



2006 MAG FREEWAY LEVEL-OF-SERVICE STUDY

APPENDICES

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APPENDIX A

PROCEDURE FOR DETERMINING LEVEL-OF-SERVICE

Introduction

Overlapping aerial photography can document many useful characteristics of traffic flow on highway networks. The photographs can be invaluable for screening problem sites, winning support for ideas, and explaining decisions to others. If formal rules and procedures are applied to the analysis of aerial photographs, the photography can provide a cost-effective basis for periodically rating the performance of large highway systems on a link-by-link basis.

Background

On motorized vehicle highways, traffic flow is normally measured in terms of three basic parameters: *volume*, *speed*, and *density*. These parameters are related mathematically such that, if only two are known, the third can be calculated (volume equals speed times density). Other useful flow parameters related to speed are *travel time* and *delay* between specific points on a system.

The *Highway Capacity Manual (HCM)*, updated in 2000 by the Transportation Research Board of the National Research Council, is an authoritative governmental resource that has established a simplified concept by which the performance of all types of transportation facilities can be described and compared. This concept is called *level of service*, or *LOS*. For each type of facility, a single traffic flow parameter – the one deemed most appropriate by the committee that publishes the manual – is chosen to be the basis for defining six rating categories. These categories are represented by the letters "A" through "F", ranging from the most favorable rating of LOS A (indicating high service quality associated with lightly-used facilities) to the poorest rating of LOS F (indicating a facility burdened by congestion or other undesirable performance characteristics). This LOS system, introduced in 1965 version of the HCM and revised periodically since, has been widely adopted for evaluating existing highway systems and planning future improvements. Because six LOS classes are easier to understand than tables of numbers, LOS has been widely used in the political process. In some jurisdictions, LOS standards are even found in legislation attempting to guide facility planning or control real estate development.

Uninterrupted-flow highways (grade-separated highways without signals)

Summary

The defining parameter for HCM LOS on freeways and other uninterrupted-flow highways is the *density* of traffic flow (in units of passenger cars per lane per mile). Density was chosen as the basis for HCM LOS because, when traffic flows without interruption, traffic density relates mathematically to both speed and volume. This means that a single LOS

measure based on density provides not only general speed information, but also provides an approximation of how heavily the facility is utilized. It also indicates where demand has exceeded capacity, resulting in congestion and delays. (Speed is less desirable as a defining basis for LOS because uninterrupted-flow highways can process high volumes of traffic at high speeds; ratings based on speed alone might not differentiate clearly between facilities that were heavily or lightly utilized.) The most common way to determine LOS on an existing freeway is to measure the speed and volume of the traffic, and then calculate the density. Another method is to determine density directly from aerial photographs, which allows for cost effective data collection across very large highway networks. (This also affords the other benefits of aerial photography, which often shows the underlying causes of congestion as well as conditions on interchange ramps, merges and crossroads.) Accordingly, when Skycomp evaluates the performance of uninterrupted-flow highway facilities, Skycomp derives traffic densities from aerial photographs and then determines density-based HCM LOS ratings.

As discussed above, the LOS rating system uses the letters "A" through "F" to describe traffic conditions: LOS "A" represents superior traffic conditions (very light traffic), while LOS "F" represents poor traffic conditions (congested flow involving various degrees of delay). These letters are assigned based on how densely cars are traveling on the road. Research has shown that for all densities below 40 pcplpm, vehicles generally move at or close to normal highway speed; LOS "A" through "E" represent these densities according to the following table (pcplpm):

- LOS "A":** densities from **zero to 11** (very light traffic);
- LOS "B":** densities from **12 to 18** (light to moderate traffic);
- LOS "C":** densities from **19 to 26** (moderate traffic);
- LOS "D":** densities from **27 to 35** (moderate to heavy traffic);
- LOS "E":** densities from **36 to approx. 45** (heavy traffic, but still at speeds close to free-flow)

At densities greater than **40**, speeds typically decrease and traveler delays are incurred. Because flow at all densities greater than **46** (approximately) are regarded as LOS "F", this report attaches actual densities to all LOS "F" ratings. Accordingly:

LOS "F":

- Densities from **46 to 60** indicate delay involving minor degrees of slowing; average speeds usually range between 50 and 30 mph;
- Densities from **60 to 80** indicate traffic flow at average speeds usually ranging between 40 and 15 mph;
- Densities from **80 to 100** indicate congested traffic flow, with some stopping possible; average speeds usually range between 10 and 25 mph;
- Densities above **100** indicate severe congestion, with considerable stop-and-go flow likely. For reference, densities above 120 almost always indicate the presence of unusual events (accidents, roadwork, etc.). The practical maximum value for density measurements is **180**; the theoretical maximum value is **264** (at 20 feet per vehicle).

Data Reduction Procedures

From overlapping time-stamped photographs, densities by highway segment were determined by manual counts taken along the entire segment length. Vehicles were classified as cars, trucks, buses, or tractor-trailers when counted; later, passenger-car equivalents (pce's) were derived according to the following table:

<u>Vehicle type:</u>	<u>PCE's:</u>
cars	1
buses	1.5
trucks	1.5
tractor-trailers	2.0

Data that were atypical due to roadwork or to known or suspected incidents were coded for exclusion from the averaging process. All data were then entered into a microcomputer database program, which performed the following tasks: 1) samples were grouped by time slice; 2) average densities were calculated; and 3) densities were converted into service levels "A" through "F". The computer then prepared matrices showing each averaged service level rating plotted by time and highway segment. These data matrices were then copied into the traffic quality tables, which are provided in this report.

In the tables, all LOS F conditions (congested traffic flow) have been darkly shaded; this permits quick identification of locations experiencing demand at levels exceeding capacity. Because LOS "F" encompasses a wide range of densities, the actual density values are entered next to the "F"; using the travel characteristics in the density ranges provided above, the nature of the flow in LOS F segments can be determined.

While examining the photography, data technicians also identified side streets and entrance/exit ramps that were congested. Where these problems were recurring, descriptive narratives were prepared.

APPENDIX B

METHODOLOGY DESCRIPTION

Procedures for obtaining speed/density samples for calibration of the Van Aerde Speed / Density Model

BACKGROUND

In the spring of 1995, Skycomp collected data to compare the speed of vehicles through congested freeway zones with corresponding densities obtained from aerial photographs. The purpose was to explore the relationship between the two, and, given a reasonable correlation, to prepare a model by which vehicle speeds could be estimated from aerial density photographs.

The program was conceived and executed by the Metropolitan Washington (D.C.) Council of Governments (MWCOG). Aerial data were collected by Skycomp; analysis of the data and calibration of the Van Aerde speed/density model were conducted by MWCOG (draft paper included in this appendix).

A secondary objective was to evaluate the accuracy of aerial speed and density measurements by comparing them to data collected by traditional methods (floating cars and loop detectors embedded in the pavement).

Accordingly, segments of freeway were chosen to be surveyed that: 1) were expected to generate congested traffic flow; and 2) either contained a loop detector station or would accommodate quick turnarounds for multiple floating car runs. Thus, while data were being collected in the air (290 speed samples were obtained from the air, along with corresponding densities), loop detector or floating car data were collected concurrently on the ground.

The outcome of this study was a finding that travel speeds across congested freeway segments could be determined with reasonable accuracy using only aerial density photographs. It was also found that speeds and densities obtained through aerial techniques closely matched data obtained using the traditional ground methods.

PROCEDURES TO OBTAIN SPEED / DENSITY SAMPLES:

The observer/photographer followed the following procedure to obtain all speed/density samples: he first flew along the selected survey segment while taking time-stamped overlapping density photographs of the entire segment; next, at the upstream end, he selected a target "floating" car for tracking; he photographed the target as it entered and departed the segment, while simultaneously timing its run to the nearest second. He then took an "after" density photo set; and then recorded the following information on a clipboard: the time of the sample, the target vehicle description, lane(s) traveled, elapsed time, and any special notes. This procedure was repeated for each speed/density data point.

In the actual course of sampling, this procedure was modified in several ways. First, where cars were moving at high (free-flow) speeds, the density did not change significantly between samples; thus sometimes three or more floating cars were timed between density runs.

Another modification done in-flight is as follows: the observer noted in several cases that the density set taken before the target vehicle went through better reflected the conditions the car encountered than the density set taken after the vehicle went through (or vice versa). This was usually due to a delay in changing film, extra maneuvering the airplane, or any other event which delayed the "after" density sample for several minutes after the completion of the run. While normally the density associated with each speed sample was an average of the "before" and "after" density sets, in these cases only the "before" or "after" density set would be used (as directed by the observer).

With regard to selection of target vehicles, the plan was to select cars that reflected the average speed of traffic, just as floating car drivers are instructed to approximate the speed of traffic flow. Fortunately, vehicles have little freedom to choose their speeds in the congested density ranges (above 40 pcplpm). So, for example, almost any vehicle in a congested traffic stream in the middle lane of three will give a suitable floating car measurement. Even tractor-trailers (unless heavily loaded and traveling uphill) moved at the same speed as passenger cars. Thus the criteria the observer used in selecting each target vehicle was 1) is it in the correct lane; and 2) does the vehicle stand out so that it is easy to keep track of?

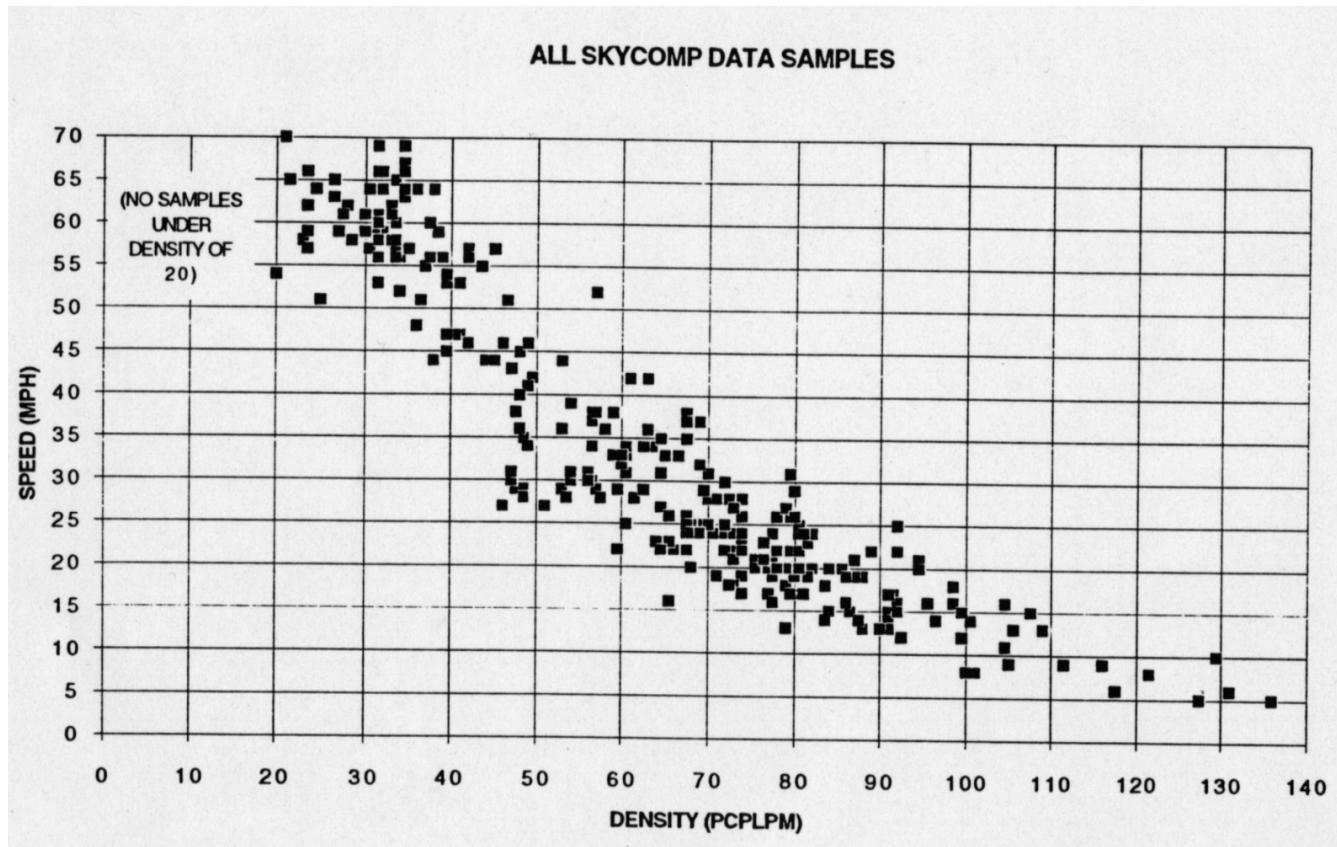
Also, in the event that the highway had four travel lanes in one direction, alternating samples were taken from both middle lanes.

