

WASHOE COUNTY TRAVEL CHARACTERISTICS STUDY EXTERNAL STATION STUDY

FINAL REPORT

PREPARED FOR
REGIONAL TRANSPORTATION COMMISSION

PREPARED BY



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This report documents the design, implementation, and results of the External Station Video License Plate Capture component of the Washoe County Travel Characteristics Study. The Regional Transportation Commission (RTC) sponsored the study. The external station data contained in this report, along with the other component data collection efforts are essential elements in the transportation planning and modeling efforts for the Washoe County area. The purpose of this study is to improve the accuracy of travel demand modeling processes of RTC to allow them to be more responsive to the evolving transportation planning needs of the region.

The external station survey focused on seven roadways that provide the main points of access and egress into and out of the study area (commonly referred to as external stations). A map of the study area with the location of each external station is included as Appendix A. The stations included:

- Station 1 – SH 445 Pyramid Highway
- Station 2 – US 395 North at the California border
- Station 3 – I-80 West at the California border (data was collected west of Verdi, NV)
- Station 4 – SH 431 Mt. Rose Highway
- Station 5 – US 395 South at the Carson County line
- Station 6 – SH 342 Geiger Grade at the Storey Country line (data was collected east of US 395)
- Station 7 – I-80 East just west of Exit 32

Video cameras were stationed to record traffic entering and exiting the study area at each of these seven stations from approximately 7:15 am to 6 pm on Tuesday, October 25, 2005. Video was successfully captured for all lanes at each of the seven locations. The captured license plate information was post-processed and transcribed in the Alliance Transportation Group, Inc. (Alliance) Austin offices and was processed to determine matching plates and create external-external (EE) trip tables. A total of 73,420 license plates were captured and of those, 68,549 were fully or partially transcribed, for a transcription rate of 93.4%. The 24-hour traffic counts recorded for the day of the survey totaled 104,738 vehicles, with over three quarters of the counts being recorded during the survey period.

The external station data collection effort was conducted over a four and a half-month period from late September 2005 through early February 2006. The project began with a kick-off meeting and site selection activities in September 2005, followed by data collection in October, data processing from November 2005 through January 2006, and quality control, analysis and reporting at the conclusion of the project. The license plate capture summarized in this report took place on October 25, 2005. The methods used to design and conduct the study are summarized in this report. This includes survey design, site selection, data collection, and data processing. Each of these is summarized below.

SURVEY DESIGN

The project began on September 21, 2005 with a kick-off meeting to finalize data needs and review the locations for the video license plate capture. At the meeting, the project objectives and modeling needs were reviewed in order to ensure that the external survey would collect the necessary elements. The following elements were identified for the external travel survey:

TABLE 1: EXTERNAL SURVEY DATA ELEMENTS

DATA ELEMENTS
Unique Identifier
Station Number(s)
Direction(s) of Travel
Survey Date
Survey Time
License Plate Number
Commercial or Non-Commercial Status
Station Specific Traffic Counts

SITE SELECTION

The seven roadways selected for the video license plate capture and daily traffic counts are shown in Table 2. The 2005 counts reflect traffic for the 24-hour period surrounding the video license plate survey effort.

TABLE 2: EXTERNAL SURVEY STATIONS

NUMBER	STATION	2005 TRAFFIC COUNT
1	SH 445 Pyramid Highway	1,969
2	US 395 North	8,830
3	I-80 West	25,464
4	SH 431 Mt. Rose Highway	5,154
5	US 395 South	33,255
6	SH 342 Geiger Grade	4,084
7	I-80 East	25,982
Total		104,738

Prior to the kick-off meeting in September 2005, the Alliance Project Manager (PM) surveyed the selected sites and videotaped them in preparation for data collection. The site inspection was necessary to plan for camera placement, roadway geometrics, and surveyor safety. The ideal location for each station

would be on the actual external cordon line, but due to roadway designs, variations in the number of travel lanes, and safety considerations, the video location was sometimes moved to achieve the highest quality capture of license plates on the activity day. The Alliance PM discussed site selection criteria and presented the ideal capture locations at the kick-off meeting. The RTC staff provided input and a final set of site locations was approved. The exact sites are listed in Table 3.

TABLE 3: EXTERNAL SURVEY STATION LOCATIONS

NUMBER	STATION	LOCATION	LATITUDE	LONGITUDE
1	SH 445	Pyramid Highway	-119.681892	39.784504
2	US 395 North	At the California border	-120.001233	39.673195
3	I-80 West	At the California border (data was collected west of Verdi, NV)	-119.997337	39.495103
4	SH 431	Mt. Rose Highway	-119.916813	39.303669
5	US 395 South	At the Carson County line	-119.809372	39.224915
6	SH 342	Geiger Grade at the Storey Country line (data was collected east of US 395)	-119.717447	39.390669
7	I-80 East	Just west of Exit 32	-119.453064	39.590299

DATA COLLECTION

The use of video cameras to capture license plate information is a proven and accepted technology application for external station surveys. Video license plate capture is a passive data collection technique that provides external-through trip information with no interruption or inconvenience to the traveling public. This technique is especially useful in jurisdictions with non-intercept policies or for high volume facilities.

The video license plate capture took place on Tuesday, October 25, 2005 from 7:15 a.m. to 6 p.m. Daylight hours for that particular day ran from 7:19 a.m. to 6:07 p.m., however, good quality video depends on the amount and angle of sunlight. Many of the unreadable plates were due to poor light conditions at the beginning or end of the survey period.

Prior to the survey date, Alliance prepared each site. Site preparation includes distribution of barrels and bases, pavement marking, and ATR counter placement. Alliance conducts its video license plate collection using digital video cameras and power supplies located inside of standard traffic barrels snapped into placed on a heavy rubber base. The barrels have a hatch cut out of the leading side of the barrel to access the camera and a rectangle cut out of the following side of the barrel for video capture. This technique draws little attention and, therefore no interruption to the traveling public.

Pavement markings are utilized to indicate barrel placement and framing. Each lane of traffic, inbound and outbound, is covered by one camera. Paint is placed on the shoulder to indicate barrel placement and then on the roadway to indicate camera framing. Paint is also placed on the roadway to indicate a unique station/barrel number to insure that the proper barrel and videotapes are used to record that lane of traffic.

Prior to conducting the survey, local field personnel were hired and trained. The training included instruction on roadway safety, camera operation, unit set up and positioning, and conduct in the field. Field personnel were informed about the project, its purpose, and provided information about what to do when someone stops to make inquiries, including law enforcement personnel.

On the survey date, all field personnel were present at each site and set up was completed in time for data collection to begin by 7:15 a.m. The Alliance PM and Assistant Project Manager (APM) circulated among the sites throughout the day to address potential issues, check camera framing, collect travel time

information to be used during the EE trip table creation, and check traffic counter (ATR) tubes and operation. The data collection effort was completed on September 25, 2005 without incident.

The only event of note occurred just after noon. A wind advisory was posted on US 395 South directing commercial trucks and recreational vehicles to use the parallel facility, Old US 395, for a short distance. Since the survey site for US 395 was located along the wind advisory corridor, a contingency plan had been developed for this occurrence. Alliance deployed one additional camera setup on Old US 395 in the southbound direction.

DATA PROCESSING AND QUALITY CONTROL

Data reduction is accomplished in three steps; 1) digital videotapes are transferred to a special server and processed to remove the 'air', 2) plates are manually transcribed, and 3) ten percent of all plates are randomly checked for accuracy.

In the first step, the videotapes are transferred to the server specifically designed to accommodate high memory applications such as video transcription. During transfer, motion sensor technology is applied to remove the 'air', or dead time (those portions of the vide that have no activity).

To accommodate and expedite manual video transcription, Alliance developed a custom transcription tool. The tool also serves a quality control/assurance function. The transcription interface is designed to allow the transcriber to flip through images of a vehicle until a clear image of the license plate is visible. The plate is then entered; a vehicle classification is given, commercial or noncommercial; and the image is saved along with the transcription. To insure that every opportunity for clear transcription is afforded, the tool provides a view from each camera angle. Transcribers work on one direction of an external location at a time using an interface, which shows images from two camera positions on either side of the roadway. Both cameras are synchronized so that images of a vehicle are available from two different angles. The angle providing the best image is used to transcribe the plate number.

