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Edwards Lake Road Tract

Jefferson County, Alabama

Traffic Impact Study & Traffic Signal Warrant Evaluation

Prepared for:

Tynes Development Corporation

Birmingham, Alabama

Prepared by:



**Gonzalez-Strength & Associates
Birmingham, Alabama**

05TDC17-T

May 2005

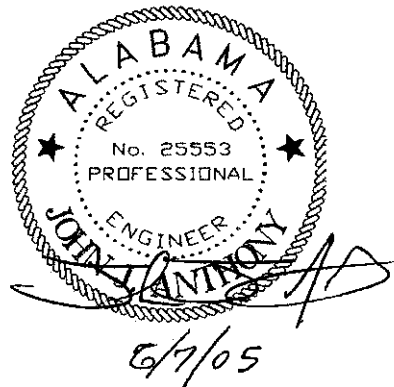


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INTRODUCTION

Purpose of Report

The purpose of this report is to determine the traffic impact the proposed development will have on the existing roadways, and to minimize or prevent any adverse impacts, with roadway operational and/or geometric improvements. This proposed residential development, the Edwards Lake Road Tract, would consist of 229 single-family lots and 32 townhouse lots. It is anticipated that this development will reach full build-out in 2008. See **Figure 1** for the site location map.

Study Objectives

This traffic study has been conducted to accomplish the following objectives:

- Collect peak hour turning movement counts at the Edwards Lake Road & Turncliff Parkway intersection;
- Collect 24-hour approach counts on Edwards Lake Road & Turncliff Parkway;
- Determine if adequate sight distance is provided;
- Estimate the traffic generated by the proposed development;
- Predict the directional distribution of site-generated traffic;
- Perform a traffic signal warrant analysis at the intersection of Edwards Lake Road & Turncliff Parkway;
- Perform a turn lane warrant analysis at the intersection of Edwards Lake Road & Turncliff Parkway;
- Perform a capacity analysis at the intersection of Edwards Lake Road & Turncliff Parkway;

- Determine if any operational and/or geometric improvements are needed to accommodate this additional traffic.

The sources for the information used in this report include: the *Institute of Transportation Engineers (ITE) Trip Generation Manual*, the *American Association of State Highway and Transportation Officials (AASHTO)*, Jeff Pate Design, Tynes Development Corporation, field reconnaissance, and other information collected by Gonzalez-Strength & Associates (GSA).

BACKGROUND INFORMATION

Site Description and Access

This proposed residential development will be located on the east side of Turncliff Parkway and on the west side of I-59. This development will consist of townhouses in the northern half of the site, and single-family homes in the southern half of the site.

It is proposed that this development will have three entrance drives onto Turncliff Parkway. The location of these drives is illustrated in the site plan, in **Figure 2**. *For the purposes of this study, Turncliff Parkway will run north and south, while Edwards Lake Road will run east and west.*

Description of Area Roadways

Edwards Lake Road (CR 130) is a major two-lane artery that runs east and west from Gadsden Highway to Springville Road. In the vicinity of the Turncliff Parkway intersection, this roadway has a posted speed limit of 35 mph, and carries approximately 23,000 vehicles per day.

Turncliff Parkway is a two-lane north/south roadway that originates at Edwards Lake Road and terminates approximately one mile to the north into a residential community. This roadway carries approximately 280 vehicles per day, and has no posted speed limit.

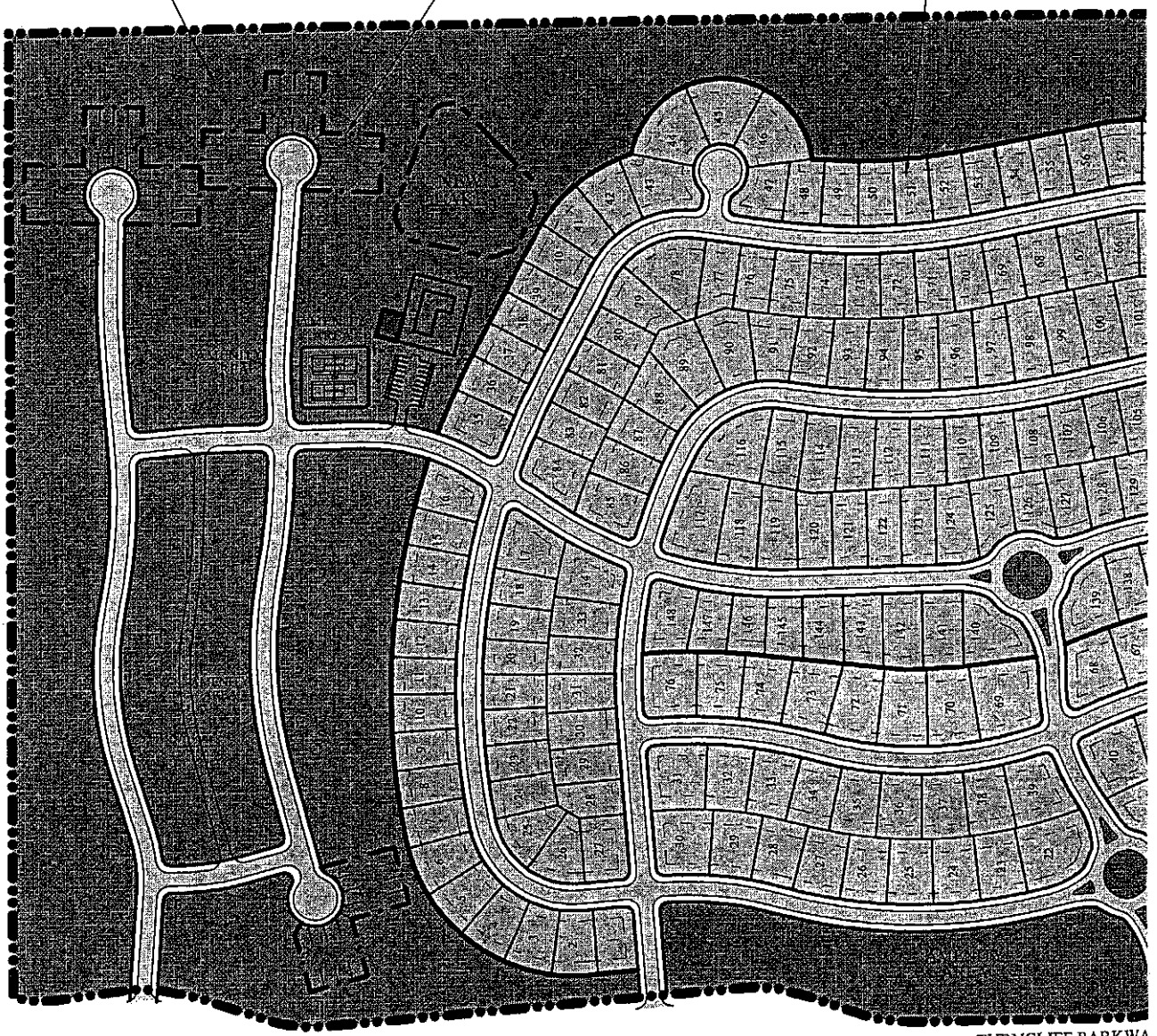
2: Site Plan



TOTAL PROJECT
AREA = 132.9± ACRES

PROPOSED TOWNHOUSE LOTS
26 FT. - 8 IN. X 110 FT.
26 FT. - 8 IN. X 55' UNITS

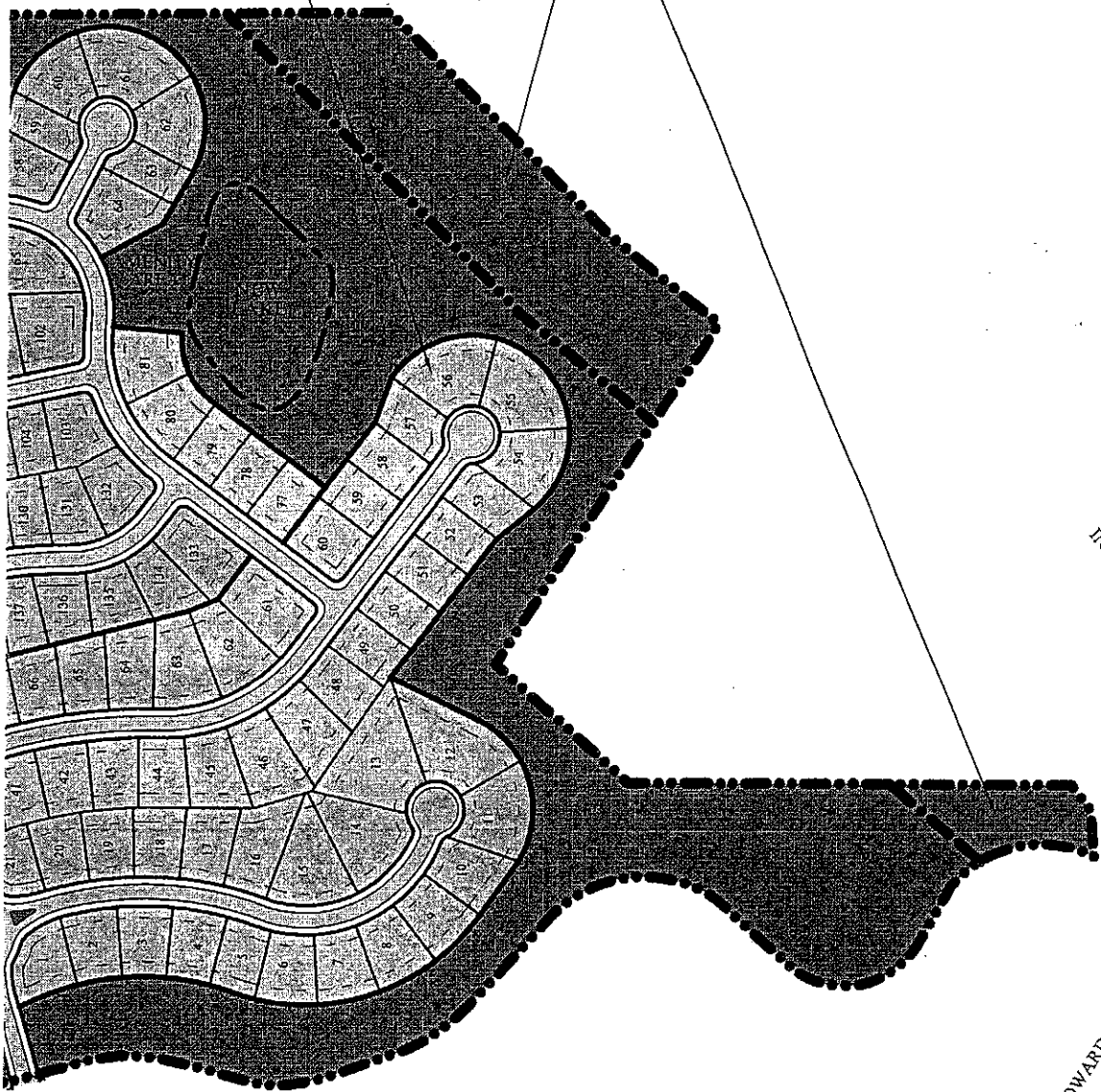
PROPOSED LOTS
65 FT. X 120 FT.



