampton TIS
East/West Street: Spinney Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		684	6	6	363	
Peak-Hour Factor, PHF		0.78	0.78	0.78	0.78	
Hourly Flow Rate, HFR		876	7	7	465	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0		0	1	
Configuration		TR			LT	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	18		6			
Peak Hour Factor, PHF	0.75		0.75			
Hourly Flow Rate, HFR	24		8			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		7		32				
C(m) (vph)		766		188				
v/c		0.01		0.17				
95% queue length		0.03		0.60				
Control Delay		9.7		28.0				
LOS		A		D				
Approach Delay				28.0				
Approach LOS				D				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: AM Peak Hour
Intersection: Spinney Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: The Hills at Southampton TIS
East/West Street: Spinney Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	684	6	6	363		
Peak-Hour Factor, PHF		0.78	0.78	0.78	0.78	
Peak-15 Minute Volume		219	2	2	116	
Hourly Flow Rate, HFR		876	7	7	465	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	18		6			
Peak Hour Factor, PHF	0.75		0.75			
Peak-15 Minute Volume	6		2			
Hourly Flow Rate, HFR	24		8			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		465
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		2	2		2			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		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		4.1	6.4		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)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		2	2		2			
t(f)		2.2	3.5		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	(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	883	1359			880			
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	1500							
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	880	
Potential Capacity	346	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	346	
Probability of Queue free St.	0.98	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	883	
Potential Capacity	766	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	766	
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	1359	
Potential Capacity	164	
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	0.97
Movement Capacity	163	

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

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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 1359
Potential Capacity 164
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 0.97
Movement Capacity 163

Results for Two-stage process:
a
y
C t 163

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	24		8			
Movement Capacity (vph)		163			346	
Shared Lane Capacity (vph)			188			

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	163			346		
Volume	24			8		
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	188					
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		LR				
v (vph)	7		32					
C(m) (vph)		766		188				
v/c	0.01		0.17					

95% queue length	0.03	0.60
Control Delay	9.7	28.0
LOS	A	D
Approach Delay		28.0
Approach LOS		D

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(il), Volume for stream 2 or 5		465
v(i2), Volume for stream 3 or 6		0
s(il), 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		9.7
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.1

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Box Tree Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: The Hills at Southampton TIS
East/West Street: Box Tree Road/Old Country Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	6	200	18	587	210	47
Peak-Hour Factor, PHF	0.81	0.81	0.81	0.86	0.86	0.86
Hourly Flow Rate, HFR	7	246	22	682	244	54
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	6	61	440	35	29	6
Peak Hour Factor, PHF	0.87	0.87	0.87	0.75	0.75	0.75
Hourly Flow Rate, HFR	6	70	505	46	38	8
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
Lanes	0	1	0	0	1	0

Configuration LTR LTR

_____Delay, Queue Length, and Level of Service_____

Approach	NB	SB	Westbound		Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR
v (vph)	7	682		581			92
C(m) (vph)	1263	1296		0			0
v/c	0.01	0.53					
95% queue length	0.02	3.20					
Control Delay	7.9	10.8					
LOS	A	B		F			F
Approach Delay							
Approach LOS							

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

_____TWO-WAY STOP CONTROL(TWSC) ANALYSIS_____

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Box Tree Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: The Hills at Southampton TIS
East/West Street: Box Tree Road/Old Country Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	6	200	18	587	210	47
Peak-Hour Factor, PHF	0.81	0.81	0.81	0.86	0.86	0.86
Peak-15 Minute Volume	2	62	6	171	61	14
Hourly Flow Rate, HFR	7	246	22	682	244	54
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	6	61	440	35	29	6
Peak Hour Factor, PHF	0.87	0.87	0.87	0.75	0.75	0.75
Peak-15 Minute Volume	2	18	126	12	10	2
Hourly Flow Rate, HFR	6	70	505	46	38	8
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	246	244
Shared ln volume, major rt vehicles:	22	54
Sat flow rate, major th vehicles:	1700	1700
Sat flow rate, major rt vehicles:	1700	1700
Number of major street through lanes:	1	1

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	4.1	7.1	6.5	6.2	7.1	6.5	6.2
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2	2	2	2	2	2	2	2
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	4.1	4.1	7.1	6.5	6.2	7.1	6.5	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)	2.20	2.20	3.50	4.00	3.30	3.50	4.00	3.30
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2	2	2	2	2	2	2	2
t(f)	2.2	2.2	3.5	4.0	3.3	3.5	4.0	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	(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	298	268	1929	1933	257	2193	1917	271
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	1500		1500		1500		1500	
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	257	271
Potential Capacity	782	768
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	782	768
Probability of Queue free St.	0.35	0.99

Step 2: LT from Major St.	4	1

Conflicting Flows	268	298
Potential Capacity	1296	1263
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1296	1263
Probability of Queue free St.	0.47	0.99
Maj L-Shared Prob Q free St.	0.36	0.99

Step 3: TH from Minor St.	8	11

Conflicting Flows	1933	1917
Potential Capacity	66	67
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.36	0.36
Movement Capacity	24	24
Probability of Queue free St.	0.00	0.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	1929	2193
Potential Capacity	50	32
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.00	0.00
Maj. L, Min T Adj. Imp Factor.	0.00	0.00
Cap. Adj. factor due to Impeding mvmnt	0.00	0.00
Movement Capacity	0	0

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

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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	1933	1917
Potential Capacity	66	67
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.36	0.36
Movement Capacity	24	24

Result for 2 stage process:
a
y

C t	24	24
Probability of Queue free St.	0.00	0.00

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	1929	2193
Potential Capacity	50	32
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.00	0.00
Maj. L, Min T Adj. Imp Factor.	0.00	0.00
Cap. Adj. factor due to Impeding mvmnt	0.00	0.00
Movement Capacity	0	0

Results for Two-stage process:
a
y
C t 0 0

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	6	70	505	46	38	8
Movement Capacity (vph)		0	24	782	0	24	768
Shared Lane Capacity (vph)			0		0	

Worksheet 9-Computation of Effect of Flared Minor Street Approaches

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Movement	7	8	9	10	11	12
	L	T	R	L	T	R
C sep	0	24	782	0	24	768
Volume	6	70	505	46	38	8
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						

---

n max
C sh 0 0
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	LTR		LTR		LTR			LTR
v (vph)	7	682		581			92	
C(m) (vph)	1263	1296		0			0	
v/c	0.01	0.53						

95% queue length	0.02	3.20		
Control Delay	7.9	10.8		
LOS	A	B	F	F
Approach Delay				
Approach LOS				

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.99	0.47
v(il), Volume for stream 2 or 5	246	244
v(i2), Volume for stream 3 or 6	22	54
s(il), Saturation flow rate for stream 2 or 5	1700	1700
s(i2), Saturation flow rate for stream 3 or 6	1700	1700
P*(oj)	0.99	0.36
d(M,LT), Delay for stream 1 or 4	7.9	10.8
N, Number of major street through lanes	1	1
d(rank,1) Delay for stream 2 or 5	0.1	6.9