Throughout the transcription process, the PM or APM monitors progress. Alliance has developed tracking tools to monitor transcription rates and spot check quality. Once initial transcription is completed, 10% of the entire database and accompanying picture is randomly reviewed for quality assurance.

In addition to the transcription work completed on the video captures, Alliance downloaded the traffic count information from each location, which was processed for later use in expanding the license plate matches to create EE trip tables.

During the video license plate external station survey, data was collected to provide information on the number and classification of vehicles traveling through the study area. These vehicle movements are referred to as External-to-External (EE) trips. Video was collected for each lane and each direction at seven locations providing access to or egress from the study area. Traffic count data was also collected at each location for each direction. Finally, travel times from each external station to every other external station were collected to determine the threshold for EE trips.

VIDEO LICENSE PLATE DATA

A total of 73,420 plates were recorded during the survey day. The transcription process resulted in the following:

- ✓ 73,420 plates captured
- ✓ 66,280 plates fully transcribed (90.3%)
- ✓ 2,269 plates partially transcribed (3.1%)
- ✓ 4,871 plates were unrecognizable (6.6%)

Of the 73,420 captured plates, 93.4% were either fully or partially transcribed. It is important to note two facts: 1) partial transcription is defined as one or more unrecognizable characters, and 2) unrecognizable is defined as no visible plate. Partial transcriptions where one or more characters are unreadable are marked with an asterisk. Partial plates are run through the matching process using the asterisk as a wild card. Unrecognizable plates include those that are completely obscured, temporary dealer plates, or those that are simply missing.

Plates were also classified according to commercial or non-commercial vehicle type using the Federal Highway Administration (FHWA) Scheme F classification. Scheme F classifies vehicles into one of 13 categories from motorcycles up to multi-trailer trucks with 7 or more axles. A listing and diagram of the classification scheme is provided in Appendix B. Non-commercial vehicles included classes 1-4 and commercial vehicles included classes 5-13.

Table 4 provides the total number of captures by site by direction (inbound or outbound) along with a breakdown by classification: commercial or non-commercial.

TABLE 4: TOTAL LICENSE PLATE CAPTURES BY STATION

All Vehicles			
Site	Direction		Grand Total
	Inbound	Outbound	
1	662	652	1,314
2	3,465	2,762	6,227
3	8,937	9,054	17,991
4	1,947	1,669	3,616
5	12,118	12,177	24,295
6	1,348	1,357	2,705
7	8,320	8,952	17,272
Total	36,797	36,623	73,420
Non-Commercial			
Site	Direction		Grand Total
	Inbound	Outbound	
1	627	600	1,227
2	3,030	2,394	5,424
3	7,052	7,030	14,082
4	1,855	1,592	3,447
5	11,079	11,367	22,446
6	1,326	1,336	2,662
7	6,753	6,745	13,498
Total	31,722	31,064	62,786
Commercial			
Site	Direction		Grand Total
	Inbound	Outbound	
1	35	52	87
2	435	368	803
3	1,885	2,024	3,909
4	92	77	169
5	1,039	810	1,849
6	22	21	43
7	1,567	2,207	3,774
Total	5,075	5,559	10,634

Once the transcription was completed, the plates were processed through a database query to determine the total number of matching plates by site and time period. A total of 1,991 matches were found for all sites combined. Table 5 shows the number of EE matches by site for all vehicles and for non-commercial (1,130) and commercial vehicles (861).

TABLE 5: EE PLATE MATCHES BY STATION (TOTAL, COMMERCIAL, NON-COMMERCIAL)

All Vehicles								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	3	1	-	1	-	3	8
2	1	-	39	3	77	5	107	232
3	4	26	-	-	91	3	681	805
4	-	2	-	-	9	21	3	35
5	5	66	73	9	-	7	23	183
6	-	5	8	19	11	-	2	45
7	1	98	542	7	31	4	-	683
Grand Total	11	200	663	38	220	40	819	1,991
Non-Commercial								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	3	1	-	1	-	3	8
2	1	-	36	3	64	5	64	173
3	4	23	-	-	72	3	246	348
4	-	2	-	-	9	21	3	35
5	5	63	48	9	-	6	21	152
6	-	5	8	19	10	-	2	44
7	1	63	269	7	27	3	-	370
Grand Total	11	159	362	38	183	38	339	1,130
Commercial								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	-	-	-	-	-	-	-
2	-	-	3	-	13	-	43	59
3	-	3	-	-	19	-	435	457
4	-	-	-	-	-	-	-	-
5	-	3	25	-	-	1	2	31
6	-	-	-	-	1	-	-	1
7	-	35	273	-	4	1	-	313
Grand Total	-	41	301	-	37	2	480	861

TRAFFIC COUNT DATA

Automatic Traffic Recorder (ATR) machines were used to collect traffic count data at each of the seven external sites. One ATR and two count tubes were used for each direction on the four lane facilities and one ATR and two tubes were used on each of the two lane facilities. The total raw count for all seven stations was 96,742 vehicles. Table 6 shows the traffic counts by site and direction for commercial, non-commercial, and total vehicles.

TABLE 6: RAW TRAFFIC COUNTS BY STATION, DIRECTION AND CLASSIFICATION

Site	Commercial		Non-Commercial		Total		Total
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	
1	42	39	894	893	936	932	1,868
2	564	636	3,413	3,475	3,977	4,111	8,088
3	3,138	2,717	8,658	7,537	11,796	10,254	22,050
4	44	44	2,324	2,294	2,368	2,338	4,706
5	1,452	1,473	14,208	14,140	15,660	15,613	31,273
6	23	27	1,935	1,950	1,958	1,977	3,935
7	3,354	2,925	9,159	9,384	12,513	12,309	24,822
Total	8,617	7,861	40,591	39,673	49,208	47,534	96,742

The full counts (adjusted) for each station by 15 minute periods are provided in Appendix C.

TRAVEL TIME DATA

In order to determine the threshold for each external-through movement, travel time data was collected. On the survey day, the Alliance PM and APM collected travel time data while circulating to each of the sites. These travel time runs were used to determine an average travel time from each site to every other site.

Table 7 shows the average travel times from each site to every other site.

TABLE 7: AVERAGE TRAVEL TIMES FOR EACH STATION (IN MINUTES)

Origin	Destination						
	1	2	3	4	5	6	7
1	-	35	37	57	48	36	44
2	37	-	27	47	39	26	36
3	46	28	-	45	37	24	33
4	64	47	44	-	38	26	52
5	59	41	39	42	-	21	47
6	44	26	24	26	18	-	32
7	48	35	32	53	44	31	-

The ultimate purpose of the video license plate data collection effort is to provide an EE trip table for use in the regional travel demand model. To this end, the license plate, traffic count, and station-to-station travel time information are necessary. The following pages outline the methodology for expanding the observed data to AM Peak, PM Peak, and Off Peak EE trip table.

To move from raw data elements to an EE trip table requires several steps:

1. Determine station-to-station travel time thresholds. The thresholds determining what would be considered an EE trip for this study were taken from the average station-to-station travel times displayed above. Alliance analyzed the travel times and determined that the threshold for an EE trip would be set at the average station-to-station travel time plus 10 minutes during the off-peak or over-night periods and plus 15 minutes for either the AM or PM peak periods. Special care was given to any travel times through the construction area on US 395 northbound north of I-80.
2. Convert the observed EE plate matches to percentages per time period. The time periods were defined as: AM Peak 7:15 a.m. – 8:15 a.m.; Off Peak 8:15 a.m. – 4:30 p.m. and 5:30 p.m. – 7:15 a.m.; and PM Peak 4:30 p.m. – 5:30 p.m. The percentages were based on the inbound traffic for each station to every other station compared to the count at that station for that time period. Since no actual plates were collected during the overnight time period, the midday off-peak percentages were used as a surrogate.
3. Apply the real traffic counts by time period to the percentages of EE trips for each inbound station by time period. During this step, expanded EE trip tables are developed by time period.
4. Convert the expanded time of day trip tables to a weighted time of day EE trip percentage table. The aggregated time periods for each inbound station must be divided by the total counts at each station to obtain a properly weighted time of day EE trip percentage table.