TURNCLIFF PARKWA

PROPOSED LOTS
80 FT. X 120 FT.

AREA RESERVED FOR
FUTURE FRONTAGE ROAD



INTERSTATE I-59

EDWARDS LAKE ROAD

Existing Traffic Volumes

Turning movement counts (TMCs) were collected by GSA staff at the intersection of Edwards Lake Road and Turncliff Parkway. These counts were performed during the AM and PM peak traffic conditions on Tuesday, May 17, 2005. The results of these counts are illustrated graphically in **Figure 3**, and provided in full detail in **Appendix A**.

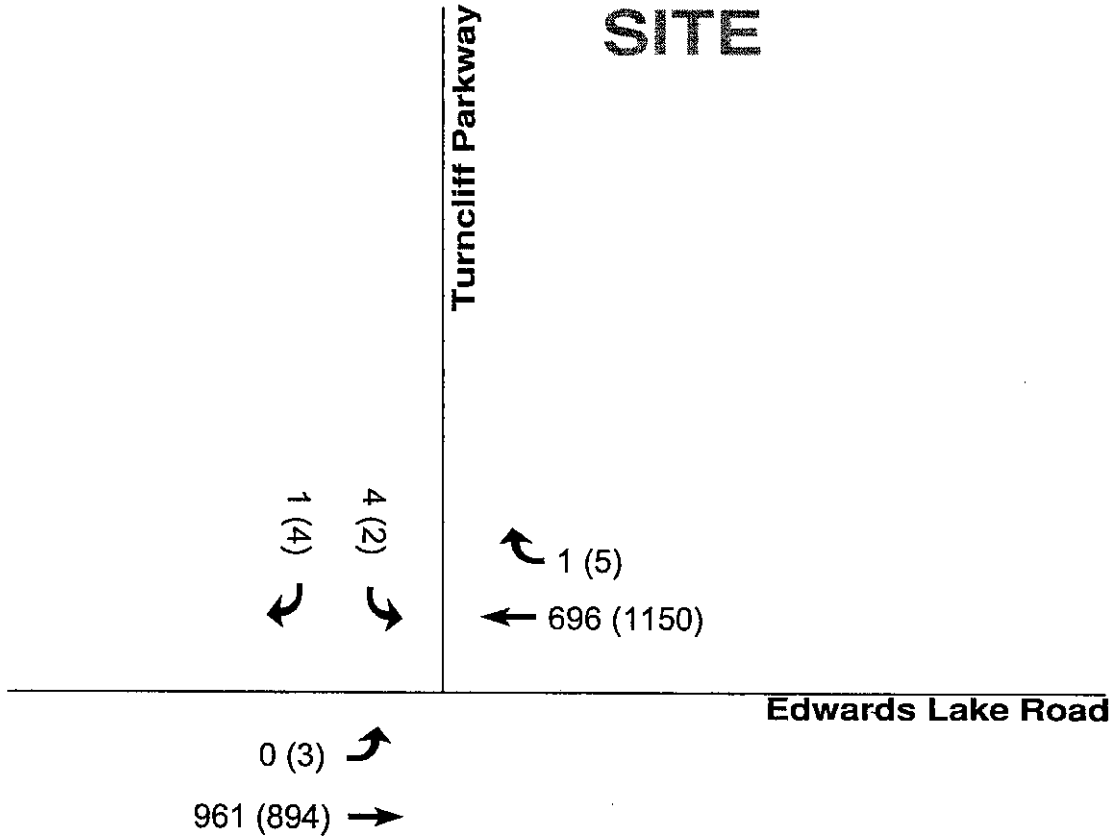
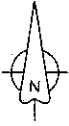
Twenty-four hour approach counts were collected by Traffic Logistics on Thursday and Friday, May 19th and 20th, respectively. These approach counts were also performed at the intersection of Edwards Lake Road & Turncliff Parkway. The results of these 24-hour counts are provided in **Appendix B**.

Sight Distance Analysis

Intersection Sight Distance (ISD) is the sight distance required for a side street motorist to be able to see an approaching main street vehicle, traveling at the design or posted speed, and have time to determine whether or not an adequate gap exists for entry onto the main street such that the main street motorist does not have to excessively decelerate. The required ISD will be based on the *American Association of State Highway and Transportation Officials (AASHTO)* guidelines. The required ISD, based on a posted speed of 35 mph and a relatively flat grade, is 390'. From the field investigation, it is determined that the provided sight distance looking to the east along Edwards Lake Drive, from the Turncliff Parkway approach, is 880'. The provided sight distance looking to the west along Edwards Lake Road, from the Turncliff Parkway approach, is 450'. Therefore, adequate ISD is provided looking east and west along Edwards Lake Road from the Turncliff Parkway approach.

Figure 3: Existing Peak Hour Traffic Volumes

XX - Indicates AM Peak Hour Volumes
(XX) - Indicates PM Peak Hour Volumes



PROJECTED TRAFFIC

Site Traffic (Generation)

The *new traffic* expected to be generated upon full build-out of the proposed development (anticipated in 2008) was estimated according to information outlined in the *Trip Generation, Sixth Edition*, published by the Institute of Transportation Engineers. The trip generation estimates were based on the following land uses: Single-Family Homes and Residential Townhouses. The total estimated trips generated by the new development are composed of *new trips*, exclusively. *New trips* consist of traffic that would not otherwise have traveled to the adjacent roadways. See **Table 1** for actual trip generated estimates.

For the purposes of performing a traffic signal warrant analysis, a fourteen-hour side street approach traffic generation analysis has been provided. In this analysis, the 24-hour site-generated traffic has been broken down into hourly volumes and analyzed. All fourteen hours of the major side street approach traffic volumes are derived in **Appendix C-Tables 1-3**.

Table 1: Peak Hour Trip Generation Estimates

Land Use	Size (Lots)	Traffic Condition	Rate Equations (X) = Size	Traffic Generated		
				Total	In	Out
Single Family Residential	229	AM Peak	$T=0.7*(X)+9.43$	170	43	127
		PM Peak	$\ln(T)=0.90*\ln(X)+0.53$	226	142	84
Residential Townhomes	32	AM Peak	$\ln(T)=0.80*\ln(X)+0.26$	21	4	17
		PM Peak	$\ln(T)=0.82*\ln(X)+0.32$	24	16	8

Site Traffic (Distribution)

The *new trips* generated into and out of the proposed development have been distributed according to existing distributions, determined from recent traffic counts. See **Figure 4** for a graphic representation of the projected distribution.

Total Future Traffic

The *future pre-development* (or no-build) *traffic* consists of the existing traffic that was recently collected, with a growth factor applied. Since the proposed development has an anticipated build-out in three years (2008), a generally accepted 3% annual growth factor has been applied to the existing counts. This future pre-development traffic condition is presented in **Figure 5**.

The *future post-development* (or total) *traffic* consists of the sum of the *future pre-development traffic* plus the *site traffic*. The future post-development traffic condition is presented in **Figure 6**.

TRAFFIC ANALYSIS

Traffic Signal Warrant Analysis

A Traffic Signal Warrant Analysis was performed for the intersection of Edwards Lake Road & Turncliff Parkway. This signal warrant analysis was performed using *TEAPAC* software, and based on the guidelines presented in the *Manual of Uniform Traffic Control Devices (MUTCD)*, 2003 Edition.

The traffic volumes used in this signal warrant were based on *future post-development traffic* conditions, which are summarized in **Table 2**, and derived in the **Appendix C** tables. The results of this signal warrant analysis indicate that a traffic signal is warranted for this intersection. See **Table 3** for a summary of the results of the traffic signal warrant analysis, and see **Appendix D** for the detailed *TEAPAC* results.

Figure 4: Site Traffic Distribution

XX - Indicates AM Peak Hour Distribution
(XX) - Indicates PM Peak Hour Distribution

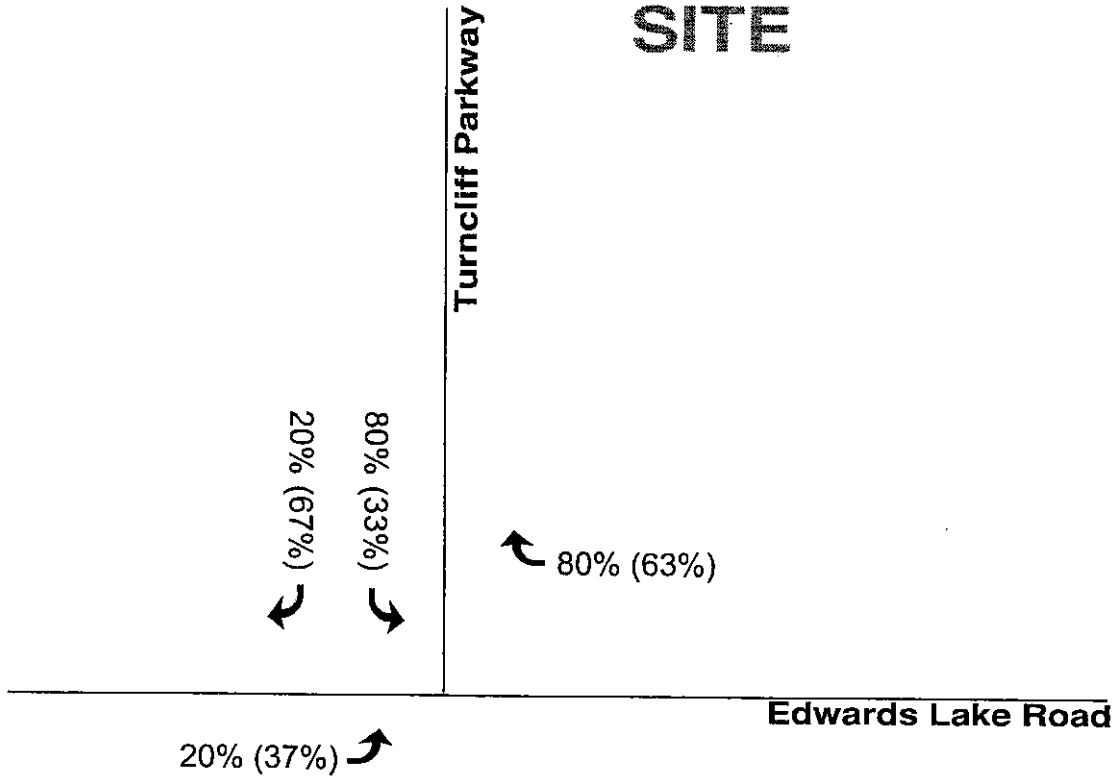
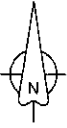


