

Traffic Impact Analysis

Walden Lake

Plant City, Florida

Final Summary Report

January 2015

Prepared by:



Sprinkle
CONSULTING

Planners + Engineers

18115 U.S. Highway 41, Suite 600
Lutz, Florida 33549
Certificate of Authorization # 4548

Theodore A. Petritsch, P.E.
Florida License # 48857

SUMMARY

This report summarizes a study conducted for the City of Plant City for the purpose of considering the traffic impacts for the Walden Lake Community Unit District modification (PB-2014-06). The proposed development is located to the southwest of downtown Plant City, generally bounded by Sydney Road, Turkey Creek Road, Trapnell Road, SR 39, and Alexander Street (See Figures 1A and 1B).

The following sections outline the estimation of background traffic and the project's anticipated trip generation, distribution, and assignment. Also, the results of the capacity analyses (for both “background only” and “background plus project” traffic conditions) are summarized with the levels of service for the four identified project access locations (shown in Figure 2), three internal development intersections, and nine additional off-site impacted intersections. In total, traffic was counted and analyzed at 16 intersections.

The results of this traffic impact study indicate that the trips generated by the development will not significantly degrade the existing levels of service at the nearby analyzed intersections. Only three intersections suffer a decline in overall level of service score: Alexander St at Timberlane Dr falls from a “C” to a “D” for AM peak conditions, Griffin Blvd at Mud Lake Rd falls from an “A” to a “B” for AM peak conditions, and Turkey Creek Rd at Sydney Rd falls from an “E” to an “F” for PM peak conditions. No individual turning movement for any intersection experiences a decline in level of service score by more than one letter grade. Due to the minimal expected impact generated by the proposed development traffic, no mitigation efforts are recommended at this time.

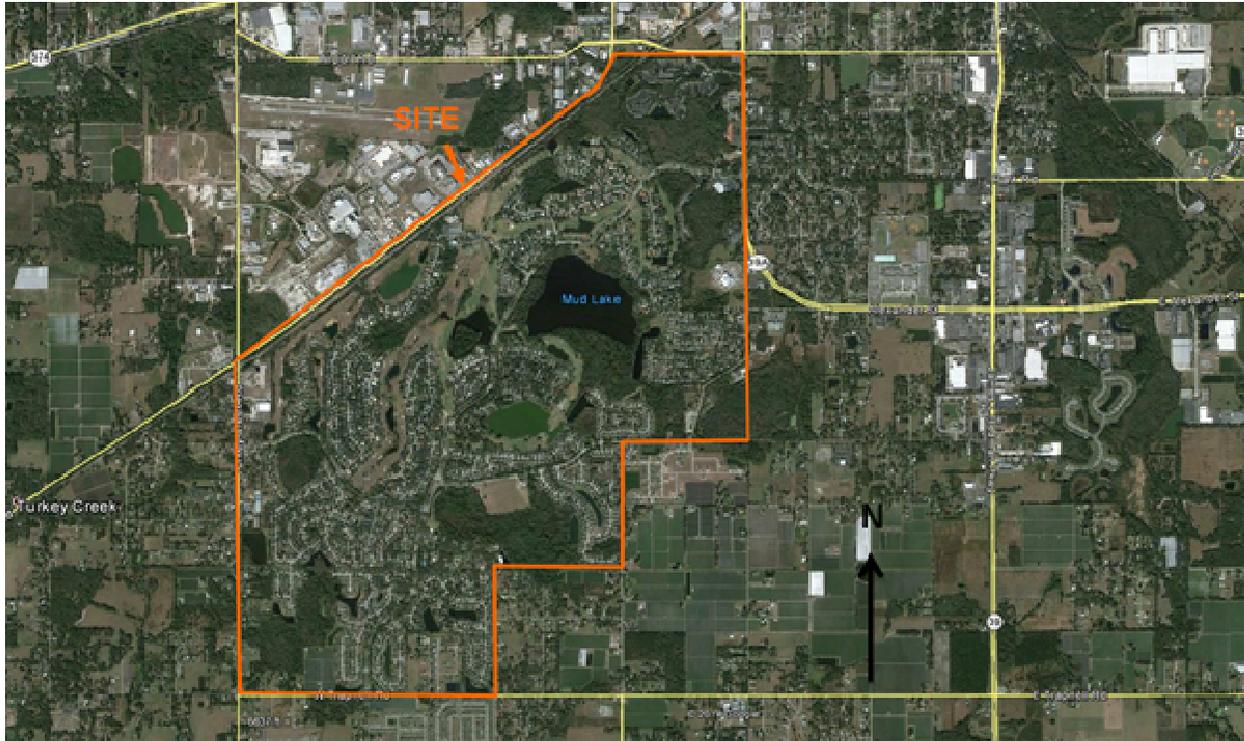


FIGURE 1A Vicinity Map

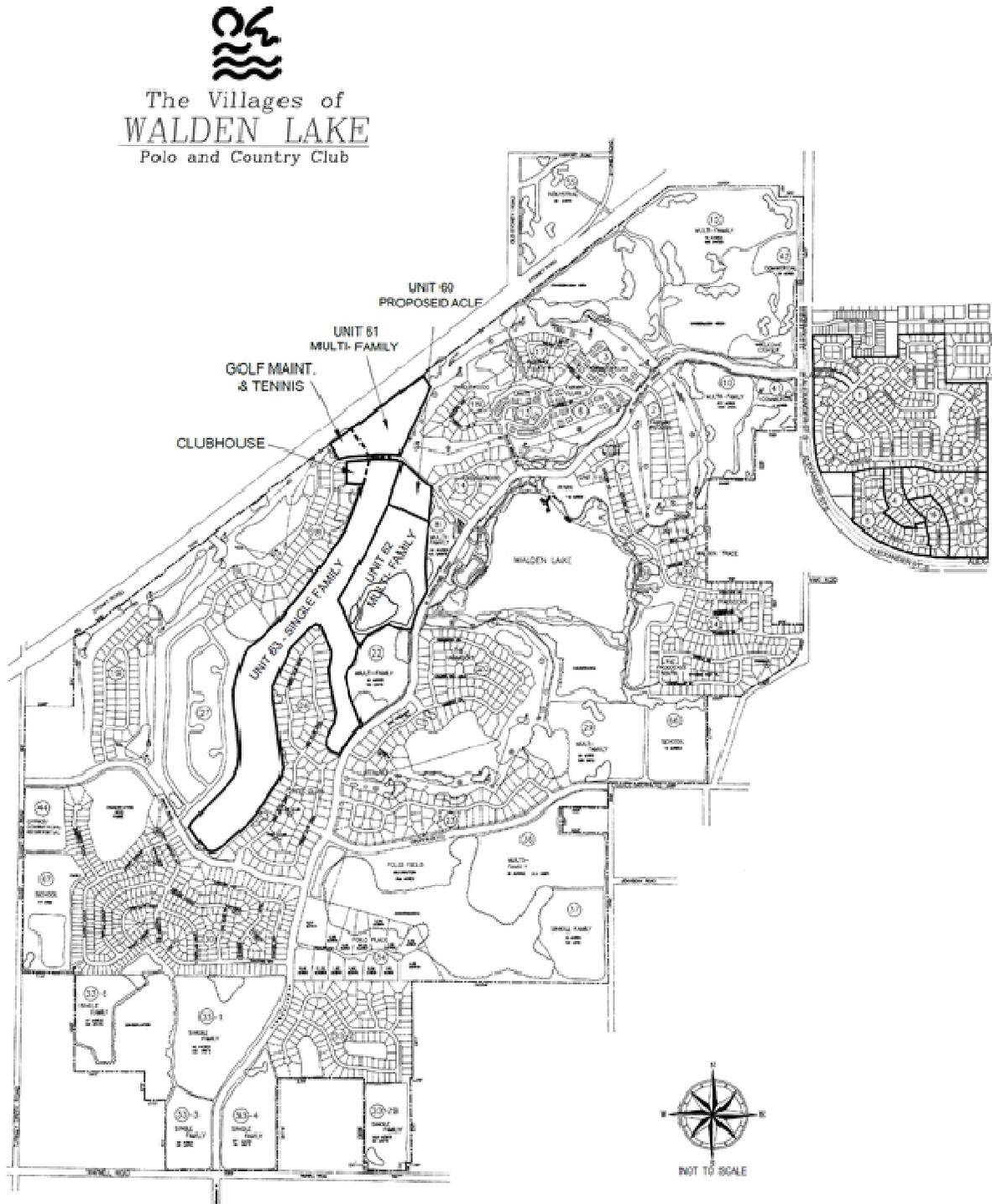


FIGURE 1B General Site Plan

BACKGROUND TRAFFIC GENERATION

PM peak hour turning movement counts were performed at each of the study intersections as outlined below:

Primary Development Access Points/Intersections

- *Alexander St at Timberlane Dr*
- *Timberlane Dr at Trapnell Rd*
- *Griffin Blvd at Turkey Creek Rd*
- *Griffin Blvd at Mud Lake Rd*

Internal Development Intersections

- *Clubhouse Dr at Timberlane Dr*
- *Griffin Blvd at Timberlane Dr (2 separately operating offset intersections)*

Other Impacted Intersections

- *Alexander St at Airport Rd/Grant St*
- *Alexander St at Mud Lake Rd*
- *Alexander St at YMCA Pl*
- *Charlie Griffin Rd at SR 39*
- *Turkey Creek Rd at Sydney Rd*
- *Mud Lake Rd at Charlie Griffin Rd*
- *Turkey Creek Rd at SR 574*
- *Turkey Creek Rd at Trapnell Rd*
- *Mud Lake Rd at Trapnell Rd*

At each study intersection, a seasonal adjustment factor of 1.04 was applied to the existing traffic volumes to determine the base traffic volumes. The seasonal adjustment factor was obtained via "FDOT Florida Traffic Online 2013 Peak Season Factor Category Report" for Hillsborough County. Historical traffic counts from the same source, in the vicinity of the site, do not indicate a need to apply a growth factor. See Appendix A for copies of turning movement counts (collected by Sprinkle Consulting,

Inc., October 2014). The final (calculated) volumes shown in the traffic volume generation worksheets are those used in the intersection capacity analyses.

TRIP GENERATION

Estimates of average daily traffic and peak hour traffic generations for the project were made using the Institute of Transportation Engineers' (ITE) *Trip Generation Manual 9th Edition*. Based on the land use categories for the developments and their proposed size, the trip generation estimates were calculated and are shown below in Table 1. Because of the planned repurposing and downsizing of existing facilities, namely a reduction in the sizes of the existing golf course, tennis club, and restaurant, vesting of these trips is provided in this analysis. The associated reduction of trips was calculated based on existing development components that are planned to be reduced in size. The reduced trips are shown in Table 2. The net trip generation (the difference between trip generation and reduced trips) is also shown in Table 3. The net trip generation was used in determining the traffic volumes expected at site access intersections and distributed to the surrounding road network.

TABLE 1 Trip Generation

Development (Trip Type)	Size	Land Use Code	ADT	AM Peak Hour Trip Ends Enter/Exit (%) (%)	PM Peak Hour Trip Ends Enter/Exit (%) (%)
Assisted Care Living Facility	282 beds	254	750	26/14 65%/35%	27/35 44%/56%
Multi-family Housing	215 units	220	1426	22/87 20%/80%	88/48 65%/35%
Single-family Housing	170 units	210	1711	32/97 25%/75%	107/63 63%/37%
Total			3887	80/198 29%/71%	222/146 60%/40%

TABLE 2 Reduced Trips

Development (Trip Type)	Size	Land Use Code	ADT	AM Peak Hour Trip Ends Enter/Exit (%) (%)	PM Peak Hour Trip Ends Enter/Exit (%) (%)
Golf Course	13 holes	430	465	21/6 79%/21%	19/19 51%/49%
Racquet/Tennis Club	2 courts	491	77	2/1 N/A*	4/3 N/A*
Quality Restaurant	5,144 sq ft	931	463	2/2 N/A*	26/13 67%/33%
Total			1005	25/9 74%/26%	49/35 58%/42%

TABLE 3 Net Trip Generation

	ADT	AM Peak Hour Trip Ends Enter/Exit (%) (%)	PM Peak Hour Trip Ends Enter/Exit (%) (%)
Net Total Trips	2882	55/189 23%/77%	173/111 61%/39%

TRIP DISTRIBUTION AND ASSIGNMENT

In keeping with practices outlined in the Institute of Transportation Engineer's (ITE's) *Traffic Access and Impact Studies for Site Development*, the total project trips are distributed based upon the surrounding land development patterns, existing traffic splits, and knowledge of the project's general market area. Four intersections, shown as blue dots in Figure 2, were identified as primary site access points. Each intersection was then assigned a portion of the net trips expected for the development. The expected percentage for each access intersection is also illustrated in Figure 2. Trips were then distributed for each access intersection (Figures 3-6). Impacted intersections are marked by red dots. Both AM and PM peak hours were analyzed independently. Note that certain intersections are expected to be impacted by trips through more than one access point. The site generated trips (Figures 7 through 32) reflect this fact and are shown accordingly. The background and background plus project trips can be seen in Figures 33 through 64 and Figures 65 through 90, respectively.

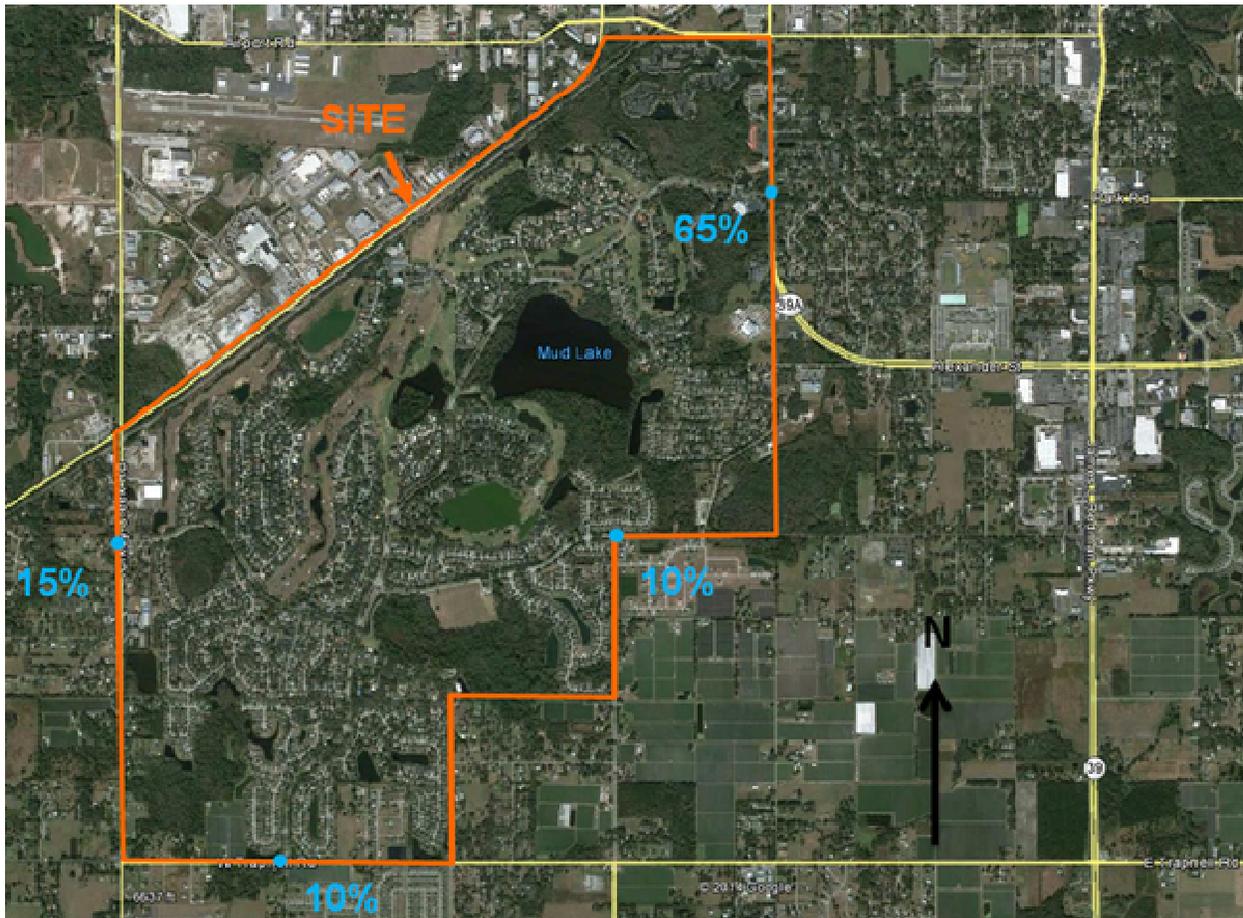


FIGURE 2 Anticipated Primary Trip Distribution – Percentage of Trips at Site Access Points

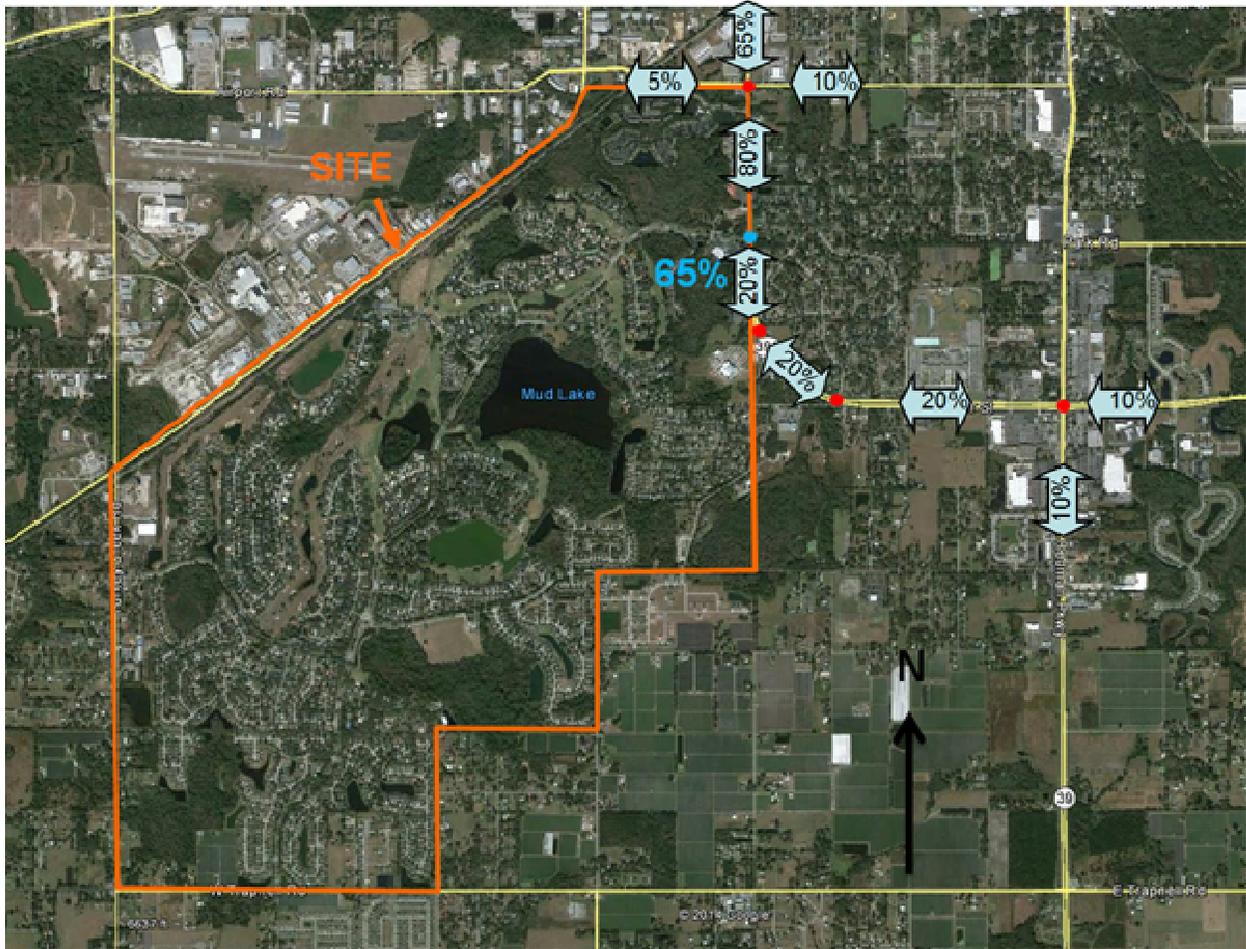


FIGURE 3 Anticipated Trip Distribution - Northeast Access

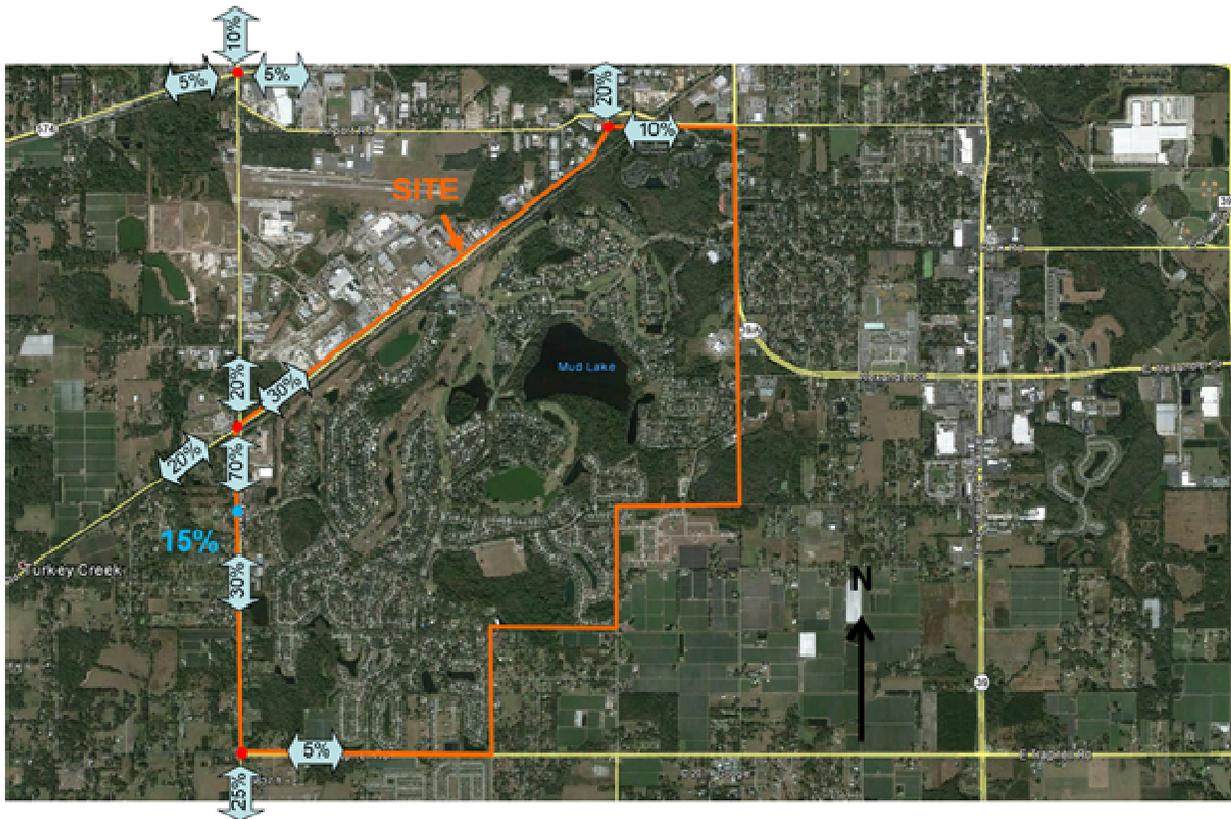


FIGURE 4 Anticipated Trip Distribution - West Access

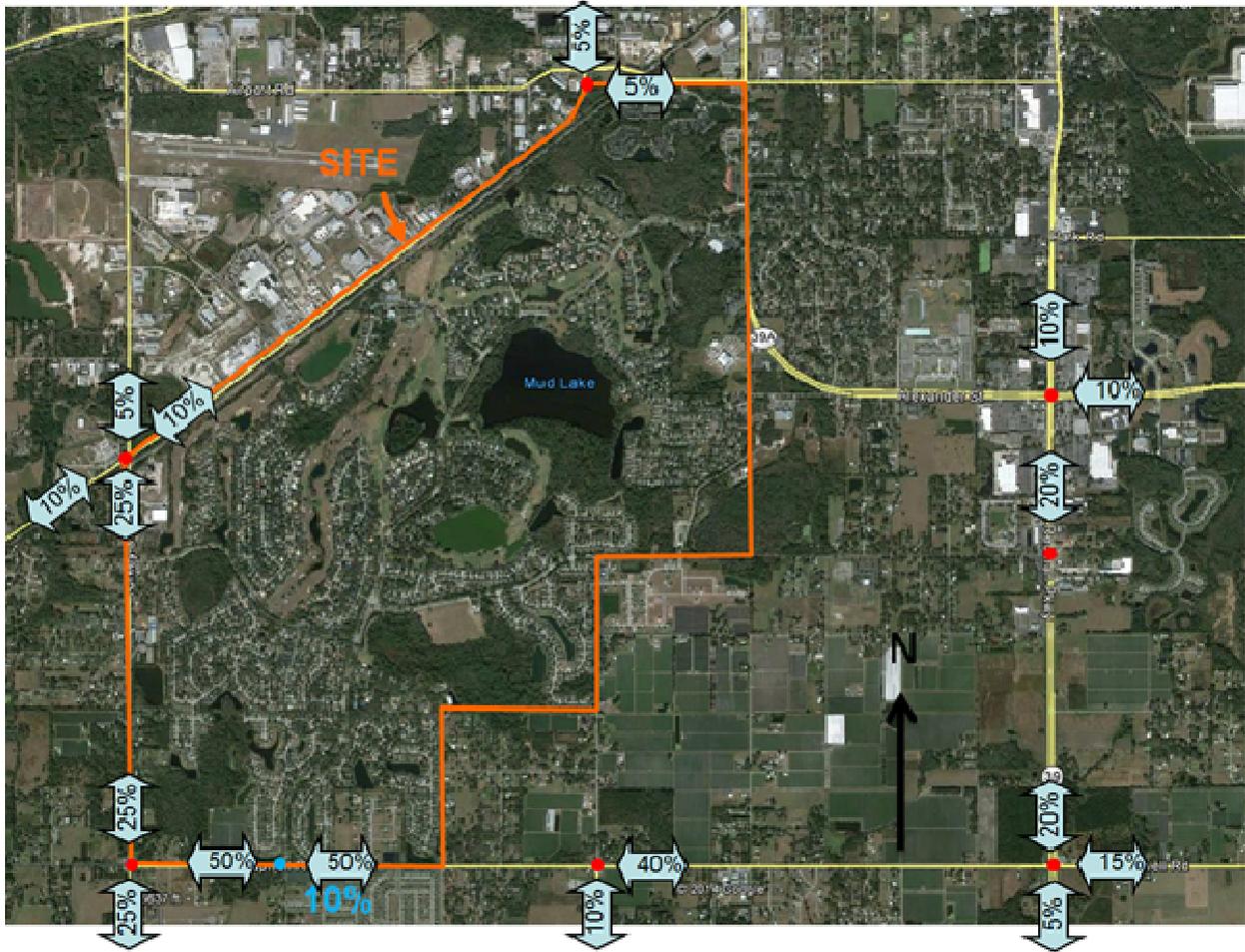


FIGURE 5 Anticipated Trip Distribution - South Access

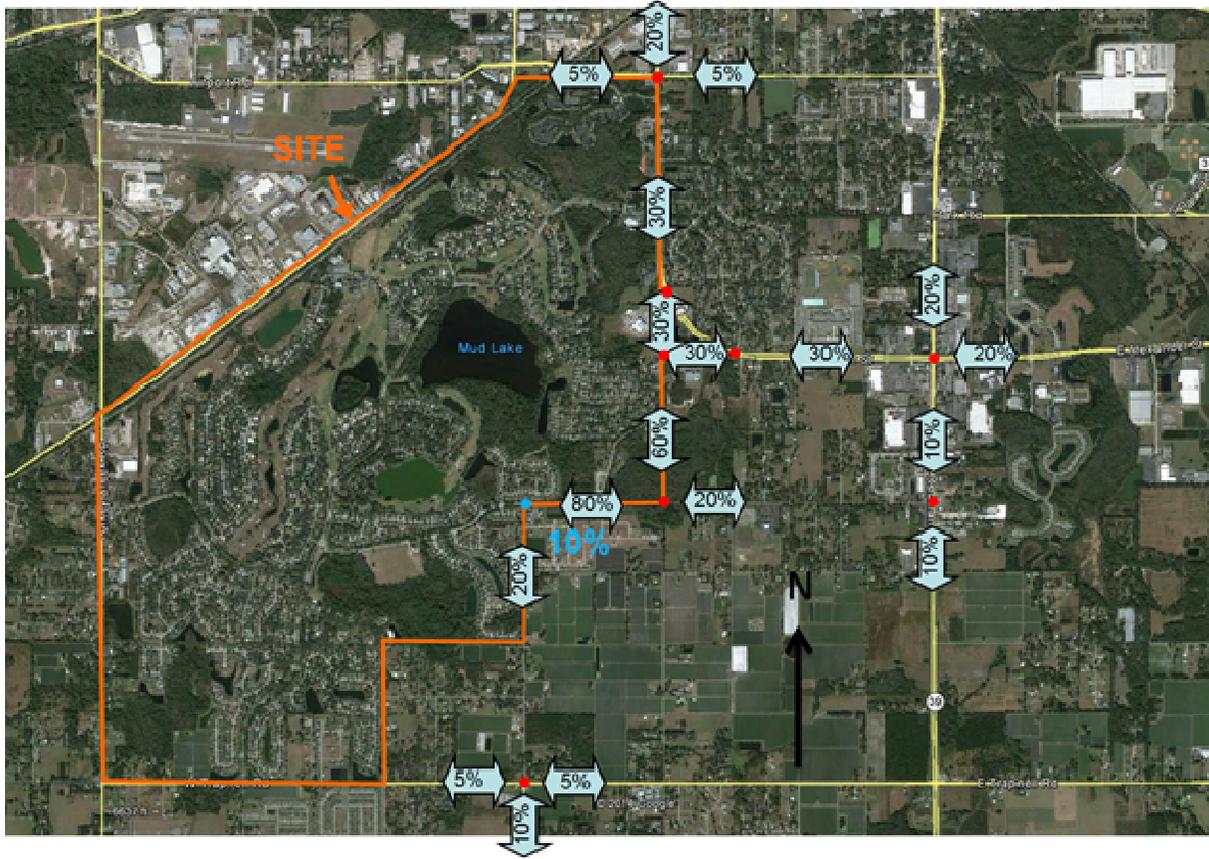


FIGURE 6 Anticipated Trip Distribution - Southeast Access

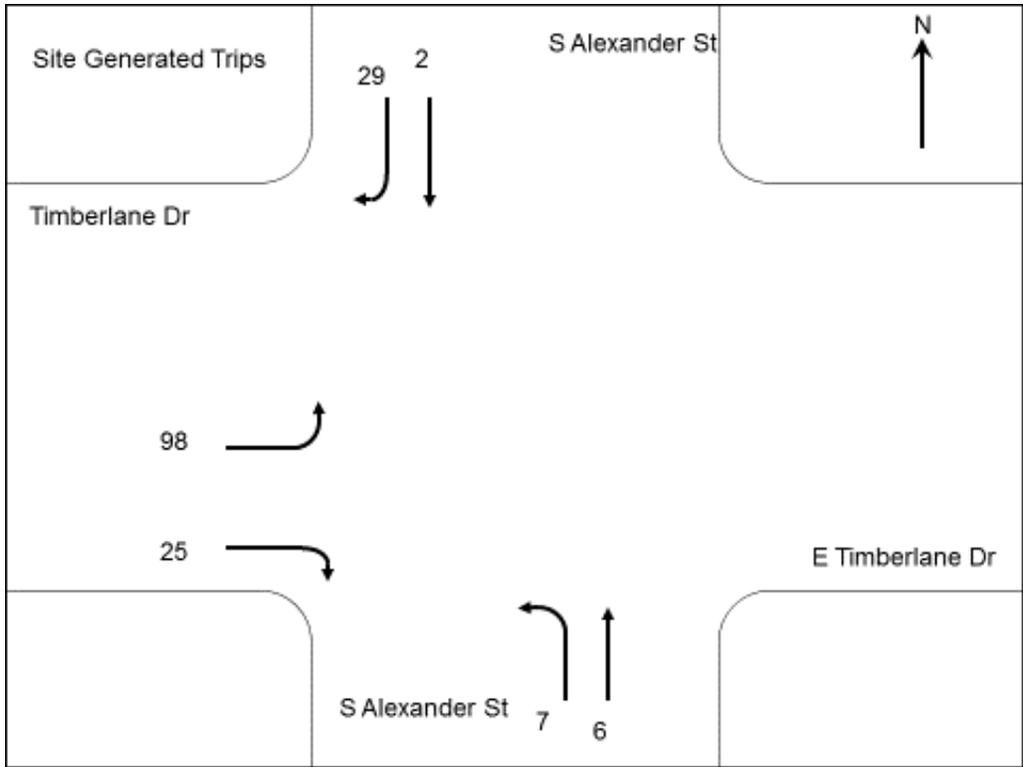


FIGURE 7 Trip Assignment: Alexander St @ Timberlane Dr (AM)

