

## **APPENDIX B**

### **BIBLIOGRAPHY FOR THE LITERATURE REVIEW**



- Aneja V.P., Deug-Soo K., and Chameides W.L. (1997) Trends and analysis of ambient NO, NO<sub>y</sub>, CO, and ozone concentrations in Raleigh, North Carolina. *Chemosphere* **34** (3), pp. 611-623.
- Austin J. (2003) Day-of-week patterns in toxic air contaminants in Southern California. *J. Air & Waste Manage. Assoc.* **53**, pp. 889-896.
- Blanchard C.L. and Tanenbaum S.J. (2003) Differences between weekday and weekend air pollutant levels in Southern California. *J. Air & Waste Manage. Assoc.* **53**, pp. 816-828.
- California Air Resources Board, Research and Planning & Technical Support Divisions (2003) The ozone weekend effect in California. Technical support document prepared for the California Air Resources Board, June.
- Croes B.E., Dolislager L.J., Larsen L.C., and Pitts J.N. (2003) The O<sub>3</sub> "weekend effect" and NO<sub>x</sub> control strategies: scientific and public health findings and their regulatory implications. *EM*, July, pp. 27-35.
- Diem J.E. (2000) Comparisons of weekday-weekend ozone: importance of biogenic volatile organic compound emissions in the semi-arid southwest USA. *Atmos. Environ.* **34** (20), pp. 3445-3451.
- Fujita E.M., Campbell D.E., Zielinska B., Sagebiel J.C., Bowen J.L., Goliff W.S., Stockwell W.R., and Lawson D.R. (2003) Diurnal and weekday variations in the source contributions of ozone precursors in California's South Coast Air Basin. *J. Air & Waste Manage. Assoc.* **53**, pp. 844-863.
- Fujita E.M., Stockwell W.R., Campbell D.E., Keislar R.E., and Lawson D.R. (2003) Evolution of the magnitude and spatial extent of the weekend ozone effect in California's South Coast Air Basin, 1981-2000. *J. Air & Waste Manage. Assoc.* **53**, pp. 802-815.
- Heuss J., Kahlbaum D.F., and Wolff G.T. (2003) Weekday/weekend ozone differences: what can we learn from them? *J. Air & Waste Manage. Assoc.* **53**, pp. 772-788.
- Jenkin M.E., Davies T.J., and Stedman J.R. (2002) The origin and day-of-week dependence of photochemical ozone episodes in the UK. *Atmos. Environ.* **36** (6), pp. 999-1012.
- Lawson D.R. (2003) The weekend ozone effect--the weekly ambient emissions control experiment. *EM*, July, pp. 17-25.
- Marr L.C. and Harley R.A. (2002) Spectral analysis of weekday-weekend differences in ambient ozone, nitrogen oxide, and non-methane hydrocarbon time series in California. *Atmos. Environ.* **36** (14), pp. 2327-2335.
- Morawska L., Jayaratne E.R., Mengersen K., Jamriska M., and Thomas S. (2002) Differences in airborne particle and gaseous concentrations in urban air between weekdays and weekends. *Atmos. Environ.* **36** (27), pp. 4375-4383.
- Motallebi N., Tran H., Croes B.E., and Larsen L.C. (2003) Day-of-week patterns of particulate matter and its chemical components at selected sites in California. *J. Air & Waste Manage. Assoc.* **53**, pp. 876-888.
- Niemeier D.A. (2003) The impact of incorporating spatial, temporal variability on running stabilized mobile emissions inventories. *Atmos. Environ.* **37** Supplement No. 2, pp. S27-S37.
- Pun B.K., Seigneur C., and White W. (2003) Day-of-week behavior of atmospheric ozone in three U.S. cities. *J. Air & Waste Manage. Assoc.* **53**, pp. 789-801.

Raddatz R.L. and Cummine J.D. (2001) Temporal surface ozone patterns in urban Manitoba, Canada. *Bound.-Layer Meteorol.* **99**, p 411–428.

Vukovich F.M. (2000) The spatial variation of the weekday/weekend differences in the Baltimore area. *J. Air & Waste Manage. Assoc.* **50**, pp. 2067-2072.

# **APPENDIX C**

## **SURVEY INSTRUMENTS**



## RESIDENTIAL INTERVIEW AND LOGGER STUDY RECRUITMENT -- FAQs

What is the purpose of the study?

The purpose of the study is to find out about activities related to air pollution in Southern California.

Who is conducting the study?

This study is being sponsored by the State of California. The state has contracted with Sonoma Technology, an air quality research firm in Petaluma, California to conduct this study.

How did we get your telephone number?

Your telephone number was randomly selected out of all possible telephone numbers in Los Angeles, Orange, San Bernardino, and Riverside counties. These counties make up the Los Angeles Air Basin.

Who will be calling you?

Population Research Systems, a private survey research firm located in San Francisco, has been hired to conduct the interviews.

Why should you participate?

Through your cooperation, the state of California and its policymakers will better understand the causes of air pollution in Southern California, which will help them develop more cost-effective strategies to improve air quality.

Do you have to do this?

No, your participation is voluntary and you can choose not to answer any questions that you would like.

How long is the interview?

The interview takes about 10 minutes on the telephone.

How will the results be used?

Study results will be used to inform state and local policymakers about factors that affect air quality in Southern California.

Are my answers confidential?

Yes. We have very strict safeguards to protect your privacy. Only group results from many households will be included in the final report.

How can I be sure this is authentic?

I can let you speak to my supervisor and he or she can provide you with additional information about the study. <If needed: Information about the study is posted on the State of California website at [www.arb.ca.gov/aqd/weekendeffect/weekendeffect.htm](http://www.arb.ca.gov/aqd/weekendeffect/weekendeffect.htm) >

Who is the person managing the study?

The person managing the study is Dr. Katrin Ewald, a researcher at Population Research Systems. I can have her give you a call when she is available.

What is the purpose of the logger study?

The purpose of the logger study is to learn how people in Southern California drive on weekends versus weekdays with respect to days of the week, time of day, types of roads, and number of miles driven.

Who is conducting the study?

This study is being sponsored by the State of California. The state has contracted with Sonoma Technology, an air quality research firm in Petaluma, California to conduct this study. If you agree to participate, Transtec, a firm under contract to Sonoma Technology, will be calling you to schedule an appointment to come to your home to install the loggers in your vehicles.

Why should you participate?

Through your cooperation, the state of California and its policymakers will better understand vehicle air emissions within the LA Basin, which will help them develop more cost-effective strategies to improve air quality.

Do you have to do this?

No, your participation is voluntary.

How long does the logger study last?

The logger study will last for 10 days including 2 weekends. You will need to be at home when the loggers are installed in your vehicles by trained technicians. You will also need to be at home when the loggers are collected from your vehicles.

How will the results be used?

Study results will be used to inform state and local policymakers about vehicle emissions in the LA Basin. Your vehicles will not be individually identified in the results. Only group results from many households will be reported.

Is my information confidential?

Yes. We have very strict safeguards to protect your privacy. Only group results from many vehicles will be included in the final report.

What does the logger record?

The logger records the number of miles and the types of roads driven.. The logger only receives signals, it does not send signals. It does not record your or driving behavior.

How does it do that?

The logger records signals from global positioning satellites. The logger will need to be physically connected to a computer in order for us to access its data.

How big is the logger?

The logger is the size of a cell phone and its antenna is even smaller.

Where do they place the logger in my car?

The logger will be connected to your cigarette lighter and will rest on your dashboard, car floor, or car seat. It must stay connected to your cigarette lighter during the entire 10-day study, 24 hours a day. An antenna will also be attached with suction cups to the inside of your windshield. Wires connect the logger to its antenna and to your cigarette lighter.

Will the logger hurt my car?

The logger has been successfully used in thousands of cars throughout the United States and has not damaged any of the cars into which it has been installed.

Will the logger hurt my battery?

The power draw from the logger is too small to hurt your car battery even when plugged in 24 hours a day for 10 days. The logger takes no more energy than a cell phone or a digital clock.

How will I know how to use the logger?

Transtech will send out a trained technician to install the logger into your vehicles. You will receive a fact sheet during this visit, which explains how the logger works. You will also receive a telephone number that you can call if you have questions.

**Los Angeles Basin Air Emissions Micro Study  
Residential Interview  
Project #884**

INTRO1: Hello, my name is \_\_\_\_\_ and I'm calling on behalf of the State of California Air Resources Board. Your household has been randomly selected to participate in an important study about air quality in Southern California.

**Q1. AGE18**

May I speak to someone in your household who is aged 18 or above?

- |                       |                    |
|-----------------------|--------------------|
| 1) YES, I'M 18        | (Go to INTRO3)     |
| 2) YES, JUST A MINUTE | (Go to INTRO2)     |
| 3) NOT HERE           | (SKIP TO CALLBACK) |
| 8) DON'T KNOW         | (TERMINATE)        |
| 9) REFUSED            | (TERMINATE)        |

INTRO2: Hello, my name is \_\_\_\_\_ and I'm calling on behalf of the state of California Air Resources Board. Your household has been randomly selected to participate in an important study about air quality in Southern California (Go to INTRO3).

INTRO3: We would like to send you a simple household activity postcard survey. All you have to do is report your household activities for a 10-day period by checking off answers on postage-paid postcards and returning them by mail. The activities we are asking about are routine daily activities such as driving a car. Filling out the postcards will only take a minute each day for 10 days. You will receive a small cash gift to thank you for your time.

Before we send you the postcards, we have a 10-minute interview that we'd like to conduct with you. Your responses will be kept confidential (Go to Q2).

CALLBACK: When would be a convenient time to call back?

**Q2. WILLING**

Are you willing to participate in this important air quality study?

- 1) Yes
- 2) No (TERMINATE)
- 3) Not now (SCHEDULE CALLBACK)
- 8) DON'T KNOW (TERMINATE)
- 9) REFUSED (TERMINATE)

Q3. NUMBERH

I'd like to start by asking you a few questions about your household. How many people live in your household? (record number) \_\_\_\_\_

- 88) DON'T KNOW (TERMINATE)
- 99) REFUSED (TERMINATE)

Q4. WORK

Do you have kids attending school this summer?

- 1). Yes
- 2). No
- 8) DON'T KNOW (TERMINATE)
- 9) REFUSED (TERMINATE)

Q7. AGE18 O

How many adults over 18 live in your household? (record number) \_\_\_\_\_

- 88) DON'T KNOW (TERMINATE)
- 99) REFUSED (TERMINATE)

Q8. AGE18 U

How many children under 18 live in your household? (record number) \_\_\_\_\_

- 88) DON'T KNOW (TERMINATE)
- 99) REFUSED (TERMINATE)

Q9. VEHICLES

How many vehicles, driven on roads, are operated by people living in your household? (record number)

- 88) DON'T KNOW
- 99) REFUSED

<If 0 vehicles in household, skip to Q12a>  
<If only 1 vehicle in the household, go to Q10>  
<If 2 or more vehicles, skip to Q11>

Q10. HOWC

What kind of vehicle is it? Is it a:

- 1) Car
- 2) RV
- 3) Truck, sport-utility vehicle, or van
- 4) Motorcycle <or>
- 5) ATV
- 8) DON'T KNOW
- 9) REFUSED

Q11 NUMVEH

In total, how many of your household vehicles are passenger cars, trucks, SUVs, or vans? \_\_\_\_\_

- 88) DON'T KNOW
- 99) REFUSED

ATVS

Q12a. Does anyone in your household own any off-road recreational vehicles, such as 3- or 4-wheelers, go-karts, dirt bikes, ATVs, ATCs, gas-powered scooters, or similar vehicles?

- 1) Yes
- 2) No (Go to Q14a)
- 8) DON'T KNOW (Go to Q14a)
- 9) REFUSED (Go to Q14a)

Q12b. How many do you own? \_\_\_\_\_

WATERCRAFT

Q14a. Does anyone in your household own any motorized water craft such as a boat or Jet Ski?

- 1) Yes
- 2) No (Skip to Q16)
- 8) DON'T KNOW (Skip to Q16)
- 9) REFUSED (Skip to Q16)

Q14b. How many do you own? \_\_\_\_\_

WATER USE

Q15. In which county or counties does your household most often use your motorized water craft?

(multiple response.)

- 1. Los Angeles County
- 2. Riverside County
- 3. San Bernardino County
- 4. Orange County
- 5. Other specify \_\_\_\_\_
- 8. DON'T KNOW
- 9. REFUSED

Q16. County

In which county do you live?

- 1. Los Angeles County
- 2. Riverside County
- 3. San Bernardino County
- 4. Orange County
- 5. Other (specify) \_\_\_\_\_
- 8. DON'T KNOW
- 9. REFUSED

Q17. GRILL

Does your household own a barbeque grill?

- 1) Yes
- 2) No (Skip TO Q19)
- 8) DON'T KNOW (Skip TO Q19)
- 9) REFUSED (Skip TO Q19)

Q18a. GRILLTYP

What kind of grill is it? Is it a:

- 1) Gas or propane (Skip to Q19)
- 2) Charcoal
- 3) Electric <or> (Skip to Q19)
- 4) Other (specify) \_\_\_\_\_ type of grill(Skip to Q19)
- 8) DON'T KNOW (Skip to Q19)
- 9) REFUSED (Skip to Q19)

Q18b. LIGHTER

Do you usually use lighter fluid, an electric starter, or neither?

- 1) Lighter fluid
- 2) Electric starter <or>
- 3) Neither
- 8) DON'T KNOW
- 9) REFUSED

Q19. HEAT

How is your home heated? Is it heated by:

- 1) Gas
- 2) Electricity <or>
- 3) Other (specify) \_\_\_\_\_
- 8) DON'T KNOW
- 9) REFUSED

Q20. WATERHEAT

What type of water heater do you have?

- 1) Gas
- 2) Electric
- 3) Other (specify) \_\_\_\_\_
- 8) DON'T KNOW
- 9) REFUSED

Q22. OWN

Do you rent or own your home?

- 1) Rent
- 2) Own
- 8) DON'T KNOW
- 9) REFUSED

Q23. INCOME

Would you say your total household income for 2001 was (Read responses):

- 1) Less than \$25,000
- 2) \$25,001 to \$35,000
- 3) \$35,001 to \$50,000
- 4) \$50,001 to \$75,000
- 5) \$75,001 to \$100,000
- 6) \$100,001 to \$150,000
- 7) \$150,001 to \$200,000
- 8) More than \$200,000
- 88) Don't Know
- 99) Refused

CONTACT

I'd now like to record your name and address so that we can send you your survey post cards and your small cash incentive.

Q24a. What is your first name?

\_\_\_\_\_

- 8) DON'T KNOW (TERMINATE)
- 9) REFUSED (TERMINATE)

Q24b. What is your last name?

\_\_\_\_\_

- 8) DON'T KNOW (TERMINATE)
- 9) REFUSED (TERMINATE)

Q24c. What is your street address? \_\_\_\_\_

- 8) DON'T KNOW (TERMINATE)
- 9) REFUSED (TERMINATE)

Q24d. In what city do you live? \_\_\_\_\_

- 8) DON'T KNOW (TERMINATE)
- 9) REFUSED (TERMINATE)

Q24e. What is your zip code? \_\_\_\_\_

- 8) DON'T KNOW (TERMINATE)
- 9) REFUSED (TERMINATE)

SENT

You will receive the daily survey postcards along with your cash thank-you gift shortly. Please remember to start filling out the postcards on a Friday evening (go to THANKS1).

THANKS1

Those are all the questions I have for you. Thank you again for your assistance with this important air quality study. Good-bye (TERMINATE INTERVIEW).



Winston H. Hickox  
Agency Secretary

## Air Resources Board

Alan C. Lloyd, Ph.D.  
Chairman

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Gray Davis  
Governor

June 2002

Participant NAME  
Participant ADDRESS  
Participant CITY, STATE ZIP

FSCID

Dear NAME:

Thank you for agreeing to participate in the Southern California Home and Business Activities Study. As a participant, you will help the State of California learn about factors that affect air quality in southern California. Enclosed please find a small cash gift, provided by Population Research Systems (PRS), to thank you for your time.

The study begins on a Friday and ends 10 days later, on a Sunday. Enclosed are 10 postcards (numbered 1 to 10). There is one postcard for each day of the 10-day study. Each postcard asks the same questions about your daily household activities.

Directions:

- Please begin filling out the first postcard (labeled Card 1) on a **Friday** evening.
- Fill out one postcard at the end of each day.
- If you forget to fill out a postcard, please fill it out as soon as possible.
- Enter two dates: (1) the date when the household activities occurred, and (2) the date when you filled out the postcard.
- Drop your completed postcards into a mailbox. No postage is required.

The State of California has contracted with PRS, a research company, to collect this information. Please be assured that your responses and personal information will be kept confidential and will not be used for any purpose other than this study. PRS will group your responses with hundreds of others and will report only group results and only to the study sponsors. If you have any questions about the study, please call Dr. Katrin Ewald of PRS, toll-free at 1-800-777-0737. If you are interested in learning about how this study can help to improve the air quality of southern California, please call Mr. Leon Dolislager of my staff at (916) 323-1533. Thank you once again for participating in this important research.

Sincerely,

Richard Corey, Chief  
Research & Economic Studies Branch  
Research Division

*The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption.  
For a list of simple ways you can reduce demand and cut your energy costs, see our Website: <http://www.arb.ca.gov>.*

California Environmental Protection Agency

*Printed on Recycled Paper*

## CARD 1 DAILY ACTIVITY SURVEY FOR: FRIDAY

1. Was a barbeque grill used at your household today?  Yes  No  
*When? (check all that apply)*  Morning  Afternoon  Evening  Total minutes used?
2. Please check if items were used at your household today, and indicate when they were used:  
 Paints, varnishes, stains, thinners, solvents, or degreasers  Morning  Afternoon  Evening  
 Consumer products (hair sprays, dyes, nail polishes, polish removers)  Morning  Afternoon  Evening  
 Took a shower or bath (with warm or hot water)  Morning  Afternoon  Evening  
 Clothes washer or automatic dishwasher (using warm or hot water)  Morning  Afternoon  Evening
3. How many times did a passenger vehicle depart from your household today?  0  1  2  3  4  5  More than 5 times  
*When? (check all that apply):*  Morning  Afternoon  Evening
4. How many times did you start a vehicle at your household without driving it today?  0  1  2  3  4  5  More than 5 times
5. Did any household member use a recreational watercraft today (such as a boat, jet ski, or other)?  Yes  No  
*When? (check all that apply)*  Morning  Afternoon  Evening  Total hours used?
6. Did any household member use an off-road recreational vehicle (such as an ATV, dirt bike, or 4-wheel drive)?  Yes  No  
*When? (check all that apply)*  Morning  Afternoon  Evening  Total hours used?
7. Did you consider today a  Work day  Holiday/vacation day off  Regular day off (Please check one)
8. Your answers to the questions above apply to **FRIDAY** on what date? \_\_\_\_\_
9. Are you completing this card on the same date that you just entered on line 8 above?  Yes  No
10. If NO, what date did you complete this postcard? \_\_\_\_\_

## CONSTRUCTION BUSINESS STUDY -- FAQs

What is the purpose of the study?

The purpose of the study is to find out about construction activities related to air emissions in the Los Angeles Basin.

Who is conducting this study?

This study is being sponsored by the State of California and Sonoma Technology, Inc., a research firm in Petaluma, California.

How did we get your telephone number/name?

Your business was randomly selected from the Yellow Pages or other similar database.

Who will be calling you?

Freeman, Sullivan & Co., a private survey research firm located in San Francisco, has been hired by Sonoma Technology to conduct the interviews.

Why should you participate?

Through your cooperation, the State of California will better understand air emissions within the LA Basin.

Do you have to do this?

No, your participation is voluntary and you can choose not to answer any questions that you would like.

How long is the interview?

The interview takes about 15 minutes on the telephone.

How will the results be used?

The results from the study will be used to inform state and local policymakers about daily construction activities as related to air emissions in the LA Basin.

Will you be contacted again?

No. We will contact you just this one time.

Will my information be given to anyone else?

No. Your telephone number will not be given out to anyone else and will not be linked to your answers. We have very strict safeguards to protect your privacy. Only group statistics will be included in the final report.

How can I be sure this is authentic?

I can let you speak to my supervisor and s/he can provide you with additional information about the study. If you would like to know more about the research project, you may look at their website <http://www.nrel.gov/>. wrong url

Who is the person managing the study?

The person managing the study is Dr. Katrin Ewald, a researcher at Freeman, Sullivan & Co. I can have her give you a call when she is available.

**MACRO STUDY CONSTRUCTION TELEPHONE INTERVIEW**  
**PROJECT #883**

INTRO1. Hello, my name is ----- and I'm calling on behalf of the state of California air resources board. Your construction business has been randomly selected to participate in an important study about air quality in the Los Angeles area. We are calling Los Angeles construction companies about normal business operations that may be related to air quality.

[INTERVIEWER]

<If asked: your responses will be held in the strictest confidence and will not be used for any purpose other than the Los Angeles air quality study. Freeman, Sullivan & Company will not identify individual study participants to the state of California>

[Q1] TYPE

Our records show that this is a construction business. Is that correct?

- |                |             |
|----------------|-------------|
| [1] Yes        | (Go to Q2)  |
| [2] No         | (Terminate) |
| [8] DON'T KNOW | (Terminate) |
| [9] REFUSED    | (Terminate) |

[Q2] PERSON

I would like to talk with your director of operations, your pr or marketing director, or the person who could best talk with me about your company's day-to-day construction activities.

- |                             |                     |
|-----------------------------|---------------------|
| [1] I am that person        | (Go to INTRO3)      |
| [2] I'll get him/her        | (Go to INTRO2)      |
| [3] No one is available now | (Schedule callback) |
| [4] No such person          | (Terminate)         |
| [8] DON'T KNOW              | (Terminate)         |
| [9] REFUSED                 | (Terminate)         |

INTRO2. Hello, my name is ----- and I'm calling on behalf of the state of California air resources board. Your construction business has been randomly selected to participate in an important study about air quality in the Los Angeles area. We are calling Los Angeles construction companies about normal business operations that may be related to air quality (go to INTRO3).

INTRO3: The interview will take about 10 minutes. Your responses will be kept confidential. Can I begin the interview?  
(Go to Q3)

[Q3] GEO

Does your company perform work in the South Coast Air Basin, which includes Los Angeles, Riverside, San Bernardino, and Orange counties?

- |                |             |
|----------------|-------------|
| 1] Yes         | (Go To Q4)  |
| [2] No         | (Terminate) |
| [8] DON'T KNOW | (Terminate) |
| [9] REFUSED    | (Terminate) |

[Q4] OFFICES

How many office locations does your company have in the United States? \_\_\_\_\_

[8] DON'T KNOW

[9] REFUSED

[Q5] CLIENTS

What types of construction projects does your company typically perform? (Read responses, multiple response)

[1] Residential development

[2] Commercial development

[3] Industrial facility development

[4] Waterway or maritime projects including piers

[5] Road, bridge, or utility construction

[6] Other (specify) \_\_\_\_\_

[8] DON'T KNOW (Terminate)

[9] REFUSED (Terminate)

For purposes of this interview, we now want you to focus only on your construction projects within Los Angeles, Orange, Riverside, and San Bernardino counties.

[Q6] WORKON

About how many projects do you typically work on each year in Los Angeles, Orange, San Bernardino, and Riverside counties? \_\_\_\_\_

[8] DON'T KNOW

[9] REFUSED

[Q7] WORKLOAD

Thinking about your projects within the 4-county area this summer during June through August, would you say that your workload is:

[1] Lighter than usual

[2] Average

[3] Heavier than usual

[8] DON'T KNOW

[9] REFUSED

[Q8] JOBSITES

At what types of job sites will your company perform work this summer in the 4-county area? (read responses, multiple response)

[1] Residential development (Go to Q9)

[2] Commercial development (Go to Q10)

[3] Industrial facility development (Go to Q11)

[4] Waterway or maritime projects (go to Q12)

[5] Road, bridge, or utility construction (Go to Q13)

[6] Other (specify) \_\_\_\_\_ (Go to Q14)

[8] DON'T KNOW (Go to Q14)

[9] REFUSED (Go to q14)

[Q9] RESID

Which phases of residential development will your company perform this summer? (Read responses, multiple response)

- [1] Site preparation (such as scraping, surface grading, and flattening)
- [2] Road construction (such as road and sidewalk development)
- [3] Foundation/infrastructure (such as foundation preparation and concrete pouring, installation of sewage lines, storm drains, and water and gas pipes)
- [4] Framing (such as structural support and carpentry work for house skeletons)
- [5] Exterior/interior accessories (such as drywall, insulation, window/door installation, carpeting, exterior paneling, painting, roofing, driveway paving, electrical, and plumbing)
- [8] DON'T KNOW
- [9] REFUSED

[Q10] COMM

Which phases of commercial development will your company perform this summer? (read responses, multiple response)

- [1] Site preparation (such as scraping, surface grading, flattening, and excavating)
- [2] Foundation/infrastructure (such as foundation preparation, concrete pouring, installation of sewage lines, storm drains, and water and gas pipes)
- [3] Framing (such as structural support using steel or wood)
- [4] Exterior/interior accessories (such as drywall, insulation, window/door installation, carpeting, exterior paneling, painting, roofing, concrete work, electrical, plumbing, and machinery installation)
- [8] DON'T KNOW
- [9] REFUSED

[Q11] INDUST

Which phases of industrial facility development will your company perform this summer? (Read responses, multiple response)

- [1] Site preparation (such as scraping, surface grading, flattening, and excavating)
- [2] Road construction (such as road and sidewalk development)
- [3] Foundation/infrastructure (such as building and equipment foundation preparation, concrete pouring, installation of sewage lines, and water and gas pipes)
- [4] Framing (such as structural support using steel or wood)
- [5] Exterior/interior accessories (such as drywall, insulation, window/door installation, carpeting, exterior paneling, painting, roofing, concrete work, electrical, plumbing, machinery, and special tools installation)
- [8] DON'T KNOW
- [9] REFUSED

[Q12] WATERWAY

What phases of coastal or waterway construction projects are in progress or are planned to be performed by your company this summer? (Read responses, multiple response)

- [1] Retaining walls with pilings (such as bulkheads or seawalls)
- [2] Erosion control projects without pilings (such as revetments or culverts)
- [3] Beach and harbor improvements (such as jetties, groins, piers, or docks)
- [4] Utility construction (such as drilling and installation of pipelines, electricity lines, and conduits beneath waterways)
- [5] Bridge, dam, or levee construction
- [6] Sedimentation control projects (such as dredging or breakwaters)
- [7] Waterfront residential or commercial development
- [8] DON'T KNOW
- [9] REFUSED

[Q13] ROAD

Which phases of road, bridge, or utility construction development will your company perform this summer? (read responses, multiple response)

- [1] Site preparation (such as scraping, surface grading, and flattening)
- [2] Base application (such as development of a road bed)
- [3] Paving (such as asphalt application, smoothing, curing, and applying sealant)
- [4] Infrastructure (such as sidewalks, curbs, gutters, lights, and signs)
- [8] DON'T KNOW
- [9] REFUSED

[Q14] WORKERS

On a typical summer workday in Los Angeles, Riverside, Orange, and San Bernardino counties, how many people are employed by your company as heavy-equipment operators or operating engineers including temporary and part-time Heavy-equipment operators?