Figure 5: Future Pre-Development Peak Hour Traffic Volumes

XX - Indicates AM Peak Hour Volumes
(XX) - Indicates PM Peak Hour Volumes

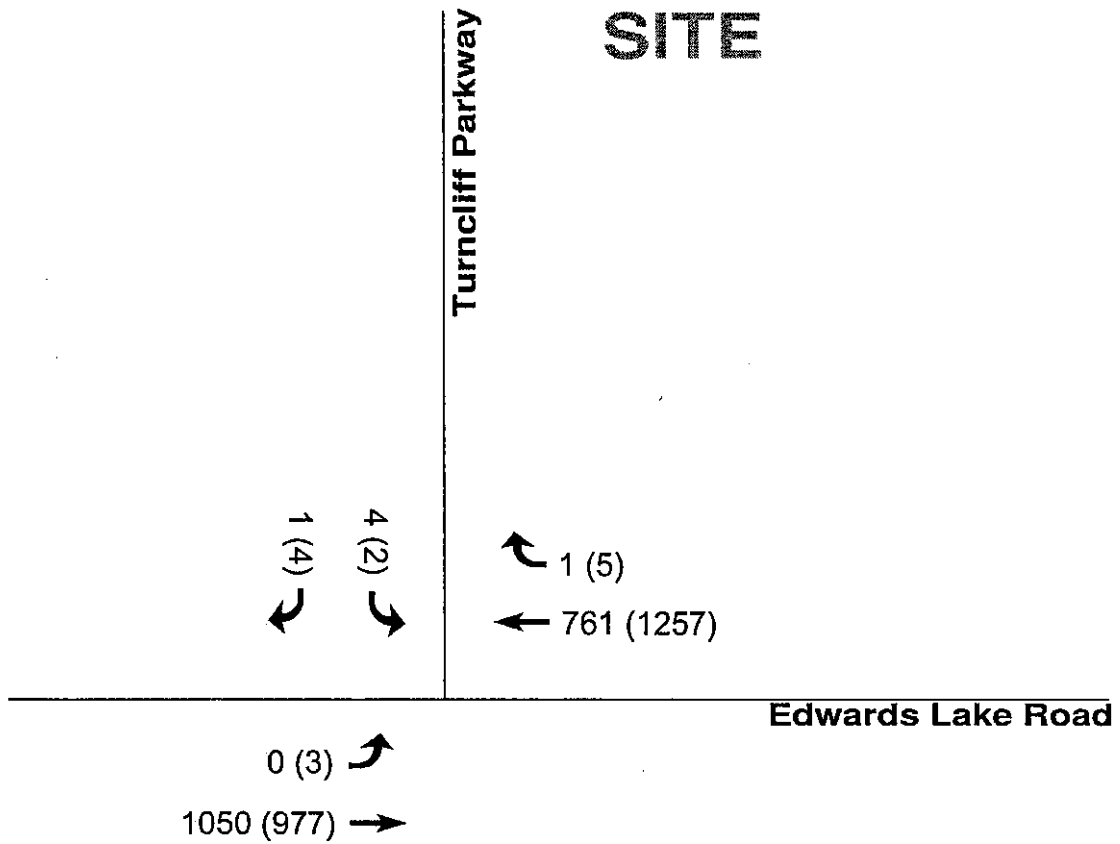
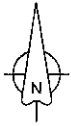


Figure 6: Future Post-Development Peak Hour Traffic Volumes

XX - Indicates AM Peak Hour Volumes

(XX) - Indicates PM Peak Hour Volumes

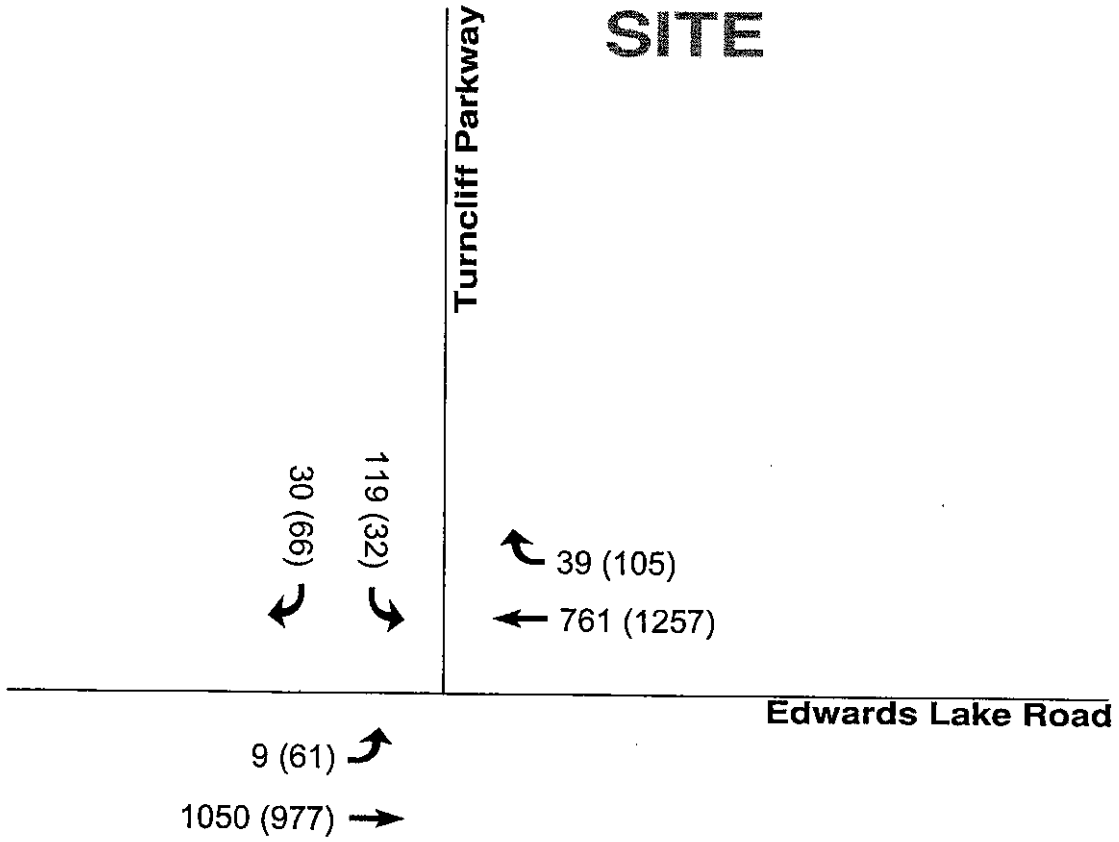
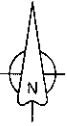


Table 2: Traffic Volumes Used in Signal Warrant Analysis

(1)-Hour	(2)-Site-Generated Volumes	Both Main Street Approaches (Edwards Lake Road)		Major Side Street Approach (Turncliff Parkway)	
		(3)-Pre-Develop. Volumes	(4)-Post-Develop. Volumes (2)+(3)	(5)-Pre-Develop. Volumes	(6)-Post-Develop. Volumes (2)+(5)
6:00 AM	124	1176	1300	15	139
7:00 AM	36	1770	1806	4	40
8:00 AM	80	1374	1454	10	90
9:00 AM	71	1198	1269	9	79
10:00 AM	80	1328	1408	10	90
11:00 AM	44	1404	1448	5	49
12:00 PM	62	1532	1594	8	69
1:00 PM	124	1613	1737	15	139
2:00 PM	80	1707	1787	10	90
3:00 PM	53	1763	1816	7	59
4:00 PM	71	1951	2022	9	79
5:00 PM	71	2230	2301	9	79
6:00 PM	71	1648	1719	9	79
7:00 PM	98	1252	1350	12	110

Table 3: Summary of Traffic Signal Warrant Analysis

Warrant	Number of Hours Required to Meet Warrant	Number of Hours Met	Warrant Met ? Yes/No
1 A – (8-Hour Min. Vehicular Volume)	8	3	NO
1 B – (8-Hour Interrupt. of Continuous traffic)	8	12	YES
1 C – (8-Hour Combo of Warrants)	80% of Warrants 1 A & 1 B		NO
2 – (Four-Hour Volume)	4	11	YES
3 A – (Peak Hour Delay)	N/A		
3 B – (Peak Hour Volume)	1	10	YES
4 – (Pedestrian Volume)	N/A	-	-
5 – (School Crossing)	N/A	-	-
6 – (Coordinated System)	N/A	-	-
7 – (Crash Experience)	N/A	-	-
8 – (Roadway Network)	N/A	-	-

Turn Lane Warrant Analysis

A turn lane warrant analysis was performed at this intersection, which is based on warranting guidelines from *the Intersection Channelization Design Guide-Record 279*, developed by the *Highway Research Board*. This design guide provides various charts for determining the need for left and right turn lanes. These turn lane warrant charts are based on volume, roadway geometry, and speed. The results of this turn lane analysis, based on *future post development volumes* (illustrated in **Figure 6**) indicate that an eastbound left turn lane and a westbound right turn lane are heavily warranted for this intersection. The actual turn lane warrant charts are presented in **Appendix E**.

Capacity Analysis

A capacity analysis of the *future pre-development* and *post-development* traffic conditions has been performed for the intersection of Edwards Lake Road & Turncliff Parkway. The pre-development analysis is performed under existing operational and geometric conditions. However, the post-development analysis is performed with the addition of recommended operational and geometric improvements. This analysis, which is performed utilizing *Synchro* software, is based on the methods outlined in the *2000 Highway Capacity Manual*. The capacity analysis results are usually described in terms of Levels of Service (LOS). The LOS ranges from “A” thru “F”, with “A” representing the most desirable conditions and “F” representing the most undesirable conditions. As a general rule, a LOS of “D” or better is acceptable, while a LOS of “C” or better is preferred. See **Appendix F** for an explanation of the Levels of Service (LOS).

