

FINAL REPORT

**STANFORD UNIVERSITY
2003 TRAFFIC MONITORING REPORT
and TECHNICAL APPENDIX**

Prepared for:

**Santa Clara County
Department of Planning Development**



January 29, 2004

Prepared by:



**1570 The Alameda, Suite 222
San Jose, CA 95126
(408) 298-2929-Phone
(408)298-2970-Fax**

Table of Contents

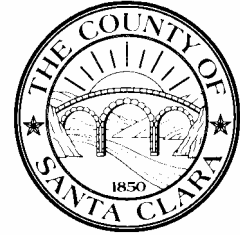
Foreword from the County of Santa Clara Planning Office	I
Introduction.....	- 1 -
Task 1.0 Traffic Monitoring Data Collection Methodology	- 1 -
Task 1.1 Machine Cordon Line Traffic Counts.....	- 1 -
Task 1.2 Parking Lot Driveway Counts	- 4 -
Task 1.3 Parking Permit Scanning/Count	- 7 -
Task 1.4 License Plate Survey	- 7 -
Task 2.0 Traffic Monitoring Data Analysis	- 7 -
Task 2.1 Daily Cordon Count Spreadsheets.....	- 7 -
Task 2.2 Daily Parking Spreadsheets	- 8 -
Task 2.3 Adjustments For Parking and Cut-Through Vehicles	- 8 -
Inbound AM Traffic.....	- 9 -
Outbound PM Traffic.....	- 12 -
Conclusion.....	- 13 -
Appendix	

List of Figures

Figure 1 Daily Machine Cordon Count Locations.....	- 2 -
Figure 2 Daily Machine Cordon Count Locations.....	- 3 -
Figure 3 Driveway and Parking Count Locations	- 6 -
Figure 4 2003 AM Peak Inbound vs. 2001 Baseline	- 11 -
Figure 5 2003 PM Peak Outbound vs. 2001 Baseline	- 12 -

List of Tables

Table 1 2003 Raw Traffic Count Summary	- 5 -
Table 2 2003 Adjusted Traffic Totals	- 9 -
Table 3 2001 Baseline Adjusted Traffic Totals	- 10 -
Table 4 2003 Monitoring Comparison to Baseline	- 13 -



FOREWORD FROM THE COUNTY OF SANTA CLARA PLANNING OFFICE

Background

The purpose of this report is to compare traffic volumes entering and exiting Stanford campus during the inbound AM peak and the outbound PM commute peak to a traffic baseline. This comparison is completed on an annual basis. The requirements for establishment of the traffic baseline and performing annual comparisons to the baseline are contained within the December 2000 Stanford Community Plan/General Use Permit (GUP)/Environmental Impact Report (EIR) and within the 2000 Stanford General Use Permit. These documents can be reviewed at the County website or at the County Planning Office. Essentially, Stanford is required to attain a “no net new commute trip” standard as defined in the GUP and EIR.

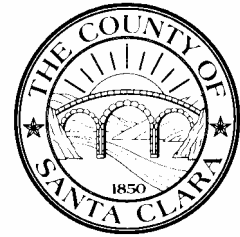
The Process

Following the adoption of the GUP by the County Board of Supervisors in December 2000, the County Planning Office selected Korve Engineering (KORVE) to conduct the monitoring process outlined in the conditions of approval. Because of the type of data to be collected (particularly license plate numbers), the data could not be collected until after the start of daylight savings time in Spring 2001. The data collection involved three, 2-week periods in the Spring and one, 2-week period in the Fall 2001.

Condition of Approval G.7 outlines the process for establishing the baseline counts and for continuing monitoring in subsequent years. The process can be summarized as follows:

- Peak hour traffic is counted at least three times per year for a two-week period each time. The three counts shall be averaged to determine the annual traffic level.
- All counts are recorded at the 16 campus entry and exit points forming a cordon around the campus.
- License plate numbers are recorded for each entering and exiting vehicle to determine the amount of non-campus traffic.
- Cordon volumes are adjusted for parking lots within the cordon used by the hospital (these volumes are subtracted from the cordon line counts) and parking lots outside the cordon used by the university (these volumes are added to the cordon line counts).
- A peak hour is then established for the campus based on the counts, adjusted for cut through and parking lot location.

Board of Supervisors: Donald F. Gage, Blanca Alvarado, Pete McHugh, James T. Beall Jr., Liz Kniss
County Executive: Peter Kutas, Jr.



Condition of Approval G.6 defines the peak commute directions as entering the campus in the morning peak commute period and leaving the campus in the evening commute period. The peak commute period is defined as the one-hour period of time between 7 AM and 9 AM and again between 4 PM and 6 PM with the highest volume of traffic, as defined by the counts. Therefore, the two peak hours are considered to be independent events. For example, an increase in AM peak traffic for two out of three years would trigger the additional elements of the monitoring program without a change, or even a decrease, in PM peak traffic, or the reverse. Also, a significant increase during one year in the AM and a sufficient increase in the PM for the following year would not trigger additional mitigation.

Activities Related to Traffic Baseline and Annual Monitoring Counts to Date

Stanford University Traffic Monitoring Report -- 2001 GUP Baseline

The 2001 Baseline Report was originally issued on July 3, 2002. An update to that report was issued on October 15, 2003. The revised report corrected some typographical errors. The original report indicated that the 3,591 figure would need to be exceeded by 1%. This was a misstatement, as the count of 3,555 is the figure that would need to be exceeded by 1%. 3,591 is the 1% trigger as noted below. Per the provisions of the GUP, this original Traffic Baseline Report established the standard for measuring future traffic impacts to the "no net new commute" standard.

The following were the count dates of the 2001 Baseline Report:

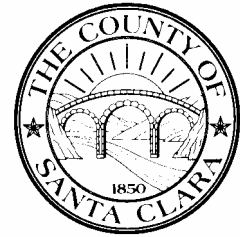
- Week of April 2, 2001
- Week of April 9, 2001
- Week of April 23, 2001
- Week of April 30, 2001
- Week of May 7, 2001
- Week of May 14, 2001
- Week of October 22, 2001
- Week of October 29, 2001

The following were the results of the 2001 Baseline Monitoring:

Inbound AM:

Average Count	3,319
90% Confidence Interval	+/- 120
Significant Traffic Increase	3,439
1% Increase Trigger	3,474

Board of Supervisors: Donald F. Gage, Blanca Alvarado, Pete McHugh, James T. Beall Jr., Liz Kniss
County Executive: Peter Kutras, Jr.



Outbound PM:

Average	3,446
90% Confidence Interval	+/- 109
Significant Traffic Increase	3,555
1% Trigger	3,591

Stanford University Traffic Monitoring Report – 2002 Monitoring Report

The 2002 Monitoring Report was originally issued in July 2003. The count dates for the 2002 Monitoring Report were as follows:

- Week of April 15, 2002
- Week of April 22, 2002
- Week of April 29, 2002
- Week of May 6, 2002
- Week of May 13, 2002
- Week of May 20, 2002
- Week of October 14, 2002
- Week of October 21, 2002

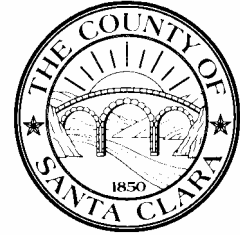
The 2002 Monitoring Report concluded that the adjusted AM inbound count totaled 3,390 vehicles. This represented an increase of 71 vehicles, which fell within the 90% confidence interval and did not represent a significant AM inbound traffic increase. The PM outbound count totaled 3,678 vehicles which was an increase of 232 vehicles from the baseline, which was higher than the 90% confidence interval. This count exceeded the 1% trigger of 3,591 vehicles by 87. The following is a summary of the results of the 2002 Monitoring Report as contained in the July 2003 document.