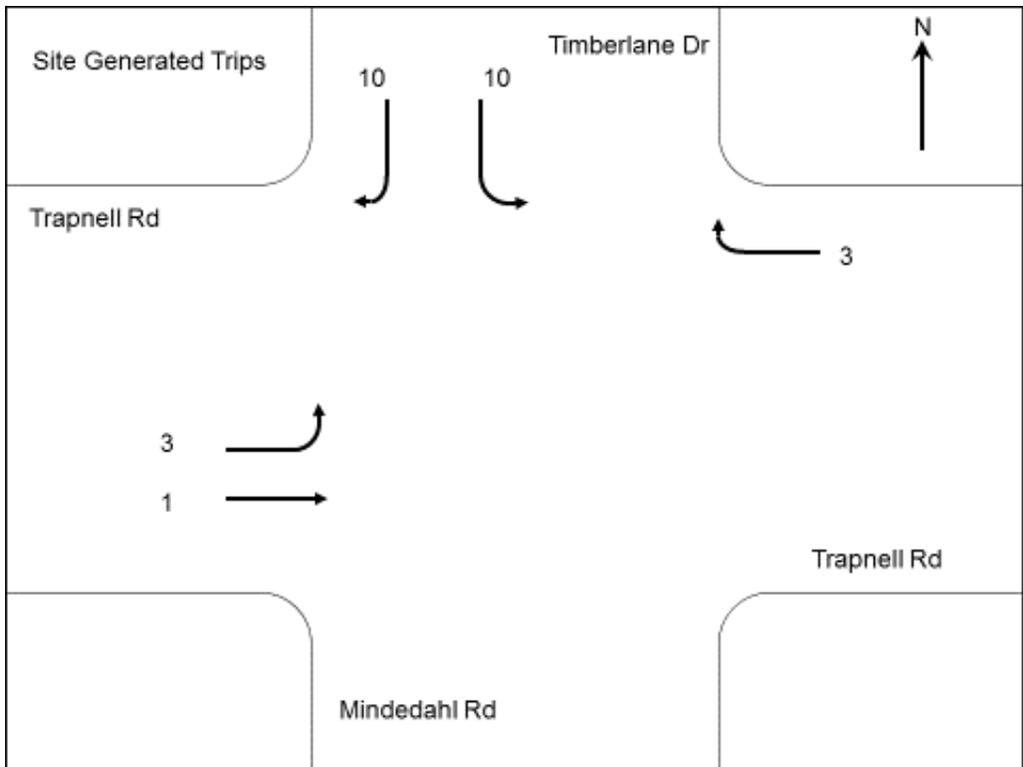


FIGURE 8 Trip Assignment: Timberlane Dr @ Trapnell Rd (AM)

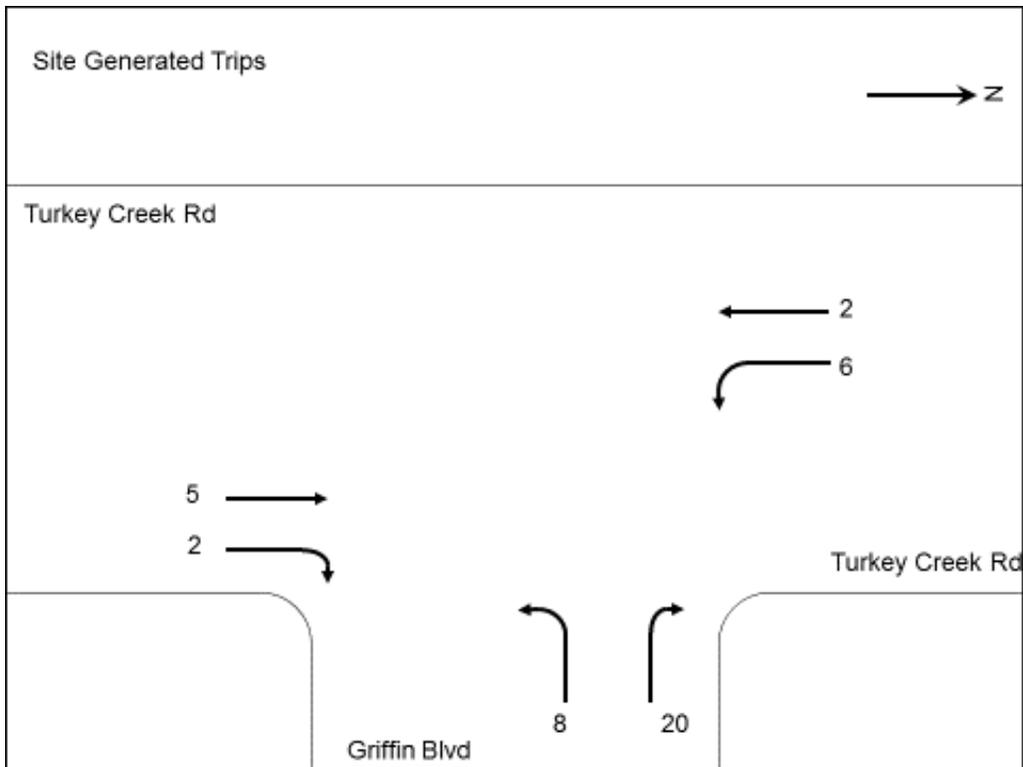


FIGURE 9 Trip Assignment: Griffin Blvd @ Turkey Creek Rd (AM)

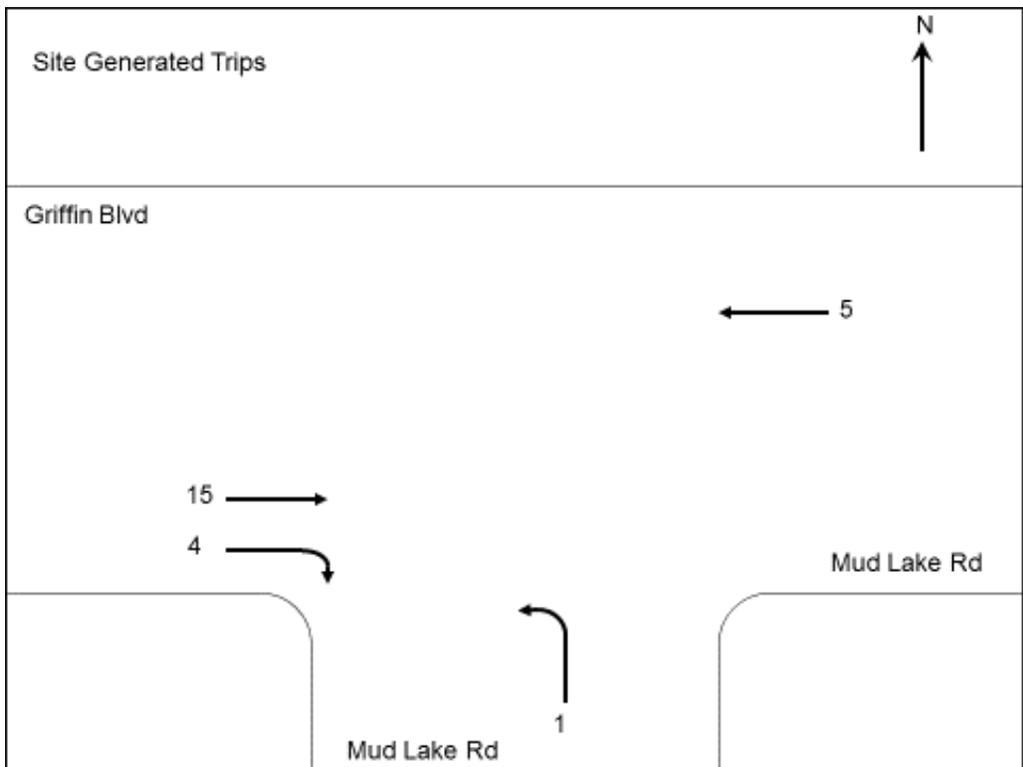


FIGURE 10 Trip Assignment: Griffin Blvd @ Mud Lake Rd (AM)

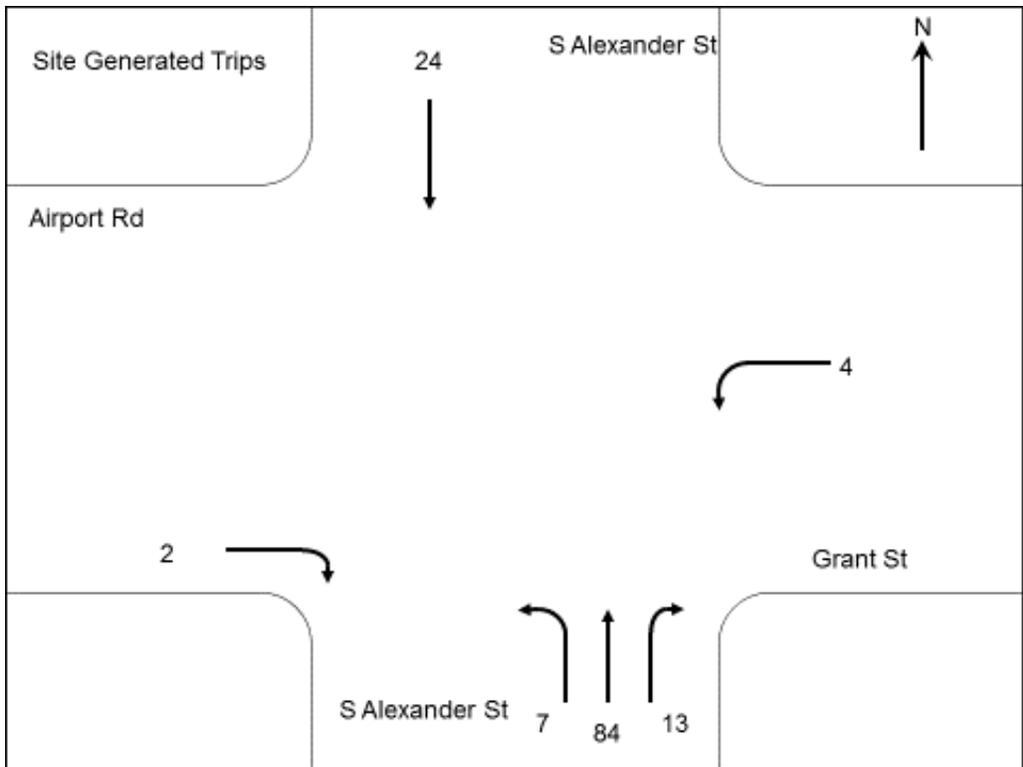


FIGURE 11 Trip Assignment: Alexander St @ Airport Rd/Grant St (AM)

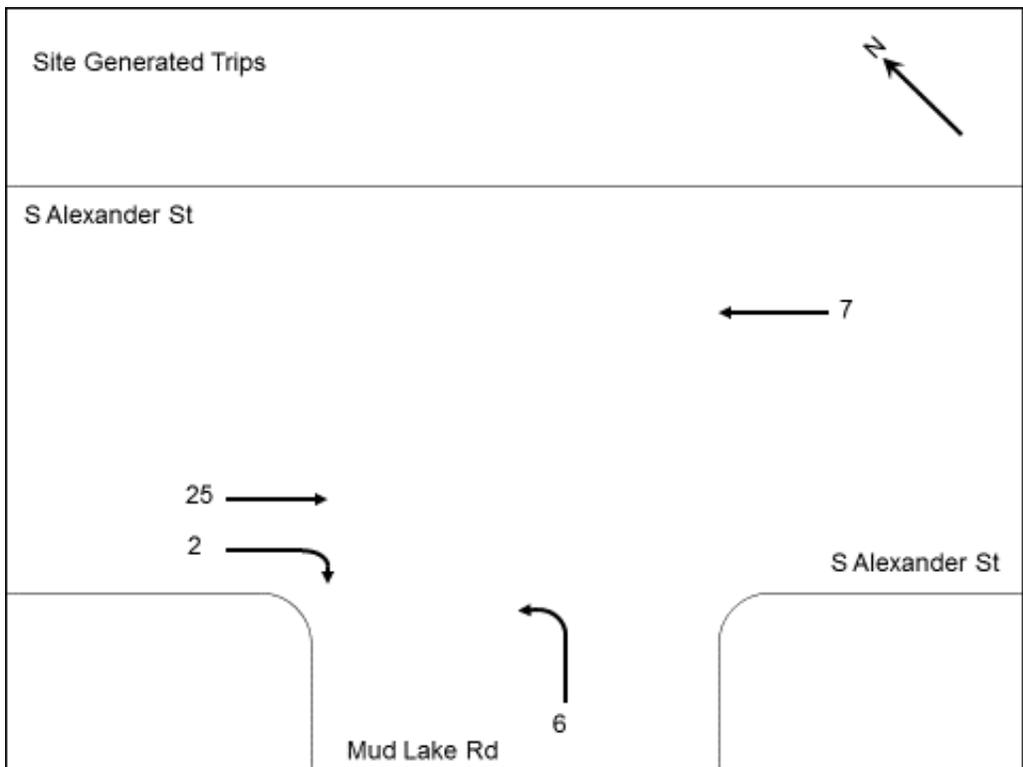


FIGURE 12 Trip Assignment: Alexander St @ Mud Lake Rd (AM)

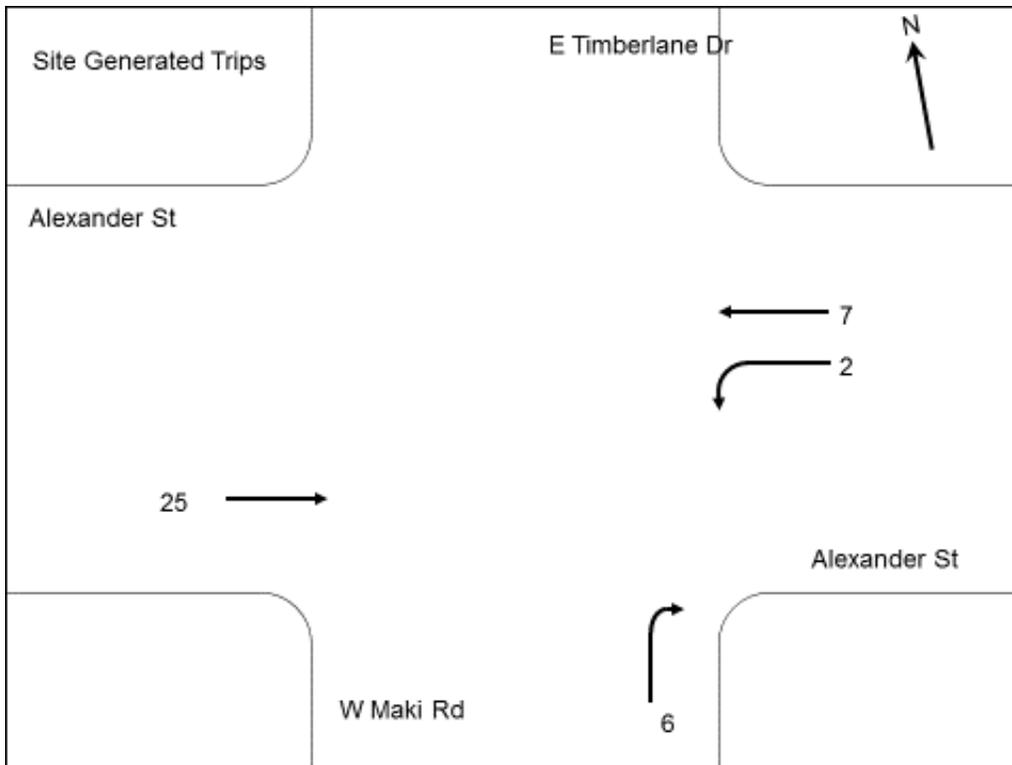


FIGURE 13 Trip Assignment: Alexander St @ YMCA PI (Maki Rd) (AM)

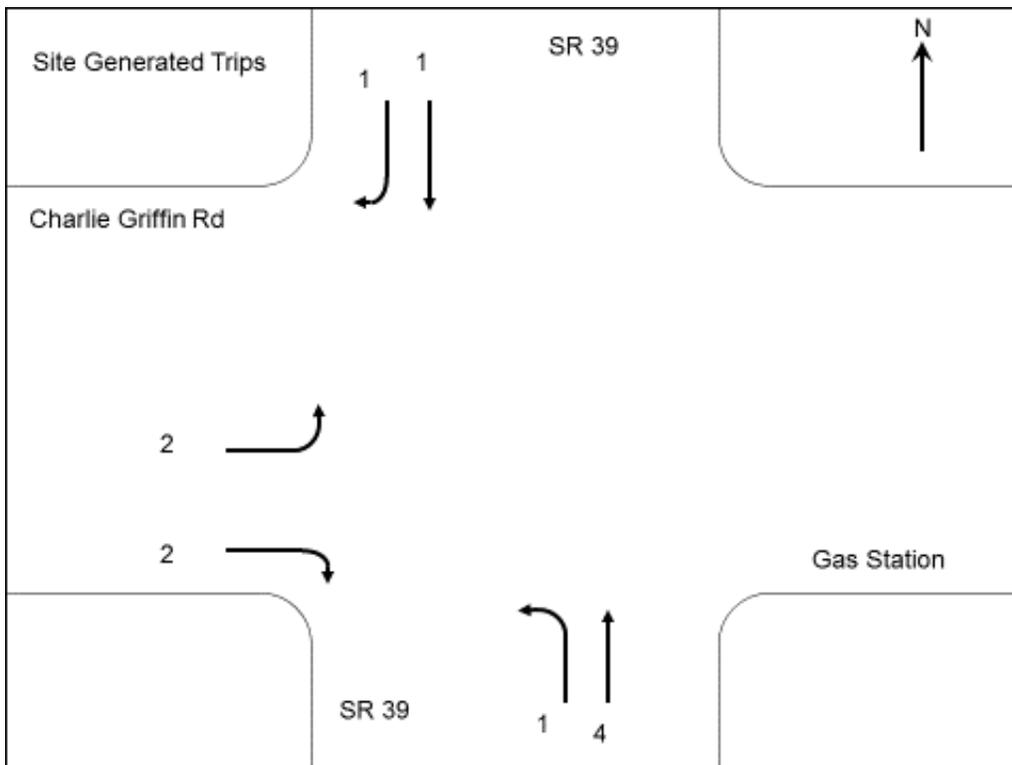


FIGURE 14 Trip Assignment: Charlie Griffin Rd @ SR 39 (AM)

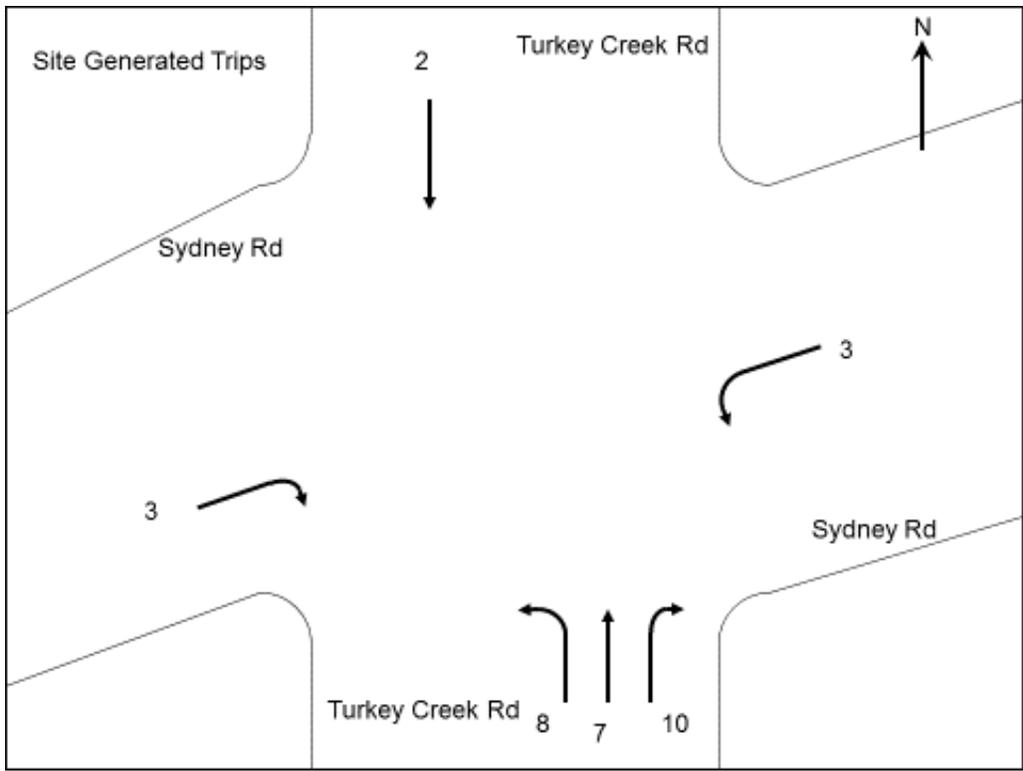


FIGURE 15 Trip Assignment: Turkey Creek Rd @ Sydney Rd (AM)

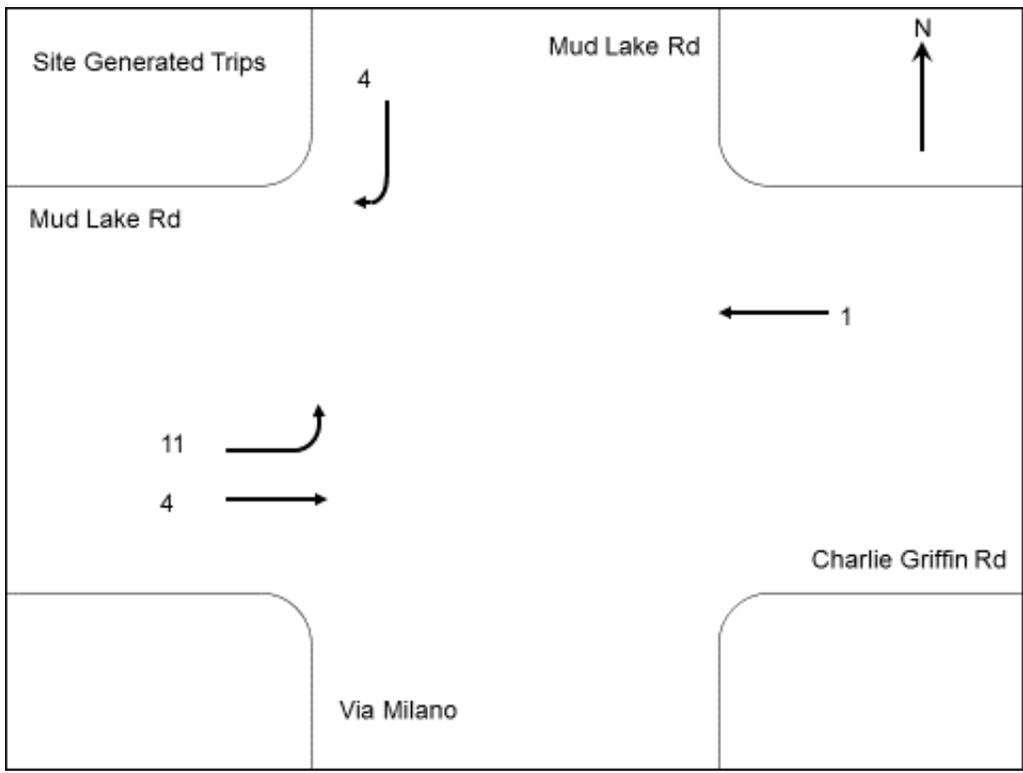


FIGURE 16 Trip Assignment: Mud Lake Rd @ Charlie Griffin Rd (AM)

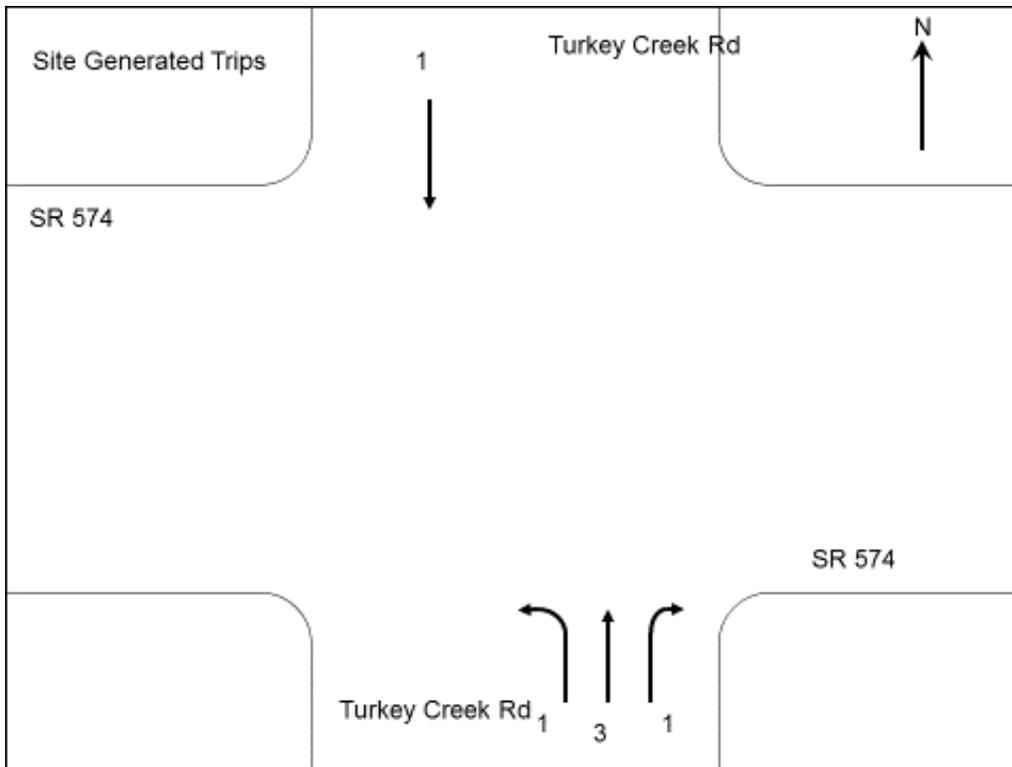


FIGURE 17 Trip Assignment: Turkey Creek Rd @ SR 574 (AM)

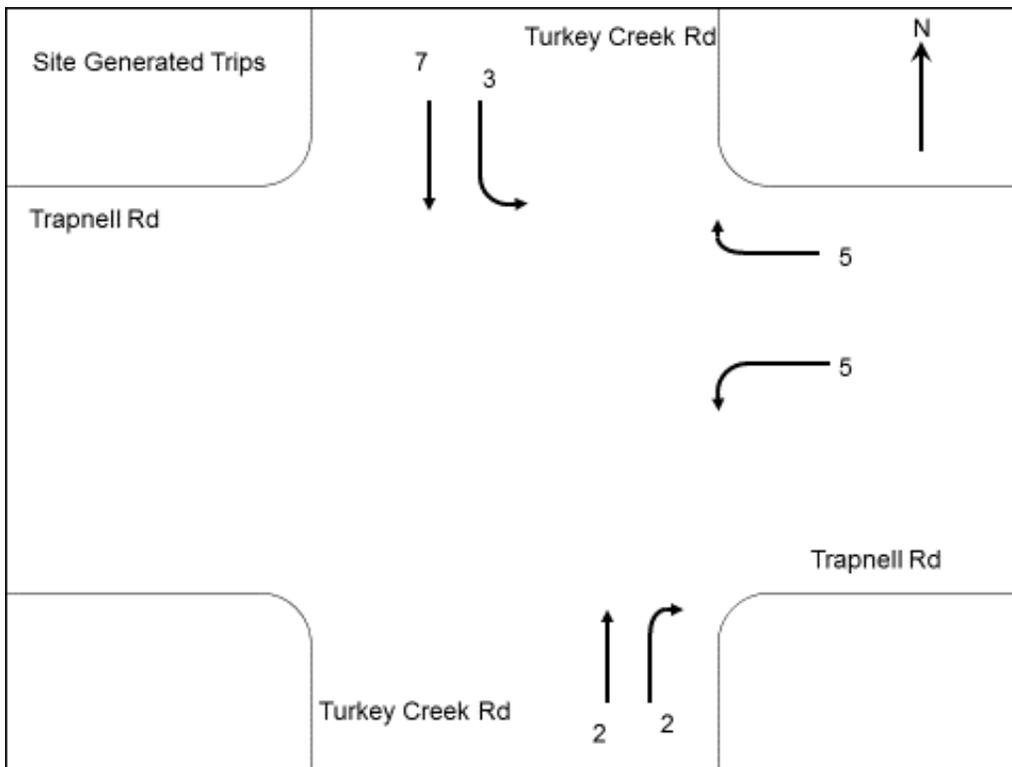


FIGURE 18 Trip Assignment: Turkey Creek Rd @ Trapnell Rd (AM)

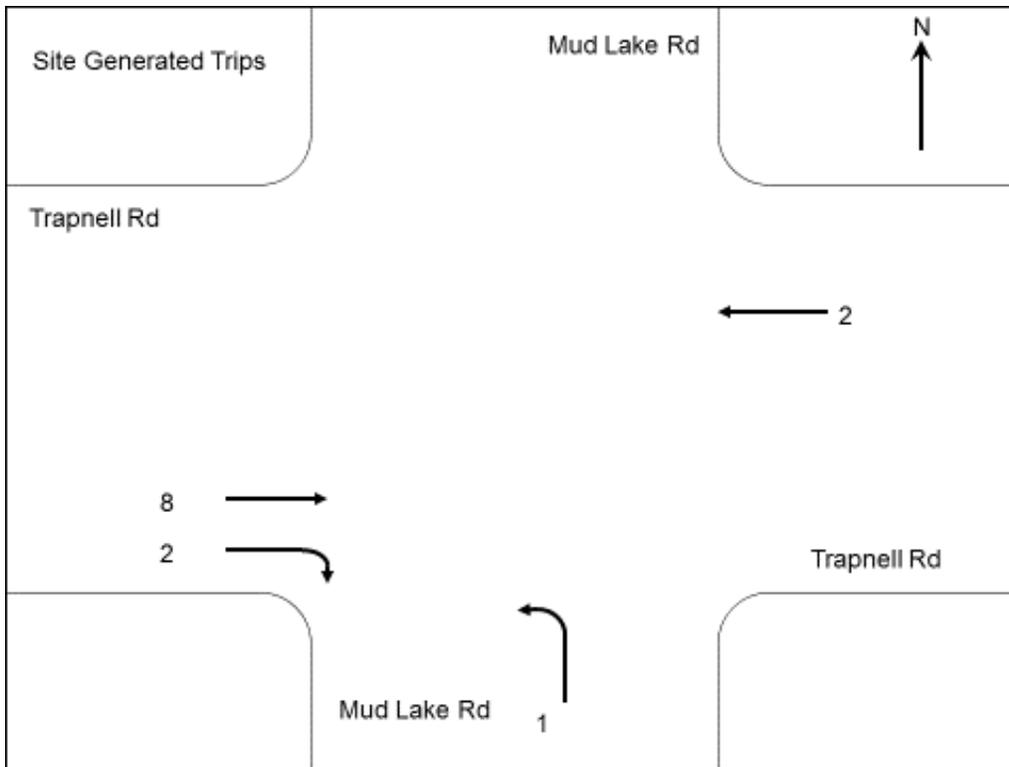


FIGURE 19 Trip Assignment: Mud Lake Rd @ Trapnell Rd (AM)