\_\_\_\_\_

- [8] DON'T KNOW
- [9] REFUSED

IF Q14=0 SKP END

[Q15] HOURS

We'd now like to ask you some questions about your operating engineers' normal summertime working hours on weekdays, Monday through Fridays. Do operating engineers normally work the same hours Monday through Friday during the summertime, or do their work hours vary?

- [1] Same hours on weekdays
- [2] Different hours on weekdays (Go to Q#17)
- [8] DON'T KNOW
- [9] REFUSED

[Q16] WEEKDAYS

What are their normal weekday hours during the summertime? \_\_\_\_\_ to \_\_\_\_\_  
(military time) (military time)

- [8] DON'T KNOW
- [9] REFUSED

(GO TO Q#18)

[Q17] DIFFER1

I'd now like to ask you about your operating engineers' normal working hours on weekdays during the summertime.

Let's start with Monday. What are their normal working hours on Monday during the summertime? How about Tuesday? What about Wednesday, Thursday and Friday?

17a. Monday	_____	to	_____ (Military tme)
17b. Tuesday`	_____	to	_____ (Military time)
17c. Wednesday	_____	to	_____ (Military time)
17d. Thursday	_____	to	_____ (Military time)
17e. Friday	_____	to	_____ (Military time)

[8] DON'T KNOW

[9] REFUSED

[Q18] WEEKENDS

Do operating engineers normally work for your business on Saturdays or Sundays during the summertime? Would you say...

- [1] Saturdays only (GO to Q19a and then Q20)
- [2] Sundays only (GO to Q19b and then Q20)
- [3] Both Saturdays and Sundays (GO to Q19a & b and then Q20)
- [4] Neither Saturday nor Sunday (GO to Q20)
- [8] DON'T KNOW (GO to Q20)
- [9] REFUSED (GO to Q20)

[Q19]

What are their normal working hours on Saturday and Sunday during the summertime? Let's begin with Saturday. How about Sunday?

19a. Saturday	_____	to	_____ (military time) <SATHRS>
19b. Sunday`	_____	to	_____ (military time) <SUNHRS>

[8] DON'T KNOW

[9] REFUSED

[Q20] SHIFTS1

We'd like to ask about the work shifts for operating engineers during the summertime. Are the shifts usually the same Monday through Friday? Would you say...

- [1] Each weekday uses the same shifts
- [2] Some weekdays use different shifts (go to q22)
- [8] DON'T KNOW (If Q18 EQ 1 or 3 go to Q23, otherwise go to "Thank You"; if Q18 EQ 2, go to Q24)
- [9] REFUSED (If Q18 EQ 1 or 3 go to Q23, otherwise go to "Thank You", if Q18 EQ 2, go to Q24)

[Q21] WEEKDAY

How many operating engineers are usually working on a weekday between the hours of:

SHIFTS	Total Number
a. 8 am and 12 noon?	_____
b. 12 noon and 4 pm?	_____
c. 4 pm and 8 pm?	_____
d. 8 pm and midnight?	_____
e. Midnight and 4 am?	_____
f. Between 4 am and 8 am?	_____

[8] DON'T KNOW

[9] REFUSED

(Go to Q23)

[Q22] DIFFER2

Starting with Monday, how many operating engineers are usually working on a weekday between the hours of...let's now talk about Tuesday...what about Wednesday, Thursday, and Friday?

<u>SHIFTS</u>	<u>Monday</u>	<u>Tuesday</u>	<u>Wednesday</u>	<u>Thursday</u>	<u>Friday</u>
a. 8 am and 12 noon?	_____	_____	_____	_____	_____
b. 12 noon and 4 pm?	_____	_____	_____	_____	_____
c. 4 pm and 8 pm?	_____	_____	_____	_____	_____
d. 8 pm and midnight?	_____	_____	_____	_____	_____
e. Midnight and 4 am?	_____	_____	_____	_____	_____
f. Between 4 am and 8 am?	_____	_____	_____	_____	_____

[8] DON'T KNOW

[9] REFUSED

(If Q18 EQ1, go to Q23; if Q18 EQ 2, go to Q24; if Q18 EQ 3, go to Q23 and Q24; if Q18 EQ 4, go to "Thank You")

[Q23] SAT

How many operating engineers are usually working on a Saturday between the hours of:

SHIFTS	Total Number
a. 8 am and 12 noon?	_____
b. 12 noon and 4 pm?	_____
c. 4 pm and 8 pm?	_____
d. 8 pm and midnight?	_____
e. Midnight and 4 am?	_____
f. Between 4 am and 8 am?	_____

[8] DON'T KNOW

[9] REFUSED

(If Q18 EQ 3, go to Q24, otherwise go to Q25 and then to "Thank You")

[Q24] SUN

How many operating engineers are usually working on a Sunday between the hours of:

SHIFTS	Total Number
a. 8 am and 12 noon?	_____
b. 12 noon and 4 pm?	_____
c. 4 pm and 8 pm?	_____
d. 8 pm and midnight?	_____
e. Midnight and 4 am?	_____
f. Between 4 am and 8 am?	_____

[8] DON'T KNOW

[9] REFUSED

[Q25] SAMEHRS

Do your operating engineers usually work the same hours as your construction workers? Would you say that your operating engineers' schedules are:

[1] Very similar

[2] Somewhat similar or

[3] Not at all similar to your construction worker schedules

[8] DON'T KNOW

[9] REFUSED

THANK YOU

Those are all the questions I have for you. Thank you again for your time and your participation in this important project. Goodbye.

## GENERAL SMALL BUSINESS STUDY – FAQs

What is the purpose of the study?

The purpose of the study is to find out about activities related to air emissions in the Los Angeles Basin.

Who is conducting this study?

This study is being sponsored by the State of California and Sonoma Technology, Inc., a research firm in Petaluma, California.

How did we get your telephone number/name?

Your business was randomly selected from the Yellow Pages or other similar database.

Who will be calling you?

Freeman, Sullivan & Co., a private survey research firm located in San Francisco, has been hired by Sonoma Technology to conduct the interviews.

Why should you participate?

Through your cooperation, the State of California will better understand air emissions within the LA Basin.

Do you have to do this?

No, your participation is voluntary and you can choose not to answer any questions that you would like.

How long is the interview?

The interview takes about 10 minutes on the telephone.

How will the results be used?

The results from the study will be used to inform state and local policymakers about daily activities as related to air emissions in the LA Basin.

Will you be contacted again?

No. We will contact you just this one time.

Will my information be given to anyone else?

No. Your telephone number will not be given out to anyone else and will not be linked to your answers. We have very strict safeguards to protect your privacy. Only group statistics will be included in the final report.

How can I be sure this is authentic?

I can let you speak to my supervisor and s/he can provide you with additional information about the study. If you would like to know more about the Air Resources Board, you may look at their website <http://www.nrel.gov/>. wrong url

Who is the person managing the study?

The person managing the study is Dr. Katrin Ewald, a researcher at Freeman, Sullivan & Co. I can have her give you a call when she is available.

**Project # 884**  
**MICRO STUDY BUSINESS INTERVIEW**  
**Project #884**

INTRO1

Hello, I'm calling on behalf of the State of California Air Resources Board. Your business has been randomly selected to participate in an important survey about air quality in the LA area. May I speak to someone who is familiar with your day-to-day business operations?

- |                         |                     |
|-------------------------|---------------------|
| 1. YES                  | (Go to Intro2)      |
| 2. YES, COMING TO PHONE | (Go to Intro2)      |
| 3. NO                   | (Schedule Callback) |
| 8. DON'T KNOW           | (TERMINATE)         |
| 9. REFUSED              | (TERMINATE)         |

INTRO2

We are asking LA residents and businesses about normal daily activities that may be related to air quality. The interview will only take about 7 minutes and all the information you provide will be kept confidential. By answering these questions, you will be helping the State of California Air Resources Board understand air quality within the LA air basin.

OFFICE

Is your business at \_\_\_\_\_ *<insert address>* best described as an office?

- |               |             |
|---------------|-------------|
| 1. YES        |             |
| 2. NO         |             |
| 8. DON'T KNOW | (TERMINATE) |
| 9. REFUSED    | (TERMINATE) |

BIZTYPE

What type of business is it? \_\_\_\_\_

TYPE

For the remaining questions that I will be asking you, I need for you to please keep your responses limited to just your operations at \_\_\_\_\_ *<insert address>*.

WORKERS

How many people are employed at this business in total?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

HOURS

We'd like to ask about your normal business hours Monday through Friday. Are your hours on Monday through Friday the same each day, or are you open different hours on different weekdays?

- |                                     |               |
|-------------------------------------|---------------|
| 1. SAME HOURS ON ALL WEEKDAYS       |               |
| 2. DIFFERENT HOURS ON SOME WEEKDAYS | (SKIP TO MON) |
| 8. DON'T KNOW                       | (SKIP TO MON) |
| 9. REFUSED                          | (TERMINATE)   |

[INTERVIEWER: BY NORMAL BUSINESS HOURS WE MEAN WHEN IS THIS BUSINESS OPEN TO THE PUBLIC OR STANDARD OPERATING HOURS. SOME BUSINESSES WILL HAVE EMPLOYEES WORKING OUTSIDE OF STANDARD BUSINESS HOURS, BUT FOR THIS SERIES OF QUESTIONS WE WANT TO KNOW THEIR STANDARD BUSINESS HOURS.]

WHRS

What are your weekday hours?

Open: \_\_\_\_\_

Close: \_\_\_\_\_

[IF HOURS=1, SKIP TO WEEKENDS)

MON

What are your hours on Monday?

ENTER RESPONSE

[IF CLOSED, ENTER 00:00AM FOR BOTH OPENING & CLOSING HOURS.]

TUE

What are your hours on Tuesday?

ENTER RESPONSE

[IF CLOSED, ENTER 00:00AM FOR BOTH OPENING & CLOSING HOURS.]

WED

What are your hours on Wednesday?

ENTER RESPONSE

[IF CLOSED, ENTER 00:00AM FOR BOTH OPENING & CLOSING HOURS.]

THU

What are your hours on Thursday?

ENTER RESPONSE

[IF CLOSED, ENTER 00:00AM FOR BOTH OPENING & CLOSING HOURS.]

FRI

What are your hours on Friday?

ENTER RESPONSE

[IF CLOSED, ENTER 00:00AM FOR BOTH OPENING & CLOSING HOURS.]

WEEKENDS

Are you open on weekends?

1. YES
2. NO (SKIP TO SHIFTS)
8. DON'T KNOW (SKIP TO SHIFTS)
9. REFUSED (SKIP TO SHIFTS)

SAT

What are your hours on Saturday?

ENTER RESPONSE

[IF CLOSED, ENTER 00:00AM FOR BOTH OPENING & CLOSING HOURS.]

SUN

What are your hours on Sunday?

ENTER RESPONSE

[IF CLOSED, ENTER 00:00AM FOR BOTH OPENING & CLOSING HOURS.]

SHIFTS

We'd like to ask about your employees' working hours or shifts, including those times before or after your normal business hours. Are your employees' working hours or shifts generally the same Monday through Friday?

1. YES, EACH WEEKDAY USES THE SAME SHIFTS
2. NO, SOME WEEKDAYS USE DIFFERENT SHIFTS THAN OTHERS (SKIP TO DIFF SHIFTS)
8. DON'T KNOW (SKIP TO DIFF SHIFT SERIES)
9. REFUSED (SKIP TO FUMES1)

SHIFT1

About how many employees are usually working between 8 am and 12 noon on weekdays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SHIFT2

About how many employees are usually working between 12 noon and 4 pm on weekdays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SHIFT3

About how many employees are usually working between 4 pm and 8 pm on weekdays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SHIFT4

About how many employees are usually working between 8 pm and midnight on weekdays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SHIFT5

About how many employees are usually working between midnight and 4 am on weekdays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SHIFT6

About how many employees are usually working between 4 am and 8 am on weekdays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

**[IF SHIFTS = 1, SKIP TO SATSHIFT].**

DIFF SHIFTS

**FOR DIFFERENT SHIFTS**

***Ask SHIFT1, SHIFT2, SHIFT3, SHIFT4, SHIFT5, SHIFT6 about each weekday...i.e., MONDS1, MONDS2, MONDS3....MONDS6, then TUEDS1, TUEDS2...TUEDS6, then WEDDS1-WEDDS6, then THUDS1-THUDS6, then FRIDS1-FRIDS6.***

SATSHIFT

Now I'd like to ask about your working shifts on the weekends. Are there usually employees working on Saturdays?

- 1. YES
- 2. NO (SKIP TO SUNSHIFT)
- 8. DON'T KNOW (SKIP TO SUNSHIFT)
- 9. REFUSED (SKIP TO SUNSHIFT)

SATS1

About how many employees are usually working between 8 am and 12 noon on Saturdays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SATS2

About how many employees are usually working between 12 noon and 4 pm on Saturdays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SATS3

About how many employees are usually working between 4 pm and 8 pm on Saturdays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SATS4

About how many employees are usually working between 8 pm and midnight on Saturdays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SATS5

About how many employees are usually working between midnight and 4 am on Saturdays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SATS6

About how many employees are usually working between 4 am and 8 am on Saturdays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SUNSHIFT

Are there usually employees working on Sundays?

1. YES

2. NO (SKIP TO FUMES1)

8. DON'T KNOW (SKIP TO FUMES1)

9. REFUSED (SKIP TO FUMES1)

SUNS1

About how many employees are usually working between 8 am and 12 noon on Sundays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SUNS2

About how many employees are usually working between 12 noon and 4 pm on Sundays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SUNS3

About how many employees are usually working between 4 pm and 8 pm on Sundays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SUNS4

About how many employees are usually working between 8 pm and midnight on Sundays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SUNS5

About how many employees are usually working between midnight and 4 am on Sundays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

SUNS6

About how many employees are usually working between 4 am and 8 am on Sundays?

ENTER RESPONSE

8888 = Don't Know

9999 = Refused

**[IF BIZTYPE = 1 (OFFICE), SKIP TO THANKS].**

FUMES1

Now I'd just like to ask about some materials or equipment that may be used at your business. Does your business use any gas ovens?

1. YES
2. NO
8. DON'T KNOW
9. REFUSED

FUMES2

Does your business use paints, solvents, thinners, stains, varnishes, or degreasers?

1. YES
2. NO
8. DON'T KNOW
9. REFUSED

FUMES3

Does your business involve the running of internal combustion engines?

1. YES
2. NO
8. DON'T KNOW
9. REFUSED

FUMES4

Does your business use motor oils, gear oils or fluids, or brake fluids?

1. YES
2. NO
8. DON'T KNOW
9. REFUSED

LAWN

Does your business use lawn and garden equipment?

1. YES
2. NO
8. DON'T KNOW
9. REFUSED

THANKS

Those are all the questions I have for you. Thank you for participating in this important project. Goodbye.

## APPENDIX D

### TIME SERIES PLOTS OF SURFACE STREET OBSERVATIONS

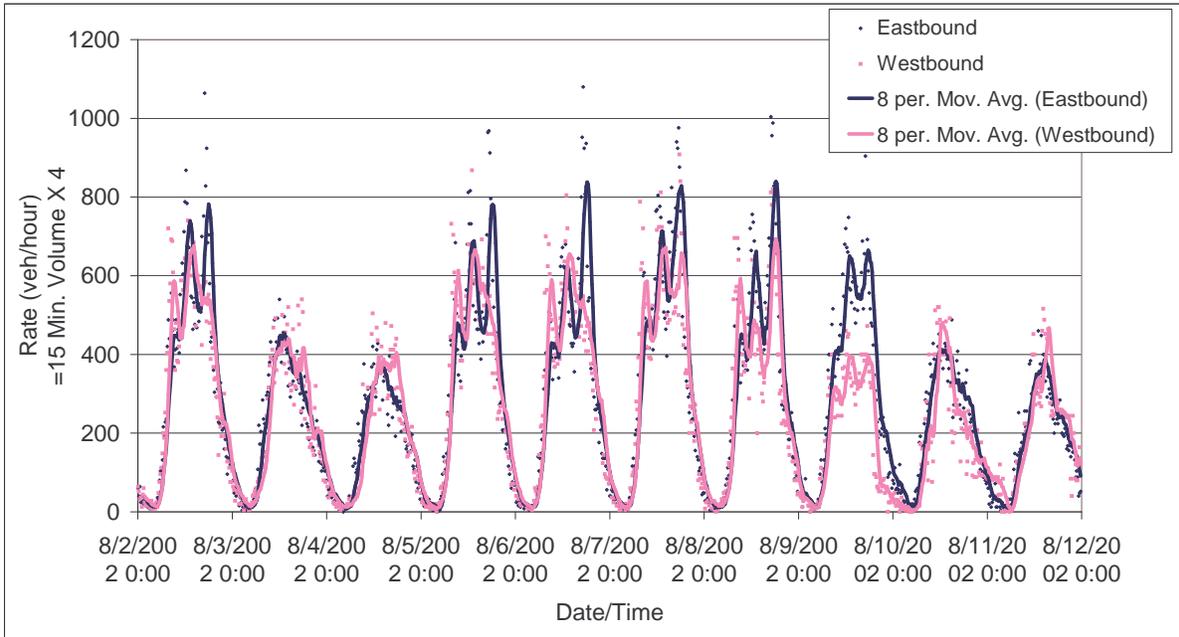
This appendix graphically illustrates time-series plots of observed traffic volumes acquired for 35 surface street locations. Individual data points and 8-period moving averages (8 per. mov. avg.) are plotted for each location and each direction of travel. 8-period moving averages are averages of 8 data points and are the equivalent of 2-hour moving averages.

Traffic volumes were measured at each location for a period of 10 days. The locations are illustrated in Figure 2-18. The precise latitudes and longitudes of each location, which are presented in the map projection of the World Geodetic System of 1984 (WGS84), are provided in **Table D-1**. Latitude/longitude coordinates were verified to be accurate within a few feet. Although a few sites experienced missing or suspect observations, the rate of captured and quality assured data exceeded 90%. Raw and quality assured data sets are provided on compact disc (CD) in Appendix F.

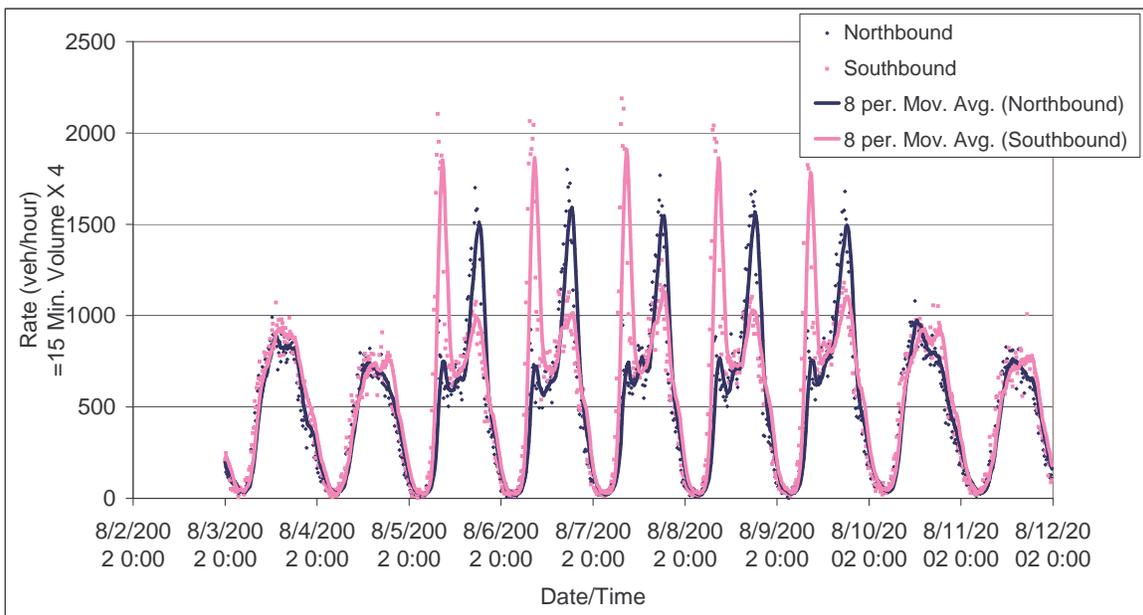
Table D-1. Locations of surface street traffic counters.

Location Number	Description of Location	Local Air Quality Site	City or County Name	Longitude (decimal degrees)	Latitude (decimal degrees)
17	1100 Foothill Blvd East of Todd Avenue	AZU	Azusa	-117.922350	34.133700
18	Irwindale Avenue South of Foothill Blvd	AZU	Azusa	-117.933417	34.133317
19	1100 West Sierra Madre Avenue	AZU	Azusa	-117.923167	34.143167
20	Coney Avenue North of Foothill Blvd	AZU	Azusa	-117.921783	34.134300
21	Vignes Street East of Main Street	LAN	Los Angeles	-118.234217	34.060583
22	Alameda Avenue South of Vignes Street	LAN	Los Angeles	-118.236450	34.060517
23	800 North Main Street	LAN	Los Angeles	-118.235800	34.060867
24	Atlantic Avenue South of 45th Street	LBC	Long Beach	-118.185100	33.839133
25	Del Amo Boulevard East of Atlantic Avenue	LBC	Long Beach	-118.177783	33.847250
26	45th Street West of Atlantic Avenue	LBC	Long Beach	-118.185883	33.840133
27	Highland Avenue West of Boulder Avenue	HIG	Highland	-117.198267	34.135700
28	Baseline Drive West of Boulder Avenue	HIG	Highland	-117.197450	34.121383
29	Robinson Drive South of Highland Avenue	HIG	Highland	-117.226917	34.135767
30	Fourth Street East of Milliken Avenue	ONT	Ontario	-117.553250	34.077433
31	Milliken Avenue North of Fourth Street	ONT	Ontario	-117.558517	34.080850
32	Richmond Drive North of Fourth Street	ONT	Ontario	-117.552717	34.080000
33	Orangewood East of 57 Freeway	ORA	Orange County	-117.875317	33.795800
34	Main Street South of Orangewood	ORA	Orange County	-117.866550	33.794683
35	Eckhoff Street North of Orangewood	ORA	Orange County	-117.873667	33.796833
36	5870 Mission Boulevard	RUB	Rubidoux	-117.415001	34.000780
37	Riverview North of Mission Boulevard	RUB	Rubidoux	-117.411519	34.000295
38	Rubidoux Boulevard North of Mission Boulevard	RUB	Rubidoux	-117.405700	33.999050
39	Long Beach Boulevard North of Imperial Highway	LYN	Lynwood	-118.212883	33.937967
40	Alma Street East of Long Beach Boulevard	LYN	Lynwood	-118.212733	33.935500
41	Imperial Hwy East of Long Beach Blvd	LYN	Lynwood	-118.207397	33.930705
42	Campus Drive East of Jamboree	IRV	Irvine	-117.849100	33.661850
43	Carlson Avenue North of Campus Drive	IRV	Irvine	-117.850450	33.664733
44	University Dr Between Campus And Harvard	IRV	Irvine	-117.839600	33.657633
45	Victory Bl Btwn Burbank & Chandler Bl	BUR	Burbank	-118.320927	34.182733
46	Chandler Boulevard West of Victory Blvd	BUR	Burbank	-118.321733	34.180117
47	Magnolia Boulevard West of Victory Boulevard	BUR	Burbank	-118.320250	34.176733
48	Palm Avenue East of Victory Boulevard	BUR	Burbank	-118.317033	34.176100

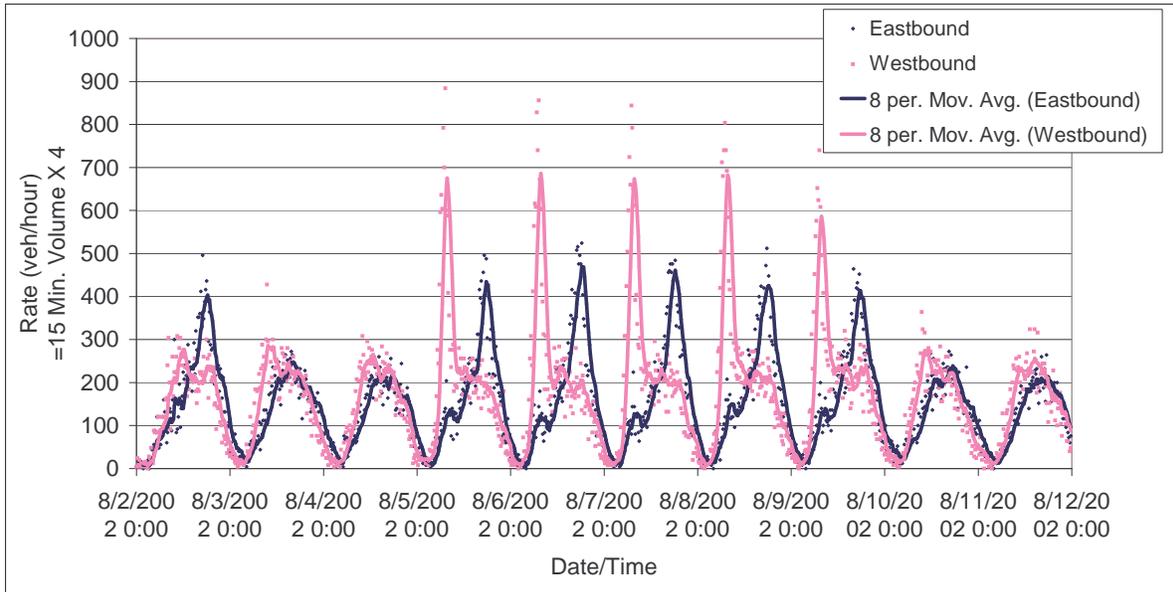
Time-Series Plot in 15-Minute Increments for  
 Location 17  
 1100 Foothill Blvd east of Todd Avenue : Arterial Azusa



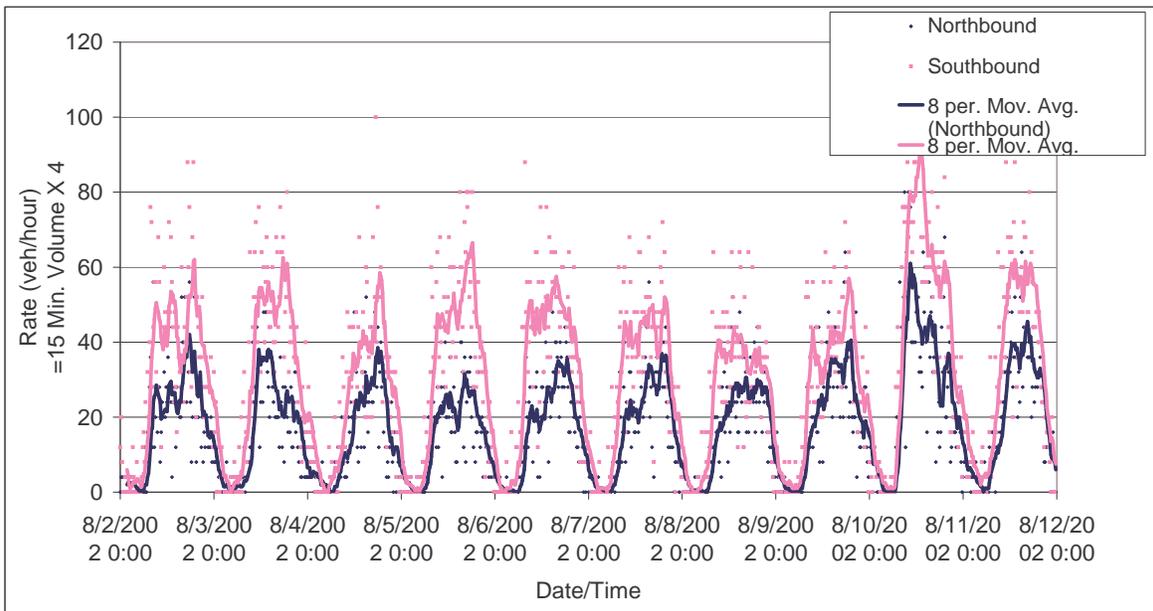
Time-Series Plot in 15-Minute Increments for  
 Location 18  
 Irwindale Avenue south of Foothill Blvd : Arterial AZUSA