The results of the capacity analysis at the intersection of Edwards Lake Road & Turncliff Parkway indicate that all travel lanes on Edwards Lake Road achieved a LOS of “C” or better, while the travel lanes on Turncliff Parkway received a LOS of “D” or better for AM and PM peak post-development conditions. A summary of the results of this capacity analysis is illustrated in **Table 3**, while detailed *Synchro* results are presented in **Appendix G**.

Table 4 - Capacity Analysis Results: Edwards Lake Road @ Turncliff Parkway

Approach	Travel Lanes	AM Peak				PM Peak			
		Pre-Development LOS	Pre-Development Delay (sec/veh)	Post-Development * LOS	Post-Development * Delay (sec/veh)	Pre-Development LOS	Pre-Development Delay (sec/veh)	Post-Development LOS	Post-Development * Delay (sec/veh)
Eastbound (Edwards Lake Rd)	Left Thru	A	0.0	A	3.7	A	0.2	A	7.0
		A		A	7.0			A	3.2
Westbound (Edwards Lake Rd)	Thru Right	A	0.0	A	6.0	A	0.0	C	32.5
				A	1.4			A	1.4
Northbound			N/A		N/A		N/A		N/A
Southbound (Turncliff Pkwy)	Left Right	B	13.3	C	34.3	C	22.4	D	46.4
				B	14.3			B	11.1

* A traffic signal, an eastbound left turn lane, and a westbound right turn lane have been added for the post-development conditions.

CONCLUSIONS & RECOMMENDATIONS

An **intersection sight distance (ISD) analysis** was performed for the intersection of Edwards Lake Road & Turncliff Parkway. The required ISD, based on a posted speed of 35 mph and a relatively flat grade, is 390'. From the field investigation, it is determined that the provided ISD looking to the east is 880', while the ISD looking to the west is 450'. Therefore, adequate ISD is provided at this intersection.

A **traffic signal warrant analysis** was performed for the intersection of Edwards Lake Road & Turncliff Parkway. The traffic volumes used in this signal warrant were based on *future post-development traffic* conditions. The results of this signal warrant analysis indicate that a traffic signal is warranted for this intersection.

A **turn lane warrant analysis** was performed for the intersection of Edwards Lake Road & Turncliff Parkway, based on *future post-development traffic* conditions. The results of this turn lane analysis indicate that an eastbound left turn lane and a westbound right turn lane are heavily warranted for this intersection.

A **capacity analysis** of the *future pre-development* and *future post-development* traffic conditions has been performed for the intersection of Edwards Lake Road & Turncliff Parkway. The pre-development analysis is performed under existing operational geometric conditions. However, the post-development analysis is performed with the addition of recommended operational and geometric improvements. The results of the capacity analysis at the intersection of Edwards Lake Road & Turncliff Parkway indicate that all travel lanes on Edwards Lake Road achieved a LOS of "C" or better, while the travel lanes on Turncliff Parkway received a LOS of "D" or better for AM and PM peak post-development conditions. As previously stated, it is an accepted general rule that a LOS of "D" or better is acceptable, while a LOS of "C" or better is preferred. Therefore, with the recommended operational and geometric improvements in place at full build-out of this proposed development, an acceptable LOS is achieved.

Based on the findings of this study, the following recommendations are made:

- **Install a traffic signal at the intersection of Edwards Lake Road & Turncliff Parkway;**
- **Construct an eastbound left turn lane on Edwards Lake Road at the Turncliff intersection with a minimum storage capacity of 100’;**
- **Construct a westbound right turn lane on Edwards Lake Road at the Turncliff intersection with a minimum storage capacity of 100’;**
- **Apply the appropriate striping for a three-section on the Turncliff Parkway approach.** This three-lane section should consist of one inbound lane and two outbound lanes.

APPENDIX A
Turning Movement Counts (TMCs)

130-Acre Tract - Edwards Lake Road
Jefferson County

File Name : AM_PM Peak TMCs
Site Code : 00000000
Start Date : 5/17/2005
Page No : 1

Groups Printed- Unshifted

Start Time	Turncliff Parkway Southbound				Edwards Lake Drive Westbound				Turncliff Parkway Northbound				Edwards Lake Drive Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
Factor	1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		1.0	1.0	1.0		
04:30 PM	1	0	1	2	0	293	2	295	0	0	0	0	0	205	0	205	502
04:45 PM	0	0	0	0	0	286	0	286	0	0	0	0	1	203	0	204	490
Total	1	0	1	2	0	579	2	581	0	0	0	0	1	408	0	409	992
05:00 PM	0	0	2	2	0	275	2	277	0	0	0	0	2	253	0	255	534
05:15 PM	1	0	1	2	0	296	1	297	0	0	0	0	0	233	0	233	532
05:30 PM	0	0	0	0	0	277	1	278	0	0	0	0	0	224	0	224	502
05:45 PM	2	0	0	2	0	267	3	270	0	0	0	0	2	182	0	184	456
Total	3	0	3	6	0	1115	7	1122	0	0	0	0	4	892	0	896	2024

*** BREAK ***

07:00 AM	3	0	2	5	0	138	0	138	0	0	0	0	0	232	0	232	375
07:15 AM	1	0	0	1	0	142	0	142	0	0	0	0	0	266	0	266	409
07:30 AM	1	0	0	1	0	184	1	185	0	0	0	0	0	236	0	236	422
07:45 AM	0	0	1	1	0	214	0	214	0	0	0	0	0	225	0	225	440
Total	5	0	3	8	0	678	1	679	0	0	0	0	0	959	0	959	1646
08:00 AM	2	0	0	2	0	156	0	156	0	0	0	0	0	234	0	234	392
Grand Total	11	0	7	18	0	2528	10	2538	0	0	0	0	5	2493	0	2498	5054
Apprch %	61.1	0.0	38.9		0.0	99.6	0.4		0.0	0.0	0.0		0.2	99.8	0.0		
Total %	0.2	0.0	0.1	0.4	0.0	50.0	0.2	50.2	0.0	0.0	0.0	0.0	0.1	49.3	0.0	49.4	

Start Time	Turncliff Parkway Southbound				Edwards Lake Drive Westbound				Turncliff Parkway Northbound				Edwards Lake Drive Eastbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	

Peak Hour From 04:30 PM to 05:45 PM - Peak 1 of 1

Intersection	04:30 PM																
Volume	2	0	4	6	0	1150	5	1155	0	0	0	0	3	894	0	897	2058
Percent	33.3	0.0	66.7		0.0	99.6	0.4		0.0	0.0	0.0		0.3	99.7	0.0		
05:00	Volume																
Volume	0	0	2	2	0	275	2	277	0	0	0	0	2	253	0	255	534
Peak Factor	High Int. 04:30 PM																
Volume	1	0	1	2	0	296	1	297	0	0	0	0	2	253	0	255	0.963
Peak Factor	0.750				0.972								0.879				

APPENDIX B
24-Hour Approach Counts

TRAFFIC LOGISTICS
VOLUME SUMMARY
FRI 05/20/2005

Client: GSA
Type Study: 24-Hour App.
Location: Edwards Lake Drive

File: ELD_EB2.prn
User: J. Anthony

TIME	1 EAST	Total
00:15	12	12
00:30	10	10
00:45	8	8
01:00	9	9
Hour Total	39	39
01:15	11	11
01:30	5	5
01:45	6	6
02:00	2	2
Hour Total	24	24
02:15	3	3
02:30	3	3
02:45	4	4
03:00	10	10
Hour Total	20	20
03:15	8	8
03:30	7	7
03:45	11	11
04:00	9	9
Hour Total	35	35
04:15	6	6
04:30	15	15
04:45	27	27
05:00	34	34
Hour Total	82	82
05:15	32	32
05:30	55	55
05:45	65	65
06:00	74	74
Hour Total	226	226
06:15	98	98
06:30	127	127
06:45	199	199
07:00	202	202
Hour Total	626	626
07:15	214	214
07:30	264	264
07:45	245	245
08:00	226	226
Hour Total	949	949
08:15	180	180
08:30	157	157
08:45	177	177

TRAFFIC LOGISTICS
 VOLUME SUMMARY
 FRI 05/20/2005

Client: GSA
 Type Study: 24-Hour App.
 Location: Edwards Lake Drive

File: ELD_EB2.prn
 User: J. Anthony

TIME	1 EAST	Total
09:00	177	177
Hour Total	691	691
09:15	165	165
09:30	154	154
09:45	161	161
10:00	173	173
Hour Total	653	653
10:15	169	169
10:30	155	155
10:45	164	164
11:00	159	159
Hour Total	647	647
11:15	171	171
11:30	190	190
11:45	184	184
12:00	183	183
Hour Total	728	728
12:15	180	180
12:30	187	187
12:45	156	156
13:00	165	165
Hour Total	688	688
13:15	169	169
13:30	186	186
13:45	181	181
14:00	211	211
Hour Total	747	747
14:15	177	177
14:30	206	206
14:45	199	199
15:00	186	186
Hour Total	768	768
15:15	211	211
15:30	189	189
15:45	165	165
16:00	188	188
Hour Total	753	753
16:15	198	198
16:30	182	182
16:45	189	189
17:00	177	177
Hour Total	746	746

TRAFFIC LOGISTICS
 VOLUME SUMMARY
 FRI 05/20/2005

Client: GSA
 Type Study: 24-Hour App.
 Location: Edwards Lake Drive

File: ELD_EB2.prn
 User: J. Anthony

TIME	1 EAST	Total
17:15	218	218
17:30	174	174
17:45	180	180
18:00	201	201
Hour Total	773	773
18:15	166	166
18:30	164	164
18:45	164	164
19:00	148	148
Hour Total	642	642
19:15	153	153
19:30	132	132
19:45	126	126
20:00	117	117
Hour Total	528	528
20:15	84	84
20:30	95	95
20:45	88	88
21:00	79	79
Hour Total	346	346
21:15	86	86
21:30	79	79
21:45	65	65
22:00	52	52
Hour Total	282	282
22:15	42	42
22:30	52	52
22:45	41	41
23:00	30	30
Hour Total	165	165
23:15	46	46
23:30	41	41
23:45	30	30
24:00	25	25
Hour Total	142	142
DAY TOTAL	11300	11300
PERCENTS	100.0%	100%
AM Times	07:15	
AM Peaks	949	
PM Times	14:30	
PM Peaks	802	