HCS+: Signalized Intersections Release 5.21

Analyst: AA Inter.: Montauk Hwy. & Central Avenue
Agency: AKRF, Inc. Area Type: All other areas
Date: 11/6/2006 Jurisd:
Period: PM Peak Hour Year : 2015 Build
Project ID: East Quogue GIES
E/W St: Montauk Highway N/S St: Central Avenue

SIGNALIZED INTERSECTION SUMMARY

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
LGConfig		LT			TR						LR	
Volume	59	955			872	60				172	65	
Lane Width		12.7			12.2						12.2	
RTOR Vol					0						0	

Duration 0.25 Area Type: All other areas

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left			
Thru	P				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	P		
Thru	P				Thru			
Right	P				Right	P		
Peds					Peds			
NB Right					EB Right			
SB Right					WB Right			
Green	92.0				20.0			
Yellow	3.0				3.0			
All Red	2.0				2.0			

Cycle Length: 122.0 secs

Intersection Performance Summary

Appr/ Lane Grp	Lane Group Capacity	Adj Sat Flow Rate (s)	Ratios v/c	g/C	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS
Eastbound								
LT	1017	1348	1.06	0.75	60.9	E	60.9	E

Westbound

TR 1121 1487 0.90 0.75 23.4 C 23.4 C

Northbound

Southbound

LR 285 1736 1.26 0.16 193.0 F 193.0 F

Intersection Delay = 64.7 (sec/veh) Intersection LOS = E

HCS+: Signalized Intersections Release 5.21

Phone: Fax:
E-Mail:

OPERATIONAL ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/6/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Central Avenue
Area Type: All other areas
Jurisdiction:
Analysis Year: 2015 Build
Project ID: East Quogue GIES
E/W St: Montauk Highway N/S St: Central Avenue

VOLUME DATA

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume	59	955			872	60				172		65
% Heavy Veh	2	2			2	2				2		2

PHF	0.94 0.94	0.92 0.92		0.66 0.66
PK 15 Vol	16 254	237 16		65 25
Hi Ln Vol				
% Grade	0	0		0
Ideal Sat	1900	1900		1900
ParkExist	X	X		
NumPark	20	20		
No. Lanes	0 1 0	0 1 0	0 0 0	0 0 0
LGConfig	LT	TR		LR
Lane Width	12.7	12.2		12.2
RTOR Vol		0		0
Adj Flow	1079	1013		359
%InSharedLn				
Prop LTs	0.058	0.000		0.727
Prop RTs	0.000	0.064		0.273
Peds Bikes		0	0	0
Buses	1	0		1
%InProtPhase				

Duration 0.25 Area Type: All other areas

OPERATING PARAMETERS

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Init Unmet		0.0			0.0						0.0	
Arriv. Type		3			3						3	
Unit Ext.		3.0			3.0						3.0	
I Factor		1.000			1.000						1.000	
Lost Time		2.0			2.0						2.0	
Ext of g		2.0			2.0						2.0	
Ped Min g					3.2			3.2			3.2	

PHASE DATA

Phase Combination	1	2	3	4	5	6	7	8
EB Left	P				NB Left			
Thru	P				Thru			
Right					Right			
Peds					Peds			
WB Left					SB Left	P		
Thru	P				Thru			
Right	P				Right	P		
Peds					Peds			

NB Right	EB Right	
SB Right	WB Right	
Green	92.0	20.0
Yellow	3.0	3.0
All Red	2.0	2.0

Cycle Length: 122.0 secs

VOLUME ADJUSTMENT AND SATURATION FLOW WORKSHEET

Volume Adjustment

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Volume, V	59	955		872	60					172	65	
PHF	0.94	0.94		0.92	0.92					0.66	0.66	
Adj flow	63	1016		948	65					261	98	
No. Lanes	0	1	0	0	1	0	0	0	0	0	0	0
Lane group	LT			TR						LR		
Adj flow	1079			1013						359		
Prop LTs	0.058			0.000						0.727		
Prop RTs	0.000			0.064						0.273		

Saturation Flow Rate (see Exhibit 16-7 to determine the adjustment factors)____

	Eastbound			Westbound			Northbound			Southbound		
LG	LT			TR						LR		
So	1900			1900						1900		
Lanes	0	1	0	0	1	0	0	0	0	0	0	0
fW	1.023			1.007						1.007		
fHV	0.980			0.980						0.980		
fG	1.000			1.000						1.000		
fP	0.800			0.800						1.000		
fBB	0.996			1.000						0.996		
fA	1.000			1.000						1.000		
fLU	1.000			1.000						1.000		
fRT	1.000			0.991						0.963		
fLT	0.888			1.000						0.965		
Sec.												
fLpb	1.000			1.000						1.000		
fRpb	1.000			1.000						1.000		
S	1348			1487						1736		
Sec.												

CAPACITY AND LOS WORKSHEET

Capacity Analysis and Lane Group Capacity

Appr/ Mvmt	Lane Group	Adj Flow Rate (v)	Adj Sat Flow Rate (s)	Green Ratio (v/s)	Green Ratio (g/C)	--Lane Group-- Capacity (c)	v/c Ratio
Eastbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LT	1079	1348	# 0.80	0.75	1017	1.06
Right							
Westbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	TR	1013	1487	0.68	0.75	1121	0.90
Right							
Northbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru							
Right							
Southbound							
Prot							
Perm							
Left							
Prot							
Perm							
Thru	LR	359	1736	# 0.21	0.16	285	1.26
Right							

Sum of flow ratios for critical lane groups, Yc = Sum (v/s) = 1.01
Total lost time per cycle, L = 10.00 sec
Critical flow rate to capacity ratio, Xc = (Yc)(C)/(C-L) = 1.10

Control Delay and LOS Determination

Appr/ Lane Grp	Ratios v/c	g/C	Unf Del d1	Prog Adj Fact	Lane Grp Cap	Incremental Factor k	Res Del d2	Lane Group Del d3	Lane Group Delay	Lane Group LOS	Approach Delay	Approach LOS

Eastbound

LT 1.06 0.75 15.0 1.000 1017 0.50 45.9 0.0 60.9 E 60.9 E

Westbound

TR 0.90 0.75 11.6 1.000 1121 0.50 11.8 0.0 23.4 C 23.4 C

Northbound

Southbound

LR 1.26 0.16 51.0 1.000 285 0.50 142.0 0.0 193.0 F 193.0 F

Intersection delay = 64.7 (sec/veh) Intersection LOS = E

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____

for exclusive lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				
Cycle length, C	122.0 sec			
Total actual green time for LT lane group, G (s)				
Effective permitted green time for LT lane group, g(s)				
Opposing effective green time, go (s)				
Number of lanes in LT lane group, N				
Number of lanes in opposing approach, No				
Adjusted LT flow rate, VLT (veh/h)				
Proportion of LT in LT lane group, PLT				
Proportion of LT in opposing flow, PLTo				
Adjusted opposing flow rate, Vo (veh/h)				
Lost time for LT lane group, tL				
Computation				
LT volume per cycle, LTC=VLTC/3600				
Opposing lane util. factor, fLUo		1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)				
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g				
Opposing platoon ratio, Rpo (refer Exhibit 16-11)				
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]				
gq, (see Exhibit C16-4,5,6,7,8)				

gu=g-gq if gq>=gf, or = g-gf if gq<gf
n=Max(gq-gf)/2,0)
PTHo=1-PLTo
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)]
EL1 (refer to Exhibit C16-3)
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g
gdiff=max(gq-gf,0)
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00)
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PERMITTED LT WORKSHEET_____
for shared lefts

