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DAVID EVANS
AND ASSOCIATES INC.

MEMORANDUM

DATE:	October 20, 2011
TO:	ODOT Project Management Team
FROM:	Mike Baker, PE
	Scott Harmon, PE
	Shelly Alexander, PE
SUBJECT:	**Methodology and Assumptions Technical Memorandum (known and available data)**
PROJECT:	Corridors Bottlenecks Operations Study (CBOS)
PROJECT NO:	ODOT 0000-0674
COPIES:	File

INTRODUCTION

The purpose of this technical memorandum is to describe the project background, assumptions, methodology for identifying and diagnosing bottlenecks, and data collection needs that are the foundation of the Corridors Bottlenecks Operations Study (the C-BOS) project). This project is intended to provide spatial and temporal evaluation of freeway operations along five metro area corridors (I-5, I-205, I-84, I-405 and US 26) and correlate locations of congestion with potential mitigation measures. As the project evolves and feasible mitigation measures are identified, methods may be refined to address new and/or different issues.

There are two main sections of this technical memorandum: 1) Introduction and 2) Assumptions, Methodology, and Existing Data Resources. The scope identifies separate technical memorandums for the methodology and data collection (existing data resources). For ease of reading and reference, these two subjects (methodology and data collection) have been combined into one document as presented below.

Project Background

Overall, this project is broken up into two phases. Phase 1 consists of six technical memorandums providing corridor-level reconnaissance that are intended to provide the foundation for specific site investigation and mitigation options to be determined by the project team during the design panel. The design panel seeks to identify and evaluate potential mitigation measures with qualitative guidance from the traffic team. Phase 2 is currently in the scoping process, thus not fully vetted. This phase of the project is to conduct a more thorough evaluation of mitigation measures deemed feasible by the design panel in phase 1. The evaluation will include traffic modeling (VISSIM and possibly other programs such as VISUM and/or HCS) to assess various performance measures allowing for selection and/or prioritization of projects along the corridors. The final product will likely be an atlas with informative details, feasible mitigation measures (including design were applicable) and geographic drawings showing the location(s) that can greatly benefit from the specific mitigation measure.

Study Area

The study area consists of five corridors in the Portland metropolitan area, I-5, I-205, I-84, I-405, and US 26. The I-5 corridor is bounded on the north by the Marquam Bridge (approximately milepost 300) and on the south by the Boone Bridge (approximately milepost 283) in Wilsonville. The I-205 corridor is bounded on the north by Airport Way (approximately milepost 25) and on the south by the I-5 interchange in Tualatin (approximately milepost 0). The I-84 corridor is bounded on the west by I-5 and on the east by 257th Avenue. The I-405 corridor is bounded on the north and south by I-5. The US 26 corridor is bounded on the west by OR 47 and on the east by I-405. The study area for each corridor includes the mainline roadway as well as the ramp merge/diverge locations. This project does not anticipate evaluation of ramp terminals or other parallel roadway facilities.

Study Period

The corridor-level reconnaissance for the five corridors will focus on both the AM and PM peak periods. The reconnaissance study period will align with the same time periods used in the regional VISSIM models (6-10 AM and 2-7 pm) plus any additional time that may be needed to evaluate bottleneck activation and/or deactivation. Loop data for both the NB/EB and SB/WB directions for each corridor will be reviewed for both the AM and PM peak periods. In total this will result in twenty analyses, four for each of the five corridors.

ASSUMPTIONS, METHODOLOGY, EXISTING DATA RESOURCES

The assumptions, methodology, review of existing data resources and identification of data collection needs are summarized below.

Assumptions and Methodology

Some assumptions are common to both phases of this project (such as definitions, operational standards, and analysis area characteristics), while others are phase specific and influence the methodology of this corridor-level reconnaissance.

Assumptions (Common to both Phases)

Definitions:

Bottleneck

A location that separates upstream queued traffic from downstream, free flowing traffic.

Congestion

An excess of vehicles on a roadway at a particular time resulting in speeds that are slower-sometimes much slower-than normal or free flow speeds.[1]

Delay[2]

The additional travel time experienced by a vehicle or pedestrian with reference to a base travel time, e.g., the free-flow travel time.

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[1]Traffic Congestion and Reliability: Trends and Advanced Strategies for Congestion Mitigation. Cambridge Systematics, Inc. and Texas Transportation Institute on behalf of the Federal Highway Administration. 2005, September.

[2] Analysis and Procedure Manual. Oregon Department of Transportation's Transportation Planning and Analysis Unit. 2006, April.

Level of Service (LOS)

A grade assigned to the performance of a roadway based on density (the proximity of other vehicles in the traffic stream in passenger cars per hour per lane)

Queue

For the purposes of this project the term queue will be used when discussing corridor operations that result in a speed of 35 miles per hour or less. A previous study[3] of the I-5 corridor concluded that an optimal setting of 35 miles per hour is the maximum upstream speed prior to a bottleneck location in the Portland area. Similar work for the I-205, I-84, I-405, and US 26 corridors has not been completed and/or published; therefore, for the purposes of this study it is assumed that all corridors will have similar results, i.e. a 35 miles per hour threshold.

Volume-to-Capacity ratio (v/c)[4]

The ratio of the traffic flow rate to capacity of the road to handle that traffic flow (usually measured in vehicles per hour). The v/c may be the actual or projected rate of flow on a designated lane group during a specific time period (e.g., PM peak hour).

Corridor

The term corridor is used to describe the roadway facility mainline plus the on-/off-ramp connections along the mainline. It does not include ramp terminal impacts or analysis.

Peak period

A peak period is assumed to occur during both the AM and PM commuting times during a typical weekday, Tuesday through Thursday. It does not account for special events or weekend fluctuations.

Operational standards

The Oregon Department of Transportation (ODOT) has defined standards for roadway operations. A description of the development and application of these standards is provided below.

OHP[5]

The ODOT Analysis Procedures Manual (APM) requires that the performance standards from the Oregon Highway Plan (OHP) be used to analyze existing conditions. ODOT has jurisdiction of all five corridors through the defined study area. The general OHP volume-to-capacity (V/C) standard is 0.99 for the highest two consecutive hours of weekday traffic volumes. There are two exceptions to this standard: I-405 and US 26 (west of Sylvan). For both of these locations the v/c standard for the highest two consecutive hours is 1.1 for the first hour and 0.99 for the second hour.

HDM

The APM states that the v/c standards contained in the Highway Design Manual (HDM) will be used for the evaluation of all build alternatives. The v/c standard listed in the HDM for interstate highways is 0.75.

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[3] Techniques For Validating An Automatic Bottleneck Detection Tool Using Archived Freeway Sensor Data. Wieczorek, Fernandez-Moctezuma, and Bertini. 2009, November.

[4] Analysis and Procedure Manual. Oregon Department of Transportation's Transportation Planning and Analysis Unit. 2006, April.

[5] Oregon Highway Plan Table 7-Maximum Volume to Capacity Ratios within Portland Metropolitan Region, http://www.oregon.gov/ODOT/TD/TP/docs/orhwyplan/registry/OHP-01-00.pdf

Design Exceptions

ODOT also has established a procedure for design exceptions in the event that an improvement is deemed beneficial, based on a cost-benefit analysis, but does not meet the HDM standards. It is anticipated that this bottleneck project will identify some practical design-type projects that are beneficial, but do not meet the HDM standards. These potential mitigation measures will not be discarded simply because they do not meet standards; rather they will require further investigation in the form of cost-benefit analysis to determine the mitigation viability.

Assumptions (Phase Specific)

- Only existing data will be used in the corridor-level reconnaissance for this project. There will be no future year analysis.
- The existing data will be used to locate recurring bottlenecks during the typical weekday commute (AM and PM peak periods). The data will not be used to identify bottlenecks associated with special events.
- The project will not include a detailed crash analysis, rather the crash data will be used to determine frequency and locations of crashes which could later be combined with design data to determine if a correlation exists.
- The traffic team will coordinate with design team where appropriate.
- Corridor-level reconnaissance will include use of various traffic data sets and modeling software. Typical evaluation measures have been listed in Table 1 to assist in the development of the evaluation criteria used in phase 2.

Table 1. Available Evaluation Measures

Available Evaluation Measures	Source[1]
V/C ratio	VISUM or HCS
Density/Level of Service (LOS)	VISSIM, HCS or VISUM
Travel Time	VISSIM or VISUM
Speed	VISSIM, HCS or VISUM
Queue Length	VISSIM or HCS
Vehicle hours of delay (VHD) for study area	VISUM or VISSIM
Vehicle miles traveled	VISUM or VISSIM
Number of congested lane miles within corridor	VISUM or VISSIM

1. The first software program listed is the preferred source.

Methodology

The methodology for identifying and diagnosing bottlenecks within the study area varies for each of the phases.

Phase 1

Phase 1 will have two parts. Phase 1 (part 1) will be a corridor-level reconnaissance utilizing loop detector data from the Portland Oregon Regional Transportation Archive Listing (PORTAL), historic crash data (5-years) from ODOT's Online Crash Database, and review of OHP mobility standards as they relate to the current operations of each corridor. The PORTAL data will be used to identify bottleneck locations for a typical weekday commute during the AM and PM peak periods.

The first tier of the bottleneck analysis will include grouped time and space diagrams from PORTAL that filter for the following characteristics:

- Analysis Year based on 2007 data: Recent studies (2008/2009) have occasionally resulted in smaller volumes due to increased gas prices and recession.
- Analysis of monthly peak flow will include data from the months of June, July, and August: typically analysis projects adjust to the peak seasonal flow (by applying a seasonal adjustment factor). To get a sense of the peak month(s) the 2007 ATR Trend Summary was consulted for all study area ATR sites. There are four sites along I-205 including: 03-016 (Stafford), 26-022 (Lents), 26-018 (Yamhill), and 26-024 (Glen Jackson Bridge). Along I-5 there are two ATR sites: 26-016 (Iowa Street), and newly added 34-008 (Tigard). The two ATRs along I-84 include: 26-015 (West Banfield), 26-014 (Hoyt). Along I-405 there are 2 ATRs including: 26-005 (Stadium Freeway), and 26-027 (Freemont Bridge). US 26 has 1 ATR: 26-002 (Vista Ridge Tunnel).
- Limit data to mid-week, non-holiday days: The purpose of the study is to identify and diagnose recurring bottlenecks. It is assumed that these will coincide with commuting patterns and thus will not analyze weekend or holiday events.
- Commuter Time periods are assumed to coincide with the Regional VISSIM model analysis periods (likely 6:00-10:00am and 2:00-7:00pm): These models will be used to evaluate potential mitigation measures. However, should a bottleneck be identified at the start or end of the specified time range a longer time period may be needed in PORTAL to determine the true activation/deactivation time, overall duration and length of queue.
- Data aggregation: 5 minute resolution (aggregation), all travel lanes, and grouped mid-week data for all three months or a single day. According to recent research[6], 3-minute data resolution is best, followed closely by 5-minute resolution. 3-minute data resolution does not appear to be an option on the PORTAL website, thus the 5-minute resolution choice. The study also evaluated lane-by-lane analysis and did not see statistical significance over the pooling of multiple lanes, thus the choice of aggregating all lanes for this analysis.

The intent of this first tier analysis is to narrow the bottleneck search and get a general idea of bottleneck locations. At this point a more in-depth analysis of these locations will utilize PORTAL data from the top 10 on-ramp volume days of the 3-month period (June thought August, 2007) to eliminate false positive observations. The top 10 threshold was chosen to provide a sufficient sample size to allow outliers to be discarded, if necessary, and still provide reasonable results. For each day a time series speed plot will be obtained to provide more date specific detail regarding activation and deactivation times as well as incidents which may skew data. The daily time series speed plots will be supplemented with oblique plot data to assist in the verification of activation, deactivation, duration, and average queue length.

Review of various articles and preliminary PORTAL research suggests that there are potential problem areas in all study area corridors. In the event that data is deemed missing, or of poor quality, data from a more recent year may be substituted, if available, to augment the analysis. Otherwise, data from previous studies and/or field observation will likely be used.

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[6] Techniques For Validating An Automatic Bottleneck Detection Tool Using Archived Freeway Sensor Data. Wieczorek, Fernandez-Moctezuma, and Bertini. 2009, November.

The second tier of bottle neck analysis will include validation of the PORTAL observations by means of existing documentation (listed below in the Existing Data Resources-Reports section), or need further investigation in the form of ODOT Video Camera footage, field travel time measurements, traffic volume collection (to determine saturation flow rates), or other existing traffic models such as VISUM or VISSIM. Once the bottleneck locations, activation/deactivation times, duration and average queue lengths are verified a spatial representation will be translated to graphics to combine and visually assess correlations between crash frequency and lane geometry on the corridors.

The product of phase 1 (part 1) will include a 1-2 page summary of each bottleneck which will include the location, duration, and contributing factors, applicable mobility standards, related crash information, and a summary of available evaluation measure categories that can be utilized in subsequent phases of the project.
The second part of Phase 1 will combine the findings from the reconnaissance (part 1) with existing design data, previously scoped corridor projects, and any new mitigation concepts to create a list of potential mitigation measures. The potential mitigation measures will then be qualitatively reviewed by traffic staff and ultimately reviewed and discussed within a project specific design panel. At this time it is anticipated that the traffic team involvement will be limited to engineering judgment only and will not include any traffic analysis or modeling. The product of phase 1 (part 2) will be a list of feasible mitigation measures for further review and analysis.

Phase 2

Phase 2 of the project includes both traffic and design team tasks. The traffic team will conduct a qualitative traffic analysis of the recommendations from the design panel in phase 1. The traffic team will coordinate with the design team and ECO-NW to provide evaluation measures that will aid in screening/selection, costing and prioritization of the feasible mitigation measures identified in phase 1. The product of Phase 2 will include a completed evaluation matrix of feasible mitigation measures as well as an atlas summarizing all mitigation measures considered throughout the phases.
As the project evolves and feasible mitigation measures are identified, methods may be refined to address new and/or different issues.

Existing Data Resources

Two main types of data resources will be used throughout the life of this project (two phases); existing reports and existing data. The existing reports include published corridor studies and plans specific to the study area corridors. Existing data has been broken into two categories: primary data and secondary data. The primary data includes loop detector data from PORTAL and crash data from ODOT's Online Database. The secondary data will be used, if necessary, to validate the findings for the existing reports and/or primary data.

Reports

A number of reports have been published with information regarding the chosen study areas of the five Metropolitan area corridors. The reports listed in this section include corridor reconnaissance, mobility standards, and proposed projects. A short description for each report is included below.

I-205 Reconnaissance Study[7]

The I-205 Reconnaissance Study is a compilation of technical information describing physical constraints of the I-205 corridor from I-5 to the Columbia River. This study provides "insight into how traffic characteristics have changed over time and where they will go over the next 20 years" and will be used to validate project observations of bottleneck locations.

Oregon Highway Plan (OHP)[8]

The Oregon Highway Plan provides mobility standards and guidelines for evaluation of existing conditions on state facilities (including but not limited to Interstates within the Portland Metropolitan Region).

Oregon Highway Design Manual (HDM)[9]

The Highway Design Manual provides mobility standards and design guidelines for roadway modifications. These standards are only applied to new construction and generally associated with mitigation measures and alternatives.

2035 Regional Transportation Plan (FINAL)[10]

The 2035 Regional Transportation Plan is still in draft form, but will be used to cross-check observed bottleneck locations, already identified projects, and potential mitigation measures to be considered in phases 1 and 2.

I-5 Corridor Plan

The traffic team will review the I-5 Corridor Plan for relevant information to validate PORTAL observations or locate additional areas of interest.

ODOT Region 1 Interchange Atlas (2009)

The ODOT Region 1 Interchange Atlas provides maps, figures, and data that characterize the current and future function of freeway interchanges in the Portland Metro Area. The Atlas includes separate page and vital information specific to each interchange including: aerial imaging, distance to adjacent ramp terminals, cross-street characteristics, and current zoning.

Sunset Highway Interchange Study (1998)

This study focused on four different interchange locations along the US 26 corridor. It identified key issues, recommended alternatives, and interim improvements based on analysis, access spacing, and phasing potential.

Interstate 84 Preliminary Design concepts for Interstate 84 (no date given)

This set of four drawings highlights a different potential project on each sheet and provides pictorial representation of the changes.

Interstate 405 Design Workshop Concepts (March 2010)/Interstate 405 Concepts Summary

The goal of the workshop was to understand the problems associated with I-405, then brainstorm ideas, screen for fatal flaws, refine ideas and finally conduct an evaluation. These documents provide a summary of the concepts that were considered including: various treatments along I-405 and concepts for areas east of Naito Parkway. The treatments along I-405 focused on two interchanges (Broadway and 4th Avenue), while an urban grid system, neighborhood by-pass, and enhanced grid were considered near the southern terminus with I-5.

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[7] Prepared by DKS Associates for Oregon Department of Transportation. June 2006.
[8] Oregon Department of Transportation. 1999.
[9] Oregon Department of Transportation. 2003.
[10] Metropolitan Regional Government (METRO). 2010.

Interstate 405 Freeway Design Loop Study (July 2005)

The I-405 Freeway Loop Study considered three major improvements as well as three minor improvement to the I-405/I-5 freeway loop.

Data:

Two categories of existing data will be used for this project: primary and secondary data. The primary data includes loop detector data from PORTAL and crash data from ODOT's Online Database. The secondary data will be used, if necessary, to validate the findings for the existing reports and/or primary data. A bullet list and details of each data type are provided below.

Primary Data

- Loop detector data from the Portland Oregon Regional Transportation Archive Listing (PORTAL)
- ODOT's Online Crash Database

Secondary Data

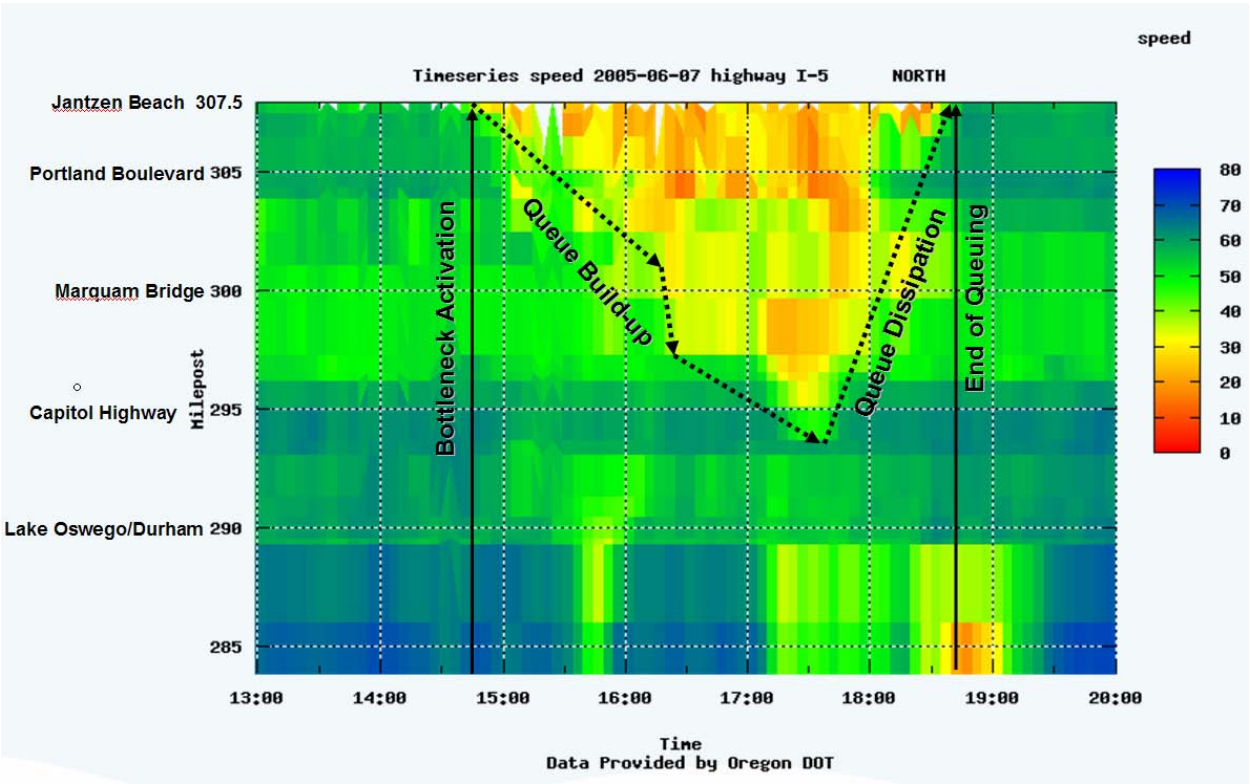
- Metro's Travel Demand Model (VISUM)
- ODOT Video Cameras
- Existing corridor VISSIM models
- Field travel time measurements
- Traffic volume collection (to determine saturation flow rate)
- HCS

PORTAL[11]

PORTAL is an official transportation archive for the Portland-Vancouver metropolitan region. The current system archives a wide variety of transportation-related data including: freeway loop detector data, weather data, incident data, and transit and freight data. Bottleneck locations, activation and dissipation times, and queue extents can be studied using several days of PORTAL data in conjunction with other data sources. Examples of PORTAL data plots are shown on the next page.

[11] Portland Oregon Regional Transportation Archive Listing (PORTAL) website: http://portal.its.pdx.edu/. January 2009.

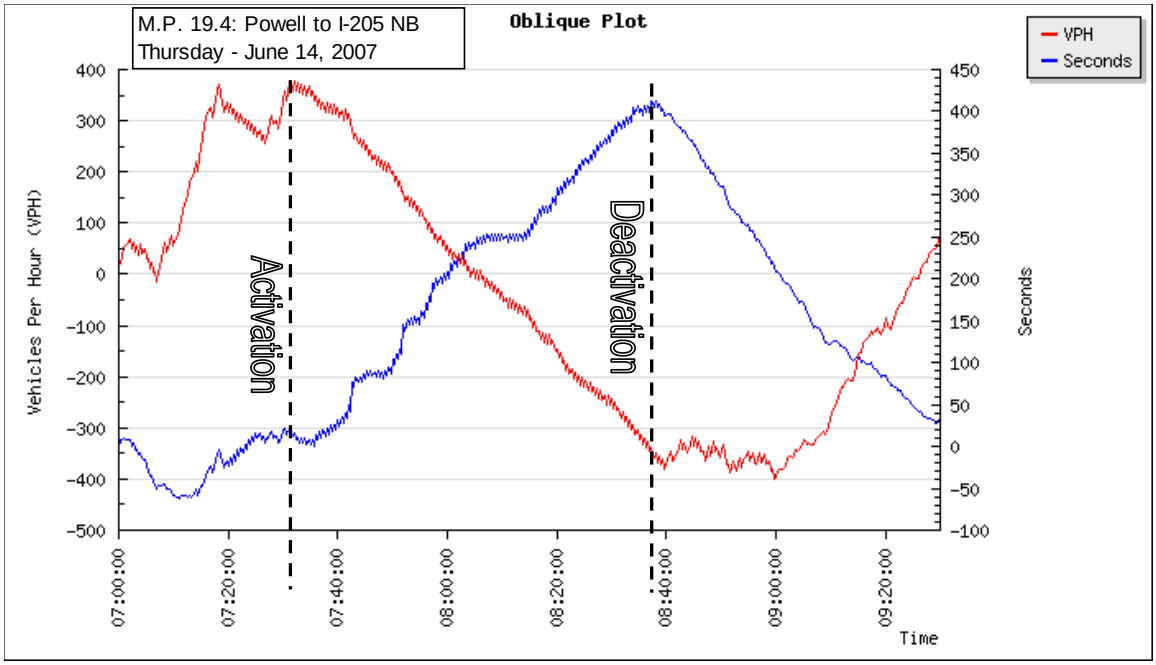
Figure 1. Timeseries speed plot (source: PORTAL)



Timeseries speed plots, as shown in Figure 1, can be initially used for visual identification of potential bottleneck locations. They can give a quick overview of a corridor or zoom in to provide more detail about a particular location. Whether looking at a corridor level or a particular location, the timeseries speed plots have many other variables to consider, namely the time of day and number of days to be included.

The detail shown on this timeseries speed plot (activation and queuing lines) is a byproduct of oblique plots such as that shown in Figure 2. Oblique plots can provide density, speed, and flow specifics for a particular location. This technique can require oblique plots at numerous loop locations to determine the location of the bottleneck, the influence area, and finally the loop location of the recovery. Bottleneck activation occurs when there is a decrease in speed and flow, and an increase in occupancy (density). Bottleneck deactivation occurs when the density no longer increases.

Figure 2: Oblique Plot (source PORTAL for I-205 at milepoint 18.1)



ODOT Online Crash Database

The ODOT online crash database provides high level crash reports for a roadway segment. For each crash the following information is of interest: time of day, type of collision, severity, location, and direction of travel. The online database is not limited to the details previously listed; various other individual crash details are also available.

METRO Travel Demand Model (VISUM)

METRO maintains a travel demand model for the entire Portland Metropolitan Area. VISUM is the chosen software used for trip assignment modeling. VISUM is a comprehensive, flexible software system for transportation planning, travel demand modeling, and network data management. Designed for multi-modal analysis, VISUM integrates all relevant modes of transportation (i.e., car, car passenger, truck, bus, train, pedestrians, and bicyclists) into one consistent network model while providing a variety of assignment procedures. VISUM provides direct network linkage capabilities to VISSIM (see description below). This linkage facilitates network building and permits the use of dynamic path building (i.e., not fixed routes) in VISSIM. For this project, the METRO VISUM model will be used to calculate roadway v/c ratios and if needed, regional performance measures such as VMT, VHD, travel patterns and travel times.

ODOT Video Cameras

The ODOT video cameras provide live stream views of the corridor including milepost, time stamp, and temperature. This data, with prior coordination with agency staff, can be recorded for future viewing and used as a living record of existing conditions if need be.

Existing Microsimulation models for I-5 and I-205 (VISSIM)

Previous work along I-5 and I-205 has resulted in existing conditions VISSIM model that will be calibrated in specific locations to test the validity of identified projects for each study corridor. VISSIM can be supplemented by VISUM, a macro-simulation model for providing traffic flow information (see description above).
VISSIM offers a wide variety of urban and highway applications, integrating public and private transportation. Even complex traffic conditions are visualized in a level of detail providing realistic traffic models. VISSIM is a microscopic behavior-based traffic simulation model capable of analyzing complex traffic operations under both uncongested and congested conditions.

Field Travel Time measurements

Occasionally web views of various locations are not available on the ODOT Video cameras. For locations of interest, or that need validation, a field visit may be necessary to ascertain the conditions at the previously unavailable location. Field work can provide an effective means to verify observations and test potential mitigation ideas.

Traffic volume collection (saturation flow rates)

It is possible that traffic volume collection may be necessary to verify saturation flow rates at key locations on a corridor. Traffic volumes and saturation flow rates for a particular day of known weather and traffic conditions can be beneficial when validating existing models, reported observations of area travelers, and qualitative or quantitative evaluation of potential mitigation measures.

Highway Capacity Software (HCS)

The HCS program may be used as a test bed for potential mitigation measures prior to full analysis in the VISSIM microsimulation software. HCS is based on the Highway Capacity Manual (HCM). The HCM Freeway Facilities Methodology module is the most applicable HCS tool for this project. It uses vehicle density as a basis for determining LOS. The procedure isolates a freeway system into a succession of freeway sections (i.e., basic, weaving, and ramp). Operations in each freeway section are compared to the adjacent sections and adjustments are made to account for the interaction between freeway sections. This methodology is not as robust as microsimulation, but it does produce reasonable results for uncongested conditions.

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DAVID EVANS
AND ASSOCIATES INC.

MEMORANDUM

DATE:	October 20, 2011
TO:	ODOT Project Management Team
FROM:	Mike Baker, PE
	Scott Harmon, PE
	Shelly Alexander, PE
SUBJECT:	**Bottleneck Identification and Diagnosis**
PROJECT:	Corridors Bottlenecks Operations Analysis (C-BOS)
PROJECT NO:	ODOT 0000-0674
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INTRODUCTION

The Corridors Bottlenecks Operations Study (the C-BOS) project is intended to provide spatial and temporal evaluation of freeway operations along the five metro area corridors (I-5, I-205, I-84, I-405 and US 26) and correlate locations of congestion with potential mitigation measures. The purpose of this technical memorandum is to summarize bottleneck identification and diagnosis. The following sections are included in the document: a summary of key findings, data sources (description and findings), and the bottleneck identification and diagnosis results.

This is the third technical memorandum for this project. Technical memorandums one and two, which were combined in one document titled "Methodology and Assumptions Technical Memorandum (known and available data)", provided the methodology and assumption used to identify the bottlenecks. For definitions of terms (including queue, corridor, and peak period, etc.) see the first technical memorandum.

STUDY AREA

The study area consists of five corridors in the Portland metropolitan area, I-5, I-205, I-84, I-405, and US 26. The I-5 corridor is bounded on the north by the Marquam Bridge (approximately milepost 300) and on the south by the Boone Bridge (approximately milepost 283) in Wilsonville. The I-205 corridor is bounded on the north by Airport Way (approximately milepost 25) and on the south by the I-5 interchange in Tualatin (approximately milepost 0). The I-84 corridor is bounded on the west by I-5 and on the east by 257th Avenue. The I-405 corridor is bounded on the north and south by I-5. The US 26 corridor is bounded on the west by OR 47 and on the east by I-405. The corridor study area for each facility includes the mainline roadway as well as the ramp merge/diverge locations. This project does not include evaluation of ramp terminals or other parallel roadway facilities.

BOTTLENECK FINDINGS

Based on review of PORTAL, ODOT camera, and field travel time data, several bottlenecks have been identified in the five corridors. The bottlenecks have been classified by direction (northbound, southbound), time of day (AM Peak or PM Peak), location, and a description of the contributing factors. This information, as well as the frequency of crashes based on mile point and PORTAL loop locations, is summarized graphically in Figures 1 through 10.

I-5 Findings

Figures 1 and 2 focus on the I-5 corridor in the northbound and southbound directions, respectively. They identify seven total bottlenecks; three in the northbound direction and four in the southbound direction. Two of the bottleneck locations (Bottleneck 3: I-5 Northbound at the Elligsen Road On-ramp and Bottleneck 7: I-5 Southbound at the I-205 On-Ramp) are included for further consideration due to general observation of traffic congestion at the locations, but PORTAL does not provide data for these locations, so duration of congestion and queue length are inconclusive. Bottleneck 7: I-5 Southbound at the I-205 On-ramp, has been identified in this summary; however, construction work on the ramp is currently underway to improve the ramp operations. It is assumed that the construction work will improve operations at this location, but it is unknown at this time to what extent. We believe ODOT would benefit from further evaluation of this location. This would allow comparison of expected benefits from the ramp improvement with expected benefits from other improvements that may be identified as part of this project.

I-205 Findings

Figures 3 and 4 focus on the I-205 corridor in the northbound and southbound directions, respectively. They identify 12 total bottleneck locations; six in the northbound direction and six in the southbound direction. One of the bottleneck locations (Bottleneck 2: I-205 Northbound at the Columbia Boulevard On-ramp) is included for further consideration due to general observation of traffic congestion at the locations, but PORTAL does not provide detailed enough data to distinguish this location from adjacent bottlenecks which are masking the impacts of this location, so duration of congestion and queue length are inconclusive.

I-84 Findings

Figures 5 and 6 focus on the I-84 corridor in the eastbound and westbound directions, respectively. They identify seven total bottleneck locations: three in the eastbound direction and four in the westbound direction. Three of the bottleneck locations (Bottlenecks 3: 39th Avenue ON Ramp, 6: Glisan ON Ramp, and 7: I-205 SB to I-84 Ramp) are included for further consideration due to general observation of traffic congestion, but PORTAL does not provide sufficient data for these locations, so duration of congestion and queue length are inconclusive. Additionally, one location was identified for potential ramp metering modifications, and five locations were identified as being impacted by adjacent facilities. For these five locations, improvement projects will be explored on the adjacent corridor (source of the congestion), not along I-84.

I-405 Findings

The bottleneck results for the I-405 corridor in the northbound and southbound directions are shown in Figures 7 and 8, respectively. Four total bottleneck locations are identified, one in the northbound direction and three in the southbound location. Five additional locations were identified as being impacted by adjacent facilities. For

these five locations, improvement projects will be explored on the adjacent corridor (source of the congestion), not along I-405.

US 26 Findings

Figures 9 and 10 focus on the US 26 corridor in the eastbound and westbound directions, respectively. They identify six bottleneck locations: five in the eastbound direction, one in the westbound direction. One of the bottleneck locations (Bottleneck 2: Skyline/Scholls Ferry On Ramp) is included for further consideration due to general observation of traffic congestion, but PORTAL does not provide sufficient data for this location, so duration of congestion and queue length are inconclusive. One additional location was identified as being impacted by adjacent facilities. For this location, improvement projects will be explored on the adjacent corridor (source of the congestion), not along US 26.

BOTTLENECK OVERVIEW

This section provides an overview of how to interpret the data and details provided in the figures.

Example: I-5 Northbound, Terwilliger On-Ramp Bottleneck

Figure 1 (I-5 Northbound): Bottlenecks 1 and 5

- The figure shows a plan view of I-5 Northbound in the study area
- Along the median edge of the freeway each segment is color coded with the number of crashes
- The loop detectors used to collect portal data are shown on the freeway with green or red circles
- The activation range[1] for independent bottlenecks are shown with red cross hatching
- The northern most bottleneck is identified at the Terwilliger Boulevard On-Ramp as bottleneck 1
- The influence area of the queuing from the Terwilliger Boulevard On-Ramp bottleneck is shown with red arrows and dashed lines. The bottleneck extends back from the On-ramp to south of Capital Highway in the AM peak hour and south of Barbur Boulevard in the PM peak hour
- The description of each bottleneck is in a text box on the right side of the figure and identifies the name/activation area, influence area, congestion duration, contributing factors, influence area crashes (2004 through 2008), and operations summary.

DATA SOURCE

PORTAL

PORTAL[2] is an established transportation archive for the Portland-Vancouver metropolitan region. The current system archives a wide variety of transportation-related data including: freeway loop detector data, weather data, incident data, and transit and freight data. Bottleneck locations, activation and dissipation times, and queue extents can be studied using several days of PORTAL data in conjunction with other data sources. Examples of PORTAL data plots are shown below.

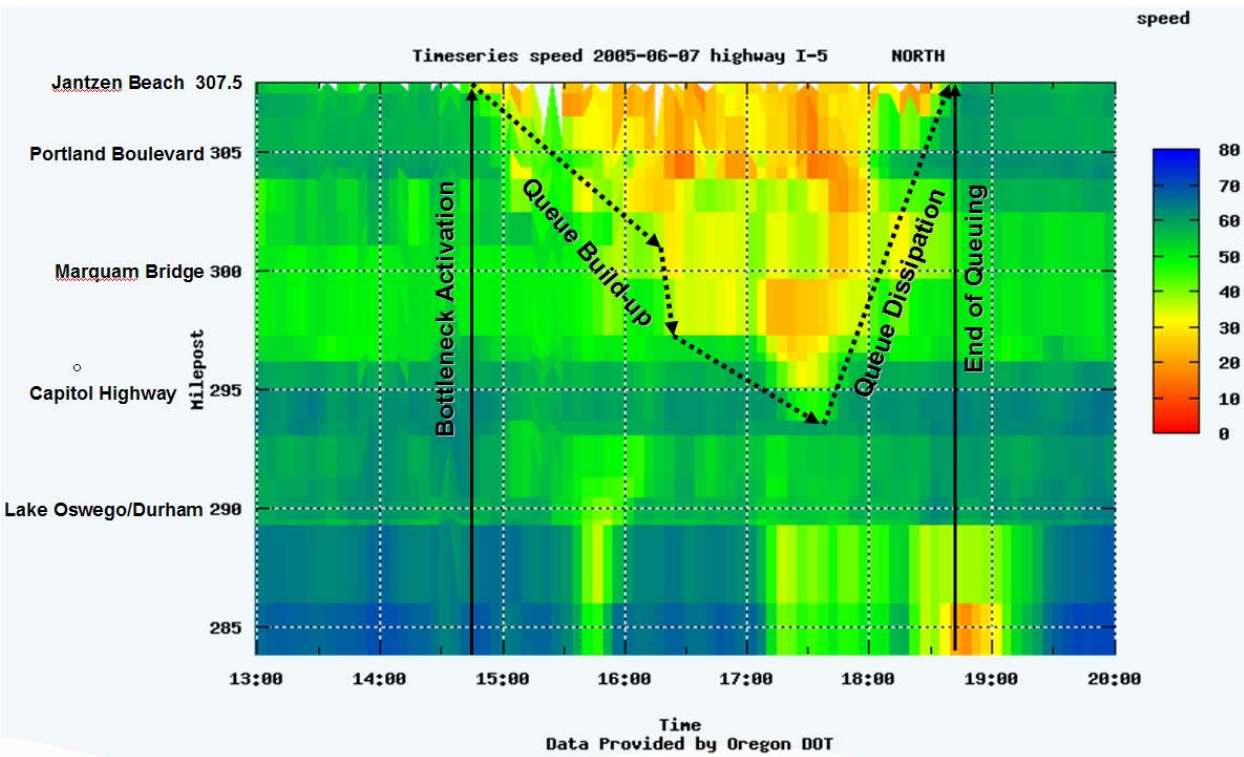
---

[1] Activation Range: cross-hatching shows the location of the start of a new independent bottleneck.

[2] Portland Oregon Regional Transportation Archive Listing (PORTAL) website: http://portal1.its.pdx.edu/ January 2009.

As outlined in the methodology memo (Technical Memorandum 1 and 2), PORTAL was used for a high-level analysis to identify potential bottleneck locations for more detailed evaluation. To identify and evaluate the potential bottleneck locations a couple different data groupings were used including: an average of data on Tuesday, Wednesday and Thursday for the months of June through August, 2007 and the top 10 on-ramp volume days of the 3-month period (June through August, 2007 and 2009), For each day, a time series speed plot was obtained to provide more date specific detail regarding activation and deactivation times as well as incidents, which may skew data. The daily time series speed plots are supplemented with oblique plot data and assist in the verification of activation, deactivation, duration, and average queue length.

Figure 11. Timeseries speed plot (source: PORTAL)

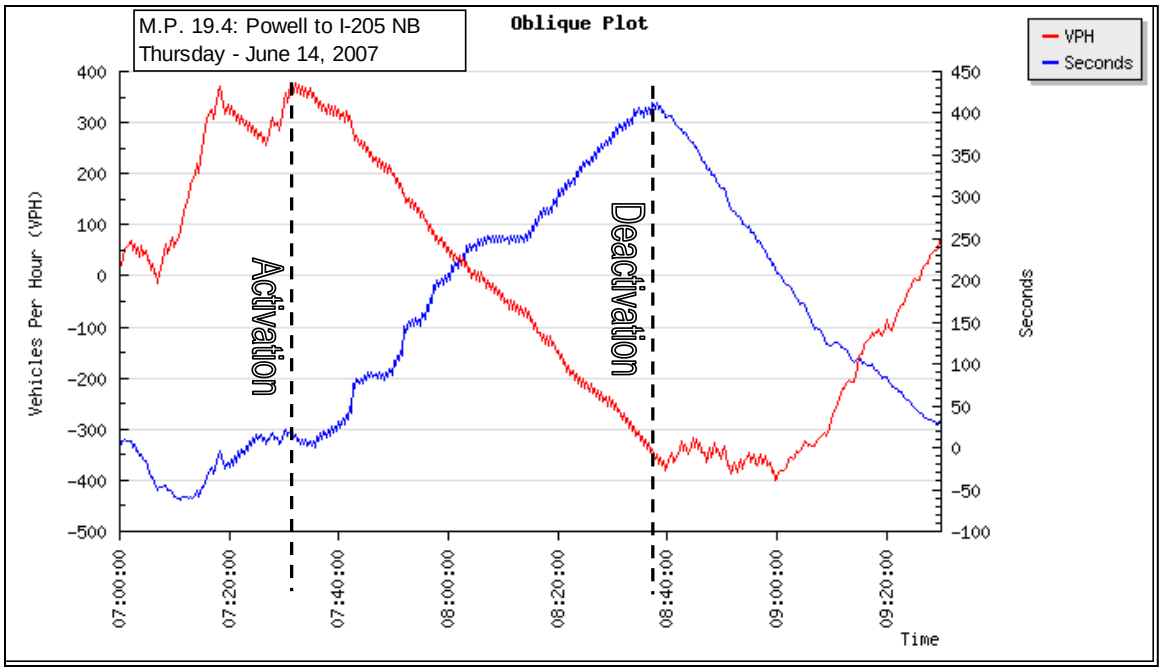


Timeseries speed plots, as shown in Figure 11, can be initially used for visual identification of potential bottleneck locations. They provide a quick overview of a corridor or provide more detail about a particular location. Whether looking at a corridor level or a particular location, the timeseries speed plots have many other variables to consider, namely the time of day and number of days to be included.

The detail shown on this timeseries speed plot (activation and queuing lines) is a byproduct of oblique plots such as that shown in Figure 12. Oblique plots can provide density, speed, and flow specifics for a particular location. This technique can require oblique plots at numerous loop locations to determine the location of the bottleneck, the influence area, and finally the loop location of the recovery. Bottleneck activation occurs when there is a

decrease in speed and flow, and an increase in occupancy (density). Bottleneck deactivation occurs when the density no longer increases.

Figure 12: Oblique Plot (source PORTAL for I-205 at milepoint 19.4)



High-level and detailed potential bottleneck plots are provided in **Appendix A**. Potential bottleneck locations identified using PORTAL were finalized using additional data sources discussed below.

ODOT Staff Review

ODOT staff reviewed the initial findings from Portal and where portal data was inconclusive the staff provided clarification on the specific location and cause of some of the bottleneck locations. For locations where ODOT staff could not provide clarification, other data sources (camera footage, travel times, and/or observations) were used to determine the location and cause of bottlenecks.

Traffic Cameras

The traffic cameras provide live stream views of the corridor including milepost, time stamp, and temperature. This data can be recorded for future viewing and used as a living record of existing conditions if need be.

Traffic camera footage was collected to supplement the PORTAL data for the ramp locations that are missing loop detectors or for ramps that need clarification. The time period of this project did not coincide with the peak three month period used in PORTAL (June through August). Data was collected for the study area facility on the following days:

- PM I-5 at Norwood Looking North (3/10/2010-Wednesday)
- PM I-5 at Elligsen Looking North (3/10/2010-Wednesday)

- PM I-5 at Lower Boones Looking North (3/16/2010-Tuesday)
- PM I-5 at I-205 Looking South (3/16/2010-Tuesday)
- PM I-5 at Wilsonville Looking North (3/30/2010-Tuesday)
- PM I-5 at Elligsen Looking South (3/30/2010-Tuesday)
- PM I-205 at Stark Looking North (3/11/2010-Thursday)
- PM I-205 at Powell Looking South (3/11/2010-Thursday)
- AM I-205 at Powell Looking North (3/17/2010-Wednesday)
- AM I-84 at 58th Ave looking west (5/11/11-Wednesday)
- AM I-84 at 33rd Ave looking west (5/11/11-Wednesday)
- AM I-84 at 21st Ave looking west at Lloyd (5/12/11-Thursday)
- PM I-84 at 122nd Ave looking west (5/12/11-Thursday)
- PM I-84 at 162nd Ave looking west (5/12/11-Thursday)
- PM I-84 at Metro Building (#26) looking east (5/25/11-Wednesday)
- PM I-84 at Lloyd (#53) looking west (5/18/11-Wednesday)
- PM I-84 at I-205 (#10) looking west (5/18/11-Wednesday)
- PM I-405 at I-405 NB exit to US 26 Looking Northwest (5/19/11-Thursday)
- PM I-405 at Highway 30 looking south to Everett Off (5/19/11-Thursday)
- PM I-405: 6 additional videos captured during travel time data collection effort
    - 1. Naito Parkway to I-5 (northbound and southbound)-2 in-car bird's eye view videos
    - 2. Highway 30 to Everett Street (northbound and southbound)-1 in-car bird's eye view video
    - 3. Northbound I-405 Burnside St to Kirby Ave/Southbound Everett St to US 26-1 in-car bird's eye view video
    - Northbound I-405 6th Ave to US 26/12th Ave-1 in-car bird's eye view video
    - Northbound I-405 I-5 southbound on ramp to Salmon St.-1 in-car bird's eye view video
- AM US 26 at Diverge to I-405 looking east (5/11/11-Wednesday)
- AM US 26 at Scholls Ferry looking east (5/11/11-Wednesday)
- AM US 26 at OR 217 Lane Drop looking east (5/11/11-Wednesday)
- AM US 26 at Canyon looking east (5/11/11-Wednesday)
- PM US 26 at OR 217 Lane Drop looking east (5/11/11-Wednesday)
- PM US 26 at Canyon looking east (5/11/11-Wednesday)
- PM US 26 at I-405 merge onto US 26 WB (5/11/11-Wednesday)
- PM US 26 at Diverge to I-405 looking east (5/11/11-Wednesday)
- PM US 26 at Scholls Ferry looking east (5/11/11-Wednesday)

A summary of camera locations and notes is provided in the **Appendix B**.

Travel Time

Occasionally web views of various locations are not available on the ODOT Video cameras. For locations of interest, or that need validation, a field visit is necessary to ascertain the conditions at the previously unavailable location. Field work can provide an effective means to verify observations and test potential mitigation ideas.

Field travel time data was collected to supplement the PORTAL data for ramp locations that are missing loop detectors or ramps that need clarification. Although the ideal time period to collect data would coincide with

the peak three month period used in PORTAL (June through August), that time period does not align with this study. Data was collected for the study area facility on the following days:

- I-5: Northbound and Southbound between Nyberg Street and Charbonneau (3/10/2010-Wednesday)
- I-205: Northbound and Southbound between Powell Boulevard and the Columbia River (3/11/2010)
- I-84: Eastbound and Westbound entire length of study area (various days in October, November, December 2007 as well as June, July, and September 2009).
- I-405: Northbound and Southbound entire length of study area (various days in October, November, December 2007 as well as June, July, and August 2009, May 11 and 12, 2011).
- US 26: Eastbound and Westbound entire length of study area (various days in July, August, and September of 2009).

A summary of the field travel time data that was collected is provided in **Appendix C**.

Field Observations

Occasionally web views of various locations are not available on the ODOT Video cameras. For locations of interest, or that need validation, field visits are necessary to ascertain the conditions at the previously unavailable locations. General field observations were used at some locations to help validate the traffic data.

ODOT Online Crash Database

The ODOT online crash database provides high level crash reports for a roadway segment. For each crash the following information is of interest: time of day, type of collision, severity, location, and direction of travel. The online database is not limited to the details previously listed; various other individual crash details are also available.

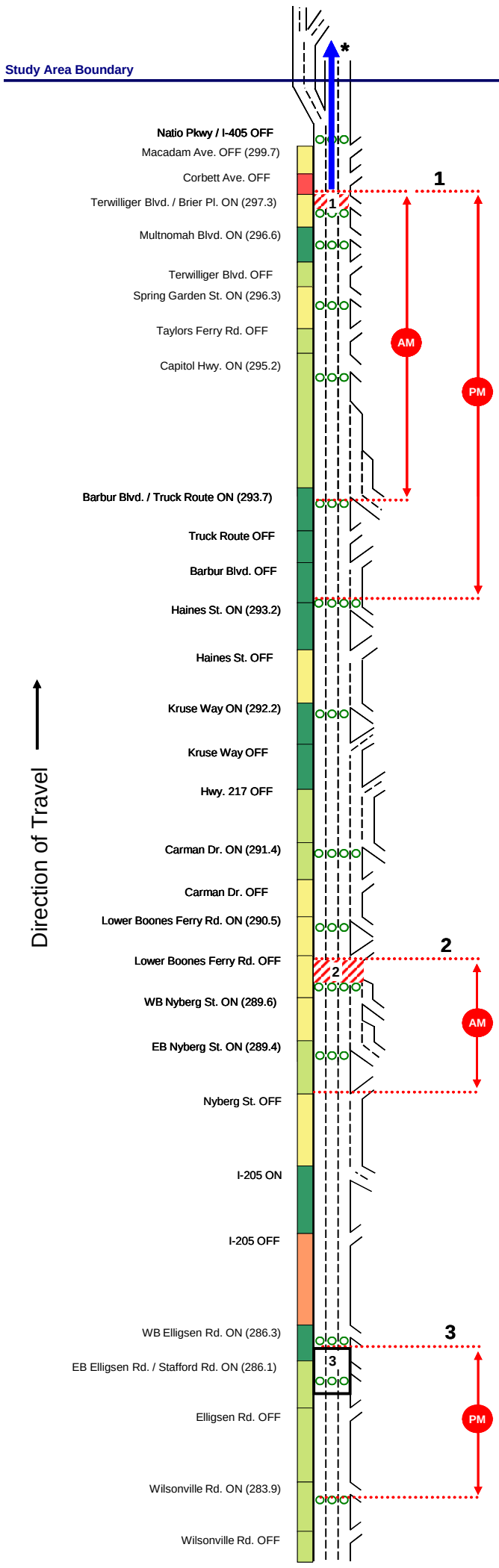
Analysis of the crash database included grouping time of day, type of collision, severity, location, and direction of travel data by ramp mile point and correlating the information with the identified bottlenecks and the lane configuration for the facility.

A summary of the crash data is provided in **Appendix D**.

Next Steps

Overall, this project is broken up into two phases. Phase 1 consists of six technical memorandums providing corridor-level reconnaissance that are intended to provide the foundation for specific site investigation and mitigation options to be determined by the project team during the design panel. The design panel seeks to identify and evaluate potential mitigation measures with qualitative guidance from the traffic team. Phase 2 is currently in the scoping process, thus not fully vetted. This phase of the project is to conduct a more thorough evaluation of mitigation measures deemed feasible by the design panel in phase 1. The evaluation will include traffic modeling (VISSIM and possibly other programs such as VISUM and/or HCS) to assess various performance measures allowing for selection and/or prioritization of projects along the corridors. The final product will likely be an atlas with informative details, feasible mitigation measures (including design were applicable) and geographic drawings showing the location(s) that can greatly benefit from the specific mitigation measure.

I-5 Northbound Bottleneck Summary



*** NOTE:** Queuing extends from downstream/adjacent corridors and impacts mainline operations

1. Terwilliger Boulevard ON Ramp (AM & PM)
Influence Area: Terwilliger Boulevard ON Ramp to north of Barbur Boulevard ON ramp (AM)/north of Haines Street ON ramp (PM)
Congestion Duration: 4 hours daily (7:15-8:45 AM and 3:00-5:30 PM)
Contributing Factors: Short acceleration lane, horizontal curvature, grade, high mainline and ramp volumes
Influence Area Crashes: Rate: 0.50 per MVMT; Frequency: 223 crashes
Operations Summary:
Activation Area: Terwilliger Boulevard ON Ramp area
Speed: During the AM bottleneck activation speeds drop as low as 25 mph (AM) and 20 mph (PM).
Volume (2007 ADT): Mainline: 65,800; Terwilliger ON Ramp: 8,290
Volume (2008 AM Peak Hour): Mainline: 5,800; Terwilliger ON Ramp: 650
Volume (2008 PM Peak Hour): Mainline: 4,750; Terwilliger ON Ramp: 450
Data Sources:

2. Lower Boones Ferry Road OFF Ramp (AM)
Influence Area: Lower Boones Ferry Road OFF Ramp to Nyberg Street OFF Ramp
Congestion Duration: 7:15-8:30 AM
Contributing Factors: Two closely spaced on-ramps merging into high through mainline volume
Influence Area Crashes: Rate: 0.94 per MVMT; Frequency: 119 crashes
Operations Summary:
Activation Area: Between the Lower Boones Ferry Road OFF Ramp and the Westbound Nyberg St. ON Ramp
Speed: Bottleneck activation speeds drop as low as 30 mph.
Volume (2007 ADT): Mainline: 58,970; Nyberg ON (EB to NB) Ramp: 11,440; Nyberg ON (WB to NB) Ramp: 7,280; Lower Boones Ferry OFF Ramp: 12,450
Volume (2008 AM Peak Hour): Mainline: 5,000; Nyberg ON (EB to NB) Ramp: 1,150; Nyberg ON (WB to NB) Ramp: 1,050; Lower Boones Ferry OFF Ramp: 1,000
Observations: Queue starts between the Lower Boones Ferry Road OFF Ramp and the Westbound Nyberg St. ON ramp; however the end of the queue is inconclusive. Observations suggest that the queue ends before the I-205 ON ramp.
Data Sources:

3. Westbound Elligsen Road ON Ramp (PM) (INCONCLUSIVE)
Influence Area: Westbound Elligsen Road ON Ramp to south of Elligsen Road OFF Ramp
Congestion Duration: location inconclusive (PM)
Contributing Factors: Two closely spaced on-ramps merging into high through mainline volume
Influence Area Crashes: Rate: 0.22 per MVMT; Frequency: 59 crashes
Operations Summary:
Activation Area: Between the westbound Elligsen Road ON Ramp and the Elligsen Road OFF Ramp.
Speed: Bottleneck activation speeds drop as low as 30 mph.
Volume (2007 ADT): Mainline: 58030; Elligson ON (EB to NB) Ramp: 4640; Elligson ON (WB to NB) Ramp: 6890
Volume (2008 PM Peak Hour): Mainline: 4,300; Elligson ON (EB to NB) Ramp: 430; Elligson ON (WB to NB) Ramp: 350
Observations: The length of queue is inconclusive. PORTAL does not have data for this ramp location and the single day of travel time data does not reflect a reduction in speed to or below 35 mph. However, the single day of travel time data was collected during the month of March, not during the peak traffic month. Although the PORTAL data is limited and a single day of travel time data does not support this location as a bottleneck, numerous independent observations, and general driver perception, is that the Stafford Rd. ON Ramp location is a questionable section of northbound I-5 when estimating travel time through the area.
Data Sources:

Study Area Boundary

LEGEND

- PORTAL Detector Location (2007 data used)
- (###.#) M.P. of PORTAL Detector (near the approximate on-ramp gore point)
- # Activation Range: This is the segment which contains the start of a new/confounding bottleck (this does not encompass all congestion; see Bottleneck Description)
- Bottleneck Influence Area - Cross reference # with Key Statistics: Initial Data Results
- Influenced by bottleneck outside of Study Area
- Inconclusive Bottleneck Activation Range

- 0 - 19 Crashes
- 20 - 39 Crashes
- 40 -59 Crashes
- 60 - 79 Crashes
- > 80 Crashes

Total crashes from 2004 through 2008

- Data collected from PORTAL website
- Data collected from travel time runs
- Information from ODOT
- Information from observations
- Data collected from traffic cameras and/or travel time videos

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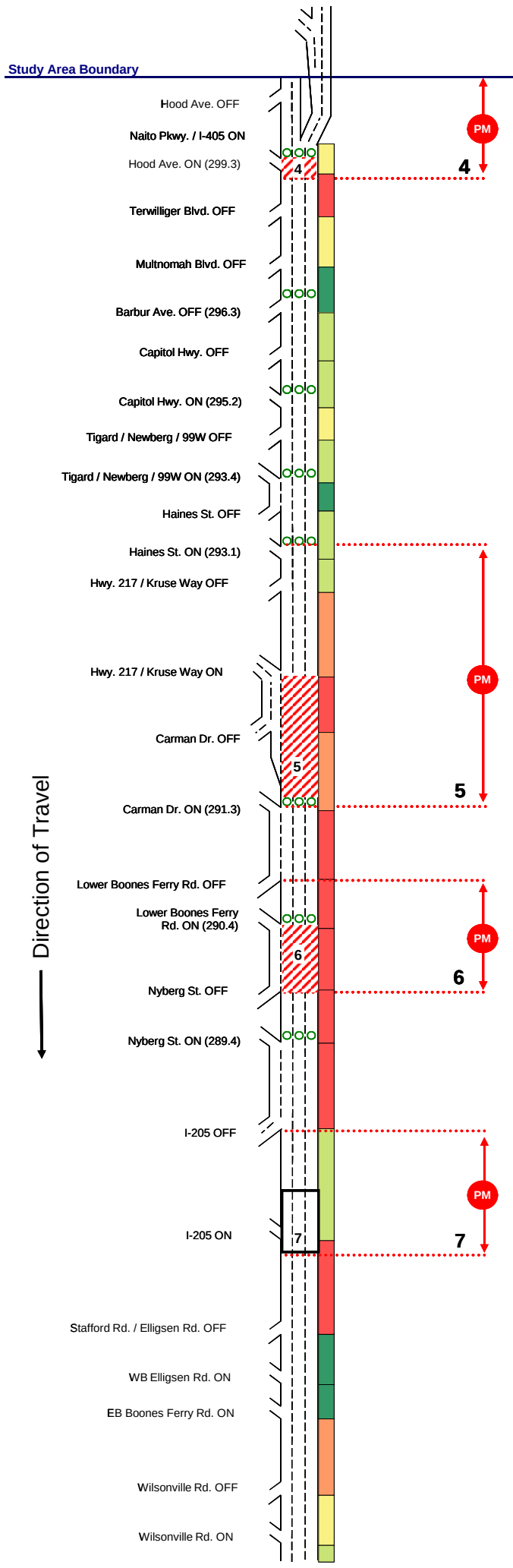
Figure 1
Corridor Bottleneck Operations Study
I-5 Northbound AM & PM Bottlenecks

I-5 Southbound Bottleneck Summary



4. Hood Avenue ON Ramp (PM)
Influence Area: Hood Avenue ON Ramp to North of Study Area
Congestion Duration: 2.75 hours daily (3:30-6:15 PM)
Contributing Factors: Short acceleration lane, high mainline and ramp volumes (I-5/I-405 traffic merge)
Influence Area Crashes: Rate: 1.42 per MVMT; Frequency: 50 crashes; 1 Fatality
Operations Summary:
Activation Range: The Hood Avenue ON Ramp area
Speed: Bottleneck activation speeds drop as low as 10 mph.
Volume (2007 ADT): Mainline: 62,040; Hood ON Ramp: 8,920
Volume (2008 PM Peak Hour): Mainline: 5,050; Hood ON Ramp: 850
Data Sources:

5. Carman Drive Lane Drop (PM)
Influence Area: Carman Drive Lane Drop to south of Haines Street ON Ramp
Congestion Duration: 2.25 hours daily (3:30-5:45 PM)
Contributing Factors: Weave section between Hwy 217/Kruse Way ON Ramp and the Carman Drive OFF Ramp, Lane drop between Carman Drive OFF Ramp and Carman Drive ON ramp, driver behavior
Influence Area Crashes: Rate: 1.50 per MVMT; Frequency: 308 crashes
Operations Summary:
Activation Range: Between the Carman Drive lane drop and the Hwy 217/Kruse Way ON ramp.
Speed: Bottleneck activation speeds drop as low as 10 mph.
Volume (2007 ADT): Mainline: 43,890; Hwy 217/Kurse ON Ramp: 34,030; Carman OFF Ramp: 8,120
Volume (2008 PM Peak Hour): Mainline: 3,770; Hwy 217/Kurse ON Ramp: 2,500; Carman OFF Ramp: 640
Data Sources:

6. Nyberg Street OFF Ramp (PM)
Influence Area: Nyberg Street ON Ramp to Lower Boones Ferry ON Ramp
Congestion Duration: 2.5 hours daily (3:30-6:00 PM)
Contributing Factors: High Mainline and weaving volumes between Nyberg Street OFF Ramp and the Lower Boones Ferry Road ON Ramp.
Influence Area Crashes: Rate: 2.45 per MVMT; Frequency: 307 crashes; 1 Fatality
Operations Summary:
Activation Range: Between Nyberg Street OFF Ramp and Lower Boones Ferry Road ON Ramp.
Speed: Bottleneck activation speeds drop as low as 25 mph.
Volume (2007 ADT): Mainline: 64,430; Lower Boones Ferry ON Ramp: 10,980; Nyberg OFF Ramp: 17,630
Volume (2008 PM Peak Hour): Mainline: 5,400; Lower Boones Ferry ON Ramp: 1,200; Nyberg OFF Ramp: 1,750
Data Sources:

7. I-205 ON Ramp (PM) (INCONCLUSIVE)
Influence Area: I-205 ON Ramp to North of I-205 OFF Ramp
Congestion Duration: Inconclusive (PM)
Contributing Factors: Merge section for I-205 ON Ramp, high mainline and ramp volumes
Influence Area Crashes: Rate: 0.31 per MVMT; Frequency: 29 crashes
Operations Summary:
Activation Range: The I-205 ON Ramp area.
Speed: Inconclusive
Volume (2007 ADT): Mainline: 46,270; I-205 ON Ramp: 20,850
Volume (2008 PM Peak Hour): Mainline: 4,100; I-205 ON Ramp: 1,100
Data Sources:

LEGEND

- PORTAL Detector Location (2007 data used)
- (###.#) M.P. of PORTAL Detector (near the approximate on-ramp gore point)
- Activation Range: This is the segment which contains the start of a new/confounding bottleck (this does not encompass all congestion; see Bottleneck Description)
- Bottleneck Influence Area - Cross reference # with Key Statistics: Initial Data Results
- Inconclusive Bottleneck Activation Range

- Data collected from PORTAL website
- Data collected from travel time runs
- Information from ODOT
- Information from observations
- Data collected from traffic cameras and/or travel time videos

- 0 - 19 Crashes
- 20 - 39 Crashes
- 40 -59 Crashes
- 60 - 79 Crashes
- > 80 Crashes

Total crashes from 2004 through 2008

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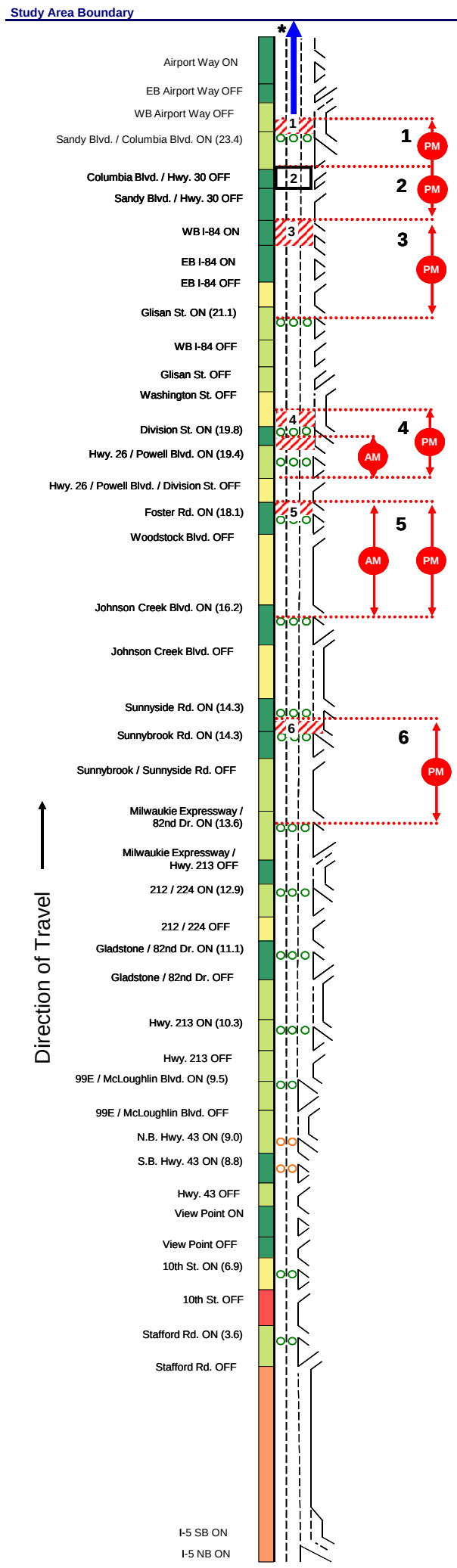
Figure 2
Corridor Bottleneck Operations Study
I-5 Southbound AM & PM Bottlenecks

I-205 Northbound Bottleneck Summary



*** NOTE:** Queuing extends from downstream/adjacent corridors and impacts mainline operations

1. Sandy Boulevard/Columbia Boulevard ON Ramp (PM)
Influence Area: Sandy Boulevard/Columbia Boulevard ON Ramp to Sandy Boulevard OFF Ramp
Congestion Duration: 3 hours daily (3:00-6:30 PM)
Contributing Factors: High mainline and ramp volumes, turbulence from slow loop-off ramp at Columbia Boulevard/Hwy 30 OFF Ramp, and weaving between Columbia Sandy Boulevard/Columbia Boulevard ON Ramp to Westbound Airport Way OFF Ramp
Influence Area Crashes: Rate: 0.43 per MVMT; Frequency: 39 crashes; 1 Fatality
Operations Summary:
Activation Range: Between Sandy Boulevard/Columbia Boulevard On-ramp and the westbound Airport Way OFF Ramp.
Speed: Bottleneck activation speeds drop as low as 20 mph.
Volume (2007 ADT): Mainline: 57,120; Sandy/Columbia ON Ramp: 11,230
Volume (2008 PM Peak Hour): Mainline: 4,200; Sandy/Columbia ON Ramp: 1,400
Observations: Queuing/congestion extends from north of the study area and is exacerbated at the Sandy/Columbia Boulevard ON Ramp and accompanying weave section (Sandy/Columbia ON to Airport Way OFF).
Data Sources:

2. Columbia Boulevard/Hwy 30 OFF Ramp (PM) (INCONCLUSIVE)
Influence Area: Columbia Boulevard/Hwy 30 OFF Ramp
Congestion Duration: Inconclusive data
Contributing Factors: High mainline and ramp volumes combined with low-speed loop OFF Ramp (immediately after recovery from I-84 on-ramp merge/slowing) causes sudden slowing
Influence Area Crashes: Rate: 0.28 per MVMT; Frequency: 15 crashes
Operations Summary:
Activation Range: The Columbia Boulevard/Highway 30 OFF Ramp area
Speed: Bottleneck activation speeds drop as low as 35 mph.
Volume (2007 ADT): Mainline: 71,520; Columbia OFF Ramp: 14,400
Volume (2008 PM Peak Hour): Mainline: 5,000; Columbia OFF Ramp: 800
Data Sources:

3. Westbound I-84 ON Ramp (PM)
Influence Area: Westbound I-84 ON Ramp to Glisan ON Ramp
Congestion Duration: 5.25 hours daily (6:45-8:30 AM and 3:00-6:30 PM)
Contributing Factors: High mainline and ramp volumes, closely spaced ON Ramps (merge points)
Influence Area Crashes: Rate: 0.42 per MVMT; Frequency: 57 crashes
Operations Summary:
Activation Range: Between westbound I-84 ON Ramp and eastbound I-84 ON Ramp
Speed: Bottleneck activation speeds drop as low as 30 mph (AM) and 5 mph (PM).
Volume (2007 ADT): Mainline: 60,220; SB I-84 ON Ramp: 15,480
Volume (2008 PM Peak Hour): Mainline: 4,250; SB I-84 ON Ramp: 1,050
Observations: Congestion in the right lane builds after the EB I-84 ON Ramp and spreads across all lanes at the WB I-84 ON Ramp. When downstream congestion is not present, free-flow speeds resume immediately after exiting the downstream horizontal curve.
Data Sources:

4. Division Street On-ramp and Hwy 26/Powell Boulevard ON Ramp (AM & PM)
Influence Area: Division Avenue ON Ramp to north of Hwy 26/Powell Boulevard OFF Ramp
Congestion Duration: 2.75 hours daily (7:15-8:15 AM and 4:30-6:15 PM)
Contributing Factors: AM bottleneck is confined to the Hwy 26/Powell Boulevard ON Ramp merge. PM bottleneck spans both the Division Avenue ON Ramp and Hwy 26/Powell Boulevard ON Ramp.
Influence Area Crashes: Rate: 0.42 per MVMT; Frequency: 83 crashes; 1 Fatality
Operations Summary:
Activation Range: Between Division Street ON Ramp and Highway 26/Powell Boulevard ON Ramp.
Speed: Bottleneck activation speeds drop as low as 15 mph (AM) and 10 mph (PM).
Volume (2007 ADT): Mainline: 66,530; Powell ON Ramp: 9,750; Division ON Ramp: 7,890
Volume (2008 AM Peak Hour): Mainline: 5,050; Powell ON Ramp: 820; Division ON Ramp: 520
Volume (2008 PM Peak Hour): Mainline: 4,550; Powell ON Ramp: 730; Division ON Ramp: 570
Observations: AM queues are confined to the Hwy 26/Powell ON Ramp merge point. In the AM queues recover north of the Hwy 26/Powell /Division OFF Ramp. PM queues occur at both ON Ramps (Division and Hwy 26/Powell). The combined queue ends north of Hwy 26/Powell Boulevard/Division Street OFF Ramp. Camera observations suggest that the bottleneck at the Hwy 26/Powell ON Ramp lingers after the Division Street ON Ramp improves.
Data Sources:

5. Foster Road ON Ramp (AM & PM)
Influence Area: Foster Road ON Ramp to south of Johnson Creek OFF Ramp
Congestion Duration: 4 hours daily (7:00-8:30 AM and 3:30-6:00 PM)
Contributing Factors: Both the AM and PM bottlenecks propagate from the Foster Road ON Ramp merge, high mainline and ramp volumes.
Influence Area Crashes: Rate: 0.26 per MVMT; Frequency: 61 crashes
Operations Summary:
Activation Range: The Foster Road ON Ramp area.
Speed: Bottleneck activation speeds drop as low as 20 mph (AM and PM).
Volume (2007 ADT): Mainline: 61,800; Foster ON Ramp: 15,730
Volume (2008 AM Peak Hour): Mainline: 4,500; Foster ON Ramp: 1,200
Volume (2008 PM Peak Hour): Mainline: 4,600; Foster ON Ramp: 900
Data Sources:

6. Sunnybrook Road ON Ramp (PM)
Influence Area: Sunnyside Road ON Ramp to Milwaukie Expressway/82nd Drive ON Ramp
Congestion Duration: 2.25 hours daily (3:45-6:00 PM)
Contributing Factors: High mainline and ramp volumes, beginning of a weave section coupled with another closely spaced ON Ramp (Sunnyside Road ON Ramp).
Influence Area Crashes: Rate: 0.44 per MVMT; Frequency: 51 crashes
Operations Summary:
Activation Range: Between Sunnybrook Boulevard ON Ramp and Sunnybrook Boulevard/Sunnyside Road OFF Ramp.
Speed: Bottleneck activation speeds drop as low as 30 mph.
Volume (2007 ADT): Mainline: 49,850; Sunnybrook ON Ramp: 1,340; Sunnyside ON Ramp: 13,130
Volume (2008 PM Peak Hour): Mainline: 4,140; Sunnybrook ON Ramp: 110; Sunnyside ON Ramp: 10,090
Data Sources:

LEGEND

- PORTAL Detector Location (2007 data used)
- PORTAL Detector Location (2007 data missing - 2009 data was used)
- Activation Range: This is the segment which contains the start of a new/confounding bottleck (this does not encompass all congestion; see Bottleneck Description)
- Bottleneck Influence Area
- Influenced by bottleneck outside of Study Area
- Inconclusive Bottleneck Activation Range

- 0 - 19 Crashes
- 20 - 39 Crashes
- 40 -59 Crashes
- 60 - 79 Crashes
- > 80 Crashes

Total crashes from 2004 through 2008

- Data collected from PORTAL website
- Data collected from travel time runs
- Information from ODOT
- Information from observations
- Data collected from traffic cameras and/or travel time videos

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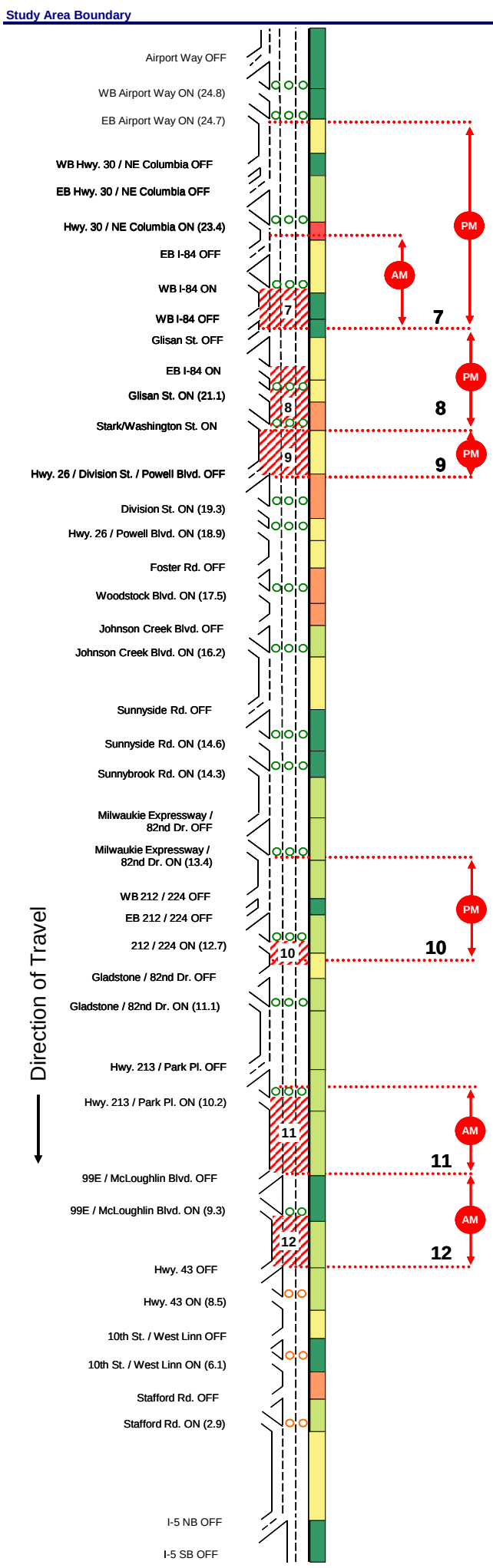
Figure 3
Corridor Bottleneck Operations Study
I-205 Northbound AM & PM Bottlenecks

I-205 Southbound Bottleneck Summary



7. Westbound I-84 OFF Ramp (AM & PM)
Influence Area: Westbound I-84 OFF Ramp to Eastbound Airport Way ON Ramp
Congestion Duration: 4.25 hours daily (8:00-9:00 AM and 3:00-6.15 PM)
Contributing Factors: The weave section between the Westbound I-84 ON Ramp, Westbound I-84 OFF Ramp and ON Ramp, as well as high mainline and ramp volumes
Influence Area Crashes: Rate: 0.75 per MVMT; Frequency: 247 crashes
Operations Summary:
Activation Range: Between Glisan Street OFF Ramp and westbound I-84 ON Ramp.
Speed: Bottleneck activation speeds drop as low as 5 mph (AM and PM).
Volume (2007 ADT): Mainline: 74,470; WB I-84 ON Ramp: 15,140; WB I-84 OFF Ramp: 17,200; Glisan OFF Ramp: 10,640
Volume (2007 AM Peak Hour): Mainline: 4,430; WB I-84 ON Ramp: 1,020; WB I-84 OFF Ramp: 1,100; Glisan OFF Ramp: 1,130
Volume (2008 PM Peak Hour): Mainline: 4,540; WB I-84 ON Ramp: 750; WB I-84 OFF Ramp: 980; Glisan OFF Ramp: 920
Data Sources:

8. Stark/Washington Street ON Ramp (PM)
Influence Area: Stark/Washington Street ON Ramp to Glisan Street OFF Ramp
Congestion Duration: 3.25 hours daily (3:00-6:15 PM)
Contributing Factors: Closely spaced ON Ramps, high mainline and ramp volumes
Influence Area Crashes: Rate: 1.12 per MVMT; Frequency: 157 crashes; 1 Fatality
Operations Summary:
Activation Range: Between Stark/Washington Street ON Ramp and eastbound I-84 ON Ramp
Speed: Bottleneck activation speeds drop as low as 10 mph.
Volume (2007 ADT): Mainline: 46,630; EB I-84 ON Ramp: 18,160; Glisan ON Ramp: 9,720; Stark/Washington ON Ramp: 11,040.
Volume (2008 PM Peak Hour): Mainline: 3,390; EB I-84 ON Ramp: 1,200; Glisan ON Ramp: 780; Stark/Washington ON Ramp: 950
Data Sources:

9. Hwy 26/Division Street/Powell Boulevard OFF Ramp (PM)
Influence Area: Hwy 26/Division Street/Powell Boulevard OFF Ramp to Stark/Washington Street ON Ramp
Congestion Duration: 3.25 hours daily (3:00-6:15 PM)
Contributing Factors: Weave segment, high mainline and ramp volumes
Influence Area Crashes: Rate: 0.97 per MVMT; Frequency: 44 crashes
Operations Summary:
Activation Range: Between Hwy 26/Division Street/Powell Boulevard OFF Ramp and Stark/Washington Street ON Ramp.
Speed: Bottleneck activation speeds drop as low as 25.
Volume (2007 ADT): Mainline: 85,540; Division/Powell/US26 OFF Ramp: 22,230
Volume (2008 PM Peak Hour): Mainline: 6,320; Division/Powell/US26 OFF Ramp: 1,350
Data Sources:

10. 212/224 ON Ramp (PM)
Influence Area: 212/224 ON Ramp to Milwaukie Expressway/82nd Drive ON Ramp
Congestion Duration: 1 hour daily (4:45-5:45 PM)
Contributing Factors: High mainline and ramp volumes, and turbulence from upstream lane-drop
Influence Area Crashes: Rate: 0.47 per MVMT; Frequency: 114 crashes
Operations Summary:
Activation Range: The 212/224 ON Ramp area.
Speed: Bottleneck activation speeds drop as low as 35 mph.
Volume (2007 ADT): Mainline: 58,120; 212/224 ON Ramp: 8,680
Volume (2008 PM Peak Hour): Mainline: 4,580; 212/224 ON Ramp: 650
Data Sources:

11. 99E/McLoughlin Boulevard OFF Ramp (AM)
Influence Area: 99E/McLoughlin Boulevard OFF Ramp to Hwy 213/Park Place ON Ramp
Congestion Duration: 1.25 hours daily (7:15-8:30 AM)
Contributing Factors: Weave segment, lane drop and high mainline and ramp volumes
Influence Area Crashes: Rate: 0.47 per MVMT; Frequency: 20 crashes
Operations Summary:
Activation Range: Between 99E/McLoughlin OFF Ramp and Highway 213/Park Place ON Ramp.
Speed: Bottleneck activation speeds drop as low as 20 mph.
Volume (2007 ADT): Mainline: 44,150; Highway 213 ON Ramp: 10,930; 99E OFF Ramp 13,230
Volume (2008 AM Peak Hour): Mainline: 3,380; Highway 213 ON Ramp: 730; 99E OFF Ramp 720
Data Sources:

12. Hwy 43 OFF Ramp (AM)
Influence Area: Hwy 43 ON Ramp to 99E/McLoughlin Boulevard OFF Ramp
Congestion Duration: 2 hours daily (6:30-8:30 AM)
Contributing Factors: Weave segment on bridge, and high mainline and ramp volumes.
Influence Area Crashes: Rate: 1.03 per MVMT; Frequency: 47 crashes
Operations Summary:
Activation Range: Between the Highway 43 OFF Ramp and 99E/McLoughlin ON Ramp
Speed: Bottleneck activation speeds drop as low as 30 mph.
Volume (2007 ADT): Mainline: 41,850; Highway 99E ON Ramp: 7,160; Highway 43 OFF Ramp: 9,180
Volume (2008 AM Peak Hour): Mainline: 3,390; Highway 99E ON Ramp: 680; Highway 43 OFF Ramp: 650
Observations: Observations show Bottleneck #11 forming prior to Bottleneck #12, indicative of two independent bottlenecks.
Data Sources:

LEGEND

- PORTAL Detector Location (2007 data used)
- PORTAL Detector Location (2007 data missing - 2009 data was used)
- Activation Range: This is the segment which contains the start of a new/confounding bottleck (this does not encompass all congestion; see Bottleneck Description)
- Bottleneck Influence Area

- Data collected from PORTAL website
- Data collected from travel time runs
- Information from ODOT
- Information from observations
- Data collected from traffic cameras and/or travel time videos

- 0 - 19 Crashes
- 20 - 39 Crashes
- 40 -59 Crashes
- 60 - 79 Crashes
- > 80 Crashes

Total crashes from 2004 through 2008

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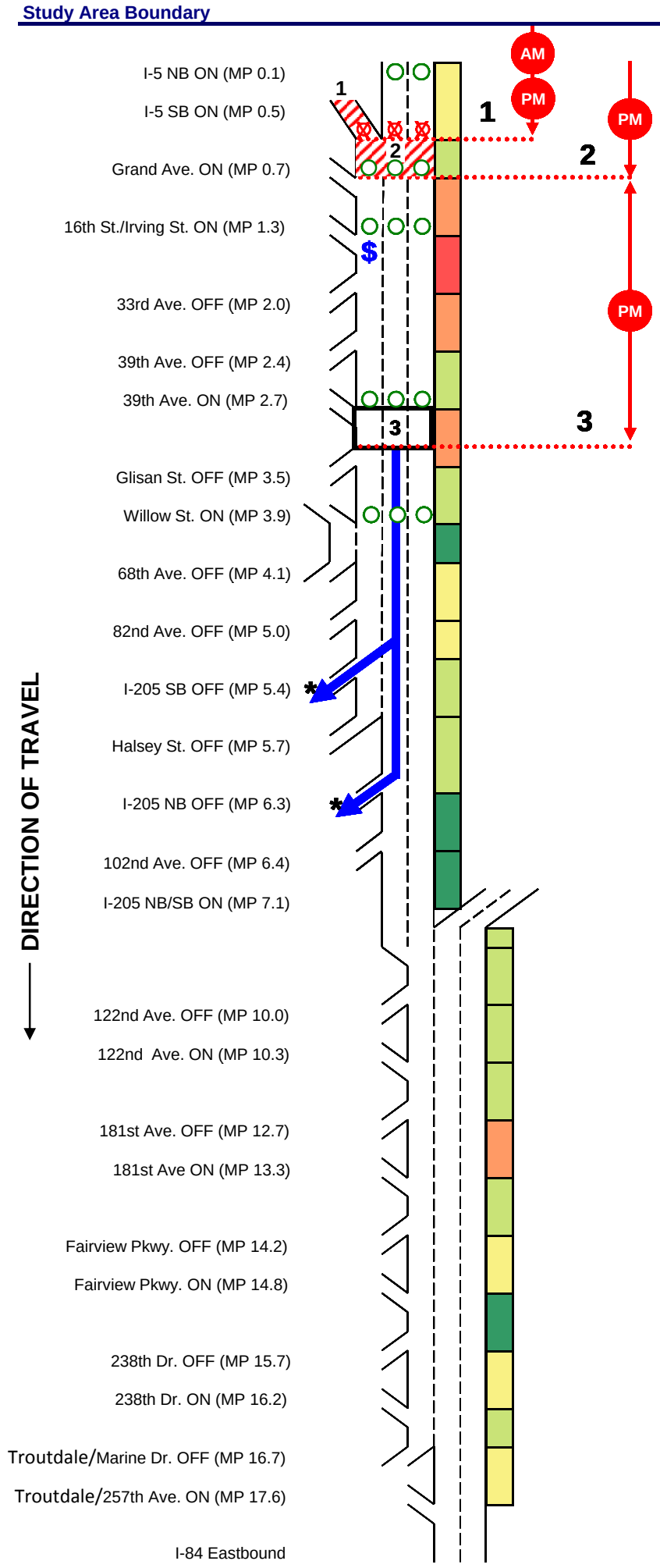
Figure 4
Corridor Bottleneck Operations Study
I-205 Southbound AM & PM Bottlenecks

I-84 Eastbound

Study Area Boundary



1. I-5 SB ON Ramp (AM & PM)
Influence Area: I-84 EB mainline to I-5 SB mainline
Congestion Duration: 12 hours or more daily (7:00 AM to 7:00 PM)
Contributing Factors: High ramp demand.
Operations Summary:
Activation Range: Along the entire ramp
Speed: Ramp speeds drop as low as 10 mph and are only as high as 35 mph between 7:00 AM and 7:00 PM
Volume (2007 ADT): I-5 SB to I-84 EB Ramp: 21,550
Volume (2008 AM Peak Hour): I-5 SB to I-84 EB Ramp: 1,250
Volume (2008 PM Peak Hour): I-5 SB to I-84 EB Ramp: 1,300
Observations: Ramp advisory speed posted at 45 mph.
Data Sources:

2. I-5 SB/NB Merge (PM)
Influence Area: I-5 NB/SB ON ramp merge area to I-5 NB/SB mainlines
Congestion Duration: Approximately 4 hours daily (2:15-6:30 PM)
Contributing Factors: High facility to facility ramp volumes. Although there is an add lane for the ON ramp from I-5 SB, the activation area acts as a merge as vehicles reposition to avoid conflict with the next closely spaced ON ramps.
Influence Area Crashes: Rate: 1.21 per MVMT; Frequency: 88 crashes
Operations Summary:
Activation Range: Between Grand Avenue ON Ramp and I-5 SB/NB merge
Speed: Bottleneck speeds drop as low as 5 mph
Volume (2007 ADT): Mainline: 67,580; I-5 SB ON Ramp: 21,550
Volume (2008 PM Peak Hour): Mainline: 2,700; I-5 SB ON Ramp: 1,300
Observations: Vehicles coming from the I-5 southbound ramp merge left very quickly once on I-84 mainline to avoid conflicting with the downstream Grand Avenue and Irving Street ON ramp vehicles.
Data Sources:

$ **NOTE:** Observations showed congestion emanating from the 16th/Irving on ramp area until the ramp meter turned on. Once the ramp meter was on, no further congestion was observed.

3. 39th Avenue ON Ramp (PM) (INCONCLUSIVE)
Influence Area: 39th Ave ON ramp to I-5 NB/SB ON ramp
Congestion Duration: Inconclusive data
Contributing Factors: High mainline and moderate ramp volumes. Spillback from downstream I-205 congestion (see I-205 graphics, bottlenecks 3 and 8).
Influence Area Crashes: Rate: 0.87 per MVMT; Frequency: 347 crashes
Operations Summary:
Activation Range: 39th Ave ON ramp merge area
Speed: Inconclusive data
Volume (2007 ADT): Mainline: 70,170; 39th ON Ramp: 10,780
Volume (2008 PM Peak Hour): Mainline: 4,730; 39th ON Ramp: 570
Data Sources:

* **NOTE:** Queuing extends from downstream/adjacent corridors and impacts mainline operations

Study Area Boundary

LEGEND

- PORTAL Detector Location (2007 Data Used)
- PORTAL Detector Location (Missing Data)
- (###.#) M.P. of ON/OFF ramp gore point
- # Activation Range: This is the segment which contains the start of a new/confounding bottleneck (this does not encompass all congestion)
- Bottleneck Influence Area - Cross reference # with data boxes above
- Influenced by a bottleneck outside of this study area
- Inconclusive Bottleneck Activation Range

- 0 - 19 Crashes
- 20 - 39 Crashes
- 40 -59 Crashes
- 60 - 79 Crashes
- > 80 Crashes

Total Crashes from 2004 through 2008

- Data collected from PORTAL website
- Data collected from travel time runs
- Information from ODOT
- Information from observations
- Data collected from traffic cameras and/or travel time videos

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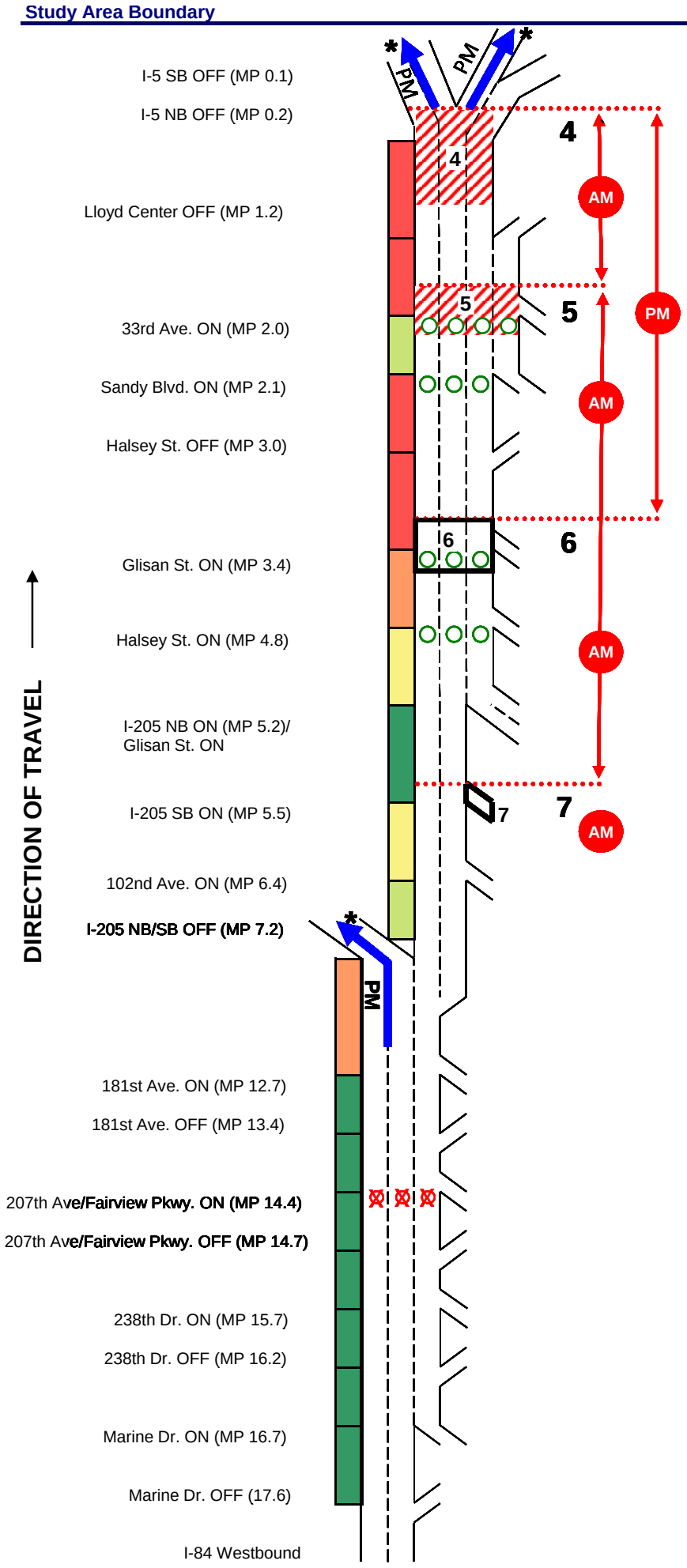
Figure 5
Corridor Bottleneck Operations Study
I-84 Eastbound AM & PM Bottlenecks

I-84 Westbound

Study Area Boundary



*** NOTE:** Queuing extends from downstream/adjacent corridors and impacts mainline operations

4. I-5 Diverge (AM & PM)
Influence Area: I-84 diverge to 33rd Avenue ON ramp (AM)/Glisan Street ON ramp (PM)
Congestion Duration: 8+ hours daily (6:00-10:30 AM; 3:00-7:00+ PM)
Contributing Factors: High mainline and ramp volumes, horizontal and vertical curvature, unclear advanced signage.
Influence Area Crashes: AM influence area Rate: 0.71 per MVMT, Frequency: 99 crashes; PM influence area Rate: 0.85 per MVMT, Frequency: 391 crashes
Operations Summary:
Activation Range: The I-84 diverge area
Speed: Bottleneck speeds drop as low as 20 mph
Volume (2007 ADT): Mainline: 75,660; to I-5 NB OFF Ramp: 21,960; to Rose Quarter OFF Ramp: 2,860; to I-5 SB OFF Ramp: 50,870
Volume (2008 AM Peak Hour): Mainline: 5,600; to I-5 NB OFF Ramp: 2,070; to Rose Quarter OFF Ramp: 230; to I-5 SB OFF Ramp: 3,300
Volume (2008 PM Peak Hour): Mainline: 4,600; to I-5 NB OFF Ramp: 1,400; to Rose Quarter OFF Ramp: 150; to I-5 SB OFF Ramp: 3,050
Data Sources:

5. 33rd Avenue ON Ramp (AM)
Influence Area: 33rd Avenue ON ramp to 58th Avenue/Glisan ON ramp
Congestion Duration: 4 hours daily (6:15-10:15 AM)
Contributing Factors: Heavy mainline, auxiliary lane, and moderate ramp volumes. Closely spaced ON ramps, downstream lane drop/diverge, and advanced signage for above mentioned bottleneck.
Influence Area Crashes: Rate: 0.91 per MVMT; Frequency: 292 crashes
Operations Summary:
Activation Range: The 33rd Avenue ON ramp area
Speed: Bottleneck speeds drop as low as 15 mph
Volume (2007 ADT): Mainline: 73,910; Sandy ON Ramp: 9,790; 33rd ON Ramp: 4,260; Lloyd Center OFF Ramp: 12,300
Volume (2008 AM Peak Hour): Mainline: 5,300; Sandy ON Ramp: 970; 33rd ON Ramp: 530; ; Lloyd Center OFF Ramp: 1,200
Observations: Advanced signage for mainline diverge is potentially misleading. Advanced signage for Lloyd Center exit only lane causes vehicles coming from Sandy ON Ramp and 33rd ON Ramp to merge left early and weave with mainline vehicles destined to Lloyd OFF Ramp.
Data Sources:

6. Glisan ON Ramp (AM) (INCONCLUSIVE)
Influence Area: Glisan ON ramp to I-205 SB ON ramp
Congestion Duration: Inconclusive data
Contributing Factors: High mainline volumes, limited sight distance for merge and downstream horizontal curve, vertical climb on ramp, and short ON ramp acceleration lane.
Influence Area Crashes: Rate: 0.49 per MVMT; Frequency: 119 crashes
Operations Summary:
Activation range: The Glisan ON ramp area
Speed: Inconclusive data
Volume (2007 ADT): Mainline: 76,510; Glisan ON Ramp: 7,050
Volume (2008 AM Peak Hour): Mainline: 5,450; Glisan ON Ramp: 450
Observations: During the review of the video data, it was noticed that any slight friction between merging traffic and mainline traffic (in this area) could cause all lanes to suddenly slow in the merge area. It is expected that with slightly more mainline volume this area could be an independently activated bottleneck.
Data Sources:

7. I-205 SB to I-84 WB Ramp (INCONCLUSIVE)
Influence Area: I-205 SB mainline to I-84 WB mainline
Congestion Duration: Inconclusive data
Contributing Factors: High ramp volume, horizontal curvature, (see I-205 graphic, bottleneck 7).
Operations Summary:
Activation Range: Along the entire ramp
Speed: Inconclusive data
Volume (2007 ADT): I-205 SB to I-84 WB Ramp: 17,210
Volume (2008 AM Peak Hour): I-205 SB to I-84 WB Ramp: 1,100
Data Sources:

Study Area Boundary

LEGEND

- PORTAL Detector Location (2007 Data Used)
- PORTAL Detector Location (Missing Data)
- (###.#) M.P. of ON/OFF ramp gore point
- # Activation Range: This is the segment which contains the start of a new/confounding bottleneck (this does not encompass all congestion)
- Bottleneck Influence Area - Cross reference # with data boxes above
- Influenced by a bottleneck outside of this study area
- Inconclusive Bottleneck Activation Range
- 0 - 19 Crashes
- 20 - 39 Crashes
- 40 -59 Crashes
- 60 - 79 Crashes
- > 80 Crashes

Total Crashes from 2004 through 2008

- Data collected from PORTAL website
- Data collected from travel time runs
- Information from ODOT
- Information from observations
- Data collected from traffic cameras and/or travel time videos

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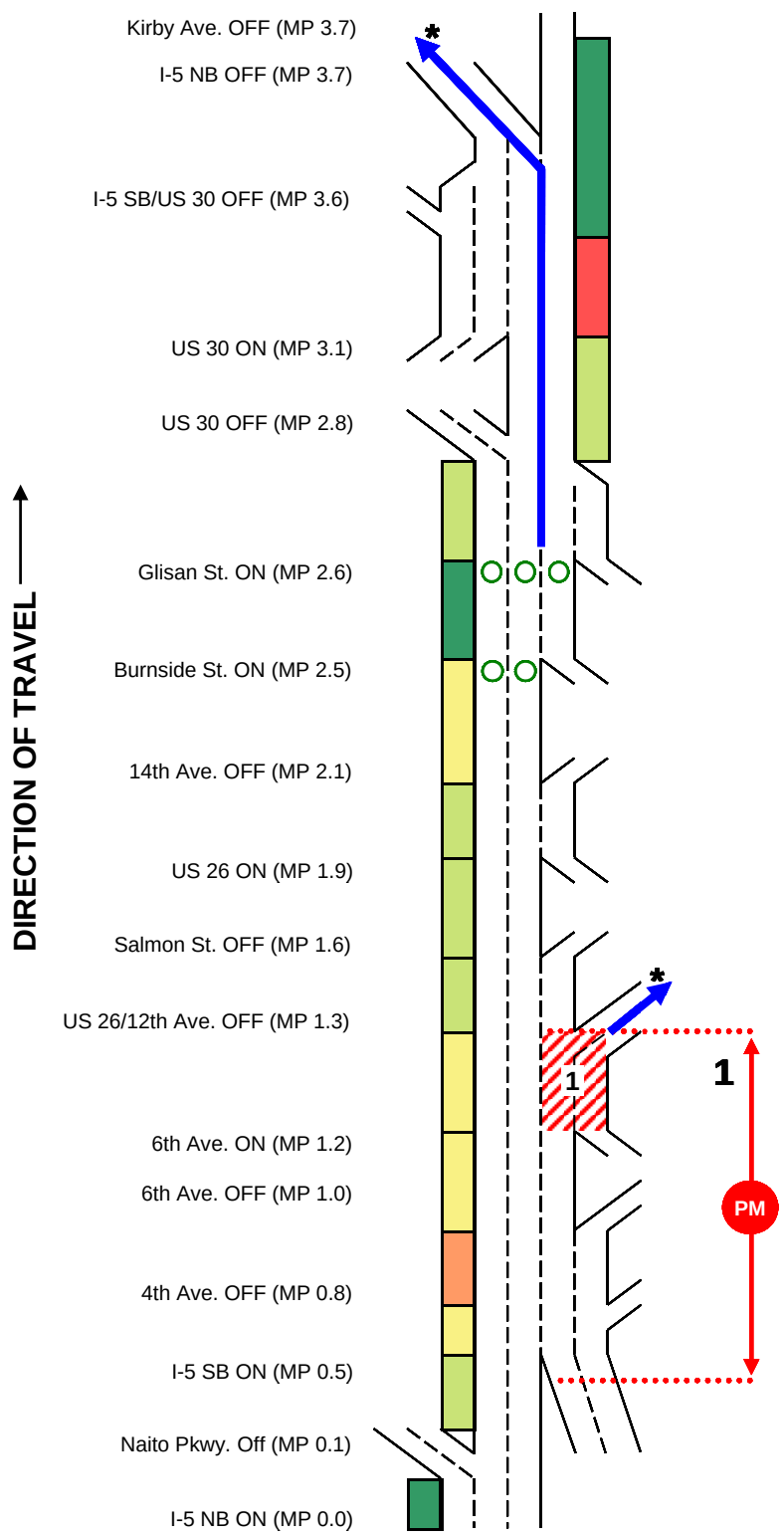
Figure 6
Corridor Bottleneck Operations Study
I-84 Westbound AM & PM Bottlenecks

I-405 Northbound

Study Area Boundary

*** NOTE:** Queuing extends from downstream/adjacent corridors and impacts mainline operations



1. US 26/12th Ave (PM)

Influence Area: Between US 26/12th Ave OFF and I-5 SB ON, in the Auxiliary lanes

Congestion Duration: Approximately 3 hours daily (3:45-6:30 PM)

Contributing Factors: High OFF ramp volumes, weaving volumes, and closely spaced ramps. OFF ramp merge to US 26 congestion (see US 26 graphic, bottleneck 4).

Influence Area Crashes: Rate: 2.84 per MVMT; Frequency: 195 crashes

Operations Summary:

Activation Range: Weave area between 6th Avenue ON ramp and US 26/12th Avenue OFF ramp

Speed: Bottleneck activation speeds drop as low as 5 mph

Volume (2007 ADT): Mainline: 37,720; 6th ON Ramp: 21,830; 12th/US 26 OFF Ramp: 34,980

Volume (2007 PM Peak Hour): Mainline: 3,940; 6th ON Ramp: 380; 12th/US 26 OFF Ramp: 2,380

Data Sources:

Study Area Boundary

LEGEND

PORTAL Detector Location (2007 Data Used)

(###.#) M.P. of ON/OFF ramp gore point

Activation Range: This is the segment which contains the start of a new/confounding bottleneck (this does not encompass all congestion)

Bottleneck Influence Area - Cross reference # with data boxes above

Influenced by a bottleneck outside of this study area

0 - 19 Crashes
20 - 39 Crashes
40 -59 Crashes
60 - 79 Crashes
> 80 Crashes

Total crashes from 2004 through 2008

Data collected from PORTAL website
Data collected from travel time runs
Information from ODOT
Information from observations
Data collected from traffic cameras and/or travel time videos

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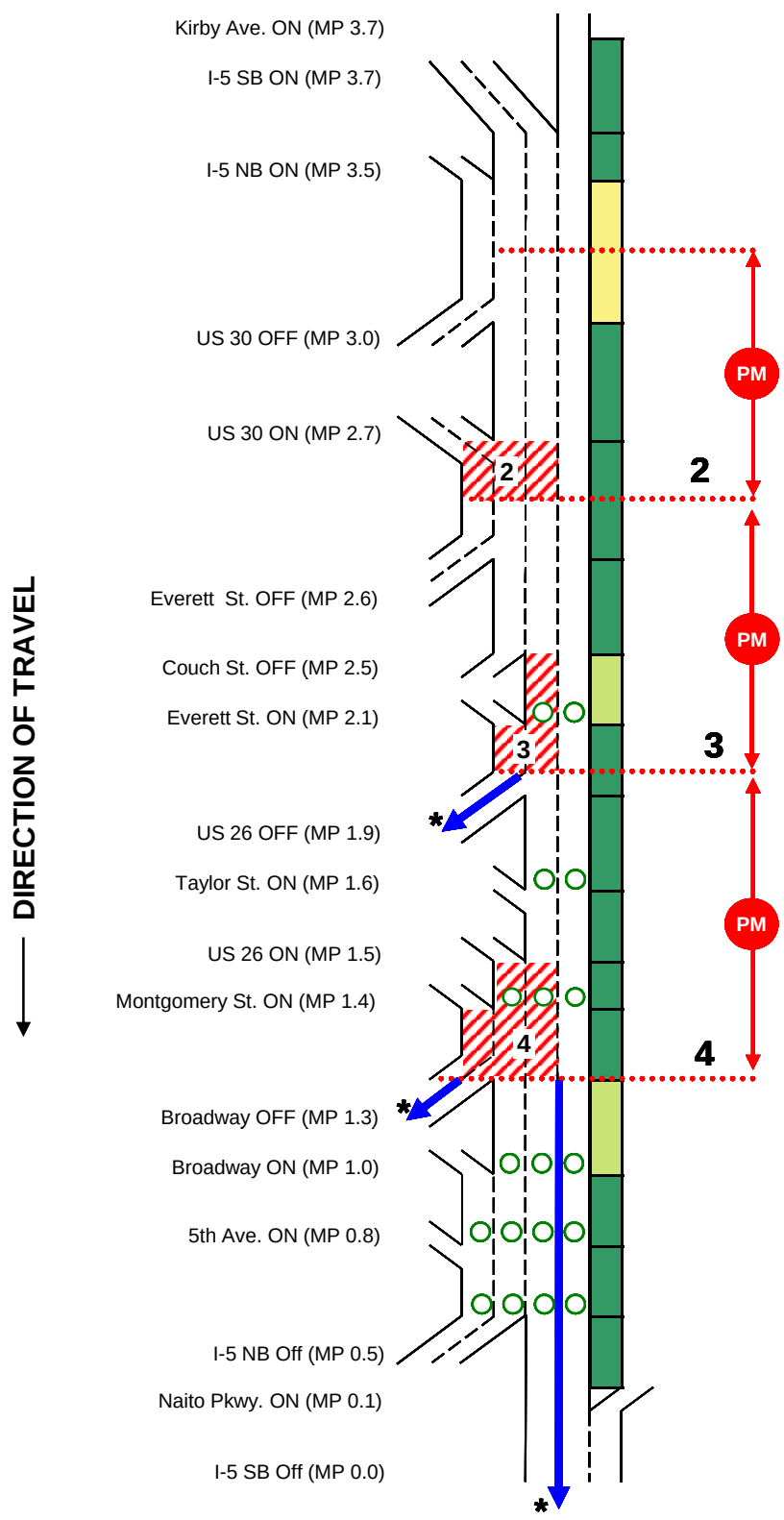
Figure 7
Corridor Bottleneck Operations Study
I-405 Northbound AM & PM Bottlenecks

I-405 Southbound

Study Area Boundary



2. US 30 ON ramp (PM)
Influence Area: Between US 30 ON ramp and north of US 30 OFF (on the Fremont Bridge)
Congestion Duration: Approximately 3 hours daily (3:15-6:00 PM)
Contributing Factors: Poor lane utilization, high US 30 ON ramp volume, and closely spaced ramps.
Influence Area Crashes: Rate: 0.33 per MVMT; Frequency: 16 crashes
Operations Summary:
Activation Range: US 30 ON ramp area
Speed: Bottleneck speeds drop as low as 5 mph
Volume (2007 ADT): Mainline: 37,170; US 30 ON Ramp: 18,070
Volume (2007 PM Peak Hour): Mainline: 2,700; US 30 ON Ramp: 1,400
Data Sources:

3. Everett Street ON ramp to US 26 OFF ramp Weave (PM)
Influence Area: Between US 26 OFF ramp and US 30 ON ramp
Congestion Duration: 3 hours daily (3:15-6:15 PM)
Contributing Factors: Poor lane utilization while positioning for US 26 OFF ramp. High ramp volumes (Everett Street ON ramp and US 26 OFF ramp), short weaving distance, and closely spaced ramps. Spillback from downstream US 26 congestion (see US 26 graphics, bottleneck 4).
Influence Area Crashes: Rate: 0.68 per MVMT; Frequency: 48 crashes
Operations Summary:
Activation Range: US 26 OFF ramp to Couch Street ON ramp
Speed: Bottleneck speeds drop as low as 5 mph.
Volume (2007 ADT): Mainline: 38,400; Couch OFF Ramp: 10,030; Everett ON Ramp: 13,970; US 26 OFF Ramp: 27,030
Volume (2007 PM Peak Hour): Mainline: 3,730; Couch OFF Ramp: 610; Everett ON Ramp: 1,150; US 26 OFF Ramp: 2,600
Observations: Drivers from US 30 ON Ramp that desire to continue southbound on I-405 navigate two lane changes: 1. lane drop at Couch Street OFF Ramp which requires a merge into a highly utilized lane occupied by vehicles destined to US 26 OFF Ramp, and 2. merge into an uncongested lane (leftmost lane).
Data Sources:

4. US 26 ON to Broadway OFF Weave (PM)
Influence Area: Between Broadway Street OFF ramp and WB US 26 OFF ramp
Congestion Duration: 3 hours daily (3:30-6:30 PM)
Contributing Factors: Poor lane utilization while positioning for the Broadway OFF ramp. Broadway OFF ramp queue (from local streets) backs onto I-405 mainline, and high volume weave area (US 26 to I-5 and I-405 to Broadway).
Influence Area Crashes: Rate: 0.73 per MVMT; Frequency: 53 crashes
Operations Summary:
Activation Range: Broadway OFF ramp to US 26 ON ramp
Speed: Bottleneck speeds drop as low as 5 mph
Volume (2007 ADT): Mainline: 27,740; US 26 ON Ramp: 30,470; Montgomery ON Ramp: 7,500; Broadway OFF Ramp: 20,630
Volume (2007 PM Peak Hour): Mainline: 2,070; US 26 ON Ramp: 1,700; Montgomery ON Ramp: 800; Broadway OFF Ramp: 1,620
Observations: The queue associated with this box impacts operations on eastbound US26.
Data Sources:

*** NOTE:** Queuing extends from downstream/adjacent corridors and impacts mainline operations

Study Area Boundary

LEGEND

PORTAL Detector Location (2007 Data Used)

(###.#) M.P. of ON/OFF ramp gore point

Activation Range: This is the segment which contains the start of a new/confounding bottleneck (this does not encompass all congestion)

Bottleneck Influence Area - Cross reference # with data boxes above

Influenced by a bottleneck outside of this study area

0 - 19 Crashes
20 - 39 Crashes
40 -59 Crashes
60 - 79 Crashes
> 80 Crashes

Total crashes from 2004 through 2008

Data collected from PORTAL website
Data collected from travel time runs
Information from ODOT
Information from observations
Data collected from traffic cameras and/or travel time videos

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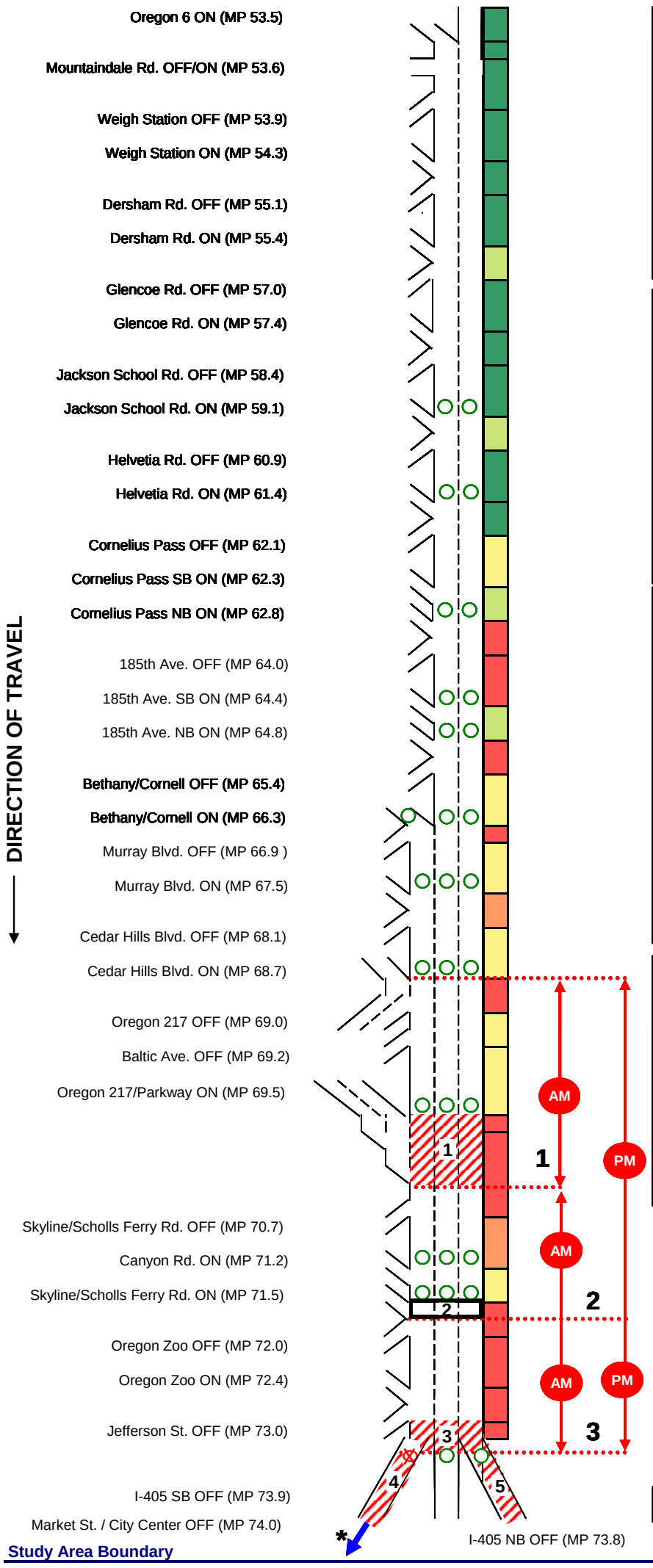
Figure 8
Corridor Bottleneck Operations Study
I-405 Southbound AM & PM Bottlenecks

US 26 Eastbound

Study Area Boundary



Study Area Boundary

1. Oregon 217 On Ramp (AM)
Influence Area: Between Oregon 217 ON lane drop and Cedar Hills Blvd. ON
Congestion Duration: 3 hours daily (7:00-10:00 AM)
Contributing Factors: High mainline and ramp volumes.
Influence Area Crashes: Rate: 1.23 per MVMT; Frequency: 189 crashes
Operations Summary:
Activation Range: Between Oregon 217 lane drop and Oregon 217 ON ramp gore point
Speed: Bottleneck activation speeds drop as low as 10 mph. (AM)
Volume (2007 ADT): Mainline: 40,830; Oregon 217 ON Ramp: 21,400
Volume (2008 AM Peak Hour): Mainline: 3,190; Oregon 217 ON Ramp: 1,300
Observations: Some mainline drivers use the long Oregon 217 ON Ramp acceleration lanes to bypass the mainline queue.
Data Sources:

2. Skyline/Scholls Ferry On Ramp (AM & PM) (INCONCLUSIVE)
Influence Area: Between Skyline ON and either Oregon 217 ON lane drop (AM) or Cedar Hills Blvd. ON (PM)
Congestion Duration: Inconclusive data
Contributing Factors: High mainline and ramp volumes, closely spaced on-ramps (merge points) .
Influence Area Crashes: AM influence area Rate: 1.49 per MVMT, Frequency: 222 crashes; PM influence area Rate: 1.34 per MVMT, Frequency: 411 crashes
Operations Summary:
Activation Range: Scholls Ferry ON ramp merge area
Speed: Bottleneck speeds drop as low as 15 mph (AM and PM)
Volume (2007 ADT): Mainline: 67,360; Scholls Ferry ON Ramp: 7,100
Volume (2008 AM Peak Hour): Mainline: 4,810; Scholls Ferry ON Ramp: 820
Volume (2008 PM Peak Hour): Mainline: 4,640; Scholls Ferry ON Ramp: 480
Data Sources:

3. I-405 Positioning/Curves/Tunnel (AM & PM)
Influence Area: I-405 Diverge to Skyline/Scholls Ferry ON
Congestion Duration: 8 hours daily (6:45-10:15 AM; 3:00-7:30 PM)
Contributing Factors: High mainline volumes. High ramp volume (facility to facility connections). Mainline horizontal and vertical curvature approaching Vista Ridge tunnel. 45 mph approach signage. No lane changes from before tunnel to diverges. Sight distance issues.
Influence Area Crashes: Rate: 2.34 per MVMT; Frequency: 849 crashes
Operations Summary:
Activation Range: Between I-405 diverge ramps and Jefferson Street OFF ramp
Speed: Bottleneck speeds drop as low as 15 mph
Volume (2007 ADT): Mainline: 71,260; I-405 NB OFF Ramp: 27,620; Market OFF Ramp: 13,170; I-405 SB OFF Ramp: 30,470
Volume (2008 AM Peak Hour): Mainline: 5,500; I-405 NB OFF Ramp: 2,100; Market OFF Ramp: 1,400; I-405 SB OFF Ramp: 2,000
Volume (2008 PM Peak Hour): Mainline: 4,800; I-405 NB OFF Ramp: 1,800; Market OFF Ramp: 1,300; I-405 SB OFF Ramp: 1,700
Observation: Center lane slows due to speed differentials with right and left lanes.
Data Sources:

4. Ramp to I-405 Southbound (AM & PM)
Influence Area: I-405 Mainline to US 26 Mainline
Congestion Duration: 8 hours daily (6:45-10:15 AM; 3:00-7:30 PM)
Contributing Factors: High ramp volume (facility to facility connection). Horizontal and vertical curvature. Sight distance issues.
Operations Summary:
Activation Range: Along the entire ramp
Speed: Bottleneck speeds drop as low as 5 mph
Volume (2007 ADT): I-405 SB OFF Ramp: 30,470
Volume (2008 AM Peak Hour): I-405 SB OFF Ramp: 2,000
Volume (2008 PM Peak Hour): I-405 SB OFF Ramp: 1,700
Data Sources:

5. Ramp to I-405 Northbound (AM & PM)
Influence Area: I-405 Mainline to US 26 Mainline
Congestion Duration: 7 hours daily (7:00-10:00 AM; 3:00-7:00 PM)
Contributing Factors: High ramp volume (facility to facility connection). Horizontal and vertical curvature. Sight distance issues.
Operations Summary:
Activation Range: Along the entire ramp
Speed: Bottleneck speeds drop as low as 5 mph
Volume (2007 ADT): I-405 NB OFF Ramp: 27,620
Volume (2008 AM Peak Hour): I-405 NB OFF Ramp: 2,100
Volume (2008 PM Peak Hour): I-405 NB OFF Ramp: 1,800
Data Sources:

*** NOTE:** Queuing extends from downstream/adjacent corridors and impacts mainline operations

Study Area Boundary

LEGEND

- PORTAL Detector Location (2007 Data Used)
- PORTAL Detector Location (Missing Data)
- (###.#) M.P. of ON/OFF ramp gore point
- # Activation Range: This is the segment which contains the start of a new/confounding bottleneck (this does not encompass all congestion)
- Bottleneck Influence Area - Cross reference # with data boxes above
- Influenced by a bottleneck outside of this study area
- Inconclusive Bottleneck Activation Range
- 0 - 19 Crashes
- 20 - 39 Crashes
- 40 -59 Crashes
- 60 - 79 Crashes
- > 80 Crashes

Total Crashes from 2004 through 2008

- Data collected from PORTAL website
- Data collected from travel time runs
- Information from ODOT
- Information from observations
- Data collected from traffic cameras and/or travel time videos

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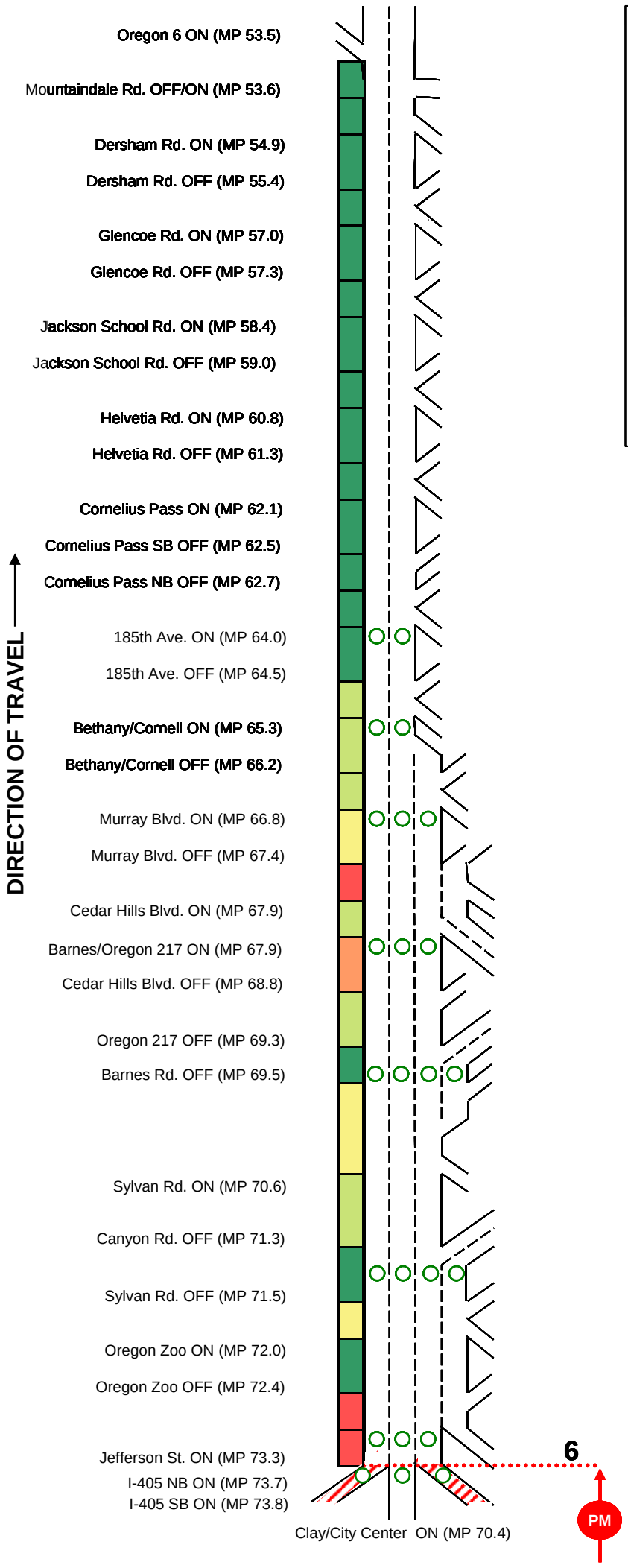
Figure 9
Corridor Bottleneck Operations Study
US 26 Eastbound AM & PM Bottlenecks

US 26 Westbound

Study Area Boundary



6. I-405 Ramps/US 26 Merge (PM)

Influence Area: Between US 26 merge and I-405 mainline along I-405 ramps

Congestion Duration: Approximately 3 hours daily (3:30-6:45 PM)

Contributing Factors: High ramp volume (including facility to facility connections). I-405 OFF ramp horizontal and vertical curvature. Lane drops on I-405 ramps. Positioning for climbing grade on US26.

Operations Summary:

Activation Range: I-405 ramp merge areas

Speed: Bottleneck speeds drop as low as 10 mph

Volume (2007 ADT): Market ON Ramp: 12,370; ON from I-405 NB Ramp: 30,750; ON from I-405 SB Ramp: 27,030

Volume (2007 PM Peak Hour): Market ON Ramp: 1,300; ON from I-405 NB Ramp: 2,000; ON from I-405 SB Ramp: 2,600

Observation: Vehicles begin positioning for the downstream climbing grade as soon as the merge onto the US 26 mainline.

Data Sources:

Study Area Boundary

LEGEND

PORTAL Detector Location (2007 Data Used)

(###.#) M.P. of ON/OFF ramp gore point

Activation Range: This is the segment which contains the start of a new/confounding bottleneck (this does not encompass all congestion)

Bottleneck Influence Area - Cross reference # with data boxes above

Data collected from PORTAL website

Data collected from travel time runs

Information from ODOT

Information from observations

Data collected from traffic cameras and/or travel time videos

0 - 19 Crashes
20 - 39 Crashes
40 -59 Crashes
60 - 79 Crashes
> 80 Crashes

Total Crashes from 2004 through 2008

DAVID EVANS AND ASSOCIATES INC.

Figure 10
Corridor Bottleneck Operations Study
US 26 Westbound AM & PM Bottlenecks

Appendix A

PORTAL Data

Potential Bottleneck Plots

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I-5 Northbound
24 Hour Speed Plots

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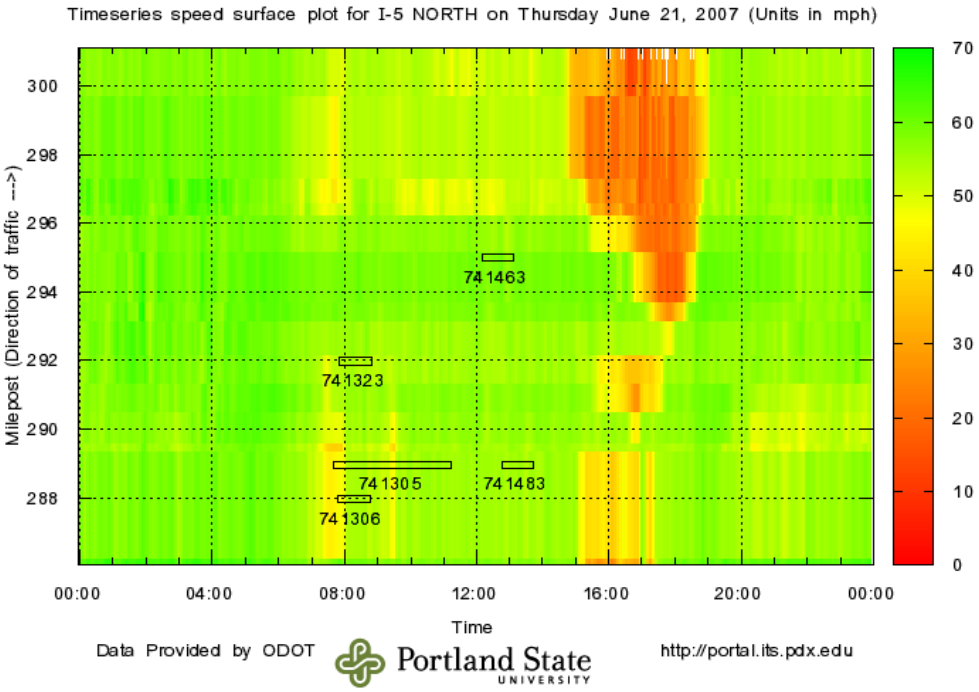
Timeseries speed surface plot for I-5 NORTH on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
300
298
296
294
292
290
288
741463
741323
741305
741483
741306
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
0
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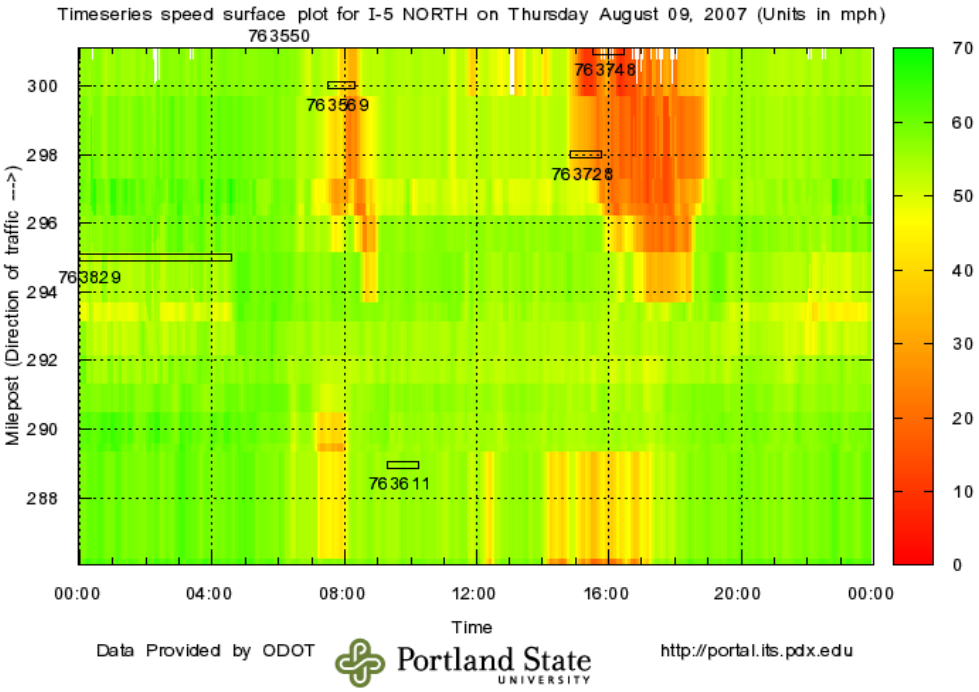
763688


Timeseries speed surface plot for I-5 NORTH on Thursday August 09, 2007 (Units in mph)
763550
763748
763569
763728
763829
763611
Milepost (Direction of traffic --->)
300
298
296
294
292
290
288
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
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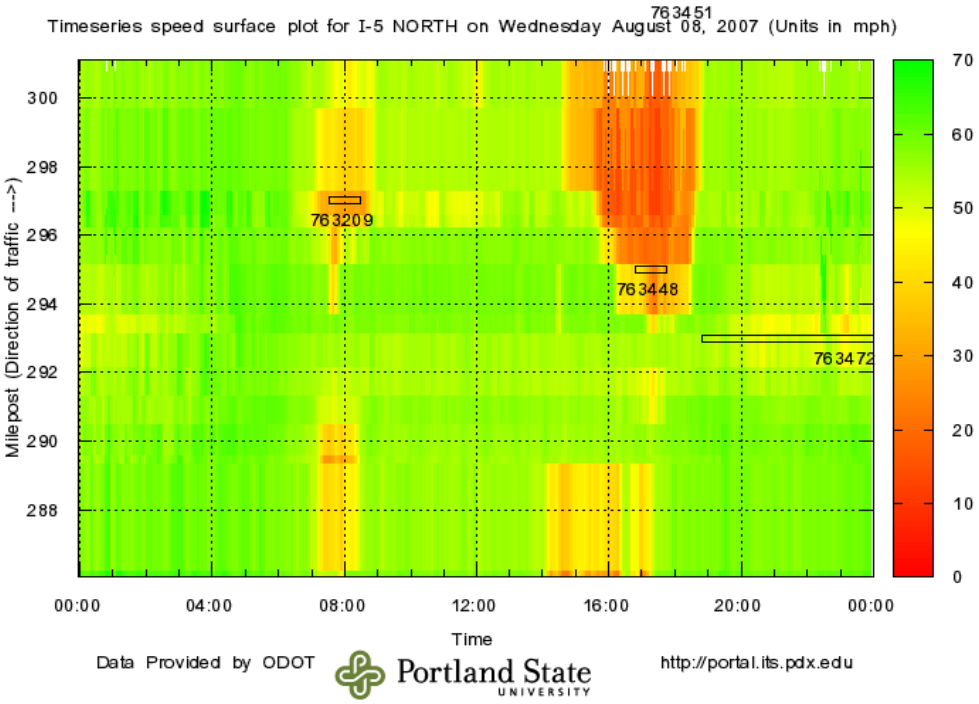
Timeseries speed surface plot for I-5 NORTH on Wednesday August 08, 2007 (Units in mph)
763451
763209
763448
763472
Milepost (Direction of traffic --->)
300
298
296
294
292
290
288
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
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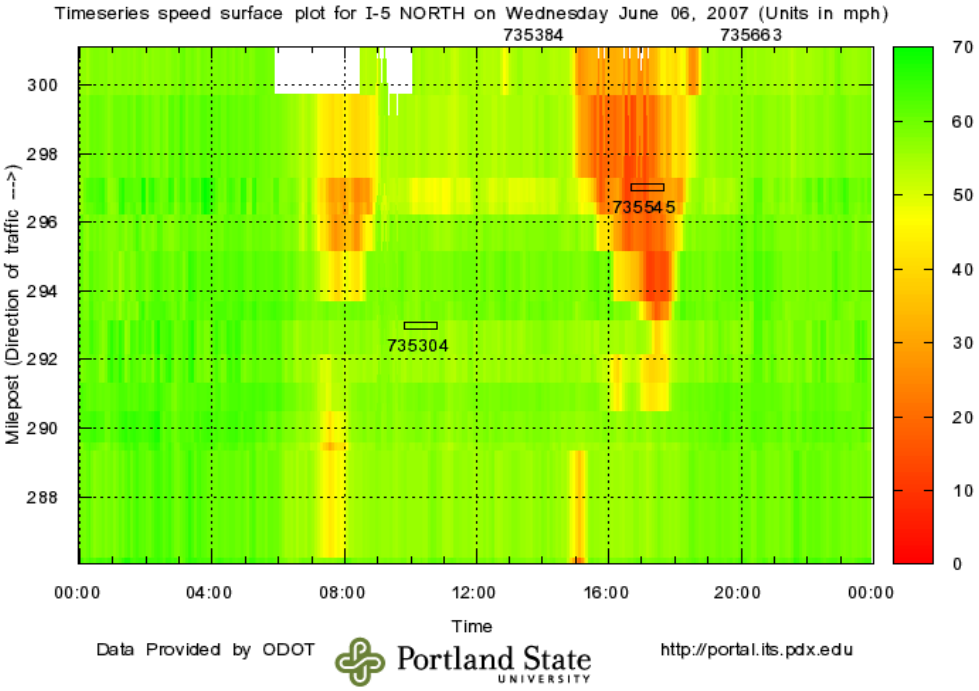
Timeseries speed surface plot for I-5 NORTH on Wednesday June 06, 2007 (Units in mph)
735384
735663
735545
735304
Milepost (Direction of traffic --->)
300
298
296
294
292
290
288
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
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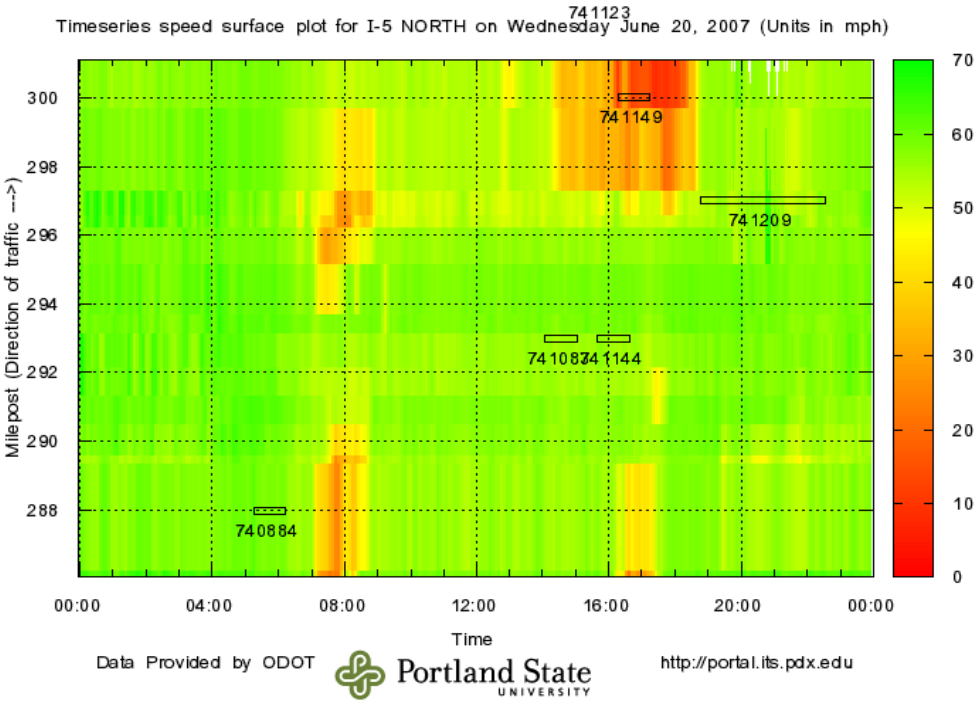
Timeseries speed surface plot for I-5 NORTH on Wednesday June 20, 2007 (Units in mph)
741123
741149
741209
741087
741144
740884
Milepost (Direction of traffic --->)
300
298
296
294
292
290
288
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
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10
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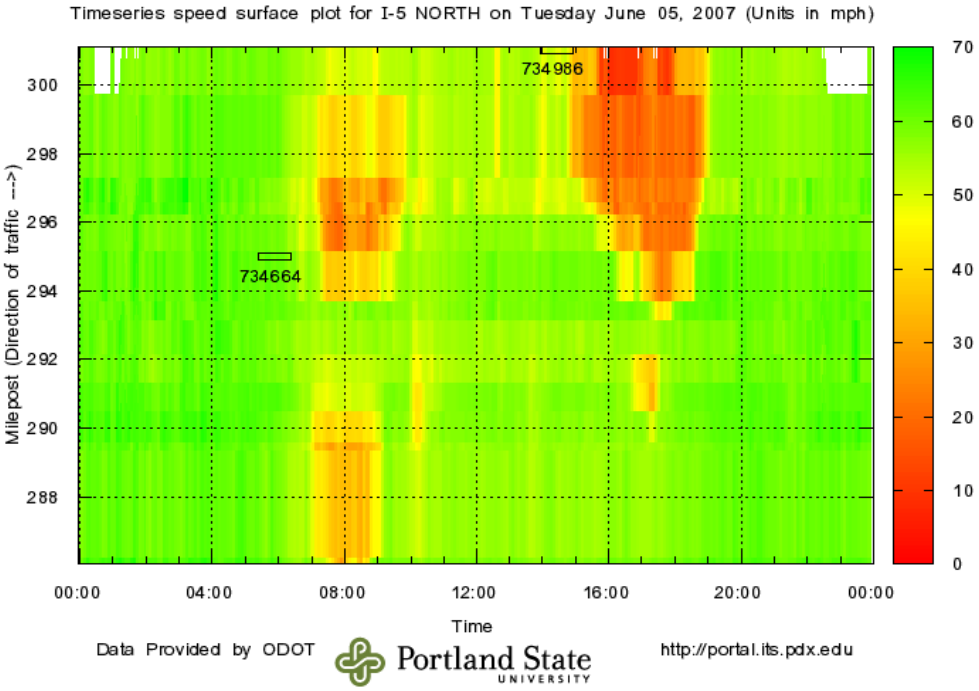
Timeseries speed surface plot for I-5 NORTH on Tuesday June 05, 2007 (Units in mph)
734986
734664
Milepost (Direction of traffic --->)
300
298
296
294
292
290
288
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
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50
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30
20
10
0
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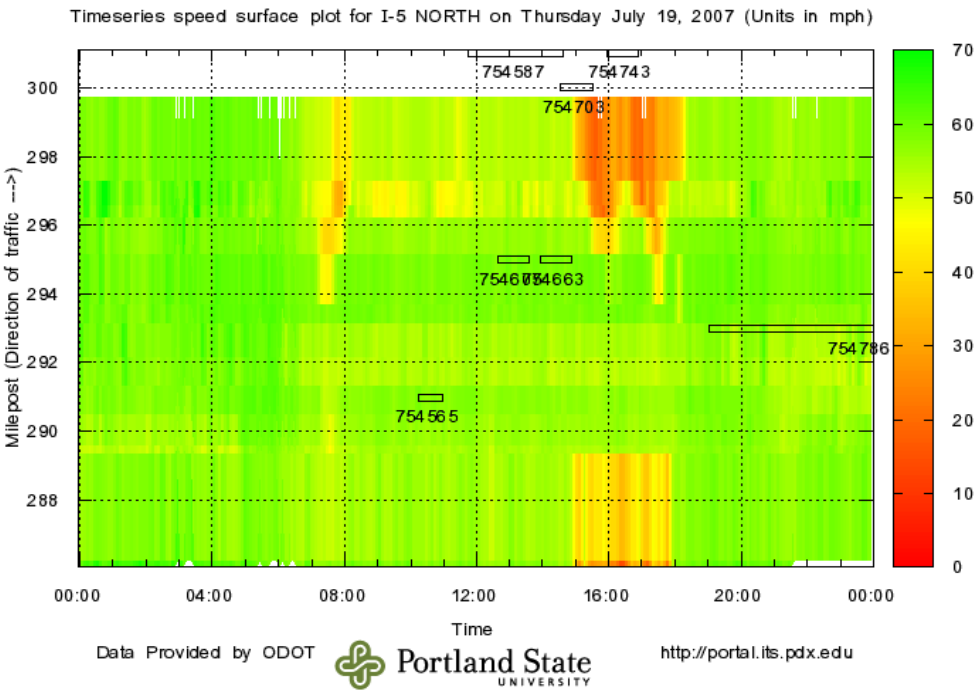
Timeseries speed surface plot for I-5 NORTH on Thursday July 19, 2007 (Units in mph)
754587
754743
754703
754663
754786
754565
Milepost (Direction of traffic --->)
300
298
296
294
292
290
288
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
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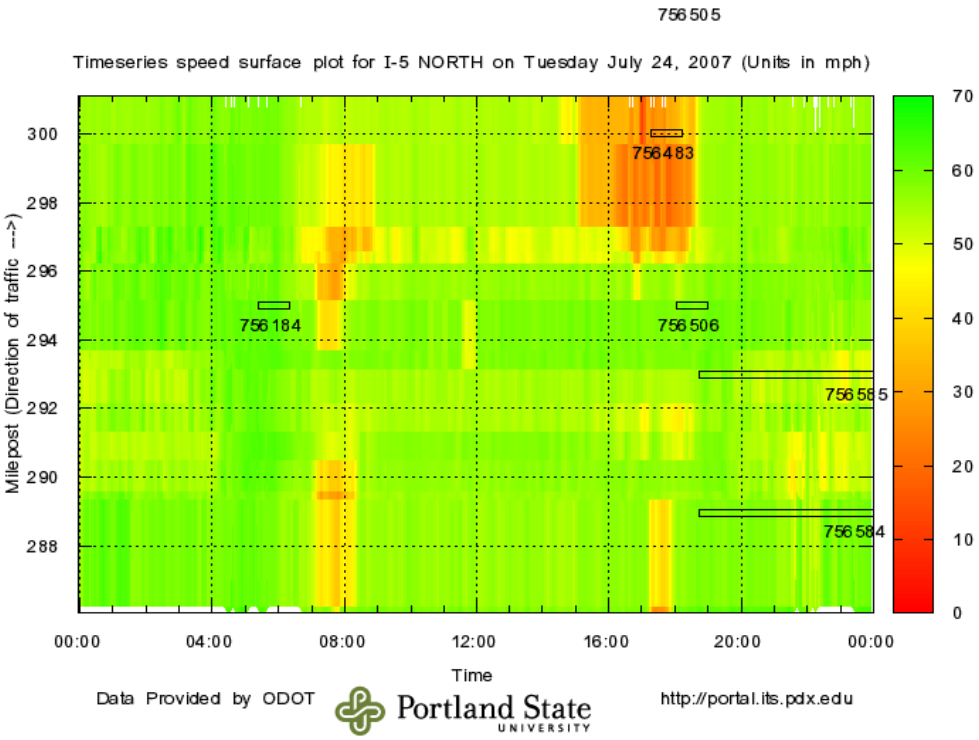
756505
Timeseries speed surface plot for I-5 NORTH on Tuesday July 24, 2007 (Units in mph)
756483
756184
756506
756585
756584
Milepost (Direction of traffic --->)
300
298
296
294
292
290
288
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
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Data Provided by ODOT
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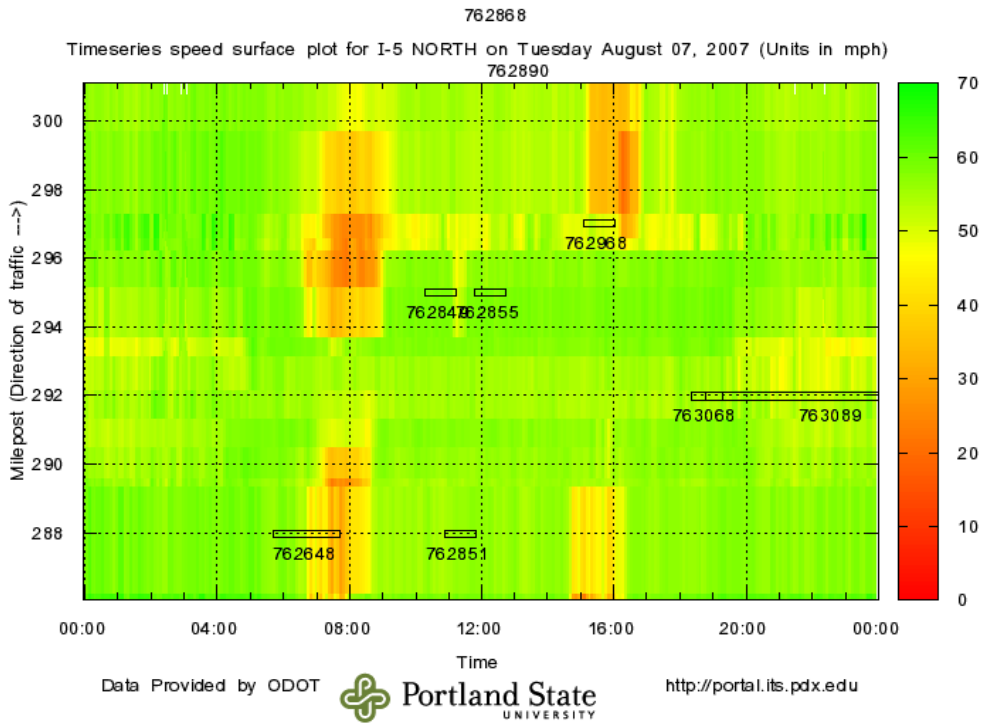
762868
Timeseries speed surface plot for I-5 NORTH on Tuesday August 07, 2007 (Units in mph)
762890
Milepost (Direction of traffic --->)
Time
Data Provided by ODOT
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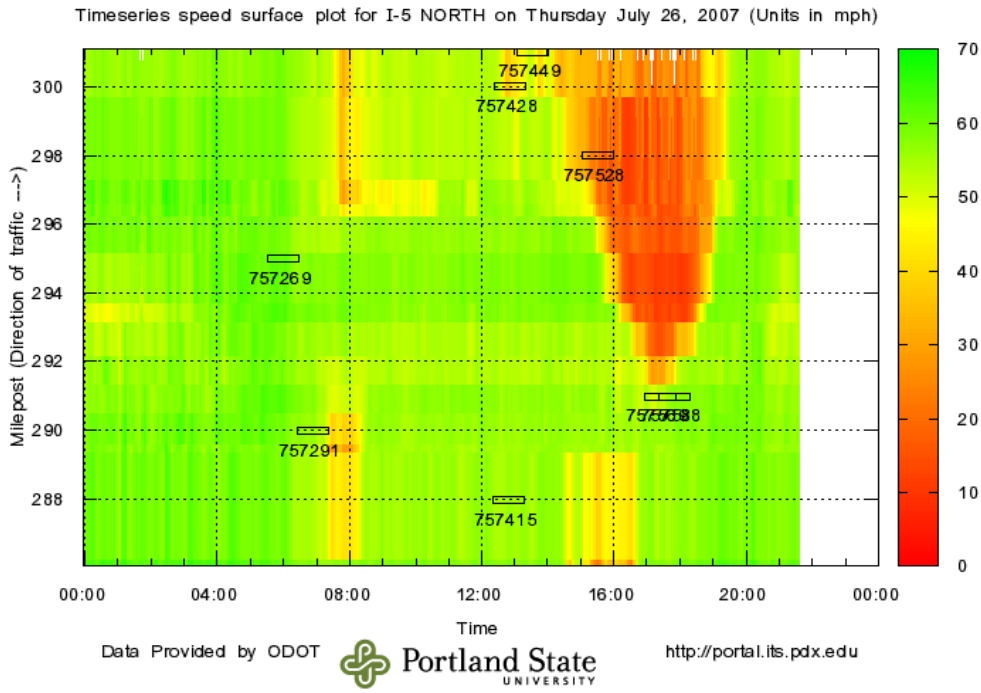
Timeseries speed surface plot for I-5 NORTH on Thursday July 26, 2007 (Units in mph)
Milepost (Direction of traffic --->)
Time
Data Provided by ODOT
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I-5 Northbound
AM Peak Hour Speed Plots

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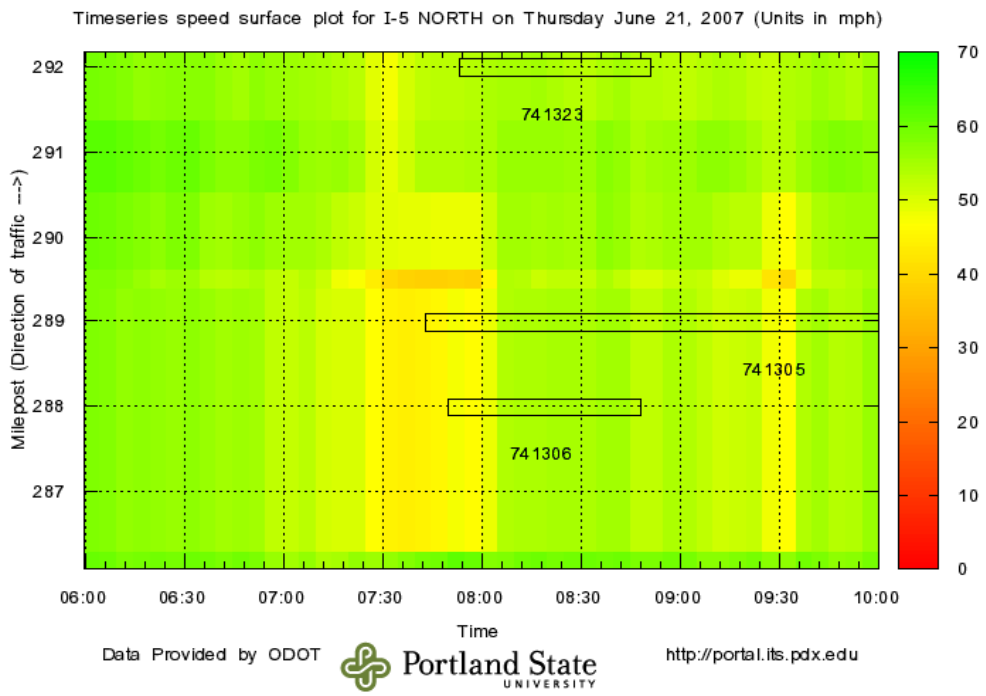
Timeseries speed surface plot for I-5 NORTH on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
292
291
290
289
288
287
741323
741305
741306
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
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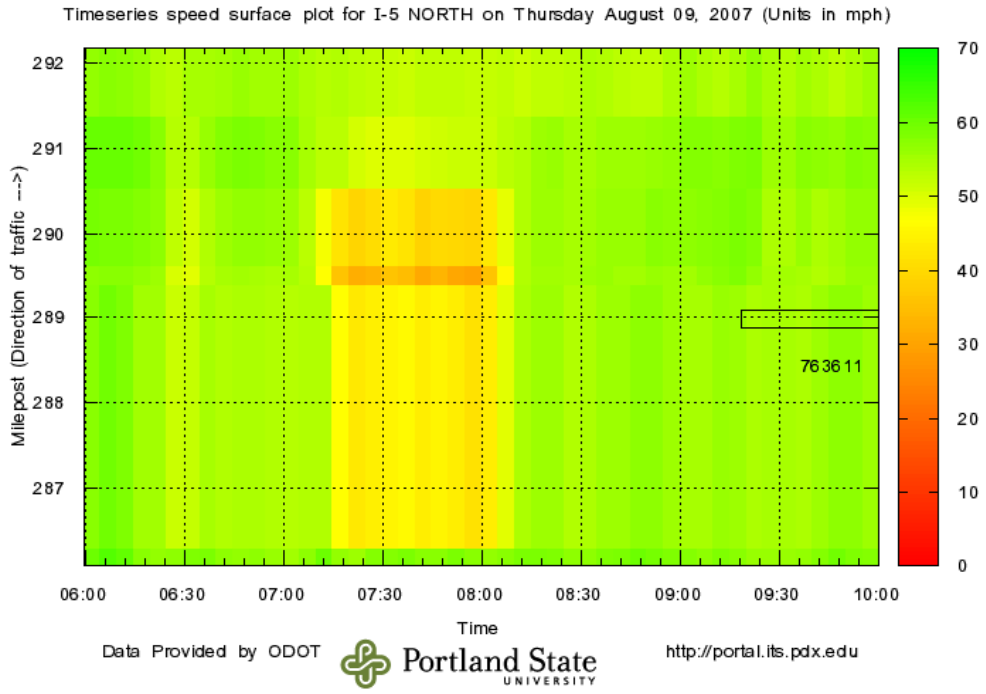
Timeseries speed surface plot for I-5 NORTH on Thursday August 09, 2007 (Units in mph)
Milepost (Direction of traffic --->)
292
291
290
289
288
287
763611
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
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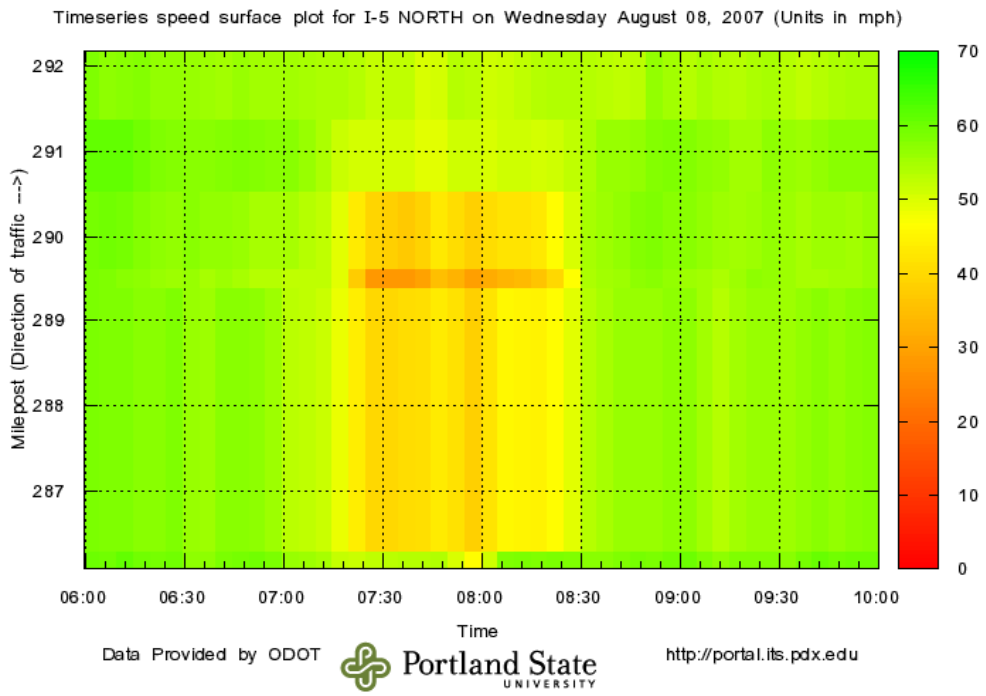
Timeseries speed surface plot for I-5 NORTH on Wednesday August 08, 2007 (Units in mph)
Milepost (Direction of traffic --->)
292
291
290
289
288
287
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
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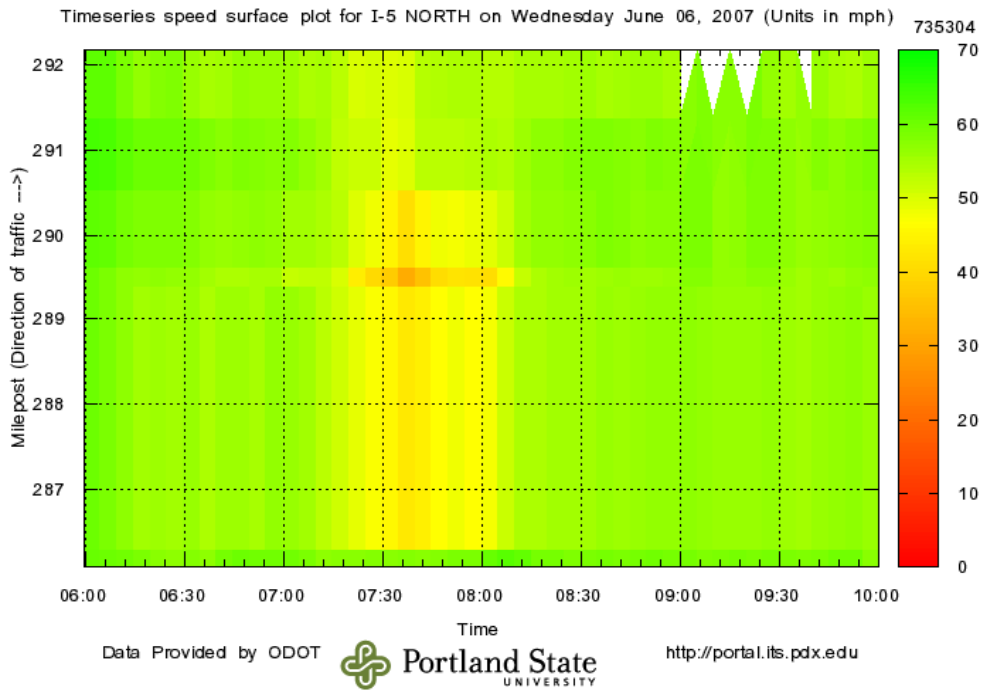
Timeseries speed surface plot for I-5 NORTH on Wednesday June 06, 2007 (Units in mph)
735304
Milepost (Direction of traffic --->)
292
291
290
289
288
287
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
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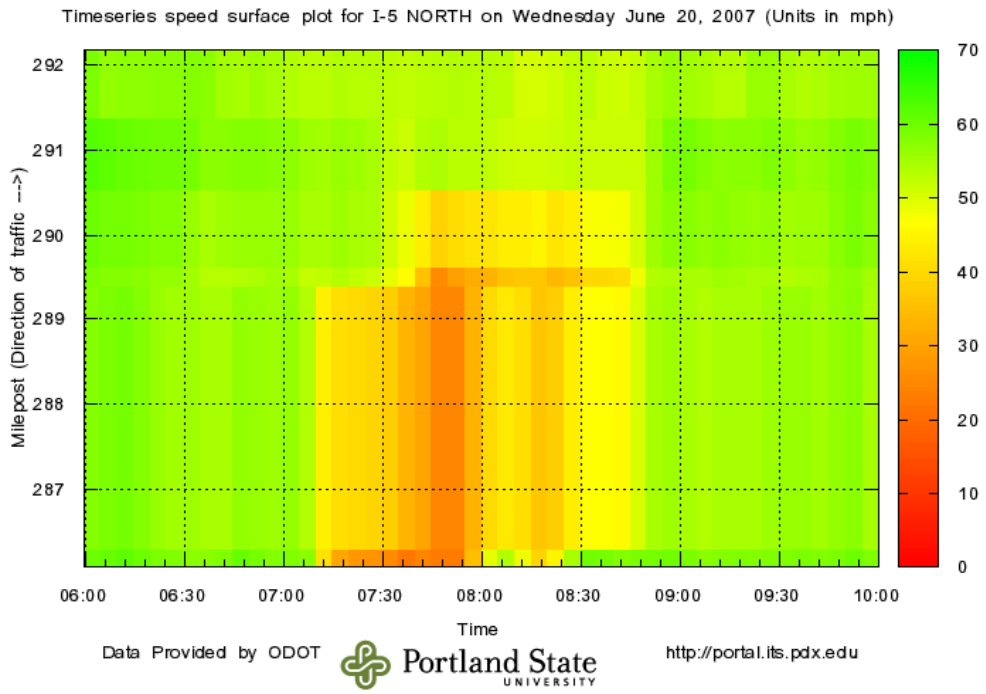
Timeseries speed surface plot for I-5 NORTH on Wednesday June 20, 2007 (Units in mph)
Milepost (Direction of traffic --->)
292
291
290
289
288
287
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
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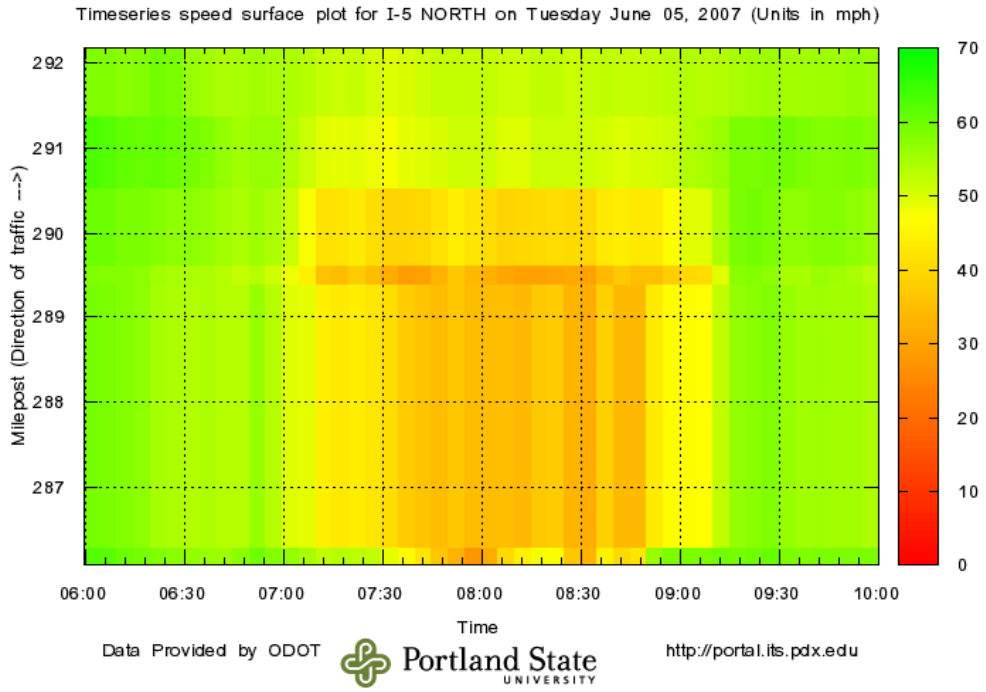
Timeseries speed surface plot for I-5 NORTH on Tuesday June 05, 2007 (Units in mph)
Milepost (Direction of traffic --->)
292
291
290
289
288
287
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
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Time
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Portland State UNIVERSITY
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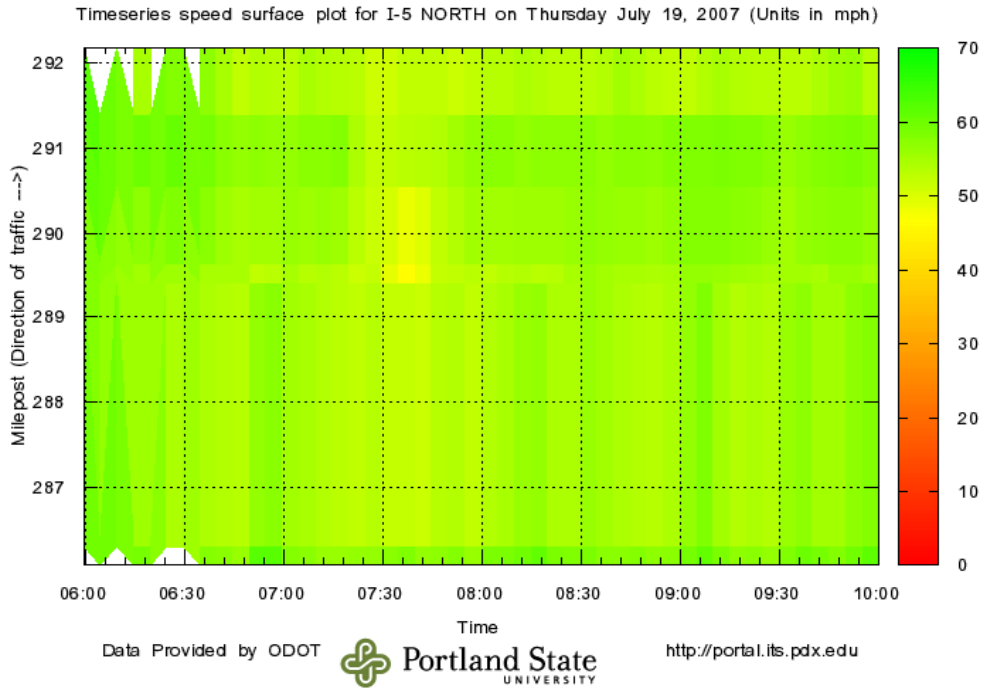
Timeseries speed surface plot for I-5 NORTH on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
292
291
290
289
288
287
06:00
06:30
07:00
07:30
08:00
08:30
09:00
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10:00
Time
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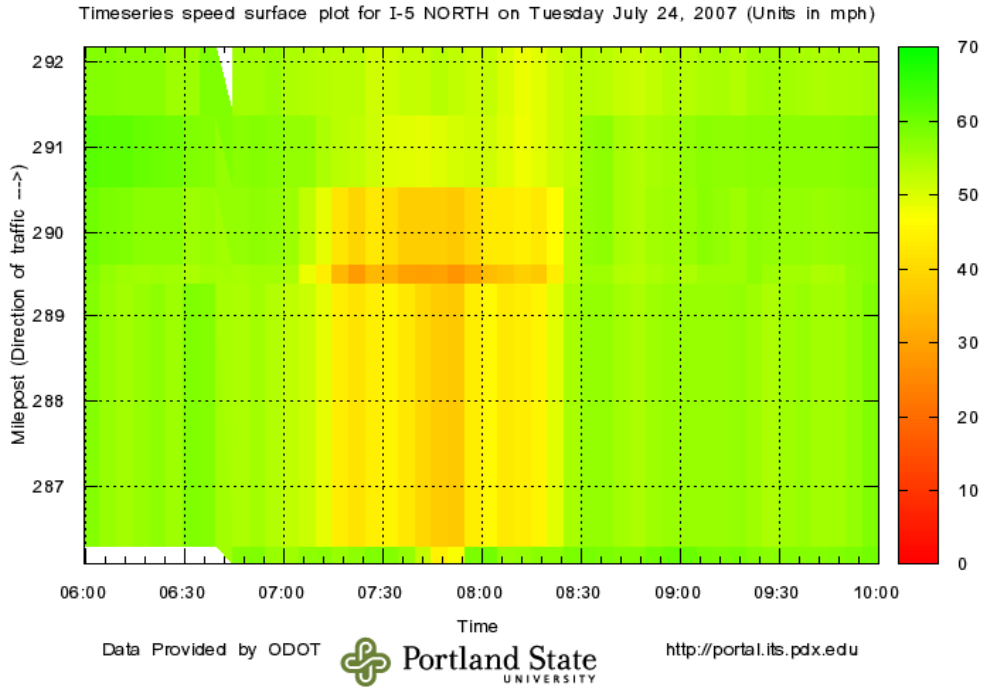
Timeseries speed surface plot for I-5 NORTH on Tuesday July 24, 2007 (Units in mph)
Milepost (Direction of traffic --->)
292
291
290
289
288
287
06:00
06:30
07:00
07:30
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08:30
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Time
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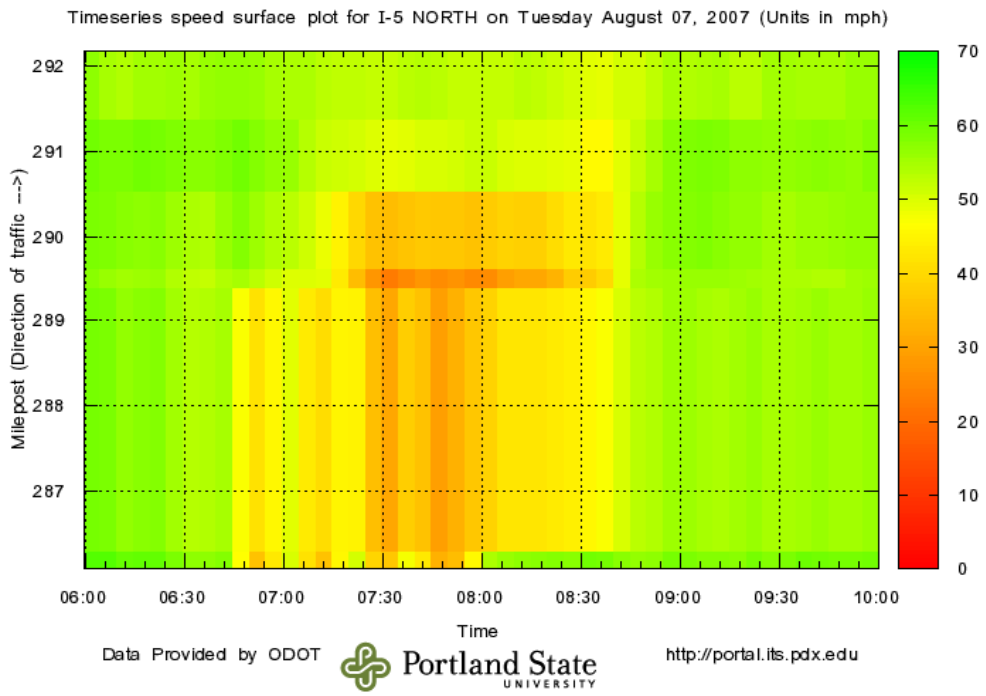
Timeseries speed surface plot for I-5 NORTH on Tuesday August 07, 2007 (Units in mph)
Milepost (Direction of traffic --->)
292
291
290
289
288
287
06:00
06:30
07:00
07:30
08:00
08:30
09:00
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Time
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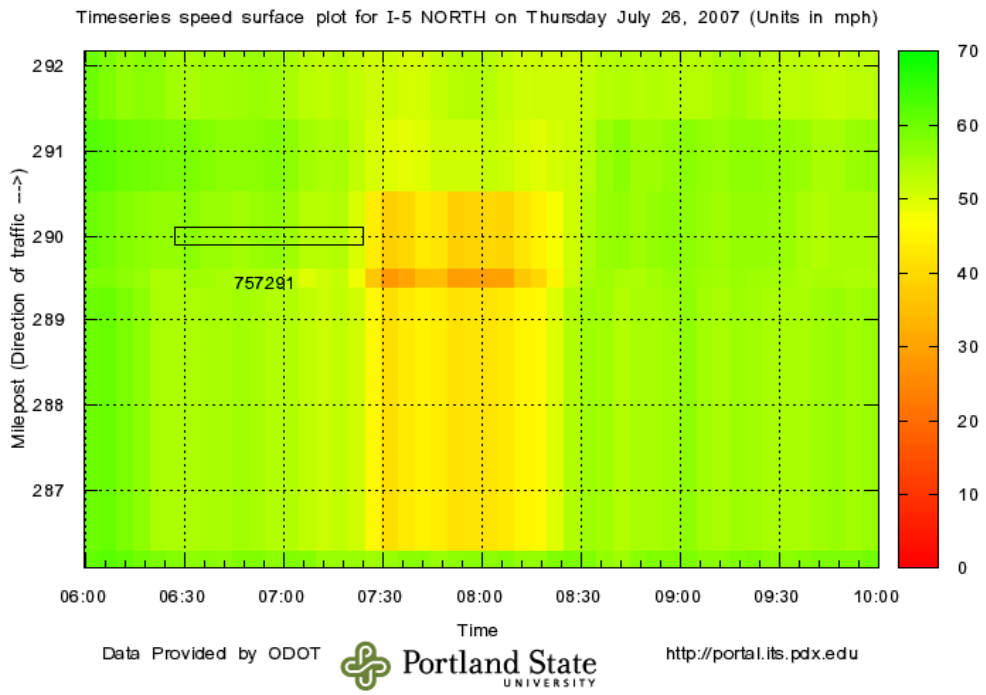
Timeseries speed surface plot for I-5 NORTH on Thursday July 26, 2007 (Units in mph)
Milepost (Direction of traffic --->)
292
291
290
289
288
287
757291
06:00
06:30
07:00
07:30
08:00
08:30
09:00
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Time
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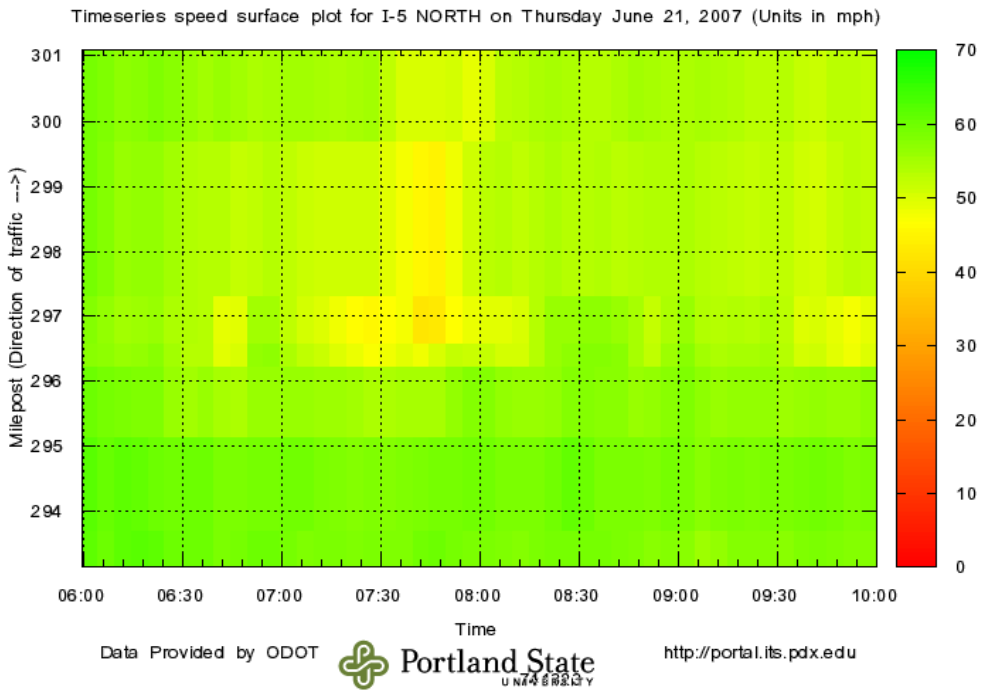
Timeseries speed surface plot for I-5 NORTH on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
301
300
299
298
297
296
295
294
06:00
06:30
07:00
07:30
08:00
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Data Provided by ODOT
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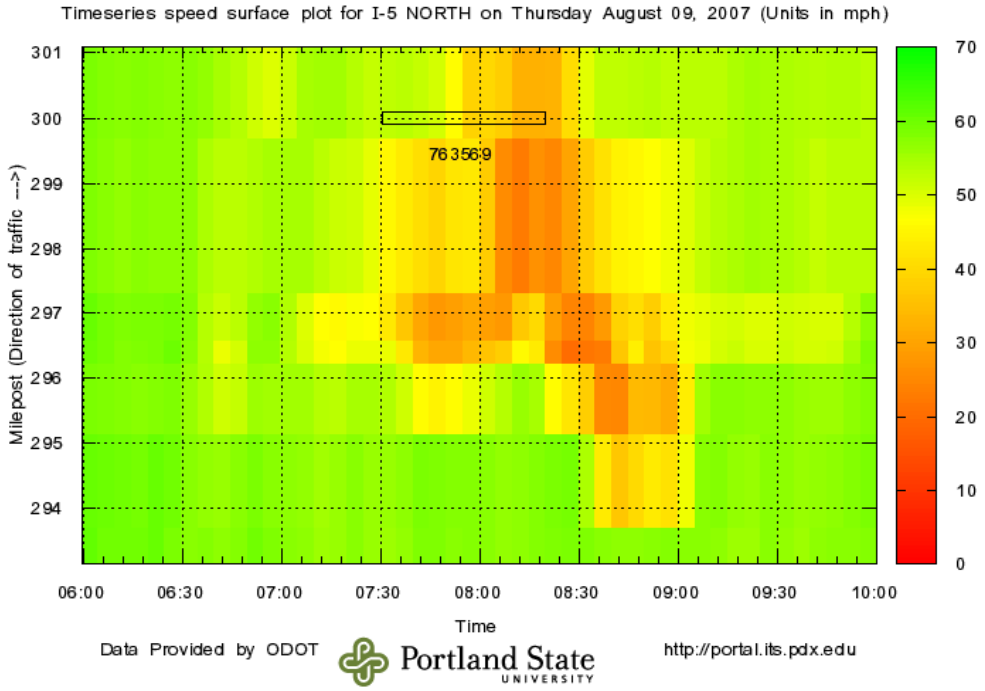
Timeseries speed surface plot for I-5 NORTH on Thursday August 09, 2007 (Units in mph)
Milepost (Direction of traffic --->)
301
300
299
298
297
296
295
294
763569
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
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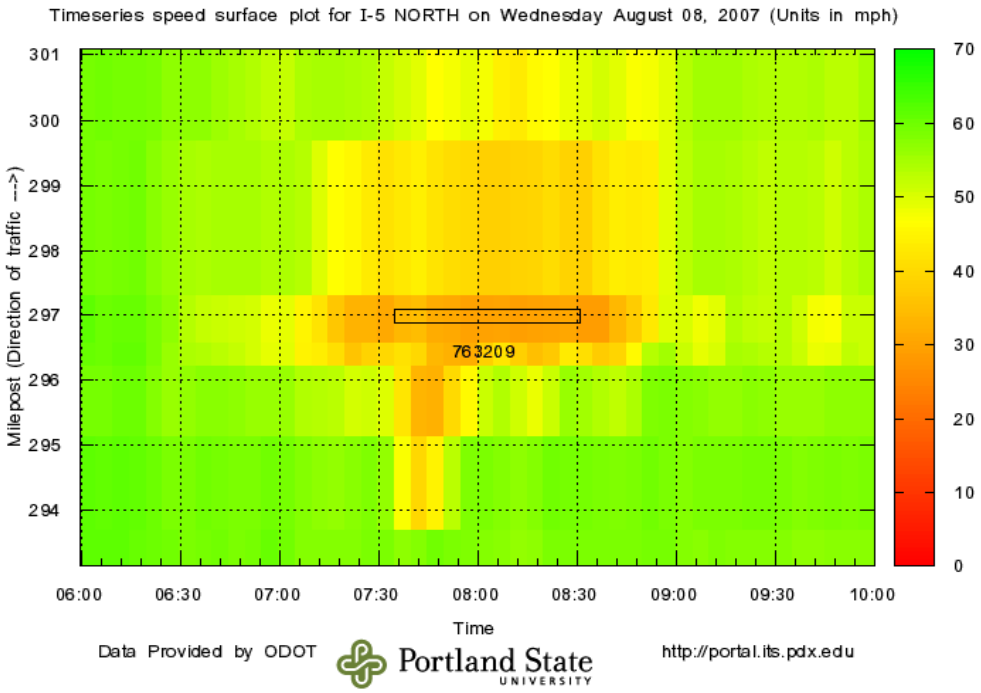
Timeseries speed surface plot for I-5 NORTH on Wednesday August 08, 2007 (Units in mph)
Milepost (Direction of traffic --->)
301
300
299
298
297
296
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294
763209
06:00
06:30
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Time
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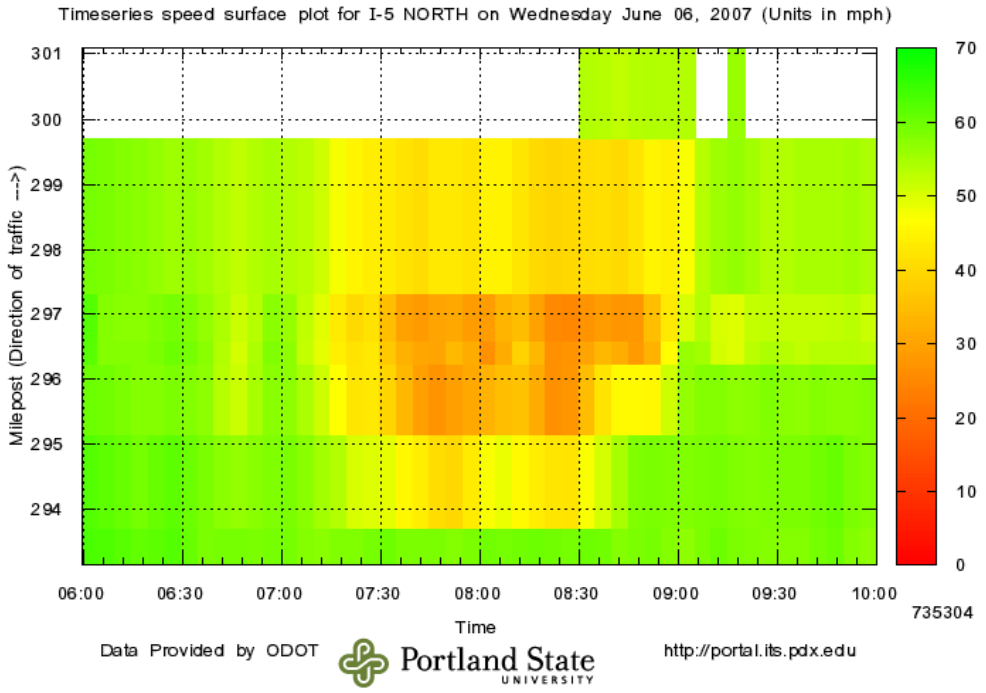
Timeseries speed surface plot for I-5 NORTH on Wednesday June 06, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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300
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298
297
296
295
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06:00
06:30
07:00
07:30
08:00
08:30
09:00
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735304
Time
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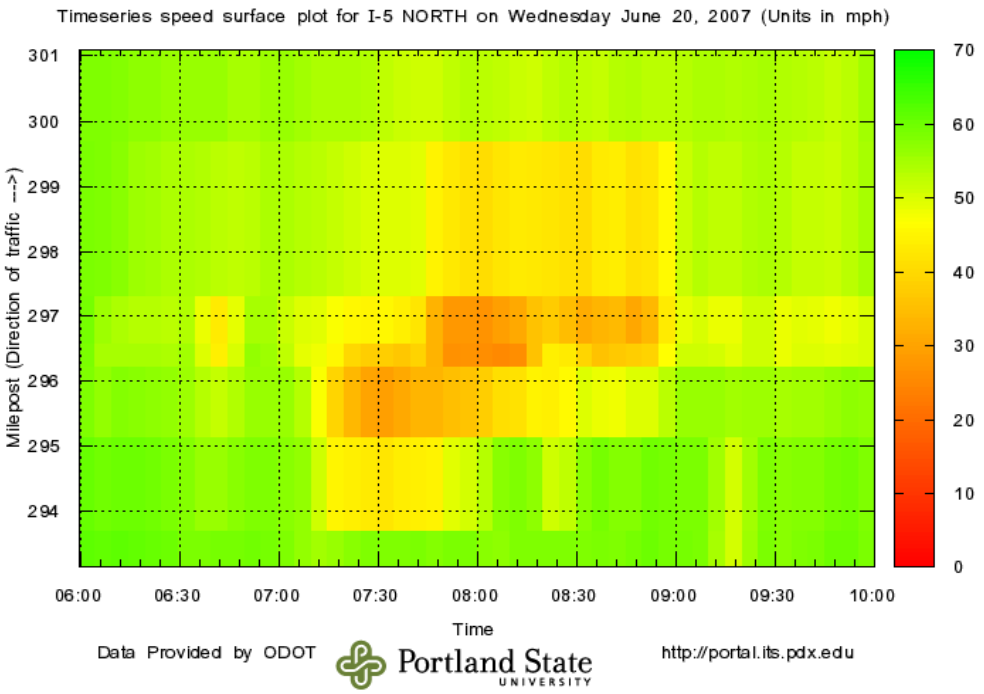
Timeseries speed surface plot for I-5 NORTH on Wednesday June 20, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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300
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294
06:00
06:30
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Time
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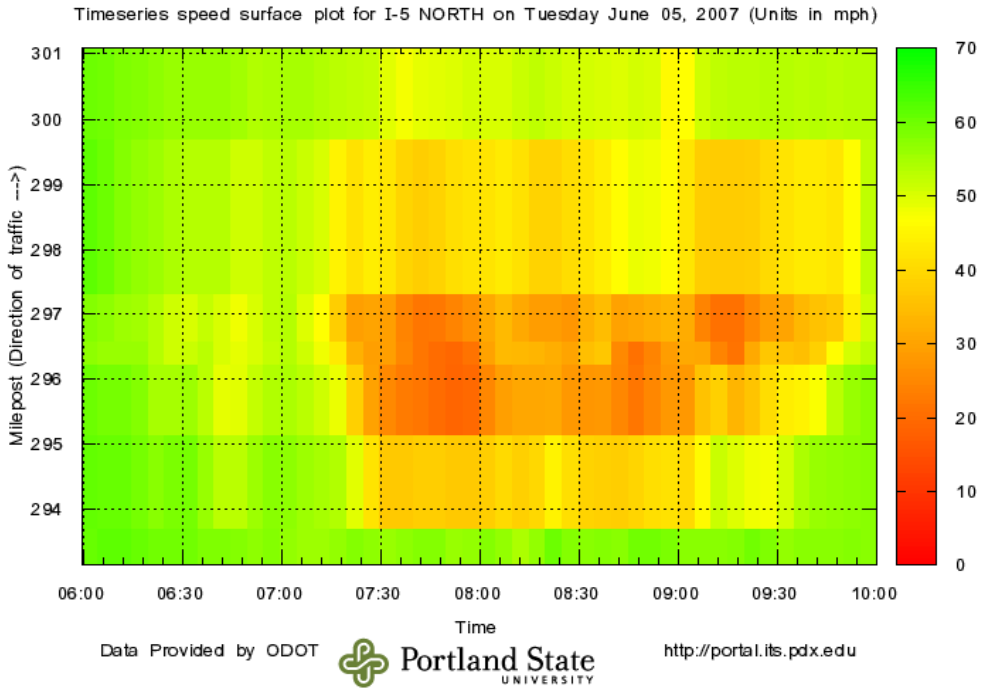
Timeseries speed surface plot for I-5 NORTH on Tuesday June 05, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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298
297
296
295
294
06:00
06:30
07:00
07:30
08:00
08:30
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Time
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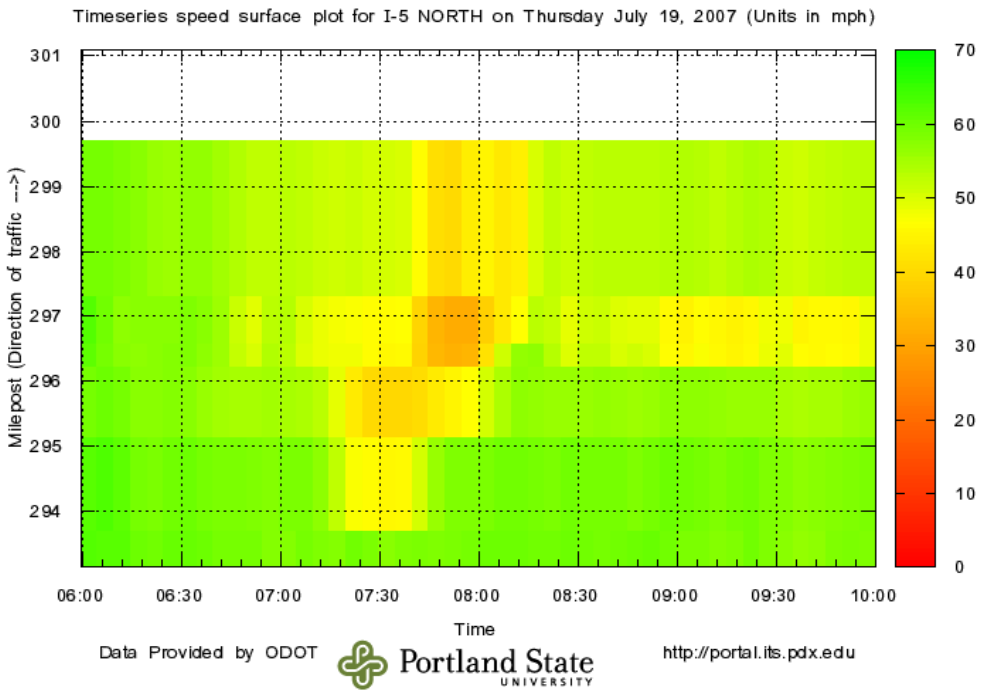
Timeseries speed surface plot for I-5 NORTH on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
301
300
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298
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294
06:00
06:30
07:00
07:30
08:00
08:30
09:00
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Time
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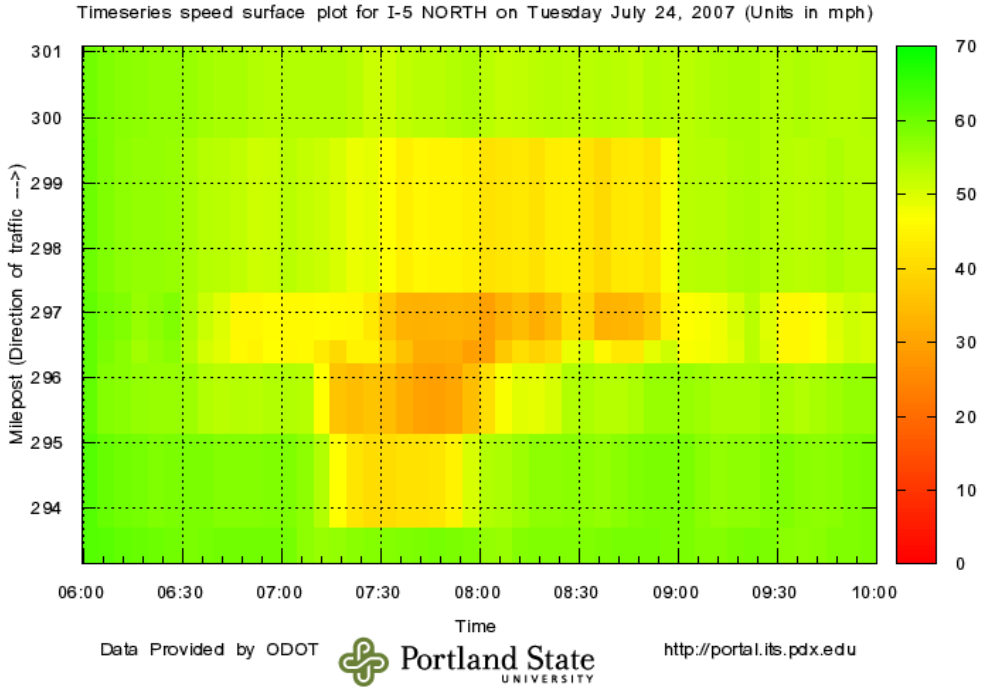
Timeseries speed surface plot for I-5 NORTH on Tuesday July 24, 2007 (Units in mph)
Milepost (Direction of traffic --->)
301
300
299
298
297
296
295
294
06:00
06:30
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Data Provided by ODOT
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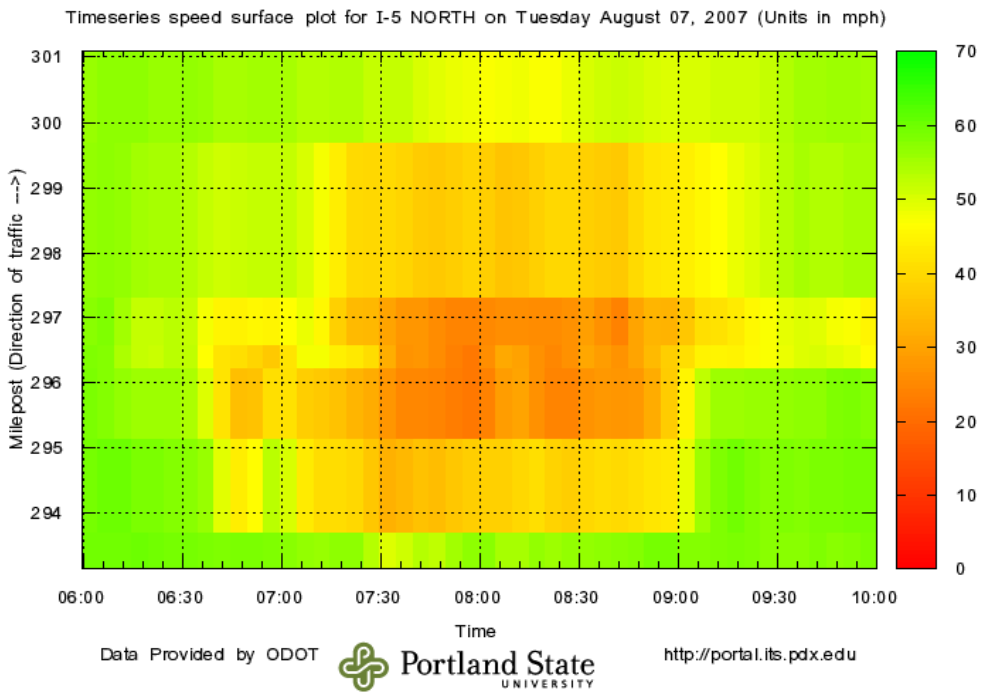
Timeseries speed surface plot for I-5 NORTH on Tuesday August 07, 2007 (Units in mph)
Milepost (Direction of traffic --->)
301
300
299
298
297
296
295
294
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
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UNIVERSITY
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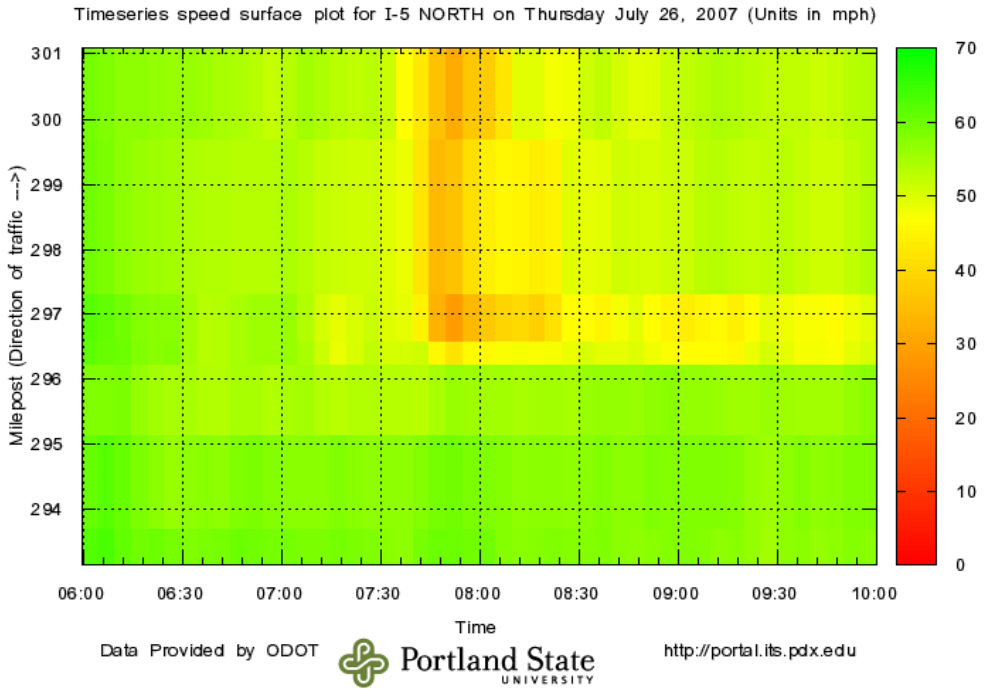
Timeseries speed surface plot for I-5 NORTH on Thursday July 26, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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300
299
298
297
296
295
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06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
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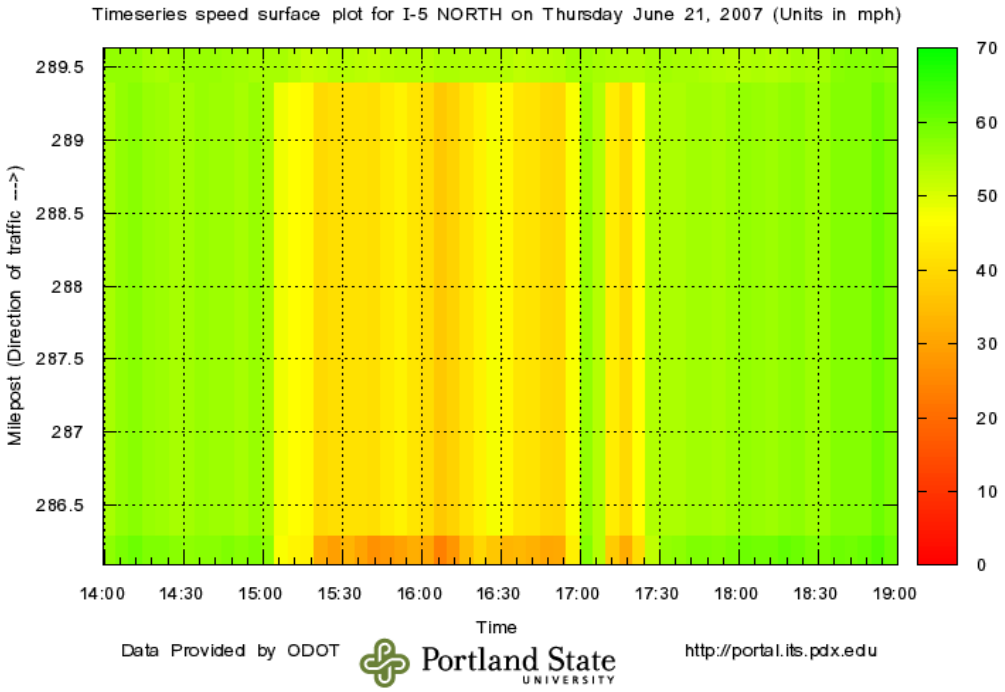
I-5 Northbound
PM Peak Hour Speed Plots

DAVID EVANS
AND ASSOCIATES INC.


Timeseries speed surface plot for I-5 NORTH on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
289.5
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288.5
288
287.5
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286.5
14:00
14:30
15:00
15:30
16:00
16:30
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17:30
18:00
18:30
19:00
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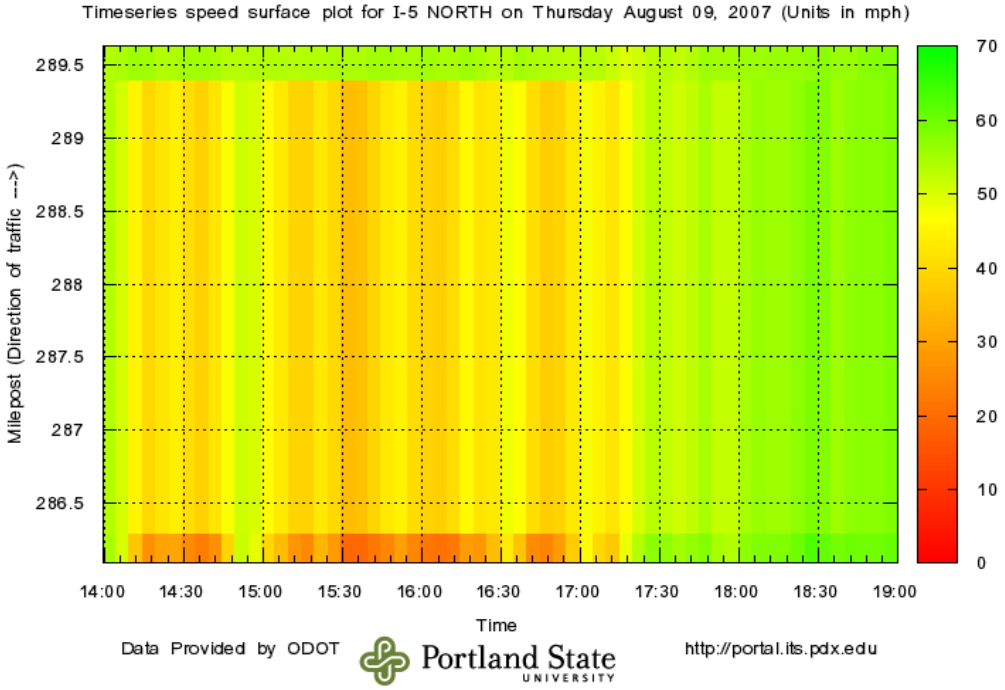
Timeseries speed surface plot for I-5 NORTH on Thursday August 09, 2007 (Units in mph)
Milepost (Direction of traffic --->)
289.5
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288.5
288
287.5
287
286.5
14:00
14:30
15:00
15:30
16:00
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18:30
19:00
Time
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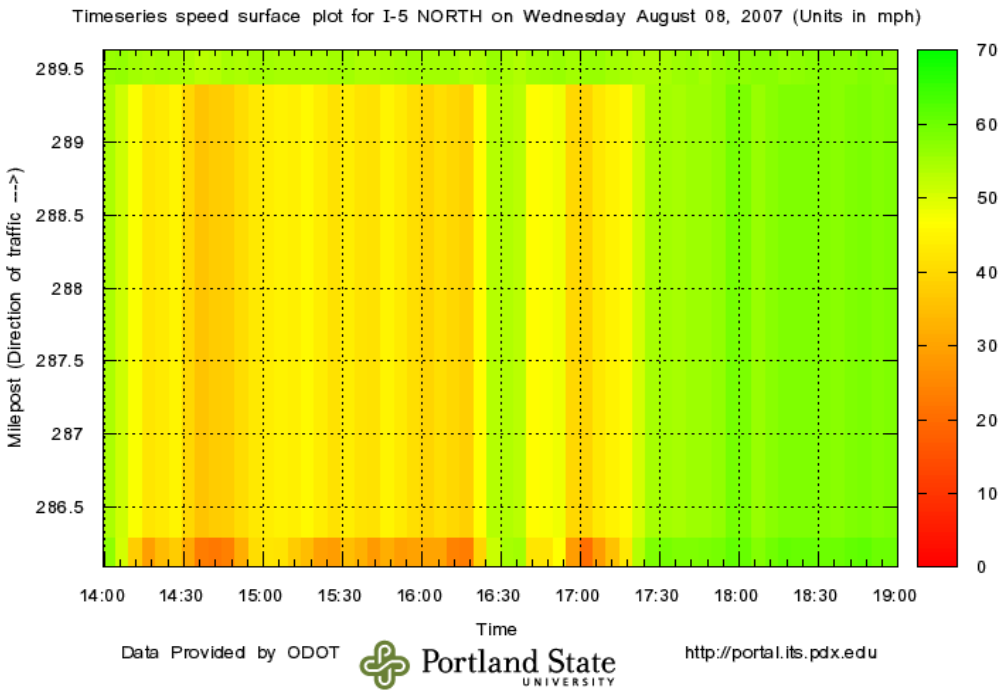
Timeseries speed surface plot for I-5 NORTH on Wednesday August 08, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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288.5
288
287.5
287
286.5
14:00
14:30
15:00
15:30
16:00
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Time
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Portland State UNIVERSITY
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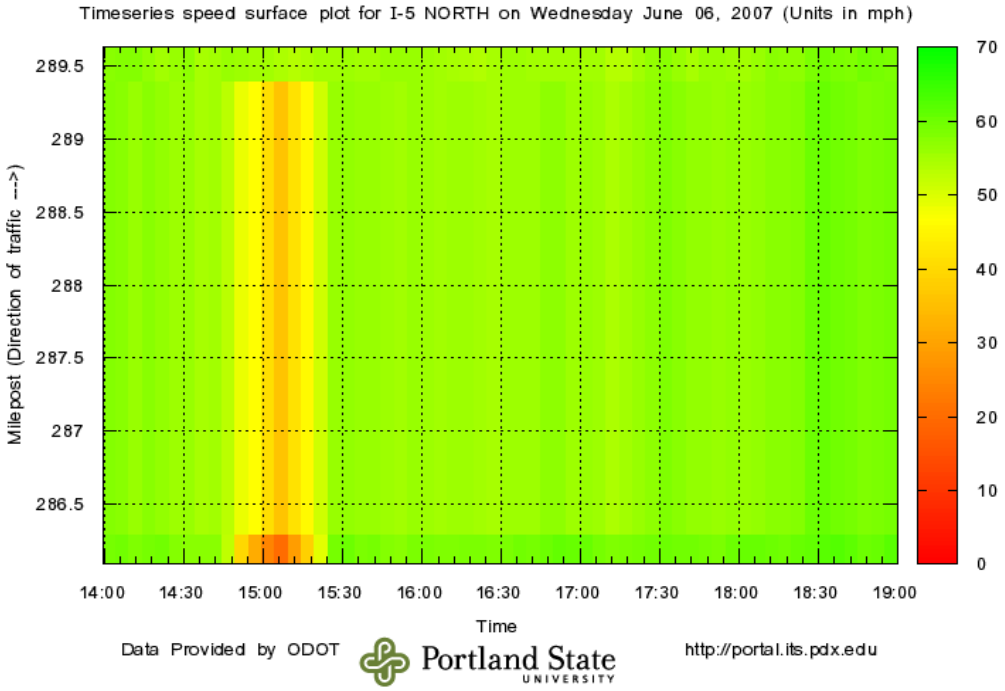
Timeseries speed surface plot for I-5 NORTH on Wednesday June 06, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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288.5
288
287.5
287
286.5
14:00
14:30
15:00
15:30
16:00
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18:00
18:30
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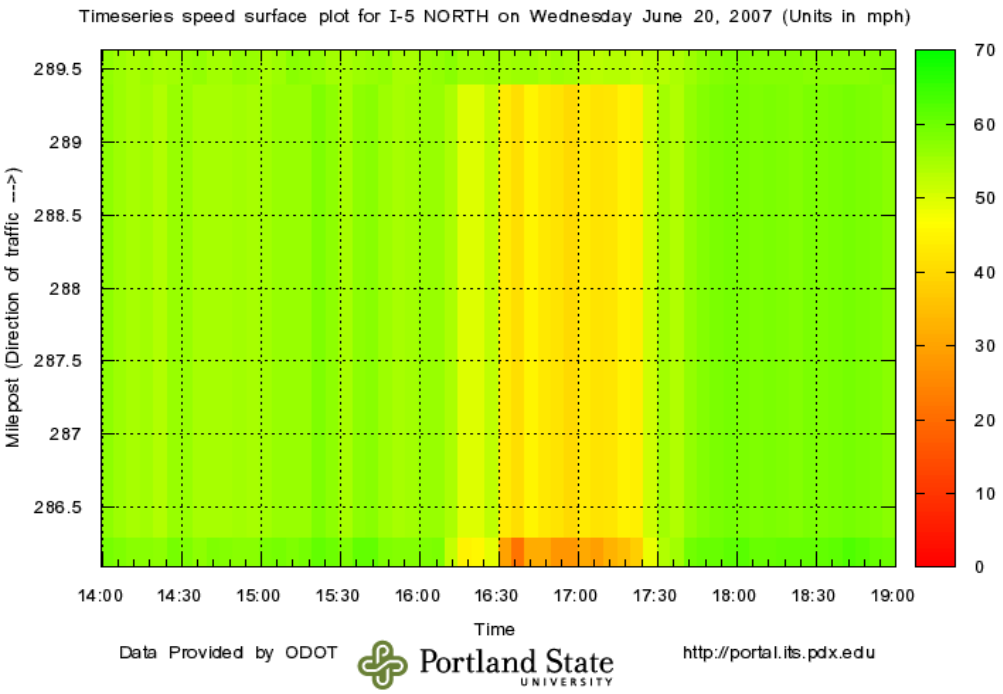
Timeseries speed surface plot for I-5 NORTH on Wednesday June 20, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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288.5
288
287.5
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286.5
14:00
14:30
15:00
15:30
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18:30
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Time
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Portland State UNIVERSITY
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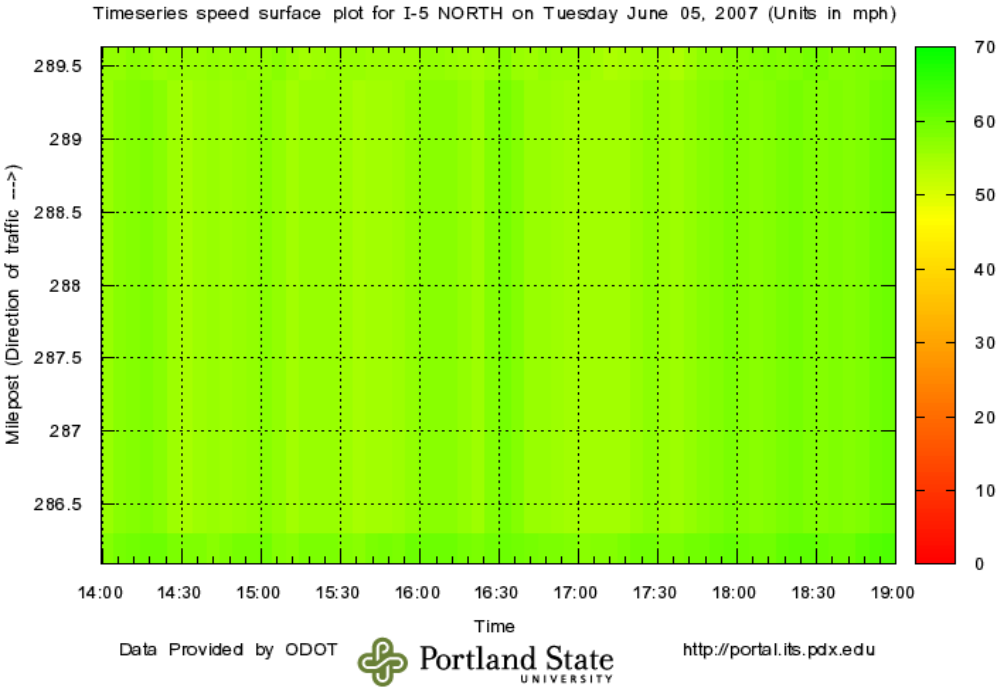
Timeseries speed surface plot for I-5 NORTH on Tuesday June 05, 2007 (Units in mph)
Milepost (Direction of traffic --->)
289.5
289
288.5
288
287.5
287
286.5
14:00
14:30
15:00
15:30
16:00
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18:30
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Time
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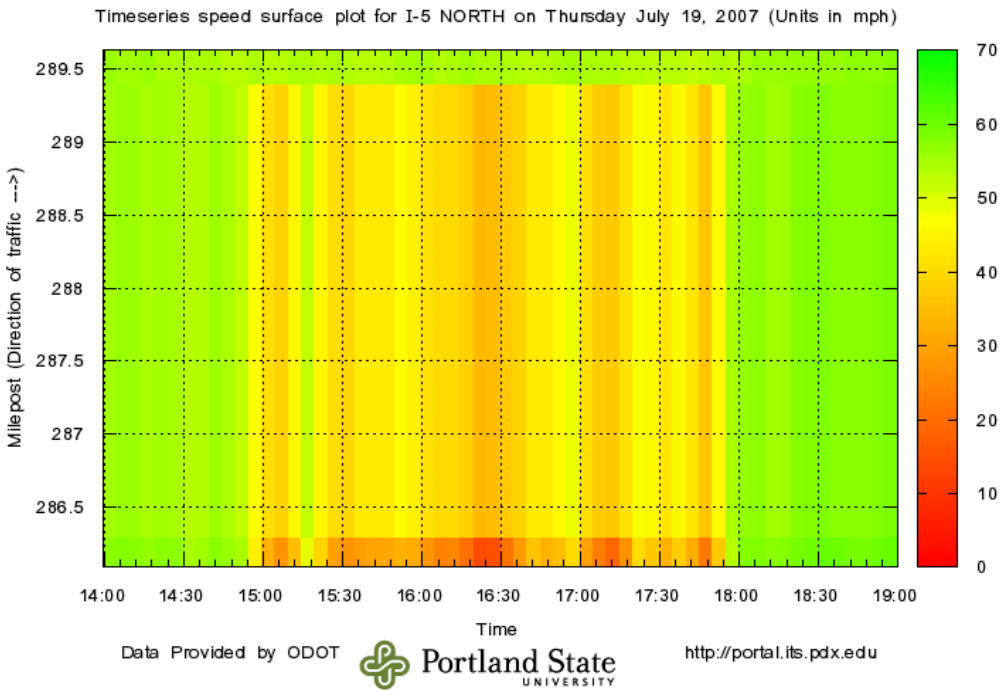
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 NORTH on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
289.5
289
288.5
288
287.5
287
286.5
14:00
14:30
15:00
15:30
16:00
16:30
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17:30
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19:00
Time
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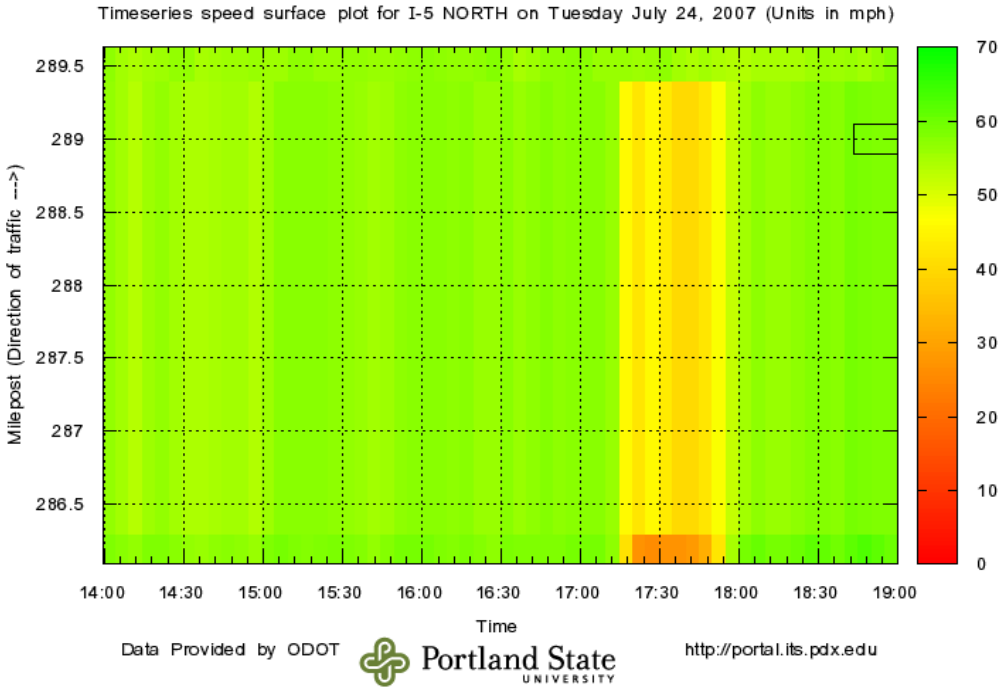
Timeseries speed surface plot for I-5 NORTH on Tuesday July 24, 2007 (Units in mph)
Milepost (Direction of traffic --->)
289.5
289
288.5
288
287.5
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286.5
14:00
14:30
15:00
15:30
16:00
16:30
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Time
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Portland State
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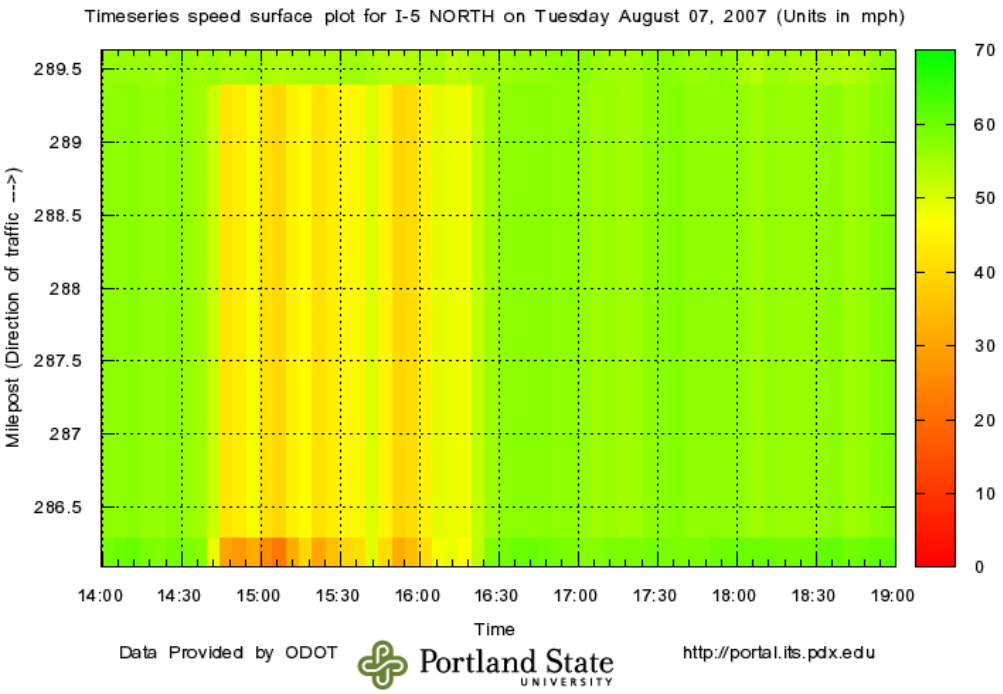

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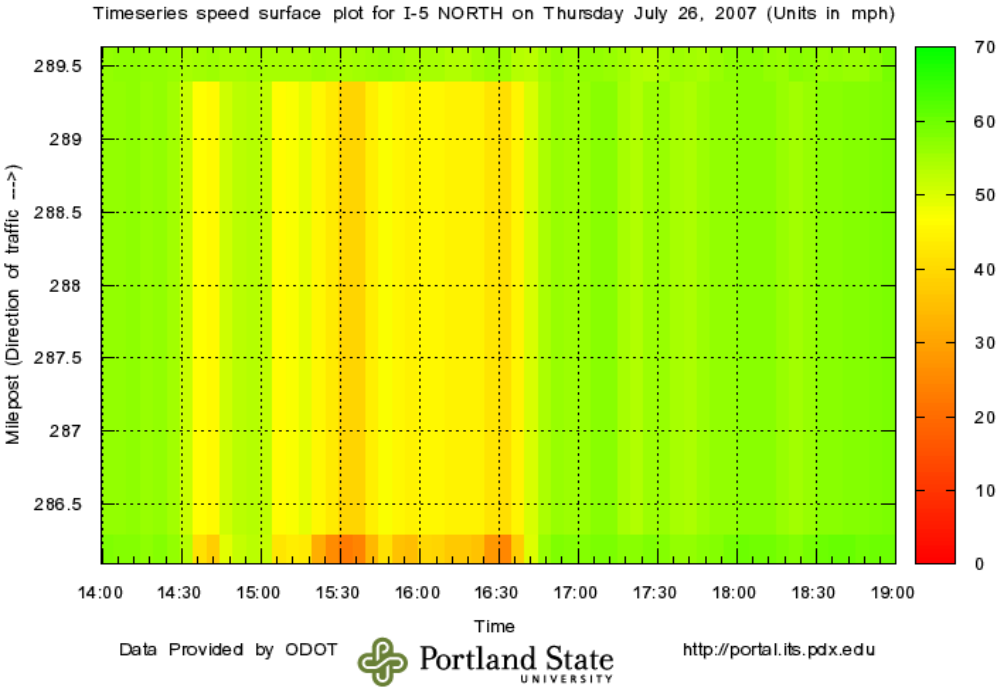

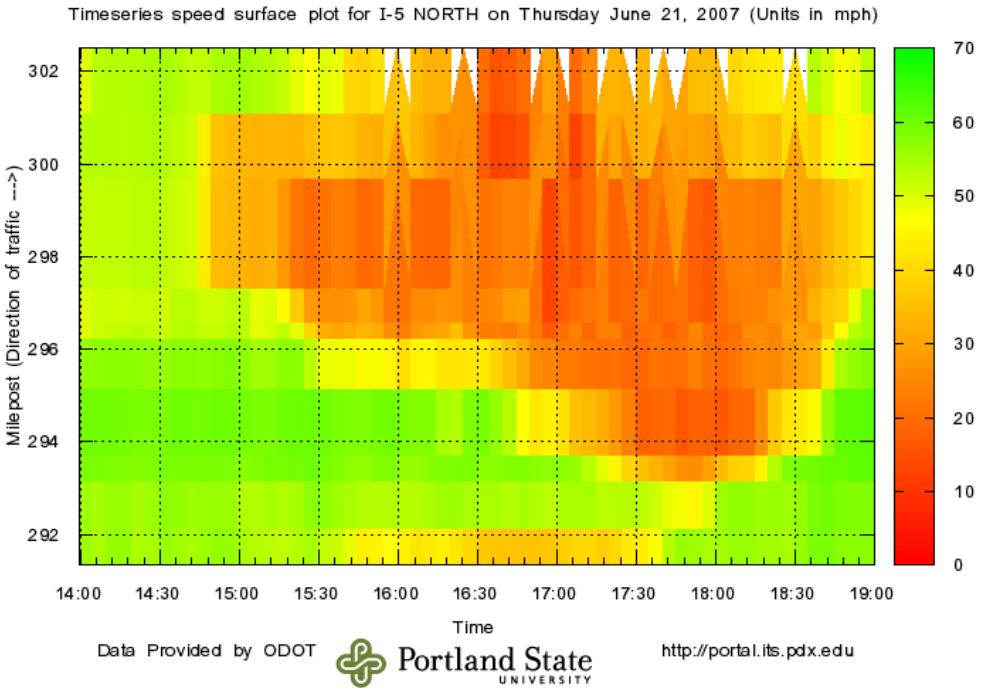
Timeseries speed surface plot for I-5 NORTH on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
302
300
298
296
294
292
14:00
14:30
15:00
15:30
16:00
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17:00
17:30
18:00
18:30
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Time
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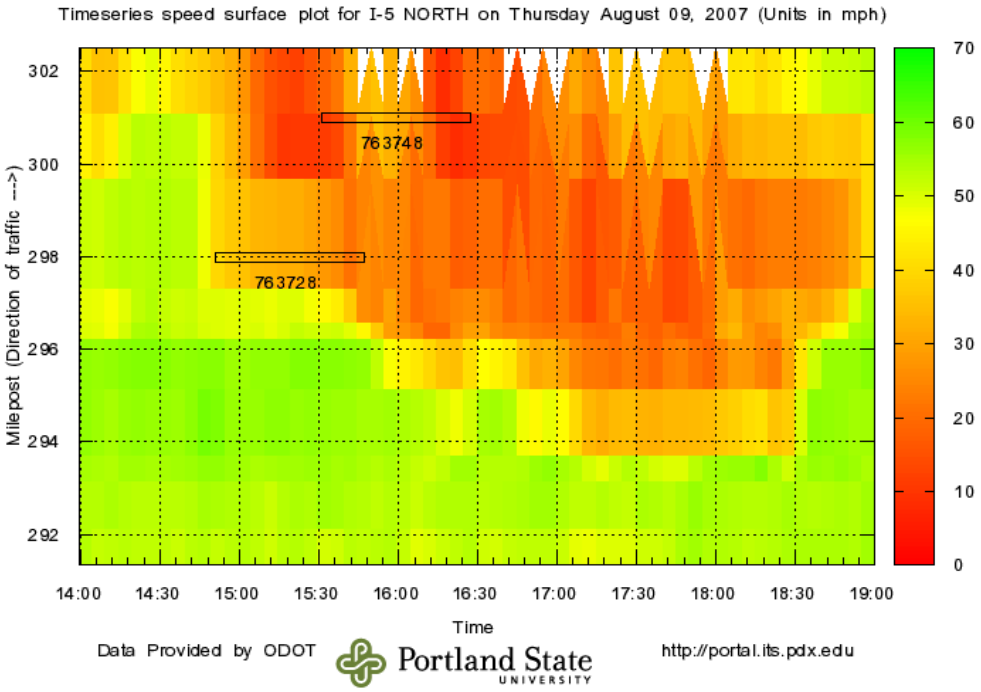
Timeseries speed surface plot for I-5 NORTH on Thursday August 09, 2007 (Units in mph)
Milepost (Direction of traffic --->)
302
300
298
296
294
292
763748
763728
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
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Time
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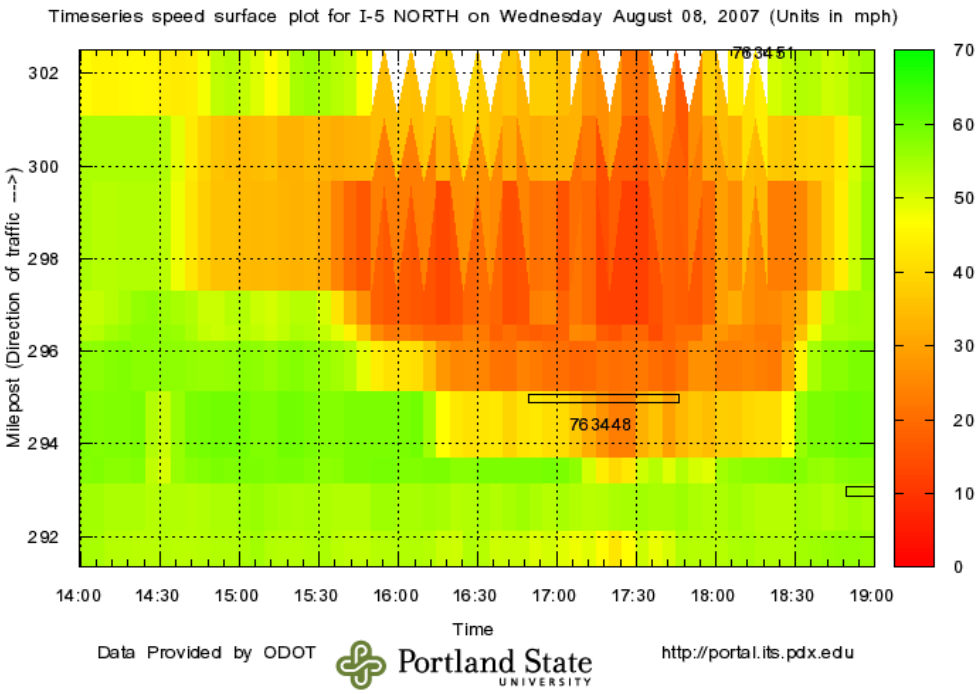
Timeseries speed surface plot for I-5 NORTH on Wednesday August 08, 2007 (Units in mph)
Milepost (Direction of traffic --->)
302
300
298
296
294
292
763451
763448
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
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Time
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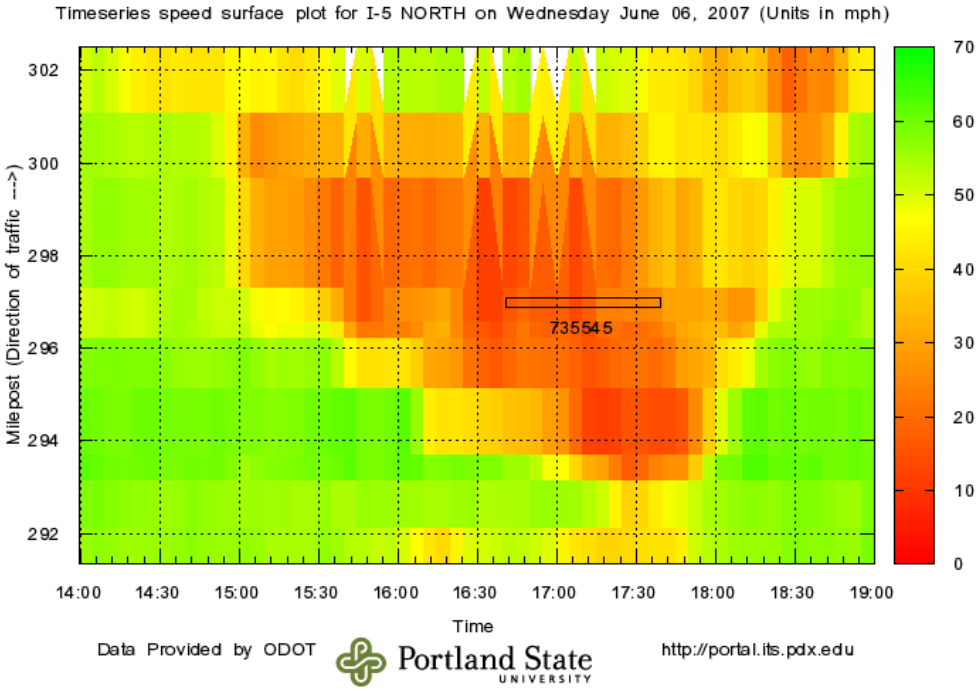
Timeseries speed surface plot for I-5 NORTH on Wednesday June 06, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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300
298
296
294
292
735545
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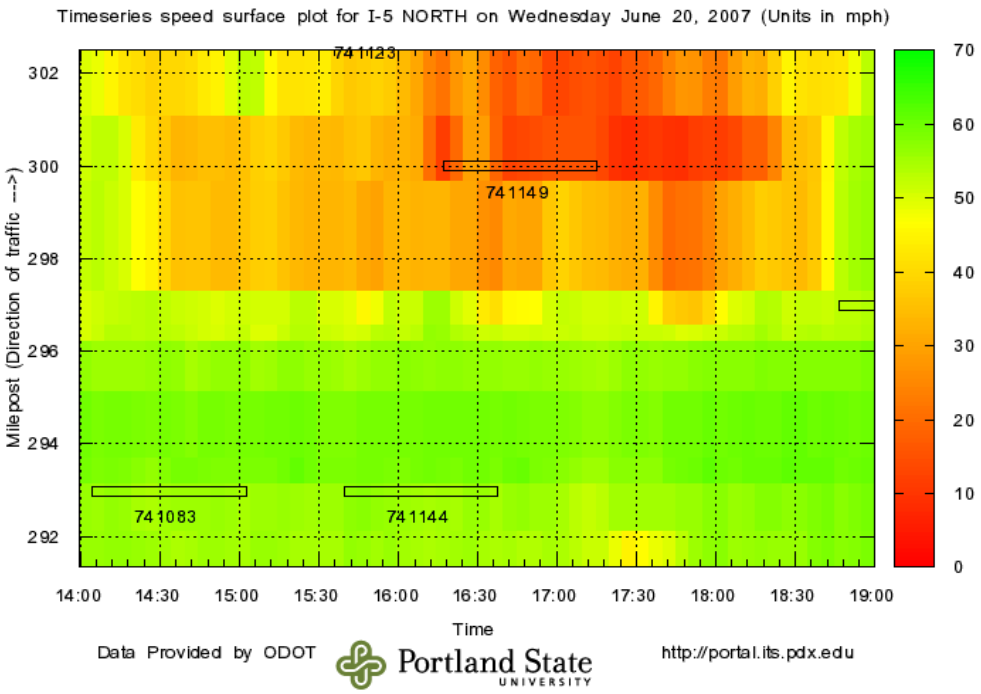
Timeseries speed surface plot for I-5 NORTH on Wednesday June 20, 2007 (Units in mph)
741123
741149
741083
741144
Milepost (Direction of traffic --->)
302
300
298
296
294
292
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
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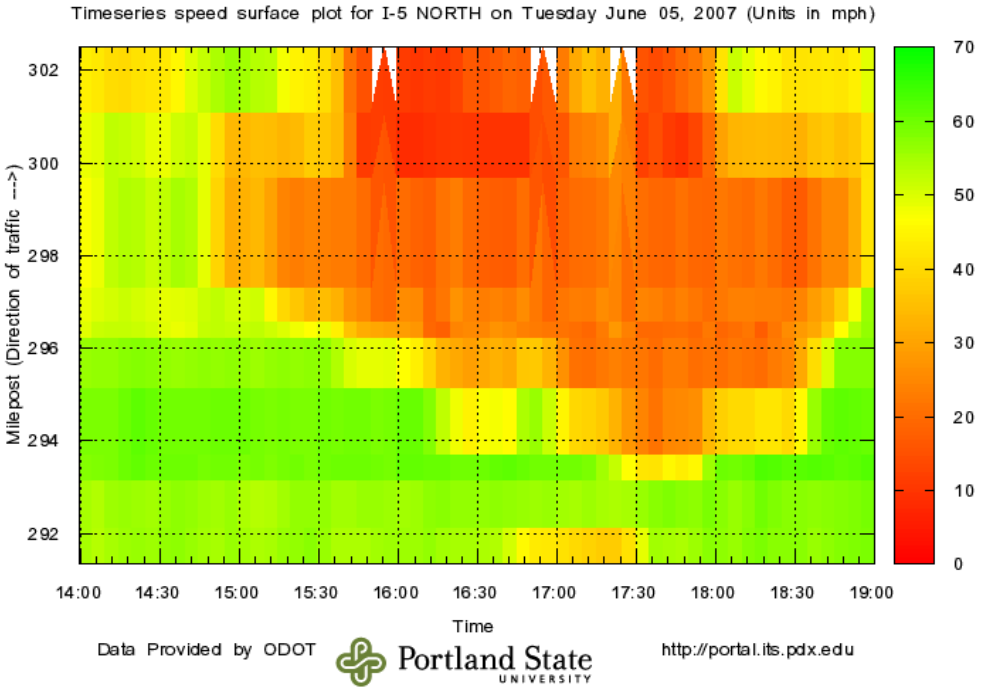
735064


Timeseries speed surface plot for I-5 NORTH on Tuesday June 05, 2007 (Units in mph)
Milepost (Direction of traffic --->)
302
300
298
296
294
292
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
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Time
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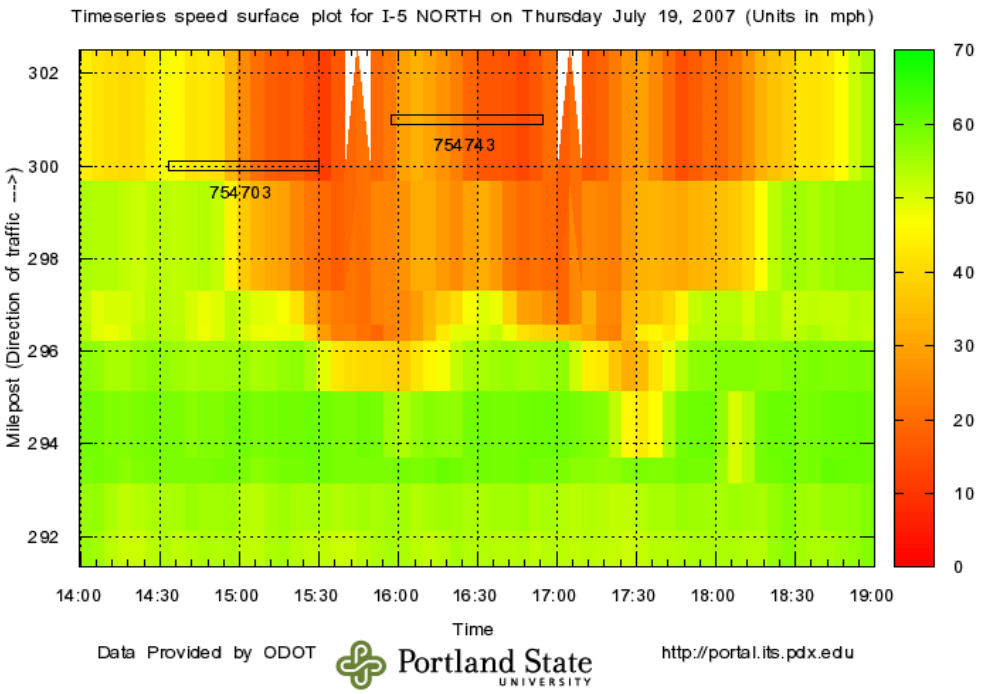
Timeseries speed surface plot for I-5 NORTH on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
302
300
298
296
294
292
754743
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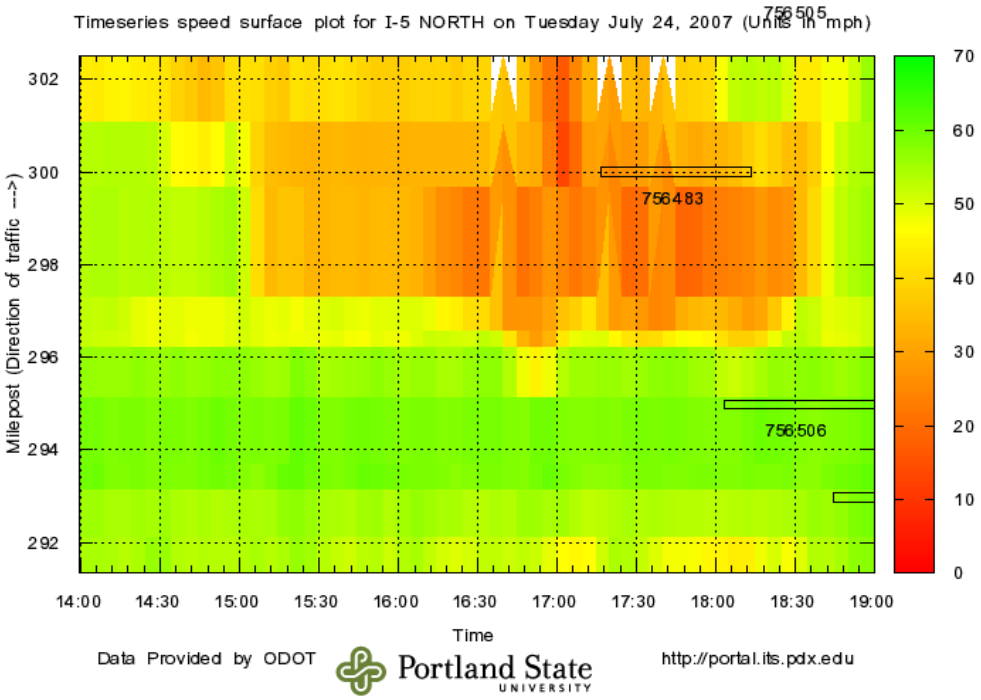
Timeseries speed surface plot for I-5 NORTH on Tuesday July 24, 2007 (Units in mph)
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Milepost (Direction of traffic --->)
302
300
298
296
294
292
756483
756506
14:00
14:30
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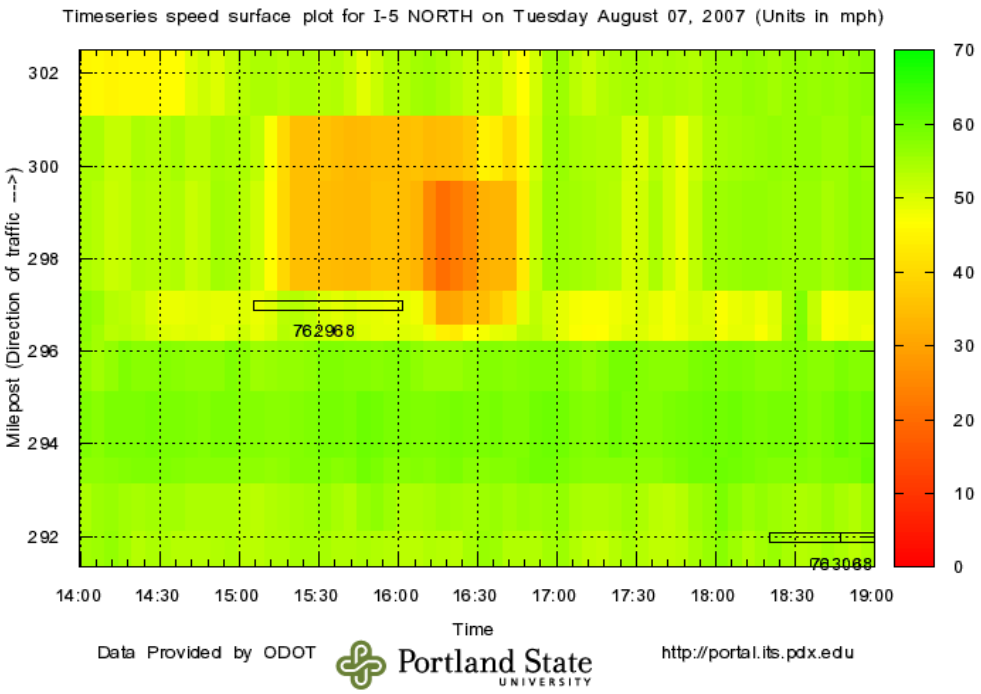
762990


Timeseries speed surface plot for I-5 NORTH on Tuesday August 07, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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298
296
294
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762968
763068
14:00
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Portland State UNIVERSITY
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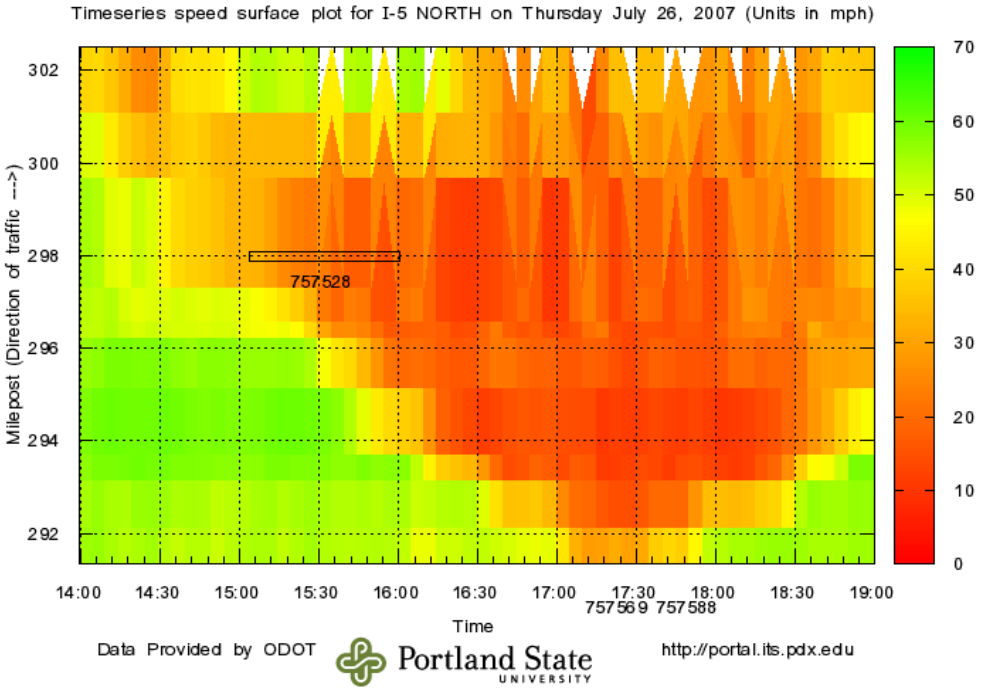
Timeseries speed surface plot for I-5 NORTH on Thursday July 26, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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300
298
296
294
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757528
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16:30
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19:00
757569 757588
Time
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50
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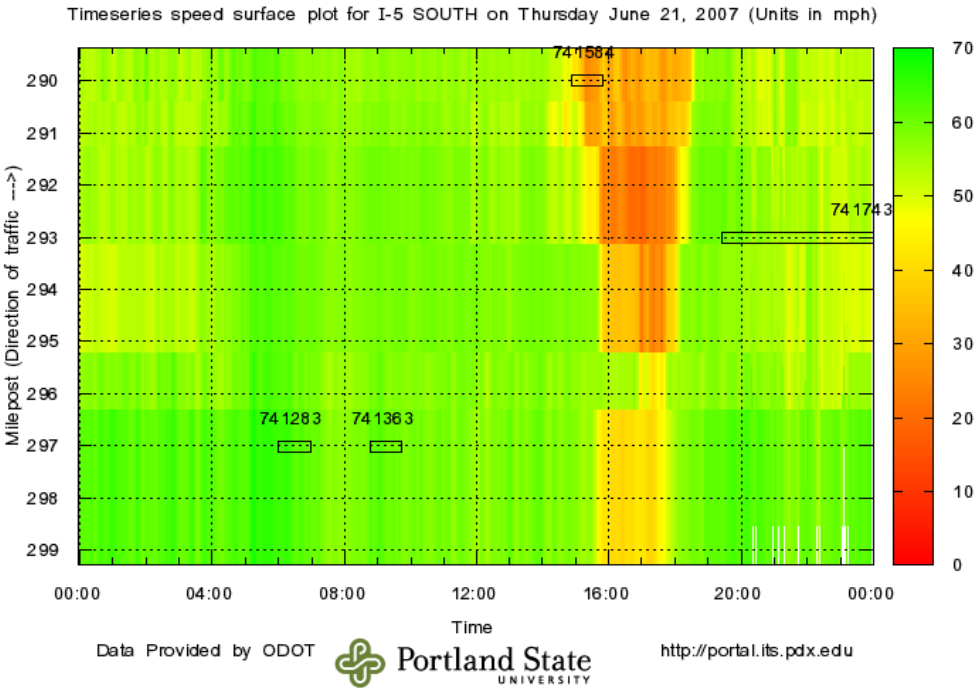
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

I-5 Southbound
24 Hour Speed Plots

DAVID EVANS
AND ASSOCIATES INC.


Timeseries speed surface plot for I-5 SOUTH on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
296
297
298
299
741584
741743
741283
741363
00:00
04:00
08:00
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20:00
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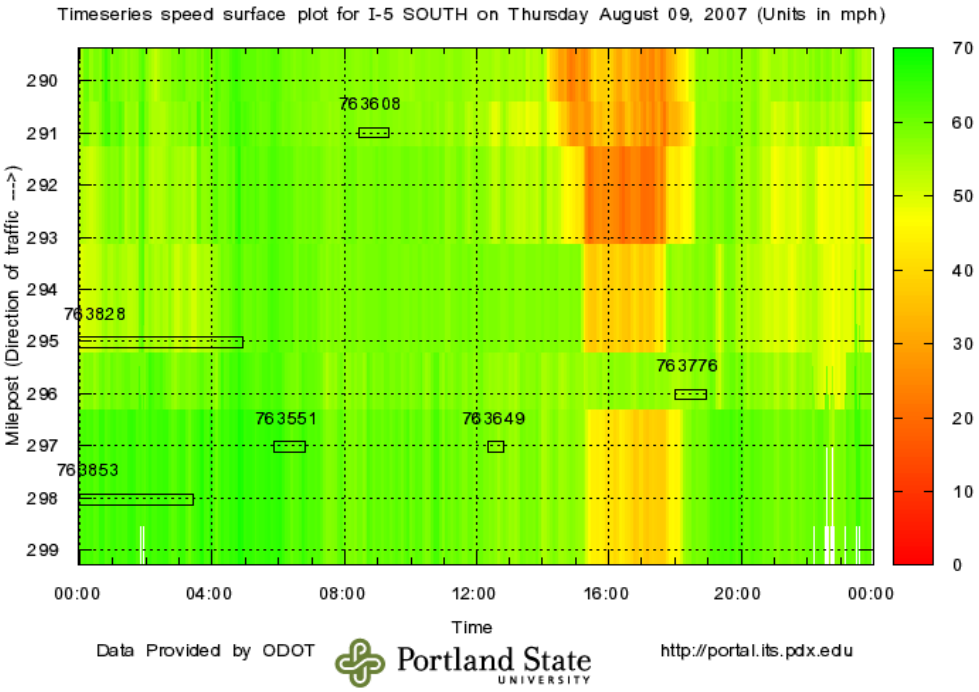
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Thursday August 09, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
296
297
298
299
763608
763828
763776
763551
763649
763853
00:00
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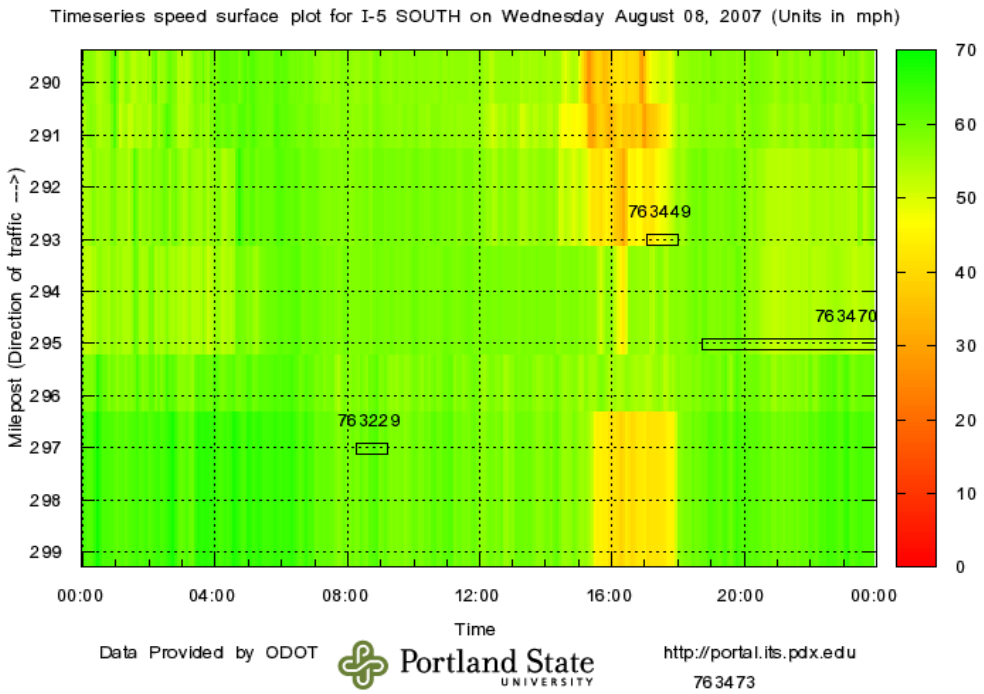
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Wednesday August 08, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
296
297
298
299
763449
763470
763229
00:00
04:00
08:00
12:00
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Portland State UNIVERSITY
http://portal.its.pdx.edu
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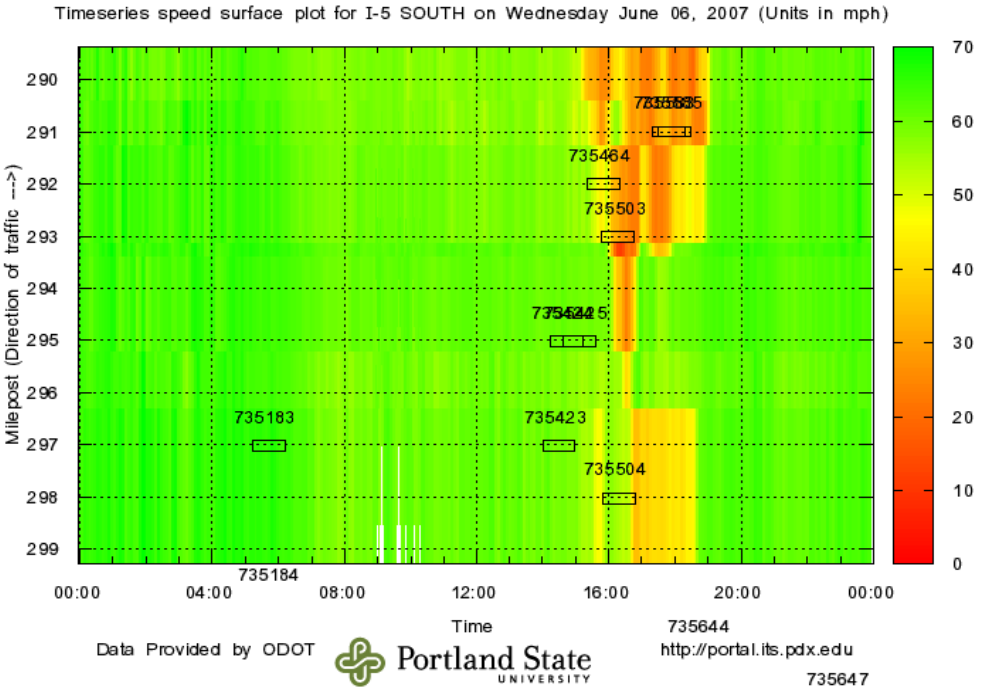
Timeseries speed surface plot for I-5 SOUTH on Wednesday June 06, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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292
293
294
295
296
297
298
299
735464
735503
735183
735423
735504
735184
735644
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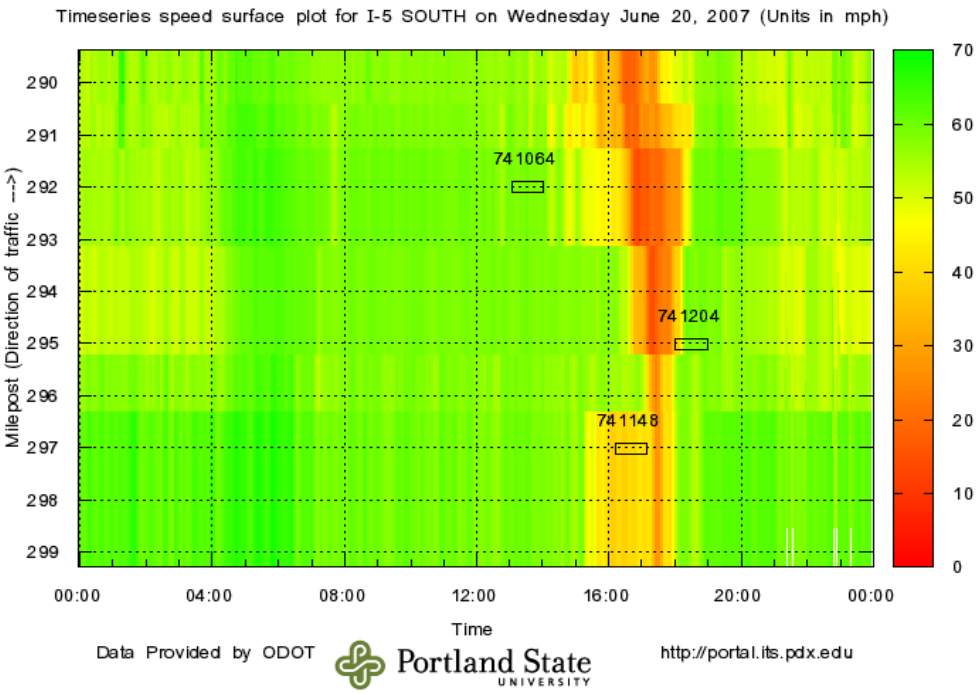
Portland State UNIVERSITY
http://portal.its.pdx.edu
735647


Timeseries speed surface plot for I-5 SOUTH on Wednesday June 20, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
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297
298
299
741064
741204
741148
00:00
04:00
08:00
12:00
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20:00
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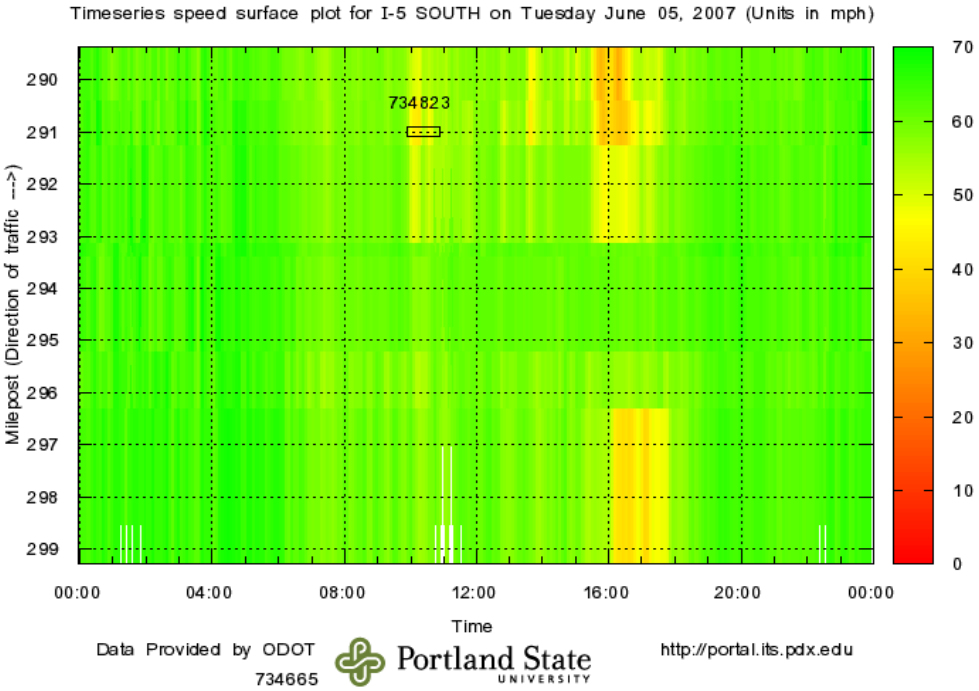
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Tuesday June 05, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
296
297
298
299
734823
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
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50
40
30
20
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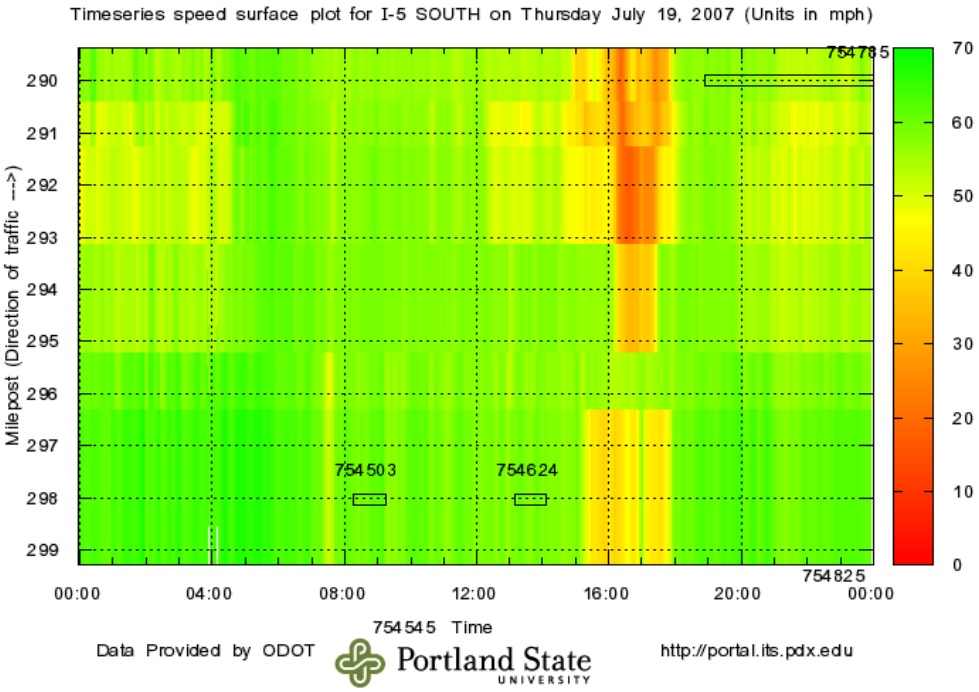
734665
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
296
297
298
299
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
754785
754503
754624
754825
754545
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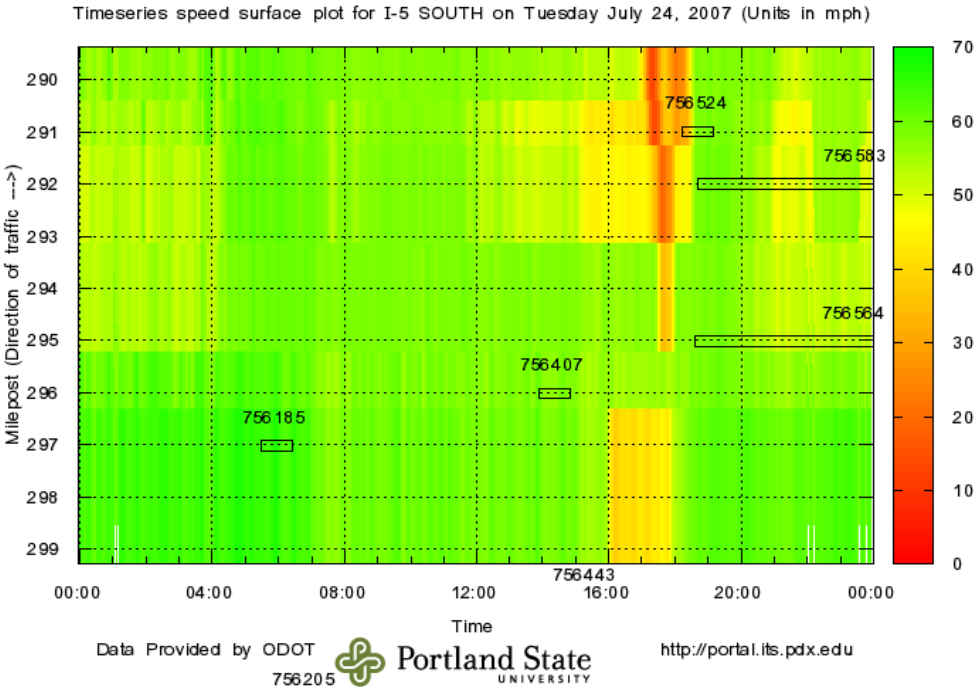
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Tuesday July 24, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
296
297
298
299
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
756524
756583
756564
756407
756185
756443
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20
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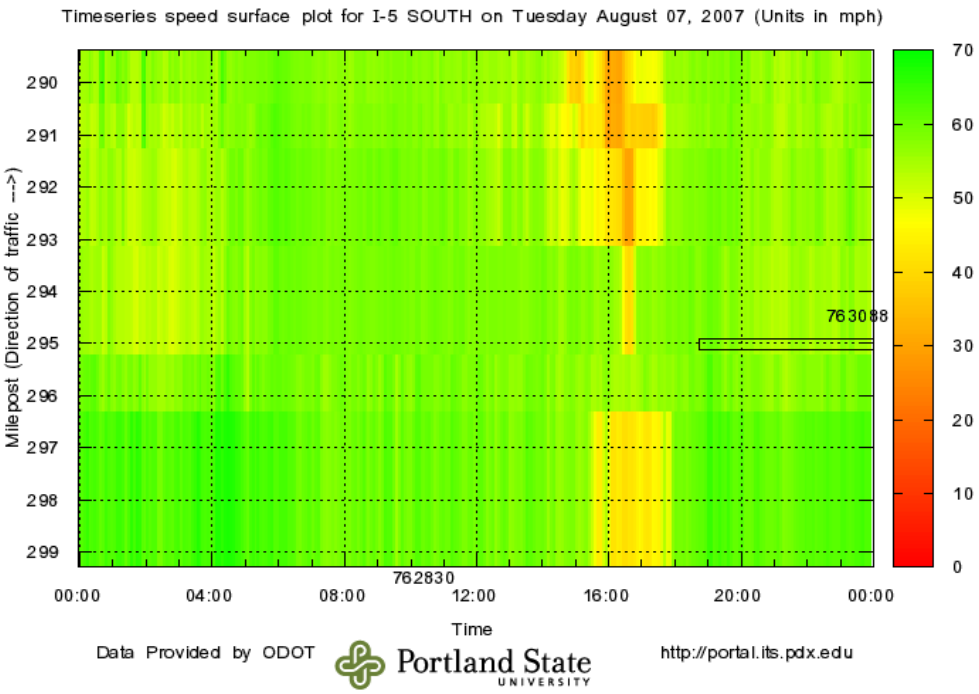
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Tuesday August 07, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
296
297
298
299
763088
762830
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
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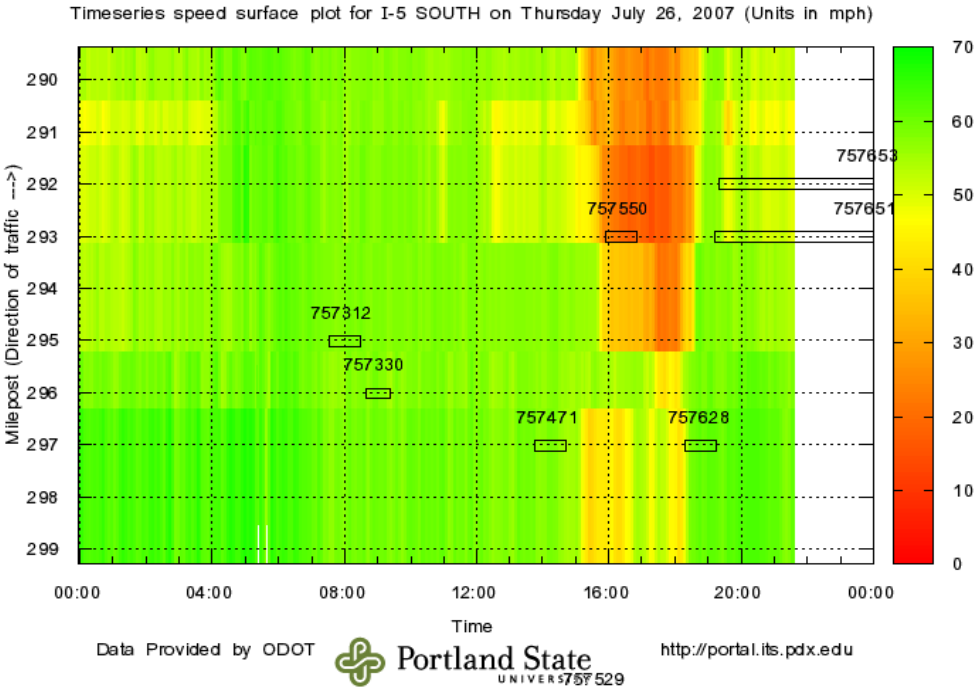
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Thursday July 26, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
296
297
298
299
757653
757550
757651
757312
757330
757471
757628
757529
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
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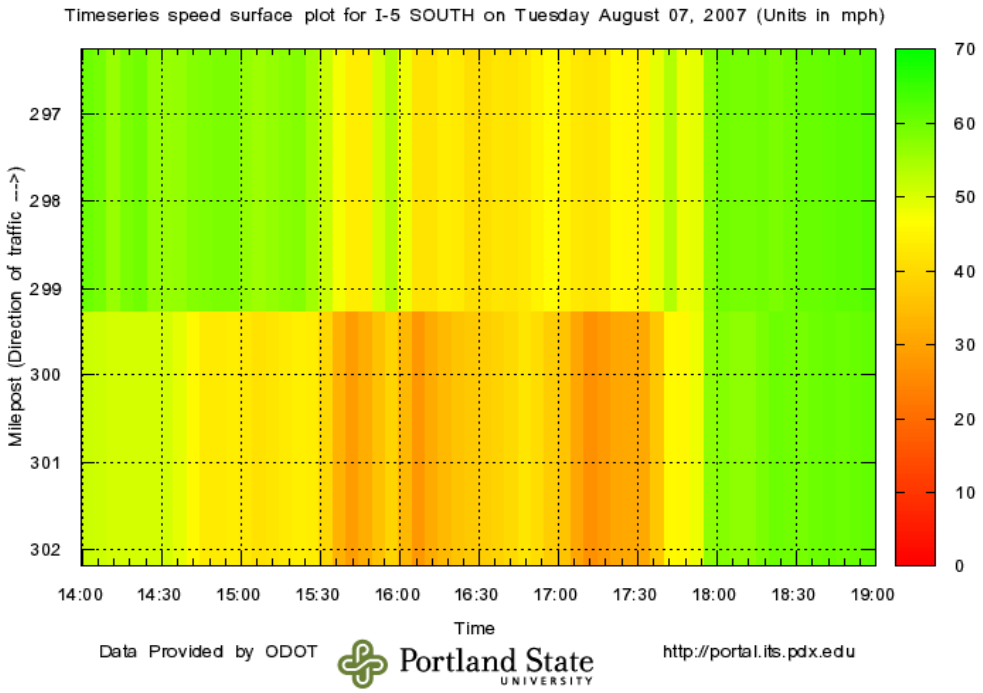
I-5 Southbound

PM Peak Hour Speed Plots

DAVID EVANS AND ASSOCIATES INC.