TRAFFIC LOGISTICS
VOLUME SUMMARY
WED 05/18/2005

Client: GSA
Type Study: 24-Hour
Location: Edwards Lake Drive

File: ELD WB.prm
User: J. Anthony

TIME	1 WEST	Total
19:00	188	188
Hour Total	188	188
19:15	182	182
19:30	156	156
19:45	151	151
20:00	129	129
Hour Total	618	618
20:15	111	111
20:30	127	127
20:45	118	118
21:00	102	102
Hour Total	458	458
21:15	103	103
21:30	119	119
21:45	91	91
22:00	88	88
Hour Total	401	401
22:15	72	72
22:30	99	99
22:45	62	62
23:00	42	42
Hour Total	275	275
23:15	25	25
23:30	35	35
23:45	36	36
24:00	37	37
Hour Total	133	133
DAY TOTAL	2073	2073
PERCENTS	100.0%	100%
AM Times		
AM Peaks		
PM Times	19:00	
PM Peaks	677	

TRAFFIC LOGISTICS
 VOLUME SUMMARY
 THU 05/19/2005

Client: GSA
 Type Study: 24-Hour
 Location: Edwards Lake Drive

File: ELD_WB.prn
 User: J. Anthony

TIME	1 WEST	Total
00:15	19	19
00:30	21	21
00:45	11	11
01:00	13	13
Hour Total	64	64
01:15	17	17
01:30	19	19
01:45	17	17
02:00	18	18
Hour Total	71	71
02:15	12	12
02:30	5	5
02:45	6	6
03:00	14	14
Hour Total	37	37
03:15	14	14
03:30	11	11
03:45	11	11
04:00	6	6
Hour Total	42	42
04:15	13	13
04:30	12	12
04:45	19	19
05:00	10	10
Hour Total	54	54
05:15	16	16
05:30	25	25
05:45	47	47
06:00	56	56
Hour Total	144	144
06:15	45	45
06:30	141	141
06:45	130	130
07:00	134	134
Hour Total	450	450
07:15	126	126
07:30	166	166
07:45	196	196
08:00	183	183
Hour Total	671	671
08:15	150	150
08:30	153	153
08:45	144	144

TRAFFIC LOGISTICS
VOLUME SUMMARY
THU 05/19/2005

Client: GSA
Type Study: 24-Hour
Location: Edwards Lake Drive

File: ELD_WB.prn
User: J. Anthony

TIME	1 WEST	Total
09:00	119	119
Hour Total	566	566
09:15	89	89
09:30	120	120
09:45	118	118
10:00	116	116
Hour Total	443	443
10:15	139	139
10:30	142	142
10:45	139	139
11:00	148	148
Hour Total	568	568
11:15	122	122
11:30	145	145
11:45	156	156
12:00	134	134
Hour Total	557	557
12:15	188	188
12:30	156	156
12:45	173	173
13:00	197	197
Hour Total	714	714
13:15	179	179
13:30	175	175
13:45	185	185
14:00	190	190
Hour Total	729	729
14:15	216	216
14:30	203	203
14:45	179	179
15:00	194	194
Hour Total	792	792
15:15	196	196
15:30	191	191
15:45	219	219
16:00	254	254
Hour Total	860	860
16:15	253	253
16:30	258	258
16:45	254	254
17:00	274	274
Hour Total	1039	1039

TRAFFIC LOGISTICS
 VOLUME SUMMARY
 THU 05/19/2005

Client: GSA
 Type Study: 24-Hour
 Location: Edwards Lake Drive

File: ELD_WB.prn
 User: J. Anthony

TIME	1 WEST	Total
17:15	391	391
17:30	329	329
17:45	282	282
18:00	266	266
Hour Total	1268	1268
18:15	264	264
18:30	227	227
18:45	187	187
Hour Total	678	678
DAY TOTAL	9747	9747
PERCENTS	100.0%	100%
AM Times	07:30	
AM Peaks	695	
PM Times	17:00	
PM Peaks	1276	
GRAND TOTAL	11820	11820
PERCENTS	100.0%	100%

TRAFFIC LOGISTICS
 VOLUME SUMMARY
 FRI 05/20/2005

Client: GSA
 Type Study: 24-Hour App.
 Location: Turncliff Pkwy

File: TCP_SB.prn
 User: J. Anthony

TIME	1 SOUTH	Total
00:15	1	1
00:30	0	0
00:45	0	0
01:00	0	0
Hour Total	1	1
01:15	0	0
01:30	0	0
01:45	0	0
02:00	0	0
Hour Total	0	0
02:15	0	0
02:30	0	0
02:45	0	0
03:00	0	0
Hour Total	0	0
03:15	0	0
03:30	0	0
03:45	0	0
04:00	0	0
Hour Total	0	0
04:15	0	0
04:30	0	0
04:45	0	0
05:00	0	0
Hour Total	0	0
05:15	0	0
05:30	0	0
05:45	2	2
06:00	1	1
Hour Total	3	3
06:15	1	1
06:30	0	0
06:45	1	1
07:00	12	12
Hour Total	14	14
07:15	1	1
07:30	1	1
07:45	1	1
08:00	1	1
Hour Total	4	4
08:15	3	3
08:30	2	2
08:45	1	1

TRAFFIC LOGISTICS
 VOLUME SUMMARY
 FRI 05/20/2005

Client: GSA
 Type Study: 24-Hour App.
 Location: Turncliff Pkwy

File: TCP_SB.prn
 User: J. Anthony

TIME	1 SOUTH	Total
09:00	3	3
Hour Total	9	9
09:15	2	2
09:30	3	3
09:45	3	3
10:00	0	0
Hour Total	8	8
10:15	3	3
10:30	3	3
10:45	1	1
11:00	2	2
Hour Total	9	9
11:15	1	1
11:30	0	0
11:45	2	2
12:00	2	2
Hour Total	5	5
12:15	2	2
12:30	2	2
12:45	1	1
13:00	2	2
Hour Total	7	7
13:15	3	3
13:30	8	8
13:45	1	1
14:00	2	2
Hour Total	14	14
14:15	5	5
14:30	2	2
14:45	1	1
15:00	1	1
Hour Total	9	9
15:15	2	2
15:30	2	2
15:45	2	2
16:00	0	0
Hour Total	6	6
16:15	1	1
16:30	1	1
16:45	6	6
17:00	0	0
Hour Total	8	8

TRAFFIC LOGISTICS
VOLUME SUMMARY
FRI 05/20/2005

Client: GSA
Type Study: 24-Hour App.
Location: Turncliff Pkwy

File: TCP_SB.prn
User: J. Anthony

TIME	1 SOUTH	Total
17:15	1	1
17:30	3	3
17:45	0	0
18:00	4	4
Hour Total	8	8
18:15	1	1
18:30	4	4
18:45	1	1
19:00	2	2
Hour Total	8	8
19:15	2	2
19:30	1	1
19:45	5	5
20:00	3	3
Hour Total	11	11
20:15	0	0
20:30	1	1
20:45	0	0
21:00	1	1
Hour Total	2	2
21:15	1	1
21:30	4	4
21:45	1	1
22:00	4	4
Hour Total	10	10
22:15	0	0
22:30	0	0
22:45	0	0
23:00	1	1
Hour Total	1	1
23:15	0	0
23:30	2	2
23:45	0	0
24:00	0	0
Hour Total	2	2
DAY TOTAL	139	139
PERCENTS	100.0%	100%
AM Times	06:45	
AM Peaks	15	
PM Times	13:30	
PM Peaks	16	

APPENDIX C

Side Street Approach Traffic Volume Generation

Table 1: Projected 24-Hour Side Street Exiting Trips

Size (1)	Land Use Size (2)	Internal Gap Rate (3)	Pass-By Rate (4)	Total Trips (5)	Internal Gap Trips (6)	Total Adj. Trips (7)	Pass-By Trips (8)	New Trips (9)
229 Units	Single-Family Residential	0%	0%	1114	0	1114	0	1114
32 Units	Residential Townhouses	0%	0%	122	0	122	0	122
0 SF	0	0%	0%	0	0	0	0	0
0 SF	0	0%	0%	0	0	0	0	0
0 SF	0	0%	0%	0	0	0	0	0
0	0	0%	0	0	0	0	0	0
Totals					0	1236	0	1236

Table 2: Land Use-Hourly Occurrence Rate

Hour (10)	Left Turn Distribution (11)	Single-Family Residential (12)	Residential Townhouses (13)	0	0	0	0
600	100%	10.07%	10.07%	0%	0%	0%	0%
700	100%	2.88%	2.88%	0%	0%	0%	0%
800	100%	6.47%	6.47%	0%	0%	0%	0%
900	100%	5.76%	5.76%	0%	0%	0%	0%
1000	100%	6.47%	6.47%	0%	0%	0%	0%
1100	100%	3.60%	3.60%	0%	0%	0%	0%
1200	100%	5.04%	5.04%	0%	0%	0%	0%
1300	100%	10.07%	10.07%	0%	0%	0%	0%
1400	100%	6.47%	6.47%	0%	0%	0%	0%
1500	100%	4.32%	4.32%	0%	0%	0%	0%
1600	100%	5.76%	5.76%	0%	0%	0%	0%
1700	100%	5.76%	5.76%	0%	0%	0%	0%
1800	100%	5.76%	5.76%	0%	0%	0%	0%
1900	100%	7.91%	7.91%	0%	0%	0%	0%

Table 3: Hourly Site-Generated Left Turn Totals

Hour	Land Use	New Lefts	Pass-By Lefts	Total Lefts
6:00	Single-Family Residential	112	0	112
	Residential Townhouses	12	0	12
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
Totals		124	0	124

Hour	Land Use	New Lefts	Pass-By Lefts	Total Lefts
7:00	Single-Family Residential	32	0	32
	Residential Townhouses	4	0	4
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
Totals		36	0	36

Hour	Land Use	New Lefts	Pass-By Lefts	Total Lefts
8:00	Single-Family Residential	72	0	72
	Residential Townhouses	8	0	8
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
Totals		80	0	80

Hour	Land Use	New Lefts	Pass-By Lefts	Total Lefts
9:00	Single-Family Residential	64	0	64
	Residential Townhouses	7	0	7
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
Totals		71	0	71

Table 3: Hourly Site-Generated Left Turn Totals (cont.)