Inbound AM:

Adjusted Average 2002 Count	3,390
Baseline-established 90% Confidence Interval (2001)	+/- 120
Baseline-established Significant Traffic Increase (2001)	3,439
Baseline-established 1% Increase Trigger (2001)	3,474
Result (Falls below the 1% Trigger by 84)	-84

Outbound PM:

Adjusted Average 2002 Count	3,678
Baseline-established 90% Confidence Interval (2001)	+/- 109
Baseline-established Significant Traffic Increase (2001)	3,555
Baseline-established 1% Increase Trigger (2001)	3,591
Result (232 increase in vehicles exceeds the trigger by 87 vehicles)	+87



Adjustment 1 to 2002 Monitoring Report

An update to the original 2002 Monitoring Report was issued on October 15, 2003. Following the publication of the July 2003 report, Stanford and the County separately analyzed traffic data for the Stanford Homecoming Week. Based on consultation with Stanford and independent analysis of County consultant traffic data, the County determined that data collected for the week of Homecoming should not be included in the comparison data set. The rationale for this decision was that this event (Homecoming) had been ongoing for years, was not included in the baseline count, and would continue to be an annual event. The County communicated to Stanford that other future “large events” would not be excluded from future counts. The revised report substituted the week of October 28, 2002 for the previously counted week of October 14, 2002. The following are the results of the Revised 2002 Monitoring Report.

Inbound AM:

Adjusted Average 2002 Count	3,287
Baseline-established 90% Confidence Interval (2001)	+/- 120
Baseline-established Significant Traffic Increase (2001)	3,439
Baseline-established 1% Increase Trigger (2001)	3,474
Result (Falls below the 1% Trigger by 187)	-187

Outbound PM:

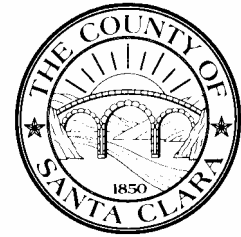
Adjusted Average 2002 Count	3,598
Baseline-established 90% Confidence Interval (2001)	+/- 109
Baseline-established Significant Traffic Increase (2001)	3,555
Baseline-established 1% Increase Trigger (2001)	3,591
Result (152 increase in vehicles exceeds the trigger by 7 vehicles)	+7

Adjustment 2 to the 2002 Monitoring Report

Subsequent to the first adjustment to the 2002 Monitoring Report, Stanford informed the County that additional Marguerite shuttle runs had been introduced to campus since the completion of the baseline count, and thus counted in the Year 1 (2002) comparison counts. This resulted in an increase of 12 vehicles in each peak hour. County staff determined that these new bus lines should be subtracted from the comparison count. This provided an end result as follows:

Inbound AM:

Adjusted Average 2002 Count	3,275
Baseline-established 90% Confidence Interval (2001)	+/- 120
Baseline-established Significant Traffic Increase (2001)	3,439
Baseline-established 1% Increase Trigger (2001)	3,474
Result (Falls below the 1% Trigger by 199)	-199



Outbound PM:

Adjusted Average 2002 Count	3,586
Baseline-established 90% Confidence Interval (2001)	+/- 109
Baseline-established Significant Traffic Increase (2001)	3,555
Baseline-established 1% Increase Trigger (2001)	3,591
Result (Falls below the 1% Trigger by 5 vehicles)	-5

Stanford University Traffic Monitoring Report – 2003 Monitoring Report

This report represents the 2003 Monitoring Report. The count dates for the 2003 Monitoring Report were as follows:

- Week of April 7, 2003
- Week of April 21, 2003
- Week of April 28, 2003
- Week of May 5, 2003
- Week of May 12, 2003
- Week of May 19, 2003
- Week of September 29, 2003
- Week of October 20, 2003

The 2003 Monitoring Report concluded that the adjusted AM inbound count totaled 3,413 vehicles. This represented an increase of 94 vehicles, which fell within the 90% confidence interval and did not represent a significant AM inbound traffic increase. The PM outbound count totaled 3,476 vehicles which was an increase of 30 vehicles from the baseline, which was also fell within the 90% confidence interval. The following is a summary of the results of the 2003 Monitoring Report.

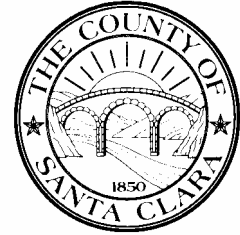
Inbound AM:

Adjusted Average 2003 Count	3,413
Baseline-established 90% Confidence Interval (2001)	+/- 120
Baseline-established Significant Traffic Increase (2001)	3,439
Baseline-established 1% Increase Trigger (2001)	3,474
Result (Falls below the 90% Confidence Interval by 26)	-26
Result (Falls below the 1% Trigger by 61 vehicles)	-61

Outbound PM:

Adjusted Average 2003 Count	3,476
Baseline-established 90% Confidence Interval (2001)	+/- 109
Baseline-established Significant Traffic Increase (2001)	3,555
Baseline-established 1% Increase Trigger (2001)	3,591

Board of Supervisors: Donald F. Gage, Blanca Alvarado, Pete McHugh, James T. Beall Jr., Liz Kniss
County Executive: Peter Kutras, Jr.



Result (Falls below the 90% Confidence Interval by 79 vehicles)	-79
Result (Falls below the 1% Trigger by 115 vehicles)	-115

Future Use and Comparison of Peak Commute Traffic

Annual traffic comparisons to the baseline count will continue to be performed for the life of the GUP. The GUP identifies the methodology used to establish the baseline and a traffic threshold that Stanford will not exceed. The GUP identifies additional criteria that would require Stanford to implement traffic mitigations. If these criteria are met, the County would require Stanford to implement the mitigations. These details are addressed in the GUP and EIR. Each annual traffic comparison will provide a conclusion that addresses Stanford attainment of the "no net new commute trip" standard.

County Planning Office Project Management:

Ann Draper: Planning Director
Gary Rudholm: Senior Planner, Post-Approval Monitoring
Tim Heffington: Associate Planner, Project Manager: Stanford University Environmental Mitigation Monitoring and Reporting Program

County Roads and Airports Review Team:

Masoud Akbarzadeh, PE, Traffic Engineer
Suhil Kandah, PE, Associate Civil Engineer

Korve Engineering:

Dennis Struecker, PE, Project Manager
Jay Nelson, PE, Project Engineer

Stanford Coordination Contact:

Brodie Hamilton, Director, Parking and Transportation Services

CONTACT INFORMATION

For further information, regarding this document or other Stanford University Community Plan and General Uses Permit policy issues, contact the County Planning Office by phone or visit our web site.

PHONE: (408) 299-5770

WEB SITE: www.sccplanning.org

Board of Supervisors: Donald F. Gage, Blanca Alvarado, Pete McHugh, James T. Beall Jr., Liz Kniss
County Executive: Peter Kutas, Jr.

