![omni-means ENGINEERS-PLANNERS logo]

September 13, 2011

Mr. Kris Pigman
The Pigman Companies
2481 Sunrise Boulevard, Suite 200
Gold River, CA 95670

**RE: Proposed Napa Commerce Center Service Station Project; Focused Trip Generation
and Site Impact Analysis with New Baseline NAIA Development**

Dear Mr. Pigman:

The following letter report evaluates the potential transportation and circulation impacts of a proposed Gasoline Service Station/Convenience Store/Car Wash within the approved Napa Commerce Center project site in the Napa Airport Industrial Area (NAIA). The proposed project would be a change in land use from previously approved "industrial park" uses. Specifically, potential changes in overall vehicle trip generation and adjacent intersection operation have been analyzed and documented. The proposed project site is located on the southeast quadrant of the Airport Boulevard/Devlin Road intersection within the NAIA (see Figure 1—Project Site Vicinity/Project Trip Assignment-attached). In addition to specific circulation and site access analysis, the effects of the proposed project have been analyzed with one other recent development proposal within the NAIA which includes the proposed Napa Gateway Plaza project. For both developments, the project applicants are proposing to change and/or add a land use consistent with previously approved development within the NAIA.

Based on discussions with Napa County Engineering staff, the transportation issues for this development relate to the following key components:

- Net change/comparison of project site trip generation as a result of new proposed service station uses,

- Near-term plus project traffic operations at Airport Boulevard/Devlin Road as well as driveway intersections, and

- Overall baseline conditions as a result of other proposed land use changes within the NAIA.

Using the above project analysis parameters, the proposed project has been analyzed for site trip generation, intersection operations, and baseline conditions with other recent NAIA development proposals.

PROPOSED PROJECT SITE TRIP GENERATION

The proposed project would consist of a gasoline service station with 12 fueling stations, a convenience market, and a car wash. Daily and peak hour trip generation has been based on the Institute of

Transportation Engineers (ITE) research for gasoline/service station with convenience market and car wash.[i]

With any gasoline service station, a portion of the overall trip generation would be considered "pass-by" in nature. ITE describes pass-by trips as existing traffic (on adjacent streets/highways) diverted from some other primary trip purpose (e.g. work trip). The ITE research on pass-by trips indicates that for a gasoline station with convenience market, 62% of the AM peak hour trips and 56% of the PM peak hour trips are pass-by in nature.[ii] Since the project site would be immediately adjacent to Airport Boulevard, the majority of the "pass-by" trips would to/from this roadway and represent employees/visitors to the Napa Airport Industrial Area. Using appropriate pass-by reductions, the proposed project's net new peak hour trip generation has been calculated below:

The proposed project's daily and peak hour vehicle trips have been calculated below:

- Daily: 12 fueling stations x 152.84 trips/station = 1,834 daily trips
- AM Peak: 12 fueling stations x 11.93 trips/station = 143 AM trips (73 in, 70 out)
- PM Peak: 12 fueling stations x 13.94 trips/station = 167 PM trips (85 in, 82 out)

- AM Peak Hour: 143 AM peak hour trips x 62% pass-by = 89 pass-by trips (45 in, 44 out)
- **AM Peak Hour: 143 AM peak hour trips – 89 pass-by trips = 54 net new trips (28 in, 26 out)**

- PM Peak Hour: 167 PM peak hour trips x 56% pass-by = 94 pass-by trips (48 in, 46 out)
- **PM Peak Hour: 167 PM peak hour trips – 94 pass-by trips = 73 net new trips (37 in, 36 out)**

As calculated above, the proposed project would be expected to generate 54 net new AM peak hour trips and 73 net new PM peak hour trips. There are no pass-by reduction rates for daily trip generation.

PREVIOUS INDUSTRIAL PARK/OFFICE SITE TRIP GENERATION

The proposed gasoline/service station project would replace two light-industrial/office buildings on the site. Each building totals 7,563 square feet of gross leasable area (GLA) for a total displacement of 15,126 square feet of industrial park uses. Previous trip generation calculations for the two buildings used ITE trip rates for general office building (as compared to Industrial Park) to account for a greater proportion of office uses in the northern half of the project site. Based on these ITE rates, the amount of approved office space/trip generation that would be replaced has been calculated below:

- Daily: 15,126 s.f. office x 11.01 trips/1,000 s.f. = 167 daily trips
- AM Peak: 15,126 s.f. office x 1.55 trips/1,000 s.f. = 23 AM trips (19 in, 4 out)
- PM Peak: 15,126 s.f. office x 1.49 trips/1,000 s.f. = 23 PM trips (5 in, 18 out)

Net Increase in Proposed Gas Station Trips

The previous industrial park/office site trip generation has been subtracted from proposed project trip generation to determine the net increase in overall project trips on the street network as follows:

- Daily: 1,834 proposed project trips – 167 approved site trips = 1,667 daily trips;
- AM Peak: 54 proposed project trips – 23 approved site trips = 31 AM trips (9 in, 22 out);
- PM Peak: 73 proposed project trips – 23 approved site trips = 50 PM trips (32 in, 18 out).

As calculated, the proposed project is estimated to generate 1,667 net new daily trips with 31 new AM peak hour trips and 50 new PM peak hour trips. It is noted that while pass-by trips related to the proposed project are not considered new in nature, they would be present at project driveways and immediately adjacent intersections. With all project pass-by trips to/from Airport Boulevard, this would include the Airport Boulevard/Devlin Road and Airport Boulevard/Project Driveway #4 (right-turn-only inbound/outbound).

PROJECT TRIP ASSIGNMENT

The proposed project is expected to serve employees and visitors within the Napa Airport Industrial Area (NAIA) and not patrons to/from State Route 29. Specifically, the proposed project will not be allowed to place any monument signs at or along the State Route 29 at Airport Boulevard or along the corridor. In addition, the nearest gas station/convenience development is 3.2 miles south of the project site in American Canyon making the proposed project more appealing to employees working within the NAIA. Finally, much of the physical project building(s) would be hidden from view to motorists along the State Route 29 corridor due to the placement of other approved Napa Commerce Center industrial park/office buildings in the northern portion of the site (buildings A and B). Consideration has also been given to proposed project access driveways and main arterial streets serving the project site. The proposed project's vehicle distribution would be as follows:

> Devlin Road to/from the north: 35%
> Airport Boulevard to/from the west: 40%
> Airport Boulevard to/from the east: 25%
>   100%

With respect to project pass-by trips, 80% would be to/from Airport Boulevard directly fronting the project site and the remaining 20% to/from State Route 29. Pass-by trips coming to/from SR29 would actually represent "diverted" trips to/from the highway and would represent new vehicle trips at the affected project driveways on Airport Boulevard and Devlin Road. The pass-by distribution represents a short-term condition that assumes the proposed gas station/convenience store/car wash project would be constructed prior to other major development slated south of Airport Boulevard in the NAIA (if approved). Once other approved development south of Airport Boulevard is constructed and Devlin Road extended south, there would likely be a portion of the pass-by trips coming to/from Devlin Road.

Proposed project trip net new and pass-by trip assignment has been shown in Figure 1 (attached). Near-term plus project intersection volumes for the AM and PM peak hour have been shown in Figure 2.

NEAR-TERM PEAK HOUR INTERSECTION OPERATIONS

With the change in peak hour trip generation due to proposed gas station uses, AM and PM peak hour levels-of-service operation has been re-calculated at the three affected intersections along Airport Boulevard and Devlin Road and is shown in Table 1 (LOS sheets attached). Intersection LOS listed represents existing plus previously approved near-term development (Greenwood Business Park and Napa Commerce Center [no project]) and existing plus near-term (Greenwood Business Park and Napa Commerce Center) plus gas station/convenience store/car wash project.