Timeseries speed surface plot for I-5 SOUTH on Tuesday August 07, 2007 (Units in mph)
Milepost (Direction of traffic --->)
297
298
299
300
301
302
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
Time
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Portland State UNIVERSITY
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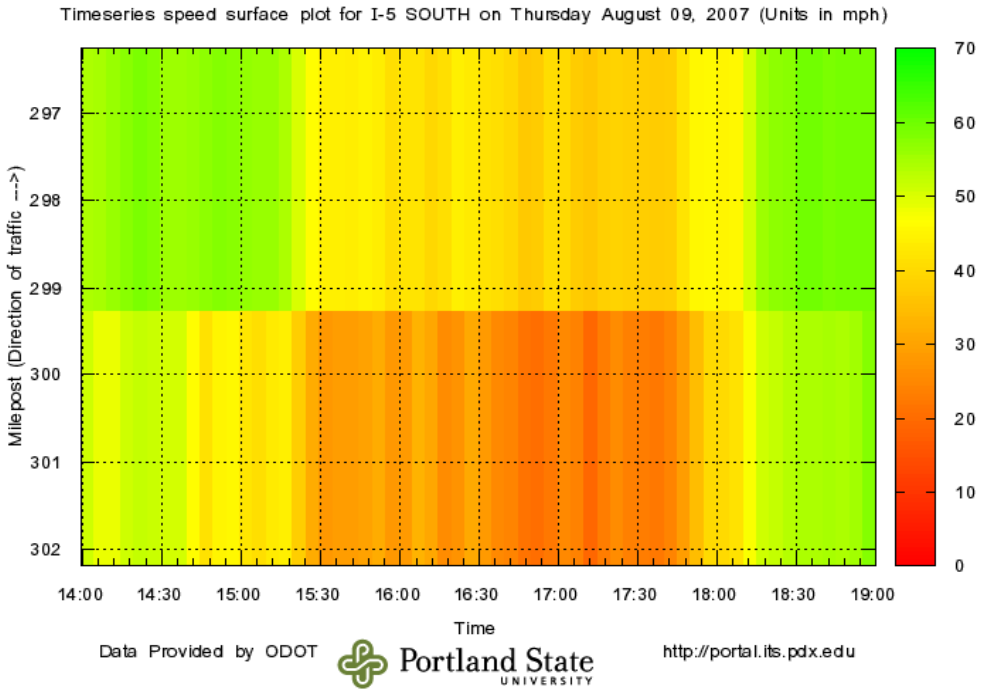
763776


Timeseries speed surface plot for I-5 SOUTH on Thursday August 09, 2007 (Units in mph)
Milepost (Direction of traffic --->)
297
298
299
300
301
302
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
Time
70
60
50
40
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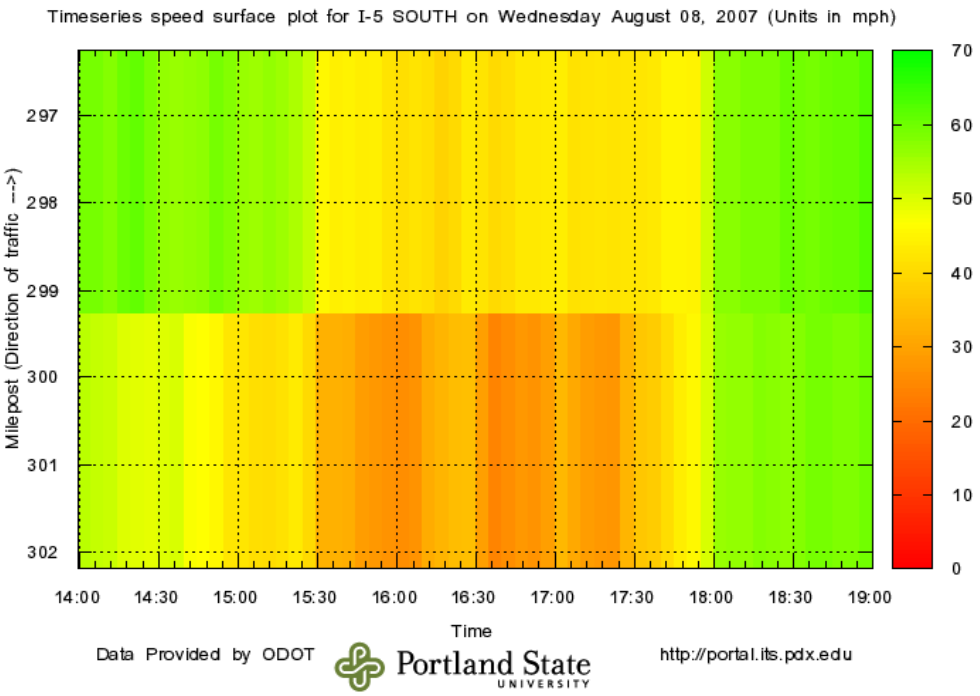
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Wednesday August 08, 2007 (Units in mph)
Milepost (Direction of traffic --->)
297
298
299
300
301
302
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
Time
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40
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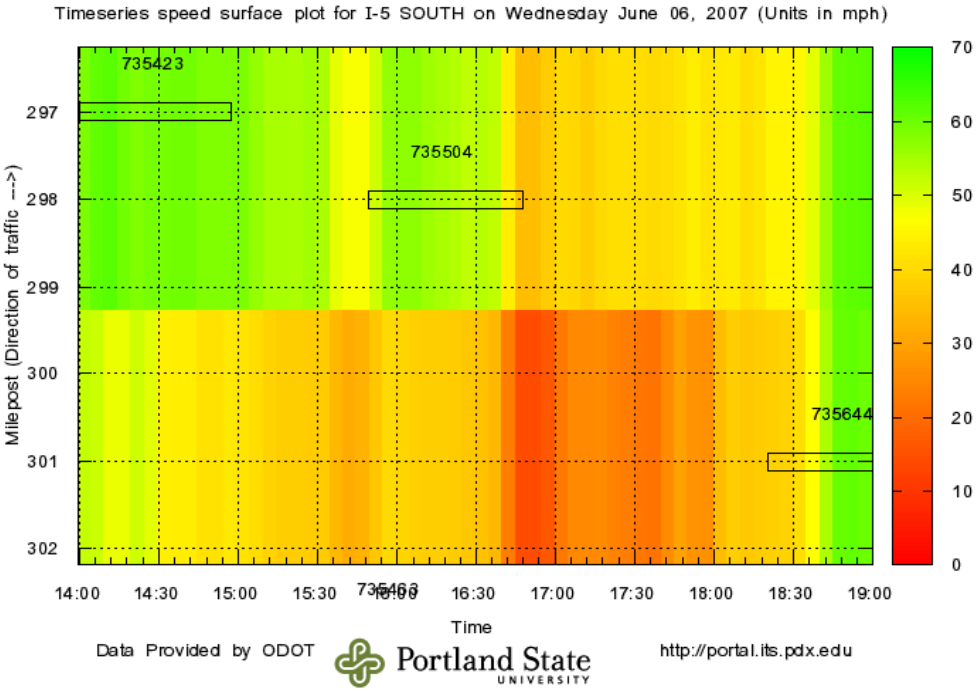
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Wednesday June 06, 2007 (Units in mph)
735423
735504
735644
735463
Milepost (Direction of traffic --->)
297
298
299
300
301
302
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
Time
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50
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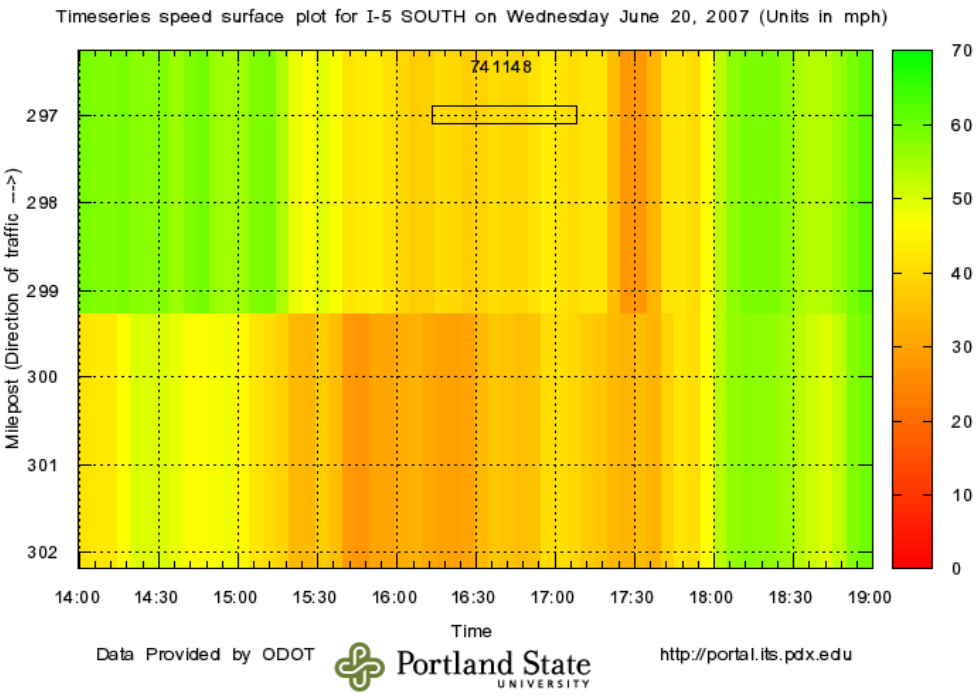
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Wednesday June 20, 2007 (Units in mph)
741148
Milepost (Direction of traffic --->)
297
298
299
300
301
302
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
Time
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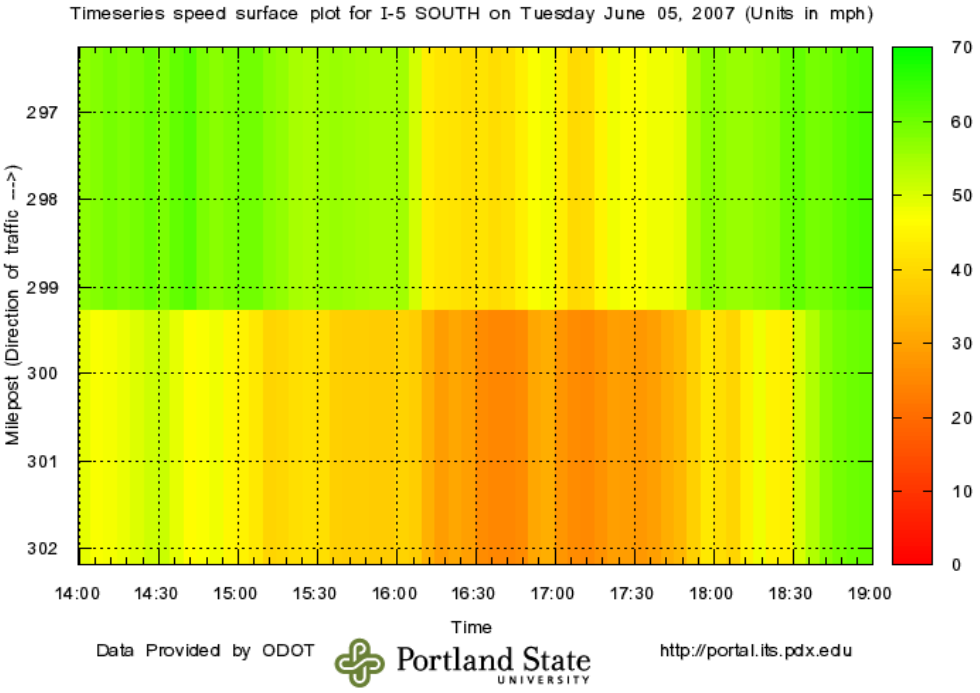
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Tuesday June 05, 2007 (Units in mph)
Milepost (Direction of traffic --->)
297
298
299
300
301
302
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
Time
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50
40
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20
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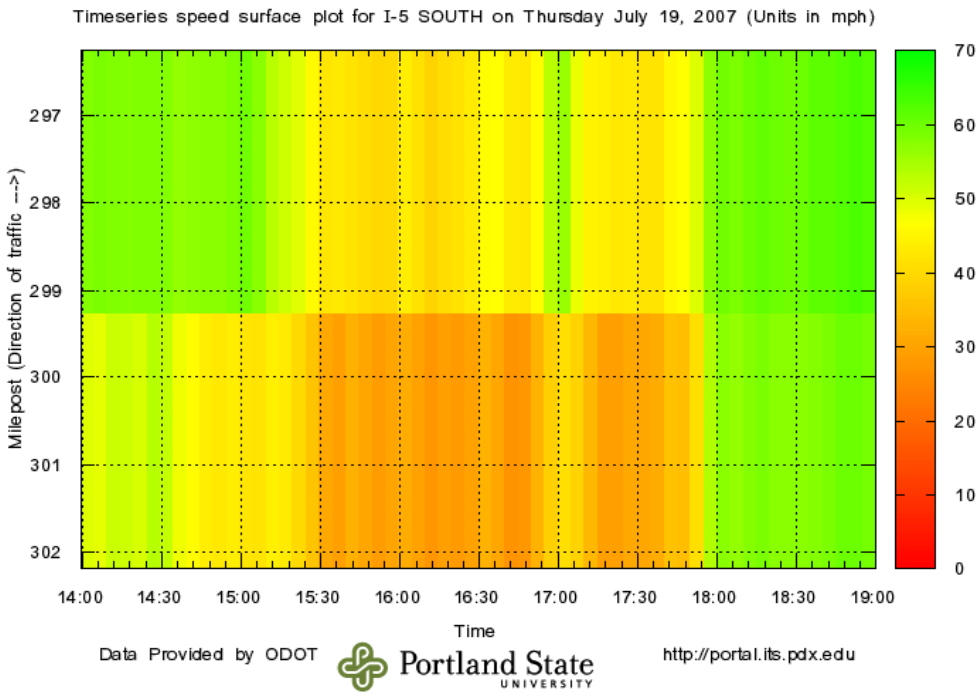
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
297
298
299
300
301
302
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
Time
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50
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20
10
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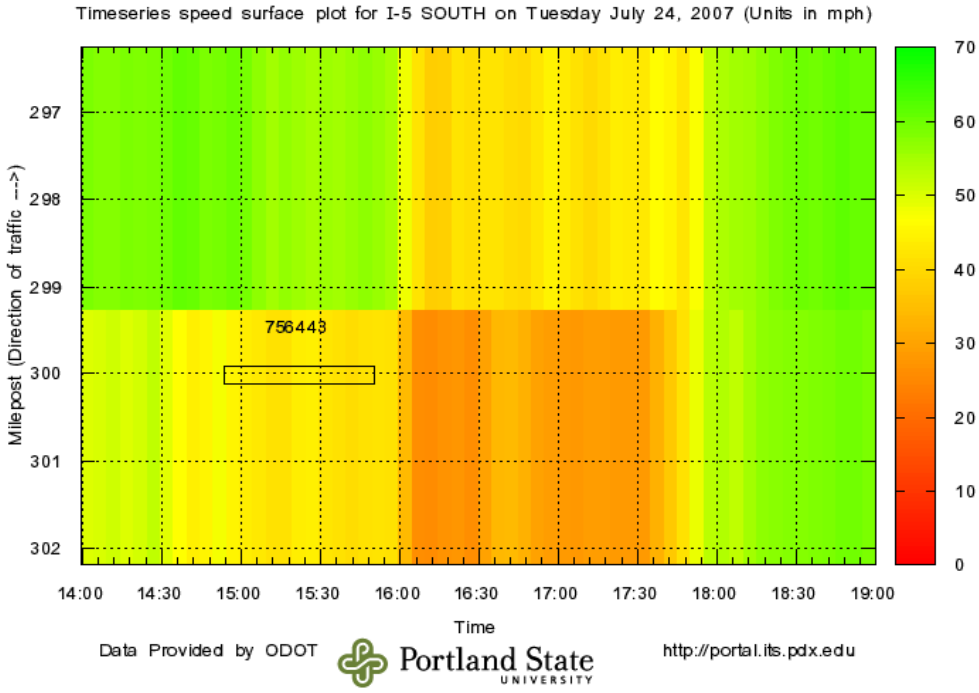
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Tuesday July 24, 2007 (Units in mph)
Milepost (Direction of traffic --->)
297
298
299
300
301
302
756443
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
Time
70
60
50
40
30
20
10
0
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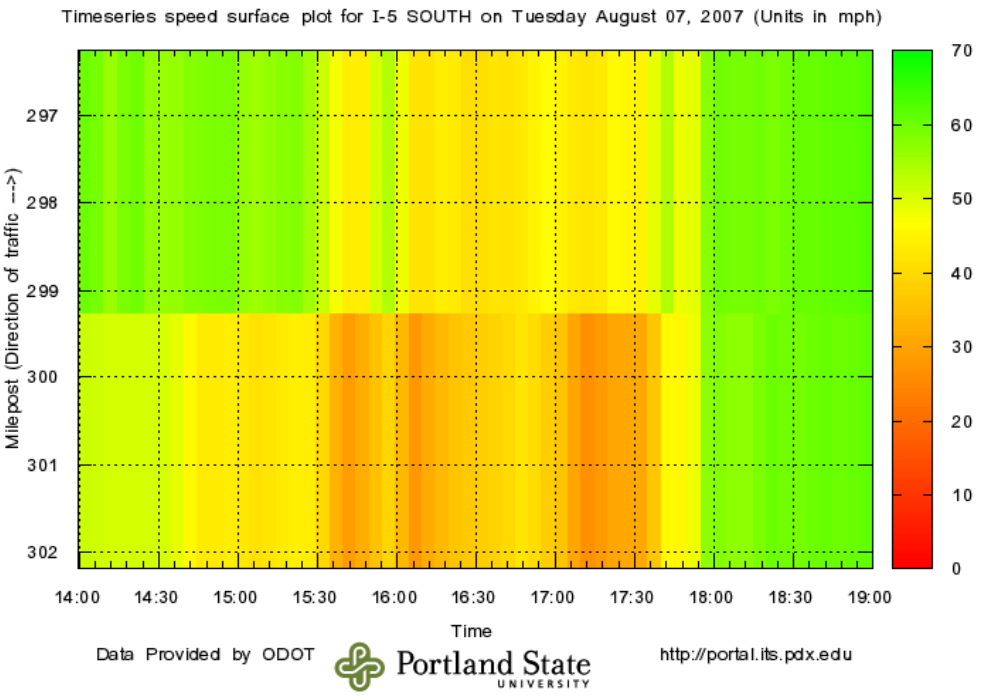
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Tuesday August 07, 2007 (Units in mph)
Milepost (Direction of traffic --->)
297
298
299
300
301
302
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
Time
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30
20
10
0
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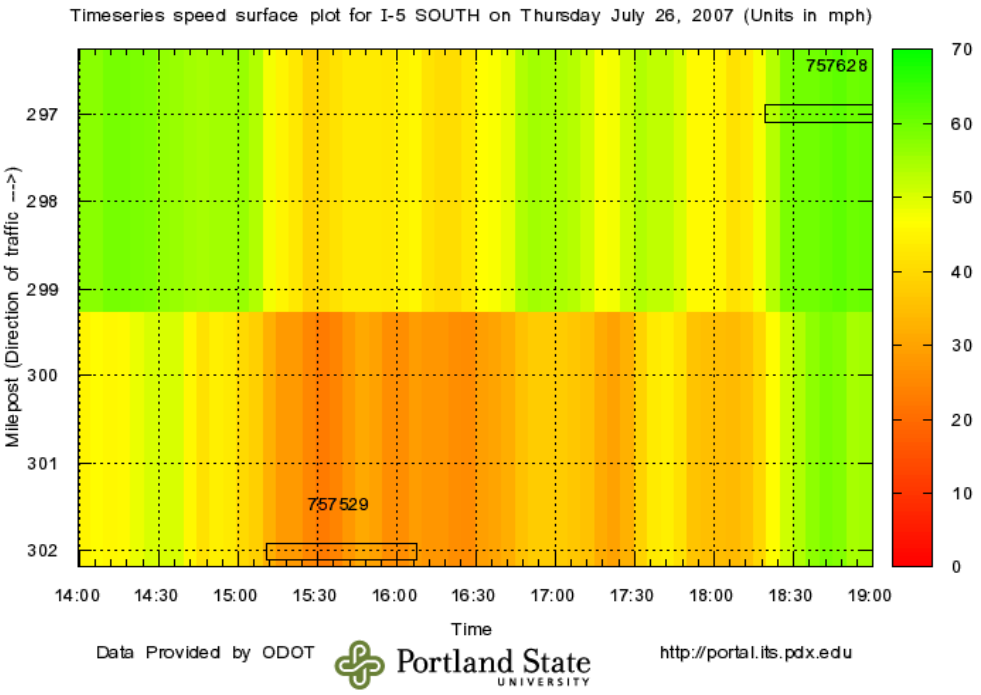
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Thursday July 26, 2007 (Units in mph)
757628
757529
Milepost (Direction of traffic --->)
297
298
299
300
301
302
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
Time
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50
40
30
20
10
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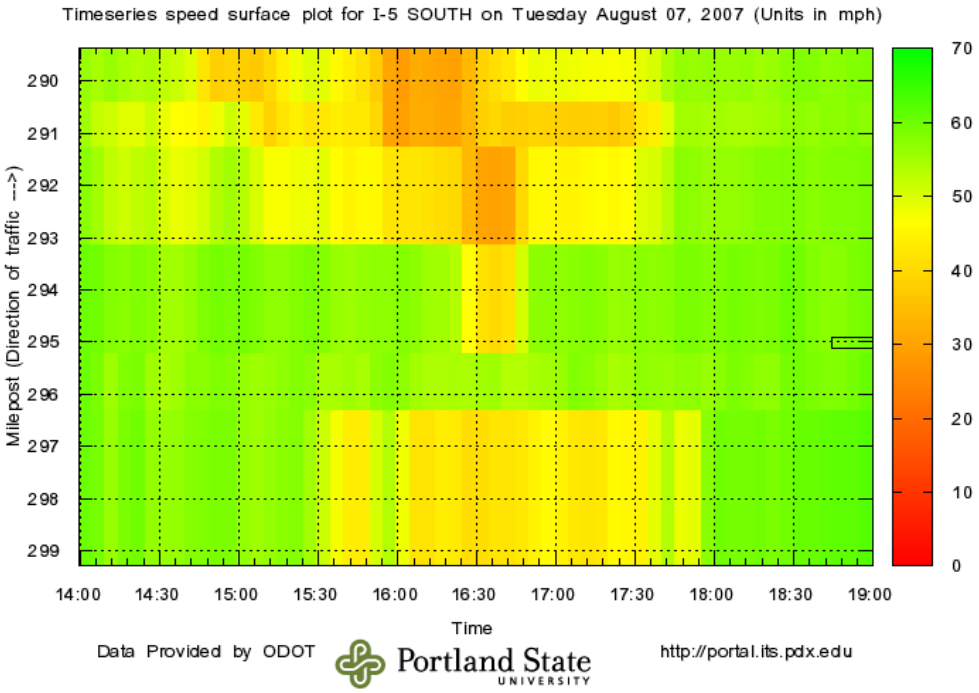
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Tuesday August 07, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
296
297
298
299
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
Time
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40
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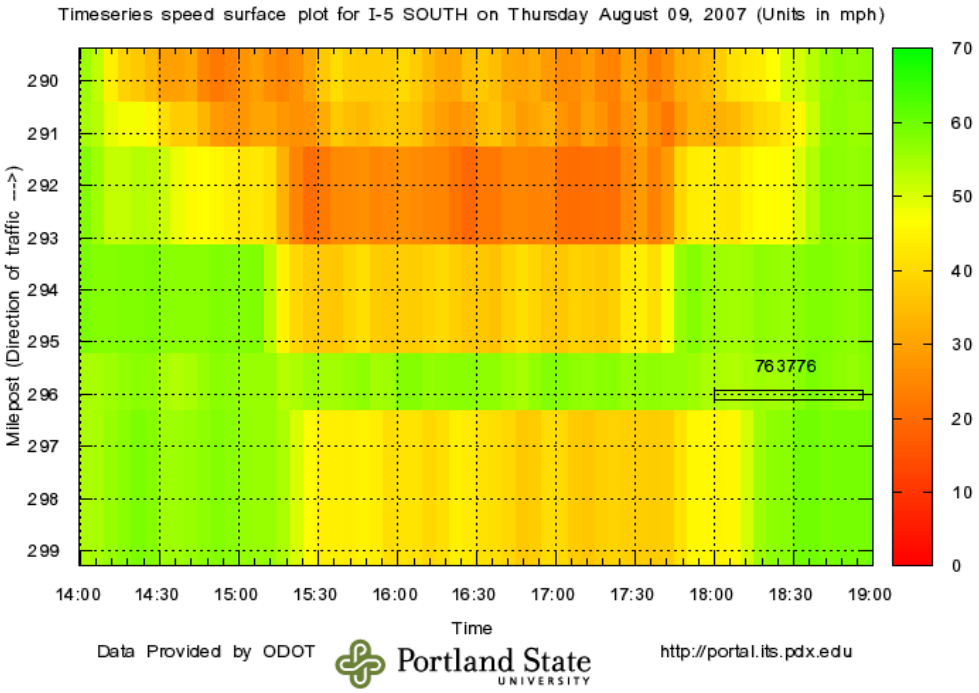
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Thursday August 09, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
296
297
298
299
763776
14:00
14:30
15:00
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16:00
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17:30
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18:30
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Time
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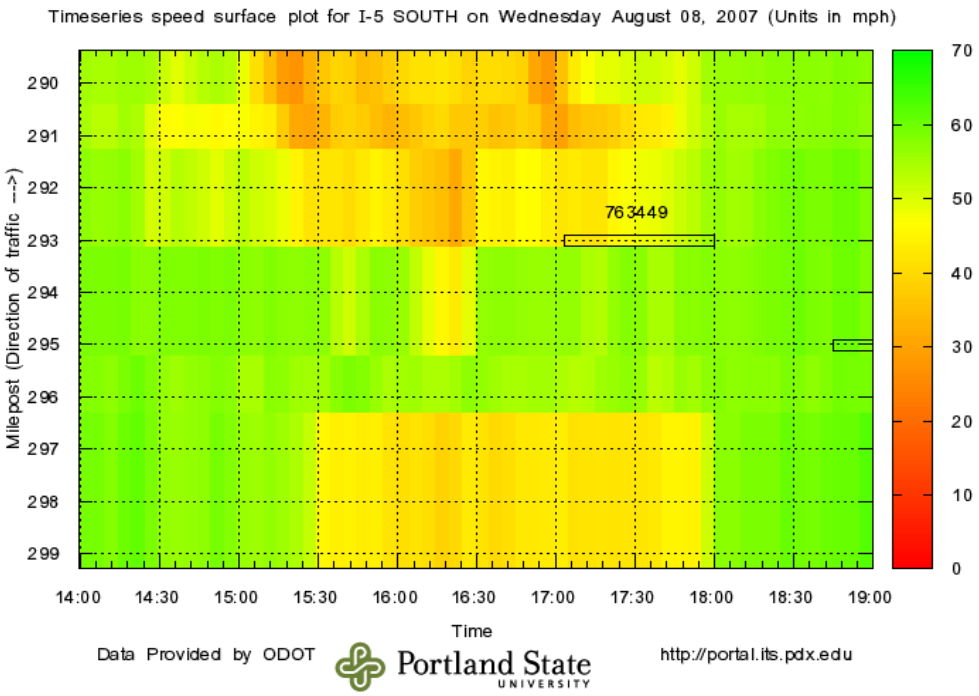
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Wednesday August 08, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
296
297
298
299
763449
14:00
14:30
15:00
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16:00
16:30
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17:30
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Time
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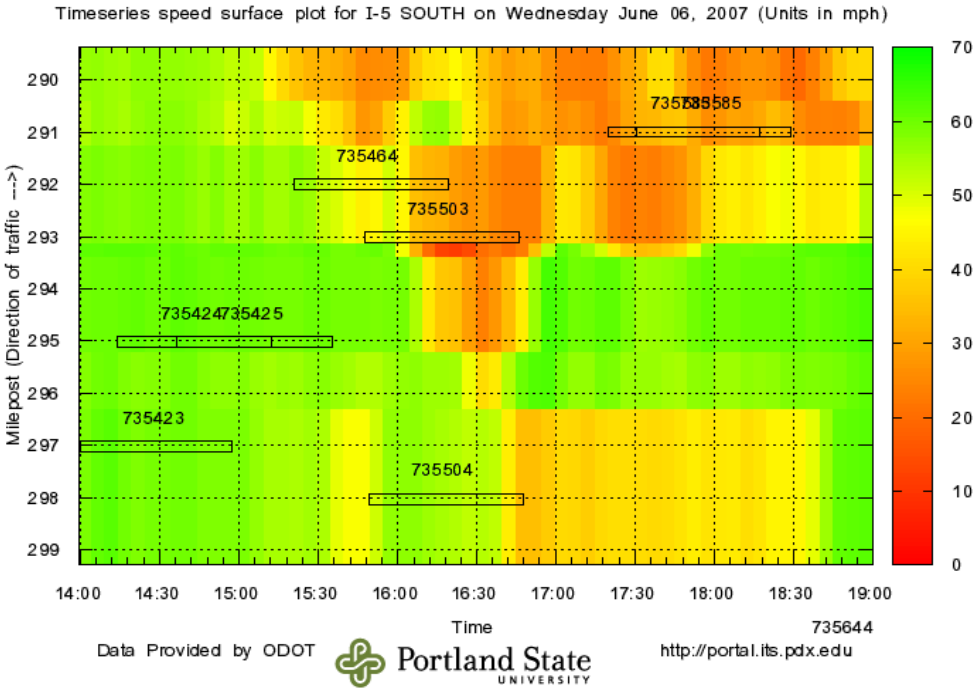
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Wednesday June 06, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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291
292
293
294
295
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297
298
299
735585
735464
735503
735424
735425
735423
735504
14:00
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17:30
18:00
18:30
19:00
Time
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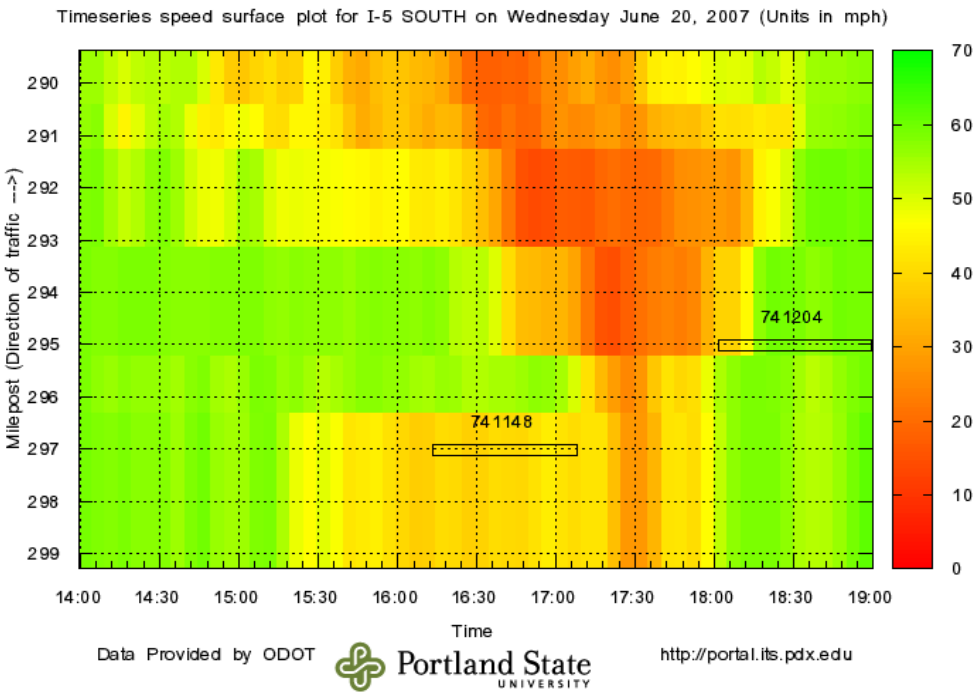
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Wednesday June 20, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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291
292
293
294
295
296
297
298
299
741204
741148
14:00
14:30
15:00
15:30
16:00
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Time
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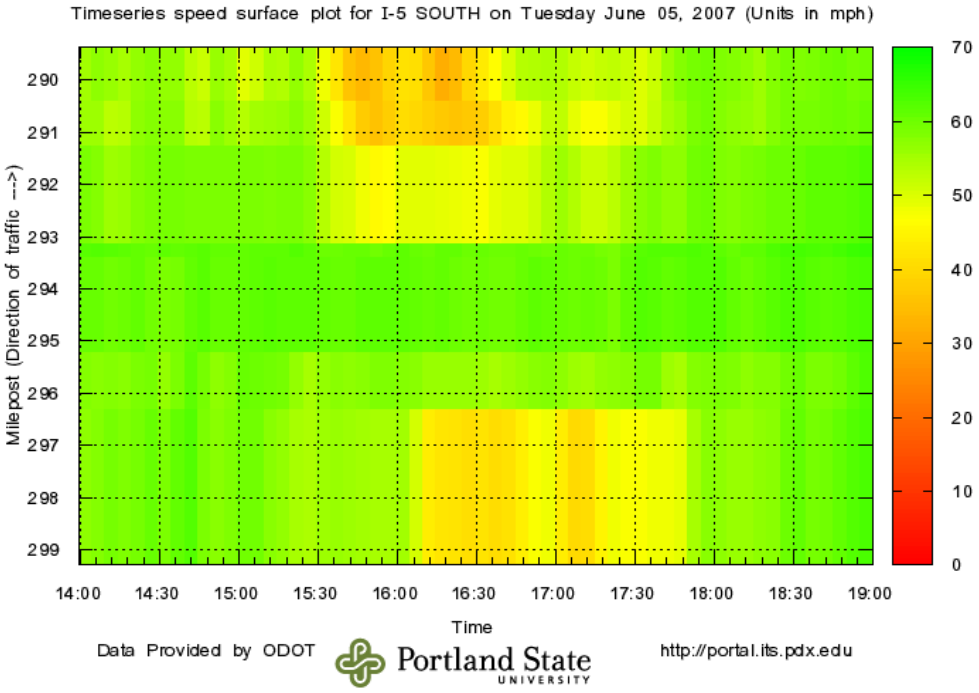
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Tuesday June 05, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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291
292
293
294
295
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297
298
299
14:00
14:30
15:00
15:30
16:00
16:30
17:00
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18:30
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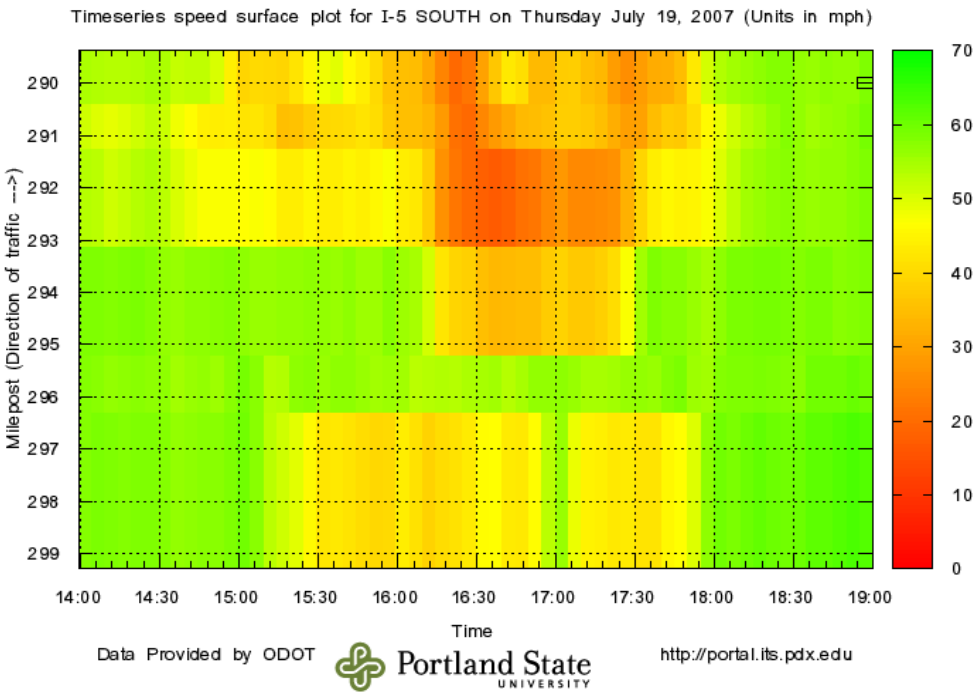
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
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297
298
299
14:00
14:30
15:00
15:30
16:00
16:30
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18:00
18:30
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Time
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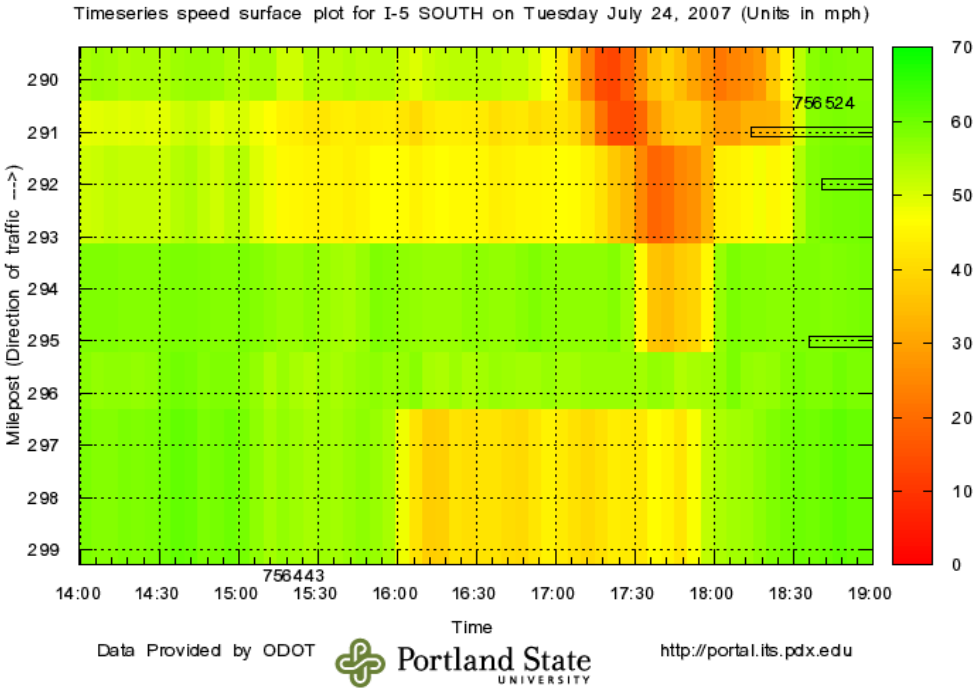
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Tuesday July 24, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
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297
298
299
756524
756443
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
Time
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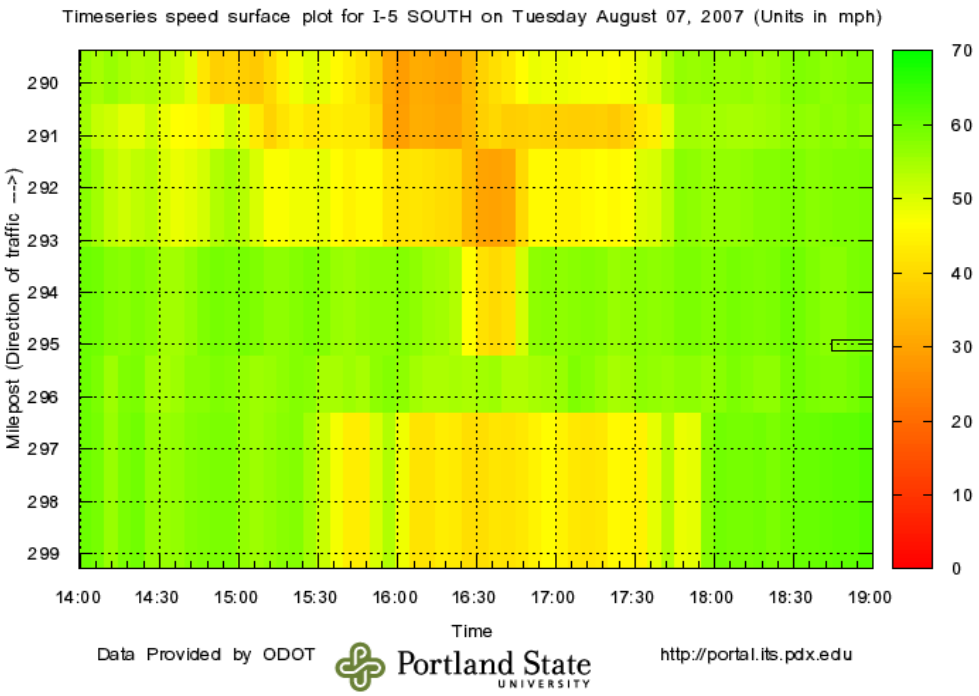
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Tuesday August 07, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
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297
298
299
14:00
14:30
15:00
15:30
16:00
16:30
17:00
17:30
18:00
18:30
19:00
Time
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10
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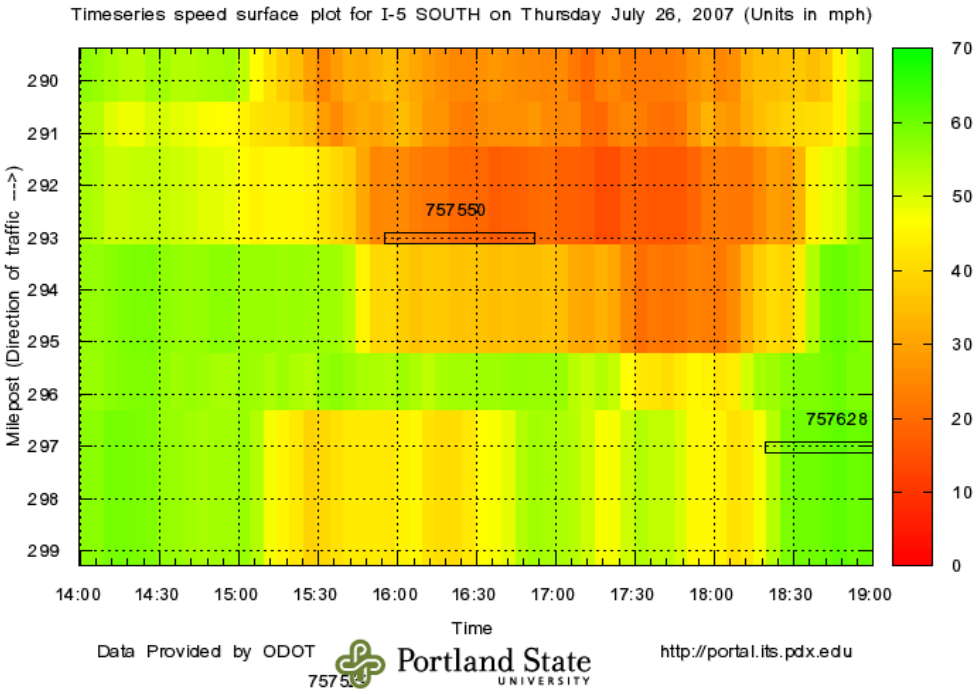
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-5 SOUTH on Thursday July 26, 2007 (Units in mph)
Milepost (Direction of traffic --->)
290
291
292
293
294
295
296
297
298
299
757550
757628
14:00
14:30
15:00
15:30
16:00
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17:00
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18:00
18:30
19:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
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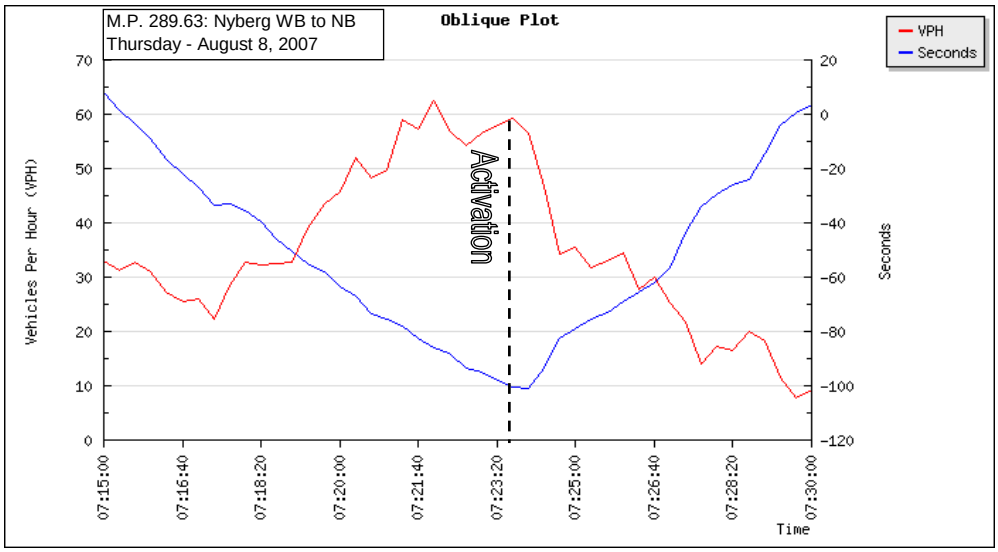
I-5 Oblique Plots

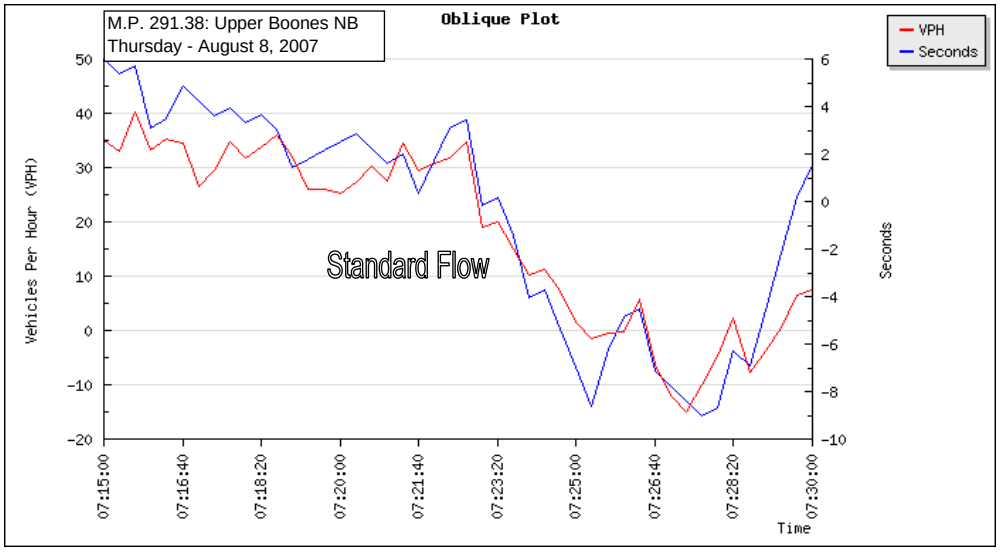
Northbound

Southbound

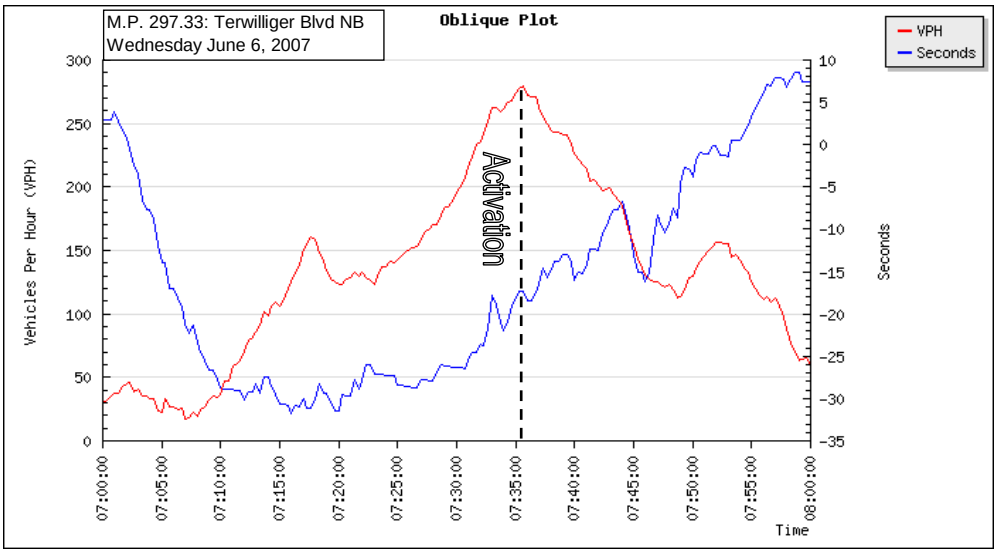
DAVID EVANS AND ASSOCIATES INC.

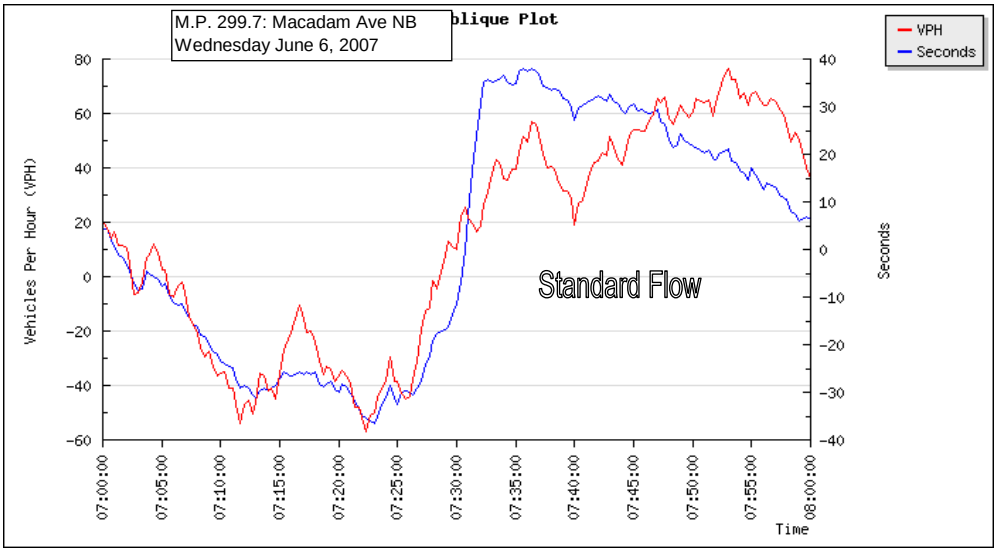
Highway: *I-5*
Direction: *Northbound*



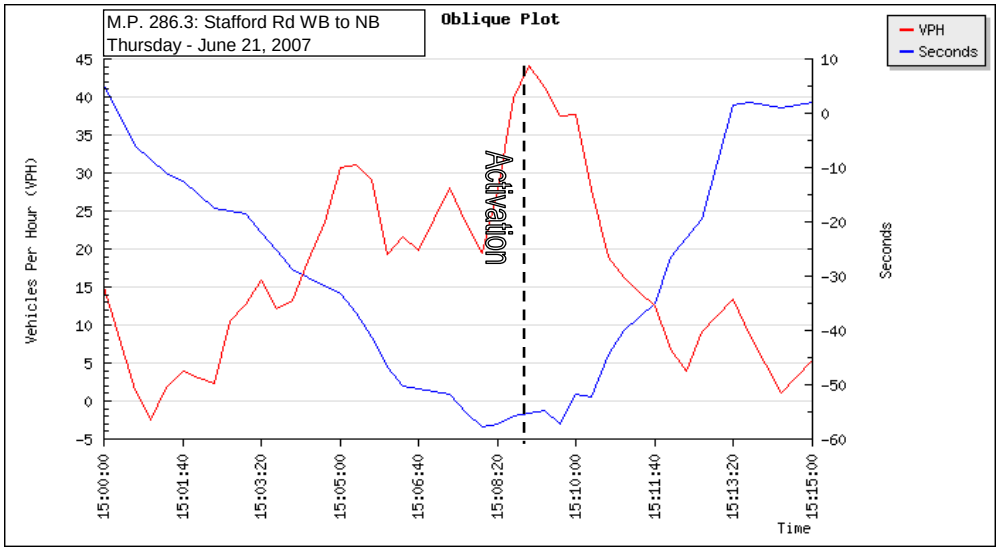


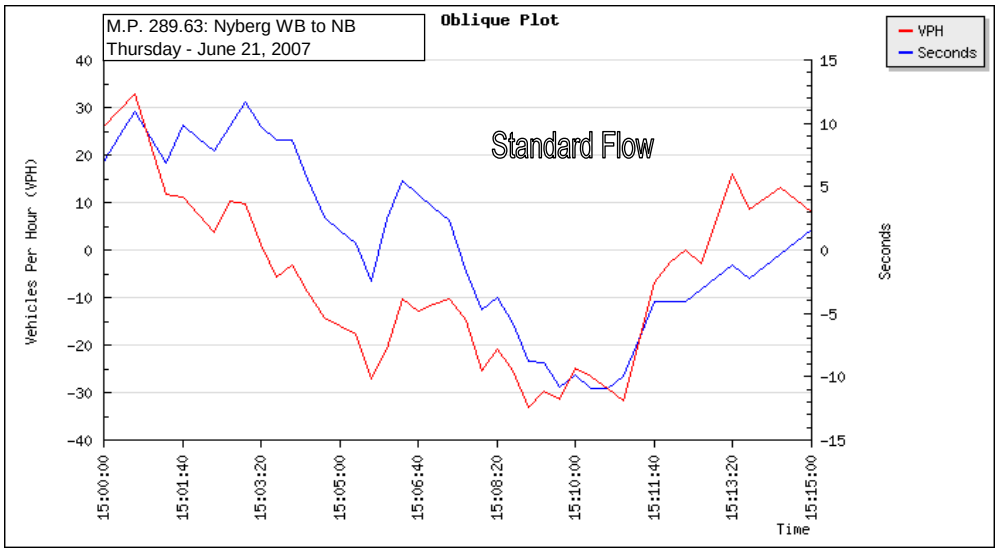
Highway: *I-5*
Direction: *Northbound*



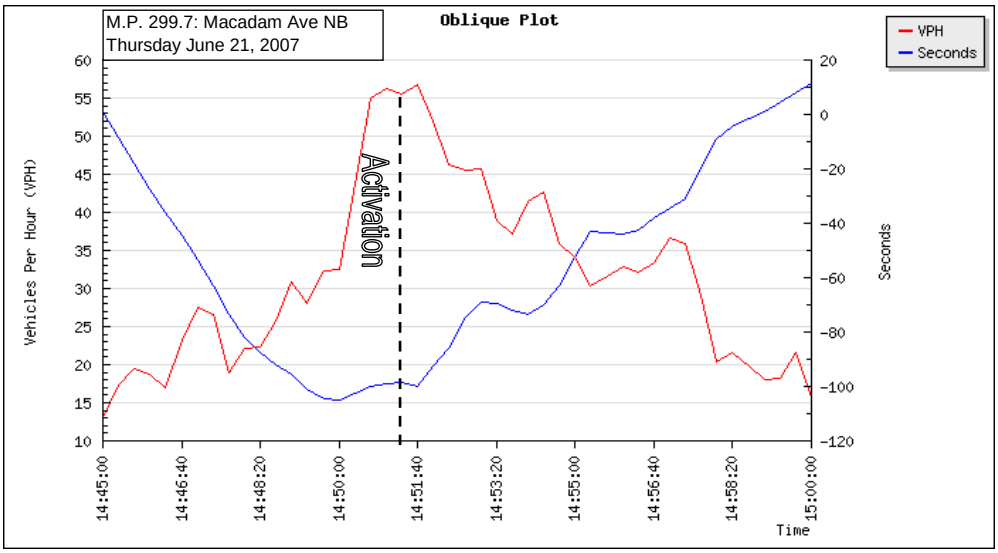


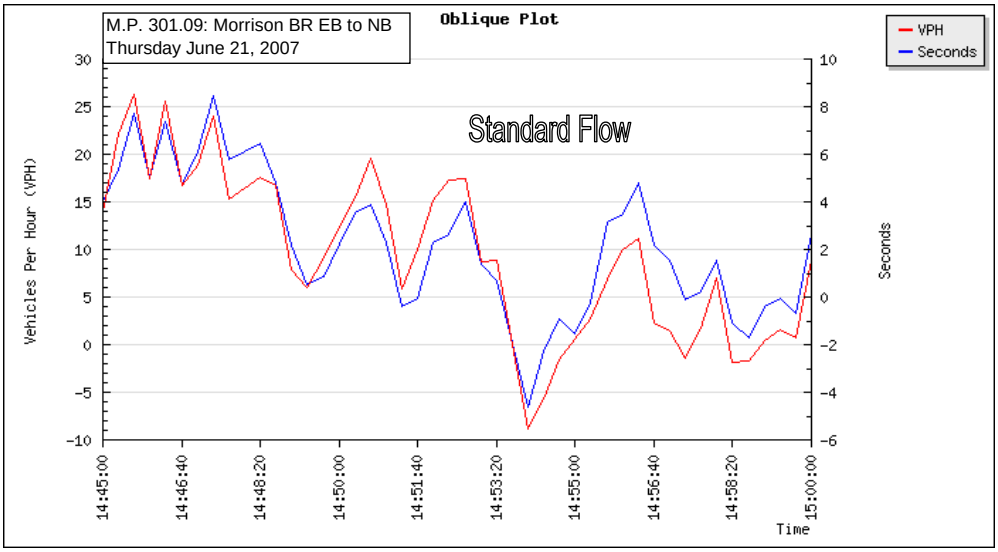
Highway: *I-5*
Direction: *Northbound*



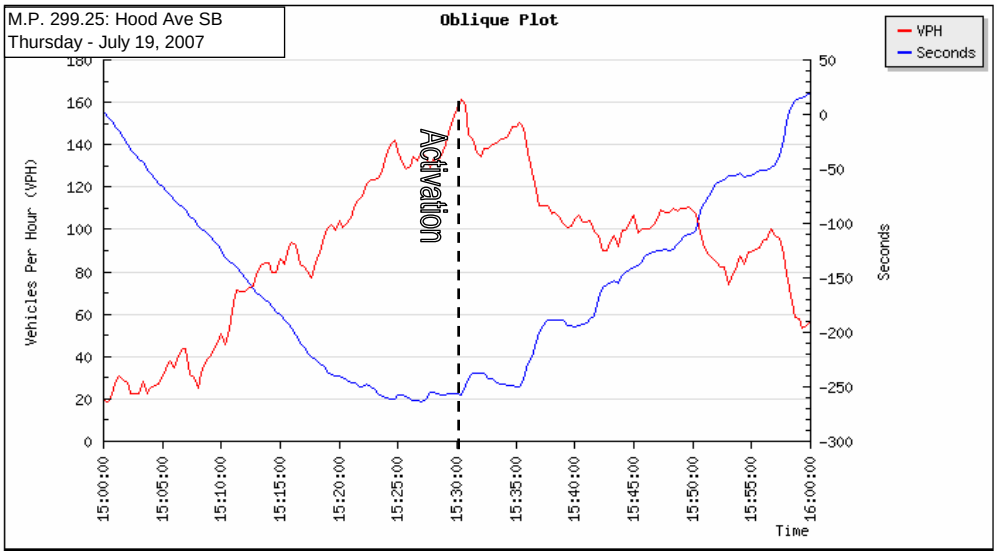


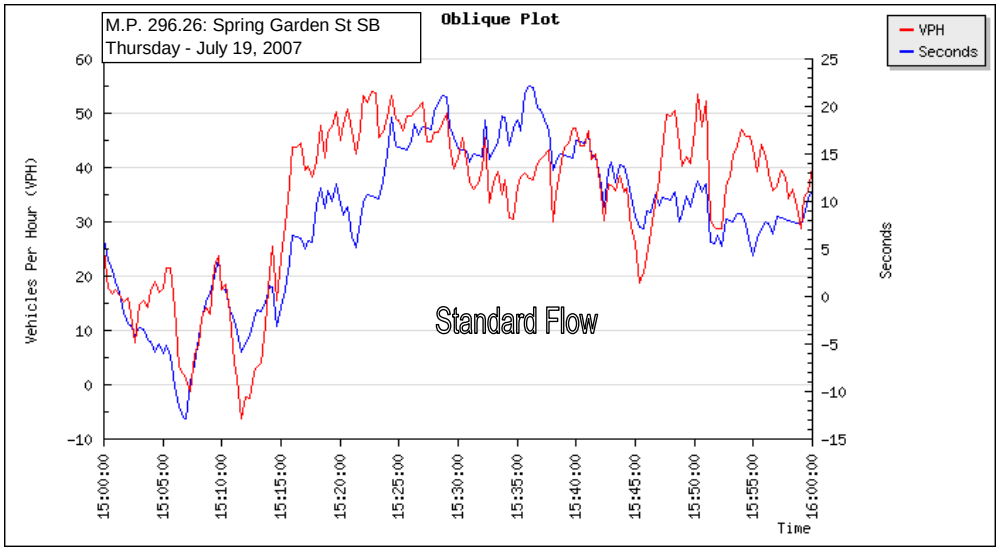
Highway: *I-5*
Direction: *Northbound*



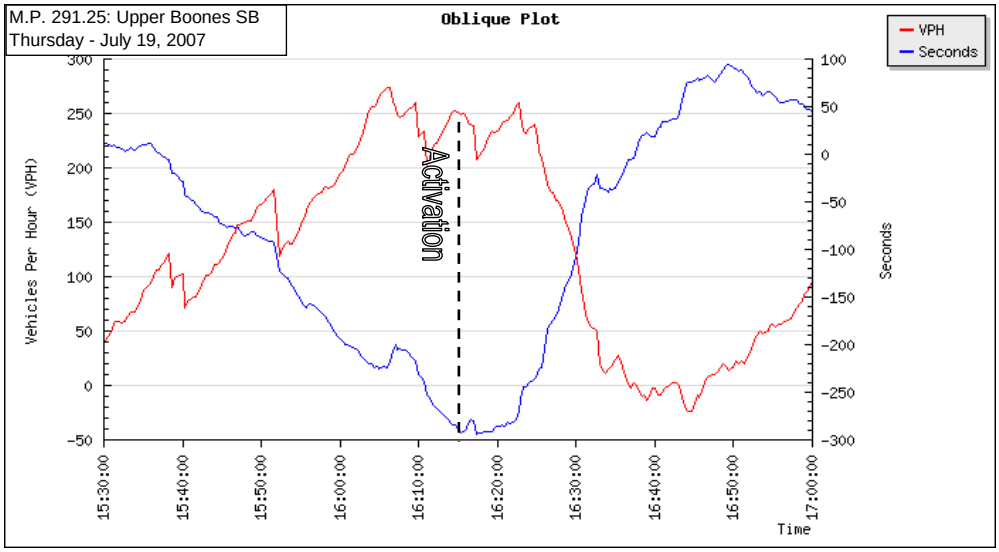


Highway: *I-5*
Direction: *Southbound*



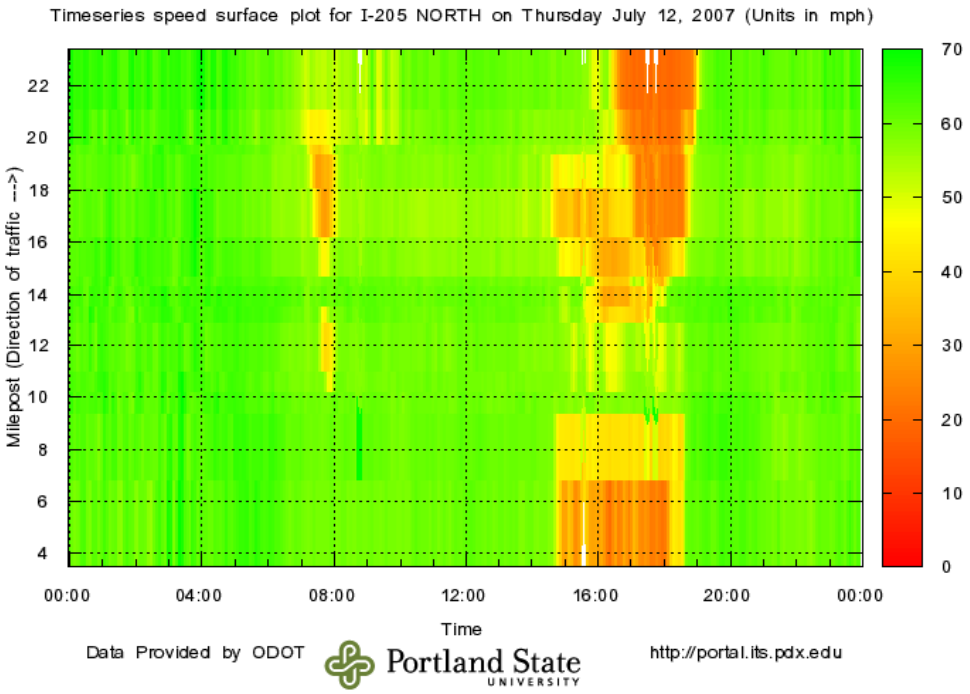


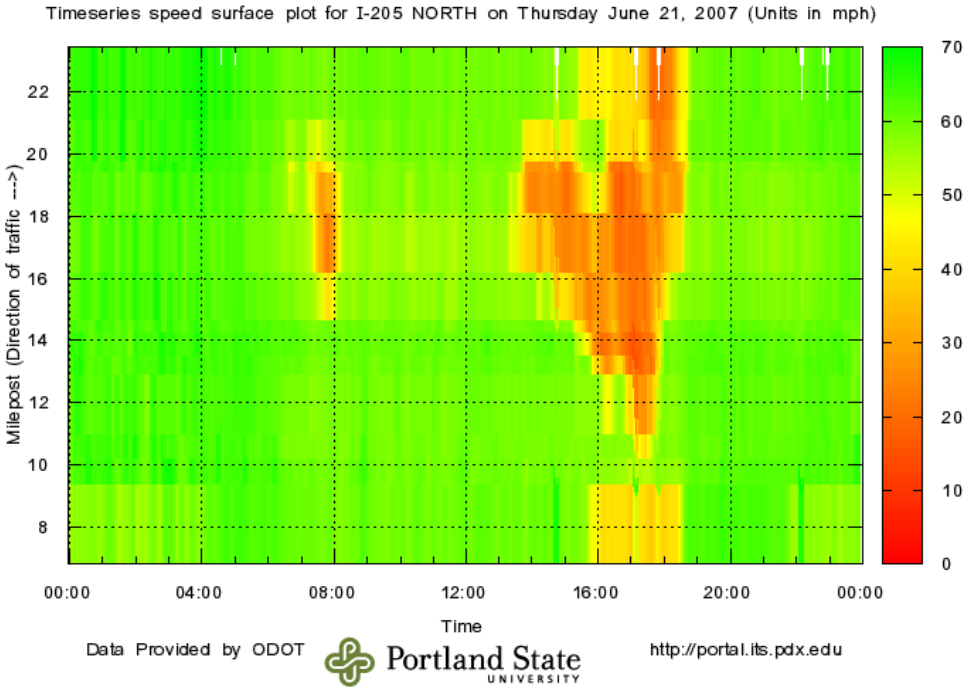
Highway: *I-5*
Direction: *Southbound*

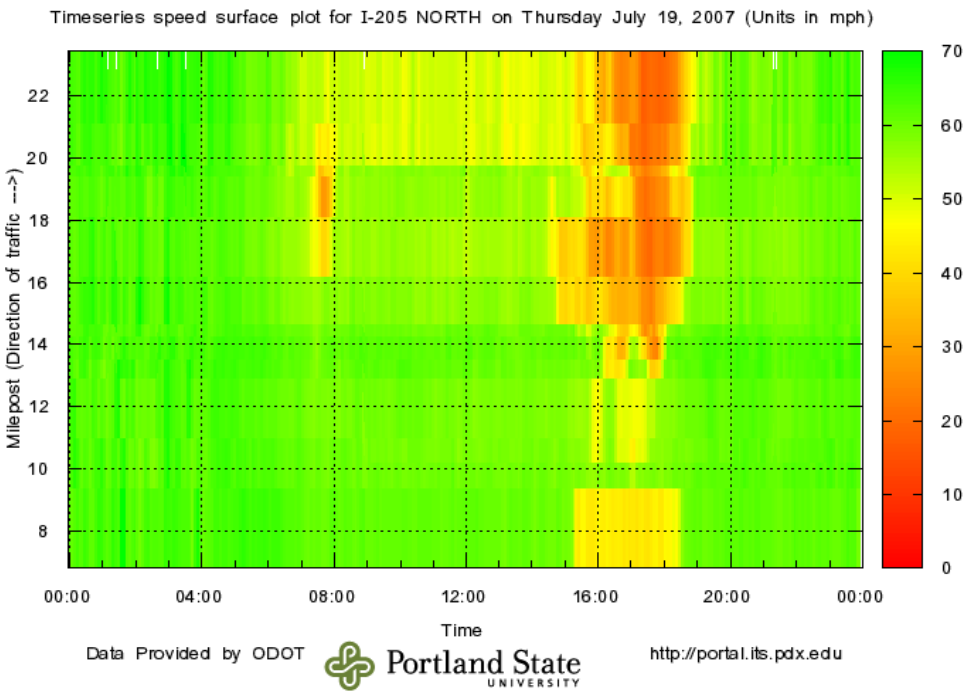


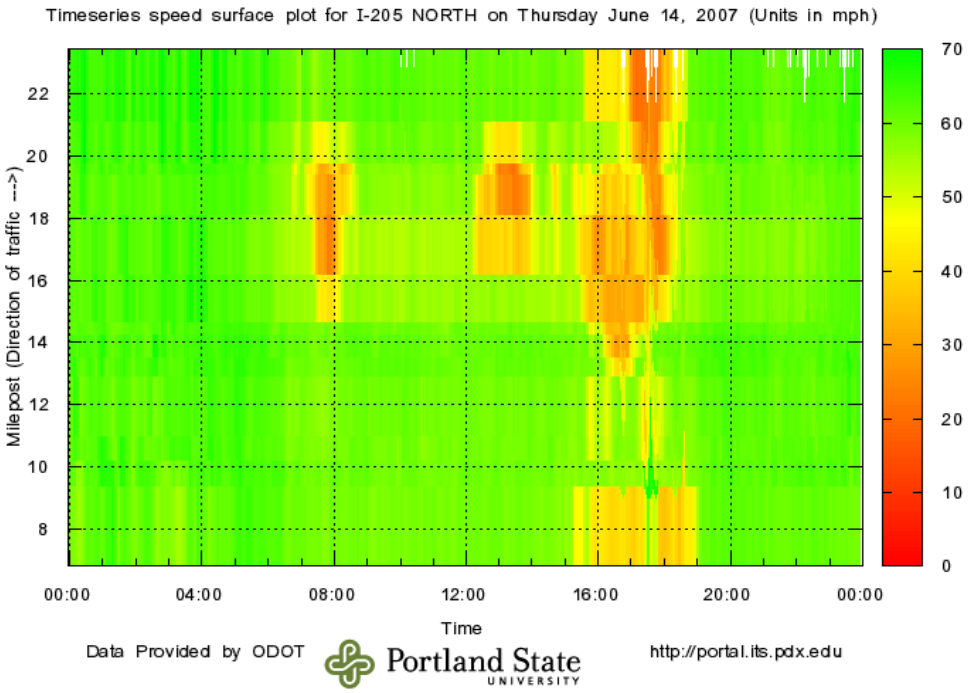
I-205 Northbound
24 Hour Speed Plots

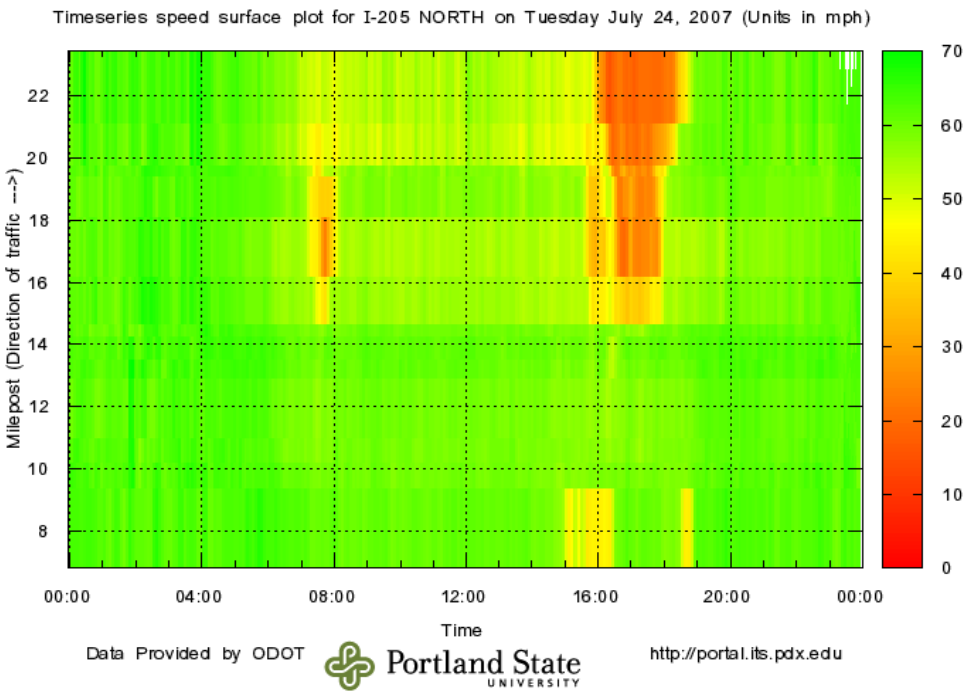
DAVID EVANS
AND ASSOCIATES INC.

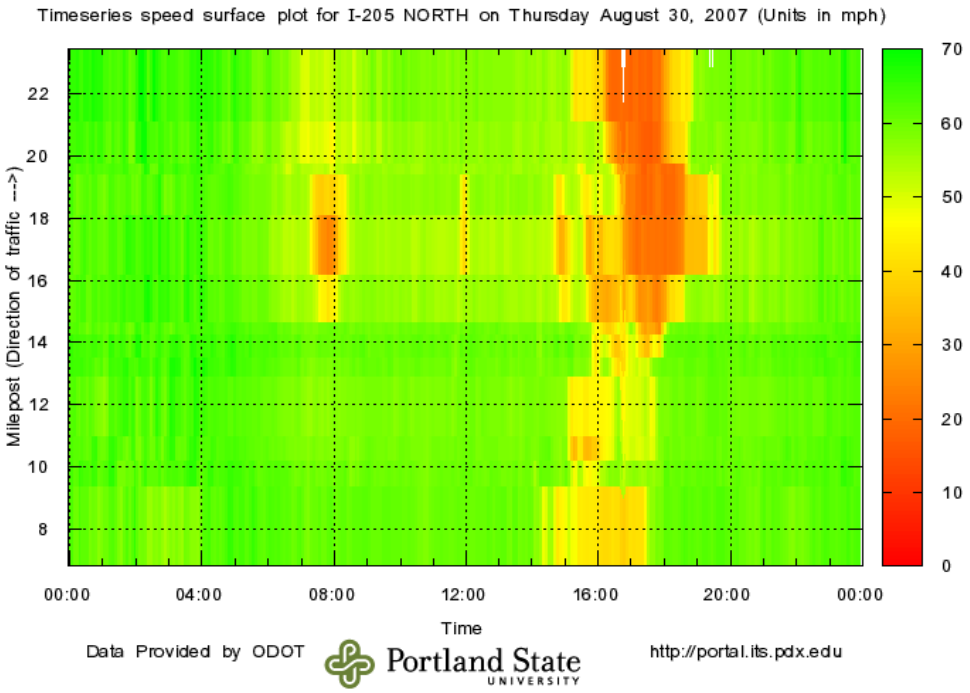

Timeseries speed surface plot for I-205 NORTH on Thursday July 12, 2007 (Units in mph)
Milepost (Direction of traffic --->)
22
20
18
16
14
12
10
8
6
4
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu

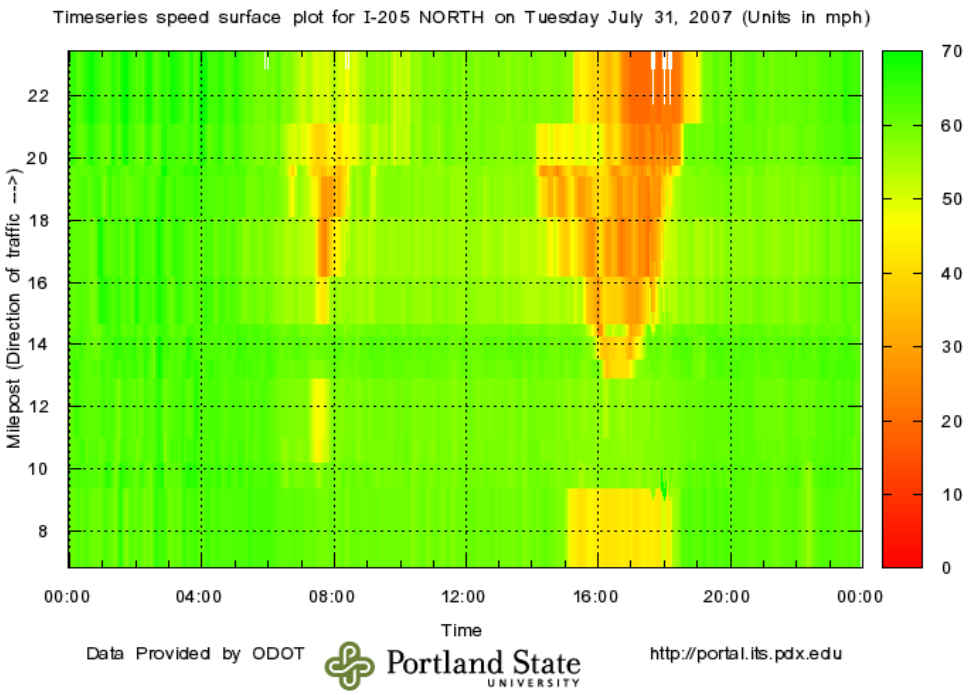

Timeseries speed surface plot for I-205 NORTH on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
22
20
18
16
14
12
10
8
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu

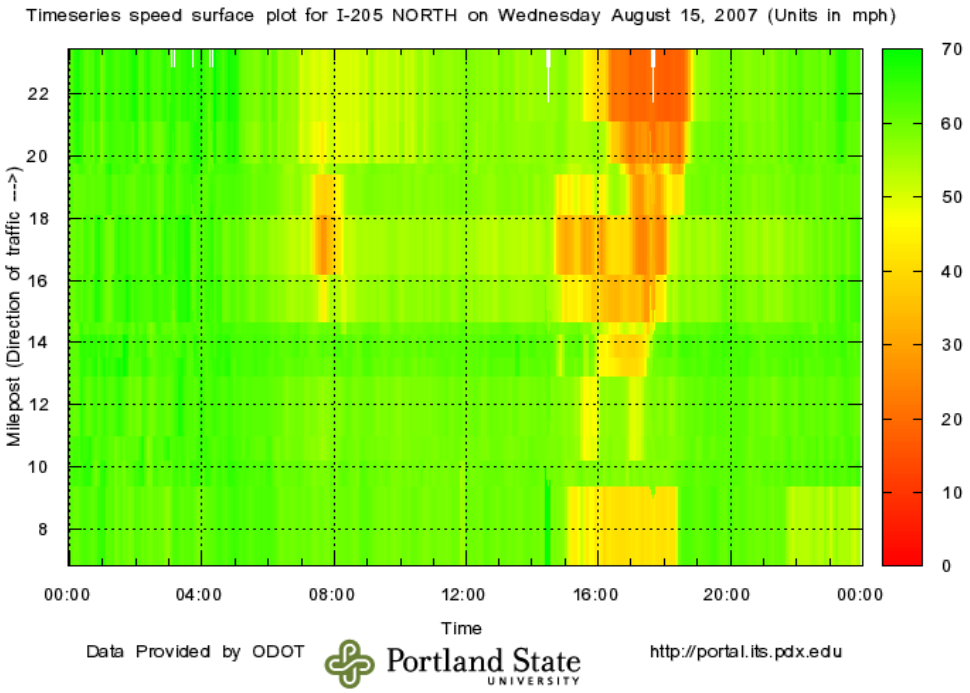

Timeseries speed surface plot for I-205 NORTH on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
22
20
18
16
14
12
10
8
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu

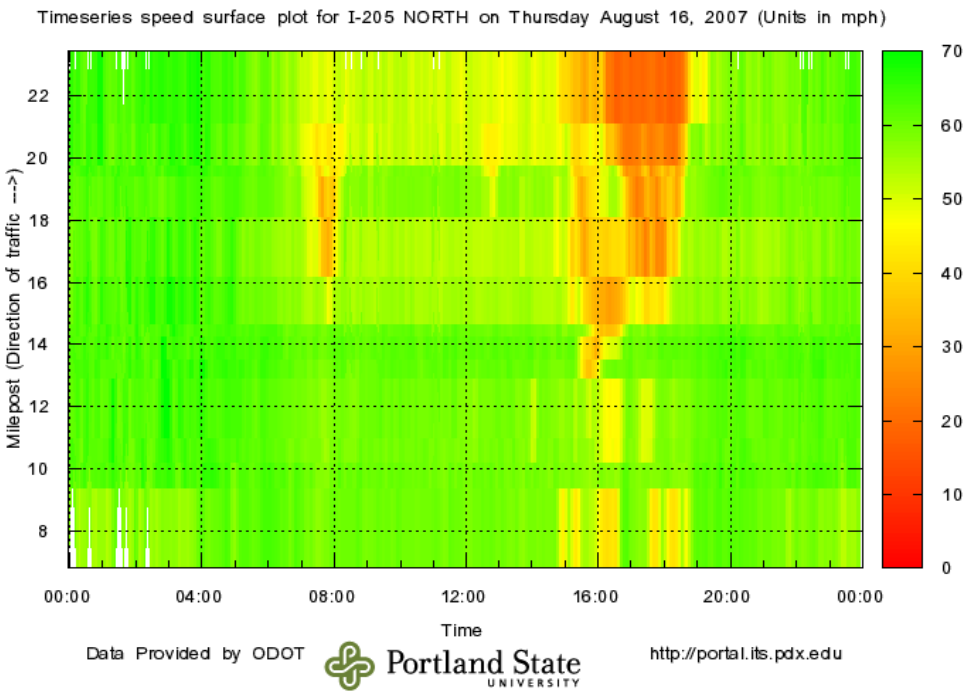

Timeseries speed surface plot for I-205 NORTH on Thursday June 14, 2007 (Units in mph)
Milepost (Direction of traffic --->)
22
20
18
16
14
12
10
8
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu

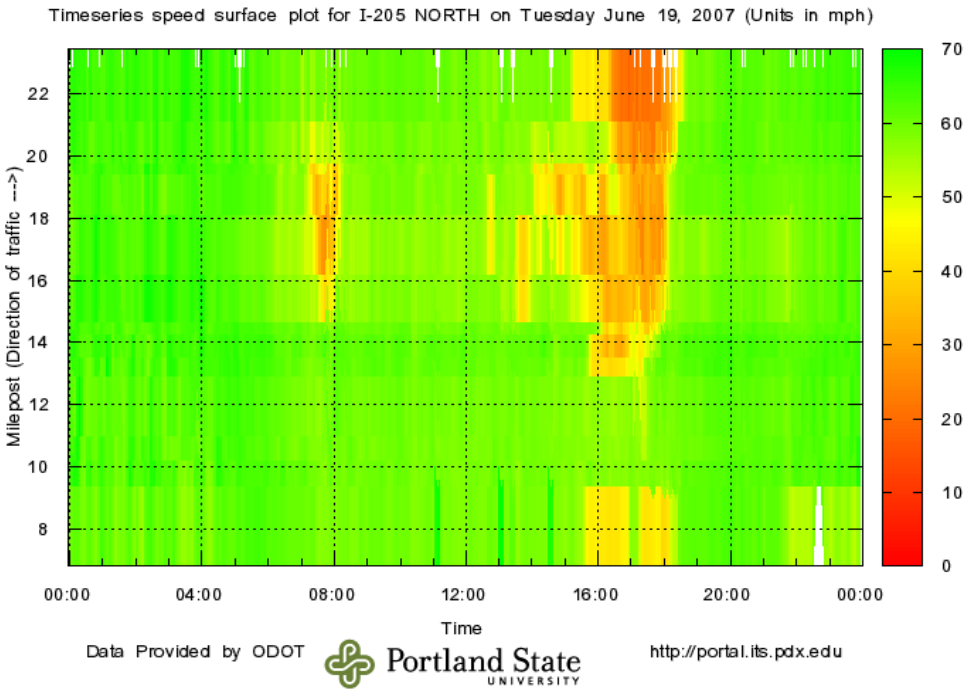

Timeseries speed surface plot for I-205 NORTH on Tuesday July 24, 2007 (Units in mph)
Milepost (Direction of traffic --->)
22
20
18
16
14
12
10
8
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 NORTH on Thursday August 30, 2007 (Units in mph)
Milepost (Direction of traffic --->)
22
20
18
16
14
12
10
8
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 NORTH on Tuesday July 31, 2007 (Units in mph)
Milepost (Direction of traffic --->)
22
20
18
16
14
12
10
8
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

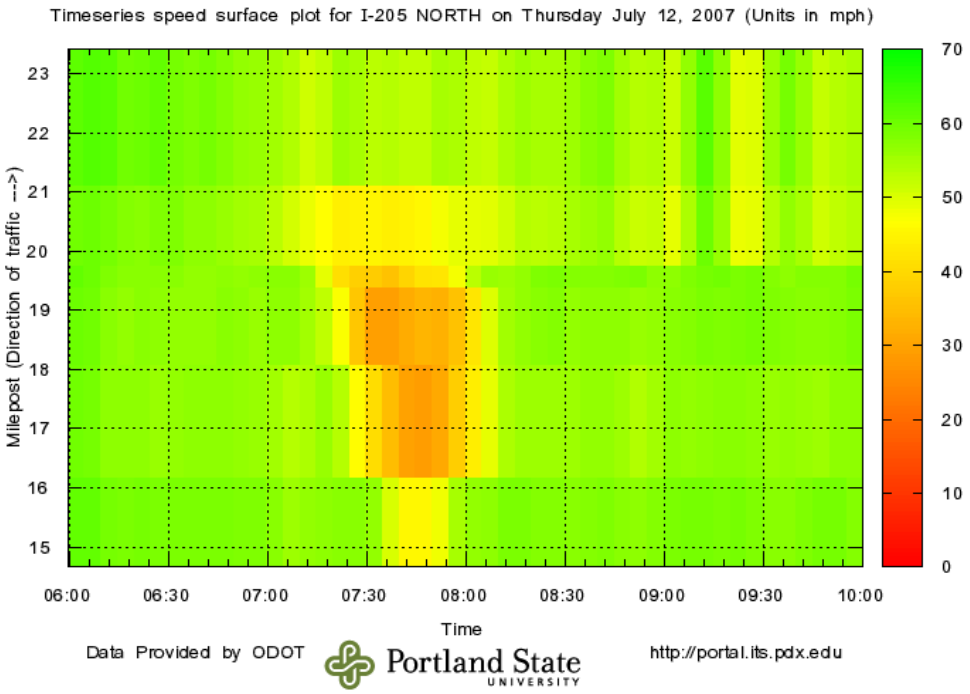

Timeseries speed surface plot for I-205 NORTH on Wednesday August 15, 2007 (Units in mph)
Milepost (Direction of traffic --->)
22
20
18
16
14
12
10
8
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

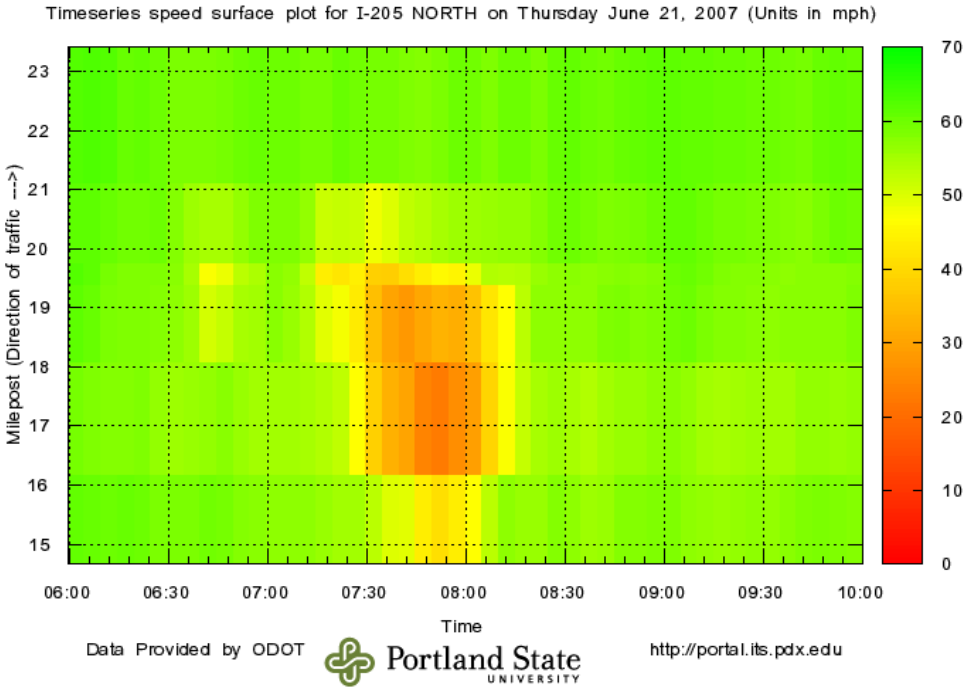

Timeseries speed surface plot for I-205 NORTH on Thursday August 16, 2007 (Units in mph)
Milepost (Direction of traffic --->)
22
20
18
16
14
12
10
8
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu

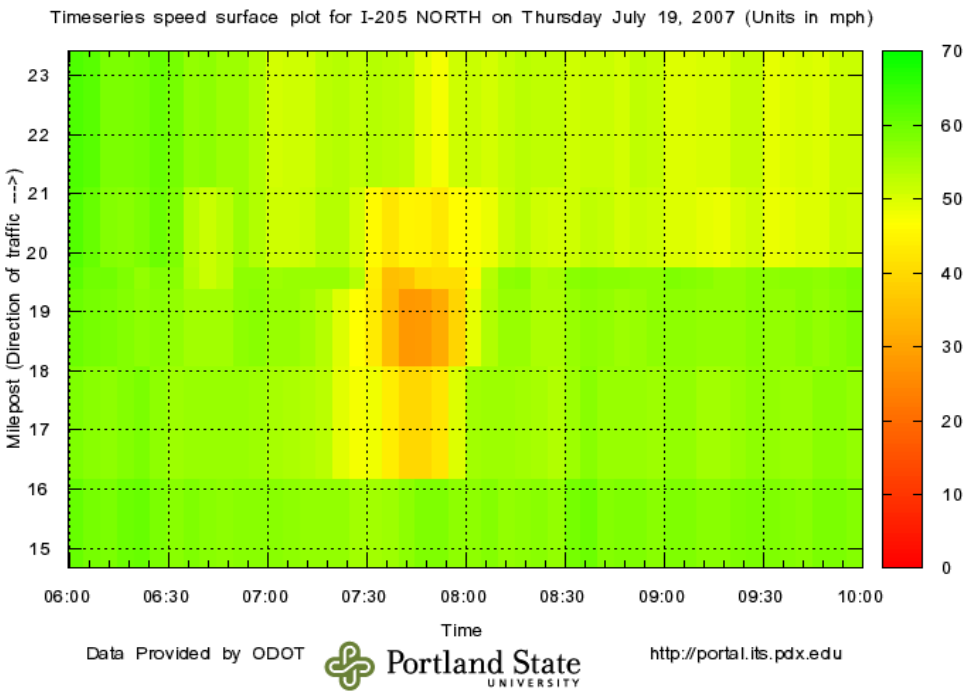

Timeseries speed surface plot for I-205 NORTH on Tuesday June 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
22
20
18
16
14
12
10
8
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu

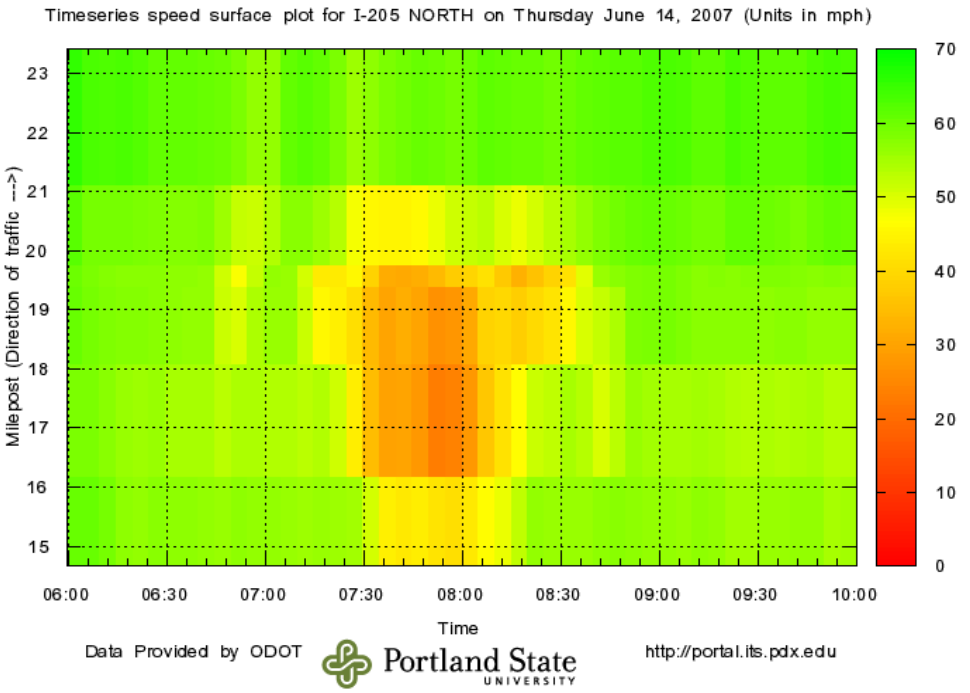
I-205 Northbound
AM Peak Hour Speed Plots

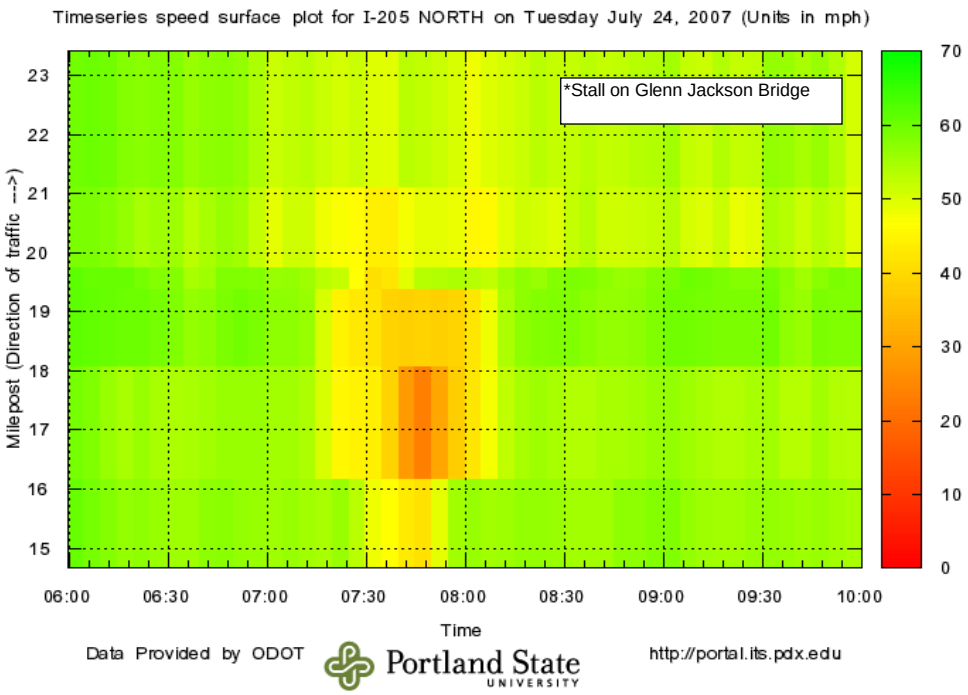
DAVID EVANS
AND ASSOCIATES INC.

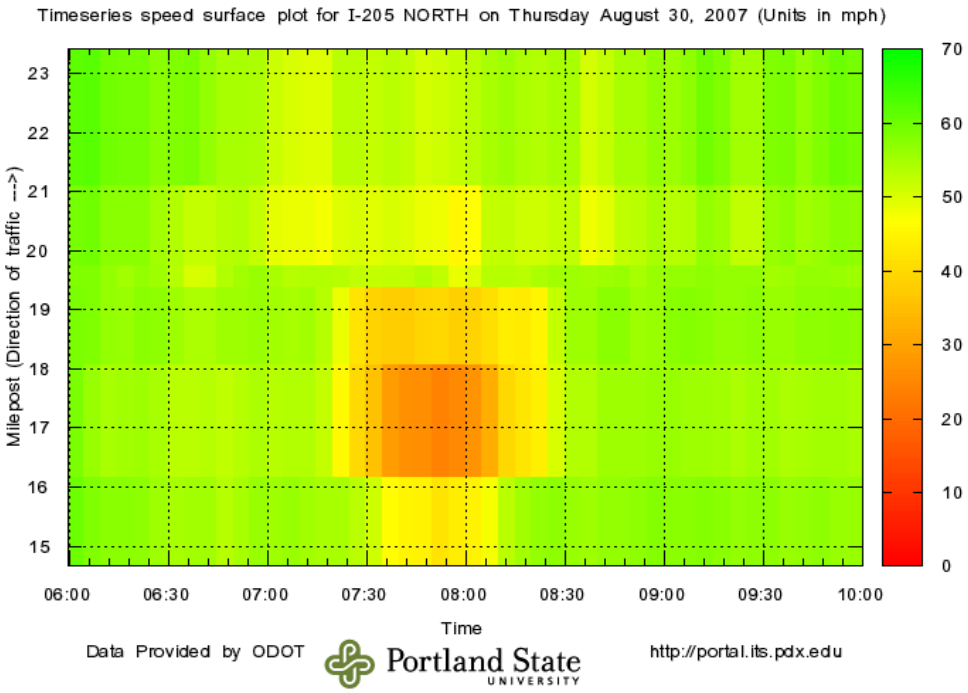

Timeseries speed surface plot for I-205 NORTH on Thursday July 12, 2007 (Units in mph)
Milepost (Direction of traffic --->)
23
22
21
20
19
18
17
16
15
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

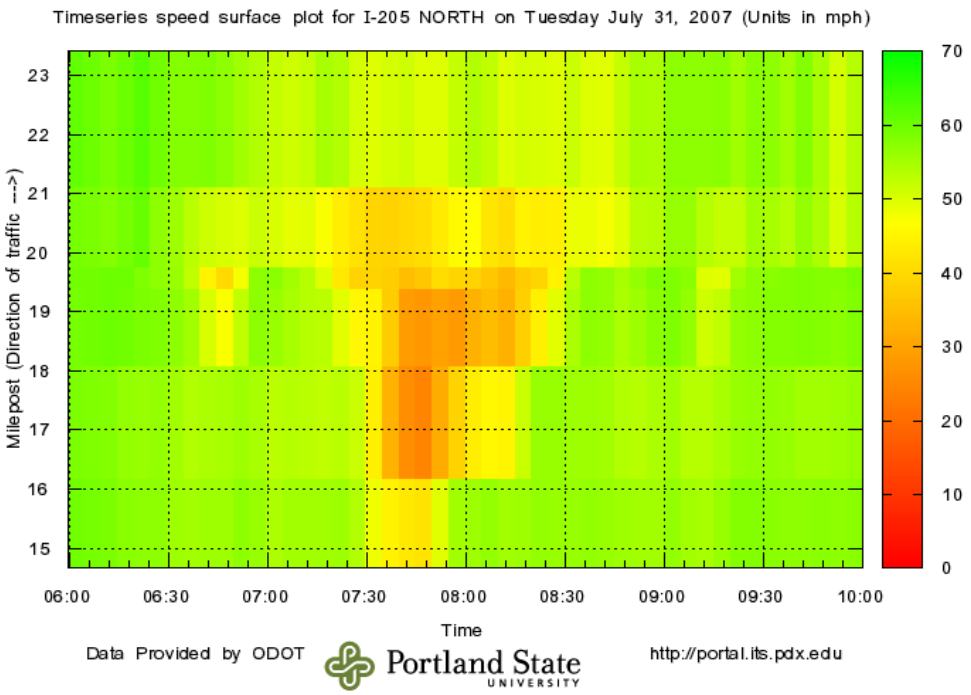

Timeseries speed surface plot for I-205 NORTH on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
23
22
21
20
19
18
17
16
15
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

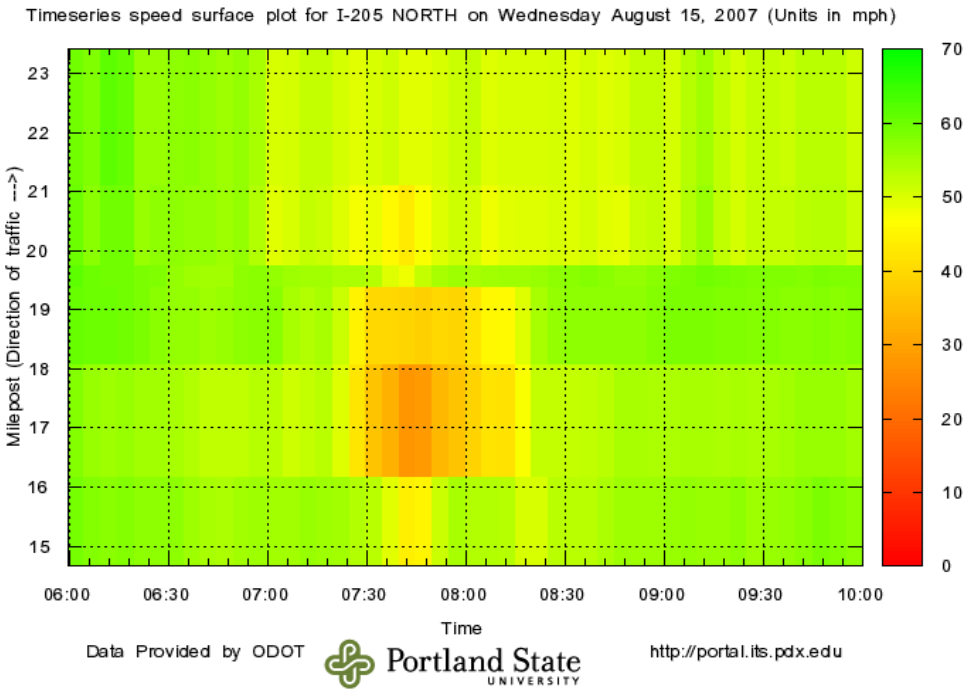

Timeseries speed surface plot for I-205 NORTH on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic -->)
23
22
21
20
19
18
17
16
15
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

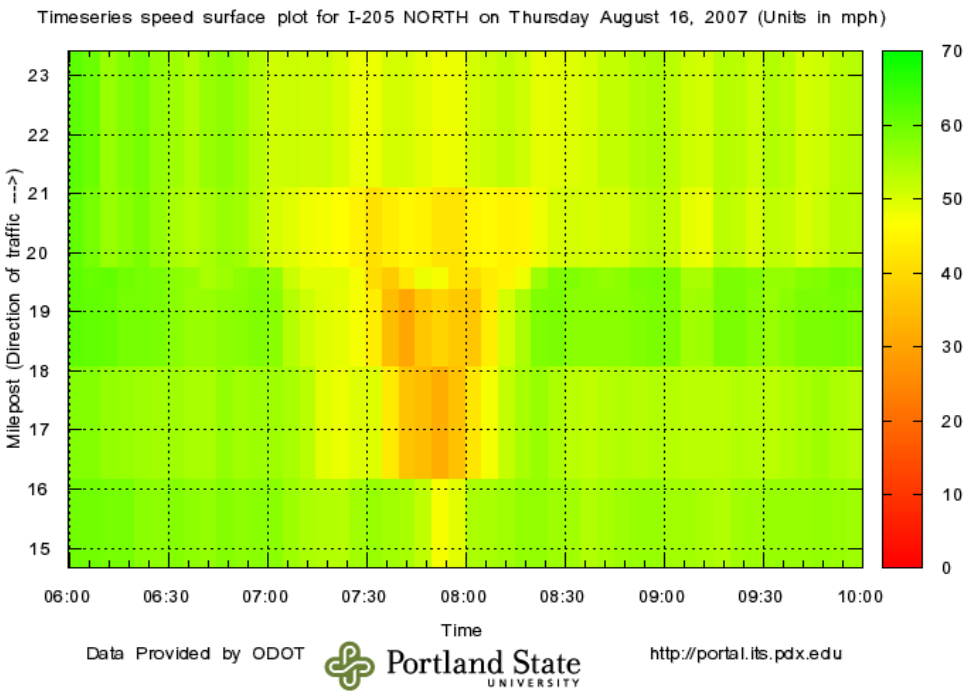

Timeseries speed surface plot for I-205 NORTH on Thursday June 14, 2007 (Units in mph)
Milepost (Direction of traffic -->)
23
22
21
20
19
18
17
16
15
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

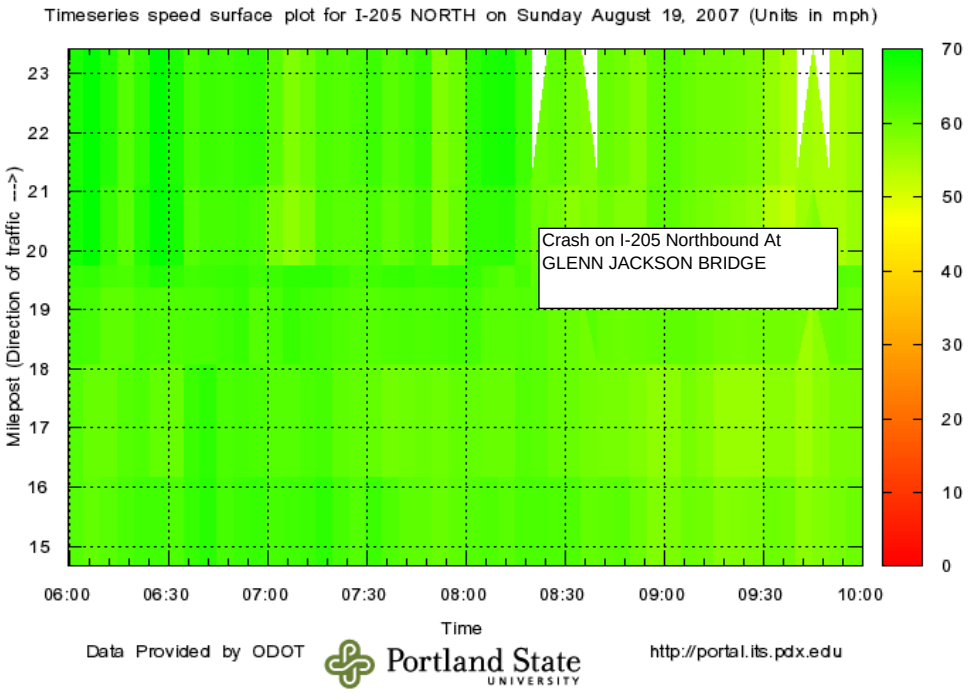

Timeseries speed surface plot for I-205 NORTH on Tuesday July 24, 2007 (Units in mph)
*Stall on Glenn Jackson Bridge
Milepost (Direction of traffic --->)
23
22
21
20
19
18
17
16
15
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 NORTH on Thursday August 30, 2007 (Units in mph)
Milepost (Direction of traffic --->)
23
22
21
20
19
18
17
16
15
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 NORTH on Tuesday July 31, 2007 (Units in mph)
Milepost (Direction of traffic --->)
23
22
21
20
19
18
17
16
15
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

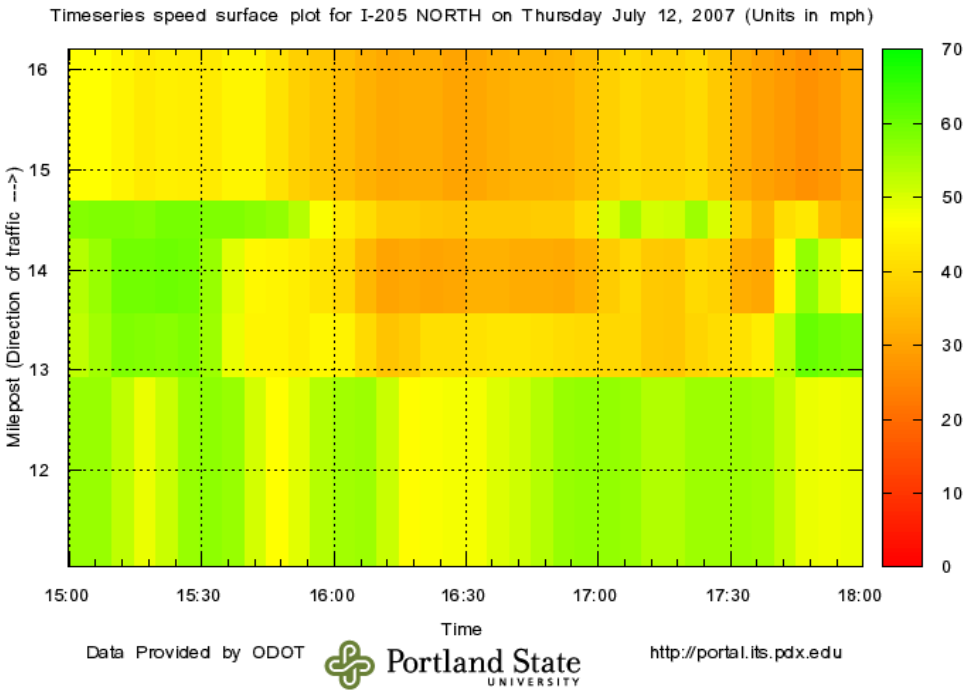

Timeseries speed surface plot for I-205 NORTH on Wednesday August 15, 2007 (Units in mph)
Milepost (Direction of traffic --->)
23
22
21
20
19
18
17
16
15
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

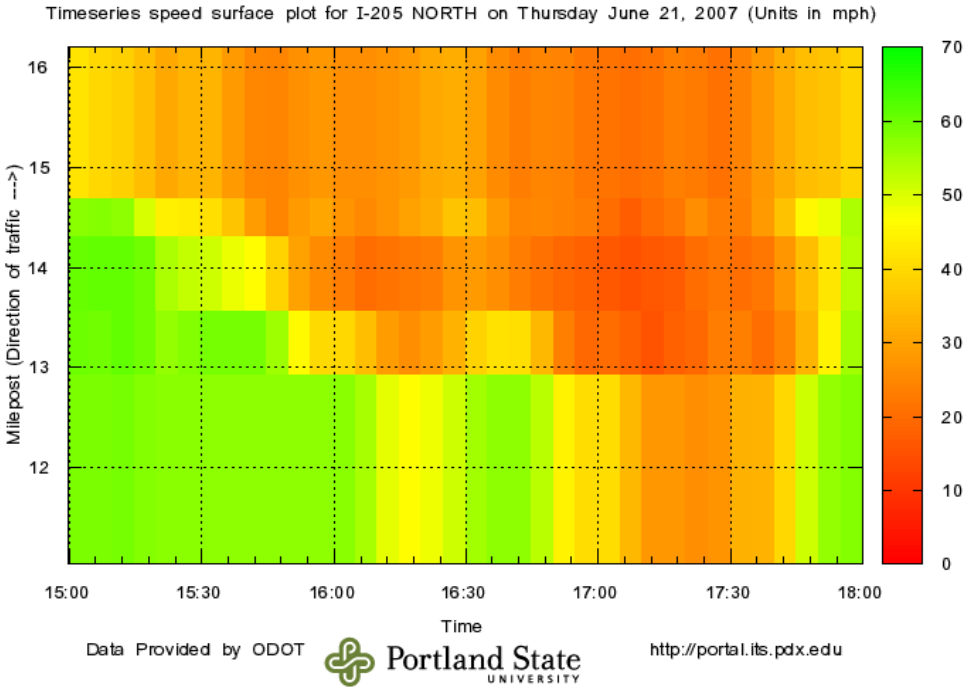

Timeseries speed surface plot for I-205 NORTH on Thursday August 16, 2007 (Units in mph)
Milepost (Direction of traffic --->)
23
22
21
20
19
18
17
16
15
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

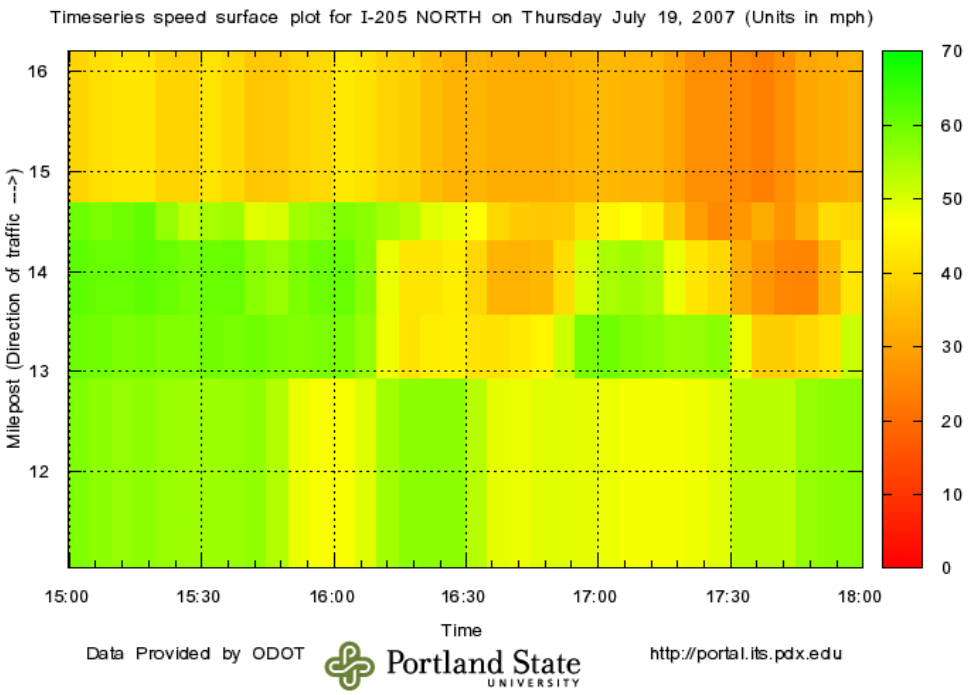

Timeseries speed surface plot for I-205 NORTH on Sunday August 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
23
22
21
20
19
18
17
16
15
Crash on I-205 Northbound At
GLENN JACKSON BRIDGE
06:00
06:30
07:00
07:30
08:00
08:30
09:00
09:30
10:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

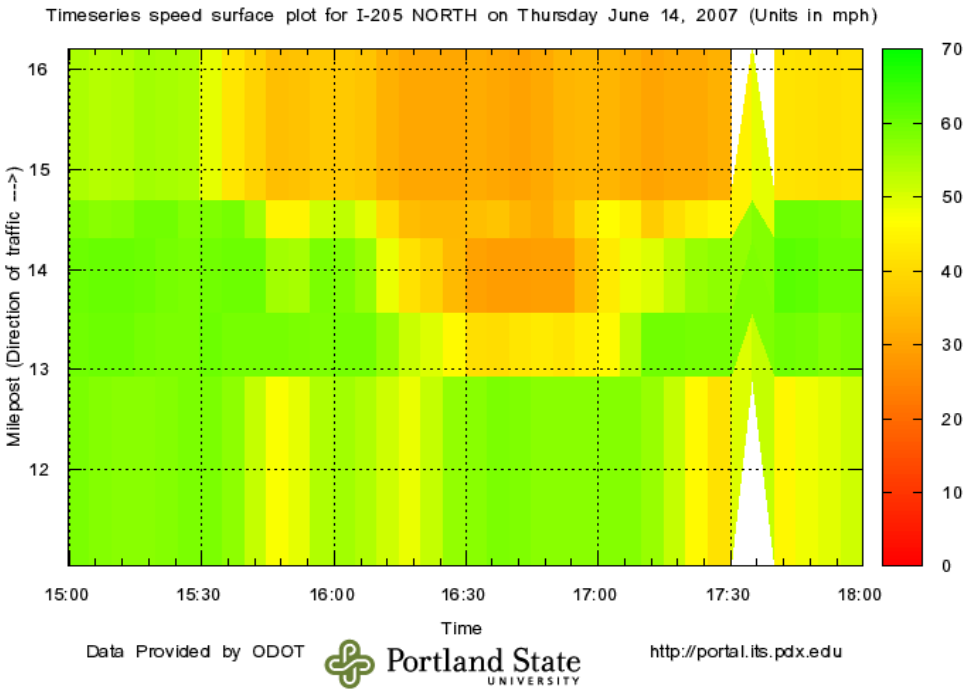
I-205 Northbound
PM Peak Hour Speed Plots

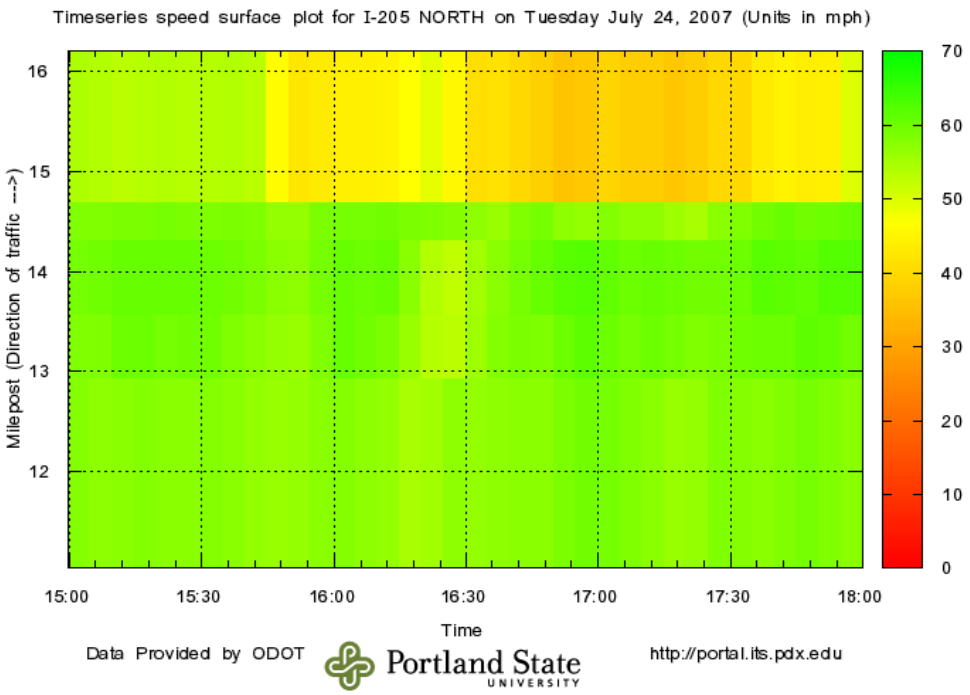
DAVID EVANS
AND ASSOCIATES INC.

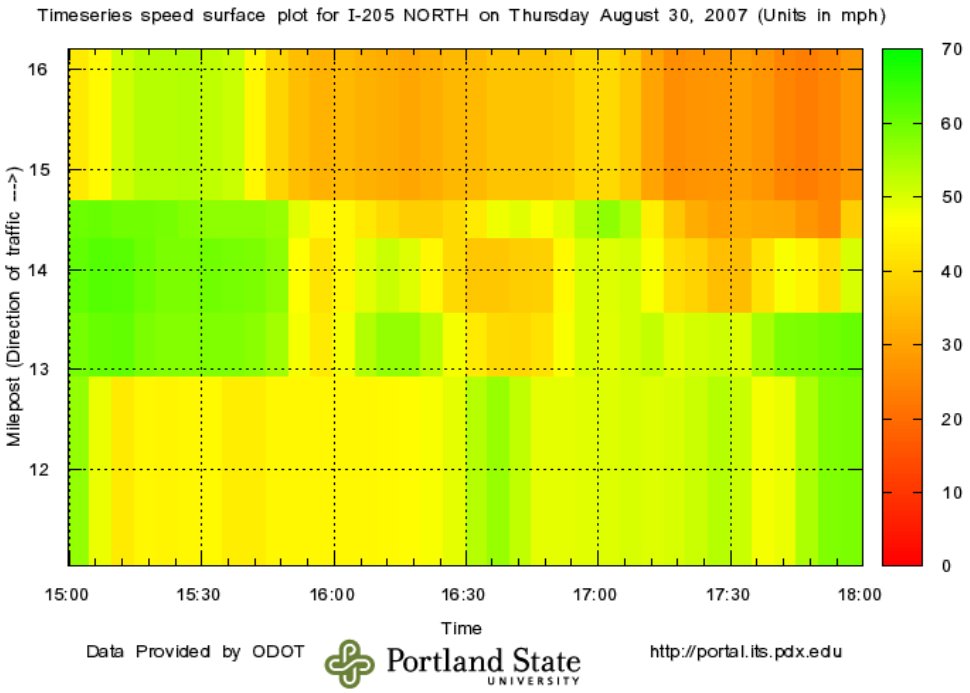

Timeseries speed surface plot for I-205 NORTH on Thursday July 12, 2007 (Units in mph)
Milepost (Direction of traffic --->)
16
15
14
13
12
15:00
15:30
16:00
16:30
17:00
17:30
18:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

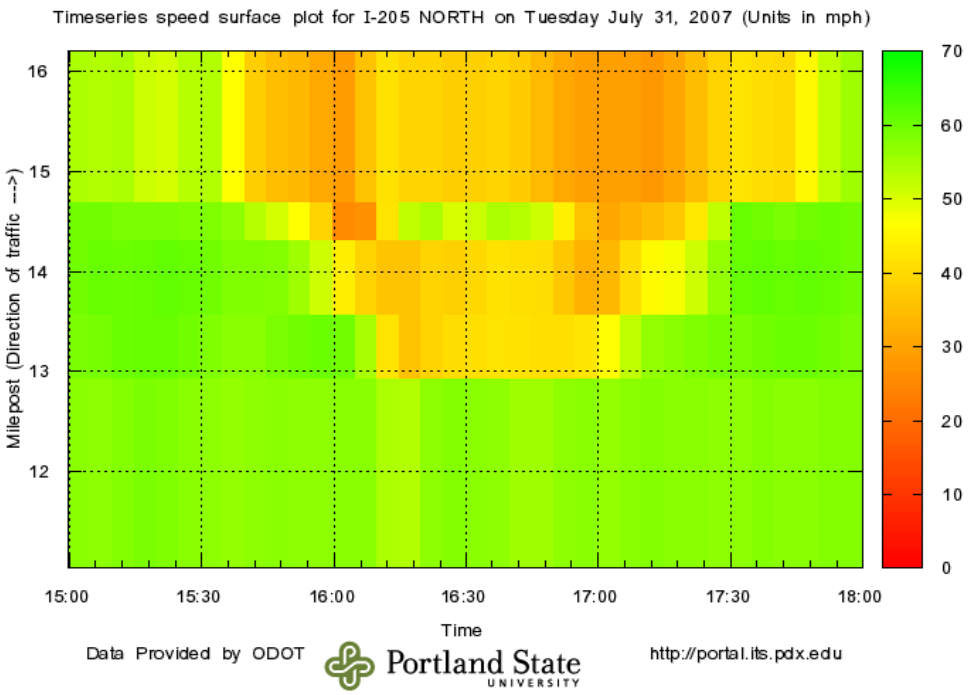

Timeseries speed surface plot for I-205 NORTH on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
16
15
14
13
12
15:00
15:30
16:00
16:30
17:00
17:30
18:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

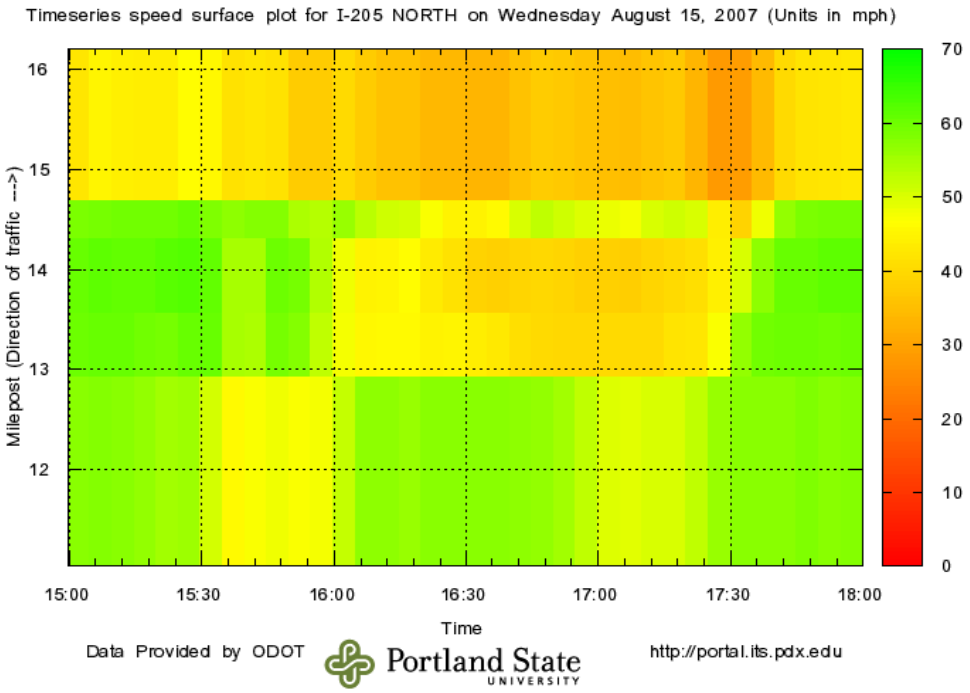

Timeseries speed surface plot for I-205 NORTH on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
16
15
14
13
12
15:00
15:30
16:00
16:30
17:00
17:30
18:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 NORTH on Thursday June 14, 2007 (Units in mph)
Milepost (Direction of traffic --->)
16
15
14
13
12
15:00
15:30
16:00
16:30
17:00
17:30
18:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 NORTH on Tuesday July 24, 2007 (Units in mph)
Milepost (Direction of traffic --->)
16
15
14
13
12
15:00
15:30
16:00
16:30
17:00
17:30
18:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 NORTH on Thursday August 30, 2007 (Units in mph)
Milepost (Direction of traffic --->)
16
15
14
13
12
15:00
15:30
16:00
16:30
17:00
17:30
18:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 NORTH on Tuesday July 31, 2007 (Units in mph)
Milepost (Direction of traffic --->)
16
15
14
13
12
15:00
15:30
16:00
16:30
17:00
17:30
18:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 NORTH on Wednesday August 15, 2007 (Units in mph)
Milepost (Direction of traffic --->)
16
15
14
13
12
15:00
15:30
16:00
16:30
17:00
17:30
18:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
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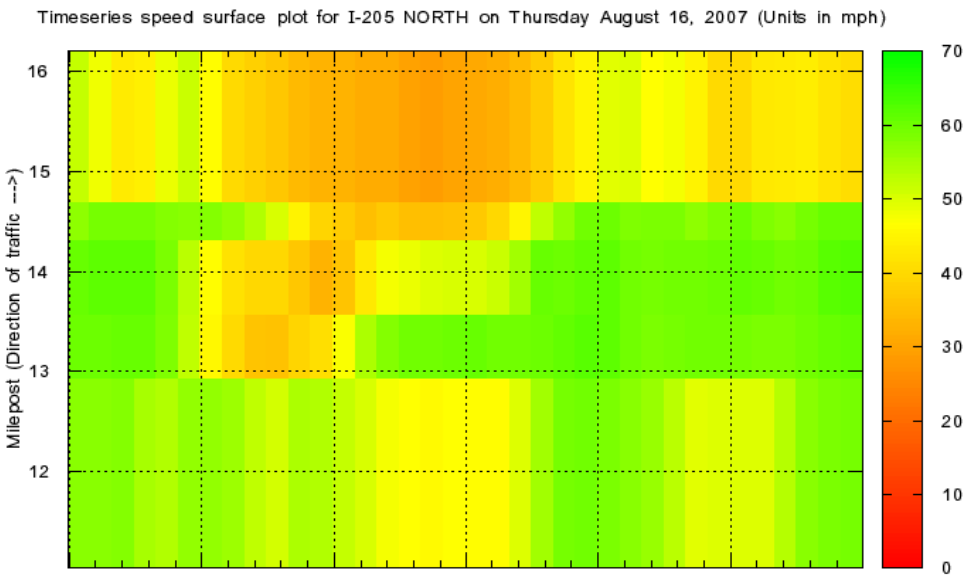
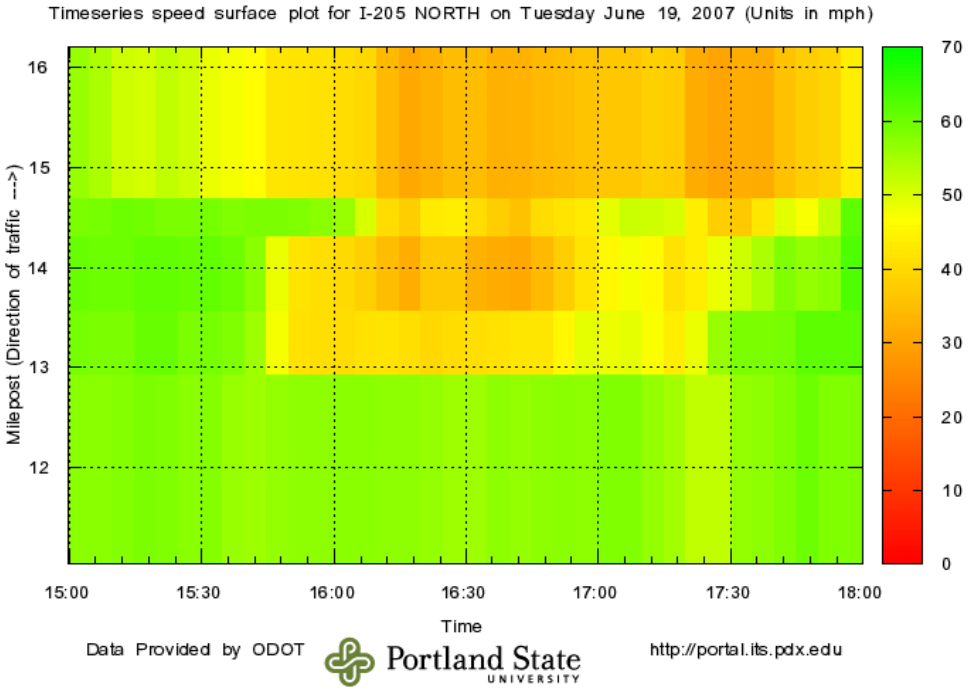
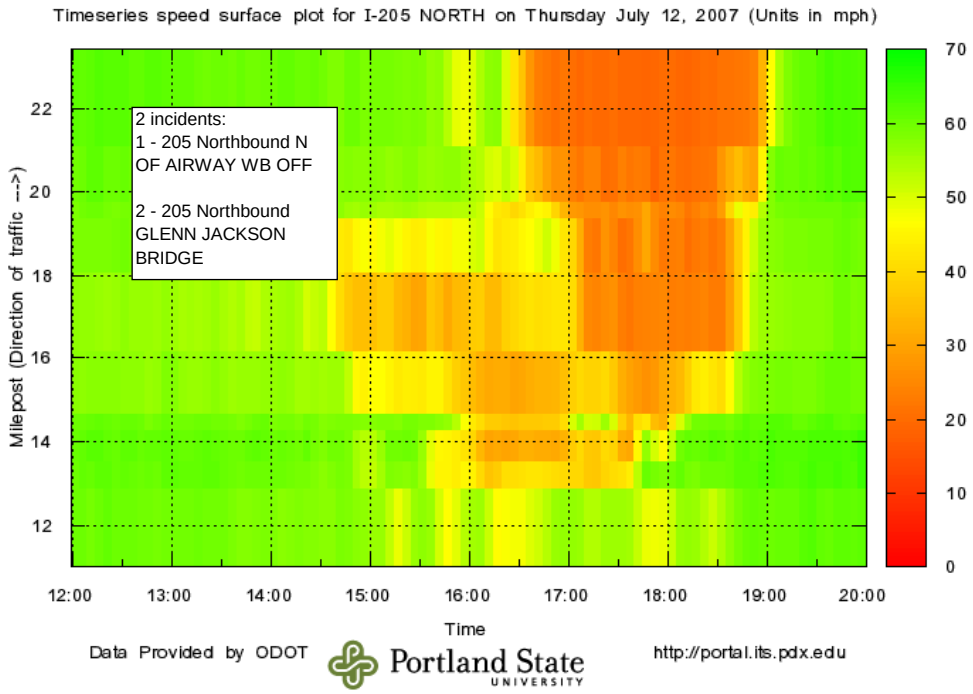


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
766608	205	205 Northbound RMP FR HWY 43	0	17:06:53	56	Debris	All Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.




Timeseries speed surface plot for I-205 NORTH on Thursday July 12, 2007 (Units in mph)
2 incidents:
1 - 205 Northbound N OF AIRWAY WB OFF
2 - 205 Northbound GLENN JACKSON BRIDGE
Milepost (Direction of traffic --->)
22
20
18
16
14
12
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
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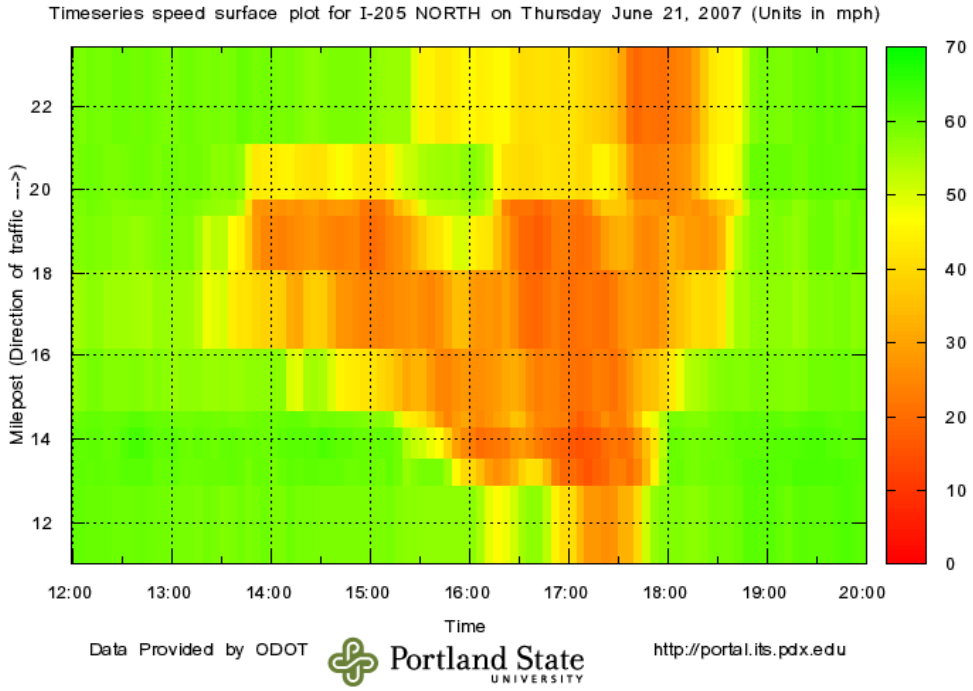
Timeseries speed surface plot for I-205 NORTH on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
22
20
18
16
14
12
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
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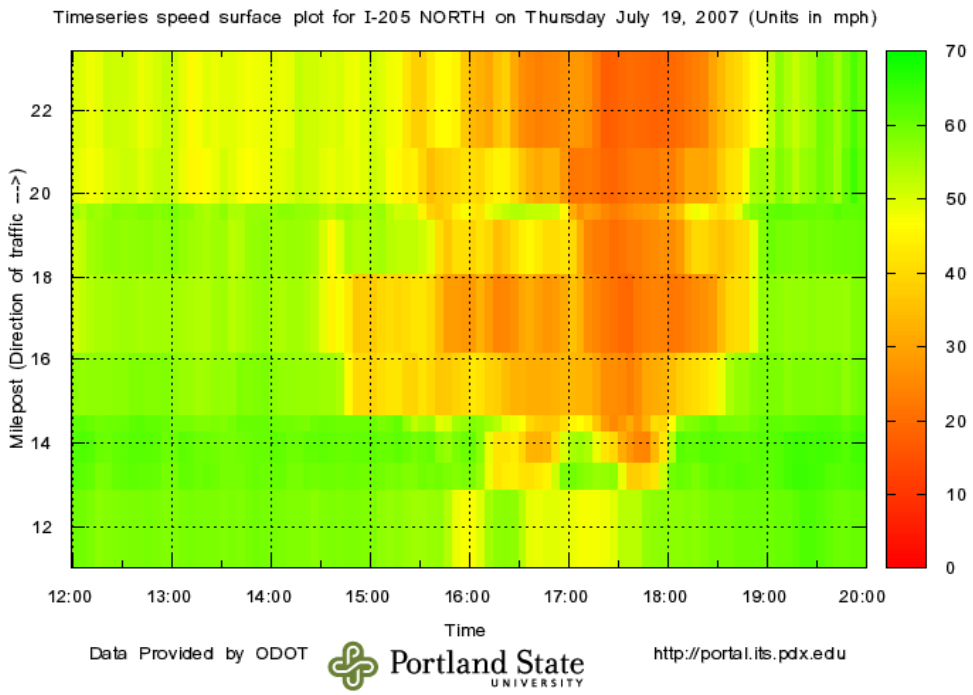
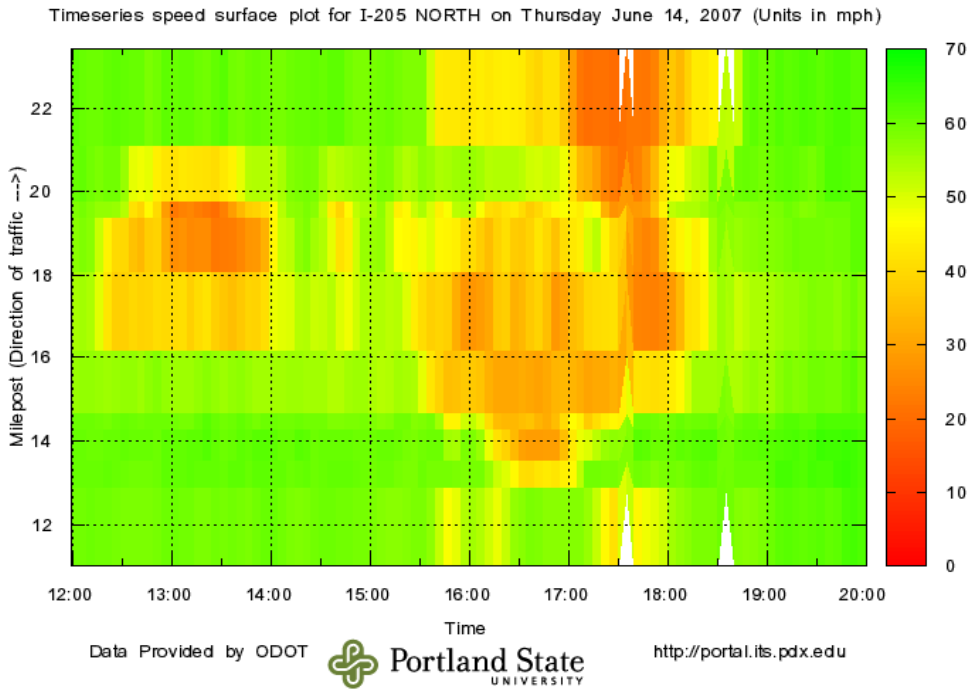
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 NORTH on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic -->)
22
20
18
16
14
12
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 NORTH on Thursday June 14, 2007 (Units in mph)
Milepost (Direction of traffic -->)
22
20
18
16
14
12
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
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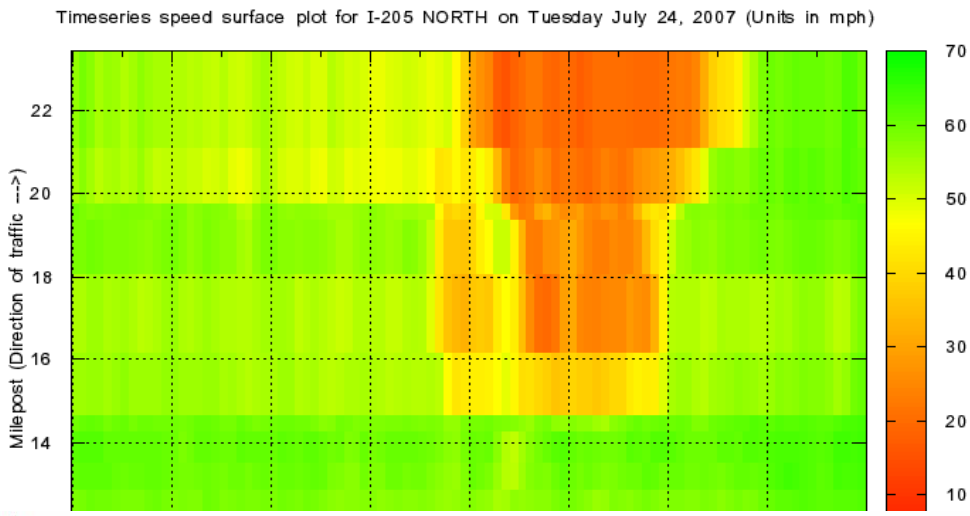
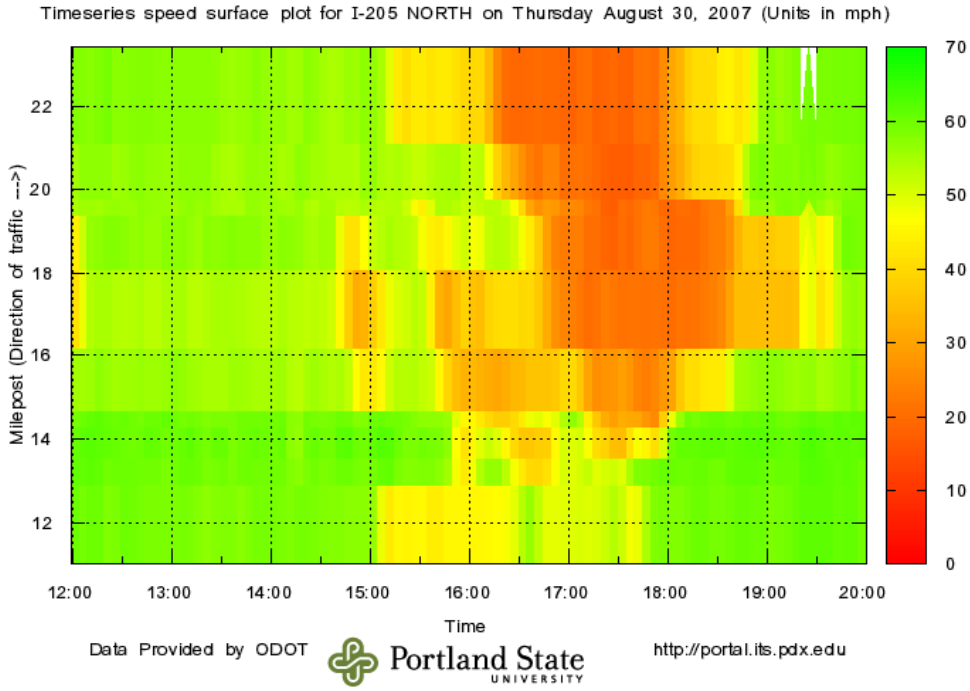
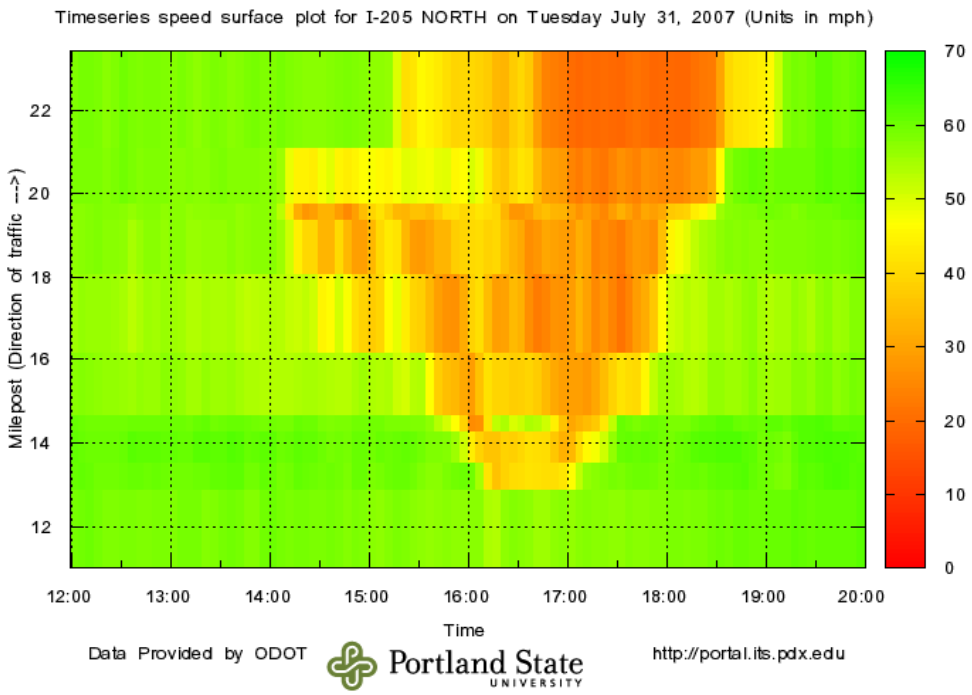
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
756384	I-205	I-205 Northbound At STARK	0	13:21:58	55	Other Incident	Right Shoulder	no	0
756409	I-205	I-205 Northbound At I-84 EB	1	14:06:59	57	Debris	Right Lanes	no	0
756425	I-205	I-205 Northbound At SANDY	1	14:42:12	57	Crash	Center Lanes	no	0
756444	I-205	I-205 Northbound Just North Of KILLINGSWORTH	3	15:14:10	54	Crash	All Lanes	no	0
756543	I-205	I-205 Northbound At STAFFORD	0	18:26:08	57	Stall	Right Shoulder	no	0
756563	I-205	I-205 Northbound Just South Of 10TH	0	18:31:22	57	Stall	Right Shoulder	no	0




Timeseries speed surface plot for I-205 NORTH on Tuesday July 31, 2007 (Units in mph)
Milepost (Direction of traffic -->)
22
20
18
16
14
12
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
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50
40
30
20
10
0
Data Provided by ODOT
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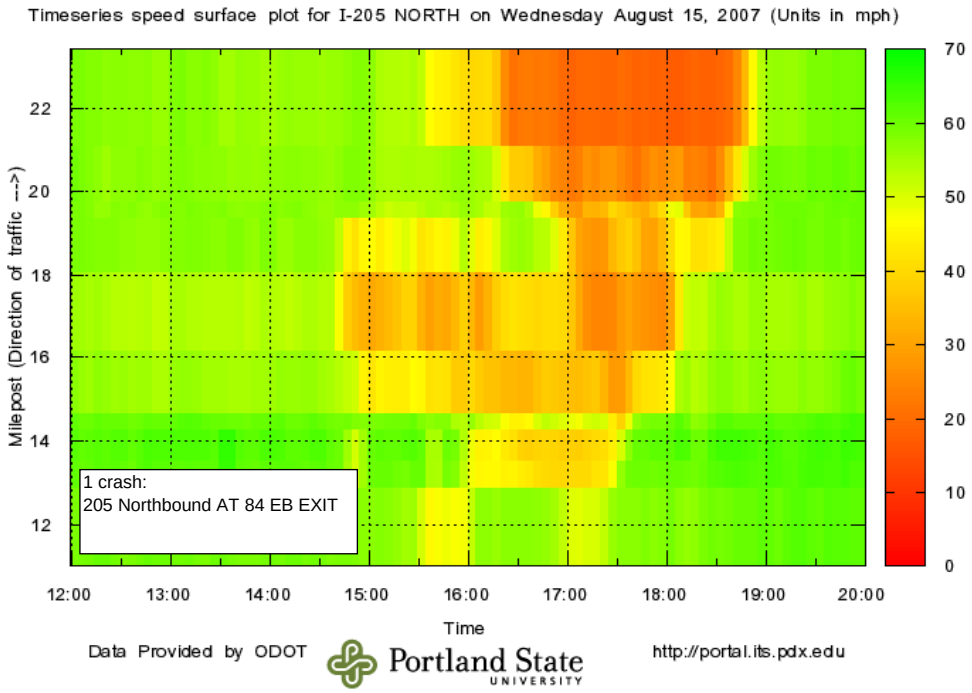
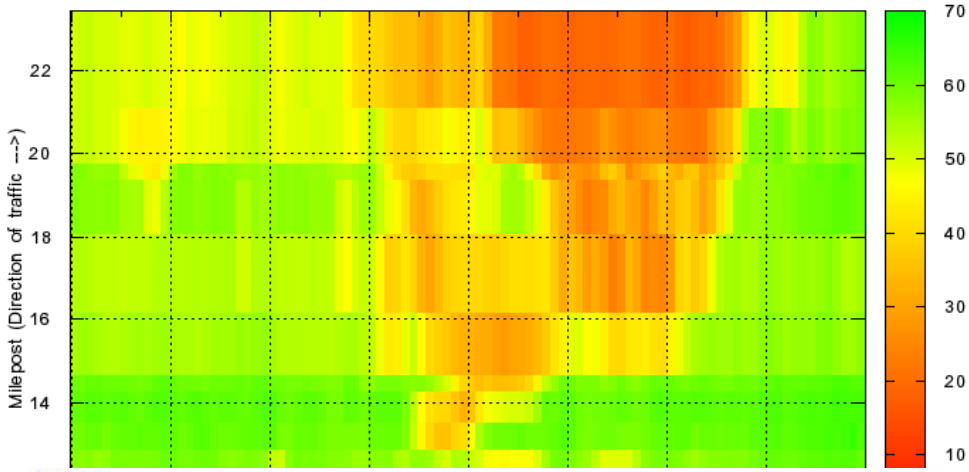
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 NORTH on Wednesday August 15, 2007 (Units in mph)
Milepost (Direction of traffic -->)
22
20
18
16
14
12
1 crash:
205 Northbound AT 84 EB EXIT
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

Timeseries speed surface plot for I-205 NORTH on Thursday August 16, 2007 (Units in mph)

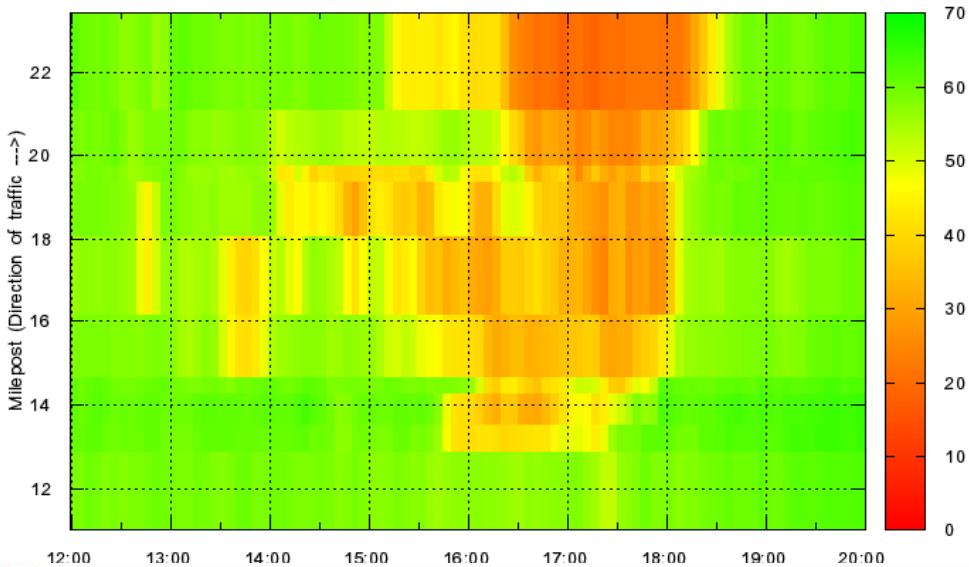


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
766529	I-205	I-205 Northbound At AIRPORT WAY	0	12:10:01	56	Stall	Right Lanes	no	0
766608	205	205 Northbound RMP FR HWY 43	0	17:06:53	56	Debris	All Lanes	no	0
766648	I-205	I-205 Northbound At DIVISION	1	18:30:59	56	Stall	Right Shoulder	no	0
766649	I-205	I-205 Northbound At BURNSIDE	1	18:37:56	56	Stall	Right Shoulder	no	0
766691	I-205	I-205 Northbound At ALBERTA	1	19:51:55	55	Stall	Right Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

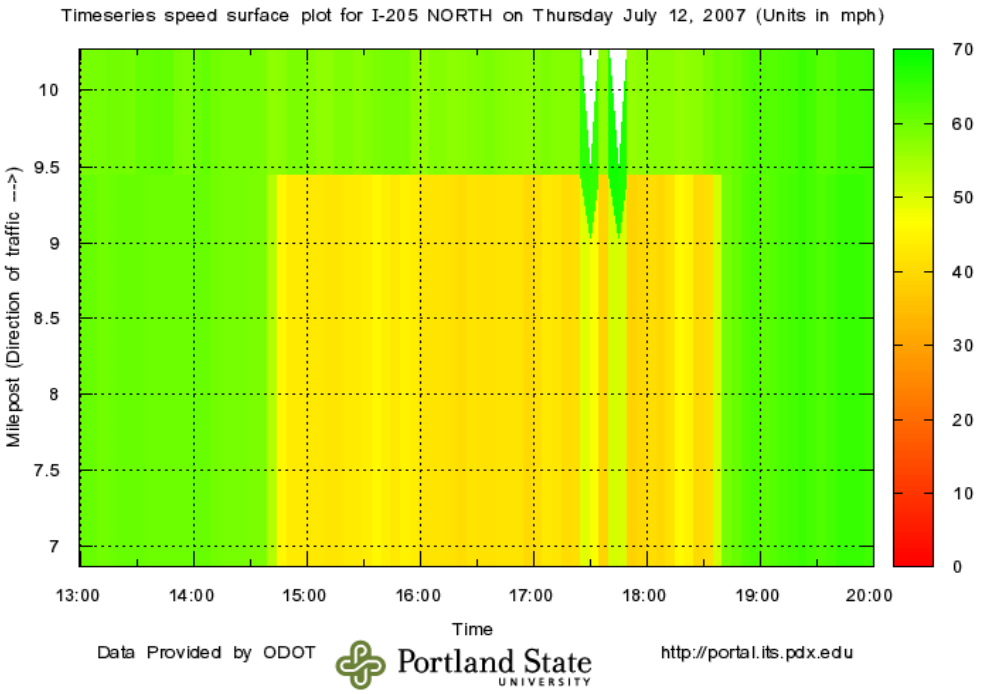
Timeseries speed surface plot for I-205 NORTH on Tuesday June 19, 2007 (Units in mph)

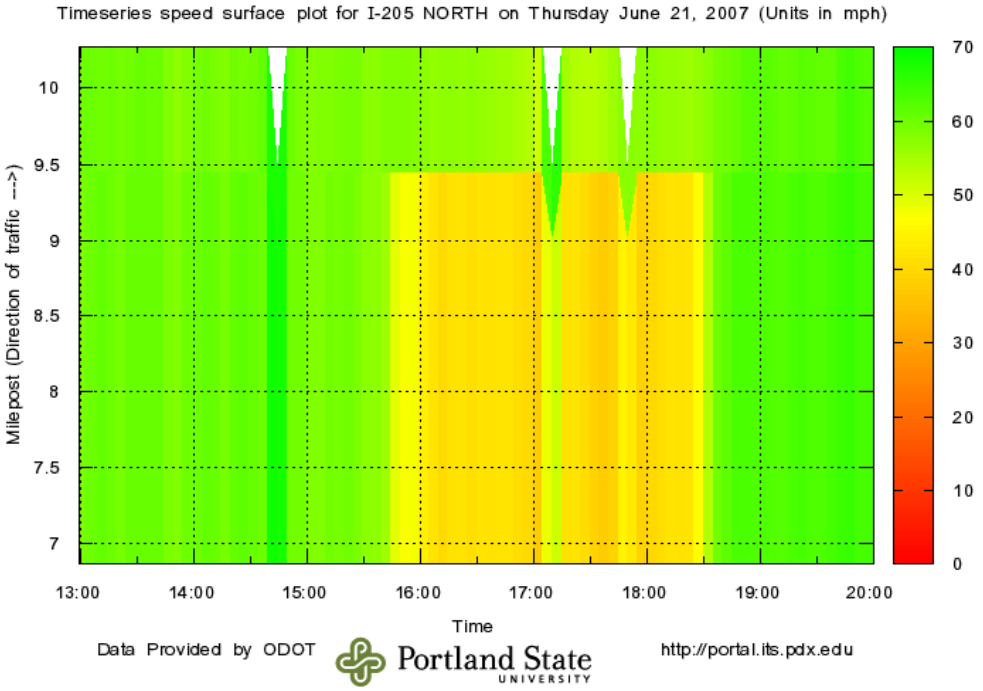


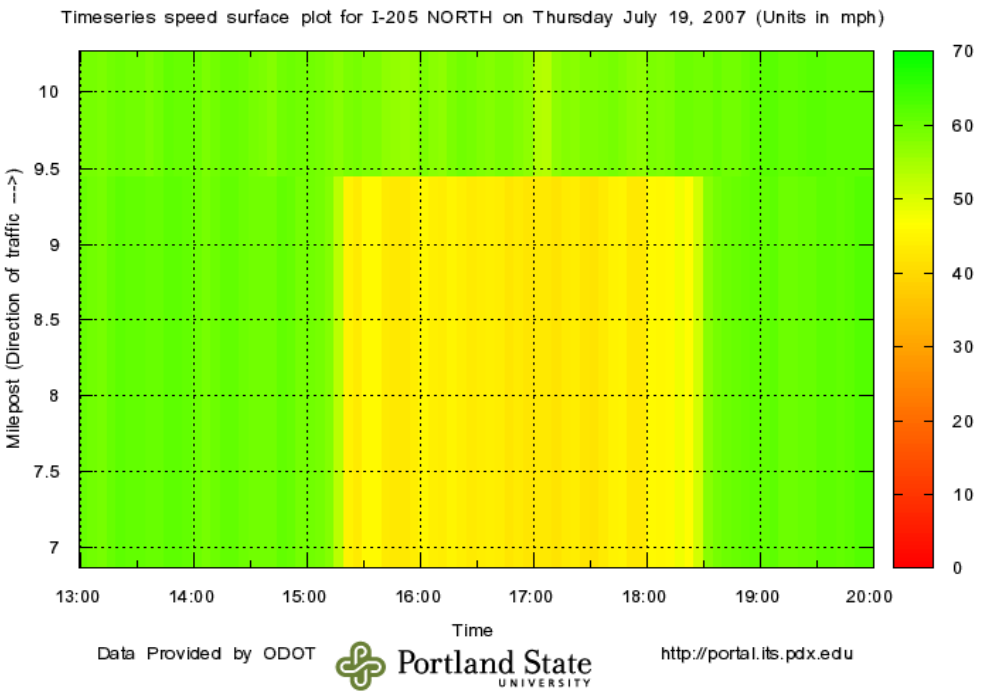
Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
740703	I-205	I-205 Northbound Just East Of I-5	0	16:03:22	58	Crash	Right Shoulder	no	0
740766	205	205 Northbound GLENN JACKSON BRIDGE	0	18:46:34	58	Stall	Right Shoulder	no	0

No Bottleneck






Timeseries speed surface plot for I-205 NORTH on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
10
9.5
9
8.5
8
7.5
7
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
60
50
40
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20
10
0
Data Provided by ODOT
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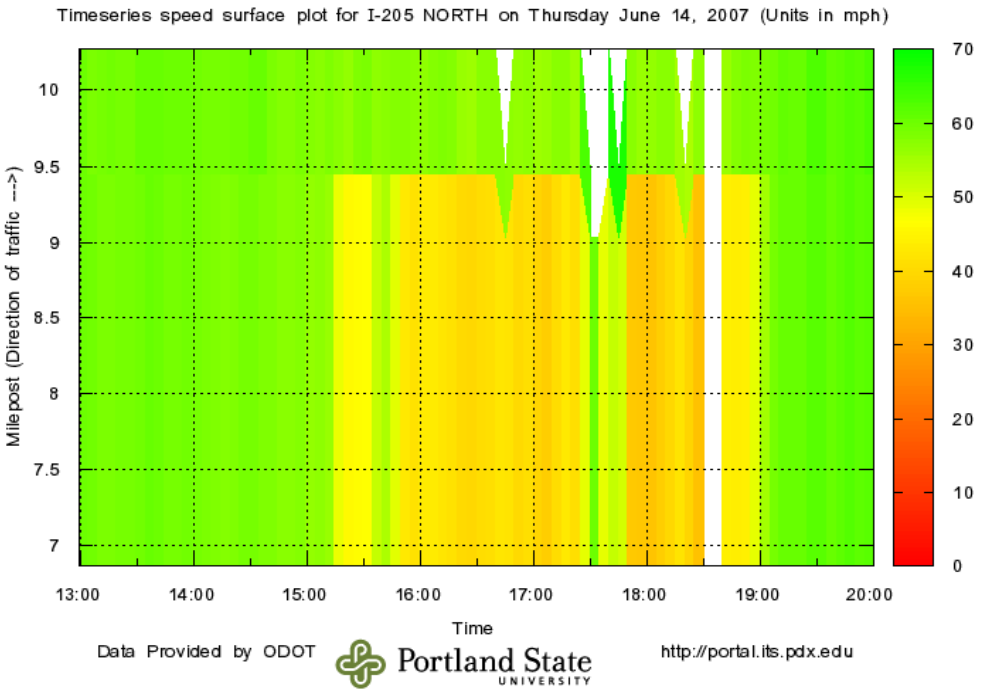
Timeseries speed surface plot for I-205 NORTH on Thursday June 14, 2007 (Units in mph)
Milepost (Direction of traffic --->)
10
9.5
9
8.5
8
7.5
7
13:00
14:00
15:00
16:00
17:00
18:00
19:00
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Time
70
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Data Provided by ODOT
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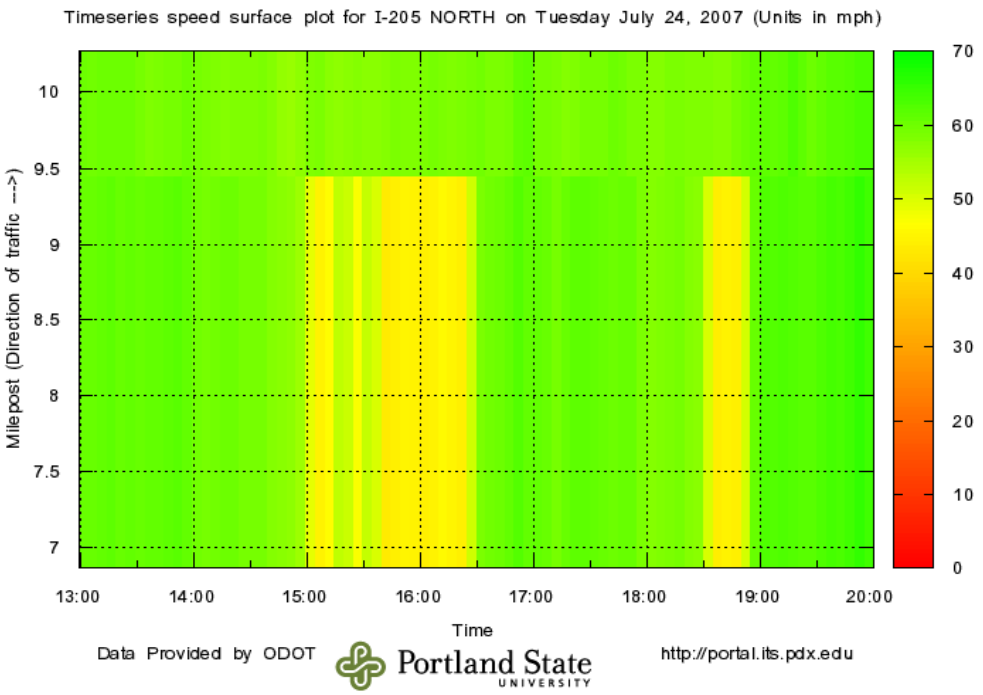
Timeseries speed surface plot for I-205 NORTH on Tuesday July 24, 2007 (Units in mph)
Milepost (Direction of traffic --->)
10
9.5
9
8.5
8
7.5
7
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
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Data Provided by ODOT
Portland State UNIVERSITY
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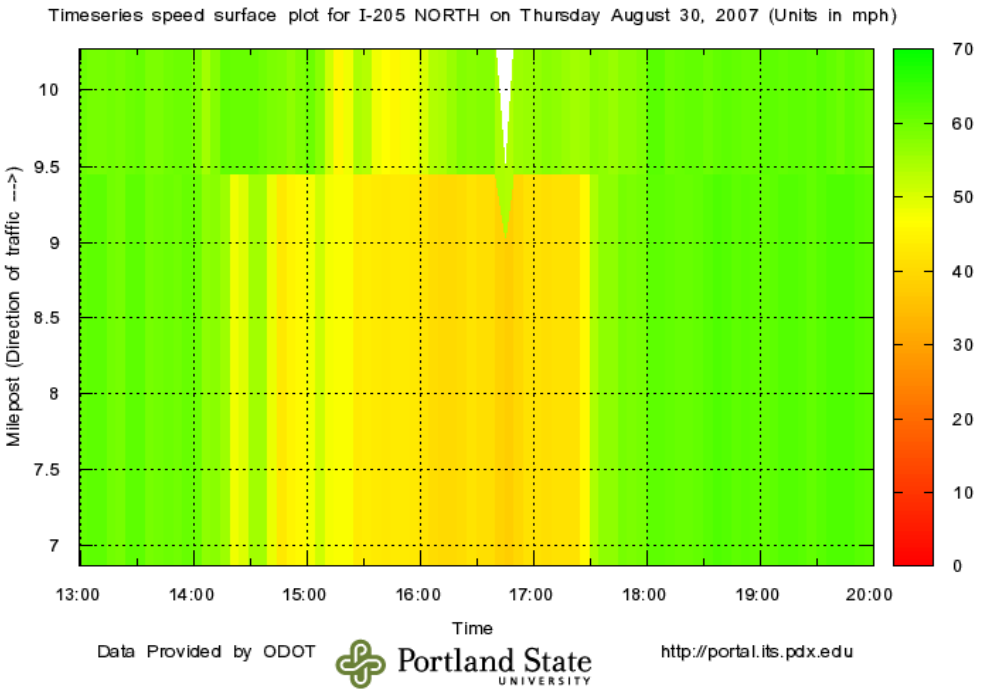
Timeseries speed surface plot for I-205 NORTH on Thursday August 30, 2007 (Units in mph)
Milepost (Direction of traffic --->)
10
9.5
9
8.5
8
7.5
7
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
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Data Provided by ODOT
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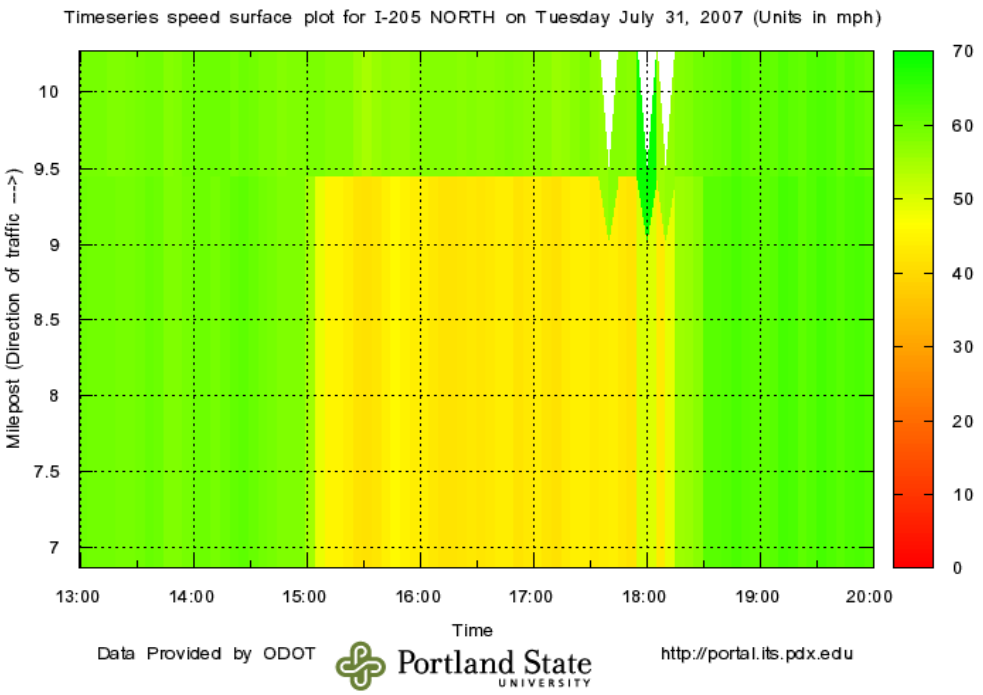
Timeseries speed surface plot for I-205 NORTH on Tuesday July 31, 2007 (Units in mph)
Milepost (Direction of traffic --->)
10
9.5
9
8.5
8
7.5
7
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
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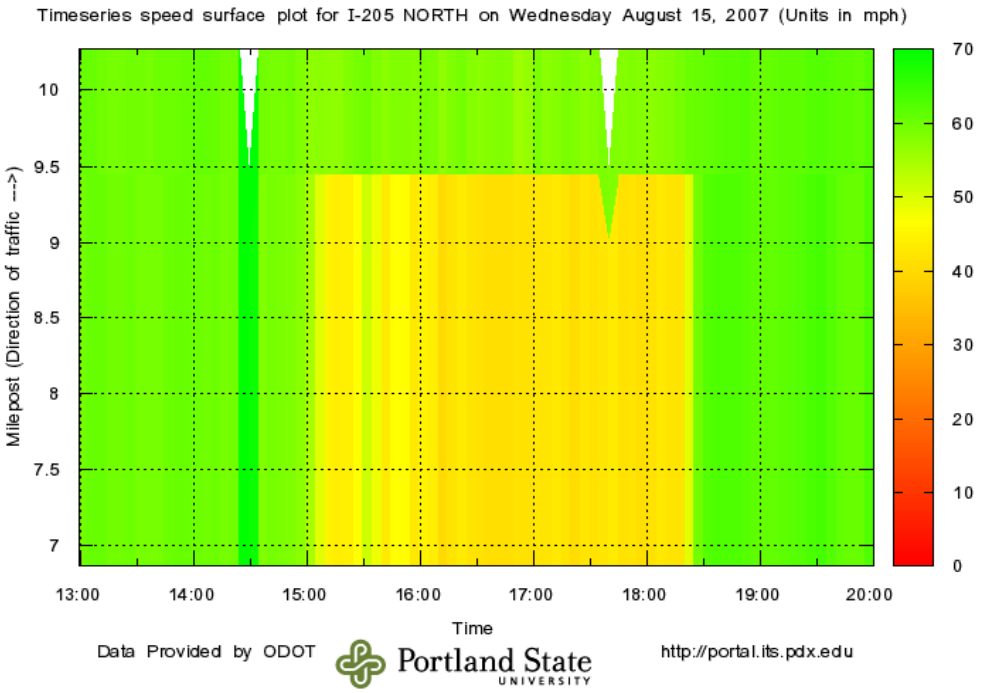
Timeseries speed surface plot for I-205 NORTH on Wednesday August 15, 2007 (Units in mph)
Milepost (Direction of traffic --->)
10
9.5
9
8.5
8
7.5
7
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
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Data Provided by ODOT
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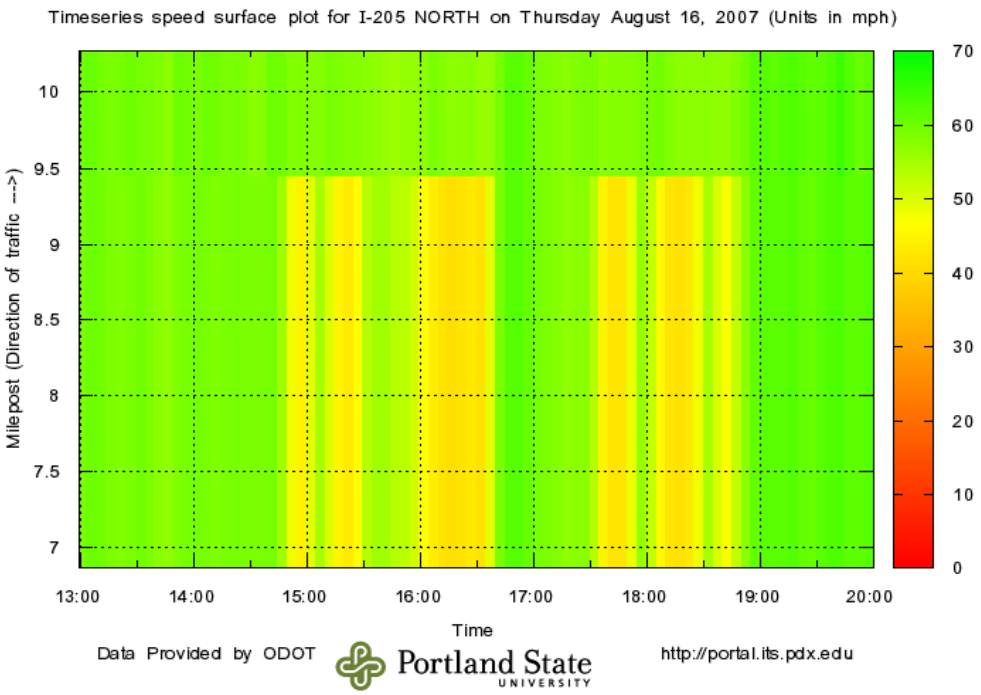
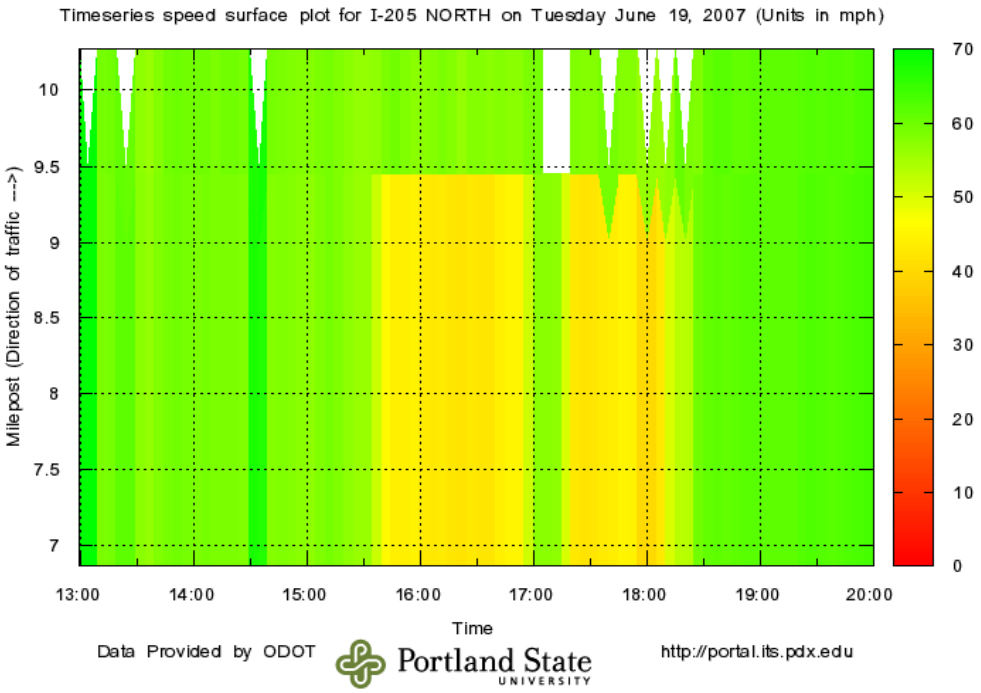
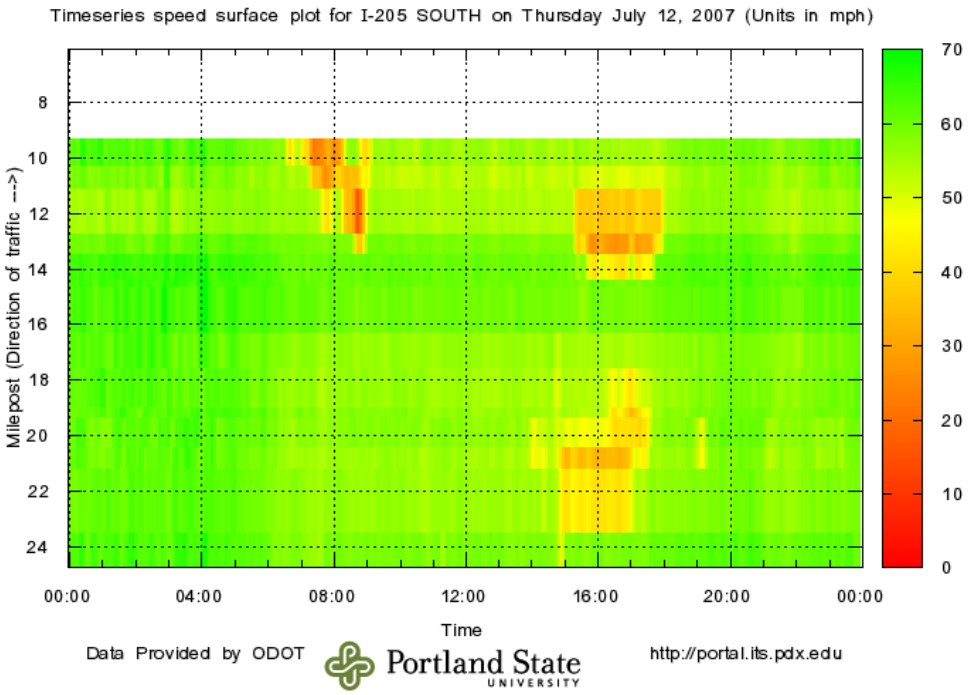




SHOW 2009 PLOTS FOR MISSING M.P. (3-7)

I-205 Southbound
24 Hour Speed Plots

DAVID EVANS
AND ASSOCIATES INC.


Timeseries speed surface plot for I-205 SOUTH on Thursday July 12, 2007 (Units in mph)
Milepost (Direction of traffic --->)
8
10
12
14
16
18
20
22
24
00:00
04:00
08:00
12:00
16:00
20:00
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Time
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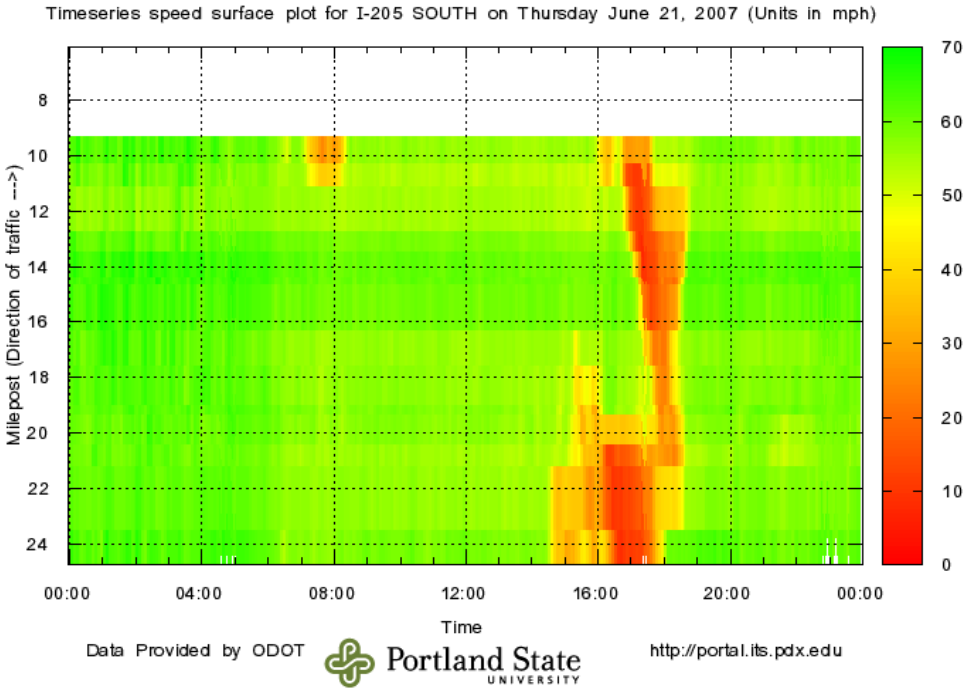
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 SOUTH on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
8
10
12
14
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20
22
24
00:00
04:00
08:00
12:00
16:00
20:00
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Time
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Data Provided by ODOT
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UNIVERSITY
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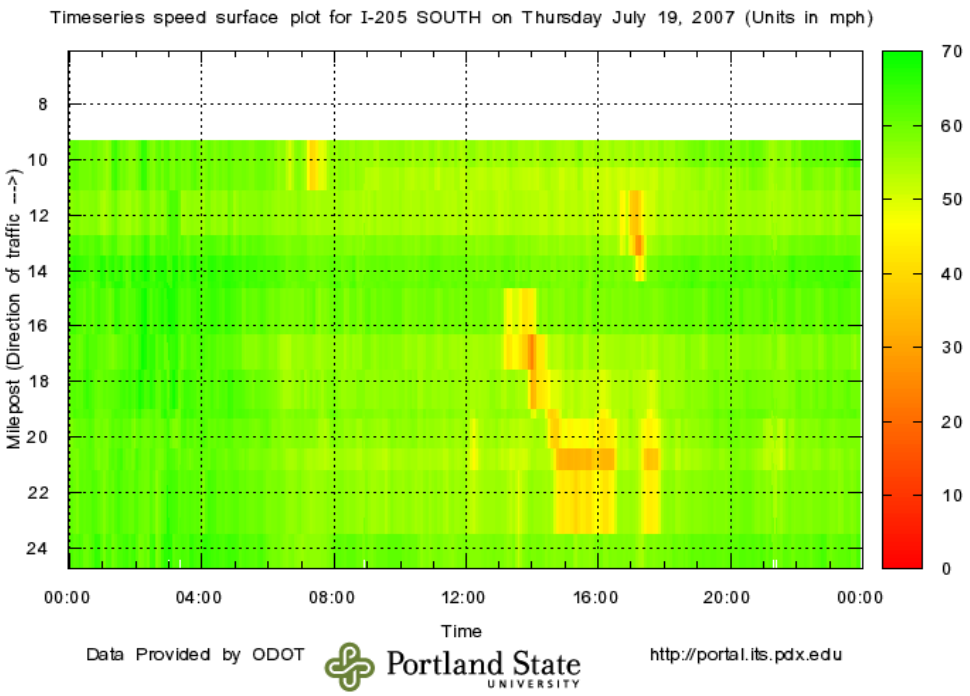
Timeseries speed surface plot for I-205 SOUTH on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
8
10
12
14
16
18
20
22
24
00:00
04:00
08:00
12:00
16:00
20:00
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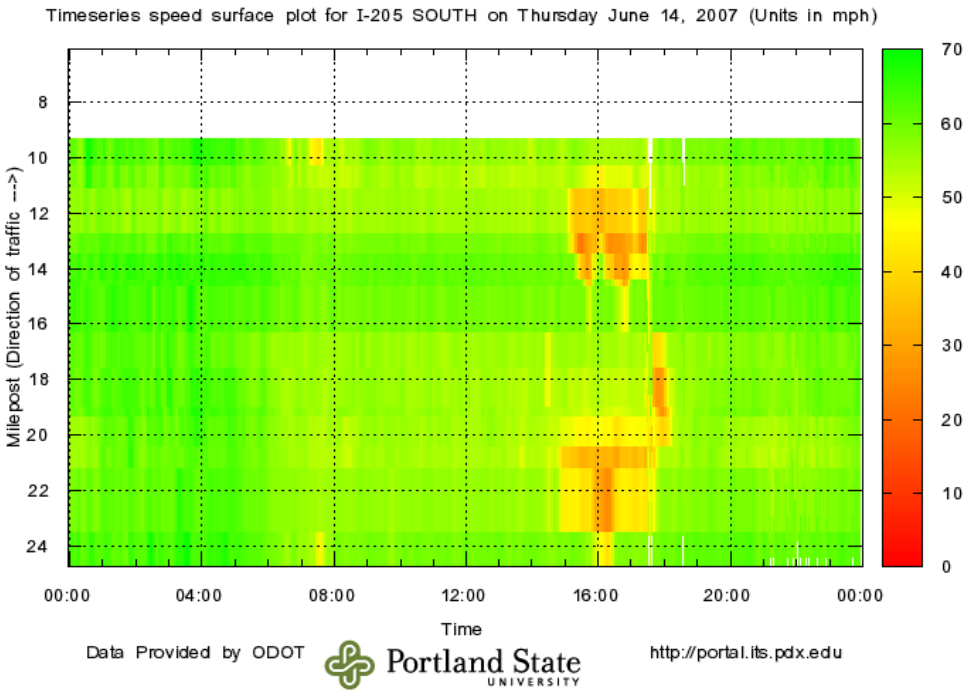
Timeseries speed surface plot for I-205 SOUTH on Thursday June 14, 2007 (Units in mph)
Milepost (Direction of traffic --->)
8
10
12
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16
18
20
22
24
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04:00
08:00
12:00
16:00
20:00
00:00
Time
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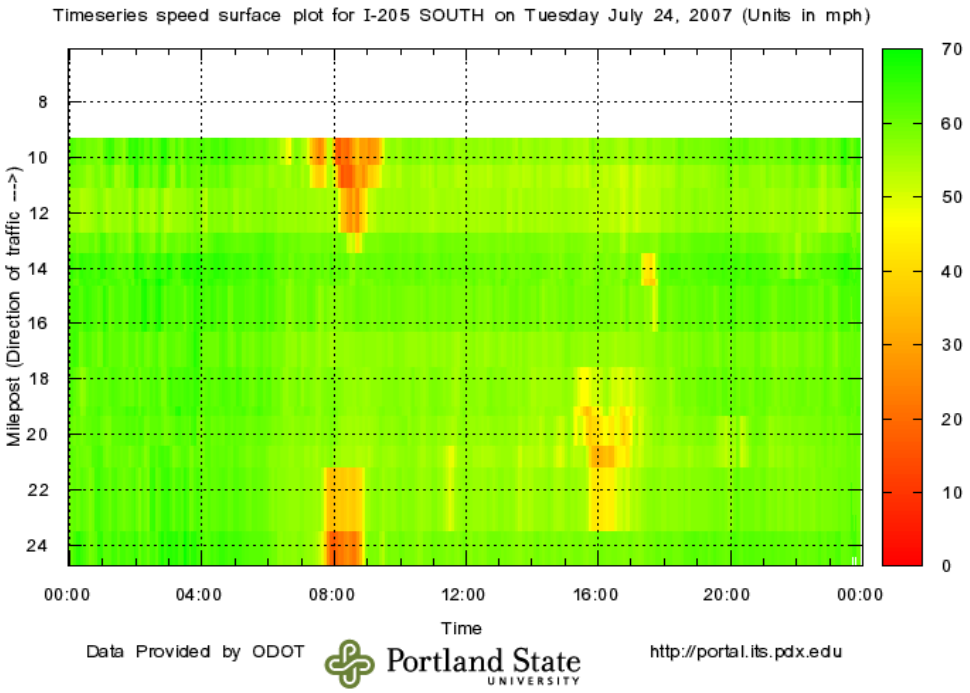
Timeseries speed surface plot for I-205 SOUTH on Tuesday July 24, 2007 (Units in mph)
Milepost (Direction of traffic --->)
8
10
12
14
16
18
20
22
24
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Time
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Data Provided by ODOT
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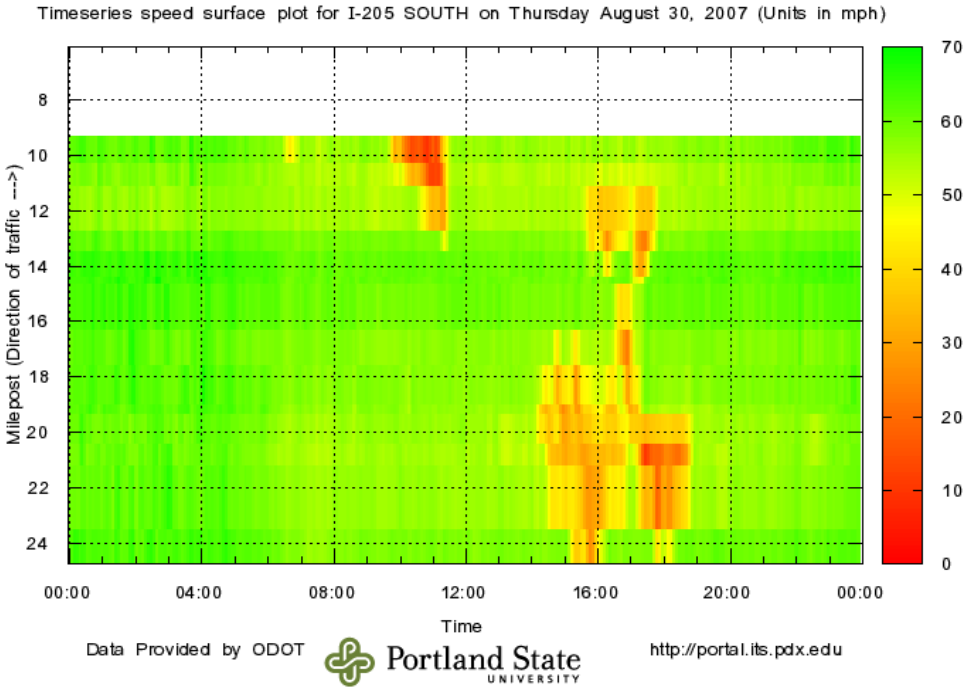
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 SOUTH on Thursday August 30, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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Data Provided by ODOT
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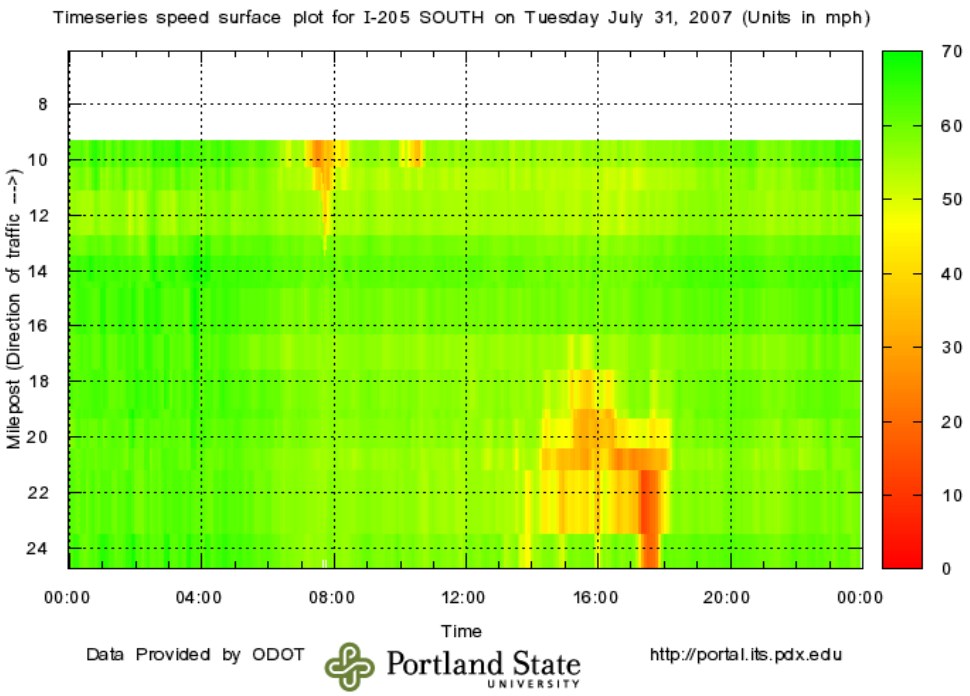
UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 SOUTH on Tuesday July 31, 2007 (Units in mph)
Milepost (Direction of traffic -->)
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Data Provided by ODOT
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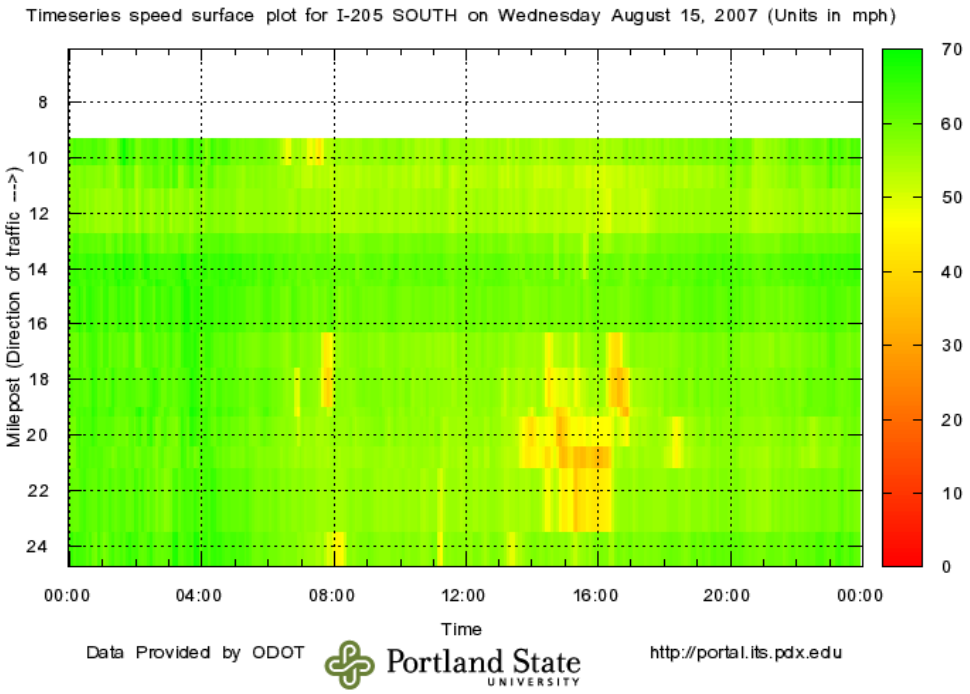
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 SOUTH on Wednesday August 15, 2007 (Units in mph)
Milepost (Direction of traffic -->)
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Data Provided by ODOT
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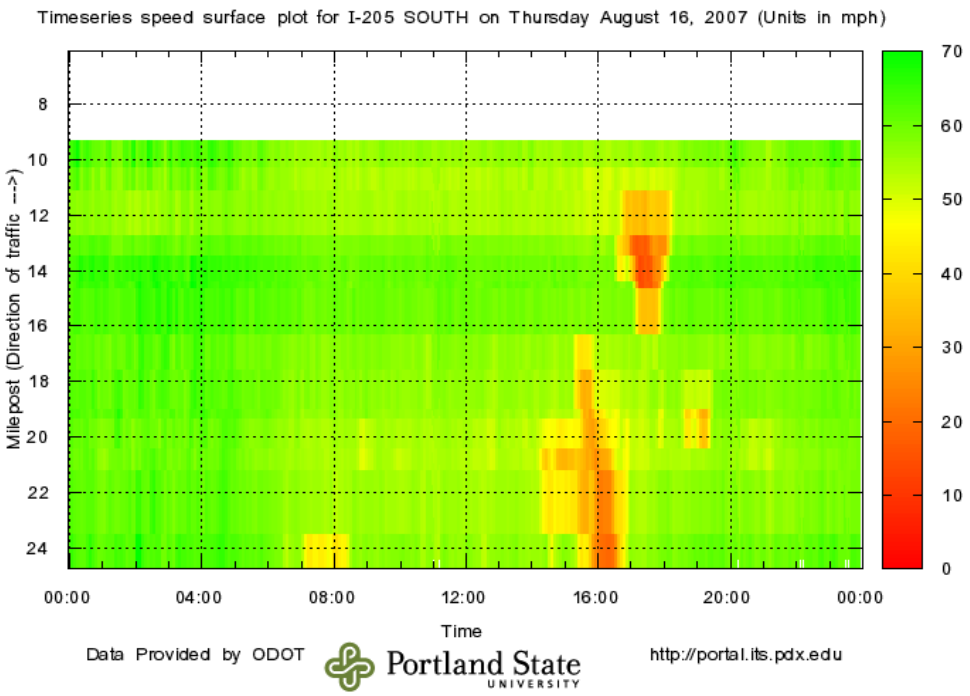
Timeseries speed surface plot for I-205 SOUTH on Thursday August 16, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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Data Provided by ODOT
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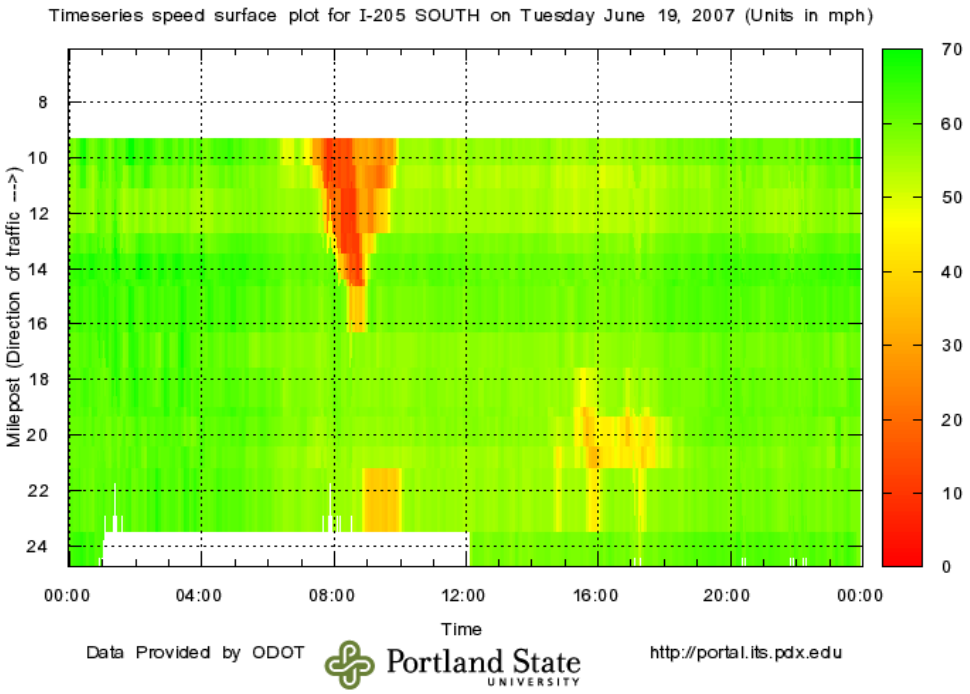
UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 SOUTH on Tuesday June 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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Data Provided by ODOT
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UNIVERSITY
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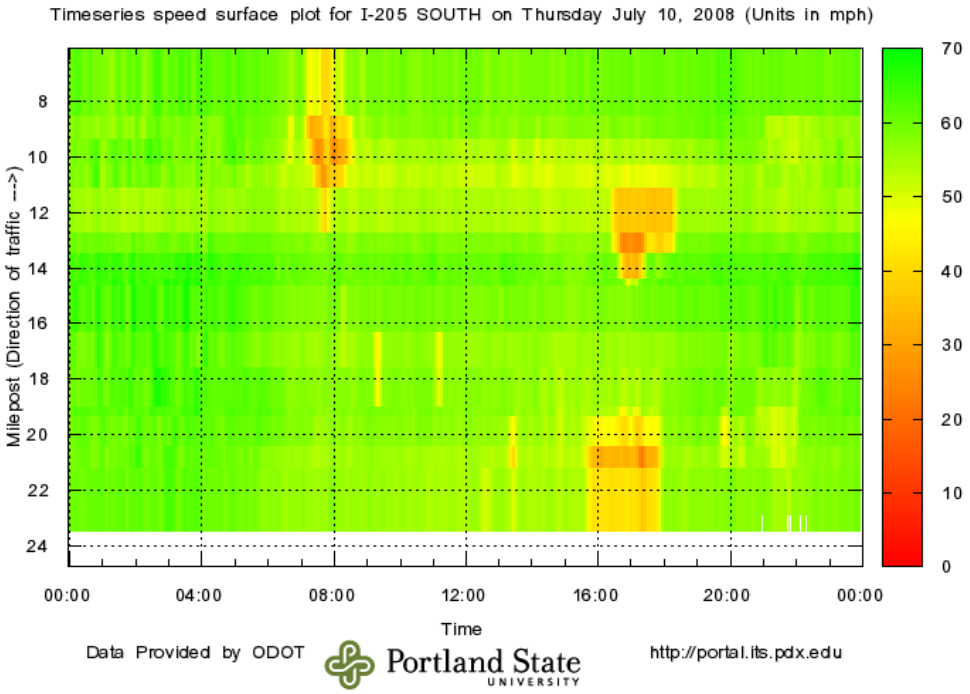
Timeseries speed surface plot for I-205 SOUTH on Thursday July 10, 2008 (Units in mph)
Milepost (Direction of traffic --->)
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Data Provided by ODOT
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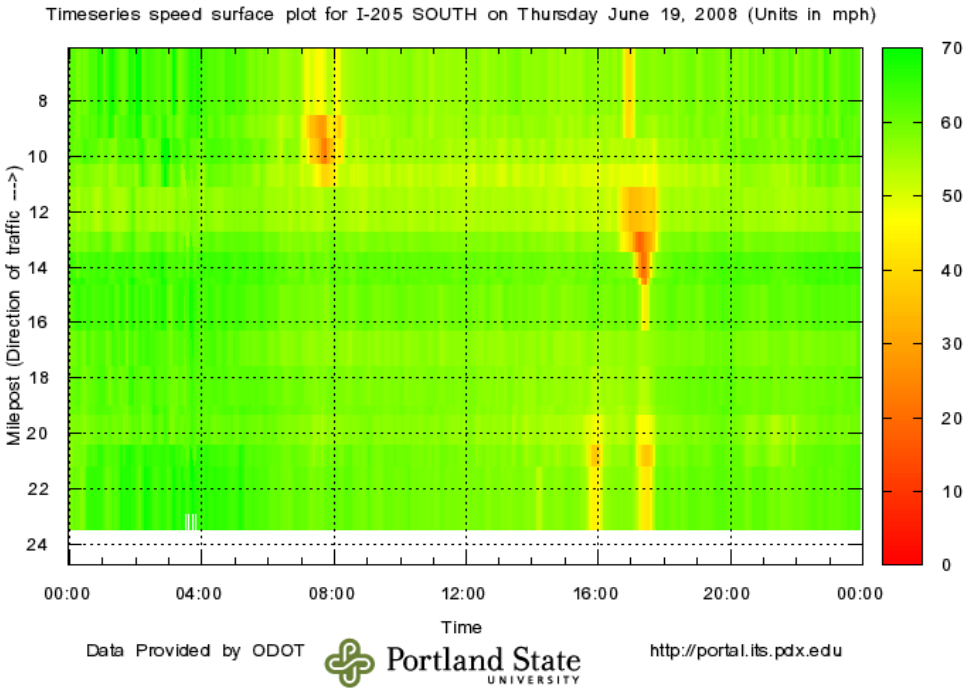
Timeseries speed surface plot for I-205 SOUTH on Thursday June 19, 2008 (Units in mph)
Milepost (Direction of traffic --->)
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Data Provided by ODOT
Portland State UNIVERSITY
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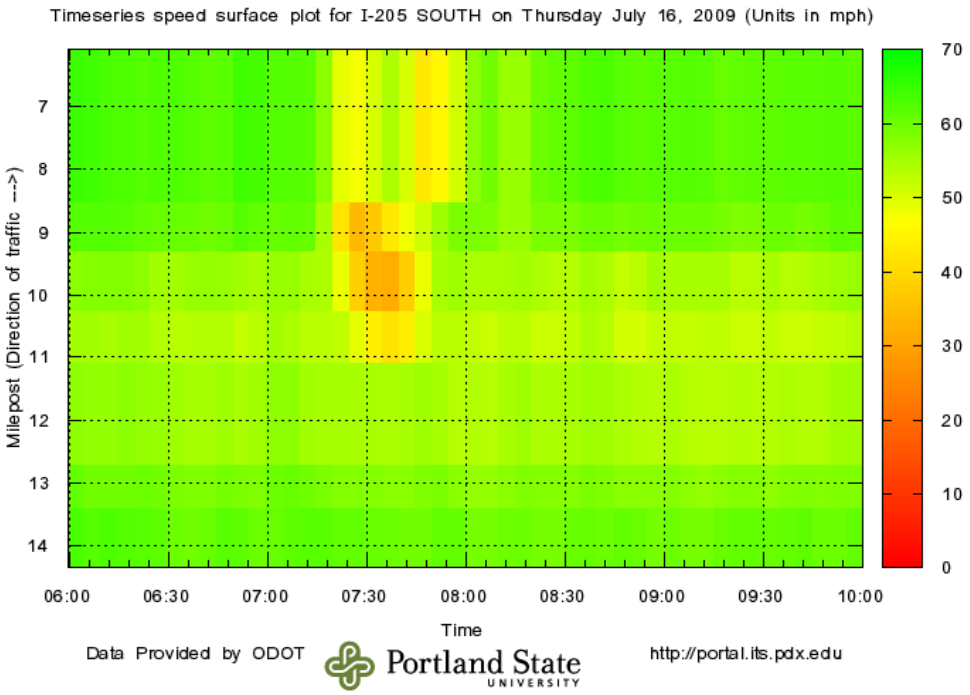
I-205 Southbound
AM Peak Hour Speed Plots

DAVID EVANS
AND ASSOCIATES INC.


Timeseries speed surface plot for I-205 SOUTH on Thursday July 16, 2009 (Units in mph)
Milepost (Direction of traffic --->)
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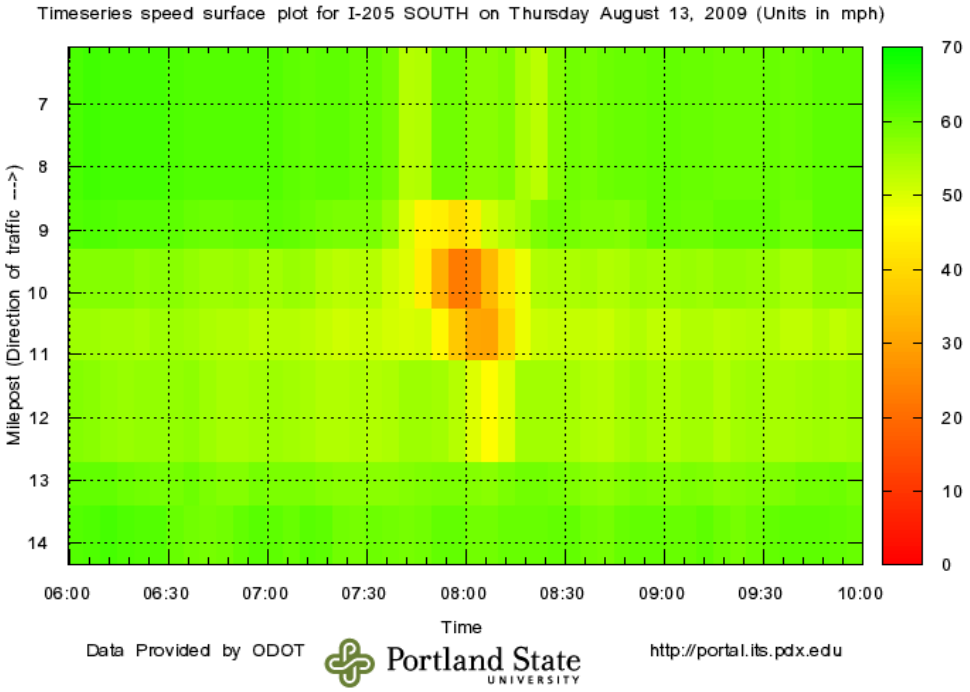
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 SOUTH on Thursday August 13, 2009 (Units in mph)
Milepost (Direction of traffic --->)
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Data Provided by ODOT
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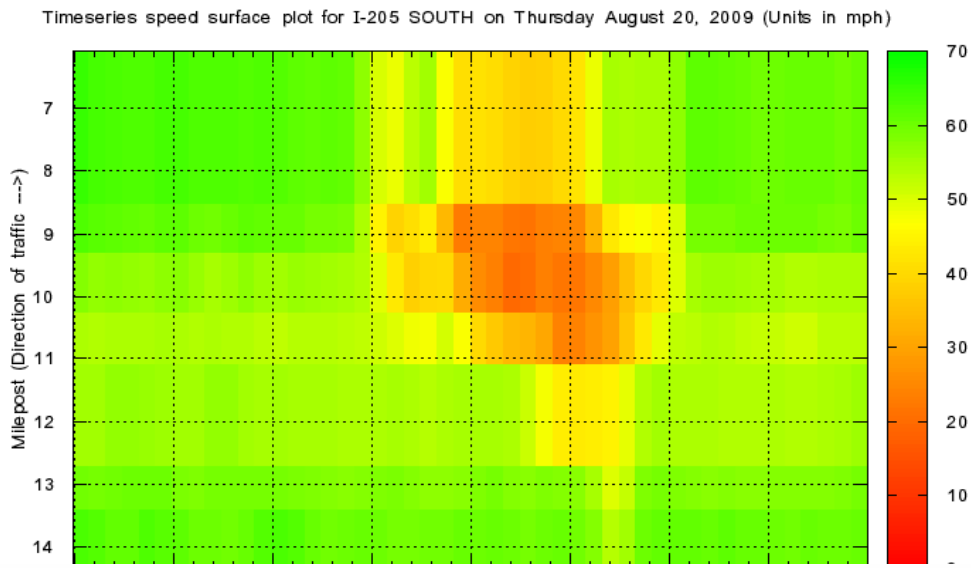
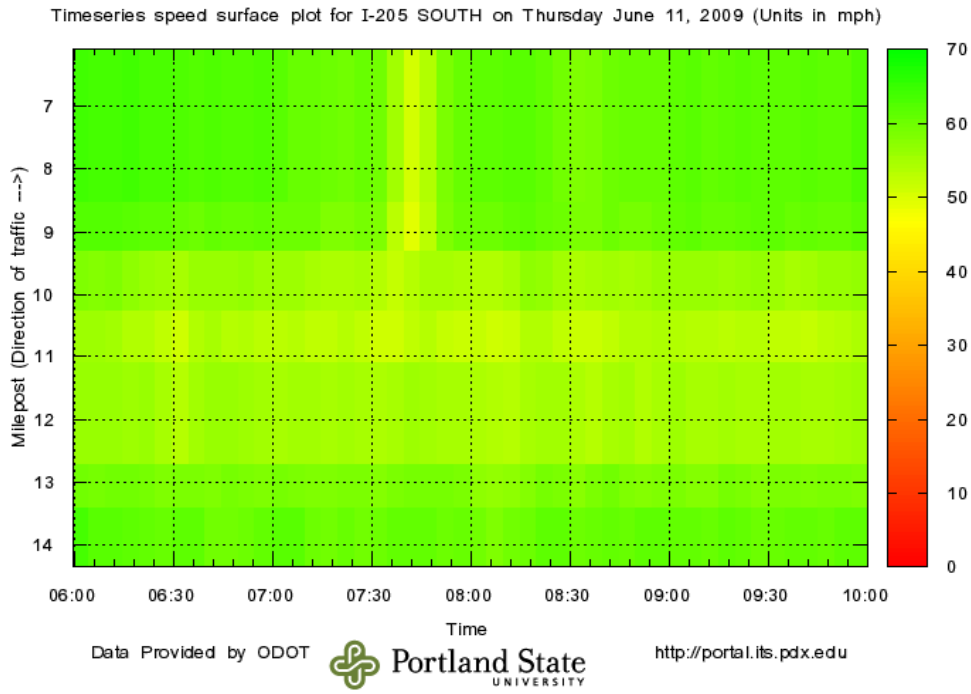
http://portal.its.pdx.edu

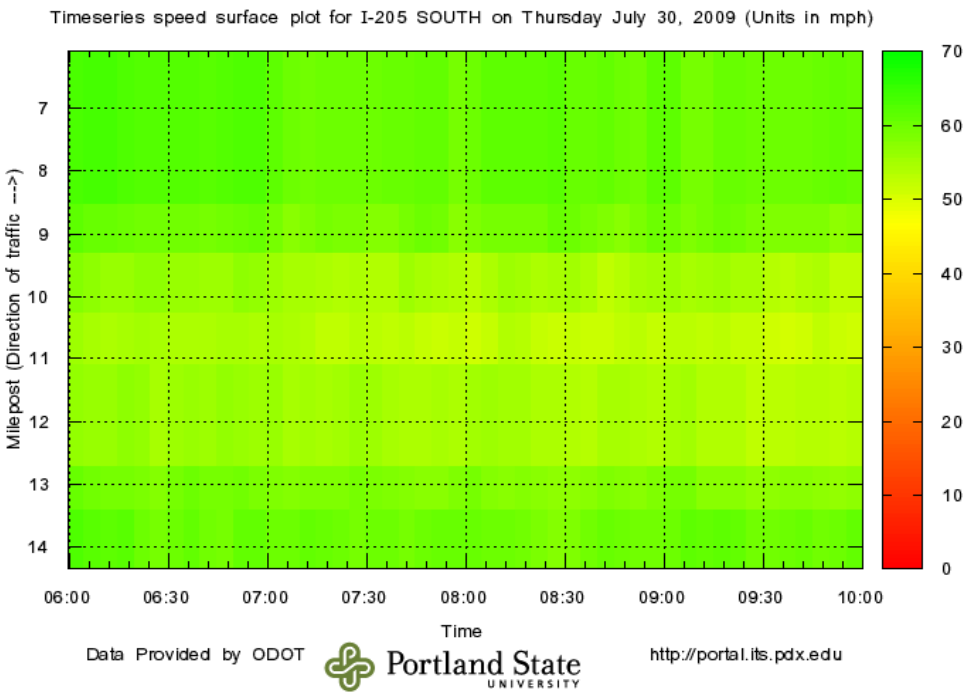


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
849800	I-205	I-205 Southbound GLADSTONE	1	08:25:16	21	Stall	Left Lanes	no	0
849797	I-205	I-205 Southbound I-84	1	07:47:50	6	Stall	Right Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.




Timeseries speed surface plot for I-205 SOUTH on Thursday July 30, 2009 (Units in mph)
Milepost (Direction of traffic -->)
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Data Provided by ODOT
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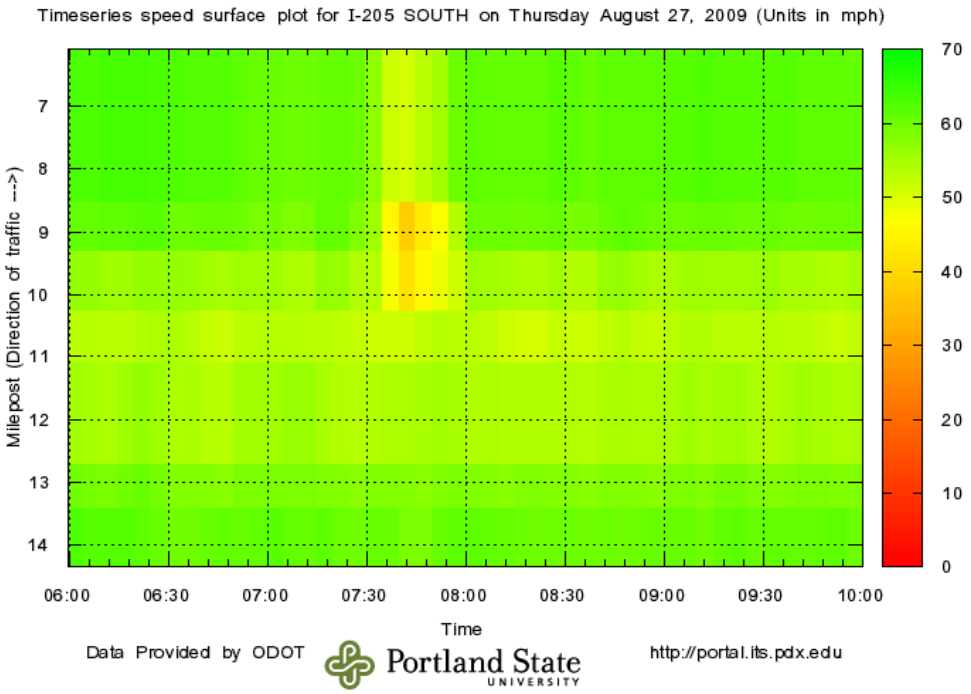
Timeseries speed surface plot for I-205 SOUTH on Thursday August 27, 2009 (Units in mph)
Milepost (Direction of traffic -->)
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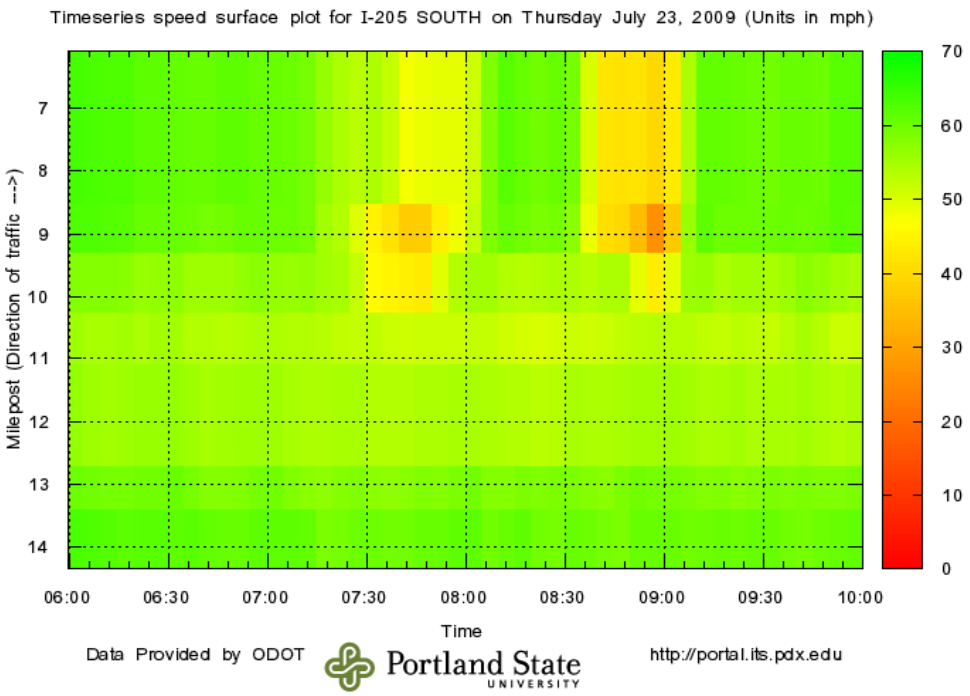
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 SOUTH on Thursday July 23, 2009 (Units in mph)
Milepost (Direction of traffic -->)
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Data Provided by ODOT
Portland State
UNIVERSITY
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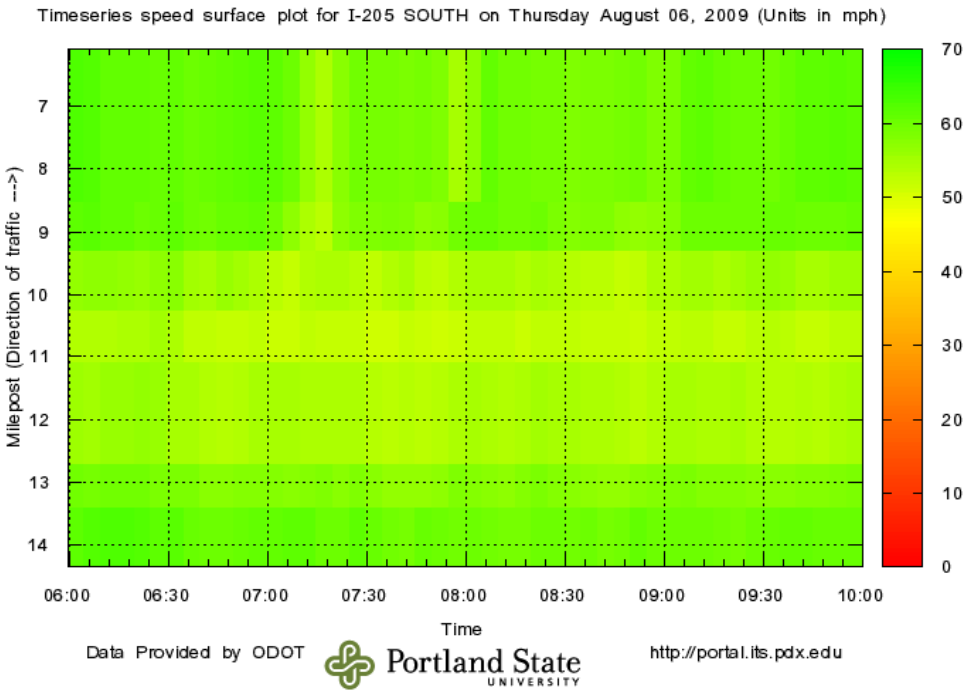
Timeseries speed surface plot for I-205 SOUTH on Thursday August 06, 2009 (Units in mph)
Milepost (Direction of traffic -->)
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Data Provided by ODOT
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UNIVERSITY
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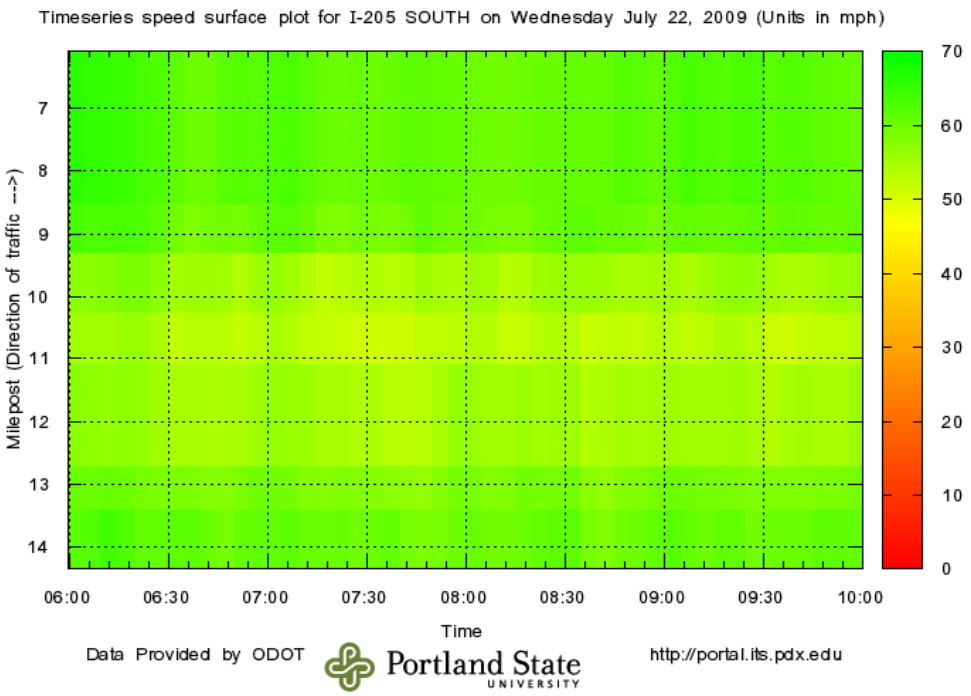
Timeseries speed surface plot for I-205 SOUTH on Wednesday July 22, 2009 (Units in mph)
Milepost (Direction of traffic -->)
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Data Provided by ODOT
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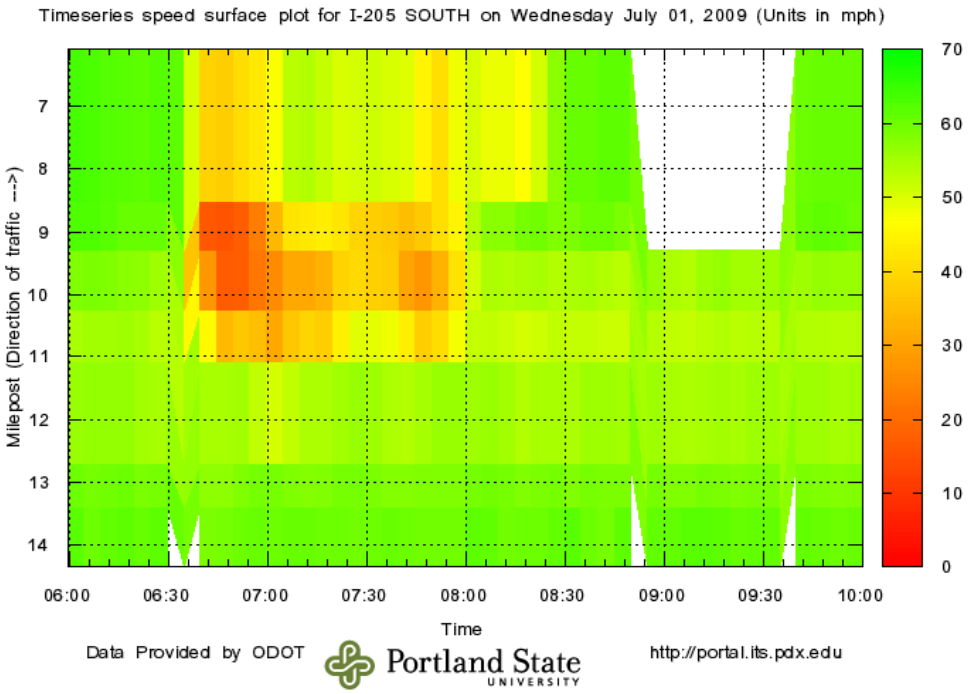
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 SOUTH on Wednesday July 01, 2009 (Units in mph)
Milepost (Direction of traffic -->)
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Data Provided by ODOT
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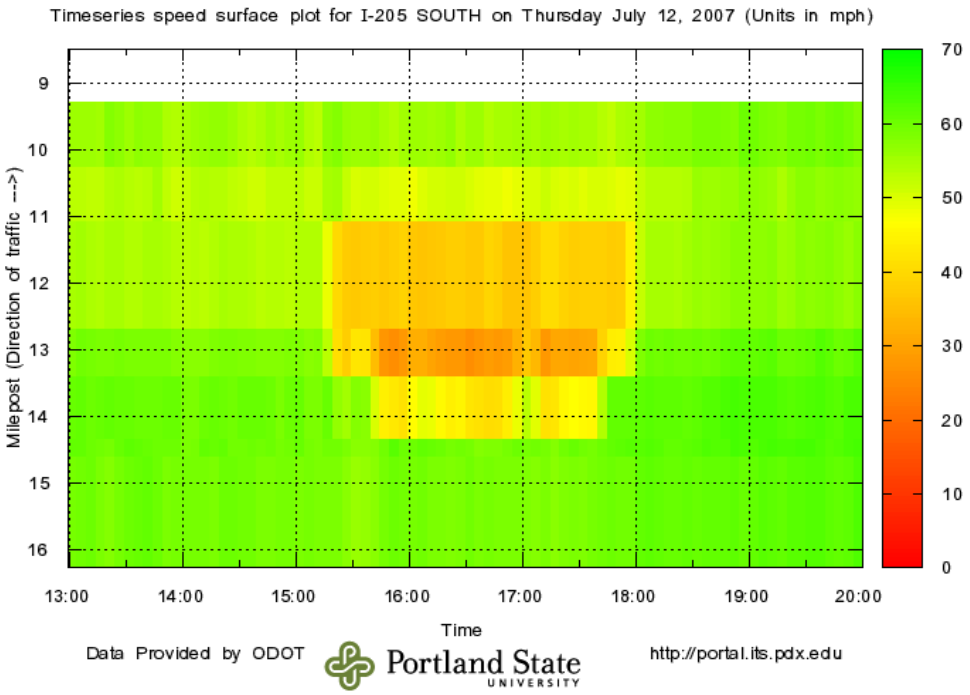
I-205 Southbound

PM Peak Hour Speed Plots

DAVID EVANS AND ASSOCIATES INC.


Timeseries speed surface plot for I-205 SOUTH on Thursday July 12, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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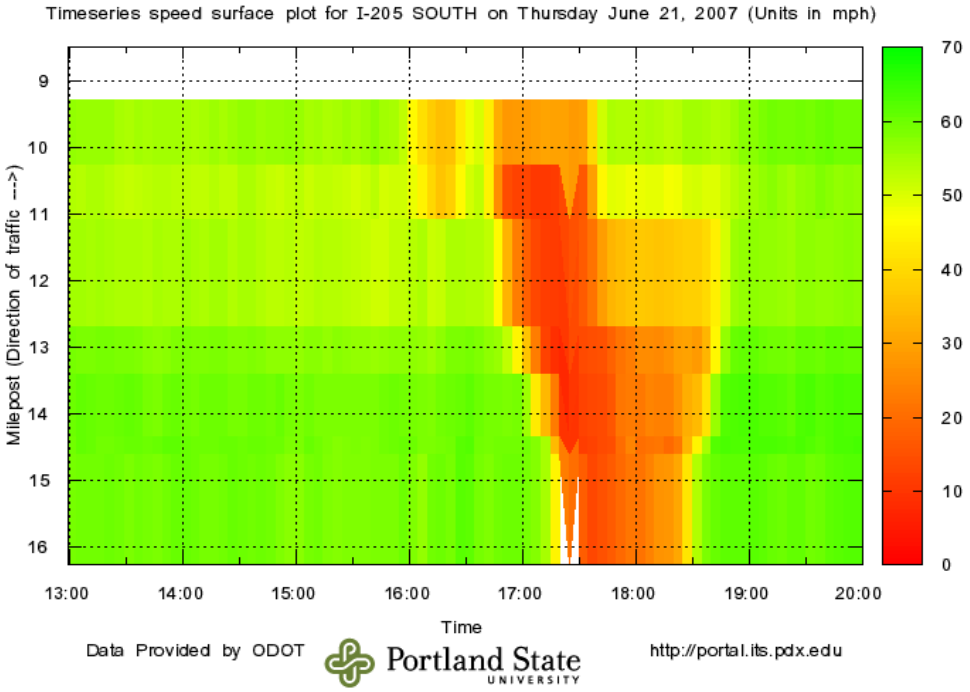
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 SOUTH on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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Data Provided by ODOT
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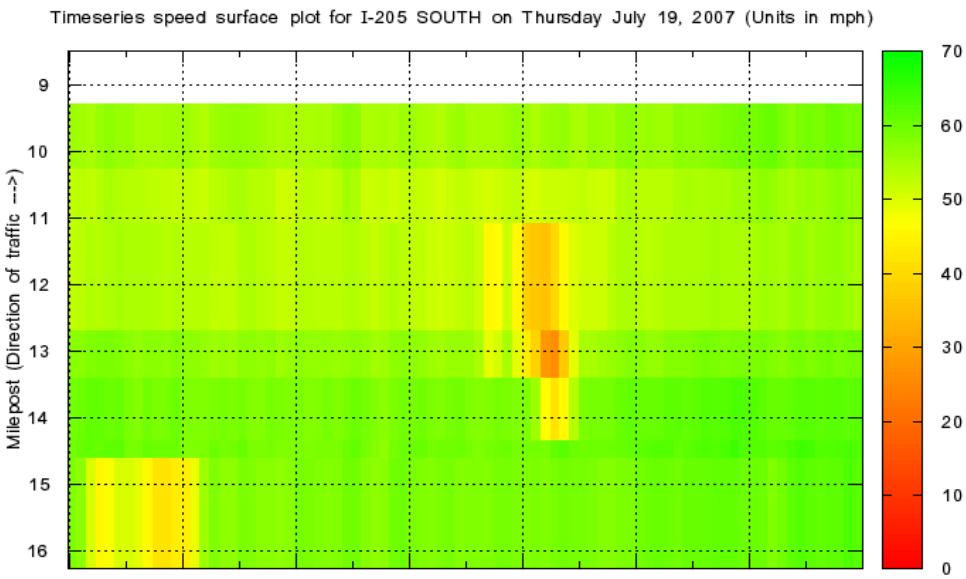
http://portal.its.pdx.edu

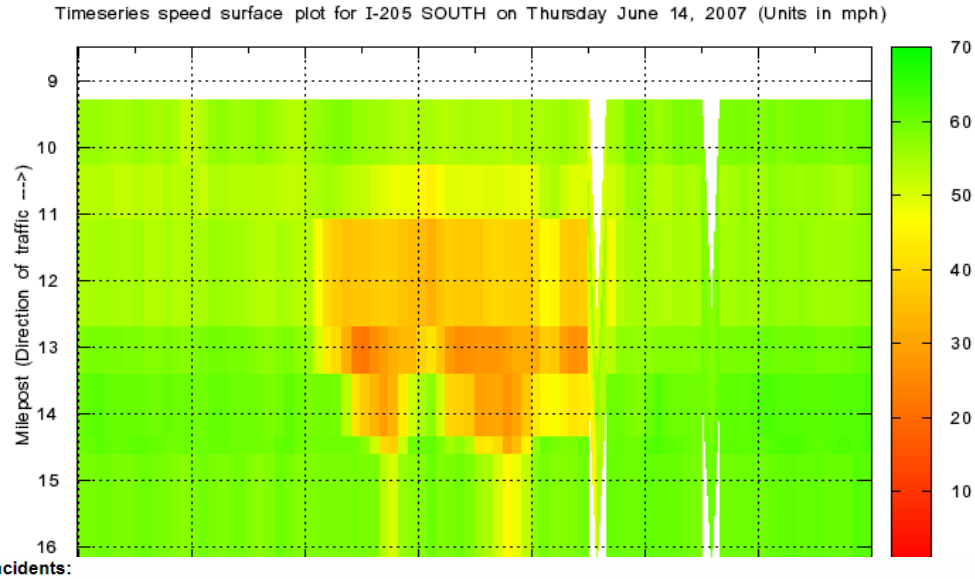
Highway: *I-205* **Time Period: PM Peak**
Direction: *Southbound* **Bottleneck Influence Area: M.P. 16-9**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
754803	205	205 Southbound AT 10TH OFF	0	19:44:09	67	Tow	Gore Area (right)	no	0

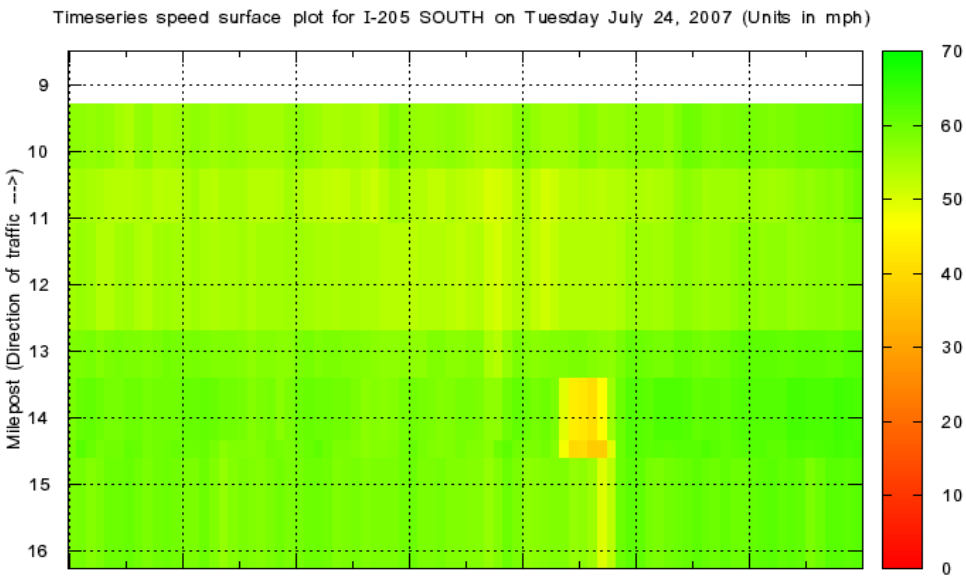
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
738925	I-205	I-205 Southbound TO SB I-5	1	17:56:47	58	Stall	Right Lanes	no	0

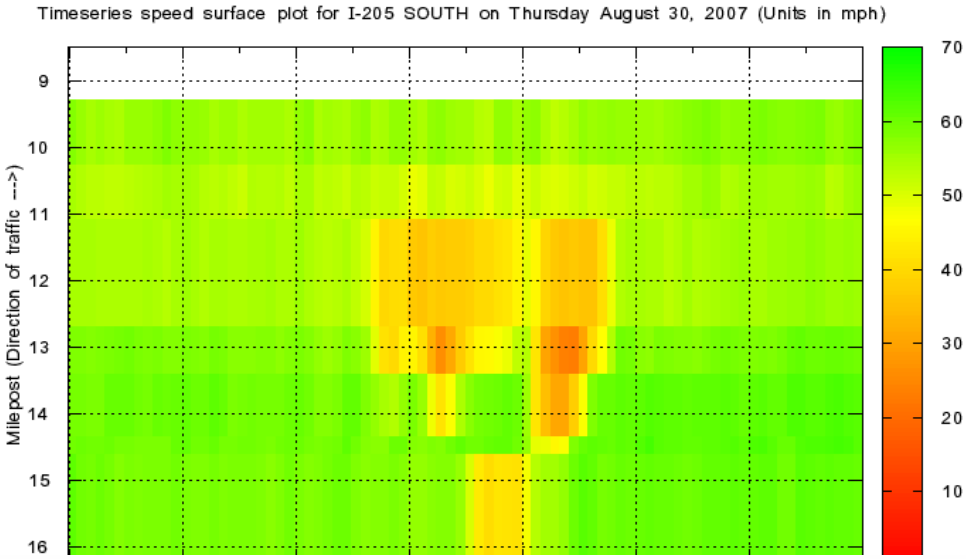
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
756463	I-205	I-205 Southbound Just North Of HWY 212	3	16:31:15	57	Debris	All Lanes	no	0
756466	I-205	I-205 Southbound Just North Of LAWNFIELD	1	16:44:31	57	Debris	Center Lanes	no	0

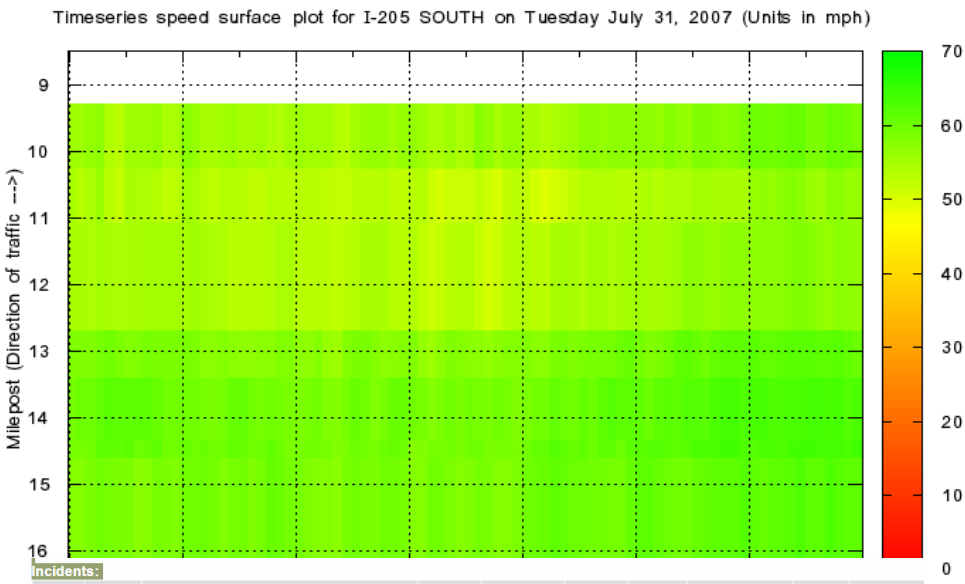
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
772988	I-205	I-205 Southbound At MARKET	1	16:28:16	56	Crash	Left Lanes	no	0
773048	SB I-205	SB I-205 TO EB I-84	1	19:48:42	31	Crash	Right Shoulder	no	0

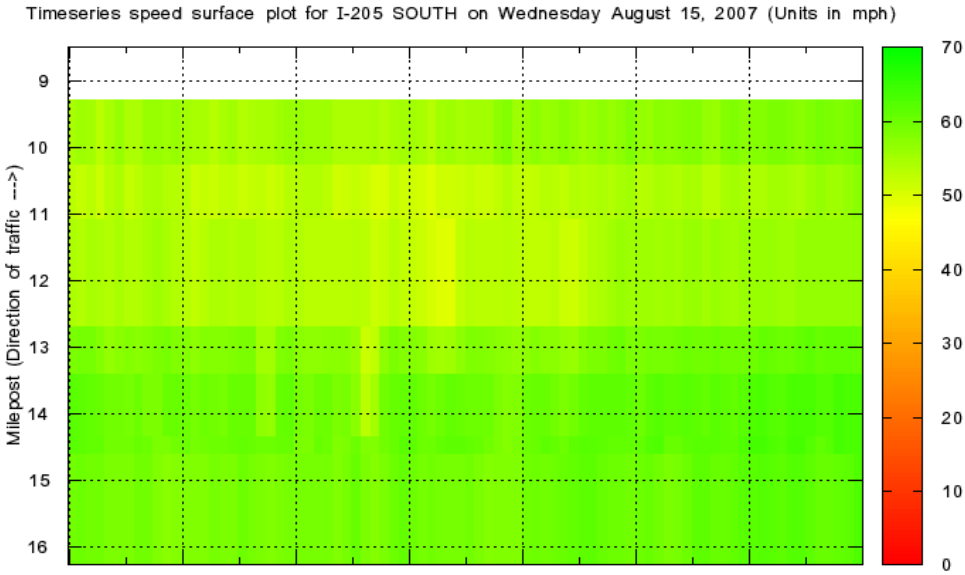
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
759490	I-205	I-205 Southbound At ABERNATHY BRIDGE	0	14:18:57	57	Debris	Left Lanes	no	0
759568	I-205	I-205 Southbound Just South Of STARK	0	16:02:41	56	Crash	Right Shoulder	no	0
759630	I-205	I-205 Southbound Just South Of STARK	1	18:25:37	57	Stall	Right Shoulder	no	0

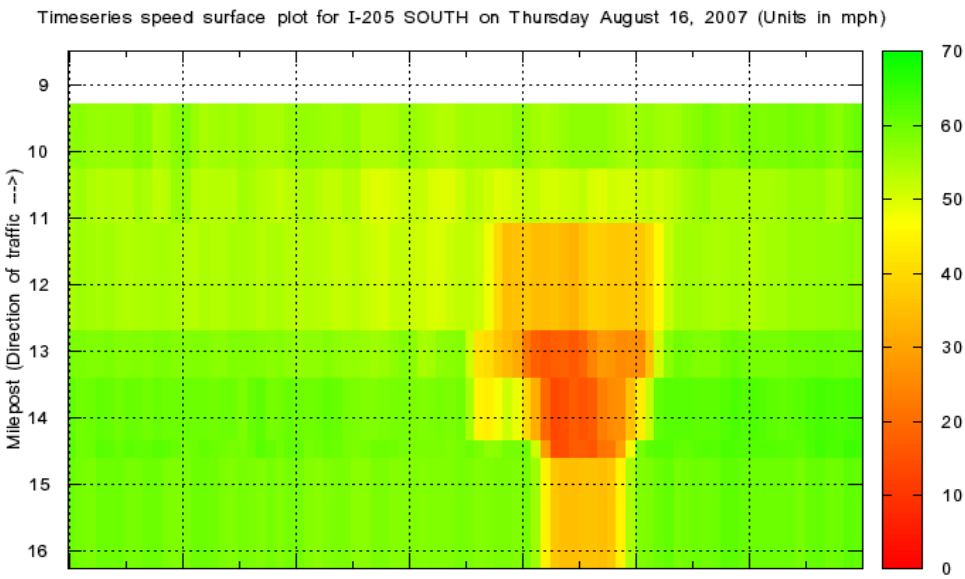
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
766028	I-205	I-205 Southbound Near 10TH ST	1	14:56:36	56	Debris	Right Lanes	no	0
766188	I-205 (GLENN JACKSON BR)	I-205 (GLENN JACKSON BR) Southbound Near GOV T ISLAND-AIRPORT WY	0	18:34:30	56	Debris	Right Lanes	no	0
766190	I-205	I-205 Southbound At JOHNSON CREEK	0	18:56:25	56	Stall	Right Lanes	no	0

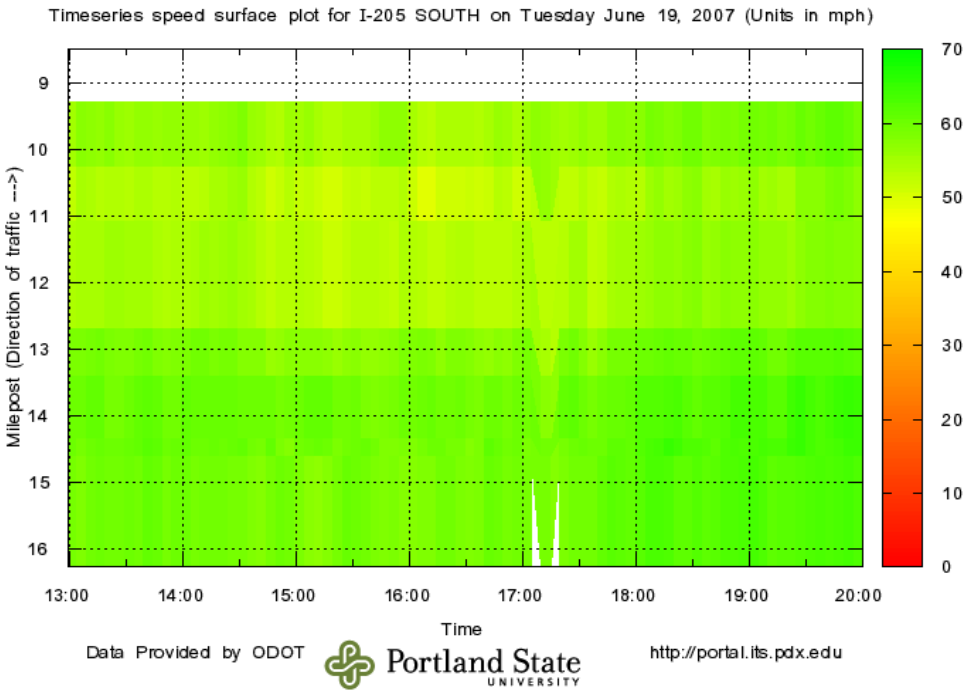
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

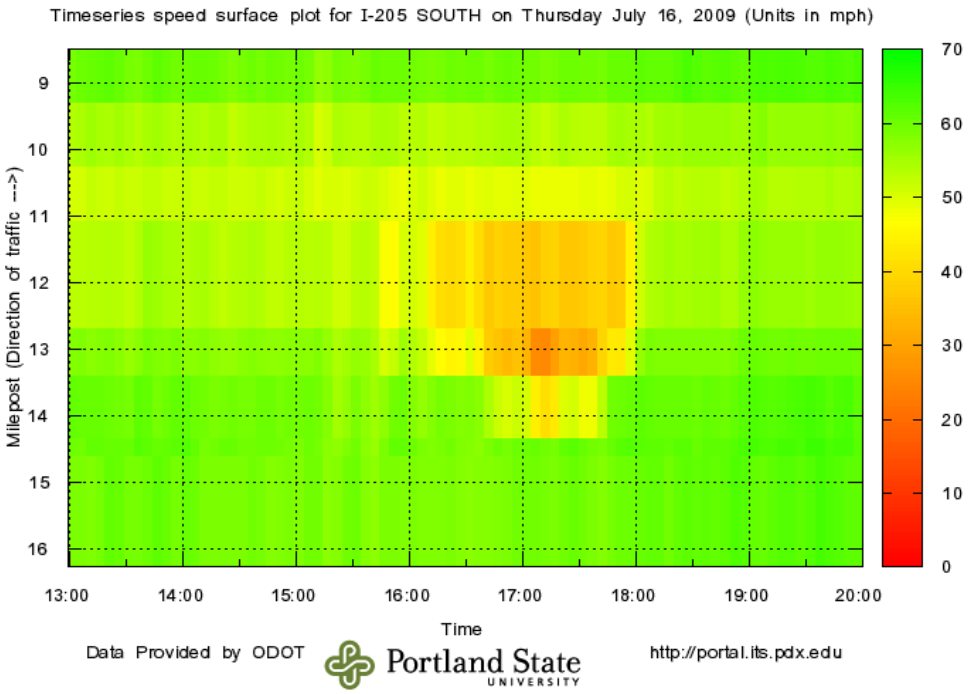


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
766572	I-205	I-205 Southbound Just South Of AIRPORT WAY	1	15:04:18	56	Crash	Left Shoulder	no	0
766573	I-205	I-205 Southbound At SW 65TH	1	15:26:38	107	Crash	Right Shoulder	no	0
766611	I-205	I-205 Southbound At POWELL BLVD	1	17:37:24	56	Stall	Left Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.




Timeseries speed surface plot for I-205 SOUTH on Thursday July 16, 2009 (Units in mph)
Milepost (Direction of traffic --->)
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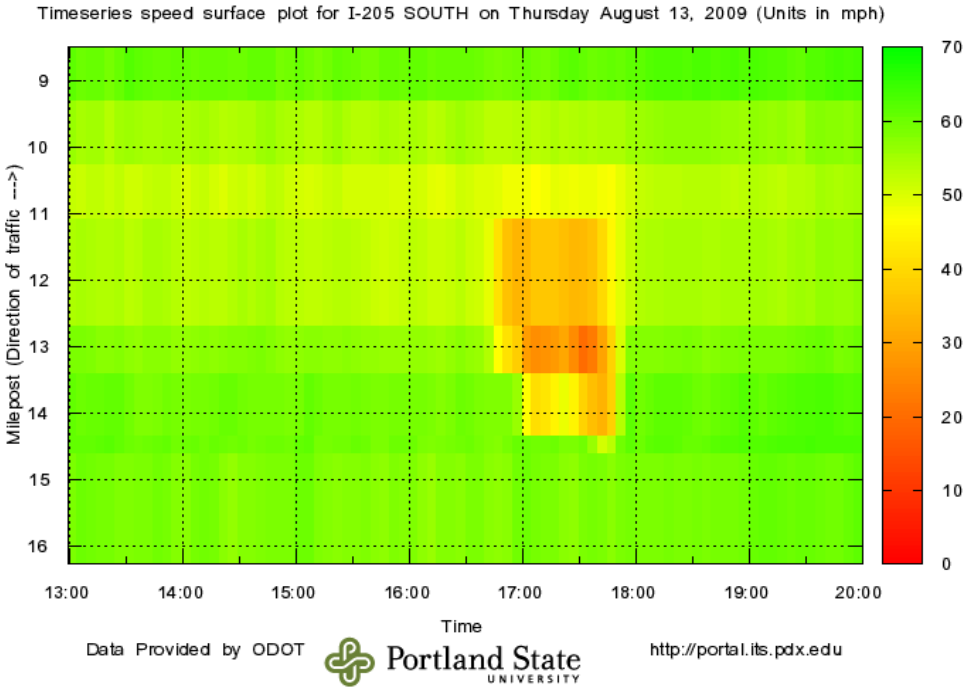
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 SOUTH on Thursday August 13, 2009 (Units in mph)
Milepost (Direction of traffic --->)
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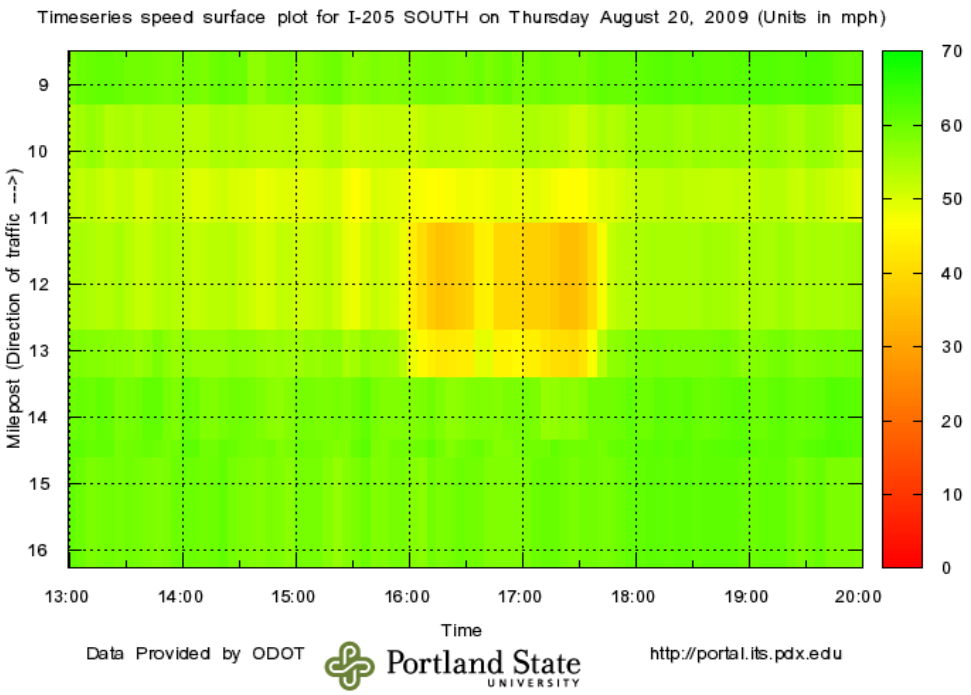
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 SOUTH on Thursday August 20, 2009 (Units in mph)
Milepost (Direction of traffic --->)
9
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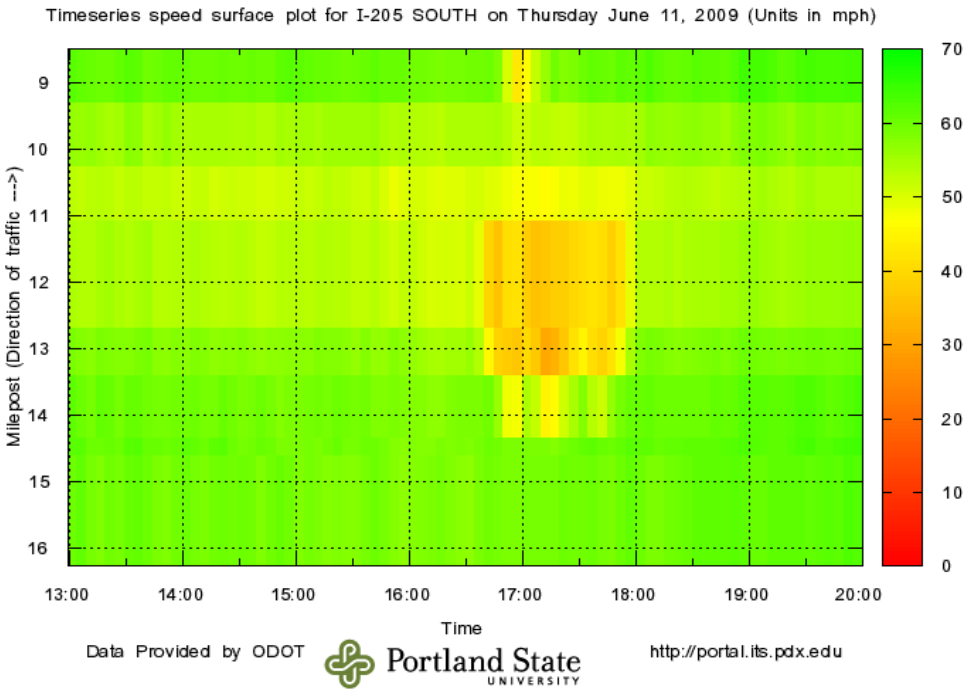
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-205 SOUTH on Thursday June 11, 2009 (Units in mph)
Milepost (Direction of traffic --->)
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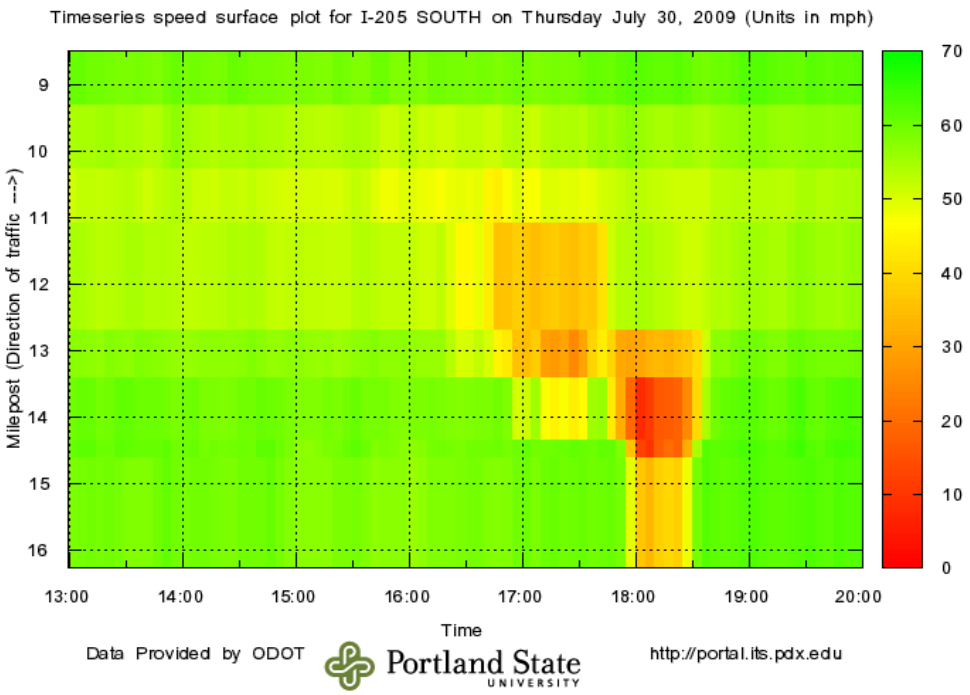
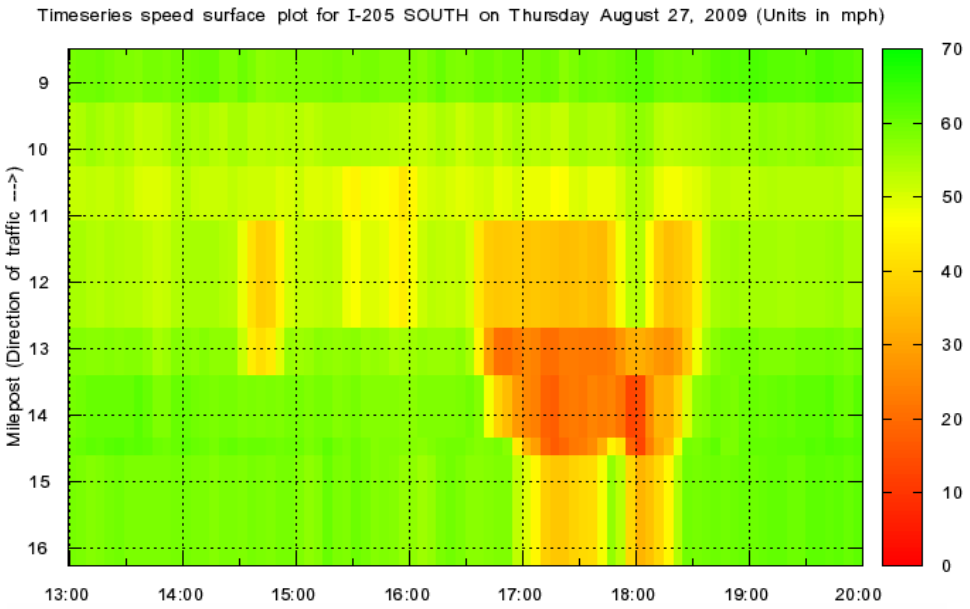
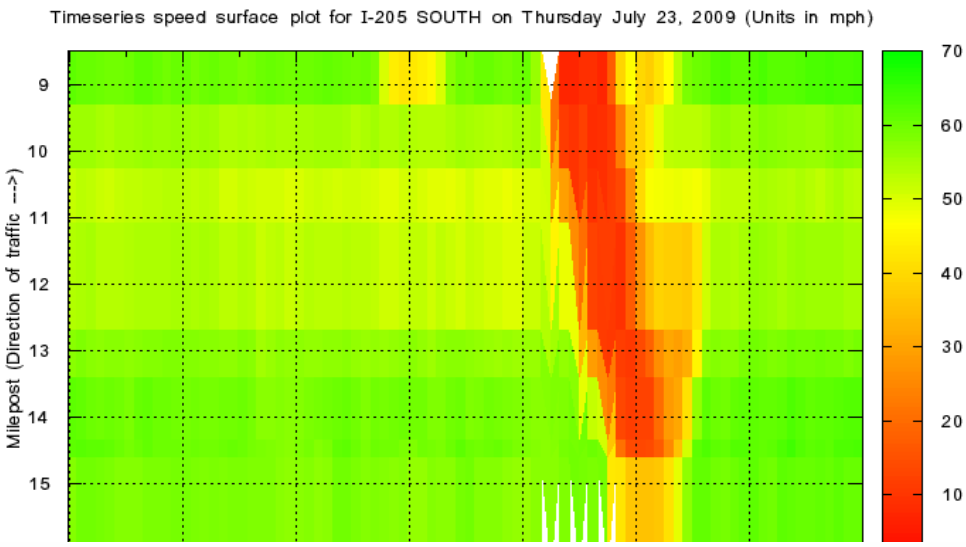
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu





Incidents:

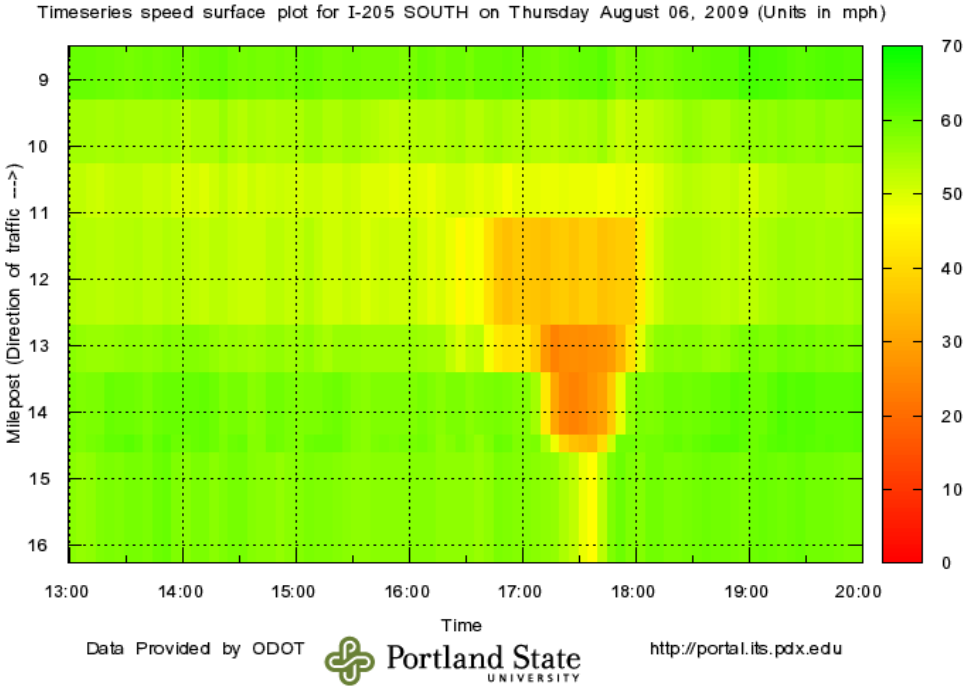
ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
850199	I-205	I-205 Southbound At HWY 212/224	1	17:59:07	7	Stall	Center Lanes	no	0

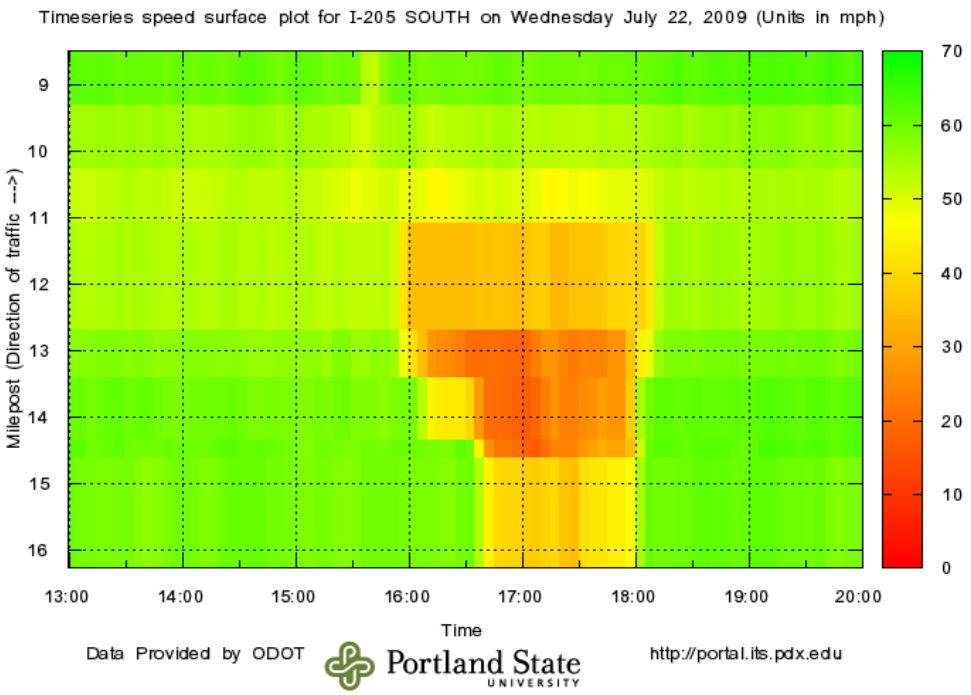


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
848317	I-205	I-205 Southbound Just South Of HWY 43	1	17:27:07	32	Crash	Left Lanes	no	0
848308	I-205	I-205 Southbound Just South Of I-84	2	15:26:23	45	Crash	Right Lanes	no	0
848306	I-205	I-205 Southbound At I-5	0	15:08:04	0	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.




Timeseries speed surface plot for I-205 SOUTH on Wednesday July 22, 2009 (Units in mph)
Milepost (Direction of traffic --->)
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Data Provided by ODOT
Portland State
UNIVERSITY
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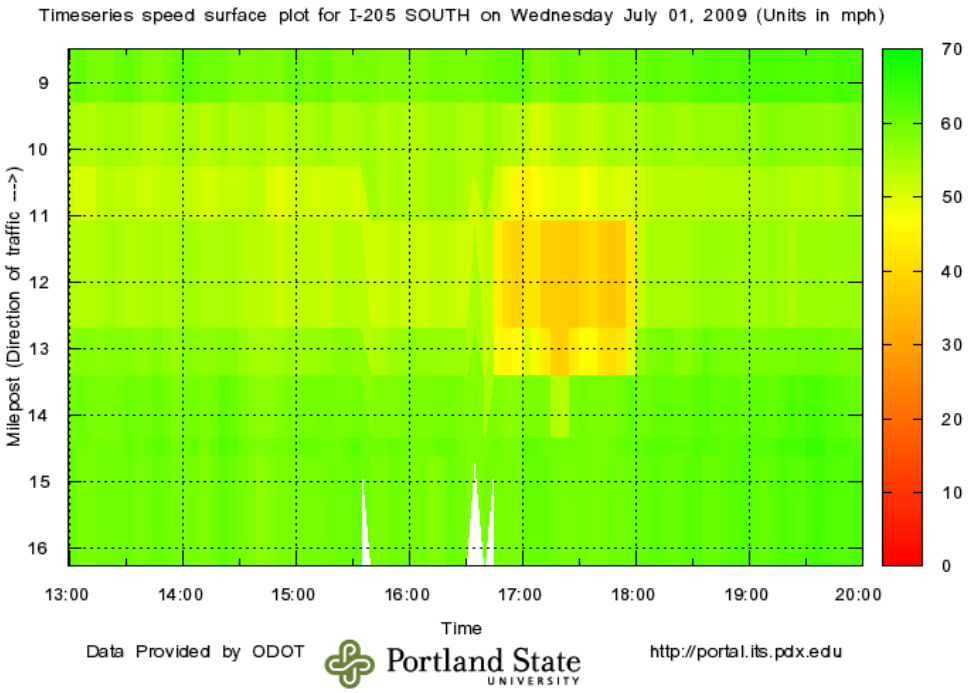
Timeseries speed surface plot for I-205 SOUTH on Wednesday July 01, 2009 (Units in mph)
Milepost (Direction of traffic --->)
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Data Provided by ODOT
Portland State
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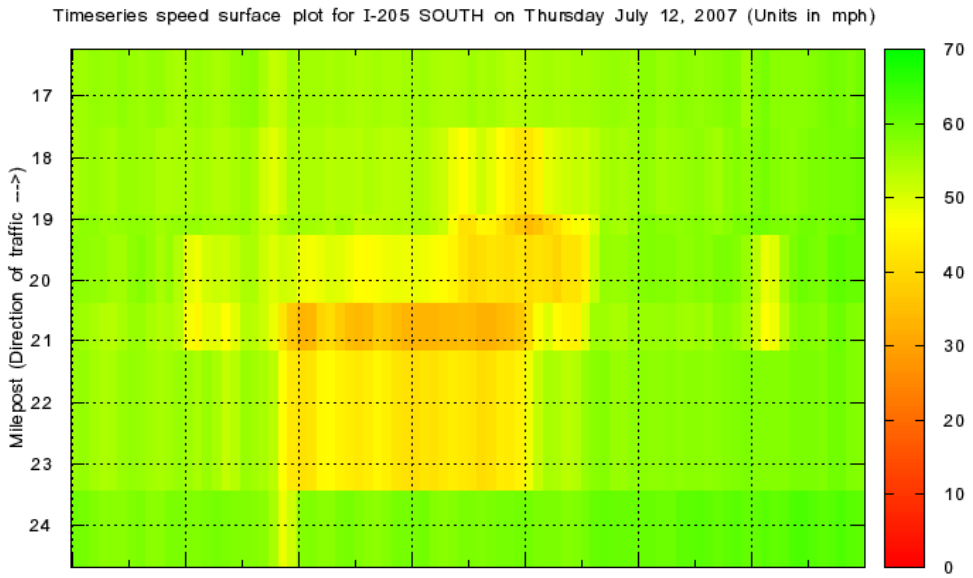
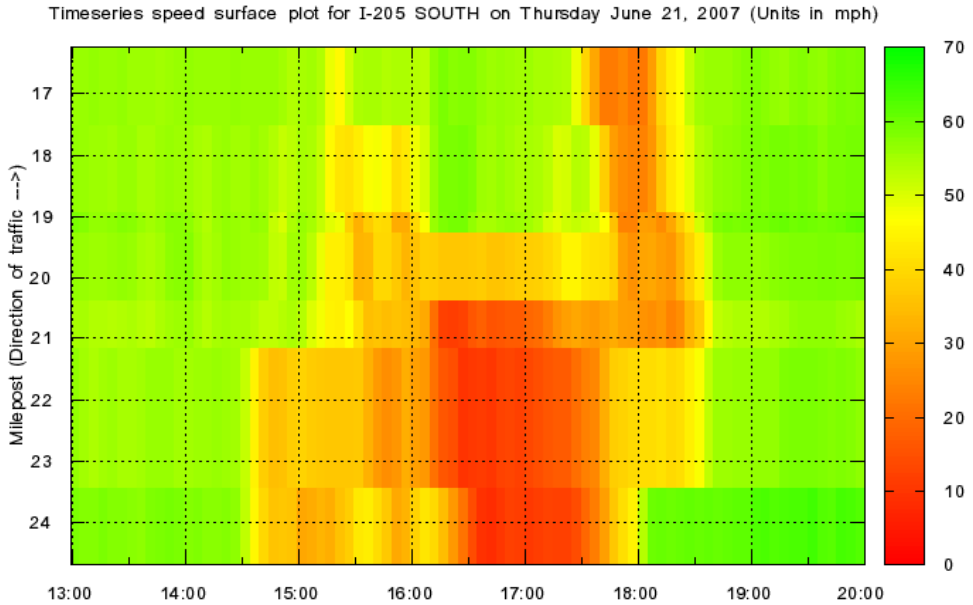
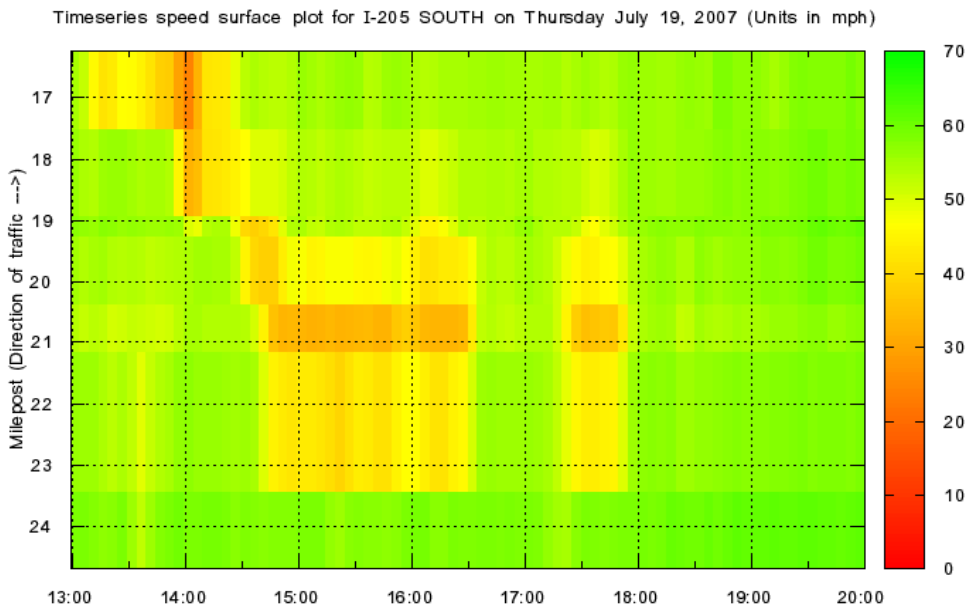


Incidents:

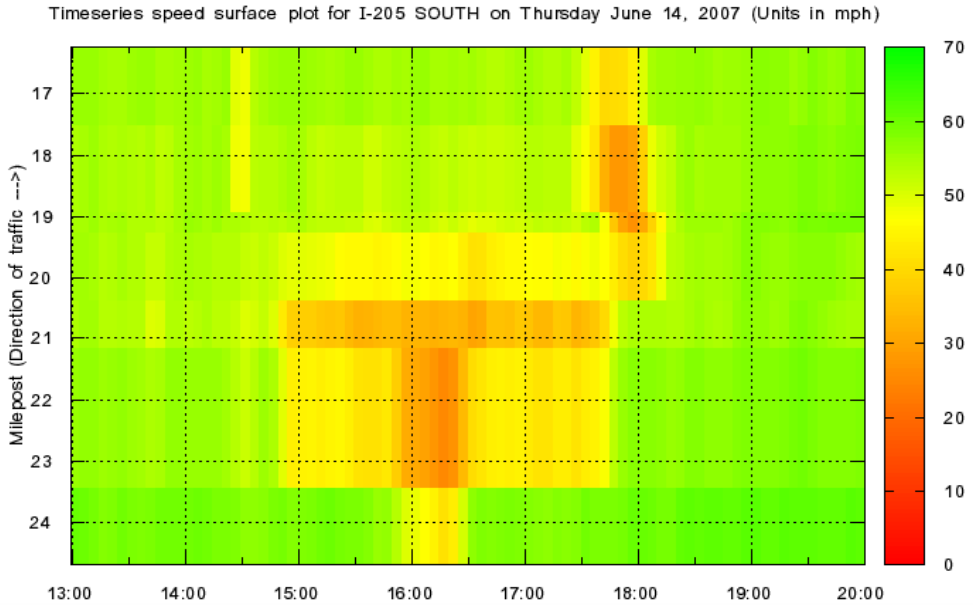
ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
751545	205	205 Southbound AT HWY 213 ON	0	14:09:08	57	Debris	Right Shoulder	no	0



ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
741604	I-205	I-205 Southbound At DIVISION	1	15:17:50	58	Crash	Left Lanes	no	0
741744	I-205	I-205 Southbound At RAMP TO 84 WB	0	19:56:38	57	Stall	Gore Area (left)	no	0

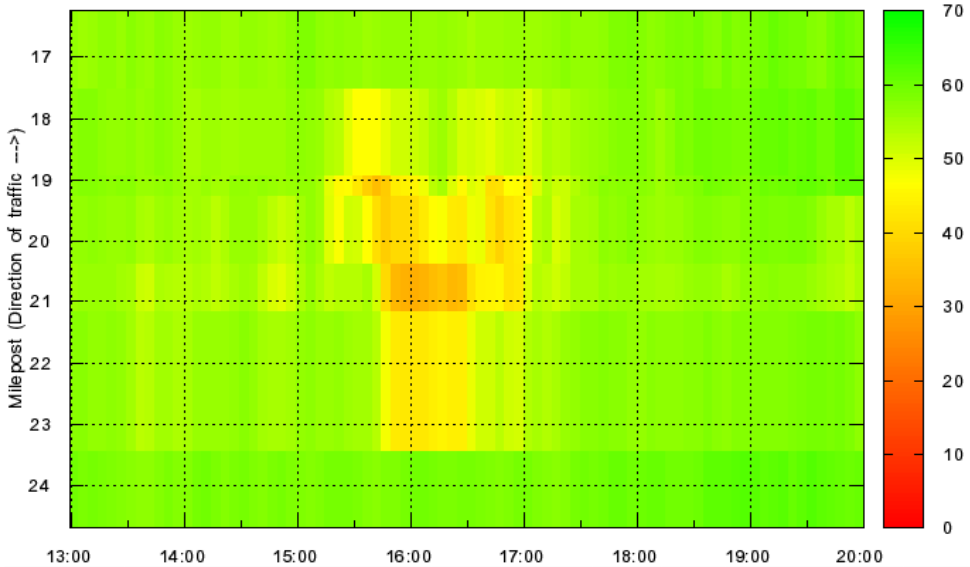


ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
754803	205	205 Southbound AT 10TH OFF	0	19:44:09	67	Tow	Gore Area (right)	no	0



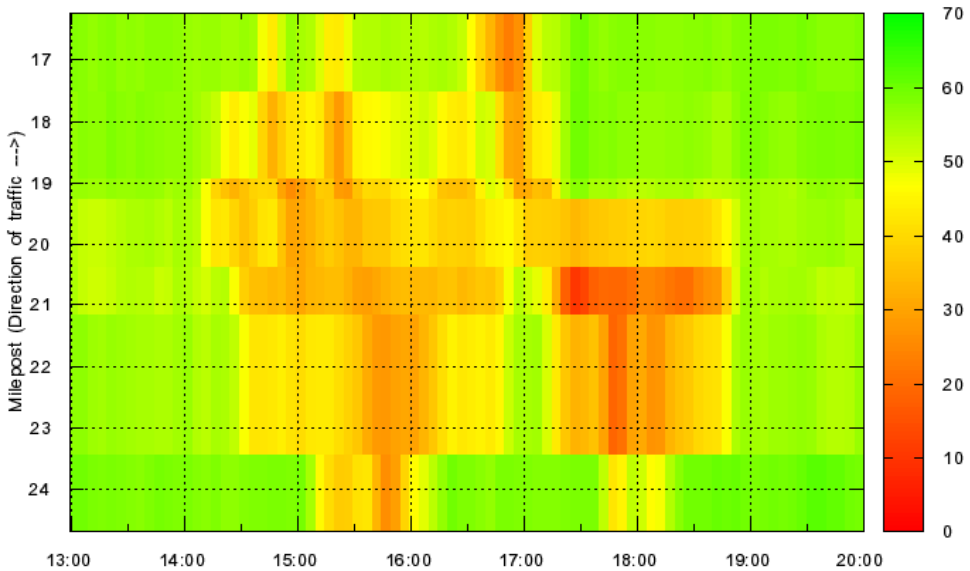
ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
738925	I-205	I-205 Southbound TO SB I-5	1	17:56:47	58	Stall	Right Lanes	no	0

Timeseries speed surface plot for I-205 SOUTH on Tuesday July 24, 2007 (Units in mph)



ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
756463	I-205	I-205 Southbound Just North Of HWY 212	3	16:31:15	57	Debris	All Lanes	no	0
756466	I-205	I-205 Southbound Just North Of LAWNFIELD	1	16:44:31	57	Debris	Center Lanes	no	0

Timeseries speed surface plot for I-205 SOUTH on Thursday August 30, 2007 (Units in mph)

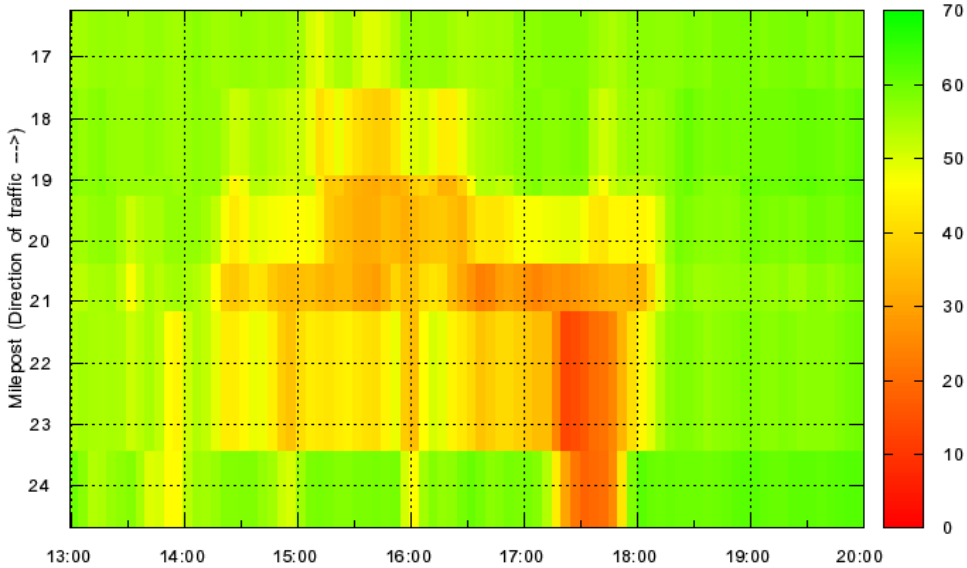


ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
772988	I-205	I-205 Southbound At MARKET	1	16:28:16	56	Crash	Left Lanes	no	0
773048	SB I-205	SB I-205 TO EB I-84	1	19:48:42	31	Crash	Right Shoulder	no	0

Highway: *I-205* **Time Period: PM Peak**

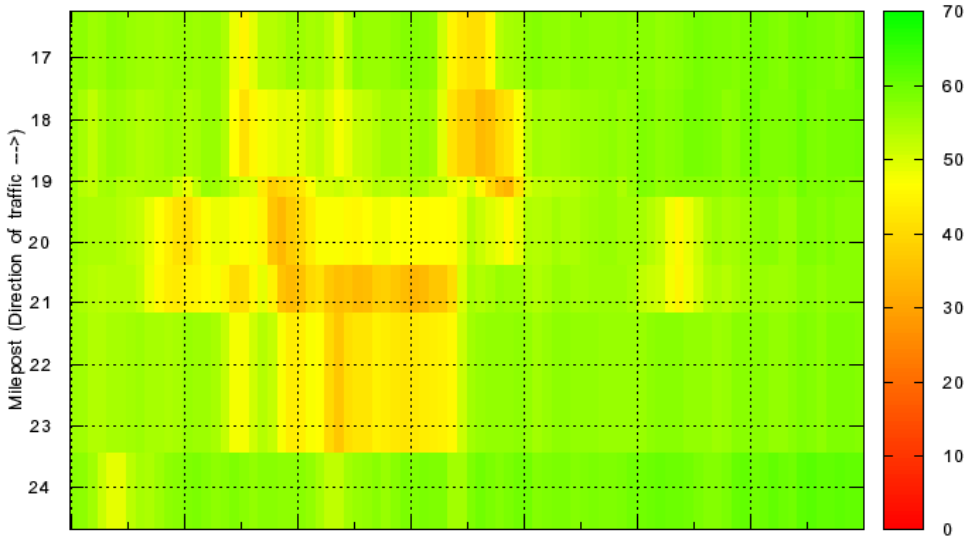
Direction: *Southbound* **Bottleneck Influence Area: M.P. 24 - 17**

Timeseries speed surface plot for I-205 SOUTH on Tuesday July 31, 2007 (Units in mph)



ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
759490	I-205	I-205 Southbound At ABERNATHY BRIDGE	0	14:18:57	57	Debris	Left Lanes	no	0
759568	I-205	I-205 Southbound Just South Of STARK	0	16:02:41	56	Crash	Right Shoulder	no	0
759630	I-205	I-205 Southbound Just South Of STARK	1	18:25:37	57	Stall	Right Shoulder	no	0

Timeseries speed surface plot for I-205 SOUTH on Wednesday August 15, 2007 (Units in mph)



Incidents:

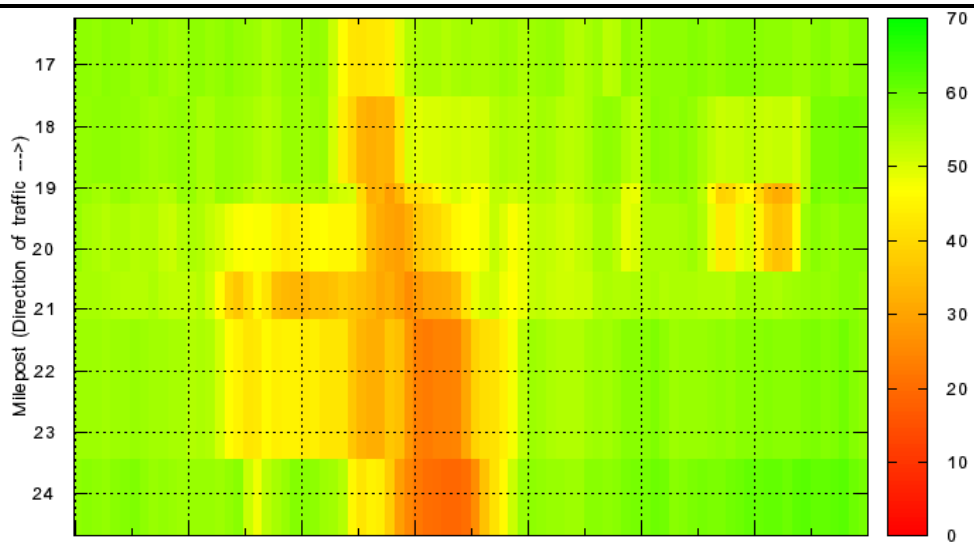
ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
766028	I-205	I-205 Southbound Near 10TH ST	1	14:56:36	56	Debris	Right Lanes	no	0
766188	I-205 (GLENN JACKSON BR)	I-205 (GLENN JACKSON BR) Southbound Near GOV T ISLAND-AIRPORT WY	0	18:34:30	56	Debris	Right Lanes	no	0
766190	I-205	I-205 Southbound At JOHNSON CREEK	0	18:56:25	56	Stall	Right Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

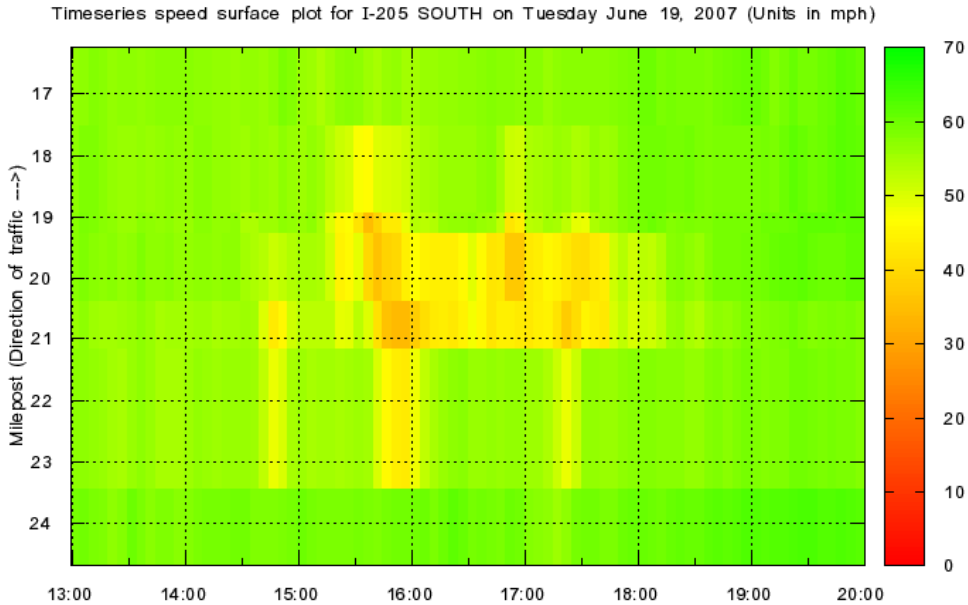
Timeseries speed surface plot for I-205 SOUTH on Thursday August 16, 2007 (Units in mph)

Highway: *I-205* **Time Period: PM Peak**

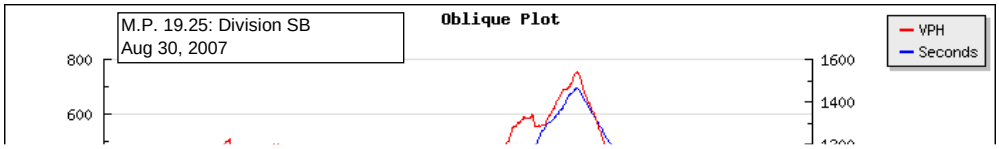
Direction: *Southbound* **Bottleneck Influence Area: M.P. 24 - 17**



ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
766572	I-205	I-205 Southbound Just South Of AIRPORT WAY	1	15:04:18	56	Crash	Left Shoulder	no	0
766573	I-205	I-205 Southbound At SW 65TH	1	15:26:38	107	Crash	Right Shoulder	no	0
766611	I-205	I-205 Southbound At POWELL BLVD	1	17:37:24	56	Stall	Left Shoulder	no	0



ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
740763	205	205 Southbound S OF 213	1	18:25:36	58	Debris	Left Lanes	no	0



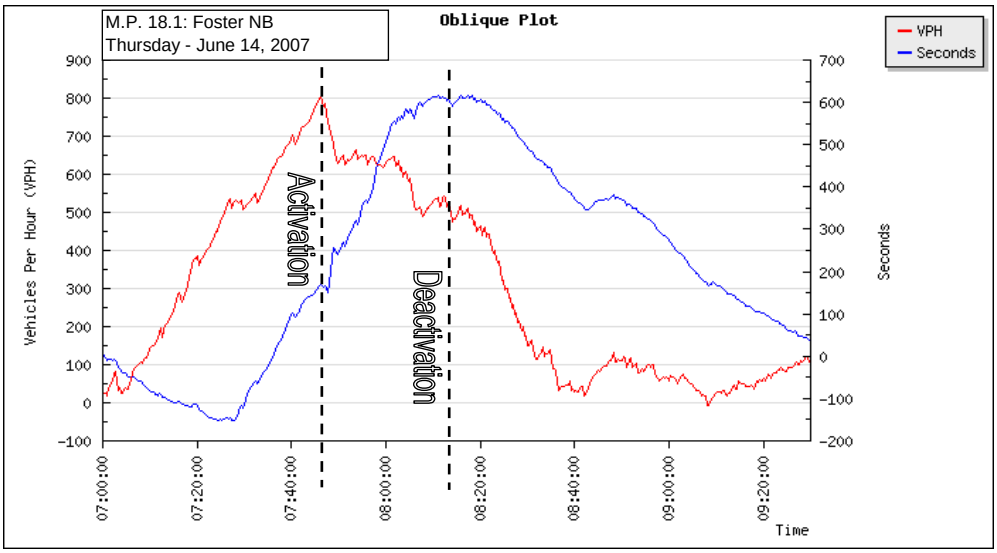
I-205 Oblique Plots

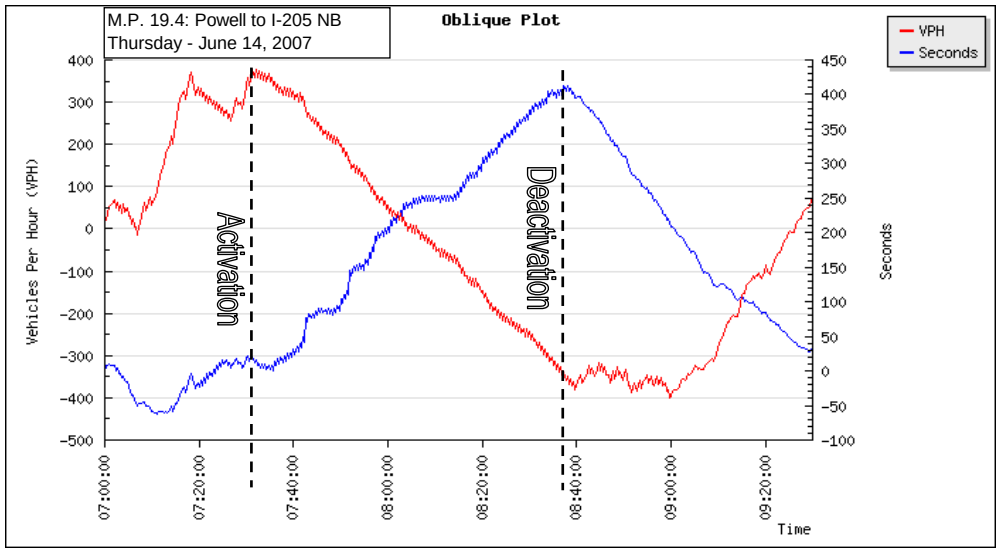
Northbound

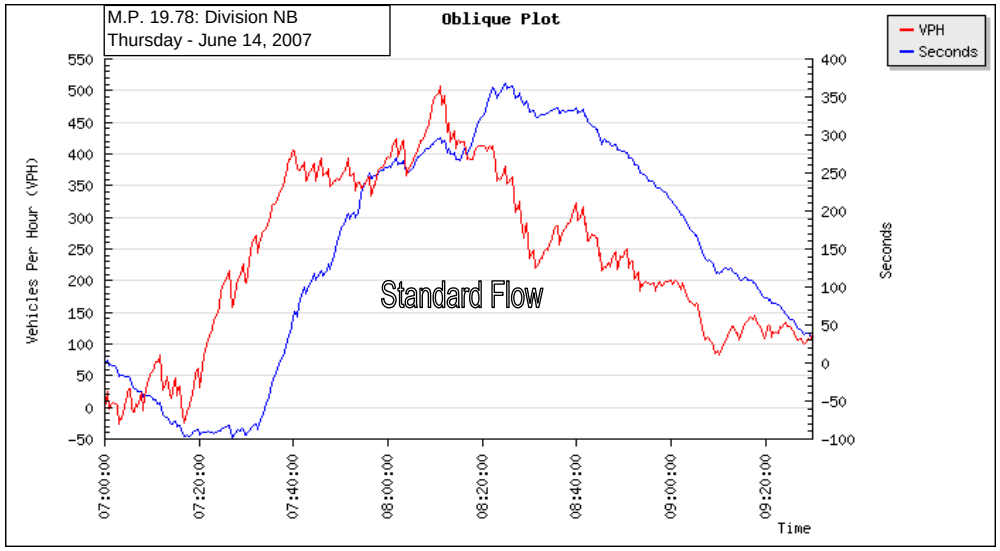
Southbound

DAVID EVANS AND ASSOCIATES INC.

