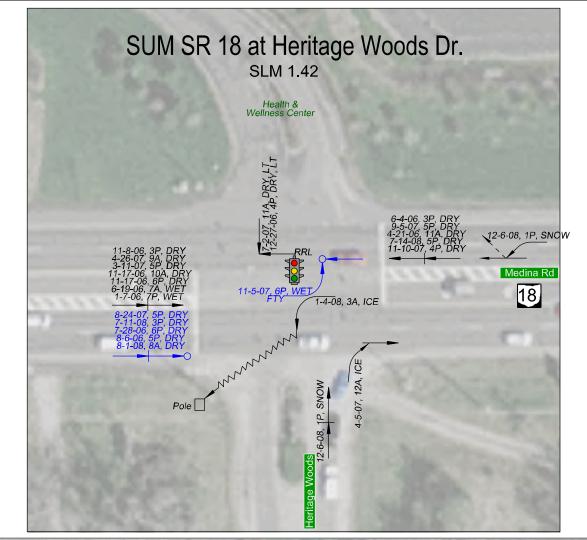
Interchange Modification Study

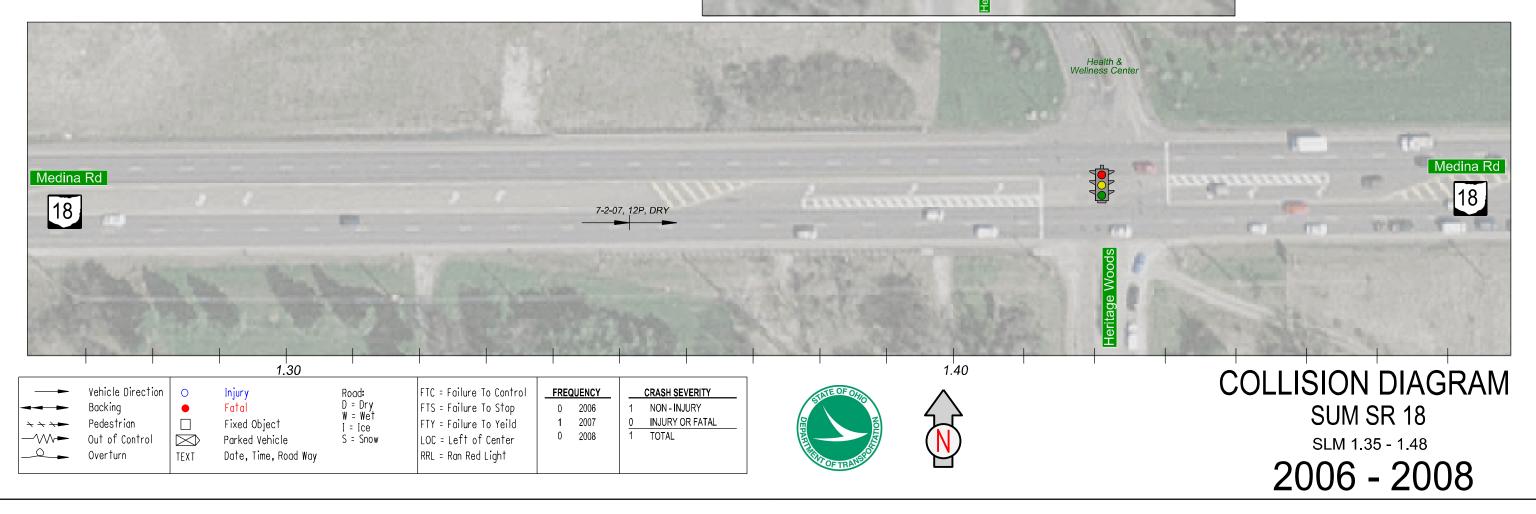
Appendix

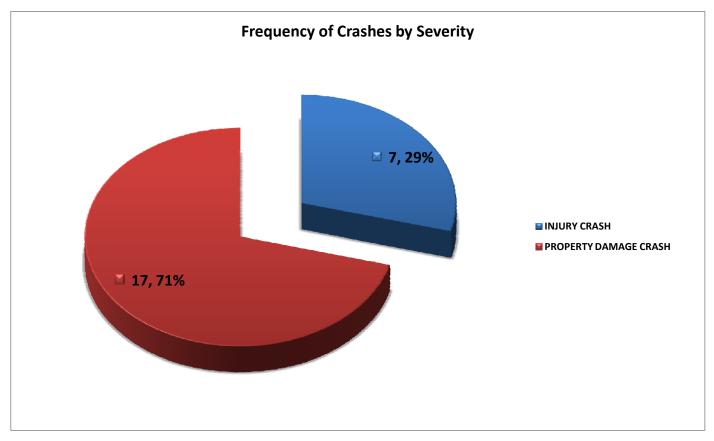
February 2012

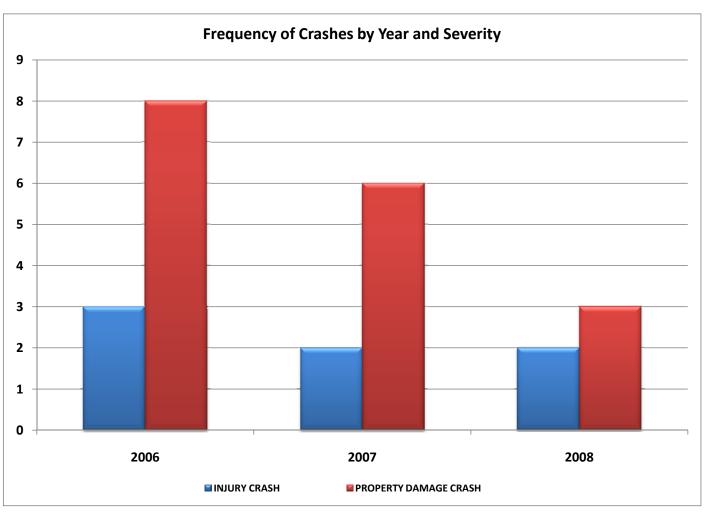
Appendix A

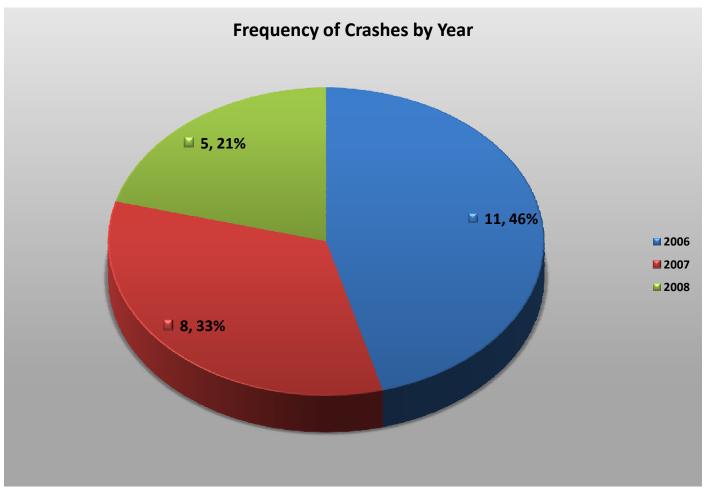
Crash Analysis

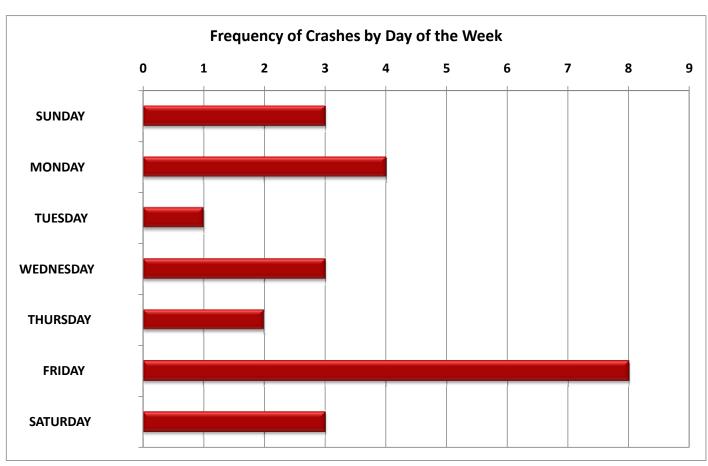




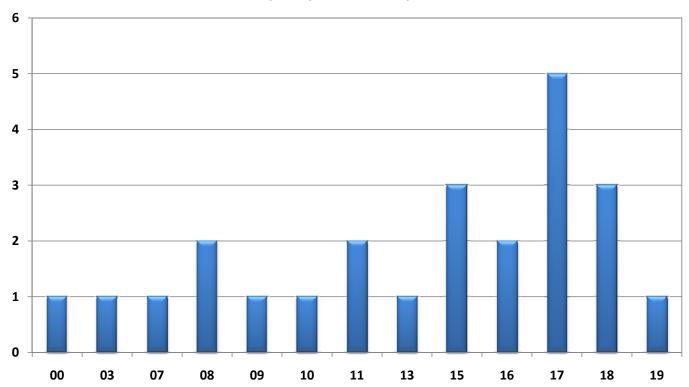


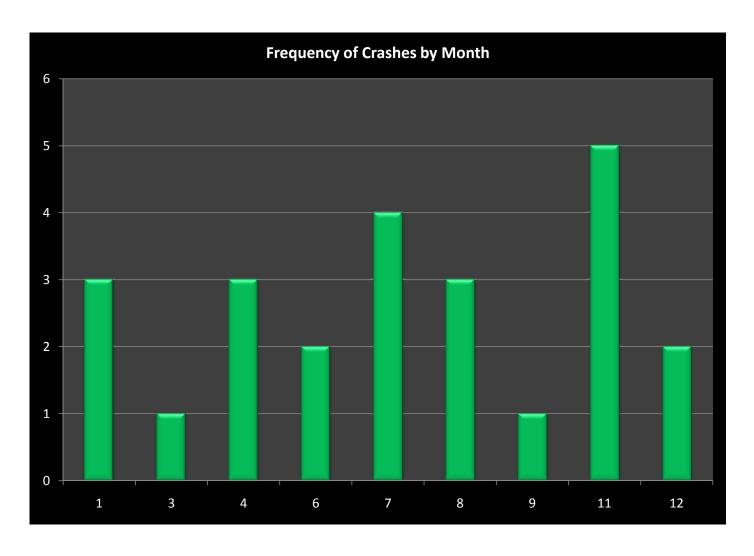


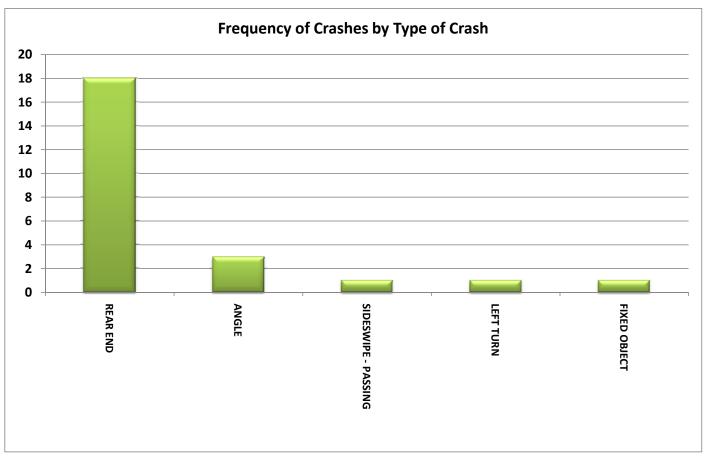


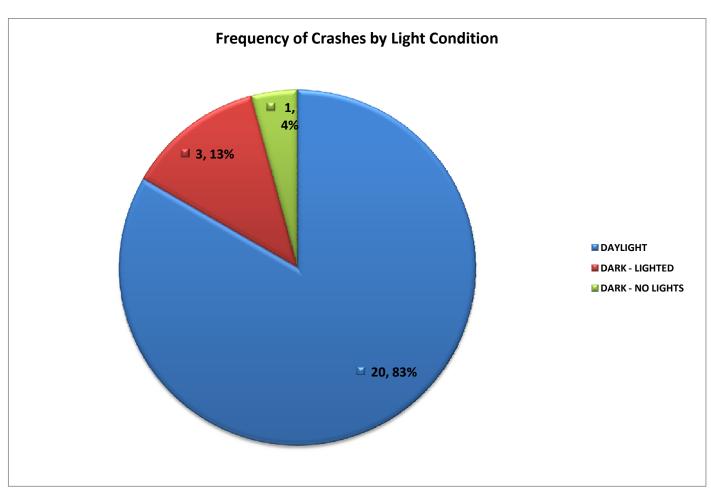


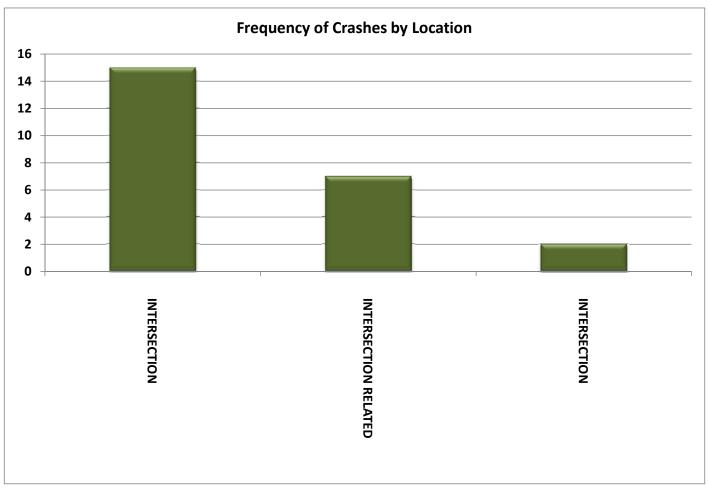
Frequency of Crashes by Hour

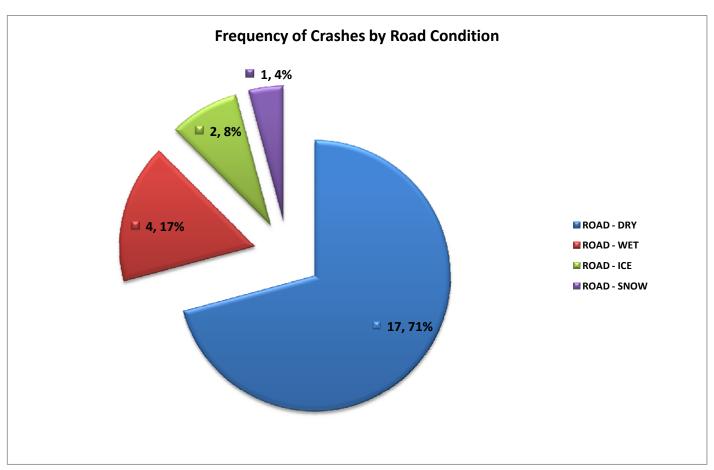


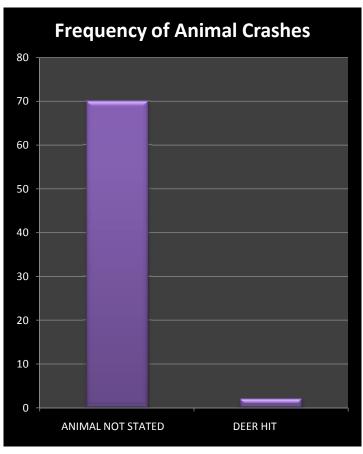


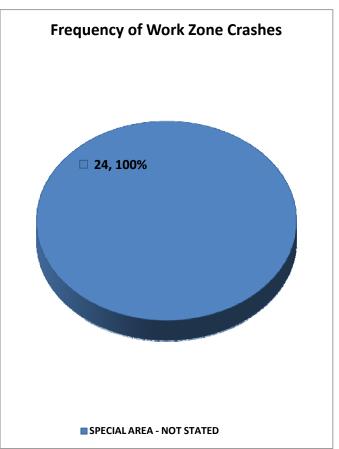


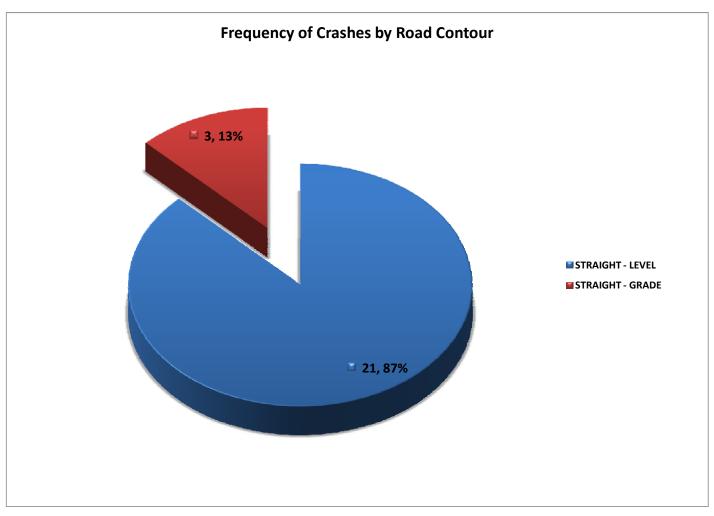




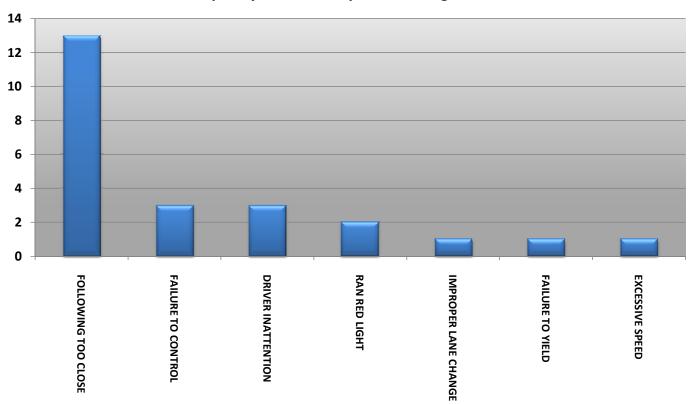


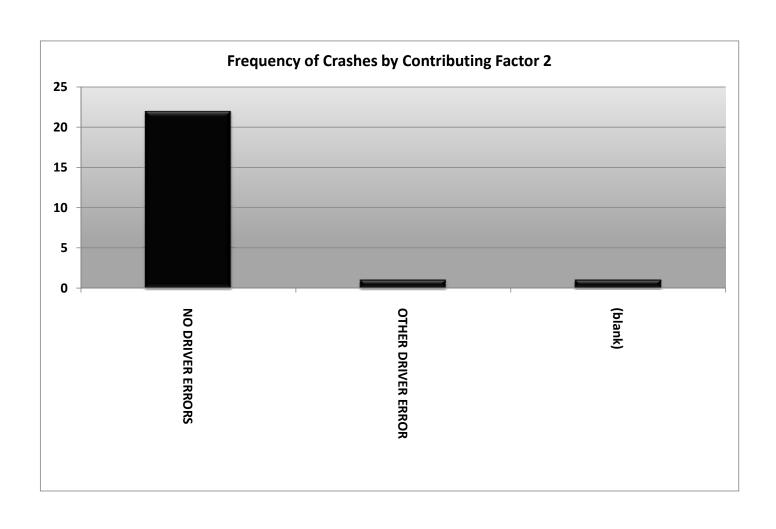


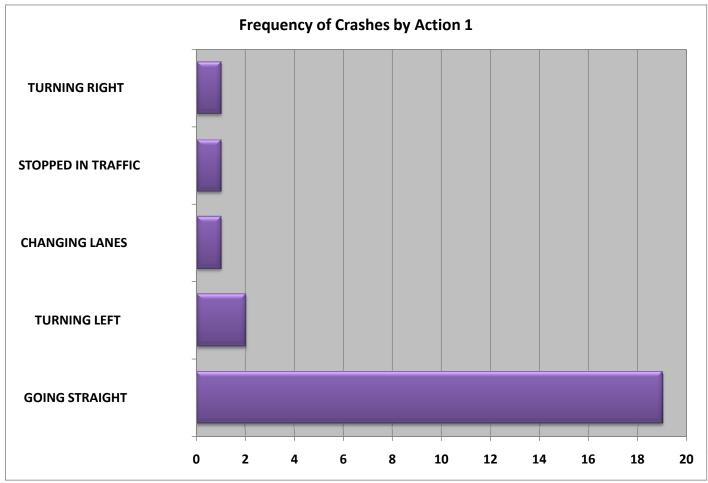


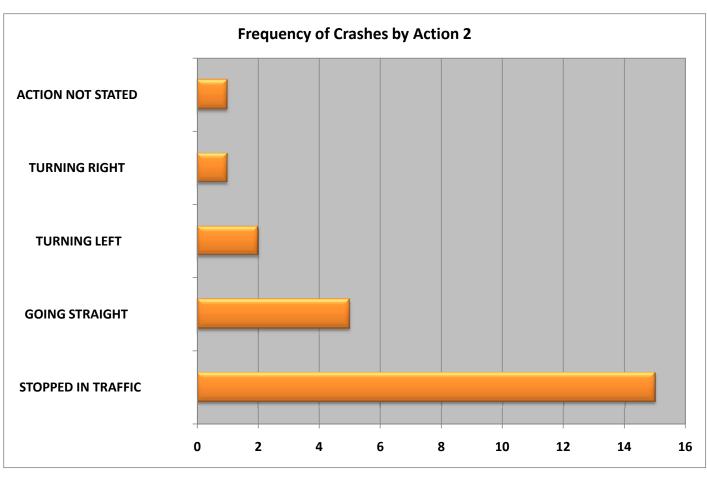


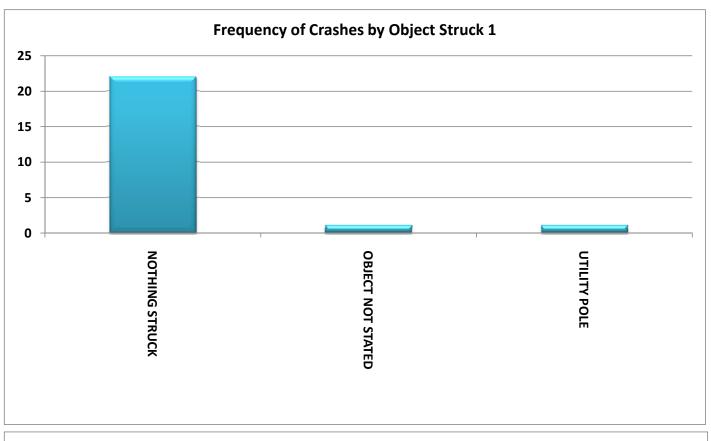
Frequency of Crashes by Contributing Factor 1