As shown in Table 1, peak hour intersection LOS would remain unchanged from previous levels calculated for the approved Napa Commerce Center. With proposed gas station/convenience store/car wash project uses, overall intersection LOS would remain at acceptable levels (LOS C or better) with

TABLE 1
NEAR-TERM (NO PROJECT) AND PLUS PROJECT CONDITIONS: INTERSECTION LEVELS-OF-SERVICE
AM AND PM PEAK HOUR

#	Intersection	Control Type	AM Peak Hour LOS/Delay		PM Peak Hour LOS/Delay	
			Near-Term (No Project)	Near-Term w/ Project	Near-Term (No Project)	Near-Term w/ Project
1	Airport Boulevard/Devlin Blvd.	Signal	C 22.9	C 28.0	C 25.1	C 28.6
2	Project Driveway/Devlin Road	Stop	C 15.4	C 16.4	B 12.7	B 14.2
3	Project Driveway/Airport Boulevard	Stop	A 9.1	A 9.4	B 12.8	B 13.8

Signalized intersection calculations based on HCM 2000 operations methodology which yields an intersection LOS and vehicle delay in seconds.

slight or moderate increases in vehicle delays of 1-5 seconds. The most noticeable change in vehicle delays would be at the signalized Airport Boulevard/Devlin Road intersection where proposed project trips are most concentrated. At this location, project intersection LOS would be C (28.0 seconds) during the AM peak hour and LOS C (28.6 seconds) during the PM peak hour.

SITE ACCESS/CIRCULATION

Vehicle access to the proposed project would be gained from a full-access driveway located off of the southerly extension of Devlin Road and a limited access driveway (right-turns inbound/outbound only) located off of Airport Boulevard. Specifically, the full-access driveway off Devlin Road would be located approximately 280-300 feet south of Airport Boulevard. This intersection would serve both the proposed project and approved Greenwood Business Park project directly west of the project site. There would be separate left-turn lanes (north-south) on Devlin Road to serve inbound project traffic and the outbound (westbound) driveway would have a separate right-turn lane and shared through/left-turn lane as recommend in previous transportation analyses for the project site.[iii] The Devlin Road project driveway would serve both proposed project traffic (gas station) and approved office/industrial park development.

The limited access driveway off Airport Boulevard would be located approximately 260 feet east of Devlin Road. The Airport Boulevard eastbound approach would have one through-lane and one shared through/right-turn lane. The northbound (outbound) driveway approach would have one right-turn lane.

Vehicle Queuing

When intersections are closely spaced and/or experience high traffic volumes, vehicle queuing can occur when existing storage capacity for turning lanes (or through-traffic) is not adequate. A vehicle queuing analysis has been conducted for the three project study intersections along the Airport Boulevard and Devlin Road (extension).

Vehicular queuing projections have been estimated utilizing *SimTraffic* micro-simulation software which is an extension of *Synchro*. Developed by *Trafficware*, Simtraffic software utilizes all field obtained inputs from Synchro intersection LOS including signal timing, phasing, and volumes to simulate traffic flows through the study intersections and corridor. Essentially, the software simulates traffic flows on the street network by randomly "seeding" vehicles using all measured/recorded field data. Vehicle queuing projections are provided in terms of the 95th percentile queue lengths. Intersections are designed using the 95th percentile queue lengths for maximum storage capacity. The available storage lengths for vehicle

turn lanes has been based on measurements and signal cycle lengths recorded in the field during the PM peak commute periods and corroborated by from aerial photographs of the corridor(s) (Google earth).

Based on the results of the vehicle queuing analysis, all three study intersections would have adequate vehicle storage during both the AM and PM peak hours based on previous circulation improvements recommended as part of the transportation analysis prepared for the approved Napa Commerce Center.[iv] (See vehicle queuing reports AM and PM peak hour—attached).

Airport Boulevard/Project Driveway; Right-Turn Deceleration Lane Warrant

With proposed project traffic, the eastbound right-turn movement from Airport Boulevard into the limited access driveway would increase due to proposed commercial-retail activity (gas station). Dedicated right-turn lanes are usually provided in situations where traffic volumes and speeds are relatively high and conflicts are likely to develop at public road intersections and driveways between through and turning traffic. Based on project trip assignments, there would be 105 eastbound right-turn movements during the AM peak hour and 73 eastbound right-turn movements during the PM peak hour.

Based on the most recent warrant research, the proposed project would meet the minimum volumes required for the installation of a dedicated right-turn lane on a four-lane roadway during the PM peak hour (see Right-Turn Guidelines for Four-Lane Roadways---attached).[v]

BASELINE TRIP GENERATION CONDITIONS WITH PROPOSED NAPA GATEWAY PLAZA DEVELOPMENT

Proposed Napa Gateway Plaza Project Description

The proposed Napa Gateway Plaza project is located on the northeast quadrant of the Airport Boulevard/State Route 29 intersection and would expand the existing Marriott Hotel. Vehicle access to the project site is currently gained from Devlin Road via Gateway Road East. The development proposal would increase the number of hotel rooms at the existing Marriott from 100 to 160 rooms. The project applicant has previous approvals on the project site for 122,178 square feet of commercial-retail uses including retail, restaurant, and office uses within a six-building use. However, based on Napa County Planning documents only a 14,570 square-foot office/bank has been constructed on the property (with the existing 100-room Marriott Hotel).[vi] With the proposed 60-room expansion of the hotel, a proportional amount of commercial-retail space would be reduced. The project applicant indicates that this would include the following components:[vii]

- Hotel: +60 Rooms
- Restaurant: -2,598 square feet
- Office: -19,856 square feet
- Retail: -12,983 square feet

The project's overall trip generation would represent the net increase (or decrease) between the 60-room increase in hotel rooms and the proportional decrease in commercial-retail trip generation. A conservative pass-by rate of 50% has been assumed based in ITE research for commercial-retail/shopping center uses. The net change in proposed project trip generation has been shown in Table 2. As calculated, the proposed changes in land use for the proposed Napa Gateway Plaza project would result in a decrease in AM and PM peak hour trip generation. Specifically, the project is expected to have a net reduction of -8 AM peak hour trips (-14 in, 6 out) and -42 PM peak hour trips (-14 in, -28 out).

TABLE 2
BASELINE TRAFFIC DEVELOPMENT; AM AND PM PEAK HOUR TRIP GENERATION

Land Use/Trip Rates	Size Rooms/ Ksf	AM Peak Hour			PM Peak Hour		
		Total	In	Out	Total	In	Out
Napa Gateway Plaza Project							
Hotel Peak Hour Trip Rates	+60	0.67	58%	42%	0.70	49%	51%
Hotel Trip Generation:		40	23	17	42	21	21
Restaurant Peak Hour Trip Rates	-2.598	0.81	50%	50%	7.49	67%	33%
Restaurant Trip Generation:		(2)	(1)	(1)	(20)	(13)	(7)
Office Peak Hour Trip Rates	-19.856	1.55	88%	12%	1.49	17%	83%
Office Trip Generation:		(31)	(27)	(4)	(30)	(5)	(25)
Retail Peak Hour Trip Rates	-12.983	1.16	61%	39%	5.24	49%	51%
Retail Trip Generation:		15	9	6	68	33	35
50% Pass-By Rate (PM Peak Only)		---	---	---	34	16	18
Net New Retail Trip Generation:		(15)	(9)	(6)	(34)	(17)	(17)
Total Napa Gateway Plaza Trips		**(8)**	**(14)**	**6**	**(42)**	**(14)**	**(28)**
Napa CC Service Station							
S.S. Peak Hour Trip Rates	+12	11.93	51%	49%	13.94	51%	49%
S.S. Trip Generation		143	73	70	167	85	82
Pass-By Rate; 62% AM, 56% PM		89	45	44	94	48	46
Net New S.S. Trip Generation		54	28	26	73	37	36
Office Peak Hour Trip Rates	-15.126	1.55	88%	12%	1.49	17%	83%
Office Trip Generation		(23)	(19)	(4)	(23)	(5)	(18)
Total Napa CC Service Station Trips		**31**	**9**	**22**	**50**	**32**	**18**
Total Short-Term Net New Trips		**23**	**(5)**	**28**	**8**	**18**	**(10)**

Source: Institute of Transportation Engineers (ITE), Trip Generation, 8th Edition, Hotel (#310), Restaurant (#932), Office (#710), Shopping Center (#820), 2008.