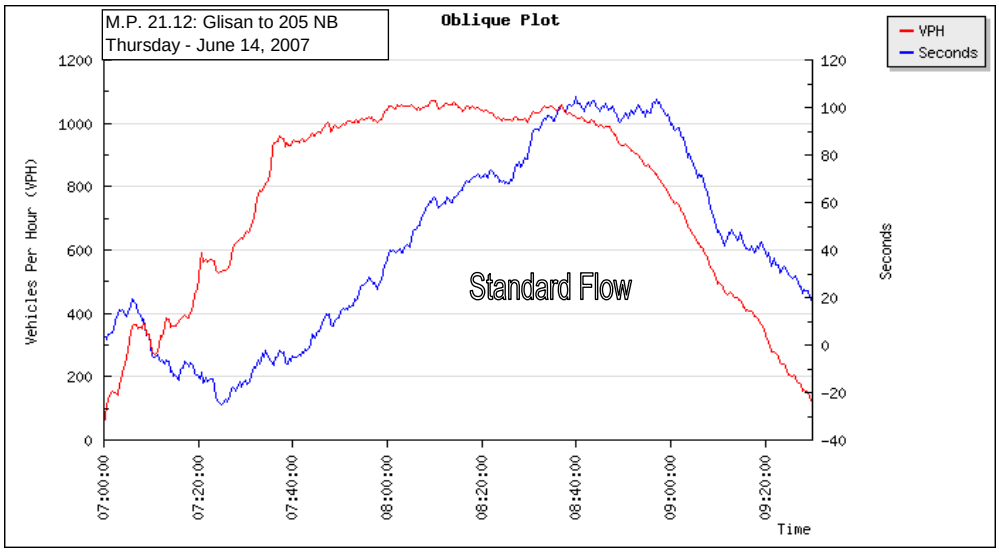
Highway: *I-205*
Direction: *Northbound*

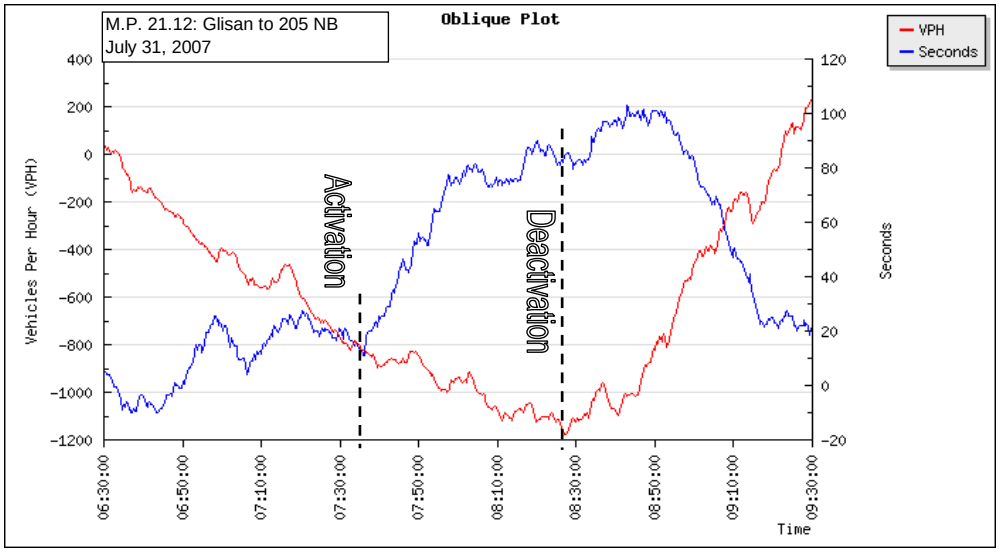


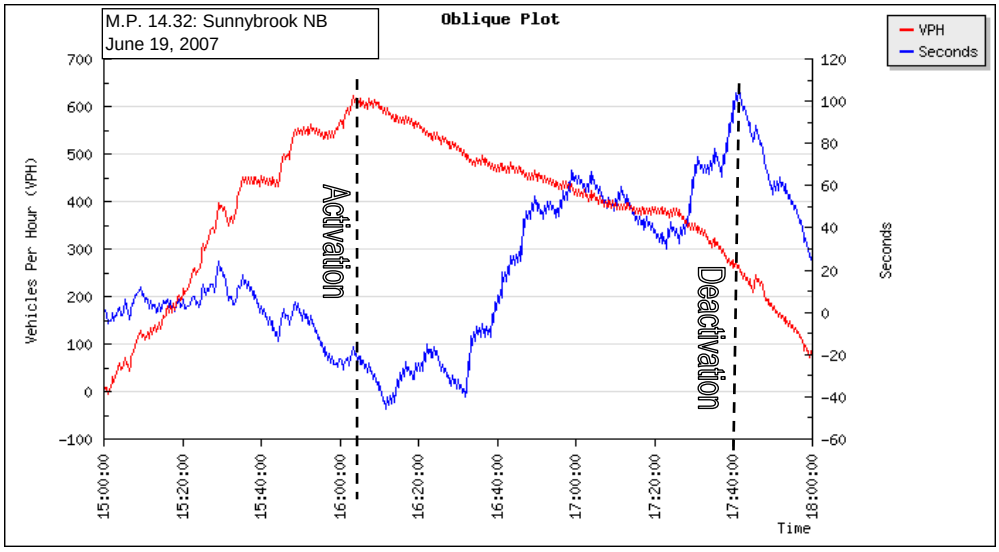




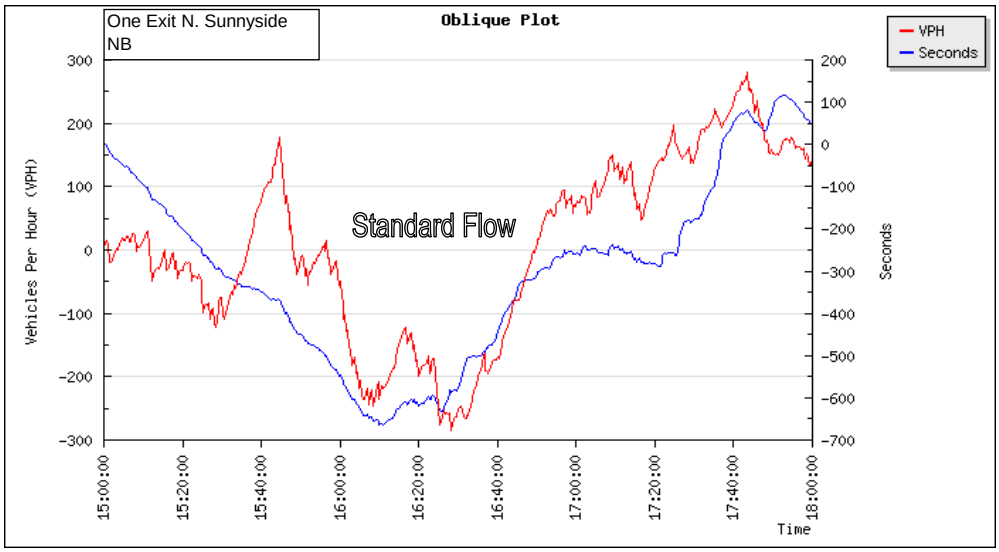
Highway: *I-205*
Direction: *Northbound*

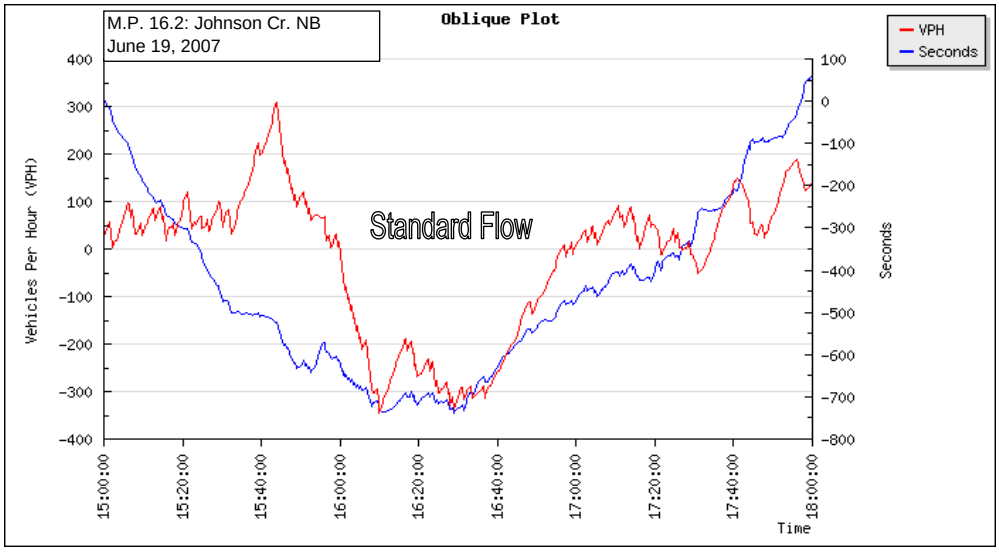


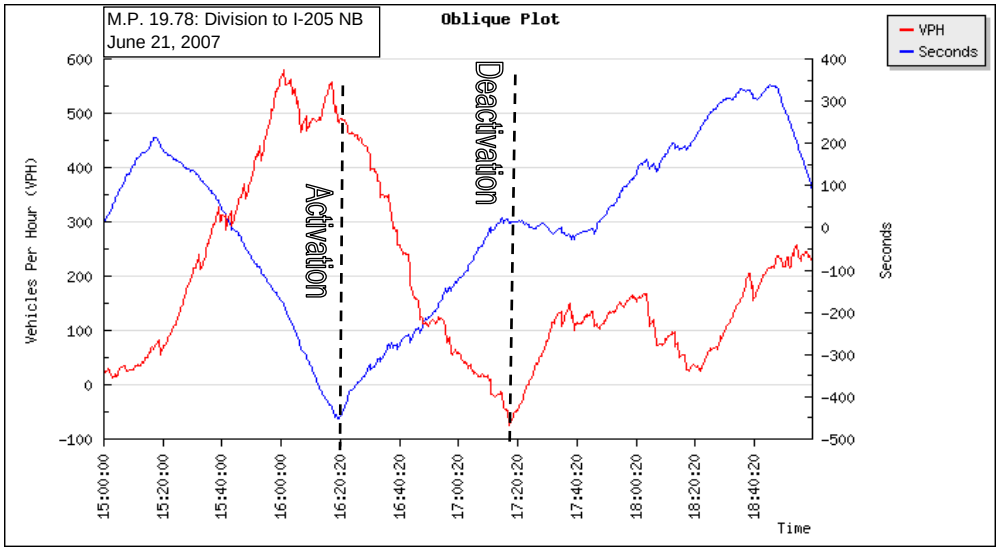




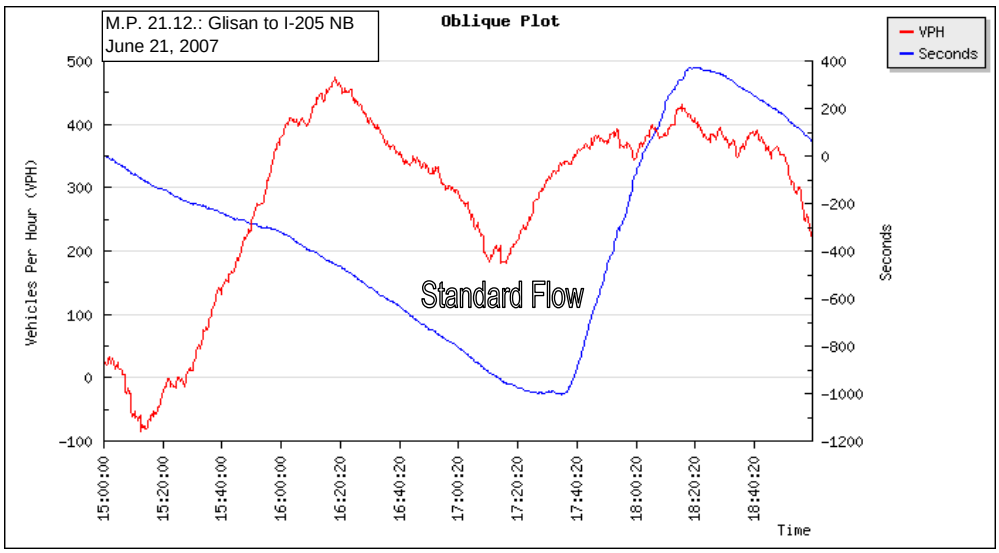
Highway: *I-205*
Direction: *Northbound*

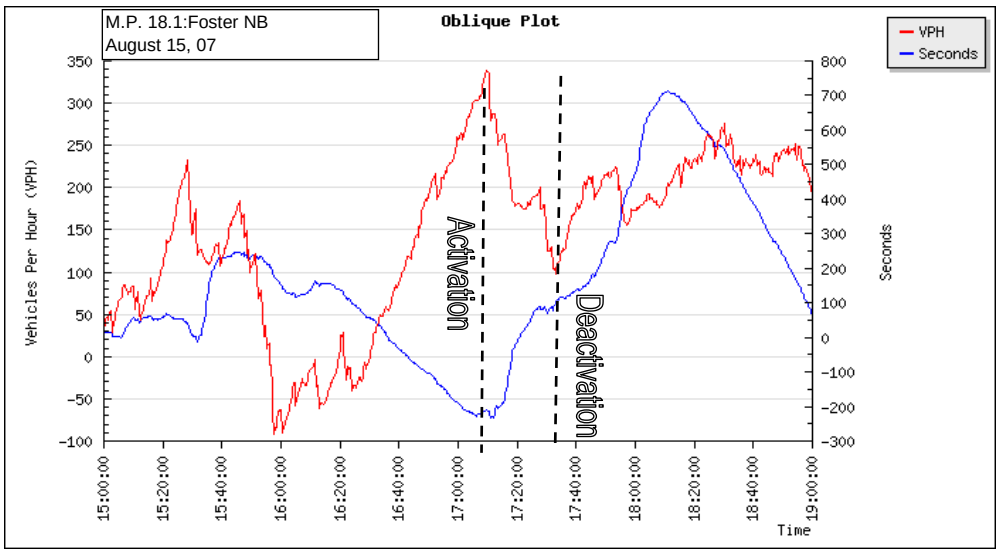


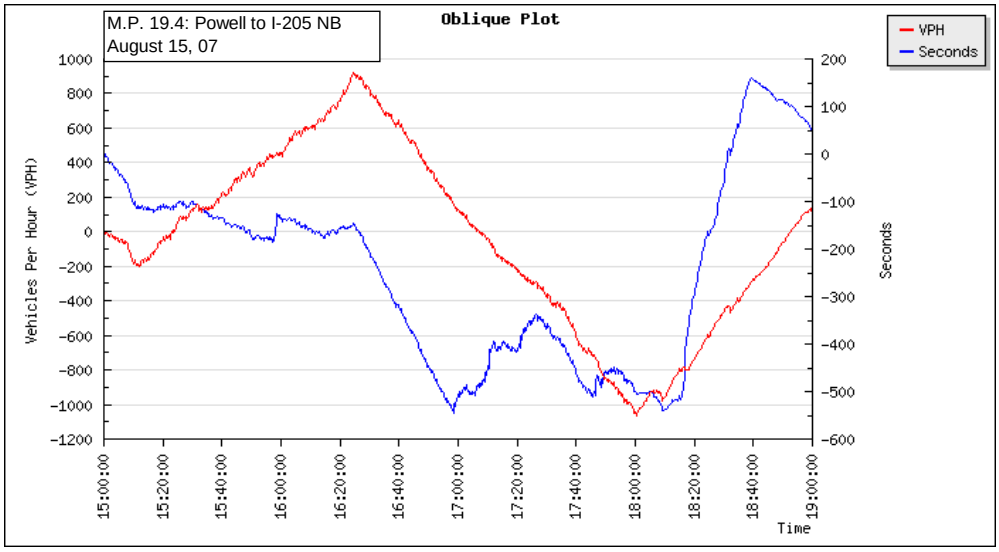




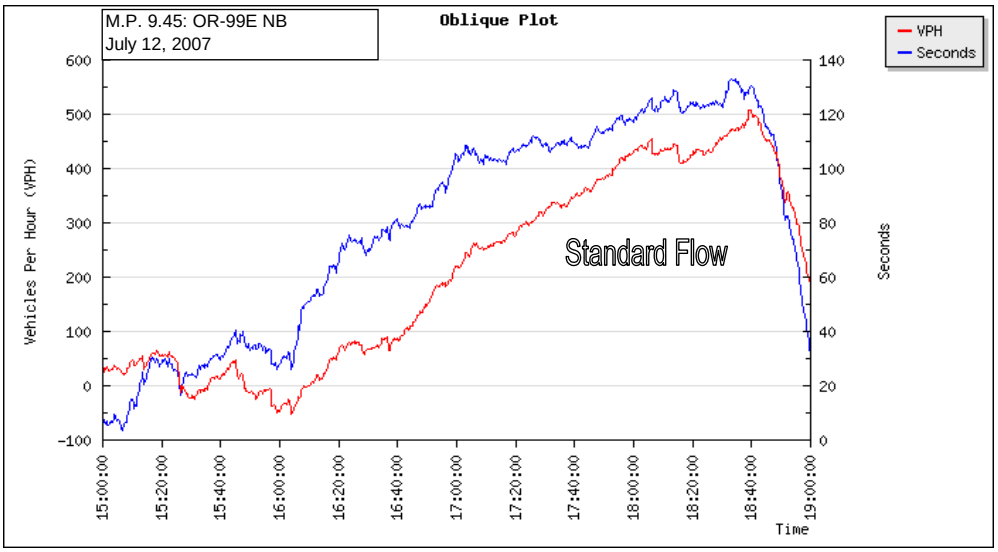
Highway: *I-205*
Direction: *Northbound*

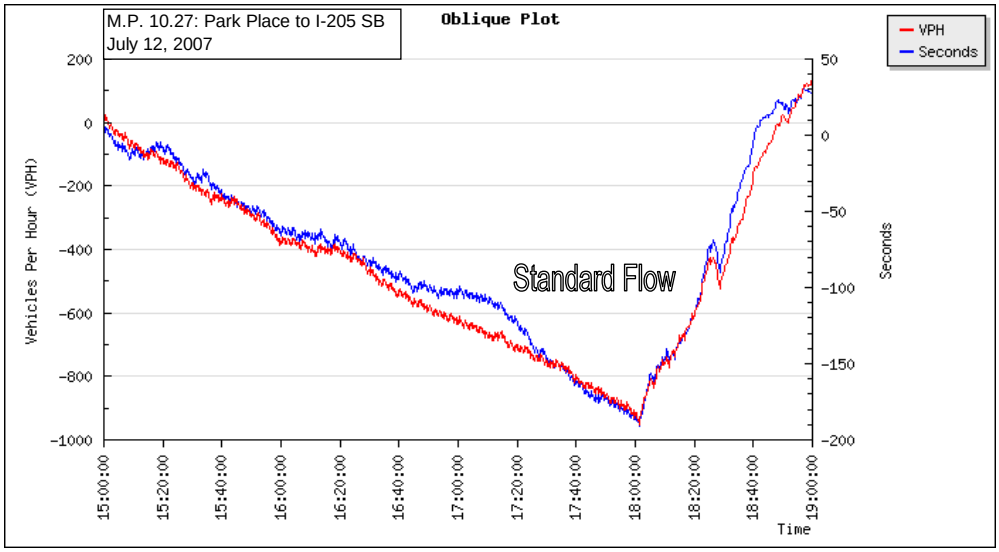


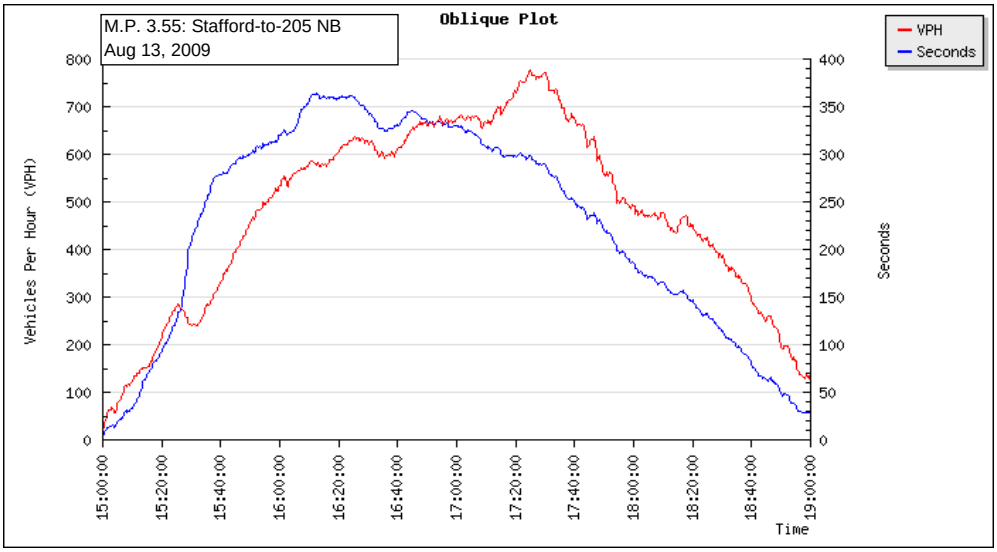




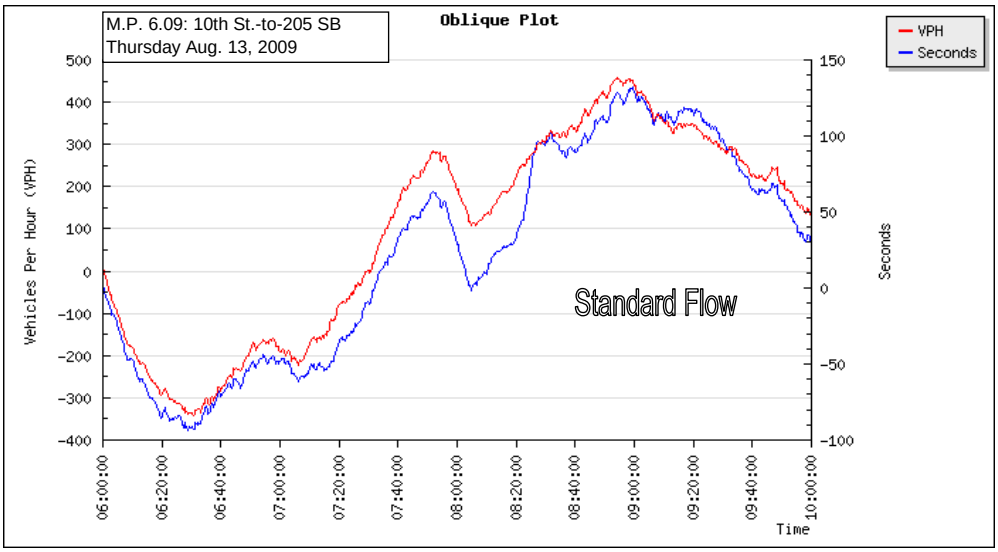
Highway: *I-205*
Direction: *Northbound*

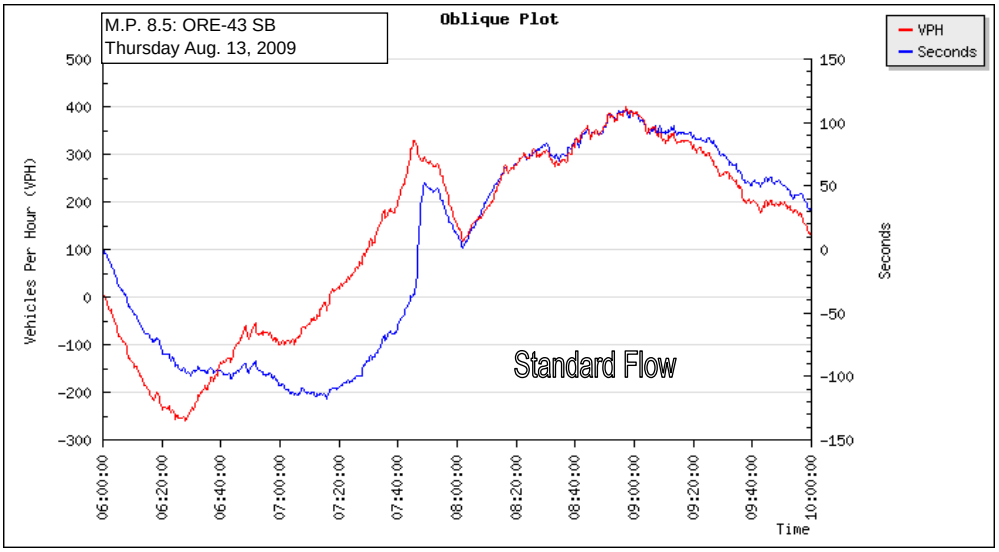


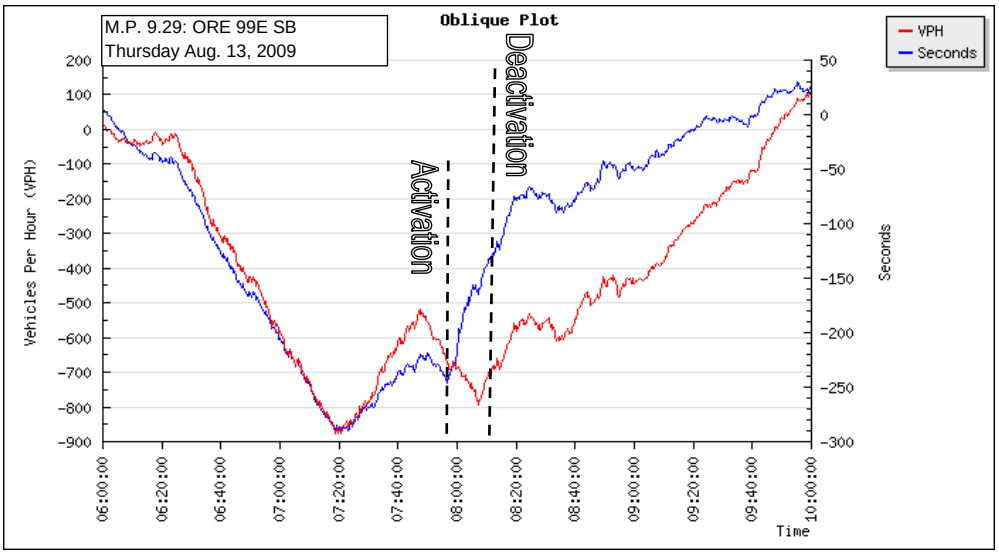




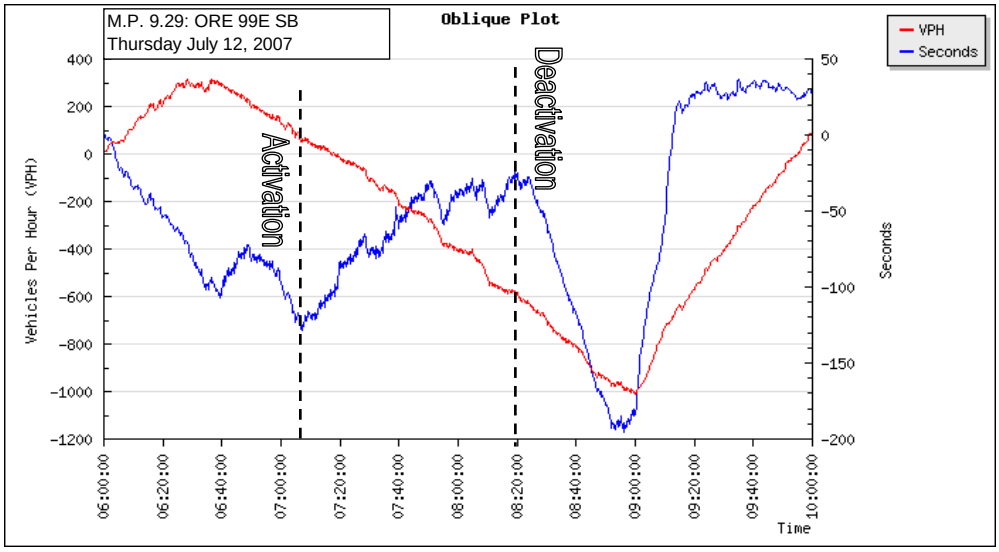
Highway: *I-205*
Direction: *Southbound*

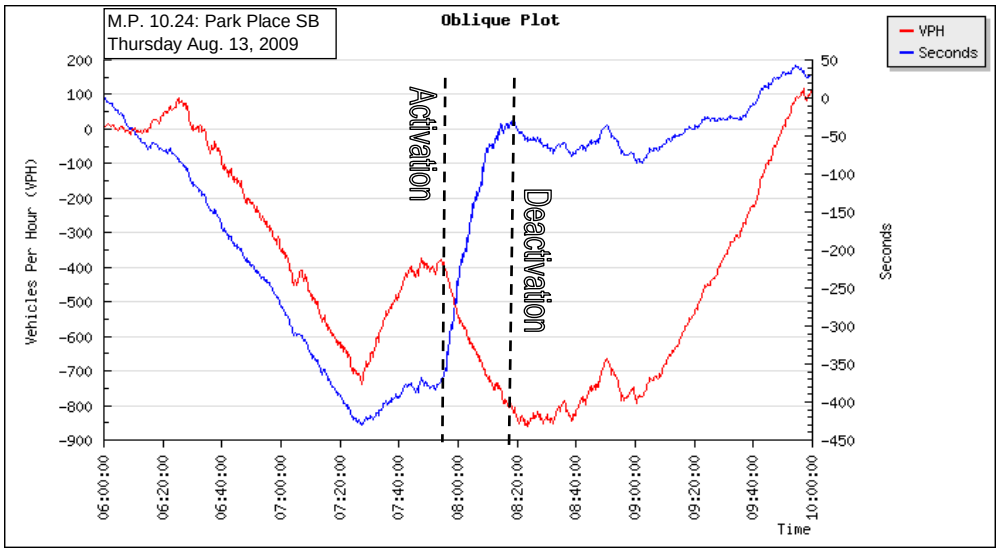


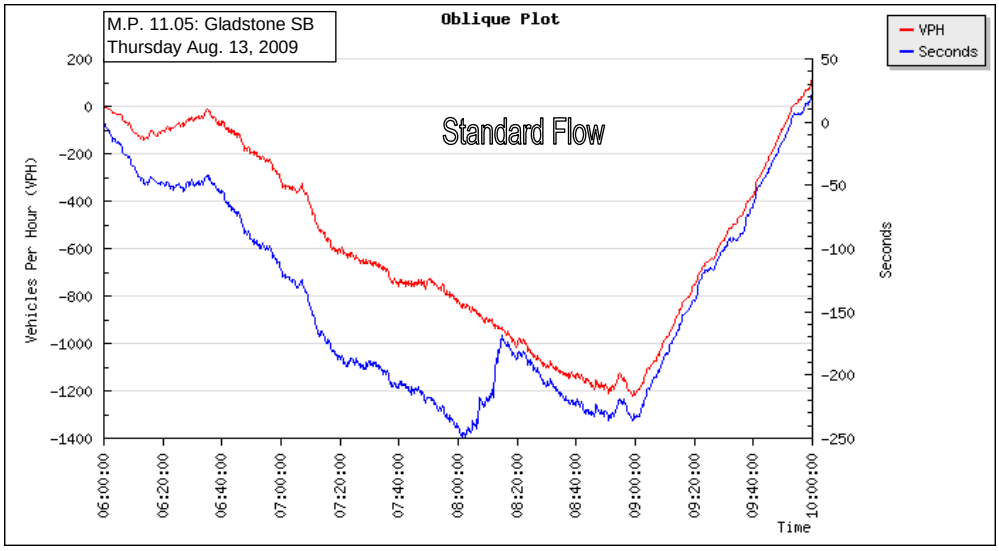




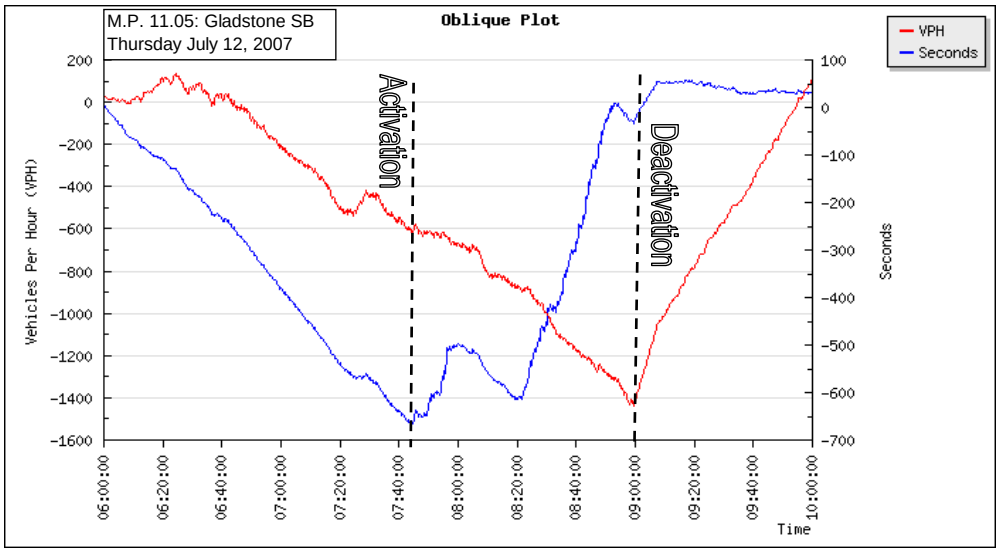
Highway: *I-205*
Direction: *Southbound*

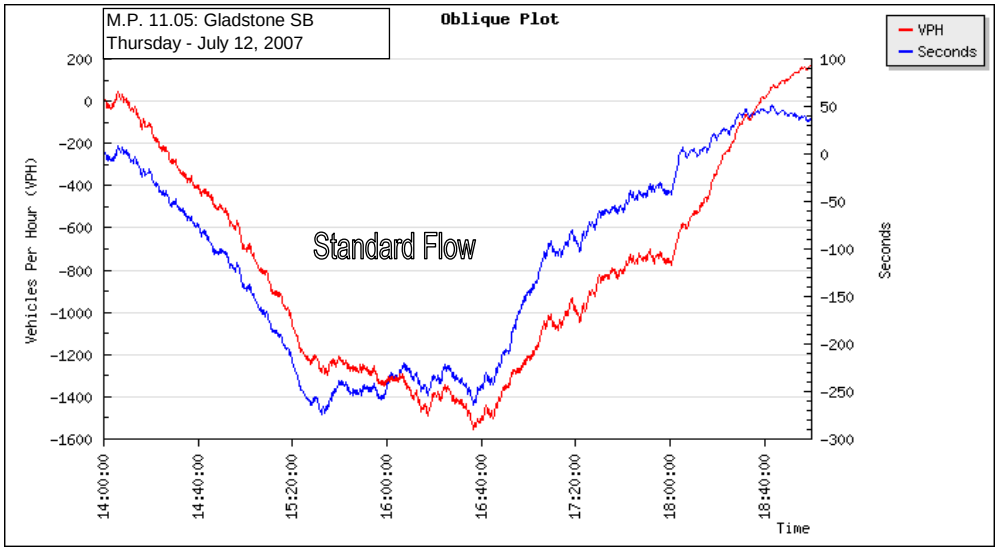


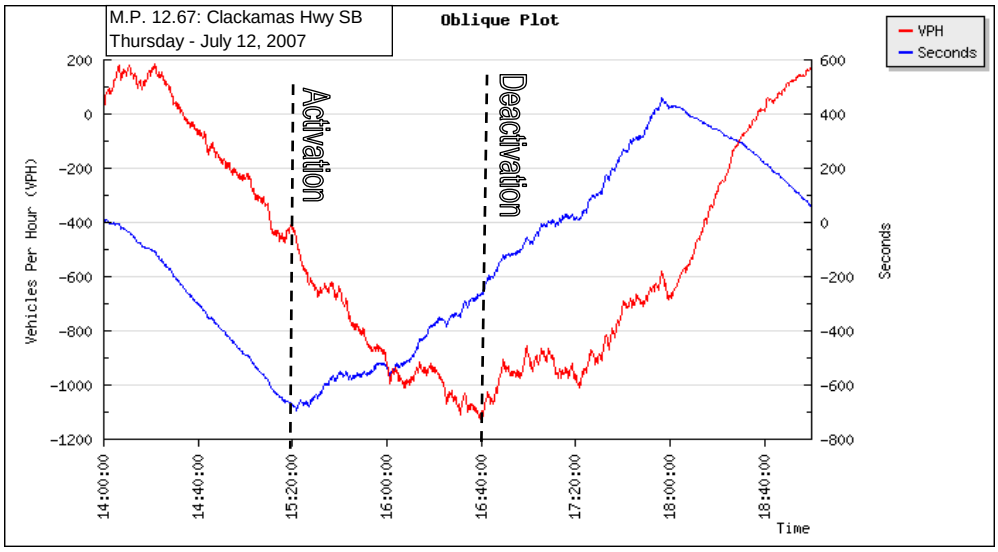




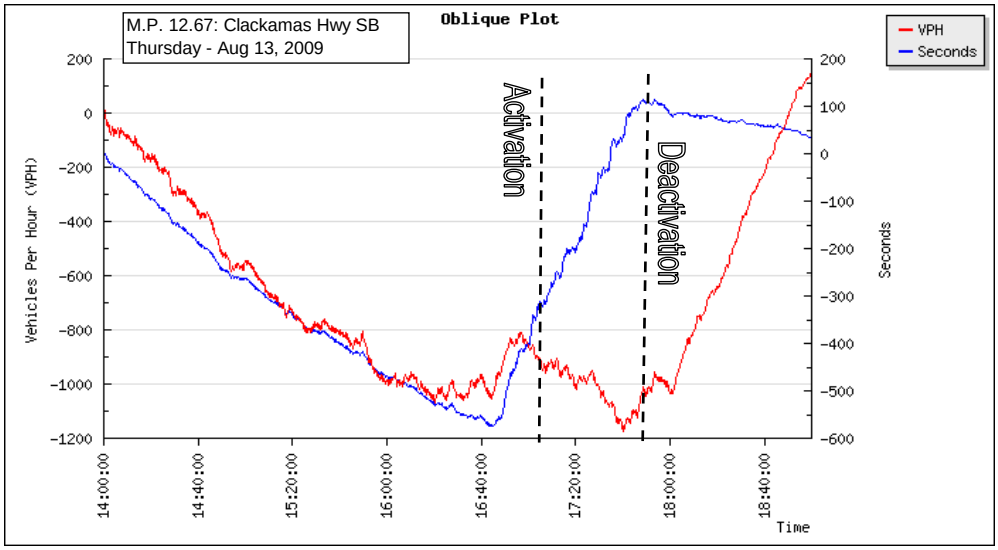
Highway: *I-205*
Direction: *Southbound*

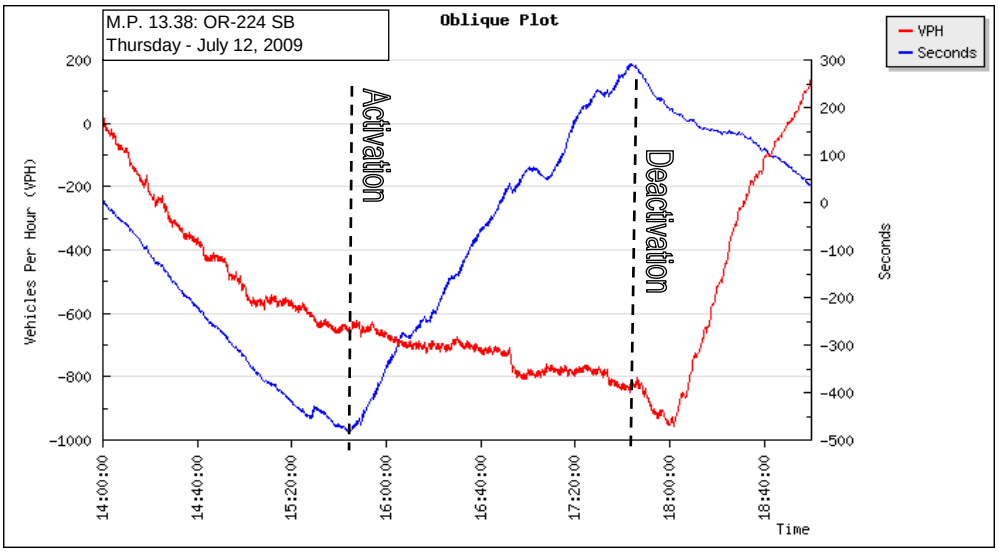


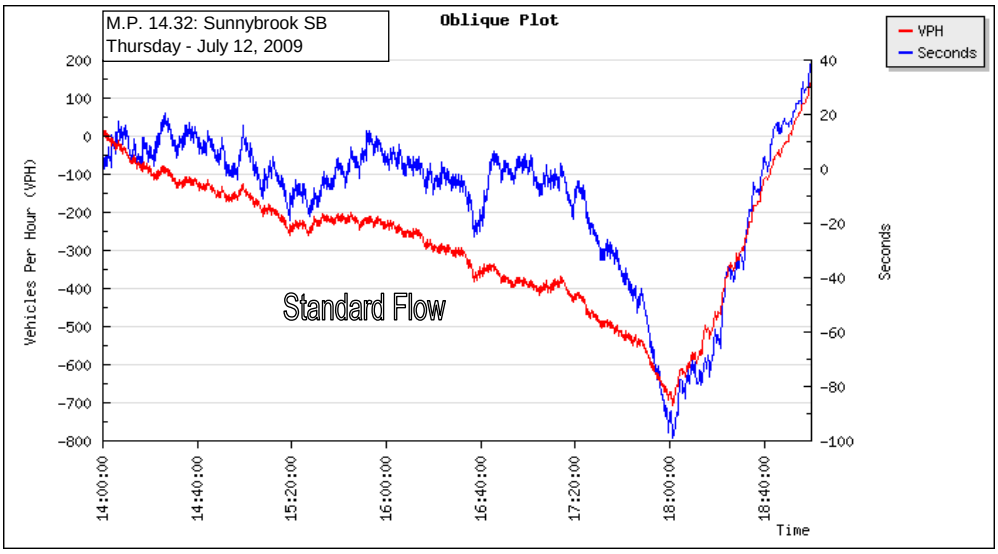




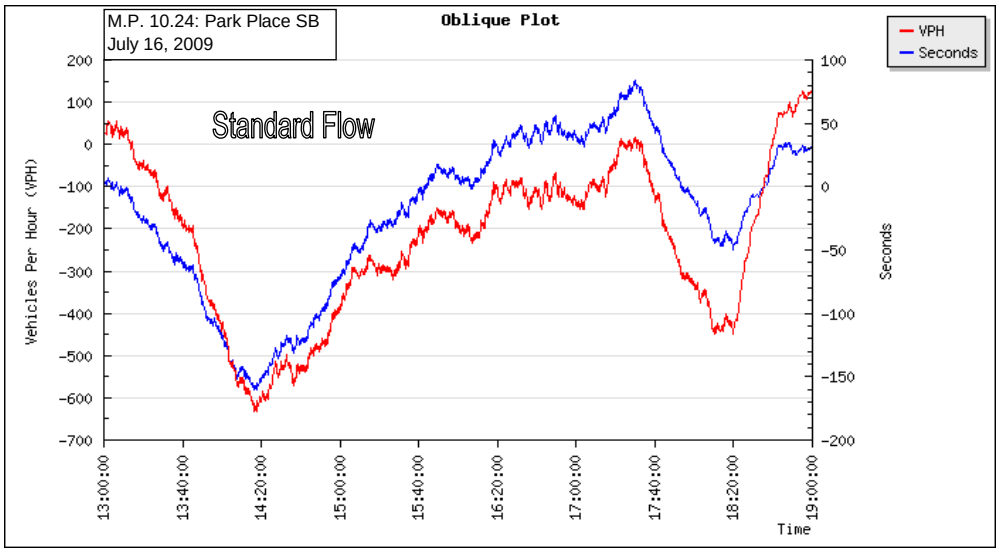
Highway: *I-205*
Direction: *Southbound*

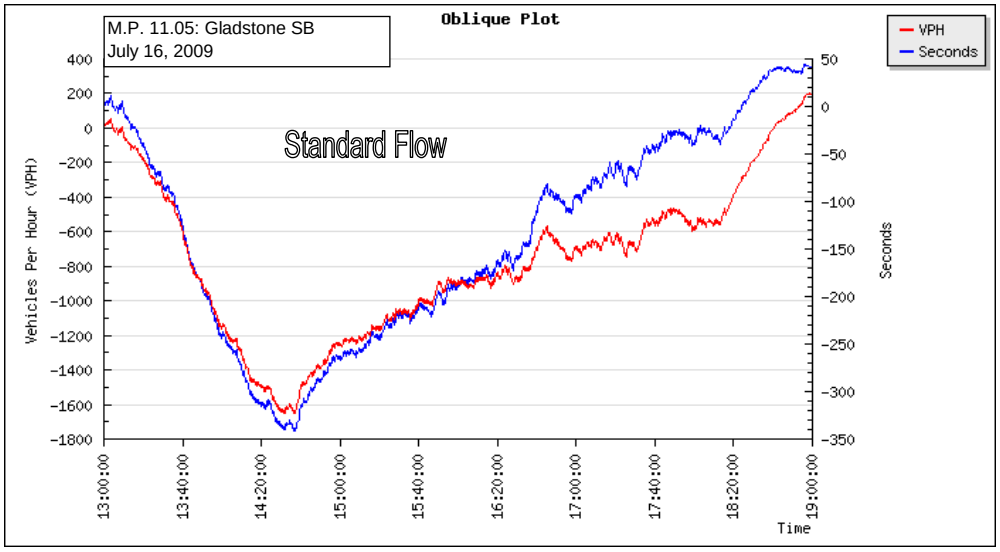


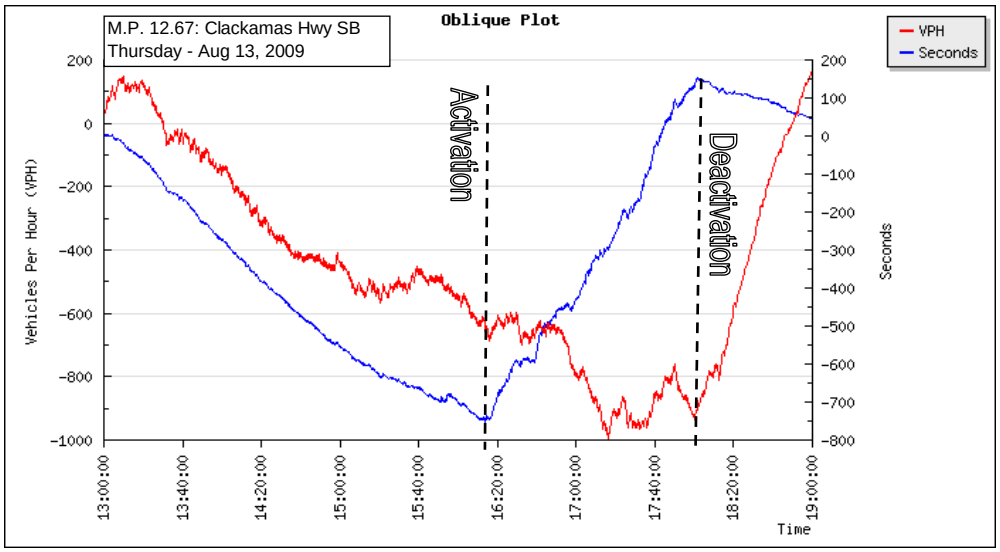




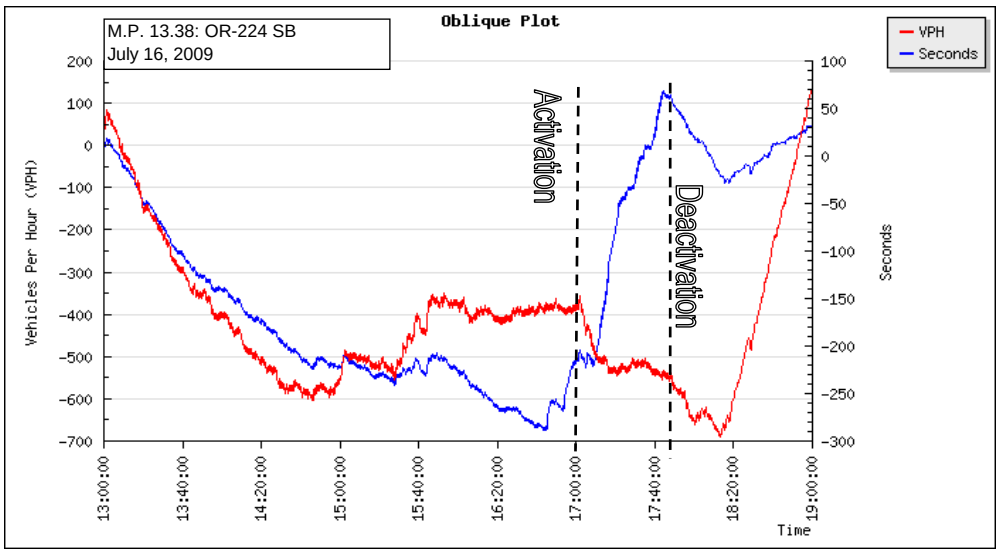
Highway: *I-205*
Direction: *Southbound*

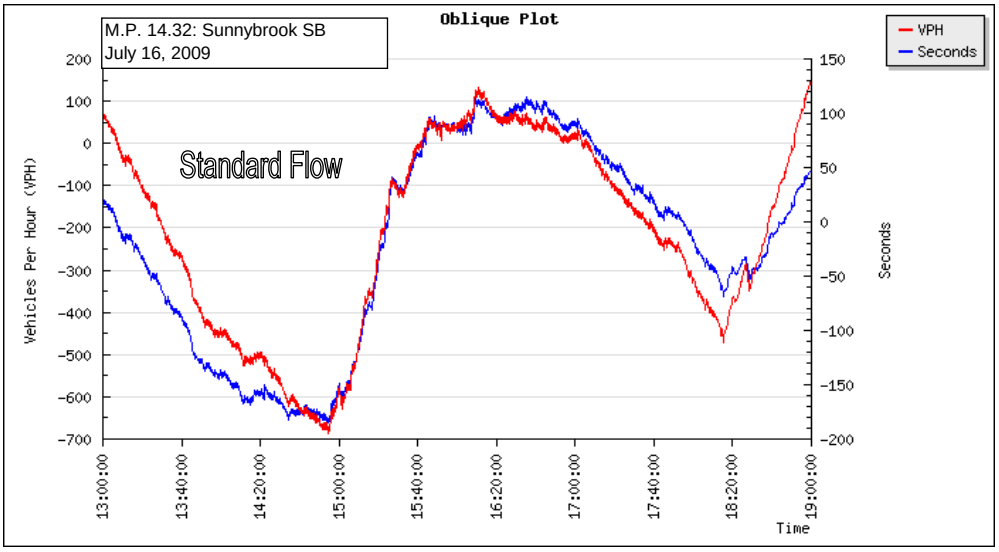


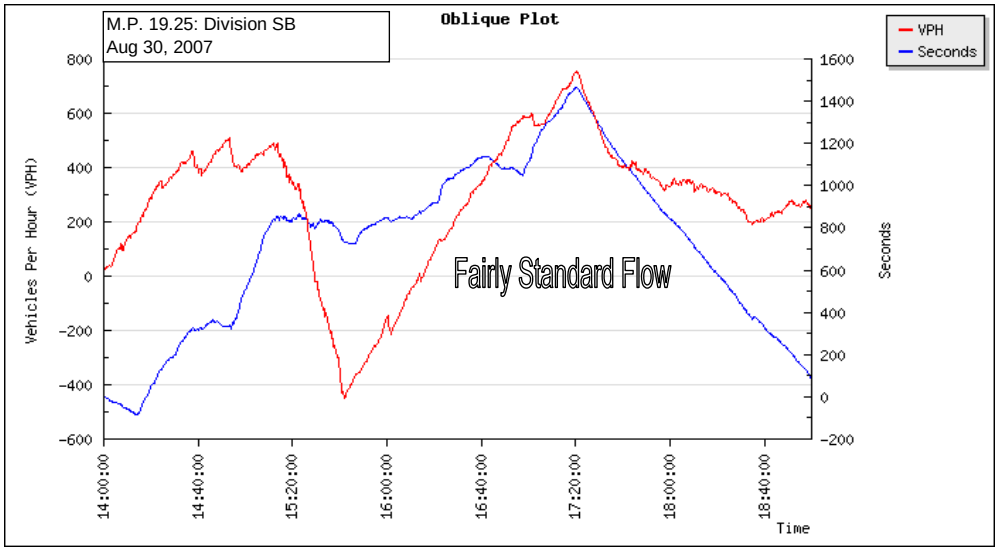




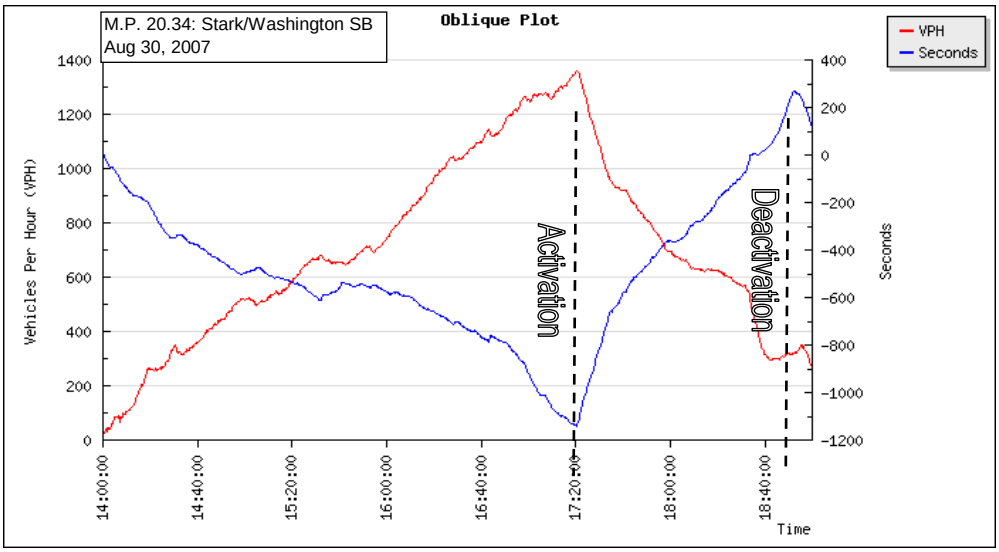
Highway: *I-205*
Direction: *Southbound*

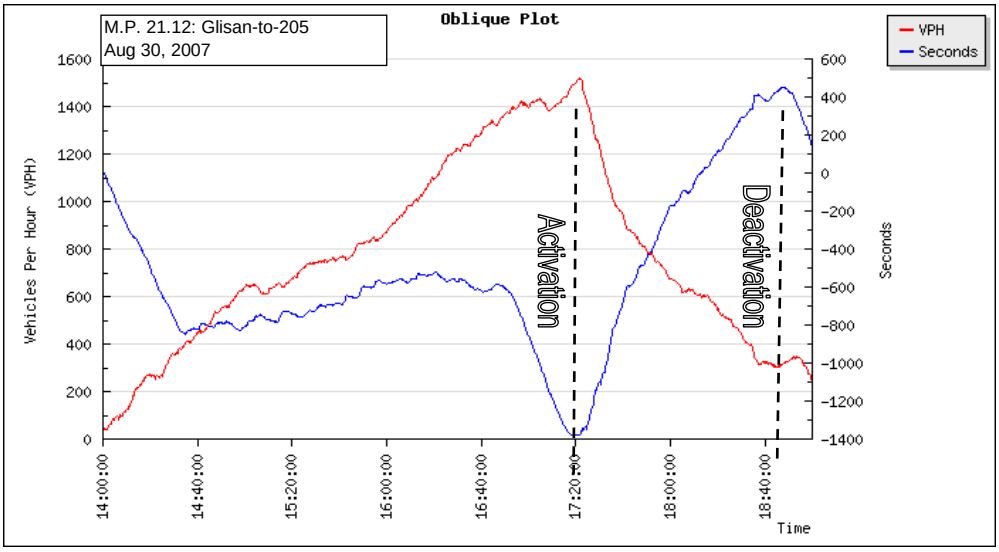


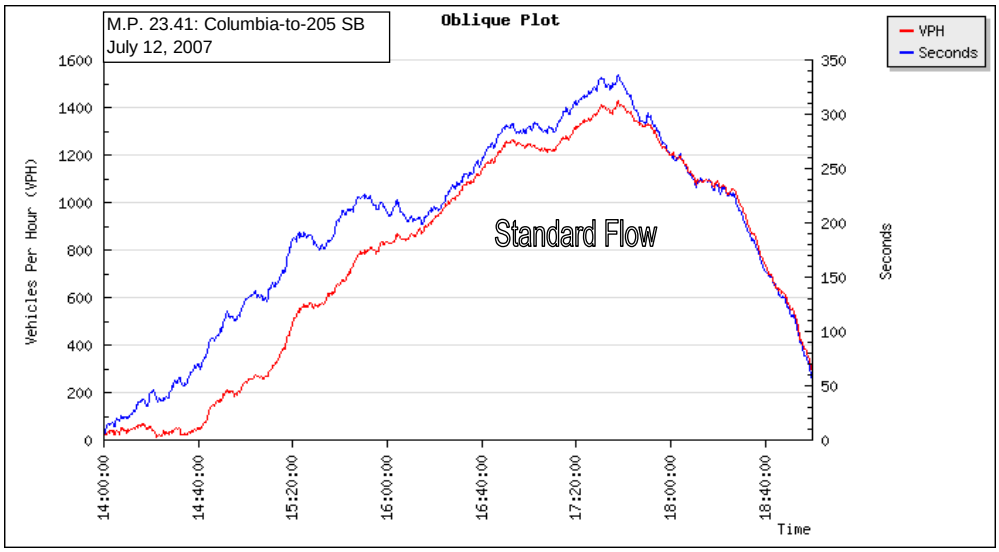




Highway: *I-205*
Direction: *Southbound*







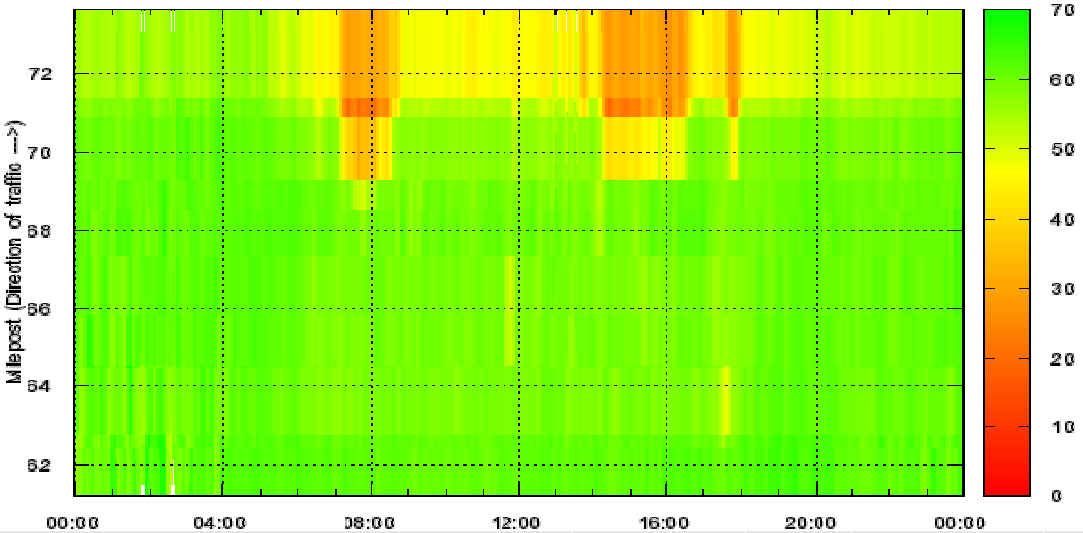
US 26 Eastbound
24 Hour Speed Plots

DAVID EVANS AND ASSOCIATES INC.

Highway: *US 26* **Time Period: 24 Hrs**

Direction: *Eastbound* **Entire US 26 Corridor: Eastbound**

Timeseries speed surface plot for US 26 EAST on Thursday August 16, 2007 (Units in mph)

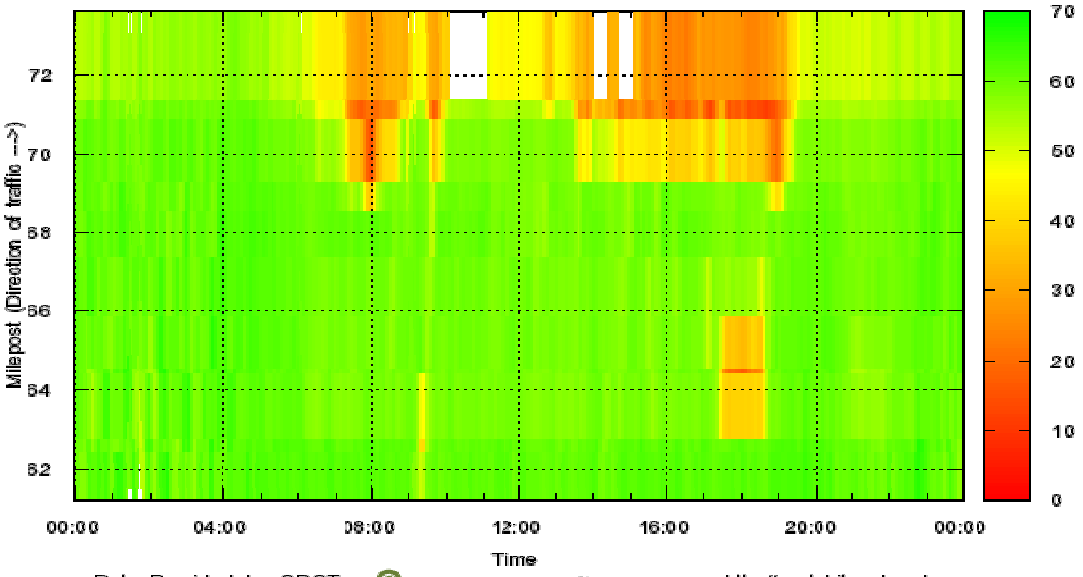


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
766309	US 26 (SUNSET)	US 26 (SUNSET) Eastbound MP 37	0	06:09:11	52	Debris	Right Shoulder	no	0
766411	US 26 (SUNSET)	US 26 (SUNSET) Eastbound BARNES	0	07:58:22	56	Stall	Right Shoulder	no	0
766428	US 26 (SUNSET)	US 26 (SUNSET) Eastbound SYLVAN	0	08:02:35	56	Stall	Right Shoulder	no	0
766689	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At PARKWAY @ BALTIC	0	19:26:36	146	Other Incident	None	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

Timeseries speed surface plot for US 26 EAST on Wednesday August 15, 2007 (Units in mph)



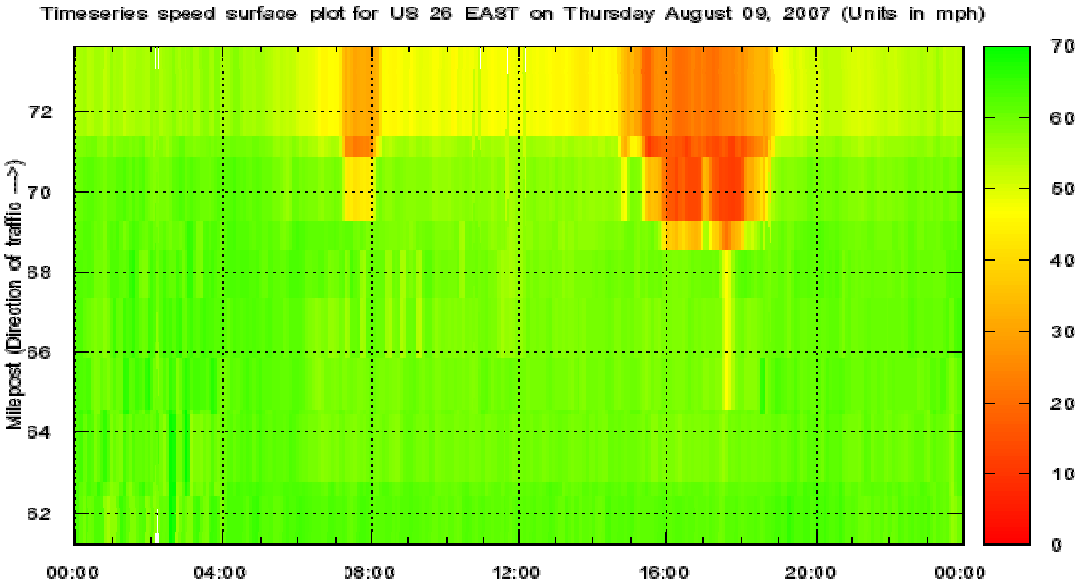
Data Provided by ODOT Portland State UNIVERSITY http://portal.its.pdx.edu

Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
765795	US 26 (SUNSET)	US 26 (SUNSET) Eastbound CORNELIUS PASS	0	06:37:23	55	Stall	Right Shoulder	no	0
765851	US 26 (SUNSET)	US 26 (SUNSET) Eastbound ZOO	1	08:34:34	54	Crash	Left Lanes	no	0
765970	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of GLENCOE	0	13:21:44	56	Stall	Right Shoulder	no	0
765972	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just West Of CAMELOT	1	13:39:20	56	Stall	Right Shoulder	no	0
765990	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of MURRAY	1	14:17:01	56	Stall	Left Shoulder	no	0
766034	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At BARNES	0	15:39:00	56	Stall	Right Shoulder	no	0
766051	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of ZOO	1	16:09:41	56	Crash	Left Lanes	no	0
766110	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At CAMELOT	1	16:47:32	56	Stall	Right Lanes	no	0
766128	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of SYLVAN	1	16:57:51	56	Stall	Left Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

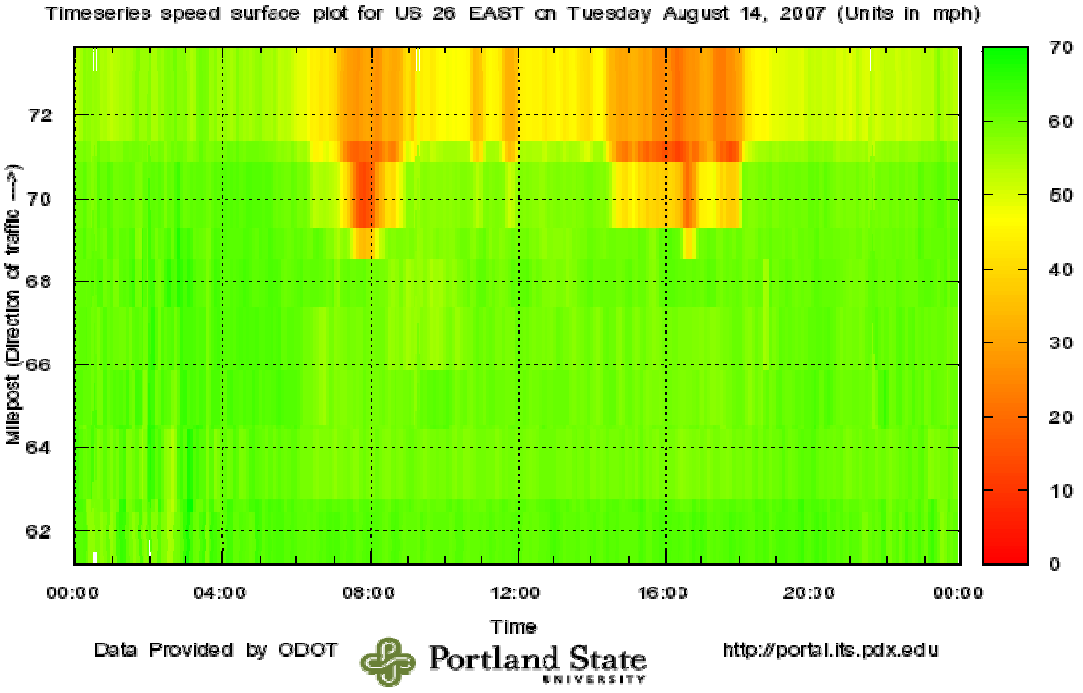
Highway: *US 26* **Time Period: 24 Hrs**
Direction: *Eastbound* **Entire US 26 Corridor: Eastbound**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
763612	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At SHUTE RD	2	09:20:16	56	Debris	Left Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



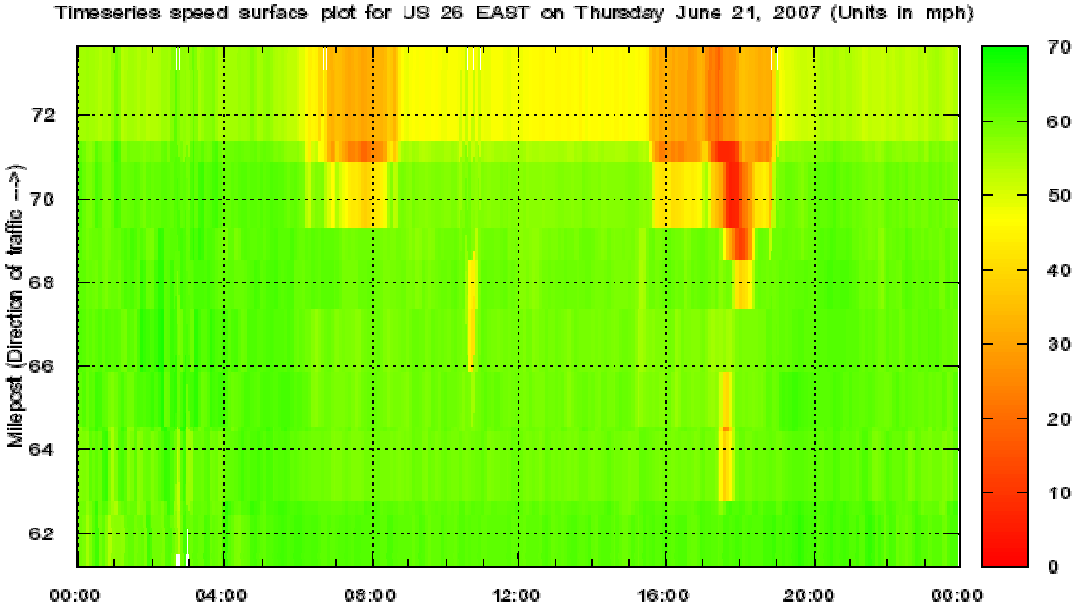
Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
765529	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just West Of 185TH	0	13:24:54	56	Stall	Right Shoulder	no	0
765689	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just South Of CAMELOT	1	17:48:26	56	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

Highway: *US 26* **Time Period: 24 Hrs**

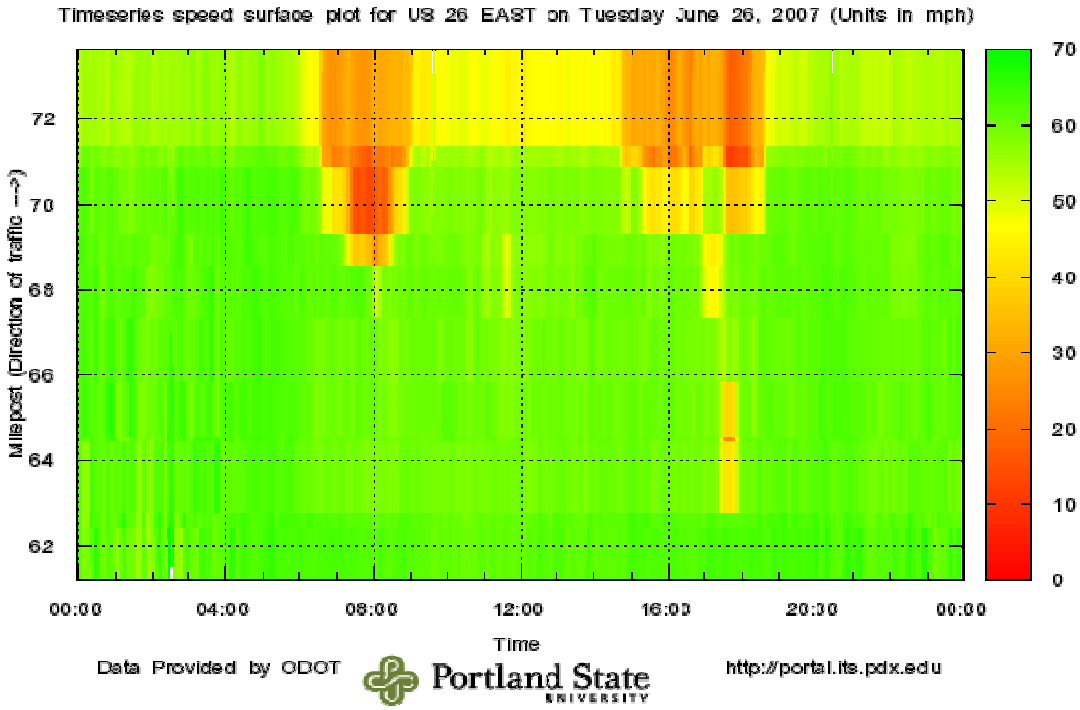
Direction: *Eastbound* **Entire US 26 Corridor: Eastbound**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
741364	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just West Of ZOO	0	08:53:51	58	Stall	Right Shoulder	no	0
741404	US 26 (SUNSET)	US 26 (SUNSET) Eastbound ZOO	0	10:32:47	58	Stall	Right Shoulder	no	0
741563	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At TUNNEL	1	14:33:19	58	Crash	Left Lanes	no	0
741644	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At ZOO	1	16:25:14	58	Crash	Left Lanes	no	0

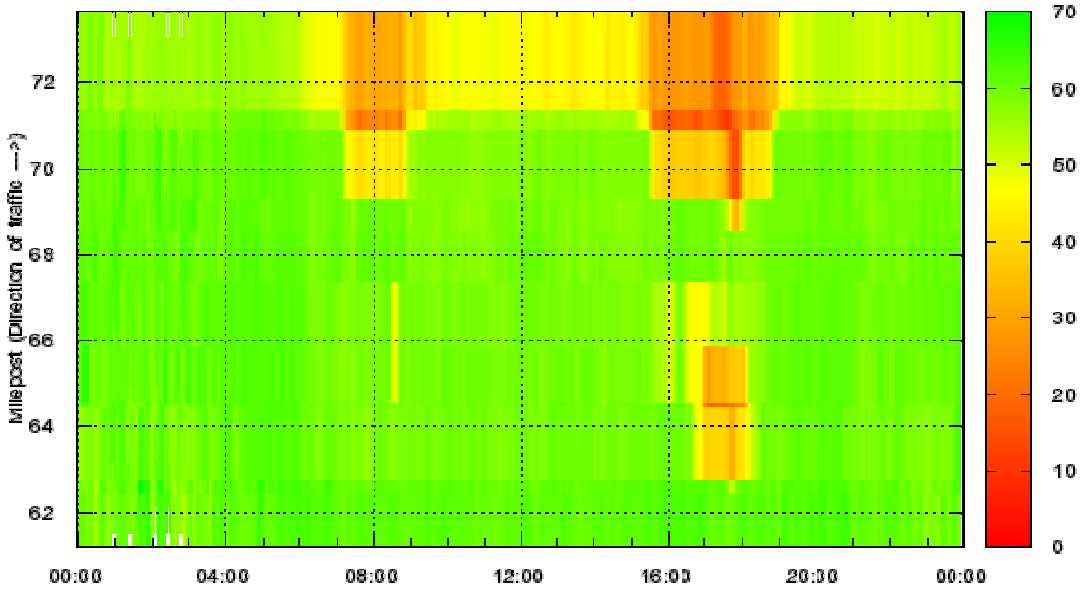
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Highway: *US 26* **Time Period: 24 Hrs**

Direction: *Eastbound* **Entire US 26 Corridor: Eastbound**

Timeseries speed surface plot for US 26 EAST on Thursday July 12, 2007 (Units in mph)

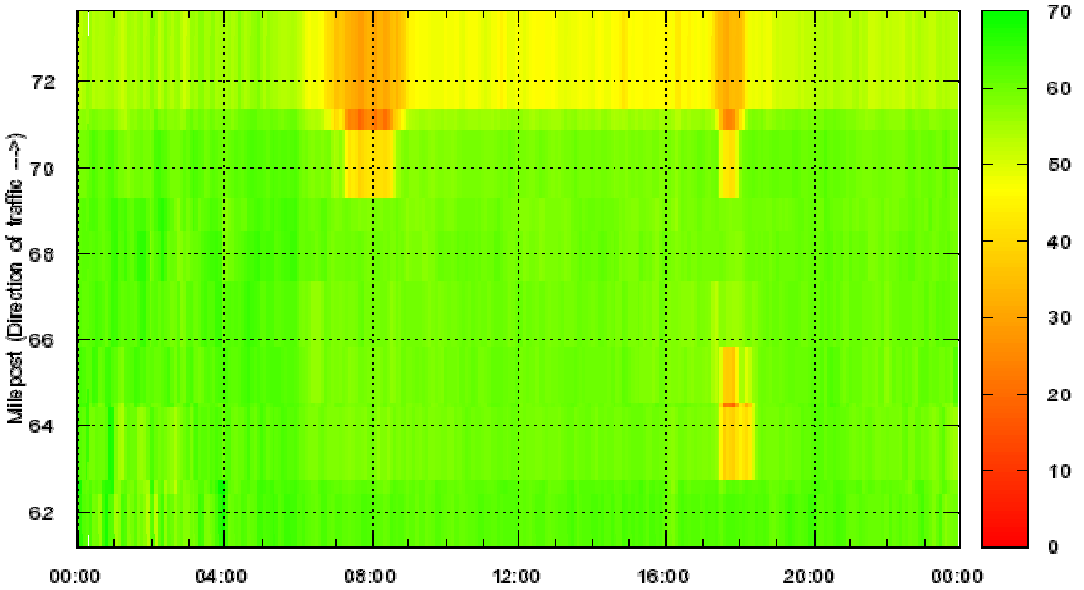


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
751463	US 26 (SUNSET)	US 26 (SUNSET) Eastbound CORNELIOUS PASS	0	12:29:48	57	Stall	Right Shoulder	no	0
751546	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At JEFFERSON	1	14:12:23	57	Crash	Right Shoulder	no	0
751583	US 26 (SUNSET)	US 26 (SUNSET) Eastbound E OF TUNNEL	1	15:11:01	57	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

Timeseries speed surface plot for US 26 EAST on Wednesday July 11, 2007 (Units in mph)



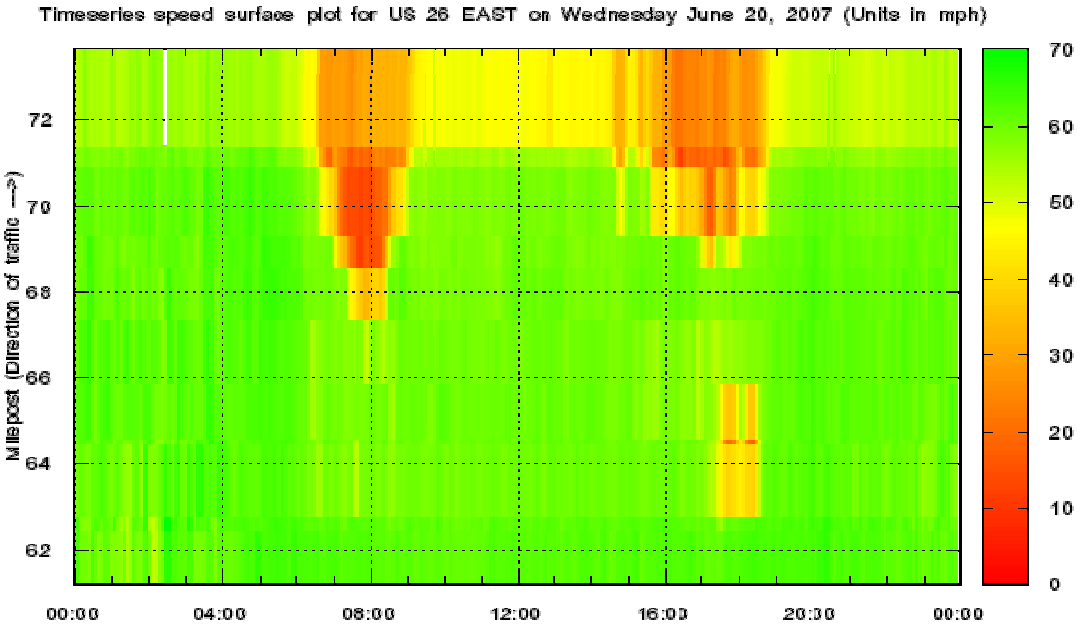
Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
750567	US 26 (MT HOOD HWY)	US 26 (MT HOOD HWY) Eastbound CHERRYVILLE-CHERRYVILLE	1	05:30:54	1341	Construction	Right Lanes	no	0
750588	US 26 (SUNSET)	US 26 (SUNSET) Eastbound HWY 217	0	06:16:43	57	Stall	Right Shoulder	no	0
750625	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At ZOO	0	07:07:36	57	Stall	Right Shoulder	no	0
750704	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At ZOO	0	09:09:11	56	Stall	Right Shoulder	no	0
750824	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At JEFFERSON	1	14:09:36	57	Debris	Left Lanes	no	0
750865	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of JEFFERSON	0	15:41:28	81	Stall	Right Shoulder	no	0
750944	US 26 (MT HOOD HWY)	US 26 (MT HOOD HWY) Eastbound Just East Of HILLYARD RD	2	18:01:29	83	Crash	All Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

Highway: *US 26* **Time Period: 24 Hrs**

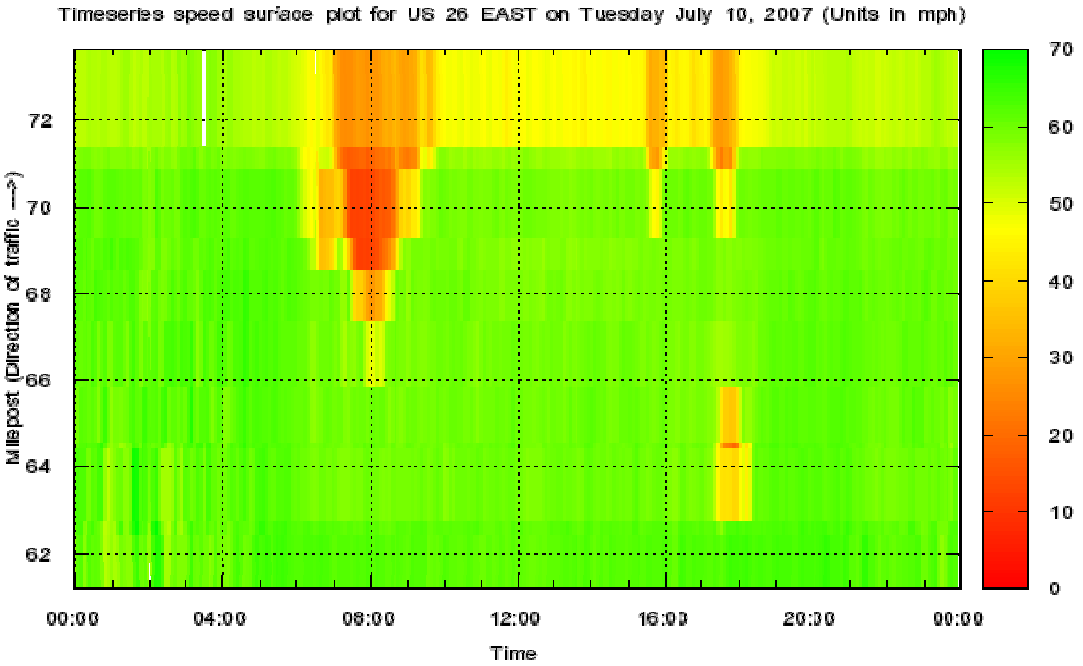
Direction: *Eastbound* **Entire US 26 Corridor: Eastbound**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
740963	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of HWY 217	0	07:34:58	237	Stall	Right Shoulder	no	0
741066	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At SYLVAN	1	13:41:26	58	Stall	Gore Area (right)	no	0
741103	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just West Of SYLVAN	1	14:42:56	58	Stall	Right Shoulder	no	0
741146	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of SYLVAN	1	16:25:22	37	Crash	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
749763	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just West Of CAMELOT	0	05:24:37	57	Stall	Left Shoulder	no	0
749805	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At MURRAY	1	06:42:57	50	Debris	Left Lanes	no	0
749903	US 26 (SUNSET)	US 26 (SUNSET) Eastbound SYLVAN	1	08:40:54	56	Debris	Right Lanes	no	0

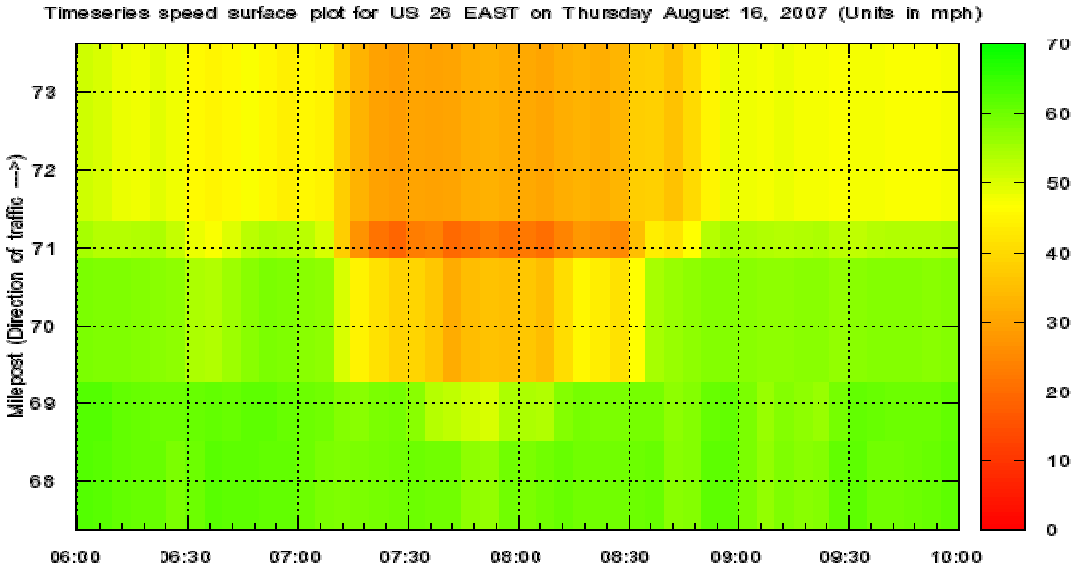
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

US 26 Eastbound
AM Peak Hour Speed Plots

DAVID EVANS AND ASSOCIATES INC.

Highway *US 26* **Time Period: AM Peak**

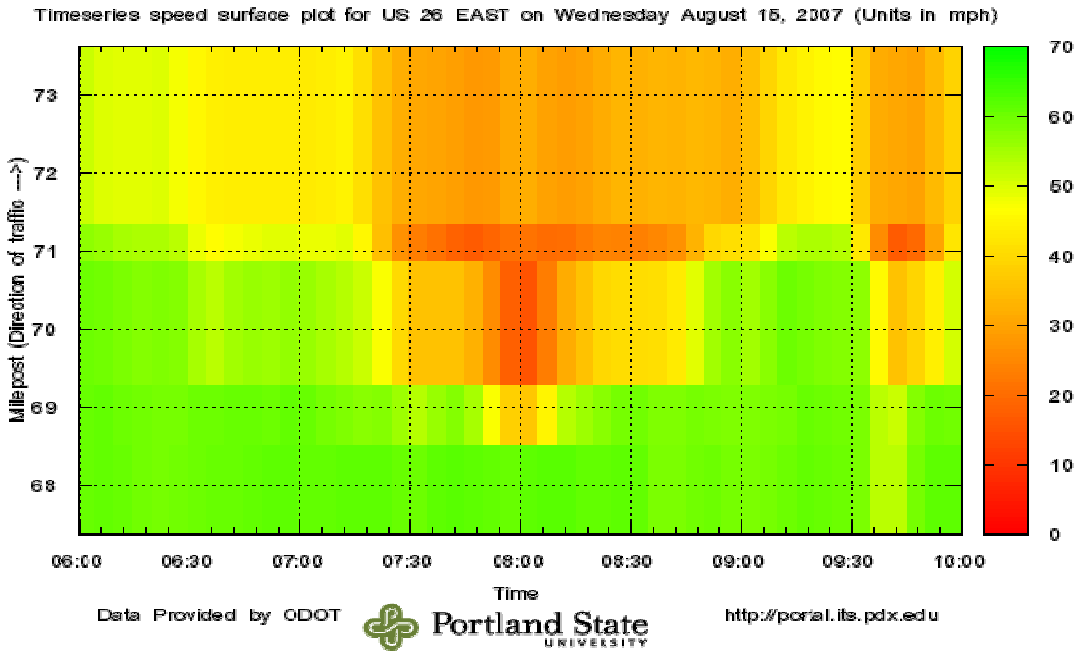
Directior *Eastbound* **Bottleneck Influence Area: M.P. 67-74**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
766309	US 26 (SUNSET)	US 26 (SUNSET) Eastbound MP 37	0	06:09:11	52	Debris	Right Shoulder	no	0
766411	US 26 (SUNSET)	US 26 (SUNSET) Eastbound BARNES	0	07:58:22	56	Stall	Right Shoulder	no	0
766428	US 26 (SUNSET)	US 26 (SUNSET) Eastbound SYLVAN	0	08:02:35	56	Stall	Right Shoulder	no	0

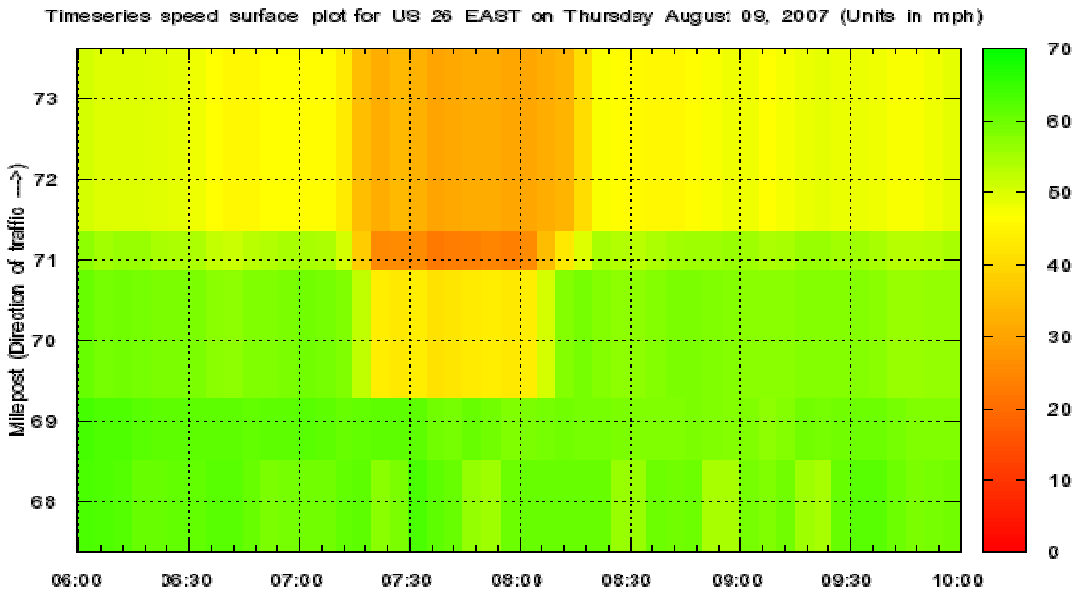
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
765795	US 26 (SUNSET)	US 26 (SUNSET) Eastbound CORNELIUS PASS	0	06:37:23	55	Stall	Right Shoulder	no	0
765851	US 26 (SUNSET)	US 26 (SUNSET) Eastbound ZOO	1	08:34:34	54	Crash	Left Lanes	no	0

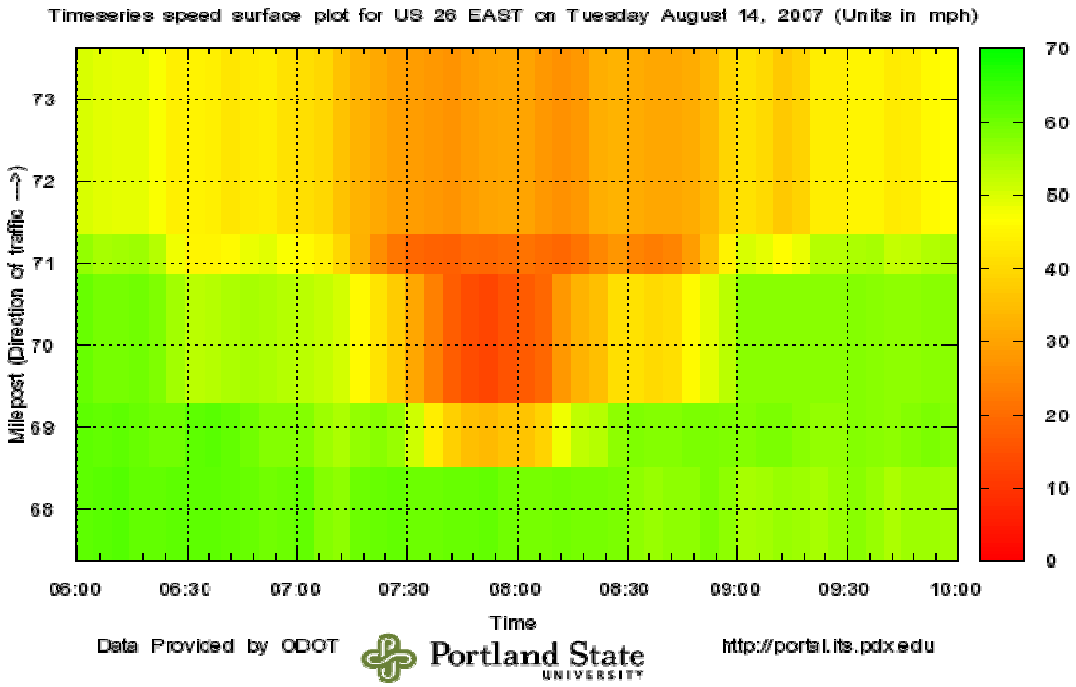
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

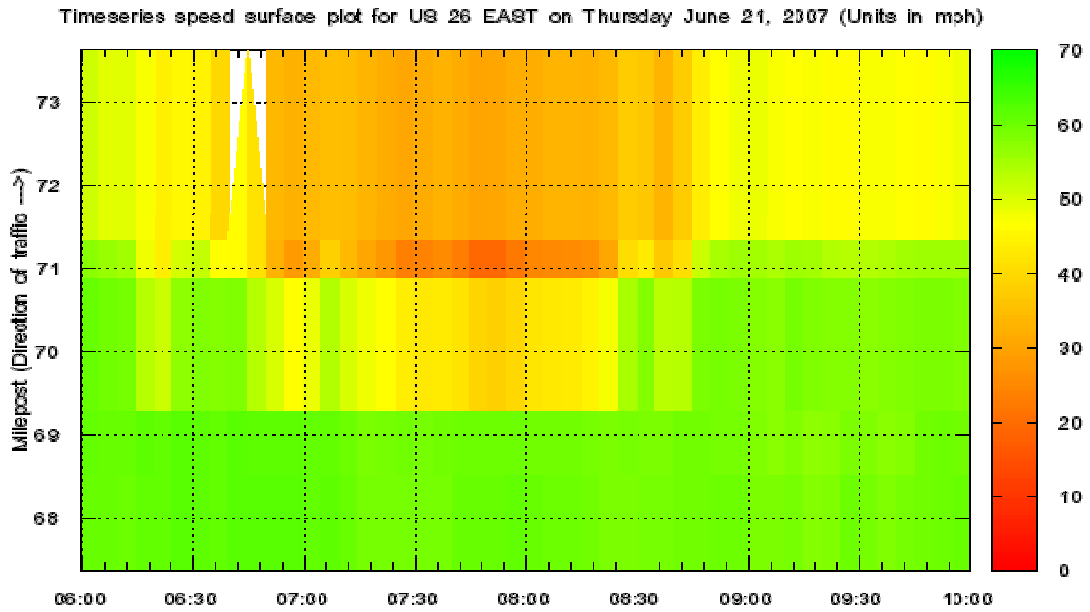


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
763612	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At SHUTE RD	2	09:20:16	56	Debris	Left Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

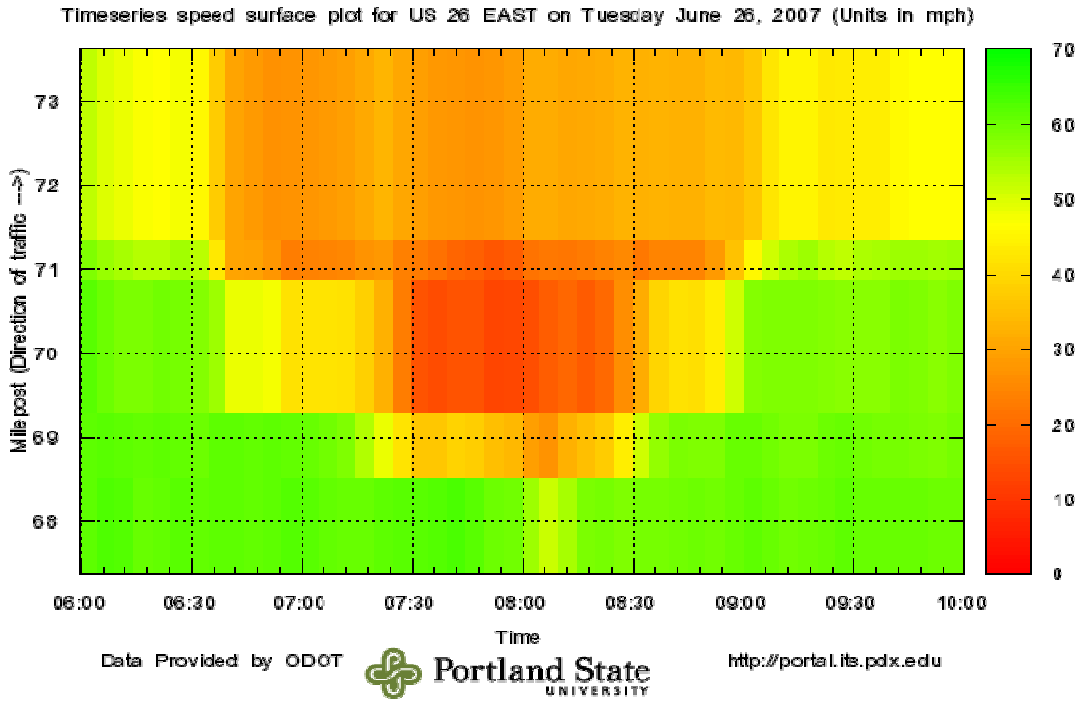


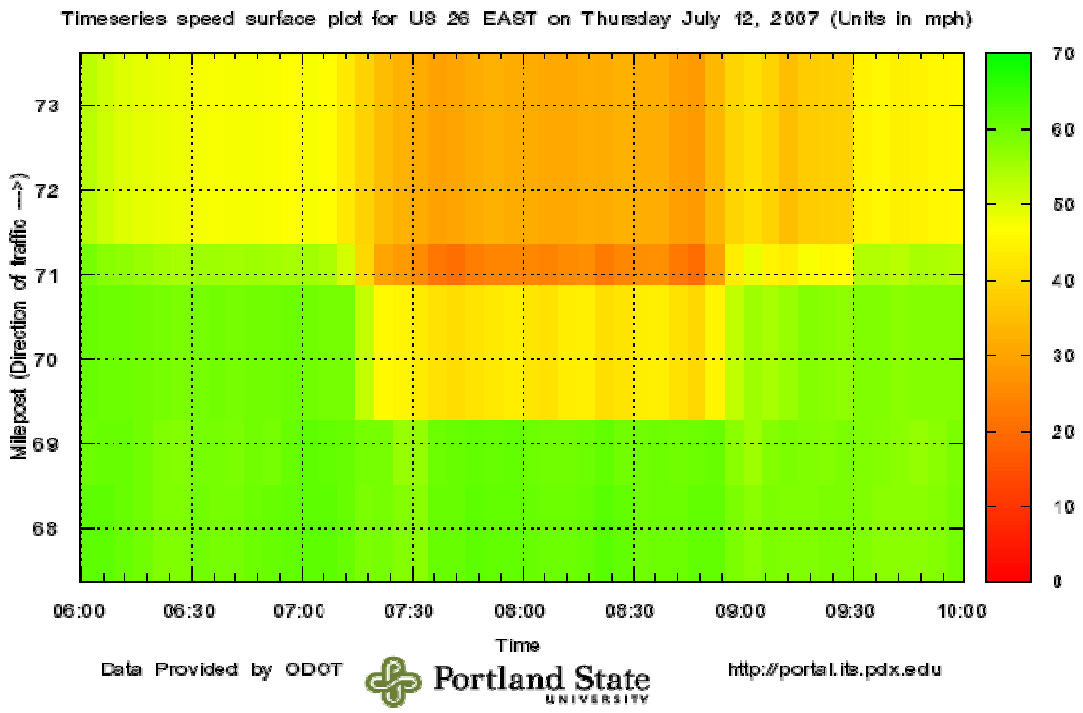


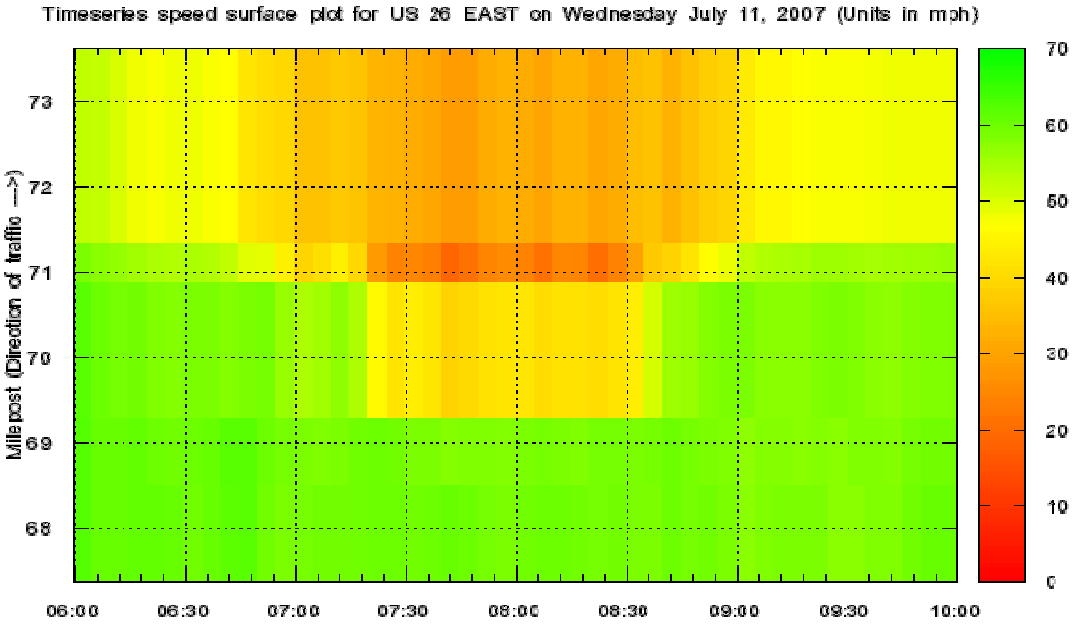
Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
741364	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just West Of ZOO	0	08:53:51	58	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.







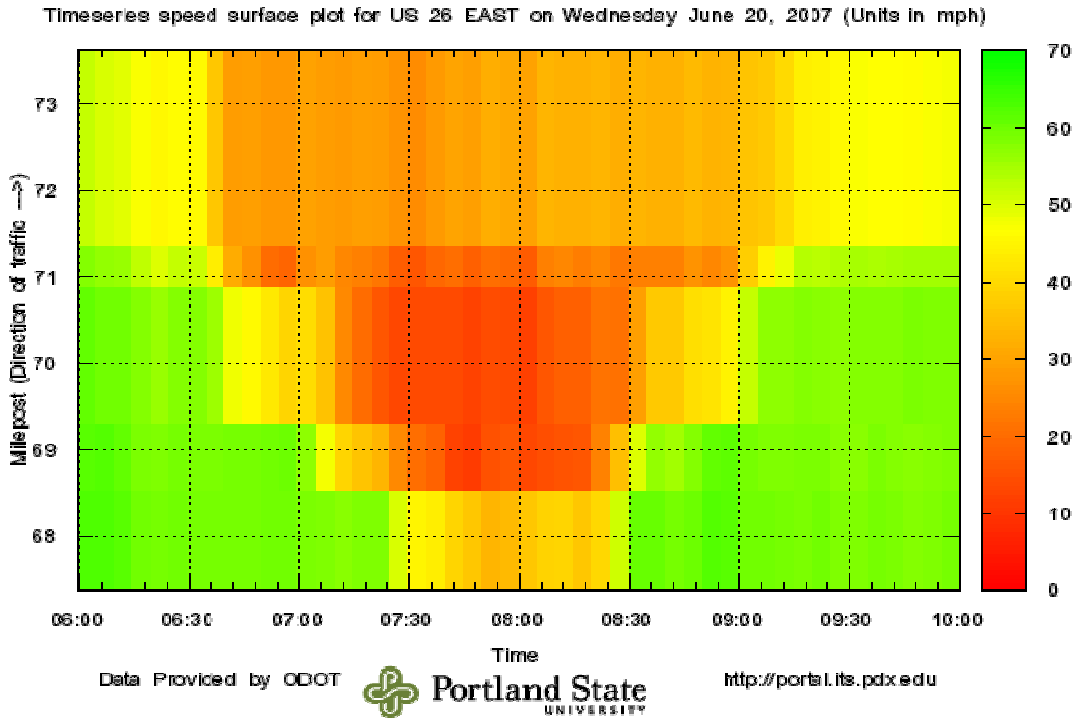
Incidents:

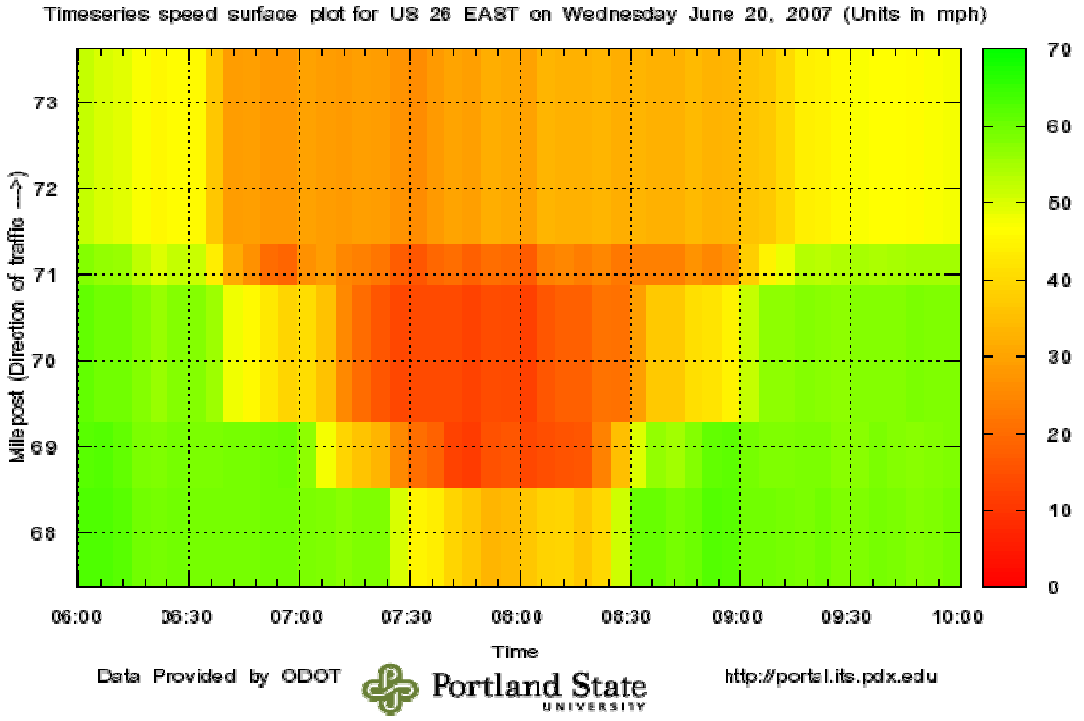
ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
750588	US 26 (SUNSET)	US 26 (SUNSET) Eastbound HWY 217	0	06:16:43	57	Stall	Right Shoulder	no	0
750625	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At ZOO	0	07:07:36	57	Stall	Right Shoulder	no	0
750704	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At ZOO	0	09:09:11	56	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

Highway *US 26* **Time Period: AM Peak**

Direction *Eastbound* **Bottleneck Influence Area: M.P. 67-74**





Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
740963	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of HWY 217	0	07:34:58	237	Stall	Right Shoulder	no	0

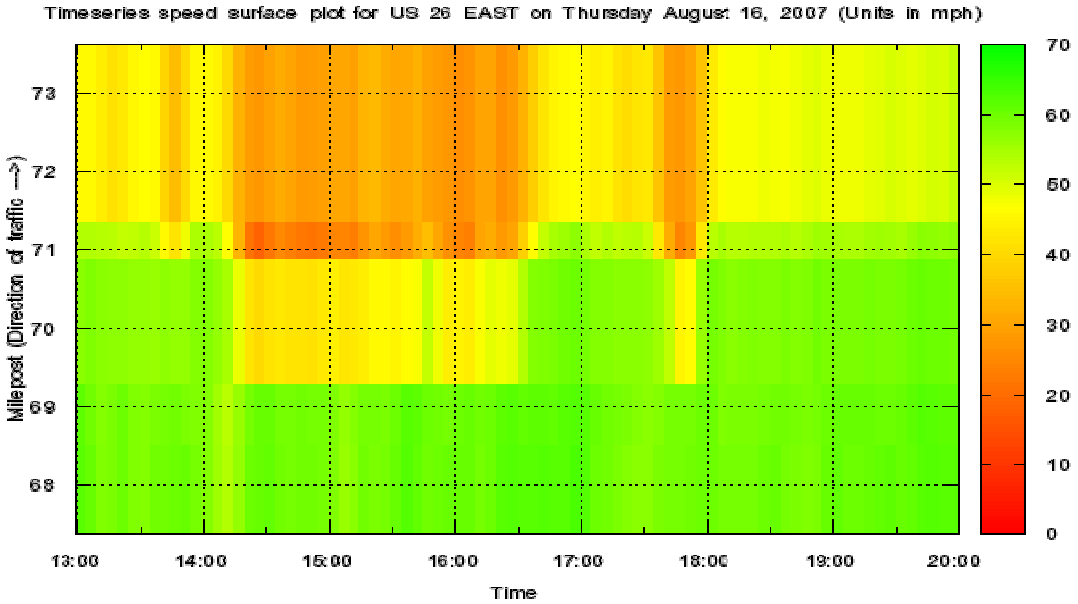
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

US 26 Eastbound
PM Peak Hour Speed Plots

DAVID EVANS AND ASSOCIATES INC.

Highway *US 26* **Time Period: PM Peak**

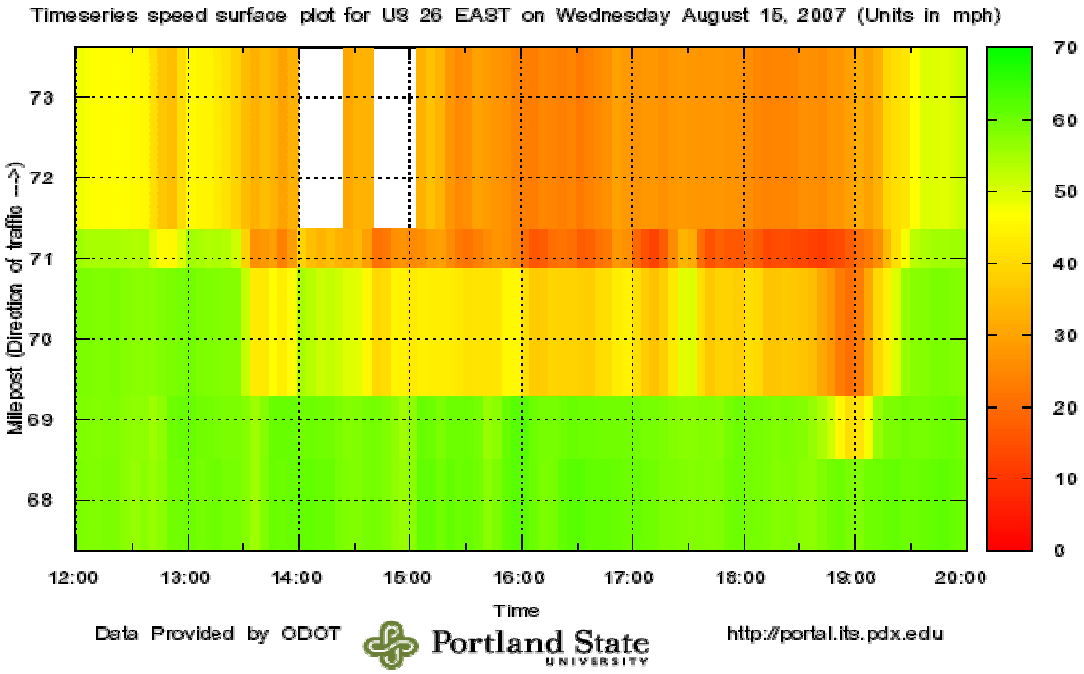
Direction *Eastbound* **Bottleneck Influence Area: M.P. 67-74**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
766689	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At PARKWAY @ BALTIC	0	19:26:36	146	Other Incident	None	no	0

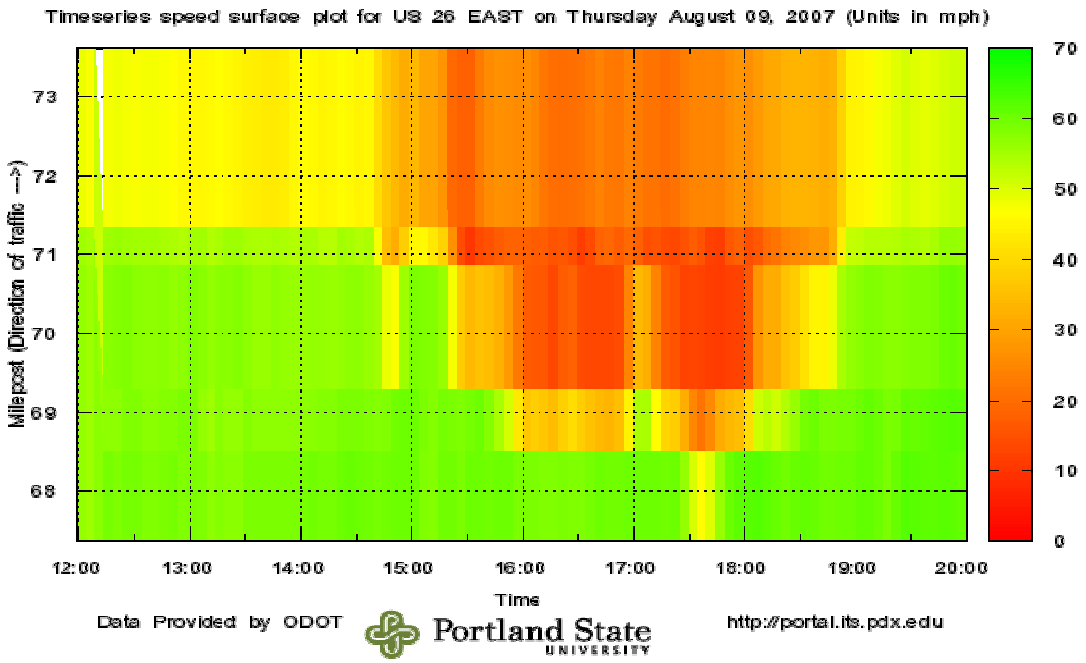
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

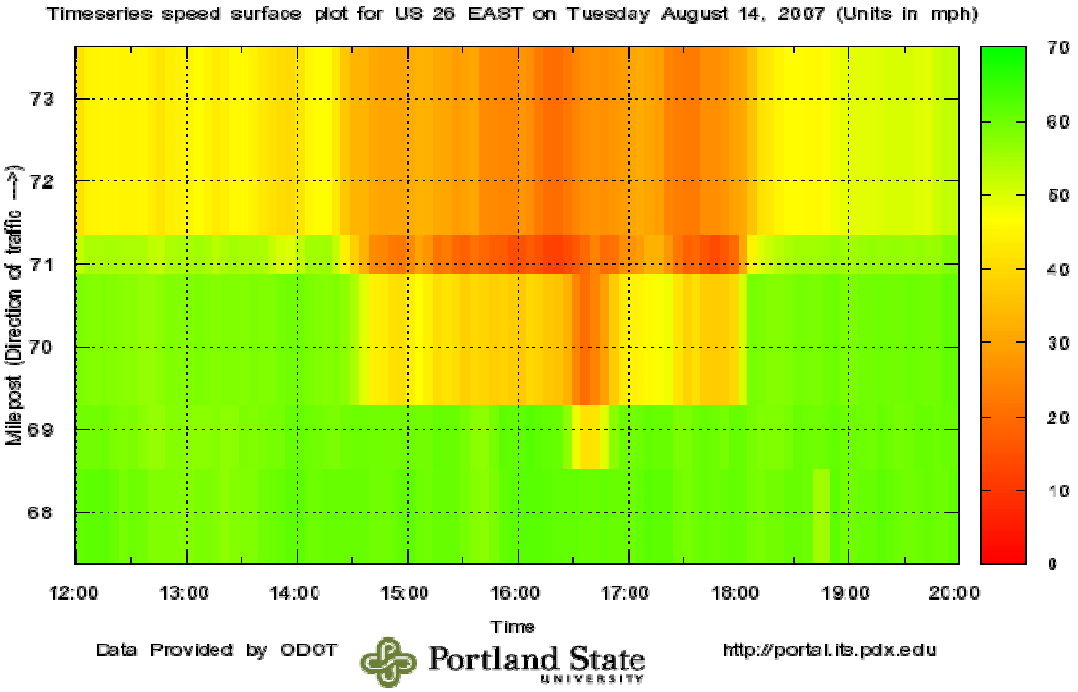


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
765970	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of GLENCOE	0	13:21:44	56	Stall	Right Shoulder	no	0
765972	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just West Of CAMELOT	1	13:39:20	56	Stall	Right Shoulder	no	0
765990	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of MURRAY	1	14:17:01	56	Stall	Left Shoulder	no	0
766034	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At BARNES	0	15:39:00	56	Stall	Right Shoulder	no	0
766051	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of ZOO	1	16:09:41	56	Crash	Left Lanes	no	0
766110	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At CAMELOT	1	16:47:32	56	Stall	Right Lanes	no	0
766128	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of SYLVAN	1	16:57:51	56	Stall	Left Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

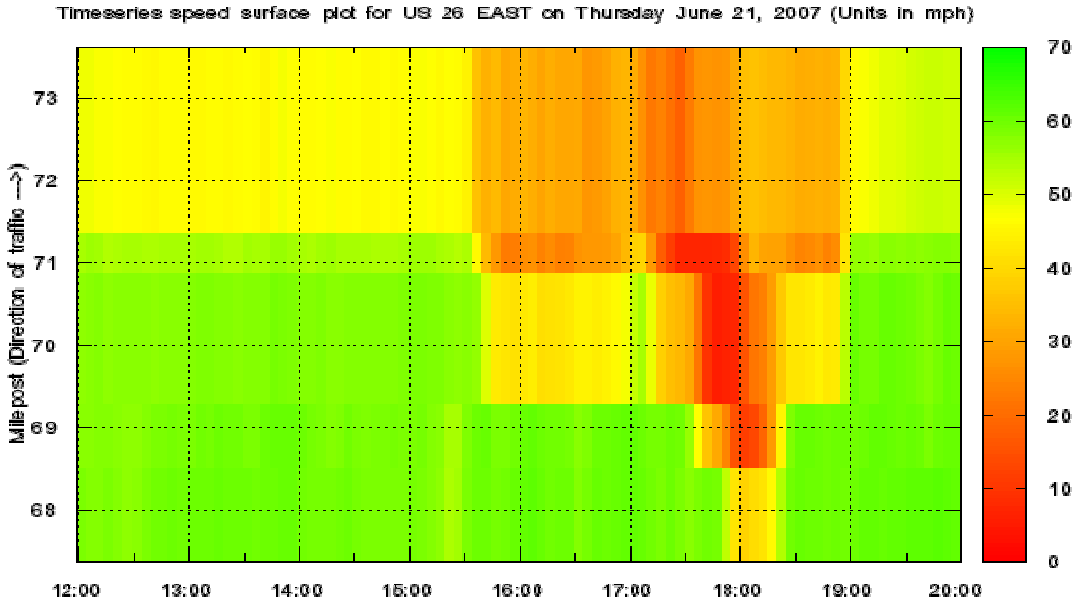




Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
765529	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just West Of 185TH	0	13:24:54	56	Stall	Right Shoulder	no	0
765689	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just South Of CAMELOT	1	17:48:26	56	Stall	Right Shoulder	no	0

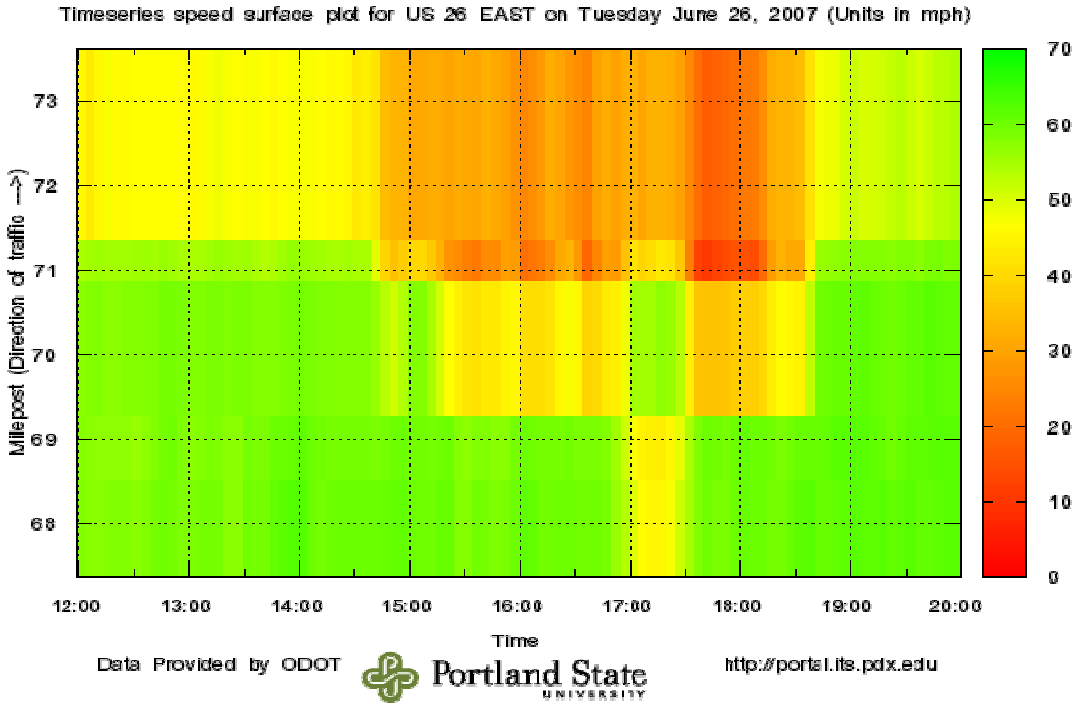
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

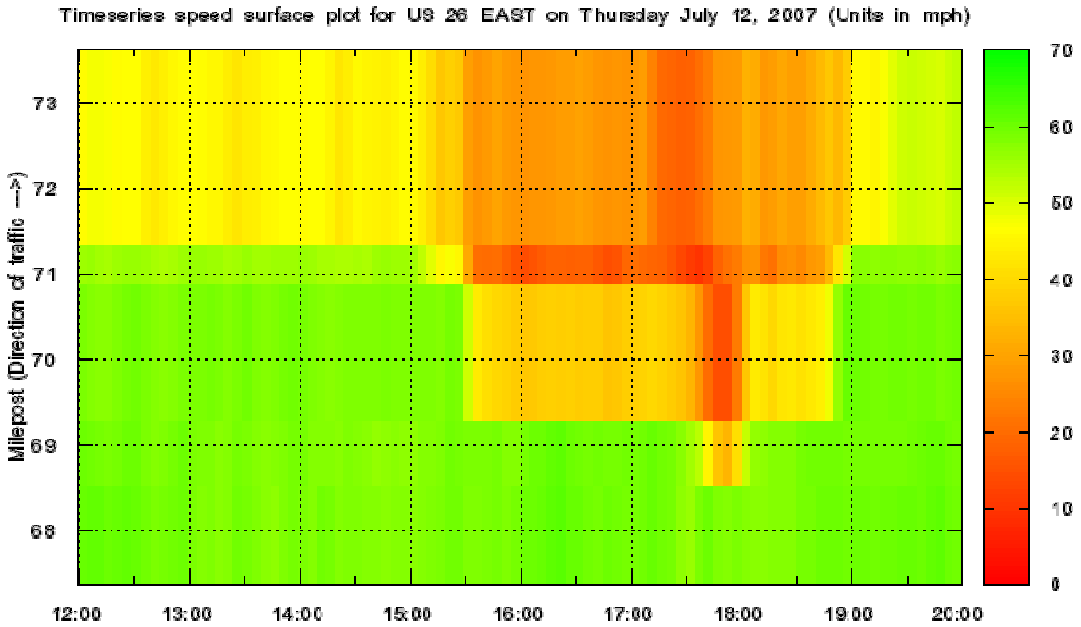


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
741563	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At TUNNEL	1	14:33:19	58	Crash	Left Lanes	no	0
741644	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At ZOO	1	16:25:14	58	Crash	Left Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

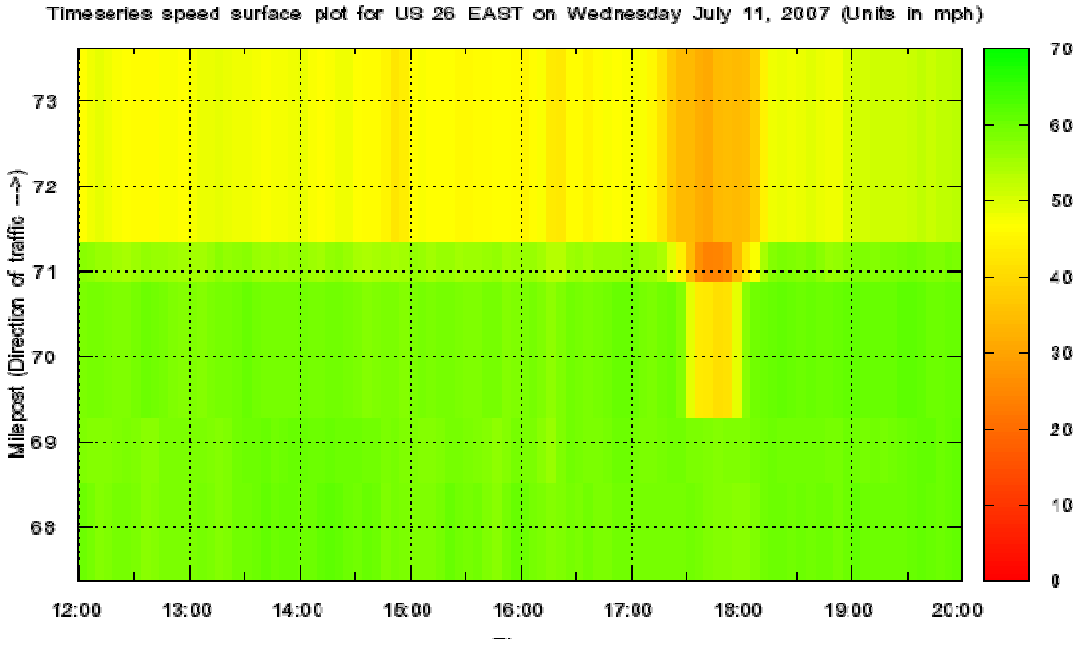




Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
751463	US 26 (SUNSET)	US 26 (SUNSET) Eastbound CORNELIOUS PASS	0	12:29:48	57	Stall	Right Shoulder	no	0
751546	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At JEFFERSON	1	14:12:23	57	Crash	Right Shoulder	no	0
751583	US 26 (SUNSET)	US 26 (SUNSET) Eastbound E OF TUNNEL	1	15:11:01	57	Stall	Right Shoulder	no	0

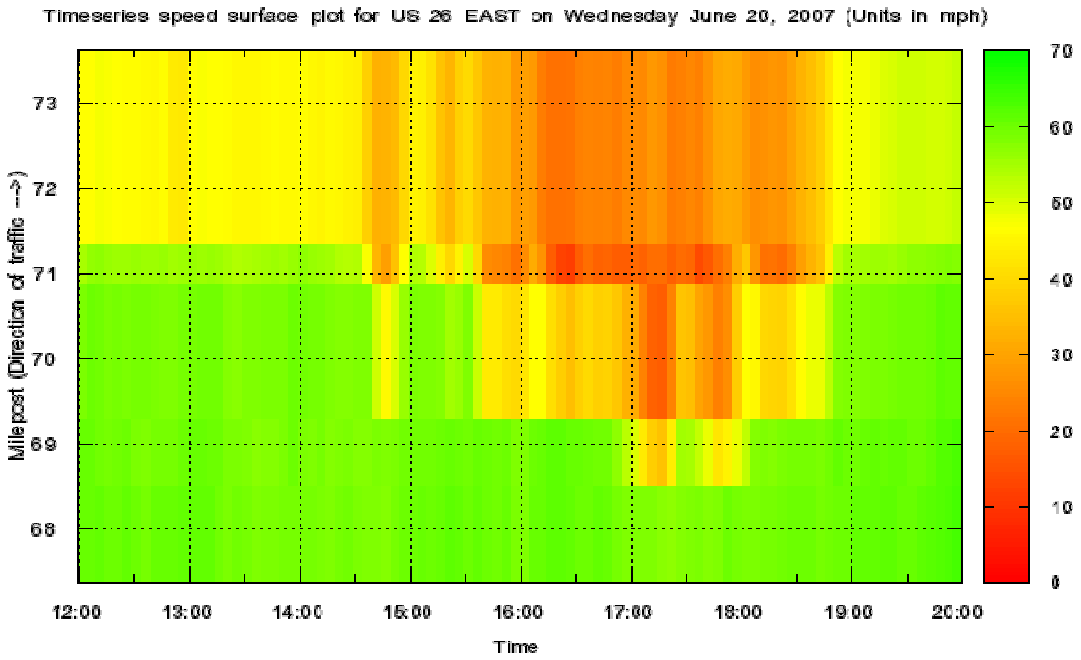
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
750824	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At JEFFERSON	1	14:09:36	57	Debris	Left Lanes	no	0
750865	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of JEFFERSON	0	15:41:28	81	Stall	Right Shoulder	no	0
750944	US 26 (MT HOOD HWY)	US 26 (MT HOOD HWY) Eastbound Just East Of HILLYARD RD	2	18:01:29	83	Crash	All Lanes	no	0

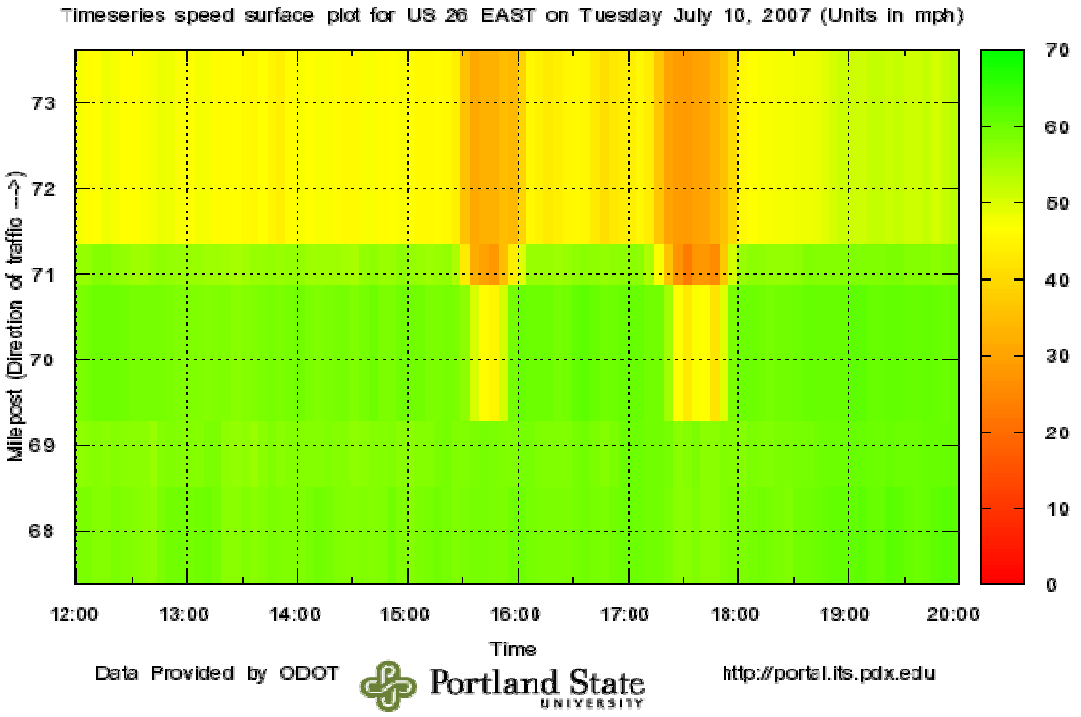
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
741066	US 26 (SUNSET)	US 26 (SUNSET) Eastbound At SYLVAN	1	13:41:26	58	Stall	Gore Area (right)	no	0
741103	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just West Of SYLVAN	1	14:42:56	58	Stall	Right Shoulder	no	0
741146	US 26 (SUNSET)	US 26 (SUNSET) Eastbound Just East Of SYLVAN	1	16:25:22	37	Crash	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

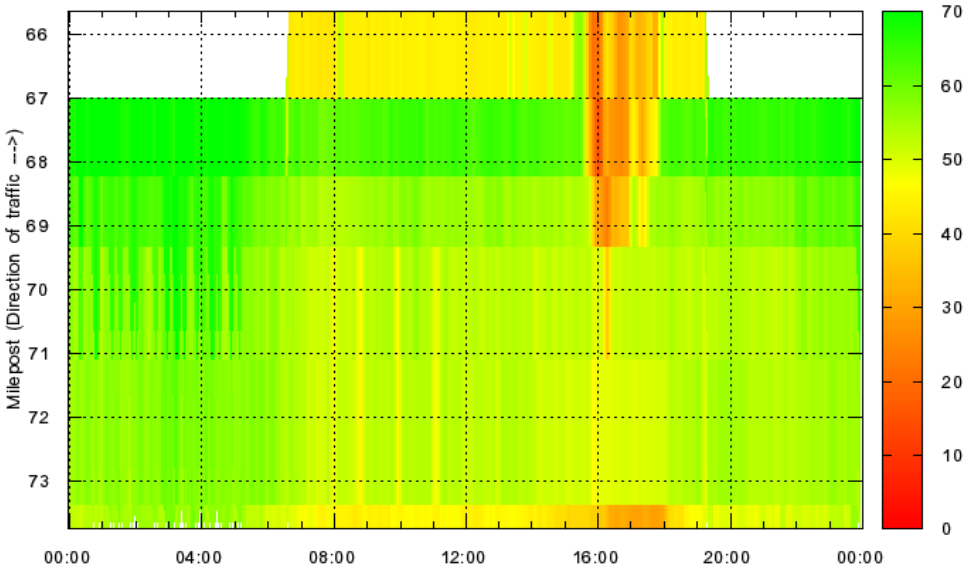


US 26 Westbound
24 Hour Speed Plots

DAVID EVANS AND ASSOCIATES INC.

Highway: *US 26* **Time Period: 24 Hrs**
Direction: *Westbound* **Entire US 26 Corridor: Westbound**

Timeseries speed surface plot for US 26 WEST on Thursday August 16, 2007 (Units in mph)

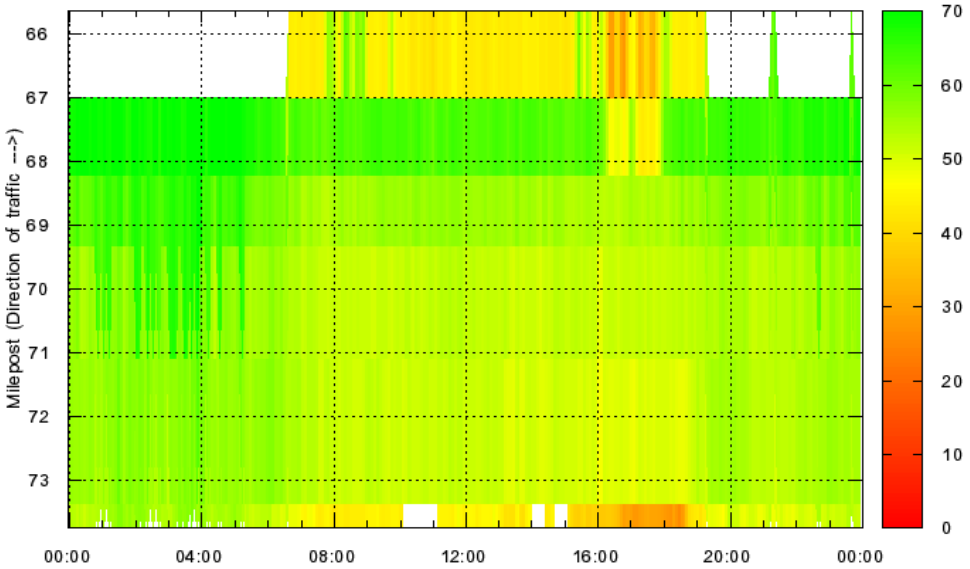


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
766288	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just West Of 185TH	0	05:25:17	56	Stall	Right Shoulder	no	0
766369	US 26 (SUNSET)	US 26 (SUNSET) Westbound Near MURRAY	0	06:38:08	59	Debris	Center Lanes	no	0
766372	US 26 (SUNSET)	US 26 (SUNSET) Westbound SYLVAN	0	06:48:55	56	Stall	Right Shoulder	no	0
766468	US 26 (SUNSET)	US 26 (SUNSET) Westbound 185TH	0	10:02:58	56	Stall	Right Shoulder	no	0
766530	US 26 (SUNSET)	US 26 (SUNSET) Westbound ZOO	0	12:19:13	56	Stall	Right Shoulder	no	0
766531	US 26 (SUNSET)	US 26 (SUNSET) Westbound Z00	0	12:21:05	56	Stall	Right Shoulder	no	0
766610	US 26 (SUNSET)	US 26 (SUNSET) Westbound W OF GRASSY KNOLL	0	17:26:04	56	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

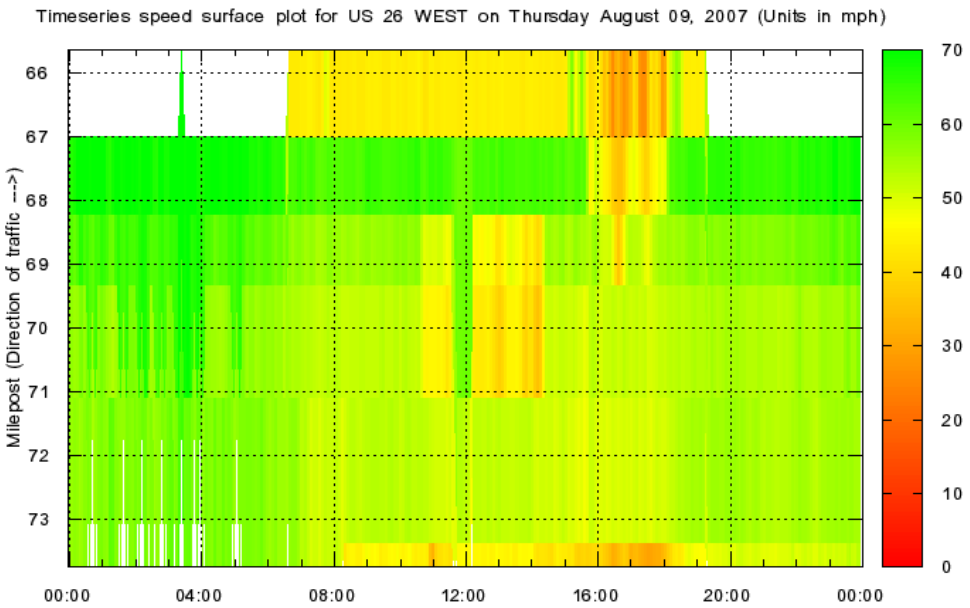
Timeseries speed surface plot for US 26 WEST on Wednesday August 15, 2007 (Units in mph)



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
765790	US 26 (SUNSET)	US 26 (SUNSET) Westbound MURRAY	0	06:09:16	56	Stall	Right Shoulder	no	0
765791	US 26 (SUNSET)	US 26 (SUNSET) Westbound At MURRAY	0	06:20:34	54	Stall	Right Shoulder	no	0
765848	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just West Of JEFFERSON	1	08:05:19	56	Stall	Right Lanes	no	0
765850	US 26 (SUNSET)	US 26 (SUNSET) Westbound At ZOO	0	08:23:19	56	Stall	Right Shoulder	no	0
765989	US 26 (SUNSET)	US 26 (SUNSET) Westbound At SYLVAN	1	14:06:40	56	Stall	Right Shoulder	no	0
766088	US 26 (SUNSET)	US 26 (SUNSET) Westbound At ZOO	1	16:28:25	56	Stall	Right Shoulder	no	0
766150	US 26 (SUNSET)	US 26 (SUNSET) Westbound At VRT	1	17:24:12	56	Stall	Left Shoulder	no	0

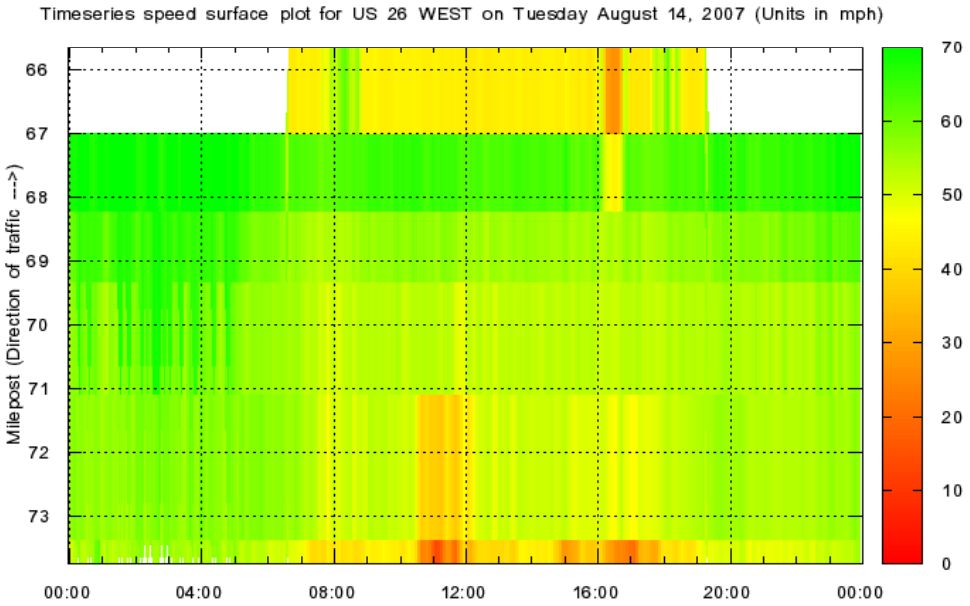
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
763588	US 26 (SUNSET)	US 26 (SUNSET) Westbound At ZOO	0	07:45:14	56	Stall	Right Shoulder	no	0
763749	US 26 (SUNSET)	US 26 (SUNSET) Westbound ZOO ON RMP	0	15:39:58	56	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



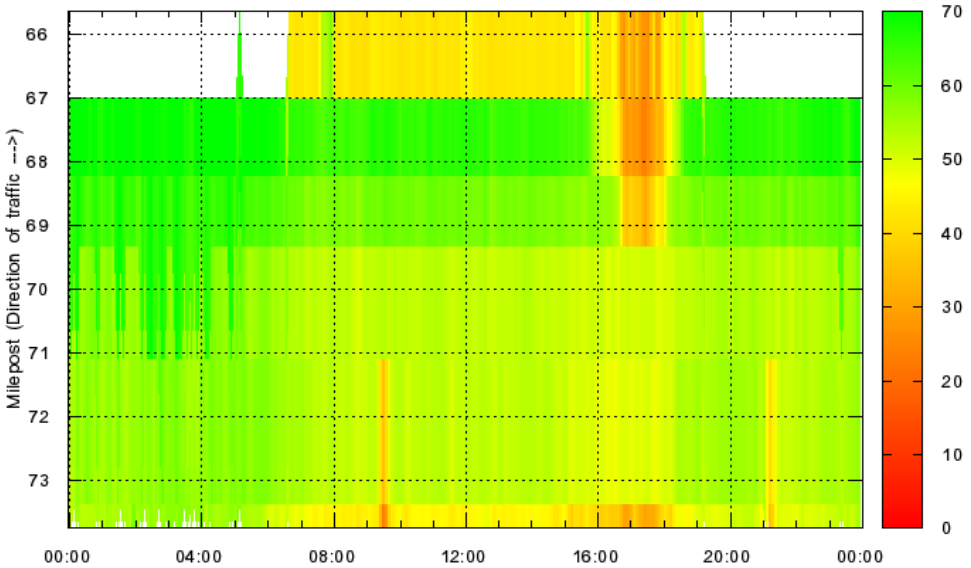
Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
765430	US 26 (SUNSET)	US 26 (SUNSET) Westbound ZOO	0	10:07:14	55	Stall	Right Lanes	no	0
765496	US 26 (SUNSET)	US 26 (SUNSET) Westbound JEFFERSON	0	11:13:37	56	Debris	Right Lanes	no	0
765569	US 26 (SUNSET)	US 26 (SUNSET) Westbound At TUNNEL	1	14:00:47	56	Stall	Right Lanes	no	0
765629	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just West Of TUNNEL	1	15:30:46	78	Stall	Right Lanes	no	0
765648	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just East Of ZOO	1	15:43:35	56	Stall	Left Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

Highway: *US 26* **Time Period: 24 Hrs**
Direction: *Westbound* **Entire US 26 Corridor: Westbound**

Timeseries speed surface plot for US 26 WEST on Thursday June 21, 2007 (Units in mph)

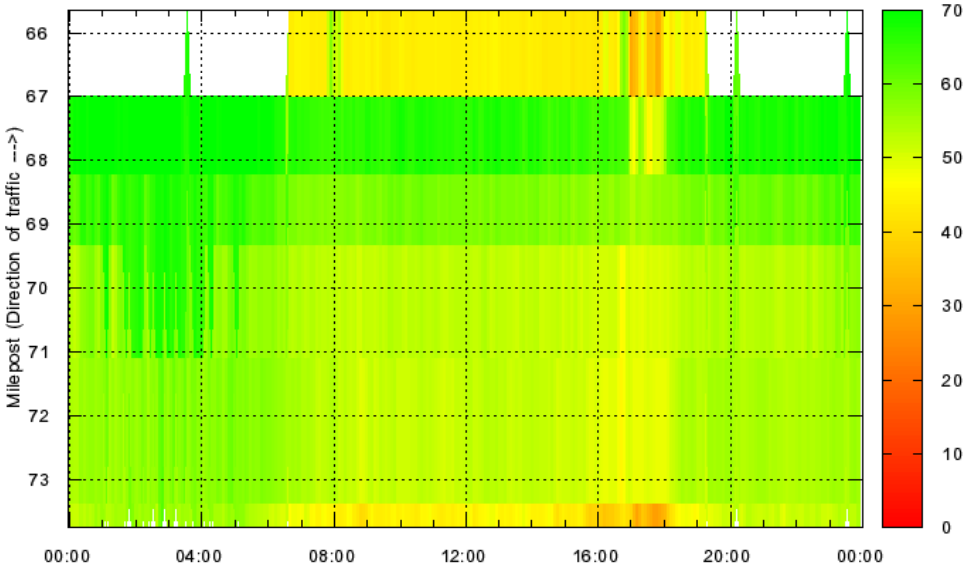


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
741343	US 26 (SUNSET)	US 26 (SUNSET) Westbound TUNNEL	1	08:35:30	58	Stall	Center Lanes	no	0
741403	US 26 (MT HOOD HWY)	US 26 (MT HOOD HWY) Westbound At SLEEPY HOLLOW	0	10:30:46	309	Debris	All Lanes	no	0
741503	US 26 (SUNSET)	US 26 (SUNSET) Westbound At HAYWARD RD	2	13:05:35	58	Crash	Right Lanes	no	0
741763	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just West Of TUNNEL	1	20:04:04	58	Stall	Left Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

Timeseries speed surface plot for US 26 WEST on Tuesday June 26, 2007 (Units in mph)

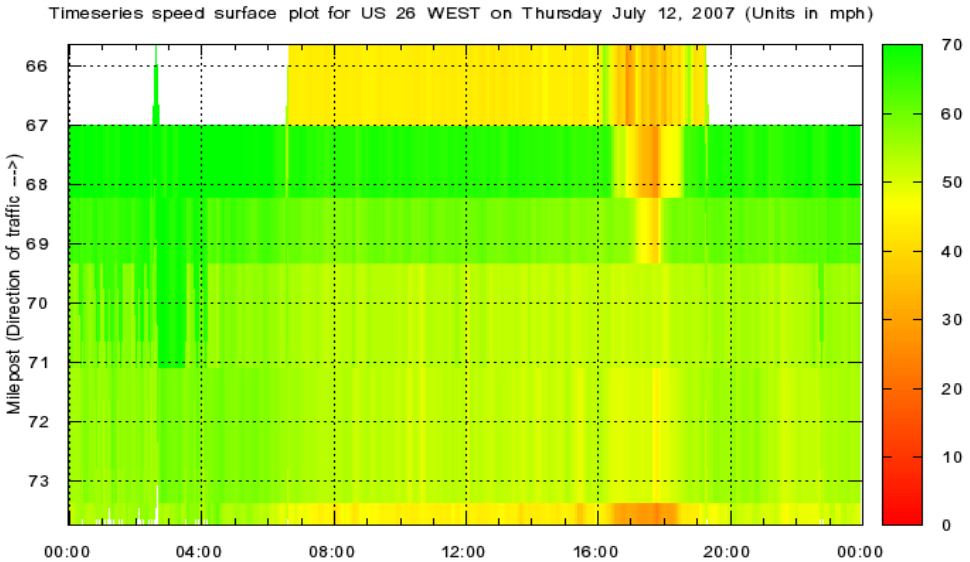


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
743283	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just West Of HWY 217	0	05:19:07	58	Stall	Right Shoulder	no	0
743344	US 26 (SUNSET)	US 26 (SUNSET) Westbound BARNES	0	07:06:43	58	Stall	Gore Area (right)	no	0
743387	US 26 (MT HOOD HWY)	US 26 (MT HOOD HWY) Westbound At BATY RD - SYLVAN RD	2	08:17:52	483	Construction	Left Lanes	no	0
743505	US 26 (SUNSET)	US 26 (SUNSET) Westbound SYLVAN	0	12:23:52	58	Stall	Right Shoulder	no	0
743683	US 26 (SUNSET)	US 26 (SUNSET) Westbound AT JEFFERSON ON	0	16:21:43	58	Stall	Right Shoulder	no	0
743805	US 26 (SUNSET)	US 26 (SUNSET) Westbound TOP OF SYLVAN OFF	1	19:18:17	80	Stall	Left Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

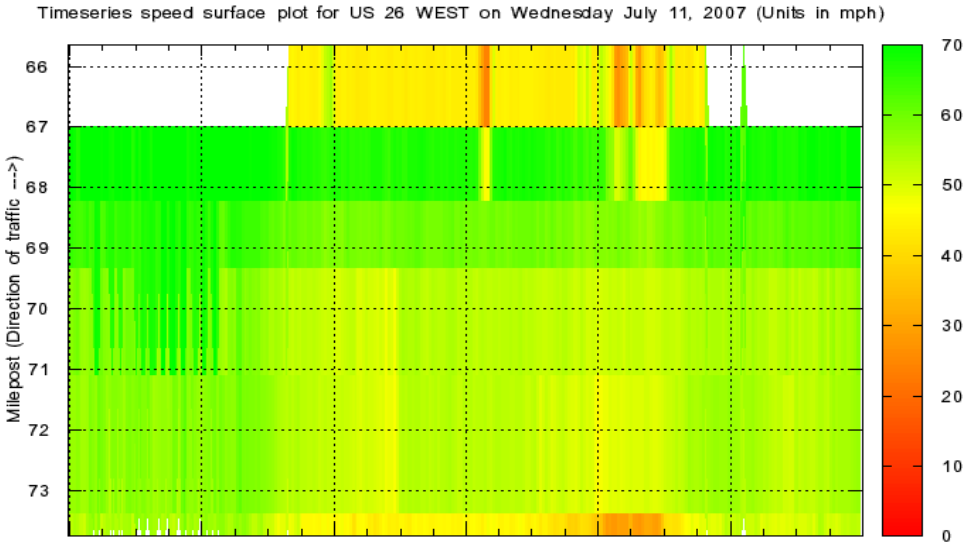
Highway: *US 26* **Time Period: 24 Hrs**
Direction: *Westbound* **Entire US 26 Corridor: Westbound**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
751164	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just East Of ZOO	0	05:44:17	57	Stall	Right Shoulder	no	0
751183	US 26 (SUNSET)	US 26 (SUNSET) Westbound Near MP 41	0	06:03:51	103	Stall	Right Shoulder	no	0
751204	US 26 (SUNSET)	US 26 (SUNSET) Westbound ZOO	0	06:47:44	57	Stall	Right Shoulder	no	0
751205	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just East Of TUNNEL	0	06:51:13	57	Debris	Right Lanes	no	0
751324	US 26 (SUNSET)	US 26 (SUNSET) Westbound SUNSET REST AREA	0	09:58:59	307	Other Incident	None	no	0
751443	US 26 (SUNSET)	US 26 (SUNSET) Westbound At CORNEILIUS PASS	0	11:46:36	57	Stall	Right Shoulder	no	0
751643	US 26 (SUNSET)	US 26 (SUNSET) Westbound At JEFFERSON	1	16:44:54	57	Stall	Right Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



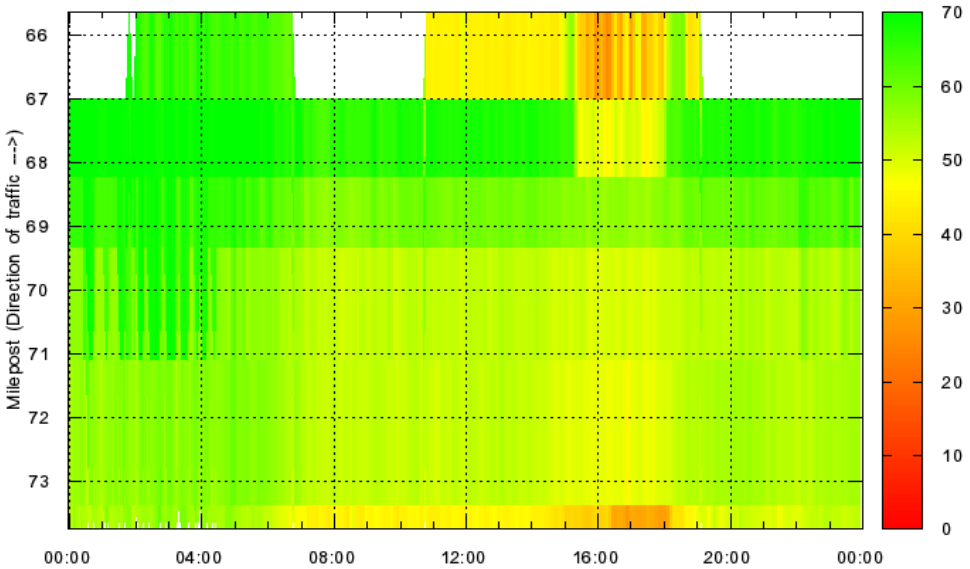
Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
750784	US 26 (SUNSET)	US 26 (SUNSET) Westbound Near MURRAY	3	11:37:56	53	Debris	All Lanes	no	0
750807	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just East Of ZOO	0	13:41:56	57	Stall	Right Shoulder	no	0
750845	US 26 (SUNSET)	US 26 (SUNSET) Westbound At JEFFERSON	0	15:02:13	57	Stall	Right Shoulder	no	0
750846	US 26 (SUNSET)	US 26 (SUNSET) Westbound At ZOO	0	15:05:53	57	Stall	Right Lanes	no	0
750847	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just East Of ZOO EAST OF	0	15:07:47	102	Stall	Right Shoulder	no	0
750864	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just West Of SYLVAN	0	17:51:13	8	Debris	Left Shoulder	no	0
750883	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just East Of ZOO	0	16:01:18	57	Stall	Right Shoulder	no	0
750884	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just West Of W OF ZOO	0	16:02:29	108	Stall	None	no	0
750946	US 26 (SUNSET)	US 26 (SUNSET) Westbound At GRASSY KNOLL	0	18:09:56	57	Stall	Right Shoulder	no	0
750963	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just East Of ZOO	0	18:15:23	57	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

Highway: *US 26* **Time Period: 24 Hrs**
Direction: *Westbound* **Entire US 26 Corridor: Westbound**

Timeseries speed surface plot for US 26 WEST on Wednesday June 20, 2007 (Units in mph)

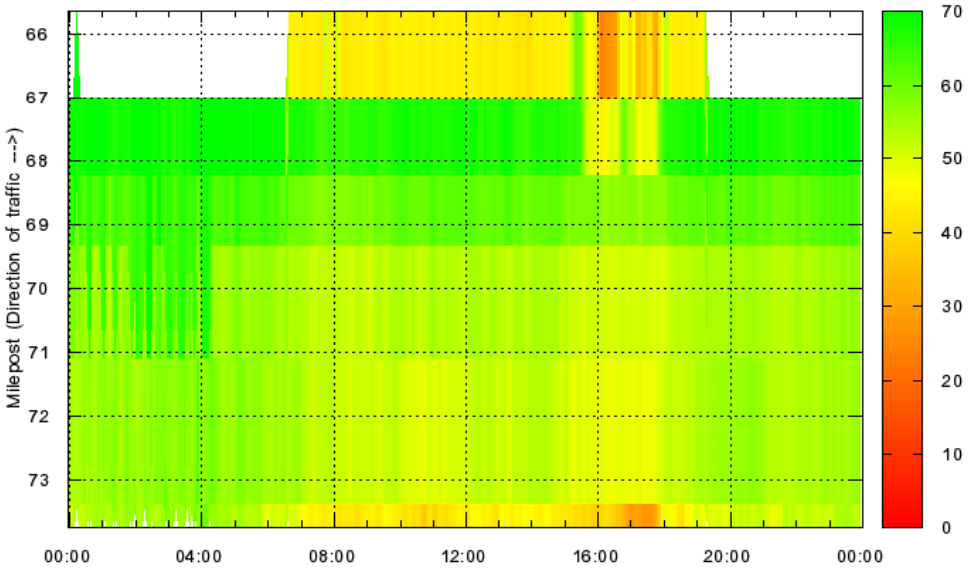


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
741065	US 26 (SUNSET)	US 26 (SUNSET) Westbound Near SYLVAN	1	13:07:04	58	Stall	Right Shoulder	no	0
741147	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just West Of JEFFERSON	1	16:11:19	52	Stall	Right Shoulder	no	0
741203	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just West Of JEFFERSON	1	17:59:55	58	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

Timeseries speed surface plot for US 26 WEST on Tuesday July 10, 2007 (Units in mph)



Incidents:

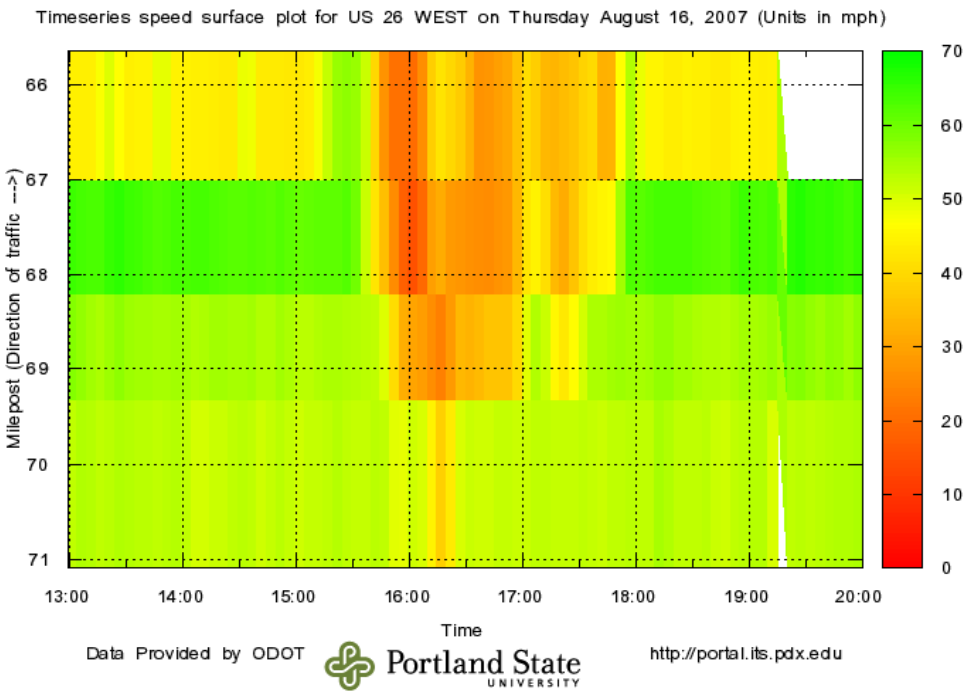
ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
749704	US 26	US 26 Westbound VRT	1	04:55:58	57	Stall	Right Lanes	no	0
749765	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just East Of ZOO	0	05:38:03	57	Stall	Right Shoulder	no	0
749965	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just East Of ZOO	0	09:15:02	57	Stall	Right Shoulder	no	0
749983	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just East Of ZOO	0	09:27:51	57	Stall	Right Shoulder	no	0
750023	US 26 (SUNSET)	US 26 (SUNSET) Westbound At BETHANY	0	10:27:08	44	Stall	Right Shoulder	no	0
750306	US 26 (SUNSET)	US 26 (SUNSET) Westbound At GRASSEY AREA	1	16:44:31	36	Stall	Right Shoulder	no	0
750323	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just West Of JEFFERSON	1	16:56:07	57	Stall	Right Shoulder	no	0
750324	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just East Of ZOO	1	17:08:46	57	Stall	Right Shoulder	no	0
750343	US 26 (SUNSET)	US 26 (SUNSET) Westbound At SYLVAN	1	17:15:44	57	Stall	Right Shoulder	no	0
750344	US 26 (SUNSET)	US 26 (SUNSET) Westbound At 217	1	17:29:04	57	Stall	Right Shoulder	no	0
750365	US 26 (SUNSET)	US 26 (SUNSET) Westbound Just East Of ZOO	1	18:44:11	57	Stall	Right Lanes	no	0
750383	US 26 (SUNSET)	US 26 (SUNSET) Westbound At ZOO	1	19:04:09	57	Stall	Right Shoulder	no	0

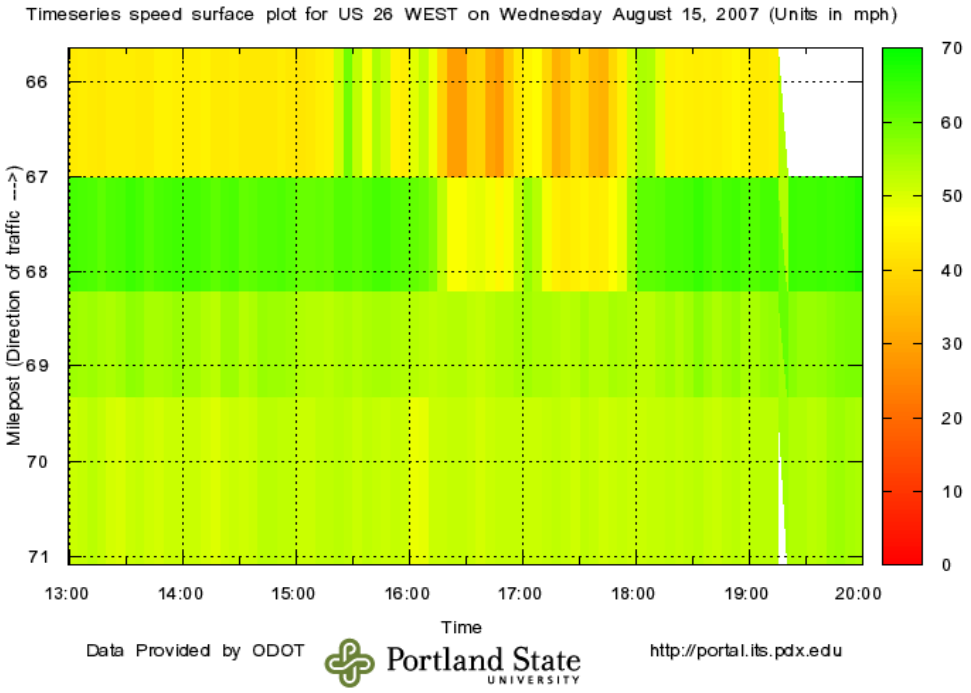
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

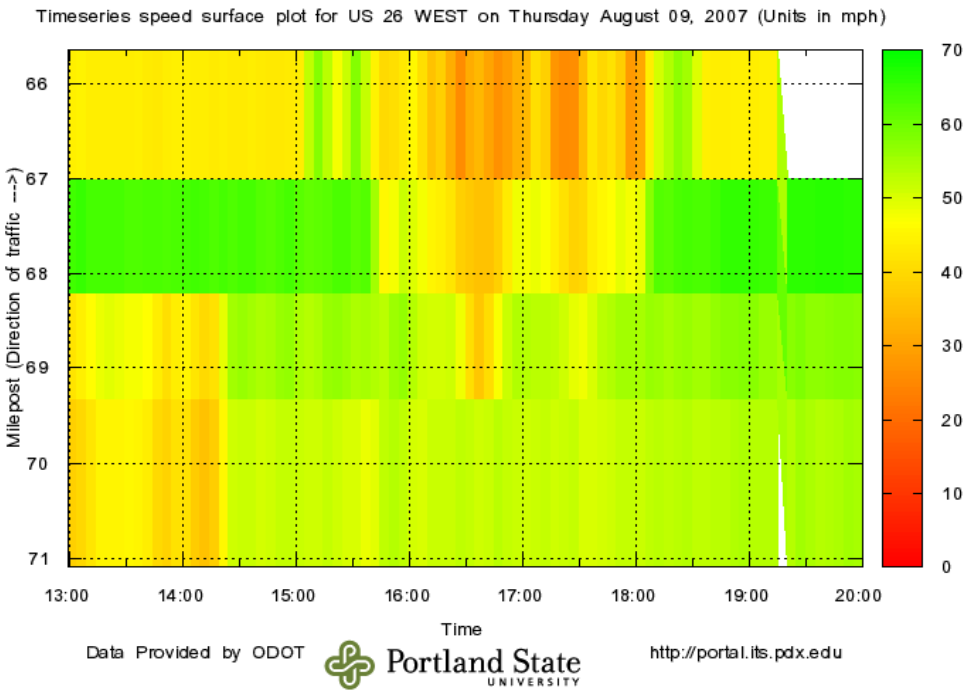
US 26 Westbound
PM Peak Hour Speed Plots

DAVID EVANS AND ASSOCIATES INC.

Highway: *US 26* **Time Period: PM Peak**
Direction: *Westbound* **Bottleneck Influence Area: M.P. 66 - 70**






Timeseries speed surface plot for US 26 WEST on Thursday August 09, 2007 (Units in mph)
Milepost (Direction of traffic --->)
66
67
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14:00
15:00
16:00
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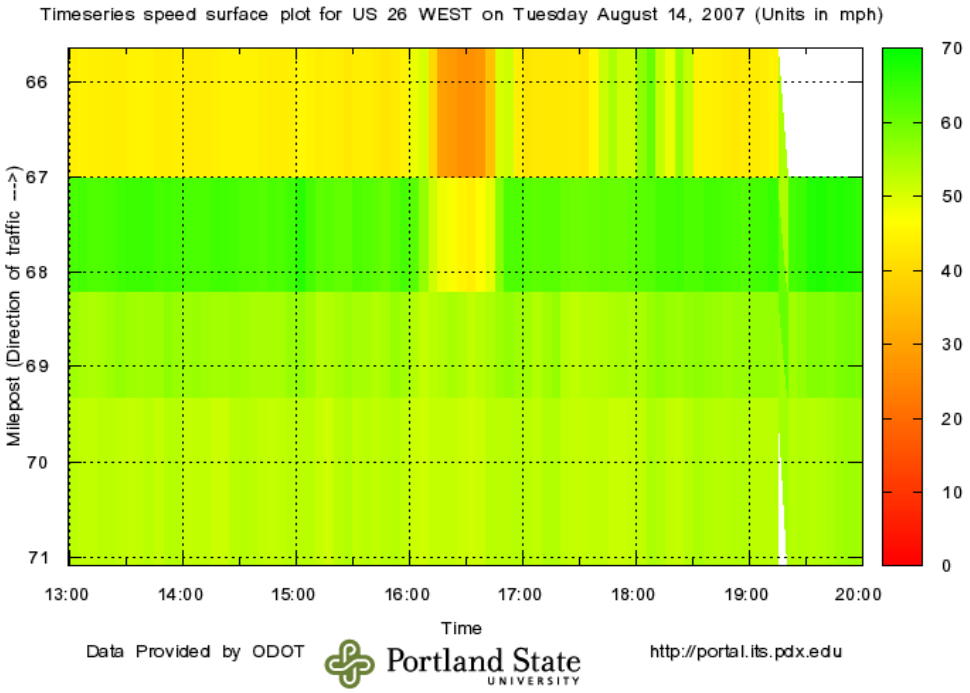
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for US 26 WEST on Tuesday August 14, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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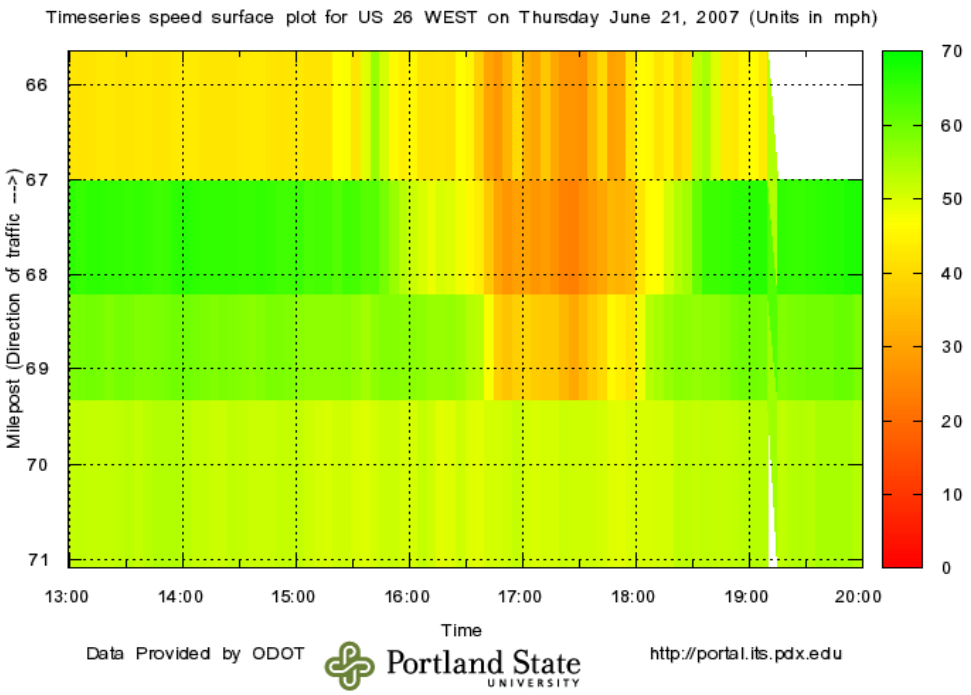
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for US 26 WEST on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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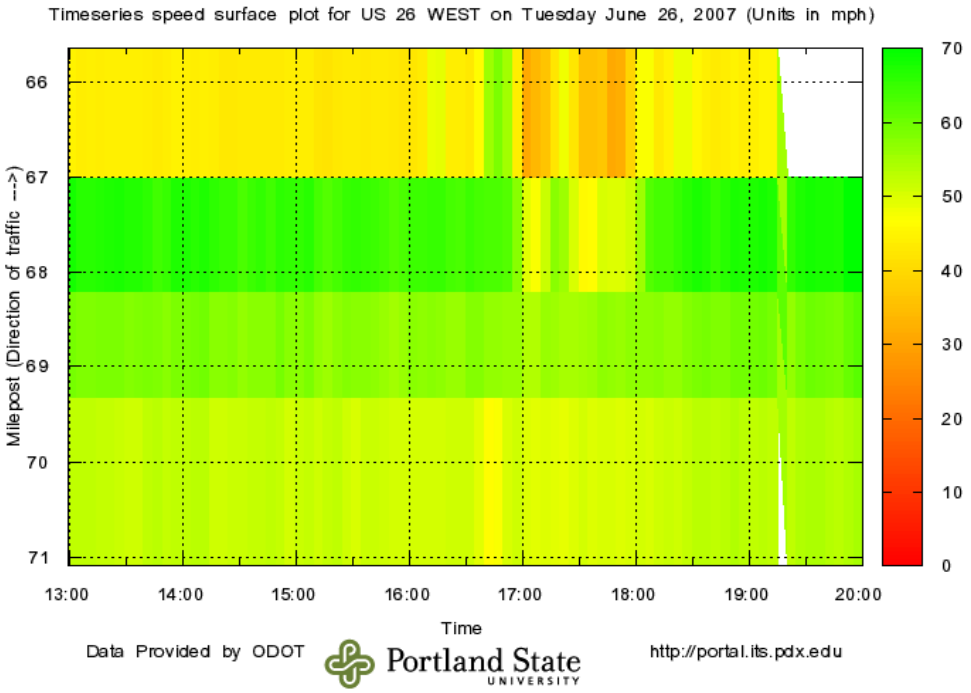
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for US 26 WEST on Tuesday June 26, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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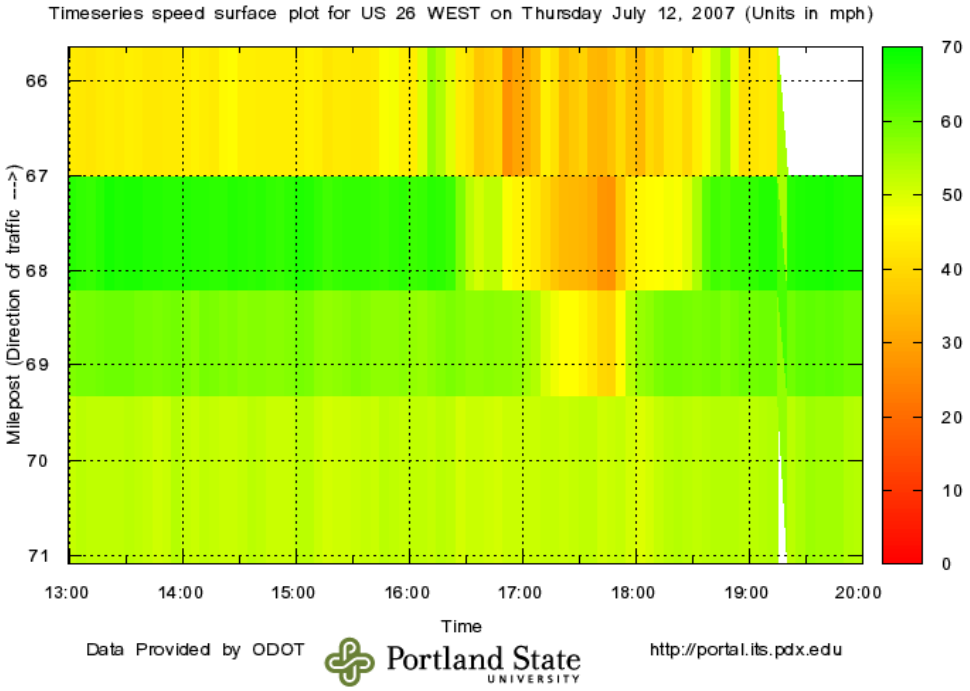
Timeseries speed surface plot for US 26 WEST on Thursday July 12, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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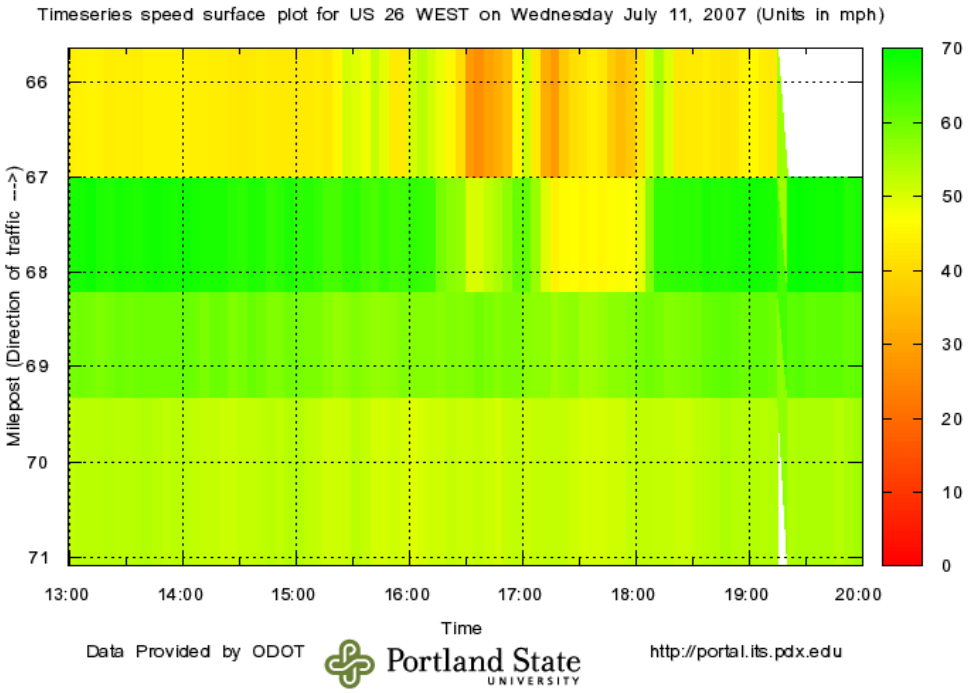
Timeseries speed surface plot for US 26 WEST on Wednesday July 11, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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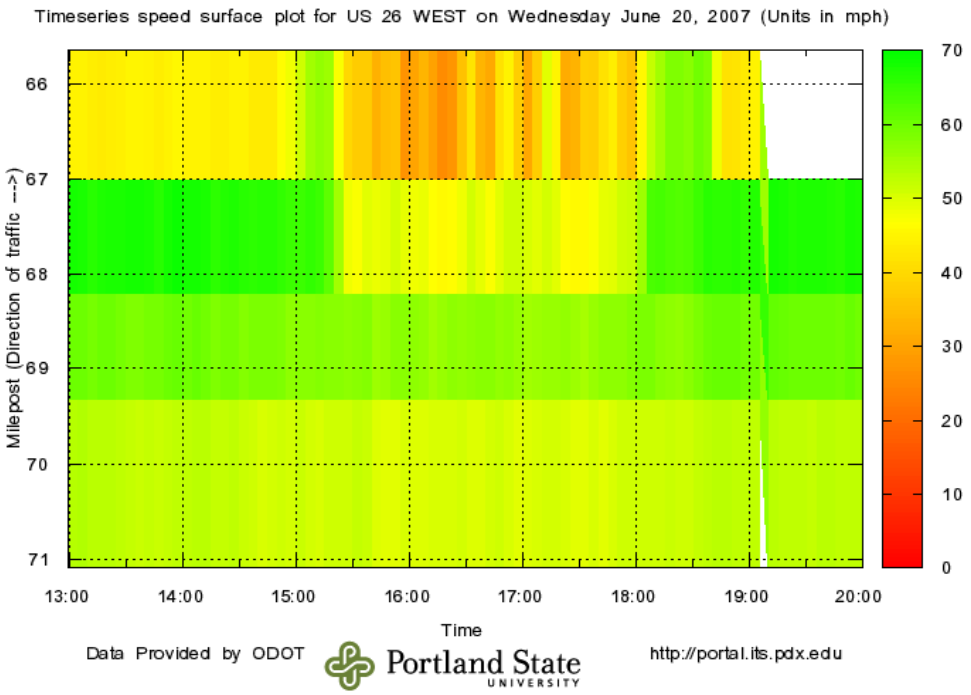
Timeseries speed surface plot for US 26 WEST on Wednesday June 20, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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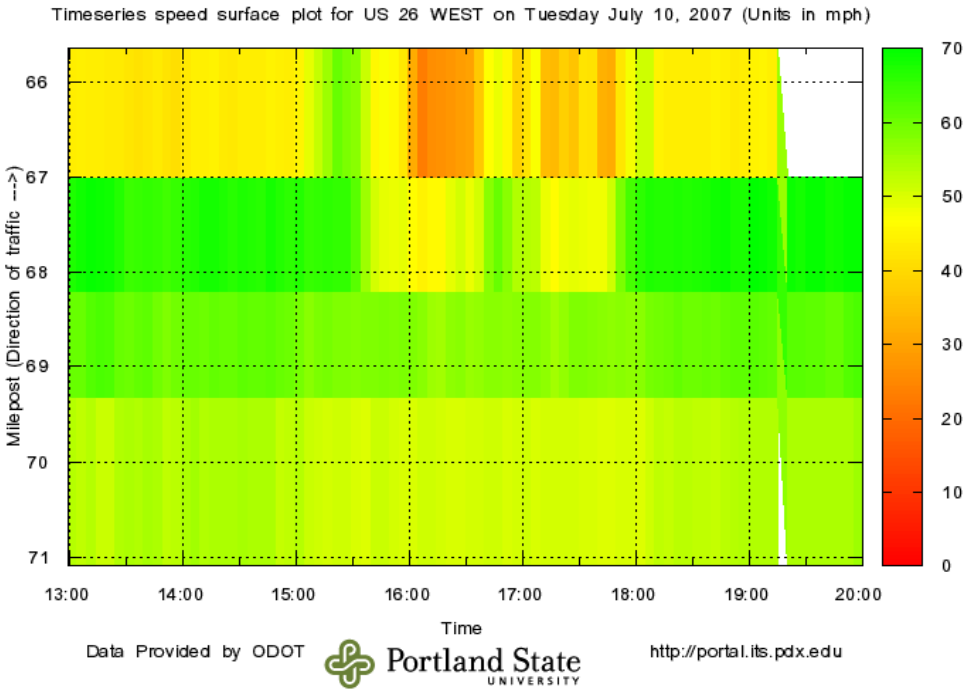
Timeseries speed surface plot for US 26 WEST on Tuesday July 10, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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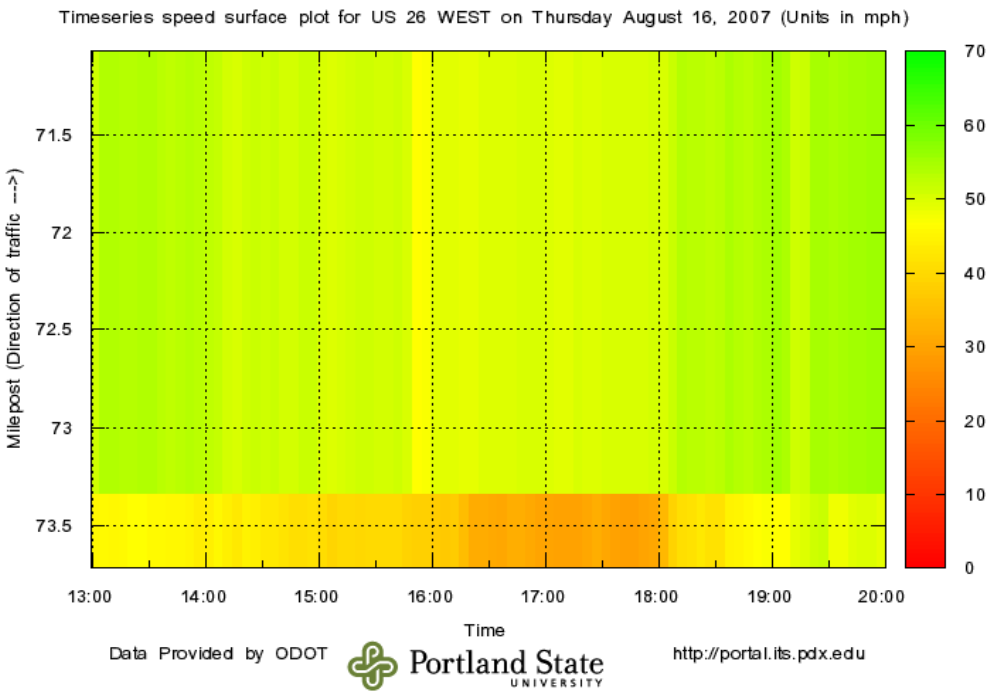
Timeseries speed surface plot for US 26 WEST on Thursday August 16, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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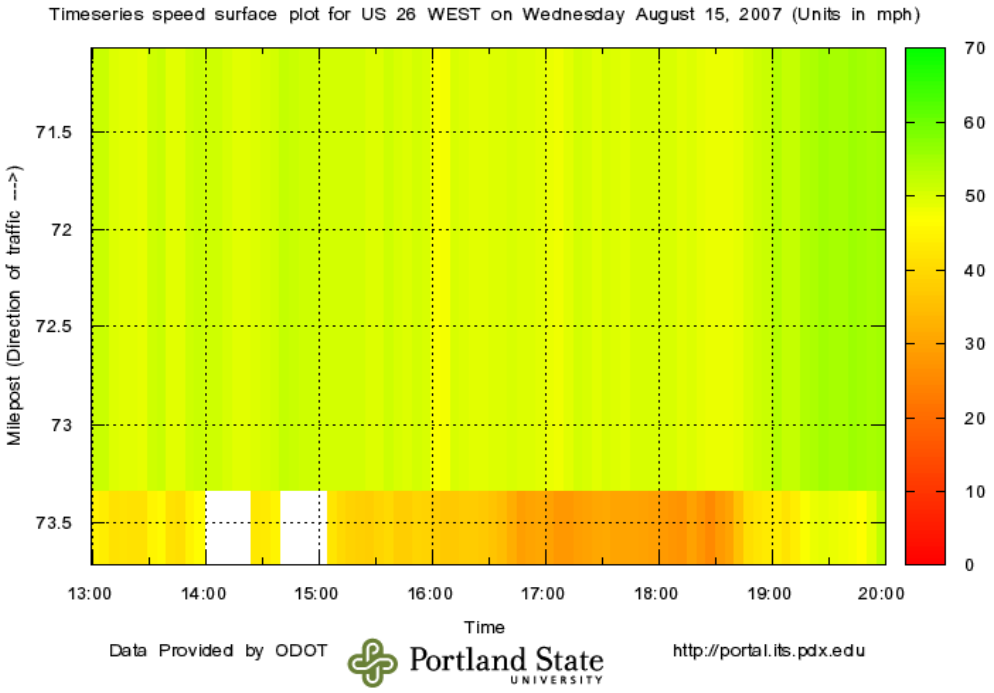
Timeseries speed surface plot for US 26 WEST on Wednesday August 15, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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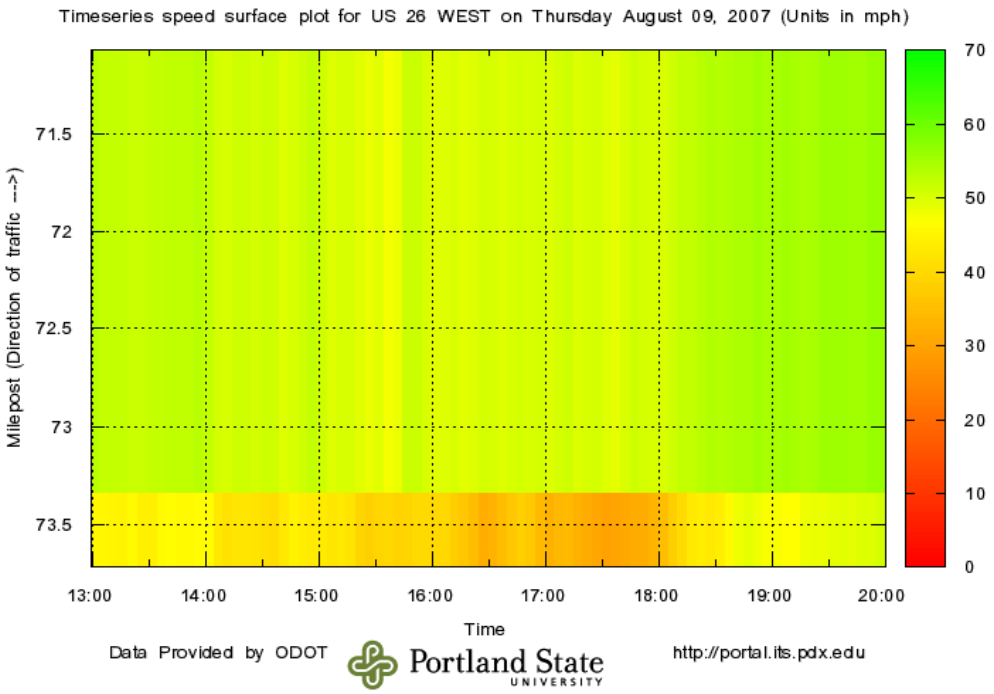
Timeseries speed surface plot for US 26 WEST on Thursday August 09, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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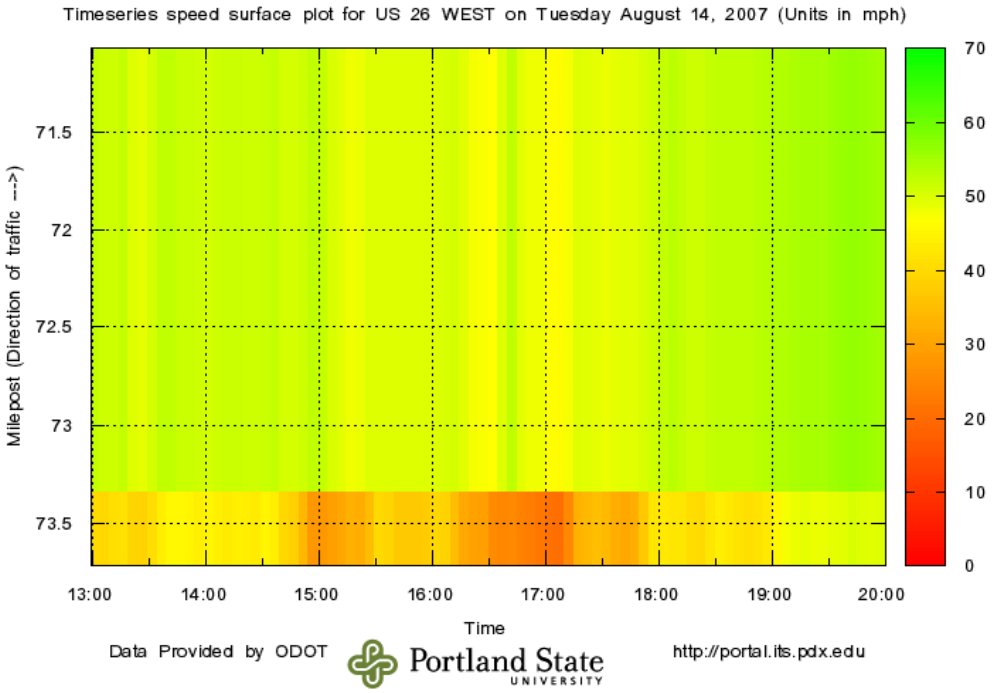
Timeseries speed surface plot for US 26 WEST on Tuesday August 14, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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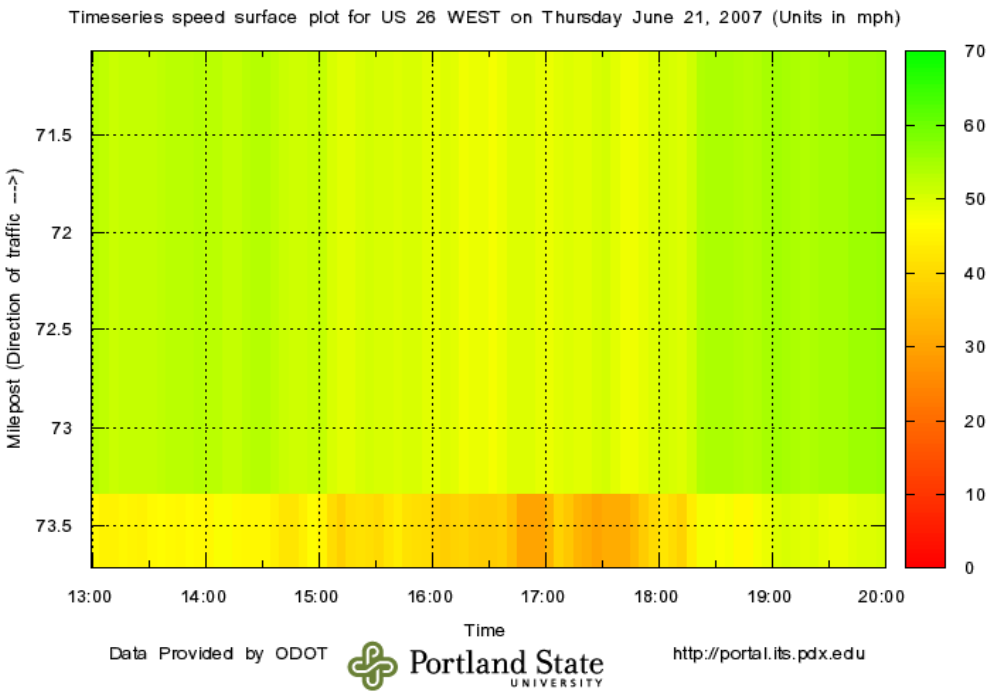
Timeseries speed surface plot for US 26 WEST on Thursday June 21, 2007 (Units in mph)
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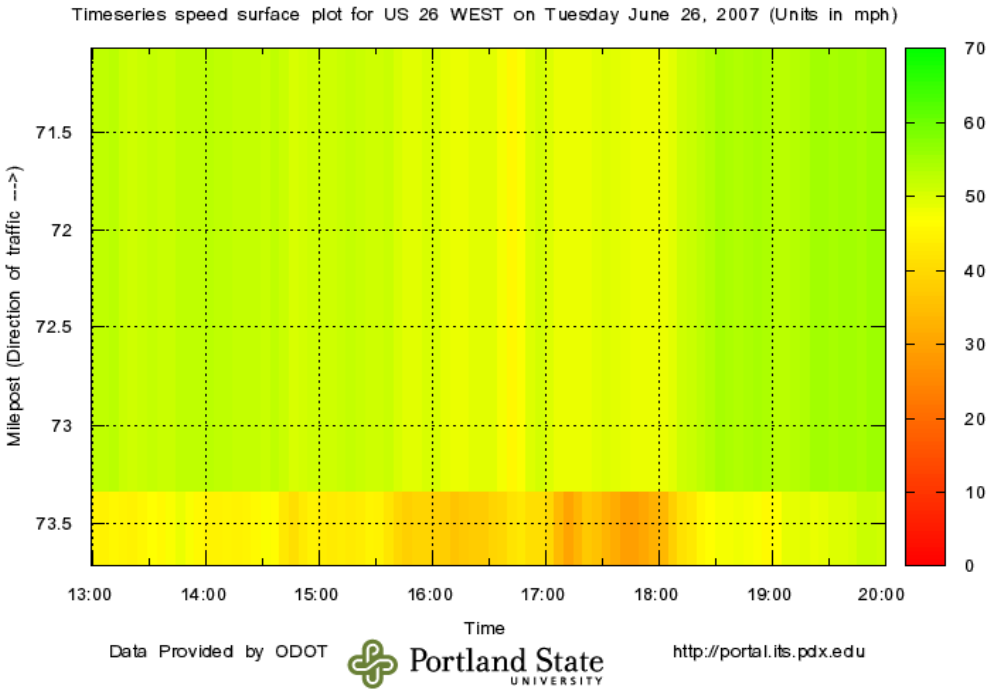
Timeseries speed surface plot for US 26 WEST on Tuesday June 26, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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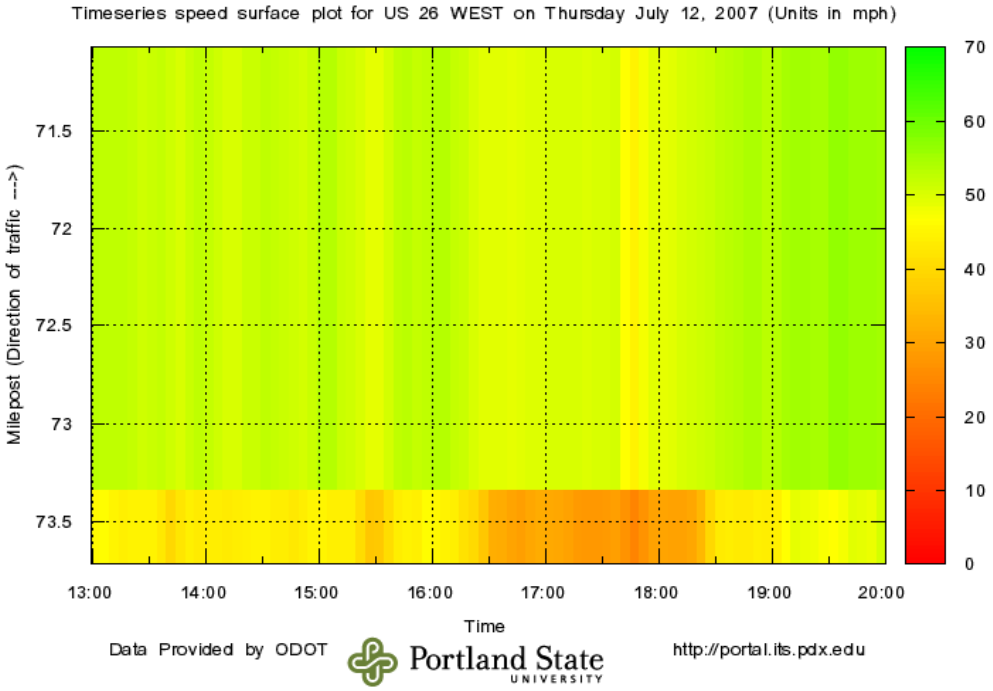
Timeseries speed surface plot for US 26 WEST on Thursday July 12, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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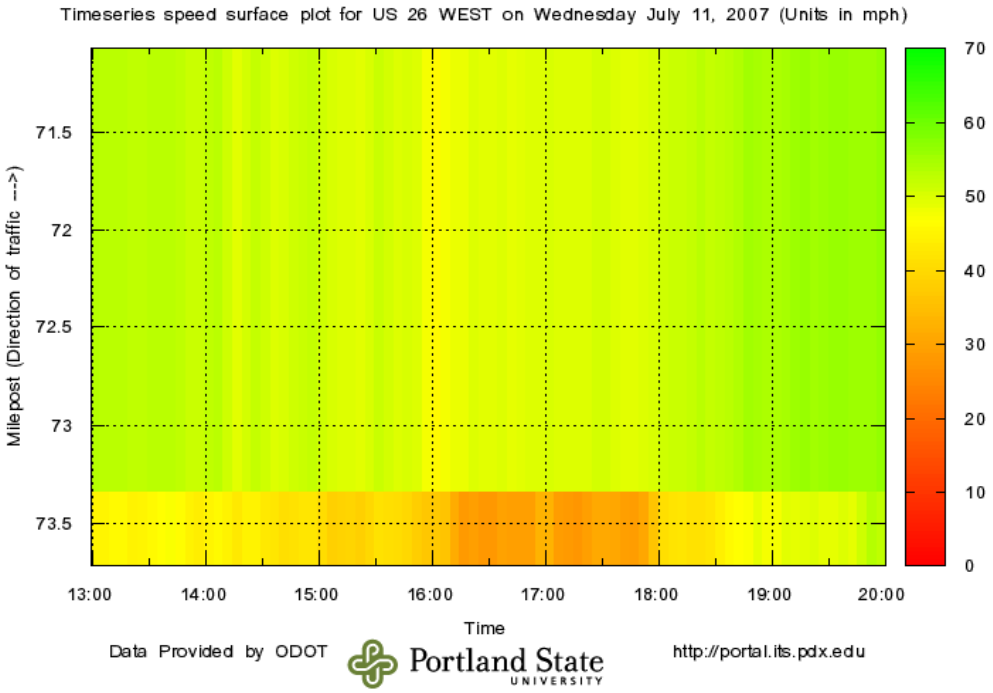
Timeseries speed surface plot for US 26 WEST on Wednesday July 11, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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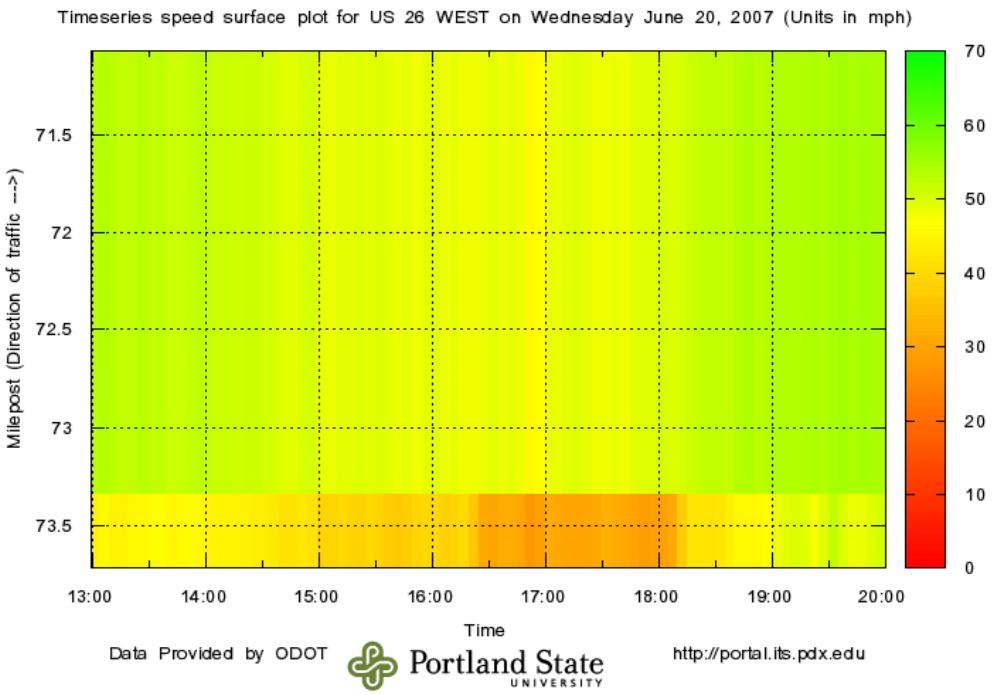
Timeseries speed surface plot for US 26 WEST on Wednesday June 20, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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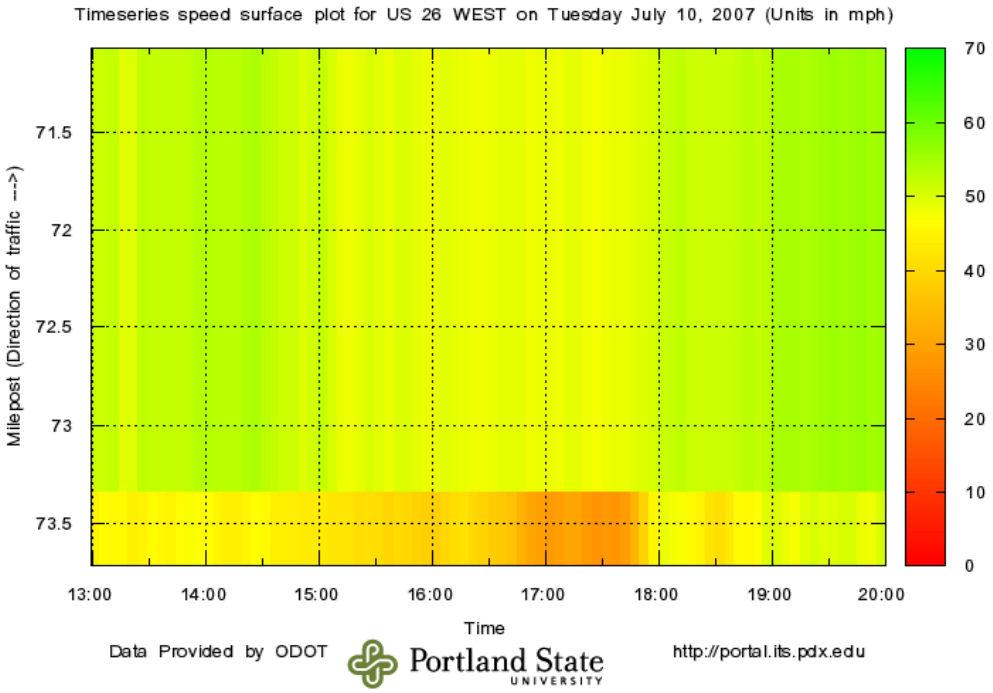
Timeseries speed surface plot for US 26 WEST on Tuesday July 10, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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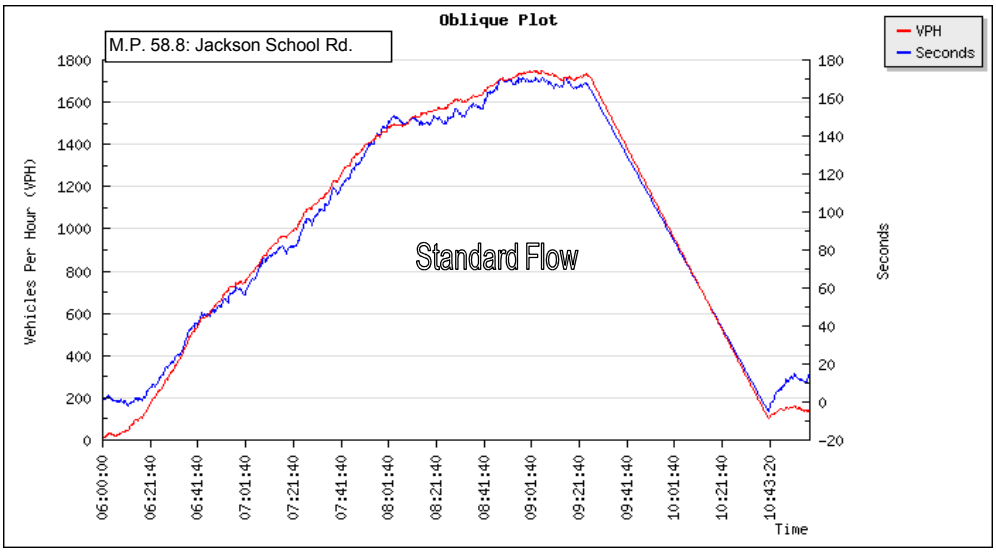
US 26 Oblique Plots

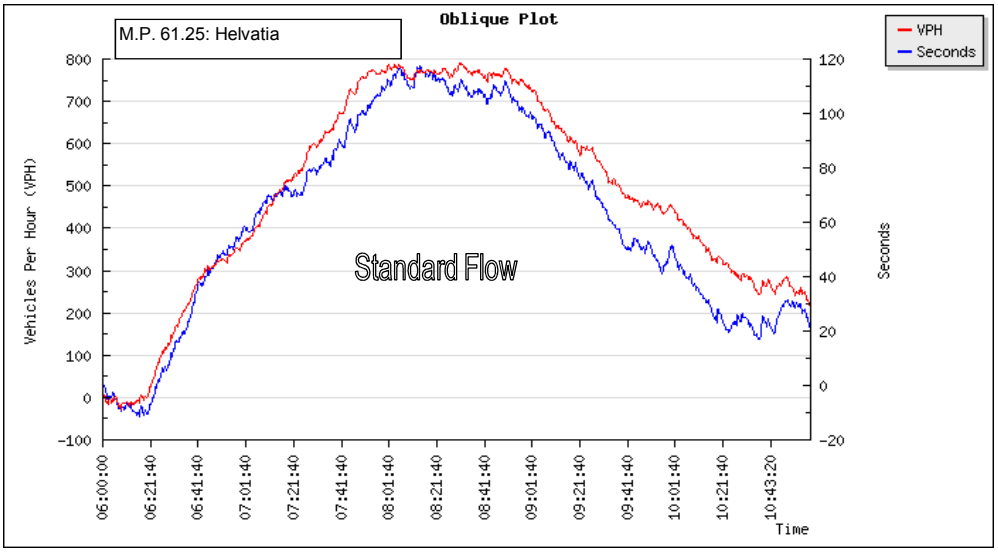
Eastbound

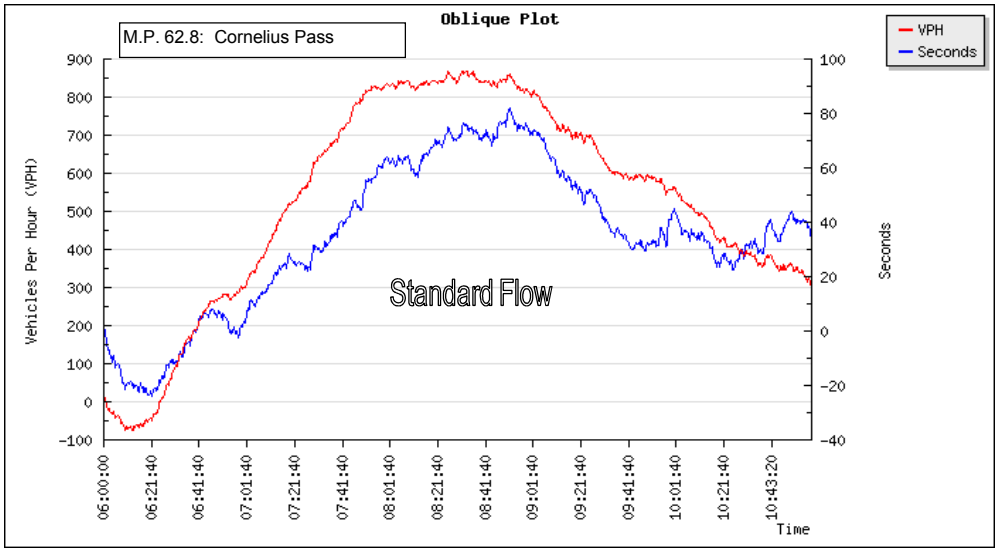
Westbound

DAVID EVANS AND ASSOCIATES INC.

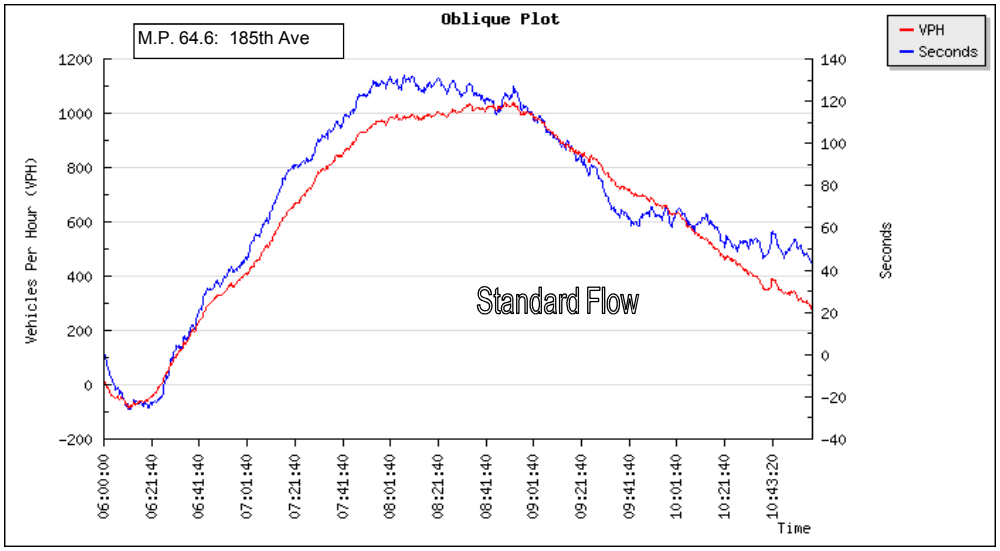
Highway: *US26* **Date:** *August 16th, 2007 AM*
Direction: *Eastbound*

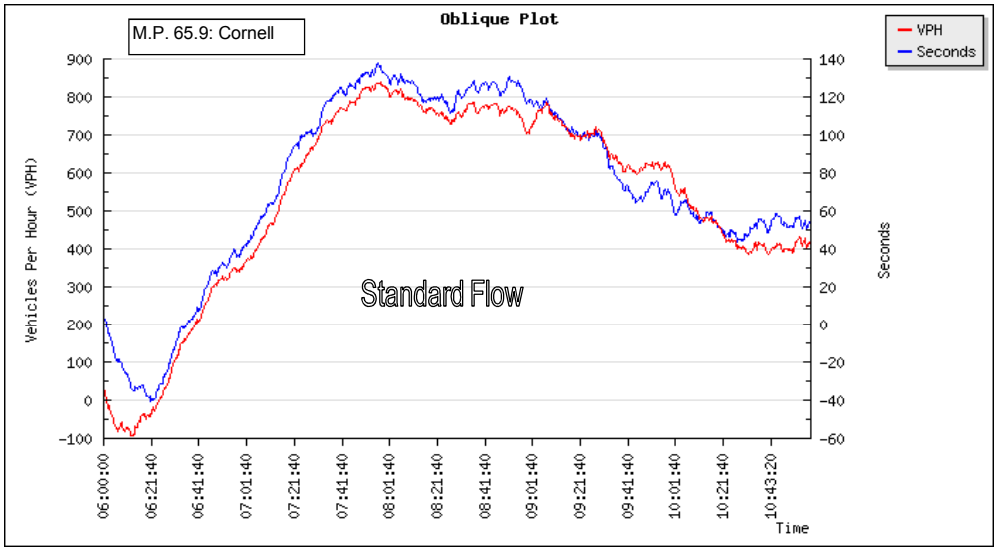


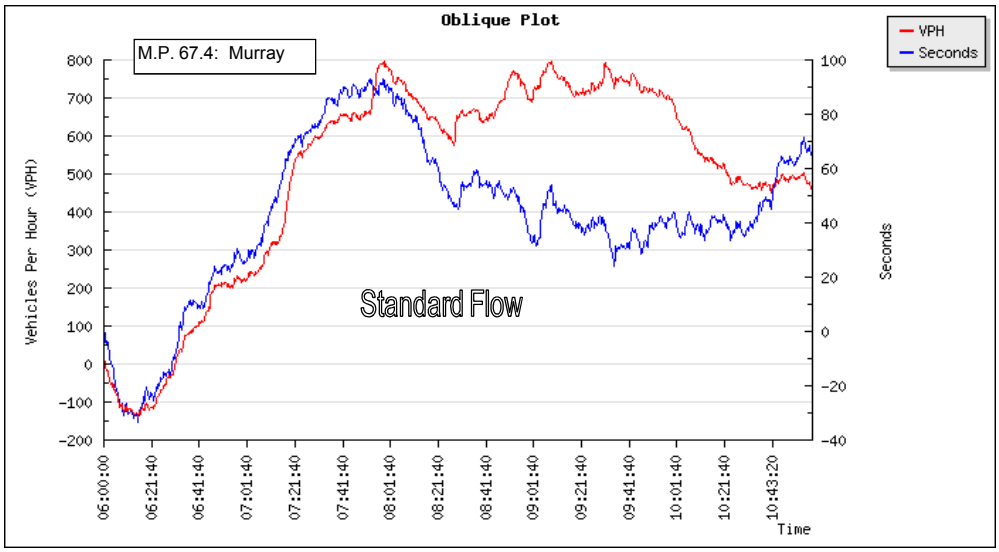




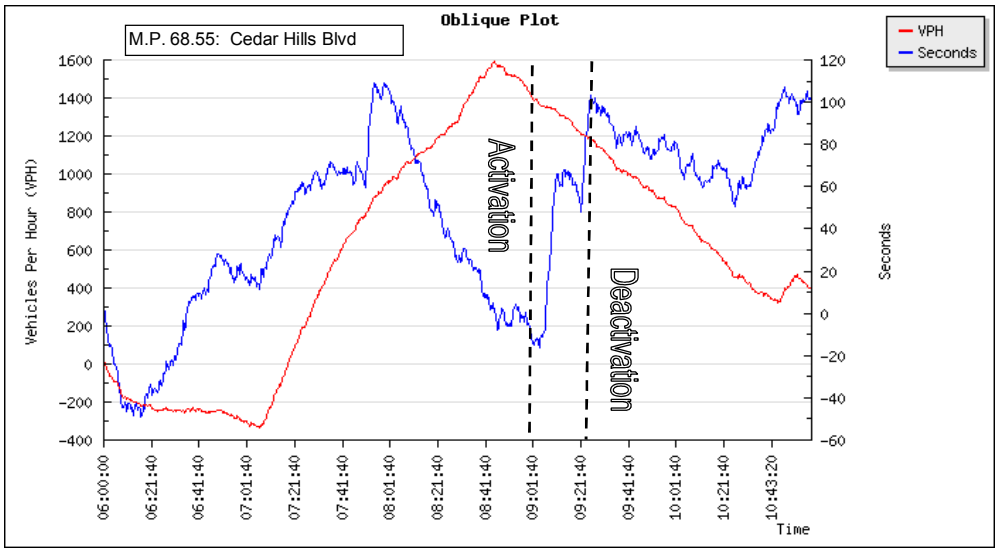
Highway: *US26* **Date:** *August 16th, 2007 AM*
Direction: *Eastbound*

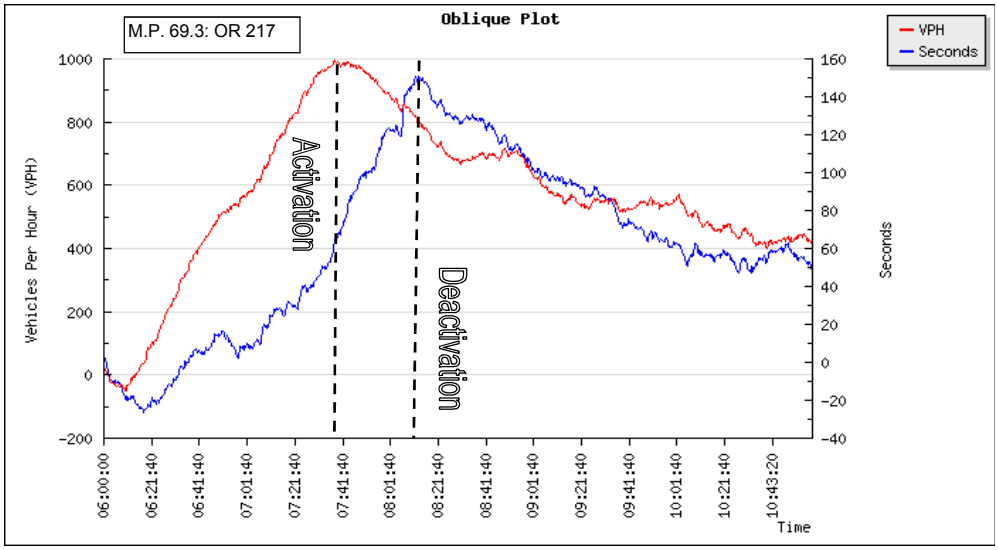


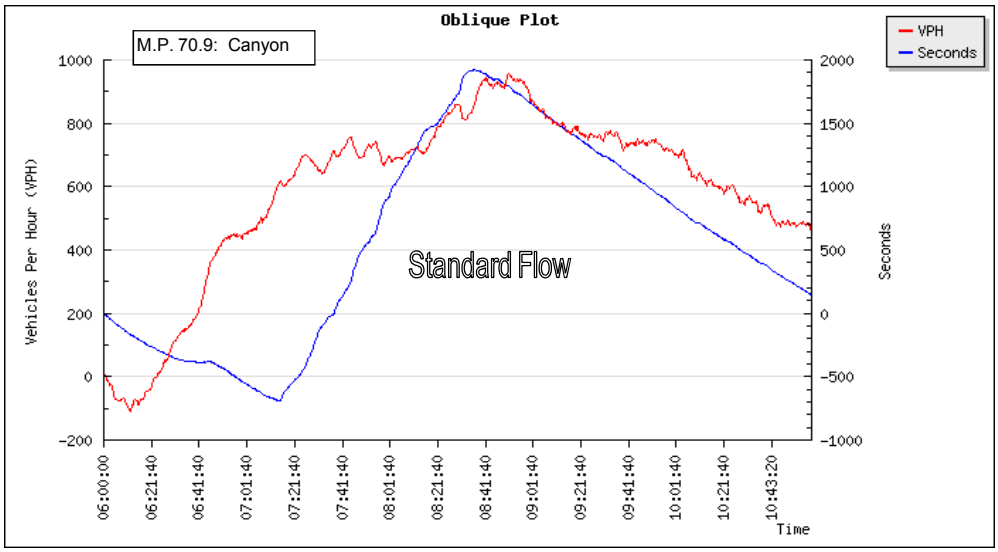




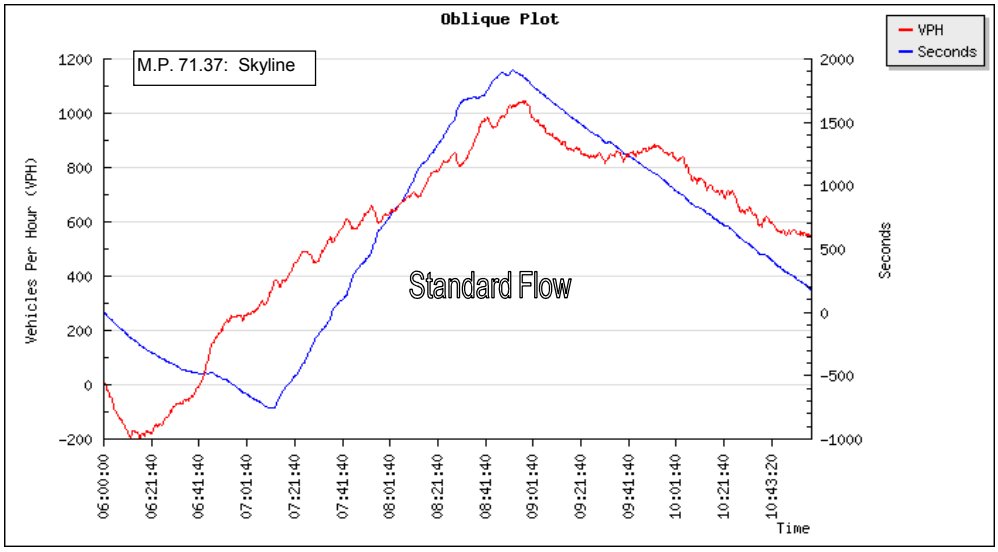
Highway: *US26* **Date:** *August 16th, 2007 AM*
Direction: *Eastbound*

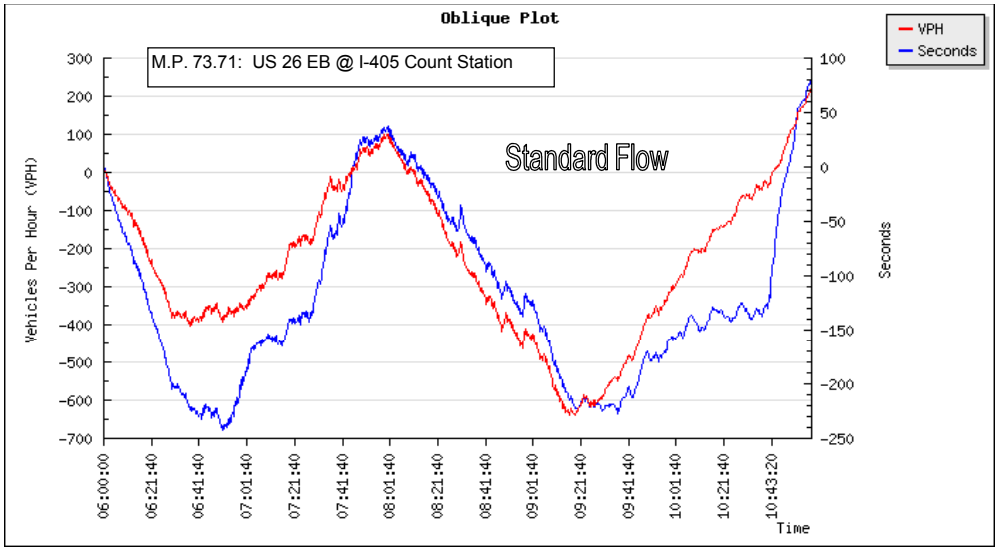




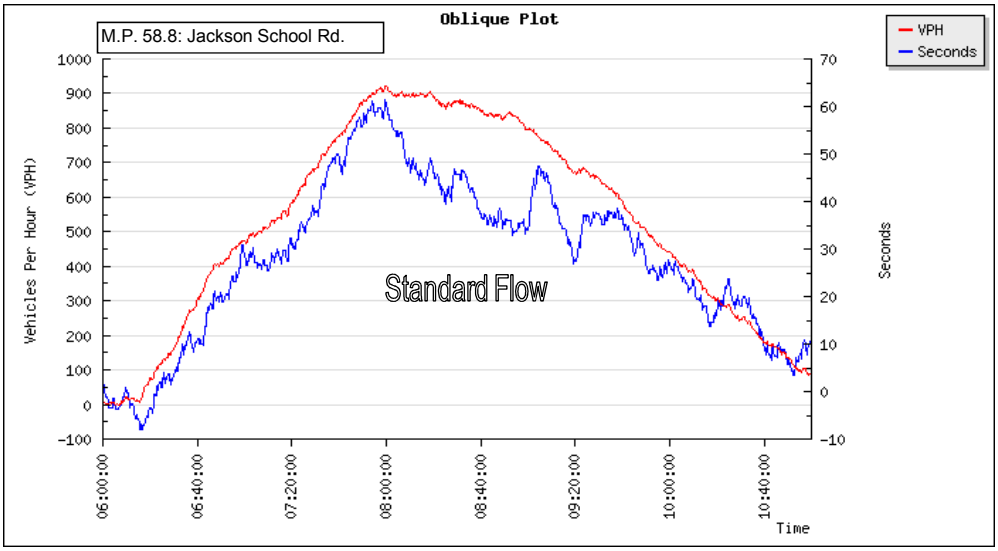


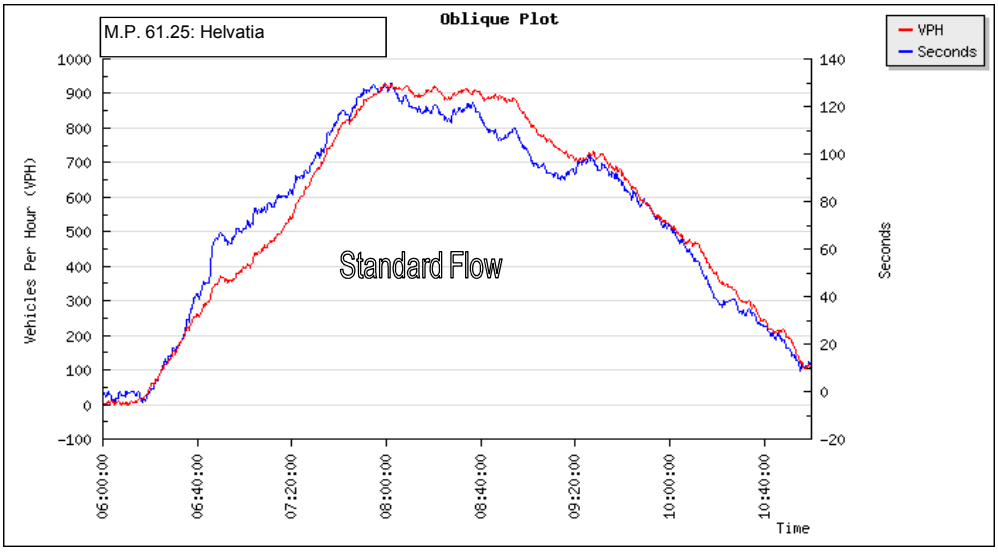
Highway: *US26* **Date:** *August 16th, 2007 AM*
Direction: *Eastbound*

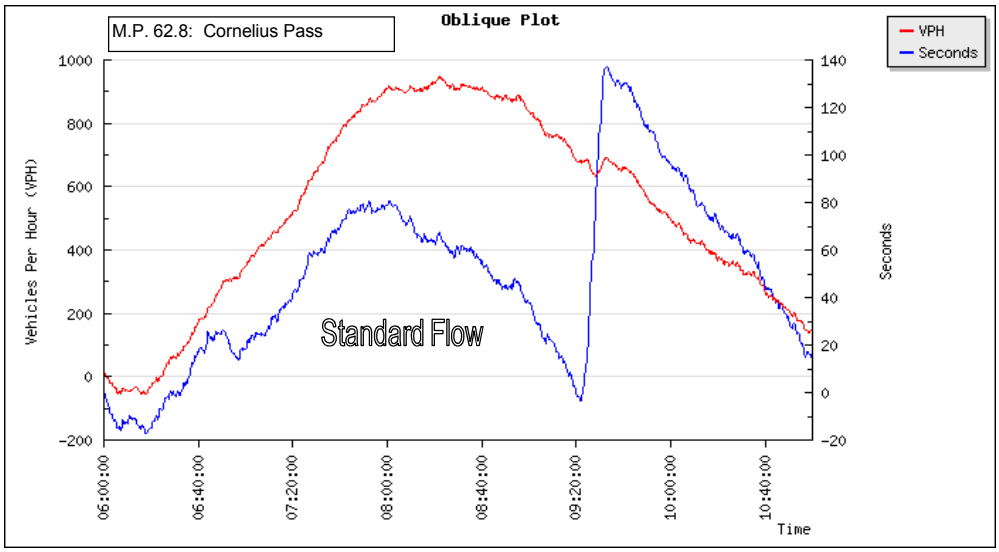




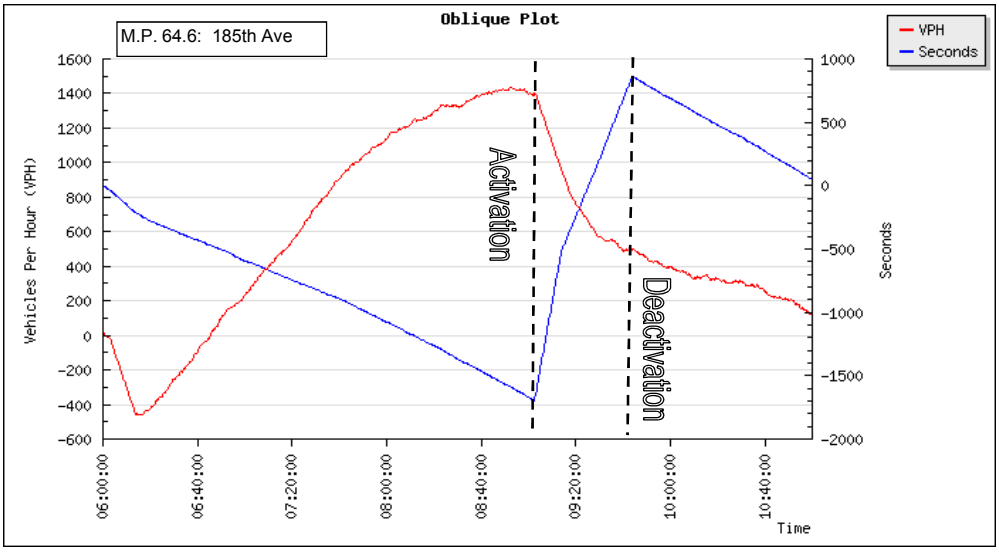
Highway: *US26* **Date:** *August 15th, 2007 AM*
Direction: *Eastbound*

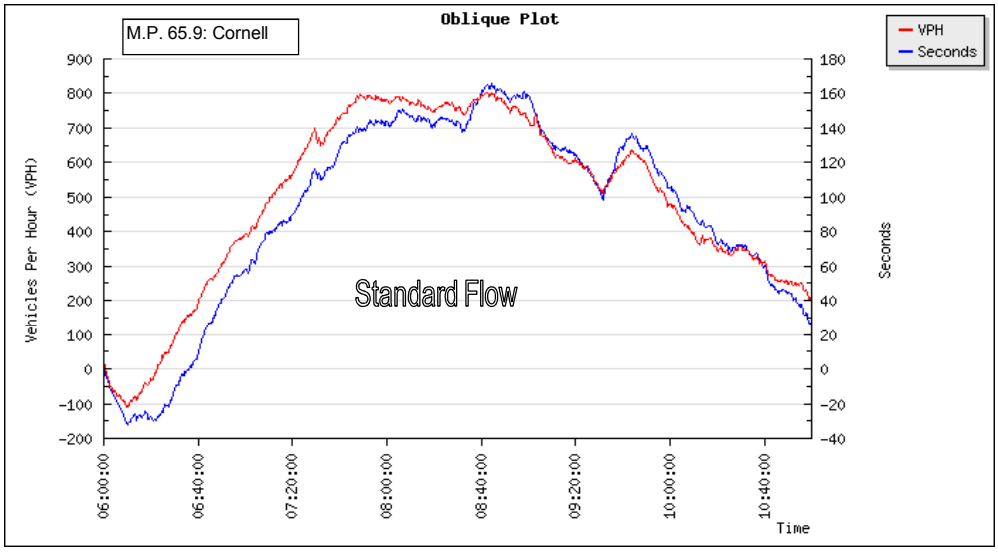


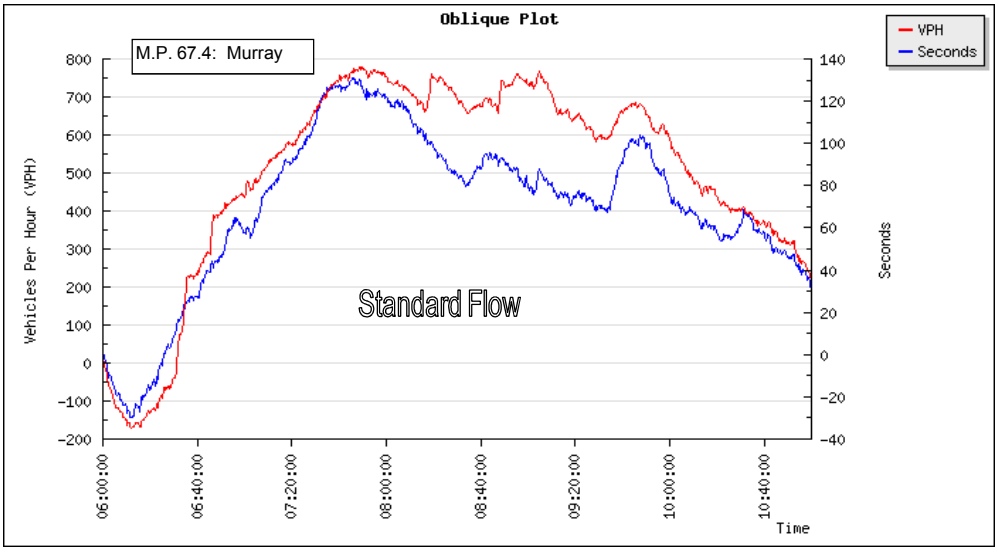




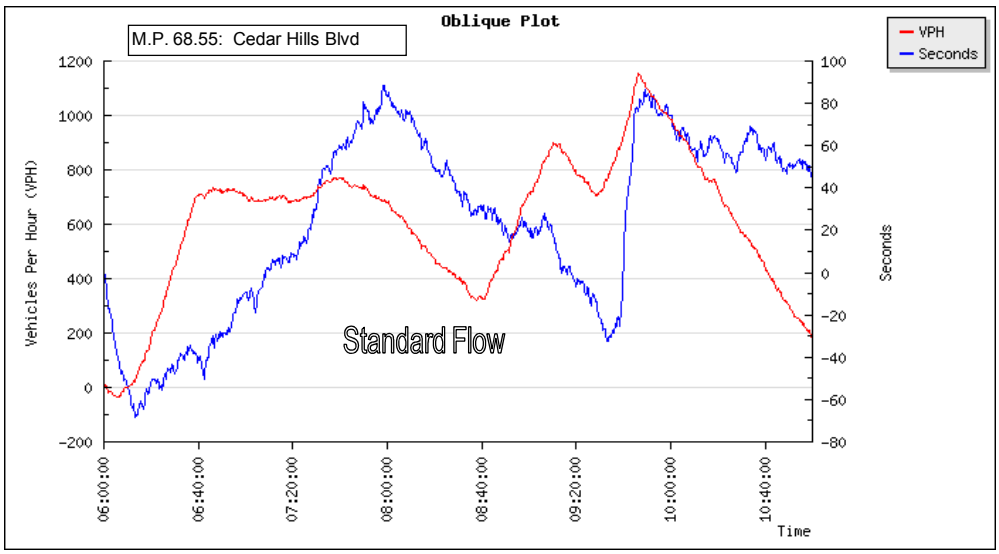
Highway: *US26* **Date:** *August 15th, 2007 AM*
Direction: *Eastbound*

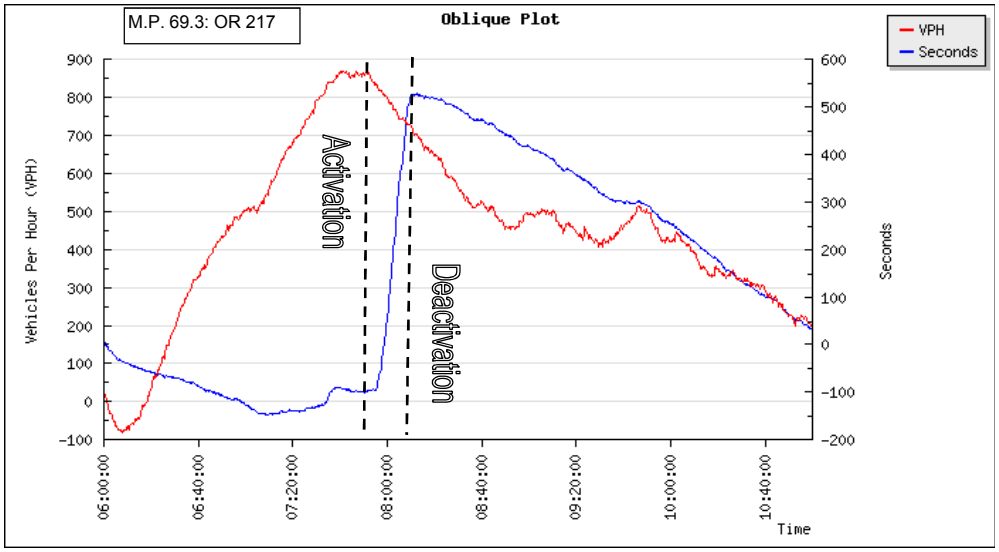


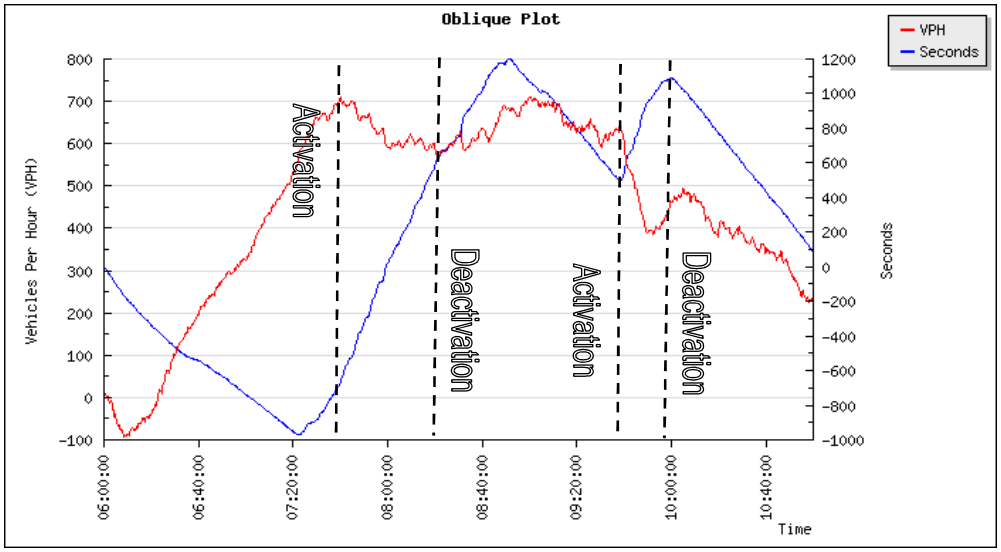




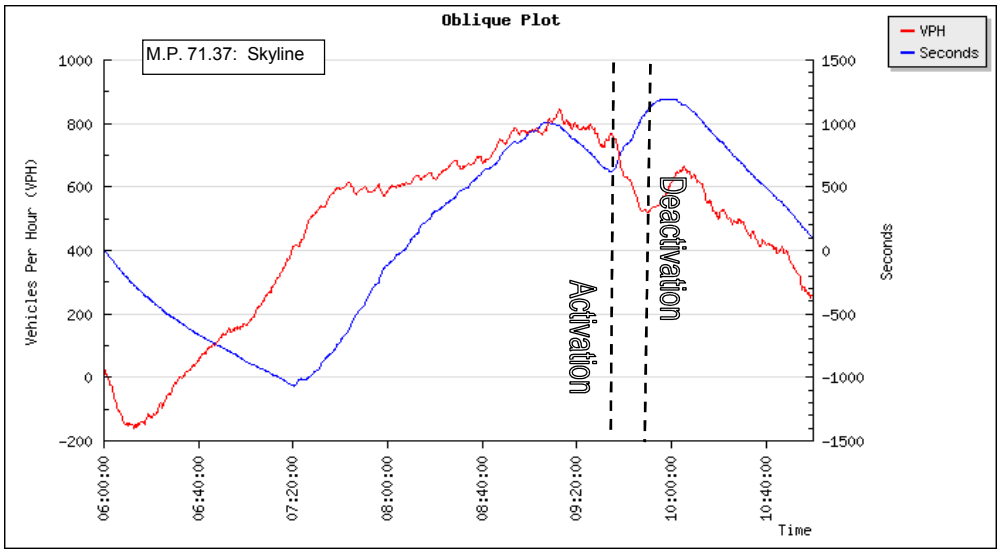
Highway: *US26* **Date:** *August 15th, 2007 AM*
Direction: *Eastbound*

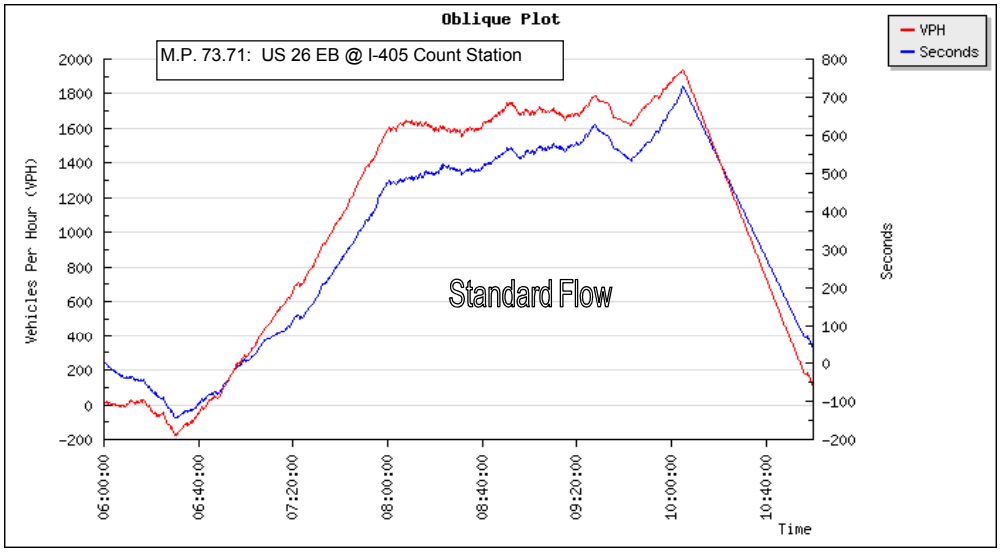




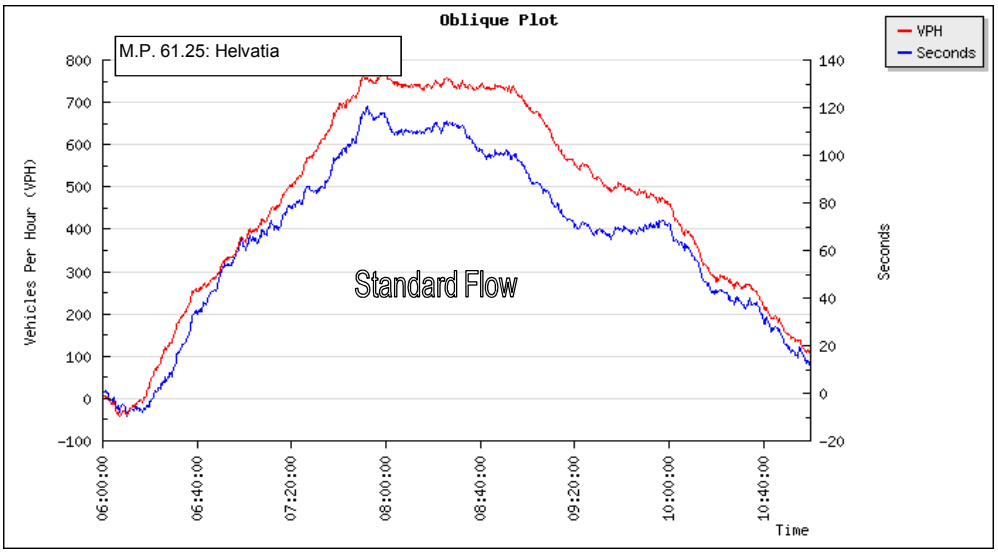


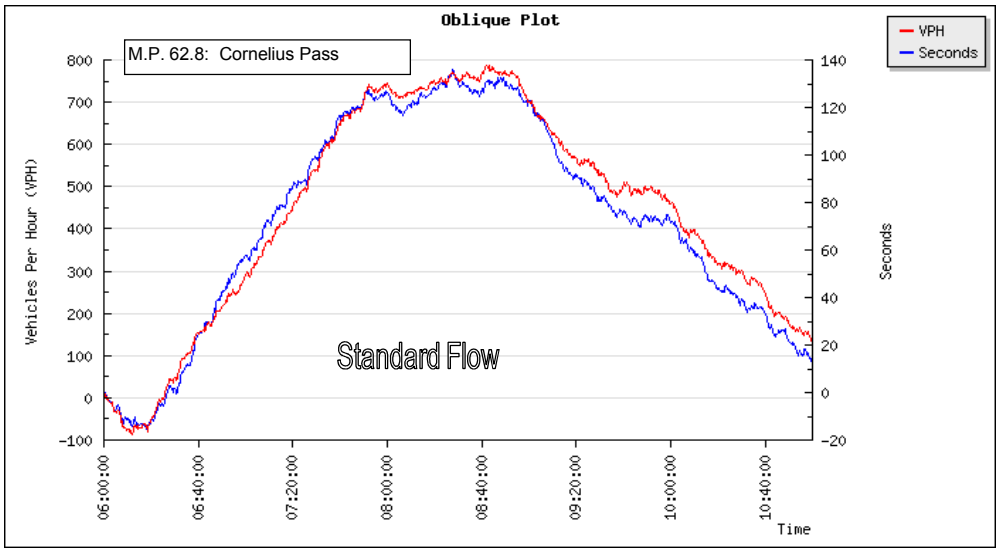
Highway: *US26* **Date:** *August 15th, 2007 AM*
Direction: *Eastbound*



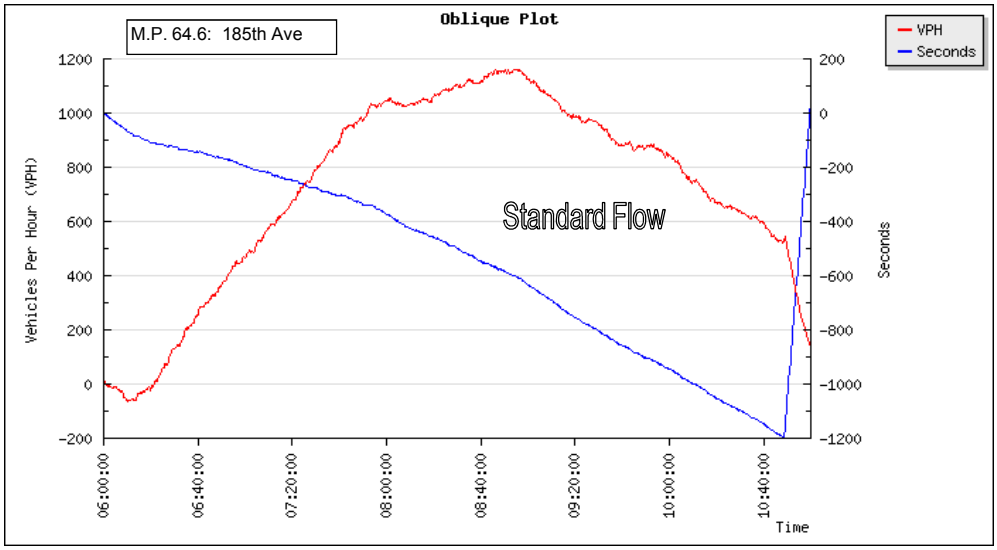


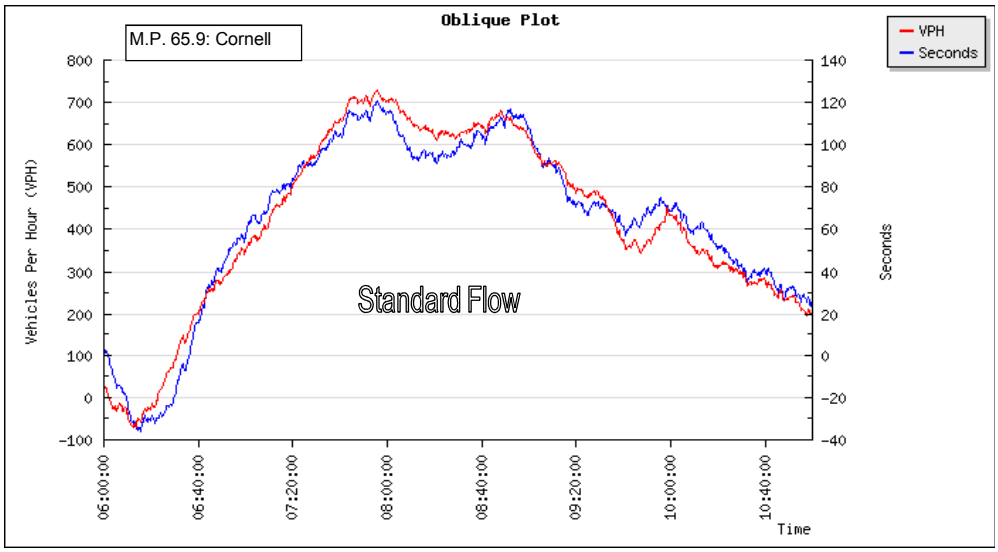
Highway: *US26* **Date:** *August 9th, 2007 AM*
Direction: *Eastbound*

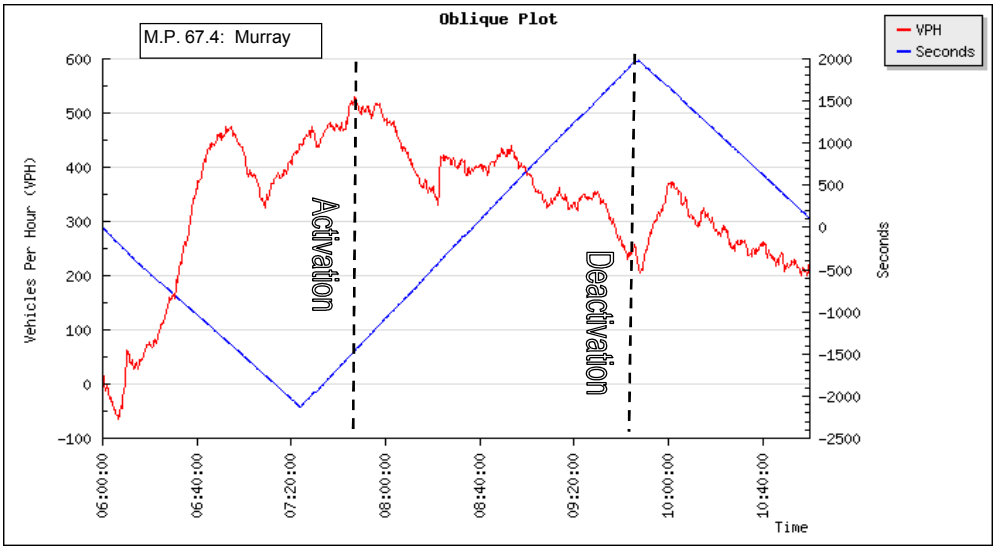




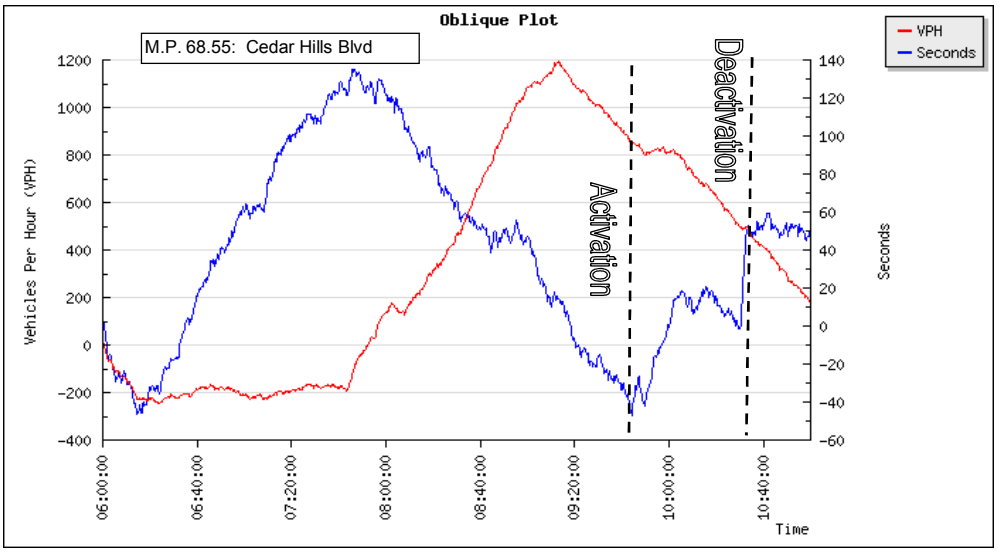
Highway: *US26* **Date:** *August 9th, 2007 AM*
Direction: *Eastbound*

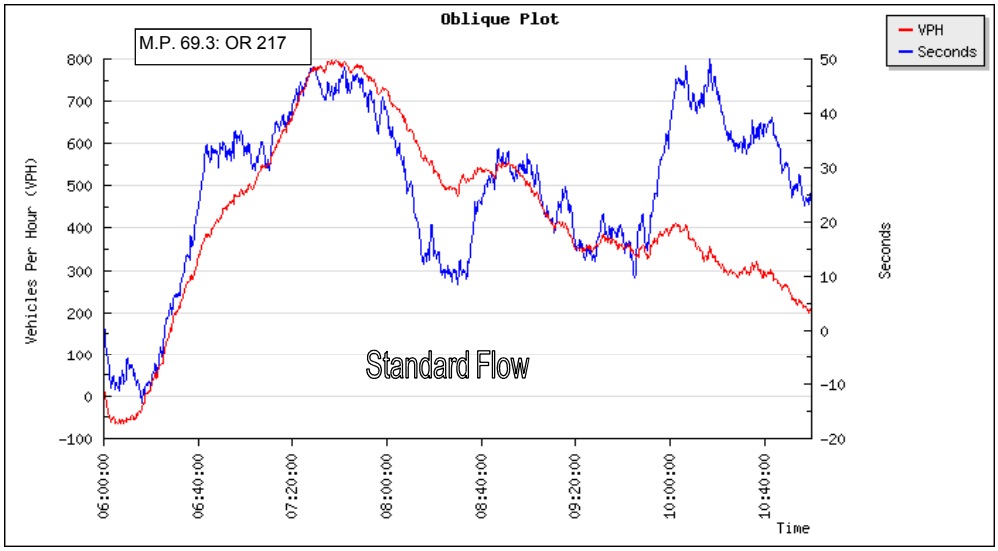


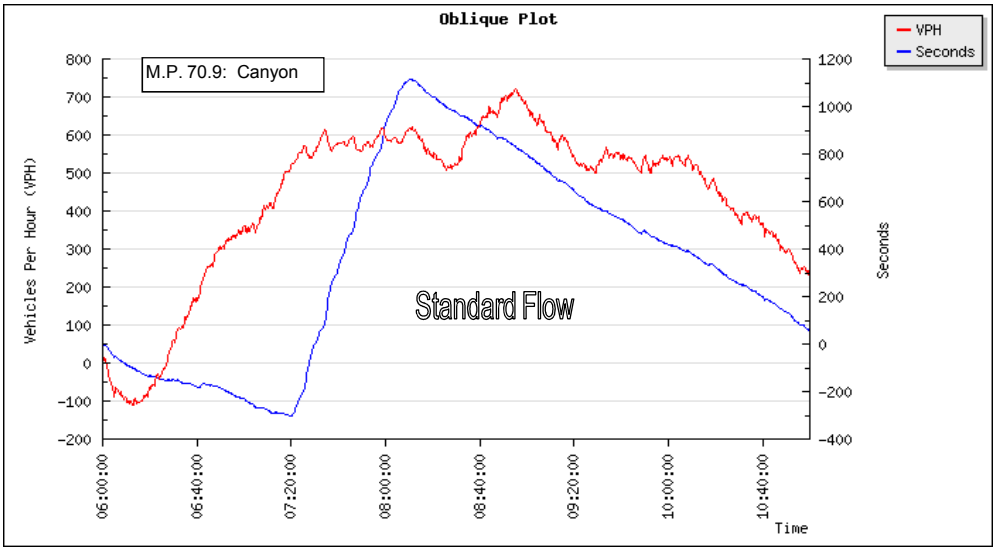




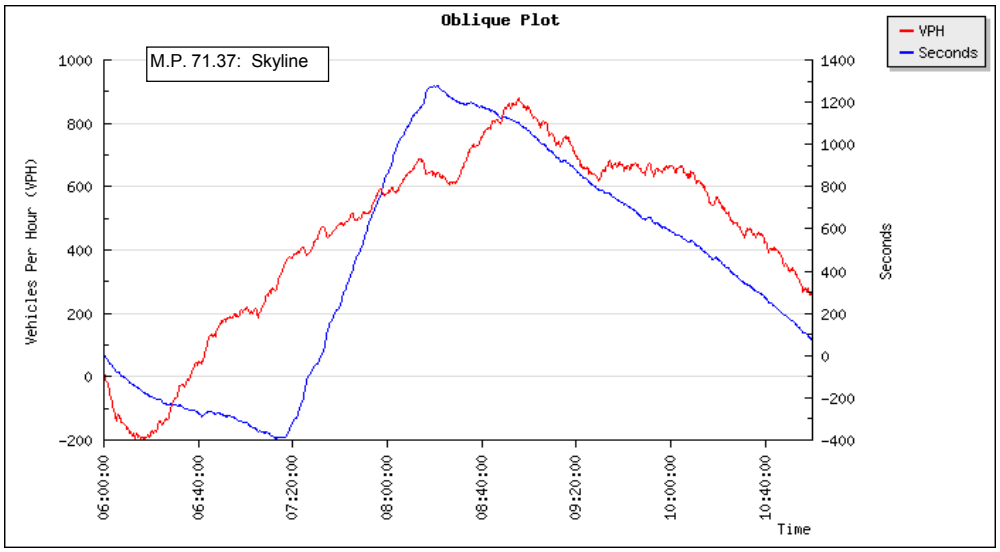
Highway: *US26* **Date:** *August 9th, 2007 AM*
Direction: *Eastbound*

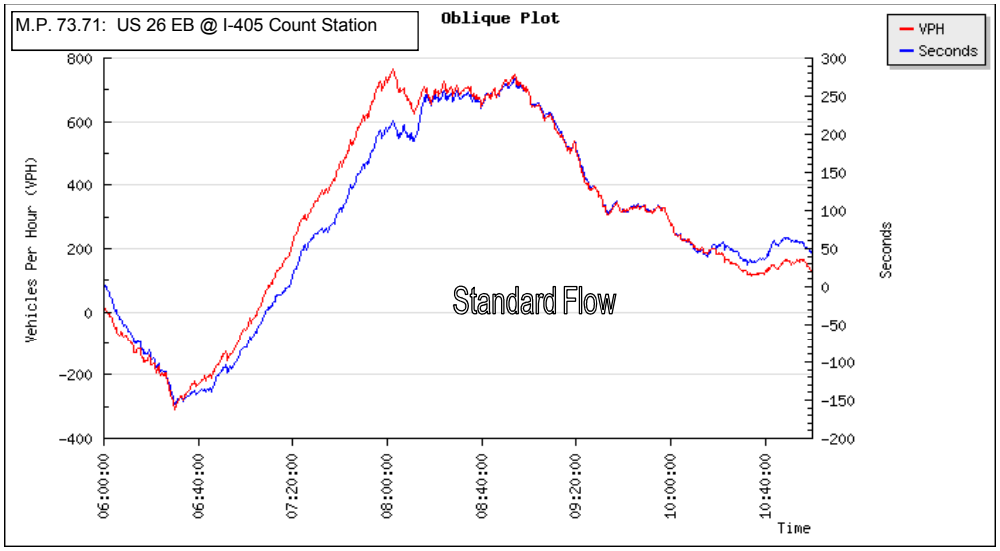




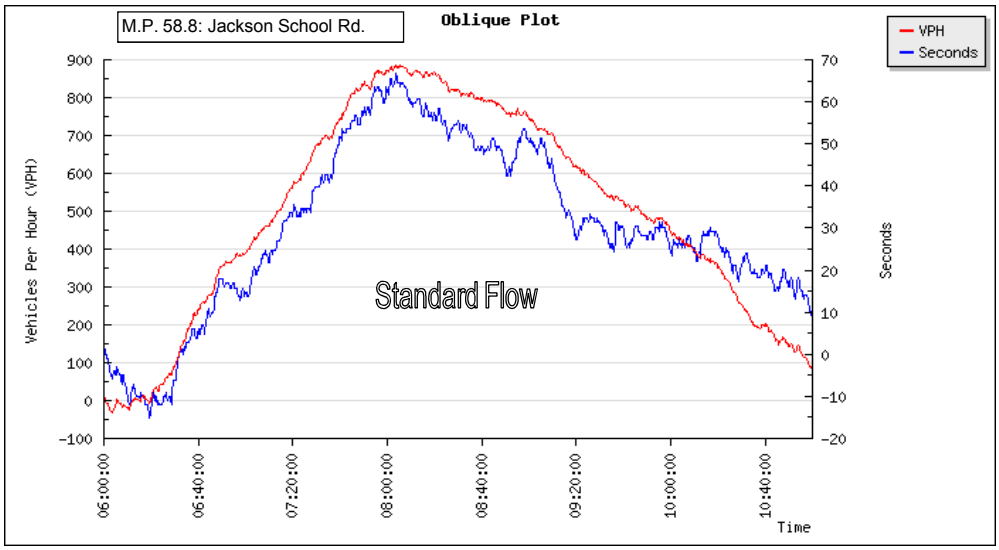


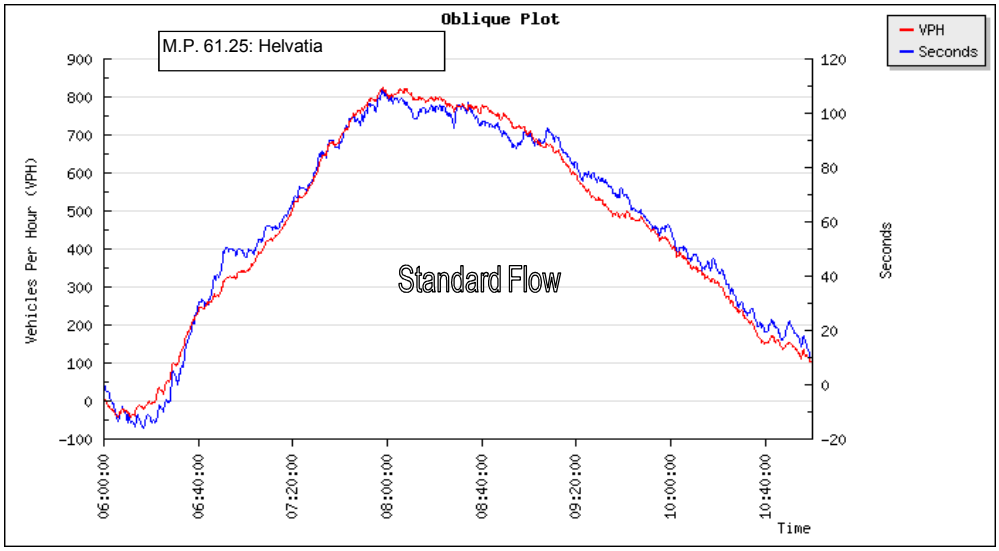
Highway: *US26* **Date:** *August 9th, 2007 AM*
Direction: *Eastbound*

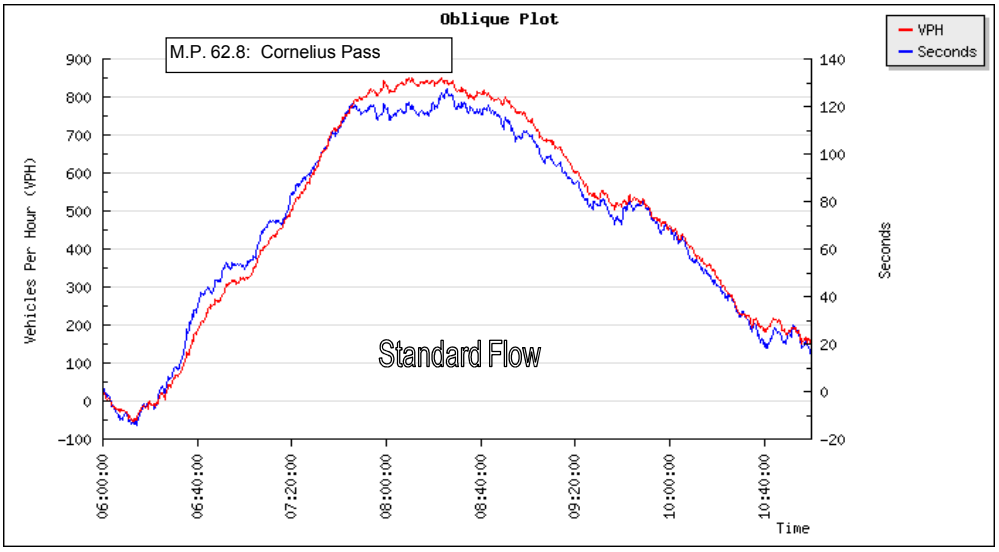




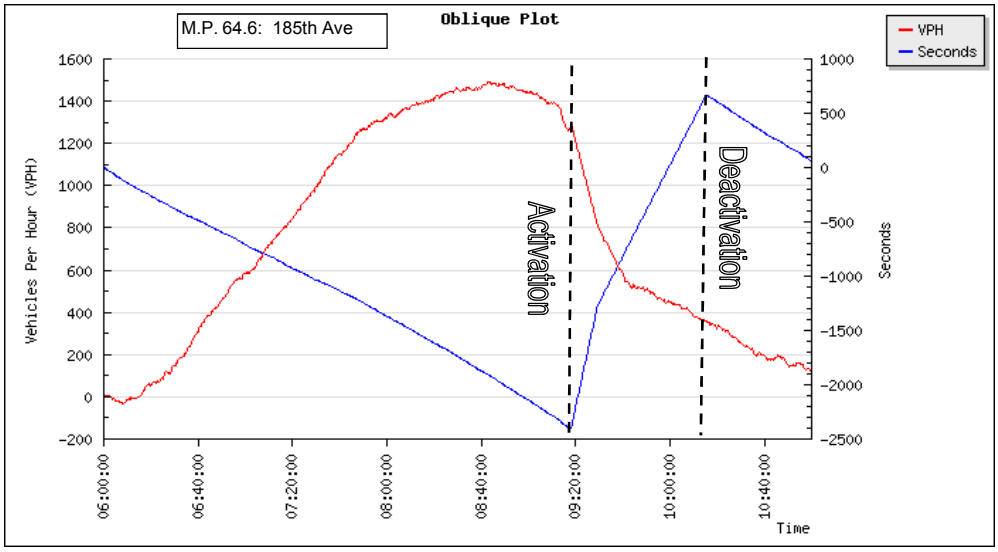
Highway: *US26* **Date:** *August 14th, 2007 AM*
Direction: *Eastbound*