INTRODUCTION

This report presents the traffic and parking data that has been collected at Stanford University by Korve Engineering during the Spring and Fall monitoring periods of 2003. Traffic volumes were collected for six weeks during the spring and two weeks during the fall. The spring counts were conducted the weeks of April 7, April 21, April 28, May 5, May 12, and May 19. The fall counts were conducted the weeks of September 29 and October 20. The data include vehicle counts at all of the access points to the campus and parking lots. Parking lot counts and cut-through percentages were used to adjust the raw traffic counts in order to determine the total amount of peak hour traffic generated by Stanford University. The parking data were used to add in campus traffic that park outside of the count area and subtract out hospital traffic from parking inside the count area. License plate surveys were used to calculate the amount of traffic that cuts through the campus and thus is not University-generated traffic. Data collection methodology is described in greater detail in Task 1. A description of the data analysis procedures is presented in Task 2. The data collected in calendar year 2003 is compared to the baseline counts collected in calendar year 2001. Differences between the two years are then analyzed to determine if traffic is increasing to a significant degree.

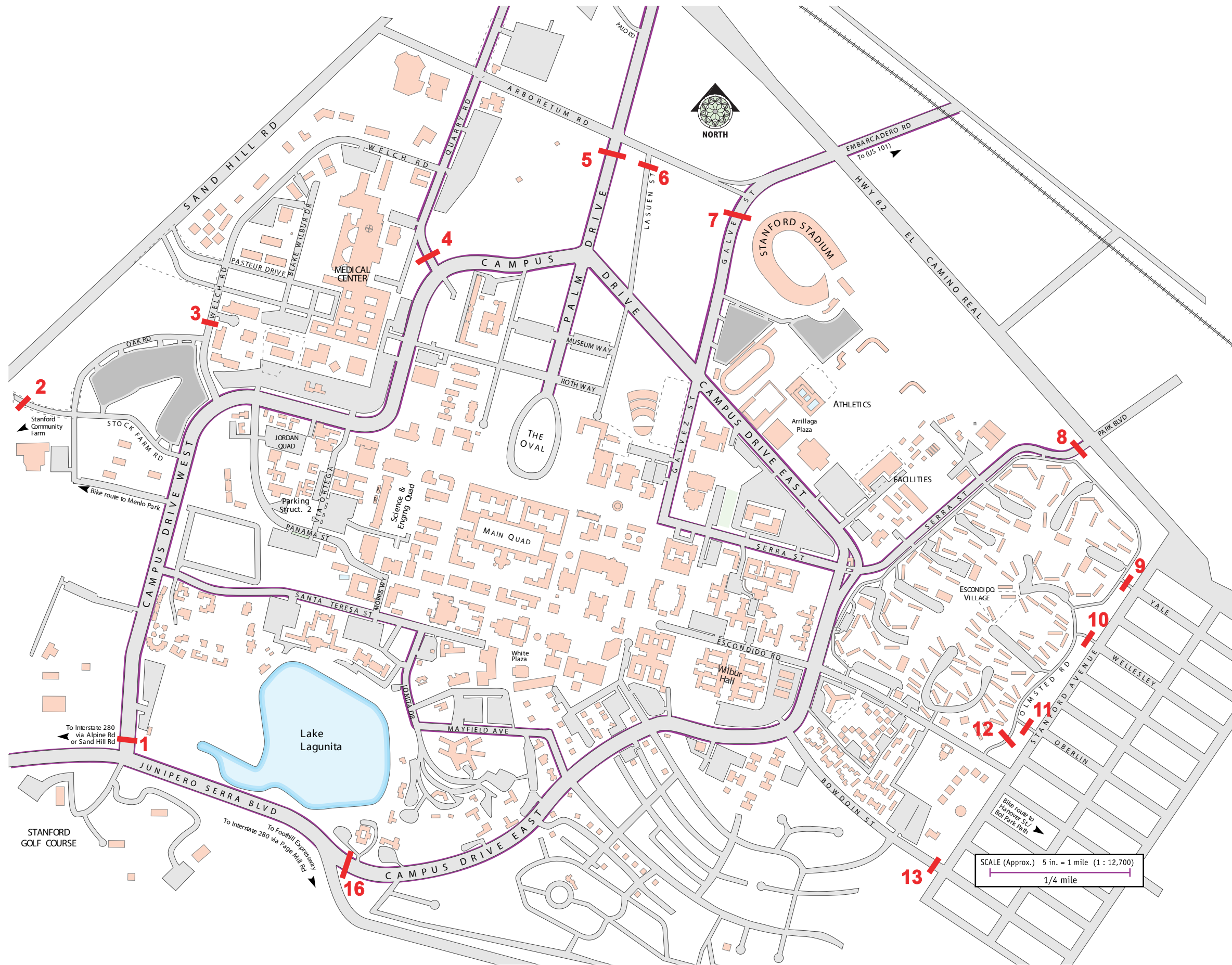
Task 1.0 Traffic Monitoring Data Collection Methodology

Data collection is a critical component of the traffic monitoring program. The following work elements were conducted to collect all relevant traffic data for the monitoring program.

Task 1.1 Machine Cordon Line Traffic Counts

Directional traffic counts were collected at Stanford University for eight weeks in 2003 on each of the 16 roadways that provide access to and from the campus. The location of the 16 cordon counts are listed below and shown graphically in Figures 1 and 2.

1. Campus Drive West, north of Junipero Serra Boulevard
2. Stock Farm Road, east of Sand Hill Road
3. Welch Road, north of Oak Road
4. Quarry Road, north of Campus Drive West
5. Palm Drive, south of Arboretum Road
6. Lasuen Street, south of Arboretum Road
7. Galvez Street, south of Arboretum Road
8. Serra Street, southwest of El Camino Real
9. Yale Street, west of Stanford Avenue
10. Wellesley Street, west of Stanford Avenue
11. Oberlin Street, west of Stanford Avenue
12. Olmsted Road, north of Escondido Road
13. Bowdoin Street, west of Stanford Avenue
14. Raimundo Way, west of Stanford Avenue
15. Santa Maria Avenue, north of Junipero Serra Boulevard
16. Campus Drive East, east of Junipero Serra Boulevard



Cordon Count Locations

1. Campus Drive West north of Junipero Serra Blvd.
2. Stock Farm Road east of Sand Hill Road
3. Welch Road north of Oak Road
4. Quarry Road north of Campus Drive
5. Palm Drive south of Arboretum Road
6. Lasuen Street south of Arboretum Road
7. Galvez Street south of Arboretum Road
8. Serra Street southwest of El Camino Real
9. Yale Street west of Stanford Avenue
10. Wellesley Street west of Stanford Avenue
11. Oberlin Street west of Stanford Avenue
12. Olmsted Road north of Escondido Road
13. Bowdoin west of Stanford Avenue
14. Raimundo west of Stanford Avenue
15. Santa Maria Avenue north of Junipero Serra Blvd.
16. Campus Drive East east of Junipero Serra Blvd.