EFFECTS OF OVERALL BASELINE DEVELOPMENT ON NAPA AIRPORT INDUSTRIAL AREA TRAFFIC OPERATIONS

The combined baseline trip generation of the proposed Napa Commerce Center Service Station and Napa Gateway Plaza projects has been shown in Table 2. The net effect of the two projects would be a minor increase in overall peak hour trip generation for the NAIA. Specifically, the two projects are expected to increase AM peak hour trip generation by 23 trips (-5 in, 28 out). During the PM peak hour, overall trip generation is expected to increase by 8 trips (18 in, -10 out). The proposed Napa Gateway Plaza project would have a net reduction in overall trip generation due to the subtraction of approved commercial-retail uses and moderate increase in hotel rooms. The proposed Napa Commerce Center Service Station would experience an increase in net new trip generation due to the addition of new commercial-retail uses. However, the two proposed project would tend to "cancel" each other out with respect to any significant increase in NAIA baseline trip generation. As shown in the distribution analysis for the proposed Napa Commerce Center Service Station project, a majority of the new retail trips would be to/from the west on Airport Boulevard and to/from the north on Devlin Road rather than to/from State Route 29. For this reason, the Airport Boulevard/Devlin Road intersection would continue to operate at acceptable levels (LOS C or better) with baseline development. In light of the conservative approach used to generate new proposed project trips and the resulting minor increase in net new AM and PM peak hour trip generation, overall traffic operations within the NAIA would not be significantly affected by proposed changes in land use from the Napa Commerce Center Service Station and Napa Gateway Plaza projects.

Please call if you have any questions.

Sincerely,

OMNI-MEANS, Ltd.
Engineers & Planners

Peter Galloway
Transportation Planner

Cc: Mr. Brad Shirhall, TLA Engineering and Planning, Inc., Mr. George Nickelson, P.E. Omni-Means

Enc. Figures 1 and 2, LOS Calculations, Vehicle Queuing Calculations, Right-Turn Warrant Sheets, ITE Pass-By Rates

C1409LTR004.DOC / 35-4853-02

[i] *Institute of Transportation Engineers (ITE), Trip Generation, 8th Edition, Gasoline/Service Station with Convenience Market (#946), 2008.*
[ii] *Institute of Transportation Engineers (ITE), Trip Generation Handbook—A Recommended Practice, 2nd Edition, Gasoline/Service Station with Convenience Market, Tables 5.29 and 5.30, Pass-By Rates, June 2004*
[iii] *Omni-Means Engineers & Planners, Napa Commerce Center Light-Industrial Project Traffic Impact Analysis, County of Napa, February 2010.*
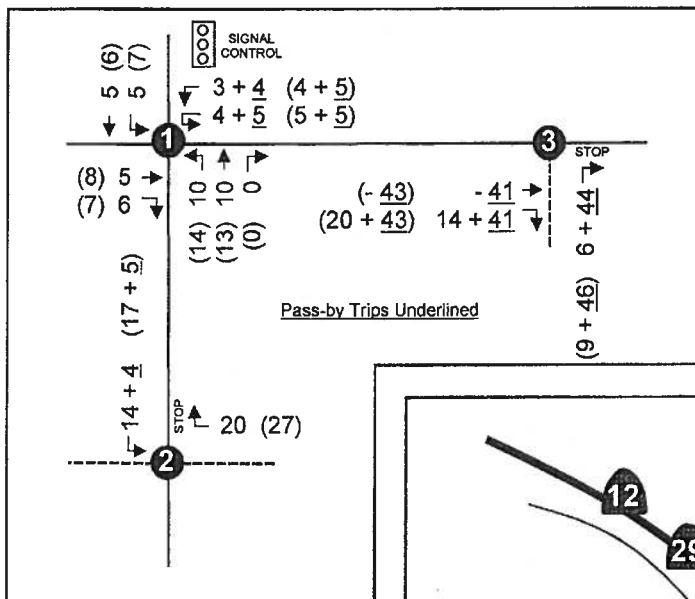[iv] *Omni-Means Engineers & Planners, Napa Commerce Center Light-Industrial Project Traffic Impact Analysis, Ibid...*
[v] *Engineering Policy Guide, Traffic Control, Auxiliary Acceleration and Turning Lanes, Chapter 940.9, December 15, 2009.*
[vi] *Napa County Board of Supervisors, Board Agenda Letter: Initiation of Amendments to the 1986 Airport Industrial Area Specific Plan, Ms. Hilary Gitelman—Director; Conservation, Development, and Planning to Board of Supervisors, April 26, 2011.*
[vii] *Cristina Alcala, Project Manager, William Maston Architects & Associates,--Phase I and II Proposed Parking Number of Reduction Summary for Napa Gateway Plaza, Updated September 8, 2011.*
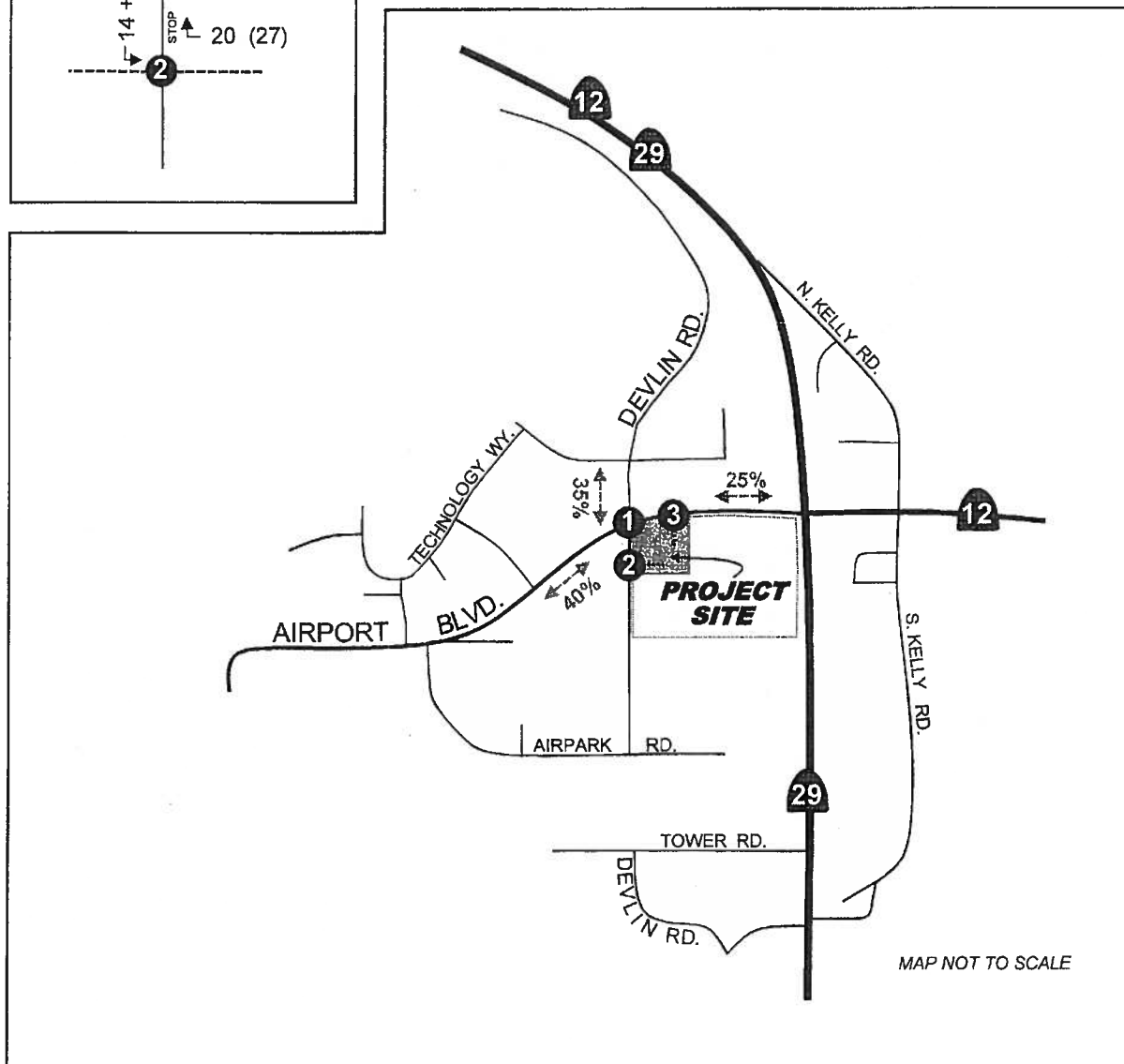
Detailed traffic diagram (top left inset)