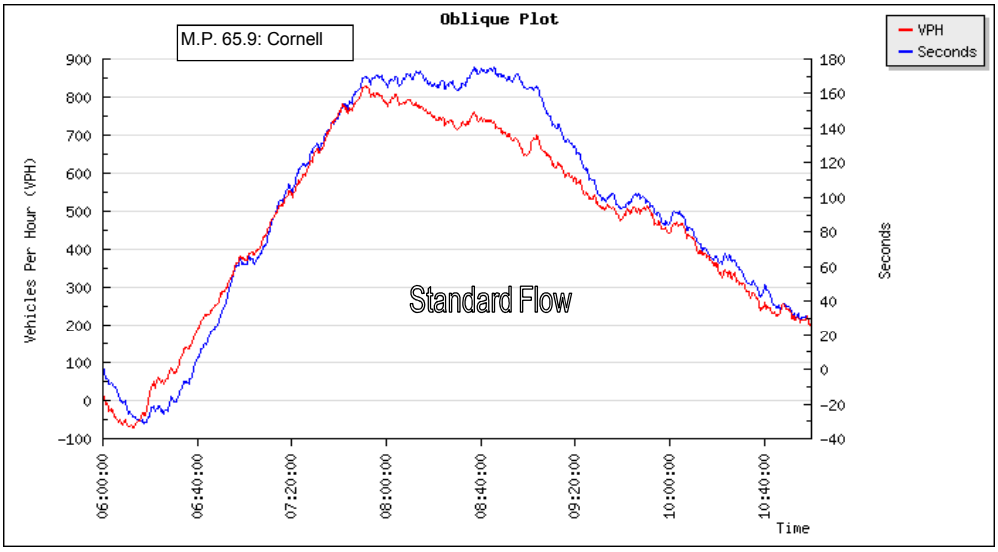


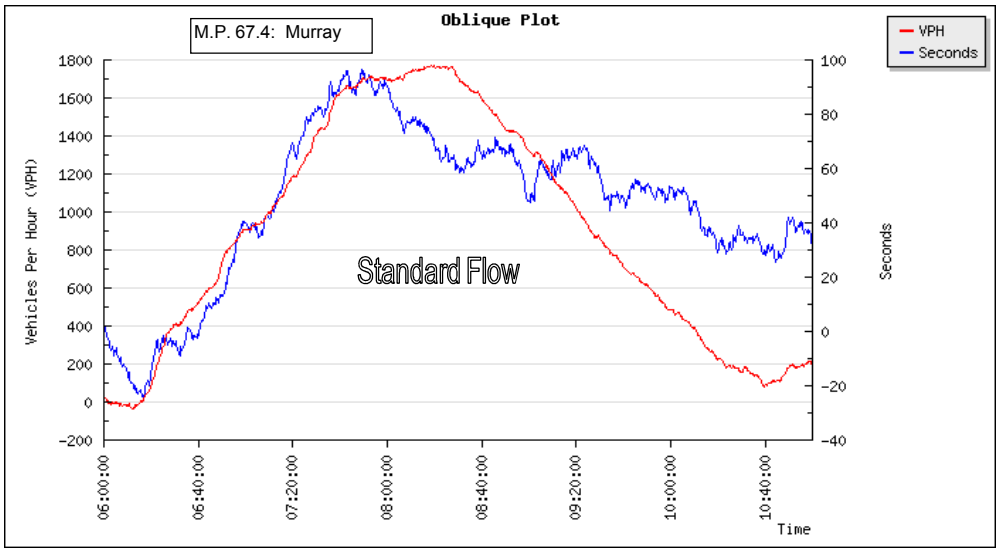




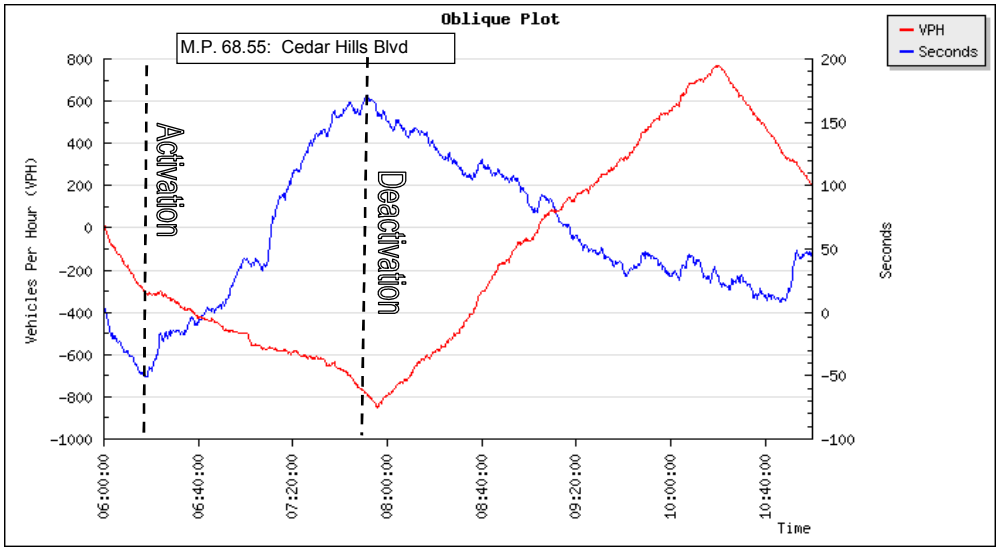
Highway: *US26* **Date:** *August 14th, 2007 AM*
Direction: *Eastbound*

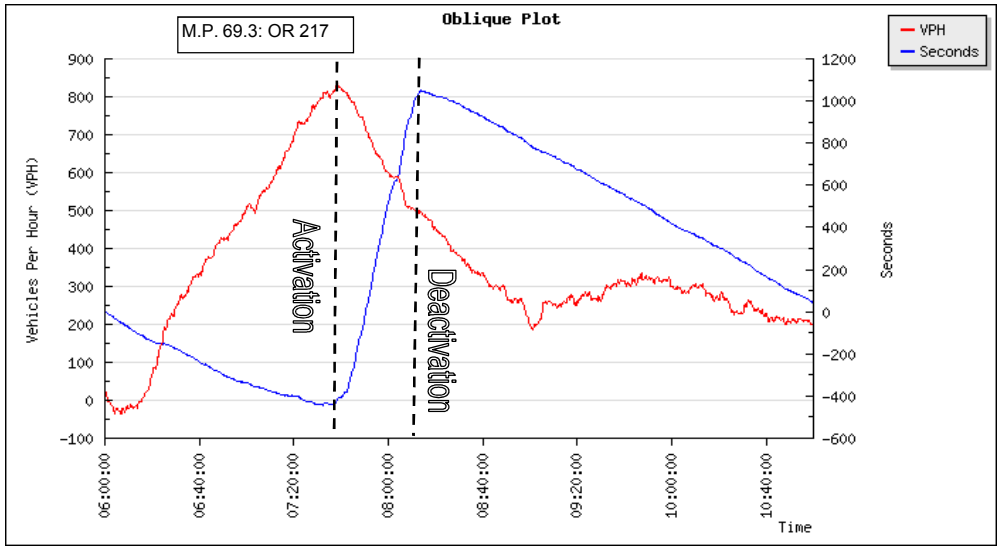


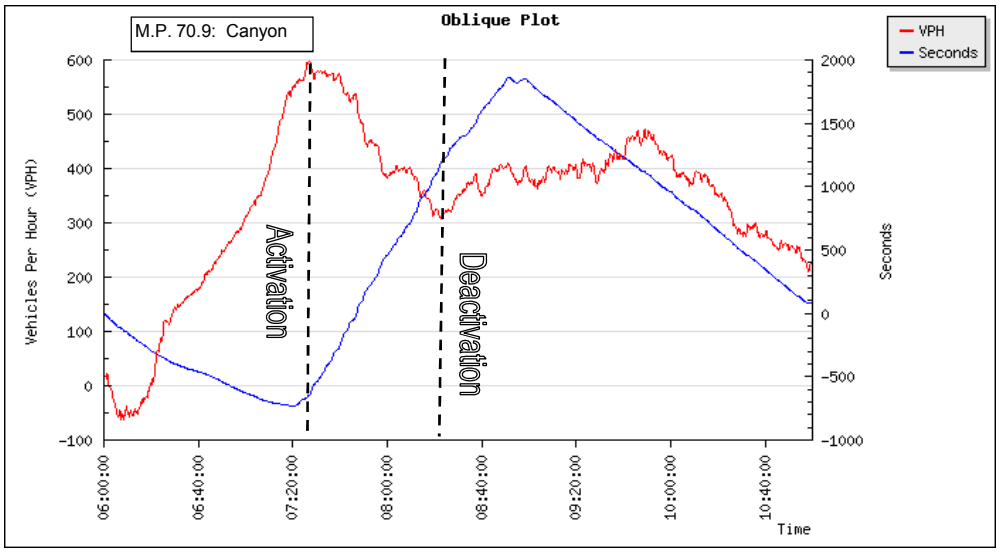




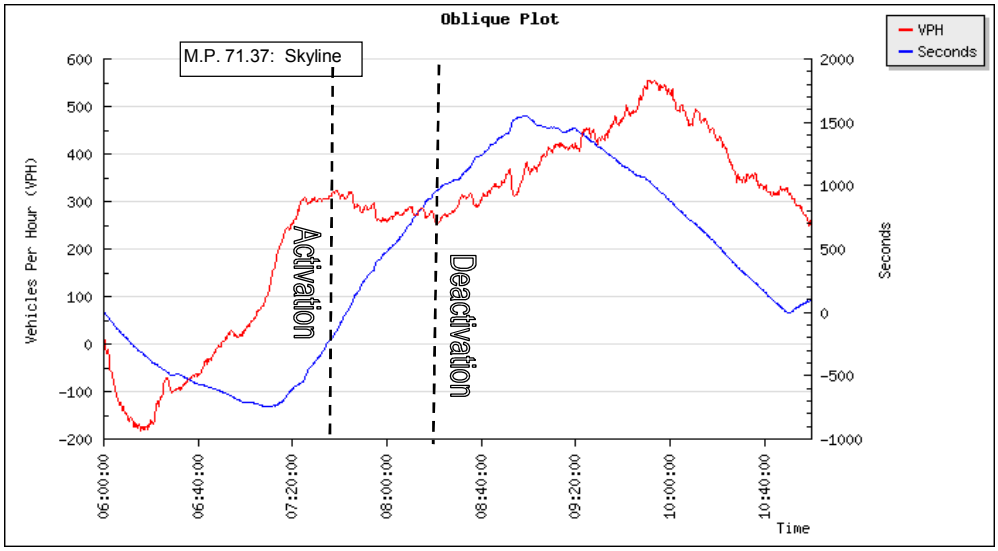
Highway: *US26* **Date:** *August 14th, 2007 AM*
Direction: *Eastbound*

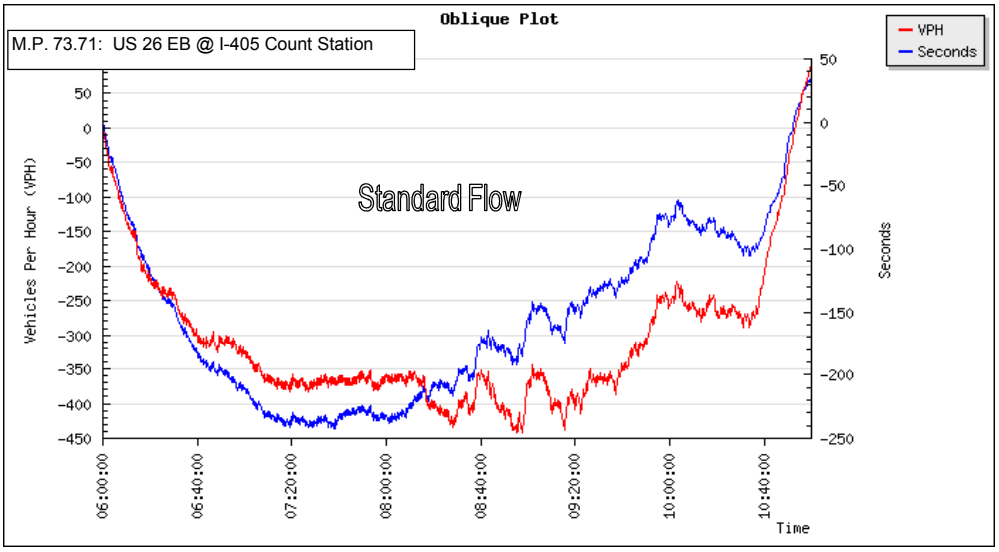




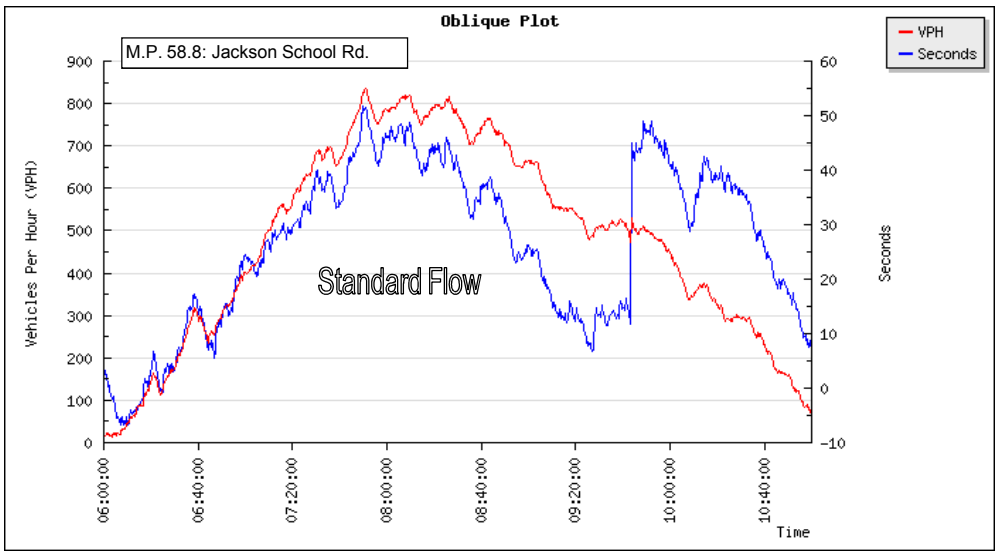


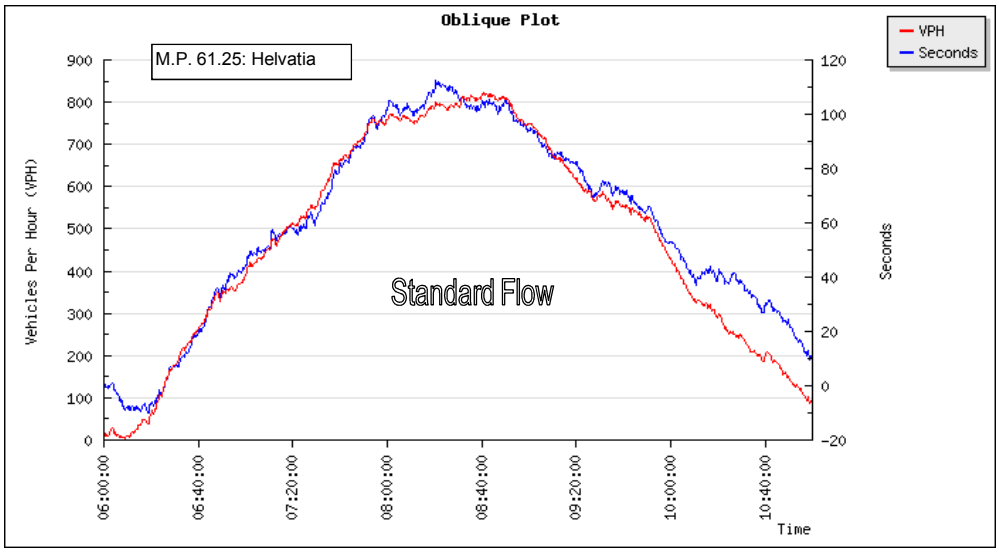
Highway: *US26* **Date:** *August 14th, 2007 AM*
Direction: *Eastbound*

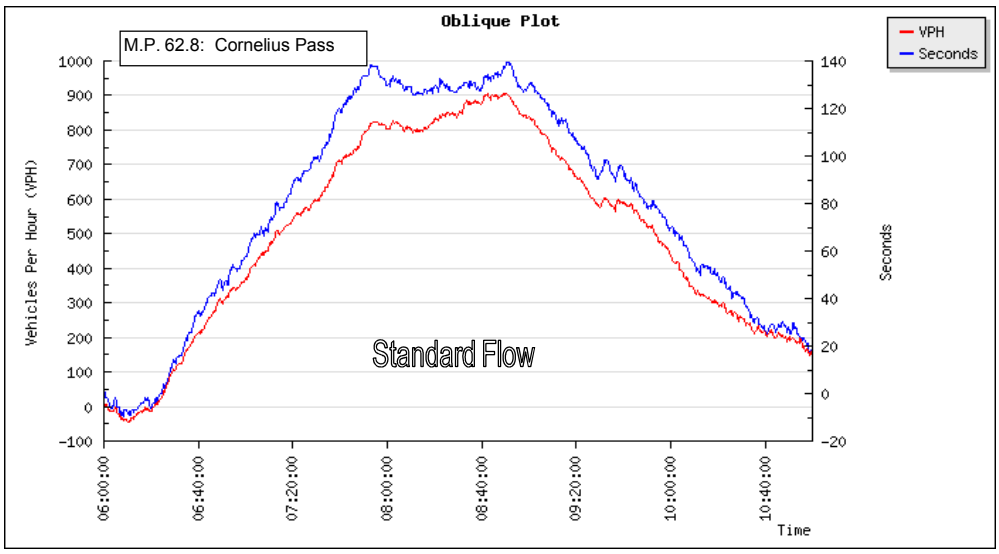




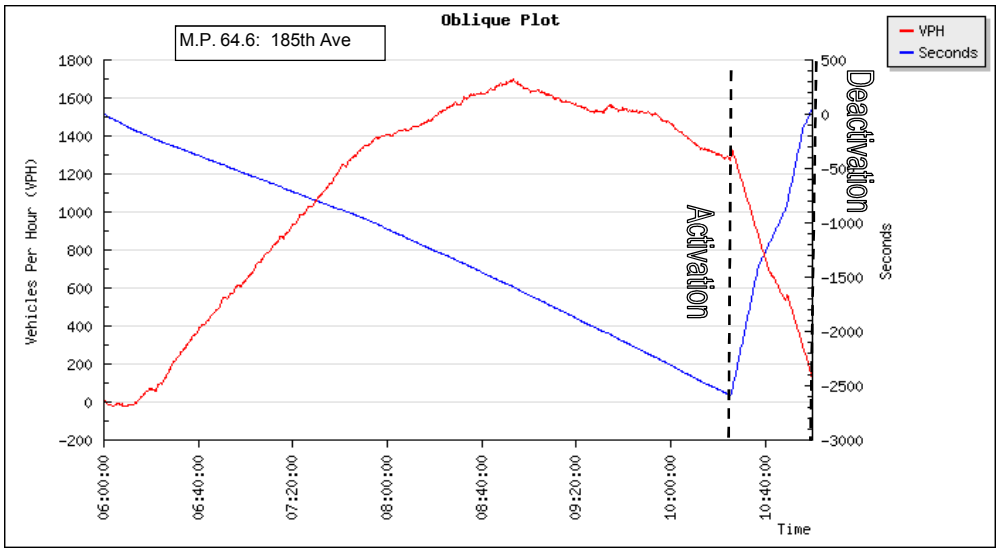
Highway: *US26* **Date:** *June 21st, 2007 AM*
Direction: *Eastbound*

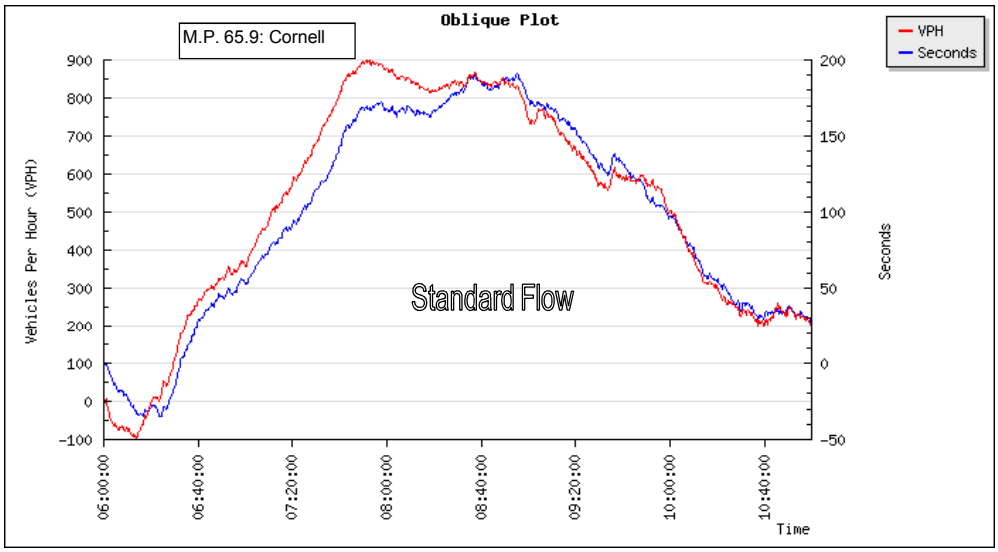


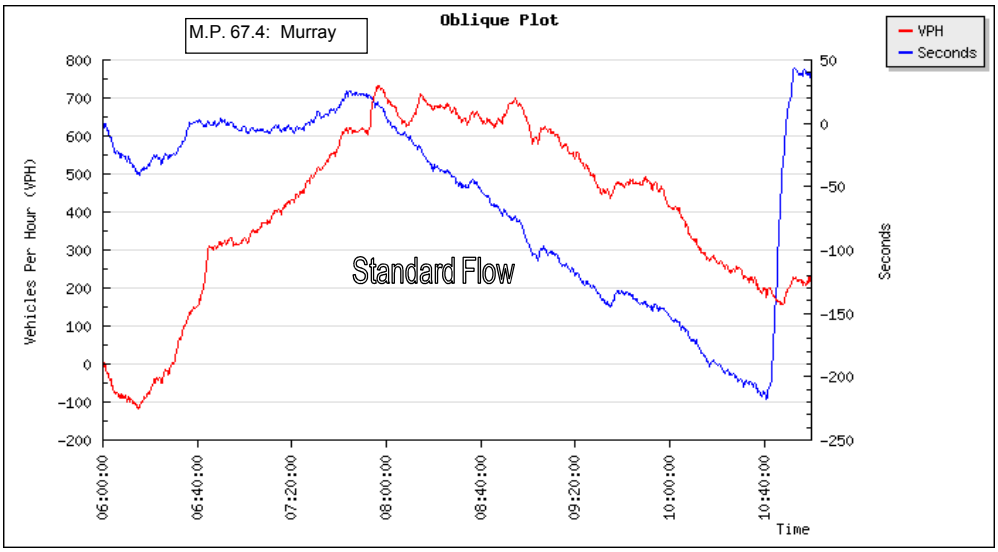




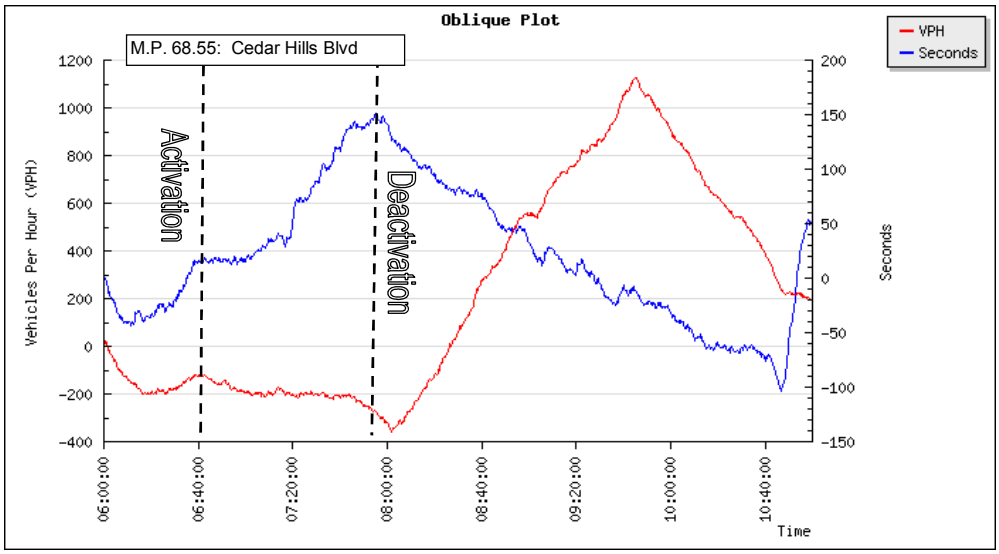
Highway: *US26* **Date:** *June 21st, 2007 AM*
Direction: *Eastbound*

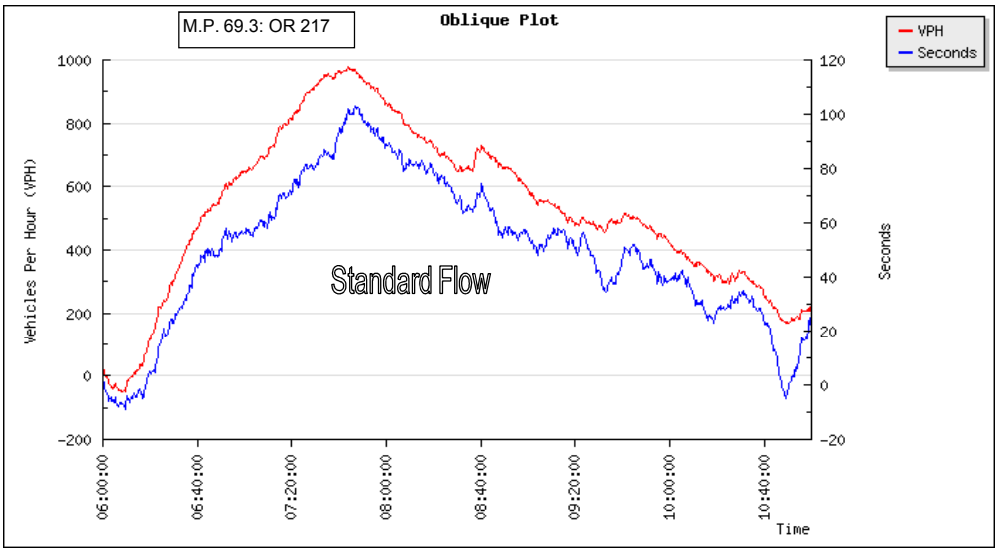


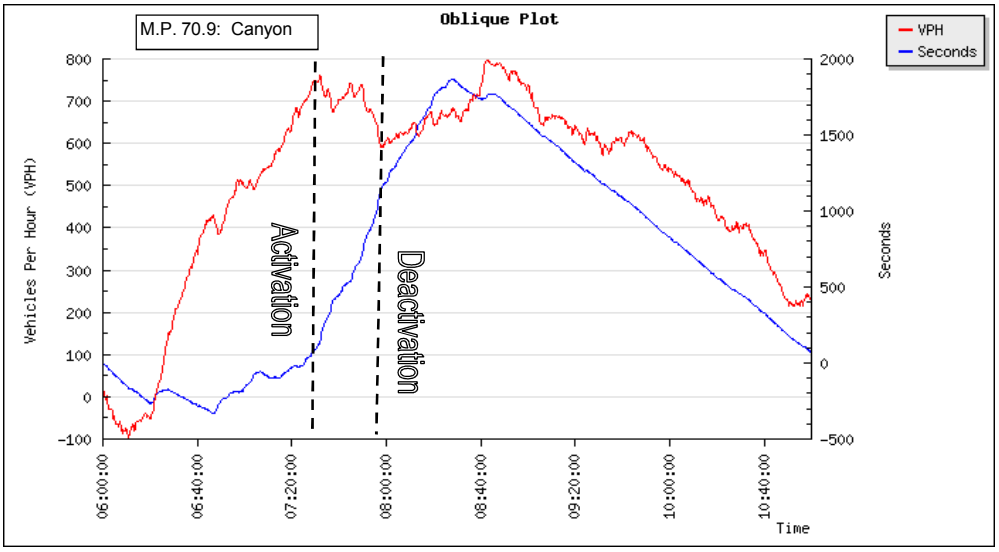




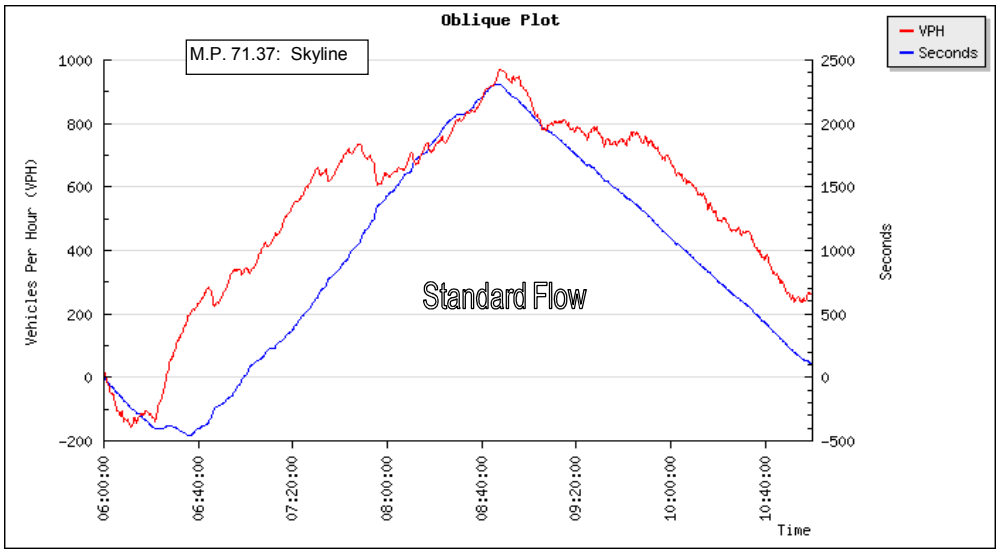
Highway: *US26* **Date:** *June 21st, 2007 AM*
Direction: *Eastbound*

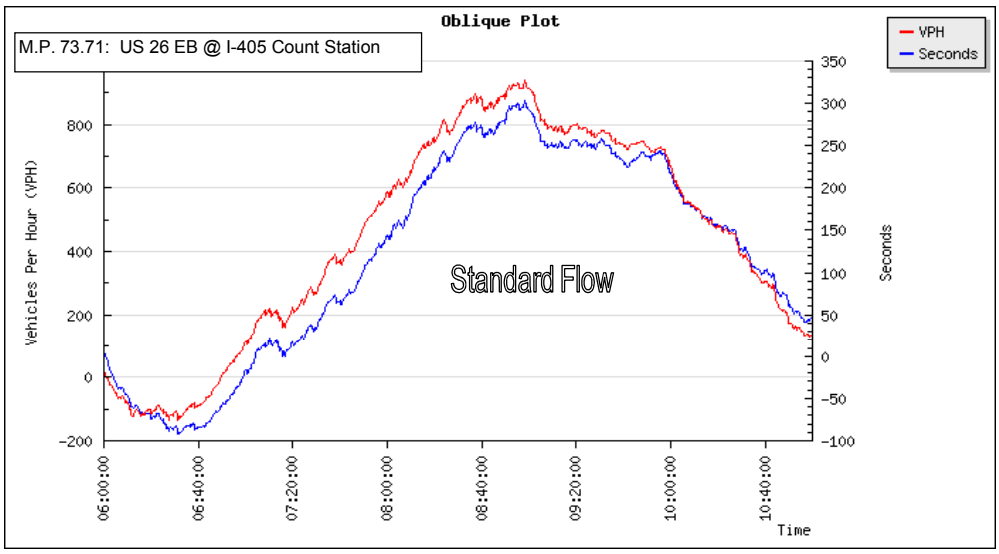




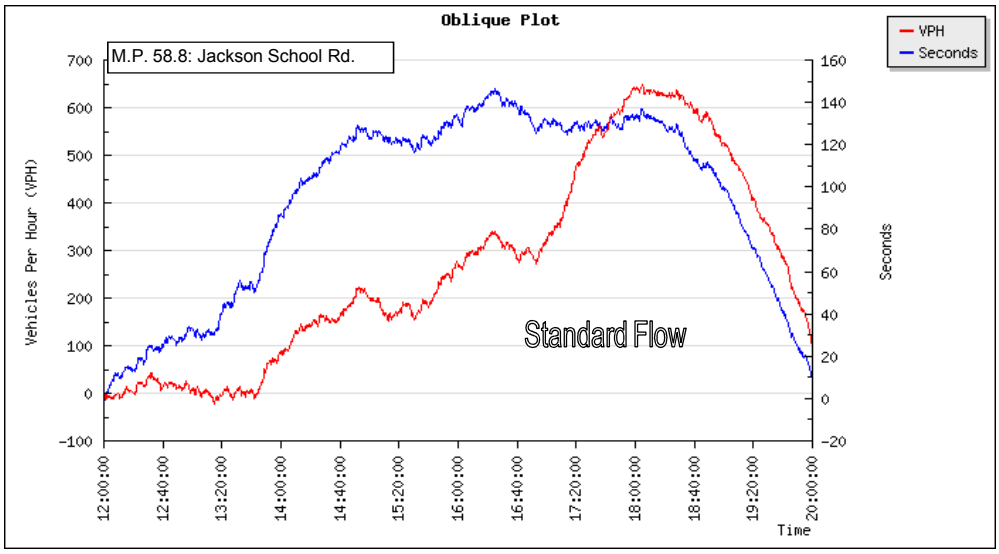


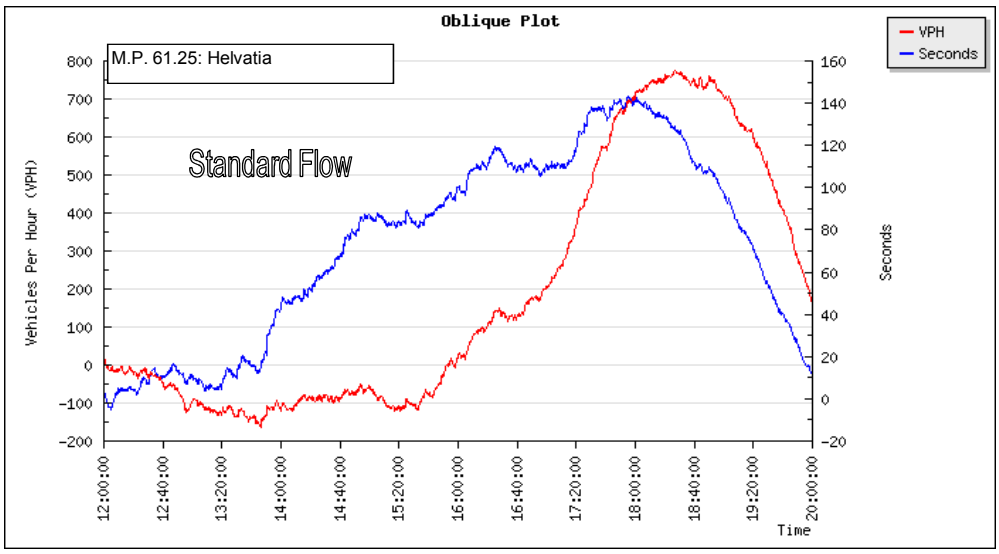
Highway: *US26* **Date:** *June 21st, 2007 AM*
Direction: *Eastbound*

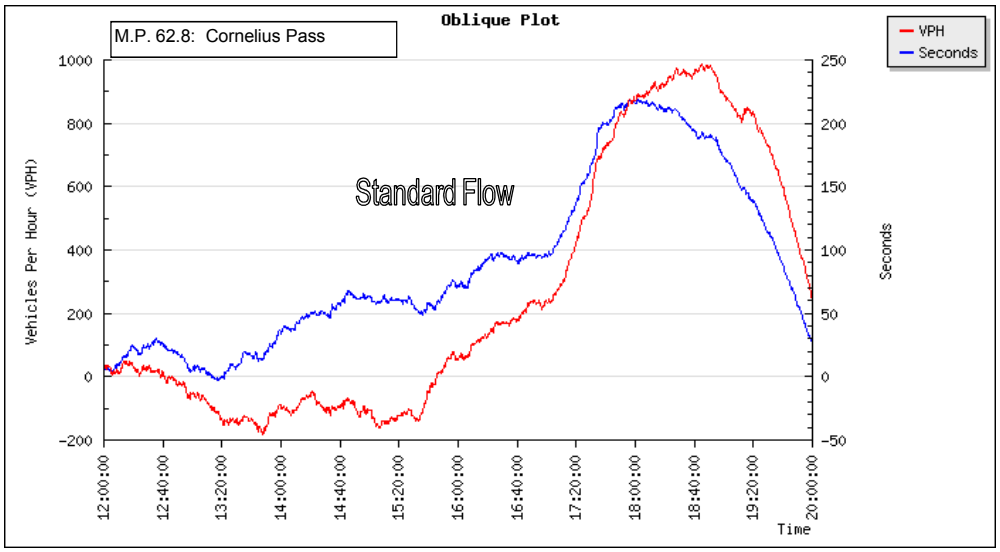




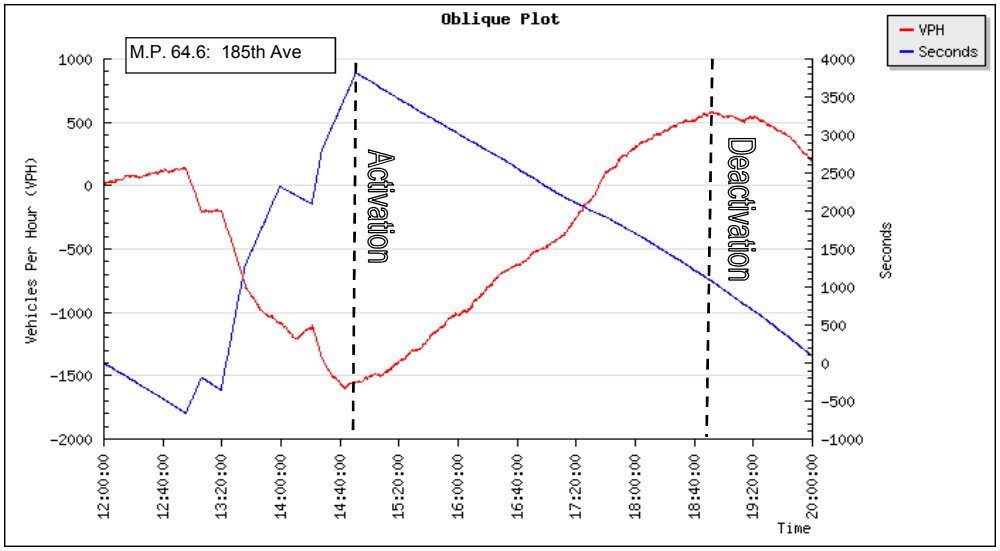
Highway: *US26* **Date:** *August 16th, 2007 PM*
Direction: *Eastbound*

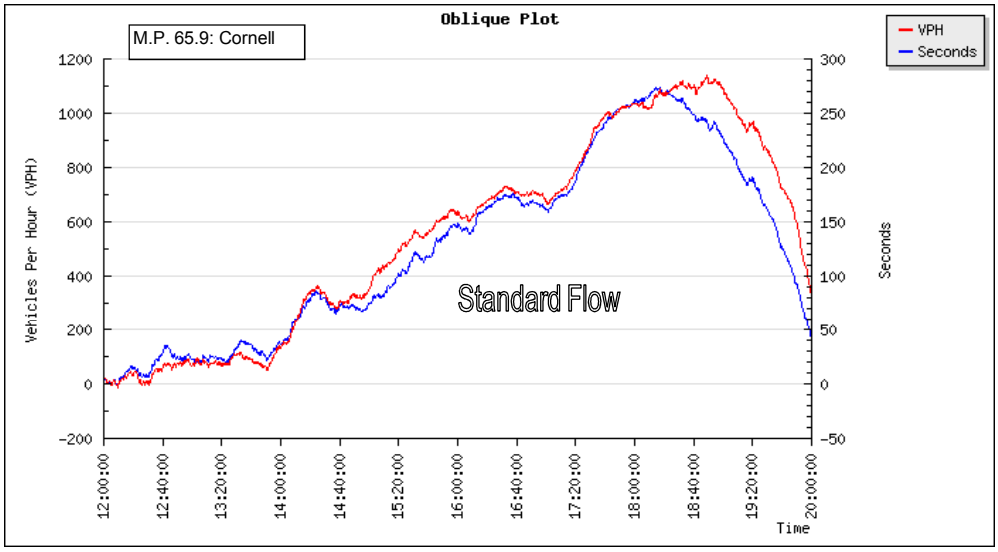


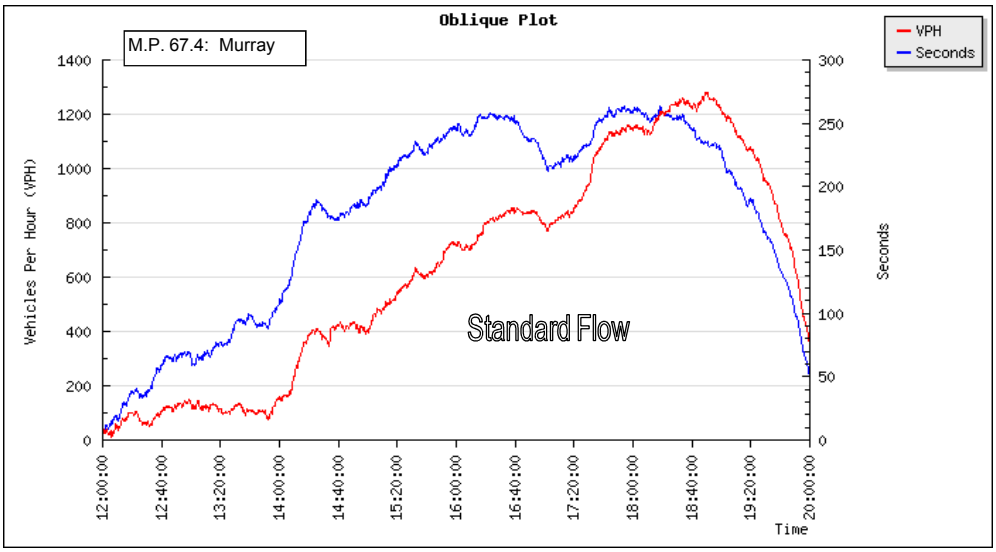




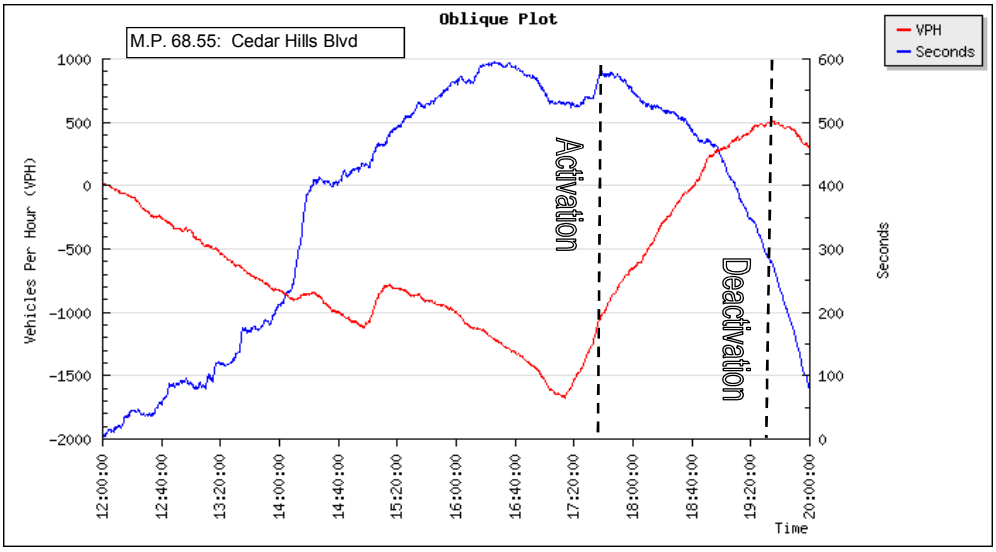
Highway: *US26* **Date:** *August 16th, 2007 PM*
Direction: *Eastbound*

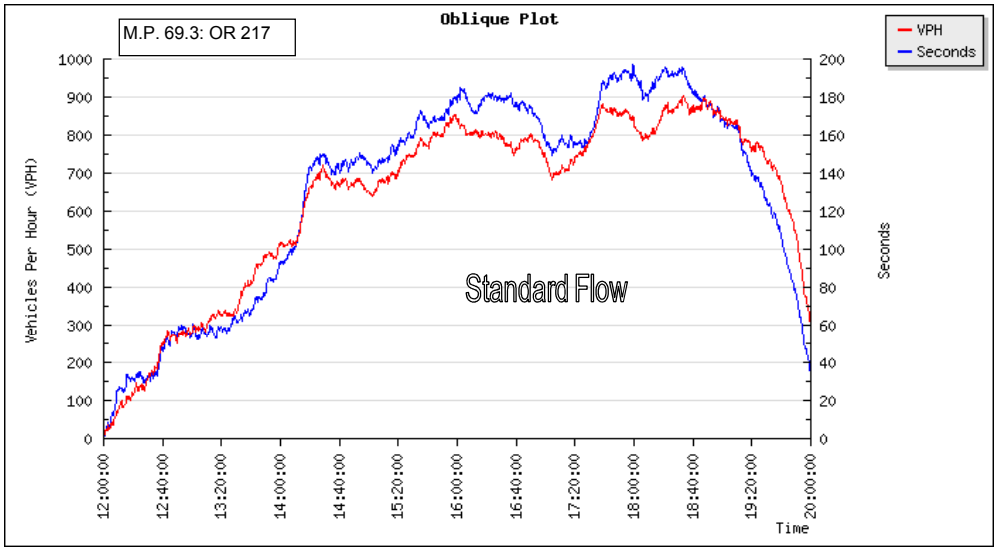


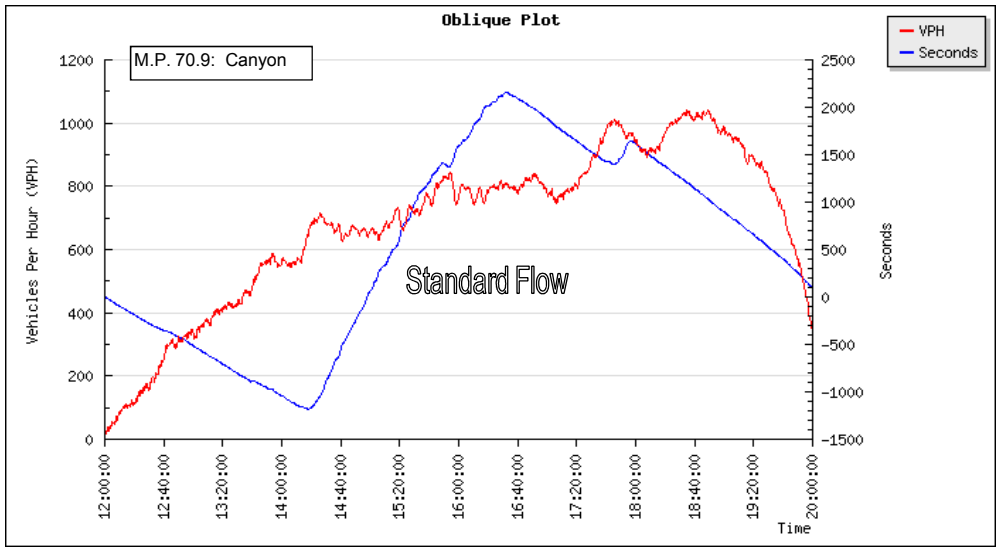




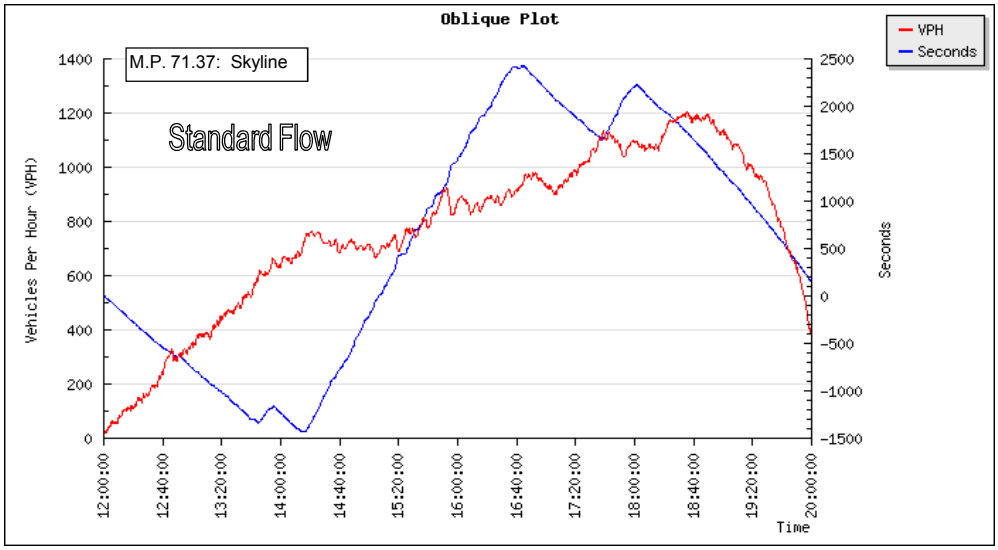
Highway: *US26* **Date:** *August 16th, 2007 PM*
Direction: *Eastbound*

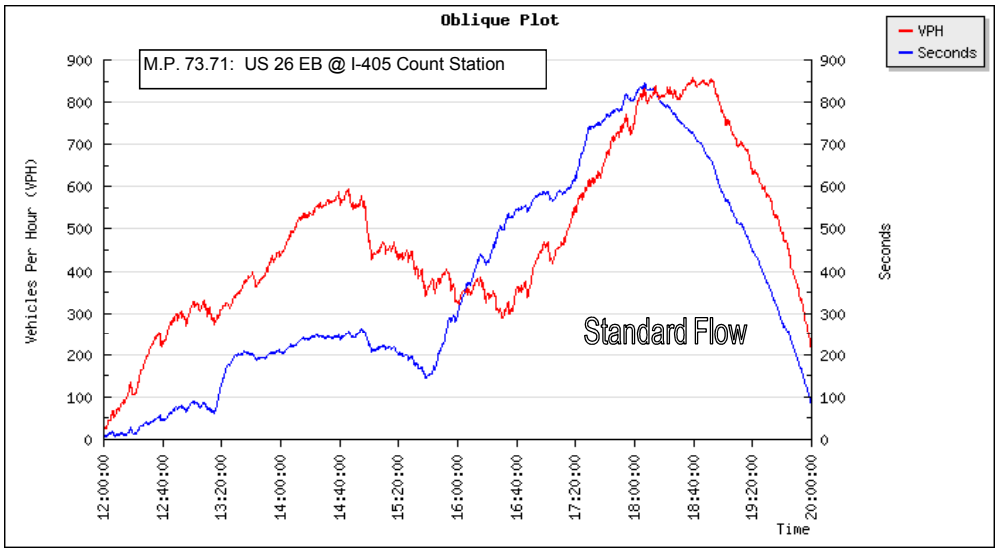




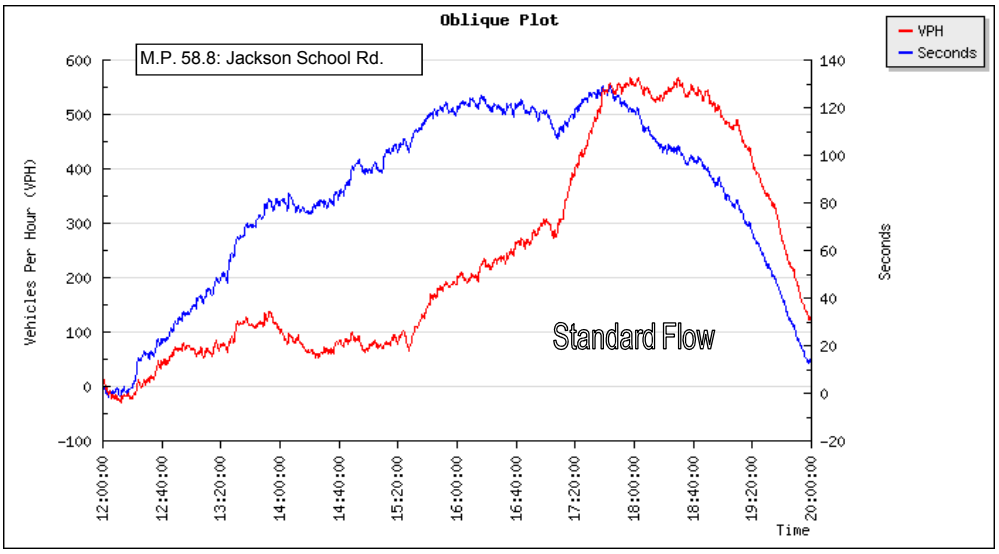


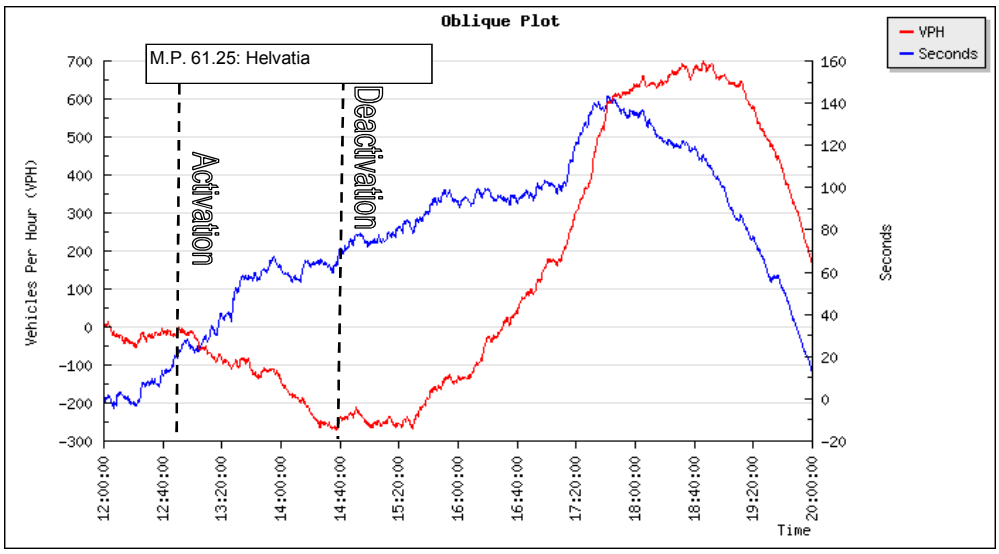
Highway: *US26* **Date:** *August 16th, 2007 PM*
Direction: *Eastbound*

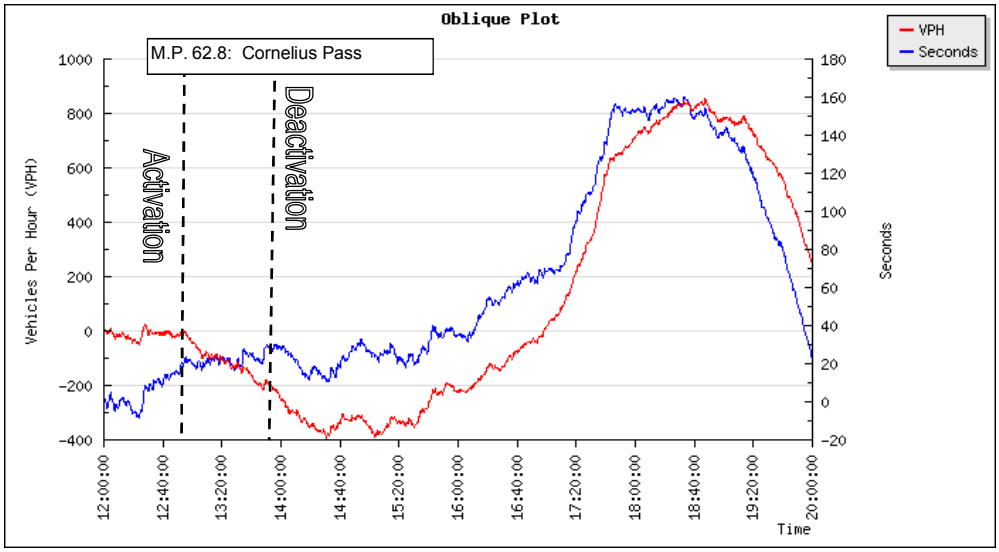




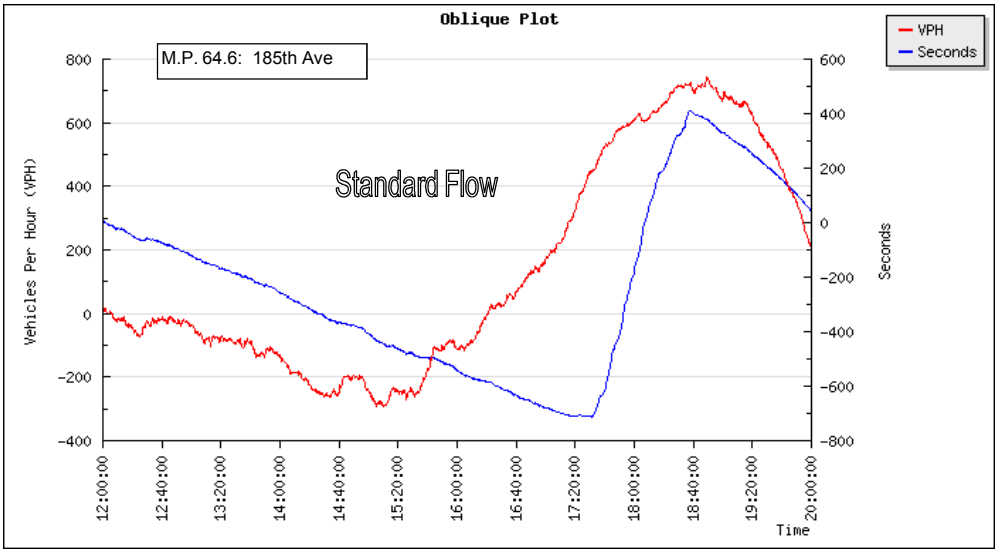
Highway: *US26* **Date:** *August 15th, 2007 PM*
Direction: *Eastbound*

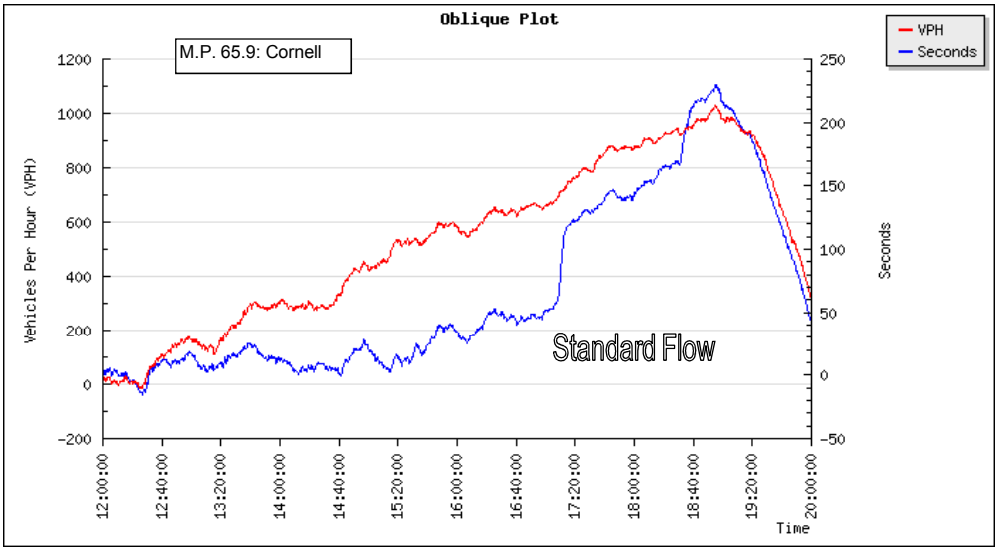


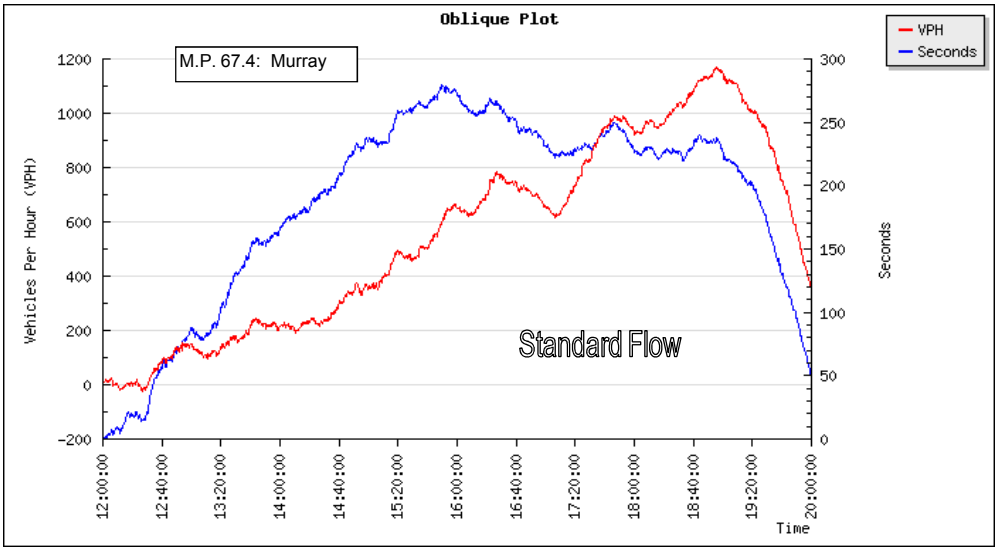




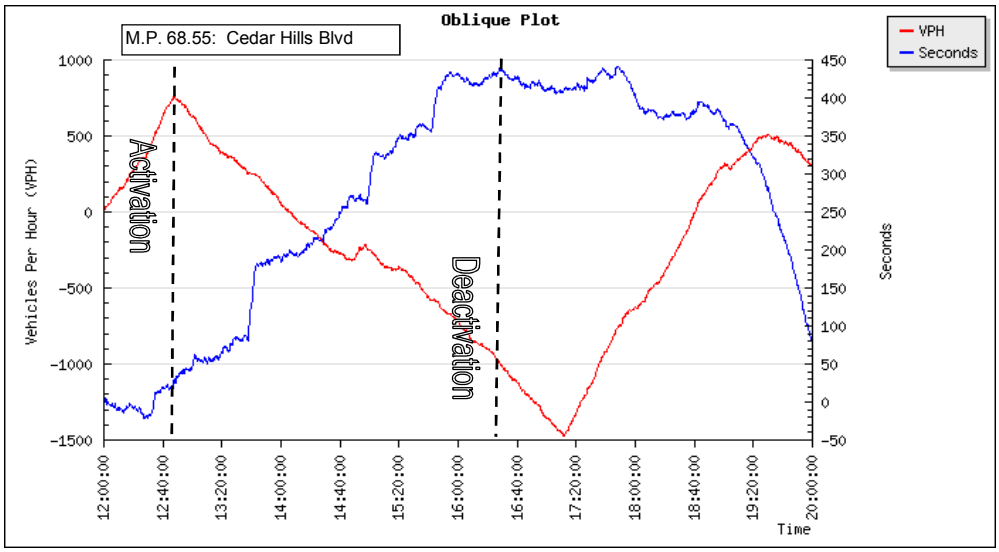
Highway: *US26* **Date:** *August 15th, 2007 PM*
Direction: *Eastbound*

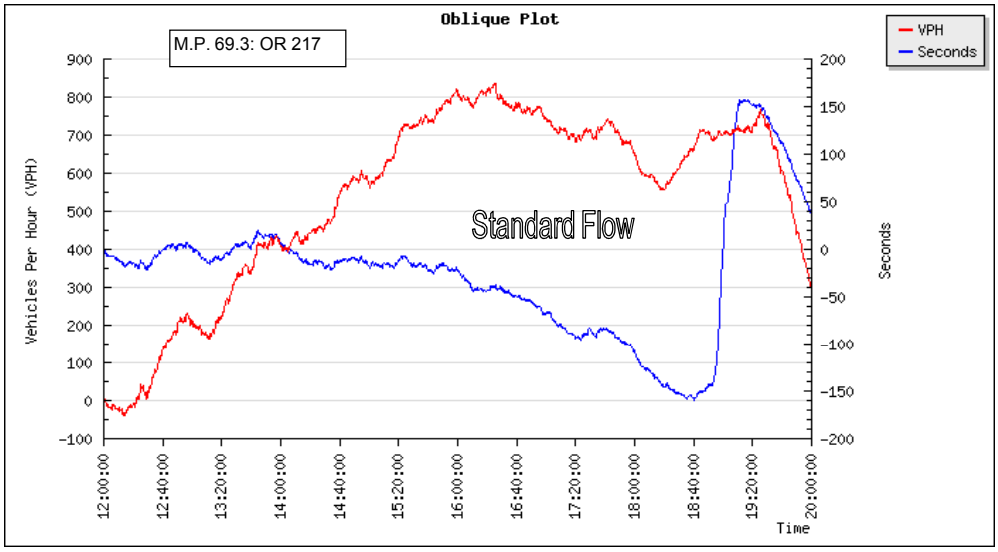


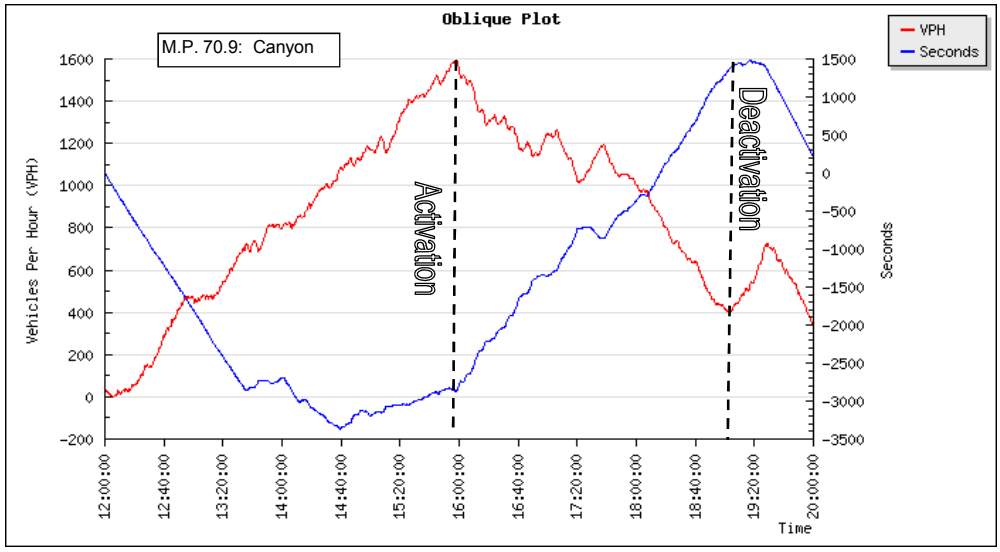




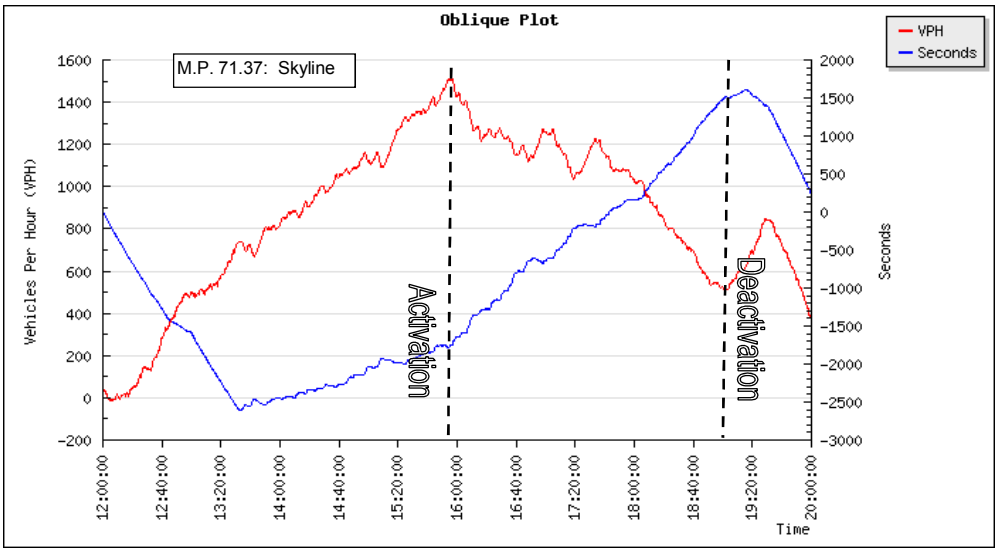
Highway: *US26* **Date:** *August 15th, 2007 PM*
Direction: *Eastbound*

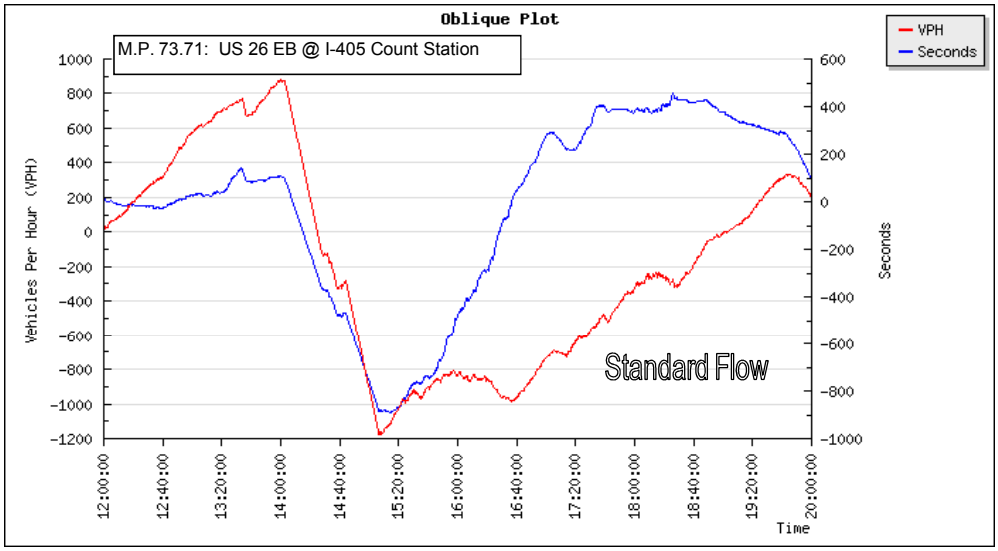




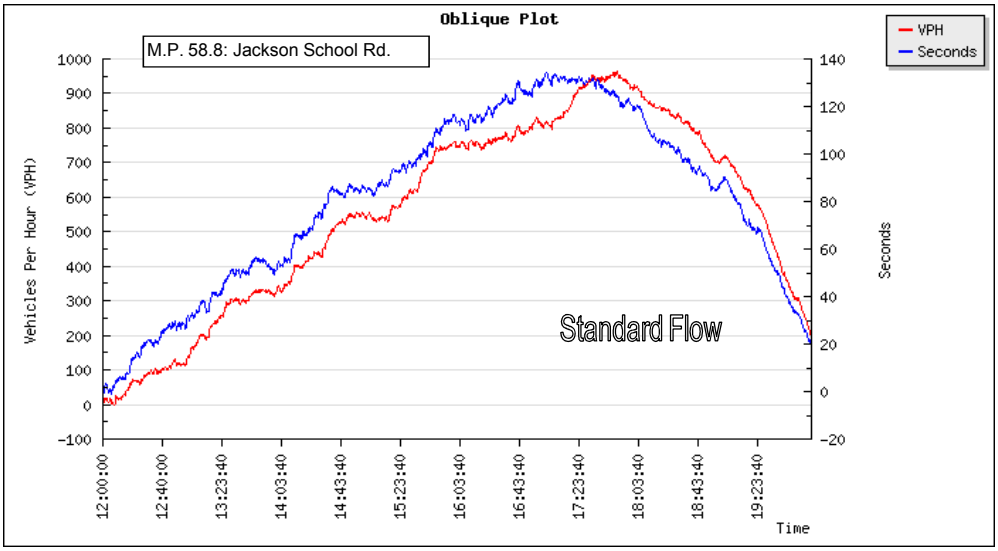


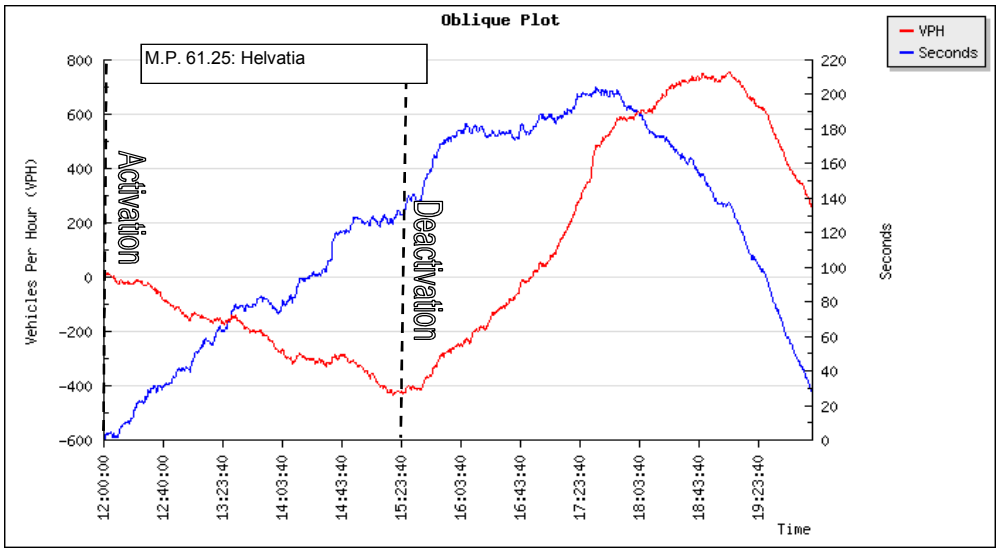
Highway: *US26* **Date:** *August 15th, 2007 PM*
Direction: *Eastbound*

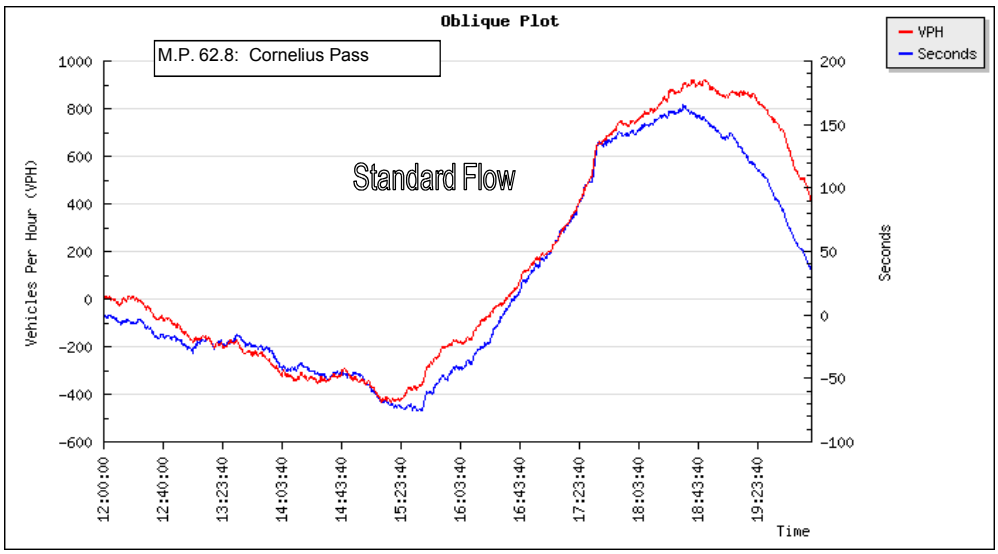




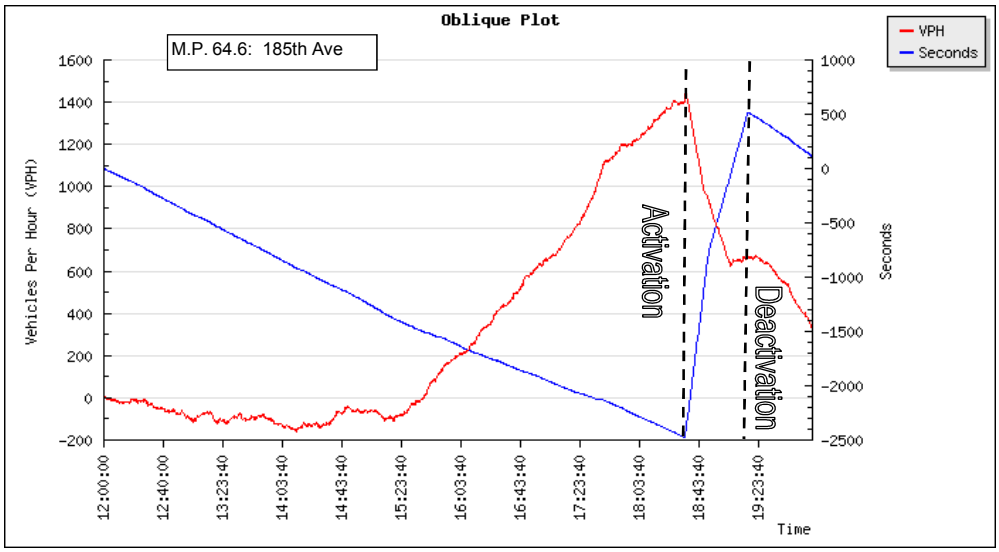
Highway: *US26* **Date:** *August 9th, 2007 PM*
Direction: *Eastbound*

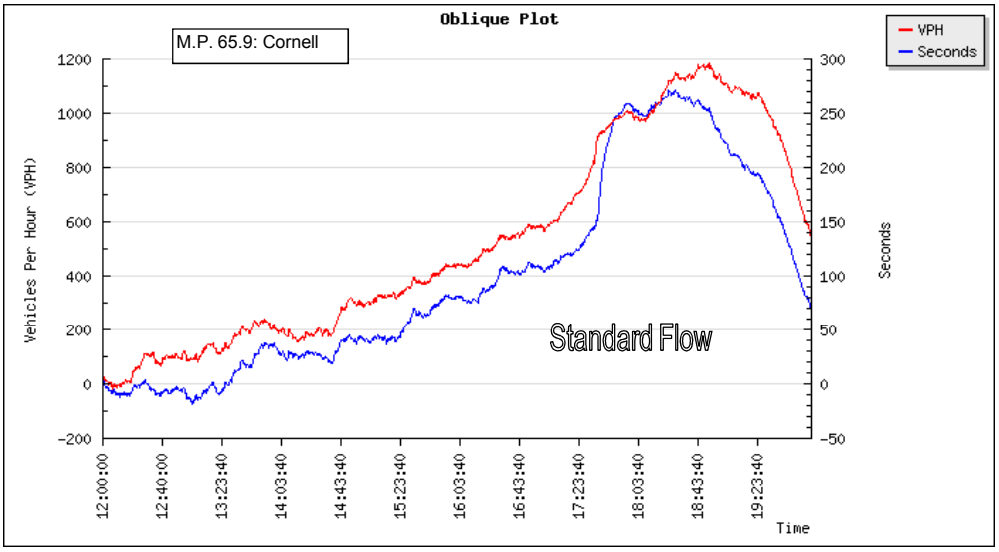


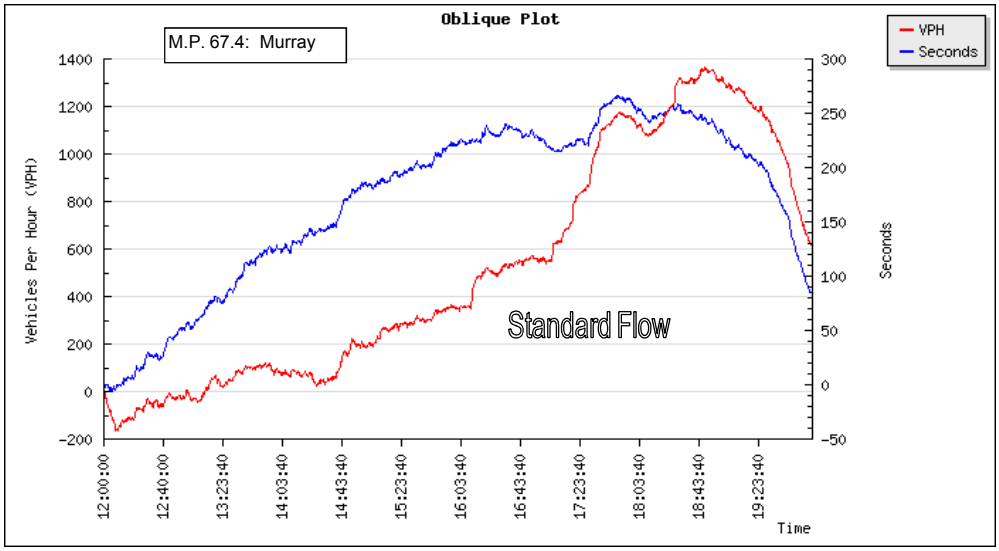




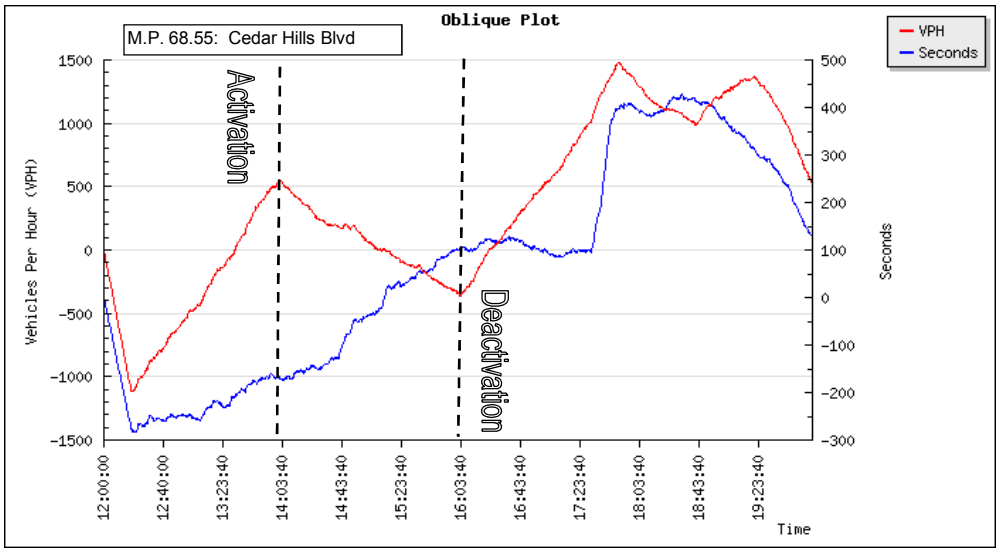
Highway: *US26* **Date:** *August 9th, 2007 PM*
Direction: *Eastbound*

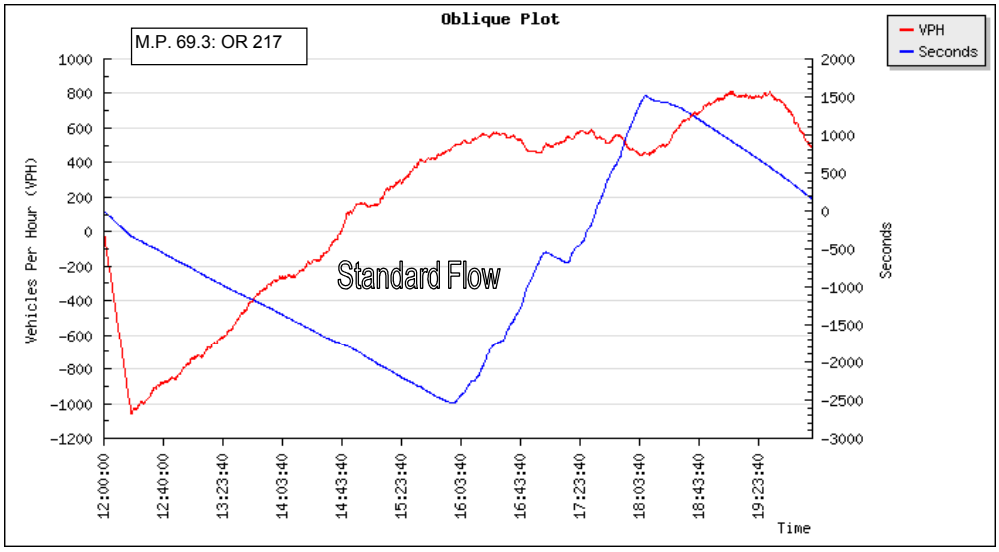


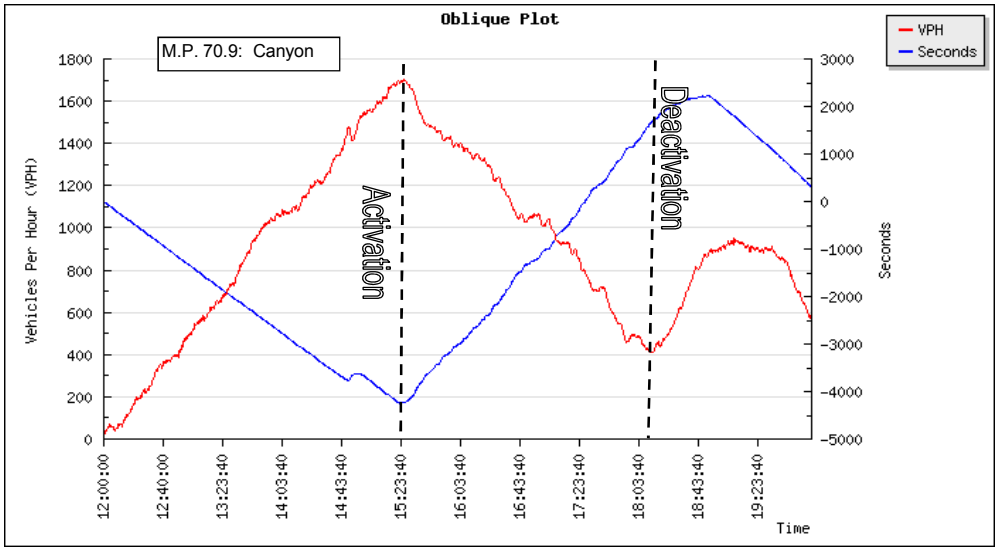




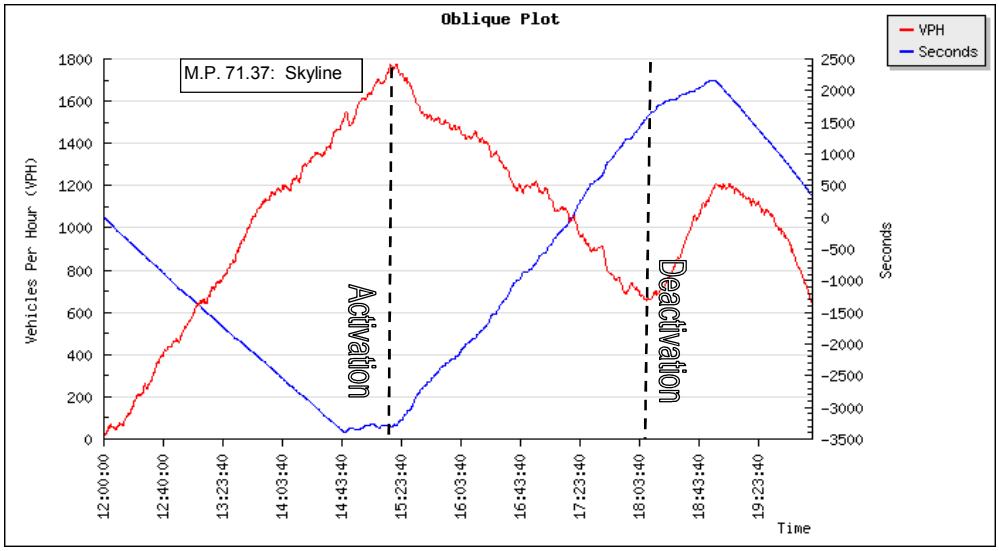
Highway: *US26* **Date:** *August 9th, 2007 PM*
Direction: *Eastbound*

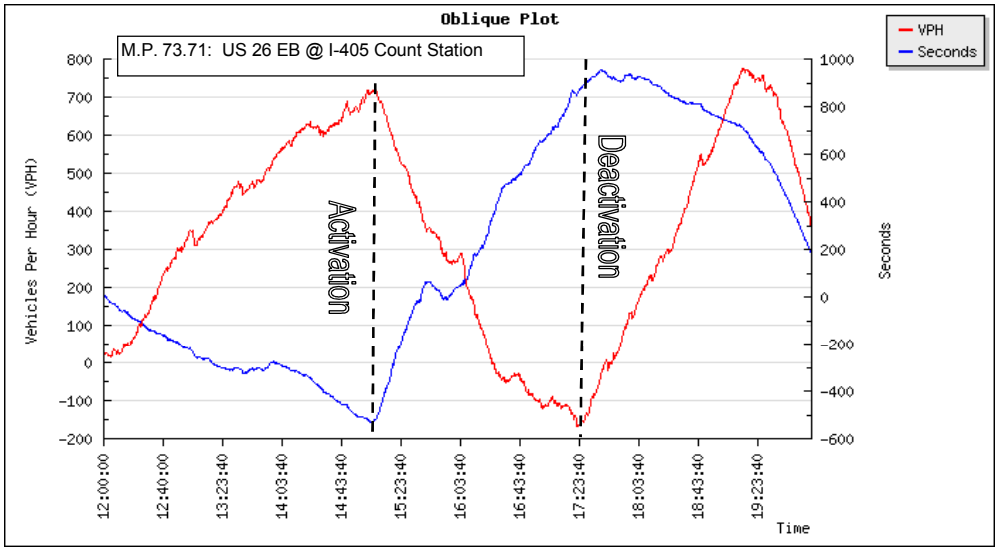




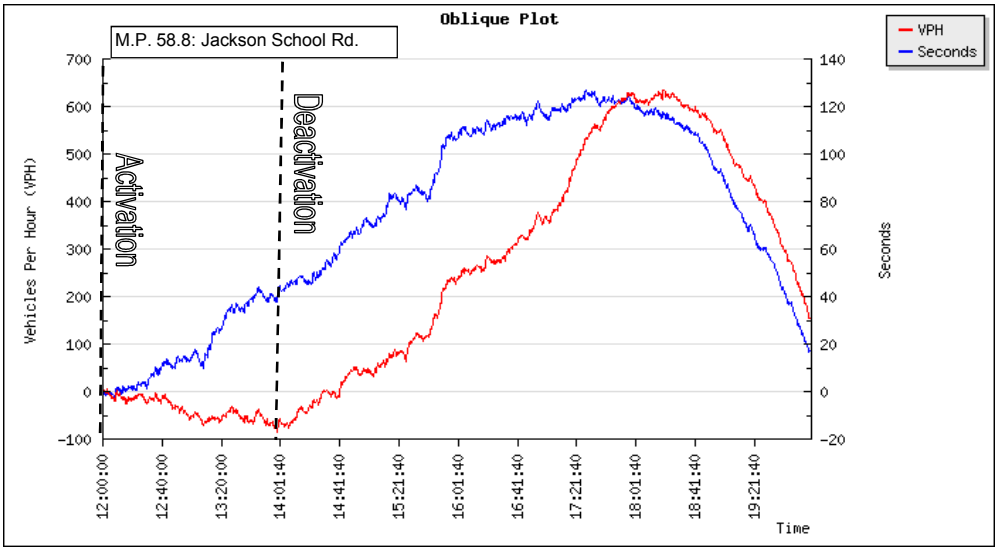


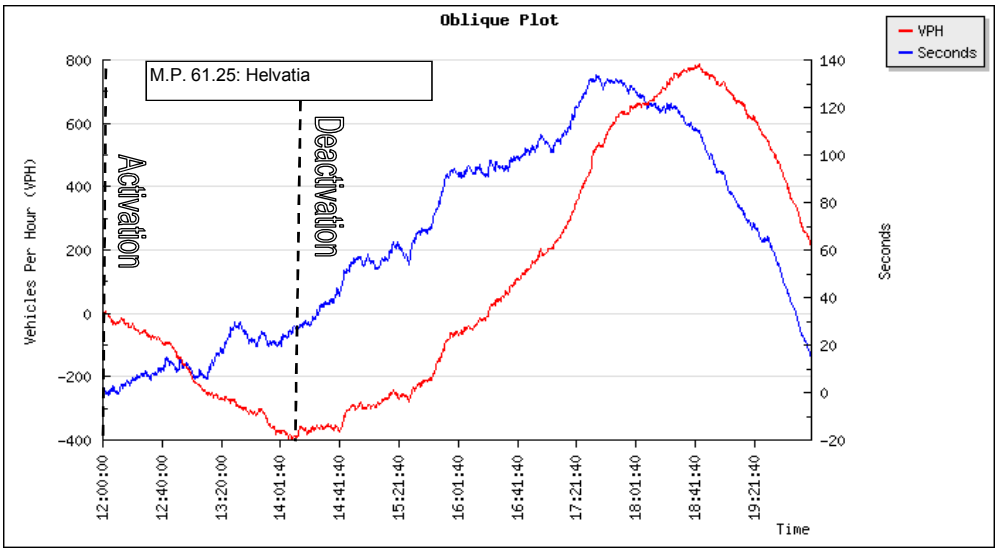
Highway: *US26* **Date:** *August 9th, 2007 PM*
Direction: *Eastbound*

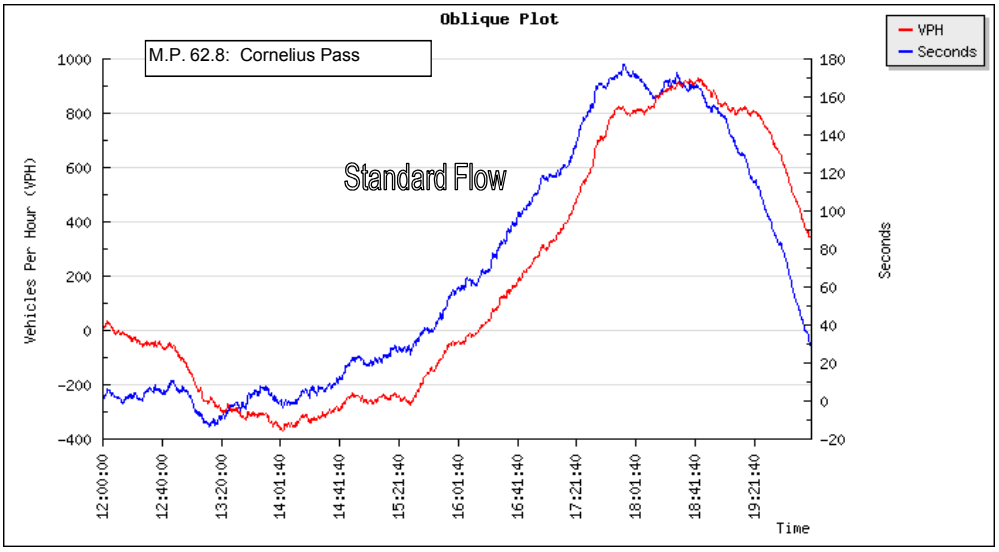




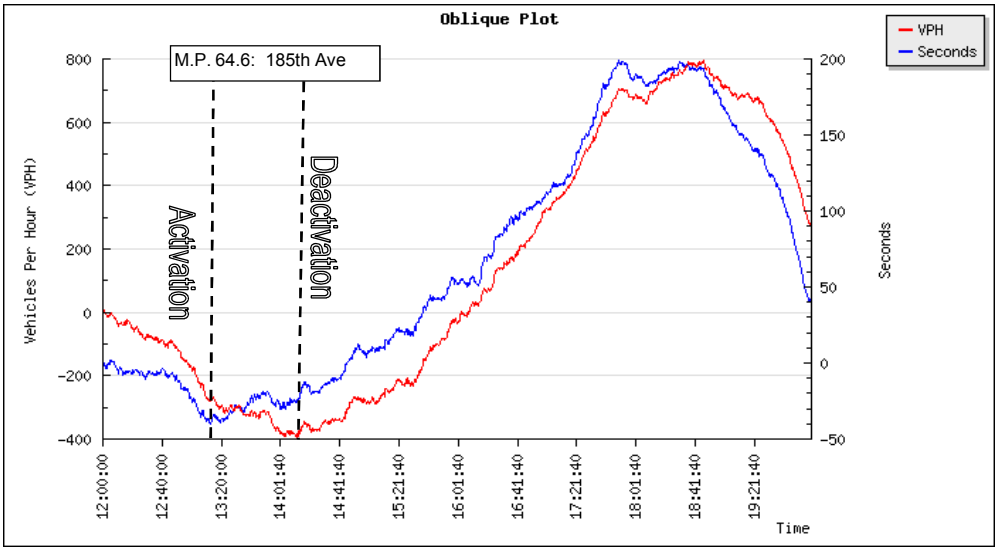
Highway: *US26* **Date:** *August 14th, 2007 PM*
Direction: *Eastbound*

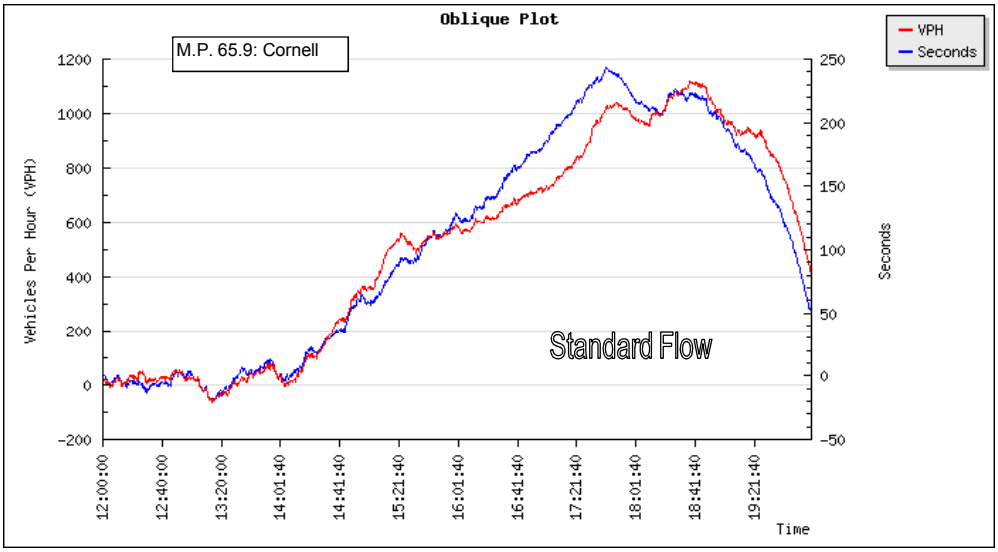


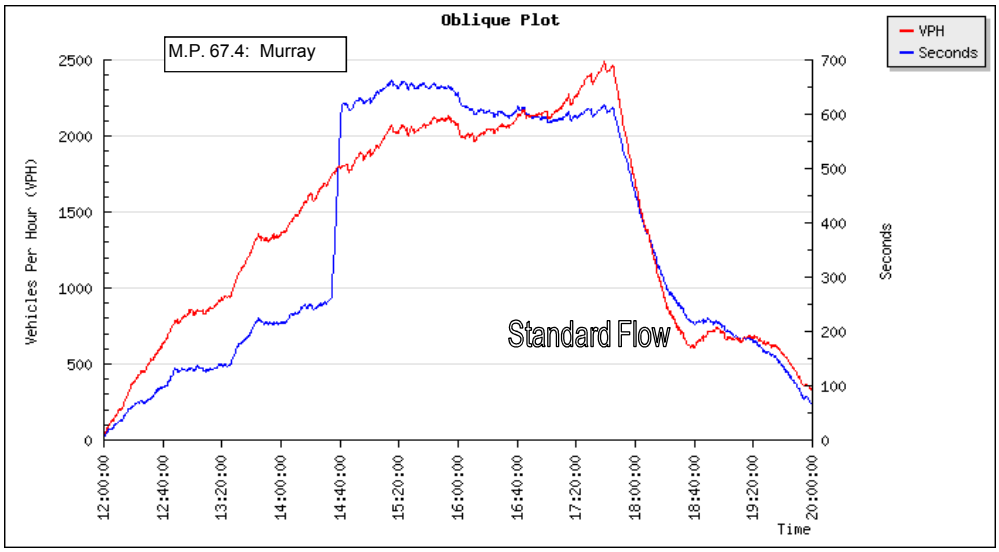




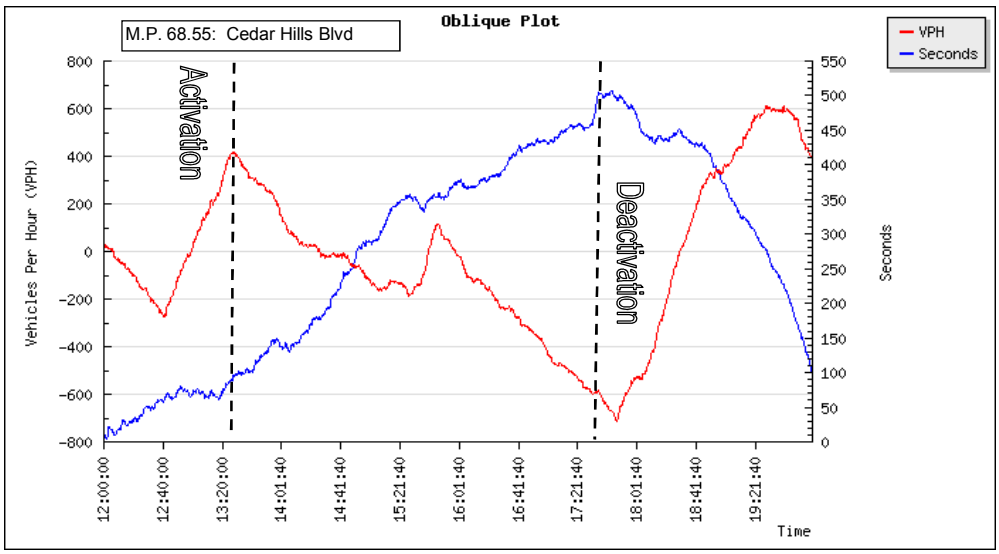
Highway: *US26* **Date:** *August 14th, 2007 PM*
Direction: *Eastbound*

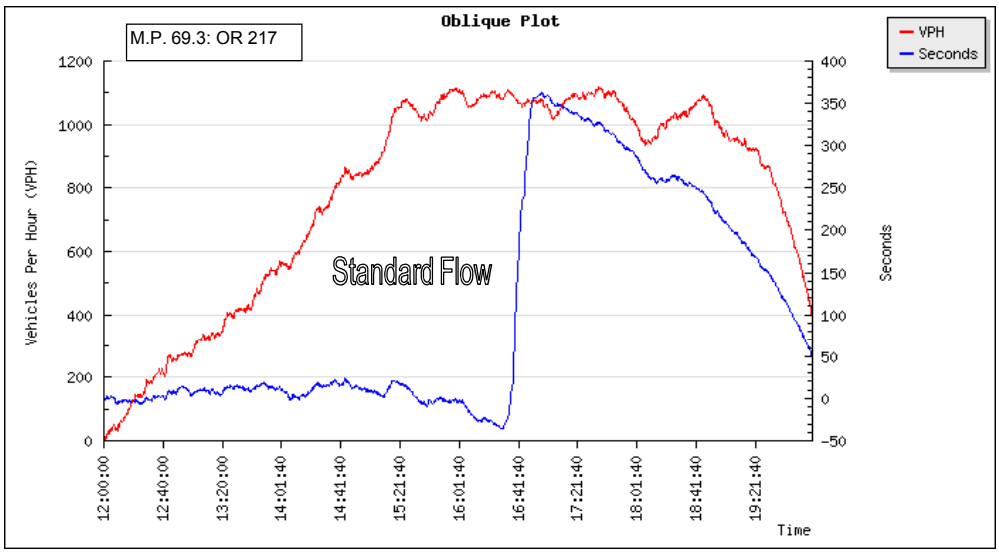


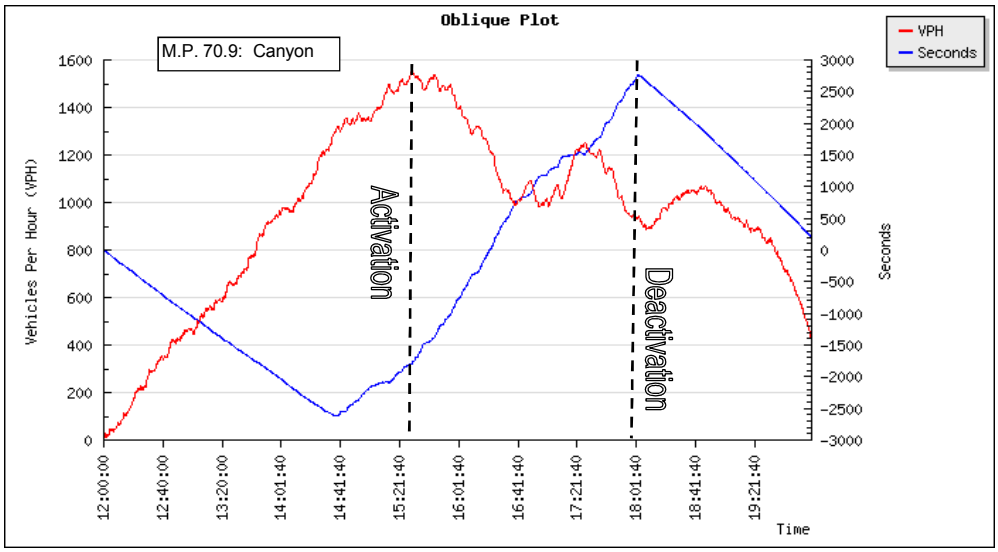




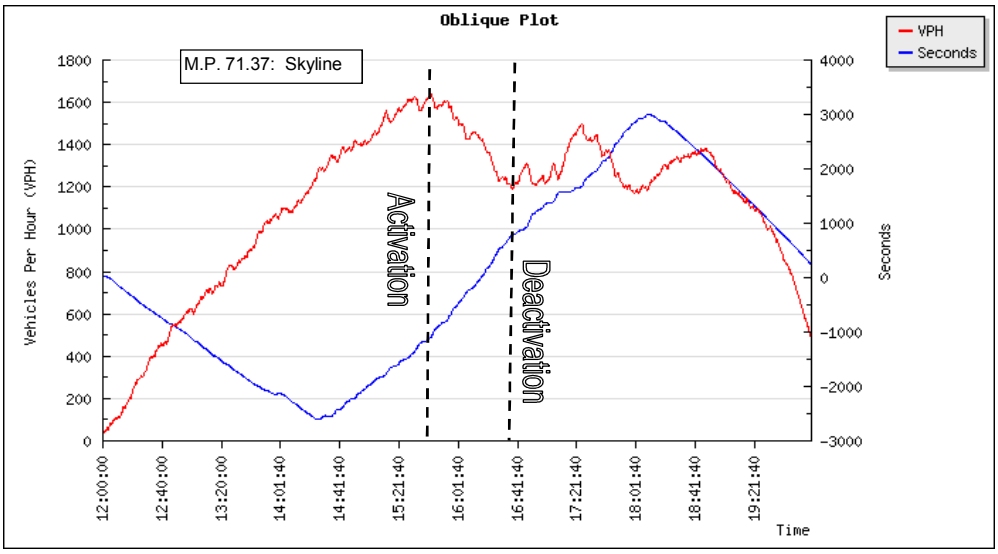
Highway: *US26* **Date:** *August 14th, 2007 PM*
Direction: *Eastbound*

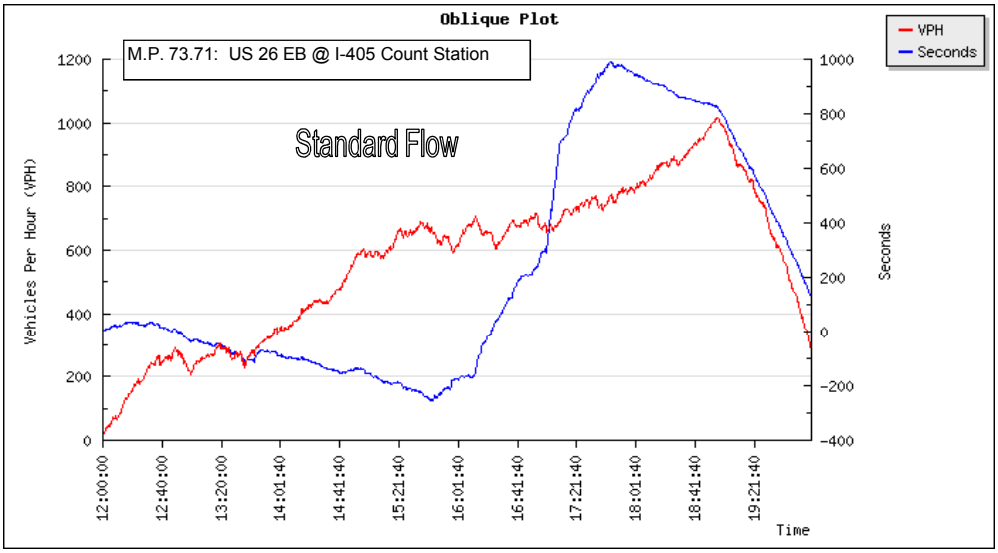




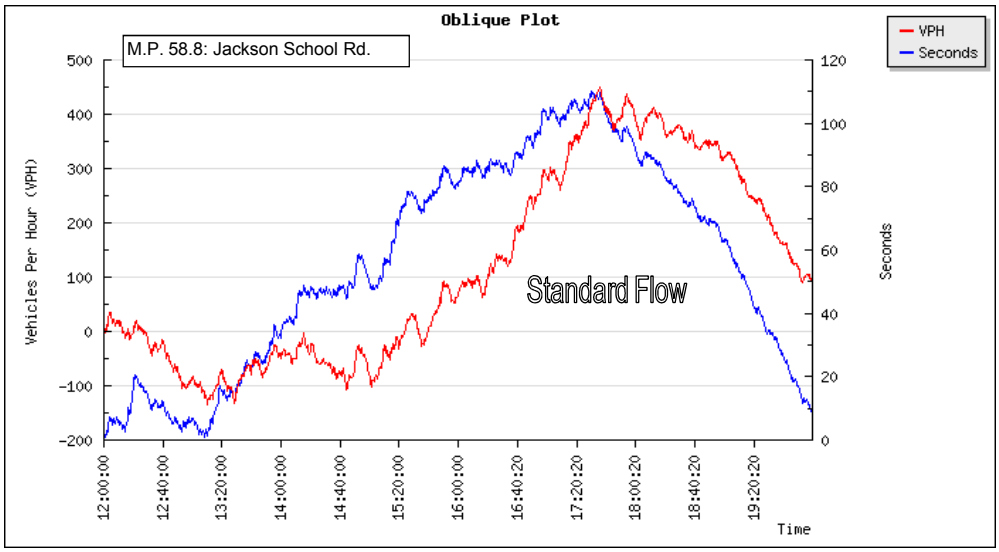


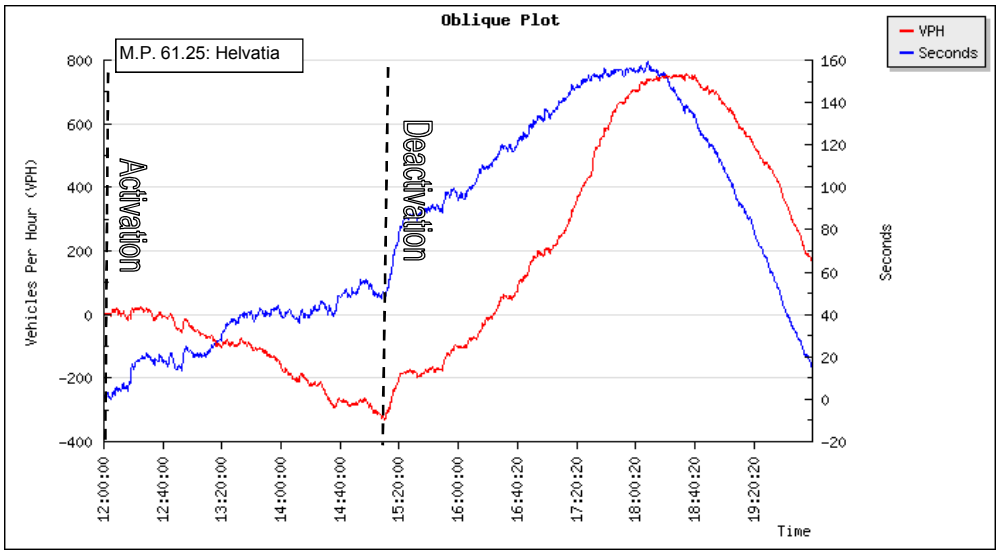
Highway: *US26* **Date:** *August 14th, 2007 PM*
Direction: *Eastbound*

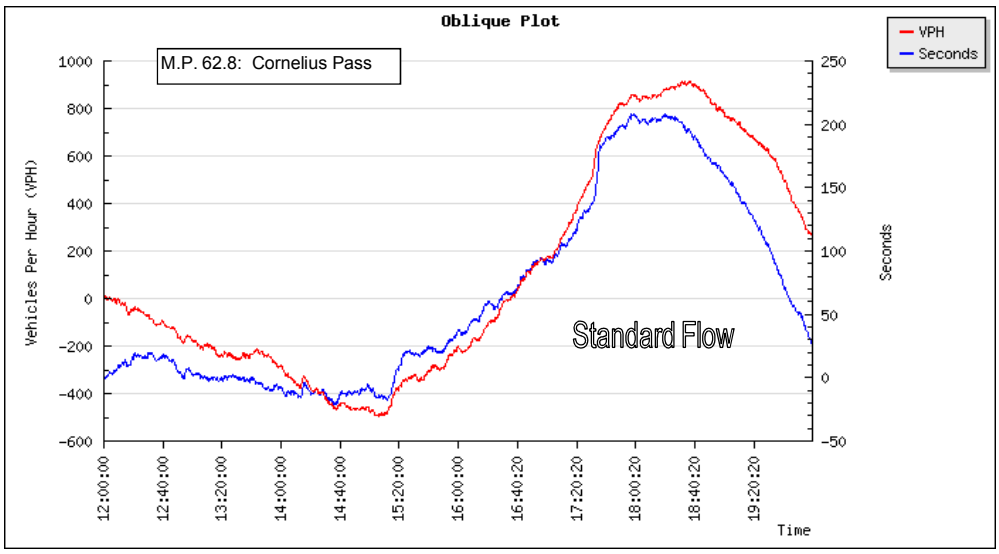




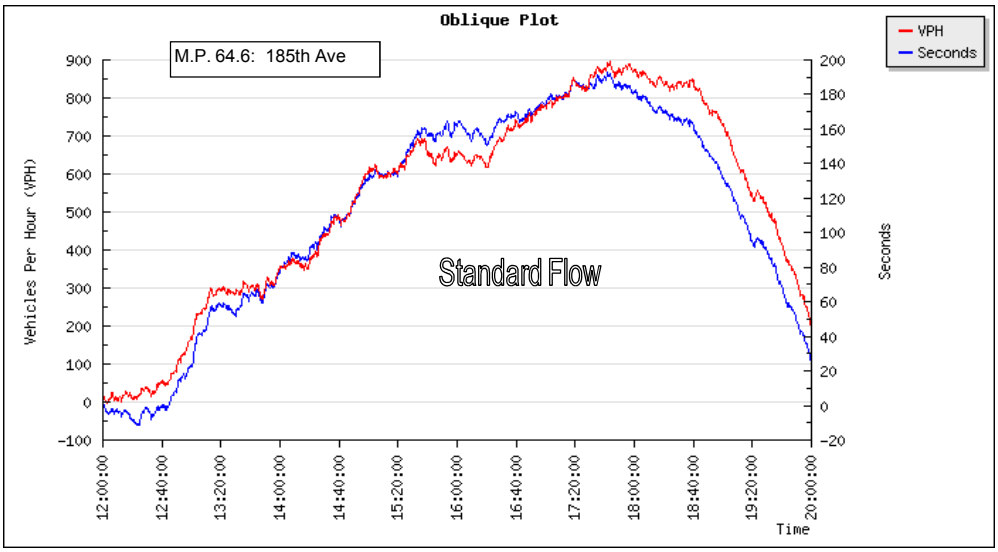
Highway: *US26* **Date:** *June 21st, 2007 PM*
Direction: *Eastbound*

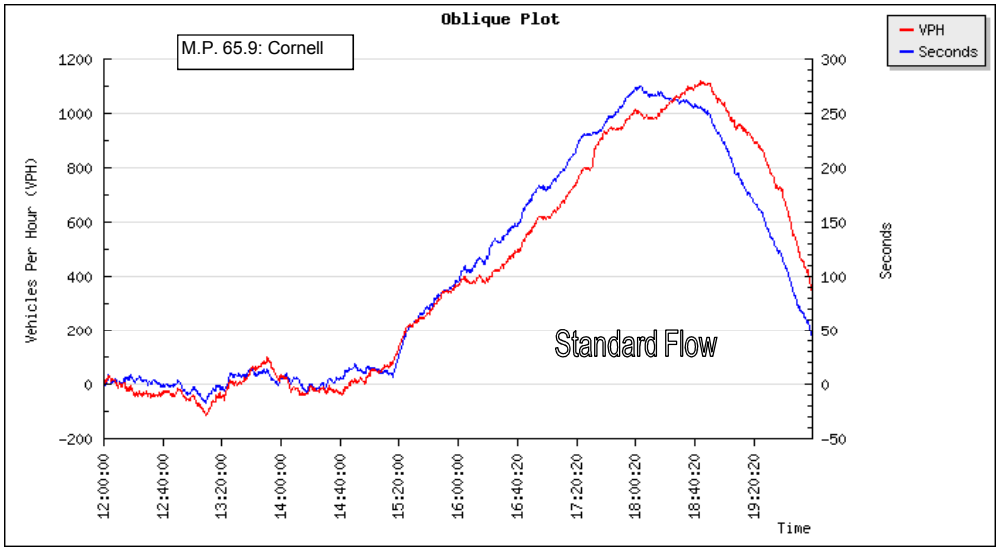


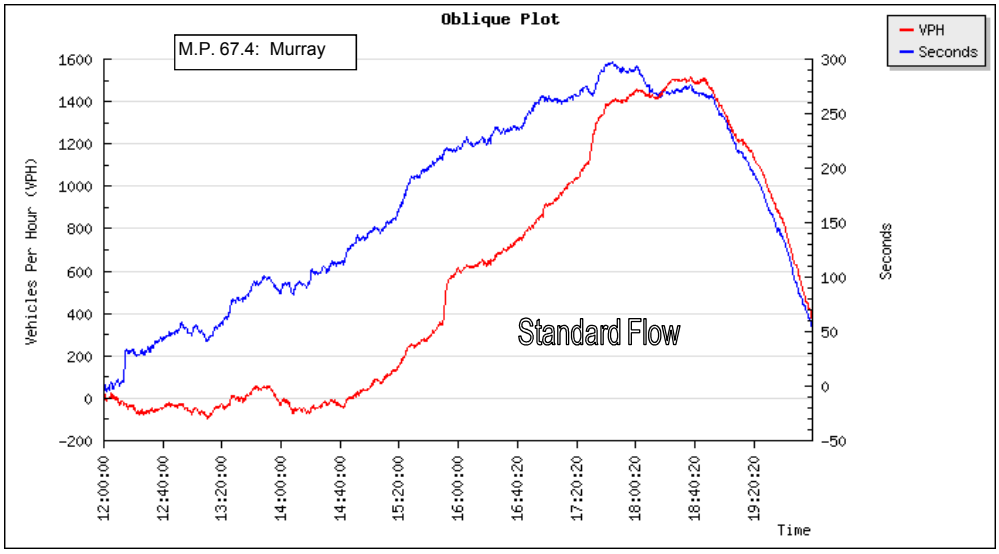




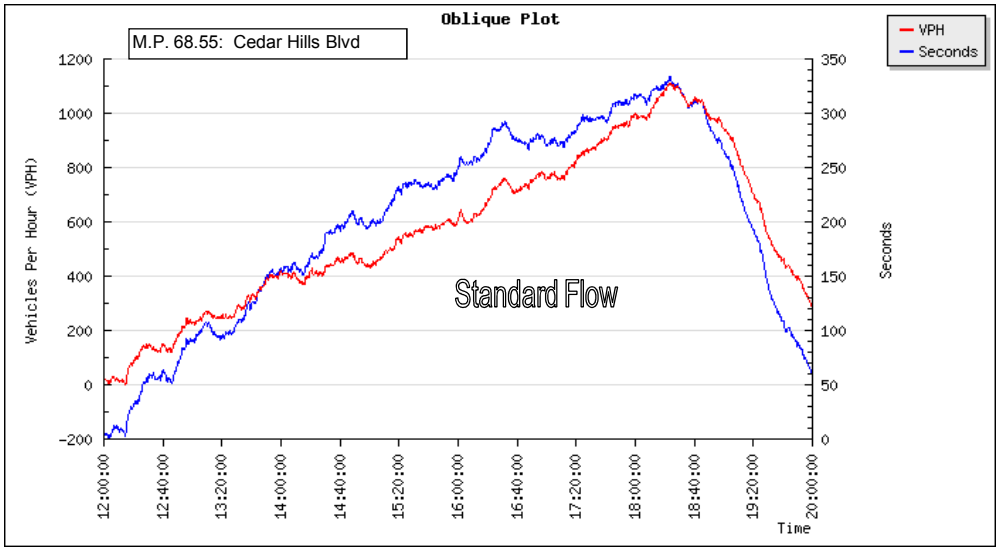
Highway: *US26* **Date:** *June 21st, 2007 PM*
Direction: *Eastbound*

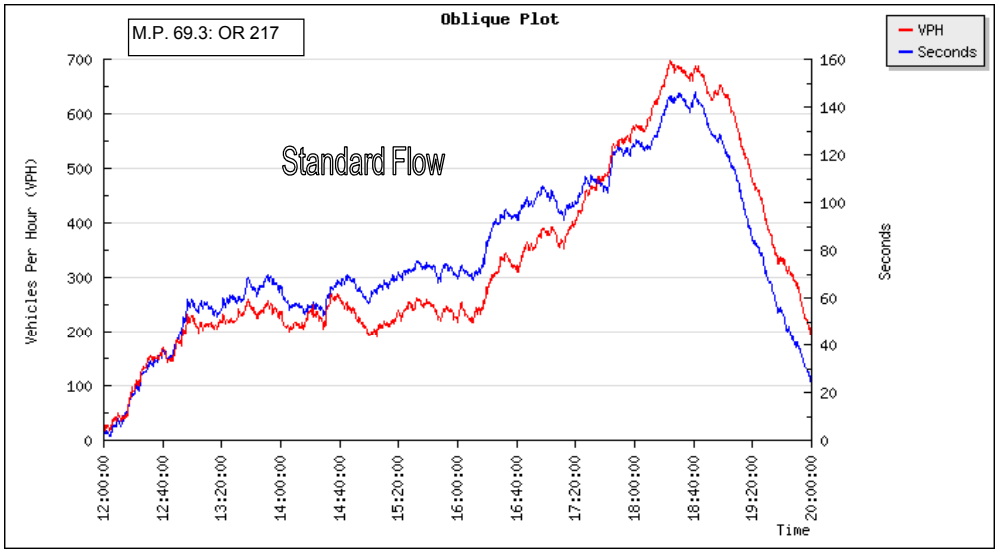


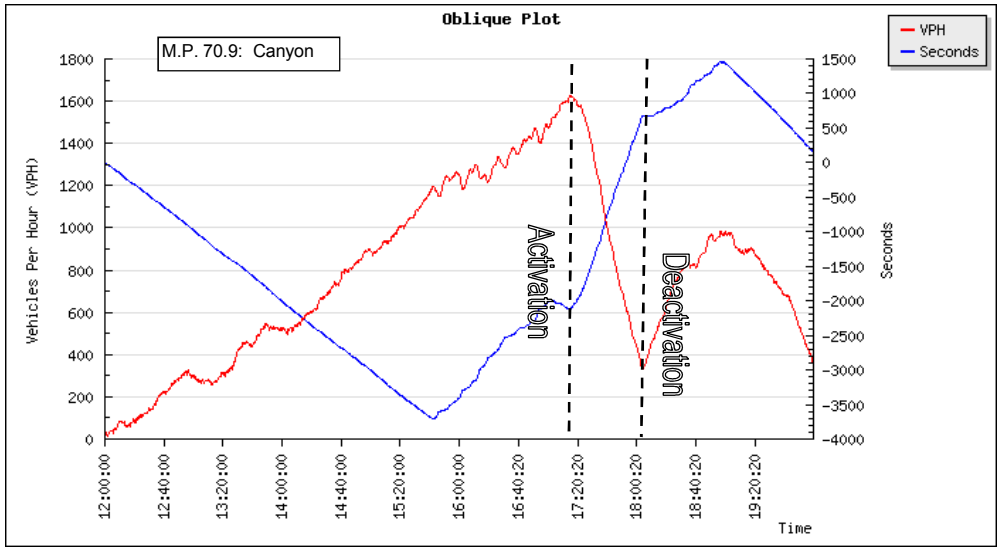




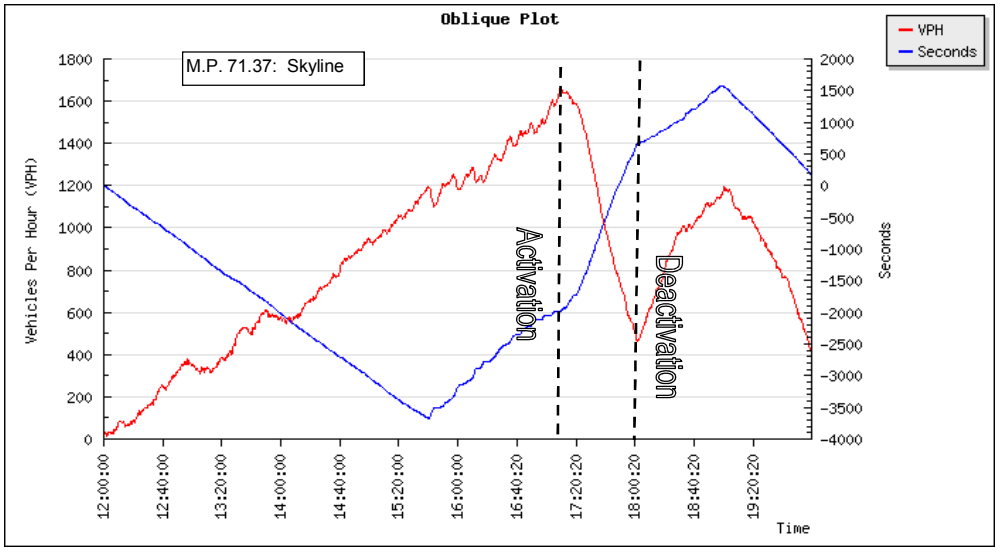
Highway: *US26* **Date:** *June 21st, 2007 PM*
Direction: *Eastbound*

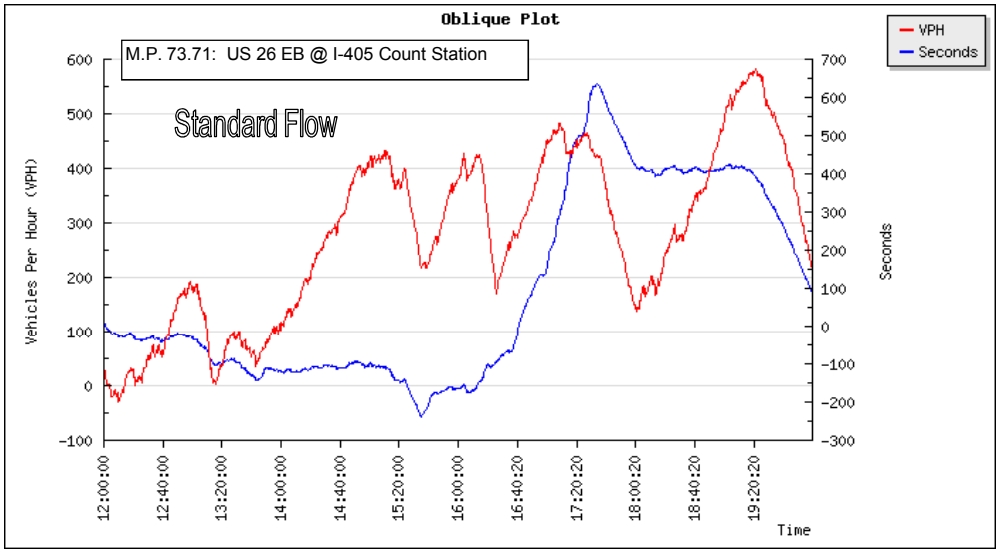




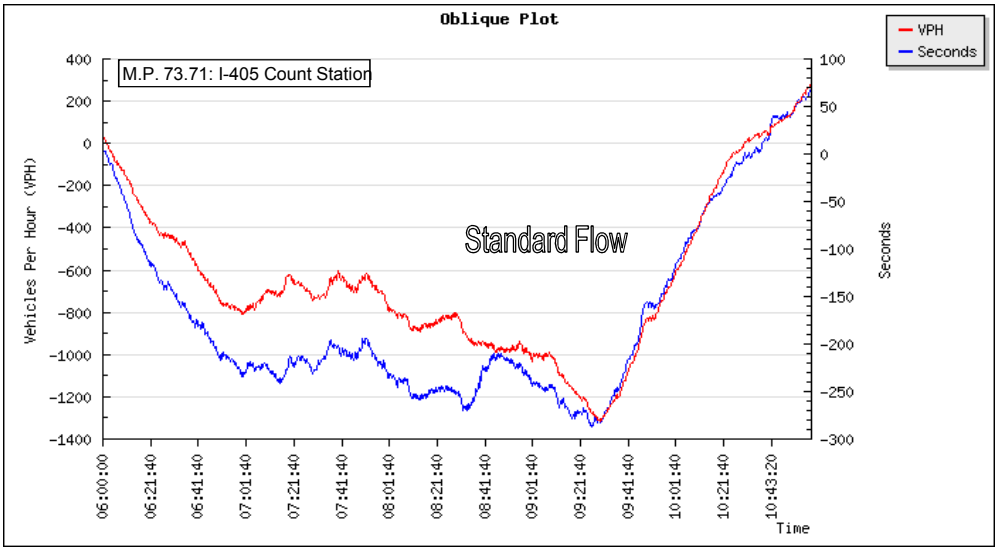


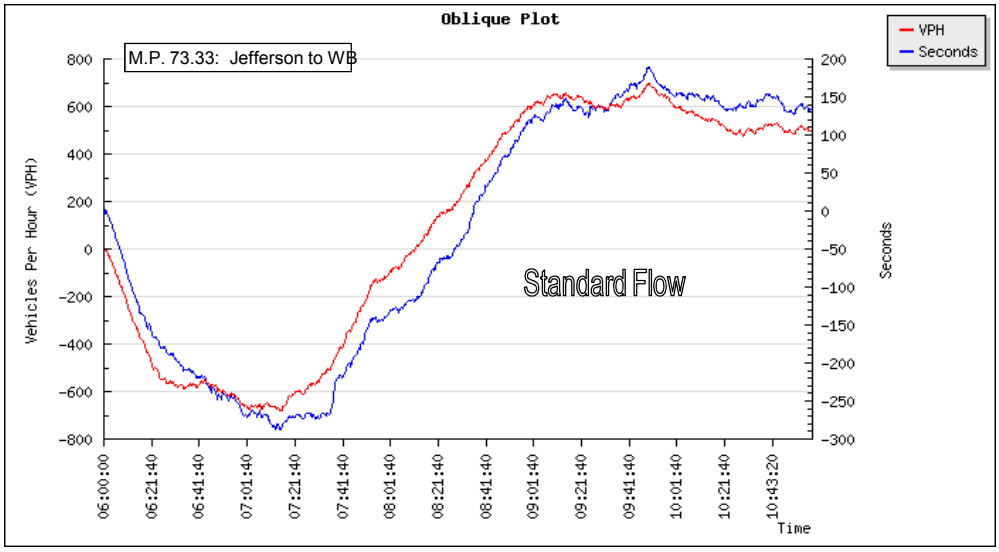
Highway: *US26* **Date:** *June 21st, 2007 PM*
Direction: *Eastbound*

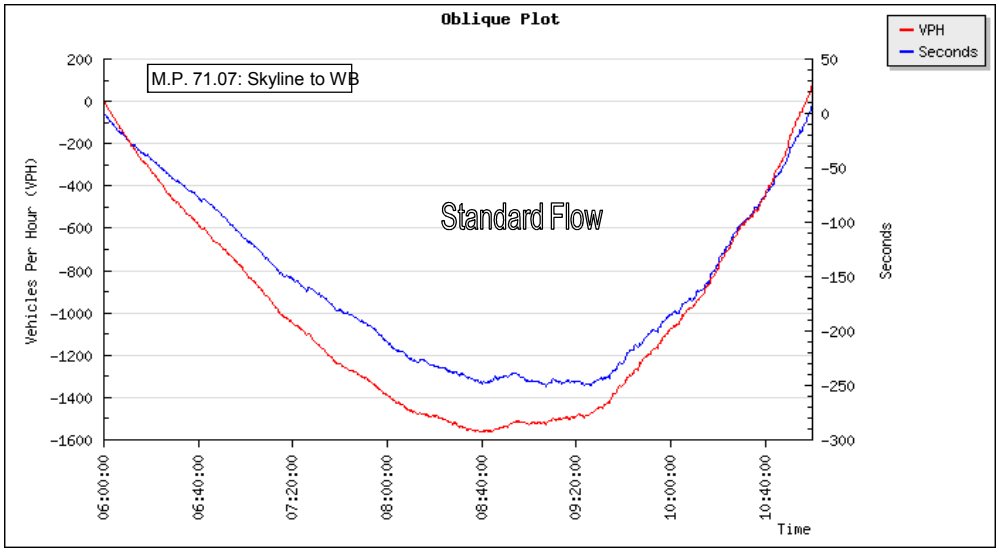




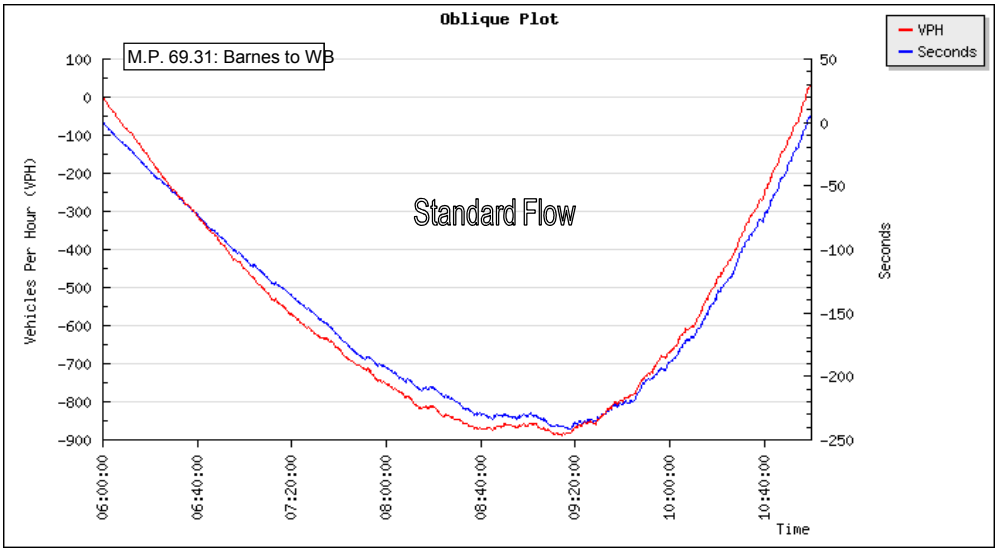
Highway: *US 26* **Date:** *August 16th, 2007 AM*
Direction: *Westbound*

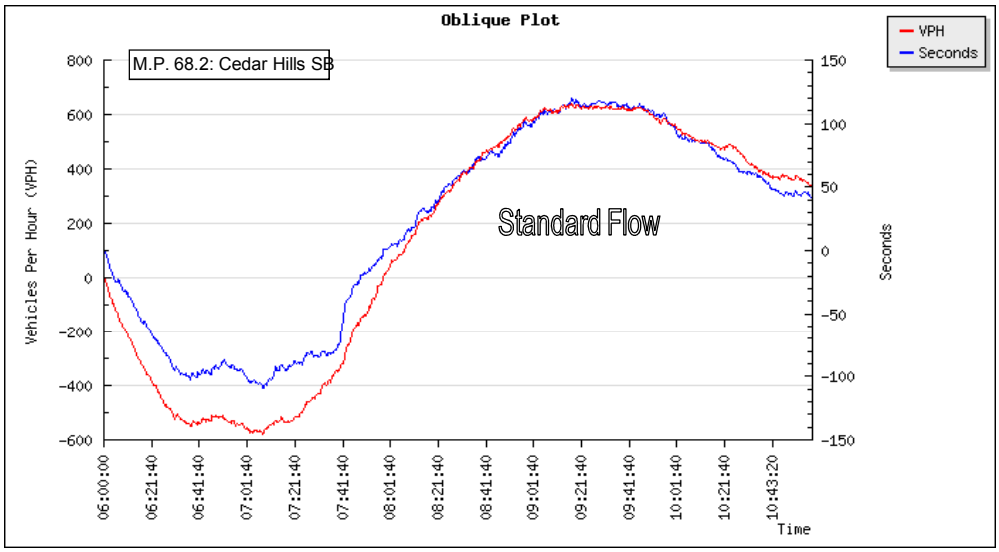


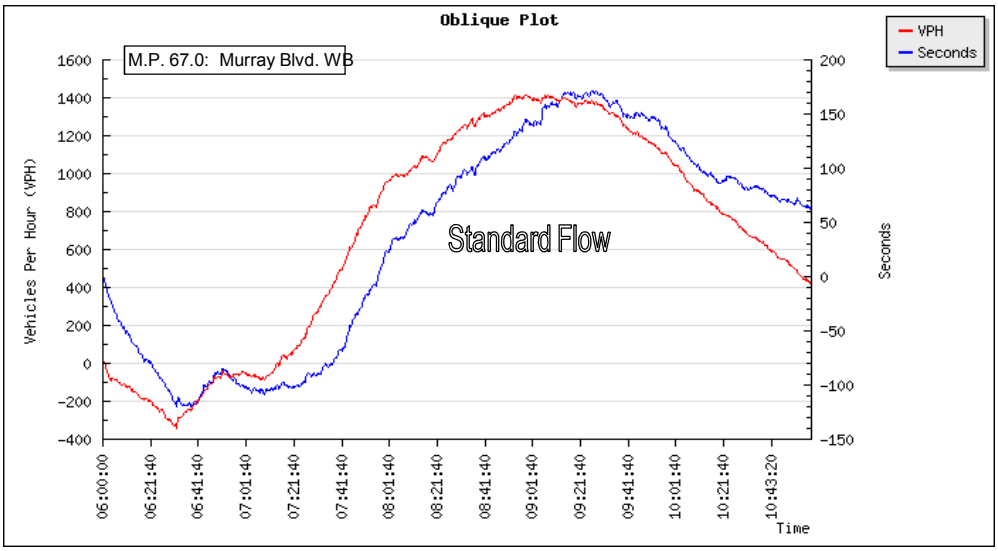




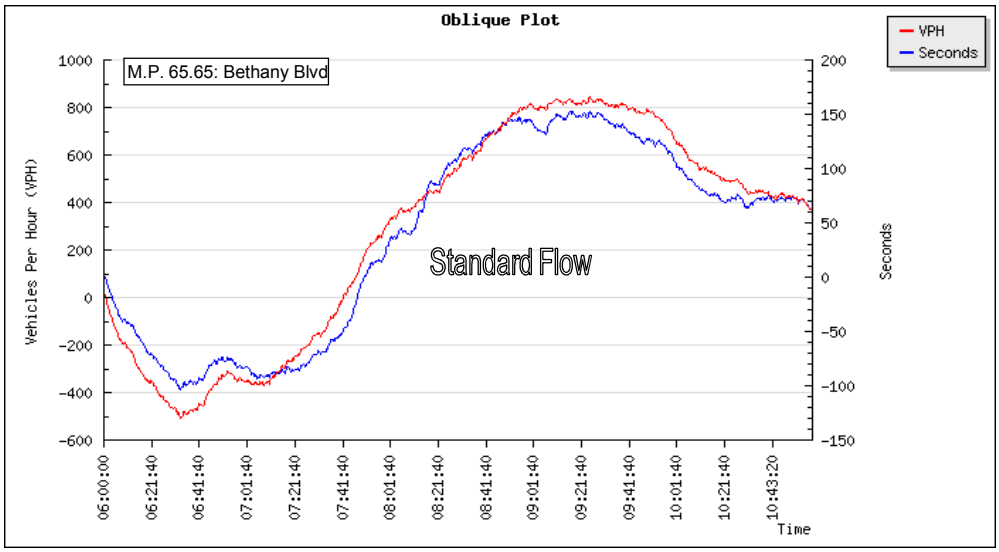
Highway: *US 26* **Date:** *August 16th, 2007 AM*
Direction: *Westbound*

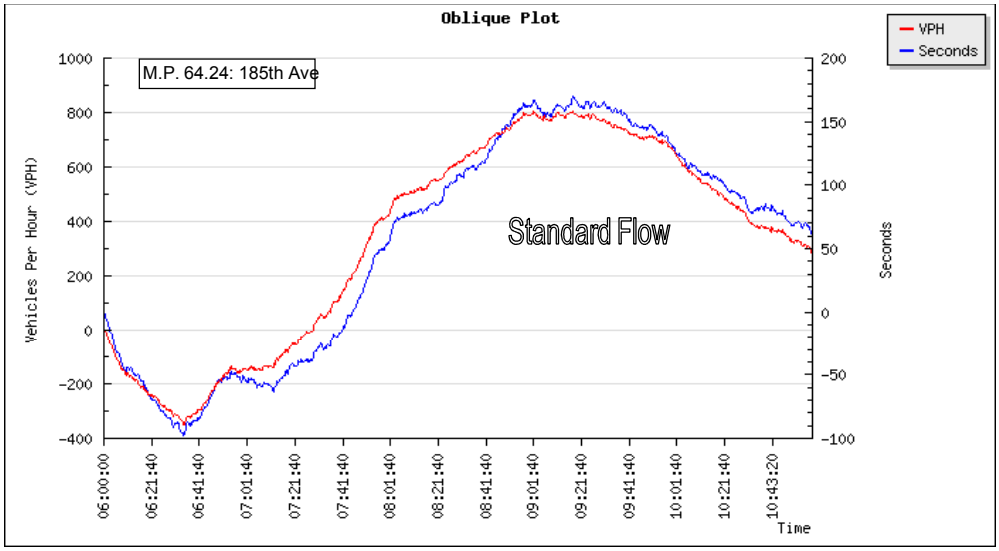




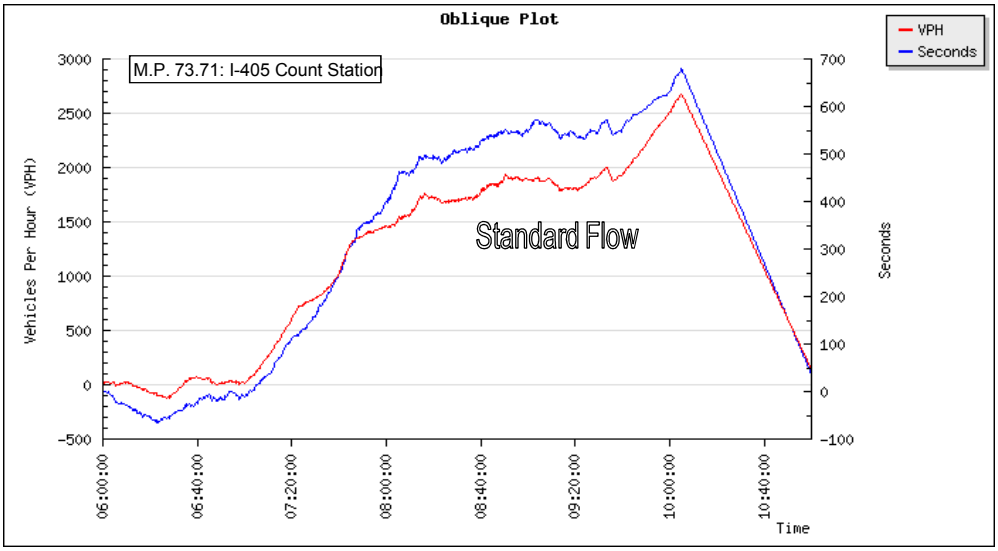


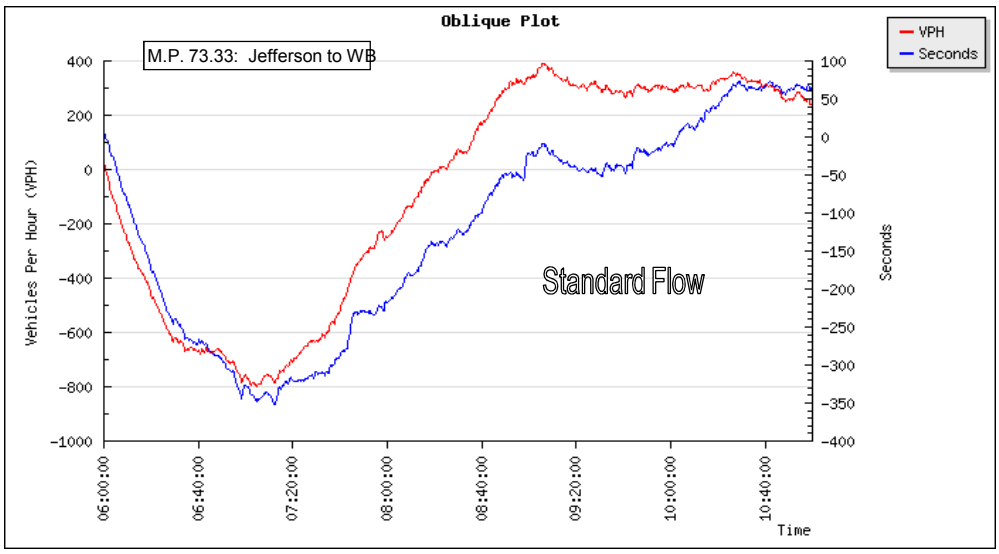
Highway: *US 26* **Date:** *August 16th, 2007 AM*
Direction: *Westbound*

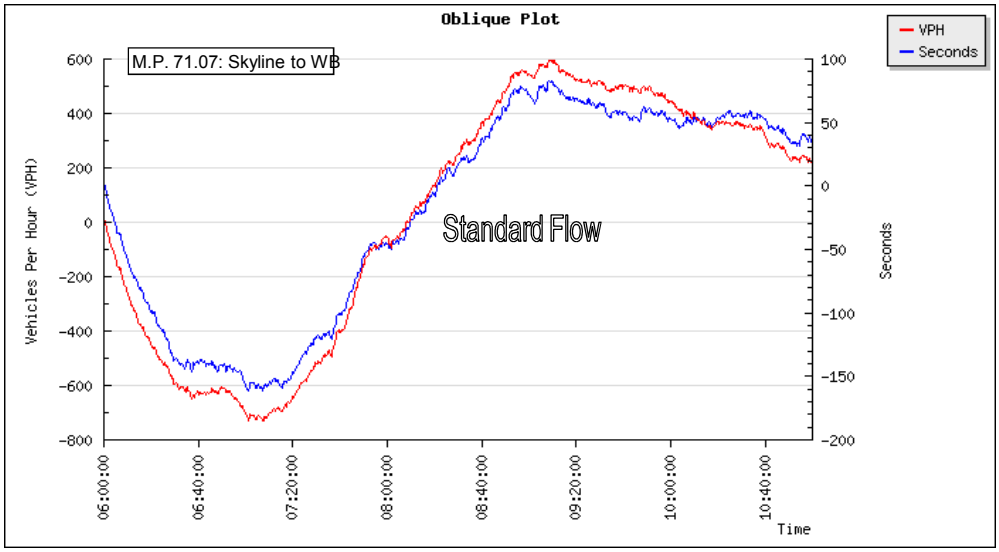




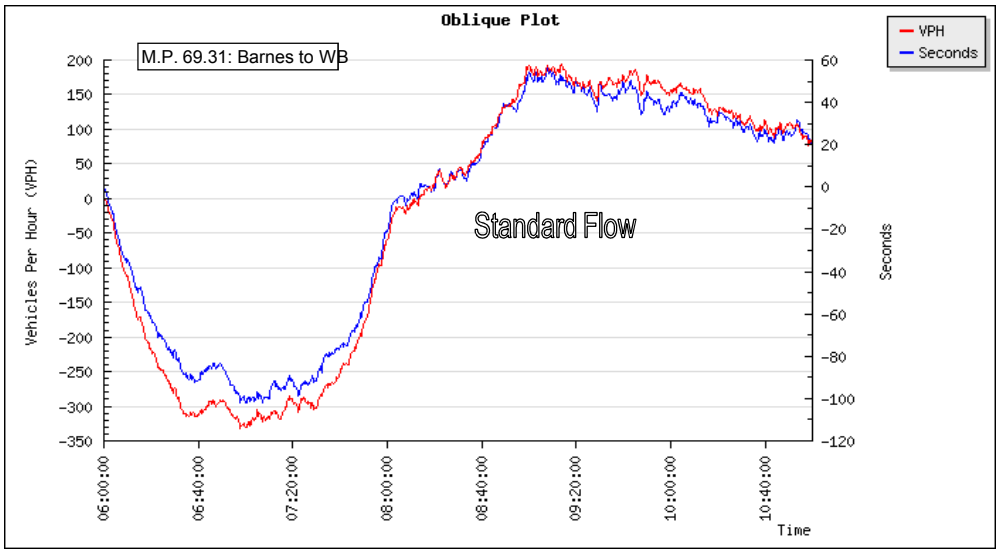
Highway: *US 26* **Date:** *August 15th, 2007 AM*
Direction: *Westbound*

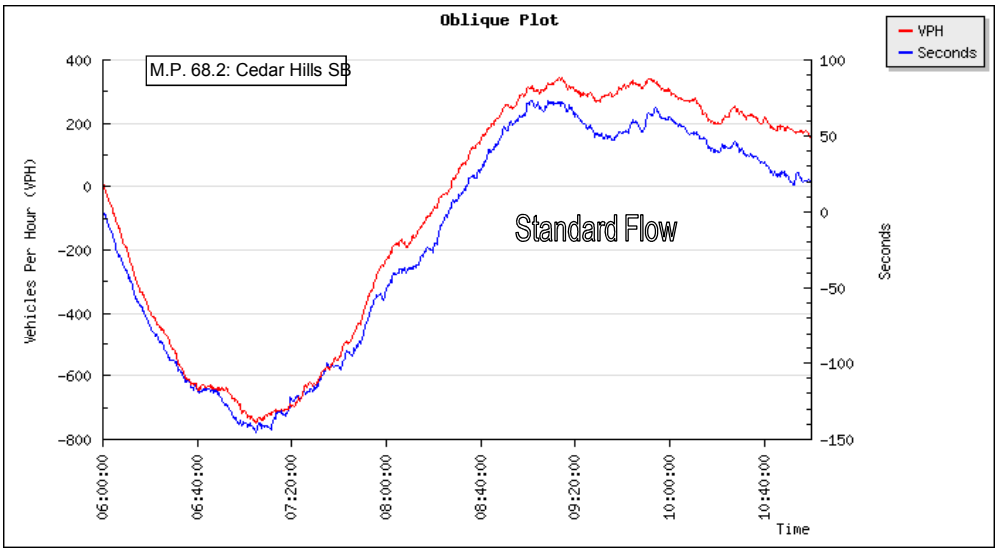


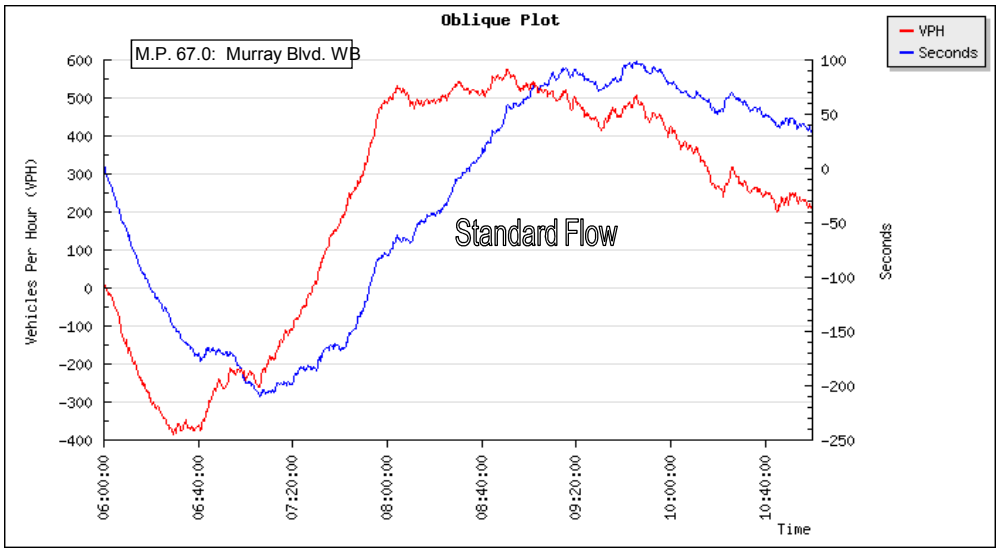




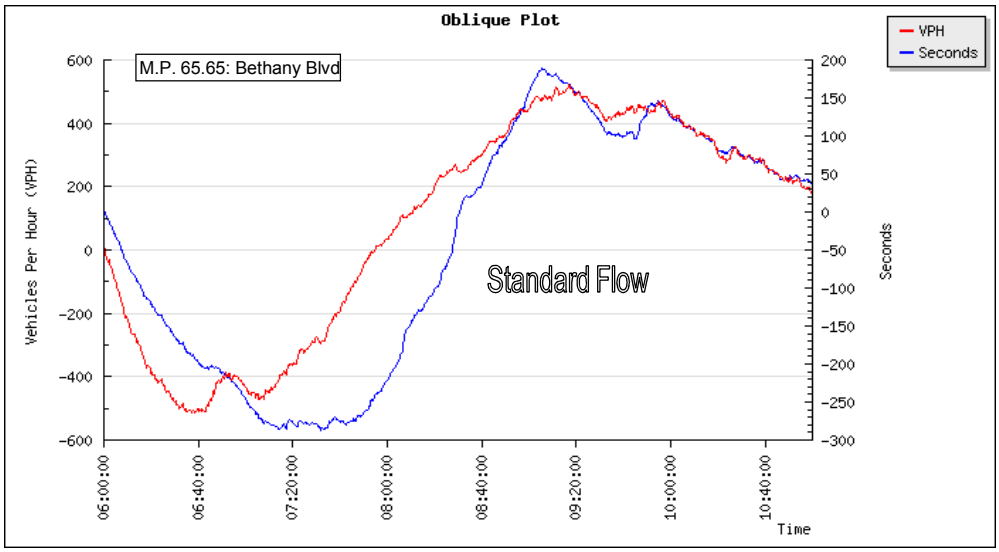
Highway: *US 26* **Date:** *August 15th, 2007 AM*
Direction: *Westbound*

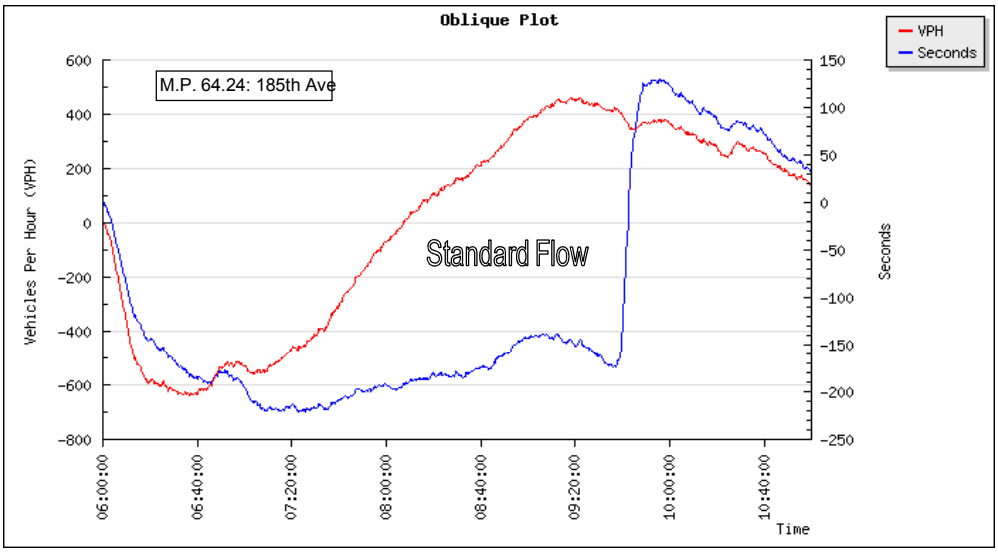




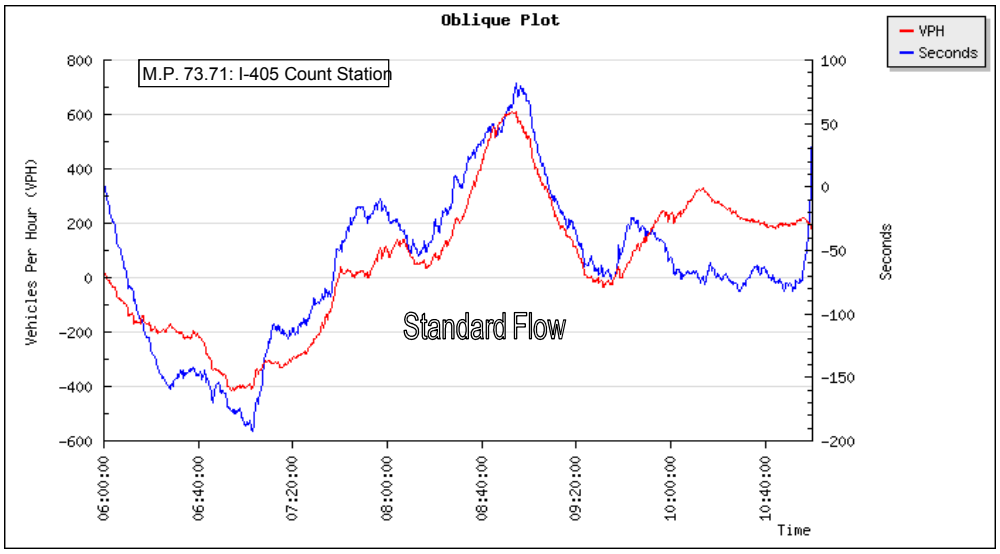


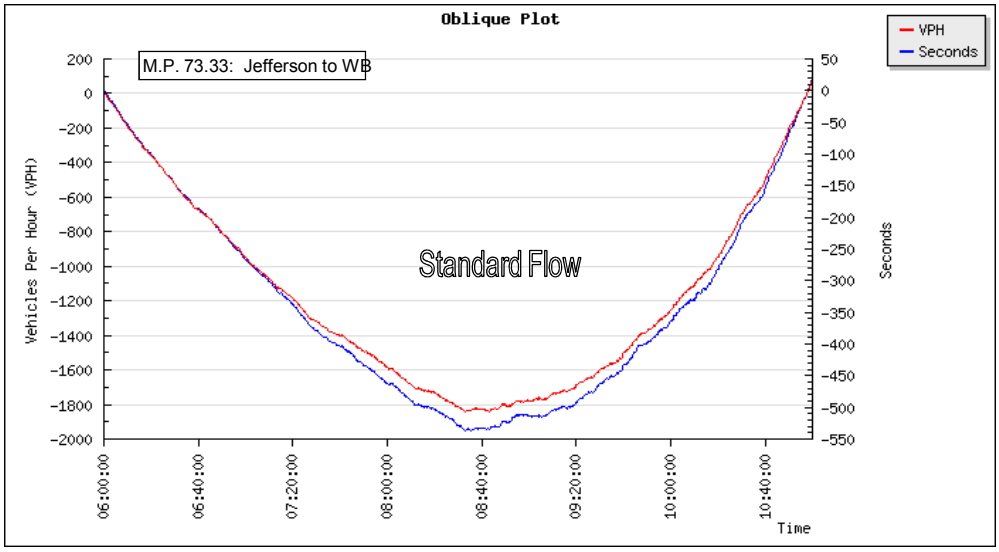
Highway: *US 26* **Date:** *August 15th, 2007 AM*
Direction: *Westbound*

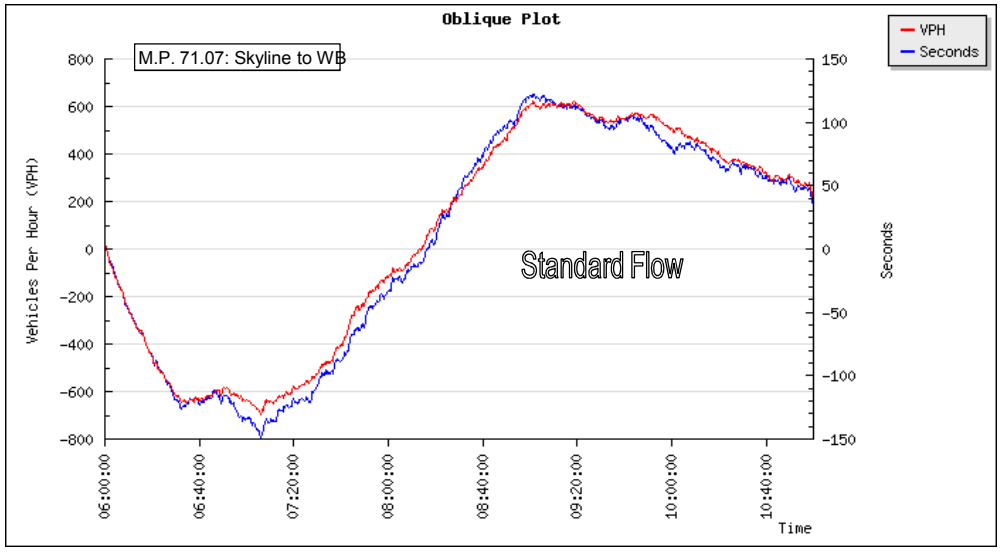




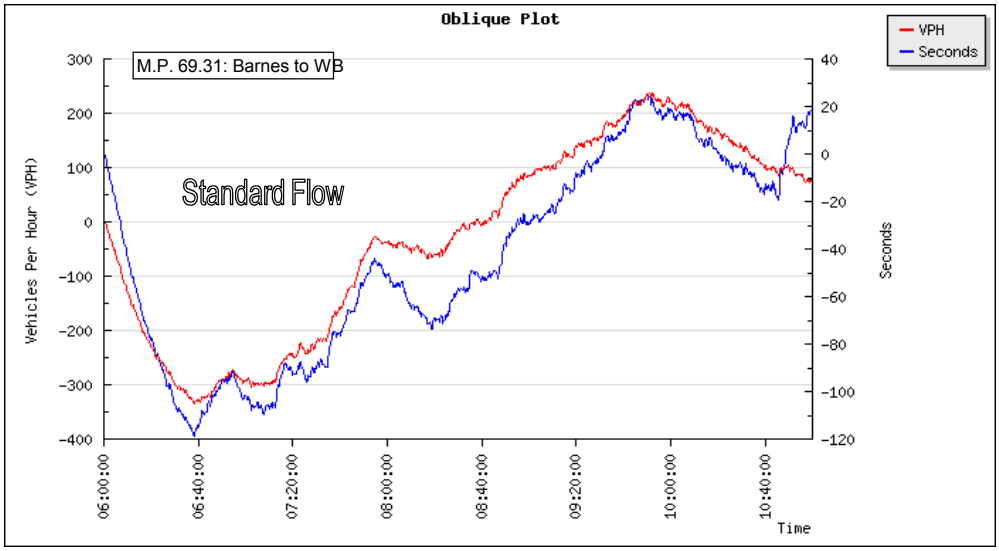
Highway: *US 26* **Date:** *August 9th, 2007 AM*
Direction: *Westbound*

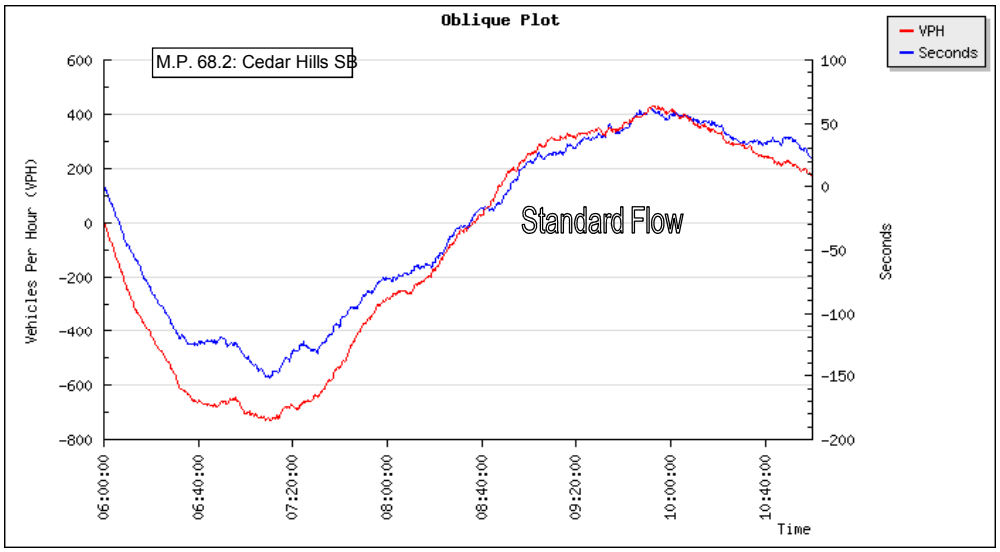


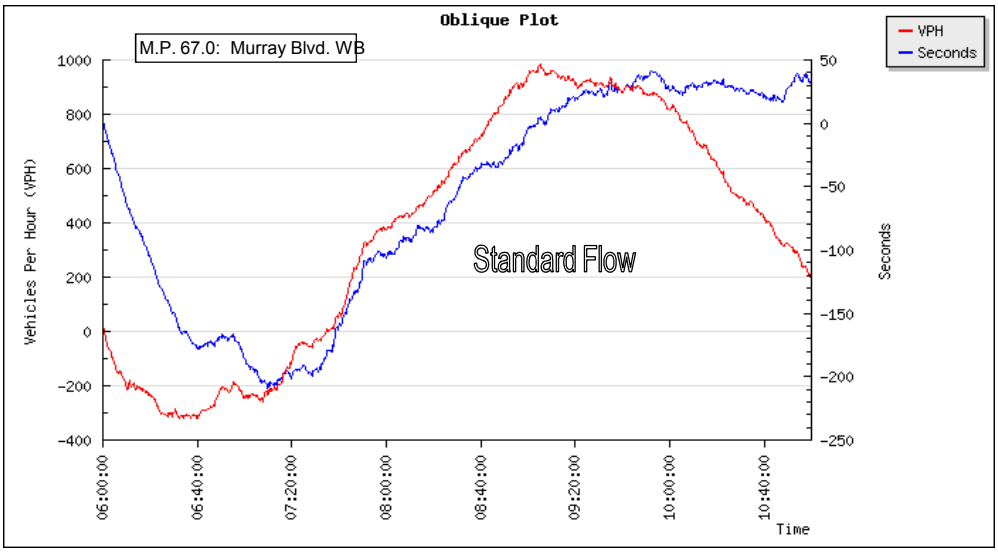




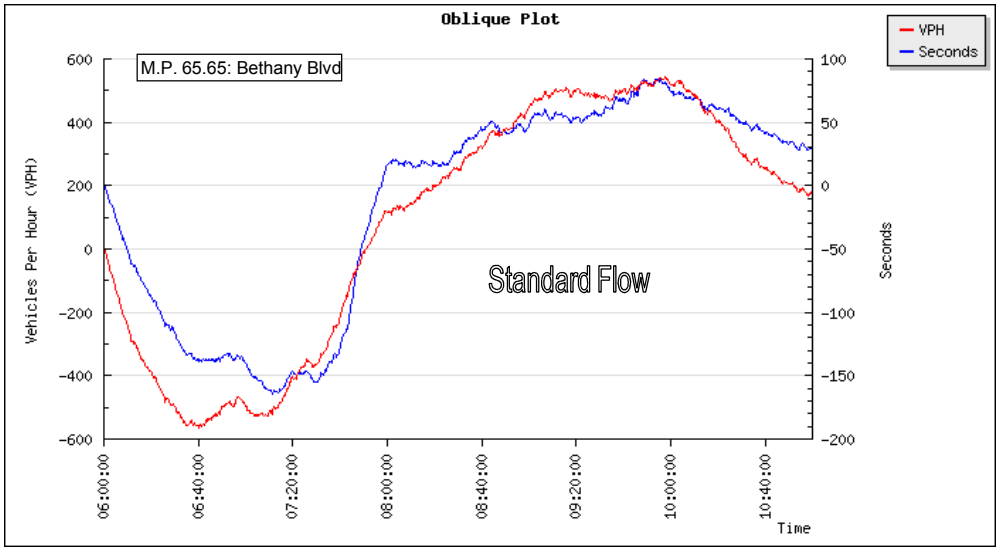
Highway: *US 26* **Date:** *August 9th, 2007 AM*
Direction: *Westbound*

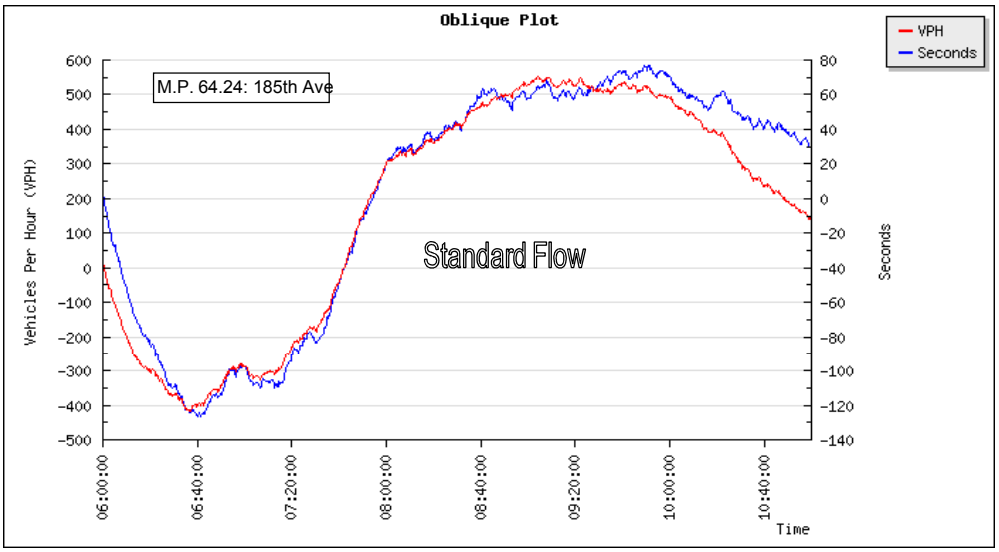




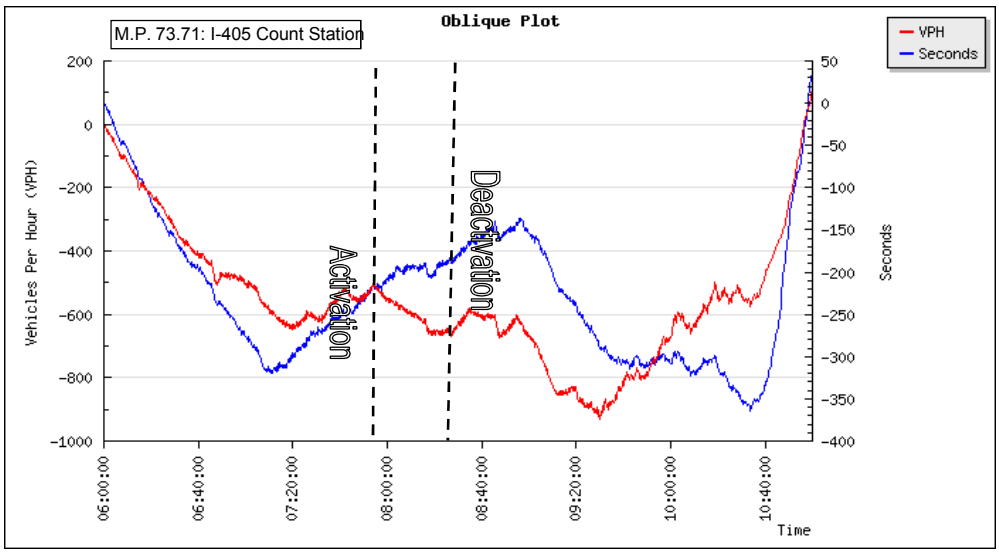


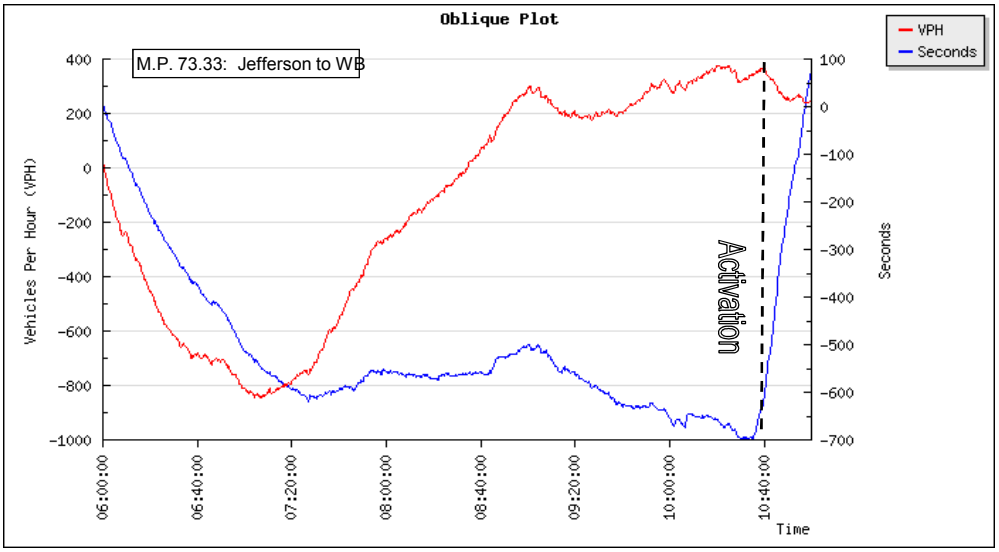
Highway: *US 26* **Date:** *August 9th, 2007 AM*
Direction: *Westbound*

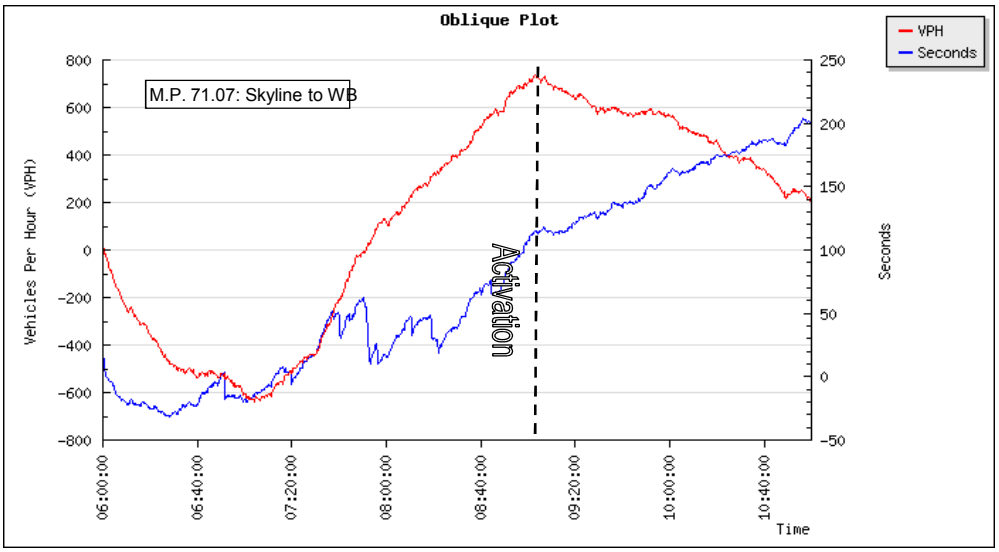




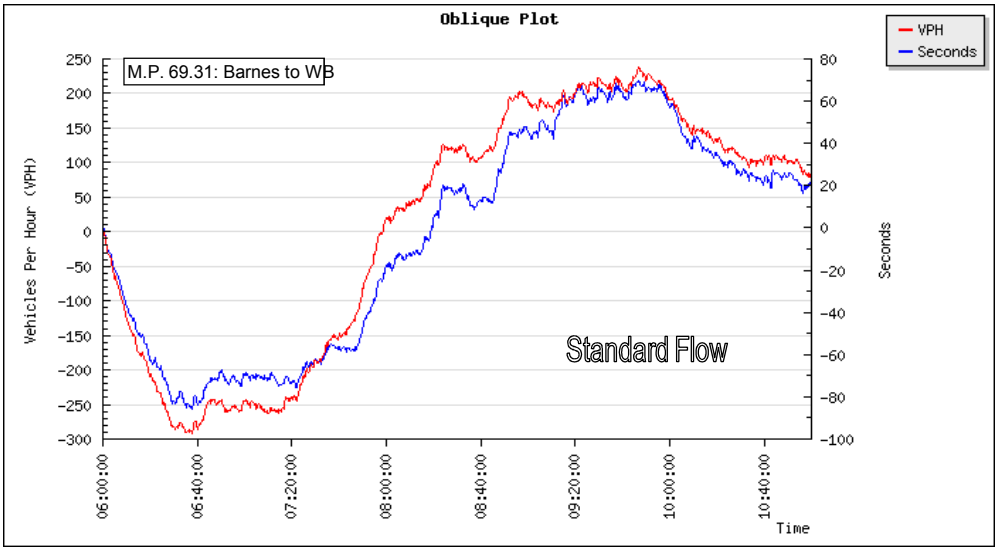
Highway: *US 26* **Date:** *August 14th, 2007 AM*
Direction: *Westbound*

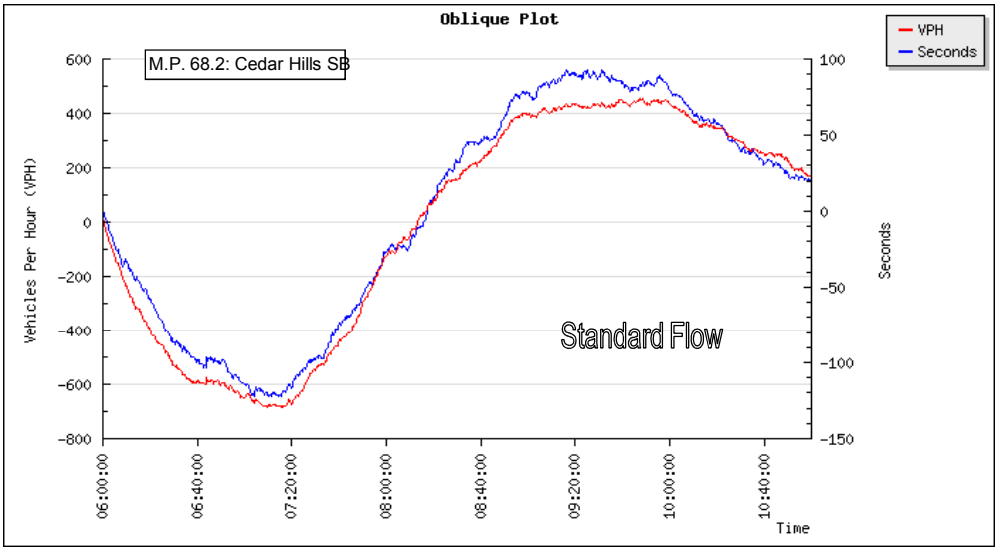


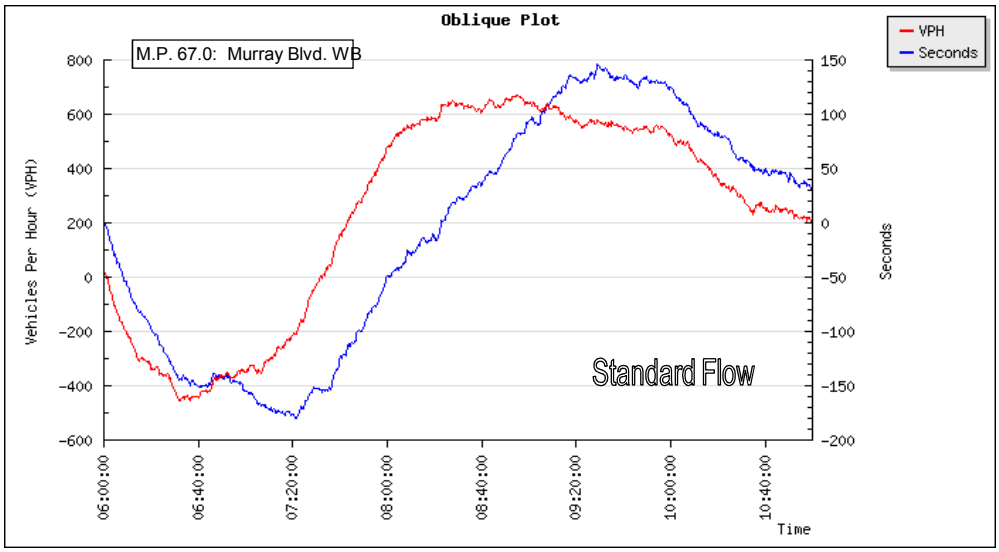




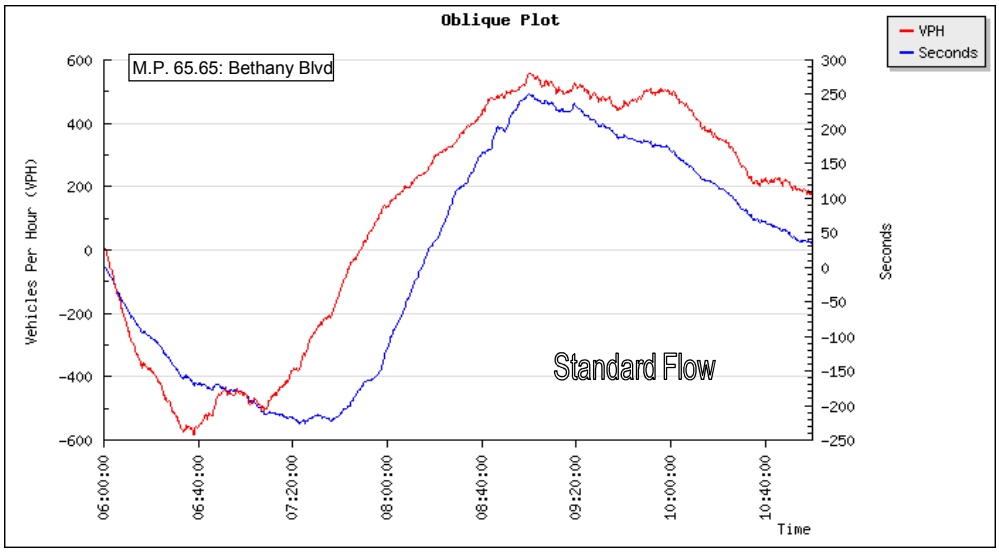
Highway: *US 26* **Date:** *August 14th, 2007 AM*
Direction: *Westbound*

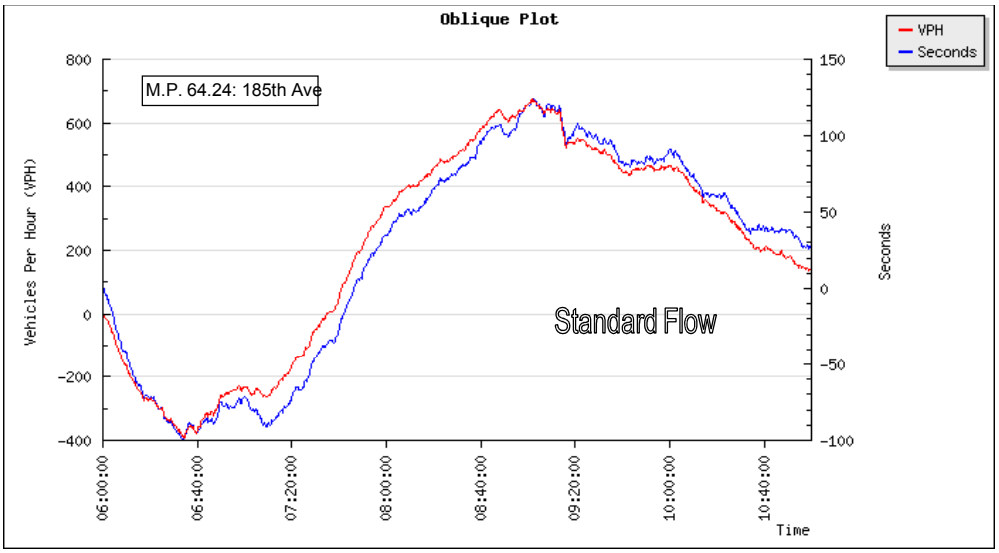




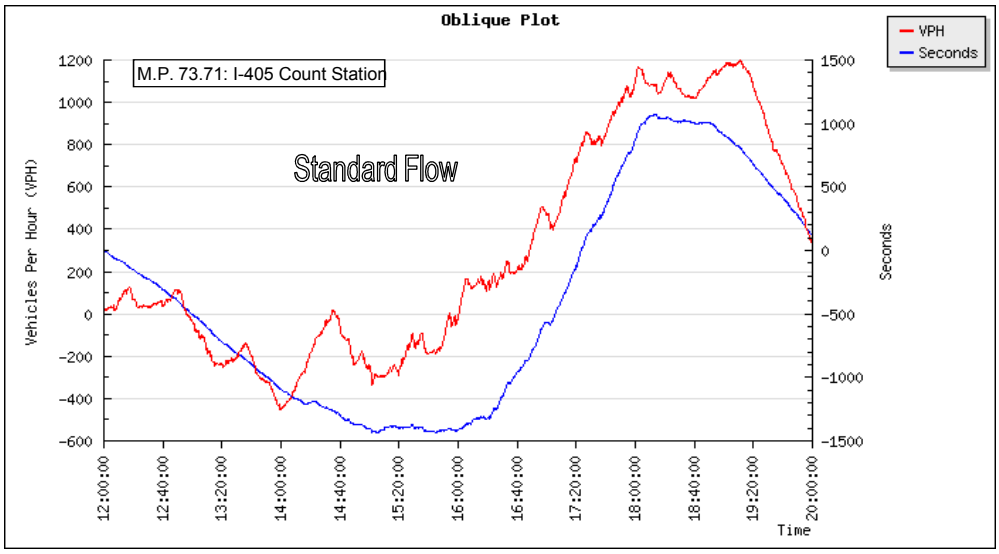


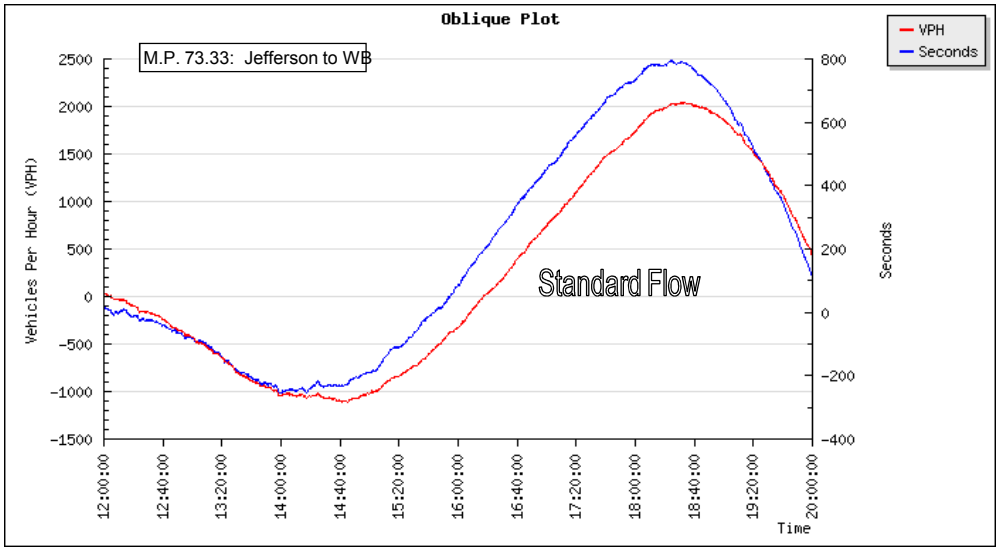
Highway: *US 26* **Date:** *August 14th, 2007 AM*
Direction: *Westbound*

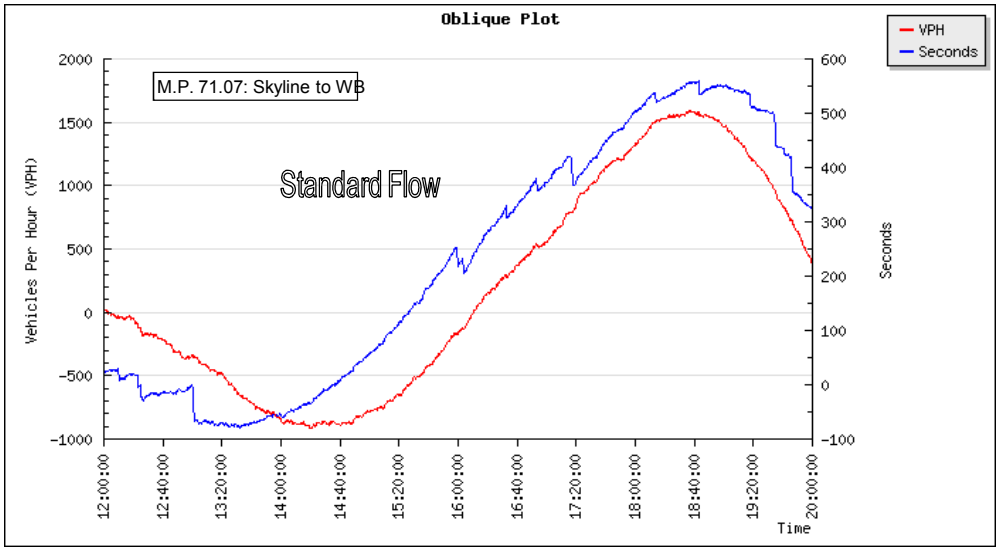




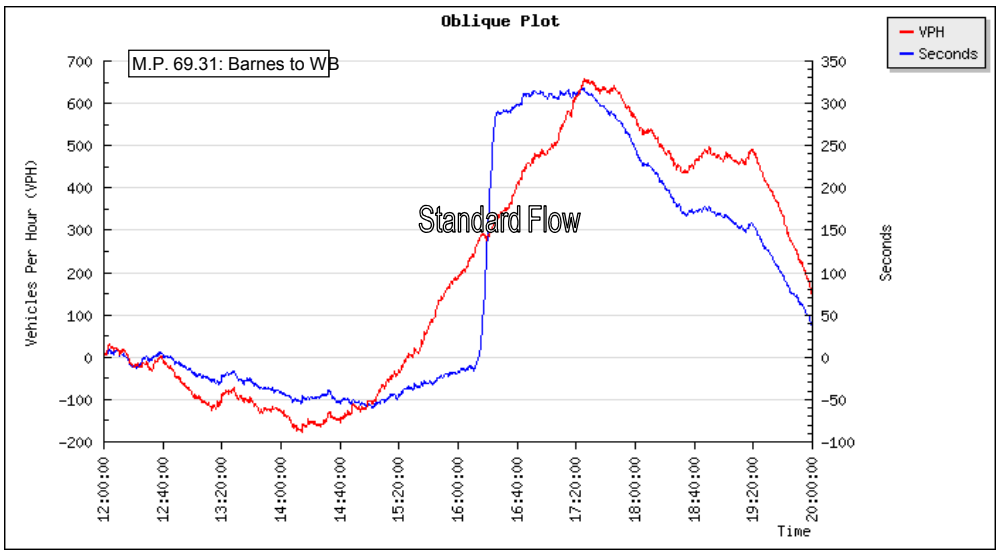
Highway: *US 26* **Date:** *August 16th, 2007 PM*
Direction: *Westbound*

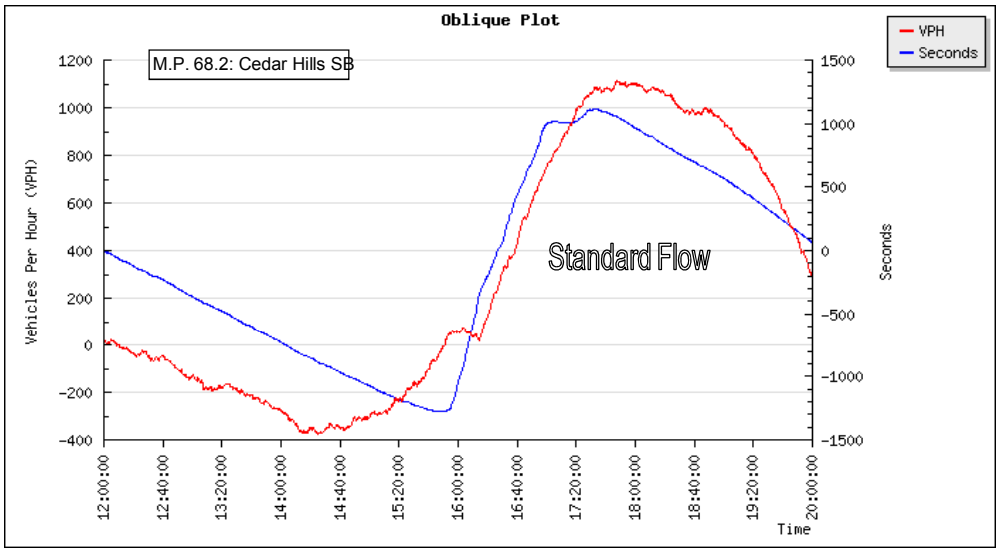


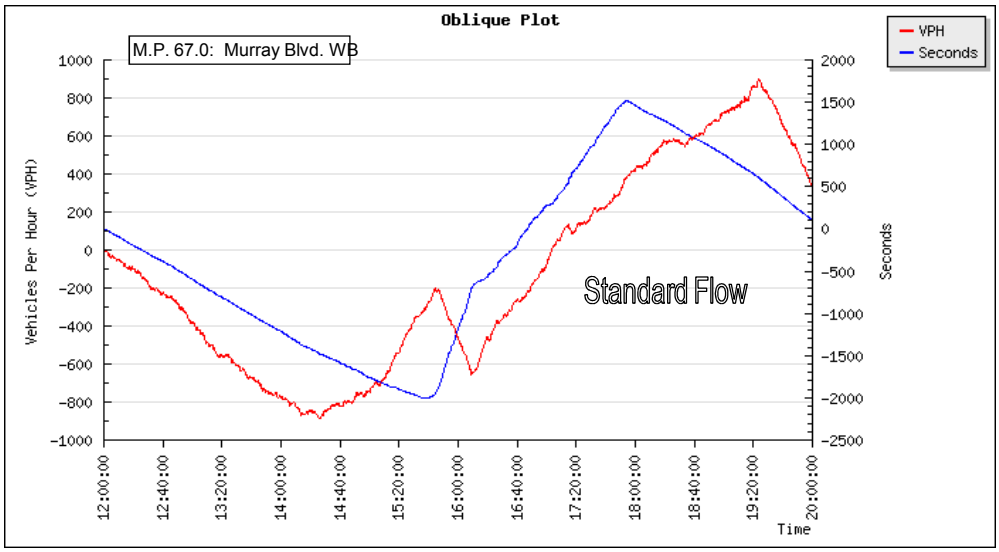




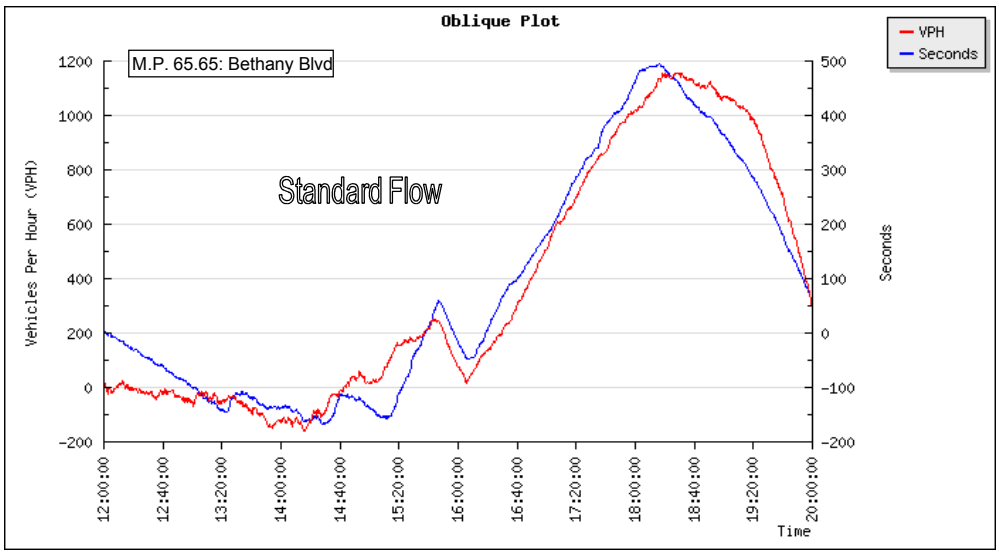
Highway: *US 26* **Date:** *August 16th, 2007 PM*
Direction: *Westbound*

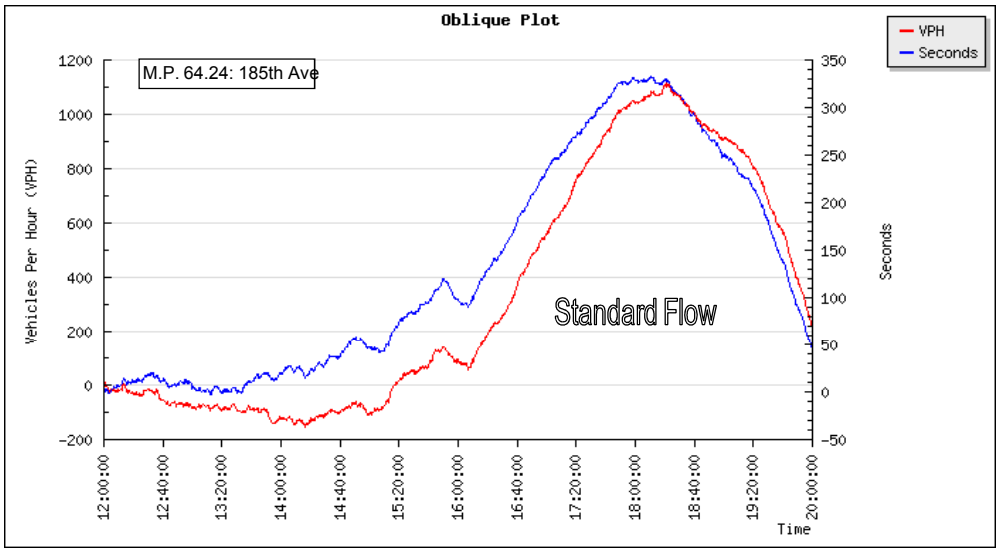




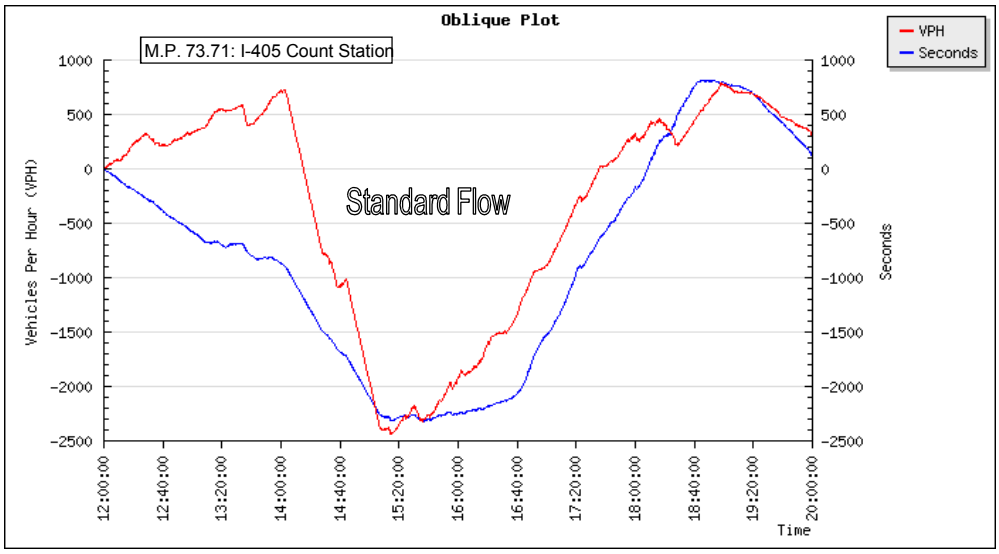


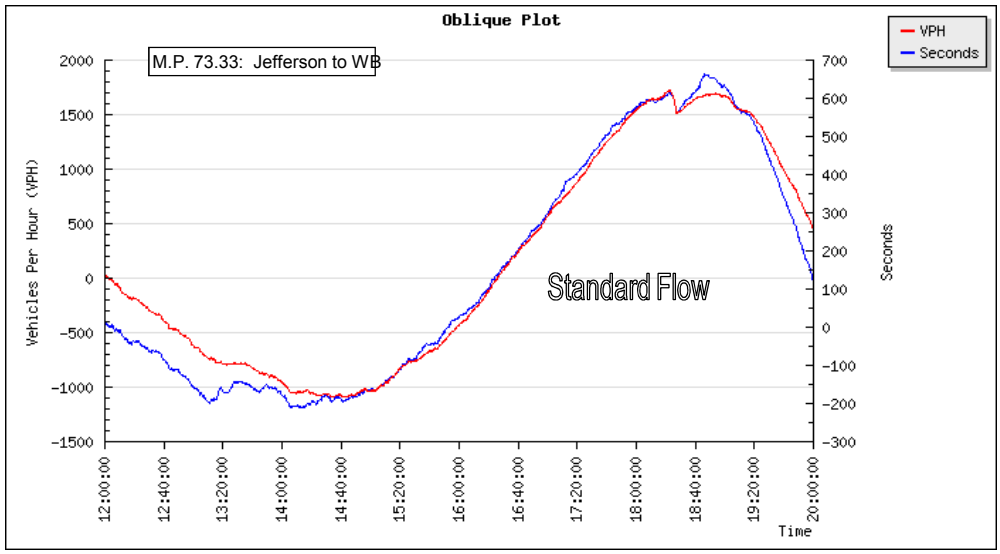
Highway: *US 26* **Date:** *August 16th, 2007 PM*
Direction: *Westbound*

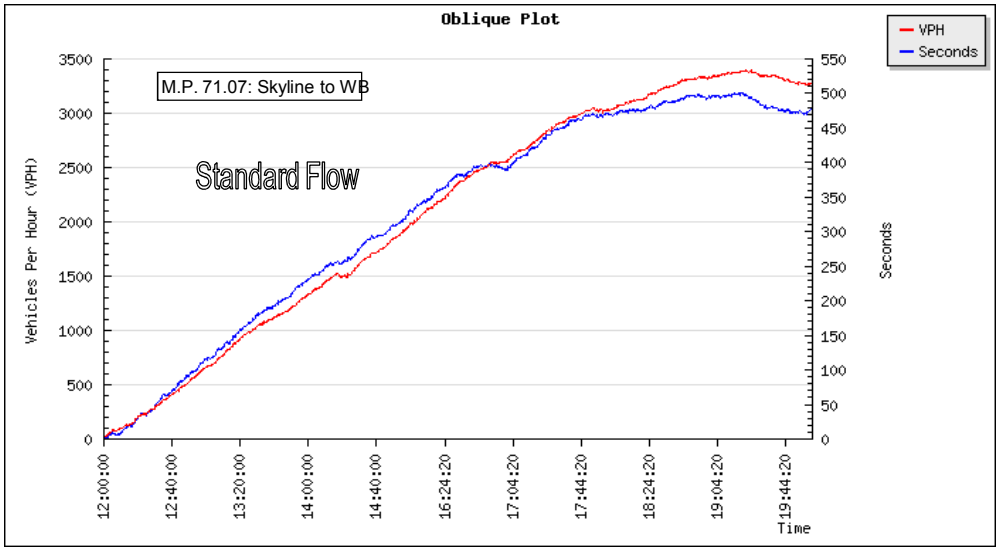




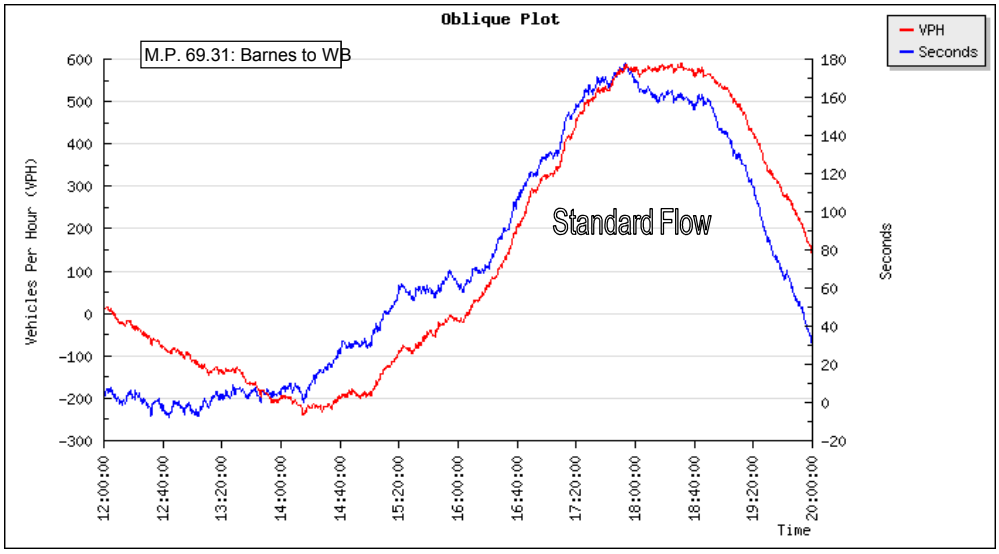
Highway: *US 26* **Date:** *August 15th, 2007 PM*
Direction: *Westbound*

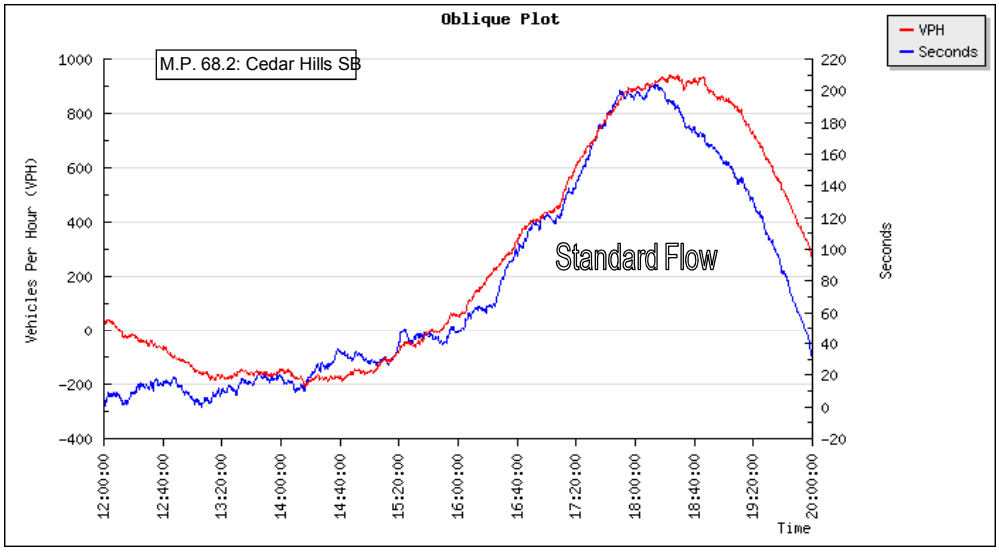


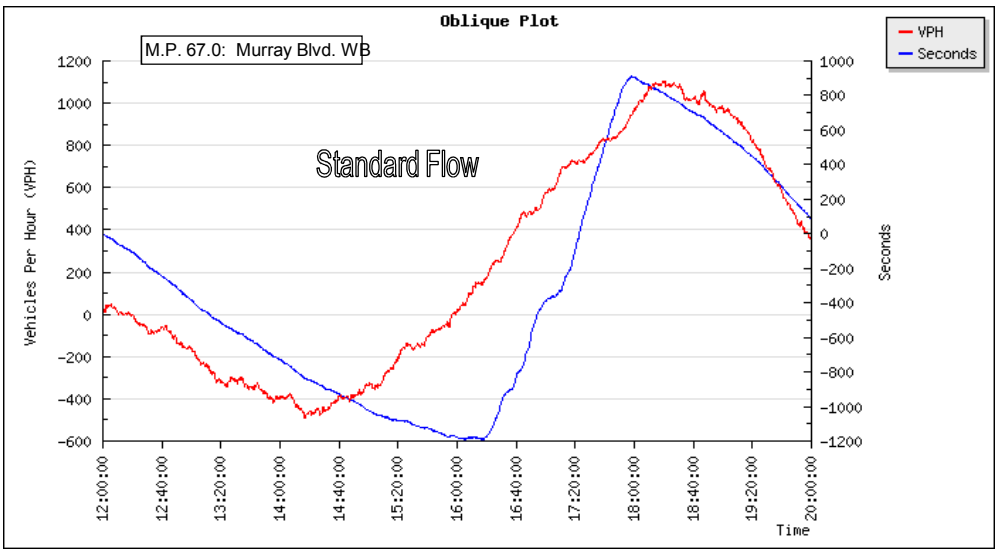




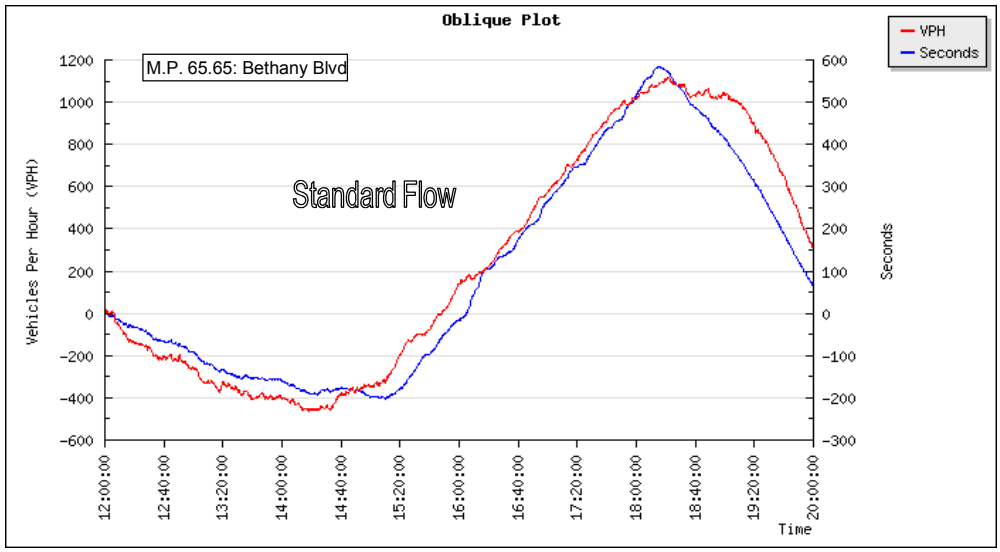
Highway: *US 26* **Date:** *August 15th, 2007 PM*
Direction: *Westbound*

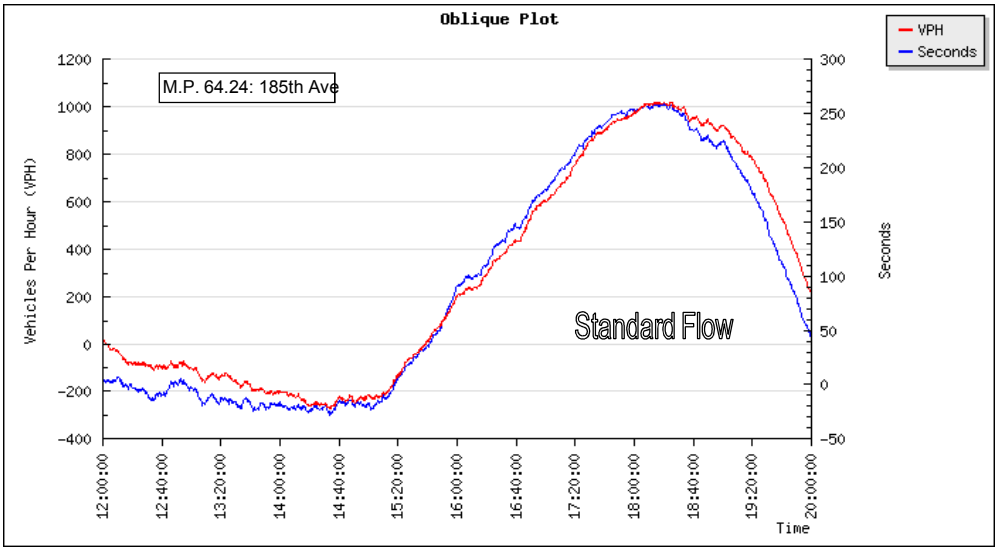




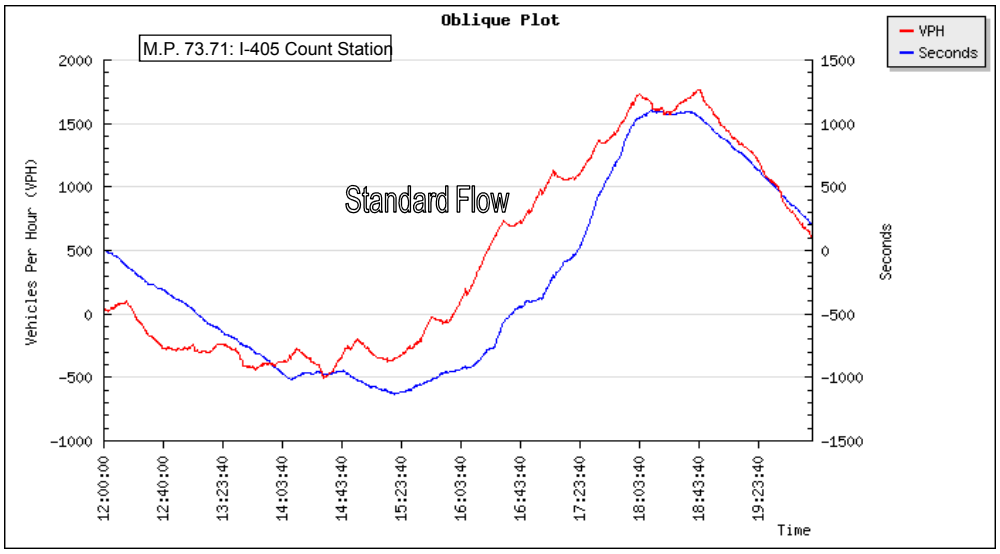


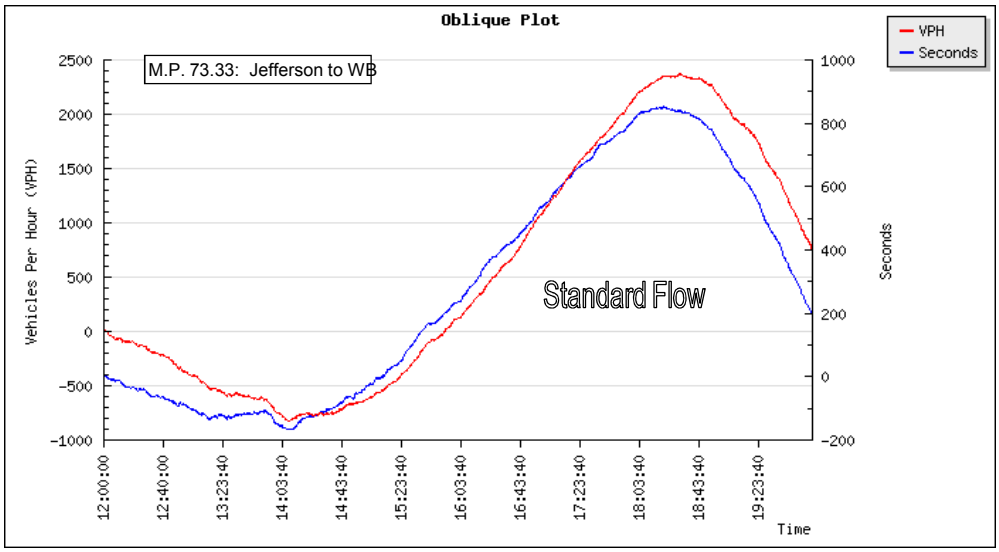
Highway: *US 26* **Date:** *August 15th, 2007 PM*
Direction: *Westbound*

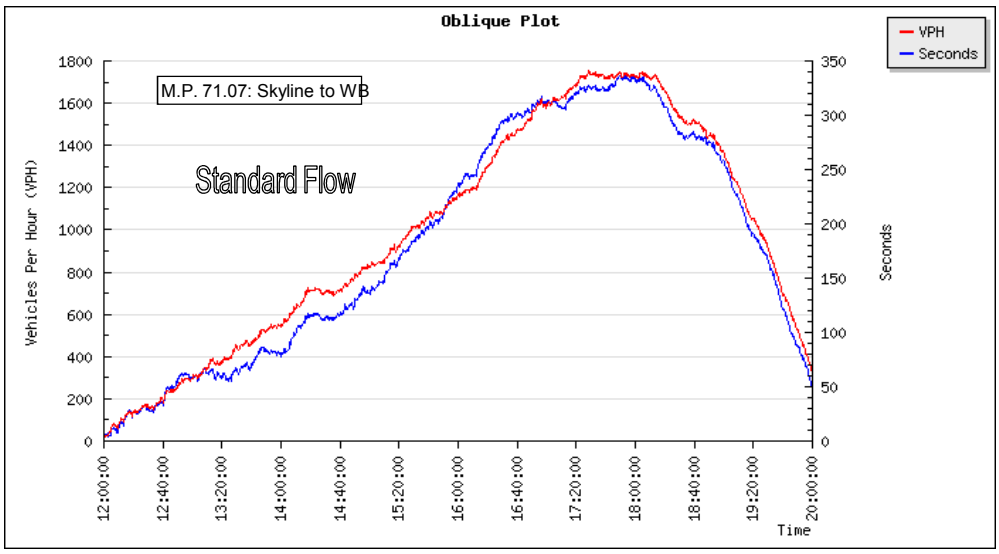




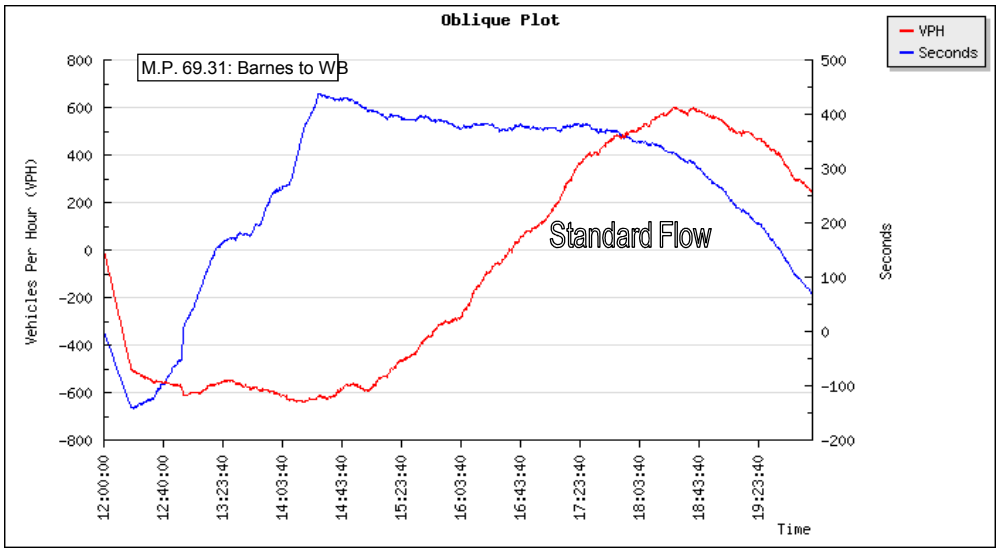
Highway: *US 26* **Date:** *August 9th, 2007 PM*
Direction: *Westbound*

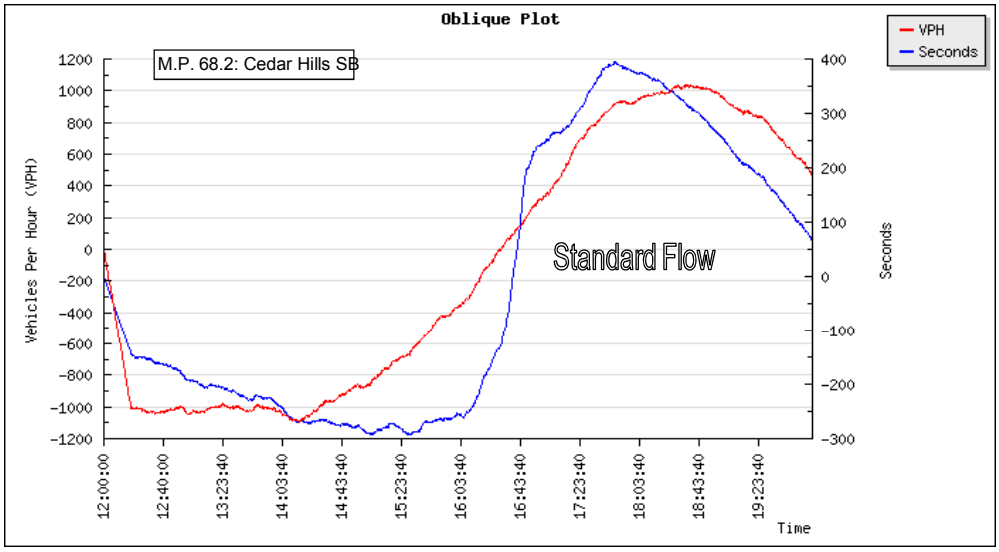


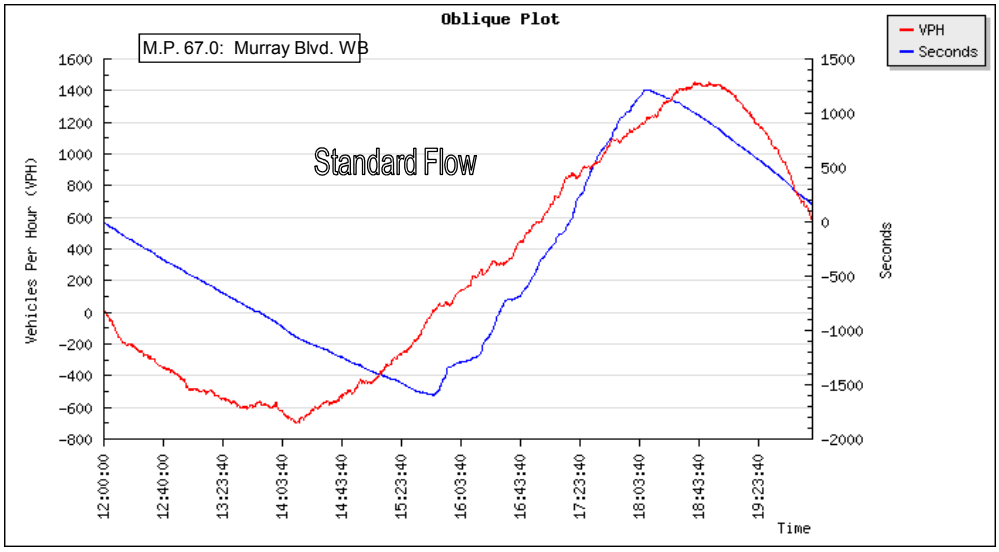




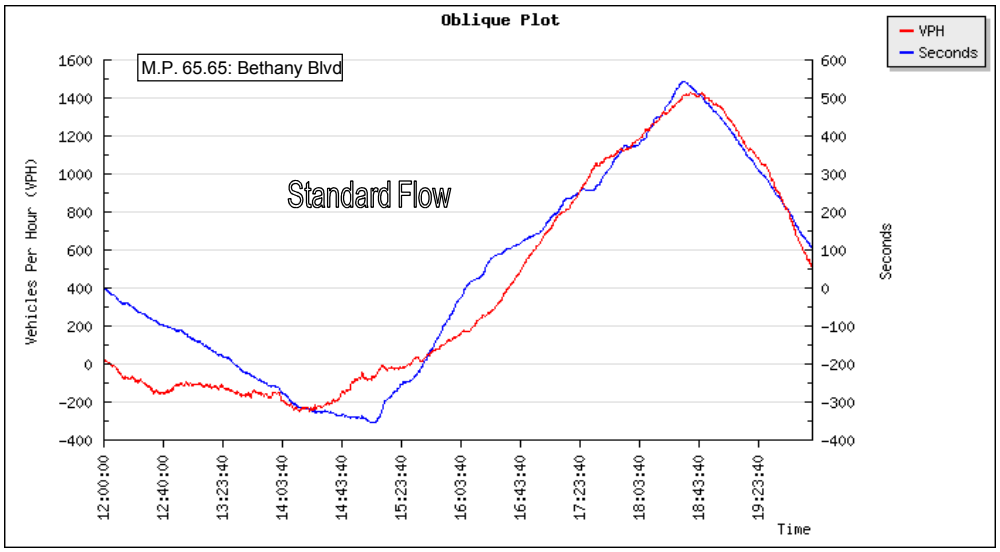
Highway: *US 26* **Date:** *August 9th, 2007 PM*
Direction: *Westbound*

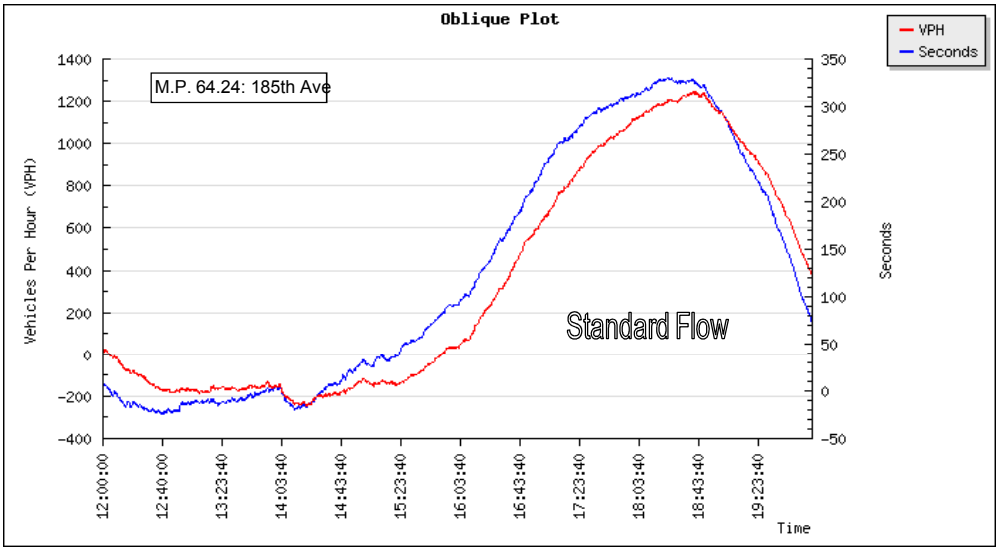




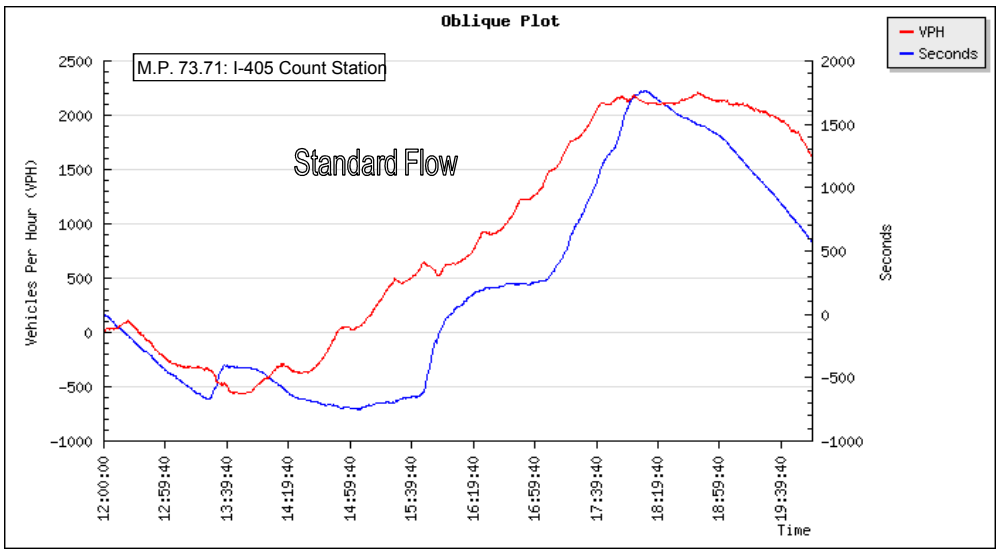


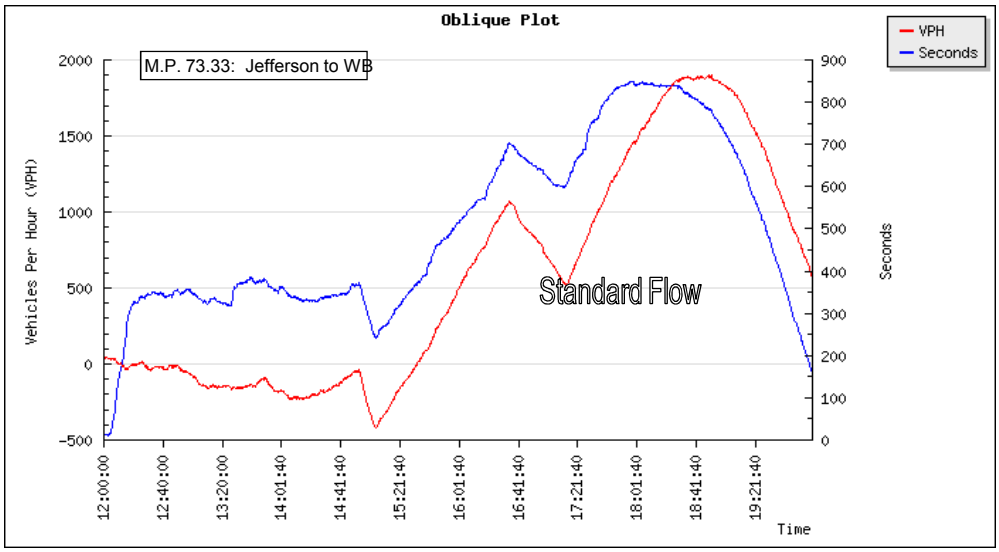
Highway: *US 26* **Date:** *August 9th, 2007 PM*
Direction: *Westbound*

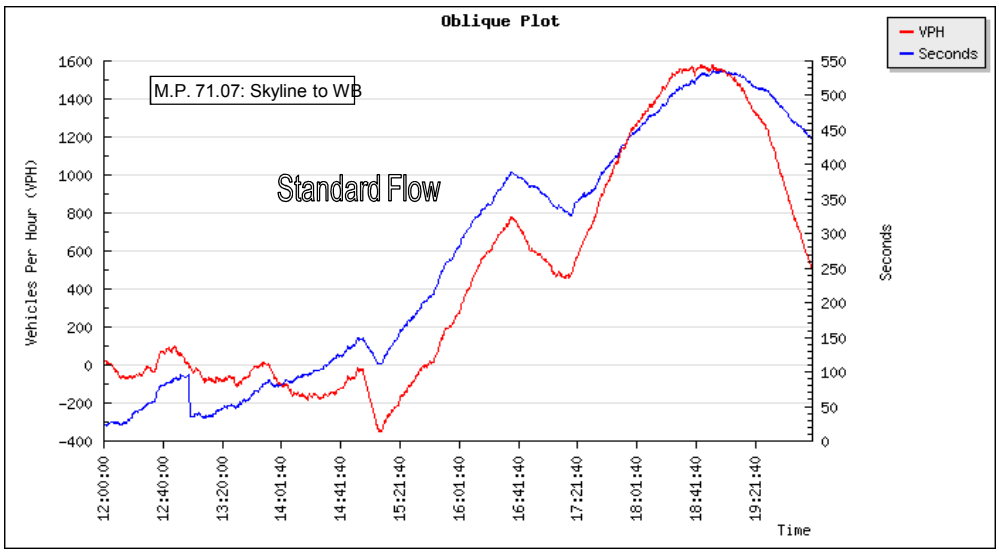




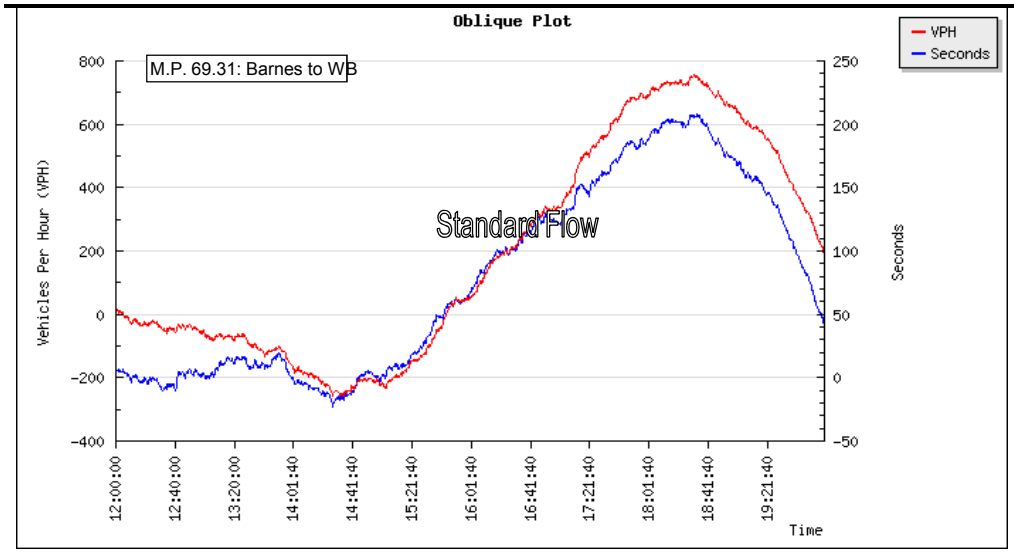
Highway: *US 26* **Date:** *August 14th, 2007 PM*
Direction: *Westbound*

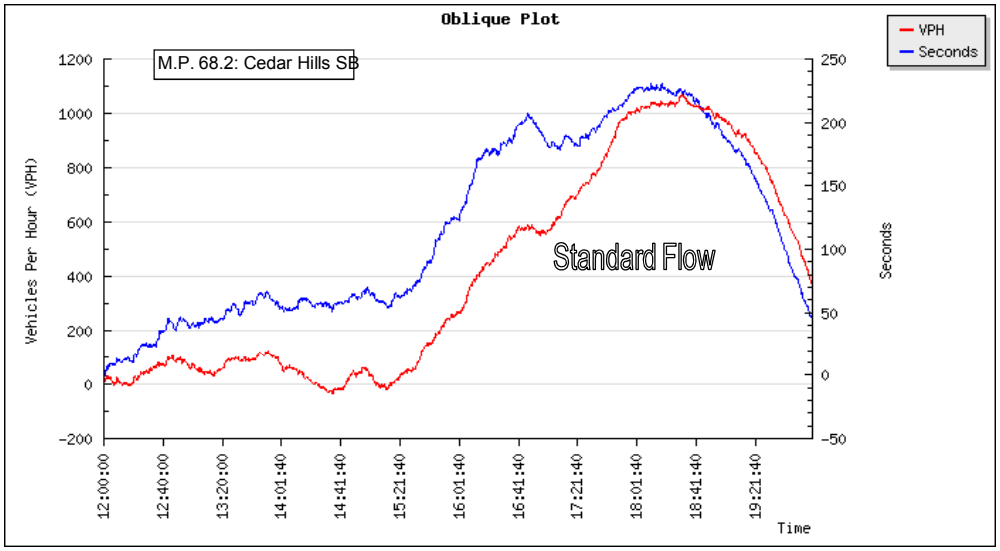


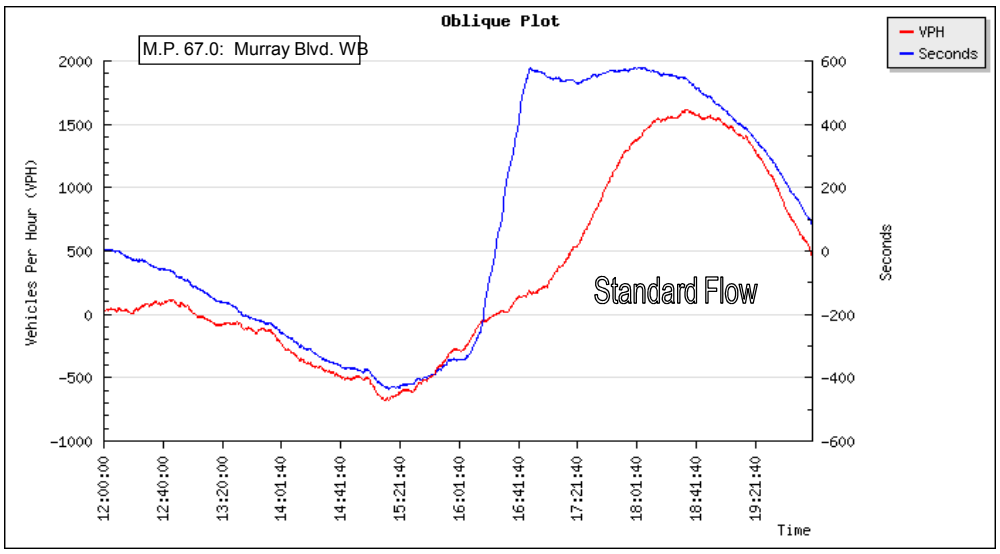


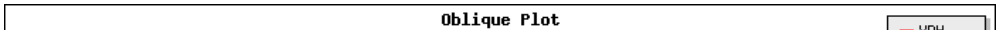


Highway: *US 26* **Date:** *August 14th, 2007 PM*
Direction: *Westbound*

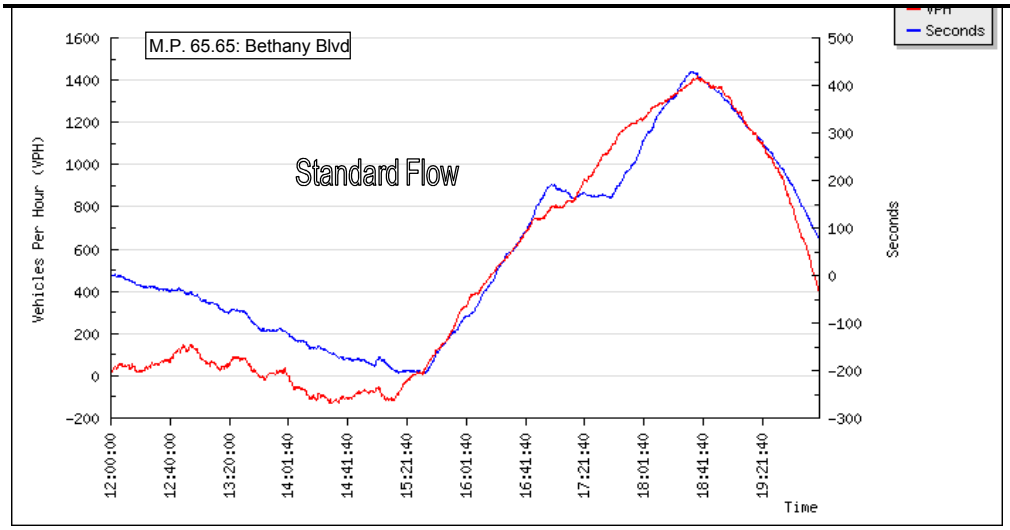


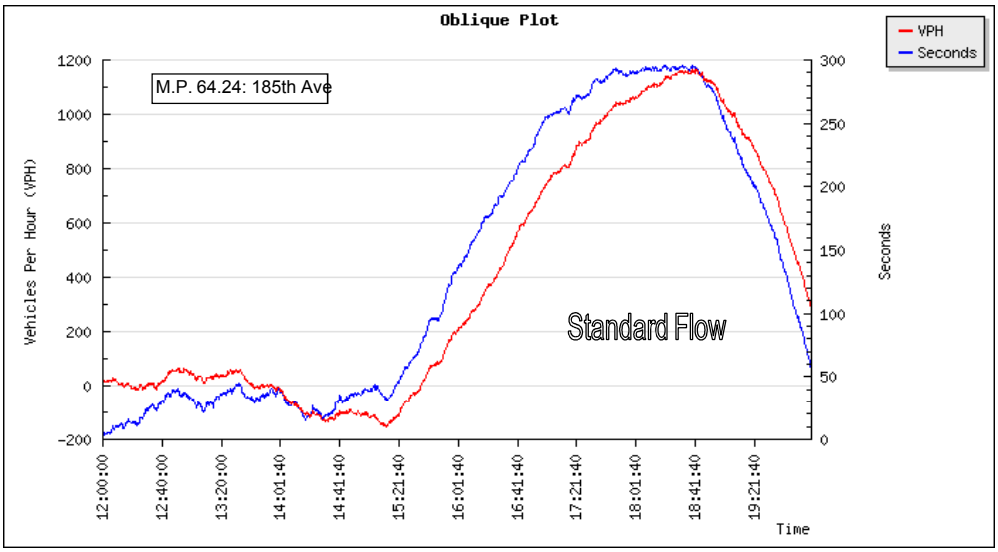






Highway: *US 26* **Date:** *August 14th, 2007 PM*
Direction: *Westbound*



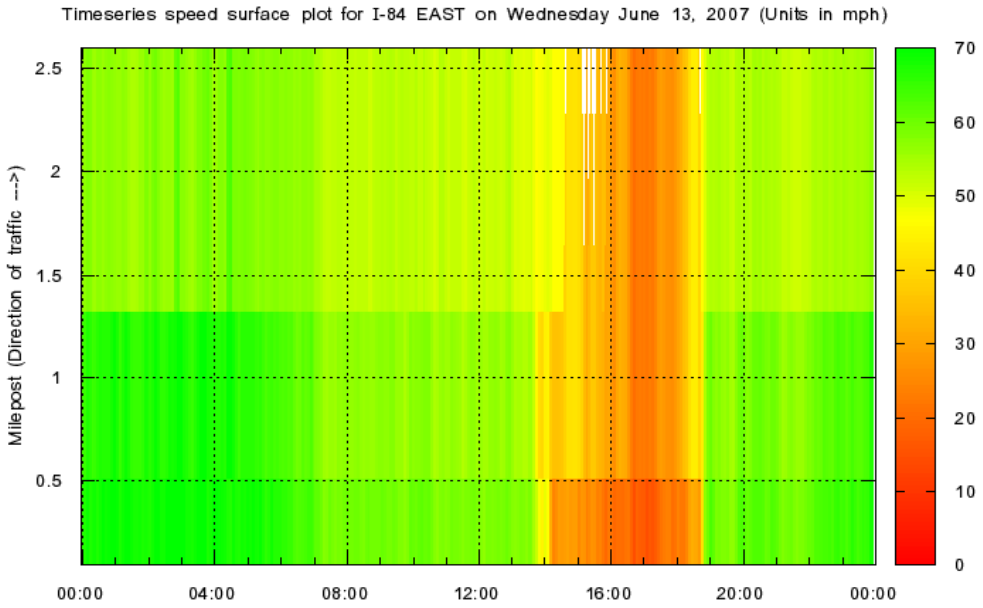


I-84 Eastbound

24 Hour Speed Plots

DAVID EVANS AND ASSOCIATES INC.

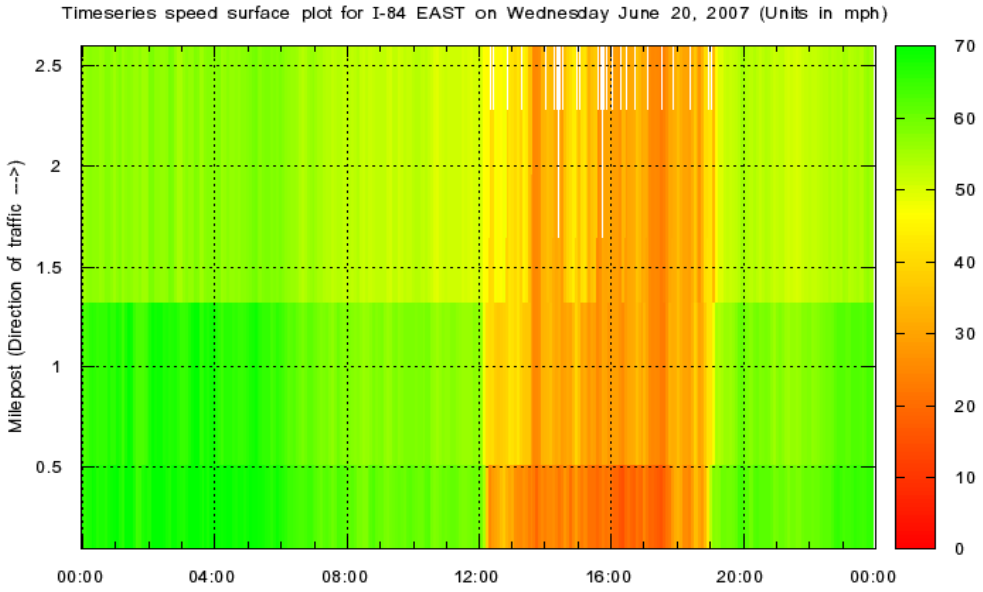
Highway: *I-84* **Time Period: 24 Hrs**
Direction: *Eastbound* **Entire I-84 Corridor: Eastbound**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
738266	I-84	I-84 Eastbound At MP 59	1	09:56:12	58	Crash	Left Lanes	no	0
738267	I-84	I-84 Eastbound 33RD	0	09:57:25	58	Stall	Right Shoulder	no	0
738284	I-84	I-84 Eastbound At 122ND	0	11:04:36	58	Stall	Right Shoulder	no	0
738324	I-84	I-84 Eastbound Near DEADMANS POND	1	13:36:30	58	Stall	Right Shoulder	no	0
738346	I-84	I-84 Eastbound Just West Of 16TH	0	14:49:21	58	Crash	Right Shoulder	no	0

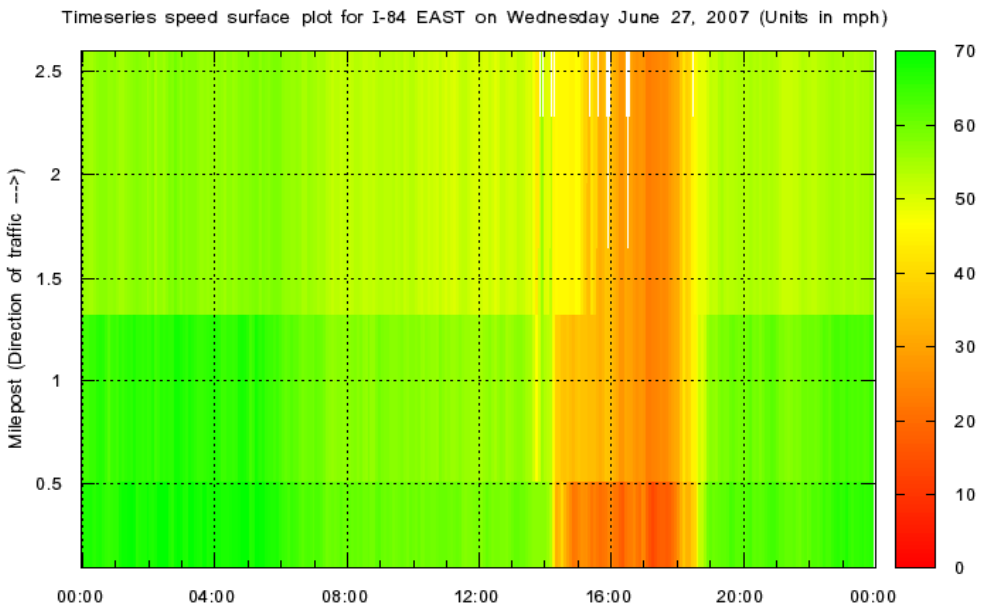
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
740944	I-84	I-84 Eastbound 122ND	0	07:20:48	58	Tow	Right Shoulder	no	0
741023	I-84	I-84 Eastbound Just West Of 33RD	0	11:22:46	58	Debris	Right Shoulder	no	0
741183	I-84	I-84 Eastbound At 74TH	0	17:38:28	58	Stall	Right Shoulder	no	0

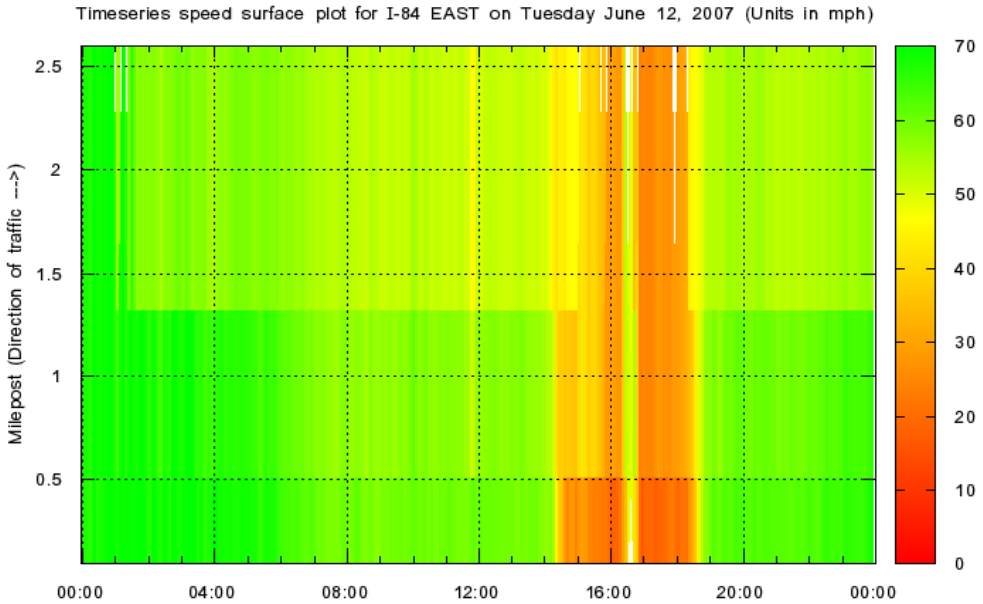
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
744345	I-84	I-84 Eastbound Just West Of 181ST	0	17:58:19	58	Stall	Right Shoulder	no	0
744463	I-84	I-84 Eastbound At 60TH	1	20:09:54	58	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

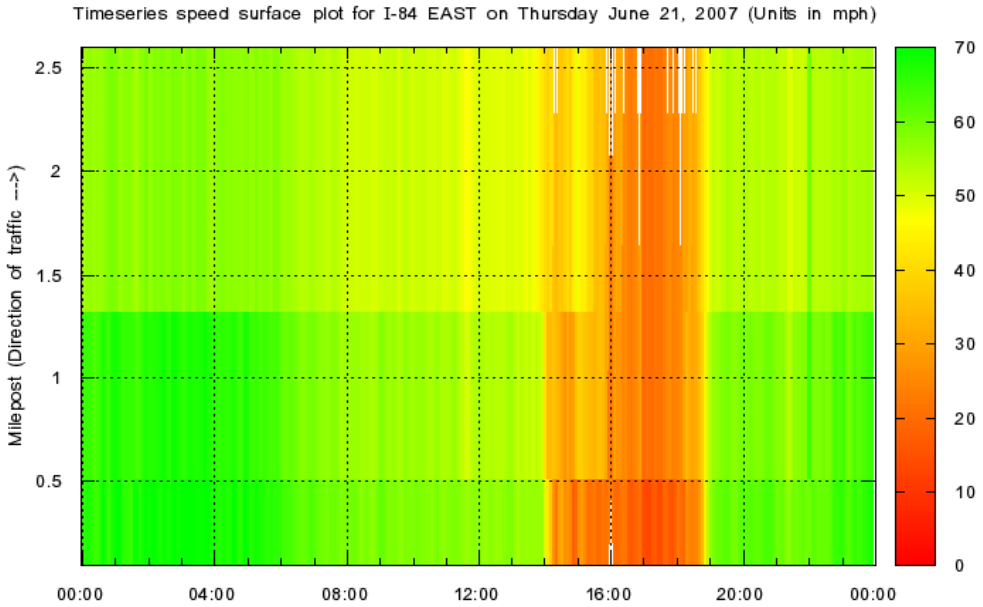


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
737886	I-84	I-84 Eastbound At HALSEY	0	13:34:28	58	Stall	Right Shoulder	no	0
738004	I-84	I-84 Eastbound Just West Of 28TH	0	16:39:51	58	Stall	Right Shoulder	no	0
738025	I-84	I-84 Eastbound At I-205	0	17:07:22	58	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

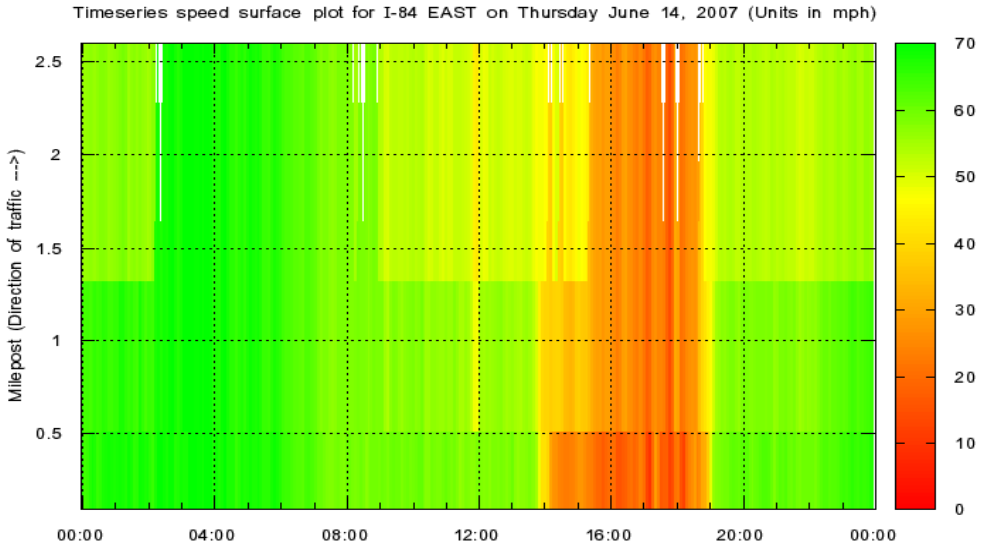
Highway: *I-84* **Time Period: 24 Hrs**
Direction: *Eastbound* **Entire I-84 Corridor: Eastbound**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
741285	I-84	I-84 Eastbound At MP 41	1	06:19:07	58	Crash	Right Lanes	no	0
741366	I-84	I-84 Eastbound Just West Of 33RD	0	09:38:21	58	Debris	Right Shoulder	no	0
741583	I-84	I-84 Eastbound At 60TH	1	14:51:15	58	Stall	Off Road Right	no	0
741623	84	84 Eastbound AT 74TH	0	15:50:17	58	Stall	Right Shoulder	no	0
741724	I-84	I-84 Eastbound At I-205 NB	0	18:51:11	58	Stall	Right Shoulder	no	0
741803	I-84	I-84 Eastbound At 68TH	1	23:39:04	208	Crash	Right Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

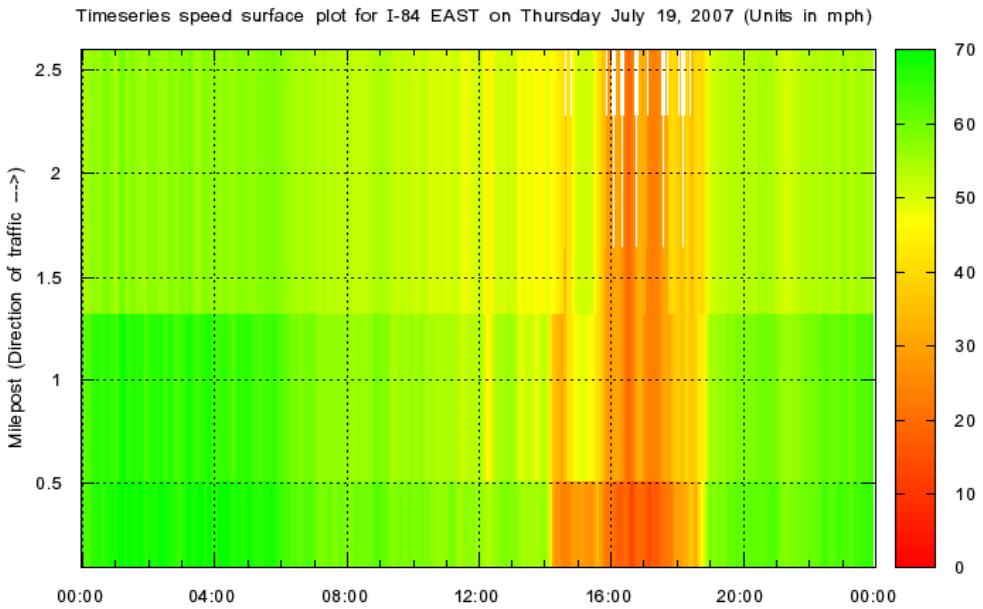


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
738803	I-84	I-84 Eastbound Just East Of 58TH	0	14:18:40	58	Stall	Right Shoulder	no	0
738826	I-84	I-84 Eastbound Just East Of 53RD	1	15:05:06	58	Stall	Right Lanes	no	0
738884	I-84	I-84 Eastbound 16TH	0	16:43:32	58	Stall	Right Shoulder	no	0
738885	I-84	I-84 Eastbound Just West Of 82ND	1	16:45:59	58	Crash	Left Lanes	no	0
738924	I-84	I-84 Eastbound At 39TH	1	17:27:29	58	Stall	Right Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

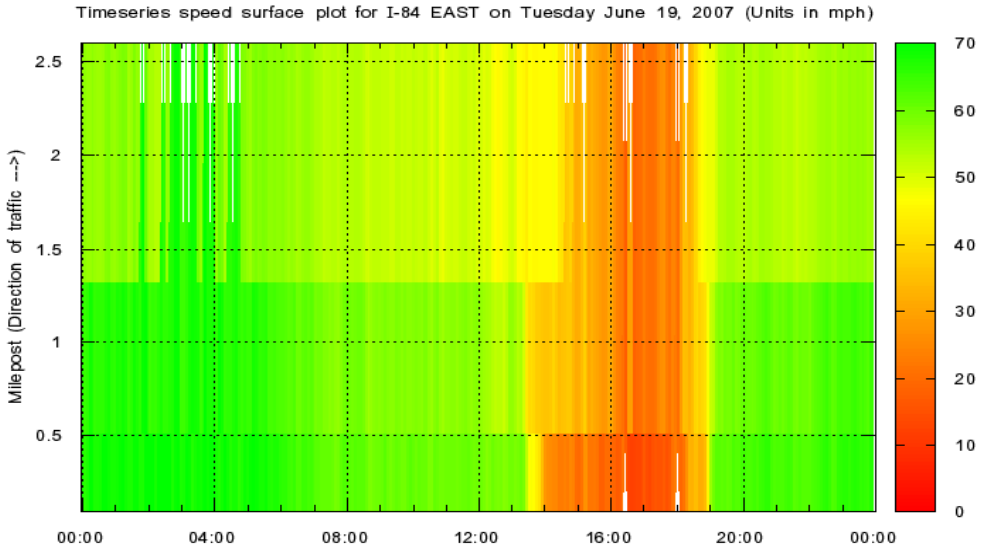
Highway: *I-84* **Time Period: 24 Hrs**
Direction: *Eastbound* **Entire I-84 Corridor: Eastbound**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
754444	I-84	I-84 Eastbound At 181ST	0	07:12:58	57	Debris	Center Lanes	no	0
754664	I-84	I-84 Eastbound GRAND	1	14:06:43	54	Stall	Center Lanes	no	0
754724	I-84	I-84 Eastbound Just East Of 58TH	1	15:34:02	55	Crash	Left Lanes	no	0
754787	84	84 Eastbound W OF 181	0	19:10:14	57	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

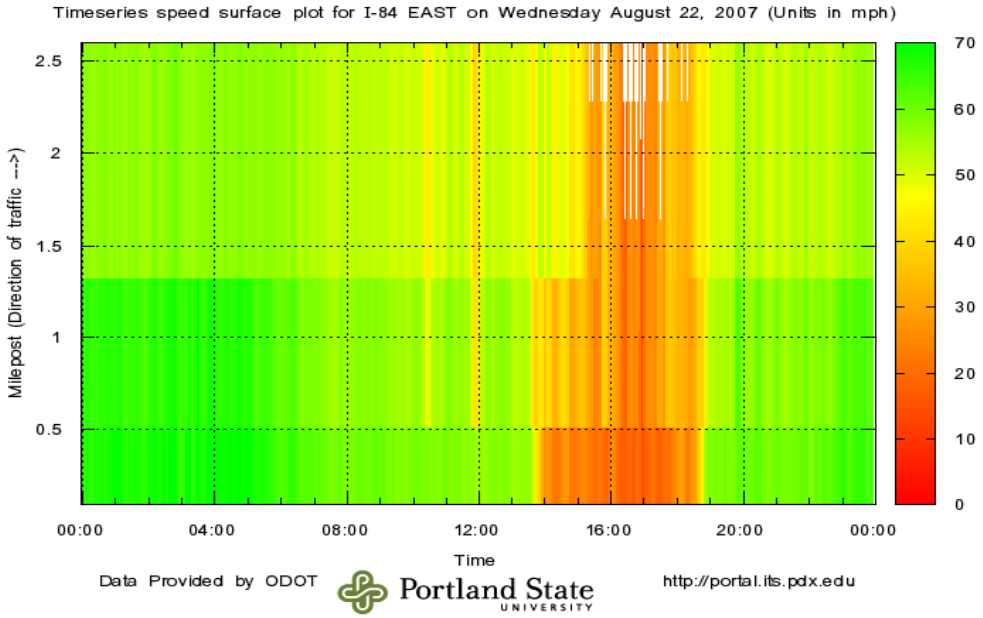


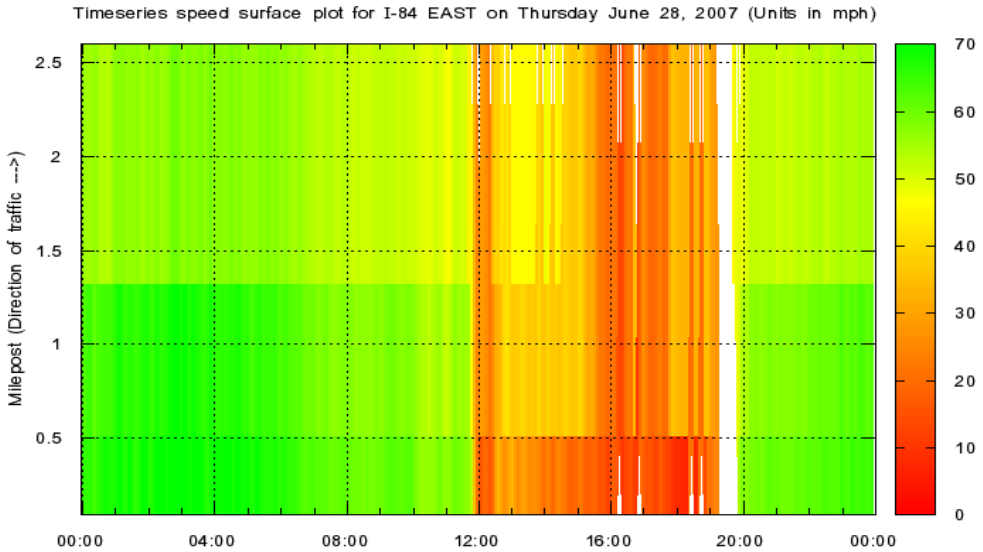
Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
740303	I-84	I-84 Eastbound Just West Of 122ND	0	05:59:13	58	Stall	Right Shoulder	no	0
740325	I-84	I-84 Eastbound At 12TH	0	07:01:04	58	Stall	Right Shoulder	no	0
740404	I-84	I-84 Eastbound At 33RD	0	08:34:17	58	Stall	Right Shoulder	no	0
740524	I-84	I-84 Eastbound Just East Of HALSEY	0	11:28:00	58	Debris	Left Shoulder	no	0
740686	84	84 Eastbound AT GRAND	0	15:21:44	58	Stall	Right Shoulder	no	0
740744	84	84 Eastbound E OF 82	0	17:26:16	58	Stall	Right Shoulder	no	0
740803	I-84	I-84 Eastbound At MP 63 & 52	1	20:09:47	501	Construction	Right Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

Highway: *I-84* **Time Period: 24 Hrs**
Direction: *Eastbound* **Entire I-84 Corridor: Eastbound**





Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
744543	I-84	I-84 Eastbound 53RD	0	05:23:15	58	Stall	Right Shoulder	no	0
744564	I-84	I-84 Eastbound 53RD	1	05:53:27	58	Stall	Right Lanes	no	0
744604	I-84	I-84 Eastbound MP 47	0	07:12:22	58	Debris	All Lanes	no	0
744630	I-84	I-84 Eastbound 82ND	0	08:12:26	58	Stall	Right Shoulder	no	0
744644	I-84	I-84 Eastbound 122ND	0	08:42:41	58	Stall	Right Shoulder	no	0
744664	I-84	I-84 Eastbound 122ND	0	09:03:49	58	Stall	Right Shoulder	no	0
744684	I-84	I-84 Eastbound I-205	0	09:41:12	58	Stall	Right Shoulder	no	0
744705	I-84	I-84 Eastbound MP 33	0	10:37:29	58	Stall	Right Shoulder	no	0
744726	I-84	I-84 Eastbound 39TH	0	10:52:38	58	Debris	All Lanes	no	0
744983	84	84 Eastbound AT 21ST	1	15:51:13	58	Stall	Center Lanes	no	0
745023	84	84 Eastbound PRI TO 82ND	1	16:49:42	58	Crash	Left Lanes	no	0
745043	84	84 Eastbound E OF 21ST	1	17:01:56	58	Crash	Right Lanes	no	0
745063	I-84	I-84 Eastbound At 21ST	0	17:10:47	58	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

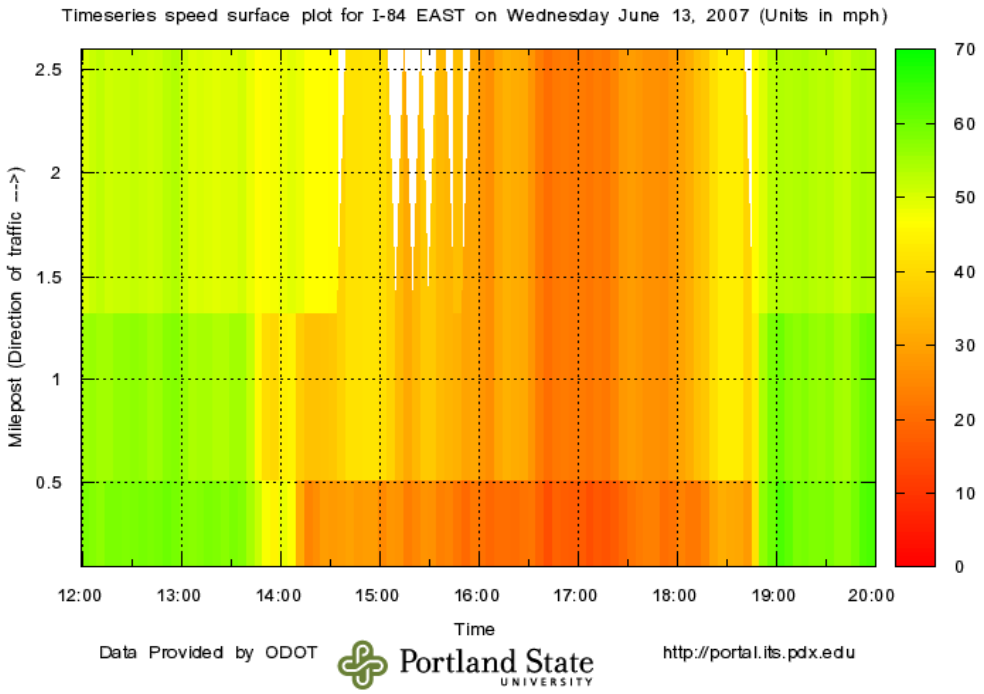
I-84 Eastbound

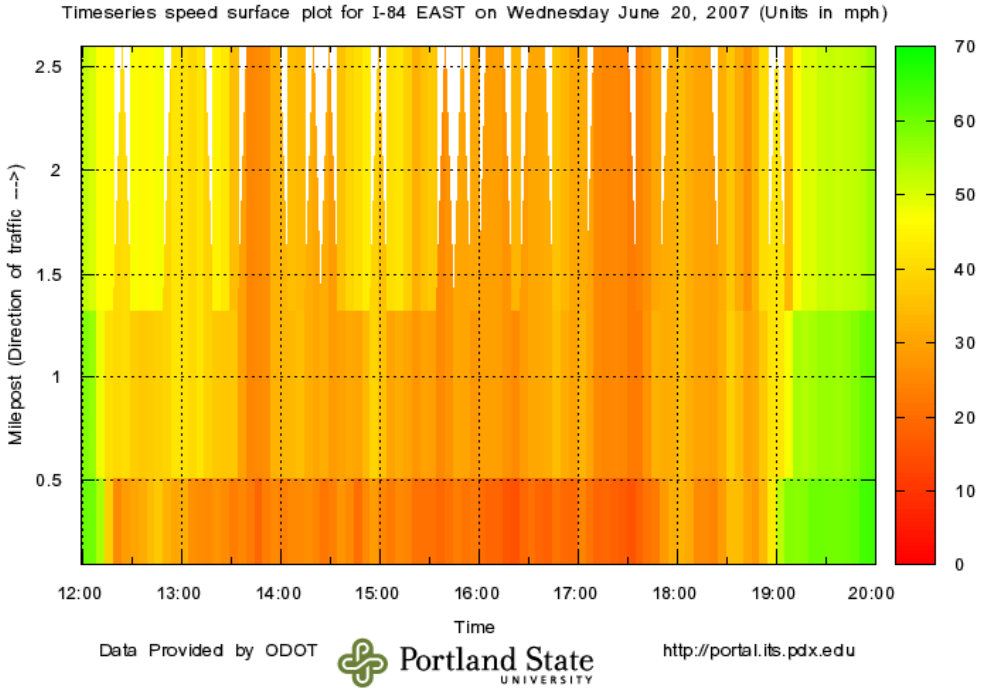
PM Peak Hour Speed Plots

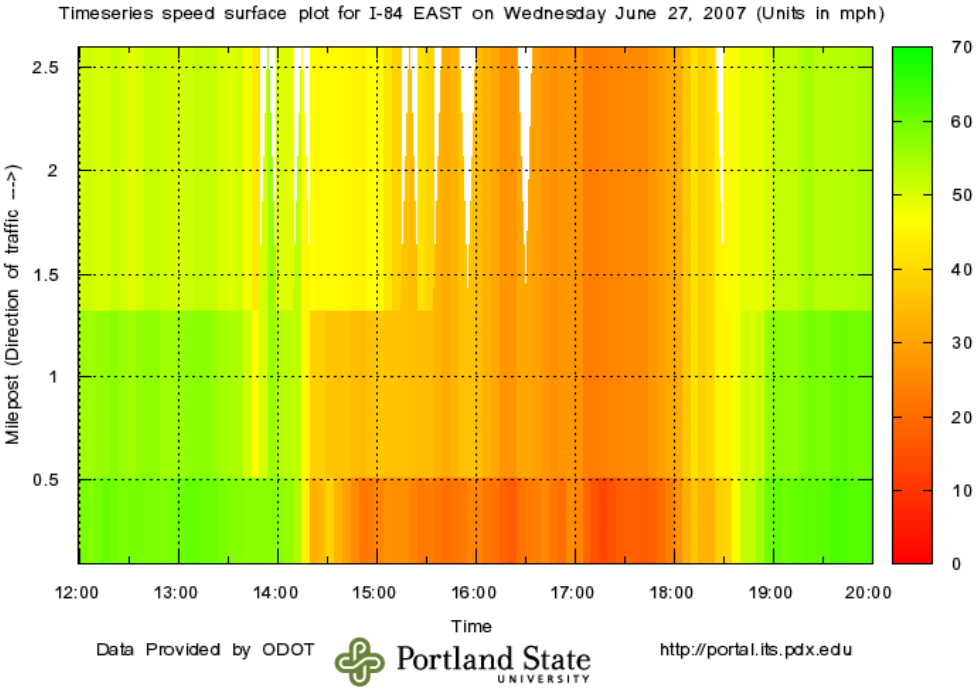
DAVID EVANS AND ASSOCIATES INC.