The following four tables show the results of the expansion process. Tables 8, 9, 10, and 11 contain adjusted counts, which were used in expanding the observed EE percentages to expanded EE trips for each O-D pair. The counts take into consideration the fact that the observed matched plates and observed count from the video may not contain all vehicles, especially in the early part of the AM Peak and the latter part of the PM Peak. This table also includes the overnight period counts in the Off-Peak totals for use in expanding to the three time period through trip tables.

TABLE 8: 24-HOUR EXPANDED COUNTS

All Vehicles			
Site	Direction		Total
	Inbound	Outbound	
1	933	1,036	1,969
2	4,610	4,220	8,830
3	13,151	12,313	25,464
4	2,645	2,509	5,154
5	16,360	16,895	33,255
6	1,981	2,103	4,084
7	12,309	13,673	25,982
Total	51,989	52,749	104,738
Non-Commercial			
Site	Direction		Total
	Inbound	Outbound	
1	893	978	1,871
2	3,933	3,646	7,579
3	9,895	9,164	19,059
4	2,547	2,427	4,974
5	14,897	15,383	30,280
6	1,948	2,074	4,022
7	9,384	10,184	19,568
Total	43,497	43,856	87,353
Commercial			
Site	Direction		Total
	Inbound	Outbound	
1	40	58	98
2	677	574	1,251
3	3,256	3,149	6,405
4	98	82	180
5	1,463	1,512	2,975
6	33	29	62
7	2,925	3,489	6,414
Total	8,492	8,893	17,385

TABLE 9: AM PEAK EXPANDED COUNTS

All Vehicles			
Site	Direction		Total
	Inbound	Outbound	
1	87	34	121
2	303	171	474
3	565	653	1,218
4	114	163	277
5	1,072	1,430	2,502
6	225	58	283
7	1,125	492	1,617
Total	3,491	3,001	6,492
Non-Commercial			
Site	Direction		Total
	Inbound	Outbound	
1	84	28	112
2	278	141	419
3	413	530	943
4	113	158	271
5	1,005	1,320	2,325
6	224	58	282
7	992	338	1,330
Total	3,109	2,573	5,682
Commercial			
Site	Direction		Total
	Inbound	Outbound	
1	3	6	9
2	25	30	55
3	152	123	275
4	1	5	6
5	67	110	177
6	1	-	1
7	133	154	287
Total	382	428	810

TABLE 10: OFF-PEAK EXPANDED COUNTS

All Vehicles			
Site	Direction		Total
	Inbound	Outbound	
1	788	904	1,692
2	4,009	3,717	7,726
3	11,518	11,055	22,573
4	2,313	2,168	4,481
5	13,816	14,149	27,965
6	1,634	1,828	3,462
7	10,482	11,795	22,277
Total	44,560	45,616	90,176
Non-Commercial			
Site	Direction		Total
	Inbound	Outbound	
1	755	855	1,610
2	3,401	3,205	6,606
3	8,618	8,159	16,777
4	2,224	2,096	4,320
5	12,545	12,838	25,383
6	1,606	1,801	3,407
7	7,850	8,659	16,509
Total	36,999	37,613	74,612
Commercial			
Site	Direction		Total
	Inbound	Outbound	
1	33	49	82
2	608	512	1,120
3	2,900	2,896	5,796
4	89	72	161
5	1,271	1,311	2,582
6	28	27	55
7	2,632	3,136	5,768
Total	7,561	8,003	15,564

TABLE 11: PM PEAK EXPANDED COUNTS

All Vehicles			
Site	Direction		Total
	Inbound	Outbound	
1	58	98	156
2	298	332	630
3	1,068	605	1,673
4	218	178	396
5	1,472	1,316	2,788
6	122	217	339
7	702	1,386	2,088
Total	3,938	4,132	8,070
Non-Commercial			
Site	Direction		Total
	Inbound	Outbound	
1	54	95	149
2	254	300	554
3	864	475	1,339
4	210	173	383
5	1,347	1,225	2,572
6	118	215	333
7	542	1,187	1,729
Total	3,389	3,670	7,059
Commercial			
Site	Direction		Total
	Inbound	Outbound	
1	4	3	7
2	44	32	76
3	204	130	334
4	8	5	13
5	125	91	216
6	4	2	6
7	160	199	359
Total	549	462	1,011

The "24-Hour Expanded EE Trip Table for all Stations" shown in Table 12 is generated using the trip rates for each O-D pair, vehicle class, and time period applied to the expansion counts for the inbound direction for each site. The 24-hour values are an aggregation of the three individual periods (AM Peak, Off-Peak, and PM Peak).

Expanded trip tables for the AM Peak, Off-Peak, and PM Peak are provided in Tables 13, 14, and 15.

TABLE 12: 24-HOUR EXPANDED EE TRIP TABLE FOR ALL STATIONS

All Vehicles								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	5	2	-	2	-	4	13
2	1	-	50	4	107	6	156	324
3	6	39	-	-	138	5	1,120	1,308
4	-	3	-	-	13	30	4	50
5	7	95	104	13	-	8	33	260
6	-	8	13	30	14	-	3	68
7	2	159	900	11	47	7	-	1,126
Grand Total	16	309	1,069	58	321	56	1,320	3,149
Non-Commercial								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	5	2	-	2	-	4	13
2	1	-	46	4	87	6	86	230
3	6	33	-	-	104	5	360	508
4	-	3	-	-	13	30	4	50
5	7	91	69	13	-	7	30	217
6	-	8	13	30	13	-	3	67
7	2	91	387	11	39	5	-	535
Grand Total	16	231	517	58	258	53	487	1,620
Commercial								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	-	-	-	-	-	-	-
2	-	-	4	-	20	-	70	94
3	-	6	-	-	34	-	760	800
4	-	-	-	-	-	-	-	-
5	-	4	35	-	-	1	3	43
6	-	-	-	-	1	-	-	1
7	-	68	513	-	8	2	-	591
Grand Total	-	78	552	-	63	3	833	1,529

TABLE 13: AM PEAK PERIOD EXPANDED EE TRIP TABLE FOR ALL STATIONS

All Vehicles								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	-	-	-	-	-	-	-
2	-	-	-	-	1	1	1	3
3	-	1	-	-	3	-	21	25
4	-	-	-	-	-	-	-	-
5	-	4	6	-	-	1	1	12
6	-	-	-	2	3	-	1	6
7	-	4	22	-	2	-	-	28
Grand Total	-	9	28	2	9	2	24	74
Non-Commercial								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	-	-	-	-	-	-	-
2	-	-	-	-	-	1	-	1
3	-	1	-	-	2	-	5	8
4	-	-	-	-	-	-	-	-
5	-	4	2	-	-	1	1	8
6	-	-	-	2	3	-	1	6
7	-	2	7	-	2	-	-	11
Grand Total	-	7	9	2	7	2	7	34
Commercial								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	-	-	-	-	-	-	-
2	-	-	-	-	1	-	1	2
3	-	-	-	-	1	-	16	17
4	-	-	-	-	-	-	-	-
5	-	-	4	-	-	-	-	4
6	-	-	-	-	-	-	-	-
7	-	2	15	-	-	-	-	17
Grand Total	-	2	19	-	2	-	17	40