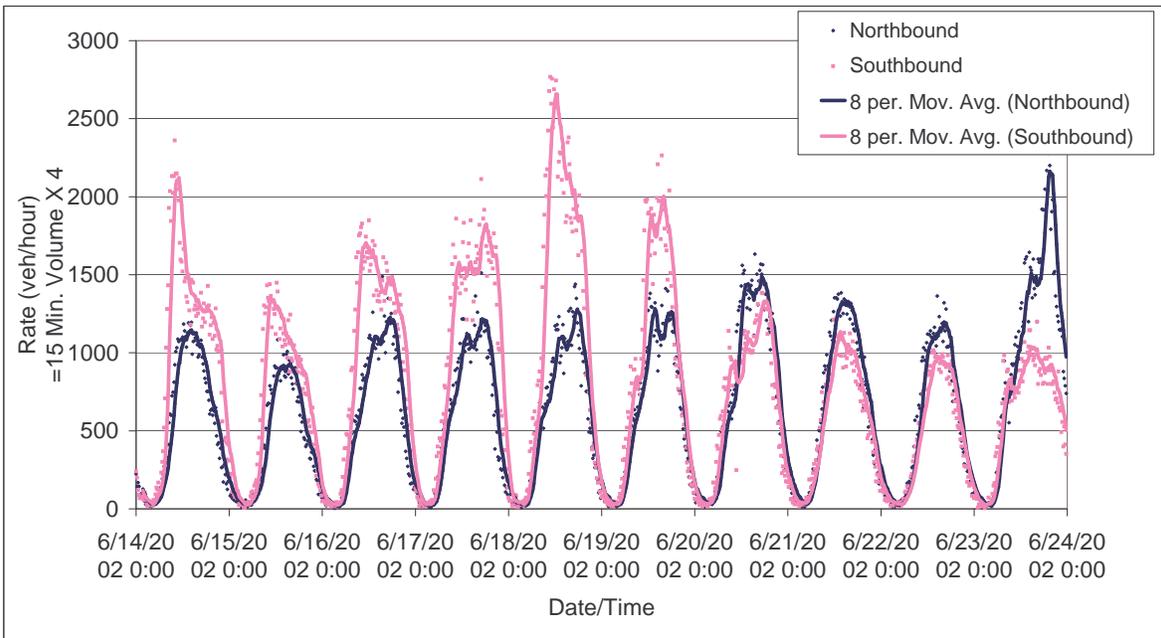
Time-Series Plot in 15-Minute Increments for  
 Location 19  
 1100 West Sierra Madre Avenue : Collector AZUSA



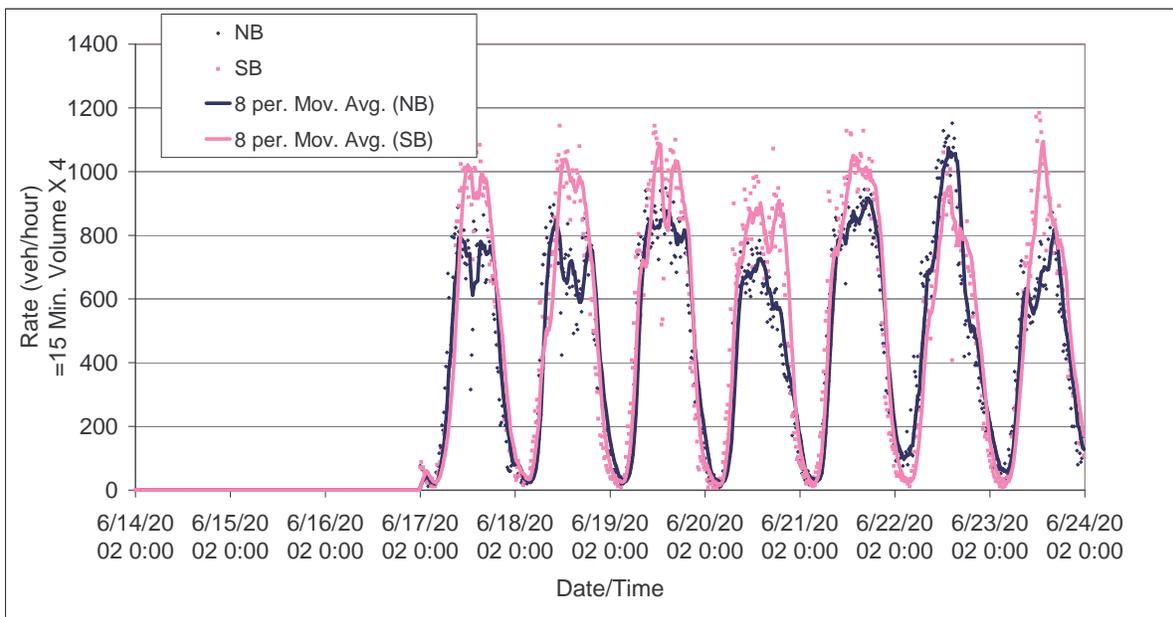
Time-Series Plot in 15-Minute Increments for  
 Location 20  
 Coney Avenue north of Foothill Blvd : Local AZUSA



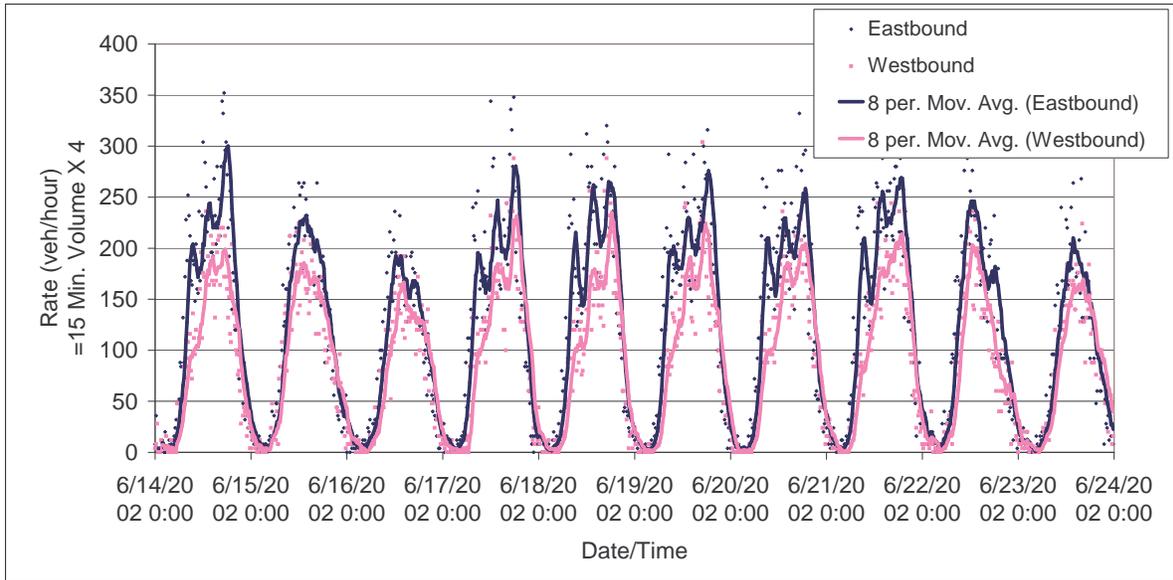
Time-Series Plot in 15-Minute Increments for  
 Location 45  
 Victory Bl Btwn Burbank & Chandler Bl : Arterial BURBANK



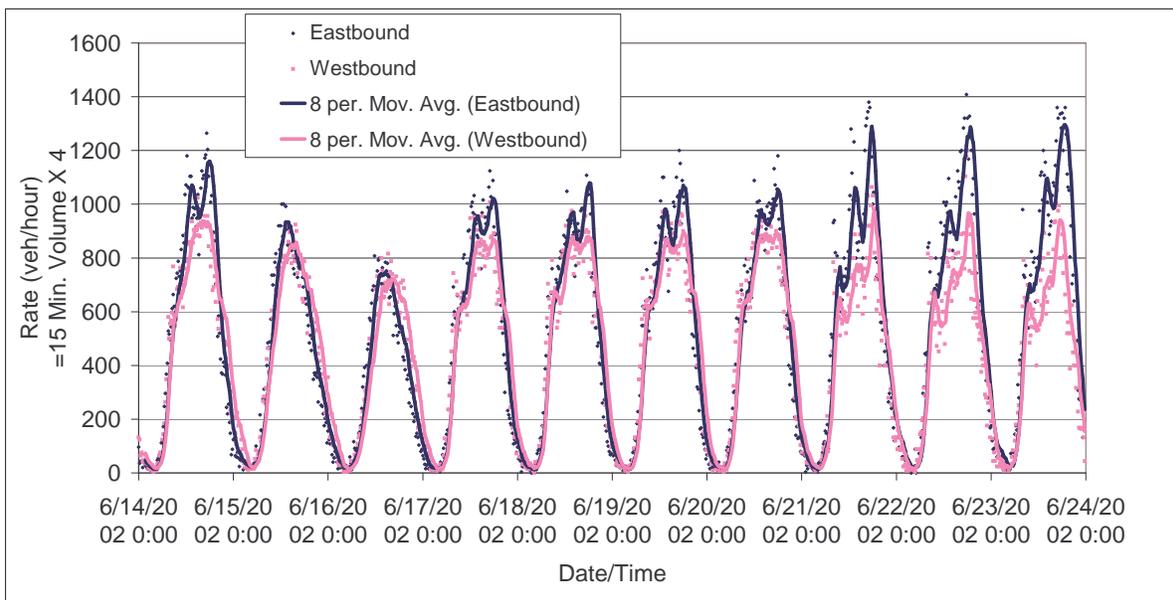
Time-Series Plot in 15-Minute Increments for  
 Location 45  
 Victory Bl Btwn Burbank & Chandler Bl : Arterial BURBANK  
 Vehicle Classification Counter



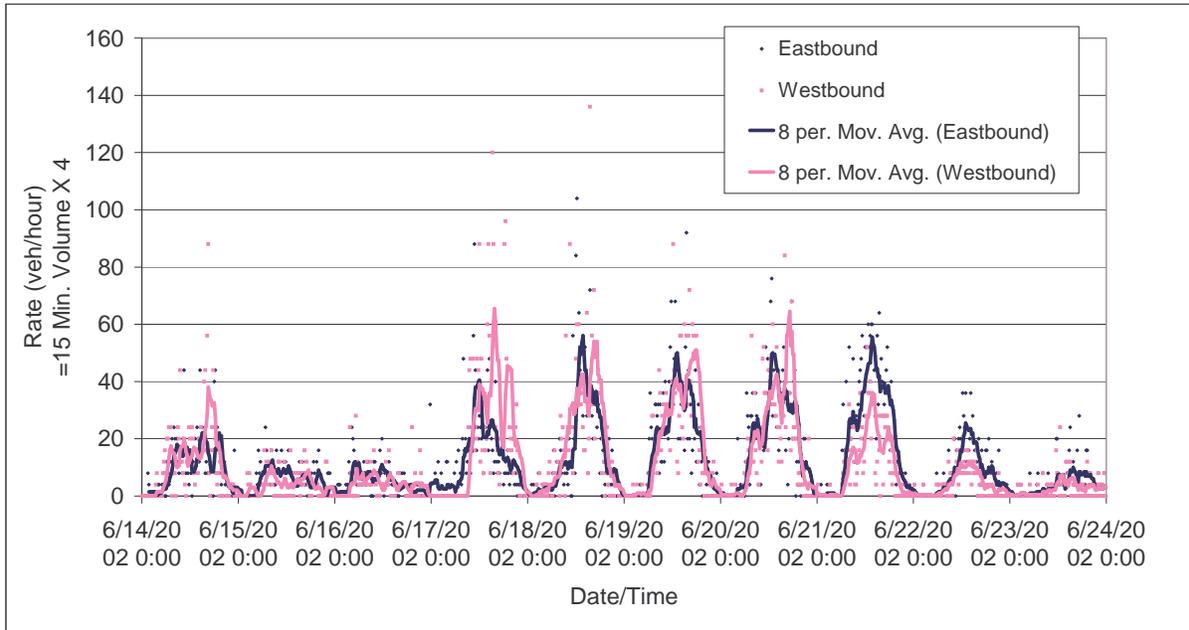
Time-Series Plot in 15-Minute Increments for  
 Location 46  
 Chandler Boulevard West Of Victory Blvd : Local BURBANK



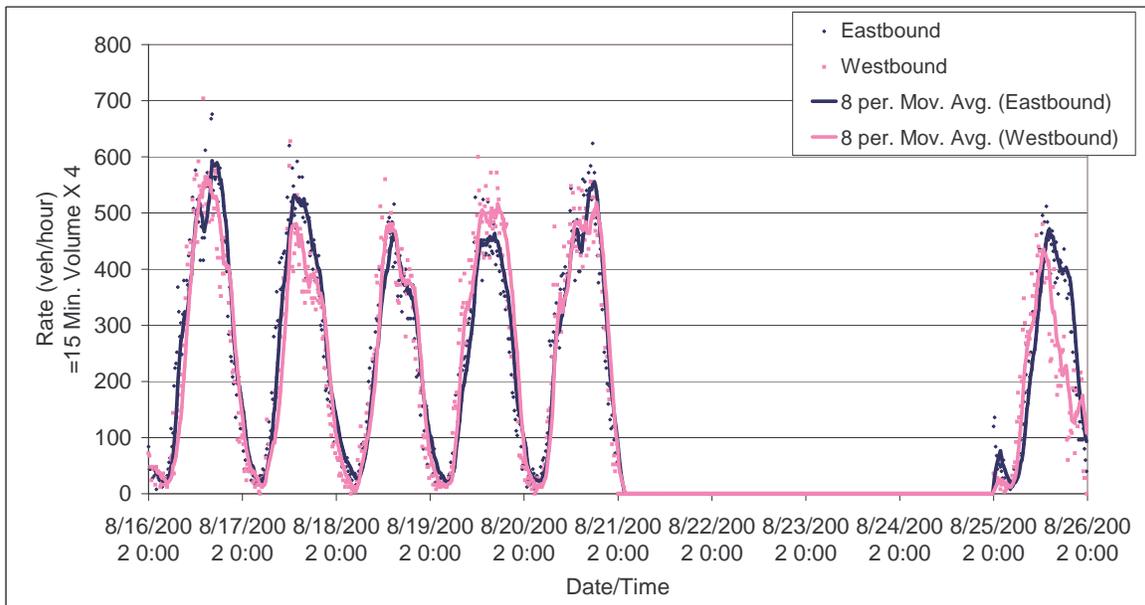
Time-Series Plot in 15-Minute Increments for  
 Location 47  
 Magnolia Boulevard West Of Victory Boulevard : Arterial BURBANK



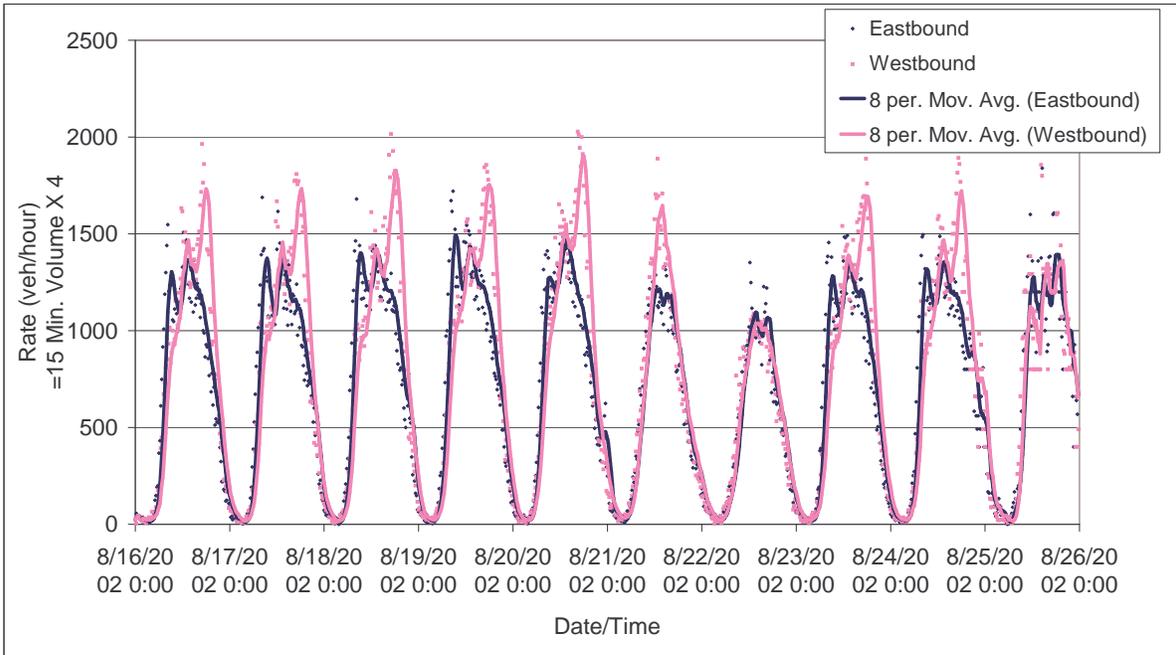
Time-Series Plot in 15-Minute Increments for  
 Location 48  
 Palm Avenue East Of Victory Boulevard : Local BURBANK



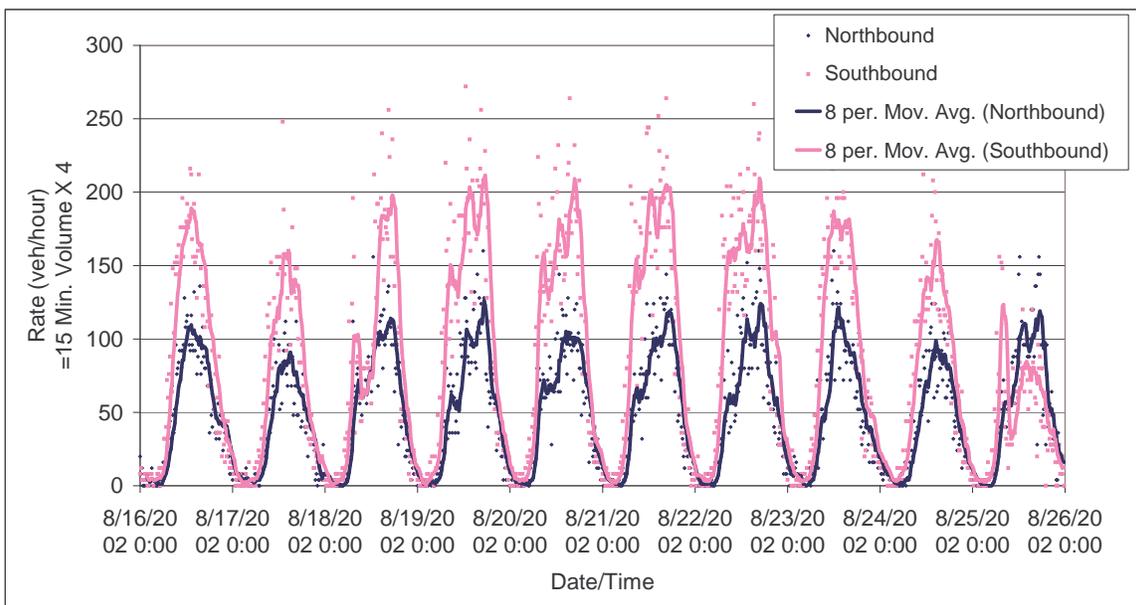
Time-Series Plot in 15-Minute Increments for  
 Location 27  
 Highland Avenue West Of Boulder Avenue : Arterial HIGHLAND  
 Vehicle Classification Counter



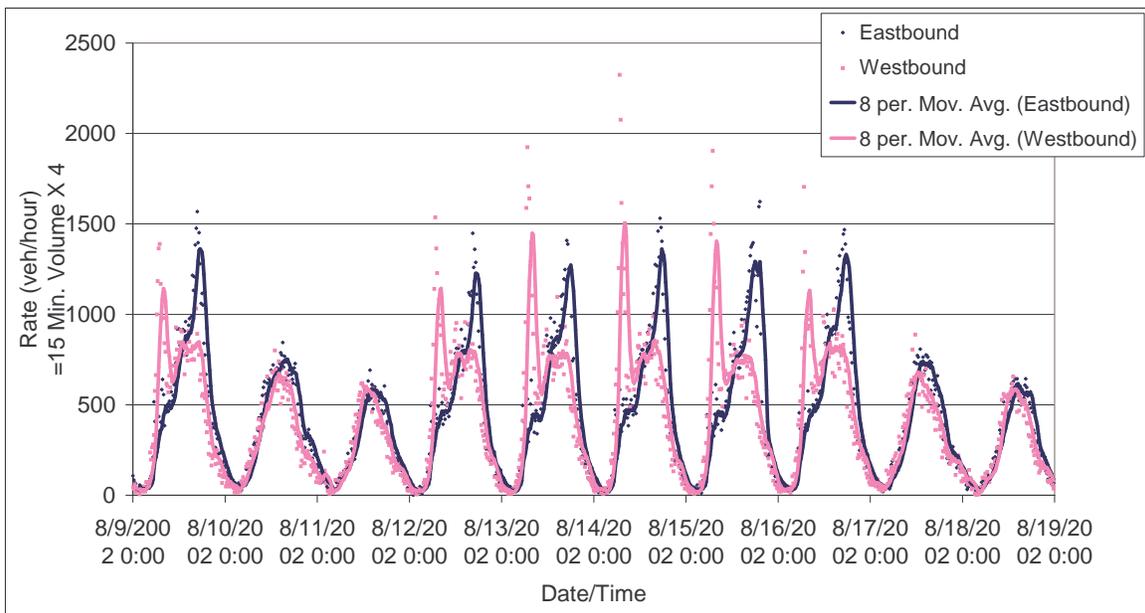
Time-Series Plot in 15-Minute Increments for  
 Location 28  
 Baseline Drive West Of Boulder Avenue : Arterial HIGHLAND



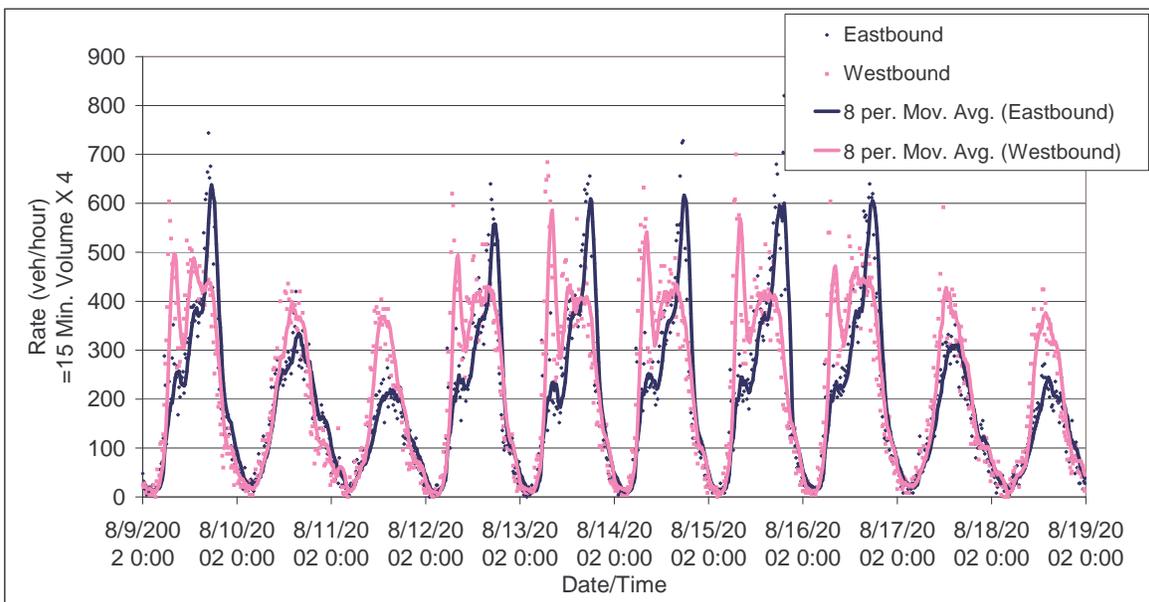
Time-Series Plot in 15-Minute Increments for  
 Location 29  
 Robinson Drive South Of Highland Avenue : Local HIGHLAND



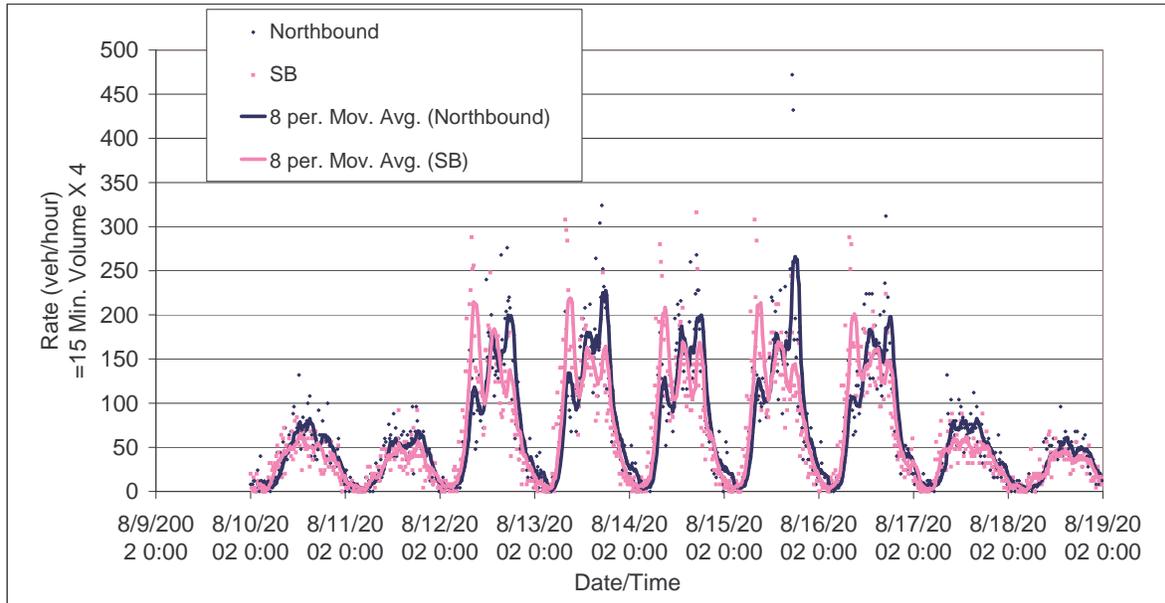
Time-Series Plot in 15-Minute Increments for  
 Location 42  
 Campus Drive East Of Jamboree : Collector IRVINE