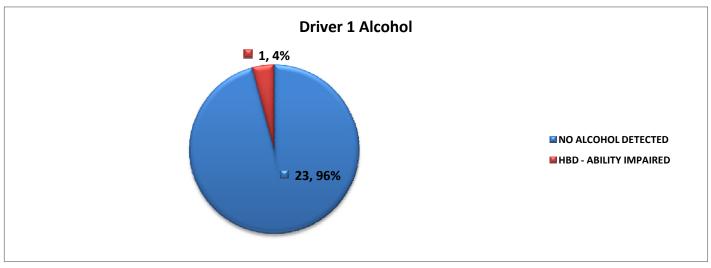


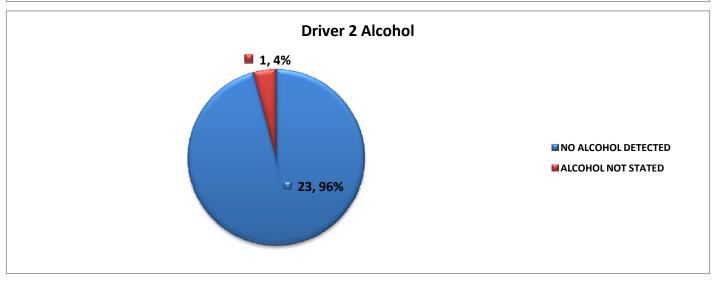


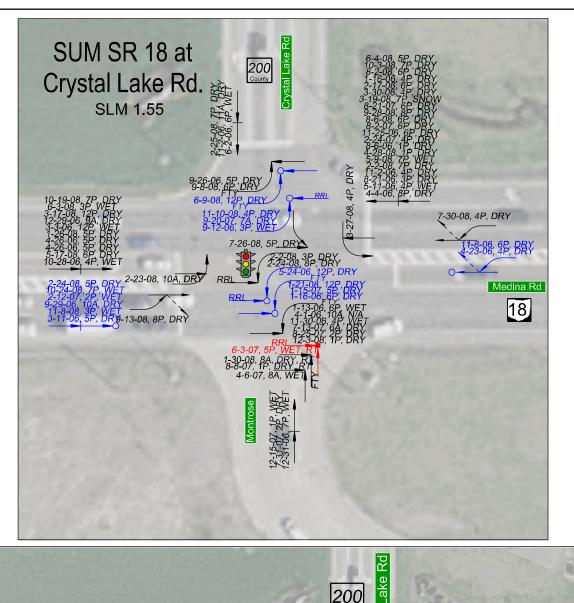


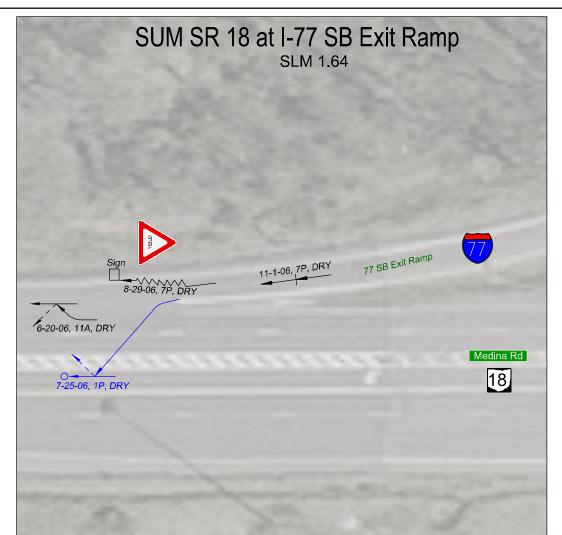


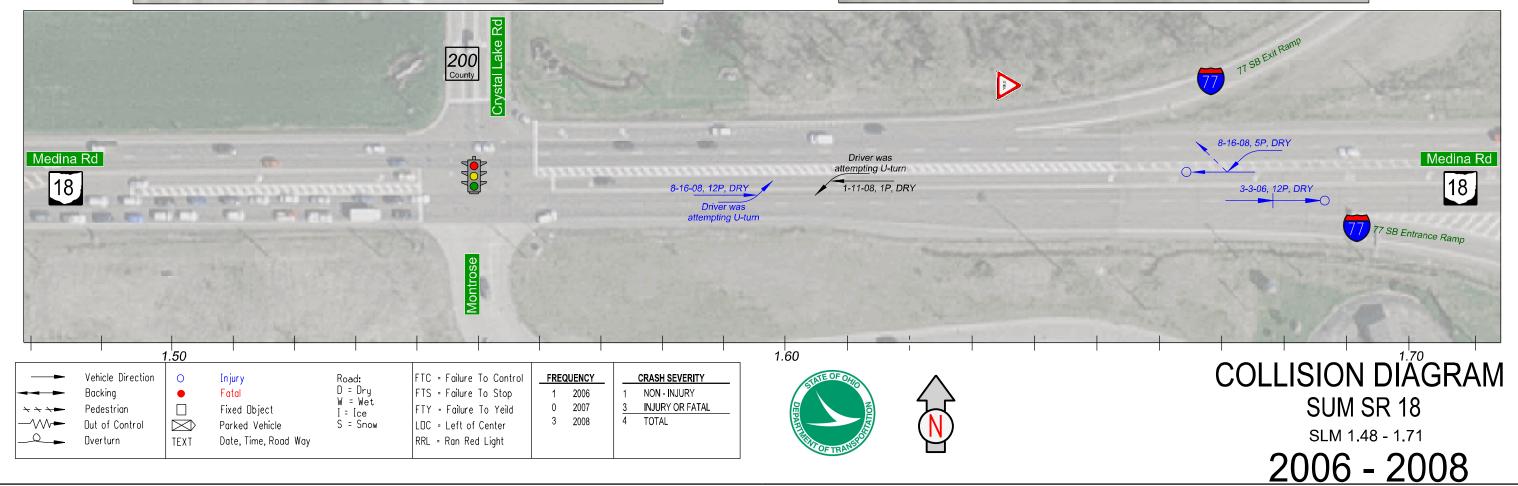


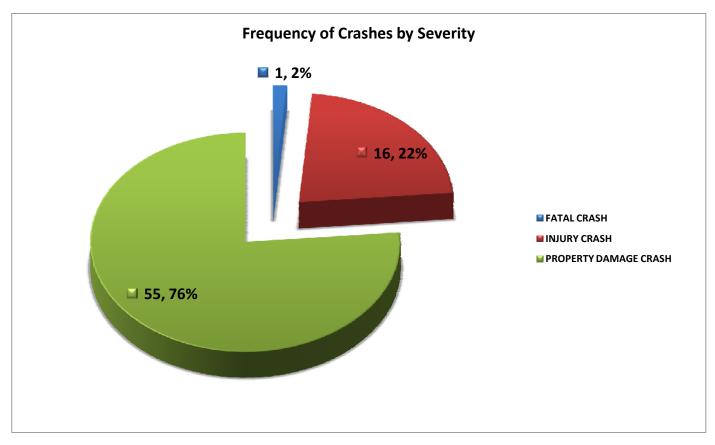


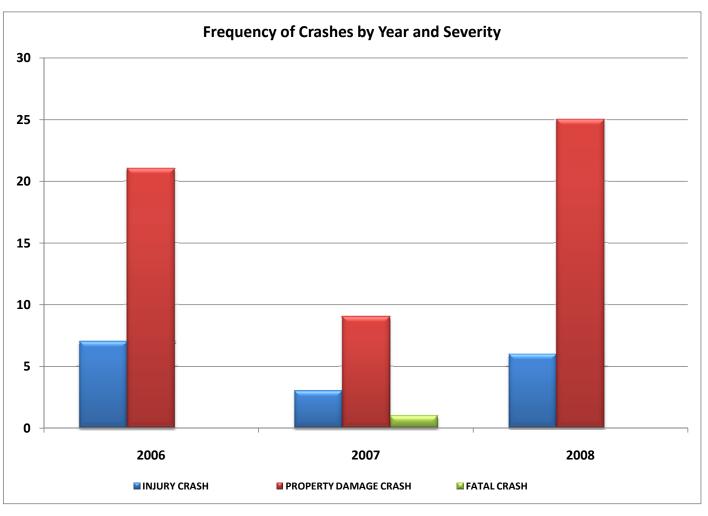


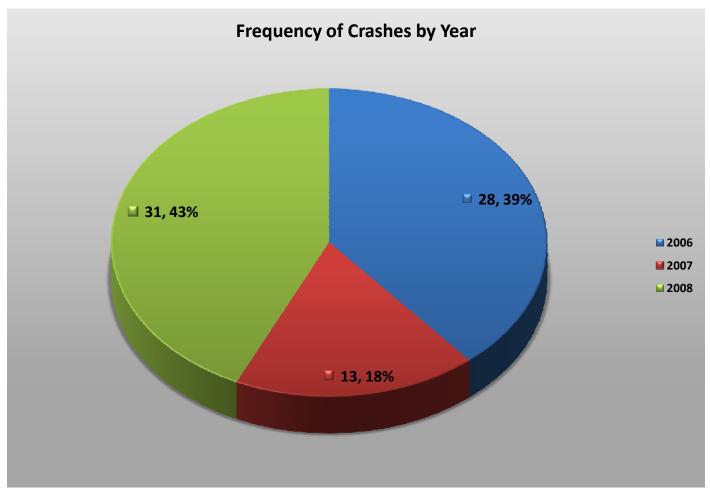


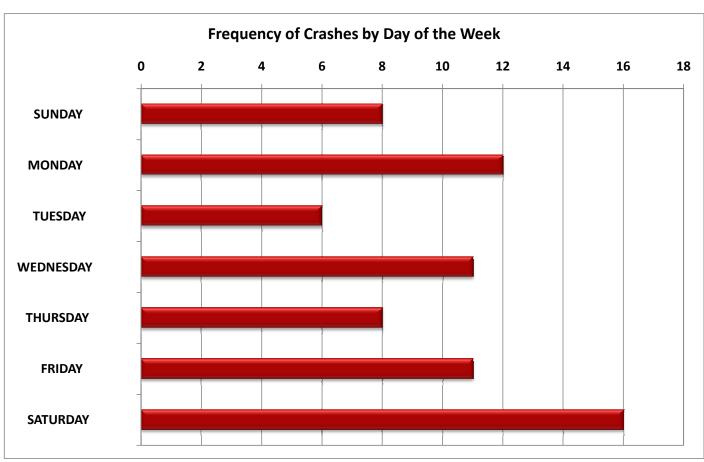




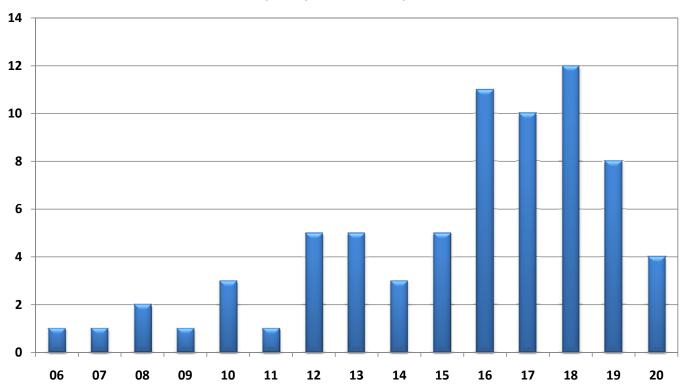


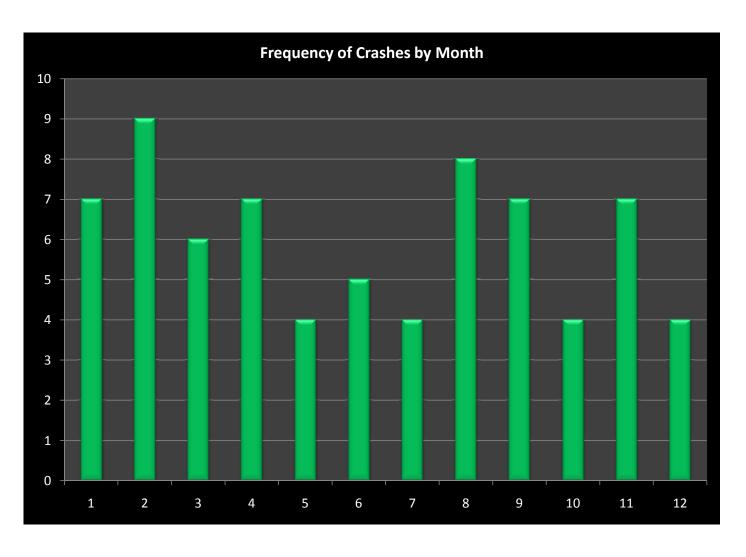


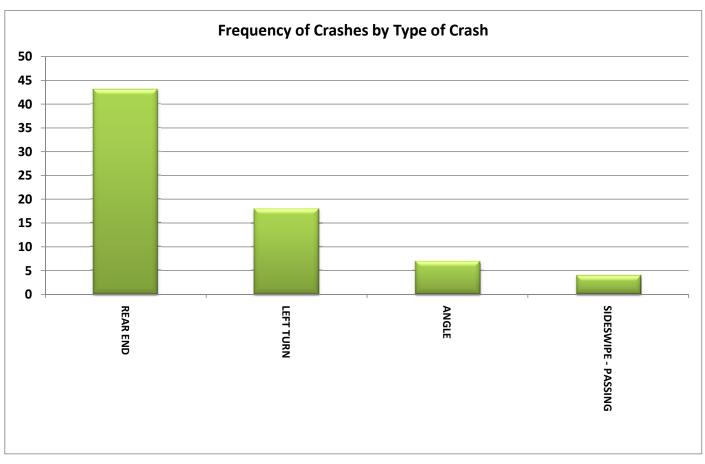


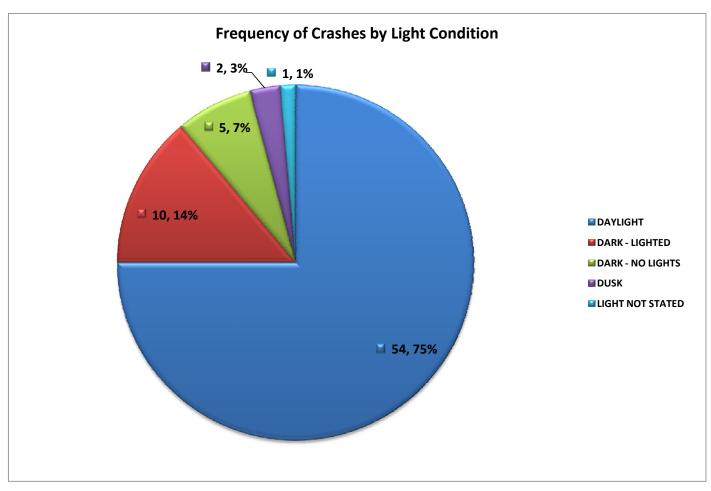


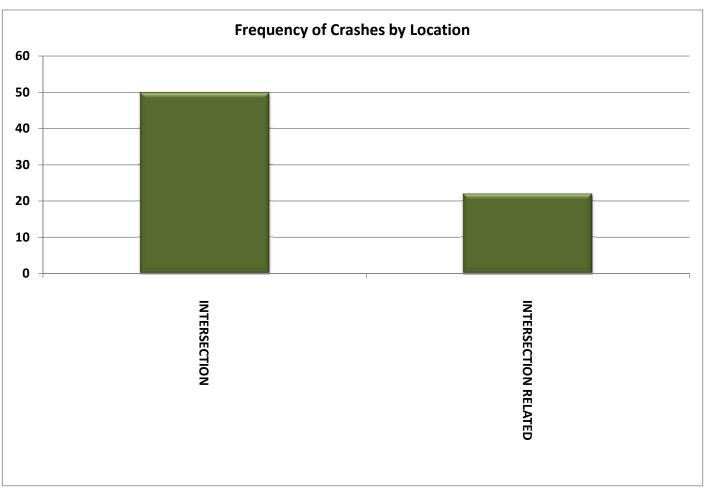
Frequency of Crashes by Hour

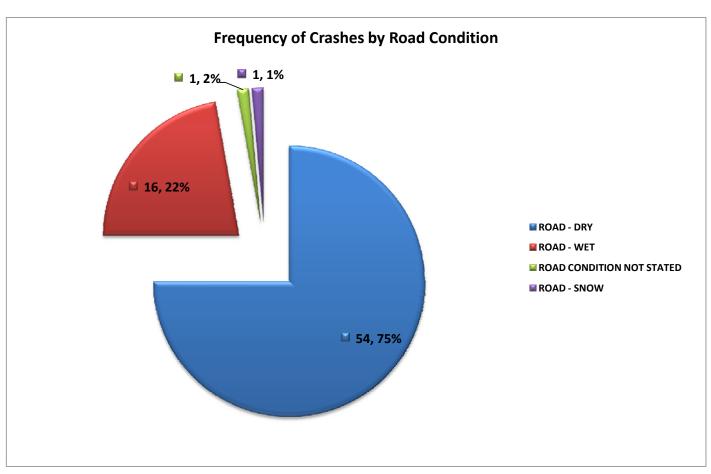


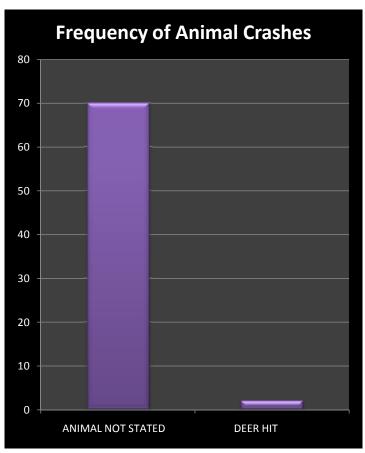


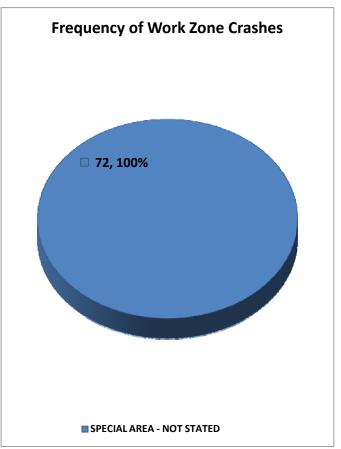


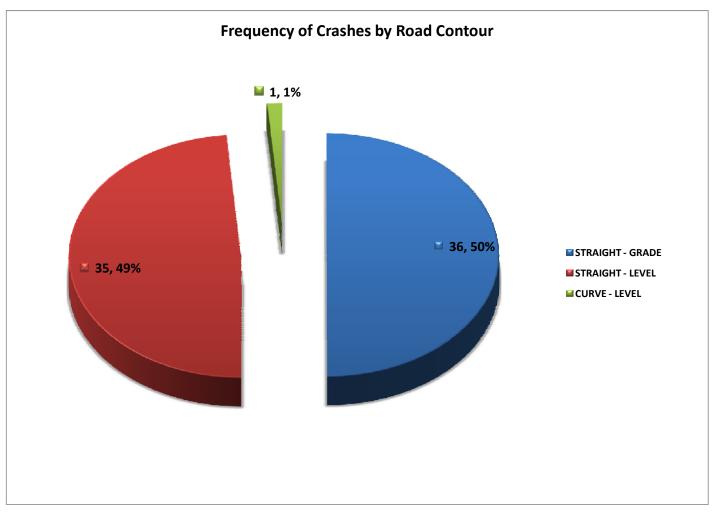




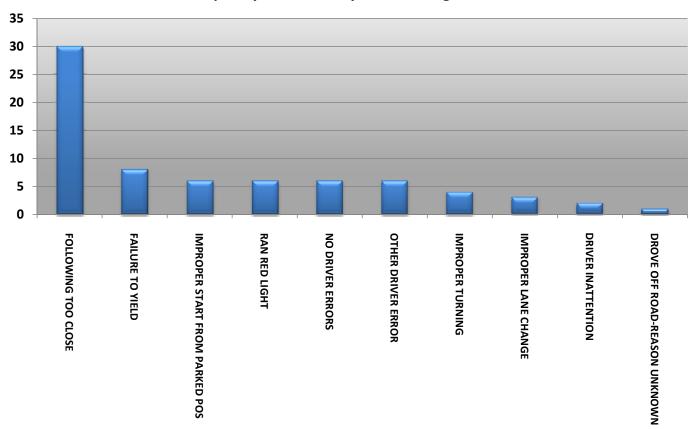


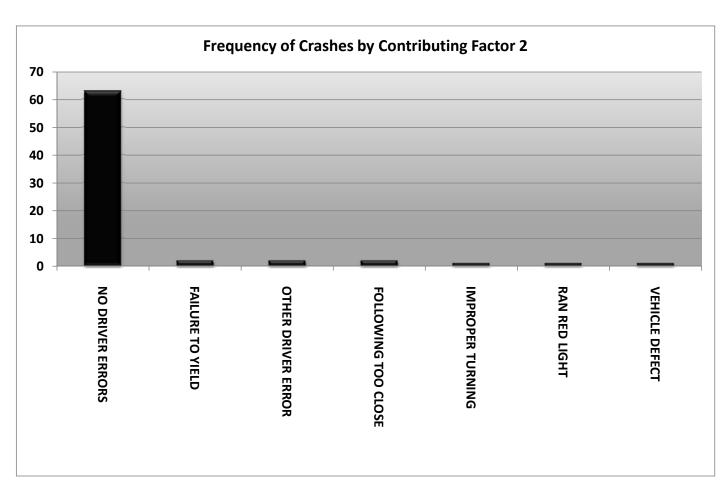


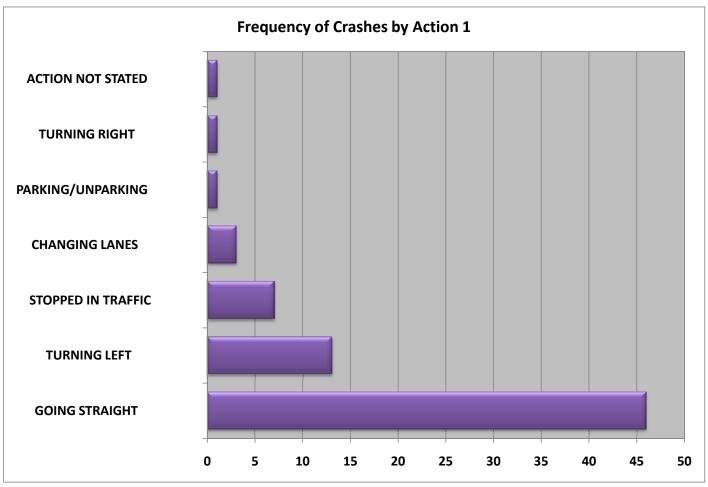


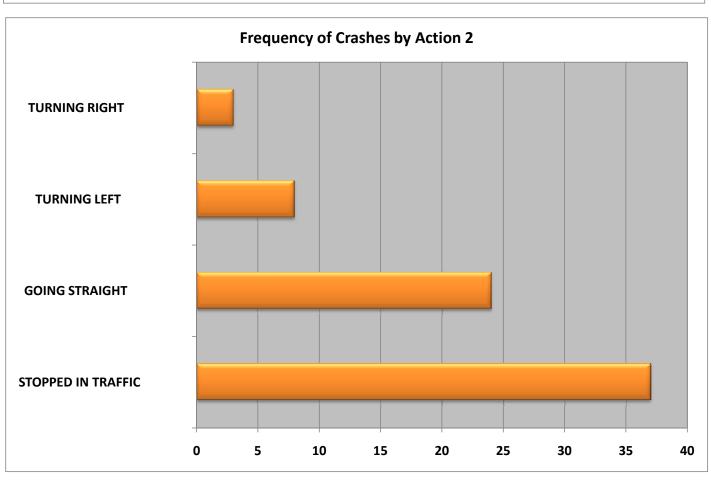


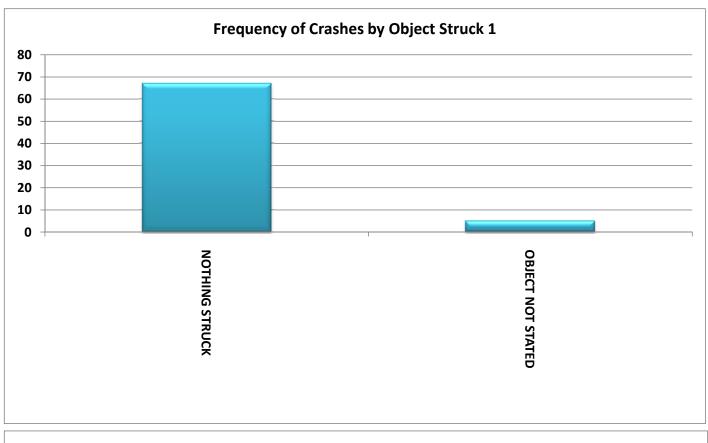
Frequency of Crashes by Contributing Factor 1

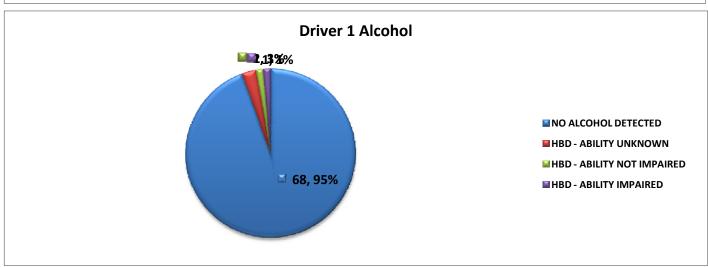














Appendix B

Certified Traffic

INTER-OFFICE COMMUNICATION

TO: Joe DeFuria, District 4

FROM: Becky Salak, Transportation Planner, Office of Statewide Planning and Research

SUBJECT: SUM-18-Corridor Study, PID 77749

DATE: May 9, 2011

In reply to a request dated April 12, 2011, attached is a set of plates showing 2015 and 2035 A.M. and P.M. DHV turning movement volumes for the subject project.

Please use the following design designations and truck factors:

	IR-77			SR-18		
	north of	north of	south of	south of Cleveland-	east of	east of
	SR-18	SR-21	SR-21	Massillon Rd	IR-77	Springside Dr
2015 ADT:	60890	83870	52640	66140	41640	32940
2035 ADT:	74620	101620	60320	73820	41640	32940
K:	0.11	0.10	0.10	0.10	0.10	0.11
D:	0.65	0.61	0.55	0.54	0.52	0.53
T24:	0.11	0.11	0.10	0.09	0.03	0.03
A.M. TD:	0.06	0.06	0.06	0.05	0.02	0.02
P.M. TD:	0.06	0.06	0.06	0.05	0.02	0.02

			SR-18			SR-21
	west of	west of Crystal	west of Heritage	west of N.	west of Medina	south of
	IR-77	Lake Dr	Woods Dr	Hametown Rd	Line Rd	IR-77
2015 ADT:	51010	36780	34900	27320	27230	39830
2035 ADT:	62640	49060	45760	35830	35520	51500
K:	0.09	0.09	0.09	0.09	0.09	0.11
D:	0.52	0.58	0.58	0.53	0.50	0.65
T24:	0.05	0.05	0.06	0.08	0.09	0.10
A.M. TD:	0.03	0.03	0.04	0.05	0.05	0.06
P.M. TD:	0.03	0.03	0.04	0.05	0.05	0.06

IR-77 & SR-18 Ramps

	SB-WB	<u>SB-EB</u>	<u>NB-EB</u>	<u>NB-WB</u>	EB-SB	<u>EB-NB</u>	<u>WB-NB</u>	WB-SB
A.M. TD:	0.07	0.08	0.03	0.12	0.07	0.04	0.03	0.04
P.M. TD:	0.02	0.04	0.02	0.07	0.07	0.03	0.02	0.04

IR-77 & SR-21 Ramps

	77 SB to 21 SB	77 NB to 21 SB	21 NB to 77 SB	21 NB to 77 NB
A.M. TD:	0.03	0.02	0.03	0.06
P.M. TD:	0.03	0.02	0.02	0.06

IR-77 & Cleveland-Massillon Rd Ramps

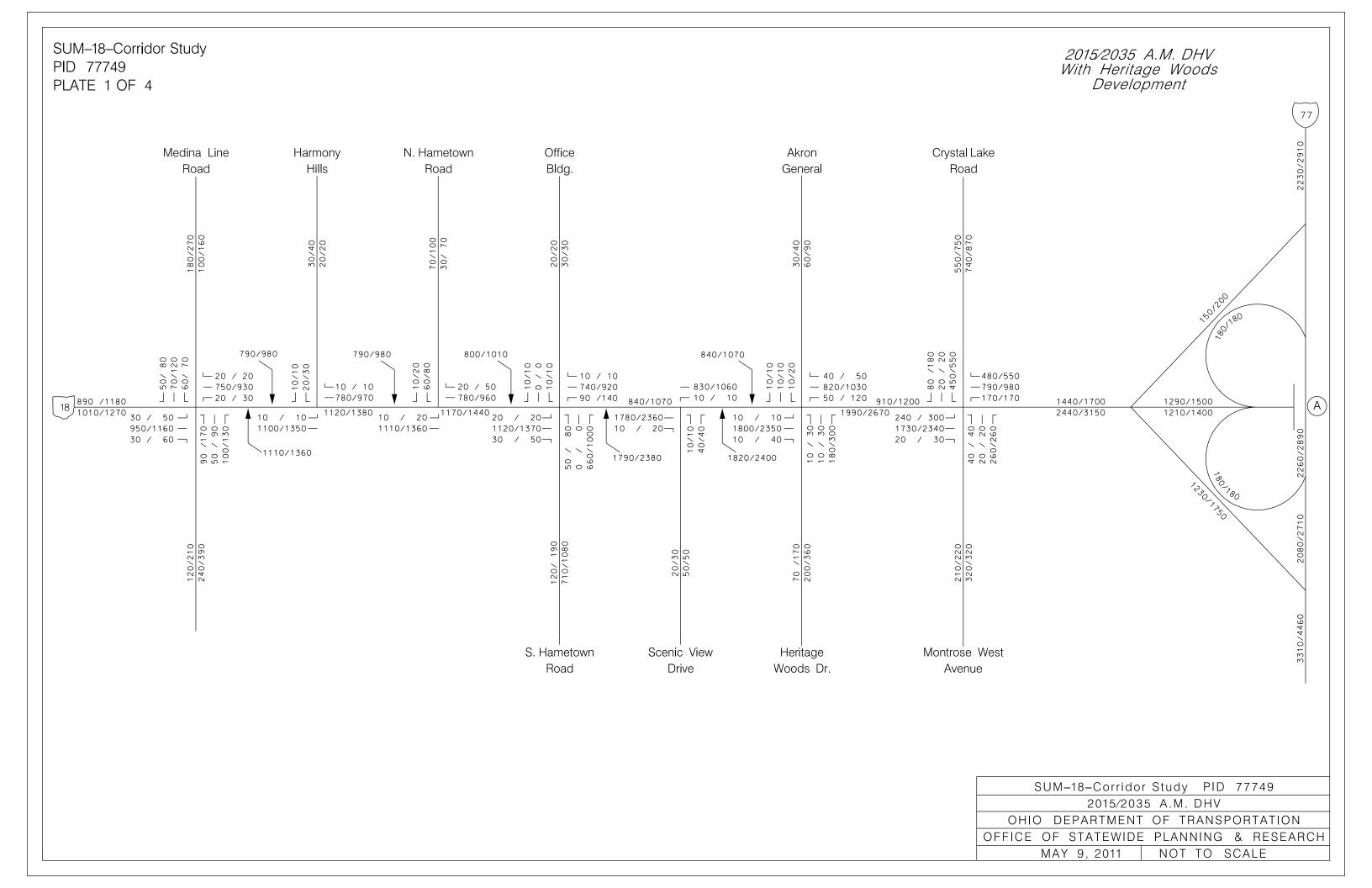
	77 NB to Clev-Mass Rd	Clev-Mass Rd to 77 SB
A.M. TD:	0.04	0.03
P.M. TD:	0.03	0.02