For count locations 14 and 15 see Figure 2

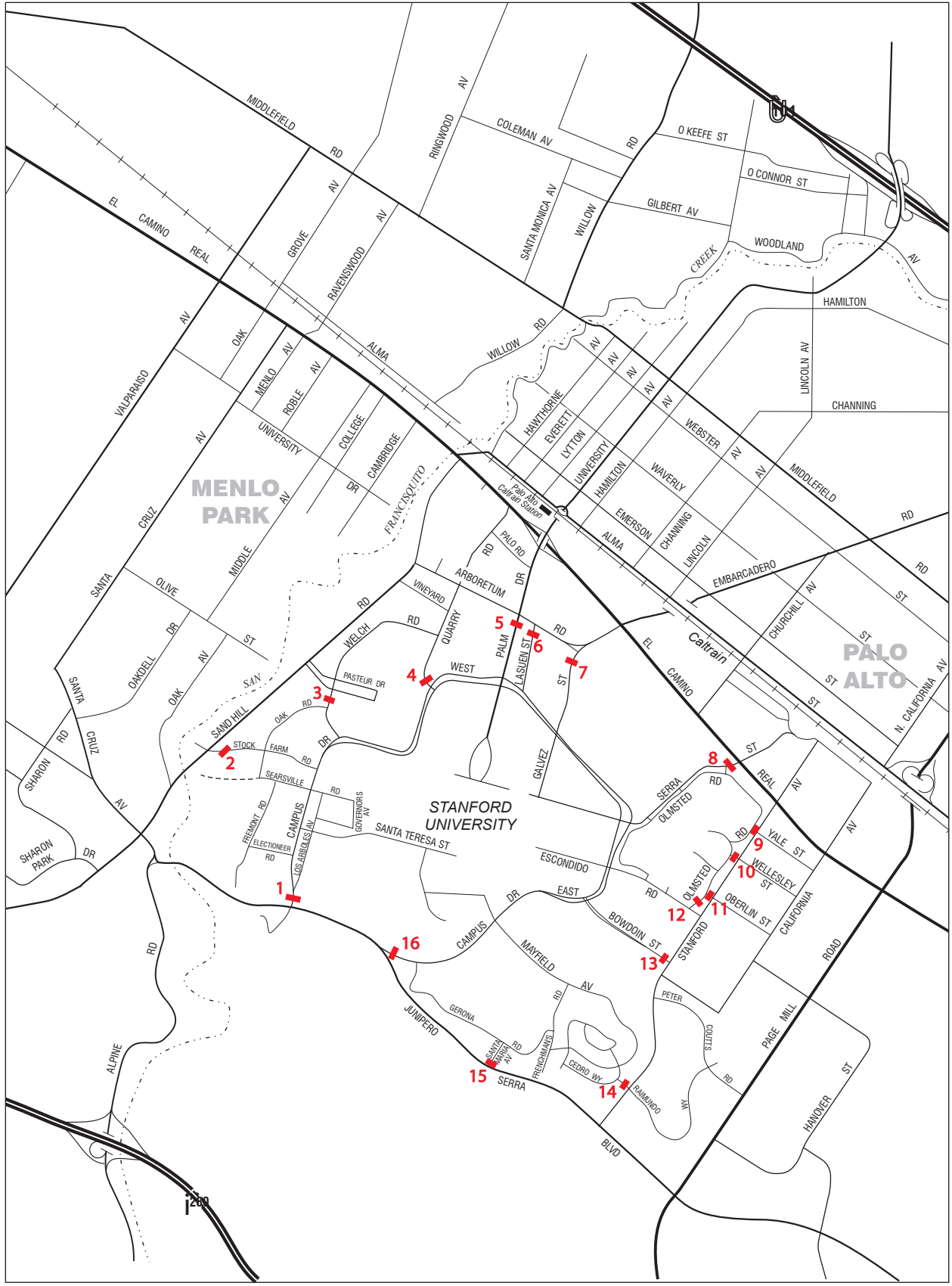


Figure 2
Daily Machine Cordon Count Locations

The detailed traffic counts at the 16 cordon locations are presented in Appendix A and are summarized in Table 1. Table 1 shows the a.m. inbound and p.m. outbound peak hour volumes for each day that traffic was monitored. As indicated in Table 1, the a.m. peak hour usually occurred from 8:00 to 9:00 and the p.m. peak hour generally occurred between 5:00 to 6:00. The unadjusted a.m. inbound traffic volumes ranged from a low of 3,104 on Friday, October 24 to a high of 5,556 on Tuesday, April 8. The p.m. peak hour traffic volumes ranged from a low of 3,869 on Tuesday, May 13 to a high of 4,747 on Friday, May 9.

Task 1.2 Parking Lot Driveway Counts

There are two parking lots (L1 – Rectangle Lot and L2 – Quarry Lot) outside the cordon line that serve some campus uses. There are also several parking lots (L3, L4 – Beckman Lot, L5 – Stock Farm Road Lot, and L6) along with parking structures 1 (PS1) and 3 (PS3) that are inside the established cordon line that serve some hospital uses. Traffic was counted by direction into and out of these parking lots during the entire count period. The detailed count sheets for the driveway traffic at these lots are included in Appendix B.

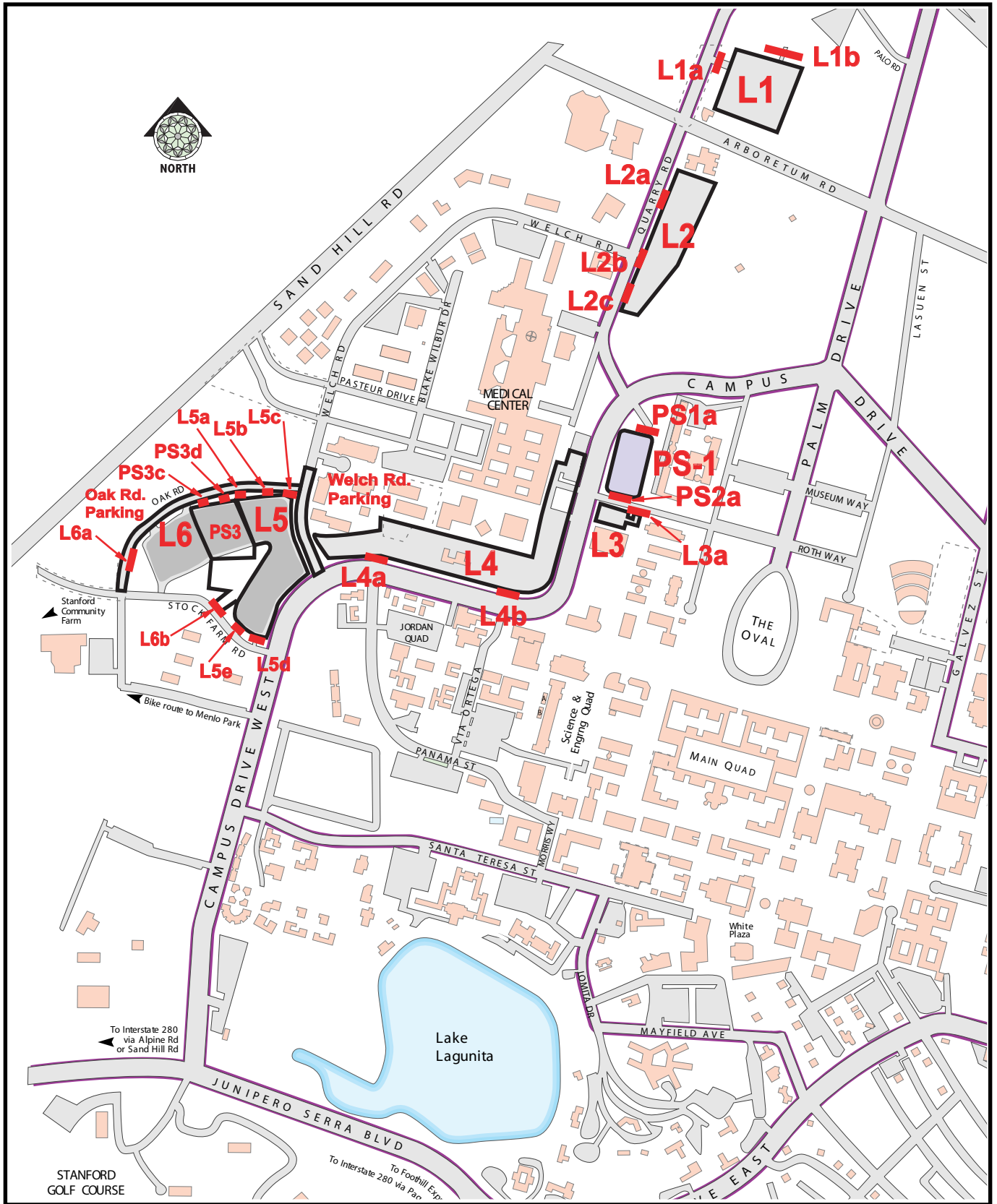
Note: Lot L3 is located on the opposite side of Campus Drive from the location used for the 2002 study. The 2002 designated L3 lot has been demolished.