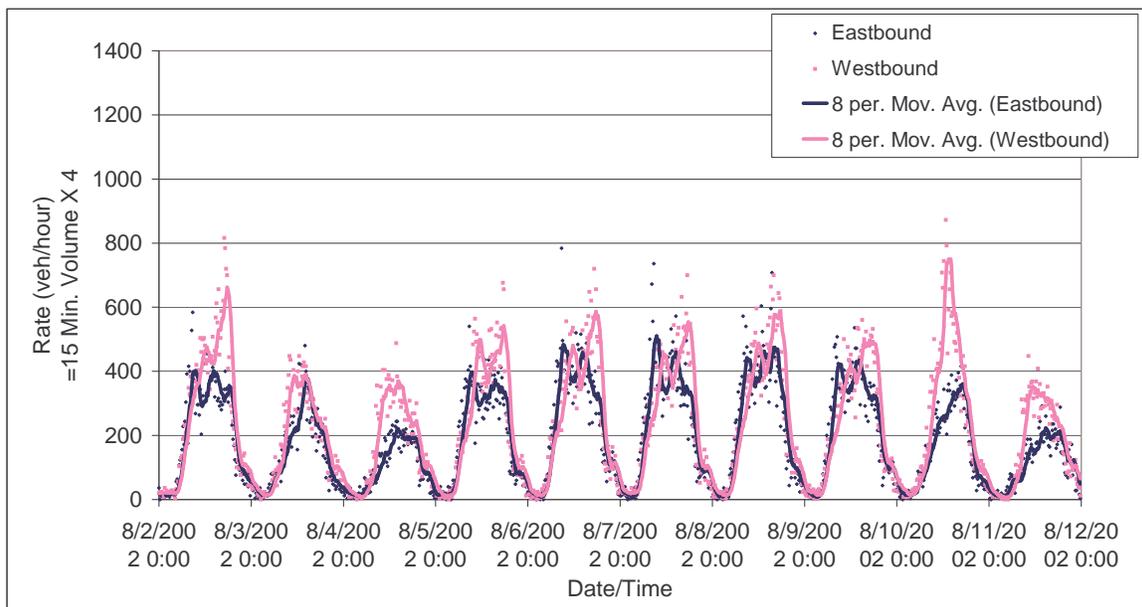
Time-Series Plot in 15-Minute Increments for  
 Location 42  
 Campus Drive East Of Jamboree : Collector IRVINE  
 Vehicle Classification Counter



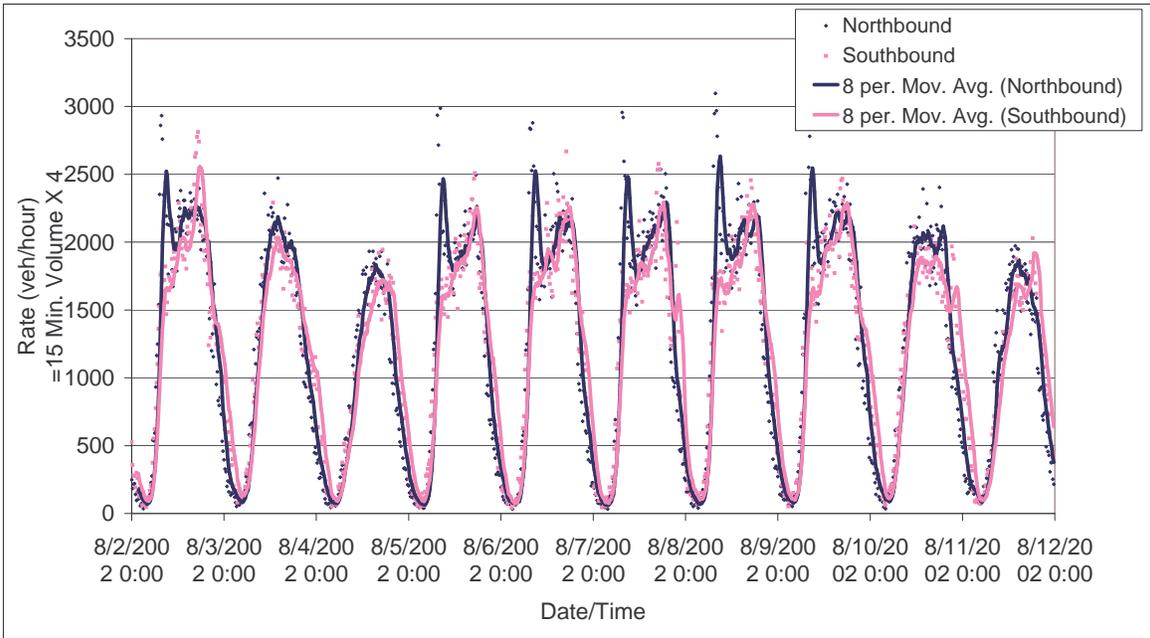
Time-Series Plot in 15-Minute Increments for  
 Location 43  
 Carlson Avenue North Of Campus Drive : Local IRVINE



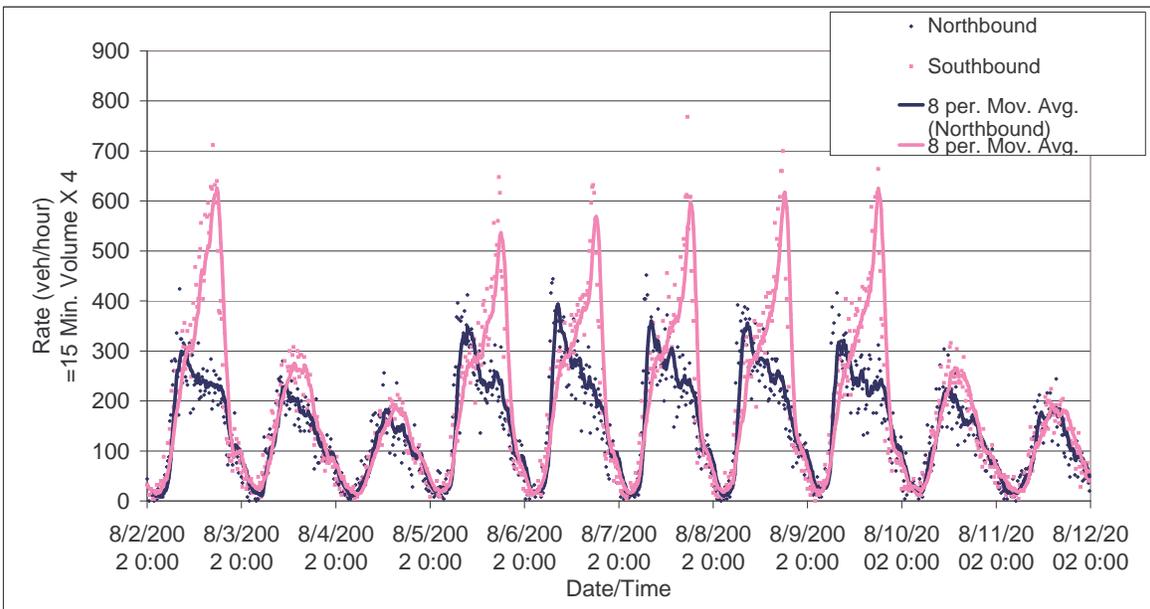
Time-Series Plot in 15-Minute Increments for  
 Location 21  
 VIGNES STREET EAST OF MAIN STREET : Collector LOS ANGELES



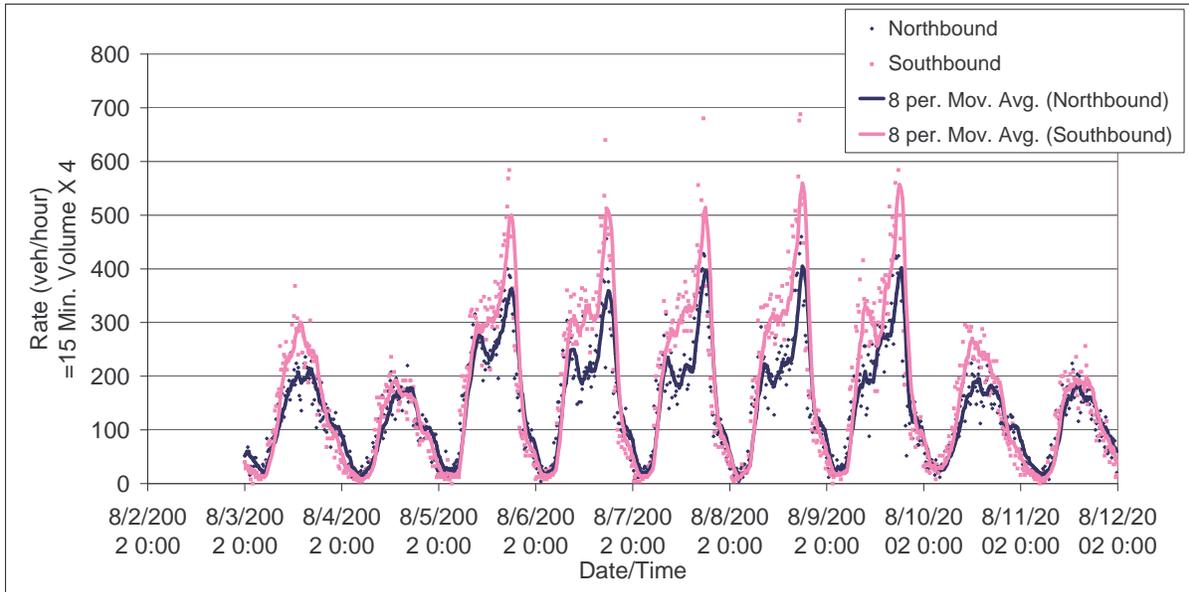
Time-Series Plot in 15-Minute Increments for  
 Location 22  
 ALAMEDA AVENUE SOUTH OF VIGNES STREET : Arterial LOS ANGELES



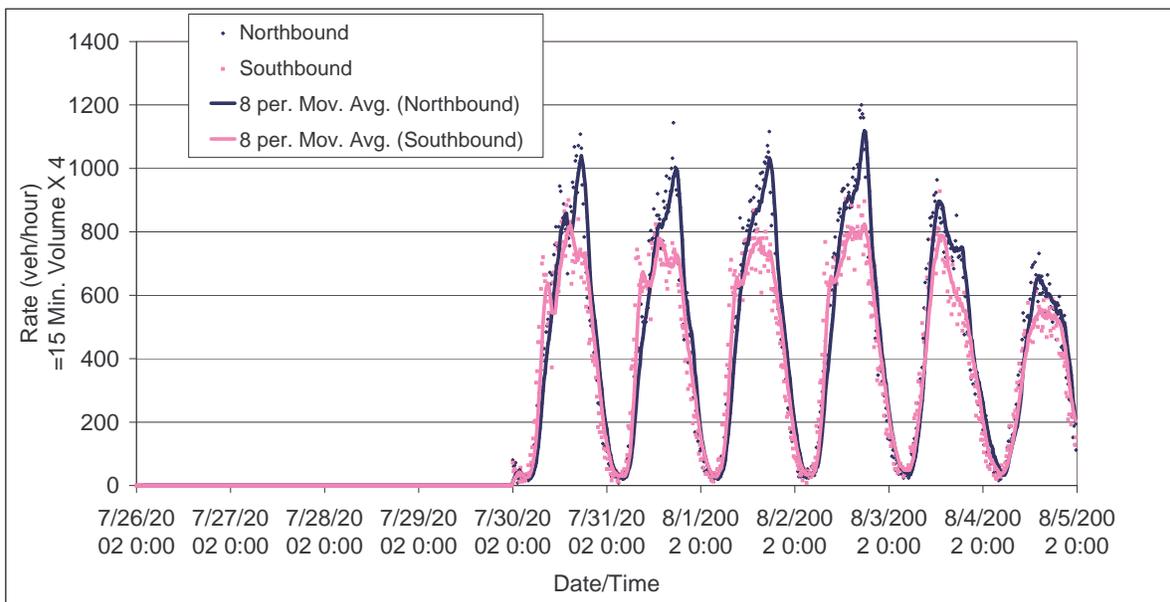
Time-Series Plot in 15-Minute Increments for  
 Location 23  
 800 North Main Street : Collector LOS ANGELES



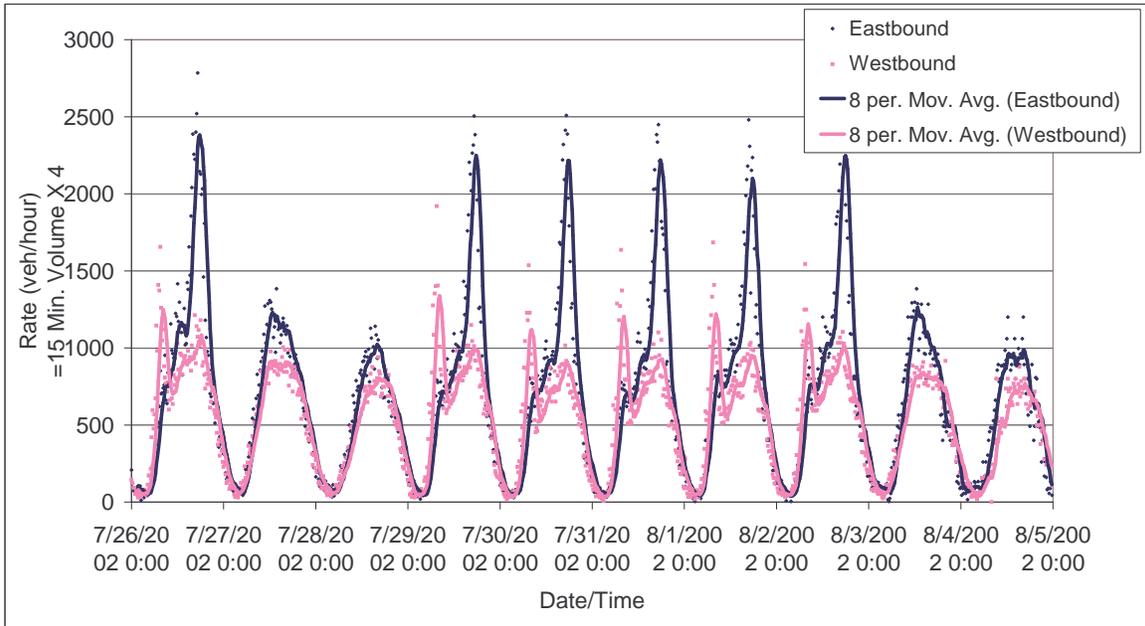
Time-Series Plot in 15-Minute Increments for  
 Location 23  
 800 North Main Street : Collector LOS ANGELES  
 Vehicle Classification Counter



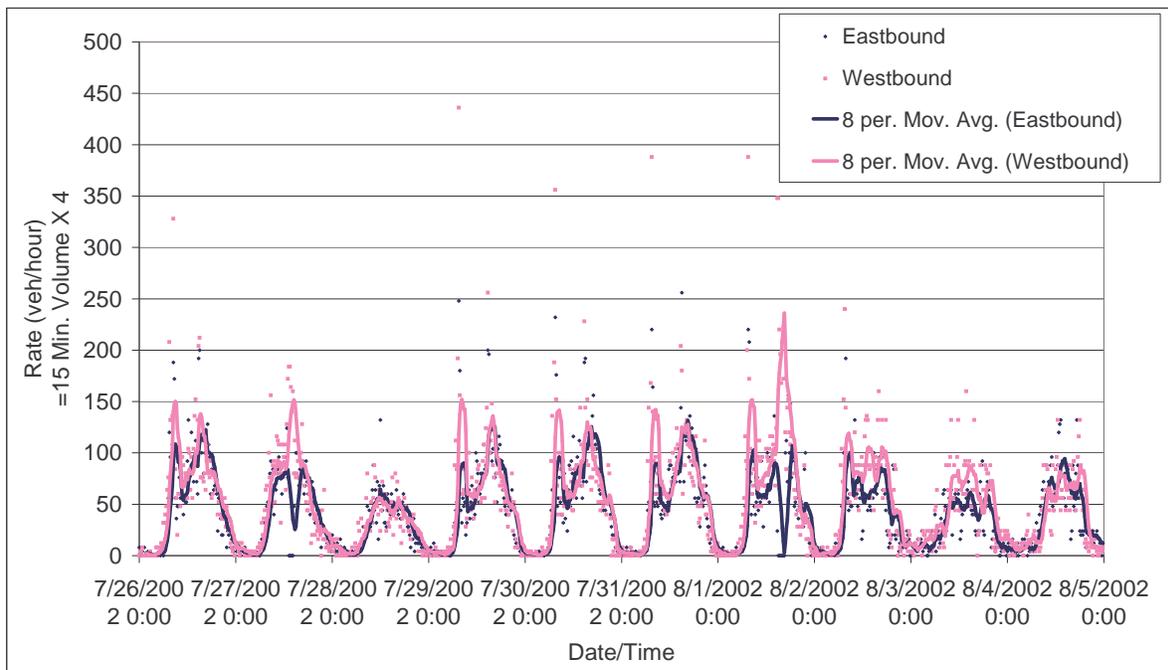
Time-Series Plot in 15-Minute Increments for  
 Location 24  
 Atlantic Avenue south of 45th Street : Arterial LONG BEACH  
 Vehicle Classification Counter



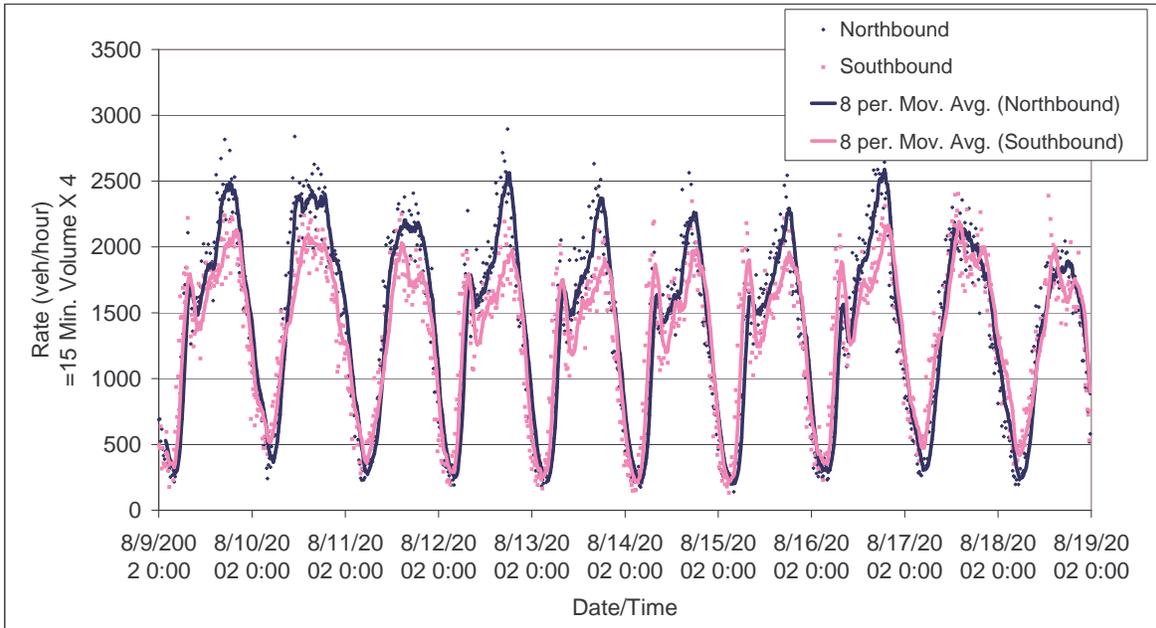
Time-Series Plot in 15-Minute Increments for  
 Location 25  
 Del Amo Boulevard East Of Atlantic Avenue : Arterial LONG BEACH



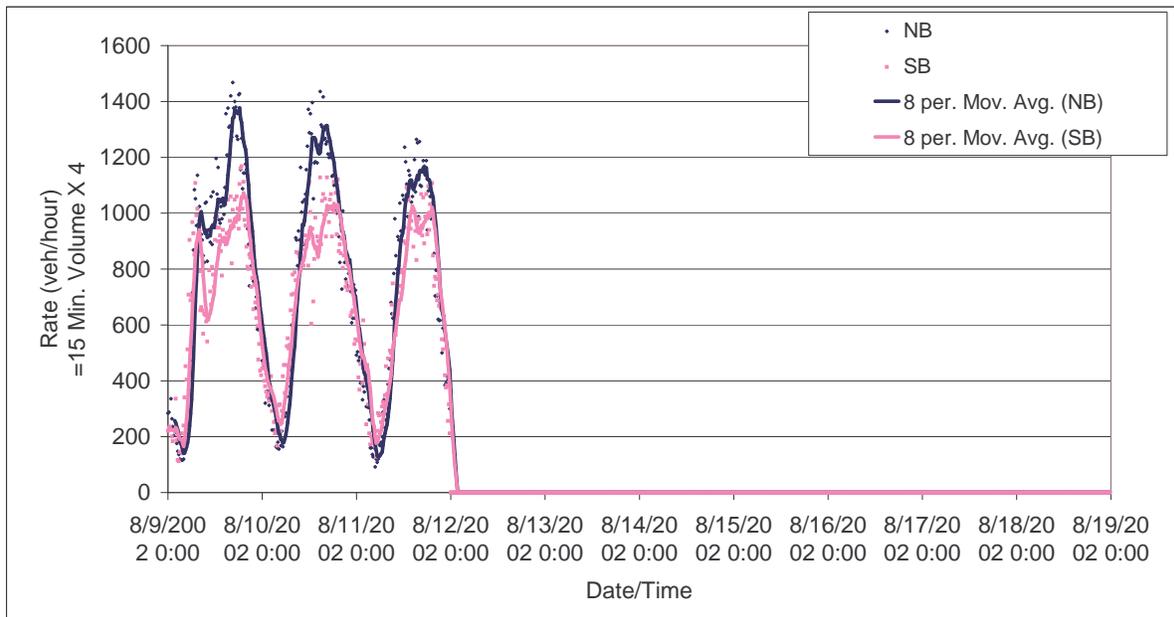
Time-Series Plot in 15-Minute Increments for  
 Location 26  
 45Th Street West Of Atlantic Avenue : Local LONG BEACH



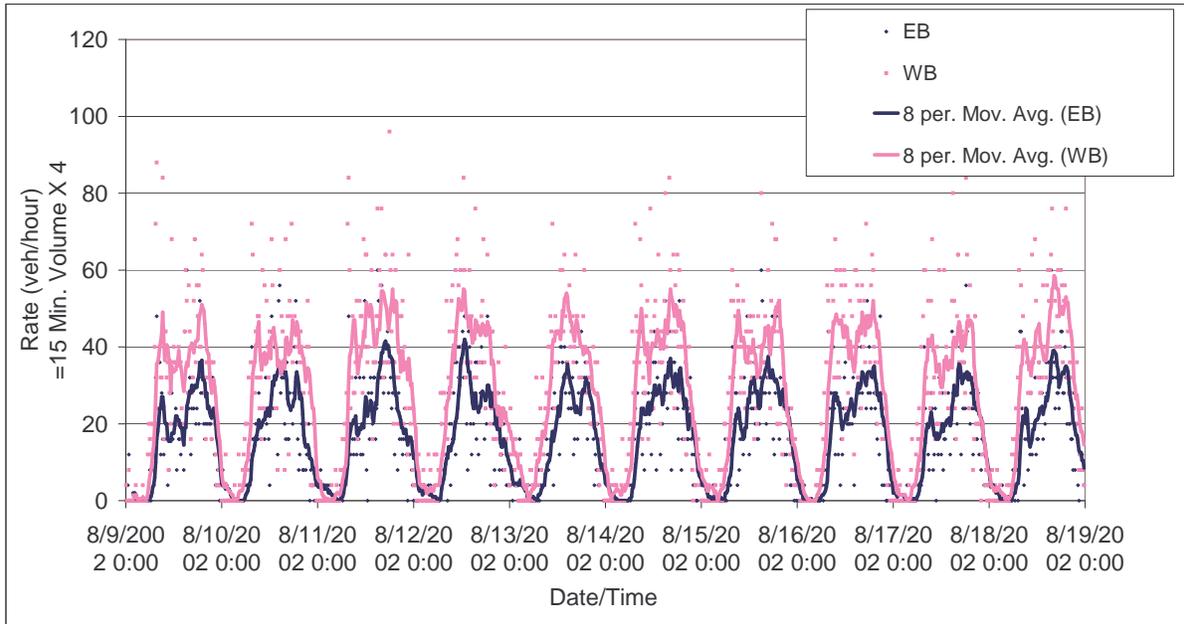
Time-Series Plot in 15-Minute Increments for  
 Location 39  
 Long Beach Boulevard North Of Imperial Highway : Arterial LYNWOOD



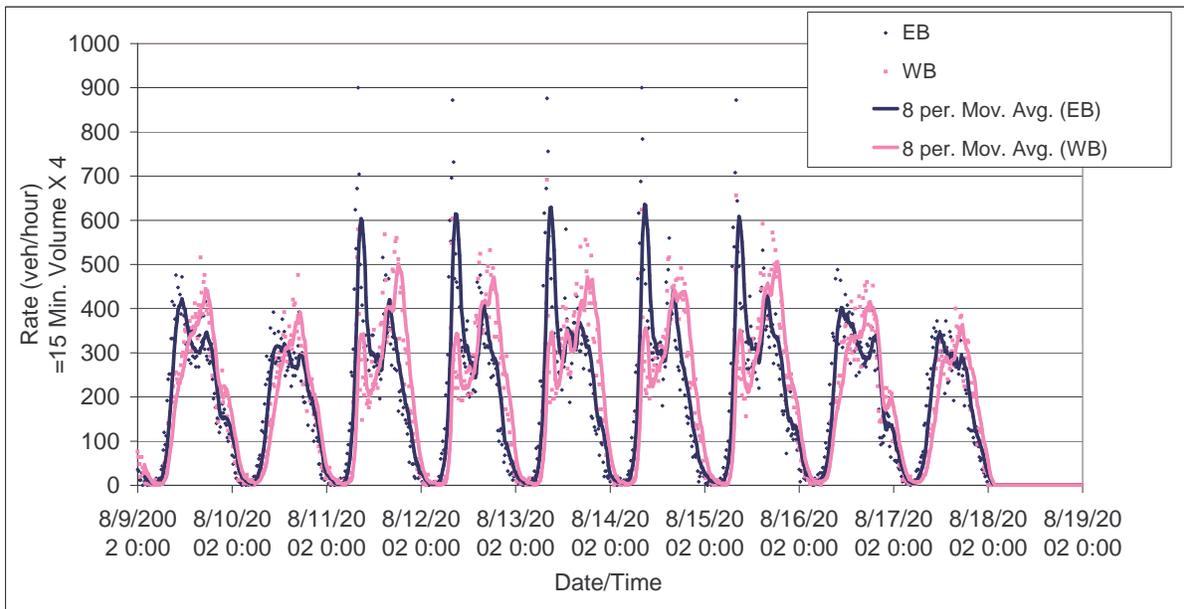
Time-Series Plot in 15-Minute Increments for  
 Location 39  
 Long Beach Boulevard North Of Imperial Highway : Arterial LYNWOOD  
 Vehicle Classification Counter