TABLE 14: OFF-PEAK PERIOD EXPANDED EE TRIP TABLE FOR ALL STATIONS

All Vehicles								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	5	2	-	2	-	3	12
2	1	-	41	4	102	4	150	302
3	6	36	-	-	126	5	1,027	1,200
4	-	3	-	-	13	28	4	48
5	7	91	97	13	-	5	30	243
6	-	8	13	28	9	-	2	60
7	2	148	817	11	44	7	-	1,029
Grand Total	16	291	970	56	296	49	1,216	2,894
Non-Commercial								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	5	2	-	2	-	3	12
2	1	-	38	4	84	4	82	213
3	6	30	-	-	95	5	340	476
4	-	3	-	-	13	28	4	48
5	7	87	66	13	-	4	27	204
6	-	8	13	28	8	-	2	59
7	2	83	355	11	36	5	-	492
Grand Total	16	216	474	56	238	46	458	1,504
Commercial								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	-	-	-	-	-	-	-
2	-	-	3	-	18	-	68	89
3	-	6	-	-	31	-	687	724
4	-	-	-	-	-	-	-	-
5	-	4	31	-	-	1	3	39
6	-	-	-	-	1	-	-	1
7	-	65	462	-	8	2	-	537
Grand Total	-	75	496	-	58	3	758	1,390

TABLE 15: PM PEAK PERIOD EXPANDED EE TRIP TABLE FOR ALL STATIONS

All Vehicles								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	-	-	-	-	-	1	1
2	-	-	9	-	4	1	5	19
3	-	2	-	-	9	-	72	83
4	-	-	-	-	-	2	-	2
5	-	-	1	-	-	2	2	5
6	-	-	-	-	2	-	-	2
7	-	7	61	-	1	-	-	69
Grand Total	-	9	71	-	16	5	80	181
Non-Commercial								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	-	-	-	-	-	1	1
2	-	-	8	-	3	1	4	16
3	-	2	-	-	7	-	15	24
4	-	-	-	-	-	2	-	2
5	-	-	1	-	-	2	2	5
6	-	-	-	-	2	-	-	2
7	-	6	25	-	1	-	-	32
Grand Total	-	8	34	-	13	5	22	82
Commercial								
EE Plate Count	Destination							Grand Total
Origin	1	2	3	4	5	6	7	
1	-	-	-	-	-	-	-	-
2	-	-	1	-	1	-	1	3
3	-	-	-	-	2	-	57	59
4	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-
7	-	1	36	-	-	-	-	37
Grand Total	-	1	37	-	3	-	58	99

The "Effective 24-hour EE Percentages" presented below in Table 16 are calculated using the aggregated 24-hour EE trip table (presented in Table 12) and the 24-hour expansion count (presented in Table 8) for each station. It is important to note that the percentages are aggregated time period counts that are then divided by the total count at that station. This insures that the percentages are properly weighted.

External-external percentages for the AM Peak, Off-Peak, and PM Peak are provided in Tables 17, 18, and 19.

TABLE 16: EFFECTIVE 24-HOUR EE PERCENTAGES BY STATION

All Vehicles								
EE Rate	Destination							
Origin	1	2	3	4	5	6	7	Grand Total
1	0.00%	0.54%	0.21%	0.00%	0.21%	0.00%	0.43%	1.39%
2	0.02%	0.00%	1.08%	0.09%	2.32%	0.13%	3.38%	7.03%
3	0.05%	0.30%	0.00%	0.00%	1.05%	0.04%	8.52%	9.95%
4	0.00%	0.11%	0.00%	0.00%	0.49%	1.13%	0.15%	1.89%
5	0.04%	0.58%	0.64%	0.08%	0.00%	0.05%	0.20%	1.59%
6	0.00%	0.40%	0.66%	1.51%	0.71%	0.00%	0.15%	3.43%
7	0.02%	1.29%	7.31%	0.09%	0.38%	0.06%	0.00%	9.15%
Grand Total	1.54%	7.32%	8.68%	2.31%	1.90%	2.66%	9.65%	6.06%
Non-Commercial								
EE Rate	Destination							
Origin	1	2	3	4	5	6	7	Grand Total
1	0.00%	0.56%	0.22%	0.00%	0.22%	0.00%	0.45%	1.46%
2	0.03%	0.00%	1.17%	0.10%	2.21%	0.15%	2.19%	5.85%
3	0.06%	0.33%	0.00%	0.00%	1.05%	0.05%	3.64%	5.13%
4	0.00%	0.12%	0.00%	0.00%	0.51%	1.18%	0.16%	1.96%
5	0.05%	0.61%	0.46%	0.09%	0.00%	0.05%	0.20%	1.46%
6	0.00%	0.41%	0.67%	1.54%	0.67%	0.00%	0.15%	3.44%
7	0.02%	0.97%	4.12%	0.12%	0.42%	0.05%	0.00%	5.70%
Grand Total	1.64%	6.34%	5.64%	2.39%	1.68%	2.56%	4.78%	3.72%
Commercial								
EE Rate	Destination							
Origin	1	2	3	4	5	6	7	Grand Total
1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	0.00%	0.00%	0.59%	0.00%	2.95%	0.00%	10.34%	13.88%
3	0.00%	0.18%	0.00%	0.00%	1.04%	0.00%	23.34%	24.57%
4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5	0.00%	0.27%	2.39%	0.00%	0.00%	0.07%	0.21%	2.94%
6	0.00%	0.00%	0.00%	0.00%	3.03%	0.00%	0.00%	3.03%
7	0.00%	2.32%	17.54%	0.00%	0.27%	0.07%	0.00%	20.21%
Grand Total	0.00%	13.59%	17.53%	0.00%	4.17%	10.34%	23.88%	18.01%

TABLE 17: AM PEAK PERIOD EE PERCENTAGES BY STATION

All Vehicles								
EE Rate	Destination							
Origin	1	2	3	4	5	6	7	Grand Total
1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	0.00%	0.00%	0.00%	0.00%	0.31%	0.31%	0.31%	0.94%
3	0.00%	0.17%	0.00%	0.00%	0.51%	0.00%	3.70%	4.38%
4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5	0.00%	0.34%	0.43%	0.00%	0.00%	0.09%	0.09%	0.95%
6	0.00%	0.00%	0.00%	0.81%	1.21%	0.00%	0.40%	2.42%
7	0.00%	0.36%	2.01%	0.00%	0.18%	0.00%	0.00%	2.55%
Grand Total	0.00%	5.20%	5.54%	1.15%	0.57%	3.23%	5.11%	2.04%
Non-Commercial								
EE Rate	Destination							
Origin	1	2	3	4	5	6	7	Grand Total
1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	0.00%	0.00%	0.00%	0.00%	0.00%	0.34%	0.00%	0.34%
3	0.00%	0.23%	0.00%	0.00%	0.46%	0.00%	1.14%	1.83%
4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5	0.00%	0.36%	0.18%	0.00%	0.00%	0.09%	0.09%	0.72%
6	0.00%	0.00%	0.00%	0.81%	1.21%	0.00%	0.40%	2.43%
7	0.00%	0.21%	0.73%	0.00%	0.21%	0.00%	0.00%	1.14%
Grand Total	0.00%	5.00%	2.25%	1.18%	0.48%	3.23%	2.07%	1.05%
Commercial								
EE Rate	Destination							
Origin	1	2	3	4	5	6	7	Grand Total
1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	0.00%	0.00%	0.00%	0.00%	3.57%	0.00%	3.57%	7.14%
3	0.00%	0.00%	0.00%	0.00%	0.64%	0.00%	10.83%	11.46%
4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5	0.00%	0.00%	5.36%	0.00%	0.00%	0.00%	0.00%	5.36%
6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
7	0.00%	1.49%	11.19%	0.00%	0.00%	0.00%	0.00%	12.69%
Grand Total	0.00%	6.06%	20.69%	0.00%	1.75%	0.00%	11.92%	10.58%