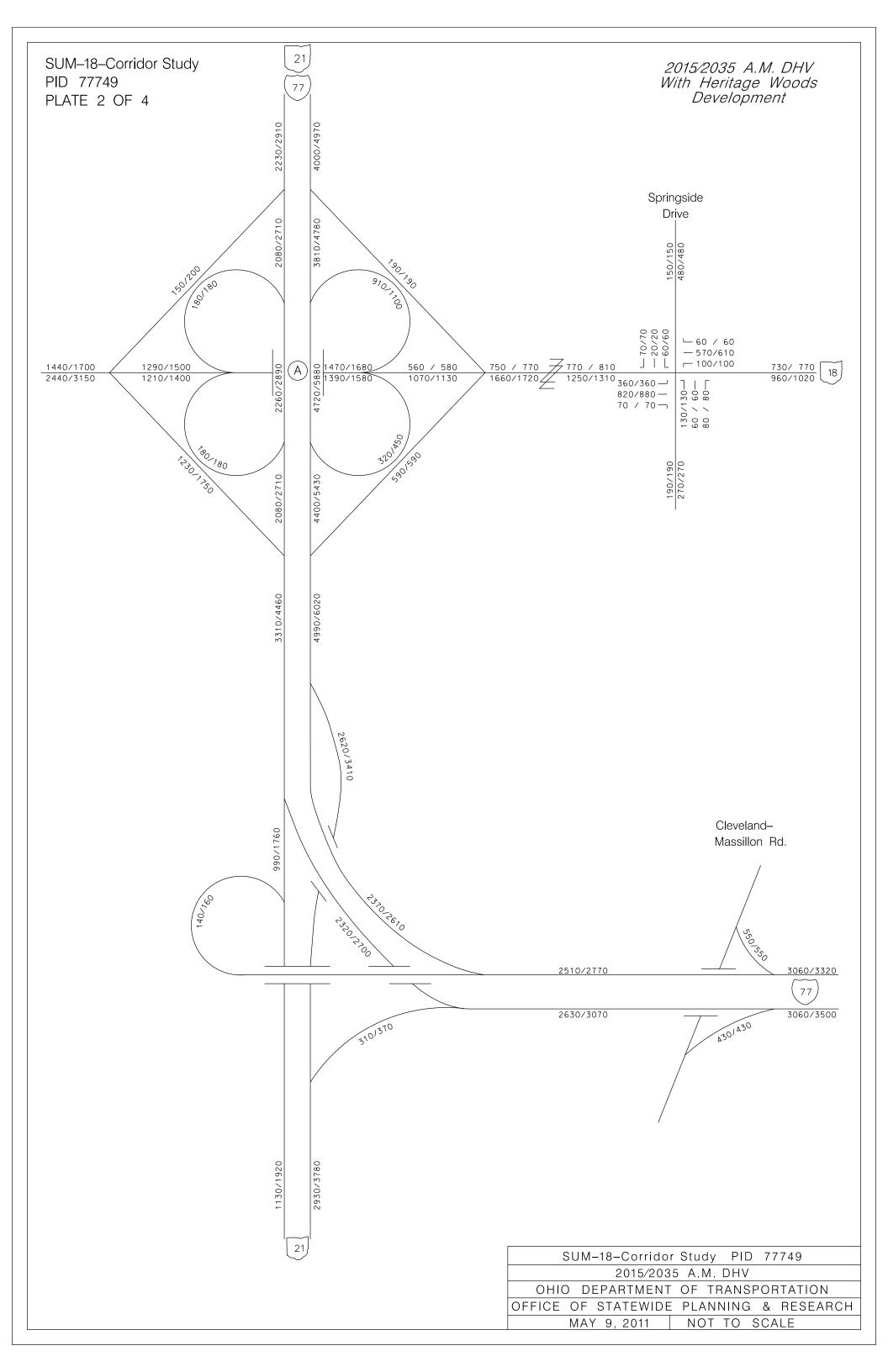
All other locations

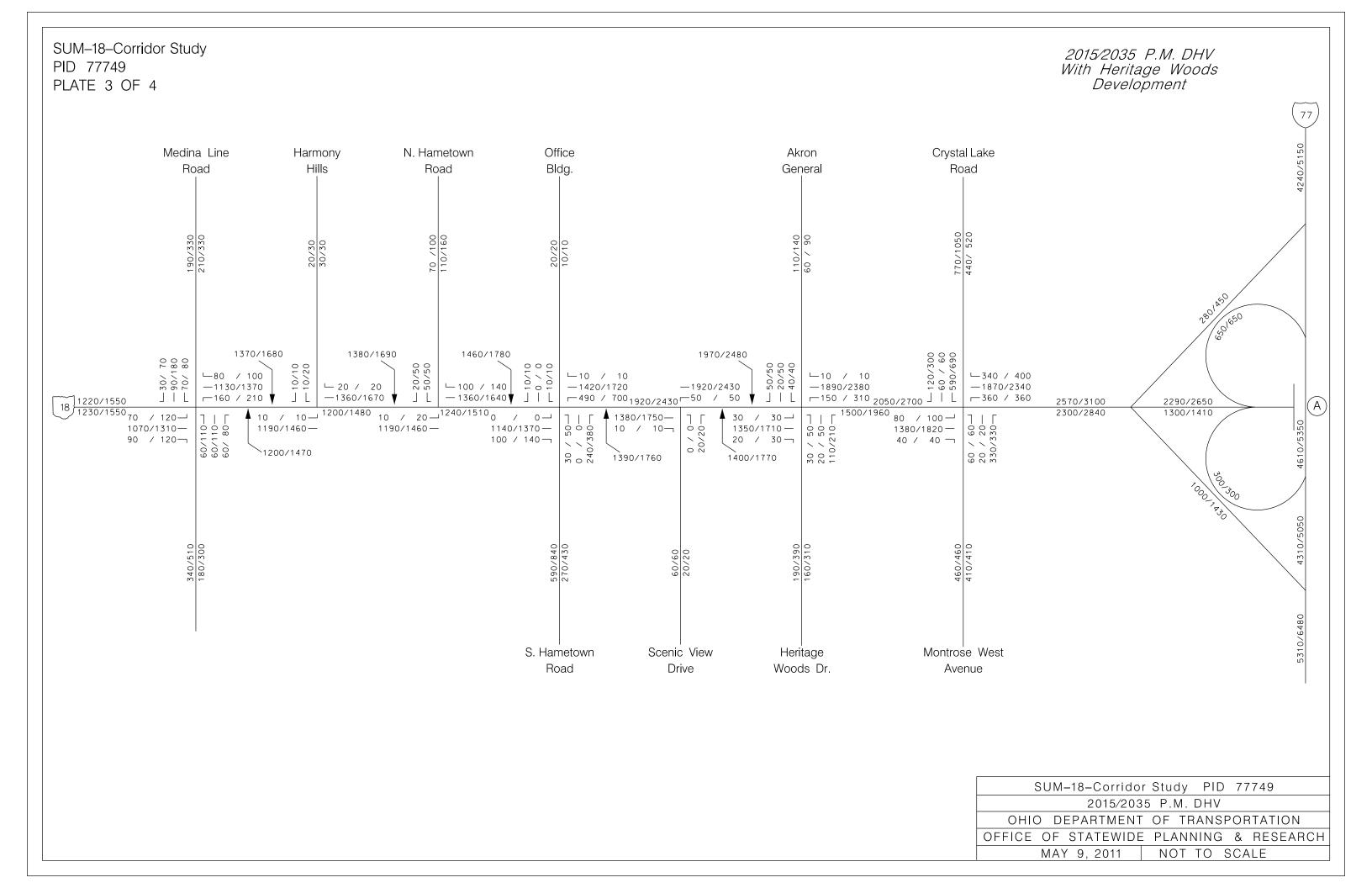
A.M. TD: 0.02 P.M. TD: 0.02

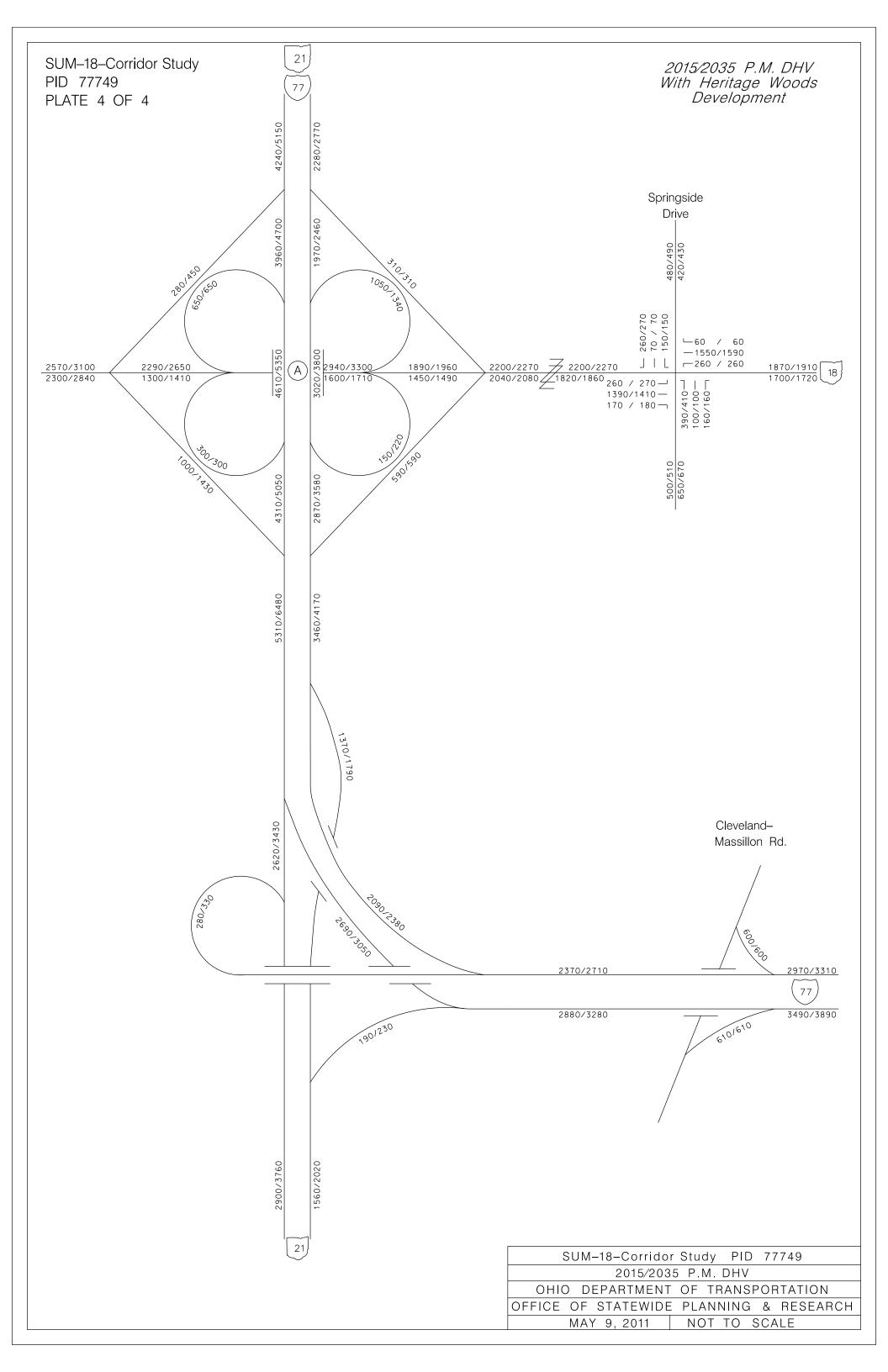
If you have any questions, please contact me at (614) 644-8195.

c: M. Byram, OSPR – G. Giaimo, OSPR – File

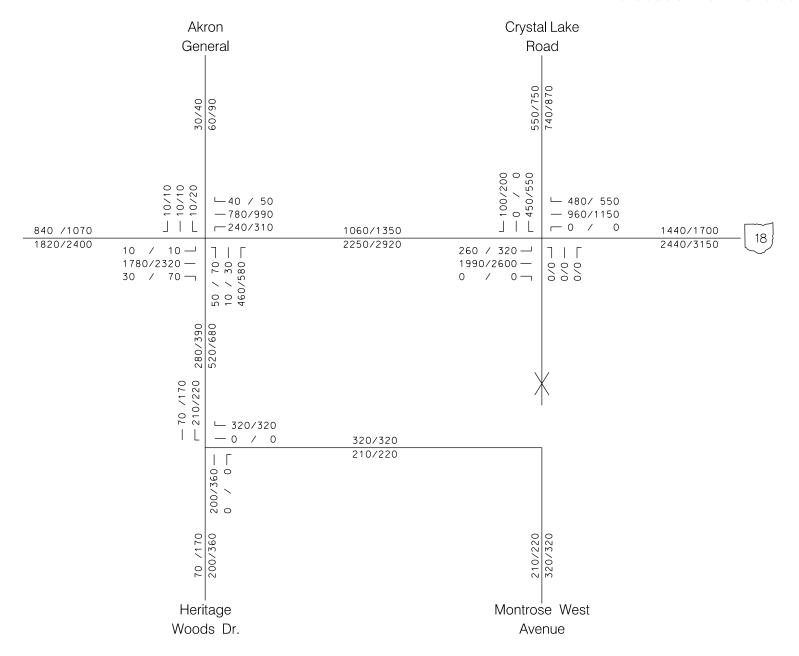




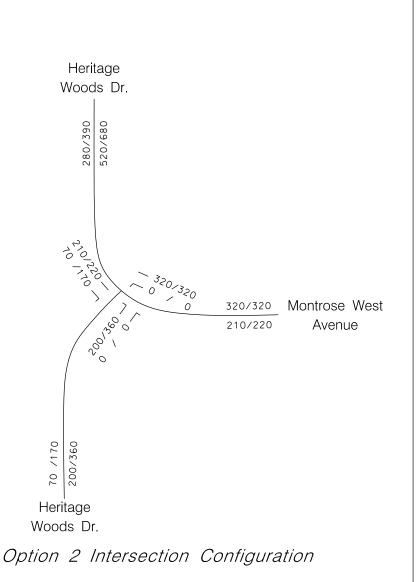


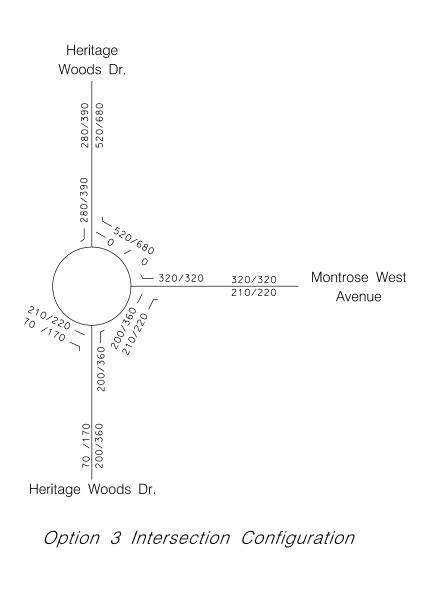


RELOCATE MONTROSE WEST TO HERITAGE WOODS PLATE 1 OF 2 2015/2035 A.M. DHV With Heritage Woods Development and Relocation of Montrose West



Option 1 Intersection Configuration





RELOCATE MONTROSE WEST

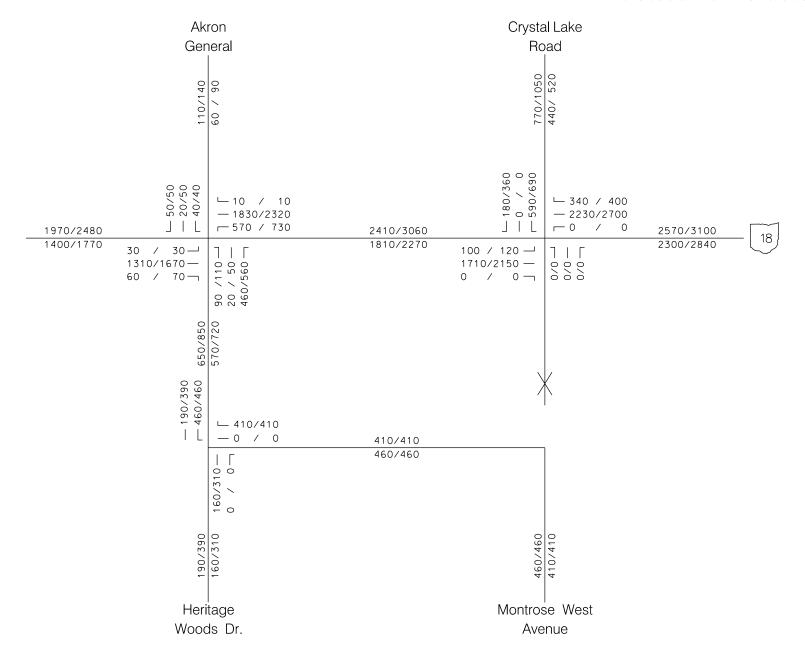
2015/2035 A.M. DHV

OHIO DEPARTMENT OF TRANSPORTATION

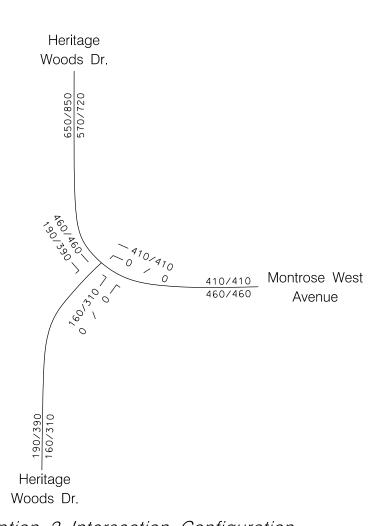
OFFICE OF STATEWIDE PLANNING & RESEARCH

MAY 9, 2011 NOT TO SCALE

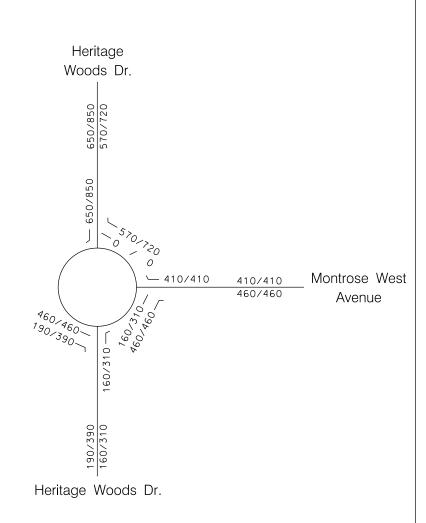
RELOCATE MONTROSE WEST TO HERITAGE WOODS PLATE 2 OF 2 2015/2035 P.M. DHV With Heritage Woods Development and Relocation of Montrose West



Option 1 Intersection Configuration



Option 2 Intersection Configuration



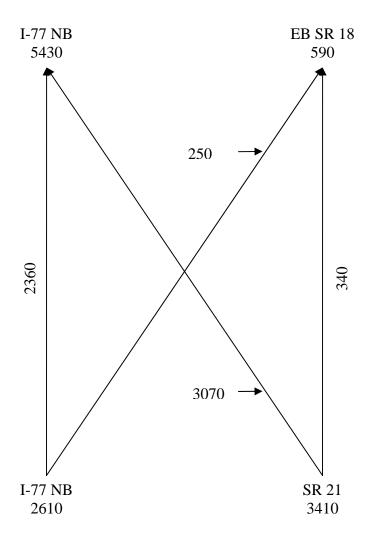
Option 3 Intersection Configuration

RELOCATE MONTROSE WEST				
2015/2035 P.M. DHV				
OHIO DEPARTMENT OF TRANSPORTATION				
OFFICE OF STATEWIDE PLANNING & RESEARCH				
MAY 9, 2011	NOT TO SCALE			

2035 AM Weave Volumes

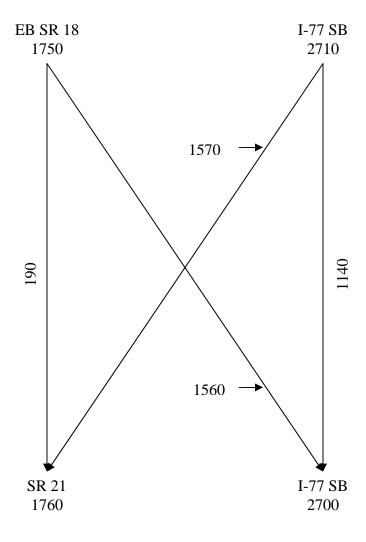
Weave 1 - I-77 Northbound from SR 21 to SR 18

% of CUBE volume on off-ramp to EB SR 18 that comes from I-77 = 1218/2827 = 43% 0.43*590 = 250 vehicles



% of CUBE volumes on off-ramp to SR 21 that come from EB SR 18 on-ramp = 350/3247 = 11%

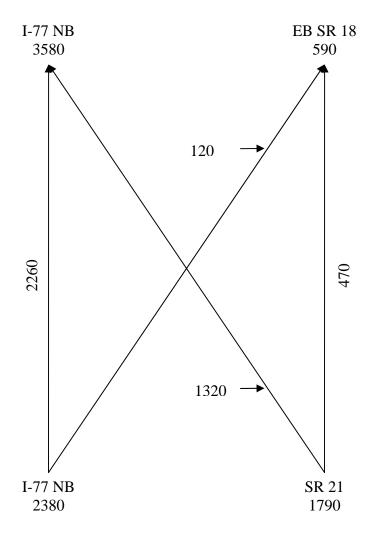
0.11 * 1760 = **190 vehicles**



2035 PM Weave Volumes

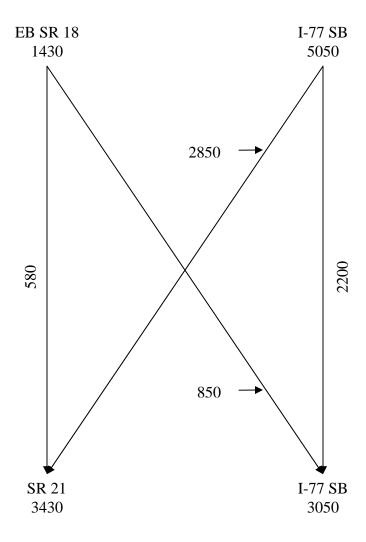
Weave 1 – I-77 Northbound from SR 21 to SR 18

% of CUBE volume on off-ramp to EB SR 18 that comes from I-77 = 400/1878 = 21% 0.21 * 590 = 120 vehicles



% of CUBE volumes on off-ramp to SR 21 that comes from EB SR 18 on-ramp = 1038/6099 = 17%

0.17 * 3430 = **580 vehicles**



Appendix C

Freeway LOS Analysis

Phone: E-mai I :		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I-77 SB North of Ramp to SR 2035	2 18 WB	
	Flow Inputs and Ad	ljustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population factor Flow rate, vp	T E, ER t, fHV	2910 0.90 808 6 0 Level 0.00 0.00 1.5 1.2 0.971 1.00	veh/h v % % mi pc/h/I n
	Speed Inputs and A	djustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustment Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 3 Measured 70.0 0.0 0.0 0.0 0.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performand	e Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	1110 70.0 70.0 3 15.9 B	pc/h/l n mi /h mi /h pc/mi /l n

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RMK Burgess & Niple Ind 9/6/2011 PM Peak Hour I-77 SB North of Ramp to SF 2035 Corridor Study PID	R 18 WB	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population factor Flow rate, vp	T E, ER it, fHV	5150 0. 90 1431 6 0 Level 0. 00 0. 00 1. 5 1. 2 0. 971 1. 00 1965	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustment, Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 3 Measured 70.0 0.0 0.0 0.0 0.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	speed, S	1965 70. 0 65. 5 3 30. 0	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mai I :		Fax:			
	Di ver	ge Analysis_			
Agency/Co.: Date performed: Analysis time period: Freeway/Dir of Travel: Junction: Jurisdiction:	MK Jurgess & Niplo /6/2011 M Peak Hour -77 SB xit to SR 18 \	e Inc			
	Free	way Data			
Type of analysis Number of lanes in freewa Free-flow speed on freewa Volume on freeway	y y	Di verç 3 70. 0 2910		mph vph	
	0ff R	amp Data			
Side of freeway Number of lanes in ramp Free-Flow speed on ramp Volume on ramp Length of first accel/dec Length of second accel/de		Ri ght 1 35. 0 200 500		mph vph ft ft	
	Adjacent Ramp	Data (if or	ne exists)	
Does adjacent ramp exist? Volume on adjacent ramp Position of adjacent ramp Type of adjacent ramp Distance to adjacent ramp		No		vph ft	
Conve	rsion to pc/h	Under Base	Condi ti o	ns	
Junction Components Volume, V (vph) Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Length Trucks and buses PCE, ET Recreational vehicle PCE, Heavy vehicle adjustment, Driver population factor, Flow rate, vp	ER fHV	Freeway 2910 0.90 808 6 0 Level 0.00 % 0.00 mi 1.5 1.2 0.971 1.00 3330	Ramp 200 0.90 56 7 0 Level 0.00 0.00 1.5 1.2 0.966 1.00 230	% mi	Adjacent Ramp vph v % % mi
L = EQ	•	ation 25-8 (_		
P = FD V = V	0.666 Using + (v - v) P	-	5 pc/h		
V = V	+ (v - v) P	= 2295	pc/n		

_Capacity Checks__

		000.1.0	
V = V	Actual 3330	Maxi mum 7200	LOS F? No
Fi F V = V - V FO F R	3100	7200	No
ro r k V R	230	2000	No
v v 3 or av34	1035 pc/h	(Equation 25-15	or 25-16)
Is v v > 2700 p	oc/h?	No	
Is $v v > 1.5 v$		No	
3 or av34 1 If yes, v = 2295 12A	2	(Equation 25-18)
FI ow		erge Influence Ar	ea
Actu V 2295		Desi rabl e)	Violation? No
Level of	Service Determ	nination (if not	F)
Density, D=	4. 252 + 0. 008	36 v - 0.009 L	= 19.5 pc/mi/ln
Level of service for ramp-	freeway juncti		uence B
	Speed Estim	nati on	
Intermediate speed variabl	e,	D = 0.449	
Space mean speed in ramp i	nfluence area,	_	mph
Space mean speed in outer	l anes,	S = 76.7	mph
Space mean speed for all v	ehi cl es	0 S = 62.3	mph

Phone: E-mail:		Fax:			
	Di ver	ge Analysis_			
Agency/Co.: Date performed: Analysis time period: Freeway/Dir of Travel: Junction: Jurisdiction: Analysis Year: Description: Summit 18	Exit to SR 18 2035 Corridor Study	WB PID 77749			
	Free	way bata			
Type of analysis Number of lanes in freew Free-flow speed on freew Volume on freeway	ay ay	Di verç 3 70. 0 5150		mph vph	
	Off R	amp Data			
Side of freeway Number of lanes in ramp Free-Flow speed on ramp Volume on ramp Length of first accel/de Length of second accel/d		Ri ght 1 35.0 450 500		mph vph ft ft	
		Data (if or	na avists	`	
Does adjacent ramp exist Volume on adjacent ramp Position of adjacent ram Type of adjacent ramp Distance to adjacent ram	? p	No No	ic carsts	∨ph ft	
Conv	ersion to pc/h	Under Base	Condi ti o	ns	
Junction Components		Freeway	Ramp		Adjacent Ramp
Volume, V (vph) Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Length Trucks and buses PCE, ET Recreational vehicle PCE Heavy vehicle adjustment Driver population factor Flow rate, vp	, ER , f HV	5150 0. 90 1431 6 0 Level 0. 00 % 0. 00 mi 1. 5 1. 2 0. 971 1. 00 5894	450 0.90 125 2 0 Level 0.00 0.00 1.5 1.2 0.990 1.00 505	% mi	vph vph v % mi
	_Estimation of	V12 Diverge	e Areas		
L =		ation 25-8 d			
EQ P =	0.589 Usi n	g Equation	5		
FD V = V	+ (v - v) P	= 3681	pc/h		

_Capacity Checks__

V = V Fi F	Actual 5894	Maxi mum 7200	LOS F? No
V = V - V	5389	7200	No
FO F R	505	2000	No
R V V	2213 pc/h	(Equation 25-15	or 25-16)
3 or av34 Is v v > 2700 p	c/h?	No	
3 or av34 Is v v > 1.5 v		No	
3 or av34 1 If yes, v = 3681 12A	2	(Equation 25-18)
FI ow	Entering Dive	rge Influence Ar	ea
Actu v 3681 12			Violation? No
	Service Determ	ination (if not	F)
Density, D =	4. 252 + 0. 008	6 v - 0.009 L	= 31.4 pc/mi/ln
Level of service for ramp-	freeway juncti	on areas of infl	uence D
	Speed Estim	ation	

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RMK Burgess & Niple Ind 9/6/2011 AM Peak Hour I-77 SB South of Exit to SI 2035 Corridor Study PID	R 18 WB	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment Length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population facto Flow rate, vp	E, ER t, fHV	2710 0. 90 753 6 0 Level 0. 00 0. 00 1. 5 1. 2 0. 971 1. 00 1034	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 3 Measured 70.0 0.0 0.0 0.0 0.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	1034 70. 0 70. 0 3 14. 8 B	pc/h/l n mi /h mi /h pc/mi /l n

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I-77 SB South of Exit to SF 2035	R 18 WB	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment Length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population facto Flow rate, vp	T E, ER t, fHV	4700 0. 90 1306 6 0 Level 0. 00 0. 00 1. 5 1. 2 0. 971 1. 00 1793	veh/h v % % mi pc/h/In
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 3 Measured 70.0 0.0 0.0 0.0 0.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	1793 70. 0 67. 9 3 26. 4 D	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analy:	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RMK Burgess & Niple Inc 9/6/2011 AM Peak Hour I-77 SB WB SR 18 On-Ramp Vo 2035 Corridor Study PID	ol/Lane DBL	
	Flow Inputs and A	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population facto Flow rate, vp	T E, ER t, fHV	360 0. 90 100 4 0 Level 0. 00 0. 00 1. 5 1. 2 0. 980 1. 00 204	veh/h v % % mi pc/h/In
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 2 Measured 55.0 0.0 0.0 4.5 55.0 Urban Freeway	ft ft i nterchange/mi mi /h
	LOS and Performan	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	204 55. 0 55. 0 2 3. 7 A	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I -77 SB WB SR 18 On-Ramp Vo 2035	ol/Lane DBL	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment Length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population factor	T E, ER t, fHV	1300 0. 90 361 4 0 Level 0. 00 0. 00 1. 5 1. 2 0. 980 1. 00 737	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustment, Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 2 Measured 55.0 0.0 0.0 4.5 55.0 Urban Freeway	ft ft i nterchange/mi mi /h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	737 55. 0 55. 0 2 13. 4 B	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:	Fax	x :			
Operati	onal Anal	ysi s			
Analyst: RMK Agency/Co.: Burgess & Nip Date Performed: 9/6/2011 Analysis Time Period: AM Peak Hour Freeway/Dir of Travel: I-77 SB Weaving Location: WB SR 18 On to Jurisdiction: Analysis Year: 2035 Description: Summit 18 Corridor Study	o EB SR ´				
l n	puts				
Freeway free-flow speed, SFF Weaving number of lanes, N Weaving segment length, L Terrain type Grade Length Weaving type Volume ratio, VR Weaving ratio, R	A O.		mph ft % mi	ו	
Conversion to pc/h	Under Ba	ase Cond	ditions		
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Trucks and buses PCE, ET Recreational vehicle PCE, ER Heavy vehicle adjustment, fHV Driver population adjustment, fP Flow rate, v	Non-Wea V o1 2530 0. 90 703 6 0 1. 5 1. 2 0. 971 1. 00 2895	evi ng V 02 0.90 0 0 1.5 1.2 1.000 1.00	Weavi no V w1 180 0.90 50 4 0 1.5 1.2 0.980 1.00 204	W2 180 0.90 50 8 0 1.5 1.2 0.962 1.00 208	veh/h v % % pc/h
Weaving and No	n-Weavi no	g Speeds	S		
a (Exhibit 24-6) b (Exhibit 24-6) c (Exhibit 24-6) d (Exhibit 24-6) Weaving intensity factor, Wi Weaving and non-weaving speeds, Si Number of lanes required for unconstrained operation, Nw (Exhibit Maximum number of lanes, Nw (max) (Exi Type of operation is	Weavi no 0. 15 2. 20 0. 97 0. 80 0. 60 52. 48 24-7) hi bi t 24-	((((((Non-Weavir 0.0035 1.00 1.30 0.75 0.22 64.08 0.77 1.40 Jnconstrai		
Weaving Segment Speed, Densi	ty, Level				/
Weaving segment speed, S Weaving segment density, D Level of service, LOS Capacity of base condition, cb Capacity as a 15-minute flow rate, c	62. 36 13. 26 B 8209	mph pc/mi/l pc/h pc/h			

Limitations on Weaving Segments_

		If Max Exce	eded See Note
	Anal yzed	Maxi mum	Note
Weaving flow rate, Vw	412	2800	а
Average flow rate (pcphpl)	826	2400	b
Volume ratio, VR	0. 12	0. 35	С
Weaving ratio, R	0. 50	N/A	d
Weaving Length (ft)	840	2500	е
Notas			