The driveway count locations are presented below and in Figure 3.

1. PS1a – Parking Structure 1 North Access to Campus Drive
2. PS1b – Parking Structure 1 South Access to Roth Way
3. PS3a – Parking Structure 3 Southeast Access
4. PS3b – Parking Structure 3 Southwest Access
5. PS3c – Parking Structure 3 Northwest Access
6. PS3d – Parking Structure 3 Northeast Access
7. L1a – Rectangle Lot (Lot 1) Quarry Road Access
8. L1b – Rectangle Lot (Lot 1) North Access
9. L2a – Quarry Lot (Lot 2) North Access to Quarry Road
10. L2b – Quarry Lot (Lot 2) Middle Access to Quarry Road
11. L2c – Quarry Lot (Lot 2) South Access to Quarry Road
12. L3a – Near Medical Drive
13. L4a – Roth Way west on Campus Drive West (Lot 4)
14. L4b – Driveway to Lot 4 from Campus Drive West opposite Via Ortega (closed for construction during spring counts)
15. L5a – West Driveway to Lot 5 from Oak Road
16. L5b – Center Driveway to Lot 5 from Oak Road
17. L5c – East Driveway to Lot 5 from Oak Road
18. L5d – East Driveway to Lot 5 from Stock Farm Road
19. L5e – West Driveway to Lot 5 from Stock Farm Road
20. L6a – West Driveway to Lot 6 from Oak Road
21. L6b – South Driveway to Lot 6 from Stockfarm Road
22. L6c – Central Driveway to Lot 6 from Stockfarm Road
23. L6d – North Driveway to Lot 6 from Stockfarm Road

Table 1 2003 Raw Traffic Count Summary

Date	Weather	AM Inbound		PM Outbound	
		Volume	Period	Volume	Period
Week 1					
April 7, 2003	Sunny	5419	8:00 to 9:00	4183	5:00 to 6:00
April 8, 2003	Sunny	5556	8:00 to 9:00	4322	5:00 to 6:00
April 9, 2003	Sunny	5432	8:00 to 9:00	4261	5:00 to 6:00
April 10, 2003	Sunny, Showers	5535	8:00 to 9:00	4308	5:00 to 6:00
April 11, 2003	Sunny	5015	8:00 to 9:00	4307	5:00 to 6:00
Week 2					
April 21, 2003	Cloudy, Showers	4749	8:00 to 9:00	4144	5:00 to 6:00
April 22, 2003	Sunny	5017	8:00 to 9:00	4392	5:00 to 6:00
April 23, 2003	Partly Cloudy	5033	8:00 to 9:00	4521	5:00 to 6:00
April 24, 2003	Cloudy, Showers	5167	8:00 to 9:00	4460	5:00 to 6:00
April 25, 2003	Cloudy, Showers	4849	8:00 to 9:00	4211	5:00 to 6:00
Week 3					
April 28, 2003	Partly Cloudy	4739	8:00 to 9:00	4091	5:00 to 6:00
April 29, 2003	Cloudy, Showers	4846	8:00 to 9:00	4161	5:00 to 6:00
April 30, 2003	Partly Sunny	4714	8:00 to 9:00	4166	5:00 to 6:00
May 1, 2003	Partly Sunny	4677	8:00 to 9:00	4423	5:00 to 6:00
May 2, 2003	Cloudy, Showers	4483	8:00 to 9:00	3997	5:00 to 6:00
Week 4					
May 5, 2003	Sunny	4442	8:00 to 9:00	4360	5:00 to 6:00
May 6, 2003	Cloudy, Showers	4597	8:00 to 9:00	4586	5:00 to 6:00
May 7, 2003	Partly Sunny	4439	8:00 to 9:00	4718	5:00 to 6:00
May 8, 2003	Rain	4590	8:00 to 9:00	4512	5:00 to 6:00
May 9, 2003	Sunny	4354	8:00 to 9:00	4747	4:45 to 5:45
Week 5					
May 12, 2003	Sunny	4327	8:00 to 9:00	4324	5:00 to 6:00
May 13, 2003	Sunny	4485	8:00 to 9:00	3869	5:00 to 6:00
May 14, 2003	Partly Cloudy	3913	8:00 to 9:00	3964	5:00 to 6:00
May 15, 2003	Sunny	3855	8:00 to 9:00	4080	5:00 to 6:00
May 16, 2003	Sunny	3734	8:00 to 9:00	3956	5:00 to 6:00
Week 6					
May 19, 2003	Sunny	3880	8:00 to 9:00	4308	5:00 to 6:00
May 20, 2003	Sunny	4373	8:00 to 9:00	4405	5:00 to 6:00
May 21, 2003	Sunny	4308	8:00 to 9:00	4544	5:00 to 6:00
May 22, 2003	Sunny	4235	8:00 to 9:00	4398	5:00 to 6:00
May 23, 2003	Sunny	3762	8:00 to 9:00	3978	4:45 to 5:45
Week 7					
Sep 29, 2003	Sunny	3826	8:00 to 9:00	4204	5:00 to 6:00
Sep 30, 2003	Sunny	3981	8:00 to 9:00	4269	5:00 to 6:00
Oct 1, 2003	Sunny	3940	8:00 to 9:00	4254	5:00 to 6:00
Oct 2, 2003	Sunny	3820	8:00 to 9:00	4338	5:00 to 6:00
Oct 3, 2003	Sunny	3581	8:00 to 9:00	4083	5:00 to 6:00
Week 8					
Oct 20, 2003	Sunny	3403	8:00 to 9:00	3986	5:00 to 6:00
Oct 21, 2003	Sunny	3527	8:00 to 9:00	4074	4:45 to 5:45
Oct 22, 2003	Partly Cloudy	3494	8:00 to 9:00	4309	5:00 to 6:00
Oct 23, 2003	Partly Cloudy	3489	8:00 to 9:00	4201	5:00 to 6:00
Oct 24, 2003	Sunny	3104	8:00 to 9:00	3988	5:00 to 6:00



Hospital trips from parking lots inside the cordon line were subtracted from the cordon counts, while campus trips from lots outside the cordon line were added to the raw counts. This was done to properly identify all trips generated by Stanford University and not by other adjacent land uses, particularly the medical complex.