SIGNAL CONTROL

5 (6)
5 (7)

3 + 4   (4 + 5)
4 + 5   (5 + 5)

(8) 5
(7) 6

10 10 0
(14) (13) (0)

(- 43)   - 41
(20 + 43) 14 + 41

44 + 9
(46 + 9)

(9 + 46)
(6)

STOP

Pass-by Trips Underlined

14 + 4 (17 + 5)

14 + 4 STOP 20 (27)

Nodes: 1, 3 (STOP), 2 (STOP)

PEAK HOUR PROJECT TRIPS (top right inset)

AM: Net New   54 (28 in, 26 out)
Pass-by   89 (45 in, 44 out)
Total   143 (73 in, 70 out)

PM: Net New   73 (37 in, 36 out)
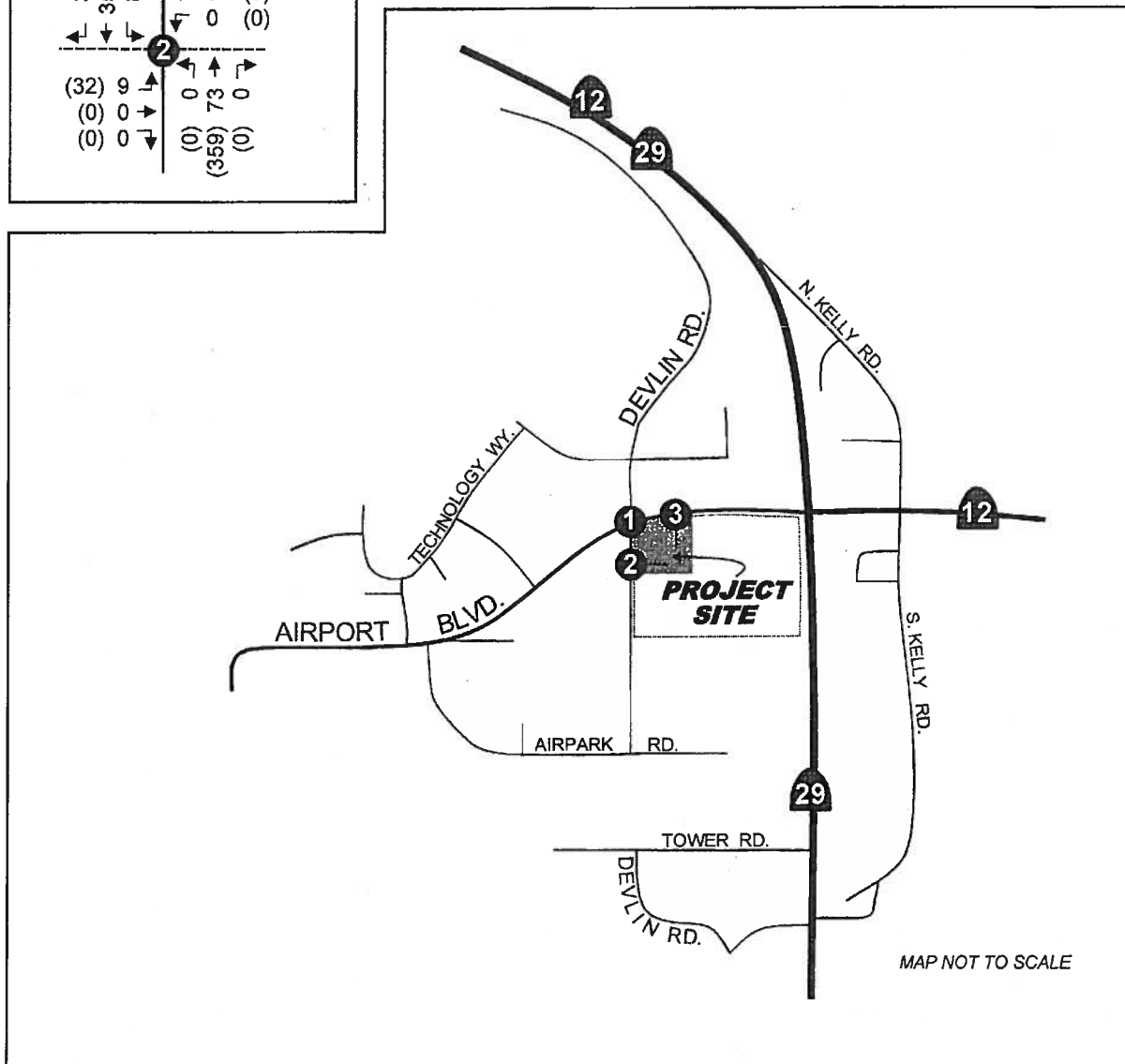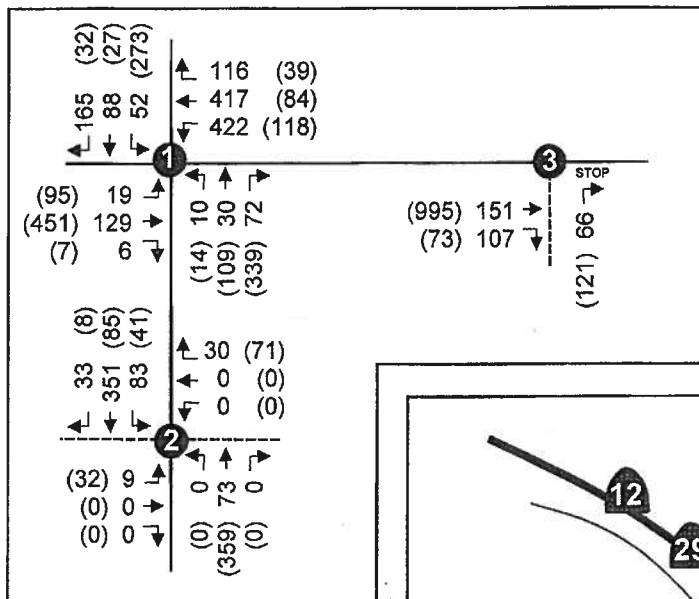Pass-by   94 (48 in, 46 out)
Total   167 (85 in, 82 out)

Map (not to scale)

Roads: DEVLIN RD., N. KELLY RD., TECHNOLOGY WY., AIRPORT BLVD., AIRPARK RD., TOWER RD., DEVLIN RD., S. KELLY RD.