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: E-mail:	Fa	x:			
0pe	rational Ana	l ysi s			
Date Performed: 9/6/2011 Analysis Time Period: PM Peak H Freeway/Dir of Travel: I-77 SB	On to EB SR				
	Inputs				
Freeway free-flow speed, SFF Weaving number of lanes, N Weaving segment length, L Terrain type Grade Length Weaving type Volume ratio, VR Weaving ratio, R	4 8 L A 0	40 evel	mpl ft % mi	ר	
Conversion to	oc/h Under B	ase Cond	ditions		
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Trucks and buses PCE, ET Recreational vehicle PCE, ER Heavy vehicle adjustment, fHV Driver population adjustment, fP Flow rate, v	Non-We V 01 4400 0.90 1222 6 0 1.5 1.2 0.971 1.00 5035	V 02 0 0. 90 0 0 0 0 1. 5 1. 2 1. 000 1. 00	Weavi no V w1 650 0.90 181 4 0 1.5 1.2 0.980 1.00 736	W2 300 0.90 83 4 0 1.5 1.2 0.980 1.00 340	veh/h v % % pc/h
Weaving an	d Non-Weavin	g Speeds	5		
a (Exhibit 24-6) b (Exhibit 24-6) c (Exhibit 24-6) d (Exhibit 24-6) Weaving intensity factor, Wi Weaving and non-weaving speeds, S Number of lanes required for unconstrained operation, Nw (Exhi Maximum number of lanes, Nw (max)	oit 24-7)	-7)	Non-Weavi I D. 0035 4. 00 1. 30 D. 75 D. 59 52. 70 1. 03 1. 40		
Type of operation is			Jnconstrai		
Weaving Segment Speed, D Weaving segment speed, S Weaving segment density, D Level of service, LOS Capacity of base condition, cb Capacity as a 15-minute flow rate	50. 50 30. 25 D 7843	mph pc/mi/l pc/h pc/h		Capaci ty	<i>J</i>

____Limitations on Weaving Segments_

		eded See Note	
	Anal yzed	Maxi mum	Note
Weaving flow rate, Vw	1076	2800	a
Average flow rate (pcphpl)	1527	2400	b
Volume ratio, VR	0. 18	0. 35	С
Weaving ratio, R	0. 32	N/A	d
Weaving Length (ft)	840	2500	е
Notas			

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I-77 SB EB SR 18 Off-Ramp \ 2035	/ol/Lane DBL	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment Length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population facto Flow rate, vp	T E, ER t, fHV	360 0. 90 100 8 0 Level 0. 00 0. 00 1. 5 1. 2 0. 962 1. 00 208	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 2 Measured 55.0 0.0 0.0 4.5 55.0 Urban Freeway	ft ft i nterchange/mi mi /h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	208 55. 0 55. 0 2 3. 8 A	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analy	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I-77 SB EB SR 18 Off-Ramp	Vol/Lane DBL	
	Flow Inputs and A	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population factor Flow rate, vp	T E, ER t, fHV	600 0.90 167 4 0 Level 0.00 0.00 1.5 1.2 0.980 1.00 340	veh/h v % % mi pc/h/I n
	Speed Inputs and	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustment Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 2 Measured 55.0 0.0 0.0 4.5 55.0 Urban Freeway	ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performan	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	340 55. 0 55. 0 2 6. 2 A	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mai I :		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I-77 SB South of Exit to SR 2035	? 18 EB	
	Flow Inputs and Ad	ljustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population factor Flow rate, vp	T E, ER t, fHV	2710 0.90 753 6 0 Level 0.00 0.00 1.5 1.2 0.971 1.00	veh/h v % % mi pc/h/I n
	Speed Inputs and A	djustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 3 Measured 70.0 0.0 0.0 0.0 0.0 J.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performand	e Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	1034 70. 0 70. 0 3 14. 8 B	pc/h/l n mi /h mi /h pc/mi /l n

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RMK Burgess & Niple Ind 9/6/2011 PM Peak Hour I-77 SB South of Exit to SF 2035 Corridor Study PID	R 18 EB	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population factor Flow rate, vp	T E, ER it, fHV	5050 0. 90 1403 6 0 Level 0. 00 0. 00 1. 5 1. 2 0. 971 1. 00 1926	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustment, Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 3 Measured 70.0 0.0 0.0 0.0 0.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	speed, S	1926 70. 0 66. 2 3 29. 1 D	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RMK Burgess & Niple Ind 9/6/2011 AM Peak Hour I-77 SB EB SR 18 On-Ramp Vo 2035 Corridor Study PID	ol/Lane DBL	
	Flow Inputs and A	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population factor Flow rate, vp	T CE, ER nt, fHV	3500 0. 90 972 7 0 Level 0. 00 0. 00 1. 5 1. 2 0. 966 1. 00 2012	veh/h v % % mi pc/h/l n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustment, Free-flow speed, FFS	fLW stment, fLC ustment, fID	12.0 6.0 0.50 2 Measured 55.0 0.0 0.0 4.5 55.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performan	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	speed, S	2012 55. 0 54. 1 2 37. 2 E	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I - 77 SB EB SR 18 On - Ramp Vo 2035	ol/Lane DBL	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment Length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population facto Flow rate, vp	T E, ER t, fHV	2860 0. 90 794 7 0 Level 0. 00 0. 00 1. 5 1. 2 0. 966 1. 00 1644	veh/h v % % mi pc/h/In
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 2 Measured 55.0 0.0 0.0 4.5 55.0 Urban Freeway	ft ft i nterchange/mi mi /h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	1644 55. 0 55. 0 2 29. 9 D	pc/h/ln mi/h mi/h pc/mi/ln

HCS+: Freeway Weaving Release 5.5

Phone: E-mail: Fax:

_____Operational Analysis_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 2/21/2012
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-77 SB

Weaving Location: EB SR 18 On to SR 21 Off

Jurisdiction:

Weaving ratio, R

Analysis Year: 2035

Description: Summit 18 Corridor Study PID 77749

_____Inputs_____ Freeway free-flow speed, SFF 70 mph Weaving number of lanes, N 4 Weaving segment length, L 2300 ft Terrain type Level % Grade Length mi Weaving type В Volume ratio, VR 0.70

_____Conversion to pc/h Under Base Conditions_____

0.49

	Non-Weaving		Weaving		
	V	V	V	V	
	01	02	w1	w2	
Volume, V	1140	190	1570	1560	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	317	53	436	433	V
Trucks and buses	6	3	6	3	용
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.985	0.971	0.985	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1304	214	1796	1759	pc/h

______Weaving and Non-Weaving Speeds_____

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.20	6.00
c (Exhibit 24-6)	0.70	1.00
d (Exhibit 24-6)	0.50	0.50
Weaving intensity factor, Wi	0.80	1.28
Weaving and non-weaving speeds, Si	48.37	41.31

Number of lanes required for

unconstrained operation,	Nw	(Exhibit 24-7)		3.23
Maximum number of lanes,	Nw	(max) (Exhibit	24-7)	3.50
Type of operation is				Unconstrained

_______Weaving Segment Speed, Density, Level of Service and Capacity______

Weaving segment speed, S	46.02	mph
Weaving segment density, D	27.56	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	5754	pc/h
Capacity as a 15-minute flow rate, c	5586	pc/h
Capacity as a full-hour volume, ch	5027	pc/h

_____Limitations on Weaving Segments______

		If Max Exce	eded See Note
	Analyzed	Maximum	Note
Weaving flow rate, Vw	3555	4000	a
Average flow rate (pcphpl)	1268	2400	b
Volume ratio, VR	0.70	0.80	C
Weaving ratio, R	0.49	N/A	d
Weaving length (ft)	2300	2500	е
Not og:			

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

HCS+: Freeway Weaving Release 5.5

Phone: E-mail: Fax:

_____Operational Analysis_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 2/21/2012
Analysis Time Period: PM Peak Hour

Freeway/Dir of Travel: I-77 SB

Weaving Location: EB SR 18 On to SR 21 Off

Jurisdiction:

Weaving ratio, R

Analysis Year: 2035

Description: Summit 18 Corridor Study PID 77749

_____Inputs_____ Freeway free-flow speed, SFF 70 mph Weaving number of lanes, N 4 Weaving segment length, L 2300 ft Terrain type Level % Grade Length mi Weaving type В Volume ratio, VR 0.57

______Conversion to pc/h Under Base Conditions_____

0.23

	Non-Weaving		Weaving		
	V	V	V	V	
	01	02	w1	w2	
Volume, V	2200	580	2850	850	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	611	161	792	236	V
Trucks and buses	6	3	3	6	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.985	0.985	0.971	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2517	654	3214	972	pc/h

______Weaving and Non-Weaving Speeds_____

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.20	6.00
c (Exhibit 24-6)	0.70	1.00
d (Exhibit 24-6)	0.50	0.50
Weaving intensity factor, Wi	0.87	1.14
Weaving and non-weaving speeds, Si	47.14	42.98
Number of lanes required for		

unconstrained operation,	Nw	(Exhibit 24-7)		2.65
Maximum number of lanes,	Nw	(max) (Exhibit	24-7)	3.50
Type of operation is				Unconstrained

_______Weaving Segment Speed, Density, Level of Service and Capacity______

Weaving segment speed, S	45.25	mph
Weaving segment density, D	40.64	pc/mi/ln
Level of service, LOS	E	
Capacity of base condition, cb	7030	pc/h
Capacity as a 15-minute flow rate, c	6825	pc/h
Capacity as a full-hour volume, ch	6142	pc/h

_____Limitations on Weaving Segments______

		If Max Exce	eded See Note
	Analyzed	Maximum	Note
Weaving flow rate, Vw	4186	4000	a
Average flow rate (pcphpl)	1839	2400	b
Volume ratio, VR	0.57	0.80	C
Weaving ratio, R	0.23	N/A	d
Weaving length (ft)	2300	2500	е
No. to a second			

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

HCS+: Freeway Weaving Release 5.5

Phone: E-mail: Fax:

_____Operational Analysis_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 2/21/2012 Analysis Time Period: AM Peak Hour Freeway/Dir of Travel: I-77 NB

Weaving Location: SR 21 On and SR 18 Off

Jurisdiction:

Weaving ratio, R

Analysis Year: 2035

Description: Summit 18 Corridor Study PID 77749

_____Inputs______Freeway free-flow speed, SFF 70 mph

Weaving number of lanes, N 4
Weaving segment length, L 1300 ft
Terrain type Level
Grade
Length %
Weaving type C
Volume ratio, VR 0.55

_____Conversion to pc/h Under Base Conditions_____

0.07

	Non-Weaving		Weaving		
	V	V	V	V	
	01	02	w1	w2	
Volume, V	2360	340	3070	250	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	656	94	853	69	v
Trucks and buses	6	3	6	3	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.985	0.971	0.985	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2700	383	3513	281	pc/h

______Weaving and Non-Weaving Speeds_____

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	1.15	1.37
Weaving and non-weaving speeds, Si	42.87	40.33
Number of lanes required for		

unconstrained operation,	Nw	(Exhibit 24-7)		2.63
Maximum number of lanes,	Nw	(max) (Exhibit	24-7)	3.00
Type of operation is				Unconstrained

_______Weaving Segment Speed, Density, Level of Service and Capacity______

Weaving segment speed, S	41.69	mph
Weaving segment density, D	41.24	pc/mi/ln
Level of service, LOS	E	
Capacity of base condition, cb	6952	pc/h
Capacity as a 15-minute flow rate, c	6750	pc/h
Capacity as a full-hour volume, ch	6075	pc/h

_____Limitations on Weaving Segments______

		If Max Exce	eded See Note
	Analyzed	Maximum	Note
Weaving flow rate, Vw	3794	3500	a
Average flow rate (pcphpl)	1719	2400	b
Volume ratio, VR	0.55	0.50	C
Weaving ratio, R	0.07	0.40	d
Weaving length (ft)	1300	2500	е
Not og:			

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

HCS+: Freeway Weaving Release 5.5

Phone: E-mail: Fax:

_____Operational Analysis_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 2/21/2012
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-77 NB

Weaving Location: SR 21 On and SR 18 Off

Jurisdiction:

Weaving ratio, R

Analysis Year: 2035

Description: Summit 18 Corridor Study PID 77749

_____Inputs_____ Freeway free-flow speed, SFF 70 mph Weaving number of lanes, N 4 Weaving segment length, L 1300 ft Terrain type Level 응 Grade Length mi Weaving type C Volume ratio, VR 0.35

______Conversion to pc/h Under Base Conditions_____

0.08

	Non-Weaving		Weaving		
	V	V	V	V	
	01	02	w1	w2	
Volume, V	2260	470	1320	120	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	628	131	367	33	v
Trucks and buses	6	2	6	2	%
Recreational vehicles	0	0	0	0	%
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.990	0.971	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2586	527	1510	134	pc/h

_______Weaving and Non-Weaving Speeds_____

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.30	6.00
c (Exhibit 24-6)	0.80	1.10
d (Exhibit 24-6)	0.60	0.60
Weaving intensity factor, Wi	0.62	0.39
Weaving and non-weaving speeds, Si	52.07	58.22
Number of lanes required for		

unconstrained operation,	Nw	(Exhibit 24-7)		2.41
Maximum number of lanes,	Nw	(max) (Exhibit	24-7)	3.00
Type of operation is				Unconstrained

_______Weaving Segment Speed, Density, Level of Service and Capacity______

Weaving segment speed, S	55.94	mph
Weaving segment density, D	21.26	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	8300	pc/h
Capacity as a 15-minute flow rate, c	8058	pc/h
Capacity as a full-hour volume, ch	7252	pc/h

_____Limitations on Weaving Segments______

		If Max Exceeded See No	
	Analyzed	Maximum	Note
Weaving flow rate, Vw	1644	3500	а
Average flow rate (pcphpl)	1189	2400	b
Volume ratio, VR	0.35	0.50	C
Weaving ratio, R	0.08	0.40	d
Weaving length (ft)	1300	2500	е

Notes:

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RMK Burgess & Niple Ind 9/6/2011 AM Peak Hour I-77 NB EB SR 18 Off-Ramp V 2035 Corridor Study PID	Vol/Lane DBL	
	Flow Inputs and A	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment Length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population facto Flow rate, vp	T E, ER t, fHV	1180 0. 90 328 3 0 Level 0. 00 0. 00 1. 5 1. 2 0. 985 1. 00 665	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 2 Measured 55.0 0.0 0.0 4.5 55.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performan	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	665 55. 0 55. 0 2 12. 1 B	pc/h/l n mi /h mi /h pc/mi /l n

Phone: E-mail:		Fax:	
	Operational Analys	i s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I-77 NB EB SR 18 Off-Ramp V 2035	ol/Lane DBL	
	Flow Inputs and Ad	justments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population facto Flow rate, vp	T E, ER t, fHV	1180 0. 90 328 2 0 Level 0. 00 0. 00 1. 5 1. 2 0. 990 1. 00 662	veh/h v % % mi pc/h/I n
	Speed Inputs and A	djustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 2 Measured 55.0 0.0 0.0 4.5 55.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performanc	e Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	662 55. 0 55. 0 2 12. 0 B	pc/h/l n mi /h mi /h pc/mi /l n

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I-77 NB North of Ramp to SF 2035	R 18 EB	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment Length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population facto Flow rate, vp	T E, ER t, fHV	5430 0. 90 1508 6 0 Level 0. 00 0. 00 1. 5 1. 2 0. 971 1. 00 2071	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 3 Measured 70.0 0.0 0.0 0.0 0.0 Urban Freeway	ft ft i nterchange/mi mi /h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	2071 70. 0 63. 4 3 32. 7	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RMK Burgess & Niple Ind 9/6/2011 PM Peak Hour I-77 NB North of Ramp to SI 2035 Corridor Study PID	R 18 EB	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population factor Flow rate, vp	T E, ER it, fHV	3580 0.90 994 6 0 Level 0.00 0.00 1.5 1.2 0.971 1.00 1366	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustment, Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 3 Measured 70.0 0.0 0.0 0.0 0.0 0.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performan	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	speed, S	1366 70. 0 70. 0 3 19. 5 C	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RMK Burgess & Niple Ind 9/6/2011 AM Peak Hour I-77 NB EB SR 18 On-Ramp Vo 2035 Corridor Study PID	ol/Lane DBL	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population facto Flow rate, vp	T E, ER t, fHV	900 0.90 250 4 0 Level 0.00 0.00 1.5 1.2 0.980 1.00 510	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustment Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 2 Measured 55.0 0.0 0.0 4.5 55.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	510 55. 0 55. 0 2 9. 3 A	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analys	si s	· · · · · · · · · · · · · · · · · · ·
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I - 77 NB EB SR 18 On - Ramp Vo 2035	ol/Lane DBL	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population facto Flow rate, vp	T E, ER t, fHV	440 0.90 122 3 0 Level 0.00 0.00 1.5 1.2 0.985 1.00 248	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 2 Measured 55.0 0.0 0.0 4.5 55.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	248 55. 0 55. 0 2 4. 5 A	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mai I :	Fax	ί:			
Operatio	nal Anal	ysi s			
Analyst: Agency/Co.: Date Performed: Analysis Time Period: Freeway/Dir of Travel: Jurisdiction: Analysis Year: Description: RMK Burgess & Nipl 9/6/2011 AM Peak Hour I-77 NB EB SR 18 On to 2035 Corridor Study) WB SR 1				
I np	outs				
Freeway free-flow speed, SFF Weaving number of lanes, N Weaving segment length, L Terrain type Grade Length Weaving type Volume ratio, VR Weaving ratio, R	Le A O.	000 evel 27 28	mph ft % mi	1	
Conversion to pc/h	Under Ba	ise Cor	ndi ti ons		
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Trucks and buses PCE, ET Recreational vehicle PCE, ER Heavy vehicle adjustment, fHV Driver population adjustment, fP Flow rate, v	Non-Weav V 01 4330 0. 90 1203 6 0 1. 5 1. 2 0. 971 1. 00 4955	vi ng V 02 0. 90 0 0 1. 5 1. 2 1. 000 0	Weavi no V w1 450 0.90 125 4 0 1.5 1.2 0.980 1.00 510	W2 1100 0.90 306 12 0 1.5 1.2 0.943 1.00 1295	veh/h v % % pc/h
Weaving and Nor	n-Weavi ng	Speed	ls		
a (Exhibit 24-6) b (Exhibit 24-6) c (Exhibit 24-6) d (Exhibit 24-6) Weaving intensity factor, Wi Weaving and non-weaving speeds, Si Number of lanes required for unconstrained operation, Nw (Exhibit 2 Maximum number of lanes, Nw (max) (Exhippe of operation is	Weavi no 0. 15 2. 20 0. 97 0. 80 1. 36 40. 43 24-7) ni bi t 24-	7)	Non-Weavir 0.0035 4.00 1.30 0.75 0.80 48.39 1.39 1.40 Unconstrai		
Weaving Segment Speed, Densit	y Loyel				.,
Weaving segment speed, S Weaving segment density, D Level of service, LOS Capacity of base condition, cb Capacity as a 15-minute flow rate, c	45. 97 36. 76 E 7487	mph pc/mi/ pc/h pc/h		capaci ty	y

_____Limitations on Weaving Segments_

		If Max Exce	eded See Note
	Anal yzed	Maxi mum	Note
Weaving flow rate, Vw	1805	2800	a
Average flow rate (pcphpl)	1690	2400	b
Volume ratio, VR	0. 27	0. 35	С
Weaving ratio, R	0. 28	N/A	d
Weaving Length (ft)	1000	2500	е
Motos:			

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: E-mail:	Fax	(:			
Operation	nal Anal	ysi s			
Analyst: RMK Agency/Co.: Burgess & Niple Inc Date Performed: 9/6/2011 Analysis Time Period: PM Peak Hour Freeway/Dir of Travel: I-77 NB Weaving Location: EB SR 18 On to WB SR 18 Off Jurisdiction: Analysis Year: 2035 Description: Summit 18 Corridor Study PID 77749					
I np	outs				
Freeway free-flow speed, SFF Weaving number of lanes, N Weaving segment length, L Terrain type Grade Length Weaving type Volume ratio, VR Weaving ratio, R	Le A O.	000 evel 41 14	mph ft % mi	n	
Conversion to pc/h	Under Ba	se Conc	ditions		
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Trucks and buses PCE, ET Recreational vehicle PCE, ER Heavy vehicle adjustment, fHV Driver population adjustment, fP Flow rate, v	Non-Weav V o1 2240 0.90 622 6 0 1.5 1.2 0.971 1.00 2563	vi ng V 02 0 0.90 0 0 1.5 1.2 1.000 1.00	Weavi no V w1 1340 0.90 372 7 0 1.5 1.2 0.966 1.00 1540	W2 220 0.90 61 3 0 1.5 1.2 0.985 1.00 248	veh/h v % % pc/h
Weaving and Nor	n-Weaving	Speeds	S		
a (Exhibit 24-6) b (Exhibit 24-6) c (Exhibit 24-6) d (Exhibit 24-6) Weaving intensity factor, Wi Weaving and non-weaving speeds, Si Number of lanes required for unconstrained operation, Nw (Exhibit 2 Maximum number of lanes, Nw (max) (Exhibit 2)	Weavi ng 0. 35 2. 20 0. 97 0. 80 2. 62 31. 57 24-7) ni bi t 24-	0 4 1 0 0 5 1 7) 1	lon-Weavi r). 0020 I. 00 I. 30). 75). 39 58. 01 I. 72 I. 40 Constrai ne		
Weaving Segment Speed, Densit	y, Level	of Ser	vice and	Capaci ty	/
Weaving segment speed, S Weaving segment density, D Level of service, LOS Capacity of base condition, cb Capacity as a 15-minute flow rate, c	25. 20 C 6870	mph pc/mi/l pc/h pc/h	n		

__Limitations on Weaving Segments_

		If Max Exce	eded See Note
	Anal yzed	Maxi mum	Note
Weaving flow rate, Vw	1788	2800	а
Average flow rate (pcphpl)	1087	2400	b
Volume ratio, VR	0. 41	0. 35	С
Weaving ratio, R	0. 14	N/A	d
Weaving Length (ft)	1000	2500	е
Notes:			

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I-77 NB WB SR 18 Off-Ramp \ 2035	Vol/Lane DBL	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population factor Flow rate, vp	T E, ER t, fHV	2200 0. 90 611 12 0 Level 0. 00 0. 00 1. 5 1. 2 0. 943 1. 00 1296	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 2 Measured 55.0 0.0 0.0 4.5 55.0 Urban Freeway	ft ft i nterchange/mi mi /h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	1296 55. 0 55. 0 2 23. 6	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I-77 NB WB SR 18 Off-Ramp \ 2035	/ol/Lane DBL	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment Length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population facto Flow rate, vp	T E, ER t, fHV	2680 0. 90 744 7 0 Level 0. 00 0. 00 1. 5 1. 2 0. 966 1. 00 1541	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 2 Measured 55.0 0.0 0.0 4.5 55.0 Urban Freeway	ft ft i nterchange/mi mi /h
· 	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	1541 55. 0 55. 0 2 28. 0 D	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RMK Burgess & Niple Ind 9/6/2011 AM Peak Hour I-77 NB North of Ramp to SF 2035 Corridor Study PID	R 18 WB	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmer Driver population factor Flow rate, vp	T E, ER it, fHV	4780 0. 90 1328 6 0 Level 0. 00 0. 00 1. 5 1. 2 0. 971 1. 00 1823	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustmere-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 3 Measured 70.0 0.0 0.0 0.0 0.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	speed, S	1823 70. 0 67. 6 3 27. 0 D	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I-77 NB North of Ramp to SF 2035	R 18 WB	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment Length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population facto Flow rate, vp	T E, ER t, fHV	2460 0. 90 683 6 0 Level 0. 00 0. 00 1. 5 1. 2 0. 971 1. 00 938	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Ndjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 3 Measured 70.0 0.0 0.0 0.0 0.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	938 70. 0 70. 0 3 13. 4 B	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:			
	Me	erge Analysis			
Analyst: Agency/Co.: Burgess & Niple Inc Date performed: Analysis time period: AM Peak Hour Freeway/Dir of Travel: Junction: SR 18 WB to I-77 NB Jurisdiction: Analysis Year: Description: Summit 18 Corridor Study PID 77749					
Type of analysis	· · · · · · · · · · · · · · · · · · ·	Freeway Data			
Type of analysis Number of lanes in free Free-flow speed on free Volume on freeway		Merge 3 70.0 4780		mph vph	
	(On Ramp Data			
Side of freeway Number of lanes in ramp Free-flow speed on ramp Volume on ramp Length of first accel/d Length of second accel/	ecel Lane	Ri ght 1 35. 0 190 850		mph vph ft ft	
	Adj acent F	Ramp Data (if on	ne exists)	
Does adjacent ramp exis Volume on adjacent Ramp Position of adjacent Ra Type of adjacent Ramp Distance to adjacent Ra	mp	No		vph ft	
Con	version to p	oc/h Under Base	Condi ti o	ns	
Junction Components	vor si on to p	Freeway			Adj acent
Volume, V (vph) Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Length Trucks and buses PCE, E	Т	4780 0.90 1328 6 0 Level mi 1.5	190 0.90 53 3 0 Level	% mi	Ramp vph v % % mi
Recreational vehicle PC Heavy vehicle adjustmen Driver population facto Flow rate, vp	t, fHV	1. 2 0. 971 1. 00 5470	1. 2 0. 985 1. 00 214		pcph
	Estimation	n of V12 Merge A	reas		
L = EQ	1021. 98 ((Equation 25-2 o	or 25-3)		
P = FM	0. 601 l	Jsing Equation	1		

pc/h

V = V (P) = 3289

Capacity Checks					
V	Actual 5684	Maxi mum 7200	LOS F? No		
F0 V V	2181 pc/h	(Equation 25-4	or 25-5)		
3 or av34 Is v v > 2700 p	c/h?	No			
3 or av34 Is v v > 1.5 v		No			
3 or av34 1 If yes, v = 3289 12A	2	(Equation 25-8)			
Actu v 5684 R12	aal Max 4600	rge Influence Ar Desirable ination (if not	Vi ol ati on? No		
Density, D = $5.475 + 0.00734 + 0.0078 + 0.0078 + 0.00627 + 0.006$					
Speed Estimation					
Intermediate speed variabl	e,	$M_{c} = 0.391$			
Space mean speed in ramp i	nfluence area,	S S = 59.1 R	mph		
Space mean speed in outer	I anes,	S = 63.9	mph		
Space mean speed for all v	ehi cl es,	S = 60.8	mph		

Phone: E-mail:		Fax:			
	Merg	je Analysis			
Agency/Co.: Date performed: Analysis time period: Freeway/Dir of Travel: Junction: Jurisdiction: Analysis Year: Description: Summit 18	I-77 NB SR 18 WB to I 2035	-77 NB ly PID 77749			
Type of analysis		Merge			
Number of lanes in freewa Free-flow speed on freewa Volume on freeway		3 70. 0 2460		mph vph	
	0n	Ramp Data			
Side of freeway Number of lanes in ramp Free-flow speed on ramp Volume on ramp Length of first accel/ded Length of second accel/de	cel Lane ecel Lane	Ri ght 1 35. 0 310 850		mph vph ft ft	
	_Adjacent Ram	np Data (if o	ne exists	s)	
Does adjacent ramp exist Volume on adjacent Ramp Position of adjacent Ramp Type of adjacent Ramp Distance to adjacent Ramp	р	No		vph ft	
Conve	ersion to pc/	'n Under Base	Conditio	ns	
Junction Components		Freeway	Ramp		Adj acent
Volume, V (vph) Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade		2460 0.90 683 6 0 Level	310 0. 90 86 2 0 Level	%	Ramp vph v % %
Length Trucks and buses PCE, ET Recreational vehicle PCE, Heavy vehicle adjustment, Driver population factor, Flow rate, vp	, fHV	1. 5 1. 2 0. 971 1. 00 2815	1. 5 1. 2 0. 990 1. 00 348	mi	mi pcph
	_Estimation o	of V12 Merge	Areas		
L = EQ	482.48 (Eq	juation 25-2	or 25-3)		
P = FM	0. 601 Usi	ng Equation	1		
V = V	(P) = 16	93 pc/h			

Capaci ty Checks					
v F0	Actual 3163	Maxi mum 7200	LOS F? No		
VV	1122 pc/h	(Equation 25-4	or 25-5)		
3 or av34 Is v v > 2700 p	oc/h?	No			
3 or av34 Is v v > 1.5 v		No			
3 or av34 1 If yes, v = 1693 12A	2	(Equation 25-8)			
Actu v 3163 R12	ual Max B 4600	erge Influence Ar Desirable) nination (if not	Violation? No		
Density, D = 5.475 + 0.007 R Level of service for ramp-	R	12	A		
Speed Estimation					
Intermediate speed variabl	e,	$M_{c} = 0.292$			
Space mean speed in ramp i	nfluence area,	S S = 61.8	mph		
Space mean speed in outer	I anes,	R S = 67.8	mph		
Space mean speed for all v	vehi cl es,	0 S = 63.8	mph		