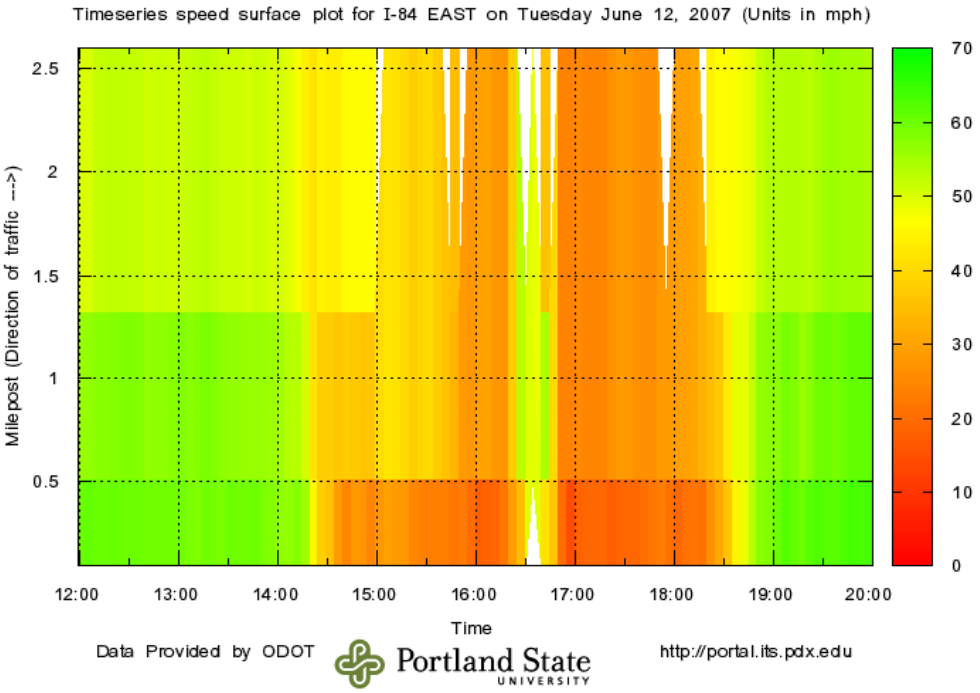
Highway: *I-84*
Direction: *Eastbound*

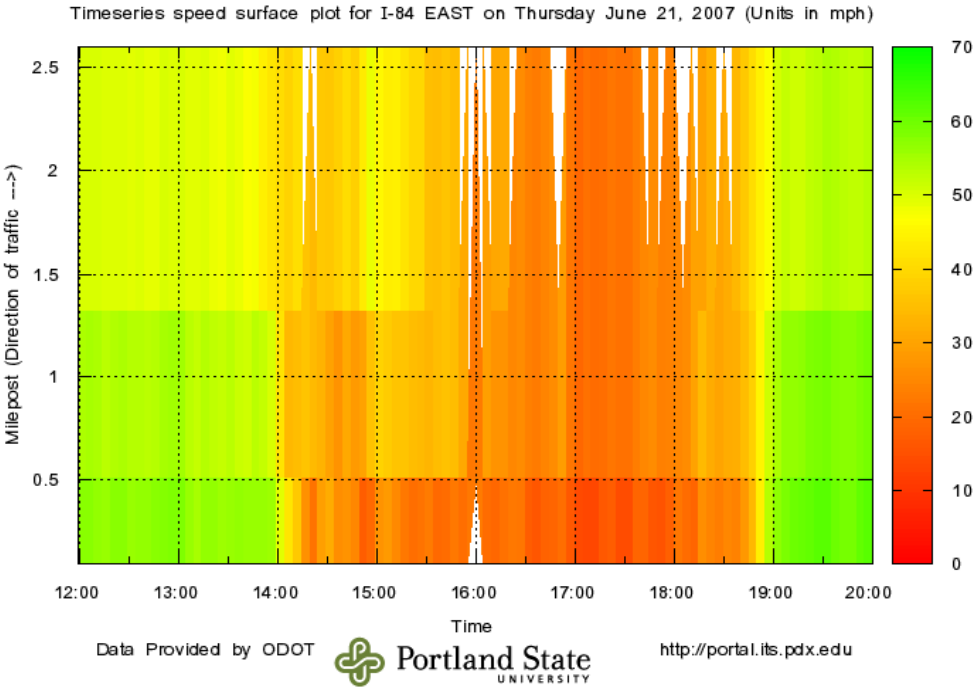
Time Period: PM Peak
Bottleneck Influence Area: M.P. 11-16

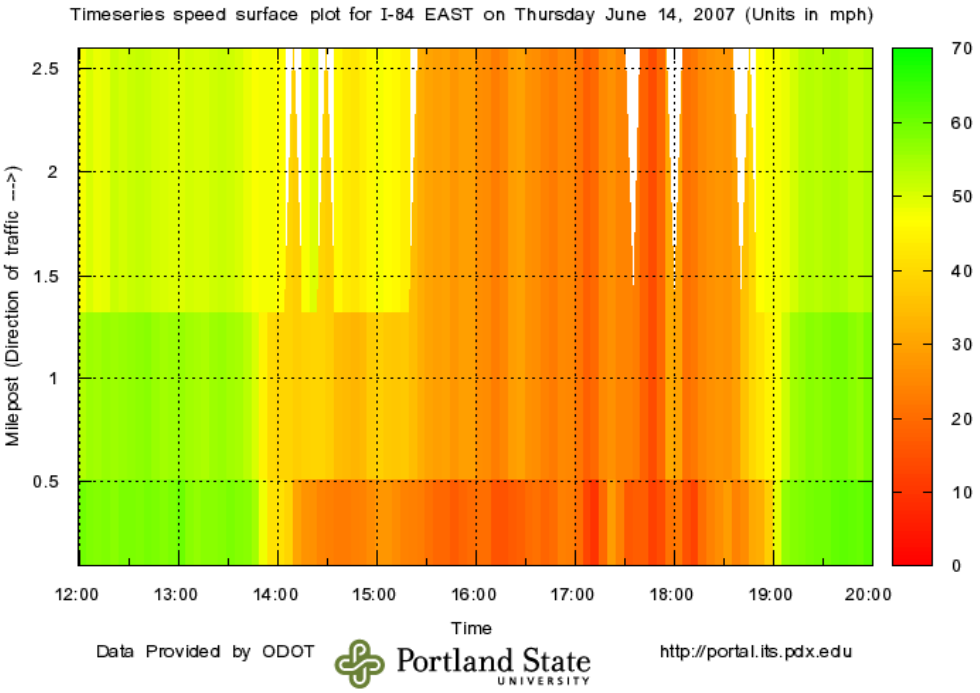


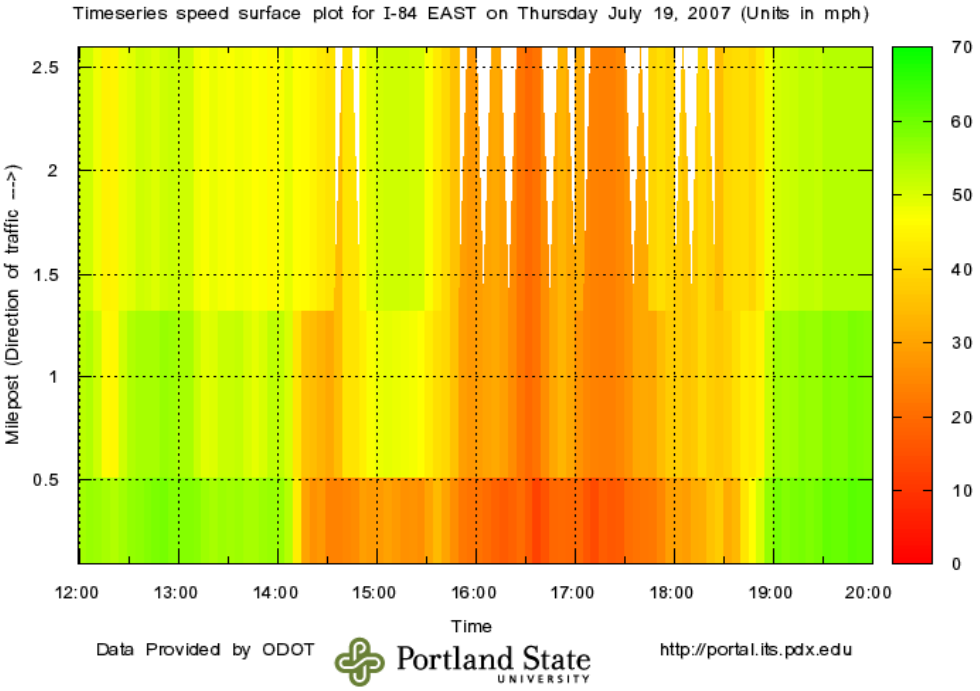


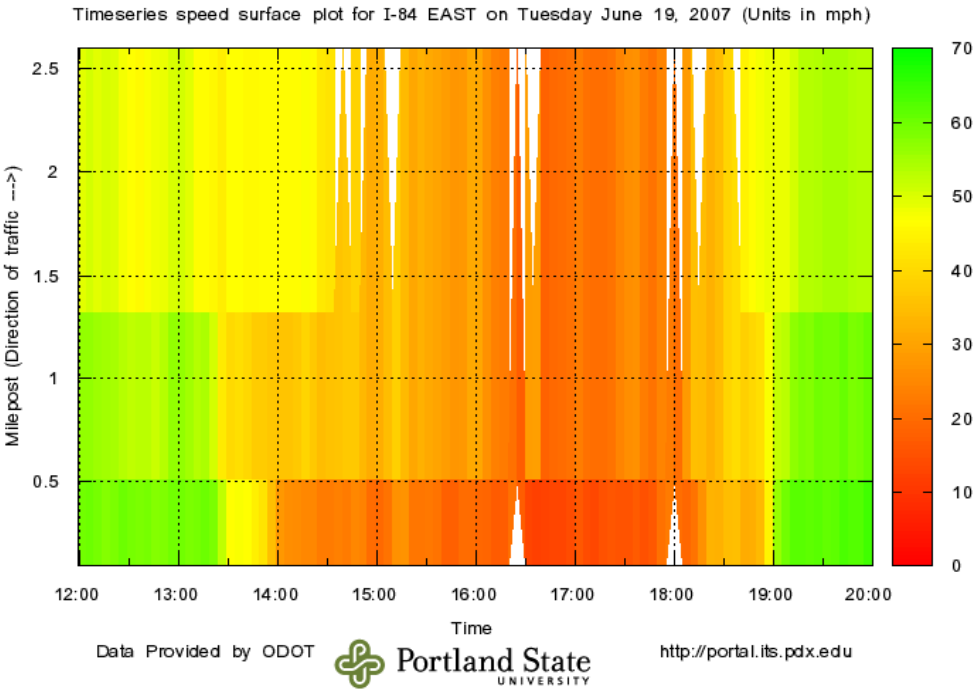

Timeseries speed surface plot for I-84 EAST on Wednesday June 27, 2007 (Units in mph)
Milepost (Direction of traffic --->)
2.5
2
1.5
1
0.5
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

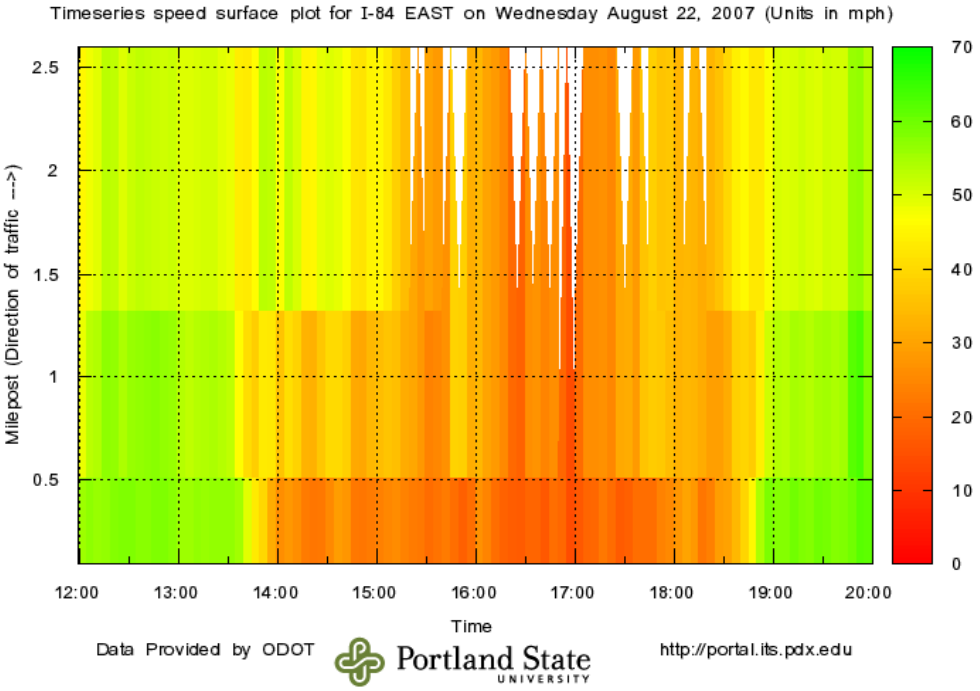

Timeseries speed surface plot for I-84 EAST on Tuesday June 12, 2007 (Units in mph)
Milepost (Direction of traffic --->)
2.5
2
1.5
1
0.5
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

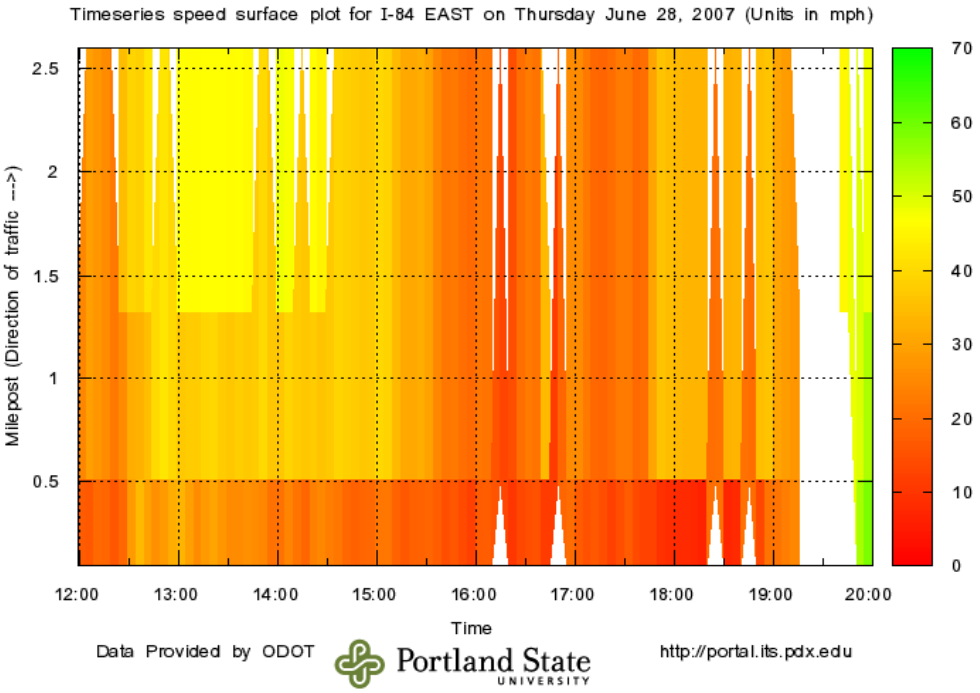

Timeseries speed surface plot for I-84 EAST on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
2.5
2
1.5
1
0.5
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-84 EAST on Thursday June 14, 2007 (Units in mph)
Milepost (Direction of traffic --->)
2.5
2
1.5
1
0.5
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-84 EAST on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
2.5
2
1.5
1
0.5
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-84 EAST on Tuesday June 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
2.5
2
1.5
1
0.5
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

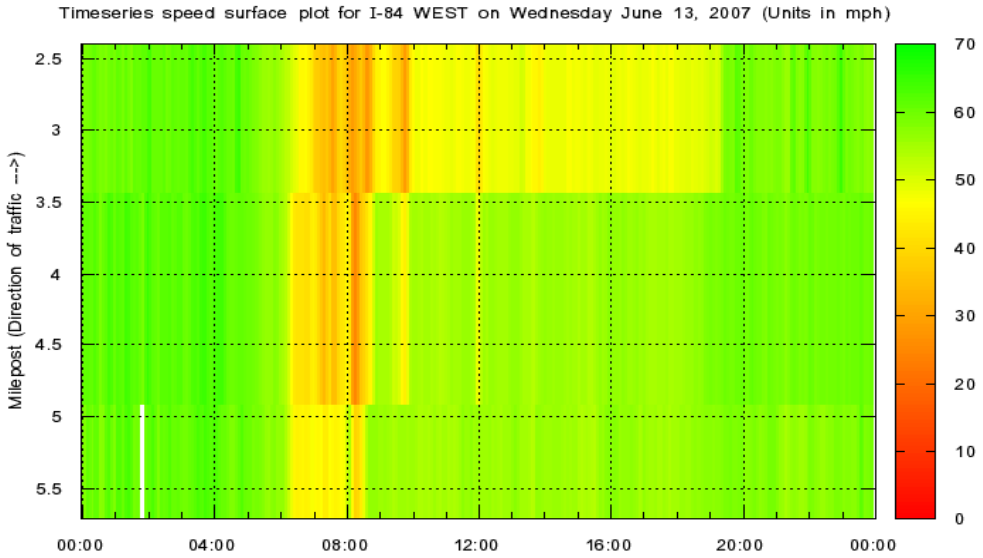

Timeseries speed surface plot for I-84 EAST on Wednesday August 22, 2007 (Units in mph)
Milepost (Direction of traffic --->)
2.5
2
1.5
1
0.5
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-84 EAST on Thursday June 28, 2007 (Units in mph)
Milepost (Direction of traffic --->)
2.5
2
1.5
1
0.5
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu

I-84 Westbound
24 Hour Speed Plots

DAVID EVANS AND ASSOCIATES INC.

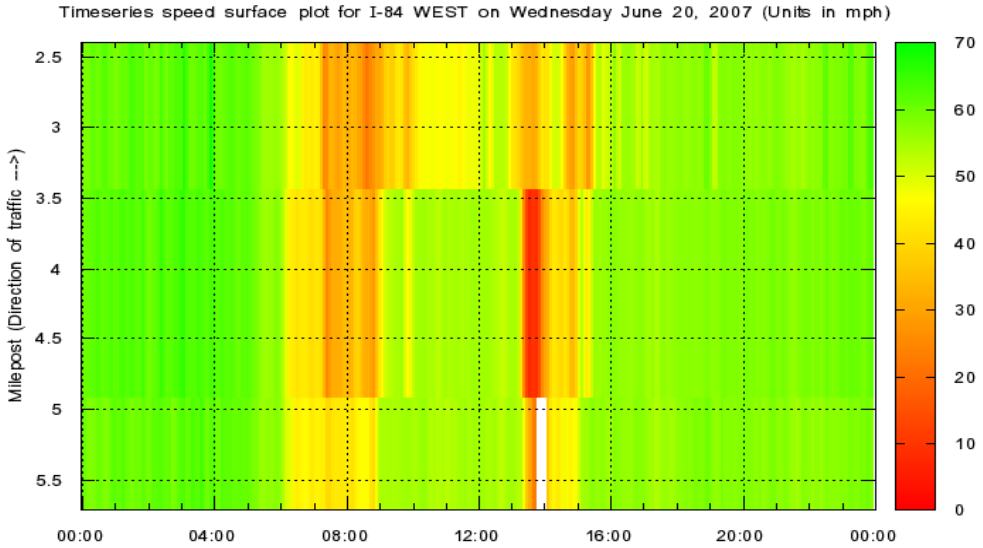
Highway: *I-84* **Time Period: 24 Hrs**
Direction: *Westbound* **Entire I-84 Corridor: Westbound**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
738224	I-84	I-84 Westbound SANDY BLVD	0	07:03:34	46	Stall	Right Shoulder	no	0
738286	I-84	I-84 Westbound Just West Of 82ND	0	11:18:29	58	Debris	Right Shoulder	no	0
738287	I-84	I-84 Westbound Just East Of TROUTDALE	0	11:20:37	58	Stall	Right Shoulder	no	0
738327	I-84	I-84 Westbound At SANDY	0	14:08:19	58	Stall	Gore Area (right)	no	0
738328	I-84	I-84 Westbound At 82ND	0	14:09:23	58	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

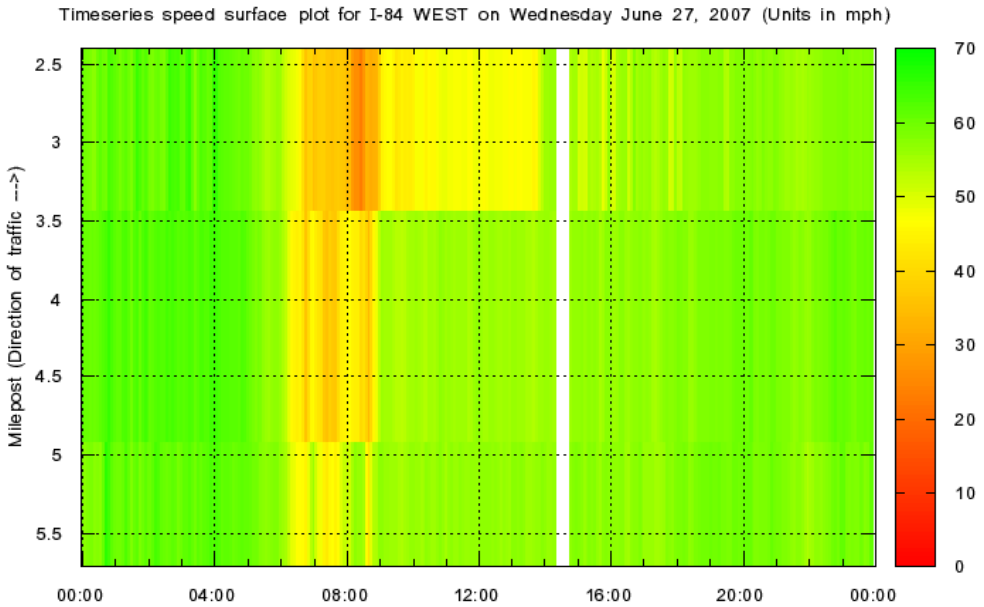


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
740903	I-84	I-84 Westbound Just East Of I-205	1	06:16:36	58	Stall	Right Lanes	no	0
740905	I-84	I-84 Westbound 28TH	0	06:21:45	58	Crash	Right Shoulder	no	0
740945	I-84	I-84 Westbound I-205	0	07:32:34	58	Stall	Right Shoulder	no	0
740986	I-84	I-84 Westbound MP 46-31	0	09:27:12	233	Construction	Right Lanes	no	0
741004	I-84	I-84 Westbound 47TH	0	10:31:02	58	Tow	Right Shoulder	no	0
741027	I-84	I-84 Westbound 238TH	0	12:04:59	58	Debris	Center Lanes	no	0
741028	I-84	I-84 Westbound 148TH	0	12:12:35	58	Stall	Right Shoulder	no	0
741030	I-84	I-84 Westbound Just East Of 43RD	2	12:22:20	58	Crash	Left Lanes	no	0
741084	84	84 Westbound RAMP TO 205 SB	1	14:07:25	58	Crash	Left Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

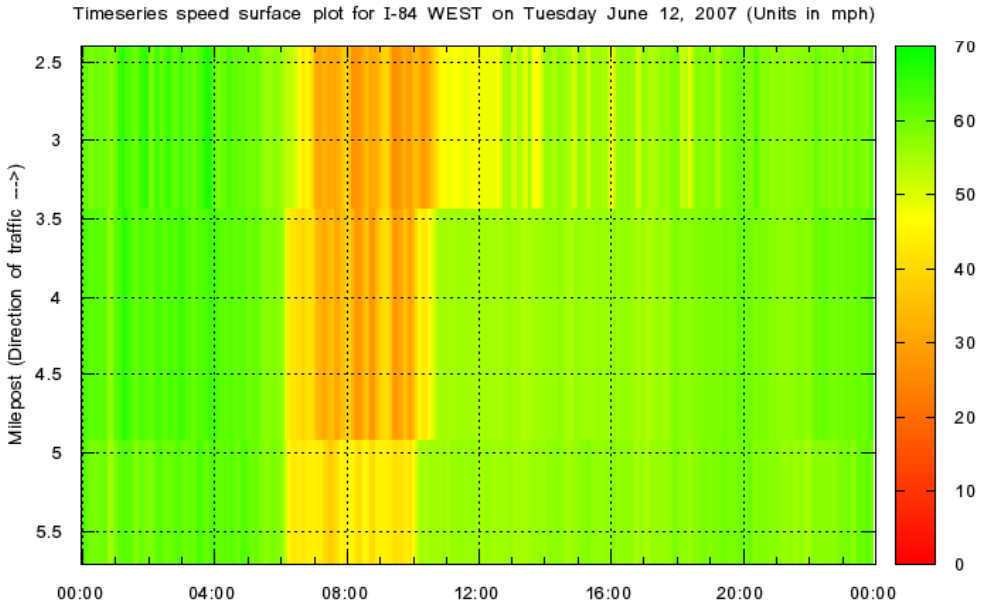
Highway: *I-84* **Time Period: 24 Hrs**
Direction: *Westbound* **Entire I-84 Corridor: Westbound**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
743944	I-84	I-84 Westbound Just East Of 82ND	0	05:16:51	58	Stall	Right Shoulder	no	0
744103	I-84	I-84 Westbound At EXIT 14	0	09:06:17	126	Stall	Right Shoulder	no	0
744383	84	84 Westbound AT MP 52	1	18:25:01	58	Stall	Right Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

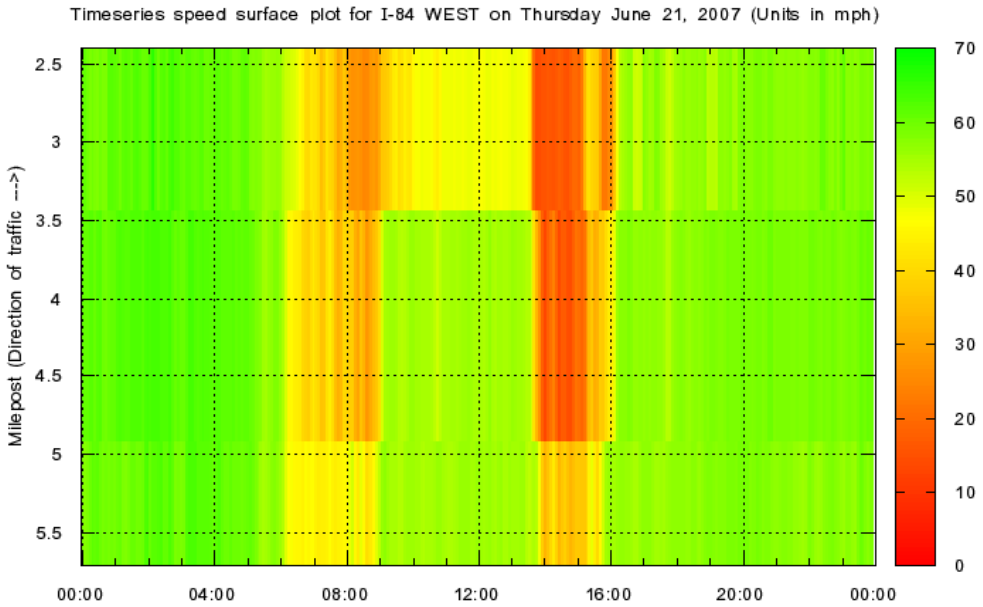


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
737643	I-84	I-84 Westbound At 43RD	0	04:53:10	128	Stall	Right Shoulder	no	0
737685	I-84	I-84 Westbound At 53RD	0	06:33:03	58	Stall	Right Shoulder	no	0
737904	I-84	I-84 Westbound At I-205	0	14:12:55	58	Stall	Gore Area (right)	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

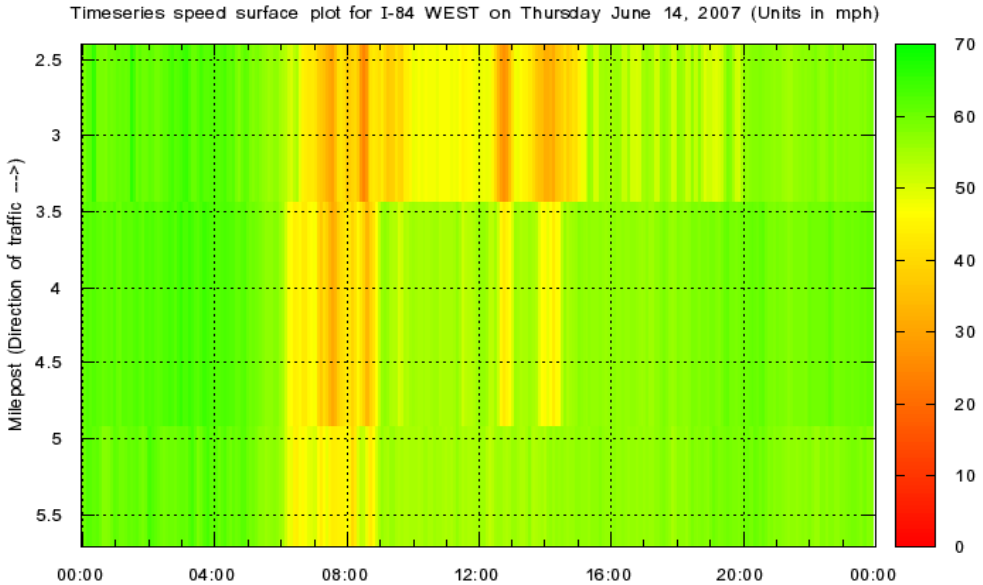
Highway: *I-84* **Time Period: 24 Hrs**
Direction: *Westbound* **Entire I-84 Corridor: Westbound**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
741465	I-84	I-84 Westbound At 33RD	1	12:42:26	91	Crash	Left Lanes	no	0
741603	I-84	I-84 Westbound At 74TH	1	15:16:26	57	Stall	Right Shoulder	no	0
741663	I-84	I-84 Westbound At 43RD EXIT	2	16:41:09	58	Crash	All Lanes	no	0
741725	I-84	I-84 Westbound Just West Of 207TH	1	19:10:06	58	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

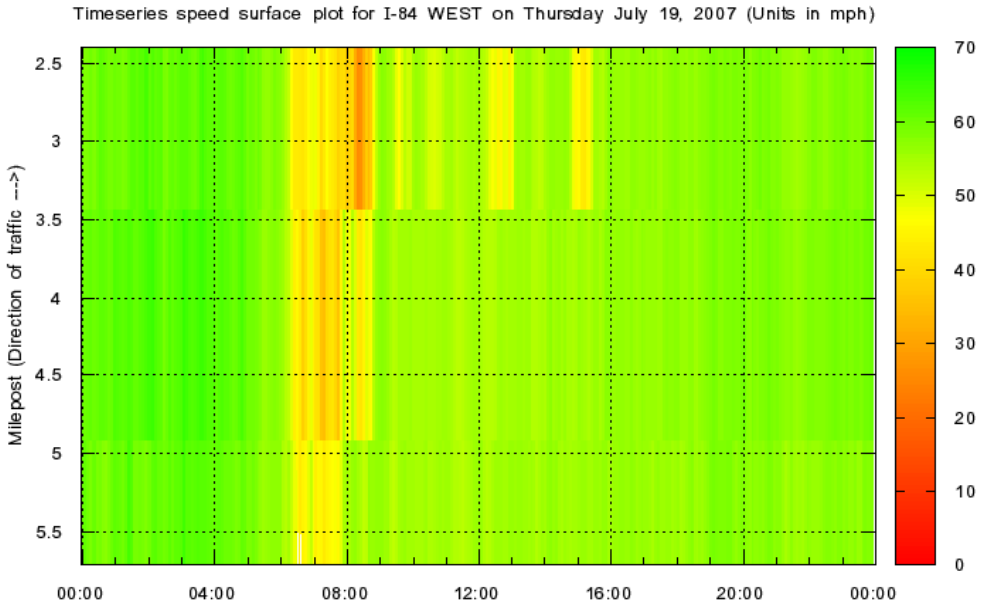


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
738627	I-84	I-84 Westbound Just East Of 28TH	0	09:24:58	58	Stall	Right Shoulder	no	0
738686	I-84	I-84 Westbound At 33RD	0	11:29:19	55	Other Incident	Gore Area (right)	no	0
738763	I-84	I-84 Westbound Just East Of LLOYD	1	12:54:10	58	Stall	Right Lanes	no	0
738964	I-84	I-84 Westbound At 58TH	0	18:55:21	58	Debris	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

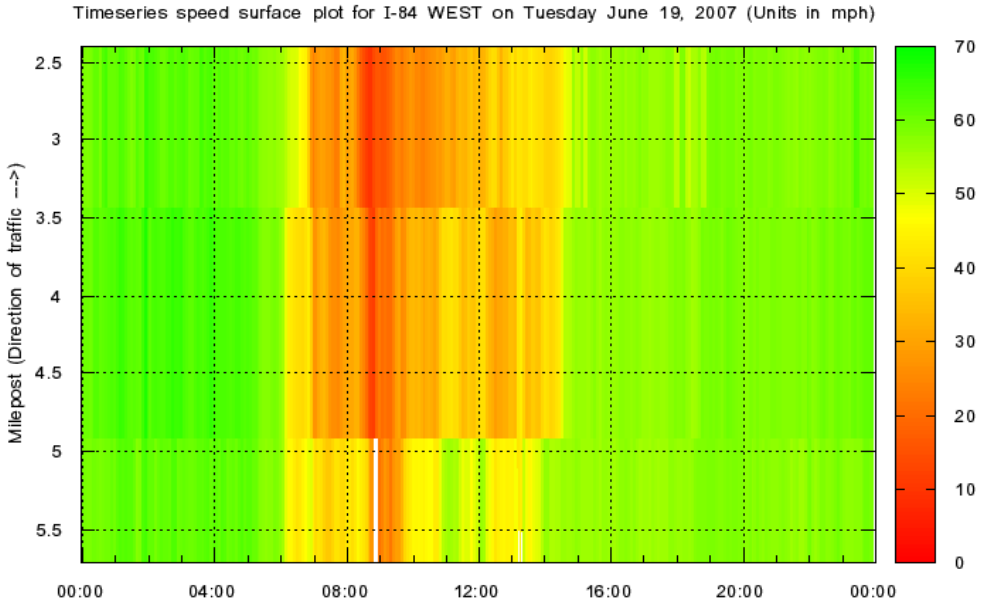
Highway: *I-84* **Time Period: 24 Hrs**
Direction: *Westbound* **Entire I-84 Corridor: Westbound**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
754466	I-84	I-84 Westbound At HALSEY	0	07:47:33	57	Stall	Right Shoulder	no	0
754564	I-84	I-84 Westbound At 28TH	0	09:46:17	57	Stall	Right Shoulder	no	0
754603	I-84	I-84 Westbound At 38TH	0	12:17:45	57	Stall	Right Shoulder	no	0
754745	I-84	I-84 Westbound Just West Of 28TH	0	16:00:32	57	Stall	Right Shoulder	no	0
754767	I-84	I-84 Westbound At LEWIS & CLARK STATE PARK	0	17:37:01	113	Other Incident	Off Road Right	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

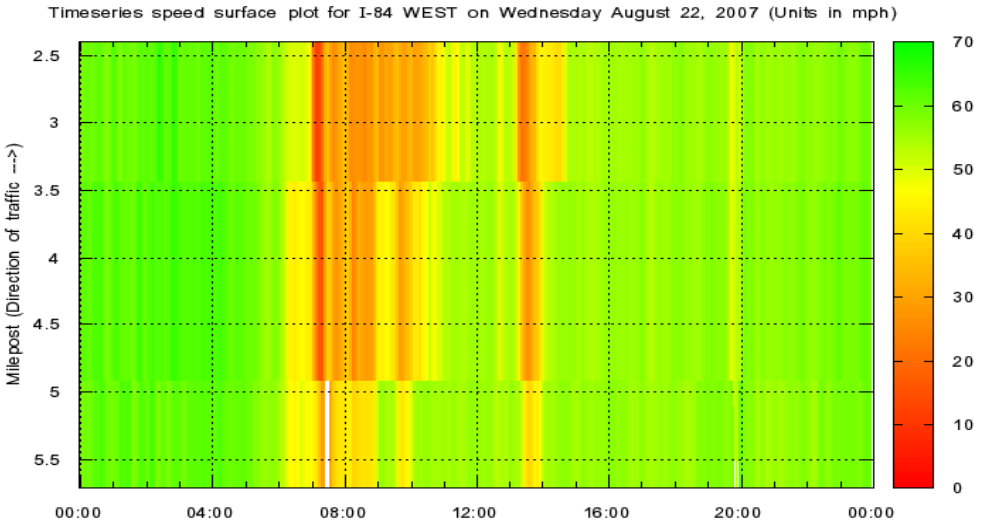


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
740264	I-84	I-84 Westbound At 47TH	0	05:19:15	58	Stall	Right Shoulder	no	0
740503	I-84	I-84 Westbound At 58TH	0	10:42:16	58	Stall	Right Shoulder	no	0
740583	I-84	I-84 Westbound Just West Of 53RD	0	12:53:14	58	Stall	None	no	0
740643	84	84 Westbound AT 74TH	0	14:16:58	58	Stall	Right Shoulder	no	0
740683	84	84 Westbound AT 33RD	0	15:00:09	58	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

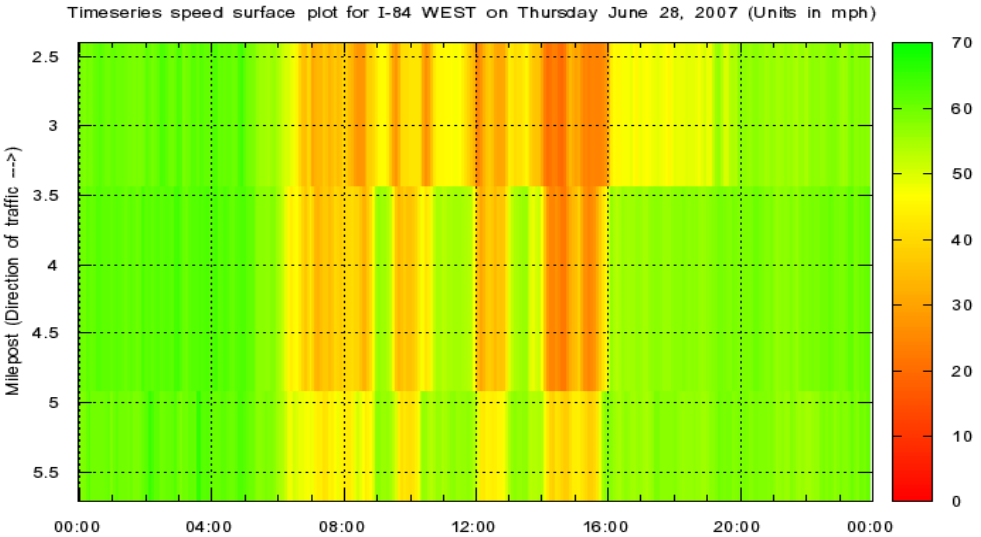
Highway: *I-84* **Time Period: 24 Hrs**
Direction: *Westbound* **Entire I-84 Corridor: Westbound**



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
769230	I-84	I-84 Westbound At 82ND	3	05:40:55	56	Debris	All Lanes	no	0
769248	I-84	I-84 Westbound Near MP 12/13	0	06:13:19	45	Stall	Left Shoulder	no	0
769249	I-84	I-84 Westbound At I-5	1	06:13:46	52	Stall	Left Lanes	no	0
769388	I-84	I-84 Westbound Just East Of 82ND	0	09:53:51	56	Stall	Right Shoulder	no	0
769469	I-84	I-84 Westbound At I-205 NB	0	13:34:50	56	Stall	Right Shoulder	no	0
769552	I-84	I-84 Westbound At 47TH	0	16:53:02	53	Stall	Right Shoulder	no	0
769568	I-84	I-84 Westbound At 47TH	0	16:56:11	56	Stall	Right Shoulder	no	0
769588	84	84 Westbound W OF 68TH	0	17:37:56	56	Debris	Right Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

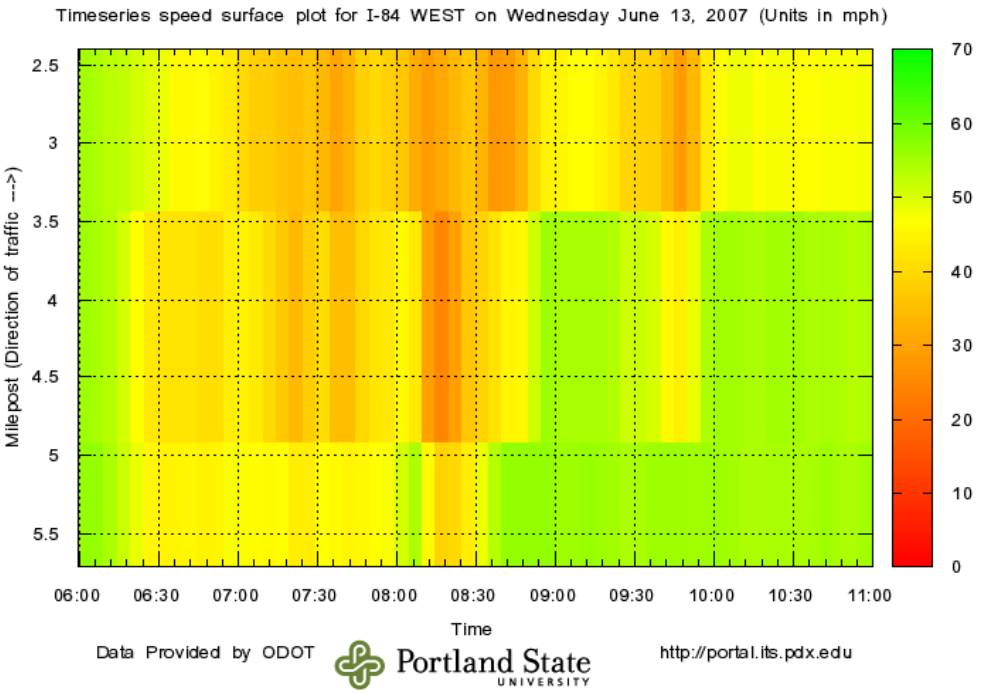
ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
744643	I-84	I-84 Westbound At SANDY	0	08:39:10	58	Stall	Right Shoulder	no	0
744704	I-84	I-84 Westbound Just West Of 82ND	0	10:29:02	58	Stall	Right Shoulder	no	0
744708	I-84	I-84 Westbound I-205	0	10:39:52	58	Stall	Right Shoulder	no	0
744724	I-84	I-84 Westbound MP 40	0	10:45:50	58	Debris	All Lanes	no	0
744725	I-84	I-84 Westbound Just East Of LLOYD	0	10:46:51	58	Stall	Right Shoulder	no	0
744905	84	84 Westbound RAMP TO SB 205	1	14:46:20	58	Crash	Left Lanes	no	0
744964	84	84 Westbound PRI TO 12TH	1	15:41:23	58	Stall	Left Lanes	no	0
744985	84	84 Westbound AT 21ST	0	15:57:30	58	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

I-84 Westbound

AM Peak Hour Speed Plots

DAVID EVANS AND ASSOCIATES INC.


Timeseries speed surface plot for I-84 WEST on Wednesday June 13, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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Portland State
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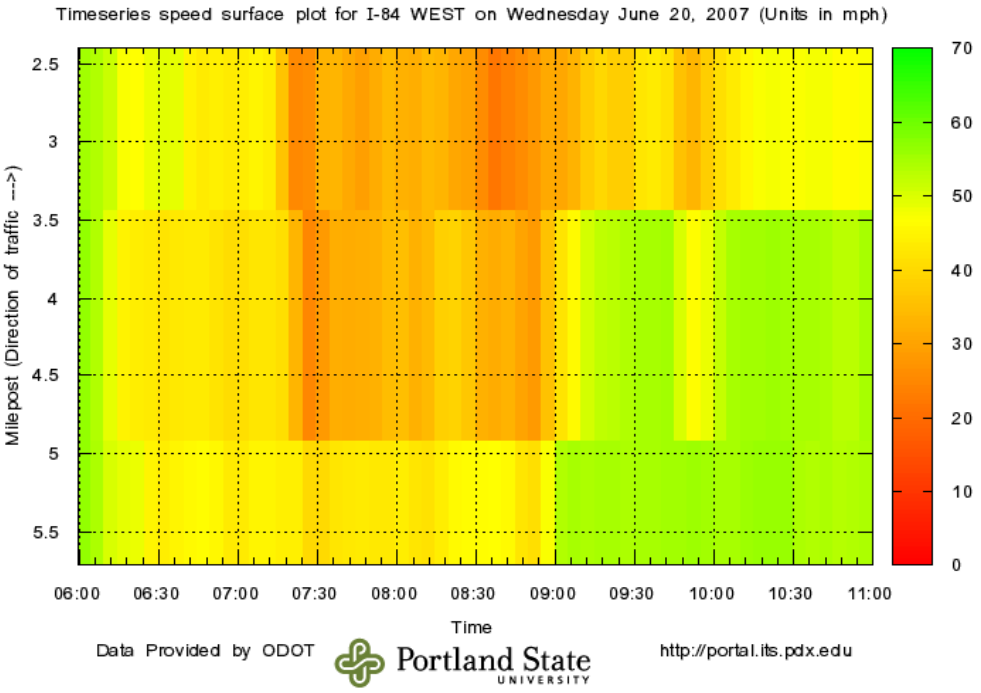
http://portal.its.pdx.edu


Timeseries speed surface plot for I-84 WEST on Wednesday June 20, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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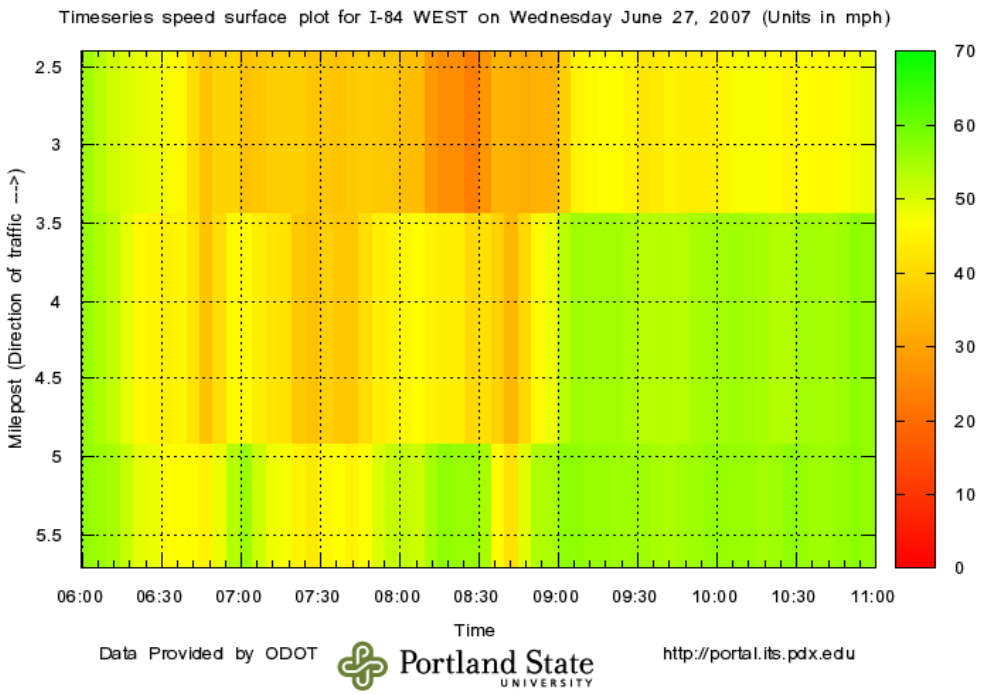
Timeseries speed surface plot for I-84 WEST on Wednesday June 27, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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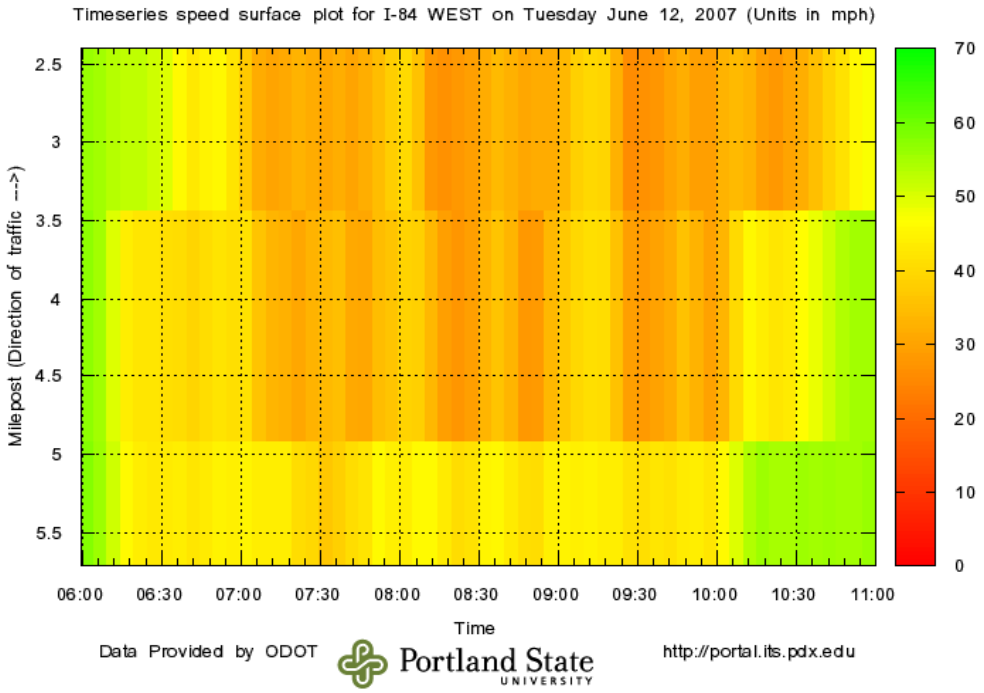
Timeseries speed surface plot for I-84 WEST on Tuesday June 12, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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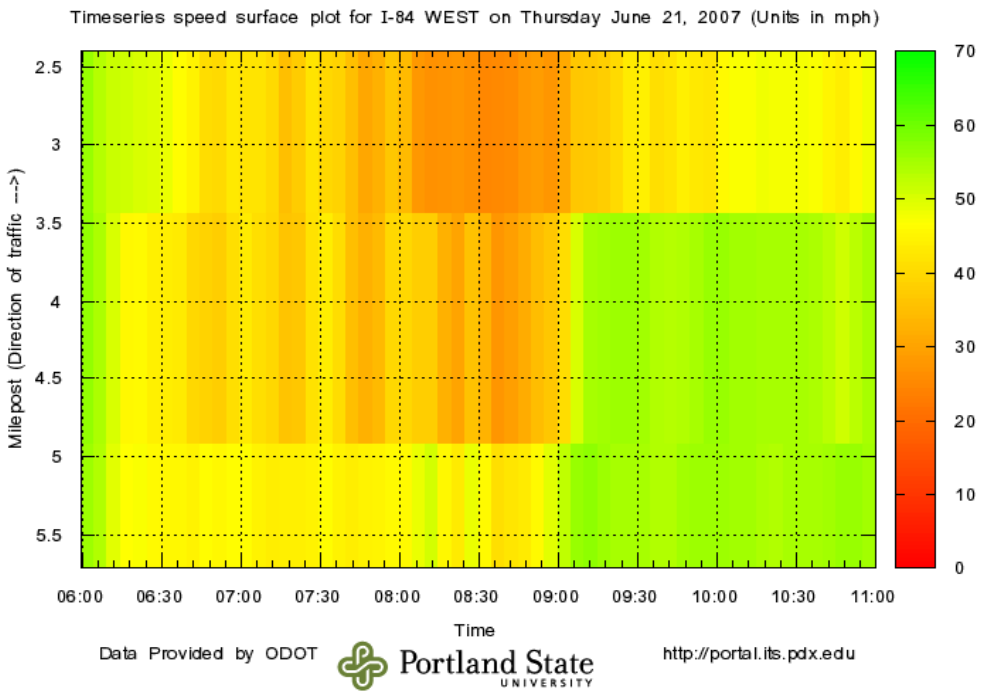
Timeseries speed surface plot for I-84 WEST on Thursday June 21, 2007 (Units in mph)
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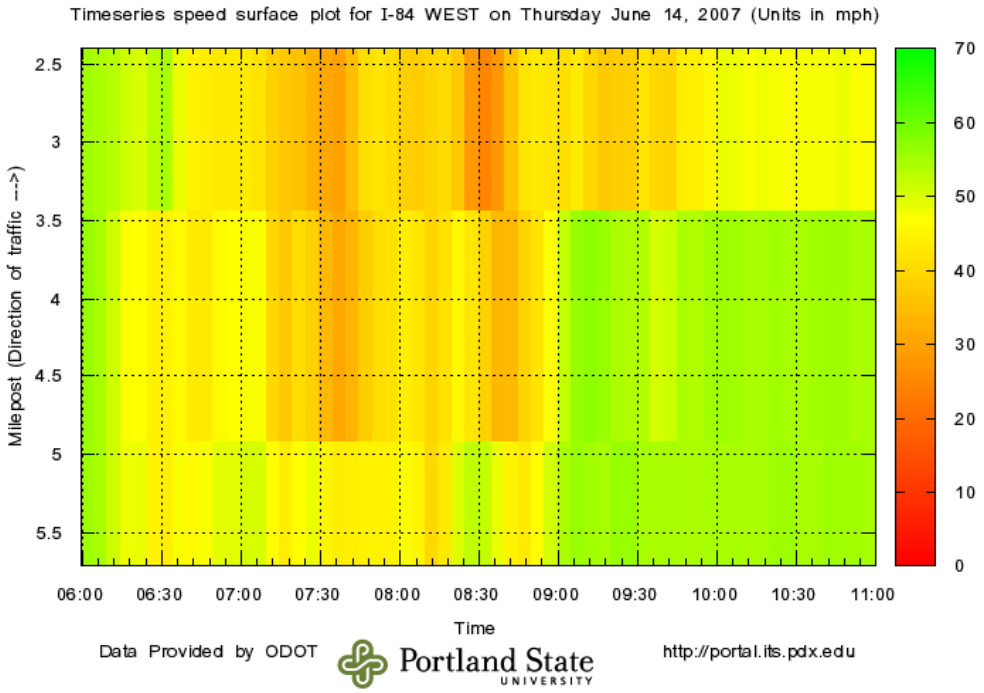
Timeseries speed surface plot for I-84 WEST on Thursday June 14, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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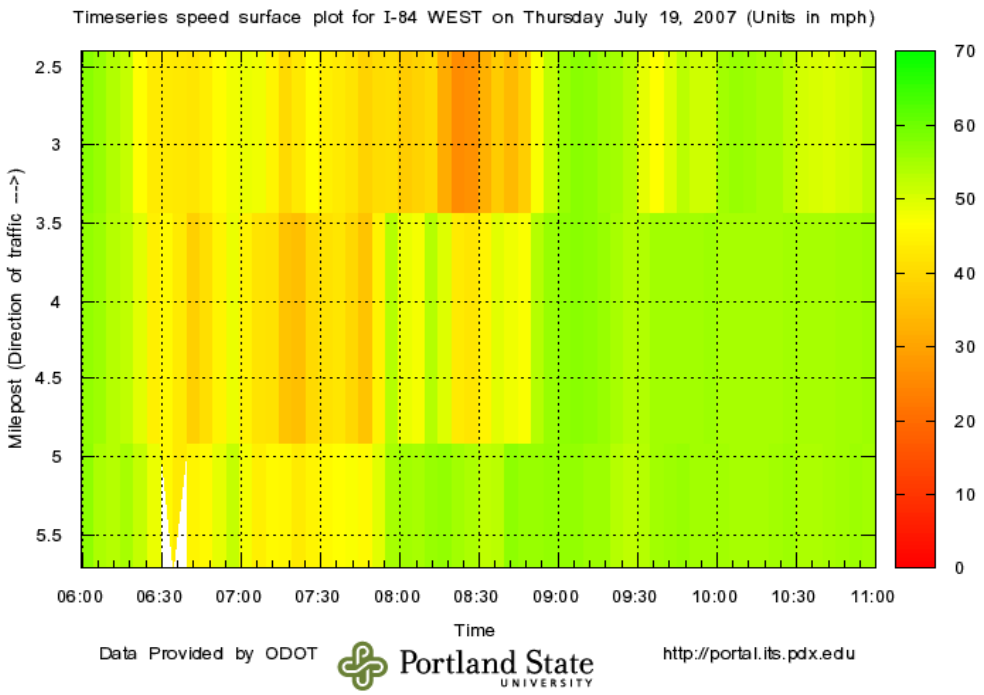
Timeseries speed surface plot for I-84 WEST on Thursday July 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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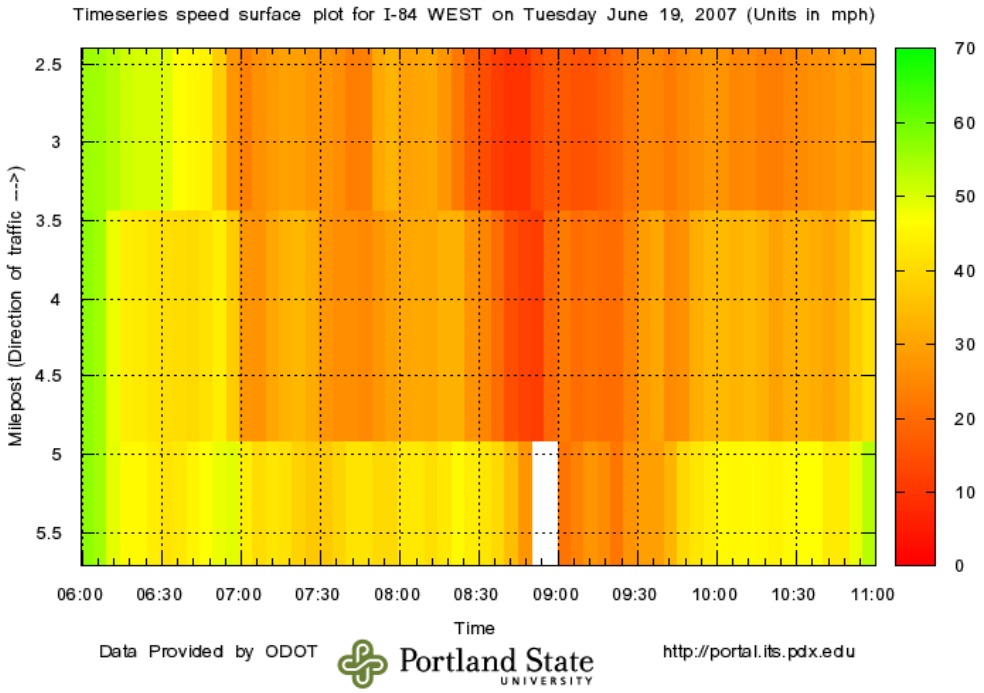
Timeseries speed surface plot for I-84 WEST on Tuesday June 19, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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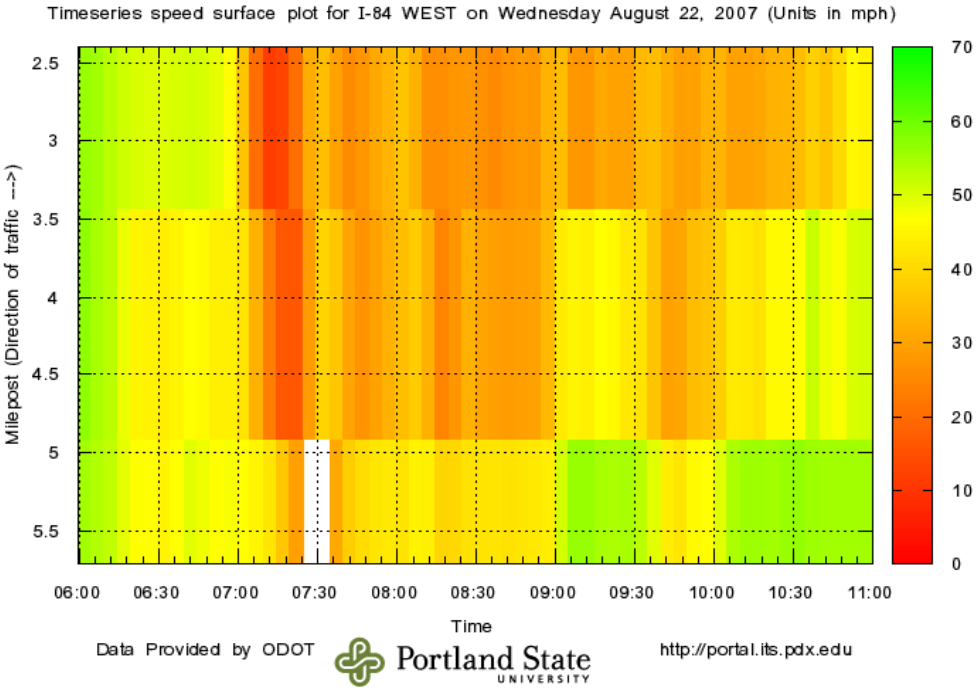
Timeseries speed surface plot for I-84 WEST on Wednesday August 22, 2007 (Units in mph)
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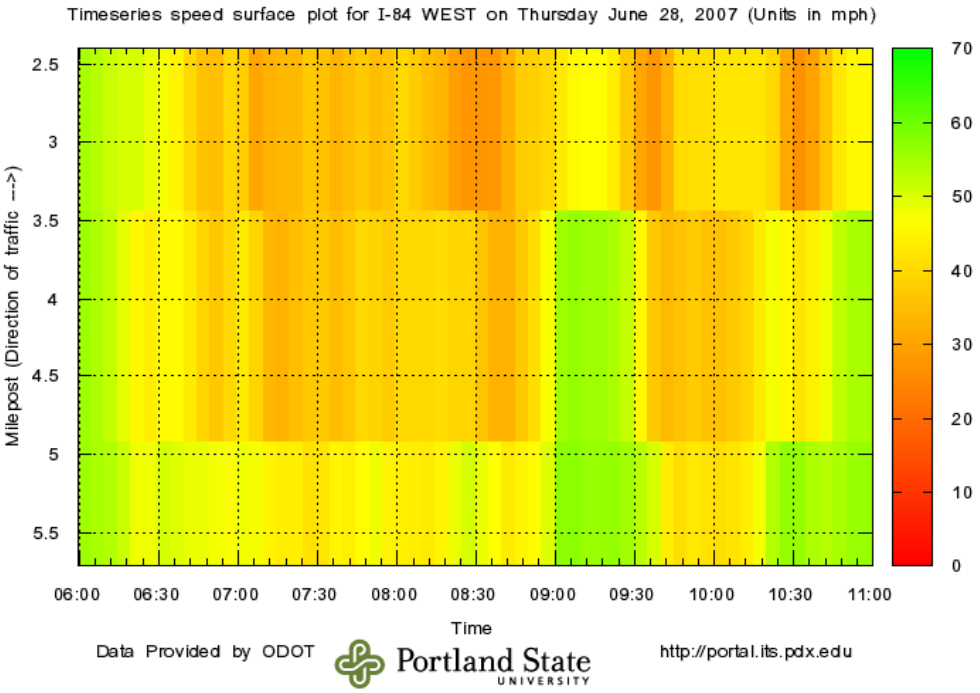
Timeseries speed surface plot for I-84 WEST on Thursday June 28, 2007 (Units in mph)
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I-84 Westbound

PM Peak Hour Speed Plots

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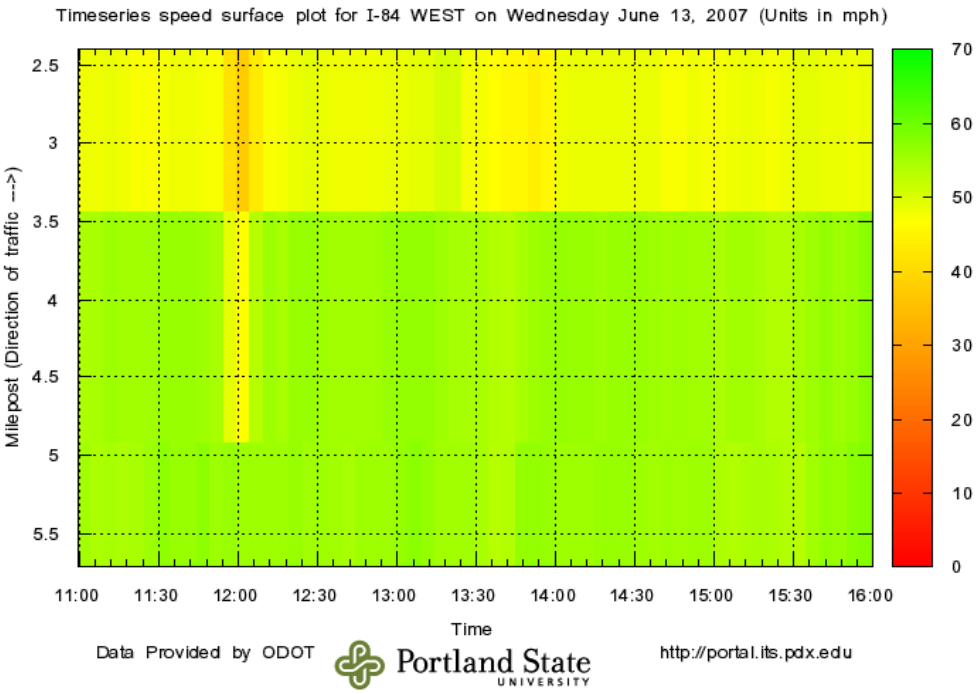
Timeseries speed surface plot for I-84 WEST on Wednesday June 13, 2007 (Units in mph)
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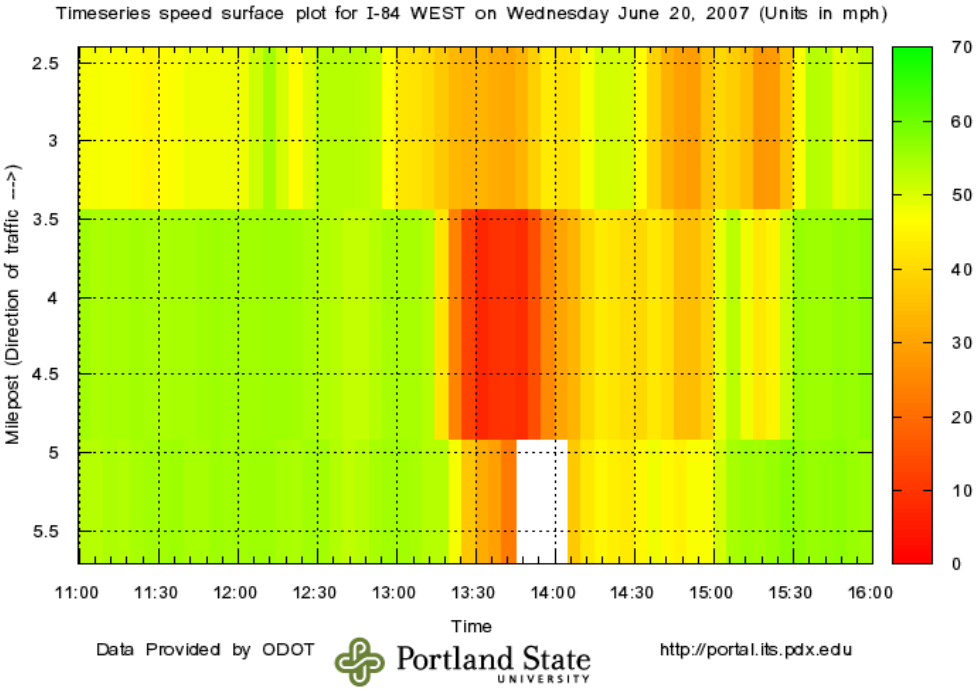
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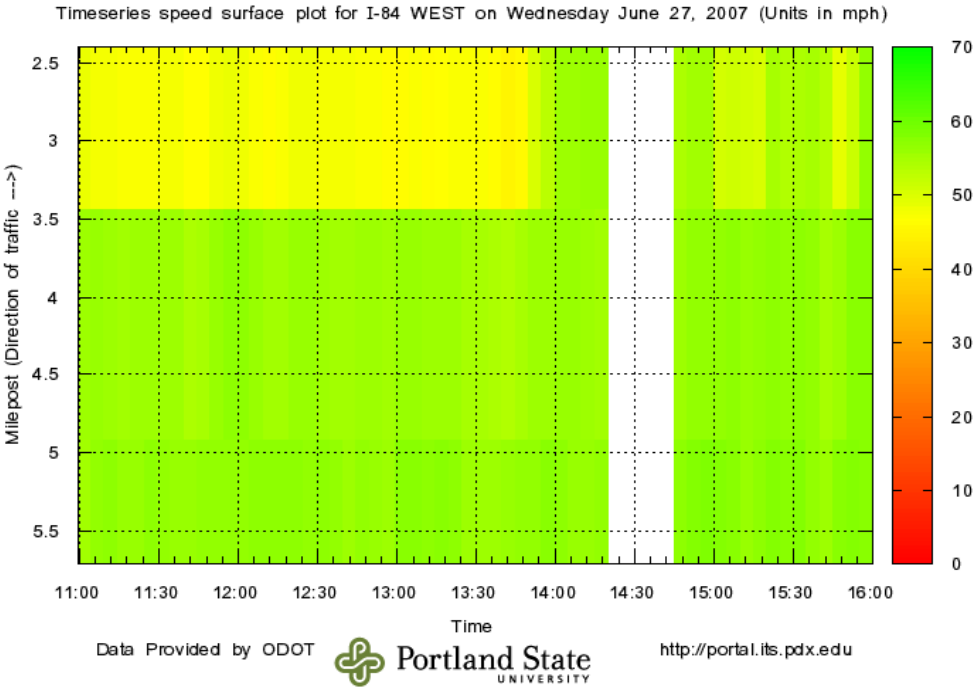
Timeseries speed surface plot for I-84 WEST on Wednesday June 27, 2007 (Units in mph)
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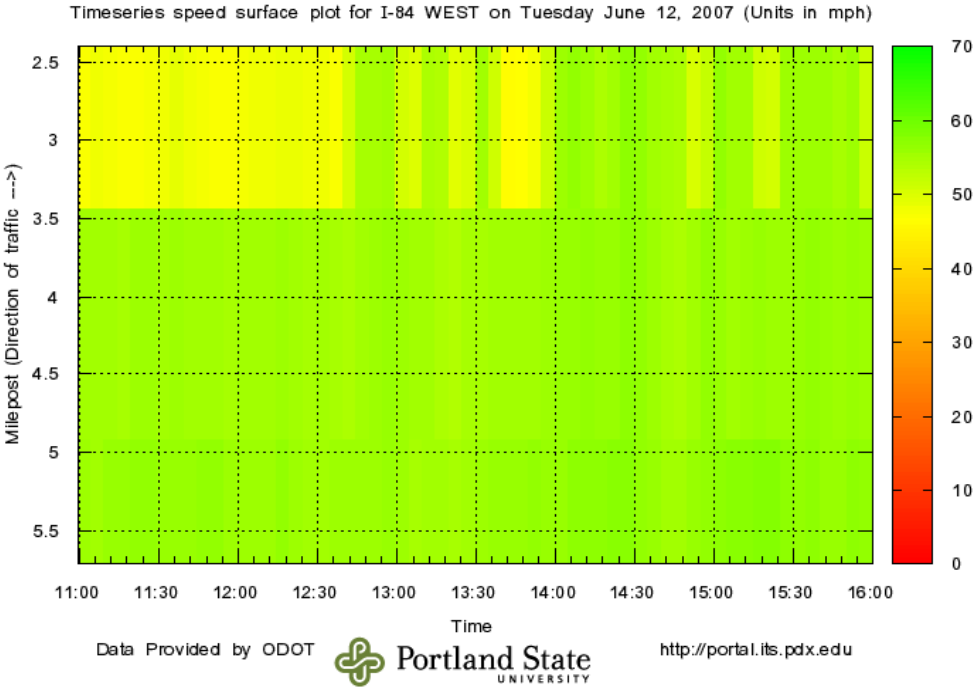
Timeseries speed surface plot for I-84 WEST on Tuesday June 12, 2007 (Units in mph)
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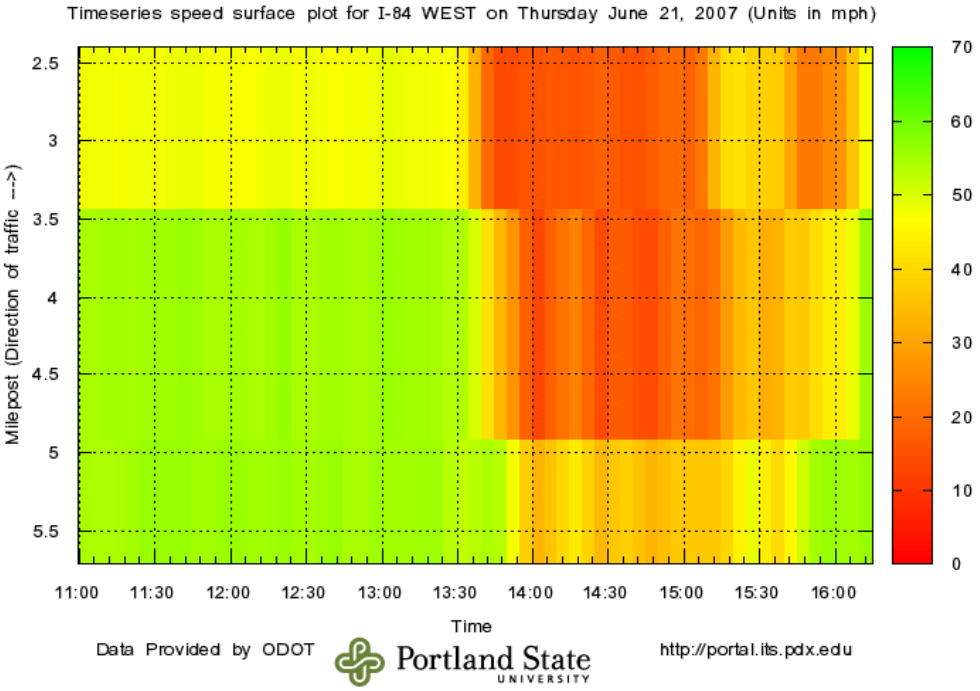
Timeseries speed surface plot for I-84 WEST on Thursday June 21, 2007 (Units in mph)
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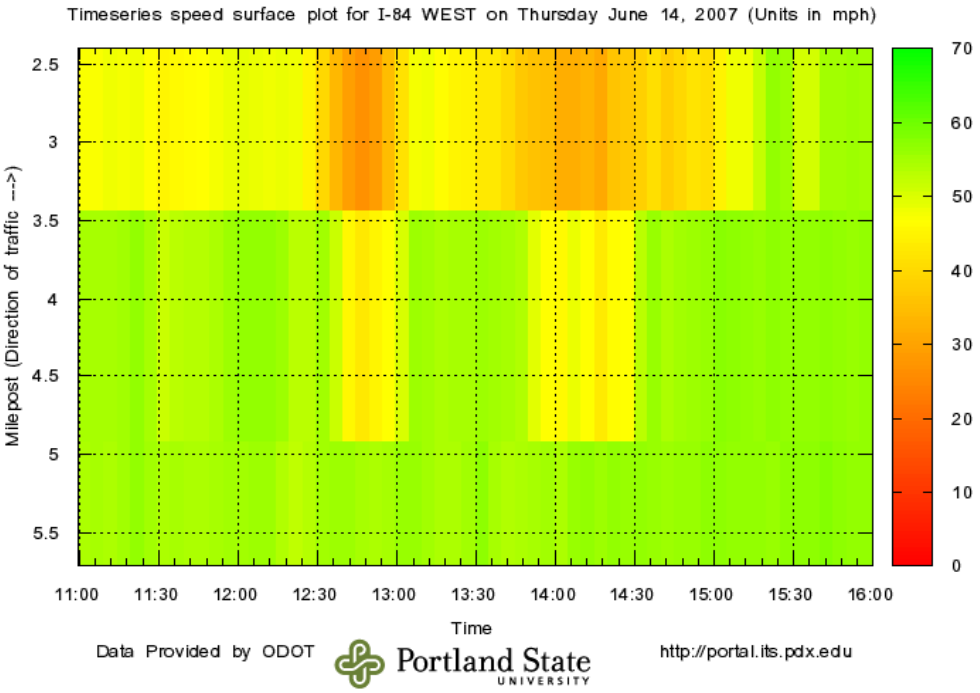
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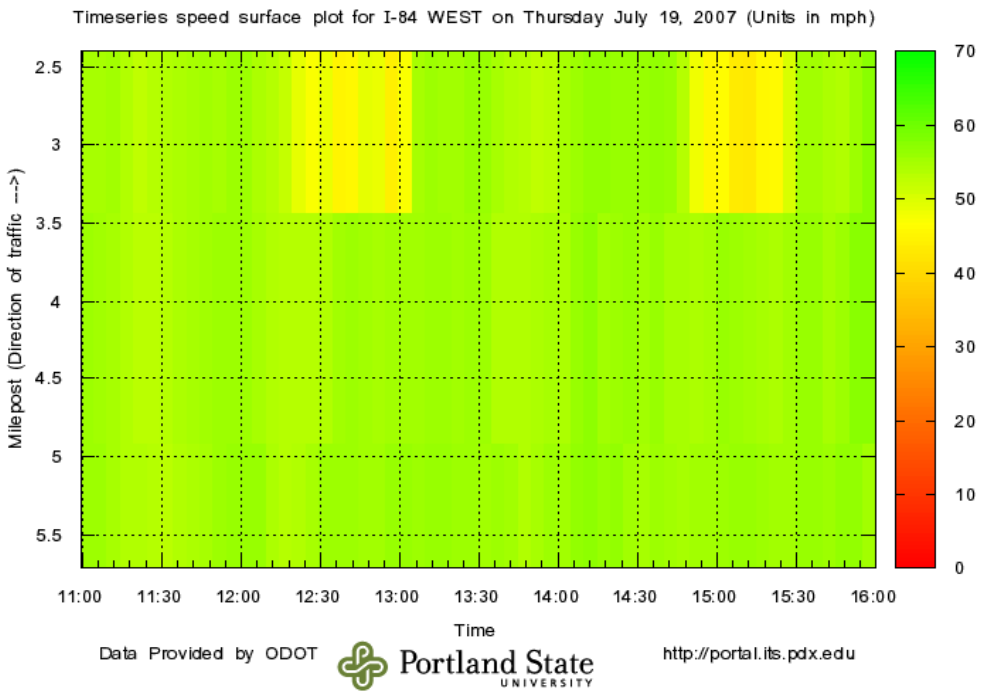
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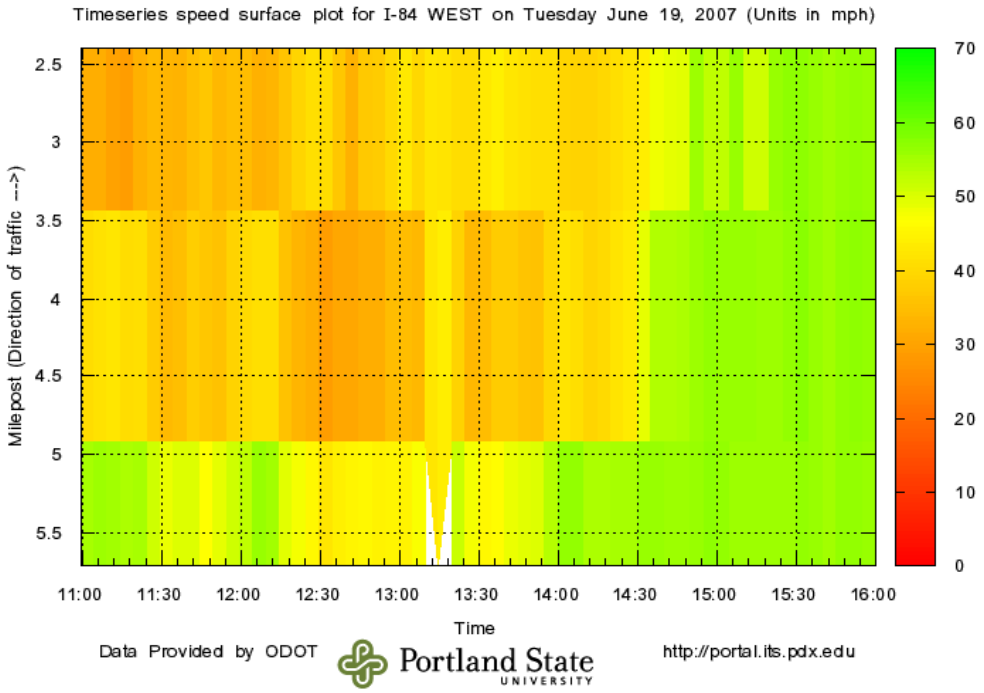
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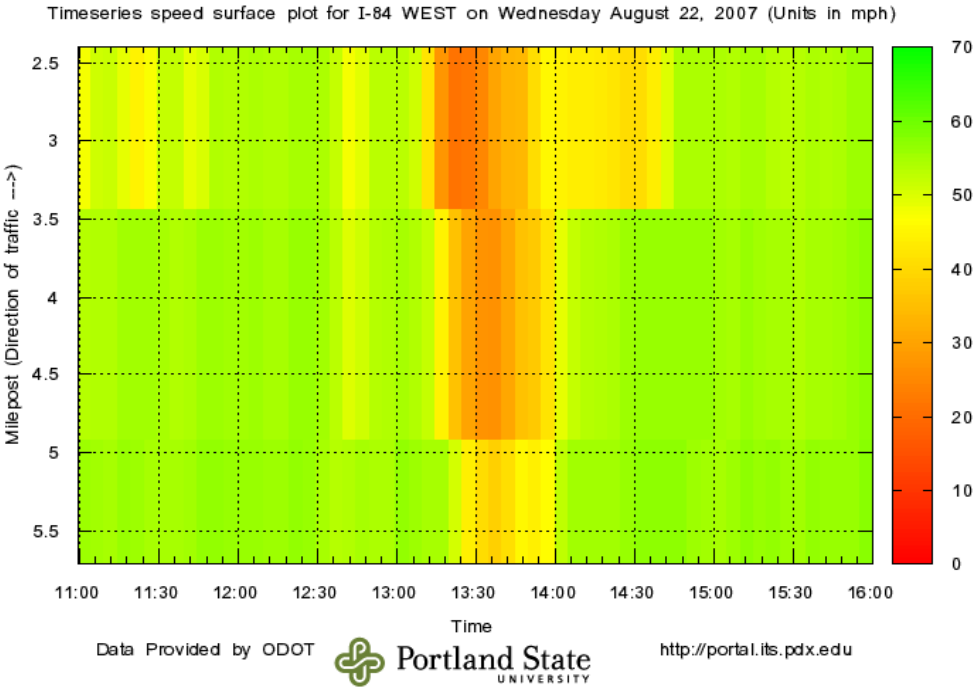
Timeseries speed surface plot for I-84 WEST on Wednesday August 22, 2007 (Units in mph)
Milepost (Direction of traffic --->)
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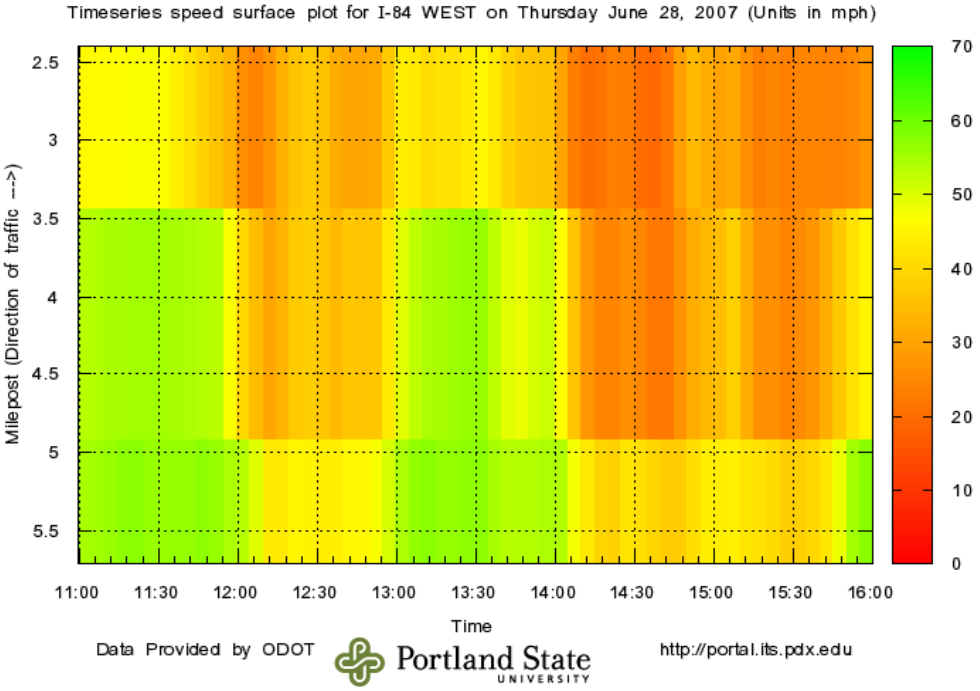
Timeseries speed surface plot for I-84 WEST on Thursday June 28, 2007 (Units in mph)
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Data Provided by ODOT
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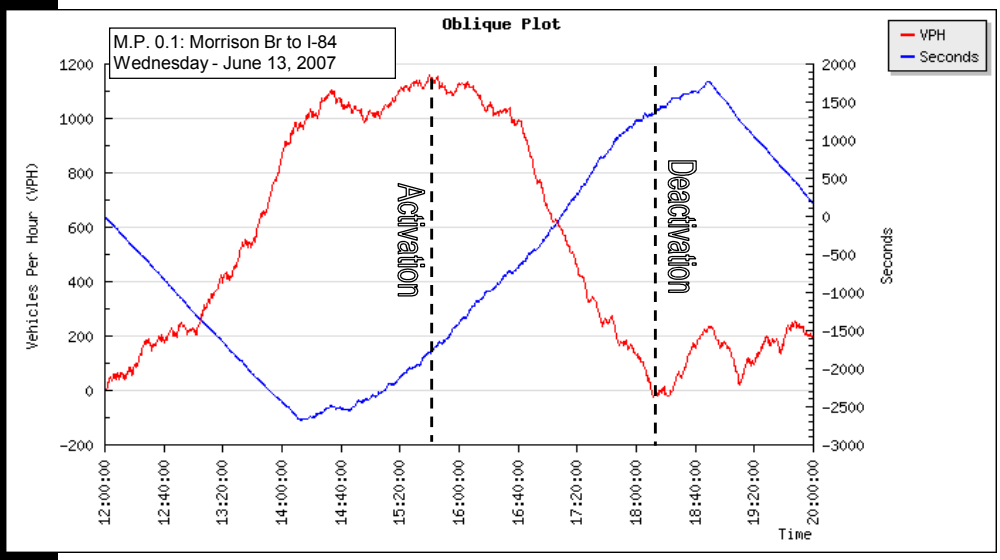
I-84 Oblique Plots

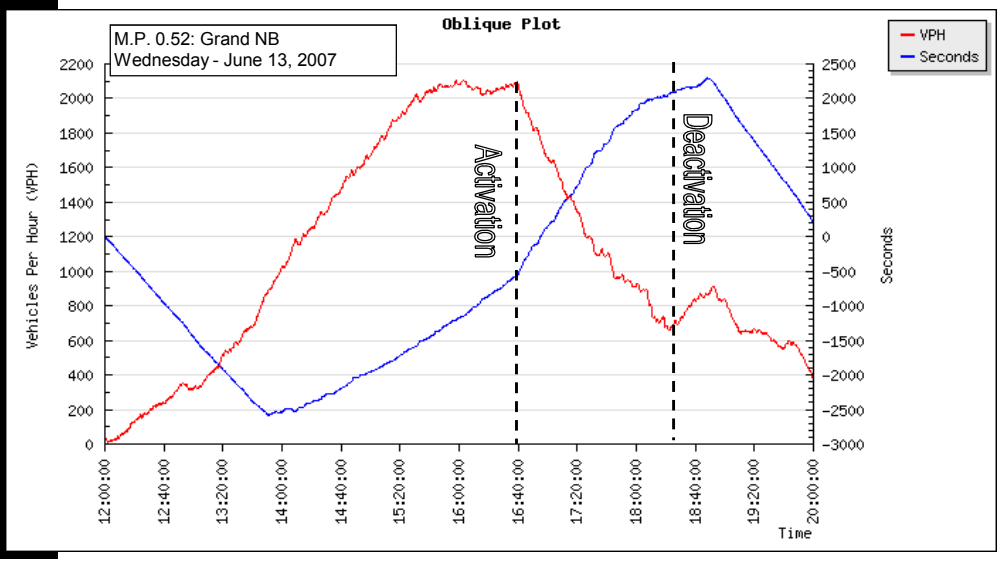
Eastbound

Westbound

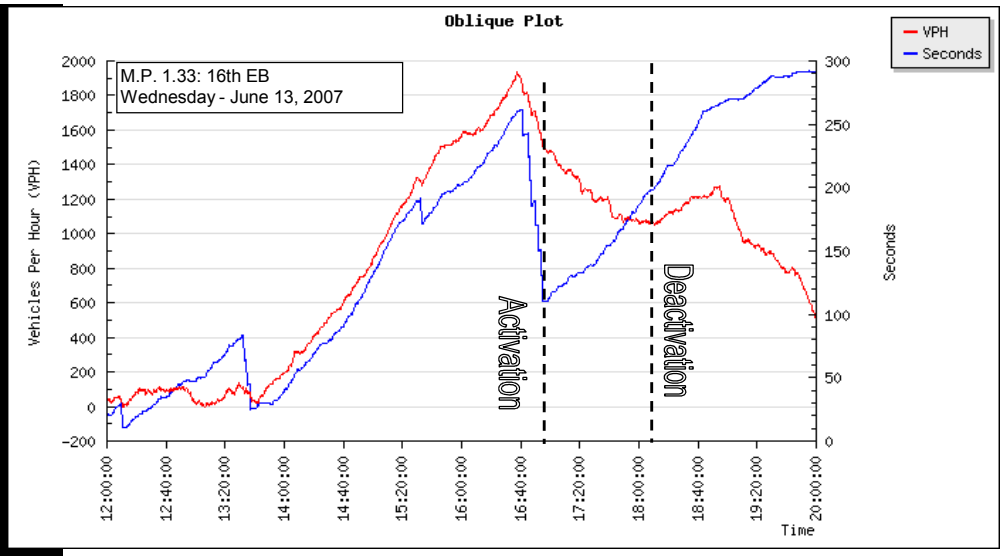
DAVID EVANS AND ASSOCIATES INC.

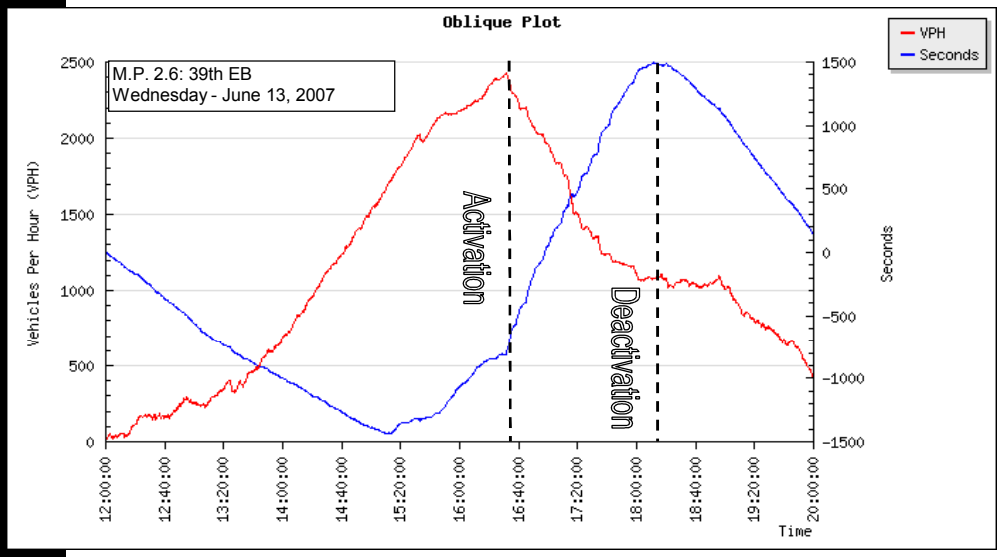
Highway: *I-84* **Date:** *June 13th 2007*
Direction: *Eastbound*



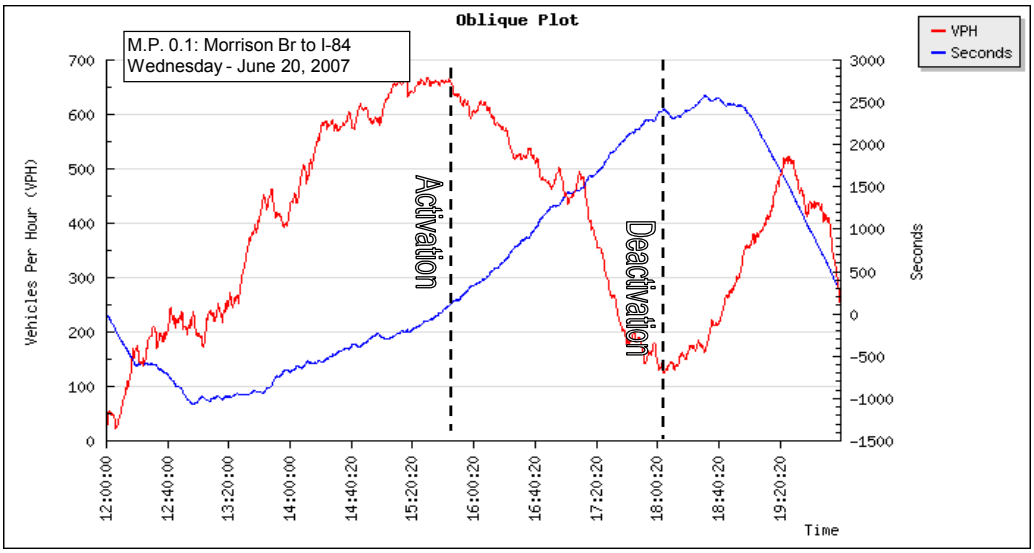


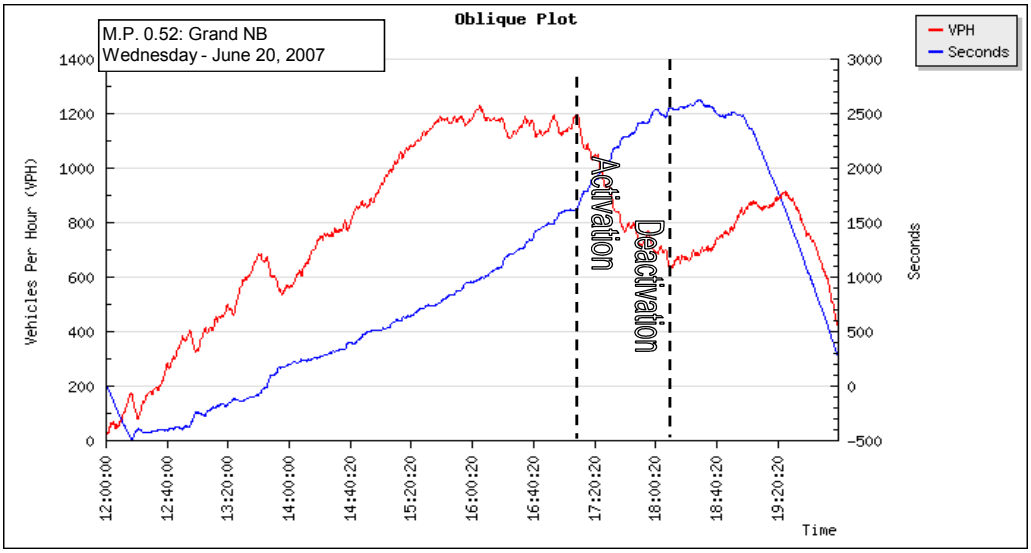
Highway: *I-84* **Date:** *June 13th 2007*
Direction: *Eastbound*



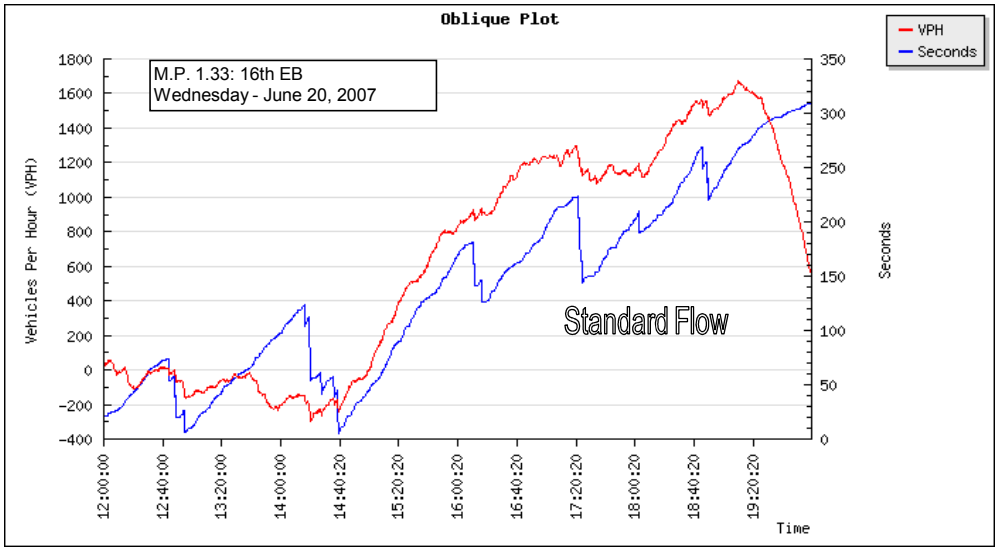


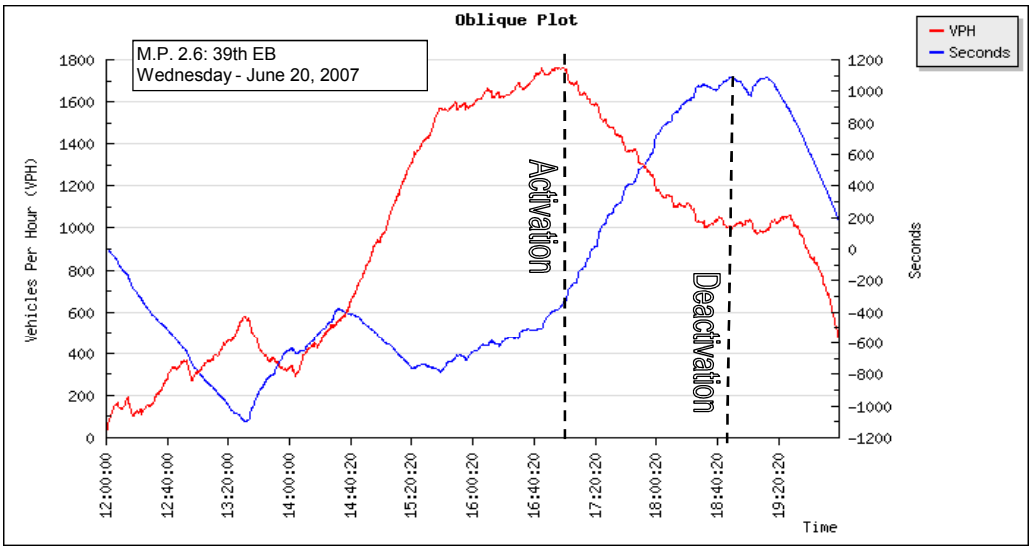
Highway: *I-84* **Date:** *June 20th 2007*
Direction: *Eastbound*



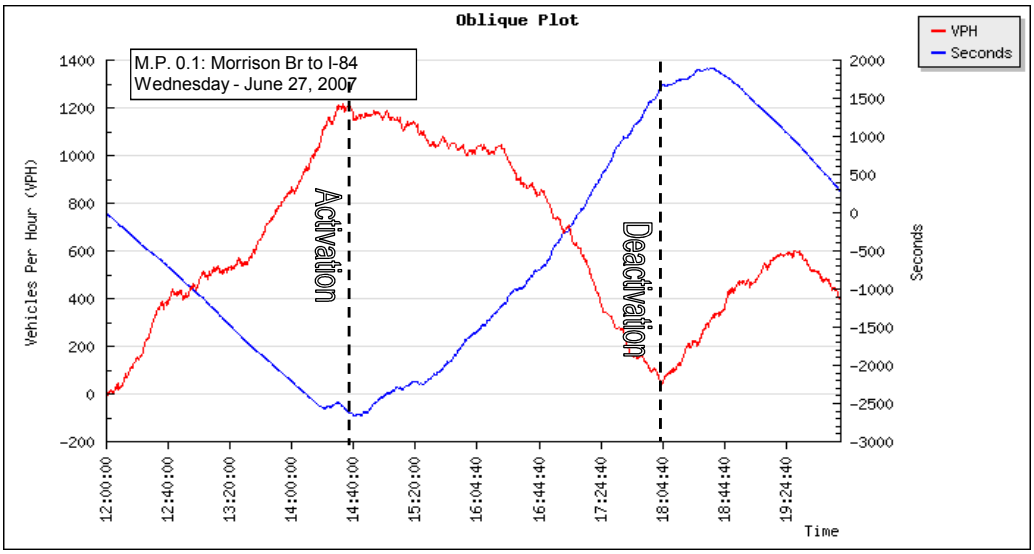


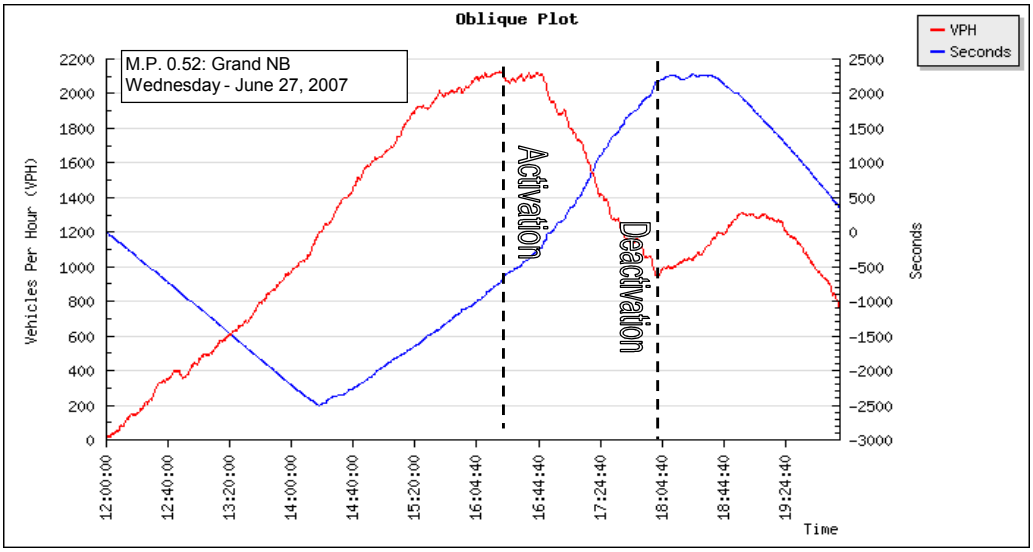
Highway: *I-84* **Date:** *June 20th 2007*
Direction: *Eastbound*



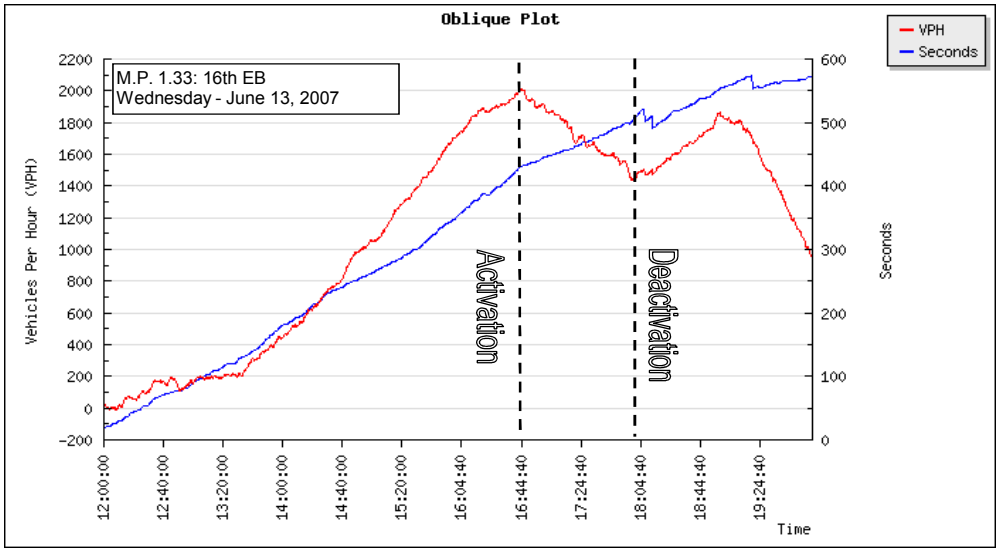


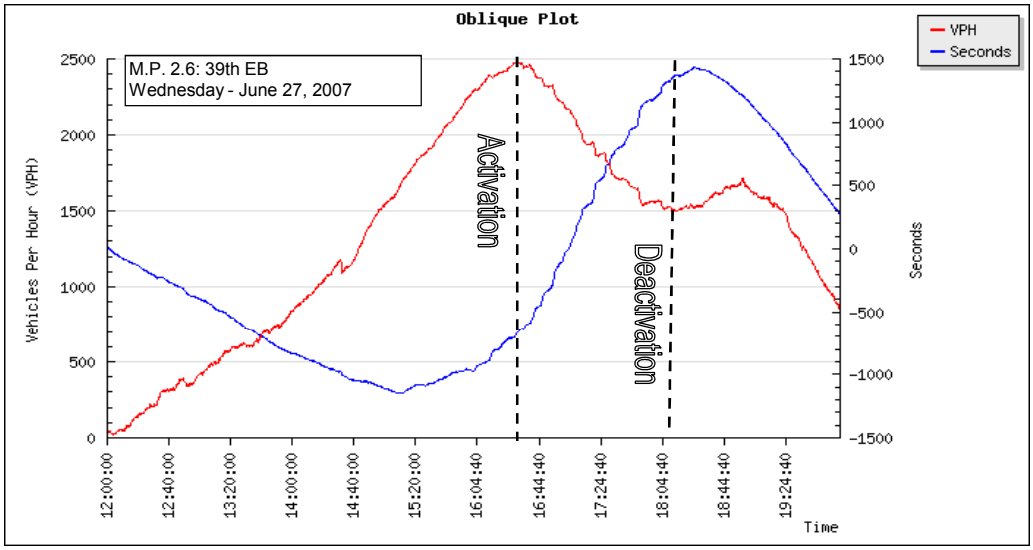
Highway: *I-84* **Date:** *June 27th 2007*
Direction: *Eastbound*



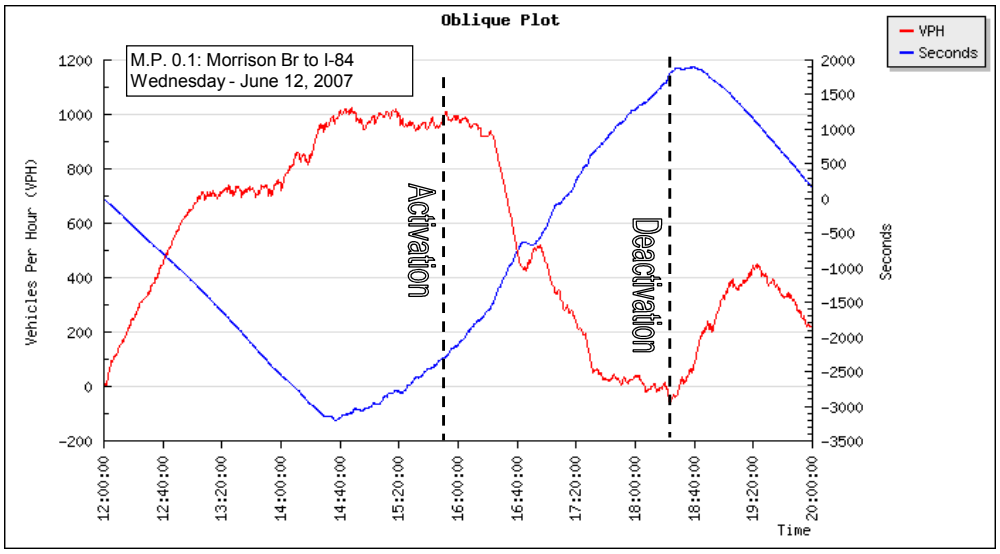


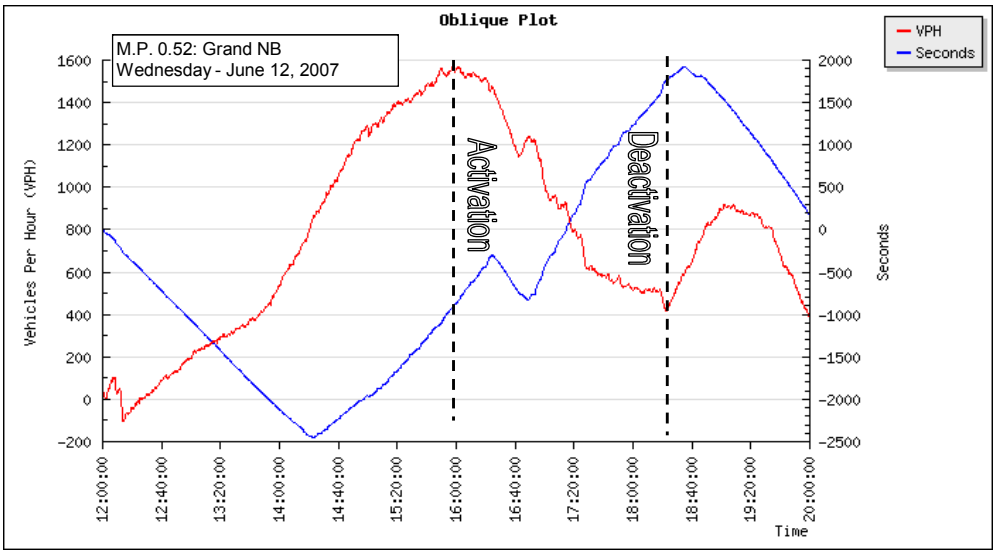
Highway: *I-84* **Date:** *June 27th 2007*
Direction: *Eastbound*



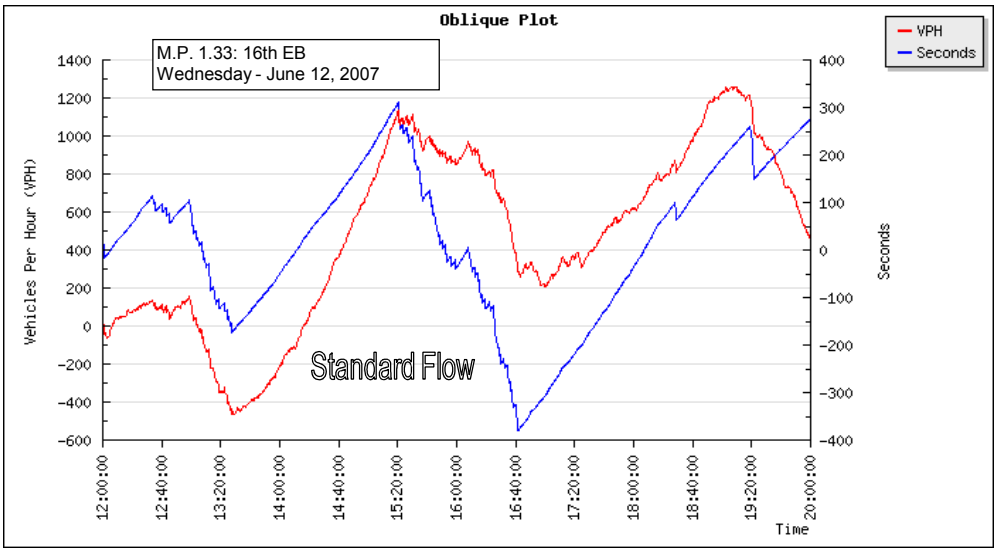


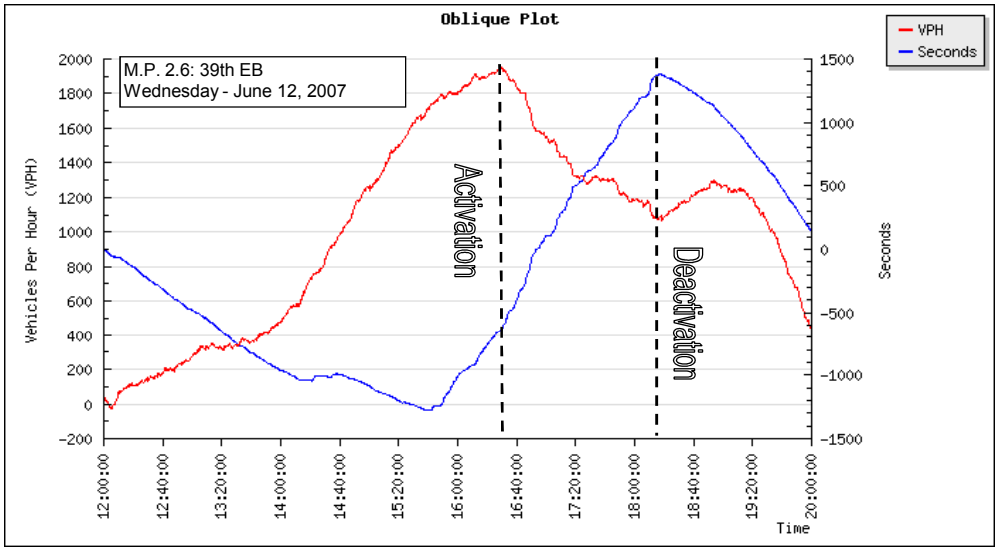
Highway: *I-84* **Date:** *June 12th 2007*
Direction: *Eastbound*



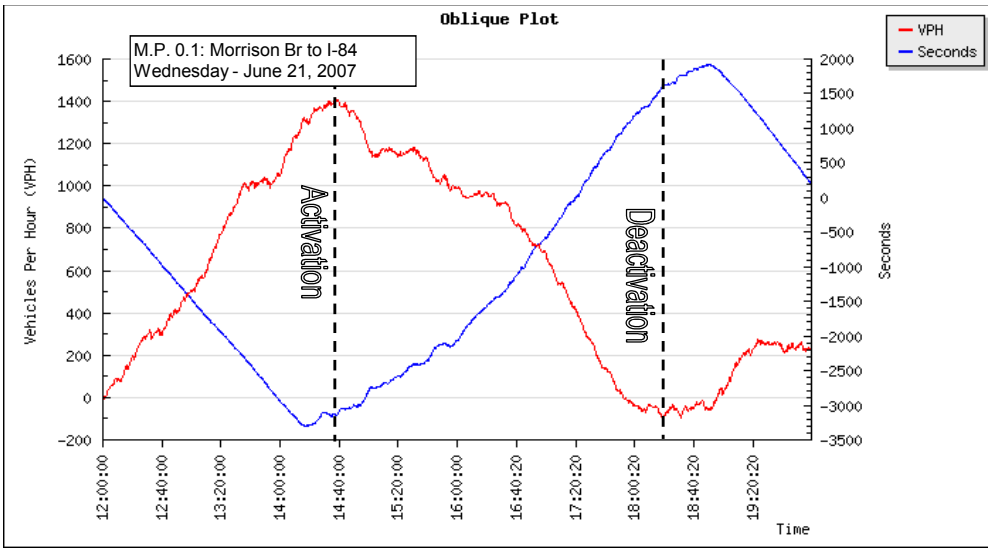


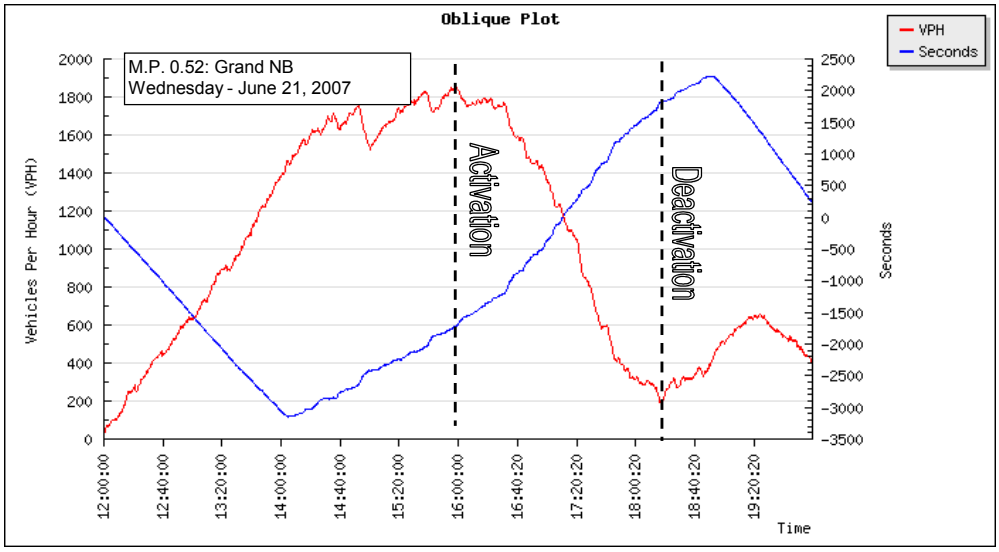
Highway: *I-84* **Date:** *June 12th 2007*
Direction: *Eastbound*



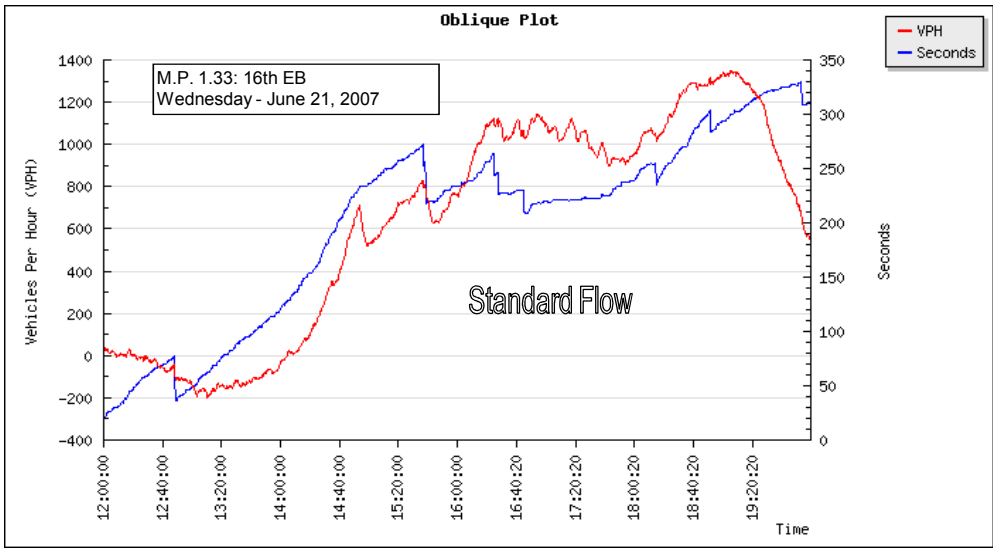


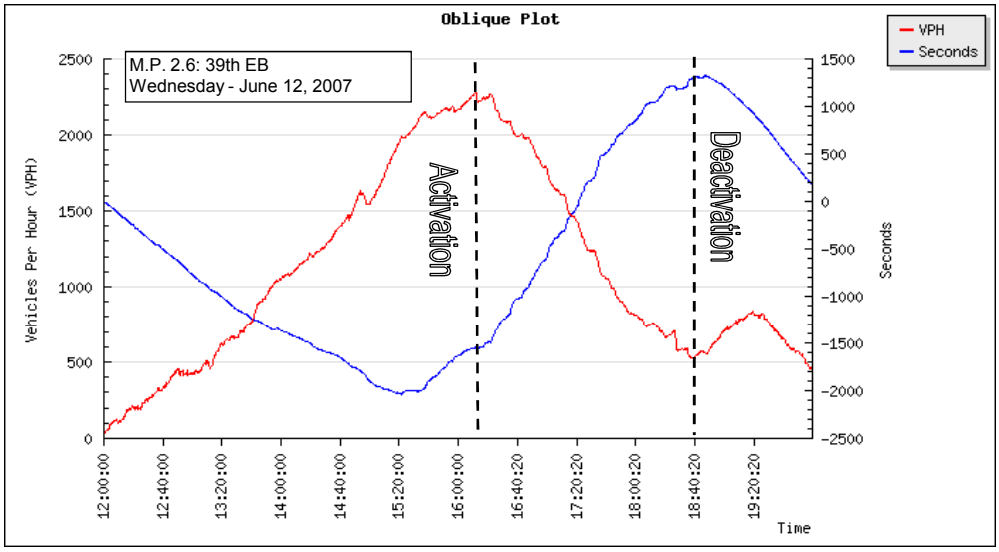
Highway: *I-84* **Date:** *June 21st 2007*
Direction: *Eastbound*



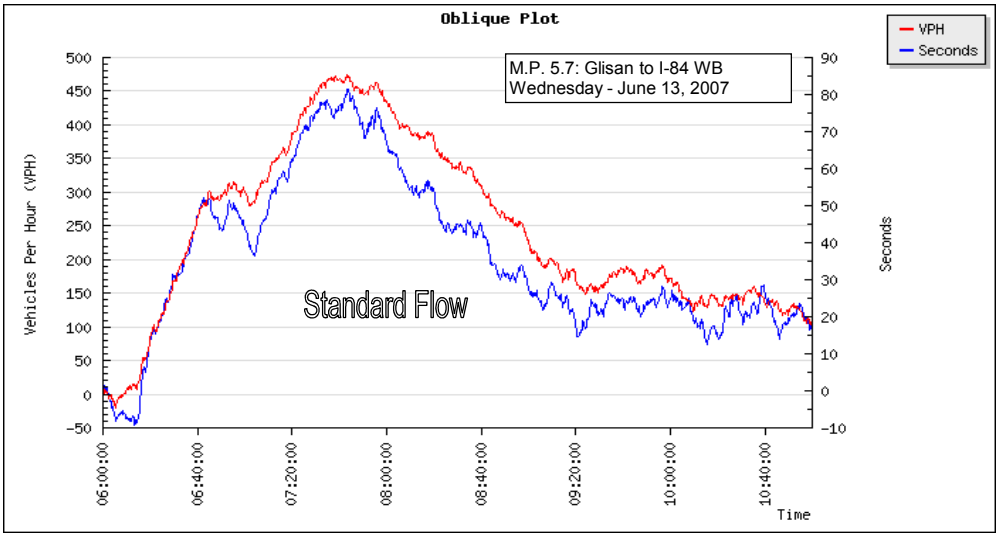


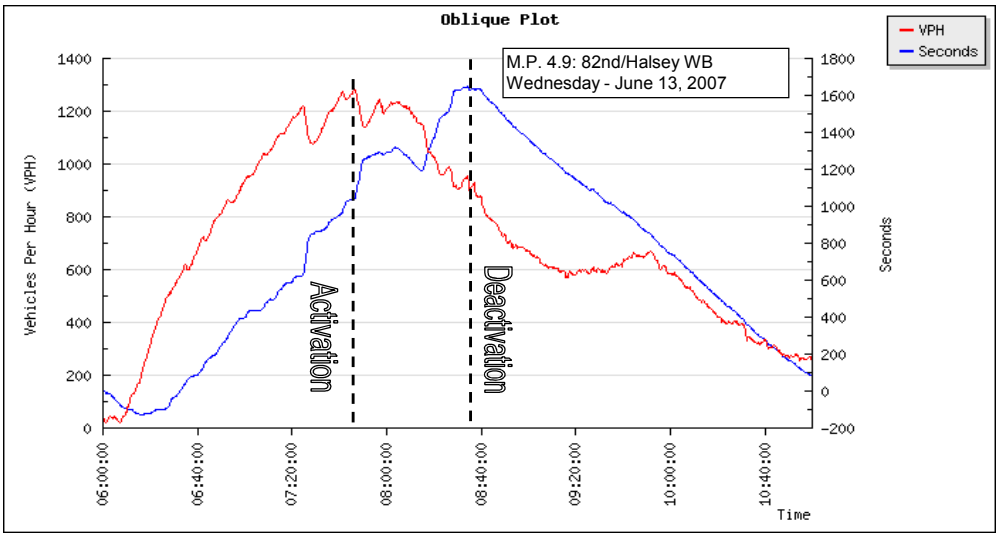
Highway: *I-84* **Date:** *June 21st 2007*
Direction: *Eastbound*

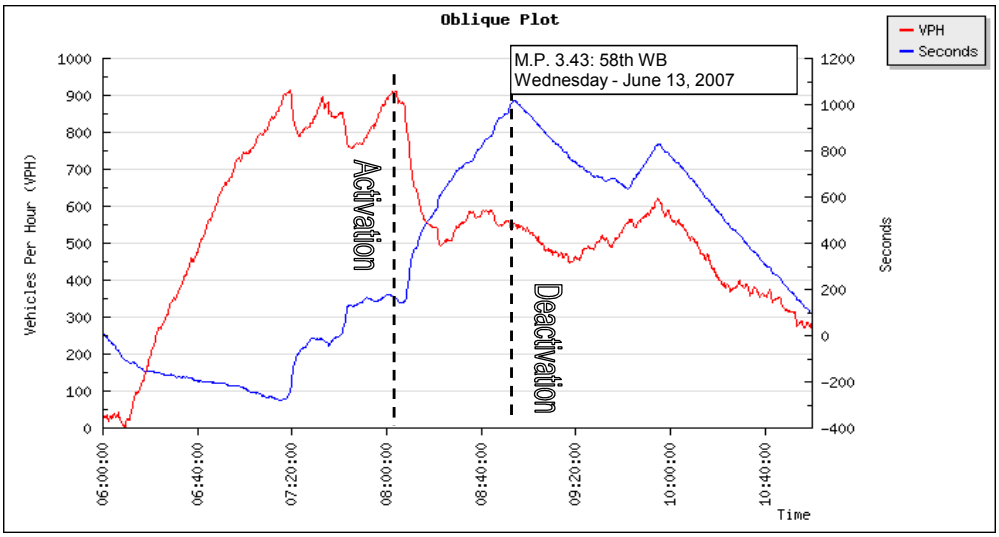




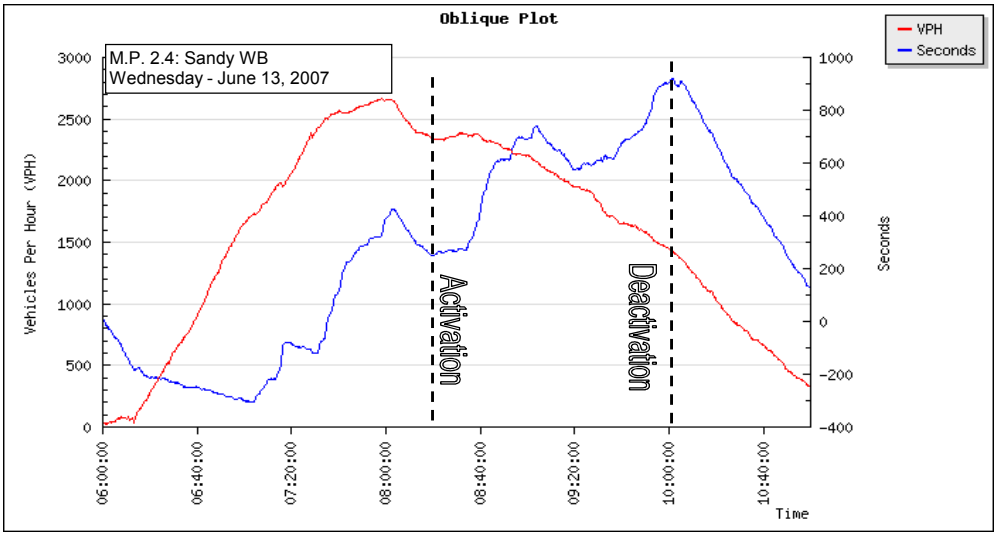
Highway: *I-84* **Date:** *June 13th 2007 AM*
Direction: *Westbound*

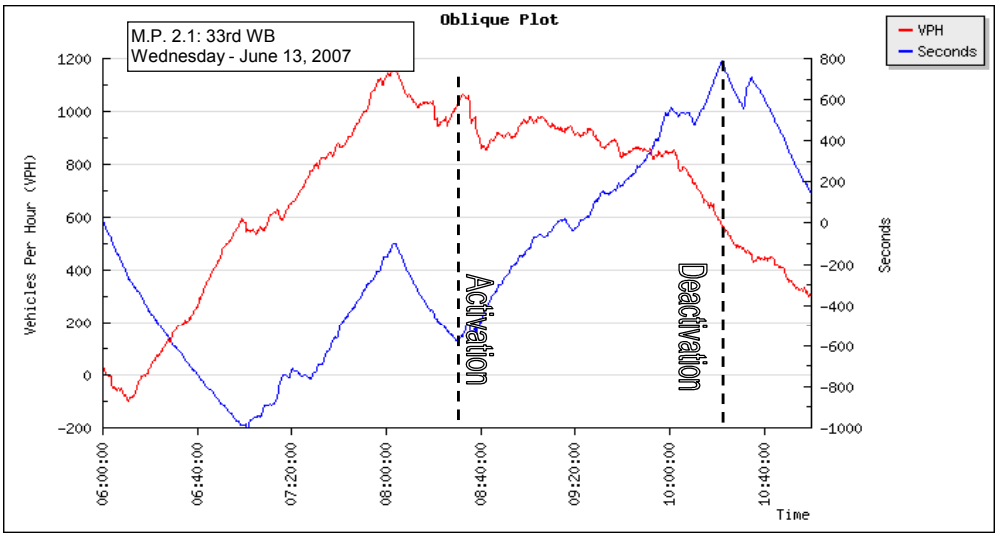




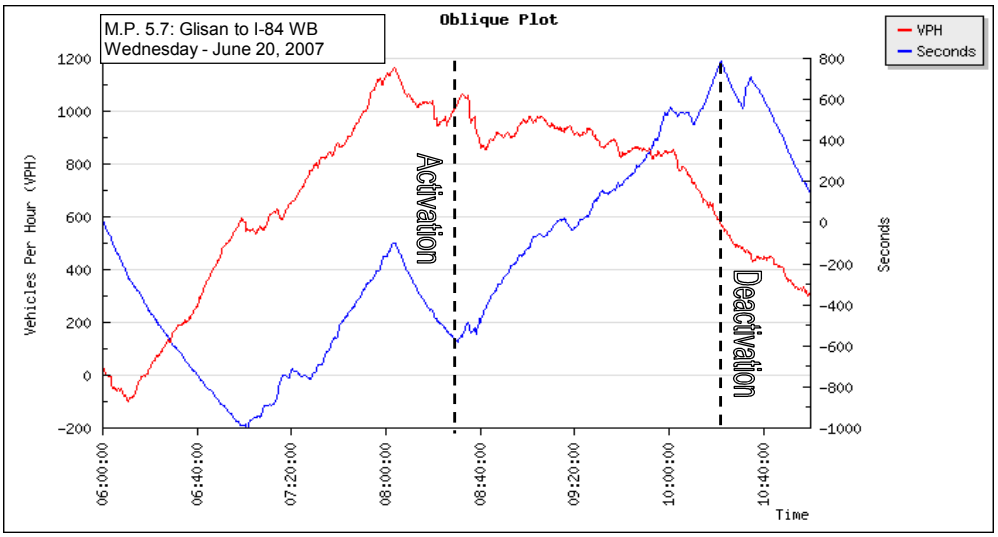


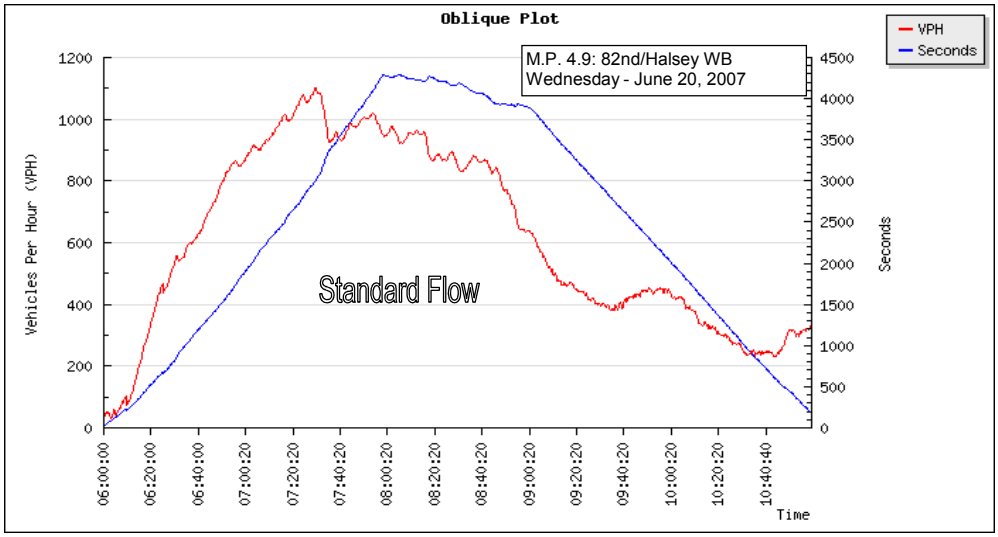
Highway: *I-84* **Date:** *June 13th 2007 AM*
Direction: *Westbound*

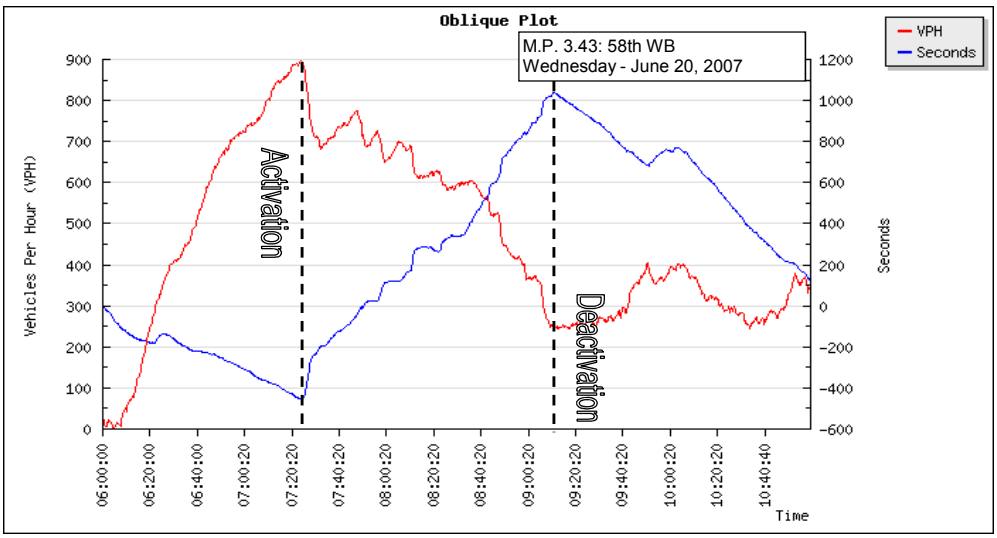




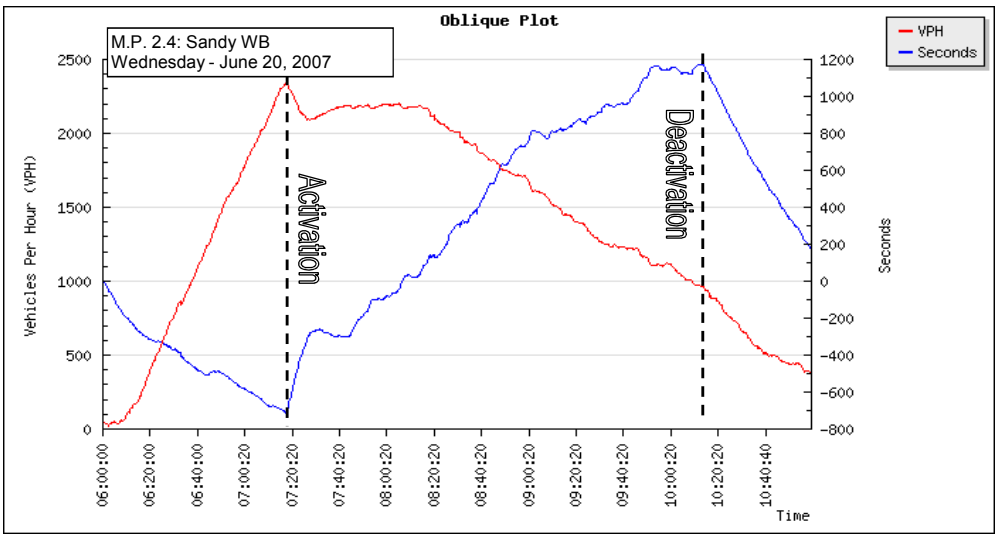
Highway: *I-84* **Date:** *June 20th 2007 AM*
Direction: *Westbound*

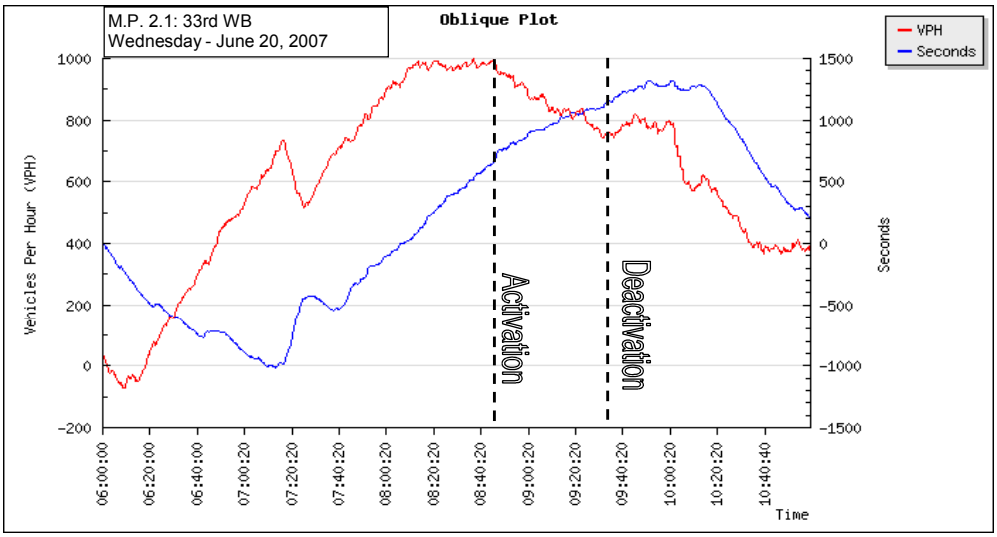




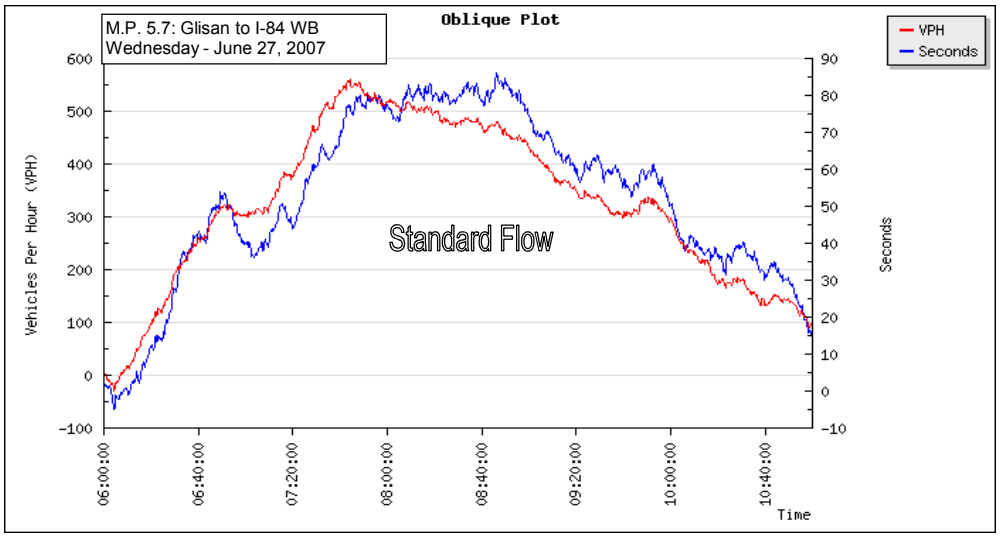


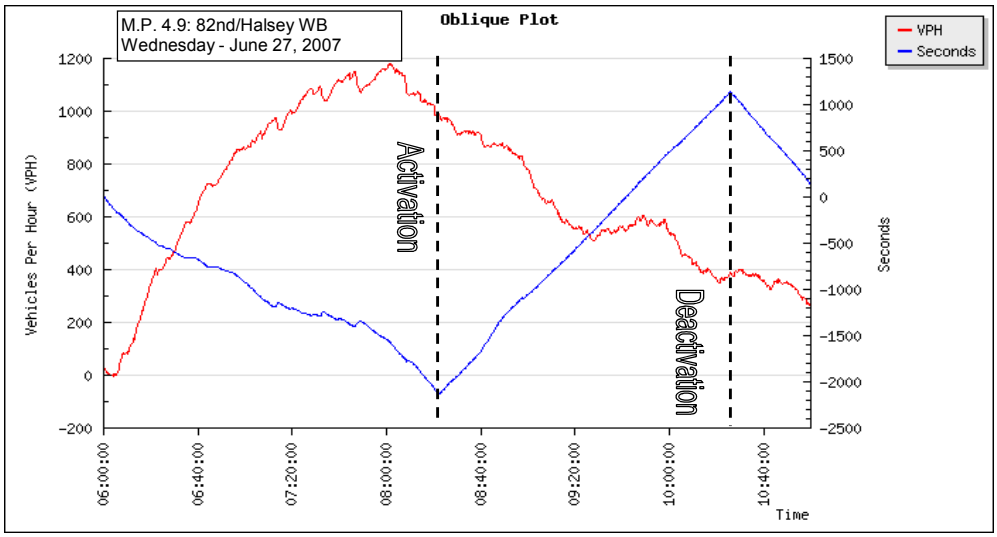
Highway: *I-84* **Date:** *June 20th 2007 AM*
Direction: *Westbound*

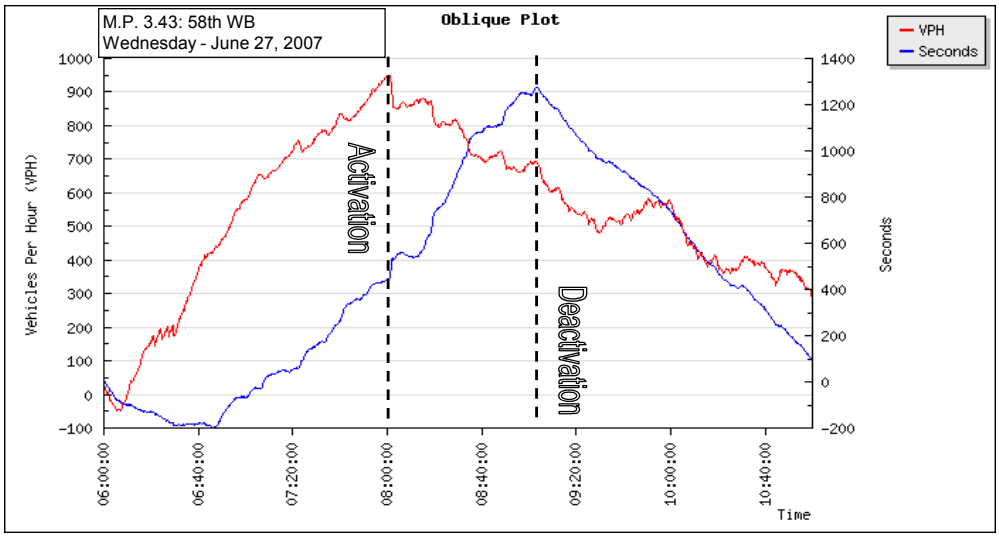




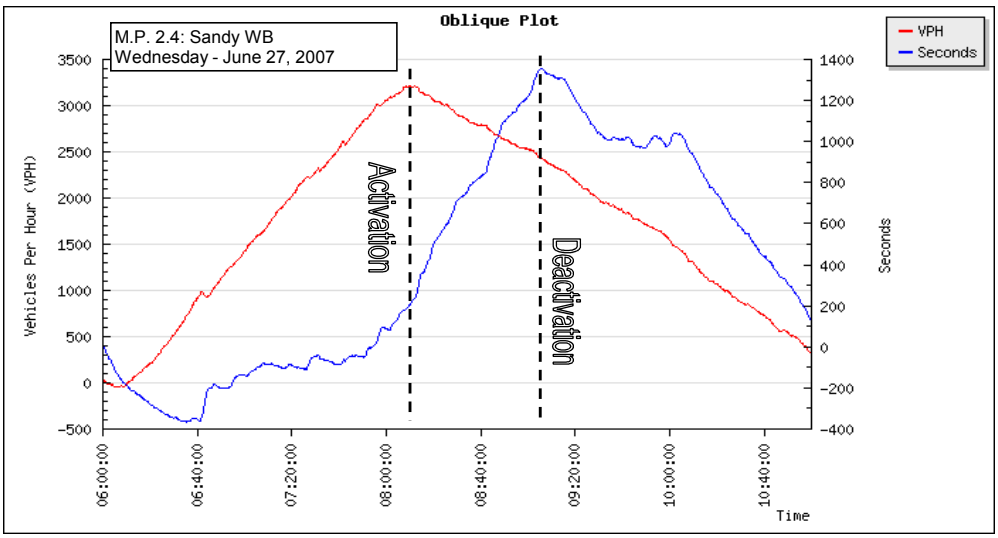
Highway: *I-84* **Date:** *June 27th 2007 AM*
Direction: *Westbound*

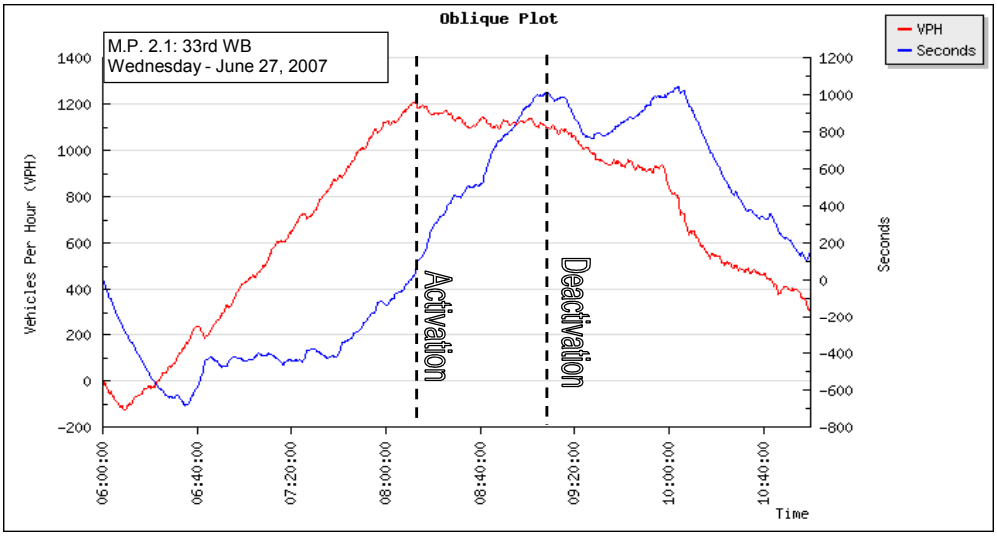




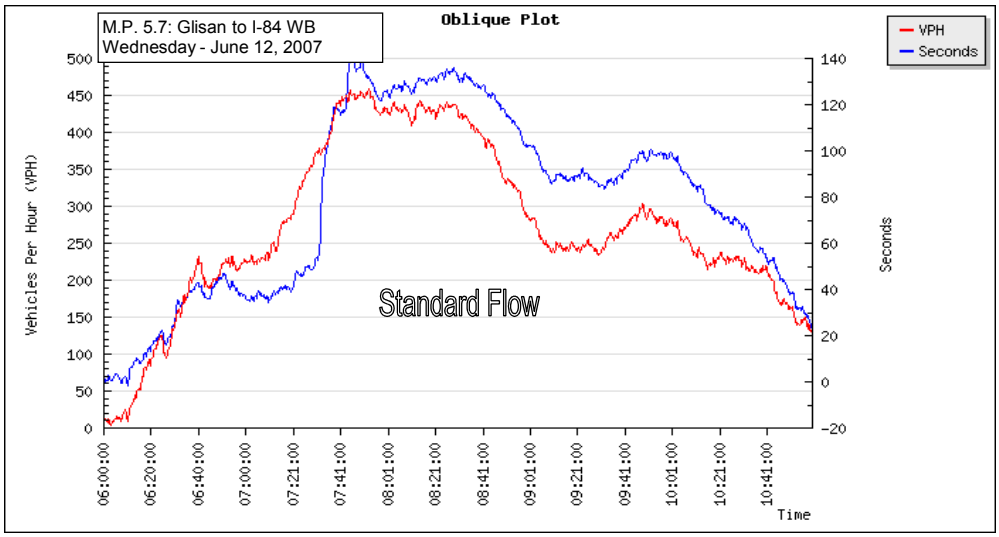


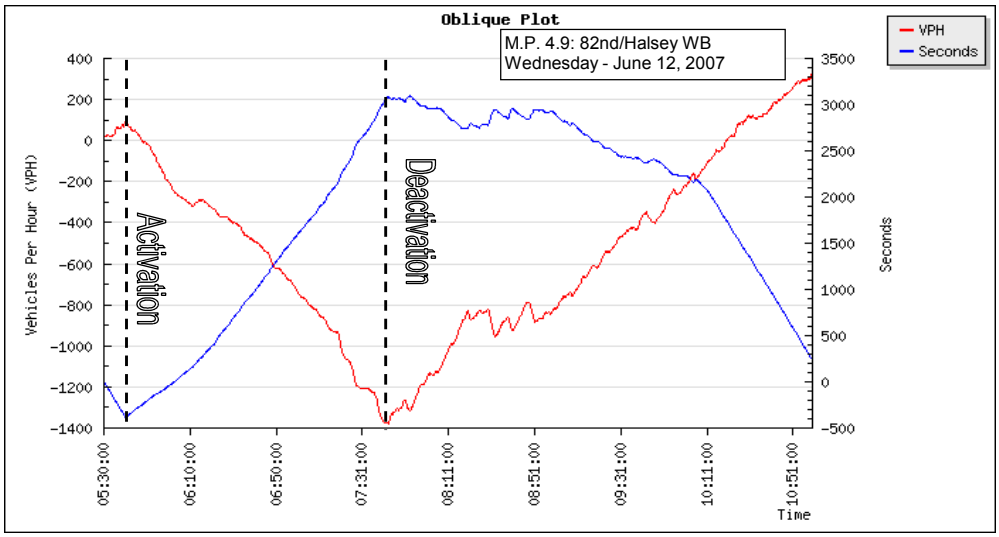
Highway: *I-84* **Date:** *June 27th 2007 AM*
Direction: *Westbound*

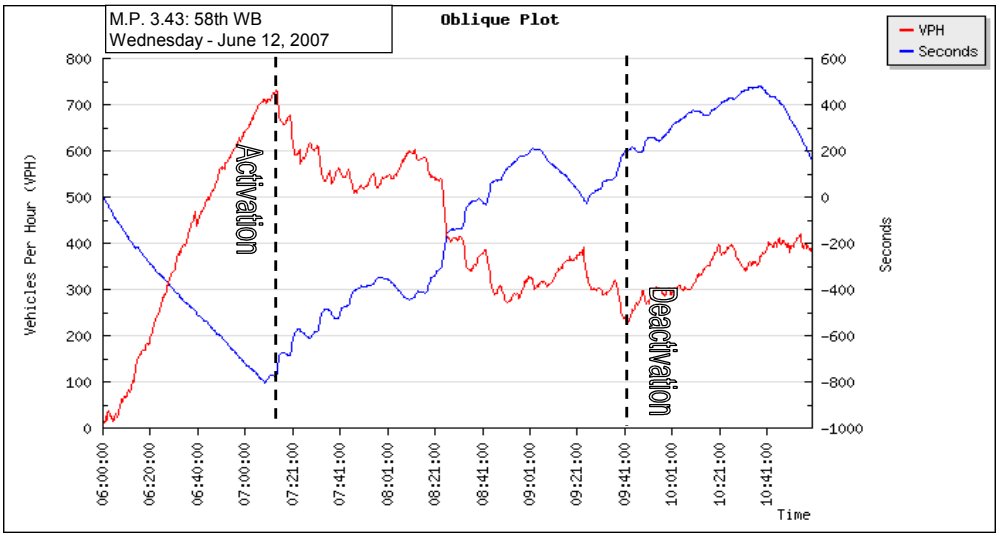




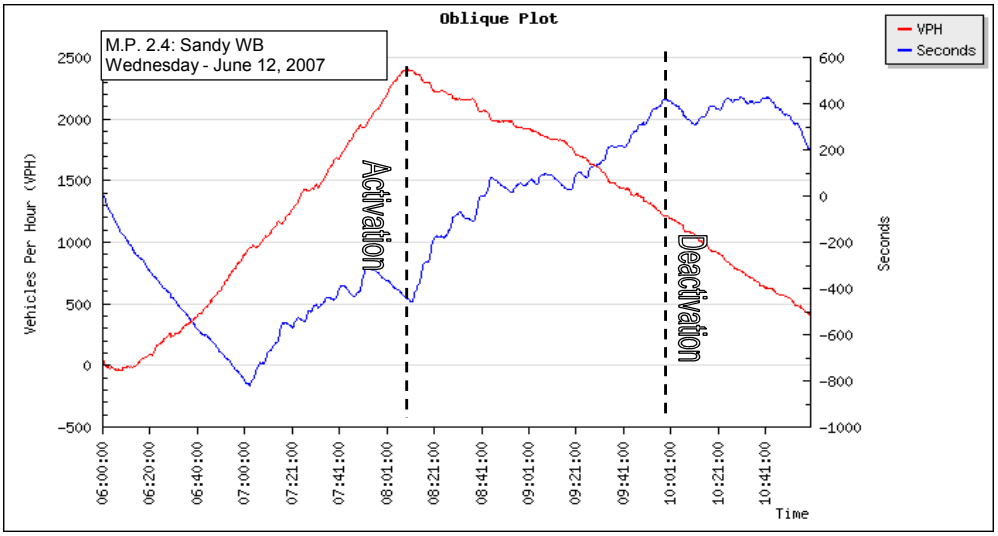
Highway: *I-84* **Date:** *June 12th 2007 AM*
Direction: *Westbound*

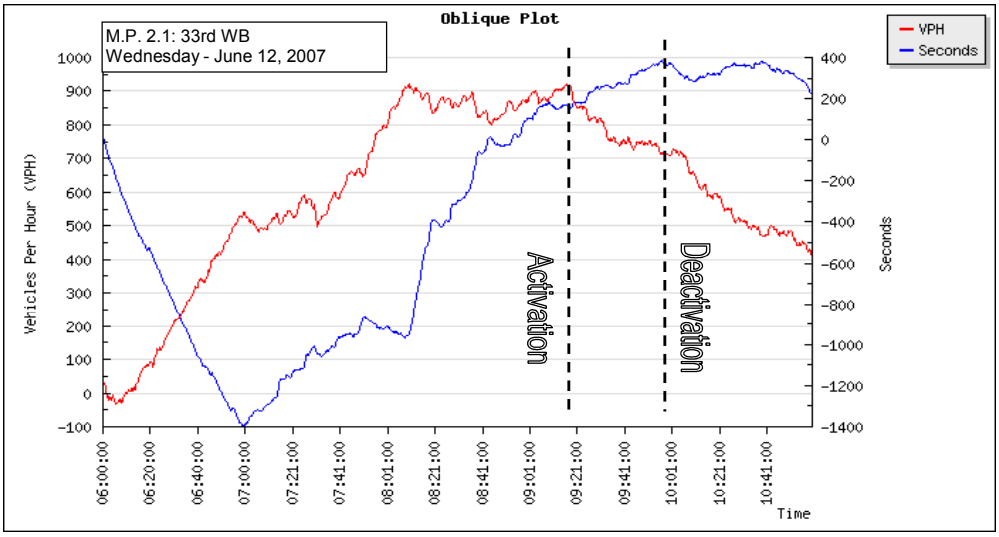




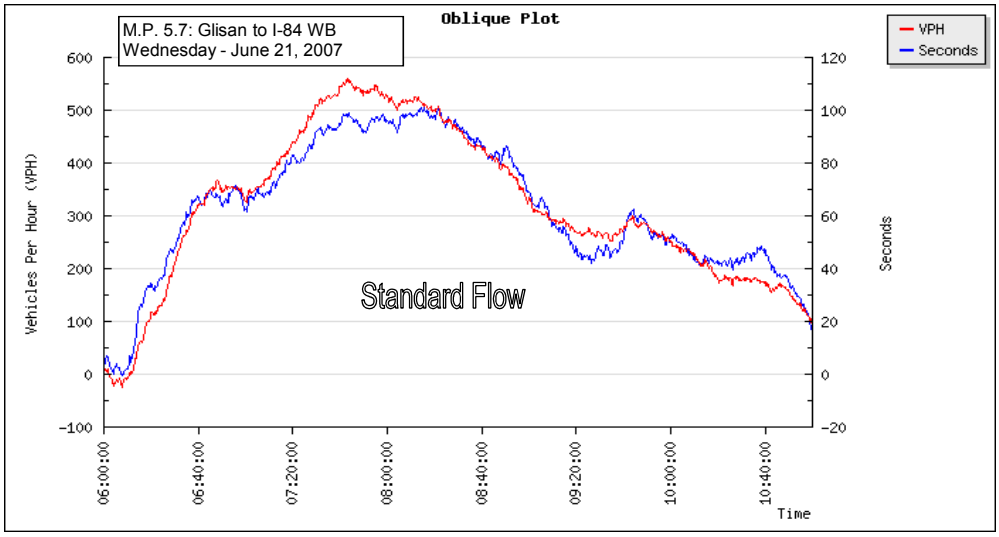


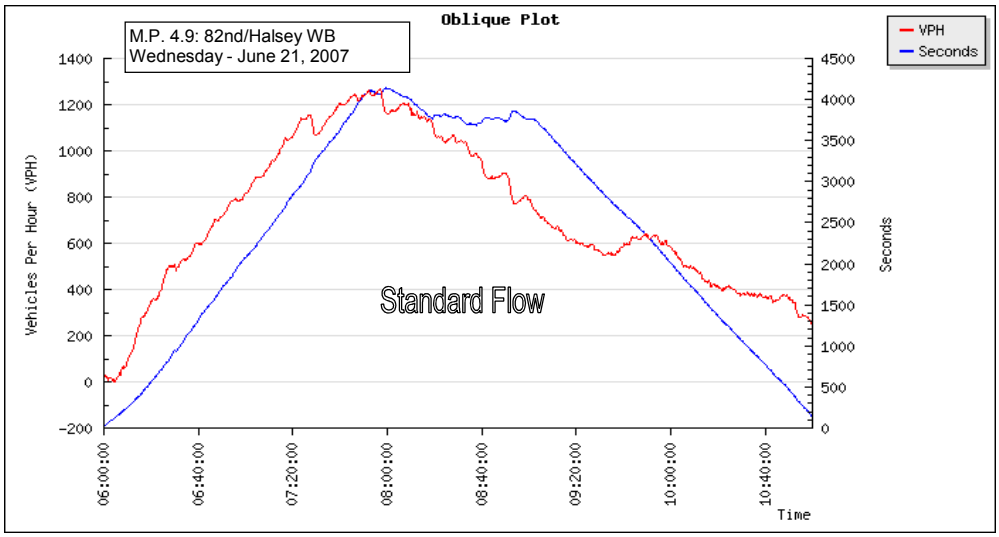
Highway: *I-84* **Date:** *June 12th 2007 AM*
Direction: *Westbound*

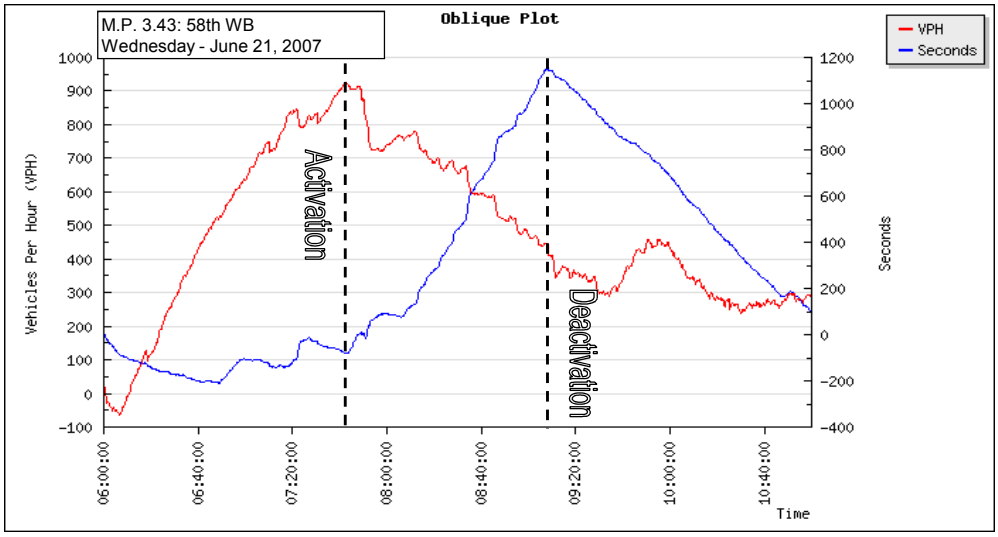




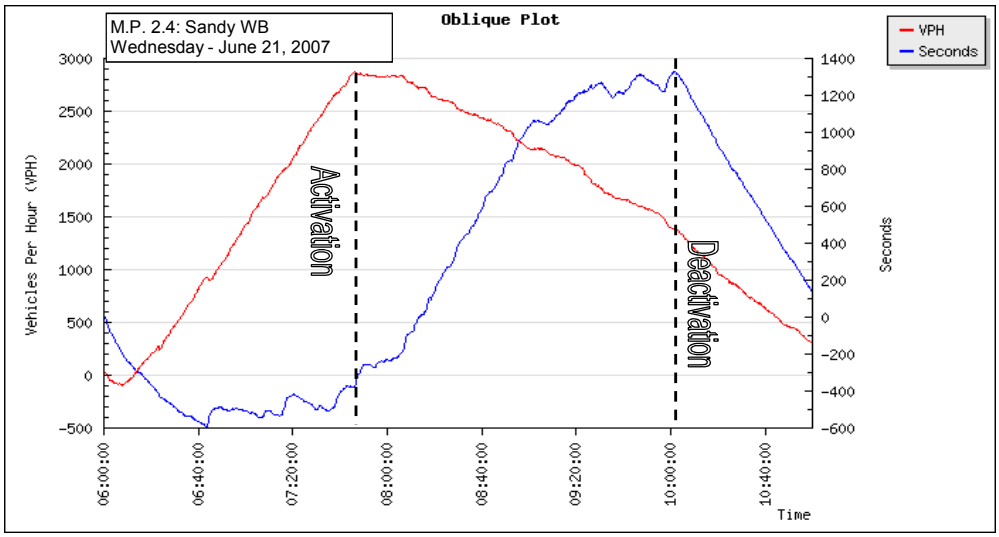
Highway: *I-84* **Date:** *June 21st 2007 AM*
Direction: *Westbound*

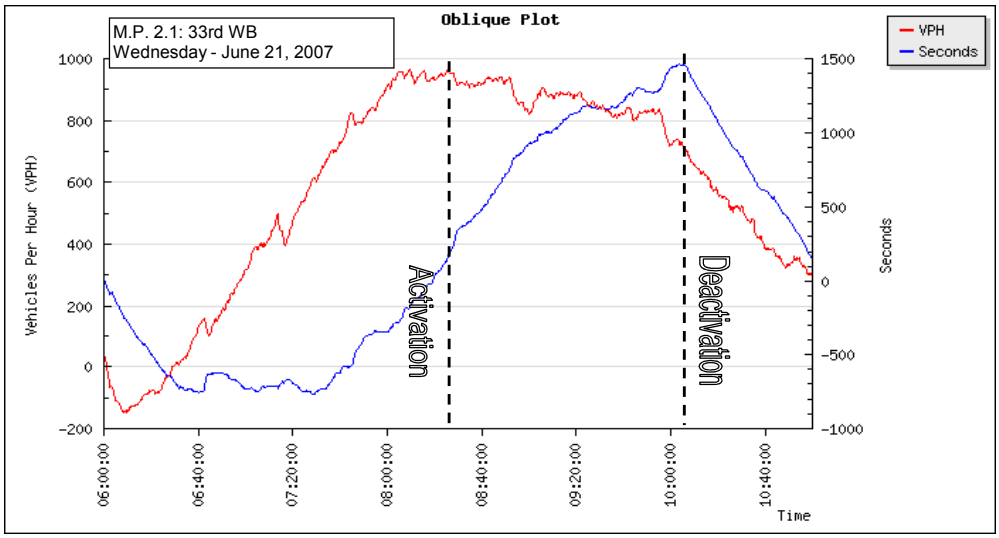




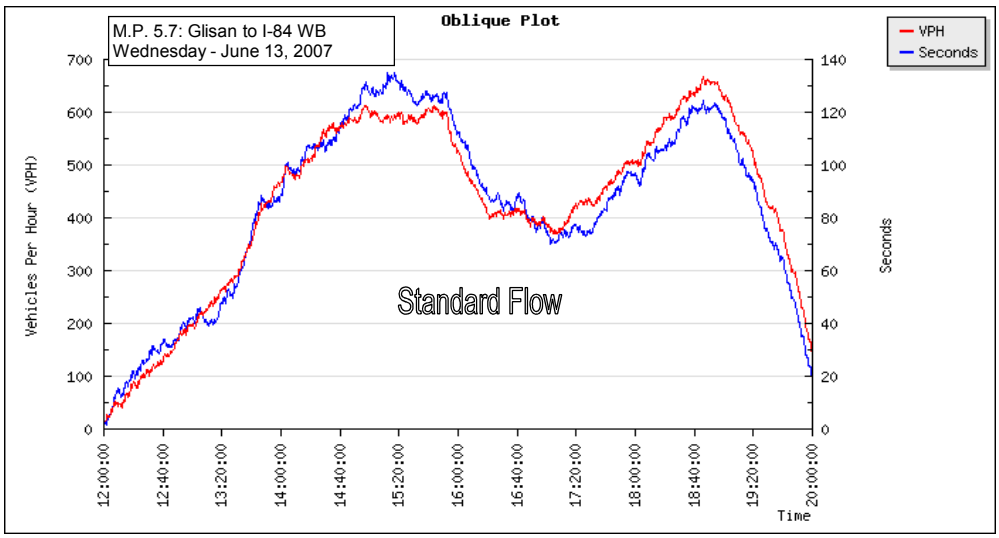


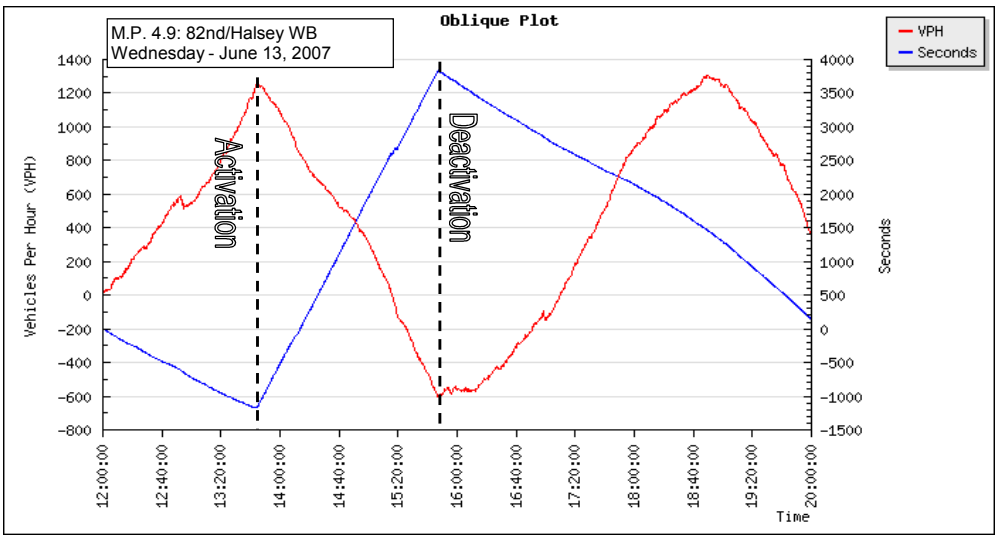
Highway: *I-84* **Date:** *June 21st 2007 AM*
Direction: *Westbound*

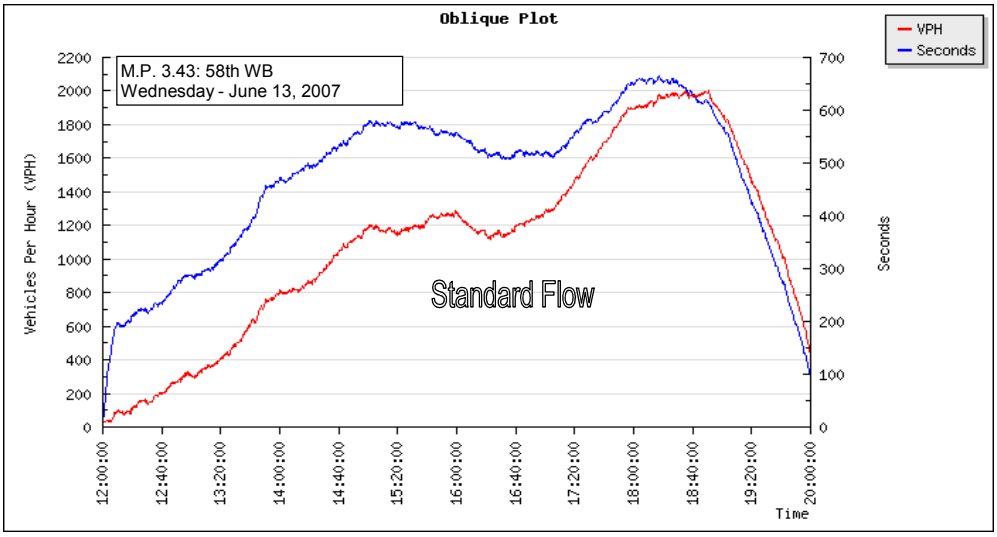




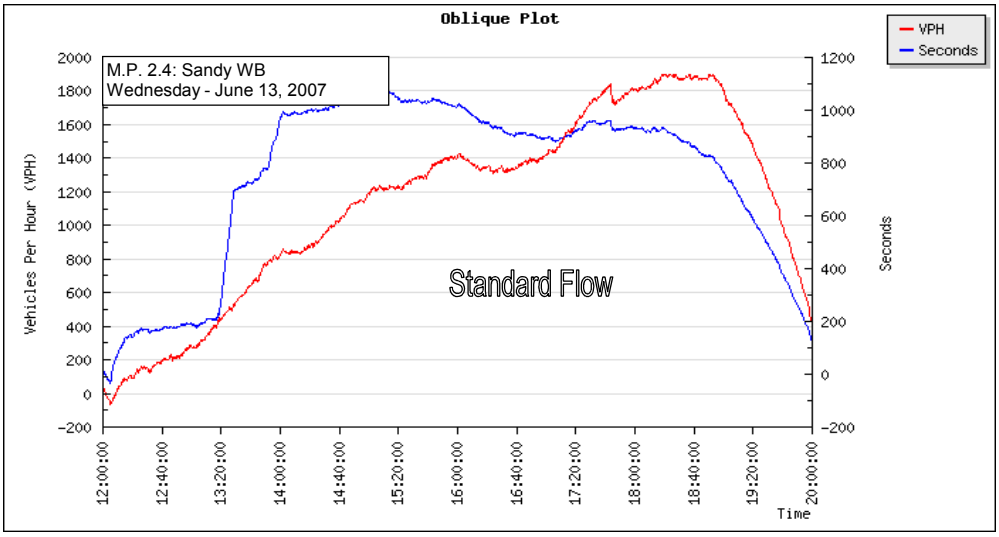
Highway: *I-84* **Date:** *June 13th 2007 PM*
Direction: *Westbound*

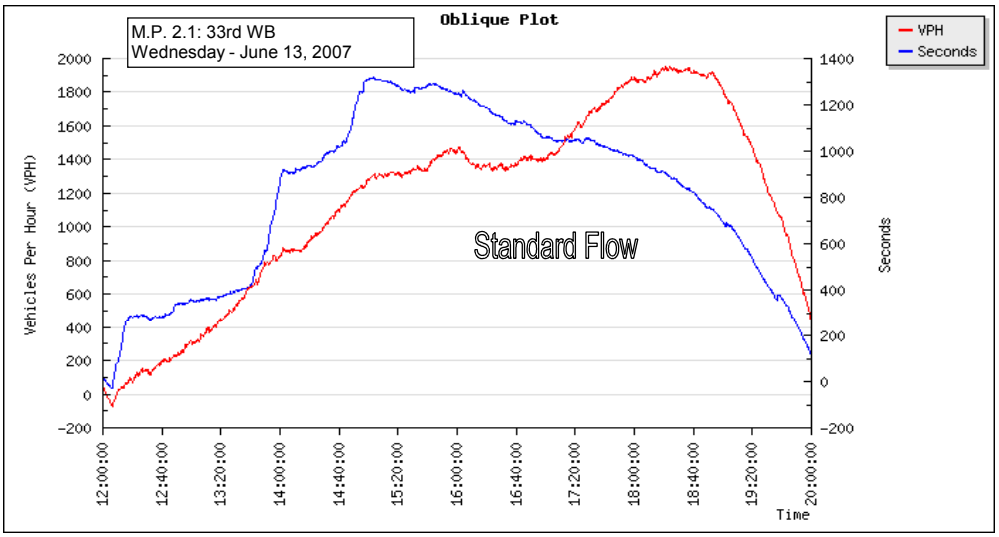




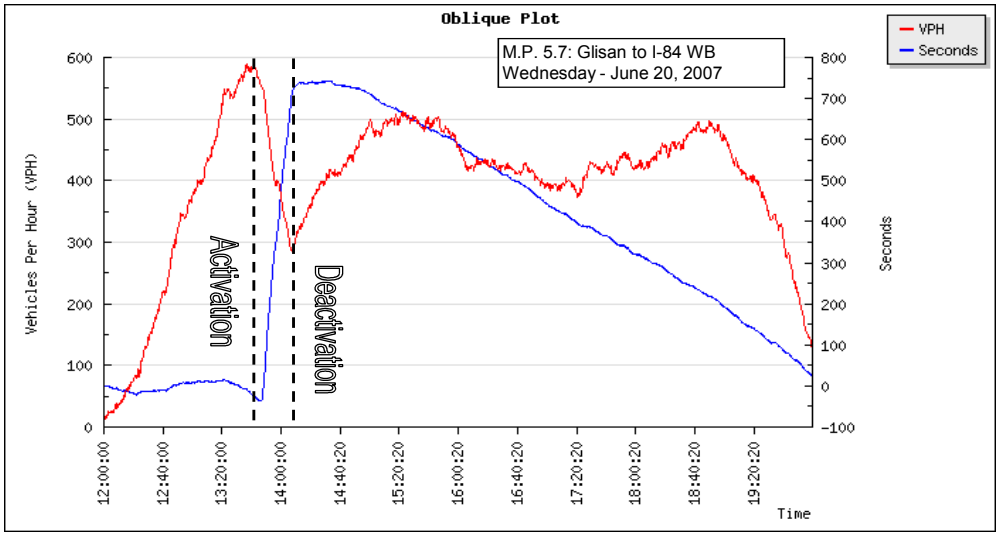


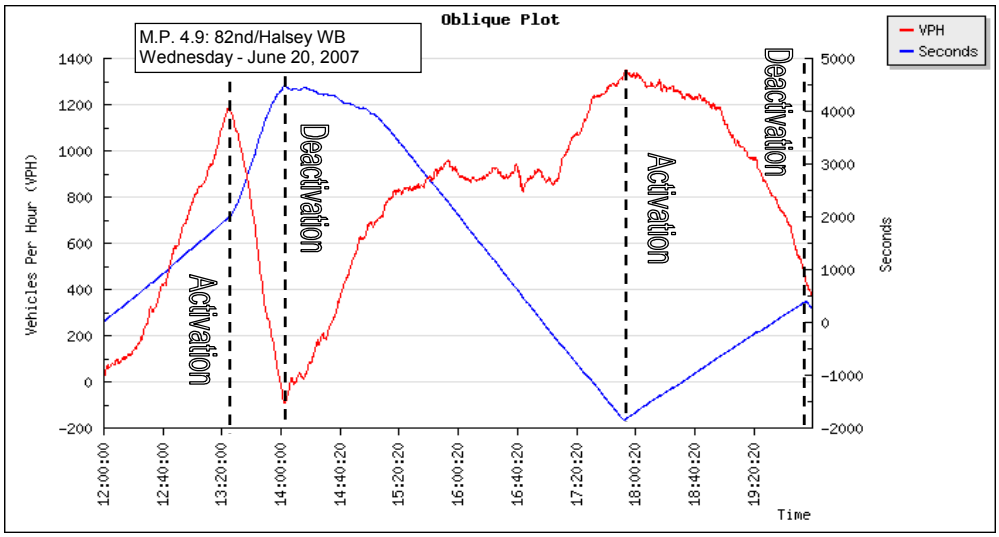
Highway: *I-84* **Date:** *June 13th 2007 PM*
Direction: *Westbound*

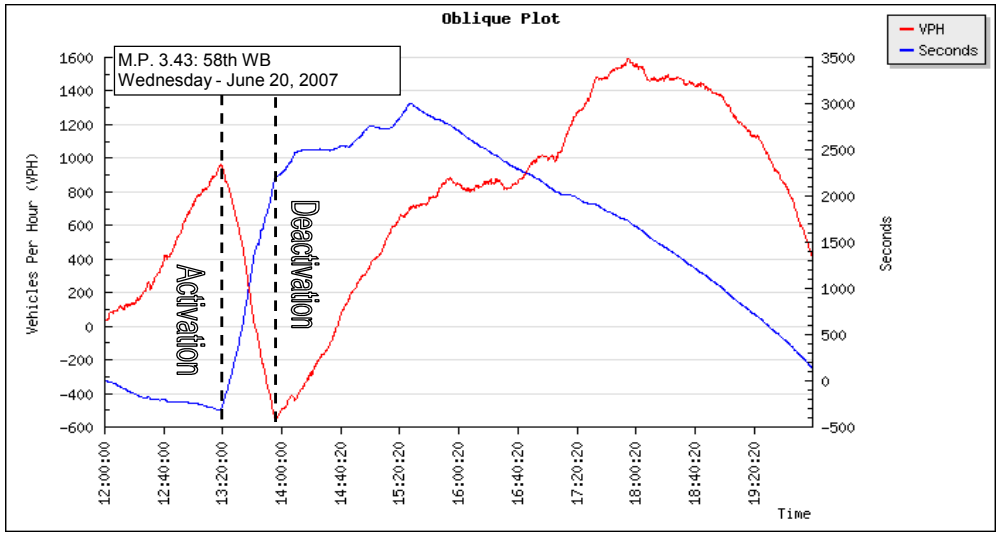




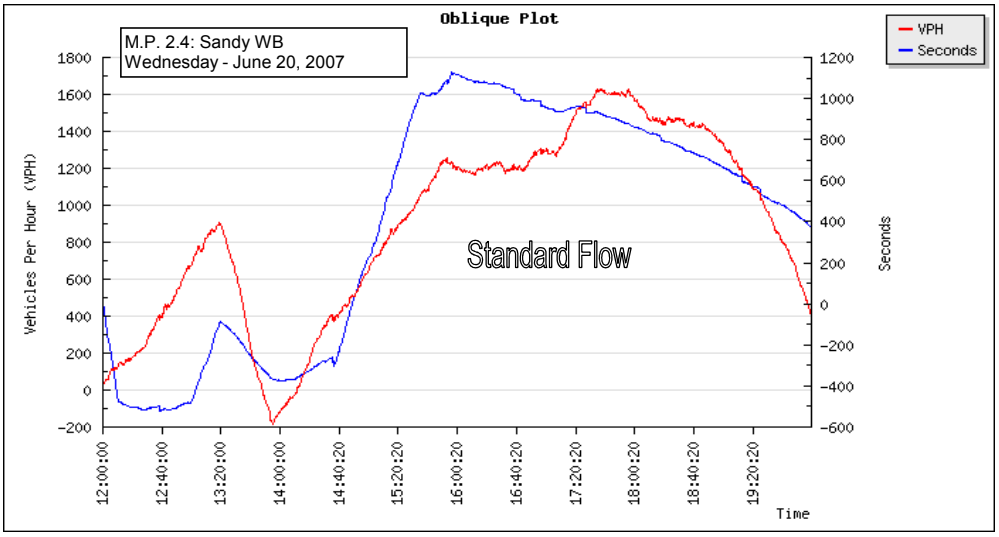
Highway: *I-84* **Date:** *June 20th 2007 PM*
Direction: *Westbound*

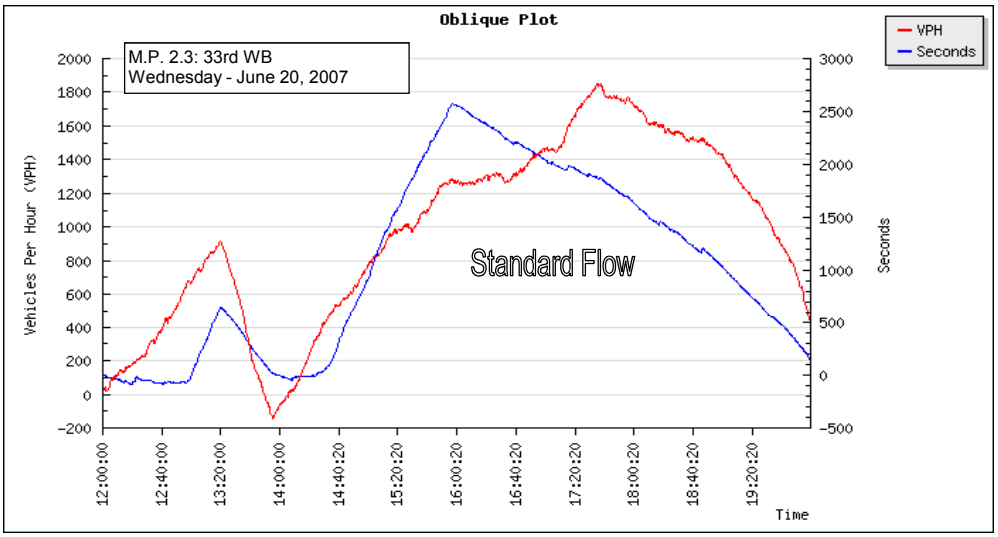




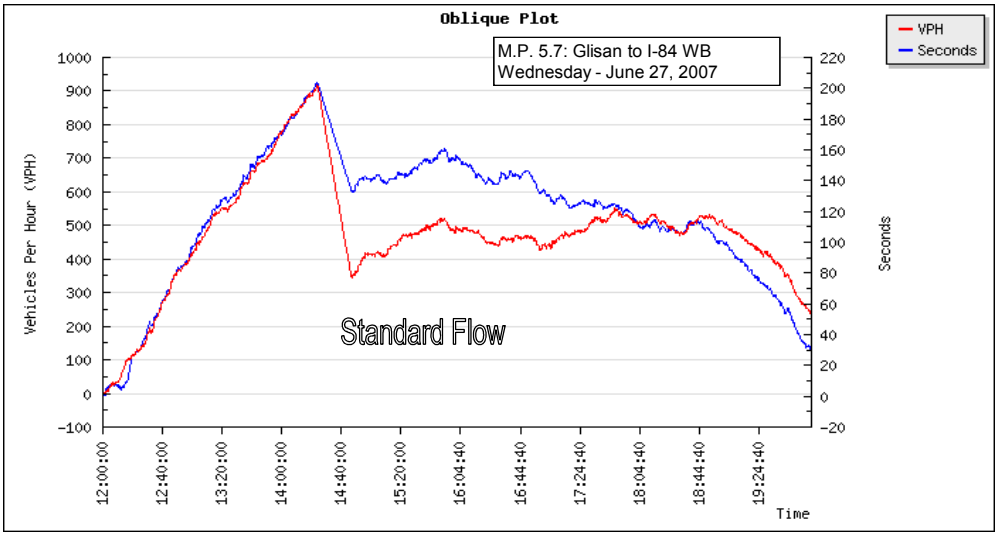


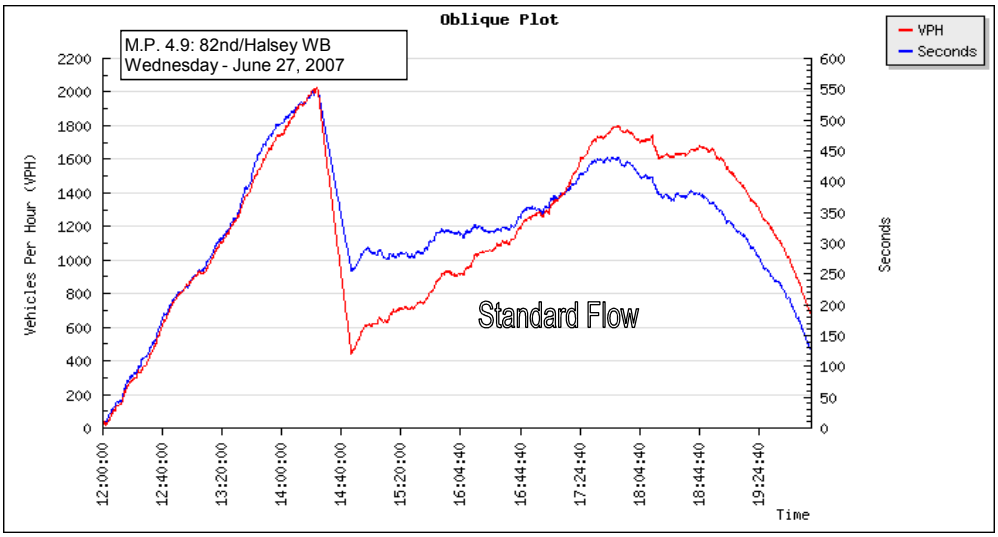
Highway: *I-84* **Date:** *June 20th 2007 PM*
Direction: *Westbound*

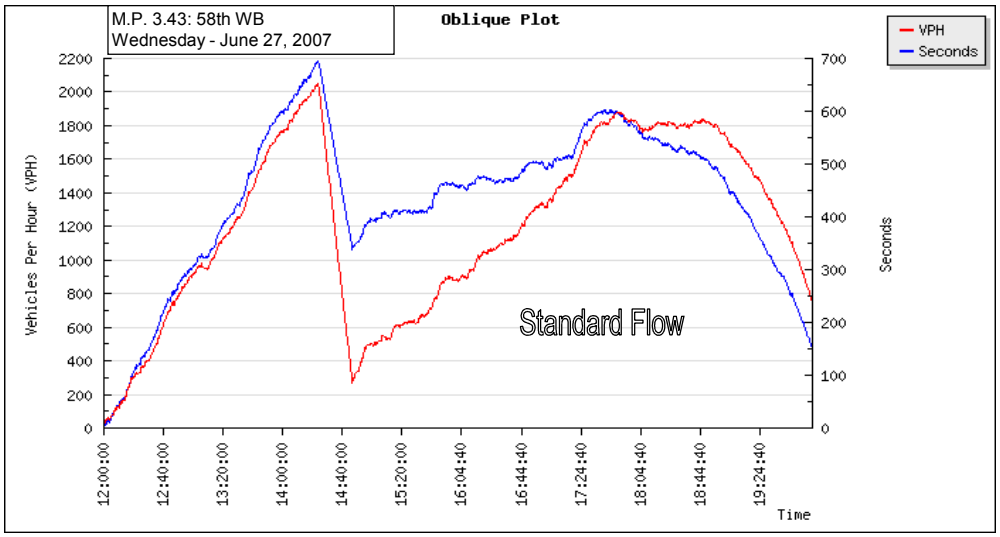




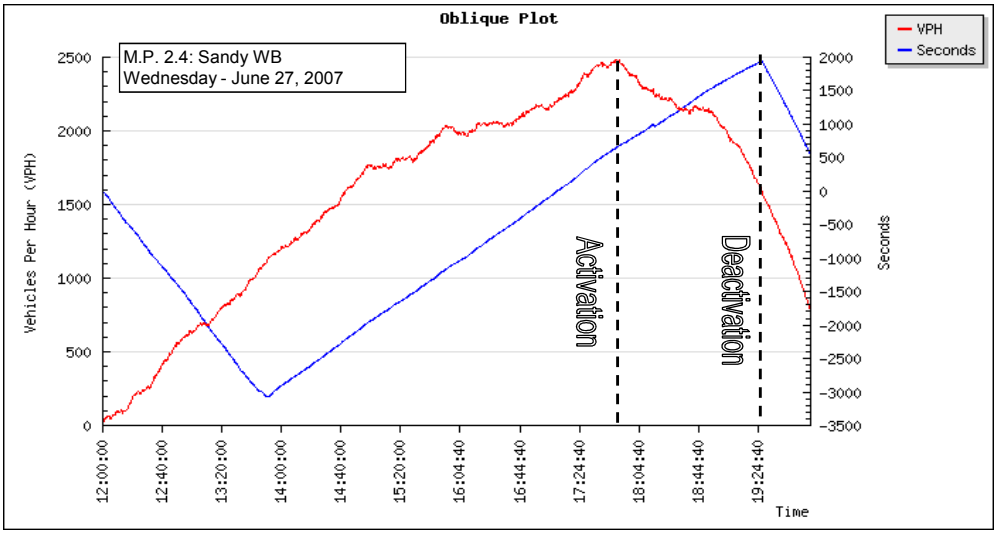
Highway: *I-84* **Date:** *June 27th 2007 PM*
Direction: *Westbound*

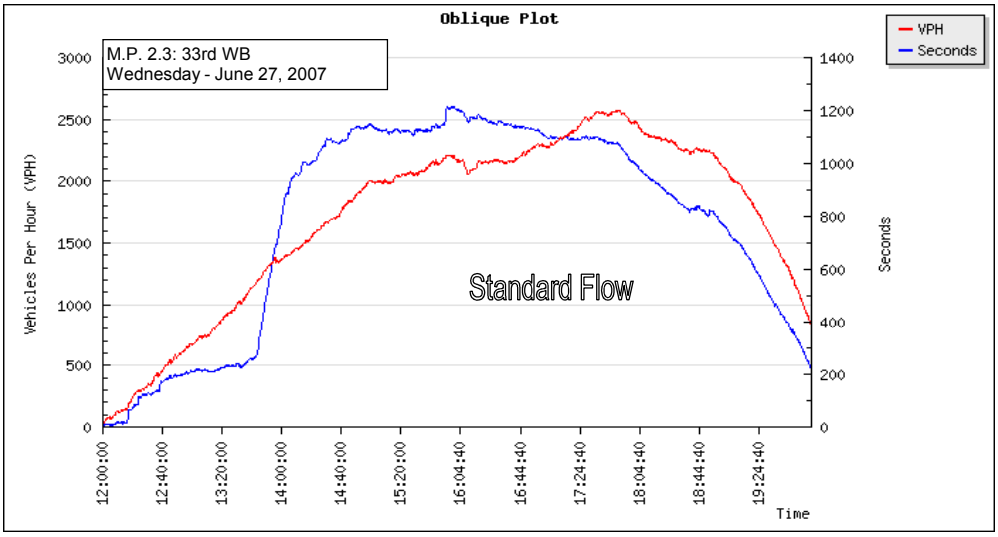




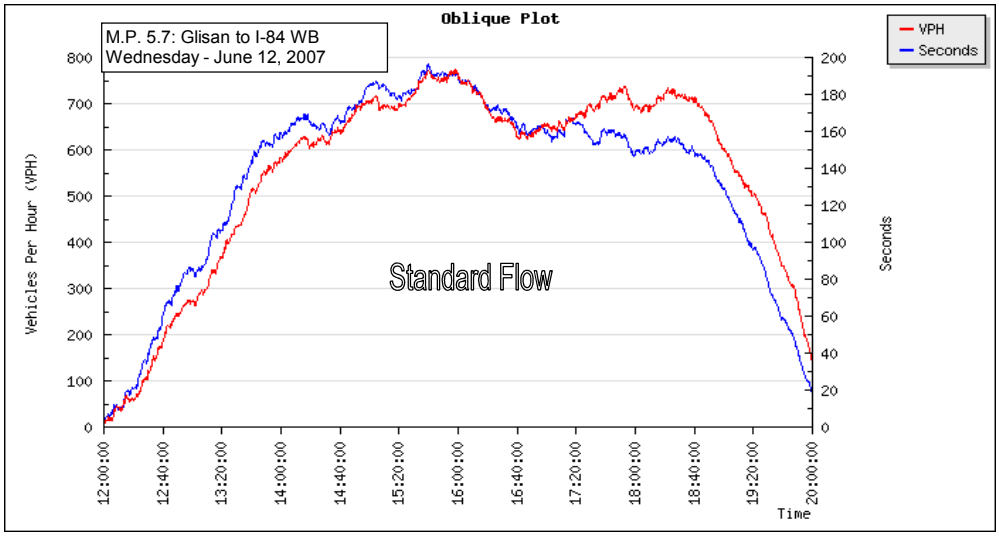


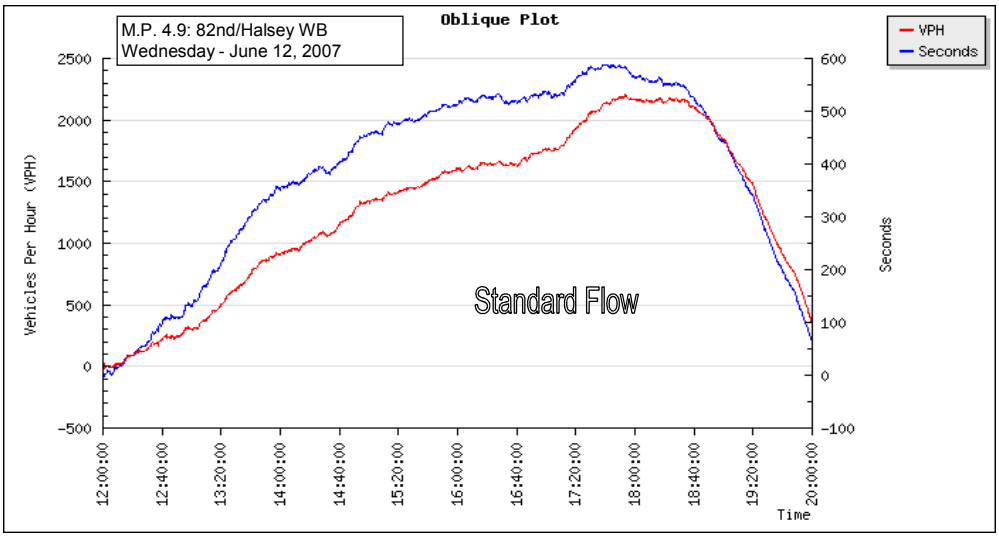
Highway: *I-84* **Date:** *June 27th 2007 PM*
Direction: *Westbound*

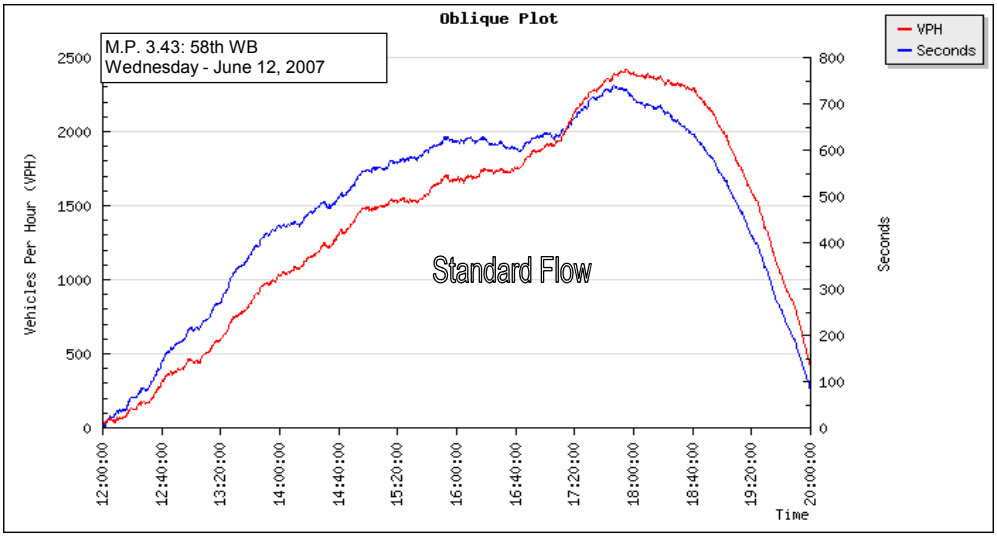




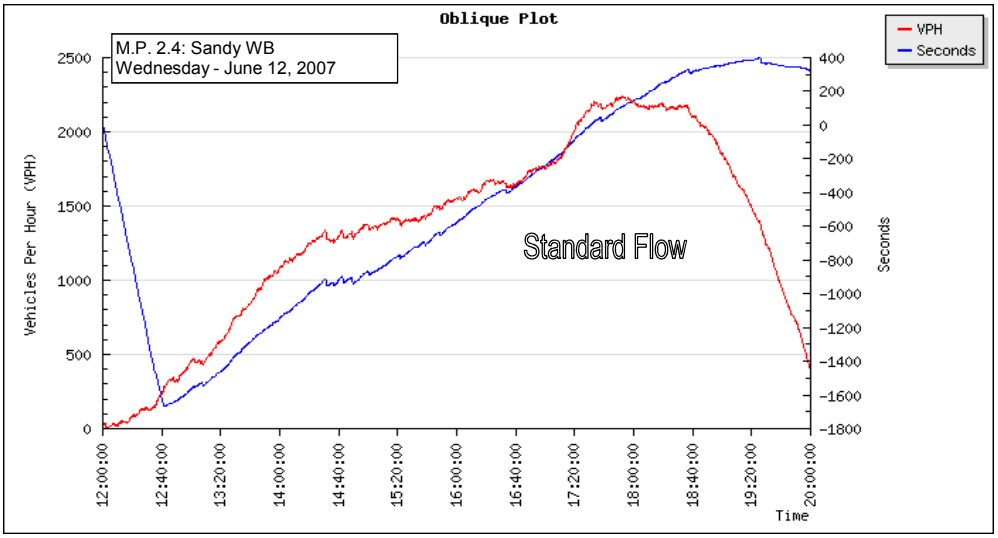
Highway: *I-84* **Date:** *June 12th 2007 PM*
Direction: *Westbound*

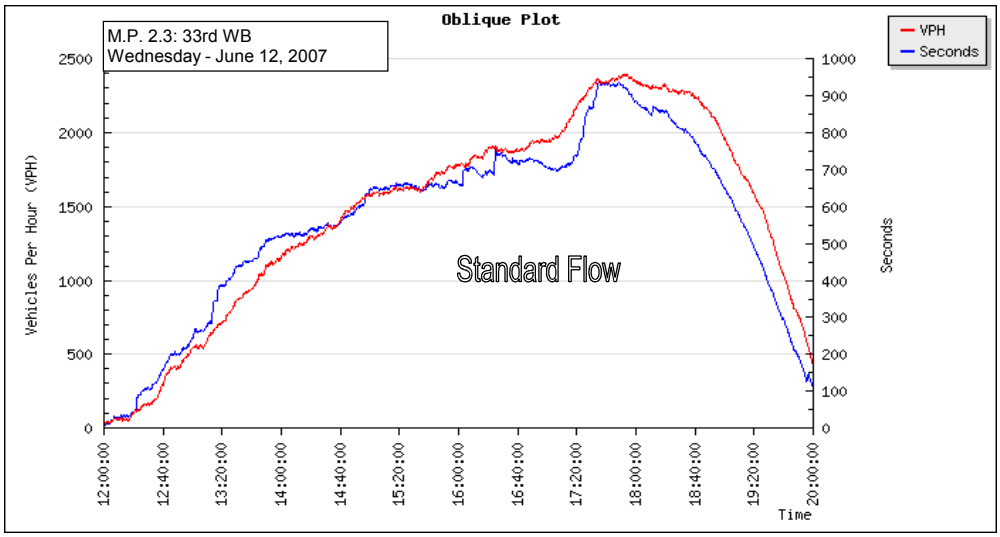




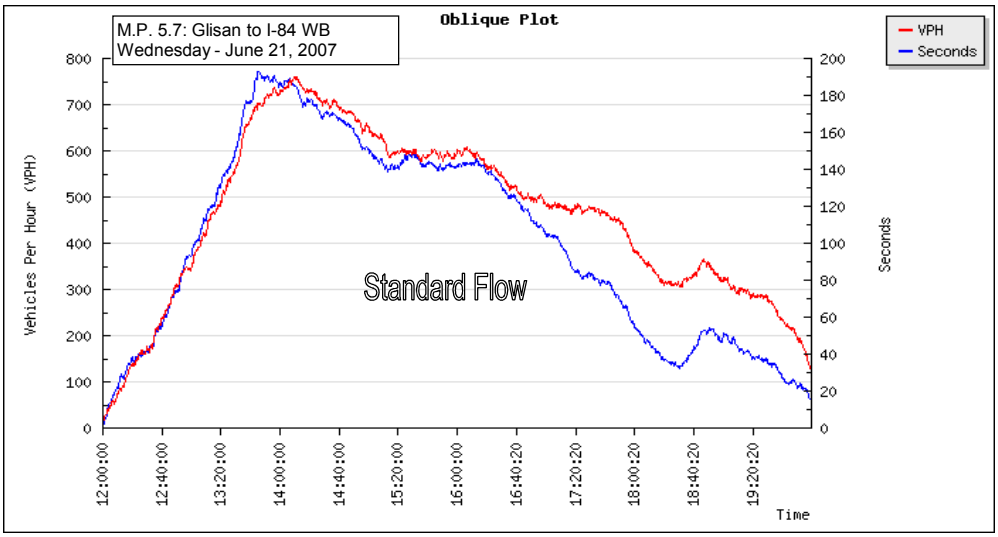


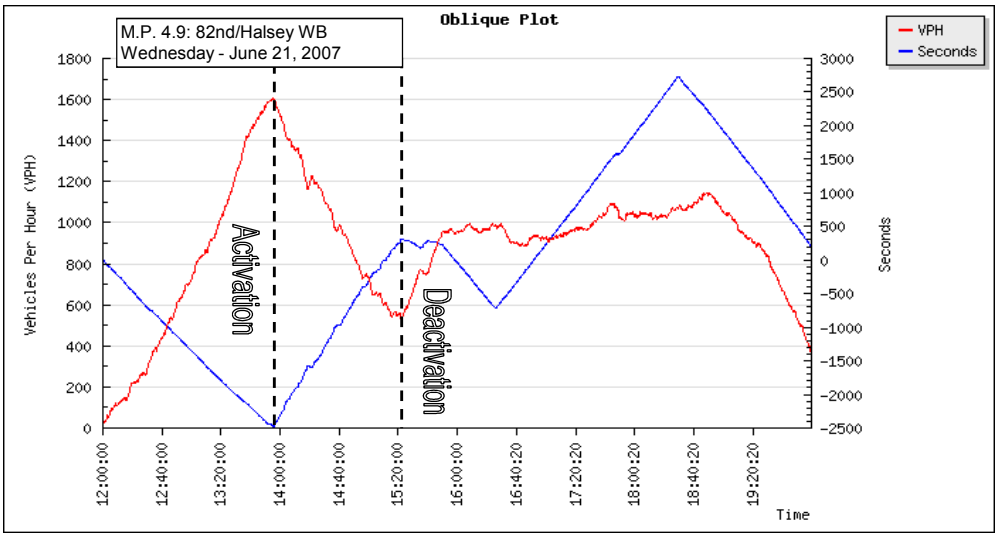
Highway: *I-84* **Date:** *June 12th 2007 PM*
Direction: *Westbound*

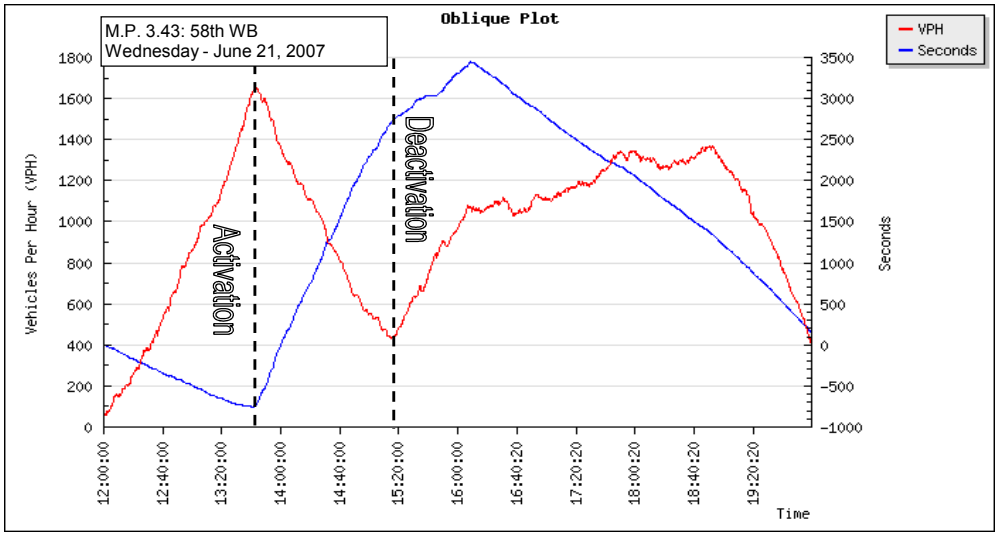




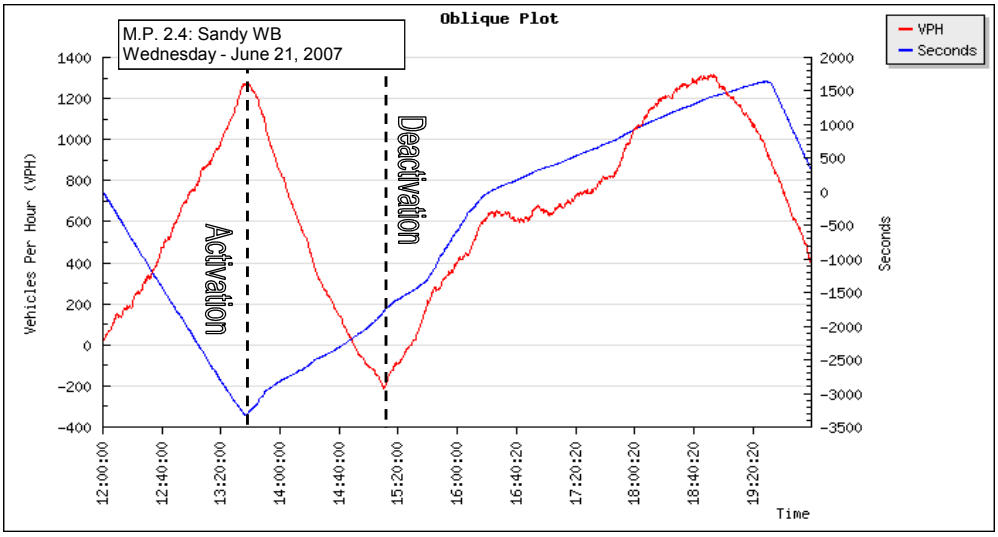
Highway: *I-84* **Date:** *June 21st 2007 PM*
Direction: *Westbound*

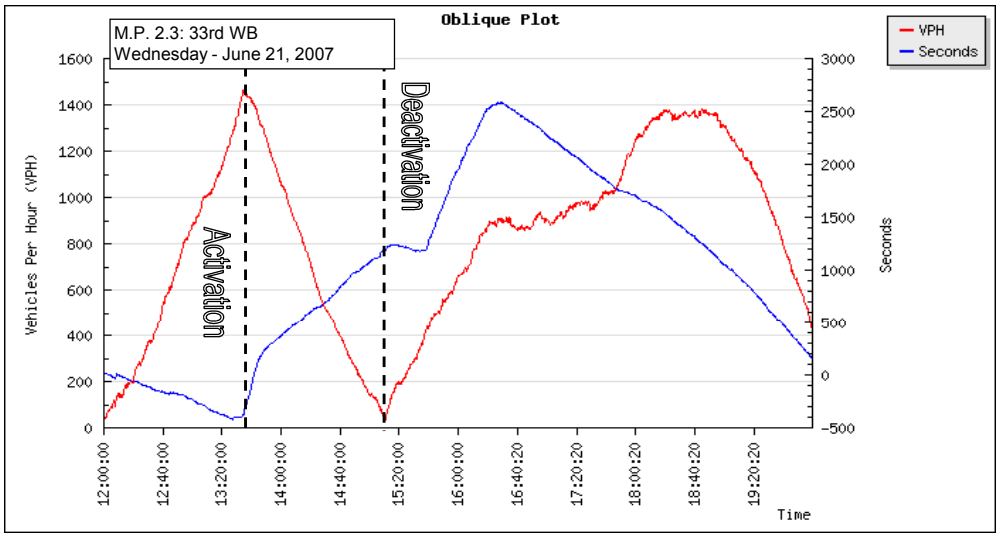






Highway: *I-84* **Date:** *June 21st 2007 PM*
Direction: *Westbound*



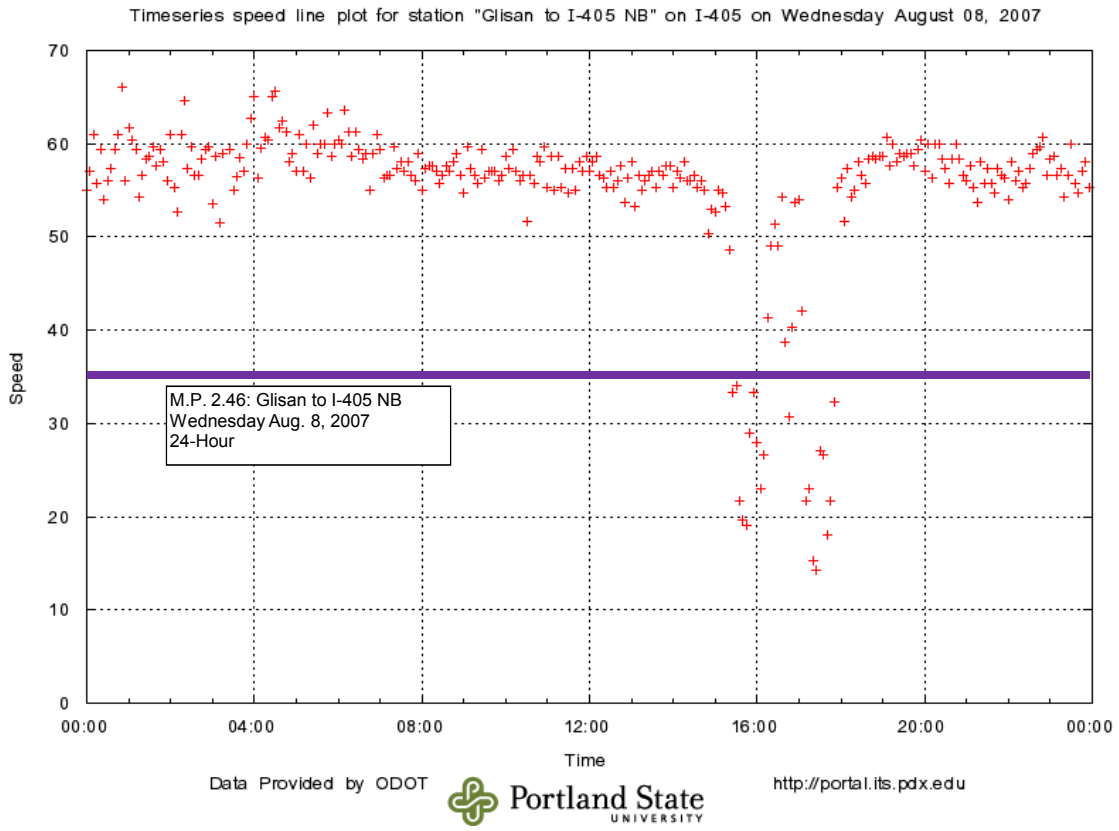


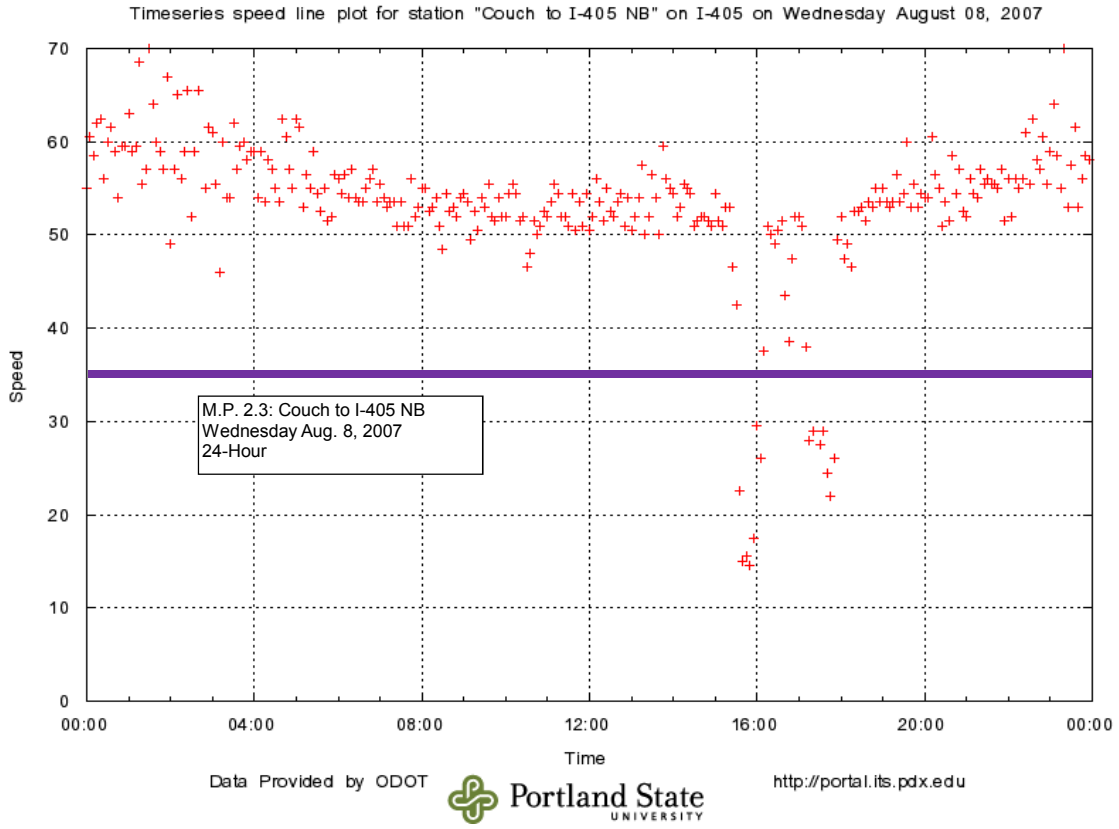
I-405 Northbound

Loop Specific 24 Hour Speed Scatters

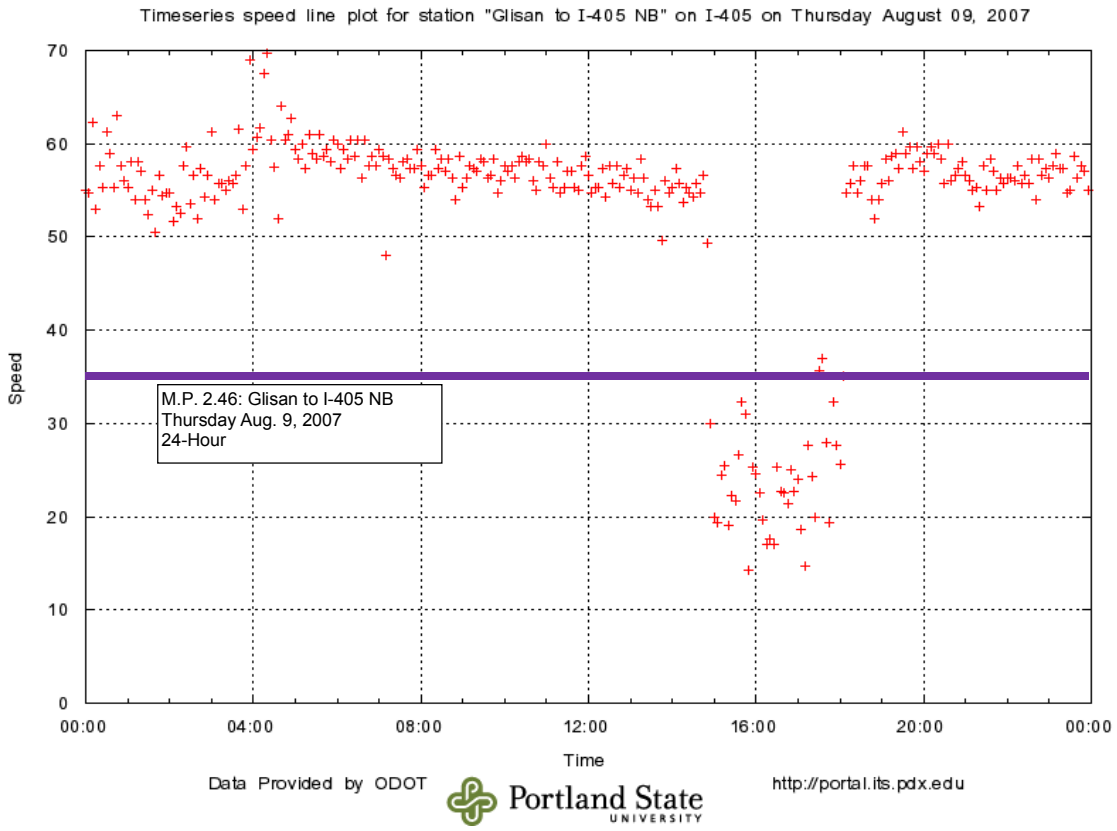
DAVID EVANS AND ASSOCIATES INC.

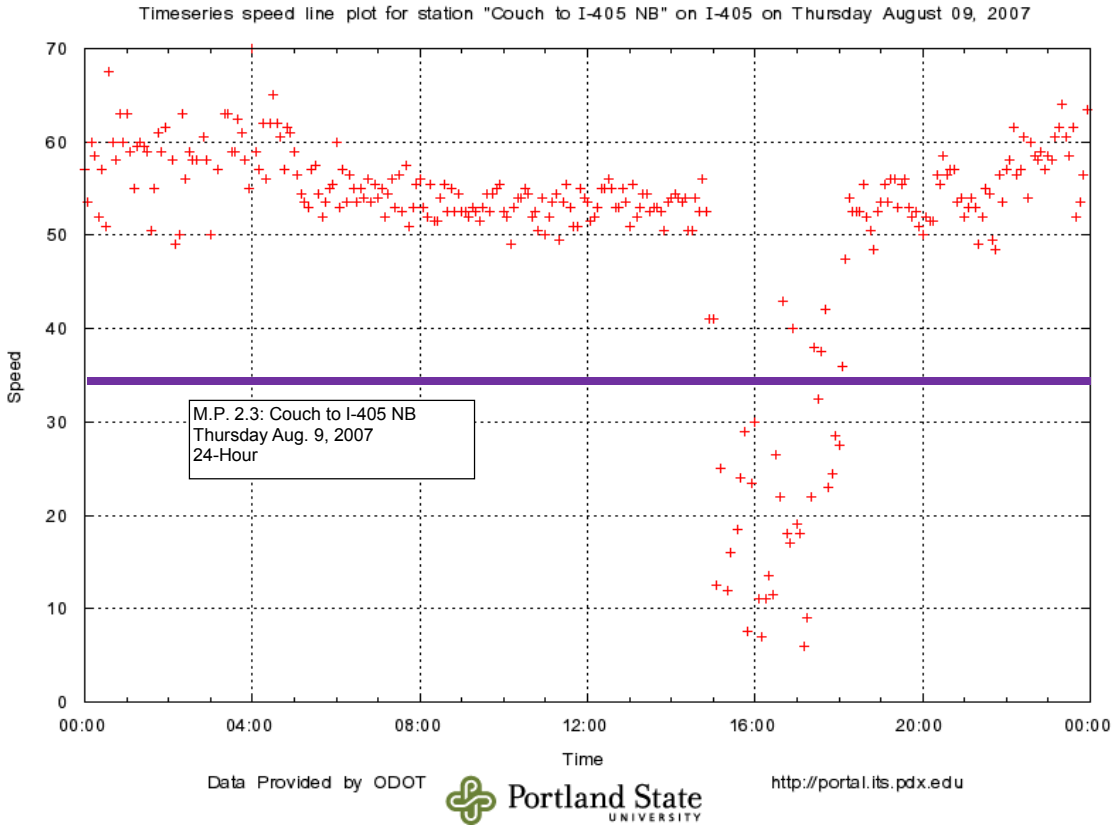
Highway: *I-405* **Date:** *August 8th 2007*
Direction: *Northbound*



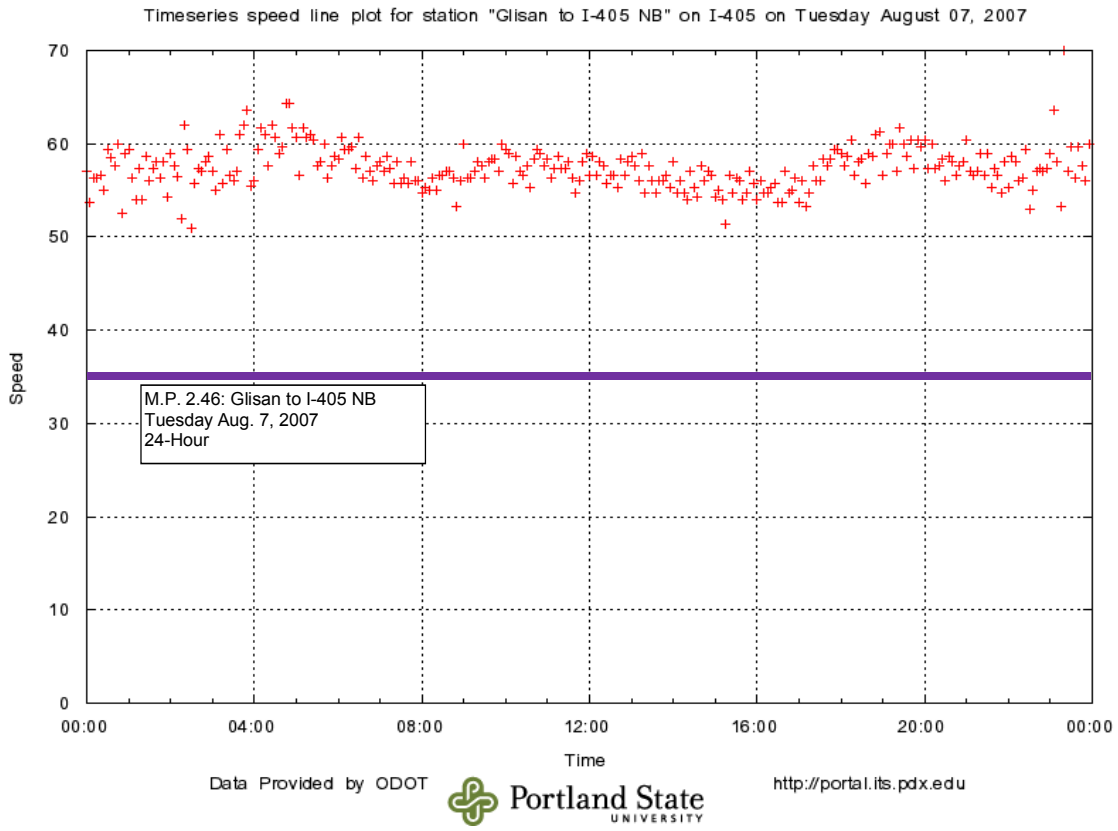


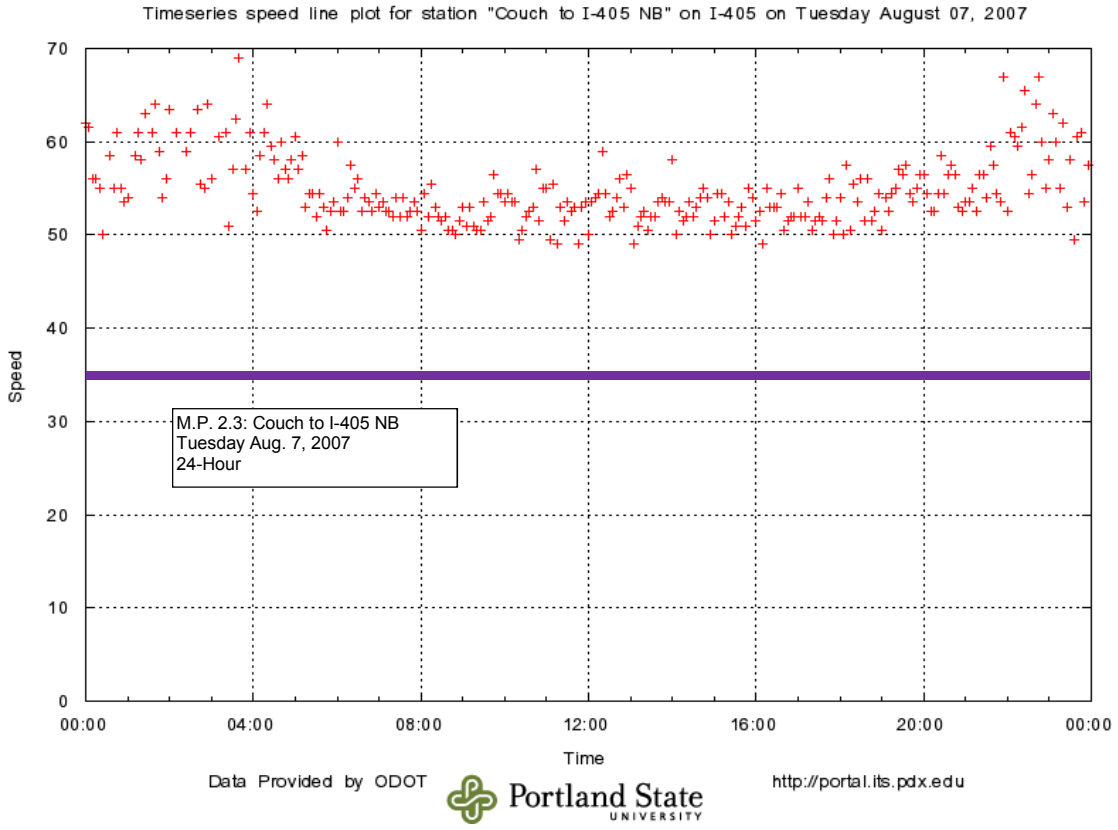
Highway *I-405* **Date:** *August 9th 2007*
Directior *Northbound*



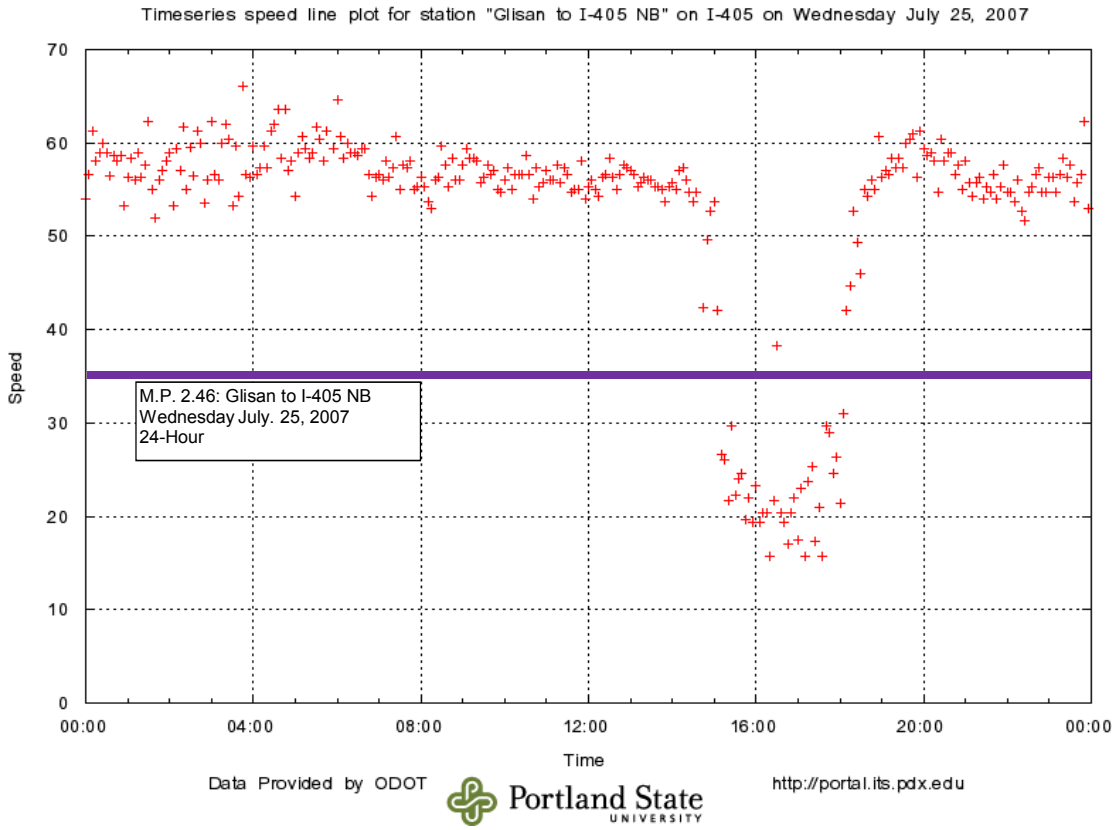


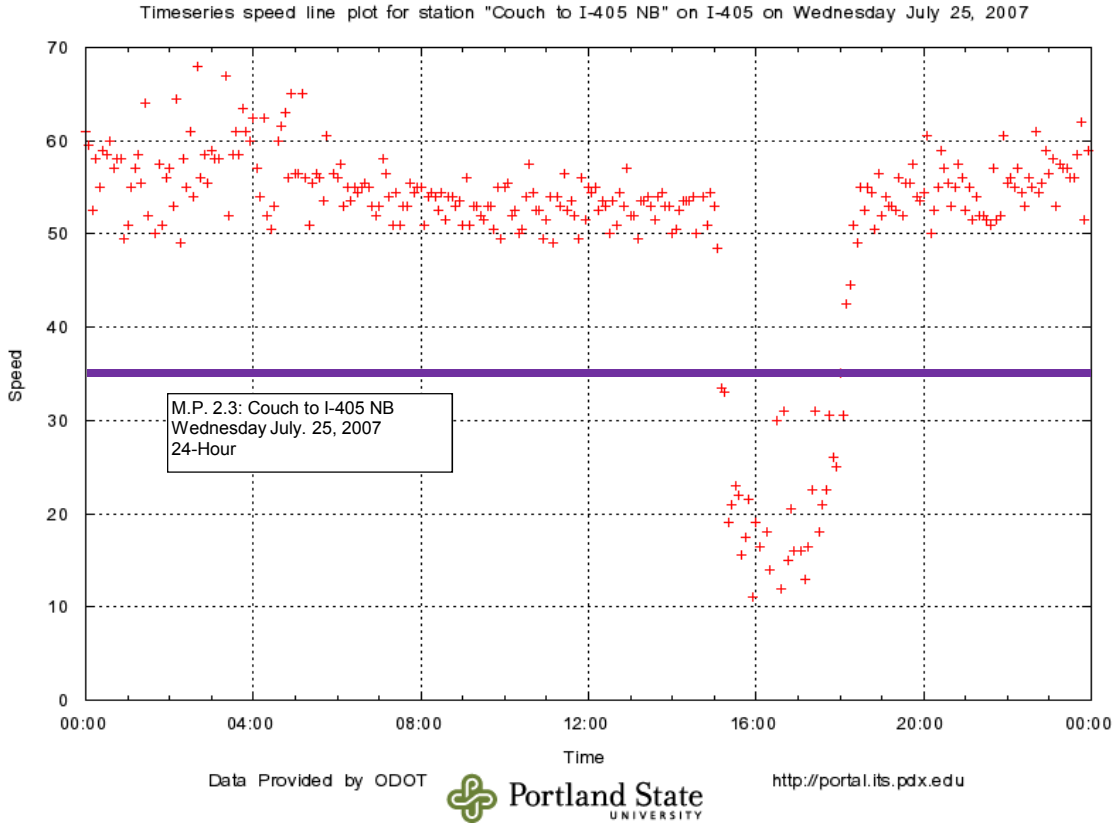
Highway *I-405* **Date:** *August 7th 2007*
Direction *Northbound*



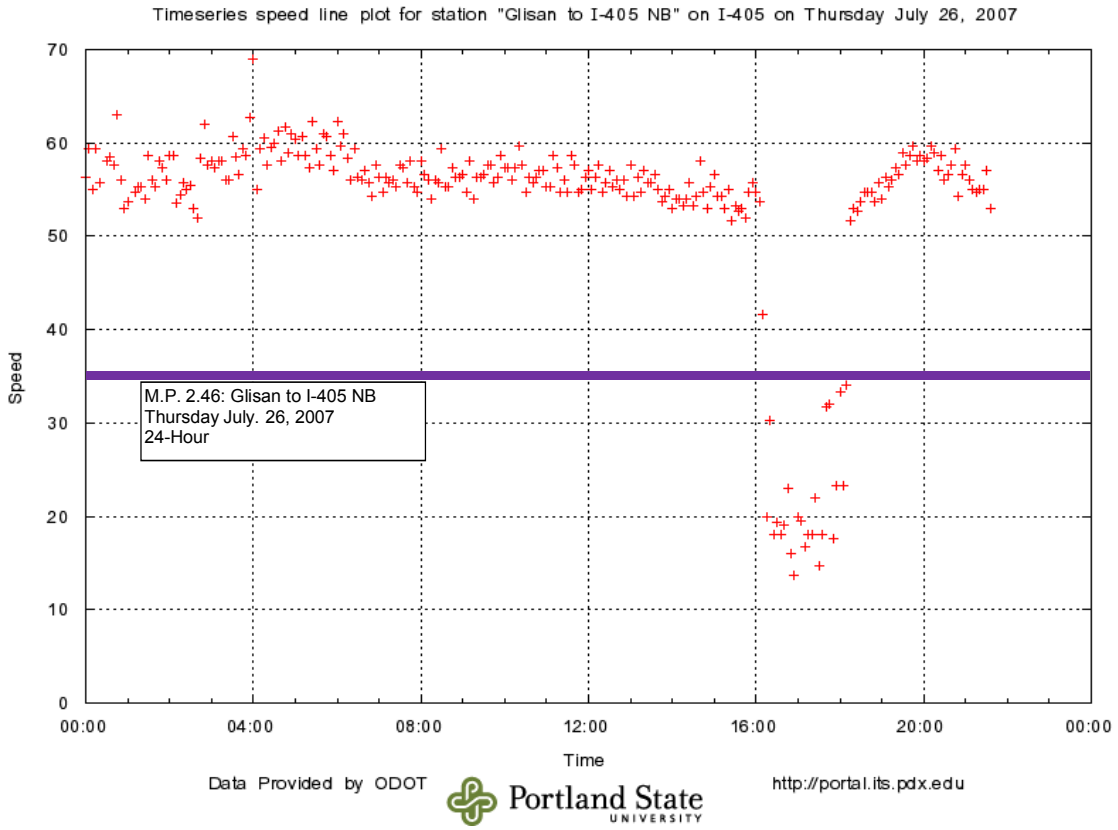


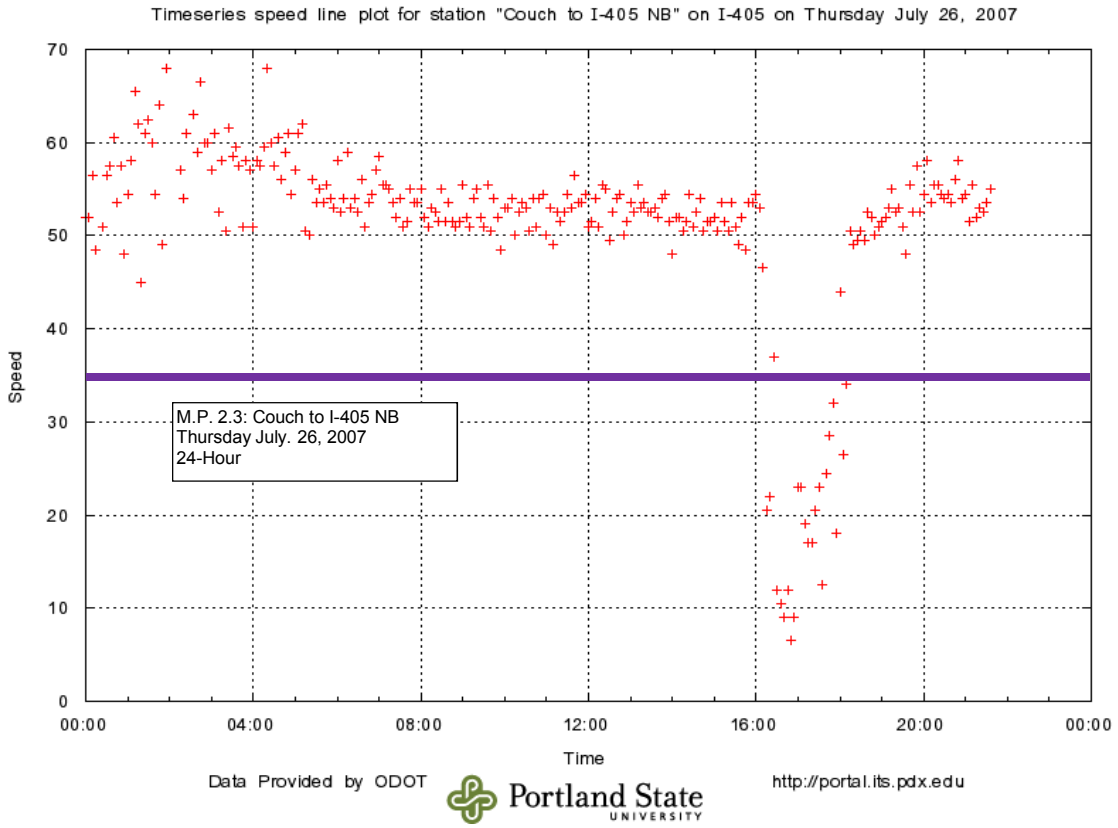
Highway *I-405* **Date:** *July 25th 2007*
Direction *Northbound*





Highway *I-405* **Date:** *July 26th 2007*
Direction *Northbound*



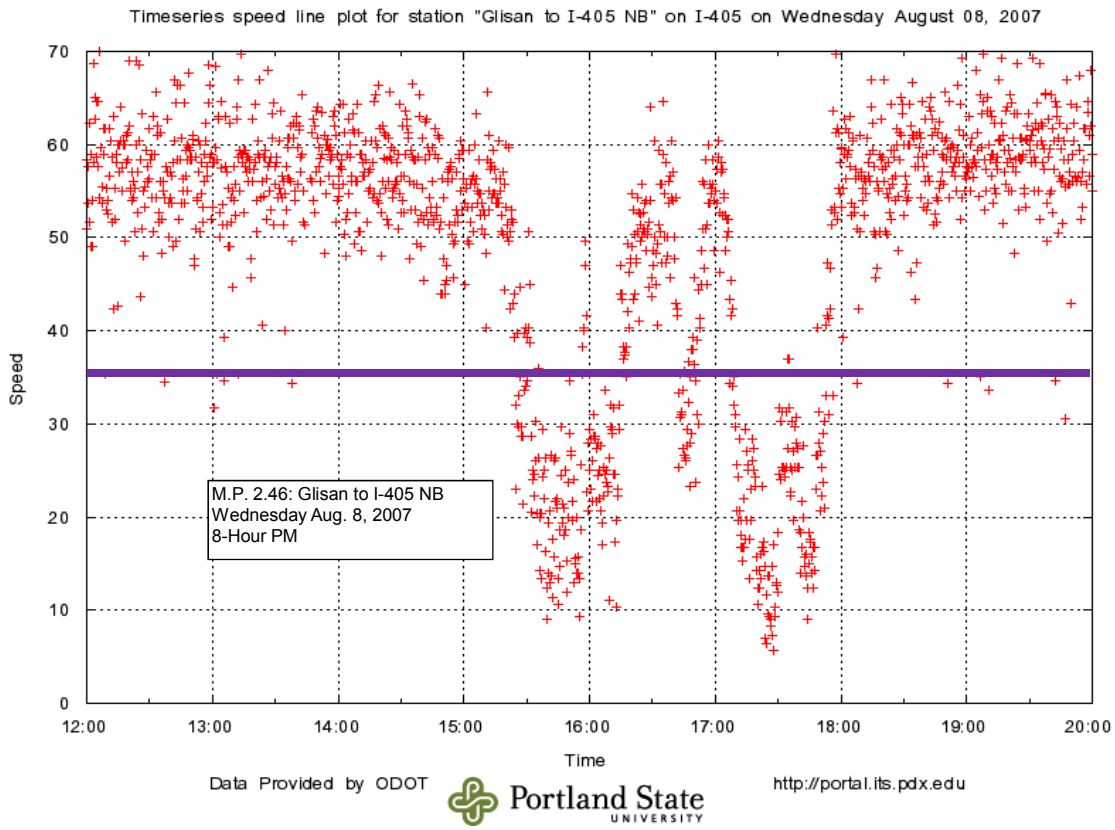


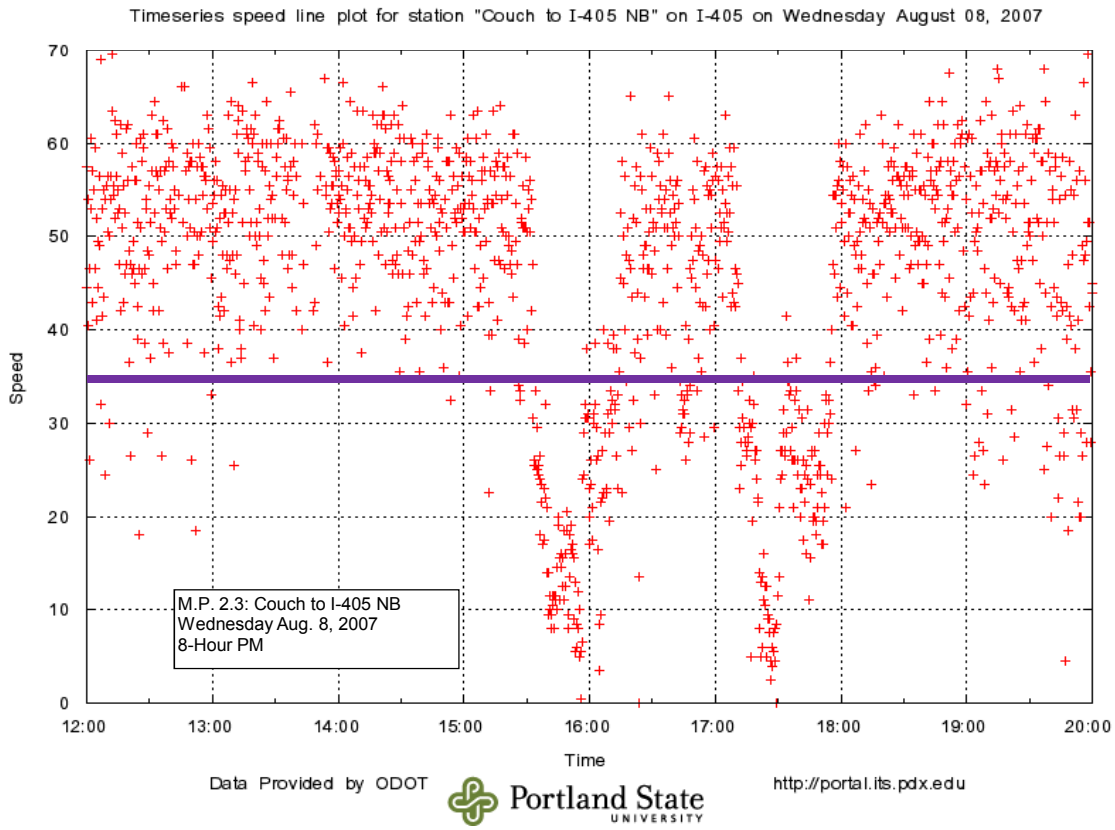
I-405 Northbound

Loop Specific PM Peak Hour Speed Scatters

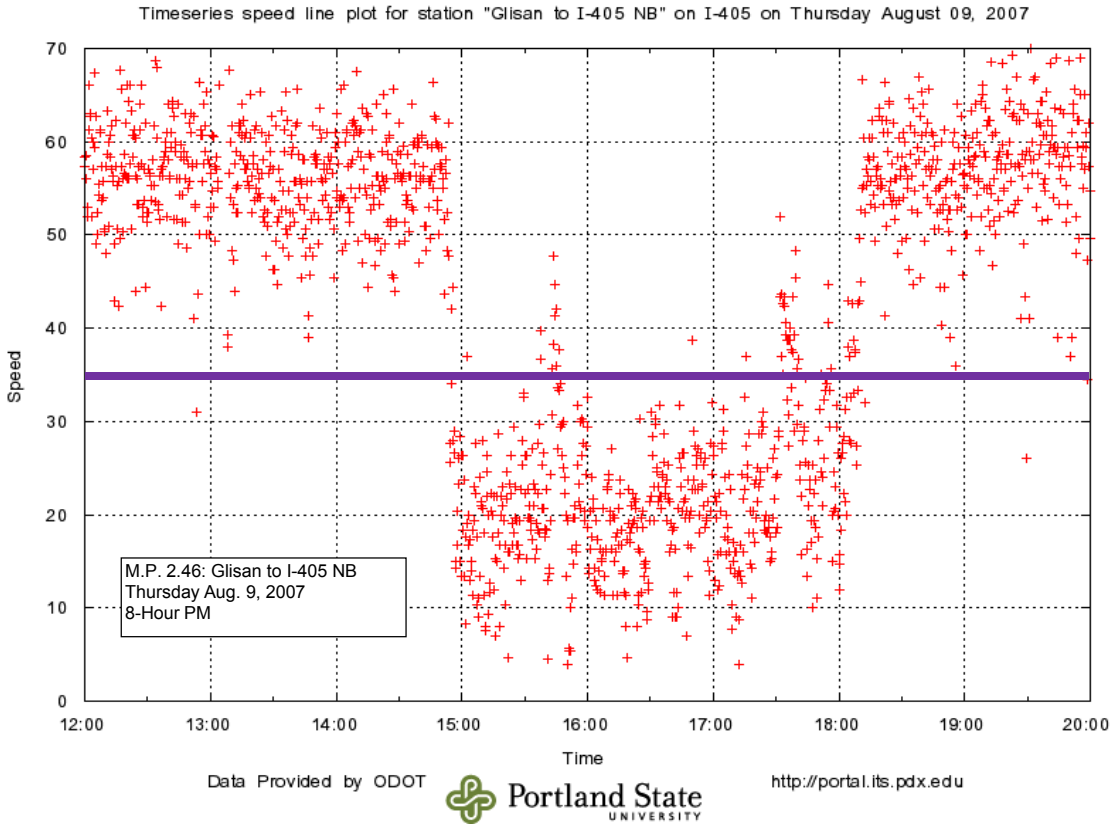
DAVID EVANS AND ASSOCIATES INC.

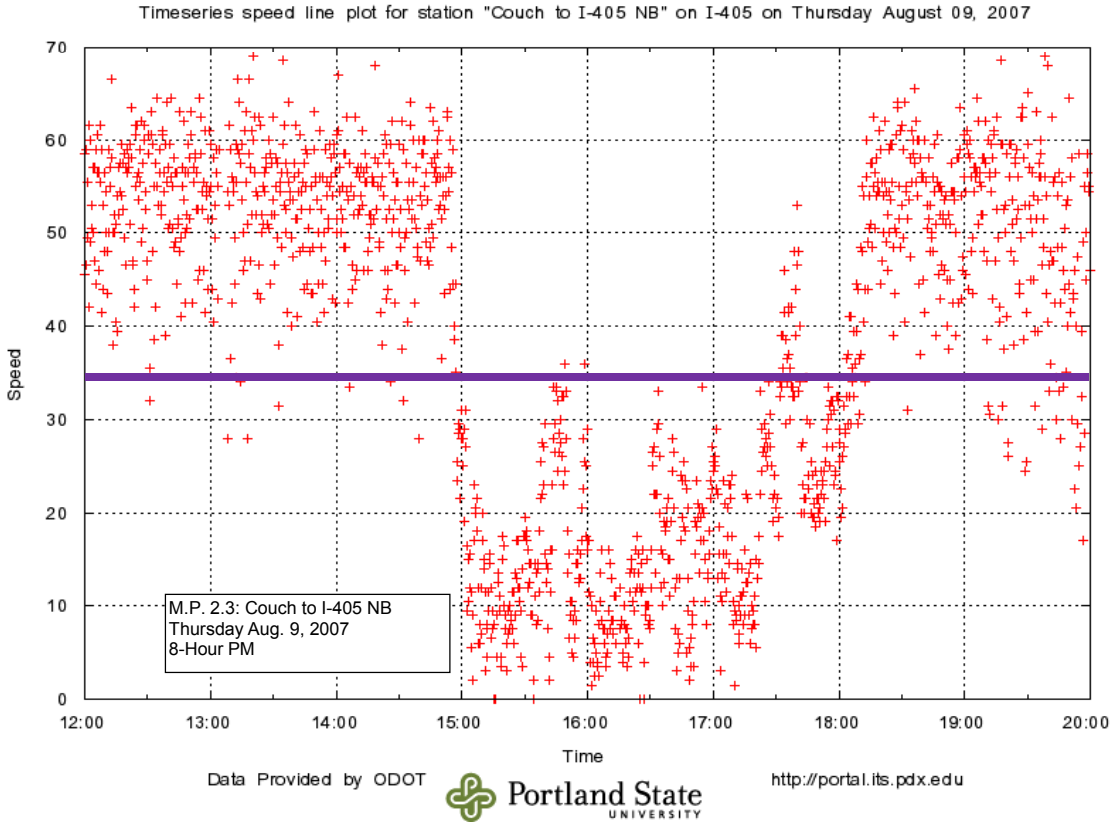
Highway: *I-405* **Date:** *August 8th 2007*
Direction: *Northbound*



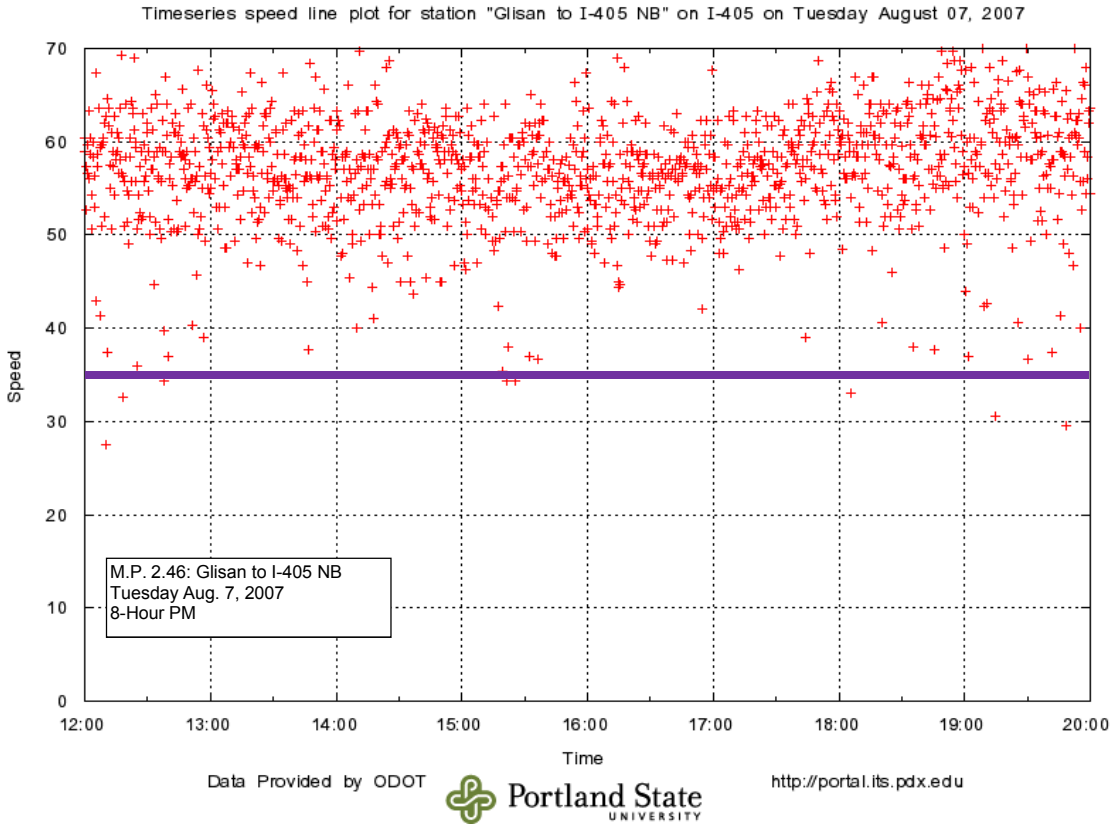


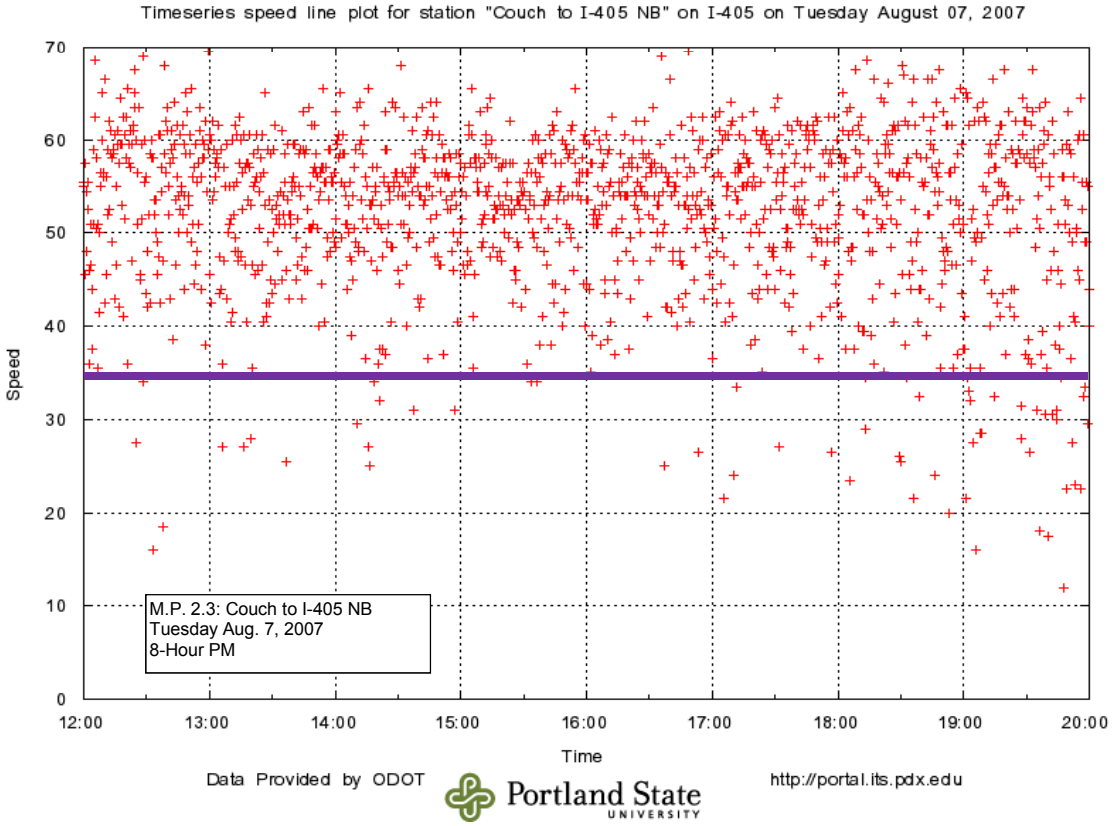
Highway *I-405* **Date:** *August 9th 2007*
Directior *Northbound*



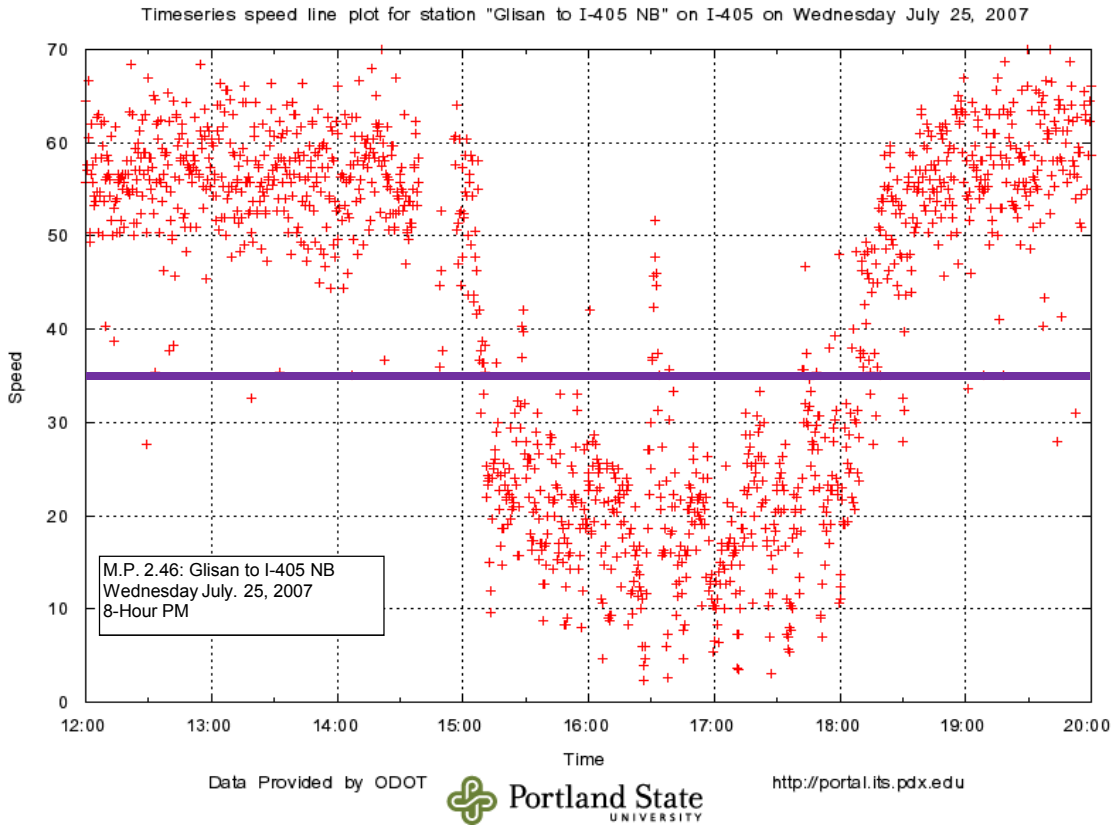


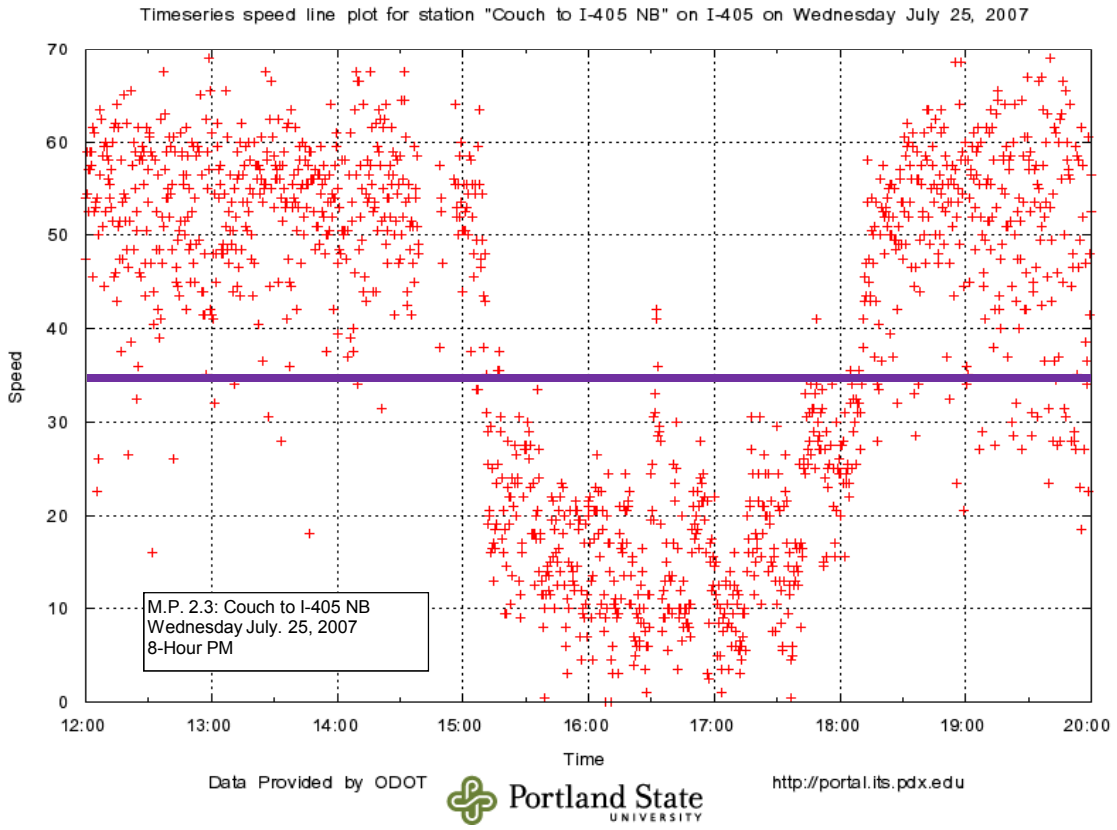
Highway *I-405* **Date:** *August 7th 2007*
Direction *Northbound*



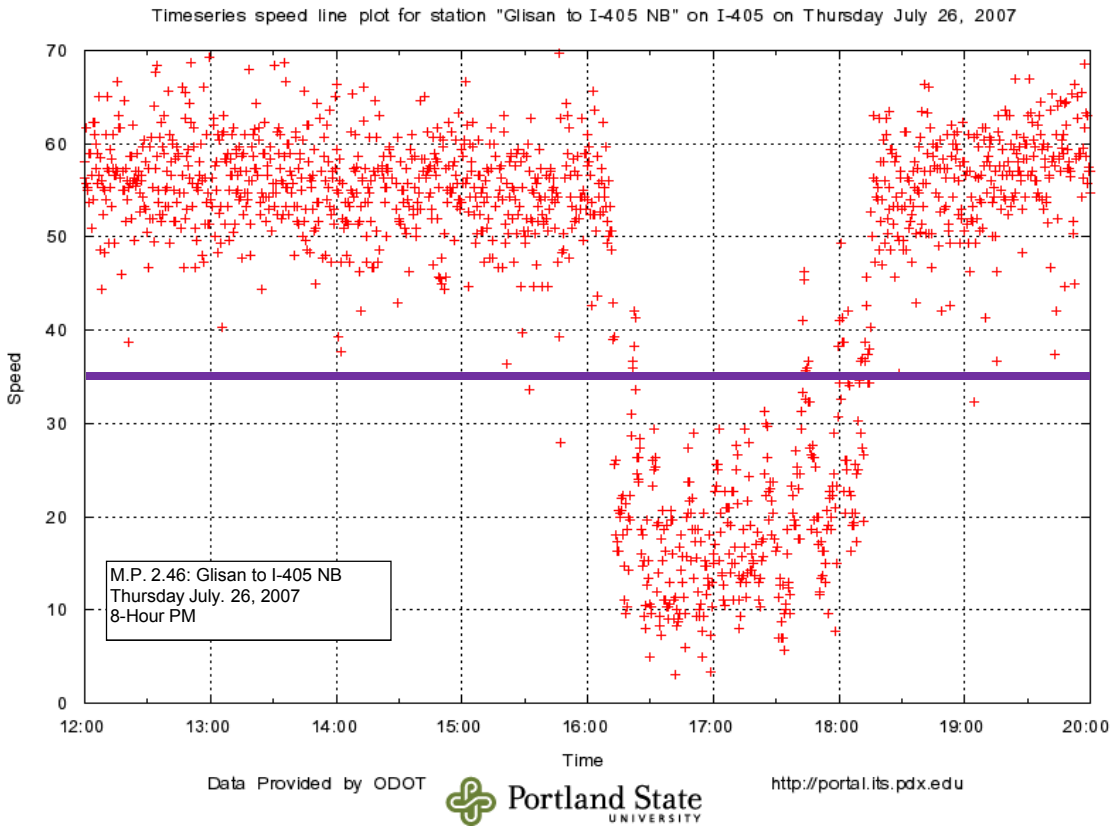


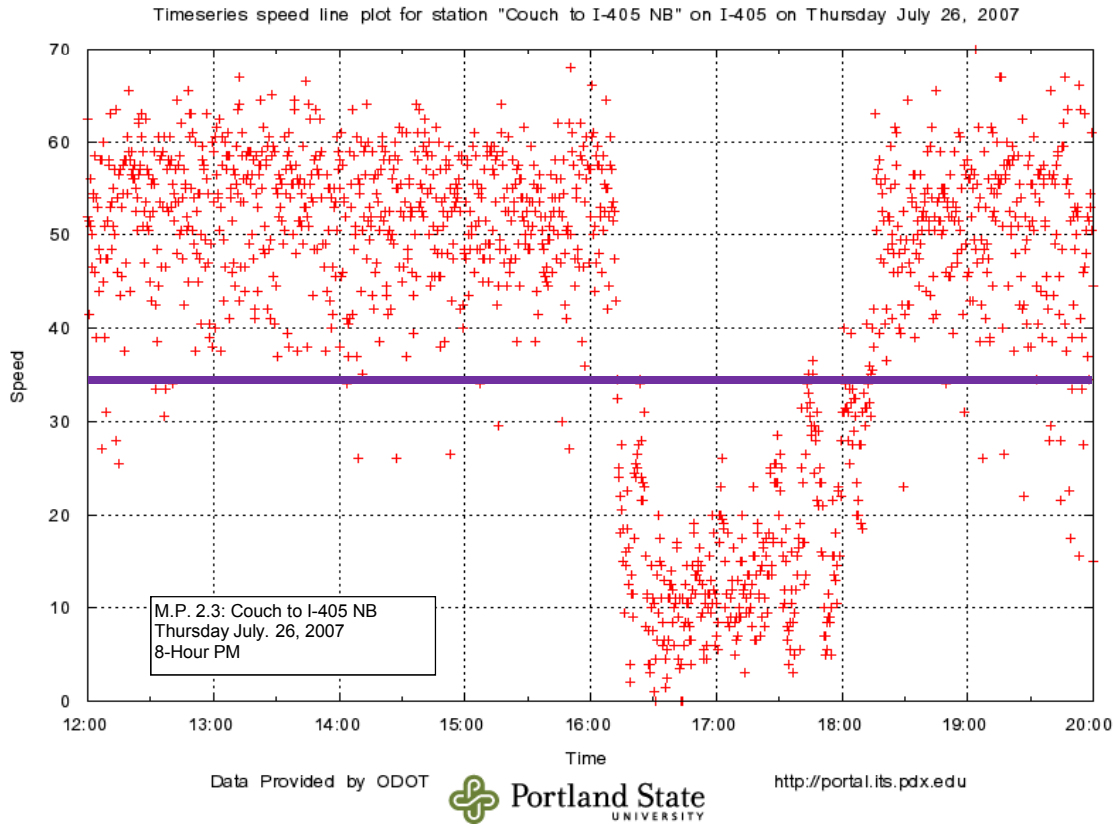
Highway *I-405* **Date:** *July 25th 2007*
Direction *Northbound*





Highway *I-405* **Date:** *July 26th 2007*
Direction *Northbound*

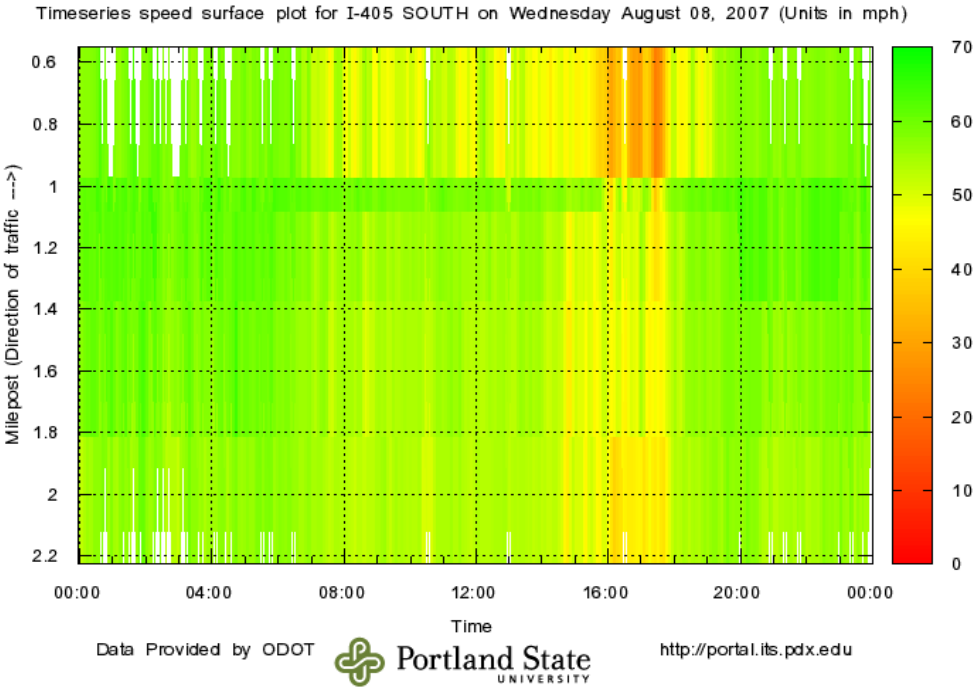


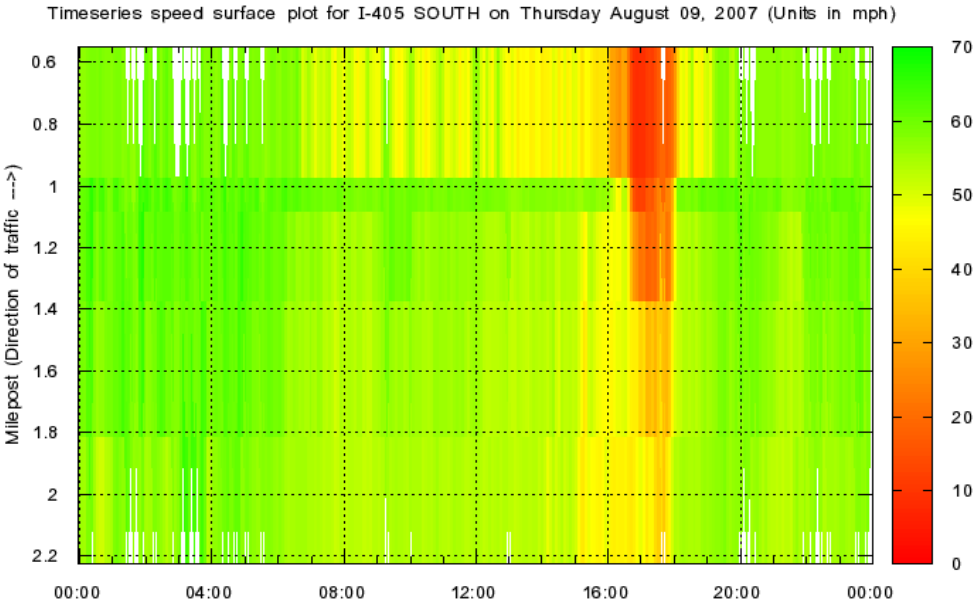


I-405 Southbound
24 Hour Speed Plots

DAVID EVANS AND ASSOCIATES INC.