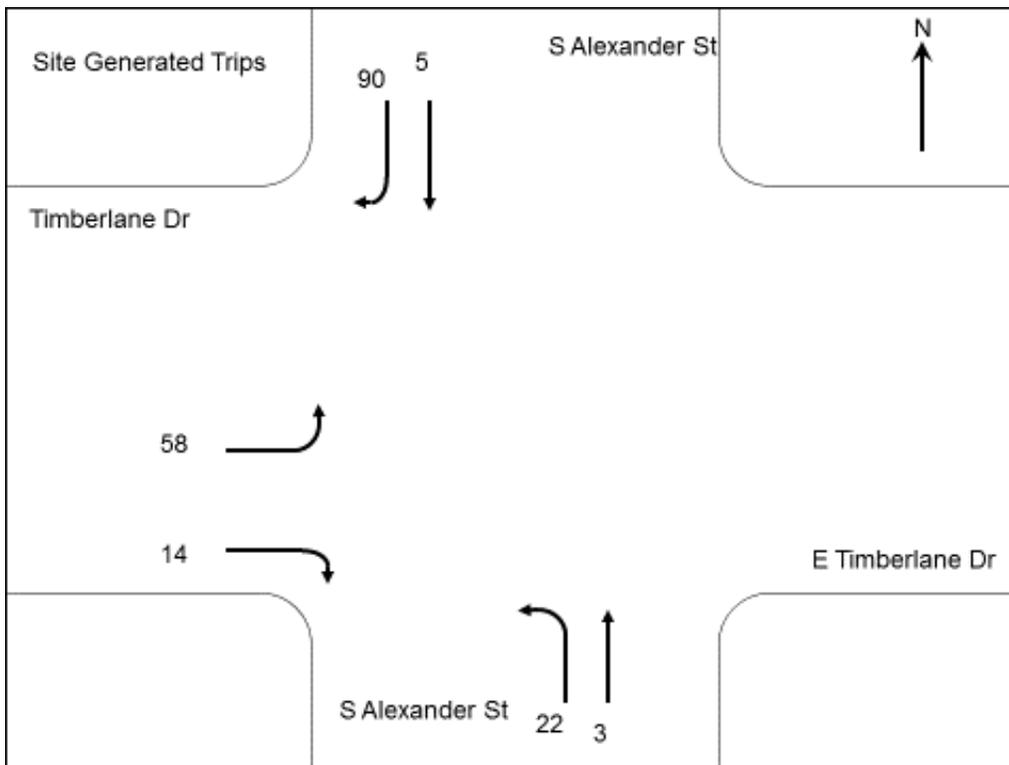


FIGURE 20 Trip Assignment: Alexander St @ Timberlane Dr (PM)

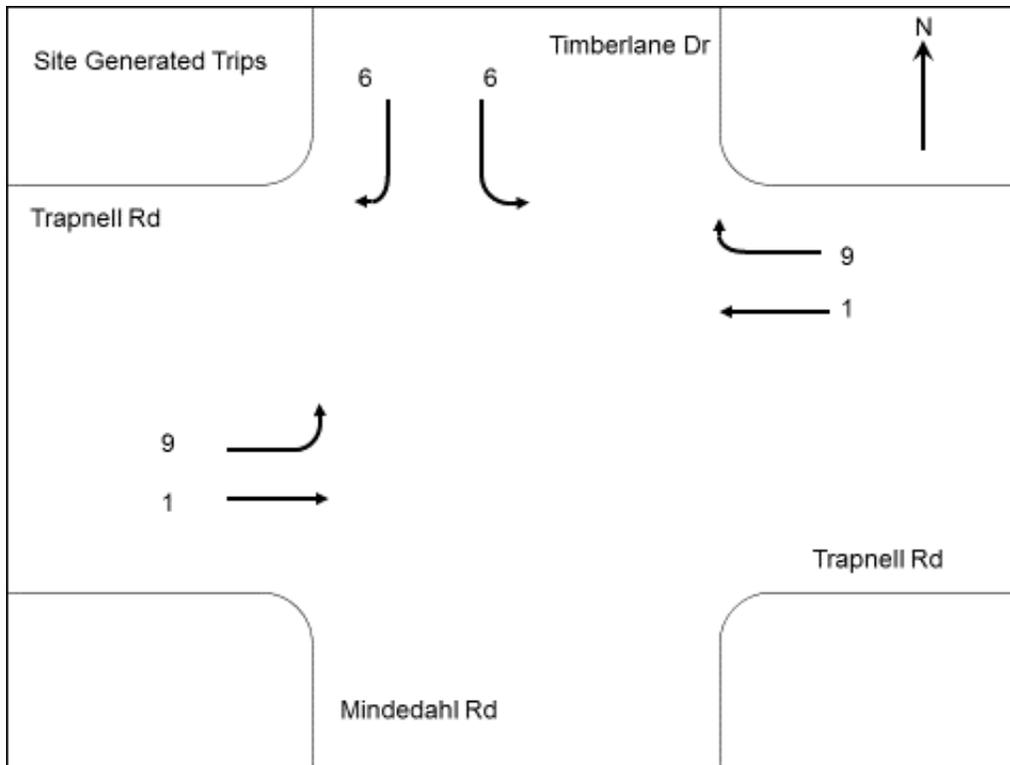


FIGURE 21 Trip Assignment: Timberlane Dr @ Trapnell Rd (PM)

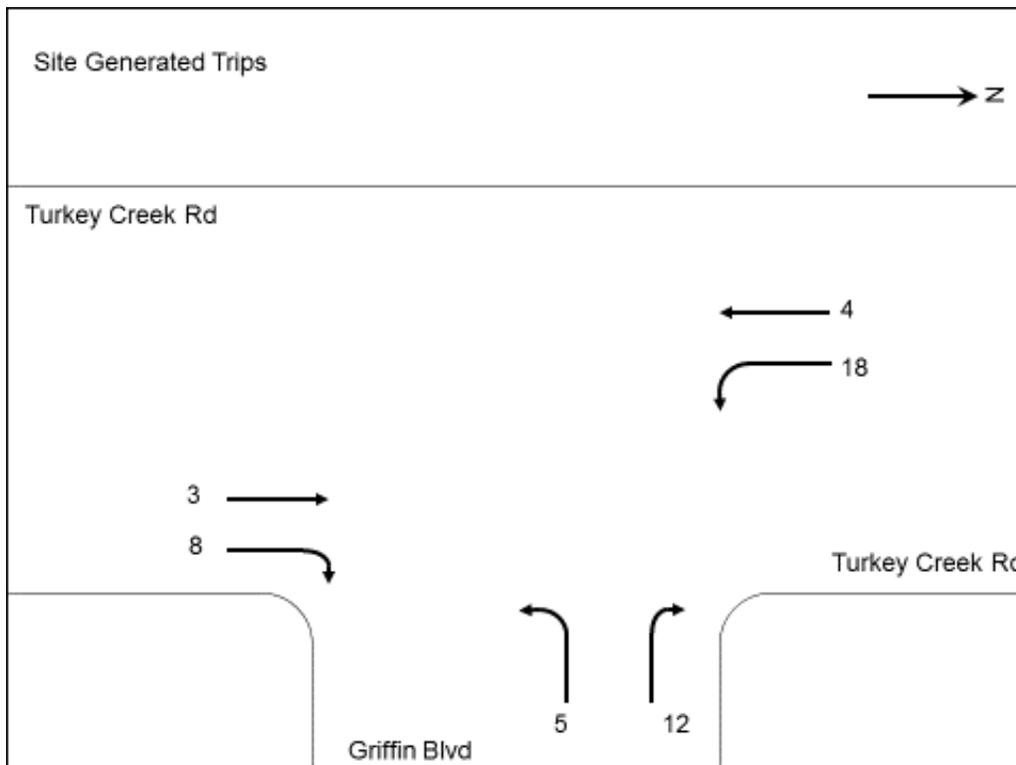


FIGURE 22 Trip Assignment: Griffin Blvd @ Turkey Creek Rd (PM)

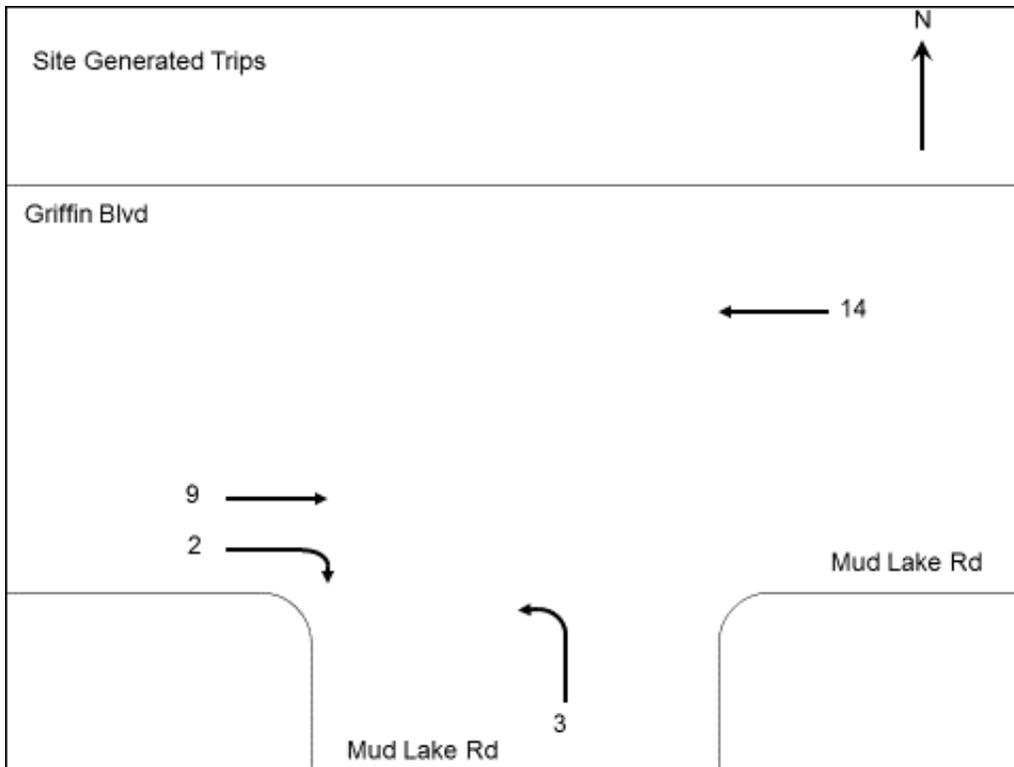


FIGURE 23 Trip Assignment: Griffin Blvd @ Mud Lake Rd (PM)

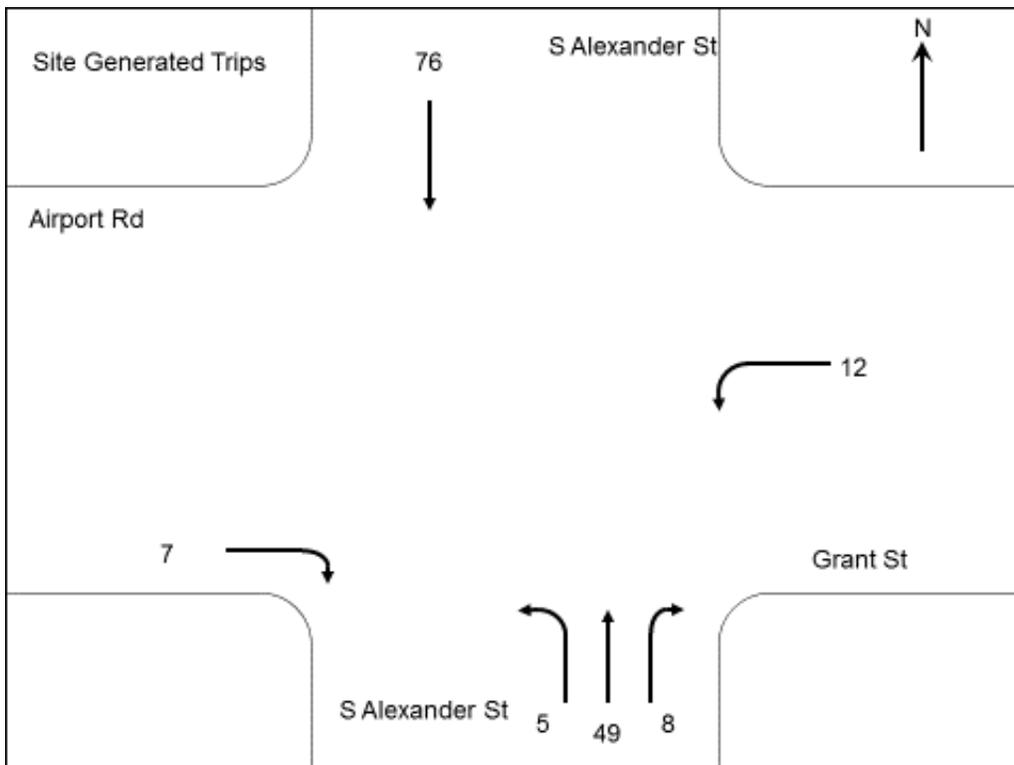


FIGURE 24 Trip Assignment: Alexander St @ Airport Rd/Grant St (PM)

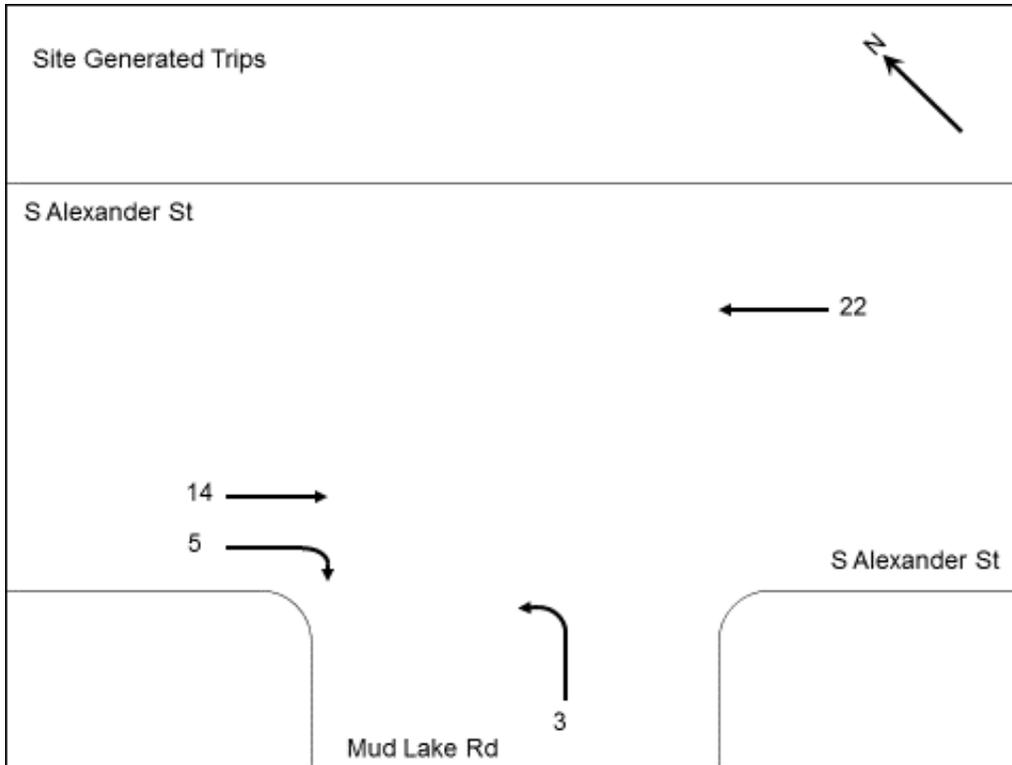


FIGURE 25 Trip Assignment: Alexander St @ Mud Lake Rd (PM)

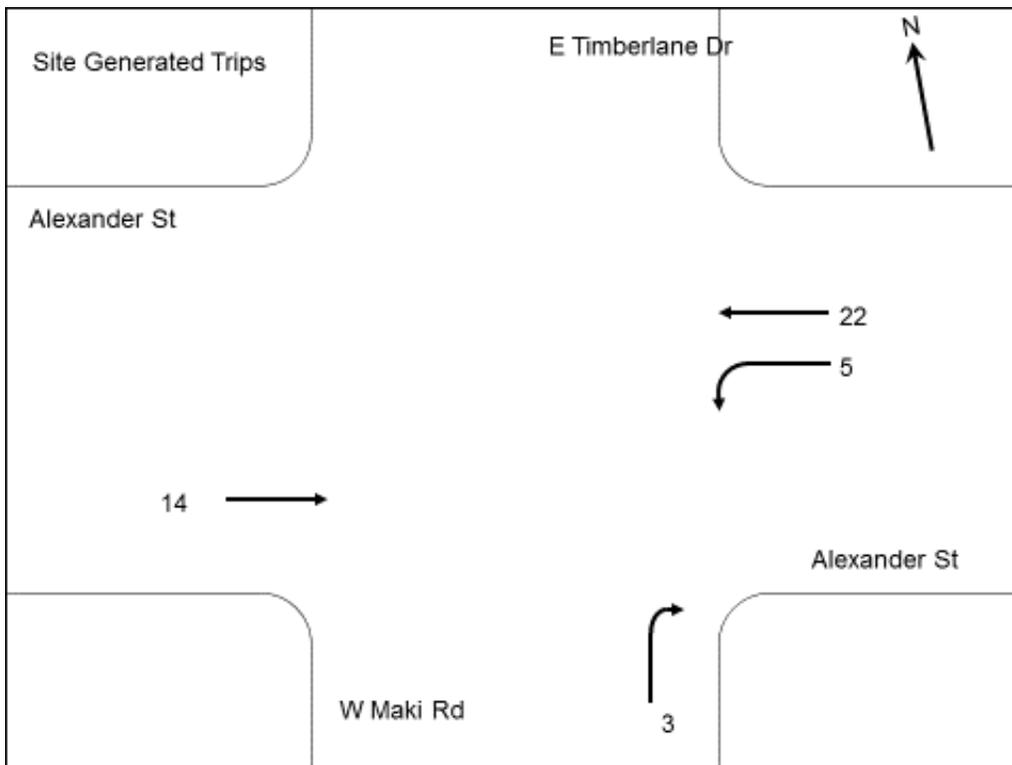


FIGURE 26 Trip Assignment: Alexander St @ YMCA PI (Maki Rd) (PM)

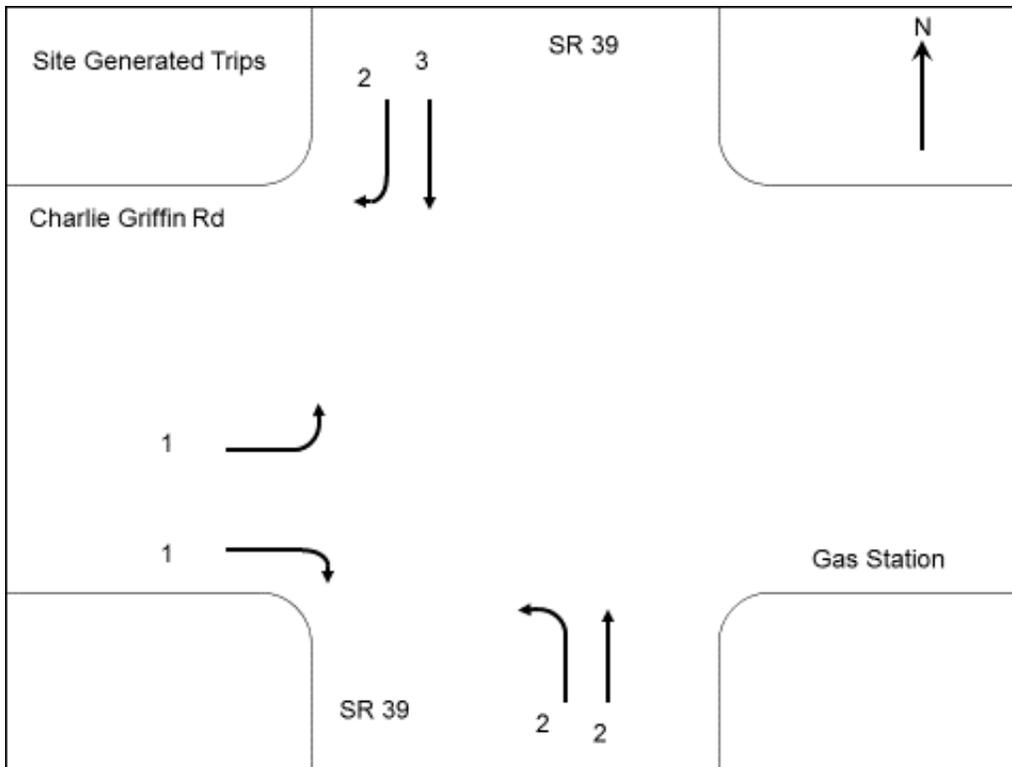


FIGURE 27 Trip Assignment: Charlie Griffin Rd @ SR 39 (PM)

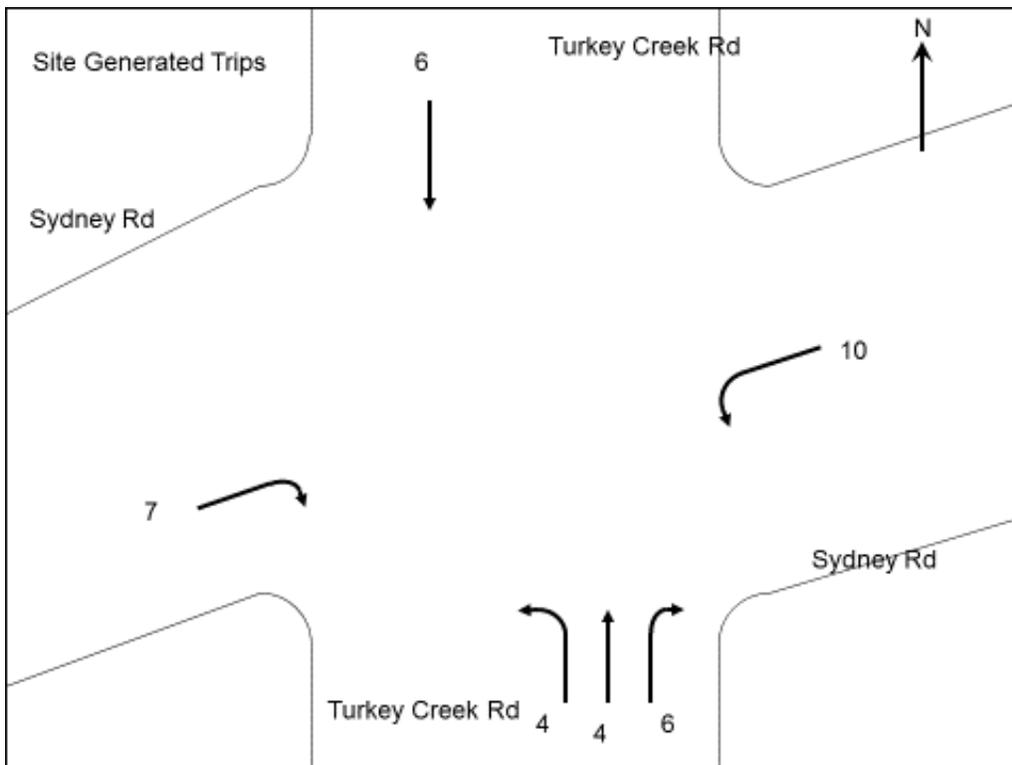


FIGURE 28 Trip Assignment: Turkey Creek Rd @ Sydney Rd (PM)

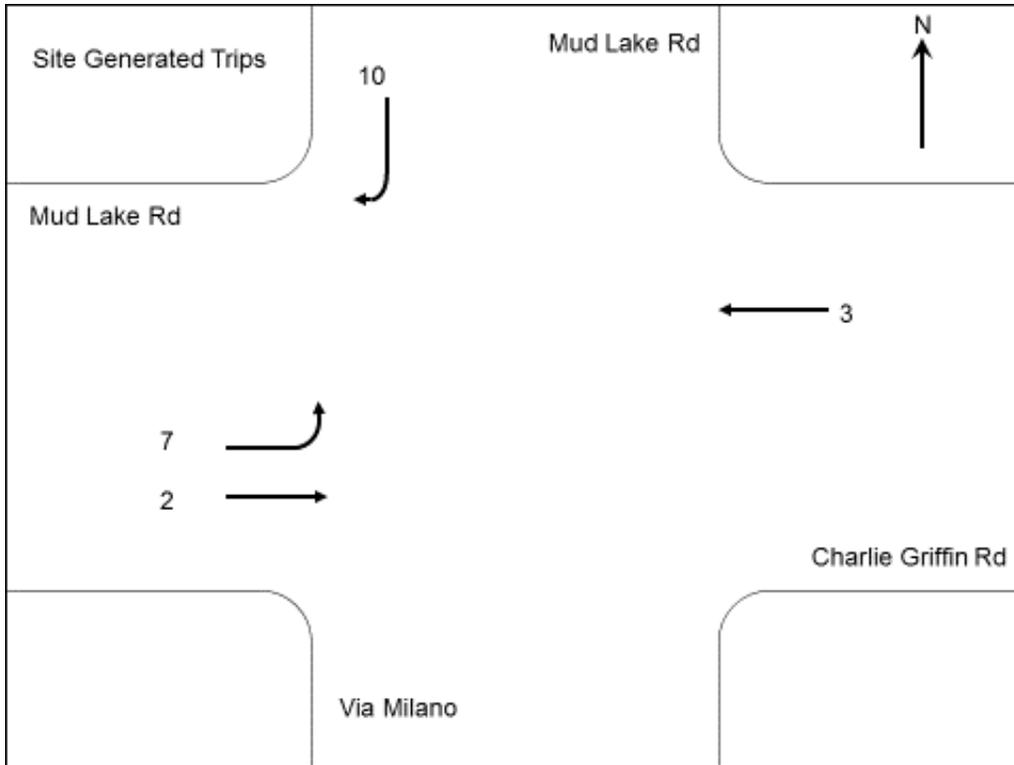


FIGURE 29 Trip Assignment: Mud Lake Rd @ Charlie Griffin Rd (PM)

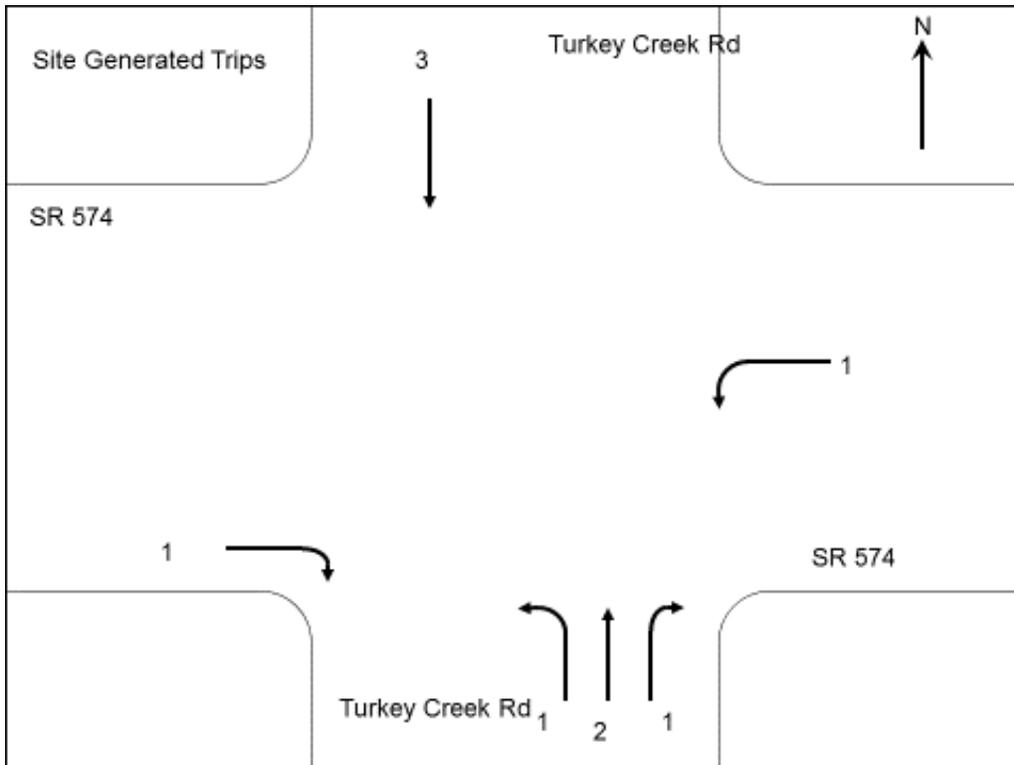


FIGURE 30 Trip Assignment: Turkey Creek Rd @ SR 574 (PM)

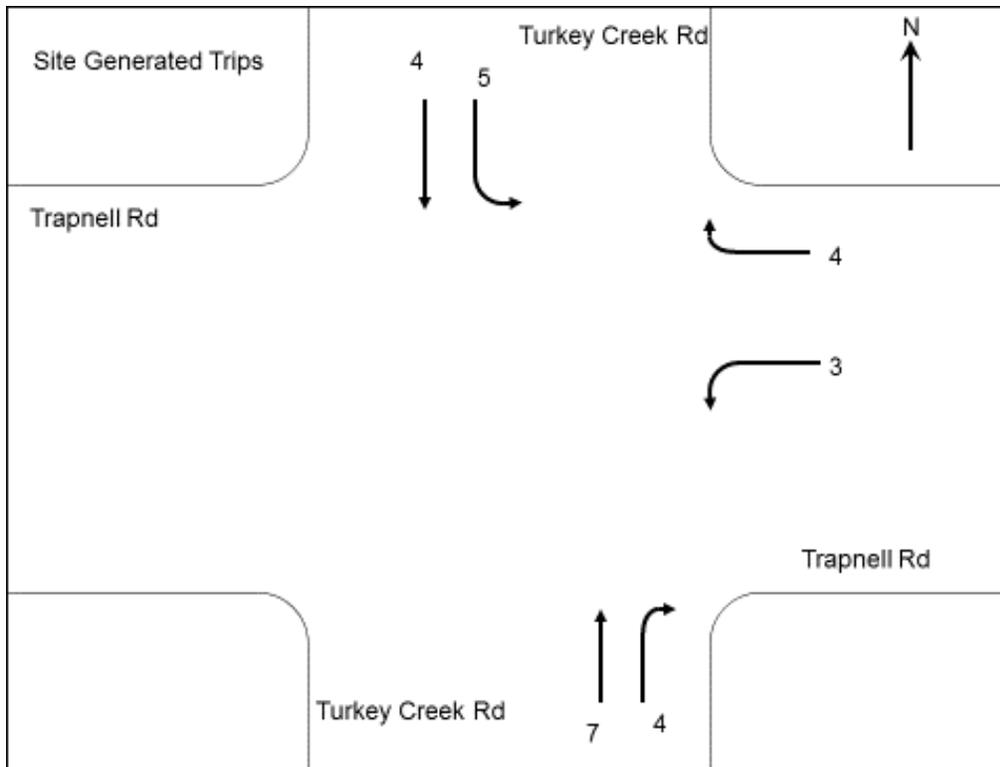


FIGURE 31 Trip Assignment: Turkey Creek Rd @ Trapnell Rd (PM)