In the event that a driver switched lanes while being tracked, the observer noted the lane change and also noted which lane the car spent the majority of time in (this is the lane for which a density count would be made later). In several cases (infrequently), the observer abandoned tracking certain vehicles when: 1) the driver made multiple lane changes, trying to beat the average speed of traffic; 2) the driver switched lanes and changed speeds obviously and significantly; 3) the vehicle turned out to be a heavily loaded truck which delayed the traffic stream; or 4) the observer "lost" the vehicle being tracked. Also, for the samples made with traffic traveling at free-flow speeds, vehicles were abandoned which

proved to be traveling significantly faster or slower than the average speed of traffic.

In the event that the target vehicle moved to the right lane in apparent preparation to exit, the observer often was able to switch tracking to another vehicle that had been just behind or ahead of the original vehicle in the same lane (and used the newly adopted vehicle to complete the sample). This was necessary because in some cases six or seven minutes had been invested in the tracking of a specific vehicle, and it was important to avoid wasting that time where possible.

It should also be pointed out that speeds were not tracked for very slow moving queues (densities over 120 / MWCOG samples only). Instead, density runs were made at 5 or 10 minute intervals, such that later on the ground the same vehicles could be found in succeeding sets of density photos; this allowed computation of speeds and associated densities.



DATA PROCESSING

After each flight, a topographic map was prepared for each zone which showed the starting and stopping points for each tracked car. Measurements were then made of the segment length (distance traveled). Then each tracked vehicle was entered into the computer database, including:

1. vehicle description
2. time-of-day
3. initial lane and subsequent lane changes
4. precise travel time (from stopwatch or time-lapse photographs)
5. density-photo preference, if any (default was to average the before- and after- density samples)
6. any special notes pertaining to that vehicle.

After the photos had been processed, each set of overlapping “density” photographs was taped together into a “mosaic” that showed each entire segment. Then vehicles in the required lane(s) were counted, listed by “car”, “truck”, “tractor-trailer” and “bus”. These totals were translated into passenger-car equivalents (PCE’s) using the following values:

Vehicle type: PCE’s:

cars	1
trucks	1.5
tractor-trailers	2.0
buses	1.5

(It should be noted that the distinction between “cars” and “trucks” could not be cleanly made, since there are many varieties of light and heavy pick-ups (both covered and uncovered). In general, a pick-up or van had to be at least twice the size of an average-sized car to be considered a “truck”).

PCE’s were then divided by segment length to calculate densities. These density samples were then matched to corresponding speed samples; each speed/density data pair was then plotted on the chart.

CALIBRATION OF THE VAN AERDE MODEL

Van Aerde Model
DRAFT -- 15 Feb 96

The main advantages to a single-regime model are that boundaries between regimes do not have to be defined; and curves from adjacent regimes do not have to be spliced at the boundaries. A single-regime model allows for a more subjective and repeatable calibration process. This will be especially true if more data from the high-speed end of the curve is ever incorporated into this process.

The disadvantages to this particular model are that it expresses this project's independent variable as a function of the dependent variable; and that it is a non-linear function. These disadvantages make performing the initial calibration more difficult. However, once SAS programs for the task are written, they can be used again usually with a minimum of effort.

The procedure for calibration was as follows: 1) The model's equation was coded into a spreadsheet so that the shape could be defined by recognizable parameters: two points that the curve passes through, the free-flow speed, and the speed at capacity. By overlaying this curve with the scatter plot of the observations, initial estimates of the parameters were made. 2) The initial parameter estimates, the equation, and the observations were used in a SAS PROC NLIN job to machine-calibrate the parameter estimates. 3) A second SAS program translated the calibrated equation into a look-up table that expresses speed as a function of density. 4) The results of the SAS work were imported into a spreadsheet for plotting and for calculation of prediction intervals.

Two outstanding technical issues related to this procedure are determination of the free-flow speed, and calculation of prediction intervals.

The free-flow speed for best fit can be determined by the PROC NLIN program, as are all other parameters. Due to the lack of data at the low-density region of the model, PROC NLIN returns a very high free-flow speed. Additional data from MD SHA was used to calculate a free-flow speed for general application on the Beltway. The calibration of the model presented here resulted from forcing the free-flow speed to match the SHA data analysis.

The prediction intervals shown in the current plot were calculated after the model was translated. This may have not been appropriate. PROC NLIN calculates prediction intervals directly as it calibrates the model. Those prediction intervals express density as a function of speed, however. Work is in progress to translate them, and to otherwise arrive at the most appropriate method of determining prediction intervals.

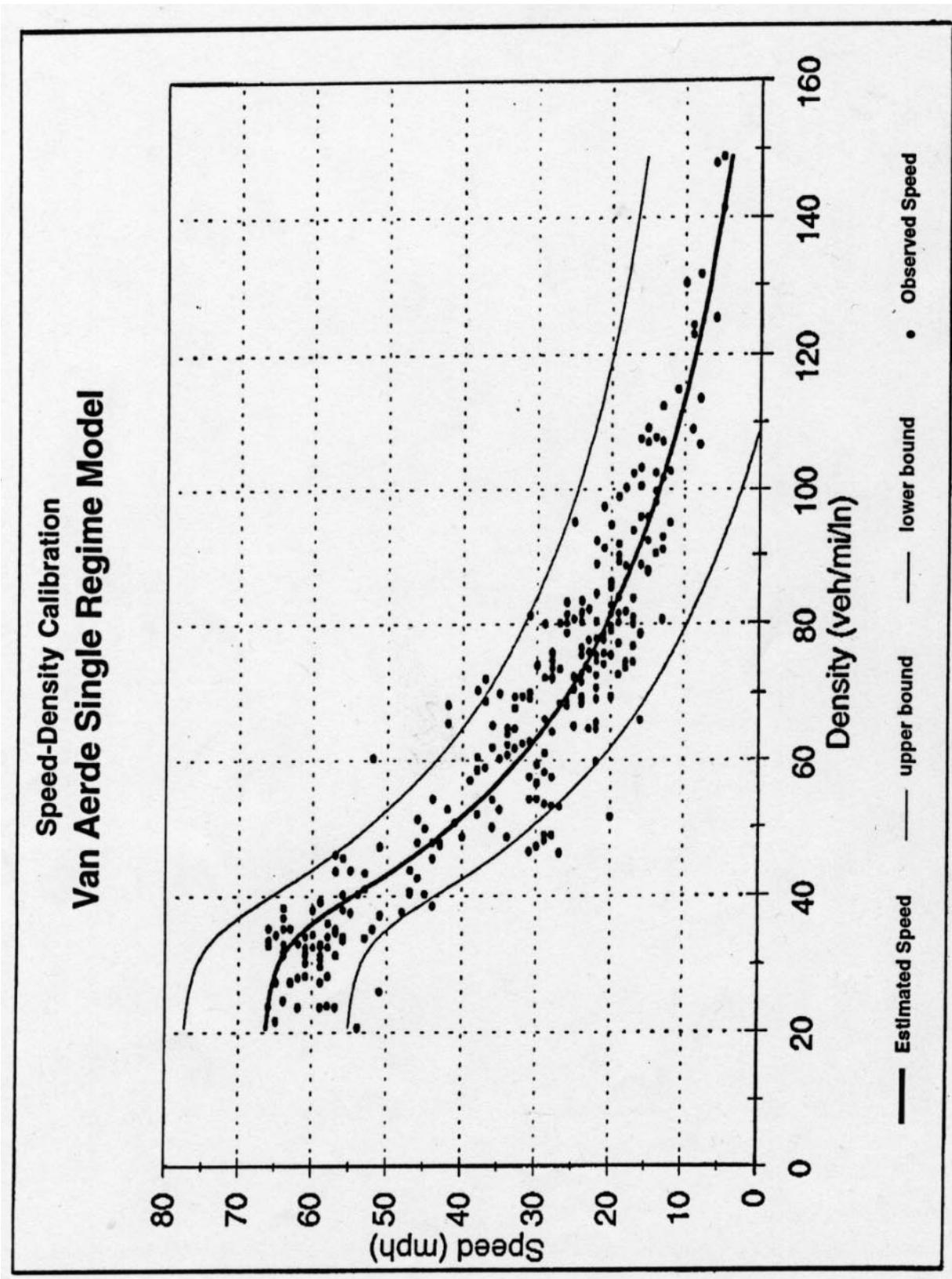
Since a single-regime model is more suitable in a computerized process, and for lack of significant difference in performance, the Van Aerde model is preferred over earlier approaches examined by MWCOG staff and presented before subcommittees.

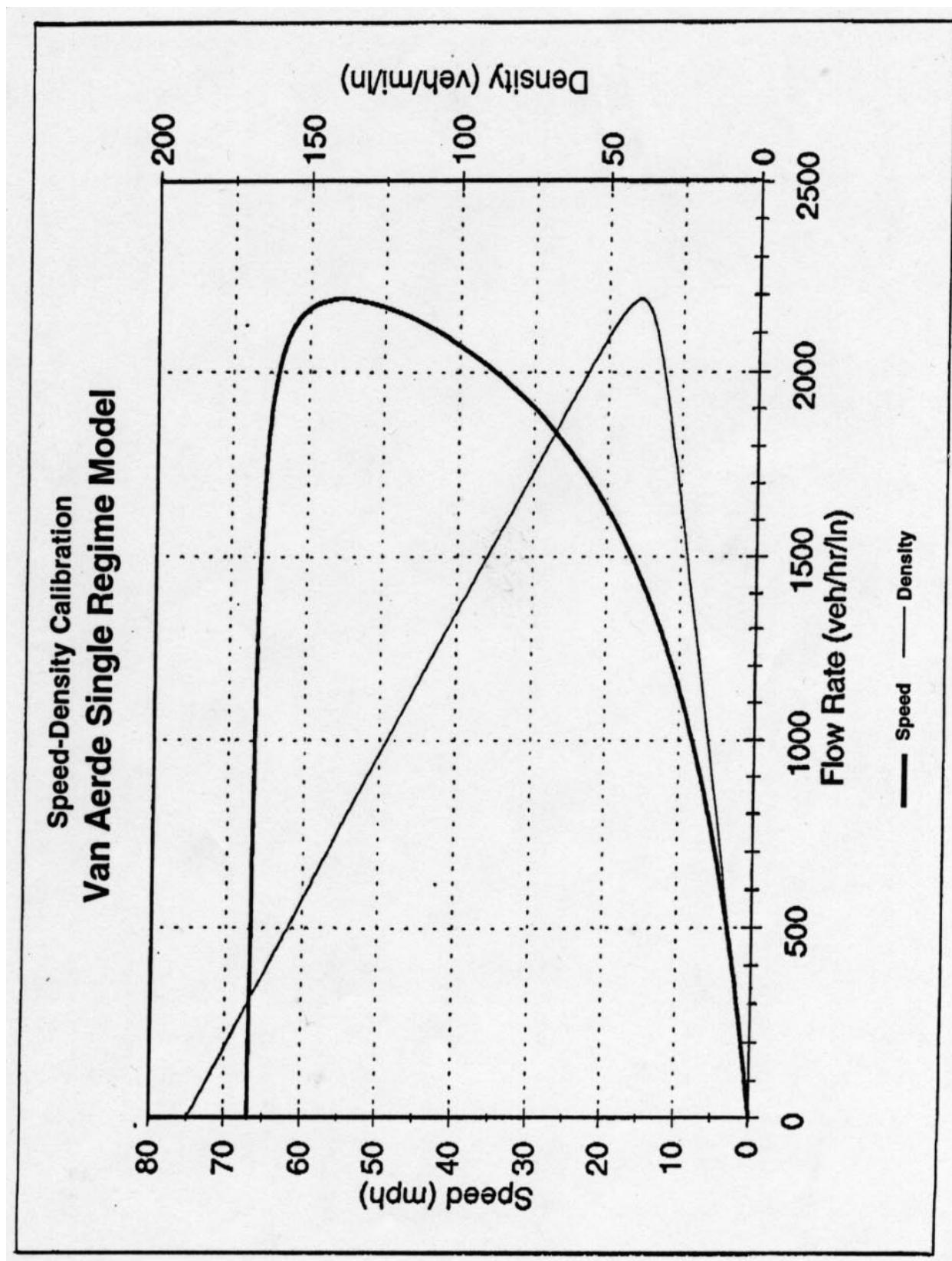
Speed-Density Calibration
Van Aerde Single Regime Model

free-flow spd = 67 mph / c1 = 0.00512 / c2 = 0.0114 / c3 = 0.000342

	DENSITY (veh/in/mi)	SPEED (mph)	VOLUME (veh/in/hr)		DENSITY (veh/in/mi)	SPEED (mph)	VOLUME (veh/in/hr)
free-flow	0	67.0	0				
	20	66.4	1,328		80	20.7	1655
	25	65.8	1,661		85	18.6	1580
	30	64.6	1,946		90	16.7	1503
	35	61.3	2,144		95	15.0	1425
capacity	39	55.8	2,190		100	13.5	1350
	40	54.7	2,189		105	12.1	1271
	45	47.8	2,153		110	10.9	1197
	50	41.9	2,094		115	9.7	1117
	55	36.8	2,025		120	8.7	1043
	60	32.6	1,954		125	7.7	963
	65	28.9	1,880		130	6.8	885
	70	25.8	1,806		135	6.0	810
	75	23.1	1,731		140	5.2	729
					187	0	0 jam