Task 1.3 Parking Permit Scanning/Count

At the beginning and end of both the morning and evening peak period, the number of vehicles in each of the lots identified in Figure 3 was counted. Each vehicle permit was also scanned to determine if it was related to campus or hospital uses. During the counts, Medical Center vehicles were identified by parking hangtags with a white background and dark lettering or with a windshield sticker with dark lettering. Campus vehicles were identified by hangtags with a dark background and white lettering or with campus windshield stickers - also with white lettering.

On-street parking on Oak Road between Stock Farm Road and Welch Road, and on Welch Road between Campus Drive West and the cordon station just north of Oak Road was counted and classified in the same manner as described above. Since these on-street parking facilities are located within the cordon line, hospital vehicles were subtracted out of the cordon count and no adjustment was made to add in campus trips. The parking lot and on-street parking occupancy data is included in Appendix B along with the parking counts.

Korve Engineering used the traffic counts in Task 1.1 and the parking counts in Tasks 1.2 and 1.3 to adjust the raw traffic counts. If campus parking permits were observed in lots outside the cordon area, they were added back into the cordon count. If hospital trips were observed inside the cordon area, they were subtracted from the cordon count. All vehicles without a parking permit were assumed to be campus trips.

Task 1.4 License Plate Survey

The purpose of the license plate survey was to identify vehicles that are only passing through the Stanford campus, not beginning or ending their trip there. License plate numbers were recorded for vehicles entering and leaving each cordon location. Vehicles that entered the cordon and left within a period of 15 minutes were considered to be "cut-through" vehicles. Surveys were done during one day each week for both of the peak hours. The license plate matching process showed that during the Spring counts the a.m. and p.m. cut-through percentages were 12.1% and 12.8%, respectively. During the Fall count period, the a.m. cut-through percentage was 12.1%, while the p.m. was 15.2%. The spring and fall percentages were used to adjust their respective vehicle counts.

Task 2.0 Traffic Monitoring Data Analysis

Task 2.1 Daily Cordon Count Spreadsheets

First, the raw cordon count numbers were entered into spreadsheets. Two spreadsheets – one for the a.m. peak period and one for the p.m. peak period – were created for each weekday that a cordon count was conducted. Each spreadsheet shows the a.m. inbound and p.m. outbound vehicles passing all 16 cordon locations during five hourly increments. For the a.m. peak, the hours were 7:00-8:00, 7:15-8:15, 7:30-8:30, 7:45-8:45, and 8:00-9:00. For the p.m. peak, the hours were 4:00-5:00, 4:15-5:15, 4:30-

5:30, 4:45-5:45, and 5:00-6:00. Since cordon counts were collected for eight weeks, there are a total of 80 daily cordon count spreadsheets (40 a.m. and 40 p.m.). These sheets are included in Appendix C of this report.

Task 2.2 Daily Parking Spreadsheets

The number of vehicles coming in and out of the parking lots in the vicinity of the Stanford Medical Center was also monitored during the eight-week period. The a.m. inbound and p.m. outbound volumes at all lot entrances were entered into spreadsheets for the a.m. and p.m. peak periods of each day just as described for the cordon counts in Task 2.1. All 80 daily parking spreadsheets are included in Appendix D.

Task 2.3 Adjustments For Parking and Cut-Through Vehicles

The parking sticker counts performed at the lots were used to compute the percentage of campus and hospital vehicles present in each lot during the a.m. and p.m. peak hours. Since a sticker survey was done at the beginning and end of each two-hour peak period count, the two values for every lot were averaged. Sticker surveys were completed for both peak hours of one day during each week.

The parking lot a.m. inbound and p.m. outbound volumes were used along with the averaged campus and hospital vehicle percentages in order to adjust the cordon count spreadsheets. Since Lots 1 and 2 are outside of the cordon boundary, some campus-related vehicles will park in those lots and not get counted in the cordon count. To add them in, the average percentage of campus vehicles in those lots was multiplied by the a.m. inbound and p.m. outbound volumes at each corresponding lot entrance (from Task 2.2), and then added to the cordon counts.

Lots 3, 4, 5, and 6, as well as the two parking structures (PS-1 and PS-3) are located inside the cordon boundary. Thus, hospital-related vehicles parking in these lots need to be subtracted out of the cordon counts. To do this, the average percentage of hospital-related vehicles was multiplied by the a.m. inbound and p.m. outbound volumes at each respective lot entrance (from Task 2.2), and then subtracted from the cordon counts.

A parking sticker survey was also conducted at two on-street locations during the same days as the surveys for the parking lots. The streets surveyed were Oak Road and the portion of Welch Road between Campus Drive West and the cordon location just north of Oak Road. Since both streets were inside the cordon, only the hospital vehicles were of importance. If more hospital vehicles were present at the end of the period than at the beginning, the change in vehicles was subtracted from the inbound totals for that period. If fewer hospital vehicles were present at the end of the period, the difference was subtracted from the outbound totals.

The average observed cut-through traffic percentages during the Spring monitoring period were about 12.1% percent during the a.m. peak hour and 12.8% percent during the p.m. peak hour. These numbers were 12.2% and 15.2%, respectively, during the Fall monitoring period. The traffic counts were reduced by these percentages in order to subtract out vehicles lacking a destination within the Stanford University campus. Spreadsheets showing the detailed license plate matching data are shown in Appendix E. A summary table showing the 80 daily cordon counts adjusted for parking lot factors and cut-through traffic is shown in Table 2 along with the average a.m. inbound and p.m. outbound traffic volume. Table 3 shows the traffic data collected in the 2001 baseline Stanford Traffic Monitoring Program, including the baseline average and the 90% confidence interval.