Input

	EB	WB	NB	SB
Opposed by Single(S) or Multiple(M) lane approach				S
Cycle length, C	122.0 sec			
Total actual green time for LT lane group, G (s)	92.0			
Effective permitted green time for LT lane group, g(s)	92.0			
Opposing effective green time, go (s)	92.0			
Number of lanes in LT lane group, N	1			
Number of lanes in opposing approach, No	1			
Adjusted LT flow rate, VLT (veh/h)	63			
Proportion of LT in LT lane group, PLT	0.058	0.000		0.727
Proportion of LT in opposing flow, PLTo	0.00			
Adjusted opposing flow rate, Vo (veh/h)	1013			
Lost time for LT lane group, tL	5.00			

Computation

LT volume per cycle, LTC=VLTC/3600	2.13		
Opposing lane util. factor, fLUo	1.000	1.000	1.000
Opposing flow, Volc=VoC/[3600(No)fLUo] (veh/ln/cyc)	34.33		
gf=G[exp(- a * (LTC ** b))]-tl, gf<=g	18.0		
Opposing platoon ratio, Rpo (refer Exhibit 16-11)	1.00		
Opposing Queue Ratio, qro=Max[1-Rpo(go/C),0]	0.25		
gq, (see Exhibit C16-4,5,6,7,8)	11.51		
gu=g-gq if gq>=gf, or = g-gf if gq<gf	73.99		

n=Max(gq-gf)/2,0) 0.00
PTHo=1-PLTo 1.00
PL*=PLT[1+(N-1)g/(gf+gu/EL1+4.24)] 0.06
EL1 (refer to Exhibit C16-3) 3.78
EL2=Max((1-Ptho**n)/Plto, 1.0)
fmin=2(1+PL)/g or fmin=2(1+Pl)/g 0.02
gdiff=max(gq-gf,0) 0.00
fm=[gf/g]+[gu/g]/[1+PL(EL1-1)], (min=fmin;max=1.00) 0.89
flt=fm=[gf/g]+[gu/g]/[1+PL(EL1-1)]+[gdiff/g]/[1+PL(EL2-1)],(fmin<=fm<=1.00)
or flt=[fm+0.91(N-1)]/N**
Left-turn adjustment, fLT 0.888

For special case of single-lane approach opposed by multilane approach,
see text.
* If Pl>=1 for shared left-turn lanes with N>1, then assume de-facto
left-turn lane and redo calculations.
** For permitted left-turns with multiple exclusive left-turn lanes, flt=fm.
For special case of multilane approach opposed by single-lane approach
or when gf>gq, see text.

_____SUPPLEMENTAL PEDESTRIAN-BICYCLE EFFECTS WORKSHEET_____
Permitted Left Turns

	EB	WB	NB	SB
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Pedestrian flow rate, Vpedg (p/h)				
OCCpedg				
Opposing queue clearing green, gq (s)				
Eff. ped. green consumed by opp. veh. queue, gq/gp				
OCCpedu				
Opposing flow rate, Vo (veh/h)				
OCCr				
Number of cross-street receiving lanes, Nrec				
Number of turning lanes, Nturn				
ApbT				
Proportion of left turns, PLT				
Proportion of left turns using protected phase, PLTA				
Left-turn adjustment, fLpb				
Permitted Right Turns				
Effective pedestrian green time, gp (s)				
Conflicting pedestrian volume, Vped (p/h)				
Conflicting bicycle volume, Vbic (bicycles/h)				
Vpedg				
OCCpedg				
Effective green, g (s)				
Vbicg				

OCCbicg
OCCr
Number of cross-street receiving lanes, Nrec
Number of turning lanes, Nturn
ApbT
Proportion right-turns, PRT
Proportion right-turns using protected phase, PRTA
Right turn adjustment, fRpb

SUPPLEMENTAL UNIFORM DELAY WORKSHEET

	EBLT	WBLT	NBLT	SBLT
Cycle length, C	122.0 sec			
Adj. LT vol from Vol Adjustment Worksheet, v				
v/c ratio from Capacity Worksheet, X				
Protected phase effective green interval, g (s)				
Opposing queue effective green interval, gq				
Unopposed green interval, gu				
Red time r=(C-g-gq-gu)				
Arrival rate, qa=v/(3600(max[X,1.0]))				
Protected ph. departure rate, Sp=s/3600				
Permitted ph. departure rate, Ss=s(gq+gu)/(gu*3600)				
XPerm				
XProt				
Case				
Queue at beginning of green arrow, Qa				
Queue at beginning of unsaturated green, Qu				
Residual queue, Qr				
Uniform Delay, d1				

DELAY/LOS WORKSHEET WITH INITIAL QUEUE

Appr/ Lane Group	Unmet Demand Q veh	Unmet Demand t hrs.	Uniform Delay Unadj. ds	Uniform Delay Adj. d1 sec	Initial Dur. u	Initial Final Param. Q veh	Initial Lane Queue Demand d3 sec	Initial Lane Unmet Delay d sec	Initial Lane Group Delay
Eastbound									
	0.0				0.0				
LT	0.0	0.00	15.0	15.0	0.00	15.5	0.0		60.9
	0.0				0.0				
Westbound									
	0.0				0.0				
TR	0.0	0.00	15.0	11.6	0.00	0.0	0.0		23.4
	0.0				0.0				

Northbound
0.0 0.0
0.0 0.0
0.0 0.0

Southbound
0.0 0.0
LR 0.0 0.00 51.0 51.0 0.00 18.5 0.0 193.0
0.0 0.0

Intersection Delay 64.7 sec/veh Intersection LOS E

BACK OF QUEUE WORKSHEET

	Eastbound	Westbound	Northbound	Southbound
LaneGroup	LT	TR		LR
Init Queue	0.0	0.0		0.0
Flow Rate	1079	1013		359
So	1900	1900		1900
No.Lanes	0 1 0	0 1 0	0 0 0	0 0 0
SL	1348	1487		1736
LnCapacity	1017	1121		285
Flow Ratio	0.8	0.7		0.2
v/c Ratio	1.06	0.90		1.26
Grn Ratio	0.75	0.75		0.16
I Factor	1.000	1.000		1.000
AT or PVG	3	3		3
Pltn Ratio	1.00	1.00		1.00
PF2	1.00	1.00		1.00
Q1	36.6	26.5		12.2
kB	1.4	1.5		0.6
Q2	18.3	8.7		11.5
Q Average	54.9	35.2		23.7
Q Spacing	25.0	25.0		25.0
Q Storage	0	0		0
Q S Ratio				
70th Percentile Output:				
fB%	1.2	1.2		1.2
BOQ	65.8	42.3		28.5
QSRatio				
85th Percentile Output:				
fB%	1.4	1.4		1.4
BOQ	76.8	49.3		33.2
QSRatio				
90th Percentile Output:				

fB%	1.5	1.5		1.5
BOQ	82.3	52.9		35.7
QSRatio				

95th Percentile Output:

fB%	1.6	1.6		1.6
BOQ	87.8	56.4		38.1
QSRatio				

98th Percentile Output:

fB%	1.7	1.7		1.7
BOQ	93.3	59.9		40.6
QSRatio				

ERROR MESSAGES

No errors to report.