Highway shields: 12, 29, 12, 29

35%
25%
40%

Nodes: 1, 3, 2

PROJECT SITE

MAP NOT TO SCALE

A.M. and (P.M.) Peak Hour Project Trips and Trip Distributions

North

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figure 1

Baseline + Project A.M. and (P.M.) Peak Hour Volumes

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figure 2

North

HCM Signalized Intersection Capacity Analysis
1: Airport Blvd. & Devlin Rd.

AM Exist + Gas Station (Incremental)
8/15/2011

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↰	↑↑↱			↰↰	↑↑↱		↰	↑	↱	↰	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.97	0.95		1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99			1.00	0.97		1.00	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00			0.95	1.00		0.95	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3514			3433	3424		1770	1863	1583	1770	1863
Flt Permitted	0.95	1.00			0.95	1.00		0.95	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3514			3433	3424		1770	1863	1583	1770	1863
Volume (vph)	19	129	6	50	372	417	116	10	30	72	52	88
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	21	140	7	54	404	453	126	11	33	78	57	96
RTOR Reduction (vph)	0	5	0	0	0	34	0	0	0	63	0	0
Lane Group Flow (vph)	21	142	0	0	458	545	0	11	33	15	57	96
Turn Type	Prot			Prot	Prot			Prot		Perm	Prot	
Protected Phases	7	4		3	3	8		5	2		1	6
Permitted Phases										2		
Actuated Green, G (s)	0.6	9.4			10.9	19.7		0.6	12.9	12.9	16.4	28.7
Effective Green, g (s)	0.6	9.4			10.9	19.7		0.6	12.9	12.9	16.4	28.7
Actuated g/C Ratio	0.01	0.14			0.17	0.30		0.01	0.20	0.20	0.25	0.44
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	16	504			570	1028		16	366	311	443	815
v/s Ratio Prot	0.01	0.04			c0.13	c0.16		c0.01	0.02		c0.03	c0.05
v/s Ratio Perm										0.01		
v/c Ratio	1.31	0.28			0.80	0.53		0.69	0.09	0.05	0.13	0.12
Uniform Delay, d1	32.5	25.1			26.3	19.1		32.4	21.6	21.4	19.1	10.9
Progression Factor	1.00	1.00			1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	337.5	0.3			8.0	0.5		80.1	0.1	0.1	0.6	0.3
Delay (s)	370.0	25.4			34.4	19.6		112.5	21.7	21.4	19.7	11.2
Level of Service	F	C			C	B		F	C	C	B	B
Approach Delay (s)		68.5				26.1			29.7			12.7
Approach LOS		E				C			C			B

Intersection Summary				
HCM Average Control Delay	28.0	HCM Level of Service	C	
HCM Volume to Capacity ratio	0.33			
Actuated Cycle Length (s)	65.6	Sum of lost time (s)	8.0	
Intersection Capacity Utilization	38.8%	ICU Level of Service	A	
Analysis Period (min)	15			
c Critical Lane Group				

HCM Signalized Intersection Capacity Analysis
1: Airport Blvd. & Devlin Rd.

AM Exist + Gas Station (Incremental)
8/15/2011

Movement	SBR
Lane Configurations	↱
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1583
Flt Permitted	1.00
Satd. Flow (perm)	1583
Volume (vph)	165
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	179
RTOR Reduction (vph)	101
Lane Group Flow (vph)	78
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	28.7
Effective Green, g (s)	28.7
Actuated g/C Ratio	0.44
Clearance Time (s)	4.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	693
v/s Ratio Prot	
v/s Ratio Perm	0.05
v/c Ratio	0.11
Uniform Delay, d1	10.9
Progression Factor	1.00
Incremental Delay, d2	0.3
Delay (s)	11.2
Level of Service	B
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	9	0	0	0	0	30	0	73	0	83	351	33
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	10	0	0	0	0	33	0	79	0	90	382	36
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											317	
pX, platoon unblocked												
vC, conflicting volume	652	659	209	451	677	40	417			79		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	652	659	209	451	677	40	417			79		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	97	100	100	100	100	97	100			94		
cM capacity (veh/h)	326	359	797	470	351	1023	1138			1517		

Direction, Lane #	EB1	EB2	WB1	WB2	NB1	NB2	NB3	SB1	SB2	SB3
Volume Total	10	0	0	33	0	53	26	90	254	163
Volume Left	10	0	0	0	0	0	0	90	0	0
Volume Right	0	0	0	33	0	0	0	0	0	36
cSH	326	1700	1700	1023	1700	1700	1700	1517	1700	1700
Volume to Capacity	0.03	0.00	0.00	0.03	0.00	0.03	0.02	0.06	0.15	0.10
Queue Length 95th (ft)	2	0	0	2	0	0	0	5	0	0
Control Delay (s)	16.4	0.0	0.0	8.6	0.0	0.0	0.0	7.5	0.0	0.0
Lane LOS	C	A	A	A				A		
Approach Delay (s)	16.4		8.6		0.0			1.3		
Approach LOS	C		A							

Intersection Summary			
Average Delay	1.8		
Intersection Capacity Utilization	25.1%	ICU Level of Service	A
Analysis Period (min)	15		
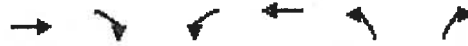
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑		↗
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	151	107	0	0	0	66
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	164	116	0	0	0	72
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (ft)	266			1048		
pX, platoon unblocked			0.99		0.99	0.99
vC, conflicting volume			280		222	140
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			270		211	129
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	92
cM capacity (veh/h)			1283		753	892

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	109	171	0	0	72
Volume Left	0	0	0	0	0
Volume Right	0	116	0	0	72
cSH	1700	1700	1700	1700	892
Volume to Capacity	0.06	0.10	0.00	0.00	0.08
Queue Length 95th (ft)	0	0	0	0	7
Control Delay (s)	0.0	0.0	0.0	0.0	9.4
Lane LOS					A
Approach Delay (s)	0.0		0.0		9.4
Approach LOS					A

Intersection Summary				
Average Delay		1.9		
Intersection Capacity Utilization		18.4%	ICU Level of Service	A
Analysis Period (min)		15		

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations	↰	↑↑↾			↰↰	↑↑↾		↰	↑	↾	↾	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0			4.0	4.0		4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	1.00	0.95			0.97	0.95		1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00			1.00	0.95		1.00	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00			0.95	1.00		0.95	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	3531			3433	3372		1770	1863	1583	1770	1863
Flt Permitted	0.95	1.00			0.95	1.00		0.95	1.00	1.00	0.95	1.00
Satd. Flow (perm)	1770	3531			3433	3372		1770	1863	1583	1770	1863
Volume (vph)	95	451	7	18	100	84	39	14	109	339	273	27
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	103	490	8	20	109	91	42	15	118	368	297	29
RTOR Reduction (vph)	0	2	0	0	0	34	0	0	0	184	0	0
Lane Group Flow (vph)	103	496	0	0	129	99	0	15	118	184	297	29
Turn Type	Prot			Prot	Prot			Prot		Perm	Prot	
Protected Phases	7	4		3	3	8		5	2		1	6
Permitted Phases										2		
Actuated Green, G (s)	4.5	13.2			3.8	12.5		0.7	14.9	14.9	16.5	30.7
Effective Green, g (s)	4.5	13.2			3.8	12.5		0.7	14.9	14.9	16.5	30.7
Actuated g/C Ratio	0.07	0.20			0.06	0.19		0.01	0.23	0.23	0.26	0.48
Clearance Time (s)	4.0	4.0			4.0	4.0		4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0			3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	124	724			203	655		19	431	366	453	888
v/s Ratio Prot	0.06	c0.14			c0.04	0.03		0.01	0.06		c0.17	0.02
v/s Ratio Perm										c0.12		
v/c Ratio	0.83	0.69			0.64	0.15		0.79	0.27	0.50	0.66	0.03
Uniform Delay, d1	29.6	23.7			29.6	21.5		31.8	20.3	21.5	21.4	9.0
Progression Factor	1.00	1.00			1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	35.4	2.7			6.4	0.1		108.2	0.3	1.1	7.2	0.1
Delay (s)	65.0	26.4			36.0	21.7		139.9	20.7	22.6	28.6	9.0
Level of Service	E	C			D	C		F	C	C	C	A
Approach Delay (s)		33.0				28.7			25.7			25.2
Approach LOS		C				C			C			C

Intersection Summary			
HCM Average Control Delay	28.6	HCM Level of Service	C
HCM Volume to Capacity ratio	0.62		
Actuated Cycle Length (s)	64.4	Sum of lost time (s)	16.0
Intersection Capacity Utilization	65.5%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

HCM Signalized Intersection Capacity Analysis
1: Airport Blvd. & Devlin Rd.