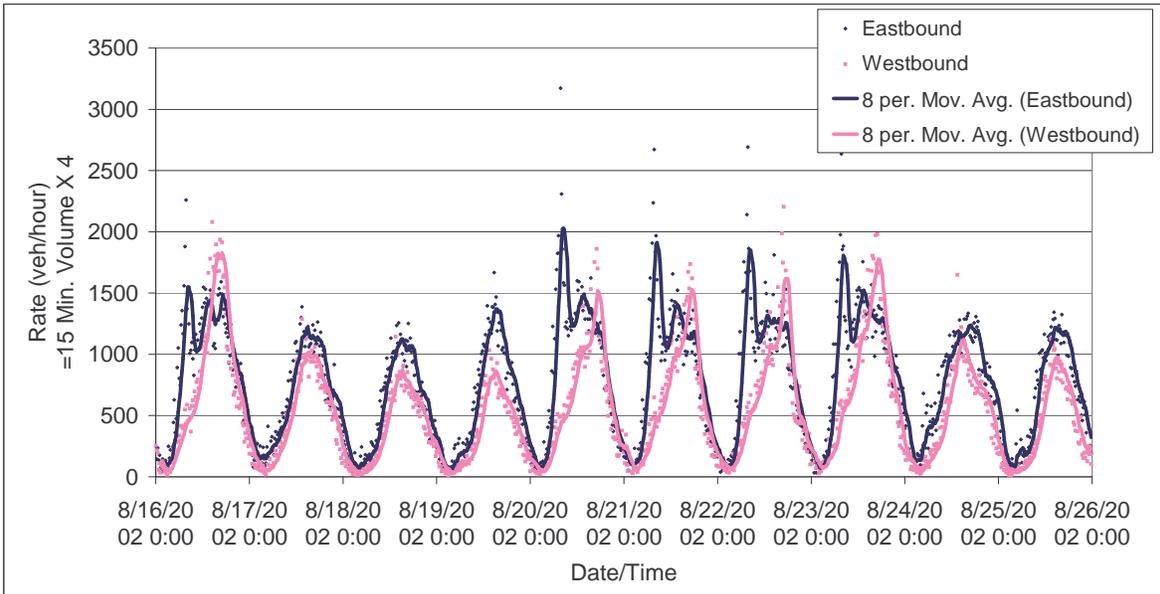
Time-Series Plot in 15-Minute Increments for  
 Location 40  
 Alma Street East Of Long Beach Boulevard : Local LYNWOOD



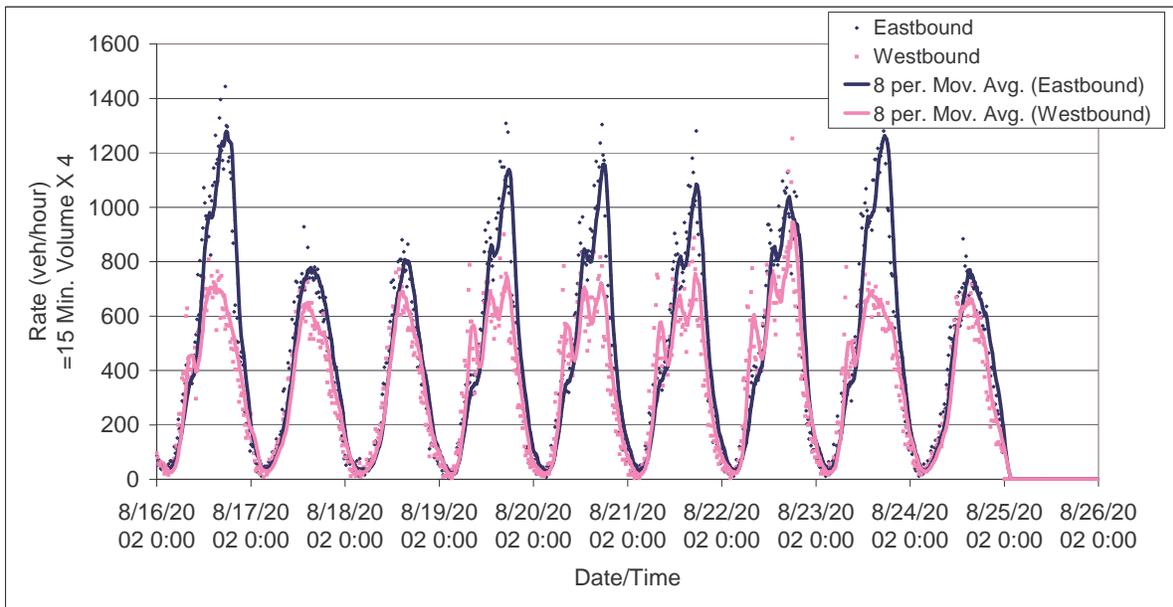
Time-Series Plot in 15-Minute Increments for  
 Location 41  
 Imperial Highway East Of Long Beach Boulevard : Arterial LYNWOOD



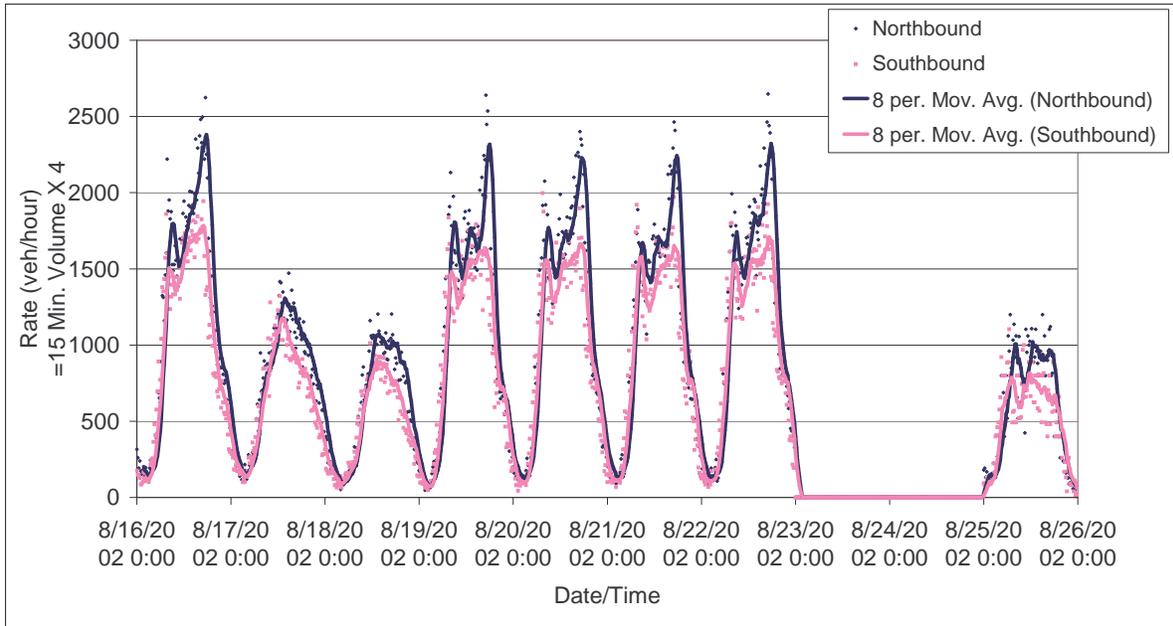
Time-Series Plot in 15-Minute Increments for  
 Location 30  
 Fourth Street East Of Milliken Avenue : Arterial ONTARIO



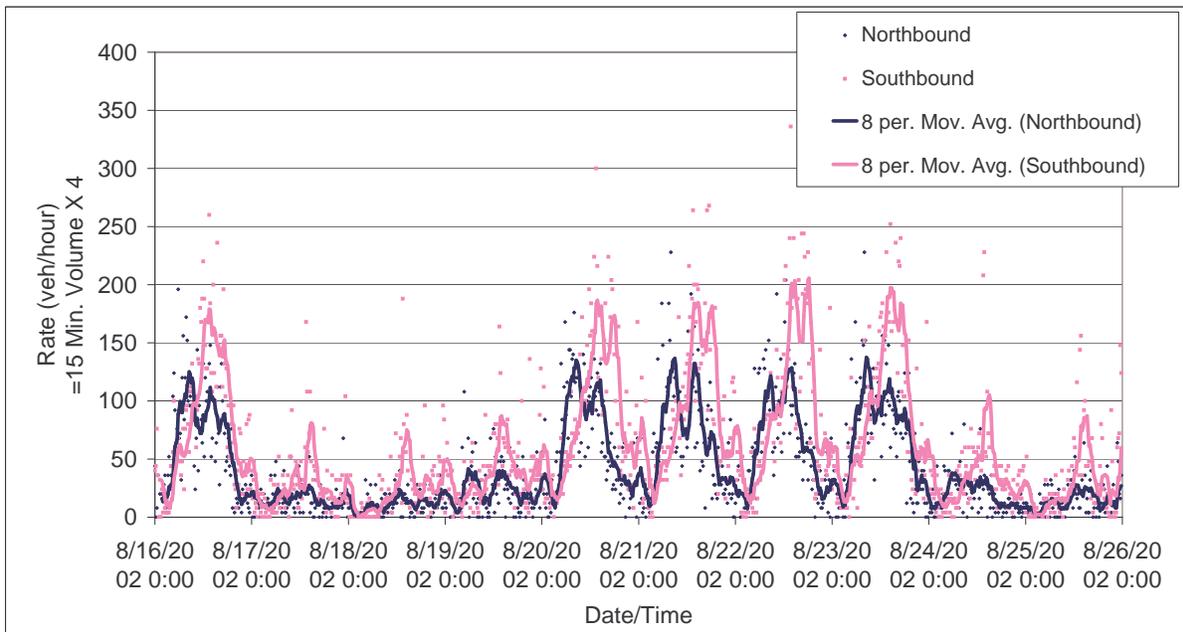
Time-Series Plot in 15-Minute Increments for  
 Location 30  
 Fourth Street East Of Milliken Avenue : Arterial ONTARIO  
 Vehicle Classification Counter



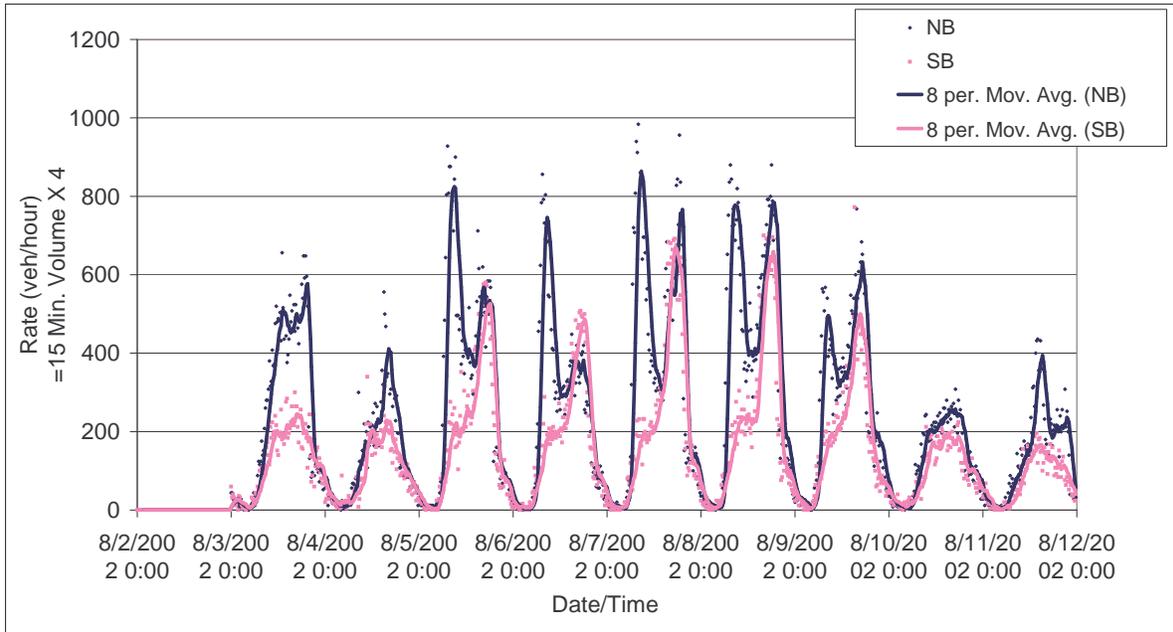
Time-Series Plot in 15-Minute Increments for  
 Location 31  
 Milliken Avenue North Of Fourth Street : Arterial ONTARIO



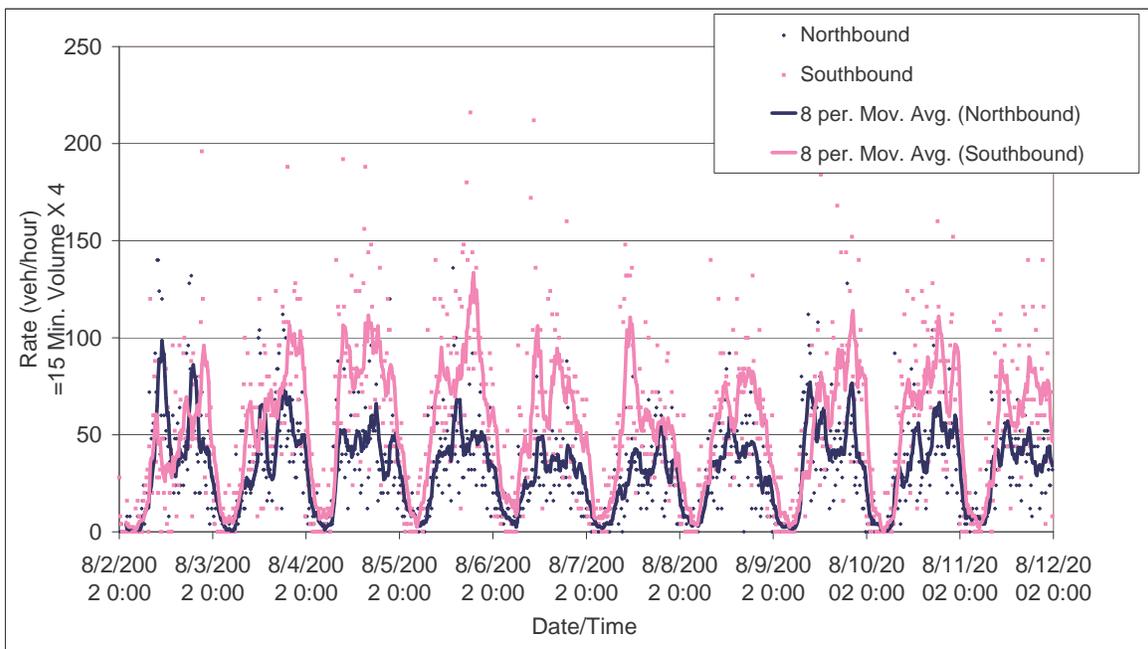
Time-Series Plot in 15-Minute Increments for  
 Location 32  
 Richmond Drive North Of Fourth Street : Local ONTARIO



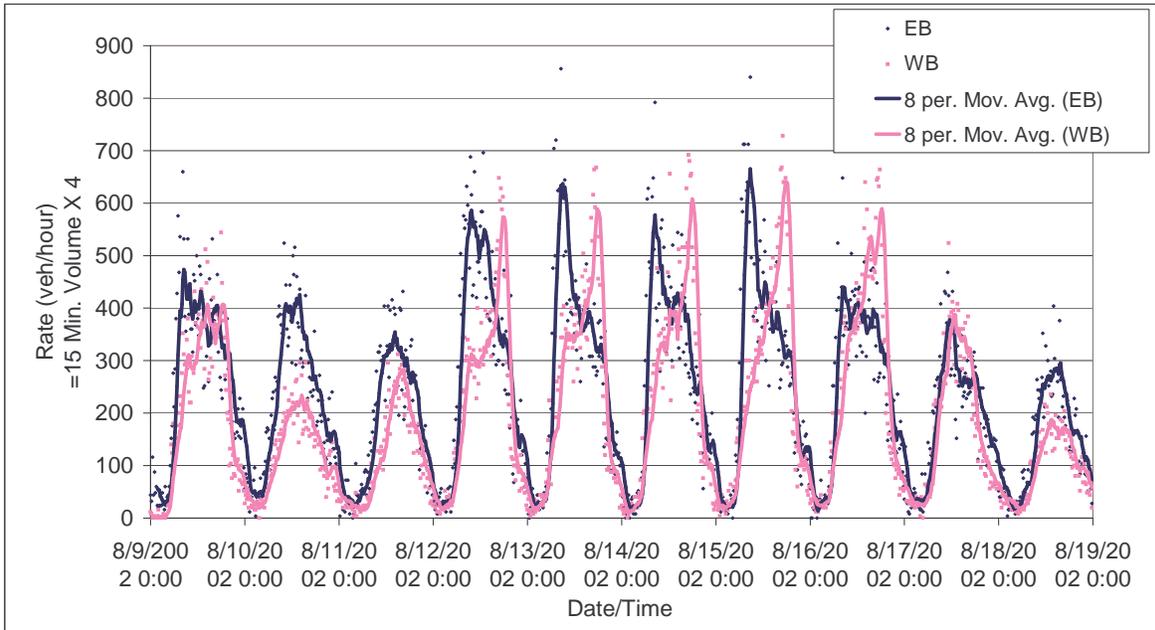
Time-Series Plot in 15-Minute Increments for  
 Location 34  
 Main Street South Of Orangewood : Arterial ORANGE



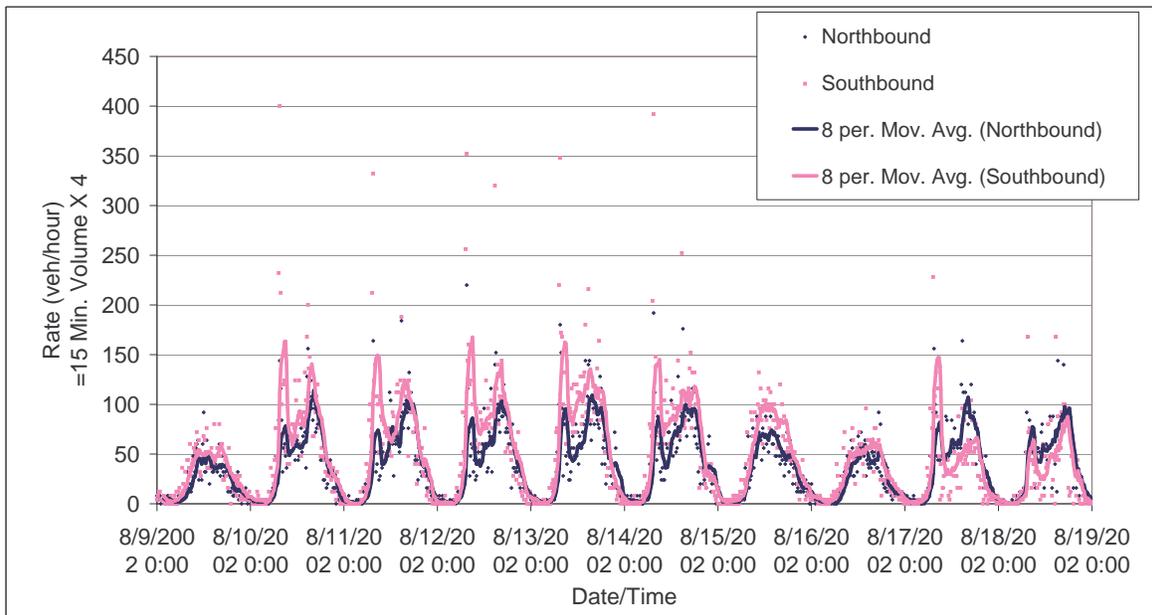
Time-Series Plot in 15-Minute Increments for  
 Location 35  
 Eckhoff Street North Of Orangewood : Collector ORANGE



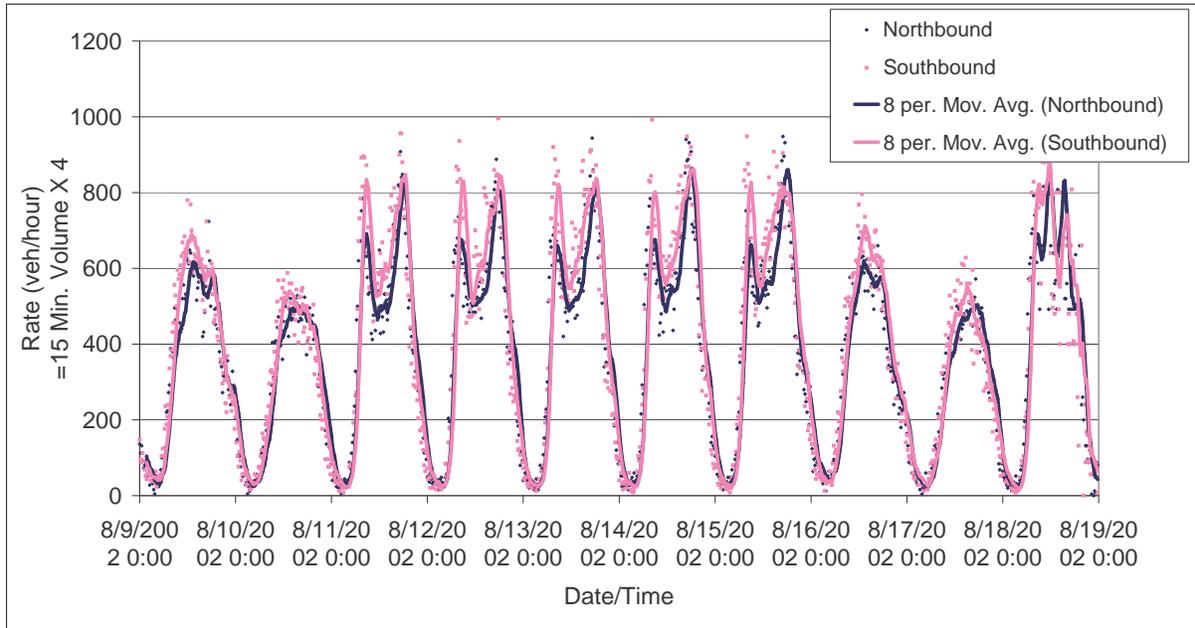
Time-Series Plot in 15-Minute Increments for  
 Location 36  
 5870 Mission Boulevard : Arterial RUBIDOUX



Time-Series Plot in 15-Minute Increments for  
 Location 37  
 Riverview North Of Mission Boulevard : Local RUBIDOUX



Time-Series Plot in 15-Minute Increments for  
Location 38  
Rubidoux Boulevard North Of Mission Boulevard : Arterial RUBIDOUX



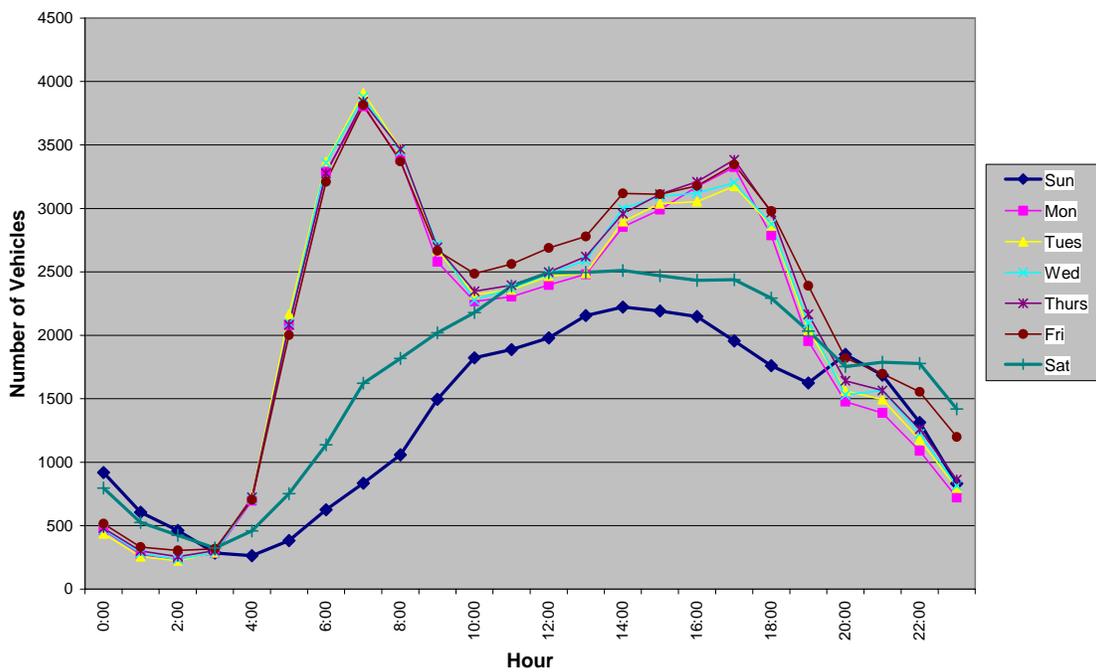
## **APPENDIX E**

### **TIME SERIES PLOTS OF FREEWAY OBSERVATIONS**

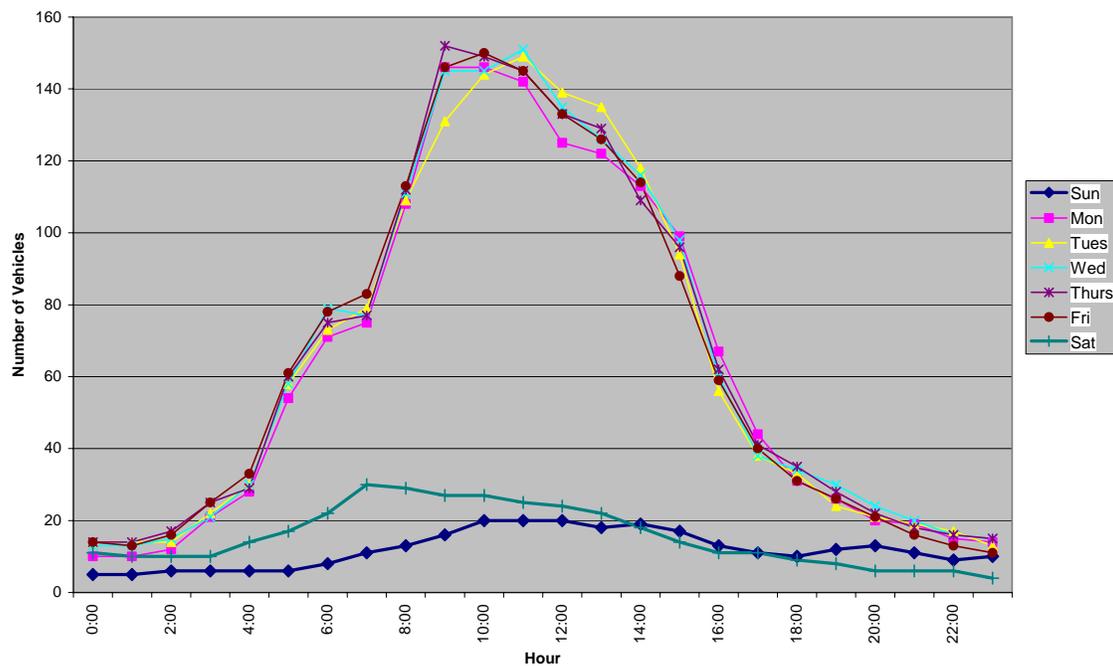
This appendix graphically illustrates time-series plots of hourly average traffic volumes acquired for 36 Caltrans weigh-in-motion (WIM) sensors for the period from May 15 to September 15, 2002. Days surrounding holidays were excluded due to abnormal traffic patterns. The holidays included Memorial Day, 4th of July, and Labor Day. Averages are plotted for each location, each day of the week, and each vehicle type and (in most cases) for the sum total of traffic flowing in both directions of travel. (However, data were only available for the southbound direction of travel at the Rainbow site.) The locations of the WIM sites are illustrated in Figure 2-18. Data sets are provided on compact disc (CD) in Appendix Table D-1.