TABLE 18: OFF-PEAK PERIOD EE PERCENTAGES BY STATION

All Vehicles								
EE Rate	Destination							
Origin	1	2	3	4	5	6	7	Grand Total
1	0.00%	0.58%	0.19%	0.00%	0.19%	0.00%	0.39%	1.36%
2	0.04%	0.00%	1.05%	0.11%	2.53%	0.11%	3.55%	7.38%
3	0.06%	0.32%	0.00%	0.00%	1.09%	0.04%	8.10%	9.61%
4	0.00%	0.13%	0.00%	0.00%	0.56%	1.19%	0.19%	2.07%
5	0.05%	0.66%	0.71%	0.10%	0.00%	0.04%	0.21%	1.78%
6	0.00%	0.51%	0.81%	1.72%	0.61%	0.00%	0.10%	3.74%
7	0.02%	1.33%	7.13%	0.11%	0.43%	0.06%	0.00%	9.08%
Grand Total	2.17%	8.12%	7.14%	2.76%	2.12%	3.14%	10.20%	5.99%
Non-Commercial								
EE Rate	Destination							
Origin	1	2	3	4	5	6	7	Grand Total
1	0.00%	0.62%	0.21%	0.00%	0.21%	0.00%	0.41%	1.44%
2	0.04%	0.00%	1.13%	0.12%	2.46%	0.12%	2.42%	6.29%
3	0.07%	0.35%	0.00%	0.00%	1.10%	0.05%	3.95%	5.52%
4	0.00%	0.13%	0.00%	0.00%	0.60%	1.26%	0.20%	2.18%
5	0.06%	0.69%	0.53%	0.11%	0.00%	0.04%	0.21%	1.64%
6	0.00%	0.52%	0.83%	1.76%	0.52%	0.00%	0.10%	3.72%
7	0.02%	1.05%	4.52%	0.13%	0.46%	0.06%	0.00%	6.25%
Grand Total	2.37%	7.42%	5.16%	2.91%	1.90%	3.00%	6.04%	4.07%
Commercial								
EE Rate	Destination							
Origin	1	2	3	4	5	6	7	Grand Total
1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	0.00%	0.00%	0.55%	0.00%	3.01%	0.00%	11.20%	14.75%
3	0.00%	0.20%	0.00%	0.00%	1.05%	0.00%	23.68%	24.93%
4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5	0.00%	0.34%	2.47%	0.00%	0.00%	0.11%	0.22%	3.14%
6	0.00%	0.00%	0.00%	0.00%	5.00%	0.00%	0.00%	5.00%
7	0.00%	2.45%	17.56%	0.00%	0.31%	0.08%	0.00%	20.40%
Grand Total	0.00%	12.67%	13.79%	0.00%	4.92%	10.00%	21.57%	17.28%

TABLE 19: PM PEAK PERIOD EE PERCENTAGES BY STATION

All Vehicles								
EE Rate	Destination							
Origin	1	2	3	4	5	6	7	Grand Total
1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.61%	1.61%
2	0.00%	0.00%	3.01%	0.00%	1.34%	0.33%	1.67%	6.35%
3	0.00%	0.18%	0.00%	0.00%	0.80%	0.00%	6.60%	7.58%
4	0.00%	0.00%	0.00%	0.00%	0.00%	0.87%	0.00%	0.87%
5	0.00%	0.00%	0.06%	0.00%	0.00%	0.13%	0.13%	0.32%
6	0.00%	0.00%	0.00%	0.00%	1.79%	0.00%	0.00%	1.79%
7	0.00%	1.00%	7.83%	0.00%	0.14%	0.00%	0.00%	8.97%
Grand Total	0.00%	2.59%	11.32%	0.00%	1.14%	2.06%	5.53%	4.32%
Non-Commercial								
EE Rate	Destination							
Origin	1	2	3	4	5	6	7	Grand Total
1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.72%	1.72%
2	0.00%	0.00%	3.10%	0.00%	1.16%	0.39%	1.55%	6.20%
3	0.00%	0.22%	0.00%	0.00%	0.77%	0.00%	1.75%	2.74%
4	0.00%	0.00%	0.00%	0.00%	0.00%	0.90%	0.00%	0.90%
5	0.00%	0.00%	0.07%	0.00%	0.00%	0.13%	0.13%	0.34%
6	0.00%	0.00%	0.00%	0.00%	1.80%	0.00%	0.00%	1.80%
7	0.00%	1.05%	4.54%	0.00%	0.17%	0.00%	0.00%	5.76%
Grand Total	0.00%	2.56%	7.42%	0.00%	0.96%	2.07%	1.78%	2.32%
Commercial								
EE Rate	Destination							
Origin	1	2	3	4	5	6	7	Grand Total
1	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	0.00%	0.00%	2.44%	0.00%	2.44%	0.00%	2.44%	7.32%
3	0.00%	0.00%	0.00%	0.00%	0.96%	0.00%	27.88%	28.85%
4	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
6	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
7	0.00%	0.78%	22.48%	0.00%	0.00%	0.00%	0.00%	23.26%
Grand Total	0.00%	2.86%	29.41%	0.00%	6.52%	0.00%	31.38%	19.25%

CONCLUSIONS

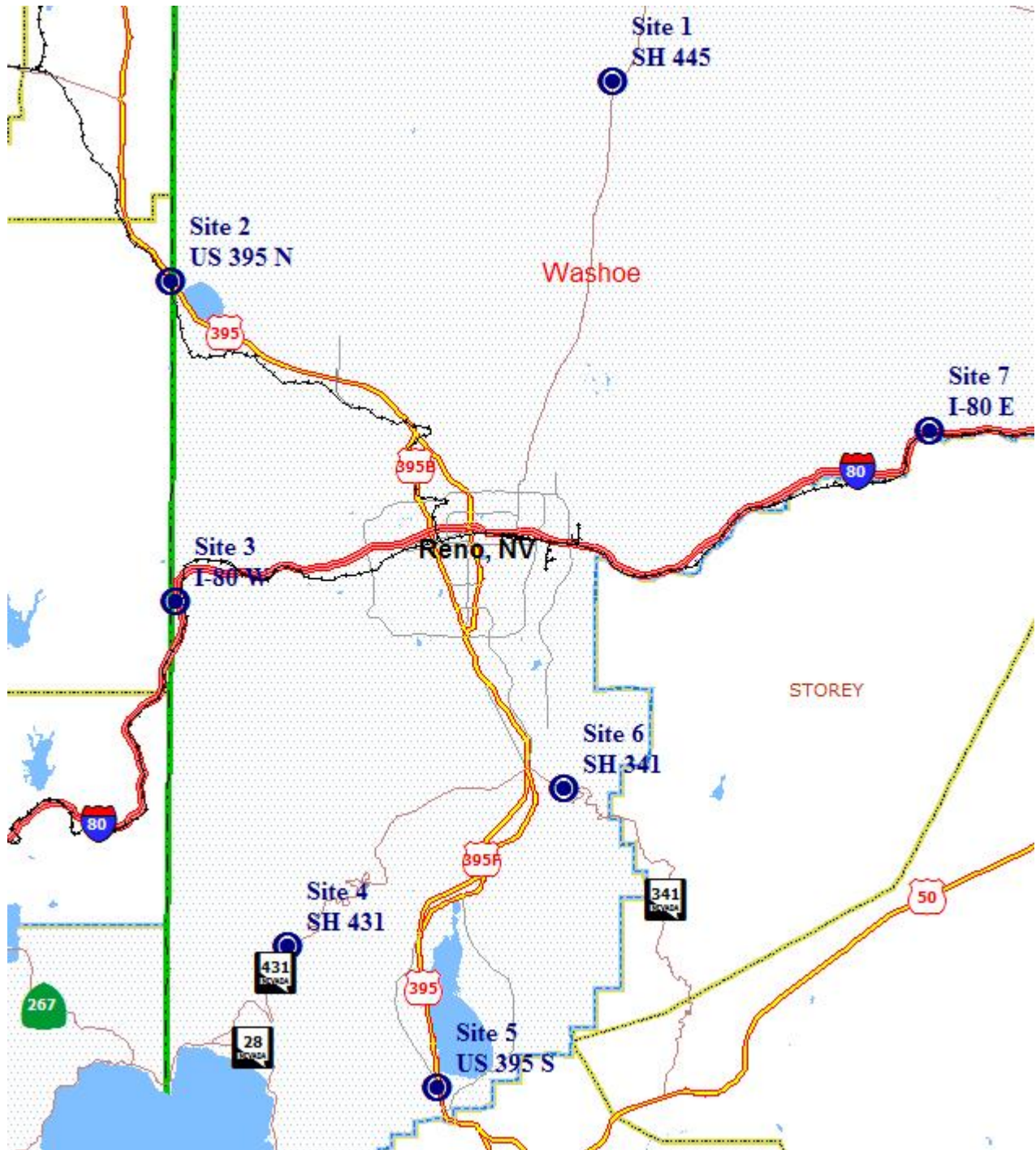
The purpose of this study was to collect and document those trips traveling through the Washoe County area on a standard model day. While external through trips do not comprise a large percentage of trips for most urban areas, they are, nonetheless, an important component to understanding the travel demand characteristics of that area.