Phone: E-mail:		Fax:	
	Operational Analys	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	I-77 NB North of Ramp from 2035	SR 18 WB	
	Flow Inputs and Ad	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment Length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population factor Flow rate, vp	T E, ER t, fHV	4970 0. 90 1381 6 0 Level 0. 00 0. 00 1. 5 1. 2 0. 971 1. 00 1896	veh/h v % % mi pc/h/I n
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustment, Free-flow speed, FFS	fLW tment, fLC ustment, fID	12.0 6.0 0.50 3 Measured 70.0 0.0 0.0 0.0 0.0 Urban Freeway	ft ft i nterchange/mi mi /h
	LOS and Performand	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	1896 70. 0 66. 6 3 28. 5	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analy	si s	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RMK Burgess & Niple In 9/6/2011 PM Peak Hour I-77 NB North of Ramp from 2035 Corridor Study PID	SR 18 WB	
	Flow Inputs and A	djustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population factor Flow rate, vp	T CE, ER nt, fHV	2770 0. 90 769 6 0 Level 0. 00 0. 00 1. 5 1. 2 0. 971 1. 00 1057	veh/h v % % mi pc/h/I n
	Speed Inputs and	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, Lateral clearance adjus Interchange density adj Number of lanes adjustment, Free-flow speed, FFS	fLW stment, fLC ustment, flD	12.0 6.0 0.50 3 Measured 70.0 0.0 0.0 0.0 0.0 0.0 0.0 To.0 Urban Freeway	ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h
	LOS and Performan	ce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	speed, S	1057 70. 0 70. 0 3 15. 1 B	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:	Fax	(:							
Operation	onal Anal	ysi s							
Analyst: RMK Agency/Co.: Burgess & Niple Inc Date Performed: 9/6/2011 Analysis Time Period: AM Peak Hour Freeway/Dir of Travel: SR 18 WB Weaving Location: SR 18 WB at I-77 Loop Ramps Jurisdiction: Analysis Year: 2035 Description: Summit 18 Corridor Study PID 77749									
·									
Freeway free-flow speed, SFF Weaving number of lanes, N Weaving segment length, L Terrain type		5 000 evel	mph ft	1					
Grade Length Weaving type Volume ratio, VR	A 0.	77	% mi						
Weaving ratio, R	0.	14							
Conversion to pc/h	Under Ba	ase Cond	di ti ons						
	Non-Wea V o1	ovi ng V o2	Weavi ng V w1) V w2					
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Trucks and buses PCE, ET Recreational vehicle PCE, ER Heavy vehicle adjustment, fHV Driver population adjustment, fP Flow rate, v	400 0. 90 111 3 0 1. 5 1. 2 0. 985 1. 00 451	0.90 0.90 0 0 1.5 1.2 1.000 1.00	1100 0. 90 306 12 0 1. 5 1. 2	180 0. 90 50 4 0 1. 5 1. 2 0. 980 1. 00 204	veh/h v % % pc/h				
Weaving and Nor	n-Weaving	Speeds	S						
a (Exhibit 24-6) b (Exhibit 24-6) c (Exhibit 24-6) d (Exhibit 24-6) Weaving intensity factor, Wi Weaving and non-weaving speeds, Si Number of lanes required for unconstrained operation, Nw (Exhibit 2 Maximum number of lanes, Nw (max) (Exh	Weavi ng 0. 35 2. 20 0. 97 0. 80 2. 61 24. 68		Non-Weavi ng 0. 0020 4. 00 1. 30 0. 75 0. 50 38. 34 2. 12 1. 40						
Type of operation is			Constrai ne						
Weaving Segment Speed, Densit	ty, Level	of Se	rvice and	Capaci ty	/				
Weaving segment speed, S Weaving segment density, D Level of service, LOS Capacity of base condition, cb Capacity as a 15-minute flow rate, c	24. 16 C 4180	mph pc/mi/l pc/h pc/h	In						

_____Limitations on Weaving Segments_

		If Max Exce	eded See Note
	Anal yzed	Maxi mum	Note
Weaving flow rate, Vw	1499	2800	а
Average flow rate (pcphpl)	650		b
Volume ratio, VR	0. 77	0. 45	С
Weaving ratio, R	0. 14	N/A	d
Weaving Length (ft)	1000	2500	е
Notos			

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: E-mail:	Fax	(:							
Operation	nal Anal	ysi s							
Operational Analysis									
I np	outs								
Freeway free-flow speed, SFF Weaving number of lanes, N Weaving segment length, L Terrain type Grade Length Weaving type Volume ratio, VR Weaving ratio, R	A O.	5 050 evel 61 32	mph ft % mi	ı					
Conversion to pc/h	Under Ba	ase Cond	ditions						
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Trucks and buses PCE, ET Recreational vehicle PCE, ER Heavy vehicle adjustment, fHV Driver population adjustment, fP Flow rate, v	Non-Weav V o1 1310 0. 90 364 3 0 1. 5 1. 2 0. 985 1. 00 1477	V 02 0 0. 90 0 0 0 1. 5 1. 2 1. 000 1. 00	Weavi ng V w1 1340 0. 90 372 7 0 1. 5 1. 2 0. 966 1. 00 1540	V w2 650 0.90 181 4 0 1.5 1.2 0.980 1.00 736	veh/h v % % pc/h				
Weaving and Nor	ı-Weavi ng	g Speeds	5						
a (Exhibit 24-6) b (Exhibit 24-6) c (Exhibit 24-6) d (Exhibit 24-6) Weaving intensity factor, Wi Weaving and non-weaving speeds, Si Number of lanes required for unconstrained operation, Nw (Exhibit 2 Maximum number of lanes, Nw (max) (Exhippe of operation is	0. 35 2. 20 0. 97 0. 80 3. 84 22. 23		Non-Weavi r D. 0020 4. 00 1. 30 D. 75 D. 77 34. 80 1. 97 1. 40 Constrai ne						
Weaving Segment Speed, Densit	y, Level	of Ser	rvice and	Capaci ty	/				
Weaving segment speed, S Weaving segment density, D Level of service, LOS Capacity of base condition, cb Capacity as a 15-minute flow rate, c	25. 92 48. 27 F 4210	mph pc/mi/l pc/h pc/h		,					

_____Limitations on Weaving Segments_

		If Max Exce	eded See Note
	Anal yzed	Maxi mum	Note
Weaving flow rate, Vw	2276	2800	а
Average flow rate (pcphpl)	1251		b
Volume ratio, VR	0. 61	0. 45	С
Weaving ratio, R	0. 32	N/A	d
Weaving Length (ft)	1050	2500	е
Notes:			

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: E-mail:	Fax	(:								
Operation	nal Anal	ysi s								
Analyst: RMK Agency/Co.: Burgess & Niple Inc Date Performed: 9/6/2011 Analysis Time Period: AM Peak Hour Freeway/Dir of Travel: SR 18 EB Weaving Location: SR 18 EB at I-77 Loop Ramps Jurisdiction: Analysis Year: 2035 Description: Summit 18 Corridor Study PID 77749										
I np	outs									
Freeway free-flow speed, SFF Weaving number of lanes, N	45 3	j	mph	1						
Weaving segment length, L Terrain type	60	00 evel	ft							
Grade	Lo	, v C i	% mi							
Length Weaving type	A	40	1111							
Volume ratio, VR Weaving ratio, R		40 29								
Conversion to pc/h	Under Ba	ise Cond	di ti ons							
	Non-Wea		Weavi ng	J ,,						
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Trucks and buses PCE, ET Recreational vehicle PCE, ER Heavy vehicle adjustment, fHV Driver population adjustment, fP Flow rate, v	V 01 950 0. 90 264 3 0 1. 5 1. 2 0. 985 1. 00 1071	V 02 0 0. 90 0 0 0 1. 5 1. 2 1. 000 1. 00 0	V w1 450 0.90 125 4 0 1.5 1.2 0.980 1.00 510	W2 180 0.90 50 8 0 1.5 1.2 0.962 1.00 208	veh/h v % % pc/h					
Weaving and Nor	n-Weavi ng	Speeds	S							
a (Exhibit 24-6) b (Exhibit 24-6) c (Exhibit 24-6) d (Exhibit 24-6) Weaving intensity factor, Wi Weaving and non-weaving speeds, Si Number of lanes required for unconstrained operation, Nw (Exhibit 2 Maximum number of lanes, Nw (max) (Exhibit 2 Type of operation is	0. 15 2. 20 4 0. 97 1 0. 80 0. 93 33. 14 3 24-7) 1i bi t 24-7)		Non-Weavi ng 0. 0035 4. 00 1. 30 0. 75 0. 45 39. 11 1. 27 1. 40 Unconstrai ned							
Weaving Segment Speed, Densit	y, Level				/					
Weaving segment speed, S Weaving segment density, D Level of service, LOS Capacity of base condition, cb Capacity as a 15-minute flow rate, c	36. 47 16. 35 B 4076 4016	mph pc/mi/I pc/h pc/h	n							

__Limitations on Weaving Segments_

		If Max Exce	eded See Note
	Anal yzed	Maxi mum	Note
Weaving flow rate, Vw	718	2800	а
Average flow rate (pcphpl)	596		b
Volumě ratio, VR	0. 40	0. 45	С
Weaving ratio, R	0. 29	N/A	d
Weaving Length (ft)	600	2500	е
Notes:			

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: E-mail:	Fax	(:								
Operation	onal Anal	ysi s								
Analyst: RMK Agency/Co.: Burgess & Niple Inc Date Performed: 9/6/2011 Analysis Time Period: PM Peak Hour Freeway/Dir of Travel: SR 18 EB Weaving Location: SR 18 EB at I-77 Loop Ramps Jurisdiction: Analysis Year: 2035 Description: Summit 18 Corridor Study PID 77749										
I np	outs									
Freeway free-flow speed, SFF Weaving number of Lanes, N	45 3	5	mph	1						
Weaving segment length, L Terrain type	60	00 evel	ft							
Grade Length			% mi							
Weaving type Volume ratio, VR	A 0.	30								
Weaving ratio, R		42								
Conversion to pc/h	Under Ba	ise Cond	ditions							
	Non-Wea	ivi ng V	Weavi no V	J V						
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Trucks and buses PCE, ET Recreational vehicle PCE, ER Heavy vehicle adjustment, fHV Driver population adjustment, fP Flow rate, v	o1 1190 0.90 331 3 0 1.5 1.2 0.985 1.00 1342	o2 0 0.90 0 0 1.5 1.2 1.000 1.00	w1 300 0.90 83 4 0 1.5 1.2 0.980 1.00 340	w2 220 0.90 61 3 0 1.5 1.2 0.985 1.00 248	veh/h v % pc/h					
Weaving and Nor	n-Weaving	Speeds	5							
a (Exhibit 24-6) b (Exhibit 24-6) c (Exhibit 24-6) d (Exhibit 24-6) Weaving intensity factor, Wi Weaving and non-weaving speeds, Si Number of lanes required for unconstrained operation, Nw (Exhibit 2 Maximum number of lanes, Nw (max) (Exh	Weavi ng 0. 15 0 0. 15 0 2. 20 4 0. 97 1 0. 80 0 0. 85 33. 87 4		Non-Weavir 0.0035 1.00 1.30 0.75 0.37 10.46 1.08 1.40 Jnconstrai							
Type of operation is Weaving Segment Speed Densit	y Level				,					
Weaving Segment Speed, Densit Weaving segment speed, S		mph	vice and	capaci ty						
Weaving segment speed, 3 Weaving segment density, D Level of service, LOS Capacity of base condition, cb Capacity as a 15-minute flow rate, c	16. 84 B 4395	pc/mi/l pc/h pc/h	n							

__Limitations on Weaving Segments_

		If Max Exceeded See Not				
	Anal yzed	Maxi mum	Note			
Weaving flow rate, Vw	588	2800	а			
Average flow rate (pcphpl)	643		b			
Volume ratio, VR	0. 30	0. 45	С			
Weaving ratio, R	0. 42	N/A	d			
Weaving Length (ft)	600	2500	е			
Notes.						

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
 g. Five-lane Type A segments do not operate well at volume ratios greater
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Appendix D

Intersection LOS Analysis

Interchange Modification Study Summit 18 Corridor PID 77749

No-Build Intersections

Jurisd:

Analyst: RMK Inter.: SR 18 and Heritage Woods Rd

Agency: Burgess & Niple Inc Area Type: All other areas

Date: 9/9/2011

Period: AM Peak Year : 2035 No-Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Heritage Woods

E/W St: SR	18		N/S	St: H	erita	ge Wood	ls		
	ST	GNALIZED I	NTERSE	CTION	SIIMMAI	RY			
	Eastbound	Westbou			thbou		Sout	hbound	
	L T R	L T	R	L	Т	R	L	T R	j
		-		.					[
No. Lanes	1 2 0	1 2	0	0	1	1	1	1 0	
LGConfig	L TR	L TR			LT	I .	L	TR	
Volume	10 2350 40	120 1030		1				.0 10	
Lane Width RTOR Vol	12.0 12.0	12.0 12.0			12.0	:	2.0 1		
RIOR VOI	l 0	I	0	I	,	0		0	I
Duration	0.25 Area	Type: All	other	areas					
		Signal	Operat	ions					
Phase Combi		3 4	:		5	6	7	8	
EB Left	P		NB	Left	P				
Thru	P			Thru	P				
Right Peds	P			Right	P				
WB Left	P P		l I SB	Peds Left	P				
Thru	P P		25	Thru	P				
Right	P P			Right					
Peds			İ	Peds					
NB Right	P		EB	Right					
SB Right			WB	Right					
Green	8.0 83.3	}			14.7				
Yellow	4.0 4.0				4.0				
All Red	0.0 1.0				1.0	la Tama	h. 1	20 0	~~~
	Interse	ction Perf	ormanc	e Siimm		le Leng	JCII• I	20.0	secs
Appr/ Lan		Ratios				 Appr	oach		
Lane Gro			•	Laire	Croup	1122	· ou oii		
	acity (s)		 / C	Delay	LOS	Delay	, LOS		
Eastbound	0 420	0.04 0	60	6.0	7\				
L 29 TR 24			.69 .69	71.3	A E	71.0	E		
110 24	09 3470	1.10	.09	11.5	111	71.0	111		
Westbound									
L 17	9 1752	0.74 0	.80	65.5	E				
TR 27	70 3488	0.43 0	.79	4.4	A	10.5	В		
Northbound									
LT 19	1 1563	0.35 0	.12	53.1	D	70.9	E		
R 36			.23	74.4	E				
Southbound									
L 16	3 1330	0.13 0	.12	48.7	D				
TR 21			.12	47.8	_	48.2	D		

Intersection Delay = 52.6 (sec/veh) Intersection LOS = D

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/9/2011 Analysis Time Period: AM Peak

Intersection: SR 18 and Heritage Woods Rd

Area Type: All other areas

Jurisdiction:

Analysis Year: 2035 No-Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Heritage Woods

_____VOLUME DATA_____

Eas	stbour	nd	Wes	stbour	nd	Noi	cthbou	ınd	Sou	ıthboı	and
L	T	R	L	T	R	L	T	R	L	Т	R
1.0	2250	4.0		1020			2.0	200		1.0	 10
		-	!			!			!		!
	_	_	! -		_	!	_		!		2
			!						0.90		0.90
3	653	11	33	286	14	8	8	83	6	3	3
	0		ĺ	0		ĺ	0		İ	0	ĺ
1900	1900		1900	1900		İ	1900	1900	1900	1900	į
			İ			İ			İ		i
			İ			İ			İ		i
1	2	0	1	2	0	0	1	1	1	1	0
L	TR		ĹГ	TR		İ	$_{ m LT}$	R	i L	TR	j
12.0	12.0		12.0	12.0		İ	12.0	12.0	12.0	12.0	j
		0	İ		0	İ		0	İ		0
11	2655		133	1200		İ	66	333	22	22	İ
			İ			İ			İ		İ
1.000	0.00	0 0	1.000	0.00	0 0	j	0.50	0.0	1.000	0.00	0 O C
0.	.017		j 0.	.047		0	.000	1.000	0	.500	j
0			j 0			0			j 0		j
0	0		0	0		j	0	0	0	0	j
2			0.0								j
	L 10 4 0.90 3 1900 1 1.000 0 0	L T 10 2350 4 4 0.90 0.90 3 653 0 1900 1900 1 2 L TR 12.0 12.0 11 2655 1.000 0.00 0.017 0 0 0	10 2350 40 4 4 4 0.90 0.90 0.90 3 653 11 0 1900 1900 1 2 0 L TR 12.0 12.0 0 11 2655 1.000 0.000 0.017 0 0 0	L T R L 10 2350 40 120 4 4 4 3 0.90 0.90 0.90 0.90 3 653 11 33 0 1900 1900 1900 1 2 0 1 1 2 0 1 1 2.0 12.0 12.0 0 11 2655 133 1.000 0.000 1.000 0.017 0 0 0 0 0 0 0 0 0 0 0 0 0	L T R L T 10 2350 40 120 1030 4 4 4 3 3 0.90 0.90 0.90 0.90 0.90 3 653 11 33 286 0 0 0 1900 1900 1900 1900 1 2 0 1 2 L TR L TR 12.0 12.0 12.0 11 2655 133 1200 1.000 0.000 1.000 0.00 0.017 0.047 0 0 0.0	L T R L T R 10 2350 40 120 1030 50 4 4 4 4 3 3 3 3 3 3 3 3 3	L T R L T R L C C C C C C C C C C C C C C C C C C	L T R L T R L T 10 2350 40 120 1030 50 30 30 4 4 4 3 3 3 2 2 0.90 <	L T R L T R L T R L T R	L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L D	L T R L T R L T R L T R L T 10 2350 40 120 1030 50 30 30 300 20 10 4 4 4 3 3 3 2

Duration 0.25 Area Type: All other areas

	Ea	stbou	nd	Westbound			Northbound			So	nd	
	L	Т	R	L	T	R	L	Т	R	L	T	R
Init Unmet	 0.0	0.0		0.0	0.0			0.0	0.0	- 0.0	0.0	
Arriv. Type	3	3		3	3		İ	3	3	3	3	į
Unit Ext.	3.0	3.0		3.0	3.0		İ	3.0	3.0	3.0	3.0	į
I Factor	ĺ	1.00	0	İ	1.00	0	Ì	1.00	0		1.000	į
Lost Time	2.0	2.0		2.0	2.0			2.0	2.0	2.0	2.0	
Ext of g	2.0	2.0		2.0	2.0		Ì	2.0	2.0	2.0	2.0	į
Ped Min g		3.2			3.2			3.2			3.2	İ

Analyst: RMK Inter.: Heritage Woods and SR 18

Agency: Burgess & Niple Inc Area Type: All other areas

Date: 9/9/2011 Jurisd: ODOT

Period: PM Peak Year : 2035 No-Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Heritage Woods

E/W St: SR	18			N/	S St: H	Ierita	ige Woo	ods		
		S	IGNALIZE	D INTERS	ECTION	SUMMA	ΙRΥ			
	Eas	stbound		bound		thbou		Sout	nbound	
	L	T R	į L	T R	L	Т	R	ļь :	r R	
No. Lanes	1	2 0	- 1	2 0	-	1	1	1	1 0	
LGConfig	L	TR	L	TR		$_{ m LT}$	R	L	TR	
Volume	30	1710 30	!	380 10	50	50	210	40 50		
Lane Width	12.0		12.0 1			12.0		12.0 1		
RTOR Vol		0	I	0			0		0	I
Duration	0.25	Area		ll other al Opera						
Phase Combi	nation	n 1 2	3	4	0110	 5	6		8	
EB Left		- – – P	-	NB	Left	P	-			
Thru		P		İ	Thru	P				
Right		P		j	Right	P				
Peds					Peds					
WB Left		P P		SB	Left	P				
Thru		P P			Thru	P				
Right		P P			Right	P				
Peds					Peds					
NB Right		P		EB	Right					
SB Right		01 0 66	_	WB	Right		•			
Green		21.0 66.	3			18.7	'			
Yellow All Red		4.0 4.0 0.0 1.0				4.0				
All Red		0.0 1.0					ile Lei	ngth: 12	20 0	secs
		Inters	ection P	erforman	ce Summ			iigeii - i	20.0	БССБ
Appr/ Lan	.e	Adj Sat						proach		
Lane Gro	up	Flow Rat							_	
Grp Cap	acity	(s)	v/c	g/C	Delay	LOS	Dela	ay LOS		
Eastbound										
L 61		110	0.54	0.55	47.5	D				
TR 19	17	3470	1.01	0.55	49.5	D	49.	4 D		
Westbound										
L 36	8	1752	0.93	0.77	65.3	E				
TR 26	71	3510	0.99	0.76	30.1	С	34.	2 C		
Northbound										
LT 20	7	1327	0.54	0.16	56.5	E	38.	4 D		
R 59		1583	0.39	0.37	29.7	С				
Southbound										
	•	44-0				_				

Intersection Delay = 40.4 (sec/veh) Intersection LOS = D

0.16

0.16

47.7

50.4

D

D

49.6

0.24

0.42

L

 ${\sf TR}$

180

269

1158

1723

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/9/2011 Analysis Time Period: PM Peak

Intersection: Heritage Woods and SR 18

Area Type: All other areas

Jurisdiction: ODOT

Analysis Year: 2035 No-Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Heritage Woods

_____VOLUME DATA_____

	Eas	Eastbound		Wes	stbour	nd	No	thbo	ınd	Sou	ıthboı	ınd
	L	T	R	L	Т	R	L	T	R	L	Т	R
_												
Volume	30	1710	30	310	2380	10	50	50	210	40	50	50
% Heavy Veh	4	4	4	3	3	3	2	2	2	2	2	2
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	8	475	8	86	661	3	14	14	58	11	14	14
Hi Ln Vol	ĺ			ĺ			ĺ			ĺ		j
% Grade	j	0		j	0		İ	0		İ	0	į
Ideal Sat	1900	1900		1900	1900		İ	1900	1900	1900	1900	į
ParkExist	İ			j			İ			j		i
NumPark	İ			İ			İ			j		i
No. Lanes	i 1	2	0	İ 1	2	0	i o	1	1	İ 1	1	0
LGConfig	L -	TR	-	L -	TR	-	i	LT	R	i L	TR	
Lane Width	12.0	12.0		! -	12.0		İ	12.0	12.0	12.0	12.0	
RTOR Vol			0			0	! 		0	• •		0
Adj Flow	l 33	1933	O	344	2655	· ·	l İ	112	233	44	112	
%InSharedLn	J J	1733		3	2033		! [112	233		112	
Prop LTs	 1	0.0	1 0	 1	0.00	^ ^	 	0.50	١.	 1	0.00) I
_	!		30	!	.004	00	l 0	.000		!	.500)
Prop RTs	!	.017		!	.004			.000 .	1.000	1	.500	- !
Peds Bikes	0	•		0	•		0	•	•	0	•	
Buses	0	0		0	0		ļ	0	0	0	0	
%InProtPhase				0.0								

Duration 0.25 Area Type: All other areas

	Ea	Eastbound			stbour	nd	No	rthbo	und	So	uthbour	nd
	L	Т	R	L	Т	R	L	Т	R	L	T	R
Init Unmet	 0 . 0	0.0		0.0	0.0			0.0	0.0	0.0	0.0	
Arriv. Type	3	3		3	3		İ	3	3	3	3	į
Unit Ext.	3.0	3.0		3.0	3.0		İ	3.0	3.0	3.0	3.0	į
I Factor	İ	1.000		İ	1.000)	İ	1.00	0	j	1.000	į
Lost Time	2.0	2.0		2.0	2.0		İ	2.0	2.0	2.0	2.0	į
Ext of g	2.0	2.0		2.0	2.0		İ	2.0	2.0	2.0	2.0	į
Ped Min g	İ	3.2		İ	3.2		İ	3.2		j	3.2	į

Analyst: RMK Inter.: Crystal Lake Road and SR 18

Agency: Burgess & Niple Inc Area Type: All other areas

Date: 9/7/2011

Period: AM Peak

Jurisd:

Year : 2035 No-Build

Project ID: Summit 18 Corridor Study

E/W St: SR 18 N/S St: Crystal Lake Road

SIGNALIZED INTERSECTION SUMMARY														
	Eas	stbour	nd	Wes	stbou	nd	No	rthbo	und	So	uthbou	ınd		
	LTR			L	T	R	L	T	R	L	T	R		
No. Lanes	1	2	0	1	2	1	0	1	1	2	1	0		
LGConfig	L	TR		L	T	R		$_{ m LT}$	R	L	TR			
Volume	300	2340	30	170	980	550	40	20	260	550	20	180		
Lane Width	12.0	12.0		12.0	12.0	12.0	Ì	12.0	12.0	12.0	12.0	Ì		
RTOR Vol			0	ĺ		0	Ì		0	ĺ		0		

Dur	ation	0.25		Area T	ype:	All of	ther	areas					
					Sig	gnal O	perat	ions					
Pha	se Comb	ination	1	2	3	4			5	6	7	8	
EB	Left		P	P	P		NB	Left		P			
	Thru			P	P		j	Thru		P			
	Right			P	P		j	Right		P			
	Peds						j	Peds					
WB	Left		P		P		SB	Left	P				
	Thru				P		j	Thru	P	P			
	Right				P		İ	Right	P	P			
	Peds						İ	Peds					
NB	Right		Р				EB	Right					
SB	Right						WB	Right	P				
Gre	en	8	3.0	10.3	53.1	L			16.6	9.0			
Yel	low	4	. 0	4.0	4.0				4.0	4.0			
All	Red	0	0.0	1.0	1.0				0.0	1.0			
									Cycl	e Lengt	h: 120	0.0	secs

		Intersec	tion Pe	erforman	ce Summa:	ry		
Appr/ Lane	Lane Group	Adj Sat Flow Rate		ios	Lane G	roup	Appro	each
Grp	Capacity	(s)	V/C	g/C	Delay :	LOS	Delay	LOS
Eastbou	 ınd							
L	435	1752	0.77	0.67	37.9	D		
TR	1998	3506	1.32	0.57	172.5	F	157.3	F
Westbou	ınd							
L	179	1752	1.06	0.51	116.5	F		
T	1554	3512	0.70	0.44	29.7	С	34.3	C
R	976	1568	0.63	0.62	17.0	В		
Northbo	ound							
LT	94	1249	0.70	0.08	89.8	F	98.9	F
R	290	1583	1.00	0.18	101.0	F		
Southbo	ound							
L	475	3437	1.29	0.14	195.8	F		
TR	397	1611	0.56	0.25	45.1	D	155.6	F

Intersection Delay = 115.2 (sec/veh) Intersection LOS = F

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/7/2011 Analysis Time Period: AM Peak

Intersection: Crystal Lake Road and SR 18

Area Type: All other areas

Jurisdiction:

Analysis Year: 2035 No-Build Project ID: Summit 18 Corridor Study

E/W St: SR 18 N/S St: Crystal Lake Road

_____VOLUME DATA_____

	Eastbound		Wes	stbour	nd	No	rthbo	und	Soi	uthbou	ınd	
	L	T	R	L	Т	R	L	T	R	L	Т	R
Volume	 300	2340	30	 170	980	550	40	20	260	 550	20	180
% Heavy Veh	3	3	3	3	3	3	2	2	2	2	2	2
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	83	650	8	47	272	153	11	6	72	153	6	50
Hi Ln Vol	İ			İ			İ			İ		
% Grade	İ	0		İ	0		İ	0		İ	0	
Ideal Sat	1900	1900		1900	1900	1900	İ	1900	1900	1900	1900	
ParkExist	ĺ						Ì					
NumPark												
No. Lanes	1	2	0	1	2	1	0	1	1	2	1	0
LGConfig	L	TR		L	T	R		$_{ m LT}$	R	L	TR	
Lane Width	12.0	12.0		12.0	12.0	12.0		12.0	12.0	12.0	12.0	
RTOR Vol			0			0			0			0
Adj Flow	333	2633		189	1089	611		66	289	611	222	
%InSharedLn												
Prop LTs	1.000	0.0	0.0	1.000	0.00	0.0		0.6	57		0.00	0 0
Prop RTs	0	.013		0.	.000	1.000	0	.000	1.000	0	.901	
Peds Bikes	0			0			0			0		
Buses	0	0		0	0	0		0	0	0	0	
%InProtPhase	InProtPhase 0.0			0.0								

Duration 0.25 Area Type: All other areas

	Ea	stbou	nd	We	stbou	nd	No	rthbo	und	So	uthbound	E
	L	Т	R	L	Т	R	L	Т	R	L	T I	١ ١
Init Unmet	 0.0	0.0		0.0	0.0	0.0	·	0.0	0.0	0.0	0.0	
Arriv. Type	3	3		3	3	3	İ	3	3	3	3	j
Unit Ext.	3.0	3.0		3.0	3.0	3.0	İ	3.0	3.0	3.0	3.0	j
I Factor	İ	1.00	0	İ	1.00	0	İ	1.00	0	İ	1.000	į
Lost Time	2.0	2.0		2.0	2.0	2.0	İ	2.0	2.0	2.0	2.0	į
Ext of g	2.0	2.0		2.0	2.0	2.0	İ	2.0	2.0	2.0	2.0	j
Ped Min g	İ	3.2		İ	3.2		İ	3.2		İ	3.2	j

Analyst: RMK Inter.: Crystal Lake Road and SR 18

Agency: Burgess & Niple Inc Area Type: All other areas

9/9/2011 Date:

Jurisd:

Year : 2035 No-Build

Period: PM Peak Project ID: Summit 18 Corridor Study

E/W St:	SR 18					N/S	St: C	rysta	ıl Lake	e Road	d	
				GNALIZ	ED IN	TERSE	CTION	SUMMA	ARY			
	Ea	stbou	nd	Wes	tbour	.d	Nor	thbou	ınd	Sou	ıthboı	und
	L	Т	R	L I	Т	R	L	Т	R	L 	Т	R
No. Lan	es 1	2	0	1	2	1	0	1	1	2	1	0
LGConfi	g L	TR		L	Т	R		$_{ m LT}$	R	L	TR	
Volume	100	1820	40		2340			20	330	690	60	300
Lane Wi	dth 12.0	12.0		12.0	12.0	12.0		12.0	12.0	12.0	12.0	
RTOR Vo	1		0			0			0			0
Duratio	n 0.25		Area	Type:								
Dhaga C	ombinatio	 n 1	2	_	nal C 4	perat 1	ions	 5	6	7		 8
Pnase C EB Lef		n 1 P	۷	3 P	4	l l nb	Left	5	6 P	/	6	0
вв цег Thr		P		P P		I I ND	Thru		P P			
Rig				P		1	Right		P P			
Ped				r		I I	Peds	•	P			
WB Lef		P	P	P		l l SB	Left	P				
wb Her Thr		ı	P	P		1 22	Thru		P			
Rig			P	P		i i	Right		P			
Ped			_	_		i i	Peds		-			
NB Rig		P	P			EB	Right					
SB Rig		-	-			WB	Right					
Green	110	8.0	5.0	53.8		1 112	1(19110	18.2	2 14.0)		
Yellow		4.0	3.0	4.0				4.0	4.0			
All Red		0.0	0.0	1.0				0.0	1.0			
				_,,					cle Ler	ngth:	120.0	0 sec
							e Summ	nary				
Appr/	Lane		j Sat		tios		Lane	Group	qqA o	proacl	ı	
Lane	Group		w Rate									
Grp	Capacity		(s)	V/C	g/	С	Delay	LOS	Dela	ay LOS	5	
Eastbou												
L	178	17		0.62		52	41.4	D				
TR	1570	35	01	1.32	0.	45	179.9	F	172	.8 F		
Westbou												
L	309	17		1.29		63	195.1					
Т	1809	35		1.44		52	229.1	. F	196	.7 F		
R	1111	15	68	0.40	0.	71	8.2	A				
Northbo	und											
		10:	27	0.74	0.	12	84.7	F	56.6	5 E		
LT	120	ΙΟ.	4 /									
	120 475	15		0.77	0.	30	49.8	D				
R	475				0.			D				
LT R Southbo L	475		83									

Intersection Delay = 180.9 (sec/veh) Intersection LOS = F

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/9/2011 Analysis Time Period: PM Peak

Intersection: Crystal Lake Road and SR 18

Area Type: All other areas

Jurisdiction:

Analysis Year: 2035 No-Build Project ID: Summit 18 Corridor Study

E/W St: SR 18 N/S St: Crystal Lake Road

_____VOLUME DATA_____

	Eas	Eastbound		Wes	stbour	nd	No	rthbo	und	Soi	ıthboı	ınd
	L	Т	R	L	Т	R	L	Т	R	L	Т	R
_												
Volume	100	1820	40	360	2340		60	20	330	690	60	300
% Heavy Veh		3	3	3	3	3	2	2	2	2	2	2
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	28	506	11	100	650	111	17	6	92	192	17	83
Hi Ln Vol												
% Grade		0		ĺ	0		Ì	0			0	ĺ
Ideal Sat	1900	1900		1900	1900	1900	İ	1900	1900	1900	1900	j
ParkExist	İ			İ			İ			İ		j
NumPark	İ			İ			İ			İ		j
No. Lanes	1	2	0	1	2	1	0	1	1	2	1	0
LGConfig	L	TR		L	Т	R	İ	$_{ m LT}$	R	L	TR	j
Lane Width	12.0	12.0		12.0	12.0	12.0	İ	12.0	12.0	12.0	12.0	j
RTOR Vol	İ		0	İ		0	İ		0	İ		0 j
Adj Flow	111	2066		400	2600	444	İ	89	367	767	400	į
%InSharedLn	İ			İ			İ			İ		j
Prop LTs	1.000	0.0	0.0	1.000	0.00	0 0	İ	0.7	53	İ	0.00) o c
Prop RTs	0	.021		j 0.	.000	1.000	0	.000	1.000	j 0	.832	į
Peds Bikes	0			j o			0			0		į
Buses	0	0		j o	0	0	İ	0	0	0	0	į
%InProtPhase				0.0			İ			İ		j
				i .		_	1					ļ

Duration 0.25 Area Type: All other areas

	Ea	stbou	nd	We	stbou	nd	No	rthbo	und	So	uthbour	nd
	L	Т	R	L	Т	R	L	Т	R	L	T	R
Init Unmet	 0.0	0.0		0.0	0.0	0.0	- ———— 	0.0	0.0	0.0	0.0	
Arriv. Type	3	3		3	3	3	İ	3	3	3	3	į
Unit Ext.	3.0	3.0		3.0	3.0	3.0	İ	3.0	3.0	3.0	3.0	į
I Factor	İ	1.00	0	İ	1.00	0	İ	1.00	0	j	1.000	į
Lost Time	2.0	2.0		2.0	2.0	2.0	İ	2.0	2.0	2.0	2.0	į
Ext of g	2.0	2.0		2.0	2.0	2.0	İ	2.0	2.0	2.0	2.0	į
Ped Min g	İ	3.2		İ	3.2		İ	3.2		j	3.2	į

Analyst: RMK Inter.: Springside Drive and SR 18

Agency: Burgess & Niple Inc Area Type: All other areas

Date: 9/9/2011 Jurisd: ODOT

Period: AM Peak Hour Year : 2035 No-Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Springside Drive

2711 20 .				11, 5		9111190	,140 1	2110		
		SI	GNALIZEI	INTERSE	CTION S	SUMMAR	Y			
	:	stbound	!	oound	1	thboun		!	nbound	ļ
	L 	T R	L 7	r R	L	Т	R	L :	r R	l I
No. Lanes	s	3 0	1	3 0	1	1	0	1	1 0	
LGConfig	L	TR	Ĺ	TR	L	TR		L	TR	j
Volume	360	880 70	100 61				0	60 20	70	
Lane Wid	th 12.0	12.0	12.0 12		12.0 1			12.0 12	2.0	
RTOR Vol		0		0		0			0	
Duration	0.25	Area '		ll other al Operat						
Phase Cor	 mbinatior	n 1 2	519110	4	10115	 5	6		8	
EB Left		P P	-	NB	Left	P			-	
Thru		P P		İ	Thru	P				
Right	t	P P		j	Right	P				
Peds					Peds					
WB Left		P		SB	Left	P				
Thru		P		ļ	Thru	Р				
Right	t	P			Right	P				
Peds	_				Peds					
NB Right				EB WB	Right Right					
Green	C	16.0 46.7		l MB	Kigiic	43.3				
Yellow		4.0 4.0				4.0				
All Red		0.0 1.0				1.0				
								ngth: 12	20.0	secs
				erformanc		_				
	Lane Group	Adj Sat Flow Rate	Rati	LOS	Lane (Group	App	proach		
	Capacity	(s)	v/c	g/C	Delay	LOS	Dela	ay LOS		
Eastbound	 d									
L	449	1770	0.89	0.56	39.0	D				
TR	2789	5018	0.38	0.56	15.4	В	21.9	9 C		
Westbound	d									
L	187	481		0.39	42.2					
TR	1948	5006	0.38	0.39	26.9	С	28.9	9 C		
Northbou	nd									
L	465	1290	0.31		29.3	C				
TR	614	1703	0.25	0.36	28.0	С	28.6	5 C		
Southbour	nd									
L	419	1161		0.36	26.8	С				
TR	594	1645	0.17	0.36	26.7	С	26.8	3 C		

Intersection Delay = 25.0 (sec/veh) Intersection LOS = C

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/9/2011
Analysis Time Period: AM Peak Hour

Intersection: Springside Drive and SR 18

Area Type: All other areas

Jurisdiction: ODOT

Analysis Year: 2035 No-Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Springside Drive

_____VOLUME DATA_____

Eas	Eastbound		Wes	stbour	nd	No	rthboi	ınd	Sou	ıthboı	ınd
L	T	R	L	Т	R	L	Т	R	L	Т	R
!			!			!			!	-	70
2	2	_	2	2		2	2		2	2	2
0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
100	244	19	28	169	17	36	17	22	17	6	19
İ	0		İ	0		İ	0		İ	0	į
1900	1900		1900	1900		1900	1900		1900	1900	į
			j			İ			j		i
! 			İ			İ			<u> </u>		i
1	3	0	i 1	3	0	i 1	1	0	i 1	1	0
, — I т.	_	Ū	, – I т.	_	Ü	, – I т.	_	Ū	, — т.	_	
!			! —			! -			!		
= = . 0	12.0	Λ	-2.0	12.0	Ω	-2.0	12.0	Λ	-2.0	12.0	0
1 1 4 0 0	1056	O	 111	7/5	O	 1111	156	O	l 67	100	
1 00	1030		-	743		 	130		0 <i>1</i>	100	
 1 00/		2.0	 1 000		0.0	 1 00	2 0 0	2.0	 1 00/		
!		J	!		00	!		J	!		0
!	.074		!	.090			.571		0	.780	ļ
!						!			0		
ı	0		0	0		0	0		0	0	
e 0.0											
	L 360 2 0.90 100 1900 1 12.0 400 1.000 0	L T 360 880 2 2 0.90 0.90 100 244 0 1900 1900 1 3 L TR 12.0 12.0 400 1056 1.000 0.00 0.074 0 0 0 0	L T R 360 880 70 2 2 2 0.90 0.90 0.90 100 244 19 0 1900 1900 1 3 0 L TR 12.0 12.0 0 400 1056 1.000 0.000 0.074 0 0 0 0	L T R L 360 880 70 100 2 2 2 2 0.90 0.90 0.90 0.90 100 244 19 28 0 1900 1900 1900 1 3 0 1 1 7R L 12.0 12.0 12.0 0 400 1056 111 1.000 0.000 1.000 0.074 0.000 0.074 0.000 0.074 0.000 0.000 0.000	L T R L T 360 880 70 100 610 2 2 2 2 2 0.90 0.90 0.90 0.90 0.90 100 244 19 28 169 0 0 1900 1900 1900 1900 1900 1 3 0 1 3 L TR L TR 12.0 12.0 12.0 12.0 0 400 1056 111 745 1.000 0.000 1.000 0.000 0.074 0.090 0 0 0 0 0	L T R L T R 360 880 70 100 610 60 2 2 2 2 2 2 2 0.90 0.90 0.90 0.90 0.90 0.90 100 244 19 28 169 17 0 0 0 1900 1900 1900 1900 1 3 0 1 3 0 1 17 TR 12.0 12.0 12.0 0 400 1056 111 745 1.000 0.000 1.000 0.000 0.074 0.090 0 0 0 0 0	L T R L T R L T R L C C C C C C C C C C C C C C C C C C	L T R L T R L T 360 880 70 100 610 60 130 60 2	L T R L T R L T R 360 880 70 100 610 60 130 60 80 2 2 2 2 2 2 2 2 2 0 0 0.90	L T R L T R L T R L T R L 360 880 70 100 610 60 130 60 80 60 2 2 2 2 2 2 2 2 2 2 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 0.90 100 244 19 28 169 17 36 17 22 17 0 0 0 0 0 0 0 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 400 1056 111 745 144 156 67 1.000 0.000 0.000 0.571 0 0 0 0 0 0 0 0 0 0 </td <td>L T R L T R L T R L T R L T 360 880 70 100 610 60 130 60 80 60 20 2</td>	L T R L T R L T R L T R L T 360 880 70 100 610 60 130 60 80 60 20 2

Duration 0.25 Area Type: All other areas

	Eastbound			Westbound			No	rthbo	und	Southbound		
	L	Т	R	L	Т	R	L	T	R	L	T	R
Init Unmet	 0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Arriv. Type	3	3		3	3		3	3		3	3	į
Unit Ext.	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	į
I Factor	İ	1.00	0	İ	1.00)	İ	1.00	0	İ	1.000	į
Lost Time	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	į
Ext of g	2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0	į
Ped Min g	İ	3.2		İ	3.2		İ	3.2		İ	3.2	į

Analyst: RMK Inter.: Springside Drive and SR 18

Agency: Burgess & Niple Inc Area Type: All other areas

Date: 9/9/2011 Jurisd: ODOT

Period: PM Peak Hour Year : 2035 No-Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Springside Drive

E/W	St: S	SR 18					N/S	St: S	pring	side D	rive			
				SIC	SNALIZ	ZED IN	TERSE	CTION	SUMMA	RY				
		:	stbour			stboun		1	thbou	:		thbou		
		L	Т	R	L	T	R	L	Т	R	L	Т	R	
No.	Lanes	 1	3	 0	<u>-</u>	3	0	 1	1	0	1	1	0	.
LGC	onfig	L	TR		L	TR		L L	TR	i	L	TR		İ
Vol		270	1410	180	260	1590	60	410		160	150	70	270	i
Lan	e Widt	h 12.0	12.0		12.0	12.0		12.0	12.0	į	12.0	12.0		İ
RTO	R Vol	İ		0			0	İ		0			0	İ
Dur	ation	0.25		Area 1	 Гуре:	All o	ther	areas						
							perat	ions						
		nbinatior		2	3	4		T - C:	5	6	7	8		
EB	Left		P	P			NB	Left	P	P				
	Thru	_		P				Thru	P	P				
	Right			P				Right	P	P				
MD	Peds Left		P	P			 SB	Peds Left		P				
WB	Thru		Р	P			20	Thru		P				
	Right	_		P				Right		P				
	Peds	-		P				Peds		Р				
NB	Right	_					 EB	Right						
SB	Right						WB	Right						
Gre	_		13.0	40.1			1 112	1(19110	22.0	26.9				
Yel			4.0	4.0					4.0	4.0				
	Red		0.0	1.0					0.0	1.0				
										le Len	gth:	120.0	se	cs
								e Summ						
App:		Lane	_	j Sat	Ra	atios		Lane	Group	App	roach			
Lan		Group		Rate			_							
Grp	C	Capacity	(s)	v/c	g/	С	Delay	LOS	Dela	y LOS			
Eas	tbound	i												
L		254	177		1.18		48	150.7	F					
TR		1667	498	88	1.06	0.	33	79.9	E	90.1	F			
Wes	tbound	Ē												
L		254	177	70	1.14	0.	48	124.5	F					
TR		1686	504	16	1.09	0.	33	89.9	F	94.6	F			
Nor	thbour	nd												
L		387	177	70	1.18	0.	45	140.0	F					
TR		745	169	1	0.39	0.	44	24.2	С	95.1	F			
Sou	thbour	nd												
L		243	108	36	0.69	0.	22	57.4	E					
TR		368	164		1.03		22	100.6		87.4	F			

Intersection Delay = 92.3 (sec/veh) Intersection LOS = F

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/9/2011
Analysis Time Period: PM Peak Hour

Intersection: Springside Drive and SR 18

Area Type: All other areas

Jurisdiction: ODOT

Analysis Year: 2035 No-Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Springside Drive

_____VOLUME DATA_____

	Eastbound		Westbound			No	thbo	und	Southbound			
	L	Т	R	L	T	R	L	T	R	L	T	R
77 - 7		1 4 1 0	1.00		1 5 0 0			1.00	1.60			
Volume	270	1410	180	260	1590	60	410	100	160	150	70	270
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	75	392	50	72	442	17	114	28	44	42	19	75
Hi Ln Vol												
% Grade		0		ĺ	0		ĺ	0			0	į
Ideal Sat	1900	1900		1900	1900		1900	1900		1900	1900	į
ParkExist				İ			İ			İ		İ
NumPark	İ			İ			İ					i
No. Lanes	1	3	0	j 1	3	0	1	1	0	1	1	o İ
LGConfig	L	TR		ĹЬ	TR		ĹЬ	TR		ĺь	TR	i
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	i
RTOR Vol			0			0			0			0
Adj Flow	300	1767		289	1834		456	289		167	378	i
%InSharedLn												İ
Prop LTs	1.000	0.0	0.0	1.000	0.00	00	1.000	0.00	0.0	1.000	0.00	oo i
Prop RTs	i o	.113		io.	.037		i o	.616		i o	.794	İ
Peds Bikes	0			0			j o			0		
Buses	0	0		0	0		0	0		0	0	
%InProtPhase	0.0			0.0			0.0			İ		į
Dunation	0 0 5		7 [Tl •	777.	a + b a - a						·

Duration 0.25 Area Type: All other areas

	Ea	stbound	We	stbound	No	rthbound	Southbound		
	L	T R	L	T R	L	T R	L	T R	
Init Unmet	 0 . 0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Arriv. Type	3	3	3	3	3	3	3	3	
Unit Ext.	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
I Factor	ĺ	1.000	İ	1.000	İ	1.000	İ	1.000	
Lost Time	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Ext of g	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
Ped Min g	j	3.2	İ	3.2	İ	3.2	İ	3.2	

___TWO-WAY STOP CONTROL SUMMARY__

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/6/2011 Analysis Time Period: AM Peak

Intersection: SR 18 and Scenic View Dr

Jurisdiction:

Units: U. S. Customary

Analysis Year: 2035 No-Build

Project ID: Summit 18 Corridor Study PID 77749

East/West Street: SR 18

North/South Street: Scenic View Dr

Intersection Orientation: EW Study period (hrs): 1.00

	Ve	hicle Volu	umes and	Adjus	stme	nts			
Major Street:	Approach	Eas	stbound			We	stbound	i	
	Movement	1	2	3		4	5	6	
		L	Т	R		L	Т	R	
Volume			2360	20		10	1060		
Peak-Hour Fact	or, PHF		0.90	0.90		0.90	0.90		
Hourly Flow Ra	ite, HFR		2622	22		11	1177		
Percent Heavy	Vehicles					4			
Median Type/St		Undiv	ided			/			
Lanes			2 0			1	2		
Configuration			T TR			L			
Upstream Signa	11?		No				No		
Minor Street:	Approach	Noi	thbound			So	uthbour	 nd	
	Movement	7	8	9		10	11	12	
		L	Т	R		L	T	R	
Volume		10		40					
Peak Hour Fact		0.90		0.90					
Hourly Flow Ra		11		44					
Percent Heavy	Vehicles	2		2					
Percent Grade			0				0		
Flared Approac	h: Exists	?/Storage		No	/				/
Lanes		0	0						
Configuration			LR						
	Dolay	Queue Lei		d Towe	.1 0	f Corr			
Approach	DCIAY, EB	WB	_	hbound		I DCIV		 hbound	
Movement	1	4	7	8	9	1	10	11	12
Lane Config	Τ.	L		LR	9		10	11	12
				шк		 			
v (vph)		11		55					
C(m) (vph)		152		27					
v/c		0.07		2.04					
95% queue leng	ŗth	0.23		18.47					
Control Delay		30.5		2238					
LOS		D		F					
Approach Delay	7			2238					
Approach LOS				F					

__TWO-WAY STOP CONTROL SUMMARY__

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/6/2011 Analysis Time Period: PM Peak

Intersection: SR 18 and Scenic View Dr

Jurisdiction:

Units: U. S. Customary

Analysis Year: 2035 No-Build

Project ID: Summit 18 Corridor Study PID 77749

East/West Street: SR 18

North/South Street: Scenic View Dr

Intersection Orientation: EW Study period (hrs): 1.00

	Veh	icle Volı	umes and	Adjus	stme	nts			
Major Street:	Approach	Eas	stbound			We	stbound	l	
	Movement	1	2	3		4	5	6	
		L	T	R	j	L	T	R	
 Volume			 1750	10		50	2430		
	or DIE		0.90	0.90		0.90	0.90		
Peak-Hour Fact Hourly Flow Ra			1944	11		55	2700		
Percent Heavy			1944			4	2700		
Median Type/St		Undiv				4 /			
RT Channelized	_	UIIQIV	ided			/			
Lanes			2 0			1	2		
Configuration			T TR			L	Т		
Upstream Signa	1?		No				No		
Minor Street:	 Approach	 No:	 thbound			So	uthbour	 ıd	
	Movement	7	8	9	- 1	10	11	12	
		L	T	R	j	L	Т	R	
 Volume		0		20					
Peak Hour Fact	or DUE	0.90		0.90					
Hourly Flow Ra		0.90		22					
Percent Heavy		2		2					
Percent Grade		2	0	4			0		
Flared Approac		/Storage	O	No	/		U		/
Lanes	II. EXISCS:	0	0		/				/
Configuration		O	LR						
	Dolor	Queue Lei	nath an	d T 0	. 1 .	£ 00			
Approach	Delay, (EB	gueue пет WB	_	a веvе hbound		r serv		hbound	 1
Movement	1	4 l	7	8	9	ı	10	11	12
Lane Config	T	L		LR	9		10	т т	12
						I 			
v (vph)		55		22					
C(m) (vph)		287		302					
v/c		0.19		0.07					
95% queue leng	th	0.71		0.24					
Control Delay		20.5		17.9					
LOS		С		С					
Approach Delay				17.9					
Approach LOS				С					

Interchange Modification Study Summit 18 Corridor PID 77749

Build Intersections

Analyst: RMK Inter.: SR 18 and Heritage Woods Rd

Agency: Burgess & Niple Inc Area Type: All other areas

Date: 9/26/2011 Jurisd:

Period: AM Peak Hour Year : 2035 Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR		10 10 0011	Idol Beac	_		ritage Woo	ods	
		S	IGNALIZEI	O INTERSE	CTION SU	JMMARY		
	Ea	stbound		oound		nbound	Southk	ound
	L 	T R	ļĿ:	Г В	j r	r R	L T	R
No. Lanes	1	3 0	2	2 0	1	1 1	1 1	. 0
LGConfig	Ĺ	TR	L	TR	L	T R	ļь т	r İ
Volume	10	2320 70		90 50		580	20 10	10
Lane Width	12.0	12.0	12.0 12	2.0	12.012	2.0 12.0	12.0 12.	0
RTOR Vol		0		0		0		0
Duration	0.25	Area		ll other al Operat				
Phase Comb	inatio	n 1 2	3	4	10110	5 6		8
EB Left		P	-	- NB	Left	P	-	•
Thru		P		İ	Thru	P		
Right		P		İ	Right	P		
Peds				ĺ	Peds			
WB Left		P		SB	Left	P		
Thru		P P			Thru	P		
Right		P P			Right	P		
Peds					Peds			
NB Right		P		EB	Right			
SB Right				WB	Right			
Green		13.0 61.	4 0.0			31.6 0.0		
Yellow		4.0 4.0				1.0		
All Red		0.0 1.0				L.O	na+h· 100) 0
		Intera	eation Da	arformana		Cycle Le	_	0.0 secs
Appr/ La	 .ne	Incers		ios		-y coup Apj		
	oup	Flow Rat		105	Dane Gi	LOUP API	proach	
	pacity		v/c	g/C	Delay I	LOS Dela	av LOS	
Eastbound	2.0	4.40	0 05	0 51	4 = 4	_		
	30	449	0.05	0.51	15.1	В		
TR 2	535	4955	1.05	0.51	61.3	E 61.	1 E	
Westbound	.	2.4.2.2	0	0 1 -	F.O	_		
	69	3403	0.63	0.11	59.2	E 10	<i>-</i>	
TR 2	278	3487	0.51	0.65	11.6	В 19.0	6 В	
Northbound		1004	0 01	2 2 5	25.2	_		
	64	1384	0.21	0.26	35.9	D	o =	
	91	1863	0.07	0.26	33.4	C 61.9	9 E	
	54	1583	0.98	0.41	66.5	E		
Southbound		1270	0.06	0 26	22 4	a		
	61	1370	0.06	0.26	33.4	C 22 1	2 G	
TR 4	54	1723	0.05	0.26	33.2	C 33.	3 C	

Intersection Delay = 49.1 (sec/veh) Intersection LOS = D

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RMK

Burgess & Niple Inc Agency/Co.:

Date Performed: 9/26/2011 Date Periormed.

Analysis Time Period: AM Peak Hour

Thtersection: SR 18 and Heritage Woods Rd

Area Type: All other areas

Jurisdiction:

2035 Build Analysis Year:

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Heritage Woods

_____VOLUME DATA_____

	Eas	stbou	nd	Wes	stbour	nd	No	rthbou	ınd	Sou	ıthboı	und
	L	T	R	L	T	R	L	Т	R	L	T	R
Volumo	 10	2220	70	 210	990	 50	 70	2.0	 580	 20	10	 10
Volume		2320	-	210			!	30		! -		- !
% Heavy Veh	:	4	4	3	3	3	2	2	2	2	2	2
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90		0.90	0.90	0.90
PK 15 Vol	3	644	19	58	275	14	19	8	161	6	3	3
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900		1900	1900		1900	1900	1900	1900	1900	ĺ
ParkExist	İ			İ			İ			İ		į
NumPark	İ			İ			İ			İ		į
No. Lanes	1	3	0	2	2	0	1	1	1	1	1	0
LGConfig	L	TR		L	TR		L	T	R	L	TR	j
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	j
RTOR Vol	j		0	İ		0	İ		0	j		0
Adj Flow	11	2656		233	1156		78	33	644	22	22	ĺ
%InSharedLn	İ			ĺ			İ			İ		j
Prop LTs	1.000	0.00	0.0	İ	0.00	0.0	1.000	0.00	0.0	1.000	0.00	j oc
Prop RTs	0	.029		0	.048		0	.000	1.000	0	.500	j
Peds Bikes	0			0			0			0		j
Buses	0	0		0	0		0	0	0	0	0	j
%InProtPhase	Э											
No. Lanes LGConfig Lane Width RTOR Vol Adj Flow %InSharedLn Prop LTs Prop RTs Peds Bikes Buses	L 12.0 11 1.000 0 0	TR 12.0 2656 0 0.00	0	L 12.0 233 0	TR 12.0 1156 0.00	0	L 12.0 78 1.000 0	12.0 33 0 0.00	12.0 0 644 00 1.000	12.0 22 1.000 0	TR 12.0 22 0.00	0

Duration 0.25 Area Type: All other areas

____OPERATING PARAMETERS______

	Ea	stbou:	nd	We	stbour	nd	No	rthbo	und	So	uthbou	nd
	L	Т	R	L	Т	R	L	Т	R	L	T	R
Init Unmet	 0.0	0.0		0.0	0.0		-	0.0	0.0	- <u></u> 0.0	0.0	
Arriv. Type	3	3		3	3		3	3	3	3	3	į
Unit Ext.	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	į
I Factor	ĺ	1.00	0	İ	1.000)	İ	1.00	0	İ	1.000	į
Lost Time	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	į
Ext of g	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	į
Ped Min q	İ	3.2		İ	3.2		İ	3.2		İ	3.2	j

Jurisd:

Analyst: RMK Inter.: SR 18 and Heritage Woods Rd

Agency: Burgess & Niple Inc Area Type: All other areas

Date: 9/26/2011

Period: PM Peak Hour Year : 2035 Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SF	18					N/S	St: I	Herita	age Wo	ods			
			QT	anat.t'	יד מקק	MTFDCF	CTION	QTTMM7	\ D V				
	Fa	 stbour			stbour			rthbou			uthbo		
	L	T	R R	We;	T	R R		T	R R	50	испро Т	R	
		1	IX.		1	K	"	1	K	"	1	IX	
No. Lanes	1	3	0	2	2	0	1	1	1	1	1	0	
LGConfig	į L	TR		i L	TR		i L	${f T}$	R	ļь	TR		į
Volume	30	1670	70	730	2320	10	110	50	560	40	50	50	j
Lane Width	ı 12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0		j
RTOR Vol	j		0	j		0	j		0	İ		0	j
						. 1							
Duration	0.25		Area '			otner Operat							
Phase Comb	oinatio	n 1	2	S±:	4			5	6			 8	
EB Left		_	P	-	-	NB	Left	P	ŭ	•		-	
Thru			P				Thru						
Right			P			i	Right						
Peds			_			i	Peds	_					
WB Left		P				l sb	Left	P					
Thru		P	P			22	Thru						
Right		P	P			i	Right						
Peds		-	-				Peds						
NB Right		P				EB	Right	t.					
SB Right		_				l WB	Right						
Green		31.9	50.9			1	3	23.2	0.0				
Yellow		4.0	4.0					4.0					
All Red		0.0	1.0					1.0					
								Сус	cle Le	ngth:	120.	0	secs
			nterse					_					
·	ane		j Sat		atios		Lane	Group	o Apj	proac.	h		
	coup		w Rate										
Grp Ca	apacity	((S)	V/C	g,	/C	ретау	y LOS	Dela	ay LO	S		
Eastbound													
L 6	51	144	4	0.5	4 0	.42	56.1	E					
TR 2	2098	494	46	0.9	2 0	.42	40.9	D	41.	1 D			
Westbound													
	905	340	0.3	0.9	0 0	. 27	55.8	E					
	2539	351		1.0		.72	39.6	D	43.	5 D			
Northbound	1												
	1 231	119	2.7	0.5	3 0	.19	51.9	D					
	331 360	186		0.5		.19	41.2		35.	9 D			
				0.1				D C	33.	פ ע			
R Southbound	793 1	158	5.5	0.7	5 0	.50	32.3	С					
		1 2 4	1.2	0 1	7 0	1 0	/11 O	D					
	259	134		0.1		.19	41.8	D	40	7 -			
TR 3	333	172	45	0.3	± U	.19	44.5	D	43.	7 D			

Intersection Delay = 41.8 (sec/veh) Intersection LOS = D

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/26/2011 Analysis Time Period: PM Peak Hour
Intersection: SR 18 and Heritage Woods Rd

Area Type: All other areas

Jurisdiction:

Analysis Year: 2035 Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Heritage Woods