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TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Emmett Drive
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Emmett Drive
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	51	710			724	45
Peak-Hour Factor, PHF	0.88	0.88			0.93	0.93
Hourly Flow Rate, HFR	57	806			778	48
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				38		42
Peak Hour Factor, PHF				0.80		0.80
Hourly Flow Rate, HFR				47		52
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	57					99		
C(m) (vph)	805					152		
v/c	0.07					0.65		
95% queue length	0.23					3.62		
Control Delay	9.8					64.7		
LOS	A					F		
Approach Delay						64.7		
Approach LOS						F		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Emmett Drive
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Emmett Drive

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	51	710			724	45
Peak-Hour Factor, PHF	0.88	0.88			0.93	0.93
Peak-15 Minute Volume	14	202			195	12
Hourly Flow Rate, HFR	57	806			778	48
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				38		42
Peak Hour Factor, PHF				0.80		0.80
Peak-15 Minute Volume				12		13
Hourly Flow Rate, HFR				47		52
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	806	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	826				1722		802	
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				1500				
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	802	
Potential Capacity	384	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		384		
Probability of Queue free St.	1.00		0.86	

Step 2: LT from Major St.	4		1	

Conflicting Flows		826		
Potential Capacity		805		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		805		
Probability of Queue free St.	1.00		0.93	
Maj L-Shared Prob Q free St.			0.87	

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		0.87		0.87
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1722		
Potential Capacity		98		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.87			
Maj. L, Min T Adj. Imp Factor.	0.90			
Cap. Adj. factor due to Impeding mvmnt		0.78		0.93
Movement Capacity		91		

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

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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 0.87 0.87
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 1722
Potential Capacity 98
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.87
Maj. L, Min T Adj. Imp Factor. 0.90
Cap. Adj. factor due to Impeding mvmnt 0.78 0.93
Movement Capacity 91

Results for Two-stage process:
a
y
C t 91

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				47		52
Movement Capacity (vph)					91	384
Shared Lane Capacity (vph)					152	

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				91		384
Volume				47		52
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				152		
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						LR	
v (vph)	57					99		
C(m) (vph)	805						152	
v/c	0.07					0.65		

95% queue length	0.23	3.62
Control Delay	9.8	64.7
LOS	A	F
Approach Delay		64.7
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.93	1.00
v(il), Volume for stream 2 or 5	806	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.87	
d(M,LT), Delay for stream 1 or 4	9.8	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	1.3	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & J. Fosters Path
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Josiah Fosters Path
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		715	184	15	608	
Peak-Hour Factor, PHF		0.86	0.86	0.78	0.78	
Hourly Flow Rate, HFR		831	213	19	779	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes		1	0	0	1	
Configuration			TR		LT	
Upstream Signal?			No		No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	86		19			
Peak Hour Factor, PHF	0.75		0.75			
Hourly Flow Rate, HFR	114		25			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		19		139				
C(m) (vph)		666		104				
v/c		0.03		1.34				
95% queue length		0.09		9.73				
Control Delay		10.6		278.3				
LOS		B		F				
Approach Delay				278.3				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & J. Fosters Path
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Josiah Fosters Path

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	715	184	15	608		
Peak-Hour Factor, PHF		0.86	0.86	0.78	0.78	
Peak-15 Minute Volume		208	53	5	195	
Hourly Flow Rate, HFR		831	213	19	779	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	86		19			
Peak Hour Factor, PHF	0.75		0.75			
Peak-15 Minute Volume	29		6			
Hourly Flow Rate, HFR	114		25			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		779
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(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	1044	1755	938					
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	1500							
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	938	
Potential Capacity	321	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	321	
Probability of Queue free St.	0.92	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	1044	
Potential Capacity	666	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	666	
Probability of Queue free St.	0.97	1.00
Maj L-Shared Prob Q free St.	0.95	

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	0.95	0.95
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	1755	
Potential Capacity	94	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.95
Maj. L, Min T Adj. Imp Factor.		0.96
Cap. Adj. factor due to Impeding mvmnt	0.97	0.89
Movement Capacity	91	

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 0.95 0.95
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 1755
Potential Capacity 94
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.95
Maj. L, Min T Adj. Imp Factor. 0.96
Cap. Adj. factor due to Impeding mvmnt 0.97 0.89
Movement Capacity 91

Results for Two-stage process:
a
y
C t 91

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	114			25		
Movement Capacity (vph)		91			321	
Shared Lane Capacity (vph)			104			

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	91			321		
Volume		114			25	
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh		104				
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		LR				
v (vph)		19		139				
C(m) (vph)		666		104				
v/c		0.03		1.34				

95% queue length	0.09	9.73
Control Delay	10.6	278.3
LOS	B	F
Approach Delay		278.3
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.97
v(il), Volume for stream 2 or 5		779
v(i2), Volume for stream 3 or 6		0
s(il), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)	0.95	
d(M,LT), Delay for stream 1 or 4		10.6
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.6

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Lewis Road
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Lewis Road
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	38	750			734	197
Peak-Hour Factor, PHF	0.93	0.93			0.94	0.94
Hourly Flow Rate, HFR	40	806			780	209
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				Yes

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				204		36
Peak Hour Factor, PHF				0.87		0.87
Hourly Flow Rate, HFR				234		41
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

_____Delay, Queue Length, and Level of Service_____

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	40					275		
C(m) (vph)	646					169		
v/c	0.06					1.63		
95% queue length	0.20					18.75		
Control Delay	10.9					355.9		
LOS	B					F		
Approach Delay						355.9		
Approach LOS						F		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

_____TWO-WAY STOP CONTROL(TWSC) ANALYSIS_____

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Lewis Road
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Lewis Road

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	38	750			734	197
Peak-Hour Factor, PHF	0.93	0.93			0.94	0.94
Peak-15 Minute Volume	10	202			195	52
Hourly Flow Rate, HFR	40	806			780	209
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				Yes

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				204		36
Peak Hour Factor, PHF				0.87		0.87
Peak-15 Minute Volume				59		10
Hourly Flow Rate, HFR				234		41
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
S2	Left-Turn						
	Through						
S5	Left-Turn	0	1700	3	0	122	35	625
	Through	793	1700	3	105	122	35	625

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

	Movement 2	Movement 5
Shared ln volume, major th vehicles:	806	
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:	1	

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				5.5*		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		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	4.1				4.8		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	793	0		
Total Saturation Flow Rate, s (vph)			1700	1700
Arrival Type	3	3		
Effective Green, g (sec)			105	0
Cycle Length, C (sec)			122	122
Rp (from Exhibit 16-11)			1.000	1.000
Proportion vehicles arriving on green P			0.861	0.000
g(q1)	7.9	0.0		
g(q2)	6.9	0.0		
g(q)	14.9	0.0		