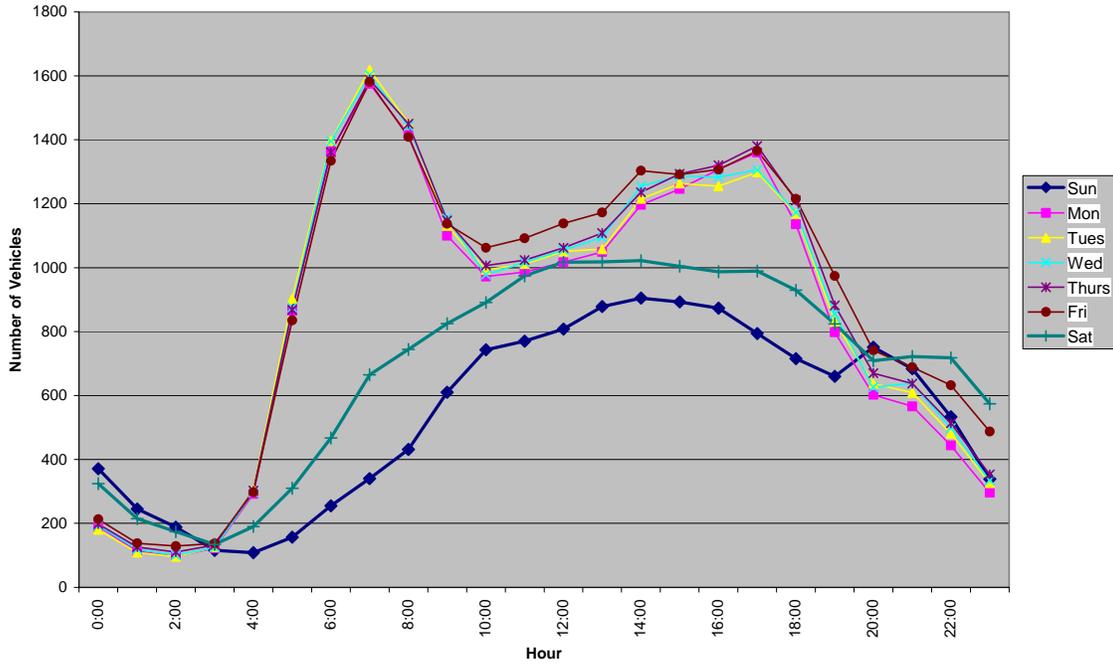
WIM Site Artesia: Passenger/2-3 axle Vehicles



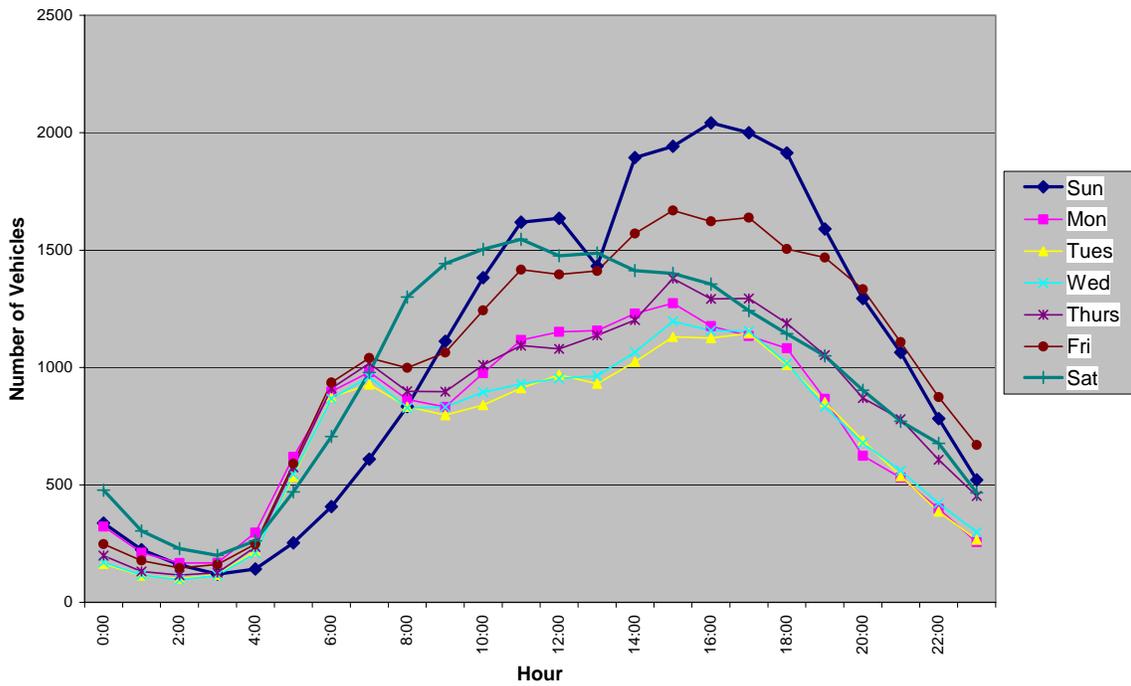
WIM Site Artesia: 4 or more axle Vehicles



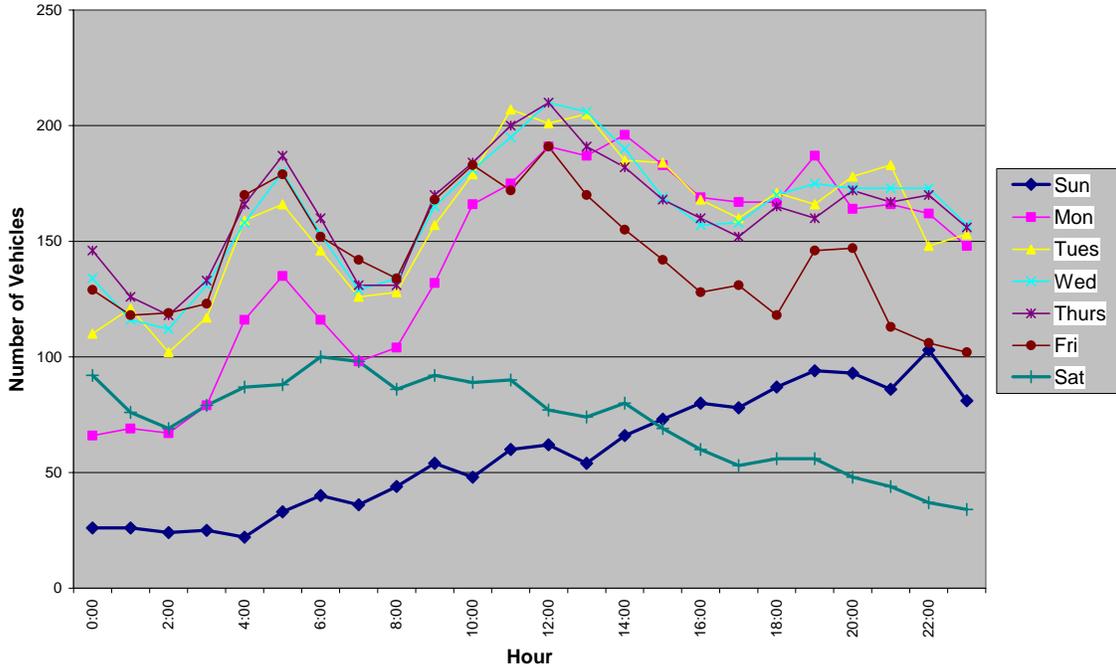
WIM Site Artesia: All Vehicle type



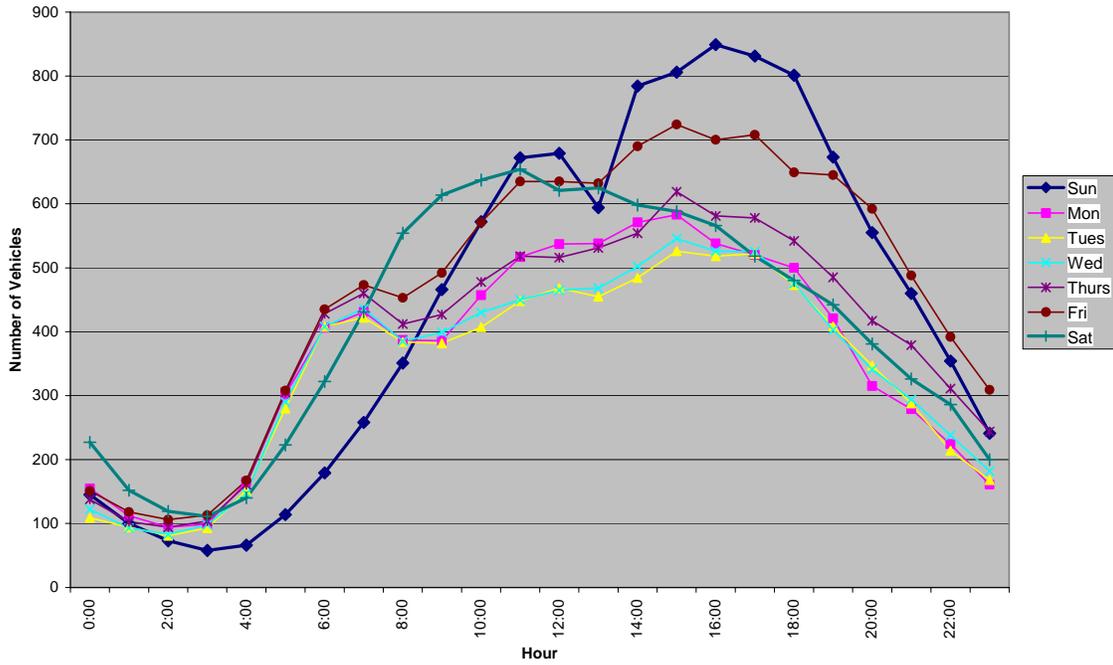
WIM Site Castaic: Passenger/2-3 axle Vehicles



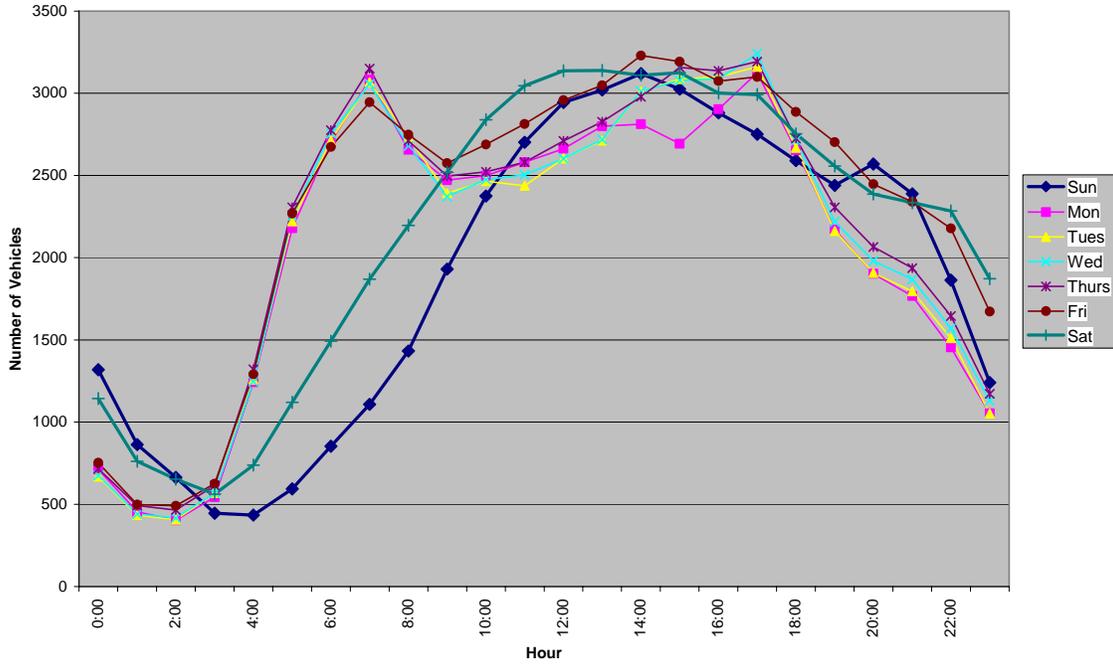
WIM Site Castaic: 4 or more axle Vehicles



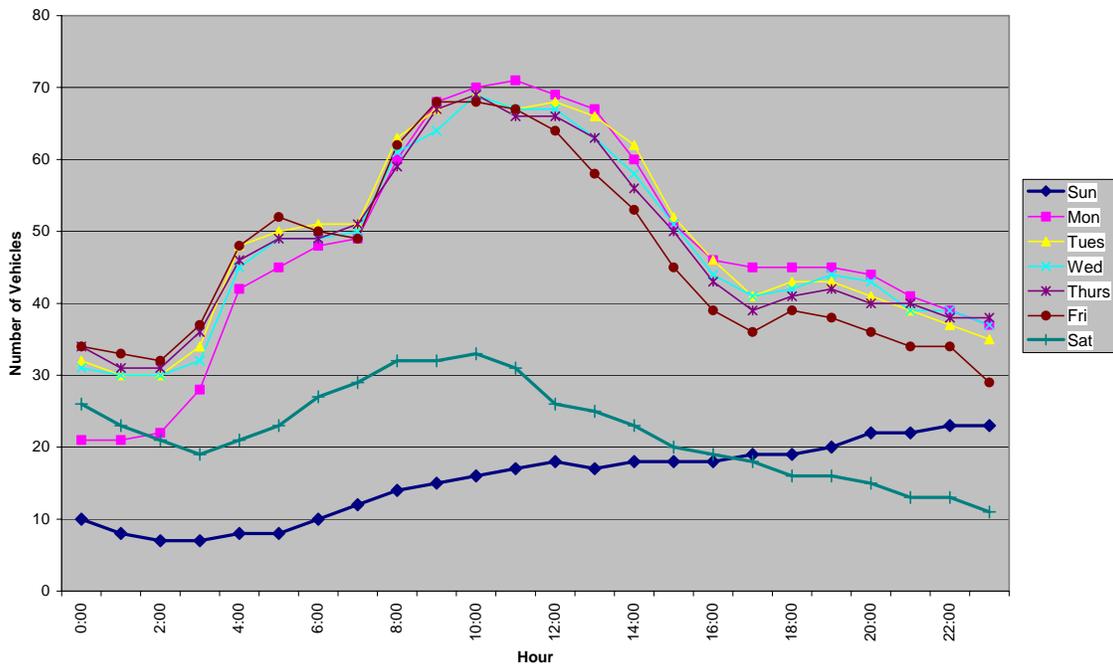
WIM Site Castaic: All Vehicle types



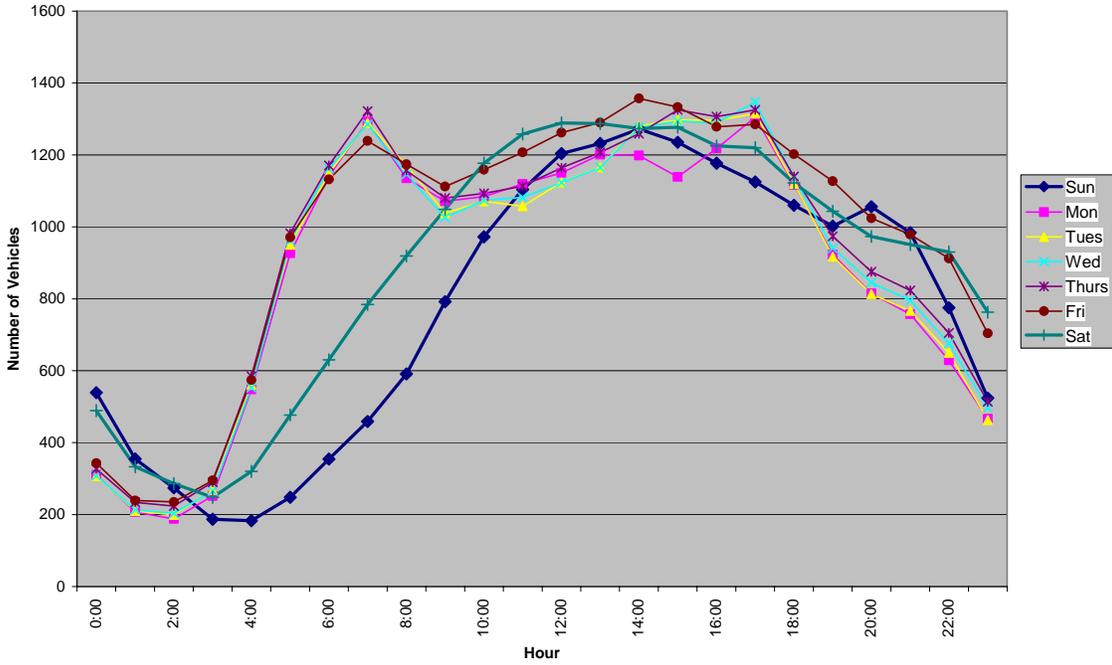
**WIM Site Colton: Passenger/2-3 axle Vehicles**



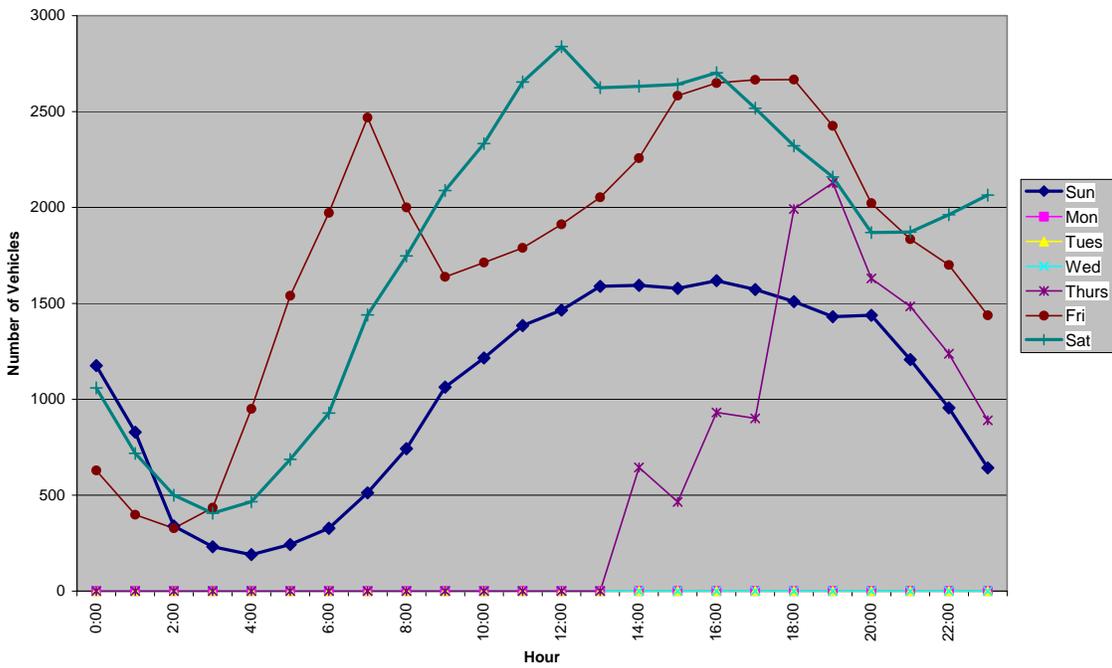
**WIM Site Colton: 4 or more axle Vehicles**



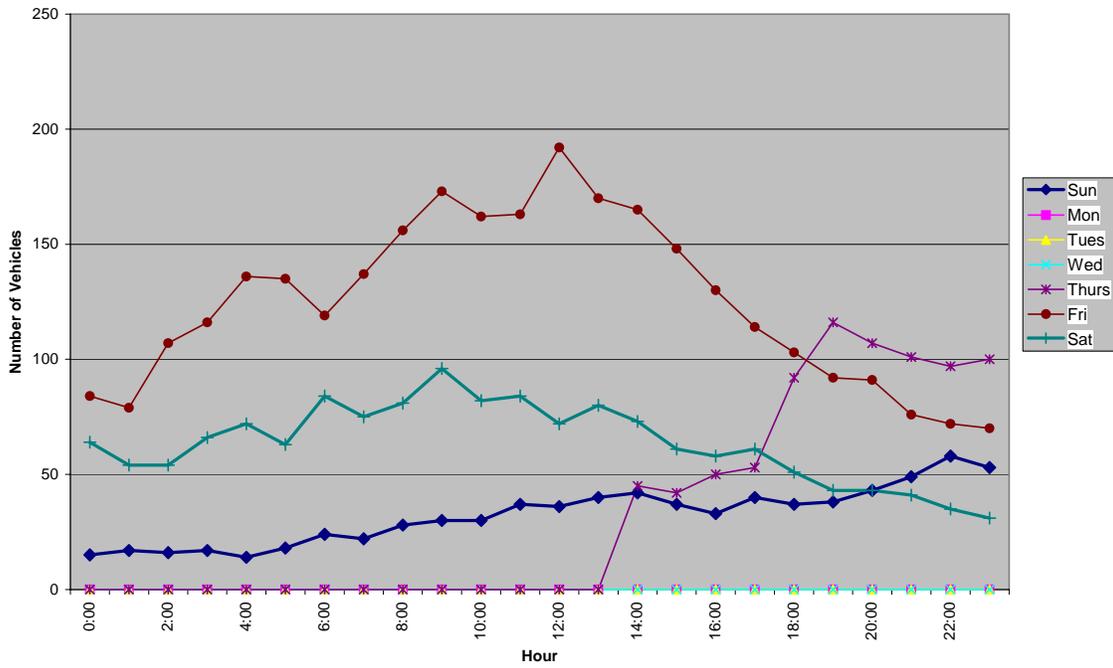
**WIM Site Colton: All Vehicle types**



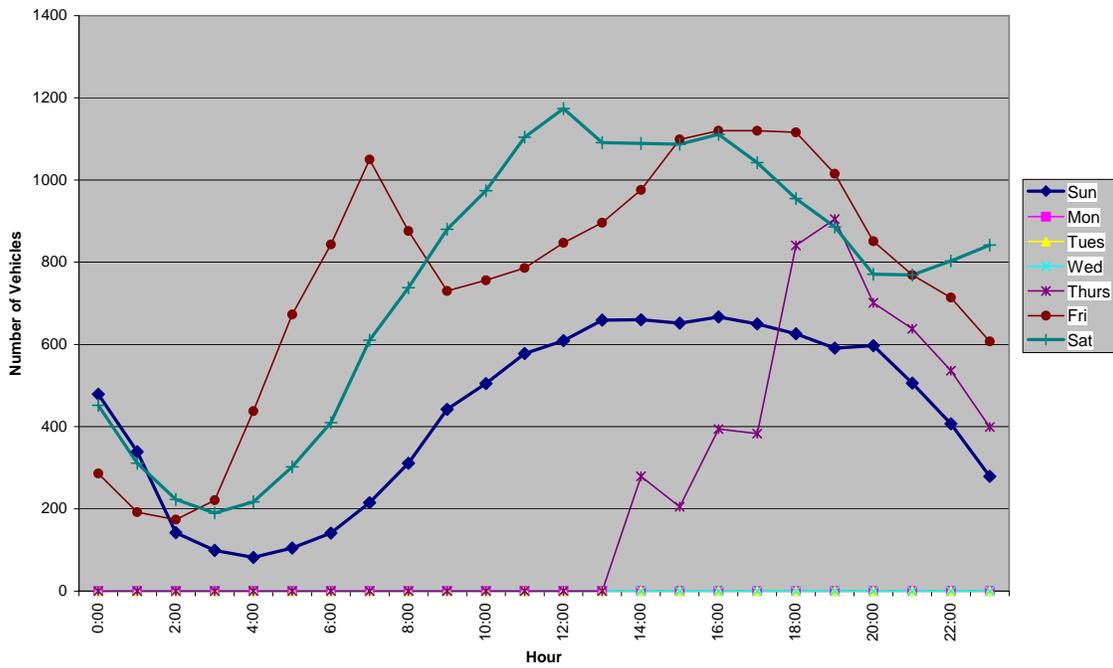
**WIM Site Fontana: Passenger/2-3 axle Vehicles**



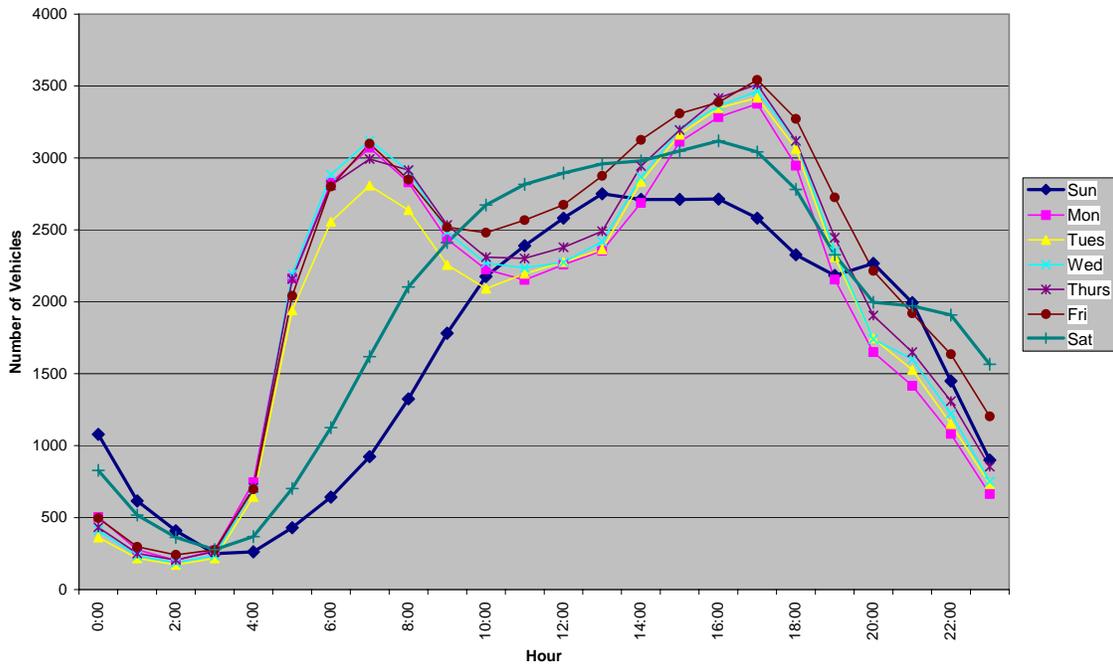
WIM Site Fontana: 4 or more axle Vehicles