_____VOLUME DATA_____

	Eas	stbou	nd	Wes	stbour	nd	No	thbo	ınd	Sou	ıthboı	ınd
	L	Т	R	L	Т	R	L	Т	R	L	Т	R
7												
Volume	30	1670	70	730	2320	10	110	50	560	40	50	50
% Heavy Veh	4	4	4	3	3	3	2	2	2	2	2	2
PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
PK 15 Vol	8	464	19	203	644	3	31	14	156	11	14	14
Hi Ln Vol												
% Grade		0		j	0		İ	0		İ	0	j
Ideal Sat	1900	1900		1900	1900		1900	1900	1900	1900	1900	į
ParkExist				İ			İ			İ		į
NumPark				İ			İ			İ		į
No. Lanes	1	3	0	2	2	0	1	1	1	1	1	0
LGConfig	L	TR		L	TR		L	Т	R	ĹГ	TR	į
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	į
RTOR Vol			0	İ		0	<u> </u>		0	İ		0
Adj Flow	33	1934		811	2589		122	56	622	44	112	į
%InSharedLn				İ			İ			İ		į
Prop LTs	1.000	0.0	0 0	İ	0.00	00	1.000	0.00	0.0	1.000	0.00) 0 j
Prop RTs	0	.040		j 0.	.004		j o	.000	1.000	j o	.500	į
Peds Bikes	0			j o			j o			j o		į
Buses	0	0		0	0		0	0	0	0	0	j
%InProtPhase	<u>-</u>			İ			İ			İ		į
-							•			•		

Duration 0.25 Area Type: All other areas

_____OPERATING PARAMETERS_____

	Ea	stbou	nd	We	stbour	nd	No	rthbo	und	So	uthbour	nd
	L I	Т	R	L	Т	R	L	Т	R	L	T	R
Init Unmet	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Arriv. Type	3	3		3	3		3	3	3	3	3	ĺ
Unit Ext.	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	į
I Factor		1.000)	ĺ	1.000)	İ	1.00	0	İ	1.000	ĺ
Lost Time	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	į
Ext of g	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	į
Ped Min g	İ	3.2		İ	3.2		Ì	3.2		j	3.2	į

Analyst: RMK Inter.: SR 18 and Crystal Lake Rd

Agency: Burgess & Niple Inc Area Type: All other areas

Date: 9/26/2011 Jurisd:

Period: AM Peak Hour Year : 2035 Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Crystal Lake Rd

	r	astbour			tbour		CTION S	hbou		9011	thbo	
	L	T T	R	L	T	R	L	T	R	L	Т	R
No. Lane	eg	 L 3	 0		 3			0	 0			 1
LGConfig	I	T		· ·	T	R		Ū		L	Ū	R
Volume	510	2600	i		1150				i	550		200
Lane Wid	1	12.0	i		12.0		İ		į	12.0		12.0
RTOR Vol	1		j			0	Ì		İ			0
Duration	n 0.25	 5	Area T									
	1- 2)perat	ions	 5				
	ombinatio		2	3	4		T of t	5	6	7		8
EB Left Thru		P P	P P			NB	Left Thru					
		Р	Р									
Righ							Right					
Peds							Peds	Ъ				
VB Left			D			SB	Left	Р				
Thru			P				Thru	Ъ				
Righ			P				Right Peds	P				
Peds						==						
NB Righ		Б				EB	Right	Ъ				
SB Righ	110	P	26 7	0 0		WB	Right					
		38.3	36.7	0.0				31.0	0.0			
Yellow		4.0	4.0	0.0				4.0	0.0			
Yellow				0.0				4.0		acth:	120	0 50
Zellow		4.0	4.0		Derfo	ormanc	e Summa	4.0 1.0 Cyc	le Len	ıgth:	120.	0 sec
Yellow All Red		4.0 0.0	4.0 1.0 ntersec	tion		ormanc	e Summa	4.0 1.0 Cycl	le Len			0 sec
Yellow All Red 	Lane	4.0 0.0 Ir Adj	4.0 1.0 ntersec j Sat	tion	Perfo	ormanc	e Summa Lane (4.0 1.0 Cycl	le Len	ngth: proach		0 sec
Yellow All Red Appr/ Lane		4.0 0.0 Ir Adj	4.0 1.0 ntersec	tion	tios			4.0 1.0 Cyclary	le Len App			0 sec
Yellow All Red Appr/ Lane Grp	Lane Group Capacity	4.0 0.0 Ir Adj	4.0 1.0 ntersec j Sat v Rate	tion Ra	tios		Lane (4.0 1.0 Cyclary	le Len App	roach		0 sec
Yellow All Red Appr/ Lane Grp Eastbour	Lane Group Capacity	4.0 0.0 Ir Adj	4.0 1.0 ntersection Sature Rate	tion Ra	tios g/	 ′C	Lane (4.0 1.0 Cyclary	le Len App	roach		0 sec
Yellow All Red Appr/ Lane Grp Lastbour	Lane Group Capacity nd 621	4.0 0.0 In Adj Flow	4.0 1.0 ntersection Sature Rate (s)	tion Ra v/c 0.91	g/		Lane (Delay	4.0 1.0 Cyclary Group LOS	le Len App ——— Dela	proach		0 sec
Yellow All Red Appr/ Cane Grp Eastbour	Lane Group Capacity nd 621 3308	4.0 0.0 Ir Adj Flow	4.0 1.0 ntersection Sature Rate (s)	tion Ra v/c	g/	 ′C	Lane (Delay	4.0 1.0 Cyclary Group LOS	le Len App	proach		0 sec
Yellow All Red Appr/ Lane Grp Eastbour	Lane Group Capacity nd 621 3308	4.0 0.0 In Adj Flow	4.0 1.0 ntersection Sature Rate (s)	tion Ra v/c 0.91	g/		Lane (Delay	4.0 1.0 Cyclary Group LOS	le Len App ——— Dela	proach		0 sec
Yellow All Red Appr/ Lane Grp Eastbour L T	Lane Group Capacity nd 621 3308	4.0 0.0 In Adj Flow (4.0 1.0 ntersection Sature Rate (SS)	tion Ra v/c 0.91 0.87	tios g/ . 0.	 (C .67 .66	Lane (Delay	4.0 1.0 Cyclary Group LOS D	le Len App ——— Dela	proach		0 sec
Yellow All Red Appr/ Lane Grp Eastbour U	Lane Group Capacity nd 621 3308	4.0 0.0 In Adj Flow (4.0 1.0 ntersection Sature Rate (S)	tion Ra v/c 0.91 0.87	g/ . 0.	 (C .67 .66	Lane (Delay 52.3 20.0+	4.0 1.0 Cyc. ary Group LOS D C	le Len App ——— Dela	proach		0 sec
Tellow All Red Appr/ Lane Grp	Lane Group Capacity nd 621 3308 nd 1537 950	4.0 0.0 In Adj Flow (4.0 1.0 ntersection Sature Rate (S)	tion Ra v/c 0.91 0.87	g/ . 0.	67 66	Lane (Delay 52.3 20.0+	4.0 1.0 Cyc. ary Group LOS D C	le Len App ——— Dela	proach		0 sec
Yellow All Red Appr/ Lane Grp Eastbour L T Westbour	Lane Group Capacity nd 621 3308 nd 1537 950	4.0 0.0 In Adj Flow (4.0 1.0 ntersection Sature Rate (S)	tion Ra v/c 0.91 0.87	g/ . 0.	67 66	Lane (Delay 52.3 20.0+	4.0 1.0 Cyc. ary Group LOS D C	le Len App ——— Dela	proach		0 sec
Yellow All Red Appr/ Lane Grp Eastbour L T Westbour R R Northbou	Lane Group Capacity and 621 3308 and 1537 950 und	4.0 0.0 In Adj Flow 7 175 502	4.0 1.0 ntersection Sature (Sature Rate (Sature Sat	0.91 0.87	g/ . 0.	67 66 31	Lane (Delay 52.3 20.0+ 44.2 18.6	4.0 1.0 Cyc. ary Group LOS D C	le Len App ——— Dela	proach		0 sec
	Lane Group Capacity nd 621 3308 nd 1537 950 und	4.0 0.0 In Adj Flow 7 175 502	4.0 1.0 ntersection Sature (Sature Rate (Sature Sat	0.91 0.87	g/ . 0.	67 66 31	Lane (Delay 52.3 20.0+	4.0 1.0 Cyc. ary Group LOS D C	le Len App ——————————————————————————————————	proach Ly Los		0 sec
Yellow All Red Appr/ Lane Grp Eastbour L T Westbour R Northbou	Lane Group Capacity and 621 3308 and 1537 950 und und 888	4.0 0.0 Ir Add Flow 7 (175 502 156	4.0 1.0 ntersective Rate (s) 	0.83 0.64	g/ . 0.	.67 .66 .31 .61	Lane (Delay 52.3 20.0+ 44.2 18.6	4.0 1.0 Cyc: ary Group LOS D C	le Len App ——————————————————————————————————	proach		0 sec

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/26/2011
Analysis Time Period: AM Peak Hour

Intersection: SR 18 and Crystal Lake Rd

Area Type: All other areas

Jurisdiction:

Analysis Year: 2035 Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Crystal Lake Rd

_____VOLUME DATA_____

	Eas	stbour	nd	Wes	stbour	nd	No	rthbo	und	Sou	thbo	und
	L	T	R	ļ L	Т	R	L	T	R	L	Т	R
Volume	 510	2600		 	1150					<u></u> 550		 200
% Heavy Veh	!	3		! 	3	3] 			2		2
PHF	:	0.90		 	-	0.90	 			0.90		0.90
PK 15 Vol	142	722		 	319	153	 			153		56
Hi Ln Vol	1 1 2	1 4 4		 	319	133	 			1 1 2 2		50
	 	0		 	0						0	ļ
% Grade		•				1000				11000	0	1000
Ideal Sat	1900	1900			1900	1900				1900		1900
ParkExist										ļ		
NumPark				ļ			ļ					ļ
No. Lanes	1	3	0	0	3	1	0	0	0	2	0	1
LGConfig	L	T			Т	R				L		R
Lane Width	12.0	12.0			12.0	12.0				12.0		12.0
RTOR Vol						0						0
Adj Flow	567	2889		İ	1278	611	İ			611		222
%InSharedLn				İ			İ			İ		į
Prop LTs	1.000	0.00	0 (İ	0.00	0.0	İ			İ		į
Prop RTs	!	.000		io.	.000		İ			i		1.000
Peds Bikes				0			i 0			0		
Buses	0	0			0	0				0		0
%InProtPhase				İ			İ					i

Duration 0.25 Area Type: All other areas

_____OPERATING PARAMETERS_____

	Ea	stbou	nd	We	stbou	nd	No	rthbo	und	Son	ıthbo	und
	L	Т	R	L	T	R	L	T	R	L	T	R
										.		
Init Unmet	0.0	0.0			0.0	0.0				0.0		0.0
Arriv. Type	3	3			3	3				3		3
Unit Ext.	3.0	3.0		İ	3.0	3.0	İ			3.0		3.0
I Factor		1.00	0	ĺ	1.00	0	Ì			İ	1.00	0
Lost Time	2.0	2.0		İ	2.0	2.0	İ			2.0		2.0
Ext of g	2.0	2.0		İ	2.0	2.0	İ			2.0		2.0
Ped Min g	İ			j	3.2		İ	3.2		İ	3.2	j

Jurisd:

Analyst: RMK Inter.: SR 18 and Crystal Lake Rd

Agency: Burgess & Niple Inc Area Type: All other areas

Date: 9/26/2011

Period: PM Peak Hour Year : 2035 Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Crystal Lake Rd

			~-~				~	~				
							CTION S					
	East L	tboun T	a R	wes L	tbour T	na R	Nort	thbour T	na R	Sou L	thbo T	una R
	-	-			_	10	-	_	1		_	10
No. Lanes	1	3	0	0	3	1	0	0	0	2	0	1
LGConfig	i L	T	į		T	R	İ		į	L		R
Volume	120 2	2150	j		2700	400	İ		j	690		360
Lane Width	12.0	12.0	j		12.0	12.0	İ		j	12.0		12.0
RTOR Vol	Ì		İ			0			İ			0
Duration	0.25		Area T									
						perat	ions					
Phase Comb	ınatıon		2	3	4		T - C -	5	6	7		8
EB Left		P	P P			NB	Left					
Thru		P	Р				Thru					
Right							Right					
Peds							Peds	ъ				
WB Left			Б			SB	Left	Р				
Thru			P				Thru	ъ				
Right			P			ļ	Right	P				
Peds						===	Peds					
NB Right		_				EB	Right	_				
SB Right	,	P	60.0	0 0		WB	Right		0 0			
Green		9.0	67.8	0.0				29.2	0.0			
Yellow		4.0	4.0					4.0				
All Red	(0.0	1.0					1.0				
								~ 7	l - T		1 0 0	A
		Tn	toraca	tion	Dorfo	xmana	o Cumma	_	le Len	igth:	120.	0 sec
7nnr/ Ia						ormanc	e Summa	ary				0 sec
	 ne oup	Adj	tersec Sat Rate		Perfo	ormanc	e Summa Lane (ary		ıgth: roach		0 sec
Lane Gr		Adj Flow	Sat		tios			ary Group	 App		 	0 sec
Lane Gr Grp Ca ————Eastbound	oup pacity 	Adj Flow (Sat Rate s)	Ra v/c	ntios g/	 ′C	Lane (ary Group	 App	roach	 	0 sec
Lane Gr Grp Ca Eastbound	oup	Adj Flow	Sat Rate s)	Ra v/c	g/ 9		Lane (ary Group	 App	roach	 	0 sec
Lane Gr Grp Ca Eastbound L 1	oup pacity 	Adj Flow (Sat Rate s) 	Ra v/c	g/ 9	 ′C	Lane (ary Group LOS	 App	roach y LOS	 	0 sec
Lane Gr Grp Ca Eastbound L 1 T 3	oup pacity 92	Adj Flow (Sat Rate s) 	Ra v/c	g/ 9		Lane (Delay	ary Group LOS	App ——— Dela	roach y LOS	 	0 sec
Lane Gr Grp Ca Eastbound L 1 T 3	oup pacity 92 384	Adj Flow (175 502	Sat Rate s) 2 5	Ra v/c 0.69 0.71	g/ 	 /C .68 .67	Lane (Delay 52.5 13.5	ary Group LOS D B	App Dela	proach Ly LOS	 	0 sec
Lane Gr Grp Ca Eastbound L 1 T 3 Westbound	oup pacity 92 384	Adj Flow (175 502	Sat Rate s) 2 5	0.69	g/ 	 /C 68 67	Lane (Delay 52.5 13.5	ary Group LOS D B	App ——— Dela	proach Ly LOS	 	0 sec
Lane Gr Grp Ca Eastbound L 1 T 3 Westbound T 2 R 1	oup pacity 92 384 839 333	Adj Flow (175 502	Sat Rate s) 2 5	0.69	g/ 	 /C .68 .67	Lane (Delay 52.5 13.5	ary Group LOS D B	App Dela	proach Ly LOS	 	0 sec
Lane Gr Grp Ca Eastbound L 1 T 3 Westbound T 2 R 1 Northbound Southbound	oup pacity 92 384 839 333	Adj Flow (175 502 502	Sat Rate s) 2 5	0.69 0.71	g/ . 0.	.68 .67 .56 .85	Delay 52.5 13.5	E A	App Dela	proach Ly LOS	 	0 sec
Lane Gr Grp Ca Eastbound L 1 T 3 Westbound T 2 R 1 Northbound Southbound	oup pacity 92 384 839 333	Adj Flow (175 502	Sat Rate s) 2 5	0.69	g/ . 0.	 /C 68 67	Delay 52.5 13.5	ary Group LOS D B	App Dela 15.5	proach y LOS	 	0 sec
Lane Gr Grp Ca Eastbound L 1 T 3 Westbound T 2 R 1 Northbound Southbound L 8	oup pacity 92 384 839 333	Adj Flow (175 502 502	Sat Rate s) 2 5 8	0.69 0.71	g/ 0 0.	.68 .67 .56 .85	Delay 52.5 13.5 60.4 2.6	E A	App Dela	proach y LOS	 	0 sec

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/26/2011 Analysis Time Period: PM Peak Hour
Intersection: SR 18 and Crystal Lake Rd

Area Type: All other areas

Jurisdiction:

Analysis Year: 2035 Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Crystal Lake Rd

_____VOLUME DATA_____

	Eas	stbour	nd	Wes	stbou	nd	Noi	thbo	und	Sou	thbo	und	
	L	T	R	L	T	R	L	T	R	L	Т	R	ĺ
										-			
Volume	120	2150		ļ	2700					690		360	ļ
% Heavy Veh	3	3			3	3				2		2	
PHF	0.90	0.90			0.90	0.90				0.90		0.90	
PK 15 Vol	33	597			750	111				192		100	
Hi Ln Vol													
% Grade	İ	0		j	0					j	0		İ
Ideal Sat	1900	1900		j	1900	1900				 1900		1900	İ
ParkExist				İ						İ			İ
NumPark	İ			İ						i			i
No. Lanes	1	3	0	i o	3	1	0	0	0	2	0	1	i
LGConfig	L	Т		j	Т	R				ĹЬ		R	İ
Lane Width	12.0	12.0		İ	12.0	12.0				12.0		12.0	İ
RTOR Vol	İ			į		0				i		0	i
Adj Flow	133	2389		İ	3000	444				767		400	i
%InSharedLn				! 									i
Prop LTs	1 . 000	0.00	0.0	i İ	0.0	0.0							i
Prop RTs	!	.000	, ,	ĺο	.000		!					1.000	i
Peds Bikes	,			0			0			0			
Buses	l 0	0		i 0	0	0						0	¦
%InProtPhase		J		! 	J	J						J	
7 IIIFI OCFIIAS			7	 	7. 7. 7	-+ h	l 			I			I

Duration 0.25 Area Type: All other areas

_____OPERATING PARAMETERS_____

	Ea	stbou	nd	We	stbou	nd	No	rthbo	und	So	uthbo	und
	L	Т	R	L	T	R	L	T	R	L	T	R
										.		
Init Unmet	0.0	0.0			0.0	0.0				0.0		0.0
Arriv. Type	3	3			3	3				3		3
Unit Ext.	3.0	3.0		İ	3.0	3.0	Ì			3.0		3.0
I Factor		1.00	0		1.00	0					1.00	0
Lost Time	2.0	2.0		İ	2.0	2.0	İ			2.0		2.0
Ext of g	2.0	2.0		İ	2.0	2.0	İ			2.0		2.0
Ped Min g				İ	3.2		Ì	3.2		İ	3.2	į

Analyst: RMK Inter.: SR 18 and Crystal Lake Rd

Agency: Burgess & Niple Inc Area Type: All other areas

Date: 9/26/2011

Jurisd:

Period: AM Peak Hour

Year : 2035 Build - WB Adjusted Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Crystal Lake Rd

E/W St:	SR 18					N/S	St: C	rysta.	l Lake	Rd		
	 Eas L	stbound T			ZED I stbou T		CTION Nor L	SUMMAI thbour T		Sou L	thbo T	und R
No. Lane LGConfig Volume Lane Wid RTOR Vol	L 510 th 12.0	3 T 2600 12.0	0	0	2 T 860 12.0	1 R 550 12.0	0	0		2 L 550 12.0	0	1 R 200 12.0 0
 Duration	0.25		rea T			other						
						Operat	ions		 6			
EB Left Thru Righ	t	P P	2 P P	3	4	 NB 	Left Thru Right	5	6	/		8
Peds WB Left Thru Righ	t		P P			 SB 	Peds Left Thru Right	P P				
Peds NB Righ SB Righ Green	t	P 38.3	37.7	0.0		 EB WB	Peds Right Right		0.0			
Yellow All Red		4.0	4.0	0.0				4.0 1.0	le Leng	gth:	120.	0 secs
							e Summ	_				
Lane	Lane Group	Adj Flow								roach		
Grp	Capacity 	(8)	v/c	g g	/C	Delay	LOS	Dela	y LOS		
Eastboun L	d 621	1752	ı	0.91	0	.68	52.5	D				
T	3350	5025		0.86		.67	18.9	В	24.4	С		
Westboun	d											
T R Northbou	1103 950 nd	3512 1568		0.87		.31	48.0 18.6	D B	36.5	D		
Southbou:	nd 859	3437		0.71	n	.25	46.0	D				
		1583							36.7	D		
R	967 Interse			0.23		.61 sec/ve	11.1 h) T	B nterse	ection	T.OS	= C	
	THICETPE	CCIOII L	стау	- 4 9.	· T (BEC/VE	ш, Т.	TICETS	CCTOIL	ПОР	– C	

Phone: Fax: E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/26/2011 Analysis Time Period: AM Peak Hour
Thtersection: SR 18 and Crystal Lake Rd

Area Type: All other areas

Jurisdiction:

2035 Build - WB Adjusted Analysis Year: Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Crystal Lake Rd

_____VOLUME DATA_____

	Eas	Eastbound		Westbound			No	rthbo	und	Sou	thbo	ound
	L	Т	R	L	Т	R	L	T	R	L	Т	R
_							ļ			·		
Volume	510	2600			860	550	ļ			550		200
% Heavy Veh		3			3	3				2		2
PHF	0.90	0.90			0.90	0.90				0.90		0.90
PK 15 Vol	142	722			239	153				153		56
Hi Ln Vol												
% Grade		0			0		ĺ			İ	0	ĺ
Ideal Sat	1900	1900			1900	1900	İ			1900		1900
ParkExist	İ						İ			İ		į
NumPark	ĺ						Ì			İ		į
No. Lanes	1	3	0	0	2	1	j o	0	0	2	0	1
LGConfig	L	Т		ĺ	т	R	İ			į L		R İ
Lane Width	!	12.0			12.0	12.0	İ			12.0		12.0
RTOR Vol						0	İ			İ		0 j
Adj Flow	567	2889			956	611	İ			611		222
%InSharedLn							İ			İ		į
Prop LTs	1.000	0.00	0 0		0.0	0 0	İ			İ		į
Prop RTs	j o	.000		0	.000	1.000	İ			İ		1.000
Peds Bikes				0			j o			i o		į
Buses	0	0			0	0	İ			0		0
%InProtPhase	0.0						j			İ		į
-			_				1			1		ı

Duration 0.25 Area Type: All other areas

_____OPERATING PARAMETERS_____

	Ea	Eastbound		Westbound			Northbound			So	Southbound	
	L	T	R	L	T	R	L	T	R	L	T	R
T										-		
Init Unmet	0.0	0.0			0.0	0.0				0.0		0.0
Arriv. Type	3	3			3	3				3		3
Unit Ext.	3.0	3.0			3.0	3.0				3.0		3.0
I Factor		1.00	0		1.00	0					1.00	0
Lost Time	2.0	2.0			2.0	2.0				2.0		2.0
Ext of g	2.0	2.0		ĺ	2.0	2.0	ĺ			2.0		2.0
Ped Min g	ĺ			İ	3.2		İ	3.2		İ	3.2	

Analyst: RMK Inter.: SR 18 and Crystal Lake Rd

Agency: Burgess & Niple Inc Area Type: All other areas

Date: 9/26/2011 Period: PM Peak Hour Jurisd:

Year : 2035 Build - WB Adjusted

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Crystal Lake Rd

2,11 50			ата	13T3 T T I	70D T	NEED CE	ICET ON		DM	. 110		
					stbou		CTION	thbou				
	L L	stbour T	R	we: L	T T	R R	L	Т	R	L	thbo T	R
No. Lane LGConfig Volume Lane Wid	J L 120 12.0	3 T 2150 12.0	0	0		1 R 400 12.0	0	0	0	L 690 12.0	0	1 R 360 12.0 0
RTOR Vol	· 						 					
Duration	0.25		Area T				areas ions					
Phase Co	mbinatio	n 1	2	3	4			 5	6	7		8
EB Left		P	P			NB	Left					
Thru	l	P	P			j	Thru					
Righ	ıt					j	Right					
Peds						į	Peds					
WB Left						SB	Left	P				
Thru	l		Р			İ	Thru					
Righ	ıt		P			i	Right	P				
Peds						j	Peds					
NB Righ						i eb	Right					
SB Righ		P				ĺWВ	Right					
Green		8.0	70.6	0.0		1	5	27.4	0.0			
Yellow		4.0	4.0					4.0				
All Red		0.0	1.0					1.0				
									le Ler	ath:	120.	0 secs
		Ir	ntersec	tion	Perf	ormand	e Summ					
	Lane	Ad	j Sat		atios		Lane			roach	1	
	Group		v Rate									
Grp 	Capacity 	((s) 	v/c		/C	Delay 	LOS		ту гоз		
Eastboun		175	- 0	0.74	1 0	7.0	E0 6	T-7				
L T	179			0.72		.70	59.6 12.3	E	1 / 0) D		
1	3459	502	45	0.63	9 0	.69	14.3	В	14.8	B B		
Westboun	ıd											
Т	2066	351	L2	1.09	9 0	.59	74.7	E	62.8	8 E		
R	1346	156		0.33		.86	2.3	A				
Northbou												
Southbou	ınd											
L	785	343	37	0.98	3 0	.23	73.0	E	60.0			
R	533	158	33	0.75	5 N	.34	44.7	D	63.3	8 E		
10	Interse								ection	T.OG	- D	
	Interse	clion	ретау	= 43	. 9 (sec/ve	:11 <i>)</i>	ncers	ection	т гор	= D	

Phone: Fax: E-Mail:

____OPERATIONAL ANALYSIS_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/26/2011 Analysis Time Period: PM Peak Hour

Intersection: SR 18 and Crystal Lake Rd

Area Type: All other areas

Jurisdiction:

Analysis Year: 2035 Build - WB Adjusted Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: Crystal Lake Rd

_____VOLUME DATA_____

	Eastbound		Westbound			Northbound			Southbound			
	L	Т	R	L	T	R	L	Т	R	L	Т	R
Volume	 120	2150		 	2030	400	 			- 690		360
% Heavy Veh	3	3		İ	3	3	İ			2		2
PHF	0.90	0.90		İ	0.90	0.90	İ			0.90		0.90
PK 15 Vol	33	597		İ	564	111	İ			192		100
Hi Ln Vol	j			İ			İ			į		
% Grade	İ	0		İ	0		İ			İ	0	
Ideal Sat	1900	1900		İ	1900	1900	İ			1900		1900
ParkExist	İ			İ			İ			j		
NumPark	İ			İ			İ			j		
No. Lanes	j 1	3	0	j o	2	1	j o	0	0	2	0	1
LGConfig	i L	Т		İ	Т	R	İ			ĹЬ		R
Lane Width	12.0	12.0		İ	12.0	12.0	İ			12.0		12.0
RTOR Vol	İ			İ		0	İ			j		0
Adj Flow	133	2389		İ	2256	444	İ			767		400
%InSharedLn	İ			İ			İ					
Prop LTs	1.000	0.00	0	İ	0.00	00	İ			j		
Prop RTs	!	.000		j o	.000		İ			j		1.000
Peds Bikes				0			i o			i o		
Buses	0	0			0	0				0		0
%InProtPhase	e 0.0			İ			İ			j		

Duration 0.25 Area Type: All other areas

_____OPERATING PARAMETERS_____

	Ea	Eastbound			Westbound			rthbo	und	So	Southbound	
	L	T	R	L	Т	R	L	Т	R	L	T	R
										.		
Init Unmet	0.0	0.0			0.0	0.0				0.0		0.0
Arriv. Type	3	3			3	3				3		3
Unit Ext.	3.0	3.0		İ	3.0	3.0	İ			3.0		3.0
I Factor		1.00	0		1.00	0					1.00	0
Lost Time	2.0	2.0		ĺ	2.0	2.0	İ			2.0		2.0
Ext of g	2.0	2.0		ĺ	2.0	2.0	İ			2.0		2.0
Ped Min g				ĺ	3.2		İ	3.2		İ	3.2	į

___TWO-WAY STOP CONTROL SUMMARY__

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/6/2011 Analysis Time Period: AM Peak

Intersection: SR 18 and Scenic View Dr

Jurisdiction:

Units: U. S. Customary

Analysis Year: 2035 Build

Project ID: Summit 18 Corridor Study PID 77749

East/West Street: SR 18

North/South Street: Scenic View Dr

Intersection Orientation: EW Study period (hrs): 1.00

	Ve	hicle Volu	umes and	Adjus	stme:	nts			
Major Street:	Approach	Eas	stbound			We	stbound	i	
	Movement	1	2	3		4	5	6	
		L	Т	R		L	Т	R	
Volume			2360	20		10	1060		
Peak-Hour Fact	or, PHF		0.90	0.90		0.90	0.90		
Hourly Flow Ra	ate, HFR		2622	22		11	1177		
Percent Heavy	Vehicles					4			
Median Type/St		Undiv	ided			/			
Lanes			2 0			1	2		
Configuration			T TR			L			
Upstream Signa	11?		No				No		
Minor Street:	Approach	Noi	thbound			So	uthbour	 nd	
	Movement	7	8	9		10	11	12	
		L	Т	R		L	T	R	
Volume		10		40					
Peak Hour Fact		0.90		0.90					
Hourly Flow Ra		11		44					
Percent Heavy	Vehicles	2		2					
Percent Grade			0				0		
Flared Approac	ch: Exists	?/Storage		No	/				/
Lanes		0	0						
Configuration			LR						
	Dolay	Queue Lei		d Toxe		f Corr			
Approach	DCIAY, EB	WB	_	hbound		I DCIV		hbound	
Movement	1	4		8	9	1	10	11	12
Lane Config	Τ.	L		LR	9	}	10	T T	12
v (vph)		11		55					
C(m) (vph)		152		27					
v/c		0.07		2.04					
95% queue leng	ŋth	0.23		18.47					
Control Delay		30.5		2238					
LOS		D		F					
Approach Delay	7			2238					
Approach LOS				F					

___TWO-WAY STOP CONTROL SUMMARY__

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 9/6/2011 Analysis Time Period: PM Peak

Intersection: SR 18 and Scenic View Dr

Jurisdiction:

Units: U. S. Customary

Analysis Year: 2035 Build

Project ID: Summit 18 Corridor Study PID 77749

East/West Street: SR 18

North/South Street: Scenic View Dr

Intersection Orientation: EW Study period (hrs): 1.00

	Veh	icle Volı	umes and	Adjus	stme	nts			
Major Street:	Approach	Eas	stbound			We	stbound	i	
	Movement	1	2	3		4	5	6	
		L	T	R	j	L	T	R	
 Volume			 1750	10		 50	2430		
	or DIE		0.90	0.90		0.90	0.90		
Peak-Hour Fact Hourly Flow Ra			1944	11		55	2700		
Percent Heavy			1944			4	2700		
Median Type/St		Undiv				4 /			
RT Channelized	_	UIIQIV	ided			/			
Lanes			2 0			1	2		
Configuration			T TR			L	T		
Upstream Signa	1?		No				No		
Minor Street:	 Approach	 No:	 thbound			 So	uthboun	 nd	
	Movement	7	8	9	- 1	10	11	12	
		L	T	R	j	L	T	R	
 Volume		0		20					
Peak Hour Fact	or DUE	0.90		0.90					
Hourly Flow Ra		0.90		22					
Percent Heavy		2		2					
Percent Grade		2	0	4			0		
Flared Approac		/Storage	O	No	/		U		/
Lanes	II. EXISCS:	0	0		/				/
Configuration		O	LR						
	Dolor	Queue Lei	nath an	d T 0	. 1 .	£ 00			
Approach	Delay, (EB	gueue пет WB	_	hbound		ı serv		hbound	
Movement	1	4 l	7	8	9	1	10	11	12
Lane Config	T	L		LR	9	}	10	T T	12
						I			
v (vph)		55		22					
C(m) (vph)		287		302					
v/c		0.19		0.07					
95% queue leng	th	0.71		0.24					
Control Delay		20.5		17.9					
LOS		С		C					
Approach Delay				17.9					
Approach LOS				С					

Appendix E

Constrained Traffic Analysis

Constrained Traffic Calculations

SB I-77 On-Ramp AM

The intersection of SR 18 @ Crystal Lake Road constrains traffic entering SB I-77. However, the downstream weaving section on I-77 is LOS C under full demand volumes. Because the full demand volumes yield and acceptable LOS, no check of constrained analysis is necessary.