Computation 2-Proportion of TWSC Intersection Time blocked

	Movement 2		Movement 5	
	V(t)	V(l,prot)	V(t)	V(l,prot)
alpha	0.550			
beta	0.645			
Travel time, t(a) (sec)			12.148	
Smoothing Factor, F			0.188	
Proportion of conflicting flow, f			1.000	1.000
Max platooned flow, V(c,max)			1623	0
Min platooned flow, V(c,min)			1000	1000
Duration of blocked period, t(p)			17.3	0.0
Proportion time blocked, p	0.000		0.142	

Computation 3-Platoon Event Periods	Result
p(2)	0.000
p(5)	0.142
p(dom)	0.142
p(subo)	0.000
Constrained or unconstrained?	U

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

movements, p(x)	Process	Stage I	Stage II
p(1)	0.858		
p(4)			
p(7)			
p(8)			
p(9)			
p(10)	0.858		
p(11)			
p(12)	0.858		

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	989					1770		884
s	1500					1500		1500
Px	0.858					0.858		0.858
V c,u,x	905					1815		782
C r,x	752					192		394
C plat,x	646					165		338

Two-Stage Process

	7		8		10		11	
	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2	Stage1	Stage2
V(c,x)								
s				1500		1500		
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	884	
Potential Capacity	338	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		338		
Probability of Queue free St.	1.00		0.88	

Step 2: LT from Major St.	4		1	

Conflicting Flows		989		
Potential Capacity		646		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		646		
Probability of Queue free St.	1.00		0.94	
Maj L-Shared Prob Q free St.			0.88	

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		0.88		0.88
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1770		
Potential Capacity		165		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.88			
Maj. L, Min T Adj. Imp Factor.	0.91			
Cap. Adj. factor due to Impeding mvmnt		0.80		0.94
Movement Capacity		155		

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

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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 0.88 0.88
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 1770
Potential Capacity 165
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.88
Maj. L, Min T Adj. Imp Factor. 0.91
Cap. Adj. factor due to Impeding mvmnt 0.80 0.94
Movement Capacity 155

Results for Two-stage process:
a
y
C t 155

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				234		41
Movement Capacity (vph)					155	338
Shared Lane Capacity (vph)					169	

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				155		338
Volume				234		41
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				169		
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						LR	
v (vph)	40					275		
C(m) (vph)	646						169	
v/c	0.06					1.63		

95% queue length	0.20	18.75
Control Delay	10.9	355.9
LOS	B	F
Approach Delay		355.9
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.94	1.00
v(il), Volume for stream 2 or 5	806	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.88	
d(M,LT), Delay for stream 1 or 4	10.9	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	1.3	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Old Country Rd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Old Country Road
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	41	591			475	291
Peak-Hour Factor, PHF	0.88	0.88			0.93	0.93
Hourly Flow Rate, HFR	46	671			510	312
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?		No				No

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				170		59
Peak Hour Factor, PHF				0.80		0.80
Hourly Flow Rate, HFR				212		73
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	46					285		
C(m) (vph)	807					171		
v/c	0.06					1.67		
95% queue length	0.18					19.68		
Control Delay	9.7					371.7		
LOS	A					F		
Approach Delay						371.7		
Approach LOS						F		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Old Country Rd.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Old Country Road

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	41	591		475	291	
Peak-Hour Factor, PHF	0.88	0.88			0.93	0.93
Peak-15 Minute Volume	12	168			128	78
Hourly Flow Rate, HFR	46	671			510	312
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				170		59
Peak Hour Factor, PHF				0.80		0.80
Peak-15 Minute Volume				53		18
Hourly Flow Rate, HFR				212		73
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	671	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	822				1429		666	
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				1500				
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	666	
Potential Capacity	459	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		459		
Probability of Queue free St.	1.00		0.84	

Step 2: LT from Major St.	4		1	

Conflicting Flows		822		
Potential Capacity		807		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		807		
Probability of Queue free St.	1.00		0.94	
Maj L-Shared Prob Q free St.			0.91	

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		0.91		0.91
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1429		
Potential Capacity		149		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.91			
Maj. L, Min T Adj. Imp Factor.	0.93			
Cap. Adj. factor due to Impeding mvmnt		0.78		0.94
Movement Capacity		141		

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

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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 0.91 0.91
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 1429
Potential Capacity 149
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.91
Maj. L, Min T Adj. Imp Factor. 0.93
Cap. Adj. factor due to Impeding mvmnt 0.78 0.94
Movement Capacity 141

Results for Two-stage process:
a
y
C t 141

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				212		73
Movement Capacity (vph)					141	459
Shared Lane Capacity (vph)					171	

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				141		459
Volume				212		73
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				171		
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						LR	
v (vph)	46					285		
C(m) (vph)	807						171	
v/c	0.06					1.67		

95% queue length	0.18	19.68
Control Delay	9.7	371.7
LOS	A	F
Approach Delay		371.7
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.94	1.00
v(il), Volume for stream 2 or 5	671	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.91	
d(M,LT), Delay for stream 1 or 4	9.7	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.9	

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Squires Avenue
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Squires Avenue
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		633	101	6	552	
Peak-Hour Factor, PHF		0.85	0.85	0.76	0.76	
Hourly Flow Rate, HFR		744	118	7	726	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0		0	1	
Configuration		TR			LT	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	71		6			
Peak Hour Factor, PHF	0.85		0.85			
Hourly Flow Rate, HFR	83		7			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		7		90				
C(m) (vph)		780		132				
v/c		0.01		0.68				
95% queue length		0.03		3.75				
Control Delay		9.7		76.8				
LOS		A		F				
Approach Delay				76.8				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/16/2006
Analysis Time Period: PM Peak Hour
Intersection: Montauk Hwy. & Squires Avenue
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Montauk Highway
North/South Street: Squires Avenue

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	633	101	6	552		
Peak-Hour Factor, PHF		0.85	0.85	0.76	0.76	
Peak-15 Minute Volume		186	30	2	182	
Hourly Flow Rate, HFR		744	118	7	726	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	71		6			
Peak Hour Factor, PHF	0.85		0.85			
Peak-15 Minute Volume	21		2			
Hourly Flow Rate, HFR	83		7			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		726
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2		2		2			
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00		0.70		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	4.1		6.4		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)	2.20		3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2		2		2			
t(f)	2.2		3.5		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	(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	862	1543			803			
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	1500							
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	803	
Potential Capacity	383	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	383	
Probability of Queue free St.	0.98	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	862	
Potential Capacity	780	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	780	
Probability of Queue free St.	0.99	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	1543	
Potential Capacity	126	
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	0.99	0.97
Movement Capacity	125	

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

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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 1543
Potential Capacity 126
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 0.99 0.97
Movement Capacity 125

Results for Two-stage process:
a
y
C t 125

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	83		7			
Movement Capacity (vph)		125			383	
Shared Lane Capacity (vph)			132			

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	125		383			
Volume	83		7			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	132					
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		LR				
v (vph)	7		90					
C(m) (vph)		780		132				
v/c	0.01		0.68					

95% queue length	0.03	3.75
Control Delay	9.7	76.8
LOS	A	F
Approach Delay		76.8
Approach LOS		F

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.99
v(il), Volume for stream 2 or 5		726
v(i2), Volume for stream 3 or 6		0
s(il), 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		9.7
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.2