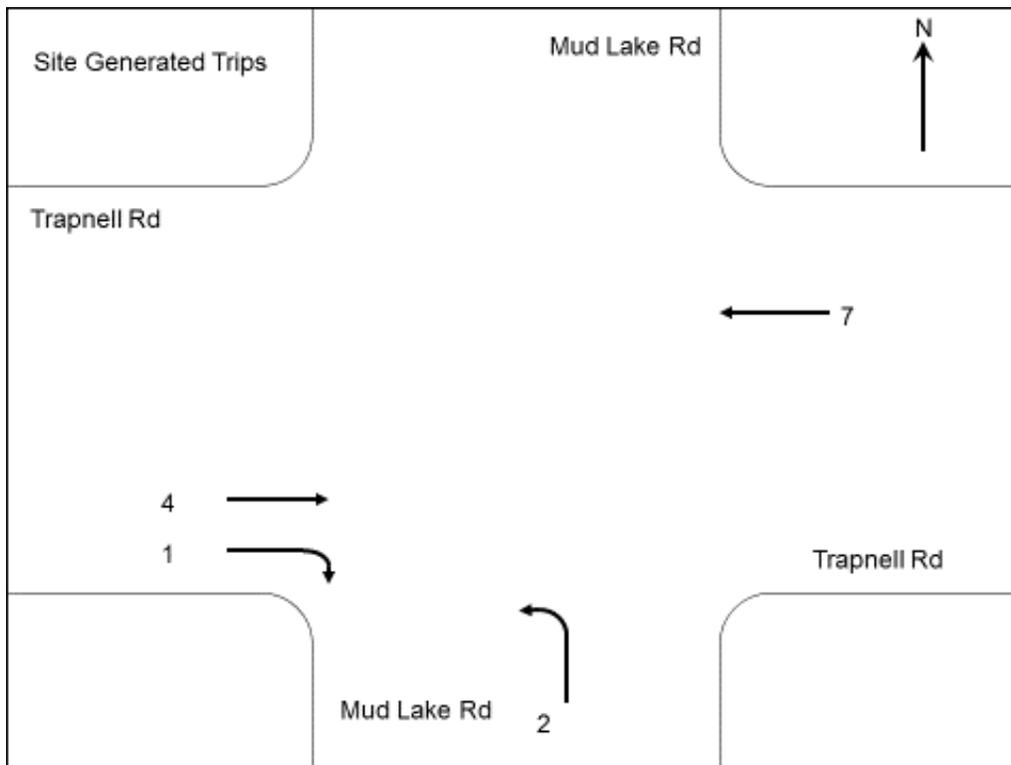


FIGURE 32 Trip Assignment: Mud Lake Rd @ Trapnell Rd (PM)

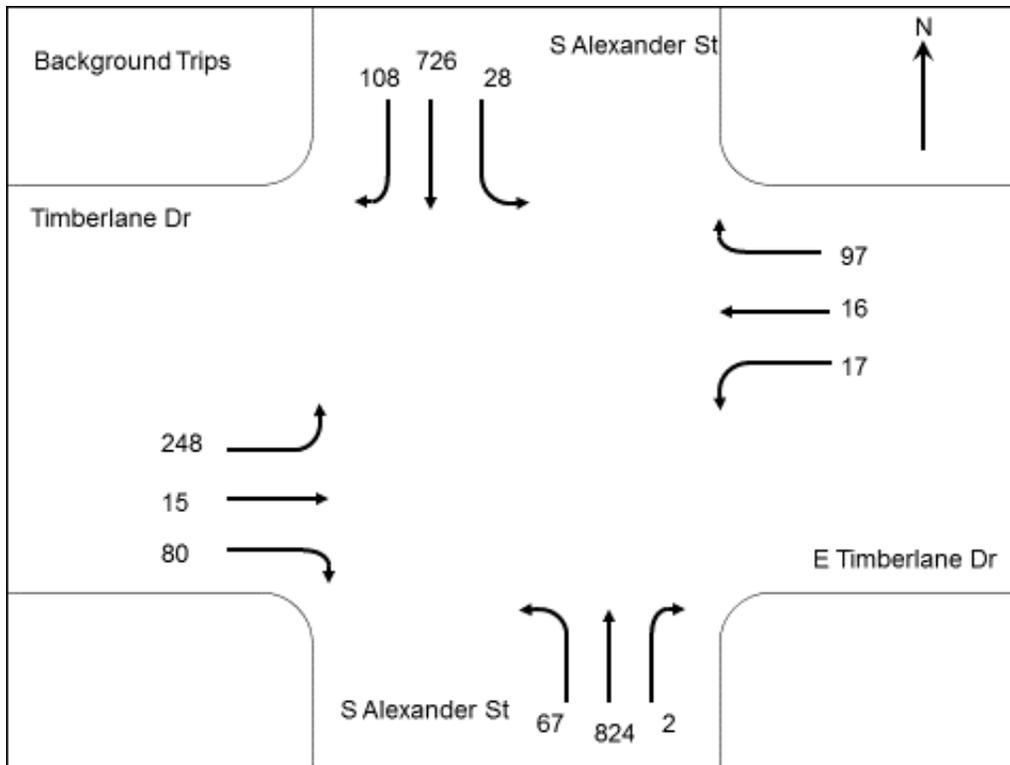


FIGURE 33 Background Traffic: Alexander St @ Timberlane Dr (AM)

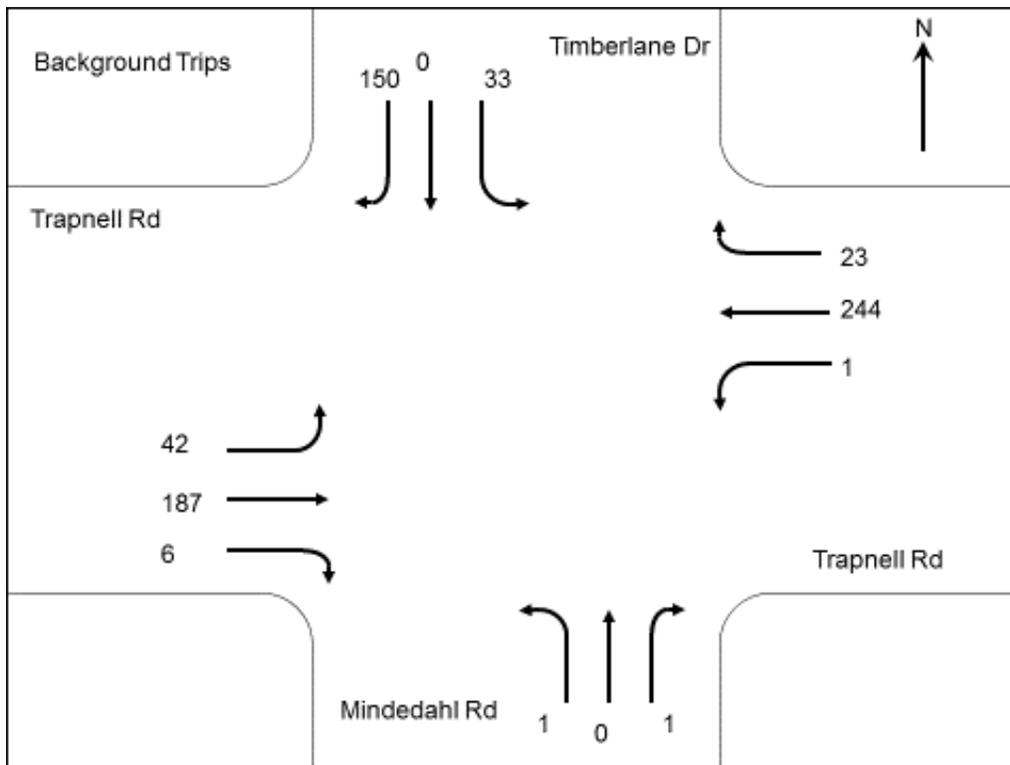


FIGURE 34 Background Traffic: Timberlane Dr @ Trapnell Rd (AM)

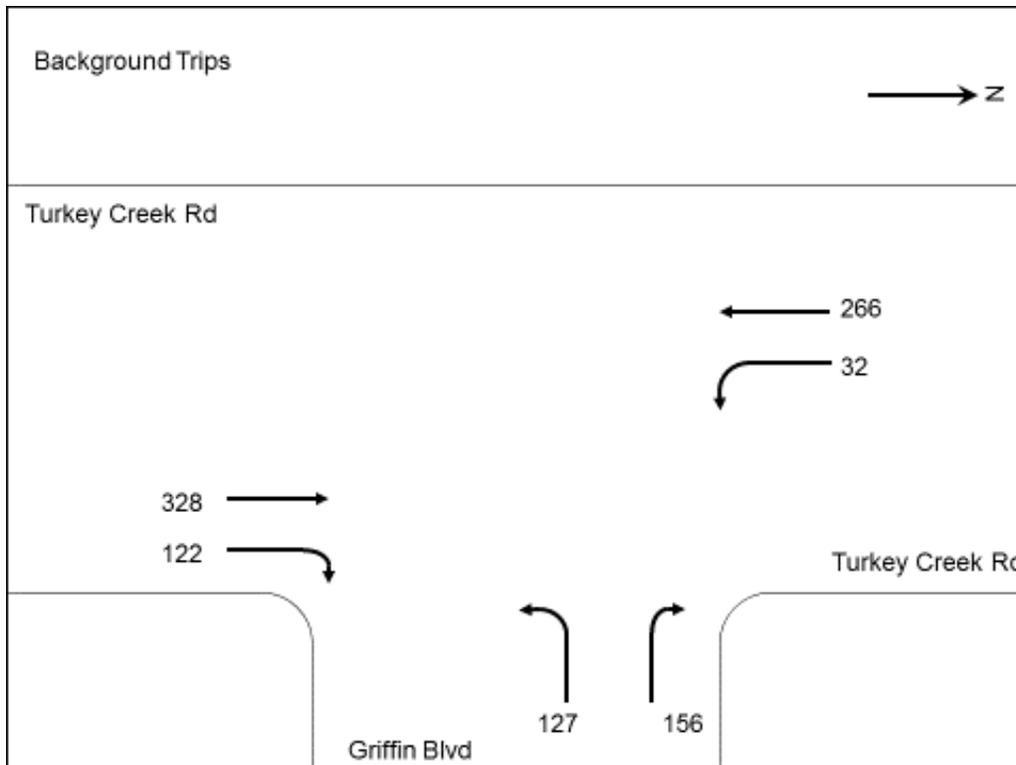


FIGURE 35 Background Traffic: Griffin Blvd @ Turkey Creek Rd (AM)

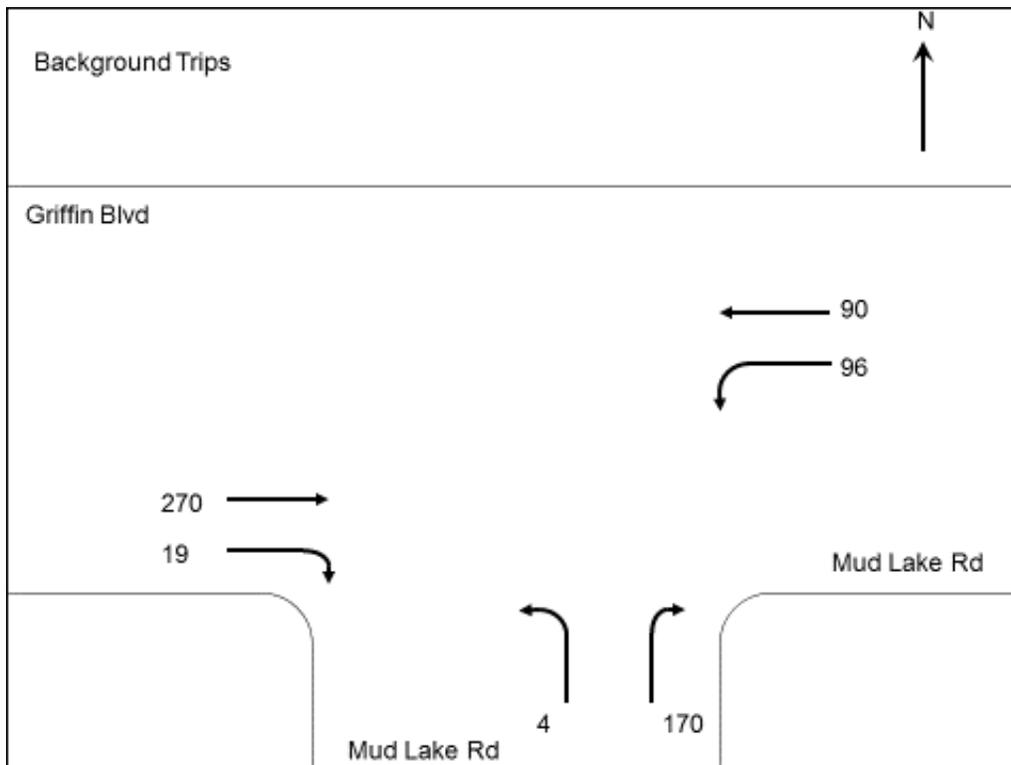


FIGURE 36 Background Traffic: Griffin Blvd @ Mud Lake Rd (AM)

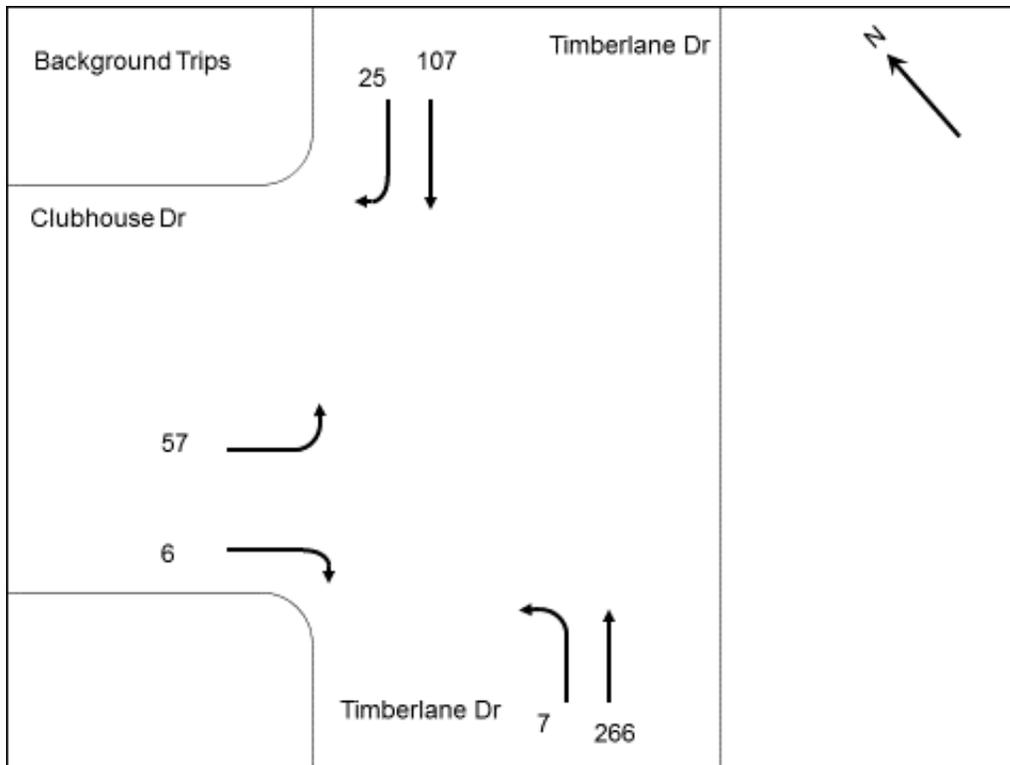


FIGURE 37 Background Traffic: Clubhouse Dr @ Timberlane Dr (AM)

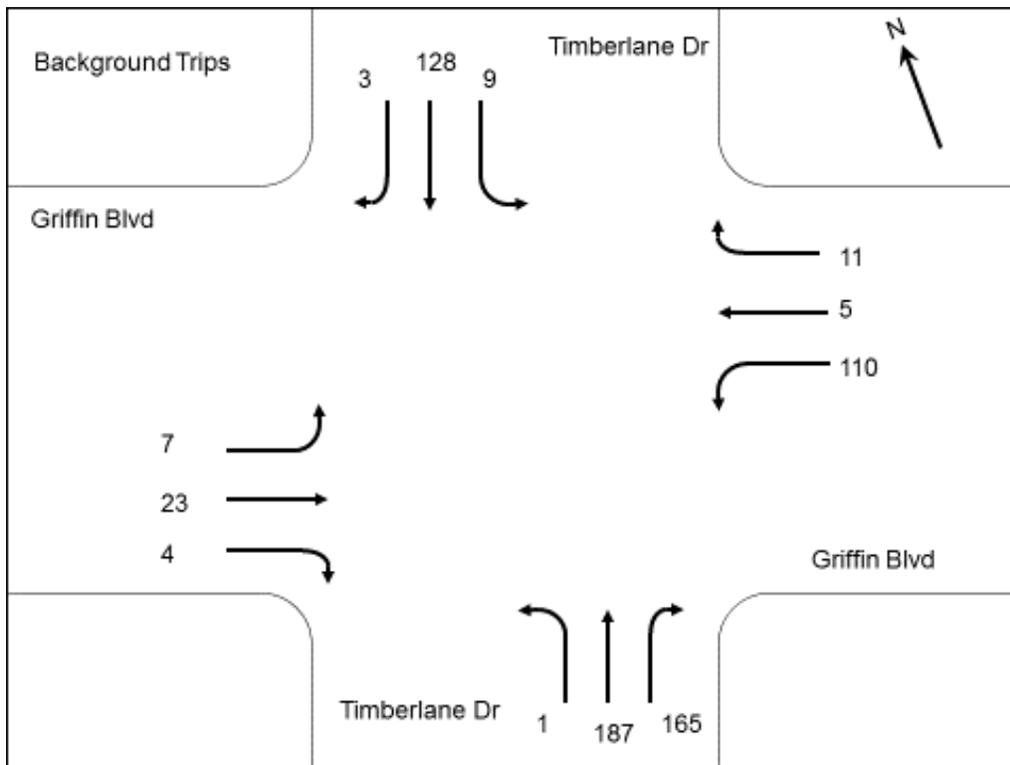


FIGURE 38 Background Traffic: Griffin Blvd @ Timberlane Dr North (AM)

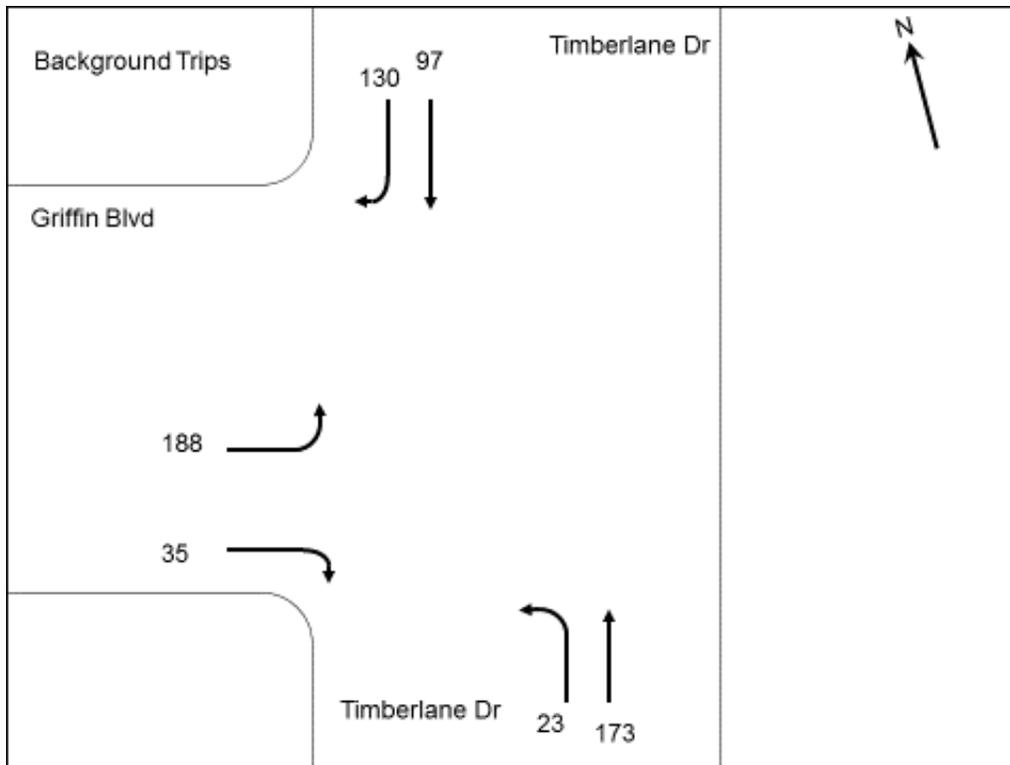


FIGURE 39 Background Traffic: Griffin Blvd @ Timberlane Dr South (AM)

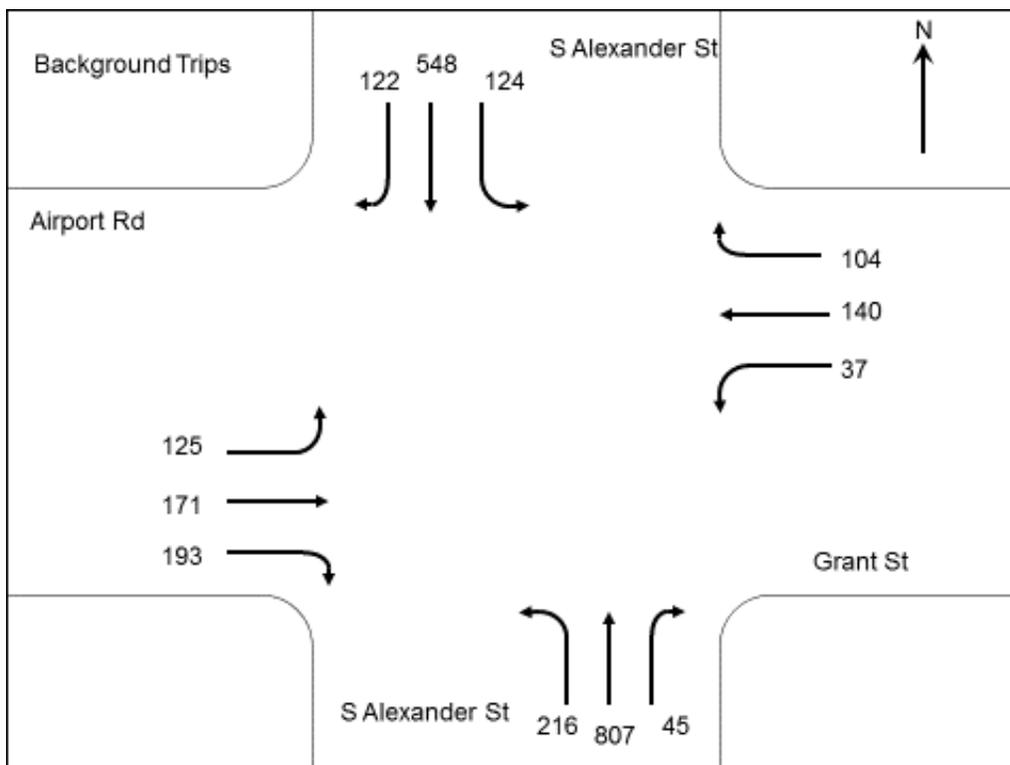


FIGURE 40 Background Traffic: Alexander St @ Airport Rd/Grant St (AM)

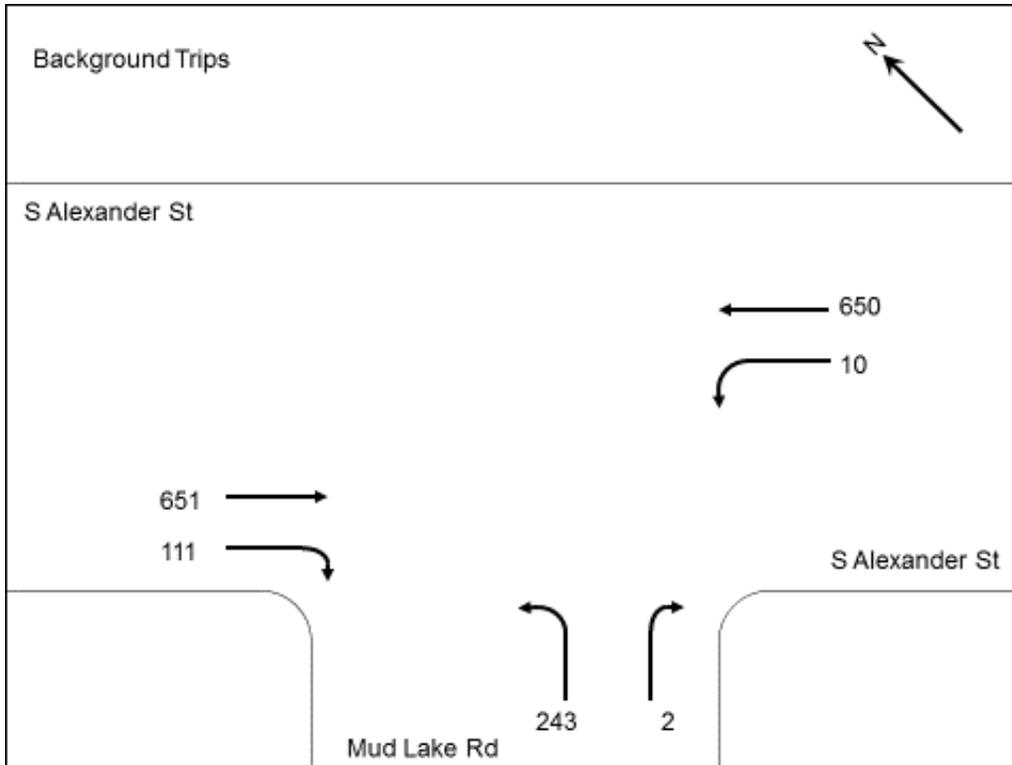


FIGURE 41 Background Traffic: Alexander St @ Mud Lake Rd (AM)

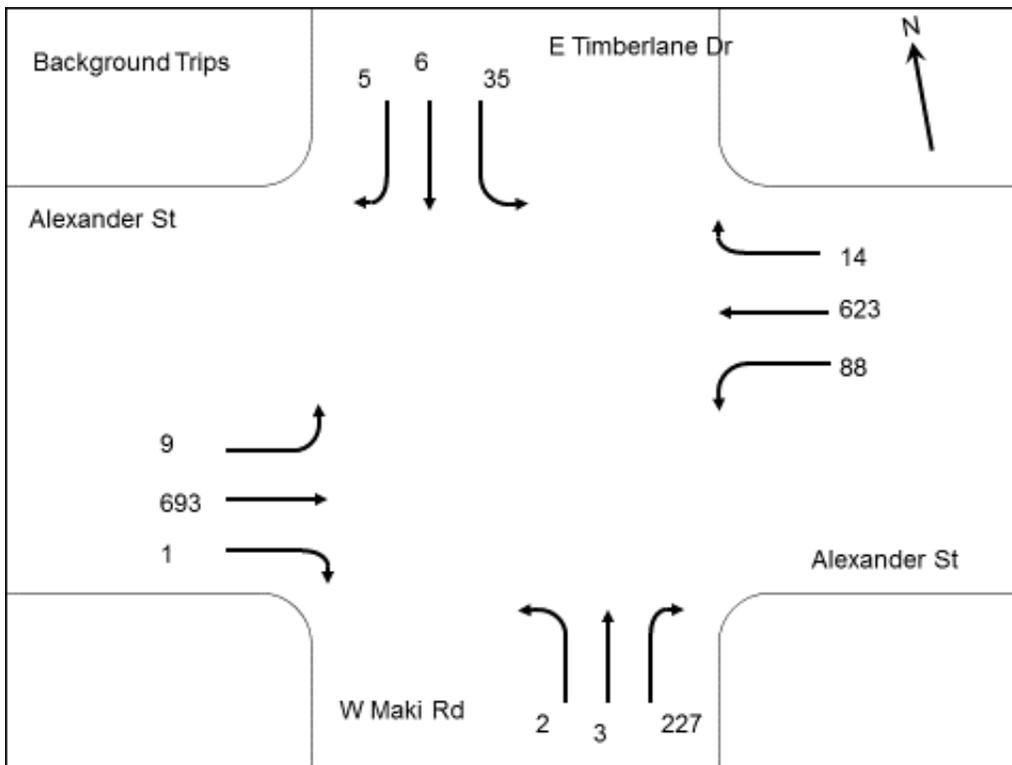


FIGURE 42 Background Traffic: Alexander St @ YMCA PI (Maki Rd) (AM)

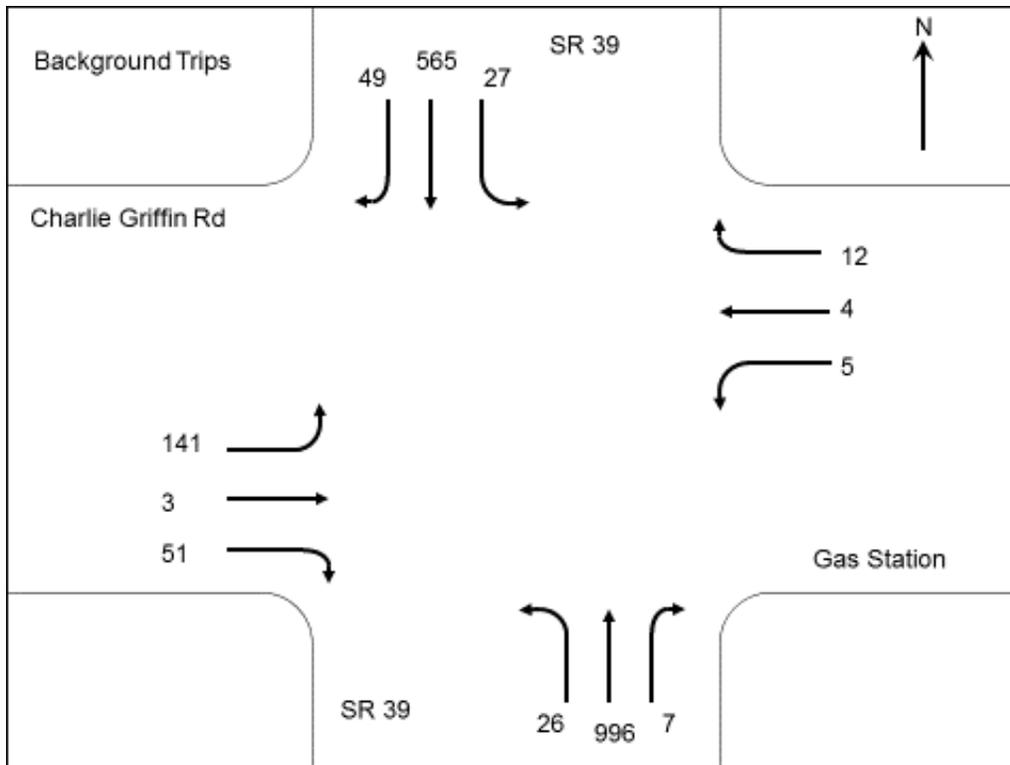


FIGURE 43 Background Traffic: Charlie Griffin Rd @ SR 39 (AM)