Hour	Land Use	New Lefts	Pass-By Lefts	Total Lefts
10:00	Single-Family Residential	72	0	72
	Residential Townhouses	8	0	8
	0	0	0	0
	0	0	0	0
	0	0	0	0
Totals		80	0	80

Hour	Land Use	New Lefts	Pass-By Lefts	Total Lefts
11:00	Single-Family Residential	40	0	40
	Residential Townhouses	4	0	4
	0	0	0	0
	0	0	0	0
	0	0	0	0
Totals		44	0	44

Hour	Land Use	New Lefts	Pass-By Lefts	Total Lefts
12:00	Single-Family Residential	56	0	56
	Residential Townhouses	6	0	6
	0	0	0	0
	0	0	0	0
	0	0	0	0
Totals		62	0	62

Hour	Land Use	New Lefts	Pass-By Lefts	Total Lefts
13:00	Single-Family Residential	112	0	112
	Residential Townhouses	12	0	12
	0	0	0	0
	0	0	0	0
	0	0	0	0
Totals		124	0	124

Table 3: Hourly Site-Generated Left Turn Totals (cont.)

Hour	Land Use	New/Lefts	Pass-By Lefts	Total Lefts
14:00	Single-Family Residential	72	0	72
	Residential Townhouses	8	0	8
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	Totals	80	0	80

Hour	Land Use	New/Lefts	Pass-By Lefts	Total Lefts
15:00	Single-Family Residential	48	0	48
	Residential Townhouses	5	0	5
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	Totals	53	0	53

Hour	Land Use	New/Lefts	Pass-By Lefts	Total Lefts
16:00	Single-Family Residential	64	0	64
	Residential Townhouses	7	0	7
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	Totals	71	0	71

Hour	Land Use	New/Lefts	Pass-By Lefts	Total Lefts
17:00	Single-Family Residential	64	0	64
	Residential Townhouses	7	0	7
	0	0	0	0
	0	0	0	0
	0	0	0	0
	0	0	0	0
	Totals	71	0	71

Table 3: Hourly Site-Generated Left Turn Totals (cont.)

Hour	Land Use	New Lefts	Pass-By Lefts	Total Lefts
18:00	Single-Family Residential	64	0	64
	Residential Townhouses	7	0	7
	0	0	0	0
	0	0	0	0
	0	0	0	0
	Totals	71	0	71

Hour	Land Use	New Lefts	Pass-By Lefts	Total Lefts
19:00	Single-Family Residential	88	0	88
	Residential Townhouses	10	0	10
	0	0	0	0
	0	0	0	0
	0	0	0	0
	Totals	98	0	98

APPENDIX D
Traffic Signal Warrant Analysis Results

Edwards Lake Drive Tract
 Edwards Lake Drive & Turncliff Parkway
 Future Post-Development (Total Traffic)

06/02/05
 13:41:41

WARRANTS/TEAPAC[Ver 2.01.16] - MUTCD Warrant Analysis

Conditions Used for Warrant Analysis 2000 MUTCD
 =====
 Intersection # 1 Edwards Lake Drive & Turncliff
 =====
 Major Street Direction EastWest
 Number of Lanes in North-South direction 1
 Number of Lanes in East-West direction 1
 Approach speed on major street is greater than 40 mph No
 Isolated community has population less than 10,000 Yes
 Signal will not seriously disrupt progressive traffic flow Yes
 Trials of other remedies have failed to improve conditions Yes
 Number of accidents correctable by a signal 0
 Peak hour stop sign delay for worst minor approach (veh-hours) 0
 Number of accidents correctable by a multi-way stop 0
 Peak hour average delay for all minor approaches (sec/veh) 0
 =====

WARRANTS/TEAPAC[Ver 2.01.16] - Warrant Analysis for Traffic Signal

Warrant 1A Analysis - 8-Hour Minimum Vehicular Volume

=====

Start Time	600	1300	1900	800	1000	1400	900	1600	Req.
Minor Volume	139	139	110	90	90	90	79	79	105
Major Volume	1176	1613	1252	1373	1328	1704	1198	1950	350
Warrant Met?	Yes	Yes	Yes	No	No	No	No	No	8

=====

Number of 1-hour periods meeting the warrant 3
 Signal will not seriously disrupt progressive traffic flow Yes
 =====

>> WARRANT 1A IS NOT MET <<

Warrant 1B Analysis - 8-Hour Interruption of Continuous Traffic

=====

Start Time	600	1300	1900	800	1000	1400	900	1600	Req.
Minor Volume	139	139	110	90	90	90	79	79	53
Major Volume	1176	1613	1252	1373	1328	1704	1198	1950	525
Warrant Met?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8

=====

Number of 1-hour periods meeting the warrant 12
 Signal will not seriously disrupt progressive traffic flow Yes
 =====

>> WARRANT 1B IS MET <<

Edwards Lake Drive Tract
 Edwards Lake Drive & Turncliff Parkway
 Future Post-Development (Total Traffic)

06/02/05
 13:41:41

WARRANTS/TEAPAC[Ver 2.01.16] - Warrant Analysis for Traffic Signal

Warrant 1A Analysis (80%) - 8-Hour Minimum Vehicular Volume

```

=====
Start Time      600  1300  1900   800  1000  1400   900  1600  Req.
=====
Minor Volume    139   139   110    90    90    90    79    79    84
Major Volume    1176  1613  1252  1373  1328  1704  1198  1950  280
Warrant Met?   Yes   Yes   Yes   Yes   Yes   Yes   No    No    8
=====
Number of 1-hour periods meeting the warrant (56% allowed)      6
=====
  
```

Warrant 1B Analysis (80%) - 8-Hour Interruption of Continuous Traf

```

=====
Start Time      600  1300  1900   800  1000  1400   900  1600  Req.
=====
Minor Volume    139   139   110    90    90    90    79    79    42
Major Volume    1176  1613  1252  1373  1328  1704  1198  1950  420
Warrant Met?   Yes   Yes   Yes   Yes   Yes   Yes   Yes   Yes   8
=====
Number of 1-hour periods meeting the warrant (56% allowed)     13
=====
  
```

Warrant 1C Analysis - 8-Hour Combination of Warrants

```

=====
80% of Warrants 1A and 1B are met (56% allowed)                No
Signal will not seriously disrupt progressive traffic flow      Yes
Trials of other remedies have failed to reduce delays          Yes
=====
                >> WARRANT 1C IS NOT MET <<
  
```

Warrant 2 Analysis - 4-Hour Vehicular Volume

```

=====
Start Time      600  1300  1900   800  1000  1400   900  1600  Req.
=====
Minor Volume    139   139   110    90    90    90    79    79    -
Minor Reqmnt    60    60    60    60    60    60    60    60    <--
Warrant Met?   Yes   Yes   Yes   Yes   Yes   Yes   Yes   Yes   4
=====
Number of 1-hour periods meeting the warrant                    11
Signal will not seriously disrupt progressive traffic flow      Yes
=====
                >> WARRANT 2 IS MET <<
  
```

Edwards Lake Drive Tract
 Edwards Lake Drive & Turncliff Parkway
 Future Post-Development (Total Traffic)

06/02/05
 13:41:41

WARRANTS/TEAPAC[Ver 2.01.16] - Warrant Analysis for Traffic Signal

Warrant 3A Analysis - Peak Hour Delay

```

=====
Start Time      600  1300  1900   800  1000  1400   900  1600  Req.
=====
Minor Volume    139   139   110    90    90    90    79    79   100
Major Volume    1315  1752  1362  1463  1418  1794  1277  2029  650
Warrant Met?   Yes   Yes   Yes   No    No    No    No    No    1
=====
Number of 1-hour periods meeting the warrant 3
Signal will not seriously disrupt progressive traffic flow Yes
Delay for worst minor approach (must be at least 4 veh-hours) 0
=====
>> WARRANT 3A IS NOT MET <<
  
```

Warrant 3B Analysis - Peak Hour Volume

```

=====
Start Time      600  1300  1900   800  1000  1400   900  1600  Req.
=====
Minor Volume    139   139   110    90    90    90    79    79    -
Minor Reqrmt    75    75    75    75    75    75    75    75  <--
Warrant Met?   Yes   Yes   Yes   Yes   Yes   Yes   Yes   Yes    1
=====
Number of 1-hour periods meeting the warrant 10
Signal will not seriously disrupt progressive traffic flow Yes
=====
>> WARRANT 3B IS MET <<
  
```

Warrant 7 Analysis - Crash Experience

```

=====
80% of Warrant 1A or 1B is met Yes
Signal will not seriously disrupt progressive traffic flow Yes
Trials of other remedies have failed to reduce accidents Yes
Number of correctable accidents (must be 5 or more per year) 0
=====
>> WARRANT 7 IS NOT MET <<
  
```

Summary of MUTCD Traffic Signal Warrant Analysis

```

=====
Warrant 1A 8-Hour Minimum Vehicular Volume NOT MET
Warrant 1B 8-Hour Interruption of Continuous Traffic MET
Warrant 1C 8-Hour Combination of Warrants NOT MET
Warrant 2 4-Hour Vehicular Volume MET
Warrant 3A Peak Hour Delay NOT MET
Warrant 3B Peak Hour Volume MET
Warrant 7 Crash Experience NOT MET
=====
>> Traffic Signal Warrant is MET <<
  