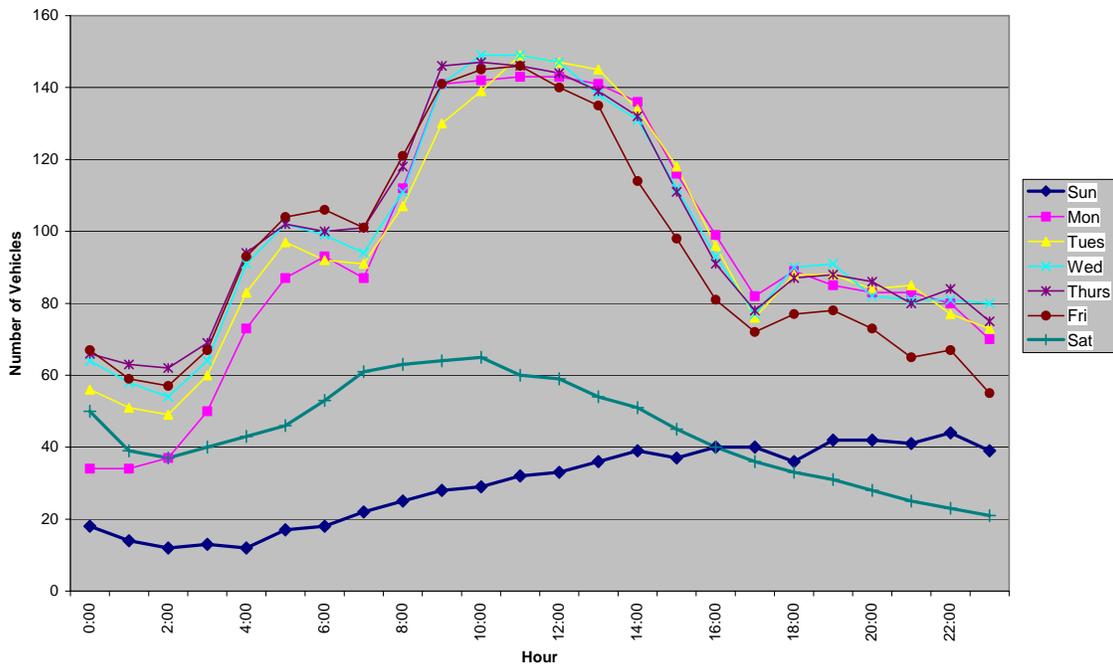
WIM Site Fontana: All Vehicle types



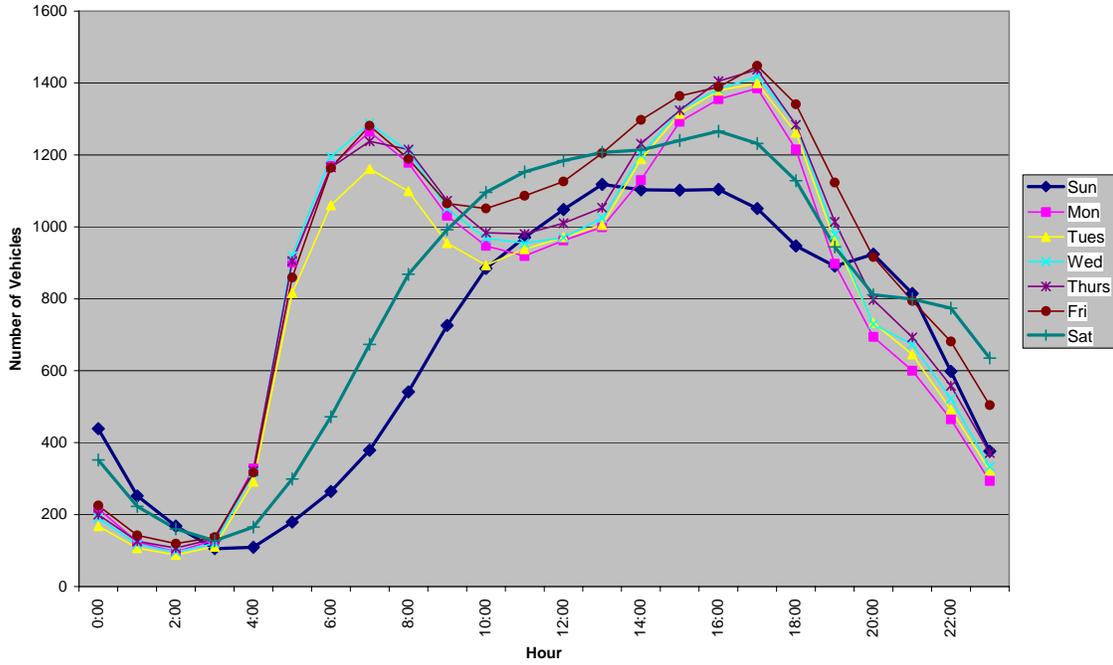
**WIM Site Glendora: Passenger/2-3 axle Vehicles**



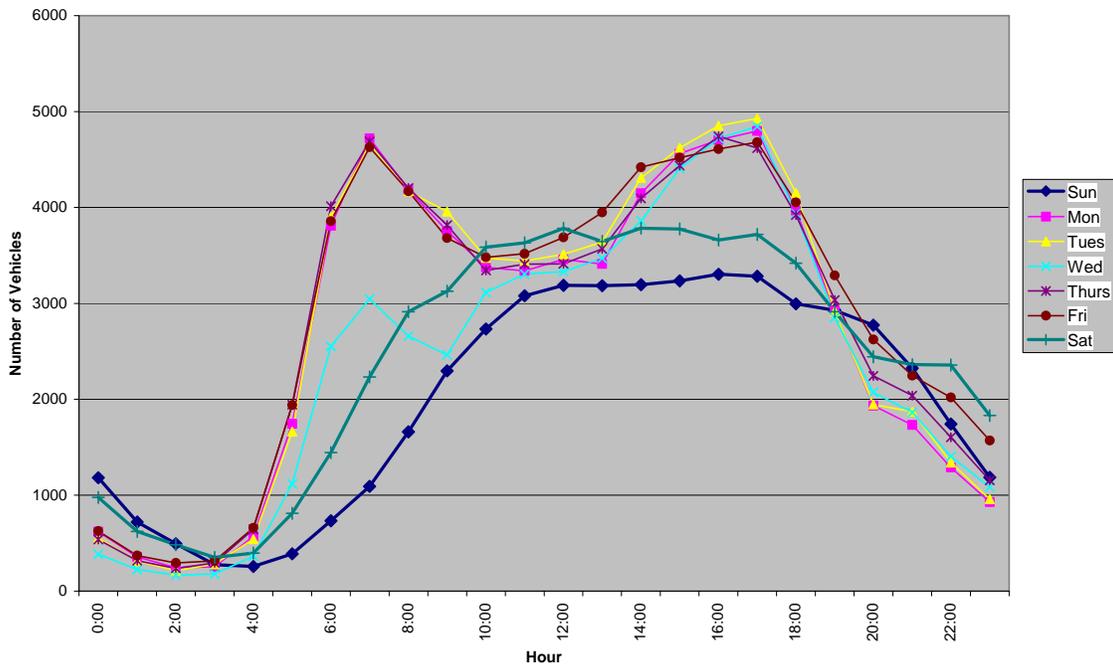
**WIM Site Glendora: 4 or more axle Vehicles**



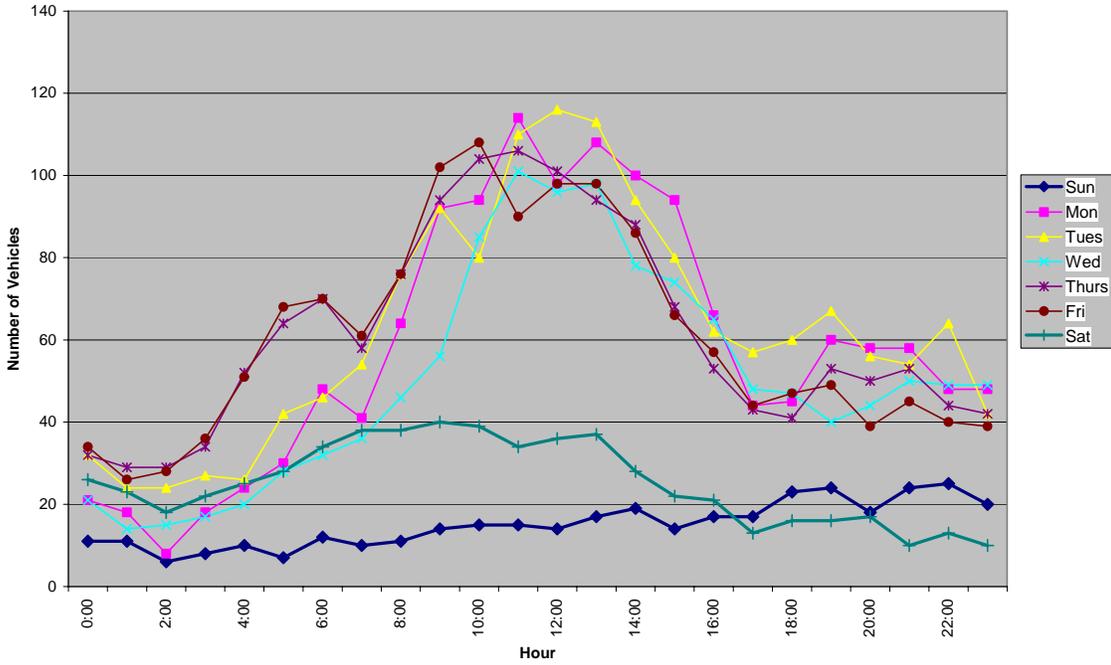
**WIM Site Glendora: All Vehicle types**



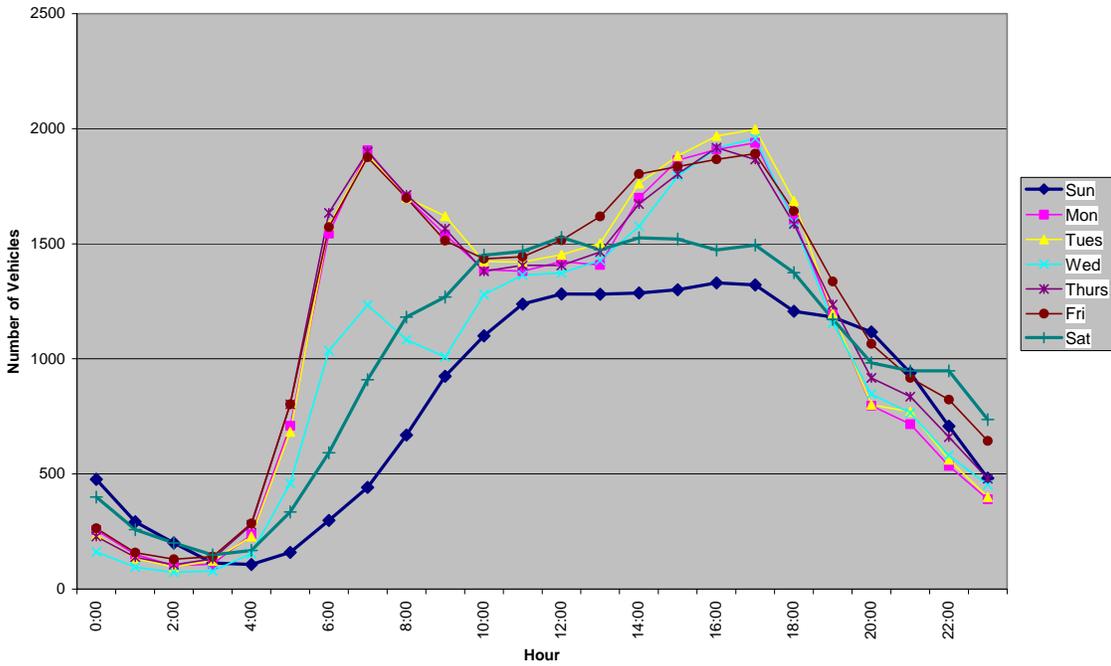
**WIM Site Irvine: Passenger/2-3 axle Vehicles**



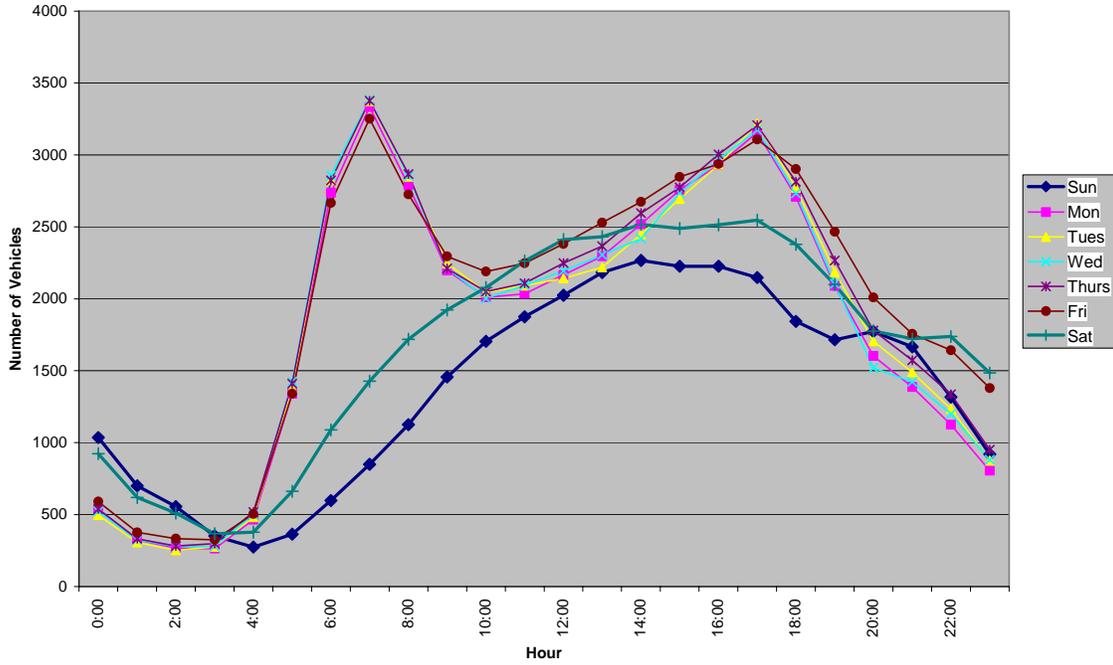
**WIM Site Irvine: 4 or more axle Vehicles**



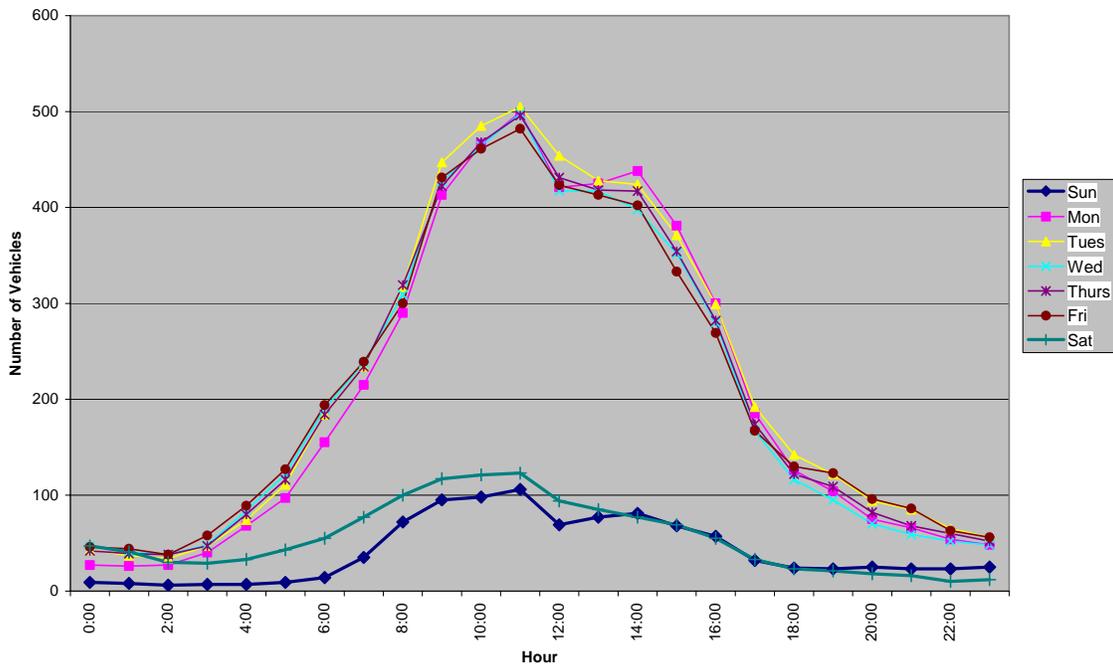
**WIM Site Irvine: All Vehicle types**



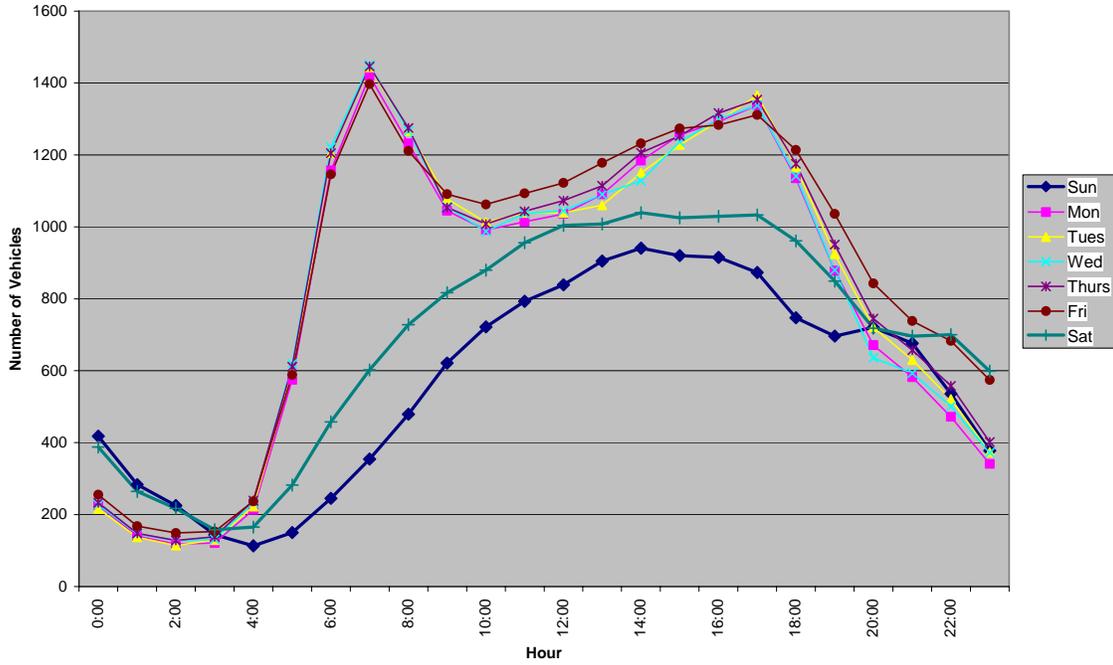
WIM Site LA-710: Passenger/2-3 axle Vehicles



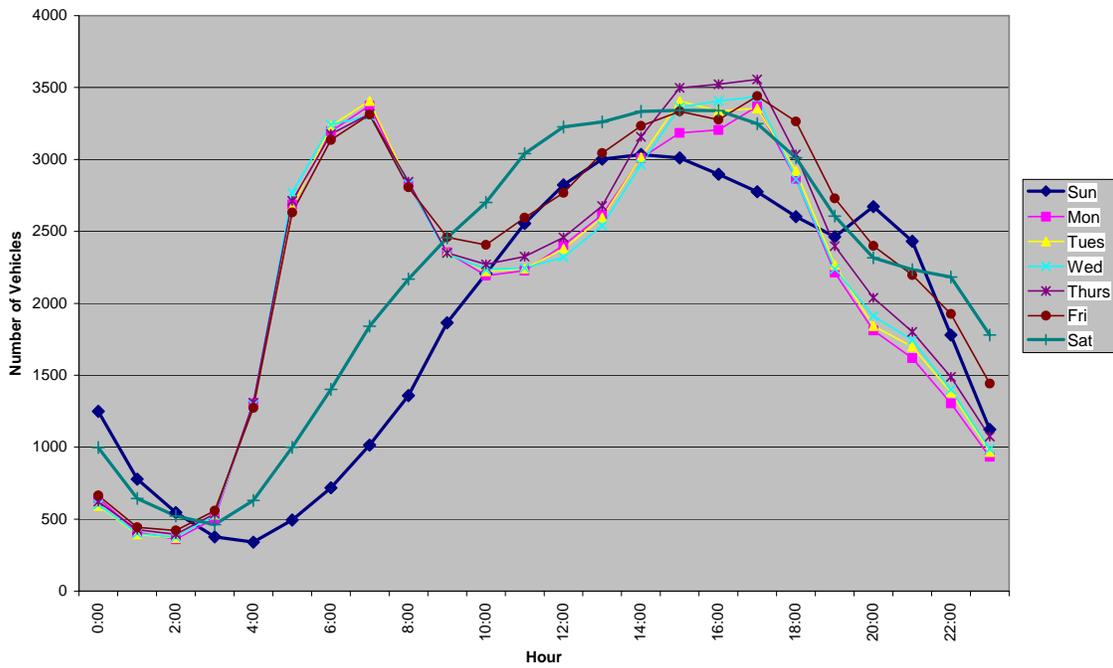
WIM Site LA-710: 4 or more axle Vehicles



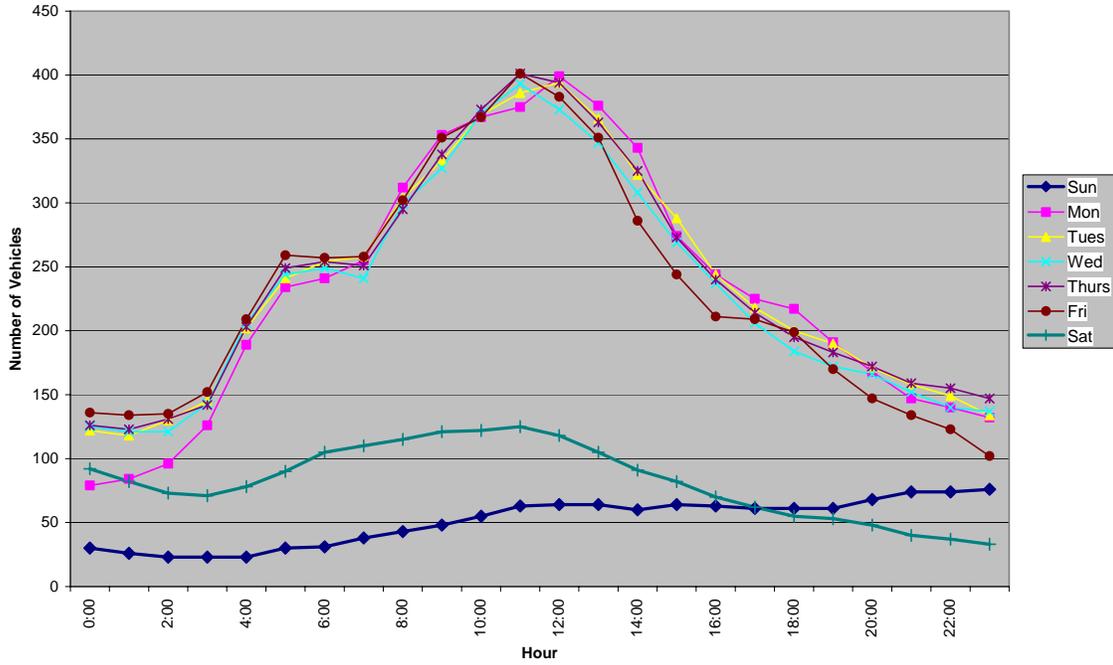
**WIM Site LA-710: All Vehicle types**



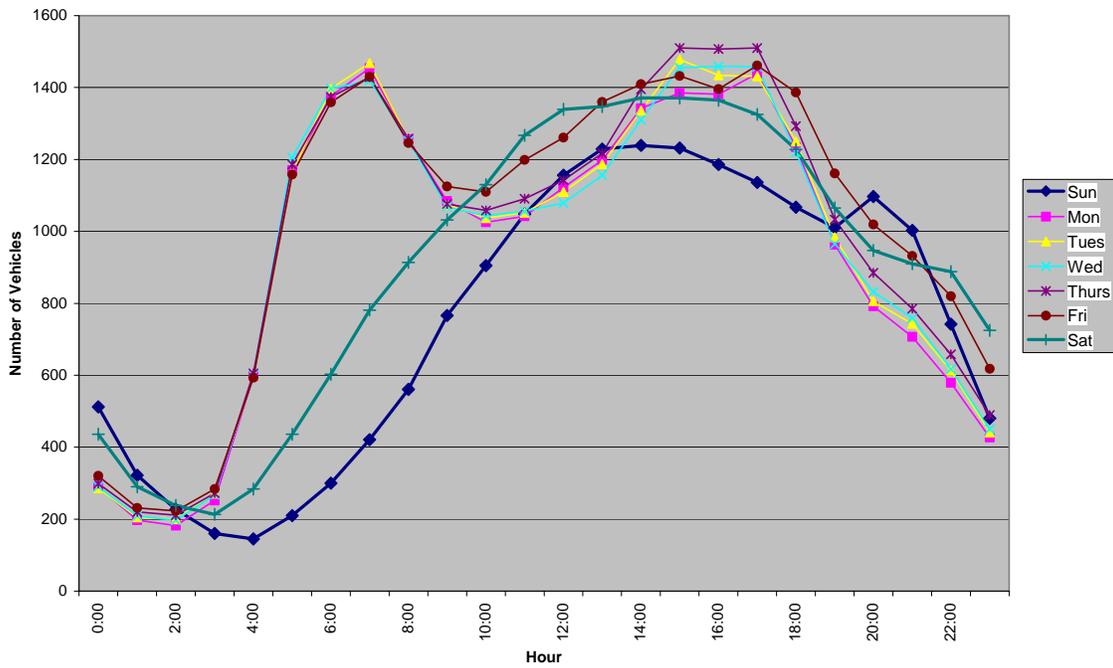
**WIM Site Ontario: Passenger/2-3 axle Vehicles**



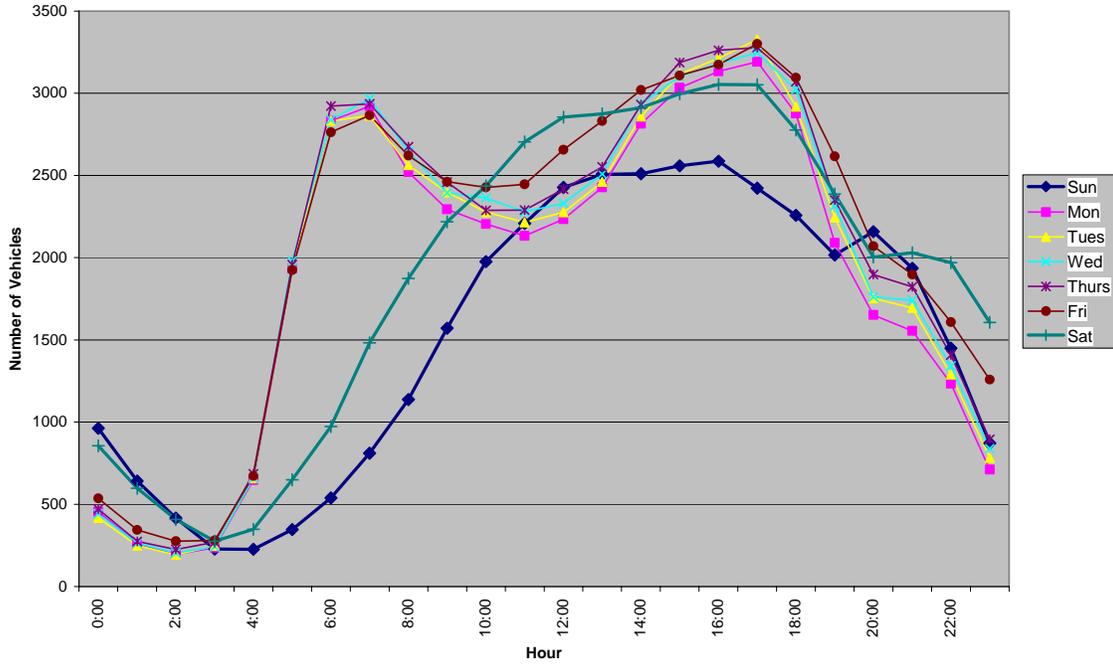
WIM Site Ontario: 4 or more axle Vehicles



