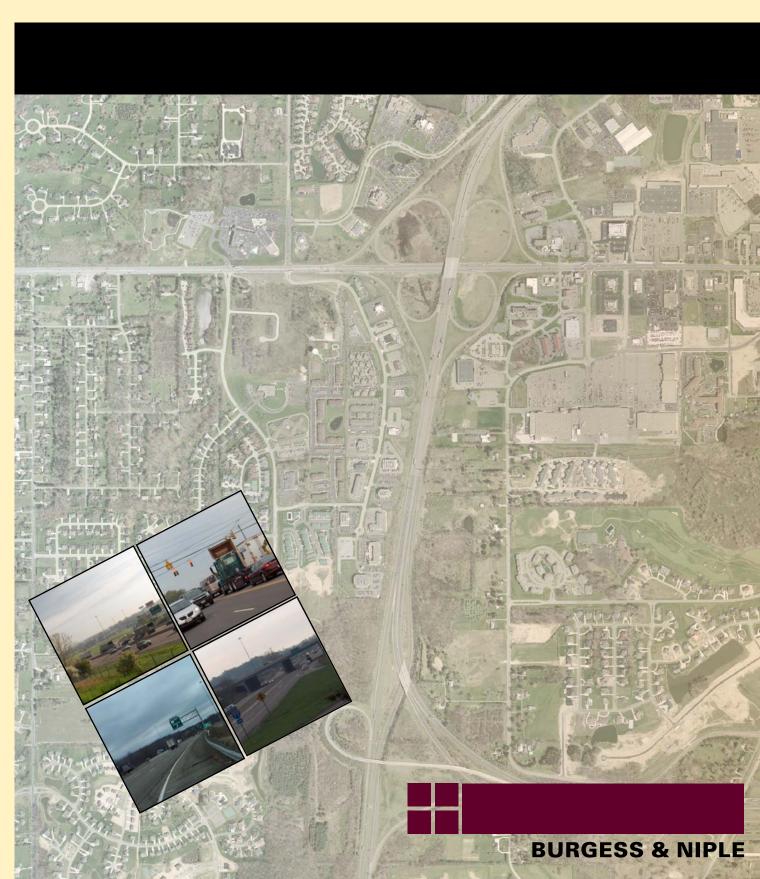
Preliminary Access Modification Report

Summit 18 Corridor PID 77749

Summit Corridor Study

June 2010



Contents

INTRODUCTION	2
1. INTERIM IMPROVEMENTS	2
2. OPERATIONAL ANALYSES	
3. ULTIMATE BUILD IMPROVEMENTS	
5. CONCLUSIONS AND RECOMMENDATIONS	
5 CONCLUNIONS AND RECOMMENDATIONS	11

INTRODUCTION

The "Planning Study including Strategic Plan" document for the Summit 18 Corridor identified preferred alternatives to improve traffic operations in the study area. Implementation of the preferred alternative, referred as the "Ultimate Build" concept from here on, will require major funding, the source for which has not yet been identified. As acknowledged in the Purpose and Need document, the primary bottleneck in the Study Corridor is the intersection of SR 18 and Crystal Lake Dr. This intersection fails in the current conditions and without improvements will be overwhelmed by additional traffic in the future. Traffic spillbacks from this intersection are the major contributing factor to the existing operational deficiencies in the Study Corridor. Therefore, fixing this intersection in the near term is critical to improving the overall traffic operations of the study corridor. The other problem areas in the corridor although important are not as critical in the near term. An Interim configuration, which assumes only the enhancements to the study corridor that are specifically targeted at improving the operations at this intersection, is therefore proposed until funding for the Ultimate Build concept becomes available. The intention is to use funding available from the "Highway Safety Program" to build the Interim improvements, addressing the immediate safety concerns. The Interim configuration also fits into the Ultimate Build configuration proposed for the study corridor.

1. INTERIM IMPROVEMENTS

The SR 18 & Montrose West Avenue/Crystal Lake Road Safety Study (see Appendix) identified two distinct crash patterns for the intersection of SR 18 & Montrose West Avenue/Crystal Lake Road.

The first observed pattern was the frequency of rear-end crashes. This is the most significant pattern of crashes at this intersection (39 of 79). Between 2002 and 2004, 8 of these crashes resulted in injury. The problem is especially distinct on the east and west approaches. Based upon the capacity analysis and field observations, congestion is the most significant factor contributing to the number of rear-end crashes at this location.

The second pattern identified was a high number of left-turn crashes. Based on field observations, one to two through vehicles frequently continue through the intersection after the onset of the red, often accelerating in the process. This situation creates a crash hazard with opposing left turning vehicles, which are waiting in the intersection for a gap in traffic. Also, with the volume of opposing through vehicles on each approach, there are very few acceptable gaps during the permissive phase during peak hours of traffic. These two situations indicate that the major contributing factor leading to left-turn crashes is congestion.

To address the identified crash patterns at the intersection, the following proposed Interim improvements were developed to relieve the bottleneck at the intersection of SR 18 and Crystal Lake Drive.

- Relocation of Montrose West Avenue to tie into Heritage Woods Drive.
- New Roundabout at the intersection of Heritage Woods Drive and Montrose West Avenue.
- Revised geometry for the intersection of SR 18 and Heritage Woods Drive to accommodate additional traffic due to Montrose West Avenue relocation. Included in the revised geometry are dual westbound left turn lanes on SR 18. The second left turn lane will be developed at the intersection with the SB I-77 exit ramp.
- Add one additional EB lane on SR 18 from just east of Scenic View Drive to the Ramp to I-77 SB, creating a two-lane entrance ramp to SB I-77. This eliminates the excessive lane changing that occurs east of the Crystal Lake Road intersection and allows the ramp traffic to travel through the Heritage Woods Drive and Crystal Lake Road intersections in two-lanes instead of queuing in the curb lane as it does today. The two-lane ramp tapers back to one lane prior to merging with I-77 SB.

These improvements, shown in Figures 1A and 1B, address the identified crash patterns in the following ways:

- Adding dual left turn lanes on the WB approach to the intersection of SR 18 and Montrose Avenue/Heritage Woods increases the capacity of the intersection and reduces the amount of left turn collisions at the intersection. This would most likely reduce the rate of rear-end, sideswipe, and angle crashes also.
- Due to the high number of left turns out of Crystal Lake Road and onto Montrose West Avenue conflicting with a high volume of East-West thru traffic it becomes beneficial to eliminate Montrose West Avenue and relocate it to Heritage Woods Drive. This relocation makes it possible to eliminate conflict points at the intersection and reduce the number of phases. This improvement makes it possible to reduce congestion and conflict points, reducing the number of left-turn crashes and congestion related crashes.
- S.R. 18 carries a high volume of East-West thru traffic thru the intersection of Crystal Lake Road/West Montrose Avenue. Additional thru lane capacity at the intersection reduces the congestion and will reduce the number of rear-end and congestion related crashes. In addition, a two-lane entrance ramp for I-77 SB reduces the congestion for the EB to SB movement.

2. OPERATIONAL ANALYSES

Traffic operational analysis was performed for the No-build and Interim conditions at the following intersections on the Summit-18 Corridor:

- SR 18 and South Hametown Road (Signalized)
- SR 18 and Scenic View Drive (Unsignalized)
- SR 18 and Heritage Woods Drive (Signalized)
- SR 18 and Crystal Lake Road (Signalized)
- SR 18 and Springside Drive (Signalized)

The freeway operational analysis on I-77 was performed for the section between its interchanges with Ghent Road and SR 21. Freeway operational analysis was performed for mainline, ramp merge, diverge and weaving areas. Because there are no freeway improvements proposed for the Interim condition, there is no difference between the No-Build and Interim freeway operations. Therefore, no separate analysis for the Interim configuration of the freeway system was performed. The existing freeway lane configuration is shown in Figure 6.

Results from HCS Analyses for the No-Build and Interim year conditions are tabulated in Table 1 and are detailed on Figures 2 and 3 for the No-Build condition and Figures 4 and 5 for the Interim condition. Detailed HCS reports for individual intersection and freeway segments are available in the Appendix. It can be inferred from the table that the individual intersection Levels of Service (LOS) for the Interim condition is better or similar to the No-Build condition. Specifically, LOS for the primary bottleneck in the corridor, the intersection of SR 18 and Crystal Lake Road, improves to C from F in the 2030 AM Peak Hour and to a D from F in the 2030 PM Peak Hour; LOS for the intersection of SR 18 and Heritage Woods Drive improves to a C from D in the 2030 PM Peak Hour. Operations at the other two intersections listed in the table, SR 18 and South Hametown Road, SR 18 and Scenic View Drive, and SR 18 and Springside Drive are similar between the No-Build and the Interim conditions. Specific insights into the above mentioned LOS deficiencies are given below.

- In the Interim condition, the intersection of SR 18 and South Hametown Road is expected to operate at LOS E without any improvements. As identified in the "Strategic Plan" document, operations at this intersection can be improved by widening SR 18 to accommodate a second westbound left turn lane and a third eastbound lane leaving the intersection. The third lane would allow the northbound right turn from South Hametown Road to SR 18 to operate as a free movement by providing a dedicated receiving lane for the turning traffic. This free movement would not require signalization.
- The intersection of SR 18 and Springside Drive is expected to operate at LOS F in the PM Peak Hour without any improvements. As identified in the "Strategic Plan" document, operations at this intersection can be improved with additional turn lanes on Springside Drive to accommodate higher turning volumes.

Table 1: Summary of HCS Analyses for No-Build and Interim Conditions

		Summit 18	Corridor I	HCS Analyses Sum	mary				
			203	0 AM			203	0 PM	
		No-Buil	d	Interin	1	No-Bui	ld	Interin	n
Intersection	Туре	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS	Delay (s)	LOS
South Hametown Road	Signalized	79.5	E	79.5	E	40.7	D	40.7	D
Heritage Woods Road	Signalized	44.2	D	43.3	D	38.5	D	40.0	С
Crystal Lake Drive	Signalized	95.1	F	30.0	С	211.0	F	48.0	D
Springside Drive	Signalized	24.3	С	24.3	С	92.1	F	92.1	F
Scenic View Drive	Unsignalized	1367.0	F	1367.0	F	17.0	С	17.0	С
			203				203	[60 PM	
		No-Buil	d	Interin	1	No-Bui	ld	Interim	
		Density		Density		Density		Density	
Freeway	Туре	(pc/mi/lane)	LOS	(pc/mi/lane)	LOS	(pc/mi/lane)	LOS	(pc/mi/lane)	LOS
I-77 SB North of Ramp to SR 18 WB	Mainline	14.3	В	14.3	В	26.0	D	26.0	D
I-77 SB South of Ramp to SR 18 WB	Mainline	13.2	В	13.2	В	23.3	С	23.3	С
I-77 SB South of Ramp to SR 18 EB	Mainline	13.2	В	13.2	В	25.6	С	25.6	С
I-77 NB North of Ramp to SR 18 EB	Mainline	28.2	D	28.2	D	17.6	В	17.6	В
I-77 NB North of Ramp to SR 18 WB	Mainline	23.3	С	23.3	С	11.6	В	11.6	В
I-77 NB North of Ramp from SR 18 WB	Mainline	24.5	С	24.5	С	13.3	В	13.3	В
Ramp from I-77 SB to SR 18 WB	Diverge	16.9	В	16.9	В	27.9	С	27.9	С
Ramp from SR 18 WB to I-77 NB	Merge	26.3	С	26.3	С	16.0	В	16.0	В
I-77 SB and SR 18 Loops	Weaving	12.88	В	12.88	В	27.92	С	27.92	С
I-77 SB, SR 18 and SR 21	Weaving	22.88	С	22.88	С	36.14	E	36.14	Е
I-77 NB, SR 21 and SR 18	Weaving	34.91	D	34.91	D	18.51	В	18.51	В
I-77 NB and SR 18 Loops	Weaving	37.17	E	37.17	E	25.35	С	25.35	С
SR 18 WB and I-77 Loops	Weaving	23.75	С	23.75	С	46.85	F	46.85	F
SR 18 EB and I-77 Loops	Weaving	15.47	В	15.47	В	15.72	В	15.72	В

• The intersection of SR 18 and Scenic View Drive is unsignalized in the current conditions. Signalization is not warranted at this intersection. Motorists currently have access to SR 18 westbound via the signalized intersection of S. Hametown Road.

All these changes will be incorporated into the Ultimate Build condition.

Operations for the freeway segments, also tabulated in Table 1 and shown in Figures 2-5, indicate that except for three weaving facilities in the study corridor, all the freeway segments perform at an acceptable level of service. The Ultimate Build configuration of the interchange will eliminate these weaving areas by incorporating a Southbound C-D system, "Early SR 18 Split" concept and the "Modified Cloverleaf" concept for the main interchange area as described later in this report.

Constrained Traffic Analyses

The intersection of SR 18 and Crystal Lake Road operates at LOS F in both the AM and PM peak for the No-Build condition. Since this intersection is immediately adjacent to the southbound I-77 ramps, it must be investigated for constrained analysis to determine if the Interim improvements are allowing more traffic to enter southbound I-77, which may cause a degradation to the operation on I-77. During the AM and PM peaks, the eastbound through movements have v/c ratios greater than 1.0 in the No-Build condition. In the Interim condition, the eastbound through movement operation has improved and the v/c ratios are less than 1.0. This means that the No-Build traffic is constrained and that the Interim improvements will allow more traffic to reach southbound I-77. The EB SR 18 to SB I-77 entrance ramp is an add lane to SB I-77 that creates a weaving section between SR 18 and SR 21. Examining the LOS results for the No-Build and Interim conditions, the weaving section operates at LOS C during the AM peak and LOS E during the PM peak. Because the mainline weaving section does not operate at LOS F during the No-Build condition, there is no degradation to the freeway caused by the constrained traffic being allowed to enter the freeway.

Turn Lane Storage Lengths

Turn lane storage lengths were calculated for all project intersections based on the procedure described in the ODOT Location and Design Manual, Section 401-7 to 401-12. These calculations are summarized in Table 2 and illustrated in Figures 1A and 1B. Most turn lanes in the project area satisfy the minimum required storage length. Due to the high through-lane volumes along SR 18, it was not possible for through-vehicle backups to avoid blocking access to certain turn lanes. The turn lane storage provided at each signalized intersection is described below.



Table 2: 2030 Storage Lane 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	Leant	Thru Vehicles per Cycle per Lane	Thru Lane Back of Queue	Turn Lane Decel and Storage Req'd	Turn Lane Decel and Storage Provided
State Route 18 & Scenic View Drive	WB	Left	1	2	50	2320	60	0.8	225	193	225	19.3	650	650	350
State Route 18 & Heritage Woods Road &	EB	Left	1	3	30	2270	120	1.0	225	193	225	25.2	825	825	600
Akron General	WB	Left	2	2	730	2220	120	24.3	225	968	484	37.0	1250	1250	1250
SR 18 & Crystal Lake Road	EB	Left	1	3	510	2290	120	17.0	225	743	743	25.4	825	825	350
OR 10 & Crystal Lake Road	WB	Right	1	3	550	2610	120	18.3	225	793	793	29.0	975	975	450

SR 18 and Scenic View Drive – The westbound left turn lane at the SR 18 & Scenic View intersection provides adequate storage for the anticipated 2030 left turning vehicle demand. However, the length does not meet the calculated queue length for the WB thru-lanes. Because this approach is the free flowing movement of a two-way stop controlled intersection, the WB thru vehicles will not be required to stop and queuing will not be an issue.

SR 18 and Heritage Woods – The required storage length for the EB left turning traffic is 225 feet. To avoid being blocked by the EB thru vehicle queue, the required left turn lane length is 825 feet. While it is possible to provide this length, Section 401.6 of the L&D Manual, Vol. 1 states that a maximum storage length of 600' is recommended. Therefore, 600' has been provided for this movement.

The westbound left turn movement provides adequate storage for the anticipated 2030 left turning vehicle demand. In addition, there is sufficient length to avoid being blocked by the thru vehicle queue.

SR 18 and Crystal Lake Road – The EB left turn lane has a calculated storage length of 743 feet. However, this lane is back-to-back with the WB left turn lane at SR 18 and Heritage Woods. Because of this, only 350 feet can be provided for the EB left turn at Crystal Lake. As a double check to the calculated storage length, *SimTraffic* was used to check the 95th percentile queue length under the proposed signal operation. Output files for the analysis are in the Appendix. *SimTraffic* shows that in 2030, the 95th percentile queue for the EB left turn will be 314 feet. Based on this, the 350 feet of **storage length provided will be sufficient.**

The storage length available for the westbound right turn at the intersection of SR 18 and Crystal Lake is 450 feet. 793 feet are required to meet the requirements for turn lane storage. At this location, the proximity of the SB I-77 to WB SR 18 ramp intersection prevents the storage length from being any longer. *SimTraffic* was used to check the required storage under the proposed signal operation. Output files for the analysis are in the Appendix. *SimTraffic* shows that in 2030, the 95th percentile queue for the WB right turn will be 203 feet. Based on this, the 450 feet of **storage length provided will be sufficient.**



3. ULTIMATE BUILD IMPROVEMENTS

The "Planning Study including Strategic Plan" document for the Summit 18 Corridor identified preferred alternatives to improve traffic operations in the interchange area. Implementation of the preferred alternative, referred as the "Ultimate Build" concept, will require major funding, the source for which has not yet been identified. The Ultimate Build concept is described below.

PREFERRED MAINLINE CONCEPTS

Early SR 18 Split – The early SR 18 split is the preferred northbound I-77 mainline concept because it effectively removes the existing weave movement between northbound SR 21 to northbound I-77 traffic and northbound I-77 traffic exiting at SR 18. This concept offers a unique opportunity to eliminate a mainline weave without braiding any ramps. A no-build concept for the northbound mainline would degrade the operation of I-77 between SR 21 and SR 18 over time as a result of the influx of traffic on SR 21 generated by the rapidly developing region to the south.

The purpose of this improvement is to eliminate the northbound weave between the SR-21 entrance and SR-18 exit ramps. Although safety was not identified as an issue in this area, the elimination of the existing weave will result in a 100% reduction in crashes resulting from that conflict point.

Southbound C-D System - The construction of a southbound C-D system between SR 18 and SR 21 is the preferred mainline concept to eliminate the existing southbound weave condition. The southbound C-D system is preferred to a no-build concept because the elimination of the southbound mainline weave is necessitated by operational deficiencies of the weave (2030 PM Peak Hour LOS E). In addition to its compatibility with the Modified Cloverleaf interchange concept, the construction of the southbound C-D system is preferred to other alternatives because it more economical and has less substantial right-of-way impacts.

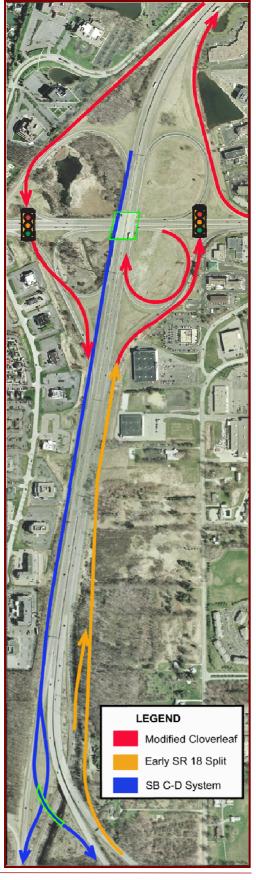
The purpose of this improvement is to eliminate the southbound weave between the SR 18 entrance and SR 21 exit ramps. Although safety was not identified as an issue for this area, the Southbound C-D System will reduce the number of vehicles performing conflicting movements as only SR-18 traffic entering SR-21 will have to switch lanes within the ramp system.

PREFERRED INTERCHANGE CONCEPT

Modified Cloverleaf

The Modified Cloverleaf is the preferred interchange concept at I-77 and SR 18 because it is advantageous compared to the no-build and other intersection reconfiguration concepts. The Modified Cloverleaf removes the existing weave conditions on SR 18 and eliminates undesirable loop exit ramps on the mainline, both undesirable aspects of the existing full cloverleaf interchange that would be preserved by a no-build concept. The Modified Cloverleaf operates more efficiently than either a Tight Diamond or Offset SPUI, in addition to more being more cost effective because it maximizes the reuse of existing ramp alignments and does not require any additional structures.

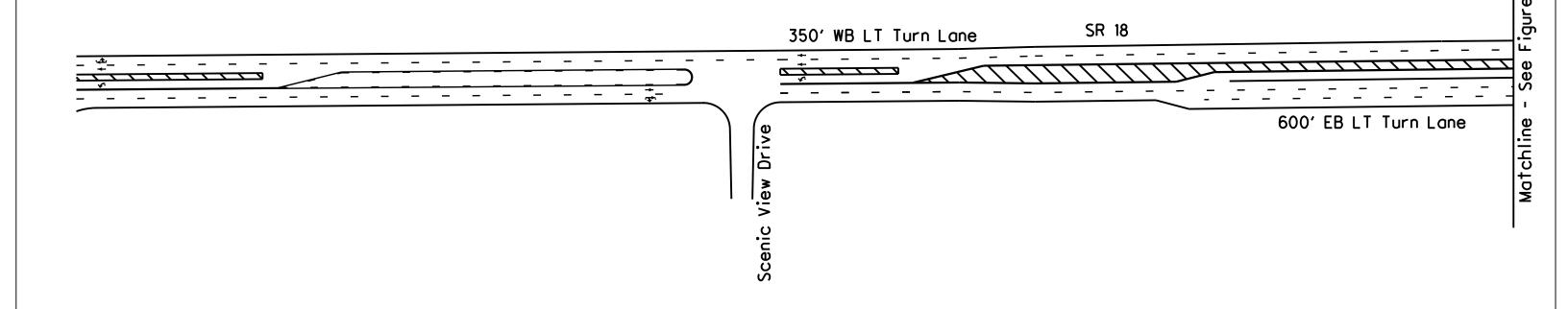
The purpose of this improvement is to address congestion and safety issues within the existing interchange along with upgrading its geometric deficiencies. Congestion issues associated with existing cloverleaf configuration (2030 PM Peak Hour LOS F along SR 18 between westbound loop ramps) will be addressed when the weave movements are eliminated through the removal of the exit loop ramps. issues within the interchange (eastbound to southbound entrance ramp, northbound to westbound exit ramp, and SR 18 through the interchange) will be mitigated by the removal of exit loop ramps and signalization of the exit Geometrically deficient shoulder ramps at SR-18. widths on the existing ramps will be upgraded to current design standards as part of the Modified Cloverleaf reconfiguration.



5. CONCLUSIONS AND RECOMMENDATIONS

As shown in this study, an Interim solution of relocating Montrose West Avenue will address the major safety and congestion issues on the SR 18 corridor and at the Montrose West/Crystal Lake intersection specifically. The revised geometry at the intersections is capable of accommodating projected future traffic volumes at acceptable levels of service in the near term. The Interim condition will be a cost effective method to handle immediate safety concerns in the study corridor until further funding to construct the Ultimate Build configuration becomes available.





COLUMBUS, OHIO

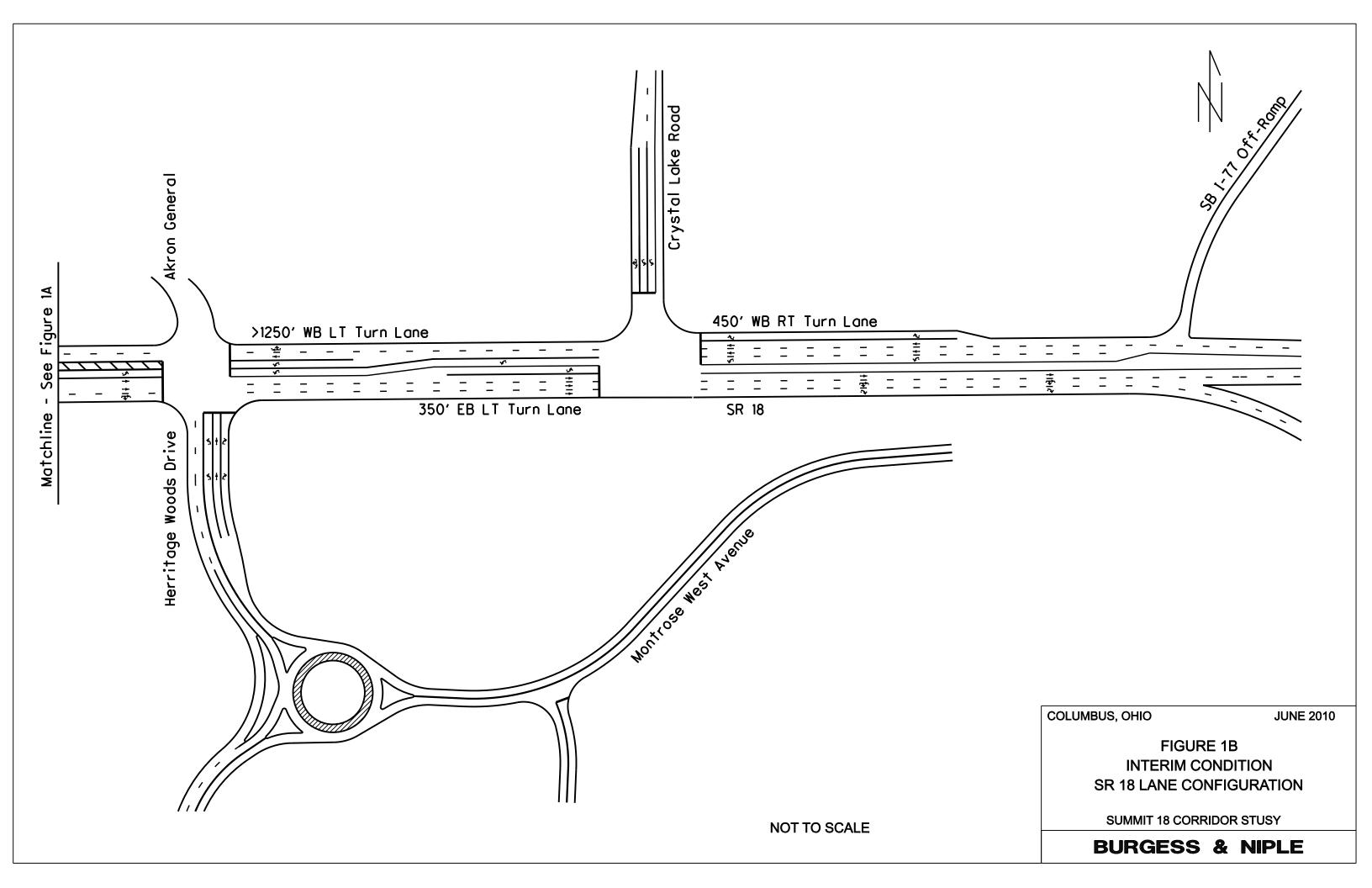
JUNE 2010

FIGURE 1A INTERIM CONDITION SR 18 LANE CONFIGURATION

SUMMIT 18 CORRIDOR STUSY

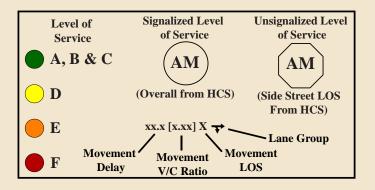
BURGESS & NIPLE

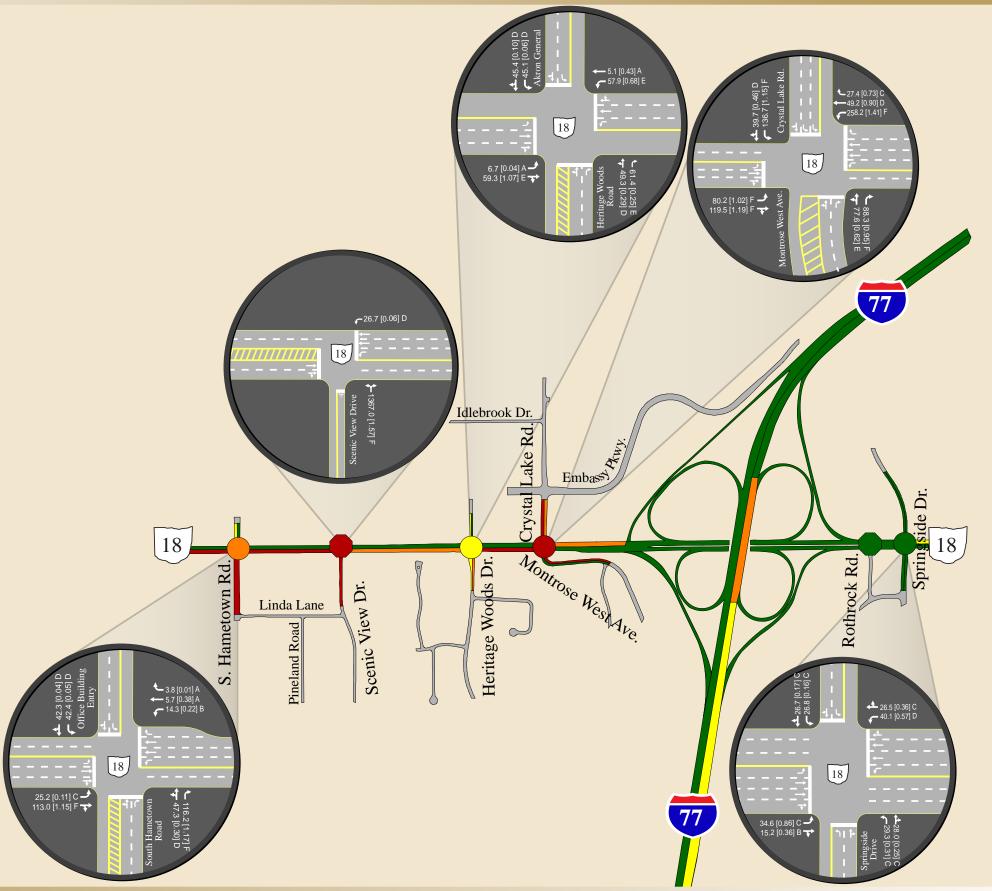
NOT TO SCALE



State Route 18 2030 No Build AM Peak LOS

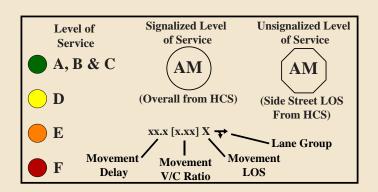


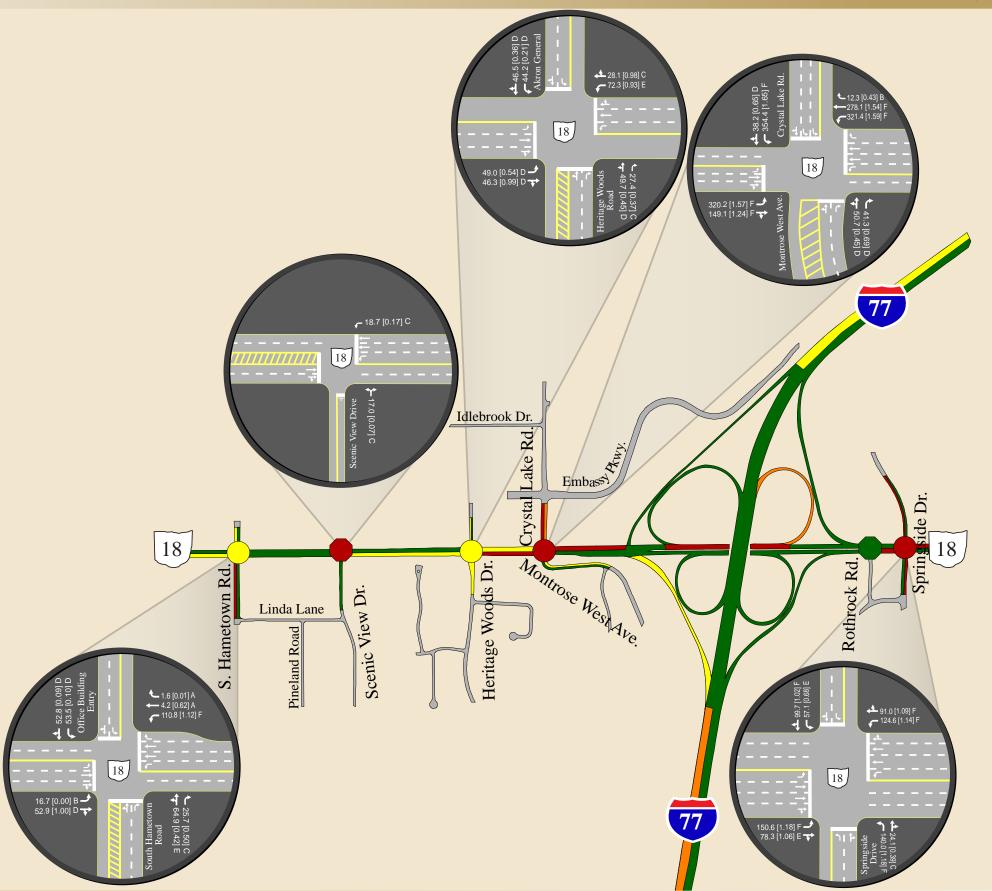




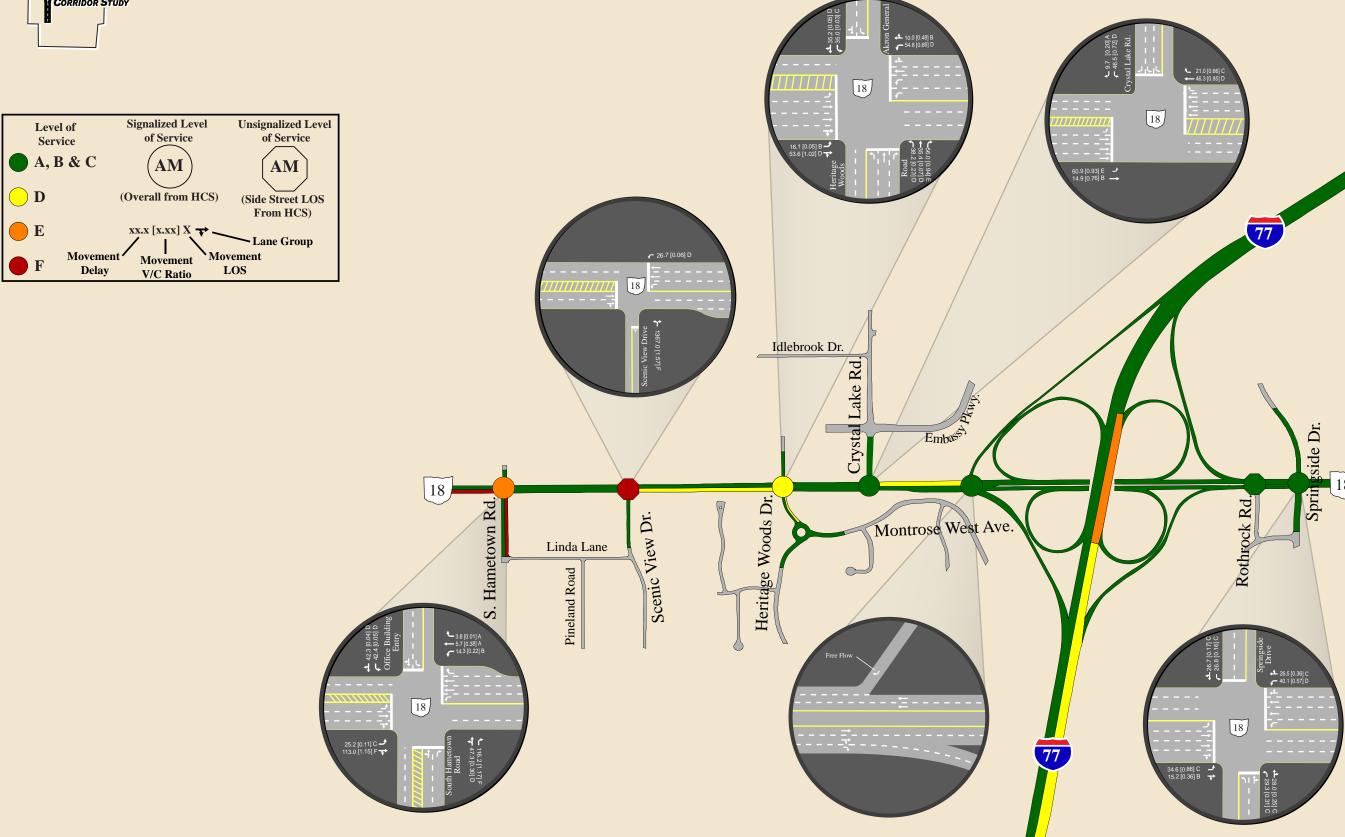
State Route 18 2030 No Build PM Peak LOS





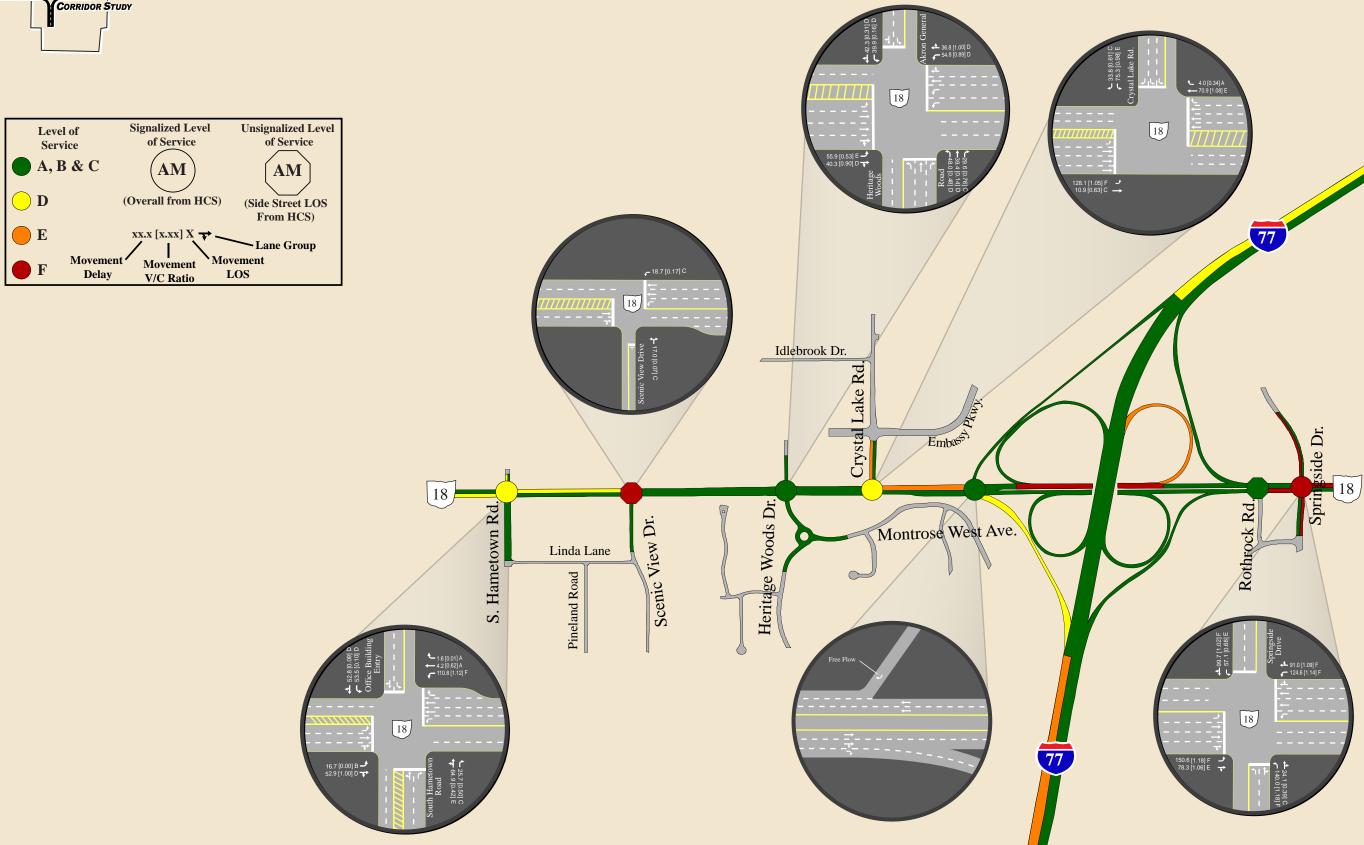




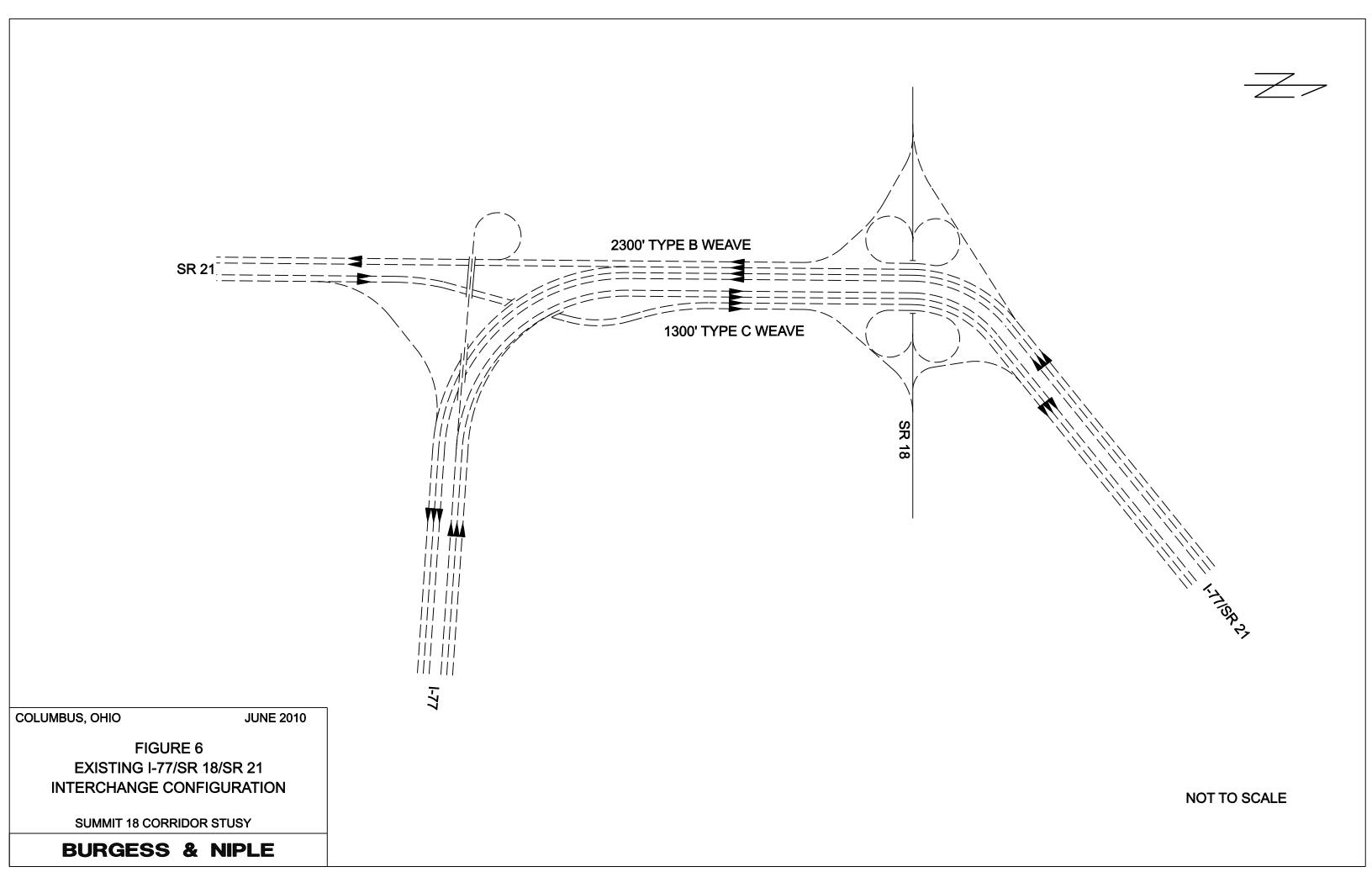












APPENDIX HCS ANALYSES

2030 Peak Hour No-Build Intersections

Inter.: SR 18 and S Hametown Rd Analyst: RA

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

Date: 11/3/2009 Jurisd:

Period: AM Peak Hour Year : 2030 No-Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18	3		N/S	St: S. Ha	ametown	Rd	
	SIC	NALIZED	INTERSE	CTION SUM	MARY		
	Eastbound	Westb		Northbo		Soutl	nbound
į	L T R	L T		L T	R		г к
No. Lanes	1 2 0		2 1	0 1	1	1	1 0
	L TR		T R	L'.		L	TR
I I	20 1330 40	130 90		60 0	910	10 0	10
!	2.0 12.0	12.0 12		12.0	0 12.0	12.0 1	:
RTOR Vol	0		0		0		0
Duration ().25 Area 7		l other l Operat				
Phase Combina	ation 1 2	3	4	5	6	7	8
EB Left	P		- NB	Left P			
Thru	Р		į	Thru P			
Right	Р		į	Right P			
Peds			i	Peds			
WB Left	P P		SB	Left P			
Thru	P P		į	Thru P			
Right	P P		į	Right P			
Peds			į	Peds			
NB Right	P		EB	Right			
SB Right			WB	Right			
Green	40.5 45.5	0.0	·	20	.0 0.0		
Yellow	4.0 4.0			4.0	O		
All Red	0.0 1.0			1.0	0		
	Tools				ycle Len	ngth: 12	20.0 secs
			riormanc os	e Summary			
Appr/ Lane Lane Group	_	Rati	OS	Lane Gro	rb Abb	Dioacii	
_	city (s)	 v/c	 g/C	Delay LOS			_
Gip Capac	:icy (5)	· · · · · · · · · · · · · · · · · · ·	9/C 			ту пов	
Eastbound	F 2 F	0 11	0 20	05 0 0			
L 203	535	0.11	0.38	25.2 C		0 -	
TR 1326	3498	1.15	0.38	113.0 F	111.	8 F	
Westbound							
L 659	1770	0.22	0.76	14.3 B			
T 2634	3512	0.38	0.75	5.7 A	6.7	A	
R 1187	1583	0.01	0.75	3.8 A			
Northbound							
LT 223	1339	0.30	0.17	47.3 D	111.	9 F	
R 864	1583	1.17	0.55	116.2 F			
Southbound							
L 222	1329	0.05	0.17	42.4 D			
TR 264	1583	0.04	0.17	42.3 D	42.3	B D	
Inte	ersection Delay	= 79.5	(sec/ve	h) Inter	rsection	LOS =	E

Phone: Fax:

E-Mail:

____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/3/2009
Analysis Time Period: AM Peak Hour

Intersection: SR 18 and S Hametown Rd

Area Type: All other areas

Jurisdiction:

Analysis Year: 2030 No-Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: S. Hametown Rd

_____VOLUME DATA_____

	Eas	stbou	nd	Wes	stbour	nd	Noi	thbo	ınd	Sou	ıthboı	ınd
	L	T	R	L	T	R	L	T	R	L	Т	R
_												
Volume	20	1330	40	130	900	10	60	0	910	10	0	10
% Heavy Veh	2	3	2	2	3	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	6	369	11	36	250	3	17	0	253	3	0	3
Hi Ln Vol				ĺ			ĺ			ĺ		j
% Grade	İ	0		İ	0		İ	0		İ	0	į
Ideal Sat	1900	1900		1900	1900	1900		1900	1900	1900	1900	į
ParkExist				İ			İ			İ		İ
NumPark				İ			İ			j		i
No. Lanes	1	2	0	1	2	1	0	1	1	j 1	1	0
LGConfig	L	TR		i L	Т	R	İ	$_{ m LT}$	R	i L	TR	į
Lane Width	12.0	12.0		12.0	12.0	12.0	İ	12.0	12.0	12.0	12.0	İ
RTOR Vol			0	İ		0			0	İ		0
Adj Flow	22	1522		144	1000	11		67	1011	İ11	11	į
%InSharedLn				İ			İ			İ		İ
Prop LTs	1.000	0.0	0 0	1.000	0.00	0 0		1.00	0.0	1.000	0.00	0 O
Prop RTs	j o	.029		j o.	.000	1.000	0	.000	1.000	j 1.	.000	į
Peds Bikes	j o			j o			j o			j o		į
Buses	0	0		ĺО	0	0	İ	0	0	ĺО	0	İ
%InProtPhase	2			0.0			İ			İ		į
			_									'

Duration 0.25 Area Type: All other areas

_____OPERATING PARAMETERS_____

	Eastbound			Westbound			No	rthbo	und	So	Southbound		
	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	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	į	
Ped Min g	İ	3.2		İ	3.2		İ	3.2		İ	3.2	į	

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

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

Date: Jurisd:

Period: AM Peak Year : 2030

Project ID: Summit 18 Corridor Study PID 77749

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

E/W St: S	R 18					N/S	St: F	Herita	age Wo	ods			
			STO	GNALT	ZED TI	NTERSE	CTION	SIIMM	ΔRY				
	Eas	 stboui			stbou			thboi			 uthboui		
	L	T	R	L	T	R	L	Т	R	L	T	R	
	j			İ			. İ			. İ			į
No. Lanes	!		0	1	2	0	0	1	1	1		0	
LGConfig	L	TR		L	TR			LT	R	L	TR		
Volume	10	2230	40	110	1000	40	30	30	300	10		10	
Lane Widt	h 12.0	12.0	0	12.0	12.0	0		12.0	12.0	12.0	12.0	2	
RTOR Vol			0			0			0		()	
Duration	0.25		Area '	Type:	All	other	areas						
					_		ions						
Phase Com	binatio	n 1	2	3	4	!	_	5	6	7	8		
EB Left			P			NB	Left	P					
Thru			P				Thru						
Right			P				Right	E P					
Peds WB Left		P	P			l l SB	Peds Left	P					
Thru		P	P			aa 	Thru	P					
Right		P	P				Right						
Peds		-	-				Peds						
NB Right		P				EB	Right	-					
SB Right						WB	Right						
Green		8.0	80.9					17.3	1				
Yellow		4.0	4.0					4.0					
All Red		0.0	1.0					1.0					
					_			_		_	120.0	se	CS
			nterse					_					
	ane		j Sat w Rate		atios		Lane	Group	g Ap	proac.	n		
	roup apacity		w Rale (s)			 /C	Delay	, I O C		ay L0			
GIP C	apacity		(5)	V/C	9	/ C	Detay	/ поз	Det	ау цо	D .		
Eastbound													
	306	45	4	0.0		.67	6.7	Α					
TR	2362	350	03	1.0	7 0	.67	59.3	E	59.	0 E			
Westbound													
	179	17!	52	0.6	8 0	.78	57.9	E					
	2703	349		0.4	3 0	.77	5.1	A	10.	1 В			
Northboun	d												
LT	225	15	78	0.2	9 0	.14	49.3	D	59.	4 E			
	397	158		0.8		.25	61.4	E	•	_			
Southboun		-		_									
L	190	133	3 0	0.0	6 0	.14	45.1	D					
TR	246	17:	23	0.0	9 0	.14	45.4	D	45.	3 D			

Intersection Delay = 44.2 (sec/veh) Intersection LOS = D

Phone: Fax:

E-Mail:

____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed:

Analysis Time Period: AM Peak
Intersection: SR 18 and Heritage Woods Rd Intersection:

Area Type: All other areas

Jurisdiction:

Analysis Year: 2030

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	and	Sou	ıthboı	ınd
	L	T	R	L	Т	R	L	T	R	L	T	R
_												
Volume	10	2230	40	110	1000	40	30	30	300	10	10	10
% 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	3	619	11	31	278	11	8	8	83	3	3	3
Hi Ln Vol												
% Grade	İ	0		İ	0		İ	0		İ	0	j
Ideal Sat	1900	1900		1900	1900		İ	1900	1900	1900	1900	į
ParkExist				İ			İ			İ		į
NumPark				İ			İ			İ		į
No. Lanes	1	2	0	1	2	0	j o	1	1	1	1	0
LGConfig	L	TR		i L	TR		İ	$_{ m LT}$	R	ĹЬ	TR	į
Lane Width	12.0	12.0		12.0	12.0		İ	12.0	12.0	12.0	12.0	į
RTOR Vol			0	İ		0	<u> </u>		0	İ		0
Adj Flow	11	2522		122	1155		İ	66	333	11	22	į
%InSharedLn				İ			İ			İ		į
Prop LTs	1.000	0.0	0 0	1.000	0.00	00	j	0.50	0.0	1.000	0.00) 0 j
Prop RTs	0	.017		j o.	.038		j o	.000	1.000	j o	.500	į
Peds Bikes	0			i o			j o			j o		į
Buses	0	0		Ö	0		İ	0	0	ĺО	0	į
%InProtPhase	2			0.0			İ			j		į
- · ·												'

Duration 0.25 Area Type: All other areas

_____OPERATING PARAMETERS_____

	Eastbound			Westbound			No	rthbo	und	So	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			3	3	3	3	
Unit Ext.	3.0	3.0		3.0	3.0			3.0	3.0	3.0	3.0	
I Factor		1.00	0		1.00	0		1.00	0		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		3.2		İ	3.2		İ	3.2		İ	3.2	ĺ

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

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

Date: 4/26/2006

Jurisd:

Year : 2030

Period: AM Peak

Project ID: Summit 18 Corridor Study

	t: SR		16 16	COLLI	dor sc	uay	N/S	St: (Crysta	al Lak	e Road	d		
				SI	GNALIZ	ED II	NTERSE	CTION	SUMMA	ARY				
		Eas	stbou	nd	Wes	tbour	nd	Noi	thbou	and	So	uthbo	und	
		L l	Т	R	L l	Т	R	L 	Т	R	L I	Т	R	ĺ
No. L	anes	1	2	0	1	2	1	0	1	1	2		0	-
LGCon		L	TR		L	Т	R		$_{ m LT}$	R	L	TR		
Volum		490	2030	20	•	950	550	40	20	260	550	20	160	ļ
Lane		12.0	12.0		12.0	12.0			12.0	12.0	12.0	12.0		ļ
RTOR '	Vol			0			0			0			0	
Durat	ion	0.25		Area	Type:			areas ions_						
Phase	Combi	natio	 n 1	2	3	4		0110	5	6			 8	
	eft		P	P	P	_	NB	Left	-	P	,		-	
	hru		=	P	P			Thru		P				
	ight			P	P		j	Right		P				
	eds						İ	Peds						
WB L	eft		P		P		SB	Left	P					
T.	hru				P		İ	Thru	P	P				
R	ight				P		İ	Right	. P	P				
	eds						İ	Peds						
NB R	ight		P				EB	Right	_					
SB R	ight						WB	Right	. P					
Green			8.0	20.3	40.0				18.6	5 10.	0			
Yello	W		4.0	4.0	4.0				4.0	4.0				
All R	ed		0.0	1.0	1.0				0.0	1.0				
									Сус	cle Le	ngth:	119.	9 s	secs
			I	nterse	ction	Perf	ormanc	e Sumr	nary					
Appr/	Lan	е	Ad	j Sat	Ra	tios		Lane	Group	p Ap	proacl	h		
Lane	Gro	up	Flor	w Rate										
Grp	Cap	acity		(s)	v/c	g	/C	Delay	, LOS	Del	ay LO	S		
Eastb														
L	53		17!		1.02		.64	80.2	F		_			
TR	19	10	350	07	1.19	0	.54	119.5	5 F	111	.9 F			
Westb						_			_					
L	13		17!		1.41		. 38	258.2			_			
T	11		351		0.90		.33	49.2	D	63.	3 E			
R	83	2	15	68	0.73	0	.53	27.4	С					
North	bound													
LT	10	6	12	71	0.62	0	.08	77.6	E	86.	3 F			
R	30		158		0.95		.19	88.3	F	•	-			
South				-		,	-		_					
L	53	3	343	37	1.15	0	.16	136.7	7 F					
TR	43		163		0.46		. 27	39.7	D	112	.8 F			
	_										-			

Intersection Delay = 95.1 (sec/veh) Intersection LOS = F

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 4/26/2006 Analysis Time Period: AM Peak

Intersection: Crystal Lake Road and SR 18

Area Type: All other areas

Jurisdiction:

Analysis Year: 2030

Project ID: Summit 18 Corridor Study

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

_____VOLUME DATA_____

	Eastbound L T R		nd	Wes	stbou	nd	No	rthbo	und	Soi	ıthboı	ınd
	L	Т	R	L	T	R	L	T	R	L	T	R
** 1												
Volume	490	2030	20	170	950	550	40	20	260	550	20	160
% 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	136	564	6	47	264	153	11	6	72	153	6	44
Hi Ln Vol												
% Grade	İ	0		İ	0		İ	0		İ	0	į
Ideal Sat	1900	1900		1900	1900	1900	İ	1900	1900	1900	1900	į
ParkExist	İ			į			İ			İ		i
NumPark	! 			! 			<u> </u>			i		
No. Lanes	! 1	2	0	1	2	1	i o	1	1	2	1	0
LGConfig	l L	TR	U	l L	T	R]	LT	R	 L	TR	ا ا
_	12.0	12.0		! —		12.0	 		12.0	12.0		
Lane Width	1 1 2 . 0	12.0	0	12.0	12.0			12.0		112.0	12.0	
RTOR Vol			0			0	ļ		0			0
Adj Flow	544	2278		189	1056	611	ļ	66	289	611	200	
%InSharedLn												
Prop LTs	1.000	0.0	0.0	1.000	0.0	00		0.6	67		0.00	00
Prop RTs	0	.010		0	.000	1.000	0	.000	1.000	0.	.890	
Peds Bikes	j o			j o			j o			j 0		į
Buses	ĺО	0		ĺО	0	0	İ	0	0	0	0	į
%InProtPhase	e 0.0			0.0			İ			į		i
Durantian			70	I	7.7.7	a + b a - a				1		1

Duration 0.25 Area Type: All other areas

_____OPERATING PARAMETERS______

	Eastbound			We	stbou	nd	No	rthbo	und	So	nd	
	L	Т	R	L	Т	R	L	Т	R	L	Т	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	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	ĺ	1.00	0	ĺ	1.00	0	İ	1.00	0		1.000	j
Lost Time	2.0	2.0		2.0	2.0	2.0	İ	2.0	2.0	2.0	2.0	j
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: RA Inter.: Springside Drive and SR 18

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

Date: 4/26/2006 Jurisd: ODOT

Period: AM Peak Hour Year : 2030 No-Build

Project ID: Summit 18 Corridor Study PID 77749

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

2, 11 20 2	711 10					11,		72	Julia	DII V C			
							CTION						
	!	stbound		:	stbou			rthbou		!	uthboı		
	L	Т	R	L 	Т	R	L	Т	R	L	Т	R	
No. Lanes	s 3 1	3	0	———- 	3	0	1	1	0	1	1	0	-
LGConfig	L	TR		L	TR		L	TR		i L	TR		j
Volume	360	840 7	0	100	570	60	130	60	80	60	20	70	j
Lane Widt	h 12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0		
RTOR Vol		C)			0			0			0	
Duration	0.25		rea :			other	areas ions						
Phase Com	bination	 n 1	2	5±:	4		.10115	5	6			 8	
EB Left		P	P		_	NB	Left	P	-			-	
Thru		P	P			j	Thru	P					
Right		P	P			j	Right	P P					
Peds							Peds						
WB Left			P			SB	Left	P					
Thru			Р				Thru	P					
Right			P				Right	: P					
Peds						===	Peds	_					
NB Right SB Right						EB WB	Right Right						
Green	-	16.0	46.7			l MD	KIGII	43.3	3				
Yellow		4.0	4.0					4.0	,				
All Red		0.0	1.0					1.0					
								Сус	cle Le	ngth:	120.0) s	ecs
							e Sumn	nary					
	ane	Adj		R	atios		Lane	Group	o Ap	proac	h		
	Group	Flow											
Grp C	Capacity	(s	5)	V/C	g	/C	ретау	LOS	Del	ау ьо	S		
Eastbound	l												
	465	1770		0.8		.56	34.6	С					
TR	2788	5015	5	0.3	б 0	.56	15.2	В	20.	7 C			
Westbound	ł												
	196	504				.39	40.1						
TR	1946	5001	-	0.3	б 0	.39	26.5	С	28.	4 C			
Northboun	nd												
	465	1290		0.3		.36	29.3						
TR	614	1703	}	0.2	5 0	.36	28.0	С	28.	6 C			
Southboun	nd												
L	419	1161			б 0		26.8						
TR	594	1645	5	0.1	7 0	.36	26.7	С	26.	8 C			

Intersection Delay = 24.3 (sec/veh) Intersection LOS = C

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 4/26/2006
Analysis Time Period: AM Peak Hour

Intersection: Springside Drive and SR 18

Area Type: All other areas

Jurisdiction: ODOT

Analysis Year: 2030 No-Build

Project ID: Summit 18 Corridor Study PID 77749

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

_____VOLUME DATA_____

	Eas	stbou	nd	Wes	stbour	nd	No	cthbou	ınd	Sou	ıthboı	ınd
	L	T	R	L	T	R	L	T	R	L	Т	R
				ļ			ļ ———-			ļ		
Volume	360	840	70	100	570	60	130	60	80	60	20	70
% 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	100	233	19	28	158	17	36	17	22	17	6	19
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900		1900	1900		1900	1900		1900	1900	
ParkExist				ĺ						ĺ		ĺ
NumPark				ĺ			ĺ			ĺ		ĺ
No. Lanes	1	3	0	1	3	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	ĺ
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	ĺ
RTOR Vol			0			0			0			0
Adj Flow	400	1011		111	700		144	156		67	100	ĺ
%InSharedLn				ĺ						ĺ		ĺ
Prop LTs	1.000	0.0	0.0	1.000	0.00	0 0	1.000	0.00	0.0	1.000	0.00	0 0
Prop RTs	0	.077		0	.096		0	.571		0	.780	ĺ
Peds Bikes	0			0			0			0		į
Buses	0	0		0	0		0	0		0	0	į
%InProtPhase	e 0.0											į
						_	•			•		

Duration 0.25 Area Type: All other areas

____OPERATING PARAMETERS_____

	Ea	stbound	We	stbound	North	oound	So	uthbound
	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
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		1.000	ĺ	1.000	1.0	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		3.2	İ	3.2	3.3	2	j	3.2

__TWO-WAY STOP CONTROL SUMMARY__

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/4/2009 Analysis Time Period: AM Peak

Intersection: SR 18 and Scenic View Dr

Jurisdiction:

Units: U. S. Customary
Analysis Year: 2030

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 Volu	umes and	Adjus	tme	nts			
Major Street:	Approach	Eas	stbound			We	stbound	l	
	Movement	1	2	3		4	5	6	
		L	Т	R	j	L	Т	R	
					· 				
Volume			2240	10		10	1030		
Peak-Hour Fact			0.90	0.90		0.90	0.90		
Hourly Flow Ra			2488	11		11	1144		
Percent Heavy						3			
Median Type/St RT Channelized	-	Undivi	ided			/			
Lanes			2 0			1	2		
Configuration			T TR			L	Т		
Upstream Signa	1?		No				No		
Minor Street:	Approach		thbound				uthbour		
	Movement	7	8	9		10	11	12	
		L	Т	R		L	Т	R	
Volume		10		40					
Peak Hour Fact	or, PHF	0.90		0.90					
Hourly Flow Ra		11		44					
Percent Heavy		2		2					
Percent Grade			0				0		
Flared Approac	h: Exists?	/Storage		No	/				/
Lanes		0	0						
Configuration			LR						
	Delay (Queue Ler	nath an	d Leve	1 0	f Serv	ice		
Approach	BCIAY, (EB	WB	_	hbound		I Delv		hbound	 3
Movement	1	4	7	8	9	1	10	11	12
Lane Config	<u> </u>	L		LR			10		12
Lane contry		_ 1				1			
v (vph)		11		 55					
C(m) (vph)		177		35					
v/c		0.06		1.57					
95% queue leng	th	0.20		15.37					
Control Delay		26.7		1367					
LOS		D		F					
Approach Delay				1367					
Approach LOS				F					

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

Date: 11/3/2009 Jurisd:

Period: PM Peak Hour Year : 2030 No-Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: S. Hametown Rd

E/W St: SR	18			N/S	S St: S	. Ham	etown R	.d		
		SI		D INTERSE	ECTION	SUMMA	RY			
	Eastbo		!	bound		thbou	:		thbound	ļ
	L T	R	L	T R	L	Т	R	L	T R	
No. Lanes	1 2	2 0	1 1	2 1	- <u>-</u>	1	_ 1		1 0	
LGConfig	i L I	TR.	İ L	T R	İ	$_{ m LT}$	R	L	TR	j
Volume	0 134	10 130	660 1	650 10	40	0	320 1	0	0 10	j
Lane Width	12.0 12.	. 0	12.0 1	2.0 12.0	ĺ	12.0	12.0 1	2.0	12.0	ĺ
RTOR Vol		0		0			0		0	
Duration	0.25	Area		ll other						
	 nation 1	2	Sign 3	al Operat	cions	 5	6	 7	 8	
EB Left	114 CT OIL T	P	J	4 NB	Left	P	J	,	J	
Thru		P		140	Thru	P				
Right		P		i	Right					
Peds		-		i	Peds	-				
WB Left	Р	P		SB	Left	P				
Thru	P	P		i	Thru	P				
Right	P	P		i	Right					
Peds				i	Peds					
NB Right	P			EB	Right					
SB Right				WB	Right					
Green	40.	0 56.7	0.0	'	5	9.3	0.0			
Yellow	4.0	4.0				4.0				
All Red	0.0	1.0				1.0				
						_	le Leng	th:	120.0 s	secs
	<u>-</u>			erformand		_				
Appr/ Lan Lane Gro		Adj Sat Low Rate	Rat	108	Lane	Group	Appr	oach		
	acity	(s)	v/c	g/C	Delay	LOS	Delay	LOS		
Eastbound										
L 10	9 2	231	0.00	0.47	16.7	В				
		3469	1.00	0.47	52.9	D	52.9	D		
						_				
Westbound						_				
L 65		L770	1.12	0.85	110.8		2.4 =	-		
		3512	0.62	0.84	4.2	A	34.5	С		
R 13	28 1	1583	0.01	0.84	1.6	A				
Northbound										
LT 10	4 1	339	0.42	0.08	64.9	E	30.0	С		
R 71		583	0.50	0.45	25.7	С				
Southbound										
	٦ 1	1357	0.10	0.08	53.5	D				
L 10	5 1	- 3 3 7	J J							
L 10 TR 12		1583	0.09	0.08	52.8	D	53.2	D		

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/3/2009
Analysis Time Period: PM Peak Hour

Intersection: SR 18 and S Hametown Rd

Area Type: All other areas

Jurisdiction:

Analysis Year: 2030 No-Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: S. Hametown Rd

_____VOLUME DATA_____

	Eas	stbou	nd	Wes	stbour	nd	No	thbo	ınd	Sou	ıthboı	ınd
	L	T	R	L	T	R	L	T	R	L	Т	R
_												
Volume	0	1340	130	660	1650	10	40	0	320	10	0	10
% Heavy Veh	2	3	2	2	3	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	0	372	36	183	458	3	11	0	89	3	0	3
Hi Ln Vol				ĺ			ĺ			ĺ		į
% Grade	İ	0		j	0		İ	0		İ	0	į
Ideal Sat	1900	1900		1900	1900	1900	İ	1900	1900	1900	1900	į
ParkExist				İ			İ			İ		į
NumPark				İ			İ			İ		į
No. Lanes	1	2	0	1	2	1	j o	1	1	j 1	1	0
LGConfig	L	TR		i L	Т	R	İ	$_{ m LT}$	R	i L	TR	į
Lane Width	12.0	12.0		12.0	12.0	12.0	İ	12.0	12.0	12.0	12.0	į
RTOR Vol			0	İ		0	<u> </u>		0	İ		0
Adj Flow	0	1633		733	1833	11	İ	44	356	İ11	11	į
%InSharedLn	İ			İ			İ			İ		į
Prop LTs	1.00	0.0	0 0	1.000	0.00	0 0	İ	1.00	0.0	1.000	0.00) o o
Prop RTs	0	.088		j o	.000	1.000	j o	.000	1.000	j 1.	.000	į
Peds Bikes	i o			j o			j o			i o		į
Buses	0	0		ĺО	0	0	İ	0	0	ĺО	0	į
%InProtPhase	2			0.0			İ			İ		į
- · ·				-								'

Duration 0.25 Area Type: All other areas

_____OPERATING PARAMETERS_____

	Ea	stbou	nd	We	stbou	nd	No	rthbo	und	So	uthboun	.d
	L	T	R	L	T	R	L	T	R	L	Т	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	
Unit Ext.	3.0	3.0		3.0	3.0	3.0	İ	3.0	3.0	3.0	3.0	į
I Factor		1.000)		1.00	0		1.00	0		1.000	
Lost Time	2.0	2.0		2.0	2.0	2.0	İ	2.0	2.0	2.0	2.0	ĺ
Ext of g	2.0	2.0		2.0	2.0	2.0	İ	2.0	2.0	2.0	2.0	ĺ
Ped Min g		3.2		İ	3.2		İ	3.2		İ	3.2	į

Analyst: RA Inter.: Heritage Woods and SR 18

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

Date: Jurisd: ODOT Period: PM Peak Year : 2030

Project ID: Summit 18 Corridor Study PID 77749

E/W St:	SR 1	.8					N/S	St: F	Herita	age Wo	ods			
				ST	GNALT	ZED TI	NTERSE	CTION	SIIMMZ	ARY				
		Ea	 stboui			stbou			rthboi			 uthbo		
		L	Т	R	L L	Т	R	L	Т	R	L	Т	R	
No. Lan		1	_	0	1	2	0	0	1	1	1		0	
LGConfi	.g	L	TR	2.0	L	TR	1.0		LT	R	L	TR		ļ
Volume Lane Wi	 a+b	30	1620 12.0	30	310	2270 12.0	10	50	50	210	40	50 12.0	50	ļ
RTOR Vo	!	12.0	12.0	0	12.0	12.0	0		12.0	12.0 0	12.0	12.0	0	<u> </u>
								· 						
Duratio	n	0.25		Area '			other Operat							
Phase C	ombir	atio	 n 1	2	S19	911a	Jperac 	TOIIS	 5	 6			 8	
EB Lef		IGCIO.		P	3	-	 NB	Left	P	O	,		0	
Thr				P				Thru	P					
Rig				P			İ	Right						
Ped							İ	Peds						
WB Lef			P	P			SB	Left	P					
Thr			P	P			i	Thru						
Rig			P	P			i	Right						
Ped							i	Peds						
NB Rig			P				EB	Right	_					
SB Rig							WB	Right						
Green			21.0	63.5			'		21.5	5				
Yellow			4.0	4.0					4.0					
All Red	l		0.0	1.0					1.0					
			-					a	_	cle Le		120.	0	secs
/				nterse j Sat		Perios atios			_					
Appr/ Lane	Lane Grou			y Rate		acios		Бапе	Groug	p Ap	proac.	LI		
Grp		city			 v/c		 / C		LOS		ay L0			
GIP	Capa	стсу		(5)	V / C	9	<i>/</i> C	Delay	у пор	Der	ау шо	S		
Eastbou														
L	61		110		0.5		.53	49.0	D					
TR	185	54	350	03	0.9	9 0	.53	46.3	D	46.	3 D			
Westbou	ınd													
L	369)	17!	52	0.9	3 0	.75	72.3	E					
TR	258	19	353	10	0.9	8 0	.74	28.1	С	33.	4 C			
Northbo	und													
LT	250)	139	93	0.4	5 0	.18	49.7	D	34.	6 C			
R	627	,	158		0.3		.40	27.4	С					
Southbo														
L	212	2	118	35	0.2	1 0	.18	44.2	D					
TR	309)	172	23	0.3	б 0	.18	46.5	D	45.	9 D			

Intersection Delay = 38.5 (sec/veh) Intersection LOS = D

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed:

Analysis Time Period: PM Peak

Intersection: Heritage Woods and SR 18

Area Type: All other areas

Jurisdiction: ODOT Analysis Year: 2030

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	T	R	L	T	R	L	T	R
_												
Volume	30	1620	30	310	2270	10	50	50	210	40	50	50
% 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	8	450	8	86	631	3	14	14	58	11	14	14
Hi Ln Vol												
% Grade		0		ĺ	0		ĺ	0		ĺ	0	ĺ
Ideal Sat	1900	1900		1900	1900		İ	1900	1900	1900	1900	j
ParkExist	İ			j			j			İ		į
NumPark				İ			İ			İ		į
No. Lanes	1	2	0	j 1	2	0	j o	1	1	j 1	1	0 j
LGConfig	L	TR		i L	TR		İ	$_{ m LT}$	R	İь	TR	į
Lane Width	12.0	12.0		12.0	12.0		İ	12.0	12.0	12.0	12.0	į
RTOR Vol			0	İ		0	<u> </u>		0	İ		0 j
Adj Flow	33	1833		344	2533		İ	112	233	44	112	į
%InSharedLn				<u> </u>			İ			İ		į
Prop LTs	1.00	0.0	0 0	1.000	0.00	0.0	İ	0.50	0.0	1.000	0.00	oo i
Prop RTs	i o	.018		io.	.004		i o	.000	1.000	i o	.500	į
Peds Bikes	0			i o			i o			i o		į
Buses	0	0		ĺo	0		İ	0	0	0	0	į
	inProtPhase			0.0			İ			İ		į
- '							1			1		ı

Duration 0.25 Area Type: All other areas

_____OPERATING PARAMETERS_____

	Ea	stbou	nd	We	stbou	nd	No	rthbo	und	So	uthbou:	nd
	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	0.0	0.0	
Arriv. Type	3	3		3	3		İ	3	3	3	3	j
Unit Ext.	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	j
Lost Time	2.0	2.0		2.0	2.0		İ	2.0	2.0	2.0	2.0	j
Ext of g	2.0	2.0		2.0	2.0		İ	2.0	2.0	2.0	2.0	j
Ped Min g	j	3.2		İ	3.2		İ	3.2		İ	3.2	j

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

Agency: Burgess & Niple Inc Date: 4/26/2006 Area Type: All other areas

Jurisd:

Period: PM Peak

Year : 2030

Project ID: Summit 18 Corridor Study

Project ID:		t 18	Corri	dor St	udy								
E/W St: SR	18					N/S	St: C	Crysta	al Lake	e Road	l		
			STO	CNDT.T7	ED IN	ב אר ב	CTION	STIMMZ	A R V				
	East	 tboun			tbour			thbou		l Sou	 ıthbou	 nd	
	L	Т	R	L	Т	R	L	Т	R	L	Т	R	į
No. Lanes		2	0	 1	2	1	0	1	1	 2	1	0	_
LGConfig	L	TR		L	Т	R	j	$_{ m LT}$	R	L	TR		j
Volume		1640	40	360	2250		60	20	330	680		280	ļ
Lane Width	12.0		_	12.0	12.0			12.0		12.0		_	ļ
RTOR Vol			0			0			0			0	
Duration	0.25		Area '	Type:									
Phase Combi			2	Sig	nai C	perat '	ions	5	6		<u>8</u>		
EB Left	Hation	т Р	4	o P	4	 NB	Left	5	P	/	0		
Thru		_		P			Thru		P				
Right				P			Right	-	P				
Peds						İ	Peds						
WB Left		P	P	P		SB	Left	P					
Thru			P	P			Thru	P	P				
Right			P	P			Right	P	P				
Peds		_	_				Peds						
NB Right		Р	P			EB	Right						
SB Right Green	G	8.0	1.0	51.5	:	WB	Right	P 16.0	22.	5			
Yellow		4.0	3.0	4.0	,			4.0	4.0	,			
All Red		0.0	0.0	1.0				0.0	1.0				
								Сус	cle Lei	ngth:	120.0	s	ecs
				ction	Perfo	rmanc	e Sumn	nary					
Appr/ Lan		_			tios		Lane	Group	o Apj	proach	1		
Lane Gro	_		Rate										
Grp Cap	acity	(s)	v/c	g/	C	ретау	7 LOS	Dela	ay LOS	j		
Eastbound													
L 13		175		1.57		47	320.2		1.00				
TR 15	02	350	0	1.24	. 0.	43	149.1	. F	166	.5 F			
Westbound			_		_								
L 25		175		1.59		58	321.4		0.40				
T 16		351				46	278.1		248	.8 F			
R 10 Northbound	00	156	8	0.43	0.	64	12.3	В					
MOT CHRONING													
LT 19		104	7	0.45		19	50.7		43.	2 D			
R 53		158	3	0.69	0.	34	41.3	D					
Southbound			_					_					
L 45		343		1.65		13	354.4		0.40	0 =			
TR 57	ŏ	163	3	0.65	υ.	35	38.2	D	249	.0 F			

Intersection Delay = 211.0 (sec/veh) Intersection LOS = F

Phone: Fax: E-Mail:

____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 4/26/2006 Analysis Time Period: PM Peak

Intersection: Crystal Lake Road and SR 18

Area Type: All other areas

Jurisdiction:

Analysis Year: 2030

Project ID: Summit 18 Corridor Study

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

_____VOLUME DATA______

	Eas	stbou	nd	Wes	stbou	nd	No	rthbo	und	Soi	uthboi	and
	L	T	R	L	T	R	L	Т	R	L	T	R
_												
Volume	190	1640	40	360	2250		60	20	330	680	60	280
% 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	53	456	11	100	625	108	17	6	92	189	17	78
Hi Ln Vol				ĺ			Ì					j
% Grade	İ	0		İ	0		İ	0		İ	0	j
Ideal Sat	1900	1900		1900	1900	1900	İ	1900	1900	1900	1900	j
ParkExist				İ			İ					j
NumPark				İ			İ			İ		į
No. Lanes	1	2	0	1	2	1	0	1	1	2	1	0
LGConfig	L	TR		İь	Т	R	İ	$_{ m LT}$	R	L	TR	İ
Lane Width	12.0	12.0		12.0	12.0	12.0	İ	12.0	12.0	12.0	12.0	į
RTOR Vol			0	İ		0	İ		0	İ		0
Adj Flow	211	1866		400	2500	433	İ	89	367	756	378	İ
%InSharedLn				İ			İ			İ		j
Prop LTs	1.000	0.0	0.0	1.000	0.0	0 0	İ	0.7	53	İ	0.0) oc
Prop RTs	0	.024		j 0.	.000	1.000	0	.000	1.000	j 0	.823	j
Peds Bikes	j o			j o			0			j o		İ
Buses	0	0		0	0	0	İ	0	0	0	0	j
%InProtPhase	InProtPhase 0.0			0.0			İ			İ		į
- · ·				-								'

Duration 0.25 Area Type: All other areas

_____OPERATING PARAMETERS_____

	Eastbound			Westbound			Northbound			Southbound		nd
	L	T	R	L	T	R	L	T	R	L	Т	R
	ļ			ļ			ļ			.		!
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	
Unit Ext.	3.0	3.0		3.0	3.0	3.0	İ	3.0	3.0	3.0	3.0	ĺ
I Factor		1.000			1.000			1.000			1.000	
Lost Time	2.0	2.0		2.0	2.0	2.0	İ	2.0	2.0	2.0	2.0	ĺ
Ext of g	2.0	2.0		2.0	2.0	2.0	İ	2.0	2.0	2.0	2.0	ĺ
Ped Min g	İ	3.2		İ	3.2		İ	3.2		İ	3.2	į

Analyst: RA Inter.: Springside Drive and SR 18

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

Date: 4/26/2006 Jurisd: ODOT Period: PM Peak Hour Year : 2030

Project ID: Summit 18 Corridor Study PID 77749

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

E/W	St: SR	18					N/S	St: S	Spring	side I	Drive			
				Q T (יד ז ג זאיב	יד חים דו	MTT D C T	CTION	CIIMMA	DV				
		Fa	stbour			stbou:			rthbou			athbo	und	
		l L	T	R	L	T	R	L	Т	R	l L	Т	R	
		-	-	10	-	-		-	-		- 	-		i
No.	Lanes	1	3	0	1	3	0	1	1	0	1	1	0	i
LGC	onfig	ļ ь	TR		ļ ь	TR		j L	TR		L	TR		j
Volu	ıme	270	1410	170	260	1590	60	410	100	160	150	70	270	j
Lane	e Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0		Ì
RTOF	R Vol			0			0			0			0	
Durs	ation	0.25		7rea '	Type:	711	 other							
Dura	aCIOII	0.25		ALEa			Operat							
Phas	se Combi	inatio	 n 1	2	3	4			5	6	7		 8	
EB	Left		P	Р			NB	Left	P	P				
	Thru			P			j	Thru		P				
	Right			P			İ	Right	t P	P				
	Peds						į	Peds						
WB	Left		P	P			SB	Left		P				
	Thru			P			j	Thru		P				
	Right			P			İ	Right	t	P				
	Peds						İ	Peds						
NB	Right						EB	Right	t					
SB	Right						WB	Right	t					
Gree	en		13.0	40.0					22.0	27.0)			
Yell			4.0	4.0					4.0	4.0				
All	Red		0.0	1.0					0.0	1.0				
			_			5 C		~		le Lei		120.	0	secs
7				nterse			ormanc		_					
Appr Lane			_	j Sat w Rate		atios		ьапе	Group	App	proaci	.1		
Grp		pacity		(s)	 v/c		 /C	De l 22	y LOS		 ay LOS			
GIÞ	Car	pacity	,	(5)	V / C	9	/ C	Delay	у поз	Der	ау по	5		
East	bound													
L	25	54	177		1.18		.48	150.6	5 F					
TR	16	564	499	92	1.06	5 0	.33	78.3	E	88.9	9 F			
West	bound													
L	25	5.4	177	7.0	1.14	4 0	.48	124.6	5 F					
	16		504		1.09		.33			95.6	5 F			
NT c - c +	- b b a ⁻¹													
	chbound		1 77	7.0	1 10	0 0	.45	140 () 					
L TR	38 74		177 169		1.18		.45	140.0 24.1		95.0) F			
ıĸ	/ 4	i /	Τ 0 2	ラ 丄	0.33	o U	.44	∠ 4 .⊥	C	95.0) F			
Sout	hbound													
L	24	14	108	36	0.68	3 0	.22	57.1	E					
TR	36	59	164	41	1.02	2 0	.22	99.7	F	86.	7 F			

Intersection Delay = 92.1 (sec/veh) Intersection LOS = F

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 4/26/2006
Analysis Time Period: PM Peak Hour

Intersection: Springside Drive and SR 18

Area Type: All other areas

Jurisdiction: ODOT Analysis Year: 2030

Project ID: Summit 18 Corridor Study PID 77749

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

_____VOLUME DATA_____

	Eas	stboui	nd	Wes	stboui	nd	No	thbo	und	Sou	ıthboı	ınd
	L	T	R	L	Т	R	L	Т	R	L	Т	R
** 1			1.7.0		1 5 0 0			1.00	1.60			
Volume	270	1410	170	260	1590	60	410	100	160	150	70	270
% Heavy Veh	!	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	47	72	442	17	114	28	44	42	19	75
Hi Ln Vol												
% Grade	İ	0		İ	0		İ	0		İ	0	j
Ideal Sat	1900	1900		1900	1900		1900	1900		1900	1900	İ
ParkExist	İ			j			İ					İ
NumPark	i			İ			İ			İ		
No. Lanes	1	3	0	1	3	0	1	1	0	1	1	0
LGConfig	L	TR	O	L	TR	Ü	L	TR	Ü	L	TR	ا
Lane Width	12.0	12.0		12.0	12.0		! -	12.0		12.0	12.0	
RTOR Vol	12.0 	12.0	0	12.0 	12.0	0	12.0	12.0	0	1 1 2 . 0	12.0	0
		1000	U		1004	U		0.00	U		250	U [
Adj Flow	300	1756		289	1834		456	289		167	378	
%InSharedLn	ļ			ļ								
Prop LTs	1.000	0.00	0 0	1.000	0.00	00	1.00	0.00	0 0	1.000	0.00	0 0
Prop RTs	0	.108		0	.037		0	.616		0	.794	
Peds Bikes	0			0			0			0		
Buses	0	0		0	0		0	0		0	0	j
%InProtPhase	e 0.0			0.0			0.0			İ		
Durantian	0 0 5		7 [T	777.	a + b a - a						'

Duration 0.25 Area Type: All other areas

	Ea	stbou	nd	We	stbour	nd	No	rthbo	und	So	uthbou	ınd
	L	Т	R	L	Т	R	L	T	R	L	Т	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	ĺ	1.00)	İ	1.000)	İ	1.00	0	ĺ	1.000) [
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 q	İ	3.2		İ	3.2		İ	3.2		İ	3.2	į

__TWO-WAY STOP CONTROL SUMMARY__

Analyst:

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/4/2009 Analysis Time Period: PM Peak

Intersection: SR 18 and Scenic View Dr

Jurisdiction:

Units: U. S. Customary

Analysis Year: 2030

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

	Vel	hicle Vol	umes and	l Adjus	stme	nts			
Major Street:	Approach	Eas	stbound			We	stbound	l	
	Movement	1	2	3		4	5	6	
		L	Т	R		L	T	R	
Volume			1660	10		50	2320		
Peak-Hour Fact	or, PHF		0.90	0.90		0.90	0.90		
Hourly Flow Ra	ite, HFR		1844	11		55	2577		
Percent Heavy	Vehicles					3			
Median Type/St RT Channelized		Undiv	ided			/			
Lanes			2 0)		1	2		
Configuration			T TR	2		L	Т		
Upstream Signa	il?		No				No		
Minor Street:	Approach	No:	rthbound			So	uthbour	 ıd	
	Movement	7	8	9		10	11	12	
		L	T	R		L	T	R	
Volume		0		20					
Peak Hour Fact		0.90		0.90					
Hourly Flow Ra		0		22					
Percent Heavy	Vehicles	2		2					
Percent Grade			0				0		
Flared Approac	ch: Exists	?/Storage		No	/				/
Lanes		0	C)					
Configuration			LR						
	Delay	Queue Lei		d Leve		f Carr			
Approach	BCIAY, EB	WB	_	hbound		I DCIV		hbound	 7
Movement	1	4	7	8	9	1	10	11	12
Lane Config	_	L	,	LR		ļ ļ	10	T T	12
v (vph)		55		22					
C(m) (vph)		318		323					
V/C		0.17		0.07					
95% queue leng	gth	0.62		0.22					
Control Delay		18.7		17.0					
LOS		C		C					
Approach Delay	7			17.0					
Approach LOS				С					

2030 Peak Hour Interim Condition Intersections

Analyst: RA Inter.: SR 18 and S Hametown Rd

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

Date: 11/3/2009 Jurisd:

Period: AM Peak Hour Year : 2030 Build

Project ID: Summit 18 Corridor Study PID 77749

E/W	St: SR	18				7	N/S	St: S	S. Har	netown	Rd			
				SI	GNALI	ZED I	NTERSE	CTION	SUMMA	ARY				
		Eas	stbou	nd	Wes	stbou:	nd	Nor	thbou	und	So	uthbo	und	
		L 	Т	R	L 	Т	R	L 	Т	R	L 	Т	R	
No.	Lanes	1	2	0	1	2	1	0	1	1	1	1	0	i
LGCo	nfig	L	TR		L	T	R	ĺ	$_{ m LT}$	R	L	TR	-	ĺ
Volu	me	20	1330	40	130	900	10	60	0	910	10	0	10	
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	
Dura	tion	0.25		Area '										
 Phas	e Combi	natio	n 1	2	sig	ا علام 4		ions	5	 6	 7		 8	
	Left			P	J	-	NB	Left	P	Ŭ	,		-	
	Thru			P				Thru	P					
	Right			P			İ	Right						
	Peds						i	Peds						
	Left		P	P			SB	Left	P					
	Thru		P	P			i	Thru	P					
	Right		P	P			i	Right						
	Peds						i	Peds						
	Right		P				EB	Right	-					
	Right						WB	Right						
Gree	_		40.5	45.5	0.0		'	3	20.0	0.0				
Yell	OW		4.0	4.0					4.0					
All	Red		0.0	1.0					1.0					
										cle Le	ngth:	120.	0	secs
				nterse										
Appr				-		atios		Lane	Group	p Ap	proac	h		
Lane		_		w Rate										
Grp	Cap	acity		(s)	v/c	g	/C	Delay	, LOS	Dela	ay LO	S		
East	bound													
L	20		53!		0.13		.38	25.2	С					
TR	13	26	349	98	1.15	5 0	.38	113.0) F	111	.8 F	1		
	bound													
L	65		17		0.22		.76	14.3						
Т		34	351		0.38		.75	5.7	А	6.7	A			
R	11	87	158	83	0.01	1 0	.75	3.8	А					
Nort	hbound													
LT	22	3	133	39	0.30	0 0	.17	47.3	D	111	.9 F	•		
R	86		158		1.1		.55	116.2						
	hbound													
L	22	2	132	29	0.0	5 0	.17	42.4	D					
TR	26		158		0.04		.17	42.3		42.	3 D)		

Intersection Delay = 79.5 (sec/veh) Intersection LOS = E

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/3/2009
Analysis Time Period: AM Peak Hour

Intersection: SR 18 and S Hametown Rd

Area Type: All other areas

Jurisdiction:

Analysis Year: 2030 Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: S. Hametown Rd

_____VOLUME DATA_____

	Eas	stbou	nd	Wes	stbour	nd	Noi	thbo	ınd	Sou	ıthboı	ınd
	L	T	R	L	T	R	L	T	R	L	Т	R
_												
Volume	20	1330	40	130	900	10	60	0	910	10	0	10
% Heavy Veh	2	3	2	2	3	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	6	369	11	36	250	3	17	0	253	3	0	3
Hi Ln Vol				ĺ			ĺ			ĺ		j
% Grade	İ	0		İ	0		İ	0		İ	0	į
Ideal Sat	1900	1900		1900	1900	1900		1900	1900	1900	1900	į
ParkExist				İ			İ			İ		İ
NumPark				İ			İ			j		i
No. Lanes	1	2	0	1	2	1	0	1	1	j 1	1	0
LGConfig	L	TR		i L	Т	R	İ	$_{ m LT}$	R	i L	TR	İ
Lane Width	12.0	12.0		12.0	12.0	12.0	İ	12.0	12.0	12.0	12.0	İ
RTOR Vol			0	İ		0			0	İ		0
Adj Flow	22	1522		144	1000	11		67	1011	İ11	11	į
%InSharedLn				İ			İ			İ		İ
Prop LTs	1.000	0.0	0 0	1.000	0.00	00		1.00	0.0	1.000	0.00	0 o
Prop RTs	j o	.029		j o.	.000	1.000	0	.000	1.000	j 1.	.000	į
Peds Bikes	j o			j o			j o			j o		į
Buses	0	0		ĺО	0	0	İ	0	0	ĺО	0	İ
%InProtPhase	2			0.0			İ			İ		į
			_									'

Duration 0.25 Area Type: All other areas

	Ea	stbou	nd	We	stbou	nd	No	rthbo	und	So	uthbour	ıd
	L	T	R	L	T	R	L	T	R	L	T	R
				ļ			ļ			.		!
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	
Unit Ext.	3.0	3.0		3.0	3.0	3.0	İ	3.0	3.0	3.0	3.0	ĺ
I Factor		1.000)		1.00	0		1.00	0		1.000	
Lost Time	2.0	2.0		2.0	2.0	2.0	İ	2.0	2.0	2.0	2.0	ĺ
Ext of g	2.0	2.0		2.0	2.0	2.0	İ	2.0	2.0	2.0	2.0	ĺ
Ped Min g		3.2		İ	3.2		İ	3.2		ĺ	3.2	į

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

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

11/3/2009 Date:

Jurisd:

Period: AM Peak Hour Year : 2030 Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SF		10 10	COLLI	aor b	zady i			Herita	age Woo	ods			
			SI	GNALIZ	ZED II	NTERSE	CTION	SUMMA	ARY				
	Ea	stbour	_		stbour			thbou		Soi	ıthbou	nd	
	L 	Т	R	L 	Т	R	L	Т	R	L 	Т	R	
No. Lanes	1	3	0	2	2	0	1	1	1	1	1	0	_ j
LGConfig	L	TR		L	TR		L	T	R	L	TR		j
Volume	10	2210	60	300	960	40	70	30	580	10	-	10	
Lane Width	n 12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0		
RTOR Vol			0			0			0			0	
Duration	0.25		Area '				areas ions						
Phase Comb	oinatio	n 1	2	3	4	 	. 1 0115	 5	6	7	 8		
EB Left			P			NB	Left	P					
Thru			P			İ	Thru	P					
Right			P			İ	Right	P					
Peds							Peds						
WB Left		P				SB	Left						
Thru		P	P			ļ	Thru						
Right		P	P				Right	: P					
Peds		ъ				===	Peds						
NB Right SB Right		P				EB WB	Right Right						
Green		17.7	59.3	0.0		I MP	KIGII	29.0	0.0				
Yellow		4.0	4.0	0.0				4.0	0.0				
All Red		0.0	1.0					1.0					
									cle Lei	ngth:	120.0	s	ecs
			nterse										
	ane		j Sat		atios		Lane	Group	o App	proacl	1		
	_		w Rate										
Grp Ca	apacity		(s)	v/c	g,	/C	Delay	LOS	Dela	ау го	5		
Eastbound													
	237	479		0.05			16.1	В	- 2 1				
TR 2	2474	500	06	1.02	2 0	.49	53.6	D	53.	5 D			
Westbound	- 0 5		.	0 5		4 =	- 4 - 6	_					
	507	343		0.66		.15	54.8		0.0	4 0			
TR 2	2336	346	60	0.48	3 0	.68	10.0+	+ В	20.4	4 C			
Northbound													
	334	138		0.23		. 24	38.2	D		-			
	150	186		0.0		.24	35.4	D	53.3	3 D			
	582	158	83	0.94	± 0	.43	56.0	Ε					
Southbound L 3	1 331	13	7.0	0.03	2 0	.24	35.0-	- C					
	116	13 172		0.05		.24	35.0-	D D	35.3	1 D			
-11. T	0	± / 4	J	0.0.	, 0	. 4 1	55.4	ע	J J • .	ע .			