Draft 15 February 1996





APPENDIX C

Flight Schedule / Flight Patterns

The 175 miles of surveyed highways were divided into two flight patterns. Flight Pattern "A" included I-10, Loop 101 and Loop 202 (Santan Freeway); flight Pattern "B" included I-17, SR 51, US 60, SR 143 and Loop 202 (Red Mountain Freeway). Each pattern was flown four times each during the morning and evening survey periods. The flight schedule was as follows:

<u>Flight # / Pattern</u>	<u>Morning / Evening</u>	<u>Date</u>
1 / B	Evening	Tuesday, Apr 11
2 / B	Morning	Wednesday, Apr 12
3 / B	Evening	Wednesday, Apr 12
4 / A	Morning	Tuesday, Apr 18
5 / A	Evening	Tuesday, Apr 18
6 / B	Morning	Wednesday, Apr 19
7 / B	Evening	Wednesday, Apr 19
8 / A	Morning	Thursday, Apr 20
9 / A	Evening	Thursday, Apr 20
10 / A & B	Morning	Tuesday, Apr 25
11 / A & B	Evening	Tuesday, Apr 25
12 / A & B	Morning	Wednesday, Apr 26
13 / A	Evening	Wednesday, Apr 26



Appendix D

Entrance and Exit Ramp Queue Profiles

This section of the report contains entrance and exit ramp queue profiles (average 30-minute intervals) for all arterial crossroads in the survey area. Entrance ramp queues typically represent queueing found at ramp meters. Exit ramp queue profiles represent two separate turning movements (left and combined thru/right) at signalized intersections at the head of each ramp.

I-10 (MORNING)

I-10 (Morning) Continued

I-10 (MORNING)**I-10 (Morning) Continued**

Arterial Exit #	Cross-Road	Ramp Lane	Ramp Turning Movements/Lanes	Average Queue Populations (30-minute intervals)							
				5:30- 6:00 a.m.	6:00- 6:30 a.m.	6:30- 7:00 a.m.	7:00- 7:30 a.m.	7:30- 8:00 a.m.	8:00- 8:30 a.m.	8:30- 9:00 a.m.	9:00- 9:30 a.m.
143	19th Ave	EL	N/A	No	N/A						
		ET/R	N/A		N/A						
		ENR	1		5	0	13	7	10	0	0
		WL	L, LR, R		3	1	1	2	6	0	2
		WT/R	L, LR, R		1	0	0	0	1	0	1
		WNR	N/A		N/A						
144	7th Ave	EL	L, L, R, R	N/A	2	0	4	2	1	5	7
		ET/R	L, L, R, R		1	0	2	0	5	5	2
		ENR	1		0	0	0	0	0	0	0
		WL	L, L, R, R		1	0	2	4	2	5	3
		WT/R	L, L, R, R		0	4	1	1	3	0	3
		WNR	2		0	0	0	0	0	0	0
145	7th St	EL	L, L, R, R	Yes	0	2	0	3	6	5	8
		ET/R	L, L, R, R		0	2	6	3	3	4	2
		ENR	2		0	0	0	0	0	0	0
		WL	L, L, R, R		6	4	6	5	12	20	21
		WT/R	L, L, R, R		0	1	4	2	2	1	5
		WNR	1		0	0	0	0	0	0	0
146	N. 16th St	EL	L, LR, R	No	0	1	1	0	2	0	0
		ET/R	L, LR, R		1	0	0	0	1	0	0
		ENR	N/A		N/A						
		WL	N/A		N/A						
		WT/R	N/A		N/A						
		WNR	1		0	0	0	0	0	0	0
148A	Washington St	EL	T, T, TR, R	N/A	1	0	0	1	0	4	1
		ET/R	T, T, TR, R		18	0	0	3	1	2	3
		ENR	N/A		N/A						
		WL	L, L, T, T		N/A						
		WT/R	L, L, T, T		N/A						
		WNR	1		0	0	0	0	0	0	0
148B	Jefferson St	EL	L, L, T, T	No	N/A						
		ET/R	L, L, T, T		N/A						
		ENR	1		0	0	0	0	0	0	0
		WL	T, T, T, R		2	0	0	4	0	2	2
		WT/R	T, T, T, R		0	0	0	0	0	0	0
		WNR	N/A		N/A						
149	Buckeye Rd	EL	N/A	No	N/A						
		ET/R	N/A		N/A						
		ENR	2		0	0	0	0	0	0	0
		WL	L, LR, R		4	1	1	1	6	0	0
		WT/R	L, LR, R		1	0	1	0	0	0	0
		WNR	N/A		N/A						
150	24th St	EL	N/A	No	N/A						
		ET/R	N/A		N/A						
		ENR	1		0	0	0	0	0	0	0
		WL	L, LR, R		0	0	0	1	3	12	2
		WT/R	L, LR, R		0	0	0	0	1	4	1
		WNR	N/A		N/A						
151	32nd St	EL	L, LR, R	Yes	6	0	8	13	9	6	6
		ET/R	L, LR, R		9	0	11	18	8	1	3
		ENR	1		0	0	0	0	0	0	0
		WL	L, LR, R		11	4	10	3	6	1	5
		WT/R	L, LR, R		5	0	2	1	2	1	0
		WNR	1		0	0	0	0	0	0	0
152	40th St	EL	L, L, R, R	Yes	3	5	3	5	12	3	5
		ET/R	L, L, R, R		1	1	1	0	2	0	1
		ENR	1		0	0	0	0	0	0	0
		WL	L, LR, R		4	8	3	3	9	9	3
		WT/R	L, LR, R		6	5	2	5	5	8	2
		WNR	1		0	0	0	0	0	0	0

I-10 (MORNING)

I-10 (Morning) Continued

		Average Queue Populations (30 minute intervals)								
Arterial Exit #	Cross-Road	Ramp Lane	Ramp Turning Movements/Lanes	5:30- 6:00 a.m.	6:00- 6:30 a.m.	6:30- 7:00 a.m.	7:00- 7:30 a.m.	7:30- 8:00 a.m.	8:00- 8:30 a.m.	8:30- 9:00 a.m.
153	48th St	EL	L, LT, T, R	N/A	5	2	5	9	3	4
		ET/R	L, LT, T, R		0	1	0	0	1	1
		ENR	N/A		N/A	N/A	N/A	N/A	N/A	N/A
		WL	N/A		N/A	N/A	N/A	N/A	N/A	N/A
		WT/R	N/A		N/A	N/A	N/A	N/A	N/A	N/A
		WNR	1		0	0	0	0	0	0
155	Baseline Rd	NL	L, L, LTR, R	No	3	1	12	11	6	0
		NT/R	L, L, LTR, R		1	3	5	0	1	2
		NNR	1		0	0	0	0	0	0
		SL	L, L, LTR, R		3	3	6	3	6	1
		ST/R	L, L, LTR, R		1	2	2	3	5	5
		SNR	2		0	0	0	0	0	0
157	Elliot Rd	NL	L, LR, R	Yes	5	0	1	1	1	0
		NT/R	L, LR, R		4	1	1	1	2	1
		NNR	2		0	27	29	59	27	56
		SL	L, LT, LT, R		10	4	2	14	8	8
		ST/R	L, LT, LT, R		6	3	1	5	2	5
		SNR	1		0	0	0	0	0	0
158	Warner Rd	NL	L, LT	No	0	0	1	0	0	1
		NT/R	L, LT		1	1	5	2	3	3
		NNR	2		0	2	27	63	36	44
		SL	L, LR, R		1	0	18	5	6	0
		ST/R	L, LR, R		1	1	0	2	2	1
		SNR	1		0	0	0	0	0	0
159	Ray Rd	NL	L, R	Yes	3	2	7	4	9	10
		NT/R	L, R		1	1	5	4	24	5
		NNR	2		0	14	8	26	16	16
		SL	L, LT, R, R		6	5	6	4	10	1
		ST/R	L, LT, R, R		0	0	0	1	0	1
		SNR	1		0	0	0	0	0	0
160	Chandler Blvd	NL	L, LR, R	No	1	1	2	0	5	6
		NT/R	L, LR, R		1	1	2	1	6	2
		NNR	2		0	0	0	0	0	1
		SL	L, LT, R, R		5	5	3	0	4	14
		ST/R	L, LT, R, R		0	1	1	0	4	0
		SNR	1		0	0	0	0	0	0
163	Sundust Rd	NL	L, LR, R	No	1	0	1	0	0	1
		NT/R	L, LR, R		1	0	1	0	0	0
		NNR	2		0	0	0	0	0	0
		SL	L, L, R		4	2	1	1	1	0
		ST/R	L, L, R		1	0	1	1	0	1
		SNR	2		0	0	0	0	0	0
164	Queen Creek Rd	NL	L, R	No	0	0	0	0	2	0
		NT/R	L, R		0	0	0	0	0	0
		NNR	2		0	0	0	0	0	0
		SL	L, LR, R		4	2	0	2	2	1
		ST/R	L, LR, R		1	2	0	1	2	4
		SNR	2		0	0	0	0	0	0
167	Riggs Rd	NL	L, R	No	0	1	0	0	1	0
		NT/R	L, R		0	0	0	0	0	0
		NNR	1		0	0	0	0	0	0
		SL	L, R		5	1	1	1	0	1
		ST/R	L, R		0	0	0	0	0	0
		SNR	1		0	0	0	0	0	0

I-10 (EVENING)

I-10 (Evening)