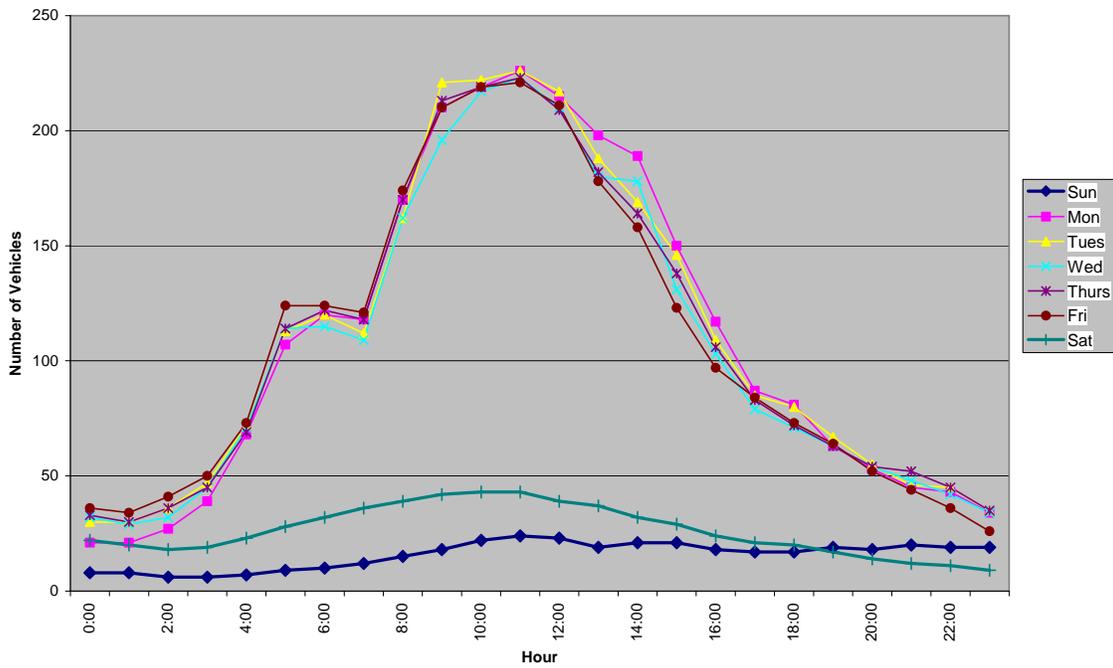
WIM Site Ontario: All Vehicle types



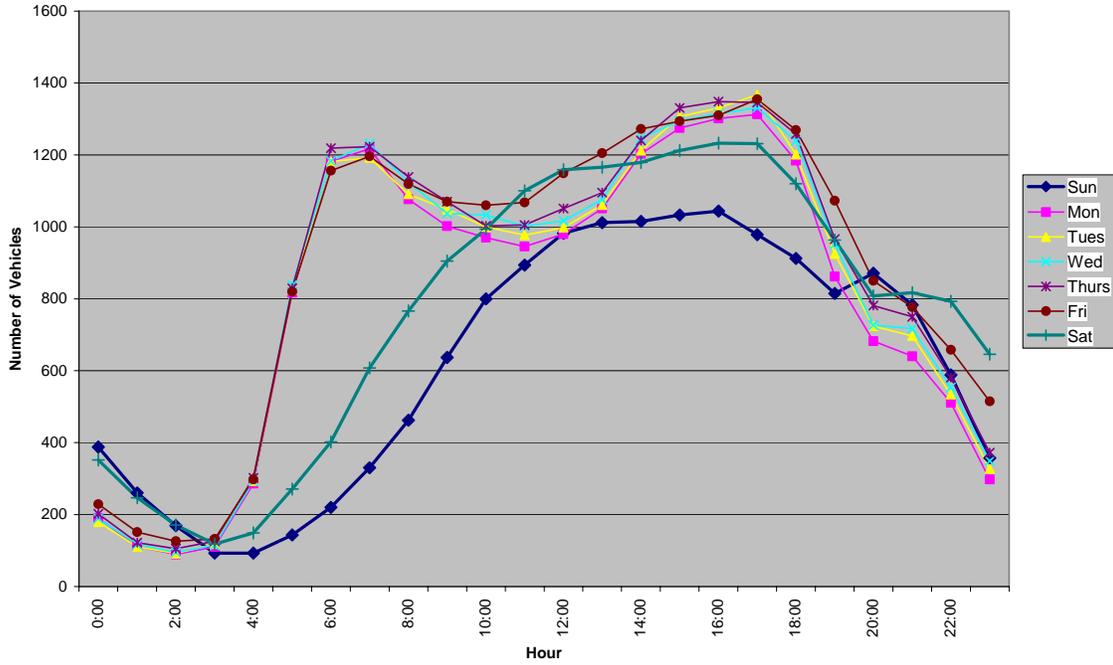
**WIM Site Orange: Passenger/2-3 axle Vehicles**



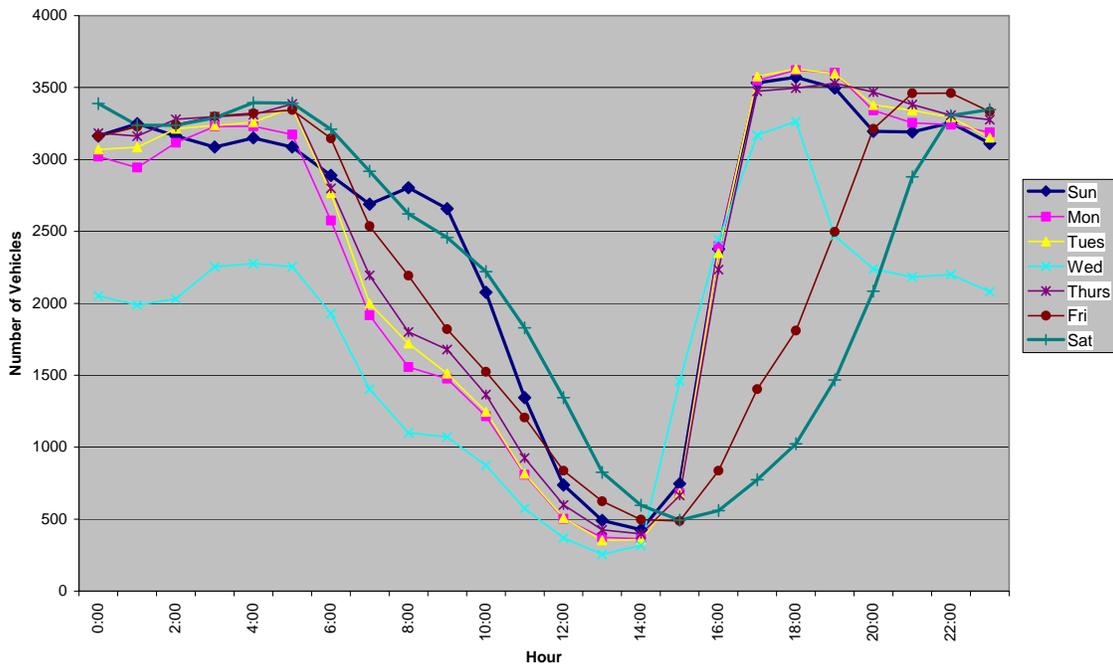
**WIM Site Orange: 4 or more axle Vehicles**



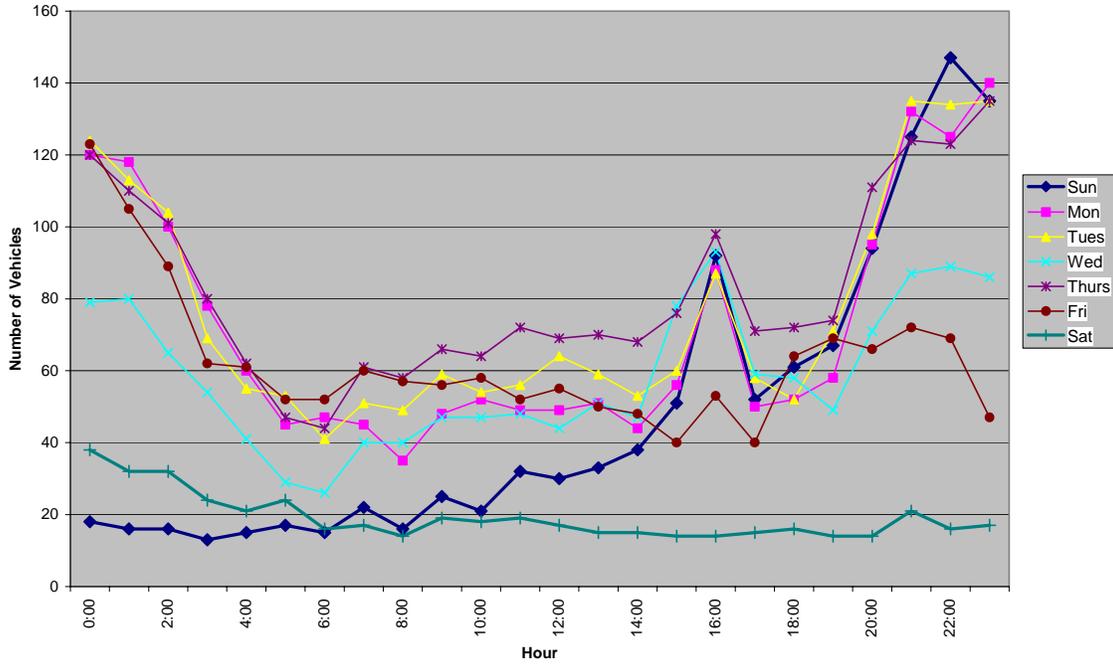
**WIM Site Orange: All Vehicle types**



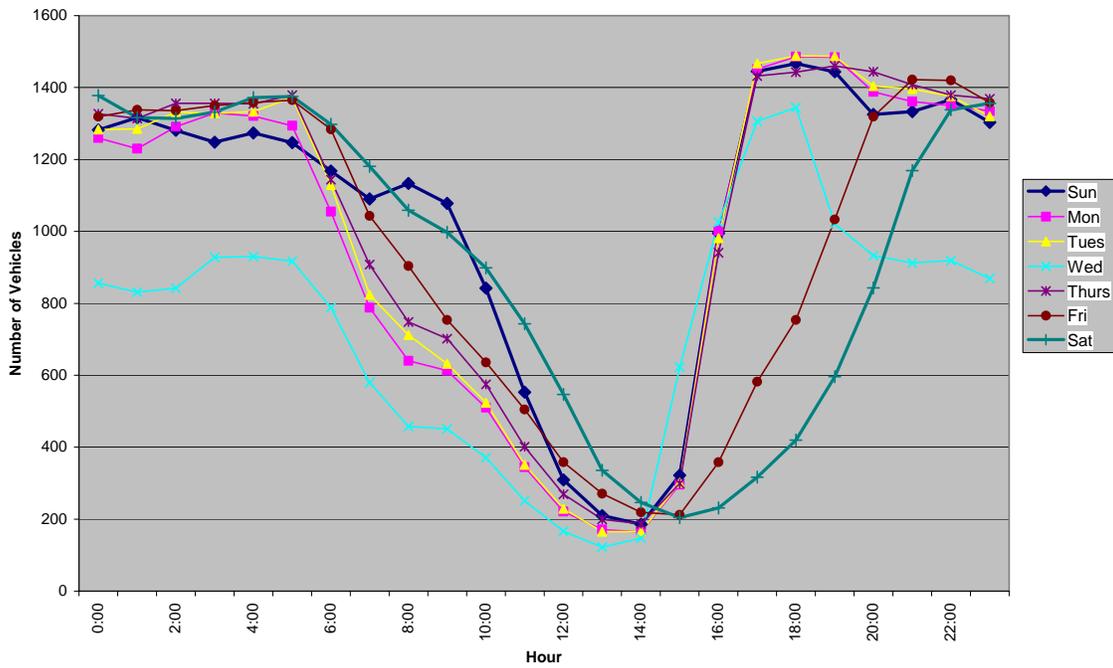
**Wim Site Peralta: Passenger/2-3 axle Vehicles**



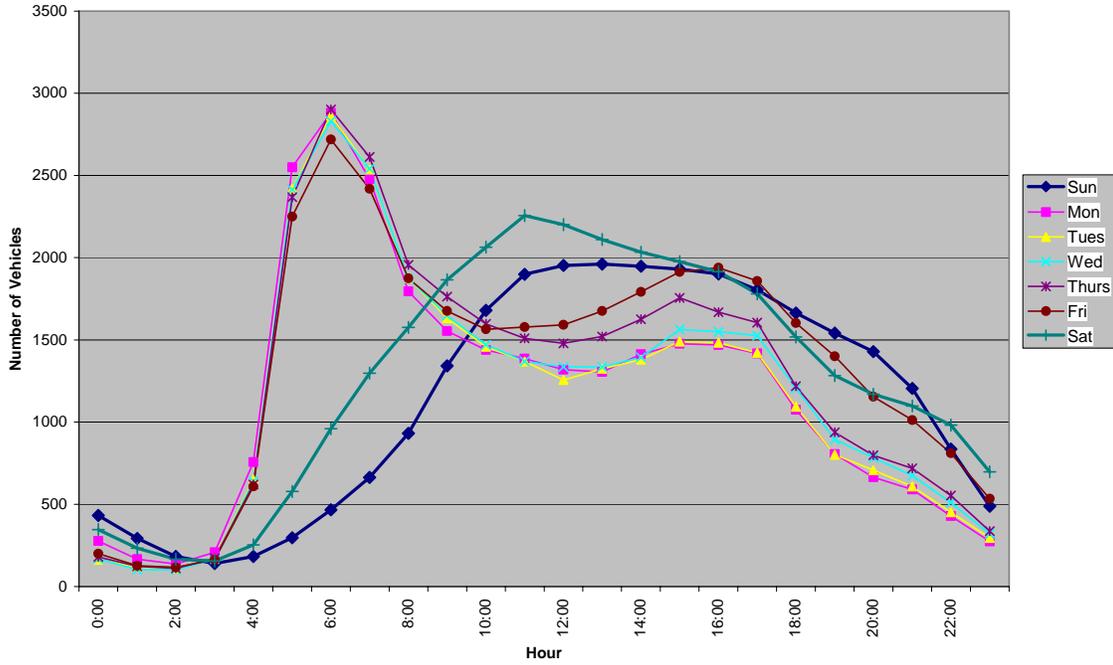
Wim Site Peralta: 4 or more axle Vehicles



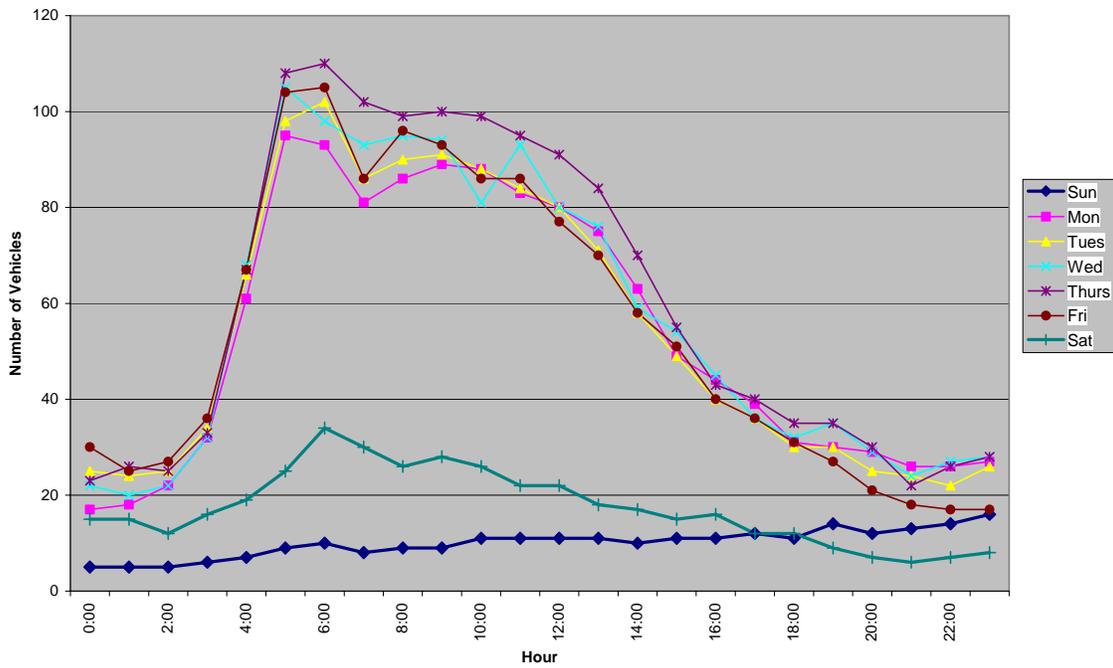
Wim Site Peralta: All Vehicle types



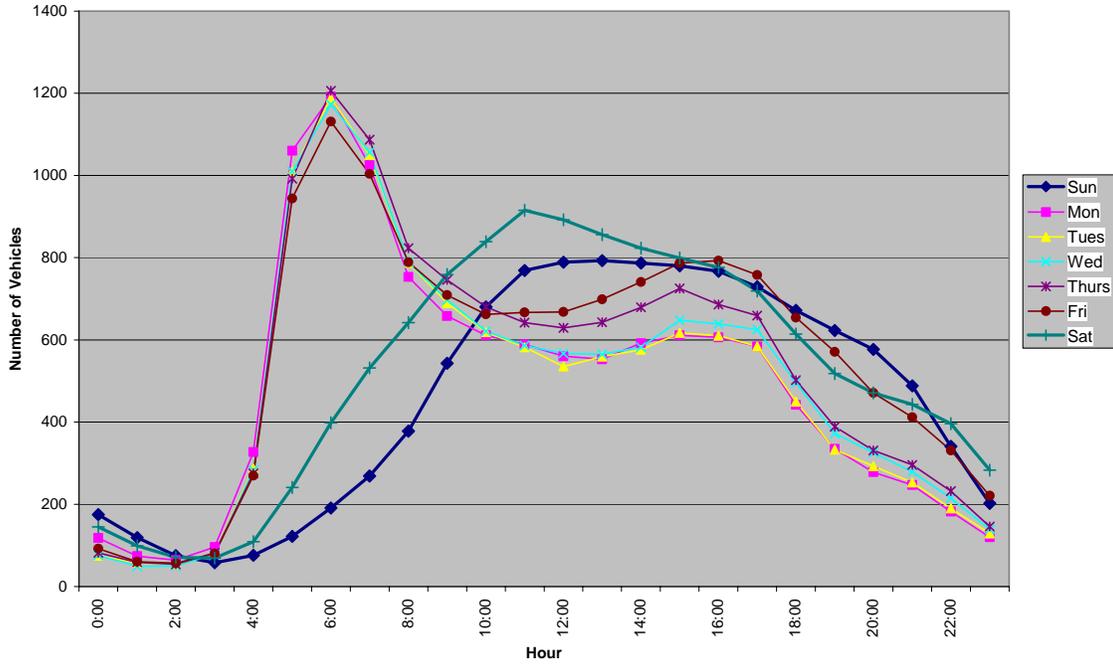
**WIM Site Rainbow SB: Passenger/2-3 axle Vehicles**



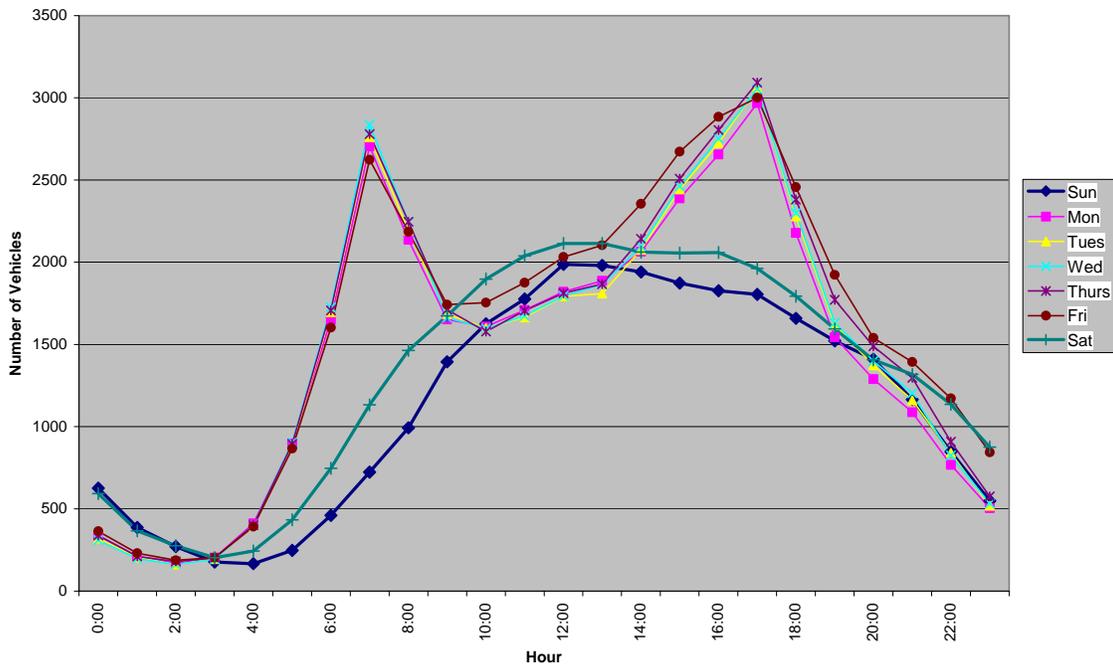
**WIM Site Rainbow SB: 4 or more axle Vehicles**



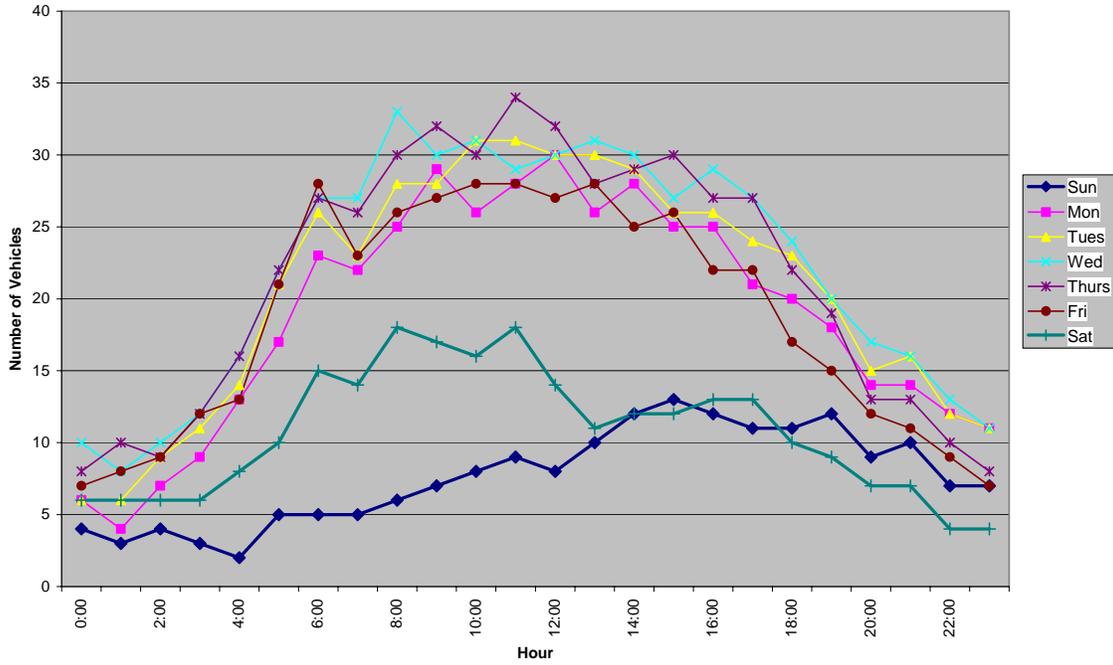
**WIM Site Rainbow SB: All Vehicle types**



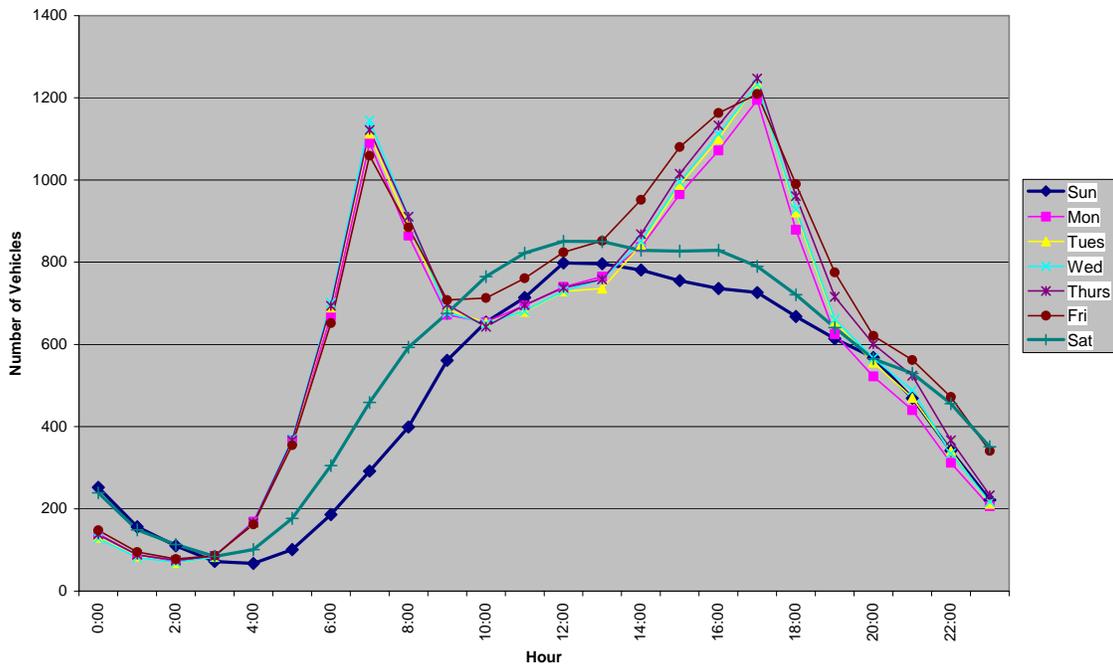
**WIM Site Redlands: Passenger/2-3 axle Vehicles**



WIM Site Redlands: 4 or more axle Vehicles



WIM Site Redlands: All Vehicle types



# **APPENDIX F**

## **DATA FILES**