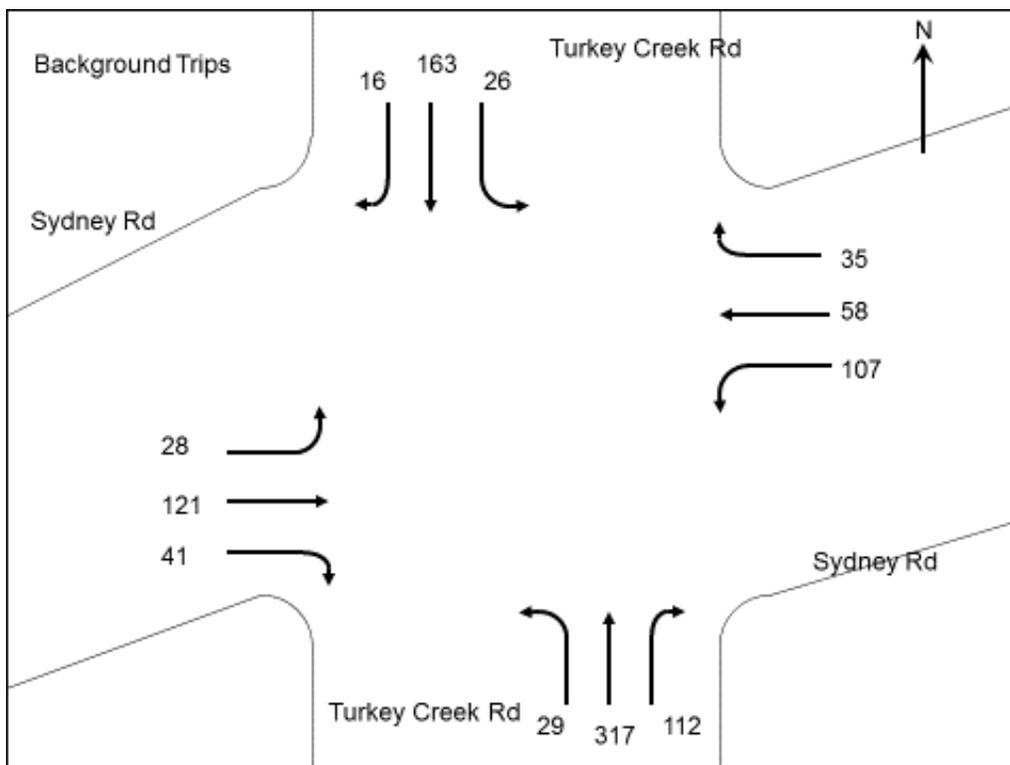


FIGURE 44 Background Traffic: Turkey Creek Rd @ Sydney Rd (AM)

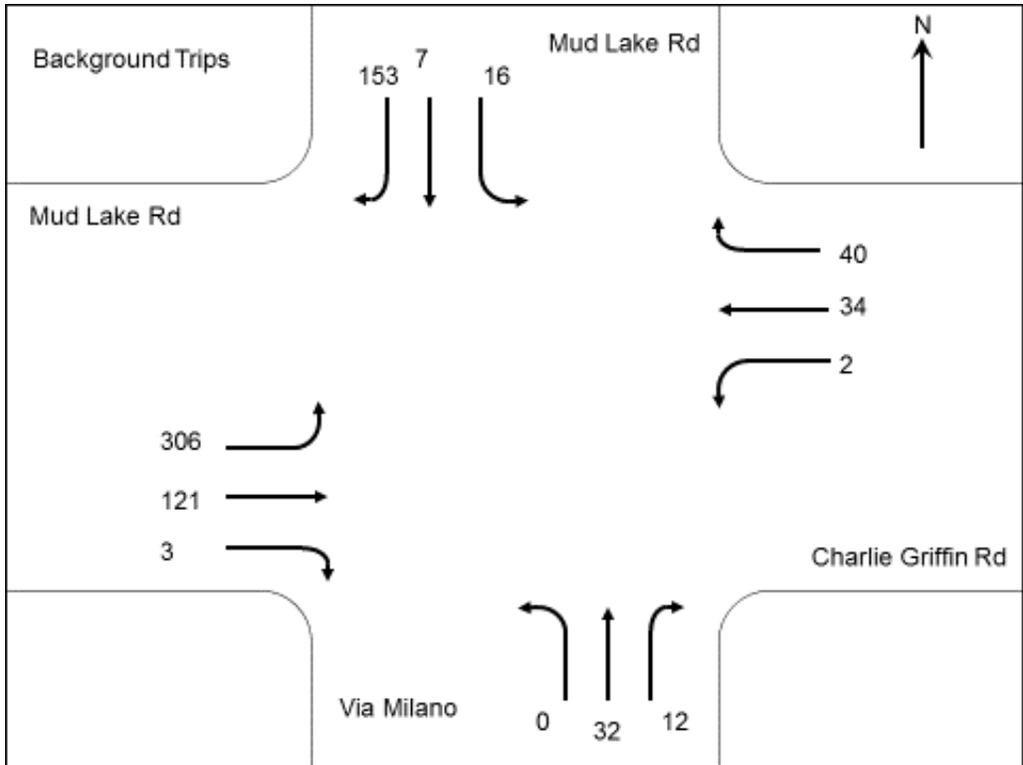


FIGURE 45 Background Traffic: Mud Lake Rd @ Charlie Griffin Rd (AM)

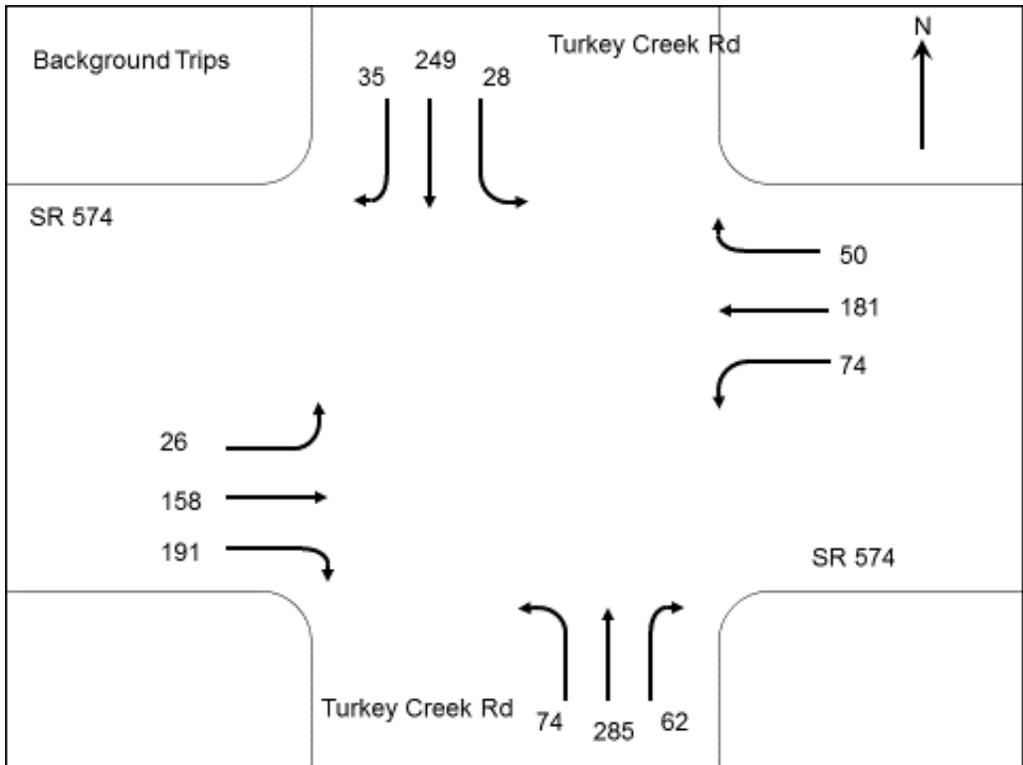


FIGURE 46 Background Traffic: Turkey Creek Rd @ SR 574 (AM)

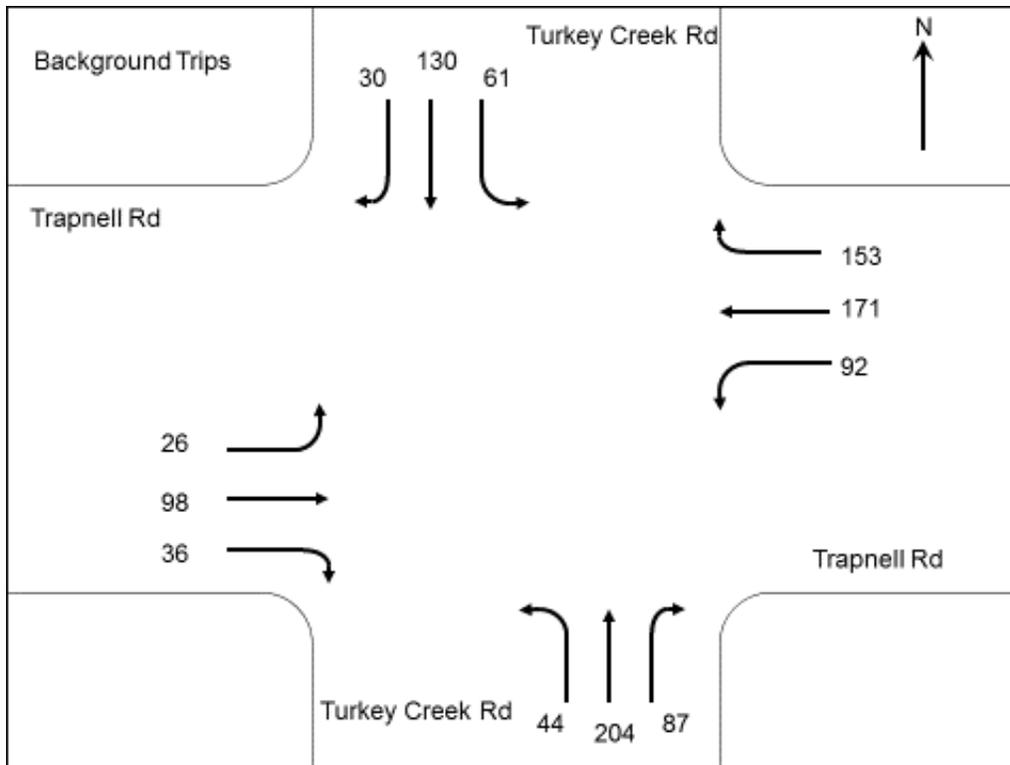


FIGURE 47 Background Traffic: Turkey Creek Rd @ Trapnell Rd (AM)

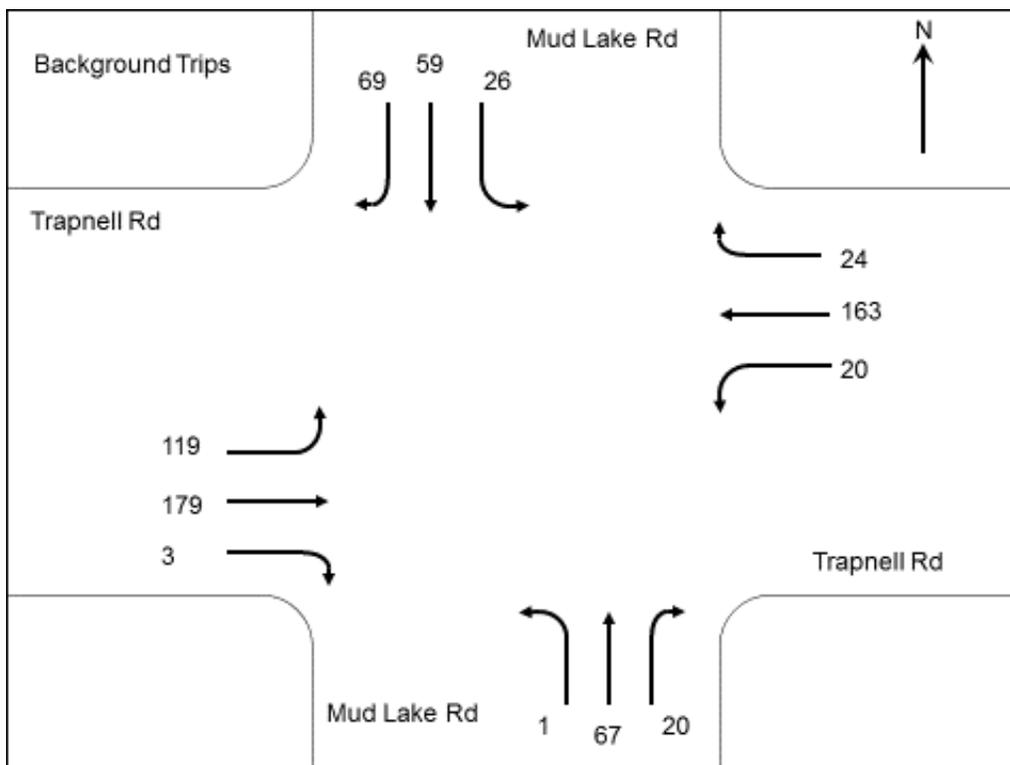


FIGURE 48 Background Traffic: Mud Lake Rd @ Trapnell Rd (AM)

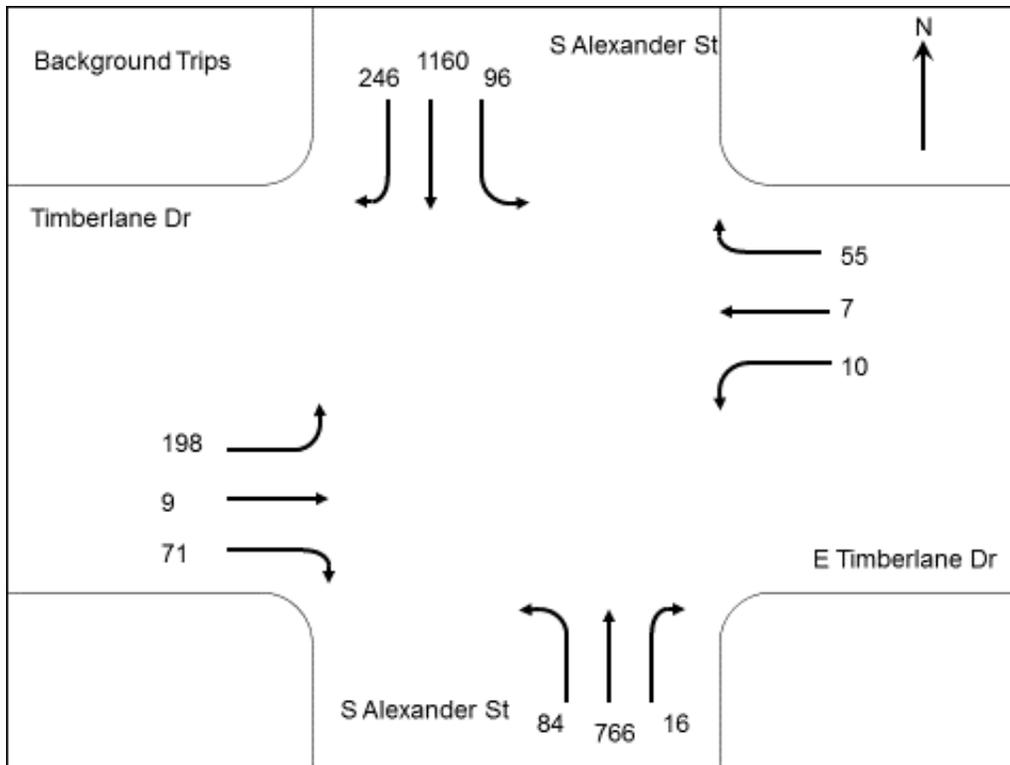


FIGURE 49 Background Traffic: Alexander St @ Timberlane Dr (PM)

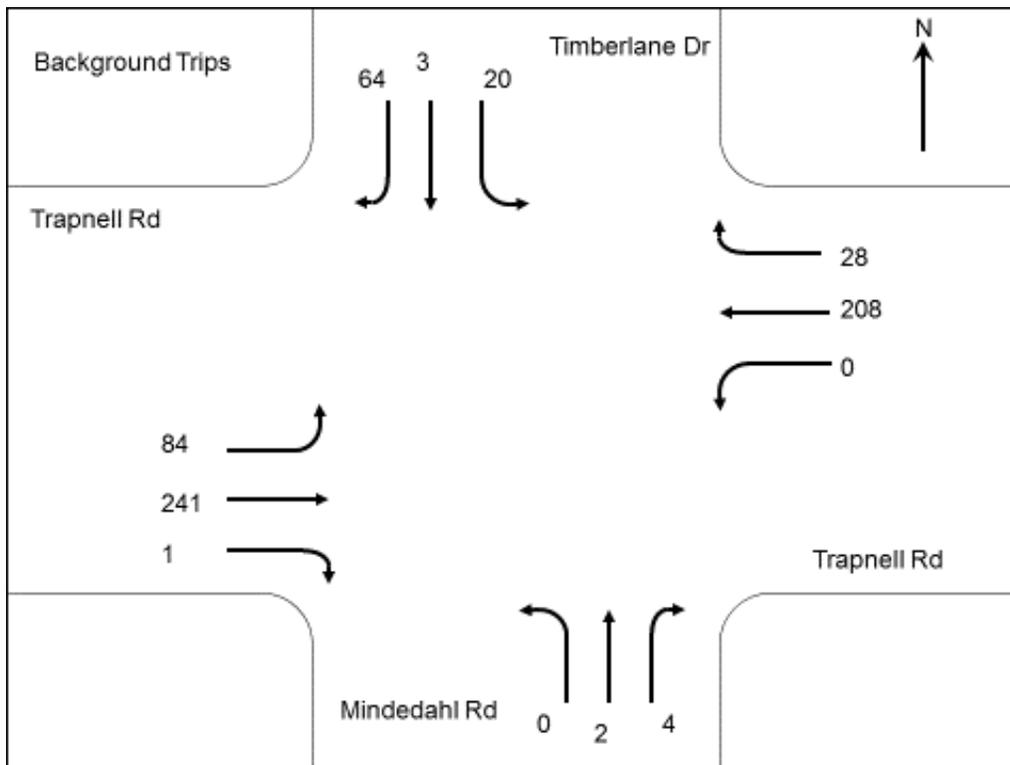


FIGURE 50 Background Traffic: Timberlane Dr @ Trapnell Rd (PM)

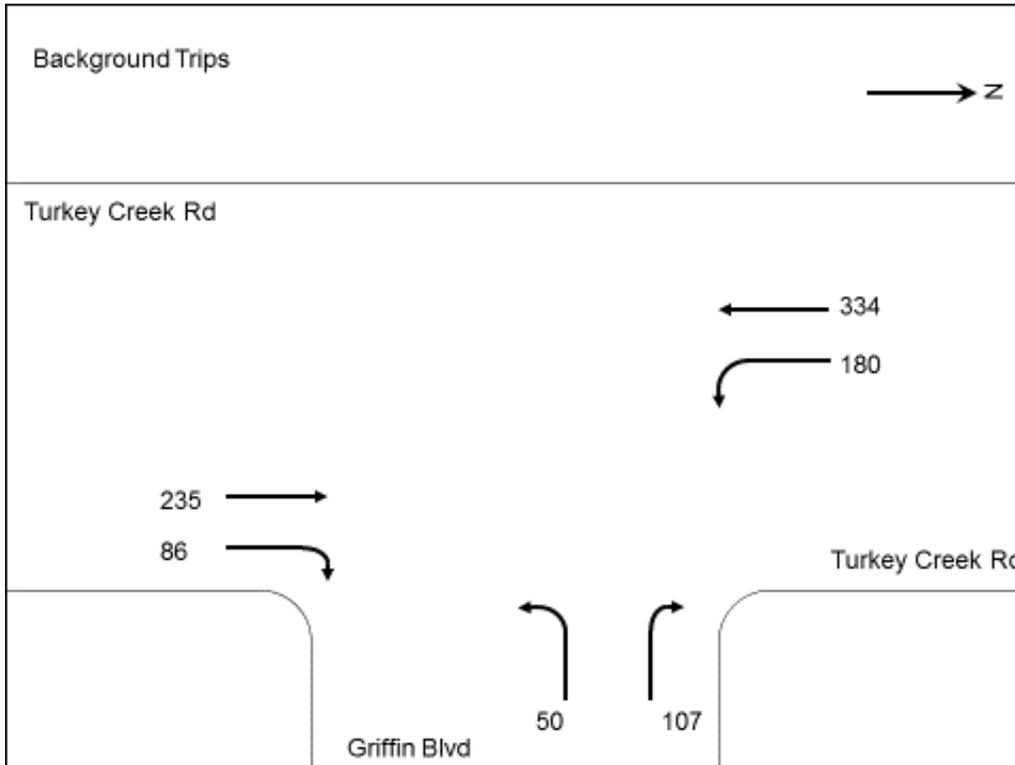


FIGURE 51 Background Traffic: Griffin Blvd @ Turkey Creek Rd (PM)

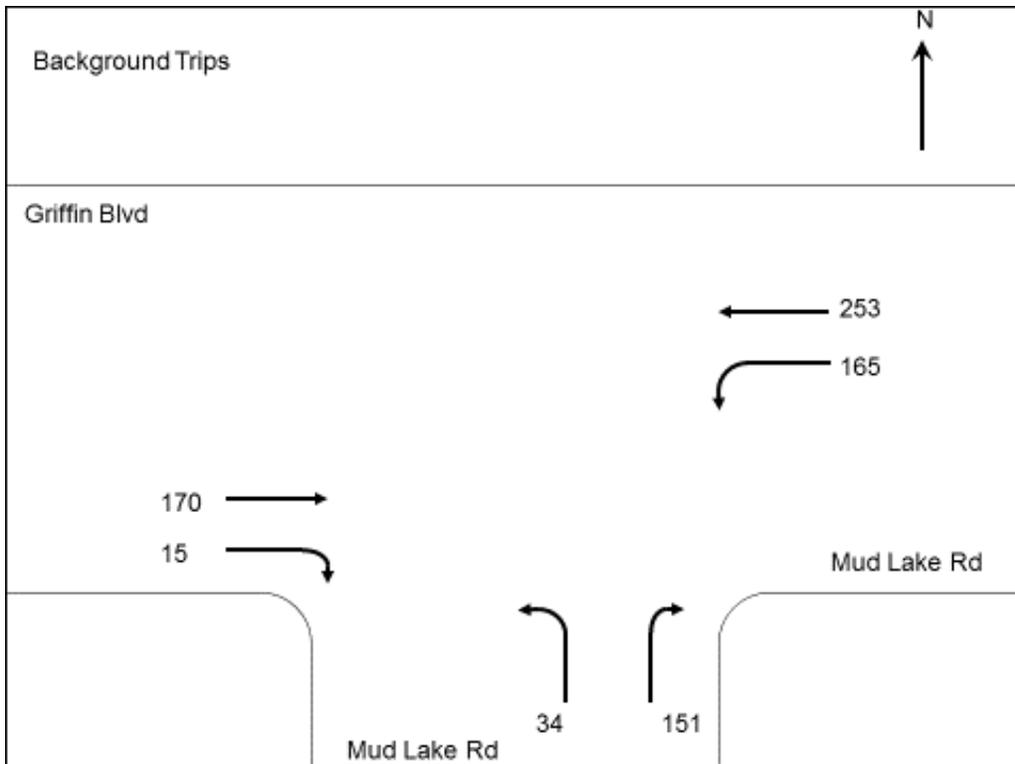


FIGURE 52 Background Traffic: Griffin Blvd @ Mud Lake Rd (PM)

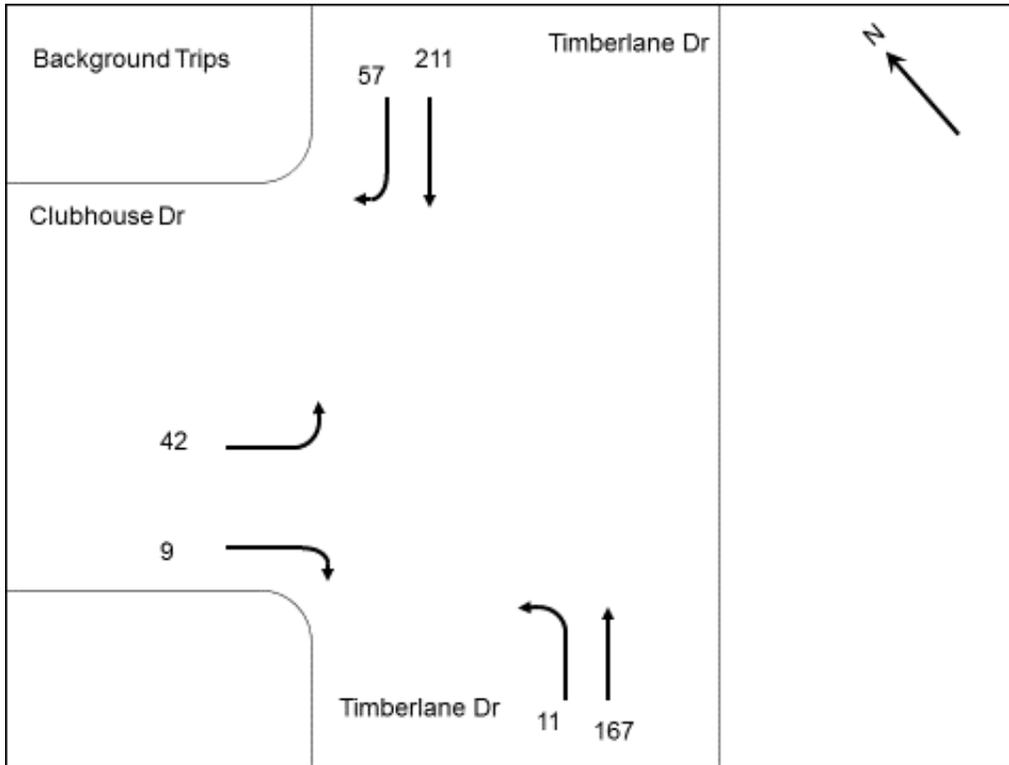


FIGURE 53 Background Traffic: Clubhouse Dr @ Timberlane Dr (PM)

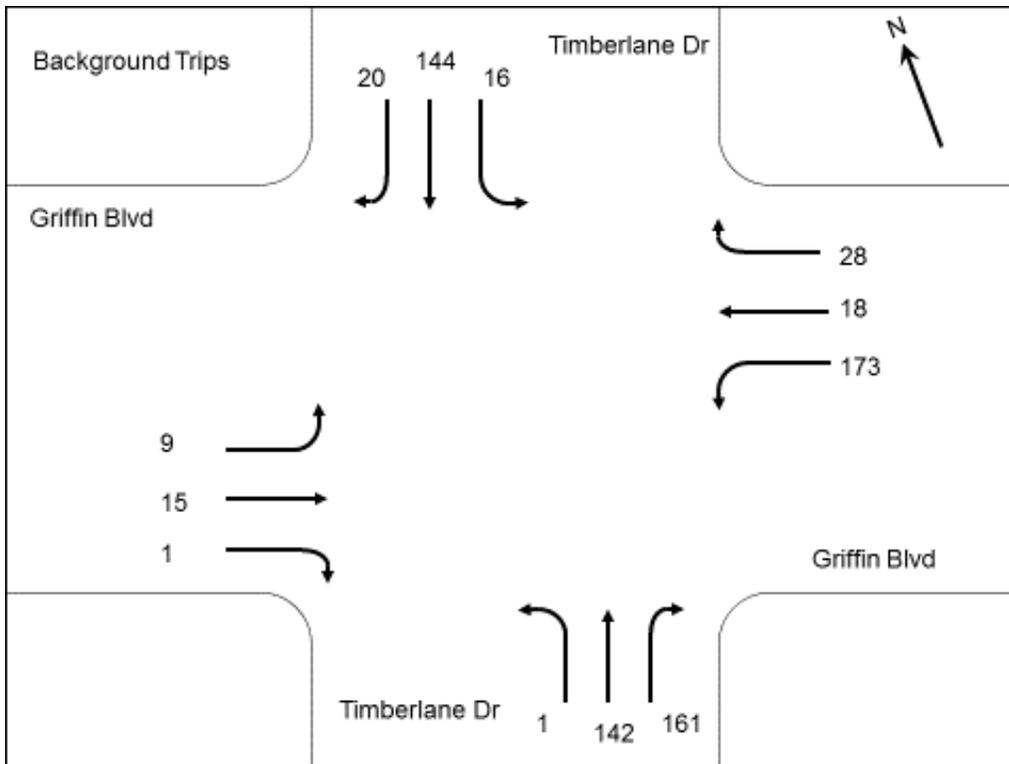


FIGURE 54 Background Traffic: Griffin Blvd @ Timberlane Dr North (PM)

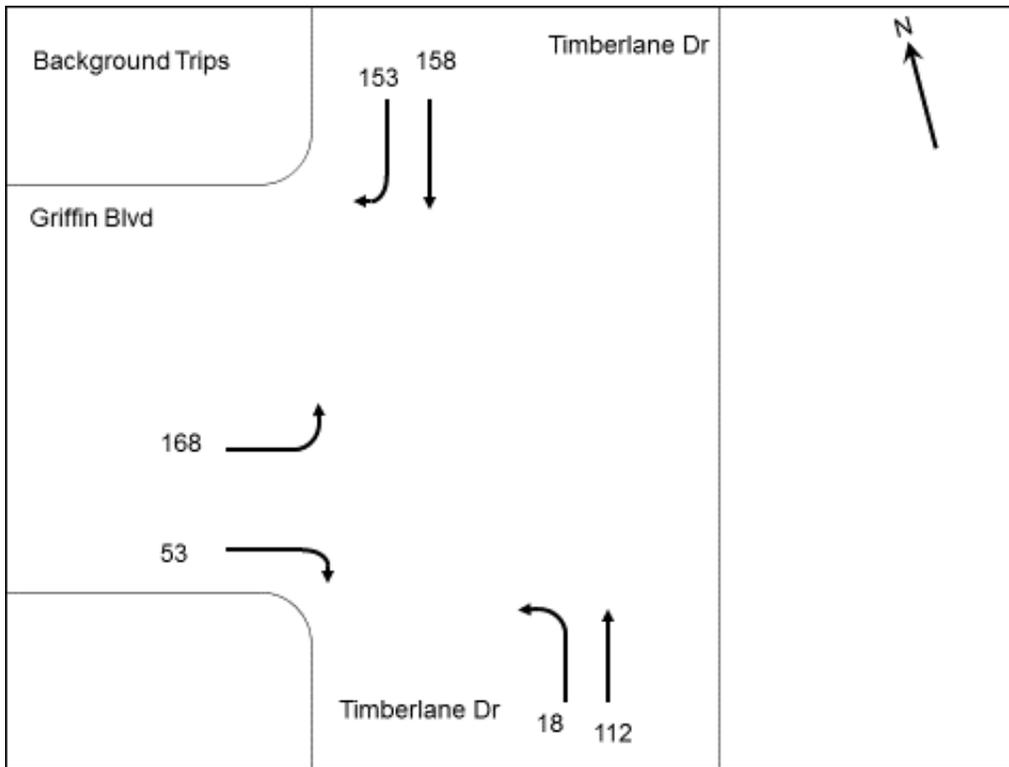


FIGURE 55 Background Traffic: Griffin Blvd @ Timberlane Dr South (PM)

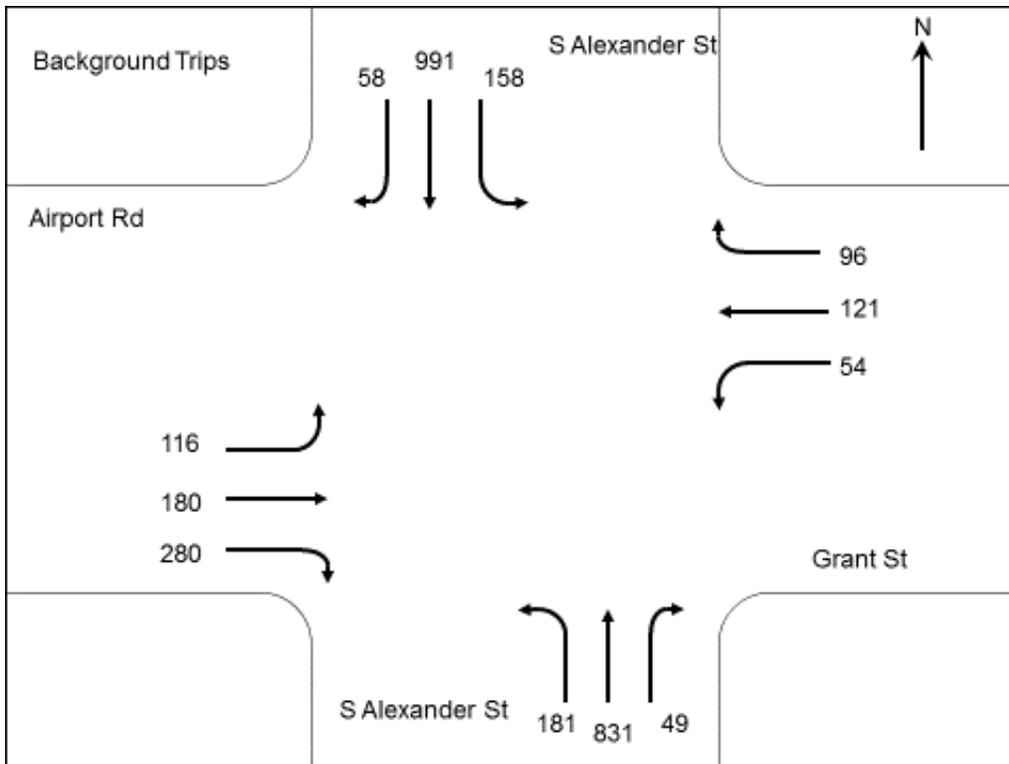


FIGURE 56 Background Traffic: Alexander St @ Airport Rd/Grant St (PM)