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd. & Central Ave.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Central Avenue
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		550	83	47	458	
Peak-Hour Factor, PHF		0.92	0.92	0.93	0.93	
Hourly Flow Rate, HFR		597	90	50	492	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0		0	1	
Configuration		TR			LT	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	48		59			
Peak Hour Factor, PHF	0.91		0.91			
Hourly Flow Rate, HFR	52		64			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0		0			

Configuration LR

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		50		116				
C(m) (vph)		907		278				
v/c		0.06		0.42				
95% queue length		0.17		1.96				
Control Delay		9.2		26.9				
LOS		A		D				
Approach Delay				26.9				
Approach LOS				D				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd. & Central Ave.
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Central Avenue

Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume		550	83	47	458	
Peak-Hour Factor, PHF		0.92	0.92	0.93	0.93	
Peak-15 Minute Volume		149	23	13	123	
Hourly Flow Rate, HFR		597	90	50	492	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage		Undivided		/		
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	48		59			
Peak Hour Factor, PHF	0.91		0.91			
Peak-15 Minute Volume	13		16			
Hourly Flow Rate, HFR	52		64			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		492
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		2	2		2			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		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		4.1	6.4		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)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		2	2		2			
t(f)		2.2	3.5		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	(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	687	1234			642			
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	1500							
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	642	
Potential Capacity	474	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	474	
Probability of Queue free St.	0.86	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	687	
Potential Capacity	907	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	907	
Probability of Queue free St.	0.94	1.00
Maj L-Shared Prob Q free St.	0.92	

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	0.92	0.92
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	1234	
Potential Capacity	195	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.92
Maj. L, Min T Adj. Imp Factor.		0.94
Cap. Adj. factor due to Impeding mvmnt	0.94	0.81
Movement Capacity	184	

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 0.92 0.92
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 1234
Potential Capacity 195
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.92
Maj. L, Min T Adj. Imp Factor. 0.94
Cap. Adj. factor due to Impeding mvmnt 0.94 0.81
Movement Capacity 184

Results for Two-stage process:
a
y
C t 184

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	52		64			
Movement Capacity (vph)		184			474	
Shared Lane Capacity (vph)			278			

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	184		474			
Volume	52		64			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	278					
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		LR				
v (vph)		50		116				
C(m) (vph)		907		278				
v/c		0.06		0.42				

95% queue length	0.17	1.96
Control Delay	9.2	26.9
LOS	A	D
Approach Delay		26.9
Approach LOS		D

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.94
v(il), Volume for stream 2 or 5		492
v(i2), Volume for stream 3 or 6		0
s(il), Saturation flow rate for stream 2 or 5		1700
s(i2), Saturation flow rate for stream 3 or 6		1700
P*(oj)	0.92	
d(M,LT), Delay for stream 1 or 4		9.2
N, Number of major street through lanes		1
d(rank,1) Delay for stream 2 or 5		0.7

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd. & Quogue-Rvrhd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Quogue-Riverhead Road (Rt 104)
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	18	148	9	30	101	65
Peak-Hour Factor, PHF	0.80	0.80	0.80	0.78	0.78	0.78
Hourly Flow Rate, HFR	22	184	11	38	129	83
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	2	123	18	118	112	12
Peak Hour Factor, PHF	0.88	0.88	0.88	0.77	0.77	0.77
Hourly Flow Rate, HFR	2	139	20	153	145	15
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
Lanes	0	1	0	0	1	0

Configuration LTR LTR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound		Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LTR	LTR		LTR			LTR
v (vph)	22	38		161			313
C(m) (vph)	1358	1378		462			380
v/c	0.02	0.03		0.35			0.82
95% queue length	0.05	0.09		1.54			7.43
Control Delay	7.7	7.7		16.9			46.1
LOS	A	A		C			E
Approach Delay				16.9			46.1
Approach LOS				C			E

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: AA
Agency/Co.: AKRF, Inc.
Date Performed: 11/3/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd. & Quogue-Rvrhd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: East Quogue GEIS
East/West Street: Old Country Road
North/South Street: Quogue-Riverhead Road (Rt 104)

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	18	148	9	30	101	65
Peak-Hour Factor, PHF	0.80	0.80	0.80	0.78	0.78	0.78
Peak-15 Minute Volume	6	46	3	10	32	21
Hourly Flow Rate, HFR	22	184	11	38	129	83
Percent Heavy Vehicles	2	--	--	2	--	--
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		
Upstream Signal?	No			No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	2	123	18	118	112	12
Peak Hour Factor, PHF	0.88	0.88	0.88	0.77	0.77	0.77
Peak-15 Minute Volume	1	35	5	38	36	4
Hourly Flow Rate, HFR	2	139	20	153	145	15
Percent Heavy Vehicles	2	2	2	2	2	2
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage	No	/		No	/	
RT Channelized?						
Lanes	0	1	0	0	1	0
Configuration	LTR			LTR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	184	129
Shared ln volume, major rt vehicles:	11	83
Sat flow rate, major th vehicles:	1700	1700
Sat flow rate, major rt vehicles:	1700	1700
Number of major street through lanes:	1	1

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	4.1	7.1	6.5	6.2	7.1	6.5	6.2
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2	2	2	2	2	2	2	2
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	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	4.1	4.1	7.1	6.5	6.2	7.1	6.5	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)	2.20	2.20	3.50	4.00	3.30	3.50	4.00	3.30
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2	2	2	2	2	2	2	2
t(f)	2.2	2.2	3.5	4.0	3.3	3.5	4.0	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	(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	212	195	560	522	190	559	485	170
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	1500		1500		1500		1500	
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	190	170
Potential Capacity	852	874
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	852	874
Probability of Queue free St.	0.98	0.98

Step 2: LT from Major St.	4	1

Conflicting Flows	195	212
Potential Capacity	1378	1358
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1378	1358
Probability of Queue free St.	0.97	0.98
Maj L-Shared Prob Q free St.	0.97	0.98

Step 3: TH from Minor St.	8	11

Conflicting Flows	522	485
Potential Capacity	459	482
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.95	0.95
Movement Capacity	436	458
Probability of Queue free St.	0.68	0.68

Step 4: LT from Minor St.	7	10

Conflicting Flows	560	559
Potential Capacity	439	440
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.65	0.65
Maj. L, Min T Adj. Imp Factor.	0.73	0.73
Cap. Adj. factor due to Impeding mvmnt	0.72	0.71
Movement Capacity	314	312

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	522	485
Potential Capacity	459	482
Pedestrian Impedance Factor	1.00	1.00
Cap. Adj. factor due to Impeding mvmnt	0.95	0.95
Movement Capacity	436	458

Result for 2 stage process:
a
y

C t	436	458
Probability of Queue free St.	0.68	0.68

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	560	559
Potential Capacity	439	440
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor	0.65	0.65
Maj. L, Min T Adj. Imp Factor.	0.73	0.73
Cap. Adj. factor due to Impeding mvmnt	0.72	0.71
Movement Capacity	314	312

Results for Two-stage process:

a		
y		
C t	314	312

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	2	139	20	153	145	15
Movement Capacity (vph)	314	436	852	312	458	874
Shared Lane Capacity (vph)	462			380		