Table 2 2003 Adjusted Traffic Totals

Date	AM Inbound		PM Outbound	
	Volume	Period	Volume	Period
Week 1				
April 7, 2003	4161	8:00 to 9:00	3429	5:00 to 6:00
April 8, 2003	4273	8:00 to 9:00	3534	5:00 to 6:00
April 9, 2003	4279	8:00 to 9:00	3483	5:00 to 6:00
April 10, 2003	4340	8:00 to 9:00	3507	5:00 to 6:00
April 11, 2003	3894	8:00 to 9:00	3535	5:00 to 6:00
Week 2				
April 21, 2003	3862	8:00 to 9:00	3417	5:00 to 6:00
April 22, 2003	4099	8:00 to 9:00	3621	5:00 to 6:00
April 23, 2003	4084	8:00 to 9:00	3749	5:00 to 6:00
April 24, 2003	4187	8:00 to 9:00	3690	5:00 to 6:00
April 25, 2003	3997	8:00 to 9:00	3599	5:00 to 6:00
Week 3				
April 28, 2003	3837	8:00 to 9:00	3395	5:00 to 6:00
April 29, 2003	3936	8:00 to 9:00	3455	5:00 to 6:00
April 30, 2003	3822	8:00 to 9:00	3473	5:00 to 6:00
May 1, 2003	3729	8:00 to 9:00	3634	5:00 to 6:00
May 2, 2003	3568	8:00 to 9:00	3311	5:00 to 6:00
Week 4				
May 5, 2003	3513	8:00 to 9:00	3559	5:00 to 6:00
May 6, 2003	3636	8:00 to 9:00	3750	5:00 to 6:00
May 7, 2003	3484	8:00 to 9:00	3852	5:00 to 6:00
May 8, 2003	3643	8:00 to 9:00	3703	5:00 to 6:00
May 9, 2003	3484	8:00 to 9:00	3941	4:45 to 5:45
Week 5				
May 12, 2003	3394	8:00 to 9:00	3667	5:00 to 6:00
May 13, 2003	3510	8:00 to 9:00	3219	5:00 to 6:00
May 14, 2003	2996	8:00 to 9:00	3339	5:00 to 6:00
May 15, 2003	2979	8:00 to 9:00	3442	5:00 to 6:00
May 16, 2003	2876	8:00 to 9:00	3313	5:00 to 6:00
Week 6				
May 19, 2003	3025	8:00 to 9:00	3497	5:00 to 6:00
May 20, 2003	3441	8:00 to 9:00	3526	5:00 to 6:00
May 21, 2003	3400	8:00 to 9:00	3660	5:00 to 6:00
May 22, 2003	3348	8:00 to 9:00	3554	5:00 to 6:00
May 23, 2003	2978	8:00 to 9:00	3237	4:45 to 5:45
Week 7				
Sep 29, 2003	2853	8:00 to 9:00	3260	5:00 to 6:00
Sep 30, 2003	2980	8:00 to 9:00	3306	5:00 to 6:00
Oct 1, 2003	2940	8:00 to 9:00	3328	5:00 to 6:00
Oct 2, 2003	2838	8:00 to 9:00	3386	5:00 to 6:00
Oct 3, 2003	2643	8:00 to 9:00	3166	5:00 to 6:00
Week 8				
Oct 20, 2003	2487	8:00 to 9:00	3132	5:00 to 6:00
Oct 21, 2003	2613	8:00 to 9:00	3282	4:45 to 5:45
Oct 22, 2003	2603	8:00 to 9:00	3480	5:00 to 6:00
Oct 23, 2003	2547	8:00 to 9:00	3396	5:00 to 6:00
Oct 24, 2003	2257	8:00 to 9:00	3206	5:00 to 6:00
Average	3413		3476	

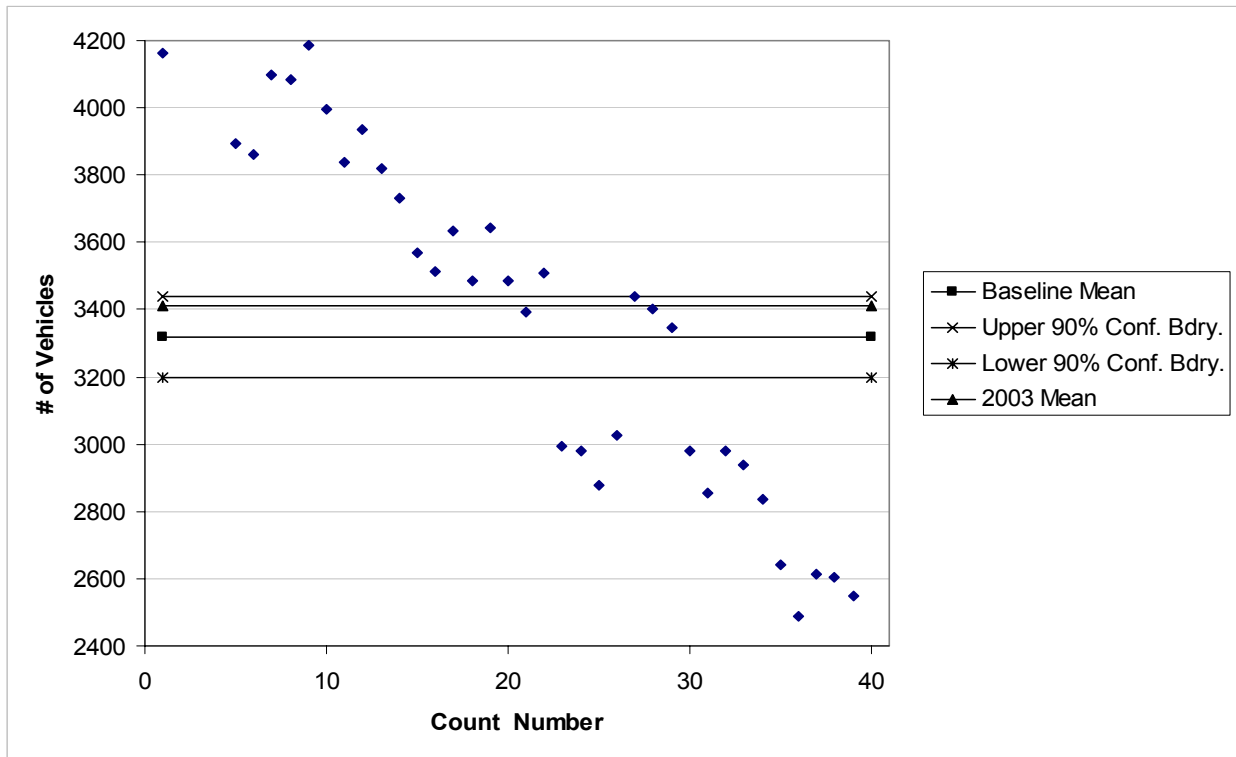
Table 3 2001 Baseline Adjusted Traffic Totals

Date	AM Inbound		PM Outbound	
	Volume	Period	Volume	Period
Week 1				
April 2, 2001	3036	7:45 to 8:45	3323	5:00 to 6:00
April 3, 2001	3059	7:45 to 8:45	3285	4:45 to 5:45
April 4, 2001	2884	8:00 to 9:00	3334	4:45 to 5:45
April 5, 2001	3000	7:45 to 8:45	3216	5:00 to 6:00
April 6, 2001	2610	8:00 to 9:00	3092	4:45 to 5:45
Week 2				
April 9, 2001	3265	8:00 to 9:00	3329	5:00 to 6:00
April 10, 2001	3141	8:00 to 9:00	3362	5:00 to 6:00
April 11, 2001	3107	8:00 to 9:00	3473	4:45 to 5:45
April 12, 2001	3081	8:00 to 9:00	3397	5:00 to 6:00
April 13, 2001	2973	8:00 to 9:00	3413	4:45 to 5:45
Week 3				
April 23, 2001	3285	7:45 to 8:45	3311	4:30 to 5:30
April 24, 2001	3322	7:45 to 8:45	3281	5:00 to 6:00
April 25, 2001	3186	7:30 to 8:30	3326	4:45 to 5:45
April 26, 2001	3129	7:45 to 8:45	3286	5:00 to 6:00
April 27, 2001	2723	8:00 to 9:00	3154	4:45 to 5:45
Week 4				
April 30, 2001	2502	7:30 to 8:30	2681	4:15 to 5:15
May 1, 2001	2826	7:45 to 8:45	2967	5:00 to 6:00
May 2, 2001	2742	7:45 to 8:45	2912	5:00 to 6:00
May 3, 2001	2632	8:00 to 9:00	2861	5:00 to 6:00
May 4, 2001	2595	8:00 to 9:00	2744	4:45 to 5:45
Week 5				
May 7 2001	3604	8:00 to 9:00	3410	4:45 to 5:45
May 8, 2001	3559	8:00 to 9:00	3422	5:00 to 6:00
May 9, 2001	3455	8:00 to 9:00	3326	5:00 to 6:00
May 10, 2001	3478	8:00 to 9:00	3396	4:45 to 5:45
May 11, 2001	3393	8:00 to 9:00	3090	5:00 to 6:00
Week 6				
May 14 2001	3479	8:00 to 9:00	3235	4:45 to 5:45
May 15, 2001	3756	8:00 to 9:00	3450	5:00 to 6:00
May 16, 2001	3830	8:00 to 9:00	3374	5:00 to 6:00
May 17, 2001	3533	8:00 to 9:00	3456	5:00 to 6:00
May 18, 2001	3246	8:00 to 9:00	3386	4:45 to 5:45
Week 7				
October 22, 2001	3221	8:00 to 9:00	3505	5:00 to 6:00
October 23, 2001	3835	8:00 to 9:00	3805	5:00 to 6:00
October 24, 2001	3550	8:00 to 9:00	3959	5:00 to 6:00
October 25, 2001	3908	7:45 to 8:45	3991	5:00 to 6:00
October 26, 2001	3371	8:00 to 9:00	4072	4:45 to 5:45
Week 8				
October 29, 2001	4241	8:00 to 9:00	4115	5:00 to 6:00
October 30, 2001	4251	8:00 to 9:00	4217	5:00 to 6:00
October 31, 2001	4139	8:00 to 9:00	4394	5:00 to 6:00
November 1, 2001	4037	8:00 to 9:00	4193	5:00 to 6:00
November 2, 2001	3789	7:45 to 8:45	4277	5:00 to 6:00
Average	3319		3446	
90% Confidence Interval	+/- 120		+/- 109	