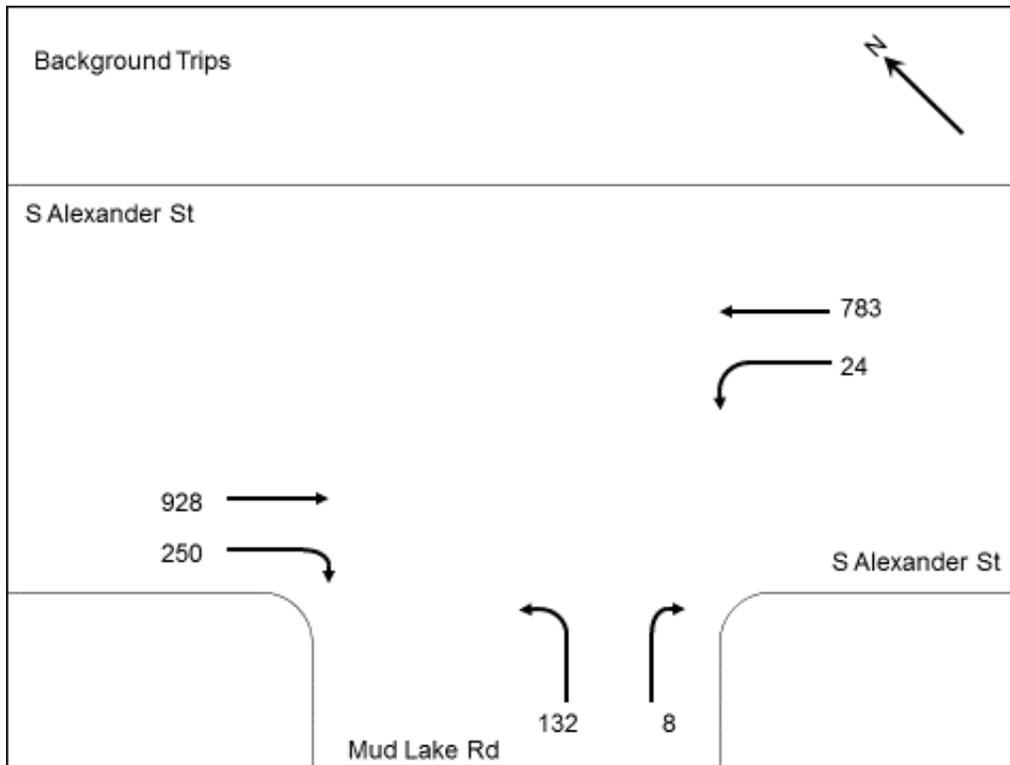


FIGURE 57 Background Traffic: Alexander St @ Mud Lake Rd (PM)

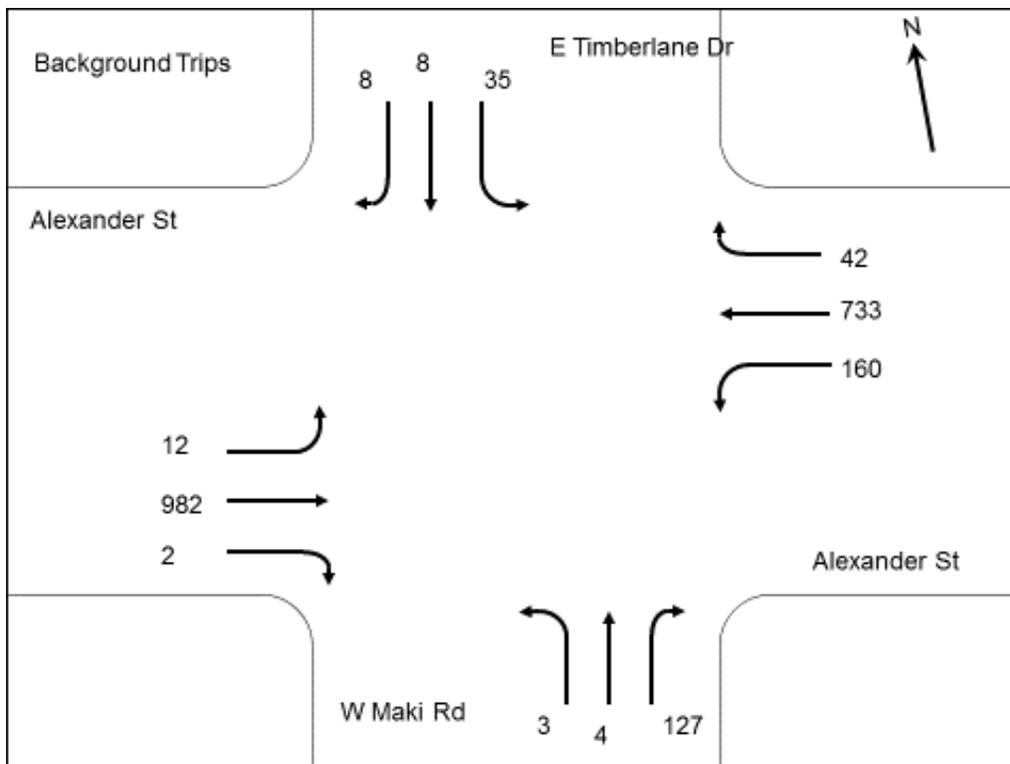


FIGURE 58 Background Traffic: Alexander St @ YMCA PI (Maki Rd) (PM)

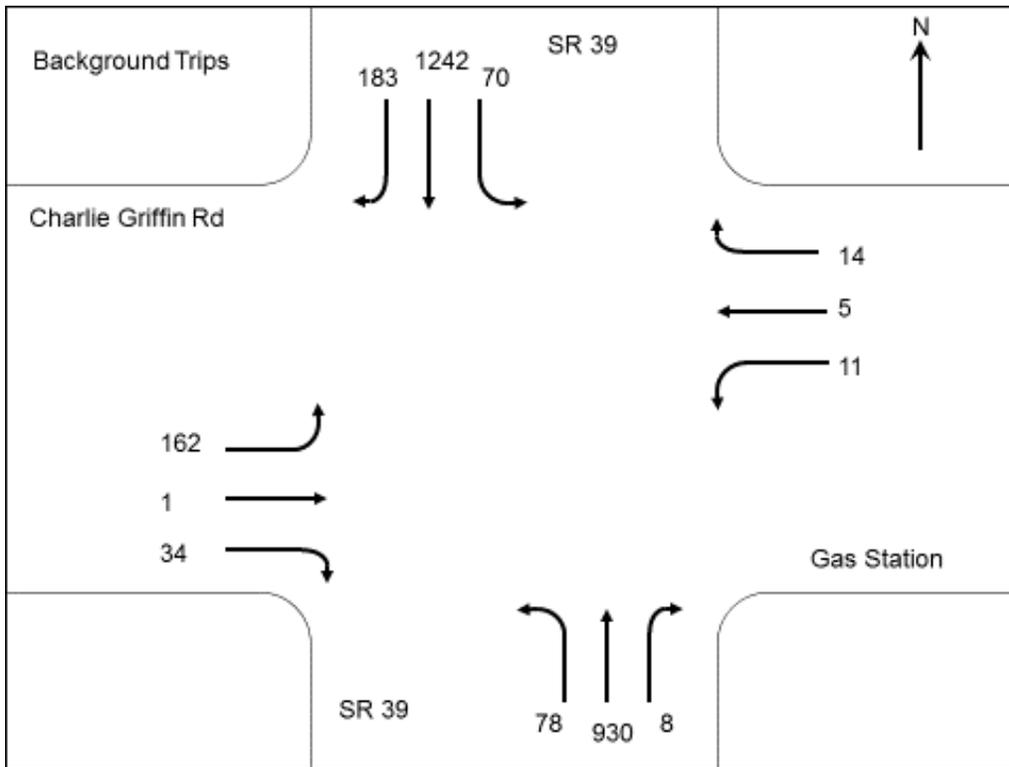


FIGURE 59 Background Traffic: Charlie Griffin Rd @ SR 39 (PM)

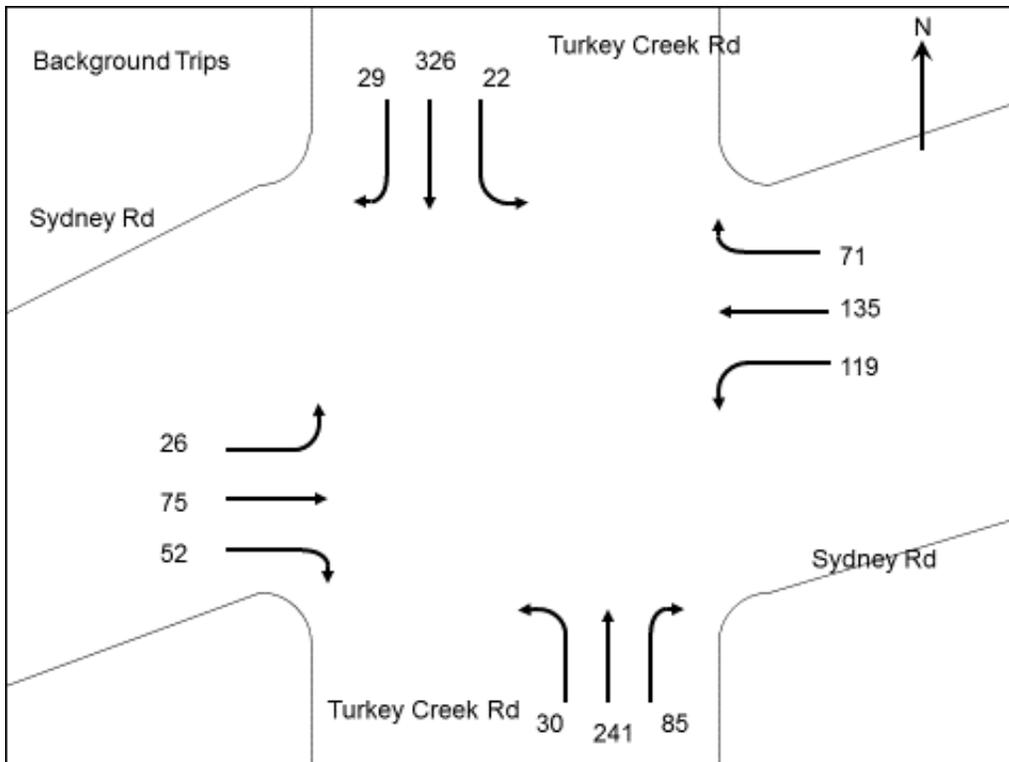


FIGURE 60 Background Traffic: Turkey Creek Rd @ Sydney Rd (PM)

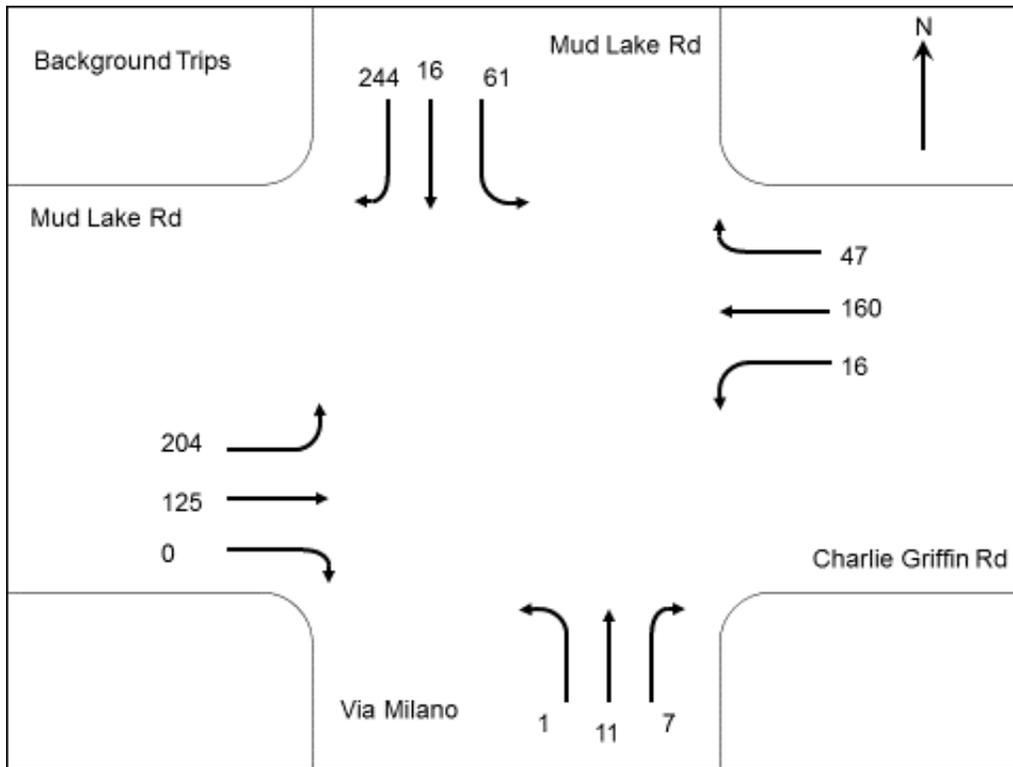


FIGURE 61 Background Traffic: Mud Lake Rd @ Charlie Griffin Rd (PM)

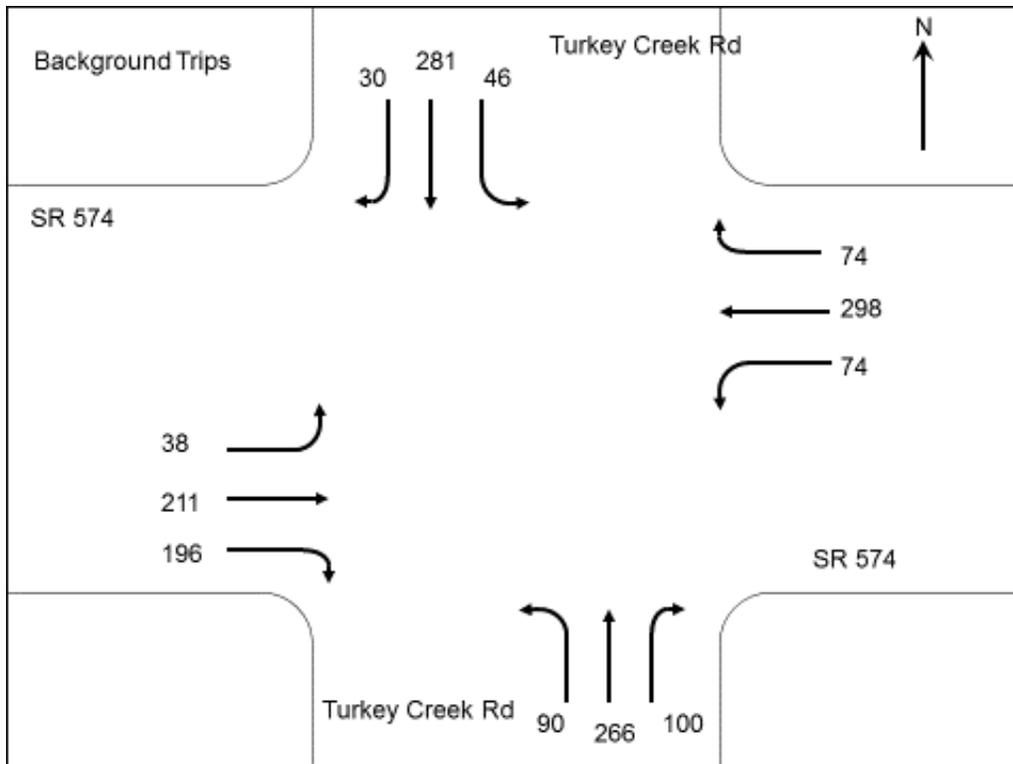


FIGURE 62 Background Traffic: Turkey Creek Rd @ SR 574 (PM)

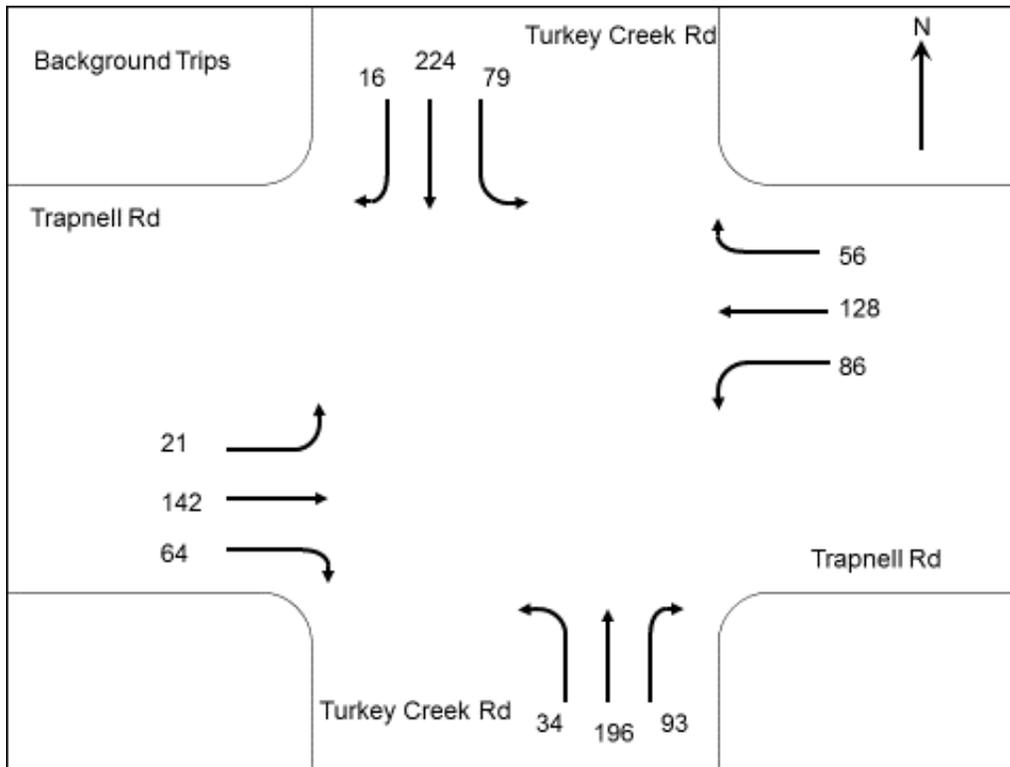


FIGURE 63 Background Traffic: Turkey Creek Rd @ Trapnell Rd (PM)

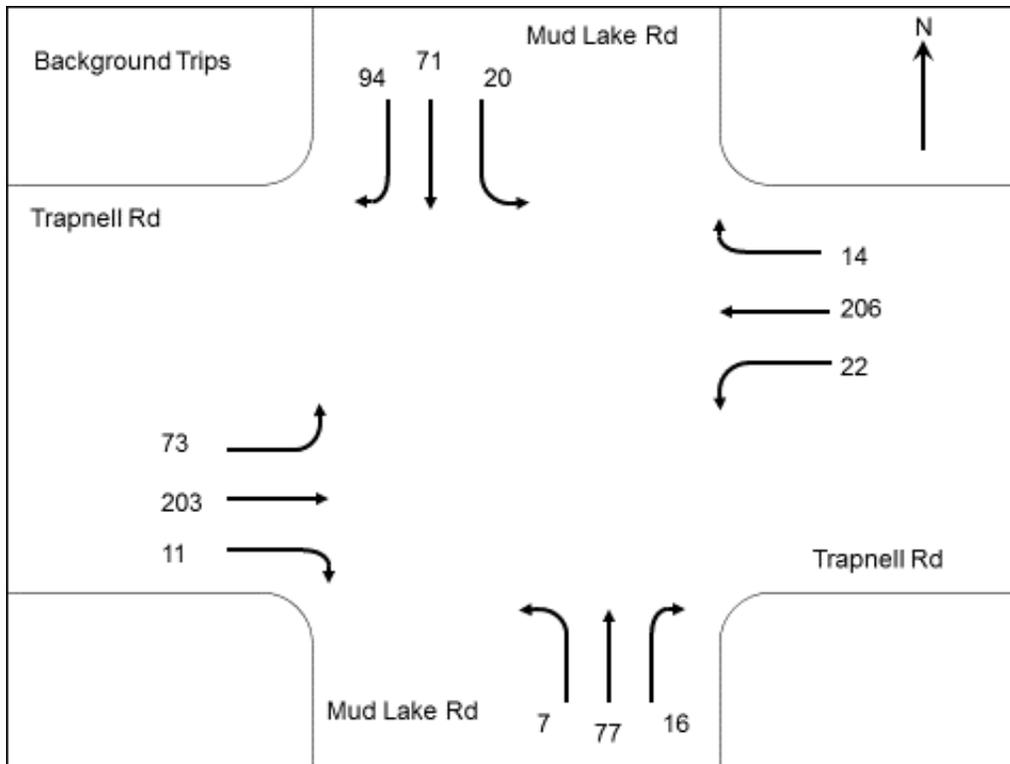


FIGURE 64 Background Traffic: Mud Lake Rd @ Trapnell Rd (PM)

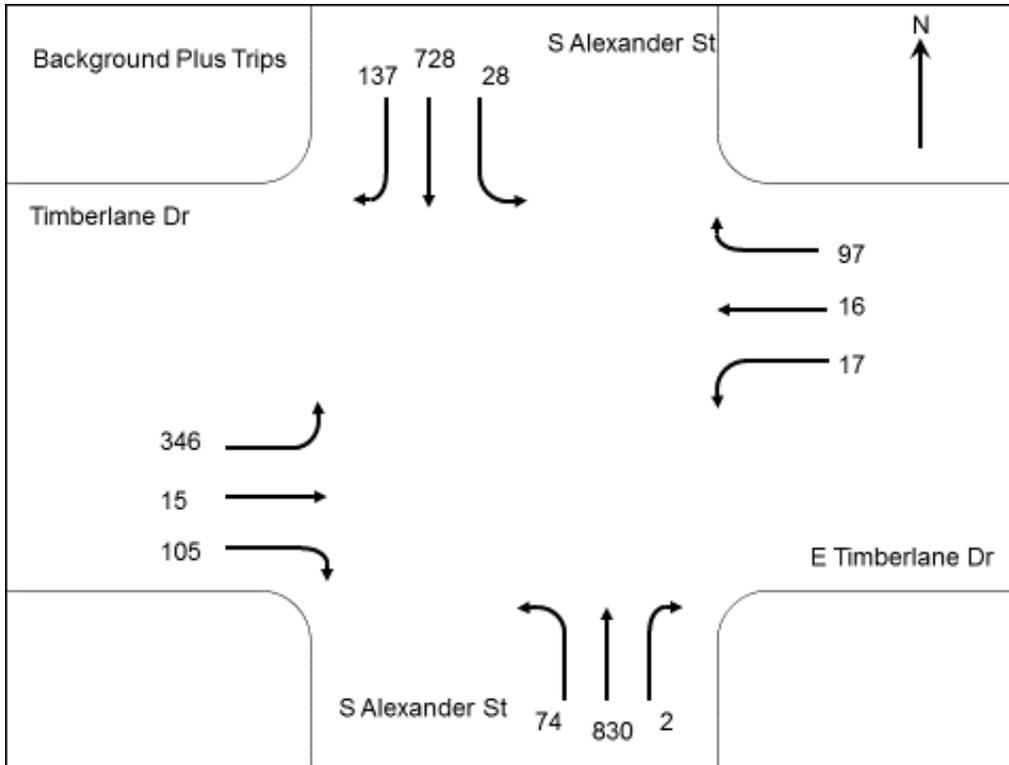


FIGURE 65 Background Plus Project Traffic: Alexander St @ Timberlane Dr (AM)

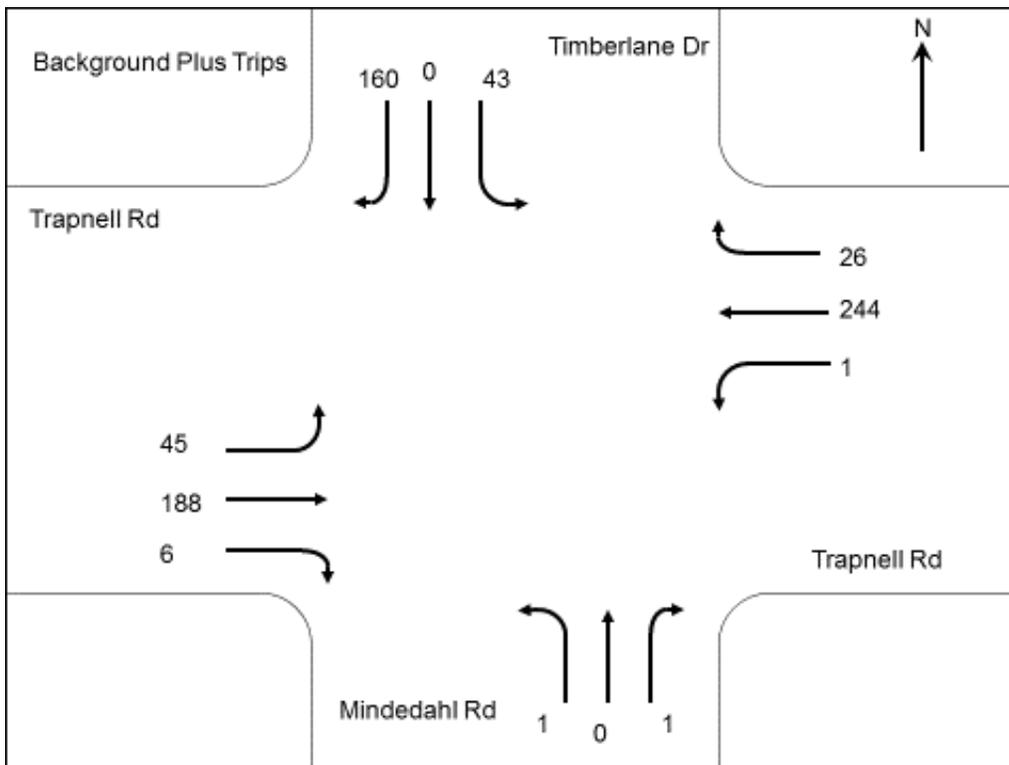


FIGURE 66 Background Plus Project Traffic: Timberlane Dr @ Trapnell Rd (AM)

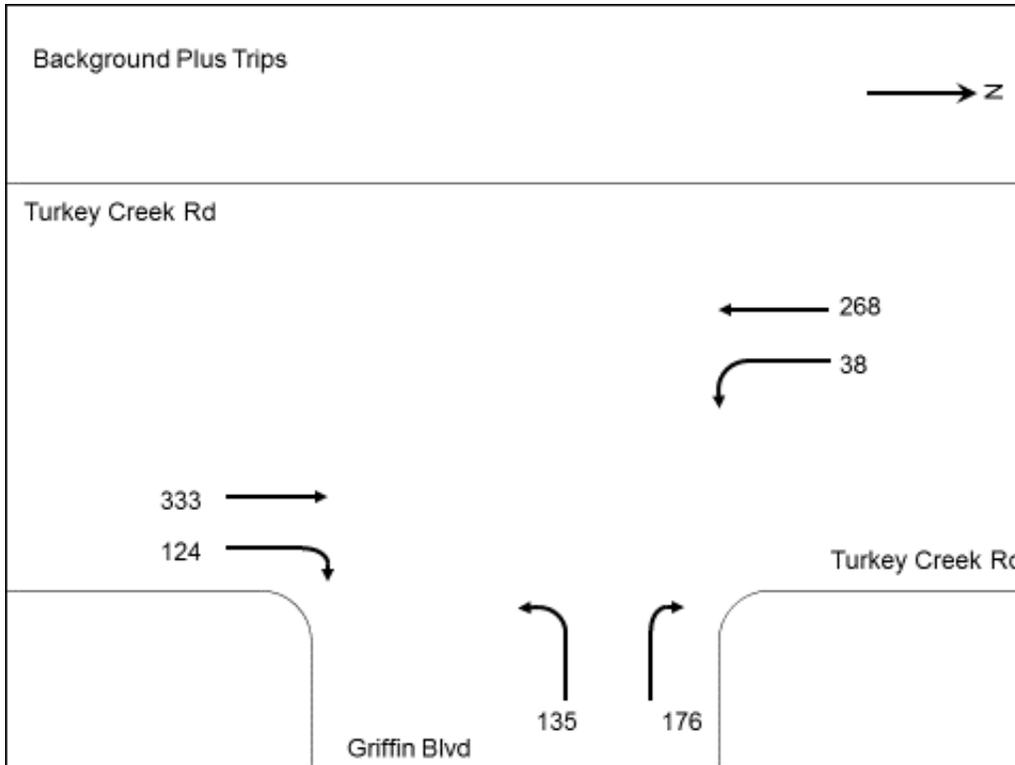


FIGURE 67 Background Plus Project Traffic: Griffin Blvd @ Turkey Creek Rd (AM)

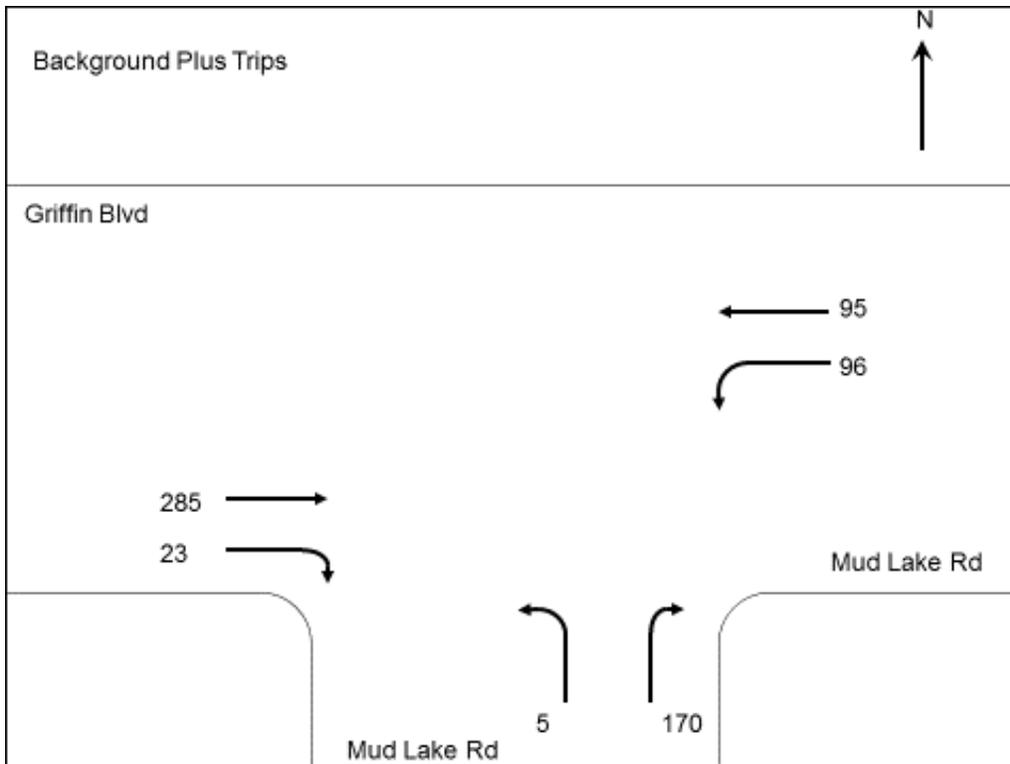


FIGURE 68 Background Plus Project Traffic: Griffin Blvd @ Mud Lake Rd (AM)