I-10 (EVENING)**I-10 (Evening) Continued**

Arterial Exit #	Cross-Road	Ramp Lane	Ramp Turning Movements/Lanes	Average Queue Populations (30-minute intervals)								
				3:00- 3:30 p.m.	3:30- 4:00 p.m.	4:00- 4:30 p.m.	4:30- 5:00 p.m.	5:00- 5:30 p.m.	5:30- 6:00 p.m.	6:00- 6:30 p.m.	6:30- 7:00 p.m.	
133A	99th Ave	EL	L, LT, TR, R	No	0	11	1	3	4	5	4	4
		ET/R	L, LT, TR, R		0	3	1	2	0	0	3	1
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LT, TR, R		2	3	10	4	5	2	4	2
		WT/R	L, LT, TR, R		2	4	3	1	3	2	6	2
		WNR	1		0	0	0	0	0	0	0	0
134	91st Ave	EL	L, LR, R	No	0	2	2	0	0	1	2	0
		ET/R	L, LR, R		0	0	0	0	0	0	1	1
		ENR	N/A		0	0	0	0	0	0	0	0
		WL	L, LR, R		2	5	2	3	2	2	1	0
		WT/R	L, LR, R		0	0	4	0	3	2	0	1
		WNR	2		N/A	N/A						
135	83rd Ave	EL	L, LR, R	N/A	1	4	3	3	4	2	5	1
		ET/R	L, LR, R		1	2	0	0	1	2	0	0
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LR, R		3	2	1	6	1	2	3	2
		WT/R	L, LR, R		5	2	3	4	1	0	4	0
		WNR	2		0	0	0	0	0	0	0	0
136	75th Ave	EL	L, LR, R	No	2	2	3	2	5	5	2	2
		ET/R	L, LR, R		0	1	1	1	0	0	0	0
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LR, R		1	1	1	2	3	1	0	1
		WT/R	L, LR, R		4	3	5	4	3	1	0	1
		WNR	2		1	1	0	2	4	0	0	0
137	67th Ave	EL	L, LR, R	Yes	9	1	0	2	3	3	0	6
		ET/R	L, LR, R		3	2	1	1	0	1	0	0
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LR, R		1	9	5	4	3	2	7	6
		WT/R	L, LR, R		1	7	7	5	6	5	5	6
		WNR	2		0	5	1	0	0	0	0	0
138	51st Ave	EL	L, LR, R	Yes	1	4	3	1	8	2	5	2
		ET/R	L, LR, R		0	0	0	0	0	0	0	0
		ENR	2		1	1	0	0	1	0	0	1
		WL	L, LR, R		1	2	4	2	4	2	5	0
		WT/R	L, LR, R		1	1	0	1	8	0	0	0
		WNR	1		4	4	3	1	3	0	2	0
139	59th Ave	EL	L, LR, R	Yes	5	2	3	0	2	1	2	0
		ET/R	L, LR, R		1	0	1	0	1	1	0	1
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LR, R		11	5	1	5	1	4	3	3
		WT/R	L, LR, R		6	3	1	7	1	0	1	3
		WNR	2		1	2	3	4	7	4	2	1
140	43rd Ave	EL	L, LR, R	Yes	0	1	2	0	5	2	1	2
		ET/R	L, LR, R		0	0	0	0	0	0	0	0
		ENR	2		4	0	0	0	0	1	1	0
		WL	L, LR, R		1	1	0	0	1	1	2	1
		WT/R	L, LR, R		5	2	2	8	6	0	0	0
		WNR	1		3	0	3	1	3	1	0	2
141	35th Ave	EL	L, LR, R	Yes	1	1	1	4	2	1	0	1
		ET/R	L, LR, R		3	0	3	1	4	0	0	2
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LR, R		3	5	1	3	2	0	0	1
		WT/R	L, LR, R		4	3	2	1	2	0	0	3
		WNR	2		3	0	8	7	5	3	5	0
142	27th Ave	EL	L, LR, R	Yes	2	0	0	1	2	1	1	0
		ET/R	L, LR, R		1	1	1	0	1	0	1	0
		ENR	N/A		N/A	N/A						
		WL	N/A		N/A	N/A						
		WT/R	N/A		N/A	N/A						
		WNR	2		2	5	4	13	8	0	0	0

I-10 (EVENING)**I-10 (Evening) Continued**

Arterial Exit #	Cross-Road	Ramp Lane	Ramp Turning Movements/Lanes	Average Queue Populations (30-minute intervals)						
				3:00- 3:30 p.m.	3:30- 4:00 p.m.	4:00- 4:30 p.m.	4:30- 5:00 p.m.	5:00- 5:30 p.m.	5:30- 6:00 p.m.	6:00- 6:30 p.m.
143	19th Ave	EL	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A
		ET/R	N/A		N/A	N/A	N/A	N/A	N/A	N/A
		ENR	1		9	5	20	4	25	0
		WL	L, LR, R		0	1	2	0	0	0
		WT/R	L, LR, R		1	1	3	1	0	0
		WNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A
144	7th Ave	EL	L, L, R, R	N/A	1	4	5	4	0	1
		ET/R	L, L, R, R		0	1	2	0	0	0
		ENR	1		0	0	0	0	0	0
		WL	L, L, R, R		1	2	2	1	0	2
		WT/R	L, L, R, R		1	1	1	0	0	0
		WNR	2		26	31	43	68	51	37
145	7th St	EL	L, L, R, R	Yes	7	4	5	4	6	3
		ET/R	L, L, R, R		1	0	2	1	1	0
		ENR	2		51	58	66	64	54	60
		WL	L, L, R, R		4	6	5	13	14	3
		WT/R	L, L, R, R		3	1	1	4	7	2
		WNR	1		0	0	0	0	0	0
146	N. 16th St	EL	L, LR, R	No	2	4	1	2	1	3
		ET/R	L, LR, R		3	2	0	1	0	2
		ENR	N/A		N/A	N/A	N/A	N/A	N/A	N/A
		WL	N/A		N/A	N/A	N/A	N/A	N/A	N/A
		WT/R	N/A		N/A	N/A	N/A	N/A	N/A	N/A
		WNR	1		1	0	0	0	0	0
148A	Washington St	EL	T, T, TR, R	N/A	1	0	2	0	1	0
		ET/R	T, T, TR, R		3	1	1	0	1	0
		ENR	N/A		N/A	N/A	N/A	N/A	N/A	N/A
		WL	L, L, T, T		N/A	N/A	N/A	N/A	N/A	N/A
		WT/R	L, L, T, T		N/A	N/A	N/A	N/A	N/A	N/A
		WNR	1		0	0	0	0	0	0
148B	Jefferson St	EL	L, L, T, T	No	N/A	N/A	N/A	N/A	N/A	N/A
		ET/R	L, L, T, T		N/A	N/A	N/A	N/A	N/A	N/A
		ENR	1		3	0	0	11	18	3
		WL	T, T, T, R		3	0	0	4	1	4
		WT/R	T, T, T, R		1	0	0	0	1	0
		WNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A
149	Buckeye Rd	EL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
		ET/R	N/A		N/A	N/A	N/A	N/A	N/A	N/A
		ENR	2		2	0	2	0	5	0
		WL	L, LR, R		2	0	0	1	2	3
		WT/R	L, LR, R		1	0	0	1	2	1
		WNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A
150	24th St	EL	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A
		ET/R	N/A		N/A	N/A	N/A	N/A	N/A	N/A
		ENR	1		0	0	0	0	0	0
		WL	L, LR, R		3	0	1	4	1	2
		WT/R	L, LR, R		2	0	0	0	1	1
		WNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A
151	32nd St	EL	L, LR, R	Yes	8	13	8	7	5	4
		ET/R	L, LR, R		7	5	2	5	2	1
		ENR	1		0	0	0	5	0	0
		WL	L, LR, R		0	2	4	0	2	4
		WT/R	L, LR, R		0	6	0	1	2	0
		WNR	1		0	0	0	0	0	0
152	40th St	EL	L, L, R, R	Yes	2	1	1	3	2	2
		ET/R	L, L, R, R		0	0	0	0	0	0
		ENR	1		1	3	0	0	1	1
		WL	L, LR, R		1	5	2	0	0	3
		WT/R	L, LR, R		0	0	0	0	6	0
		WNR	1		2	3	1	0	0	3

I-10 (EVENING)**I-10 (Evening) Continued**

Arterial Exit #	Cross-Road	Lane	Ramp Turning Movements/Lanes	Average Queue Populations (30-minute intervals)							
				3:00- 3:30 p.m.	3:30- 4:00 p.m.	4:00- 4:30 p.m.	4:30- 5:00 p.m.	5:00- 5:30 p.m.	5:30- 6:00 p.m.	6:00- 6:30 p.m.	6:30- 7:00 p.m.
153	48th St	EL	L, LT, T, R	N/A	2	0	8	3	2	2	0
		ET/R	L, LT, T, R		1	0	1	0	1	0	0
		ENR	N/A		N/A						
		WL	N/A		N/A						
		WT/R	N/A		N/A						
		WNR	1		0	0	0	0	0	0	0
155	Baseline Rd	NL	L, L, LTR, R	No	7	3	9	7	4	12	10
		NT/R	L, L, LTR, R		0	0	0	0	0	0	0
		NNR	1		3	2	1	3	1	2	4
		SL	L, L, LTR, R		6	6	4	6	1	7	6
		ST/R	L, L, LTR, R		7	23	58	58	58	81	50
		SNR	2		7	4	4	3	8	3	2
157	Elliot Rd	NL	L, LR, R	Yes	2	10	3	3	3	3	4
		NT/R	L, LR, R		0	0	0	1	23	0	0
		NNR	2		2	11	3	5	3	5	2
		SL	L, LT, LT, R		2	11	2	7	8	6	8
		ST/R	L, LT, LT, R		5	3	2	0	2	0	0
		SNR	1		1	10	6	3	6	7	5
158	Warner Rd	NL	L, LT	No	2	2	3	3	1	0	1
		NT/R	L, LT		0	0	0	0	0	0	0
		NNR	2		2	24	1	12	1	1	0
		SL	L, LR, R		1	8	4	0	7	5	2
		ST/R	L, LR, R		0	3	0	0	0	0	1
		SNR	1		0	3	2	0	2	2	1
159	Ray Rd	NL	L, R	Yes	5	11	8	6	18	11	2
		NT/R	L, R		0	0	0	0	0	0	0
		NNR	2		1	2	1	3	6	5	2
		SL	L, LT ,R, R		4	3	13	4	7	8	2
		ST/R	L, LT ,R, R		0	0	0	0	0	0	0
		SNR	1		1	2	1	2	1	0	0
160	Chandler Blvd	NL	L, LR, R	No	1	0	1	0	2	2	2
		NT/R	L, LR, R		0	0	0	0	0	0	0
		NNR	2		2	1	1	2	1	0	0
		SL	L, LT ,R, R		13	5	9	5	3	2	1
		ST/R	L, LT ,R, R		0	0	0	0	0	0	0
		SNR	1		3	1	1	1	4	3	3
163	Sundust Rd	NL	L, LR, R	No	0	0	1	0	1	0	0
		NT/R	L, LR, R		0	0	0	0	0	0	0
		NNR	2		0	0	0	2	0	0	0
		SL	L, L, R		1	1	3	1	0	1	2
		ST/R	L, L, R		0	0	0	0	0	0	0
		SNR	2		0	2	1	0	0	1	0
164	Queen Creek Rd	NL	L, R	No	1	0	0	1	0	0	1
		NT/R	L, R		0	0	0	0	0	0	0
		NNR	2		1	1	0	0	0	0	0
		SL	L, LR, R		2	1	3	5	2	4	2
		ST/R	L, LR, R		0	0	0	0	0	0	0
		SNR	2		2	2	3	9	9	5	4
167	Riggs Rd	NL	L, R	No	0	0	2	0	1	1	0
		NT/R	L, R		0	0	0	0	0	0	0
		NNR	1		0	0	0	0	0	0	0
		SL	L, R		1	3	3	2	2	4	3
		ST/R	L, R		0	0	0	0	0	0	0
		SNR	1		0	0	0	0	7	0	0

I-17 (MORNING)

I-17 (Morning)