Inbound AM Traffic

The 2001 baseline counts determined that an average of 3,439 inbound vehicles during the a.m. peak hour would constitute a significant increase in traffic at the 90% confidence level. The 2003 a.m. average of 3,413 vehicles does not represent a statistically significant increase over the a.m. baseline average with an upper threshold of 3,439 at the 90% confidence level. A scatter plot of the 2003 a.m. inbound data is shown in Figure 4. Lines representing the baseline average, baseline 90% confidence interval, and 2003 average are also shown in this figure.

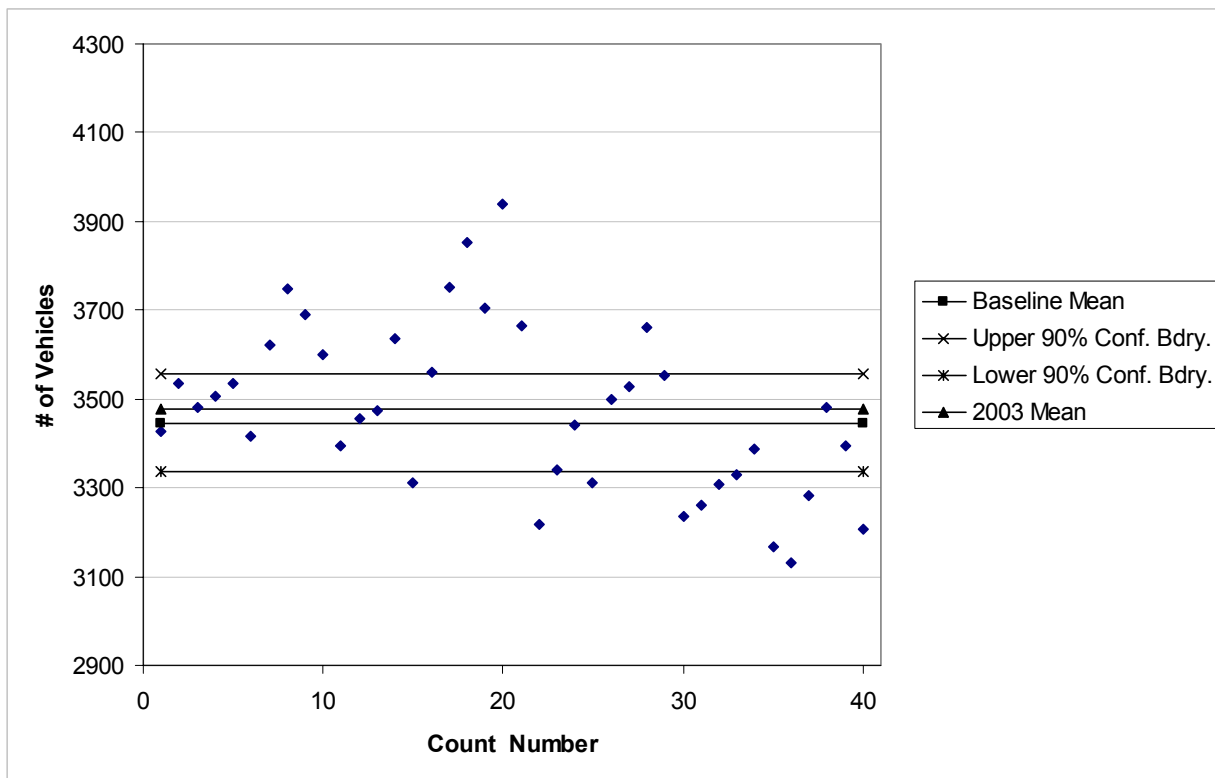
Figure 4 2003 AM Peak Inbound vs. 2001 Baseline



Outbound PM Traffic

The 2001 baseline counts determined that an average of 3,555 outbound vehicles during the p.m. peak hour would constitute a significant increase in traffic at the 90% confidence level. The 2003 p.m. average of 3,476 vehicles does not constitute a statistically significant increase since it is lower than the 3,555-vehicle p.m. threshold. A scatter plot of the 2003 a.m. outbound data is shown in Figure 5. Lines representing the baseline average, baseline 90% confidence interval, and 2003 average are shown in this figure.

Figure 5 2003 PM Peak Outbound vs. 2001 Baseline



CONCLUSION

Although the a.m. inbound adjusted average shows an increase of 94 vehicles from the baseline count to the 2003 count, this increase still falls within the 90% confidence interval of ± 120 . Therefore, this 94-vehicle increase does not represent a significant increase in traffic during the a.m. peak hour. The p.m. peak outbound adjusted average increased by 30 vehicles from the baseline p.m. counts. This increase is also not significant because it falls within the upper 90% confidence boundary of ± 109 determined by the baseline counts. Table 4 summarizes the comparison between the baseline counts and the 2003 monitoring counts.

Table 4 2003 Monitoring Comparison to Baseline

Inbound AM:

Adjusted Average 2003 Count	3,413
Baseline-established 90% Confidence Interval (2001)	+/- 120
Baseline-established Significant Traffic Increase (2001)	3,439
Baseline-established 1% Increase Trigger (2001)	3,474
Result (Falls below the 90% Confidence Interval by 26 vehicles)	-26
Result (Falls below the 1% Trigger by 61 vehicles)	-61

Outbound PM:

Adjusted Average 2003 Count	3,476
Baseline-established 90% Confidence Interval (2001)	+/- 109
Baseline-established Significant Traffic Increase (2001)	3,555
Baseline-established 1% Increase Trigger (2001)	3,591
Result (Falls below the 90% Confidence Interval by 79 vehicles)	-79
Result (Falls below the 1% Trigger by 115 vehicles)	-115