Highway: *I-405* **Time Period: 24 Hrs**
Direction: *Southbound* **Entire I-205 Corridor: Southbound**

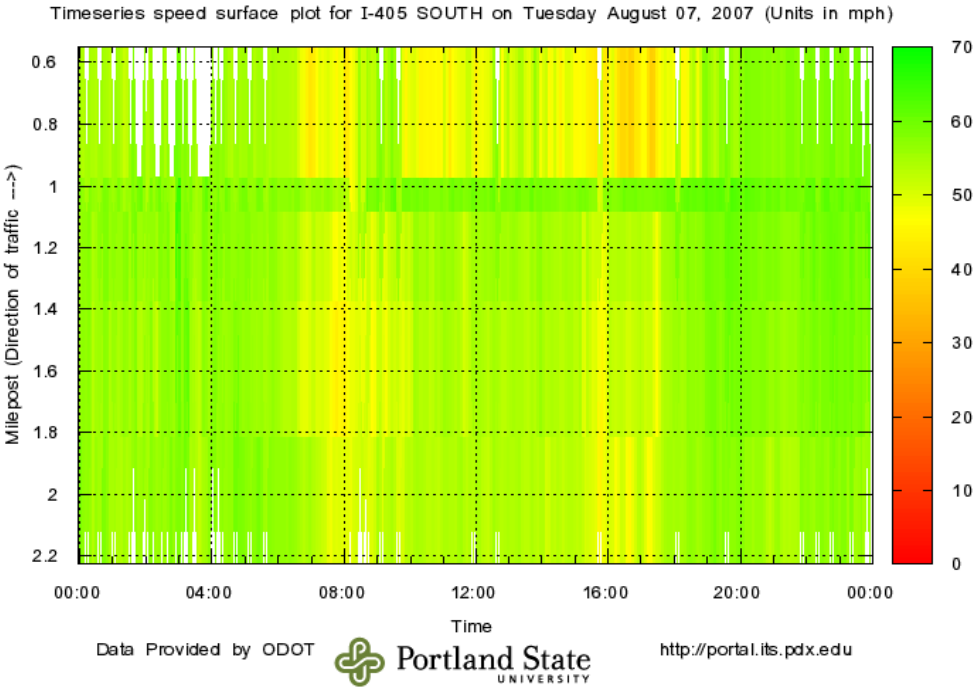


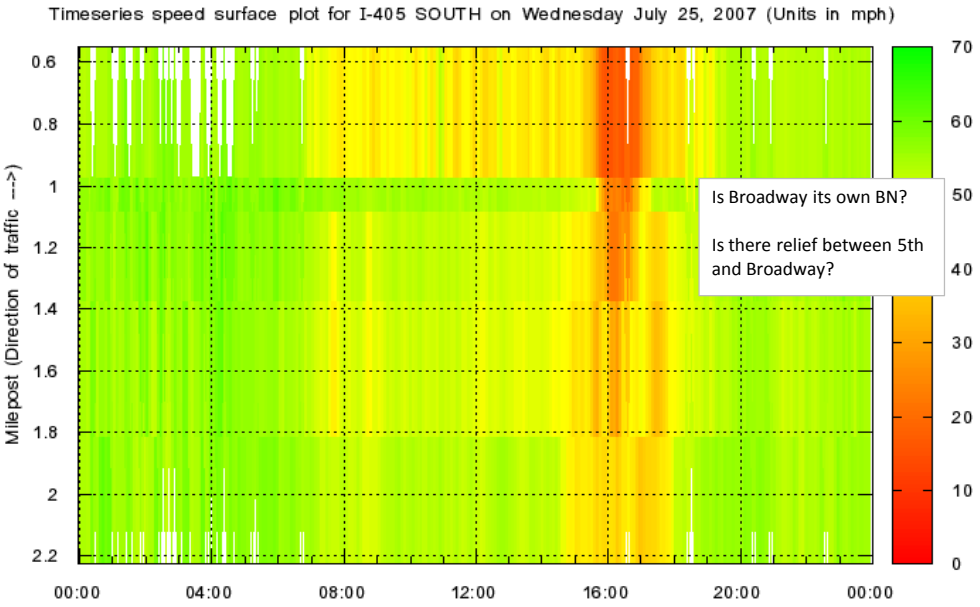


Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
763768	I-405	I-405 Southbound At BURNSIDE	0	16:49:05	56	Stall	Right Shoulder	no	0
763769	I-405	I-405 Southbound At EVERETT	0	16:51:12	56	Stall	Right Shoulder	no	0
763770	I-405	I-405 Southbound At 1ST	0	16:52:54	56	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

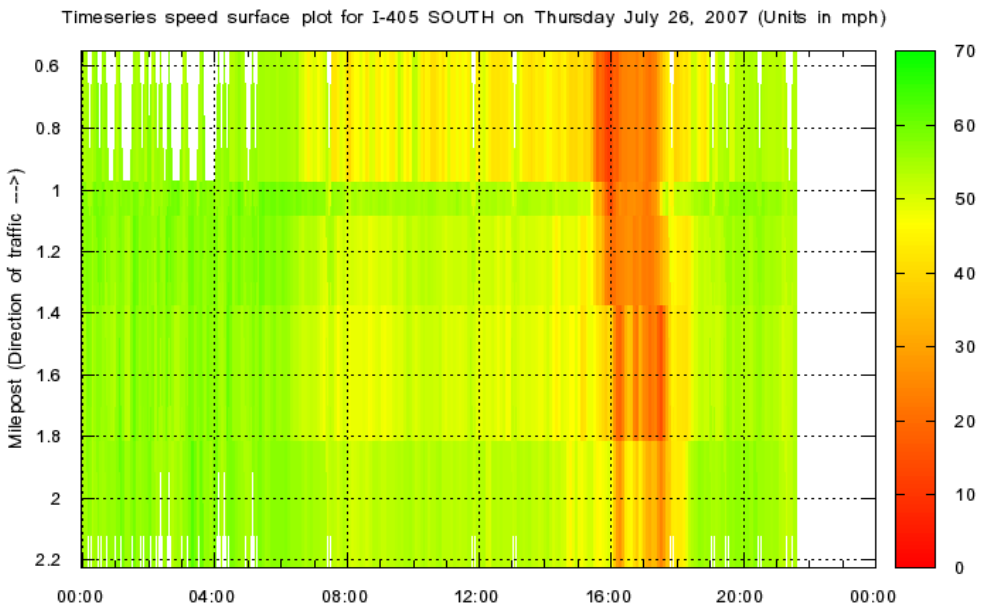




Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
756985	I-405	I-405 Southbound At SALMON	0	13:21:31	57	Stall	Right Shoulder	no	0
756989	405	405 Southbound SALMON	0	14:08:56	57	Stall	Right Shoulder	no	0
757069	I-405	I-405 Southbound At 4TH	0	15:42:27	57	Stall	Gore Area (right)	no	0

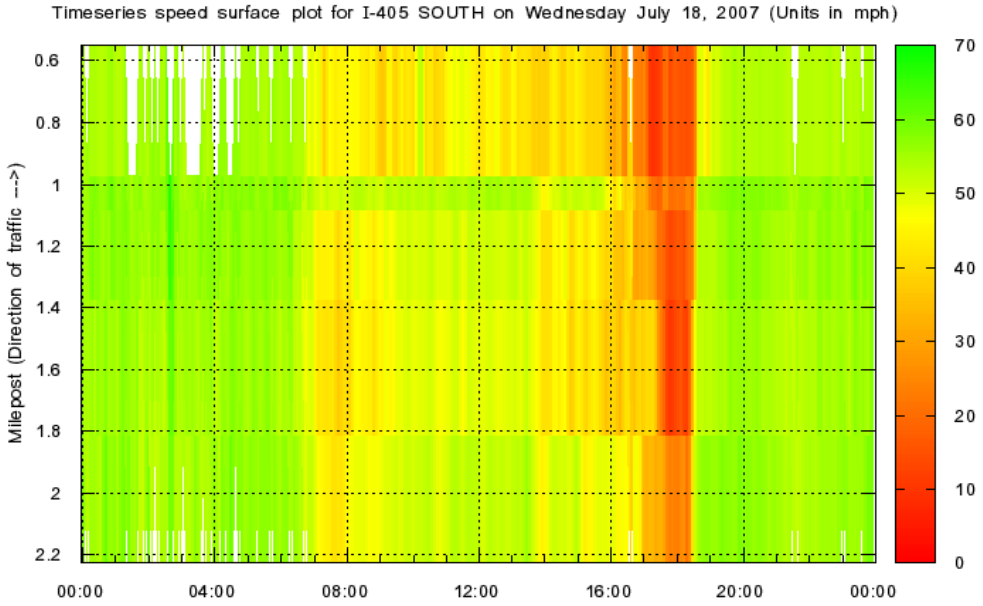
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
757308	I-405	I-405 Southbound MARQUAM BRIDGE	0	06:58:19	57	Stall	Right Shoulder	no	0
757314	I-405	I-405 Southbound At FREEMONT BRIDGE TOP DECK	0	07:44:31	57	Stall	Left Shoulder	no	0
757548	I-405	I-405 Southbound At 1ST	0	15:48:15	57	Stall	Right Shoulder	no	0

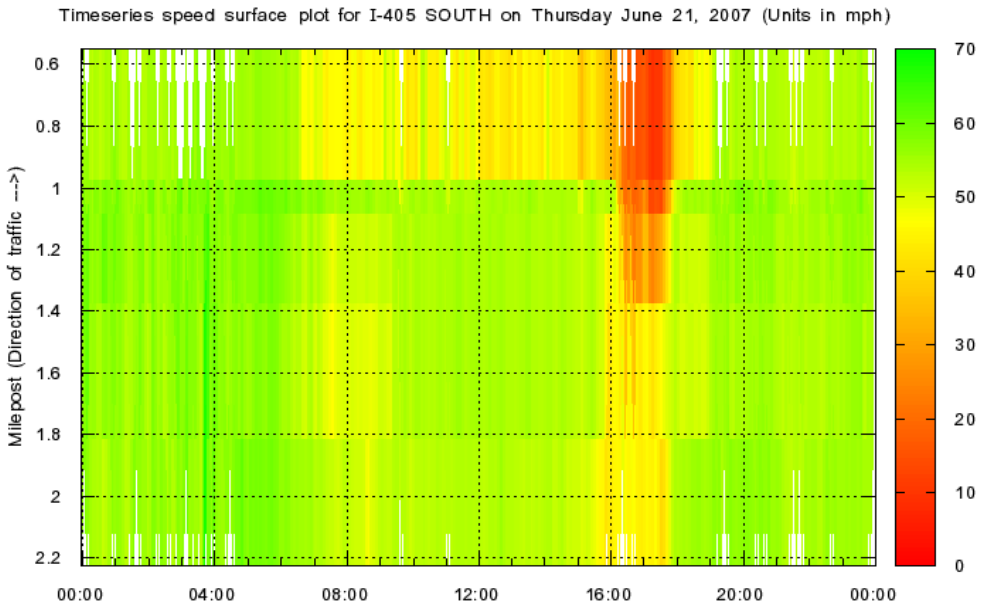
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
753844	I-405	I-405 Southbound FREMONT BRIDGE	0	07:45:28	57	Crash	Right Shoulder	no	0
753947	I-405	I-405 Southbound At I-5	1	10:57:25	55	Debris	Left Lanes	no	0
754263	I-405	I-405 Southbound Just South Of EVERETT	1	17:19:15	57	Stall	Left Lanes	no	0

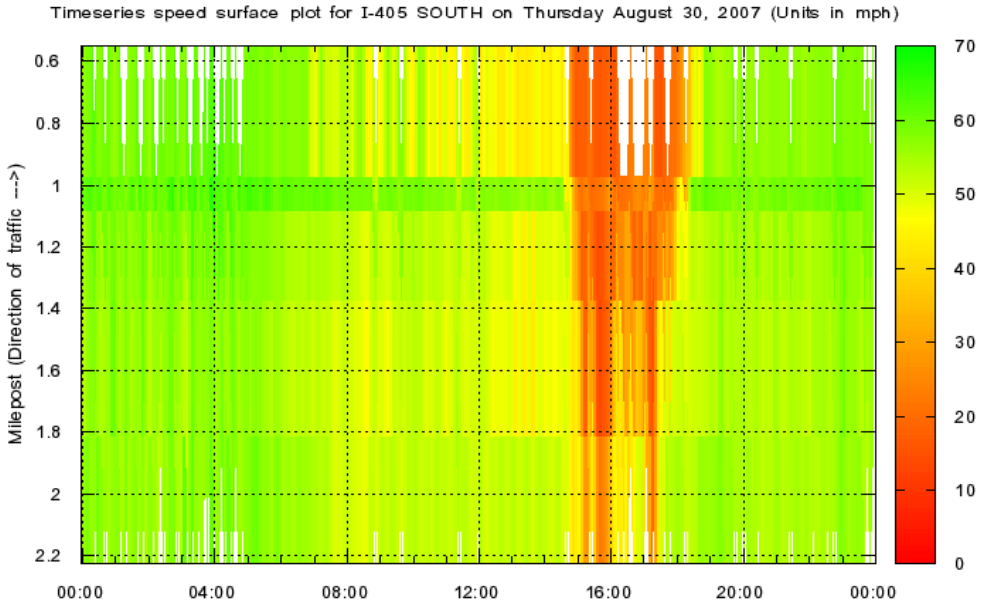
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
741643	I-405	I-405 Southbound At SALMON	0	16:22:49	109	Stall	Right Shoulder	no	0

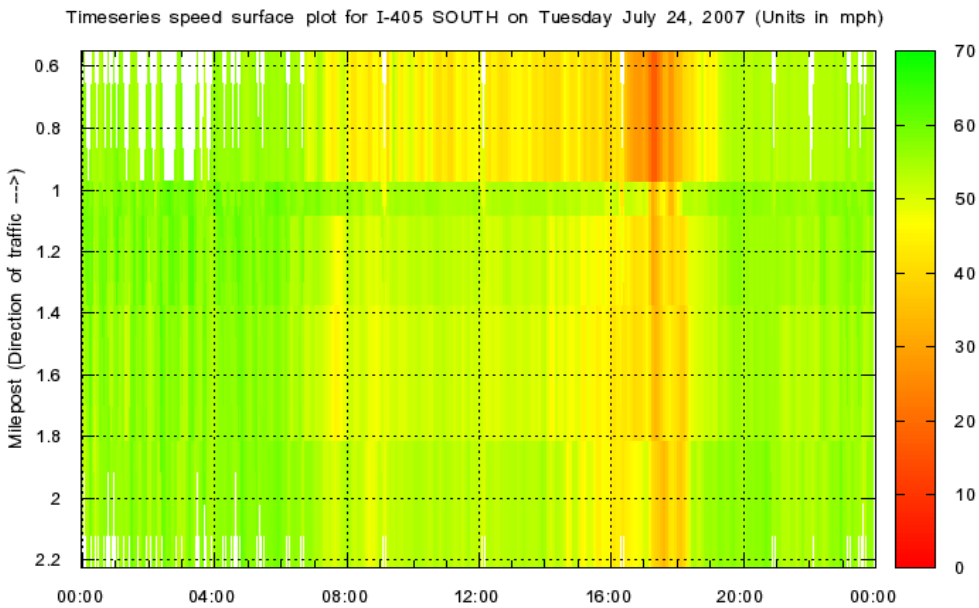
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
772789	I-405	I-405 Southbound 6TH	0	12:20:15	113	Stall	Right Shoulder	no	0
772849	I-405	I-405 Southbound FREMONT BRIDGE	1	13:37:33	56	Crash	Center Lanes	no	0

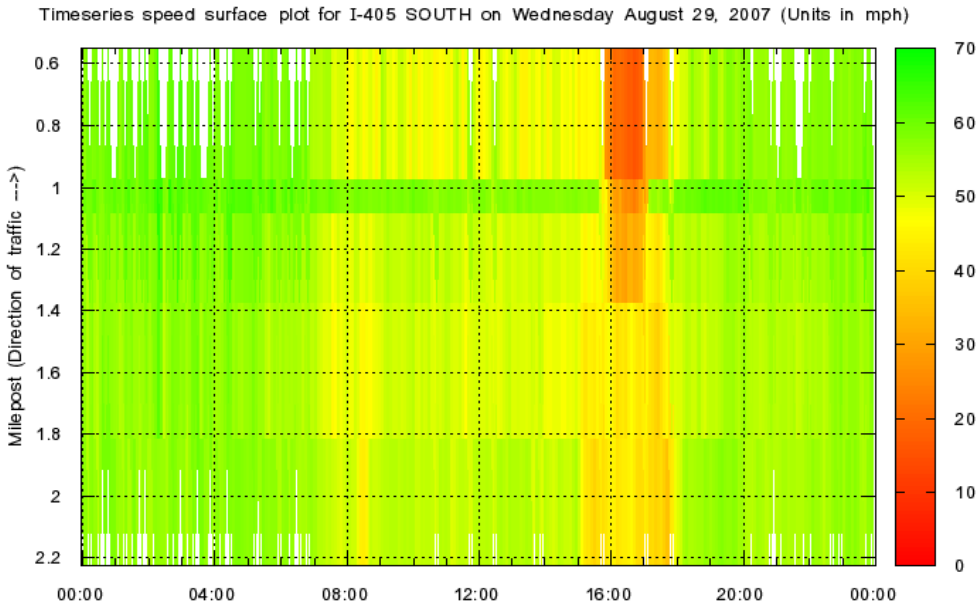
NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
756467	I-405	I-405 Southbound RAMP TO I-5 SB	1	16:55:51	57	Stall	Right Lanes	no	0
756503	I-405	I-405 Southbound Just South Of 6TH	1	17:42:40	56	Stall	Right Lanes	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.



Incidents:

ID	Primary Route	Location	Number of Lanes Affected	Start Time (hh:mm:ss)	Duration (min)	Incident Type	Affected Lanes	Hazmat	Number of Fatalities
772289	I-405	I-405 Southbound Just North Of US 26 (SUNSET)	0	13:01:21	56	Debris	None	no	0
772328	I-405	I-405 Southbound At EVERETT	1	14:35:08	56	Stall	Right Shoulder	no	0
772351	I-405	I-405 Southbound TO WB US 26	1	15:32:39	54	Stall	Right Shoulder	no	0

NOTE: Incidents appearing in the table but not on the plot are incidents that have not been associated with a highway milepost.

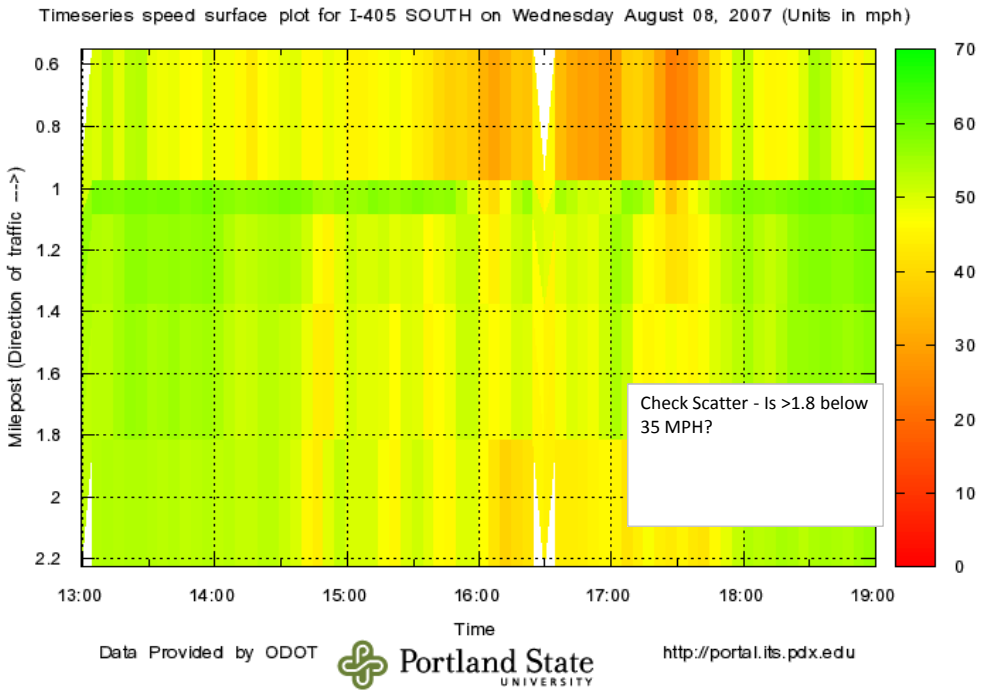
I-405 Southbound

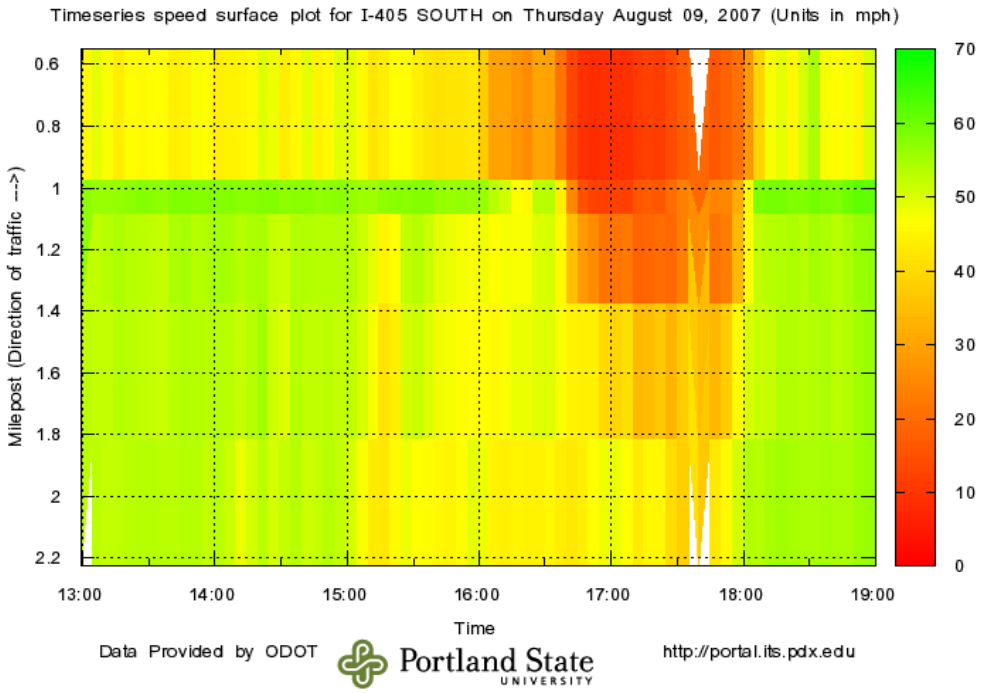
PM Peak Hour Speed Plots

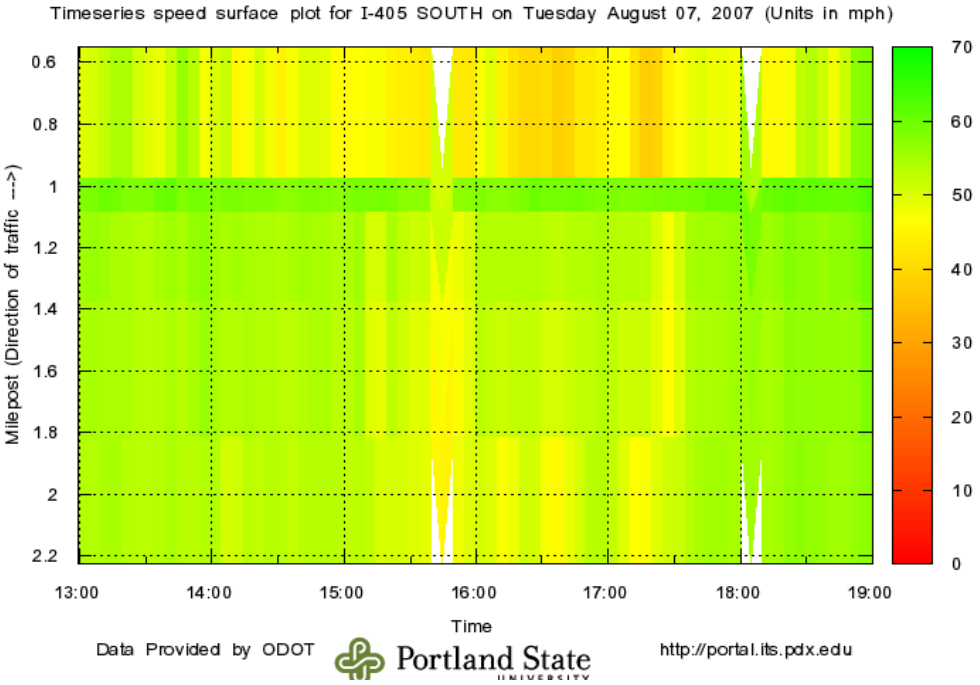
DAVID EVANS AND ASSOCIATES INC.

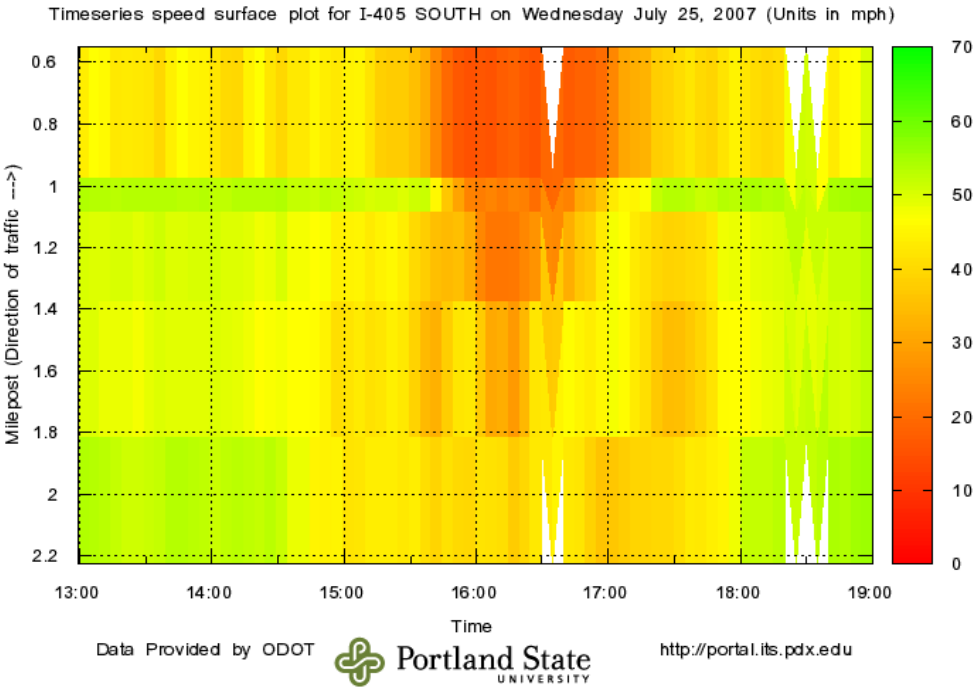
Highway: *I-405*
Direction: *Southbound*

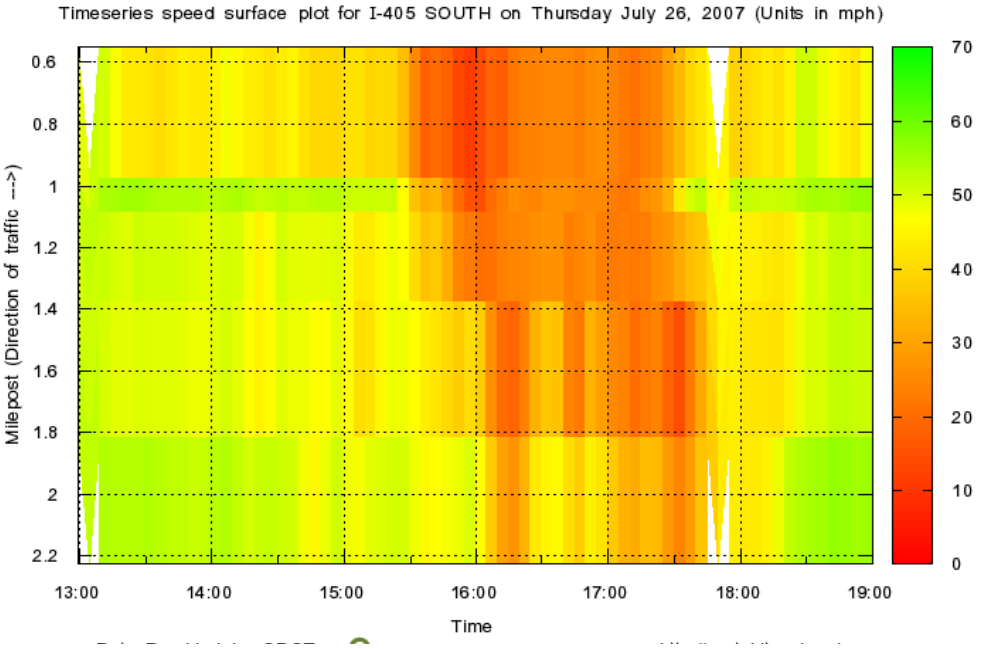
Time Period: PM Peak
Bottleneck Influence Area: M.P. 2 - .5

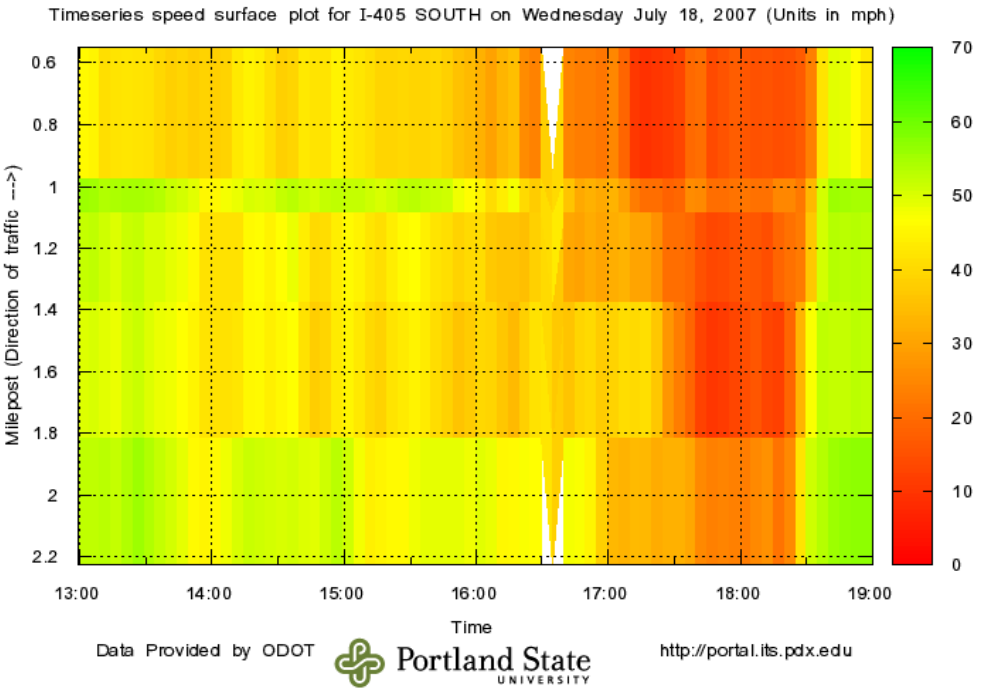


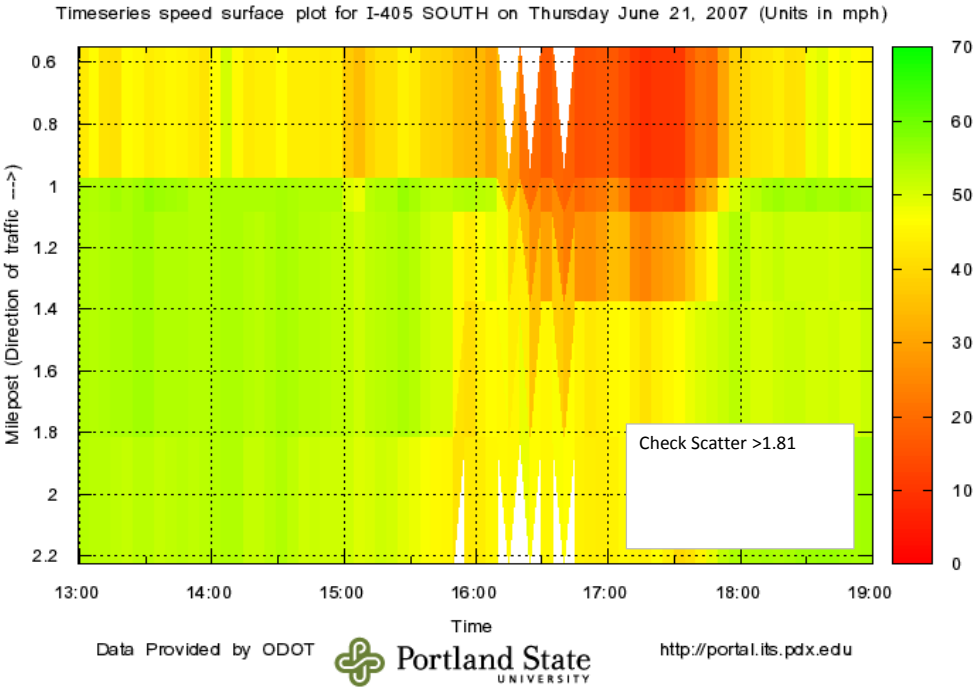


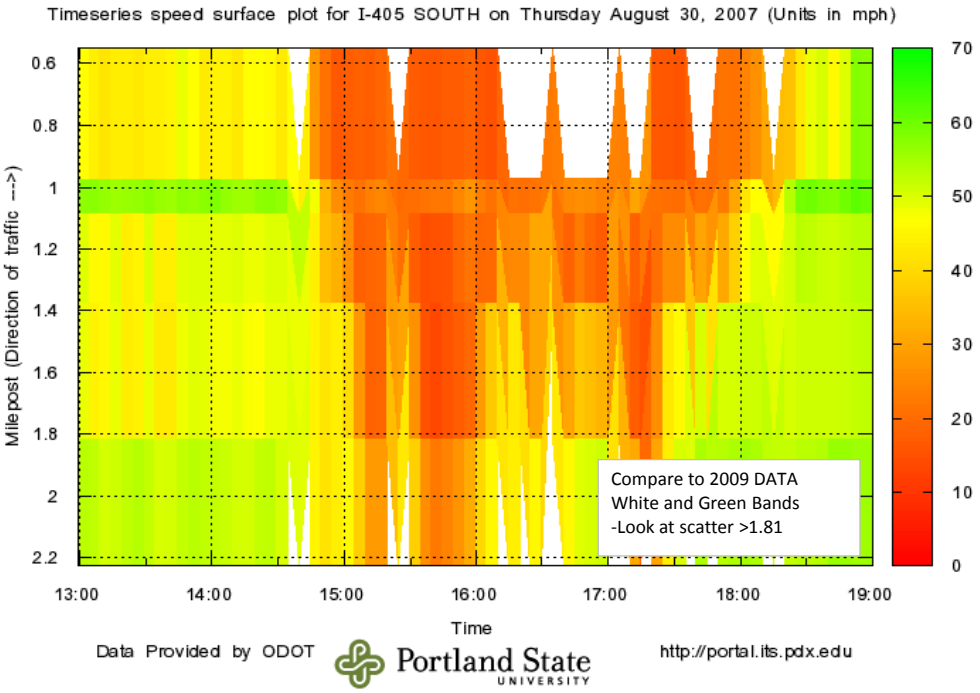

Timeseries speed surface plot for I-405 SOUTH on Tuesday August 07, 2007 (Units in mph)
Milepost (Direction of traffic --->)
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
13:00
14:00
15:00
16:00
17:00
18:00
19:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu

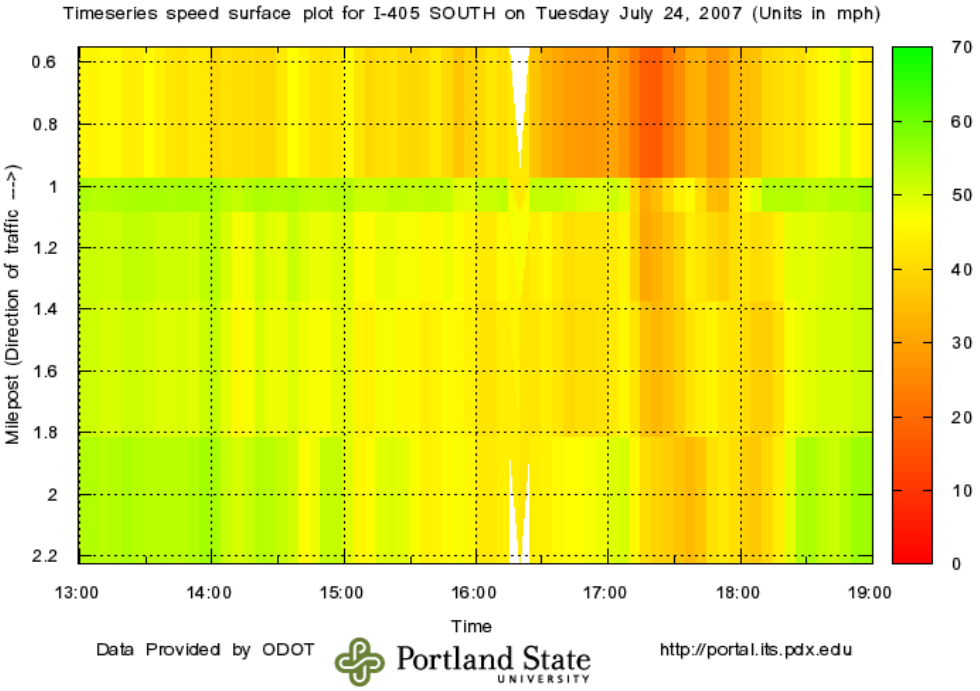

Timeseries speed surface plot for I-405 SOUTH on Wednesday July 25, 2007 (Units in mph)
Milepost (Direction of traffic --->)
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
13:00
14:00
15:00
16:00
17:00
18:00
19:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-405 SOUTH on Thursday July 26, 2007 (Units in mph)
Milepost (Direction of traffic --->)
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
13:00
14:00
15:00
16:00
17:00
18:00
19:00
Time
70
60
50
40
30
20
10
0


Timeseries speed surface plot for I-405 SOUTH on Wednesday July 18, 2007 (Units in mph)
Milepost (Direction of traffic --->)
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
13:00
14:00
15:00
16:00
17:00
18:00
19:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-405 SOUTH on Thursday June 21, 2007 (Units in mph)
Milepost (Direction of traffic --->)
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
13:00
14:00
15:00
16:00
17:00
18:00
19:00
Time
70
60
50
40
30
20
10
0
Check Scatter >1.81
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-405 SOUTH on Thursday August 30, 2007 (Units in mph)
Milepost (Direction of traffic --->)
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
13:00
14:00
15:00
16:00
17:00
18:00
19:00
Time
70
60
50
40
30
20
10
0
Compare to 2009 DATA
White and Green Bands
-Look at scatter >1.81
Data Provided by ODOT
Portland State UNIVERSITY
http://portal.its.pdx.edu


Timeseries speed surface plot for I-405 SOUTH on Tuesday July 24, 2007 (Units in mph)
Milepost (Direction of traffic --->)
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
13:00
14:00
15:00
16:00
17:00
18:00
19:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
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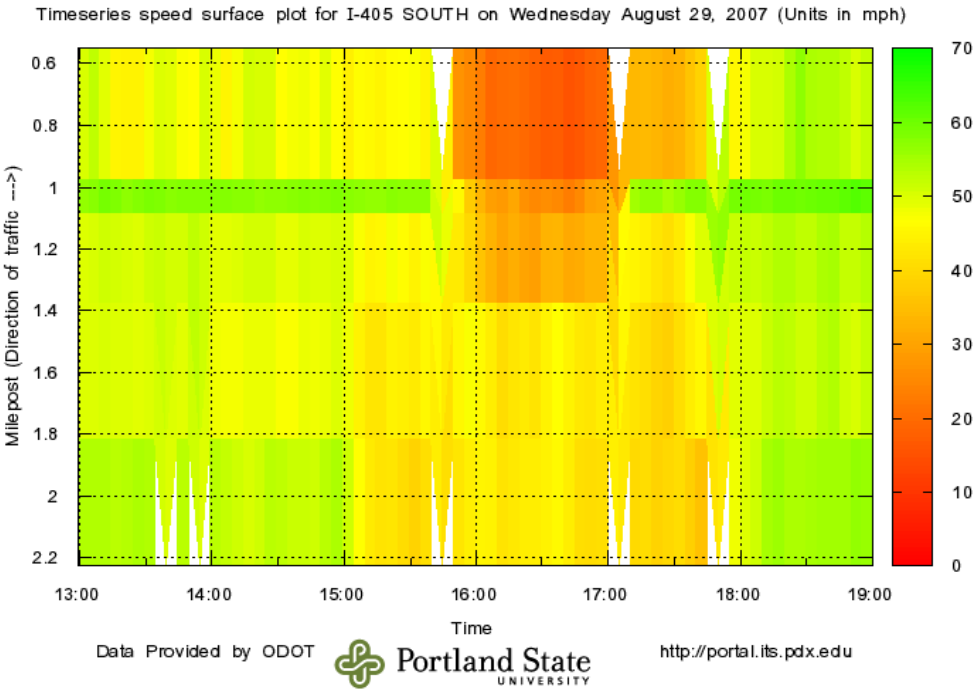

Timeseries speed surface plot for I-405 SOUTH on Wednesday August 29, 2007 (Units in mph)
Milepost (Direction of traffic --->)
0.6
0.8
1
1.2
1.4
1.6
1.8
2
2.2
13:00
14:00
15:00
16:00
17:00
18:00
19:00
Time
70
60
50
40
30
20
10
0
Data Provided by ODOT
Portland State
UNIVERSITY
http://portal.its.pdx.edu

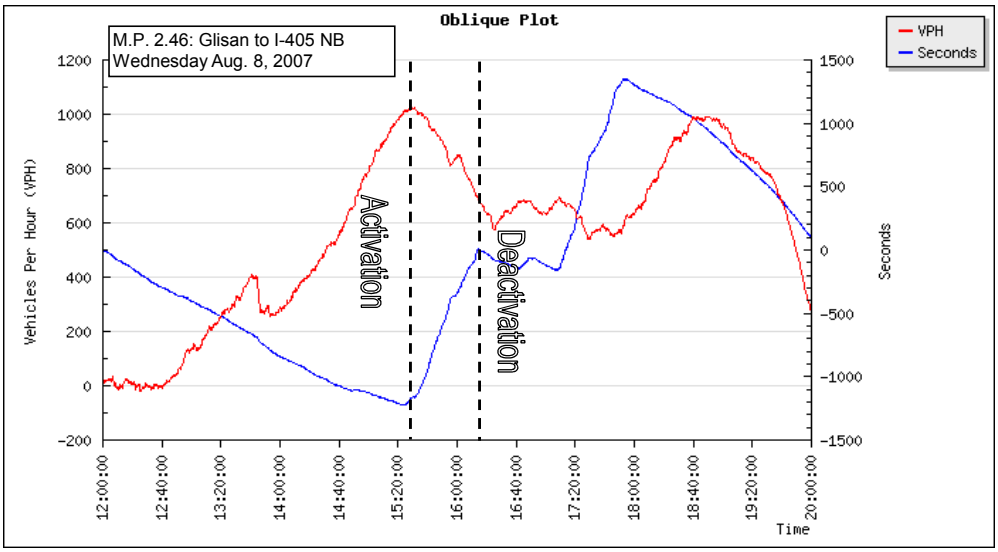
I-405 Oblique Plots

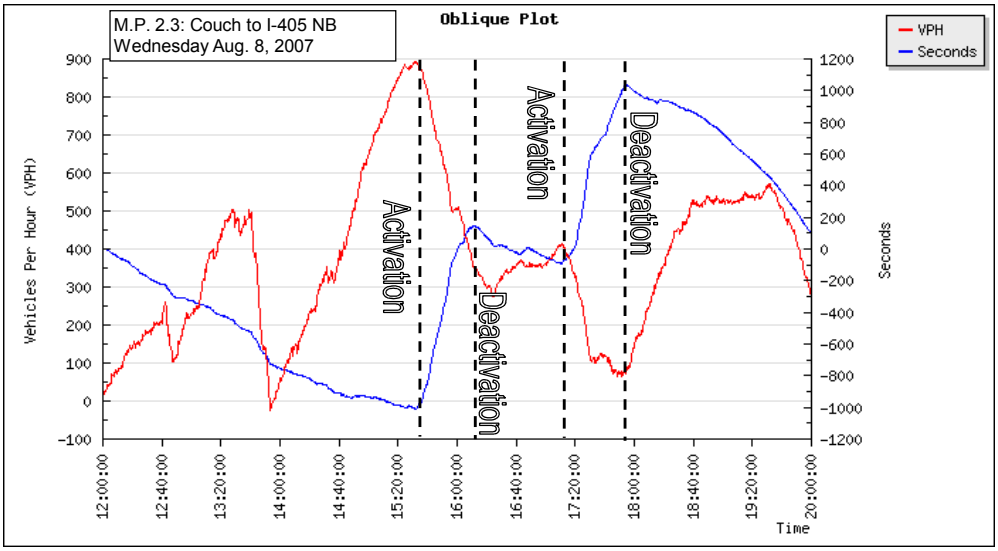
Northbound

Southbound

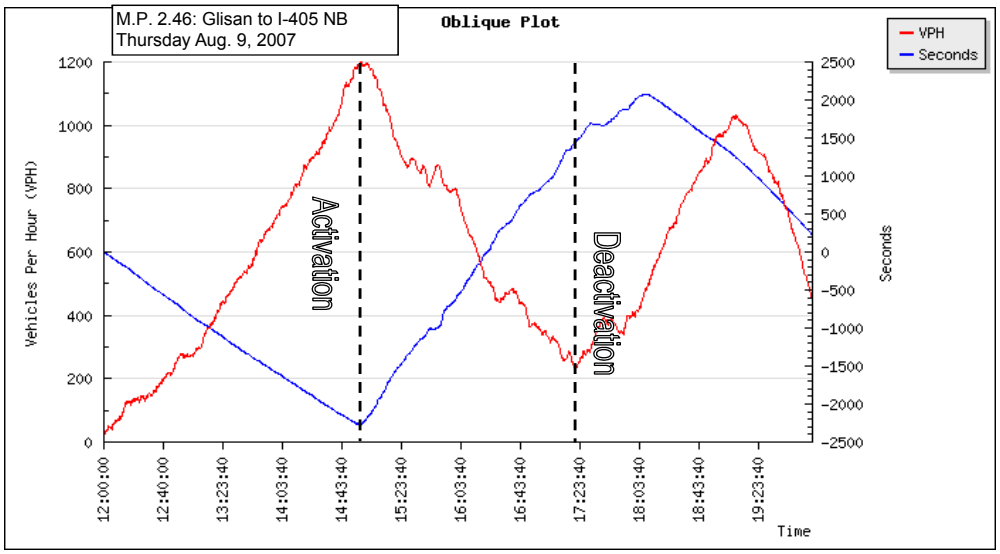
DAVID EVANS AND ASSOCIATES INC.

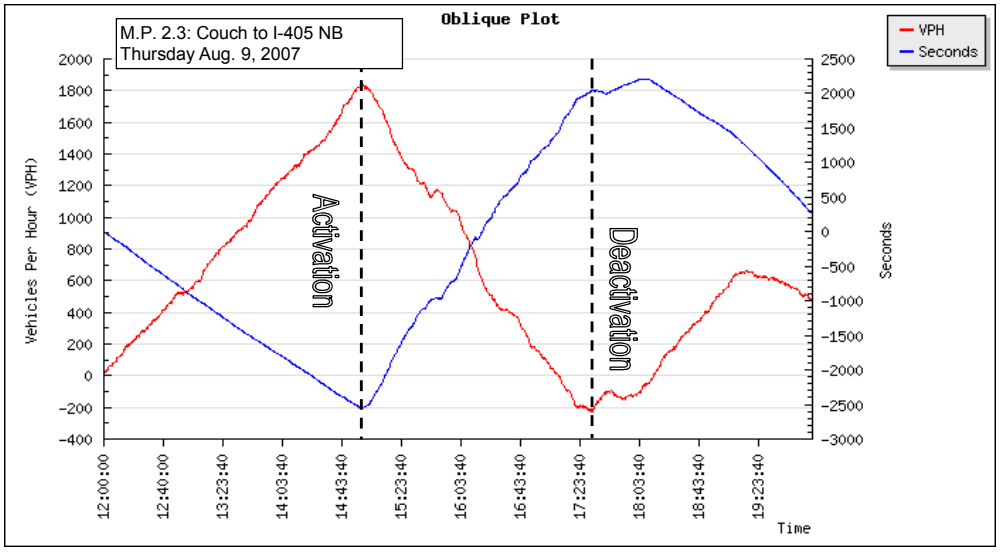
Highway: *I-405* **Date:** *August 8th 2007 PM*
Direction: *Northbound*



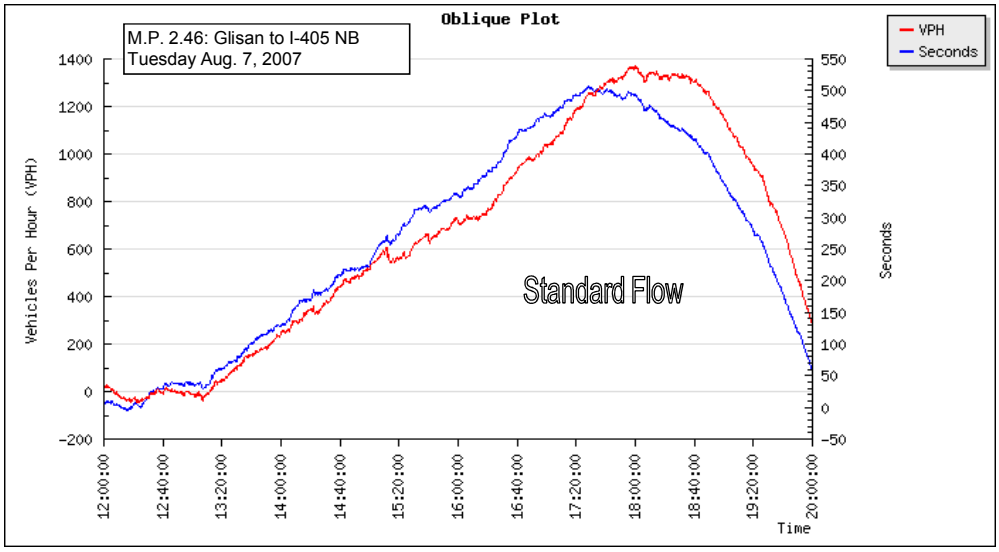


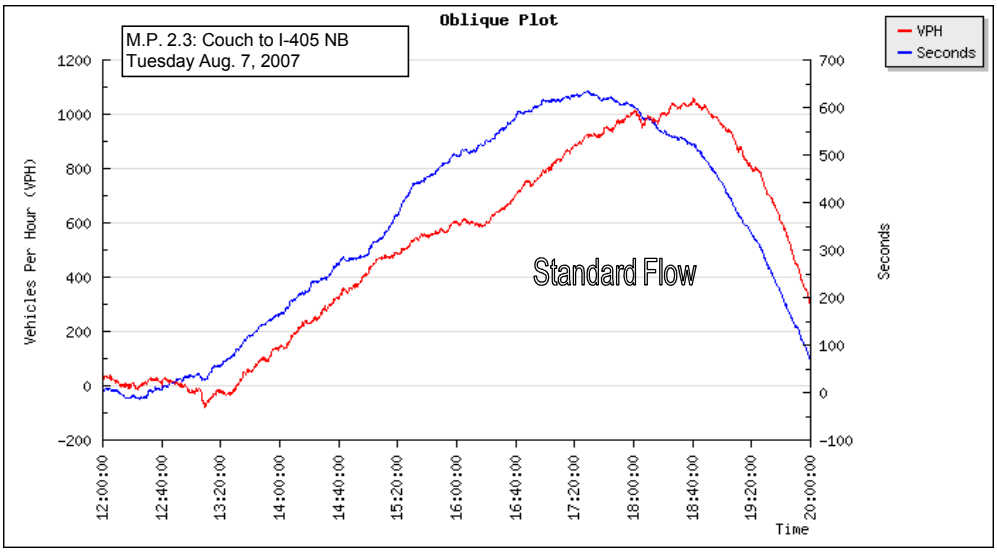
Highway: *I-405* **Date:** *August 9th 2007 PM*
Direction: *Northbound*



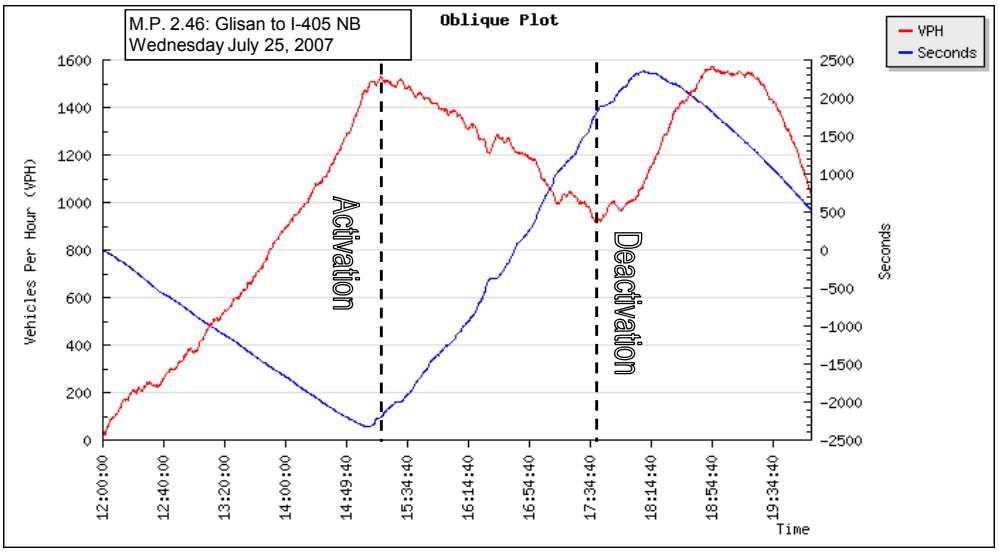


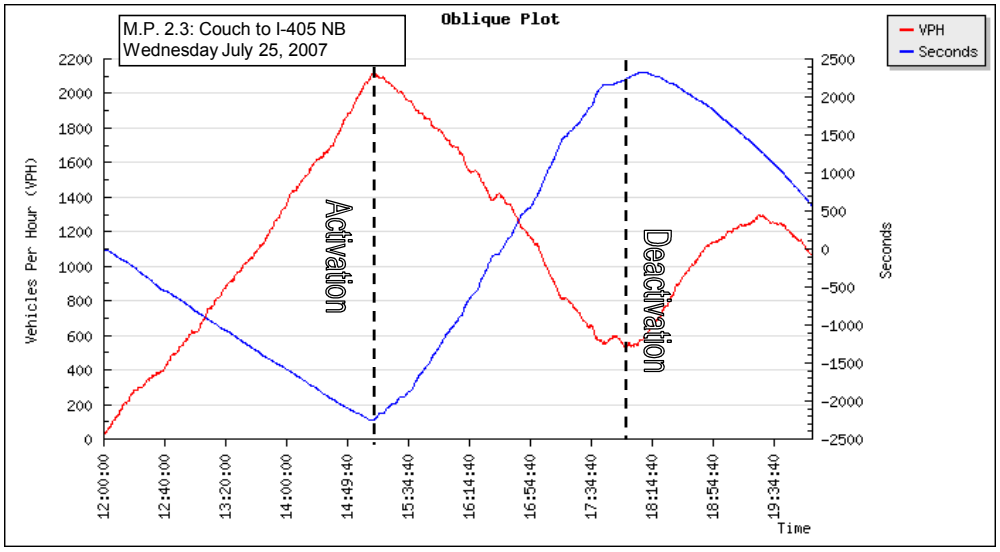
Highway: *I-405* **Date:** *August 7th 2007 PM*
Direction: *Northbound*



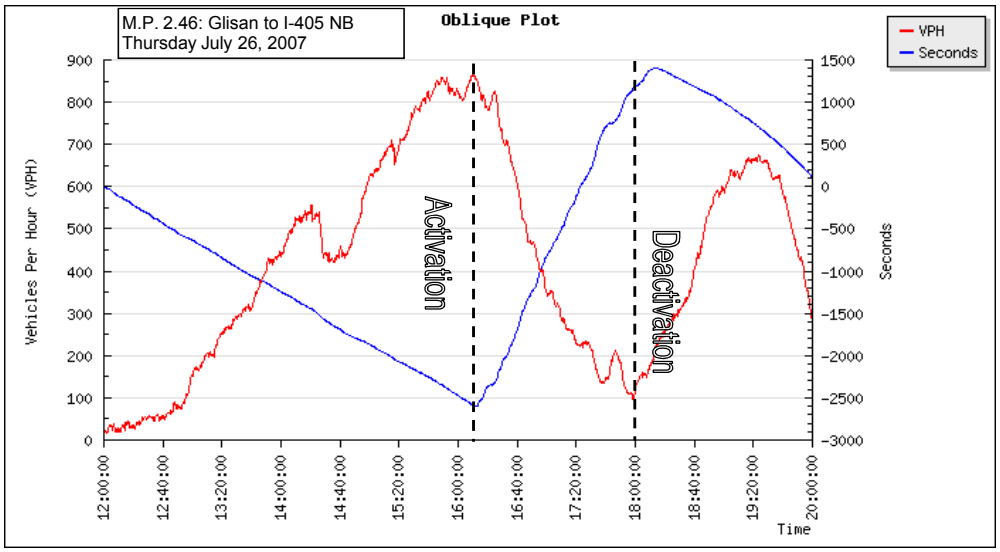


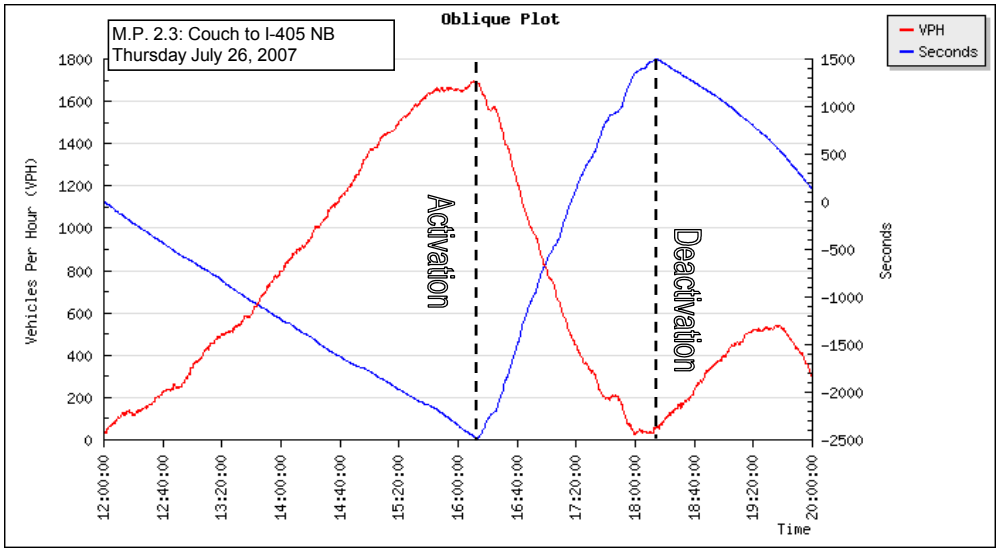
Highway: *I-405* **Date:** *July 25th 2007 PM*
Direction: *Northbound*



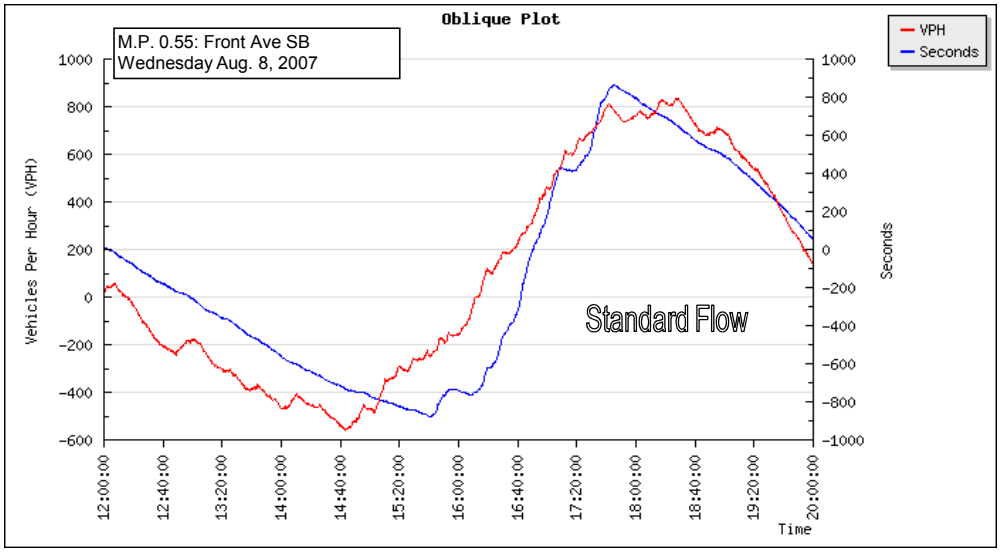


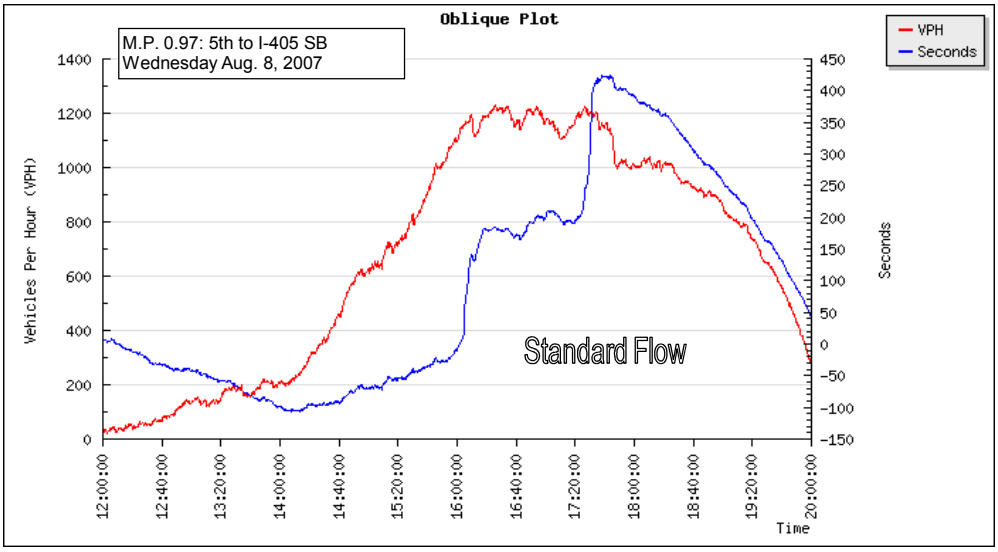
Highway: *I-405* **Date:** *July 26th 2007 PM*
Direction: *Northbound*

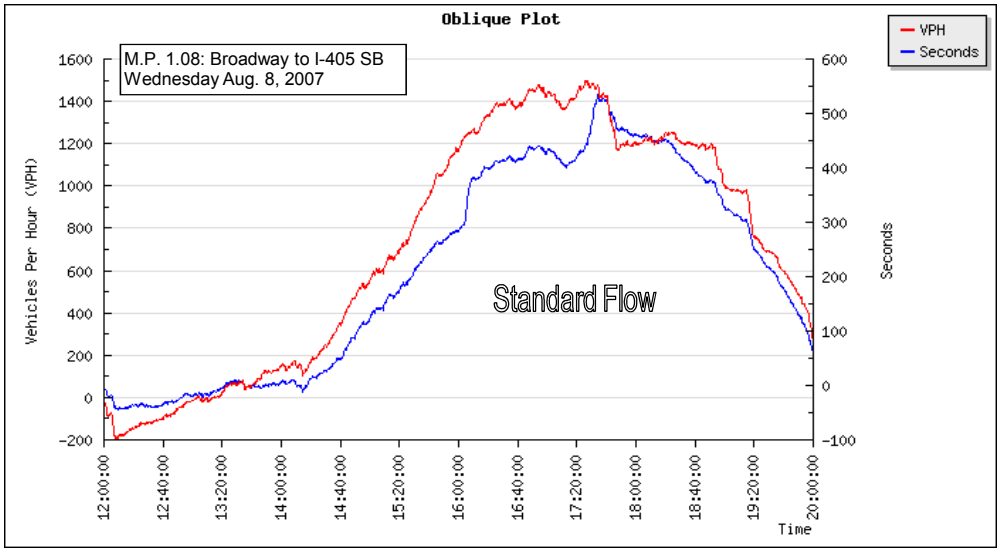




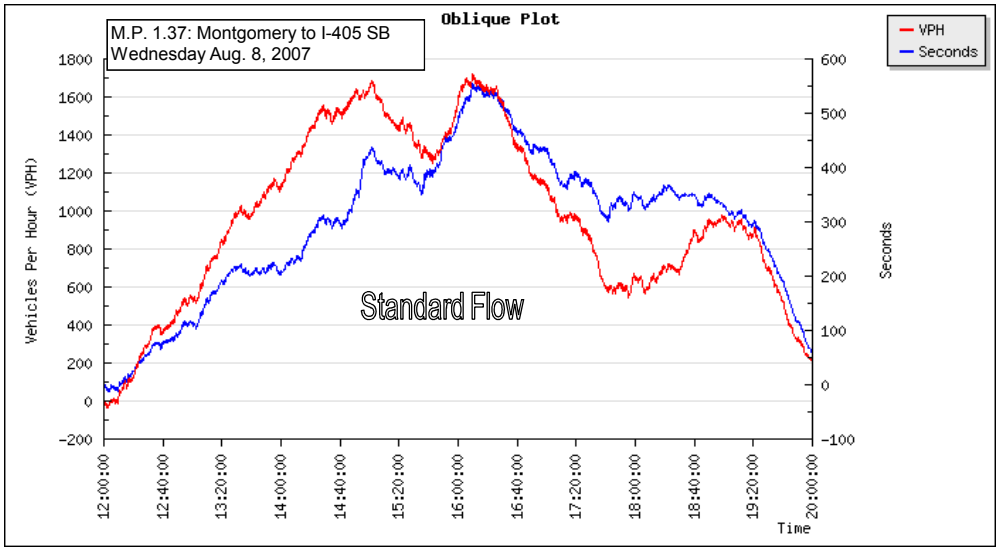
Highway: *I-405* **Date:** *August 8th 2007 PM*
Direction: *Southbound*

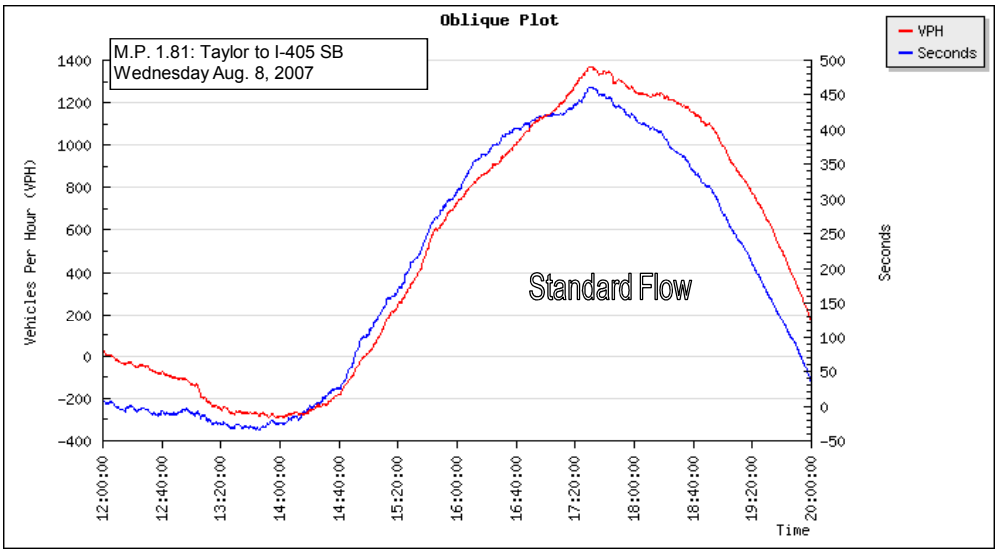


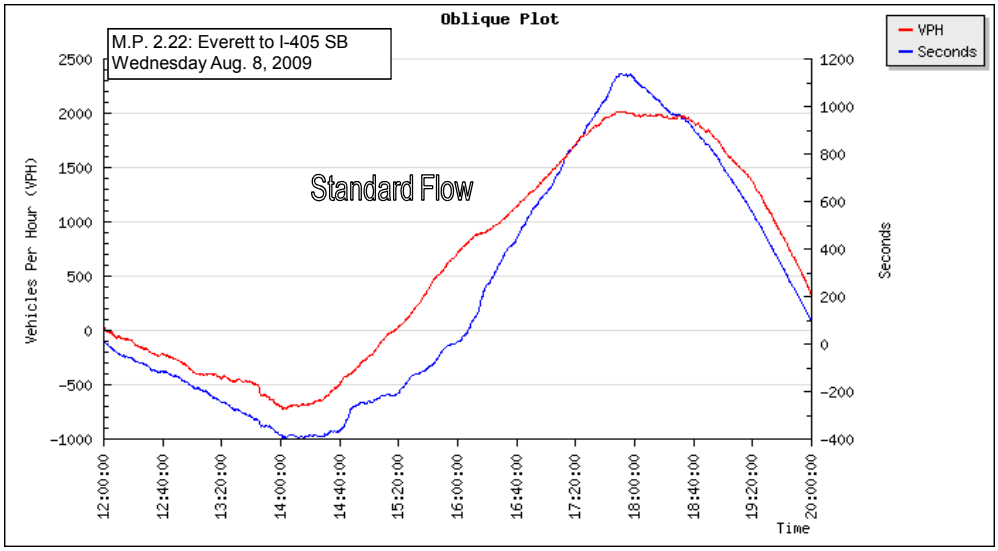




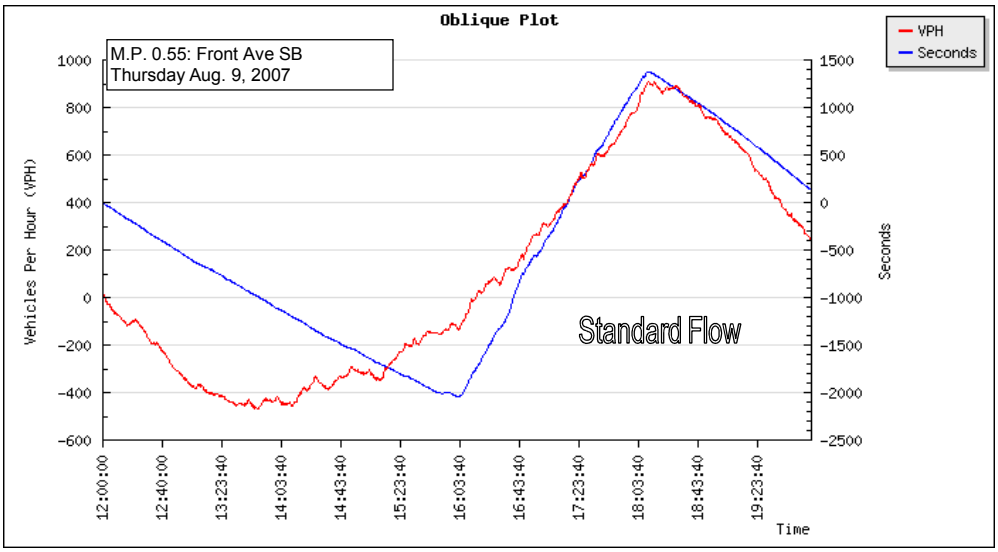
Highway: *I-405* **Date:** *August 8th 2007 PM*
Direction: *Southbound*

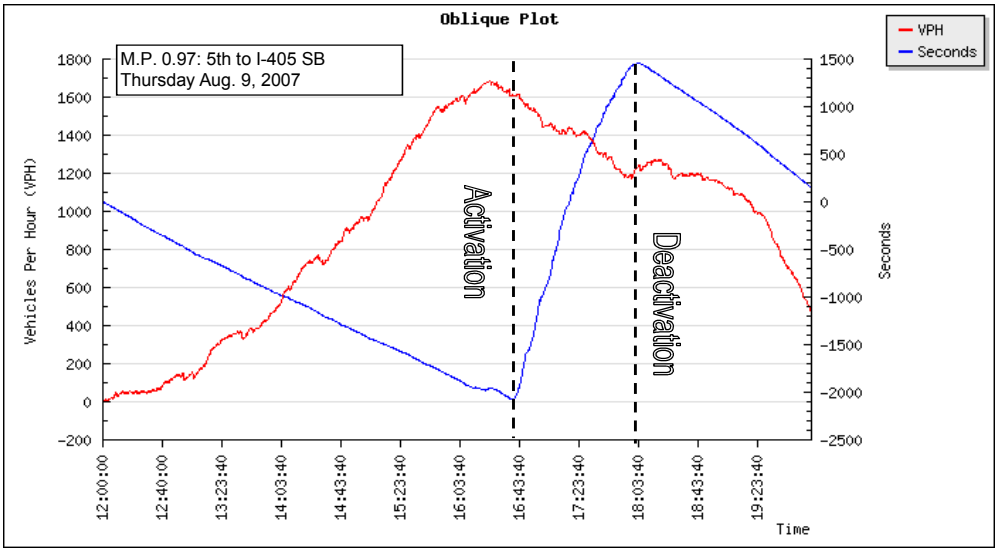


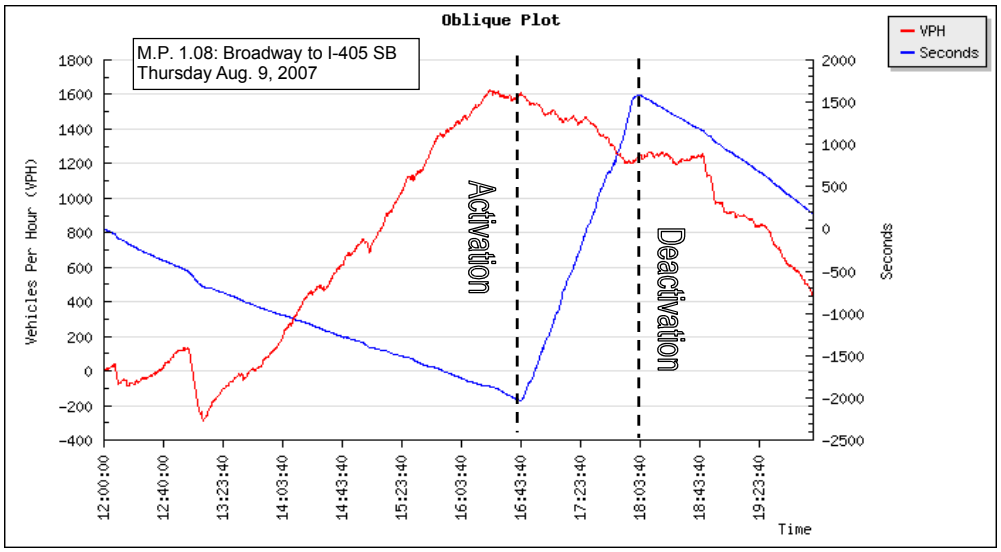




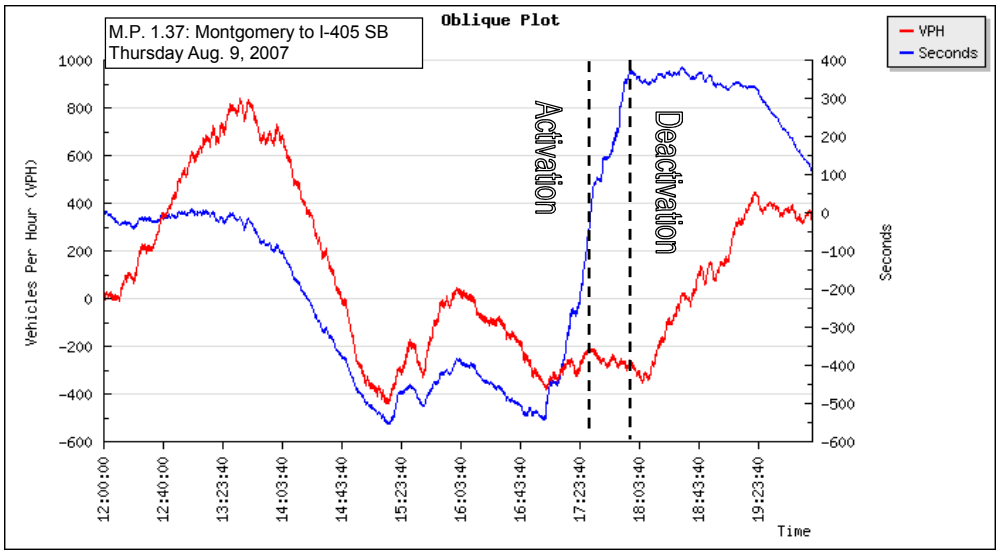
Highway: *I-405* **Date:** *August 9th 2007 PM*
Direction: *Southbound*

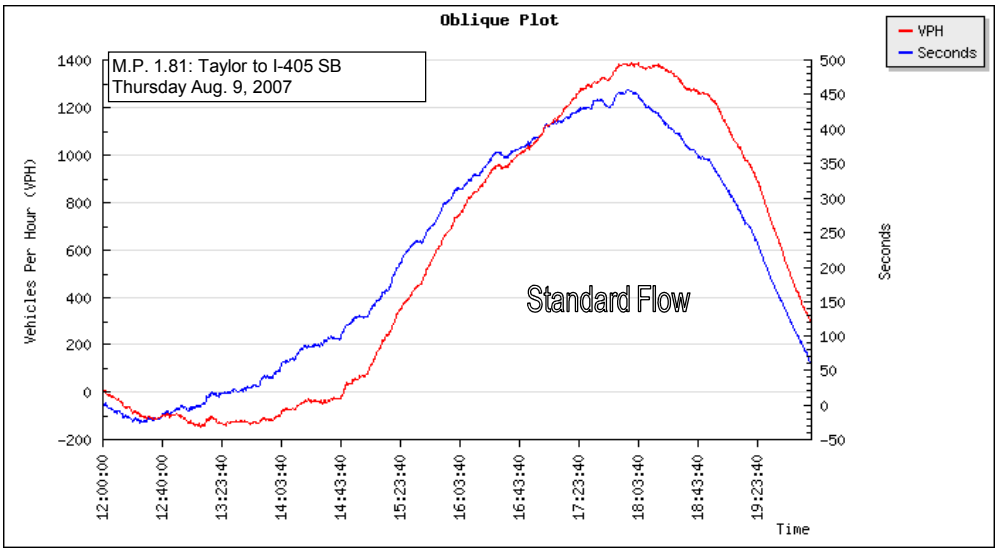


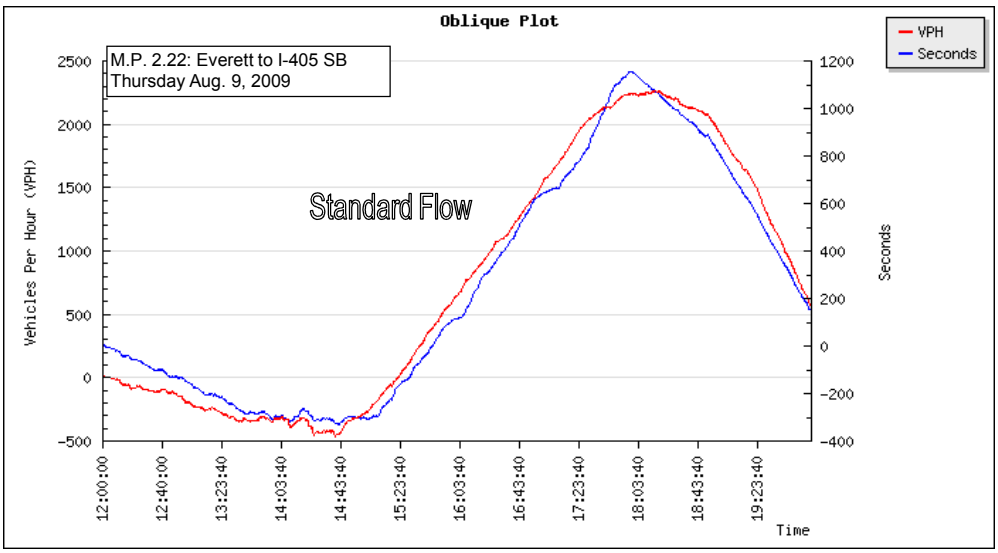




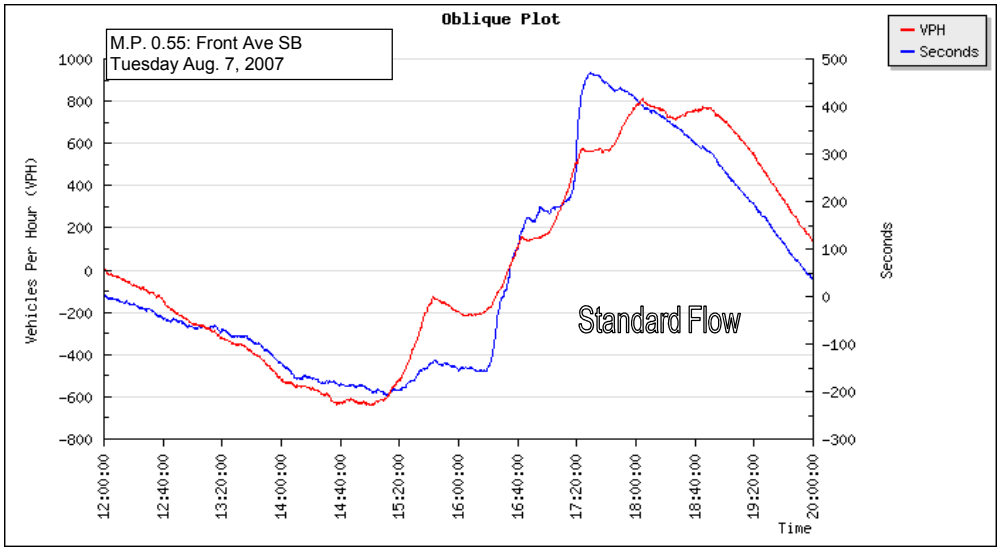
Highway: *I-405* **Date:** *August 9th 2007 PM*
Direction: *Southbound*

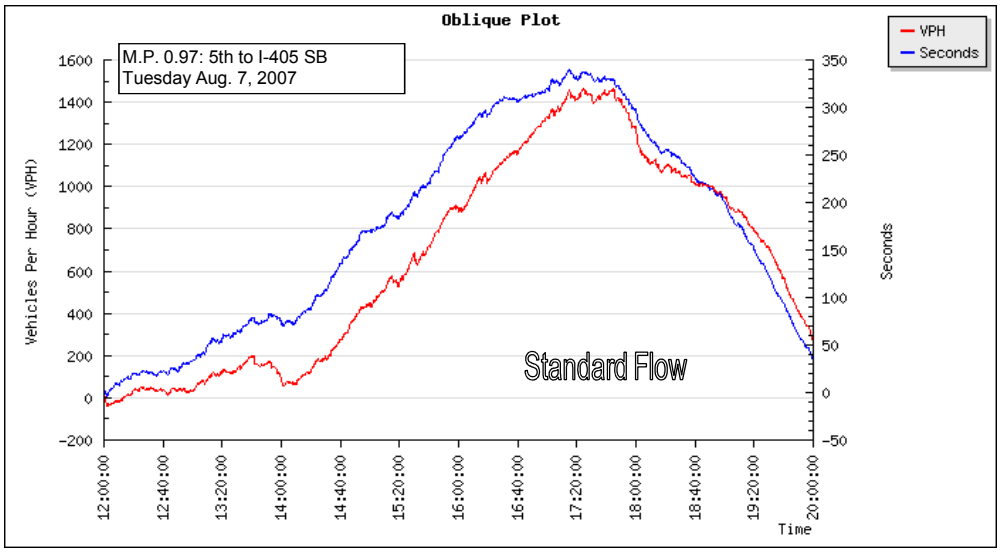


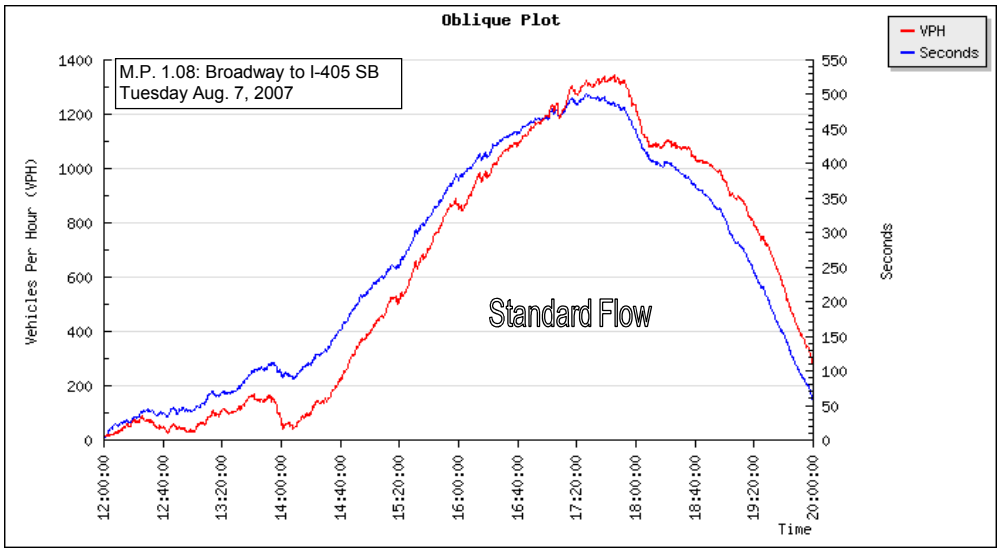




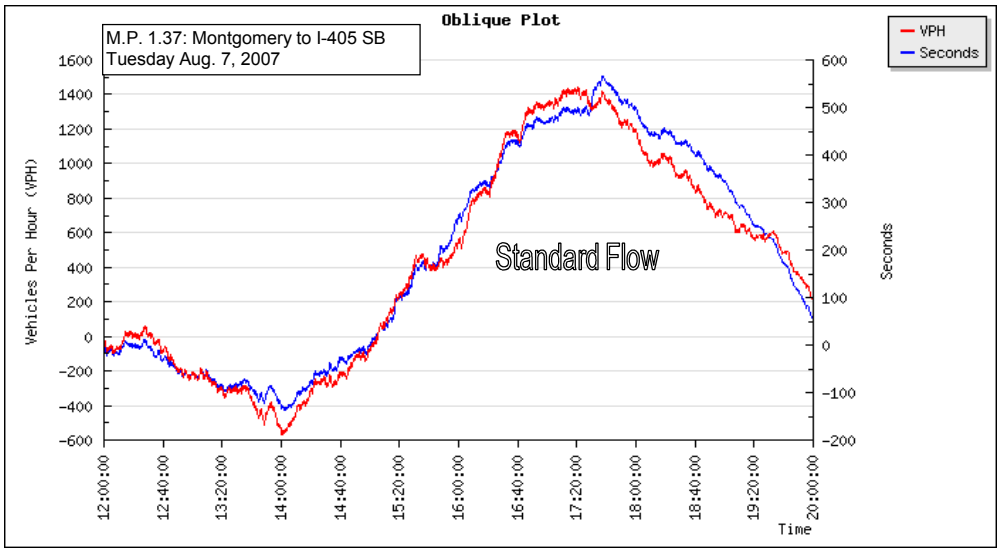
Highway: *I-405* **Date:** *August 7th 2007 PM*
Direction: *Southbound*

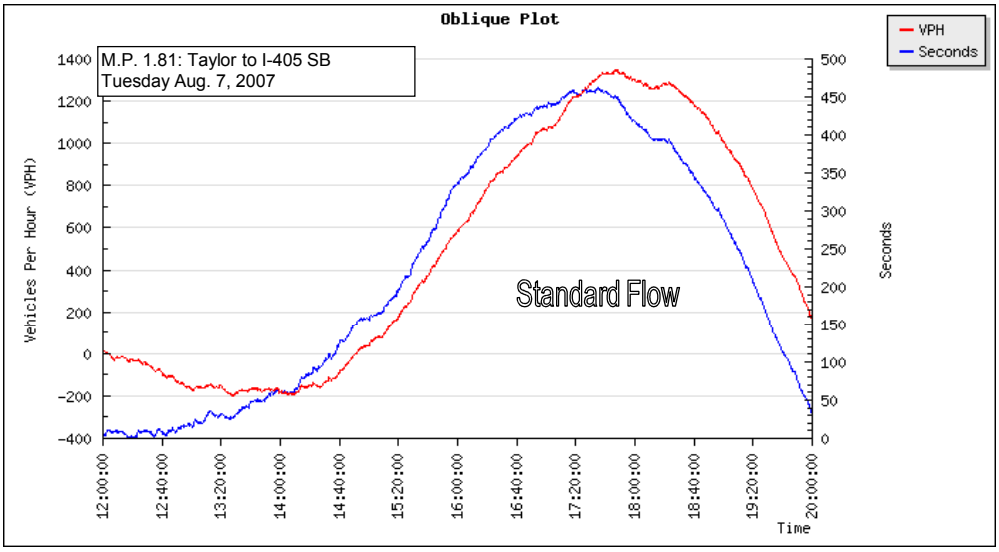


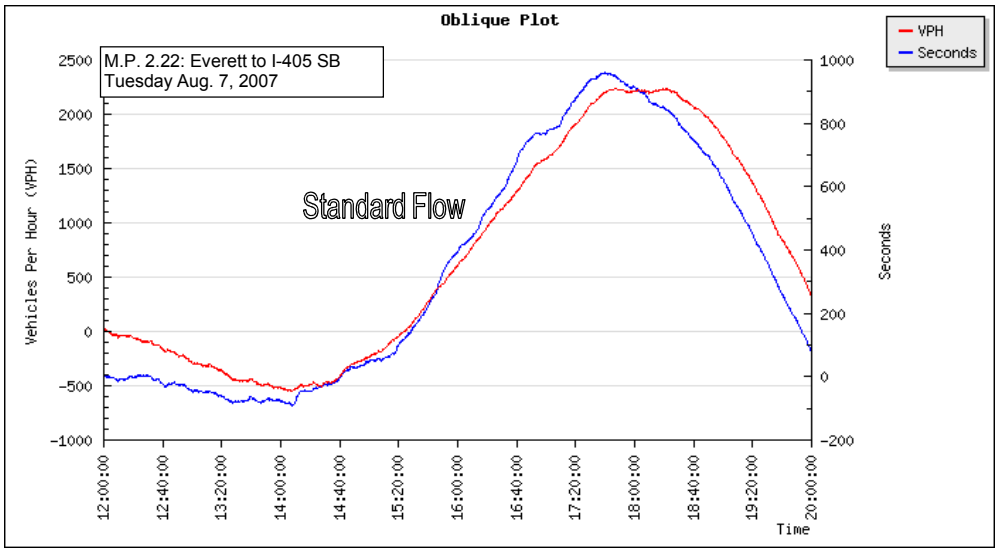




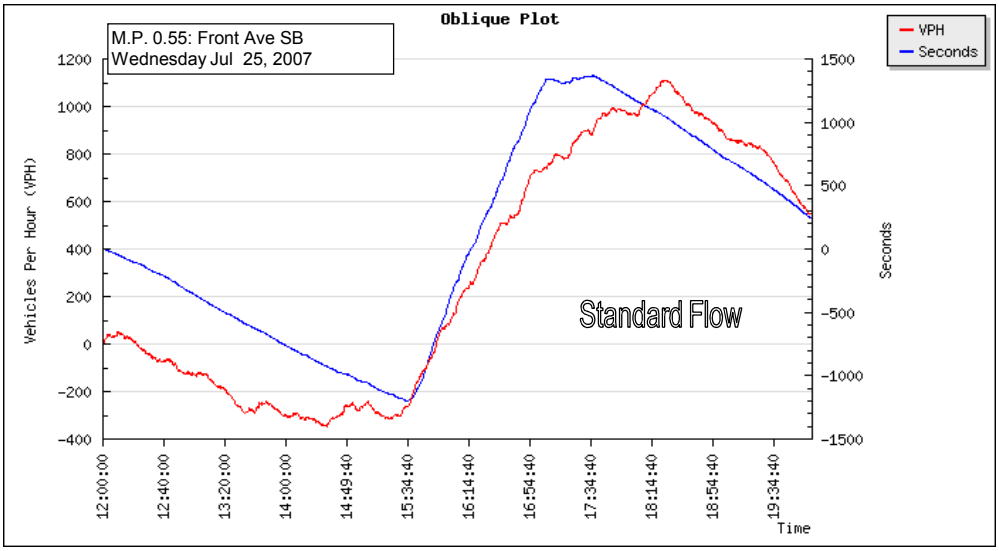
Highway: *I-405* **Date:** *August 7th 2007 PM*
Direction: *Southbound*

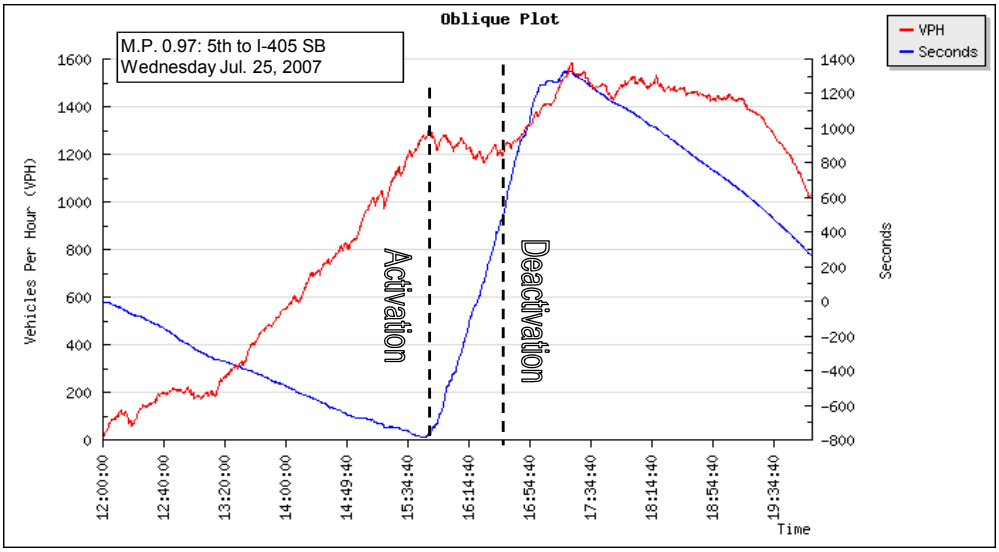


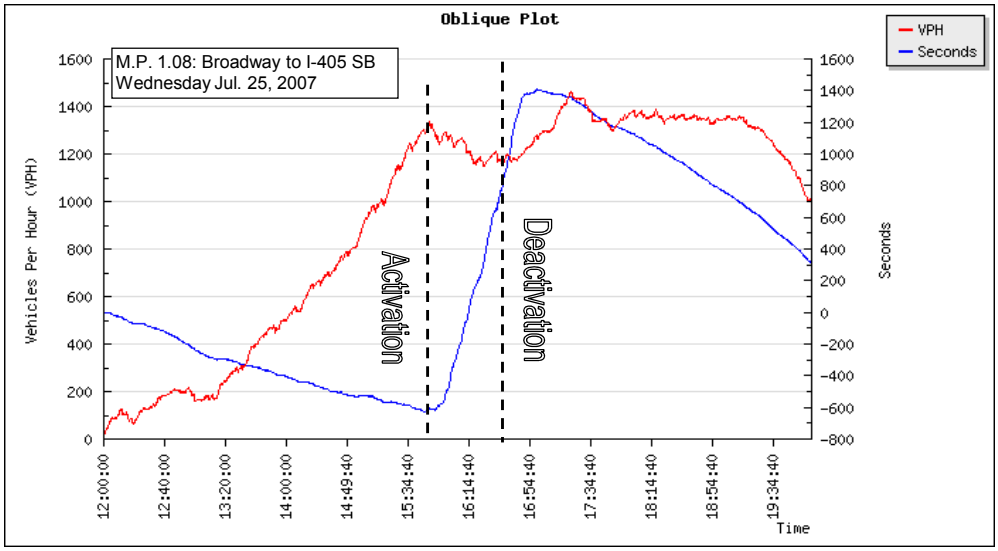




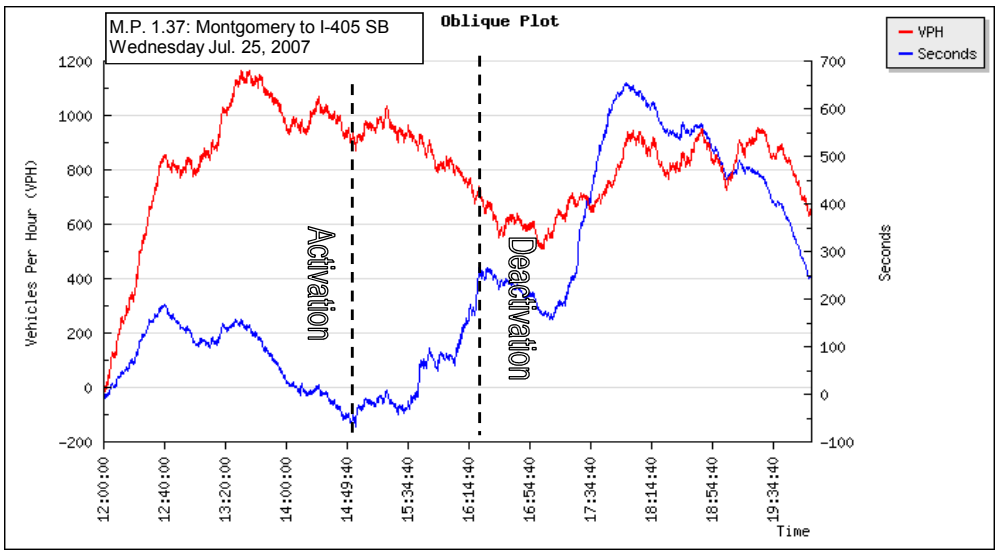
Highway: *I-405* **Date:** *July 25th 2007 PM*
Direction: *Southbound*

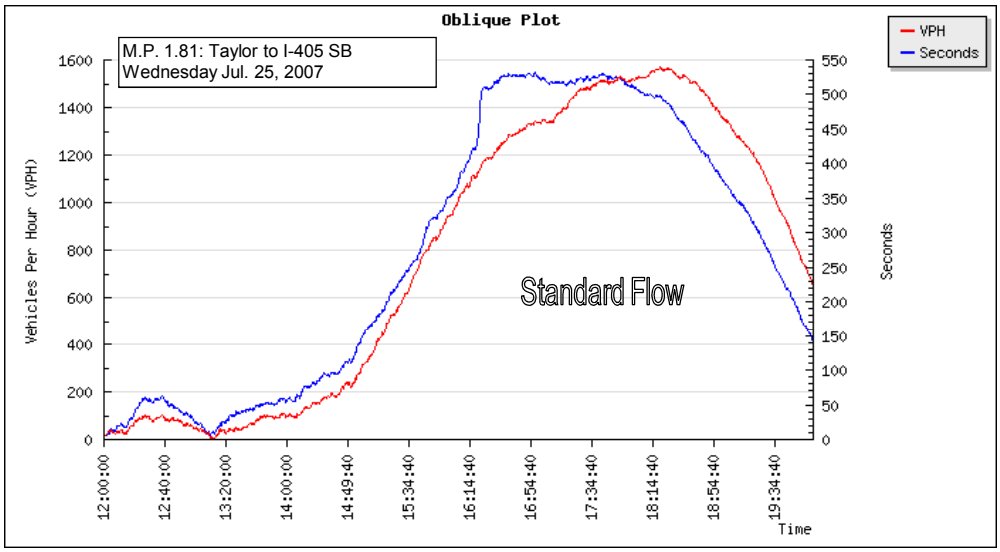


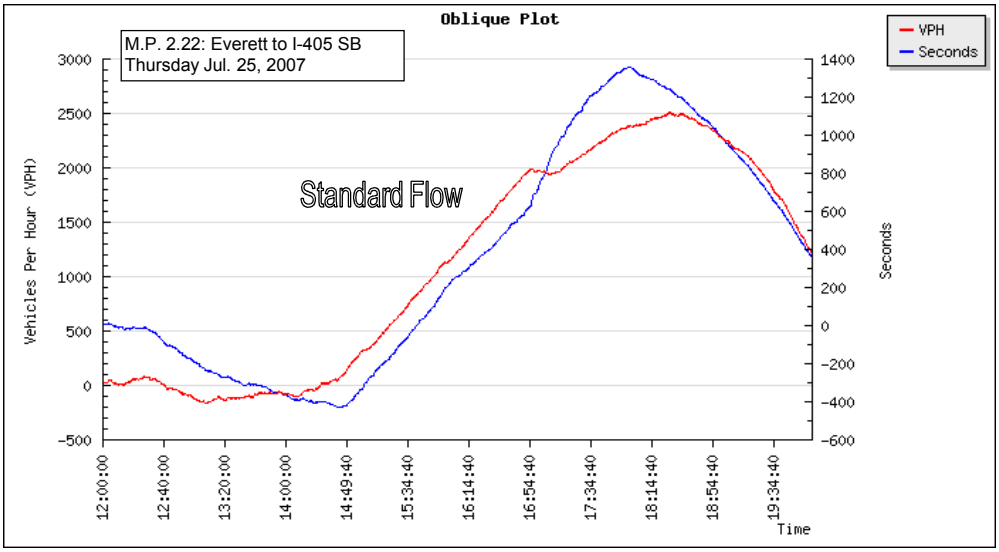




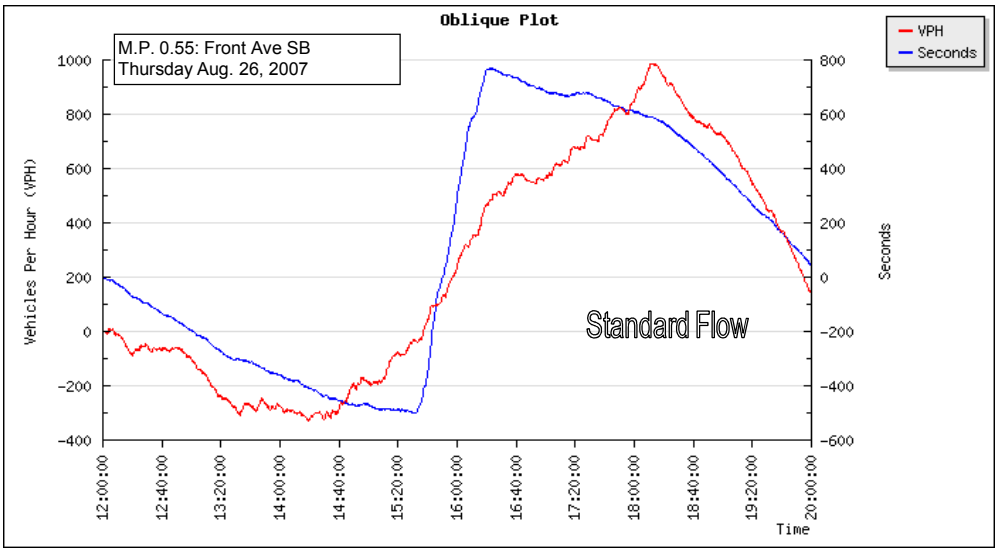
Highway: *I-405* **Date:** *July 25th 2007 PM*
Direction: *Southbound*

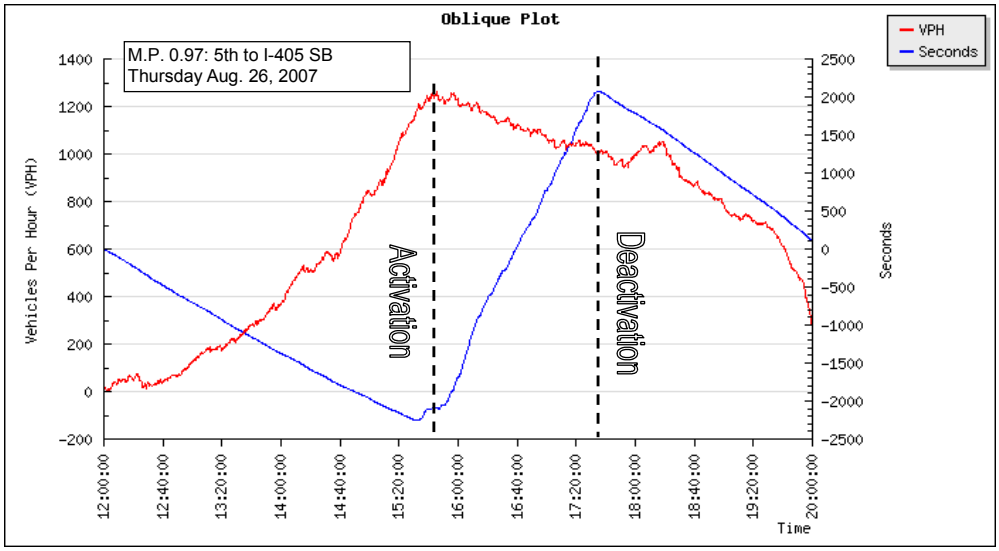


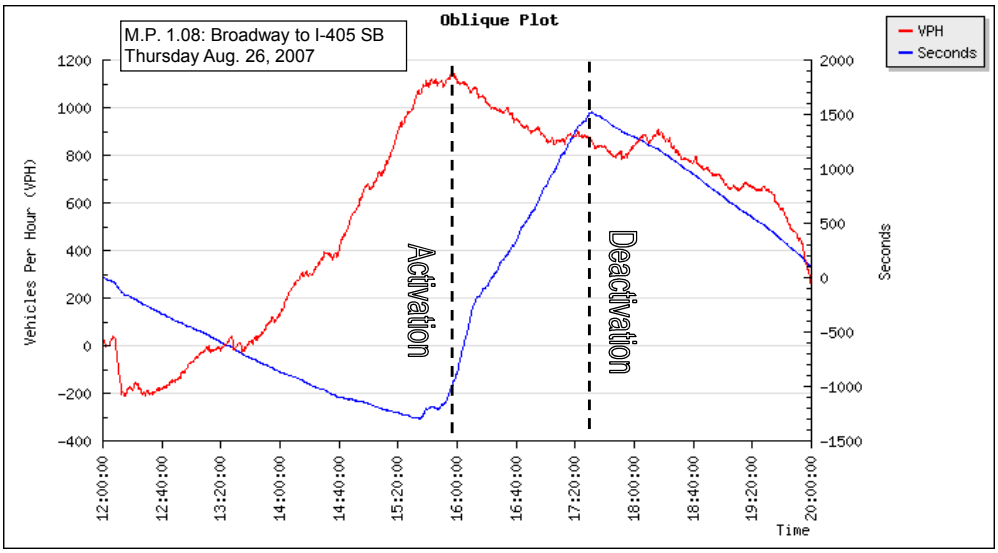




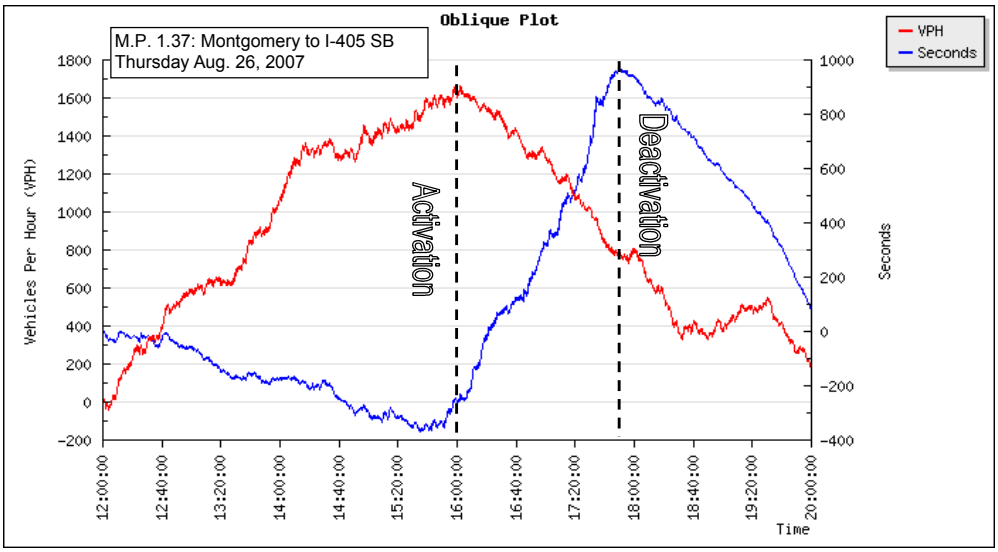
Highway: *I-405* **Date:** *July 26th 2007 PM*
Direction: *Southbound*

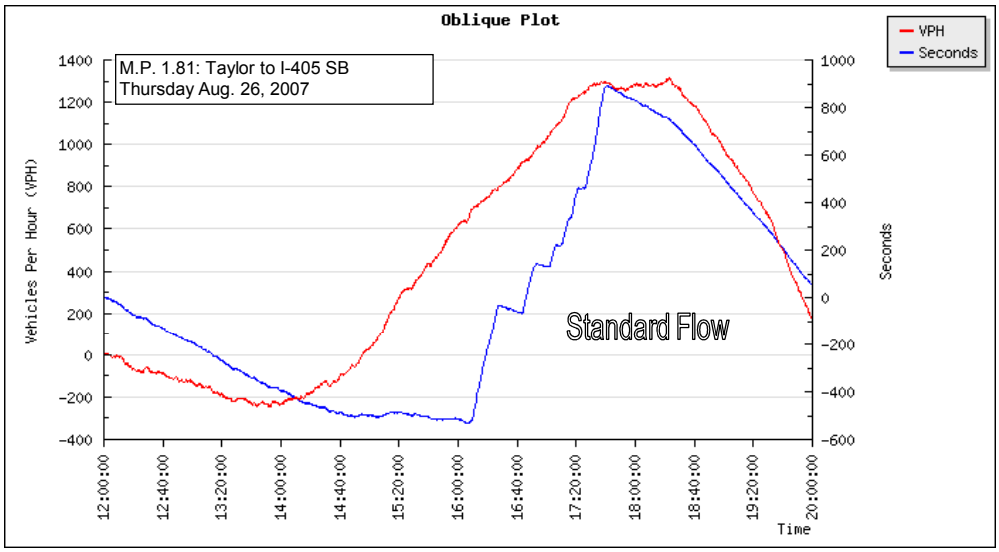


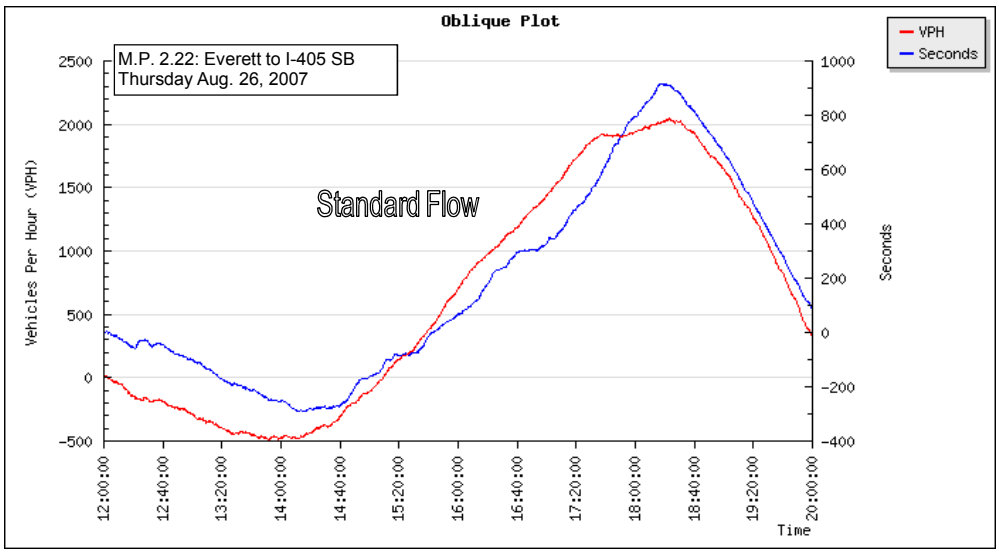




Highway: *I-405* **Date:** *July 26th 2007 PM*
Direction: *Southbound*







Appendix B

Summary of Camera Locations & Notes

ODOT Traffic Camera Recordings

Camera Name/Location	Direction	Date	Time Period	Findings
I-5 Cameras				
Norwood	North	3/10/2010	1445-1845	Low volume day. No Bottlenecks
Elligson	North	3/10/2010	1445-1845	Low volume day. No Bottlenecks
I-205	South	3/16/2010	1445-1845	Slowing immediately approaching I-205 merge point. Appears to be a lower volume day
Lower Boones	North	3/16/2010	1445-1845	Most cars in right lane. Slows significantly
Wilsonville	North	3/30/2010	1500-1830	Southbound appears congested
Elligson	South	3/30/2010	1500-1830	No apparent bottleneck
I-205 Cameras				
Powell	South	3/11/2010	1445-1845	Raining with poor visibility.
Stark	North	3/11/2010	1445-1845	All southbound lanes are slow. Appears to speed up after merge.
Powell	North	3/17/2010	0645-0845	No extensive weaving noticeable. Bottleneck most likely due to volume and merging traffic.
I-405 Cameras				
I-405 NB at the US 26 Diverge (WB)	NW	5/19/2011	1400-1900	Confirmed site observations and anecdotal information
Hwy 30 On to Everett Off	N	5/19/2011	1400-1900	Confirmed site observations and anecdotal information
Various (6 corridor TT videos)	N/S	5/19/2011	1400-1900	Confirmed site observations and anecdotal information
I-84 Cameras				
58th looking west	W	5/11/2011	600-1000	Slight friction between merging traffic and mainline, could cause all lanes to suddenly slow in the merge area.
33rd on ramp	W	5/11/2011	600-1000	Confirmed site observations and anecdotal information
21st looking west at Lloyd	W	5/12/2011	700-1000	Confirmed site observations and anecdotal information
122nd looking west	W	5/12/2011	1400-1900	Confirmed site observations and anecdotal information
162nd looking west	W	5/12/2011	1400-1900	Confirmed site observations and anecdotal information
Metro (camera #26) looking E	E		1400-1900	Confirmed site observations and anecdotal information
Lloyd (camera #53) looking W	W		1400-1900	Confirmed site observations and anecdotal information
I-205 (camera #10) looking W	W		1400-1900	Confirmed site observations and anecdotal information
US 26 Cameras				
EB US 26 to I-405 Diverge	E	5/11/2011	600-10:00	Confirmed site observations and anecdotal information
EB Scholls Ferrry On	E	5/11/2011	600-10:00	Confirmed site observations and anecdotal information
EB OR 217 Lane Drop	E	5/11/2011	600-10:00	Confirmed site observations and anecdotal information
EB Canyon On	E	5/11/2011	600-10:00	No bottleneck observed
EB OR 217 Lane Drop	E	5/11/2011	1400-18:30	Confirmed site observations and anecdotal information
EB Canyon On	E	5/11/2011	1400-18:30	No bottleneck observed
I-405 Merge to WB US 26	E	5/11/2011	1400-18:45	Confirmed site observations and anecdotal information
EB US 26 to I-405 Diverge	E	5/11/2011	1400-18:45	Confirmed site observations and anecdotal information
EB Scholls Ferrry On	E	5/11/2011	1400-18:45	Confirmed site observations and anecdotal information

Appendix C

Travel Time Summaries

(Electronic data available upon request)

I-5 (AM/PM)
Between Wilsonville and Carman Drive

I-205 (AM/PM)
Between the Columbia River and Foster Road

I-405 (PM)

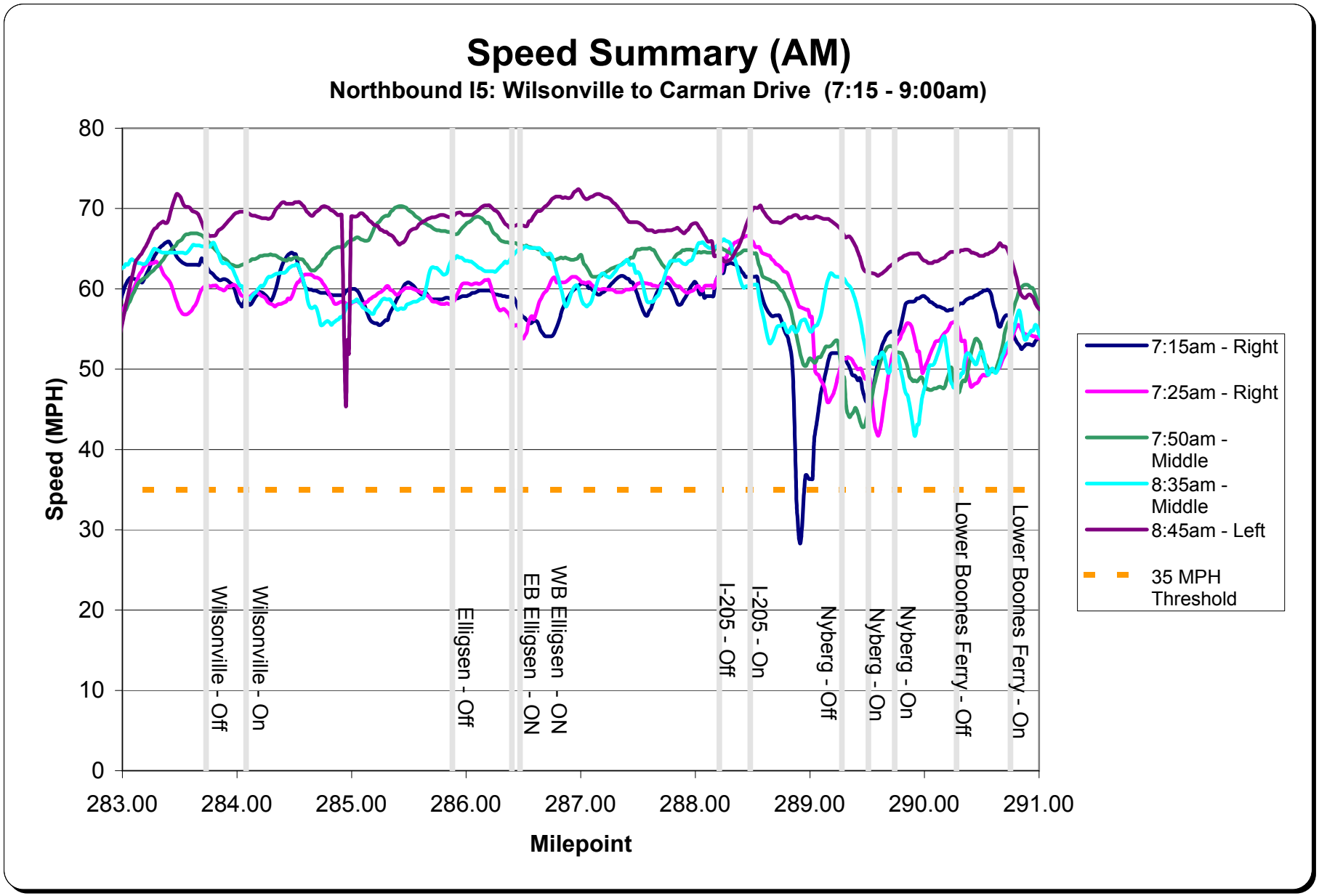
1. TT A (baseline): Between Naito Parkway and I-5
2. TT B (targeted): Between NB Highway 30 On and Off and between SB Highway 30 On and Everett Street Off
3. TT C (targeted): Between NB Burnside Street On and Kirby Avenue Off and between SB Everett Street On and US 26 Off
4. TT D (targeted): Between NB 6th Avenue On and US 26/12th Avenue Off ramp
5. TT E (targeted): Between NB I-5 SB On and Salmon St. Off

I-84 (AM/MIDDAY/PM)
Between Lewis and Clark Park and I-5

US 26 (AM/MIDDAY/PM)
Between US 101 and I-405

I-5 (AM)

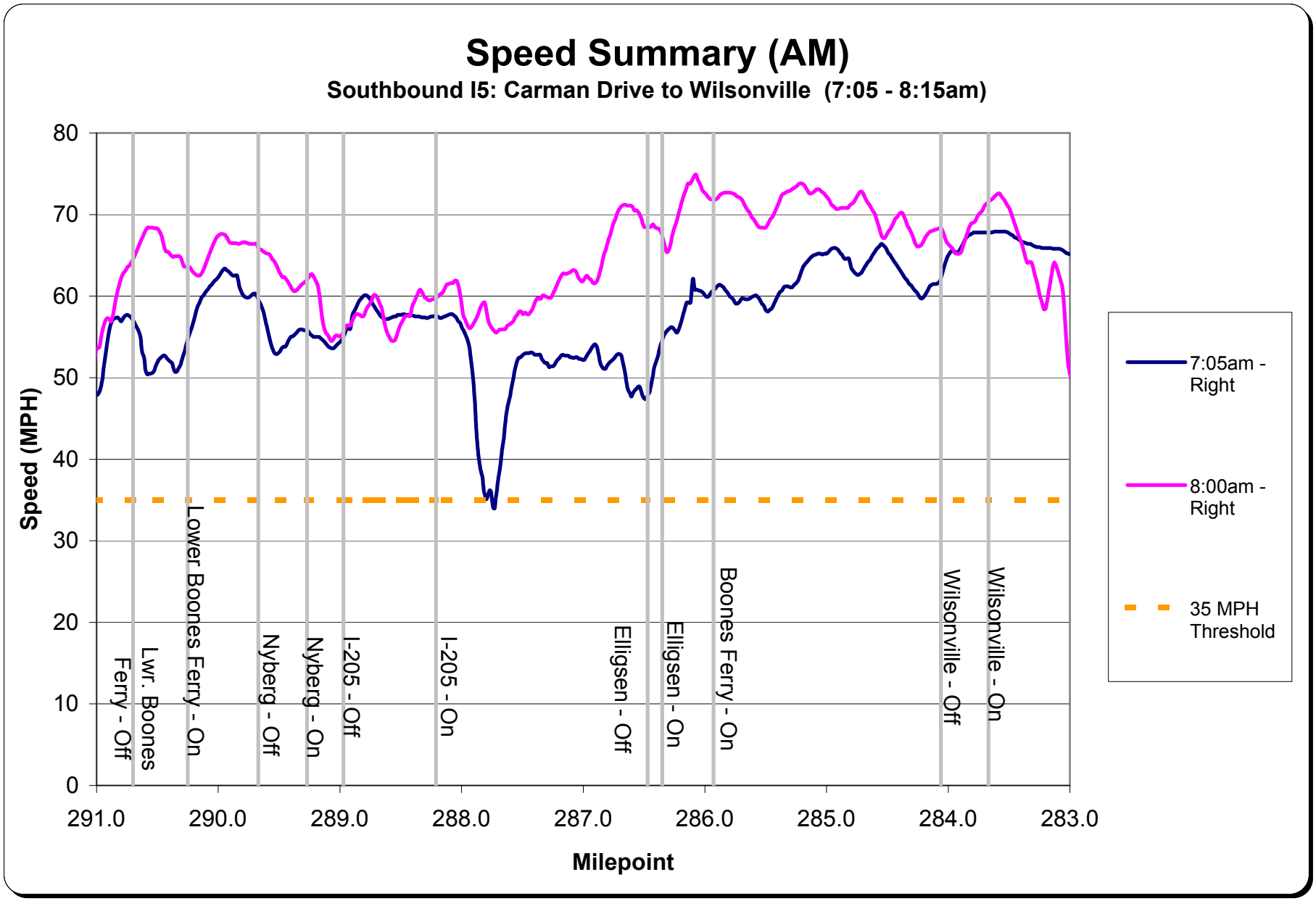
Northbound: Wilsonville to Carman Drive
(7:15 - 9:00am)



DAVID EVANS AND ASSOCIATES INC.

I-5 (AM)

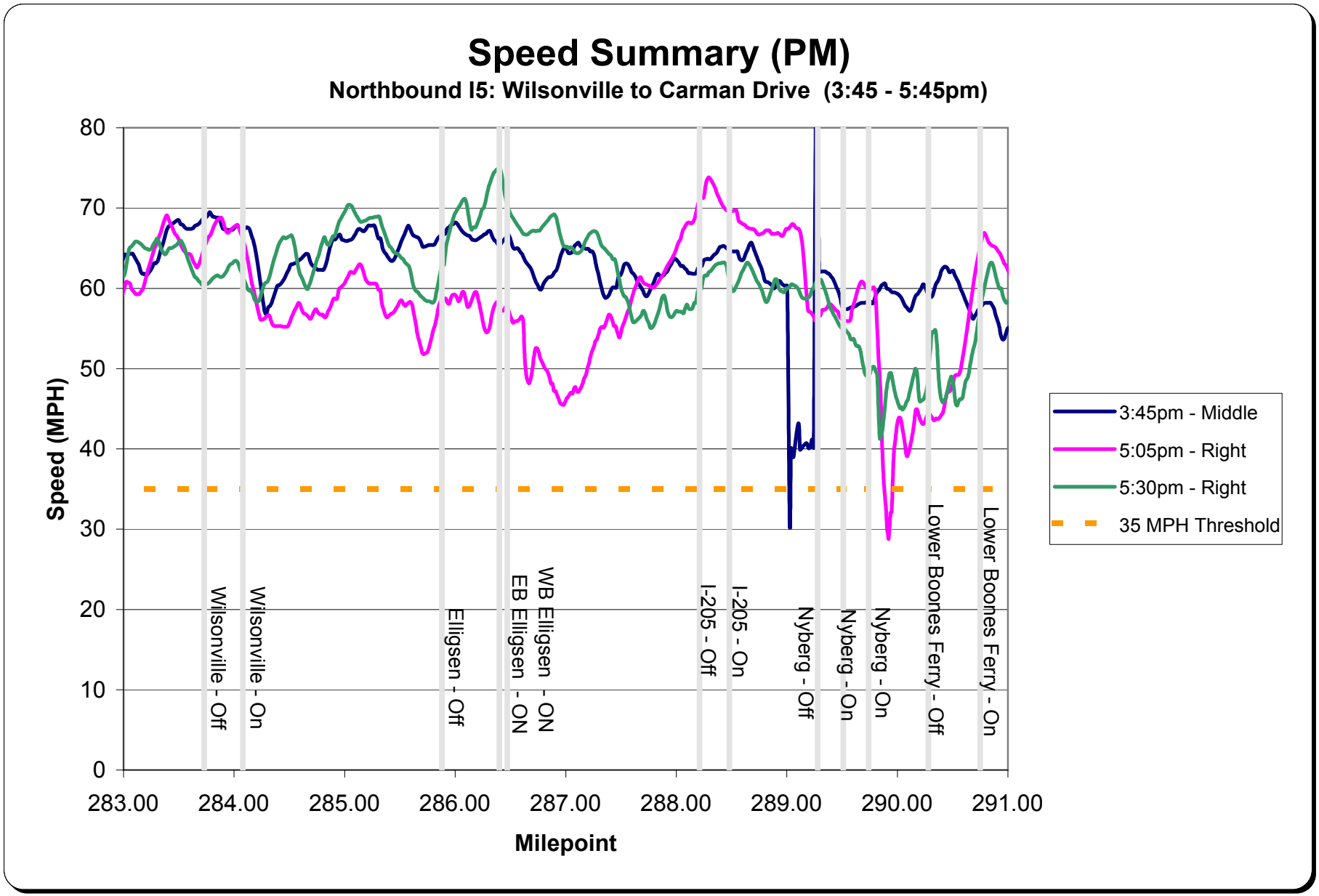
Southbound: Carman Drive to Wilsonville
(7:05 - 9:15am)



DAVID EVANS AND ASSOCIATES INC.

I-5 (PM)

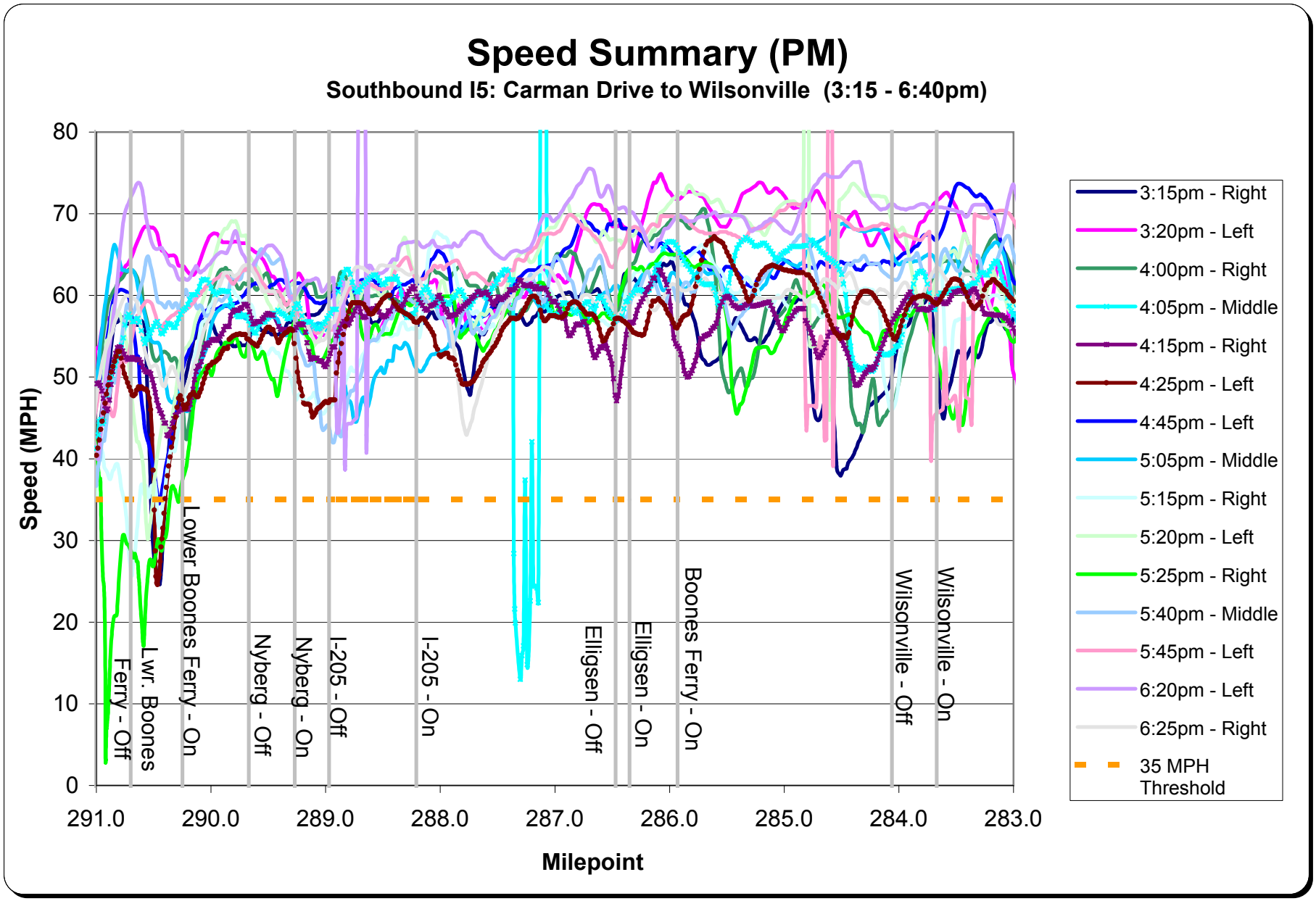
Northbound: Wilsonville to Carman Drive
(3:45 - 5:45pm)



DAVID EVANS AND ASSOCIATES INC.

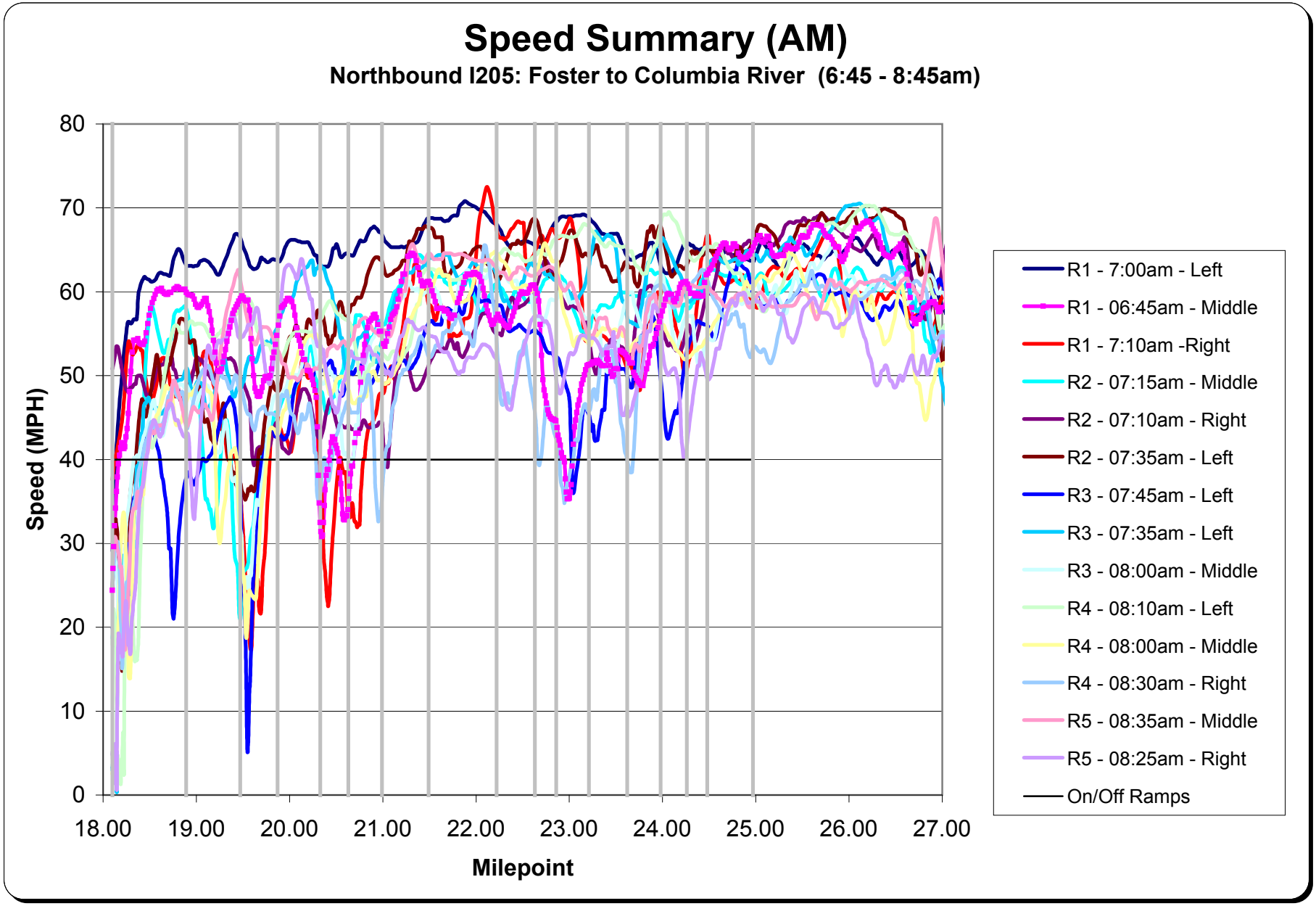
I-5 (PM)

Southbound: Carman Drive to Wilsonville
(3:15 - 7:00pm)


Speed Summary (PM)
Southbound I5: Carman Drive to Wilsonville (3:15 - 6:40pm)
Speed (MPH)
80
70
60
50
40
30
20
10
0
291.0
290.0
289.0
288.0
287.0
286.0
285.0
284.0
283.0
Milepoint
Ferry - Off
Lwr. Boones
Lower Boones Ferry - On
Nyberg - Off
Nyberg - On
I-205 - Off
I-205 - On
Elligsen - Off
Elligsen - On
Boones Ferry - On
Wilsonville - Off
Wilsonville - On
3:15pm - Right
3:20pm - Left
4:00pm - Right
4:05pm - Middle
4:15pm - Right
4:25pm - Left
4:45pm - Left
5:05pm - Middle
5:15pm - Right
5:20pm - Left
5:25pm - Right
5:40pm - Middle
5:45pm - Left
6:20pm - Left
6:25pm - Right
35 MPH Threshold

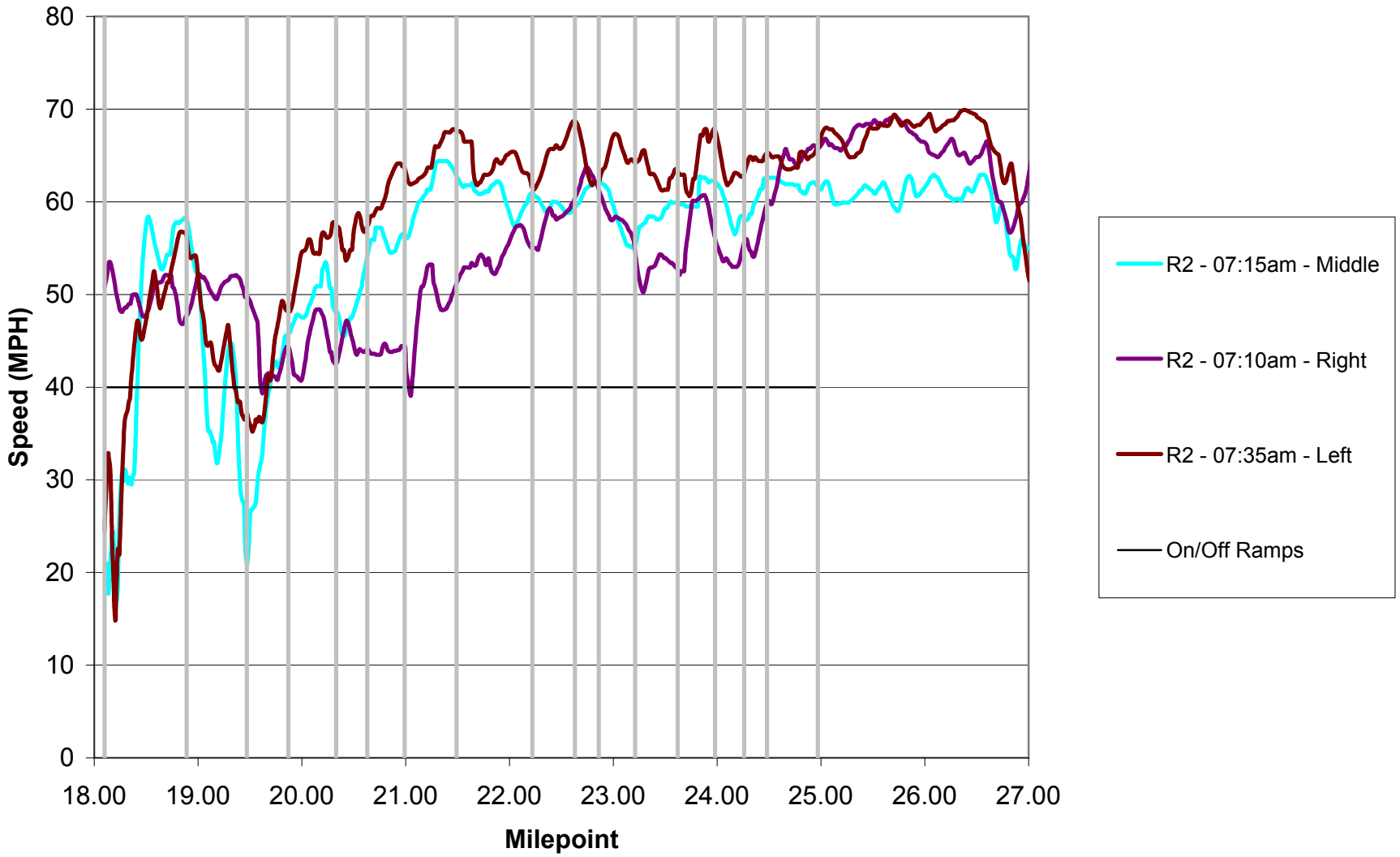
I-205 (AM)

Northbound: Foster Road to Columbia River
(6:45 - 8:45am)


Speed Summary (AM)
Northbound I205: Foster to Columbia River (6:45 - 8:45am)
Speed (MPH)
80
70
60
50
40
30
20
10
0
18.00
19.00
20.00
21.00
22.00
23.00
24.00
25.00
26.00
27.00
Milepoint
R1 - 7:00am - Left
R1 - 06:45am - Middle
R1 - 7:10am -Right
R2 - 07:15am - Middle
R2 - 07:10am - Right
R2 - 07:35am - Left
R3 - 07:45am - Left
R3 - 07:35am - Left
R3 - 08:00am - Middle
R4 - 08:10am - Left
R4 - 08:00am - Middle
R4 - 08:30am - Right
R5 - 08:35am - Middle
R5 - 08:25am - Right
On/Off Ramps

Run 2 - Speed Summary (AM)

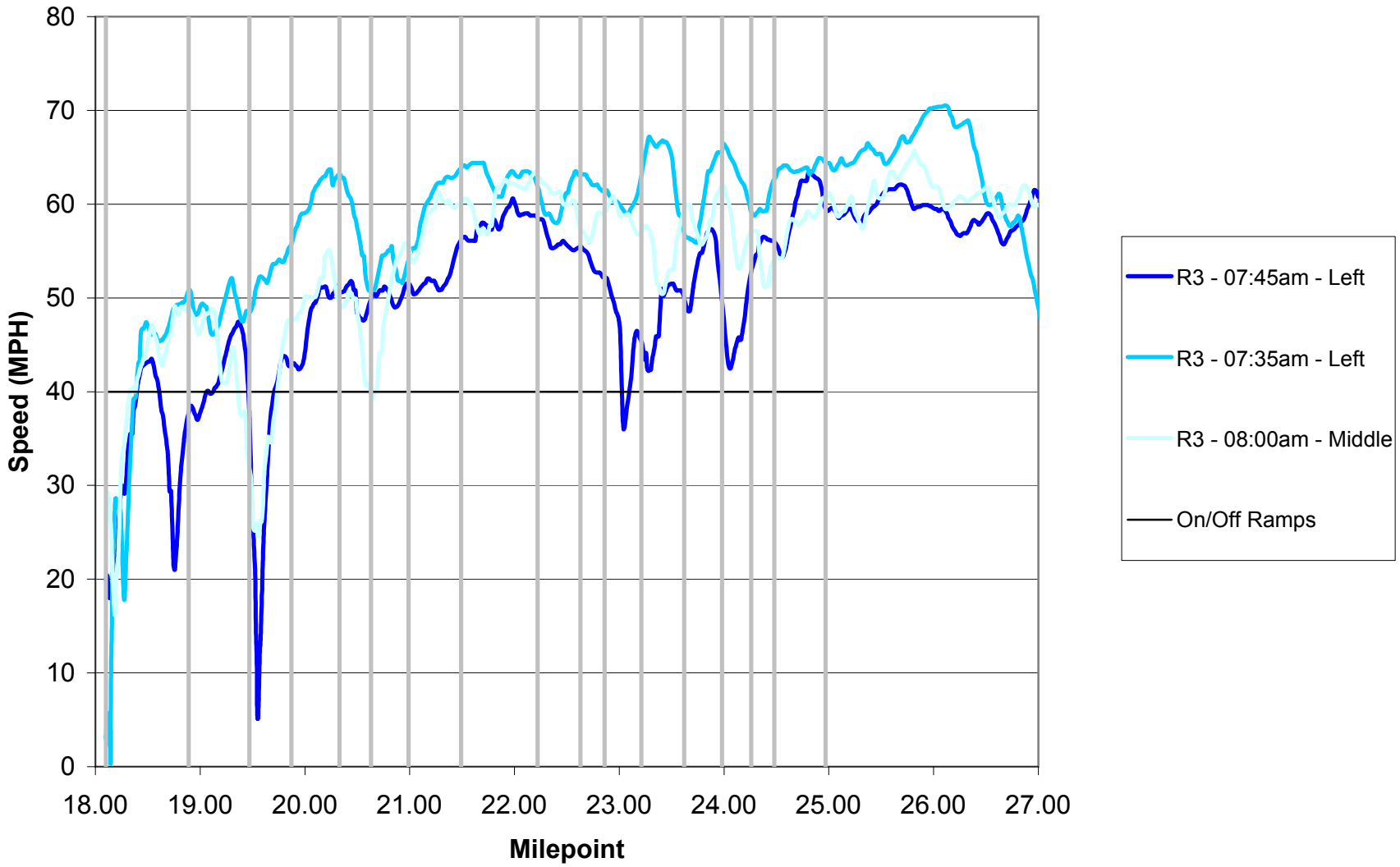
Northbound I205: Foster to Columbia River (7:00 - 08:45am)



DAVID EVANS AND ASSOCIATES INC.

Run 3 - Speed Summary (AM)

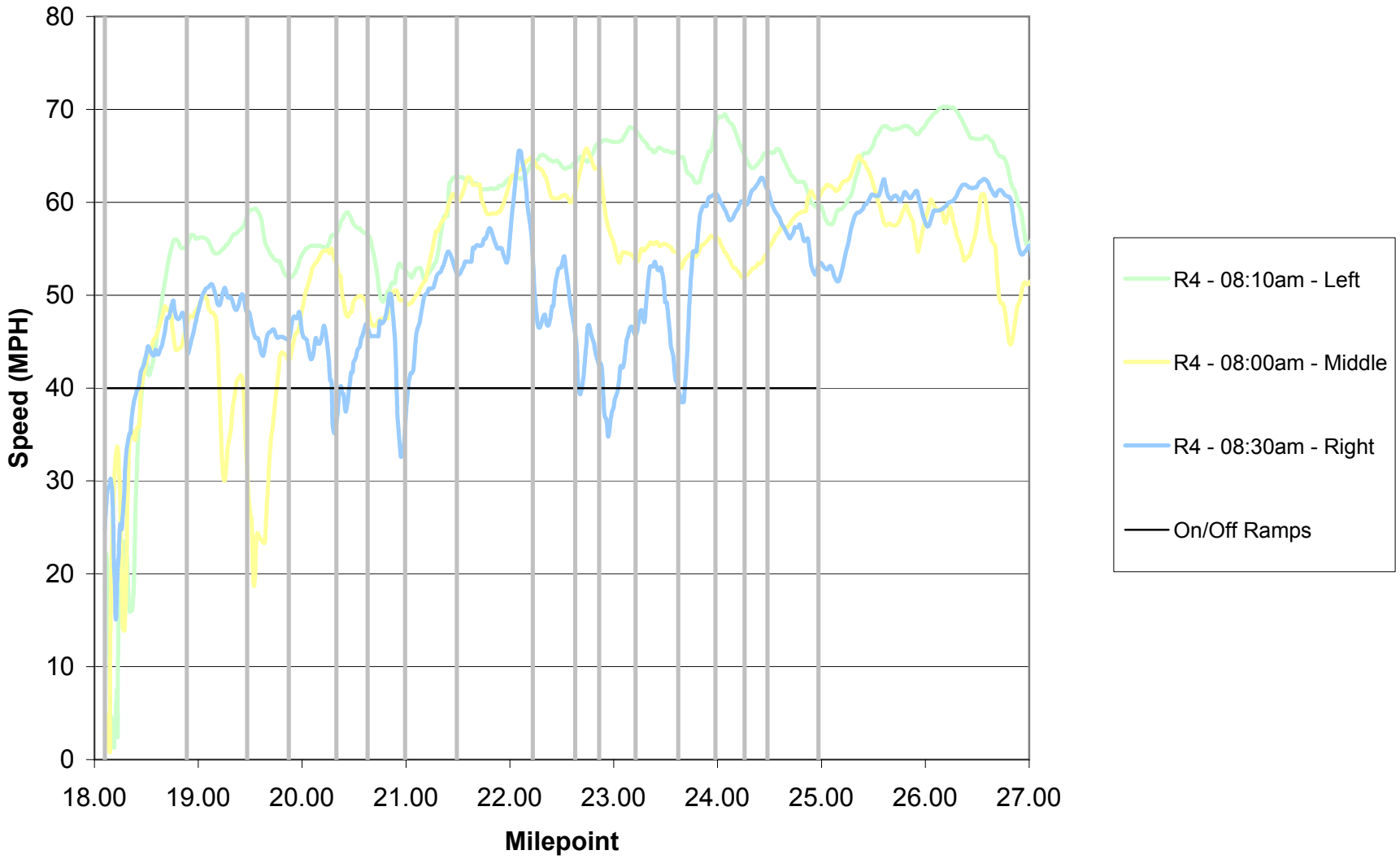
Northbound I205: Foster to Columbia River (7:00 - 08:45am)



DAVID EVANS AND ASSOCIATES INC.

Run 4 - Speed Summary (AM)

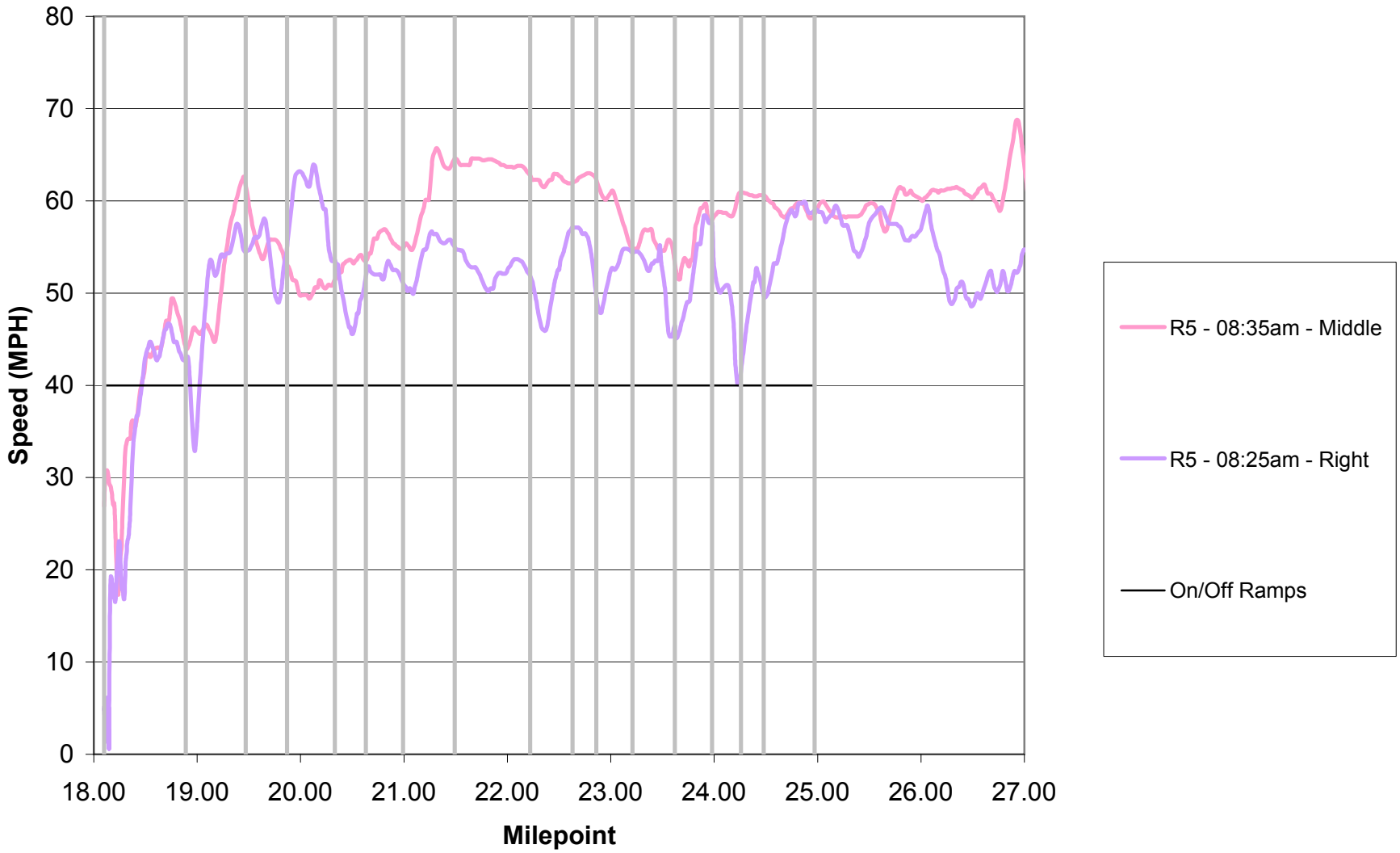
Northbound I205: Foster to Columbia River (7:00 - 08:45am)



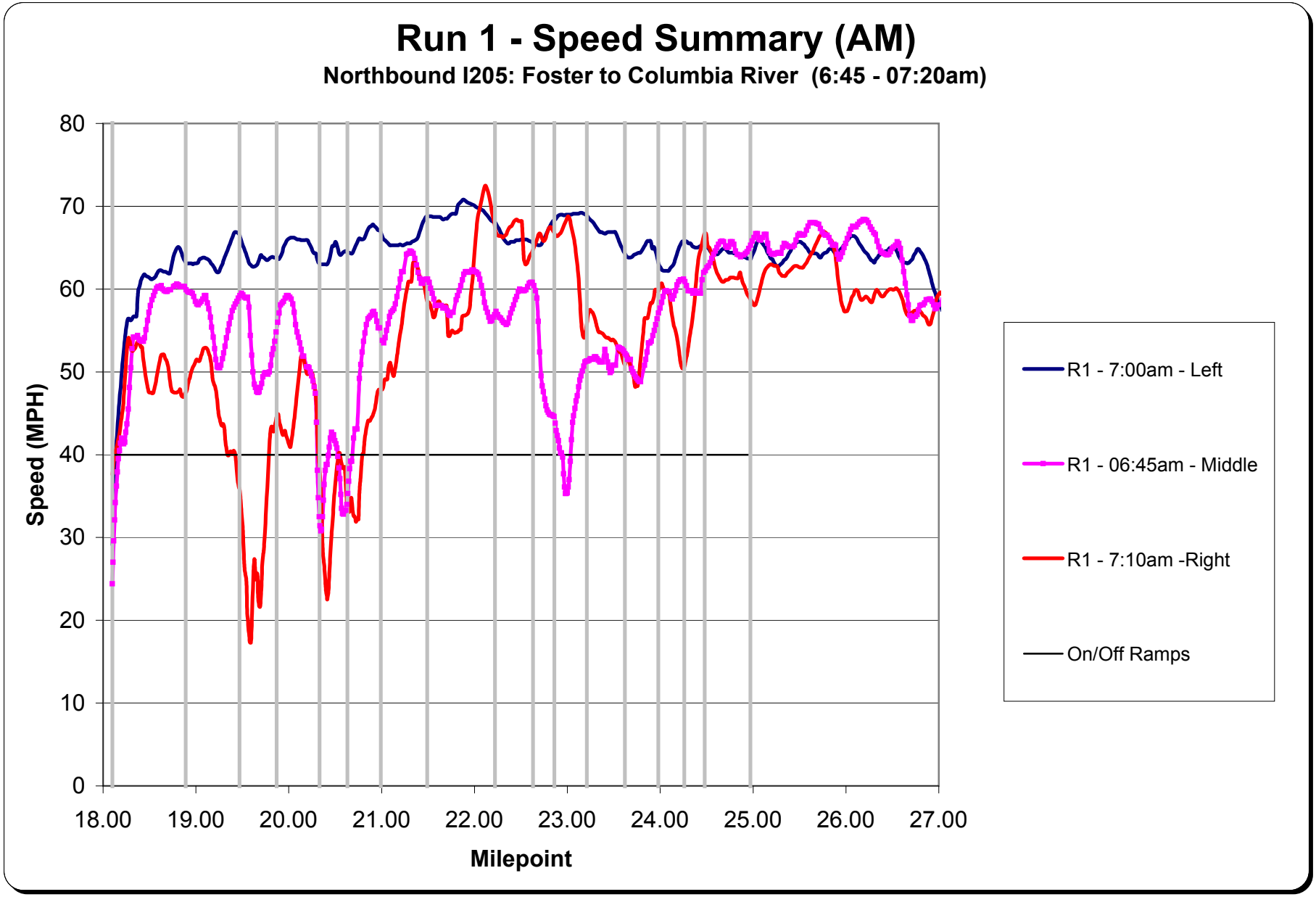
DAVID EVANS AND ASSOCIATES INC.

Run 5 - Speed Summary (AM)

Northbound I205: Foster to Columbia River (7:00 - 08:45am)



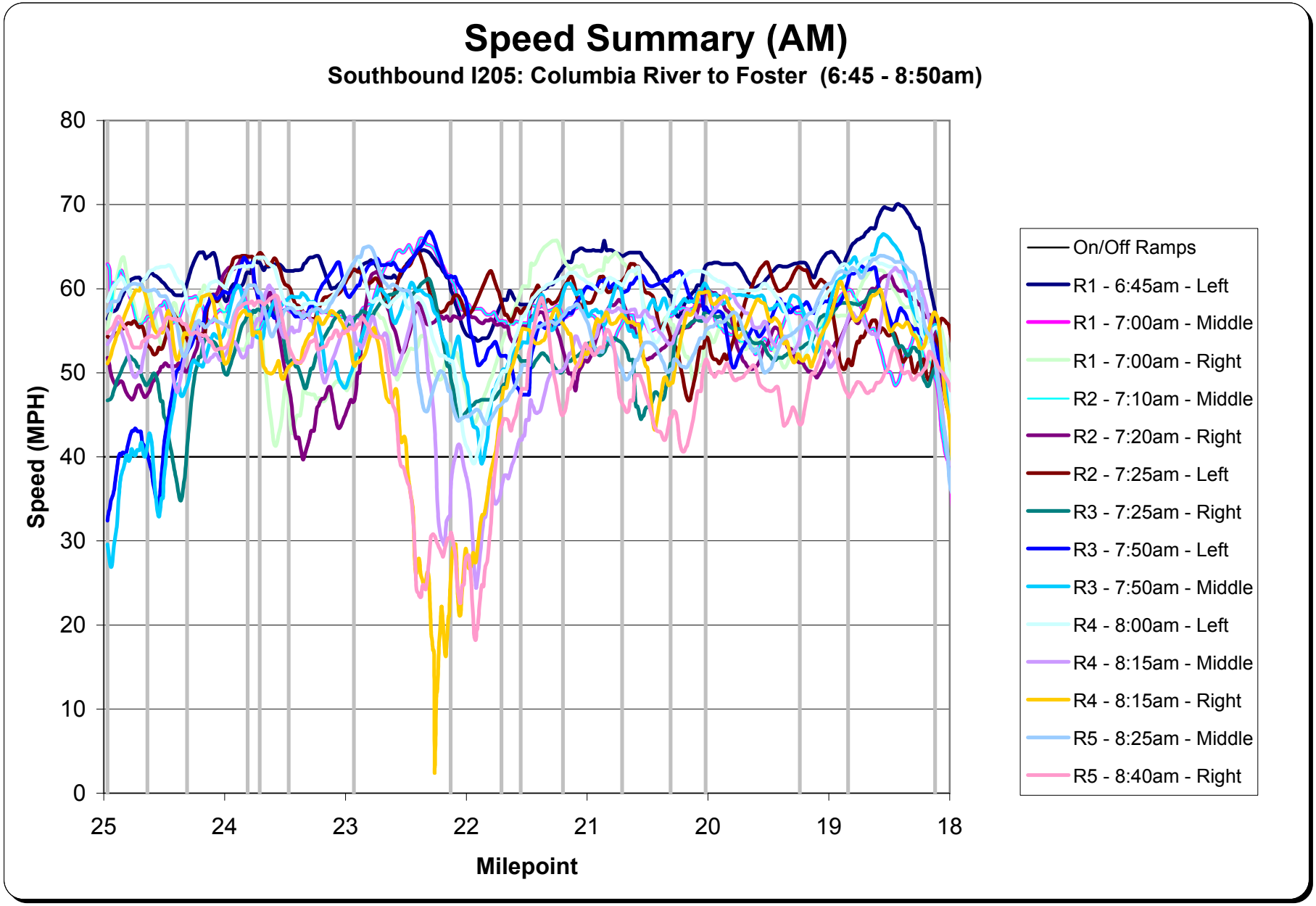
DAVID EVANS AND ASSOCIATES INC.



DAVID EVANS AND ASSOCIATES INC.

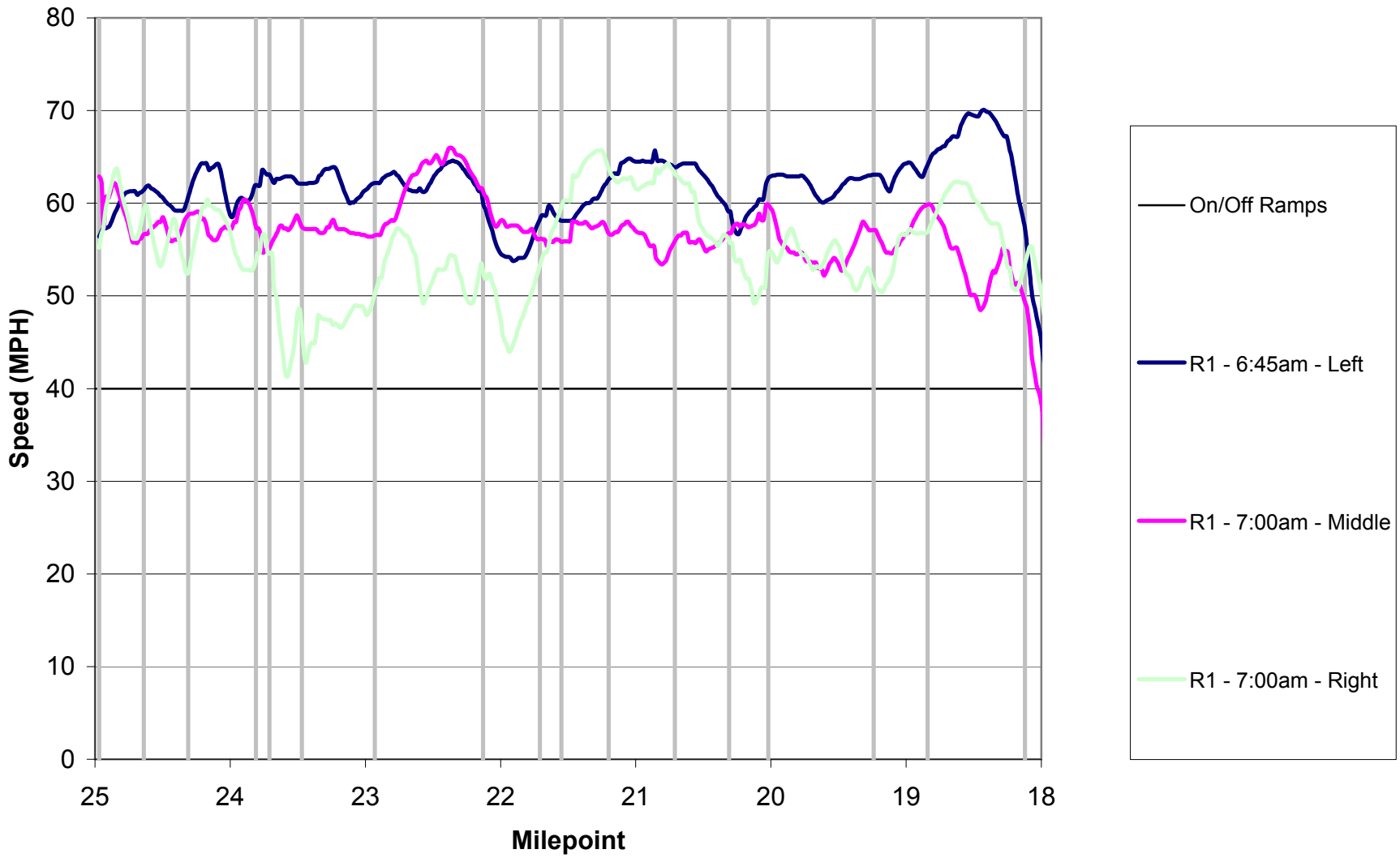
I-205 (AM)

Southbound: Columbia River to Foster Road
(6:45 - 8:50am)


Speed Summary (AM)
Southbound I205: Columbia River to Foster (6:45 - 8:50am)
Speed (MPH)
80
70
60
50
40
30
20
10
0
25
24
23
22
21
20
19
18
Milepoint
On/Off Ramps
R1 - 6:45am - Left
R1 - 7:00am - Middle
R1 - 7:00am - Right
R2 - 7:10am - Middle
R2 - 7:20am - Right
R2 - 7:25am - Left
R3 - 7:25am - Right
R3 - 7:50am - Left
R3 - 7:50am - Middle
R4 - 8:00am - Left
R4 - 8:15am - Middle
R4 - 8:15am - Right
R5 - 8:25am - Middle
R5 - 8:40am - Right

Run 1- Speed Summary (AM)

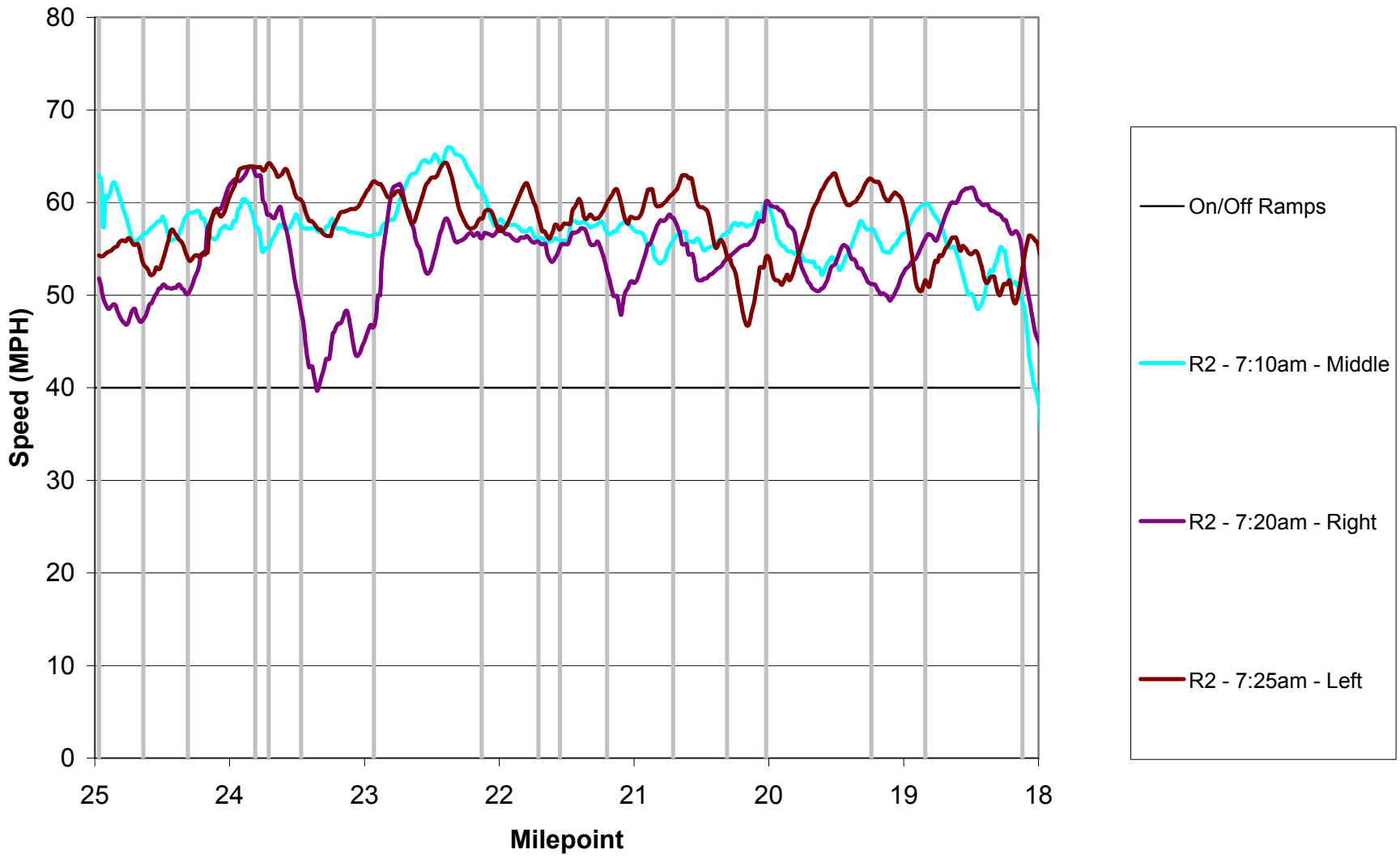
Southbound I205: Columbia River to Foster (6:45 - 7:10am)



DAVID EVANS AND ASSOCIATES INC.

Run 2 - Speed Summary (AM)

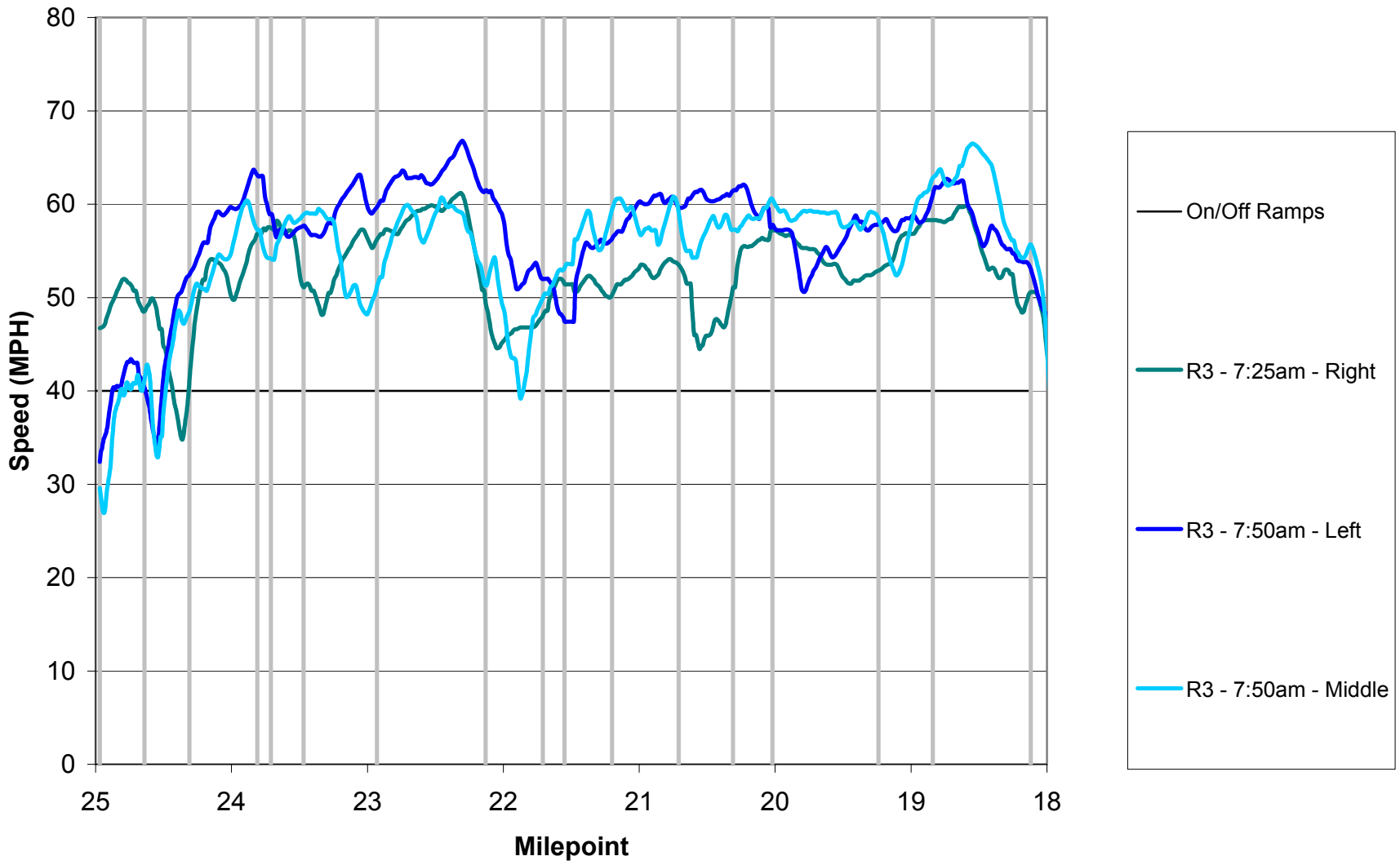
Southbound I205: Columbia River to Foster (7:10 - 7:35am)



DAVID EVANS AND ASSOCIATES INC.

Run 3 - Speed Summary (AM)

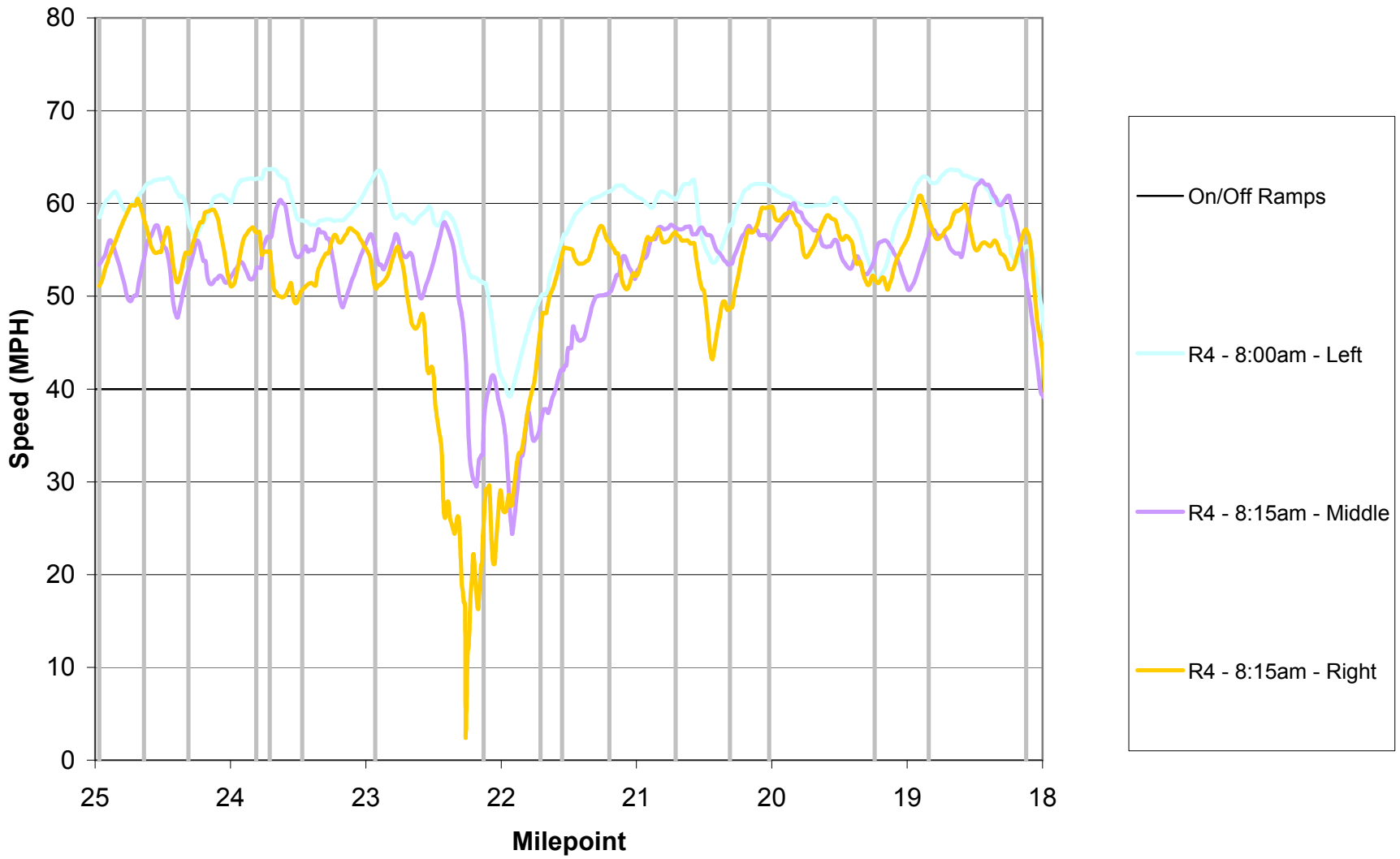
Southbound I205: Columbia River to Foster (7:25 - 8:00am)



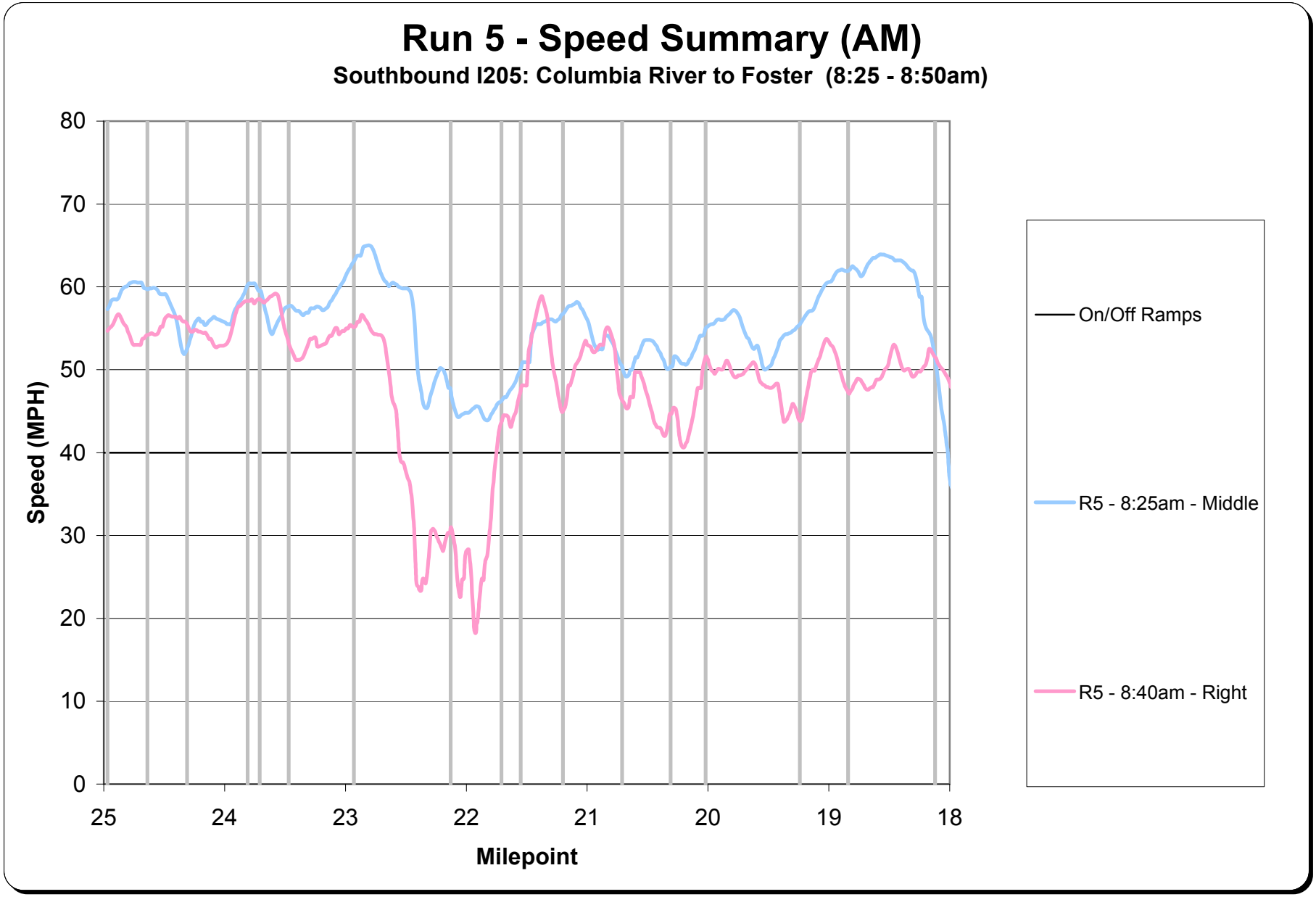
DAVID EVANS AND ASSOCIATES INC.

Run 4 - Speed Summary (AM)

Southbound I205: Columbia River to Foster (8:00 - 8:25am)



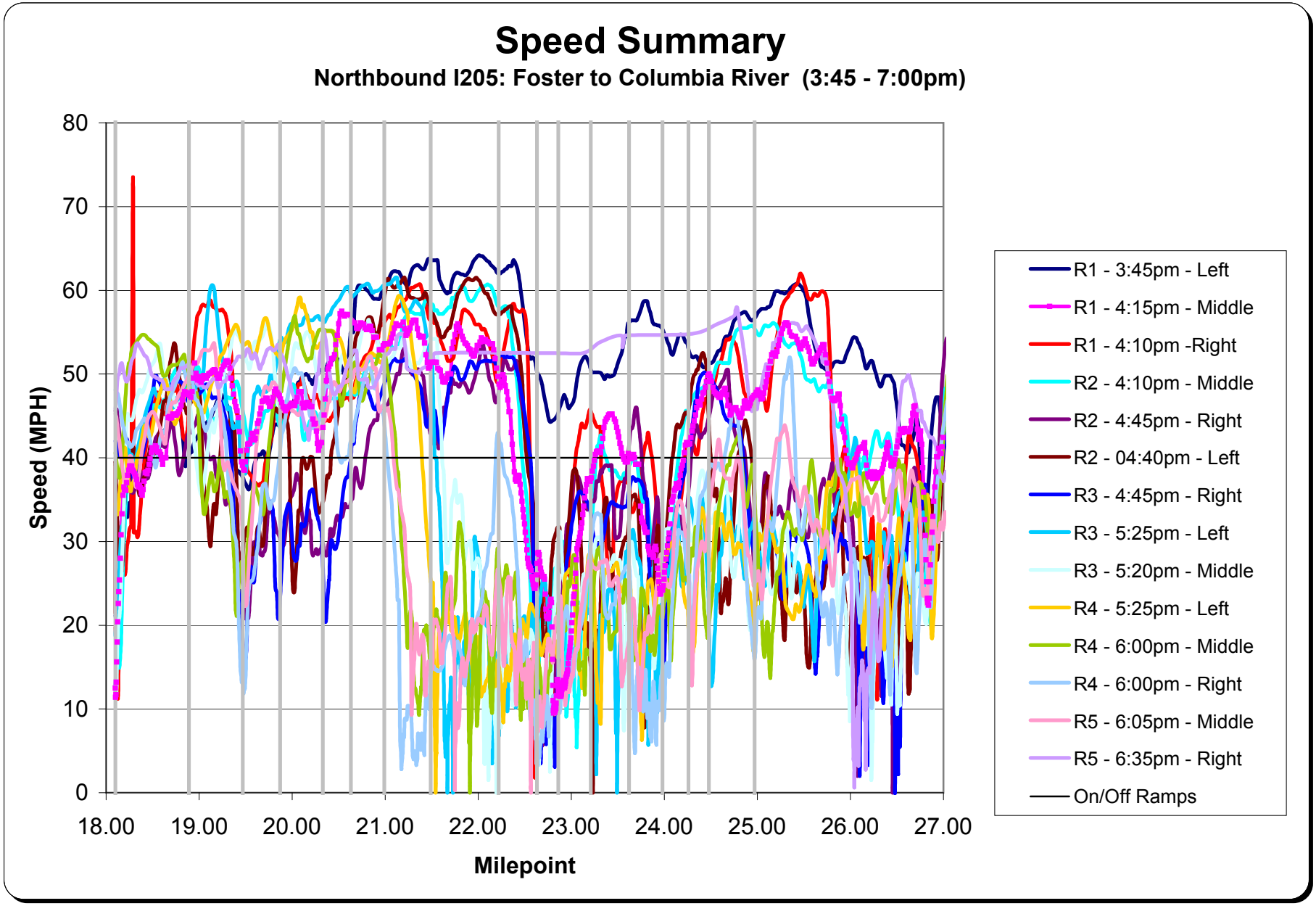
DAVID EVANS AND ASSOCIATES INC.



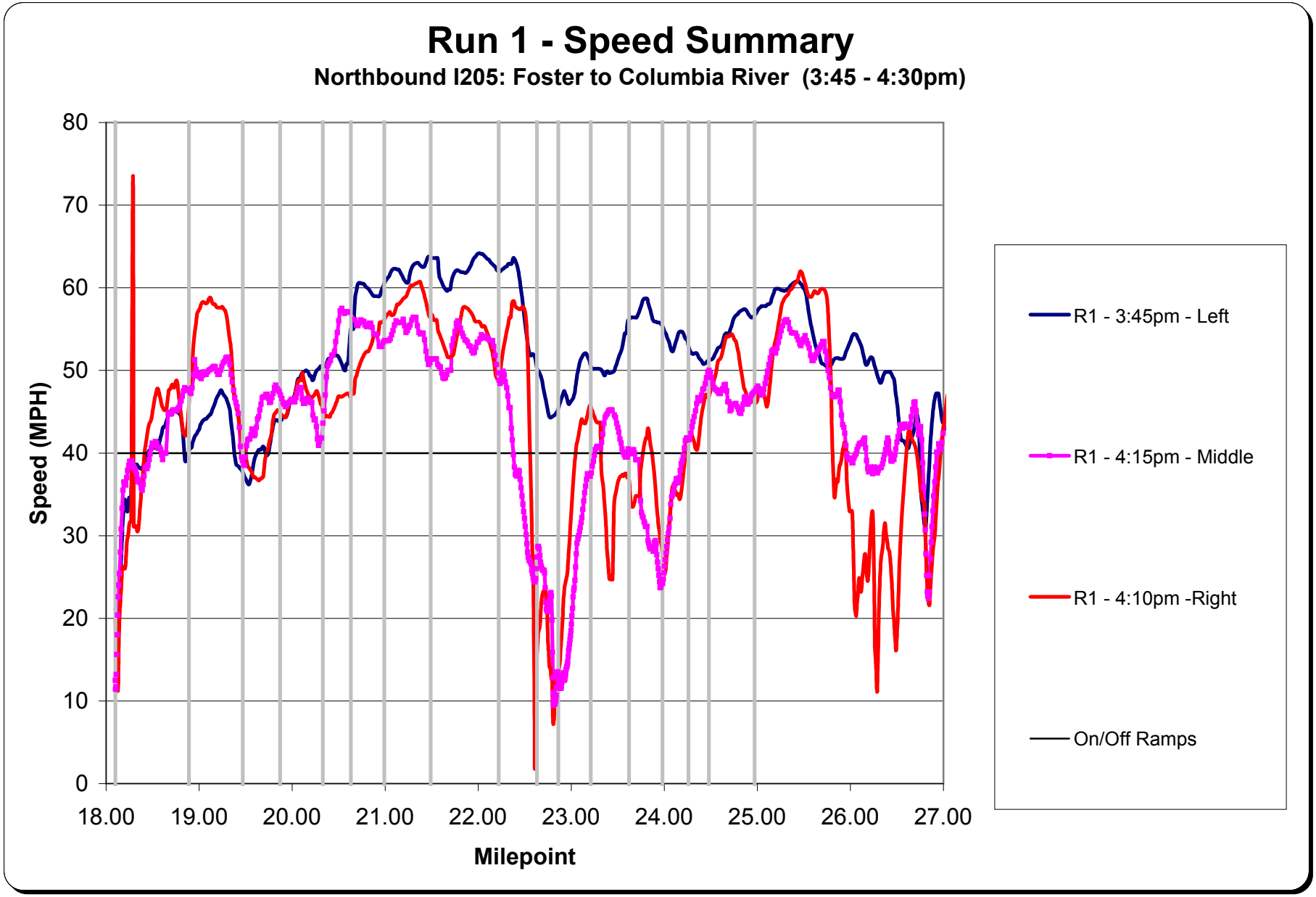
DAVID EVANS AND ASSOCIATES INC.

I-205 (PM)

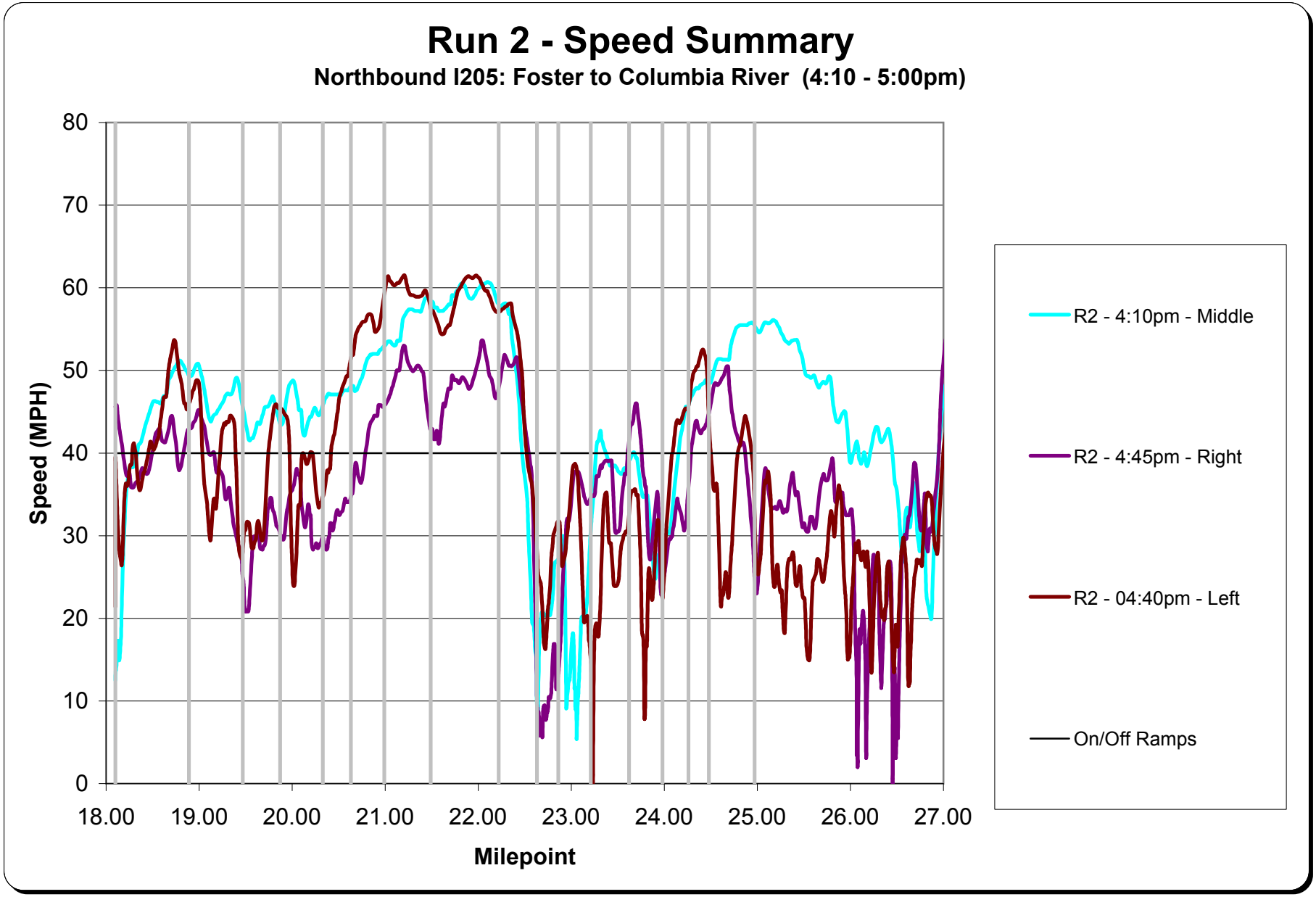
Northbound: Foster Road to Columbia River
(3:45 - 7:00pm)



DAVID EVANS AND ASSOCIATES INC.



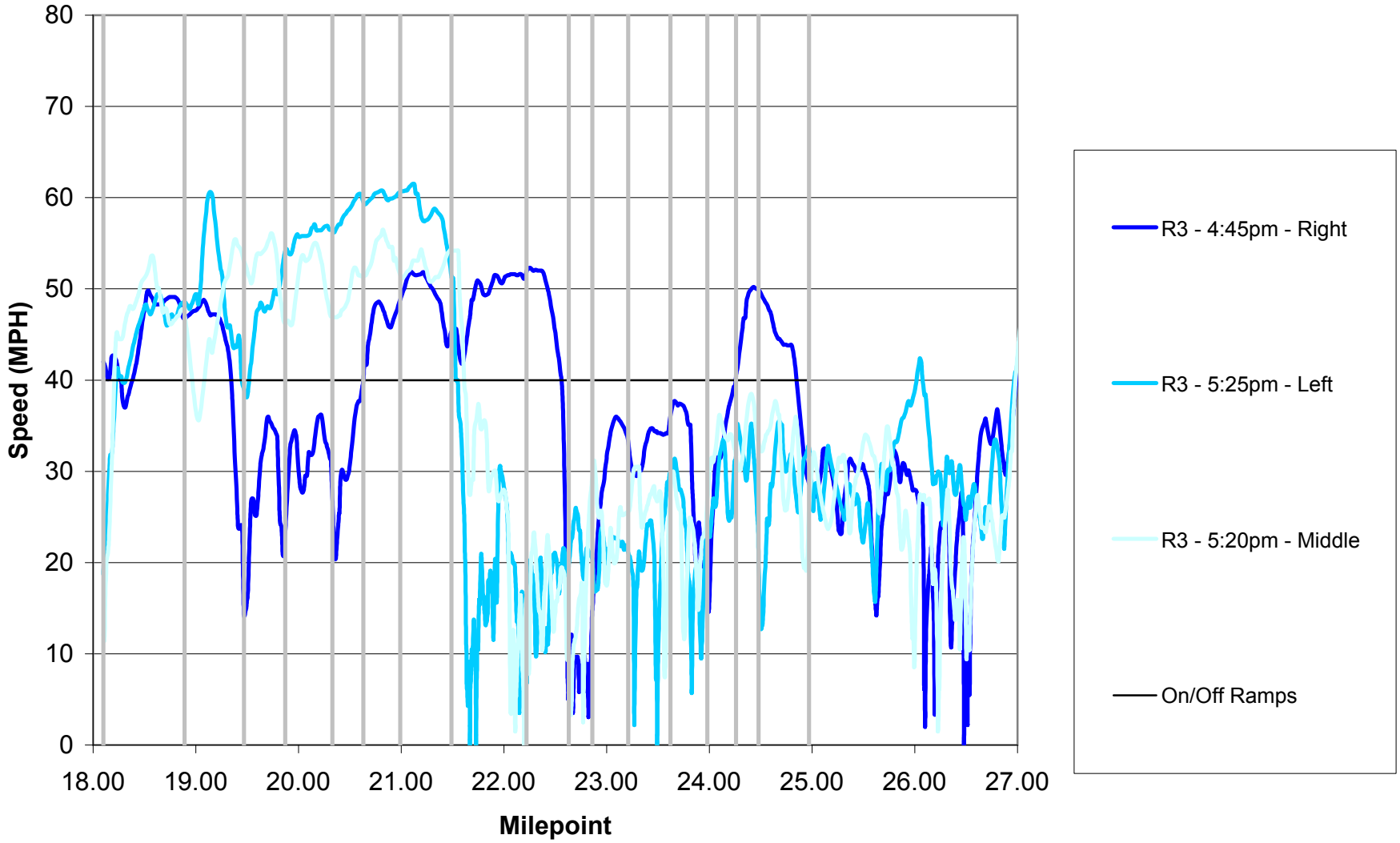
DAVID EVANS AND ASSOCIATES INC.



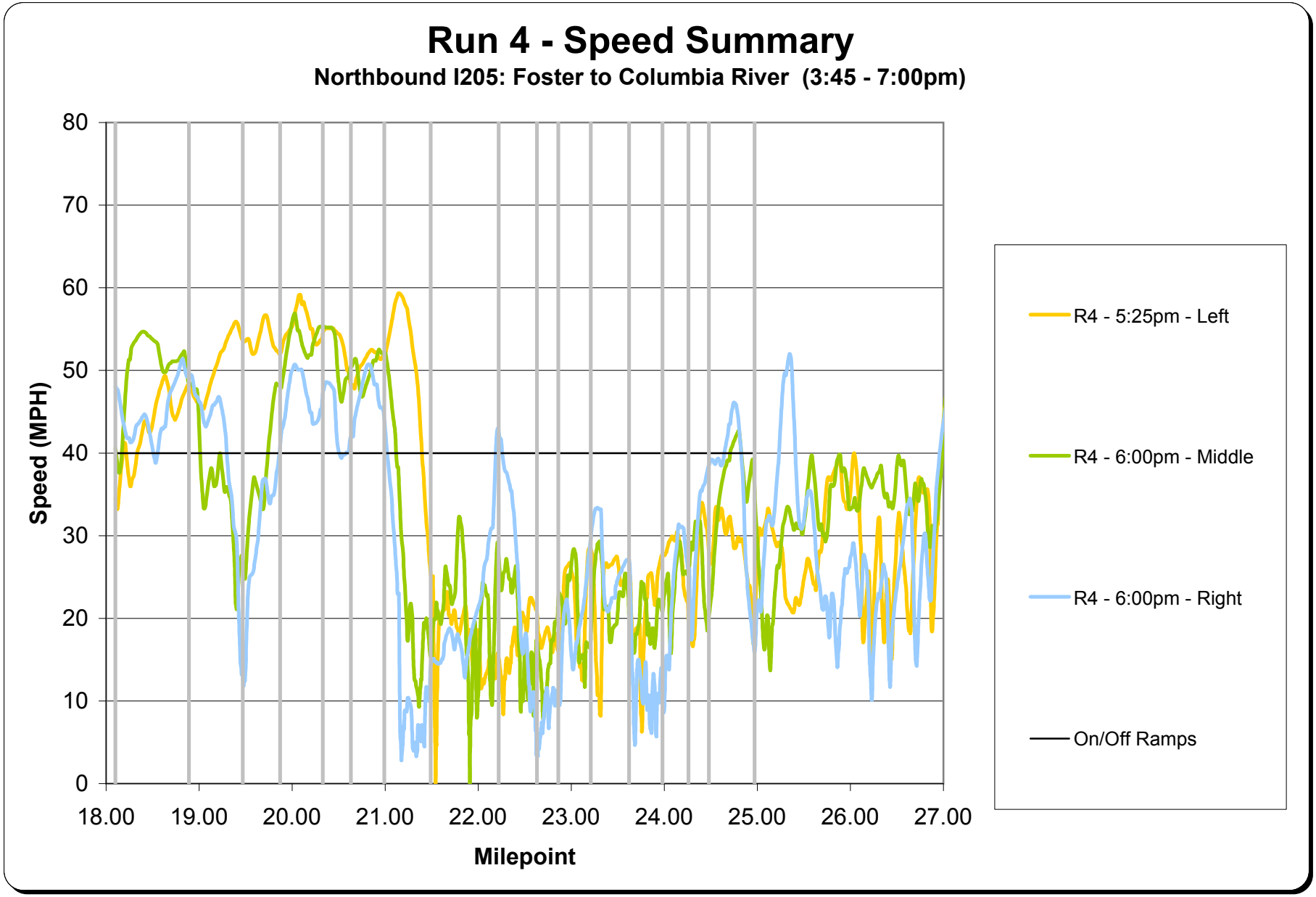
DAVID EVANS AND ASSOCIATES INC.

Run 3 - Speed Summary

Northbound I205: Foster to Columbia River (4:45 - 5:35pm)



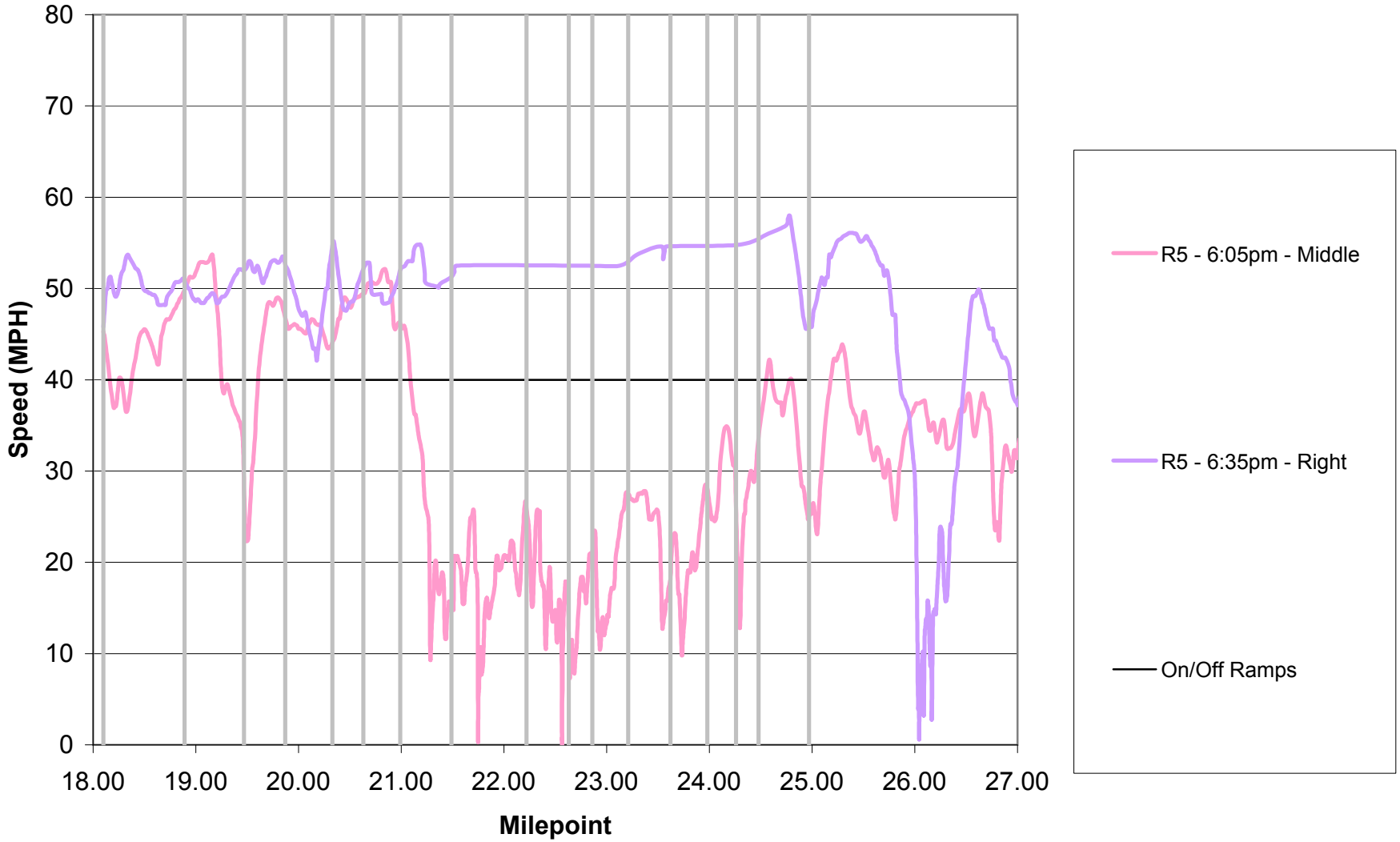
DAVID EVANS AND ASSOCIATES INC.



DAVID EVANS AND ASSOCIATES INC.

Run 5 - Speed Summary

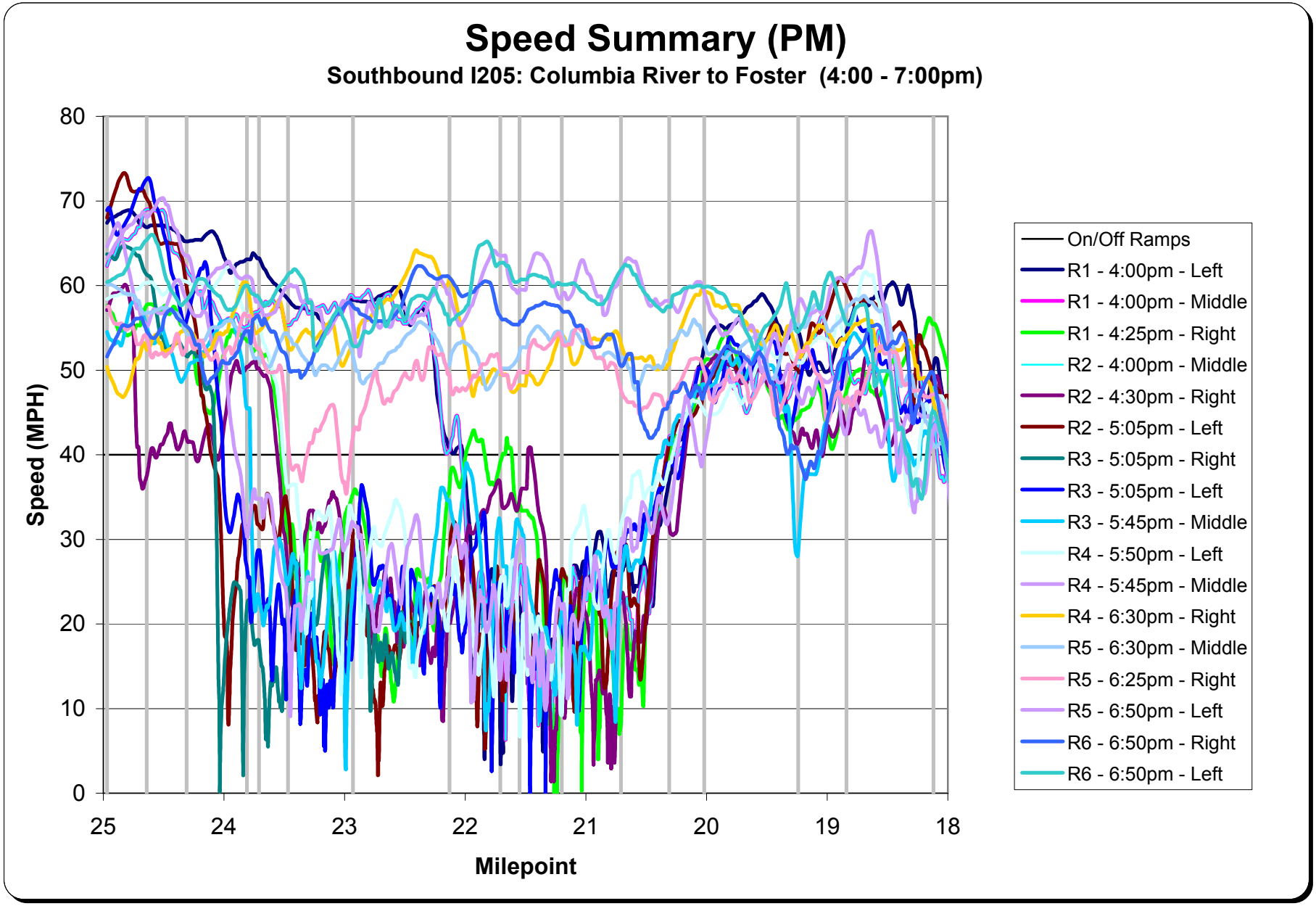
Northbound I205: Foster to Columbia River (6:05 - 7:00pm)

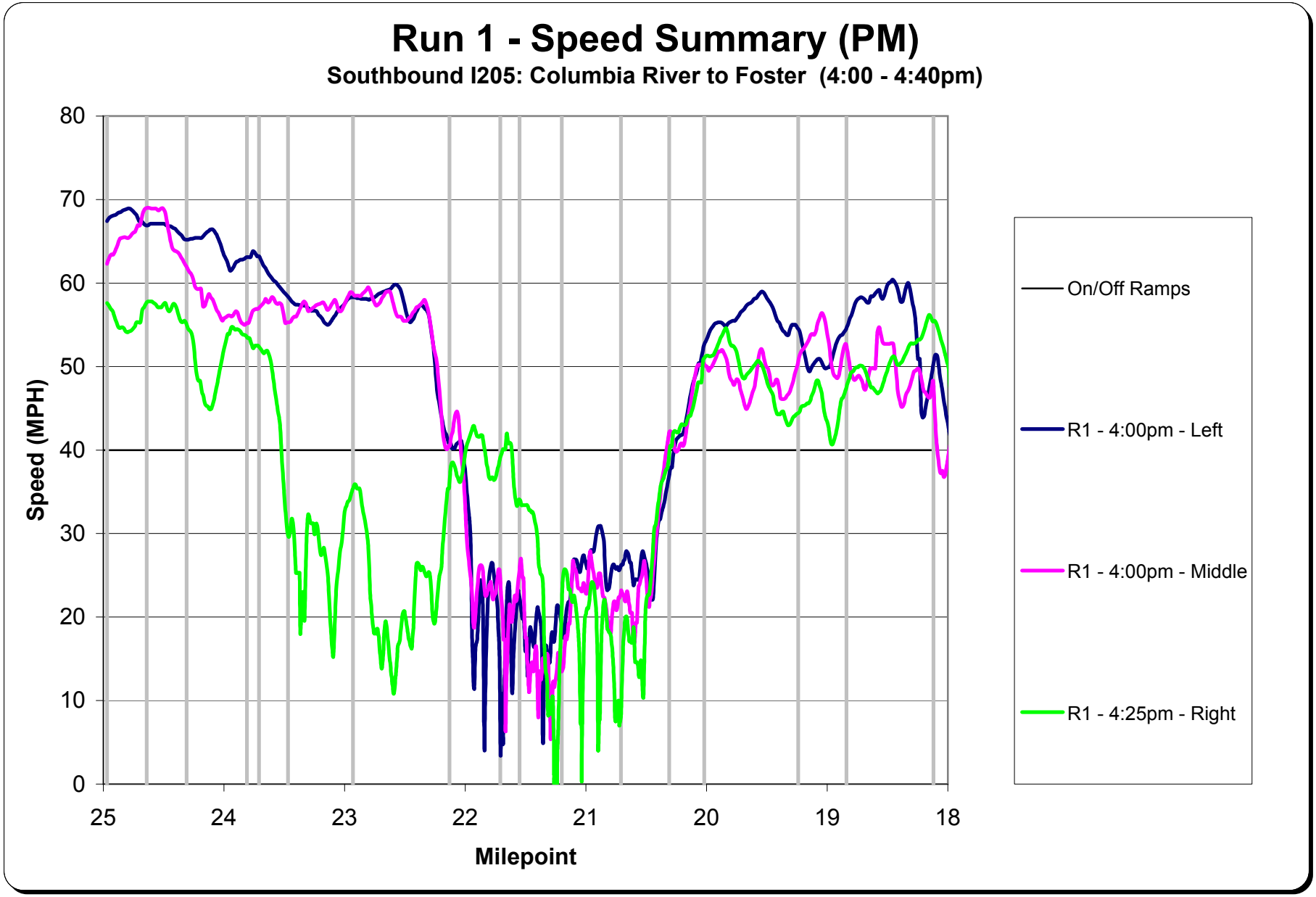


DAVID EVANS AND ASSOCIATES INC.

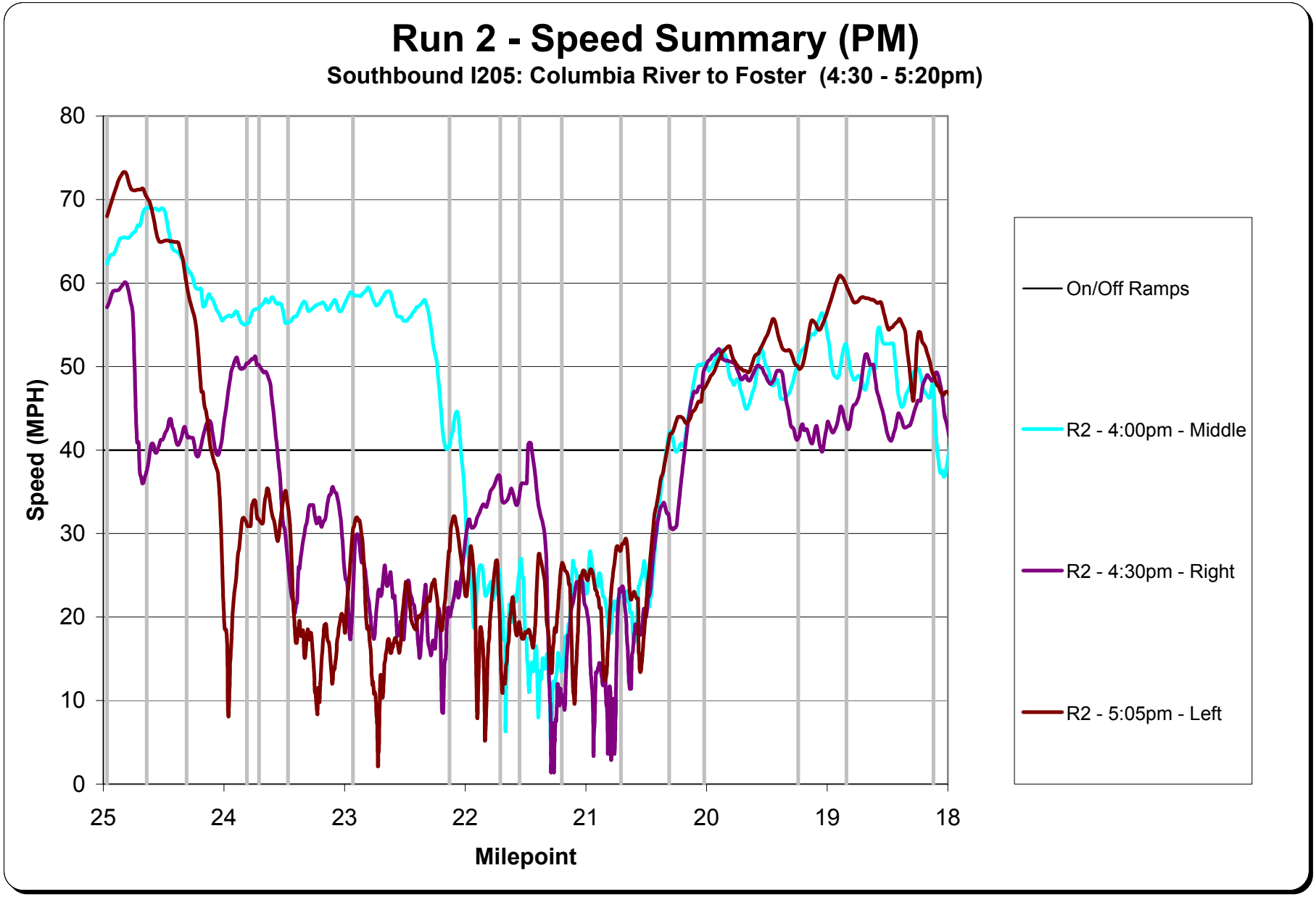
I-205 (PM)

Southbound: Columbia River to Foster Road
(4:00 - 7:00pm)


Speed Summary (PM)
Southbound I205: Columbia River to Foster (4:00 - 7:00pm)
Speed (MPH)
80
70
60
50
40
30
20
10
0
25
24
23
22
21
20
19
18
Milepoint
On/Off Ramps
R1 - 4:00pm - Left
R1 - 4:00pm - Middle
R1 - 4:25pm - Right
R2 - 4:00pm - Middle
R2 - 4:30pm - Right
R2 - 5:05pm - Left
R3 - 5:05pm - Right
R3 - 5:05pm - Left
R3 - 5:45pm - Middle
R4 - 5:50pm - Left
R4 - 5:45pm - Middle
R4 - 6:30pm - Right
R5 - 6:30pm - Middle
R5 - 6:25pm - Right
R5 - 6:50pm - Left
R6 - 6:50pm - Right
R6 - 6:50pm - Left



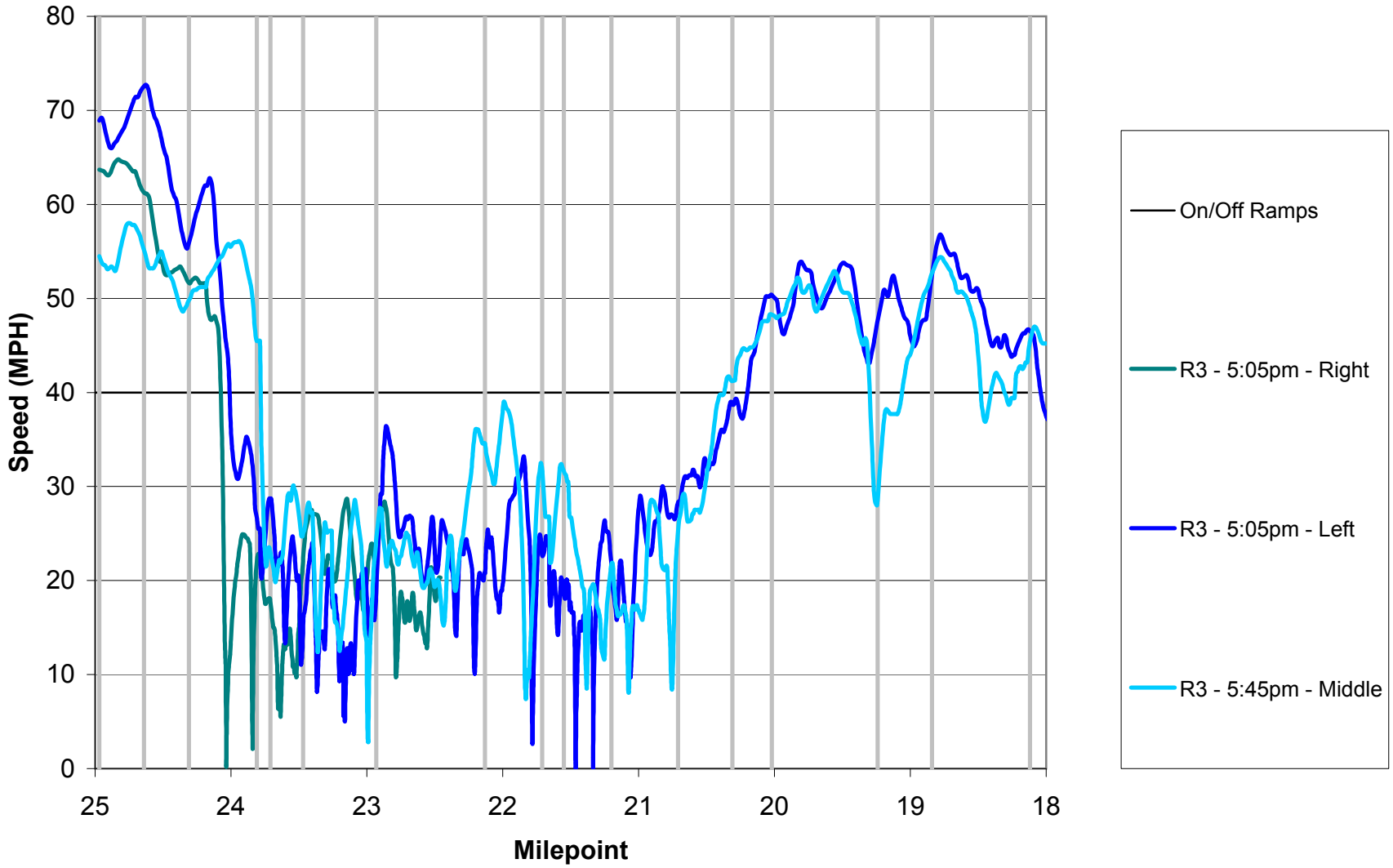
DAVID EVANS AND ASSOCIATES INC.



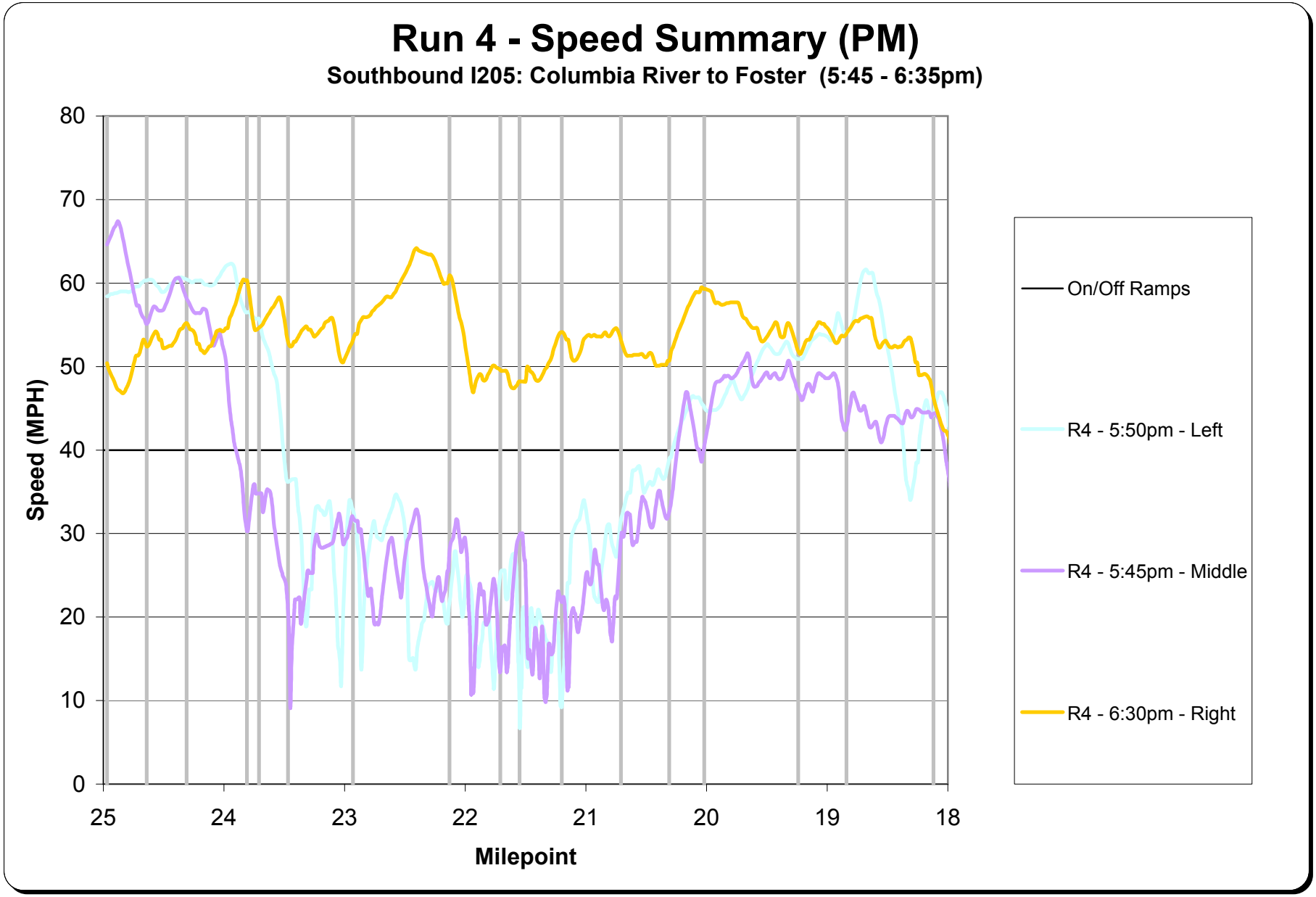
DAVID EVANS AND ASSOCIATES INC.

Run 3 - Speed Summary (PM)

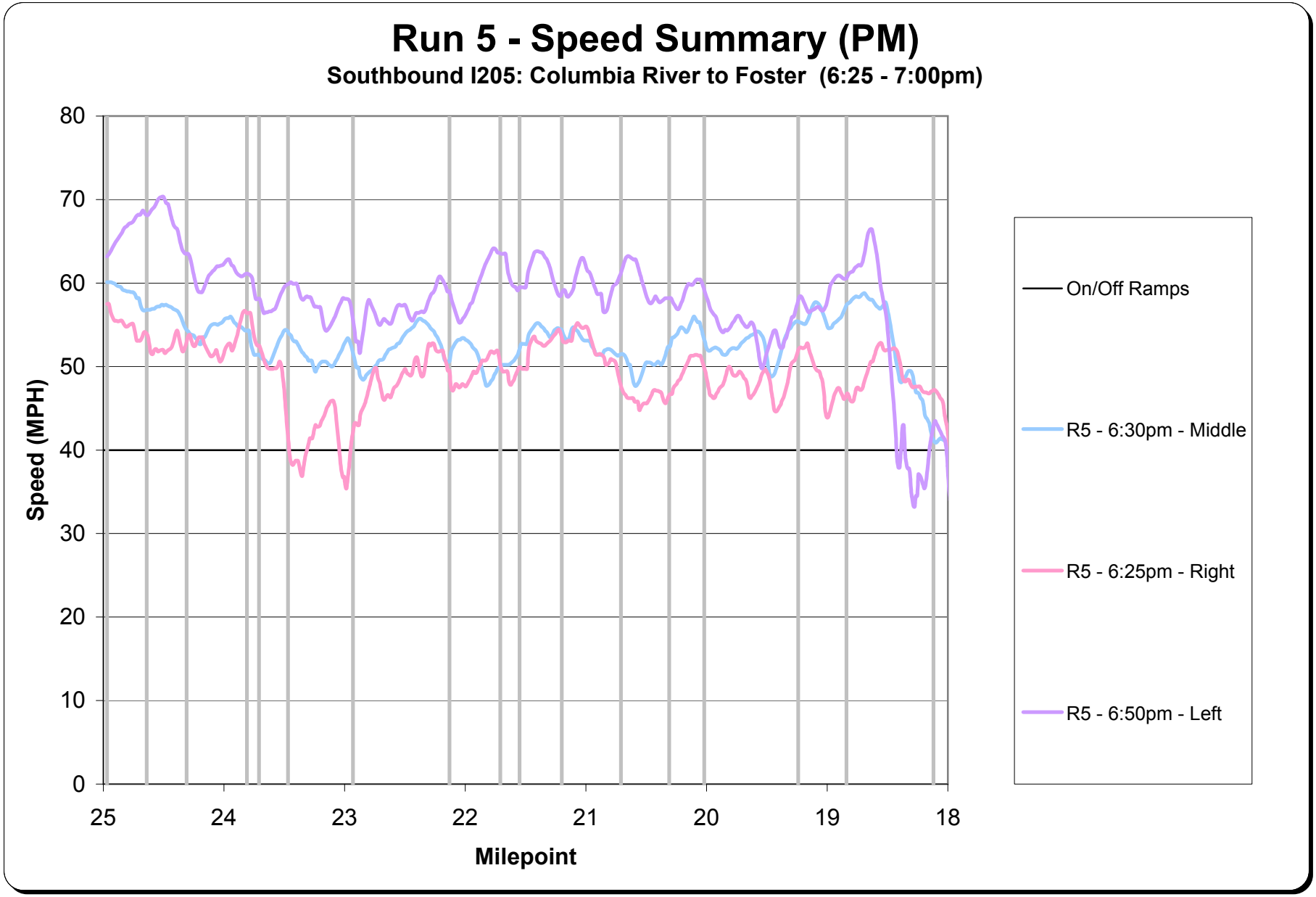
Southbound I205: Columbia River to Foster (5:05 - 6:00pm)



DAVID EVANS AND ASSOCIATES INC.



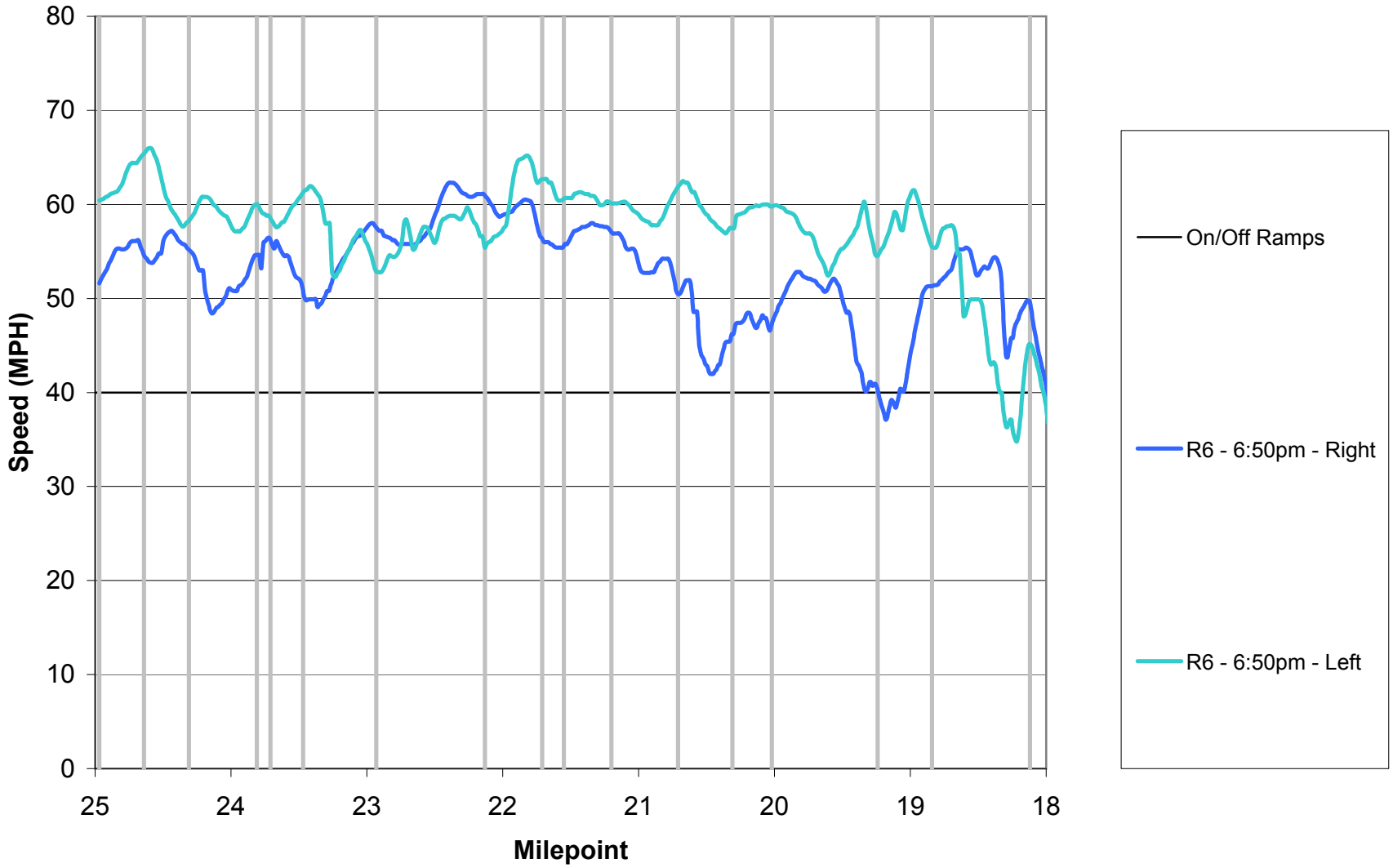
DAVID EVANS AND ASSOCIATES INC.



DAVID EVANS AND ASSOCIATES INC.

Run 6 - Speed Summary (PM)

Southbound I205: Columbia River to Foster (6:50 - 7:00pm)



DAVID EVANS AND ASSOCIATES INC.

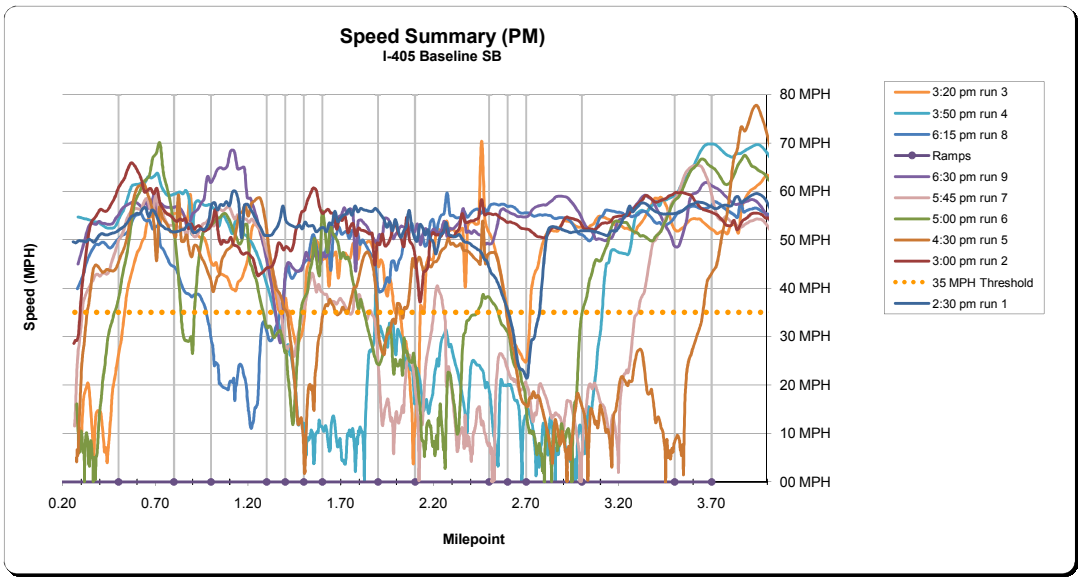
I-405 (PM)

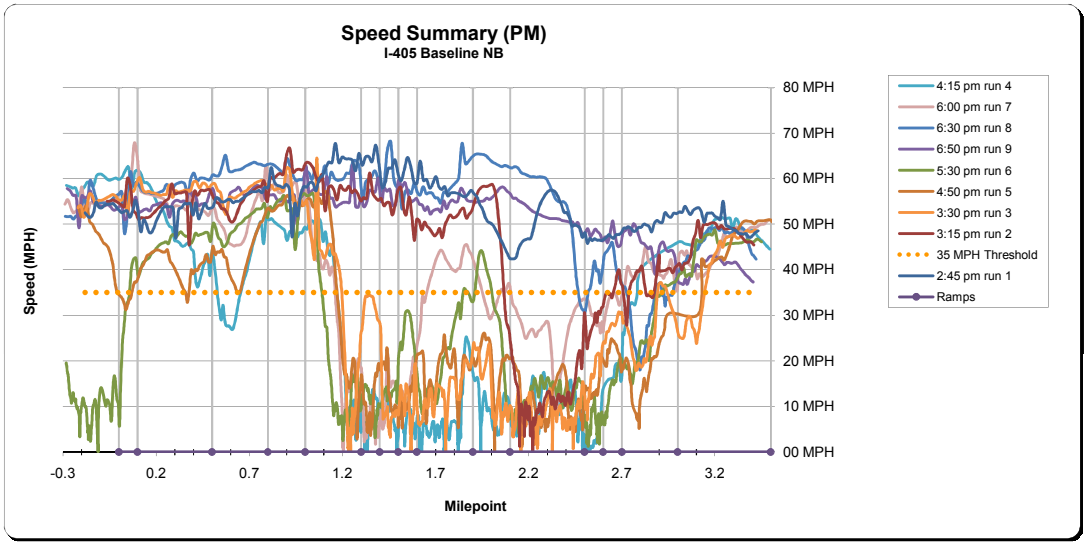
Northbound: Naito Parkway to I-5
(2:30 - 7:00pm)

I-405 NB Travel Time Summary - PM Peak

Node #	Distance (Miles)			Node Names	Nb7.01.08m4	Nb7.16.08p1	Nb6.26.08n10	Nb7.16.08p2	Nb7.01.08p1	Nb7.8.08p1	Nb7.01.08p2	Nb7.8.08p2	Nb7.15.08p1	Nb7.15.08p3	Nb7.16.08p4	Nb7.01.08p4	Nb7.15.08p4	Nb7.16.08p5	Nb7.01.08p5	Average
					2:01	2:05	2:15	3:03	3:20	3:37	3:52	4:18	4:31	5:08	5:24	5:32	5:58	6:11	6:14	
					Left	Left	Right	Right	Center	Right	Left	Right	Center	Center	Left	Center	Left	Right	Left	
Travel Time (in seconds)																				
1	0.00	0.00		Terwilliger On-ramp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2	1.23	1.23		Exit 298 Corbett Off-ramp	82	74	88	86	89	95	120	139	308	275	338	85	201	132	82	**146**
3	0.44	1.67		Exit 299 Ross Island Off-ramp	27	27	32	30	37	30	102	113	157	79	126	46	99	38	26	**65**
4	0.41	2.08		I-5 Split (I-5 299.64 = I-405 0.00)	24	23	22	67	108	66	53	136	58	58	53	74	53	45	28	**58**
5	0.25	2.33		Naito Parkway Split	14	17	16	18	20	21	17	22	20	19	18	18	19	18	17	**18**
6	0.27	2.60		I-5 N	20	20	21	20	21	25	21	22	23	21	22	21	20	20	21	**21**
7	0.14	2.75		Exit 1B: 4th Ave Off-ramp	11	7	9	10	9	9	9	10	11	8	12	8	10	9	9	**9**
8	0.20	2.94		Exit 1C: 6th Ave Off-ramp	12	13	16	14	14	16	12	16	18	16	17	15	12	15	13	**15**
9	0.32	3.26		Exit 1D: Sunset Hwy/12th Ave Off-ramp	21	20	25	20	22	22	20	24	24	23	27	30	23	37	21	**24**
10	0.30	3.56		Exit 2A: Salmon Off-ramp/PGE	19	19	28	19	19	25	19	20	22	21	21	23	20	22	19	**21**
11	0.57	4.13		Exit 2B: Everett St	33	33	38	118	38	39	33	37	36	40	53	36	36	89	34	**46**
12	0.25	4.37		Glisan On-ramp	15	14	19	67	17	21	13	21	20	18	38	60	21	91	17	**30**
13	0.35	4.73		US 30 Off-ramp	26	24	23	73	27	39	25	101	27	32	230	173	32	119	23	**65**
14	0.95	5.68		I-5 S Off-ramp	72	81	75	497	79	386	234	451	201	443	459	392	81	163	70	**246**
15	0.37	6.05		I-5 N (I-405 MP 4.19 = I-5 MP 303.44)	26	88	30	129	49	130	193	145	83	140	87	182	37	50	40	**94**
16	0.36	6.41		Exit 303: Killingsworth/Swan Island	29	37	28	56	63	88	220	244	39	49	36	169	35	46	100	**83**
Total	**6.41**			**Total Time**	**431**	**497**	**470**	**1224**	**612**	**1012**	**1091**	**1501**	**1047**	**1242**	**1537**	**1332**	**699**	**894**	**520**	**1097**
Average Speed (in mph)																				
1	0.00	0.00	35.00	Terwilliger On-ramp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2	1.23	1.23	35.00	Exit 298 Corbett Off-ramp	54.2	60.1	50.5	51.7	49.9	46.8	37.0	32.0	14.4	16.2	13.2	52.3	22.1	33.7	54.2	**29.8**
3	0.44	1.67	35.00	Exit 299 Ross Island Off-ramp	58.6	58.6	49.5	52.8	42.8	52.8	15.5	14.0	10.1	20.0	12.6	34.4	16.0	41.6	60.9	**26.2**
4	0.41	2.08	35.00	I-5 Split (I-5 299.64 = I-405 0.00)	61.4	64.1	67.0	22.0	13.7	22.3	27.8	10.8	25.4	25.4	27.8	19.9	27.8	32.8	52.7	**27.8**
5	0.25	2.33	35.00	Naito Parkway Split	63.5	52.3	55.6	49.4	44.5	42.3	52.3	40.4	44.5	46.8	49.4	49.4	46.8	49.4	52.3	**47.4**
6	0.27	2.60	35.00	I-5 N	49.0	49.0	46.6	49.0	46.6	39.2	46.6	44.5	42.6	46.6	44.5	46.6	49.0	49.0	46.6	**46.2**
7	0.14	2.75	35.00	Exit 1B: 4th Ave Off-ramp	46.6	73.2	57.0	51.3	57.0	57.0	57.0	51.3	46.6	64.1	42.7	64.1	51.3	57.0	57.0	**54.3**
8	0.20	2.94	35.00	Exit 1C: 6th Ave Off-ramp	58.6	54.1	43.9	50.2	50.2	43.9	58.6	43.9	39.0	43.9	41.3	46.9	58.6	46.9	54.1	**46.8**
9	0.32	3.26	35.00	Exit 1D: Sunset Hwy/12th Ave Off-ramp	55.3	58.1	46.5	58.1	52.8	52.8	58.1	48.4	48.4	50.5	43.0	38.7	50.5	31.4	55.3	**45.8**
10	0.30	3.56	35.00	Exit 2A: Salmon Off-ramp/PGE	56.4	56.4	38.3	56.4	56.4	42.9	56.4	53.6	48.7	51.0	51.0	46.6	53.6	48.7	56.4	**51.2**
11	0.57	4.13	35.00	Exit 2B: Everett St	61.7	61.7	53.6	17.3	53.6	52.2	61.7	55.0	56.5	50.9	38.4	56.5	56.5	22.9	59.9	**49.6**
12	0.25	4.37	35.00	Glisan On-ramp	59.4	63.6	46.9	13.3	52.4	42.4	68.5	42.4	44.5	49.5	23.4	14.8	42.4	9.8	52.4	**34.9**
13	0.35	4.73	35.00	US 30 Off-ramp	48.8	52.8	55.1	17.4	46.9	32.5	50.7	12.5	46.9	39.6	5.5	7.3	39.6	10.7	55.1	**27.2**
14	0.95	5.68	35.00	I-5 S Off-ramp	47.7	42.4	45.7	6.9	43.4	8.9	14.7	7.6	17.1	7.7	7.5	8.8	42.4	21.0	49.0	**20.1**
15	0.37	6.05	35.00	I-5 N (I-405 MP 4.19 = I-5 MP 303.44)	51.3	15.1	44.4	10.3	27.2	10.3	6.9	9.2	16.1	9.5	15.3	7.3	36.0	26.7	33.3	**19.2**
16	0.36	6.41	35.00	Exit 303: Killingsworth/Swan Island	45.2	35.5	46.8	23.4	20.8	14.9	6.0	5.4	33.6	26.8	36.4	7.8	37.5	28.5	13.1	**23.6**
Total	**6.41**			**Average Speed**	**54.5**	**53.1**	**49.8**	**35.3**	**43.9**	**37.4**	**41.2**	**31.4**	**35.6**	**36.6**	**30.1**	**33.4**	**42.0**	**34.0**	**50.1**	**36.7**
				Legend	≥ 45 mph	≥ 30 and < 45 mph					≥ 15 and < 30 mph				< 15 mph					

File Name	Nb7.01.08m4	Nb7.16.08p1	Nb6.26.08n10	Nb7.16.08p2	Nb7.01.08p1	Nb7.8.08p1	Nb7.01.08p2	Nb7.8.08p2	Nb7.15.08p1	Nb7.15.08p3	Nb7.16.08p4	Nb7.01.08p4	Nb7.15.08p4	Nb7.16.08p5	Nb7.01.08p5
Time	2:01	2:05	2:15	3:03	3:20	3:37	3:52	4:18	4:31	5:08	5:24	5:32	5:58	6:11	6:14
Log Data	Mid 80's, Mostly sunny	Sunny, low 80's	Partly cloudy	Sunny, low 80's	Mid 80's, Mostly sunny	low 90's, sunny	Mid 80's, Mostly sunny	low 90's, sunny	Warm, sunny	Warm, sunny	Sunny, low 80's	Mid 80's, sunny	Warm, sunny	Sunny, low 80's	Mid 80's, Mostly sunny


Speed Summary (PM)
I-405 Baseline SB
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
0.20
0.70
1.20
1.70
2.20
2.70
3.20
3.70
Milepoint
3:20 pm run 3
3:50 pm run 4
6:15 pm run 8
Ramps
6:30 pm run 9
5:45 pm run 7
5:00 pm run 6
4:30 pm run 5
3:00 pm run 2
35 MPH Threshold
2:30 pm run 1


Speed Summary (PM)
I-405 Baseline NB
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
-0.3
0.2
0.7
1.2
1.7
2.2
2.7
3.2
Milepoint
4:15 pm run 4
6:00 pm run 7
6:30 pm run 8
6:50 pm run 9
5:30 pm run 6
4:50 pm run 5
3:30 pm run 3
3:15 pm run 2
35 MPH Threshold
2:45 pm run 1
Ramps

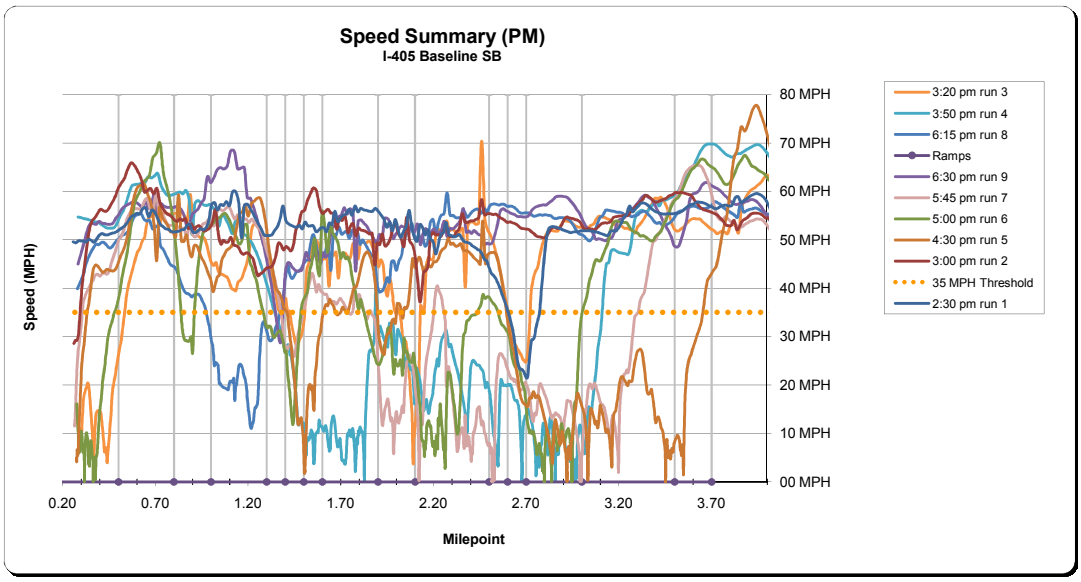
I-405 (PM)

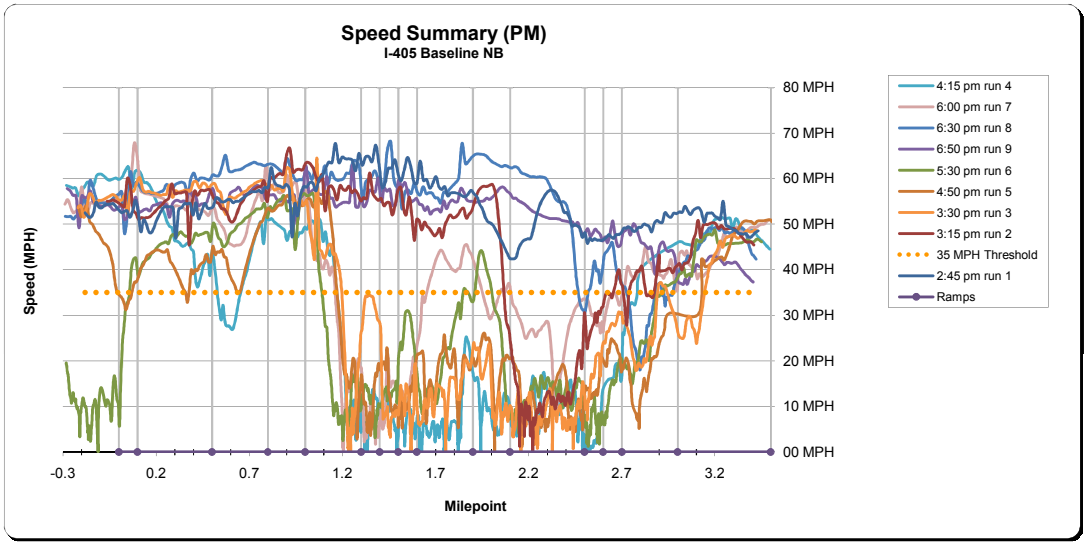
Southbound: I-5 to Naito Parkway
(2:30 - 7:00pm)

I-405 SB Travel Time Summary - PM Peak

Node #	Distance (Miles)			Node Names	Sb6.26.08s9	Sb7.01.08m4	Sb7.16.08p1	Sb7.15.08p1	Sb7.16.08p2	Sb7.1.08p1	Sb7.8.08p1	Sb7.15.08p2	Sb7.01.08p2	Sb7.15.08p3	Sb7.01.08p3	Sb7.15.08p4	Sb7.16.08p4	Sb7.01.08p4	Sb7.15.08p5	Average
					2:02	14:13	2:20	3:12	3:26	3:38	4:04	4:16	4:25	4:53	5:12	5:34	5:52	6:01	6:13	
					Right	Left	Left	Right	Right	Center	Left	Center	Left	Right	Right	Center	Left	Center	Left	
Travel Time (in seconds)																				
1	0.00	0.00		Terwilliger On-ramp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2	0.34	0.34		Exit 298 Corbett Off-ramp	23	23	21	27	27	21	22	23	27	17	21	46	27	20	22	**25**
3	0.47	0.81		Exit 299 Ross Island Off-ramp	34	38	36	34	38	34	35	34	38	31	34	39	38	33	32	**36**
4	0.61	1.42		I-5 Split (I-5 299.64 = I-405 0.00)	40	41	44	38	45	43	40	43	47	43	43	105	42	41	39	**47**
5	0.29	1.71		Naito Parkway Split	19	18	17	22	20	35	30	22	19	34	65	86	58	19	19	**34**
6	0.17	1.88		I-5 N	14	10	11	24	12	27	17	14	11	20	51	28	29	11	11	**21**
7	0.16	2.03		Exit 1B: 4th Ave Off-ramp	11	10	10	14	10	18	17	10	9	18	33	15	16	10	9	**15**
8	0.57	2.60		Exit 1C: 6th Ave Off-ramp	44	38	38	50	48	51	55	54	38	52	130	60	58	42	36	**55**
9	0.42	3.03		Exit 1D: Sunset Hwy/12th Ave Off-ramp	32	29	28	36	34	36	30	29	30	29	41	35	35	31	28	**33**
10	0.18	3.21		Exit 2A: Salmon Off-ramp/PGE	12	12	11	14	15	13	12	13	12	15	16	16	13	17	12	**13**
11	0.29	3.50		Exit 2B: Everett St	19	21	18	17	22	21	19	20	20	21	24	34	88	20	17	**26**
12	0.21	3.70		Glisan On-ramp	14	15	13	12	15	13	13	13	12	15	15	117	76	14	12	**26**
13	0.29	4.00		US 30 Off-ramp	24	23	22	21	22	25	23	23	85	27	76	172	137	21	23	**52**
14	0.37	4.37		I-5 S Off-ramp	27	25	23	32	24	27	25	29	154	70	102	124	68	23	30	**56**
15	0.29	4.65		I-5 N (I-405 MP 4.19 = I-5 MP 303.44)	20	18	18	20	18	20	20	58	47	47	59	50	29	19	45	**33**
16	1.69	6.34		Exit 303: Killingsworth/Swan Island	167	125	127	130	158	146	137	161	200	161	177	206	148	166	183	**157**
Total	**6.34**			**Total Time**	**500**	**446**	**437**	**491**	**508**	**530**	**495**	**546**	**749**	**600**	**887**	**1133**	**862**	**487**	**518**	**630**
Average Speed (in mph)																				
1	0.00	0.00	35.00	Terwilliger On-ramp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2	0.34	0.34	35.00	Exit 298 Corbett Off-ramp	53.6	53.6	58.7	45.6	45.6	58.7	56.0	53.6	45.6	72.5	58.7	26.8	45.6	61.6	56.0	51.5
3	0.47	0.81	35.00	Exit 299 Ross Island Off-ramp	49.9	44.6	47.1	49.9	44.6	49.9	48.4	49.9	44.6	54.7	49.9	43.5	44.6	51.4	53.0	47.8
4	0.61	1.42	35.00	I-5 Split (I-5 299.64 = I-405 0.00)	54.5	53.1	49.5	57.3	48.4	50.7	54.5	50.7	46.4	50.7	50.7	20.8	51.9	53.1	55.9	47.2
5	0.29	1.71	35.00	Naito Parkway Split	54.5	57.5	60.9	47.1	51.8	29.6	34.5	47.1	54.5	30.5	15.9	12.0	17.9	54.5	54.5	32.6
6	0.17	1.88	35.00	I-5 N	44.2	61.9	56.3	25.8	51.6	22.9	36.4	44.2	56.3	30.9	12.1	22.1	21.3	56.3	56.3	33.1
7	0.16	2.03	35.00	Exit 1B: 4th Ave Off-ramp	51.1	56.2	56.2	40.1	56.2	31.2	33.0	56.2	62.4	31.2	17.0	37.5	35.1	56.2	62.4	40.0
8	0.57	2.60	35.00	Exit 1C: 6th Ave Off-ramp	46.6	53.9	53.9	41.0	42.7	40.2	37.2	37.9	53.9	39.4	15.8	34.1	35.3	48.8	56.9	37.4
9	0.42	3.03	35.00	Exit 1D: Sunset Hwy/12th Ave Off-ramp	47.6	52.6	54.4	42.3	44.8	42.3	50.8	52.6	50.8	52.6	37.2	43.5	43.5	49.2	54.4	46.5
10	0.18	3.21	35.00	Exit 2A: Salmon Off-ramp/PGE	53.6	53.6	58.5	45.9	42.9	49.5	53.6	49.5	53.6	42.9	40.2	40.2	49.5	37.8	53.6	46.9
11	0.29	3.50	35.00	Exit 2B: Everett St	54.9	49.7	58.0	61.4	47.5	49.7	54.9	52.2	52.2	49.7	43.5	30.7	11.9	52.2	61.4	43.6
12	0.21	3.70	35.00	Glisan On-ramp	53.5	50.0	57.6	62.4	50.0	57.6	57.6	57.6	62.4	50.0	50.0	6.4	9.9	53.5	62.4	44.6
13	0.29	4.00	35.00	US 30 Off-ramp	44.1	46.0	48.1	50.4	48.1	42.3	46.0	46.0	12.5	39.2	13.9	6.2	7.7	50.4	46.0	29.1
14	0.37	4.37	35.00	I-5 S Off-ramp	49.1	53.0	57.6	41.4	55.2	49.1	53.0	45.7	8.6	18.9	13.0	10.7	19.5	57.6	44.2	30.4
15	0.29	4.65	35.00	I-5 N (I-405 MP 4.19 = I-5 MP 303.44)	51.7	57.5	57.5	51.7	57.5	51.7	51.7	17.8	22.0	22.0	17.5	20.7	35.7	54.4	23.0	33.0
16	1.69	6.34	35.00	Exit 303: Killingsworth/Swan Island	36.5	48.7	47.9	46.8	38.5	41.7	44.4	37.8	30.4	37.8	34.4	29.6	41.1	36.7	33.3	37.3
Total	**6.34**			**Average Speed**	**49.7**	**52.8**	**54.8**	**47.3**	**48.4**	**44.5**	**47.5**	**46.6**	**43.8**	**41.5**	**31.3**	**25.6**	**31.4**	**51.6**	**51.6**	**40.1**
				Legend	≥ 45 mph	≥ 30 and < 45 mph				≥ 15 and < 30 mph			< 15 mph							

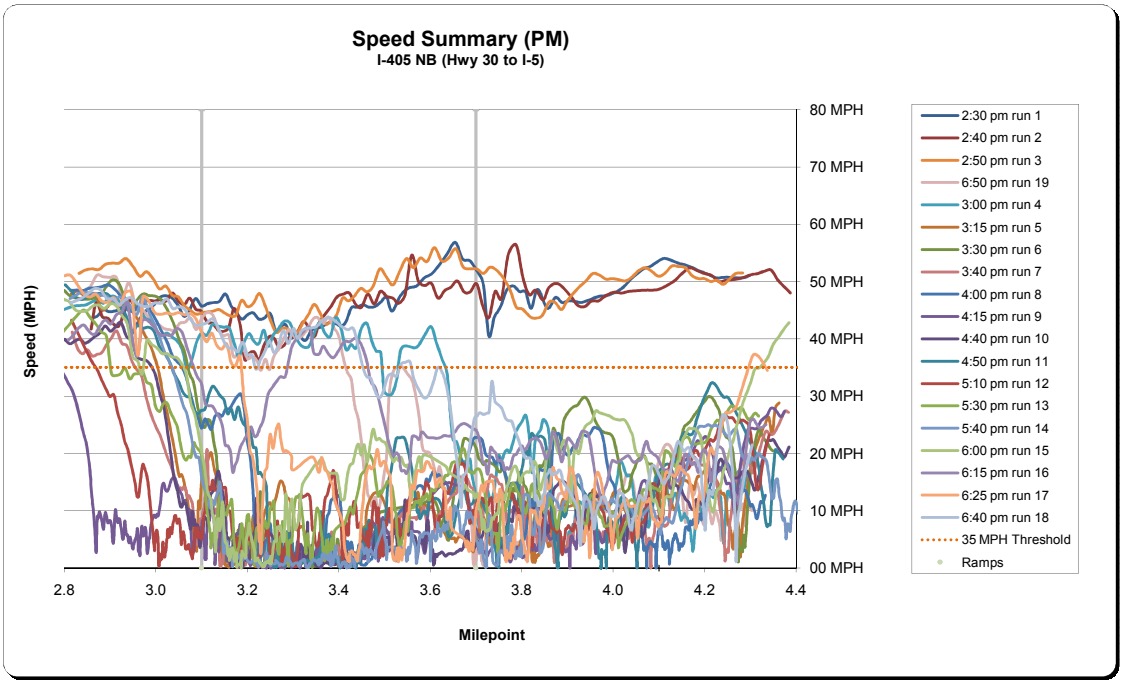
File Name	Sb6.26.08s9	Sb7.01.08m4	Sb7.16.08p1	Sb7.15.08p1	Sb7.16.08p2	Sb7.1.08p1	Sb7.8.08p1	Sb7.15.08p2	Sb7.01.08p2	Sb7.15.08p3	Sb7.01.08p3	Sb7.15.08p4	Sb7.16.08p4	Sb7.01.08p4	Sb7.15.08p5
Time	2:02	14:13	2:20	3:12	3:26	3:38	4:04	4:16	4:25	4:53	5:12	5:34	5:52	6:01	6:13
Log Data	Partly cloudy	Mid 80's, mostly sunny	Low 80's, sunny	Warm, sunny	Low 80's, sunny	Mid 80's, mostly sunny	Low 90's, sunny	Warm, sunny	Mid 80's, mostly sunny	Warm, sunny	Mid 80's, mostly sunny	Warm, sunny	Low 80's, sunny	Mid 80's, mostly sunny	Warm, sunny

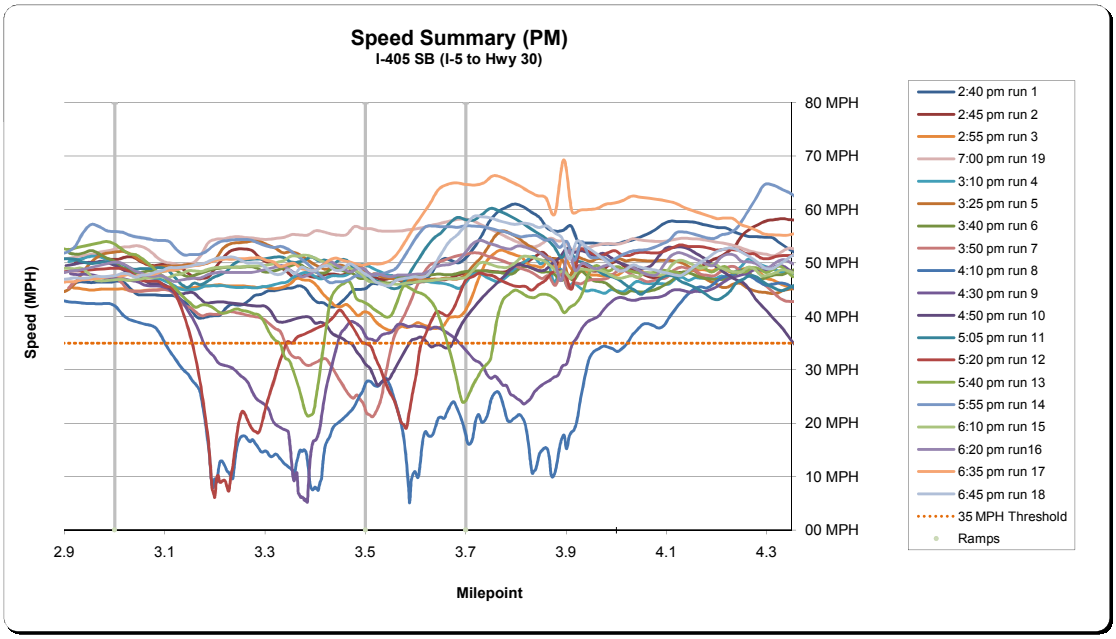

Speed Summary (PM)
I-405 Baseline SB
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
0.20
0.70
1.20
1.70
2.20
2.70
3.20
3.70
Milepoint
3:20 pm run 3
3:50 pm run 4
6:15 pm run 8
Ramps
6:30 pm run 9
5:45 pm run 7
5:00 pm run 6
4:30 pm run 5
3:00 pm run 2
35 MPH Threshold
2:30 pm run 1


Speed Summary (PM)
I-405 Baseline NB
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
-0.3
0.2
0.7
1.2
1.7
2.2
2.7
3.2
Milepoint
4:15 pm run 4
6:00 pm run 7
6:30 pm run 8
6:50 pm run 9
5:30 pm run 6
4:50 pm run 5
3:30 pm run 3
3:15 pm run 2
35 MPH Threshold
2:45 pm run 1
Ramps

I-405 (PM)

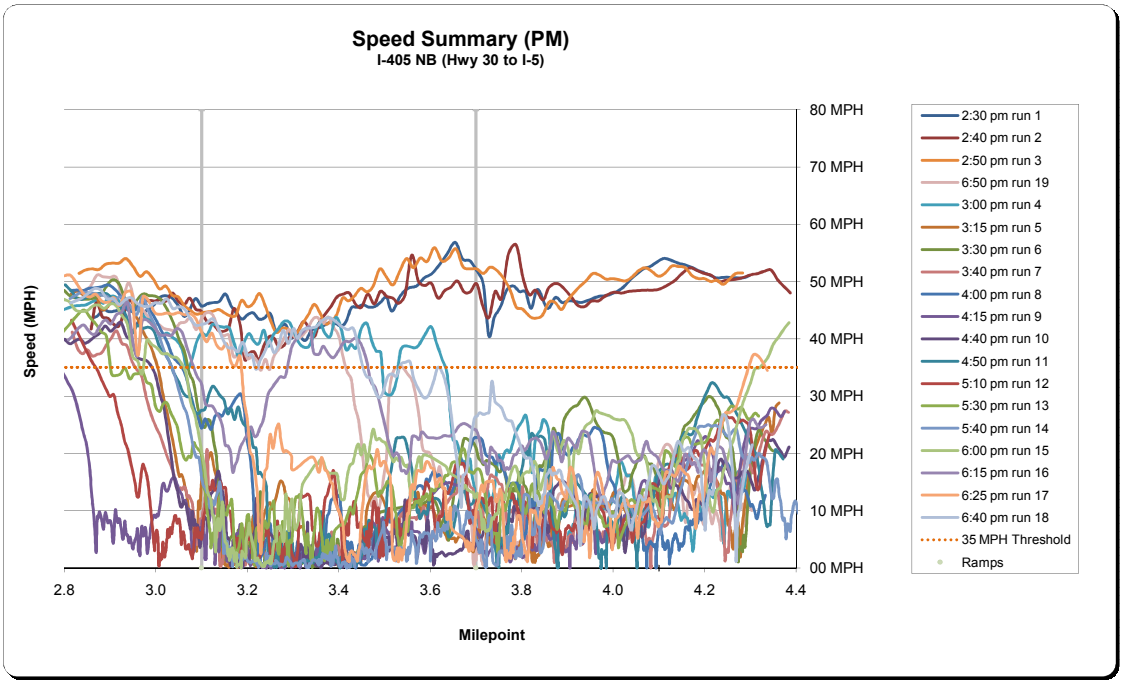
Northbound: Highway 30 On to Highway 30 Off
(2:30 - 7:00pm)

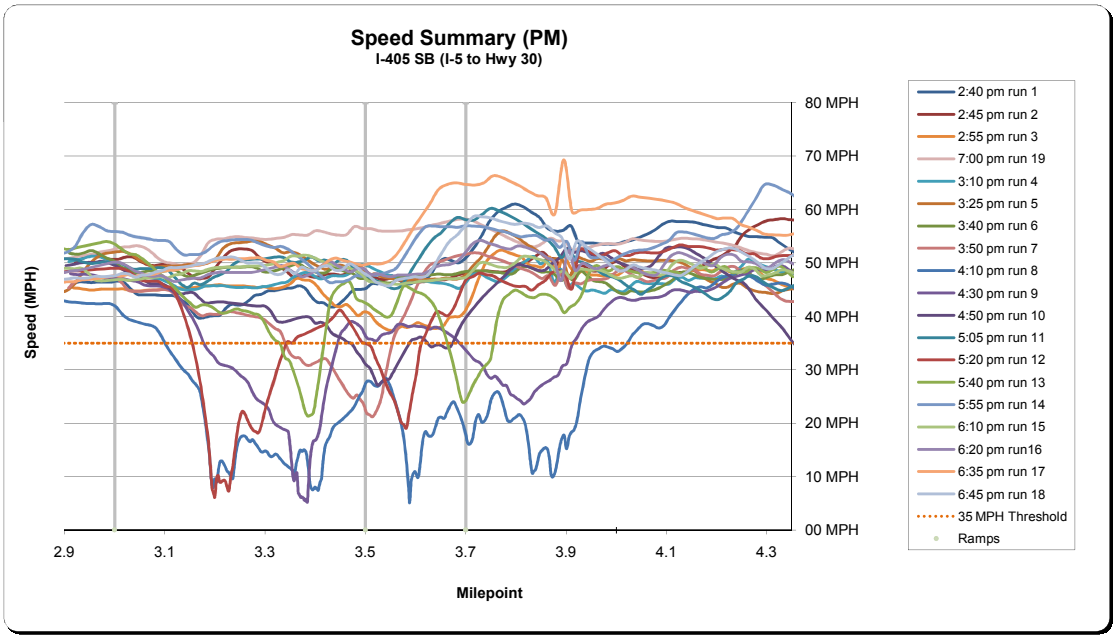

Speed Summary (PM)
I-405 NB (Hwy 30 to I-5)
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
2.8
3.0
3.2
3.4
3.6
3.8
4.0
4.2
4.4
Milepoint
2:30 pm run 1
2:40 pm run 2
2:50 pm run 3
6:50 pm run 19
3:00 pm run 4
3:15 pm run 5
3:30 pm run 6
3:40 pm run 7
4:00 pm run 8
4:15 pm run 9
4:40 pm run 10
4:50 pm run 11
5:10 pm run 12
5:30 pm run 13
5:40 pm run 14
6:00 pm run 15
6:15 pm run 16
6:25 pm run 17
6:40 pm run 18
35 MPH Threshold
Ramps


Speed Summary (PM)
I-405 SB (I-5 to Hwy 30)
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
2.9
3.1
3.3
3.5
3.7
3.9
4.1
4.3
Milepoint
2:40 pm run 1
2:45 pm run 2
2:55 pm run 3
7:00 pm run 19
3:10 pm run 4
3:25 pm run 5
3:40 pm run 6
3:50 pm run 7
4:10 pm run 8
4:30 pm run 9
4:50 pm run 10
5:05 pm run 11
5:20 pm run 12
5:40 pm run 13
5:55 pm run 14
6:10 pm run 15
6:20 pm run16
6:35 pm run 17
6:45 pm run 18
35 MPH Threshold
Ramps

I-405 (PM)

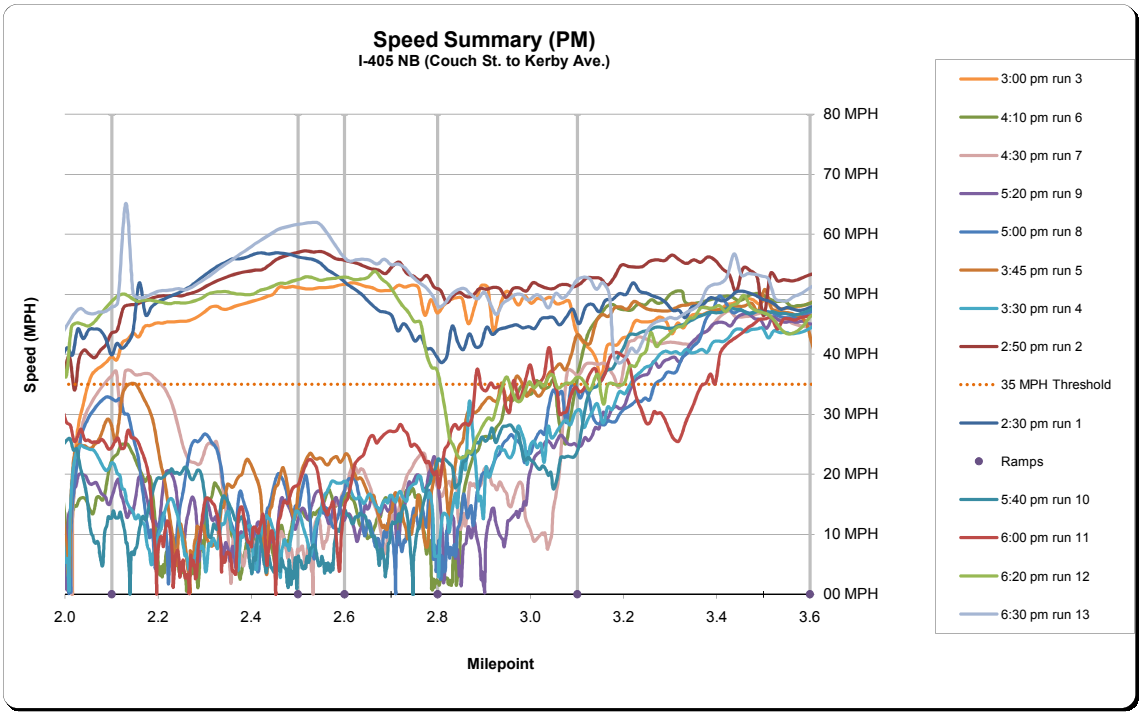
Southbound: Highway 30 On to Everett Street Off
(2:30 - 7:00pm)


Speed Summary (PM)
I-405 NB (Hwy 30 to I-5)
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
2.8
3.0
3.2
3.4
3.6
3.8
4.0
4.2
4.4
Milepoint
2:30 pm run 1
2:40 pm run 2
2:50 pm run 3
6:50 pm run 19
3:00 pm run 4
3:15 pm run 5
3:30 pm run 6
3:40 pm run 7
4:00 pm run 8
4:15 pm run 9
4:40 pm run 10
4:50 pm run 11
5:10 pm run 12
5:30 pm run 13
5:40 pm run 14
6:00 pm run 15
6:15 pm run 16
6:25 pm run 17
6:40 pm run 18
35 MPH Threshold
Ramps


Speed Summary (PM)
I-405 SB (I-5 to Hwy 30)
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
2.9
3.1
3.3
3.5
3.7
3.9
4.1
4.3
Milepoint
2:40 pm run 1
2:45 pm run 2
2:55 pm run 3
7:00 pm run 19
3:10 pm run 4
3:25 pm run 5
3:40 pm run 6
3:50 pm run 7
4:10 pm run 8
4:30 pm run 9
4:50 pm run 10
5:05 pm run 11
5:20 pm run 12
5:40 pm run 13
5:55 pm run 14
6:10 pm run 15
6:20 pm run16
6:35 pm run 17
6:45 pm run 18
35 MPH Threshold
Ramps

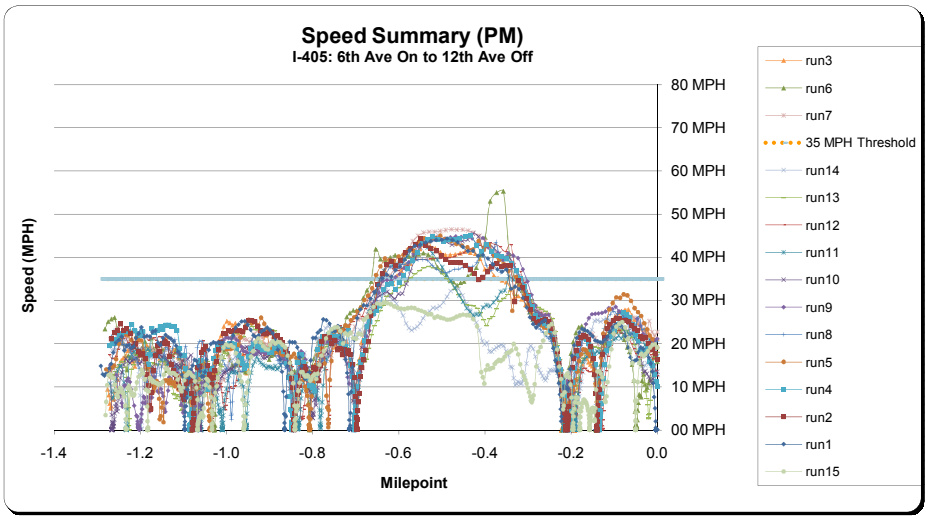
I-405 (PM)

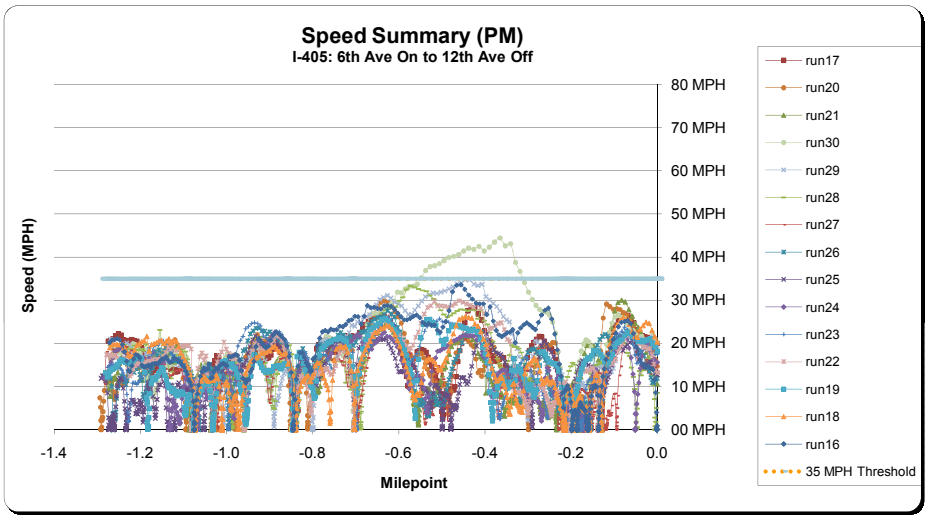
Northbound: Burnside Street On to Kirby Avenue Off (2:30 - 7:00pm)

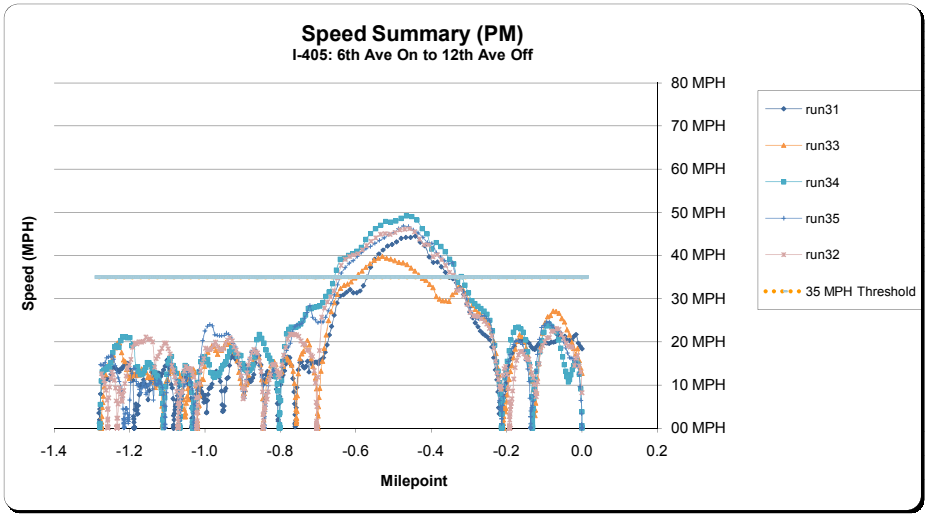

Speed Summary (PM)
I-405 NB (Couch St. to Kerby Ave.)
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
2.0
2.2
2.4
2.6
2.8
3.0
3.2
3.4
3.6
Milepoint
3:00 pm run 3
4:10 pm run 6
4:30 pm run 7
5:20 pm run 9
5:00 pm run 8
3:45 pm run 5
3:30 pm run 4
2:50 pm run 2
35 MPH Threshold
2:30 pm run 1
Ramps
5:40 pm run 10
6:00 pm run 11
6:20 pm run 12
6:30 pm run 13

I-405 (PM)

Northbound: 6th Avenue On to Us 26/12th Avenue Off (2:30 - 7:00pm)

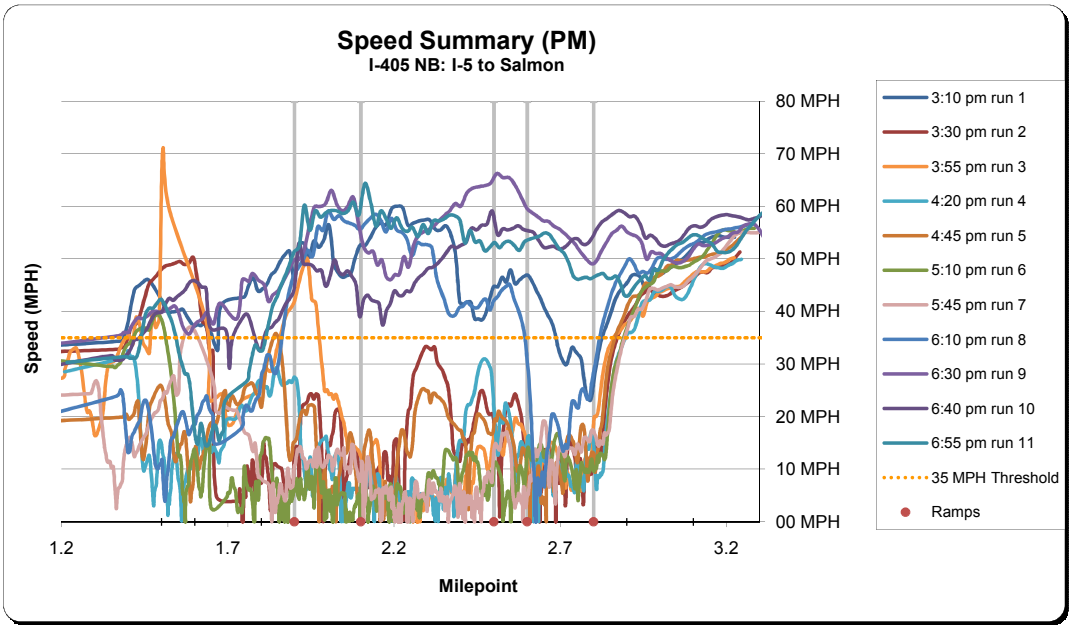

Speed Summary (PM)
I-405: 6th Ave On to 12th Ave Off
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
-1.4
-1.2
-1.0
-0.8
-0.6
-0.4
-0.2
0.0
Milepoint
run3
run6
run7
35 MPH Threshold
run14
run13
run12
run11
run10
run9
run8
run5
run4
run2
run1
run15

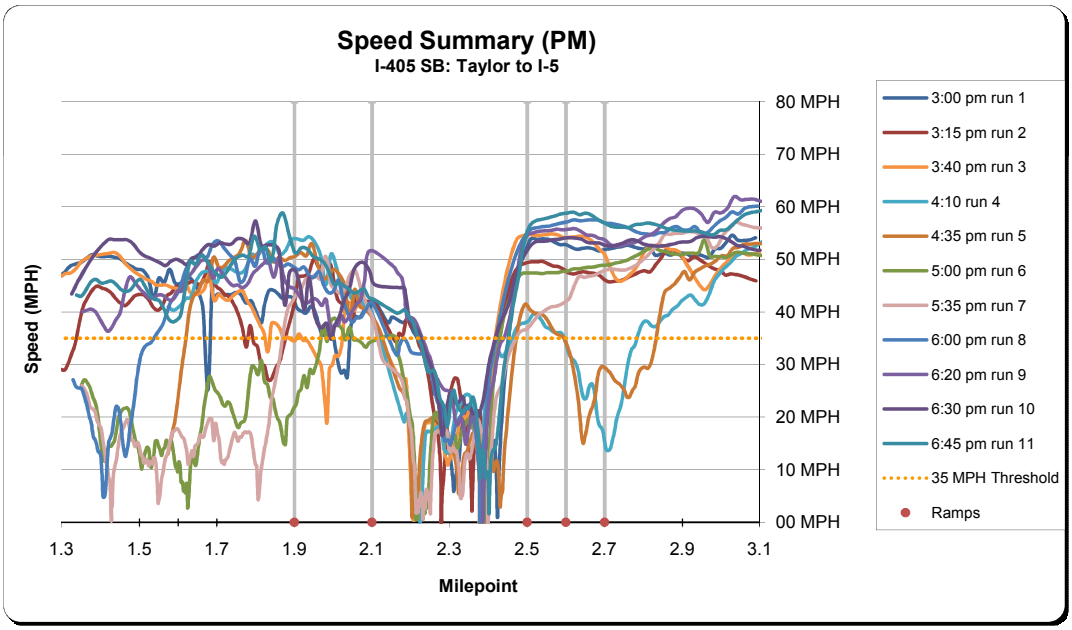

Speed Summary (PM)
I-405: 6th Ave On to 12th Ave Off
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
-1.4
-1.2
-1.0
-0.8
-0.6
-0.4
-0.2
0.0
Milepoint
run17
run20
run21
run30
run29
run28
run27
run26
run25
run24
run23
run22
run19
run18
run16
35 MPH Threshold


Speed Summary (PM)
I-405: 6th Ave On to 12th Ave Off
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
-1.4
-1.2
-1.0
-0.8
-0.6
-0.4
-0.2
0.0
0.2
Milepoint
run31
run33
run34
run35
run32
35 MPH Threshold

I-405 (PM)

Northbound: I-5 SB On to Salmon Street Off
(2:30 - 7:00pm)


Speed Summary (PM)
I-405 NB: I-5 to Salmon
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
1.2
1.7
2.2
2.7
3.2
Milepoint
3:10 pm run 1
3:30 pm run 2
3:55 pm run 3
4:20 pm run 4
4:45 pm run 5
5:10 pm run 6
5:45 pm run 7
6:10 pm run 8
6:30 pm run 9
6:40 pm run 10
6:55 pm run 11
35 MPH Threshold
Ramps


Speed Summary (PM)
I-405 SB: Taylor to I-5
Speed (MPH)
80 MPH
70 MPH
60 MPH
50 MPH
40 MPH
30 MPH
20 MPH
10 MPH
00 MPH
1.3
1.5
1.7
1.9
2.1
2.3
2.5
2.7
2.9
3.1
Milepoint
3:00 pm run 1
3:15 pm run 2
3:40 pm run 3
4:10 run 4
4:35 pm run 5
5:00 pm run 6
5:35 pm run 7
6:00 pm run 8
6:20 pm run 9
6:30 pm run 10
6:45 pm run 11
35 MPH Threshold
Ramps

I-84 (AM)

Eastbound: I-5 to Lewis and Clark Park
(6:00 - 9:45am)

ODOT Data Collected on various days over in 2007

I-5 SB to I-84 EB Travel Time Summary - AM Peak

Node #	Distance (Miles)	Node Names	SE11.07.07E1	SE11.14.07E1	SE11.07.07EW1	SE11.14.07WE1	SE11.15.07E1	SE10.17.07E1	SE10.17.07WE1	Average
			Right	Right	Right	Right	Right	Right	Right	
			7:11	7:23	8:06	8:16	8:22	8:56	9:49	
Travel Time (in seconds)										
1	0.00	I-5 Off/I-84 On Ramp	-	-	-	-	-	-	-	
2	0.30	I-84 On	33	36	42	36	42	42	36	**38**
3	0.13	Everett St On	9	9	9	9	9	12	9	**9**
4	0.66	16th Ave On	42	42	45	51	48	51	42	**46**
5	0.66	33rd Ave Off	42	48	45	60	54	51	39	**48**
6	0.35	39th Ave Off	27	24	24	27	27	27	24	**26**
7	0.30	39th Ave On	18	21	18	24	24	18	18	**20**
8	0.75	Glisan St Off	51	51	45	54	72	48	51	**53**
9	0.38	Glisan St On	24	30	27	27	24	24	21	**25**
10	0.23	Halsey St Off	15	15	15	15	15	12	12	**14**
11	0.84	Multnomah St Off	57	63	63	87	69	63	57	**66**
12	0.41	I-205 Southbound Off	24	30	30	30	24	30	27	**28**
13	0.22	Halsey St Off	15	15	12	15	12	15	12	**14**
14	0.60	I-205 Northbound Off	33	33	39	33	42	39	39	**37**
15	0.28	Fargo St Off	18	18	18	18	18	15	18	**18**
16	0.47	I-205 On	30	30	30	30	30	33	33	**31**
17	0.63	122nd Ave Off	39	39	39	36	39	39	36	**38**
18	0.24	122nd Ave On	15	15	15	15	15	15	12	**15**
19	2.42	181st Off	147	156	141	147	141	150	141	**146**
20	0.51	181st On	30	33	27	30	30	30	30	**30**
21	0.92	207th Off	54	54	48	54	54	54	54	**53**
22	0.56	207th On	33	33	30	36	30	33	33	**33**
23	0.91	238th Off	57	60	51	60	60	57	51	**57**
24	0.47	238th On	27	30	27	27	27	30	27	**28**
25	0.48	Marine Dr Off	27	27	27	30	30	27	27	**28**
26	0.83	257th On	48	51	51	51	48	51	54	**51**
27	0.34	Lewis & Clark Park Off	18	24	18	15	18	18	18	**18**
Total	**14.87**	**Total Time**	**933**	**987**	**936**	**1017**	**1002**	**984**	**921**	**969**
Average Speed (in mph)										
1	0.00	I-5 Off/I-84 On Ramp	-	-	-	-	-	-	-	
2	0.30	I-84 On	33.0	30.2	25.9	30.2	25.9	25.9	30.2	**28.8**
3	0.13	Everett St On	50.6	50.6	50.6	50.6	50.6	37.9	50.6	**48.8**
4	0.66	16th Ave On	56.2	56.2	52.5	46.3	49.2	46.3	56.2	**51.8**
5	0.66	33rd Ave Off	56.4	49.4	52.7	39.5	43.9	46.5	60.8	**49.9**
6	0.35	39th Ave Off	46.7	52.6	52.6	46.7	46.7	46.7	52.6	**49.2**
7	0.30	39th Ave On	59.7	51.2	59.7	44.8	44.8	59.7	59.7	**54.2**
8	0.75	Glisan St Off	53.0	53.0	60.1	50.1	37.6	56.3	53.0	**51.9**
9	0.38	Glisan St On	56.4	45.1	50.1	50.1	56.4	56.4	64.5	**54.1**
10	0.23	Halsey St Off	54.1	54.1	54.1	54.1	54.1	67.6	67.6	**57.9**
11	0.84	Multnomah St Off	53.2	48.1	48.1	34.8	43.9	48.1	53.2	**47.1**
12	0.41	I-205 Southbound Off	61.6	49.3	49.3	49.3	61.6	49.3	54.8	**53.6**
13	0.22	Halsey St Off	52.3	52.3	65.4	52.3	65.4	52.3	65.4	**57.9**
14	0.60	I-205 Northbound Off	65.3	65.3	55.3	65.3	51.3	55.3	55.3	**59.0**
15	0.28	Fargo St Off	55.5	55.5	55.5	55.5	55.5	66.6	55.5	**57.1**
16	0.47	I-205 On	55.9	55.9	55.9	55.9	55.9	50.8	50.8	**54.4**
17	0.63	122nd Ave Off	58.1	58.1	58.1	63.0	58.1	58.1	63.0	**59.5**
18	0.24	122nd Ave On	58.1	58.1	58.1	58.1	58.1	58.1	72.6	**60.2**
19	2.42	181st Off	59.4	55.9	61.9	59.4	61.9	58.2	61.9	**59.8**
20	0.51	181st On	60.7	55.2	67.5	60.7	60.7	60.7	60.7	**60.9**
21	0.92	207th Off	61.6	61.6	69.3	61.6	61.6	61.6	61.6	**62.7**
22	0.56	207th On	61.4	61.4	67.5	56.2	67.5	61.4	61.4	**62.4**
23	0.91	238th Off	57.4	54.5	64.1	54.5	54.5	57.4	64.1	**58.1**
24	0.47	238th On	62.9	56.6	62.9	62.9	62.9	56.6	62.9	**61.1**
25	0.48	Marine Dr Off	63.8	63.8	63.8	57.4	57.4	63.8	63.8	**62.0**
26	0.83	257th On	62.1	58.5	58.5	58.5	62.1	58.5	55.2	**59.1**
27	0.34	Lewis & Clark Park Off	67.9	51.0	67.9	81.5	67.9	67.9	67.9	**67.5**
Total	**14.87**	**Average Speed**	**57.0**	**54.0**	**57.2**	**53.8**	**54.4**	**54.9**	**58.7**	**55.7**

Legend	≥ 45 mph	≥ 30 and < 45 mph	≥ 15 and < 30 mph	< 15 mph

File Name	SE11.07.07E1	SE11.14.07E1	SE11.07.07EW1	SE11.14.07WE1	SE11.15.07E1	SE10.17.07E1	SE10.17.07WE1
Travel Lane	**Right**	**Right**	**Right**	**Right**	**Right**	**Right**	**Right**
Time	**7:11**	**7:23**	**8:06**	**8:16**	**8:22**	**8:56**	**9:49**
Log Data	Fog, 50's.	Wind, 50's, Cloudy, Dark.	Clear, 50's.	Dusk, Windy, 50's, Cloudy.	Cloudy, Wet, 50's.	Cloudy, Drizzle.	Cloudy, Drizzle.