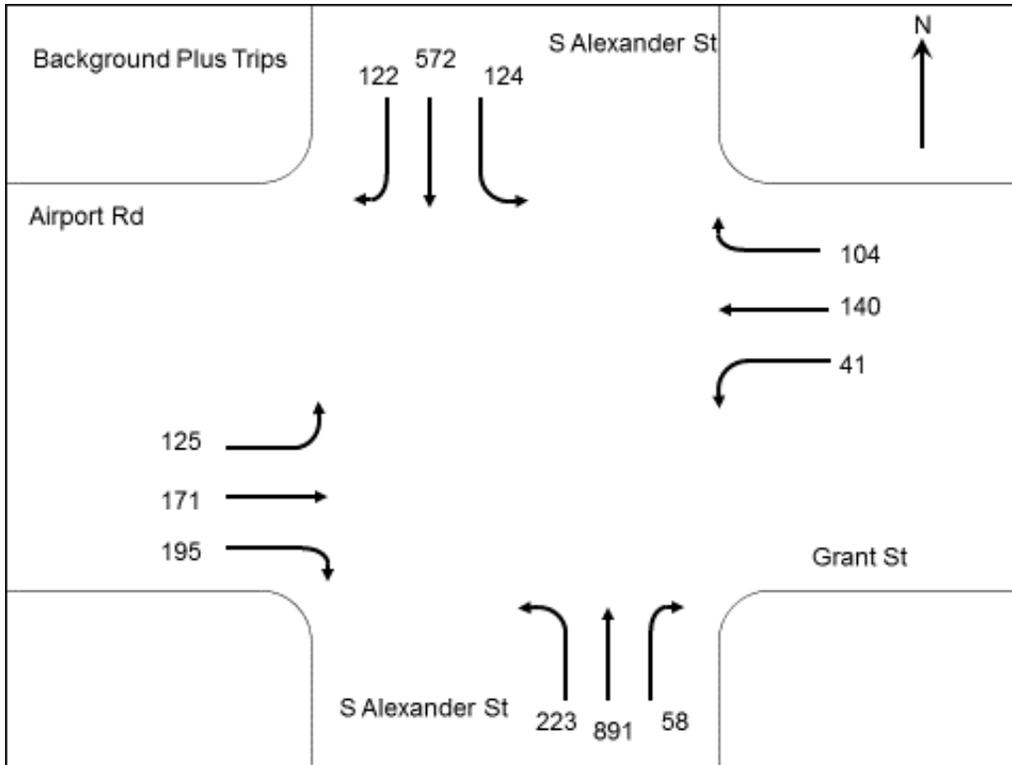


FIGURE 69 Background Plus Project Traffic: Alexander St @ Airport Rd/Grant St (AM)

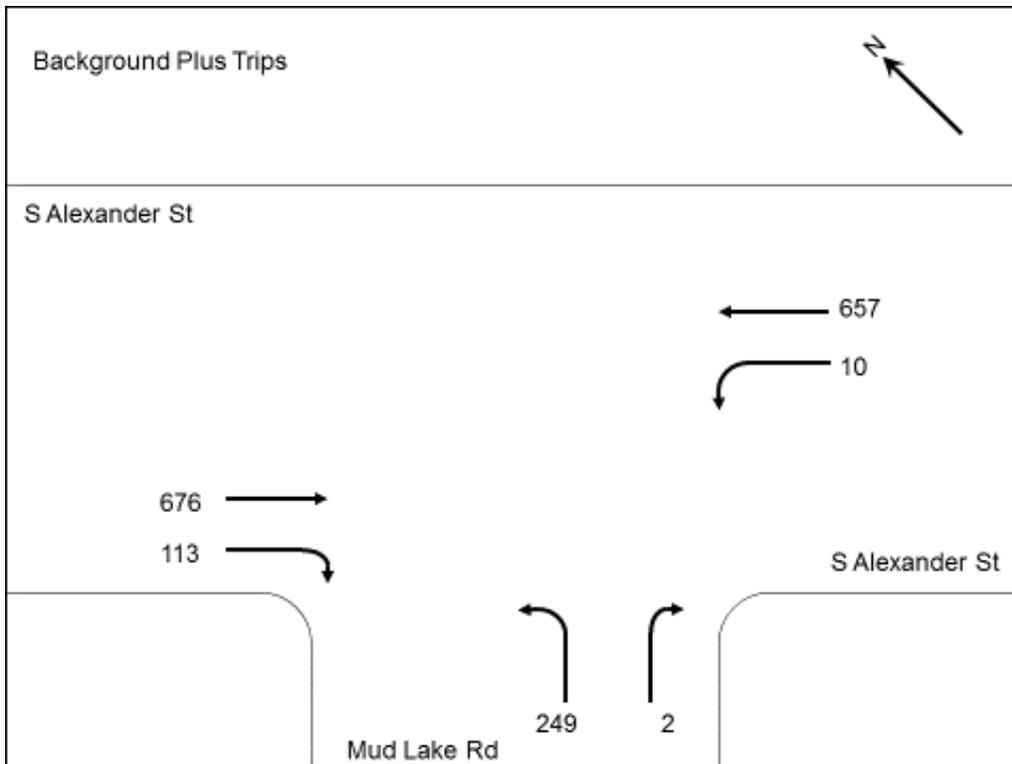


FIGURE 70 Background Plus Project Traffic: Alexander St @ Mud Lake Rd (AM)

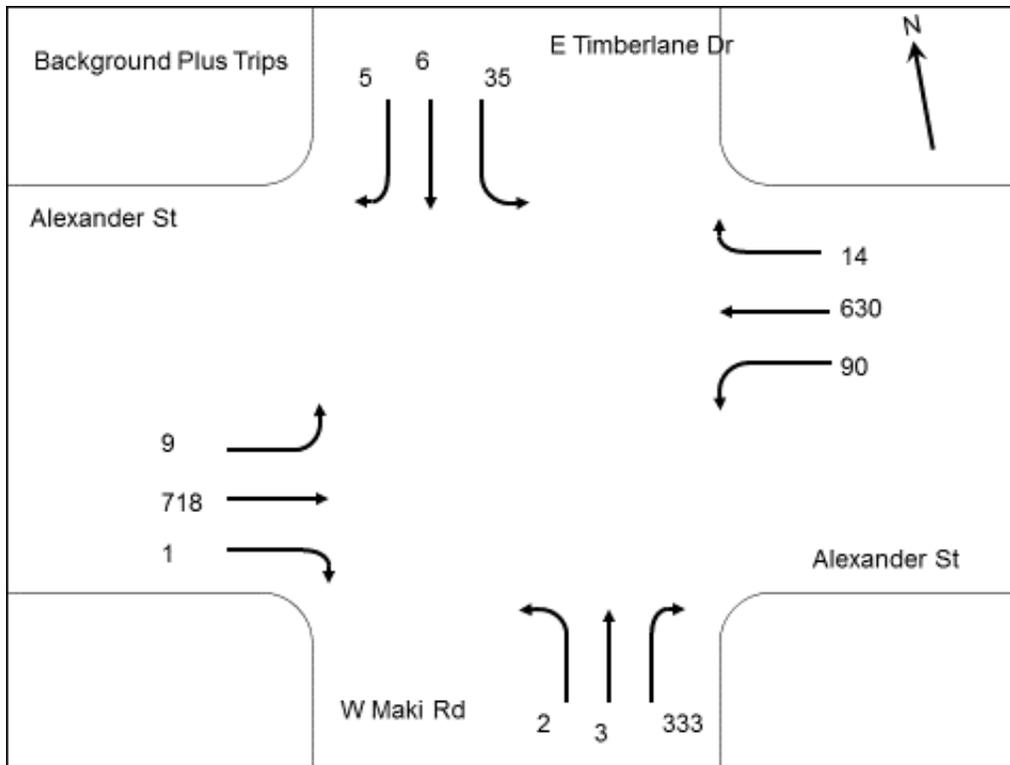


FIGURE 71 Background Plus Project Traffic: Alexander St @ YMCA PI (Maki Rd) (AM)

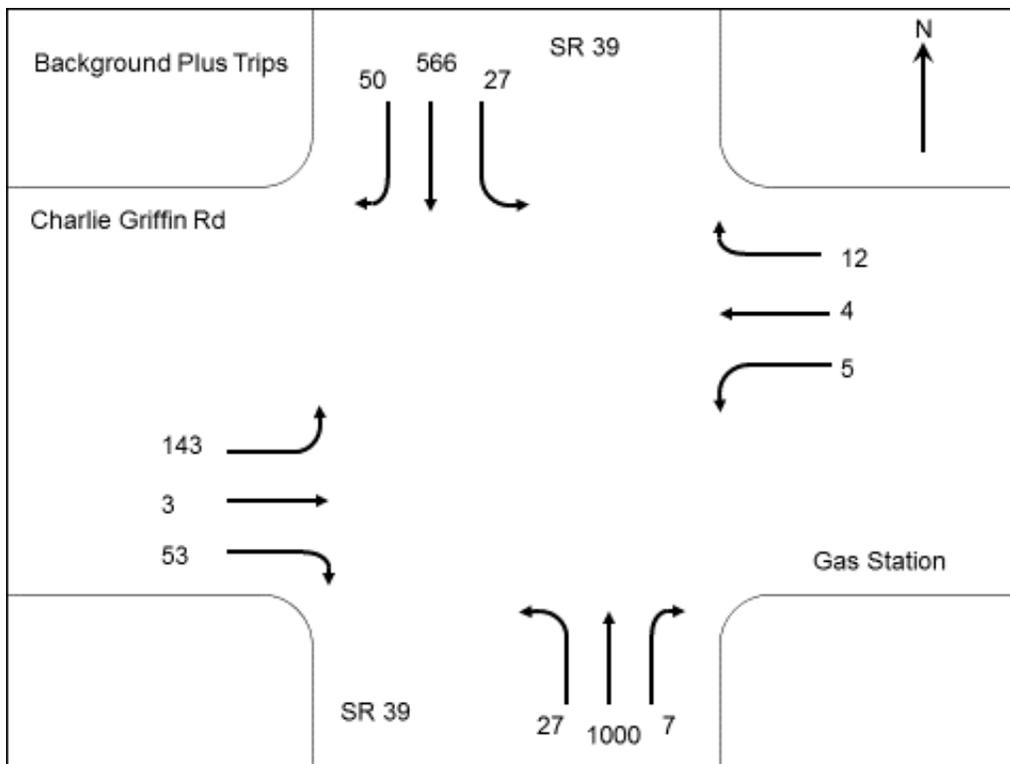


FIGURE 72 Background Plus Project Traffic: Charlie Griffin Rd @ SR 39 (AM)

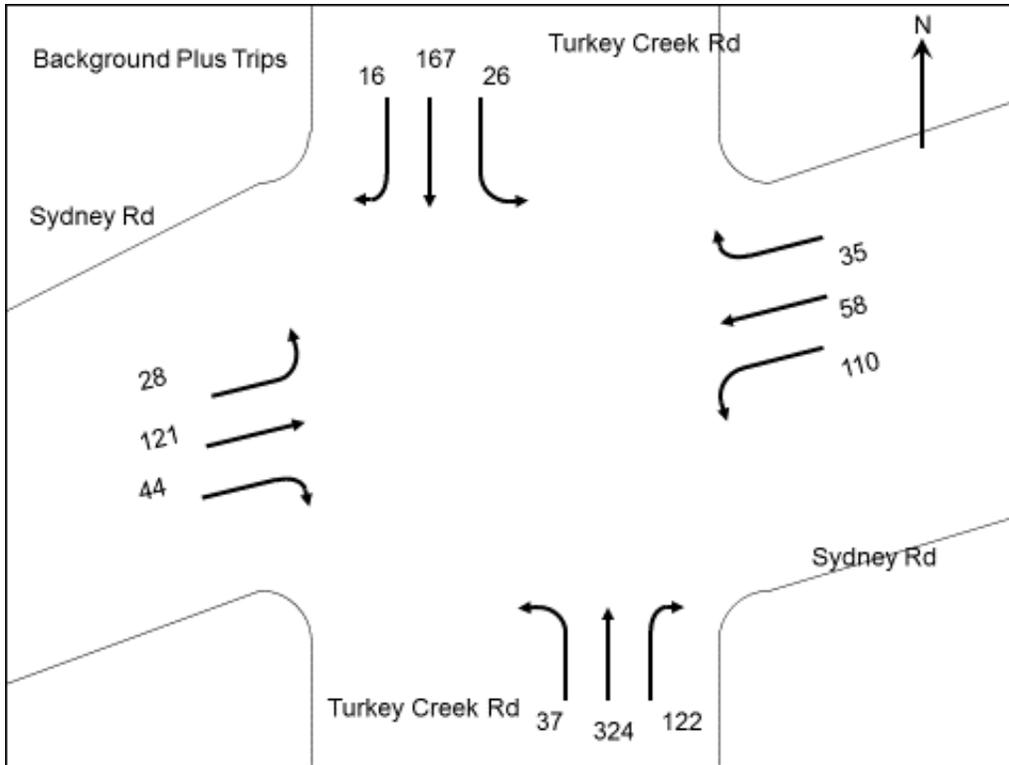


FIGURE 73 Background Plus Project Traffic: Turkey Creek Rd @ Sydney Rd (AM)

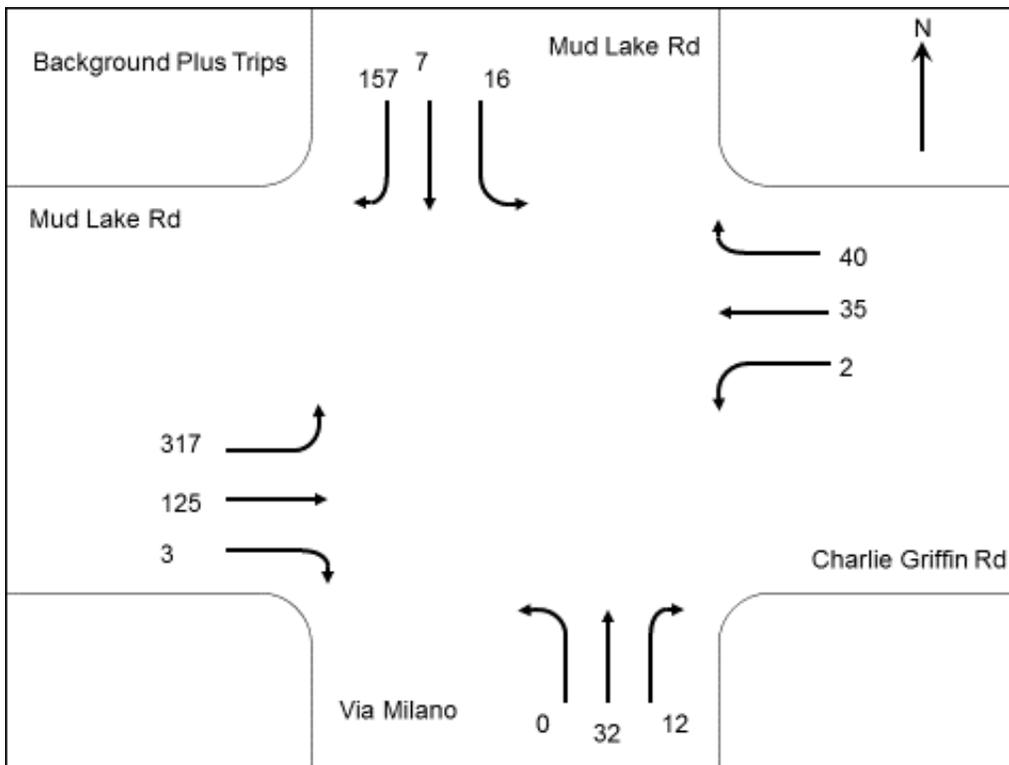


FIGURE 74 Background Plus Project Traffic: Mud Lake Rd @ Charlie Griffin Rd (AM)

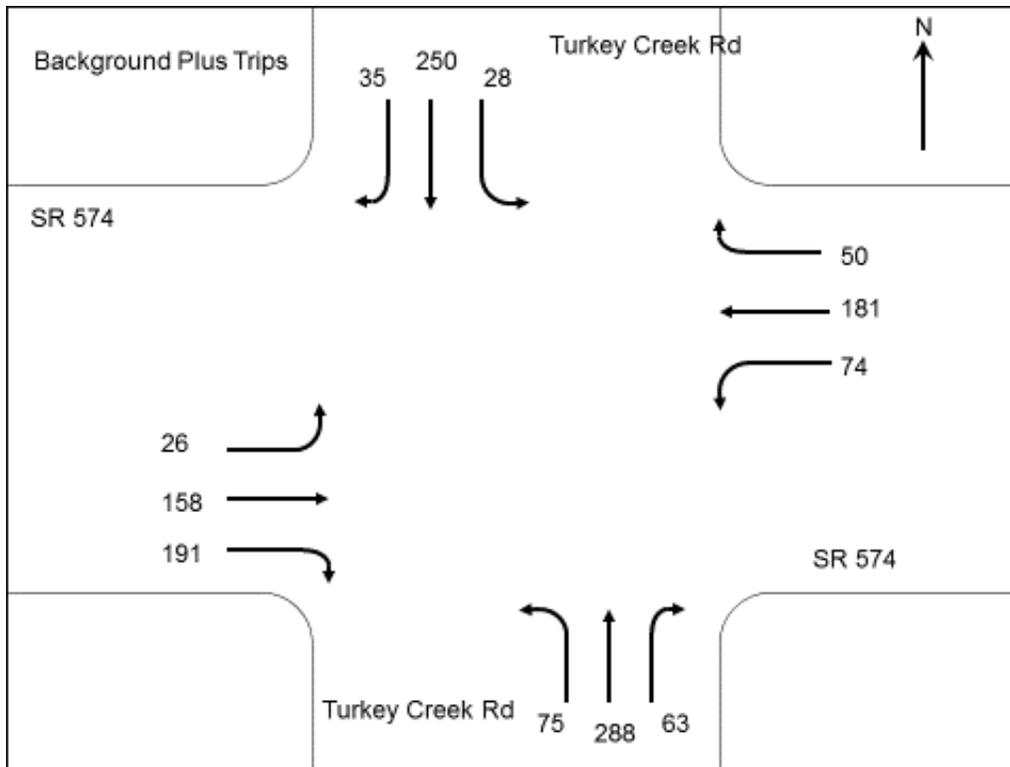


FIGURE 75 Background Plus Project Traffic: Turkey Creek Rd @ SR 574 (AM)

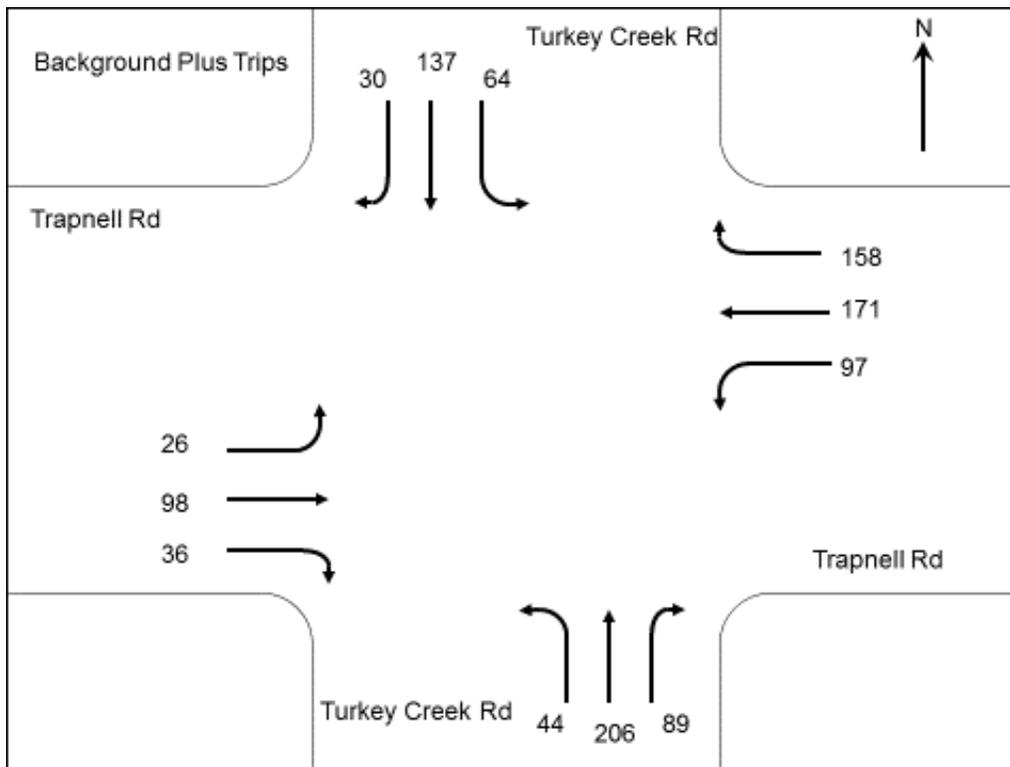


FIGURE 76 Background Plus Project Traffic: Turkey Creek Rd @ Trapnell Rd (AM)

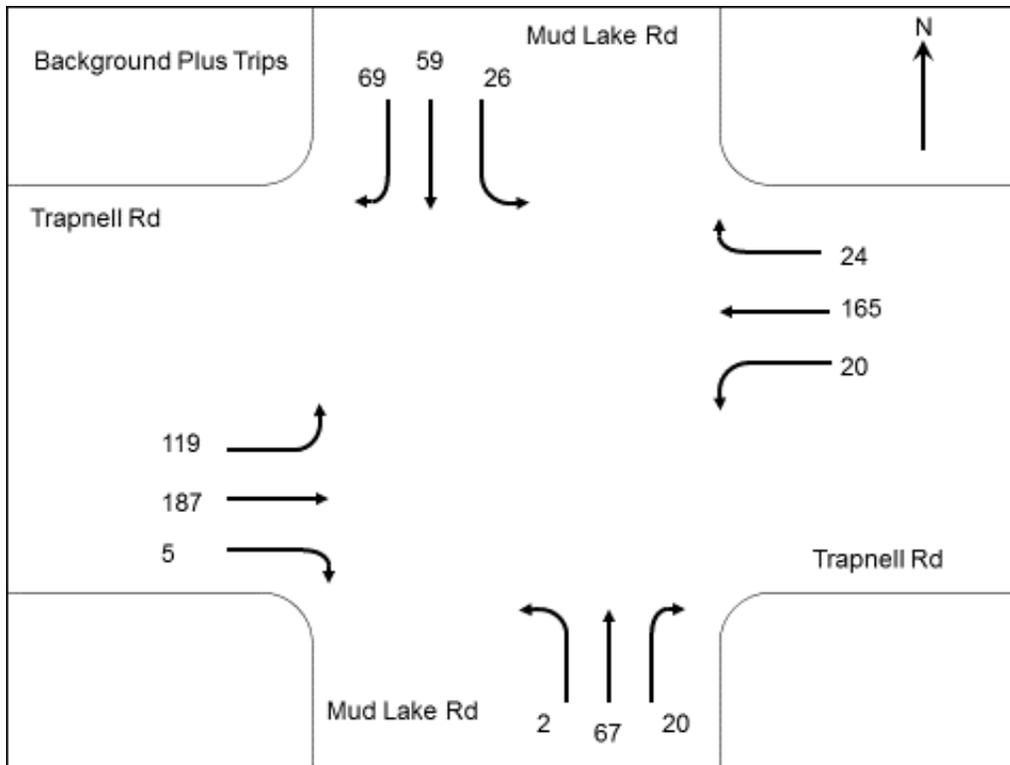


FIGURE 77 Background Plus Project Traffic: Mud Lake Rd @ Trapnell Rd (AM)

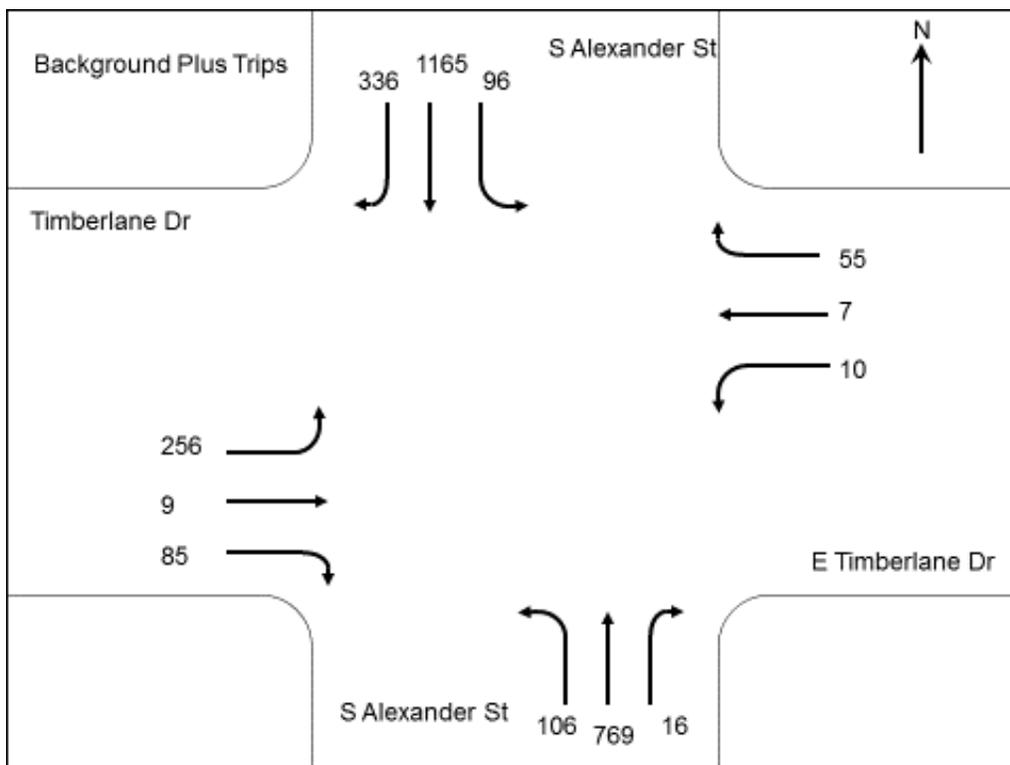


FIGURE 78 Background Plus Project Traffic: Alexander St @ Timberlane Dr (PM)

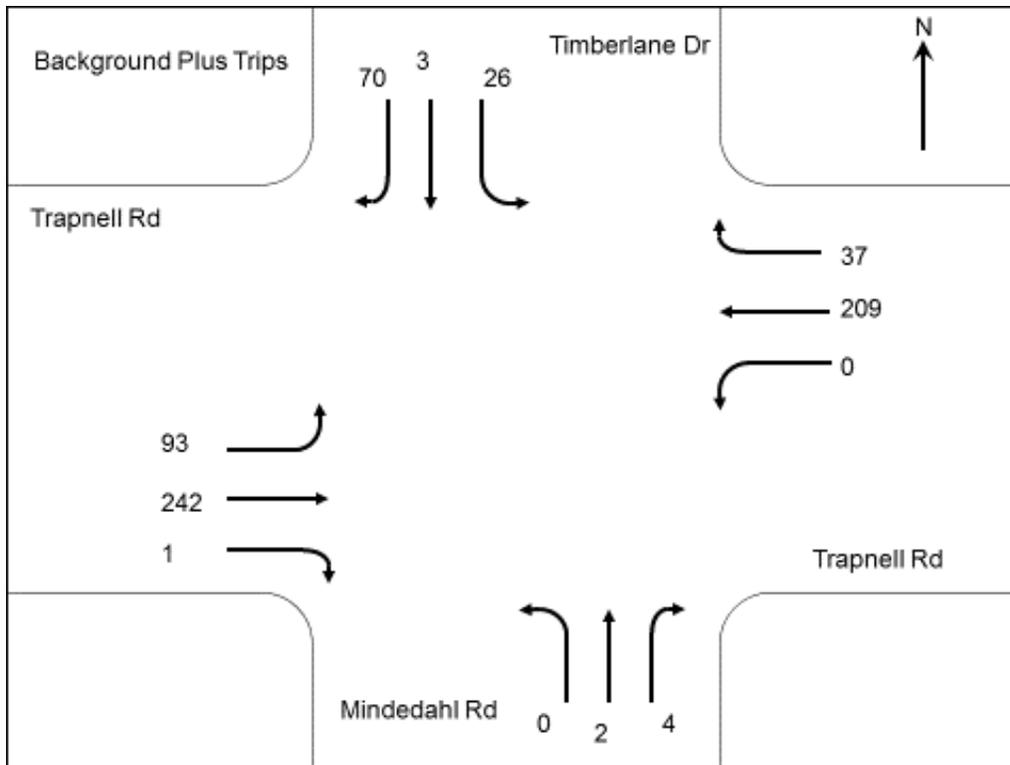


FIGURE 79 Background Plus Project Traffic: Timberlane Dr @ Trapnell Rd (PM)

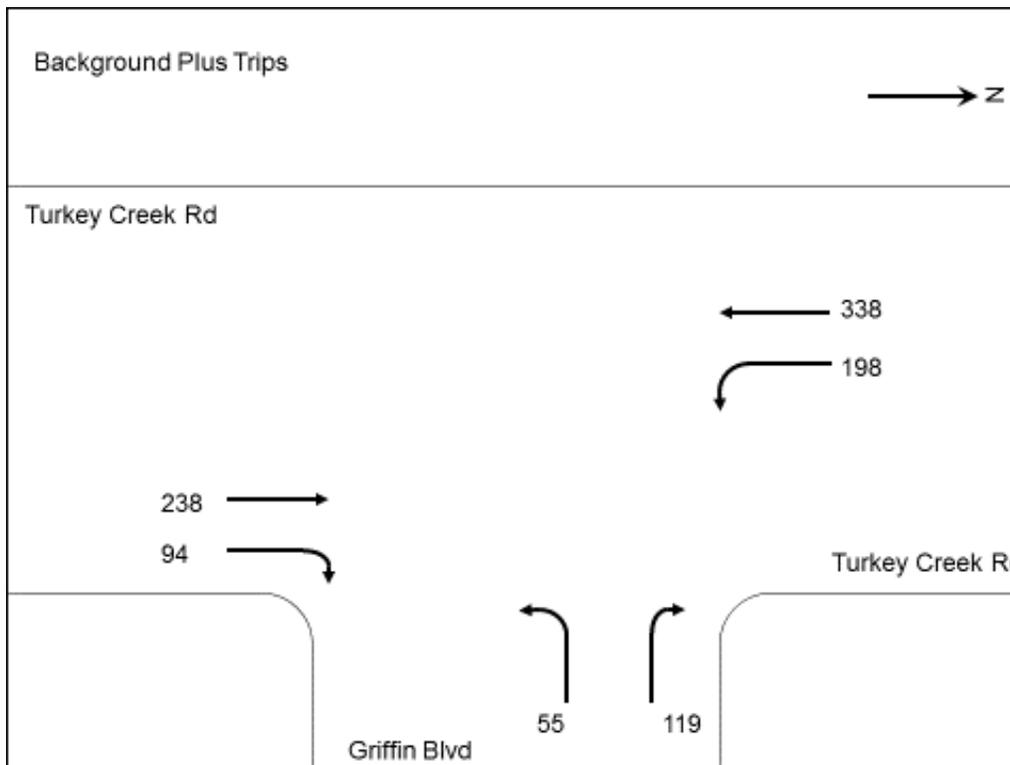


FIGURE 80 Background Plus Project Traffic: Griffin Blvd @ Turkey Creek Rd (PM)