```

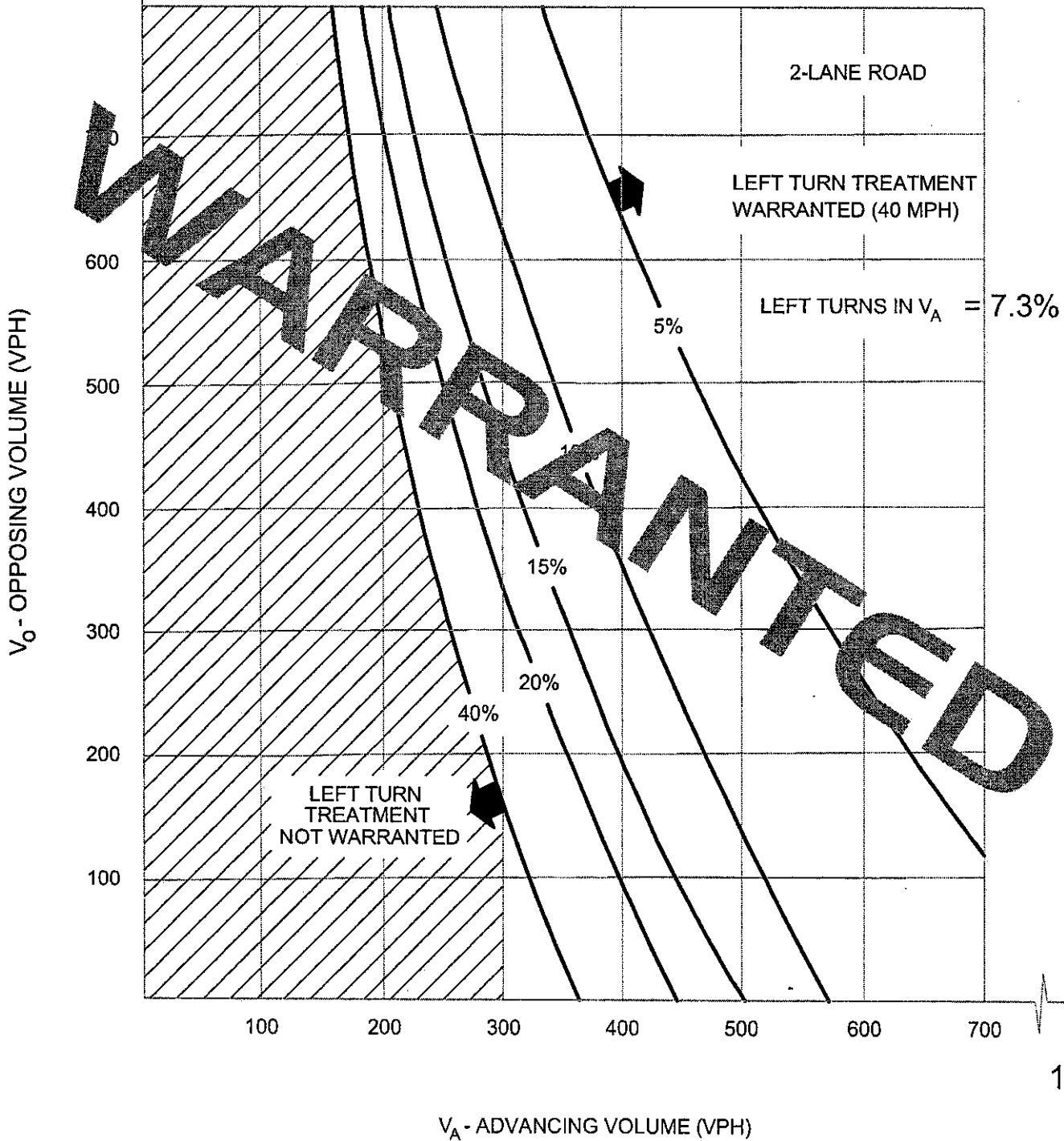
APPENDIX E

Turn Lane Warrant Analysis Results

Highway Research Record 279 Left Turn Lane Warrant

Edwards Lake Road @ Turncliff Parkway
Eastbound Left Turn Lane
(Based on Peak Traffic Conditions)

1362

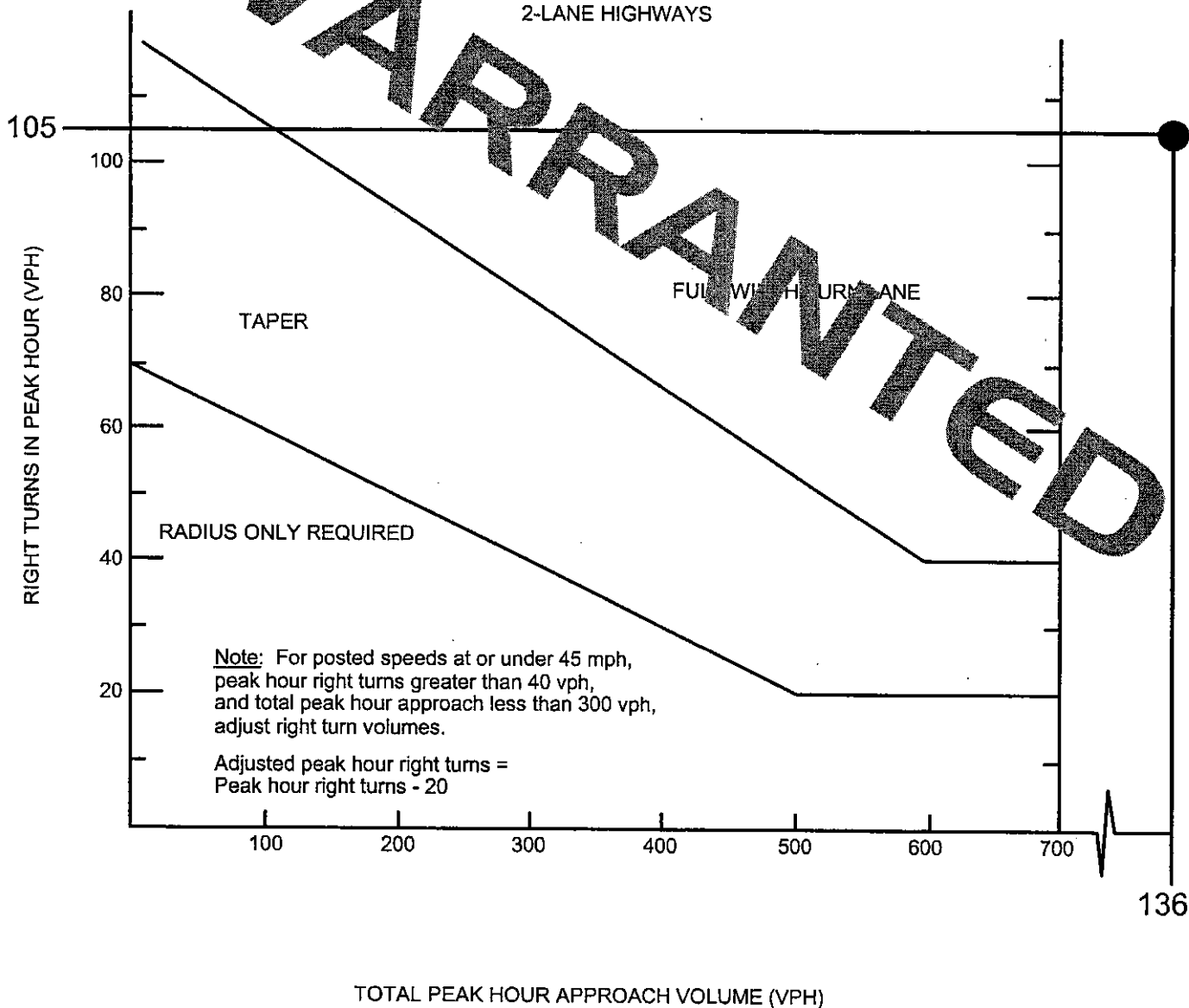


1038

Highway Research Record 279 Right Turn Lane Warrant

Edwards Lake Road @ Turncliff Parkway
Westbound Right Turn Lane
(Based on Peak Traffic Conditions)

2-LANE HIGHWAYS



1362

TOTAL PEAK HOUR APPROACH VOLUME (VPH)

APPENDIX F

Explanation of Levels of Service (LOS)

From the 2000 Highway Capacity Manual, Table 6-4, the Levels of Service are determined by control delay (in seconds per vehicle). The exhibit below illustrates how the amount of delay being experienced coincides with each Level of Service (LOS).

Unsignalized Intersections

<u>Level of Service</u>	<u>Control Delay (sec/veh)</u>
A.....	0 - 10
B.....	> 10 – 15
C.....	> 15 – 25
D.....	> 25 – 35
E.....	> 35 – 50
F.....	> 50

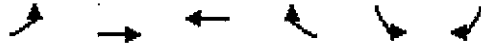
Signalized Intersections

<u>Level of Service</u>	<u>Control Delay (sec/veh)</u>
A.....	0 - 10
B.....	> 10 – 20
C.....	> 20 – 35
D.....	> 35 – 55
E.....	> 55 – 80
F.....	> 80

APPENDIX G
Capacity Analysis
(Synchro Results)

Traffic Impact Study
 1: Edwards Lake Road & Turncliff Pkwy.

Edwards Lake Road Tract
 AM Peak - Future Pre-Development

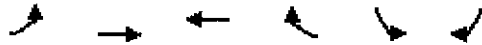


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		←	→		←	→
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	50
Storage Lanes	0			0	1	1
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1770	1583
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		25	
Link Distance (ft)		922	870		768	
Travel Time (s)		18.0	16.9		20.9	
Volume (vph)	0	1050	761	1	4	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	1141	827	1	4	1
Lane Group Flow (vph)	0	1141	828	0	4	1
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type	Other
Control Type	Unsignalized
Intersection Capacity Utilization	70.1%
ICU Level of Service	C

Traffic Impact Study
1: Edwards Lake Road & Turncliff Pkwy.

Edwards Lake Road Tract
AM Peak - Future Pre-Development



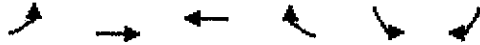
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	0	1050	761	1	4	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	0	1141	827	1	4	1
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						2
Median type				None		
Median storage (veh)						
vC, conflicting volume	828			1969	828	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	100			94	100	
cM capacity (veh/h)	803			69	371	

Direction Lane #	EB 1	WB 1	SB 1
Volume Total	1141	828	5
Volume Left	0	0	4
Volume Right	0	1	1
cSH	803	1700	440
Volume to Capacity	0.00	0.49	0.01
Queue Length (ft)	0	0	1
Control Delay (s)	0.0	0.0	13.3
Lane LOS			B
Approach Delay (s)	0.0	0.0	13.3
Approach LOS			B

Intersection Summary			
Average Delay		0.0	
Intersection Capacity Utilization	70.1%	ICU Level of Service	C

Traffic Impact Study
 1: Edwards Lake Road & Turncliff Pkwy.

Edwards Lake Road Tract
 PM Peak - Future Pre-Development

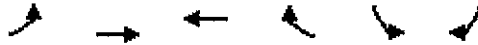


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0			0	0	50
Storage Lanes	0			0	1	1
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850
Flt Protected					0.950	
Satd. Flow (prot)	0	1863	1863	0	1770	1583
Flt Permitted					0.950	
Satd. Flow (perm)	0	1863	1863	0	1770	1583
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		25	
Link Distance (ft)		922	870		768	
Travel Time (s)		18.0	16.9		20.9	
Volume (vph)	3	977	1257	5	2	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	3	1062	1366	5	2	4
Lane Group Flow (vph)	0	1065	1371	0	2	4
Sign Control		Free	Free		Stop	

Intersection Summary	
Area Type:	Other
Control Type:	Unsignalized
Intersection Capacity Utilization	82.2%
ICU Level of Service	D

Traffic Impact Study
1: Edwards Lake Road & Turncliff Pkwy.