Arterial Exit #	Cross-Road	Ramp Turning Movements/Lanes	Ramp Lane	Ramp Meter	Average Queue Populations (30-minute intervals)								
					5:30- 6:00 a.m.	6:00- 6:30 a.m.	6:30- 7:00 a.m.	7:00- 7:30 a.m.	7:30- 8:00 a.m.	8:00- 8:30 a.m.	8:30- 9:00 a.m.	9:00- 9:30 a.m.	
195A	16th St	NL	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		NT/R	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		NNR	1		0	0	0	0	0	0	0	0	
		SL	L, LT, R		0	1	4	0	1	4	1	2	
		ST/R	L, LT, R		0	0	6	2	1	0	1	0	
		SNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
195B	7th St	NL	L, LT, R	Yes	6	3	7	9	7	14	8	5	
		NT/R	L, LT, R		1	2	0	1	6	0	2	0	
		NNR	1		0	0	0	0	0	0	0	0	
		SL	L, LT, TR		4	6	3	6	9	3	2	4	
		ST/R	L, LT, TR		4	3	3	6	7	0	0	2	
		SNR	1		0	0	0	0	0	1	0	0	
196	7th Ave	NL	LT, TR, R	Yes	0	4	6	5	6	4	3	2	
		NT/R	LT, TR, R		1	2	1	6	0	2	3	3	
		NNR	1		0	0	0	0	0	0	0	0	
		SL	L, LT, TR		3	4	7	1	5	3	1	0	
		ST/R	L, LT, TR		3	4	7	6	6	2	2	7	
		SNR	1		0	0	0	3	0	0	0	0	
197	19th Ave	NL	L, LT, T, R	Yes	11	1	0	14	8	9	0	8	
		NT/R	L, LT, T, R		1	1	0	1	0	1	0	0	
		NNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		SL	L, LT, TR		14	11	13	10	29	6	10	1	
		ST/R	L, LT, TR		12	27	32	13	36	5	7	1	
		SNR	1		3	0	5	24	16	5	0	0	
199A	Buckeye Rd	NL	L, LT, TR	Yes	5	5	3	2	5	4	2	6	
		NT/R	L, LT, TR		2	1	0	0	2	1	0	1	
		NNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		SL	L, LT, R		1	4	6	2	0	2	1	1	
		ST/R	L, LT, R		1	1	1	0	0	0	2	1	
		SNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
199	Grant St	NL	L, LT, TR	Yes	3	0	8	7	3	1	0	5	
		NT/R	L, LT, TR		1	0	2	1	0	0	0	2	
		NNR	1		0	0	0	0	0	0	0	0	
		SL	L, LT, T		3	7	3	8	4	6	5	1	
		ST/R	L, LT, T		0	2	0	2	1	6	1	0	
		SNR	1		0	0	0	0	0	0	0	0	
199B	Adams St	NL	LT, LT, T	Yes	0	1	0	1	1	1	0	1	
		NT/R	LT, LT, T		0	1	1	2	1	1	0	1	
		NNR	1		0	0	0	1	0	0	0	0	
		SL	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		ST/R	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		SNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
200	McDonald Rd	NL	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		NT/R	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		NNR	1		0	0	0	0	0	0	0	0	
		SL	L, LT, TR		8	3	7	11	8	3	6	4	
		ST/R	L, LT, TR		1	2	3	3	4	1	3	2	
		SNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
201	Thomas Rd	NL	L, LT, T, TR	Yes	2	0	5	3	8	6	1	12	
		NT/R	L, LT, T, TR		1	0	0	4	17	3	3	3	
		NNR	2		0	0	0	0	0	0	0	0	
		SL	L, LT, T, TR		1	4	17	11	19	9	16	13	
		ST/R	L, LT, T, TR		3	3	7	3	1	2	3	3	
		SNR	2		0	0	0	0	0	0	0	0	
202	Indian School Rd	NL	L, L, T, TR, R	Yes	6	1	2	12	4	1	9	4	
		NT/R	L, L, T, TR, R		1	2	1	3	4	0	3	2	
		NNR	2		0	0	0	0	0	0	0	0	
		SL	L, L, T, TR, R		3	8	13	12	42	19	19	20	
		ST/R	L, L, T, TR, R		3	6	4	1	10	4	3	2	
		SNR	2		0	0	3	0	0	0	4	0	

I-17 (MORNING)**I-17 (Morning) Continued**

Exit #	Arterial <u>Cross-Road</u>	Ramp Turning <u>Movements/Lanes</u>	Ramp <u>Lane</u>	Average Queue Populations (30-minute intervals)								
				5:30- 6:00 a.m.	6:00- 6:30 a.m.	6:30- 7:00 a.m.	7:00- 7:30 a.m.	7:30- 8:00 a.m.	8:00- 8:30 a.m.	8:30- 9:00 a.m.	9:00- 9:30 a.m.	
203	Camelback Dr	NL	L, L, T, T, T, R	5	4	2	8	22	6	22	2	
		NT/R	L, L, T, T, T, R	3	2	6	2	9	3	3	1	
		NNR	2	0	0	0	0	1	0	0	0	
		SL	L, L, T, T, T, R	9	1	4	11	33	7	17	9	
		ST/R	L, L, T, T, T, R	4	2	6	1	9	1	2	3	
		SNR	2	0	0	0	0	2	3	0	0	
204	Bethany Home Rd	NL	L, L, T, T, T, R	3	3	2	3	14	1	3	4	
		NT/R	L, L, T, T, T, R	0	2	1	2	1	3	4	3	
		NNR	2	0	0	0	0	0	0	0	0	
		SL	L, L, T, T, TR	3	4	5	10	38	3	3	4	
		ST/R	L, L, T, T, TR	0	1	1	4	5	0	0	3	
		SNR	2	0	3	2	12	11	2	2	0	
205	Glendale Rd	NL	L, L, T, T, TR	3	1	2	4	6	4	4	3	
		NT/R	L, L, T, T, TR	1	2	3	3	3	2	2	3	
		NNR	2	0	0	0	0	0	0	0	0	
		SL	L, L, T, T, TR	5	0	10	8	9	0	9	11	
		ST/R	L, L, T, T, TR	0	0	2	4	7	17	5	4	
		SNR	2	0	0	0	6	4	5	1	1	
206	Northern Ave	NL	L, L, T, T, TR	6	1	5	5	7	4	10	3	
		NT/R	L, L, T, T, TR	1	3	6	4	8	3	4	1	
		NNR	2	0	0	0	0	0	0	0	0	
		SL	L, L, T, T, TR	5	1	11	6	19	6	11	6	
		ST/R	L, L, T, T, TR	0	2	3	5	2	14	6	2	
		SNR	2	0	0	0	5	5	5	0	0	
207	Dunlap Rd	NL	L, L, T, T, TR, R	2	6	8	4	2	14	10	1	
		NT/R	L, L, T, T, TR, R	5	0	7	5	17	1	6	4	
		NNR	2	0	0	0	0	0	0	0	0	
		SL	L, L, T, T, TR, R	5	6	28	7	3	25	10	5	
		ST/R	L, L, T, T, TR, R	2	0	8	10	21	7	4	4	
		SNR	2	0	0	0	2	0	0	1	0	
208	Peoria Dr	NL	L, L, TR, R	1	3	6	4	3	0	5	8	
		NT/R	L, L, TR, R	0	1	5	6	9	0	1	3	
		NNR	2	0	0	0	0	0	0	0	0	
		SL	L, LT, TR, R	9	1	4	2	8	17	2	19	
		ST/R	L, LT, TR, R	1	0	2	1	2	3	2	2	
		SNR	2	0	3	0	7	1	3	0	0	
209	Cactus Rd	NL	L, LT, T, R	1	0	2	4	5	2	3	0	
		NT/R	L, LT, T, R	0	0	1	1	0	2	1	1	
		NNR	2	0	0	0	0	5	0	0	0	
		SL	L, LT, T, R	0	4	5	3	8	6	2	3	
		ST/R	L, LT, T, R	0	2	4	2	12	7	2	5	
		SNR	2	0	0	2	4	2	0	1	0	
210	Thunderbird Rd	NL	L, LT, TR, R	3	2	2	5	2	2	5	6	
		NT/R	L, LT, TR, R	1	1	2	2	8	2	1	2	
		NNR	2	0	0	0	0	3	0	0	0	
		SL	L, LT, TR, R	1	3	7	3	8	3	1	2	
		ST/R	L, LT, TR, R	1	1	3	3	2	4	3	1	
		SNR	2	0	1	26	15	14	8	9	0	
211	Greenway Rd	NL	L, LT, TR, R	3	2	3	3	4	4	4	3	
		NT/R	L, LT, TR, R	0	0	1	0	5	2	3	2	
		NNR	1	0	0	0	0	1	0	0	0	
		SL	L, LT, TR, R	0	1	1	3	0	4	4	0	
		ST/R	L, LT, TR, R	1	2	0	2	3	2	1	1	
		SNR	2	0	0	0	0	1	3	1	0	
212	Bell Rd	NL	L, LT, TR, R	1	0	5	5	0	6	6	1	
		NT/R	L, LT, TR, R	2	0	2	2	1	2	2	0	
		NNR	2	0	0	0	0	0	0	0	0	
		SL	L, LT, TR, R	2	1	1	3	4	2	0	1	
		ST/R	L, LT, TR, R	0	0	1	1	7	1	0	0	
		SNR	2	0	0	0	1	2	0	0	0	

I-17 (MORNING)

I-17 (Morning) Continued

I-17 (MORNING)

I-17 (Morning) Continued

Exit # Arterial
232 Cross-Road
 New River Rd

<u>Ramp Turning Movements/Lanes</u>	<u>Ramp Lane</u>
NL	L, R
NT/R	L, R
NNR	1
SL	L, R
ST/R	L, R
SNR	1

I-17 (EVENING)

I-17 (Evening)

I-17 (EVENING)

I-17 (Evening) Continued

Exit #	Arterial <u>Cross-Road</u>	Ramp Turning <u>Movements/Lanes</u>	Ramp <u>Lane</u>	Average Queue Populations (30-minute intervals)							
				3:00- 3:30 p.m.	3:30- 4:00 p.m.	4:00- 4:30 p.m.	4:30- 5:00 p.m.	5:00- 5:30 p.m.	5:30- 6:00 p.m.	6:00- 6:30 p.m.	6:30- 7:00 p.m.
203	Camelback Dr	NL	L, L, T, T, T, R	22	7	14	7	11	18	6	3
		NT/R	L, L, T, T, T, R	9	1	3	13	4	6	9	7
		NNR	2	Yes	11	4	13	8	8	6	0
		SL	L, L, T, T, T, R	18	3	9	5	8	7	6	5
		ST/R	L, L, T, T, T, R	4	3	0	3	8	2	4	6
		SNR	2	Yes	0	0	0	0	0	0	0
204	Bethany Home Rd	NL	L, L, T, T, T, R	12	17	6	11	35	30	27	14
		NT/R	L, L, T, T, T, R	4	11	10	3	13	11	2	4
		NNR	2	Yes	4	0	6	0	0	7	5
		SL	L, L, T, T, TR	9	18	3	8	19	10	11	8
		ST/R	L, L, T, T, TR	1	16	9	3	9	1	3	3
		SNR	2	Yes	0	0	0	0	0	0	0
205	Glendale Rd	NL	L, L, T, T, TR	4	3	10	15	19	18	5	9
		NT/R	L, L, T, T, TR	0	2	8	6	1	1	1	3
		NNR	2	Yes	3	0	0	3	3	0	0
		SL	L, L, T, T, TR	1	8	7	10	7	7	7	6
		ST/R	L, L, T, T, TR	4	12	7	6	3	10	1	2
		SNR	2	Yes	0	0	0	0	0	0	0
206	Northern Ave	NL	L, L, T, T, TR	12	16	14	8	24	5	11	10
		NT/R	L, L, T, T, TR	1	10	10	9	12	12	7	2
		NNR	2	Yes	12	0	8	18	11	27	0
		SL	L, L, T, T, TR	3	22	22	6	3	1	7	9
		ST/R	L, L, T, T, TR	1	11	7	3	2	7	2	0
		SNR	2	Yes	0	0	0	0	0	0	0
207	Dunlap Rd	NL	L, L, T, T, TR, R	6	10	15	21	20	24	11	13
		NT/R	L, L, T, T, TR, R	9	7	14	3	17	13	1	3
		NNR	2	Yes	13	9	19	37	32	17	0
		SL	L, L, T, T, TR, R	6	6	4	13	1	10	7	12
		ST/R	L, L, T, T, TR, R	7	5	13	5	15	14	0	3
		SNR	1 + HOV Lane	Yes	0	0	0	0	0	0	0
208	Peoria Dr	NL	L, L, TR, R	10	24	15	34	51	62	29	16
		NT/R	L, L, TR, R	8	5	2	10	10	5	8	4
		NNR	2	Yes	0	0	0	0	0	1	0
		SL	L, LT, TR, R	2	1	9	6	5	3	3	3
		ST/R	L, LT, TR, R	4	6	11	10	7	4	4	14
		SNR	2	Yes	0	0	0	0	0	0	0
209	Cactus Rd	NL	L, LT, T, R	2	6	15	17	15	9	17	4
		NT/R	L, LT, T, R	1	4	5	12	13	1	9	2
		NNR	2	Yes	0	0	0	0	0	0	0
		SL	L, LT, T, R	3	10	6	2	0	2	3	2
		ST/R	L, LT, T, R	1	9	10	4	4	5	2	1
		SNR	2	Yes	0	0	0	0	0	0	0
210	Thunderbird Rd	NL	L, LT, TR, R	10	10	15	9	16	16	30	7
		NT/R	L, LT, TR, R	3	1	4	4	2	5	3	1
		NNR	2	Yes	0	0	0	0	0	0	1
		SL	L, LT, TR, R	6	0	3	6	1	3	5	2
		ST/R	L, LT, TR, R	5	3	15	10	1	2	8	1
		SNR	2	Yes	0	0	0	0	0	0	0
211	Greenway Rd	NL	L, LT, TR, R	5	4	2	0	3	33	10	4
		NT/R	L, LT, TR, R	1	2	1	0	0	1	4	3
		NNR	1	No	0	0	0	0	0	0	0
		SL	L, LT, TR, R	5	2	5	6	9	8	6	2
		ST/R	L, LT, TR, R	2	2	9	6	9	8	2	3
		SNR	2	Yes	0	0	0	0	0	0	0
212	Bell Rd	NL	L, LT, TR, R	9	4	7	11	13	9	6	7
		NT/R	L, LT, TR, R	4	3	2	4	3	3	3	0
		NNR	2	Yes	0	0	0	0	0	0	0
		SL	L, LT, TR, R	7	3	3	3	4	3	2	5
		ST/R	L, LT, TR, R	4	2	3	1	7	8	5	1
		SNR	2	Yes	0	0	0	0	0	0	0