PM Exist + Gas Station (Incremental)
8/15/2011

Movement	SBR
Lane Configurations	↗
Ideal Flow (vphpl)	1900
Total Lost time (s)	4.0
Lane Util. Factor	1.00
Frt	0.85
Flt Protected	1.00
Satd. Flow (prot)	1583
Flt Permitted	1.00
Satd. Flow (perm)	1583
Volume (vph)	32
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	35
RTOR Reduction (vph)	18
Lane Group Flow (vph)	17
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	30.7
Effective Green, g (s)	30.7
Actuated g/C Ratio	0.48
Clearance Time (s)	4.0
Vehicle Extension (s)	3.0
Lane Grp Cap (vph)	755
v/s Ratio Prot	
v/s Ratio Perm	0.01
v/c Ratio	0.02
Uniform Delay, d1	8.9
Progression Factor	1.00
Incremental Delay, d2	0.1
Delay (s)	9.0
Level of Service	A
Approach Delay (s)	
Approach LOS	

Intersection Summary

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↱		↰	↱		↰	↑↱		↰	↑↱	
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Volume (veh/h)	32	0	0	0	0	71	0	359	0	41	85	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	35	0	0	0	0	77	0	390	0	45	92	9
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh)												
Upstream signal (ft)											317	
pX, platoon unblocked												
vC, conflicting volume	458	576	51	526	580	195	101			390		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	458	576	51	526	580	195	101			390		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	100	100	100	100	91	100			96		
cM capacity (veh/h)	427	410	1007	422	408	813	1489			1165		

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	35	0	0	77	0	260	130	45	62	39
Volume Left	35	0	0	0	0	0	0	45	0	0
Volume Right	0	0	0	77	0	0	0	0	0	9
cSH	427	1700	1700	813	1700	1700	1700	1165	1700	1700
Volume to Capacity	0.08	0.00	0.00	0.09	0.00	0.15	0.08	0.04	0.04	0.02
Queue Length 95th (ft)	7	0	0	8	0	0	0	3	0	0
Control Delay (s)	14.2	0.0	0.0	9.9	0.0	0.0	0.0	8.2	0.0	0.0
Lane LOS	B	A	A	A				A		
Approach Delay (s)	14.2		9.9		0.0			2.5		
Approach LOS	B		A							

Intersection Summary				
Average Delay		2.5		
Intersection Capacity Utilization		31.7%	ICU Level of Service	A
Analysis Period (min)		15		

	→	↘	↙	←	↖	↗

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑↳			↑↑		↗
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Volume (veh/h)	995	73	0	0	0	121
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	1082	79	0	0	0	132
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None		
Median storage veh)						
Upstream signal (ft)	266			1048		
pX, platoon unblocked			0.88		0.88	0.88
vC, conflicting volume			1161		1121	580
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			1042		996	379
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	76
cM capacity (veh/h)			581		211	542

Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1
Volume Total	721	440	0	0	132
Volume Left	0	0	0	0	0
Volume Right	0	79	0	0	132
cSH	1700	1700	1700	1700	542
Volume to Capacity	0.42	0.26	0.00	0.00	0.24
Queue Length 95th (ft)	0	0	0	0	24
Control Delay (s)	0.0	0.0	0.0	0.0	13.8
Lane LOS					B
Approach Delay (s)	0.0		0.0		13.8
Approach LOS					B

Intersection Summary					
Average Delay		1.4			
Intersection Capacity Utilization		44.0%		ICU Level of Service	A
Analysis Period (min)		15			

Intersection: 1: Airport Blvd. & Devlin Rd.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	UL	L	T	TR	L	T	R	L	T
Maximum Queue (ft)	59	74	81	121	114	108	121	45	53	51	88	89
Average Queue (ft)	19	37	43	103	78	77	73	9	18	28	29	32
95th Queue (ft)	49	67	71	123	127	120	124	32	46	47	69	70
Link Distance (ft)		772	772						230	230		748
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	320			225	225			125			220	
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 1: Airport Blvd. & Devlin Rd.

Movement	SB											
Directions Served	R											
Maximum Queue (ft)	95											
Average Queue (ft)	35											
95th Queue (ft)	62											
Link Distance (ft)	748											
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 2: GWBP & Devlin Rd.

Movement	EB	WB	SB									
Directions Served	L	TR	L									
Maximum Queue (ft)	32	49	46									
Average Queue (ft)	9	20	7									
95th Queue (ft)	31	45	33									
Link Distance (ft)	241	226										
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)			150									
Storage Blk Time (%)												
Queuing Penalty (veh)												

Omni-Means

Intersection: 3: Airport Blvd. & NCC rto #4

Movement	NB											
Directions Served	R											
Maximum Queue (ft)	54											
Average Queue (ft)	28											
95th Queue (ft)	47											
Link Distance (ft)	142											
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 4: Airport Blvd. & SR-29

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB
Directions Served	L	LT	T	R	L	T	R	T	L	T	T	T
Maximum Queue (ft)	87	94	72	46	213	1303	241	371	381	1768	1771	1620
Average Queue (ft)	33	41	31	2	84	716	165	52	322	1198	1109	1058
95th Queue (ft)	69	75	66	25	195	1397	307	303	445	1987	1851	1783
Link Distance (ft)		968	968			1232		1742		1754	1754	1754
Upstream Blk Time (%)						7				6	3	3
Queuing Penalty (veh)						0				0	0	0
Storage Bay Dist (ft)	300			600	175		200		350			
Storage Blk Time (%)					0	48	1		7	43		63
Queuing Penalty (veh)					0	242	3		39	152		14

Intersection: 4: Airport Blvd. & SR-29

Movement	NB	SB	SB	SB	SB	SB			
Directions Served	R	L	L	T	T	R			
Maximum Queue (ft)	225	421	439	469	474	175			
Average Queue (ft)	29	315	337	280	288	6			
95th Queue (ft)	144	413	433	428	431	97			
Link Distance (ft)				1845	1845				
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)	200	1000	1000			500			
Storage Blk Time (%)	0				0				
Queuing Penalty (veh)	0				1				

Omni-Means

Intersection: 7: GWBP & Devlin Rd.

Movement	EB	WB	SB			
Directions Served	L	TR	L			
Maximum Queue (ft)	39	40	39			
Average Queue (ft)	12	20	5			
95th Queue (ft)	37	44	28			
Link Distance (ft)	225	273				
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			150			
Storage Blk Time (%)						
Queuing Penalty (veh)						

Nework Summary

Network wide Queuing Penalty: 451

Omni-Means

Intersection: 1: Airport Blvd. & Devlin Rd.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	UL	L	T	TR	L	T	R	L	T
Maximum Queue (ft)	117	135	166	108	77	86	68	53	117	173	224	232
Average Queue (ft)	61	80	99	63	15	40	28	15	49	81	123	19
95th Queue (ft)	107	122	155	104	49	73	55	43	94	141	196	100
Link Distance (ft)		772	772						230	230		748
Upstream Blk Time (%)										0		
Queuing Penalty (veh)										0		
Storage Bay Dist (ft)	320			225	225			125			220	
Storage Blk Time (%)									0		1	
Queuing Penalty (veh)									0		0	

Intersection: 1: Airport Blvd. & Devlin Rd.