Intersection Delay = 43.3 (sec/veh) Intersection LOS = D

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/3/2009 Analysis Time Period: AM Peak Hour
Intersection: SR 18 and Heritage Woods Rd

Area Type: All other areas

Jurisdiction:

Analysis Year: 2030 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	rthbo	und	So	uthbou	ınd
	L	T	R	L	Т	R	L	Т	R	L	Т	R
Volume	10	2210	60	300	960	40	70	30	580	10	10	10
% Heavy Veh	2	3	2	2	4	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	3	614	17	83	267	11	19	8	161	3	3	3
Hi Ln Vol												
% Grade	İ	0		İ	0		İ	0		İ	0	į
Ideal Sat	1900	1900		1900	1900		1900	1900	1900	1900	1900	į
ParkExist				İ			İ			İ		İ
NumPark				j			İ			İ		İ
No. Lanes	1	3	0	2	2	0	1	1	1	1	1	0
LGConfig	L	TR		İь	TR		L	Т	R	L	TR	į
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0	12.0	12.0	12.0	İ
RTOR Vol			0	İ		0	İ		0	İ		0
Adj Flow	11	2523		333	1111		78	33	644	11	22	į
%InSharedLn	İ			j			İ			İ		j
Prop LTs	1.000	0.0	0 0	İ	0.00	0 0	1.00	0.0	0 0	1.00	0.00	0 o
Prop RTs	j o	.027		j o	.040		j o	.000	1.000	j o	.500	į
Peds Bikes	i o			i o			i o			i o		İ
Buses	0	0		ĺО	0		0	0	0	0	0	j
%InProtPhase	<u>.</u>			j			İ			İ		i
-				-			1			1		1

Duration 0.25 Area Type: All other areas

	Ea	stbou	nd	We	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	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: RA Inter.: SR 18 and Crystal Lake Rd

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

Date: 11/3/2009 Jurisd:

Period: AM Peak Hour Year : 2030 Build

Project ID: Summit 18 Corridor Study PID 77749

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

					.н:г) г	$M \cap H \cap H \cap G \cap H$						
		hound			tbou		CTION S	chbour				
	!	bound T I	R	wes L	T	R R	L	T	R	L L	thbo T	R R
No. Lanes LGConfig	 1 L	3 (0	0	3 T	1 R	0	0	0	2 L	0	1 R
Volume Lane Width	510 2	290			1120					550 12.0		180 12.0
RTOR Vol		_,,				0						0
Duration	0.25	A	rea T			other Operat	areas ions					
Phase Combi	ination	1	2	3	4			5	6	7		8
EB Left		P				NB	Left					
Thru		P	P			İ	Thru					
Right							Right					
Peds							Peds					
WB Left						SB	Left	P				
Thru			P				Thru					
Right			P			İ	Right	P				
Peds						į	Peds					
reus												
						EB	Right					
NB Right	:	P				EB WB	Right Right	Р				
NB Right SB Right			35.0	0.0		!	Right Right	P 29.7	0.0			
NB Right SB Right Green	4	1.3		0.0		!		29.7	0.0			
NB Right SB Right Green Yellow	4 4	1.3	4.0	0.0		!		29.7 4.0	0.0			
NB Right SB Right Green Yellow	4 4	1.3		0.0		!		29.7 4.0 1.0		iath:	120.	0 sec
NB Right SB Right Green Yellow	4 4	1.3	4.0		Perf	WB	Right	29.7 4.0 1.0 Cycl	le Len	ıgth:	120.	0 sec
NB Right SB Right Green Yellow All RedAppr/ Lar	4 4 0	1.3 3 .0 4 .0 5	4.0 1.0 ersec Sat	tion	Perf	WB ormanc		29.7 4.0 1.0 Cycl	le Len			0 sec
NB Right SB Right Green Yellow All Red Appr/ Lar Lane Gro	4 4 0	1.3 3 .0 4 .0 5	4.0 1.0 ersec Sat Rate	tion	tios	WB ormanc	Right e Summa	29.7 4.0 1.0 Cyclary Group	le Len App	roach	 L	0 sec
NB Right SB Right Green Yellow All Red Appr/ Lar Lane Gro Grp Car Eastbound	4 4 0 one oup oacity	1.3 .0 .0 .0	4.0 1.0 ersec Sat Rate)	tion Ra v/c	tios g	WB ormanc 	e Summa Lane (Delay	29.7 4.0 1.0 Cyclary Group LOS	le Len App	roach	 L	0 sec
NB Right SB Right Green Yellow All Red Appr/ Lar Lane Gro Grp Car Eastbound	4 4 0 0 ne pacity	1.3 .0 .0 .0 .0	4.0 1.0 ersec Sat Rate)	tion Ra v/c	tios g	WB ormanc	e Summa Lane (Delay	29.7 4.0 1.0 Cyclary Group LOS	le Len App ——— Dela	roach	 L	0 sec
NB Right SB Right Green Yellow All Red Appr/ Lar Lane Gro Grp Car Eastbound	4 4 0 one oup oacity	1.3 .0 .0 .0	4.0 1.0 ersec Sat Rate)	tion Ra v/c	tios g	WB ormanc 	e Summa Lane (Delay	29.7 4.0 1.0 Cyclary Group LOS	le Len App	roach	 L	0 sec
NB Right SB Right Green Yellow All Red Appr/ Lar Lane Gro Grp Car Eastbound L 60 T 33	4 4 0 0 ne pacity	1.3 .0 .0 .0 .0	4.0 1.0 ersec Sat Rate)	tion Ra v/c	tios g	WB ormanc	e Summa Lane (Delay	29.7 4.0 1.0 Cyclary Group LOS	le Len App ——— Dela	roach	 L	0 sec
NB Right SB Right Green Yellow All Red Appr/ Lar Lane Gro Grp Car Eastbound L 60 T 33	4 4 0 0 ne pacity	1.3 .0 .0 .0 .0	4.0 1.0 ersec Sat Rate)	tion Ra- v/c 0.93 0.76	g 0 0 0 0 0 0	WB ormanc	e Summa Lane (Delay	29.7 4.0 1.0 Cyclary Group LOS	le Len App ——— Dela	proach Ly LOS	 L	0 sec
NB Right SB Right Green Yellow All Red Appr/ Lar Lane Gro Grp Car Eastbound L 60 T 33 Westbound	de de de de de de de de de de de de de d	1.3 : .0 : .0 : .1nte Adj : Flow i (s .1770 5025	4.0 1.0 ersec Sat Rate)	tion Ra- v/c 0.93	g 0 0 0 0 0 0	WB ormanc 	e Summa Lane (Delay 60.9 14.9	29.7 4.0 1.0 Cyclary Group LOS E B	le Len App Dela	proach Ly LOS	 L	0 sec
NB Right SB Right Green Yellow All Red Appr/ Lar Lane Gro Grp Car Eastbound L 60 T 33 Westbound T 14 R 93	4 4 0 ne oup pacity 	1.3 : .0 : .0 : .1nte Adj : Flow i (s 1770 5025	4.0 1.0 ersec Sat Rate)	tion Ra- v/c 0.93 0.76	g 0 0 0 0 0 0	WB ormanc /C .34 .67	e Summa Lane (Delay 60.9 14.9	29.7 4.0 1.0 Cyclary Group LOS E B	le Len App Dela	proach Ly LOS	 L	0 sec
NB Right SB Right Green Yellow All Red Appr/ Lar Lane Gro Grp Car Eastbound L 60 T 33 Westbound T 14 R 91 Northbound	4 4 0 ne oup pacity 	1.3 : .0 : .0 : .1nte Adj : Flow i (s 1770 5025	4.0 1.0 ersec Sat Rate)	tion Ra- v/c 0.93 0.76	g 0 0 0 0 0 0	WB ormanc /C .34 .67	e Summa Lane (Delay 60.9 14.9	29.7 4.0 1.0 Cyclary Group LOS E B	le Len App Dela	proach Ly LOS	 L	0 sec
NB Right SB Right Green Yellow All Red Appr/ Lar Lane Gro Grp Cap Eastbound L 60 T 33 Westbound T 14 R 91 Northbound	4 4 0 ne oup pacity 	1.3 : .0 : .0 : .1nte Adj : Flow i (s 1770 5025	4.0 1.0 ersec Sat Rate)	tion Ra- v/c 0.93 0.76	tios g 3 0 6 0	WB ormanc /C .34 .67	e Summa Lane (Delay 60.9 14.9	29.7 4.0 1.0 Cyclary Group LOS E B	le Len App Dela 23.3	proach Ly LOS	 L	0 sec
NB Right SB Right Green Yellow All Red Appr/ Lar Lane Gro Grp Car Eastbound L 60 T 33 Westbound T 14 R 93 Northbound Southbound L 85	4 4 0 ne oup pacity 	1.3	4.0 1.0 ersec Sat Rate)	tion Ra	######################################	WB ormanc 	e Summa Lane (Delay 60.9 14.9	29.7 4.0 1.0 Cyclary Group LOS E B	le Len App Dela	proach Ly LOS	 L	0 sec

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Agency/co..

Date Performed: 11/3/2009

Analysis Time Period: AM Peak Hour

SR 18 and Crystal Lake Rd

Jurisdiction:

2030 Build Analysis Year:

Project ID: Summit 18 Corridor Study PID 77749

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

_____VOLUME DATA_____

	Eas	stbour	ıd	We	stbou	nd	No:	rthbo	und	Sou	thbo	ound
	L 	Т	R	L 	T	R	L 	Т	R	L 	Т	R
Volume	510	2290			1120	550				550		180
% Heavy Veh	2	3		j	3	2	İ			2		2
PHF	0.90	0.90		j	0.90	0.90	İ			0.90		0.90
PK 15 Vol	142	636		j	311	153	İ			153		50
Hi Ln Vol	j			j			İ			j		j
% Grade	j	0		j	0		İ			j	0	j
Ideal Sat	1900	1900		j	1900	1900	İ			1900		1900
ParkExist	j			j			İ			İ		į
NumPark	İ			İ			İ			İ		j
No. Lanes	1	3	0	0	3	1	0	0	0	2	0	1
LGConfig	L	Т		ĺ	T	R	İ			L		R
Lane Width	12.0	12.0		ĺ	12.0	12.0	İ			12.0		12.0
RTOR Vol	ĺ			ĺ		0	İ			İ		0
Adj Flow	567	2544		ĺ	1244	611	İ			611		200
%InSharedLn	ĺ			ĺ			İ			İ		
Prop LTs	ĺ	0.00	0 (ĺ	0.00	0.0	İ			İ		ĺ
Prop RTs	0	.000		0	.000	1.000						1.000
Peds Bikes	İ			0			0			0		j
Buses	0	0		ĺ	0	0	İ			0		0
%InProtPhase	9											ĺ

Duration 0.25 Area Type: All other areas

	Ea	stbou	nd	We	stbou	nd	No	rthbo	und	So	uthbo	und
	L	T	R	L	Т	R	L	T	R	L	T	R
	ļ			ļ						.		<u> </u>
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	ĺ			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	İ			2.0		2.0
Ped Min g	ĺ			ĺ	3.2		ĺ	3.2		ĺ	3.2	į

Analyst: RA Inter.: Springside Drive and SR 18

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

Date: 4/26/2006 Jurisd: ODOT Period: AM Peak Hour Year : 2030

Project ID: Summit 18 Corridor Study PID 77749

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

E/W	St: SR	18					N/S	S St: S	Spring	gside	Drive			
				SI	GNALI	ZED II	NTERSE	CTION	SUMMA	ARY				
			stboun	ıd	!	stbou	nd	!	rthbou	und	!	uthbou	nd	
		L	Т	R	L	Т	R	L	Т	R	L	Т	R	
No.	Lanes			0	 1	3	0	- 1		0			0	
	nfig	L -	TR		 L	TR		L _	TR	-	L -	TR	i	
Volu		360	840	70	100	570	60	130	60	80	60	20	70 İ	
Lane	e Width		12.0		!	12.0		12.0	12.0		12.0	12.0	į	
RTOF	R Vol	İ		0			0	İ		0	İ		0	
 Dura	ation	0.25		Area :										
	e Combi		 n 1	2	Sig	gna⊥ (4	_	ions_	 5	 6		 8		
EB	Left	.114 C I O	P	Z P	3	4	l l NB	Left	э Р	U	/	0		
טם	Thru		P	P				Thru						
	Right		P	P			-	Right						
	Peds		-	-				Peds						
WB	Left			P			SB	Left	P					
	Thru			P				Thru						
	Right			P			İ	Right						
	Peds						i	Peds						
NB	Right						EB	Right	t					
	Right						WB	Right						
Gree	en		16.0	46.7			'		43.3	3				
Yell	LOW		4.0	4.0					4.0					
All	Red		0.0	1.0					1.0					
												120.0	sec	!s
Appr			_	20.0		atios		Lane	Group	p Ap	proacl	n		
Lane		_		Rate										
Grp	Car	acity	(S)	v/c	g	/C	ретау	y LOS	Del	ay LO	S		
East	bound													
L		55	177		0.86		.56	34.6						
TR	27	88	501	.5	0.36	5 0	.56	15.2	В	20.	7 C			
West	bound													
L	19	6	504		0.5	7 0	.39	40.1	D					
TR	19	946	500	1	0.3	5 0	.39	26.5	С	28.	4 C			
Nort	hbound													
L	46	55	129	0	0.33	1 0	.36	29.3	С					
TR	61	. 4	170	13	0.2	5 0	.36	28.0	С	28.	6 C			
Sout	hbound													
L	41	9	116	1	0.1	5 0	.36	26.8	С					
TR	5.9		164		0.1		.36	26.7		26.	8 C			

Intersection Delay = 24.3 (sec/veh) Intersection LOS = C

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 4/26/2006
Analysis Time Period: AM Peak Hour

Intersection: Springside Drive and SR 18

Area Type: All other areas

Jurisdiction: ODOT Analysis Year: 2030

Project ID: Summit 18 Corridor Study PID 77749

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

_____VOLUME DATA_____

	Eas	stbou	nd	Wes	stbour	nd	No	rthbou	ınd	Sou	ıthboı	ınd
	L	Т	R	L	Т	R	L	Т	R	L	Т	R
				ļ						ļ		
Volume	360	840	70	100	570	60	130	60	8 0	60	20	70
% 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	100	233	19	28	158	17	36	17	22	17	6	19
Hi Ln Vol												
% Grade		0			0			0			0	
Ideal Sat	1900	1900		1900	1900		1900	1900		1900	1900	
ParkExist												
NumPark												
No. Lanes	1	3	0	1	3	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	ĺ
RTOR Vol			0			0			0			0
Adj Flow	400	1011		111	700		144	156		67	100	ĺ
%InSharedLn				ĺ			İ			ĺ		ĺ
Prop LTs	1.000	0.0	0.0	1.000	0.00	0 0	1.000	0.0	0.0	1.000	0.00	00
Prop RTs	0	.077		0	.096		0	.571		j 0.	.780	į
Peds Bikes	0			0			0			0		į
Buses	0	0		0	0		0	0		0	0	į
%InProtPhase	e 0.0											į
						_						-

Duration 0.25 Area Type: All other areas

	Ea	stboun	d	We	stbour	ıd	No	rthbound	Sc	uthbound
	L	T	R	L	Т	R	L	T R	Ĺ	T R
	ļ ———			ļ			ļ			
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		1.000			1.000)		1.000		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		3.2			3.2			3.2		3.2

__TWO-WAY STOP CONTROL SUMMARY__

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/4/2009 Analysis Time Period: AM Peak

Intersection: SR 18 and Scenic View Dr

Jurisdiction:

Units: U. S. Customary
Analysis Year: 2030

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 Volu	umes and	Adjus	tme	nts			
Major Street:	Approach	Eas	stbound			We	stbound	l	
	Movement	1	2	3		4	5	6	
		L	Т	R	j	L	Т	R	
					· 				
Volume			2240	10		10	1030		
Peak-Hour Fact			0.90	0.90		0.90	0.90		
Hourly Flow Ra			2488	11		11	1144		
Percent Heavy						3			
Median Type/St RT Channelized	-	Undivi	ided			/			
Lanes			2 0			1	2		
Configuration			T TR			L	Т		
Upstream Signa	1?		No				No		
Minor Street:	Approach		thbound				uthbour		
	Movement	7	8	9		10	11	12	
		L	Т	R		L	Т	R	
Volume		10		40					
Peak Hour Fact	or, PHF	0.90		0.90					
Hourly Flow Ra		11		44					
Percent Heavy		2		2					
Percent Grade			0				0		
Flared Approac	h: Exists?	/Storage		No	/				/
Lanes		0	0						
Configuration			LR						
	Delay (Queue Ler	nath an	d Leve	1 0	f Serv	ice		
Approach	BCIAY, (EB	WB	_	hbound		I Delv		hbound	 3
Movement	1	4	7	8	9	1	10	11	12
Lane Config	<u> </u>	L		LR			10		12
Lane contry		_ 1				1			
v (vph)		11		 55					
C(m) (vph)		177		35					
v/c		0.06		1.57					
95% queue leng	th	0.20		15.37					
Control Delay		26.7		1367					
LOS		D		F					
Approach Delay				1367					
Approach LOS				F					

Analyst: RA Inter.: SR 18 and S Hametown Rd

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

Date: 11/3/2009 Jurisd:

Period: PM Peak Hour Year : 2030 Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: S. Hametown Rd

E/W St: SR	18					N/S	St: S	S. Ham	netown	Rd		
							CTION					
	:	tbour		!	stbou		1	rthbou	:		uthboun	:
	L 	Т	R	L 	Т	R	L	Т	R	L	Т	R
No. Lanes	1	2	0		2	1		1	 1	1		0
LGConfig	L	TR		L	Т	R	İ	$_{ m LT}$	R	L	TR	İ
Volume		1340	130	660	1650	10	40	0	320	10	0 1	0
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	
Duration	0.25		Area 5			other Operat						
Phase Combi	 nation	 1 1	2	s_s	911aı 4		TOIIS	 5	6	<u>-</u>	 8	
EB Left			P	5	ı	 NB	Left	P	0	,	O	
Thru			P				Thru	P				
Right			P			j	Right	P P				
Peds							Peds					
WB Left		P	P			SB	Left					
Thru		Р	P				Thru					
Right		P	P				Right	E P				
Peds NB Right		P				 EB	Peds Right	_				
SB Right		P				WB	Right					
Green		40.0	56.7	0.0		1 112	1(1911)	9.3	0.0			
Yellow		4.0	4.0					4.0				
All Red		0.0	1.0					1.0				
							_	_	cle Len	igth:	120.0	secs
7 mm = / T o m			terse					_				
Appr/ Lan Lane Gro		_	j Sat , Rate	Ra	atios		Lane	Group) App	roac	.1	
	acity		s)	v/c	g		Delay	/ LOS	Dela	y LO	 S	
Eastbound												
L 10	9	231		0.00	0 0	.47	16.7	В				
TR 16		346		1.00		.47	52.9	D	52.9	D		
Westbound	•	1				0.5	110					
L 65		177		1.13		.85	110.8		24 5			
T 29 R 13		351 158		0.62		.84 .84	4.2 1.6	A A	34.5	C		
Northbound	20	136) 3	0.0.	1 0	.04	1.0	А				
LT 10	4	133	2 Q	0.42	2 ^	.08	64.9	E	30.0	C		
R 71		158		0.4		.45	25.7		30.0			
Southbound	•	100	, 5	0.5	0	. 10	23.7	C				
L 10	5	135	57	0.10	0 0	.08	53.5	D				
TR 12		158		0.09		.08	52.8		53.2	. D		

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/3/2009
Analysis Time Period: PM Peak Hour

Intersection: SR 18 and S Hametown Rd

Area Type: All other areas

Jurisdiction:

Analysis Year: 2030 Build

Project ID: Summit 18 Corridor Study PID 77749

E/W St: SR 18 N/S St: S. Hametown Rd

_____VOLUME DATA_____

	Eas	stbou	nd	Wes	stbour	nd	No	thbo	ınd	Sou	ıthboı	ınd
	L	T	R	L	T	R	L	T	R	L	Т	R
_												
Volume	0	1340	130	660	1650	10	40	0	320	10	0	10
% Heavy Veh	2	3	2	2	3	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	0	372	36	183	458	3	11	0	89	3	0	3
Hi Ln Vol				ĺ			ĺ			ĺ		į
% Grade	İ	0		j	0		İ	0		İ	0	į
Ideal Sat	1900	1900		1900	1900	1900	İ	1900	1900	1900	1900	į
ParkExist				İ			İ			İ		į
NumPark				İ			İ			İ		į
No. Lanes	1	2	0	1	2	1	i o	1	1	j 1	1	0
LGConfig	L	TR		i L	Т	R	İ	$_{ m LT}$	R	i L	TR	į
Lane Width	12.0	12.0		12.0	12.0	12.0	İ	12.0	12.0	12.0	12.0	į
RTOR Vol			0	İ		0	<u> </u>		0	İ		0
Adj Flow	0	1633		733	1833	11	İ	44	356	İ11	11	į
%InSharedLn	İ			İ			İ			İ		į
Prop LTs	1.00	0.0	0 0	1.000	0.00	0 0	İ	1.00	0.0	1.000	0.00) o o
Prop RTs	0	.088		j o	.000	1.000	j o	.000	1.000	j 1.	.000	į
Peds Bikes	i o			j o			j o			i o		į
Buses	0	0		ĺО	0	0	İ	0	0	ĺО	0	į
%InProtPhase	2			0.0			İ			İ		į
- · ·				-								'

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	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	j	1.000	j
Lost Time	2.0	2.0		2.0	2.0	2.0	İ	2.0	2.0	2.0	2.0	j
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 q	İ	3.2		İ	3.2		İ	3.2		j	3.2	j

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

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

Date: 11/3/2009

Jurisd: Year : 2030 Build

Period: PM Peak Hour Year : Project ID: Summit 18 Corridor Study PID 77749

E/W St	: SR 18			N/S	St: Heri	tage Woo	ods		
		SI	GNALIZED	INTERSE	CTION SUM	IMARY			
	Eas	stbound	Westb	ound	Northb	ound	Sout	hbound	
	L	T R	L T	R	L T	R	L	T R	
No. Lar	nes	3 0	 2	2 0	1 1	. 1	1	1 0	-
LGConf	ig L	TR	L L	TR	L T	' R	L	TR	İ
Volume	30	1580 70	730 22	10 10	110 50	560	40 5	0 50	İ
Lane W	idth 12.0	12.0	12.0 12	.0	12.0 12.	0 12.0	12.0 1	2.0	
RTOR V	ol	0		0		0		0	
Duratio	on 0.25	Area		l other					
Dhage (Combination	n 1 2	Signa 3	l Operat	ions5	 5 6	<u>-</u> 7	 8	
EB Lei			3	I NB	Left P		,	O	
Thi		P			Thru P				
	ght	P			Right P				
Ped	_	-		i	Peds				
WB Lei		P		SB	Left P)			
Thi		P P		i	Thru P				
	ght	P P		i	Right P				
Ped				i	Peds				
NB Rig		P		EB	Right				
SB Rig				i wb	Right				
Green	5	31.9 48.9		1		.2 0.0			
Yellow		4.0 4.0			4.				
All Rec	d	0.0 1.0			1.	0			
				_		ycle Ler	ngth: 1	20.0 se	ecs
Appr/	 Lane	Interse Adj Sat	ction Pe Rati		e Summary Lane Gro		ah		
Lane	Group	Flow Rate		OS	Daile GIO	up Apr	JIOacii		
Grp	Capacity		v/c	g/C	Delay LO	S Dela	ay LOS	_	
Eastbou	 und								
L	62	152	0.53	0.41	55.9 E	}			
TR	2035	4995	0.90	0.41	40.3 D	40.5	5 D		
Westbou	und								
L	914	3437	0.89	0.27	54.8 D)			
TR	2456	3476	1.00	0.71	36.8 D		3 D		
Nonthi	ound								
Northbo L	254	1210	0.48	0.21	48.0 D	`			
т	391	1863	0.48	0.21			. C		
R	819	1583	0.14	0.52	39.4 D				
Southbo		1303	0.70	0.54	49.0 C	•			
L	282	1342	0.16	0.21	39.9 D)			
TR	362	1723	0.10	0.21	42.3 D		5 D		
110	J U Z	1/23	0.51	0.21	12.J D	, 41.0	, ב		
	Interse	ction Delay	= 40.0	(sec/ve	h) Inte	ersection	n LOS =	D	

Phone: Fax: E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/3/2009 Analysis Time Period: PM Peak Hour
Intersection: SR 18 and Heritage Woods Rd

Area Type: All other areas

Jurisdiction:

Analysis Year: 2030 Build

Project ID: Summit 18 Corridor Study PID 77749

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

_____VOLUME DATA_____

	Eas	stboui	nd	Wes	stbour	nd	No	thbo	ınd	Sou	ıthboı	ınd
	L	T	R	L	Т	R	L	T	R	L	T	R
1		1500										
Volume	30	1580	70	730	2210	10	110	50	560	40	50	50
% Heavy Veh	2	3	2	2	4	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	8	439	19	203	614	3	31	14	156	11	14	14
Hi Ln Vol												
% Grade		0		ĺ	0		ĺ	0		ĺ	0	ĺ
Ideal Sat	1900	1900		1900	1900		1900	1900	1900	1900	1900	j
ParkExist	İ			j			j			j		j
NumPark				İ			İ			İ		į
No. Lanes	1	3	0	j 2	2	0	j 1	1	1	j 1	1	0
LGConfig	L	TR		i L	TR		L	Т	R	İь	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	İ		0	İ		0	İ		0	İ		0
Adj Flow	33	1834		811	2467		122	56	622	44	112	j
%InSharedLn	İ			j			İ			İ		j
Prop LTs	1.000	0.00	0.0	j	0.00	00	1.000	0.00	0.0	1.000	0.00) 0 j
Prop RTs	0	.043		j o.	.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	į
%InProtPhase	2			İ			İ			İ		į
				-								'

Duration 0.25 Area Type: All other areas

	Ea	stbou	nd	We	stbou	nd	No	rthbo	und	So	uthbou:	nd
	L	T	R	L	Т	R	L	Т	R	L	T	R
T ! L TT L												
	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	- 1
Arriv. Type	3	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	3.0	
I Factor		1.00	0		1.000)		1.00	0		1.000	
Lost Time	2.0	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	2.0	
Ped Min g		3.2			3.2			3.2			3.2	İ

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

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

Date: 11/3/2009 Jurisd:

Period: PM Peak Hour Year : 2030 Build

Project ID: Summit 18 Corridor Study PID 77749

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

								CTION S						
			stboun T		Wes L	tboun T	d R	Nort	thbour T	nd R		thbo T		
	l I	L	1	R	ь	1	ĸ	"	1	K	L	1	R	
No. Lan	nes	1	3	0	0			0	0	0	2	0	1	i
LGConfi	ig	L	Т	į		T	R	İ		İ	L		R	İ
Volume	j	210	1970	j		2610	390	İ		j	680		340	İ
Lane Wi		12.0	12.0			12.0	12.0				12.0		12.0	
RTOR Vo	ol						0						0	
Duratio	 on	0.25		Area T										
 Phase C				2	S19 3	naı O	perat 	ions	 5	6	7		 8	
Fnase C EB Lef		ıacıUl	P	۷	3	4	l l NB	Left	J	U	,		U	
Thr			P	P			112	Thru						
Rig			_	_			İ	Right						
Ped	-						İ	Peds						
WB Lef	Et						SB	Left	P					
Thr	ru			P			İ	Thru						
Rig	ght			P			İ	Right	P					
Ped	ds						İ	Peds						
NB Rig	ght						EB	Right						
SB Rig	ght		P				WB	Right	P					
_														
_			15.0	64.2	0.0				26.8	0.0				
Green Yellow			4.0	4.0	0.0				4.0	0.0				
Green Yellow					0.0				4.0 1.0			1.00	0	
Green Yellow			4.0	4.0		Dorfo	rmana	o Summa	4.0 1.0 Cyc	le Len	ıgth:	120.	0 se	cs
Green Yellow All Red	i 		4.0 0.0	4.0 1.0	tion		rmanc	e Summa	4.0 1.0 Cycl	le Len			0 se	CS
Green Yellow All Red Appr/	d Lane		4.0 0.0 In Adj	4.0 1.0 tersec	tion	Perfo tios	rmanc	e Summa Lane (4.0 1.0 Cycl	le Len			0 se	CS
Green Yellow All Red Appr/ Lane	d Lane Grou	ıp	4.0 0.0 In Adj	4.0 1.0 tersec Sat Rate	tion Ra ———	tios 	_	Lane (4.0 1.0 Cycl ary Group	le Len App	roach		0 se 	CS
Green Yellow All Red Appr/ Lane Grp	Lane Grou Capa		4.0 0.0 In Adj	4.0 1.0 tersec	tion	tios 	_		4.0 1.0 Cycl ary Group	le Len App			0 se	CS
Green Yellow All Red Appr/ Lane Grp Eastbou	Lane Grou Capa	ip acity	4.0 0.0 In Adj Flow	4.0 1.0 tersec Sat Rate s)	tion Ra v/c	tios g/	_ C	Lane (Delay	4.0 1.0 Cyclary Group LOS	le Len App	roach		0 se	CS
Green Yellow All Red Appr/ Lane Grp Eastbou	Lane Grou Capa	ip acity 	4.0 0.0 In Adj	4.0 1.0 tersec Sat Rate s)	tion Ra ———	g/ 0.		Lane (4.0 1.0 Cyclary Group LOS	le Len App	roach		0 se	CS
Green Yellow All Red Appr/ Lane Grp Eastbou L	Lane Grou Capa Land 221	ip acity 	4.0 0.0 In Adj Flow (4.0 1.0 tersec Sat Rate s)	tion Ra v/c 	g/ 0.		Lane (Delay	4.0 1.0 Cyclary Group LOS	le Len App —— Dela	roach		0 se	CS
Green Yellow All Red Appr/ Lane Grp Eastbou L	Lane Grou Capa Land 221	ip acity 	4.0 0.0 In Adj Flow (4.0 1.0 tersec Sat Rate s)	tion Ra v/c 	g/ 0.		Lane (Delay	4.0 1.0 Cyclary Group LOS	le Len App —— Dela	roach		0 se	CS
Green Yellow All Red Appr/ Lane Grp Eastbou L T	Lane Grou Capa Land 221	np acity 34	4.0 0.0 In Adj Flow (4.0 1.0 tersec Sat Rate s)	tion Ra v/c 1.05 0.63	g/ 0. 0.		Lane (Delay 128.1	4.0 1.0 Cyclary Group LOS	le Len App —— Dela	proach Ly LOS		0 se	CS
Green Yellow All Red Appr/ Lane Grp Eastbou L T Westbou	Lane Grou Capa 	np acity 34	4.0 0.0 In Adj Flow (177 502	4.0 1.0 tersec Sat Rate s)	tion Ra v/c 1.05 0.63	g/ 0.		Lane (Delay 128.1 10.9	4.0 1.0 Cyclary Group LOS F B	App Dela	proach Ly LOS		0 se	CS
Green Yellow All Red Appr/ Lane Grp Eastbou L T Westbou	Lane Grou Capa 	np acity 34	4.0 0.0 In Adj Flow (177 502	4.0 1.0 tersec Sat Rate s)	tion Ra v/c 1.05 0.63	g/ 0. 0.		Lane (Delay 128.1 10.9	4.0 1.0 Cyclary Group LOS F B	App Dela	proach Ly LOS		0 se	Cs
Green Yellow All Red Appr/ Lane Grp Eastbou L T Westbou T R Northbo	Lane Grow Capa Ind 221 348 Ind 268 Land	np acity 34	4.0 0.0 In Adj Flow (177 502	4.0 1.0 tersec Sat Rate s)	tion Ra v/c 1.05 0.63	g/ 0. 0.		Lane (Delay 128.1 10.9	4.0 1.0 Cyclary Group LOS F B	App Dela	proach Ly LOS		0 se	CS
Green Yellow All Red Appr/ Lane Grp Eastbou L T Westbou T R Northbo	Lane Grou Capa Ind 221 348 Ind 268 126 Dund	acity 34	4.0 0.0 In Adj Flow (177 502	4.0 1.0 tersec Sat Rate s)	tion Ra v/c 1.05 0.63	0. 0.		128.1 10.9	4.0 1.0 Cyclary Group LOS F B	App Dela	proach Ly LOS		0 se	CS
Green Yellow All Red Appr/ Lane Grp Eastbou L T Westbou T R Northbo	Lane Grow Capa Ind 221 348 Ind 268 Land	acity 34	4.0 0.0 In Adj Flow (177 502	4.0 1.0 tersec Sat Rate s)	tion Ra v/c 1.05 0.63	g/ 0. 0.		Lane (Delay 128.1 10.9	4.0 1.0 Cyclary Group LOS F B	App Dela	proach Ly Los		0 se	CS
Green Yellow All Red Appr/	Lane Grou Capa Ind 221 348 Ind 268 126 Dund	acity 34 38	4.0 0.0 In Adj Flow (177 502 502 158	4.0 1.0 tersec Sat Rate s)	tion Ra v/c 1.05 0.63 1.08 0.34	0. 0. 0.		Lane (Delay 128.1 10.9 70.9 4.0	4.0 1.0 Cyclary Group LOS F B	App Dela	proach Ly Los		0 se	Cs

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/3/2009 Analysis Time Period: PM Peak Hour

Intersection: SR 18 and Crystal Lake Rd

Area Type: All other areas

Jurisdiction:

Analysis Year: 2030 Build

Project ID: Summit 18 Corridor Study PID 77749

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

_____VOLUME DATA_____

	Eas	stboun	ıd	We	stbou	nd	No	rthbo	und	Sou	thbo	und
	L	T	R	L	T	R	L	T	R	L	Т	R
Volume	 210	 1970		 	2610	390				_ 680		 340
% Heavy Veh	!	3		<u> </u>	3	2	i			2		2
PHF	0.90	_		! 	0.90	0.90				0.90		0.90
PK 15 Vol	58	547		İ	725	108				189		94
Hi Ln Vol	İ			İ			İ					i
% Grade	İ	0		İ	0		İ			İ	0	j
Ideal Sat	1900	1900		İ	1900	1900	İ			1900		1900 İ
ParkExist	İ			İ			İ			İ		j
NumPark	İ			İ			İ			İ		İ
No. Lanes	1	3	0	j 0	3	1	0	0	0	2	0	1 İ
LGConfig	L	T		İ	Т	R	İ			i L		R
Lane Width	12.0	12.0		İ	12.0	12.0	İ			12.0		12.0
RTOR Vol	j			İ		0	İ			İ		0 j
Adj Flow	233	2189		İ	2900	433	İ			756		378 j
%InSharedLn	j			İ			İ			İ		į
Prop LTs	İ	0.00	0	İ	0.0	00	İ			j		į
Prop RTs	j o	.000		j 0	.000	1.000	İ			İ		1.000
Peds Bikes	İ			j 0			0			j 0		į
Buses	0	0		İ	0	0	İ			0		0
%InProtPhase	=											į

Duration 0.25 Area Type: All other areas

	Ea	stbou	nd	We	stbou	nd	No	rthbo	und	So	uthbo	ound
	L	Т	R	L	Т	R	L	Т	R	L	Т	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			2.0	2.0				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		ĺ	3.2		İ	3.2	į

Inter.: Springside Drive and SR 18 Analyst: RA

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

Jurisd: ODOT Date: 4/26/2006

Period: PM Peak Hour Year : 2030 Build

Project ID: Summit 18 Corridor Study PID 77749

E/W	St: SR	18				7	N/S	St: S	Sprin	gside	Drive			
				SI	GNALI	ZED II	NTERSE	CTION	SUMM	ARY				
		Eas	stbou	nd	Wes	stbou	nd	Nor	thbo	und	Soi	ıthbo	und	
		L	Т	R	Ĺ	T	R	L	T	R	L	Т	R į	
No.	Lanes	1	3	0	- 1	3	0	 1	1	0	1	1	0	
LGC	onfig	L	TR		L	TR		L	TR		L	TR		
Vol	ume	270	1410	170	260	1590	60	410	100	160	150	70	270	
Lan	e Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0		
RTO	R Vol			0			0			0			0	
Dur	ation	0.25		Area			other							
						_	Operat	ions					 8	
	se Combi	natio		2	3	4		T - C+	5	6	7		8	
EΒ	Left		P	P			NB	Left		P				
	Thru			P				Thru		P				
	Right			P				Right	E P	P				
	Peds							Peds						
WB	Left		Р	P			SB	Left		P				
	Thru			P			ļ	Thru		P				
	Right			P				Right	5	P				
	Peds							Peds						

Peds Peds NB Right EB Right SB Right WB Right 13.0 40.0 Green 22.0 27.0 Yellow 4.0 4.0 4.0 4.0 All Red 0.0 1.0 0.0 1.0

> Cycle Length: 120.0 secs

		Interce	stion De	arforman	.ce Summa	-	_	tn: 120.0	secs
Appr/ Lane		Intersec Adj Sat Flow Rate	Rati			_		oach	
	_	(s)		g/C	Delay	LOS	Delay	LOS	
Eastbo	 und								
L	254	1770	1.18	0.48	150.6	F			
TR	1664	4992	1.06	0.33	78.3	E	88.9	F	
Westbo	und								
L	254	1770	1.14	0.48	124.6	F			
TR	1682	5046	1.09	0.33	91.0	F	95.6	F	
Northbo	ound								
L	387	1770	1.18	0.45	140.0	F			
TR	747	1691	0.39	0.44	24.1	С	95.0	F	
Southbo	ound								
L	244	1086	0.68	0.22	57.1	E			
TR	369	1641	1.02	0.22	99.7	F	86.7	F	
	Intersec	tion Delay	= 92.1	(sec/v	eh) In	terse	ction I	LOS = F	

Phone: Fax:

E-Mail:

_____OPERATIONAL ANALYSIS_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 4/26/2006
Analysis Time Period: PM Peak Hour

Intersection: Springside Drive and SR 18

Area Type: All other areas

Jurisdiction: ODOT

Analysis Year: 2030 Build

Project ID: Summit 18 Corridor Study PID 77749

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

_____VOLUME DATA_____

	Eas	stbou	nd	Wes	stbou	nd	No	rthbo	und	Soi	ıthboı	and
	L	T	R	L	T	R	L	Т	R	L	T	R
				ļ								
Volume	270	1410	170	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	47	72	442	17	114	28	44	42	19	75
Hi Ln Vol												
% Grade		0		ĺ	0		İ	0			0	j
Ideal Sat	1900	1900		1900	1900		1900	1900		1900	1900	į
ParkExist				İ			İ			İ		j
NumPark				İ			İ			İ		į
No. Lanes	1	3	0	1	3	0	1	1	0	1	1	0
LGConfig	L	TR		L	TR		L	TR		L	TR	į
Lane Width	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	j
RTOR Vol	İ		0	İ		0	İ		0	İ		0
Adj Flow	300	1756		289	1834		456	289		167	378	į
%InSharedLn				İ			İ			İ		j
Prop LTs	1.000	0.0	00	1.000	0.0	0 0	1.00	0.0	0 0	1.000	0.00) 0 j
Prop RTs	0	.108		j 0	.037		0	.616		0	.794	j
Peds Bikes	0			j 0			0			0		j
Buses	0	0		0	0		0	0		0	0	j
%InProtPhase	0.0			0.0			0.0					j
				•		_	•			•		

Duration 0.25 Area Type: All other areas

	Ea	stbound	We	stbound	North	oound	So	uthbound
	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
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		1.000	ĺ	1.000	1.0	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		3.2	İ	3.2	3.3	2	j	3.2

__TWO-WAY STOP CONTROL SUMMARY__

Analyst:

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/4/2009 Analysis Time Period: PM Peak

Intersection: SR 18 and Scenic View Dr

Jurisdiction:

Units: U. S. Customary

Analysis Year: 2030

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

	Vel	hicle Vol	umes and	l Adjus	stme	nts			
Major Street:	Approach	Eas	stbound			We	stbound	l	
	Movement	1	2	3		4	5	6	
		L	Т	R		L	T	R	
Volume			1660	10		50	2320		
Peak-Hour Fact	or, PHF		0.90	0.90		0.90	0.90		
Hourly Flow Ra	ite, HFR		1844	11		55	2577		
Percent Heavy	Vehicles					3			
Median Type/St RT Channelized		Undiv	ided			/			
Lanes			2 0)		1	2		
Configuration			T TR	2		L	Т		
Upstream Signa	il?		No				No		
Minor Street:	Approach	No:	rthbound			So	uthbour	 ıd	
	Movement	7	8	9		10	11	12	
		L	T	R		L	T	R	
Volume		0		20					
Peak Hour Fact		0.90		0.90					
Hourly Flow Ra		0		22					
Percent Heavy	Vehicles	2		2					
Percent Grade			0				0		
Flared Approac	ch: Exists	?/Storage		No	/				/
Lanes		0	C)					
Configuration			LR						
	Delay	Queue Lei		d Leve		f Carr			
Approach	BCIAY, EB	WB	_	hbound		I DCIV		hbound	 7
Movement	1	4	7	8	9	1	10	11	12
Lane Config	_	L	,	LR		ļ ļ	10	T T	12
v (vph)		55		22					
C(m) (vph)		318		323					
V/C		0.17		0.07					
95% queue leng	gth	0.62		0.22					
Control Delay		18.7		17.0					
LOS		C		C					
Approach Delay	7			17.0					
Approach LOS				С					

2030 AM Peak Hour Freeway Segments

Phone: E-mail:		Fax:	
	Operational Anal	ysis	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RA Burgess & Niple I: 11/6/2009 AM Peak Hour I-77 SB Ghent Rd Onramp to 2030 Corridor Study PI:	o SR 18 Exit	
	Flow Inputs and .	Adjustments	
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	2620 0.90 728 6 0 Level 0.00 0.00 1.5 1.2 0.971 1.00	veh/h v % % % mi pc/h/ln
	Speed Inputs and	Adjustments	
Lane width Right-shoulder lateral Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment,		12.0 6.0 0.50 3 Measured 70.0 0.0	ft ft interchange/mi mi/h mi/h
Lateral clearance adjus Interchange density adj Number of lanes adjustm Free-flow speed, FFS	tment, fLC ustment, fID	0.0 0.0 3.0 70.0 Urban Freeway	mi/h mi/h mi/h mi/h mi/h
	LOS and Performa	nce Measures	
Flow rate, vp Free-flow speed, FFS Average passenger-car s Number of lanes, N Density, D Level of service, LOS	peed, S	999 70.0 70.0 3 14.3 B	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analys	sis	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RA Burgess & Niple Ind 11/6/2009 AM Peak Hour I-77 SB South of Exit to SE 2030 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	E, ER	2430 0.90 675 6 0 Level 0.00 0.00 1.5 1.2	veh/h v % % % mi
Driver population facto		1.00 927	pc/h/ln
	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 ent, fN	12.0 6.0 0.50 3 Measured 70.0 0.0 0.0 0.0 0.0 Urban Freeway	<pre>ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h</pre>
	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	927 70.0 70.0 3 13.2 B	<pre>pc/h/ln mi/h mi/h pc/mi/ln</pre>

Phone: E-mail:		Fax:	
	Operational Analys	sis	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RA Burgess & Niple Inc 11/6/2009 AM Peak Hour I-77 SB 2030 Corridor Study PID		
	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, ET Recreational vehicle PCE Heavy vehicle adjustment Driver population factor Flow rate, vp	E, ER E, fHV	2430 0.90 675 6 0 Level 0.00 0.00 1.5 1.2 0.971 1.00	veh/h v % % % mi pc/h/ln
	Speed Inputs and A	Adjustments	
Lane width Right-shoulder lateral of Interchange density Number of lanes, N Free-flow speed: FFS or BFFS Lane width adjustment, f Lateral clearance adjust Interchange density adjustment	FLW cment, fLC ustment, fID	12.0 6.0 0.50 3 Measured 70.0 0.0	ft ft interchange/mi mi/h mi/h mi/h mi/h
Number of lanes adjustme Free-flow speed, FFS	ent, iN	3.0 70.0 Urban Freeway	mi/h mi/h
	_LOS and Performand		
Flow rate, vp Free-flow speed, FFS Average passenger-car sp Number of lanes, N Density, D Level of service, LOS	peed, S	927 70.0 70.0 3 13.2 B	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analys	sis	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RA Burgess & Niple Ind 11/6/2009 AM Peak Hour I-77 NB North of Ramp to SE 2030 Corridor Study PID	R 18 EB	
	Flow Inputs and Ad	ljustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles		4940 0.90 1372 6	veh/h v %
Terrain type: Grade Segment length Trucks and buses PCE, E Recreational vehicle PC Heavy vehicle adjustmen Driver population facto	E, ER t, fHV	Level 0.00 0.00 1.5 1.2 0.971	% mi
Flow rate, vp	I, IP	1885	pc/h/ln
	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 3.0 70.0 Urban Freeway	<pre>ft ft interchange/mi mi/h mi/h mi/h mi/h mi/h mi/h mi/h</pre>
	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	1885 70.0 66.8 3 28.2 D	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail:		Fax:	
	Operational Analys	sis	
Analyst: Agency or Company: Date Performed: Analysis Time Period: Freeway/Direction: From/To: Jurisdiction: Analysis Year: Description: Summit 18	RA Burgess & Niple Ind 11/6/2009 AM Peak Hour I-77 NB North of Ramp to SE 2030 Corridor Study PID	R 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	E, ER	4240 0.90 1178 6 0 Level 0.00 0.00 1.5 1.2	veh/h v % % % mi
Driver population facto		1.00 1617	pc/h/ln
, E	Speed Inputs and A		
T 3+1-			£_
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	peed, S	1617 70.0 69.3 3 23.3 C	<pre>pc/h/ln mi/h mi/h pc/mi/ln</pre>