I-17 (EVENING)

I-17 (Evening) Continued

I-17 (EVENING)**I-17 (Evening) Continued**

Arterial <u>Exit #</u> 232	Cross-Road New River Rd	Ramp Turning <u>Movements/Lanes</u>	Ramp Lane	Average Queue Populations (30-minute intervals)							
				3:00- 3:30 p.m.	3:30- 4:00 p.m.	4:00- 4:30 p.m.	4:30- 5:00 p.m.	5:00- 5:30 p.m.	5:30- 6:00 p.m.	6:00- 6:30 p.m.	6:30- 7:00 p.m.
		NL	L, R	0	0	0	0	0	0	0	0
		NT/R	L, R	0	0	0	0	0	0	0	0
		NNR	1	No	0	0	0	0	0	0	0
		SL	L, R	0	0	0	0	0	0	0	0
		ST/R	L, R	0	0	0	0	0	0	0	0
		SNR	1	No	0	0	0	0	0	0	0

SR 51 (MORNING)

SR 51 (Morning)

SR 51 (MORNING)**SR 51 (Morning) Continued**

Exit #	Arterial Cross-Road	Ramp Turning	Ramp	Average Queue Populations (30-minute intervals)							
		Movements/Lanes	Lane	5:30- 6:00 a.m.	6:00- 6:30 a.m.	6:30- 7:00 a.m.	7:00- 7:30 a.m.	7:30- 8:00 a.m.	8:00- 8:30 a.m.	8:30- 9:00 a.m.	9:00- 9:30 a.m.
9	Shea Blvd	NL	L, L, R, R	No	1	0	0	1	0	1	1
		NT/R	L, L, R, R		1	1	0	2	3	2	1
		NNR	1		0	0	0	0	0	0	0
		SL	L, L, T, R		5	4	2	1	4	6	3
		ST/R	L, L, T, R		1	0	1	0	1	0	0
		SNR	2		1	1	0	0	0	0	2
10	Cactus Rd	NL	L, L, R	No	3	0	1	4	0	4	9
		NT/R	L, L, R		0	0	1	1	1	1	1
		NNR	1		0	0	0	0	0	0	0
		SL	L, L, R		2	3	4	4	5	10	14
		ST/R	L, L, R		1	1	0	2	0	0	5
		SNR	2		3	3	5	8	6	3	2
11	Thunderbird Rd	NL	L, LR, R	Yes	0	2	2	0	3	3	1
		NT/R	L, LR, R		1	0	1	1	2	0	0
		NNR	N/A		N/A						
		SL	N/A		N/A						
		ST/R	N/A		N/A						
		SNR	1		0	0	0	5	4	0	1
12	Greenway Rd	NL	L, L, R	No	2	3	0	4	11	3	10
		NT/R	L, L, R		1	1	0	3	7	0	2
		NNR	2		0	0	0	0	0	0	0
		SL	L, L, R		2	2	1	3	9	2	3
		ST/R	L, L, R		0	1	0	1	3	0	0
		SNR	2		0	1	1	0	0	0	0
13	Bell Rd	NL	L, L, R, R	No	6	1	5	1	11	0	5
		NT/R	L, L, R, R		2	1	1	1	6	0	1
		NNR	2		0	0	0	0	0	0	0
		SL	L, L, R		4	1	2	4	7	0	5
		ST/R	L, L, R		1	0	0	0	1	0	0
		SNR	2		0	0	0	0	0	0	0
14	Union Hills Dr	NL	L, L, R	No	3	0	2	0	0	1	2
		NT/R	L, L, R		1	0	0	3	0	0	1
		NNR	2		0	0	0	0	0	0	0
		SL	L, L, R		0	0	1	0	1	8	2
		ST/R	L, L, R		0	0	0	0	0	0	1
		SNR	2		0	0	0	0	0	0	0

SR 51 (EVENING)

SR 51 (Evening)

SR 51 (EVENING)**SR 51 (Evening) Continued**

Exit #	Arterial Cross-Road	Ramp Turning Movements/Lanes	Ramp Lane	Average Queue Populations (30-minute intervals)							
				3:00- 3:30 p.m.	3:30- 4:00 p.m.	4:00- 4:30 p.m.	4:30- 5:00 p.m.	5:00- 5:30 p.m.	5:30- 6:00 p.m.	6:00- 6:30 p.m.	6:30- 7:00 p.m.
9	Shea Blvd	NL	L, L, R, R	No	0	1	2	2	0	0	0
		NT/R	L, L, R, R		3	2	1	1	0	3	0
		NNR	1		0	0	0	0	0	0	0
		SL	L, L, T, R		5	7	2	2	2	1	2
		ST/R	L, L, T, R		0	1	2	0	1	0	0
		SNR	2		0	0	0	0	0	0	0
10	Cactus Rd	NL	L, L, R	No	1	5	4	9	2	5	4
		NT/R	L, L, R		3	4	0	5	4	2	1
		NNR	1		1	2	0	1	0	0	0
		SL	L, L, R		2	6	12	1	12	3	5
		ST/R	L, L, R		0	1	2	9	1	2	3
		SNR	2		1	0	0	0	0	0	1
11	Thunderbird Rd	NL	L, LR, R	N/A	0	5	3	2	5	2	1
		NT/R	L, LR, R		0	4	3	1	2	3	2
		NNR	N/A		N/A						
		SL	N/A		N/A						
		ST/R	N/A		N/A						
		SNR	1		0	0	0	0	0	0	0
12	Greenway Rd	NL	L, L, R	No	15	13	10	1	8	5	2
		NT/R	L, L, R		3	3	1	8	1	4	3
		NNR	2		0	0	0	0	0	0	0
		SL	L, L, R		5	6	8	0	6	3	3
		ST/R	L, L, R		4	0	2	1	2	6	1
		SNR	2		0	0	0	0	6	0	0
13	Bell Rd	NL	L, L, R, R	No	7	2	9	2	8	3	0
		NT/R	L, L, R, R		2	2	2	0	1	4	0
		NNR	2		0	0	0	0	0	0	0
		SL	L, L, R		3	2	4	1	2	1	0
		ST/R	L, L, R		1	1	2	0	4	1	0
		SNR	2		0	0	0	0	0	0	0
14	Union Hills Dr	NL	L, L, R	No	0	0	0	5	8	7	0
		NT/R	L, L, R		0	0	1	0	1	2	1
		NNR	2		0	0	0	2	0	0	1
		SL	L, L, R		1	6	0	1	1	0	3
		ST/R	L, L, R		1	4	0	0	2	1	1
		SNR	2		0	0	0	0	0	1	0

US 60 (MORNING)**US 60 (Morning)**

Arterial Exit #	Cross-Road	Ramp Turning Movements/Lanes	Ramp Lane	Ramp Meter	Average Queue Populations (30-minute intervals)								
					5:30- 6:00 a.m.	6:00- 6:30 a.m.	6:30- 7:00 a.m.	7:00- 7:30 a.m.	7:30- 8:00 a.m.	8:00- 8:30 a.m.	8:30- 9:00 a.m.	9:00- 9:30 a.m.	
172	Priest Dr	EL	N/A	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		ET/R	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		ENR	2		0	0	0	0	0	0	0	0	
		WL	L, LR, R	N/A	2	1	2	2	2	2	3	2	
		WT/R	L, LR, R		4	2	3	0	5	3	6	1	
		WNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
173	Mill Ave	EL	L, LR, R	Yes	2	2	5	2	1	5	3	2	
		ET/R	L, LR, R		0	1	1	2	2	2	2	0	
		ENR	2		0	0	0	0	0	0	0	0	
		WL	L, LR, R	Yes	2	2	1	1	1	1	2	2	
		WT/R	L, LR, R		4	1	5	2	3	2	3	4	
		WNR	2		0	1	0	2	13	0	0	0	
174	Rural Rd	EL	L, LR, R	Yes	2	1	3	0	3	2	3	3	
		ET/R	L, LR, R		1	0	4	1	4	2	2	5	
		ENR	2		0	0	0	1	0	0	0	0	
		WL	L, LR, R	Yes	2	1	5	1	3	3	3	3	
		WT/R	L, LR, R		4	1	9	2	7	2	4	3	
		WNR	2		1	3	0	11	1	1	0	0	
175	McClintock Dr	EL	L, LR, R	Yes	0	2	4	5	1	3	0	2	
		ET/R	L, LR, R		2	1	3	5	3	3	0	3	
		ENR	1		0	0	0	0	0	0	0	0	
		WL	L, LR, R	Yes	1	1	8	7	2	7	0	4	
		WT/R	L, LR, R		1	2	6	10	1	6	1	1	
		WNR	2		1	0	7	1	18	6	0	0	
177	Dobson Rd	EL	L, LR, R	Yes	4	1	3	2	1	1	5	2	
		ET/R	L, LR, R		2	1	1	1	1	1	6	2	
		ENR	2		0	0	0	0	0	0	0	0	
		WL	L, LR, R	Yes	3	2	2	3	1	2	2	5	
		WT/R	L, LR, R		7	2	3	5	1	2	6	4	
		WNR	2		0	1	0	3	0	2	1	0	
178	Alma School Rd	EL	L, LR, R	Yes	0	3	1	3	8	6	7	3	
		ET/R	L, LR, R		0	3	5	3	5	6	5	2	
		ENR	2		0	0	0	0	0	0	0	0	
		WL	L, LR, R	Yes	0	2	2	3	7	3	4	1	
		WT/R	L, LR, R		0	3	2	4	8	5	6	0	
		WNR	2		2	0	3	2	0	7	3	0	
179	Country Club Rd	EL	L, LR, R	Yes	7	3	2	5	13	5	4	7	
		ET/R	L, LR, R		9	5	2	4	19	8	6	6	
		ENR	2		0	0	0	1	0	0	0	0	
		WL	L, LR, R	Yes	1	3	2	3	4	4	3	3	
		WT/R	L, LR, R		2	4	1	4	11	6	4	3	
		WNR	2		4	8	6	11	35	31	26	0	
180	Mesa Dr	EL	L, LR, R	Yes	2	1	2	4	1	1	2	5	
		ET/R	L, LR, R		1	1	4	2	5	3	6	6	
		ENR	2		0	0	0	0	0	1	0	0	
		WL	L, LR, R	Yes	2	0	1	3	2	1	8	1	
		WT/R	L, LR, R		2	0	1	2	2	4	7	3	
		WNR	2		28	25	31	46	44	51	31	0	
181	Stapley Dr	EL	L, LTR, R	Yes	2	3	2	6	5	2	4	2	
		ET/R	L, LTR, R		2	5	6	4	5	3	5	3	
		ENR	2		0	0	0	0	0	0	0	0	
		WL	L, LTR, R	Yes	4	1	2	1	1	1	1	1	
		WT/R	L, LTR, R		3	1	1	0	1	1	2	2	
		WNR	2		16	28	35	40	62	51	20	0	
182	Gilbert Rd	EL	L, LTR, R	Yes	2	3	6	4	4	8	4	4	
		ET/R	2		1	4	6	1	5	6	5	3	
		ENR	L, LTR, R		0	0	0	1	0	0	0	0	
		WL	L, LTR, R	Yes	1	1	4	2	2	1	1	2	
		WT/R	L, LTR, R		2	1	4	2	1	1	2	1	
		WNR	2		32	42	75	87	74	64	66	0	

US 60 (MORNING)