Movement	SB
Directions Served	R
Maximum Queue (ft)	43
Average Queue (ft)	12
95th Queue (ft)	38
Link Distance (ft)	748
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 2: GWBP & Devlin Rd.

Movement	EB	WB	NB	SB
Directions Served	L	TR	TR	L
Maximum Queue (ft)	52	62	7	46
Average Queue (ft)	21	31	0	14
95th Queue (ft)	47	56	4	42
Link Distance (ft)	241	226	270	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			150	
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Airport Blvd. & NCC rto #4

Movement	NB
Directions Served	R
Maximum Queue (ft)	98
Average Queue (ft)	42
95th Queue (ft)	71
Link Distance (ft)	142
Upstream Blk Time (%)	0
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 4: Airport Blvd. & SR-29

Movement	EB	EB	EB	EB	WB	WB	WB	NB	NB	NB	NB	NB
Directions Served	L	LT	T	R	L	T	R	L	T	T	T	R
Maximum Queue (ft)	325	396	393	405	108	184	225	382	670	641	612	226
Average Queue (ft)	227	259	243	191	37	59	109	124	403	379	363	55
95th Queue (ft)	331	390	375	356	85	140	249	283	605	572	549	187
Link Distance (ft)		968	968			1232			1754	1754	1754	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	300			600	175		200	350				200
Storage Blk Time (%)	2	8					1		14		36	0
Queuing Penalty (veh)	6	12					1		15		15	0

Intersection: 4: Airport Blvd. & SR-29

Movement	SB	SB	SB	SB	SB
Directions Served	L	L	T	T	R
Maximum Queue (ft)	459	496	565	589	350
Average Queue (ft)	317	335	310	321	12
95th Queue (ft)	405	428	474	491	140
Link Distance (ft)			1845	1845	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)	1000	1000			500
Storage Blk Time (%)				1	0
Queuing Penalty (veh)				0	0

Omni-Means

Intersection: 7: GWBP & Devlin Rd.

Movement	EB	WB	SB
Directions Served	L	TR	L
Maximum Queue (ft)	60	80	30
Average Queue (ft)	29	40	4
95th Queue (ft)	49	63	21
Link Distance (ft)	225	273	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			150
Storage Blk Time (%)			
Queuing Penalty (veh)			

Nework Summary
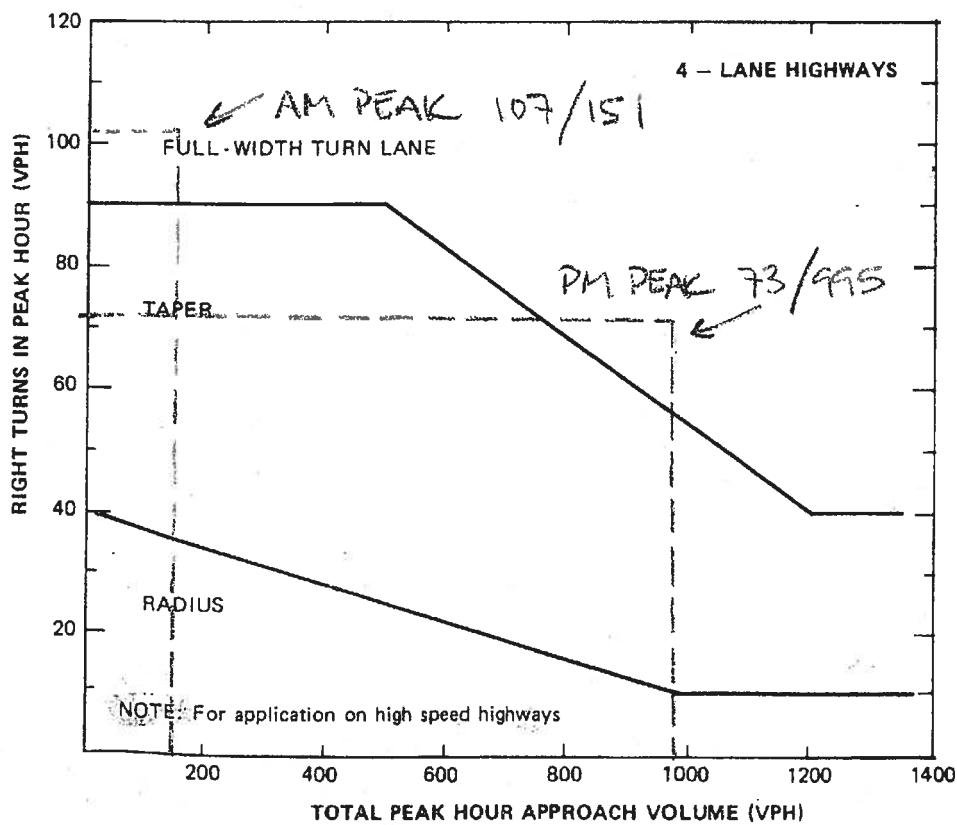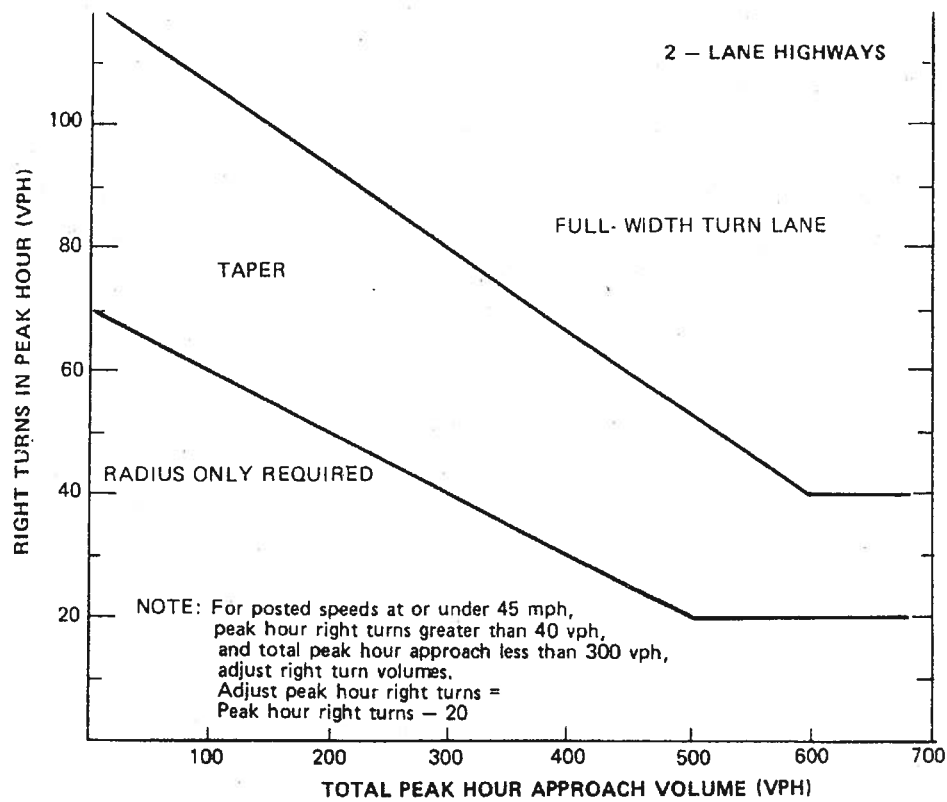
Network wide Queuing Penalty: 50