Phone: E-mail:		Fax:	
	Operational Analys	sis	
Analyst: RA Agency or Company: Burgess & Niple Inc Date Performed: 11/6/2009 Analysis Time Period: AM Peak Hour Freeway/Direction: I-77 NB From/To: North of Ramp from SR 18 WB Jurisdiction: Analysis Year: 2030 Description: Summit 18 Corridor Study PID 77749			
	Flow Inputs and Ad	ljustments	
Volume, V Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles		4430 0.90 1231 6 0	veh/h v %
Terrain type: Grade Segment length Trucks and buses PCE, ET Recreational vehicle PCE Heavy vehicle adjustment	E, ER	Level 0.00 0.00 1.5 1.2 0.971	% mi
Driver population factor Flow rate, vp	c, fp	1.00 1690	pc/h/ln
	_Speed Inputs and A	djustments	
Lane width Right-shoulder lateral of Interchange density Number of lanes, N Free-flow speed:	learance	12.0 6.0 0.50 3 Measured	ft ft interchange/mi
FFS or BFFS Lane width adjustment, f Lateral clearance adjust Interchange density adju Number of lanes adjustme Free-flow speed, FFS	ment, fLC stment, fID	70.0 0.0 0.0 0.0 3.0 70.0 Urban Freeway	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 sp Number of lanes, N Density, D Level of service, LOS	_	1690 70.0 68.9 3 24.5	pc/h/ln mi/h mi/h pc/mi/ln

Phone: E-mail: _____Diverge Analysis_____

Fax:

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date performed: 11/8/2009 Analysis time period: AM Peak Hour Freeway/Dir of Travel: I-77 SB

Junction: Exit to SR 18 WB

Jurisdiction:

Analysis Year: 2030

Description: Summit 18 Corridor Study PID 77749

_____Freeway Data_____

Type of analysis Diverge Number of lanes in freeway Free-flow speed on freeway 70.0 mph Volume on freeway 2620 vph

_____Off Ramp Data_____

Side of freeway	Right	
Number of lanes in ramp	1	
Free-Flow speed on ramp	35.0	mph
Volume on ramp	190	vph
Length of first accel/decel lane	600	ft
Length of second accel/decel lane		ft

_____Adjacent Ramp Data (if one exists)_____

Does adjacent ramp exist? Yes Volume on adjacent ramp 180 vph Position of adjacent ramp Downstream Type of adjacent ramp On Distance to adjacent ramp 1650 ft

_____Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp		Adjacer Ramp	nt
Volume, V (vph)	2620	190		180	vph
Peak-hour factor, PHF	0.90	0.90		0.90	
Peak 15-min volume, v15	728	53		50	V
Trucks and buses	6	7		4	%
Recreational vehicles	0	0		0	%
Terrain type:	Level	Level		Level	
Grade	0.00 %	0.00	%	0.00	%
Length	0.00 m	i 0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		1.5	
Recreational vehicle PCE, ER	1.2	1.2		1.2	

```
1.00
Driver population factor, fP
                                               1.00
                                                          1.00
                                    2998
Flow rate, vp
                                               218
                                                          204
                                                                  pcph
                  _____Estimation of V12 Diverge Areas__
                               (Equation 25-8 or 25-9)
                L =
                 ΕQ
                      0.675 Using Equation 5
                 FD
                v = v + (v - v) P = 2095 pc/h
                 12 R
                          F R FD
                  _____Capacity Checks____
                                     Maximum
                                                   LOS F?
                        Actual
    v = v
                         2998
                                     7200
                                                    No
     Fi F
    v = v - v
                        2780
                                     7200
                                                    No
         F R
     FΟ
                         218
                                     2000
                                                    No
    V
     R
                        903 pc/h (Equation 25-15 or 25-16)
    3 or av34
Is
    v v
               > 2700 pc/h?
                                     No
    3 or av34
                > 1.5 v /2
                                     No
Is
       V
     3 or av34
                      12
If yes, v = 2095
                                     (Equation 25-18)
        12A
                   _Flow Entering Diverge Influence Area____
                                 Max Desirable
                                                     Violation?
                    Actual
                                 4400
                    2095
                                                     No
    V
     12
             ___Level of Service Determination (if not F)______
                     D = 4.252 + 0.0086 v - 0.009 L = 16.9 pc/mi/ln
Density,
                                       12
                      R
Level of service for ramp-freeway junction areas of influence B
                _____Speed Estimation_____
                                         D = 0.448
Intermediate speed variable,
                                          S
Space mean speed in ramp influence area,
                                         S = 57.5
                                                     mph
                                         R
Space mean speed in outer lanes,
                                         S = 76.8
                                                     mph
Space mean speed for all vehicles,
                                        S = 62.2
                                                     mph
```

0.971

0.966

0.980

Heavy vehicle adjustment, fHV

Phone: Fax: E-mail: ______Merge Analysis______ RA Analyst: Agency/Co.: Burgess & Niple Inc Agency/Co.:

Date performed:

Analysis time period:

AM Peak Hour Freeway/Dir of Travel: I-77 NB Junction: SR 18 WB to I-77 NB Jurisdiction: Analysis Year: 2030 Description: Summit 18 Corridor Study PID 77749 _____Freeway Data_____ Type of analysis Merge Number of lanes in freeway Free-flow speed on freeway 70.0 mph Volume on freeway 4240 vph _____On Ramp Data_____ Side of freeway Right Number of lanes in ramp 1 Free-flow speed on ramp 35.0 mph 190 Volume on ramp vph Length of first accel/decel lane 500 ft Length of second accel/decel lane ft _____Adjacent Ramp Data (if one exists)_____ Does adjacent ramp exist? Yes 1080 Volume on adjacent Ramp vph Position of adjacent Ramp Upstream Type of adjacent Ramp Off Distance to adjacent Ramp 1500 ft _____Conversion to pc/h Under Base Conditions_____ Freeway Junction Components Ramp Adjacent Ramp Volume, V (vph) 190 4240 1080 vph Peak-hour factor, PHF 0.90 0.90 0.90 Peak 15-min volume, v15 1178 53 300 V Trucks and buses 6 3 12 0 0 Recreational vehicles % Level Level Level Terrain type: % % Grade કૃ Length mi mi шi

1.5

1.2

1.5

1.2

1.5

1.2

Trucks and buses PCE, ET

Recreational vehicle PCE, ER

```
4852
                                                214
Flow rate, vp
                                                           1272
                                                                   pcph
                   ____Estimation of V12 Merge Areas___
                        734.32 (Equation 25-2 or 25-3)
                 ΕQ
                        0.591 Using Equation 1
                 FM
                v = v (P) = 2870 pc/h
                 12 F FM
                     _____Capacity Checks_____
                                                    LOS F?
                                      Maximum
                         Actual
                         5066
                                      7200
                                                     No
     FO
                         1982 pc/h
                                     (Equation 25-4 or 25-5)
     3 \text{ or } av34
Is
                > 2700 pc/h?
                                      No
         V
     3 or av34
                > 1.5 v / 2
                                      No
Is
    v v
     3 or av34
                      12
If yes, v = 2870
                                      (Equation 25-8)
        12A
                     __Flow Entering Merge Influence Area_
                    Actual Max Desirable
                                                      Violation?
                                 4600
                    2870
                                                      No
     R12
            ____Level of Service Determination (if not F)_____
Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 26.3 pc/mi/ln
Level of service for ramp-freeway junction areas of influence C
                  _____Speed Estimation___
Intermediate speed variable,
                                          M = 0.371
                                          S
Space mean speed in ramp influence area,
                                          S = 59.6
                                                      mph
                                          R
                                          S = 64.7
Space mean speed in outer lanes,
                                                      mph
                                          0
```

S = 61.5

mph

0.971

1.00

0.985

1.00

0.943

1.00

Heavy vehicle adjustment, fHV

Driver population factor, fP

Space mean speed for all vehicles,

Phone: E-mail: Fax:

_____Operational Analysis_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/8/2009
Analysis Time Period: AM Peak Hour
Freeway/Dir of Travel: I-77 SB

Weaving Location: Loop Ramps at SR 18

Jurisdiction:

Weaving ratio, R

Analysis Year: 2030

Description: Summit 18 Corridor Study PID 77749

_____Inputs_____ Freeway free-flow speed, SFF 65 mph Weaving number of lanes, N 4 Weaving segment length, L 725 ft Terrain type Level % Grade Length mi Weaving type Α Volume ratio, VR 0.14

______Conversion to pc/h Under Base Conditions_____

0.50

Non-Weaving		Weaving		
V	V	V	V	
01	02	w1	w2	
2250	0	180	180	veh/h
0.90	0.90	0.90	0.90	
625	0	50	50	v
6	0	8	4	%
0	0	0	0	%
1.5	1.5	1.5	1.5	
1.2	1.2	1.2	1.2	
0.971	1.000	0.962	0.980	
1.00	1.00	1.00	1.00	
2575	0	208	204	pc/h
	V 01 2250 0.90 625 6 0 1.5 1.2 0.971 1.00	V V V 01 02 2250 0 0.90 625 0 6 0 0 1.5 1.5 1.5 1.2 0.971 1.000 1.00	V V V 01 02 w1 2250 0 180 0.90 0.90 0.90 625 0 50 6 0 8 0 0 0 1.5 1.5 1.5 1.2 1.2 1.2 0.971 1.000 0.962 1.00 1.00 1.00	V V V V 01 02 w1 w2 2250 0 180 180 0.90 0.90 0.90 0.90 625 0 50 50 6 0 8 4 0 0 0 0 1.5 1.5 1.5 1.5 1.2 1.2 1.2 1.2 0.971 1.000 0.962 0.980 1.00 1.00 1.00 1.00

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.63	0.23
Weaving and non-weaving speeds, Si	48.77	59.78
Number of lanes required for		

unconstrained operat:	ion, Nw (Exhibit 2	4-7) 0.81
Maximum number of lan	nes, Nw (max) (Exh	ibit 24-7) 1.40
Type of operation is		Unconstrained

_______Weaving Segment Speed, Density, Level of Service and Capacity______

Weaving segment speed, S	57.98	mph
Weaving segment density, D	12.88	pc/mi/ln
Level of service, LOS	В	
Capacity of base condition, cb	7575	pc/h
Capacity as a 15-minute flow rate, c	7354	pc/h
Capacity as a full-hour volume, ch	6619	pc/h

_____Limitations on Weaving Segments______

		If Max Exce	eded See Note
	Analyzed	Maximum	Note
Weaving flow rate, Vw	412	2800	a
Average flow rate (pcphpl)	746	2350	b
Volume ratio, VR	0.14	0.35	C
Weaving ratio, R	0.50	N/A	d
Weaving length (ft)	725	2500	е
Not on the 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.

Phone: E-mail: Fax:

4

ft

%

mi

_____Operational Analysis_____

RMK Analyst:

Agency/Co.: Burgess & Niple, Inc.

Date Performed: 6/28/2010 Analysis Time Period: AM Peak Hour Freeway/Dir of Travel: I-77 SB

Weaving Location: EB SR 18 amd SR 21

Jurisdiction: Analysis Year:

2030

Description: Summit 18 Corridor Study PID 77749

_____Inputs_____ Freeway free-flow speed, SFF 70 mph

Weaving number of lanes, N Weaving segment length, L 2300 Terrain type Level Grade Length Weaving type В Volume ratio, VR 0.62

0.45 Weaving ratio, R

_____Conversion to pc/h Under Base Conditions_____

	Non-Weaving		Weaving		
	V	V	V	V	
	01	02	w1	w2	
Volume, V	1320	210	1330	1110	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	367	58	369	308	V
Trucks and buses	6	7	7	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	0.966	0.966	0.971	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1510	241	1529	1270	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	0.66	0.84
Weaving and non-weaving speeds, Si	51.15	47.57
Number of lanes required for		

unconstrained operation,	Nw	(Exhibit 24-7)		2.74
Maximum number of lanes,	Nw	(max) (Exhibit	24-7)	3.50
Type of operation is				Unconstrained

Weaving segment speed, S	49.71	mph
Weaving segment density, D	22.88	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	6532	pc/h
Capacity as a 15-minute flow rate, c	6342	pc/h
Capacity as a full-hour volume, ch	5708	pc/h

_____Limitations on Weaving Segments______

		If Max Exce	eded See Note
	Analyzed	Maximum	Note
Weaving flow rate, Vw	2799	4000	a
Average flow rate (pcphpl)	1137	2400	b
Volume ratio, VR	0.62	0.80	C
Weaving ratio, R	0.45	N/A	d
Weaving length (ft)	2300	2500	е
NT - H •			

- 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.

Fax:

_____Operational Analysis______

RA Analyst:

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/8/2009 Analysis Time Period: AM Peak Hour

Freeway/Dir of Travel: I-77 NB

Weaving Location: Jurisdiction:

SR 21 and I-77 NB Merge

Analysis Year: 2030

Description: Summit 18 Corridor Study PID 77749

_____Inputs______

Freeway free-flow speed, SFF Weaving number of lanes, N	7 0 4	mph
Weaving segment length, L	1300	ft
Terrain type	Level	
Grade		%
Length		mi
Weaving type	C	
Volume ratio, VR	0.49	
Weaving ratio, R	0.06	

______Conversion to pc/h Under Base Conditions_____

h
H

	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	0.98	0.99
Weaving and non-weaving speeds, Si	45.24	45.22
Number of lanes required for		

unconstrained operation,	Nw	(Exhibit 24-7)		2.56
Maximum number of lanes,	Nw	(max) (Exhibit	24-7)	3.00
Type of operation is				Unconstrained

Weaving segment speed, S	45.23	mph
Weaving segment density, D	34.91	pc/mi/ln
Level of service, LOS	D	
Capacity of base condition, cb	7027	pc/h
Capacity as a 15-minute flow rate, c	6822	pc/h
Capacity as a full-hour volume, ch	6140	pc/h

_____Limitations on Weaving Segments______

		If Max Exce	eded See Note	
	Analyzed	Maximum	Note	
Weaving flow rate, Vw	3108	3500	а	
Average flow rate (pcphpl)	1578	2400	b	
Volume ratio, VR	0.49	0.50	C	
Weaving ratio, R	0.06	0.40	d	
Weaving length (ft)	1300	2500	е	
N				

- 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.

Fax:

_____Operational Analysis_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/8/2009
Analysis Time Period: AM Peak Hour

Freeway/Dir of Travel: I-77 NB
Weaving Location: Loop Ramps

Turiadiation:

Loop Ramps at SR 18

Jurisdiction:

Analysis Year: 2030

Description: Summit 18 Corridor Study PID 77749

Inputs

Freeway free-flow speed, SFF 65 mph
Weaving number of lanes, N 4
Weaving segment length, L 725 ft
Terrain type Level

Grade %
Length mi
Weaving type A

Volume ratio, VR0.28Weaving ratio, R0.25

______Conversion to pc/h Under Base Conditions_____

	Non-Wea	aving	Weaving	3	
	V	V	V	V	
	01	02	w1	w2	
Volume, V	3860	0	1080	380	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	1072	0	300	106	V
Trucks and buses	6	0	12	4	%
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	1.000	0.943	0.980	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	4417	0	1272	430	pc/h

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	1.63	0.92
Weaving and non-weaving speeds, Si	35.94	43.60
Number of lanes required for		

unconstrained operation	, Nw	(Exhibit 24-7)	1.39
Maximum number of lanes	, Nw	(max) (Exhibit 24-7)	1.40
Type of operation is			Unconstrained

Weaving segment speed, S	41.16	mph
Weaving segment density, D	37.17	pc/mi/ln
Level of service, LOS	E	
Capacity of base condition, cb	6673	pc/h
Capacity as a 15-minute flow rate, c	6479	pc/h
Capacity as a full-hour volume, ch	5831	pc/h

_____Limitations on Weaving Segments______

		If Max Exce	eded See Note
	Analyzed	Maximum	Note
Weaving flow rate, Vw	1702	2800	a
Average flow rate (pcphpl)	1529	2350	b
Volume ratio, VR	0.28	0.35	С
Weaving ratio, R	0.25	N/A	d
Weaving length (ft)	725	2500	е
Not on the second			

- 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.

Fax:

_____Operational Analysis_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/13/2009
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: 2030

Description: Summit 18 Corridor Study PID 77749

Freeway free-flow speed, SFF 45 mph
Weaving number of lanes, N 3
Weaving segment length, L 1000 ft
Terrain type Level
Grade
Length %
mi

Weaving type A
Volume ratio, VR 0.77
Weaving ratio, R 0.14

______Conversion to pc/h Under Base Conditions_____

	Non-We	aving	Weaving	3	
	V	V	V	V	
	01	02	w1	w2	
Volume, V	400	0	1080	180	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	111	0	300	50	v
Trucks and buses	3	0	12	4	%
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	0.985	1.000	0.943	0.980	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	451	0	1272	204	pc/h

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.35	0.0020
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	2.58	0.49
Weaving and non-weaving speeds, Si	24.79	38.51
Number of lanes required for		

unconstrained operation,	Nw (Exhibit 24-7)	2.11
Maximum number of lanes,	Nw (max) (Exhibit 24-7)	1.40
Type of operation is		Constrained

Weaving segment speed, S	27.04	mph
Weaving segment density, D	23.75	pc/mi/ln
Level of service, LOS	C	
Capacity of base condition, cb	4180	pc/h
Capacity as a 15-minute flow rate, c	4118	pc/h
Capacity as a full-hour volume, ch	3706	pc/h

_____Limitations on Weaving Segments______

		If Max Exceeded See Not	
	Analyzed	Maximum	Note
Weaving flow rate, Vw	1476	2800	a
Average flow rate (pcphpl)	642		b
Volume ratio, VR	0.77	0.45	C
Weaving ratio, R	0.14	N/A	d
Weaving length (ft)	1000	2500	е

- 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.

Fax:

_____Operational Analysis_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/13/2009
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: 2030

Description: Summit 18 Corridor Study PID 77749

_____Inputs____ Freeway free-flow speed, SFF 45 mph Weaving number of lanes, N 3 Weaving segment length, L 600 ft Terrain type Level 응 Grade Length mi Weaving type Α Volume ratio, VR 0.37 0.33 Weaving ratio, R

______Conversion to pc/h Under Base Conditions_____

	Non-Weaving		Weaving		
	V	V	V	V	
	01	02	w1	w2	
Volume, V	980	0	380	180	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	272	0	106	50	V
Trucks and buses	3	0	4	8	%
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	0.985	1.000	0.980	0.962	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1105	0	430	208	pc/h

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.86	0.39
Weaving and non-weaving speeds, Si	33.85	40.10
Number of lanes required for		

unconstrained opera	tion, Nw	(Exhibit 24-7)	1.3	19
Maximum number of 1	anes, Nw	(max) (Exhibit	24-7) 1.4	40
Type of operation i	.s		Uno	constrained

Weaving segment speed, S	37.56	mph
Weaving segment density, D	15.47	pc/mi/ln
Level of service, LOS	В	
Capacity of base condition, cb	4192	pc/h
Capacity as a 15-minute flow rate, c	4130	pc/h
Capacity as a full-hour volume, ch	3717	pc/h

_____Limitations on Weaving Segments______

		If Max Exce	eded See Note
	Analyzed	Maximum	Note
Weaving flow rate, Vw	638	2800	а
Average flow rate (pcphpl)	581		b
Volume ratio, VR	0.37	0.45	С
Weaving ratio, R	0.33	N/A	d
Weaving length (ft)	600	2500	е
No. to a second			

- 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.

2030 PM Peak Hour Freeway Segments

Phone: Fax: E-mail: Operational Analysis_____ Analyst: RA Burgess & Niple Inc Agency or Company: Date Performed: 11/6/2009 Analysis Time Period: PM Peak Hour Freeway/Direction: I-77 SB From/To: North of Ramp to SR 18 WB Jurisdiction: Analysis Year: 2030 Description: Summit 18 Corridor Study PID 77749 Flow Inputs and Adjustments Volume, V veh/h 4600 0.90 Peak-hour factor, PHF Peak 15-min volume, v15 1278 Trucks and buses Recreational vehicles 0 Terrain type: Level 0.00 ્ટ Grade 0.00 Segment length mi Trucks and buses PCE, ET 1.5 Recreational vehicle PCE, ER 1.2 Heavy vehicle adjustment, fHV Driver population factor, fp 0.962 1.00 pc/h/ln Flow rate, vp 1772 Speed Inputs and Adjustments ft Lane width 12.0 Right-shoulder lateral clearance 6.0 ft Interchange density 0.50 interchange/mi Number of lanes, N Free-flow speed: Measured FFS or BFFS 70.0 mi/h Lane width adjustment, fLW 0.0 mi/h Lateral clearance adjustment, fLC 0.0 mi/h Interchange density adjustment, fID 0.0 mi/h Number of lanes adjustment, fN 3.0 mi/h Free-flow speed, FFS 70.0 mi/h Urban Freeway LOS and Performance Measures____ pc/h/ln Flow rate, vp 1772 Free-flow speed, FFS 70.0 mi/h Average passenger-car speed, S 68.2 mi/h Number of lanes, N 3 Density, D 26.0+ pc/mi/ln Level of service, LOS

Phone: Fax: E-mail: Operational Analysis_____ Analyst: RA Burgess & Niple Inc Agency or Company: Date Performed: 11/6/2009 Analysis Time Period: PM Peak Hour Freeway/Direction: I-77 SB From/To: South of Exit to SR 18 WB Jurisdiction: Analysis Year: 2030 Description: Summit 18 Corridor Study PID 77749 Flow Inputs and Adjustments Volume, V veh/h 4190 0.90 Peak-hour factor, PHF Peak 15-min volume, v15 1164 Trucks and buses Recreational vehicles 0 Terrain type: Level 0.00 ્ટ Grade 0.00 Segment length mi Trucks and buses PCE, ET 1.5 Recreational vehicle PCE, ER 1.2 Heavy vehicle adjustment, fHV Driver population factor, fp 0.962 1.00 pc/h/ln Flow rate, vp 1614 Speed Inputs and Adjustments ft Lane width 12.0 Right-shoulder lateral clearance 6.0 ft Interchange density 0.50 interchange/mi Number of lanes, N Free-flow speed: Measured FFS or BFFS 70.0 mi/h Lane width adjustment, fLW 0.0 mi/h Lateral clearance adjustment, fLC 0.0 mi/h Interchange density adjustment, fID 0.0 mi/h Number of lanes adjustment, fN 3.0 mi/h Free-flow speed, FFS 70.0 mi/h Urban Freeway LOS and Performance Measures____ pc/h/ln Flow rate, vp 1614 Free-flow speed, FFS 70.0 mi/h Average passenger-car speed, S 69.4 mi/h Number of lanes, N 3 Density, D 23.3 pc/mi/ln Level of service, LOS

Phone: Fax: E-mail: Operational Analysis_____ Analyst: RA Burgess & Niple Inc Agency or Company: Date Performed: 11/6/2009 Analysis Time Period: PM Peak Hour Freeway/Direction: I-77 SB From/To: South of Exit to SR 18 EB Jurisdiction: Analysis Year: 2030 Description: Summit 18 Corridor Study PID 77749 Flow Inputs and Adjustments Volume, V veh/h 4540 0.90 Peak-hour factor, PHF Peak 15-min volume, v15 1261 Trucks and buses Recreational vehicles 0 Terrain type: Level 0.00 ્ટ Grade 0.00 Segment length mi Trucks and buses PCE, ET 1.5 Recreational vehicle PCE, ER 1.2 Heavy vehicle adjustment, fHV Driver population factor, fp 0.962 1.00 pc/h/ln Flow rate, vp 1749 Speed Inputs and Adjustments ft Lane width 12.0 Right-shoulder lateral clearance 6.0 ft Interchange density 0.50 interchange/mi Number of lanes, N Free-flow speed: Measured FFS or BFFS 70.0 mi/h Lane width adjustment, fLW 0.0 mi/h Lateral clearance adjustment, fLC 0.0 mi/h Interchange density adjustment, fID 0.0 mi/h Number of lanes adjustment, fN 3.0 mi/h Free-flow speed, FFS 70.0 mi/h Urban Freeway LOS and Performance Measures____ pc/h/ln Flow rate, vp 1749 Free-flow speed, FFS 70.0 mi/h Average passenger-car speed, S mi/h 68.4 Number of lanes, N 3 Density, D 25.6 pc/mi/ln Level of service, LOS

Phone: Fax: E-mail: Operational Analysis_____ Analyst: RA Burgess & Niple Inc Agency or Company: 11/6/2009 Date Performed: Analysis Time Period: PM Peak Hour Freeway/Direction: I-77 NB From/To: North of Ramp to SR 18 EB Jurisdiction: Analysis Year: 2030 Description: Summit 18 Corridor Study PID 77749 Flow Inputs and Adjustments Volume, V veh/h 3190 0.90 Peak-hour factor, PHF Peak 15-min volume, v15 886 Trucks and buses Recreational vehicles 0 Terrain type: Level 0.00 ્ટ Grade 0.00 Segment length mi Trucks and buses PCE, ET 1.5 Recreational vehicle PCE, ER 1.2 Heavy vehicle adjustment, fHV Driver population factor, fp 0.962 1.00 pc/h/ln Flow rate, vp 1229 Speed Inputs and Adjustments ft Lane width 12.0 Right-shoulder lateral clearance 6.0 ft Interchange density 0.50 interchange/mi Number of lanes, N Free-flow speed: Measured FFS or BFFS 70.0 mi/h Lane width adjustment, fLW 0.0 mi/h Lateral clearance adjustment, fLC 0.0 mi/h Interchange density adjustment, fID 0.0 mi/h Number of lanes adjustment, fN 3.0 mi/h Free-flow speed, FFS 70.0 mi/h Urban Freeway LOS and Performance Measures____ pc/h/ln Flow rate, vp 1229 Free-flow speed, FFS 70.0 mi/h Average passenger-car speed, S 70.0 mi/h Number of lanes, N 3 Density, D 17.6 pc/mi/ln Level of service, LOS

Phone: Fax: E-mail: Operational Analysis_____ Analyst: RA Burgess & Niple Inc Agency or Company: 11/6/2009 Date Performed: Analysis Time Period: PM Peak Hour Freeway/Direction: I-77 NB From/To: North of Ramp to SR 18 WB Jurisdiction: Analysis Year: 2030 Description: Summit 18 Corridor Study PID 77749 Flow Inputs and Adjustments Volume, V veh/h 2100 0.90 Peak-hour factor, PHF Peak 15-min volume, v15 583 Trucks and buses Recreational vehicles 0 Terrain type: Level 0.00 ્ટ Grade 0.00 Segment length mi Trucks and buses PCE, ET 1.5 Recreational vehicle PCE, ER 1.2 Heavy vehicle adjustment, fHV Driver population factor, fp 0.962 1.00 pc/h/ln Flow rate, vp 809 Speed Inputs and Adjustments ft Lane width 12.0 Right-shoulder lateral clearance 6.0 ft Interchange density 0.50 interchange/mi Number of lanes, N Free-flow speed: Measured FFS or BFFS 70.0 mi/h Lane width adjustment, fLW 0.0 mi/h Lateral clearance adjustment, fLC 0.0 mi/h 0.0 Interchange density adjustment, fID mi/h Number of lanes adjustment, fN 3.0 mi/h Free-flow speed, FFS 70.0 mi/h Urban Freeway LOS and Performance Measures____ pc/h/ln Flow rate, vp 809 Free-flow speed, FFS 70.0 mi/h Average passenger-car speed, S 70.0 mi/h Number of lanes, N 3 Density, D 11.6 pc/mi/ln Level of service, LOS

Phone: Fax: E-mail: Operational Analysis_____ Analyst: RA Burgess & Niple Inc Agency or Company: 11/6/2009 Date Performed: Analysis Time Period: PM Peak Hour Freeway/Direction: I-77 NB From/To: North of Ramp from SR 18 WB Jurisdiction: Analysis Year: 2030 Description: Summit 18 Corridor Study PID 77749 Flow Inputs and Adjustments Volume, V veh/h 2410 0.90 Peak-hour factor, PHF Peak 15-min volume, v15 669 Trucks and buses Recreational vehicles 0 Terrain type: Level 0.00 ્ટ Grade 0.00 Segment length mi Trucks and buses PCE, ET 1.5 Recreational vehicle PCE, ER 1.2 Heavy vehicle adjustment, fHV Driver population factor, fp 0.962 1.00 pc/h/ln Flow rate, vp 928 Speed Inputs and Adjustments ft Lane width 12.0 Right-shoulder lateral clearance 6.0 ft Interchange density 0.50 interchange/mi Number of lanes, N Free-flow speed: Measured FFS or BFFS 70.0 mi/h Lane width adjustment, fLW 0.0 mi/h Lateral clearance adjustment, fLC 0.0 mi/h 0.0 Interchange density adjustment, fID mi/h Number of lanes adjustment, fN 3.0 mi/h Free-flow speed, FFS 70.0 mi/h Urban Freeway LOS and Performance Measures____ pc/h/ln Flow rate, vp 928 Free-flow speed, FFS 70.0 mi/h Average passenger-car speed, S 70.0 mi/h Number of lanes, N 3 Density, D 13.3 pc/mi/ln Level of service, LOS

Phone: Fax: E-mail: _____Diverge Analysis______ Analyst: RAAgency/Co.: Burgess & Niple Inc Date performed: 11/8/2009 Analysis time period: PM Peak Hour Freeway/Dir of Travel: I-77 SB Junction: Exit to SR 18 WB Jurisdiction: Analysis Year: 2030 Description: Summit 18 Corridor Study PID 77749 _____Freeway Data_____ Type of analysis Diverge Number of lanes in freeway Free-flow speed on freeway 70.0 mph

	Off Ramp Data	
Side of freeway	Right	

4600

vph

Number of lanes in ramp 1
Free-Flow speed on ramp 35.0 mph
Volume on ramp 410 vph
Length of first accel/decel lane 600 ft
Length of second accel/decel lane ft

Volume on freeway

______Adjacent Ramp Data (if one exists)_____

Does adjacent ramp exist?

Volume on adjacent ramp

Position of adjacent ramp

Type of adjacent ramp

Distance to adjacent ramp

1650

Test

Test

Test

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Type

Typ

______Conversion to pc/h Under Base Conditions_____

Junction Components	Freeway	Ramp		Adjacen	t
				Ramp	_
Volume, V (vph)	4600	410		650	vph
Peak-hour factor, PHF	0.90	0.90		0.90	
Peak 15-min volume, v15	1278	114		181	V
Trucks and buses	6	2		4	%
Recreational vehicles	0	0		0	%
Terrain type:	Level	Level		Level	
Grade	0.00 %	0.00	8	0.00	%
Length	0.00 m	i 0.00	mi	0.00	mi
Trucks and buses PCE, ET	1.5	1.5		1.5	
Recreational vehicle PCE, ER	1.2	1.2		1.2	

```
1.00
Driver population factor, fP
                                               1.00
                                                          1.00
Flow rate, vp
                                    5264
                                               460
                                                          737
                                                                  pcph
                  _____Estimation of V12 Diverge Areas__
                               (Equation 25-8 or 25-9)
                L =
                 ΕQ
                      0.607 Using Equation 5
                 FD
                v = v + (v - v) P = 3377 pc/h
                 12 R
                         F R FD
                  _____Capacity Checks_____
                        Actual
                                     Maximum
                                                   LOS F?
    v = v
                         5264
                                     7200
                                                    No
     Fi F
                        4804
                                     7200
                                                    No
    v = v - v
         F R
     FΟ
                        460
                                     2000
                                                    No
    V
     R
                        1887 pc/h (Equation 25-15 or 25-16)
    3 or av34
Is
    v v
               > 2700 pc/h?
                                     No
    3 or av34
                > 1.5 v /2
                                     No
Is
        V
     3 or av34
                      12
If yes, v = 3377
                                     (Equation 25-18)
        12A
                   _Flow Entering Diverge Influence Area____
                                 Max Desirable
                                                     Violation?
                    Actual
                                 4400
                    3377
                                                     No
    V
     12
             ___Level of Service Determination (if not F)______
                     D = 4.252 + 0.0086 v - 0.009 L = 27.9 pc/mi/ln
Density,
                                       12
                      R
Level of service for ramp-freeway junction areas of influence C
                _____Speed Estimation_____
                                         D = 0.469
Intermediate speed variable,
                                          S
Space mean speed in ramp influence area,
                                         S = 56.9
                                                     mph
                                         R
Space mean speed in outer lanes,
                                         S = 73.3
                                                     mph
Space mean speed for all vehicles,
                                        S = 61.8
                                                     mph
```

0.971

0.990

0.980

Heavy vehicle adjustment, fHV

Phone: E-mail:]	Fax:				
	Merge	Anal	ysis				
Analyst: 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-7	77 NB	77749				
	Free	way Da	ata				
Type of analysis Number of lanes in free Free-flow speed on free Volume on freeway	_		Merge 3 70.0 2100		mph vph		
	On Ra	amp Da	ata				
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/			Right 1 35.0 310 500		mph vph ft ft		
	Adjacent Ramp	Data	(if on	e exists)		
Does adjacent ramp exis Volume on adjacent Ramp Position of adjacent Ramp Type of adjacent Ramp Distance to adjacent Ramp	t? mp		Yes 1280 Upstre Off 1500	am	vph ft		
Con	version to pc/h	Unde:	r Base	Conditio	ns		
Junction Components		Free	way	Ramp		Adjacen ^a Ramp	t
Volume, V (vph) Peak-hour factor, PHF Peak 15-min volume, v15 Trucks and buses Recreational vehicles Terrain type: Grade		2100 0.90 583 6 0 Leve	l %	310 0.90 86 2 0 Level	o\o .	1280 0.90 356 7 0 Level	vph v % %
Length	T	1 🛭	mi	1 5	mi	1 5	mi

1.5

1.2

1.5

1.2

1.5

1.2

Trucks and buses PCE, ET

Recreational vehicle PCE, ER

```
1.00
Driver population factor, fP
                                               1.00
                                                          1.00
                                    2403
Flow rate, vp
                                               348
                                                          1472
                                                                  pcph
                   ____Estimation of V12 Merge Areas___
                        238.91 (Equation 25-2 or 25-3)
                 ΕQ
                       0.591 Using Equation 1
                 FM
                v = v (P) = 1421 pc/h
                 12 F FM
                    _____Capacity Checks_____
                                                   LOS F?
                                      Maximum
                         Actual
                         2751
                                      7200
                                                    No
     FO
                         982 pc/h
                                     (Equation 25-4 or 25-5)
     3 or av34
Is
                > 2700 pc/h?
                                     No
         V
     3 or av34
                > 1.5 v / 2
                                     No
Is
    v v
     3 or av34
                      12
If yes, v = 1421
                                      (Equation 25-8)
        12A
                    __Flow Entering Merge Influence Area_
                    Actual Max Desirable
                                                     Violation?
                    1421
                                 4600
                                                     No
     R12
            ____Level of Service Determination (if not F)______
Density, D = 5.475 + 0.00734 v + 0.0078 v - 0.00627 L = 16.0 pc/mi/ln
Level of service for ramp-freeway junction areas of influence B
                  _____Speed Estimation___
Intermediate speed variable,
                                         M = 0.309
                                          S
Space mean speed in ramp influence area,
                                         S = 61.4
                                                     mph
                                          R
                                         S = 68.3
Space mean speed in outer lanes,
                                                     mph
                                          0
```

S = 63.7

mph

0.971

0.990

0.966

Heavy vehicle adjustment, fHV

Space mean speed for all vehicles,

Fax:

_____Operational Analysis_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/8/2009
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: I-77 SB

Weaving Location: Loop Ramps at SR 18

Jurisdiction:

Analysis Year: 2030

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 725 ft
Terrain type Level
Grade
Length %
Weaving type A
Volume ratio, VR 0.20

Weaving ratio, R 0.32

_____Conversion to pc/h Under Base Conditions______

Non-Weaving Weaving

V V V

02 w1w2 01 Volume, V 3890 0 650 veh/h 300 0.90 0.90 0.90 0.90 Peak-hour factor, PHF Peak 15-min volume, v15 1081 0 181 83 V 0 Trucks and buses 6 4 8 응 0 Recreational vehicles 0 0 0 Trucks and buses PCE, ET 1.5 1.5 1.5 1.5 1.2 Recreational vehicle PCE, ER 1.2 1.2 1.2 Heavy vehicle adjustment, fHV 0.971 1.000 0.980 0.962 Driver population adjustment, fP 1.00 1.00 1.00 1.00 Flow rate, v 4451 0 736 346 pc/h

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	1.27	0.62
Weaving and non-weaving speeds, Si	41.39	52.04
Number of lanes required for		

unconstrained operation	, Nw	(Exhibit 24-7)		1.07
Maximum number of lanes	, Nw	(max) (Exhibit	24-7)	1.40
Type of operation is				Unconstrained

Weaving segment speed, S	49.55	mph
Weaving segment density, D	27.92	pc/mi/ln
Level of service, LOS	С	
Capacity of base condition, cb	7484	pc/h
Capacity as a 15-minute flow rate, c	7266	pc/h
Capacity as a full-hour volume, ch	6539	pc/h

_____Limitations on Weaving Segments______

		If Max Exce	eded See Note
	Analyzed	Maximum	Note
Weaving flow rate, Vw	1082	2800	a
Average flow rate (pcphpl)	1383	2400	b
Volume ratio, VR	0.20	0.35	C
Weaving ratio, R	0.32	N/A	d
Weaving length (ft)	725	2500	е
Not on the second			

- 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.

Fax:

_____Operational Analysis_____

Analyst: RMK

Agency/Co.: Burgess & Niple, Inc.

Date Performed: 6/28/2010
Analysis Time Period: PM Peak Hour

Freeway/Dir of Travel: I-77 SB

Weaving Location: EB SR 18 amd SR 21

Jurisdiction:

Analysis Year: 2030

Description: Summit 18 Corridor Study PID 77749

Terrain type Level

Grade %
Length mi
Weaving type B

Volume ratio, VR 0.57
Weaving ratio, R 0.26

______Conversion to pc/h Under Base Conditions_____

	Non-Weaving		Weaving		
	V	V	V	V	
	01	02	w1	w2	
Volume, V	2090	460	2450	870	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	581	128	681	242	v
Trucks and buses	6	7	6	7	%
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	0.966	0.971	0.966	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2391	528	2803	1000	pc/h

	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	0.81	1.03
Weaving and non-weaving speeds, Si	48.15	44.52
Number of lanes required for		

unconstrained operation, Nw	(Exhibit 24-7)	2.60
Maximum number of lanes, Nw	(max) (Exhibit 24-7)	3.50
Type of operation is		Unconstrained

Weaving segment speed, S 46.50 mph Weaving segment density, D 36.14 pc/mi/ln Level of service, LOS Capacity of base condition, cb 7067 pc/h Capacity as a 15-minute flow rate, c 6861 pc/h Capacity as a full-hour volume, ch 6175 pc/h

_____Limitations on Weaving Segments______

		If Max Exce	eded See Note
	Analyzed	Maximum	Note
Weaving flow rate, Vw	3803	4000	a
Average flow rate (pcphpl)	1680	2400	b
Volume ratio, VR	0.57	0.80	С
Weaving ratio, R	0.26	N/A	d
Weaving length (ft)	2300	2500	е
Not og:			

- 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.

Fax:

_____Operational Analysis_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/8/2009 Analysis Time Period: PM Peak Hour

Freeway/Dir of Travel: I-77 NB Weaving Location:

Jurisdiction:

SR 21 and I-77 NB Merge

Analysis Year: 2030

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 0.34 Weaving ratio, R 0.12

_____Conversion to pc/h Under Base Conditions_____

	Non-Weaving		Weaving		
	V	V	V	V	
	01	02	w1	w2	
Volume, V	2060	430	1130	160	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	572	119	314	44	v
Trucks and buses	б	2	0	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	1.000	0.990	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2357	482	1255	179	pc/h

	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	0.56	0.33
Weaving and non-weaving speeds, Si	53.51	60.12
Number of lanes required for		

unconstrained operation,	Nw	(Exhibit 24-7)		2.40
Maximum number of lanes,	Nw	(max) (Exhibit	24-7)	3.00
Type of operation is				Unconstrained

Weaving segment speed, S	57.73	mph
Weaving segment density, D	18.51	pc/mi/ln
Level of service, LOS	В	
Capacity of base condition, cb	8371	pc/h
Capacity as a 15-minute flow rate, c	8127	pc/h
Capacity as a full-hour volume, ch	7314	pc/h

_____Limitations on Weaving Segments______

		If Max Exce	eded See Note	
	Analyzed	Maximum	Note	
Weaving flow rate, Vw	1434	3500	а	
Average flow rate (pcphpl)	1068	2400	b	
Volume ratio, VR	0.34	0.50	С	
Weaving ratio, R	0.12	0.40	d	
Weaving length (ft)	1300	2500	е	

- 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.

Fax:

_____Operational Analysis______

Analyst: RA

Agency/Co.: Burgess & Niple, Inc

Date Performed: 11/8/2009
Analysis Time Period: AM Peak Hour

Freeway/Dir of Travel: I-77 NB

Weaving Location: Loop Ramps at SR 18

Jurisdiction:

Analysis Year: 2030

Description: Summit 18 Corridor Study PID 77749

_____Inputs_____ Freeway free-flow speed, SFF 65 mph Weaving number of lanes, N 4 Weaving segment length, L 725 ft Terrain type Level 응 Grade Length mi Weaving type A Volume ratio, VR 0.44 Weaving ratio, R 0.13

______Conversion to pc/h Under Base Conditions_____

	Non-Weaving		Weaving		
	V	V	V	V	
	01	02	w1	w2	
Volume, V	1910	0	1280	190	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	531	0	356	53	V
Trucks and buses	6	0	7	8	%
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	1.000	0.966	0.962	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	2185	0	1471	219	pc/h

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.35	0.0020
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	3.15	0.46
Weaving and non-weaving speeds, Si	28.25	52.57
Number of lanes required for		

unconstrained operation,	Nw (Exhibit 24-7)	1.74
Maximum number of lanes,	Nw (max) (Exhibit 24-7)	1.40
Type of operation is		Constrained

Weaving segment speed, S	38.22	mph
Weaving segment density, D	25.35	pc/mi/ln
Level of service, LOS	С	
Capacity of base condition, cb	6208	pc/h
Capacity as a 15-minute flow rate, c	6027	pc/h
Capacity as a full-hour volume, ch	5424	pc/h

_____Limitations on Weaving Segments______

		If Max Exce	eded See Note
	Analyzed	Maximum	Note
Weaving flow rate, Vw	1690	2800	a
Average flow rate (pcphpl)	968	2350	b
Volume ratio, VR	0.44	0.35	C
Weaving ratio, R	0.13	N/A	d
Weaving length (ft)	725	2500	е
Not og:			

- 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
- 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.

Fax:

_____Operational Analysis_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/13/2009
Analysis Time Period: PM Peak Hour
Freeway/Dir of Travel: SR 18 WB

Weaving Location: SR 18 WB at I-77 Loop Ramps

Jurisdiction:

Weaving ratio, R

Analysis Year: 2030

Description: Summit 18 Corridor Study PID 77749

_____Inputs_____ Freeway free-flow speed, SFF 45 mph Weaving number of lanes, N 3 Weaving segment length, L 1050 ft Terrain type Level 응 Grade Length mi Weaving type Α Volume ratio, VR 0.60

______Conversion to pc/h Under Base Conditions_____

0.33

	Non-Weaving		Weaving		
	V	V	V	V	
	01	02	w1	w2	
Volume, V	1310	0	1280	650	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	364	0	356	181	V
Trucks and buses	3	0	7	4	%
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	0.985	1.000	0.966	0.980	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1477	0	1471	736	pc/h

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.35	0.0020
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	3.73	0.74
Weaving and non-weaving speeds, Si	22.39	35.17
Number of lanes required for		

unconstrained operation,	Nw (Exhibit 24-7)	1.95
Maximum number of lanes,	Nw (max) (Exhibit 24-7)	1.40
Type of operation is		Constrained

Weaving segment speed, S	26.21	mph
Weaving segment density, D	46.85	pc/mi/ln
Level of service, LOS	F	
Capacity of base condition, cb	4210	pc/h
Capacity as a 15-minute flow rate, c	4148	pc/h
Capacity as a full-hour volume, ch	3733	pc/h

_____Limitations on Weaving Segments______

		If Max Exceeded See Note		
	Analyzed	Maximum	Note	
Weaving flow rate, Vw	2207	2800	a	
Average flow rate (pcphpl)	1228		b	
Volume ratio, VR	0.60	0.45	C	
Weaving ratio, R	0.33	N/A	d	
Weaving length (ft)	1050	2500	е	
N - + •				

- 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.

Fax:

_____Operational Analysis_____

Analyst: RA

Agency/Co.: Burgess & Niple Inc

Date Performed: 11/13/2009
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: 2030

Description: Summit 18 Corridor Study PID 77749

_____Inputs_____ Freeway free-flow speed, SFF 45 mph 3 Weaving number of lanes, N Weaving segment length, L 600 ft Terrain type Level 응 Grade Length mi Weaving type Α Volume ratio, VR 0.30 0.39 Weaving ratio, R

______Conversion to pc/h Under Base Conditions_____

	Non-Weaving		Weaving		
	V	V	V	V	
	01	02	w1	w2	
Volume, V	1130	0	300	190	veh/h
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	
Peak 15-min volume, v15	314	0	83	53	V
Trucks and buses	3	0	3	4	%
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	0.985	1.000	0.985	0.980	
Driver population adjustment, fP	1.00	1.00	1.00	1.00	
Flow rate, v	1274	0	338	215	pc/h

	Weaving	Non-Weaving
a (Exhibit 24-6)	0.15	0.0035
b (Exhibit 24-6)	2.20	4.00
c (Exhibit 24-6)	0.97	1.30
d (Exhibit 24-6)	0.80	0.75
Weaving intensity factor, Wi	0.81	0.35
Weaving and non-weaving speeds, Si	34.36	40.99
Number of lanes required for		

unconstrained operation,	Nw	(Exhibit 24-7)	1.06
Maximum number of lanes,	Nw	(max) (Exhibit 2	4-7) 1.40
Type of operation is			Unconstrained

Weaving segment speed, S	38.73	mph
Weaving segment density, D	15.72	pc/mi/ln
Level of service, LOS	В	
Capacity of base condition, cb	4401	pc/h
Capacity as a 15-minute flow rate, c	4336	pc/h
Capacity as a full-hour volume, ch	3902	pc/h

_____Limitations on Weaving Segments______

		If Max Exceeded See Note		
	Analyzed	Maximum	Note	
Weaving flow rate, Vw	553	2800	a	
Average flow rate (pcphpl)	609		b	
Volume ratio, VR	0.30	0.45	C	
Weaving ratio, R	0.39	N/A	d	
Weaving length (ft)	600	2500	е	
Not og:				

- 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.