SB I-77 On-Ramp PM

No-Build Condition (SR 18 @ Crystal Lake Road

```
EB Thru v/c = 1.32
NB Right v/c = 0.77 (No Constraint)
SB Left v/c = 1.47
```

Assume 50.35% diversion to interstate based on 2035 PM traffic plates DHV

```
EB Thru = 1820 * 0.5035 = 916

SB Left = 690 * 0.5035 = 348

NB Right = 330 * 0.5035 = 166

Total = 916+348+166 = 1430 = Full demand ramp volume
```

Constrained (No-Build Ramp Volume):

EB Thru = 916/1.32 = 694 vehicles

SB Left = 348/1.47 = 237 vehicles

NB Right = 166 vehicles

Total entering freeway = 694+237+166 = 1097 vehicles in PM No-Build condition

Operation for freeway weaving segment under constrained condition is LOS E

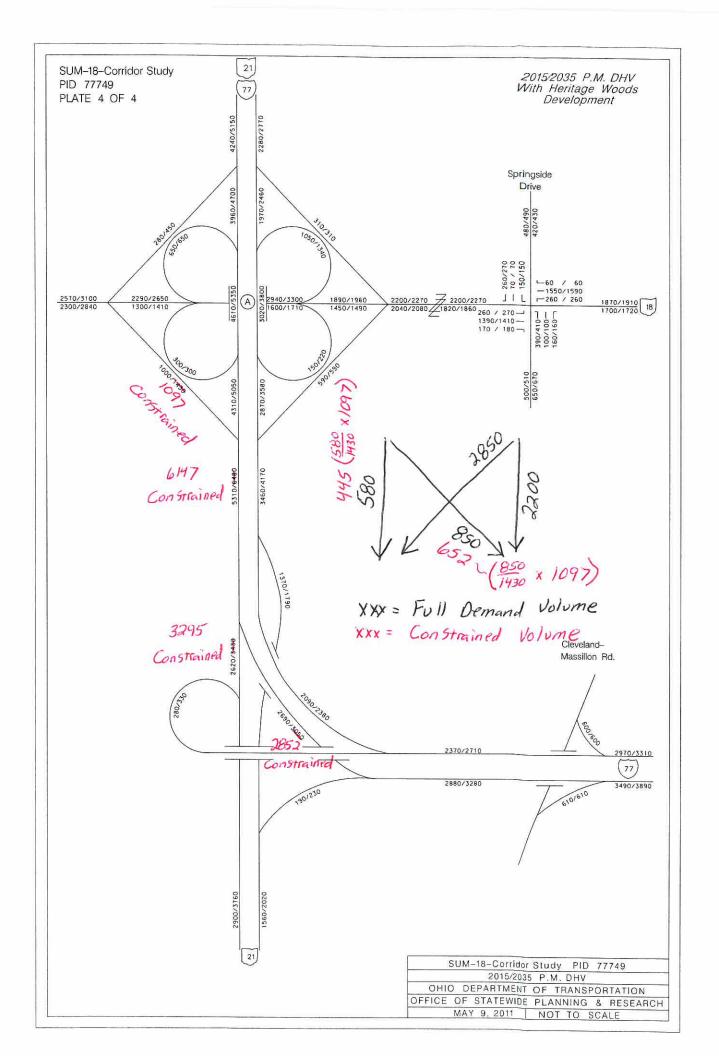
Build Condition (SR 18 @ Crystal Lake Road)

```
EB Thru v/c = 0.71 (No Constraint)
NB Right v/c = N/A (Approach Removed)
SB Left v/c = 0.92 (No Constraint)
```

The Build condition will operate with full demand traffic of 1430 because all v/c ratios are less than 1.0.

Operation for freeway weaving segment under full demand traffic condition is LOS E

LOS No-Build (Constrained) = LOS Build, Therefore No Degradation occurs to the freeway segment



Phone: E-mail:

Fax:

____Operational Analysis_____

Analyst: RMK

Agency/Co.: Burgess & Niple Inc

Date Performed: 2/21/2012

Analysis Time Period: PM No-Build (Constrained)

Freeway/Dir of Travel: I-77 SB

Weaving Location: EB SR 18 On to SR 21 Off

Jurisdiction:

Analysis Year: 2035

Description: Summit 18 Corridor Study PID 77749

-					
Ιn	2	11	+		
$_{\rm L}$	U	u	-	0	

70 4	mph
2300	ft
Level	
	8
	mi
В	
0.57	
0.19	
	4 2300 Level B 0.57

___Conversion to pc/h Under Base Conditions____

	Non-Weaving		Weaving		
	V	V	V	V	
	01	02	w1	w2	
Volume, V	2200	445	2850	652	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	611	124	792	181	v
Trucks and buses	6	3	3	6	%
Recreational vehicles	0	0	0	0	양
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.985	0.985	0.971	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2517	501	3214	746	pc/h

______Weaving and Non-Weaving Speeds_____

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.20	6.00
c (Exhibit 24-6)	0.70	1.00
d (Exhibit 24-6)	0.50	0.50
Weaving intensity factor, Wi	0.83	1.08
Weaving and non-weaving speeds, Si	47.73	43.86
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7) 2.62
Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.50
Type of operation is Unconstrained

_Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S	45.97	mph
Weaving segment density, D		pc/mi/ln
Level of service, LOS	(E)	
Capacity of base condition, cb	7047	pc/h
Capacity as a 15-minute flow rate, c	6842	pc/h
Capacity as a full-hour volume, ch	6158	pc/h

Limitations on Weaving Segments_____

		If Max Exce	eded See Note
	Analyzed	Maximum	Note
Weaving flow rate, Vw	3960	4000	a
Average flow rate (pcphpl)	1744	2400	b
Volume ratio, VR	0.57	0.80	С
Weaving ratio, R	0.19	N/A	d
Weaving length (ft)	2300	2500	е
Notes.			

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Phone: E-mail: Fax:

Operational Analysis_____

Analyst:

RMK

Agency/Co.:

Burgess & Niple Inc

Date Performed:

2/21/2012

Analysis Time Period: PM Peak Hour

Full Demand

Freeway/Dir of Travel: I-77 SB

Weaving Location: EB SR 18 On to SR 21 Off

Jurisdiction:

Analysis Year:

2035

Description: Summit 18 Corridor Study PID 77749

Ļ	n	p	u	t	S	
		_				-

Freeway free-flow speed, SFF	70	mph
Weaving number of lanes, N	4	
Weaving segment length, L	2300	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	В	
Volume ratio, VR	0.57	
Weaving ratio, R	0.23	

___Conversion to pc/h Under Base Conditions_____

	Non-Wea	ving	Weaving		
	V	V	V	V	
	01	02	w1	w2	
Volume, V	2200	580	2850	850	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	2 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -
Peak 15-min volume, v15	611	161	792	236	v
Trucks and buses	6	3	3	6	%
Recreational vehicles	0	0	0	0	9
Trucks and buses PCE, ET	1.5	1.5	1.5	1.5	
Recreational vehicle PCE, ER	1.2	1.2	1.2	1.2	
Heavy vehicle adjustment, fHV	0.971	0.985	0.985	0.971	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2517	654	3214	972	pc/h

___Weaving and Non-Weaving Speeds____

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.08	0.0020
b (Exhibit 24-6)	2.20	6.00
c (Exhibit 24-6)	0.70	1.00
d (Exhibit 24-6)	0.50	0.50
Weaving intensity factor, Wi	0.87	1.14
Weaving and non-weaving speeds, Si	47.14	42.98
Number of lanes required for		

unconstrained operation, Nw (Exhibit 24-7) 2.65
Maximum number of lanes, Nw (max) (Exhibit 24-7) 3.50
Type of operation is Unconstrained

_____Weaving Segment Speed, Density, Level of Service and Capacity

Weaving segment speed, S

Weaving segment density, D

Level of service, LOS

Capacity of base condition, cb

Capacity as a 15-minute flow rate, c

Capacity as a full-hour volume, ch

45.25 mph

40.64 pc/mi/ln

6825 pc/h

6825 pc/h

Limitations on Weaving Segments

		If Max Exce	eded See Note
	Analyzed	Maximum	Note
Weaving flow rate, Vw	4186	4000	a
Average flow rate (pcphpl)	1839	2400	b
Volume ratio, VR	0.57	0.80	С
Weaving ratio, R	0.23	N/A	đ
Weaving length (ft)	2300	2500	е
Notes:			

- a. Weaving segments longer than 2500 ft. are treated as isolated merge and diverge areas using the procedures of Chapter 25, "Ramps and Ramp Junctions".
- b. Capacity constrained by basic freeway capacity.
- c. Capacity occurs under constrained operating conditions.
- d. Three-lane Type A segments do not operate well at volume ratios greater than 0.45. Poor operations and some local queuing are expected in such cases.
- e. Four-lane Type A segments do not operate well at volume ratios greater than 0.35. Poor operations and some local queuing are expected in such cases.
- f. Capacity constrained by maximum allowable weaving flow rate: 2,800 pc/h (Type A), 4,000 (Type B), 3,500 (Type C).
- g. Five-lane Type A segments do not operate well at volume ratios greater than 0.20. Poor operations and some local queuing are expected in such cases.
- h. Type B weaving segments do not operate well at volume ratios greater than 0.80. Poor operations and some local queuing are expected in such cases.
- i. Type C weaving segments do not operate well at volume ratios greater than 0.50. Poor operations and some local queuing are expected in such cases.

Appendix F

Storage Length Calculations

SR 18 Storage Length Calculations

Intersection	Approach	Turn Movement	# Turn Lanes	# Thru Lanes	Turn Volume	Thru Volume	Cycle Length	Turn Vehicles per Cycle	Req'd Storage Length Type B	Req'd Storage Length Type C	Req'd Storage Leght (per lane)	Thru Vehicles per Cycle per Lane	_	Turn Lane Decel and Storage Req'd for Thru	Turn Lane Decel and Storage Provided
State Route 18 & Heritage Woods Road &	EB	Left	1	3	30	2390	120	1.0	225	193	225	26.6	975	975	600
Akron General	WB	Left	2	2	730	2330	120	24.3	225	968	484	38.8	1250	1250	1525
SR 18 & Crystal Lake Road	EB	Left	1	3	320	2600	120	10.7	225	543	543	28.9	975	975	350
Six 10 & Crystal Lake Road	WB	Right	1	3	550	2700	120	18.3	225	793	793	30.0	975	975	450

Appendix G

Synchro/SimTraffic Analysis

Intersection: 25: SR 18 & Crystal Lake, Interval #1

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB	
Directions Served	L	T	T	T	T	T	T	R	L	L	R	
Maximum Queue (ft)	266	96	140	137	269	305	318	228	200	218	151	
Average Queue (ft)	150	77	82	96	150	216	232	153	146	142	68	
95th Queue (ft)	248	112	141	148	290	294	304	269	204	190	117	
Link Distance (ft)		596	596	596	597	597	597		2638	2638		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	315							450			300	
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 25: SR 18 & Crystal Lake, Interval #2

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB	
Directions Served	L	T	Т	T	T	T	Т	R	L	L	R	
Maximum Queue (ft)	267	140	116	116	314	287	286	246	544	591	325	
Average Queue (ft)	183	95	77	102	164	213	214	195	422	458	169	
95th Queue (ft)	295	143	112	120	302	296	296	297	563	607	401	
Link Distance (ft)		596	596	596	597	597	597		2638	2638		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	315							450			300	
Storage Blk Time (%)										33	0	
Queuing Penalty (veh)										73	0	

Intersection: 25: SR 18 & Crystal Lake, Interval #3

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB	
Directions Served	L	T	T	T	T	T	T	R	L	L	R	
Maximum Queue (ft)	286	96	112	141	270	312	348	244	346	347	324	
Average Queue (ft)	215	73	87	104	189	256	287	184	184	192	106	
95th Queue (ft)	311	100	109	142	284	317	377	264	320	335	261	
Link Distance (ft)		596	596	596	597	597	597		2638	2638		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	315							450			300	
Storage Blk Time (%)										3		
Queuing Penalty (veh)										5		

SUM-18 SimTraffic Report

Intersection: 25: SR 18 & Crystal Lake, Interval #4

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB	
Directions Served	L	T	T	T	T	T	T	R	L	L	R	
Maximum Queue (ft)	240	103	120	138	203	270	263	184	265	282	171	
Average Queue (ft)	175	81	93	105	140	210	206	105	207	230	91	
95th Queue (ft)	261	109	131	137	231	271	274	188	272	306	189	
Link Distance (ft)		596	596	596	597	597	597		2638	2638		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	315							450			300	
Storage Blk Time (%)										0		
Queuing Penalty (veh)										0		

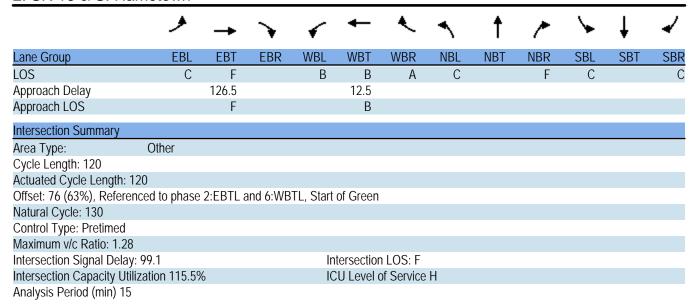
Intersection: 25: SR 18 & Crystal Lake, All Intervals

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB	
Directions Served	L	Т	T	T	T	Т	T	R	L	L	R	
Maximum Queue (ft)	286	140	140	141	314	312	348	246	544	591	325	
Average Queue (ft)	181	82	85	102	161	224	235	159	240	255	108	
95th Queue (ft)	287	119	126	139	283	301	329	272	447	485	270	
Link Distance (ft)		596	596	596	597	597	597		2638	2638		
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	315							450			300	
Storage Blk Time (%)										9	0	
Queuing Penalty (veh)										19	0	

SUM-18 SimTraffic Report

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	∱ }		ሻ	^	7	ሻ		7	ሻ		7
Volume (vph)	20	1370	50	140	920	10	80	0	1000	10	0	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		0	330		125	150		0	50		0
Storage Lanes	1		0	1		1	1		1	1		1
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995				0.850			0.850			0.850
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	3456	0	1770	3438	1583	1770	0	1583	1770	0	1583
Flt Permitted	0.280			0.082			0.950			0.950		
Satd. Flow (perm)	522	3456	0	153	3438	1583	1770	0	1583	1770	0	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			35			30	
Link Distance (ft)		1287			951			2174			424	
Travel Time (s)		19.5			14.4			42.4			9.6	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	4%	2%	2%	5%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	22	1522	56	156	1022	11	89	0	1111	11	0	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	22	1578	0	156	1022	11	89	0	1111	11	0	11
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Perm			pm+pt		Perm	custom		custom	custom		custom
Protected Phases		2		1	6				18			
Permitted Phases	2			6		6	8			4		4
Minimum Split (s)	30.0	30.0		13.0	30.0	30.0	13.0			13.0		13.0
Total Split (s)	49.0	49.0	0.0	25.0	74.0	74.0	46.0	0.0	71.0	46.0	0.0	46.0
Total Split (%)	40.8%	40.8%	0.0%	20.8%	61.7%	61.7%	38.3%	0.0%	59.2%	38.3%	0.0%	38.3%
Maximum Green (s)	44.0	44.0		20.0	69.0	69.0	41.0			41.0		41.0
Yellow Time (s)	4.0	4.0		4.0	4.0	4.0	4.0			4.0		4.0
All-Red Time (s)	1.0	1.0		1.0	1.0	1.0	1.0			1.0		1.0
Lost Time Adjust (s)	-2.0	-2.0	0.0	0.0	-2.0	0.0	-2.0	-2.0	0.0	-2.0	-2.0	0.0
Total Lost Time (s)	3.0	3.0	4.0	5.0	3.0	5.0	3.0	2.0	5.0	3.0	2.0	5.0
Lead/Lag	Lag	Lag		Lead								
Lead-Lag Optimize?	Yes	Yes		Yes								
Act Effct Green (s)	46.0	46.0		69.0	71.0	69.0	43.0		66.0	43.0		41.0
Actuated g/C Ratio	0.38	0.38		0.58	0.59	0.58	0.36		0.55	0.36		0.34
v/c Ratio	0.11	1.19		0.44	0.50	0.01	0.14		1.28	0.02		0.02
Control Delay	25.8	127.9		19.2	11.6	2.9	26.8		159.7	25.1		26.5
Queue Delay	0.0	0.0		0.0	0.0	0.0	0.0		0.0	0.0		0.0
Total Delay	25.8	127.9		19.2	11.6	2.9	26.8		159.7	25.1		26.5

2035 AM Build RMK



Splits and Phases: 2: SR 18 & S. Hametown



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Lane Group	WBL	WBR	SBL	SBR	NEL	NER	
Lane Configurations	W		W	7	W		_
Volume (vph)	0	320	220	170	360	0	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00	
Frt	0.865		0.989	0.850			
Flt Protected			0.956		0.950		
Satd. Flow (prot)	1611	0	1761	1504	1770	0	
Flt Permitted			0.956		0.950		
Satd. Flow (perm)	1611	0	1761	1504	1770	0	
Link Speed (mph)	25		25		25		
Link Distance (ft)	1228		464		448		
Travel Time (s)	33.5		12.7		12.2		
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	
Adj. Flow (vph)	0	356	244	189	400	0	
Shared Lane Traffic (%)				10%			
Lane Group Flow (vph)	356	0	263	170	400	0	
Enter Blocked Intersection	No	No	No	No	No	No	
Lane Alignment	Left	Right	Left	Right	Left	Right	
Median Width(ft)	12		24		12		
Link Offset(ft)	0		0		0		
Crosswalk Width(ft)	16		16		16		
Two way Left Turn Lane							
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Turning Speed (mph)	15	9	15	9	15	9	
Sign Control	Yield		Yield		Yield		
Intersection Summary							

Area Type: Other

Control Type: Roundabout Intersection Capacity Utilization 65.4%

Analysis Period (min) 15

ICU Level of Service C

2035 AM Build Synchro 7 - Report RMK Page 3

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ተተኈ		44	↑ ↑		ሻ		7	ሻ	1>	
Volume (vph)	10	2320	70	310	990	50	70	30	580	10	10	10
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	600		0	270		0	250		250	50		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	25		25	25		25	25		25	25		25
Lane Util. Factor	1.00	0.91	0.91	0.97	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.993				0.850		0.925	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	5017	0	3433	3450	0	1770	1863	1583	1770	1723	0
Flt Permitted	0.245			0.950			0.743			0.736		
Satd. Flow (perm)	456	5017	0	3433	3450	0	1384	1863	1583	1371	1723	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			25			25	
Link Distance (ft)		719			684			464			388	
Travel Time (s)		10.9			10.4			12.7			10.6	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	3%	2%	2%	4%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	11	2578	78	344	1100	56	78	33	644	11	11	11
Shared Lane Traffic (%)												
Lane Group Flow (vph)	11	2656	0	344	1156	0	78	33	644	11	22	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		24			24			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	1		1	1		1	1	1	1	1	
Detector Template												
Leading Detector (ft)	50	50		50	50		50	50	50	50	50	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	50	50		50	50		50	50	50	50	50	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Turn Type	Perm			Prot			Perm		pm+ov	Perm		
Protected Phases		2		1	6			8	1		4	
Permitted Phases	2						8		8	4		
Detector Phase	2	2		1	6		8	8	1	4	4	
Switch Phase												
Minimum Initial (s)	8.0	8.0		8.0	8.0		8.0	8.0	8.0	8.0	8.0	
Minimum Split (s)	20.0	20.0		13.0	32.0		14.0	14.0	13.0	14.0	14.0	
Total Split (s)	65.0	65.0	0.0	18.0	83.0	0.0	37.0	37.0	18.0	37.0	37.0	0.0

2035 AM Build RMK

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (%)	54.2%	54.2%	0.0%	15.0%	69.2%	0.0%	30.8%	30.8%	15.0%	30.8%	30.8%	0.0%
Maximum Green (s)	60.0	60.0		13.0	78.0		32.0	32.0	13.0	32.0	32.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	1.0	1.0		1.0	1.0		1.0	1.0	1.0	1.0	1.0	
Lost Time Adjust (s)	0.0	-2.0	0.0	0.0	-2.0	0.0	-2.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	5.0	3.0	4.0	5.0	3.0	4.0	3.0	3.0	3.0	3.0	3.0	4.0
Lead/Lag	Lag	Lag		Lead					Lead			
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	C-Max	C-Max		None	C-Max		None	None	None	None	None	
Act Effct Green (s)	61.2	63.2		34.0	102.8		14.4	14.4	50.8	14.4	14.4	
Actuated g/C Ratio	0.51	0.53		0.28	0.86		0.12	0.12	0.42	0.12	0.12	
v/c Ratio	0.05	1.00		0.35	0.39		0.47	0.15	0.96	0.07	0.11	
Control Delay	11.7	25.5		37.5	5.6		57.7	47.0	60.7	45.4	46.2	
Queue Delay	0.0	0.0		0.0	0.1		0.0	0.0	0.0	0.0	0.0	
Total Delay	11.7	25.5		37.5	5.6		57.7	47.0	60.7	45.4	46.2	
LOS	В	С		D	А		Е	D	Е	D	D	
Approach Delay		25.4			12.9			59.8			46.0	
Approach LOS		С			В			Е			D	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 93 (78%), Referenced to phase 2:EBTL and 6:WBT, Start of Green

Natural Cycle: 80

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 27.0 Intersection LOS: C
Intersection Capacity Utilization 99.0% ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 15: SR 18 & Heritage Woods Dr.



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Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑ ↑		ሻ	^	W	
Volume (vph)	2360	20	10	1060	10	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		0	350		0	0
Storage Lanes		0	1		1	0
Taper Length (ft)		25	25		25	25
Lane Util. Factor	0.95	0.95	1.00	0.95	1.00	1.00
Frt	0.999				0.892	
Flt Protected			0.950		0.990	
Satd. Flow (prot)	3536	0	1770	3539	1645	0
Flt Permitted			0.950		0.990	
Satd. Flow (perm)	3536	0	1770	3539	1645	0
Link Speed (mph)	45			45	25	
Link Distance (ft)	951			491	519	
Travel Time (s)	14.4			7.4	14.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	2622	22	11	1178	11	44
Shared Lane Traffic (%)						
Lane Group Flow (vph)	2644	0	11	1178	55	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12	ŭ		12	12	ŭ
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	
Intersection Summary						
	Other					
Control Type: Unsignalized						

Intersection Capacity Utilization 75.9% Analysis Period (min) 15

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ICU Level of Service D

	۶	-	←	•	-	1
Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	<u>LDL</u>	†	↑ ↑↑	WDIX	35L	الماد الم
Volume (vph)	320	777 2600	TTT 1150	550	550	200
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	315	1700	1700	450	1900	300
	1			450	1	1
Storage Lanes	25			25	25	25
Taper Length (ft)		0.01	0.01			
Lane Util. Factor	1.00	0.91	0.91	1.00	0.97	1.00
Frt	0.050			0.850	0.050	0.850
Flt Protected	0.950	500/	F00/	4500	0.950	4500
Satd. Flow (prot)	1770	5036	5036	1583	3433	1583
Flt Permitted	0.125				0.950	
Satd. Flow (perm)	233	5036	5036	1583	3433	1583
Right Turn on Red				No		No
Satd. Flow (RTOR)						
Link Speed (mph)		45	45		45	
Link Distance (ft)		684	666		2709	
Travel Time (s)		10.4	10.1		41.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	3%	3%	2%	2%	2%
Adj. Flow (vph)	356	2889	1278	611	611	222
Shared Lane Traffic (%)	330	2007	1270	011	011	
Lane Group Flow (vph)	356	2889	1278	611	611	222
Enter Blocked Intersection	No		No	No	No	No
		No				
Lane Alignment	Left	Left	Left	Right	Right	Right
Median Width(ft)		12	12		24	
Link Offset(ft)		0	0		0	
Crosswalk Width(ft)		16	16		16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15			9	15	9
Number of Detectors	1	1	1	1	1	1
Detector Template						
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	50	50	50	50	50	50
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
	CI+LX	CI+LX	CI+LX	CI+LX	CI+LX	CI+LX
Detector 1 Channel	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Turn Type	pm+pt			pm+ov		pm+ov
Protected Phases	5	2	6	4	4	5
Permitted Phases	2			6		4
Detector Phase	5	2	6	4	4	5
Switch Phase						
Minimum Initial (s)	8.0	8.0	8.0	8.0	8.0	8.0
Minimum Split (s)	13.0	22.0	22.0	22.0	22.0	13.0
Total Split (s)	34.0	83.0	49.0	37.0	37.0	34.0
- July 2511 (2)	J-1.U	00.0	77.0	37.0	37.0	J-1.U

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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Total Split (%)	28.3%	69.2%	40.8%	30.8%	30.8%	28.3%
Maximum Green (s)	30.0	78.0	44.0	32.0	32.0	30.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.0	1.0	1.0	1.0	1.0	0.0
Lost Time Adjust (s)	0.0	-2.0	-2.0	-2.0	-2.0	0.0
Total Lost Time (s)	4.0	3.0	3.0	3.0	3.0	4.0
Lead/Lag	Lead		Lag			Lead
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	C-Max	C-Max	None	None	None
Act Effct Green (s)	83.0	84.0	57.3	90.3	30.0	55.7
Actuated g/C Ratio	0.69	0.70	0.48	0.75	0.25	0.46
v/c Ratio	0.79	0.82	0.53	0.51	0.71	0.30
Control Delay	37.4	4.1	24.8	8.8	45.7	19.6
Queue Delay	0.0	0.4	0.0	0.0	0.0	0.0
Total Delay	37.4	4.4	24.8	8.8	45.7	19.6
LOS	D	Α	С	Α	D	В
Approach Delay		8.1	19.6		38.7	
Approach LOS		А	В		D	
Intersection Summary						
Area Type:	Other					
Cycle Length: 120						
Actuated Cycle Length: 12						
Offset: 0 (0%), Referenced	d to phase 2	:EBTL an	d 6:WBT,	Start of 0	Green, Ma	aster Inte
Natural Cycle: 60						
Control Type: Actuated-Co	oordinated					
Maximum v/c Ratio: 0.82						
Intersection Signal Delay:					ntersectio	
Intersection Capacity Utiliz	zation 72.6%)		[(CU Level	of Service
Analysis Period (min) 15						

Splits and Phases: 25: SR 18 & Crystal Lake



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