Figure 4-23. Traffic volume guidelines for design of right-turn lanes. (Source: Ref. 4-11)
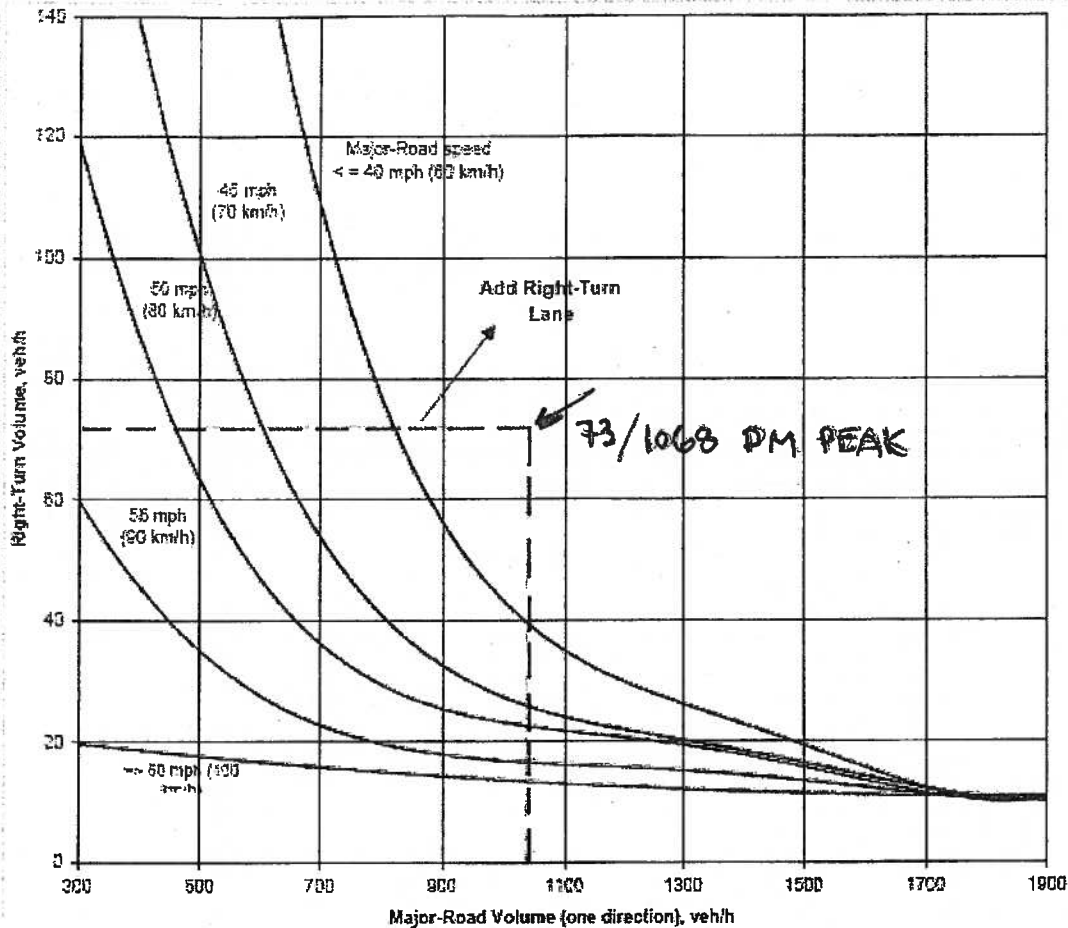
Figure 940.9.9, Right Turn Lane Guidelines for Four-Lane Roadways

The following data are required:

1. Advancing Volume (veh/hr) - The advancing volume is to include the right-turn, left-turn and through movements in the same direction as the right turning vehicle.

2. Right Turning Volume (veh/hr) - The right turning volume is the number of advancing vehicles turning right.

3. Operating Speed (mph) - The greatest of anticipated operating speed, measured 85th percentile speed or posted speed.

Note: Right turn lane not warranted for right turn volume less than 10 vph. However, criteria other than volume, e.g. crash experience, may be used to justify a right turn lane.

If the combination of major road approach volume and right-turn volume intersects above or to the right of the speed trend line corresponding the major road operating speed, then a right-turn lane is appropriate.

940.9.10 Offset Right- and Left-Turn Lanes

Vehicles in the right-turn lane tend to obstruct the vision of drivers waiting at the stop bar of the minor roadway.

Land Use 945—Gasoline/Service Station with Convenience Market

SIZE (1,000 SQ. FT. GFA)	VEHICLE FUELING POSITIONS	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PRIMARY TRIP (%)	NON-PASS-BY TRIP (%)	DIVERTED LINKED TRIP (%)	PASS-BY TRIP (%)	ADJ. STREET PEAK HOUR VOLUME	SOURCE
0.8	8	Louisville area, KY	1993	61	7:00–9:00 a.m.	15	—	25	60	4,000	Barton-Aschman Assoc.
0.6	8	Louisville, KY	1993	48	7:00–9:00 a.m.	13	—	19	68	1,307	Barton-Aschman Assoc.
0.7	10	Louisville, KY	1993	47	7:00–9:00 a.m.	11	—	22	67	1,105	Barton-Aschman Assoc.
0.7	8	Louisville area, KY	1993	n/a	7:00–9:00 a.m.	22	—	22	56	1,211	Barton-Aschman Assoc.
0.7	10	Louisville area, KY	1993	n/a	7:00–9:00 a.m.	31	—	12	46	1,211	Barton-Aschman Assoc.
0.3	n/a	Louisville area, KY	1993	75	7:00–9:00 a.m.	15	—	13	72	n/a	Barton-Aschman Assoc.
0.8	8	Silver Spring, MD	1992	36	7:00–9:00 a.m.	14	—	39	47	3,095	RBA
0.4	8	Derwood, MD	1992	46	7:00–9:00 a.m.	0	—	25	75	3,770	RBA
2.2	8	Kensington, MD	1992	31	7:00–9:00 a.m.	34	—	19	47	1,785	RBA
1	8	Silver Spring, MD	1992	35	7:00–9:00 a.m.	9	—	13	78	7,080	RBA

Average Pass-By Trip Percentage: 62

Table 5.30
Pass-By Trips and Diverted Linked Trips
Weekday, p.m. Peak Period

Land Use 945—Gasoline/Service Station with Convenience Market

SIZE (1,000 SQ. FT. GFA)	VEHICLE FUELING POSITIONS	LOCATION	WEEKDAY SURVEY DATE	NO. OF INTERVIEWS	TIME PERIOD	PRIMARY TRIP (%)	NON-PASS-BY TRIP (%)	DIVERTED LINKED TRIP (%)	PASS-BY TRIP (%)	ADJ. STREET PEAK HOUR VOLUME	SOURCE
0.8	8	Louisville area, KY	1993	83	4:00–6:00 p.m.	8	—	40	52	4,965	Barton-Aschman Assoc.
0.6	8	Louisville, KY	1993	60	4:00–6:00 p.m.	20	—	27	53	1,491	Barton-Aschman Assoc.
0.7	10	Louisville, KY	1993	n/a	4:00–6:00 p.m.	19	—	24	57	1,812	Barton-Aschman Assoc.
0.7	8	Louisville area, KY	1993	n/a	4:00–6:00 p.m.	7	—	21	72	2,657	Barton-Aschman Assoc.
0.7	10	Louisville area, KY	1993	n/a	4:00–6:00 p.m.	16	—	29	55	2,657	Barton-Aschman Assoc.
0.8	8	Silver Spring, MD	1992	36	4:00–6:00 p.m.	14	—	19	67	3,095	RBA
0.4	8	Derwood, MD	1992	46	4:00–6:00 p.m.	11	—	43	46	3,770	RBA
2.1	8	Kensington, MD	1992	31	4:00–6:00 p.m.	13	—	35	52	1,785	RBA
1	8	Silver Spring, MD	1992	35	4:00–6:00 p.m.	3	—	43	54	7,080	RBA

Average Pass-By Trip Percentage: 56