The various data elements necessary for determining the EE trips for the Washoe County region were collected in October 2005 and analyzed over the next several months. That data included video license plate capture at seven external station locations, 24-hour traffic counts for each location, and station-to-station travel time information.

The data was ultimately used to develop AM Peak Period, Off-Peak Period, PM Peak Period, and 24-hour EE trip tables for use in the travel demand model used by the Regional Transportation Commission. That model assists in planning efforts performed by the RTC for Washoe County. The data presented in this report will provide one more component necessary to perform those transportation planning efforts.

APPENDIX A – MAP OF STUDY AREA AND EXTERNAL STATIONS

FIGURE 1: STUDY AREA AND SITE LOCATION MAP












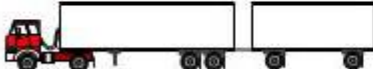



APPENDIX B – FHWA SCHEME F VEHICLE CLASSIFICATION

TABLE 20: FHWA SCHEME F VEHICLE CLASSIFICATION

CLASS	DESCRIPTION
1	Motorcycles
2	Passenger Cars
3	Other Two-Axle, Four-Tire Single Unit Vehicles
4	Buses
5	Two-Axle, Six-Tire, Single-Unit Trucks
6	Three-Axle Single-Unit Trucks
7	Four or More Axle Single-Unit Trucks
8	Four or Fewer Axle Single-Trailer Trucks
9	Five-Axle Single-Trailer Trucks
10	Six or More Axle Single-Trailer Trucks
11	Five or fewer Axle Multi-Trailer Trucks
12	Six-Axle Multi-Trailer Trucks
13	Seven or More Axle Multi-Trailer Trucks

FIGURE 2: FHWA SCHEME F VEHICLE CLASSIFICATION

1 Motorcycles 	2 Passenger Cars 	3 Two Axle, 4 Tire Single Units 	4 Buses 
5 Two Axle, Six Tire Single Unit 	6 Three Axle Single Units 	7 Four or More Axle Single Units 	8 Four or Less Axle Single Trailers 
9 Five Axle Single Trailers 	10 Seven or More Axle Single Trailers 	11 Five or Less Axle Multi-Trailers 	
12 Six Axle Multi-Trailers 	13 Seven or More Axle Multi-Trailers 		

APPENDIX C – TIME OF DAY EXPANDED COUNTS

SH 445 - Site 01				
Start Time	South (bound)		North (bound)	
	Inbound		Outbound	
	NC	C	NC	C
0000	2	-	1	-
0015	-	-	2	-
0030	1	-	3	-
0045	-	-	3	-
0100	-	-	2	-
0115	2	-	2	-
0130	3	-	3	-
0145	-	-	2	-
0200	1	-	1	-
0215	2	-	1	-
0230	-	-	2	-
0245	1	-	1	-
0300	-	-	-	-
0315	-	-	1	-
0330	-	-	1	-
0345	-	-	1	-
0400	-	-	-	-
0415	-	-	1	-
0430	1	-	-	-
0445	1	-	1	-
0500	-	1	-	-
0515	-	-	-	1
0530	1	-	1	-
0545	1	-	-	-
0600	2	-	-	1
0615	1	-	-	1
0630	2	-	1	-
0645	3	-	1	-
0700	5	1	3	-
0715	23	1	8	2
0730	19	1	6	1
0745	16	1	8	1
0800	26	-	6	2
0815	26	1	6	1
0830	28	1	6	1
0845	31	-	11	2
0900	27	1	15	1
0915	23	-	6	1
0930	12	1	9	1
0945	18	1	7	1
1000	22	1	8	1
1015	15	-	9	1
1030	16	1	6	1

SH 445 - Site 01				
Start Time	South (bound)		North (bound)	
	Inbound		Outbound	
	NC	C	NC	C
1045	14	1	11	1
1100	17	1	8	2
1115	17	1	12	2
1130	14	1	9	1
1145	12	1	15	1
1200	15	1	11	1
1215	11	1	6	2
1230	16	1	14	2
1245	16	1	13	1
1300	13	2	13	-
1315	16	1	7	2
1330	13	-	10	2
1345	15	1	17	4
1400	12	2	13	-
1415	21	1	15	1
1430	15	-	23	-
1445	14	1	17	1
1500	15	-	12	1
1515	13	1	9	1
1530	14	1	21	1
1545	12	1	15	1
1600	17	1	22	1
1615	13	1	18	-
1630	17	1	20	1
1645	11	1	25	-
1700	15	1	22	-
1715	11	1	28	2
1730	15	1	22	1
1745	10	-	25	1
1800	12	-	14	-
1815	21	1	24	-
1830	9	-	27	-
1845	11	-	25	-
1900	11	-	23	-
1915	12	-	28	2
1930	10	-	24	-
1945	7	-	21	-
2000	8	-	29	1
2015	12	-	24	-
2030	5	-	14	-
2045	5	-	17	-
2100	1	-	17	-
2115	2	-	15	-
2130	2	-	10	-
2145	3	-	12	1
2200	4	-	6	-
2215	3	-	6	-

SH 445 - Site 01				
Start Time	South (bound)		North (bound)	
	Inbound		Outbound	
	NC	C	NC	C
2230	2	-	15	1
2245	1	-	6	-
2300	3	-	8	-
2315	1	-	6	-
2330	2	-	4	-
2345	1	-	5	-
Total	893	40	978	58

US 395 North - Site 02				
Start Time	South (bound)		North (bound)	
	Inbound		Outbound	
	NC	C	NC	C
0000	10	4	13	4
0015	12	5	16	4
0030	10	5	13	6
0045	9	4	17	2
0100	5	3	5	5
0115	5	4	10	3
0130	8	2	7	4
0145	5	1	5	1
0200	3	2	10	4
0215	8	4	5	-
0230	6	3	7	2
0245	4	2	2	3
0300	6	2	6	-
0315	6	-	3	-
0330	1	2	3	4
0345	4	-	8	2
0400	3	-	5	-
0415	1	-	2	-
0430	2	-	3	4
0445	5	-	1	-
0500	3	-	5	1
0515	9	-	2	1
0530	2	1	2	3
0545	4	-	1	2
0600	10	4	5	-
0615	9	2	3	1
0630	10	1	10	4
0645	7	1	8	2
0700	25	4	14	5
0715	119	7	32	7
0730	62	4	40	8
0745	55	6	38	9

US 395 North - Site 02				
Start Time	South (bound)		North (bound)	
	Inbound		Outbound	
	NC	C	NC	C
0800	42	8	31	6
0815	52	4	38	12
0830	72	9	35	12
0845	53	9	43	5
0900	81	9	62	10
0915	79	12	46	12
0930	66	7	46	9
0945	66	5	44	8
1000	78	16	56	9
1015	76	13	40	10
1030	66	8	49	9
1045	46	10	57	11
1100	71	14	46	14
1115	65	11	44	7
1130	78	10	52	11
1145	56	11	47	9
1200	70	11	48	14
1215	71	13	50	7
1230	86	12	47	10
1245	72	13	43	14
1300	62	17	42	7
1315	60	6	48	13
1330	78	12	42	5
1345	51	13	55	12
1400	61	14	39	8
1415	78	7	72	12
1430	74	11	104	15
1445	57	11	62	11
1500	62	7	53	8
1515	64	7	39	3
1530	66	13	57	9
1545	88	12	73	9
1600	69	16	64	8
1615	67	15	75	5
1630	73	12	71	8
1645	64	12	78	7
1700	58	9	71	12
1715	59	11	80	5
1730	72	12	71	8
1745	83	12	66	5
1800	61	12	72	5
1815	63	16	65	10
1830	67	5	76	8
1845	52	12	68	12
1900	48	6	74	6
1915	60	9	52	5
1930	66	12	68	2