INTER-OFFICE COMMUNICATION

TO:

Joe DeFuria, District 4

FROM:

Peggy Siddle, Transportation Planner, Office of Technical Services

SUBJECT:

SUM-18-Corridor Study, PID 77749

DATE:

September 23, 2008

In reply to a request received on August 5, 2008, the Office of Technical Services (OTS) has provided year 2010 and 2030 A.M. DHV and P.M. DHV turning movements plates for the SUM-18-Corridor Study. These plates reflect the traffic generated by the Heritage Woods development.

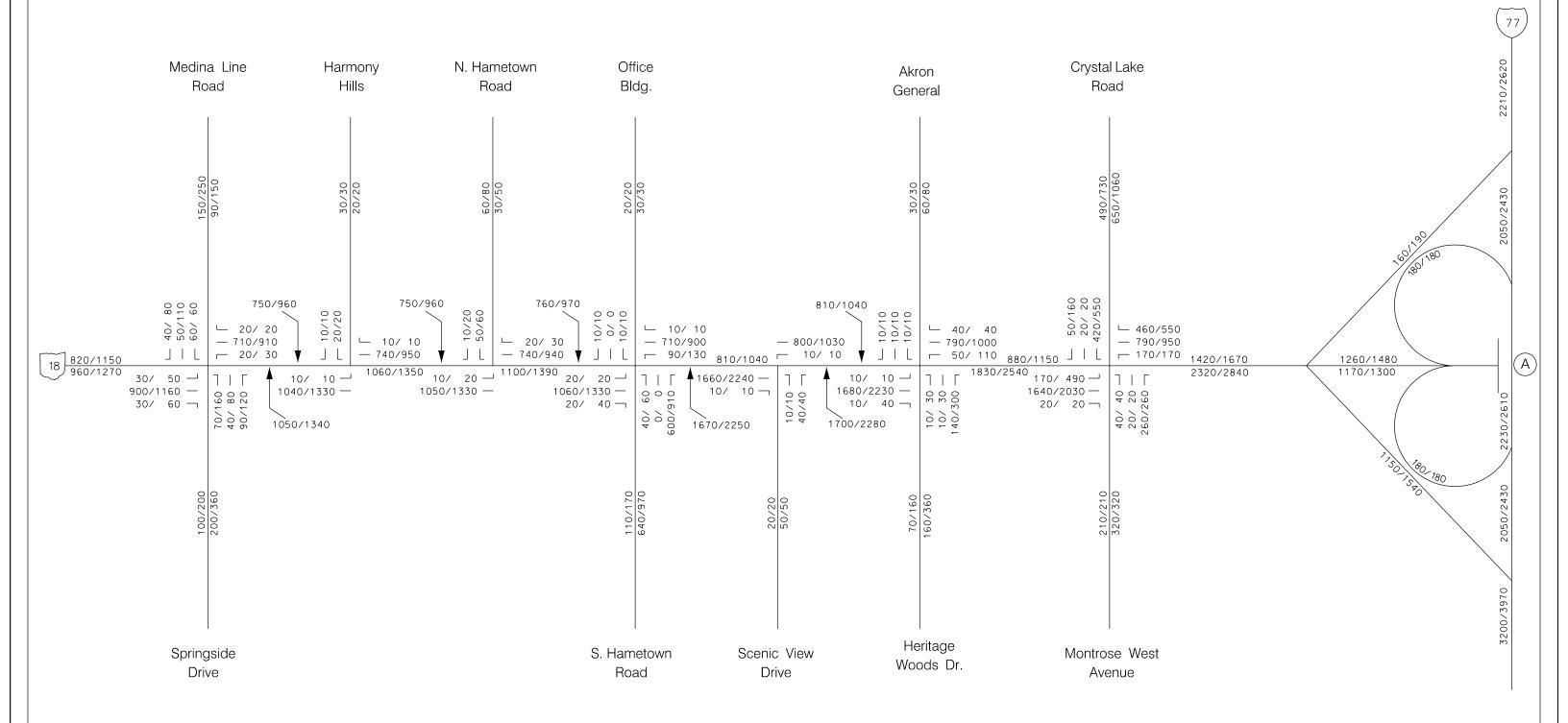
Additionally, 2 plates for the Build Relocation are provided for your use.

Please use the design designations that were provided to you on February 10, 2006 for the SUM-18-Corridor Study (PID 77749).

If you have any questions, please contact me at (614) 752-5734.

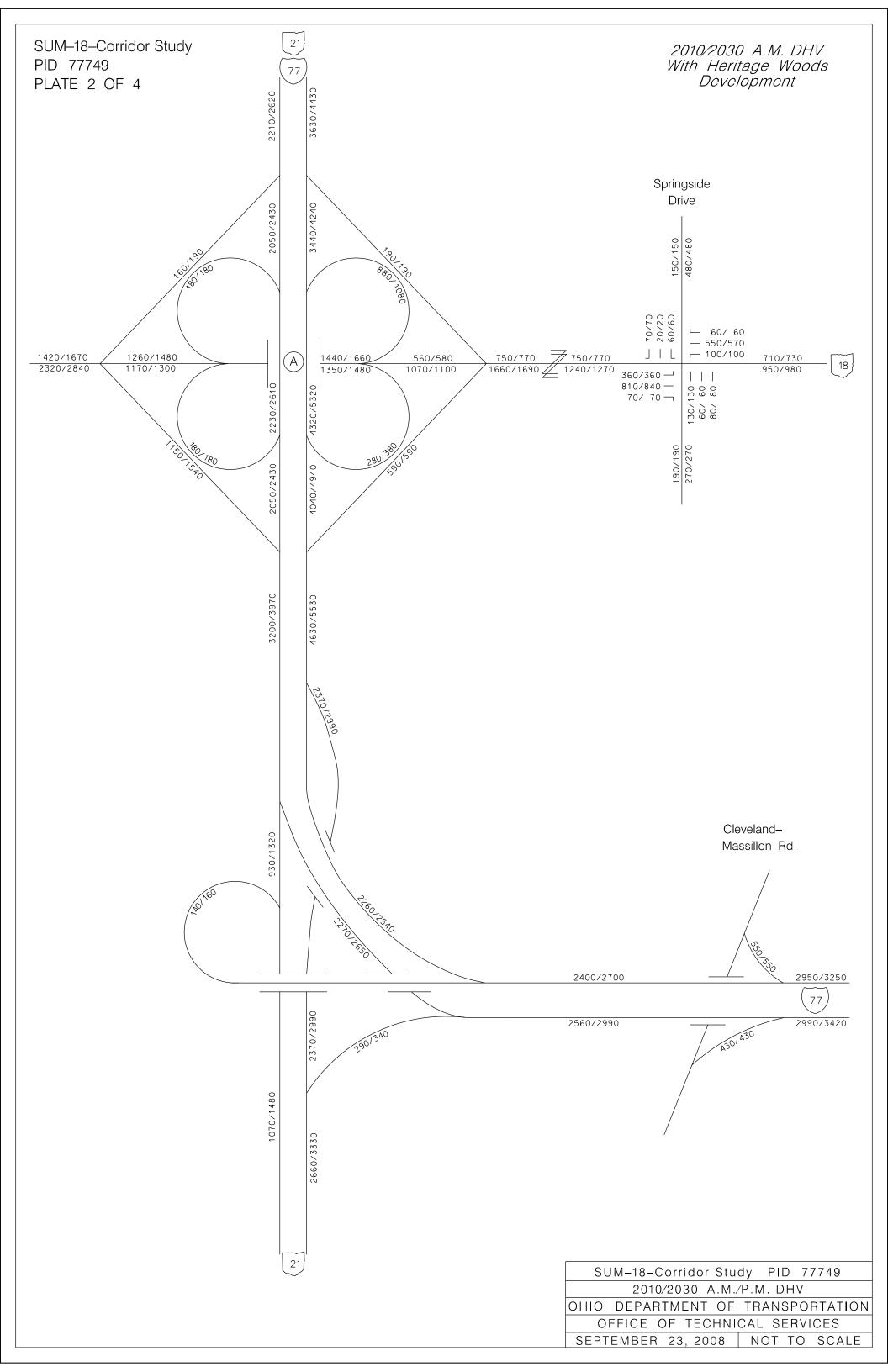
YS:ps

c: L. Oesterling, OTS – File

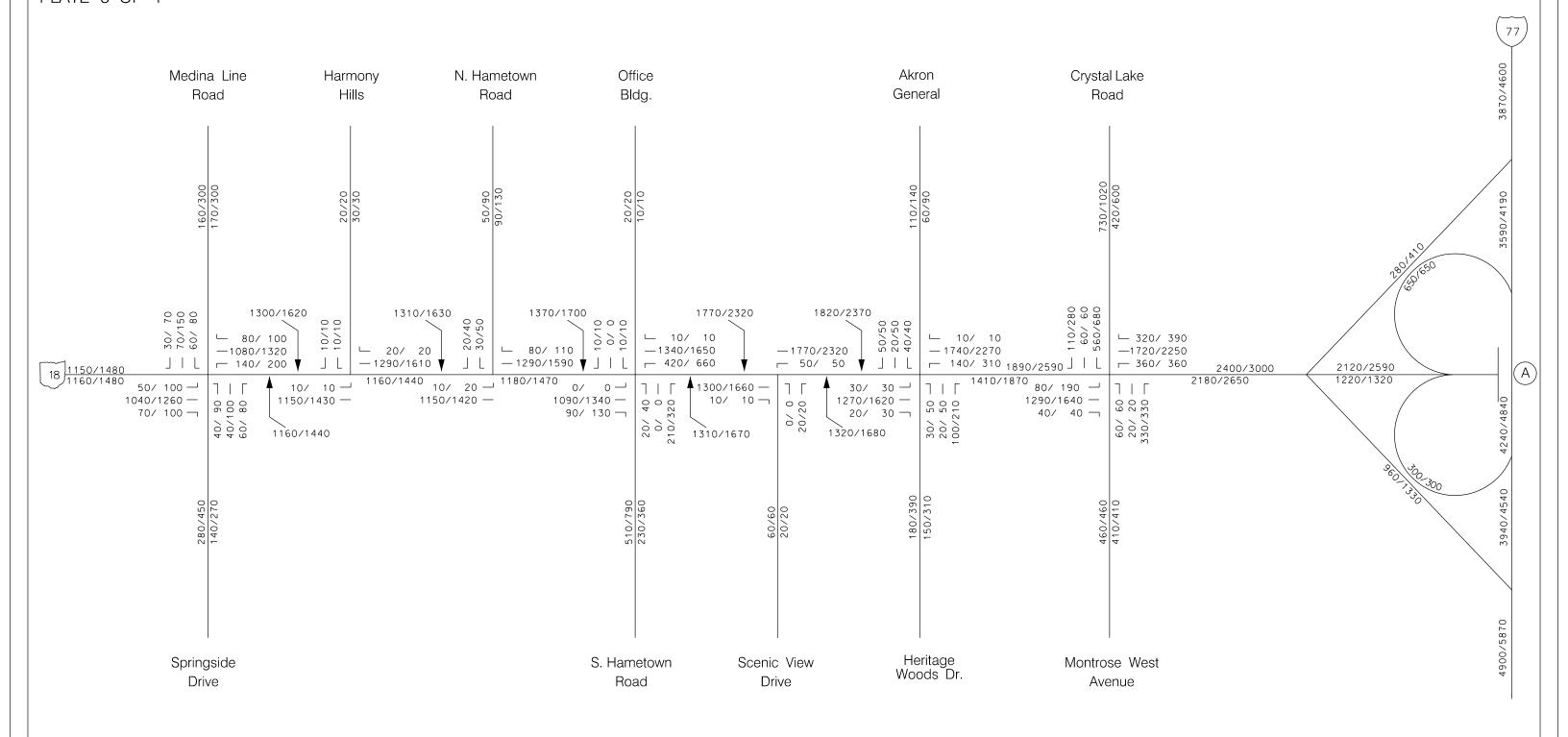


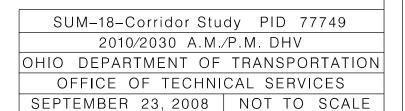
SUM-18-Corridor Study PID 77749
2010/2030 A.M./P.M. DHV
OHIO DEPARTMENT OF TRANSPORTATION
OFFICE OF TECHNICAL SERVICES

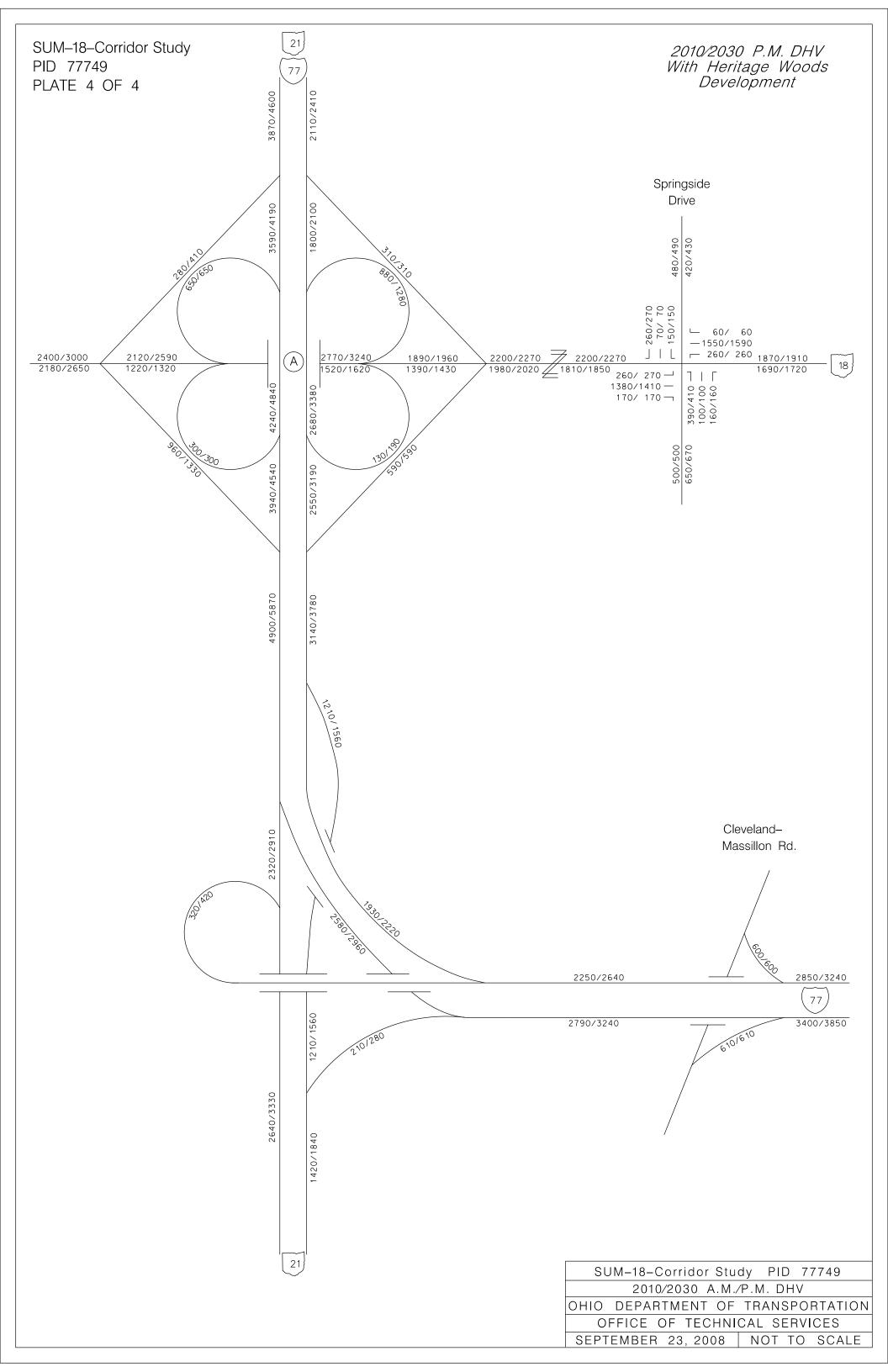
SEPTEMBER 23, 2008 | NOT TO SCALE

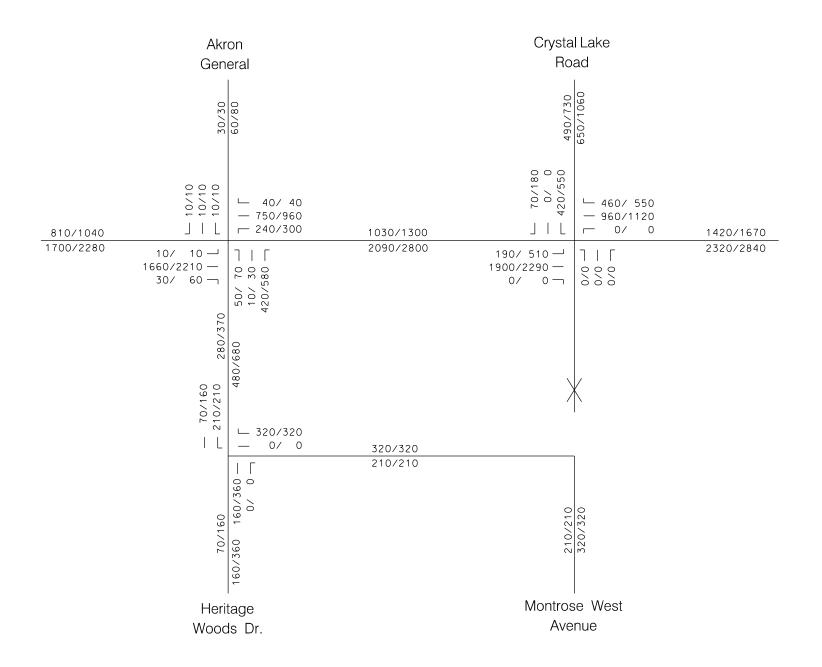


2010/2030 P.M. DHV With Heritage Woods Development

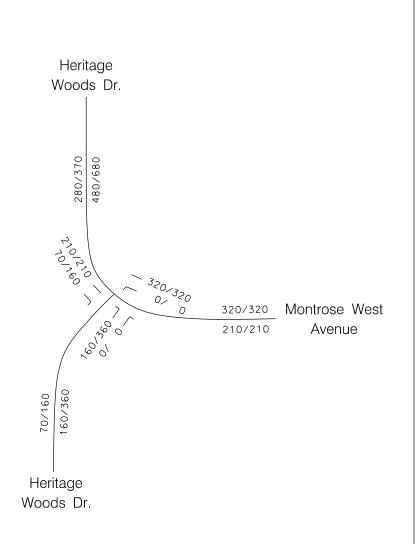




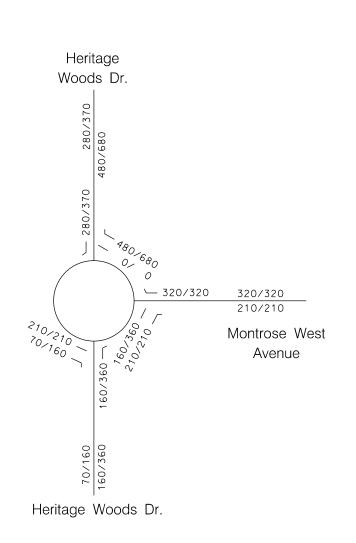




Option 1 Intersection Configuration

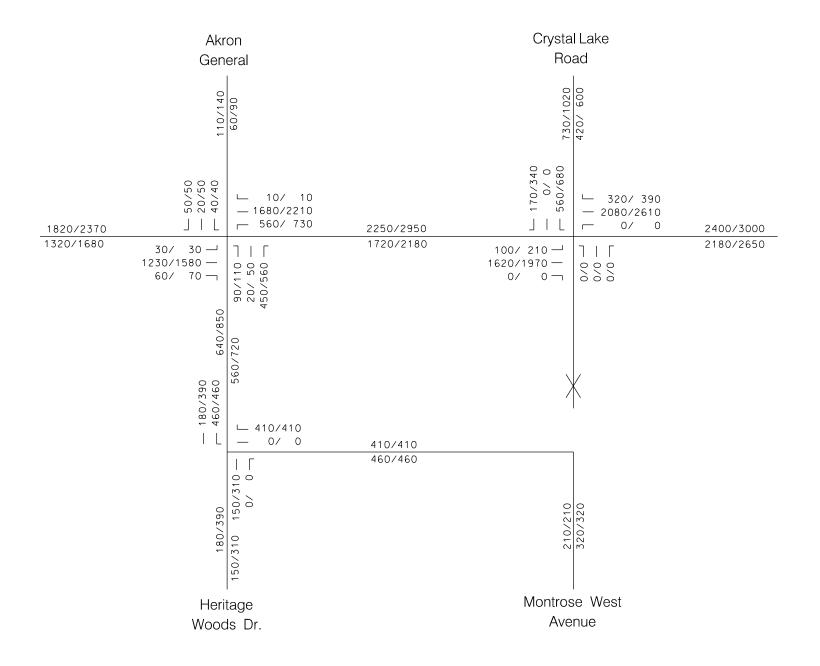


Option 2 Intersection Configuration

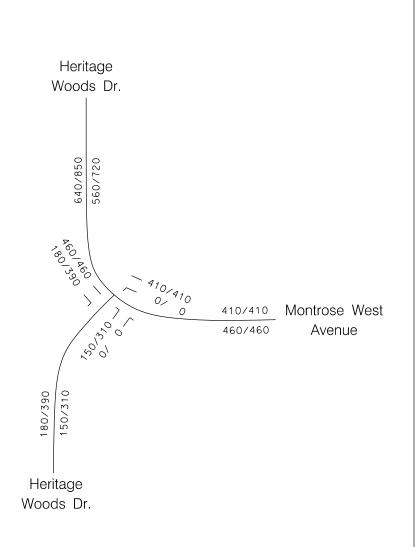


Option 3 Intersection Configuration

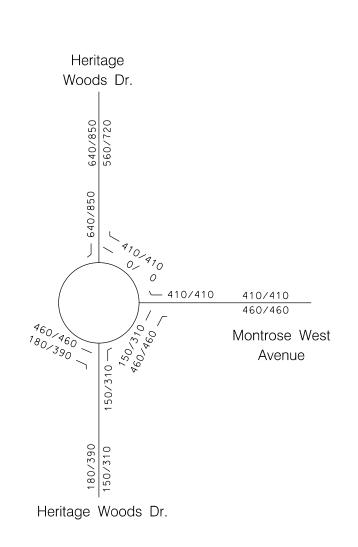
	RELOCATE MONTROSE WEST
	2010/2030 A.M./P.M. DHV
OHIO	DEPARTMENT OF TRANSPORTATION
0	FFICE OF TECHNICAL SERVICES
SEPT	EMBER 23, 2008 NOT TO SCALE



Option 1 Intersection Configuration



Option 2 Intersection Configuration



Option 3 Intersection Configuration

	RELOCATE MONTROSE WEST
	2010/2030 A.M./P.M. DHV
OHIO	DEPARTMENT OF TRANSPORTATION
0	FFICE OF TECHNICAL SERVICES
SEPT	EMBER 23, 2008 NOT TO SCALE

INTER-OFFICE COMMUNICATION

TO:

Joe Defuria, District 4

FROM:

Leigh A. Oesterling, Transportation Planner, Office of Technical Services

SUBJECT:

SUM-18-Corridor Study, PID 77749

DATE:

February 10, 2006

In reply to a request dated January 20, 2006, attached is a set of plates showing 2010 and 2030 AM DHVs and PM DHVs, and the requested turning movement volumes for the subject project.

Please use the following design designations and truck factors:

		IR 77			SR 18					
	north	of	sou	uth of	east of					
	<u>SR 18</u>	<u>SR 21</u>	SR 21	Cleveland-Massillon Rd	<u>IR 77</u>	Springside Dr				
2010 ADT:	55640	78060	50780	64280	41460	32940				
2030 ADT:	69200	95680	58460	71960	41460	32940				
K:	0.11	0.10	0.10	0.10	0.10	0.11				
D:	0.64	0.61	0.55	0.55	0.52	0.52				
T24:	0.11	0.11	0.10	0.09	0.03	0.03				
TD A.M.:	0.06	0.06	0.06	0.05	0.02	0.02				
TD P.M.:	0.06	0.06	0.06	0.05	0.02	0.02				

			SR 18			SR 21
	west o	f west of	west of	west of	west of	south of
	<u>IR 77</u>	Crystal Lake	<u>Heritage</u>	N. Hametown	<u>Medina Line</u>	<u>IR 77</u>
2010 ADT:	50670	36440	34560	27110	25300	35360
2030 ADT:	59780	46200	42900	33560	32330	46840
K:	0.09	0.09	0.09	0.09	0.09	0.11
D:	0.53	0.58	0.58	0.53	0.50	0.65
T24:	0.05	0.05	0.06	0.08	0.09	0.10
TD A.M.:	0.03	0.03	0.04	0.05	0.05	0.06
TD P.M.:	0.03	0.03	0.04	0.05	0.05	0.06

IR 77 & SR 18 RAMPS

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

IR 77 & SR 21 RAMPS

	<u>77 SB to 21 SB</u>	<u>77 NB to 21 SB</u>	<u>21 NB to 77 SB</u>	<u>21 NB to 77 NB</u>
TD A.M.:	0.03	0.02	0.03	0.06
TD P.M.:	0.03	0.02	0.02	0.06

IR 77 & CLEVELAND-MASSILLON RD RAMPS

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

J. DeFuria, District 4 February 10, 2006 RE: SUM-18-Corridor Study, PID 77749 PAGE 2

 $\frac{\textbf{All other locations}}{\textbf{0.02}}$

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

If you have any questions, please contact me at (614) 752-5747.

LAO:lo

c: J. McQuirt, OTS-P. Siddle, OTS-B. Schafer, D-4-File

Intersection: 25: Crystal Lake & , Interval #1

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	
Directions Served	L	T	T	Т	Т	T	T	R	L	LR	
Maximum Queue (ft)	284	326	116	140	442	428	412	150	311	345	
Average Queue (ft)	227	87	86	111	263	304	330	123	224	263	
95th Queue (ft)	291	251	125	136	401	427	432	206	305	350	
Link Distance (ft)		608	608	608	1344	1344	1344		2638	2638	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	260							125			
Storage Blk Time (%)	8						26	8			
Queuing Penalty (veh)	62						139	28			

Intersection: 25: Crystal Lake & , Interval #2

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	
Directions Served	L	T	Т	T	T	T	T	R	L	LR	
Maximum Queue (ft)	284	355	98	165	784	1147	1243	150	396	454	
Average Queue (ft)	282	221	77	106	478	616	698	111	225	289	
95th Queue (ft)	287	453	100	150	836	1172	1355	212	362	434	
Link Distance (ft)		608	608	608	1344	1344	1344		2638	2638	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	260							125			
Storage Blk Time (%)	28						44	13			
Queuing Penalty (veh)	239						270	54			

Intersection: 25: Crystal Lake & , Interval #3

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	
Directions Served	L	T	T	Т	T	T	Т	R	L	LR	_
Maximum Queue (ft)	284	417	124	138	999	1370	1359	150	456	448	
Average Queue (ft)	259	202	94	105	823	1140	1339	90	325	353	
95th Queue (ft)	297	442	123	146	1055	1541	1384	171	524	500	
Link Distance (ft)		608	608	608	1344	1344	1344		2638	2638	
Upstream Blk Time (%)						5	22				
Queuing Penalty (veh)						0	0				
Storage Bay Dist (ft)	260							125			
Storage Blk Time (%)	15						50	5			
Queuing Penalty (veh)	110						263	18			

SUM-18 SimTraffic Report

Intersection: 25: Crystal Lake & , Interval #4

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	
Directions Served	L	T	T	Т	T	T	Т	R	L	LR	
Maximum Queue (ft)	284	356	332	119	801	1330	1357	150	350	384	
Average Queue (ft)	280	299	155	110	698	843	1071	149	241	289	
95th Queue (ft)	288	467	335	125	857	1191	1388	151	377	396	
Link Distance (ft)		608	608	608	1344	1344	1344		2638	2638	
Upstream Blk Time (%)						0	1				
Queuing Penalty (veh)						0	0				
Storage Bay Dist (ft)	260							125			
Storage Blk Time (%)	26						48	16			
Queuing Penalty (veh)	193						253	59			

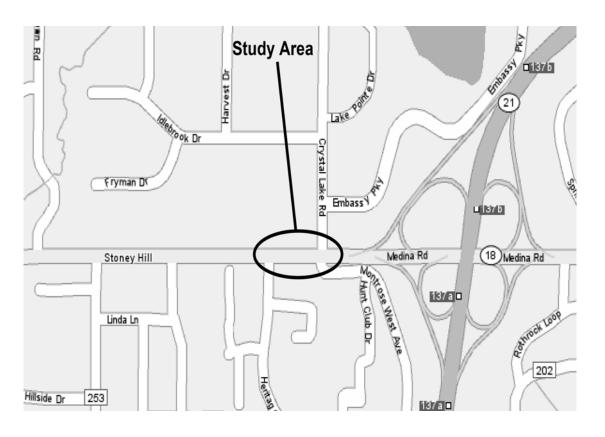
Intersection: 25: Crystal Lake & , All Intervals

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	
Directions Served	L	T	T	Т	T	T	Т	R	L	LR	
Maximum Queue (ft)	284	417	332	165	999	1370	1359	150	456	454	
Average Queue (ft)	262	202	103	108	565	726	860	118	254	299	
95th Queue (ft)	314	442	209	142	991	1364	1589	203	414	434	
Link Distance (ft)		608	608	608	1344	1344	1344		2638	2638	
Upstream Blk Time (%)						1	6				
Queuing Penalty (veh)						0	0				
Storage Bay Dist (ft)	260							125			
Storage Blk Time (%)	19						42	11			
Queuing Penalty (veh)	151						231	40			

SUM-18 SimTraffic Report

S.R. 18 & MONTROSE WEST AVE. / CRYSTAL LAKE ROAD SUM 18 at Crystal Lake #1207 HSP Intersection for 2005 SUM 18, 1.69 to 2.05, #1417 HSP Non-Freeway Section for 2005 SUM 18 2.00 to 4.00, #93 Hot Spot Section for 2005

SAFETY STUDY



Prepared for: ODOT District 4 April, 2007



Table of Contents

1.0 Executive Summary	3
2.0 Purpose and Background	4
3.0 Existing Conditions	4
4.0 Crash Data	12
5.0 Crash Analysis	19
6.0 Capacity Analysis	21
7.0 Identify and Evaluate Proposed Countermeasures	23
7.1 Evaluation of Countermeasures	23
7.2 Proposed Countermeasures	26
8.0 Conclusions:	30
9.0 Recommendations:	31
10.0 Appendix	32
Site Photographs	32
Turning Counts	50
Operational Analysis	66
List of Figures	
Figure 1 - Existing Condition Diagram 1	6
Figure 2 - Existing Condition Diagram 2	7
Figure 3-6 - Existing peak hour volume	
Figure 7 - Collision Diagram 2002-2004	
Figure 8-11 - Crash Analysis Graphs and Tables	
Figure 12 - Rate of Return - Mediem-term (Crystal Lake)	
Figure 13 - Rate of Return - Medium-term (Heritage Woods)	
Figure 14 - Medium-term recommendations diagram	29
List of Tables	
Table 1 - Crash Type compared with statewide averages for urban intersections	19
Table 2 - Level of Service at a signalized intersection	
Table 3 - Level of Service	21
Table 4 - Potential Countermeasures and Evaluation	23
Table 5 - Proposed Countermeasures and Cost	26

1.0 Executive Summary

The Montrose West Ave. / Crystal Lake Rd. and S.R. 18 intersection is located in Summit County, in Copley and Bath Townships. Montrose West Ave. / Crystal Lake Road has a north-south orientation and is classified as a 2-lane urban local road. S.R. 18 is oriented east-west and is classified as a 5-lane urban principal arterial. The intersection is signalized with protected / permissive left-turn phasing for S.R. 18 with the northbound and southbound phases being split. The northbound approach consists of a right turn lane and a thru-left lane. The southbound approach consists of a thruright lane and two left turn lanes. The westbound approach consists of two thru lanes a right turn lane and a left turn lane. The eastbound approach consists of two thru lanes and a left turn lane. The intersection is surrounded by a mixed commercial, business, and residential area and is within close proximity to the S.R. 18 / IR 77 interchange. The northeast corner is developed with an office building. northwest corner is developed with a large wellness center. Although the southern corners are undeveloped, Montrose West Avenue is developed with retail business in close proximity to the intersection. The intersection has an AADT of 49,846 vehicles, and has experienced 79 crashes in the three year analysis, for a crash rate of 1.45

The crash analysis revealed two distinct crash patterns at this intersection. The first observed pattern was the frequency of rear-end crashes. Rear-end crashes are typical at signalized intersections. This is the most significant pattern of crashes at this intersection (39 of 79). Between 2002 and 2004, 8 of these crashes resulted in injury. The problem is especially distinct on the east and west approaches. Based upon the capacity analysis and field observations, congestion is the most significant factor contributing to the number of rear-end accidents at this location. Countermeasures identified to address the rear end accident problem are to relocate Montrose West Avenue to Heritage Woods, and add capacity to Heritage Woods through additional turn lanes as well as adding capacity to S.R. 18 by adding additional thru lanes.

The second pattern identified was a high number of left-turn crashes. Based on field observations, one to two through vehicles frequently continue through the intersection after the onset of the red, often accelerating in the process. This situation creates a crash hazard with opposing left turning vehicles, which are waiting in the intersection for a gap in traffic. Also, with the volume of opposing through vehicles on each approach, there are very few acceptable gaps during the permissive phase during peak hours of traffic. These two situations indicate that the major contributing factor leading to left-turn crashes is congestion. The countermeasures identified to address this problem are to relocate Montrose West Avenue to Heritage Woods, and add capacity to Heritage Woods through additional turn lanes as well as adding capacity to S.R. 18 by adding additional thru lanes and dual left turn lanes onto Crystal Lake Road and Heritage Woods Drive.

The medium-term recommended improvements are:

 Relocate Montrose West Avenue to Heritage Woods, and add capacity to Heritage Woods through additional turn lanes, as well as adding capacity to S.R. 18 by adding additional thru lanes and dual left turn lanes onto Crystal Lake Road and Heritage Woods Drive.

2.0 Purpose and Background

The Montrose West Ave. / Crystal Lake Rd. and S.R. 18 intersection has an AADT of 49,846 vehicles, and has experienced 79 crashes in the three year analysis, for a crash rate of 1.45. The purpose of this study is to analyze crash patterns and determine appropriate countermeasures to enhance the safety of this intersection in relation to the overall S.R. 18 corridor.

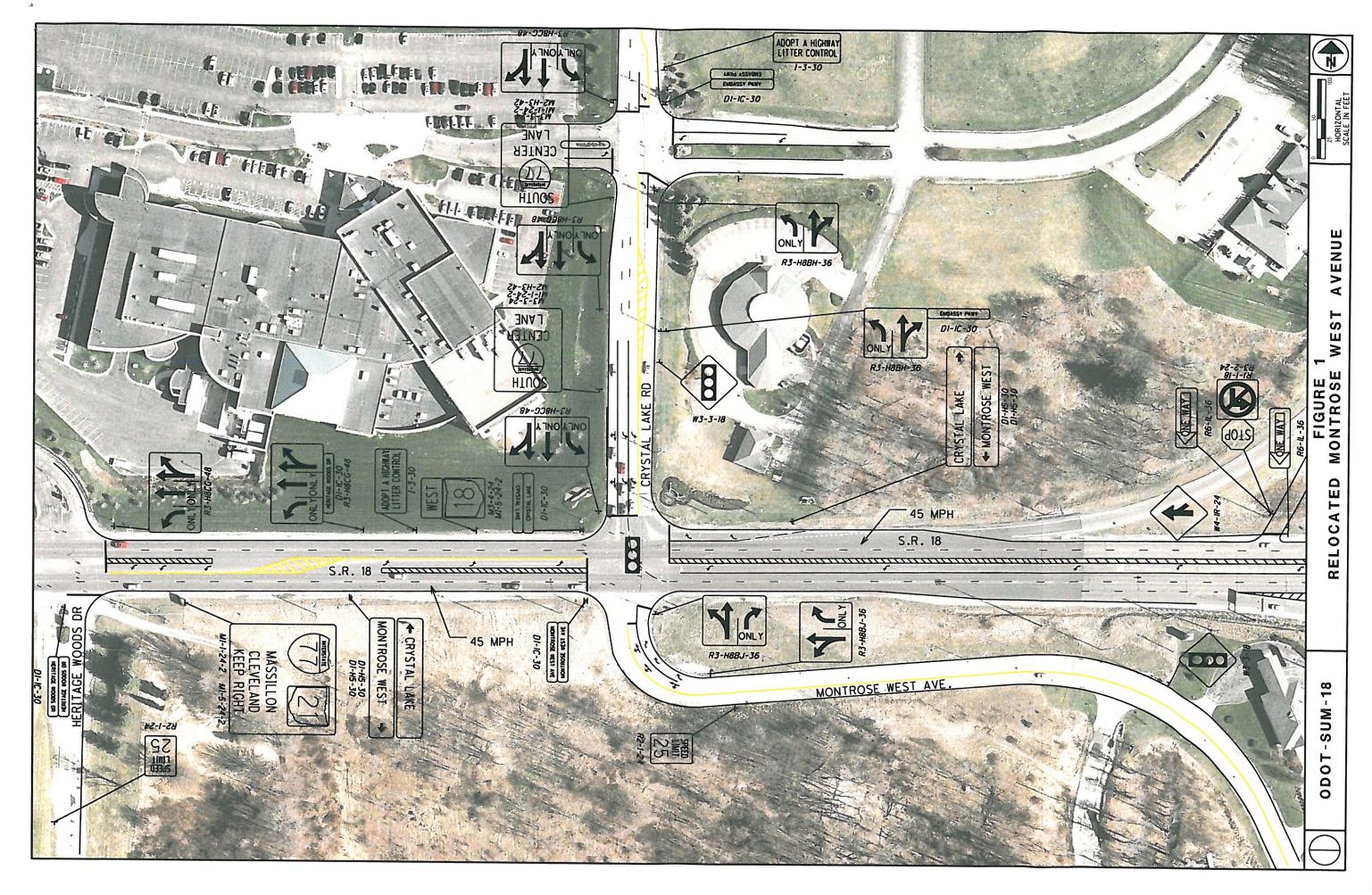
The intersection is located in Summit County, in Copley and Bath Townships. Montrose West Ave. / Crystal Lake Road has a north-south orientation and is classified as a 2-lane urban local road. S.R. 18 is oriented east-west and is classified as a 5-lane urban principal arterial. The intersection is signalized with protected / permissive left-turn phasing for S.R. 18 with the northbound and southbound phases being split. The northbound approach consists of a right turn lane and a thru-left lane. The southbound approach consists of a thru-right lane and two left turn lanes. The westbound approach consists of two thru lanes a right turn lane and a left turn lane. The eastbound approach consists of two thru lanes and a left turn lane.

3.0 Existing Conditions

The intersection of Montrose West Ave. / Crystal Lake Rd. and S.R. 18 is in Summit County, in the Townships of Copley and Bath. Montrose West Ave. / Crystal Lake Rd. has a north-south orientation and is classified as a 2-lane urban local road. S.R. 18 is oriented east-west and is classified as a 5-lane urban principal arterial. intersection is signalized with protected / permissive left-turn phasing for S.R. 18 with the northbound and southbound phases being split. The northbound approach consists of a right turn lane and a thru-left lane. The southbound approach consists of a thruright lane and two left turn lanes. The westbound approach consist of two thru lanes, a right turn lane and a left turn lane. The eastbound approach consists of two thru lanes, and a left turn lane. The intersection is located in mixed commercial, business, and residential area and is located in close proximity to the S.R. 18 / IR 77 interchange. The northeast corner is developed with an office building. northwest corner is developed with a large wellness centre. The southwest and southeast corners are undeveloped, however; Montrose West Ave. is developed with retail business in close proximity to the intersection. The intersection has an AADT of 49,846 vehicles, and has experienced 58 crashes in the three year analysis, for a crash rate of 1.45.

The AM peak hour volumes are larger eastbound than westbound due to the large morning commute traffic from the residents of Copley and Bath townships and well as Medina County. The AM peak hour volumes for the intersection in the eastbound direction are 83 left turning vehicles, 1506 thru vehicles and 17 right turning vehicles. In the westbound direction there are 100 left turning vehicles, 739 thru vehicles, and 414 right turning vehicles. The northbound direction consists of 23 left turning vehicles, 13 thru vehicles, and 257 right turning vehicles. The southbound direction consists of 349 left turning vehicles, 15 thru vehicles and 15 right turning vehicles.

The PM peak hour volumes are larger westbound than eastbound due to the large evening commute home for the residents of Copley and Bath townships as well as Medina County. The traffic in the eastbound direction consists of 57 left turning vehicles, 1222 thru vehicles and 46 right turning vehicles. In the westbound direction there are 368 left turning vehicles, 1529 thru vehicles, and 302 right turning vehicles. The northbound direction consists of 58 left turning vehicles, 23 thru vehicles, and 317 right turning vehicles. The southbound direction consists of 529 left turning vehicles, 75 thru vehicles and 74 right turning vehicles.