US 60 (Morning) Continued

US 60 (MORNING)**US 60 (Morning) Continued**

Exit #	Arterial Cross-Road	Ramp Turning Movements/Lanes	Ramp Lane	Average Queue Populations (30-minute intervals)							
				5:30- 6:00 a.m.	6:00- 6:30 a.m.	6:30- 7:00 a.m.	7:00- 7:30 a.m.	7:30- 8:00 a.m.	8:00- 8:30 a.m.	8:30- 9:00 a.m.	9:00- 9:30 a.m.
196	Idaho Rd	EL	L, LTR, R	No	1	1	0	1	0	0	0
		ET/R	L, LTR, R		0	0	1	0	0	0	1
		ENR	1		0	0	0	0	0	0	0
		WL	L, LTR, R		0	0	1	1	1	0	1
		WT/R	L, LTR, R		0	0	0	1	1	1	0
		WNR	1		0	0	0	0	0	0	0
197	Tomahawk Rd	EL	L, LTR, R	No	0	0	0	0	0	0	1
		ET/R	L, LTR, R		0	0	0	0	0	0	1
		ENR	1		0	0	0	0	0	0	1
		WL	L, LTR, R		0	1	0	0	0	2	0
		WT/R	L, LTR, R		0	1	0	0	0	1	1
		WNR	1		0	0	0	0	0	0	0
198	Goldfield Rd	EL	L, LTR, R	No	0	0	0	0	0	0	0
		ET/R	L, LTR, R		0	0	0	0	0	0	0
		ENR	1		0	0	0	0	0	0	0
		WL	L, LTR, R		0	1	0	0	0	0	0
		WT/R	L, LTR, R		0	0	0	0	0	0	0
		WNR	1		0	0	0	0	0	0	0

US 60 (EVENING)

I-17 (Evening)

US 60 (EVENING)**US 60 (Evening) Continued**

Arterial Exit #	Cross-Road	Ramp Turning Movements/Lanes	Ramp Lane	
184	Val Vista Dr	EL	L, LTR, R	Yes
		ET/R	L, LTR, R	
		ENR	1	
		WL	L, LR, R	
		WT/R	L, LR, R	
		WNR	1	
185	Greenfield Rd	EL	1	Yes
		ET/R	L, CLOSED, R	
		ENR	L, CLOSED, R	
		WL	L, CLOSED, R	
		WT/R	L, CLOSED, R	
		WNR	1	
186	Higley Rd	EL	L, LR, R	Yes
		ET/R	L, LR, R	
		ENR	1	
		WL	L, LR, R	
		WT/R	L, LR, R	
		WNR	1	
187.5	Superstition Springs Blvd	EL	L, LR, R	Yes
		ET/R	L, LR, R	
		ENR	N/A	
		WL	N/A	
		WT/R	N/A	
		WNR	1	
188	Power Rd	EL	L, LR, R	Yes
		ET/R	L, LR, R	
		ENR	1	
		WL	N/A	
		WT/R	N/A	
		WNR	1	
189	Sossaman Rd	EL	L, LR, R	Yes
		ET/R	L, LR, R	
		ENR	N/A	
		WL	N/A	
		WT/R	N/A	
		WNR	1	
191	Ellsworth Rd	EL	L, LR, R	Yes
		ET/R	L, LR, R	
		ENR	N/A	
		WL	L, LR, R	
		WT/R	L, LR, R	
		WNR	1	
192	Crimson Rd	EL	N/A	No
		ET/R	N/A	
		ENR	L, LR, R	
		WL	1	
		WT/R	L, LR, R	
		WNR	N/A	
193	Signal Butte Rd	EL	L, LR, R	No
		ET/R	L, LR, R	
		ENR	1	
		WL	L, LR, R	
		WT/R	L, LR, R	
		WNR	1	
195	Ironwood Dr	EL	L, LR, R	No
		ET/R	1	
		ENR	L, LR, R	
		WL	L, LR, R	
		WT/R	L, LR, R	
		WNR	1	

Average Queue Populations (30-minute intervals)								
3:00- 3:30 p.m.	3:30- 4:00 p.m.	4:00- 4:30 p.m.	4:30- 5:00 p.m.	5:00- 5:30 p.m.	5:30- 6:00 p.m.	6:00- 6:30 p.m.	6:30- 7:00 p.m.	
10	6	22	7	14	16	11	0	
6	10	25	14	20	29	41	1	
0	0	0	0	0	1	0	0	
1	3	0	3	2	3	2	0	
2	4	1	2	2	3	2	1	
0	0	0	0	0	0	0	3	
2	2	2	0	0	0	3	3	
1	0	0	4	0	0	3	1	
0	0	0	0	0	0	0	1	
1	0	3	1	1	1	5	1	
4	0	1	0	2	1	1	0	
0	0	2	0	0	2	0	0	
4	1	5	1	4	1	3	2	
8	0	8	5	6	2	7	5	
0	1	0	0	0	0	0	0	
3	0	3	2	1	3	1	2	
3	1	4	2	1	1	2	2	
0	0	0	0	0	0	0	0	
3	1	2	3	1	1	0	3	
3	1	4	4	1	1	1	4	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
0	0	0	0	0	0	0	0	
1	0	3	3	6	0	2	3	
0	N/A	4	2	4	0	2	2	
2	1	0	0	0	0	0	1	
0	0	N/A	N/A	N/A	N/A	N/A	N/A	
1	N/A							
0	24	0	0	0	0	0	0	
0	2	1	1	1	1	1	3	
N/A	N/A	2	1	1	0	2	2	
2	0	N/A	N/A	N/A	N/A	N/A	N/A	
2	N/A							
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
0	N/A							
10	5	9	6	2	2	8	3	
0	1	1	3	3	4	3	3	
5	0	3	2	N/A	N/A	N/A	N/A	
4	0	6	0	0	0	2	1	
N/A	1	N/A	1	0	1	1	0	
1	0	2	0	0	0	0	0	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
1	0	0	0	0	0	0	0	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
0	0	0	0	0	0	2	1	
0	0	0	0	0	0	1	1	
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
no data	1	0	3	1	2	1	1	
no data	1	0	1	1	0	1	1	
0	0	0	0	0	0	0	0	
0	0	0	0	0	0	0	0	
0	1	0	1	0	1	0	0	
0	0	0	0	0	0	0	0	
3	1	1	1	2	3	1	1	
0	0	1	1	1	1	0	3	
3	0	0	0	3	1	0	0	
4	5	1	0	6	0	1	0	
4	3	0	0	0	1	1	0	
0	0	0	0	0	1	0	0	

US 60 (EVENING)**US 60 (Evening) Continued**

Exit #	Arterial <u>Cross-Road</u>	Ramp Turning <u>Movements/Lanes</u>	Ramp <u>Lane</u>	Average Queue Populations (30-minute intervals)							
				3:00- 3:30 p.m.	3:30- 4:00 p.m.	4:00- 4:30 p.m.	4:30- 5:00 p.m.	5:00- 5:30 p.m.	5:30- 6:00 p.m.	6:00- 6:30 p.m.	6:30- 7:00 p.m.
196	Idaho Rd	EL	L, LTR, R	No	0	1	0	1	0	0	1
		ET/R	L, LTR, R		0	1	0	1	0	0	1
		ENR	1		0	0	0	0	0	0	0
		WL	L, LTR, R		1	1	1	0	1	1	0
		WT/R	L, LTR, R		1	0	0	0	0	1	0
		WNR	1		0	0	0	0	0	0	0
197	Tomahawk Rd	EL	L, LTR, R	No	0	0	0	0	0	1	1
		ET/R	L, LTR, R		0	0	0	0	1	0	1
		ENR	1		0	0	0	0	0	0	0
		WL	L, LTR, R		0	1	2	0	1	0	1
		WT/R	L, LTR, R		1	1	1	0	0	0	0
		WNR	1		0	0	0	0	0	0	0
198	Goldfield Rd	EL	L, LTR, R	No	N/A	1	0	0	0	0	0
		ET/R	L, LTR, R		0	0	0	0	0	0	0
		ENR	1		0	0	0	0	0	0	0
		WL	L, LTR, R		0	0	0	1	0	0	0
		WT/R	L, LTR, R		0	0	0	0	0	0	0
		WNR	1		0	0	0	0	0	0	0

Loop 101 (Morning)

Loop 101 (Morning)

Loop 101 (Morning)

Loop 101 (Morning) Continued

Exit #	Arterial Cross-Road	Ramp Turning Movements/Lanes	Ramp Lane	5:30- 6:00- 6:30- 7:00- 7:30- 8:00- 8:30- 9:00-						
				6:00 a.m.	6:30 a.m.	7:00 a.m.	7:30 a.m.	8:00 a.m.	8:30 a.m.	9:00 a.m.
42	90th St	NL	L, R, R	No	0	0	1	0	1	0
		NT/R	L, R, R		1	0	0	1	1	0
		NNR	2		0	0	0	0	0	0
		SL	L, R, R		0	0	2	1	0	2
		ST/R	L, R, R		0	0	0	0	1	1
		SNR	2		0	0	0	0	0	0
43	Via de Ventura	NL	L, L, R	No	2	0	2	1	2	1
		NT/R	L, L, R		0	0	0	0	0	0
		NNR	2		0	0	0	0	0	0
		SL	L, TR, R		0	0	0	0	0	1
		ST/R	L, TR, R		0	0	0	0	2	0
		SNR	2		0	0	0	0	0	0
44	Indian Bend Rd	NL	L, L, R	No	1	3	1	1	3	0
		NT/R	L, L, R		0	1	0	0	1	1
		NNR	2		0	0	0	0	0	0
		SL	L, TL, R		0	0	0	0	0	1
		ST/R	L, TL, R		0	0	0	0	0	2
		SNR	2		0	0	0	0	0	0
45	McDonald Dr	NL	L, L	No	0	1	0	0	0	1
		NT/R	L, L		N/A	N/A	N/A	N/A	N/A	N/A
		NNR	2		0	0	0	0	0	0
		SL	TR, R		0	0	0	0	0	1
		ST/R	TR, R		0	0	0	0	0	0
		SNR	2		0	0	0	0	0	0
46	Chaparral Rd	NL	L, LR, L	No	1	0	1	0	4	6
		NT/R	L, LR, L		0	0	1	0	1	1
		NNR	2		0	0	0	0	0	0
		SL	L, LR, L		0	0	0	1	0	6
		ST/R	L, LR, L		1	1	0	0	1	1
		SNR	2		0	0	0	0	0	0
47	Indian School Rd	NL	L, LR, L	No	2	1	3	0	0	4
		NT/R	L, LR, L		0	0	0	0	2	1
		NNR	2		0	0	1	0	3	0
		SL	L, LR, L		0	0	1	1	0	1
		ST/R	L, LR, L		0	1	0	0	1	2
		SNR	2		0	0	0	0	0	0
48	Thomas Rd	NL	L, L, R	No	2	2	7	4	7	5
		NT/R	L, L, R		0	0	1	1	1	0
		NNR	2		0	0	0	0	0	0
		SL	L, R, R		0	0	0	0	1	0
		ST/R	L, R, R		0	0	0	0	0	4
		SNR	2		0	0	0	0	0	0
49	McDowell Rd	NL	L, L, R	Yes	1	1	2	2	5	7
		NT/R	L, L, R		0	0	1	0	2	2
		NNR	2		0	0	5	8	7	0
		SL	L, L, R		0	0	0	1	1	3
		ST/R	L, L, R		0	0	0	1	3	6
		SNR	2		0	0	0	0	0	0
50	McKellips Rd	NL	L, LR, R	Yes	1	1	1	2	1	5
		NT/R	L, LR, R		0	0	0	0	1	2
		NNR	2		0	0	0	0	0	3
		SL	L, LR, R		0	1	1	1	1	1
		ST/R	L, LR, R		0	0	0	1	1	0
		SNR	2		0	0	0	0	0	0
52	Universityn Dr	NL	L, LT, TR, R	No	1	1	1	2	1	5
		NT/R	L, LT, TR, R		0	0	0	0	1	2
		NNR	N/A		0	0	0	0	0	3
		SL	N/A		N/A	N/A	N/A	N/A	N/A	0
		ST/R	N/A		N/A	N/A	N/A	N/A	N/A	4
		SNR	2		0	0	0	0	0	0

Loop 101 (Morning)

Loop 101 (Morning) Continued

Loop 101 Evening

Loop 101 (Evening)