US 395 North - Site 02				
Start Time	South (bound)		North (bound)	
	Inbound		Outbound	
	NC	C	NC	C
1945	55	5	80	3
2000	38	4	75	5
2015	42	7	68	5
2030	42	9	61	5
2045	28	7	56	6
2100	28	6	36	5
2115	23	9	41	4
2130	23	11	40	5
2145	22	6	28	5
2200	23	8	35	1
2215	14	4	37	4
2230	9	5	27	4
2245	14	3	23	2
2300	9	4	24	2
2315	5	6	19	1
2330	9	3	22	5
2345	12	1	12	4
Total	3,933	677	3,646	574

IH 80 West - Site 03				
Start Time	East (bound)		West (bound)	
	Inbound		Outbound	
	NC	C	NC	C
0000	49	19	30	24
0015	37	24	44	27
0030	34	23	28	25
0045	36	13	21	27
0100	25	27	25	15
0115	36	15	20	22
0130	27	10	14	17
0145	29	15	9	19
0200	23	14	17	12
0215	15	20	17	19
0230	14	26	7	20
0245	14	15	10	17
0300	4	9	11	14
0315	10	20	9	23
0330	3	17	7	15
0345	12	18	9	25
0400	11	14	10	11
0415	11	16	8	18
0430	5	19	9	19
0445	5	10	13	28
0500	9	9	11	20

IH 80 West - Site 03				
Start Time	East (bound)		West (bound)	
	Inbound		Outbound	
	NC	C	NC	C
0515	8	13	10	20
0530	6	18	16	21
0545	5	19	25	17
0600	10	18	11	25
0615	10	17	17	14
0630	9	15	12	22
0645	16	24	30	29
0700	14	12	23	22
0715	97	31	64	30
0730	123	33	121	20
0745	92	43	120	30
0800	101	45	225	43
0815	98	29	207	40
0830	117	37	189	67
0845	123	32	160	65
0900	125	39	161	87
0915	121	42	191	81
0930	119	34	147	50
0945	139	47	152	58
1000	144	37	128	26
1015	117	37	132	66
1030	137	35	154	60
1045	148	34	113	34
1100	151	45	125	45
1115	164	46	101	46
1130	129	42	125	46
1145	134	31	113	45
1200	141	52	120	28
1215	133	48	117	45
1230	139	39	154	61
1245	140	44	222	60
1300	159	43	172	47
1315	135	49	236	48
1330	152	52	223	36
1345	132	43	170	59
1400	143	54	160	38
1415	135	43	224	60
1430	152	49	252	56
1445	161	57	238	68
1500	172	44	141	36
1515	192	46	106	20
1530	217	53	120	40
1545	271	55	241	35
1600	254	55	214	51
1615	189	46	223	53
1630	212	60	131	35
1645	231	54	123	33

IH 80 West - Site 03				
Start Time	East (bound)		West (bound)	
	Inbound		Outbound	
	NC	C	NC	C
1700	195	46	122	30
1715	226	44	99	32
1730	205	52	122	35
1745	246	64	197	33
1800	217	36	115	36
1815	181	58	125	21
1830	180	45	118	31
1845	198	55	103	20
1900	192	42	105	18
1915	199	41	113	22
1930	196	36	110	16
1945	185	34	97	21
2000	163	37	88	22
2015	147	39	85	22
2030	113	35	78	34
2045	89	35	79	19
2100	61	24	81	28
2115	78	32	59	31
2130	67	29	53	25
2145	58	25	53	18
2200	54	43	62	19
2215	67	33	54	21
2230	46	34	47	27
2245	46	34	70	25
2300	46	30	35	20
2315	42	32	33	25
2330	30	27	32	36
2345	42	20	41	27
Total	9,895	3,256	9,164	3,149

SH 431 - Site 04				
Start Time	North (bound)		South (bound)	
	Inbound		Outbound	
	NC	C	NC	C
0000	4	-	9	-
0015	2	-	7	1
0030	3	-	6	-
0045	4	-	6	-
0100	-	-	8	-
0115	4	-	6	-
0130	5	-	3	-
0145	5	-	3	-
0200	1	-	2	-
0215	2	-	2	-

SH 431 - Site 04				
Start Time	North (bound)		South (bound)	
	Inbound		Outbound	
	NC	C	NC	C
0230	2	-	1	-
0245	-	-	1	-
0300	-	-	-	-
0315	2	-	-	-
0330	1	-	2	-
0345	-	-	1	-
0400	-	-	-	-
0415	1	-	-	-
0430	-	-	-	-
0445	-	-	1	-
0500	1	-	1	-
0515	-	-	-	-
0530	2	-	1	-
0545	1	-	-	1
0600	3	-	1	-
0615	4	-	2	-
0630	7	-	-	-
0645	6	-	-	1
0700	10	-	1	-
0715	25	-	26	-
0730	35	-	57	1
0745	28	-	32	1
0800	25	1	43	3
0815	44	1	38	2
0830	37	3	52	5
0845	20	1	45	5
0900	34	3	39	3
0915	38	1	48	5
0930	40	2	51	3
0945	28	1	37	1
1000	33	3	45	-
1015	47	2	42	2
1030	34	1	47	2
1045	39	-	40	2
1100	36	1	37	1
1115	36	1	36	2
1130	34	2	35	3
1145	43	3	38	2
1200	37	2	18	1
1215	45	3	37	2
1230	34	2	32	2
1245	38	3	26	2
1300	34	3	29	1
1315	34	3	37	2
1330	38	2	34	2
1345	43	1	35	2
1400	44	4	26	1

SH 431 - Site 04				
Start Time	North (bound)		South (bound)	
	Inbound		Outbound	
	NC	C	NC	C
1415	36	3	32	1
1430	50	4	37	1
1445	46	4	25	1
1500	40	2	36	-
1515	57	3	34	2
1530	61	1	34	1
1545	62	6	39	2
1600	58	2	47	2
1615	68	4	40	-
1630	49	2	38	1
1645	42	3	38	1
1700	55	1	47	2
1715	64	2	50	1
1730	66	2	52	1
1745	63	3	50	1
1800	59	-	40	-
1815	74	2	34	1
1830	50	1	36	-
1845	49	1	39	-
1900	51	-	46	2
1915	73	1	55	-
1930	51	-	49	-
1945	47	1	40	-
2000	40	-	42	-
2015	29	-	29	-
2030	21	-	29	-
2045	30	-	24	-
2100	10	-	28	-
2115	7	-	24	-
2130	7	1	19	-
2145	9	-	24	-
2200	5	-	19	1
2215	7	-	20	-
2230	6	-	14	-
2245	6	-	24	-
2300	6	-	14	-
2315	6	-	23	-
2330	5	-	13	-
2345	9	-	17	-
Total	2,547	98	2,427	82

US 395 South - Site 05				
Start Time	North (bound)		South (bound)	
	Inbound		Outbound	
	NC	C	NC	C
0000	40	5	47	10
0015	26	4	43	2
0030	26	3	34	5
0045	21	-	33	5
0100	25	3	45	2
0115	15	2	31	3
0130	11	-	22	2
0145	10	2	21	4
0200	12	3	19	1
0215	14	3	14	4
0230	12	4	17	4
0245	9	1	18	1
0300	10	-	15	-
0315	2	2	7	-
0330	7	1	11	-
0345	10	1	10	2
0400	8	-	5	1
0415	12	1	7	2
0430	11	1	7	5
0445	4	3	8	4
0500	7	1	8	4
0515	5	-	8	3
0530	15	2	11	2
0545	16	4	11	6
0600	32	5	13	5
0615	32	4	22	8
0630	39	8	31	6
0645	52	3	39	10
0700	73	7	47	11
0715	224	6	191	10
0730	294	16	522	41
0745	221	18	319	29
0800	266	27	288	30
0815	253	23	229	31
0830	254	16	241	24
0845	252	29	224	26
0900	301	25	204	30
0915	253	23	421	59
0930	224	19	354	37
0945	221	26	246	32
1000	229	31	215	40
1015	233	25	216	30
1030	197	28	209	38
1045	184	20	190	27
1100	228	27	195	32
1115	210	28	182	26
1130	195	24	190	24