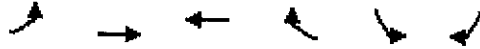
Edwards Lake Road Tract
PM Peak - Future Pre-Development



Movement	EBL	EBT	WB1	WBR	SBL	SBR
Lane Configurations		↕	↕		↕	↕
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	3	977	1257	5	2	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (veh/h)	3	1062	1366	5	2	4
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)	2					
Median type	None					
Median storage (veh)						
vC, conflicting volume	1372			2438	1369	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
tC, single (s)	4.1			6.4	6.2	
tC, 2 stage (s)						
tF (s)	2.2			3.5	3.3	
p0 queue free %	99			94	98	
cM capacity (veh/h)	500			35	179	
Direction Lane #						
	EB 1	WB 1	SB 1			
Volume Total	1065	1372	7			
Volume Left	3	0	2			
Volume Right	0	5	4			
cSH	500	1700	214			
Volume to Capacity	0.01	0.81	0.03			
Queue Length (ft)	0	0	2			
Control Delay (s)	0.2	0.0	22.4			
Lane LOS	A		C			
Approach Delay (s)	0.2	0.0	22.4			
Approach LOS			C			
Intersection Summary						
Average Delay	0.2					
Intersection Capacity Utilization	82.2%		ICU Level of Service		D	

Traffic Impact Study
1: Edwards Lake Road & Turncliff Pkwy.

Edwards Lake Road Tract
AM Peak - Future Post-Development_Signalized

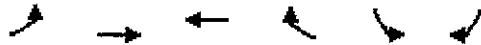


Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗	↗	↖	↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1863	1583	1770	1583
Flt Permitted	0.224				0.950	
Satd. Flow (perm)	417	1863	1863	1583	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				42		33
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		25	
Link Distance (ft)		922	870		768	
Travel Time (s)		18.0	16.9		20.9	
Volume (vph)	9	1050	761	39	119	30
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	1141	827	42	129	33
Lane Group Flow (vph)	10	1141	827	42	129	33
Turn Type	pm+pt			Perm		Perm
Protected Phases	5	2	6		8	
Permitted Phases	2			6		8
Detector Phases	5	2	6	6	8	8
Minimum Initial (s)	4.0	12.0	12.0	12.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	12.0	95.0	83.0	83.0	20.0	20.0
Total Split (%)	10%	83%	72%	72%	17%	17%
Maximum Green (s)	8.0	89.0	77.0	77.0	15.0	15.0
Yellow Time (s)	3.5	4.0	4.0	4.0	3.5	3.5
All-Red Time (s)	0.5	2.0	2.0	2.0	1.5	1.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min	Min	Min	None	None
Act Effct Green (s)	73.5	65.9	64.4	64.4	12.1	12.1
Actuated g/C Ratio	0.72	0.76	0.74	0.74	0.14	0.14
v/c Ratio	0.03	0.80	0.60	0.04	0.52	0.13
Uniform Delay, d1	2.3	5.8	6.2	0.0	36.0	0.0
Delay	3.7	7.0	6.0	1.4	34.3	14.3
LOS	A	A	A	A	C	B
Approach Delay		7.0	5.8		30.3	
Approach LOS		A	A		C	
90th %ile Green (s)	5.9	89.0	79.1	79.1	15.0	15.0
90th %ile Term Code	Gap	Max	Hold	Hold	Max	Max
70th %ile Green (s)	0.0	67.8	67.8	67.8	13.7	13.7
70th %ile Term Code	Skip	Gap	Hold	Hold	Gap	Gap

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Traffic Impact Study
 1: Edwards Lake Road & Turncliff Pkwy.

Edwards Lake Road Tract
 AM Peak - Future Post-Development_Signalized

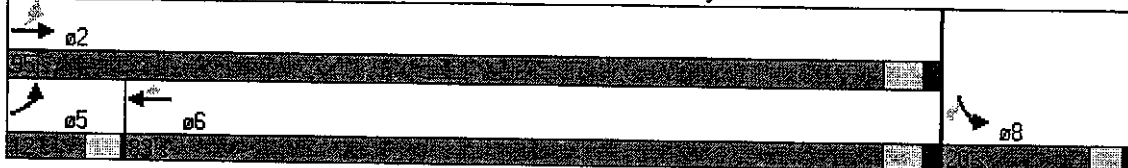


Lane Group	EBL	EBT	WBL	WBR	SBL	SBR
50th %ile Green (s)	0.0	46.4	46.4	46.4	10.2	10.2
50th %ile Term Code	Skip	Gap	Hold	Hold	Gap	Gap
30th %ile Green (s)	0.0	41.2	41.2	41.2	8.2	8.2
30th %ile Term Code	Skip	Dwell	Dwell	Dwell	Gap	Gap
10th %ile Green (s)	0.0	78.7	78.7	78.7	7.1	7.1
10th %ile Term Code	Skip	Dwell	Dwell	Dwell	Gap	Gap
Stops (vph)	3	598	325	5	102	9
Fuel Used (gal)	0	13	8	0	2	0
CO Emmisions (g/hr)	6	908	570	21	140	22
NOx Emmisions (g/hr)	1	177	111	4	27	4
VOC Emmisions (g/hr)	1	210	132	5	32	5
Dilemma Vehicles (#)	0	63	46	0	0	0
Queue Length 50th (ft)	1	271	137	0	49	0
Queue Length 95th (ft)	4	548	403	7	155	29
Internal Link Dist (ft)		842	790		688	
50th Up Block Time (%)						
95th Up Block Time (%)						
Turn Bay Length (ft)						
50th Bay Block Time %						
95th Bay Block Time %						
Queuing Penalty (veh)						

Intersection Summary

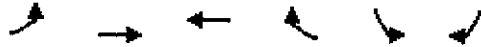
Area Type:	Other
Cycle Length:	115
Actuated Cycle Length:	86.5
Natural Cycle:	75
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.80
Intersection Signal Delay:	8.2
Intersection LOS:	A
Intersection Capacity Utilization:	73.9%
ICU Level of Service:	C
90th %ile Actuated Cycle:	115
70th %ile Actuated Cycle:	92.5
50th %ile Actuated Cycle:	67.6
30th %ile Actuated Cycle:	60.4
10th %ile Actuated Cycle:	96.8

Splits and Phases: 1: Edwards Lake Road & Turncliff Pkwy.



Traffic Impact Study
1: Edwards Lake Road & Turncliff Pkwy.

Edwards Lake Road Tract
PM Peak - Future Post-Development_Signalized



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↑	↑	↑	↖	↖
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Flt				0.850		0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1863	1863	1583	1770	1583
Flt Permitted	0.048				0.950	
Satd. Flow (perm)	89	1863	1863	1583	1770	1583
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)				92		72
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		25	
Link Distance (ft)		922	870		768	
Travel Time (s)		18.0	16.9		20.9	
Volume (vph)	61	977	1257	105	32	66
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	66	1062	1366	114	35	72
Lane Group Flow (vph)	66	1062	1366	114	35	72
Turn Type	pm+pt			Perm		Perm
Protected Phases	5	2	6		8	
Permitted Phases	2			6		8
Detector Phases	5	2	6	6	8	8
Minimum Initial (s)	4.0	12.0	12.0	12.0	4.0	4.0
Minimum Split (s)	8.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	12.0	95.0	83.0	83.0	20.0	20.0
Total Split (%)	10%	83%	72%	72%	17%	17%
Maximum Green (s)	8.0	89.0	77.0	77.0	15.0	15.0
Yellow Time (s)	3.5	4.0	4.0	4.0	3.5	3.5
All-Red Time (s)	0.5	2.0	2.0	2.0	1.5	1.5
Lead/Lag	Lead		Lag	Lag		
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min	Min	Min	None	None
Act Effct Green (s)	97.5	96.4	86.7	86.7	8.8	8.8
Actuated g/C Ratio	0.85	0.87	0.79	0.79	0.08	0.08
v/c Ratio	0.35	0.65	0.93	0.09	0.25	0.38
Uniform Delay, d1	1.1	2.6	11.4	0.6	49.6	0.0
Delay	7.0	3.2	32.5	1.4	46.4	11.1
LOS	A	A	C	A	D	B
Approach Delay		3.4	30.1		22.7	
Approach LOS		A	C		C	
90th %ile Green (s)	8.0	89.0	77.0	77.0	10.2	10.2
90th %ile Term Code	Max	Hold	Max	Max	Gap	Gap
70th %ile Green (s)	8.0	89.0	77.0	77.0	8.6	8.6
70th %ile Term Code	Max	Hold	Max	Max	Gap	Gap

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Line Group	EBL	EBT	WBL	WBR	SBL	SBR
50th %ile Green (s)	8.0	89.0	77.0	77.0	7.5	7.5
50th %ile Term Code	Max	Hold	Max	Max	Gap	Gap
30th %ile Green (s)	7.2	88.2	77.0	77.0	6.4	6.4
30th %ile Term Code	Gap	Hold	Max	Max	Gap	Gap
10th %ile Green (s)	0.0	114.0	114.0	114.0	0.0	0.0
10th %ile Term Code	Skip	Dwell	Dwell	Dwell	Skip	Skip
Stops (vph)	15	294	1041	12	30	15
Fuel Used (gal)	1	9	24	1	1	1
CO Emmisions (g/hr)	42	653	1687	54	44	45
NOx Emmisions (g/hr)	8	127	327	11	9	9
VOC Emmisions (g/hr)	10	151	389	13	10	10
Dilemma Vehicles (#)	0	38	45	0	0	0
Queue Length 50th (ft)	5	180	302	3	23	0
Queue Length 95th (ft)	37	333	#1290	15	56	44
Internal Link Dist (ft)		842	790		688	
50th Up Block Time (%)			6%			
95th Up Block Time (%)			25%			
Turn Bay Length (ft)						
50th Bay Block Time %						
95th Bay Block Time %						
Queuing Penalty (veh)						

Intersection Summary

Area Type: Other
 Cycle Length: 115
 Actuated Cycle Length: 110.4
 Natural Cycle: 120
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.93
 Intersection Signal Delay: 18.7
 Intersection LOS: B
 Intersection Capacity Utilization: 88.9%
 ICU Level of Service: D
 90th %ile Actuated Cycle: 110.2
 70th %ile Actuated Cycle: 108.6
 50th %ile Actuated Cycle: 107.5
 30th %ile Actuated Cycle: 105.6
 10th %ile Actuated Cycle: 120
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles

Splits and Phases: 1: Edwards Lake Road & Turncliff Pkwy.