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	314	436	852	312	458	874
Volume	2	139	20	153	145	15
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	462			380		
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	LTR		LTR		LTR			LTR
v (vph)	22	38		161			313	
C(m) (vph)	1358	1378		462			380	
v/c	0.02	0.03		0.35			0.82	

95% queue length	0.05	0.09	1.54	7.43
Control Delay	7.7	7.7	16.9	46.1
LOS	A	A	C	E
Approach Delay			16.9	46.1
Approach LOS			C	E

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.98	0.97
v(il), Volume for stream 2 or 5	184	129
v(i2), Volume for stream 3 or 6	11	83
s(il), Saturation flow rate for stream 2 or 5	1700	1700
s(i2), Saturation flow rate for stream 3 or 6	1700	1700
P*(oj)	0.98	0.97
d(M,LT), Delay for stream 1 or 4	7.7	7.7
N, Number of major street through lanes	1	1
d(rank,1) Delay for stream 2 or 5	0.1	0.2

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: The Hills at Southampton TIS
East/West Street: Old Country Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	102	573			734	30
Peak-Hour Factor, PHF		0.98	0.98		0.91	0.91
Hourly Flow Rate, HFR		104	584		806	32
Percent Heavy Vehicles		2	--	--	--	--
Median Type/Storage		Undivided			/	
RT Channelized?						
Lanes	0	1			1	0
Configuration		LT				TR
Upstream Signal?			No			No

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				23		110
Peak Hour Factor, PHF				0.75		0.75
Hourly Flow Rate, HFR				30		146
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
Lanes				0		0

Configuration LR

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	LT					LR		
v (vph)	104					176		
C(m) (vph)	796					254		
v/c	0.13					0.69		
95% queue length	0.45					4.60		
Control Delay	10.2					46.0		
LOS	B					E		
Approach Delay						46.0		
Approach LOS						E		

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Old Country Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: The Hills at Southampton TIS
East/West Street: Old Country Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	102	573			734	30
Peak-Hour Factor, PHF	0.98	0.98			0.91	0.91
Peak-15 Minute Volume	26	146			202	8
Hourly Flow Rate, HFR	104	584			806	32
Percent Heavy Vehicles	2	--	--		--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	0	1		1	0	
Configuration		LT			TR	
Upstream Signal?		No			No	

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume				23		110
Peak Hour Factor, PHF				0.75		0.75
Peak-15 Minute Volume				8		37
Hourly Flow Rate, HFR				30		146
Percent Heavy Vehicles				2		2
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage				/		No /
RT Channelized?						
Lanes				0		0
Configuration				LR		

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:	584	
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:	1	

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		6.2	
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)	2				2		2	
t(c,g)		0.20	0.20	0.10	0.20	0.20	0.10	
Grade/100		0.00	0.00	0.00	0.00	0.00	0.00	
t(3,lt)	0.00				0.70		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	4.1				6.4		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)	2.20				3.50		3.30	
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)	2				2		2	
t(f)	2.2				3.5		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	(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	838				1614		822	
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				1500				
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	822	
Potential Capacity	374	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity		374		
Probability of Queue free St.	1.00		0.61	

Step 2: LT from Major St.	4		1	

Conflicting Flows		838		
Potential Capacity		796		
Pedestrian Impedance Factor	1.00		1.00	
Movement Capacity		796		
Probability of Queue free St.	1.00		0.87	
Maj L-Shared Prob Q free St.			0.80	

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		0.80		0.80
Movement Capacity				
Probability of Queue free St.	1.00		1.00	

Step 4: LT from Minor St.	7		10	

Conflicting Flows		1614		
Potential Capacity		114		
Pedestrian Impedance Factor	1.00		1.00	
Maj. L, Min T Impedance factor	0.80			
Maj. L, Min T Adj. Imp Factor.	0.85			
Cap. Adj. factor due to Impeding mvmnt		0.52		0.87
Movement Capacity		99		

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

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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 0.80 0.80
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 1614
Potential Capacity 114
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.80
Maj. L, Min T Adj. Imp Factor. 0.85
Cap. Adj. factor due to Impeding mvmnt 0.52 0.87
Movement Capacity 99

Results for Two-stage process:
a
y
C t 99

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)				30		146
Movement Capacity (vph)					99	374
Shared Lane Capacity (vph)					254	

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				99		374
Volume				30		146
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh				254		
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						LR	
v (vph)	104					176		
C(m) (vph)	796					254		
v/c	0.13					0.69		

95% queue length	0.45	4.60
Control Delay	10.2	46.0
LOS	B	E
Approach Delay		46.0
Approach LOS		E

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	0.87	1.00
v(il), Volume for stream 2 or 5	584	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.80	
d(M,LT), Delay for stream 1 or 4	10.2	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	2.0	

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TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Quogue-Riverhead Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID:
East/West Street: Lewis Road
North/South Street: Quogue-Riverhead Road (CR 104)
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume				231	36	716
Peak-Hour Factor, PHF				0.75	0.75	0.79
Hourly Flow Rate, HFR				308	48	906
Percent Heavy Vehicles				--	--	2
Median Type/Storage	Undivided				/	
RT Channelized?						
Lanes				1	0	1
Configuration					TR	
Upstream Signal?				No		

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume					30	
Peak Hour Factor, PHF					0.83	
Hourly Flow Rate, HFR					36	
Percent Heavy Vehicles					2	
Percent Grade (%)					0	
Flared Approach: Exists?/Storage					/	
Lanes					1	

Configuration L R

Delay, Queue Length, and Level of Service

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		L	L		R			
v (vph)		906	36		684			
C(m) (vph)		1203	9		710			
v/c		0.75	4.00		0.96			
95% queue length		7.60	5.73		14.47			
Control Delay		16.5	2164		49.4			
LOS		C	F		E			
Approach Delay				155.2				
Approach LOS				F				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

TWO-WAY STOP CONTROL(TWSC) ANALYSIS

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Quogue-Riverhead Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID:
East/West Street: Lewis Road
North/South Street: Quogue-Riverhead Road (CR 104)

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	231	36	716	196		
Peak-Hour Factor, PHF	0.75	0.75	0.79	0.79		
Peak-15 Minute Volume	77	12	227	62		
Hourly Flow Rate, HFR	308	48	906	248		
Percent Heavy Vehicles	--	--	2	--	--	
Median Type/Storage	Undivided		/			
RT Channelized?						
Lanes	1	0	1	1		
Configuration	TR		L	T		
Upstream Signal?	No		No			

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	30		568			
Peak Hour Factor, PHF	0.83		0.83			
Peak-15 Minute Volume	9		171			
Hourly Flow Rate, HFR	36		684			
Percent Heavy Vehicles	2		2			
Percent Grade (%)	0			0		
Flared Approach: Exists?/Storage			/			/
RT Channelized?			No			
Lanes	1		1			
Configuration	L		R			