US 395 South - Site 05				
Start Time	North (bound)		South (bound)	
	Inbound		Outbound	
	NC	C	NC	C
1145	196	26	155	22
1200	217	21	160	26
1215	202	24	181	22
1230	208	28	168	38
1245	202	32	173	22
1300	185	23	173	26
1315	214	30	199	16
1330	203	28	208	28
1345	175	19	207	21
1400	187	24	179	12
1415	204	25	182	21
1430	225	32	226	17
1445	227	33	270	20
1500	261	26	226	19
1515	270	34	263	26
1530	303	34	276	17
1545	310	30	346	17
1600	299	21	355	17
1615	331	26	293	15
1630	309	33	316	28
1645	327	26	323	25
1700	323	24	278	18
1715	388	42	308	20
1730	337	29	321	14
1745	270	29	309	28
1800	305	18	274	24
1815	289	32	268	28
1830	293	29	249	33
1845	287	27	267	19
1900	338	26	263	17
1915	332	28	248	17
1930	253	29	281	22
1945	213	12	226	14
2000	206	13	217	13
2015	146	9	183	15
2030	130	9	178	10
2045	120	9	142	7
2100	131	4	143	11
2115	87	4	115	5
2130	76	3	116	4
2145	87	4	134	4
2200	56	3	99	5
2215	71	-	118	5
2230	64	4	89	5
2245	51	1	111	12
2300	54	4	90	6
2315	57	5	77	10

US 395 South - Site 05				
Start Time	North (bound)		South (bound)	
	Inbound		Outbound	
	NC	C	NC	C
2330	46	4	82	6
2345	37	3	78	7
Total	14,897	1,463	15,383	1,512

SH 341 - Site 06				
Start Time	North (bound)		South (bound)	
	Inbound		Outbound	
	NC	C	NC	C
0000	4	-	9	-
0015	3	-	6	-
0030	4	-	4	-
0045	1	-	-	-
0100	2	-	3	-
0115	5	-	5	-
0130	2	-	2	-
0145	1	-	-	-
0200	1	-	1	-
0215	-	-	2	-
0230	-	-	1	-
0245	2	-	1	-
0300	-	-	2	-
0315	-	-	-	-
0330	1	-	3	-
0345	1	-	2	-
0400	-	-	3	-
0415	1	-	-	-
0430	1	-	1	-
0445	2	-	-	-
0500	2	-	1	-
0515	-	-	1	-
0530	1	-	-	-
0545	1	-	-	-
0600	4	-	-	-
0615	3	-	-	-
0630	8	-	2	-
0645	8	-	1	-
0700	10	-	1	-
0715	47	-	3	-
0730	68	1	22	-
0745	64	-	12	-
0800	45	-	21	-
0815	57	1	20	1
0830	47	-	16	1
0845	48	1	16	-

SH 341 - Site 06				
Start Time	North (bound)		South (bound)	
	Inbound		Outbound	
	NC	C	NC	C
0900	44	-	27	1
0915	60	1	20	1
0930	61	-	22	-
0945	50	-	15	-
1000	37	-	17	1
1015	26	-	21	1
1030	33	-	20	-
1045	33	1	21	1
1100	32	1	23	-
1115	27	1	30	1
1130	23	-	19	-
1145	25	1	24	2
1200	24	-	20	1
1215	23	-	18	1
1230	21	2	27	1
1245	26	1	21	-
1300	17	1	33	-
1315	24	1	24	1
1330	20	-	26	1
1345	27	1	27	1
1400	25	1	24	1
1415	30	1	20	1
1430	28	-	28	1
1445	23	1	28	1
1500	29	2	32	-
1515	33	1	32	1
1530	22	-	41	-
1545	36	2	50	-
1600	25	-	47	-
1615	36	-	42	-
1630	25	1	51	-
1645	31	3	45	1
1700	32	-	54	1
1715	30	-	65	-
1730	27	1	63	1
1745	30	-	57	1
1800	32	1	56	-
1815	25	1	43	1
1830	28	2	45	-
1845	24	-	52	1
1900	25	-	46	-
1915	26	-	69	-
1930	28	1	59	-
1945	37	-	61	-
2000	21	-	48	-
2015	21	1	44	1
2030	27	-	32	-

SH 341 - Site 06				
Start Time	North (bound)		South (bound)	
	Inbound		Outbound	
	NC	C	NC	C
2045	11	-	34	-
2100	11	-	30	1
2115	11	-	28	-
2130	9	-	13	-
2145	10	-	15	-
2200	12	-	27	-
2215	7	-	19	-
2230	14	-	12	-
2245	11	-	15	-
2300	2	-	12	-
2315	11	-	9	-
2330	4	-	5	-
2345	2	-	5	-
Total	1,948	33	2,074	29

IH 80 East - Site 07				
Start Time	West (bound)		East (bound)	
	Inbound		Outbound	
	NC	C	NC	C
0000	17	22	42	26
0015	18	20	43	14
0030	15	13	26	21
0045	19	14	20	19
0100	17	10	31	23
0115	22	17	23	18
0130	14	10	22	14
0145	18	14	25	12
0200	9	6	20	12
0215	8	13	21	14
0230	7	11	18	6
0245	12	15	10	18
0300	10	17	14	12
0315	6	12	5	10
0330	7	9	10	12
0345	4	12	6	12
0400	8	25	14	9
0415	8	16	12	12
0430	12	13	5	9
0445	10	9	13	13
0500	17	18	4	7
0515	18	14	9	15
0530	15	24	6	10
0545	12	11	11	17
0600	21	17	8	12

IH 80 East - Site 07				
Start Time	West (bound)		East (bound)	
	Inbound		Outbound	
	NC	C	NC	C
0615	30	22	19	10
0630	54	17	19	10
0645	95	20	24	14
0700	100	22	33	25
0715	261	25	45	20
0730	269	27	95	40
0745	204	43	97	47
0800	258	38	101	47
0815	274	42	129	50
0830	223	39	94	51
0845	229	39	92	40
0900	282	34	88	50
0915	250	38	101	48
0930	205	46	93	49
0945	169	46	87	50
1000	146	49	90	48
1015	168	38	84	57
1030	151	39	106	46
1045	121	34	89	53
1100	131	43	96	64
1115	127	39	98	57
1130	130	42	97	60
1145	146	42	100	57
1200	129	39	95	53
1215	127	49	105	45
1230	119	40	113	54
1245	116	41	96	55
1300	122	56	103	48
1315	123	37	115	58
1330	140	46	104	56
1345	137	52	114	50
1400	124	37	104	57
1415	143	37	126	50
1430	108	31	114	49
1445	138	39	166	45
1500	152	44	132	51
1515	124	35	155	56
1530	165	48	171	51
1545	164	43	228	58
1600	154	40	220	50
1615	143	40	263	63
1630	136	36	286	50
1645	149	44	307	54
1700	133	39	281	50
1715	124	41	313	45
1730	152	44	329	37
1745	160	49	242	53

IH 80 East - Site 07				
Start Time	West (bound)		East (bound)	
	Inbound		Outbound	
	NC	C	NC	C
1800	137	32	233	62
1815	123	42	239	54
1830	126	35	258	61
1845	134	31	251	41
1900	115	34	263	46
1915	98	41	299	39
1930	116	37	229	41
1945	114	27	204	35
2000	94	38	217	39
2015	104	43	160	36
2030	71	38	149	34
2045	73	29	126	34
2100	62	35	99	26
2115	57	29	95	33
2130	49	22	112	40
2145	42	25	109	35
2200	42	34	84	28
2215	36	23	82	28
2230	38	20	73	48
2245	28	25	78	28
2300	23	26	65	28
2315	26	27	75	29
2330	27	13	58	33
2345	20	26	49	33
Total	9,384	2,925	10,184	3,489