I-5 NB to I-84 EB Travel Time Summary - AM Peak

Node #	Distance (Miles)	Node Names	NE12.5.07NE1 Left 6:09	NE12.5.07NE Left 7:08	NE12.6.07NE2 Left 7:15	NE12.5.07NE3 Left 8:19	NE11.07.07WE2 Left 9:06	NE12.5.07NE4 Left 9:08	NE11.14.07WE2 Left 9:21	NE11.29.07NE1 Middle 6:00	NE12.6.07NE1 Middle 6:07	NE11.29.07WE1 Middle 6:48	NE11.29.07WE2 Middle 7:58	NE11.29.07WE3 Middle 9:02	NE11.28.07WE1 Middle 9:04	NE11.15.07WE1 Middle 9:29	Average
Travel Time (in seconds)																	
1	0.00	I-5 Northbound/Marquam Bridge On	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2	0.40	I-84 Eastbound On	27	36	35	30	33	36	36	33	33	33	36	33	33	39	**34**
3	0.19	Central Eastside/Water St Off	9	12	14	15	15	12	15	12	12	15	15	18	15	15	**14**
4	0.47	Morrison Bridge On	30	33	34	30	30	33	27	27	33	33	33	30	30	36	**31**
5	0.34	I-84 On	30	30	31	30	27	33	30	36	30	30	27	30	30	30	**30**
6	0.13	Everett St On	6	9	9	6	9	9	6	9	9	9	9	9	9	9	**8**
7	0.66	16th Ave On	42	42	48	42	39	42	45	42	42	48	48	45	39	48	**44**
8	0.66	33rd Ave Off	45	45	50	39	42	42	42	42	45	57	45	48	45	45	**45**
9	0.35	39th Ave Off	27	27	30	24	24	27	24	27	27	30	27	27	24	30	**27**
10	0.30	39th Ave On	21	21	25	18	18	18	21	21	18	21	18	18	18	21	**20**
11	0.75	Glisan St Off	54	51	56	48	48	45	51	48	51	54	51	51	48	48	**50**
12	0.38	Glisan St On	24	21	27	21	24	24	24	27	24	27	24	24	24	24	**24**
13	0.23	Halsey St Off	15	15	16	12	12	15	15	12	15	15	12	15	12	15	**14**
14	0.84	Multnomah St Off	66	60	73	60	54	60	60	63	60	66	63	57	57	63	**62**
15	0.41	I-205 Southbound Off	24	27	30	24	24	24	24	27	24	30	24	24	24	27	**26**
16	0.22	Halsey St Off	15	15	17	15	12	15	15	15	15	15	15	9	15	15	**15**
17	0.60	I-205 Northbound Off	33	33	46	39	36	33	36	45	39	36	42	36	33	36	**37**
18	0.28	Fargo St Off	18	15	21	15	15	18	18	18	18	18	15	18	18	18	**17**
19	0.47	I-205 On	30	30	31	33	30	30	27	36	30	30	33	30	30	30	**31**
20	0.63	122nd Ave Off	39	36	41	36	36	39	39	39	42	42	39	39	36	39	**39**
21	0.24	122nd Ave On	15	15	16	12	15	12	15	15	18	15	12	15	15	15	**15**
22	2.42	181st Off	150	141	149	144	138	144	141	147	147	153	141	150	144	141	**145**
23	0.51	181st On	27	27	27	30	27	27	30	30	27	30	30	30	33	27	**29**
24	0.92	207th Off	51	54	53	57	54	54	51	54	54	54	51	54	51	54	**53**
25	0.56	207th On	33	33	31	33	30	33	33	33	33	36	33	36	33	33	**33**
26	0.91	238th Off	51	57	54	54	51	54	51	57	54	54	51	54	54	54	**54**
27	0.47	238th On	30	27	29	30	27	27	30	27	30	27	30	30	30	27	**29**
28	0.48	Marine Dr Off	27	24	28	27	24	27	27	27	27	27	24	30	30	27	**27**
29	0.83	257th On	48	51	52	51	51	48	51	51	51	51	51	51	48	48	**50**
30	0.34	Lewis & Clark Park Off	21	21	19	27	18	21	18	21	21	18	18	18	18	21	**20**
Total	**15.98**	**Total Time**	**1008**	**1008**	**1092**	**1002**	**963**	**1002**	**1002**	**1041**	**1029**	**1074**	**1017**	**1029**	**996**	**1035**	**1021**
Average Speed (in mph)																	
1	0.00	I-5 Northbound/Marquam Bridge On	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2	0.40	I-84 Eastbound On	53.9	40.4	41.6	48.5	44.1	40.4	40.4	44.1	44.1	44.1	40.4	44.1	44.1	37.3	**43.4**
3	0.19	Central Eastside/Water St Off	76.5	57.4	49.2	45.9	45.9	57.4	45.9	57.4	57.4	45.9	45.9	38.2	45.9	45.9	**51.0**
4	0.47	Morrison Bridge On	56.8	51.6	50.1	56.8	56.8	51.6	63.1	63.1	51.6	51.6	51.6	56.8	56.8	47.3	**54.7**
5	0.34	I-84 On	41.3	41.3	40.0	41.3	45.9	37.5	41.3	34.4	41.3	41.3	45.9	41.3	41.3	41.3	**41.1**
6	0.13	Everett St On	75.9	50.6	50.6	75.9	50.6	50.6	75.9	50.6	50.6	50.6	50.6	50.6	50.6	50.6	**56.0**
7	0.66	16th Ave On	56.2	56.2	49.2	56.2	60.5	56.2	52.5	56.2	56.2	49.2	49.2	52.5	60.5	49.2	**54.3**
8	0.66	33rd Ave Off	52.7	52.7	47.4	60.8	56.4	56.4	56.4	56.4	52.7	41.6	52.7	49.4	52.7	52.7	**52.9**
9	0.35	39th Ave Off	46.7	46.7	42.1	52.6	52.6	46.7	52.6	46.7	46.7	42.1	46.7	46.7	52.6	42.1	**47.4**
10	0.30	39th Ave On	51.2	51.2	43.0	59.7	59.7	59.7	51.2	51.2	59.7	51.2	59.7	59.7	59.7	51.2	**54.8**
11	0.75	Glisan St Off	50.1	53.0	48.3	56.3	56.3	60.1	53.0	56.3	53.0	50.1	53.0	53.0	56.3	56.3	**54.0**
12	0.38	Glisan St On	56.4	64.5	50.1	64.5	56.4	56.4	56.4	50.1	56.4	50.1	56.4	56.4	56.4	56.4	**56.2**
13	0.23	Halsey St Off	54.1	54.1	50.7	67.6	67.6	54.1	54.1	67.6	54.1	54.1	67.6	54.1	67.6	54.1	**58.7**
14	0.84	Multnomah St Off	45.9	50.5	41.5	50.5	56.1	50.5	50.5	48.1	50.5	45.9	48.1	53.2	53.2	48.1	**49.5**
15	0.41	I-205 Southbound Off	61.6	54.8	49.3	61.6	61.6	61.6	61.6	54.8	61.6	49.3	61.6	61.6	61.6	54.8	**58.4**
16	0.22	Halsey St Off	52.3	52.3	46.2	52.3	65.4	52.3	52.3	52.3	52.3	52.3	52.3	87.2	52.3	52.3	**55.3**
17	0.60	I-205 Northbound Off	65.3	65.3	46.9	55.3	59.9	65.3	59.9	47.9	55.3	59.9	51.3	59.9	65.3	59.9	**58.4**
18	0.28	Fargo St Off	55.5	66.6	47.6	66.6	66.6	55.5	55.5	55.5	55.5	55.5	66.6	55.5	55.5	55.5	**58.1**
19	0.47	I-205 On	55.9	55.9	54.1	50.8	55.9	55.9	62.1	46.6	55.9	55.9	50.8	55.9	55.9	55.9	**54.8**
20	0.63	122nd Ave Off	58.1	63.0	55.3	63.0	63.0	58.1	58.1	58.1	54.0	54.0	58.1	58.1	63.0	58.1	**58.7**
21	0.24	122nd Ave On	58.1	58.1	54.5	72.6	58.1	72.6	58.1	58.1	48.4	58.1	72.6	58.1	58.1	58.1	**60.3**
22	2.42	181st Off	58.2	61.9	58.6	60.6	63.2	60.6	61.9	59.4	59.4	57.0	61.9	58.2	60.6	61.9	**60.2**
23	0.51	181st On	67.5	67.5	67.5	60.7	67.5	67.5	60.7	60.7	67.5	60.7	60.7	60.7	55.2	67.5	**63.7**
24	0.92	207th Off	65.2	61.6	62.8	58.4	61.6	61.6	65.2	61.6	61.6	61.6	65.2	61.6	65.2	61.6	**62.5**
25	0.56	207th On	61.4	61.4	65.3	61.4	67.5	61.4	61.4	61.4	61.4	56.2	61.4	56.2	61.4	61.4	**61.3**
26	0.91	238th Off	64.1	57.4	60.5	60.5	64.1	60.5	64.1	57.4	60.5	60.5	64.1	60.5	60.5	60.5	**61.1**
27	0.47	238th On	56.6	62.9	58.5	56.6	62.9	62.9	56.6	62.9	56.6	62.9	56.6	56.6	56.6	62.9	**59.4**
28	0.48	Marine Dr Off	63.8	71.8	61.5	63.8	71.8	63.8	63.8	63.8	63.8	63.8	71.8	57.4	57.4	63.8	**64.4**
29	0.83	257th On	62.1	58.5	57.4	58.5	58.5	62.1	58.5	58.5	58.5	58.5	58.5	58.5	62.1	62.1	**59.4**
30	0.34	Lewis & Clark Park Off	58.2	58.2	64.4	45.3	67.9	58.2	67.9	58.2	58.2	67.9	67.9	67.9	67.9	58.2	**61.9**
Total	**15.98**	**Average Speed**	**58.0**	**56.8**	**52.2**	**58.1**	**59.5**	**57.2**	**57.3**	**55.1**	**55.3**	**53.5**	**56.9**	**56.2**	**57.1**	**54.7**	**56.3**
			Legend	≥ 45 mph	≥ 30 and < 45 mph	≥ 15 and < 30 mph	< 15 mph										

File Name	NE12.5.07NE1	NE12.5.07NE	NE12.6.07NE2	NE12.5.07NE3	NE11.07.07WE2	NE12.5.07NE4	NE11.14.07WE2	NE11.29.07NE1	NE12.6.07NE1	NE11.29.07WE1	NE11.29.07WE2	NE11.29.07WE3	NE11.28.07WE1	NE11.15.07WE1
Travel Lane	**Left**	**Left**	**Left**	**Left**	**Left**	**Left**	**Left**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**
Time	**6:09**	**7:08**	**7:15**	**8:19**	**9:06**	**9:08**	**9:21**	**6:00**	**6:07**	**6:48**	**7:58**	**9:02**	**9:04**	**9:29**
Log Data	Dark, Fog.	Dawn, Fog.	Dawn, Light Rain.	Fog, Some Mist.	Clear, 50's.	Light Fog, Mist.	Windy, 50's, Cloudy.	Light Rain. Incidents: Poor Satellite Reception.	Dark, Rain, 40's.	Dawn, Cloudy, 40's.	Dawn, Cloudy, 40's.	Cloudy, Light Rain, 40's.	Cloudy, Fog.	Cloudy, Wet, 50's.

I-84 (AM)

Westbound: Lewis and Clark Park to I-5
(6:15 - 9:45am)

ODOT Data Collected on various days over in 2007

I-84 WB to I-5 SB Travel Time Summary - AM Peak

Node #	Distance (Miles)	Node Names	WS11.07.07WE1 Left 7:35	WS11.14.07WE1 Left 7:46	WS12.5.07WS2 Left 8:44	WS10.17.07WE1 Left 9:25	WS12.5.07WS3 Left 9:34	Average
Travel Time (in seconds)								
1	0.00	Lewis & Clark Park	-	-	-	-	-	
2	0.35	SW 257th Dr Off	21	18	18	24	21	**20**
3	0.88	NE Marine Dr On	57	51	54	54	48	**53**
4	0.48	NE 238th Dr Off	24	30	30	30	30	**29**
5	0.50	NE 238th Dr On	30	30	30	30	30	**30**
6	0.93	NE 207th Ave Off	60	54	57	57	57	**57**
7	0.30	NE 207th Ave On	18	18	18	21	18	**19**
8	1.01	NE 181st Ave Off (Slip)	63	63	63	57	57	**61**
9	0.30	NE 181st Ave On (Loop)	18	15	18	18	18	**17**
10	0.34	NE 181st Ave On	21	21	21	18	21	**20**
11	3.18	I205 Off	189	201	204	192	183	**194**
12	0.59	NE 102nd Av On	39	39	42	39	39	**40**
13	0.93	I205 Southbound On	206	135	66	66	57	**106**
14	0.29	I205 Northbound On	36	33	18	18	18	**25**
15	0.41	NE Halsey St On	42	36	24	21	24	**29**
16	1.32	NE Glisan St On	186	213	84	84	81	**130**
17	0.38	NE Halsey St Off	33	39	27	24	27	**30**
18	0.83	NE Sandy Blvd On	102	108	54	60	51	**75**
19	0.11	NE 33rd On	15	12	12	21	9	**14**
20	0.77	Lloyd Center Off	159	117	156	111	96	**128**
21	0.77	I84 Off/I5 NB/SB Ramp	114	93	78	81	54	**84**
22	0.28	Morrison Bridge Off	27	27	27	27	24	**26**
23	0.04	I-5 Southbound On	3	3	3	4	3	**3**
24	1.04	I-405 Northbound Ramp	78	78	72	78	54	**72**
Total	**16.04**	**Total Time**	**1541**	**1434**	**1176**	**1135**	**1020**	**1261**
Average Speed (in mph)								
1	0.00	Lewis & Clark Park	-	-	-	-	-	
2	0.35	SW 257th Dr Off	60.6	70.7	70.7	53.0	60.6	**63.1**
3	0.88	NE Marine Dr On	55.7	62.2	58.8	58.8	66.1	**60.3**
4	0.48	NE 238th Dr Off	71.5	57.2	57.2	57.2	57.2	**60.1**
5	0.50	NE 238th Dr On	60.5	60.5	60.5	60.5	60.5	**60.5**
6	0.93	NE 207th Ave Off	55.9	62.1	58.8	58.8	58.8	**58.9**
7	0.30	NE 207th Ave On	59.8	59.8	59.8	51.3	59.8	**58.1**
8	1.01	NE 181st Ave Off (Slip)	57.7	57.7	57.7	63.8	63.8	**60.1**
9	0.30	NE 181st Ave On (Loop)	59.2	71.0	59.2	59.2	59.2	**61.6**
10	0.34	NE 181st Ave On	57.8	57.8	57.8	67.5	57.8	**59.8**
11	3.18	I205 Off	60.6	57.0	56.1	59.6	62.6	**59.2**
12	0.59	NE 102nd Av On	54.7	54.7	50.8	54.7	54.7	**53.9**
13	0.93	I205 Southbound On	16.3	24.9	50.9	50.9	58.9	**40.4**
14	0.29	I205 Northbound On	29.3	32.0	58.7	58.7	58.7	**47.5**
15	0.41	NE Halsey St On	35.1	40.9	61.4	70.2	61.4	**53.8**
16	1.32	NE Glisan St On	25.6	22.3	56.7	56.7	58.7	**44.0**
17	0.38	NE Halsey St Off	41.9	35.4	51.2	57.6	51.2	**47.4**
18	0.83	NE Sandy Blvd On	29.1	27.5	55.0	49.5	58.2	**43.9**
19	0.11	NE 33rd On	25.4	31.8	31.8	18.2	42.4	**29.9**
20	0.77	Lloyd Center Off	17.5	23.8	17.9	25.1	29.0	**22.7**
21	0.77	I84 Off/I5 NB/SB Ramp	24.2	29.7	35.4	34.1	51.1	**34.9**
22	0.28	Morrison Bridge Off	37.3	37.3	37.3	37.3	41.9	**38.2**
23	0.04	I-5 Southbound On	52.2	52.2	52.2	39.2	52.2	**49.6**
24	1.04	I-405 Northbound Ramp	48.1	48.1	52.1	48.1	69.5	**53.2**
Total	**16.04**	**Average Speed**	**45.0**	**46.8**	**52.5**	**51.7**	**56.3**	**50.5**
			Legend	≥ 45 mph	≥ 30 and < 45 mph	≥ 15 and < 30 mph	< 15 mph	

File Name	**WS11.07.07WE1**	**WS11.14.07WE1**	**WS12.5.07WS2**	**WS10.17.07WE1**	**WS12.5.07WS3**
Travel Lane	**Left**	**Left**	**Left**	**Left**	**Left**
Time	**7:35**	**7:46**	**8:44**	**9:25**	**9:34**
Log Data	Clear, 50's.	Dawn, Windy, 50's, Cloudy.	Little Fog, Mist.	Cloudy, Drizzle.	Little Fog, Mist.

I-84 WB to I-5 NB Travel Time Summary - AM Peak

Node #	Distance (Miles)	Node Names	WN11.29.07WE1 Middle 6:17	WN11.29.07WE2 Middle 7:23	WN11.29.07WE3 Middle 8:30	WN11.07.07WE2 Middle 8:33	WN11.28.07WE1 Middle 8:39	WN11.14.07WE2 Middle 8:54	WN11.15.07WE1 Middle 8:56	WN11.14.07WE3 Middle 9:45	W12.6.07W1 Right 6:31	W12.5.07W1 Right 7:34	W12.6.07W2 Right 7:50	W10.17.07W1 Right 8:16	W11.29.07W1 Right 9:21	W11.28.07W1 Right 9:22	W11.07.07W1 Right 9:40	Average
Travel Time (in seconds)																		
1	0.00	Lewis & Clark Park	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2	0.35	SW 257th Dr Off	21	24	24	21	21	21	21	21	22	21	23	21	21	24	18	**22**
3	0.88	NE Marine Dr On	54	51	51	51	54	48	54	51	52	54	56	51	51	51	54	**52**
4	0.48	NE 238th Dr Off	30	30	30	27	27	30	27	30	29	27	31	33	27	30	27	**29**
5	0.50	NE 238th Dr On	33	30	33	33	33	33	33	30	31	30	32	30	33	30	33	**32**
6	0.93	NE 207th Ave Off	54	57	57	54	57	57	57	57	60	60	59	60	54	57	54	**57**
7	0.30	NE 207th Ave On	18	18	18	18	18	18	18	21	19	18	20	18	18	18	18	**19**
8	1.01	NE 181st Ave Off (Slip)	63	60	60	57	63	63	63	54	60	60	70	63	60	60	63	**61**
9	0.30	NE 181st Ave On (Loop)	18	18	18	18	15	15	15	18	20	18	19	18	18	18	15	**18**
10	0.34	NE 181st Ave On	18	24	21	18	21	21	21	18	22	24	22	21	18	18	21	**21**
11	3.18	I205 Off	198	195	198	210	192	192	189	186	206	195	196	192	201	207	192	**196**
12	0.59	NE 102nd Av On	45	48	39	45	42	42	42	39	64	39	92	60	42	39	39	**50**
13	0.93	I205 Southbound On	180	282	66	276	72	78	165	60	351	129	476	258	72	69	63	**199**
14	0.29	I205 Northbound On	63	81	48	42	21	57	126	21	66	45	61	138	24	21	18	**64**
15	0.41	NE Halsey St On	69	99	60	36	27	42	57	120	37	57	38	51	30	27	39	**58**
16	1.32	NE Glisan St On	153	180	297	222	93	159	171	141	241	174	189	231	96	93	195	**188**
17	0.38	NE Halsey St Off	39	42	42	60	24	57	33	27	43	51	112	57	33	21	42	**49**
18	0.83	NE Sandy Blvd On	81	138	114	159	54	96	120	84	125	96	152	156	102	57	78	**115**
19	0.11	NE 33rd On	12	12	21	33	6	18	15	9	10	9	17	18	15	6	12	**15**
20	0.77	Lloyd Center Off	120	117	135	177	84	147	150	111	110	99	109	150	90	57	96	**126**
21	0.77	I84 Off/I5 NB/SB Ramp	153	114	93	96	78	108	132	96	89	72	63	78	69	54	90	**98**
22	0.14	Central Eastbound Off	39	39	12	15	15	9	21	15	18	12	14	12	15	12	18	**18**
23	0.15	I5 NB On	27	36	33	30	24	21	30	24	-	-	-	-	-	-	-	**28**
24	0.24	Weidler St Off	24	21	24	21	24	24	24	21	-	-	-	-	-	-	-	**23**
Total	**15.20**	**Total Time**	**1512**	**1716**	**1494**	**1719**	**1065**	**1356**	**1584**	**1254**	**1675**	**1290**	**1851**	**1716**	**1089**	**969**	**1185**	**1463**
Average Speed (in mph)																		
1	0.00	Lewis & Clark Park	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2	0.35	SW 257th Dr Off	60.6	53.0	53.0	60.6	60.6	60.6	60.6	60.6	57.9	60.6	55.3	60.6	60.6	53.0	70.7	**58.7**
3	0.88	NE Marine Dr On	58.8	62.2	62.2	62.2	58.8	66.1	58.8	62.2	61.0	58.8	56.7	62.2	62.2	62.2	58.8	**60.8**
4	0.48	NE 238th Dr Off	57.2	57.2	57.2	63.6	63.6	57.2	63.6	57.2	59.2	63.6	55.4	52.0	63.6	57.2	63.6	**58.9**
5	0.50	NE 238th Dr On	55.0	60.5	55.0	55.0	55.0	55.0	55.0	60.5	58.6	60.5	56.7	60.5	55.0	60.5	55.0	**57.3**
6	0.93	NE 207th Ave Off	62.1	58.8	58.8	62.1	58.8	58.8	58.8	58.8	55.9	55.9	56.8	55.9	62.1	58.8	62.1	**58.4**
7	0.30	NE 207th Ave On	59.8	59.8	59.8	59.8	59.8	59.8	59.8	51.3	56.7	59.8	53.9	59.8	59.8	59.8	59.8	**58.4**
8	1.01	NE 181st Ave Off (Slip)	57.7	60.6	60.6	63.8	57.7	57.7	57.7	67.3	60.6	60.6	51.9	57.7	60.6	60.6	57.7	**59.5**
9	0.30	NE 181st Ave On (Loop)	59.2	59.2	59.2	59.2	71.0	71.0	71.0	59.2	53.3	59.2	56.1	59.2	59.2	59.2	71.0	**61.4**
10	0.34	NE 181st Ave On	67.5	50.6	57.8	67.5	57.8	57.8	57.8	67.5	55.2	50.6	55.2	57.8	67.5	67.5	57.8	**58.6**
11	3.18	I205 Off	57.8	58.7	57.8	54.5	59.6	59.6	60.6	61.6	55.6	58.7	58.4	59.6	57.0	55.3	59.6	**58.5**
12	0.59	NE 102nd Av On	47.4	44.5	54.7	47.4	50.8	50.8	50.8	54.7	33.3	54.7	23.2	35.6	50.8	54.7	54.7	**45.7**
13	0.93	I205 Southbound On	18.7	11.9	50.9	12.2	46.6	43.0	20.3	56.0	9.6	26.0	7.1	13.0	46.6	48.7	53.3	**26.3**
14	0.29	I205 Northbound On	16.8	13.0	22.0	25.1	50.3	18.5	8.4	50.3	16.0	23.5	17.3	7.7	44.0	50.3	58.7	**22.4**
15	0.41	NE Halsey St On	21.4	14.9	24.6	40.9	54.6	35.1	25.9	12.3	39.8	25.9	38.8	28.9	49.1	54.6	37.8	**30.3**
16	1.32	NE Glisan St On	31.1	26.4	16.0	21.4	51.2	29.9	27.8	33.7	19.7	27.3	25.2	20.6	49.6	51.2	24.4	**27.5**
17	0.38	NE Halsey St Off	35.4	32.9	32.9	23.0	57.6	24.2	41.9	51.2	32.1	27.1	12.3	24.2	41.9	65.8	32.9	**32.9**
18	0.83	NE Sandy Blvd On	36.7	21.5	26.1	18.7	55.0	30.9	24.8	35.4	23.8	30.9	19.5	19.0	29.1	52.1	38.1	**28.5**
19	0.11	NE 33rd On	31.8	31.8	18.2	11.6	63.6	21.2	25.4	42.4	38.2	42.4	22.4	21.2	25.4	63.6	31.8	**30.9**
20	0.77	Lloyd Center Off	23.2	23.8	20.6	15.7	33.2	19.0	18.6	25.1	25.3	28.2	25.6	18.6	31.0	48.9	29.0	**23.1**
21	0.77	I84 Off/I5 NB/SB Ramp	18.0	24.2	29.7	28.8	35.4	25.6	20.9	28.8	31.0	38.4	43.8	35.4	40.0	51.1	30.7	**30.0**
22	0.14	Central Eastbound Off	13.3	13.3	43.1	34.5	34.5	57.4	24.6	34.5	28.7	43.1	36.9	43.1	34.5	43.1	28.7	**33.9**
23	0.15	I5 NB On	19.7	14.7	16.1	17.7	22.1	25.3	17.7	22.1	-	-	-	-	-	-	-	**19.4**
24	0.24	Weidler St Off	35.4	40.5	35.4	40.5	35.4	35.4	35.4	40.5	-	-	-	-	-	-	-	**37.3**
Total	**15.20**	**Average Speed**	**41.1**	**38.9**	**42.2**	**41.1**	**51.9**	**44.4**	**41.1**	**47.5**	**41.5**	**45.5**	**39.5**	**40.6**	**50.0**	**56.1**	**49.3**	**42.5**

Legend	≥ 45 mph	≥ 30 and < 45 mph	≥ 15 and < 30 mph	< 15 mph

File Name	WN11.29.07WE1	WN11.29.07WE2	WN11.29.07WE3	WN11.07.07WE2	WN11.28.07WE1	WN11.14.07WE2	WN11.15.07WE1	WN11.14.07WE3	W12.6.07W1	W12.5.07W1	W12.6.07W2	W10.17.07W1	W11.29.07W1	W11.28.07W1	W11.07.07W1
Travel Lane	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Right**	**Right**	**Right**	**Right**	**Right**	**Right**	**Right**
Time	**6:17**	**7:23**	**8:30**	**8:33**	**8:39**	**8:54**	**8:56**	**9:45**	**6:31**	**7:34**	**7:50**	**8:16**	**9:21**	**9:22**	**9:40**
Log Data	Cloudy, Dawn, Wet, 40's.	Cloudy, Dawn, Wet, 40's.	Cloudy, Light Rain, 40's.	Clear, 50's.	Cloudy, Fog, 40's.	Windy, 50's, Cloudy.	Cloudy, Wet, 50's.	Windy, 50's, Cloudy.	Rain, Dark.	Fog.	Light Rain.	Cloudy, Drizzle.	Wet, Cloudy, 40's.	Cloudy, Fog, 40's.	Clear, 50's.

I-84 (MIDDAY)

Eastbound: I-5 to Lewis and Clark Park
(10:00am - 1:45pm)

ODOT Data Collected on various days over in 2007

I-5 SB to I-84 EB Travel Time Summary - MD Off Peak

Node #	Distance (Miles)	Node Names	SE11.07.07E2 Right 10:09	SE11.08.07E1 Right 10:38	SE11.14.07E2 Right 10:56	SE11.07.07WE4 Right 11:55	SE11.08.07WE1 Right 11:58	SE11.15.07WE4 Right 12:13	SE11.08.07WE2 Right 12:47	Average
Travel Time (in seconds)										
1	0.00	I-5 Off/I-84 On Ramp	-	-	-	-	-	-	-	
2	0.30	I-84 On	39	39	33	42	39	36	46	**39**
3	0.13	Everett St On	9	12	9	9	9	9	9	**9**
4	0.66	16th Ave On	45	48	48	45	51	45	51	**48**
5	0.66	33rd Ave Off	48	48	48	39	54	54	51	**49**
6	0.35	39th Ave Off	27	27	30	27	30	27	30	**28**
7	0.30	39th Ave On	21	24	21	18	18	24	21	**21**
8	0.75	Glisan St Off	54	54	51	48	60	54	54	**54**
9	0.38	Glisan St On	24	27	27	21	27	27	27	**26**
10	0.23	Halsey St Off	18	18	12	12	15	18	15	**15**
11	0.84	Multnomah St Off	60	63	63	60	66	57	60	**61**
12	0.41	I-205 Southbound Off	30	27	27	24	27	30	27	**27**
13	0.22	Halsey St Off	15	12	15	15	12	15	15	**14**
14	0.60	I-205 Northbound Off	39	42	39	33	39	39	36	**38**
15	0.28	Fargo St Off	15	18	15	18	21	15	21	**18**
16	0.47	I-205 On	30	33	27	30	30	30	30	**30**
17	0.63	122nd Ave Off	36	36	39	36	39	36	39	**37**
18	0.24	122nd Ave On	15	15	15	15	15	15	15	**15**
19	2.42	181st Off	150	150	153	138	156	150	144	**149**
20	0.51	181st On	30	30	30	27	30	33	30	**30**
21	0.92	207th Off	57	57	60	48	54	57	57	**56**
22	0.56	207th On	33	33	36	33	33	33	33	**33**
23	0.91	238th Off	63	54	60	51	57	57	57	**57**
24	0.47	238th On	27	30	30	30	27	30	30	**29**
25	0.48	Marine Dr Off	27	27	27	27	27	27	30	**27**
26	0.83	257th On	51	54	51	48	51	51	51	**51**
27	0.34	Lewis & Clark Park Off	21	18	18	21	18	18	18	**19**
Total	**14.87**	**Total Time**	**984**	**996**	**984**	**915**	**1005**	**987**	**997**	**981**
Average Speed (in mph)										
1	0.00	I-5 Off/I-84 On Ramp	-	-	-	-	-	-	-	
2	0.30	I-84 On	27.9	27.9	33.0	25.9	27.9	30.2	23.6	**28.1**
3	0.13	Everett St On	50.6	37.9	50.6	50.6	50.6	50.6	50.6	**48.8**
4	0.66	16th Ave On	52.5	49.2	49.2	52.5	46.3	52.5	46.3	**49.8**
5	0.66	33rd Ave Off	49.4	49.4	49.4	60.8	43.9	43.9	46.5	**49.0**
6	0.35	39th Ave Off	46.7	46.7	42.1	46.7	42.1	46.7	42.1	**44.7**
7	0.30	39th Ave On	51.2	44.8	51.2	59.7	59.7	44.8	51.2	**51.8**
8	0.75	Glisan St Off	50.1	50.1	53.0	56.3	45.1	50.1	50.1	**50.7**
9	0.38	Glisan St On	56.4	50.1	50.1	64.5	50.1	50.1	50.1	**53.1**
10	0.23	Halsey St Off	45.1	45.1	67.6	67.6	54.1	45.1	54.1	**54.1**
11	0.84	Multnomah St Off	50.5	48.1	48.1	50.5	45.9	53.2	50.5	**49.6**
12	0.41	I-205 Southbound Off	49.3	54.8	54.8	61.6	54.8	49.3	54.8	**54.2**
13	0.22	Halsey St Off	52.3	65.4	52.3	52.3	65.4	52.3	52.3	**56.1**
14	0.60	I-205 Northbound Off	55.3	51.3	55.3	65.3	55.3	55.3	59.9	**56.8**
15	0.28	Fargo St Off	66.6	55.5	66.6	55.5	47.6	66.6	47.6	**58.0**
16	0.47	I-205 On	55.9	50.8	62.1	55.9	55.9	55.9	55.9	**56.1**
17	0.63	122nd Ave Off	63.0	63.0	58.1	63.0	58.1	63.0	58.1	**60.9**
18	0.24	122nd Ave On	58.1	58.1	58.1	58.1	58.1	58.1	58.1	**58.1**
19	2.42	181st Off	58.2	58.2	57.0	63.2	55.9	58.2	60.6	**58.8**
20	0.51	181st On	60.7	60.7	60.7	67.5	60.7	55.2	60.7	**60.9**
21	0.92	207th Off	58.4	58.4	55.4	69.3	61.6	58.4	58.4	**60.0**
22	0.56	207th On	61.4	61.4	56.2	61.4	61.4	61.4	61.4	**60.6**
23	0.91	238th Off	51.9	60.5	54.5	64.1	57.4	57.4	57.4	**57.6**
24	0.47	238th On	62.9	56.6	56.6	56.6	62.9	56.6	56.6	**58.4**
25	0.48	Marine Dr Off	63.8	63.8	63.8	63.8	63.8	63.8	57.4	**62.9**
26	0.83	257th On	58.5	55.2	58.5	62.1	58.5	58.5	58.5	**58.5**
27	0.34	Lewis & Clark Park Off	58.2	67.9	67.9	58.2	67.9	67.9	67.9	**65.2**
Total	**14.87**	**Average Speed**	**54.4**	**53.5**	**55.1**	**58.2**	**54.3**	**54.0**	**53.5**	**54.7**

Legend	≥ 45 mph	≥ 30 and < 45 mph	≥ 15 and < 30 mph	< 15 mph

File Name	**SE11.07.07E2**	**SE11.08.07E1**	**SE11.14.07E2**	**SE11.07.07WE4**	**SE11.08.07WE1**	**SE11.15.07WE4**	**SE11.08.07WE2**
Travel Lane	**Right**	**Right**	**Right**	**Right**	**Right**	**Right**	**Right**
Time	**10:09**	**10:38**	**10:56**	**11:55**	**11:58**	**12:13**	**12:47**
Log Data	Cloudy, 50's.	Cloudy, 50's.	Windy, Cloudy, 50's.	Clear 50's.	Cloudy, 50's.	Cloudy, Wet, 50's.	Cloudy, 50's.

I-5 NB to I-84 EB Travel Time Summary - MD Off Peak

Node #	Distance (Miles)	Node Names	NE11.28.07NE2 Left 10:01	NE11.15.07WE2 Left 10:27	NE11.28.07NE3 Left 10:41	NE11.29.07W2 Left 11:38	NE11.14.07WE4 Left 11:50	NE11.14.07WE3 Middle 10:11	NE10.17.07WE2 Middle 10:45	NE11.07.07WE3 Middle 10:53	NE11.15.07WE3 Middle 11:12	NE10.17.07WE3 Middle 11:28	NE11.07.07WE5 Middle 13:12	NE11.08.07WE3 Middle 13:38	Average
Travel Time (in seconds)															
1	0.00	I-5 Northbound/Marquam Bridge On	-	-	-	-	-	-	-	-	-	-	-	-	
2	0.40	I-84 Eastbound On	36	30	33	33	33	36	36	36	33	36	39	39	**35**
3	0.19	Central Eastside/Water St Off	15	12	15	15	15	15	15	12	15	15	18	13	**15**
4	0.47	Morrison Bridge On	33	30	33	33	30	36	33	30	33	33	33	38	**33**
5	0.34	I-84 On	30	27	30	36	27	30	30	30	30	33	33	33	**31**
6	0.13	Everett St On	9	6	9	9	9	9	9	9	12	9	9	9	**9**
7	0.66	16th Ave On	39	42	42	39	39	45	48	39	39	45	45	63	**44**
8	0.66	33rd Ave Off	39	45	42	45	39	48	51	45	45	45	48	55	**46**
9	0.35	39th Ave Off	24	27	27	21	24	24	27	27	27	24	30	27	**26**
10	0.30	39th Ave On	18	18	18	15	18	18	21	18	21	18	18	21	**19**
11	0.75	Glisan St Off	48	51	48	48	45	51	54	51	51	51	60	54	**51**
12	0.38	Glisan St On	24	24	24	21	24	27	27	24	27	24	24	24	**25**
13	0.23	Halsey St Off	12	15	12	15	15	15	18	15	24	12	18	18	**16**
14	0.84	Multnomah St Off	54	60	57	54	60	60	66	60	72	60	63	63	**61**
15	0.41	I-205 Southbound Off	24	27	24	27	24	24	27	27	33	24	27	27	**26**
16	0.22	Halsey St Off	15	15	15	12	15	15	12	15	18	15	12	18	**15**
17	0.60	I-205 Northbound Off	33	36	33	36	36	39	45	39	33	36	39	39	**37**
18	0.28	Fargo St Off	18	18	15	18	18	18	18	15	21	15	15	18	**17**
19	0.47	I-205 On	27	33	30	36	33	30	30	33	30	33	30	33	**32**
20	0.63	122nd Ave Off	36	39	36	39	39	39	36	36	36	36	39	36	**37**
21	0.24	122nd Ave On	15	15	15	18	15	12	15	15	15	15	12	15	**15**
22	2.42	181st Off	141	147	141	141	150	147	141	141	138	147	150	147	**144**
23	0.51	181st On	30	30	30	30	33	30	30	33	30	33	30	30	**31**
24	0.92	207th Off	57	51	54	54	57	54	57	54	51	54	57	54	**55**
25	0.56	207th On	33	33	33	33	36	30	33	30	33	30	33	36	**33**
26	0.91	238th Off	57	57	54	51	60	54	57	54	54	57	54	57	**56**
27	0.47	238th On	30	27	27	27	30	30	27	27	27	27	30	27	**28**
28	0.48	Marine Dr Off	27	24	27	24	30	27	27	30	27	27	27	30	**27**
29	0.83	257th On	51	51	51	51	51	48	54	51	48	51	54	51	**51**
30	0.34	Lewis & Clark Park Off	27	18	21	21	18	18	24	18	18	18	18	21	**20**
Total	**15.98**	**Total Time**	**1002**	**1008**	**996**	**1002**	**1023**	**1029**	**1068**	**1014**	**1041**	**1023**	**1065**	**1096**	**1031**
Average Speed (in mph)															
1	0.00	I-5 Northbound/Marquam Bridge On	-	-	-	-	-	-	-	-	-	-	-	-	
2	0.40	I-84 Eastbound On	40.4	48.5	44.1	44.1	44.1	40.4	40.4	40.4	44.1	40.4	37.3	37.3	**41.8**
3	0.19	Central Eastside/Water St Off	45.9	57.4	45.9	45.9	45.9	45.9	45.9	57.4	45.9	45.9	38.2	52.9	**47.7**
4	0.47	Morrison Bridge On	51.6	56.8	51.6	51.6	56.8	47.3	51.6	56.8	51.6	51.6	51.6	44.8	**52.0**
5	0.34	I-84 On	41.3	45.9	41.3	34.4	45.9	41.3	41.3	41.3	41.3	37.5	37.5	37.5	**40.6**
6	0.13	Everett St On	50.6	75.9	50.6	50.6	50.6	50.6	50.6	50.6	37.9	50.6	50.6	50.6	**51.6**
7	0.66	16th Ave On	60.5	56.2	56.2	60.5	60.5	52.5	49.2	60.5	60.5	52.5	52.5	37.5	**54.9**
8	0.66	33rd Ave Off	60.8	52.7	56.4	52.7	60.8	49.4	46.5	52.7	52.7	52.7	49.4	43.1	**52.5**
9	0.35	39th Ave Off	52.6	46.7	46.7	60.1	52.6	52.6	46.7	46.7	46.7	52.6	42.1	46.7	**49.4**
10	0.30	39th Ave On	59.7	59.7	59.7	71.6	59.7	59.7	51.2	59.7	51.2	59.7	59.7	51.2	**58.5**
11	0.75	Glisan St Off	56.3	53.0	56.3	56.3	60.1	53.0	50.1	53.0	53.0	53.0	45.1	50.1	**53.3**
12	0.38	Glisan St On	56.4	56.4	56.4	64.5	56.4	50.1	50.1	56.4	50.1	56.4	56.4	56.4	**55.5**
13	0.23	Halsey St Off	67.6	54.1	67.6	54.1	54.1	54.1	45.1	54.1	33.8	67.6	45.1	45.1	**53.5**
14	0.84	Multnomah St Off	56.1	50.5	53.2	56.1	50.5	50.5	45.9	50.5	42.1	50.5	48.1	48.1	**50.2**
15	0.41	I-205 Southbound Off	61.6	54.8	61.6	54.8	61.6	61.6	54.8	54.8	44.8	61.6	54.8	54.8	**56.8**
16	0.22	Halsey St Off	52.3	52.3	52.3	65.4	52.3	52.3	65.4	52.3	43.6	52.3	65.4	43.6	**54.2**
17	0.60	I-205 Northbound Off	65.3	59.9	65.3	59.9	59.9	55.3	47.9	55.3	65.3	59.9	55.3	55.3	**58.7**
18	0.28	Fargo St Off	55.5	55.5	66.6	55.5	55.5	55.5	55.5	66.6	47.6	66.6	66.6	55.5	**58.5**
19	0.47	I-205 On	62.1	50.8	55.9	46.6	50.8	55.9	55.9	50.8	55.9	50.8	55.9	50.8	**53.5**
20	0.63	122nd Ave Off	63.0	58.1	63.0	58.1	58.1	58.1	63.0	63.0	63.0	63.0	58.1	63.0	**60.9**
21	0.24	122nd Ave On	58.1	58.1	58.1	48.4	58.1	72.6	58.1	58.1	58.1	58.1	72.6	58.1	**59.7**
22	2.42	181st Off	61.9	59.4	61.9	61.9	58.2	59.4	61.9	61.9	63.2	59.4	58.2	59.4	**60.5**
23	0.51	181st On	60.7	60.7	60.7	60.7	55.2	60.7	60.7	55.2	60.7	55.2	60.7	60.7	**59.3**
24	0.92	207th Off	58.4	65.2	61.6	61.6	58.4	61.6	58.4	61.6	65.2	61.6	58.4	61.6	**61.1**
25	0.56	207th On	61.4	61.4	61.4	61.4	56.2	67.5	61.4	67.5	61.4	67.5	61.4	56.2	**62.0**
26	0.91	238th Off	57.4	57.4	60.5	64.1	54.5	60.5	57.4	60.5	60.5	57.4	60.5	57.4	**59.0**
27	0.47	238th On	56.6	62.9	62.9	62.9	56.6	56.6	62.9	62.9	62.9	62.9	56.6	62.9	**60.8**
28	0.48	Marine Dr Off	63.8	71.8	63.8	71.8	57.4	63.8	63.8	57.4	63.8	63.8	63.8	57.4	**63.5**
29	0.83	257th On	58.5	58.5	58.5	58.5	58.5	62.1	55.2	58.5	62.1	58.5	55.2	58.5	**58.5**
30	0.34	Lewis & Clark Park Off	45.3	67.9	58.2	58.2	67.9	67.9	51.0	67.9	67.9	67.9	67.9	58.2	**62.2**
Total	**15.98**	**Average Speed**	**56.6**	**57.5**	**57.2**	**57.0**	**55.8**	**55.8**	**53.4**	**56.4**	**53.7**	**56.5**	**54.7**	**52.2**	**55.6**
			Legend	≥ 45 mph	≥ 30 and < 45 mph	≥ 15 and < 30 mph	< 15 mph								

File Name	NE11.28.07NE2	NE11.15.07WE2	NE11.28.07NE3	NE11.29.07W2	NE11.14.07WE4	NE11.14.07WE3	NE10.17.07WE2	NE11.07.07WE3	NE11.15.07WE3	NE10.17.07WE3	NE11.07.07WE5	NE11.08.07WE3
Travel Lane	**Left**	**Left**	**Left**	**Left**	**Left**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**
Time	**10:01**	**10:27**	**10:41**	**11:38**	**11:50**	**10:11**	**10:45**	**10:53**	**11:12**	**11:28**	**13:12**	**13:38**
Log Data	Cloudy, 50's.	Cloudy, Wet, 50's.	Cloudy, 40's.	Cloudy, Wet, 40's.	Windy, 50's, Cloudy.	Windy, 50's, Cloudy.	Cloudy, Drizzle.	Clear, 50's.	Cloudy, Wet, 50's.	Cloudy, Drizzle.	Clear, 50's.	Cloudy, 50's.

I-84 (MIDDAY)

Westbound: Lewis and Clark Park to I-5
(10:00am - 1:30pm)

ODOT Data Collected on various days over in 2007

I-84 WB to I-5 NB Travel Time Summary - MD Off Peak

Node #	Distance (Miles)	Node Names	WN11.15.07WE2 Middle 10:02	WN10.17.07WE2 Middle 10:18	WN11.07.07WE3 Middle 10:34	WN11.15.07WE3 Middle 10:50	WN10.17.07WE3 Middle 11:07	WN11.14.07WE4 Middle 11:27	WN11.07.07WE5 Middle 12:50	WN11.08.07WE3 Middle 13:16	W11.14.07W1 Right 10:35	W11.14.07W2 Right 11:13	WN11.29.07W2 Right 11:14	W10.17.07W2 Right 11:57	W11.29.07W3 Right 11:57	W11.15.07W1 Right 12:44	W11.07.07W2 Right 13:32	Average
Travel Time (in seconds)																		
1	0.00	Lewis & Clark Park	-	-	-	-	-	-	-	-								
2	0.35	SW 257th Dr Off	24	18	18	21	24	21	12	21	21	21	24	21	21	24	18	**20**
3	0.88	NE Marine Dr On	54	54	54	54	51	51	48	54	54	51	51	54	54	51	51	**53**
4	0.48	NE 238th Dr Off	27	30	30	27	27	30	27	27	30	30	27	30	30	30	30	**28**
5	0.50	NE 238th Dr On	33	30	30	33	33	30	33	30	27	30	30	33	33	33	30	**32**
6	0.93	NE 207th Ave Off	57	57	60	57	57	57	54	60	57	57	57	57	57	57	60	**57**
7	0.30	NE 207th Ave On	21	18	18	18	21	18	21	18	18	21	18	18	18	21	21	**19**
8	1.01	NE 181st Ave Off (Slip)	60	57	60	63	60	60	60	63	63	60	57	60	57	69	66	**60**
9	0.30	NE 181st Ave On (Loop)	18	18	18	18	15	18	21	15	15	15	18	18	18	18	15	**18**
10	0.34	NE 181st Ave On	21	21	21	18	21	18	18	18	21	21	21	18	21	21	21	**20**
11	3.18	I205 Off	201	198	195	201	189	195	195	192	186	192	204	195	198	189	195	**196**
12	0.59	NE 102nd Av On	42	39	39	45	42	42	39	42	42	42	42	42	42	42	42	**41**
13	0.93	I205 Southbound On	69	66	63	63	60	66	63	60	57	66	69	60	69	63	63	**64**
14	0.29	I205 Northbound On	15	18	21	18	15	18	18	18	18	18	21	18	21	18	18	**18**
15	0.41	NE Halsey St On	30	27	27	30	27	27	24	27	27	27	30	24	27	27	27	**27**
16	1.32	NE Glisan St On	90	96	99	93	81	87	84	87	81	90	96	93	102	93	99	**90**
17	0.38	NE Halsey St Off	27	27	33	30	27	24	27	24	27	30	27	24	36	27	30	**27**
18	0.83	NE Sandy Blvd On	54	57	57	54	54	60	57	57	54	54	57	63	60	57	63	**56**
19	0.11	NE 33rd On	6	6	6	6	9	6	6	6	6	6	9	6	6	6	6	**6**
20	0.77	Lloyd Center Off	120	138	63	57	51	60	57	54	66	54	60	57	54	54	57	**75**
21	0.77	I84 Off/I5 NB/SB Ramp	102	111	60	54	78	60	60	51	63	54	54	54	63	51	60	**72**
22	0.14	Central Eastbound Off	15	27	12	15	15	12	12	13	9	12	15	12	15	6	9	**15**
23	0.15	I5 NB On	15	36	9	27	27	12	9	10	-	-	-	-	-	-	-	**18**
24	0.24	Weidler St Off	30	27	18	24	24	18	21	15	-	-	-	-	-	-	-	**22**
Total	**14.85**	**Total Time**	**1131**	**1176**	**1011**	**1026**	**1008**	**990**	**966**	**962**	**942**	**951**	**987**	**957**	**1002**	**957**	**981**	**1034**
Average Speed (in mph)																		
1	0.00	Lewis & Clark Park	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
2	0.35	SW 257th Dr Off	53.0	70.7	70.7	60.6	53.0	60.6	106.1	60.6	60.6	60.6	53.0	60.6	60.6	53.0	70.7	**66.9**
3	0.88	NE Marine Dr On	58.8	58.8	58.8	58.8	62.2	62.2	66.1	58.8	58.8	62.2	62.2	58.8	58.8	62.2	62.2	**60.5**
4	0.48	NE 238th Dr Off	63.6	57.2	57.2	63.6	63.6	57.2	63.6	63.6	57.2	57.2	63.6	57.2	57.2	57.2	57.2	**61.2**
5	0.50	NE 238th Dr On	55.0	60.5	60.5	55.0	55.0	60.5	55.0	60.5	67.3	60.5	60.5	55.0	55.0	55.0	60.5	**57.8**
6	0.93	NE 207th Ave Off	58.8	58.8	55.9	58.8	58.8	58.8	62.1	55.9	58.8	58.8	58.8	58.8	58.8	58.8	55.9	**58.5**
7	0.30	NE 207th Ave On	51.3	59.8	59.8	59.8	51.3	59.8	51.3	59.8	59.8	51.3	59.8	59.8	59.8	51.3	51.3	**56.6**
8	1.01	NE 181st Ave Off (Slip)	60.6	63.8	60.6	57.7	60.6	60.6	60.6	57.7	57.7	60.6	63.8	60.6	63.8	52.7	55.1	**60.3**
9	0.30	NE 181st Ave On (Loop)	59.2	59.2	59.2	59.2	71.0	59.2	50.7	71.0	71.0	71.0	59.2	59.2	59.2	59.2	71.0	**61.1**
10	0.34	NE 181st Ave On	57.8	57.8	57.8	67.5	57.8	67.5	67.5	67.5	57.8	57.8	57.8	67.5	57.8	57.8	57.8	**62.6**
11	3.18	I205 Off	57.0	57.8	58.7	57.0	60.6	58.7	58.7	59.6	61.6	59.6	56.1	58.7	57.8	60.6	58.7	**58.5**
12	0.59	NE 102nd Av On	50.8	54.7	54.7	47.4	50.8	50.8	54.7	50.8	50.8	50.8	50.8	50.8	50.8	50.8	50.8	**51.9**
13	0.93	I205 Southbound On	48.7	50.9	53.3	53.3	56.0	50.9	53.3	56.0	58.9	50.9	48.7	56.0	48.7	53.3	53.3	**52.8**
14	0.29	I205 Northbound On	70.4	58.7	50.3	58.7	70.4	58.7	58.7	58.7	58.7	58.7	50.3	58.7	50.3	58.7	58.7	**60.5**
15	0.41	NE Halsey St On	49.1	54.6	54.6	49.1	54.6	54.6	61.4	54.6	54.6	54.6	49.1	61.4	54.6	54.6	54.6	**54.1**
16	1.32	NE Glisan St On	52.9	49.6	48.1	51.2	58.7	54.7	56.7	54.7	58.7	52.9	49.6	51.2	46.7	51.2	48.1	**53.3**
17	0.38	NE Halsey St Off	51.2	51.2	41.9	46.0	51.2	57.6	51.2	57.6	51.2	46.0	51.2	57.6	38.4	51.2	46.0	**51.0**
18	0.83	NE Sandy Blvd On	55.0	52.1	52.1	55.0	55.0	49.5	52.1	52.1	55.0	55.0	52.1	47.2	49.5	52.1	47.2	**52.9**
19	0.11	NE 33rd On	63.6	63.6	63.6	63.6	42.4	63.6	63.6	63.6	63.6	63.6	42.4	63.6	63.6	63.6	63.6	**61.0**
20	0.77	Lloyd Center Off	23.2	20.2	44.2	48.9	54.6	46.5	48.9	51.6	42.2	51.6	46.5	48.9	51.6	51.6	48.9	**42.3**
21	0.77	I84 Off/I5 NB/SB Ramp	27.1	24.9	46.0	51.1	35.4	46.0	46.0	54.1	43.8	51.1	51.1	51.1	43.8	54.1	46.0	**41.3**
22	0.14	Central Eastbound Off	34.5	19.1	43.1	34.5	34.5	43.1	43.1	39.8	57.4	43.1	34.5	43.1	34.5	86.1	57.4	**36.4**
23	0.15	I5 NB On	35.4	14.7	59.0	19.7	19.7	44.2	59.0	53.1	-	-	-	-	-	-	-	**38.1**
24	0.24	Weidler St Off	28.3	31.5	47.2	35.4	35.4	47.2	40.5	56.7	-	-	-	-	-	-	-	**40.3**
Total	**14.85**	**Average Speed**	**50.7**	**50.0**	**54.7**	**52.7**	**52.7**	**55.3**	**57.9**	**57.3**	**57.4**	**56.1**	**53.4**	**56.5**	**53.4**	**56.9**	**56.0**	**53.9**

Legend	≥ 45 mph	≥ 30 and < 45 mph	≥ 15 and < 30 mph	< 15 mph

File Name	WN11.15.07WE2	WN10.17.07WE2	WN11.07.07WE3	WN11.15.07WE3	WN10.17.07WE3	WN11.14.07WE4	WN11.07.07WE5	WN11.08.07WE3	W11.14.07W1	W11.14.07W2	WN11.29.07W2	W10.17.07W2	W11.29.07W3	W11.15.07W1	W11.07.07W2
Travel Lane	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Right**	**Right**	**Right**	**Right**	**Right**	**Right**	**Right**
Time	**10:02**	**10:18**	**10:34**	**10:50**	**11:07**	**11:27**	**12:50**	**13:16**	**10:35**	**11:13**	**11:14**	**11:57**	**11:57**	**12:44**	**13:32**
Log Data	Cloudy, Wet, 50's.	Cloudy, Drizzle.	Clear, 50's.	Cloudy, Wet, 50's.	Cloudy, Drizzle.	Windy, 50's, Cloudy.	Clear, 50's.	Cloudy, 50's.	Windy, 50's. Cloudy.	Windy, 50's, Cloudy.	Cloudy, 40's, Light Rain West of I-205, Rain East of I-205.	Cloudy, Drizzle.	Cloudy, 40's, Heavy Rain.	Cloudy, Wet, 50's.	Clear, 50's.

I-85 WB to I-5 SB Travel Time Summary - MD Off Peak

Node #	Distance (Miles)	Node Names	WS11.28.07WS1 Middle 10:21	WS11.28.07WS2 Middle 11:12	WS11.08.07WE1 Middle 11:31	WS11.07.07WE4 Middle 11:33	WS11.15.07WE4 Middle 11:51	WS11.08.07WE2 Middle 12:24	Average
Travel Time (in seconds)									
1	0.00	Lewis & Clark Park	-	-	-	-	-	-	
2	0.35	SW 257th Dr Off	21	21	24	18	24	20	**21**
3	0.88	NE Marine Dr On	54	54	54	57	51	54	**54**
4	0.48	NE 238th Dr Off	27	30	33	30	30	27	**30**
5	0.50	NE 238th Dr On	33	30	33	33	33	33	**33**
6	0.93	NE 207th Ave Off	57	57	60	60	57	54	**58**
7	0.30	NE 207th Ave On	18	18	18	18	18	18	**18**
8	1.01	NE 181st Ave Off (Slip)	60	63	63	60	60	60	**61**
9	0.30	NE 181st Ave On (Loop)	18	18	15	15	18	18	**17**
10	0.34	NE 181st Ave On	18	18	21	21	18	21	**20**
11	3.18	I205 Off	195	192	201	197	189	195	**195**
12	0.59	NE 102nd Av On	42	42	42	39	42	42	**42**
13	0.93	I205 Southbound On	66	63	66	60	63	63	**64**
14	0.29	I205 Northbound On	18	18	21	18	18	15	**18**
15	0.41	NE Halsey St On	24	24	24	21	27	27	**25**
16	1.32	NE Glisan St On	90	87	102	84	90	87	**90**
17	0.38	NE Halsey St Off	27	27	36	24	24	27	**28**
18	0.83	NE Sandy Blvd On	57	54	177	57	57	51	**76**
19	0.11	NE 33rd On	6	6	6	6	6	6	**6**
20	0.77	Lloyd Center Off	54	51	132	54	72	51	**69**
21	0.77	I84 Off/I5 NB/SB Ramp	57	54	96	48	51	51	**60**
22	0.28	Morrison BRG Off	24	24	21	24	27	24	**24**
23	0.04	I-5 Southbound On	3	3	3	3	3	3	**3**
Total	**15.00**	**Total Time**	**969**	**954**	**1248**	**947**	**978**	**947**	**1007**
Average Speed (in mph)									
1	0.00	Lewis & Clark Park	-	-	-	-	-	-	
2	0.35	SW 257th Dr Off	60.6	60.6	53.0	70.7	53.0	63.6	**60.3**
3	0.88	NE Marine Dr On	58.8	58.8	58.8	55.7	62.2	58.8	**58.8**
4	0.48	NE 238th Dr Off	63.6	57.2	52.0	57.2	57.2	63.6	**58.5**
5	0.50	NE 238th Dr On	55.0	60.5	55.0	55.0	55.0	55.0	**55.9**
6	0.93	NE 207th Ave Off	58.8	58.8	55.9	55.9	58.8	62.1	**58.4**
7	0.30	NE 207th Ave On	59.8	59.8	59.8	59.8	59.8	59.8	**59.8**
8	1.01	NE 181st Ave Off (Slip)	60.6	57.7	57.7	60.6	60.6	60.6	**59.6**
9	0.30	NE 181st Ave On (Loop)	59.2	59.2	71.0	71.0	59.2	59.2	**63.1**
10	0.34	NE 181st Ave On	67.5	67.5	57.8	57.8	67.5	57.8	**62.6**
11	3.18	I205 Off	58.7	59.6	57.0	58.1	60.6	58.7	**58.8**
12	0.59	NE 102nd Av On	50.8	50.8	50.8	54.7	50.8	50.8	**51.5**
13	0.93	I205 Southbound On	50.9	53.3	50.9	56.0	53.3	53.3	**52.9**
14	0.29	I205 Northbound On	58.7	58.7	50.3	58.7	58.7	70.4	**59.2**
15	0.41	NE Halsey St On	61.4	61.4	61.4	70.2	54.6	54.6	**60.6**
16	1.32	NE Glisan St On	52.9	54.7	46.7	56.7	52.9	54.7	**53.1**
17	0.38	NE Halsey St Off	51.2	51.2	38.4	57.6	57.6	51.2	**51.2**
18	0.83	NE Sandy Blvd On	52.1	55.0	16.8	52.1	52.1	58.2	**47.7**
19	0.11	NE 33rd On	63.6	63.6	63.6	63.6	63.6	63.6	**63.6**
20	0.77	Lloyd Center Off	51.6	54.6	21.1	51.6	38.7	54.6	**45.4**
21	0.77	I84 Off/I5 NB/SB Ramp	48.4	51.1	28.8	57.5	54.1	54.1	**49.0**
22	0.28	Morrison BRG Off	41.9	41.9	47.9	41.9	37.3	41.9	**42.1**
23	0.04	I-5 Southbound On	52.2	52.2	52.2	52.2	52.2	52.2	**52.2**
Total	**15.00**	**Average Speed**	**56.3**	**56.7**	**50.3**	**57.9**	**55.4**	**57.2**	**55.7**
			Legend	≥ 45 mph	≥ 30 and < 45 mph	≥ 15 and < 30 mph	< 15 mph		

File Name	**WS11.28.07WS1**	**WS11.28.07WS2**	**WS11.08.07WE1**	**WS11.07.07WE4**	**WS11.15.07WE4**	**WS11.08.07WE2**
Travel Lane	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**
Time	**10:21**	**11:12**	**11:31**	**11:33**	**11:51**	**12:24**
Log Data	Party Cloudy, 40's.	Partly Cloudy, 40's.	Cloudy, 50's. Incidents: Stall at 33rd.	Clear, 50's.	Cloudy, Wet, 50's.	Cloudy, 50's.

I-84 (PM)

Eastbound: I-5 to Lewis and Clark Park
(2:30 - 7:15pm)

ODOT Data Collected on various days over in 2007

I-5 SB to I-84 EB Travel Time Summary - PM Peak

Node #	Distance (Miles)	Node Names	SE10.16.07E1 Right 14:23	SE11.08.07E2 Right 14:39	SE11.07.07E3 Right 14:43	SE11.14.07E3 Right 14:59	SE11.07.07WE6 Right 15:08	SE11.14.07WE6 Right 16:40	SE11.06.07WE2 Right 16:53	SE11.08.07E3 Right 19:13	Average
Travel Time (in seconds)											
1	0.00	I-5 Off/I-84 On Ramp	-	-	-	-	-	-	-	-	
2	0.30	I-84 On	57	39	48	120	33	138	87	102	**78**
3	0.13	Everett St On	12	12	9	21	9	24	18	18	**15**
4	0.66	16th Ave On	54	48	45	75	51	114	123	96	**76**
5	0.66	33rd Ave Off	60	51	48	57	54	84	81	72	**63**
6	0.35	39th Ave Off	27	24	24	30	27	39	36	27	**29**
7	0.30	39th Ave On	21	21	21	21	21	29	31	24	**24**
8	0.75	Glisan St Off	60	69	51	51	57	78	63	63	**62**
9	0.38	Glisan St On	24	27	27	27	27	30	30	30	**28**
10	0.23	Halsey St Off	18	18	12	15	18	18	24	18	**18**
11	0.84	Multnomah St Off	75	66	60	72	69	114	75	75	**76**
12	0.41	I-205 Southbound Off	30	24	27	36	27	39	27	33	**30**
13	0.22	Halsey St Off	15	12	12	12	15	18	15	18	**15**
14	0.60	I-205 Northbound Off	45	39	39	39	45	174	39	33	**57**
15	0.28	Fargo St Off	18	18	18	15	15	21	18	15	**17**
16	0.47	I-205 On	33	30	30	33	33	36	30	33	**32**
17	0.63	122nd Ave Off	42	42	36	42	42	42	39	39	**41**
18	0.24	122nd Ave On	15	15	15	15	15	21	15	15	**16**
19	2.42	181st Off	156	150	150	159	153	165	144	150	**153**
20	0.51	181st On	30	30	30	33	30	30	30	24	**30**
21	0.92	207th Off	60	54	57	63	51	57	60	54	**57**
22	0.56	207th On	36	30	33	36	33	33	33	30	**33**
23	0.91	238th Off	60	54	54	63	54	60	60	57	**58**
24	0.47	238th On	30	30	27	27	27	30	27	27	**28**
25	0.48	Marine Dr Off	30	27	27	30	27	27	27	27	**28**
26	0.83	257th On	54	48	51	48	48	51	51	48	**50**
Total	**14.53**	**Total Time**	**1062**	**978**	**951**	**1140**	**981**	**1472**	**1183**	**1128**	**1112**
Average Speed (in mph)											
1	0.00	I-5 Off/I-84 On Ramp	-	-	-	-	-	-	-	-	
2	0.30	I-84 On	19.1	27.9	22.7	9.1	33.0	7.9	12.5	10.7	**17.8**
3	0.13	Everett St On	37.9	37.9	50.6	21.7	50.6	19.0	25.3	25.3	**33.5**
4	0.66	16th Ave On	43.7	49.2	52.5	31.5	46.3	20.7	19.2	24.6	**36.0**
5	0.66	33rd Ave Off	39.5	46.5	49.4	41.6	43.9	28.2	29.3	32.9	**38.9**
6	0.35	39th Ave Off	46.7	52.6	52.6	42.1	46.7	32.4	35.0	46.7	**44.3**
7	0.30	39th Ave On	51.2	51.2	51.2	51.2	51.2	37.0	34.7	44.8	**46.5**
8	0.75	Glisan St Off	45.1	39.2	53.0	53.0	47.4	34.7	42.9	42.9	**44.8**
9	0.38	Glisan St On	56.4	50.1	50.1	50.1	50.1	45.1	45.1	45.1	**49.0**
10	0.23	Halsey St Off	45.1	45.1	67.6	54.1	45.1	45.1	33.8	45.1	**47.6**
11	0.84	Multnomah St Off	40.4	45.9	50.5	42.1	43.9	26.6	40.4	40.4	**41.3**
12	0.41	I-205 Southbound Off	49.3	61.6	54.8	41.1	54.8	37.9	54.8	44.8	**49.9**
13	0.22	Halsey St Off	52.3	65.4	65.4	65.4	52.3	43.6	52.3	43.6	**55.1**
14	0.60	I-205 Northbound Off	47.9	55.3	55.3	55.3	47.9	12.4	55.3	65.3	**49.3**
15	0.28	Fargo St Off	55.5	55.5	55.5	66.6	66.6	47.6	55.5	66.6	**58.7**
16	0.47	I-205 On	50.8	55.9	55.9	50.8	50.8	46.6	55.9	50.8	**52.2**
17	0.63	122nd Ave Off	54.0	54.0	63.0	54.0	54.0	54.0	58.1	58.1	**56.1**
18	0.24	122nd Ave On	58.1	58.1	58.1	58.1	58.1	41.5	58.1	58.1	**56.0**
19	2.42	181st Off	55.9	58.2	58.2	54.9	57.0	52.9	60.6	58.2	**57.0**
20	0.51	181st On	60.7	60.7	60.7	55.2	60.7	60.7	60.7	75.9	**61.9**
21	0.92	207th Off	55.4	61.6	58.4	52.8	65.2	58.4	55.4	61.6	**58.6**
22	0.56	207th On	56.2	67.5	61.4	56.2	61.4	61.4	61.4	67.5	**61.6**
23	0.91	238th Off	54.5	60.5	60.5	51.9	60.5	54.5	54.5	57.4	**56.8**
24	0.47	238th On	56.6	56.6	62.9	62.9	62.9	56.6	62.9	62.9	**60.5**
25	0.48	Marine Dr Off	57.4	63.8	63.8	57.4	63.8	63.8	63.8	63.8	**62.2**
26	0.83	257th On	55.2	62.1	58.5	62.1	62.1	58.5	58.5	62.1	**59.9**
Total	**14.53**	**Average Speed**	**49.8**	**53.7**	**55.7**	**49.6**	**53.5**	**41.9**	**47.4**	**50.2**	**50.2**

Legend	≥ 45 mph	≥ 30 and < 45 mph	≥ 15 and < 30 mph	< 15 mph

File Name	SE10.16.07E1	SE11.08.07E2	SE11.07.07E3	SE11.14.07E3	SE11.07.07WE6	SE11.14.07WE6	SE11.06.07WE2	SE11.08.07E3
Travel Lane	**Right**	**Right**	**Right**	**Right**	**Right**	**Right**	**Right**	**Right**
Time	**14:23**	**14:39**	**14:43**	**14:59**	**15:08**	**16:40**	**16:53**	**19:13**
Log Data	Cloudy, Drizzle, 50's. Rain east of I-205.	Cloudy, 60's.	Clear, 60's.	Windy, 50's, Cloudy.	Clear, 60's.	Windy, 50's, Cloudy	Clear, 50's.	Cloudy, 60's

I-5 NB to I-84 EB Travel Time Summary - PM Peak

Node #	Distance (Miles)	Node Names	NE12.5.07NE5 Middle 14:36	NE10.16.07WE1 Middle 15:12	NE11.27.07NE4 Left 15:32	NE11.14.07WE5 Middle 15:46	NE11.06.07WE1 Middle 15:54	NE11.08.07WE4 Middle 16:07	NE11.08.07WE5 Middle 16:57	NE11.27.07E3 Left 17:21	NE11.08.07WE6 Middle 17:56	NE11.14.07WE7 Left 17:57	Average
Travel Time (in seconds)													
1	0.00	I-5 Northbound/Marquam Bridge On	-	-	-	-	-	-	-	-	-	-	
2	0.40	I-84 Eastbound On	33	45	-	39	102	72	45	279	39	87	**58**
3	0.19	Central Eastside/Water St Off	18	42	33	27	36	27	36	132	18	60	**31**
4	0.47	Morrison Bridge On	63	147	168	120	126	96	93	324	90	120	**120**
5	0.34	I-84 On	39	60	87	69	105	72	137	201	99	90	**72**
6	0.13	Everett St On	12	27	24	21	27	18	30	78	21	24	**22**
7	0.66	16th Ave On	48	111	90	144	84	84	129	195	99	75	**94**
8	0.66	33rd Ave Off	60	63	63	63	69	54	69	234	72	57	**62**
9	0.35	39th Ave Off	27	54	42	51	30	30	51	99	36	30	**39**
10	0.30	39th Ave On	24	30	36	27	27	24	45	111	30	21	**28**
11	0.75	Glisan St Off	57	66	144	63	54	63	84	240	114	66	**75**
12	0.38	Glisan St On	27	48	78	33	27	39	45	138	87	75	**42**
13	0.23	Halsey St Off	18	18	72	21	18	21	21	48	24	24	**28**
14	0.84	Multnomah St Off	72	72	246	72	69	69	78	342	132	111	**100**
15	0.41	I-205 Southbound Off	30	30	144	27	27	27	30	147	39	33	**48**
16	0.22	Halsey St Off	15	18	39	15	15	18	15	63	24	18	**20**
17	0.60	I-205 Northbound Off	42	45	84	39	42	42	45	81	246	36	**49**
18	0.28	Fargo St Off	15	15	18	18	18	18	18	18	21	18	**17**
19	0.47	I-205 On	30	33	30	30	33	30	36	30	33	27	**31**
20	0.63	122nd Ave Off	36	39	36	39	39	36	45	39	42	51	**38**
21	0.24	122nd Ave On	15	15	15	12	15	15	18	18	18	12	**15**
22	2.42	181st Off	147	147	147	144	147	138	144	147	153	153	**145**
23	0.51	181st On	33	30	30	33	33	30	30	30	30	30	**32**
24	0.92	207th Off	57	54	58	54	54	54	51	54	60	57	**55**
25	0.56	207th On	33	33	30	36	36	33	33	30	39	36	**34**
26	0.91	238th Off	57	57	57	57	57	57	54	57	54	57	**57**
27	0.47	238th On	30	27	30	27	30	27	27	27	30	30	**29**
28	0.48	Marine Dr Off	27	27	27	30	30	30	27	27	27	30	**29**
29	0.83	257th On	54	51	48	51	51	48	51	48	51	51	**51**
Total	**15.64**	**Total Time**	**1119**	**1404**	**1876**	**1362**	**1401**	**1272**	**1487**	**3237**	**1728**	**1479**	**1406**
Average Speed (in mph)													
1	0.00	I-5 Northbound/Marquam Bridge On	-	-	-	-	-	-	-	-	-	-	
2	0.40	I-84 Eastbound On	44.1	32.4	-	37.3	14.3	20.2	32.4	5.2	37.3	16.7	**29.7**
3	0.19	Central Eastside/Water St Off	38.2	16.4	20.9	25.5	19.1	25.5	19.1	5.2	38.2	11.5	**24.3**
4	0.47	Morrison Bridge On	27.0	11.6	10.1	14.2	13.5	17.7	18.3	5.3	18.9	14.2	**15.7**
5	0.34	I-84 On	31.8	20.6	14.2	18.0	11.8	17.2	9.0	6.2	12.5	13.8	**18.9**
6	0.13	Everett St On	37.9	16.9	19.0	21.7	16.9	25.3	15.2	5.8	21.7	19.0	**22.9**
7	0.66	16th Ave On	49.2	21.3	26.2	16.4	28.1	28.1	18.3	12.1	23.8	31.5	**28.2**
8	0.66	33rd Ave Off	39.5	37.6	37.6	37.6	34.3	43.9	34.3	10.1	32.9	41.6	**38.4**
9	0.35	39th Ave Off	46.7	23.4	30.0	24.7	42.1	42.1	24.7	12.7	35.0	42.1	**34.8**
10	0.30	39th Ave On	44.8	35.8	29.8	39.8	39.8	44.8	23.9	9.7	35.8	51.2	**39.1**
11	0.75	Glisan St Off	47.4	41.0	18.8	42.9	50.1	42.9	32.2	11.3	23.7	41.0	**40.5**
12	0.38	Glisan St On	50.1	28.2	17.4	41.0	50.1	34.7	30.1	9.8	15.6	18.0	**36.9**
13	0.23	Halsey St Off	45.1	45.1	11.3	38.6	45.1	38.6	38.6	16.9	33.8	33.8	**37.3**
14	0.84	Multnomah St Off	42.1	42.1	12.3	42.1	43.9	43.9	38.9	8.9	23.0	27.3	**37.8**
15	0.41	I-205 Southbound Off	49.3	49.3	10.3	54.8	54.8	54.8	49.3	10.1	37.9	44.8	**45.5**
16	0.22	Halsey St Off	52.3	43.6	20.1	52.3	52.3	43.6	52.3	12.5	32.7	43.6	**44.1**
17	0.60	I-205 Northbound Off	51.3	47.9	25.7	55.3	51.3	51.3	47.9	26.6	8.8	59.9	**47.1**
18	0.28	Fargo St Off	66.6	66.6	55.5	55.5	55.5	55.5	55.5	55.5	47.6	55.5	**59.2**
19	0.47	I-205 On	55.9	50.8	55.9	55.9	50.8	55.9	46.6	55.9	50.8	62.1	**54.2**
20	0.63	122nd Ave Off	63.0	58.1	63.0	58.1	58.1	63.0	50.4	58.1	54.0	44.4	**60.5**
21	0.24	122nd Ave On	58.1	58.1	58.1	72.6	58.1	58.1	48.4	48.4	48.4	72.6	**60.5**
22	2.42	181st Off	59.4	59.4	59.4	60.6	59.4	63.2	60.6	59.4	57.0	57.0	**60.2**
23	0.51	181st On	55.2	60.7	60.7	55.2	55.2	60.7	60.7	60.7	60.7	60.7	**58.0**
24	0.92	207th Off	58.4	61.6	57.4	61.6	61.6	61.6	65.2	61.6	55.4	58.4	**60.4**
25	0.56	207th On	61.4	61.4	67.5	56.2	56.2	61.4	61.4	67.5	51.9	56.2	**60.7**
26	0.91	238th Off	57.4	57.4	57.4	57.4	57.4	57.4	60.5	57.4	60.5	57.4	**57.4**
27	0.47	238th On	56.6	62.9	56.6	62.9	56.6	62.9	62.9	62.9	56.6	56.6	**59.7**
28	0.48	Marine Dr Off	63.8	63.8	63.8	57.4	57.4	57.4	63.8	63.8	63.8	57.4	**60.6**
29	0.83	257th On	55.2	58.5	62.1	58.5	58.5	62.1	58.5	62.1	58.5	58.5	**59.2**
Total	**15.64**	**Average Speed**	**50.3**	**44.0**	**37.8**	**45.5**	**44.7**	**46.2**	**42.1**	**31.5**	**39.2**	**43.1**	**44.8**

≥ 15 and < 30 mph	< 15 mph	**Legend**	≥ 45 mph	≥ 30 and < 45 mph

File Name	**NE12.5.07NE5**	**NE10.16.07WE1**	**NE11.27.07NE4**	**NE11.14.07WE5**	**NE11.06.07WE1**	**NE11.08.07WE4**	**NE11.08.07WE5**	**NE11.27.07E3**	**NE11.08.07WE6**	**NE11.14.07WE7**
Travel Lane	**Middle**	**Middle**	**Left**	**Middle**	**Middle**	**Middle**	**Middle**	**Left**	**Middle**	**Left**
Time	**14:36**	**15:12**	**15:32**	**15:46**	**15:54**	**16:07**	**16:57**	**17:21**	**17:56**	**17:57**
Log Data	Cloudy, 50's, Rain.	Rain west of I-205.	Partly Cloudy, 50's. Incidents: Accident on I-205 NB at Columbia.	Windy, 50's, Cloudy.	Clear, 50's.	Cloudy, 60's.	Cloudy, 60's.	Partly Cloudy, 50's.	Cloudy, 60's.	Windy, 50's, Cloudy.

I-84 (PM)

Westbound: Lewis and Clark Park to I-5
(2:15 - 7:30pm)

ODOT Data Collected on various days over in 2007

I-84 WB to I-5 SB Travel Time Summary - PM Peak

Node #	Distance (Miles)	Node Names	WS11.07.07WE6 Left 14:45	WS12.05.07WS4 Left 15:00	WS11.14.07WE6 Left 15:16	WS11.06.07WE2 Left 16:24	WS11.27.07W2 Left 16:44	Average
Travel Time (in seconds)								
1	0.00	Lewis & Clark Park	-	-	-	-	-	
2	0.35	SW 257th Dr Off	21	21	21	18	24	**21**
3	0.88	NE Marine Dr On	48	51	54	54	57	**53**
4	0.48	NE 238th Dr Off	30	30	30	30	33	**31**
5	0.50	NE 238th Dr On	30	30	30	33	33	**31**
6	0.93	NE 207th Ave Off	60	60	54	51	60	**57**
7	0.30	NE 207th Ave On	18	18	18	18	21	**19**
8	1.01	NE 181st Ave Off (Slip)	63	60	57	60	63	**61**
9	0.30	NE 181st Ave On (Loop)	18	18	18	15	18	**17**
10	0.34	NE 181st Ave On	21	21	18	21	27	**22**
11	3.18	I205 Off	195	189	201	198	834	**323**
12	0.59	NE 102nd Av On	39	42	42	42	45	**42**
13	0.93	I205 Southbound On	66	66	63	60	69	**65**
14	0.29	I205 Northbound On	18	21	18	18	18	**19**
15	0.41	NE Halsey St On	30	24	24	27	24	**26**
16	1.32	NE Glisan St On	87	90	87	87	87	**88**
17	0.38	NE Halsey St Off	30	27	24	24	27	**26**
18	0.83	NE Sandy Blvd On	57	54	54	60	54	**56**
19	0.11	NE 33rd On	6	9	6	6	6	**7**
20	0.77	Lloyd Center Off	51	60	60	63	66	**60**
21	0.77	I84 Off/I5 NB/SB Ramp	60	57	84	99	63	**73**
22	0.28	Morrison Bridge Off	27	24	24	24	27	**25**
23	0.04	I-5 Southbound On	3	3	6	3	-	**4**
24	1.04	I-405 Northbound Ramp	81	75	84	81	-	**80**
Total	**16.04**	**Total Time**	**1059**	**1050**	**1077**	**1092**	**1656**	**1187**
Average Speed (in mph)								
1	0.00	Lewis & Clark Park	-	-	-	-	-	
2	0.35	SW 257th Dr Off	60.6	60.6	60.6	70.7	53.0	**61.1**
3	0.88	NE Marine Dr On	66.1	62.2	58.8	58.8	55.7	**60.3**
4	0.48	NE 238th Dr Off	57.2	57.2	57.2	57.2	52.0	**56.2**
5	0.50	NE 238th Dr On	60.5	60.5	60.5	55.0	55.0	**58.3**
6	0.93	NE 207th Ave Off	55.9	55.9	62.1	65.7	55.9	**59.1**
7	0.30	NE 207th Ave On	59.8	59.8	59.8	59.8	51.3	**58.1**
8	1.01	NE 181st Ave Off (Slip)	57.7	60.6	63.8	60.6	57.7	**60.1**
9	0.30	NE 181st Ave On (Loop)	59.2	59.2	59.2	71.0	59.2	**61.6**
10	0.34	NE 181st Ave On	57.8	57.8	67.5	57.8	45.0	**57.2**
11	3.18	I205 Off	58.7	60.6	57.0	57.8	13.7	**49.6**
12	0.59	NE 102nd Av On	54.7	50.8	50.8	50.8	47.4	**50.9**
13	0.93	I205 Southbound On	50.9	50.9	53.3	56.0	48.7	**51.9**
14	0.29	I205 Northbound On	58.7	50.3	58.7	58.7	58.7	**57.0**
15	0.41	NE Halsey St On	49.1	61.4	61.4	54.6	61.4	**57.6**
16	1.32	NE Glisan St On	54.7	52.9	54.7	54.7	54.7	**54.3**
17	0.38	NE Halsey St Off	46.0	51.2	57.6	57.6	51.2	**52.7**
18	0.83	NE Sandy Blvd On	52.1	55.0	55.0	49.5	55.0	**53.3**
19	0.11	NE 33rd On	63.6	42.4	63.6	63.6	63.6	**59.4**
20	0.77	Lloyd Center Off	54.6	46.5	46.5	44.2	42.2	**46.8**
21	0.77	I84 Off/I5 NB/SB Ramp	46.0	48.4	32.9	27.9	43.8	**39.8**
22	0.28	Morrison BRIDGE Off	37.3	41.9	41.9	41.9	37.3	**40.0**
23	0.04	I-5 Southbound On	52.2	52.2	26.1	-	-	**43.5**
24	1.04	I-405 Northbound Ramp	46.3	50.0	44.7	-	-	**47.0**
Total	**16.04**	**Average Speed**	**54.8**	**54.3**	**54.5**	**55.9**	**50.6**	**53.7**

Legend	≥ 30 and < 45 mph	≥ 15 and < 30 mph	< 15 mph

File Name	WS11.07.07WE6	WS12.05.07WS4	WS11.14.07WE6	WS11.06.07WE2	WS11.27.07W2
Travel Lane	**Left**	**Left**	**Left**	**Left**	**Left**
Time	**14:45**	**15:00**	**15:16**	**16:24**	**16:44**
Log Data	Clear, 60's.	Cloudy, Light Rain.	Windy, 50's, Cloudy.	Clear, 50's.	Partly Cloudy, 50's.

I-84 WB to I-5 NB Travel Time Summary - PM Peak

Node #	Distance (Miles)	Node Names	WN10.16.07WE1 Middle 14:45	WN11.14.07WE5 Middle 15:24	WN11.06.07WE1 Middle 15:32	WN11.08.07WE4 Middle 15:44	WN11.08.07WE5 Middle 16:33	WN11.14.07WE7 Middle 17:29	WN11.08.07WE6 Middle 17:32	W11.08.07W1 Right 14:15	W11.07.07W3 Right 15:29	W11.14.07W3 Right 18:24	W11.08.07W2 Right 18:48	W11.08.07W3 Right 19:36	Average
Travel Time (in seconds)															
1	0.00	Lewis & Clark Park	-	-	-	-	-	-	-	-	-	-	-	-	
2	0.35	SW 257th Dr Off	24	21	24	21	21	18	18	21	24	18	18	18	**21**
3	0.88	NE Marine Dr On	57	48	51	51	51	51	54	51	51	54	51	51	**52**
4	0.48	NE 238th Dr Off	30	30	27	30	30	27	27	27	30	27	30	30	**29**
5	0.50	NE 238th Dr On	30	30	30	30	30	30	30	33	30	33	30	30	**31**
6	0.93	NE 207th Ave Off	54	57	57	57	60	57	57	60	57	60	60	57	**58**
7	0.30	NE 207th Ave On	18	18	18	18	18	15	18	21	18	18	18	21	**18**
8	1.01	NE 181st Ave Off (Slip)	60	60	60	60	60	60	57	63	60	63	63	60	**61**
9	0.30	NE 181st Ave On (Loop)	21	18	18	18	15	15	18	15	15	15	15	18	**17**
10	0.34	NE 181st Ave On	27	21	24	21	21	21	21	21	24	18	21	21	**22**
11	3.18	I205 Off	249	195	189	195	195	182	192	207	204	192	201	192	**199**
12	0.59	NE 102nd Av On	39	39	39	42	42	39	42	42	42	42	42	42	**41**
13	0.93	I205 Southbound On	66	66	60	63	66	123	63	63	63	69	57	63	**69**
14	0.29	I205 Northbound On	24	18	21	21	18	69	18	18	18	18	18	18	**23**
15	0.41	NE Halsey St On	30	27	24	24	30	63	27	27	24	27	24	24	**29**
16	1.32	NE Glisan St On	93	90	90	87	87	186	84	90	90	90	93	90	**98**
17	0.38	NE Halsey St Off	27	24	24	30	24	36	27	27	27	30	27	24	**27**
18	0.83	NE Sandy Blvd On	60	54	57	60	51	63	54	51	60	51	54	57	**56**
19	0.11	NE 33rd On	9	6	6	6	9	6	9	9	6	9	12	6	**8**
20	0.77	Lloyd Center Off	54	54	57	54	81	60	129	81	54	57	96	51	**69**
21	0.77	I84 Off/I5 NB/SB Ramp	57	57	54	57	108	51	108	75	78	54	72	54	**69**
22	0.14	Central Eastbound Off	12	9	12	12	9	15	12	12	12	12	-	-	**12**
23	0.15	I5 NB On	9	12	12	12	9	15	18	-	-	-	-	-	**12**
24	0.24	Weidler St Off	18	18	18	18	18	33	21	-	-	-	-	-	**21**
Total	**14.85**	**Total Time**	**1068**	**972**	**972**	**987**	**1053**	**1235**	**1104**	**1014**	**987**	**957**	**1002**	**927**	**1023**
Average Speed (in mph)															
1	0.00	Lewis & Clark Park	-	-	-	-	-	-	-	-	-	-	-	-	
2	0.35	SW 257th Dr Off	53.0	60.6	53.0	60.6	60.6	70.7	70.7	60.6	53.0	70.7	70.7	70.7	**62.9**
3	0.88	NE Marine Dr On	55.7	66.1	62.2	62.2	62.2	62.2	58.8	62.2	62.2	58.8	62.2	62.2	**61.4**
4	0.48	NE 238th Dr Off	57.2	57.2	63.6	57.2	57.2	63.6	63.6	63.6	57.2	63.6	57.2	57.2	**59.9**
5	0.50	NE 238th Dr On	60.5	60.5	60.5	60.5	60.5	60.5	60.5	55.0	60.5	55.0	60.5	60.5	**59.6**
6	0.93	NE 207th Ave Off	62.1	58.8	58.8	58.8	55.9	58.8	58.8	55.9	58.8	55.9	55.9	58.8	**58.1**
7	0.30	NE 207th Ave On	59.8	59.8	59.8	59.8	59.8	71.8	59.8	51.3	59.8	59.8	59.8	51.3	**59.4**
8	1.01	NE 181st Ave Off (Slip)	60.6	60.6	60.6	60.6	60.6	60.6	63.8	57.7	60.6	57.7	57.7	60.6	**60.1**
9	0.30	NE 181st Ave On (Loop)	50.7	59.2	59.2	59.2	71.0	71.0	59.2	71.0	71.0	71.0	71.0	59.2	**64.4**
10	0.34	NE 181st Ave On	45.0	57.8	50.6	57.8	57.8	57.8	57.8	57.8	50.6	67.5	57.8	57.8	**56.4**
11	3.18	I205 Off	46.0	58.7	60.6	58.7	58.7	62.9	59.6	55.3	56.1	59.6	57.0	59.6	**57.7**
12	0.59	NE 102nd Av On	54.7	54.7	54.7	50.8	50.8	54.7	50.8	50.8	50.8	50.8	50.8	50.8	**52.1**
13	0.93	I205 Southbound On	50.9	50.9	56.0	53.3	50.9	27.3	53.3	53.3	53.3	48.7	58.9	53.3	**50.8**
14	0.29	I205 Northbound On	44.0	58.7	50.3	50.3	58.7	15.3	58.7	58.7	58.7	58.7	58.7	58.7	**52.4**
15	0.41	NE Halsey St On	49.1	54.6	61.4	61.4	49.1	23.4	54.6	54.6	61.4	54.6	61.4	61.4	**53.9**
16	1.32	NE Glisan St On	51.2	52.9	52.9	54.7	54.7	25.6	56.7	52.9	52.9	52.9	51.2	52.9	**50.9**
17	0.38	NE Halsey St Off	51.2	57.6	57.6	46.0	57.6	38.4	51.2	51.2	51.2	46.0	51.2	57.6	**51.4**
18	0.83	NE Sandy Blvd On	49.5	55.0	52.1	49.5	58.2	47.2	55.0	58.2	49.5	58.2	55.0	52.1	**53.3**
19	0.11	NE 33rd On	42.4	63.6	63.6	63.6	42.4	63.6	42.4	42.4	63.6	42.4	31.8	63.6	**52.1**
20	0.77	Lloyd Center Off	51.6	51.6	48.9	51.6	34.4	46.5	21.6	34.4	51.6	48.9	29.0	54.6	**43.7**
21	0.77	I84 Off/I5 NB/SB Ramp	48.4	48.4	51.1	48.4	25.6	54.1	25.6	36.8	35.4	51.1	38.4	51.1	**42.9**
22	0.14	Central Eastbound Off	43.1	57.4	43.1	43.1	57.4	34.5	43.1	43.1	43.1	43.1	-	-	**45.1**
23	0.15	I5 NB On	59.0	44.2	44.2	44.2	59.0	35.4	29.5	-	-	-	-	-	**45.1**
24	0.24	Weidler St Off	47.2	47.2	47.2	47.2	47.2	25.8	40.5	-	-	-	-	-	**43.2**
Total	**14.85**	**Average Speed**	**51.9**	**56.4**	**55.3**	**54.8**	**54.4**	**49.2**	**52.0**	**53.7**	**55.3**	**56.0**	**54.8**	**57.7**	**54.3**
			Legend	≥ 45 mph	≥ 30 and < 45 mph	≥ 15 and < 30 mph	< 15 mph								

File Name	WN10.16.07WE1	WN11.14.07WE5	WN11.06.07WE1	WN11.08.07WE4	WN11.08.07WE5	WN11.14.07WE7	WN11.08.07WE6	W11.08.07W1	W11.07.07W3	W11.14.07W3	W11.08.07W2	W11.08.07W3
Travel Lane	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Middle**	**Right**	**Right**	**Right**	**Right**	**Right**
Time	**14:45**	**15:24**	**15:32**	**15:44**	**16:33**	**17:29**	**17:32**	**14:15**	**15:29**	**18:24**	**18:48**	**19:36**
Log Data	Cloudy, Drizzle, 50's. Rain west of I-205.	Windy, 50's, Cloudy.	Clear, 50's.	Cloudy, 60's.	Cloudy, 60's.	Windy, 50's, Cloudy.	Cloudy, 60's.	Cloudy, 60's.	Clear, 60's.	Windy, 50's, Cloudy.	Cloudy, 60's.	Cloudy, 60's.

US 26 (AM)

Eastbound: US 101 to I-405
(7:30 - 9:30am)

ODOT Data Collected on various days over in 2009

US 26 Eastbound Travel Time Data
Summer 2009 AM Peak

Node #	Distance (Miles)	Node Names	Thurs 7.30.09 7:30 Right Lane	Tues 8.04.09 7:45 Left Lane	Wed 7.29.09 8:00 Left Lane	Thurs 7.23.09 8:00 Right Lane	Tues 7.28.09 8:15 Left Lane	Wed 8.12.09 9:00 Right Lane	Wed 8.05.09 9:30 Right Lane	Average
Travel Time (in seconds)										
1	0.00	US 101 Off	-	-	-	-	-	-	-	-
2	0.36	US 101 On	36	36	36	30	33	30	39	**34**
3	18.33	Jewell Jct (OR 103) Off	1418	1426	1353	1356	1365	1442	1408	**1395**
4	21.01	Staleys Jct Off	1552	1469	1459	1461	1497	1484	1530	**1493**
5	3.86	Davies Jct Off	273	246	261	255	264	246	270	**259**
6	3.88	Wilson River Hwy (OR 6) Off	246	243	270	234	252	288	258	**256**
7	0.22	Wilson River Hwy (OR 6) On	15	15	15	15	15	18	15	**15**
8	1.57	Dersham Rd Off	99	96	99	93	93	102	99	**97**
9	0.36	Dersham Rd On	24	21	24	24	21	21	24	**23**
10	1.62	Glencoe Rd Off	99	99	99	99	96	102	108	**100**
11	0.32	Glencoe Rd On	21	24	21	21	21	18	21	**21**
12	1.72	Jackson School Rd On	111	102	105	108	102	108	108	**106**
13	1.81	Shute Off	117	111	105	114	108	111	114	**111**
14	0.45	Shute On	27	27	24	30	30	27	27	**27**
15	0.81	Cornelius Pass Off	48	51	51	51	48	54	54	**51**
16	0.28	Cornelius Pass On	18	15	15	15	18	18	18	**17**
17	0.36	Cornelius Pass On	24	24	24	24	21	24	24	**24**
18	1.21	185th Off	75	72	72	75	72	84	78	**75**
19	0.67	185th On	45	42	42	42	39	45	42	**42**
20	0.73	Bethany Off	51	45	42	45	48	54	48	**48**
21	0.79	Cornell On	48	48	48	48	48	54	54	**50**
22	0.76	Murray Off	48	45	51	48	45	51	48	**48**
23	0.45	Murray On	27	27	27	27	27	30	30	**28**
24	0.73	Cedar Hills Off	48	48	45	51	45	51	51	**48**
25	0.54	Cedar Hills On	36	36	33	36	33	45	39	**37**
26	0.35	OR 217 Off	24	21	21	21	21	24	24	**22**
27	0.15	Baltic Off	9	9	9	9	9	9	9	**9**
28	0.28	OR 217 On	18	18	15	18	18	18	21	**18**
29	1.22	Sylvan Off	165	78	78	81	78	81	84	**92**
30	0.44	Canyon Rd On	78	30	27	30	27	30	33	**36**
31	0.35	Skyline Blvd On	81	42	21	27	24	24	24	**35**
32	0.52	Zoo Rd Off	78	123	30	81	33	36	39	**60**
33	0.28	Zoo Rd On	27	45	18	78	21	21	21	**33**
34	0.65	Canyon Rd Off	60	72	45	102	57	54	48	**63**
35	0.62	I-405 Off	114	78	105	129	132	90	48	**99**
Total	**67.69**	**Total Time**	**5160**	**4884**	**4690**	**4878**	**4761**	**4894**	**4858**	**4875**
Average Speed (in mph)										
1	0.00	US 101 Off	-	-	-	-	-	-	-	-
2	0.36	US 101 On	36.3	36.3	36.3	43.6	39.6	43.6	33.5	**38.5**
3	18.33	Jewell Jct (OR 103) Off	46.5	46.3	48.8	48.7	48.3	45.8	46.9	**47.3**
4	21.01	Staleys Jct Off	48.7	51.5	51.8	51.8	50.5	51.0	49.4	**50.7**
5	3.86	Davies Jct Off	50.9	56.5	53.2	54.5	52.6	56.5	51.5	**53.7**
6	3.88	Wilson River Hwy (OR 6) Off	56.8	57.5	51.8	59.7	55.5	48.5	54.2	**54.8**
7	0.22	Wilson River Hwy (OR 6) On	53.9	53.9	53.9	53.9	53.9	44.9	53.9	**52.6**
8	1.57	Dersham Rd Off	57.0	58.8	57.0	60.7	60.7	55.4	57.0	**58.1**
9	0.36	Dersham Rd On	54.2	61.9	54.2	54.2	61.9	61.9	54.2	**57.5**
10	1.62	Glencoe Rd Off	59.0	59.0	59.0	59.0	60.8	57.3	54.1	**58.3**
11	0.32	Glencoe Rd On	55.3	48.4	55.3	55.3	55.3	64.6	55.3	**55.7**
12	1.72	Jackson School Rd On	55.8	60.7	59.0	57.4	60.7	57.4	57.4	**58.3**
13	1.81	Shute Off	55.7	58.7	62.0	57.1	60.3	58.7	57.1	**58.5**
14	0.45	Shute On	60.5	60.5	68.1	54.4	54.4	60.5	60.5	**59.8**
15	0.81	Cornelius Pass Off	60.6	57.0	57.0	57.0	60.6	53.8	53.8	**57.1**
16	0.28	Cornelius Pass On	55.2	66.2	66.2	66.2	55.2	55.2	55.2	**59.9**
17	0.36	Cornelius Pass On	53.9	53.9	53.9	53.9	61.6	53.9	53.9	**55.0**
18	1.21	185th Off	58.2	60.6	60.6	58.2	60.6	51.9	55.9	**58.0**
19	0.67	185th On	53.2	57.0	57.0	57.0	61.4	53.2	57.0	**56.6**
20	0.73	Bethany Off	51.8	58.7	62.9	58.7	55.1	48.9	55.1	**55.9**
21	0.79	Cornell On	59.5	59.5	59.5	59.5	59.5	52.9	52.9	**57.6**
22	0.76	Murray Off	56.8	60.5	53.4	56.8	60.5	53.4	56.8	**56.9**
23	0.45	Murray On	59.3	59.3	59.3	59.3	59.3	53.4	53.4	**57.7**
24	0.73	Cedar Hills Off	54.8	54.8	58.4	51.5	58.4	51.5	51.5	**54.4**
25	0.54	Cedar Hills On	54.3	54.3	59.2	54.3	59.2	43.4	50.1	**53.5**
26	0.35	OR 217 Off	52.2	59.7	59.7	59.7	59.7	52.2	52.2	**56.5**
27	0.15	Baltic Off	59.5	59.5	59.5	59.5	59.5	59.5	59.5	**59.5**
28	0.28	OR 217 On	56.2	56.2	67.4	56.2	56.2	56.2	48.2	**56.7**
29	1.22	Sylvan Off	26.5	56.1	56.1	54.0	56.1	54.0	52.1	**50.7**
30	0.44	Canyon Rd On	20.2	52.4	58.3	52.4	58.3	52.4	47.7	**48.8**
31	0.35	Skyline Blvd On	15.3	29.6	59.2	46.0	51.8	51.8	51.8	**43.7**
32	0.52	Zoo Rd Off	23.9	15.1	62.1	23.0	56.5	51.7	47.8	**40.0**
33	0.28	Zoo Rd On	37.1	22.2	55.6	12.8	47.6	47.6	47.6	**38.7**
34	0.65	Canyon Rd Off	39.3	32.7	52.4	23.1	41.4	43.7	49.1	**40.2**
35	0.62	I-405 Off	19.6	28.6	21.2	17.3	16.9	24.8	46.5	**25.0**
Total	**67.69**	**Average Speed**	**48.8**	**51.9**	**56.2**	**51.4**	**55.0**	**52.1**	**52.4**	**52.5**
		Legend	≥ 50 mph	50 - 35 mph	35 - 20 mph	< 20 mph				

Date	Thurs 7.30.09	Tues 8.04.09	Wed 7.29.09	Thurs 7.23.09	Tues 7.28.09	Wed 8.12.09	Wed 8.05.09
Time	7:30	7:45	8:00	8:00	8:15	9:00	9:30
Lane	Right Lane	Left Lane	Left Lane	Right Lane	Left Lane	Right Lane	Right Lane
Log Data	Weather: rainy, wet	Weather: cloudy, dry. Incident: Exit 61 Police citing car causing vehicles to weave from RL	Weather: sunny, dry	Weather: overcast, rainy	Weather: sunny, dry. Incident: milepost 12 RL closed off for ~1 mile	Weather: rainy, wet	Weather: cloudy, dry. Incident: RL construction closure for ~2 miles near David Douglas Park

US 26 (AM)

Westbound: I-405 to US 101
(6:00 - 9:30am)

ODOT Data Collected on various days over in 2009

US 26 Westbound Travel Time Data
Summer 2009 AM Peak

Node #	Distance (Miles)	Node Names	Thurs 7.30.09 6:00 Right Lane	Tues 7.28.09 6:30 Left Lane	Wed 7.29.09 6:30 Left Lane	Wed 7.22.09 6:45 Left Lane	Tues 7.21.09 7:00 Right Lane	Wed 8.12.09 7:30 Right Lane	Thurs 9.10.09 7:30 Right Lane	Wed 8.05.09 8:00 Left Lane	Tues 8.11.09 8:00 Right Lane	Thurs 8.13.09 8:30 Right Lane	Tues 8.04.09 9:00 Left Lane	Thurs 7.30.09 9:20 Left Lane	Average
Travel Time (in seconds)															
1	0.00	I-405 Off	-	-	-	-	-	-	-	-	-	-	-	-	-
2	0.32	I-405 On	24	30	21	27	27	132	39	15	30	30	33	24	**36**
3	0.37	Canyon Rd On	30	30	30	24	24	39	39	27	30	33	33	33	**31**
4	0.90	Zoo Rd Off	75	69	63	57	63	70	81	66	69	72	66	66	**68**
5	0.40	Zoo Rd On	21	24	27	24	30	27	30	26	27	27	27	27	**26**
6	0.48	Skyline Blvd Off	36	33	30	33	33	42	33	33	39	36	33	33	**35**
7	0.25	Canyon Rd Off	15	15	18	18	15	18	18	18	18	18	15	18	**17**
8	0.56	Sylvan On	39	36	36	36	42	45	42	39	39	42	39	39	**40**
9	1.14	Barnes Rd Off	69	66	66	69	75	84	90	69	81	78	69	69	**74**
10	0.21	OR 217 Off	15	12	12	12	15	12	12	12	12	12	12	12	**13**
11	0.40	Cedar Hills Off	24	24	27	21	24	27	27	24	27	27	24	24	**25**
12	0.35	Cedar Hills On	21	18	18	21	21	24	24	21	24	24	21	21	**22**
13	0.55	Cedar Hills On	33	34	33	33	30	39	33	36	36	33	33	33	**34**
14	0.52	Murray Off	30	30	33	27	27	36	33	33	30	33	33	135	**40**
15	0.48	Murray On	30	27	27	27	33	33	30	30	30	30	30	147	**40**
16	0.75	Cornell Off	48	45	45	42	48	54	66	42	51	48	48	255	**66**
17	0.81	Bethany On	54	48	51	49	54	72	120	54	54	54	54	252	**76**
18	0.84	185th Off	54	51	51	51	57	84	81	54	60	57	54	57	**59**
19	0.50	185th On	30	33	33	27	30	42	36	30	30	33	33	33	**33**
20	1.32	Cornelius Pass Off	87	78	78	75	84	96	90	81	96	84	81	81	**84**
21	0.59	Cornelius Pass On	36	36	36	33	36	36	36	48	36	39	33	33	**37**
22	0.83	Helvetia Rd Off	48	48	48	48	54	54	54	42	51	54	51	51	**50**
23	0.46	Helvetia Rd On	27	27	30	27	30	30	30	27	27	30	27	27	**28**
24	1.79	Jackson School Rd Off	108	105	108	102	96	114	117	136	108	120	111	108	**111**
25	1.68	Glencoe Rd Off	102	102	105	96	93	103	102	87	105	105	102	105	**101**
26	0.32	Glencoe Rd On	21	21	18	18	18	24	18	18	18	21	21	21	**20**
27	1.63	Dersham Rd Off	102	96	102	93	108	108	105	107	102	111	105	105	**104**
28	0.36	Dersham Rd On	21	24	21	21	24	27	21	24	21	24	21	24	**23**
29	1.54	Wilson River Hwy (OR 6) Off	99	93	99	87	102	102	99	104	96	96	99	96	**98**
30	0.35	Wilson River Hwy (OR 6) On	21	21	24	21	24	21	21	21	21	24	24	21	**22**
31	4.15	Davies Jct On	270	258	273	255	276	291	261	278	264	273	273	273	**270**
32	3.36	Staleys Jct Off	213	219	216	225	234	227	219	231	294	237	213	228	**230**
33	21.09	Jewell Jct (OR 103) Off	1524	1464	1495	1474	1467	1544	1512	1517	1495	1612	1491	1569	**1514**
34	18.31	US 101 Off	1463	1346	1569	1359	1321	1394	1320	1407	1414	1532	1437	1464	**1419**
35	0.21	US 101 On	18	18	15	18	30	18	18	ND	15	18	18	15	**18**
Total	**67.81**	**Total Time**	**4808**	**4581**	**4858**	**4550**	**4645**	**5069**	**4857**	**4757**	**4850**	**5067**	**4764**	**5499**	**4859**
Average Speed (in mph)															
1	0.00	I-405 Off	-	-	-	-	-	-	-	-	-	-	-	-	-
2	0.32	I-405 On	48.5	38.8	55.4	43.1	43.1	8.8	29.9	77.6	38.8	38.8	35.3	48.5	**42.2**
3	0.37	Canyon Rd On	45.0	45.0	45.0	56.2	56.2	34.6	34.6	49.9	45.0	40.9	40.9	40.9	**44.5**
4	0.90	Zoo Rd Off	43.1	46.8	51.3	56.7	51.3	46.2	39.9	49.0	46.8	44.9	49.0	49.0	**47.8**
5	0.40	Zoo Rd On	69.0	60.4	53.7	60.4	48.3	53.7	48.3	55.8	53.7	53.7	53.7	53.7	**55.4**
6	0.48	Skyline Blvd Off	47.8	52.1	57.3	52.1	52.1	41.0	52.1	52.1	44.1	47.8	52.1	52.1	**50.2**
7	0.25	Canyon Rd Off	60.0	60.0	50.0	50.0	60.0	50.0	50.0	50.0	50.0	50.0	60.0	50.0	**53.4**
8	0.56	Sylvan On	51.3	55.6	55.6	55.6	47.7	44.5	47.7	51.3	51.3	47.7	51.3	51.3	**50.9**
9	1.14	Barnes Rd Off	59.7	62.4	62.4	59.7	54.9	49.1	45.8	59.7	50.9	52.8	59.7	59.7	**56.4**
10	0.21	OR 217 Off	49.9	62.4	62.4	62.4	49.9	62.4	62.4	62.4	62.4	62.4	62.4	62.4	**60.3**
11	0.40	Cedar Hills Off	60.7	60.7	54.0	69.4	60.7	54.0	54.0	60.7	54.0	54.0	60.7	60.7	**58.6**
12	0.35	Cedar Hills On	59.7	69.6	69.6	59.7	59.7	52.2	52.2	59.7	52.2	52.2	59.7	59.7	**58.9**
13	0.55	Cedar Hills On	59.5	57.8	59.5	59.5	65.5	50.4	59.5	54.6	54.6	59.5	59.5	59.5	**58.3**
14	0.52	Murray Off	61.9	61.9	56.2	68.7	68.7	51.6	56.2	56.2	61.9	56.2	56.2	13.7	**55.8**
15	0.48	Murray On	57.2	63.5	63.5	63.5	52.0	52.0	57.2	57.2	57.2	57.2	57.2	11.7	**54.1**
16	0.75	Cornell Off	56.3	60.0	60.0	64.3	56.3	50.0	40.9	64.3	53.0	56.3	56.3	10.6	**52.4**
17	0.81	Bethany On	54.3	61.1	57.5	59.8	54.3	40.7	24.4	54.3	54.3	54.3	54.3	11.6	**48.4**
18	0.84	185th Off	55.8	59.0	59.0	59.0	52.8	35.8	37.2	55.8	50.2	52.8	55.8	52.8	**52.2**
19	0.50	185th On	60.1	54.6	54.6	66.7	60.1	42.9	50.0	60.1	60.1	54.6	54.6	54.6	**56.1**
20	1.32	Cornelius Pass Off	54.4	60.7	60.7	63.2	56.4	49.3	52.6	58.5	49.3	56.4	58.5	58.5	**56.6**
21	0.59	Cornelius Pass On	59.1	59.1	59.1	64.4	59.1	59.1	59.1	44.3	59.1	54.5	64.4	64.4	**58.8**
22	0.83	Helvetia Rd Off	62.5	62.5	62.5	62.5	55.5	55.5	55.5	71.4	58.8	55.5	58.8	58.8	**60.0**
23	0.46	Helvetia Rd On	61.5	61.5	55.4	61.5	55.4	55.4	55.4	61.5	61.5	55.4	61.5	61.5	**59.0**
24	1.79	Jackson School Rd Off	59.7	61.4	59.7	63.2	67.1	56.5	55.1	47.4	59.7	53.7	58.1	59.7	**58.4**
25	1.68	Glencoe Rd Off	59.2	59.2	57.5	62.9	64.9	58.6	59.2	69.4	57.5	57.5	59.2	57.5	**60.2**
26	0.32	Glencoe Rd On	55.4	55.4	64.7	64.7	64.7	48.5	64.7	64.7	64.7	55.4	55.4	55.4	**59.5**
27	1.63	Dersham Rd Off	57.6	61.2	57.6	63.1	54.4	54.4	55.9	54.9	57.6	52.9	55.9	55.9	**56.8**
28	0.36	Dersham Rd On	62.3	54.5	62.3	62.3	54.5	48.5	62.3	54.5	62.3	54.5	62.3	54.5	**57.9**
29	1.54	Wilson River Hwy (OR 6) Off	56.0	59.6	56.0	63.7	54.4	54.4	56.0	53.3	57.8	57.8	56.0	57.8	**56.9**
30	0.35	Wilson River Hwy (OR 6) On	59.8	59.8	52.4	59.8	52.4	59.8	59.8	59.8	59.8	52.4	52.4	59.8	**57.4**
31	4.15	Davies Jct On	55.3	57.9	54.7	58.6	54.1	51.3	57.2	53.7	56.6	54.7	54.7	54.7	**55.3**
32	3.36	Staleys Jct Off	56.8	55.2	56.0	53.8	51.7	53.3	55.2	52.4	41.1	51.0	56.8	53.1	**53.0**
33	21.09	Jewell Jct (OR 103) Off	49.8	51.9	50.8	51.5	51.8	49.2	50.2	50.0	50.8	47.1	50.9	48.4	**50.2**
34	18.31	US 101 Off	45.0	49.0	42.0	48.5	49.9	47.3	49.9	46.8	46.6	43.0	45.9	45.0	**46.6**
35	0.21	US 101 On	41.1	41.1	49.3	41.1	24.6	41.1	41.1	ND	49.3	41.1	41.1	49.3	**41.8**
Total	**67.81**	**Average Speed**	**55.7**	**57.1**	**56.7**	**59.2**	**54.8**	**48.9**	**50.9**	**56.8**	**53.9**	**52.3**	**55.0**	**49.9**	**54.3**
		Legend	≥ 50 mph	50 - 35 mph	35 - 20 mph	< 20 mph									

Date	Thurs 7.30.09	Tues 7.28.09	Wed 7.29.09	Wed 7.22.09	Tues 7.21.09	Wed 8.12.09	Thurs 9.10.09	Wed 8.05.09	Tues 8.11.09	Thurs 8.13.09	Tues 8.04.09	Thurs 7.30.09
Time	6:00	6:30	6:30	6:45	7:00	7:30	7:30	8:00	8:00	8:30	9:00	9:20
Lane	Right Lane	Left Lane	Left Lane	Left Lane	Right Lane	Right Lane	Right Lane	Left Lane	Right Lane	Right Lane	Left Lane	Left Lane
Log Data	Weather: sunny, dry	Weather: sunny, dry. Incident: milepost 12 RL closed off for ~2 miles	Weather: sunny, dry. Incident: milepost 8 tree in road, delays during removal	Weather: sunny, dry. Incident: construction 185th to Glencoe	Weather: sunny, dry. Incident: construction 185th to Glencoe and OR 6	Weather: rainy, wet; Pouring rain last half of run caused traffic to slow	Weather: sunny, dry. Incident: 185th Ave area slow traffic; milepoint 20 hit deer roadkill	Weather: cloudy, dry	Weather: cloudy, dry. Incident: wet paint near Vernonia causing traffic to slow	Weather: sunny, dry. Incident: milepoint 28 RL closed; Construction near Creekside Dr. causing traffic to slow	Weather: cloudy, dry	Weather: sunny, dry. Incident: Exit 64 accident

US 26 (MIDDAY)

Eastbound: US 101 to I-405
(10:00am - 1:30pm)

ODOT Data Collected on various days over in 2009

US 26 Eastbound Travel Time Data
Summer 2009 Midday

Node #	Distance (Miles)	Node Names	Thurs 8.13.09 10:00 Left Lane	Tues 8.11.09 10:00 Right Lane	Tues 8.04.09 10:30 Left Lane	Sat 7.25.09 11:20 Right Lane	Thurs 7.30.09 11:30 Right Lane	Wed 7.29.09 1:00 Right Lane	Mon 7.20.09 1:30 Right Lane	Average
Travel Time (in seconds)										
1	0.00	US 101 Off	-	-	-	-	-	-	-	-
2	0.36	US 101 On	33	33	33	33	36	33	ND	**34**
3	18.33	Jewell Jct (OR 103) Off	1452	1407	1407	1359	1467	1407	1428	**1418**
4	21.01	Staleys Jct Off	1495	1649	1550	1446	1566	1479	1527	**1530**
5	3.86	Davies Jct Off	267	336	270	240	270	279	270	**276**
6	3.88	Wilson River Hwy (OR 6) Off	249	240	246	228	246	255	261	**246**
7	0.22	Wilson River Hwy (OR 6) On	15	15	15	15	15	12	15	**15**
8	1.57	Dersham Rd Off	98	102	96	90	96	96	90	**95**
9	0.36	Dersham Rd On	21	21	21	21	21	21	18	**21**
10	1.62	Glencoe Rd Off	102	102	96	96	102	96	93	**98**
11	0.32	Glencoe Rd On	21	18	21	21	18	18	18	**19**
12	1.72	Jackson School Rd On	111	111	108	105	105	108	99	**107**
13	1.81	Shute Off	114	111	114	105	114	111	108	**111**
14	0.45	Shute On	27	27	27	27	30	30	30	**28**
15	0.81	Cornelius Pass Off	48	51	51	48	48	57	48	**50**
16	0.28	Cornelius Pass On	15	15	15	18	18	18	15	**16**
17	0.36	Cornelius Pass On	24	24	24	21	24	21	24	**23**
18	1.21	185th Off	78	72	75	81	81	75	81	**78**
19	0.67	185th On	45	42	39	42	39	45	42	**42**
20	0.73	Bethany Off	52	48	48	48	48	45	48	**48**
21	0.79	Cornell On	57	51	48	51	51	54	48	**51**
22	0.76	Murray Off	48	51	48	48	48	51	48	**49**
23	0.45	Murray On	30	30	30	27	30	27	24	**28**
24	0.73	Cedar Hills Off	51	48	45	45	48	54	48	**48**
25	0.54	Cedar Hills On	36	42	36	36	39	42	36	**38**
26	0.35	OR 217 Off	24	21	21	18	30	27	27	**24**
27	0.15	Baltic Off	9	9	9	9	9	9	12	**9**
28	0.28	OR 217 On	21	18	18	18	21	18	18	**19**
29	1.22	Sylvan Off	84	75	87	87	84	87	78	**83**
30	0.44	Canyon Rd On	30	30	30	30	32	30	30	**30**
31	0.35	Skyline Blvd On	21	24	27	21	27	24	27	**24**
32	0.52	Zoo Rd Off	36	36	33	39	42	42	42	**39**
33	0.28	Zoo Rd On	21	24	21	21	24	24	21	**22**
34	0.65	Canyon Rd Off	45	54	45	51	97	78	60	**61**
35	0.62	I-405 Off	42	114	155	146	200	145	109	**130**
Total	**67.69**	**Total Time**	**4822**	**5051**	**4909**	**4691**	**5126**	**4918**	**4843**	**4909**
Average Speed (in mph)										
1	0.00	US 101 Off	-	-	-	-	-	-	-	-
2	0.36	US 101 On	39.6	39.6	39.6	39.6	36.3	39.6	ND	**39.1**
3	18.33	Jewell Jct (OR 103) Off	45.4	46.9	46.9	48.5	45.0	46.9	46.2	**46.5**
4	21.01	Staleys Jct Off	50.6	45.9	48.8	52.3	48.3	51.1	49.5	**49.5**
5	3.86	Davies Jct Off	52.1	41.4	51.5	57.9	51.5	49.8	51.5	**50.8**
6	3.88	Wilson River Hwy (OR 6) Off	56.1	58.2	56.8	61.3	56.8	54.8	53.5	**56.8**
7	0.22	Wilson River Hwy (OR 6) On	53.9	53.9	53.9	53.9	53.9	67.3	53.9	**55.8**
8	1.57	Dersham Rd Off	57.6	55.4	58.8	62.8	58.8	58.8	62.8	**59.3**
9	0.36	Dersham Rd On	61.9	61.9	61.9	61.9	61.9	61.9	72.2	**63.4**
10	1.62	Glencoe Rd Off	57.3	57.3	60.8	60.8	57.3	60.8	62.8	**59.6**
11	0.32	Glencoe Rd On	55.3	64.6	55.3	55.3	64.6	64.6	64.6	**60.6**
12	1.72	Jackson School Rd On	55.8	55.8	57.4	59.0	59.0	57.4	62.6	**58.1**
13	1.81	Shute Off	57.1	58.7	57.1	62.0	57.1	58.7	60.3	**58.7**
14	0.45	Shute On	60.5	60.5	60.5	60.5	54.4	54.4	54.4	**57.9**
15	0.81	Cornelius Pass Off	60.6	57.0	57.0	60.6	60.6	51.0	60.6	**58.2**
16	0.28	Cornelius Pass On	66.2	66.2	66.2	55.2	55.2	55.2	66.2	**61.5**
17	0.36	Cornelius Pass On	53.9	53.9	53.9	61.6	53.9	61.6	53.9	**56.1**
18	1.21	185th Off	55.9	60.6	58.2	53.8	53.8	58.2	53.8	**56.3**
19	0.67	185th On	53.2	57.0	61.4	57.0	61.4	53.2	57.0	**57.2**
20	0.73	Bethany Off	50.8	55.1	55.1	55.1	55.1	58.7	55.1	**55.0**
21	0.79	Cornell On	50.1	56.0	59.5	56.0	56.0	52.9	59.5	**55.7**
22	0.76	Murray Off	56.8	53.4	56.8	56.8	56.8	53.4	56.8	**55.8**
23	0.45	Murray On	53.4	53.4	53.4	59.3	53.4	59.3	66.8	**57.0**
24	0.73	Cedar Hills Off	51.5	54.8	58.4	58.4	54.8	48.7	54.8	**54.5**
25	0.54	Cedar Hills On	54.3	46.5	54.3	54.3	50.1	46.5	54.3	**51.5**
26	0.35	OR 217 Off	52.2	59.7	59.7	69.7	41.8	46.4	46.4	**53.7**
27	0.15	Baltic Off	59.5	59.5	59.5	59.5	59.5	59.5	44.6	**57.4**
28	0.28	OR 217 On	48.2	56.2	56.2	56.2	48.2	56.2	56.2	**53.9**
29	1.22	Sylvan Off	52.1	58.4	50.3	50.3	52.1	50.3	56.1	**52.8**
30	0.44	Canyon Rd On	52.4	52.4	52.4	52.4	49.2	52.4	52.4	**52.0**
31	0.35	Skyline Blvd On	59.2	51.8	46.0	59.2	46.0	51.8	46.0	**51.4**
32	0.52	Zoo Rd Off	51.7	51.7	56.5	47.8	44.4	44.4	44.4	**48.7**
33	0.28	Zoo Rd On	47.6	41.7	47.6	47.6	41.7	41.7	47.6	**45.1**
34	0.65	Canyon Rd Off	52.4	43.7	52.4	46.2	24.3	30.2	39.3	**41.2**
35	0.62	I-405 Off	53.1	19.6	14.4	15.3	11.2	15.4	20.5	**21.3**
Total	**67.69**	**Average Speed**	**54.1**	**53.2**	**54.1**	**55.0**	**51.0**	**52.2**	**54.1**	**53.4**
		Legend	≥ 50 mph	50 - 35 mph	35 - 20 mph	< 20 mph				

Date	Thurs 8.13.09	Tues 8.11.09	Tues 8.04.09	Sat 7.25.09	Thurs 7.30.09	Wed 7.29.09	Mon 7.20.09
Time	10:00	10:00	10:30	11:20	11:30	13:00	13:30
Lane	Left Lane	Right Lane	Left Lane	Right Lane	Right Lane	Right Lane	Right Lane
Log Data	Weather: sunny, dry	Weather: wet, rainy. Incident: Milepoint 36 RL closed-traffic stopped for WB traffic, Wet paint near Stewart State Park	Weather: cloudy, dry	Weather: sunny, dry	Weather: cloudy, dry	Weather: sunny, dry	Weather: sunny, dry

US 26 (MIDDAY)

Westbound: I-405 to US 101
(10:00am - 12:00pm)

ODOT Data Collected on various days over in 2009

US 26 Westbound Travel Time Data
Summer 2009 Midday

Node #	Distance (Miles)	Node Names	Sat 7.25.09 10:00 Right Lane	Mon 7.20.09 11:45 Right Lane	Thurs 8.06.09 12:00 Left Lane	Wed 7.29.09 12:00 Right Lane	Average
Travel Time (in seconds)							
1	0.00	I-405 Off	-	-	-	-	-
2	0.32	I-405 On	27	33	24	27	**28**
3	0.37	Canyon Rd On	33	27	27	36	**31**
4	0.90	Zoo Rd Off	66	66	63	75	**68**
5	0.40	Zoo Rd On	27	24	24	27	**26**
6	0.48	Skyline Blvd Off	33	33	33	33	**33**
7	0.25	Canyon Rd Off	18	15	15	15	**16**
8	0.56	Sylvan On	39	36	39	39	**38**
9	1.14	Barnes Rd Off	66	66	69	72	**68**
10	0.21	OR 217 Off	11	12	12	12	**12**
11	0.40	Cedar Hills Off	24	21	27	24	**24**
12	0.35	Cedar Hills On	21	21	21	18	**20**
13	0.55	Cedar Hills On	33	30	30	33	**32**
14	0.52	Murray Off	30	27	30	33	**30**
15	0.48	Murray On	33	30	30	30	**31**
16	0.75	Cornell Off	48	42	48	51	**47**
17	0.81	Bethany On	48	45	54	81	**57**
18	0.84	185th Off	51	51	54	66	**56**
19	0.50	185th On	30	27	30	36	**31**
20	1.32	Cornelius Pass Off	81	72	78	87	**80**
21	0.59	Cornelius Pass On	36	33	33	36	**35**
22	0.83	Helvetia Rd Off	51	45	51	48	**49**
23	0.46	Helvetia Rd On	27	24	27	27	**26**
24	1.79	Jackson School Rd Off	114	102	111	117	**111**
25	1.68	Glencoe Rd Off	105	96	99	108	**102**
26	0.32	Glencoe Rd On	21	18	21	21	**20**
27	1.63	Dersham Rd Off	96	96	102	105	**100**
28	0.36	Dersham Rd On	21	21	21	24	**22**
29	1.54	Wilson River Hwy (OR 6) Off	93	93	93	99	**95**
30	0.35	Wilson River Hwy (OR 6) On	21	24	24	21	**23**
31	4.15	Davies Jct On	276	251	258	273	**265**
32	3.36	Staleys Jct Off	246	222	225	237	**233**
33	21.09	Jewell Jct (OR 103) Off	1635	1532	1543	1545	**1564**
34	18.31	US 101 Off	1503	1449	1473	1389	**1454**
35	0.21	US 101 On	15	18	15	ND	**16**
Total	**67.81**	**Total Time**	**4979**	**4702**	**4804**	**4845**	**4833**
Average Speed (in mph)							
1	0.00	I-405 Off	-	-	-	-	-
2	0.32	I-405 On	43.1	35.3	48.5	43.1	**42.5**
3	0.37	Canyon Rd On	40.9	49.9	49.9	37.5	**44.6**
4	0.90	Zoo Rd Off	49.0	49.0	51.3	43.1	**48.1**
5	0.40	Zoo Rd On	53.7	60.4	60.4	53.7	**57.0**
6	0.48	Skyline Blvd Off	52.1	52.1	52.1	52.1	**52.1**
7	0.25	Canyon Rd Off	50.0	60.0	60.0	60.0	**57.5**
8	0.56	Sylvan On	51.3	55.6	51.3	51.3	**52.4**
9	1.14	Barnes Rd Off	62.4	62.4	59.7	57.2	**60.5**
10	0.21	OR 217 Off	68.1	62.4	62.4	62.4	**63.8**
11	0.40	Cedar Hills Off	60.7	69.4	54.0	60.7	**61.2**
12	0.35	Cedar Hills On	59.7	59.7	59.7	69.6	**62.2**
13	0.55	Cedar Hills On	59.5	65.5	65.5	59.5	**62.5**
14	0.52	Murray Off	61.9	68.7	61.9	56.2	**62.2**
15	0.48	Murray On	52.0	57.2	57.2	57.2	**55.9**
16	0.75	Cornell Off	56.3	64.3	56.3	53.0	**57.5**
17	0.81	Bethany On	61.1	65.1	54.3	36.2	**54.2**
18	0.84	185th Off	59.0	59.0	55.8	45.6	**54.9**
19	0.50	185th On	60.1	66.7	60.1	50.0	**59.2**
20	1.32	Cornelius Pass Off	58.5	65.8	60.7	54.4	**59.9**
21	0.59	Cornelius Pass On	59.1	64.4	64.4	59.1	**61.8**
22	0.83	Helvetia Rd Off	58.8	66.7	58.8	62.5	**61.7**
23	0.46	Helvetia Rd On	61.5	69.2	61.5	61.5	**63.5**
24	1.79	Jackson School Rd Off	56.5	63.2	58.1	55.1	**58.2**
25	1.68	Glencoe Rd Off	57.5	62.9	61.0	55.9	**59.3**
26	0.32	Glencoe Rd On	55.4	64.7	55.4	55.4	**57.7**
27	1.63	Dersham Rd Off	61.2	61.2	57.6	55.9	**58.9**
28	0.36	Dersham Rd On	62.3	62.3	62.3	54.5	**60.4**
29	1.54	Wilson River Hwy (OR 6) Off	59.6	59.6	59.6	56.0	**58.7**
30	0.35	Wilson River Hwy (OR 6) On	59.8	52.4	52.4	59.8	**56.1**
31	4.15	Davies Jct On	54.1	59.5	57.9	54.7	**56.5**
32	3.36	Staleys Jct Off	49.2	54.5	53.8	51.0	**52.1**
33	21.09	Jewell Jct (OR 103) Off	46.4	49.6	49.2	49.1	**48.6**
34	18.31	US 101 Off	43.8	45.5	44.7	47.4	**45.4**
35	0.21	US 101 On	49.3	41.1	49.3	ND	**46.5**
Total	**67.81**	**Average Speed**	**55.7**	**59.0**	**56.7**	**54.0**	**56.3**
		Legend	≥ 50 mph	50 - 35 mph	35 - 20 mph	< 20 mph	

Date	Sat 7.25.09	Mon 7.20.09	Thurs 8.06.09	Wed 7.29.09
Time	10:00	11:45	12:00	12:00
Lane	Right Lane	Right Lane	Left Lane	Right Lane
Log Data	Weather: sunny, dry	Weather: sunny, dry. Incident: construction OR 6	Weather: cloudy, dry	Weather: sunny, dry

US 26 (PM)

Eastbound: US 101 to I-405
(2:00 - 5:00pm)

ODOT Data Collected on various days over in 2009

US 26 Eastbound Travel Time Data
Summer 2009 PM Peak

Node #	Distance (Miles)	Node Names	Thurs 8.06.09 2:00 Left Lane	Tues 7.28.09 2:30 Left Lane	Tues 7.21.09 3:15 Right Lane	Thurs 8.13.09 4:00 Right Lane	Tues 8.18.09 4:00 Right Lane	Wed 8.05.09 4:30 Left Lane	Thurs 8.06.09 5:00 Left Lane	Average
Travel Time (in seconds)										
1	0.00	US 101 Off	-	-	-	-	-	-	-	-
2	0.36	US 101 On	33	33	30	33	36	32	33	**33**
3	18.33	Jewell Jct (OR 103) Off	1404	1338	1320	1385	1404	1339	1372	**1366**
4	21.01	Staleys Jct Off	1551	1547	1444	1534	1624	1603	1526	**1547**
5	3.86	Davies Jct Off	264	252	246	267	261	246	249	**255**
6	3.88	Wilson River Hwy (OR 6) Off	258	240	240	264	240	234	240	**245**
7	0.22	Wilson River Hwy (OR 6) On	15	15	12	15	12	15	12	**14**
8	1.57	Dersham Rd Off	102	90	93	108	93	93	96	**96**
9	0.36	Dersham Rd On	24	21	21	24	21	21	21	**22**
10	1.62	Glencoe Rd Off	102	96	99	108	105	99	102	**102**
11	0.32	Glencoe Rd On	21	18	21	21	21	21	21	**21**
12	1.72	Jackson School Rd On	111	99	102	111	113	105	111	**107**
13	1.81	Shute Off	114	108	108	120	120	108	111	**113**
14	0.45	Shute On	30	27	27	30	30	30	30	**29**
15	0.81	Cornelius Pass Off	54	48	51	48	54	48	51	**51**
16	0.28	Cornelius Pass On	15	18	15	18	15	15	15	**16**
17	0.36	Cornelius Pass On	24	21	24	21	24	21	24	**23**
18	1.21	185th Off	75	75	72	72	81	78	72	**75**
19	0.67	185th On	42	39	39	42	51	87	42	**49**
20	0.73	Bethany Off	48	45	45	45	57	75	57	**53**
21	0.79	Cornell On	51	57	51	54	54	60	51	**54**
22	0.76	Murray Off	48	51	51	48	51	75	51	**54**
23	0.45	Murray On	30	27	27	30	30	27	30	**29**
24	0.73	Cedar Hills Off	45	45	45	48	48	48	48	**47**
25	0.54	Cedar Hills On	36	36	39	39	39	36	36	**37**
26	0.35	OR 217 Off	24	21	24	24	21	18	24	**22**
27	0.15	Baltic Off	9	9	9	9	9	9	9	**9**
28	0.28	OR 217 On	18	18	15	21	18	18	18	**18**
29	1.22	Sylvan Off	84	81	78	81	81	78	81	**81**
30	0.44	Canyon Rd On	36	27	27	30	27	27	27	**29**
31	0.35	Skyline Blvd On	60	21	24	33	24	24	24	**30**
32	0.52	Zoo Rd Off	93	36	39	45	45	69	99	**61**
33	0.28	Zoo Rd On	57	18	24	21	24	99	99	**49**
34	0.65	Canyon Rd Off	143	48	84	78	63	154	138	**101**
35	0.62	I-405 Off	145	51	135	98	115	142	78	**109**
Total	**67.69**	**Total Time**	**5166**	**4676**	**4681**	**4925**	**5011**	**5154**	**4998**	**4944**
Average Speed (in mph)										
1	0.00	US 101 Off	-	-	-	-	-	-	-	-
2	0.36	US 101 On	39.6	39.6	43.6	39.6	36.3	40.9	39.6	**39.9**
3	18.33	Jewell Jct (OR 103) Off	47.0	49.3	50.0	47.6	47.0	49.3	48.1	**48.3**
4	21.01	Staleys Jct Off	48.8	48.9	52.4	49.3	46.6	47.2	49.6	**48.9**
5	3.86	Davies Jct Off	52.6	55.2	56.5	52.1	53.2	56.5	55.8	**54.6**
6	3.88	Wilson River Hwy (OR 6) Off	54.2	58.2	58.2	52.9	58.2	59.7	58.2	**57.1**
7	0.22	Wilson River Hwy (OR 6) On	53.9	53.9	67.3	53.9	67.3	53.9	67.3	**59.6**
8	1.57	Dersham Rd Off	55.4	62.8	60.7	52.3	60.7	60.7	58.8	**58.8**
9	0.36	Dersham Rd On	54.2	61.9	61.9	54.2	61.9	61.9	61.9	**59.7**
10	1.62	Glencoe Rd Off	57.3	60.8	59.0	54.1	55.6	59.0	57.3	**57.6**
11	0.32	Glencoe Rd On	55.3	64.6	55.3	55.3	55.3	55.3	55.3	**56.7**
12	1.72	Jackson School Rd On	55.8	62.6	60.7	55.8	54.8	59.0	55.8	**57.8**
13	1.81	Shute Off	57.1	60.3	60.3	54.3	54.3	60.3	58.7	**57.9**
14	0.45	Shute On	54.4	60.5	60.5	54.4	54.4	54.4	54.4	**56.2**
15	0.81	Cornelius Pass Off	53.8	60.6	57.0	60.6	53.8	60.6	57.0	**57.6**
16	0.28	Cornelius Pass On	66.2	55.2	66.2	55.2	66.2	66.2	66.2	**63.1**
17	0.36	Cornelius Pass On	53.9	61.6	53.9	61.6	53.9	61.6	53.9	**57.2**
18	1.21	185th Off	58.2	58.2	60.6	60.6	53.8	55.9	60.6	**58.3**
19	0.67	185th On	57.0	61.4	61.4	57.0	47.0	27.5	57.0	**52.6**
20	0.73	Bethany Off	55.1	58.7	58.7	58.7	46.4	35.2	46.4	**51.3**
21	0.79	Cornell On	56.0	50.1	56.0	52.9	52.9	47.6	56.0	**53.1**
22	0.76	Murray Off	56.8	53.4	53.4	56.8	53.4	36.3	53.4	**51.9**
23	0.45	Murray On	53.4	59.3	59.3	53.4	53.4	59.3	53.4	**56.0**
24	0.73	Cedar Hills Off	58.4	58.4	58.4	54.8	54.8	54.8	54.8	**56.3**
25	0.54	Cedar Hills On	54.3	54.3	50.1	50.1	50.1	54.3	54.3	**52.5**
26	0.35	OR 217 Off	52.2	59.7	52.2	52.2	59.7	69.7	52.2	**56.9**
27	0.15	Baltic Off	59.5	59.5	59.5	59.5	59.5	59.5	59.5	**59.5**
28	0.28	OR 217 On	56.2	56.2	67.4	48.2	56.2	56.2	56.2	**56.7**
29	1.22	Sylvan Off	52.1	54.0	56.1	54.0	54.0	56.1	54.0	**54.3**
30	0.44	Canyon Rd On	43.7	58.3	58.3	52.4	58.3	58.3	58.3	**55.3**
31	0.35	Skyline Blvd On	20.7	59.2	51.8	37.7	51.8	51.8	51.8	**46.4**
32	0.52	Zoo Rd Off	20.0	51.7	47.8	41.4	41.4	27.0	18.8	**35.5**
33	0.28	Zoo Rd On	17.6	55.6	41.7	47.6	41.7	10.1	10.1	**32.1**
34	0.65	Canyon Rd Off	16.5	49.1	28.1	30.2	37.4	15.3	17.1	**27.7**
35	0.62	I-405 Off	15.4	43.7	16.5	22.8	19.4	15.7	28.6	**23.2**
Total	**67.69**	**Average Speed**	**48.9**	**56.4**	**54.7**	**51.3**	**52.1**	**49.9**	**51.2**	**52.1**
		Legend	≥ 50 mph	50 - 35 mph	35 - 20 mph	< 20 mph				

Date	Thurs 8.06.09	Tues 7.28.09	Tues 7.21.09	Thurs 8.13.09	Tues 8.18.09	Wed 8.05.09	Thurs 8.06.09
Time	14:00	14:30	15:15	16:00	16:00	16:30	17:00
Lane	Left Lane	Left Lane	Right Lane	Right Lane	Right Lane	Left Lane	Left Lane
Log Data	Weather: cloudy, dry. Incident: Klootchy Creek Hwy Road painting; RL closed for ~2 miles near David Douglas Park	Weather: sunny, dry	Weather: sunny, dry	Weather: sunny, dry	Weather: sunny, dry	Weather: sunny, dry. Incident: Exit 67 Police citing vehicle, causing RL traffic to switch to LL	Weather: cloudy, dry

US 26 (PM)

Westbound: I-405 to US 101
(2:00 - 3:30pm)

ODOT Data Collected on various days over in 2009

US 26 Westbound Travel Time Data
Summer 2009 PM Peak

Node #	Distance (Miles)	Node Names	Tues 8.18.09 2:00 Left Lane	Tues 7.21.09 2:00 Right Lane	Thurs 8.13.09 2:30 Left Lane	Wed 8.05.09 3:00 Left Lane	Thurs 8.06.09 3:30 Left Lane	Average
Travel Time (in seconds)								
1	0.00	I-405 Off	-	-	-	-	-	-
2	0.32	I-405 On	27	36	72	57	27	**44**
3	0.37	Canyon Rd On	36	33	39	35	33	**35**
4	0.90	Zoo Rd Off	65	60	60	69	66	**64**
5	0.40	Zoo Rd On	27	33	27	24	27	**28**
6	0.48	Skyline Blvd Off	33	33	33	42	36	**35**
7	0.25	Canyon Rd Off	18	18	18	12	18	**17**
8	0.56	Sylvan On	36	42	42	42	39	**40**
9	1.14	Barnes Rd Off	69	69	72	69	69	**70**
10	0.21	OR 217 Off	15	15	15	12	15	**14**
11	0.40	Cedar Hills Off	24	24	27	27	24	**25**
12	0.35	Cedar Hills On	21	21	21	21	24	**22**
13	0.55	Cedar Hills On	33	33	36	36	36	**35**
14	0.52	Murray Off	30	27	30	33	33	**31**
15	0.48	Murray On	30	33	30	30	33	**31**
16	0.75	Cornell Off	45	48	48	48	48	**47**
17	0.81	Bethany On	51	51	48	48	84	**56**
18	0.84	185th Off	54	57	54	55	66	**57**
19	0.50	185th On	33	30	33	30	30	**31**
20	1.32	Cornelius Pass Off	78	90	78	81	81	**82**
21	0.59	Cornelius Pass On	36	36	36	39	36	**37**
22	0.83	Helvetia Rd Off	51	54	51	54	51	**52**
23	0.46	Helvetia Rd On	27	30	30	27	30	**29**
24	1.79	Jackson School Rd Off	111	117	114	111	111	**113**
25	1.68	Glencoe Rd Off	105	96	108	105	102	**103**
26	0.32	Glencoe Rd On	21	18	21	21	21	**20**
27	1.63	Dersham Rd Off	105	90	111	105	111	**104**
28	0.36	Dersham Rd On	24	18	24	24	24	**23**
29	1.54	Wilson River Hwy (OR 6) Off	102	87	102	105	105	**100**
30	0.35	Wilson River Hwy (OR 6) On	21	21	21	24	24	**22**
31	4.15	Davies Jct On	279	258	276	276	267	**271**
32	3.36	Staleys Jct Off	231	249	228	228	237	**235**
33	21.09	Jewell Jct (OR 103) Off	1548	1529	1552	1527	1618	**1555**
34	18.31	US 101 Off	1391	1353	1590	1446	1436	**1443**
35	0.21	US 101 On	21	15	15	15	18	**17**
Total	**67.81**	**Total Time**	**4798**	**4724**	**5062**	**4878**	**4980**	**4888**
Average Speed (in mph)								
1	0.00	I-405 Off	-	-	-	-	-	-
2	0.32	I-405 On	43.1	32.3	16.2	20.4	43.1	**31.0**
3	0.37	Canyon Rd On	37.5	40.9	34.6	38.5	40.9	**38.5**
4	0.90	Zoo Rd Off	49.7	53.9	53.9	46.8	49.0	**50.6**
5	0.40	Zoo Rd On	53.7	43.9	53.7	60.4	53.7	**53.1**
6	0.48	Skyline Blvd Off	52.1	52.1	52.1	41.0	47.8	**49.0**
7	0.25	Canyon Rd Off	50.0	50.0	50.0	75.0	50.0	**55.0**
8	0.56	Sylvan On	55.6	47.7	47.7	47.7	51.3	**50.0**
9	1.14	Barnes Rd Off	59.7	59.7	57.2	59.7	59.7	**59.2**
10	0.21	OR 217 Off	49.9	49.9	49.9	62.4	49.9	**52.4**
11	0.40	Cedar Hills Off	60.7	60.7	54.0	54.0	60.7	**58.0**
12	0.35	Cedar Hills On	59.7	59.7	59.7	59.7	52.2	**58.2**
13	0.55	Cedar Hills On	59.5	59.5	54.6	54.6	54.6	**56.5**
14	0.52	Murray Off	61.9	68.7	61.9	56.2	56.2	**61.0**
15	0.48	Murray On	57.2	52.0	57.2	57.2	52.0	**55.1**
16	0.75	Cornell Off	60.0	56.3	56.3	56.3	56.3	**57.0**
17	0.81	Bethany On	57.5	57.5	61.1	61.1	34.9	**54.4**
18	0.84	185th Off	55.8	52.8	55.8	54.7	45.6	**52.9**
19	0.50	185th On	54.6	60.1	54.6	60.1	60.1	**57.9**
20	1.32	Cornelius Pass Off	60.7	52.6	60.7	58.5	58.5	**58.2**
21	0.59	Cornelius Pass On	59.1	59.1	59.1	54.5	59.1	**58.2**
22	0.83	Helvetia Rd Off	58.8	55.5	58.8	55.5	58.8	**57.5**
23	0.46	Helvetia Rd On	61.5	55.4	55.4	61.5	55.4	**57.8**
24	1.79	Jackson School Rd Off	58.1	55.1	56.5	58.1	58.1	**57.2**
25	1.68	Glencoe Rd Off	57.5	62.9	55.9	57.5	59.2	**58.6**
26	0.32	Glencoe Rd On	55.4	64.7	55.4	55.4	55.4	**57.3**
27	1.63	Dersham Rd Off	55.9	65.2	52.9	55.9	52.9	**56.6**
28	0.36	Dersham Rd On	54.5	72.7	54.5	54.5	54.5	**58.2**
29	1.54	Wilson River Hwy (OR 6) Off	54.4	63.7	54.4	52.8	52.8	**55.6**
30	0.35	Wilson River Hwy (OR 6) On	59.8	59.8	59.8	52.4	52.4	**56.9**
31	4.15	Davies Jct On	53.5	57.9	54.1	54.1	55.9	**55.1**
32	3.36	Staleys Jct Off	52.4	48.6	53.1	53.1	51.0	**51.6**
33	21.09	Jewell Jct (OR 103) Off	49.0	49.7	48.9	49.7	46.9	**48.9**
34	18.31	US 101 Off	47.4	48.7	41.4	45.6	45.9	**45.8**
35	0.21	US 101 On	35.2	49.3	49.3	49.3	41.1	**44.8**
Total	**67.81**	**Average Speed**	**54.5**	**55.3**	**53.0**	**53.9**	**52.2**	**53.8**
		Legend	≥ 50 mph	50 - 35 mph	35 - 20 mph	< 20 mph		

Date	Tues 8.18.09	Tues 7.21.09	Thurs 8.13.09	Wed 8.05.09	Thurs 8.06.09
Time	14:00	14:00	14:30	15:00	15:30
Lane	Left Lane	Right Lane	Left Lane	Left Lane	Left Lane
Log Data	Weather: sunny, dry. Incident: ambulances near Wunsch Rd causing traffic to move to R shoulder	Weather: sunny, dry. Incident: construction 185th to Glencoe and OR 6	Weather: cloudy, dry. Incident: Construction near Creekside Dr.	Weather: cloudy, dry	Weather: cloudy, dry; rainy during middle of run

Appendix D

Crash Data Summaries

DAVID EVANS
AND ASSOCIATES INC.

I-5 Crash Summaries

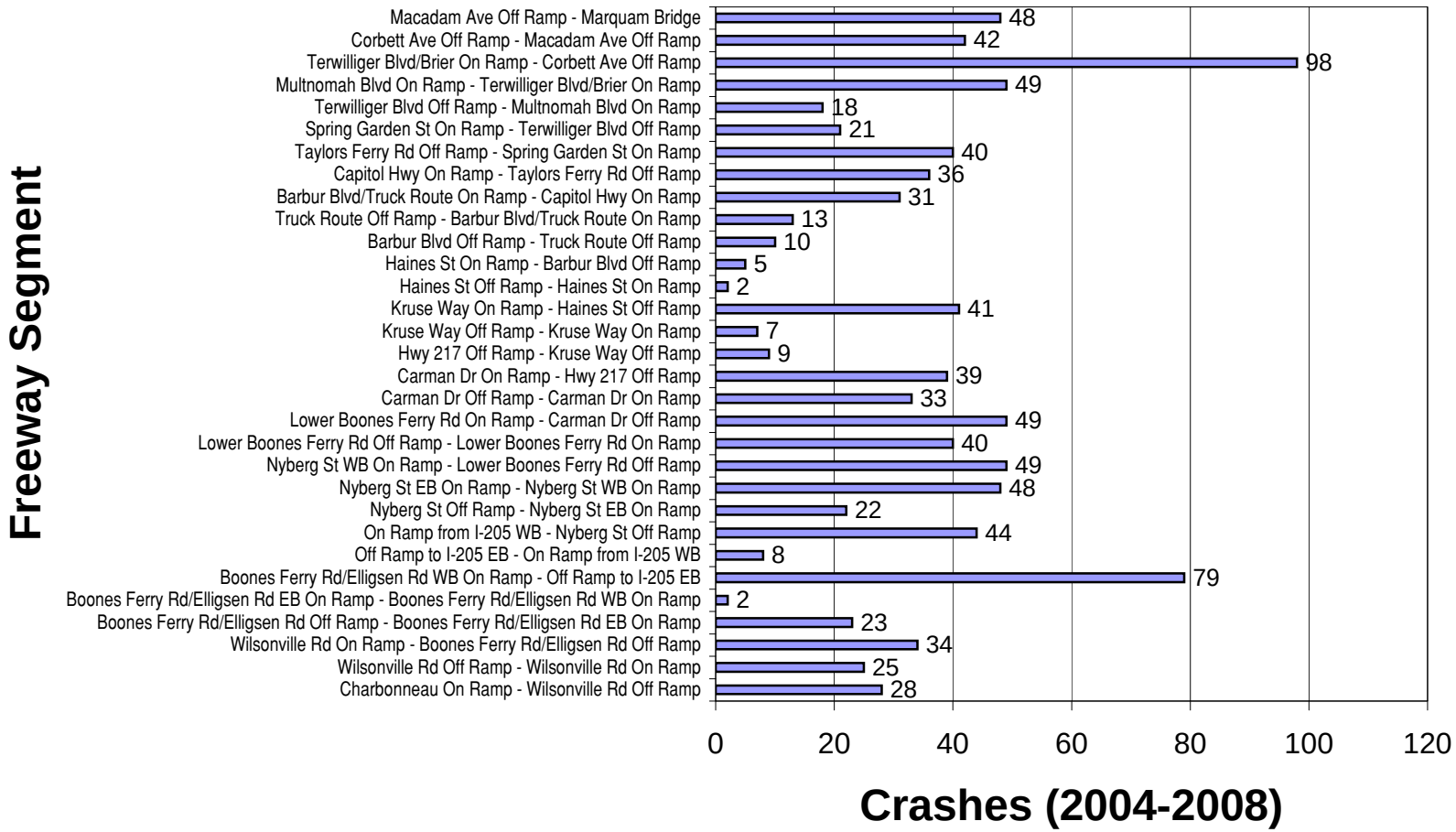
Northbound

Southbound

DAVID EVANS AND ASSOCIATES INC.

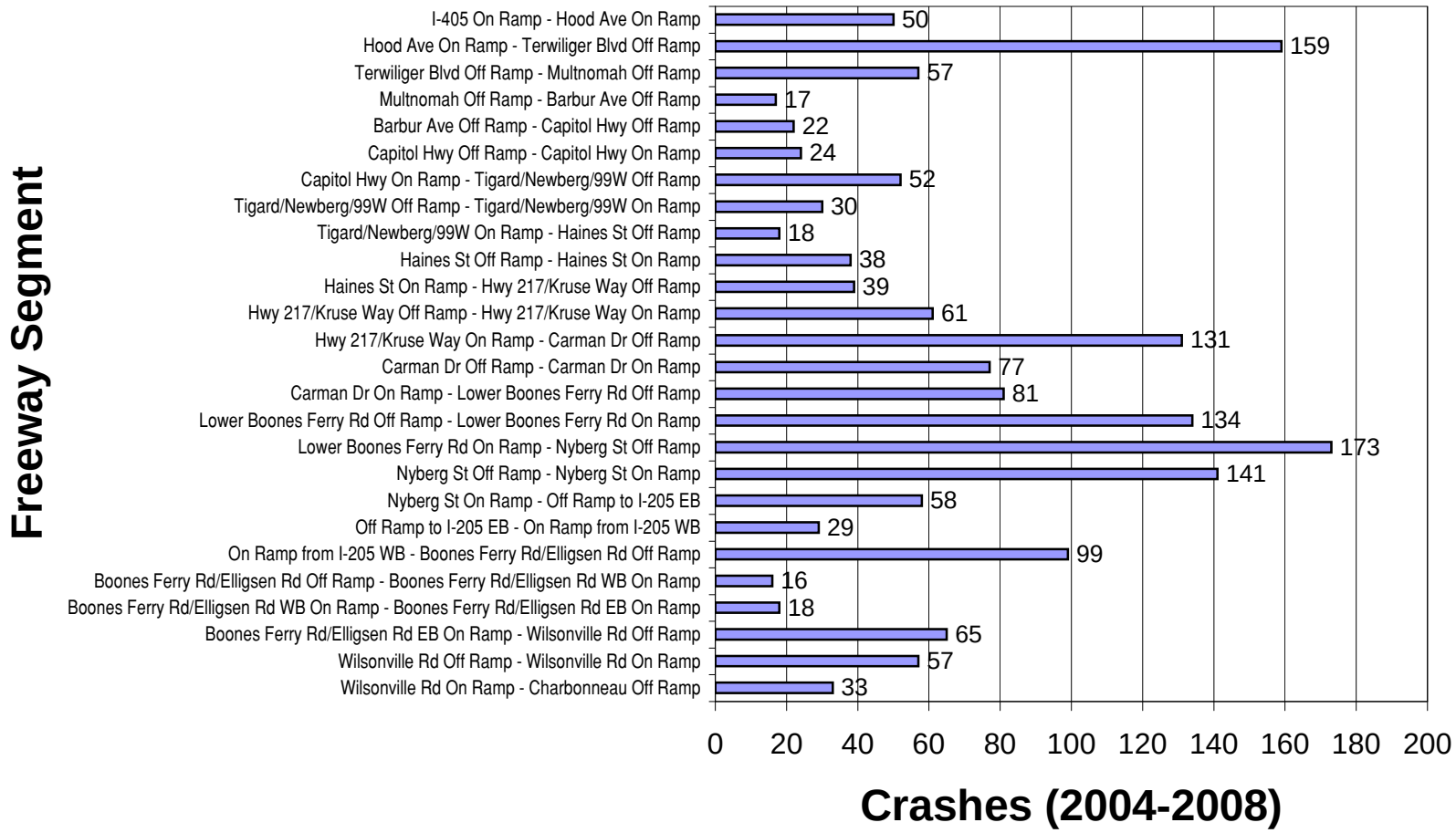
Northbound I-5 Crash Data				Crash Rate							Collision Type												Injury					Surface			
Northbound				Beg MP	End MP	MP Range	NB Crashes	NB Vol	NB Rate	Segment Crash Rate	REAR	SS-O	FIX	OTH	NCOL	TURN	ANGL	SS-M	PED	HEAD	BACK	PARK	FATAL	INJ A	INJ B	INJ C	PDO	WET	DRY	ICE	UNK
Between (Ramp Gore Points)			**Segment Name**				993				864	6	123	0	0	0	0	0	0	0	0	0	3	27	136	272	644	0	0	0	0
Charbonneau On Ramp	282.91	Wilsonville Rd Off Ramp	Charbonneau On Ramp - Wilsonville Rd Off Ramp	282.91	283.73	282. - 283.	28	61750	0.30		21	6	1	0	0	0	0	0	0	0	0	0	0	0	2	7	22	0	0	0	0
Wilsonville Rd Off Ramp	283.73	Wilsonville Rd On Ramp	Wilsonville Rd Off Ramp - Wilsonville Rd On Ramp	283.73	284.08	283. - 284.	25	52890	0.74		24	0	1	0	0	0	0	0	0	0	0	0	0	0	1	3	9	0	0	0	0
Wilsonville Rd On Ramp	284.08	Boones Ferry Rd/Elligsen Rd Off Ramp	Wilsonville Rd On Ramp - Boones Ferry Rd/Elligsen Rd Off Ramp	284.08	285.88	284. - 285.	34	63390	0.16		28	0	6	0	0	0	0	0	0	0	0	0	0	2	8	17	18	0	0	0	0
Boones Ferry Rd/Elligsen Rd Off Ramp	285.88	Boones Ferry Rd/Elligsen Rd EB On Ramp	Boones Ferry Rd/Elligsen Rd Off Ramp - Boones Ferry Rd/Elligsen Rd EB On Ramp	285.88	286.40	285. - 286.	23	58030	0.42	0.22	16	0	7	0	0	0	0	0	0	0	0	0	0	1	2	9	17	0	0	0	0
Boones Ferry Rd/Elligsen Rd EB On Ramp	286.4	Boones Ferry Rd/Elligsen Rd WB On Ramp	Boones Ferry Rd/Elligsen Rd EB On Ramp - Boones Ferry Rd/Elligsen Rd WB On Ramp	286.40	286.47	286. - 286.	2	62670	0.25		2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Boones Ferry Rd/Elligsen Rd WB On Ramp	286.47	Off Ramp to I-205 EB	Boones Ferry Rd/Elligsen Rd WB On Ramp - Off Ramp to I-205 EB	286.47	288.21	286. - 288.	79	69560	0.36		69	0	10	0	0	0	0	0	0	0	0	0	0	2	13	23	55	0	0	0	0
Off Ramp to I-205 EB	288.21	On Ramp from I-205 WB	Off Ramp to I-205 EB - On Ramp from I-205 WB	288.21	288.48	288. - 288.	8	49960	0.32		6	0	2	0	0	0	0	0	0	0	0	0	1	0	0	3	6	0	0	0	0
On Ramp from I-205 WB	288.48	Nyberg St Off Ramp	On Ramp from I-205 WB - Nyberg St Off Ramp	288.48	289.28	288. - 289.	44	71130	0.42		35	0	9	0	0	0	0	0	0	0	0	0	1	3	6	13	34	0	0	0	0
Nyberg St Off Ramp	289.28	Nyberg St EB On Ramp	Nyberg St Off Ramp - Nyberg St EB On Ramp	289.28	289.51	289. - 289.	22	58970	0.89		15	0	7	0	0	0	0	0	0	0	0	0	0	0	3	2	5	0	0	0	0
Nyberg St EB On Ramp	289.51	Nyberg St WB On Ramp	Nyberg St EB On Ramp - Nyberg St WB On Ramp	289.51	289.74	289. - 289.	48	70410	1.62	0.94	44	0	4	0	0	0	0	0	0	0	0	0	0	0	0	2	8	0	0	0	0
Nyberg St WB On Ramp	289.74	Lower Boones Ferry Rd Off Ramp	Nyberg St WB On Ramp - Lower Boones Ferry Rd Off Ramp	289.74	290.28	289. - 290.	49	77690	0.64		42	0	7	0	0	0	0	0	0	0	0	0	0	0	6	15	38	0	0	0	0
Lower Boones Ferry Rd Off Ramp	290.28	Lower Boones Ferry Rd On Ramp	Lower Boones Ferry Rd Off Ramp - Lower Boones Ferry Rd On Ramp	290.28	290.75	290. - 290.	40	65240	0.71		36	0	4	0	0	0	0	0	0	0	0	0	0	1	3	11	5	0	0	0	0
Lower Boones Ferry Rd On Ramp	290.75	Carman Dr Off Ramp	Lower Boones Ferry Rd On Ramp - Carman Dr Off Ramp	290.75	291.09	290. - 291.	49	78310	1.01		40	0	9	0	0	0	0	0	0	0	0	0	0	2	13	11	37	0	0	0	0
Carman Dr Off Ramp	291.09	Carman Dr On Ramp	Carman Dr Off Ramp - Carman Dr On Ramp	291.09	291.58	291. - 291.	33	70990	0.52		32	0	1	0	0	0	0	0	0	0	0	0	0	1	3	8	10	0	0	0	0
Carman Dr On Ramp	291.58	Hwy 217 Off Ramp	Carman Dr On Ramp - Hwy 217 Off Ramp	291.58	291.95	291. - 291.	39	78170	0.74		36	0	3	0	0	0	0	0	0	0	0	0	0	2	9	12	33	0	0	0	0
Hwy 217 Off Ramp	291.95	Kruse Way Off Ramp	Hwy 217 Off Ramp - Kruse Way Off Ramp	291.95	292.12	291. - 292.	9	47790	0.61		6	0	3	0	0	0	0	0	0	0	0	0	0	0	2	2	8	0	0	0	0
Kruse Way Off Ramp	292.12	Kruse Way On Ramp	Kruse Way Off Ramp - Kruse Way On Ramp	292.12	292.49	292. - 292.	7	41720	0.25		6	0	1	0	0	0	0	0	0	0	0	0	0	0	0	4	5	0	0	0	0
Kruse Way On Ramp	292.49	Haines St Off Ramp	Kruse Way On Ramp - Haines St Off Ramp	292.49	292.91	292. - 292.	41	54340	0.98		38	0	3	0	0	0	0	0	0	0	0	0	0	0	3	4	11	0	0	0	0
Haines St Off Ramp	292.91	Haines St On Ramp	Haines St Off Ramp - Haines St On Ramp	292.91	293.16	292. - 293.	2	50130	0.09		2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Haines St On Ramp	293.16	Barbur Blvd Off Ramp	Haines St On Ramp - Barbur Blvd Off Ramp	293.16	293.36	293. - 293.	5	52900	0.26		4	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2	3	0	0	0	0
Barbur Blvd Off Ramp	293.36	Truck Route Off Ramp	Barbur Blvd Off Ramp - Truck Route Off Ramp	293.36	293.62	293. - 293.	10	47530	0.44		7	0	3	0	0	0	0	0	0	0	0	0	0	0	3	5	8	0	0	0	0
Truck Route Off Ramp	293.62	Barbur Blvd/Truck Route On Ramp	Truck Route Off Ramp - Barbur Blvd/Truck Route On Ramp	293.62	294.05	293. - 294.	13	47530	0.35		12	0	1	0	0	0	0	0	0	0	0	0	0	0	2	3	13	0	0	0	0
Barbur Blvd/Truck Route On Ramp	294.05	Capitol Hwy On Ramp	Barbur Blvd/Truck Route On Ramp - Capitol Hwy On Ramp	294.05	295.21	294. - 295.	31	58320	0.25		26	0	5	0	0	0	0	0	0	0	0	0	0	0	5	7	35	0	0	0	0
Capitol Hwy On Ramp	295.21	Taylors Ferry Rd Off Ramp	Capitol Hwy On Ramp - Taylors Ferry Rd Off Ramp	295.21	295.53	295. - 295.	36	64950	0.95	0.50	35	0	1	0	0	0	0	0	0	0	0	0	0	1	6	16	22	0	0	0	0
Taylors Ferry Rd Off Ramp	295.53	Spring Garden St On Ramp	Taylors Ferry Rd Off Ramp - Spring Garden St On Ramp	295.53	296.32	295. - 296.	40	62130	0.45		36	0	4	0	0	0	0	0	0	0	0	0	0	1	5	16	24	0	0	0	0
Spring Garden St On Ramp	296.32	Terwilliger Blvd Off Ramp	Spring Garden St On Ramp - Terwilliger Blvd Off Ramp	296.32	296.60	296. - 296.	21	64190	0.64		19	0	2	0	0	0	0	0	0	0	0	0	0	2	2	9	12	0	0	0	0
Terwilliger Blvd Off Ramp	296.6	Multnomah Blvd On Ramp	Terwilliger Blvd Off Ramp - Multnomah Blvd On Ramp	296.60	296.96	296. - 296.	18	59490	0.46		16	0	2	0	0	0	0	0	0	0	0	0	0	0	5	6	13	0	0	0	0
Multnomah Blvd On Ramp	296.96	Terwilliger Blvd/Brier On Ramp	Multnomah Blvd On Ramp - Terwilliger Blvd/Brier On Ramp	296.96	297.33	296. - 297.	49	65800	1.10		44	0	5	0	0	0	0	0	0	0	0	0	0	3	5	12	41	0	0	0	0
Terwilliger Blvd/Brier On Ramp	297.33	Corbett Ave Off Ramp	Terwilliger Blvd/Brier On Ramp - Corbett Ave Off Ramp	297.33	298.75	297. - 298.	98	74090	0.51		85	0	13	0	0	0	0	0	0	0	0	0	0	4	16	26	75	0	0	0	0
Corbett Ave Off Ramp	298.75	Macadam Ave Off Ramp	Corbett Ave Off Ramp - Macadam Ave Off Ramp	298.75	299.17	298. - 299.	42	70610	0.78		37	0	5	0	0	0	0	0	0	0	0	0	1	0	4	11	33	0	0	0	0
Macadam Ave Off Ramp	299.17	Marquam Bridge	Macadam Ave Off Ramp - Marquam Bridge	299.17	300.00	299. - 300	48	65140	0.49		45	0	3	0	0	0	0	0	0	0	0	0	0	2	7	12	42	0	0	0	0

Northbound I-5: Crashes By Freeway Segment



Southbound I-5 Crash Data				Crash Rate							Collision Type													Injury					Surface			
Southbound				Beg MP	End MP	MP Range	SB Crashes	SB Vol	SB Rate	Segment Crash Rate	PARK	REAR	OTH	SS-O	FIX	PARK	NCOL	ANGL	TURN	HEAD	BACK	PED	SS-M	FATAL	INJ A	INJ B	INJ C	PDO	WET	DRY	ICE	UNK
Between (Ramp Gore Points)			**Segment Name**				1679				0	1056	28	230	174	0	18	13	134	5	11	8	2	7	37	183	498	954	0	0	0	0
I-405 On Ramp	299.56	Hood Ave On Ramp	I-405 On Ramp - Hood Ave On Ramp	299.56	299.25	299. - 299.	50	62040	1.42		0	30	0	12	6	0	0	0	2	0	0	0	0	1	1	6	7	35	0	0	0	0
Hood Ave On Ramp	299.25	Terwiliger Blvd Off Ramp	Hood Ave On Ramp - Terwiliger Blvd Off Ramp	299.25	297.31	299. - 297.	159	70960	0.63		0	109	1	33	14	0	0	0	0	1	1	0	0	0	3	15	41	100	0	0	0	0
Terwiliger Blvd Off Ramp	297.31	Multnomah Off Ramp	Terwiliger Blvd Off Ramp - Multnomah Off Ramp	297.31	296.68	297. - 296.	57	63470	0.78		0	35	1	10	11	0	0	0	0	0	0	0	0	1	1	5	13	37	0	0	0	0
Multnomah Off Ramp	296.68	Barbur Ave Off Ramp	Multnomah Off Ramp - Barbur Ave Off Ramp	296.68	296.30	296. - 296.	17	58540	0.42		0	10	0	6	0	0	0	0	0	0	1	0	0	0	0	0	4	13	0	0	0	0
Barbur Ave Off Ramp	296.30	Capitol Hwy Off Ramp	Barbur Ave Off Ramp - Capitol Hwy Off Ramp	296.30	295.19	296. - 295.	22	55910	0.19		0	14	1	3	2	0	0	0	1	0	0	1	0	0	2	5	3	12	0	0	0	0
Capitol Hwy Off Ramp	295.19	Capitol Hwy On Ramp	Capitol Hwy Off Ramp - Capitol Hwy On Ramp	295.19	294.86	295. - 294.	24	50700	0.79		0	14	0	5	3	0	0	0	0	1	1	0	0	0	0	1	8	15	0	0	0	0
Capitol Hwy On Ramp	294.86	Tigard/Newberg/99W Off Ramp	Capitol Hwy On Ramp - Tigard/Newberg/99W Off Ramp	294.86	294.01	294. - 294.	52	61870	0.54		0	28	0	14	6	0	1	1	1	0	1	0	0	0	0	4	12	36	0	0	0	0
Tigard/Newberg/99W Off Ramp	294.01	Tigard/Newberg/99W On Ramp	Tigard/Newberg/99W Off Ramp - Tigard/Newberg/99W On Ramp	294.01	293.56	294. - 293.	30	48790	0.75		0	10	1	6	8	0	1	2	1	1	0	0	0	0	1	4	6	19	0	0	0	0
Tigard/Newberg/99W On Ramp	293.56	Haines St Off Ramp	Tigard/Newberg/99W On Ramp - Haines St Off Ramp	293.56	293.30	293. - 293.	18	51990	0.73		0	9	0	2	4	0	0	1	1	0	1	0	0	0	0	2	5	11	0	0	0	0
Haines St Off Ramp	293.30	Haines St On Ramp	Haines St Off Ramp - Haines St On Ramp	293.30	292.86	293. - 292.	38	48040	0.99		0	27	1	1	3	0	0	0	5	1	0	0	0	1	0	1	9	27	0	0	0	0
Haines St On Ramp	292.86	Hwy 217/Kruse Way Off Ramp	Haines St On Ramp - Hwy 217/Kruse Way Off Ramp	292.86	292.41	292. - 292.	39	53240	0.89		0	29	0	3	6	0	0	0	1	0	0	0	0	0	0	8	12	19	0	0	0	0
Hwy 217/Kruse Way Off Ramp	292.41	Hwy 217/Kruse Way On Ramp	Hwy 217/Kruse Way Off Ramp - Hwy 217/Kruse Way On Ramp	292.41	291.95	292. - 291.	61	43980	1.65		0	27	2	5	24	0	1	1	0	0	1	0	0	0	6	11	13	31	0	0	0	0
Hwy 217/Kruse Way On Ramp	291.95	Carman Dr Off Ramp	Hwy 217/Kruse Way On Ramp - Carman Dr Off Ramp	291.95	291.50	291. - 291.	131	78010	2.04	1.50	0	105	1	15	7	0	1	0	2	0	0	0	0	0	0	21	50	60	0	0	0	0
Carman Dr Off Ramp	291.50	Carman Dr On Ramp	Carman Dr Off Ramp - Carman Dr On Ramp	291.50	291.02	291. - 291.	77	69890	1.26		0	51	2	4	3	0	2	1	13	0	1	0	0	0	1	6	26	44	0	0	0	0
Carman Dr On Ramp	291.02	Lower Boones Ferry Rd Off Ramp	Carman Dr On Ramp - Lower Boones Ferry Rd Off Ramp	291.02	290.70	291. - 290.	81	64430	2.15		0	65	1	5	4	0	2	0	4	0	0	0	0	0	2	8	26	45	0	0	0	0
Lower Boones Ferry Rd Off Ramp	290.70	Lower Boones Ferry Rd On Ramp	Lower Boones Ferry Rd Off Ramp - Lower Boones Ferry Rd On Ramp	290.70	290.25	290. - 290.	134	75410	2.16	2.45	0	71	2	10	5	0	0	1	42	0	1	2	0	0	3	17	41	73	0	0	0	0
Lower Boones Ferry Rd On Ramp	290.25	Nyberg St Off Ramp	Lower Boones Ferry Rd On Ramp - Nyberg St Off Ramp	290.25	289.67	290. - 289.	173	57780	2.83		0	120	4	18	11	0	1	2	13	0	2	2	0	1	6	20	61	85	0	0	0	0
Nyberg St Off Ramp	289.67	Nyberg St On Ramp	Nyberg St Off Ramp - Nyberg St On Ramp	289.67	289.27	289. - 289.	141	67390	2.87		0	89	2	17	4	0	0	1	24	1	1	1	1	0	2	15	45	79	0	0	0	0
Nyberg St On Ramp	289.27	Off Ramp to I-205 EB	Nyberg St On Ramp - Off Ramp to I-205 EB	289.27	288.97	289. - 288.	58	46270	2.29		0	41	1	9	3	0	2	0	2	0	0	0	0	0	1	3	16	38	0	0	0	0
Off Ramp to I-205 EB	288.97	On Ramp from I-205 WB	Off Ramp to I-205 EB - On Ramp from I-205 WB	288.97	288.21	288. - 288.	29	67120	0.31		0	20	1	7	1	0	0	0	0	0	0	0	0	0	0	5	12	12	0	0	0	0
On Ramp from I-205 WB	288.21	Boones Ferry Rd/Elligsen Rd Off Ramp	On Ramp from I-205 WB - Boones Ferry Rd/Elligsen Rd Off Ramp	288.21	286.47	288. - 286.	99	54800	0.57		0	50	4	22	16	0	1	1	5	0	0	0	0	1	2	4	34	58	0	0	0	0
Boones Ferry Rd/Elligsen Rd Off Ramp	286.47	Boones Ferry Rd/Elligsen Rd WB On Ramp	Boones Ferry Rd/Elligsen Rd Off Ramp - Boones Ferry Rd/Elligsen Rd WB On Ramp	286.47	286.35	286. - 286.	16	57190	1.28		0	11	1	1	2	0	0	0	1	0	0	0	0	0	0	2	6	8	0	0	0	0
Boones Ferry Rd/Elligsen Rd WB On Ramp	286.35	Boones Ferry Rd/Elligsen Rd EB On Ramp	Boones Ferry Rd/Elligsen Rd WB On Ramp - Boones Ferry Rd/Elligsen Rd EB On Ramp	286.35	285.93	286. - 285.	18	60810	0.39		0	8	0	6	3	0	0	1	0	0	0	0	0	0	2	3	8	5	0	0	0	0
Boones Ferry Rd/Elligsen Rd EB On Ramp	285.93	Wilsonville Rd Off Ramp	Boones Ferry Rd/Elligsen Rd EB On Ramp - Wilsonville Rd Off Ramp	285.93	284.06	285. - 284.	65	50930	0.37		0	30	2	5	17	0	4	0	4	0	0	2	1	1	3	8	21	32	0	0	0	0
Wilsonville Rd Off Ramp	284.06	Wilsonville Rd On Ramp	Wilsonville Rd Off Ramp - Wilsonville Rd On Ramp	284.06	283.67	284. - 283.	57	60530	1.32		0	34	0	4	6	0	0	1	12	0	0	0	0	0	0	6	12	39	0	0	0	0
Wilsonville Rd On Ramp	283.67	Charbonneau Off Ramp	Wilsonville Rd On Ramp - Charbonneau Off Ramp	283.67	282.86	283. - 282.	33	54300	0.41		0	19	0	7	5	0	2	0	0	0	0	0	0	1	1	3	7	21	0	0	0	0

Southbound I-5: Crashes By Freeway Segment



I-205 Crash Summaries

Northbound

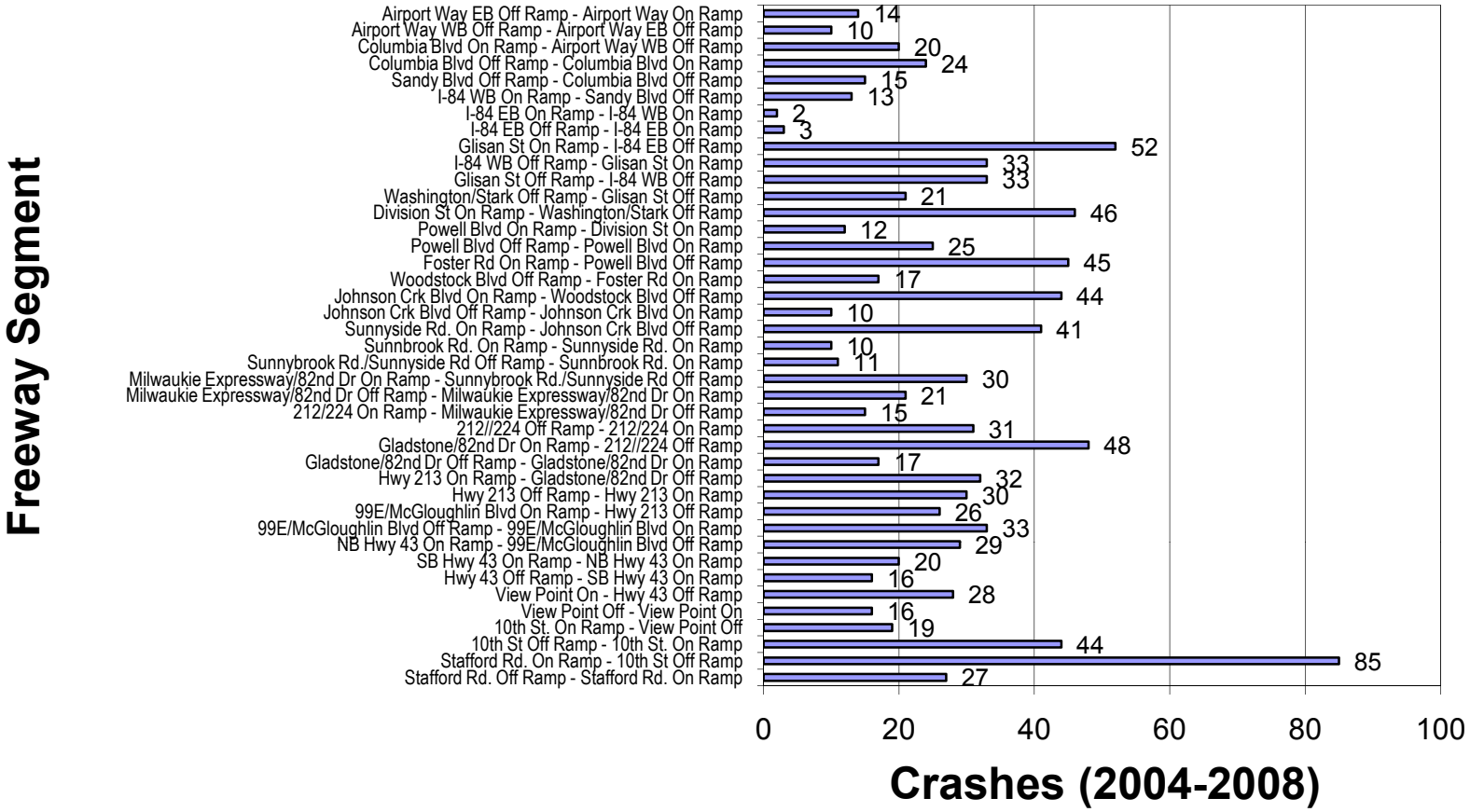
Southbound

DAVID EVANS AND ASSOCIATES INC.

Northbound I-205 Crash Data

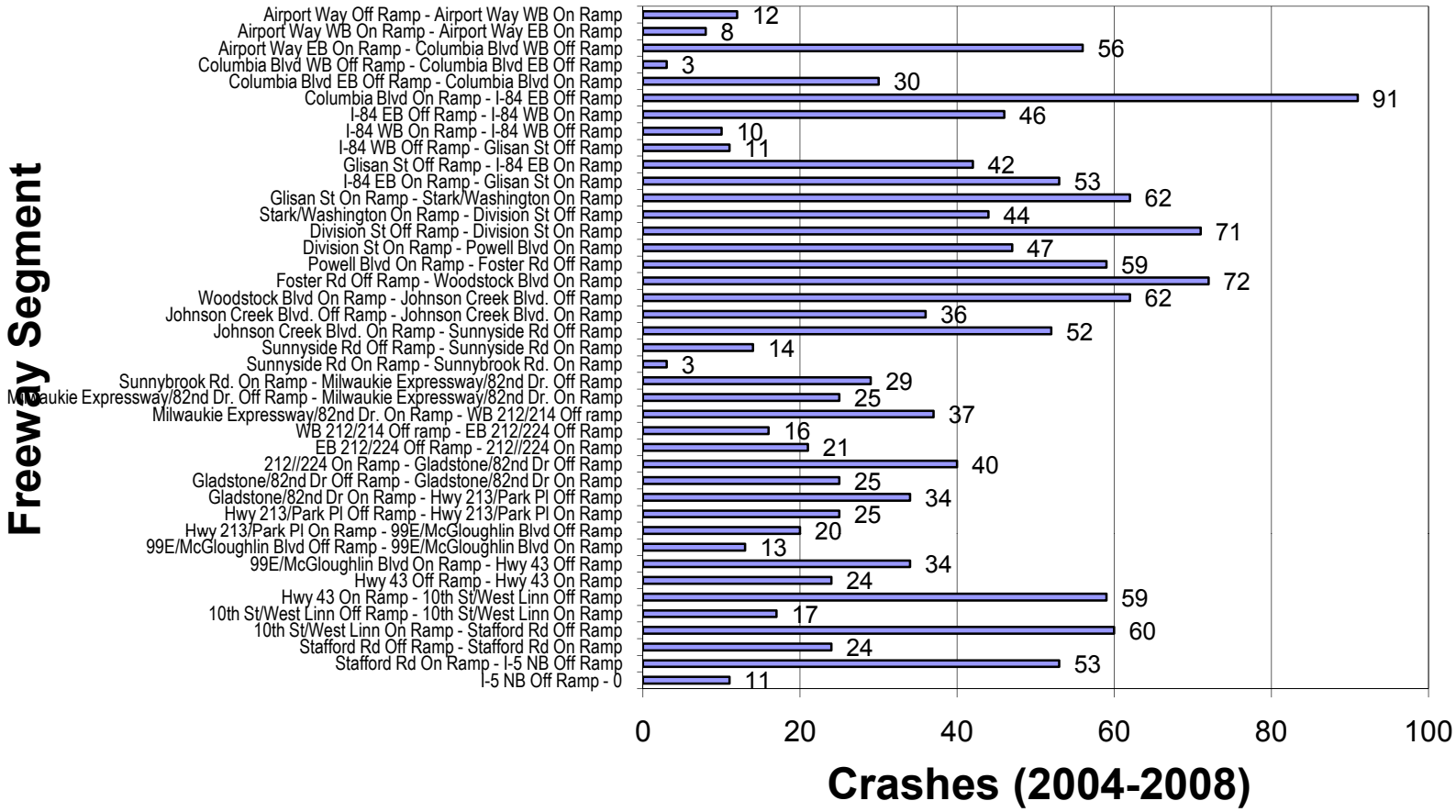
Northbound				Crash Rate							Collision Type													Injury					Surface			
				Beg MP	End MP	MP Range	NB Crashes	NB Vol	NB Rate	Segment Crash Rate	PARK	REAR	OTH	SS-O	FIX	PARK	NCOL	ANGL	TURN	HEAD	BACK	PED	SS-M	FATAL	INJ A	INJ B	INJ C	PDO	WET	DRY	ICE	UNK
Between (Ramp Gore Points)			**Segment Name**				368				1	733	18	171	102	1	23	2	7	5	2	2	1	4	43	151	304	565	349	671	22	13
Stafford Rd. Off Ramp	2.86	Stafford Rd. On Ramp	Stafford Rd. Off Ramp - Stafford Rd. On Ramp	2.86	3.55	2.86 - 3.55	27	37630	0.57		0	21	1	2	2	0	0	1	0	0	0	0	0	0	2	2	11	12	7	19	0	0
Stafford Rd. On Ramp	3.55	10th St Off Ramp	Stafford Rd. On Ramp - 10th St Off Ramp	3.55	6.09	3.55 - 6.09	85	43030	0.43		0	55	3	12	14	0	1	0	0	0	0	0	0	0	6	14	21	44	28	51	3	1
10th St Off Ramp	6.09	10th St. On Ramp	10th St Off Ramp - 10th St. On Ramp	6.09	6.88	6.09 - 6.88	44	39110	0.78		0	32	0	2	10	0	0	0	0	0	0	0	0	0	3	6	12	23	18	25	1	0
10th St. On Ramp	6.88	View Point Off	10th St. On Ramp - View Point Off	6.88	7.48	6.88 - 7.48	19	45370	0.38		0	15	1	2	1	0	0	0	0	0	0	0	0	0	1	5	7	6	3	13	2	1
View Point Off	7.48	View Point On	View Point Off - View Point On	7.48	7.95	7.48 - 7.95	16	44980	0.41		0	13	1	1	0	0	1	0	0	0	0	0	0	0	1	4	6	5	5	10	1	0
View Point On	7.95	Hwy 43 Off Ramp	View Point On - Hwy 43 Off Ramp	7.95	8.50	7.95 - 8.5	28	45370	0.61		0	24	1	1	2	0	0	0	0	0	0	0	0	0	0	2	8	18	10	18	0	0
Hwy 43 Off Ramp	8.5	SB Hwy 43 On Ramp	Hwy 43 Off Ramp - SB Hwy 43 On Ramp	8.50	8.88	8.5 - 8.88	16	41820	0.55		0	12	0	2	1	0	1	0	0	0	0	0	0	0	1	1	7	7	5	11	0	0
SB Hwy 43 On Ramp	8.88	NB Hwy 43 On Ramp	SB Hwy 43 On Ramp - NB Hwy 43 On Ramp	8.88	9.03	8.88 - 9.03	20	48060	1.52		0	14	0	2	4	0	0	0	0	0	0	0	0	0	0	5	4	11	4	16	0	0
NB Hwy 43 On Ramp	9.03	99E/McGloughlin Blvd Off Ramp	NB Hwy 43 On Ramp - 99E/McGloughlin Blvd Off Ramp	9.03	9.23	9.03 - 9.23	29	50850	1.56		0	24	0	3	2	0	0	0	0	0	0	0	0	0	1	5	9	14	4	25	0	0
99E/McGloughlin Blvd Off Ramp	9.23	99E/McGloughlin Blvd On Ramp	99E/McGloughlin Blvd Off Ramp - 99E/McGloughlin Blvd On Ramp	9.23	9.52	9.23 - 9.52	33	44510	1.40		0	26	0	3	2	0	1	0	0	1	0	0	0	0	2	7	8	16	11	22	0	0
99E/McGloughlin Blvd On Ramp	9.52	Hwy 213 Off Ramp	99E/McGloughlin Blvd On Ramp - Hwy 213 Off Ramp	9.52	9.99	9.52 - 9.99	26	60670	0.50		0	17	0	3	5	0	1	0	0	0	0	0	0	0	0	4	7	15	12	13	0	1
Hwy 213 Off Ramp	9.99	Hwy 213 On Ramp	Hwy 213 Off Ramp - Hwy 213 On Ramp	9.99	10.46	9.99 - 10.4	30	49990	0.70		0	18	0	8	3	0	1	0	0	0	0	0	0	0	0	4	8	18	11	18	1	0
Hwy 213 On Ramp	10.46	Gladstone/82nd Dr Off Ramp	Hwy 213 On Ramp - Gladstone/82nd Dr Off Ramp	10.46	10.83	10.4 - 10.8	32	73540	0.64		0	22	0	3	5	0	1	0	1	0	0	0	0	0	0	9	9	14	20	11	1	0
Gladstone/82nd Dr Off Ramp	10.83	Gladstone/82nd Dr On Ramp	Gladstone/82nd Dr Off Ramp - Gladstone/82nd Dr On Ramp	10.83	11.13	10.8 - 11.1	17	59510	0.52		0	13	0	4	0	0	0	0	0	0	0	0	0	0	1	2	7	7	4	13	0	0
Gladstone/82nd Dr On Ramp	11.13	212//224 Off Ramp	Gladstone/82nd Dr On Ramp - 212//224 Off Ramp	11.13	12.47	11.1 - 12.4	48	63800	0.31		1	30	0	9	6	1	0	0	1	0	0	0	0	0	2	6	14	25	17	27	0	2
212//224 Off Ramp	12.47	212/224 On Ramp	212//224 Off Ramp - 212/224 On Ramp	12.47	12.94	12.4 - 12.9	31	54940	0.66		0	22	1	7	1	0	0	0	0	0	0	0	0	0	0	6	9	16	12	18	0	0
212/224 On Ramp	12.94	Milwaukie Expressway/82nd Dr Off Ramp	212/224 On Ramp - Milwaukie Expressway/82nd Dr Off Ramp	12.94	13.11	12.9 - 13.1	15	66610	0.73		0	11	0	1	1	0	2	0	0	0	0	0	0	0	0	4	3	8	5	9	1	0
Milwaukie Expressway/82nd Dr Off Ramp	13.11	Milwaukie Expressway/82nd Dr On Ramp	Milwaukie Expressway/82nd Dr Off Ramp - Milwaukie Expressway/82nd Dr On Ramp	13.11	13.60	13.1 - 13.6	21	49970	0.47		0	14	0	5	0	0	1	0	0	1	0	0	0	0	0	6	5	10	7	13	0	0
Milwaukie Expressway/82nd Dr On Ramp	13.6	Sunnybrook Rd./Sunnyside Rd Off Ramp	Milwaukie Expressway/82nd Dr On Ramp - Sunnybrook Rd./Sunnyside Rd Off Ramp	13.60	14.27	13.6 - 14.2	30	58410	0.42		0	19	0	4	5	0	1	1	0	0	0	0	0	0	0	5	9	16	8	19	1	0
Sunnybrook Rd./Sunnyside Rd Off Ramp	14.27	Sunnbrook Rd. On Ramp	Sunnybrook Rd./Sunnyside Rd Off Ramp - Sunnbrook Rd. On Ramp	14.27	14.50	14.2 - 14.5	11	49860	0.53	0.44	0	5	1	3	1	0	1	0	0	0	0	0	0	0	0	3	3	5	6	5	0	0
Sunnbrook Rd. On Ramp	14.5	Sunnyside Rd. On Ramp	Sunnbrook Rd. On Ramp - Sunnyside Rd. On Ramp	14.50	14.79	14.5 - 14.7	10	51200	0.37		0	7	0	1	1	0	1	0	0	0	0	0	0	0	1	1	3	5	7	3	0	0
Sunnyside Rd. On Ramp	14.79	Johnson Crk Blvd Off Ramp	Sunnyside Rd. On Ramp - Johnson Crk Blvd Off Ramp	14.79	15.89	14.7 - 15.8	41	64330	0.32		0	23	1	4	8	0	4	0	0	0	0	1	0	0	4	8	12	17	11	27	0	2
Johnson Crk Blvd Off Ramp	15.89	Johnson Crk Blvd On Ramp	Johnson Crk Blvd Off Ramp - Johnson Crk Blvd On Ramp	15.89	16.20	15.8 - 16.2	10	56430	0.31		0	6	1	2	0	0	0	0	0	1	0	0	0	1	1	2	3	3	2	8	0	0
Johnson Crk Blvd On Ramp	16.2	Woodstock Blvd Off Ramp	Johnson Crk Blvd On Ramp - Woodstock Blvd Off Ramp	16.20	17.49	16.2 - 17.4	44	71110	0.26	0.26	0	25	1	8	7	0	1	0	0	1	0	0	1	0	1	6	11	26	13	27	3	1
Woodstock Blvd Off Ramp	17.49	Foster Rd On Ramp	Woodstock Blvd Off Ramp - Foster Rd On Ramp	17.49	18.10	17.4 - 18.1	17	61800	0.25		0	10	0	2	4	0	1	0	0	0	0	0	0	0	1	2	3	11	4	12	1	0
Foster Rd On Ramp	18.1	Powell Blvd Off Ramp	Foster Rd On Ramp - Powell Blvd Off Ramp	18.10	18.89	18.1 - 18.8	45	77530	0.40		0	28	1	13	2	0	1	0	0	0	0	0	0	1	2	2	12	28	16	28	0	0
Powell Blvd Off Ramp	18.89	Powell Blvd On Ramp	Powell Blvd Off Ramp - Powell Blvd On Ramp	18.89	19.47	18.8 - 19.4	25	66530	0.36		0	21	0	3	1	0	0	0	0	0	0	0	0	0	2	1	6	16	10	15	0	0
Powell Blvd On Ramp	19.47	Division St On Ramp	Powell Blvd On Ramp - Division St On Ramp	19.47	19.87	19.4 - 19.8	12	76280	0.22	0.42	0	9	0	1	0	0	0	0	1	0	0	1	0	0	2	1	3	6	2	9	0	1
Division St On Ramp	19.87	Washington/Stark Off Ramp	Division St On Ramp - Washington/Stark Off Ramp	19.87	20.33	19.8 - 20.3	46	84170	0.65		0	32	0	8	3	0	1	0	1	0	1	0	0	0	1	4	13	28	13	31	0	2
Washington/Stark Off Ramp	20.33	Glisan St Off Ramp	Washington/Stark Off Ramp - Glisan St Off Ramp	20.33	20.63	20.3 - 20.6	21	73990	0.52		0	18	0	2	0	0	0	0	0	1	0	0	0	1	0	1	7	12	9	10	1	1
Glisan St Off Ramp	20.63	I-84 WB Off Ramp	Glisan St Off Ramp - I-84 WB Off Ramp	20.63	20.99	20.6 - 20.9	33	65500	0.77		0	28	0	5	0	0	0	0	0	0	0	0	0	0	3	4	15	11	16	17	0	0
I-84 WB Off Ramp	20.99	Glisan St On Ramp	I-84 WB Off Ramp - Glisan St On Ramp	20.99	21.49	20.9 - 21.4	33	48090	0.75		0	25	0	5	2	0	0	0	1	0	0	0	0	0	0	6	11	16	10	23	0	0
Glisan St On Ramp	21.49	I-84 EB Off Ramp	Glisan St On Ramp - I-84 EB Off Ramp	21.49	22.22	21.4 - 22.2	52	58720	0.66		0	35	1	10	3	0	1	0	1	0	1	0	0	0	1	4	12	35	15	37	0	0
I-84 EB Off Ramp	22.22	I-84 EB On Ramp	I-84 EB Off Ramp - I-84 EB On Ramp	22.22	22.63	22.2 - 22.6	3	42670	0.09	0.42	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	2	0	0
I-84 EB On Ramp	22.63	I-84 WB On Ramp	I-84 EB On Ramp - I-84 WB On Ramp	22.63	22.86	22.6 - 22.8	2	60220	0.08		0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0
I-84 WB On Ramp	22.86	Sandy Blvd Off Ramp	I-84 WB On Ramp - Sandy Blvd Off Ramp	22.86	23.21	22.8 - 23.2	13	75700	0.27		0	10	0	3	0	0	0	0	0	0	0	0	0	0	0	2	6	5	2	11	0	0
Sandy Blvd Off Ramp	23.21	Columbia Blvd Off Ramp	Sandy Blvd Off Ramp - Columbia Blvd Off Ramp	23.21	23.62	23.2 - 23.6	15	71520	0.28	0.43	0	10	0	4	1	0	0	0	0	0	0	0	0	0	1	3	7	4	2	13	0	0
Columbia Blvd Off Ramp	23.62	Columbia Blvd On Ramp	Columbia Blvd Off Ramp - Columbia Blvd On Ramp	23.62	23.98	23.6 - 23.9	24	57120	0.64		0	15	2	6	1	0	0	0	0	0	0	0	0	1	2	1	2	18	5	17	1	0
Columbia Blvd On Ramp	23.98	Airport Way WB Off Ramp	Columbia Blvd On Ramp - Airport Way WB Off Ramp	23.98	24.26	23.9 - 24.2	20	68350	0.57		0	13	0	6	1	0	0	0	0	0	0	0	0	0	0	2	5	13	7	11	2	0
Airport Way WB Off Ramp	24.26	Airport Way EB Off Ramp	Airport Way WB Off Ramp - Airport Way EB Off Ramp	24.26	24.48	24.2 - 24.4	10	58660	0.42		0	5	0	3	1	0	0	0	1	0	0	0	0	0	0	0	2	8	3	6	0	0
Airport Way EB Off Ramp	24.48	Airport Way On Ramp	Airport Way EB Off Ramp - Airport Way On Ramp	24.48	24.97	24.4 - 24.9	14	53530	0.29		0	3	2	7	2	0	0	0	0	0	0	0	0	0	1	1	2	10	3	7	3	1

Northbound I-205: Crashes By Freeway Segment



Southbound I-205 Crash Data				Crash Rate							Collision Type													Injury					Surface			
Southbound				Beg MP	End MP	MP Range	SB Crashes	SB Vol	SB Rate	Segment Crash Rate	PARK	REAR	OTH	SS-O	FIX	PARK	NCOL	ANGL	TURN	HEAD	BACK	PED	SS-M	FATAL	INJ A	INJ B	INJ C	PDO	WET	DRY	ICE	UNK
Between (Ramp Gore Points)			Segment Name				717				1	1000	20	247	133	1	28	1	13	3	2	1	1	2	45	188	410	805	395	965	55	25
Airport Way Off Ramp	24.97	Airport Way WB On Ramp	Airport Way Off Ramp - Airport Way WB On Ramp	24.97	24.64	24.9 - 24.6	12	48310	0.41		0	7	0	4	1	0	0	0	0	0	0	0	0	0	0	0	2	10	2	5	4	1
Airport Way WB On Ramp	24.64	Airport Way EB On Ramp	Airport Way WB On Ramp - Airport Way EB On Ramp	24.64	24.31	24.6 - 24.3	8	55370	0.24		0	3	1	1	1	0	0	0	1	1	0	0	0	0	0	1	4	3	2	6	0	0
Airport Way EB On Ramp	24.31	Columbia Blvd WB Off Ramp	Airport Way EB On Ramp - Columbia Blvd WB Off Ramp	24.31	23.81	24.3 - 23.8	56	67670	0.91		0	40	0	13	2	0	0	0	0	0	1	0	0	0	1	5	15	35	15	38	1	1
Columbia Blvd WB Off Ramp	23.81	Columbia Blvd EB Off Ramp	Columbia Blvd WB Off Ramp - Columbia Blvd EB Off Ramp	23.81	23.71	23.8 - 23.7	3	62910	0.26		0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	2	0	0
Columbia Blvd EB Off Ramp	23.71	Columbia Blvd On Ramp	Columbia Blvd EB Off Ramp - Columbia Blvd On Ramp	23.71	23.47	23.7 - 23.4	30	58230	1.18		0	25	0	4	1	0	0	0	0	0	0	0	0	0	0	2	5	23	10	20	0	0
Columbia Blvd On Ramp	23.47	I-84 EB Off Ramp	Columbia Blvd On Ramp - I-84 EB Off Ramp	23.47	22.93	23.4 - 22.9	91	76540	1.21	0.75	0	69	1	13	2	0	5	0	0	1	0	0	0	0	4	14	22	51	28	59	1	3
I-84 EB Off Ramp	22.93	I-84 WB On Ramp	I-84 EB Off Ramp - I-84 WB On Ramp	22.93	22.13	22.9 - 22.1	46	59330	0.53		0	27	1	13	5	0	0	0	0	0	0	0	0	0	0	3	12	31	12	25	7	1
I-84 WB On Ramp	22.13	I-84 WB Off Ramp	I-84 WB On Ramp - I-84 WB Off Ramp	22.13	21.71	22.1 - 21.7	10	74470	0.18		0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	5	1	9	0	0
I-84 WB Off Ramp	21.71	Glisan St Off Ramp	I-84 WB Off Ramp - Glisan St Off Ramp	21.71	21.55	21.7 - 21.5	11	57270	0.66		0	10	0	1	0	0	0	0	0	0	0	0	0	0	0	2	6	3	7	4	0	0
Glisan St Off Ramp	21.55	I-84 EB On Ramp	Glisan St Off Ramp - I-84 EB On Ramp	21.55	21.20	21.5 - 21.2	42	46630	1.41		0	32	0	7	0	0	0	0	3	0	0	0	0	0	1	7	9	25	7	35	0	0
I-84 EB On Ramp	21.2	Glisan St On Ramp	I-84 EB On Ramp - Glisan St On Ramp	21.20	20.71	21.2 - 20.7	53	64790	0.91	1.12	0	39	0	9	2	0	2	0	1	0	0	0	0	1	5	11	8	28	13	39	0	1
Glisan St On Ramp	20.71	Stark/Washington On Ramp	Glisan St On Ramp - Stark/Washington On Ramp	20.71	20.31	20.7 - 20.3	62	74510	1.14		0	46	0	11	5	0	0	0	0	0	0	0	0	0	1	6	23	32	18	40	1	1
Stark/Washington On Ramp	20.31	Division St Off Ramp	Stark/Washington On Ramp - Division St Off Ramp	20.31	20.02	20.3 - 20.0	44	85550	0.97		0	38	0	5	0	0	0	0	0	0	1	0	0	0	1	6	14	23	19	25	0	0
Division St Off Ramp	20.02	Division St On Ramp	Division St Off Ramp - Division St On Ramp	20.02	19.24	20.0 - 19.2	71	63320	0.79		0	57	0	9	3	0	0	0	1	1	0	0	0	0	1	9	22	39	20	48	2	1
Division St On Ramp	19.24	Powell Blvd On Ramp	Division St On Ramp - Powell Blvd On Ramp	19.24	18.84	19.2 - 18.8	47	73860	0.87		0	38	0	5	3	0	1	0	0	0	0	0	0	0	0	6	17	24	14	33	0	0
Powell Blvd On Ramp	18.84	Foster Rd Off Ramp	Powell Blvd On Ramp - Foster Rd Off Ramp	18.84	18.12	18.8 - 18.1	59	78360	0.57		0	44	1	8	6	0	0	0	0	0	0	0	0	0	2	11	12	34	12	45	0	2
Foster Rd Off Ramp	18.12	Woodstock Blvd On Ramp	Foster Rd Off Ramp - Woodstock Blvd On Ramp	18.12	17.51	18.1 - 17.5	72	64310	1.01		0	56	0	9	5	0	1	0	0	0	0	0	1	0	1	8	22	41	15	52	1	3
Woodstock Blvd On Ramp	17.51	Johnson Creek Blvd. Off Ramp	Woodstock Blvd On Ramp - Johnson Creek Blvd. Off Ramp	17.51	16.47	17.5 - 16.4	62	74180	0.44		0	45	0	10	6	0	1	0	0	0	0	0	0	0	2	10	20	30	18	41	2	0
Johnson Creek Blvd. Off Ramp	16.47	Johnson Creek Blvd. On Ramp	Johnson Creek Blvd. Off Ramp - Johnson Creek Blvd. On Ramp	16.47	15.94	16.4 - 15.9	36	61800	0.60		0	29	2	2	1	0	2	0	0	0	0	0	0	0	0	5	12	19	16	18	1	1
Johnson Creek Blvd. On Ramp	15.94	Sunnyside Rd Off Ramp	Johnson Creek Blvd. On Ramp - Sunnyside Rd Off Ramp	15.94	14.82	15.9 - 14.8	52	71870	0.35		0	33	0	10	2	0	5	0	2	0	0	0	0	0	2	8	11	31	13	35	2	1
Sunnyside Rd Off Ramp	14.82	Sunnyside Rd On Ramp	Sunnyside Rd Off Ramp - Sunnyside Rd On Ramp	14.82	14.50	14.8 - 14.5	14	56270	0.43		0	9	0	3	0	0	0	0	2	0	0	0	0	0	0	4	1	9	5	8	0	1
Sunnyside Rd On Ramp	14.50	Sunnybrook Rd. On Ramp	Sunnyside Rd On Ramp - Sunnybrook Rd. On Ramp	14.50	14.30	14.5 - 14.3	3	62440	0.13		0	1	1	1	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	2	0	0
Sunnybrook Rd. On Ramp	14.3	Milwaukie Expressway/82nd Dr. Off Ramp	Sunnybrook Rd. On Ramp - Milwaukie Expressway/82nd Dr. Off Ramp	14.30	13.64	14.3 - 13.6	29	67010	0.36		0	19	1	7	2	0	0	0	0	0	0	0	0	0	3	3	9	14	11	17	1	0
Milwaukie Expressway/82nd Dr. Off Ramp	13.64	Milwaukie Expressway/82nd Dr. On Ramp	Milwaukie Expressway/82nd Dr. Off Ramp - Milwaukie Expressway/82nd Dr. On Ramp	13.64	13.18	13.6 - 13.1	25	58340	0.51		0	17	1	4	3	0	0	0	0	0	0	0	0	0	1	1	7	16	9	14	2	0
Milwaukie Expressway/82nd Dr. On Ramp	13.18	WB 212/214 Off ramp	Milwaukie Expressway/82nd Dr. On Ramp - WB 212/214 Off ramp	13.18	12.87	13.1 - 12.8	37	75880	0.86		0	14	1	12	7	0	2	0	0	0	0	1	0	1	2	6	12	16	13	22	2	0
WB 212/214 Off ramp	12.87	EB 212/224 Off Ramp	WB 212/214 Off ramp - EB 212/224 Off Ramp	12.87	12.63	12.8 - 12.6	16	71650	0.51	0.47	0	9	0	3	4	0	0	0	0	0	0	0	0	0	0	2	5	9	2	13	1	0
EB 212/224 Off Ramp	12.63	212//224 On Ramp	EB 212/224 Off Ramp - 212//224 On Ramp	12.63	12.29	12.6 - 12.2	21	58120	0.58		0	11	0	7	3	0	0	0	0	0	0	0	0	0	2	2	9	8	7	14	0	0
212//224 On Ramp	12.29	Gladstone/82nd Dr Off Ramp	212//224 On Ramp - Gladstone/82nd Dr Off Ramp	12.29	11.23	12.2 - 11.2	40	66800	0.31		0	28	1	5	5	0	1	0	0	0	0	0	0	0	2	4	12	22	10	27	2	1
Gladstone/82nd Dr Off Ramp	11.23	Gladstone/82nd Dr On Ramp	Gladstone/82nd Dr Off Ramp - Gladstone/82nd Dr On Ramp	11.23	10.79	11.2 - 10.7	25	61540	0.51		0	12	0	10	3	0	0	0	0	0	0	0	0	0	0	5	5	15	5	18	2	0
Gladstone/82nd Dr On Ramp	10.79	Hwy 213/Park Pl Off Ramp	Gladstone/82nd Dr On Ramp - Hwy 213/Park Pl Off Ramp	10.79	10.32	10.7 - 10.3	34	70250	0.56		0	19	0	11	4	0	0	0	0	0	0	0	0	0	0	4	12	18	10	17	7	0
Hwy 213/Park Pl Off Ramp	10.32	Hwy 213/Park Pl On Ramp	Hwy 213/Park Pl Off Ramp - Hwy 213/Park Pl On Ramp	10.32	9.98	10.3 - 9.98	25	44150	0.91		0	10	0	5	8	0	1	1	0	0	0	0	0	0	2	4	6	13	9	16	0	0
Hwy 213/Park Pl On Ramp	9.98	99E/McGloughlin Blvd Off Ramp	Hwy 213/Park Pl On Ramp - 99E/McGloughlin Blvd Off Ramp	9.98	9.56	9.98 - 9.56	20	55080	0.47		0	6	1	7	6	0	0	0	0	0	0	0	0	0	1	4	4	11	8	10	1	0
99E/McGloughlin Blvd Off Ramp	9.56	99E/McGloughlin Blvd On Ramp	99E/McGloughlin Blvd Off Ramp - 99E/McGloughlin Blvd On Ramp	9.56	9.26	9.56 - 9.26	13	41850	0.57	1.03	0	7	0	3	3	0	0	0	0	0	0	0	0	0	0	2	2	9	7	6	0	0
99E/McGloughlin Blvd On Ramp	9.26	Hwy 43 Off Ramp	99E/McGloughlin Blvd On Ramp - Hwy 43 Off Ramp	9.26	9.01	9.26 - 9.01	34	49010	1.52		0	17	1	8	8	0	0	0	0	0	0	0	0	0	1	3	11	19	6	18	7	3
Hwy 43 Off Ramp	9.01	Hwy 43 On Ramp	Hwy 43 Off Ramp - Hwy 43 On Ramp	9.01	8.50	9.01 - 8.5	24	39830	0.65		0	16	1	3	2	0	0	0	2	0	0	0	0	0	1	5	4	14	3	17	2	0
Hwy 43 On Ramp	8.5	10th St/West Linn Off Ramp	Hwy 43 On Ramp - 10th St/West Linn Off Ramp	8.50	6.71	8.5 - 6.71	59	43330	0.42		0	45	1	5	8	0	0	0	0	0	0	0	0	0	2	6	19	32	11	47	1	0
10th St/West Linn Off Ramp	6.71	10th St/West Linn On Ramp	10th St/West Linn Off Ramp - 10th St/West Linn On Ramp	6.71	6.09	6.71 - 6.09	17	37540	0.40		0	12	1	2	1	0	1	0	0	0	0	0	0	0	1	2	6	8	3	13	1	0
10th St/West Linn On Ramp	6.09	Stafford Rd Off Ramp	10th St/West Linn On Ramp - Stafford Rd Off Ramp	6.09	3.43	6.09 - 3.43	60	43680	0.28		0	41	2	3	11	0	2	0	1	0	0	0	0	0	5	5	17	33	13	45	2	0
Stafford Rd Off Ramp	3.43	Stafford Rd On Ramp	Stafford Rd Off Ramp - Stafford Rd On Ramp	3.43	2.86	3.43 - 2.86	24	39090	0.59		0	17	1	5	1	0	0	0	0	0	0	0	0	0	0	2	10	12	9	14	0	1
Stafford Rd On Ramp	2.86	I-5 NB Off Ramp	Stafford Rd On Ramp - I-5 NB Off Ramp	2.86	0.58	2.86 - 0.58	53	42020	0.30		1	33	1	5	8	1	4	0	0	0	0	0	0	0	0	4	15	33	8	39	2	3
I-5 NB Off Ramp	0.58	0	I-5 NB Off Ramp - 0	0.58	0.00	0.58 - 0	11	20850	0.50		0	7	0	3	1	0	0	0	0	0	0	0	0	0	0	3	4	4	2	9	0	0

Southbound I-205: Crashes By Freeway Segment



US 26 Crash Summaries

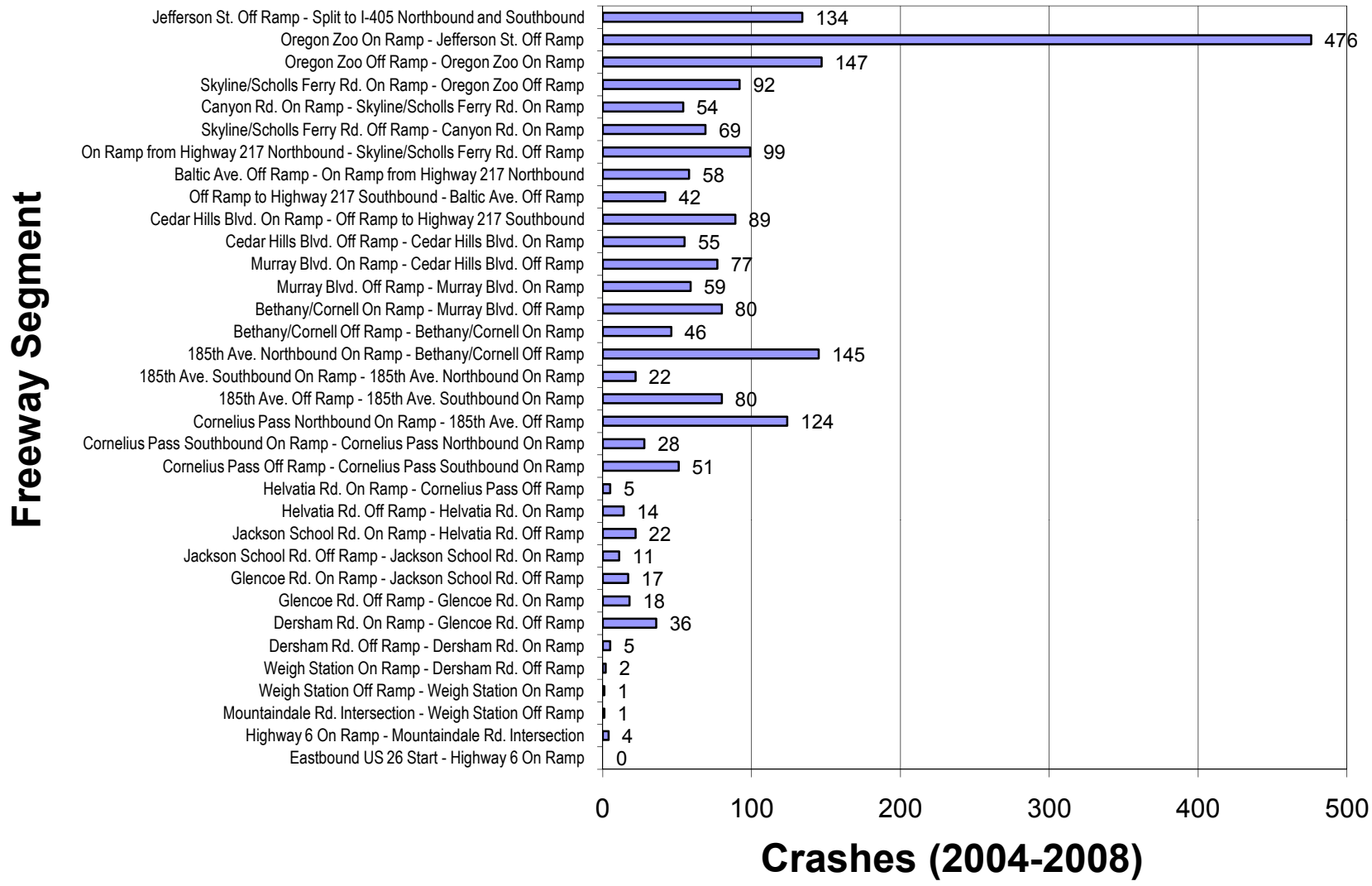
Eastbound

Westbound

DAVID EVANS AND ASSOCIATES INC.

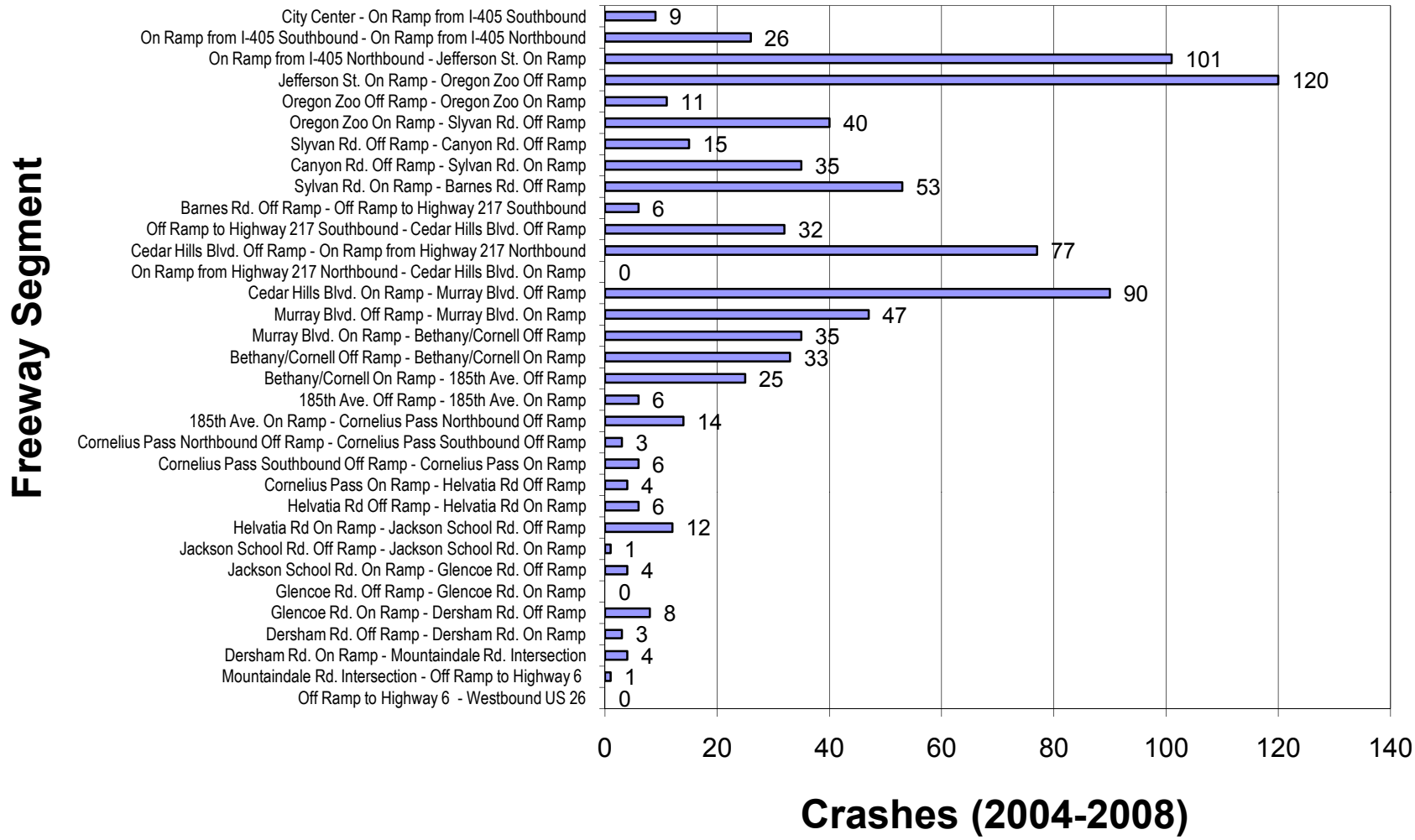
Easthbound US26 Crash Data				Crash Rate								Collision Type												Injury					Surface			
Easthbound				Beg MP	End MP	MP Range	EB Crashes	EB Vol	EB Rate	Influence Area Rate		REAR	SS-O	FIX	OTH	NCOL	TURN	ANGL	SS-M	PED	HEAD	BACK	PARK	FATAL	INJ A	INJ B	INJ C	PDO	WET	DRY	ICE	UNK
Between (Ramp Gore Points)			**Segment Name**				2163					1413	159	212	16	10	225	110	2	1	5	10	0	6	32	219	473	1249	698	1388	35	38
Eastbound US 26 Start	53.5	Highway 6 On Ramp	Eastbound US 26 Start - Highway 6 On Ramp	53.50	53.60	53.5 - 53.6	0	6220	0.00			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Highway 6 On Ramp	53.6	Mountaindale Rd. Intersection	Highway 6 On Ramp - Mountaindale Rd. Intersection	53.60	53.90	53.6 - 53.9	4	10140	0.72			0	0	1	0	0	1	2	0	0	0	0	0	0	0	1	1	1	2	1	1	0
Mountaindale Rd. Intersection	53.9	Weigh Station Off Ramp	Mountaindale Rd. Intersection - Weigh Station Off Ramp	53.90	54.30	53.9 - 54.3	1	10140	0.14			0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Weigh Station Off Ramp	54.3	Weigh Station On Ramp	Weigh Station Off Ramp - Weigh Station On Ramp	54.30	55.10	54.3 - 55.1	1	10140	0.07			0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
Weigh Station On Ramp	55.1	Dersham Rd. Off Ramp	Weigh Station On Ramp - Dersham Rd. Off Ramp	55.10	55.40	55.1 - 55.4	2	10140	0.36			0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0
Dersham Rd. Off Ramp	55.4	Dersham Rd. On Ramp	Dersham Rd. Off Ramp - Dersham Rd. On Ramp	55.40	57.00	55.4 - 57	5	9920	0.17			1	0	3	0	0	1	0	0	0	0	0	0	0	0	1	1	2	1	3	1	0
Dersham Rd. On Ramp	57.0	Glencoe Rd. Off Ramp	Dersham Rd. On Ramp - Glencoe Rd. Off Ramp	57.00	57.40	57 - 57.4	36	10740	4.59			18	1	2	0	0	15	0	0	0	0	0	0	1	1	5	10	14	6	27	2	1
Glencoe Rd. Off Ramp	57.4	Glencoe Rd. On Ramp	Glencoe Rd. Off Ramp - Glencoe Rd. On Ramp	57.40	58.40	57.4 - 58.4	18	9280	1.06			5	1	6	4	0	2	0	0	0	0	0	0	0	1	2	5	8	1	13	4	0
Glencoe Rd. On Ramp	58.4	Jackson School Rd. Off Ramp	Glencoe Rd. On Ramp - Jackson School Rd. Off Ramp	58.40	59.10	58.4 - 59.1	17	17060	0.78			7	1	0	1	0	8	0	0	0	0	0	0	0	1	2	3	11	4	13	0	0
Jackson School Rd. Off Ramp	59.1	Jackson School Rd. On Ramp	Jackson School Rd. Off Ramp - Jackson School Rd. On Ramp	59.10	60.90	59.1 - 60.9	11	16390	0.20			7	1	2	0	0	1	0	0	0	0	0	0	0	0	0	3	5	3	8	0	0
Jackson School Rd. On Ramp	60.9	Helvatia Rd. Off Ramp	Jackson School Rd. On Ramp - Helvatia Rd. Off Ramp	60.90	61.40	60.9 - 61.4	22	20050	1.20			13	0	4	0	1	4	0	0	0	0	0	0	0	0	3	6	12	7	15	0	0
Helvatia Rd. Off Ramp	61.4	Helvatia Rd. On Ramp	Helvatia Rd. Off Ramp - Helvatia Rd. On Ramp	61.40	62.10	61.4 - 62.1	14	18300	0.60			12	1	0	1	0	0	0	0	0	0	0	0	1	1	1	5	6	3	11	0	0
Helvatia Rd. On Ramp	62.1	Cornelius Pass Off Ramp	Helvatia Rd. On Ramp - Cornelius Pass Off Ramp	62.10	62.30	62.1 - 62.3	5	26440	0.52			2	1	2	0	0	0	0	0	0	0	0	0	1	0	0	0	4	3	2	0	0
Cornelius Pass Off Ramp	62.3	Cornelius Pass Southbound On Ramp	Cornelius Pass Off Ramp - Cornelius Pass Southbound On Ramp	62.30	62.80	62.3 - 62.8	51	22710	2.46			28	6	5	1	1	10	0	0	0	0	0	0	0	0	6	10	31	12	37	2	0
Cornelius Pass Southbound On Ramp	62.8	Cornelius Pass Northbound On Ramp	Cornelius Pass Southbound On Ramp - Cornelius Pass Northbound On Ramp	62.80	64.00	62.8 - 64	28	25030	0.51			18	3	4	1	0	1	0	1	0	0	0	0	0	0	6	7	14	7	20	1	0
Cornelius Pass Northbound On Ramp	64.0	185th Ave. Off Ramp	Cornelius Pass Northbound On Ramp - 185th Ave. Off Ramp	64.00	64.40	64 - 64.4	124	40220	4.22			71	5	5	0	0	39	2	1	0	0	1	0	0	0	3	24	83	28	93	2	1
185th Ave. Off Ramp	64.4	185th Ave. Southbound On Ramp	185th Ave. Off Ramp - 185th Ave. Southbound On Ramp	64.40	64.80	64.4 - 64.8	80	35690	3.07			70	1	2	1	1	4	1	0	0	0	0	0	0	1	4	18	44	18	60	0	2
185th Ave. Southbound On Ramp	64.8	185th Ave. Northbound On Ramp	185th Ave. Southbound On Ramp - 185th Ave. Northbound On Ramp	64.80	65.40	64.8 - 65.4	22	39250	0.51			18	1	1	1	0	1	0	0	0	0	0	0	0	0	4	6	12	4	16	0	1
185th Ave. Northbound On Ramp	65.4	Bethany/Cornell Off Ramp	185th Ave. Northbound On Ramp - Bethany/Cornell Off Ramp	65.40	66.30	65.4 - 66.3	145	49300	1.79			70	4	4	0	0	29	37	0	0	0	1	0	0	5	16	35	82	21	118	4	1
Bethany/Cornell Off Ramp	66.3	Bethany/Cornell On Ramp	Bethany/Cornell Off Ramp - Bethany/Cornell On Ramp	66.30	66.90	66.3 - 66.9	46	44770	0.94			39	3	3	0	0	1	0	0	0	0	0	0	0	1	5	12	24	11	33	1	1
Bethany/Cornell On Ramp	66.9	Murray Blvd. Off Ramp	Bethany/Cornell On Ramp - Murray Blvd. Off Ramp	66.90	67.50	66.9 - 67.5	80	55860	1.31			50	1	5	1	1	16	4	0	1	1	0	0	0	4	11	14	46	24	54	0	2
Murray Blvd. Off Ramp	67.5	Murray Blvd. On Ramp	Murray Blvd. Off Ramp - Murray Blvd. On Ramp	67.50	68.10	67.5 - 68.1	59	51780	1.04			49	3	4	0	0	2	0	0	0	1	0	0	0	1	10	9	32	15	42	1	1
Murray Blvd. On Ramp	68.1	Cedar Hills Blvd. Off Ramp	Murray Blvd. On Ramp - Cedar Hills Blvd. Off Ramp	68.10	68.70	68.1 - 68.7	77	61220	1.15			34	3	3	0	0	32	4	0	0	0	1	0	0	1	6	16	43	19	53	2	3
Cedar Hills Blvd. Off Ramp	68.7	Cedar Hills Blvd. On Ramp	Cedar Hills Blvd. Off Ramp - Cedar Hills Blvd. On Ramp	68.70	69.00	68.7 - 69	55	55250	1.82			40	7	4	0	2	2	0	0	0	0	0	0	0	1	4	11	34	14	36	2	3
Cedar Hills Blvd. On Ramp	69.0	Off Ramp to Highway 217 Southbound	Cedar Hills Blvd. On Ramp - Off Ramp to Highway 217 Southbound	69.00	69.20	69 - 69.2	89	64200	3.80			18	10	58	1	1	1	0	0	0	0	0	0	0	0	7	27	47	69	17	2	1
Off Ramp to Highway 217 Southbound	69.2	Baltic Ave. Off Ramp	Off Ramp to Highway 217 Southbound - Baltic Ave. Off Ramp	69.20	69.50	69.2 - 69.5	42	43900	1.75	1.23		5	4	26	1	2	0	1	0	0	2	1	0	0	0	5	12	22	33	8	1	0
Baltic Ave. Off Ramp	69.5	On Ramp from Highway 217 Northbound	Baltic Ave. Off Ramp - On Ramp from Highway 217 Northbound	69.50	70.70	69.5 - 70.7	58	40830	0.65		1.34	27	6	17	2	0	4	1	0	0	0	1	0	0	1	6	13	32	27	28	1	2
On Ramp from Highway 217 Northbound	70.7	Skyline/Scholls Ferry Rd. Off Ramp	On Ramp from Highway 217 Northbound - Skyline/Scholls Ferry Rd. Off Ramp	70.70	71.20	70.7 - 71.2	99	62230	1.74			73	13	5	1	0	6	0	0	0	0	1	0	2	2	13	23	51	24	69	2	3
Skyline/Scholls Ferry Rd. Off Ramp	71.2	Canyon Rd. On Ramp	Skyline/Scholls Ferry Rd. Off Ramp - Canyon Rd. On Ramp	71.20	71.50	71.2 - 71.5	69	58280	2.16	1.49		43	2	6	0	0	17	1	0	0	0	0	0	1	2	9	21	32	19	47	1	2
Canyon Rd. On Ramp	71.5	Skyline/Scholls Ferry Rd. On Ramp	Canyon Rd. On Ramp - Skyline/Scholls Ferry Rd. On Ramp	71.50	72.00	71.5 - 72	54	67360	0.88			43	8	2	0	0	0	0	0	0	1	0	0	0	0	6	14	33	15	37	0	2
Skyline/Scholls Ferry Rd. On Ramp	72.0	Oregon Zoo Off Ramp	Skyline/Scholls Ferry Rd. On Ramp - Oregon Zoo Off Ramp	72.00	72.40	72 - 72.4	92	74460	1.69			77	10	4	0	0	0	0	0	0	0	1	0	0	0	3	21	59	23	67	1	1
Oregon Zoo Off Ramp	72.4	Oregon Zoo On Ramp	Oregon Zoo Off Ramp - Oregon Zoo On Ramp	72.40	73.00	72.4 - 73	147	73640	1.82			122	18	5	0	1	0	0	0	0	0	1	0	0	3	16	34	86	64	79	0	3
Oregon Zoo On Ramp	73.0	Jefferson St. Off Ramp	Oregon Zoo On Ramp - Jefferson St. Off Ramp	73.00	73.90	73 - 73.9	476	75780	3.82	2.34		415	36	22	0	0	1	1	0	0	0	1	0	0	6	47	87	291	182	288	1	5
Jefferson St. Off Ramp	73.9	Split to I-405 Northbound and Southbound	Jefferson St. Off Ramp - Split to I-405 Northbound and Southbound	73.90	74.70	73.9 - 74.7	134	71260	1.29			38	9	4	0	0	26	56	0	0	0	1	0	0	0	17	25	85	39	92	0	3
Split to I-405 Northbound and Southbound	74.7																															

Eastbound US26: Crashes By Freeway Segment



Westbound US26 Crash Data				Crash Rate						Collision Type													Injury					Surface			
Westbound				Beg MP	End MP	MP Range	SB Crashes	WB Vol	WB Rate	PARK	REAR	OTH	SS-O	FIX	PARK	NCOL	ANGL	TURN	HEAD	BACK	PED	SS-M	FATAL	INJ A	INJ B	INJ C	PDO	WET	DRY	ICE	UNK
Between (Ramp Gore Points)			Segment Name				827			1	532	6	123	129	1	13	4	11	6	0	1	0	1	10	83	177	476	0	275	503	15
City Center	74.0	On Ramp from I-405 Southbound	City Center - On Ramp from I-405 Southbound	74.00	73.80	74 - 73.8	9	12370	1.99	0	1	0	1	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
On Ramp from I-405 Southbound	73.8	On Ramp from I-405 Northbound	On Ramp from I-405 Southbound - On Ramp from I-405 Northbound	73.80	73.70	73.8 - 73.7	26	39400	3.62	0	15	0	3	7	0	1	0	0	0	0	0	0	0	0	4	2	8	0	8	10	0
On Ramp from I-405 Northbound	73.7	Jefferson St. On Ramp	On Ramp from I-405 Northbound - Jefferson St. On Ramp	73.70	73.30	73.7 - 73.3	101	70150	1.97	0	47	1	25	25	0	1	2	0	0	0	0	0	0	1	10	17	69	0	53	44	1
Jefferson St. On Ramp	73.3	Oregon Zoo Off Ramp	Jefferson St. On Ramp - Oregon Zoo Off Ramp	73.30	72.40	73.3 - 72.4	120	75770	0.96	0	58	1	30	30	0	1	0	0	0	0	0	0	0	1	13	27	72	0	58	60	1
Oregon Zoo Off Ramp	72.4	Oregon Zoo On Ramp	Oregon Zoo Off Ramp - Oregon Zoo On Ramp	72.40	72.00	72.4 - 72	11	74160	0.20	0	6	0	0	5	0	0	0	0	0	0	0	0	0	0	3	3	3	0	7	4	0
Oregon Zoo On Ramp	72.0	Slyvan Rd. Off Ramp	Oregon Zoo On Ramp - Slyvan Rd. Off Ramp	72.00	71.50	72 - 71.5	40	74950	0.58	0	23	0	10	5	0	0	0	1	1	0	0	0	0	1	6	10	19	0	13	27	0
Slyvan Rd. Off Ramp	71.5	Canyon Rd. Off Ramp	Slyvan Rd. Off Ramp - Canyon Rd. Off Ramp	71.50	71.30	71.5 - 71.3	15	67890	0.61	0	7	0	4	2	0	0	0	2	0	0	0	0	0	0	1	3	10	0	5	10	0
Canyon Rd. Off Ramp	71.3	Sylvan Rd. On Ramp	Canyon Rd. Off Ramp - Sylvan Rd. On Ramp	71.30	70.60	71.3 - 70.6	35	55160	0.50	0	24	0	5	4	0	0	1	1	0	0	0	0	0	1	3	8	20	0	8	24	0
Sylvan Rd. On Ramp	70.6	Barnes Rd. Off Ramp	Sylvan Rd. On Ramp - Barnes Rd. Off Ramp	70.60	69.50	70.6 - 69.5	53	63210	0.42	0	45	0	5	2	0	0	0	0	0	0	1	0	0	0	7	6	36	0	14	38	1
Barnes Rd. Off Ramp	69.5	Off Ramp to Highway 217 Southbound	Barnes Rd. Off Ramp - Off Ramp to Highway 217 Southbound	69.50	69.30	69.5 - 69.3	6	57180	0.29	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	4	0	2	4	0
Off Ramp to Highway 217 Southbound	69.3	Cedar Hills Blvd. Off Ramp	Off Ramp to Highway 217 Southbound - Cedar Hills Blvd. Off Ramp	69.30	68.80	69.3 - 68.8	32	42400	0.83	0	23	0	1	6	0	0	1	1	0	0	0	0	0	0	1	10	16	0	14	18	0
Cedar Hills Blvd. Off Ramp	68.8	On Ramp from Highway 217 Northbound	Cedar Hills Blvd. Off Ramp - On Ramp from Highway 217 Northbound	68.80	67.90	68.8 - 67.9	77	31570	1.48	0	56	2	11	4	0	2	0	2	0	0	0	0	0	2	5	15	48	0	22	51	2
On Ramp from Highway 217 Northbound	67.9	Cedar Hills Blvd. On Ramp	On Ramp from Highway 217 Northbound - Cedar Hills Blvd. On Ramp	67.90	67.90	67.9 - 67.9	0	50190	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cedar Hills Blvd. On Ramp	67.9	Murray Blvd. Off Ramp	Cedar Hills Blvd. On Ramp - Murray Blvd. Off Ramp	67.90	67.40	67.9 - 67.4	90	59400	1.66	1	80	0	7	1	1	0	0	0	0	0	0	0	0	1	7	22	50	0	19	68	1
Murray Blvd. Off Ramp	67.4	Murray Blvd. On Ramp	Murray Blvd. Off Ramp - Murray Blvd. On Ramp	67.40	66.80	67.4 - 66.8	47	48840	0.88	0	44	0	1	2	0	0	0	0	0	0	0	0	0	0	6	9	26	0	14	32	0
Murray Blvd. On Ramp	66.8	Bethany/Cornell Off Ramp	Murray Blvd. On Ramp - Bethany/Cornell Off Ramp	66.80	66.20	66.8 - 66.2	35	54750	0.58	0	29	1	3	1	0	1	0	0	0	0	0	0	0	1	2	8	23	0	5	29	1
Bethany/Cornell Off Ramp	66.2	Bethany/Cornell On Ramp	Bethany/Cornell Off Ramp - Bethany/Cornell On Ramp	66.20	65.30	66.2 - 65.3	33	42780	0.47	0	29	0	1	2	0	0	0	0	1	0	0	0	0	0	2	9	21	0	10	22	0
Bethany/Cornell On Ramp	65.3	185th Ave. Off Ramp	Bethany/Cornell On Ramp - 185th Ave. Off Ramp	65.30	64.50	65.3 - 64.5	25	48080	0.36	0	22	0	1	2	0	0	0	0	0	0	0	0	0	0	1	9	15	0	6	16	0
185th Ave. Off Ramp	64.5	185th Ave. On Ramp	185th Ave. Off Ramp - 185th Ave. On Ramp	64.50	64.00	64.5 - 64	6	32100	0.20	0	3	0	2	0	0	1	0	0	0	0	0	0	0	0	0	3	2	0	2	4	0
185th Ave. On Ramp	64.0	Cornelius Pass Northbound Off Ramp	185th Ave. On Ramp - Cornelius Pass Northbound Off Ramp	64.00	62.70	64 - 62.7	14	36610	0.16	0	5	1	2	5	0	1	0	0	0	0	0	0	0	0	2	4	8	0	3	9	1
Cornelius Pass Northbound Off Ramp	62.7	Cornelius Pass Southbound Off Ramp	Cornelius Pass Northbound Off Ramp - Cornelius Pass Southbound Off Ramp	62.70	62.50	62.7 - 62.5	3	33470	0.25	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	1	1	0	0	1	2	0
Cornelius Pass Southbound Off Ramp	62.5	Cornelius Pass On Ramp	Cornelius Pass Southbound Off Ramp - Cornelius Pass On Ramp	62.50	62.10	62.5 - 62.1	6	24950	0.33	0	2	0	1	2	0	1	0	0	0	0	0	0	1	0	0	3	3	0	1	5	0
Cornelius Pass On Ramp	62.1	Helvatia Rd Off Ramp	Cornelius Pass On Ramp - Helvatia Rd Off Ramp	62.10	61.30	62.1 - 61.3	4	29090	0.09	0	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	3	0
Helvatia Rd Off Ramp	61.3	Helvatia Rd On Ramp	Helvatia Rd Off Ramp - Helvatia Rd On Ramp	61.30	60.80	61.3 - 60.8	6	18570	0.35	0	2	0	2	1	0	1	0	0	0	0	0	0	0	0	2	1	1	0	1	3	2
Helvatia Rd On Ramp	60.8	Jackson School Rd. Off Ramp	Helvatia Rd On Ramp - Jackson School Rd. Off Ramp	60.80	59.00	60.8 - 59	12	20200	0.18	0	4	0	1	4	0	1	0	0	2	0	0	0	0	0	2	3	7	0	3	8	1
Jackson School Rd. Off Ramp	59.0	Jackson School Rd. On Ramp	Jackson School Rd. Off Ramp - Jackson School Rd. On Ramp	59.00	58.40	59 - 58.4	1	16640	0.05	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0
Jackson School Rd. On Ramp	58.4	Glencoe Rd. Off Ramp	Jackson School Rd. On Ramp - Glencoe Rd. Off Ramp	58.40	57.30	58.4 - 57.3	4	17060	0.12	0	1	0	0	3	0	0	0	0	0	0	0	0	0	1	2	0	2	0	1	3	0
Glencoe Rd. Off Ramp	57.3	Glencoe Rd. On Ramp	Glencoe Rd. Off Ramp - Glencoe Rd. On Ramp	57.30	57.00	57.3 - 57	0	8750	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glencoe Rd. On Ramp	57.0	Dersham Rd. Off Ramp	Glencoe Rd. On Ramp - Dersham Rd. Off Ramp	57.00	55.40	57 - 55.4	8	10650	0.26	0	0	0	1	5	0	0	0	0	2	0	0	0	0	1	1	0	6	0	1	5	2
Dersham Rd. Off Ramp	55.4	Dersham Rd. On Ramp	Dersham Rd. Off Ramp - Dersham Rd. On Ramp	55.40	54.90	55.4 - 54.9	3	9910	0.33	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	1	1
Dersham Rd. On Ramp	54.9	Mountaindale Rd. Intersection	Dersham Rd. On Ramp - Mountaindale Rd. Intersection	54.90	53.60	54.9 - 53.6	4	10130	0.17	0	1	0	0	2	0	1	0	0	0	0	0	0	0	0	1	2	1	0	2	1	1
Mountaindale Rd. Intersection	53.6	Off Ramp to Highway 6	Mountaindale Rd. Intersection - Off Ramp to Highway 6	53.60	53.50	53.6 - 53.5	1	10130	0.54	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0
Off Ramp to Highway 6	53.5	Westbound US 26	Off Ramp to Highway 6 - Westbound US 26	53.50	53.00	53.5 - 53	0	5910	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Westbound US 26	53.0																														

Westbound US26: Crashes By Freeway Segment



I-84 Crash Summaries

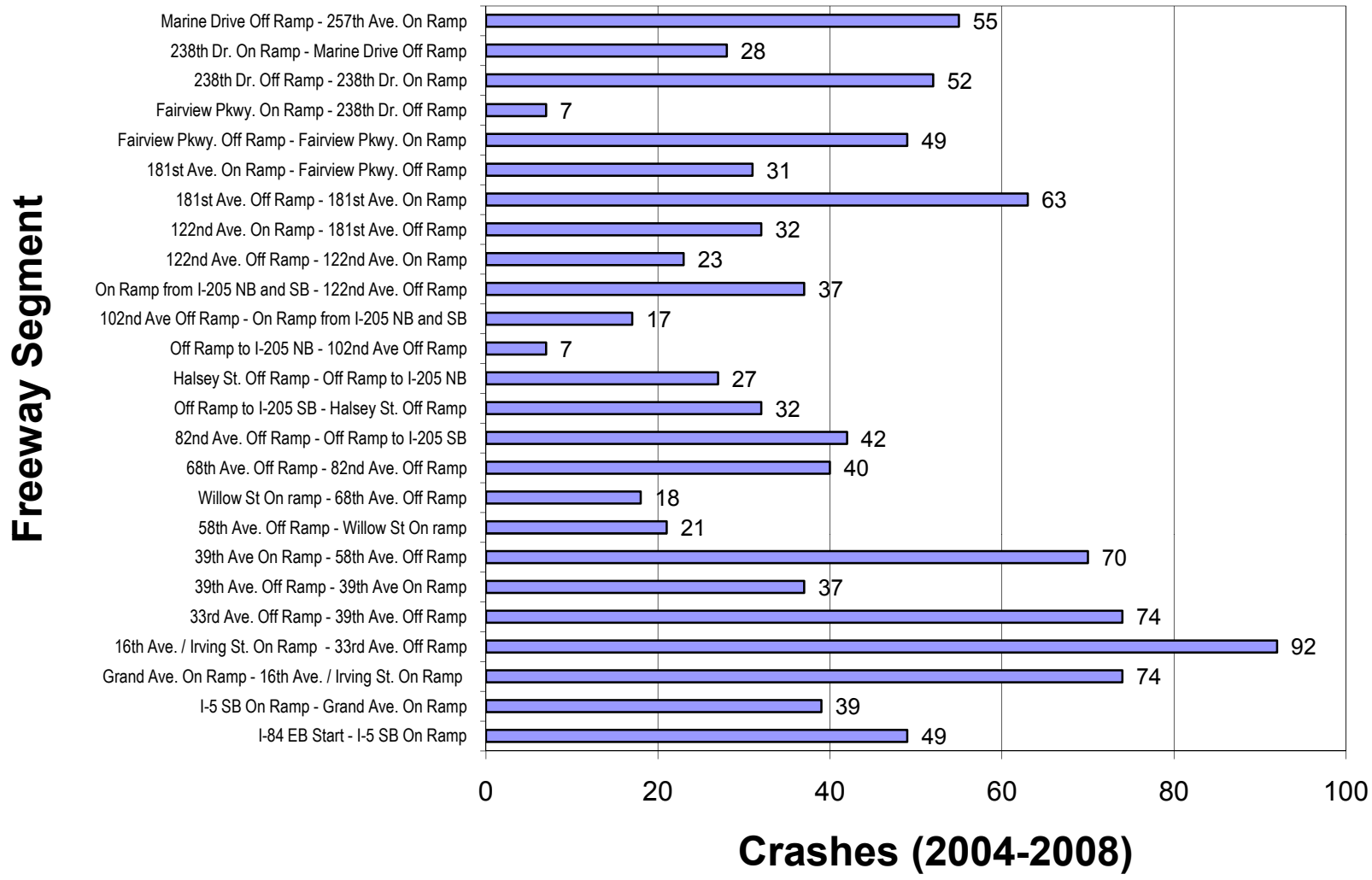
Eastbound

Westbound

DAVID EVANS AND ASSOCIATES INC.

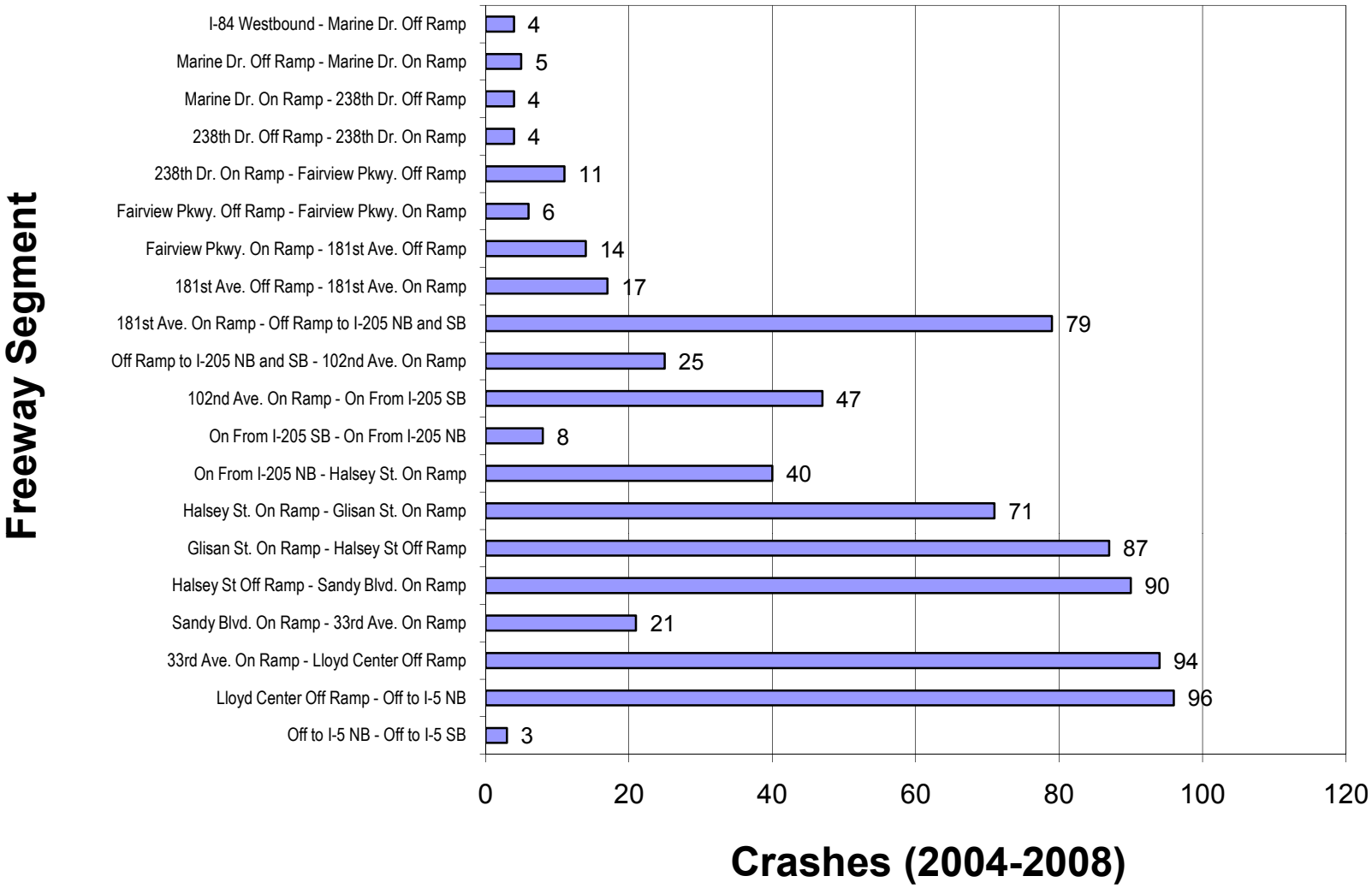
Easthbound I-84 Crash Data				Crash Rate								Collision Type												Injury					Surface			
Easthbound				**Beg MP**	**End MP**	**MP Range**	**EB Crashes**	**EB Vol**	**EB Rate**	**Influence Area Rate**		**REAR**	**SS-O**	**FIX**	**OTH**	**NCOL**	**TURN**	**ANGL**	**SS-M**	**PED**	**HEAD**	**BACK**	**PARK**	**FATAL**	**INJ A**	**INJ B**	**INJ C**	**PDO**	**WET**	**DRY**	**ICE**	**UNK**
Between (Ramp Gore Points)			**Segment Name**				**1016**					**594**	**147**	**148**	**12**	**3**	**87**	**17**	**0**	**4**	**2**	**2**	**0**	**3**	**28**	**117**	**208**	**606**	**288**	**667**	**29**	**25**
I-84 EB Start	0.0	I-5 SB On Ramp	I-84 EB Start - I-5 SB On Ramp	0.00	0.50	0 - 0.5	49	46030	1.17	1.21		35	5	8	0	0	1	0	0	0	0	0	0	0	0	3	10	34	10	37	0	1
I-5 SB On Ramp	0.5	Grand Ave. On Ramp	I-5 SB On Ramp - Grand Ave. On Ramp	0.50	0.70	0.5 - 0.7	39	67580	1.58			32	2	3	0	0	1	0	0	0	1	0	0	0	0	5	9	23	12	27	0	0
Grand Ave. On Ramp	0.7	16th Ave. / Irving St. On Ramp	Grand Ave. On Ramp - 16th Ave. / Irving St. On Ramp	0.70	1.30	0.7 - 1.3	74	76660	0.88	0.87		56	13	2	0	0	2	1	0	0	0	0	0	0	0	11	12	43	21	49	0	4
16th Ave. / Irving St. On Ramp	1.3	33rd Ave. Off Ramp	16th Ave. / Irving St. On Ramp - 33rd Ave. Off Ramp	1.30	2.00	1.3 - 2	92	83780	0.86			70	19	3	0	0	0	0	0	0	0	0	0	0	2	11	27	47	14	72	3	3
33rd Ave. Off Ramp	2.0	39th Ave. Off Ramp	33rd Ave. Off Ramp - 39th Ave. Off Ramp	2.00	2.40	2 - 2.4	74	77000	1.32			42	10	11	3	1	7	0	0	0	0	0	0	2	3	6	19	43	18	53	0	3
39th Ave. Off Ramp	2.4	39th Ave On Ramp	39th Ave. Off Ramp - 39th Ave On Ramp	2.40	2.70	2.4 - 2.7	37	70170	0.96			25	2	7	0	0	2	1	0	0	0	0	0	0	1	3	7	24	11	26	0	0
39th Ave On Ramp	2.7	58th Ave. Off Ramp	39th Ave On Ramp - 58th Ave. Off Ramp	2.70	3.50	2.7 - 3.5	70	80950	0.59			43	13	10	0	0	3	0	0	1	0	0	0	0	2	8	18	42	20	47	0	3
58th Ave. Off Ramp	3.5	Willow St On ramp	58th Ave. Off Ramp - Willow St On ramp	3.50	3.90	3.5 - 3.9	21	76050	0.38			14	4	0	0	0	1	1	0	1	0	0	0	0	1	3	6	11	9	12	0	0
Willow St On ramp	3.9	68th Ave. Off Ramp	Willow St On ramp - 68th Ave. Off Ramp	3.90	4.10	3.9 - 4.1	18	81410	0.61			12	4	2	0	0	0	0	0	0	0	0	0	0	0	2	2	10	6	10	0	1
68th Ave. Off Ramp	4.1	82nd Ave. Off Ramp	68th Ave. Off Ramp - 82nd Ave. Off Ramp	4.10	5.00	4.1 - 5	40	78070	0.31			28	3	5	0	0	0	4	0	0	0	0	0	0	1	5	8	26	9	29	0	0
82nd Ave. Off Ramp	5.0	Off Ramp to I-205 SB	82nd Ave. Off Ramp - Off Ramp to I-205 SB	5.00	5.40	5 - 5.4	42	74960	0.77			30	6	6	0	0	0	0	0	0	0	0	0	0	1	7	11	24	11	30	0	0
Off Ramp to I-205 SB	5.4	Halsey St. Off Ramp	Off Ramp to I-205 SB - Halsey St. Off Ramp	5.40	5.70	5.4 - 5.7	32	49950	1.17			18	8	6	0	0	0	0	0	0	0	0	0	0	2	3	6	19	10	21	0	0
Halsey St. Off Ramp	5.7	Off Ramp to I-205 NB	Halsey St. Off Ramp - Off Ramp to I-205 NB	5.70	6.30	5.7 - 6.3	27	44080	0.56			14	7	5	0	0	1	0	0	0	0	0	0	0	1	4	6	16	6	17	3	1
Off Ramp to I-205 NB	6.3	102nd Ave Off Ramp	Off Ramp to I-205 NB - 102nd Ave Off Ramp	6.30	6.40	6.3 - 6.4	7	26530	1.45			4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	6	2	5	0	0
102nd Ave Off Ramp	6.4	On Ramp from I-205 NB and SB	102nd Ave Off Ramp - On Ramp from I-205 NB and SB	6.40	7.10	6.4 - 7.1	17	25300	0.53			11	4	2	0	0	0	0	0	0	0	0	0	0	0	3	5	8	5	10	2	0
On Ramp from I-205 NB and SB	7.1	122nd Ave. Off Ramp	On Ramp from I-205 NB and SB - 122nd Ave. Off Ramp	7.10	10.00	7.1 - 10	37	58330	0.12			28	7	2	0	0	0	0	0	0	0	0	0	1	1	1	9	22	10	26	1	0
122nd Ave. Off Ramp	10.0	122nd Ave. On Ramp	122nd Ave. Off Ramp - 122nd Ave. On Ramp	10.00	10.30	10 - 10.3	23	50660	0.83			12	3	3	0	0	3	1	0	0	1	0	0	0	1	1	4	14	4	17	2	0
122nd Ave. On Ramp	10.3	181st Ave. Off Ramp	122nd Ave. On Ramp - 181st Ave. Off Ramp	10.30	12.70	10.3 - 12.7	32	53480	0.14			9	11	7	3	0	2	0	0	0	0	0	0	0	2	3	6	21	15	10	4	3
181st Ave. Off Ramp	12.7	181st Ave. On Ramp	181st Ave. Off Ramp - 181st Ave. On Ramp	12.70	13.30	12.7 - 13.3	63	37880	1.52			26	9	13	2	1	12	0	0	0	0	0	0	0	3	13	8	35	25	31	5	2
181st Ave. On Ramp	13.3	Fairview Pkwy. Off Ramp	181st Ave. On Ramp - Fairview Pkwy. Off Ramp	13.30	14.20	13.3 - 14.2	31	41380	0.46			12	3	8	1	1	5	0	0	1	0	0	0	0	0	4	4	20	9	19	2	1
Fairview Pkwy. Off Ramp	14.2	Fairview Pkwy. On Ramp	Fairview Pkwy. Off Ramp - Fairview Pkwy. On Ramp	14.20	14.80	14.2 - 14.8	49	30610	1.46			17	1	13	1	0	15	1	0	0	0	1	0	0	1	5	9	29	20	27	1	1
Fairview Pkwy. On Ramp	14.8	238th Dr. Off Ramp	Fairview Pkwy. On Ramp - 238th Dr. Off Ramp	14.80	15.70	14.8 - 15.7	7	31450	0.14			1	1	4	1	0	0	0	0	0	0	0	0	0	0	0	1	6	1	4	2	0
238th Dr. Off Ramp	15.7	238th Dr. On Ramp	238th Dr. Off Ramp - 238th Dr. On Ramp	15.70	16.20	15.7 - 16.2	52	20800	2.74			20	3	10	0	0	16	3	0	0	0	0	0	0	2	7	5	34	15	35	0	1
238th Dr. On Ramp	16.2	Marine Drive Off Ramp	238th Dr. On Ramp - Marine Drive Off Ramp	16.20	16.70	16.2 - 16.7	28	23210	1.32			13	3	7	1	0	3	1	0	0	0	0	0	0	3	5	4	14	10	16	1	1
Marine Drive Off Ramp	16.7	257th Ave. On Ramp	Marine Drive Off Ramp - 257th Ave. On Ramp	16.70	17.60	16.7 - 17.6	55	9780	3.42			22	4	10	0	0	13	4	0	1	0	1	0	0	1	4	11	35	15	37	3	0
257th Ave. On Ramp	17.6																															

Eastbound I-84: Crashes By Freeway Segment



Westbound I-84 Crash Data				Crash Rate								Collision Type													Injury					Surface			
Westbound				Beg MP	End MP	MP Range	SB Crashes	WB Vol	WB Rate	Influence Area Rate		PARK	REAR	OTH	SS-O	FIX	PARK	NCOL	ANGL	TURN	HEAD	BACK	PED	SS-M	FATAL	INJ A	INJ B	INJ C	PDO	WET	DRY	ICE	UNK
Between (Ramp Gore Points)			Segment Name				726					0	504	5	124	74	0	4	2	9	1	2	1	0	3	13	93	174	394	0	193	505	5
I-84 Westbound	18.0	Marine Dr. Off Ramp	I-84 Westbound - Marine Dr. Off Ramp	18.00	17.60	18 - 17.6	4	14310	0.38			0	0	0	0	2	0	1	0	0	0	0	1	0	1	1	0	0	1	0	1	2	1
Marine Dr. Off Ramp	17.6	Marine Dr. On Ramp	Marine Dr. Off Ramp - Marine Dr. On Ramp	17.60	16.70	17.6 - 16.7	5	10930	0.28			0	1	0	0	3	0	0	0	1	0	0	0	0	0	0	0	1	4	0	2	2	0
Marine Dr. On Ramp	16.7	238th Dr. Off Ramp	Marine Dr. On Ramp - 238th Dr. Off Ramp	16.70	16.20	16.7 - 16.2	4	23770	0.18			0	1	0	2	0	0	0	1	0	0	0	0	0	0	0	0	1	2	0	1	3	0
238th Dr. Off Ramp	16.2	238th Dr. On Ramp	238th Dr. Off Ramp - 238th Dr. On Ramp	16.20	15.70	16.2 - 15.7	4	21580	0.20			0	0	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	4	0	2	1	0
238th Dr. On Ramp	15.7	Fairview Pkwy. Off Ramp	238th Dr. On Ramp - Fairview Pkwy. Off Ramp	15.70	14.70	15.7 - 14.7	11	33440	0.18			0	1	1	3	5	0	0	0	1	0	0	0	0	0	0	3	2	5	0	4	7	0
Fairview Pkwy. Off Ramp	14.7	Fairview Pkwy. On Ramp	Fairview Pkwy. Off Ramp - Fairview Pkwy. On Ramp	14.70	14.40	14.7 - 14.4	6	32260	0.34			0	0	0	2	2	0	0	1	1	0	0	0	0	0	0	2	2	2	0	4	2	0
Fairview Pkwy. On Ramp	14.4	181st Ave. Off Ramp	Fairview Pkwy. On Ramp - 181st Ave. Off Ramp	14.40	13.40	14.4 - 13.4	14	41190	0.19			0	4	0	5	2	0	0	0	3	0	0	0	0	0	0	1	2	8	0	7	6	0
181st Ave. Off Ramp	13.4	181st Ave. On Ramp	181st Ave. Off Ramp - 181st Ave. On Ramp	13.40	12.70	13.4 - 12.7	17	37320	0.36			0	5	0	5	6	0	0	0	1	0	0	0	0	0	1	2	4	8	0	12	4	0
181st Ave. On Ramp	12.7	Off Ramp to I-205 NB and SB	181st Ave. On Ramp - Off Ramp to I-205 NB and SB	12.70	7.21	12.7 - 7.21	79	52000	0.15			0	47	0	18	13	0	0	0	0	0	1	0	0	0	2	14	21	35	0	29	42	3
Off Ramp to I-205 NB and SB	7.2	102nd Ave. On Ramp	Off Ramp to I-205 NB and SB - 102nd Ave. On Ramp	7.21	6.40	7.21 - 6.4	25	21840	0.77			0	16	0	5	2	0	1	0	0	1	0	0	0	0	0	1	3	16	0	12	12	1
102nd Ave. On Ramp	6.4	On From I-205 SB	102nd Ave. On Ramp - On From I-205 SB	6.40	5.50	6.4 - 5.5	47	25870	1.11			0	32	0	11	4	0	0	0	0	0	0	0	0	0	2	6	14	23	0	20	26	0
On From I-205 SB	5.5	On From I-205 NB	On From I-205 SB - On From I-205 NB	5.50	5.20	5.5 - 5.2	8	43080	0.34			0	6	0	2	0	0	0	0	0	0	0	0	0	0	0	1	3	3	0	3	5	0
On From I-205 NB	5.2	Halsey St. On Ramp	On From I-205 NB - Halsey St. On Ramp	5.20	4.80	5.2 - 4.8	40	70200	0.78	0.49		0	30	0	5	4	0	0	0	1	0	0	0	0	1	0	8	10	21	0	11	28	0
Halsey St. On Ramp	4.8	Glisan St. On Ramp	Halsey St. On Ramp - Glisan St. On Ramp	4.80	3.40	4.8 - 3.4	71	76510	0.36			0	51	1	13	5	0	0	0	1	0	0	0	0	1	2	4	17	45	0	13	57	0
Glisan St. On Ramp	3.4	Halsey St Off Ramp	Glisan St. On Ramp - Halsey St Off Ramp	3.40	3.00	3.4 - 3	87	83560	1.43			0	66	0	14	6	0	1	0	0	0	0	0	0	0	0	11	10	61	0	11	74	0
Halsey St Off Ramp	3.0	Sandy Blvd. On Ramp	Halsey St Off Ramp - Sandy Blvd. On Ramp	3.00	2.10	3 - 2.1	90	73910	0.74	0.91		0	73	1	10	6	0	0	0	0	0	0	0	0	0	1	9	26	50	0	20	66	0
Sandy Blvd. On Ramp	2.1	33rd Ave. On Ramp	Sandy Blvd. On Ramp - 33rd Ave. On Ramp	2.10	2.00	2.1 - 2	21	73910	1.56			0	14	0	4	3	0	0	0	0	0	0	0	0	0	1	4	5	9	0	5	16	0
33rd Ave. On Ramp	2.0	Lloyd Center Off Ramp	33rd Ave. On Ramp - Lloyd Center Off Ramp	2.00	1.20	2 - 1.2	94	87960	0.73		0.85	0	85	0	6	3	0	0	0	0	0	0	0	0	0	1	12	30	46	0	15	77	0
Lloyd Center Off Ramp	1.2	Off to I-5 NB	Lloyd Center Off Ramp - Off to I-5 NB	1.20	0.20	1.2 - 0.2	96	75660	0.70			0	69	1	18	7	0	0	0	0	0	1	0	0	0	2	15	21	50	0	20	73	0
Off to I-5 NB	0.2	Off to I-5 SB	Off to I-5 NB - Off to I-5 SB	0.20	0.00	0.2 - 0	3	50870	0.16	0.71		0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	1	2	0
Off to I-5 SB	0.0																																

Westbound I-84: Crashes By Freeway Segment



I-405 Crash Summaries

Northbound

Southbound

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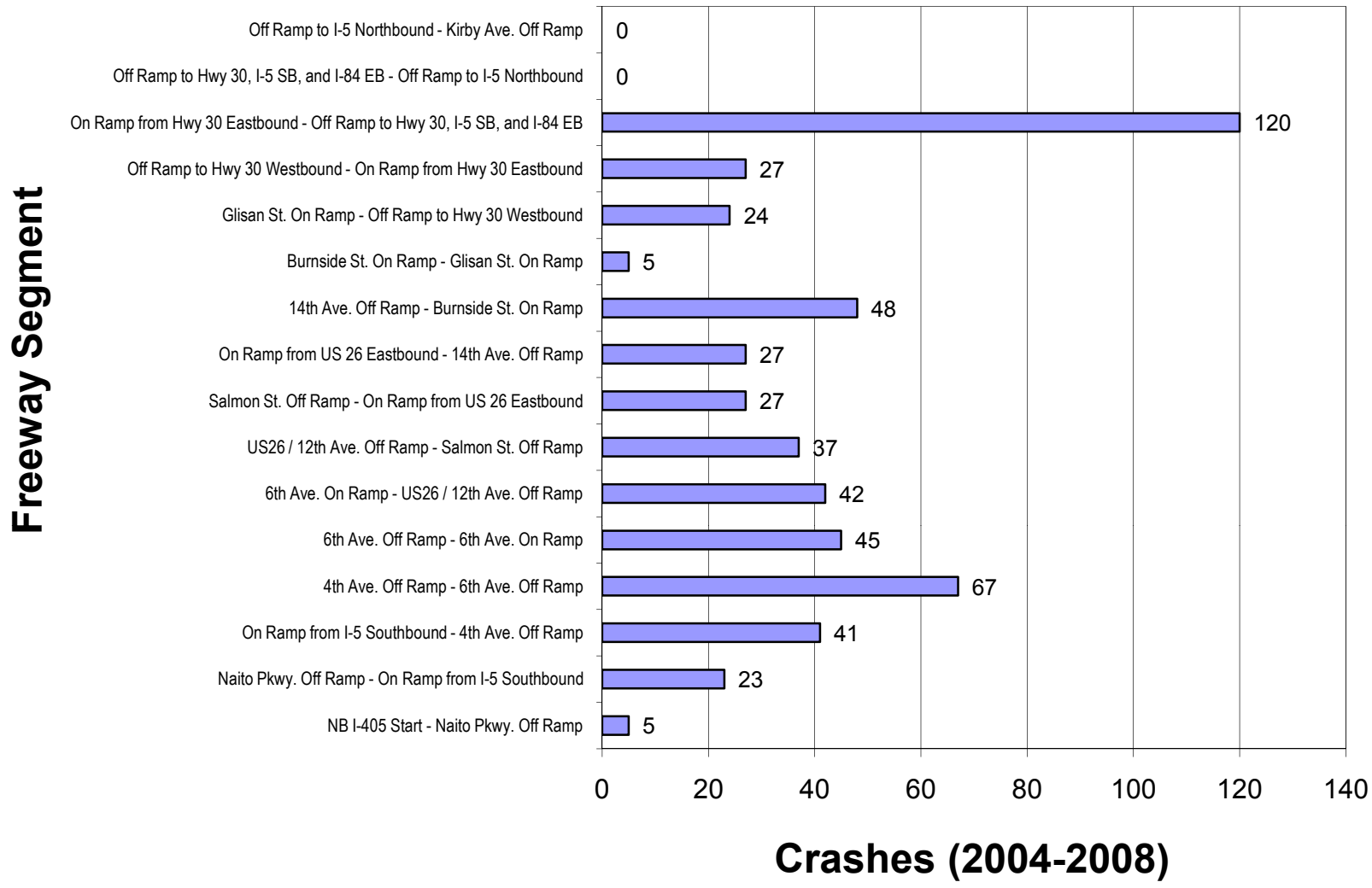
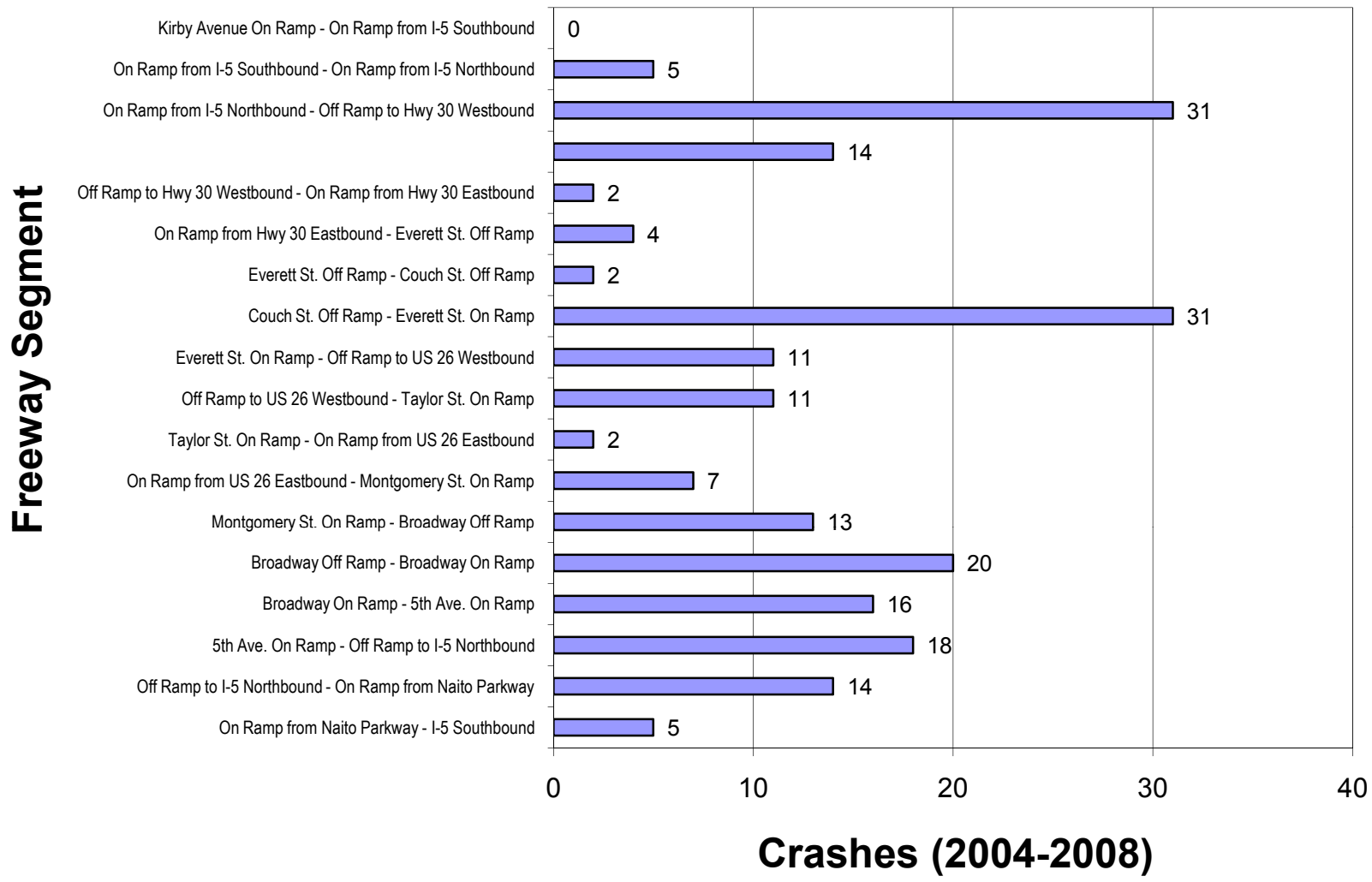
Northbound I-405 Crash Data				Crash Rate							Collision Type												Injury					Surface			
Northbound				Beg MP	End MP	MP Range	EB Crashes	NB Vol	NB Rate	Influence Area Rate	REAR	SS-O	FIX	OTH	NCOL	TURN	ANGL	SS-M	PED	HEAD	BACK	PARK	FATAL	INJ A	INJ B	INJ C	PDO	WET	DRY	ICE	UNK
Between (Ramp Gore Points)			**Segment Name**				538				327	111	38	0	2	27	24	1	4	2	2	0	0	14	52	120	328	151	375	7	3
NB I-405 Start	0.0	Naito Pkwy. Off Ramp	NB I-405 Start - Naito Pkwy. Off Ramp	0.00	0.10	0 - 0.1	5	27820	0.98		3	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	3	1	4	0	0
Naito Pkwy. Off Ramp	0.1	On Ramp from I-5 Southbound	Naito Pkwy. Off Ramp - On Ramp from I-5 Southbound	0.10	0.50	0.1 - 0.5	23	20790	1.52		15	6	2	0	0	0	0	0	0	0	0	0	0	0	2	5	16	12	11	0	0
On Ramp from I-5 Southbound	0.5	4th Ave. Off Ramp	On Ramp from I-5 Southbound - 4th Ave. Off Ramp	0.50	0.80	0.5 - 0.8	41	47540	1.58		30	5	3	0	0	0	3	0	0	0	0	0	0	1	6	10	23	16	25	0	0
4th Ave. Off Ramp	0.8	6th Ave. Off Ramp	4th Ave. Off Ramp - 6th Ave. Off Ramp	0.80	1.00	0.8 - 1	67	43390	4.23		45	9	2	0	1	6	3	0	1	0	0	0	0	5	5	11	42	16	50	1	0
6th Ave. Off Ramp	1.0	6th Ave. On Ramp	6th Ave. Off Ramp - 6th Ave. On Ramp	1.00	1.20	1 - 1.2	45	37680	3.27	2.84	19	12	6	0	0	5	3	0	0	0	0	0	0	1	5	16	24	6	39	0	0
6th Ave. On Ramp	1.2	US26 / 12th Ave. Off Ramp	6th Ave. On Ramp - US26 / 12th Ave. Off Ramp	1.20	1.30	1.2 - 1.3	42	59550	3.86		30	9	1	0	1	1	0	0	0	0	0	0	0	1	4	10	26	16	26	0	0
US26 / 12th Ave. Off Ramp	1.3	Salmon St. Off Ramp	US26 / 12th Ave. Off Ramp - Salmon St. Off Ramp	1.30	1.60	1.3 - 1.6	37	24570	2.75		20	4	5	0	0	3	1	0	2	1	1	0	0	2	3	9	22	13	23	1	0
Salmon St. Off Ramp	1.6	On Ramp from US 26 Eastbound	Salmon St. Off Ramp - On Ramp from US 26 Eastbound	1.60	1.90	1.6 - 1.9	27	20150	2.45		13	2	3	0	0	2	7	0	0	0	0	0	0	1	6	7	13	8	19	0	0
On Ramp from US 26 Eastbound	1.9	14th Ave. Off Ramp	On Ramp from US 26 Eastbound - 14th Ave. Off Ramp	1.90	2.10	1.9 - 2.1	27	47770	1.55		18	5	2	0	0	0	0	0	1	1	0	0	0	1	4	5	17	7	19	1	0
14th Ave. Off Ramp	2.1	Burnside St. On Ramp	14th Ave. Off Ramp - Burnside St. On Ramp	2.10	2.50	2.1 - 2.5	48	35100	1.87		30	11	3	0	0	1	2	0	0	0	1	0	0	1	3	8	33	14	31	0	2
Burnside St. On Ramp	2.5	Glisan St. On Ramp	Burnside St. On Ramp - Glisan St. On Ramp	2.50	2.60	2.5 - 2.6	5	45250	0.61		3	1	1	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	4	1	0
Glisan St. On Ramp	2.6	Off Ramp to Hwy 30 Westbound	Glisan St. On Ramp - Off Ramp to Hwy 30 Westbound	2.60	2.80	2.6 - 2.8	24	51330	1.28		16	6	2	0	0	0	0	0	0	0	0	0	0	0	3	3	17	7	17	0	0
Off Ramp to Hwy 30 Westbound	2.8	On Ramp from Hwy 30 Eastbound	Off Ramp to Hwy 30 Westbound - On Ramp from Hwy 30 Eastbound	2.80	3.10	2.8 - 3.1	27	35680	1.38		10	3	2	0	0	6	5	1	0	0	0	0	0	0	1	7	14	5	22	0	0
On Ramp from Hwy 30 Eastbound	3.1	Off Ramp to Hwy 30, I-5 SB, and I-84 EB	On Ramp from Hwy 30 Eastbound - Off Ramp to Hwy 30, I-5 SB, and I-84 EB	3.10	3.60	3.1 - 3.6	120	55780	2.36		75	38	6	0	0	1	0	0	0	0	0	0	0	1	8	28	76	30	85	3	1
Off Ramp to Hwy 30, I-5 SB, and I-84 EB	3.6	Off Ramp to I-5 Northbound	Off Ramp to Hwy 30, I-5 SB, and I-84 EB - Off Ramp to I-5 Northbound	3.60	3.70	3.6 - 3.7	0	40820	0.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Off Ramp to I-5 Northbound	3.7	Kirby Ave. Off Ramp	Off Ramp to I-5 Northbound - Kirby Ave. Off Ramp	3.70	3.70	3.7 - 3.7	0	7370	0.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kirby Ave. Off Ramp	3.7																														

Northbound I-405: Crashes By Freeway Segment



Southbound I-405 Crash Data				Crash Rate									Collision Type													Injury					Surface			
Southbound				Dir Code	Conn #	Beg MP	End MP	MP Range	SB Crashes	SB Vol	SB Rate	Influence Area Rate	PARK	REAR	OTH	SS-O	FIX	PARK	NCOL	ANGL	TURN	HEAD	BACK	PED	SS-M	FATAL	INJ A	INJ B	INJ C	PDO	WET	DRY	ICE	UNK
Between (Ramp Gore Points)			Segment Name						206				0	126	0	48	23	0	1	2	3	2	1	0	0	0	4	23	35	124	0	63	132	4
Kirby Avenue On Ramp	3.7	On Ramp from I-5 Southbound	Kirby Avenue On Ramp - On Ramp from I-5 Southbound	2	0	3.70	3.70	3.7 - 3.7	0	6750	0.00		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
On Ramp from I-5 Southbound	3.7	On Ramp from I-5 Northbound	On Ramp from I-5 Southbound - On Ramp from I-5 Northbound	2	0	3.70	3.50	3.7 - 3.5	5	41400	0.33		0	1	0	3	0	0	1	0	0	0	0	0	0	0	1	2	0	2	0	1	4	0
On Ramp from I-5 Northbound	3.5		On Ramp from I-5 Northbound - Off Ramp to Hwy 30 Westbound	2	0	3.50	3.25	3.5 - 3.25	31	58800	1.16		0	21	0	1	7	0	0	0	0	1	1	0	0	0	0	5	8	16	0	13	17	1
	3.3	Off Ramp to Hwy 30 Westbound		2	0	3.25	3.00	3.25 - 3	14	58800	0.52	0.33	0	8	0	4	2	0	0	0	0	0	0	0	0	0	0	3	4	4	0	4	9	1
Off Ramp to Hwy 30 Westbound	3.0	On Ramp from Hwy 30 Eastbound	Off Ramp to Hwy 30 Westbound - On Ramp from Hwy 30 Eastbound	2	0	3.00	2.70	3 - 2.7	2	37170	0.10		0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	1	1	0
On Ramp from Hwy 30 Eastbound	2.7	Everett St. Off Ramp	On Ramp from Hwy 30 Eastbound - Everett St. Off Ramp	2	0	2.70	2.60	2.7 - 2.6	4	55240	0.40		0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	1	3	0
Everett St. Off Ramp	2.6	Couch St. Off Ramp	Everett St. Off Ramp - Couch St. Off Ramp	2	0	2.60	2.50	2.6 - 2.5	2	48430	0.23		0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0
Couch St. Off Ramp	2.5	Everett St. On Ramp	Couch St. Off Ramp - Everett St. On Ramp	2	0	2.50	2.10	2.5 - 2.1	31	38400	1.11	0.68	0	25	0	4	2	0	0	0	0	0	0	0	0	0	0	4	4	19	0	8	23	0
Everett St. On Ramp	2.1	Off Ramp to US 26 Westbound	Everett St. On Ramp - Off Ramp to US 26 Westbound	2	0	2.10	1.90	2.1 - 1.9	11	52370	0.58		0	8	0	2	1	0	0	0	0	0	0	0	0	0	1	1	4	4	0	3	7	0
Off Ramp to US 26 Westbound	1.9	Taylor St. On Ramp	Off Ramp to US 26 Westbound - Taylor St. On Ramp	2	0	1.90	1.60	1.9 - 1.6	11	25340	0.79		0	8	0	2	1	0	0	0	0	0	0	0	0	0	0	0	2	8	0	3	7	0
Taylor St. On Ramp	1.6	On Ramp from US 26 Eastbound	Taylor St. On Ramp - On Ramp from US 26 Eastbound	2	0	1.60	1.50	1.6 - 1.5	2	27740	0.40		0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	1	0
On Ramp from US 26 Eastbound	1.5	Montgomery St. On Ramp	On Ramp from US 26 Eastbound - Montgomery St. On Ramp	2	0	1.50	1.40	1.5 - 1.4	7	58210	0.66	0.73	0	4	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	2	3	1
Montgomery St. On Ramp	1.4	Broadway Off Ramp	Montgomery St. On Ramp - Broadway Off Ramp	2	0	1.40	1.30	1.4 - 1.3	13	65710	1.08		0	7	0	4	2	0	0	0	0	0	0	0	0	0	0	1	3	8	0	4	8	0
Broadway Off Ramp	1.3	Broadway On Ramp	Broadway Off Ramp - Broadway On Ramp	2	0	1.30	1.00	1.3 - 1	20	45080	0.81		0	9	0	8	1	0	0	1	1	0	0	0	0	0	2	0	3	14	0	6	12	0
Broadway On Ramp	1.0	5th Ave. On Ramp	Broadway On Ramp - 5th Ave. On Ramp	2	0	1.00	0.80	1 - 0.8	16	48770	0.90		0	6	0	7	1	0	0	0	1	1	0	0	0	0	0	1	2	13	0	6	9	1
5th Ave. On Ramp	0.8	Off Ramp to I-5 Northbound	5th Ave. On Ramp - Off Ramp to I-5 Northbound	2	0	0.80	0.50	0.8 - 0.5	18	50690	0.65		0	12	0	3	3	0	0	0	0	0	0	0	0	0	0	2	1	12	0	8	10	0
Off Ramp to I-5 Northbound	0.5	On Ramp from Naito Parkway	Off Ramp to I-5 Northbound - On Ramp from Naito Parkway	2	0	0.50	0.10	0.5 - 0.1	14	19640	0.98		0	8	0	4	1	0	0	0	1	0	0	0	0	0	0	2	1	10	0	2	11	0
On Ramp from Naito Parkway	0.1	I-5 Southbound	On Ramp from Naito Parkway - I-5 Southbound	2	0	0.10	0.00	0.1 - 0	5	20520	1.34		0	3	0	2	0	0	0	0	0	0	0	0	0	0	0	1	1	3	0	0	5	0
I-5 Southbound	0.0																																	

Southbound I-405: Crashes By Freeway Segment



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CHAPTER 5: APPENDICES

5.2 Appendix A: Technical Memoranda

A.1 Technical Memoranda 1 & 2: Methodology and Assumptions (known and available data)

A.2 Technical Memoranda 3: Bottleneck Identification and Diagnosis

A.3 Technical Memoranda 4 & 5: Corridor Design Review

A.4 Technical Memoranda 6: Evaluation Framework for Investments to Improve Freeway Operations at Bottlenecks on I-5 & I-205

A.5 Technical Memoranda 7: Design Panel Results

A.6 Technical Memoranda 8: Feasibility Review

A.7 Technical Memoranda 9: Summary of Operations Result

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DAVID EVANS
AND ASSOCIATES INC.