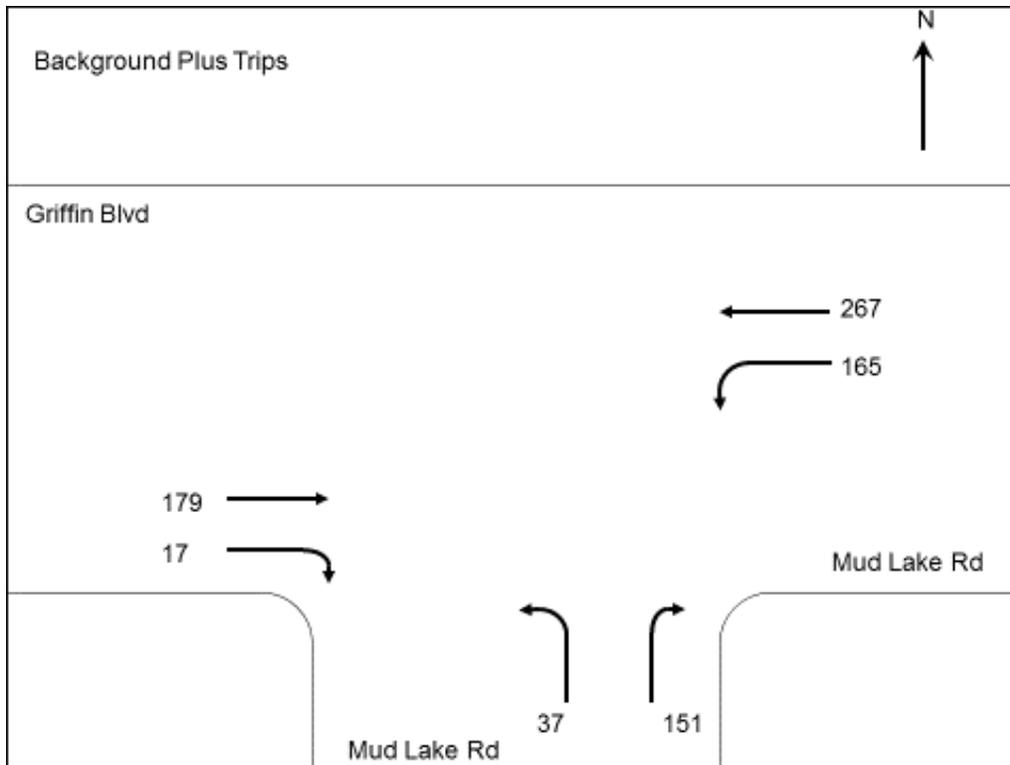


FIGURE 81 Background Plus Project Traffic: Griffin Blvd @ Mud Lake Rd (PM)

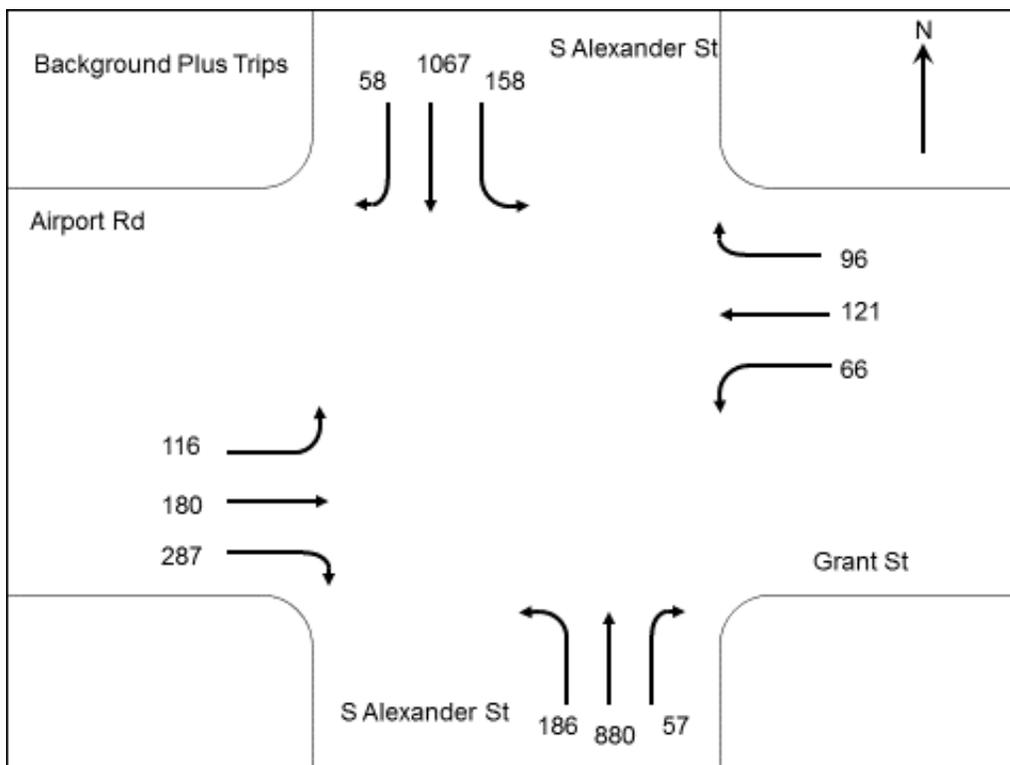


FIGURE 82 Background Plus Project Traffic: Alexander St @ Airport Rd/Grant St (PM)

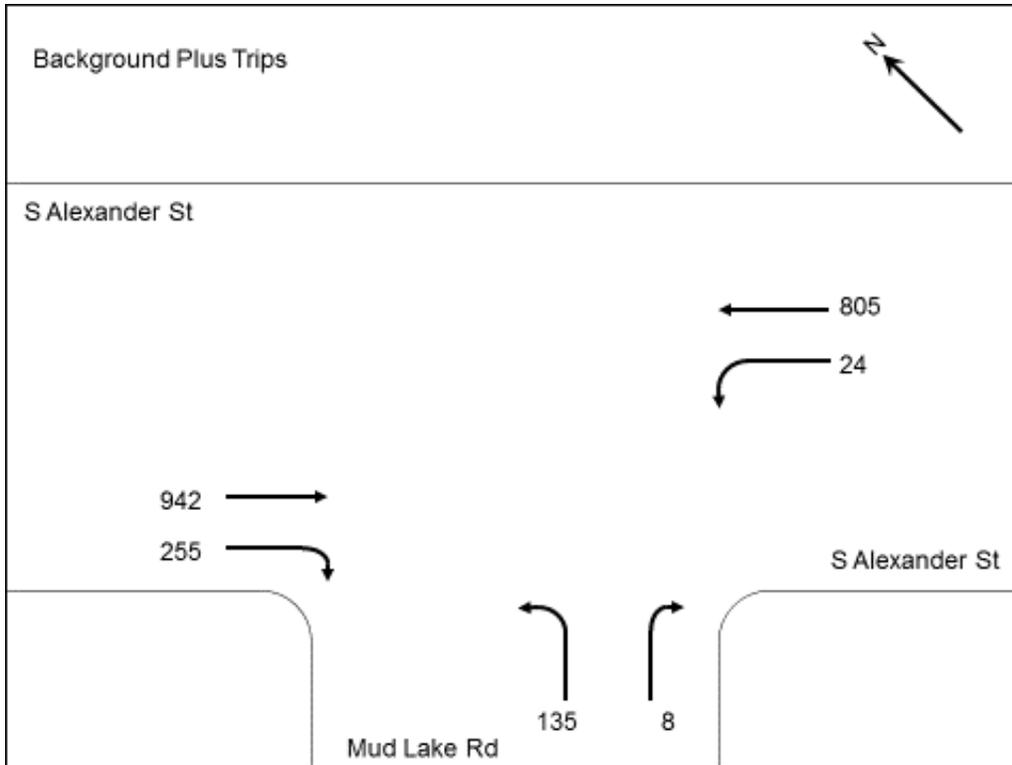


FIGURE 83 Background Plus Project Traffic: Alexander St @ Mud Lake Rd (PM)

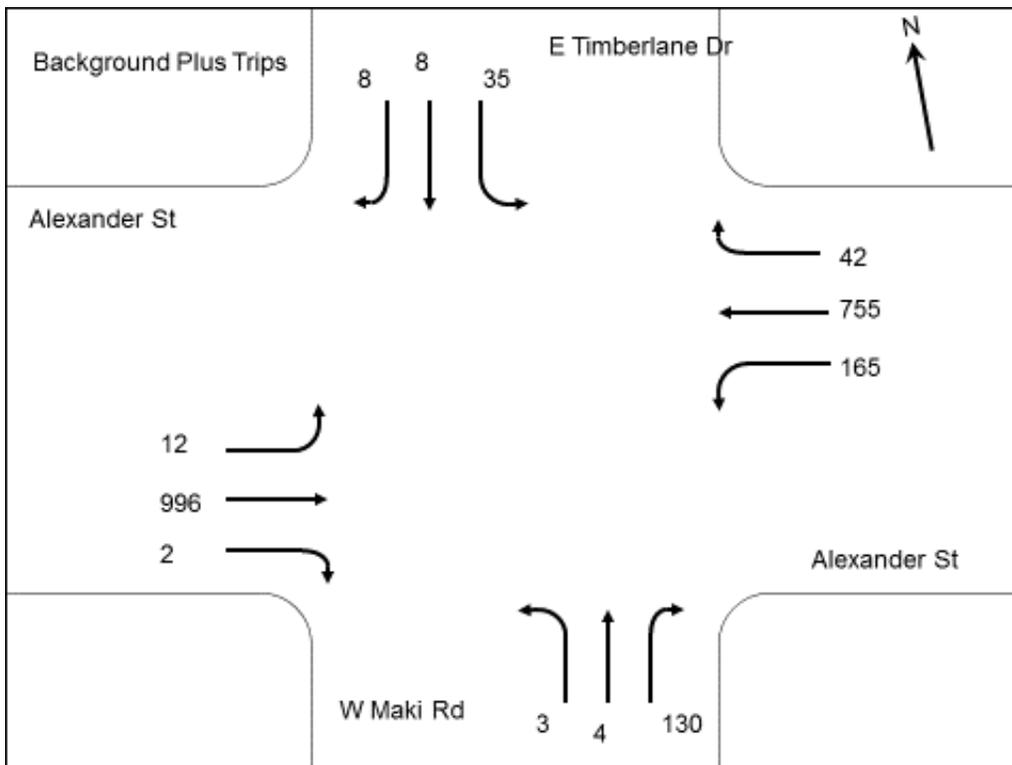


FIGURE 84 Background Plus Project Traffic: Alexander St @ YMCA PI (Maki Rd) (PM)

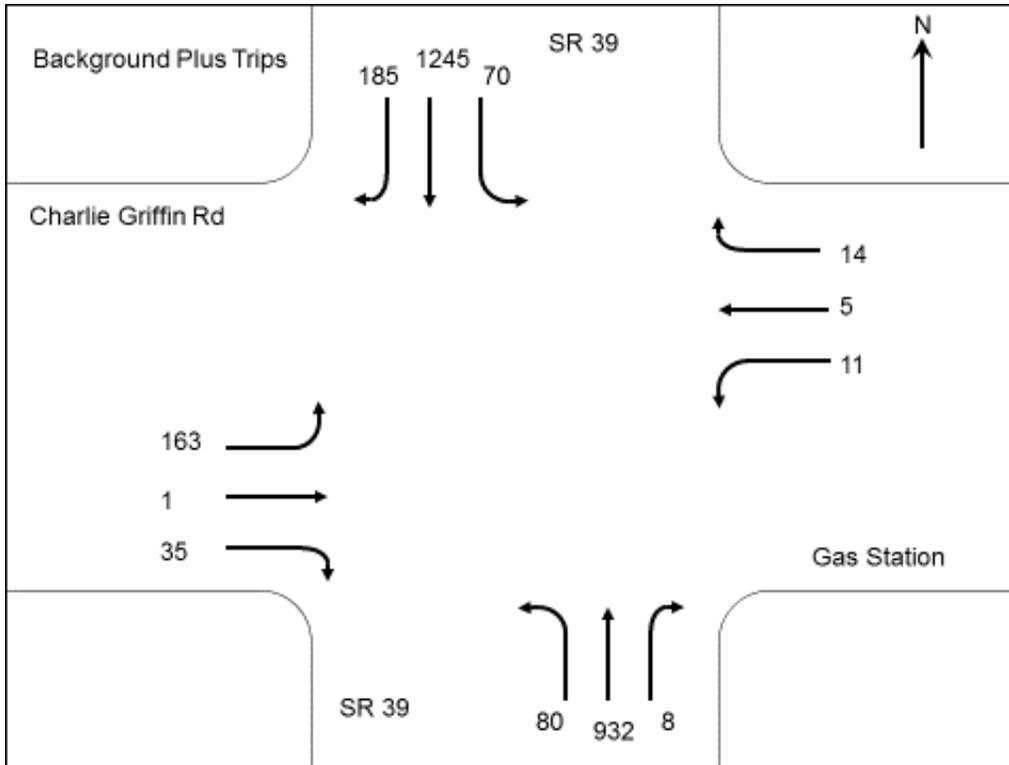


FIGURE 85 Background Plus Project Traffic: Charlie Griffin Rd @ SR 39 (PM)

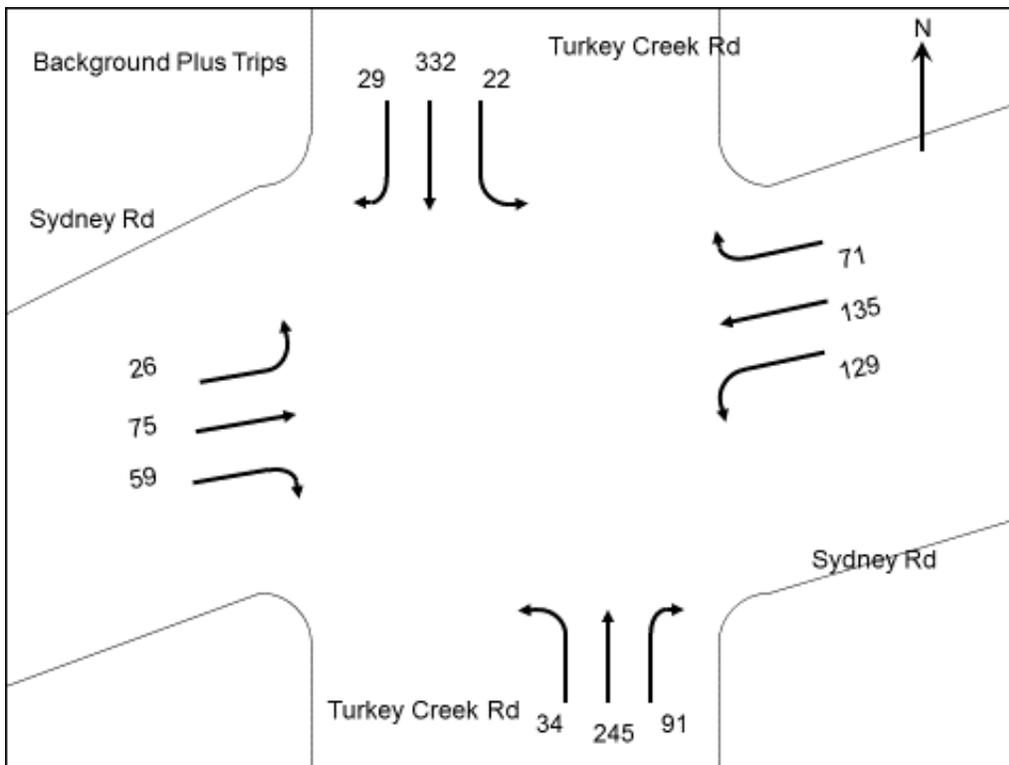


FIGURE 86 Background Plus Project Traffic: Turkey Creek Rd @ Sydney Rd (PM)

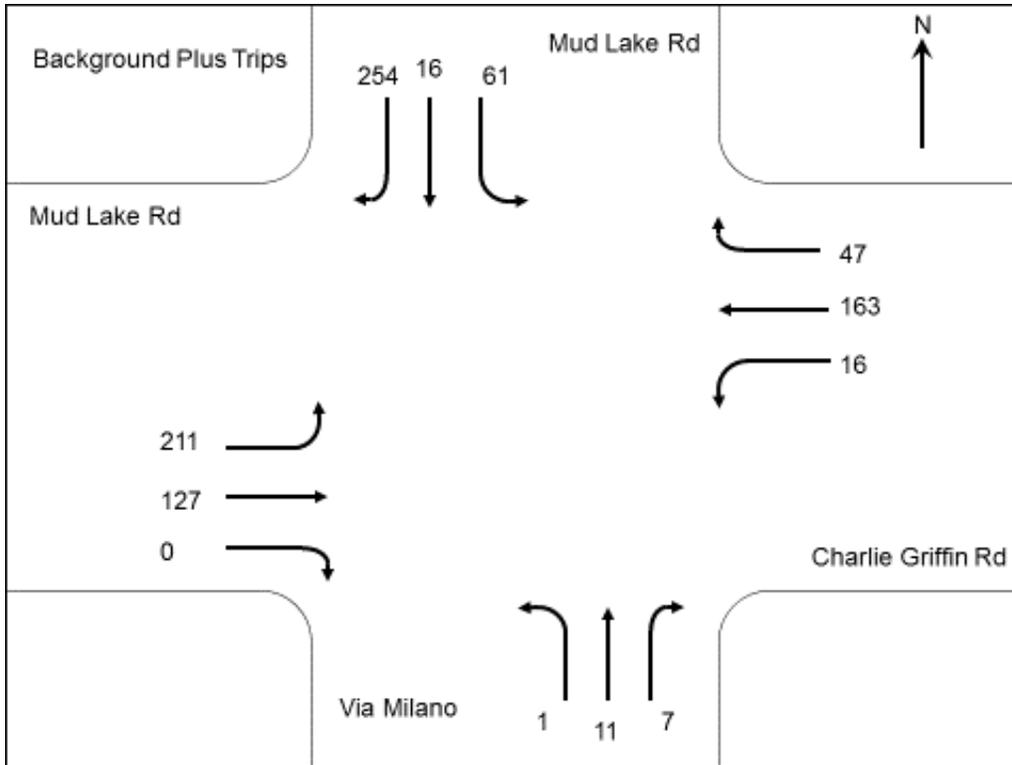


FIGURE 87 Background Plus Project Traffic: Mud Lake Rd @ Charlie Griffin Rd (PM)

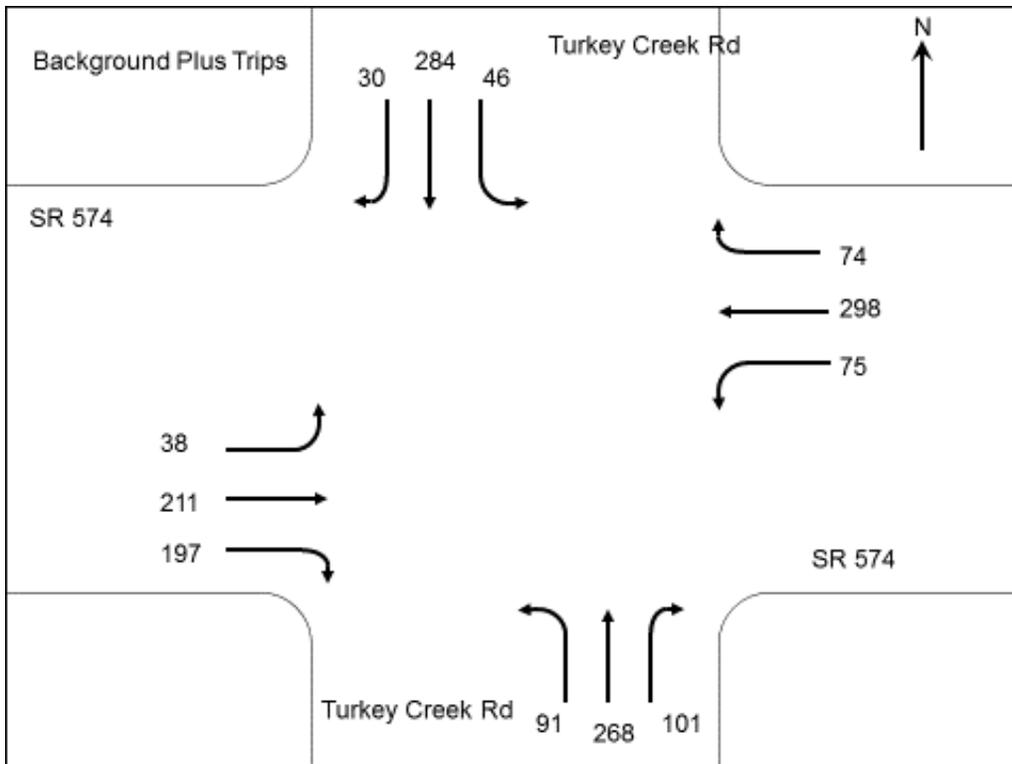


FIGURE 88 Background Plus Project Traffic: Turkey Creek Rd @ SR 574 (PM)

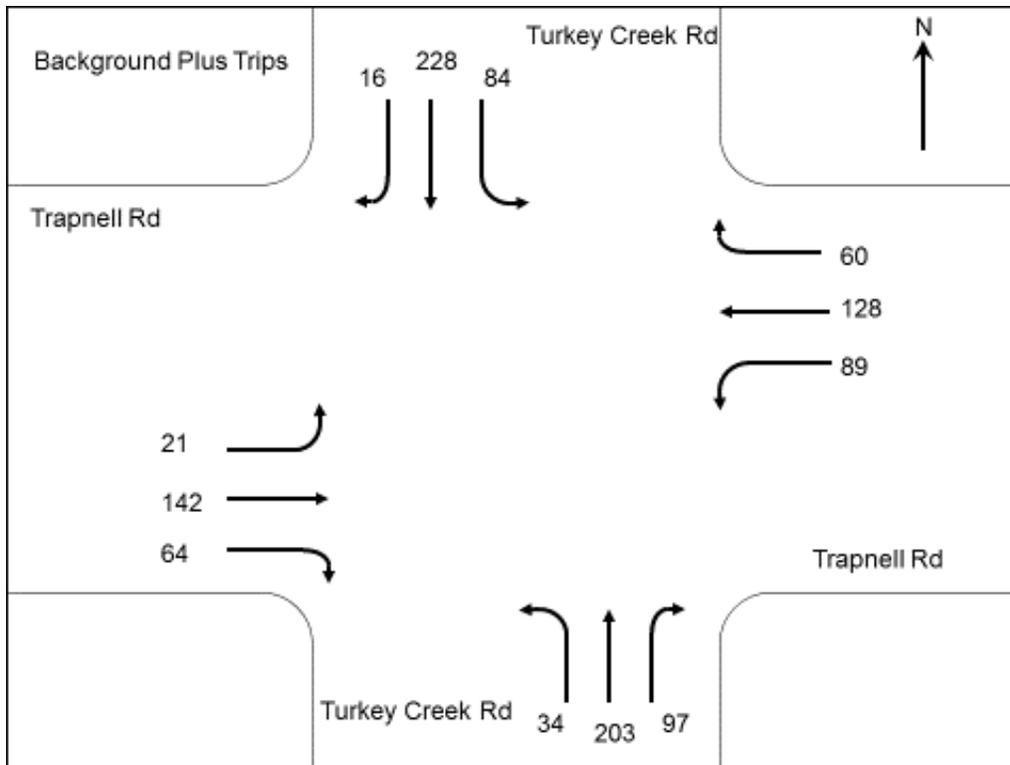


FIGURE 89 Background Plus Project Traffic: Turkey Creek Rd @ Trapnell Rd (PM)

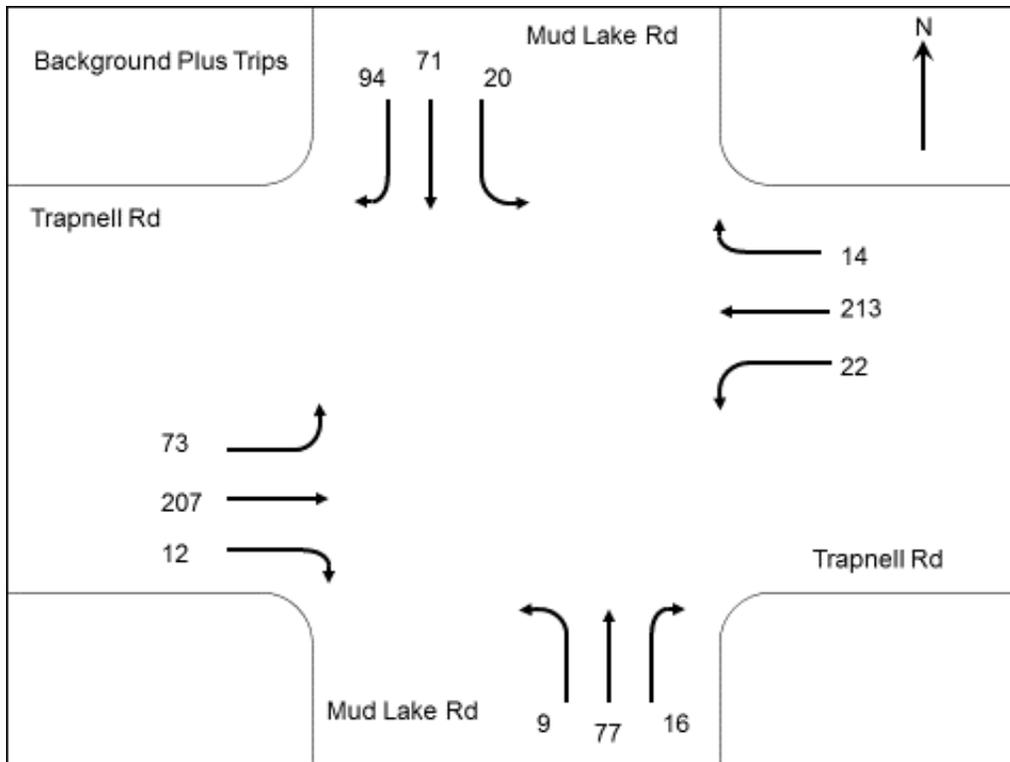


FIGURE 90 Background Plus Project Traffic: Mud Lake Rd @ Trapnell Rd (PM)

INTERSECTION ANALYSES, LEVEL OF SERVICE DETERMINATIONS AND RECOMMENDATIONS

The intersection impact analyses were conducted for both “background” and “background plus project” conditions. *Highway Capacity Software* was used to determine the expected levels of service. Tables 4, 5, and 6 summarize the results of the HCS analysis for primary development intersections, internal development intersections, and off-site intersections, respectively. The results of the analyses are included in Appendix A for the “background” and “background plus project” conditions. Note that for two-way stop controlled intersections, overall LOS was not calculated by HCS. These intersections scores are noted with “N/A”.

Primary Development Intersection Impacts

As Table 4 indicates, levels of service at primary site access intersections remain nearly unaffected by traffic generated by the development. The AM peak level of service for Alexander St at Timberlane Dr drops from a “C” to a “D”. Similarly, the AM peak level of service for Griffin Blvd at Mud Lake Rd drops from an “A” to a “B”. However, the total delay per vehicle at the Griffin Blvd and Mud Lake Rd intersection increases by less than ½ second. No individual turning movement level of service falls by more than one letter grade.

Internal Development Intersection Impacts

Internal intersections were not analyzed for level of service with project traffic conditions, as traffic distribution throughout the development would be too variable and difficult to predict without an origin-destination study. However, it is expected that level of service scores for internal intersections would remain steady or deteriorate only slightly. All movements currently operate at level of service “A” or “B”.

Other Intersection Impacts

Level of service scores for off-site intersections by and large remain unchanged. Delays increase minimally for most intersections. As expected, intersections closer to site access points and those impacted by vehicles travelling through more than one access point suffer greater delays than intersections located further away from site access points. This is predictable, as traffic volume dispenses more and more as distance from site access points increases. Turkey Creek Rd at Sydney Rd was the only intersection with a decline in overall level of service, with a drop from an “E” to an “F” for the PM peak period. Delays are not such that we would recommend a traffic signal. With regard to individual turning movements, level of service scores drop by no more than one letter grade for off-site intersections.

Recommendations

Of the 16 intersections analyzed, most remain unaffected by the proposed site developments. While site generated traffic does affect all intersections analyzed, the expected delays per vehicle are increased by only marginal amounts. In fact, only three intersections suffer a decrease in overall level of service score: Alexander St at Timberlane Dr, Griffin Blvd at Mud Lake Rd, and Turkey Creek Rd at Sydney Rd. However, no individual turning movement level of service is expected to decrease by more than one letter grade. For these reasons, no mitigation efforts are recommended at this time.

TABLE 4 Primary Development Intersections' Levels of Service - Summary

Intersection Name	Movement	AM Peak Period		PM Peak Period	
		Background	with Project	Background	with Project
Alexander St @ Timberlane Dr	EB L	F	D	F	D
	EB T				
	WB L	E	F	E	F
	WB T				
	NB L	B	A	B	A
	NB				
	T	A	B	A	B
	NB R				
	SB L	A	A	A	A
	SB T				
	SB R				
	Overall	C	D	B	B
Timberlane Dr @ Trapnell Rd	EB LTR	A	A	A	A
	WB LTR	A	A	A	A
	NB LTR	B	B	B	B
	SB LTR	B	B	B	B
	Overall	N/A	N/A	N/A	N/A
Griffin Blvd @ Turkey Creek Rd	SB LT	A	A	A	A
	WB L	C	D	D	D
	WB R	B	B	B	B
	Overall	N/A	N/A	N/A	N/A
Griffin Blvd @ Mud Lake Rd	EB	B	B	B	B
	WB	A	A	C	C
	NB	A	A	B	B
	Overall	A	B	B	B

TABLE 5 Internal Development Intersections' Levels of Service - Summary

Intersection Name	Movement	AM Peak Period		PM Peak Period	
		Background	with Project	Background	with Project
Clubhouse Dr @ Timberlane Dr	NB LT EB LR	A B	N/A	A B	N/A
	Overall	N/A	N/A	N/A	N/A
Griffin Blvd @ Timberlane Dr North	NB L SB L WB LTR EB LTR	A A B B	N/A	A A B B	N/A
	Overall	N/A	N/A	N/A	N/A
Griffin Blvd @ Timberlane Dr South	NB LT EB LR	A B	N/A	A B	N/A
	Overall	N/A	N/A	N/A	N/A

TABLE 6 Other Impacted Intersections' Levels of Service - Summary

Intersection Name	Movement	AM Peak Period		PM Peak Period	
		Background	with Project	Background	with Project
Alexander St @ Airport Rd/Grant St	EB L EB T EB R WB L WB T NB L NB T NB R SB L SB T SB R	E D E D F B B B B C	E D E D F B C C B C	D D F D F B C C B C	D D F D F C C C B C
	Overall	D	D	D	D
Alexander St @ Mud Lake Rd	NB L EB LR	B E	B E	B E	B E
	Overall	N/A	N/A	N/A	N/A
Alexander St @ YMCA Pl	EB L WB L NB LTR SB LTR	A A B D	A B C E	B B B E	B B B E
	Overall	N/A	N/A	N/A	N/A
Charlie Griffin Rd @ SR 39	EB L EB T WB T NB L NB T NB R SB L SB T SB R	D D E A A A A A	D D E A A A A A	E D E C B B A A	E D E C B B A A
	Overall	B	B	B	B
Turkey Creek Rd @ Sydney Rd	EB WB NB SB	B B D B	B C E B	C E E F	C E F F
	Overall	C	C	E	F

TABLE 6 (cont'd)

Intersection Name	Movement	AM Peak Period		PM Peak Period	
		Background	with Project	Background	with Project
Mud Lake Rd @ Charlie Griffin Rd	EB	B	B	B	B
	WB	A	A	B	B
	NB	A	A	A	A
	SB	A	A	B	B
	Overall	B	B	B	B
Turkey Creek Rd @ SR 574	EB L	C	C	D	C
	EB T	C	C	C	D
	WB L	C	C	C	C
	WB T	C	C	C	C
	NB L	A	A	A	A
	NB T	A	A	A	A
	SB L	A	A	A	A
	SB T	A	A	A	A
	Overall	B	B	B	B
Turkey Creek Rd @ Trapnell Rd	EB T	B	B	B	C
	WB T	C	C	B	C
	NB T	A	A	A	A
	SB T	A	A	A	A
	Overall	B	B	B	B
Mud Lake Rd @ Trapnell Rd	EB	B	B	B	B
	WB	B	B	B	B
	NB	A	A	A	B
	SB	B	B	B	B
	Overall	B	B	B	B

APPENDIX A
Data and Analyses Sheets