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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)		4.1	7.1		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		2	2		2			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		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		4.1	6.4		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)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		2	2		2			
t(f)		2.2	3.5		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	(1) Single-stage	(2) Two-Stage Process	(3)

movements, p(x) Process Stage I 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	356	2392			332			
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	1500							
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	332	
Potential Capacity	710	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	710	
Probability of Queue free St.	0.04	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	356	
Potential Capacity	1203	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	1203	
Probability of Queue free St.	0.25	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	0.25	0.25
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	2392	
Potential Capacity	37	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.25
Maj. L, Min T Adj. Imp Factor.		0.38
Cap. Adj. factor due to Impeding mvmnt	0.25	0.01
Movement Capacity	9	

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

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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 0.25 0.25
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 2392
Potential Capacity 37
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.25
Maj. L, Min T Adj. Imp Factor. 0.38
Cap. Adj. factor due to Impeding mvmnt 0.25 0.01
Movement Capacity 9

Results for Two-stage process:
a
y
C t 9

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	36		684			
Movement Capacity (vph)		9		710		
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	9		710			
Volume	36		684			
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		L	L		R			
v (vph)	906	36			684			
C(m) (vph)		1203	9		710			
v/c	0.75	4.00			0.96			

95% queue length		7.60	5.73	14.47
Control Delay		16.5	2164	49.4
LOS	C	F	E	
Approach Delay			155.2	
Approach LOS			F	

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.25
v(il), Volume for stream 2 or 5		
v(i2), Volume for stream 3 or 6		
s(il), 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		16.5
N, Number of major street through lanes		
d(rank,1) Delay for stream 2 or 5		

HCS+: Unsignalized Intersections Release 5.21

TWO-WAY STOP CONTROL SUMMARY

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Spinney Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: The Hills at Southampton TIS
East/West Street: Spinney Road
North/South Street: Lewis Road
Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Northbound			Southbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	591	24		18	819	
Peak-Hour Factor, PHF		0.94	0.94	0.97	0.97	
Hourly Flow Rate, HFR		628	25	18	844	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0		0	1	
Configuration		TR			LT	
Upstream Signal?		No			No	

Minor Street: Approach	Westbound			Eastbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	6			12		
Peak Hour Factor, PHF	0.75			0.75		
Hourly Flow Rate, HFR	8			16		
Percent Heavy Vehicles	2			2		
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/			/
Lanes	0			0		

Configuration LR

_____Delay, Queue Length, and Level of Service_____

Approach	NB	SB	Westbound			Eastbound		
Movement	1	4	7	8	9	10	11	12
Lane Config		LT		LR				
v (vph)		18		24				
C(m) (vph)		934		250				
v/c		0.02		0.10				
95% queue length		0.06		0.32				
Control Delay		8.9		20.9				
LOS		A		C				
Approach Delay				20.9				
Approach LOS				C				

HCS+: Unsignalized Intersections Release 5.21

Phone: Fax:
E-Mail:

_____TWO-WAY STOP CONTROL(TWSC) ANALYSIS_____

Analyst: RJ
Agency/Co.: Nelson & Pope
Date Performed: 1/13/2006
Analysis Time Period: PM Peak Hour
Intersection: Spinney Rd & Lewis Rd
Jurisdiction:
Units: U. S. Customary
Analysis Year: 2015 Build
Project ID: The Hills at Southampton TIS
East/West Street: Spinney Road
North/South Street: Lewis Road

Intersection Orientation: NS Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street Movements	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	591	24	18	819		
Peak-Hour Factor, PHF		0.94	0.94	0.97	0.97	
Peak-15 Minute Volume		157	6	5	211	
Hourly Flow Rate, HFR		628	25	18	844	
Percent Heavy Vehicles		--	--	2	--	--
Median Type/Storage	Undivided			/		
RT Channelized?						
Lanes	1	0	0	1		
Configuration		TR		LT		
Upstream Signal?		No		No		

Minor Street Movements	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	6		12			
Peak Hour Factor, PHF	0.75		0.75			
Peak-15 Minute Volume	2		4			
Hourly Flow Rate, HFR	8		16			
Percent Heavy Vehicles	2		2			
Percent Grade (%)		0		0		
Flared Approach: Exists?/Storage		No	/		/	
RT Channelized?						
Lanes	0	0				
Configuration		LR				

Pedestrian Volumes and Adjustments

Movements	13	14	15	16
Flow (ped/hr)	0	0	0	0
Lane Width (ft)	12.0	12.0	12.0	12.0
Walking Speed (ft/sec)	4.0	4.0	4.0	4.0
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	mph	feet
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:		844
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:		1

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		6.2			
t(c,hv)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
P(hv)		2	2		2			
t(c,g)			0.20	0.20	0.10	0.20	0.20	0.10
Grade/100			0.00	0.00	0.00	0.00	0.00	0.00
t(3,lt)		0.00	0.70		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		4.1	6.4		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)		2.20	3.50		3.30			
t(f,HV)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
P(HV)		2	2		2			
t(f)		2.2	3.5		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	(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	653	1520			640			
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	1500							
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	640	
Potential Capacity	475	
Pedestrian Impedance Factor	1.00	1.00

Movement Capacity	475	
Probability of Queue free St.	0.97	1.00

Step 2: LT from Major St.	4	1

Conflicting Flows	653	
Potential Capacity	934	
Pedestrian Impedance Factor	1.00	1.00
Movement Capacity	934	
Probability of Queue free St.	0.98	1.00
Maj L-Shared Prob Q free St.	0.96	

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	0.96	0.96
Movement Capacity		
Probability of Queue free St.	1.00	1.00

Step 4: LT from Minor St.	7	10

Conflicting Flows	1520	
Potential Capacity	131	
Pedestrian Impedance Factor	1.00	1.00
Maj. L, Min T Impedance factor		0.96
Maj. L, Min T Adj. Imp Factor.		0.97
Cap. Adj. factor due to Impeding mvmnt	0.98	0.94
Movement Capacity	128	

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

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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 0.96 0.96
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 1520
Potential Capacity 131
Pedestrian Impedance Factor 1.00 1.00
Maj. L, Min T Impedance factor 0.96
Maj. L, Min T Adj. Imp Factor. 0.97
Cap. Adj. factor due to Impeding mvmnt 0.98 0.94
Movement Capacity 128

Results for Two-stage process:
a
y
C t 128

Worksheet 8-Shared Lane Calculations

Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume (vph)	8		16			
Movement Capacity (vph)		128			475	
Shared Lane Capacity (vph)			250			

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	128		475			
Volume	8		16			
Delay						
Q sep						
Q sep +1						
round (Qsep +1)						
n max						
C sh	250					
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		LR				
v (vph)	18		24					
C(m) (vph)		934		250				
v/c	0.02		0.10					

95% queue length	0.06	0.32
Control Delay	8.9	20.9
LOS	A	C
Approach Delay		20.9
Approach LOS		C

Worksheet 11-Shared Major LT Impedance and Delay

	Movement 2	Movement 5
p(oj)	1.00	0.98
v(il), Volume for stream 2 or 5	844	
v(i2), Volume for stream 3 or 6	0	
s(il), Saturation flow rate for stream 2 or 5	1700	
s(i2), Saturation flow rate for stream 3 or 6	1700	
P*(oj)	0.96	
d(M,LT), Delay for stream 1 or 4	8.9	
N, Number of major street through lanes	1	
d(rank,1) Delay for stream 2 or 5	0.3	