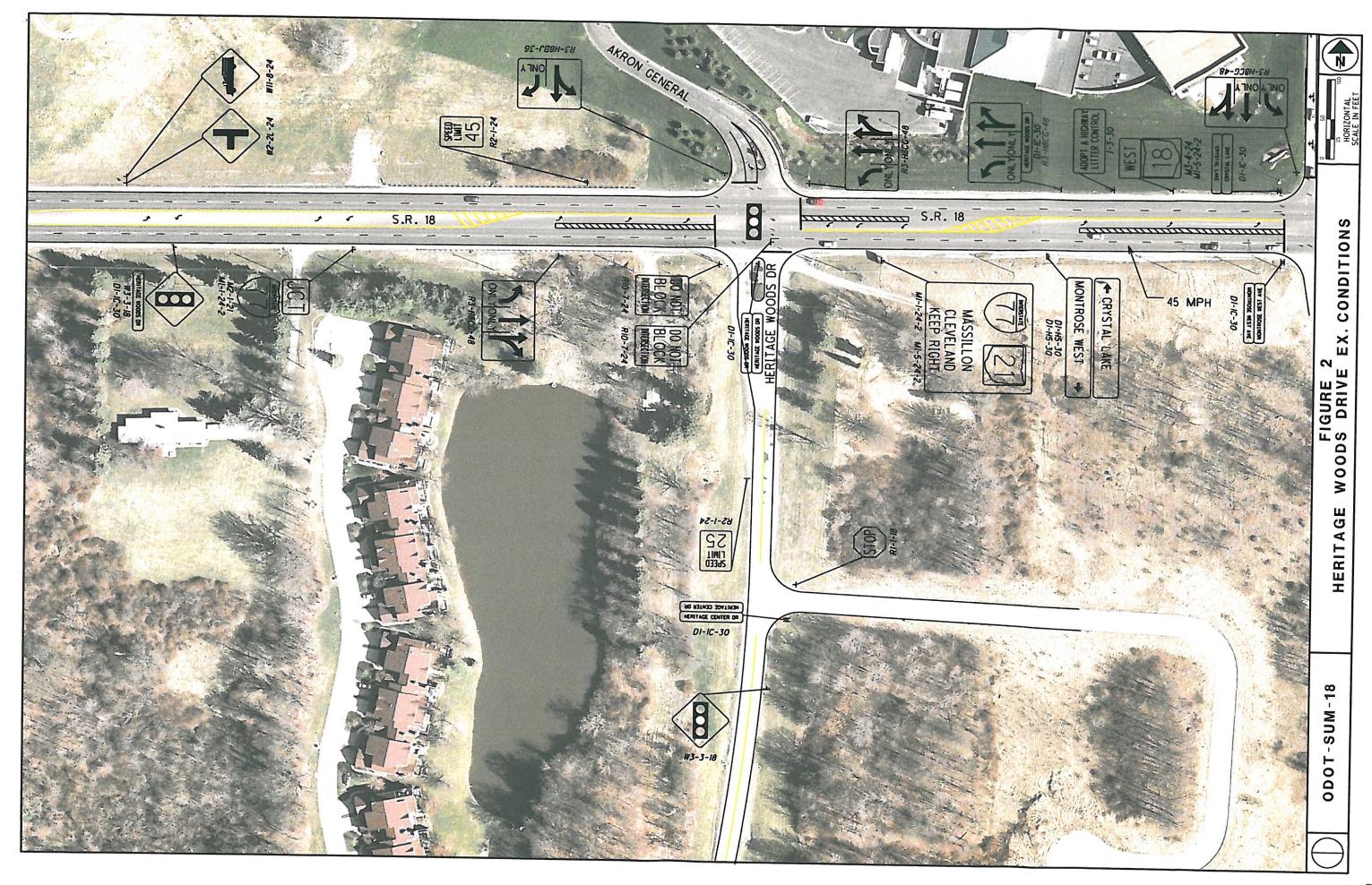


Figure 3 – Peak Hour Turning Movement Volumes

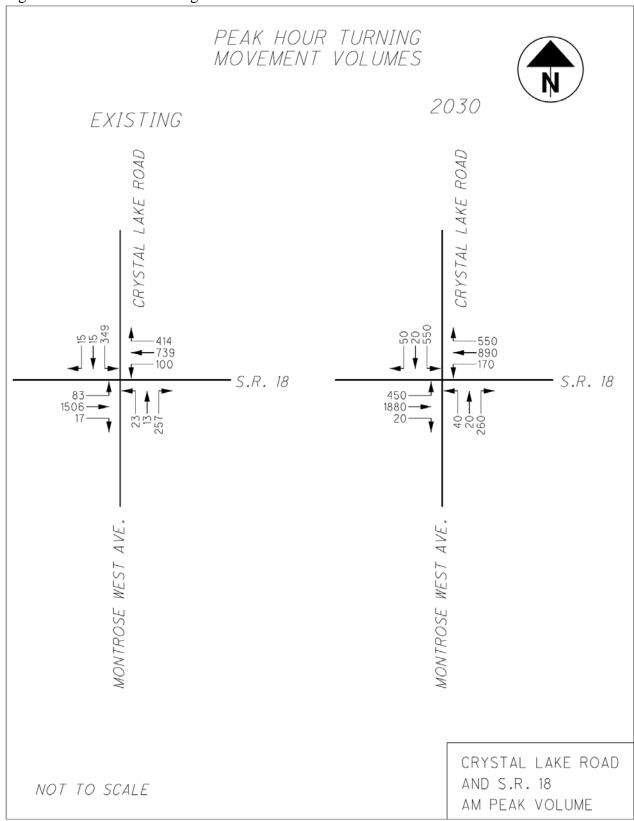


Figure 4 – Peak Hour Turning Movement Volumes

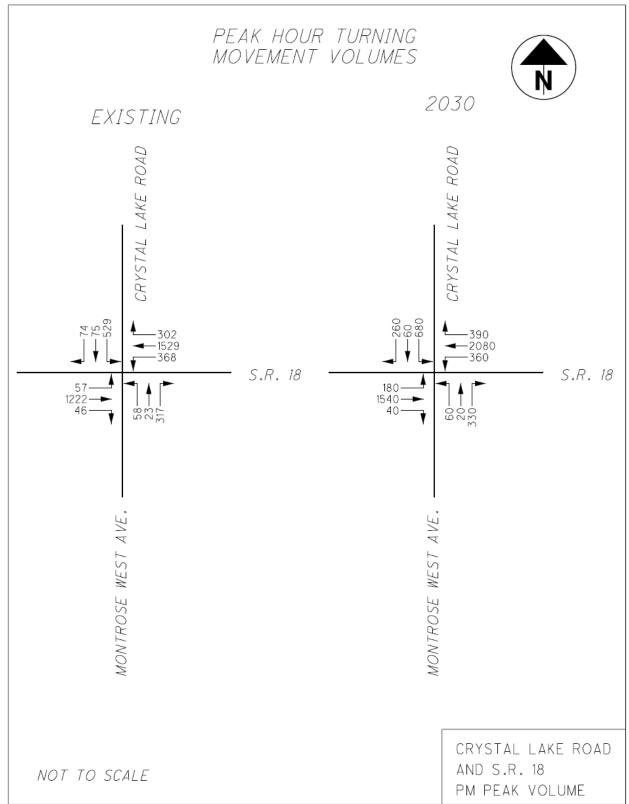
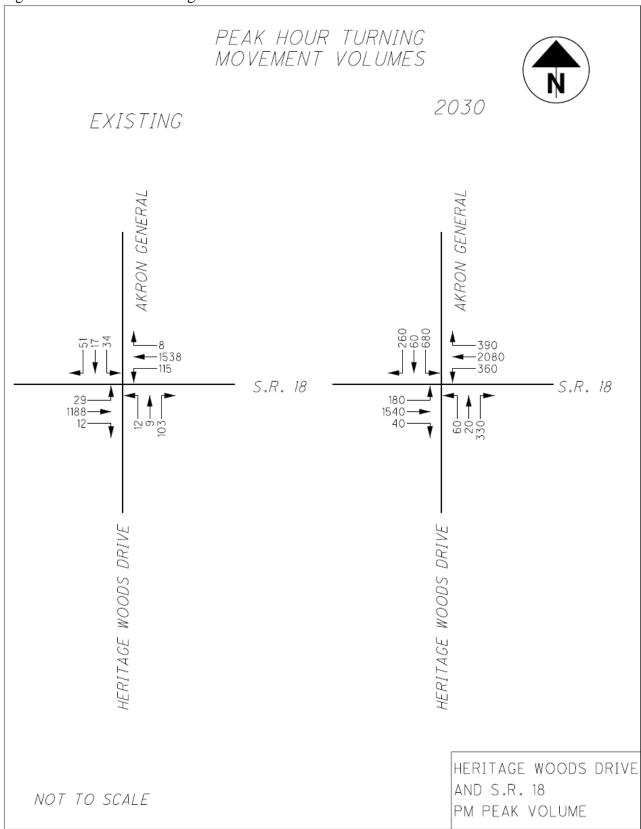


Figure 5 – Peak Hour Turning Movement Volumes



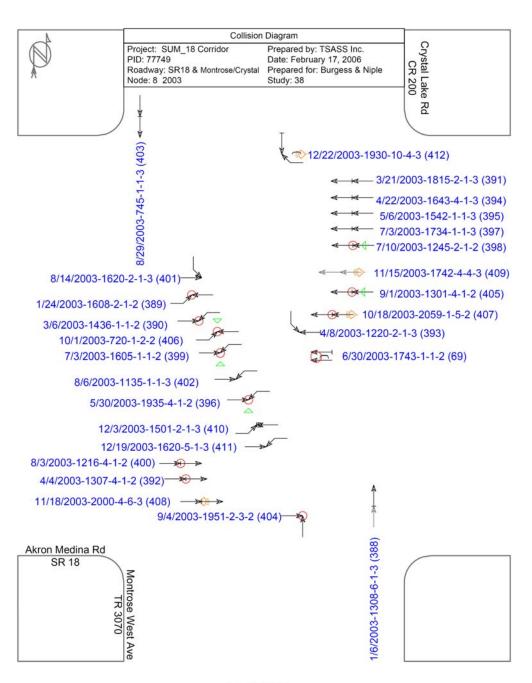
Figure 6 – Peak Hour Turning Movement Volumes



4.0 Crash Data

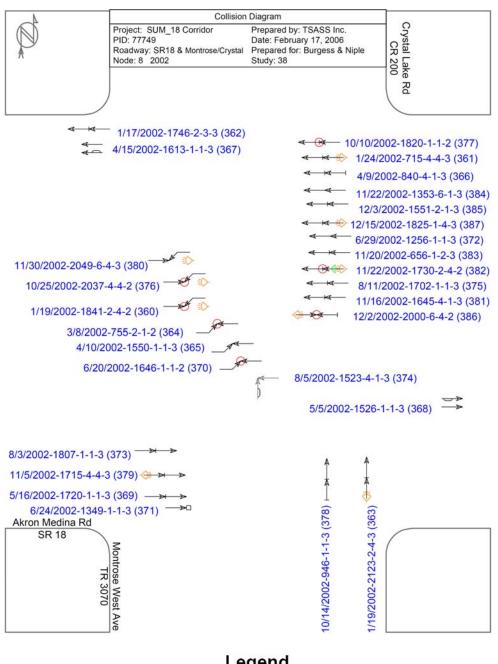
This section of the report includes crash data and summaries used in the crash analysis. The data is presented as Figure 7. Crash data analyzed was from 2002, 2003, and 2004.

Figure 7 - Collision Diagram 2002-2004 Crystal Lake CR 200 Project: SUM_18 Corridor Prepared by: TSASS Inc. Date: February 17, 2006 Roadway: SR18 & Montrose/Crystal Node: 8 2004 Prepared for: Burgess & Niple Study: 38 12/22/2004-1124-6-1-3 (436) 10/8/2004-900-1-1-3 (432) 3/1/2004-1917-2-4-3 (419) 3/11/2004-2050-4-4-3 (420) 7/25/2004-2142-1-4-3 (427) 8/9/2004-1835-1-1-3 (429) 10/26/2004-1341-1-1-3 (433) 2/6/2004-1152-2-1-2 (418) 11/3/2004-1713-1-1-3 (434) 12/21/2004-1639-1-1-3 (435) 6/13/2004-1910-1-1-3 (426) 3/16/2004-947-6-1-2 (421) 2/2/2004-1830-2-4-3 (415) /2/2004-941-4-1-3 (423) 3/20/2004-1619-4-1-3 (422) ▼ ♥ 11/11/2004-1935-4-5-2 (78) 1/31/2004-1500-1-1-2 (417) 2/24/2004-1230-1-1-3 (416) 1/25/2004-1355-2-1-3 (414) 1/19/2004-1143-1-1-3 (413) 7/30/2004-1712-1-1-3 (428) 4/15/2004-2030-1-4-3 (424) 5/27/2004-1619-10-9-3 (425) 3/9/2004-1603-1-1-3 (2294) Akron Medina Rd **SR 18** 9/14/2004-1445-1-1-3 (431) Legend Straight Parked Pedestrian Fixed objects: × Bicycle Pole Curb - Stopped Erratic General Unknown Out of control Injury Signal 0 Animal Backing Right turn Fatality 0 Overtaking Left turn Nighttime 3rd vehicle - Sideswipe - U-turn DUI Extra data



Legend





Legend

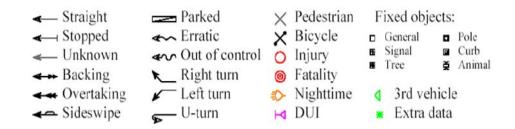
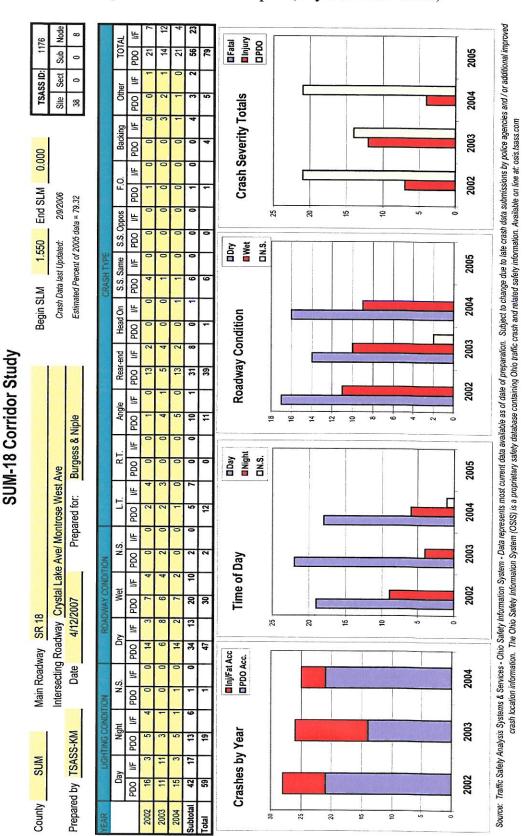


Figure 8 – Crash Analysis Tables and Graphs (Crystal Lake Road)



TRAFFIC ACCIDENT ANALYSIS

Figure 9 – Crash Analysis Tables and Graphs (Crystal Lake Road)

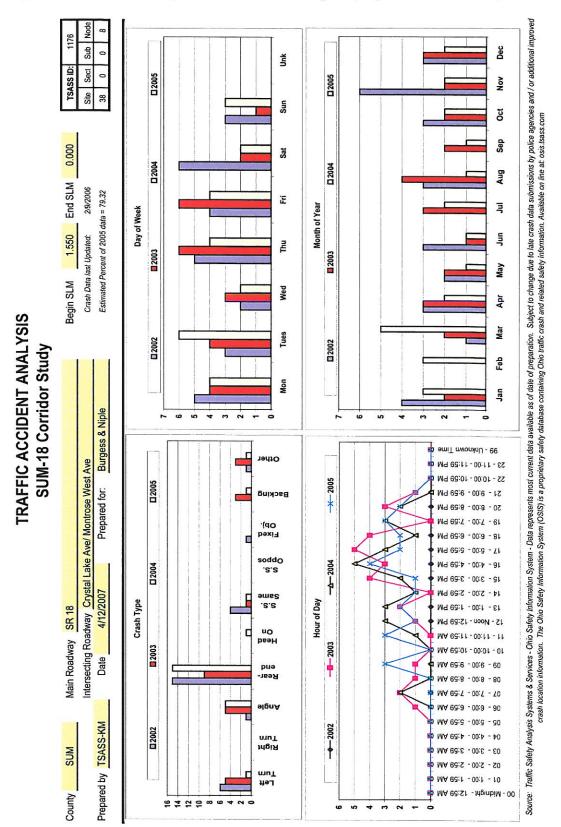
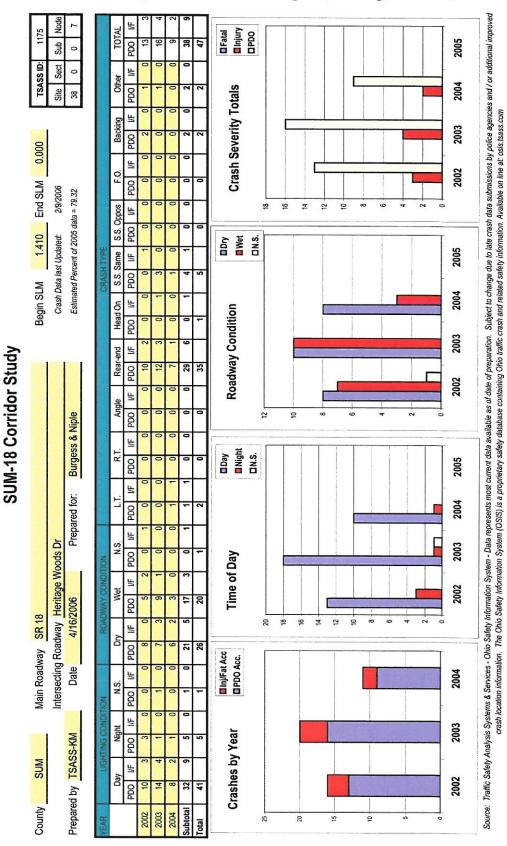
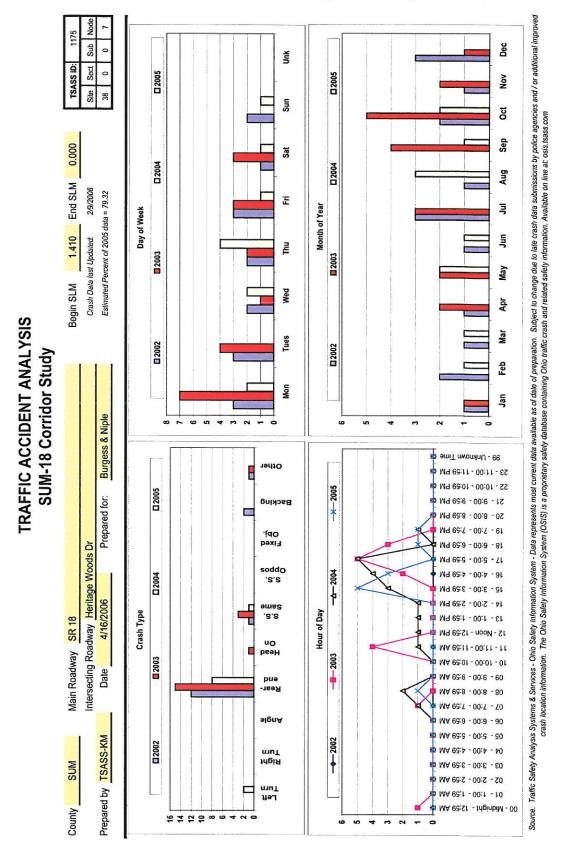


Figure 10 – Crash Analysis Tables and Graphs (Heritage Woods)



TRAFFIC ACCIDENT ANALYSIS

Figure 11 – Crash Analysis Tables and Graphs (Heritage Woods)



5.0 Crash Analysis

From 2002 to 2004, there were 79 crashes at the intersection – 56 property damage and 23 injury crashes. None of the crashes involved a fatality. The 2002-2004 crash rate at this intersection is 1.45 crashes per million entering vehicles. The data shows a peak in crashes between 6 a.m. and 8 a.m., and between 4 p.m. and 7 p.m. The predominant crash types at this location are left-turn and rear-end crashes, which together account for more than 64% of the crashes.

Table 1 compares crashes at the intersection with the statewide percentage for that type or condition of crash.

Table 1 - Crash Type compared with statewide averages for urban intersections

Condition	# of crashes 2002 – 2004	% of crashes 2002 – 2004	% of crashes statewide 2002-2004
Night-time	19	24.1	28.8
Wet pavement	30	38.0	28.4
Crash type			
Left-turn	12	15.2	12.0
Rear-end	39	49.4	26.2
Same-direction sideswipe	6	7.6	12.5
Angle	11	13.9	22.3

Source: Ohio Department of Public Safety Crash Data

Based on the collision diagrams, crash summaries, and Table 1, the following patterns and possible causes of these crashes are apparent:

Rear-End crashes: While rear-end accidents are typical of signalized intersections the percentage of rear-end crashes at this intersection is high relative to statewide averages for urban intersections and deserves consideration. This is the most significant pattern of crashes at this intersection (39 of 79). Between 2002 and 2004, 8 of these crashes resulted in injury. The problem is especially distinct on the east and west approaches. Potential causes for rear-end crashes are, are congestion, queued traffic, wet or slippery pavement, and poor geometry.

Based upon the capacity analysis and field observations, congestion is significant at this intersection, which contributes to the number of rear-end accidents. The percentage of crashes occurring on wet pavement is above the statewide average, however; skid testing in the area shows sufficient pavement friction thus discounting that condition as a significant crash contributor. The main contributing factor for wet pavement crashes in conjunction with congestion is following too closely.

There are no apparent geometry characteristics on the approaches that would lead to rear-end crashes, namely grades or structures that limit the sight distance, or conflict with the left turning vehicles related to horizontal and vertical sight distance.

Left-turn crashes: This is the second most significant (12 of 79) pattern of crashes at this intersection and is slightly above the state-wide average for left turn crashes. Between 2002 and 2004, over half (7 of 12) of these crashes resulted in injury. The problem is especially distinct on the eastbound and westbound approaches. Potential causes for left-turn crashes are, restricted sight distance, permitted left-turn phase, and excessive speeding on approaches.

There is a moderate volume of left turns at this intersection. During the PM peak hour, the westbound left turn volume is 368 vehicles. The left-turn volume for the southbound approach is 529 vehicles. Delay and vehicle queues experienced by these movements are also significant.

Currently all four approaches at the intersection have protected left-turn phasing and phasing on the east and west legs that allows for a protected / permitted eastbound and westbound left turn. Based on field observations, one to two through vehicles frequently continue through the intersection after the onset of the red, often accelerating in the process. This situation creates a crash hazard with opposing left turning vehicles, which are waiting in the intersection for a gap in traffic. Also, with the volume of opposing through vehicles on each approach, there are very few acceptable gaps during the permissive phase during peak hours of traffic.

Same-direction sideswipe crashes: The percentage of side-swipe crashes is below the statewide average for urban intersections. Side-swipe crashes can be discounted due to the low frequency of the crashes.

Night-time crashes: The number of crashes occurring at night is below the statewide average for urban intersections. This would indicate that the intersection lighting for this location seems to be adequate and would not require upgrades to lighting.

Based on the above crash patterns, potential countermeasures considered for this intersection include:

- Restrict or prohibit maneuvers by signing.
- Increase capacity (widen roadway).
- Add dual left turn lanes on EB and WB approaches
- Relocate Montrose West Ave. to Heritage Woods Drive intersection
- Improve signing and pavement markings.
- Retime signals (green times).
- Resurface the intersection to improve skid resistance.

6.0 Capacity Analysis

A capacity analysis was performed to quantify the congestion problem observed at the intersection during the existing morning and evening peak hours. The capacity analysis performed on the existing traffic conditions uses the current signal timings now operating. Detailed Capacity analysis including the future "2030" traffic with existing signal timings is included in the Appendix.

Peak hour traffic delay (Level of Service) was calculated using the *Highway Capacity Software*TM. Level of Service (LOS) for a signalized intersection is defined by the *Highway Capacity Manual* as "a measure of driver discomfort, frustration, fuel consumption, and lost travel time," and is evaluated on the basis of control delay per vehicle, in seconds per vehicle. Control delay is the portion of the total delay attributed to traffic signal operation for signalized intersections, and includes initial deceleration delay, queue move-up, stopped delay, and final acceleration delay.

Table 2 - Level of Service at a signalized intersection

Level	Controlled	Description
of	delay	
Service	in seconds	
A	< 10	Most vehicles do not stop.
В	10 - 20	Good progression; more vehicles stop than at LOS A.
C	20 - 35	The number of vehicles stopping is significant at this level,
		though many still pass through the intersection without stopping.
D	35 - 55	Many vehicles stop, and the proportion of vehicles not stopping
		declines. Occasionally, all vehicles on an approach will not clear
		the intersection during the green.
E	55 - 80	Considered the limit of acceptable delay. Frequently, all vehicles
		on an approach will not clear the intersection during the green.
F	> 80	Considered unacceptable to most drivers.

Table 3 - Level of Service

Heritage		EB		W	В	N	В	S	В
Woods 2006 Existing	Overall	TH-RT	LT	TH-RT	LT	RT	TH-LT	TH-RT	LT
AM Peak Hour	D	E	A	В	В	D	С	С	С

Heritage		EB	}	W	В	N	В	S	В
Woods 2006 Existing	Overall	TH-RT	LT	TH-RT	LT	RT	TH-LT	TH-RT	LT
PM									
Peak	Е	C	В	F	В	C	C	C	C
Hour									

Crystal		EB	}		WB		N	В	S	В
Lake Rd 2006 Existing	Overall	TH-RT	LT	LT	TH	RT	RT	TH-LT	TH-RT	LT
AM Peak Hour	F	F	С	С	С	В	D	D	D	Е

Crystal		EB	1		WB		N	В	S	В
Lake Rd 2006 Existing	Overall	TH-RT	LT	LT	RT	ТН	RT	TH-LT	TH-RT	LT
PM Peak	F	F	C	F	В	F	F	Е	E	F
Hour	*	•			D	1	1	<u>D</u>	Ð	*

Heritage		EB		WB		NB		SB	
Woods 2030	Overall	TH-RT	LT	TH-RT	LT	RT	TH-LT	TH-RT	LT
Relocated									
AM Peak	C	C	A	A	D	C	D	D	D
Hour									

Heritage		EB		WB		1	NΒ	SB	
Woods	Over								
2030	all	TH-RT	LT	TH-RT	LT	RT	TH-LT	TH-RT	LT
Relocated									
PM									
Peak	В	C	C	A	D	В	C	C	C
Hour									

Crystal		EB		V	VB	SB	
Lake Rd 2030 Relocated	Overall	ТН	LT	RT	ТН	RT	LT
AM							
Peak	C	C	C	В	C	A	C
Hour							

Crystal		EB		V	VΒ	SB		
Lake Rd 2030	Overall	TH	LT	RT	TH	RT	LT	
Relocated								
PM								
Peak	C	A	D	В	C	C	E	
Hour								

7.0 Identify and Evaluate Proposed Countermeasures

7.1 Evaluation of Countermeasures

Table 5 lists each countermeasure considered, whether the countermeasure is being proposed, and the reason for including or not including the countermeasure.

Table 4 - Potential Countermeasures and Evaluation

	Proposed	
Countermeasure	Countermeasure?	Reason
"Do Nothing"	No	Congestion alone would warrant an
		improvement at this location and the
		accident rate for a signalized
		intersection of (1.45) is substantially
		higher than the state average of (0.32)
		These factors indicate that the "Do
		Nothing" option is not a viable option
		over the long-term.
Restrict or eliminate left turns	No	Since this is the intersection of an
by signing		east-west principal arterial with a
		north-south local road, restricting left
		turns would have a detrimental impact
		on traffic flow. No reasonable
		alternatives exist for the rerouting of
		left turns at the intersection.

	Proposed	
Countermeasure	Countermeasure?	Reason
Add dual left turn lanes on the EB and WB approaches by widening the intersection.	Yes Medium-term	Adding dual left turn lanes on the EB and WB approaches increases the capacity of the intersection and reduces the amount of left turn collisions at the intersection. This would most likely reduce the rate of rear-end, sideswipe, and angle crashes also.
Improve signing and pavement markings	Yes Medium-Term	The existing pavement markings and signing throughout both intersections should be upgraded as part of the overall intersection reconstruction. This upgrade will provide the driver with a highly visible set of traffic control devices, reducing driver confusion and congestion thereby reducing congestion related crashes.
Retime signals (green times)	Yes Medium-Term	Although signal timing alone will not solve the congestion related crash problem at the intersection, new signal timing to reduce the number of phases, coupled with intersection widening and the relocation of West Montrose Ave. to Heritage Woods will increase the intersection LOS, reduce congestion and congestion-related crashes.
Improve roadway illumination	No	Night-time crashes are below the state average indicating that lighting conditions seem to be adequate for the intersection. This situation can be discounted as a significant crash indicator.

	Proposed	
Countermeasure	Countermeasure?	Reason
Relocate Montrose West Ave.	Yes	Due to the high number of left turns
approach to Heritage Woods	Medium-Term	out of Crystal Lake Road and onto
Drive.		Montrose West Avenue conflicting
		with a high volume of East-West thru
		traffic it becomes beneficial to
		eliminate Montrose West Avenue and
		relocate it to Heritage Woods Drive.
		This relocation makes it possible to
		eliminate conflict points at the
		intersection and reduce the number of
		phases. This improvement makes it possible to reduce congestion and
		conflict points, reducing the number
		of left-turn crashes and congestion
		related crashes.
Widen roadway to create	Yes	S.R. 18 carries a high volume of East-
additional East-West thru	Medium-Term	West thru traffic thru the intersection
capacity.		of Crystal Lake Road/West Montrose
		Avenue. Additional thru lane capacity
		at the intersection reduces the
		congestion and will reduce the number
		of rear-end and congestion related
		accidents.
Resurface the intersection	No	Skid testing in the area shows
approaches to improve skid		sufficient pavement friction thus
resistance		discounting that condition as a
		significant crash contributor.

7.2 Proposed Countermeasures

Table 14 shows the recommended countermeasures with an estimated cost. These are grouped with respect to required implementation time.

Table 5 - Proposed Countermeasures and Cost

Proposed Countermeasure	Estimated Cost
Medium – term	
Relocate Montrose West Avenue to Heritage Woods,	· ·
and add capacity to Heritage Woods through additional	9
turn lanes as well as adding capacity to S.R. 18 by	Right-of-Way - <u>\$2,477,000</u>
adding additional thru lanes and dual left turn lanes onto	Total - \$6,407,000
Crystal Lake Road and Heritage Woods Drive. This	
includes one total Right-of-Way take.	

Short-term

No recommendations

Long-term

No recommendations

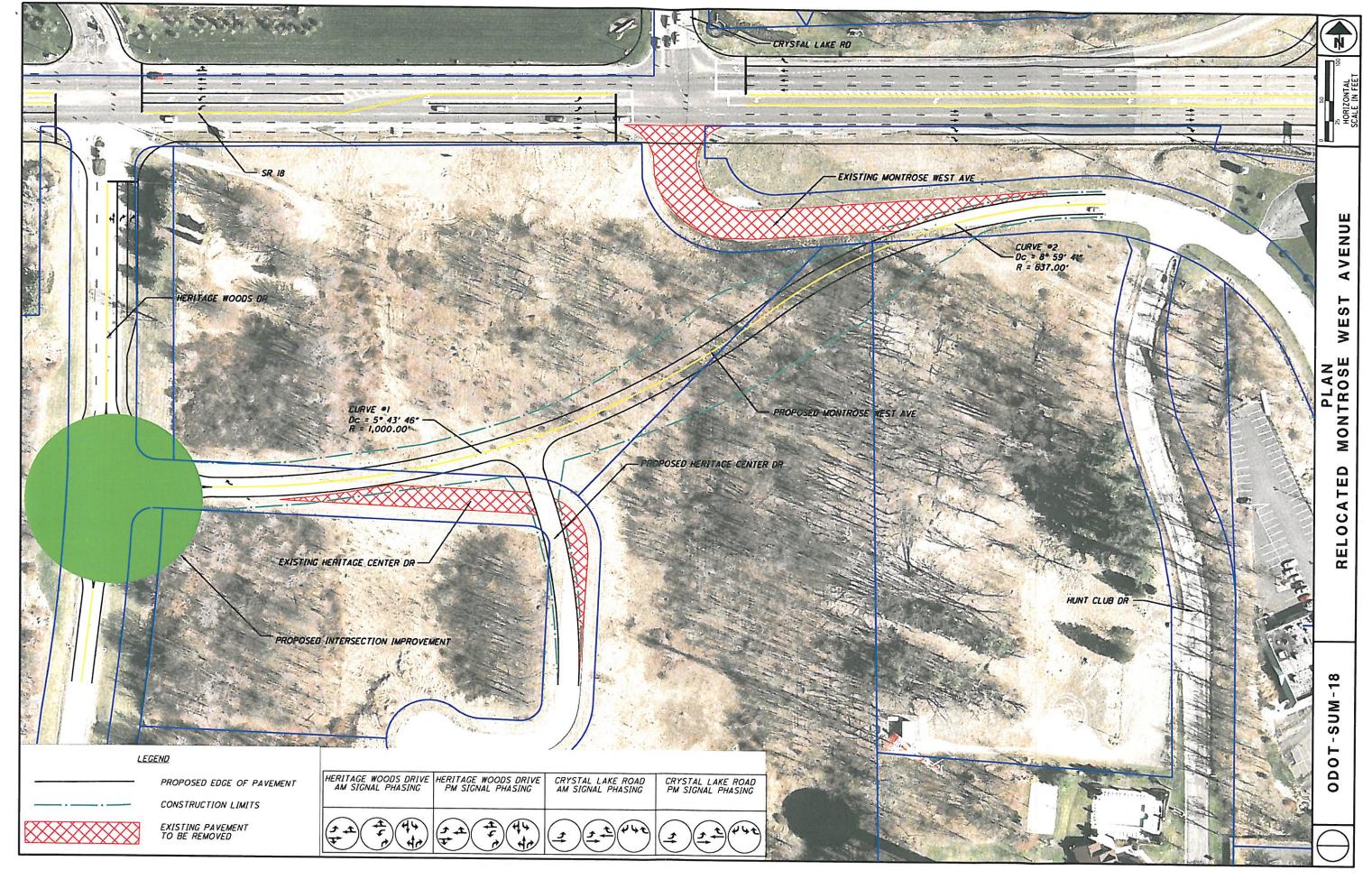
Figure 12 - Medium-Term Rate of Return (Crystal Lake Road):

							ľ	ATE	RATE OF RETUR	TUR	I-EC	NONC	IIC AN	ALYS	RN - ECONOMIC ANALYSIS WORKSHEET	RKSH	ΈT													
																										TSASS ID:	:	1176		
County	ا (``	SUM				Main	Main Roadway	ay	$\overline{}$	<u>~</u>						Begin SLM	SLM		1.55		End SLM	>				Site	Sect S	Sub Node	ę	
						Inters	Intersecting Roadway	Road		Crysta	al Lake	Ave/	Montro	se W	Crystal Lake Ave/ Montrose West Ave	<u></u>										38	0	0 8		
Prepared by	•	RWD											Date	Ť	16-Apr-07	77			L,										ı	
Year		Ĕ	TIME OF DAY	DAY				ROA	DWAY (ROADWAY CONDITION	NO										CRAS	CRASH TYPE								
	DAY		NITE	וט	N	S.	DRY	Υ	WET	I	N. S.		L.T.		R.T.		Angle	Re	Rear-end	He	Head On	S.	S.	F.0.		Backing	g	Other	⊥	TOTAL
	PDO	I/F	PDO	Ι/Ε	PDO	I/F	PDO	I/F	PDO	1/F	PDO	1/F	PDO	I/F P	PDO I/	I/F PDO	0 	. PDO	1/F	PDO	I/F	PDO	I/F	PDO	1/F	PDO		PDO I/F	= PDO	J/I C
2002	16	က	2	4	,	,	14	က	7	4	,		2	4			-	1 13	2	,		4		-	,		·	-	21	_
2003	1	=	က	-			9	∞	9	4	2		2	က			9	2 5	7		ŀ	-				 			14	4 12
2004	15	3	2	-	-		14	2	7	2			-		Ė		9	13	3	Ŀ	1	-					H	Ľ	21	1
TOTAL	42	17	13	9	-		34	13	20	10	2		2	7	<u> </u>		13	3 31	12		1	9		_				<u>'</u>	26	56 23
3 yr AVG.	14	9	4	2	0		11	4	7	3	-		2	2	Ľ	H	4	1 10	4		0	2		0				<u>'</u>	19	8
	REC	RECOMMENDED IMPROVEMENTS	VDED I	MPRO	/EME	ILS				CRA	CRASH TYPE	m				ч	PDO CRASHES	4SHES							INJ	INJ FAT. CRASHES	RASHE			
-	Relocate Montrose West Ave.	ate Mo	ntros	e Wes	t Ave								œ	R1 R	R2 R3	3 R4	RT	AVG	AVG PDO	EST. RED.	RED.	R1	R2	R3	R4 F	RT A	AVG INJ-FAT	=AT	EST	EST. RED.
2.	Reconstruct Crystal Lake Intersection	struct	Cryst	al Lak	e Inte	rsecti	on		Left Turn	E				-	0.27 0.	0.42 0.10	10 0.62	2	1.67		1.03	0.08	0.27	0.46	0.10	0.67		2.3	2.33	1.57
က်	Resurface Urban > 2 Lane	ace U	rban :	> 2 La	ne				Right Turn	nrn					0.27 0.	0.42 0.10	10 0.62	2					0.27	0.46	0.10	0.65				
4	Upgrade Pavement Marking - General	de Pa\	remer	nt Mar	king -	Gene	ıral		Angle					0.15	0.27	0.42 0.1	0.10 0.68	œ	4.33		2.93	0.08	0.27	0.46	0.10	29.0		1.(1.00	0.67
5.									Rearend	р				0.16	0.27 0.	0.42 0.10	_	ø	10.33		7.03		0.27	0.46	0.10	0.65		4.(4.00	2.58
9								_	Head On	L(0.27 0.	0.42 0.1	0.10 0.62	2	٠				0.27	0.46	0.10	0.65		0.3	0.33	0.22
7.									Side Swipe	wipe				Ĕ	0.27 0.	0.42 0.10	10 0.62	.5	2.00		1.24		0.27	0.46	0.10	0.65		'		
œί									Fixed Object)bject					0.27 0.	0.42 0.10	10 0.62	.5	0.33		0.21		0.27	0.46	0.10	0.65		•		•
																	•		٠		-					-				•
																	•				-									•
														ESJ	ESTIMATED PDO CRASH REDUCTION	PDO CI	RASH RI	EDUCTIC	NC		12.43	Ε	ESTIMATED INJ.	ED INJ.	- FAT.	CRASH REDUCTION	REDUC	NOIL		5.04
															ADT Factor	tor														
Project Service Life	ice Life					20	20 years																							
Present ADT (PADT)	T (PADT)				4	49,723							Average ADT =	ADT =	(P,	(PADT + FADT)/2	ADT)/2	<u> </u>	49	49,723.00	+	61,1	61,112.00)/2)/2=	55,417.50	7.50				
Future ADT (FADT)	(FADT)				a	61,112						•	ADT Factor =	tor =	Ą	Average ADT / PADT =	DT / PAL)T =	55	55,417.50	_	49,7	49,723.00	"		1.11				
													Ā	prage	Average Applial Benefits	al Ren	ofite													
Annual PDO Benefits = Estimated PDO Crash Reduction * Ava PDO	DO Bene	efits =	Estin	ated	000	Crash	Reduc	* tion	Ava F	DOC	Cost		Ē	, and		3	3		"		12.43	*			2.500	,,		31.078	82	
Annual INJFAT. Benefits = Estimated INJFAT. Crash Reduction * Ava INJFAT. Cost	UFAT.	Benet		=stim	ated II	/4-C/	T. Cra	ish Re	ductic	* u	a INJ.	-FAT	Cost						п		5.04	*		6	006.79	I "		342,304	2 2	
Total Benefits	efits																									I "		373,382	8	
Average Annual Benefits = Total Benefits * ADT Factor	Annual E	3enefit) = S	otal B	enefit	s * Al	ОТ Fac	tor											п		1.11	*		373	373,382	 		416,143	43	
														Ra	Rate of Return	eturn														
Project Cost	ost		(₽	4,0	4,000,000.00	00.						1	!	,			ě					
Maintenance and Energy Costs	nce and	Enerç	Š S	sts							<i>-</i> → <i>-</i> ←	1,000.00	90.0							Kat	Kate of Keturn	E		1	%8					
0888	v alde										+	,00,	0.0																	

Figure 13 - Medium-Term Rate of Return (Heritage Woods Drive)

			ĺ			ĺ	ľ	ATE	C DE1	N	Ę,	OMIC	V N V	VCIC	NO DK	DATE OF DETIIDN FOONOMIC ANALYSIS WODKSHEET														Γ
							₹	7	<u> </u>		3			2) 	_								TSAS	TSASS ID:	1175	10		
County		SUM			2	lain R	Main Roadway		SR 18						æ	Begin SLM	Σ	1	1.41	End	End SLM		1		Site	Sect	Sub	Node		
	•				<u>-</u>	nterse	cting F	Intersecting Roadway	ay H	eritag	Heritage Woods Dr	ds Dr					l							I	38	0	0	7		
Prepared by		RWD										Date	ദാ	16-A	16-Apr-07													I		
						ŀ																				١	١	١	١	٦
Year		_	'IME O	TIME OF DAY				ROADV	ROADWAY CONDIT	NDITIC	NOI						-		-	CR	CRASH TYPE	PE			-			ŀ		
	DAY	≻ .	NITE	ш	N. S.		DRY		WET		N.S.		L.T.	_	R.T.	Angle	le 1	Rear-end	pu	Head On	_	S. S.		F.O.	Bac	Backing	Other	-ie	TOTAL	
	PDO	I/F	PDO	I/F	PDO	I/F F	PDO	I/F PI	PDO I	I/F PI	PDO I/F	F PDO) I/F	PDO	1/F	PDO	1/F	PDO	I/F P	PDO I/F	F PDO	0 I/F	: PDO	J/I	PDO	I/F	PDO	I/F PI	PDO I/	I/F
2002	10	3	3			-	8	-	2	2	_	1	- 1	•	-	-		12	2	-	_		1 -			-			13	3
2003	14	4	1		1	-	7	3	6	1			1	-				12	3		1	3	•			-		-	16	4
2004	8	2	1			-	9	2	3	_	_		1 1	_		-	-	7	-	_		1	_	'		-		-	6	2
TOTAL	32	6	5	Ī	1	-	21	5	17	3	H	1	3 1	-			-	31	9		1	4	1 -	Ŀ	Ŀ	-			38	6
3 yr AVG.	11	3	2	ī	0	H	7	2	9	_	H		1 0	-	-		-	10	2	H	0	1	- 0	_	-	-		•	13	3
	RE	COMME	NDED	IMPRO	RECOMMENDED IMPROVEMENTS	s				CRAS	SH TYPE					PDO	PDO CRASHES	ES						Ň	INJ FAT. CRASHES	CRAS	HES			
-	(56) F	Resurfa	ce -	Urban ((56) Resurface - Urban section > 2 lane	> 218	ıne						R 1	R2	R3	R4	RT A	AVG PDO		EST. RED.	R	R2	R3	R4	RT	AVG II	AVG INJ-FAT	E	EST. RED.	
2.	(22)	Jpgade	exis	ting sig	(22) Upgade existing signal - general	enera		تا	Left Turn				0.42	0.20	-		88		8	0	0.58 0.46	16 0.20	-	0	0.61			0.33	0	0.20
က်	(1) U	ograde	pave	ment r	(1) Upgrade pavement markings	St		2	Right Turn	_ [0.42	0.20	0.10		0.58		-		0.46	16 0.20	0.10	0	0.61				ļ .	,
4								Ā	Angle				0.42	0.20	0.10		0.58		-		0.46	16 0.20	0.10	0	0.61					,
5.								ď	Rearend				0.42	0.20	0.10		0.58	=	10.33	9	6.02 0.46	16 0.20	0.10	0	0.61			2.00		1.22
								ĬŢ	Head On				0.42	0.20	0.10		0.58			[0.46	16 0.20	0.10	0	0.61			0.33	0	0.20
7.								Ś	Side Swipe	ā			0.42	-	0.10		0.58		1.33	0	0.78 0.46	—	0.10	6	0.61			0.33	0	0.20
œί								证	Fixed Object	ect			0.42	┡	0.10		0.58		,		0.46	16 0.20	0.10	G	0.61				ľ	,
																			-										ľ	,
																									-				Ċ	
								Ц						ESTIM/	TED PD	ESTIMATED PDO CRASH REDUCTION	H REDU	CTION	H	7.	7.38	ESTIN	AATED II	ESTIMATED INJ FAT.		SH RED	CRASH REDUCTION		1.	1.83
														AD	ADT Factor															
Project Service Life	ce Life					20 years	ears																							
Present ADT (PADT)	(PADT)				34	34,111						Ave	Average ADT	<u> </u>	(PADT	(PADT + FADT)/2)/2 = (34,111.00	1.00	7	13,223.0	43,223.00)/2	п	38,667.00					
Future ADT (FADT)	(FADT)				43	43,223						ADT	ADT Factor =	II.	Avera	Average ADT / PADT =	PADT =	ıl	38,667.00	7.00.7	[]	34,111.00	။ [၉		1.13					
													Aver	A one	Jeine	Average Annual Renefite	u u													
Annual PDO Benefits ≡ Estimated PDO Crash Reduction * Avg PDO Cost	OC Ber	= Stite	Fstir	nated	PDO C	rash F	Seduct	A voi	Va PD	S	+=		Ž	age A	2		Q.	"		7	* 28			2 500	11		18	18 443		
Annual INJ-FAT, Benefits = Estimated INJ-FAT, Crash Reduction * Ava INJFAT, Cost	JFAT	. Bene	fits =	Estima	ated IN	J-FA	Cras	sh Red	uction	* Ava	INF.	AT. Co	st					II	I	1	1.83			67.900	_		124	124.501		
Total Benefits	efits)									1		ı						142	142,944		
Average Annual Benefits = Total Benefits * ADT Factor	\nnual	Benefi	ts = 1	otal Bo	enefits	* AD	T Fact	ō										II	ı	_	1.13			142,944	II		162	162,036		
																										ı			ı	
														Rate (Rate of Return	E														
Project Cost	ost	L	Ċ	+						€ 6		2,407,	2,407,000.00	_							C			·	Š					
Maintenance and Energy Costs Salvage Value	nce an ⁄alue	d Ener	g S	SIS						e e		1,000.00	ماد						-	Kate of Return	Retur	_			3%					
)										1			ı																	
																										l				7

· Figure-14 - Medium-Term Recommendation Diagram:



8.0 Conclusions:

The Montrose West Ave. / Crystal Lake Rd. and S.R. 18 intersection is located in Summit County, in Copley and Bath Townships. Montrose West Ave. / Crystal Lake Road has a north-south orientation and is classified as a 2-lane urban local road. S.R. 18 is oriented east-west and is classified as a 5-lane urban principal arterial. The intersection is signalized with protected / permissive left-turn phasing for S.R. 18 with the northbound and southbound phases being split. The south approaches consist of right turn lane and a thru-left lane. The north approach consists of a thru-right lane and two left turn lanes. The east approach consist of two thru lanes a right turn lane and a left turn lane. The west approach consists of two thru lanes and a left turn lane. The intersection is surrounded by a mixed commercial, business, and residential area and is within close proximity to the S.R. 18 / IR 77 interchange. The northeast corner is developed with an office building. The northwest corner is developed with a large wellness center. Although the southern corners are undeveloped, Montrose West Avenue is developed with retail business in close proximity to the intersection. The intersection has an AADT of 49,846 vehicles, and has experienced 79 crashes in the three year analysis, for a crash rate of 1.45

The crash analysis revealed two distinct crash patterns at this intersection. The first observed pattern was the frequency of rear-end crashes. Rear-end crashes are typical at signalized intersections. This is the most significant pattern of crashes at this intersection (39 of 79). Between 2002 and 2004, 8 of these crashes resulted in injury. The problem is especially distinct on the east and west approaches. Based upon the capacity analysis and field observations, congestion is the most significant factor contributing to the number of rear-end accidents at this location. Countermeasures identified to address the rear end accident problem are to relocate Montrose West Avenue to Heritage Woods, and add capacity to Heritage Woods through additional turn lanes as well as adding capacity to S.R. 18 by adding additional thru lanes.

The second pattern identified was a high number of left-turn crashes. Based on field observations, one to two through vehicles frequently continue through the intersection after the onset of the red, often accelerating in the process. This situation creates a crash hazard with opposing left turning vehicles, which are waiting in the intersection for a gap in traffic. Also, with the volume of opposing through vehicles on each approach, there are very few acceptable gaps during the permissive phase during peak hours of traffic. These two situations indicate that the major contributing factor leading to left-turn crashes is congestion. The countermeasures identified to address this problem are to relocate Montrose West Avenue to Heritage Woods, and add capacity to Heritage Woods through additional turn lanes as well as adding capacity to S.R. 18 by adding additional thru lanes and dual left turn lanes onto Crystal Lake Road and Heritage Woods Drive.

The short-term approaches to addressing the crash problem at this intersection are to coordinate Crystal Lake/Montrose West and Heritage Woods Drive for optimal performance to reduce the congestion at the intersection. However due to the close spacing of the two intersections, approximately 600 ft between them, and the congestion experienced at this location it is a common occurrence for the EB Crystal Lake Road intersection and the WB Heritage Woods intersection to experience very large Queue lengths and spill back past the adjacent intersections. Even with the optimal timings and coordination at these two intersections the congestion continues to be too heavy for the capacity available and the Intersections still operate at unacceptable Levels of Service. Due to this heavy congestion situation there is no viable

short-term solution that adequately addresses the crash problem without capacity improvements, therefore no short-term recommendation can be made at this time.

The rate of return for the short-term was not evaluated since as previously stated no short-term recommendation is available at this time. The rate of return for the medium-term countermeasure is positive at 8 percent for the Crystal Lake intersection and 3 percent for the Heritage Woods intersection for a combined rate of return of 11 percent total. This positive rate of return indicates a viable solution to address the crashes at the intersection. No long-term countermeasure is being recommended because of the extensive improvements that can be addressed in the medium term recommendation. Since the congestion at the location requires an extensive multifaceted group of improvements such as a road relocation and roadway widening to remedy the crash problem, there are no further improvements identified that are not already included as part of the medium term recommendation.

9.0 Recommendations:

The short-term recommended improvements are:

None Recommended

The medium-term recommended improvements are:

- Increase capacity (widen roadway).
- Add dual left turn lanes on EB and WB approaches
- Relocate Montrose West Ave. to Heritage Woods Intersection.
- Optimize Signal timings
- Upgrade pavement markings

The long-term recommended improvements are:

None Recommended.

10.0 Appendix:

PHOTOS

Crystal Lake southbound cross corner site distance facing east-photo 1.



Crystal Lake southbound cross corner site distance facing west- photo 2.



Crystal Lake southbound approach at 200 feet- photo 3.



Crystal Lake southbound approach at 600 feet- photo 4.



Crystal Lake southbound approach at 1000 feet- photo 5



S.R. 18 westbound cross corner site distance facing south- photo6.



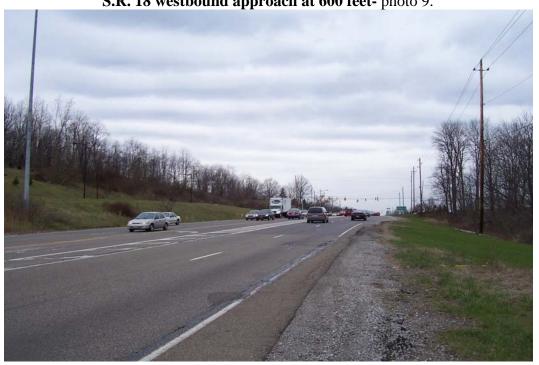
S.R. 18 westbound cross corner site distance facing north-photo 7.