Loop 101 (EVENING)**Loop 101 (Evening) Continued**

Exit #	Arterial Cross-Road	Ramp Turning Movements/Lanes	Ramp Lane	Average Queue Populations (30-minute intervals)								
				3:00- 3:30 p.m.	3:30- 4:00 p.m.	4:00- 4:30 p.m.	4:30- 5:00 p.m.	5:00- 5:30 p.m.	5:30- 6:00 p.m.	6:00- 6:30 p.m.	6:30- 7:00 p.m.	
14	Bell Rd	NL	L, L, R, R	No	9	3	5	6	10	8	5	3
		NT/R	L, L, R, R		2	1	1	1	0	1	0	2
		NNR	2		0	0	0	0	0	0	0	0
		SL	L, L, R, R		2	1	1	5	5	7	8	1
		ST/R	L, L, R, R		0	4	1	3	0	1	0	2
		SNR	2		0	0	0	0	0	0	0	0
15	Union Hills Dr	NL	L, LR, R	No	10	31	40	1	30	21	14	5
		NT/R	L, LR, R		7	8	10	1	13	9	6	2
		NNR	2		0	0	0	0	0	0	0	0
		SL	L, LR, R		0	5	6	5	5	0	5	2
		ST/R	L, LR, R		2	11	7	18	13	0	13	2
		SNR	2		0	0	0	0	0	0	0	0
17	75th Ave	EL	L, LT, TR	No	2	3	0	2	2	0	1	1
		ET/R	L, LT, TR		1	1	0	1	1	0	0	0
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LT, TR, R		5	1	7	3	8	4	3	11
		WT/R	L, LT, TR, R		2	2	7	6	11	6	5	8
		WNR	2		0	0	0	0	0	0	0	0
18	67th Ave	EL	L, LT, TR, R	No	2	2	9	10	0	8	4	5
		ET/R	L, LT, TR, R		0	2	8	5	0	3	4	2
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LT, TR, R		5	4	2	2	6	9	0	5
		WT/R	L, LT, TR, R		6	11	2	5	9	24	0	14
		WNR	2		0	0	0	0	0	0	0	0
19	59th Ave	EL	L, LT, TR, R	No	3	4	4	13	13	11	9	9
		ET/R	L, LT, TR, R		4	3	3	7	7	7	4	12
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LT, TR, R		8	12	0	10	4	12	10	3
		WT/R	L, LT, TR, R		8	15	0	15	4	21	10	2
		WNR	2		0	0	0	0	0	0	0	0
20	51st Ave	EL	L, T, TR, R	No	4	1	4	1	1	3	1	2
		ET/R	L, T, TR, R		9	0	7	7	1	4	2	4
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LT, T, R		3	2	9	5	13	12	3	8
		WT/R	L, LT, T, R		0	0	11	4	10	12	2	7
		WNR	2		0	0	0	0	0	0	0	0
22	35th Ave	EL	L, LT, TR, R	N/A	1	7	3	1	5	6	4	3
		ET/R	L, LT, TR, R		0	6	1	0	3	2	4	1
		ENR	N/A		N/A	N/A						
		WL	N/A		N/A	N/A						
		WT/R	N/A		N/A	N/A						
		WNR	2		2	3	2	5	0	0	0	0
24	N. 19th Ave	EL	L, LT, TR, R	No	2	1	1	1	3	2	2	1
		ET/R	L, LT, TR, R		3	1	1	1	4	0	1	1
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LT, T, R		4	3	2	3	4	3	2	0
		WT/R	L, LT, T, R		2	2	3	4	4	4	2	0
		WNR	N/A		N/A	N/A						
25	N. 7th Ave	EL	L, LT, TR, R	No	4	2	2	1	3	0	1	2
		ET/R	L, LT, TR, R		2	6	4	1	4	0	1	2
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LT, TR, R		1	3	2	1	5	0	3	4
		WT/R	L, LT, TR, R		0	2	1	1	5	1	4	0
		WNR	2		0	0	0	0	0	0	0	0
26	N. 7th St	EL	L, LT, TR, R	No	1	2	0	1	0	1	0	0
		ET/R	L, LT, TR, R		2	4	0	3	0	4	2	0
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LT, TR, R		2	3	1	5	4	1	2	0
		WT/R	L, LT, TR, R		1	4	0	4	5	1	2	0
		WNR	2		1	0	0	0	0	0	0	0

Loop 101 Evening

Loop 101 (Evening) Continued

SR 143 (MORNING AND EVENING)

SR 143 (Morning)

SR 143 (Evening)

Loop 202 S (Morning)

Loop 202 (S) (Morning)

Loop 202 S (EVENING)

Loop 202 (S) (Evening)		Average Queue Populations (30-minute intervals)										
Exit #	Arterial Cross-Road	Ramp Turning Movements/Lanes	Ramp Lane	Ramp Meter	3:00- 3:30: 3:30 p.m.	3:30- 4:00: 4:00 p.m.	4:00- 4:30: 4:30 p.m.	4:30- 5:00: 5:00 p.m.	5:00- 5:30: 5:30 p.m.	5:30- 6:00: 6:00 p.m.	6:00- 6:30: 6:30 p.m.	6:30- 7:00: 7:00 p.m.
100	Gilbert Rd	EL	L, L, R, R	No	6	22	12	15	4	16	15	5
		ET/R	L, L, R, R		4	6	3	4	1	4	5	2
		ENR	N/A		N/A							
		WL	N/A		N/A							
		WT/R	N/A		N/A							
		WNR	2		0	0	1	0	0	0	0	0
					0	0	0	0	0	0	0	0
101	Cooper Rd	EL	L, LTR, R	No	4	2	11	5	6	5	3	3
		ET/R	L, LTR, R		1	1	2	2	3	3	1	1
		ENR	1		0	0	0	0	0	0	0	0
		WL	L, LTR, R		0	0	0	0	1	0	0	0
		WT/R	L, LTR, R		0	1	0	0	1	1	0	0
		WNR	2		0	0	0	0	0	0	0	0
					2	1	3	4	7	5	0	2
102	McQueen Rd	EL	L, LTR, R	No	2	2	4	4	3	4	0	2
		ET/R	L, LTR, R		0	0	0	0	0	0	0	0
		ENR	2		1	1	1	1	0	0	0	0
		WL	L, LTR, R		0	1	0	1	0	0	0	0
		WT/R	L, LTR, R		0	1	0	1	0	0	0	0
		WNR	2		0	0	0	0	0	0	0	0
					2	1	3	4	7	5	0	2
103	Arizona Ave	EL	L, LT, R, R	No	4	7	0	1	5	9	10	3
		ET/R	L, LT, R, R		1	1	1	1	4	2	2	4
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LTR, R		0	1	1	0	1	2	1	1
		WT/R	L, LTR, R		1	0	0	1	0	1	0	1
		WNR	2		0	0	0	0	0	0	0	0
					4	7	0	1	5	9	10	3
104	Alma School Rd	EL	L, LR, R	No	1	4	6	6	6	3	7	3
		ET/R	L, LR, R		3	4	10	20	18	8	13	6
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LR, R		0	1	2	4	3	1	4	1
		WT/R	L, LR, R		0	1	2	2	1	3	3	0
		WNR	2		0	0	0	0	0	0	0	0
					1	4	6	6	6	3	7	3
105	Dobson Rd	EL	N/A	No	N/A							
		ET/R	N/A		N/A							
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, LR, L		1	1	0	1	1	3	1	1
		WT/R	L, LR, L		1	1	2	1	1	5	1	1
		WNR	N/A		N/A							
					0	0	0	0	0	0	0	0
106	Price Rd	EL	L, L, R, R	No	4	2	3	5	2	2	2	3
		ET/R	L, L, R, R		1	0	2	5	2	2	1	1
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, L, R, R		1	0	0	1	0	0	0	0
		WT/R	L, L, R, R		1	1	1	1	0	1	2	0
		WNR	2		0	0	0	0	0	0	0	0
					4	2	3	5	2	2	2	3
107	McClintock Rd	EL	L, LT, T	No	1	0	1	0	1	1	0	1
		ET/R	L, LT, T		1	0	1	3	1	2	0	1
		ENR	N/A		N/A							
		WL	LT, T, R		1	0	0	0	0	1	0	1
		WT/R	LT, T, R		0	0	0	0	0	0	0	0
		WNR	2		0	0	0	0	0	0	0	0
					1	0	1	0	1	1	0	1
108	Kyrene Rd	EL	L, L, R	No	3	2	3	3	4	0	2	3
		ET/R	L, L, R		1	1	2	2	2	0	1	1
		ENR	2		0	0	0	0	0	0	0	0
		WL	L, R, R		1	0	1	1	1	1	0	1
		WT/R	L, R, R		2	0	1	1	0	3	0	1
		WNR	2		0	0	0	0	0	0	0	0
					3	2	3	3	4	0	2	3

LOOP 202 N (MORNING)**Loop 202 (N) (Morning)**

Arterial Exit #	Cross-Road	Ramp Turning Movements/Lanes	Ramp Lane	Ramp Meter	Average Queue Populations (30-minute intervals)								
					5:30- 6:00 a.m.	6:00- 6:30 a.m.	6:30- 7:00 a.m.	7:00- 7:30 a.m.	7:30- 8:00 a.m.	8:00- 8:30 a.m.	8:30- 9:00 a.m.	9:00- 9:30 a.m.	
1	24th St	EL	L, L, R, R	Yes	0	0	2	0	0	0	0	0	
		ET/R	L, L, R, R		0	0	0	2	0	0	1	1	
		ENR	2		0	0	0	4	1	0	0	0	
		WL	L, L, R, R		2	1	0	1	0	1	1	0	
		WT/R	L, L, R, R		0	1	0	1	0	3	1	0	
		WNR	1		0	0	0	0	1	2	0	0	
1C	32nd St	EL	L, L, R, R	Yes	0	0	1	0	1	0	2	0	
		ET/R	L, L, R, R		0	0	0	0	2	1	0	0	
		ENR	1		3	0	4	6	0	3	5	0	
		WL	L, L, R, R		3	1	6	1	6	4	3	1	
		WT/R	L, L, R, R		1	0	0	1	1	1	3	2	
		WNR	2		5	0	0	0	3	0	0	0	
2A	40th St	EL	L, LT, TR, R	N/A	0	2	2	3	1	3	5	2	
		ET/R	L, LT, TR, R		0	3	0	2	2	2	1	0	
		ENR	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		WL	LT, TR		0	0	1	1	2	1	0	2	
		WT/R	LT, TR		1	1	1	0	0	1	1	2	
		WNR	1		0	3	0	2	1	2	2	1	
2B	44th St	EL	L, L, R	Yes	1	0	3	3	0	2	3	3	
		ET/R	L, L, R		0	0	2	6	3	3	0	1	
		ENR	1		1	0	0	0	8	1	0	0	
		WL	L, L, R		2	3	1	1	2	3	2	1	
		WT/R	L, L, R		1	0	3	0	1	2	2	3	
		WNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
4	Van Buren St	EL	N/A	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		ET/R	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		ENR	2		0	0	0	0	0	0	0	0	
		WL	L, LT, T, R		0	3	0	1	8	2	0	1	
		WT/R	L, LT, T, R		0	1	0	1	0	0	0	0	
		WNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
5	Priest Dr	EL	L, LT, TR, R	N/A	4	3	2	2	5	14	7	4	
		ET/R	L, LT, TR, R		1	1	2	2	4	10	2	1	
		ENR	1		0	0	0	0	0	0	0	0	
		WL	L, LT, TR, R		2	3	2	4	9	9	4	3	
		WT/R	L, LT, TR, R		6	2	0	2	0	2	1	1	
		WNR	1		0	0	0	0	0	0	0	0	
5.5	W Center Pkwy	EL	L, T	No	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		ET/R	L, T		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		ENR	2		0	0	0	0	0	0	1	0	
		WL	LT, R		0	0	0	0	0	0	0	0	
		WT/R	LT, R		0	0	0	0	0	0	0	0	
		WNR	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
7	Scottsdale Rd	EL	L, L, R, R	Yes	3	2	0	8	8	13	0	6	
		ET/R	L, L, R, R		1	0	0	3	2	6	3	3	
		ENR	2		0	0	0	0	0	0	0	0	
		WL	L, L, R		2	0	2	5	3	12	2	13	
		WT/R	L, L, R		0	0	0	1	1	4	0	0	
		WNR	2		0	0	1	4	44	20	18	0	
8	McClintock Dr	EL	L, L, R, R	N/A	3	1	6	4	8	1	4	2	
		ET/R	L, L, R, R		1	2	1	0	1	0	1	1	
		ENR	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		WL	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		WT/R	N/A		N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
		WNR	1		0	0	0	0	7	0	0	0	
10	Dobson Rd	EL	L, R, R	No	0	0	0	0	0	0	0	0	
		ET/R	L, R, R		1	0	0	1	0	0	0	0	
		ENR	2		0	0	0	0	0	0	0	0	
		WL	L, L, T		0	0	0	1	1	2	0	1	
		WT/R	L, L, T		0	0	0	2	7	0	0	1	
		WNR	2		0	0	5	0	0	0	0	0	

Loop 202 N (Evening)

Loop 202 (N) (Evening)

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