S.R. 18 westbound approach at 600 feet- photo 9.



S.R. 18 westbound approach at 1000 feet- photo 10.



Montrose West northbound cross corner site distance facing west-photo 11.







Montrose West northbound approach at 200 feet- photo 13

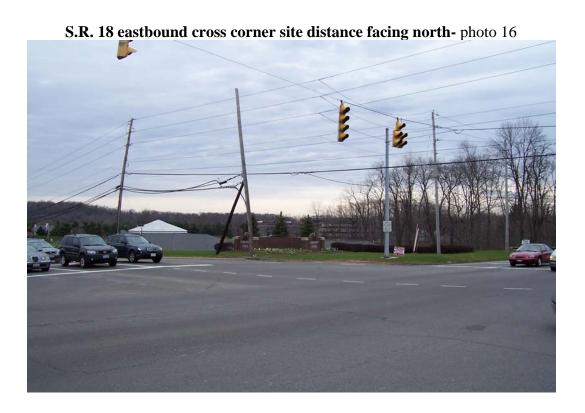


Montrose West northbound approach at 600 feet- photo 14



Montrose West northbound approach at 1000 feet- photo 15





S.R. 18 eastbound cross corner site distance facing north- photo 17



S.R. 18 eastbound approach at 200 feet- photo 18



S.R. 18 eastbound approach at 600 feet- photo 19



Heritage Woods northbound cross corner site distance facing west- photo 20



 $\textbf{Heritage \underline{Woods northbound cross corner site distance facing east-} \ photo \ 21$



 $\textbf{Heritage Woods northbound approach at 200 feet -} \\ \textbf{photo 22}$



PHOTOS

 $\textbf{Heritage Woods northbound approach at 600 feet -} \ photo \ 23$



Heritage Woods northbound approach at 1000 feet - photo 24



S.R. 18 eastbound cross corner site distance facing north- photo 25





S.R. 18 eastbound approach at 200 feet - photo 27







 $\textbf{S.R. 18 eastbound approach at 1000 feet -} \ photo \ 29$



Akron General Driveway southbound cross corner site distance facing east- photo 30



 $\textbf{Akron General Driveway southbound cross corner site distance facing west-} \ photo \ 31$







S.R. 18 westbound cross corner site distance facing south- photo33







S.R. 18 westbound approach at 600 feet - photo 35



 $\textbf{S.R. 18 westbound approach at 1000 feet -} \ photo \ 36$



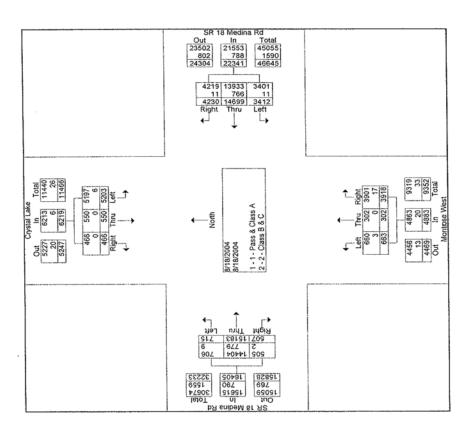
Turning Count Data:

File Name: SU 72 (2004)
Site Code: 00000000
Start Date: 08/18/2004
Page No:

kron Metro. Area sportation Study 806 Citicenter 7-46 S. High St. Akron, Ohio 44308 (330) 375-2436

SR 18 Medina Rd & Crystal Lake Rd AM & PM Counters: DP & MA

Akron Metro. Area



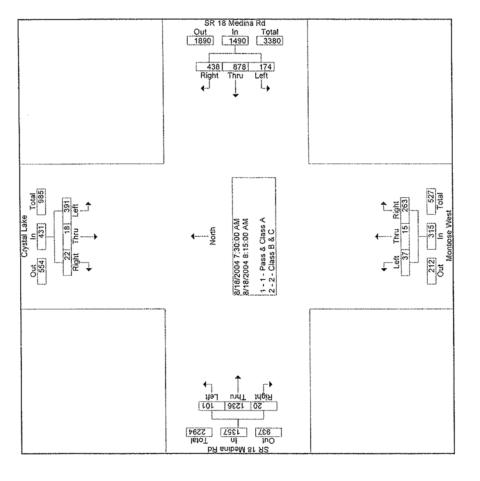
Seasonally Adjusted Intersection Volume = 49,849 24 Hour Expanded Count

Akron Metro. Area

806 Citicenter , 146 S. High St. Akron, Ohio 44308 (330) 375-2436

SR 18 Medina Rd & Crystal Lake Rd AM & PM Counters: DP & MA

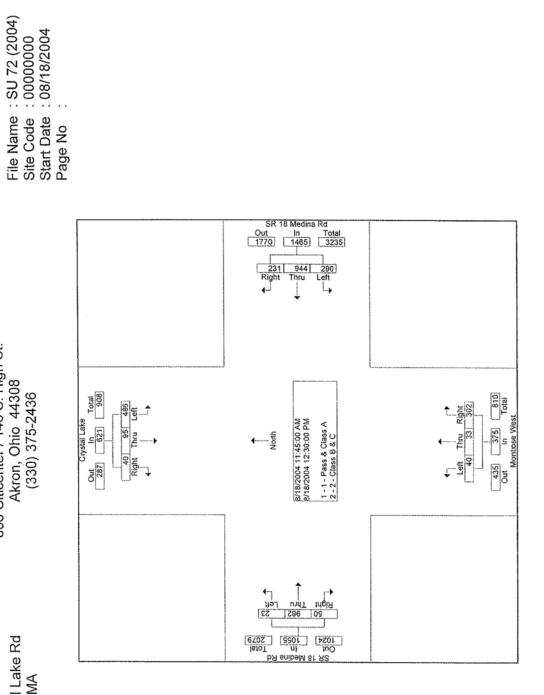
File Name : SU 72 (2004) Site Code : 00000000 Start Date : 08/18/2004 Page No :



AM Peak Hour: 7:30 - 8:30 Intersection Volume = 3,593

SR 18 Medina Rd & Crystal Lake Rd AM & PM Counters: DP & MA

on Metro. Area sportation Study 806 Citicenter / 146 S. High St. Akron, Ohio 44308 (330) 375-2436 Akron Metro. Area



Midday Peak Hour: 11:45 - 12:45 Intersection Volume = 3,516

Akron Metro. Area sportation Study 806 Citicenter / 146 S. High St. Akron, Ohio 44308

(330) 375-2436

SR 18 Medina Rd & Crystal Lake Rd AM & PM Counters: DP & MA

File Name: SU 72 (2004) Site Code: 00000000 Start Date: 08/18/2004 Page No:

| Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Section | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Coverage | Co

PM Peak Hour: 4:45 - 5:45 Intersection Volume = 4,492

Akron Metro. Area nsportation Study 806 Citicenter / 146 S. High St. Akron, Ohio 44308 (330) 375-2436

SR 18 Medina Rd & Crystal Lake Rd AM & PM Counters: DP & MA

File Name: SU 72 (2004)
Site Code: 00000000
Start Date: 08/18/2004
Page No:

Weather: Sunny and warm

		Cryst	Crystal Lake Southbound			SR 18 Medina Rd Westbound	edina Rd ound	SR 18 Medina Rd Montrose V Westbound Northbou		Montrose West Northbound	se West oound		D. Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Control of the Con	SR 18 M East	SR 18 Medina Rd Eastbound		
Start Time	Left	Thru	Right	App.	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	int. Total
Factor	10	10	10		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
07.00	57	6	33	63	12	195	68	275	2	2	43	47	∞	214	9	227	612
07:15	78	4	0	84	17	223	80	320	4		61	99	œ	272	က	285	755
07:10	124	٠,	l (C	133	58	204	107	340	10	က	79	95	34	305	S	341	906
20.70	5 0	ט ע	4	5 6	42	229	159	430	7	_	74	88	33	296	2	331	948
Total	349	15	15	379	100	851	414	1365	23	13	257	293	83	1084	17	1184	3221
00.00	,	1	4	120	23	215 20		355	00	2	49	29	17	342	9	365	806
00.00	2 2 2	۰ ۳	2 ^	270	3 6	230		365	12	n	61	192	17	296	7	320	831
06:30	0 0	" (7 6	5 5	8 8	193/		313	: ;	(C)	43	22	15	227	9	248	709
08.45	0 0	- v	o (c	105	09	191	109	360	3	က	41	22	14	250	7	271	793
Total	358	16	21	395	209	829		1393	44	-	194	249	63	1115	56	7.599	3241
*** BREAK ***				1 1 24													
11.00	102	14	ď	770	44	201	62	307	œ	က	33	44	2	224	5	234	704
0.1.	132		00	137	27	196	62	285	œ	_	37	46	12	211	10	233	701
2.5	100	24	1 00	123	57	230	45	332		2	49	62	က	215	Ø	226	743
11.45	155	16	10	181	7	216	62	349	10	4	22	69	10	313	=	334	933
Total	490	47	23	560	199	843	231	1273	37	10	174	221	30	963	34	1027	3081
12:00	Ö	35	41	147	83	248	63	394	4	4	62	10/	4	206	12	222	833
12.45	7 0 7	3 5	. ć.	146	6 6	245	52	358	12	14	96	122	က	221	16	240	. 866
12:30	1 0	25	e co	147	75	235	54	364	14	11	88	114	9	242	#	528	884
12:45	83	12	, =	106	67	242	101	410	17	13	86	128	14	252	O	275	918
Total	414	91	41	546	286	970	270	1526	47	42	345	434	- 27	921	84	2000	3502
*** BREAK ***				3011				1117									
16.00	125	6	17	151	74	284	64	422	4	80	99	71	13	222	13	248	892
16.15	134	10	200	162	61	317	38	416	12	က	63	78	7	291	13	311	96
16:30	108	n	7	122	20	268	42	360	56	9	72	104	13	367	∞ (388	974
16:45	120	10	13	143	83	368	69	530	12	2	67	81	B	282	5	303	CO.
Total	487	32	69	929	278	1237	213	1728	54	19	261	334	42	1165	43	1250	3890
17:00	148	15	25	188	80	344	63	487	4	2	100	116	14	351	o ;	374	1165
17:15	163	15	17	195	9	383	80	554	14	2	72	91	12	263	10	288	1128
17:30	66	21	19	139	94	405	86	585	17	7	87	77	·- !	282	17	307	1142
17:45	119	24	13	156	103	340	73	516	13	6	28	80	1/	607	9	787	1044
Total	529	75	74	678	368	1472	302	2142	. 28	23	317	398	21	1158	46	753	44/8
Grand Total	2627	276	233	3136	1440	6202	1785	9427	263	118	1548	1929	302	6406	214	6922	21414

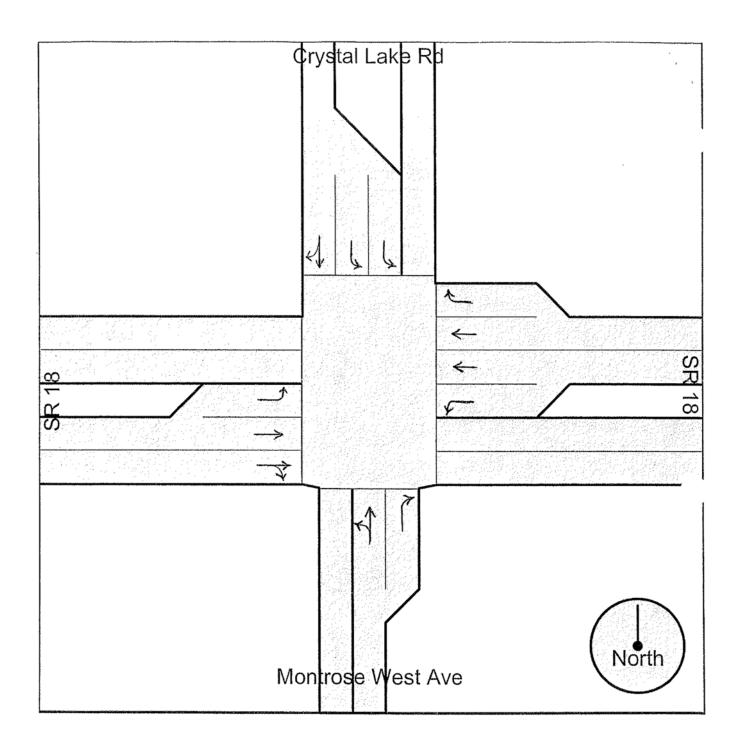
3.1 92.5 29.9 4.4 18 Medina Rd In Total 9094 19338 333 670 9427 20008 Out 10244 337 10581 9.0 1780 5879 1435 5 323 5 1785 6202 1440 Right Thru Left 80.2 7.2 6.1 13.6 3846 13 3859 Total 8/18/2004 7:00:00 AM 8/18/2004 5:45:00 FM Montrose West Crystal Lake 3133 3 1 - Pass & Class A 2 - Class B & C 276 1929 In 1922 North 233 0 233 Right 1924 6 1930 Out Out 2196 9 2205 18.9 8.3 65.8 29.0 213 6078 1 328 214 6406 Right Thru 302 4 302 7 7 7 15.3 14.6 27 18 Medina Rd 17 10 10 17 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 18 10 12963 657 13620 100 \$26 \$26 \$26 Data from all hours manually counted 7.4 8.8

.)

83.8 12.3

Appr Tot_c

Plot of all hours manually counted 7:00 - 9:00 AM and 4:00 - 6:00 PM



09/28/04

AMATS 806 CitiCenter; 146 S. High St. Akron, Ohio 44308 (330) 375-2436

Page:

*** Basic Count Print (#302) *** ************************ Site ID : Crystal Lake Rd SB (SU 72) Data Starts : 00:00 on 08/18/ Info 1 : Data Ends : 23:45 on 08/18/ Info 2 : Adj. Factor : 1.000% Lane #1 Info : SB ******************* Lane 1 Basic Count Print **************** Date Time :00 :15 :30 :45 Total 08/18/04 00:00 01:00 02:00 1 6 03:00 04:00 05:00 15 19 06:00 07:00 08:00 09:00 10:00 115 102 119 104 12:00 128 130 114 13:00 14:00 15:00 103 84 132 16:00 17:00 230 177 137 143 115 98 18:00 19:00 20:00 21:00 22:00 7 11 23:00 Daily Total: 6693 Average Period: 69.0 AM Total : 2426 (36.2%) Average Hour : 278.9 PM Total : 4267 (63.8%) Peak AM Hour: 11:00= 582 (8.7%) Peak AM Factor: 0.909 Peak PM Hour: 16:30= 698 (10.4%) Peak PM Factor: 0.759 $7-9 762 774 24 HP EXP TACTOP = \frac{6693}{3151} = 2.12$ 4-6 1299 1256 5.1.F. = 0.93

1,98

09/28/04

AMATS 806 CitiCenter; 146 S. High St. Akron, Ohio 44308 (330) 375-2436

Page:

GRAND TOTALS

Grand Total : 6693 Average Period: 69.0 # Of Days : 1.01 ADT : 6624 AVERAGE Hour : 278.9 PM Total : 4267 (63.8%)

Peak AM Hour: 11:00= 582 (08/18/04) Peak AM Factor: 0.000

Peak AM Hour: 11:00= 582 (08/18/04) Peak AM Factor: 0.909 Peak PM Hour: 16:30= 698 (08/18/04) Peak PM Factor: 0.759 09/28/04 13:44:19

AMATS 806 CitiCenter; 146 S. High St. Akron, Ohio 44308 (330) 375-2436

Page:

*** Basic Count Print (#302) *** ********************** Site ID : SR 18 WB (SU 72) Data Starts: 00:00 on 08/18/0 Info 1 : Data Ends : 23:45 on 08/18/0 Adj. Factor : 1.000% Info 2: ******************************* Lane #1 Info : WB Lane Mode : Normal Sensor Used : Axle ********************** *********************** Lane 1 Basic Count Print ***************** Date Time :00 :15 :30 :45 Total ------08/18/04 00:00 57 39 51 36 01:00 27 34 25 33 02:00 23 34 20 22 119 03:00 1.5 9 22 12 43 56 04:00 23 23 05:00 50 84 87 85 06:00 132 176 212 253 340 371 07:00 284 430 1425 371 379 330 300 08:00 411 1536 1222 375 09:00 311 281 337 1308 344 1346 10:00 297 329 337 309 370 344 345 11:00 323 366 354 383 1489 439 408 394 1648 12:00 386 13:00 407 406 14:00 402 370 415 1593 443 435 461 436 553 523 452 369 15:00 443 439 1760 513 16:00 1835 425 17:00 474 18:00 482 553 452 475 2025 371 1674 369 285 1268 326 310 19:00 347 20:00 285 1205 328 291 301 288 256 232 21:00 184 960 22:00 165 130 146 106 547 23:00 120 77 68 71 336 Daily Total : 24860 Average Period: 256.3 AM Total : 8520 (34.3%)

PM Total : 16340 (65.7%)

Peak AM Hour: 07:45= 1591 (6.4%)

Peak PM Hour: 16:45= 2063 (8.3%) Average Hour : 1035.8 Peak AM Factor: 0.925 Peak PM Factor: 0.933 7-9 2961 2758 24 HR. EXP FACTOR - 34860 11-1 2835 2797 24 HR. EXP FACTOR - 9656 = 2,57 4-6 3860 3870 9656 9427 5.A.F. = 0.972

* (237) * USE THIS VALUE IS ET THE ALGO, ET GOVERN HOSE DEVELOPED A HOLE. 09/28/04 13:44:19

AMATS 806 CitiCenter; 146 S. High St. Akron, Ohio 44308 (330) 375-2436

Page:

GRAND TOTALS

Average Hour : 1035.8

Grand Total : 24860 Average Period: 256.3 # Of Days : 1.01 AM Total : 8520 (34.3%) : 24604

PM Total : 16340 (65.7%)

Peak AM Hour: 07:45= 1591 (08/18/04) Peak PM Hour: 16:45= 2063 (08/18/04) Peak AM Factor: 0.925 Peak PM Factor: 0.933 09/28/04 13:57:31

AMATS 806 CitiCenter; 146 S. High St. Akron, Ohio 44308 (330) 375-2436

Page:

*** Basic Count Print (#302) ***

************************* Site ID : Montrose West NB (SU 72) Data Starts: 00:00 on 08/18/0 Info 1: Data Ends : 23:45 on 08/18/0 Info 2: Adj. Factor: 1.000% Lane #1 Info : NB Lane Mode : Normal Sensor Used : Axle ******************* Lane 1 Basic Count Print **************** Date Time :00 :15 :30 :45 Total 08/18/04 00:00 7 13 35 01:00 7 2 7 25 02:00 3 1 1 6 03:00 2 3 4 13 3 0 1 5 10 18 0 04:00 1 05:00 11 22 31 06:00 33 54 140 64 07:00 71 105 85 325 08:00 58. 63 60 51 232 48 09:00 54 58 37 60 60 45 10:00 36 201 82 39 42 220 99 121 81 12:00 110 411 103 13:00 118 109 83 413 14:00 68 91 55 64 278 15:00 73 295 316 83 69 70 79 16:00 72 82 17:00 94 98 94 73 359 18:00 99 64 97 95 355 392 19:00 94 104 78 116 66 321 20:00 92 79 84 87 64 21:00 50 53 254 22:00 55 31 32 32 150 27 23:00 21 25 16 89 Daily Total : 5076 Average Period: 52.3 AM Total : Average Hour : 211.5 1443 (28.4%) PM Total 3633 (71.6%) Peak AM Hour: 07:00= 325 (6.4%) Peak AM Factor: 0.774 Peak PM Hour: 12:30= 452 (8.9%) Peak PM Factor: 0.934 MECH, MONUAL 7-9 557 542 24 HR, EXP FACTOR = 5076 = 2,72 4-6 675 5, A.F. = 0.93

61

2.53

09/28/04 13:57:31

AMATS 806 CitiCenter; 146 S. High St. Akron, Ohio 44308 (330) 375-2436

Page:

GRAND TOTALS

Grand Total : 5076 Average Period: 52.3 # Of Days : 1.01
AM Total : 1443 (28.4%)
PM Total : 3633 (71.6%)
Peak AM Hour: 07:00= 325 (08/18/04)
Peak PM Hour: 12:30= 452 (08/18/04) ADT : 5024 Average Hour : 211.5

Peak AM Factor: 0.774 Peak PM Factor: 0.934

07/13/04		Ohio De	17077 partment of Transportation Page:
12:13:44		Traffic	e of Technical Services Section - 2nd Floor North olumbus, Ohio 43223 (614) 466-3727
		*** Count D	ump with 24hr Totals (#309) ***
*****	******	************** oo (costal lake A	**************************************
Site ID :			Data Starts : 02:00 on
06/29/04 Info 1: 06/30/04			Data Ends : 01:00 on
	*****	****	Adj. Factor : 1.000%
Lane #1] Lane Mode	: :	Normal	Sensor Used : Axle
******	*****	****** Lane 1 C	ount Dump with 24hr Totals
Date	Time	#1	
Record In			
06/29/04		1854	
Tue	03:00	1725	
	04:00	1897	
	05:00	1908	
	06:00	1907	
	07:00	1375	
	08:00	1243	
	09:00	817	
	10:00	494	
	11:00	291	
	12:00	175	
	13:00	106	
	14:00	45	
	15:00	46	
	16:00	47	
-	17:00	224	
	18:00	867	

Page 1

疳)

07/13/04 1		Ohio	Department of Transportation Page:
12:13:44		Of Traf	fice of Technical Services fic Section - 2nd Floor North Columbus, Ohio 43223 (614) 466-3727
		*** Coun	t Dump with 24hr Totals (#309) ***
***	*****	*****	*********************
Site ID: 06/29/04	00000001	.7077	Data Starts : 02:00 on
Info 1: 06/30/04			Data Ends : 01:00 on
Info 2:	****	******	Adj. Factor : 1.000%
Lane #1 I Lane Mode	: Nor		Sensor Used : Axle
*******	*******	**** Lane	1 Count Dump with 24hr Totals
Date	Time	#1	
Record Ir	nterval: 0	01:00	
06/29/04	02:00	1854	
Tue	03:00	1725	
	04:00	1897	
	05:00	1908	
	06:00	1907	
	07:00	1375	
	08:00	1243	
	09:00	817	
	10:00	494	
	11:00	291	
	12:00	175	
	13:00	106	
	14:00	45	
	15:00	46	
	16:00	47	
	17:00	224	
	18:00	867	

Page 1

1	7	0	7	7	
---	---	---	---	---	--

19:00	1601
20:00	1716
21:00	1593
22:00	1781
23:00	2009
Record Interval:	01:00
06/30/04 00:00	2057
Wed 01:00	1827
24HR TOTAL	27605

Page 2

Operational Analysis:

						HCS	S+'	DETA	۱IL	.ED R	EF	PORT								
General Inform									100			rmatior	7							
Analyst	B&N									Interse	ctio	on		Cryst	al Lake Ro	oad	and SI	R 18		
Agency or Co.									1	Area T	ype	е		CBD	or Similar					
Date Performed									1	Jurisdi	ctic	on		ODO	Τ					
Time Period /	AM PeaK - E	x:st	ing 1	, w	ing				1	Analys	is '	Year		200	6					
									F	Project	ID)		Sum-	18-Corrido	or S	tudy			
Volume and Ti	iming Input																			
					EB					WB	_		4		NB	_			SB	
			LT	4	TH	RT		LT	4	TH		RT	4	LT	TH	_	RT	LT	TH	RT
Number of Lane	9S, N1		1		2	0		1	4	2	_	1	4	0	1	L	1	2	1	0
Lane Group			L	_ļ_	TR	ļ		L	_	T		R	_ļ_		LT	丄	R	L	TR	
Volume, V (vph)		83	4	1506	17		100	_	739	_	414	4	23	13	╽.	257	349	15	15
% Heavy Vehic	les, %HV		5	_ļ_	5	5		5	_	5		5		2	2	L	2	2	2	2
Peak-Hour Fact			0.90		0.90	0.90		0.90	4	0.90	_	0.90	4	0.90	0.90	0	.90	0.90	0.90	0.90
Pretimed (P) or			A	4	Р	P		A	4	P	_	Р	4	P	P	_	Р	P	P	P
Start-up Lost Ti			2.0	-	2.0	<u> </u>		2.0	_	2.0		2.0	4		2.0	2	2.0	2.0	2.0	
Extension of Ef	fective Green, e		2.0	4	2.0	<u> </u>		2.0	_	2.0		2.0	_		2.0	2	2.0	2.0	2.0	
Arrival Type, A	Г		3	_	3	<u> </u>		3	_	3		3			3		3	3	3	
Unit Extension,			3.0	4	3.0			3.0	_	3.0		3.0	_		3.0	3	3.0	3.0	3.0	
Filtering/Metering	ng, I		1.000		1.000	<u> </u>		1.000		1.000		1.000			1.000	1	.000	1.000	1.000	
Initial Unmet De	emand, Q _b		0.0		0.0	<u> </u>		0.0		0.0		0.0			0.0		0.0	0.0	0.0	
Ped / Bike / RT	OR Volumes		0		0	0		0		0		0		0	0		0	0	0	0
Lane Width			12.0	\perp	12.0			12.0		12.0		12.0	┙		12.0	1	2.0	12.0	12.0	
Parking / Grade	e / Parking		N		0	N		N		0		N		Ν	0		Ν	N	0	N
Parking Maneu	vers, Nm																			
Buses Stopping	g, Nв		0		0			0		0		0			0	Ι	0	0	0	
Min. Time for P	edestrians, Gp				3.2					3.2					3.2				3.2	
Phasing	Excl. Left	W	B Only		EW	Perm		0	4			SB Or	nly		NB Only		T	07		08
Timing	G = 5.0	G =	9.0		G = 5	6.0		G =			G	= 21.0	0	G	= 21.0		G =		G =	
Timing	Y = 4	Y =	6		Y = 6			Y =			Υ	= 6		Y	= 6		Y =		Y =	
Duration of Ana	alysis, T = 0.25													С	ycle Leng	th, C	0 = 14	40.0		
Lane Group Co	apacity, Control	Delay	y, and	Los	Deterr	ninatio	n													
		_			В		L			WB	_				NB				SB	,
Adjusted Flow I	Poto v		LT	TI		RT	-	LT		TH	_	RT	L	T	TH	_	RT	LT	TH	RT
Lane Group Ca		_	92	16			-	111		321	_	460			40	-	286	388	34	<u> </u>
v/c Ratio, X	ipacity, c		275	12			-	250	_	573	_	969			244	-	58	464	233	
Total Green Ra	atio a/C		.33	1.3			-	.44		52	_	.47			0.16	0.6		0.84	0.15	
Uniform Delay,			3.7	0.4 42.			-	.57	_	51	_	.70			0.15	0.3		0.15	0.15	
Progression Fa			.000	1.0			-	8.3		3.1	_	9.4			51.8	40		57.8	51.7	-
Delay Calibration			.11	0.5			-	.000	_	000 50	_	.000			1.000		000	1.000	1.000	
Incremental De			0.7	170			-	1.3	_	1.2	_	.50			0.50	0.5		0.50	0.50	
Initial Queue D		-	0.7	0.0			-	0.0		2.0	_	0.0			1.4	-	5.3	16.2	1.3	
Control Delay	oray, ug		24.4	212	—-		-	29.6		4.4	-				0.0		0	0.0	0.0	
Lane Group LO	os.		C C	- F			<u>-</u>	C C	_	4.4 C	_	11.1 B			53.3	-	6.6	74.1	53.0	
Approach Dela		-	202				-					0			D 7.4)	E	D 70.4	
Approach LOS		_	202 F				\vdash		0.4 C						7.4				72.4	
Intersection De		-					-		_	20			1		0				E	
	versity of Florida, All R	ighte Be	11					$X_c =$	1.0			ICS+TM V			on LOS				F	007 4:29 PM

						HCS	5+"	DETA	۱IL	.ED R	EΡ	ORT								
General Inform									_	-	_	mation								
Analyst	B&N								-	Interse				,	al Lake Ro	ad	and SI	R 18		
Agency or Co.									1	Area T	ype				or Similar					
Date Performed				~					1	Jurisdi	ctior	n		ODO						
Time Period	PM Peak -	£x.5	ting	1	Min	5			1	Analys	is Y	ear		200	56					
										Project	ID			Sum-	18-Corrido	or S	tudy			
Volume and Ti	ming Input												ļ							
				_	EB		4			WB			1		NB	_			SB	,
			LT	-	TH	RT	4	LT	4	TH	4	RT	+	LT	TH	ļ_	RT	LT	TH	RT
Number of Lane	9S, N1		1	_	2	0	4	1	4	_2	4	1	4	0	1	_	1	2	1	0
Lane Group			L		TR	-	4	L	4	T	4	R	+		LT	-	R	L	TR	
Volume, V (vph			57	_	1222	46	_	368	4	1529	4	302	4	58	23	-	317	529	75	74
% Heavy Vehic			5	_	5	5	4	5	4	5	4	5	-	2	2	+-	2	2	2	2
Peak-Hour Fac			0.90	(0.90	0.90	4	0.90	4	0.90	4	0.90	10	0.90	0.90	-	.90	0.90	0.90	0.90
Pretimed (P) or			A	_	P	P	4	A	_	P	4	P	4	<i>P</i>	P		P	P	P	P
Start-up Lost Ti			2.0		2.0	-	4	2.0	4	2.0	_	2.0	4		2.0	+	2.0	2.0	2.0	ļ
	fective Green, e		2.0	\dashv	2.0	 	4	2.0	4	2.0	4	2.0	+		2.0	-	2.0	2.0	2.0	
Arrival Type, A			3	_	3	_	4	3	4	3	-	3	+		3	+	3	3	3	
Unit Extension,			3.0		3.0	-	4	3.0	_	3.0	_	3.0	+		3.0	+-	3.0	3.0	3.0	
Filtering/Metering	-		1.000		1.000		4	1.000	4	1.000	-	1.000	+		1.000	+	.000	1.000	1.000	
Initial Unmet De			0.0	4	0.0	_	4	0.0	4	0.0	4	0.0	4		0.0	+	0.0	0.0	0.0	ļ
Ped / Bike / RT	OR Volumes		0	_	0	0	4	0	4	0	_	0	1	0	0	ļ_	0	0	0	0
Lane Width			12.0	_	12.0	_	4	12.0	4	12.0	_	12.0	4		12.0	+-	2.0	12.0	12.0	ļ
Parking / Grade			N		0	N	4	N	4	0	4	N	4	N	0	╙	N	N	0	N
Parking Maneu	vers, Nm			_			4		_		4		╀		<u> </u>	Ļ				
Buses Stopping	д, Nв		0		0		4	0		0		0	ļ		0		0	0	0	
Min. Time for P	edestrians, Gp				3.2		_			3.2	_				3.2		-		3.2	
Phasing	Excl. Left	W	B Only		EW	Perm	_	0)4			NB Onl	ly		SB Only			07		08
Timing	G = 10.0	G =	4.0		G = 5	6.0		G =			G	= 21.0		G	= 21.0		G =		G =	
	Y = 4	Y =	6		Y = 6	: 		Y =			Υ:	= 6		Y	= 6		Y =		Y =	
Duration of Ana	alysis, T = 0.25													C	ycle Lengt	h, C	C = 14	40.0		
Lane Group C	apacity, Control	Dela	y, and			ninatio	n													
		-	LT	TI	<u>B</u>	RT	<u> </u>	T [WB TH		RT	- 1.1	- 1	NB	_		1.7	SB	l pr
Adjusted Flow	Rate. v	\dashv	63	14		A1		09	_	699	_	36	L	· '	7H 90		RT 152	LT 588	TH 165	RT
Lane Group Ca		-	162	12			-	50	_	462	-	60				_				
v/c Ratio, X		\dashv	.39	1.1	-		1.6		_	.16		39	_		243 0.37	1.	116	1.27	233 0.71	_
Total Green Ra	atio, g/C		.47	0.4			0.5			.47	-	62			0.15	0.2		0.15	0.77	
Uniform Delay,			0.4	42.	_		45		_	7.0	-	3.2			53.5	54		59.5	56.6	_
Progression Fa	<u> </u>		.000	1.0			-	000	_	.000		000			1.000		000	1.000	1.000	
Delay Calibration			.11	0.5			0.5		_	.50	_	50			0.50	0.5		0.50	0.50	
Incremental De			1.5	74	_		-	3.7		30.9		.3			4.3	_	4.9	136.5	16.6	<u> </u>
Initial Queue D		\dashv	0.0	0.0			0.		_	0.0	ļ	.0			0.0		0	0.0	0.0	
Control Delay			32.0	116	-		-	19.2		17.9	-	4.6			57.8		39.4	196.0	73.2	
Lane Group LC	os	_	C	F				=	_	F		3			E		=	F	E	
Approach Dela		\dashv		2.4					2.4					12	2.8		-	-	169.1	J
Approach LOS	*	\dashv		=					F						=				F	
Intersection De		_		6.0			_	X _c =		72			Inte		on LOS				 F	
	iversity of Florida, All R	ights Re						6			н	CS+™ Ve				-		Genera	ited: 4/19/20	07 4:31 PM

	-				HCS	+~ DET	AILED	RE	PORT								
General Inform	ation					100	Site	Info	rmation								
Analyst	B&N						Inter	rsecti	ion	Cry	rstal	Lake Ro	ad a	and Si	7 18		
Agency or Co.							Area	а Тур	e	CB	D or	Similar					
Date Performed			_				Juris	sdicti	on	-	ОТ	_					
Time Period	AM Pen	K - 1	Exis	tins 1	inju	ر ک	Anal	lysis	Year	20	03	0					
							Proje	ect I)	Sui	m-18	3-Corrido	r St	udy			
Volume and Ti	ming Input																
				EB			V	VB	,			NB				SB	
			LT	TH	RT	LT	T	Н	RT	LT		TH	F	RT.	LT	TH	RT
Number of Lane	es, N ₁		1	2	0	1	2	!	1	0		1		1	2	1	0
Lane Group			L	TR		L	T	•	R			LT		R	L	TR	
Volume, V (vph))		450	1880	20	170	89	90	550	40		20	2	260	550	20	150
% Heavy Vehicl	es, %HV		5	5	5	5	5		5	2		2	2	2	2	2	2
Peak-Hour Fact	or, PHF		0.90	0.90	0.90	0.90	0.9	90	0.90	0.90)	0.90	0.	90	0.90	0.90	0.90
Pretimed (P) or	Actuated (A)		A	P	P	Α	Р	,	Р	P		Р	1	Þ	Р	P	Р
Start-up Lost Tir	me, Iı		2.0	2.0		2.0	2.0	0	2.0			2.0	2	.0	2.0	2.0	
Extension of Eff	ective Green, e		2.0	2.0		2.0	2.0	0	2.0			2.0	2	.0	2.0	2.0	
Arrival Type, AT	Г		3	3		3	3		3			3	1	3	3	3	
Unit Extension,	UE		3.0	3.0		3.0	3.0	0	3.0			3.0	3.	.0	3.0	3.0	
Filtering/Metering	ng, I		1.000	1.000		1.000	1.0	000	1.000			1.000	1.	000	1.000	1.000	
Initial Unmet De	emand, Qb		0.0	0.0		0.0	0.0	0	0.0	1		0.0	0	.0	0.0	0.0	
Ped / Bike / RTG	OR Volumes		0	0	0	0	0)	0	0		0	17	0	0	0	0
Lane Width			12.0	12.0		12.0	12.	.0	12.0			12.0	12	2.0	12.0	12.0	
Parking / Grade	/ Parking		N	0	N	N	0)	N	N		0	1	V	N	0	N
Parking Maneuv	vers, Nm												1				
Buses Stopping	J, Nв		0	0		0		0	0			0	✝	0	0	0	
Min. Time for P	edestrians, Gp			3.2			3.	.2				3.2				3.2	
Phasing	Excl. Left	l w	B Only	EV	V Perm	1 (04	T	SB On	ıly	1	NB Only		Ī	07	1 0	8
71	G = 5.0	G =	9.0	G =	56.0	G =			G = 21.0)	G=	21.0		G =		G =	
Timing	Y = 4	Y =	6	Y =	6	Y =		1	Y = 6		Y =	6		Y =		Y =	
Duration of Ana	lysis, T = 0.25	,									Cyc	cle Lengt	h, C	= 14	40.0		
Lane Group Ca	apacity, Control	Dela	y, and	LOS Dete	rminatio	n						3					
				EB			WB					NB				SB	
			LT	TH	RT	LT	TH	\Box	RT	LT		TH	R	Т	LT	TH	RT
Adjusted Flow F			500	2111		189	989		611		_	66	28	89	611	189	
Lane Group Ca	pacity, c		221	1238		250	1573		969			243	_	58	464	218	
v/c Ratio, X		2	.26	1.71		0.76	0.63	(0.63		- (0.27	0.6	3	1.32	0.87	
Total Green Ra		0	.44	0.40		0.57	0.51	(0.70		(0.15	0.3	32	0.15	0.15	
Uniform Delay,		4	8.0	42.0		41.7	25.0		11.3			52.7	40.	.4	59.5	58.1	
Progression Fa		1	.000	1.000		1.000	1.000)	1.000			1.000	1.0	000	1.000	1.000	
Delay Calibration	on, k	0	.50	0.50		0.31	0.50	(0.50		(0.50	0.5	0	0.50	0.50	
Incremental De		5	82.3	320.8		12.4	1.9		3.1			2.7	6	.5	157.2	34.2]
Initial Queue De	elay, d ₃	(0.0	0.0		0.0	0.0		0.0			0.0	0.0	0	0.0	0.0	
Control Delay		6	30.3	362.8		54.1	26.9		14.4			55.5	46	5.9	216.7	92.4	
Lane Group LO	S		F	F		D	С		В			E	D	,	F	F	
Approach Delay	у		414	4.0		2	25.5				48.	5				187.3	
Approach LOS			F	-			С				D					F	
Intersection De	lay		232	2.9		X _c =	1.61			Interse	ection	n LOS			1	F	
Copyright © 2005 Uni	versity of Florida, All R	Rights Re	eserved						HCS+™ V						Genera	ted: 4/19/20	07 6:53 P

68

Conoral Info	otlas					nuc)T	DETA	no houseanneamhan	CONTRACT.	PURI	100					Olympia parameter	us tomas, la intra-
General Inform	B&N								Inter	_	ormation		Crysta	l Lake Ro	ad and C	D 10		
Agency or Co.	Dan								Area				-	r Cake no or Similar	au anu S	n 10		
Date Performed	3/15/2006								Juris				ODOT					
Time Period	PM Peak	Ε.	-+:		Tim	ì na			1		Year		203					
Time Femou	FIT FEGIN	- 4^	(1311)	3		3			Proje	•				8-Corrido	r Study			
Volume and Ti	mina Innut								1110,0	1000			- Cum T	o-comac	Totady			
voidine and Th	iling input	T			EB				W	/B		T		NB			SB	
		ŀ	LT	Т	TH	RT	\dashv	LT	TI		RT	+	LT	TH	RT	LT	TH	RT
Number of Lane	s. Nı	\dashv	1	+	2	0	\dashv	1	2		1	╁	0	1	1	2	1	0
Lane Group	70,111			-	 TR	-	\dashv	L	1 T		R	+		LT	R	L	TR	1
Volume, V (vph))		180	-	1540	40	\dashv	360	20		390	+	60	20	330	680	60	260
% Heavy Vehicl			5	+	5	5	ᅱ	5	5		5	+	2	2	2	2	2	2
Peak-Hour Fact			0.90	+	0.90	0.90	\dashv	0.90	0.9	<u> </u>	0.90	+	2 0.90	0.90	0.90	0.90		-
	-		A	+-	P	P	\dashv	A	0.9 P		P 0.90	+	P.	P P	0.90 P	P 0.90	0.90 P	0.90 P
Pretimed (P) or Start-up Lost Ti			2.0	+	2.0	-	\dashv	2.0	2.0		2.0	+			 `		 	1 -
	fective Green, e		2.0	-	2.0 2.0		+	2.0	2.0			+		2.0	2.0	2.0	2.0	-
			3	+	3		+	3	3		2.0	+		2.0	2.0	2.0	2.0	-
Arrival Type, AT			3.0	+		-	\dashv		-		3	+		3	3	3	3	-
				-	3.0		4	3.0	3.0		3.0	+		3.0	3.0	3.0	3.0	
Filtering/Metering		\dashv	1.000	-	1.000	-	4	1.000	1.0		1.000	-		1.000	1.000	1.000	1.000	-
Initial Unmet De			0.0	4	0.0	 	-	0.0	0.0		0.0	+		0.0	0.0	0.0	0.0	
Ped / Bike / RT	OH Volumes	\dashv	0	+	0	0	-	0	0	_	0		0	0	0	0	0	0
Lane Width	/s		12.0	17	2.0	 	-	12.0	12.		12.0	- -		12.0	12.0	12.0	12.0	
Parking / Grade			N	-	0	N	4	N	0		N	-	N	0	N	N	0	N
Parking Maneu				4		ļ	_					-		<u> </u>		<u> </u>	ļ	<u> </u>
Buses Stopping	-		0		0		4	0			0			0	0	0	0	
Min. Time for P	edestrians, Gp			-	3.2		4		3.	2				3.2		1	3.2	
Phasing	Excl. Left	 	3 Only	_	EW	Perm	_	0	4	4	NB Or	nly		SB Only		07		08
Timing	G = 10.0	G = -	4.0	_	G = 5		_	G =			G = 21.0	0	G	= 21.0	G =		G =	
	Y = 4	Y = 6	6	_	Y = 6			Y =			Y = 6		Y :	= 6	Y =		Y =	
Duration of Ana	llysis, T = 0.25												Су	cle Lengt	h, C = 1	40.0		
Lane Group Ca	apacity, Control	Delay	, and L			ninatio	n											
			LT	Th		RT	-	LT	WB TH	Т	RT	L.	r	NB TH	RT	LT	SB	I DT
Adjusted Flow F	Rate. v		200	175		п	1	100	2311	+	433		'	89	367	756	356	RT
Lane Group Ca			62	123			-	250	1462	╅	860		-	242	316	464	221	-
v/c Ratio, X	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			1.42			-	60	1.58	+	0.50	_	\dashv	0.37	1.16	1.63	1.61	
Total Green Ra	tio a/C			0.40			1-	57	0.47	+	0.62			0.15	0.22	-		-
Uniform Delay,				42.0			-	3.0	37.0	+	14.6	_	_	53.5	54.5	0.15 59.5	0.15 59.5	-
Progression Fa		_		1.00			-	000	1.000	\dashv	1.000	—		1.000	1.000	1.000	1.000	
Delay Calibration				0.50			 	50	0.50	+	0.50	_	+	0.50	0.50	0.50	0.50	-
Incremental De				193			1-	38.0	264.6	+	2.1	-		4.3	101.9	292.9	294.9	-
Initial Queue De			.0	0.0			-	0.0	0.0	+	0.0	_	\dashv	0.0	0.0	0.0	 	
Control Delay	olay, uz	_		235			┼─	36.0	301.6	+	16.7	—	-			352.4	0.0 354.4	-
Lane Group LC	ns		F	235 F			-	50.0 F	301.6 F	+	B	_	-	57.8 E	156.4 F	352.4 F	354.4 F	-
Approach Dela							 				D					+-		
Approach LOS	<u></u>		231. F				\vdash		6.8 F				137	7.1 =		 	353.0	
Approach LOS							<u> </u>									 	F	
Intersection De	lav	1	261.	0				$X_c = i$	260			10-1-	A 17 -	on LOS			F	

HCS+" DETAILED REPORT

						HCS-	+" l	DET/	ΑIL	ED R	EP(ORT								
General Inform										Site In	forn	nation								
Analyst	B&N								- 1	Interse		n					and S	R 18 W	/ w.	Montrose
Agency or Co.									- 1	Area T					r Similai	-		Υ.	eloca	7.00
Date Performed										Jurisdi				ODOT						
Time Period	AM Peak									Analys		ear	•	1030	•					
										Project	: ID			Sum-1	8-Corria	lor S	tudy			
Volume and T	iming Input		1				_													
					EB		4			WE	3		4		NB	_			SB	
			LT	4	TH	RT	4	LT	_	TH	_	RT	<u> </u>	LT	TH		RT	LT	TH	RT
Number of Lan	es, N1		2	_	3		4			3	_	1				_ļ_		2		1
Lane Group			L	4	T	ļ	4			T		R						L		R
Volume, V (vph	1)		470	_	2140	ļ	_			1060		550						550		170
% Heavy Vehic	les, %HV		5		5					5		5						2		2
Peak-Hour Fac	tor, PHF		0.90		0.90					0.90		0.90						0.90		0.90
Pretimed (P) or	Actuated (A)		Α		Р					P		Р						P		P
Start-up Lost T	ime, Iı		2.0		2.0					2.0		2.0						2.0		2.0
Extension of Ef	fective Green, e		2.0		2.0					2.0		2.0				\neg		2.0		2.0
Arrival Type, A	Т		3		3					3	1	3	\neg			\dashv		3		3
Unit Extension,	UE		3.0	\neg	3.0		ヿ			3.0	\neg	3.0	_			1		3.0		3.0
Filtering/Meteri	ng, I		1.000		1.000		寸		_	1.000	7	1.000	\neg			\top		1.000		1.000
Initial Unmet D			0.0	十	0.0	<u> </u>	┪			0.0	\dashv	0.0	_			_		0.0	<u> </u>	0.0
Ped / Bike / RT			0	十	0	1	┪	0		0	-	0	+			+		0	0	0.0
Lane Width			12.0	\dashv	12.0	 	十		_	12.0	\dashv	12.0	+			+		12.0	-	12.0
Parking / Grade	e / Parking		N	+	0	T _N	\dashv	N		0	\dashv	N	+			+		N	0	N N
Parking Maneu			 ''	\dashv		+ ~	\dashv		_	-	\dashv		-		+	+		"	-	- / /
Buses Stopping			0	\dashv	0	-	\dashv		_	0	+	0	+		-	+		0	-	+
Min. Time for P			1		3.2	1	\dashv		_	3.2		-	\dashv		<u> </u>			0		0
		T					ᆛ		_	3.2	T							<u> </u>	3.2	
Phasing	EB Only	-	ru & RT	_		3	+		04			SB On	_	_	06		 	07		08
Timing	G = 18.0		25.0		G =		- -	G =			-	= 21.0)	G			G =		G =	
	Y = 4	Y =	6	_	Y =		1	Y =	_		Υ =	= 6		Υ:			Y =		Y =	
	alysis, T = 0.25								_					Су	cle Lenç	gth, (C = 8	0.0		
Lane Group C	apacity, Control	Dela	y, and L			nination	1													
		-	LT [E	B	DT	_	- 1	_	WB				- 1	NB				SB	1 ==
Adjusted Flow	Bate v	+	522	23		RT		.T_	_	TH 178	_	RT 11	L.	-	TH	╀	RT	LT 611	TH	RT
Lane Group Ca				26					-			00		-		┼─			-	189
v/c Ratio, X	apaony, o	_	676						-	386	_			-		+-		812		802
Total Green Ra	atio a/C		0.77	0.9						.85	0.6			-		-		0.75		0.24
			0.22	0.5					-	.31	0.6			-		+-		0.26	-	0.56
Uniform Delay, Progression Fa			9.1	14.					-	5.7	8.			-		-		27.1		8.8
		\rightarrow	.000	1.0					-	.000		000				-		1.000		1.000
Delay Calibrati			0.32	0.5					-	.50	0.5					 _		0.50		0.50
Incremental De	7	_	5.5		2				_	6.7		.1				1		6.4		0.7
Initial Queue D	elay, d ₃	_	0.0	0.0					-	0.0	0.					1		0.0		0.0
Control Delay			34.6		0.9				3	32.4	12	2.9				_		33.5		9.5
Lane Group LC			С	С					_	C	В	3						С		A
Approach Dela			23.	4				2	25.8	3									27.8	
Approach LOS			С						С										С	
Intersection De	elay		24.	8				$X_c =$	0.	86			Inte	rsectio	n LOS				С	
Copyright @ 2005 Un	iversity of Florida, All R	ights Re	eserved								HC	S+TM V	ersion	1 5.2				Genera	ted: 4/19/2	007 4:33 PI

					НС	S+"	DETA	ILI	ED R	EPO	RT								
General Inform								-	Site In:			Control of Particular							
Analyst	Burgess & N	liple, K	CAM					1	nterse						ad a	and S			Montrose
Agency or Co.	SUM-18							1	Area Ty			All	othe	er areas			ν.	واددم	100
Date Performed								J	lurisdio	ction									
Time Period	PM Peak	<						1	Analysi Project		ar	30	3	>					
Volume and Ti	ming Input							1.	TOJOUL										
Annual his consistence of the factor of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consistence of the consist				Е	В		1		WB			ſ		NB				SB	
			LT	TI	+ R	Т	LT	T	TH		RT	L	Т	TH	П	RT	LT	TH	RT
Number of Lane	s, N1		2	3				\exists	3	\neg	1	$\neg \neg$			1		2	1	1
Lane Group			L	T				\dashv	T	_	R	\neg			\top		L		R
Volume, V (vph))		200	18	70			\dashv	2440	\vdash	390	\neg			\vdash		680		320
% Heavy Vehicl			5	5				\neg	5	\top	5	$\neg \neg$			\top		2	<u> </u>	2
Peak-Hour Fact			0.90	0.9	0		 	7	0.90		0.90	\dashv			\dagger		0.90		0.90
Pretimed (P) or			A	P				7	P	+	P	\dashv			1		A		A
Start-up Lost Ti			2.0	2.0)			7	2.0	1	2.0	\top			\dagger		2.0	1	2.0
Extension of Eff	ective Green, e		2.0	4.0)				4.0	7	4.0				Τ		4.0		2.0
Arrival Type, AT	•		2	5				\neg	3		3				1		4		4
Unit Extension,	UE		3.0	3.0	,				3.0		3.0		-		Τ		3.0		3.0
Filtering/Metering	ng, I		0.773	0.7	73			T	1.000	7	1.000	\neg			T		0.771		0.771
Initial Unmet De	emand, Qb		0.0	0.0)				0.0		0.0				Π		0.0		0.0
Ped / Bike / RT	OR Volumes		0	0			0		0		0						0	0	0
Lane Width			12.0	12.	0				12.0	1	12.0						12.0		12.0
Parking / Grade	/ Parking		N	0	N		N		0		Ν						N	0	N
Parking Maneu	vers, Nm																		
Buses Stopping	, N _B		0	0					0		0						0		0
Min. Time for P	edestrians, Gp			3.	2				3.2									3.2	
Phasing	EB Only	Thr	u & RT		03		0)4		s	SB On	ly		06			07		08
Timing	G = 8.0	G =	48.0	G	=		G =			G =	18.0)	G =	=		G =		G =	
	Y = 4	Y =	6	Υ:	=		Y =			Y =	6		Y =	:		Y =		Y =	
Duration of Ana	lysis, T = 0.25												Су	cle Lengt	h, C	= 9	0.0		
Lane Group Co	apacity, Control	Delay	, and L		terminati	on		_									T		
		\vdash	LT	EB TH	RT		LT		WB_ TH	R	_	LT		NB TH		T	LT	SB TH	RT
Adjusted Flow I	Rate. v		222	2078		+			711	43.	_	LI	\dashv			1	756	1111	356
Lane Group Ca			297	3396	-	+			738	85	-		\dashv				764	_	563
v/c Ratio, X	,// -		.75	0.61	-	+			99	0.5			\dashv				0.99	 	0.63
Total Green Ra	tio, g/C	_	.09	0.69		+			56	0.56			\dashv				0.22	-	0.36
Uniform Delay,			0.0	7.5	1	+			9.8	12.4			\dashv				34.9	+	24.1
Progression Fa			.000	0.161		+			000	1.00			-				1.000	 	0.939
Delay Calibration			.30	0.50	1	\top			50	0.50							0.49		0.21
Incremental De			7.9	0.6	1	\dagger			5.0	2.			\dashv				25.9		1.8
Initial Queue D			0.0	0.0		\top			.0	0.0			\dashv				0.0	+	0.0
Control Delay		4	17.9	1.9	1	\top			4.8	14.			\neg				60.8	1	24.4
Lane Group LC	S		D	A	1	\dagger	-		C	В			\dashv				E	1	С
Approach Dela	у	\neg	6.	3		1	3	2.0)									49.2	
Approach LOS		\dashv				+		С										D	
Intersection De		\dashv	25			\top	X _c =		97			Inters	ectio	n LOS				С	
Copyright © 2005 Uni	versity of Florida, All R	lights Re	served							HCS	S+IM V	ersion 5	.2				Gene	rated: 4/19	/2007 4:45 PN

						HCS	5+"	DET/		.ED R										
General Inform									-		-	mation								
Analyst Agency or Co.	B&N								- 1	Interse Area Ty					ge Wood or Similar		nd SR	18		
Date Performed	4/26/2006								- 1	Jurisdio				ODO						
Time Period	AM Peak	- L	v:=+.	. 10	TI		_		-	Analysi				200						
	MIL LEGIN	_	21311	~=	, ,,,	• () • • •	2		- 1	Project					18-Corrido	or S	tudv			
Volume and Ti	imina Input									,					re coma	,, 0	ludy			
					EB		T			WB	100 PM		Τ		NB	000000000000000000000000000000000000000			SB	
			LT		TH	RT		LT		TH		RT		LT	TH	T	RT	LT	TH	RT
Number of Land	es, N1		1		2	0		1		2		0	7	0	1	T	1	1	1	0
Lane Group			L		TR			L		TR					LT	Τ	R	L	TR	
Volume, V (vph)		12		1479	12		43		696		38		9	8		115	12	9	7
% Heavy Vehic	les, %HV		5		5	5		5		5		5		2	2		2	2	2	2
Peak-Hour Fac	tor, PHF		0.90	- 0	0.90	0.90		0.90		0.90		0.90		0.90	0.90	0	.90	0.90	0.90	0.90
Pretimed (P) or	Actuated (A)		Α		P	P		Α		Р		Р		Р	P		Р	P	P	P
Start-up Lost Ti	me, Iı		2.0		2.0			2.0		2.0					2.0	1	2.0	2.0	2.0	
Extension of Ef	fective Green, e		2.0		2.0			2.0		2.0					2.0] 2	2.0	2.0	2.0	
Arrival Type, A	T		3		3			3		3					3		3	3	3	
Unit Extension,			3.0		3.0			3.0		3.0					3.0	3	3.0	3.0	3.0	
Filtering/Meteri	ng, I		1.000		1.000		\bot	1.000		1.000					1.000	1	.000	1.000	1.000	
Initial Unmet De	emand, Qb		0.0	\bot	0.0			0.0		0.0					0.0	(2.0	0.0	0.0	
Ped / Bike / RT	OR Volumes		0	\bot	0	0		0		0		0		0	0		0	0	0	0
Lane Width			12.0		12.0			12.0		12.0					12.0	1	2.0	12.0	12.0	1
Parking / Grade	e / Parking		N		0	N		Ν		0		Ν		Ν	0		N	N	0	N
Parking Maneu	vers, Nm																			
Buses Stopping	д, Nв		0		0			0		0					0		0	0	0	
Min. Time for P	edestrians, Gp				3.2					3.2					3.2				3.2	
Phasing	Excl. Left	EV	V Perm		()3		C)4			NS Per	rm		06		1	07		08
Timing	G = 9.0	G =	34.0		G =			G =			G	= 11.0)	G	=		G =		G =	
Timing	Y = 4	Y =	6		Y =			Y =			Υ	= 6		Υ	=		Y =		Y =	
Duration of Ana	alysis, T = 0.25													C	ycle Leng	th, (C = 70	0.0		
Lane Group C	apacity, Control	Delay	, and L			ninatio	n													
		-	i + 1		B		<u> </u>	-	_	WB			_	_ 7	NB				SB	
Adjusted Flow	Rate v	_	LT	165		RT	1	LT 48	_	TH 815	_	RT	L.	.Т	TH 	_	RT 28	LT	TH	RT
Lane Group Ca			414	150				102	-	495	_		_		227		24	13	18	
v/c Ratio, X		_	.03	1.1			1	16	-	.55					0.08		57	196 0.07	246 0.07	-
Total Green Ra	atio, g/C		.67	0.4			_	67	-	.49	_		_		0.16	-	16	0.07	0.07	
Uniform Delay,			1.7	18.		*****	├─	2.3	 	2.6	_				25.2	 —	7.3	25.1	25.2	-
Progression Fa		_	.000	1.0				000	-	.000	_				1.000		000	1.000	1.000	
Delay Calibration			.11	0.5			0.		 	.50	_	+			0.50	-	50 50	0.50	0.50	
Incremental De			0.0	56			-	0.2	\vdash	1.4	_	_			0.7	-	0.2	0.30	0.6	
Initial Queue D			0.0	0.0				.0	-	0.0	_	\dashv			0.0	-	.0	0.0	0.0	
Control Delay			4.8	74			-	2.5	-	14.0	_	_			25.9	_	7.5	25.8	25.7	_
Lane Group LC)S		A	E			1-	В	-	В	_	\dashv			C	_)	C	C	
Approach Dela		_	73.						3.9			\dashv			5.0			<u> </u>	25.8	
Approach LOS		\dashv	E	_			\vdash		B			-)				C	
Intersection De		\dashv	52.					X _c =		38	_	_	Inte		on LOS					
	iversity of Florida, All R	ights Re					I	C			н	CS+TM V			200	_		Genera		007 4:35 PI

						HCS	}+"	DETA	-											
General Inform									-		005000	rmation	Section 1							
Analyst	B&N								1	nterse					age Wood		d SR	18		
Agency or Co.	045/0000								1	Area Ty					or Similar					
Date Performed					~ `					Jurisdio				ODC						
Time Period	PM Peak-	Exi	(6 T : ^	5	14 14	رسع)		1	Analysi				200		_				
		urours) in his non-	White Orbido (Wiles	0000000	Such duty have a man of		character services			Project	ID	1	Assessment	Sum	-18-Corrid	or S	tudy			
Volume and Ti	ming Input		<u> </u>		EB		-1			WD			T		ND			<u> </u>		
				$\overline{}$		I DT	\dashv	- T	_	WB		- DT	+		NB	_			SB	
Number of Lane	No. No.		LT 1	+	TH 2	RT 0	+	LT 1	4	TH 	-	RT 0	+	LT 0	TH 1	+	RT 1	LT	TH	RT
Lane Group	55, IN1		'L	+	TR	0	4	_ <u></u>	+	 TR	_	-	+	-	LT	+-	<u>'</u> R	1	1 TD	0
Volume, V (vph)	١		29	-	1188	12	-	115	+	1538	_	8	╬	12	9	+-	103	34	TR	51
% Heavy Vehicl			5	+	5	5	\dashv	5	+	5	\dashv	5	+	2	2		2	2	17	51
Peak-Hour Fact			0.90	-	0.90	0.90	ᆉ	0.90	+	0.90	-	0.90	+	0.90	0.90	- -	.90		2	2
Pretimed (P) or			A	+	P	P 0.90	\dashv	A	\dashv	P.90	-	0.90 P	+	P.90	0.90 P	_	.90 P	0.90 P	0.90 P	0.90 P
Start-up Lost Ti			2.0	+	2.0	-	\dashv	2.0	+	2.0	-	ļ	+		2.0		2.0	2.0	2.0	-
Extension of Eff			2.0	 -	2.0	 	\dashv	2.0	+	2.0	_		+		2.0	-	2.0	2.0	2.0	
Arrival Type, A7			3	-	3	-	\dashv	3	+	3	_		+		3		3	3	3	
Unit Extension,			3.0	\dashv	3.0	-	+	3.0	┪	3.0	-		+		3.0	-	3.0	3.0	3.0	-
Filtering/Metering			1.000		1.000	-	ᅱ	1.000	+	1.000			+		1.000	-	.000	1.000	1.000	
Initial Unmet De			0.0	+	0.0	 	-	0.0	┪	0.0	-		╁		0.0	-	0.0	0.0	0.0	
Ped / Bike / RT			0	╁	0	0	ㅓ	0	+	0		0	╁	0	0.0	_	0	0.0	0.0	0
Lane Width	011 101011100		12.0	+	12.0	 	+	12.0	\dashv	12.0			+		12.0	-	2.0	12.0	12.0	-
Parking / Grade	/ Parking		N	\dashv	0	N	\dashv	N	┪	0		N	╁	N	0	-	N	N N	0	l N
Parking Maneu			<u> </u>	+		<u> </u>	\dashv		┪				+		 	+	-	1	 	
Buses Stopping			0	\dashv	0		7	0	┪	0			╅		0	+	0	0	0	-
Min. Time for P					3.2		\dashv			3.2		J	+		3.2			-	3.2	J
Phasing	Excl. Left	FV	N Perm	1		03	1	0-	4		Ī	NS Pe	rm	T	06		ī	07		08
Tricomg	G = 9.0		33.0		G =		\dashv	G =			G	i = 12.0			a =		G =		G =	,,,
Timing	Y = 4	Y =			Y =		-	Y =			\vdash	' = 6	_	_	/ =		Y =		Y =	
Duration of Ana					<u> </u>						<u>'</u>			_	Cycle Leng	th (2.0		
	apacity, Control	Dela	v and	I OS	Deterr	ninatio	n								zycie Leng	111, 0		J.0		
Lune aroup of	ариону, остно	Julia	y, and		В	minatio			53340	WB	95,891	1			NB				SB	
			LT	Т	Н	RT		LT		TH		RT	L	T.	TH	F	RT	LT	TH	RT
Adjusted Flow	Rate, v		32		33		1	28	1	718					23	1	14	38	76	
Lane Group Ca	pacity, c		302	14	60		3	302	1.	460					239	2	44	213	255	
v/c Ratio, X		0).11	0.9			0.	42	1.	.18					0.10	0.4	47	0.18	0.30	
Total Green Ra	tio, g/C	0	0.66	0.4	7		0.	66	0.	.47					0.17	0.	17	0.17	0.17	
Uniform Delay,		1	2.1	17.	2		9	.9	18	8.5					24.4	26	.1	24.8	25.3	
Progression Fa	ctor, PF	1	1.000	1.0	000		1.	000	1.	.000					1.000	1.	000	1.000	1.000	
Delay Calibration	on, k	0	0.11	0.5	50		0.	11	0.	.50	L				0.50	0.5	50	0.50	0.50	
Incremental De	lay, d ₂		0.2	10	0.3			1.0	8	37.0					0.8	6	5.3	1.8	3.0	
Initial Queue D	elay, d ₃	(0.0	0.0	0		0	.0	0	0.0	L				0.0	0.	0	0.0	0.0	
Control Delay			12.3	ļ	7.4		1	0.8	10	05.5	L				25.2	3.	2.4	26.6	28.3	
Lane Group LC	os		В	_ c			1	В		F					С	(>	С	С	
Approach Dela			27	7.1				99	9.0)				3	31.2				27.7	
Approach LOS			(2				<i>H</i>	_						С				С	
Intersection De	lay		65	5.6				$X_c = 0$	0.9	97			Inte	ersec	tion LOS				E	
Copyright @ 2005 Uni	versity of Florida, All R	ights R	eserved								H	HCS+™ V	/ersic	on 5.2				Genera	ted: 4/19/20	07 4:35 P

Analyst Agency or Co. Date Performed	tion B&N						S	Site Int	ormatic	on							
Agency or Co. Date Performed	B&N						-			1000000							
Date Performed								ntersed				age Woods	an	d SR 1	18		
	4/20/2022						ı	Area Ty				or Similar 					
T	4/26/2006						-	lurisdic			ODO						
Time Period A	M- Peak-	Exist	125	Timi	ns		- 1	•	s Year		203						
	Processia sed coron sincella del colo	namentaria se antido	Naturino no	Con A Selection and a second]P	Project	ID	con a dan co	Sum-	18-Corrido	r St	udy			
Volume and Timi	ing Input	T				7		14/5							ı		
		<u> </u>		EB			_	WB			1.7	NB	Т.			SB	T
No contract to a contract	N.		.T	TH	RT	LT	4	TH	RT		LT	TH	┼─	RT	LT	TH	RT
Number of Lanes,	, IN1			2	0	1	+	2	0	-	0	1	+-	1	1	1	0
Lane Group	******	L		TR	10	L	4	TR				LT	1	R	L	TR	
Volume, V (vph)			10	2230	10	40	4	1000	40		10	10	+-	10	10	10	10
% Heavy Vehicles	·	5		5	5	5	4	5	5	\dashv	2	2	1—	2	2	2	2
Peak-Hour Factor,		0.9		0.90	0.90	0.90	4	0.90	0.90	_	0.90	0.90	+-	90	0.90	0.90	0.90
Pretimed (P) or Ac				Р	P	A	4	Р	P	_	Р	P	1	P 	P	P	P
Start-up Lost Time		2.		2.0	ļ	2.0	_	2.0		_		2.0	2	.0	2.0	2.0	
Extension of Effec	ctive Green, e	2.		2.0		2.0	_	2.0		_		2.0	2	.0	2.0	2.0	
Arrival Type, AT		3	3	3		3	_	3		_		3		3	3	3	
Unit Extension, UE	Ε	3.	0	3.0		3.0		3.0				3.0	3	.0	3.0	3.0	
Filtering/Metering,	, I	1.0	000	1.000		1.000	<u> </u>	1.000				1.000	1.	000	1.000	1.000	
Initial Unmet Dem	and, Qb	0.	0	0.0		0.0		0.0				0.0	0	.0	0.0	0.0	
Ped / Bike / RTOF	R Volumes	0)	0	0	0		0	0		0	0		0	0	0	0
Lane Width		12	2.0	12.0		12.0		12.0				12.0	12	2.0	12.0	12.0	
Parking / Grade / I	Parking	٨	I	0	N	N		0	N		Ν	0	1	V	N	0	N
Parking Maneuver	rs, Nm						\neg			\neg			Τ				
Buses Stopping, N	Vв	0)	0		0		0				0	1	0	0	0	
Min. Time for Ped	lestrians, Gp			3.2				3.2		\neg		3.2				3.2	J
Phasing	Excl. Left	EW Pe	erm	1 0)3		04		NS F	erm	T	06		<u> </u>	07	1 ()8
	$\hat{a} = 9.0$	G = 34.	0	G =		G =			G = 11			i =		G =		G =	
Timing	<i>l</i> = 4	Y = 6		Y =		Y =			Y = 6		_	' =		Y =		Y =	
Duration of Analys				+								ycle Lengt	h. C		2.0		
Lane Group Capa		Delav. ar	nd L C	S Detern	ninatio	n					10/10/10	yoro Lorigi	.,, с		<i>7.0</i>		
				EB			١	WB		I		NB				SB	
		LT		TH	RT	LT	<u> </u>	тн	RT		LT	TH	F	T	LT	TH	RT
Adjusted Flow Rat	ite, v	11		2489		44	11	155				22	1.	22	11	22	
Lane Group Capa	acity, c	312		1505		302	14	497				228	2	24	196	244	
v/c Ratio, X		0.04		.65		0.15	0.	77				0.10	0.5	54	0.06	0.09	
Total Green Ratio	o, g/C	0.67	(0.49		0.67	0.4	49				0.16	0.1	6	0.16	0.16	
Uniform Delay, d ₁		6.3	1	8.0		12.4	14	1.8				25.2	27	.2	25.1	25.2	1
Progression Factor	or, PF	1.000)	1.000		1.000	1.0	000		T		1.000	1.0	000	1.000	1.000	
Delay Calibration,	, k	0.11	(0.50		0.11	0.3	50				0.50	0.5	50	0.50	0.50	
Incremental Delay	y, d ₂	0.0	2	297.2		0.2	3	3.9		1		0.8	9	.2	0.5	0.7	
Initial Queue Dela	ay, d ₃	0.0	_	0.0		0.0	0.	.0		1		0.0	0.	0	0.0	0.0	
Control Delay		6.3	7	315.2		12.6	1	8.7		1		26.1	36	6.4	25.6	26.0	
Lane Group LOS		A	\top	F		В	E	В		1		С			С	С	
Approach Delay			313.9	,		1	8.5			1	3	4.8				25.8	
Approach LOS		_	F				В			+		C				C	
Intersection Delay	y		209.7	7		X _c =		?3		In	tersect	ion LOS					
Copyright © 2005 Univers	<u> </u>								HCS+™						Genera		107 4:37 PM

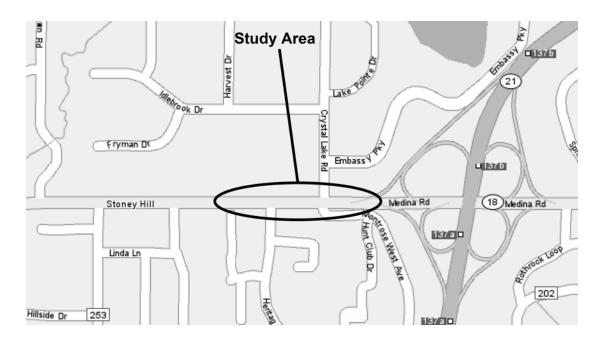
						HCS	S+"	DET		LED R	_									
General Inform									-			mation	1							
Analyst	B&N								- 1	Interse					ge Woods	an	d SR	18		
Agency or Co.	0/15/0000								- 1	Area T					r Similar -					
Date Performed									- 1	Jurisdio				ODO1						
Time Period	PM Peak - E	ixis	4:00	Γ_{C}	imi	ng			- 1	Analysi				203						
		Zuel Hilleringson	Designated Accounts	in Discord Mich.	SUR-OWN-SET/SCHOOL-SELF	T. COLUMN DE CONTROL	North State		4330000	Project	טו	AN TO SERVICE AND ADDRESS OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF THE PARTY OF TH	MANAGER	Sum-1	8-Corrido	or S	tudy			
Volume and Ti	ming Input		<u> </u>	90	EB					WD					ND			I		
			LT		TH	Грт	\dashv	-,-	-	WB	_	DT.	-		NB I Tu	_			SB	T ==
Number of Lane	ae Na		1	+	2	RT 0	-	LT 1	_	TH 2	-	RT 0	+	LT 0	TH 1	╀	RT 1	LT 1	TH 1	RT 0
Lane Group	55,141		L		TR	-	\dashv	L		TR	┥		+		LT	╁	r R	L	TR	0
Volume, V (vph)		30		1620	10	\dashv	120		2270	┥	10	+	10	10	+-	100	40	20	50
% Heavy Vehic			5	_	5	5	\exists	5	_	5	┪	5	十	2	2	┤─	2	2	2	2
Peak-Hour Fact			0.90		0.90	0.90	\neg	0.90	_	0.90	┪	0.90	1	0.90	0.90	+-	.90	0.90	0.90	0.90
Pretimed (P) or			Α	\top	P	P	_	A	_	P		P	+	P	P	+	P	P	P	P
Start-up Lost Ti			2.0	1	2.0		\neg	2.0		2.0			\dagger		2.0	┿	2.0	2.0	2.0	<u> </u>
	fective Green, e		2.0	\dashv	2.0			2.0		2.0			+		2.0	+-	2.0	2.0	2.0	1
Arrival Type, A	Г		3	\neg	3	1		3		3			\top		3	T	3	3	3	<u> </u>
Unit Extension,	UE		3.0	\neg	3.0			3.0		3.0			7		3.0	3	3.0	3.0	3.0	
Filtering/Metering	ng, I		1.000		1.000			1.000)	1.000			1		1.000	1	.000	1.000	1.000	1
Initial Unmet De	emand, Qb		0.0		0.0			0.0		0.0			7		0.0	1	0.0	0.0	0.0	1
Ped / Bike / RT	OR Volumes		0		0	0		0		0		0	7	0	0	T	0	0	0	0
Lane Width			12.0		12.0			12.0		12.0			7		12.0	1.	2.0	12.0	12.0	
Parking / Grade	/ Parking		N		0	N		N		0		N		Ν	0	T	N	N	0	N
Parking Maneu	vers, Nm															Γ				
Buses Stopping	j, Nв		0		0			0		0					0	Τ	0	0	0	
Min. Time for P	edestrians, Gp				3.2					3.2					3.2				3.2	
Phasing	Excl. Left	ΕV	V Perm		()3		(04			NS Pe	rm		06			07		08
Timing	G = 9.0	G =	33.0		G =			G =			G	i = 12.0	0	G	=		G =		G =	
	Y = 4	Y =	6		Y =			Y =			Υ	= 6		Υ			Y =		Y =	
Duration of Ana	alysis, T = 0.25						_							Cy	cle Leng	h, C) = 70	0.0		
Lane Group C	apacity, Control	Dela	y, and I			ninatio	n													
		-	LT	T	B	RT	-	LT	_	TH	1	RT		- 1	NB			. . .	SB	DT
Adjusted Flow I	Rate. v	-	33	18		П	1	133	1-	2533	-	n1		.Т	TH 22	_	RT 11	LT 44	TH 78	RT
Lane Group Ca			302	14			-	302	├	1461	-			-	244		44	214	256	-
v/c Ratio, X			.11	1.2			1-	.44	1	.73	┢	_		\dashv	0.09	0.4		0.21	0.30	
Total Green Ra	itio, g/C		.66	0.4			┼	.66	-	0.47	_				0.17	0.		0.17	0.17	
Uniform Delay,	d ₁		2.1	18.			-	3.0	-	8.5	Г				24.4	26		24.9	25.4	
Progression Fa	ctor, PF	1	.000	1.0	00		1.	.000	١	.000	Γ				1.000		000	1.000	1.000	
Delay Calibration	on, k	0	.11	0.5	0		0.	.11	0	0.50					0.50	0.5	50	0.50	0.50	
Incremental De	lay, d ₂		0.2	114	1.2			1.0	3	333.1					0.7	-6	5.0	2.2	3.1	
Initial Queue D	elay, d ₃	(0.0	0.0			0	0.0	(0.0					0.0	0.	0	0.0	0.0	
Control Delay			12.3	132	2.7		1	14.0	3	351.6					25.1	3.	2.1	27.1	28.4	
Lane Group LC	S		В	F				В		F					С	(7	С	С	
Approach Dela	у		130	0.6				33	34.	7				30	.9				27.9	
Approach LOS			F	= _					F					(;				С	
Intersection De	lay		239	9.4				$X_c =$	1.	32			Inte	ersectio	n LOS				F	
Copyright © 2005 Uni	iversity of Florida, All R	ights Re	eserved								Н	CS+™ V	/ersid	on 5.2				Genera	ited: 4/19/20	007 4:38 PM

						HCS	}+"	DETA	IL	ED R	EF	PORT									
General Inform									-		-	rmatior									
Analyst	B&N									nterse							and	d SR			untrusa
Agency or Co.										Area T						Similar			موا	ocat:	SN
Date Performed										Jurisdio				ODC							
Time Period	AM Penk									Analysi				20	-						
		TANK TANK TO		V.OWI NIVING		Bellin to de l'annue de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la constante de la con	and all and		J F	Project	ID)		Sum	1-18	3-Corrido	r St	udy			
Volume and Ti	ming Input		Γ																		
				-	EB		4		- 1	WB	_		4			NB				SB	
			LT	-	TH	RT	4	LT	4	TH	_	RT	-	LT		TH	+-	RT	LT	TH	RT
Number of Lane	9S, N1		1	+	3	0	_		4	3	_	0	-	0	_	1	-	2	1	1	0
Lane Group			L	-	TR	-	-	L	4	TR	_					LT	+-	R	L	TR	
Volume, V (vph			10	4	2210	30	_	230	4	960		40	4	50		10	-	390	10	10	10
% Heavy Vehicl			5	_	5	5	4	5	4	5	_	5	4	2		2	-	2	2	2	2
Peak-Hour Fact			0.90	(0.90	0.90		0.90	4	0.90		0.90		0.90		0.90	-	90	0.90	0.90	0.90
Pretimed (P) or			P	_	P	P	_	Α	4	P		P	_ _	<u>A</u>		Α	<u> </u>	4	A	A	A
Start-up Lost Ti			2.0	-	2.0	<u> </u>	_	2.0	4	2.0			_			2.0	+	2.0	2.0	2.0	
Extension of Eff	fective Green, e		2.0	_	2.0	ļ		2.0	4	2.0	_					2.0	2	2.0	2.0	2.0	
Arrival Type, A7			3		3			3	_	3						3		3	3	3	
Unit Extension,			3.0	_ļ_	3.0			3.0	_	3.0						3.0	3	.0	3.0	3.0	
Filtering/Metering	ng, I		1.000	<u></u>	1.000		_	1.000	_	1.000			ᆚ			1.000	1.	000	1.000	1.000	
Initial Unmet De	emand, Qb		0.0		0.0			0.0	╛	0.0						0.0	0	.0	0.0	0.0	
Ped / Bike / RT	OR Volumes		0		0	0		0		0		0		0		0		0	0	0	0
Lane Width			12.0		12.0			12.0		12.0						12.0	12	2.0	12.0	12.0	
Parking / Grade	/ Parking		N		0	N		Ν		0		N		Ν		0	1	V	N	0	N
Parking Maneu	vers, Nm																				
Buses Stopping	ј, N в		0		0			0		0						0		0	0	0	
Min. Time for P	edestrians, Gp				3.2					3.2						3.2				3.2	
Phasing	EW Perm	W	B Only		(03		0-	4			NS Pe	erm	\Box		06			07	1	08
	G = 52.0	G =	10.0		G =		ᅵ	G =			G	i = 10.	0	7	G =			G =		G =	
Timing	Y = 6	Y =	6		Y =			Y =			Υ	' = 6		7	Y =	:		Y =		Y =	
Duration of Ana	llysis, T = 0.25										_			7	Cyc	cle Lengt	h, C	= 9	0.0		
Lane Group Co	apacity, Control	Dela	y, and	Los	Deterr	ninatio	n												lai sanan		
					В				1	WB						NB				SB	
			LT	T	Н	RT		LT		TH		RT	L	T	L	TH	P	łΤ	LT	TH	RT
Adjusted Flow I			11	24			┼	256		111					┸	67		33	11	22	
Lane Group Ca	pacity, c		228	25	58		1	334	3	332	_				_	139	72	29	133	172	
v/c Ratio, X		0	.05	0.9	7		0.	.77	0.	.33	_				1	0.48	0.5	59	0.08	0.13	
Total Green Ra	itio, g/C	0	.58	0.5	8		0.	.11	0.	.76					1	0.11	0.2	29	0.11	0.11	
Uniform Delay,			3.3	18.	3		3	8.9	3	3.6					13	37.6	27.	.5	35.9	36.1	
Progression Fa	ctor, PF	1	.000	1.0	000		1.	.000	1.	.000						1.000	1.0	000	1.000	1.000	
Delay Calibration	on, k	0	.50	0.5	0		0.	.32	0.	.50					(0.11	0.1	8	0.11	0.11	
Incremental De	lay, d ₂		0.4	12	2.5		1	10.2	(0.3						2.6	1	.3	0.3	0.3	
Initial Queue D	elay, d ₃		0.0	0.0	0		0	0.0	0	0.0						0.0	0.	0	0.0	0.0	
Control Delay			8.7	30	0.8		4	19.1	ć	3.9						40.2	28	3.8	36.2	36.4	
Lane Group LC)S		Α	С				D	,	A						D	- 0	;	D	D	
Approach Dela	у		30	.7				12	2.3	1					30.	3				36.3	
Approach LOS			(;			Γ	E	В						С					D	
Intersection De	lay		25	.0			Ī	$X_c = 0$	0.8	35	_		Inte	ersec	tio	n LOS				С	
Copyright © 2005 Uni	versity of Florida, All F	lights Re	eserved				-				Н	+CS+™ \							Genera	ited: 4/19/20	07 4:38 PN

						HCS	÷" DET	AIL	ED R	EF	PORT								
General Inform								_		-	rmatior								/
Analyst	Burgess & I	Viple,	KAM					- 1	Interse			5	SR 1	8 & Herita	ge V	Voods	Dr. w/	w. M	rsortno
Agency or Co.	SUM-18							-	Area T	ype	е	A	All of	her areas			امواه	catio	SVS
Date Performed	04/03/2006							- 1	Jurisdio										
Time Period	PM Pec	X							Analysi	is '	Year	a	03	٥					
									Project	:ID)								
Volume and Ti	ming Input											.,							
					EB	1		_	WB			_		NB	_		ļ	SB	
Number of Lond	- N.		LT		ГН	RT	LT		TH		RT		LT	TH	-	RT	LT	TH	RT
Number of Lane	9S, N1		1	3		0	2		3		0	-	0	1	-	2	1	1	0
Lane Group	`		L	T		50	L 540	_	TR	_	10	-	70	LT	-	R	L	TR	
Volume, V (vph)	·		30 5	—	580 5	50 5	540		2210		10		70	10	-	150	40	20	50
% Heavy Vehicl			0.90	-	90	0.90	0.90		5 0.90	_	5 0.90		2 90	0.90	-	90	0.90	2	2
Pretimed (P) or			P		5	P	A A	-	0.90 P	-	0.90 P	\dashv	90 4	A	+-	.90 A	0.90 A	0.90 A	0.90
Start-up Lost Ti			2.0		.0	'	2.0		2.0		ļ .	+	-1	2.0	+-	2.0	2.0	2.0	A
	fective Green, e		2.0		.0		2.0		4.0			+		4.0	-	2.0	4.0	4.0	
Arrival Type, A7			3	_	3		4		4	_		+		3	+-	3	3	3	
Unit Extension,			3.0	3.	.0	<u> </u>	3.0	_	3.0			+		3.0		2.0	3.0	3.0	
Filtering/Metering	ng, I		1.000) 1.	000		0.375	5	0.375	:		\top		1.000	-	.000	1.000	1.000	
Initial Unmet De	emand, Qb		0.0	0	.0		0.0		0.0			1		0.0	0	0.0	0.0	0.0	
Ped / Bike / RT	OR Volumes		0	7	0	0	0		0		0	1	0	0	\dagger	0	0	0	0
Lane Width			12.0	12	2.0		12.0		12.0			_	-	12.0	1.	2.0	12.0	12.0	
Parking / Grade	e / Parking		N	7	0	N	N		0		N	7	N	0	1	N	N	0	N
Parking Maneu	vers, Nm																		
Buses Stopping	ј , Nв		0)		0		0					0		0	0	0	
Min. Time for P	edestrians, Gp			3	3.2				3.2					3.2				3.2	
Phasing	EW Perm	W	B Only		0	3		04			NS Pe	rm		06			07)8
Timing	G = 39.0	G =	20.0		G =		G =			G	i = 13.0	0	(3 =		G =		G =	
	Y = 6	Y =	6	\	Y =		Y =			Y	= 6			<u> </u>		Y =		Y =	
Duration of Ana	alysis, T = 0.25												(Cycle Lengt	h, C	= 9	0.0		
Lane Group Ca	apacity, Control	Dela	y, and			ninatio	n												
		-	LT	EB TH		RT	1.7	~	WB		DT.			NB		·-	1.7	SB	l pr
Adjusted Flow f	Rate, v	_	33	1812	<u>_</u>	111	600	+-	TH 2467	-	RT	LT		TH 89	_	<u>₹T</u> 00	LT 44	TH 78	RT
Lane Group Ca			81	2235	-		742	-	3667	-				217	_	215	217	277	
v/c Ratio, X		0	.41	0.81	_		0.81	+-	0.67	-				0.41	0.4		0.20	0.28	
Total Green Ra	itio, g/C		.43	0.46			0.22	+-	0.74	Г	$\neg \neg$		_	0.17	0.4		0.17	0.17	
Uniform Delay,	d ₁	1	7.5	21.2			33.2	+-	5.9	Τ				33.5	17		32.3	32.8	1
Progression Fa	ctor, PF	1	.000	1.00	0		1.000	0).225	Γ				1.000		000	1.000	1.000	
Delay Calibration	on, k	0	.50	0.50			0.35	0	0.50					0.11	0.1	11	0.11	0.11	
Incremental De	lay, d ₂		14.5	3.3			2.6		0.4					1.3	0	.2	0.5	0.6	
Initial Queue D	elay, d ₃	(0.0	0.0			0.0	(0.0					0.0	0.	0	0.0	0.0	
Control Delay		;	32.0	24.5	5		35.8		1.7					34.8	1	7.8	32.8	33.3	
Lane Group LO	os		С	C			D		Α					С	E	3	С	С	
Approach Dela	у		24	1.6				8.4					2	20.4				33.2	
Approach LOS			()				Α						С				С	
Intersection De	lay		15	5.5			X _c =	0.	73			Inter	sect	ion LOS				В	
Copyright © 2005 Uni	iversity of Florida, All F	Rights Re	eserved							H	HCS+™ \	/ersion	5.2				Genera	ited: 4/19/20	07 4:39 P

S.R. 18 & MONTROSE WEST AVE. / CRYSTAL LAKE ROAD SUM 18 at Crystal Lake #1207 HSP Intersection for 2005 SUM 18, 1.69 to 2.05, #1417 HSP Non-Freeway Section for 2005 SUM 18 2.00 to 4.00, #93 Hot Spot Section for 2005

ADDENDUM



Prepared for: ODOT District 4 April, 2007



Addendum:

To investigate to effects of a 2004 resurfacing project completed to reduce crashes in the project location and to include 2005 crash data, a more thorough query of crashes were analyzed. The crash frequencies were examined before and after the resurfacing project to identify what, if any, effects it had on crash frequencies. Before the resurfacing project, wet pavement related crashes accounted for 42 percent of all crashes, after the resurfacing, wet pavement related crashes dropped to 25.6 percent of the total crashes. The rear-end crashes, which are occurring mainly due to congestion, accounted for 64.8 percent of all crashes before the resurfacing and rose to 68.3 percent after the resurfacing. Although the wet pavement crashes were reduced to below the state wide average, the congestion related crashes, namely the rear-end crashes continue to be a safety problem and need to be addressed. The crash reduction factor that would be applied due to the resurfacing needed for the recommended improvement has been taken out of the Rate of Return analysis since the past resurfacing of this location provided a reduction of wet pavement crashes and no further reduction is anticipated with the proposed project.

Due to the results of this new query, updated to the most current 3-year period (2003-2005), the crash data contained in the original report differs from the crash data used during the following analysis. The crash data contained in the original report contains information available from 2002-2004 and analyzes the location as two separate intersection locations. Due to the very close proximity of the intersections and the availability of the 2003-2005 crash data, the study area was re-analyzed as a section of roadway. Though the crash data frequencies changed during this analysis the patterns remained the same. The crashes are still predominantly due to congestion and the inefficient operation of two intersections located in close proximity each other and to the S.R. 18 & I-77 interchange. Since the recommendations made remain prudent to solving the identified crash patterns, the recommendations have remained unchanged. The updated Crash Analysis has been included as part of this Addendum.

Crash Analysis

From 2003 to 2005, there were 170 crashes at the location – 116 property damage and 54 injury crashes. None of the crashes involved a fatality. The 2003-2005 crash rate at this 1-mile section is 4.28 crashes per million vehicle miles. The data shows a peak in crashes between 3 p.m. and 6 p.m. relating to the evening commute. The predominant crash types at this location are angle and rear-end crashes, which together account for 84.7% of the crashes. The 3 year average for wet pavement crashes is 34.1%, however, before the 2004 resurfacing wet pavement crashes were 42% and 25.6% after, so the effective rate studied was 25.6%. The 3 year average for rear-end accidents is 66.5%, however, they were 64.8% before the 2004 resurfacing and 68.3% after, leaving 68.3% as the effective rate studied.

Table 1 - Crash Type compared with statewide averages for urban intersections

Condition	# of crashes 2003 – 2005	% of crashes 2003 – 2005	% of crashes statewide 2003-2005
Night-time	40	23.5	28.6
Wet pavement	30	34.1	32.3
Crash type			
Rear-end	39	66.5	26.3
Same-direction sideswipe	6	11.8	6.9
Angle	11	18.2	24.7

Source: Ohio Department of Public Safety Crash Data

Conclusions:

Though the crash data frequencies changed during this analysis the patterns remained the same. The crashes are still predominantly due to congestion and the inefficient operation of two intersections located in close proximity each other and to the S.R. 18 & I 77 interchange. Since the recommendations made remain prudent to solving the identified crash patterns, the recommendations have remained unchanged. The short-term approaches to addressing the crash problem at this intersection are to coordinate Crystal Lake/Montrose West and Heritage Woods Drive for optimal performance to reduce the congestion at the intersection. However due to the close spacing of the two intersections, approximately 600 ft between them, and the congestion experienced at this location it is a common occurrence for the EB Crystal Lake Road intersection and the WB Heritage Woods intersection to experience very large Queue lengths and spill back past the adjacent intersections. Even with the optimal timings and coordination at these two intersections the congestion continues to be too heavy for the capacity available and the Intersections still operate at unacceptable Levels of Service. Due to this heavy congestion situation there is no viable short-term solution that adequately addresses the crash problem without capacity improvements, therefore no short-term recommendation can be made at this time.

The rate of return for the short-term was not evaluated since as previously stated no short-term recommendation is available at this time. The rate of return for the medium-term countermeasure is positive at 12.32 percent. This positive rate of return indicates a viable solution to address the crashes at the intersection. Since the congestion at the location requires an extensive multifaceted group of improvements such as a road relocation and roadway widening to remedy the crash problem, there are no further improvements identified that are not already included as part of the medium term recommendation.

Figure 1 – Crash Analysis Tables and Graphs

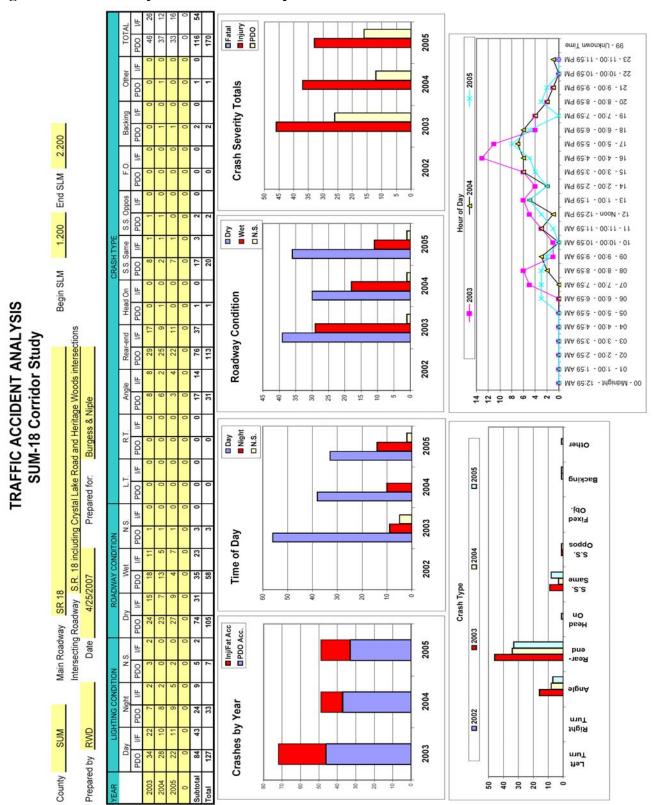


Figure 2 – Rate of Return Analysis

Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Comparison Com	Click to Clear Sample Information
Creach Blobae 2003 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach Eloade 2005 Creach	
1.13	
8.82	
135	7 1
892 892 892 892 892 892 892 892	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
1.17 1.17 1.17 1.18 1.18 1.18 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19	
1.17 1.17 1.17 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19 1.19	
Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register Register	3 0 71
R1 R2 R3 R4 RT AVG PDO EST. RED R1 R2 R3 R4 RT AVG INJ-FAT	
R1 R2 R3 R4 RT AVG PDO EST. RED. RT R2 R3 R4 RT AVG INJ-FAT	CRASH TYPE
10	
100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100 100	ANGLE
Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Cont	SS PASS
100 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1200 1	SS MEET
Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Color Colo	REAR END
1	BACKING
1 1 5.00 5.00 1 0.15 0.32 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.05 0.	OVERTURN
0.2 0.15 0.32 11.67 3.73 0.2 0.15 0.32 6.00 6.00 6.67 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	CR200 S.Leg
Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Cont	TR3075
Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Control Cont	NIGHT
ADT = CRASH REDUCTION = 17.08 ESTIMATED INJ FAT. CRASH REDUCTION = ADT Factor ADT = (PADT + FADT)/2 = (36300 + 45997	CR200 w/o S.Leg
## STIMATED PDO CRASH REDUCTION = 17.08 ESTIMATED INJ FAT. CRASH REDUCTION = ADT Factor (PADT + FADT)/2 = (36300 + 45997	
ADT Factor (PADT + FADT)/2 = (36300 + 45997) = 41148.5 Average Annual Benefits lect Facility Type Below: = 17.08 * \$ 8.501.00 = \$ State Highways	
PADT + FADT)/2 = (36300	
Type Below: 17.08 \$ 8.501.00 = \$ Type Below: 7.92 \$ 7.9.341.00 = \$ 1.13 \$ 7773.743.09 = \$ um Rate of Return 12.32%	Average ADT Fa
Type Below: = 17.08	
um Rate of Return 12.32% 7.92 * \$ 79.341.00 = \$ \$ 773.743.09 = \$ \$ Nate of Return 12.32%	
= 1.13 * \$ 773.743.09 = \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	Annual INJFAT. Benefits = Estimated INJFAT. Crash Reduction * Avg INJFAT. Cost
Rate of Return	
	\$6,407,000 \$2,000 \$2,000