MEMORANDUM

DATE:	June 1, 2010
TO:	ODOT Project Management Team
FROM:	Gavin Oien, PE, Scott Harmon, PE and Ryan Oster, EIT
SUBJECT:	**Technical Memoranda #4 & #5 - Corridor Design Review**
PROJECT:	I-5/I-205 Freeway Operations Improvement Program
PROJECT NO:	ODOT 0000-0674
COPIES:	File

INTRODUCTION

The Interstate 5/Interstate 205 (I-5/I-205) Freeway Operations Improvement Analysis (project) is intended to provide spatial and temporal evaluation of freeway operations along the I-5 and I-205 corridors and correlate locations of congestion with potential mitigation measures. The purpose of this technical memorandum is to relate previously documented operational issues to relevant limitations presented by design standards or policy as well as summarizing the initial range of potential options addressing identified bottlenecks.

STUDY AREA

The study area consists of two interstate facilities in the Portland metropolitan area, I-5 and I-205. The I-5 corridor is bounded on the north by the Marquam Bridge (approximately milepost 300) and on the south by the Boone Bridge (approximately milepost 283) in Wilsonville. The I-205 corridor is bounded on the north by Airport Way (approximately milepost 25) and on the south by the I-5 interchange in Tualatin (approximately milepost 0). The corridor study areas for each facility includes the mainline roadway as well as the ramp merge/diverge locations. This project does not include evaluation of ramp terminals or other parallel roadway facilities.

PREVIOUSLY DOCUMENTED OPERATIONAL ISSUES

Based on the review of PORTAL, ODOT camera, and field travel time data, several bottlenecks were identified in the I-5 and I-205 corridors. These bottlenecks were further compared with the State Highway Inventory Reports and Bridge Log. This information is summarized graphically in **Figure 1 through Figure 8**.

DESIGN STANDARD OR POLICY LIMITATIONS

A review of design standards for this project included the following references:

- 2003 ODOT Highway Design Manual (HDM)
- A Policy on Geometric Design of Highway and Streets – 2000 and 2004
- A Policy on Design Standards – Interstate System. (AASHTO 1991)
- Transportation Research Board (TRB) Special Report #214 – Designing Safer Roads

The major design elements that we considered in consultation with ODOT include design speed, interchange spacing, sight distance, shoulder widths, horizontal and vertical clearances and horizontal and vertical grades. The purpose of this corridor design review is to establish a possible correlation between substandard design features at locations operating as bottlenecks and to assess how possible solution projects may fit within ODOT's right-of-way at these locations.

Design Speed:

Within the study area both Interstate 5 and Interstate 205 are classified as urban freeways and as a result typically maintain a 55 mile per hour (mph) speed limit. However, according to the ODOT Speed Zone Order #734-20-011 the following areas of Interstate 5 do not maintain the 55 mph speed limit: MP 283.90 – 288.60 (65 mph) and MP 296.34 – 298.02 (50 mph). In spite of the 55 mph posting, the 85th percentile operating speeds are often observed in excess of 55 mph and a 70 mph design speed is typically used.

Interchange Spacing Distance:

The interchange spacing standard in urban environments is three (3) miles and the distance is measured from crossroad to crossroad. Existing interchanges that do not meet the current standards will not require a design exception, although, moving towards the access managements spacing standard should always be a project consideration. (Source: HDM Table 6-2)

Ramp Spacing Distance:

The minimum spacing for on to off ramp spacing distance in a fully developed urban interchange environment is one (1) mile. (Source: HDM Table 6-3)

Shoulder Widths:

The minimum shoulder width for the areas in question is 10 feet. The inside shoulder on 4 lane highways is 6 feet and on 6 lane highways is 10 feet. Additionally, where barriers exist and truck traffic exceeds a value of 250 Design Hourly Volume (DHV) 12 feet should be used. (Source: HDM Page 6-3 and Table 6-1)

Horizontal and Vertical Clearances:

The vertical bridge clearance on all new urban and rural Interstate Freeway structures shall be a minimum of 17.5 feet. The clearance shall be from the top of the pavement to the bottom of the structure and includes the entire roadway width including the usable shoulder width. Existing clear heights below 16 feet will require consideration of raising the structure and/or lowering the roadbed. The horizontal clearance on the areas in question is governed by existing structures including bridges and overpasses. (Source: HDM Page 6-6 and Table 6-1)

Horizontal and Vertical Grades:

The maximum horizontal curve allowed in an urban environment is 5°00'. The maximum vertical gradient for the areas in question is 5%. Care should be taken in urban environments to minimize the use of steep grades due to the close spacing of interchanges and the multiple speed changes needed in an urban area. Steep grades make it more difficult for lane changes and other maneuvers to be made. (Source: HDM Table 6.1)

I-5 Findings

Design Criteria	Standard	Standard met I-5 NB (Y/N)	Standard met I-5 SB (Y/N)	Comments
Interchange spacing	3 miles	N	N	Existing – No Design Exception Required (See Figures 1-4)
Distance between on-off gore points	1 mile	N	N	Existing – No Design Exception Required (See Figures 1-4)
Shoulder Width	10’	N	N	Less than 8’ (See Figure 1-4)
Vertical Clearance	17.5’	N	N	16 instances of < 17.5’, 2 of those < 16’
Horizontal Curves	$5^{o}00$’	N	N	11 instances of > $5^{o}00$’ (See Figures 2 & 4)
Vertical Grades	5%	N	Y	5 instances of > $5^{\%}$ (See Figure 2)

Figures 1 and 2 summarize design features along the I-5 corridor in the northbound direction. The first study area encompasses the Wilsonville Road On Ramp (MP 283.9) to the Lower Boones Ferry Road On Ramp (MP 290.5). Within this area there are four major interchanges all with spacing of less than 3 miles. The distance between gore points meets the minimum requirements for areas between the Wilsonville Road and Elligsen Road as well as between Elligsen Road and the I-205 interchange. However, it does not meet minimum requirements between the I-205 interchange and Nyberg Street or between Nyberg Street and Lower Boones Ferry Road. Additionally, the shoulder widths in this area fall short of the 10’ minimum. There does not appear to be issues with horizontal clearance, vertical grades or horizontal curvature. The second figure spans the Haines Street On Ramp (MP 293.2) to the Naito / I-405 Off Ramp (MP 301.0). There are multiple areas in this study area that do not meet the interchange distance, ramp spacing distance requirements and vertical clearance. Additionally, in this area, where there are multiple on/off ramps, the shoulders width becomes substandard; and there are a number of locations where the horizontal curves exceed $5^{o}00$’ and the vertical grade exceeds 5%.

Figures 3 and 4 summarize design features along the I-5 corridor in the southbound direction. Figure 3 encompasses an area from the Nyberg Street On Ramp (MP 289.4) to the Hanes Street On-Ramp (MP 293.1). Interchange distances in this study area are less than 3 miles. The gore point distances are all less than the 1 mile minimum. Minimum shoulder widths fall below the 10-foot mark between the Lower Boones Ferry Road Off Ramp and the Carman Drive On Ramp; and number of bridges have less than 17.5’ of vertical clearance but none drop below 16’. There does not appear to be any horizontal curvature or grade issues in this study area. Figure 4 encompasses the Barbur Avenue Off Ramp (MP 296.3) to the Naito / I-405 Off Ramp (MP 301.0). Both Interchange and Ramp Spacing requirements are too short here as well. In one location the vertical clearance is less than new construction standard but not less than 16’. There are a few areas where the vertical grade gets near 5%, but in this study area all the horizontal curves exceed $3^{o}15$’ including curves of 7° and 9°.

I-205 Findings

Design Criteria	Standard	Standard met I-205 NB (Y/N)	Standard met I-205 SB (Y/N)	Comments
Interchange spacing	3 miles	N	N	Existing – No Design Exception Required (See Figures 5-8)
Distance between gore points	1 mile	N	N	Existing – No Design Exception Required (See Figures 5-8)
Shoulder Width	10’	N	N	Less than 8’ (See Figures 5, 6 & 8)
Vertical Clearance	17.5’	N	N	8 instances of < 17.5’, 0 < 16’
Horizontal Curves	$5^{o}00$’	Y	Y	
Vertical Grades	5%	Y	Y	

Figure 5 focuses on the I-205 corridor in the northbound direction. Figure 5 stretches from the Milwaukee Expressway / 82nd Drive On Ramp (MP 13.6) to the Airport Way On Ramp (MP 24.9). There are multiple interchanges in this study area and none of them meet the minimum distance of 3 miles between interchanges. Distance between gore points are also an issue with all 23 of the distances not meeting the 1 mile standard, and shoulder widths and vertical clearances are short of new construction standards. However there appears to be no horizontal clearance, vertical grade, or horizontal curvature deficiencies.

Figures 6, 7 and 8 highlight data with respect to the I-205 corridor in the southbound direction. Figure 6 extends from the Highway 43 On Ramp (MP 8.5) to the Highway 213 / Park Place On Ramp (MP 10.2). There are only three interchanges in this area and the distances between them are less than 3 miles and the gore point distances are also below the 1 mile mark. There are shoulder width issues in this area with a substantial portion of the shoulders being less than 8’. Fortunately, there are no design standard issues with respect to the vertical and horizontal clearances, vertical grades or horizontal curves. Figure 7 spans the area from the Gladstone / 82nd Drive On Ramp (MP 11.1) to the Milwaukee Expressway / 82nd Drive On Ramp (MP 13.4). This study area does not meet new construction standards with respect to the interchange distance, gore point distance and vertical clearance, but meets the standards for shoulder widths, horizontal clearances, vertical grades and horizontal curves. Figure 8 highlights an area from the Division Street On Ramp (MP 19.3) to the Eastbound Airport Way On Ramp (MP 24.7). The interchange distances in this area are all below the 3 mile standard along with the 1 mile ramp spacing minimum. There are shoulder width distances of less than 8’ between the Glisan Street On-Ramp and Westbound I-84 On Ramp and between the Eastbound I-84 Off Ramp and Highway 30 / NE Columbia Off Ramp. Additionally, there are two instances of vertical clearance that fall below the 17.5’ minimum. There does not appear to be any horizontal clearance issues with existing structures or vertical grade or horizontal curve problems.

POTENTIAL PROJECTS WITHIN THE STUDY AREA

The following potential improvements (including source) have been identified as potential bottleneck improvement projects along Interstates 5 and 205 and are recommended to advance to the project design panel for consideration and possible evaluation:

Potential Interstate 5 Northbound Projects

Bottleneck #	ODOT #	Project Location	Project Name	Description	Est. Cost
1		Terwilliger Curves	Truck Variable Speed Signs	Variable speed signs for trucks entering curves	
1		Terwilliger Curves	NB Curve Improvements	Current curves are substandard	
1		Terwilliger On-Ramp	NB Terwilliger On-Ramp Improvements	Current On-Ramp is substandard	
2		Lower Boones Ferry Off-Ramp		No Projects Identified	
3	441	Stafford/Elligsen to I-205	I-5/I-205 NB Auxiliary Lane, Elligsen to 205	Add auxiliary lane NB I-5 from Stafford to I-205 to tie into permanent auxiliary lane constructed with the I-205 Preservation Project Phase 3.	$11,000,000
3	442	Stafford/Elligsen to Wilsonville	I-5 Auxiliary Lanes, Elligsen to Wilsonville Rd both dir	Auxiliary lanes in both directions from Stafford Interchange (Elligsen Road) to Wilsonville Road	$8,000,000

Potential Interstate 5 Southbound Projects

Bottleneck #	ODOT #	Project Location	Project Name	Description	Est. Cost
4		Harbor Drive to Terwilliger	NB I-5 Auxiliary Lane, Harbor Drive to Terwilliger	Add southbound auxiliary lane from Harbor Drive to Terwilliger	
4		Harbor Drive	Harbor Drive Realignment	Realign Harbor Drive to outside of I-405. Let I-405 add both lanes	
5		OR-217 On-Ramp	OR-217 to SB I-5 Lane utilization improvements	Signing and other driver awareness tools to improve driver behavior and lane utilization	
5		Carman Dr. Lane Drop	Carman Dr. Lane Drop Improvements	Remove Lane Drop by running lane all the way through to Upper Boones On-Ramp	
6		Nyberg St. Off-Ramp	Nyberg St. Off-Ramp Improvements	Modify Off-Ramp to provide two lanes	
7	337	I-205 On-Ramp	SB I-205 to SB I-5, Extend Accel/Aux to Elligsen	Add lane to SB I-205 to SB I-5 interchange ramp and extend acceleration lane and add auxiliary lane on SB I-5 to Stafford Road.	$9,700,000

Potential Interstate 205 Northbound Projects

Bottleneck #	ODOT #	Project Location	Project Name	Description	Est. Cost
1	45	Columbia Blvd. to Airport Way	I-205 Aux Lanes/Braids - AWI to Columbia	New I-205 auxiliary lane and/or braided ramps in both directions from Airport Way to Columbia Boulevard based on I-205/Airport Way Study	$27,200,000
1, 2 and 3	46	I-84 to Columbia Blvd.	I-205 Aux lanes - I-84 to Columbia Boulevard	New auxiliary lane and/or braided ramps in both directions from I-84 to Columbia Boulevard based on I-205/Airport Way Study	$6,800,000
1, 2 and 3	129	Glisan St. to Airport way	I-205 N Aux Lanes: AW, Sandy, I-84, Glisan	Southbound between Airport Way WB and EB; Northbound between Airport Way EB & WB; Sandy/Columbia; I-84E/Sandy; Glisan/I-84E	$45,952,610
4		Division St. to Glisan St.	I-205 NB and SB aux lanes – Division St. to Glisan St.	Construct NB and SB aux lane between Division St. and Glisan St.	
4		Powell Blvd. to Division St.	I-205 NB and SB aux lanes – Powell to Division	Construct NB and SB aux lane between Powell Blvd. and Division St.	
4, 5 and 6	82	OR 212/224 to I-84	I-205 Widening: OR 212/224 to I-84 in 2 phases	Widen I-205 by one lane in each direction. Widen NB railroad bridge just north of OR 224. Widen Foster Rd/Woodstock Bridge.	$63,400,000
5	447	Johnson Creek Blvd. to Foster Rd.	I-205 Aux Lanes between Powell/Div, Foster, JCB	Southbound between: Division-Powell/Foster and Foster/Johnson Creek Blvd. Northbound between Johnson Creek Blvd/Foster and Foster-Division/Powell	$43,933,422
6		Milwaukie Expressway to Sunnybrook	I-205 NB aux lanes - Milwaukie Expressway to Sunnybrook	Construct NB aux lane from Milwaukie Expressway to Sunnybrook	

Potential Interstate 205 Southbound Projects

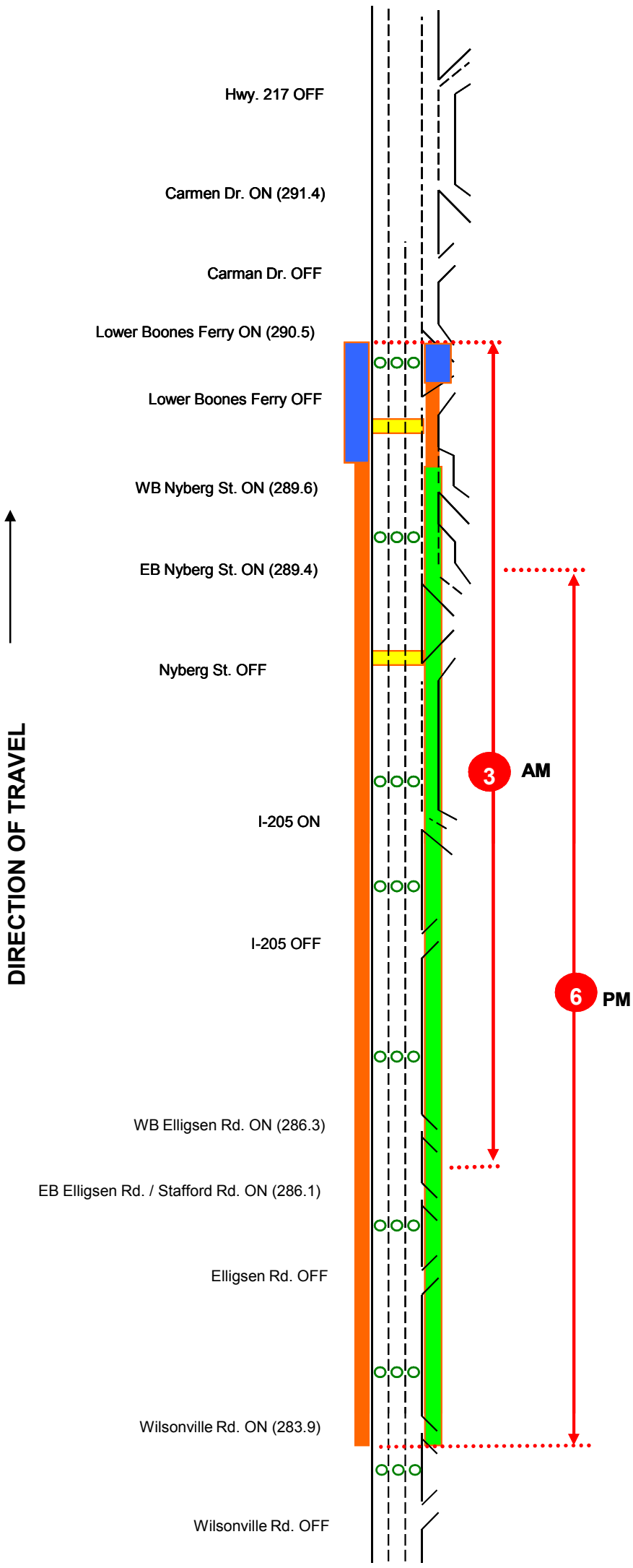
Bottleneck #	ODOT #	Project Location	Project Name	Description	Est. Cost
7	46	Columbia Blvd. to I-84	I-205 Aux lanes - I-84 to Columbia Boulevard	New auxiliary lane and/or braided ramps in both directions from I-84 to Columbia Boulevard based on I-205/Airport Way Study	$6,800,000
7, 8 and 9	82	I-84 to OR 212/224	I-205 Widening: OR 212/224 to I-84 in 2 phases	Widen I-205 by one lane in each direction. Widen NB railroad bridge just north of OR 224. Widen Foster Rd/Woodstock Bridge.	$63,400,000
7, 8 and 9		Glisan St. to Division St.	I-205 NB/SB aux lanes – Division St. to Glisan St.	Construct NB and SB aux lane between Division St. and Glisan St.	
10	85	OR 212/224 to Gladstone	I-205 Aux Lanes: Gladstone to OR 212/224	Auxiliary lanes in both directions - OR 212/224 to Gladstone interchange (82nd Dr).	$18,500,000
11	74	Hwy 213 to 99E	I-205/OR 213 Stage 5: Braids between 99E, 213, Gladstone	Auxiliary lanes/braided ramp enhancements and freeway modifications needed to support I-205/OR 213 interchange improvements.	$200,888,876
12	83	Abernethy Bridge	I-205 Abernethy Bridge Widening (Willamette River crossing)	Improvements to Abernethy Bridge, as identified through I-205 Refinement Planning (#5027).	$106.400,000
12		Hwy 99E to 10th Street	I-205 Widening: Hwy 99E to 10th Street	Add one lane each direction from 10th Street to Hwy 99E. Remove NB 99E Ramp, keep loop ramp.	
12	84	Abernethy Bridge to 10th Street	I-205 Climbing Lanes, Abernethy Br. to 10th	New SB Truck climbing lane from Abernethy Bridge Bridge to 10th Street).	$56,800,000
12	449	OR 43 to Stafford	I-205 Widening & Aux Lanes, OR 43 to Stafford	'Southbound between 10th/Stafford and Northbound between Stafford/10th, 10th/OR 43. Includes addition of SB third lane OR-43 to Stafford	$74,600,000

Next Steps:

This project is organized into three phases. This memorandum adds to the context development under phase 1. Phase 1 consists of six technical memorandums providing corridor-level reconnaissance that are intended to provide the foundation for specific site investigation and mitigation options to be determined later in phases 2 and 3. Phase 2 will be primarily design oriented with qualitative guidance from the traffic team, identifying potential mitigation measures to be evaluated by a design panel. The final phase of the project, phase 3, is to conduct a more thorough evaluation of mitigation measures deemed feasible by the design panel in phase 2. The evaluation will include traffic modeling (VISSIM and possibly other programs such as VISUM and/or HCS) to assess various performance measures allowing for selection and/or prioritization of projects along the corridors. The final product will be an atlas with informative details, feasible mitigation measures (including design were applicable) and geographic drawings showing the locations benefiting from the specific mitigation measures.

I-5 Northbound

Wilsonville Rd On Ramp to Lower Bones Ferry On Ramp



Distance Between Interchanges:

SW Wilsonville Rd. to SW Elligsen Rd. = 2.29 miles
SW Elligsen Rd. to I-205 = 2.33 miles
I-205 to SW Nyberg Rd = 1.00 miles
SW Nyberg Rd to Lower Boones Fery Rd. = 0.98 miles

Distance Between Gore Points:

1) Wilsonville Rd On Ramp to Elligsen Rd Off Ramp = 1.8 miles
2) Elligsen Rd Off Ramp to Elligsen Rd EB On Ramp = 0.52 miles
3) Elligsen Rd EB On Ramp to Elligsen Rd WB On Ramp = 0.07 miles
4) Elligsen Rd WB On Ramp to Off Ramp to I-205 EB = 1.74 miles
5) Off Ramp to I-205 EB to On Ramp from I-205 WB = 0.27 miles
6) On Ramp from I-205 WB to Nyberg St Off Ramp= 0.80 miles
7) Nyberg St Off Ramp to Nyberg St EB On Ramp = 0.23 mile
8) Nyberg St EB On Ramp to Nyberg St WB On Ramp = 0.23 miles
9) Nyberg St WB On Ramp to Lower Boones Ferry Rd Off Ramp = 0.54 miles
10) Lower Boones Ferry Rd Off Ramp to Lower Boones Ferry Rd On Ramp = 0.47 miles

Shoulder Widths:

Greater than 12' | 12' to 8' | Less than 8'

Width at Structures:

MP 284.88 (Boeckman) HC = 40', VC = 18'
MP 286.18 (Elligsen) HC = 78', VC = 19' 2"
MP 287.42 (Norwood) HC = 86', VC = 17' 7"
MP 288.47 (I-205) HC = 54', VC = 17' 3"
MP 288.98 (Sagert) HC = 58', VC = 17' 2"
MP 289.50 (Nyberg) HC = 58', VC = 17' 9"

Vertical Grades:

MP 289.00 - Crest: -4.88%
MP 289.94 - Sag: 3.26%

3-5% | Greater than 5%

Horizontal Curves:

Greater than 3^ 15'

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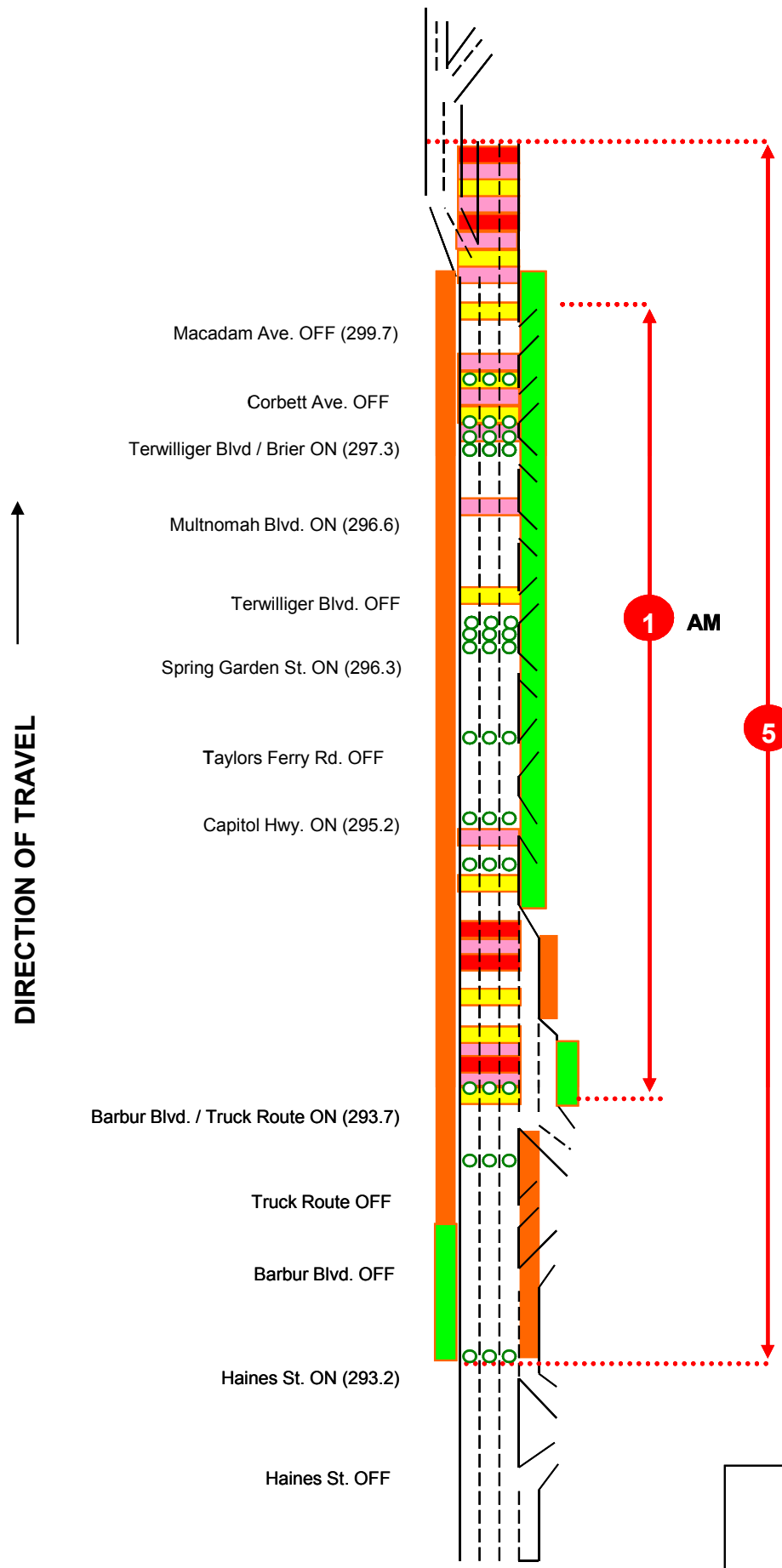
Figure 1
Corridor Bottleneck Operations Study
I-5 Northbound Geometric Summary

I-5 Northbound

Haines St On Ramp to Naito / I-405 Off Ramp



Distance Between Interchanges:

SW Haines St to SW Barbur Blvd = 0.73 miles
SW Barbur Blvd to SW Capitol Hwy = 1.21 miles
SW Capitol Hwy to SW Spring Garden St = 1.35 miles
SW Spring Garden St to SW Terwilliger Blvd = 0.78 miles
SW Terwilliger Blvd to Sw Macadam Ave = 2.58 miles

Distance Between Gore Points:

1) Haines St On Ramp to Barbur Blvd Off Ramp = 0.20 miles
2) Barbur Blvd Off Ramp to Truck Route Off Ramp = 0.26 miles
3) Truck Route Off Ramp to Barbur Blvd/Truck Route On Ramp = 0.43 miles
4) Barbur Blvd /Truck Route to Capitol Hwy On Ramp = 1.16 miles
5) Capitol Hwy On Ramp to Taylors Ferry Rd Off Ramp = 0.32 miles
6) Taylors Ferry Rd Off Ramp to Spring Garden St On Ramp = 0.79 miles
7) Spring Garden St On Ramp to Terwilliger Blvd Off Ramp = 0.28 miles
8) Terwilliger Blvd Off Ramp to Multnomah Blvd On Ramp = 0.36 miles
9) Multnomah Blvd On Ramp to Terwilliger Blvd/Brier On Ramp = 0.74 miles
10) Terwilliger Blvd/Brier On Ramp to Corbett Ave Off Ramp = 1.05 miles
11) Corbett Ave Off Ramp to Macadam Ave Off Ramp = 0.42 miles
12) Macadam Ave Off Ramp to Naito /I-405 Off Ramp = 0.73 miles

Shoulder Widths:

Greater than 12' | 12' to 8' | Less than 8'

Width at Structures:

MP 293.90 (Haines) HC = 71', VC = 28' 8"
MP 293.77 (Barbur) HC = 54', VC = 17' 3"
MP 293.82 (Barbur) HC = 54', VC = 18' 3"
MP 295.04 (Capitol) HC = 49', VC = 15' 3"
MP295.26 (Ped Bridge) HC = 49', VC = 17' 9"
MP 296.04 (26th) HC = 42' 4"
MP 296.34 (Spring Garden) HC = 56', VC = 14' 10"
MP 296.46 (19th) HC = 49' 6", VC = 19' 1"
MP 296.55 (Multnomah) HC = 50' 06", VC = 16' 05"
MP 297.05 (Bertha) HC = 56', VC = 19' 1"
MP 297.17 (Terwilliger) HC = 49', VC = 17' 5"
MP 297.55 (Brier) HC = 50', VC = 17'
MP 298.83 (Corbett) HC = 50' 6", VC = 17' 8"

Horizontal Curves:

MP 293.75 - 4.00
MP 293.78 - 6.00
MP 294.56 - 3.50
MP 295.08 - 4.00
MP 296.89 - 7.00
MP 297.36 - 7.00
MP 298.58 - 5.00
MP 298.80 - 6.00
MP 299.92 - 8.00
MP 300.45 - 8.50
MP 300.57 - 6.00
MP 300.68 - 4.00

Vertical Grades:

MP 293.74 - Crest: -3.63%
MP 293.88 - Crest: -5.93%
MP 293.97 - Sag: -4.27%
MP 294.05 - Crest: -4.78%
MP 294.14 - Crest: - 5.97%
MP 294.20 - Sag: -5.23%
MP 294.69 - Crest: -4.39%
MP 296.44 - Crest: -4.00%
MP 297.77 - Crest: -3.54%
MP 298.91 - Crest: -3.80%
MP 299.86 - Sag 4.42%
MP 300.02 - Sag -5.00%
MP 300.10 - Sag: 5.72%
MP 300.54 - Crest: -5.00%
MP 300.66 - Crest: -5.54%

3-5% | Greater than 5%

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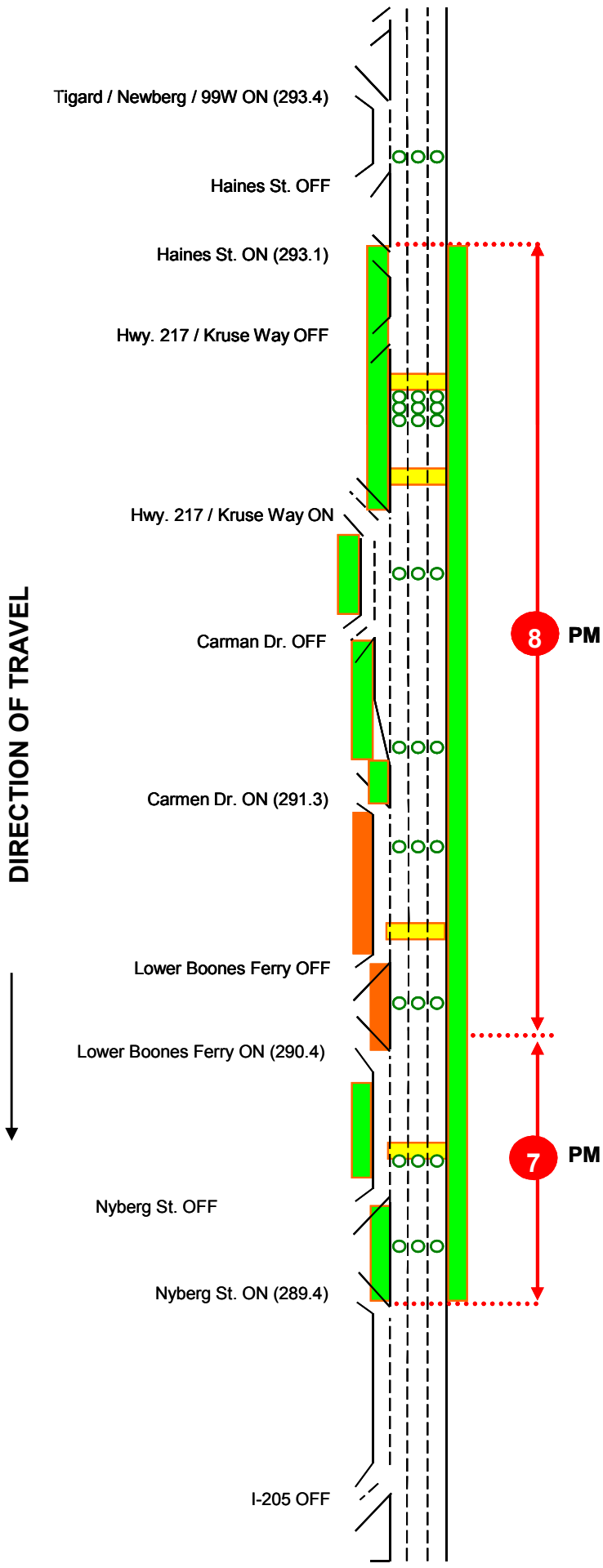
Figure 2
Corridor Bottleneck Operations Study
I-5 Northbound Geometric Summary

I-5 Southbound

Nyberg St On Ramp to Haines St On Ramp



Distance Between Interchanges:

SW Nyberg St to Lower Boones Ferry Rd = 0.98 miles
Lower Boones Ferry Rd to Carman Dr = 0.82 miles
Carman Dr to Kruse Way = 0.92
Kruse Way to SW Haines St = 1.01 miles

Distance Between Gore Points:

1) Nyberg St On Ramp to Lower Boones Fery Rd On Ramp = 0.58 miles
2) Lower Boones Fery Rd On Ramp to Lower Boones Ferry Rd Off Ramp = 0.45 miles
3) Lower Boones Ferry Rd Off Ramp to Carman Dr On Ramp = 0.32 miles
4) Carman Dr On Ramp to Carman Dr Off Ramp = 0.48 miles
5) Carman Dr Off Ramp to Hwy 217/Kruse Way On Ramp = 0.45 miles
6) Hwy 217/Kruse Way On Ramp to Hwy 217/Kruse Way Off Ramp = 0.46 miles
7) Hwy 217/Kruse Way Off Ramp to Haines St On Ramp = 0.45 miles

Shoulder Widths:

Greater than 12' | 12' to 8' | Less than 8'

Width at Structures:

MP 289.50 (Nyberg) HC = 62', VC = 17' 3"
MP 289.91 (RR) HC = 60', VC = 18' 6"
MP 290.48 (Lower Boones) HC = 88'
MP 290.97 (RR) HC = 69'
MP 291.30 (Carman) HC = 50', VC = 17' 5"
MP 291.81 (Bonita) HC = 60', VC = 16' 10"
MP 292.16 (Kruseway) VC = 17' 2"
MP 292.19 (Ped Bridge) VC = 17' 2"
MP 292.20 (Kruseway) HC = 60', VC = 16' 10"
MP 293.30 (Haines) HC = 67', VC = 16' 1"

Vertical Grades:

MP 289.94 - Sag: 3.26%
MP 290.78 - Sag: 3.41%
MP 292.26 - Sag 4.75%
MP 292.42 - Crest 3.32%

3-5% | Greater than 5%

Horizontal Curves:

Greater than 3^ 15'

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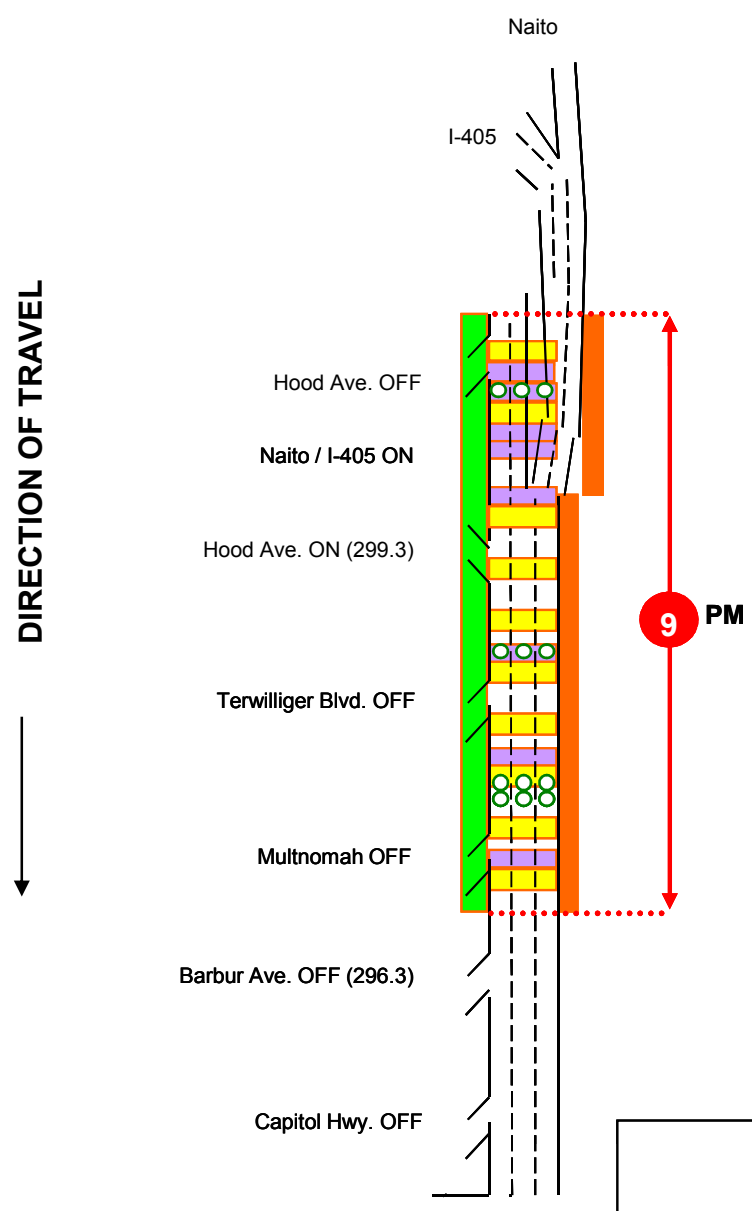
Figure 3
Corridor Bottleneck Operations Study
I-5 Southbound Geometric Summary

I-5 Southbound

Barbur Ave Off Ramp to Naito/ I-405 Off Ramp



Distance Between Interchanges:

SW Terwilliger Blvd to SW Corbett Ave = 1.65 miles
SW Corbett Ave to SW Macadam Ave = 0.45 miles

Distance Between Gore Points:

1) Barbur Ave Off Ramp to Multnomah Off Ramp = 0.38 miles
2) Multnomah Off Ramp to Terwiliger Blvd Off Ramp = 0.63 miles
3) Terwiliger Blvd Off Ramp to Hood Ave On Ramp = 1.94 miles
4) Hood Ave On Ramp to I-405 On Ramp = 0.31 miles

Shoulder Widths:

Greater than 12' | 12' to 8' | Less than 8'

Width at Structures:

MP 297.05 (Bertha) HC = 26', VC = 19' 1"
MP 297.17 (Terwilliger) HC = 49', VC = 16' 1"
MP 297.55 (Brier) HC = 50', VC = 24' 5"
MP 298.83 (Corbett) HC = 49' 1", VC = 27' 4"

Horizontal Curves:

MP 296.89 - 7.00
MP 297.36 - 7.00
MP 298.58 - 5.00
MP 299.99 - 5.00
MP 300.21 - 4.00
MP 300.46 - 9.13
MP 300.68 - 6.00
MP 300.74 - 4.00

Greater than 3^ 15'

Vertical Grades:

MP 296.44 - Crest: -4.00%;
MP 296.80 - Crest: -3.36%;
MP 297.31 - Crest -3.38%;
MP 297.77 - Crest -3.54%;
MP 298.55 - Crest: -3.36%;
MP 298.91 - Crest: -3.80%;
MP 299.21 - Sag -3.11%;
MP 299.91 - Sag -5.00%;
MP 300.56 - Crest -5.00%;
MP 300.83 - Crest -4.72%;

3-5% | Greater than 5%

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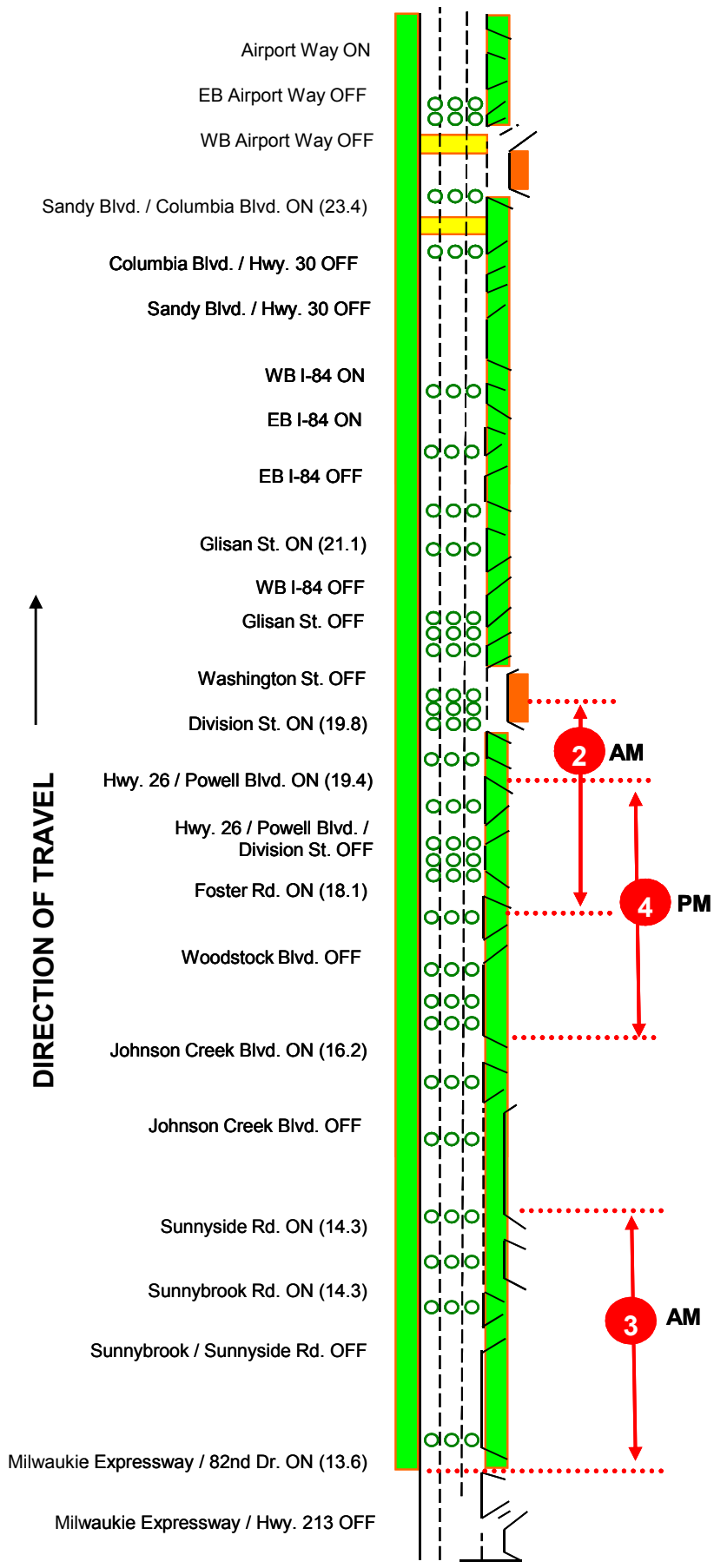
Figure 4
Corridor Bottleneck Operations Study
I-5 Southbound Geometric Summary

I-205 Northbound

Milwauke Expressway / 82nd Dr On Ramp to Airport Way On Ramp



Distance Between Interchanges:

Milwauke Expy to SE Sunnybrook Blvd = 0.72 miles
SE Sunnybrook Blvd to SE Sunnyside Rd = 0.26 miles
SE Sunnyside Rd to SE Johnson Creek Blvd = 1.66 miles
SE Johnson Creek Blvd to SE Foster Rd = 1.62 miles
SE Foster Rd to SE Powell Blvd = 1.27 miles
SE Powell Blvd to SE Division St = 0.49 miles
SE Division St to SE Washington = 0.99 miles
SE Washington St to NE Glisan St = 0.55 miles
NE Glisasn St to I-84 = 0.48 miles
I-84 to HWY 30 = 1.02 miles
HWY 30 to NE Sandy Blvd = 1.07 miles
NE Sandy Blvd to Airport Way = 0.97 miles

Distance Between Gore Points:

1) Milwauke Expy/82nd Dr Off Ramp to Sunnybrook Rd/Sunnyside Rd Off Ramp = 0.67 miles
2) Sunnybrook Rd/Sunnyside Rd Off Ramp to Sunnybrook Rd On Ramp = 0.30 miles
3) Sunnybrook Rd On Ramp to Sunnyside Rd On Ramp = 0.22 miles
4) Sunnyside Rd On Ramp to Johnson Crk Blvd Off Ramp = 1.10 miles
5) Johnson Crk Blvd Off Ramp to Johnson Creek Blvd On ramp = 0.31 miles
6) Johnson Crk Blvd On Ramp to Woodstock Blvd Off Ramp = 1.29 miles
7) Woodstock Blvd Off Ramp to Foster Rd On Ramp = 0.61 miles
8) Foster Rd On Ramp to Powell Blvd Off Ramp = 0.79 miles
9) Powell Blvd Off Ramp to Powell Blvd On Ramp = 0.58 miles
10) Powell Blvd On Ramp to Division St On Ramp= 0.40 miles
11) Division St On Ramp to Washington/Stark Off Ramp = 0.46 miles
12) Washington/Stark Off Ramp to Glisan St Off Ramp = 0.30 miles
13) Glisan St Off Ramp to I-84 WB Off Ramp = 0.36 miles
14) I-84 WB Off Ramp to Glisan St On Ramp = 0.50 miles
15) Glisan St On Ramp to I-84 EB Off Ramp = 0.73 miles
16) I-84 EB Off Ramp to I-84 EB On Ramp = 0.41 miles
17) I-84 EB On Ramp to I-84 WB On Ramp = 0.23 miles
18) I-84 WB On Ramp to Sandy Blvd Off Ramp = 0.35 miles
19) Sandy Blvd Off Ramp to Columbia Blvd Off Ramp = 0.41 miles
20) Columbia Blvd Off Ramp to Columbia Blvd On Ramp = 0.36 miles
21) Columbia Blvd On Ramp to Airport Way WB Off Ramp = 0.28 miles
22) Airport Way WB Off Ramp to Airport Way EB Off Ramp = 0.22 miles

Shoulder Widths:

Greater than 12' | 12' to 8' | Less than 8'

Width at Structures:

MP 13.76 (RR) HC = 60';
MP 14.32 (Sunybrook) HC = 56', VC = 17' 1"
MP 14.58 (Sunnyside) HC = 56', VC = 17' 1"
MP 14.94 (Monterey) HC = 55' 10", VC = 18'
MP 15.87 (Otty) HC = 56', VC = 22' 7"
MP 16.24 (Johnson) HC = 56', VC = 18' 3"
MP 16.80 (92nd) HC = 58'
MP 17.12 (Flavel) HC = 58'
MP 17.43 (RR) HC = 58'
MP 17.80 (Woodstock/Foster) HC = 60'
MP 18.11 (Harold) HC = 58'
MP 18.24 (Ped Bridge) HC = 58', VC = 17' 10"
MP 18.62 (Holgate) HC = 58', VC = 17' 1"
MP 19.12 (Hwy 26) HC = 72'
MP 19.61 (Division) HC = 72'
MP 20.06 (Market) HC = 64', VC = 19' 3"
MP 20.28 (Ped Bridge) HC = 64', VC = 22'
MP 20.57 (Washington) HC = 68', VC = 18' 7"
MP 20.62 (Stark) HC = 68', VC = 19'
MP 20.87 (Burnside) HC = 68', VC = 19'
MP 21.07 (Glisan) HC = 68', VC = 17' 9"
MP 21.18 (Ramp) HC = 68', VC = 17' 9"
MP 21.48 (Max Line) HC = 65', VC = 18'
MP 21.58 (Hwy 64) HC = 68'
MP 21.86 (RR) HC = 60'
MP 21.68 (Halsey) HC = 68', VC = 19' 4"
MP 23.27 (Prescott) HC = 70', VC = 25' 2"
MP 23.40 (Sandy) HC = 72', VC = 18' 7"
MP 23.70 (Columbia) HC = 64', VC = 25'

Horizontal Curves:

Greater than 3^ 15'

Vertical Grades:

MP 23.28 - Crest: -3.00%
MP 23.62 - Crest: -3.00%

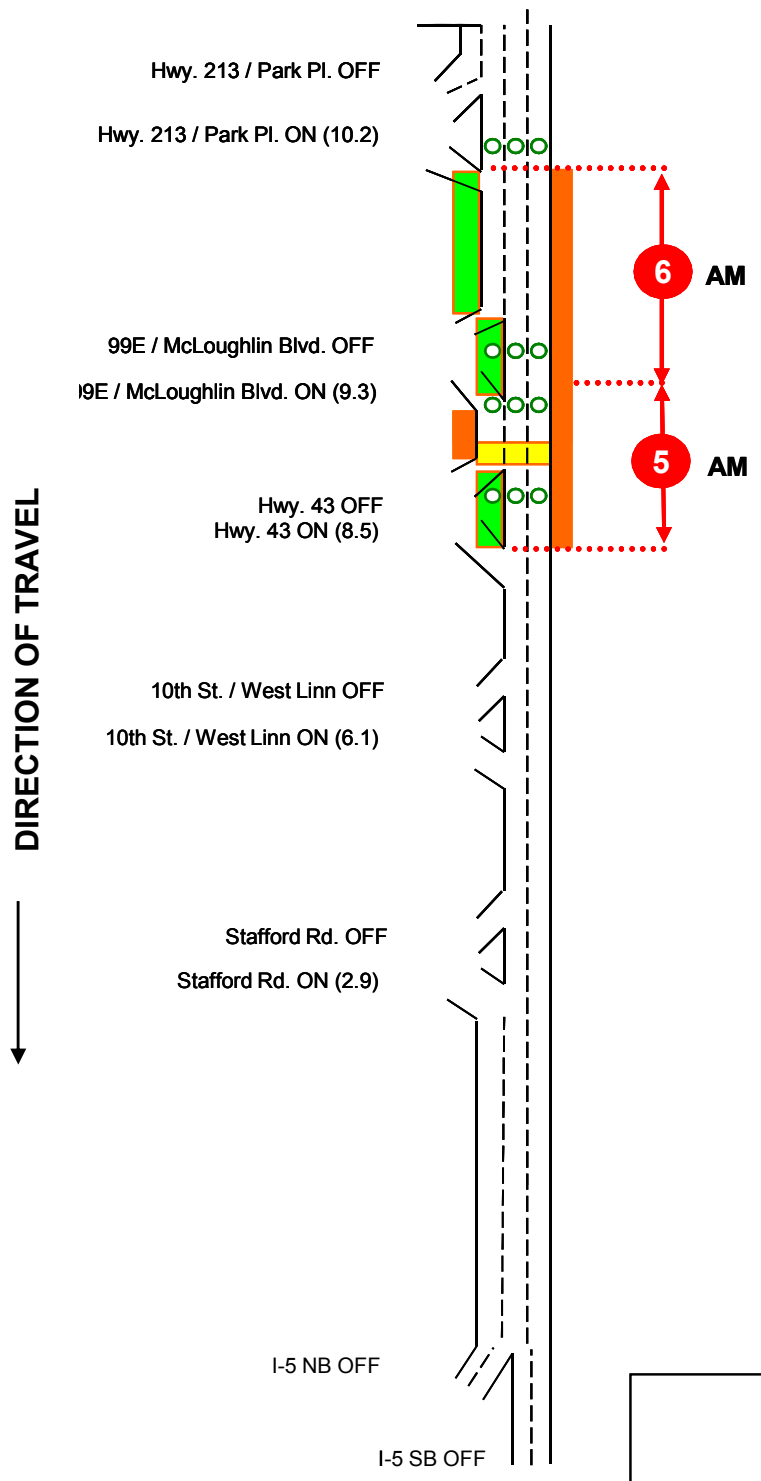
3-5% | Greater than 5%

DAVID EVANS AND ASSOCIATES INC.

Figure 5
Corridor Bottleneck Operations Study
I-205 Northbound Geometric Summary

I-205 Southbound

Highway 43 On Ramp to Highway 213 / Park Place On Ramp



Distance Between Interchanges:

Hwy 43 to McLoughlin Blvd = 0.56 miles
McLoughlin Blvd to Hwy 213 = 0.88 miles

Distance Between Gore Points:

1) Hwy 43 On Ramp to Hwy 43 Off Ramp = 0.51 miles
2) Hwy 43 Off Ramp to 99E/McGloughlin Blvd On Ramp = 0.25 miles
3) 99E/McGloughlin Blvd On Ramp to 99E/McGloughlin Blvd Off Ramp = 0.30 miles
4) 99E/McGloughlin Blvd Off Ramp to Hwy 213/Park Pl On Ramp = 0.42 miles

Shoulder Widths:

Greater than 12' | 12' to 8' | Less than 8'

Width at Structures:

MP 8.82 (Willamette River) HC = 92"
MP (McLoughlin) HC = 92'
MP 9.51 (Main St) HC = 71'
MP 10.24 (Parkplace) HC = 64', VC = 17' 4"

Horizontal Curves:

Greater than 3^ 15'

Vertical Grades:

MP 8.86 - Crest: -3.00

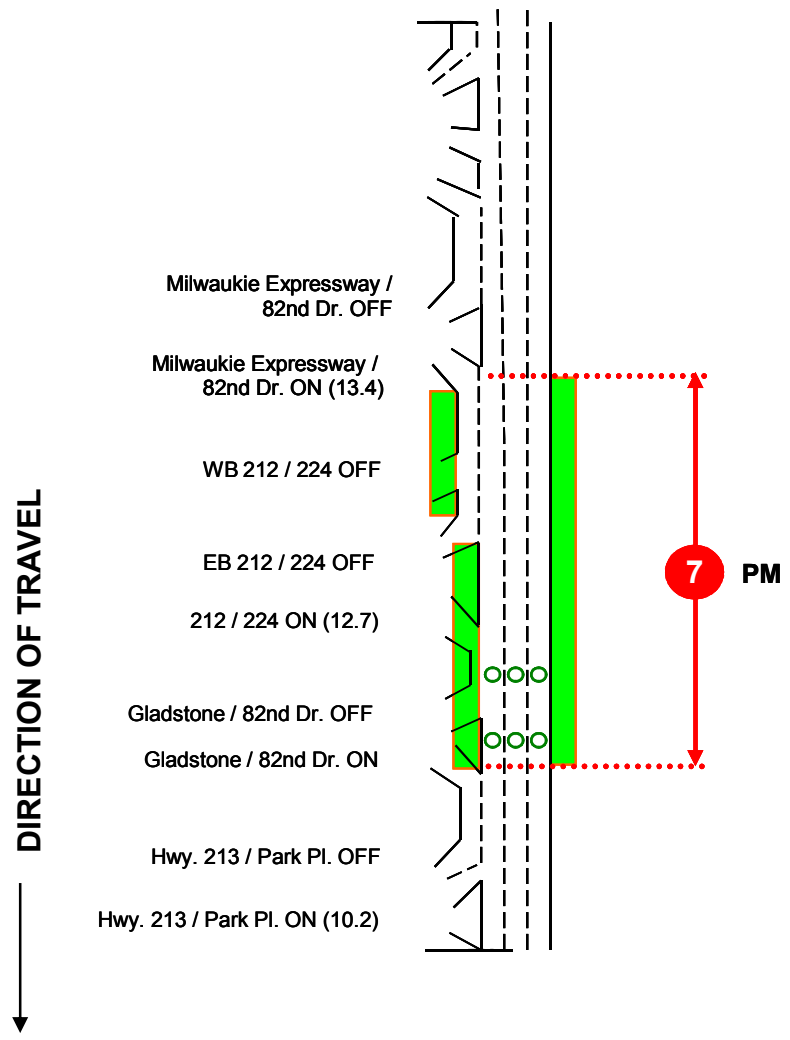
3-5% | Greater than 5%

DAVID EVANS AND ASSOCIATES INC.

Figure 6
Corridor Bottleneck Operations Study
I-205 Southbound Geometric Summary

I-205 Southbound

Gladstone / 82nd Dr On Ramp to Milwauke Expressway / 82dn Dr On Ramp



Distance Between Interchanges:

Gladstone / 82nd Dr to Carver Rd = 1.63 miles
Carver Rd to Milwauke Expressway = 0.82 miles

Distance Between Gore Points:

1) Gladstone/82nd Dr On Ramp to Gladstone/82nd Dr Off Ramp = 0.44 miles
2) Gladstone/82nd Dr Off Ramp to 212//224 On Ramp = 1.06 miles
3) 212//224 On Ramp to EB 212/224 Off Ramp = 0.34 miles
4) EB 212/224 Off Ramp to WB 212/214 Off Ramp = 0.24 miles
5) WB 212/214 Off Ramp to Milwaukie Expressway/82nd Dr. On Ramp = 0.31 miles

Shoulder Widths:

Greater than 12' | 12' to 8' | Less than 8'

Width at Structures: ooo

MP 11.05 (82nd Dr) HC = 120', VC = 18' 4"
MP 11.98 (Strawberry) HC = 92', VC = 17' 3"

Horizontal Curves:

Greater than 3^ 15'

Vertical Grades:

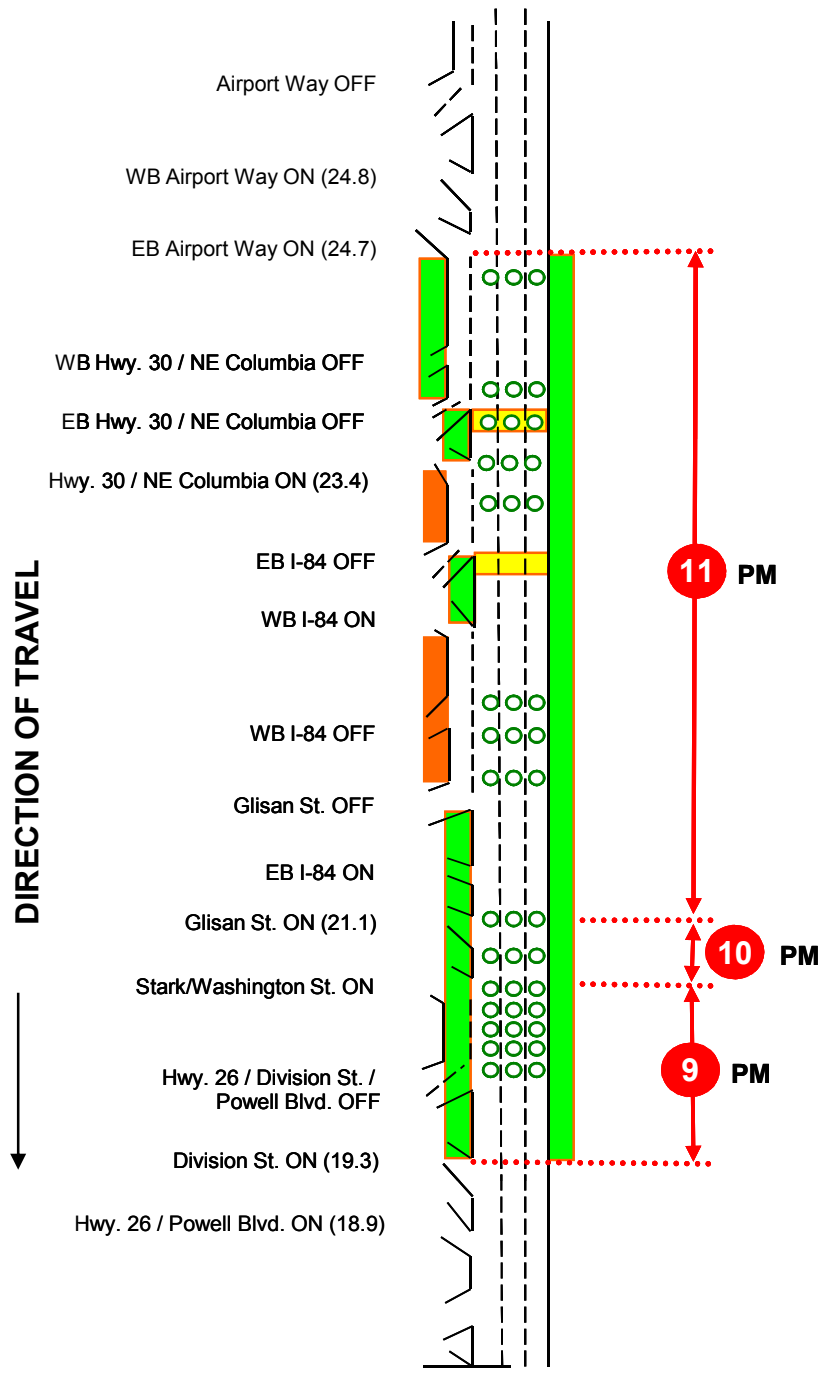
3-5% | Greater than 5%

DAVID EVANS AND ASSOCIATES INC.

Figure 7
Corridor Bottleneck Operations Study
I-205 Southbound Geometric Summary

I-205 Southbound

Gladstone / 82nd Dr On Ramp to Milwauke Expressway / 82nd Dr On Ramp



Distance Between Interchanges:

SE Division St to Stark / Washington St = 0.98 miles
Stark / Washington St to NE Glisan St = 0.53 miles
NE Glisan St to I-84 WB = 0.30 miles
I-84 WB to I-84 EB = 1.16 miles
I 84 EB to NE Columbia Blvd = 1.09 miles
NE Columbia Blvd to NE Airport Way = 0.97 miles

Distance Between Gore Points:

1) Division St On Ramp to Division St Off Ramp = 0.78 miles
2) Division St Off Ramp to Stark/Washington On Ramp = 0.29 miles
3) Stark/Washington On Ramp to Glisan St On Ramp = 0.40 miles
4) Glisan St On Ramp to I-84 EB On Ramp = 0.49 miles
5) I-84 EB On Ramp to Glisan St Off Ramp = 0.35 miles
6) Glisan St Off Ramp to I-84 WB Off Ramp = 0.16 miles
7) I-84 WB Off Ramp to I-84 WB On Ramp = 0.42 miles
8) I-84 WB On Ramp to I-84 EB Off Ramp = 0.80 miles
9) I-84 EB Off Ramp to Columbia Blvd On Ramp = 0.54 miles
10) Columbia Blvd On Ramp to Columbia Blvd EB Off Ramp = 0.24 miles
11) Columbia Blvd EB Off Ramp to Columbia Blvd WB Off Ramp = 0.10 miles
12) Columbia Blvd WB Off Ramp to Airport Way EB On Ramp = 0.50 miles

Shoulder Widths:

Greater than 12' | 12' to 8' | Less than 8'

Vertical Grades:

MP 23.28 - Crest: -3.00
MP 23.62 - Crest: -3.00

3-5% | Greater than 5%

Width at Structures:

MP 19.61 (Division) HC = 144'
MP 20.06 (Market) HC = 64', VC = 20'
MP 20.28 (Ped Bridge) HC = 64', VC = 18' 9";
MP 20.57 (Washington) HC = 62', VC = 18' 2"
MP 20.62 (Stark) HC = 62', VC = 19'
MP 20.87 (Burnside) HC = 58', VC = 17' 11"
MP 21.07 (Glisan) HC = 68', VC = 18'
MP 21.48 (MAX LRT) HC = 55', VC = 17' 7"
MP 21.57 (I-84) HC = 79'
MP 21.68 (Halsey) HC = 68', VC = 16' 7"
MP 23.27 (Prescott) HC = 90', VC = 24' 4"
MP 23.48 (Sandy) HC = 78', VC = 17' 10"
MP 23.70 (Columbia) HC = 78', VC = 17' 10"
MP 23.79 (UPRR) HC = 96', VC = 17'
MP 24.35 (Alderwood) HC = 65'

Horizontal Curves:

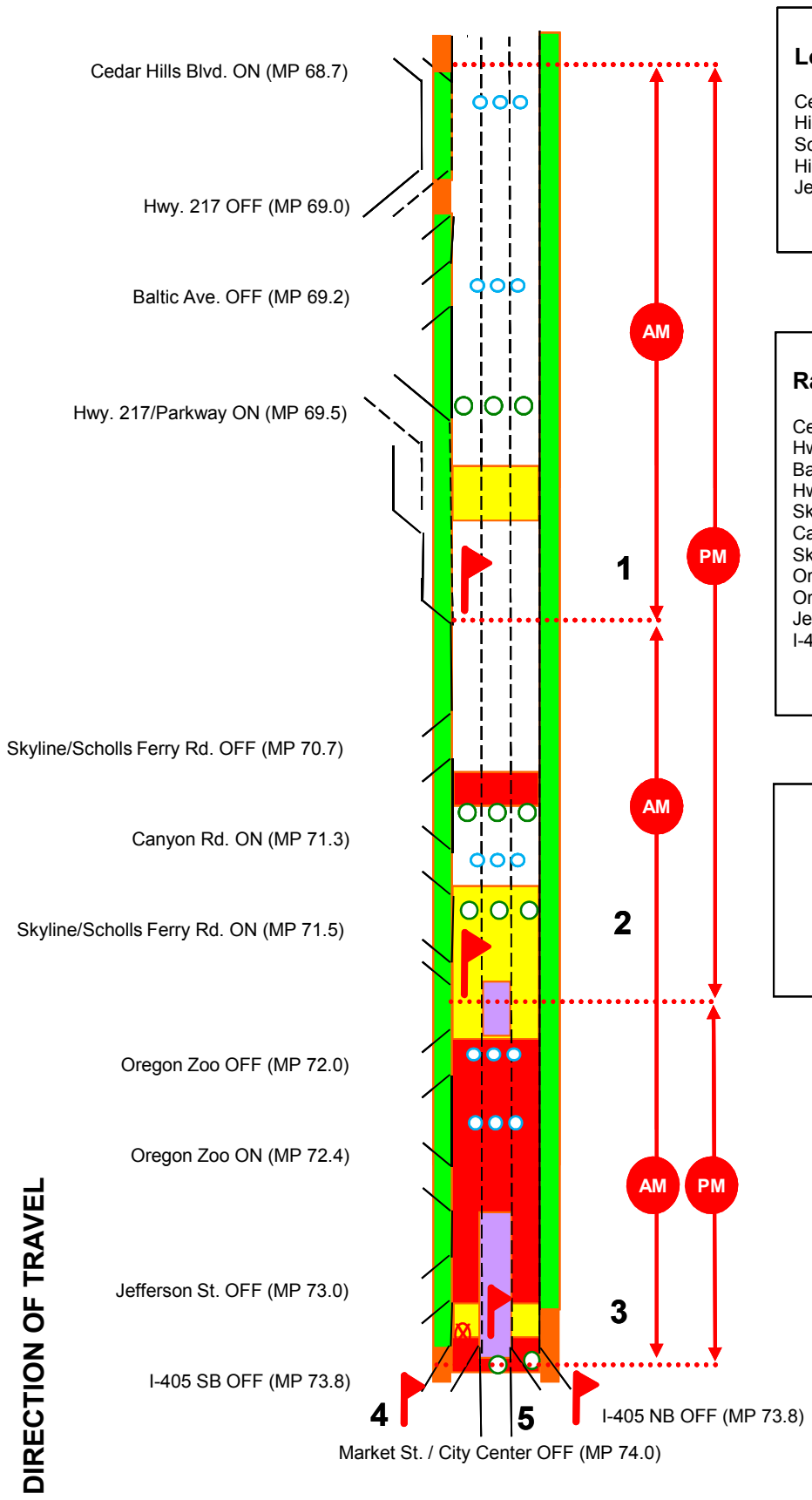
Greater than 3^ 15'

DAVID EVANS AND ASSOCIATES INC.

Figure 8
Corridor Bottleneck Operations Study
I-205 Southbound Geometric Summary

US 26 Eastbound

Study Area Boundary



Location of Interchanges	Distance Between
Cedar Hills Blvd. (MP 68.83)	
Highway 217 (MP 69.20)	0.37 miles
Scholls Ferry Rd. (MP 71.30)	2.10 miles
Highland Rd. (MP 72.18)	0.88 miles
Jefferson St. (MP 73.42)	1.24 miles

Ramp Gore Points	Distance Between
Cedar Hills Blvd. on ramp (MP 68.73)	
Hwy. 217 off Ramp (MP 69.01)	0.28 miles
Baltic Ave. off ramp (MP 69.17)	0.16 miles
Hwy. 217 on ramp (69.53)	0.36 miles
Skyline/Scholls Ferry Rd. off ramp (MP 70.68)	1.15 miles
Canyon Rd. on ramp (MP 71.30)	0.62 miles
Skyline/Scholls Ferry Rd. on ramp (MP 71.47)	0.17 miles
Oregon Zoo off ramp (MP 72.03)	0.56 miles
Oregon Zoo on ramp (MP 72.36)	0.33 miles
Jefferson St. off ramp (MP 73.33)	0.97 miles
I-405 SB off ramp (MP 73.81)	0.48 miles

Shoulder Widths:

Greater than 12' | 12' to 8' | Less than 8'

Vertical Grades:

MP 69.71 - Sag: 4.27%; MP 70.90 - Sag: 5.11%
MP 71.31 - Crest: -4.95%; MP 71.46 - Crest: -4.92%
MP 71.61 - Sag: -3.87%; MP 71.89 - Crest -3.43%
MP 71.96 - Crest: -4.96%; MP 72.02 - Sag: -3.58%
MP 72.06 - Crest: -3.91%; MP 72.10 - Crest: -3.51%
MP 72.44 - Crest: -6.21%; MP 72.67- Sag: -5.07%
MP 72.88 - Crest: -6.20%; MP 73.06 - Sag: -5.97%
MP 73.21 - Sag: -5.03%; MP 73.39 - Sag: -4.80%
MP 73.48 - Sag: -4.03%; MP 73.56 - Crest: -4.92%
MP 73.86 - Sag: 5.52%; MP 73.89 - Crest: 5.10%

3-5% | Greater than 5%

Clearance at Structures:

MP 68.96 (Pedestrian Bridge) HC = 66' 8", VC = 18'1"
MP 70.64 (Camelot Ct) HC = 37', VC = 18' 8"
MP 71.30 (Skyline Blvd) HC = 54' 2", VC = 17' 1"
MP 72.18 (Highland Rd) HC = 49', VC = 15' 3"

Horizontal Curves:

MP 71.61 - 4.5; MP 71.82 - 4.00
MP 72.53 - 7.0; MP 72.80 - 4.00
MP 73.09 - 4.50; MP 73.31 - 8.00
MP 73.81 - 12.00

Greater than 3^ 15'

Study Area Boundary

LEGEND

- Location of Interchanges
- PORTAL Detector Location (Year 2007 data)
- PORTAL Detector Location (Detector data missing or questionable)
- (###.#) M.P. of PORTAL Detector (near the approximate on-ramp gore point)
- Activation Range: This is the segment which contains the start of a new/confounding bottleneck (this does not encompass all congestion; see Bottleneck Description)
- Bottleneck Influence Area - Cross reference # with Key Statistics: Initial Data Results
- Mainline bottleneck concern

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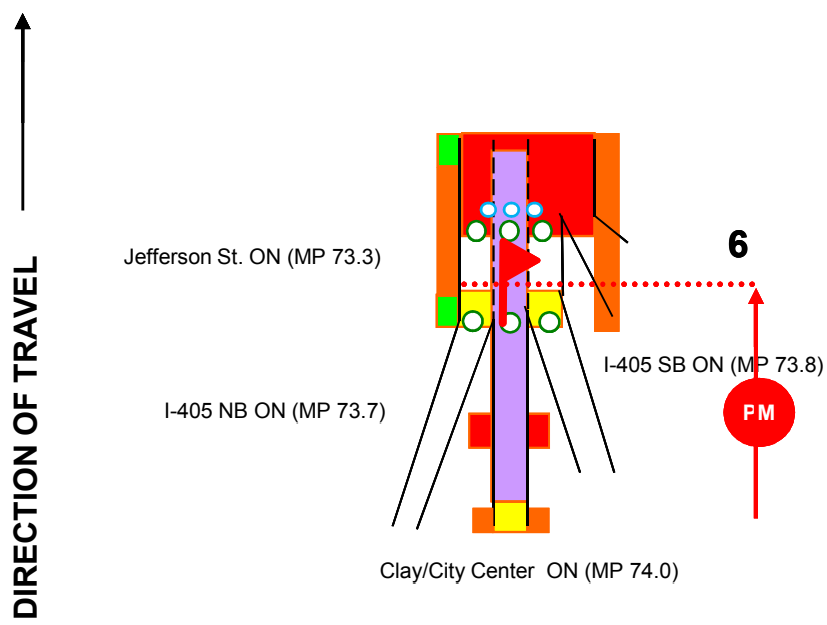
Figure 9
Corridor Bottleneck Operations Study
US26 Eastbound Geometric Summary

US 26 Westbound

Study Area Boundary

Location of Interchanges	Distance Between
Jefferson St. (MP 73.42)	0.31 miles
Stadium Fwy Intchg Connections (MP 73.73)	

Ramp Gore Points	Distance Between
Jefferson St. on ramp (MP 73.33)	0.67 miles
Clay St. on ramp (MP 74.0)	



Shoulder Widths:

Greater than 12' | 12' to 8' | Less than 8'

Clearance at Structures:

MP 73.56 (Vista Ridge Tunnel) HC = 41', VC = 15' 8"

Vertical Grades:

MP 73.06 - Sag: -5.97%
MP 73.21 - Sag -5.03%
MP 73.49 - Sag -4.30%
MP 73.60 - Crest: -5.19%
MP 73.98 - Crest: -3.72%

3-5% | Greater than 5%

Horizontal Curves:

MP 73.09 - 4.50
MP 73.33 - 8.50
MP 73.83 - 12.00
MP 73.84 - 28.00

Greater than 3^ 15'

Study Area Boundary

LEGEND

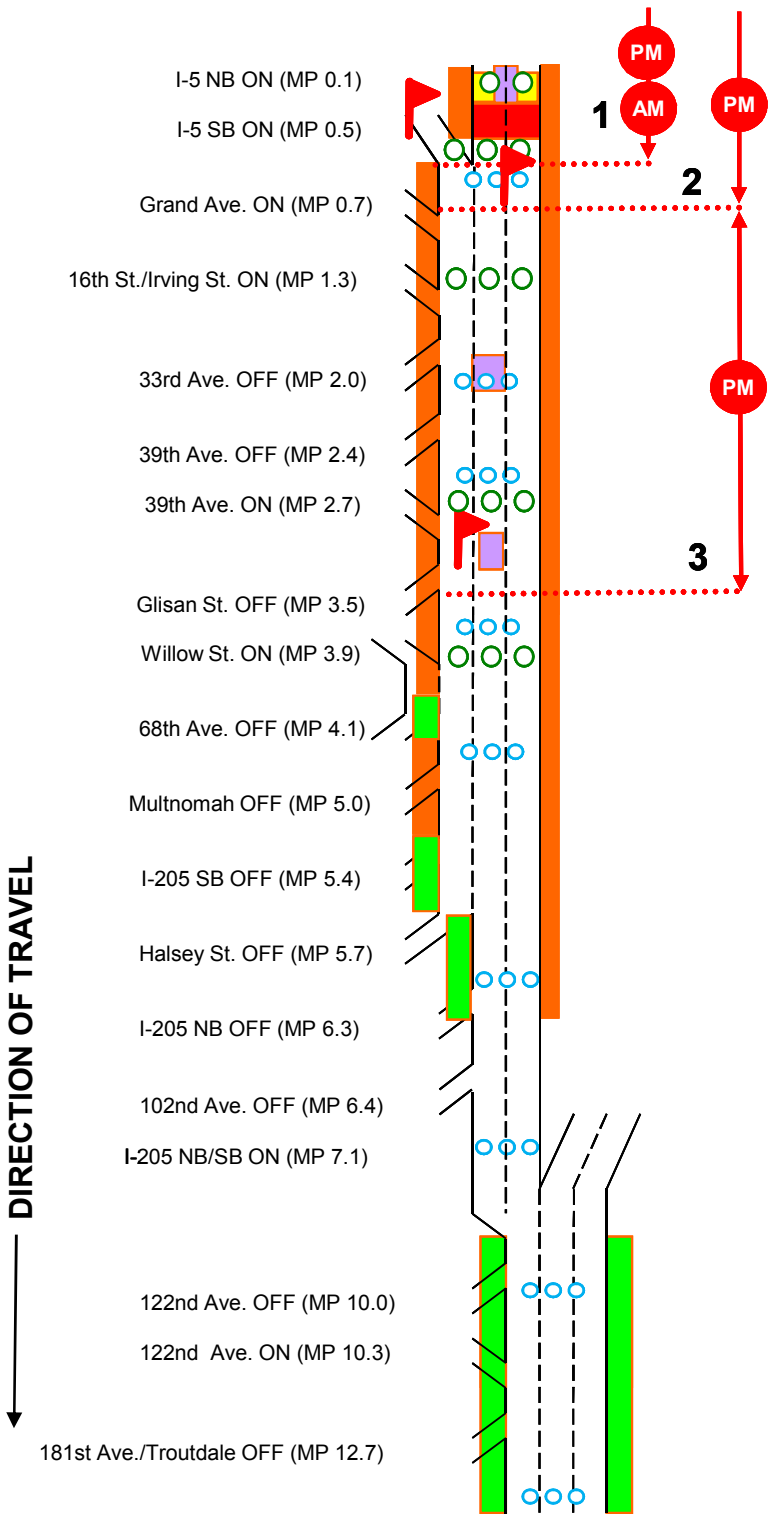
- Location of Interchange
- PORTAL Detector Location (Year 2007 data)
- PORTAL Detector Location (Detector data missing or questionable)
- (###.#) M.P. of PORTAL Detector (near the approximate on-ramp gore point)
- Activation Range: This is the segment which contains the start of a new/confounding bottleneck (this does not encompass all congestion; see Bottleneck Description)
- Bottleneck Influence Area - Cross reference # with Key Statistics: Initial Data Results
- Mainline bottleneck concern

DAVID EVANS AND ASSOCIATES INC.

Figure 10
Corridor Bottleneck Operations Study
US26 Westbound Geometric Summary

I-84 Eastbound

Study Area Boundary



Location of Interchanges	Distance Beween
Grand Avenue (MP 0.52)	
	1.64 miles
33rd Avenue (MP 2.16)	
	0.39 miles
39th Avenue (MP 2.55)	
	1.14 miles
60th Avenue (MP 3.69)	
	0.57 miles
Halsey St. (MP 4.26)	
	1.60 miles
Halsey St. (MP 5.86)	
	0.69 miles
102nd Avenue (MP 6.55)	
	3.53 miles
122nd Avenue (MP 10.08)	
	2.96 miles
181th Avenue (MP 13.04)	

Ramp Gore Points	Distance Beween
Grand Ave. on ramp (MP 0.66)	
	0.67 miles
16th Ave. (MP 1.33)	
	0.67 miles
33rd Ave. off ramp (MP 2.00)	
	0.43 miles
39th Ave. off ramp (MP 2.43)	
	0.29 miles
39th Ave. on ramp (MP 2.71)	
	0.77 miles
Glisan St. off ramp (MP 3.48)	
	0.41 miles
Willow St. on ramp (MP 3.89)	
	0.22 miles
68th Ave. off ramp (MP 4.11)	
	0.95 miles
Multnomah off ramp (MP 5.06)	
	0.37 miles
I-205 SB off ramp (MP 5.43)	
	0.29 miles
Halsey St. off ramp (MP 5.72)	
	0.58 miles
I-205 NB off ramp (MP 6.30)	
	0.26 miles
102nd Ave. off ramp (MP 6.56)	
	3.46 miles
122nd Ave. off ramp (MP 10.02)	
	0.30 miles
122nd Ave. on ramp (MP 10.32)	
	2.41 miles
181th Ave. off ramp (MP 12.73)	
181st Ave. on ramp (MP 13.26)	

Clearance at Structures:

MP 0.46 (MLK Blvd.) HC = 30', VC= 17' 01"
MP 0.52 (Grand Avenue) HC = 40', VC = 18' 08"
MP 0.92(12th Avenue) HC = 41', VC > 25'
MP 1.36 (21th Avenue) HC = 56', VC = 22' 06"
MP 1.74 (28th Avenue) HC = 46' 06", VC = 16'
MP 2.16 (33rd Avenue) HC = 48', VC = 17' 06"
MP 2.40 (Sandy Blvd.) HC = 45' 03", VC = 15' 10"
MP 2.55 (39th Avenue) HC = 46' 06", VC = 15' 11"
MP 2.68 (Pedestrian walkway) HC = 64', VC = 16'
MP 2.98 (47th Avenue) HC = 46' 02", VC = 16' 05"
MP 3.35 (53rd Avenue) HC = 34' 10", VC = 16' 06"
MP 3.69 (60th Avenue) HC = 51'08", VC = 16' 05"
MP 4.26 (Halsey St.) HC = 50' 05", VC = 16' 02"
MP 4.57 (74th Avenue) HC = 46' 06", VC = 16' 10"
MP 4.93 (Halsey St.) HC = 46' 03", VC = 16' 05"
MP 5.01 (Cascade Hwy) HC = 47' 06", VC = 16' 11"
MP 5.65 (I-205 NB off ramp) HC = 53', VC = 26' 06"
MP 5.67 (Trimet light rail) HC = 50', VC = 35'
MP 5.74 (I-205 SB) HC= 30', VC = 17' 06"
MP 5.76 (I-205 NB) HC= 30', VC = 17' 06"
MP 5.86 (Halsey St.) HC = 37', VC = 17' 06"
MP 6.74 (102nd Ave.) HC = 39' 06", VC = 18' 03"

Vertical Grades:

MP 0.02 - Crest: -4.65%;
MP 0.31 - Crest: -6.97%

3-5% Greater than 5%

Horizontal Curves:

MP 0.00 - 6.00; MP 0.11 - 8.80
MP 2.00 - 5.8; MP 3.12 - 3.50

Greater than 3^ 15'

Shoulder Widths:

Greater than 12' 12' to 8' Less than 8'

Study Area Boundary

LEGEND

- Location of Interchanges
- PORTAL Detector Location (Year 2007 Data)
- PORTAL Detector Location (Detector data missing or questionable)
- (###.#) M.P. of PORTAL Detector (near the approximate on-ramp gore point)
- Activation Range: This is the segment which contains the start of a new/confounding bottleneck (this does not encompass all congestion; see Bottleneck Description)
- Bottleneck Influence Area - Cross reference # with Key Statistics: Initial Data Results
- Mainline bottleneck concern

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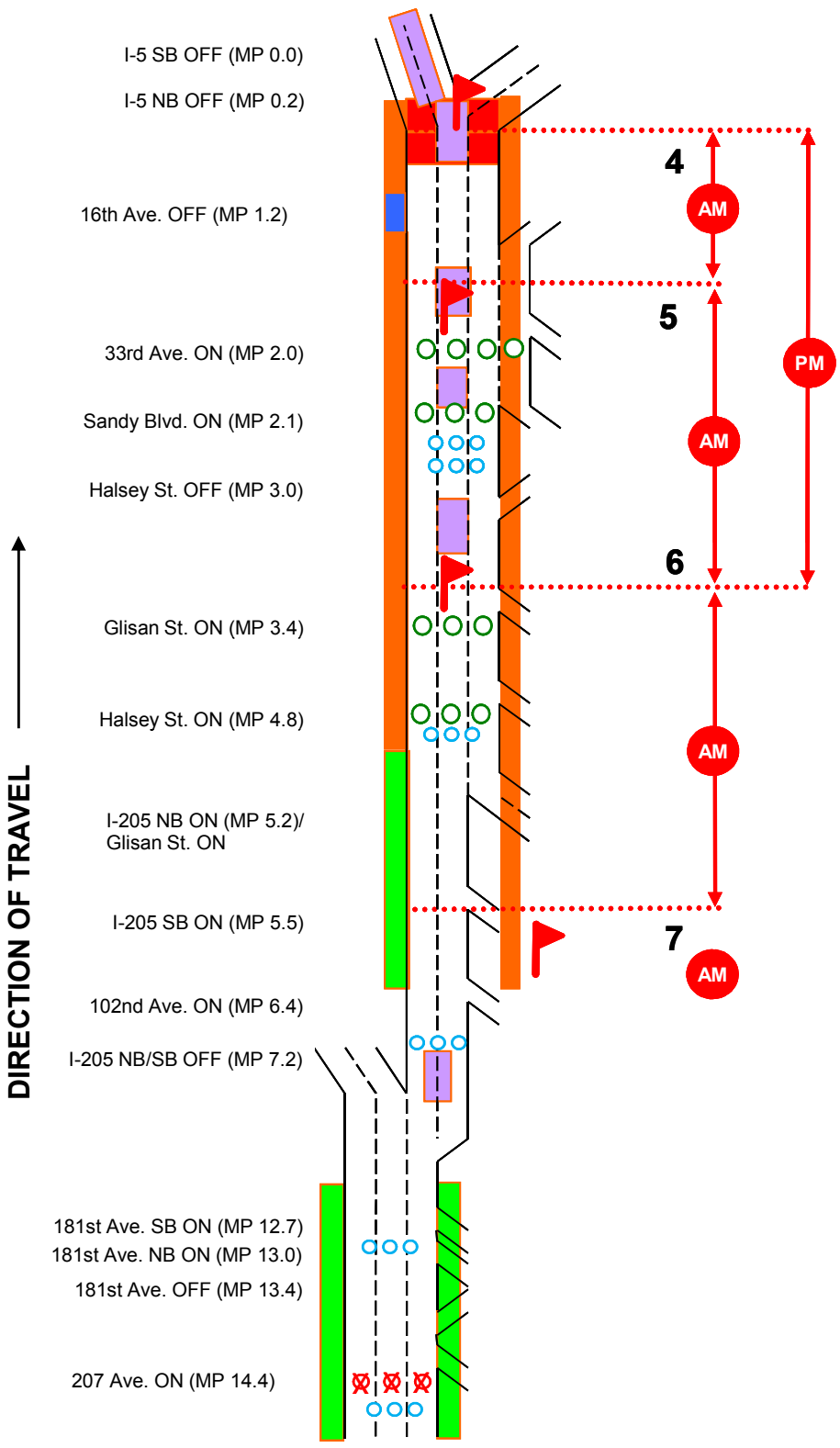
Figure 11
Corridor Bottleneck Operations Study
I-84 Eastbound Geometric Summary

I-84 Westbound

Study Area Boundary



Location of Interchanges	Distance Between
33rd Avenue (MP 2.17)	0.25 miles
Sandy Blvd. (MP 2.42)	2.53 miles
Halsey St. (MP 4.95)	1.79 miles
102nd Ave (MP 6.74)	6.29 miles
181st Avenue (MP 13.03)	1.39 miles
207th Ave. (MP 14.42)	

Ramp Gore Points	Distance Between
Merge with I-5 SB (MP 0.00)	0.20 miles
I-5 NB off ramp (MP 0.20)	0.99 miles
16th Ave. off ramp (MP 1.19)	0.86 miles
33rd Ave. on ramp (MP 2.05)	0.09 miles
Sandy Blvd. on ramp (MP 2.14)	0.88 miles
Halsey St. off ramp (MP 3.02)	0.36 miles
Glisan St. on ramp (MP 3.38)	1.42 miles
Halsey St. on ramp (MP 4.80)	0.37 miles
I-205 NB on ramp (MP 5.17)	0.34 miles
I-205 SB on ramp (MP 5.51)	0.88 miles
102nd on ramp (MP 6.39)	0.83 miles
I-205 NB/SB off ramp (MP 7.22)	5.49 miles
181st Ave. SB on ramp (MP 12.71)	0.33 miles
181st Ave. NB on ramp (MP 13.04)	0.34 miles
181st Ave. off ramp (MP 13.38)	0.98 miles
207th Ave. on ramp (MP 14.36)	

Clearance at Structures:

MP 0.39 (MLK Blvd.) HC = 35', VC = 15' 03"
MP 0.44 (Grand Ave.) HC = 40'; VC = 18'03"
MP 0.92 (12th Ave.) HC = 46', VC = 19' 09"
MP 1.36 (21th Ave.) HC = 58' 06", VC 22' 07"
MP 1.74 (28th Ave.) HC = 58' 06", VC = 16' 02"
MP 2.17 (33rd Ave.) HC = 46', VC = 17'
MP 2.42 (Sandy Blvd.) HC = 46' 03", VC = 16' 04"
MP 2.55 (39th Ave.) HC = 46', VC = 16' 06"
MP 2.69 (Pedestrian walkway) HC = 46' 02", VC = 16' 01"
MP 2.99 (47th Ave.) HC = 42', VC = 16' 08"
MP 3.36 (53rd Ave.) HC = 34' 10", VC = 17' 03"
MP 3.71 (60th Ave.) HC = 46' 04", VC = 20' 07"
MP 4.26 (Halsey St.) HC = 46'08", VC = 16' 04"
MP 4.59 (74th Ave.) HC = 45' 11", VC = 16' 07"
MP 4.95 (Halsey St.) HC = 46' 03", VC = 18'
MP 5.01 (Cascade Hwy) HC = 46' 06", VC = 17'
MP 5.64 (I-205 NB on ramp) HC = 38', VC = 24' 06"
MP 5.67 (Trimet light rail) HC = 38', VC = 24' 06"
MP 5.76 (I-205 SB) HC = 30', VC = 17' 06"
MP 5.78 (I-205 NB) HC = 30', VC = 17' 06"
MP 5.87 (Halsey st.) HC = 31', VC = 33'
MP 6.74 (102nd Ave) HC = 29', VC = 15' 03"
MP 14.42 (207th Ave) HC = 74', VC = 21' 07"

Shoulder Widths:

Greater than 12' | 12' to 8' | Less than 8'

Horizontal Curves:

MP 0.00 - 4.00; MP 0.28 - 9.75
MP 0.40 - 6.00; MP 1.73 - 5.75
MP 2.01 -6.00 ; MP 3.13 - 3.50
MP 6.98 - 3.50

Greater than 3^ 15'

Study Area Boundary

LEGEND

- Location of Interchanges
- PORTAL Detector Location (Year 2007 Data)
- PORTAL Detector Location (Detector data missing or questionable)
- (###.#) M.P. of PORTAL Detector (near the approximate on-ramp gore point)
- Activation Range: This is the segment which contains the start of a new/confounding bottleneck (this does not encompass all congestion; see Bottleneck Description)
- Bottleneck Influence Area - Cross reference # with Key Statistics: Initial Data Results
- Mainline bottleneck concern

Vertical Grades:

MP 0.21 - Crest: -6.19%; MP 0.32 - Crest:6.86%
MP 0.36 - Sag: -5.51%;

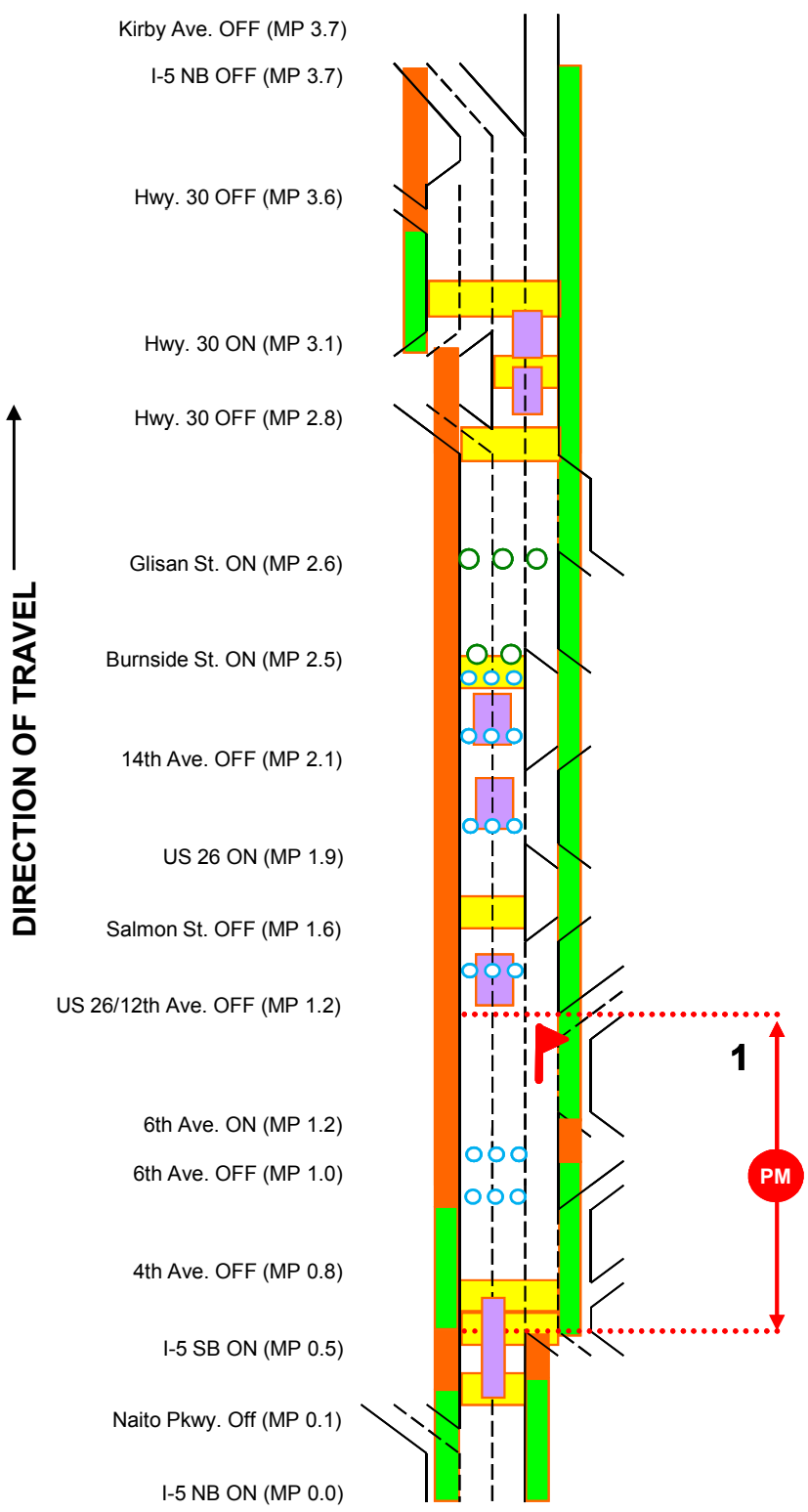
3-5% | Greater than 5%

DAVID EVANS AND ASSOCIATES INC.

Figure 12
Corridor Bottleneck Operations Study
I-84 Westbound Geometric Summary

I-405 Northbound

Study Area Boundary



Location of Interchanges	Distance Between
Glisan Street (MP 2.45)	
	0.20 miles
Couch Street (MP 2.25)	
	0.31 miles
Salmon Street (MP 1.94)	
	0.48 miles
12th Avenue (MP 1.46)	
	0.33 miles
6th Avenue (MP 1.13)	
	0.17 miles
4th Avenue (MP 0.96)	

Clearance at Structures:

MP 3.10 (Fremont Bridge (2 decks)) HC = 52', VC = 18' 04"
MP 2.45 (Glisan St.) HC = 51', VC = 15' 10"
MP 2.35 (Everett St.) HC = 39', VC = 17' 09"
MP 2.25 (Couch St) HC = 39', VC = 19' 09"
MP 2.20 (Burnside) HC = 63', VC = 16' 02"
MP 2.15 (14th Ave.) HC = 49', VC = 19' 01"
MP 2.12 (Alder st.) HC = 50', VC = 17' 08"
MP 2.07 (Morrison St.) HC = 51'. VC = 22' 06"
MP 2.02 (Yamhill St.) HC = 60', VC = 25' 09"
MP 1.97 (Taylor St.) HC = 50', VC = 20' 10"
MP 1.96 (Taylor St. SB on ramp) HC = 50', VC = 20' 10"
MP 1.92 (Salmon St.) HC = 50', VC = 20' 07"
MP 1.87 (Salmon St. off ramp) HC = 50', VC = 16' 08"
MP 1.77 (Jefferson St.) HC = 38', VC = 16' 03"
MP 1.72 (Columbia St.) HC = 38', VC = 19' 08"
MP 1.67 (Clay St.) HC = 38', VC = 17' 08"
MP 1.62 (Market St.) HC = 52', VC = 20' 06"
MP 1.56 (I-26 WB off ramp) HC = 50', VC >18'
MP 1.55 (13th Ave.) HC = 50', VC = 16' 05"
MP 1.52 (Montgomery St.) HC = 50', VC = 17' 01"
MP 1.40 (12th Ave.) HC = 46', VC = 38' 07"
MP 1.19 (Park Ave.) HC = 61', VC = 17' 03"
MP 1.12 (Broadway) HC = 46', VC = 19' 11"
MP 1.10 (Broadway I-405 SB on ramp) HC = 46', VC = 19' 11"
MP 1.03 (6th Ave.) HC = 53', VC = 16' 06"
MP 1.00 (5th Ave.) HC = 57' 04", VC = 19' 08"
MP 0.99 (th Ave. I-405 SB on ramp) HC = 58', VC = 16"
MP 0.89 (4th Ave.) HC = 67', VC = 18' 02"
MP 0.71 (1st Ave.) HC = 67', VC = 18' 04"
MP 0.66 (Hwy 99W) HC = 66', VC = 15' 06"

Ramp Gore Points	Distance Between
Hwy 30 on ramp (MP 3.08)	
	0.32 miles
Hwy 30 off ramp (MP 2.76)	
	0.14 miles
Glisan St. on ramp (MP 2.62)	
	0.17 miles
Burnside on ramp (MP 2.45)	
	0.34 miles
14th Ave. off ramp (MP 2.11)	
	0.51 miles
Salmon St. off ramp (MP 1.60)	
	0.36 miles
US 26/12th Ave. off ramp (MP 1.24)	
	0.07 miles
6th Ave. on ramp (MP 1.17)	
	0.22 miles
6th Ave. off ramp (MP 0.95)	
	0.20 miles
4th Ave. off ramp (MP 0.75)	

Shoulder Widths:

Greater than 12' | 12' to 8' | Less than 8'

Horizontal Curves:

MP 3.03 - 9.00; MP 2.94 - 8.00; MP 2.23 - 4.00;
MP 2.00 - 6.00: MP 1.45 - 4.50; MP 0.70 - 4.00;
MP 0.39 - 8.00

Greater than 3^ 15'

Study Area Boundary

LEGEND

- Location of Interchanges
- PORTAL Detector Location (Year 2007 data)
- PORTAL Detector Location (Detector data missing or questionable)
- (###.#) M.P. of PORTAL Detector (near the approximate on-ramp gore point)
- Activation Range: This is the segment which contains the start of a new/confounding bottleneck (this does not encompass all congestion; see Bottleneck Description)
- Bottleneck Influence Area - Cross reference # with Key Statistics: Initial Data Results
- Mainline bottleneck concern

Vertical Grades:

MP 3.32 - Crest: -5.00%; MP 3.04 - Sag: 5.00%
MP 2.80 - Sag: 3.59%; MP 2.48 - Sag: 5.00%
MP 1.68 - Crest: -3.60%; MP 0.76 - Crest: 4.08%
MP 0.71 - Sag: 4.60%; MP 0.66 - Sag: 4.59%
MP 0.38 - Sag: 3.92%

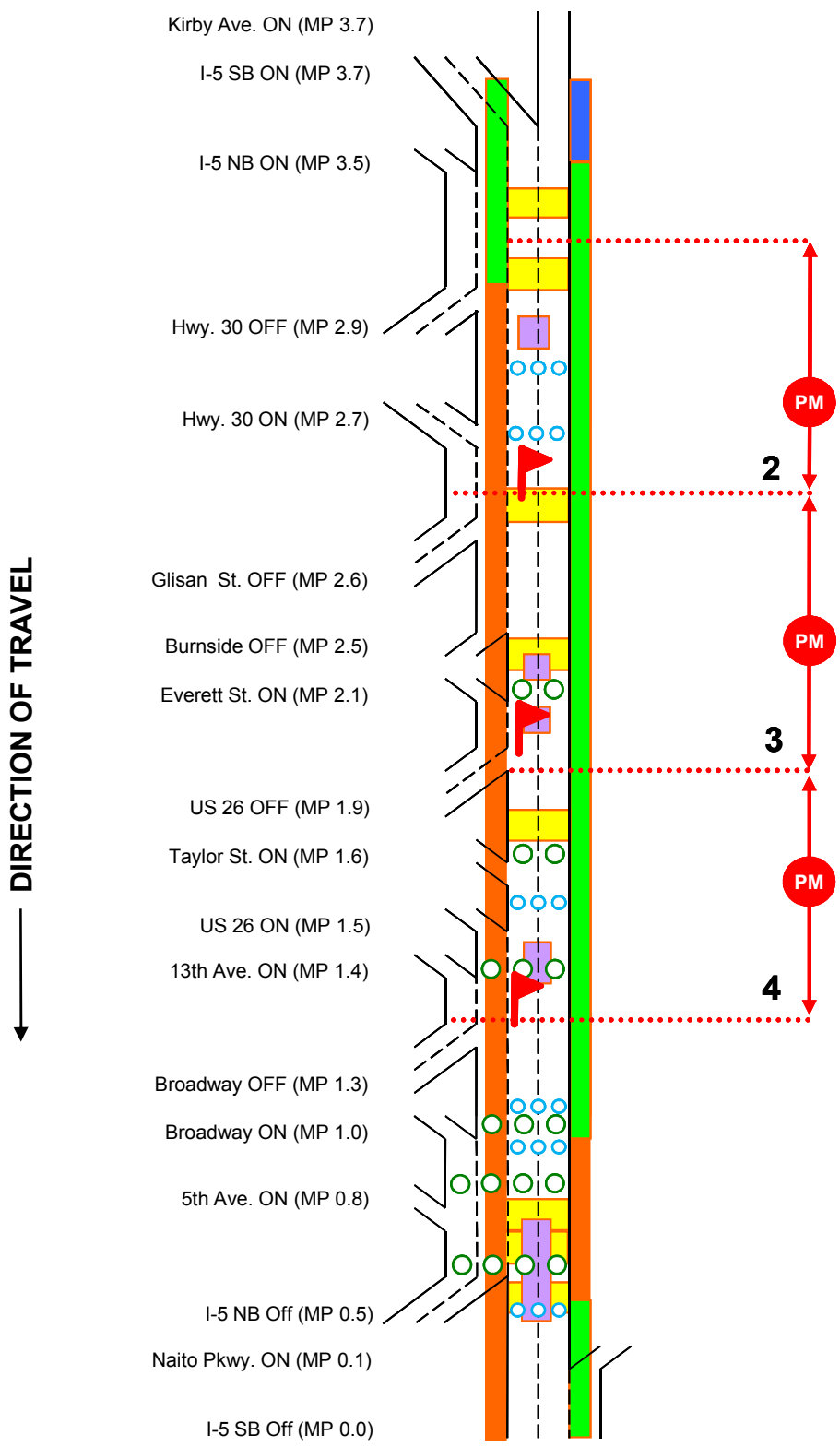
3-5% | Greater than 5%

DAVID EVANS AND ASSOCIATES INC.

Figure 13
Corridor Bottleneck Operations Study
I-405 Northbound Geometric Summary

I-405 Southbound

Study Area Boundary



Location of Interchanges	Distance Beween
Glisan St. (MP 2.83)	0.14 miles
Burnside (MP 2.69)	1.17 miles
Montgomery St. (MP 1.52)	0.41 miles
Broadway (MP 1.11)	0.11 miles
5th Ave. (MP 1.00)	0.73 miles
W Marquam intchge. connection (MP 0.27)	

Clearance at Structures:

MP 3.58 (N Fremont Bridge (2 decks)) HC = 68', VC = 18' 04"
MP 3.10 (S Fremont Bridge (2 decks)) HC = 52', VC = 18' 04"
MP 2.45 (Glisan St.) HC = 51', VC = 16' 03"
MP 2.35 (Everett St.) HC = 39', VC = 18' 06"
MP 2.25 (Couch St.) HC = 39', VC = 18' 06"
MP 2.20 (Burnside) HC = 39', VC = 16' 02"
MP 2.14 (14th Ave.) HC = 45', VC = 23' 02"
MP 2.12 (Alder St.) HC = 48', VC = 22' 03"
MP 2.07 (Morrison st.) HC = 51', VC = 25' 05"
MP 2.02 (Yamhill) HC = 51', VC = 26' 08"
MP 1.97 (Taylor St.) HC = 50', VC = 19' 08"
MP 1.96 (Taylor St. on ramp) HC = 50', VC = 18' 01"
MP 1.92 (Salmon St.) HC = 50', VC = 20' 02"
MP 1.88 (Salmon St. NB off ramp) HC = 50', VC = 17' 05"
MP 1.77 (Jefferson St.) HC = 41', VC = 17'
MP 1.72 (Columbia St.) HC = 38', VC = 19' 09"
MP 1.68 (Clay St.) HC = 37', VC = 17' 10"
MP 1.62 (Market St.) HC = 37', VC = 19' 10"
MP 1.56 (I-405 NB off ramp) HC = 46', VC > 18'
MP 1.55 (13th Ave.) HC = 46', VC = 16' 04"
MP 1.52 (Montgomery St.) HC = 46', VC = 16' 10"
MP 1.41 (12th Ave.) HC = 46', VC = 24' 10"
MP 1.18 (Park Ave.) HC = 53', VC = 19' 10"
MP 1.11 (Broadway) HC = 51', VC = 23' 02"
MP 1.10 (Broadway SB off ramp) HC = 51', VC = 16' 01"
MP 1.03 (6th Ave.) HC = 39', VC = 19' 07"
MP 1.00 (5th Ave.) HC = 60', VC = 20' 01"
MP 0.99 (5th Ave. on ramp) HC = 65' 06", VC = 15' 11"
MP 0.88 (4th Ave.) HC = 64', VC = 17' 02"
MP 0.71 (1st Ave.) HC= 75', VC = 16' 01"

Ramp Gore Points	Distance Between
Hwy 30 off ramp (MP 2.88)	
Hwy 30 on ramp (MP 2.68)	0.20 miles
Glisan st. off ramp (MP 2.64)	0.04 miles
Burnside off ramp (MP 2.45)	0.19 miles
Everett St. on ramp (MP 2.10)	0.35 miles
Hwy 26 off ramp (MP 1.88)	0.22 miles
Taylor St. on ramp (MP 1.55)	0.33 miles
Hwy 26 on ramp (MP 1.41)	0.14 miles
13th Ave. on ramp (MP 1.36)	0.05 miles
Broadway off ramp (MP 1.29)	0.07 miles
Broadway on ramp (MP 0.95)	0.34 miles
5th Ave. on ramp (MP 0.80)	0.15 miles

Shoulder Widths:

Greater than 12' | 12' to 8' | Less than 8'

Vertical Grades:

MP 3.32 - Crest: -5.00%; MP 3.03 - Sag: 5.00%
MP 2.61 - Crest: 3.94%; MP 2.48 - Sag: 5.00%
MP 1.68 - Crest: -3.60%; MP 0.76 - Crest: 4.08%
MP 0.71 - Sag: 4.60%; MP 0.58 - Crest: 3.71%
MP 0.49 - Sag: 4.10%

3-5% | Greater than 5%

Horizontal Curves:

MP 2.91 - 7.00; MP 2.23 - 4.00; MP 2.00 - 6.00
MP 1.45 - 4.50; MP 0.70 - 4.00; MP 0.54 - 8.00
MP 0.42 - 8.75

Greater than 3^ 15'

Study Area Boundary

LEGEND

- Location of Interchanges
- PORTAL Detector Location (Year 2007 data)
- PORTAL Detector Location (Detector data missing or questionable)
- (###.#) M.P. of PORTAL Detector (near the approximate on-ramp gore point)
- Activation Range: This is the segment which contains the start of a new/confounding bottleneck (this does not encompass all congestion; see Bottleneck Description)
- Bottleneck Influence Area - Cross reference # with Key Statistics: Initial Data Results
- Mainline bottleneck concern

DAVID EVANS AND ASSOCIATES INC.

Figure 14
Corridor Bottleneck Operations Study
I-405 Southbound Geometric Summary

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CHAPTER 5: APPENDICES

5.2 Appendix A: Technical Memoranda

A.1 Technical Memoranda 1 & 2: Methodology and Assumptions (known and available data)

A.2 Technical Memoranda 3: Bottleneck Identification and Diagnosis

A.3 Technical Memoranda 4 & 5: Corridor Design Review

A.4 Technical Memoranda 6: Evaluation Framework for Investments to Improve Freeway Operations at Bottlenecks on I-5 & I-205

A.5 Technical Memoranda 7: Design Panel Results

A.6 Technical Memoranda 8: Feasibility Review

A.7 Technical Memoranda 9: Summary of Operations Result

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October 20, 2011 Project #:7403

TO: **ODOT and DEA**
FROM: **Terry Moore and Sarah Dammen**
SUBJECT: **EVALUATION FRAMEWORK FOR INVESTMENTS TO IMPROVE FREEWAY OPERATIONS AT BOTTLENECKS ON I-5, I-205, I -405, I-84, AND US 26**

SUMMARY

ODOT is evaluating potential projects to relieve congestion at existing freeway bottlenecks along five Metro area corridors in the Portland area including: segments of I-5, I-205, I-405, segments of I-84 and US 26. This evaluation requires methods and criteria (i.e., an evaluation framework). This technical memorandum (TM#6 of the project) proposes such a framework. In summary:

- The framework is consistent with and based on well-accepted principles for project evaluation and selection (see pages 2 – 6).
- Broadly, transportation projects have impacts (benefits and costs) on the performance of the transportation system (e.g., access, mobility, speed, reliability, convenience) and on everything else (e.g., land use, the environment, the economy).
- Evaluations generally look at all these impacts. But because this project is looking at small adjustments to existing highways (not new highways) for the expressed purpose of relieving congestion, this project can and should focus its evaluation on travel performance, which also simplifies that evaluation. Other reasonable simplifications are also recommended (see pages 7 – 9).
- Traffic engineers and modelers will use traffic simulation models and professional judgment to estimate how different projects will change travel performance. Those changes will be evaluated in several categories and sub-categories: user benefits (travel time, travel-time reliability, safety, vehicle operating costs, emissions): other, non-user impacts (e.g., on land or economic development); and direct (monetary) costs (construction, disruption, O&M). Pages 10 – 14 describe how these impacts will be measured.
- Key measures will be summarized into a matrix display for ranking and screening (pages 15 – 17). Exactly how their relative values (weights) will be determined is something still to be decided by ODOT and the consultants. Options are suggested.

BACKGROUND

ECONorthwest is a subcontractor to David Evans and Associates (DEA) on a project for the Oregon Department of Transportation (ODOT). The purpose of the project is to evaluate low-cost, cost-effective mitigation options aimed at improving operational performance at bottlenecks on I-5, I-205, I-405, I-84 and US 26. In Phase 1, DEA, with participation from ODOT staff and other project team members will identify bottlenecks, and identify potential bottleneck mitigation options. In Phase 2 the mitigation options will be evaluated based on improvements in operational performance and the cost-effectiveness or cost benefit ratio of the mitigation option. ECONorthwest is charged with developing, and helping implement a framework for comparing and selecting among investments.

The framework has two related purposes: (1) it provides the technicians working on the project with an efficient, and consistent structure to evaluate, and (2) it documents the evaluation so that its results will be credible, transparent, and useful in subsequent discussion and selection of investments by appointed and elected decision-makers.

Thousands of pages have been written about how to evaluate transportation investments. ECONW has contributed to, and is thoroughly familiar with that literature. For efficiency, the conclusions of that literature are summarized without going through the more extensive description of articles and reports typical of literature reviews. Appendix A provides additional background on the principles guiding project evaluation and the bibliography at the end of this memorandum directs readers wanting more detail to key articles on economic analysis for project evaluation.

The rest of this memorandum is organized as follows:

- Section 2: Framework and Principles of Project Evaluation
- Section 3: Framework and Criteria for this Project
- Section 4: References
- Appendix A: Principles of Project Evaluation
- Appendix B: Potential Evaluation Criteria (Measures)

FRAMEWORK AND PRINCIPLES OF PROJECT EVALUATION

This project is about evaluating potential investments in transportation. Such investments may be in facilities (capital construction or operation), programs, or policies. For this project, most of the investments will be for some physical or operational improvement targeted at identified bottlenecks on the facilities being studied: e.g., a new merge lane, electronic signing, more vehicles for responding to and clearing incidents. Those facilities may have a programmatic component: e.g., driver education, user charges. For the purposes of this

memorandum, we refer to any of these types of investments as potential *projects or mitigation options* (they are intended to reduce—mitigate—congestion at bottlenecks).

Planners typically talk about project evaluation in terms of positive and negative impacts. That, for example, was the original intent of Environmental Impact Statements. The categories of impacts are essentially categories of *evaluation criteria*, and planners try to gather data to *measure performance* of projects on the relevant criteria. Economists use different terms and, arguably, more sophisticated analytical techniques, but the same concepts: projects have *benefits and costs*, and the evaluation exercise is to identify, define, and measure relevant benefits and costs so that potential projects can be consistently compared. The identification, measurement, and comparison of the potential benefits and costs of alternative public actions is fundamental to all policy evaluation.

A large body of literature exists on evaluative frameworks for public policy decision-making and analytical techniques for project evaluation. For the screening and prioritization of mitigation options in this project we aim for a framework that allows for a transparent (well-documented) and consistent method for evaluating the mitigation options.

Performance measurement should be tied to an evaluation framework since the ultimate purpose of the measurement is to evaluate performance and choose projects that improve performance. An evaluation framework should be built on:

- Good theory (e.g., the principles of benefit-cost analysis; an understanding of the interconnections of transportation facilities and travel performance, and of transportation to land use and economic development)
- Mutually exclusive and non-overlapping categories of impacts/benefits
- A nested hierarchy of performance measures
- Consistent measurement.
- Reasonable, documented simplifications.

Appendix A provides more detail about the principles of project evaluation.

FRAMEWORK AND CRITERIA FOR THIS PROJECT

Given the number of criteria and potential measures for each, our task for developing an evaluation framework is threefold:

1. Identify pertinent evaluation criteria and measures.
2. Determine data collection needs based on recommended evaluation criteria and measures.
3. Provide a framework for screening and ranking feasible transportation projects at bottlenecks on I-5, I-205, I-405, I-84, and US 26.

If the expected impacts on some dimension are small or roughly the same across all alternatives, one can simplify the evaluation by excluding explicit consideration of criteria related to those impacts. A good case can be made that the types of projects being evaluated for this study make the evaluation simpler than is typical for larger transportation projects with multiple objectives. This project is specifically about finding cost-effective ways to improve traffic flow at bottlenecks. It is not trying to determine, for example, whether transit, bike, or pedestrian facilities should be built instead of highway facilities; or whether highways have important positive or negative effects on land use or economic development. I-5, I-205, I-405, I-84, and US 26 already exist in their full glory: their impacts, good and bad, on land use, economic development, and the environment are what they are. Making them work a little more efficiently (i.e., improving performance at bottlenecks) is not going to change the structure of land development and the economy at the regional level.

What the potential projects *will* do is change travel performance on key links. They will do that to different degrees and they will cost different amounts.

If one accepts that logic, then the evaluation process can be greatly simplified. It would focus on measures of travel performance and cost (of construction and lifecycle operations and maintenance (O&M)). The majority of the benefits will derive from mobility improvements (measured best by travel time savings). Two other potentially significant benefit categories are safety and travel time reliability. We can address other categories of benefits or cost at the margin and less thoroughly by providing a brief qualitative description of other types of impacts for each alternative.

The rest of this section discusses the objectives and assumptions for the evaluation, selection of performance measures and benefits categories, aspects of capturing mitigation option costs, and a method for prioritizing options across benefit measures (benefit-cost approach). Transparency and consistency in the treatment of mitigation option costs and benefits is paramount for the comparison of alternatives for a specific bottleneck and across locations.

1.1 OBJECTIVES AND ASSUMPTIONS

The ultimate objective is to develop and compare a list of lower-cost and cost-effective[1] bottleneck projects. Some specific desired outcomes for the screening and evaluation are:

1.1.1 Ranking of projects based on their performance within and across performance measures

Sorting projects within performance measures is easy if one has a measurement for all projects. One could, for example, sort projects on their reduction in vehicle-hours of delay. The resulting (sorted) list would then show projects (irrespective of cost or other benefits) that produce the greatest change in that particular performance measure.

But as described above, transportation will always have multiple performance measures. Decisionmakers ultimately need a rating not on one evaluation criterion, but on all criteria in combination. Sorting projects across performance measures requires a method to combine measurements on multiple criteria, measured in different units, into a single "score" for each project. This technical memorandum proposes estimating a number of direct user benefits that can be roughly monetized and then compared to total project costs. Given the sketch nature of our evaluation, we may face some challenges to properly and consistently treat projects with respect to the stream of future year benefits. Additionally, some benefit categories may lack measures that allow us to fully monetize the benefits or costs.

1.1.2 Matrix display of projects relative to potential screening criteria/performance measures

To facilitate the sorting and evaluation of options across and within performance criteria, a matrix to track and document the cost and impacts of each feasible mitigation option is the typical tool for presenting options for comparison. For this project that matrix will be a spreadsheet. It will facilitate screening and evaluation, and also provide transparent documentation of the alternatives evaluated in Phase 2.

1.1.3 Consistent treatment and inclusion of relevant impacts and cost of the mitigation projects.

For consistent and level comparison of project options one needs consistent measurement and consistent inclusion of performance criteria to capture the impacts (benefits and costs) of each option. The analysis should acknowledge impacts on secondary facilities, not just the freeway corridors under consideration.

[1] Lower-cost and cost-effective are related but different, and the difference is important for this project. Cost-effectiveness is critical: one should only want projects whose expected benefits are more valuable than expected costs (most "bang for the buck"). But both small and large projects could be cost-effective. Given Oregon's and ODOT's funding constraints, ODOT may be forced to focus on small (lower-cost) projects.

Some assumptions guiding the development of the evaluation framework and proposed methods for ranking projects:

- Current traffic conditions (current data) will be used to identify bottlenecks and evaluate operational improvements. If there are no forecasts of future congestion and future congestion relief that results from the project, it will is not be possible to estimate user benefits for future years. Limiting the analysis to current traffic conditions implies that operational improvements, as would be expected under current conditions, must be assumed for future years. An extrapolation measure could be used to approximate future year benefits so that discounting the future stream of benefits and costs can be performed to try to capture, in a consistent fashion the relative benefits and costs of mitigation options with different impacts with respect to time horizon. A possible simplification, if it comports with expectations, is to assume that traffic and congestion will be growing at about the same rate at all bottlenecks: then one could compare relative benefits across mitigation options in a single base year. That simplification, however, does not account for all other performance characteristics of interest (e.g., cost) and how they change over time, and does not allow for a calculation of net benefits.
- The analysis will not consider dependencies or synergies among phased improvements or multiple project options. It may need to simplify by clustering certain congestion-relief projects that traffic engineers conclude would probably be implemented as a package.
- At the margin, many criteria are likely to be very small or are likely to be the same for all options. For these criteria it is probably sufficient and defensible to focus on the direct user benefits and limit the analysis of other impacts to a qualitative description.
- The evaluation framework and measures will be consistent with the methods proposed for developing the list of feasible mitigation options in Phase 1. The evaluation framework and measures must rely on the available data and measures from the traffic analysis.

1.1.4 Performance measures and evaluation criteria

Mobility is the likely primary benefit from the bottleneck mitigation, with safety and perhaps travel-time reliability as significant secondary impacts.

The VISSIM and VISUM traffic analysis will provide a number of transportation performance measures, most of which measure changes in traffic flow and operations. As noted, we must be careful not to double count impacts (or, at least, to identify potential double counts) given that we have multiple measures capturing the same benefit.

1.1.5 Transportation performance

Traffic evaluation measures proposed in DEA's *Technical Memorandum: Methodology and Assumptions* focus on operational measures, all of which are roughly variants, (predecessors or decedents) of travel time. We recommend tracking all of these measures in the evaluation matrix, so that projects may be sorted based on these various transportation performance measures.

1.1.6 User benefits

Most of the economic benefits from transportation projects come from the reduction in direct user costs. Indirect impacts are also important, particularly in the public/political decision-making process. Given that the bottleneck remediation projects are mobility-based, the overwhelming majority of the benefits will come from user travel time savings (also potential travel time reliability savings).

Traffic volumes will be required to estimate benefits across users on the facility. For our sketch-level analysis we will assume that these low-cost mitigation options are not going to appreciably increase traffic volumes (i.e., we will not include induced demand). Projects that change the generalized user cost of transportation (e.g., improved travel times will reduce the generalized cost) lead to movements along the demand curve for travel. Given the sketch nature of the benefit-cost analysis, the small portion of total trip time that the operational improvements are likely to engender, and the fact that we will be treating all potential mitigation options the same way (so that we still have a good measure of relative differences, we think this simplification is reasonable.

To capture the benefits from the project options, we will consider a set of mutually exclusive, direct user benefits (emissions reductions is actually a non-user category) calculated using the available traffic evaluation measures. These benefits categories are summarized, along with associated measures and required input in Table 1. Appendix B provides more detail.

Table 1: Bottleneck Mitigation Benefits Criteria, Measures and Calculations

Broad Criteria	Benefit Category	Measure/Input
Mobility	Travel Time	Change in travel time by vehicle class (passenger vehicles and trucks)
	Travel Time Reliability	Qualitative Assessment of travel time reliability improvement
Safety	Crashes	Qualitative assessment of potential safety improvements
Sustainability	Fuel Costs	Change in fuel costs due to changes in fuel consumption (based on changes in speed)
	CO2 Emissions	Change in CO2 emissions (convert fuel to CO2 emissions)

Travel time

Congestion relief from projects at bottlenecks is measured as a change in travel times (speeds) relative to base (no-project) travel times. As indicated in Tech Memo 1, there are a number of available evaluation measures from VISSIM, VISUM, or HCS related to changes in traffic flow, congestion, and travel time. All of these measures capture operational performance and represent some dimension or measure required to calculate direct user travel time benefits.

To calculate the direct user benefit of travel time savings, travel time savings must be calculated and disaggregated by vehicle class or user group (e.g., total hours of travel time savings by vehicle class). Total travel time is calculated based on the average speed, distance traveled, and volume on the corridor, or simply as the reduction in delay measured as vehicle hours or minutes of travel time savings. It is most appropriate to monetize travel time savings for different user groups because different classes have different values for travel time. In particular, trucks have much higher value of time than passenger vehicles.

ECONorthwest has recently undertaken a thorough review of the academic literature on estimation of the value of travel time (the literature review also extended to evaluation of methods for valuation of travel time reliability). Value of time for passenger travel is generally valued at 50 percent of the average hourly income, and up to 80 percent or higher of the average hourly income in peak periods. Trucks have a slightly higher value of time reflecting the higher vehicle capital value, the hourly wage paid to the driver (full cost), and freight inventory costs. The Puget Sound Regional Council developed value of time estimates in 2008 for the Seattle metropolitan area. ODOT produced statewide value of time estimates in 2003 based on FHWA guidance on the value of travel time. Adjusting for inflation, the ODOT value of time for passenger time is slightly lower than the PSRC estimates. The ODOT values of time reflect the statewide average, while PSRC is estimating values for the Seattle metropolitan area, where

average incomes will be higher than state averages. So it could be reasonable to assume that Portland peak period value of time is more like the Seattle metropolitan area than it is like the Oregon State average.

Ramp metering is a typical mitigation option. In the case of ramp metering and potentially other mitigation options we should also capture control delay. Ramp metering may have a positive effect on freeway operations but imposes some (incremental) control delay (i.e., delay due to deceleration, queue move-up time, etc.) on traffic waiting at ramp meter. Ideally the traffic analysis could account for the control delay experienced at the ramp meter in addition to the operational improvement on the freeway and the travel time savings to users once on the freeway.

Recommendation: Travel time savings will be monetized using user value of time and the travel time savings measured in the traffic analysis. Passenger vehicle and truck travel time savings should be measured separately, total travel time savings (hours) for each vehicle class.

Travel time reliability

There is increasing emphasis on measurement and valuation of improvements to travel time reliability. It is anticipated that operational improvements aimed at mitigating freeway bottlenecks will affect both recurring and non-recurring congestion.

Measurement of travel time reliability generally relies on knowledge of the variability observed in speeds or travel time. ECONorthwest, for a Strategic Highway Research Program project, has refined an approach for the valuation of travel time reliability. ECONorthwest's approach for the valuation of travel time requires information on the change in the mean and standard deviation of travel times, along with an assumption of log-normal distribution of travel time and information about the user class composition (vehicle classes). Of the traffic measures identified in DEA's first technical memorandum, there do not appear to be any measures to estimate travel time variation.

Disentangling travel time (congestion relief/reduction in delay) and reliability can be difficult. As we indicate in the next subsection on safety benefits, there may be reason to believe that remediation of queuing at bottlenecks may reduce the number of crashes, even minor fender benders, further reducing delays/non-recurring congestion due to those incidents.

A further complication we will need to pay attention to is that some bottleneck projects that might reduce typical daily travel times may decrease travel time reliability. For example, converting the shoulder to a lane adds capacity and increases throughput most of the time, but if an incident occurs, the shoulder lane is now not available for disabled vehicles or passing, and longer delays can occur occasionally.

Recommendation: Absent quantitative measures for improvements in travel time reliability, a qualitative assessment of whether the mitigation options will improve travel time reliability

and whether the reliability improvement is likely to be high/medium (++), low (+), or none (0) (or negative (--) which could be the case for projects that convert emergency shoulders into travel lanes) should be assigned based on expert/engineering judgment.

Safety

Safety benefits are derived from the cost savings due to a reduction in the number of crashes. Given the research on the relationship between congestion and crashes under congested conditions, there is reason to believe that bottleneck mitigation options may offer secondary benefits of reduction in crashes.

Basic relationships have been estimated looking at crash rates and volume-to-capacity ratios on urban freeways. Using these relationships may capture some of the safety benefits for some projects. We must be careful, however, to avoid including safety benefits for some projects (because we can roughly estimate those benefits) while excluding potential safety benefits of other projects due to absences of measures.

Recommendation: If safety benefits (reduction in crashes) can not be consistently estimated and monetized, a qualitative assessment of whether the safety improvement is high/medium (++), low (+), or none (0) should be assigned to each mitigation option based on expert/engineering judgment.

Vehicle operating costs

Fuel savings are typically the biggest category of user vehicle operating cost savings. At the margin there may be other vehicle operating cost categories where users may benefit from some small reduction in vehicle operating costs, but these are likely very small and similar across options.

In the *Redbook/User Benefits Analysis for Highways Guidebook*, ECONorthwest developed basic functions for estimating fuel consumption by speed, so that changes in fuel costs as function of speed and fuel consumption based on minutes of delay can be calculated. To the extent that operational improvements alter average speeds, then there should be some benefit from a reduction in fuel costs and we can (approximately) estimate those savings.

Recommendation: Calculate the change in fuel costs due to changes in vehicle operating speeds to determine an aggregated change in fuel cost. Include the user benefit from changes in fuel costs as a benefit for a benefit-cost analysis.

Emissions

Technically, emissions are not a direct user cost, but rather an indirect, external cost. The impact on criteria pollutants is likely to be negligible since those are mostly a function of starts and vehicle miles traveled. Mitigation options that appreciably change the number of vehicle

miles traveled may affect criteria pollutants and we can use equations developed for the *Redbook*, which compute emissions based on changes in VMT.

To the extent that improved operational flow can improve fuel efficiency and reduce user fuel costs, it has been mentioned that it is possible to convert (perhaps quite crudely) improvements in speed and operations to changes in fuel consumption and then carbon dioxide emissions. This will require some information about the vehicle classes on the facility and operational speed profiles. It is fairly well documented that GHG emissions benefits are a small fraction of the benefits derived from travel time savings for operational or congestion mitigation projects. All the same, the change in fuel consumption and thus emissions could be included in the evaluation since these are recognized category of benefits.

Recommendation: Calculate benefits from carbon dioxide emissions reductions based on the reduction in fuel consumption. The FHWA TIGER Grant Application Guidance recommends the value of $33 dollars per metric ton of CO2 emissions.

1.1.7 Other (non-user) impacts

As listed in the background introduction to project evaluation, there are many different *possible* evaluation criteria that *can* be considered in the project selection public process and decision-making. Some of these indirect benefits and other impacts include:

- **Economic impacts and development**. Economic impacts and development may include changes in employment, income, and the spatial distribution of business establishments due to changes in accessibility and transportation costs. Since none of these small congestion-mitigation projects is about opening new land for development or about joint development, any project effects on economic development are likely to derive directly from travel time improvements relative to the base case, and thus are primarily double counts of the direct user benefits. If so, this criterion could be ignored.
- **Land use compatibility and land prices**. Land use compatibility usually means: “is the project consistent with the regional / local land use plan?” Since this project is about small improvements to big, existing freeways (and not, for example, new freeways), all those mitigation projects are likely to be compatible in a broad sense with the regional and local land use plans, so this criterion is probably irrelevant to project selection.
- **Equity and Social Impacts**. Externalities (impacts or costs not borne by users of the facility, and usually negative) may fall disproportionately on disadvantaged segments of the population. Equity and social impacts (changes from the base line) are likely to be very small and very similar across options, so they could probably be ignored.

In summary, these “other impact” categories are likely to be largely irrelevant for the types of potential low-cost, bottleneck mitigation projects discussed at the project kick-off meeting and for the project options to be considered in Phase 1 of this project.

Recommendation: Describe land use, economic development, and any other indirect impacts in a qualitative fashion, if such impacts are identified. A qualitative description can provide useful information in the project selection process when comparing two mitigation options with relatively similar, quantitative benefits (e.g., qualitative description of other impacts can be useful in the case of a 'tie-breaker'). These impacts are not benefits categories to be included in the traditional benefit-cost framework.

1.1.8 Cost

In weighing the benefits against the costs of the congestion-relief projects, it is important to capture their full-life costs.

Capital costs

Capital costs are the "up front" investment required to implement the project. Capital costs include the engineering and design, right-of-way acquisition, signals, signs, etc. In colloquial or common usage terms, when people talk about a $3-million-dollar project cost, they are usually referring to the project capital costs.

Disruption costs

Another "up front" cost of project implementation is the cost associated with disruption to traffic due to construction zones, lane closures, work crews, etc. Many projects impose a calculable (and significant) cost in terms of disruptions to traffic operations. Disruption/construction costs may vary greatly among the feasible mitigation options, which is of particular concern when comparing alternatives. The importance of construction costs/disruption is recognized in the fact that for most projects in congested areas, work occurs in off peak (at higher construction cost) to reduce these costs of disruption.

Annual maintenance and operating costs

Maintenance and operations costs are the annual costs necessary to maintain or operate the mitigation option, and the additional facility operating costs directly attributable to the project option.

The present value of the full-life project costs can be roughly calculated by averaging the expenditure of capital and disruption costs over the project implementation period, then discounting those costs (if spread over multiple years) and discounting the stream of annual operating costs to calculate the total present value of the mitigation option.

Recommendation: Estimate all three categories of costs described above.

1.2 SCREENING AND RANKING

1.2.1 Screening

The initial screening will be based on engineering judgment, characteristics of the bottleneck locations and knowledge regarding past proposed remediation options. Key criteria for the initial screening are likely to be the following:

- **Capital Cost.** The intent of this analysis is to develop a list of low-cost bottleneck mitigation options. Mitigation options should have an expected upfront capital cost of (roughly) no more than $20 million.

- **Required Right-Of-Way**. Acquisition of right-of-way is another screening criteria, where the mitigation options should generally exist within ODOT ROW. Right-of-way acquisition is also likely to impose significant costs, which means that the mitigation option is also likely to be screened out based on capital cost threshold.

- **Within the Scope of the Current Analysis.** The defined scope of the I-5, I-205, I-405, I-84, and US 26 Corridors Bottlenecks Operations Study is generally limited to mitigation options along the mainline and ramps. Mitigation options, such as an option requiring modifications at adjacent intersections, is beyond the scope of this analysis due to issues interjurisdictional and other feasibility issues.

- **Political Feasibility; Timeliness or Readiness.** Some mitigation options, such as congestion pricing, may be screened out due to political issues or public acceptance. Political feasibility may also pertain to jurisdictional or institutional barriers to implementation. In addition to political feasibility, it may be that certain mitigation options are ahead of their time.

- **Other fatal flaw identified using professional judgment.** Additional engineering judgment may be applied to screen mitigation options for fatal flaws.

The Phase 1 initial screening will document the reasons that a project may be screened out of further analysis. The product of Phase 1 will be a list of projects for further analysis in Phase 2. For the list of project options that survive the initial screening, Phase 2 consists of the traffic analysis to produce evaluation performance measures, estimation of benefits and costs of each mitigation option, and the ranking of the mitigation options.

1.2.2 Ranking

Appendix B shows a proposed content for a matrix for evaluating the projects that survive the initial screening. For each project we will consider sketch-level estimates of the cost to implement and maintain/operate the mitigation option, the disruption costs (travel time) due

to construction or implementation of the remediation, and a number of performance metrics quantifying the benefits of the mitigation option.

Benefit cost analysis[2] is the traditional framework used by economists to compare the total benefits to project costs. This method monetizes direct user benefits and project costs for a specified project time horizon (a consistent time horizon is used for all alternatives), discounts those benefits and costs for comparison of present values. The monetary values for each user benefit category become the de facto "weights" applied to each category of benefits. Since all costs and benefits are converted to consistent and comparable measures, it is relatively straightforward to identify the most cost-beneficial ("cost-effective") options, ranked by the benefit-cost ratio. An advantage of this approach for this project is that it not only allows us to determine the most cost-beneficial treatment for a particular bottleneck, but it allows us to determine the most cost-beneficial allocation across all bottlenecks within the project scope.

Use of performance measures to sort and compare mitigation options may prove instructive, particularly if ODOT were to be given particular guidance regarding mobility measures. It is, however, difficult to justify weighting and combining measures, which essentially capture the same performance outcome. For this reason, the proposed prioritization measure is a benefit-cost ratio, based on the benefits and costs described in the preceding subsection. The evaluation matrix will retain all information for each option allowing for sorting and screening using the performance measures. Qualitative measures, like Safety, might be used to filter or sort the mitigation options at a later time if such a funding constraint or funding objective was specified. (E.g., evaluate mitigation options based on BC ratio for all options with a "high/medium" safety impact, etc.)

We described previously the benefit and cost categories included in the benefit cost-analysis. The benefit-cost analysis calculates the present value of these benefits and costs using a consistent project time horizon for all projects, and discounting costs and benefits with a standard discount rate.

The benefit-cost ratio (BC ratio) is the ratio of the present value of benefits to present value of costs. Net present value is calculated as present value of benefits minus present value of costs. Mitigation options with a BC ratio greater than one, or positive net present values, are mitigation options that have present value benefits exceeding present value costs: in other

[2] "Cost-Effectiveness" or "cost-effective mitigation options" is mentioned numerous times in the RFP and Scope of Work. Cost-Effectiveness is a type of economic analysis that helps to identity the lowest cost alternative given a particular outcome (i.e., a pre-determined, desired outcome must be specified.) Therefore, when economists talk about cost-effective analysis, we have a more narrow and precise meaning of what constitutes the cost-effective alternative. This method assumes all options have the same benefit and makes selection based on cost, rather than the comparison of options with varying levels of benefits and costs, as is done in BCA. Benefit-cost should generally be preferred to a cost-effectiveness measure since the mitigation options will produce different levels of benefits and we should acknowledge not only the travel time and operational improvements (benefits) but also any other benefits that help to justify investment. In the context of our project, an example of cost-effectiveness analysis would be to specify a desired outcome (e.g., elimination of peak period delay at bottleneck) and to identify the lowest cost mitigation option that achieves the desired outcome.

words, they are "cost-beneficial" (i.e., direct user benefits from the project option exceed the direct costs of building and operating the project).

Our sketch BC analysis will attempt to approximate a future stream of benefits based on methods for extrapolation of benefits in the absence of a future year forecast. A challenge of the analysis is to measure benefits and costs of mitigation options in a consistent and comparable manner, but at a sketch level.

In a typical constrained funding situation, sorting on the BC ratio prioritizes transportation improvements. Funds are allocated by working down the list, starting with the most cost-beneficial (highest BC ratio) project, until all funds are exhausted. Additional constraints or objectives could be incorporated into this process by first filtering or allocating funds, and then using the BC ratio.

The discussion of the benefit-cost analysis to this point has not addressed "other impacts" that may not be monetized and included in the BC ratio. There are ways to deal with those costs. The most common one is consider the BC ratio as one criterion and then consider it in the context of other performance measures / criteria (e.g., economic development, the environment, equity). Doing so raises the problem of "weighting."

For the BC ratio, weighting is not an issue because all components of the ratio are measured in the same units—dollars—which means the weighting occurs automatically: if the present discounted value of the benefits of one project is $10 million / year and of another is $20 million / year, then the latter has twice the benefits (twice the weight) as the former. But when the units of measure are different (e.g., dollars versus "compatibility with land use plans") the relative importance (weight) of the two measures is not defined. One solution—the one used in a full benefit-cost analysis—is to convert as many of the measures as possible from their natural units (e.g., minutes of delay, parts per million of a pollutant, crash fatalities) to dollars. That solution has problems: the technical ones may be manageable, but the political ones often are not; many people do not believe that some concerns can be appropriately expressed in dollars.

In that case (which is the most common one) other techniques are used to incorporate non-monetized criteria into an evaluation. We have described the most common one, and the one we are recommending for this project: matrix display. In essence, the concerns that lend themselves to consolidation via benefit-cost techniques get incorporated into the BC ratio, and the BC ratio then gets considered as one column in a matrix with other evaluation criterion.

That solution, however, still does not answer the questions: "How important is the BC ratio relative to other criteria? What weight should the performance on each criterion have?" What if, for example, Project 1 has a BC ratio of 2.5 but benefits mainly through traffic and causes queuing delay for local traffic, and Project 2 has a BC ratio of 1.8 and no impacts on local trips? Which project is better? There is no obvious right answer: it depends on how important

decision makers think the local impacts are relative to the regional impacts. Many similar examples could easily be hypothesized.

Thus, the question for this project, and all "multi-criterion" projects, is how to handle the weighting (relative importance) of different evaluation criteria. There are many different solutions: ignore the issue (show the criteria in a matrix and presume that decisionmakers will do their weighting implicitly and that the their final decisions are based on those implicit weights), discuss weights explicitly but qualitatively, or go through a formal weighting process (e.g., an Analytical Hierarchy Process[3]). ECO can implement any of these methods: it depends on client preferences and available time, and budget.

Given our understanding of the project objectives and budget, we propose creating an Excel spreadsheet that will contain a record for each mitigation option. For each mitigation option considered in Phase 2, the associated traffic model performance measures, quantified user benefits, mitigation option costs, benefit-cost ratio, and qualitative measures will be recorded. Many of these measures will be presented as total observed value with the mitigation option, as well as the difference observed relative to the base case. The spreadsheet can be developed to allow weighting of performance criteria, but at this point we are not proposing a formal process for deriving those weights.

1.3 NEXT STEPS

A draft of this technical memorandum was delivered on January 8th. It was reviewed by DEA and ODOT, with some discussion of the evaluation framework and criteria during the PM Meeting on January 28th, 2010. The technical memorandum has been revised to address all comments and feedback.

Phase 1 will proceed by documenting decisions regarding project options based on engineering judgment and perform the initial screening to develop a list of feasible mitigation options that will be analyzed in Phase 2.

Phase 2 activities will include the traffic analysis and estimation of the costs and impacts for each of the proposed, feasible mitigation options. The data collection plan required for evaluative framework is consistent with the evaluation measures available from the traffic analysis. Safety is one area where further thought on quantitative measurement of impacts might be possible, but perhaps not comprehensive.

[3] Thomas Saaty. "How to make decisions: The Analytical hierarchy Process." *Interfaces* 24:6 November-December 1994.

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APPENDIX A: A BRIEF BACKGROUND PROJECT EVALUATION FRAMEWORKS AND CRITERIA

There is a huge professional literature on evaluative frameworks for public policy decision-making and analytical economic techniques for project evaluation.[4] Terry Moore and ECONorthwest have written extensively about a framework for evaluating public policy in general, and the techniques of benefit-cost analysis in particular. Accompanying this memorandum are two summary articles that ECO has written: "Framework for Evaluating Public Policy," and "Framework for an Economic Evaluation of Transportation Investments."[5] In the rest of this section we further summarize from that work to cover just the main points as they relate to this project.

The summary in this section draws from recent work of ECONorthwest[6]:

- An agency's performance measures should relate to what that agency is trying to achieve.
- In broad terms, any agency is trying to implement programs that are efficient and fair. They are efficient if they provide benefits (which can include the reduction of negative impacts) that exceed costs.
- For regional land use, transportation, and economic development projects, the things an agency wants to achieve (i.e., its goals) fit under some close approximation of headings that define broad categories of impacts: economic, the environmental, land use, infrastructure (including transportation), social, fiscal, institutional, or legal.
- The primary goals of a transportation improvement project are usually, and should be, related to transportation performance (e.g., direct user benefits): safety, travel time (accessibility and mobility), reliability, cost-effectiveness / fiscal constraint, and distribution of impacts (equity).

Figure 1 shows how Portland Metro's extensive process for developing performance measures ("measurable outcomes") ended up with ones very close to those just listed.

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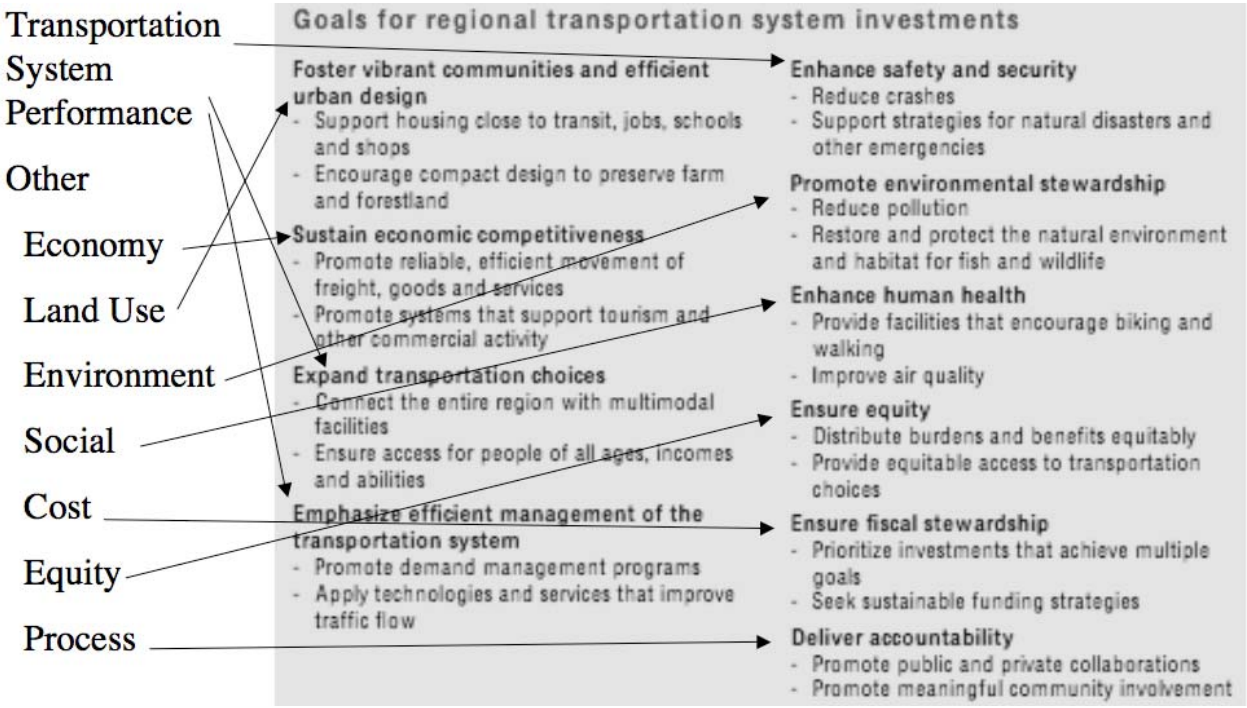
[4] ECONorthwest is the author of what may be the most extensive and used guidebook for transportation benefit-cost analysis: American Association of State Highway and Transportation Officials AASHTO. 2003. User benefit analysis for highways, Washington, D.C.

[5] Terry Moore and Paul Thorsnes. 2007. "Appendix A, Framework for Evaluating Public Policy." In *The Transportation / Land Use Connection.* American Planning Association. Terry Moore and Randall Pozdena. 2004. Framework for an Economic Evaluation of Transportation Investments." In *Economic Impacts of Intelligent Transportation Systems*. Edited by Evangelos Bekaris.

[6] In particular, this chapter uses information Terry Moore is preparing for the Lane Transit District on performance measures (to be delivered in the first quarter of 2010).

Figure 1: Goals from Portland Metro's Long-Range Transportation Plan



Source: Portland Metro, ECONorthwest

Within each of those categories one can create dozens of performance measures. The problem is not that measurement is not possible. Rather, it is that so much measurement is possible that it is often not clear what to measure, or how to use multiple measurements to support better policy choices.

There are several technical issues relating to performance measurement that must be addressed, including:

- **Number of measures**. Critical to any practical evaluation is a recognition of how numerous evaluation measures can get. Figure 1 lists half a dozen broad categories of transportation-performance criteria, and even more categories of criteria of impacts on other systems. If each of 15 broad categories has three sub-categories (e.g., the efficiency of transportation performance might be measured as speed, accessibility, or mobility) and each of those sub-categories has three measures (e.g., "speed" might be measured by peak-hour travel time, annual vehicle-hours of delay, and annual per-hours of delay) then there are 135 possible measures (15 x 3 x 3). There are inherent tradeoffs: more measures are both better (better specification of the multi-dimensional nature of the evaluation) and worse (too many everyone gets lost in the details). Our solution to this problem is to have an evaluation start with a few broad categories at the top, and then "nest" all sub-categories and measures so that the details can be "rolled-up" into summary measures.

- **Double counting**. Analysts or policymakers may choose to measure what they can or what they like, and thus may have multiple measures of nearly the same performance attribute. The effect is to give greater value to that attribute. It is not uncommon for performance measures to double and triple count the same effect. The greater the number of measures, the more likely that effect is, and the greater the risk that those using the indicators can "find what they want." If the tendency is to measure what you can or what you like, and thus to have multiple measures of nearly the same performance attribute, the result will be to give greater emphasis to that attribute. As an example, it is well established that changes in accessibility influence land price, land price influences land development, and land development influences economic development. Yet it is common to measure each of those categories, and sometimes with multiple measures for each. What may seem like an important refinement may be, in fact, an unnecessary complication: all the downstream effects may be highly correlated with the primary effect: building the transportation project increases access. Thus, it may be sufficient—even superior—to just measure the relative change in access across alternative transportation investments. That is a fair restatement of the guidance from the Federal Transit Administration on evaluating transit improvements: measure the transportation user benefits and compare to cost to get a measure of cost effectiveness (bang for the buck).
- **Units of measurement**. Consider a justification for some transportation facilities or policies: that they will reduce energy consumption. If that is important, then one would like some measure of that reduction. Will an agency measure energy consumption directly (i.e., gallons of fuel consumed), or will it measure a correlate (e.g., vehicle miles traveled (VMT))? Most transportation agencies choose to measure VMT. Set aside for a moment the more fundamental problem of how to interpret the measure,[7] and look just at units of measurement. Should a measure of vehicle miles traveled be total or per capita; per year or per peak hour; an absolute amount or a rate of change[8]; for a region or for subareas; and so on. If the answer is "all the above" then the implication is that we need perhaps dozens of measures of different aspects of VMT: the "exponential" problem again.

[7] I.e., are more vehicle miles traveled a good thing or a bad thing? The answer, despite all planning rhetoric, is not an obvious negative. VMT is a measure of people's use of the transportation system, which is built to accommodate and even encourage that use. More VMT may be interpreted as a measure of the transportation system's ability to deliver benefits (efficiency). Of course, the more common interpretation today is that VMT is undesirable and should be reduced to reduce use of fossil fuel and greenhouse gas emissions. That interpretation requires the implicit assumption that people can be just as well off (can still get to all the places they want at about the same cost) even as they reduce their VMT.

[8] For example, VMT has risen inexorably for several decades at rates about three to four times those of population growth rates. Growth rates have only recently started to decline, but national and most state forecasts are for continued growth of VMT. Should the measure be absolute reductions in VMT (which will be very difficult to achieve) or changes (presumably decrease) in the annual rate of increase in (1) VMT (which will be easier to achieve) or (2)VMT per capita (easier still)?

The point is that whether and how measures are standardized is critical and there is no obviously single answer for all situations: it depends (which means it requires judgment by the technical staff setting up the evaluation framework).

- **Weighting.** Different people and groups value the various performance aspects differently. Thus, it is not enough just to measure: one must have an agreed upon method for consolidating multiple measures into summary measures that can be compared. Such consolidation usually requires some process for "weighting" measures.

There is no professional consensus, much less adopted standards, on: (1) categories of evaluation criteria, (2) measurements, or (3) consolidation of measures. There is no single "right way" to do performance measurement, but some ways make more sense than others.

Despite these problems, evaluation must occur if choices are to be informed by logic and data. Performance measurement should be tied to an evaluation framework since the ultimate purpose of the measurement is to evaluate performance and choose projects that improve performance. An evaluation framework should be built on:

- Good theory (e.g., the principles of benefit-cost analysis; an understanding of the interconnections of transportation facilities and travel performance, and of transportation to land use and economic development)
- Mutually exclusive and non-overlapping categories of impacts/benefits
- A nested hierarchy of performance measures
- Consistent measurement.
- Reasonable, documented simplifications.

In the face of a potentially overwhelming number of possible measures, a bit of good news is that one might be able to simplify a little by not measuring things that are unlikely to change much across alternative transportation investments. The bad news is that though often all the "build" options may have some similar effects (e.g., they all require an expanded right-of-way), the "no build" option may be different. Similarly, one can simplify by noting that a lot of measures are mainly double-counts of a single primary effect; measuring just the primary effect will capture most of the differences across transportation investment options.

APPENDIX B: EVALUATION CRITERIA AND PERFORMANCE MEASURES

The following table lists the column headings for a table or matrix format that can be used to organize, track and evaluate feasible mitigation options.

Table 2 Evaluation Matrix Column Headings

Matrix Column Heading	Measure/Description of Matrix Content
Bottleneck Location	
Mitigation Option	Descriptive name of mitigation option
Construction/Implementation Duration (months)	Elapsed time (months) required to implement mitigation option.
Capital Cost	Capital, construction cost.
Annual Operating Costs	Estimated annual operating/maintenance costs.
Implementation/Construction Disruption Cost	Cost to travelers (delay hours, etc.) due to implementation mitigation option.
Change in Travel Time-Auto (vehicle hours, $)	Hours, dollar value of travel time savings for passenger vehicles.
Change in Travel Time-Truck (vehicle hours, $)	Hours, dollar value of travel time savings for heavy trucks.
Improvement in Travel Time Reliability	Qualitative assessment of improvement to travel time reliability (high, medium, low, none)
Improvement in Safety	Qualitative assessment of improvement to safety (high, medium, low, none)
Change in Fuel Costs ($)	Vehicle operating cost savings, fuel saved (in gallons and converted to dollar value)
Change in Emissions (metric tons CO2, $)	Value of reduction in CO2 emissions (calculated from fuel savings)
Benefit-Cost Ratio	Present value of benefits divided by present value of mitigation costs.
V/C Ratio	VISUM or HCS
Density/Level of Service (LOS)	VISSIM
Travel Time	VISSIM
Speed	VISSIM
Queue Length	VISSIM
Vehicle hours of delay (VHD) for study area	VISSIM
Vehicle miles traveled	VISSIM
Number of congested lane miles within corridor	VISSIM
Summary	Other qualitative description of mitigation option.

CHAPTER 5: APPENDICES

5.2 Appendix A: Technical Memoranda

A.1 Technical Memoranda 1 & 2: Methodology and Assumptions (known and available data)

A.2 Technical Memoranda 3: Bottleneck Identification and Diagnosis

A.3 Technical Memoranda 4 & 5: Corridor Design Review

A.4 Technical Memoranda 6: Evaluation Framework for Investments to Improve Freeway Operations at Bottlenecks on I-5 & I-205

A.5 Technical Memoranda 7: Design Panel Results

A.6 Technical Memoranda 8: Feasibility Review

A.7 Technical Memoranda 9: Summary of Operations Result

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DAVID EVANS
AND ASSOCIATES INC.

MEMORANDUM

DATE:	October 2, 2012
TO:	ODOT Project Management Team
FROM:	Mike Baker, PE
	Scott Harmon, PE
	Shelly Alexander, PE
SUBJECT:	**TM 7 - Design Panel Results**
PROJECT:	Corridors Bottlenecks Operations Analysis (C-BOS)
PROJECT NO:	ODOT 0000-0674
COPIES:	File

INTRODUCTION

The Corridors Bottlenecks Operations Study (the C-BOS) project is intended to provide spatial and temporal evaluation of freeway operations along the five metro area corridors (I-5, I-205, I-84, I-405 and US 26) and correlate locations of congestion with potential mitigation measures. Building on the bottleneck identification, presented in a previous task, a design panel convened to initiate the evaluation process. The intent of the design panel is to engage a group of transportation design and traffic engineering experts to assess bottleneck locations and performance and identify potential lower-cost design and operational solutions for consideration. The purpose of this technical memorandum is to summarize the design panel review process and findings.

This is the seventh technical memorandum for this project.

DESIGN PANEL OVERVIEW

The purpose for each design panel session is to engage an expert panel of transportation design and traffic engineering experts to assess each bottleneck location and performance, and identify potential low-cost design and operational solutions for ODOT consideration. The panels convened for 3 separate sessions, each session focusing on a specific corridor(s). The first session focused on the I-5 and I-205 corridors. The second and third sessions focused on the I-84 and US 26 corridors and I-405 corridor, respectively.

For each session the panel was briefed on bottleneck locations specific to the session focus, likely causes and effects, corridor design context, and potential solutions that have been explored to date. From this starting point, the design panels engaged to identify new potential solutions as well as comment on potential solutions previously considered.

The intent of the design panel is to offer an objective perspective and potential solution ideas, apply high-level fatal flaw screening, and remain a resource as needed throughout the screening process. The goal was to create an expanded list (new concepts or building on concepts already explored) of potential lower-cost solutions with

documentation of the screening results and sufficient conceptual design to support modeling, costing and benefit-cost estimating. Each design panel session was split into two teams (A and B) for independent review and consideration. The split of the design panel teams varied slightly each session to capture the uniqueness of the corridor of focus, though always included traffic engineers, roadway designers, and cost estimators.
The two groups reconvened as one large group for each corridor providing the teams an opportunity to share their findings/recommendations with each other, solicit comments/new proposals, and prioritize proposals for further refinement. Further details regarding the design panel format and participants can be found in Appendix A.

The project management team (PMT) developed a set of fatal flaw screening guidelines to guide the design panel in the selection of potential projects for the identified bottlenecks. The goalof the guidelines is to identify projects that can provide a measurable benefit within the financial realities that ODOT is operating under. To the The following guidelines were used during project selection to facilitate the goal.

- Design exceptions are allowed as long as there is a measurable safety or operational benefit
- Relatively low cost projects or projects that can be phased at a low cost of $50 million or less
- Little to no additional right-of-way required
- Avoid impacts that would aggravate know political concerns

CORRIDOR SPECIFIC OVERVIEW AND FINDINGS

This section summarizes the design panel format and findings for each corridor. The summary is grouped by the sessions corridor focus and includes the session date, approach, and a list of projects that have been screened and identified for further consideration (findings).

Session 1

The first session considered the I-5 and I-205 corridors and occurred on June 16, 2010. During this session the teams were assigned to a specific corridor. The teams brainstormed potential solutions, did a preliminary fatal flaw screening of the potential solutions, refined the remaining solutions and selected those which were the most promising for advanced refinement. The groups were responsible for documenting the results throughout the process. Midway through the day, the teams reconvened to provide an overview of the potential solutions as well as those identified for advanced refinement ideas for their corridor to solicit feedback from the other team prior to beginning the refinement process. The later portion of the session included refinement of the potential solutions by the corridor team and a presentation of the refined alternatives to the larger group. The larger group then assessed clustering opportunities and project prioritization for moving forward.

I-5 Findings

Design panel session findings for I-5 included 22 projects identified for further consideration by the Project Management Team (PMT). The PMT further narrowed the list to 12; recommending 4 projects in the northbound direction and 8 in the southbound direction. A list of the projects recommended by the PMT for I-5 is provided in Table 1. The PMT list of projects may be further refined in later phases of the project. The complete project list generated during the design panel is located in Appendix B.

Table 1: I-5 Design Panel Projects

Name (Study Area)	Project Name	Description
SB Hood Ave. On-Ramp Bottleneck (Harbor Drive to Terwilliger)	Restripe Harbor Drive On-ramp to I-405	Restripe Harbor Drive as a single lane left side merge to the left lane of I-405 rather than dropping a 405 lane
	Harbor Drive Realignment	Realign Harbor Drive to outside of I-405. Let I-405 add both lanes
	Hood to Corbett Lane Extension Widen	Widen to create fourth lane from Hood Ave On-ramp to Corbett overpass
	Hood to Brier Lane Extension Widen	Widen to create fourth lane from Hood Ave On ramp to Brier overpass
	I-5/I-405 Merge Lane Extension to Corbett	Lane Extension from I-5 to Corbett; widen or construct a separate structure for Hood On-ramp, move Hood On-ramp downstream
NB Terwilliger On-Ramp Bottleneck (Terwilliger Curves)	Terwilliger Ramp Extension (Widen)	Extend Terwilliger On-ramp through curve
	ATMS	Install ATMS throughout curves. (extending concept from I-405)
SB Carman Lane Drop Bottleneck (OR 217 Lower Boones)	Carman to Lower Boones Aux lane	Carry 4th lane from Carman to Lower Boones
	Ramp Meter	Ramp meter On HWY 217
SB Nyberg Off-Ramp Bottleneck (Lower Boones to Nyberg)	Nyberg Off ramp Lane Increase	Increase Off ramp to Nyberg from One lane to two.
NB Lower Boones Off-Ramp Bottleneck (Nyberg to Lower Boones)	Reconstruct Lower Boones Off ramp	Increase Lower Boones Off ramp from One lane to two
	Increased Aux Lanes Nyberg to Carman	Extend 4th lane Aux from Nyberg through Lower Boones; Lower Boones adds 5th lane through Carman interchange; Carman interchange merges into 5 lanes

I-205 Findings

Design panel session findings for I-205 included 23 projects identified for further consideration by the PMT. The PMT further narrowed the list to 16; recommending 9 projects in the northbound direction and 7 in the southbound direction. A list of the projects recommended by the PMT for I-205 is provided in Table 2. The PMT list of projects may be further refined in later phases of the project. The complete project list generated during the design panel is located in Appendix B.

Table 2: I-205 Design Panel Projects

Name (Study Area)	Project Name	Description
NB Division and Powell On-Ramp Bottleneck (Powell On-Ramp to WB I-84 Off-Ramp)	Aux Lane, Powell On-ramp to Division On-ramp	Constructs/stripes new auxiliary lane from NB Powell On-ramp to the aux lane that begins at the Division On-ramp
	Aux Lane, Washington / Stark On-ramp to I-84 WB Off-ramp	Constructs/stripes new auxiliary lane from NB Stark/Washington On-ramp to I-84 WB Off-ramp.
NB Foster On-Ramp Bottleneck (Foster to Powell)	Aux Lane, Foster On-ramp to Powell Off-ramp	Constructs/stripes new NB auxiliary lane from Foster On-ramp to Powell Off-ramp.
NB I-84 WB On-Ramp Bottleneck (EB I-84 Off-Ramp to Airport Way)	Northbound Aux Lane from I-84 EB On-ramp (Restripe)	Aux/add lane from I-84 EB On-ramp to Sandy Blvd. Off-ramp by restriping
	Northbound Aux Lane from I-84 EB On-ramp (Widen)	Aux/add lane from I-84 EB On-ramp to Sandy Blvd. Off-ramp by widening
	Aux lane extension to Columbia WB Off-ramp	Extends aux lane from option 1/2 from Sandy Off-ramp to Columbia Off-ramp
	Aux lane extension to Airport Way WB Off-ramp	Extends aux lane from option A from Columbia Off-ramp to Airport Way WB Off-ramp (aux lane already in place between Columbia On-ramp and Airport Way WB Off-ramp)
	Additional aux lane between Columbia On-ramp and Airport Way WB Off-ramp	Constructs new aux lane (fifth lane) from Columbia On-ramp to Airport Way WB Off-ramp
	Remove lane from I-205 NB between I-84 EB Off-ramp and I-84 EB On-ramp	Restripe, reduces I-205 NB mainline to two lanes so that I-84 EB On-ramp becomes an add lane
SB OR 212/224 On-Ramp Bottleneck (Milwaukie Expy On-ramp to Gladstone/82nd Dr. Off-Ramp)	I-205 Aux Lanes: Gladstone to OR 212/224	Auxiliary lanes in both directions -- OR 212/224 to Gladstone interchange (82nd Dr.)
SB OR 43 Off-Ramp Bottleneck (Abernethy Bridge to Stafford Rd. interchange)	I-205 Climbing Lanes, Abernethy Br. To 10th	New SB truck climbing lane from Abernethy Bridge to 10th St.

Session 2

The second session considered the I-84 and US 26 corridors and occurred on June 14, 2011. During this session the teams started with one corridor in the morning then switched midway through the session to conduct the refinement of the most promising solutions. The morning session included brainstorming of the potential solutions, clustering opportunities, preliminary fatal flaw screening, and selection of the most promising potential solutions for advanced refinement by the afternoon team. Midway through the day, the teams reconvened to provide an overview of the potential solutions for each corridor and solicit feedback The teams then switched corridors to conduct the advanced refinement and preliminary cost estimating. Each group was responsible for documenting the results throughout the process.

I-84

Design panel session findings for I-84 included 27 projects identified for further consideration by the PMT. The PMT further narrowed the list to 16; recommending 6 projects in the eastbound direction and 10 in the westbound direction. A list of the projects recommended by the PMT for I-84 is provided in Table 3. The PMT list may be further refined in later phases of the project. The complete project list generated during the design panel is located in Appendix B.

Table 3: I-84 Design Panel Projects

Name (Study Area)	Project Name	Description
Eastbound		
I-5 to I-84 Bottleneck (Grand Ave. On-ramp - SE 21st Ave.)	I-5 SB On to I-84 EB (mainline)	Widen mainline with extension of 4th EB lane, from Grand Ave. On-Ramp through 21st Ave. O'Xing; install retaining wall; reconstruct 12th Ave. O'Xing.
	I-5 SB On to I-84 EB (mainline)	Same as 1b, or retain existing configuration of I-5 SB On ramp; continue further east and close SE 16th Ave. On ramp
I-5 SB/NB Merge Bottleneck (I-5 SB/I-5 NB merge @ Grand Ave. On-Ramp)	I-5 SB/NB Merge	Add deflectors or separation between Grand Ave On-ramp and I-5 NB > I-84 EB; widen mainline to accommodate barriers and shy distance
Irving St./16th On-Ramp Bottleneck (Irving St./16th Ave. On-Ramp)	Irving St./16th Ave. On-Ramp	Congestion appears Only to occur when ramp meters are Off; consider turning On ramp meter sooner, or extend period longer.
39th Ave. On-Ramp (33rd Ave. - 39th Ave.)	Interchange/ ramp consolidation @ 33rd Ave. interchange	Relocate EB 39th On & Off ramps back to 33rd Ave, interchange, and create 3/4 interchange @ 33rd Ave; WB traffic still exits at Halsey St.
Corridor-wide (I-5 - I-205)	Corridor Active Management Signage	Use corridor-wide active management signage to warn of queuing ahead;

Name (Study Area)	Project Name	Description
Westbound		
I-5 to I-84 WB Bottleneck (Ramp to I-5/I-84 Diverge)	I-84 - I-5 Diverge Ramp Lanes Configuration	I-84WB approach to I-5 NB/I-5 SB split should consider 3-2-1 split @ I-5 diverge, instead of current 3-2-2 split; assign 2-lanes SB & 1 Lane NB (then widen to 2-lanes NB); restripe?
I-5 NB Off-Ramp (33rd Ave. On-Ramp - I-5 SB/NB split)	Signage Upgrade 33rd On-Ramp/ Glisan St. On-Ramp - I-5 NB/I-5 SB diverge	Signage is misleading; sight distance issue at curve to I-5 NB; improve signage; may require new/large sign structures;
I-5 NB Off-Ramp (MLK/Grand Ave. - I-5 NB/I-5SB diverge)	Signage Upgrade /extend start of On-Ramp - I-5 NB/I-5 SB diverge. (no accommodation for streetcar On MLK/Grand)	Extend gore point east 1,500'; enhance signage On Grand Ave. O'Xing, and sign bridge west of 12th Ave. O'Xing; keep 3-2-2 split. (*assume R/R encroachment can be worked out; assume vertical clearance can be maintained; assume bridge supports can be replaced -- need confirm possible).
I-5 NB Off-Ramp (MLK/Grand Ave. - I-5 NB/I-5SB diverge)	Signage Upgrade /extend start of On-Ramp - I-5 NB/I-5 SB diverge. (accommodation for street-car On MLK/Grand)	Extend gore point east 1,500'; enhance signage On Grand Ave. O'Xing, and sign bridge west of 12th Ave. O'Xing; keep 3-2-2 split. (*assume R/R encroachment can be worked out; assume vertical clearance can be maintained; assume bridge span will be replaced and streetcar tracks replaced --- need confirm).
33rd Ave. On-Ramp (Sandy Blvd. On-Ramp to 33rd Ave. On-Ramp)	Sandy Blvd/33rd Ave. C-D road interchange consolidation	Combine Sandy Blvd. On-ramp with new 33rd Ave. Off-Ramp via Aux/C-D road; no 33rd Ave. NB>I-84 WB On-ramp left-turn allowed at signal On interchange

Name (Study Area)	Project Name	Description
Glisan St. On-Ramp Bottleneck (I-205 SB On-Ramp to Glisan St. On-Ramp)	Glisan St. On-Ramp Signage Improve-ments	Consider lower ramp meter adjustments?; speed harmonization/variable speed measures?; employ active warning signs of ramp meter ahead?; widen shoulders;
	Glisan St. On-Ramp O'Xing	Replace/reconstruct U'Xing entrance to I-84 with O'Xing to improve sight distance and have WB On-ramp connect at same elevation as mainline.
	Glisan St. On-Ramp O'Xing	Close ramp.
Corridor-wide (I-5 - I-205)	Interchange Entrance Ramp Closures.	Remove selective interchange ramps (Irving St./16th Ave. On-ramp?; Willow St. On-ramp?; 58th Ave. On-ramp?)
Corridor-wide (I-5 - I-205)	Time-of-day, Directional Interchange Ramp Closures.	Install peak period-operated ramp gates to actively manage Entrance to mainline/allow Exit-Only movements during PM peak hours; and manage Exit-Only movements and selective Entrance-Only access during AM peak hours.

US 26

Design panel session findings for US 26 included 17 projects identified for further consideration by the PMT. The PMT further narrowed the list to 4; recommending 3 projects in the eastbound direction and 1 in the westbound direction. A list of the projects recommended by the PMT for US 26 is provided in Table 4. The PMT list may be further refined in later phases of the project. The complete project list generated during the design panel is located in Appendix B.

Table 4: US 26 Design Panel Projects

Name (Study Area)	Project Name	Description
Eastbound		
Highway 217 On Ramp (Hwy 217 On ramp to Cedar Hills Blvd. On)	Hwy 217 Guide Signage	Mainline and ramp guide signs On/near OR 217 & US 26; thru traffic merge left.
	ATMS	ATM variable signs indicating lane assignments and variable speeds; per lane side or overhead.
	Hwy 217 to US 26 EB Aux Lane	Modify acceleration lane into an auxiliary lane from OR 217 On to Sylvan/Scholls Ferry Off. 11' lanes, 4'-6-8' shoulders.
Westbound		
I-405 x US 26 Merge Bottleneck (I-405 Ramps at US 26 x I-405 Merge)	Striping Plan	Look at original construction lay-out plans for striping. Perhaps wasn't striped correctly.

Session 3

The third session occurred on June 15, 2011 and considered the remaining corridor, I-405, and was the shortest of the sessions. During this session each team reviewed the I-405 corridor. The morning session included individual team brainstorming of the potential solutions, clustering opportunities, preliminary fatal flaw screening, and selection of the most promising potential solutions for advanced refinement in the afternoon. Midway through the day, the teams reconvened to provide an overview of the potential solutions they'd generated for the corridor and solicit feedback. The remainder of the session was used to conduct the advanced refinement and preliminary cost estimating. The target for the preliminary costs was set at $50 million or less. Each group was responsible for documenting the results throughout the process.

I-405

Design panel session findings for I-405 included 28 projects identified for further consideration by the PMT. The PMT further narrowed the list to 16; recommending 1 project in the northbound direction and 15 in the southbound direction. A list of the projects recommended by the PMT for I-405 is provided in Table 5. The PMT list may be further refined in later phases of the project. The complete project list generated during the design panel is located in Appendix B.

Table 5: I-405 Design Panel Projects

Name (Study Area)	Project Name	Description
Northbound		
US 26/12th Ave. (US 26/12th Ave. Off-Ramp - I-405 SB On-Ramp)	12th Ave. Off-Ramp Closure	Close 12th Ave Off-ramp
Southbound		
Hwy 30 On-ramp Bottleneck (I-405 Ramps at US 26 x I-405 Merge)	Hwy 30 On-Ramp to I-405 SB 2>1 Merge (3-lns SB I-405 @ US 30 Merge)	Restripe for parallel 2-lane merge On Hwy 30 On-Ramp, to 1-lane before merging with I-405 SB. Retain existing Fremont Bridge split (4 to 3+2) and carry 3-lanes I-405 SB to US 30 single-lane merge.
	Hwy 30 On/Off-Ramp Merge	Restripe Fremont Bridge split to I-405 SB & US 30 as 4-lane split to 2 + 2; move Bridge split/ diverge gore point to east.
	Hwy 30 On/Off-Ramp Merge	Retain existing Fremont Bridge split at bridge end (4 to 3+2); lane drop to 2-lanes @ US 30 On-ramp entrance (US 30 On-ramp remains as 2-lane merge).
	Hwy 30 On-Ramp	Carry 4th lane through/past Everett St. Off-ramp, and 3-lanes past Couch; single-lane diverge @ Everett; 4-lane to 3-2 lane @ Couch/Burnside (2-lane to US 26); 2 or 3 lanes past Burnside
Hwy 30 On-ramp Bottleneck (I-405 Ramps at US 26 x I-405 Merge)	Add 3rd lane.	Add 3rd lane from Couch St. Off-ramp drop to US 26 WB
	Add 4th lane.	Add 4th lane from Everett St. Off-ramp to Couch St. Off-ramp; add accel. lane to west.
Everett St. On-ramp Bottleneck (Everett St. On-Ramp to US 26 Off-Ramp)	Static Signage & Sight Distance Improvements	Add additional static signage SB (cantilever sign from side just before Morrison St. O'Xing); extend gore point of Everett St. On-ramp, to prevent earlier weaving; clear landscaping to improve sight distance.
	Install active variable speed signage by lane.	Use active variable speed signs by lane

Name (Study Area)	Project Name	Description
	Extend Everett St. On-Ramp to US 26 Off-Ramp Merge/ Gore South	Push Everett St. On-ramp gore point further south (Alder St.).
	Extend Everett St. On-Ramp over closed Taylor St. On-Ramp/slip ramp to US 26	Extend Everett St. On-Ramp Onto Taylor St. On-Ramp (Taylor St. Ramp closed) past Salmon St; physical barrier separates Everett St. On-Ramp and I-405; connection [slip ramp] from Everett On-Ramp to US 26 past Salmon St.; widen 2,000' from Alder St.; 1,200' of retaining wall along west edge of I-405, to add shoulders (need confirm sufficient space available);
	Everett Street Realigning	Everett St.On to 26 Off. Shoulder widening, restripe, realign; trim landscaping.
US 26 On-Ramp/Broadway Off-Ramp (US 26 WB Off-Ramp to Broad-way Off-Ramp)	Montgomery St. On-Ramp limited to Broadway Off Ramp only as frontage road to Ross Is Bridge.	Barrier separate Montgomery St. On-ramp and then use it as a C-D frontage road to Ross Island Bridge. Eliminates conflicts of merge to I-405. Install signage On US 26 to Ross Island Bridge and to CBD.
	Montgomery St. On-Ramp closure.	Close Montgomery St. On-Ramp. Local traffic Only.
	Montgomery St. On-Ramp closure-peak hrs Only.	Close Montgomery St. On-Ramp during peak hours Only --- or adjust/slow ramp meter rates. Local traffic Only.
Broadway Off ramp (Signalized 6th Avenue at Broadway to I-405 mainline)	SE Broadway left to 6th On-Ramp NB closure	Eliminate EB > NB left-turn from Broadway to 6th Ave. Restripe NB 6th Ave. lanes from existing 2-lanes to 3-lanes (2 lanes to 6th Ave. On-ramp; 1 thru lane NB; bike lane)

Appendix A: Design Panel Outlines

I-5/I-205 Freeway Operations Improvement Project

Design Panel Outline June 16-2010

Purpose: To engage an expert panel of transportation design and traffic engineering experts to assess I-5/205 bottleneck locations and performance and identify potential low-cost design and operational solutions for ODOT consideration.

Context: The panel would be briefed on bottleneck locations, likely causes, and effects. They would also be briefed on corridor design context and potential solutions that have been explored to date. From this starting point, they would be engaged to identify new potential solutions as well as comment on potential solutions previously considered.

Intent: The panel will offer the following value:

1. Offer an objective perspective on potential bottleneck solutions for these two corridors;
2. Apply high-level fatal flaw screening opinion;
3. Offer potential solution ideas studies and/or implemented elsewhere around the country;
4. Remain a resource as needed throughout screening

End of the day: We need to complete the day with the following to be successful:

1. An expanded list of potential low cost bottleneck solutions
2. Documentation of screening results for this study- projects screened and why
3. Sufficient conceptual design to support modeling, costing, and benefit cost estimating

Panel Members: The panel participants include:

Project Manager: Ray Delahanty

Lead Facilitator: Mike Baker

Floaters: Ray Delahanty, Mike Baker, Mark Johnson

I-5 Corridor team: Dennis Mitchell, Ryan LeProwse, Gavin Oien, Aaron Shupien, Canh Lam,

- Still need to identify one more planner or designer (ODOT)
- Need a recorder/facilitator (ODOT or DEA person)

I-205 Corridor team: Scott Harmon, Steve Long, Bill James, Dave Parisi, John Wolf

- Still need to identify one more planner or designer (ODOT)
- Need a recorder/facilitator (ODOT or DEA person)

Panel Organization: The panel will be organized as follows with design and traffic expertise per team:

I-5 corridor: Team A and Team B

I-205 corridor: Team A and Team B

Materials: The following materials will be provided by ODOT:

- 1”=100’, 1”=200’, and 1”=400’ aerial roll map of I-5 and I-205 corridors (4 sets or each scale)
- Flip charts, markers and easels (1 per room)
- Post-it note pads (3”x5”) and sharpie pens- 15 of each
- Design template tools
- Acetate or onion skin
- Laptops, screens, and internet access (1 per room)
- To engage an expert panel of transportation design and traffic engineering experts to assess I-5/205 bottleneck locations and performance and identify potential low-cost design and operational solutions

Logistics: The following logistics will be coordinated by ODOT:

- Reserve Rooms 344, 318, and 313 for June 16 and if possible the afternoon of June 15 for set up
- Provide mid-morning and mid-afternoon snack for 20 people
- Provide lunch for 20 people
- Provide water and coffee for 20 people

Organization of the day: (This is one way that the flow of the day could go but it needs to remain flexible based on a variety of factors)

- **Welcome/introductions (8:00 – 8:15 am)- Ray**
- **Panel Overview (8:15- 8:30 am)- Ray and handoff to Mike**
- **Context Presentations and Q&A (8:30 – 9:00 am)- Mike**
    a. Mike overview of advance materials- 3 min
    b. Mark and Dennis overview existing corridor context- 15 min
    c. Group Q&A- 10 min
    d. Mike develop example of general feedback format for orientation (single line and text box including termini, lane config, geometric config, alignment, structures affected)
- **Morning Design Session**- group breakout to brainstorm potential solutions **(9:00 am – noon)**
    a. I-5 and I-205 Corridor teams A and B develop solutions- (9:00 am to 11:00 am)
    b. Corridor teams A and B present ideas to each other for feedback and possible project clustering (11:00 am to 11:30 am)
    c. Apply fatal flaw screening, document results, refine remaining ideas, and select most promising solutions for advanced refinement during afternoon session
- **Working lunch** (**noon-1 pm**)
    a. I-5 team report on range of ideas, fatal flaw screening, and top solutions for refinement in afternoon- receive feedback (12:15-12:30)
    b. I-205 team report on range of ideas, fatal flaw screening, and top solutions for refinement in afternoon- receive feedback (12:30-12:45)
    c. Briefing on afternoon session (12:45-1 pm)
- **Afternoon Design Session**- Group breakout to refine promising solutions (**1 – 3:30 pm**)
    a. I-5 and I-205 Corridor teams A and B conduct refinement- (1:00 pm to 2:30 pm)
    b. Corridor teams A and B present ideas to each other for feedback and possible project clustering (2:30 pm to 3:00 pm)
    c. Apply fatal flaw screening, document results, refine remaining ideas based on feedback and prioritize most promising solutions for advanced refinement during afternoon session (3:00 pm to 3:30 pm)
- **Group reports (3:30 – 4:30 pm)**
    a. I-5 Corridor teams A and B present summary of final solutions w/Q&A (3:30 pm to 4:00 pm)
    b. I-205 Corridor teams A and B present summary of final solutions w/Q&A (4:00 pm to 4:30 pm)
- **Summary of day, closing thoughts and next steps (4:30- 5 pm)**

Actions:

1. Ray to coordinate the following:
    a. Logistics- venue, materials, food
    b. create briefing board examples of morning and afternoon products to brief participants
        i. **morning**- single line drawings with text box detailing project termini, lane configurations, geometric configurations, alignment, structures affected)
        ii. **afternoon**- 2-line drawings detailing lane locations, shoulder locations, lane lines, etc., major cost items
2. Mike to send advance materials to panel members
3. Mark and Dennis- prepare existing I-5 and I-205 corridor overviews (15 min total to cover both corridors)
4. Ray to prioritize bottleneck locations to launch the day for each corridor and identify any bottleneck locations to be removed from this panel workshop
5. Ray to identify remaining staffing needs and coordinate needs with Mike

I-405 C-BOS Design Panels

Design Panel Outline – June 15, 2011

Purpose: To engage an expert panel of transportation design and traffic engineering experts to assess I-405 bottleneck locations and performance and identify potential low-cost design and operational solutions for ODOT consideration.

Context: The panel would be briefed on bottleneck locations, likely causes, and effects. They would also be briefed on corridor design context and potential solutions that have been explored to date. From this starting point, they would be engaged to identify new potential solutions as well as comment on potential solutions previously considered. Cost estimates of proposed operational solutions should be ≤ $50M.

Intent: The panel will offer the following value:

1. Offer an objective perspective on potential bottleneck solutions for these three corridors;
2. Apply high-level fatal flaw screening opinion;
3. Offer potential solution ideas studies and/or implemented elsewhere around the country;
4. Remain a resource as needed throughout screening

End of the day: We need to complete the day with the following to be successful:

1. An expanded list of potential low cost bottleneck solutions
2. Documentation of screening results for this study- projects screened and why
3. Sufficient conceptual design to support modeling, costing, and benefit cost estimating

Panel Members: The panel participants include:

Project Manager: Thomas Picco

Lead Facilitator: Mike Baker

Floaters: Mike Baker, Andy Johnson, Mark Johnson

Design Participants: ODOT: Thomas Picco, Dennis Mitchell, Canh Lam, Mark Johnson, Sarah Abbott, Andy Johnson, Chi Mai, Simon Eng, Mark Barrett, Lindsay Higa. DEA: Ryan LeProwse, Gavin Oien, Aaron Shupien (Bellevue, WA), Scott Harmon, Shelly Alexander, Josh Anderson, Joshan Rohani, Mike Baker. OTHERS: Bill James (HNTB – Puget Sound)

Cost Estimators: need two cost estimators (one for each team) Mark J.? Canh L.?

Note Taker: need two note takers (one for each team) Sarah Abbott and Thomas Picco

Design Panel Format:

- One ¾ day design session for I-405 corridor: Day 2 = June 15, 2011
- Design group will break into two teams (Team A/Team B);
- Each Team will evaluate *I-405* simultaneously in morning sessions and then refine sections of the corridor for afternoon session;
- Each Team will present findings/recommendations to full group at end of morning sessions; solicit comments/new proposals from full group; and prioritize proposals for further refinement in afternoon sessions;

Panel Organization: The panel will be organized as follows with design and traffic expertise per team:

- Team A
    - Sarah Abbot, Note Taker
    - Scott Harmon
    - Josh Anderson
    - Bill James
    - Aaron Shupien
    - Mark Johnson (and floater)
    - Simon Eng
    - Mark Barrett
- Team B
    - Thomas Picco, Note Taker
    - Scott Harmon
    - Gavin Oien
    - Ryan LeProwse
    - Canh Lam
    - Chi Mai
    - Dennis Mitchell
    - Lindsay Higa

Materials: The following materials will be provided by ODOT:

- 1"=100', 1"=200', and 1"=400' aerial roll map of I-405, I-84, US 26 corridors
- Flip charts, markers and easels (1 per room)
- Post-it note pads (3"x5") and sharpie pens- 15 of each
- Design template tools
- Acetate or onion skin
- Laptops, screens, and internet access (1 per room)

Logistics: The following logistics will be coordinated by ODOT:

- Reserve Rooms 318, 337, 344, 228 for June panels & if possible the afternoon of June 13/14 for set up
- Provide lunch, water, and coffee for 15-16 people

Organization of the day: (This is one way that the flow of the full-day [Day 1] could go but it needs to remain flexible based on a variety of factors; time frame condensed for Day 2 Design Panel)

- **Welcome/introductions (8:00 – 8:15 am) –** Thomas (ask Rian W. or Andy J.?)
- **Panel Overview (8:15- 8:30 am) -** Thomas and handoff to Mike
- **Context Presentations and Q&A (8:30 – 9:00 am) –** Mike
    a. Mike overview of advance materials- 5 min
    b. Josh overview of bottleneck locations- 5 min
    c. Mark and Dennis overview existing corridor context- 10 min (notify/invite)
    d. Group Q&A- 10 min (anything to be taken 'off the table'?)
    e. Mike develop example of general feedback format for orientation (single line and text box including termini, lane config, geometric config, alignment, structures affected)
- **Morning Design Session** - group breakout to brainstorm potential solutions **(9:00 – 11:00 am)**
    a. Corridor teams review prioritized bottleneck and potential mitigation
    b. Corridor teams identify possible project clustering (bundle projects)
    c. Apply fatal flaw screening, document results, refine remaining ideas, and select most promising solutions for advanced refinement during group session (11:00 – 11:30 am)

- **Group reports (11:00 am – Noon)**
    a. Both team present initial solutions by bottleneck locations w/Q&A
- **Working lunch** (**Noon -1 pm**)
    a. Deliver lunches and social time (12:00 – 12:15 pm)
    b. Full group review by bottleneck location of range of ideas, fatal flaw screening, and top solutions for refinement in afternoon- receive feedback (12:15-12:45)
    c. Briefing on afternoon session (12:45-1 pm)
- **Afternoon Design Session**- Group breakout to refine most promising solutions (**1 – 2:00 pm**)
    a. Corridor Teams A and B conduct refinement by bottleneck location- (1:00 pm to 1:30 pm)
    b. Apply fatal flaw screening, document results, refine remaining ideas and prioritize most promising solutions (1:30 pm to 2:00 pm)
- **Group reports (2:00 – 2:30 pm)**
    a. Team A presents summary of final solutions w/Q&A (2:00 pm to 2:20 pm)
    b. Team B presents summary of final solutions w/Q&A (2:20 pm to 2:40 pm)
- **Summary of day, closing thoughts and next steps (2:40- 3:00)**

Actions:

1. Thomas to coordinate the following:
    a. Logistics- venue, materials, food
    b. Create briefing board examples of morning and afternoon products to brief participants
        i. **morning**- single line drawings with text box detailing project termini, lane configurations, geometric configurations, alignment, structures affected)
        ii. **afternoon**- 2-line drawings detailing lane locations, shoulder locations, lane lines, etc., major cost items
2. Scott to send advance materials to panel members
3. Mark and Dennis- prepare existing I-84, US 26, and I-405 corridor overviews (15 min total to cover each corridor)
4. Thomas to prioritize bottleneck locations to launch the day for each corridor and identify any bottleneck locations to be removed from this panel workshop
5. Thomas to identify remaining staffing needs and coordinate needs with Scott

I-84/US 26 C-BOS Design Panels

Design Panel Outline – June 14, 2011

Purpose: To engage an expert panel of transportation design and traffic engineering experts to assess I-84 and US 26bottleneck locations and performance and identify potential low-cost design and operational solutions for ODOT consideration.

Context: The panel would be briefed on bottleneck locations, likely causes, and effects. They would also be briefed on corridor design context and potential solutions that have been explored to date. From this starting point, they would be engaged to identify new potential solutions as well as comment on potential solutions previously considered. Cost estimates of proposed operational solutions should be $\leq$ $50M.

Intent: The panel will offer the following value:

1. Offer an objective perspective on potential bottleneck solutions for these three corridors;
2. Apply high-level fatal flaw screening opinion;
3. Offer potential solution ideas studies and/or implemented elsewhere around the country;
4. Remain a resource as needed throughout screening

End of the day: We need to complete the day with the following to be successful:

1. An expanded list of potential low cost bottleneck solutions
2. Documentation of screening results for this study- projects screened and why
3. Sufficient conceptual design to support modeling, costing, and benefit cost estimating

Panel Members: The panel participants include:

Project Manager: Thomas Picco

Lead Facilitator: Mike Baker

Floaters: Mike Baker, Andy Johnson, Mark Johnson

Design Participants: ODOT: Thomas Picco, Dennis Mitchell, Canh Lam, Mark Johnson, Sarah Abbott, Andy Johnson, Chi Mai, Simon Eng, Mark Barrett, Lindsay Higa. DEA: Ryan LeProwse, Gavin Oien, Aaron Shupien (Bellevue, WA), Scott Harmon, Shelly Alexander, Josh Anderson, Joshan Rohani, Mike Baker. OTHERS: Bill James (HNTB – Puget Sound)

Cost Estimators: need two cost estimators (one for each team) Mark J.? Canh L.?

Design Panel Format:

- One full-day design session for I-84 and US 26 corridors: Day 1 = June 14
- Design group will break into two teams (Team A/Team B);
- Each Team will evaluate *different* corridors simultaneously in morning sessions and then switch corridors for afternoon refinement sessions;
- Each Team will present findings/recommendations to full group at end of morning sessions; solicit comments/new proposals from full group; and prioritize proposals for further refinement in afternoon sessions;
- Each Team will *switch* corridors for afternoon refinement sessions;

Panel Organization: The panel will be organized as follows with design and traffic expertise per team:

- I-84 corridor: Team A in morning session; Team B in afternoon refinement session
- US 26 corridor: Team B in morning session; Team A in afternoon refinement session

- Team A (Starts on I-84)
  - Sarah Abbot, Note Taker (I-84 All Day)
  - Shelly Alexander, Traffic (I-84 All Day)
  - Bill James
  - Ryan LeProwse
  - Mark Johnson (and floater)
  - Chi Mai
  - Dennis Mitchell
  - Lindsay Higa
- Team B (Starts on US 26)
  - Thomas Picco, Note Taker (US 26 All Day)
  - Josh Anderson, Traffic (US 26 All Day)
  - Gavin Oien
  - Aaron Shupien
  - Canh Lam
  - Simon Eng
  - Mark Barrett

Materials: The following materials will be provided by ODOT:

- **1"=100'**, **1"=200'**, and 1"=400' aerial roll map of I-405, I-84, US 26 corridors
- Flip charts, markers and easels (1 per room)
- Post-it note pads (3"x5") and sharpie pens- 15 of each
- Design template tools
- Acetate or onion skin (use dry-erase pens)
- Laptops, screens, and internet access (1 per room)

Logistics: The following logistics will be coordinated by ODOT:

- Reserve Rooms 318, 337, 344, 228 for June panels & if possible the afternoon of June 13/14 for set up
- Provide lunch, water, and coffee for 15-16 people

Organization of the day: (This is one way that the flow of the full-day [Day 1] could go but it needs to remain flexible based on a variety of factors; time frame condensed for Day 2 Design Panel)

- **Welcome/introductions (8:00 – 8:15 am) –** Thomas (ask Rian W. or Andy J.?)
- **Panel Overview (8:15- 8:30 am) -** Thomas and handoff to Mike
- **Context Presentations and Q&A (8:30 – 9:00 am) –** Mike
  a. Mike overview of advance materials- 3 min
  b. Shelly overview of bottleneck locations- 5 min
  c. Mark and Dennis overview existing corridor context- 10 min (notify/invite)
  d. Group Q&A- 10 min (anything to be taken 'off the table'?)
  e. Mike develop example of general feedback format for orientation (single line and text box including termini, lane config, geometric config, alignment, structures affected)

- **Morning Design Session** - group breakout to brainstorm potential solutions **(9:00 am – noon)**
    a. Day 1: I-84 and US 26 Corridor teams develop solutions (9:00 am to 11:00 am)
    b. Corridor teams identify possible project clustering (bundle projects)
    c. Apply fatal flaw screening, document results, refine remaining ideas, and select most promising solutions for advanced refinement during group session (11:00 – 11:30 am)
- **Working lunch** (**11:30 -1 pm**)
    a. Lunch and social time (11:30-12:00)
    b. I-84 Team report back to full group on range of ideas, fatal flaw screening, and top solutions for refinement in afternoon- receive feedback (12:00-12:25)
    c. US 26 Team report back to full group on range of ideas, fatal flaw screening, and top solutions for refinement in afternoon- receive feedback (12:25-12:50)
    d. Briefing on afternoon session (12:50-1 pm)
- **Afternoon Design Session**- Group breakout to refine most promising solutions (**1 – 3:30 pm**)
    a. Corridor Teams A and B conduct refinement- (1:00 pm to 2:30 pm)
    b. Corridor Teams A and B present ideas to each other for feedback and possible project clustering (2:30 pm to 3:00 pm)
    c. Apply fatal flaw screening, document results, refine remaining ideas based on feedback and prioritize most promising solutions (3:00 pm to 3:30 pm)
- **Group reports (3:30 – 4:30 pm)**
    a. Team A presents summary of final solutions w/Q&A (3:30 pm to 4:00 pm)
    b. Team B presents summary of final solutions w/Q&A (4:00 pm to 4:30 pm)
- **Summary of day, closing thoughts and next steps (4:30- 5:00 pm)**

Actions:

1. Thomas to coordinate the following:
    a. Logistics- venue, materials, food
    b. Create briefing board examples of morning and afternoon products to brief participants
        i. **morning**- single line drawings with text box detailing project termini, lane configurations, geometric configurations, alignment, structures affected)
        ii. **afternoon**- 2-line drawings detailing lane locations, shoulder locations, lane lines, etc., major cost items
2. Scott to send advance materials to panel members
3. Mark and Dennis- prepare existing I-84, US 26, and I-405 corridor overviews (15 min total to cover each corridor)
4. Thomas to prioritize bottleneck locations to launch the day for each corridor and identify any bottleneck locations to be removed from this panel workshop
5. Thomas to identify remaining staffing needs and coordinate needs with Scott

Appendix B: Design Panel Preliminary Projects (I-5)

I-5 Corridor												
Name	Bottle-neck #	Study Area	Option	Project Name	Description	Cost Elements	Design Panel Comments	Acetate	Aerial	Design Panel Rkg	7/15/10 PMT Comments	7/15/10 PMT Ranking
SB Hood Ave. On-Ramp Bottleneck	4	Harbor Drive to Terwilliger	1a	Hood to Corbett Lane Extension Restripe	Restripe shoulder to create fourth lane from Hood Ave on-ramp to Corbett overpass	Minor Costs		5A	5-1A	1	Screened out due to sightline/safety concerns	x
			1b	Hood to Corbett Lane Extension Widen	Widen to create fourth lane from Hood Ave on-ramp to Corbett overpass	1500 ft of Shoulder pavement and possibly walls		5A	5-1A	2	Mark J. suggested this project would require shifting the striping of both the southbound and the northbound lanes	3
			2a	Hood to Brier Lane Extension Restripe	Restripe shoulder to create fourth lane from Hood Ave on ramp to Brier overpass	Minor Costs		5A	5-1A	2	Can't be done as a restripe	x
			2b	Hood to Brier Lane Extension Widen	Widen to create fourth lane from Hood Ave on ramp to Brier overpass	8500ft of Shoulder pavement and possibly walls; Rock Cut		5A	5-1A	3a	Team felt it was likely this would be a >$50M project, so we need to take a close look at cost	4
			3	I-5/I-405 Merge Lane Extension to Corbett	Lane Extension from I-5 to Corbett; widen or contsruct a separate structure for Hood on-ramp, move Hood on-ramp downstream	1200ft of shoulder widening; 1200ft ramp construction; 200ft bridge widening		5A	5-1A	3b	Likely high cost makes this a low-priority project	5
			4	Restripe Harbor Drive On-ramp to I-405	Restripe Harbor Drive as a single lane left side merge to the left lane of I-405 rather than dropping a 405 lane	Minor Costs	discuss internally issues regarding leftside on ramp	5A	5-1A	1	Improves speed balance and promotes better utilization of left lane, which helps the downstream merges.	1
			5	Hood Ave Braid	Braid Hood Ave on-ramp, separating it and carrying it over the I-5 off-ramp to OR 43	800ft of structure; 1200ft of ramp reconstruction; potential right of ways	significant structure changes/access issues that need to be resolved	5A	5-1A	4	Doesn't address mainline issues.	x
			6	US26 WB to I-5 SB Realignment	Realign 26 westbound to I-5 SB ramp to the east (includes South Waterfront to I-5 SB traffic); realign and separate I-5 SB connection to OR 43 to the west	2400ft of ramp reconstruction; 200ft new structure	how this project will affect local access and routes; Gibbs St. structure	5A	5-1A	3	Fatal flaws: political, feasibility, risk	x
			7	Harbor Drive Relaignment	Realign Harbor Drive to outside of I-405. Let I-405 add both lanes	Historical, not from Design Panel	Historical, not from Design Panel	none	none	none	Historical, not from Design Panel	2

I-5 Corridor												
Name	Bottle-neck #	Study Area	Option	Project Name	Description	Cost Elements	Design Panel Comments	Acetate	Aerial	Design Panel Rkg	7/15/10 PMT Comments	7/15/10 PMT Ranking
NB Terwilliger On-Ramp Bottleneck	1	Terwilliger Curves	1a	Terwilliger Ramp Extension (Widen)	Extend Terwilliger on-ramp through curve	330ft bridge construction; 1000ft ramp consruction (+1000ft ramp construction for better rearview sight)		5B	5-1B	3	Mark J. says that this extended accel lane should be barrier separated to prevent early merge	1
			1b	Terwilliger Ramp Extension (Restripe)	Restripe Terwilliger on-ramp through curve	Minor Costs		5B	5-1B	2	Not physically feasible (Brier overpass)	x
			2	ATMS	Install ATMS throughout curves. (extending concept from I-405)	Minor Costs		none	none	1	Dennis M. felt this could have some merit. Scott H. did not think it would model well in VISSIM	2
			3	Terwilliger Interchange Reconfiguration	Reconfigure Terwilliger Interchange - relocate the westbound Terwilliger on-ramp and Bertha on-ramp to a loop on-ramp and relocate northbound Terwilliger off-ramp to new Spring Garden off-ramp	Multiple ramp and bridge reconstruction	Political issues, Traffic operations at Barbur and Bertha/access Worth further investigation	5B	5-1B	4	Screened out due to likely political issues	x
SB Carman Lane Drop Bottleneck	5	OR 217 to Lower Boones	1	Ramp Meter	Ramp meter on HWY 217	Minor Costs		none	none	3		2
			2	ATMS	Add ATMS where HWY 217 meets 1-5 and rechannelization of 217	Minor Costs	for better lane utilization	none	none	1	Team had difficulty seeing benefit	x
			3	Carman to Lower Boones Aux lane	Carry 4th lane from Carman to Lower Boones	1200ft of Carman on ramp reconstruction; 800ft of Lower Boones off ramp reconstruction		5C	5-3	2	Slam dunk	1
SB Nyberg Off-Ramp Bottleneck	6	Lower Boones to Nyberg	1	Nyberg Off ramp Lane Increase	Increase off ramp to Nyberg from one lane to two.	Ramp reconstruction		5C	5-3	1	PMT suggested modeling this, but it has since been learned that this project is already in development	1*

I-5 Corridor												
Name	Bottle-neck #	Study Area	Option	Project Name	Description	Cost Elements	Design Panel Comments	Acetate	Aerial	Design Panel Rkg	7/15/10 PMT Comments	7/15/10 PMT Ranking
NB Lower Boones Off-Ramp Bottleneck	2	Nyberg to Lower Boones	1	Nyberg On Ramp	Move WB to NB Nyberg on ramp onto the existing loop on-ramp	Ramp Modification		5C	5-3	OUT	Ramp volumes too high	x
			2a	Reconstruct Lower Boones off ramp	Increase Lower Boones off ramp from one lane to two	1200ft of ramp reconstruction		5C	5-3	1		1
			2b	Increased Aux Lanes Nyberg to Carman	Extend 4th lane Aux from Nyberg through Lower Boones; Lower Boones adds 5th lane through Carman interchange; Carman interchange merges into 5 lanes	6200ft of Aux construction; 800ft ramp modification		5C	5-3	3	Aerial 11x17 needs to be redrawn	2
			2c	Lower Boones/Carman Peak Shoulder	Peak period shoulder use between off and on ramps at Lower Boones and Carman	4000ft of Aux construction / shoulder improvements		none	none	2	Better addressed at the corridor refinement level	x
			3	Nyberg/Lower Boones Braid	Braid Nyberg on ramps with Lower Boones off ramps		environmental/ cost issues	none	none	OUT		x

Appendix B: Design Panel Preliminary Projects (I-205)

I-205 Corridor												
Name	Bottle-neck #	Study Area	Option	Project Name	Description	Cost Elements	Design Panel Comments	Acetate	Aerial	Design Panel Rkg	7/15/10 PMT Comments	7/15/10 PMT Ranking
SB I-84 WB Off-Ramp Bottleneck	7	EB I-84 On-Ramp to Glisan Off-Ramp	1	I-205 to I-84 WB Ramp Reconfiguration	Merge two I-205 NB to I-84 WB flyover lanes together, then merge this lane with I-205 SB to I-84 WB lane, then add this single lane to I-84 WB	Mainly restriping, minimal pavement -- less than $1M		205A	205-2		Proposal modified: make I-205 SB the add-lane, and make I-205 NB into a single-lane merge. Could create negative consequences for I-205 NB.	1
			2	I-84/I-205 SB Braid	Braid I-84 WB to I-205 SB movement with I-205 SB to I-84 WB movement	structures -- 8400 SF bridge for weave, 83,000 cu yds earthwork, 75,000 sf retaining wall, 130,000 sf pavement: TOTAL $34.6M		205A	205-2		Probably fairly expensive for the benefit	2
			3	Major Split, I-205 SB to I-84 WB	Split off I-205 SB to I-84 WB movement onto new, grade-separated roadway upstream of the I-84 WB to I-205 SB ramp, aligned to the west	sign bridges, retaining walls, 50,000 cu yds earthwork pavement: TOTAL $26.1M		205B	205-2		Likely very expensive and politically difficult (rock-blasting); feasibility issues; puts more pressure on the Columbia - I-84 WB weave	3
			4	I-84 WB Approach to I-205 Widening	I-84 WB 4-lane approach currently a 2/2 split -- left two lanes go to I-205 NB/SB, right two lanes continue on I-84 WB. Change to 3/2 split, with three lanes providing access to I-205 NB/SB	sign bridge, 2000 SF retaining wall, 5000 cu yds earthwork, additional lane 40,000 sf: TOTAL $3.2M		205C	205-2			x
			5	Review signing				none	none			x

I-205 Corridor												
Name	Bottle-neck #	Study Area	Option	Project Name	Description	Cost Elements	Design Panel Comments	Acetate	Aerial	Design Panel Rkg	7/15/10 PMT Comments	7/15/10 PMT Ranking
SB Stark / Washington On-Ramp Bottleneck; SB Division / Powell Off-Ramp Bottleneck	8,9	EB I-84 On-Ramp to Division / Powell Off-Ramp	1	Auxiliary Lane, I-84 EB on-ramp to Division / Powell off-ramp	Constructs new aux lane from I-84 EB on-ramp to Stark/Washington on-ramp (already an aux lane between Stark/Washington and Division/ Powell)	$4.5M		205D	205-2		PMT highly supportive	1
			1A	I-84 EB Approach to I-205 SB Reconfiguration	Reconfigures the three lanes eastbound approaching I-205 SB to a 2-2 split (2 lanes southbound onto I-205 SB)	TBD	Appears to conflict with current RTP project that carries third I-84 EB lane to I-205 NB off-ramp	205D	205-2		Project would preclude having a third lane eastbound on I-84 beyond the I-205 SB off-ramp. Also, doesn't relate directly to I-205 operations	x
			2	Second Aux Lane, Washington / Stark on-ramp to Division / Powell off-ramp	Constructs additional aux lane between Stark / Washington and Division / Powell (assumes that first aux lane has been carried through from I-84 EB on-ramp, as in Option 1)	$27.4M		205D	205-2		Mark J. pointed out that you can not drop two lanes at Powell/Division, so it would have to be a 5>4/2 split, necessitating a fourth lane all the way to Foster. We would want the widening to be to the inside	2
				Close Glisan on-ramp			Dropped	none	none			x

I-205 Corridor												
Name	Bottle-neck #	Study Area	Option	Project Name	Description	Cost Elements	Design Panel Comments	Acetate	Aerial	Design Panel Rkg	7/15/10 PMT Comments	7/15/10 PMT Ranking
NB Division and Powell On-Ramp Bottleneck	4	Powell on-ramp to WB I-84 Off-Ramp	1	Aux Lane, Powell on-ramp to Division on-ramp	Constructs/stripes new auxiliary lane from NB Powell on-ramp to the aux lane that begins at the Division on-ramp	TBD		205E	205-2			1
			2a	Aux lane, Stark / Washington off-ramp to Glisan off-ramp	Constructs/stripes new auxiliary lane from existing upstream aux lane at NB Stark/Washington off-ramp to Glisan off-ramp	TBD	Unclear how addresses bottleneck	205E	205-2			x
			2b	Aux Lane, Washington / Stark on-ramp to I-84 WB off-ramp	Constructs/stripes new auxiliary lane from NB Stark/Washington on-ramp to I-84 WB off-ramp.			205E	205-2			2
NB Foster On-Ramp Bottleneck	5	Foster to Powell	1	Aux Lane, Foster on-ramp to Powell off-ramp	Constructs/stripes new NB auxiliary lane from Foster on-ramp to Powell off-ramp.	88,000 SF pavement, 13,000 cu yds earthwork, 32,000 sf wall -- TOTAL $10.5M		205G	205-5			1

I-205 Corridor												
Name	Bottle-neck #	Study Area	Option	Project Name	Description	Cost Elements	Design Panel Comments	Acetate	Aerial	Design Panel Rkg	7/15/10 PMT Comments	7/15/10 PMT Ranking
NB I-84 WB On-Ramp Bottleneck	3	EB I-84 Off-Ramp to Airport Way	1	Northbound Aux Lane from I-84 EB on-ramp (Restripe)	Aux/add lane from I-84 EB on-ramp to Sandy Blvd. off-ramp by restriping	Restriping -- under $1M		205F	205-2			1
			2	Northbound Aux Lane from I-84 EB on-ramp (Widen)	Aux/add lane from I-84 EB on-ramp to Sandy Blvd. off-ramp by widening	TOTAL $10.6M		205F	205-2		Models the same as Option 1	2
			A	Aux lane extension to Columbia WB off-ramp	Extends aux lane from option 1/2 from Sandy off-ramp to Columbia off-ramp	TOTAL $8.4M		205F	205-2			3
			B1	Aux lane extension to Airport Way WB off-ramp	Extends aux lane from option A from Columbia off-ramp to Airport Way WB off-ramp (aux lane already in place between Columbia on-ramp and Airport Way WB off-ramp)	TOTAL $4.9M	Railroad overpass constraint	205F	205-2		Lower priority for modeling -- railroad coordination issues	4
			B2	Additional aux lane between Columbia on-ramp and Airport Way WB off-ramp	Constructs new aux lane (fifth lane) from Columbia on-ramp to Airport Way WB off-ramp	Two new lanes from Columbia off-ramp to Airport Way WB off-ramp, TOTAL $16.1M	Railroad overpass constraint	205F	205-2		Lower priority for modeling -- railroad coordination issues	5
			3	Remove lane from I-205 NB between I-84 EB off-ramp and I-84 EB on-ramp	Restripe, reduces I-205 NB mainline to two lanes so that I-84 EB on-ramp becomes an add lane	Restriping -- under $1M	ORS 366 freight mobility / reduction in capacity issue	205F	205-2		Political and operational issues	6
			4	Lane drop between I-84 EB off-ramp and I-84 EB on-ramp	Similar to option 3, except drops lane in between ramps rather than dropping at I-84 EB off-ramp	Restriping -- under $1M	ORS 366 freight mobility / reduction in capacity issue	205F	205-2		Would have similar benefit to Option 3, but be worse operationally	x
			5	Close Sandy Blvd. exit		No construction -- under $1M		205F	205-2		Politically difficult	x
SB OR 212/224 On-Ramp Bottleneck	10	Milwaukie Expy on-ramp to Gladstone/82nd Dr. off-ramp	1	I-205 Aux Lanes: Gladston to OR 212/224	Auxiliary lanes in both directions -- OR 212/224 to Gladston interchange (82nd Dr.)	Previously estimated at $18.5M, covers both directions	Historical, not from Design Panel	none	none		Historical, not from Design Panel	1

I-205 Corridor												
Name	Bottle-neck #	Study Area	Option	Project Name	Description	Cost Elements	Design Panel Comments	Acetate	Aerial	Design Panel Rkg	7/15/10 PMT Comments	7/15/10 PMT Ranking
SB OR 43 Off-Ramp Bottleneck	12	Abernethy Bridge to Stafford Rd. interchange	1	I-205 Climbing Lanes, Abernethy Br. To 10th	New SB truck climbing lane from Abernethy Bridge to 10th St.	Previously estimated at $56.8M, covers both directions.	Historical, not from Design Panel	none	none		Mark J. thinks this is a lane that can be shoehorned into the existing pavement at significantly lower cost than what was estimated previously	1

Appendix B: Design Panel Preliminary Projects (I-84, I-405, US 26)

C-BOS PROJECTS - I-84, US 26, I-405
PRELIMINARY PRIORITIZATION LIST

Name Bottleneck Study Area	Op-tion	Project Name	Description	Cost Elements	Design Panel/PMT Comments	Physical Feasibility Assessment	Traffic Analysis Assessment	Cost Priority	Potential Perform. Priority	Potential Risk Priority
						(Canh Lam)	(Simon Eng)			
I-84 EB										
> I-5 to I-84 Bottleneck > Bottleneck #1 > Grand Ave. ON-ramp - SE 21st Ave.	**1b**	I-5 SB ON to I-84 EB (mainline)	Widen mainline with extension of 4th EB lane, from Grand Ave. ON-Ramp through 21st Ave. O'Xing; install retaining wall; reconstruct 12th Ave. O'Xing.	**$20M-$21M**: 3,000'L x 16'W main-line widening and extension of 4th lane ($1.5M-$2.5M) ; 3,000'L x 20'H retaining wall ($6M); replace/reconst. 12th Ave. O'Xing to accommodate 4th lane ($4.5M); PE/CE/contingency ($8M-$9M)	Need to model. Does not add much value if accel lane does not extend further. Consider extending 4th lane to 33rd as Aux lane. See Option 1e.	Feasible.	Not much to model. Qualitative Assessment: The Grand Avenue on-ramp bottleneck would be moved downstream to the termination of the 4th lane where it merges into the mainline. Benefits: Allow better flow for traffic from I-5 North and South and more time for Grand Ave on-ramp traffic to pick up gaps. It would provide additional queue storage area for I-5 SB and NB traffic which would relieve the queue spillback in the I-5 SB at Rose Quarter area and I-5 NB at Marquam Bridge.	**1**	**2**	**2**
	1c	I-5 SB ON to I-84 EB (mainline)	Same as 1b, or retain existing configuration of I-5 SB ON ramp; continue further east and close SE 16th Ave. ON ramp	**$20.5M - $22M** (minimal additional cost to 1b -- scarify ramp pavement; add detour signage = ~ $500K-$1M))	May be politically difficult to close ramp. Need to model, to determine impacts/ benefits of closing ramp.	Feasible.	Run Visum to determine where the ramp traffic would divert to. Run HCS to analyze the 4th lane termination effect on the mainline at 21st Avenue. If traffic diverts to multiple downstream on-ramps, run HCS to analyze the merge junctions.	**1**	**2**	**1**
> I-5 SB/NB Merge Bottleneck > Bottleneck **#2** > I-5 SB/I-5 NB merge @ Grand Ave. ON-Ramp	**2a**	I-5 SB/NB Merge	Add deflectors or separation between Grand Ave ON-ramp and I-5 NB > I-84 EB; widen mainline to accommodate barriers and shy distance	**$11M:** add 750'L x 42'W & 900'L x 20'W to highway for adequate separ-ation (shoulders/barrier/shy) ($1.1M); 750'L x 25'H & 900'L x 20'H retaining walls ($4.1M). Plus PE/CE/ contin-gency ($5.8M).	I-5 NB > I-84 EB merges soon upon touching I-84; Grand Ave. ON-Ramp drivers attempt mainline merge sooner than necessary. Consider extending accel lane out further; need better cost estimate.	Feasible.	XXX	**1**	**1**	**2**
> Irving St./16th ON-Ramp Bottleneck > Bottleneck > Irving St./16th Ave. ON-Ramp	**2b**	Irving St./16th Ave. ON-Ramp	Congestion appears only to occur when ramp meters are OFF; consider turning on ramp meter sooner, or extend period longer.	**$0:**	Consider turning on ramp meter sooner, or extend period longer. Need to check ramp meter parameters.	Feasible, but politically difficult.	The ramp meter is activated from 1:00 p.m. through 7:00 p.m. During this period, there could be times at which the ramp meter may not be in service if there is no congestion detected downstream on the mainline.	**3**	**1**	**2**
> 39th Ave. ON-Ramp > Bottleneck **#3** > 33rd Ave. - 39th Ave.	**3b**	Interchange/ ramp consolidation @ 33rd Ave. interchange	Relocate EB 39th ON & OFF ramps back to 33rd Ave, interchange, and create 3/4 interchange @ 33rd Ave; WB traffic still exits at Halsey St.	**$10M:** 1,200' x 20'H retaining wall ($3.6M); 1,200' x 30' W ramp ($0.9M); plus PE/CE/contingency ($5.5M)	May not be feasible. More of a system improvement than addressing a bottleneck.	Awaiting assessment of traffic feasibility.	Need confirm whether relatively high OFF-ramp volumes may be too heavy for local street system to accommodate.	**1**	**1**	**1**
> Corridor-wide > Bottleneck Corr-Wide > I-5 - I-205	**3c**	Corridor Active Management Signage	Use corridor-wide active management signage to warn of queueing ahead;	**$2M-$4M:**	Funding being pursued for future study of active management sign-age of major corridors. Future study of region corridors to address imple-mentation of active management/ variable speed signage.	Feasible	NA	**3**	**2**	**3**

C-BOS PROJECTS - I-84, US 26, I-405
PRELIMINARY PRIORITIZATION LIST

Name Bottleneck Study Area	Op-tion	Project Name	Description	Cost Elements	Design Panel/PMT Comments	Physical Feasibility Assessment	Traffic Analysis Assessment	Cost Priority	Potential Perform. Priority	Potential Risk Priority
I-84 WB										
> I-5 to I-84 WB Bottleneck > Bottleneck **#4** > Ramp to I-5/I-84 Diverge (MLK/ Grand Ave. - RQ)	**4a**	I-84 - I-5 Diverge Ramp Lanes Configuration	I-84WB approach to I-5 NB/I-5 SB split should consider 3-2-1 split @ I-5 diverge, instead of current 3-2-2 split; assign 2-lanes SB & 1 Lane NB (then widen to 2-lanes NB); restripe?	**$800,000:** 1/2 mile sign bridge ($300K); 1 mile sign support ($50K); restriping ($13.6K); plus PE/CE/contin-gency ($436.4K).	Long-term need; long-term solution requires 2-lane I-84 WB to I-5 NB near MLK/ Grand Ave; may conflict with UPRR Graham Line connec-tion; need traffic analysis of lane capacity/demand of different lane split configurations. Need start with HCS analysis to determine if one NB lane to I-5 will work, before determining whether to model this	Feasible	Collect a.m. and p.m. peak period counts for the traffic movements from I-84 WB to I-5 SB, I-5 NB and Rose Quarter. Run HCS to determine if 3-2-1 split would be appropriate. Determine the growth potential for the I-84 WB to I-5 NB ramp traffic utilizing on the Rose Quarter Study. Simon to check on the existing loop detectors at the two I-5 ramp connections to see if data collection can be done. Extending gore point east is desirable for improved signage. Cost could be a little higher.	**3**	**1**	**3**
> I-5 NB OFF-Ramp > Bottleneck **#4** > 33rd Ave. ON-Ramp - I-5 SB/NB split	**4b**	Signage Upgrade 33rd ON-Ramp/ Glisan St. ON-Ramp - I-5 NB/I-5 SB diverge	Signage is misleading; sight distance issue at curve to I-5 NB; improve signage; may require new/large sign structures;	**$1M-$2M:**	Signage of upcoming I-5 NB/SB split is not clear. Need correct signage showing I-5 NB/SB diverge details, and move further upstream. Need review how to better depict I-5 NB/SB split, and where to place advance signage.	Feasible	NA	**3**	**1**	**3**
> I-5 NB OFF-Ramp > Bottleneck **#4** > MLK/Grand Ave. - I-5 NB/I-5SB diverge	**4c1**	Signage Upgrade /extend start of ON-Ramp - I-5 NB/I-5 SB diverge. (*no* accommoda-tion for streetcar on MLK/Grand)	Extend gore point east 1,500'; enhance signage on Grand Ave. O'Xing, and sign bridge west of 12th Ave. O'Xing; keep 3-2-2 split. *assume R/R encroachment can be worked out; assume vertical clearance can be maintained; assume bridge supports can be replaced -- need confirm possible.	**$8M-$10M:** Widen 1,500'L x 10'W mainline merge approach ($275K); upgrade signage ($350K); bridge sup-port/column type change ($2M-$3M); plus PE/CE/contingency ($3.1M); **ADD**: 450'L x 10'W WB>NB ramp bridge widening ($900K); plus PE/CE/ contingency ($1.04M).	Uncertain of physical feasibility due to location of support piers close to highway. Need to review O'Xing structure piers for physical feasibility for widening mainline.	Feasible. *No* MLK & Grand span replace-ments. If option moved forward, need consult w. bridge engineer; scoping; consult re: streetcar. *see description.	NA	**2**	**2**	**1**
> I-5 NB OFF-Ramp > Bottleneck **#4** > MLK/Grand Ave. - I-5 NB/I-5SB diverge	**4c2**	Signage Upgrade /extend start of ON-Ramp - I-5 NB/I-5 SB diverge. (accommoda-tion for street-car on MLK/Grand)	Extend gore point east 1,500'; enhance signage on Grand Ave. O'Xing, and sign bridge west of 12th Ave. O'Xing; keep 3-2-2 split. *assume R/R encroachment can be worked out; assume vertical clearance can be maintained; assume bridge span will be replaced and streetcar tracks replaced --- need confirm.	**$9M-$11M:** Option 4c1 costs *plus*: 50' x (12'x4' + 8'x1' + 8'x2') Grand Ave. adjustments ($720K); 50' x (12'x4' + 8'x1' + 8'x2') MLK Blvd. adjustments ($$720K). Plus PE/CE/contingency ($4.6M). Plus streetcar replacement.		Feasible. *With* MLK & Grand span re-placements & accom-modation for street-car. If option moved forward, need consult w. bridge engineer; scoping. *see description.	NA	**1**	**2**	**1**

C-BOS PROJECTS - I-84, US 26, I-405
PRELIMINARY PRIORITIZATION LIST

Name Bottleneck Study Area	Op-tion	Project Name	Description	Cost Elements	Design Panel/PMT Comments	Physical Feasibility Assessment	Traffic Analysis Assessment	Cost Priority	Potential Perform. Priority	Potential Risk Priority
I-84 WB										
> 33rd Ave. ON-Ramp > Bottleneck **#5** > Sandy Blvd. ON-Ramp to 33rd Ave. ON-Ramp	**5c**	Sandy Blvd/33rd Ave. C-D road interchange consolidation	Combine Sandy Blvd. ON-ramp with new 33rd Ave. OFF-Ramp via Aux/C-D road; no 33rd Ave. NB>I-84 WB ON-ramp left-turn allowed at signal on interchange	**$34M - $40M:** rebuild 2 spans (87'L x 60'W) of 33rd Ave. structure ($1.1M); rebuild 33rd Ave. WB ON-ramp (330'L x 40'W) ($2.6M); rebuild northern portion of Sandy Blvd. structure (150' x 88' W) ($2.6M); rebuild Sandy Blvd. ON-ramp (1,340'L x 40'W) ($10.7M) to 33rd Ave.; pave WB 33rd Ave. roadway ON-ramp (400'L x 36') ($317K); pave 800'L x 28' ($493K). Plus PE/CE/contingency ($16.1M - $22.1M). Low end cost estimate assumes partial structure rebuild; high end assumes structure demolitions/new.	Need to assess impacts to local streets; trafffic signal at new 33rd Ave. interchange connection may be too close to 33rd x Broadway signal; need traffic analysis of traffic demand/signal capacities (new + Broadway x 33rd Ave.). May not be feasible Need start with Syncro/ HCS analysis to determine if combining traffic volumes from 33rd Ave. & Sandy Blvd. creates too heavy a traffic demand;need assess impacts of two traffic signals (on Broadway x 33rd Ave. & new signal on O'Xing).	Feasible.	Don't do any Synchro/SimTraffic or HCS analysis yet. It does not appear to be needed. The existing 33rd Avenue on-ramp operates with only a single lane ramp meter. It is not wide enough to allow for 2-lane ramp meter. As such, the combined volume of the two on-ramps would exceed the single lane ramp meter capacity and result in long queue spillback. In my opinion, the new C-D Road would be too close to 33rd Avenue @ Broadway signal, which is less than 200 feet apart.	**1**	**1**	**1**
> Glisan St. ON-Ramp Bottleneck > Bottleneck **#6** > I-205 SB ON-Ramp to Glisan St. ON-Ramp	**6a**	Glisan St. ON-Ramp Signage Improve-ments	Consider lower ramp meter adjustments?; speed harmonization/variable speed measures?; employ active warning signs of ramp meter ahead?; widen shoulders;	**$500K-$1M:**	Poor horizontal curve/sight-distance at point of ON-ramp entrance; structure also causes poor sight-distance; left lane brake lights affects other lanes. Need to review location of accidents (mainline or ramp) to determine whether improvements will address problem.	Feasible	Could add a "Ramp Signal On" Part-Time electronic sign if it is not there already. Someone could check the ramp meter plan.	**3**	**1**	**3**
	6b	Glisan St. ON-Ramp O'Xing	Replace/reconstruct U'Xing entrance to I-84 with O'Xing to improve sight distance and have WB ON-ramp connect at same elevation as mainline.	**$12M-$13M**: O'Xing = 300' x 30'W ($1.8M-$2.2M); 900'+ ramp ($700K - $1M); 900' x 20' retaining wall ($2.5M); plus PE/CE/contingency ($7M-$7.3M)	Need to review location of accidents (mainline or ramp) to determine whether improvements will address problem.	Feasible	NA	**1**	**1**	**2**
	6d	Glisan St. ON-Ramp O'Xing	Close ramp.	**$200,000:** scarify ramp pavement; add detour signage	New. Top 5% SPIS site.	Feasible	Run Visum to determine where the ramp traffic would divert to.	**3**	**1**	**1**
> Corridor-wide > Bottleneck Corr-Wide > I-5 - I-205	**8a** (new)	Interchange Entrance Ramp Closures.	Remove selective interchange ramps (Irving St./16th Ave. ON-ramp?; Willow St. ON-ramp?; 58th Ave. ON-ramp?)	**$500K - $1M per ramp:** (scarify pavement; close ramps; detour signage);sign mitigation ($50K-$100K).	May not be politically feasible. Business & neighborhood resistance likely. Politically difficult.	Feasible. Check Washington Square x Scholls Ferry Rd. project.	Run Visum to analyze the impact and traffic diversion as a result of ramp closures.	**3**	**2**	**1**

C-BOS PROJECTS - I-84, US 26, I-405
PRELIMINARY PRIORITIZATION LIST

Name Bottleneck Study Area	Op-tion	Project Name	Description	Cost Elements	Design Panel/PMT Comments	Physical Feasibility Assessment	Traffic Analysis Assessment	Cost Priority	Potential Perform. Priority	Potential Risk Priority
> Corridor-wide > Bottleneck Corr-Wide > I-5 - I-205	**8b** (new)	Time-of-day, Directional Interchange Ramp Closures.	Install peak period-operated ramp gates to actively manage Entrance to mainline/allow Exit-Only movements during PM peak hours; and manage Exit-Only movements and selective Entrance-Only access during AM peak hours.	**$250K - $350K per ramp site:** (to include gate, cabinet, camera, ptr sign, and communications)	May not be politically feasible. Business & neighborhood resistance likely. Need to model effects of constraining ramp Entrance to mainline by active management of selected ON-ramps. Recommend modeling 4-5 interchange locations for active management. Recommend modeling to test effectiveness of active management of 1/2 or 3/4 or all inbound/ outbound interchange ramps.	Feasible. Check Washington Square x Scholls Ferry Rd. project. No signage inventory available. No mitigation investigation or (assessed invest-ment) on local system available.	Run Visum to analyze the impact and traffic diversion as a result of ramp closures.	**3**	**2**	**1**

C-BOS PROJECTS - I-84, US 26, I-405
PRELIMINARY PRIORITIZATION LIST

Name Bottleneck Study Area	Op-tion	Project Name	Description	Cost Elements	Design Panel/PMT Comments	Physical Feasibility Assessment	Traffic Analysis Assessment	Cost Priority	Potential Perform. Priority	Potential Risk Priority
US 26 EB										
	1b	Hwy 217 Guide Signage	Mainline and ramp guide signs on/near OR 217 & US 26; thru traffic merge left.	**$2M-$4M:** Identify number/spacing of improved signage, from OR 217 to I-405.	Might have safety benefits and help with upcoming diverge for US 26/I-405. High crashes: would be beneficial to forewarn drivers about speed differentials. Future study of region corridors to address implementation of active management/ variable speed signage (as per OR 217).	Feasible.	NA STIP project programmed.	**3**	**X**	**3**
US 26 EB										
	1c	ATMS	ATM variable signs indicating lane assignments and variable speeds; per lane side or overhead.	**$2M-$4M:** Identify number/location of variable message signs, from OR 217 to I-405.	Might have safety benefits and help with upcoming diverge for US 26/I-405. High crashes: would be beneficial to forewarn drivers about speed differentials. Need better cost estimate of number/ spacing of signage. (Canh/Mark/ Dennis) Future study of region corridors to address implementation of active management/ variable speed signage (as per OR 217).	Feasible.	NA	**3**	**2**	**3**
	1d	Hwy 217 to US 26 EB Aux Lane	Modify acceleration lane into an auxiliary lane from OR 217 ON to Sylvan/Scholls Ferry OFF. 11' lanes, 4'-6-8' shoulders.	**$6M:** 1 mile of 2" overlay ($2.0M); 1 mile of barrier/median ($185K); signs & sign bridges ($400K); 1 mile of solid stripping ($21K); 1 mile of skip stripping ($13K); PE/CE/contingency ($3.1M) assume one mile of lane changing or restriping US 26 centerline for typical: barrier-6'shld-12'ramp-12'WB ln-12'WB ln-12'WB ln-10'median-12'EB ln-12'EB ln-12'EB ln-12'aux ln-6'shld-barrier	May need to alter lane width and shoulder width to accommodate trucks; i.e., 12', 12', 11', 11' (lanes); 6', 4' (shoulders). Need to model effects/benefits of adding auxiliary lane.	Feasible. Given this facility is an NHS route and freight route, obtaining design exceptions for reduced lane widths may not be counted on.	Run HCS to evaluate benefits of adding auxiliary lane. Determine the origins of the Sylvan exit-ramp traffic using Visum's Flow Bundle.	**2**	**2**	**2**
US 26 WB										
> I-405 x US 26 Merge Bottleneck > Bottleneck **#6** > I-405 Ramps at US 26 x I-405 Merge	**6a**	Striping Plan	Look at original construction lay-out plans for striping. Perhaps wasn't striped correctly.	**$100K:**	Review construction lay-out plans for striping. Recommend sensitivity modeling *to assess* impacts/benefits from enhanced striping.	Feasible.	There is no sensitivity HCS modeling to asses impacts/benefits from enhanced striping. From an operational perspective, lengthening the outside lane a few hundred feet to allow for additional time to pick up gaps would be desirable. Investigate to determine if the existing sign spacing meets the current standard. Add lane reduction pavement marking arrows.	**3**	**1**	**3**

C-BOS PROJECTS - I-84, US 26, I-405
PRELIMINARY PRIORITIZATION LIST

Name Bottleneck Study Area	Op-tion	Project Name	Description	Cost Elements	Design Panel/PMT Comments	Physical Feasibility Assessment	Traffic Analysis Assessment	Cost Priority	Potential Perform. Priority	Potential Risk Priority
I-405 NB										
> US 26/12th Ave. > Bottleneck **#1** > US 26/12th Ave. OFF-Ramp - I-405 SB ON-Ramp	**1a**	12th Ave. OFF-Ramp Closure	Close 12th Ave OFF-ramp	**$200K:** scarify ramp pavement; add detour signage	Volumes are low but would take ~1,200 vehicles out of weave section. Modeling recommended. May be politically difficult to close 12th Ave. OFF-ramp. Need start with HCS analysis to assess impacts/benefits of closing ramp on weave section; as well as, to determine impacts of closed 12th Ave. OFF traffic diverted to 6th Ave. OFF-ramp.	Feasible. Need to assess new signage requirements, and impacts on local street system.	Run Visum to determine where the ramp traffic would divert to. Question - Where did the 1,200 vehicles in the Design Panel Comment come from?	**3**	**1**	**1**
I-405 SB										
> Hwy 30 ON-ramp Bottleneck > Bottleneck **#2** > I-405 Ramps at US 26 x I-405 Merge	**2a (new)**	Hwy 30 ON-Ramp to I-405 SB 2>1 Merge (3-lns SB I-405 @ US 30 Merge)	Restripe for parallel 2-lane merge on Hwy 30 ON-Ramp, to 1-lane before merging with I-405 SB. Re-tain existing Fremont Bridge split (4 to 3+2) and carry 3-lanes I-405 SB to US 30 single-lane merge.	**$2M - $5.4M:**	A merge issue moreso than weave issue. High speed differentials between lanes (outside lanes free flow). Parallel merge. Model for lane balance.	Feasible.	Run HCS Weaving analysis of a 3+1 = 4-3-2 Split; i.e. 3 SB lanes on I-405 converging with an auxiliary lane from US30 and maintain the existing 4-3-2 Split to Everett St. exit-ramp. I have 2008 counts for the I-405 SB mainline and US30 on-ramp. The Everett St. exit-ramp volume is low.	**3**	**1**	**3**
	2b	Hwy 30 ON/OFF-Ramp Merge	Restripe Fremont Bridge split to I-405 SB & US 30 as 4-lane split to 2 + 2; move Bridge split/ diverge gore point to east.	**$2-$5M:**	A merge issue moreso than weave issue. Model for lane balance	Feasible.	I-405 SB mainline volume is more than twice as much as the US30 SB ON-ramp volume. This option does not seem reasonable. Check 2008 counts.	**3**	**1**	**3**
	2c	Hwy 30 ON/OFF-Ramp Merge	Retain existing Fremont Bridge split at bridge end (4 to 3+2); lane drop to 2-lanes @ US 30 ON-ramp entrance (US 30 ON-ramp remains as 2-lane merge).	**$2-$5M:**	A merge issue moreso than weave issue. Model for lane balance	Feasible.	I-405 SB mainline volume is more than twice as much than the US30 SB on-ramp volume. This option does not seem reasonable. Check 2008 counts.	**3**	**1**	**3**
	2d	Hwy 30 ON-Ramp	Carry 4th lane through/past Everett St. OFF-ramp, and 3-lanes past Couch; single-lane diverge @ Everett; 4-lane to 3-2 lane @ Couch/Burnside (2-lane to US 26); 2 or 3 lanes past Burnside	**$12M - $17M:** Compare with separate cost estimates for 2E & 2F; combined lane extensions/additions	Model for lane balance.	Feasible, although with Design Exceptions likely.	Everett St. ON-ramp currently is add-lane,with proposed 3rd lane extending to south, Everett St. ON-ramp traffic destined to I-5 SB would have to make merging maneuver first, then make a lane change to weave over to the left to avoid US 26 exit-ramp to get to I-5 SB. Increasing acceleration lane for Everett St. ON-ramp results in very short spacing between Everett St. ON-ramp and exit-ramp to US26, making it more difficult for traffic to I-5 SB.	**1**	**2**	**2**

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I-405 SB										
> Hwy 30 ON-ramp Bottleneck > Bottleneck **#2** > I-405 Ramps at US 26 x I-405 Merge	**2e**	Add 3rd lane.	Add 3rd lane from Couch St. OFF-ramp drop to US 26 WB	**$6M - $10M:** rebuild 700' Couch St. OFF-ramp as 2-lane exit ($524K); construct 200'L x 5'H retaining wall between ramp & mainline ($100K); widen mainline 2,160'L x 24'W ($1.14M); rebuild Everett St. ON-ramp 1,050'L x 18'W ($416K); remove & reduild Taylor St. ON-ramp 200'L x 30' ($132K) with 2 x 200'L x 10'H retaining walls ($400K); plus sign bridge ($?); plus PE/CE/contingency ($3.3M-$5.3M).	Model for lane balance. Addition of 3rd ln may require adding ~1,200' accel lane from Everett St. ON-Ramp to accommodate 3rd lane. Need to model for lane balance. Need better cost estimate, if accel ln need be added to accommodate 3rd ln.	Feasibility uncertain. Need further assess existing Everett St. ON-ramp bridge footing & wall.	Everett St. on-ramp currently is an add-lane and with the proposed 3rd lane extending to the south, Everett St. on-ramp traffic destined to I-5 South would have to make a merging maneuver first and then have to make a lane change to weave over to the left to avoid the US26 exit-ramp in order to get to I-5 South. Increasing the acceleration lane for Everett St. on-ramp would result in very short spacing between the Everett St. ON-ramp and the exit-ramp to US26, making it more difficult for traffic heading to I-5 South.	**2**	**1**	**2**
	2f	Add 4th lane.	Add 4th lane from Everett St. OFF-ramp to Couch St. OFF-ramp; add accel ln to west.	**$6M - $7M:**	Model for lane balance.	Feasible, although with Design Exceptions likely.	Everett St. on-ramp currently is an add-lane and with the proposed 3rd lane extending to the south, Everett St. on-ramp traffic destined to I-5 South would have to make a merging maneuver first and then have to make a lane change to weave over to the left to avoid the US26 exit-ramp in order to get to I-5 South. Increasing the acceleration lane for Everett St. on-ramp would result in very short spacing between the Everett St. ON-ramp and the exit-ramp to US26, making it more difficult for traffic heading to I-5 South.	**2**	**1**	**2**
> Everett St. ON-ramp Bottleneck > Bottleneck **#3** > Everett St. ON-Ramp to US 26 OFF-Ramp	**3a**	Static Signage & Sight Distance Improvements	Add additional static signage SB (cantelever sign from side just before Morrison St. O'Xing); extend gore point of Everett St. ON-ramp, to prevent earlier weaving; clear landscaping to improve sight distance.	**$1M:**	Weave problem. Lane drop at Couch St. OFF-ramp. Limited signage preceeding US 26 OFF-ramp. Aim is to get motorists to use left-lane, to improve lane utilization. (restriping and signage costs do NOT incl. any PE/CE/ Contingency costs). Note: no schematic drawn	Feasible	NA	**3**	**1**	**3**
I-405 SB										
> Everett St. ON-ramp Bottleneck > Bottleneck **#3** > Everett St. ON-Ramp to US 26 OFF-Ramp	**3b**	Install active variable speed signage by lane.	Use active variable speed signs by lane?	**$2M-$4M**	(restriping and signage costs do NOT incl. any PE/CE/Contingency costs). Need better cost estimate. (Mark/Canh/ Dennis) Note: no schematic drawn	Feasible	NA	**3**	**1**	**3**

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	3c	Extend Everett St. ON-Ramp to US 26 OFF-Ramp Merge/ Gore South	Push Everett St. ON-ramp gore point further south (Alder St.).	**$5K-$15K:** extend double solid line/ profile striping 700' ($2.8K); plus traffic staging; plus PE/CE/contingency ($2.2K-$4.2K);	To be studied further. Need better cost estimate. Note: no schematic drawn.	Feasible	XXX or NA?	**2**	**1**	**3**
I-405 SB										
	3d	Extend Everett St. ON-Ramp over closed Taylor St. ON-Ramp/slip ramp to US 26	Extend Everett St. ON-Ramp onto Taylor St. ON-Ramp (Taylor St. Ramp closed) past Salmon St; physical barrier separates Everett St. ON-Ramp and I-405; connection [slip ramp] from Everett ON-Ramp to US 26 past Salmon St.; widen 2,000' from Alder St.; 1,200' of retaining wall along west edge of I-405, to add shoulders (need confirm sufficient space available);	**$10M-$15M:** rebuild 2,400'L x 32'W Everett St.>Taylor St. ON-ramp segment (up to Columbia St. structure) ($1.7M); 450'L x 26'W slip ramp to US 26 ($257K); construct 800'L x 20'H retaining wall, Salmon St. > Columbia St.($1.6M); construct 215'L x 5'H retaining wall, between SB>WB ramp & Taylor St. ON-ramp ($108K); install 2,000' barrier, between mainline & new Everett St. ramp ($100K); signage/sign structure ($770K); plus PE/CE/contin-gency ($5.5M-$7.5M)	Provides opportunity for Everett St. ON-Ramp motorists to access both US 26 & I-405 SB. May negatively impact US 26 downstream. Need to model for traffic impacts. Need confirm physically feasible. Concern with spacing, and traffic volume point loading.	Feasible	Run Visum to determine what the trips would divert to and the potential traffic impacts.	**1**	**1,2**	**1**
	3e		Everett St.ON to 26 OFF. Shoulder widening, restripe, realign; trim landscaping.	**$215K-$270K:**	Improve sight distance.	Feasible	NA	**3**	**1**	**3**
I-405 SB										
	4c1	Montgomery St. ON-Ramp limited to Broadway OFF Ramp only as frontage road to Ross Is Bridge.	Barrier separate Montgomery St. ON-ramp and then use it as a C-D frontage road to Ross Island Bridge. Eliminates conflicts of merge to I-405. Install signage on US 26 to Ross Island Bridge and to CBD.	**$15M:** 325'L x 15'H retaining wall ($488K); reconstruct 12th Ave. O'Xing - 428'L x 51'W x 200'H ($4.4M); assume NB side of wall can remain "untouched" with bridge replacement; new 1,000'L x 15'H SB wall for C-D road ($1.5M); 1,000' barrier between I-405 mainline & C-D road ($35K); sign bridge replace ($250K); 1,000' L x 28' roadway widening ($616K); PE/CE/contingency ($8.2M).	Come OFF at Market St. from US 26, then get ON Mont-gomery St. ramp to Ross Island Bridge. SB I-405 motorists would still have choice to Ross Island Bridge & Broadway OFF. Sign for Market St. to Ross Island Bridge	Feasible. Need assess signage changes. May need to replace 12th Ave. O'Xing.	XXX	**1**	**1**	**2**
I-405 SB										
> US 26 ON-Ramp/Broadway OFF-Ramp > Bottleneck #4 > US 26 WB OFF-Ramp to Broad-way OFF-Ramp	**4c2**	Montgomery St. ON-Ramp closure.	Close Montgomery St. ON-Ramp. Local traffic only.	**$200K:** scarify ramp pavement; add detour signage	Relatively low ramp volumes (~800 vph) may not cause significant merge/weave conflicts. Need model for traffic impacts.	Feasible. Need assess signage changes.	Run Visum to determine what the trips would divert to and the potential traffic impacts.	**3**	**2**	**1**

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I-405 SB										
	4c3 (new)	Montgomery St. ON-Ramp closure-peak hrs only.	Close Montgomery St. ON-Ramp during peak hours only --- or adjust/slow ramp meter rates. Local traffic only.	**$1.1M-$1.2M:**	Relatively low ramp volumes (~800 vph) may not cause significant merge/weave conflicts. Need model for traffic impacts.	Feasible. Need assess signage changes.	Run Visum to determine what the trips would divert to and the potential traffic impacts.	**3**	**1**	**1**
	4e	SE Broadway left to 6th ON-Ramp NB closure	Eliminate EB > NB left-turn from Broadway to 6th Ave. Restripe NB 6th Ave. lanes from existing 2-lanes to 3-lanes (2 lanes to 6th Ave. ON-ramp; 1 thru lane NB; bike lane)	**$200K:**	People trying to get ON at I-405 NB block intersection for I-405 SB OFF causing back up. Would enhanced green time allow for better movement? Couple with I-405 NB Option 1B.	XXX	6th Avenue on-ramp is not wide enough for a two-lane ramp meter. Wdiening the ramp will be required. The ramp volume exceeds the capacity of a single lane and two-lane ramp meters; that's why there is no existing ramp meter. It is not practical to install a 2-lane ramp meter at this location since the ramp volume exceeds the capacity of a ramp meter. Excessive traffic queue spillback onto local arterials and streets would occur.	**3**	**1**	**1**
			ODOT will be initiating a variable speed project on I-5 & I-405 south end (Broadway to I-5 South)			NA	NA			

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				OPTIONS CONSIDERED but NOT FORWARDED						
I-84 EB										
> I-5 to I-84 Bottleneck > Bottleneck #1 > I-5 SB ON (Rose Qtr -	**1a**	I-5 SB ON to I-84 EB (ramp)	Construct 2-lane SB>EB ramp to just before Grand Ave ON-Ramp; go under MLK/Grand Ave. O'Xings	**$62M-$88M:** 2,800' flyover ramp 40'-45'	Long-term improvement. Can be a later phase after 1b. *Exceeds Study cost limits.*					
	1d	Combined I-5 SB ON-Ramp & Mainline Improve-ments to 21st	TOTAL of 1a + 1b or 1c	**$88M - $118M**	*Exceeds Study cost limits.*					
	1e (new)	Separate I-5 NB merge with I-84 EB	Separate I-5 NB merge with I-84 EB from I-5 NB ramp 2,200'; Consider adding/extending 4th lane to 33rd as Aux lane.	**$78M:** auxiliary lane/shoulders ($4.8M) retaining wall; 12th Ave. O'Xing struc-ture renovation ($5.2M); 28th Ave. O'Xing structure renovation ($6.2M); 7,950'L x 25'H retaining walls/barriers ($19.9M). Plus PE/CE/contingency ($41.9M). Plus ROW (not included).	Need to model. More valuable/beneficial than 1b. Exceeds Study cost limits.	Feasible, but expensive.	Run Flow Bundle in Visum to deter-mine the origins of the 33rd Ave exit-ramp traffic with respect to the up-stream on-ramps incl. SB & NB I-5. Run HCS to determine v/c & LOS for the new 4-lane section and down-stream ON-ramp merge junctions for diverted trips resulting from closure of 16th Avenue ON-ramp.			
> 39th Ave. ON-Ramp Bottleneck > Bottleneck #3 > 39th Ave. ON-Ramp to I-5 NB/SB ON-Ramp	**3a**	39th Ave. ON-Ramp	XXX	XXX	No recommendation					
I-84 WB										
> 33rd Ave. ON-Ramp > Bottleneck **#5** > Sandy Blvd. ON-Ramp to 33rd Ave. ON-Ramp	**5a**	East of Sandy Blvd. ON-ramp/ Auxiliary Ln. to 28th Ave. O'Xing	Have Sandy Blvd. ON-Ramp come on as a separate Aux lane from mainline, and have 33rd Ave. merge with Aux lane further west; some widening required. Keep I-84 separate from Sandy until after 33rd merge. Lane drops at Lloyd Center OFF-ramp.	**> $50M:** Exceeds Study cost limits.	Heavy mainline volumes, aux lane, moderate ramp volumes; merge conflicts from Sandy Blvd. ON-ramp - 33rd Ave. ON-ramp, and motorists merging to Lloyd Center OFF-ramp; will require shoulders for each ON-ramp lane, and barriers; very tight segment to widen, beyond short segment that does not conflict with LRT alignment; 5a may not be feasible by itself - would need to do 5b also. Need to determine whether sufficient space to widen highway (barriers + shoulders); need to model whether combining Sandy blvd. ON & 33rd Ave. ON traffic volumes creates too heavy a traffic demand for common merge with mainline.Exceeds Study cost limits.	Borderline feasible. Need for barrier or traffic separator will push shoulder barrier out toward LRT line; 33rd WB ON-ramp on structure to provide vertical clearance for Sandy WB ON and for LRT; will require 28th Ave. O'Xing to be replaced/new.	Collect data for the two on-ramps in the a.m. peak period from PSU Portal and determine what the total on-ramp volume would be in the aux. lane. I don't think it would exceed the capacity of a freeway lane. Run HCS to evaluate the 4-lane section and compare it to the existing ramp merge at 33rd Ave.			

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I-84 WB										
	5b	33rd Ave. ON-ramp extension	Extend 33rd ON-ramp acceler-ation lane west to provide more time for merge; keep 33rd ON-ramp accel lane separate; some widening required.	**> $50M:** Exceeds Study cost limits.	Very tight segment to widen, beyond short segment. May not be feasible. Need to model. Same issue as with Option 5a. Exceeds Study cost limits.	Borderline feasible. No available space between current 33rd Ave. WB ON-ramp and LRT tracks. Feasible if no barrier or traffic separator.	Run sensitivity analysis using HCS for a range of incremental increase in the accel lane distance. HCS may not show any discernible benefit, but there is safety and operational benefit associated with lengthening the accel distance.			
	5d	Interchange/ramp consolidation @ 33rd Ave. interchange	Relocate EB 39th ON & OFF ramps back to 33rd Ave, interchange, and create 3/4 interchange @ 33rd Ave; WB traffic still exits at Halsey St.	**$10M:** 1,200' x 20'H retaining wall ($3.6M); 1,200' x 30' W ramp ($0.9M); plus PE/CE/contingency ($5.5M).	May not be feasible. This Option is more closely related to I-84 EB Bottleneck 3. See Option 3b.	XXX	XXX			
	5e	Sandy Blvd interchange consolidation	XXX	XXX	Could not make work					
> Glisan St. ON-Ramp Bottlenck > Bottleneck **#6** > I-205 SB ON-Ramp to Glisan St. ON-Ramp	**6c**	60th Ave. ON-Ramp	Have WB ON-ramp connect to mainline off NE 60th Ave.	No cost estimate.	Not feasible. Conflicts with LRT station west of 60th Ave. O'Xing. Conflicts with pedestrian movements from 60th Ave. to LRT station.					
> I-205 SB to I-84 WB Merge Bottleneck > Bottleneck #7 > I-205 SB Ramp to I-84 WB Ramp	**7a** com-bine with 7b	I-205 to I-84 WB Ramp Reconfigura-tion	Merge two I-205 NB to I-84 WB flyover lanes together; then merge this lane with I-205 SB ramp to I-84 WB; then add this single lane to I-84 WB mainline; extend accel lane out further; restripe NB>WB ramp; separate some of SB>WB ramp from mainline.	**$3.5M - $4M:** restripe 5,550' of mainline & SB > WB ramp, and 5,600' of NB > WB ramp ($22.3K); widen & pave roadway (1,850'L x 33'W) ($1.3M); construct retaining wall (1,400'L x 5'H) ($350K); plus PE/CE/contingency ($1.5M - $2M).	As described in I-205 Design Panel work: Bottleneck #7 Option #1. Need to model as part of I-205 corridor.	Feasible (combine 7a with 7b)	I don't think merging the two I-205 ramps is a good idea as the total volume of the I-205 NB and I-205 SB ramps would exceed the capacity of a single lane ramp connection. Review traffic counts or collect new counts if necessary.	**3**	**0**	**2**
	7b (new) com-bine w. 7a	I-205 to I-84 WB Ramp Reconfig-uration	2010 modified proposal: make I-205 SB the add-lane; make I-205 NB into single-lane merge.	**$4.5M - $6M**: Mainly restriping; some pavement widening	Modification of 7a as described in I-205 Design Panel work: Bottleneck #7 Option #1. May create negative consequences for I-205 NB. Need to model as part of I-205 corridor.	Combine 7b with 7a.	Current counts show the I-5 NB ramp has much higher volume than I-5 SB, especially in the a.m, peak period. I don't see there would be any benefit for doing this; it would only make the current conditions worse.	**2**	**0**	**2**
US 26 EB										
> Hwy 217 On-Ramp Bottleneck > Bottleneck **#1** > Cedar Hills ON-Ramp to Hwy 217 ON-Ramp/Lane Drop	**1a**	Hwy 217 to US 26 EB ON-Ramp Striping Modification	Extend solid double line, or separator (profile striping) 3,000' from painted gore past first lane drop. Establishes single lane ON traffic, and prohibits US 26 EB mainline from early weave to outside	**$30K - $50K:** extend 3,000' of solid double line (profile striping) ($12,000); may need to grind pavement and re-pave; traffic staging can be costly; need PE/CE/contingency.	Could reduce motorist merging over: pushes merges farther down the line. Recommend sensitivity modeling to assess how long accel lane needs to be to be beneficial. Identify speed by lane, to help assess effectiveness of extending lane.	Feasible, but must use solid double-line (profile striping); less effective than islands/ barrriers/ traffic sep-arators, which are more enforceable, but insufficient space to widen highway to ac-commodate barriers.	Retrieve lane by lane speed data from Portal. For operational purposes, it is most desirable to maintain existing lane geometry. Add lane reduction pavement marking arrows between the Right Lane Ends and Lane Reduction Symbol signs. Consider installing a Right Lane Ends Ahead sign with a 1/4 mile rider in advance of the Right Lane Ends sign to emphasize the lane reduction downstream although not a standard sign in the MUTCD.	**3**	**0**	**3**

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US 26 EB										
> Skyline/ Scholls Ferry On-Ramp Bottleneck > Bottleneck **#2** > Hwy 217 ON-Ramp to Skyline /Scholls Ferry ON-Ramp					2a: acceleration lane appears to be short					
> I-405 Diverge Bottleneck > Bottleneck **#3** > Skyline/ Scholls Ferry Rd. ON-Ramp to I-405 Diverge	**3a**	Jefferson St. Option	Close Market St. OFF and use Jefferson St. for downtown exit. Open Jefferson St. to two lanes. Several structures; widening not possible.	**< $5M:** signage is ~ $100K - $150K, depending on how many to be installed; cost of mitigation (local street improvements) cannot be assessed at this level (without input from Traffic); cost to remove Market St. OFF-ramp (7,200 sq. ft.) uncertain. Plus PE/CE/contingency.	Perhaps politically unfeasible. Might have issues getting drivers to PGE park. Analyze roundabout. Remove bus stop in intersection. Check timing for trains and driver delay. May need to be combined with other improvements. Insofar as EB US 26 > CBD does not queue back like EB US 26 > I-405 NB & SB; routing traffic to Jefferson St. OFF will *not* gain much benefit. Need start with HCS analysis to assess concerns with overloading local street system (2,200 vph in p.m. peak) (200' blocks); and conflicts with: LRT; round-about; peds., PGE Park; before determin-ing whether to model this option.	Need to assess impacts to local street system (roadway capacity; 200' block lengths; potential conflicts with: LRT, round-about, pedestrians; PGE Park).		**3**	**0**	**1**
> I-405 SB Ramp Bottleneck > Bottleneck **#4** > Skyline/ Scholls Ferry Rd. ON-Ramp to I-405 Diverge	**4a**		EB US 26 to SB I-405 entrance ramp realign/relocation. Realign market ramp to allow for larger radius for I-405 SB. Termini: EB US 26 diverge to SB I-405 ramp. Improve sight distance. Two struc-tures potentially affected (maybe Market & I-405 SB structure). Modification of wing wall under Montgomery St. structure be-tween 13th Ave. & Mont-gomery St. may need to be altered. Pull back ramp: merge sooner. Com-bine 14th Ave. & Taylor St.	**$32.4M:** 300' x 200'(roadwork), (ramp) 3,000' x 40'H, (walls) 1,300' - 1,400' (structure) 300' (sign bridge)	Braid Montgomery St. with Taylor St.? Sight distance not particularly an issue: perhaps put up signage saying queue ahead would have same impact and aggressive ramp metering for Montgomery St. ON-ramp.					

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US 26 EB										
> I-405 SB Ramp Bottleneck > Bottleneck **#4** > Skyline/ Scholls Ferry Rd. ON-Ramp to I-405 Diverge	**4b**		Realign to outside from diverge with less of an angle to I-405 SB using the same structure. Market St. structure may not be impacted. Combine 14th Ave. & Taylor St.	**$$??:** Consider as add-ons to I-405 Options.	Braid Montgomery St. with Taylor St.? Sight distance not particularly an issue: perhaps put up signage saying queue ahead would have same impact and aggressive ramp metering for Montgomery St.ON-ramp. Does not address problem. Congestion problems are primarily generated on I-405, not US 26. Consider in conjunction with I-405 SB corridor bottleneck #4.	Consider only if options to address I-405 SB Bottleneck #4 are implemented.		**?**	**0**	**2**
	4c		EB US 26 ramp to SB I-405 widen to south (inside) and realign. New structure under Montgomery St. Improve sight distance and maybe two lanes.	**$$??:** Consider as add-ons to I-405 Options.	Does not address the problem. Congestion problems are primarily generated on I-405, not US 26. Consider in conjunction with I-405 SB corridor bottleneck #4.	Consider only if options to address I-405 SB Bottleneck #4 are implemented.		**?**	**0**	**1**
US 26 WB										
> Ramp to I-405 NB Bottleneck > Bottleneck **#5** > US 26 Mainline to I-405 Mainline	**5a1**		Bring ramp up to Market St. structure and then back down to join with the I-405 NB ON ramp. Relocate I-405 NB to widening structure of Market St.	XX	Instead of merge lane have aux lane that goes N to Fremont Br.(add lane miles at 14th Ave. OFF and Burnside St. ON) cut back mostly landscaping with impact to 1 wall. Impact ramp meter (1). Can't clear the freeway and get down to ramp. Not physically feasible.					
	5a2		Close Market St. Bring I-405 NB up over Market St. and then back down to I-405 NB ON-ramp.	XX	Not physically feasible. Would result in poor loading.					
	5a3		Close Market St. but realign center lane to Montgomery St. Could then use the market exit to support I-405 NB	**>$50M**	Exceeds Study cost limits. Does not address the problem. Not physically feasible. Would result in poor loading.					
	5b		Close Market St. OFF and use Jefferson St. for downtown exit. Open Jefferson St. to two lanes	XX	Alternative: Use gate arms on Market for temp closure? Politically challenging to close Market St. and use Jefferson St. as alternative.					
US 26 WB										
> I-405 Ramps/US 26 Merge Bottlnck > Bottleneck **#6** > US 26 merge with I-405	**6b**		Restrict lane change through tunnel with double white striping.	XX	Need to analyze further but may not address bottleneck (1/4 mile). Center lane is underutilized now, but provides gaps for merges/weaves.					

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US 26 WB										
	6c		Flyover from I-405 NB to US 26 WB to tie into future truck lane.	XX	Limited benefits compared to cost. Not physically feasible; insufficient length. Why move highest volumes?					
	6d		Realign Clay St. ON-ramp to outside south side of US 26 (left of I-405 NB)	XX	I-405: would give priority to US 26 instead of I-405: 2(I-405 SB), 1(I-405 NB) merge (Clay St.): perhaps merge Clay St. to right side merge. realign Clay St. to north side with single lane, 405 NB two lanes, SB ramp single lane in middle. Down to three just before tunnel merge.					
I-405 NB										
> US 26/12th Ave. > Bottleneck **#1** > US 26/12th Ave. OFF-Ramp - I-405 SB ON-Ramp	**1**	US 26/12th Ave. OFF-Ramp Start @ 5th Ave. OFF	Pull US 26 ON-ramp back 1,800' to before SW 5th Ave.; renovate structures at 6th Ave. (100'x100'x300')/Broadway (250'x100'x300')/ Park Ave. O'Xing (250'x100'x300'); close 6th Ave. OFF-ramp (?); 1,500' x 20' retaining wall; traffic signal;	**$110M + ROW:**	Congestion starts at SW 6th Ave. ON-ramp. High speed differentials between lanes (center & inside lanes OK). Plus separate queuing back from I-5 and US 26. Exceeds Study cost limits. Not physically feasible. Insufficient space to widen under structures/columns/ retaining wall next to roadway.					
> US 26/12th Ave. > Bottleneck **#1** > US 26/12th Ave. OFF-Ramp - I-405 SB ON-Ramp	**1b**	6th Ave ON-Ramp Meter & Restripe as Double Lane ON-Ramp	Add ramp meter at 6th Ave.ON-ramp; install as close to gore as possible; restripe existing single-lane ON-ramp as dual-lane ramp; connect dual-lane ramp restriping to restriping of two-lane NB 6th Ave. to three-lanes over O'Xing.	**$400K - $600K:** Couple with closing EB>NB left-turn at 6th Ave (I-405 SB Option 4E).	Less traffic through weave with very aggressive weave. Will need to accommodate bike traffic (bike lane) over 6th Ave. O'Xing. Middle-lane of restriped 3-ln 6th Ave may be an 'Option' lane that would allow choice of NB I-405 ramp <u>or</u> thru-ln NB on 6th Ave. Need to review 6th Ave. O'Xing structure width to determine if restriping (2-lane approach to 2-lane ON-ramp/1-lane NB thru/NB bike lane) is physically feasible. Structure flairs wider to north to accom-modate OFF-ramp. Co-ordinate with I-405 SB Option 4E.	Not Feasible. Ramp is too short to accom-modate much storage or provide adequate acceler-ation. Too much demand for ramp metering, without backing up onto local arterials.	6th Avenue on-ramp is not wide enough for a two-lane ramp meter. Widening the ramp will be required. The ramp volume exceeds the capacity of a single lane and two-lane ramp meters; that's why there is no existing ramp meter. It is not practical to install a 2-lane ramp meter at this location since the ramp volume exceeds the capacity of a ramp meter. Excessive traffic queue spillback onto local arterials and streets would occur. Need to assess both NB & SB I-405 impacts (e.g., I-405 SB Broadway Ave. OFF-ramp).	**3**	**0**	**1**
	1c	6th Ave ON-Ramp limited to WB US 26	6th Ave ON-ramp signed for WB US 26 <u>only</u>. Install barrier to prevent merge with NB I-405 main-line. Close access to 12th Ave OFF-ramp from NB I-405.	**$1M-$5M:** Some widening.	Signed but not forced (would need barrier: can't sign for two options). Model for impacts/traffic diversion.					
	1d		Remove 6th Ave ON, add 4th Ave. ON & braid w. 6th Ave. OFF	**$75-$90M:**	Exceeds Study cost limits.					

C-BOS PROJECTS - I-84, US 26, I-405
PRELIMINARY PRIORITIZATION LIST

Name Bottleneck Study Area	Op-tion	Project Name	Description	Cost Elements	Design Panel/PMT Comments	Physical Feasibility Assessment	Traffic Analysis Assessment	Cost Priority	Potential Perform. Priority	Potential Risk Priority
I-405 NB										
	1e (new)		Add 1st Ave. ON and close 6th Ave. and 4th Ave. OFF	**$21M-$25M:**	Politically difficult. Unfeasible.					
	1f		Add 1st Ave. ON but with flyover and close 6th Ave. OFF	**>$50M**	Insufficient vertical clearance under structures. Exceeds Study cost limits.					
	1g (new)		Braid 6th Ave. ON-ramp with US 26 EXIT.	**>$50M**	Would require construction of rigid-frame U'Xing to effect braid. Exceeds Study cost limits.					
I-405 SB										
	2g	Hwy 30 ON-Ramp to I-405 SB 2>1 Merge (2-lns SB I-405 @ US 30 Merge)	Restripe US 30 ON to be single merge to I-405. 2 lanes merge into one lane on US 30. Retain existing Fremont Bridge split (4 to 3+2), but drop one lane to carry 2 lanes to US 30 ON-ramp merge.	**$2M - $5.4M:**	A merge issue moreso than weave issue. Model for lane balance	Feasible	Option 2G would reduce the 4-lane section on SB I-405 to 3 lanes. What is the perceived benefit of this proposed capacity reduction on I-405 SB?	**3**	**0**	**2**
> Everett St. ON-ramp Bottleneck > Bottleneck **#3** > Everett St. ON-Ramp to US 26 OFF-Ramp	**3f**		Combine Clay St. to US 26 WB by using Jefferson St./SW 14th Ave. reroute to right side of ON-ramp. Close Clay St. ON-ramp to WB US 26.	**$8.5M-$10.5M:**	Utilize local street network but build next to I-405 to US 26 WB. One lane ON from Jefferson St. Will need new wall.					
> US 26 ON-Ramp/Broadway OFF-Ramp > Bottleneck #4 > US 26 WB OFF-Ramp to Broad-way OFF-Ramp	**4a**	US 26 ON-Ramp/Broadway OFF-ramp	Close Taylor St. ON-Ramp. Replace/relocate existing US 26 ON-Ramp to I-405 SB with flyover ramp, as 2-lane to 1-lane ramp before merging with new Montgomery St. ON-ramp; remove existing Montgomery St. ON-Ramp; add new Montgomery St. ON-Ramp from east side of I-405 as add lane to I-405 lane to Broadway OFF-ramp; retaining wall; renovate 12th Ave. O'Xing; slip ramp from US 26 ramp to I-405 ramp to Brdway OFF-ramp.	**$77M-$110M:** 1,200' for ramp/lane to Broadway OFF-ramp; 1,500' US 26 to Broadway OFF-Ramp (2-lns); 1,600' slip ramp US 26 to Broadway OFF; 200'x12' H retaining wall; US 26 700' Ave. flyover structure to SB I-405 (?); 300' Montgomery St. ON-Ramp from east side of I-405; 300' slip ramp to Broadway; 50' modification of 12th Ave. O'Xing structure (need Bridge Unit to assess cost of renovation); .	Weave problem. US 26 ON-ramp & Montgomery St. ON-ramp merge, and back up at Broadway OFF-ramp. Lane speed imbalance. Separate queuing from Broadway OFF-ramp. Exceeds Study cost limits.					
> US 26 ON-Ramp/Broadway OFF-Ramp > Bottleneck #4 > US 26 WB OFF-Ramp to Broad-way OFF-Ramp	**4b**	Re-order merge priorities of SB I-5/I-405/Naito Parkway.	`	**$50M +/-?:** Re-assign priority merge to higher volume SB I-5 instead of to SB I-405; re-locate SB Naito Parkway to west, under I-405 ramps to merge into SB I-405; maintain 2-lane I-5 SB ON-ramp as 2-lane merge; SB I-405/ SB Naito Parkway merge with SB I-5.	Model different lane configuration to analyze change. Need better cost estimate. Suggest traffic analysis be conducted before cost estimate prepared. Exceeds Study cost limits?	Will require more work to determine feasibility and cost estimate. Suggest traffic modeling first.	XXX	**0**	**1**	**1**
	4d		Close Taylor St. and Montgomery St.ON-ramps; braid with Broadway OFF	**> $50M**	Exceeds Study cost limits.					

C-BOS PROJECTS - I-84, US 26, I-405
PRELIMINARY PRIORITIZATION LIST

Name Bottleneck Study Area	Op-tion	Project Name	Description	Cost Elements	Design Panel/PMT Comments	Physical Feasibility Assessment	Traffic Analysis Assessment	Cost Priority	Potential Perform. Priority	Potential Risk Priority

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CHAPTER 5: APPENDICES

5.2 Appendix A: Technical Memoranda

A.1 Technical Memoranda 1 & 2: Methodology and Assumptions (known and available data)

A.2 Technical Memoranda 3: Bottleneck Identification and Diagnosis

A.3 Technical Memoranda 4 & 5: Corridor Design Review

A.4 Technical Memoranda 6: Evaluation Framework for Investments to Improve Freeway Operations at Bottlenecks on I-5 & I-205

A.5 Technical Memoranda 7: Design Panel Results

A.6 Technical Memoranda 8: Feasibility Review

A.7 Technical Memoranda 9: Summary of Operations Result

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DAVID EVANS
AND ASSOCIATES INC.

MEMORANDUM

DATE:	October 2, 2012
TO:	ODOT Project Management Team
FROM:	Mike Baker, PE
	Scott Harmon, PE
	Shelly Alexander, PE
SUBJECT:	**TM 8 - Feasibility Review**
PROJECT:	Corridors Bottlenecks Operations Analysis (C-BOS)
PROJECT NO:	ODOT 0000-0674
COPIES:	File

INTRODUCTION

The Corridors Bottlenecks Operations Study (the C-BOS) project is intended to provide spatial and temporal evaluation of freeway operations along the five metro area corridors (I-5, I-205, I-84, I-405 and US 26) and correlate locations of congestion with potential mitigation measures/projects. Building on the promising ideas and design panel list of projects (presented in previous tasks/technical memorandums as TM 4/5 and TM 7, respectively), it was necessary to assess feasibility of implementing design projects as well as project operational benefits. The intent of the feasibility review is to provide a high-level fatal flaw assessment which considers cost, right-of-way impacts, system integration, political readiness, and other critical success factors as discussed in (TM 6 Evaluation Criteria). The purpose of this technical memorandum is to summarize the feasibility review process and findings.

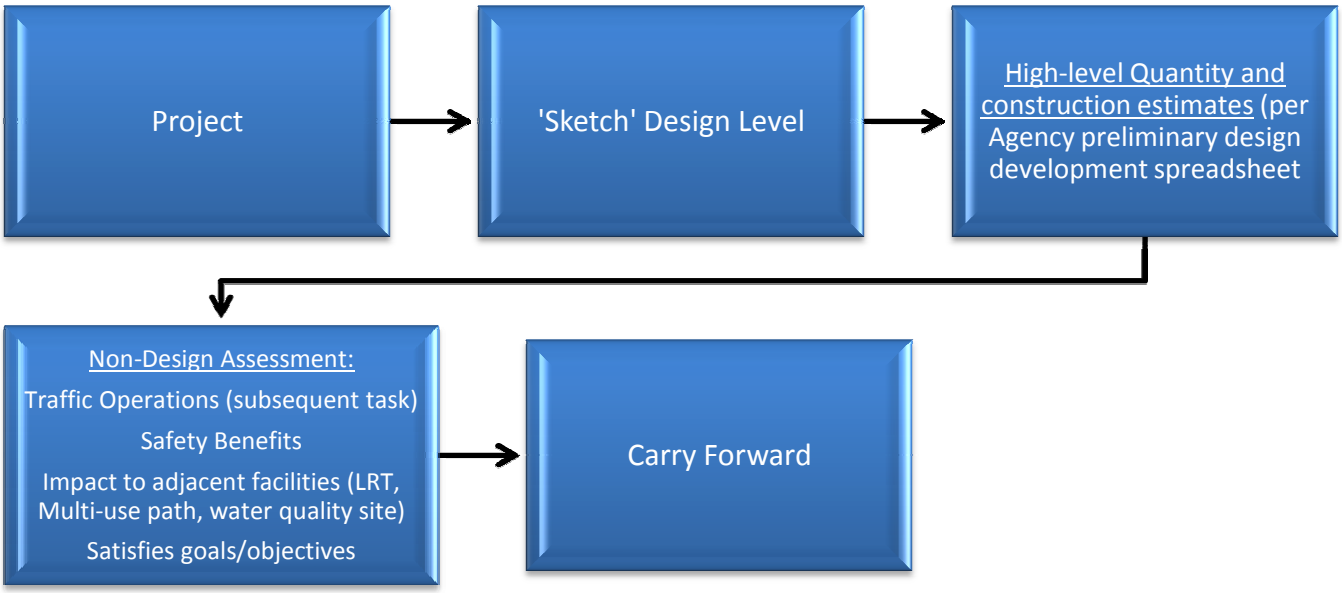
Travel performance was also discussed but not evaluated at this time. Subsequent technical memorandums will address this issue.

This is the eighth technical memorandum for this project.

FEASIBILITY REVIEW

Each project identified by the PMT for further evaluation in TM 7 was subjected to a variety of criteria to act as a preliminary fatal-flaw screening (see Figure 1). The feasibility review process started with a freehand drawing over an aerial base ("sketch" design level) to refine potential projects. The "sketch" designs were then used to prepare cost estimates. The estimates were based on the ODOT preliminary design cost development spreadsheet. Constructability was also assessed at this time. Elements such as right-of-way (ROW) and infrastructure (bridges for over and under crossings) impacts, retaining and sounds walls, and seismic concerns are considered to effect constructability.

Figure 1: Feasibility Review Process



The next step in the evaluation process looked beyond the roadway improvements to consider traffic operations, safety benefits, impact to adjacent facilities, and project goals and objectives. The traffic analysis needs were assessed and the appropriate analysis tools identified. In some cases preliminary operational results were determined; however, operational analysis for many projects will be evaluated in a later phase of the project.

Safety benefits were also considered during the fatal-flaw assessment. While the measure is subjective there are instances were projects show minimal operational improvements yet have potential to provide significant safety benefits.

Roadway improvements effect more than just the motor vehicle users. Existing non-freeway infrastructure adjacent to the roadway may be impacted with some projects. Adjacent facilities that were identified and considered as part of the fatal-flaw process include, but are not limited to area multi-use paths, water quality sites, light rail transit railways, and retaining walls/terrain.

The final step was to consider the project goals and objectives. In some cases the evaluation process was iterative and resulted in redefined projects to maximize benefit and minimize cost and impacts. The following section discusses the projects selected to move forward for traffic analysis. Operational findings may result in further refinement of the project list.

FINDINGS

The feasibility review process identified a list of 18 projects to move forward for traffic analysis assessment. *(See Appendix A for full list of projects prior to fatal-flaw screening.)* The list includes a project description, estimated cost, traffic analysis tool for evaluation, and comments regarding relevant findings of the feasibility review by corridor. The majority of the projects were identified for the I-5 and I-205 corridors; no projects were moved forward for the US 26 corridor. The feasibility review list is attached and discussed in the following sections.

I-5 projects

Three different bottlenecks along the I-5 corridor have projects identified for them. In total, seven projects have been identified, some allowing for phasing options to address problematic locations. Project costs range from $1 million to $20 million, though 3 do not currently have estimates. Two projects have been identified as high priority. Both projects are located at the Lower Boones Ferry Road interchange, though one is in the southbound direction between Lower Boones Ferry and Nyberg, while the other is in the northbound direction and reconstructs the exit ramp. There is one medium/high priority project located between Nyberg Street and the I-205 auxiliary lane in the southbound direction. The remaining projects are medium priority to address issues in the northbound direction at the Terwilliger Boulevard entrance ramp/acceleration lane and the section of roadway between Nyberg Road and Carman Drive. *See attachment for further details.*

I-205 projects

Four different bottlenecks along the I-205 corridor have projects identified for them. In total, nine projects have been identified, some allowing for phasing options to address problematic locations. Project costs range from $2 million to $15 million (one project currently does not have an estimate). Two projects have been identified as high priority; one in the southbound direction between the entrance from I-84 EB and the ramp to Stark/Washington auxiliary lane, and one in the northbound direction between Powell Blvd. and Division St. (auxiliary lanes). There is one medium/high priority project which builds on the high priority work of the Powell Blvd. to Division St. auxiliary lanes extending it to I-84. The remaining projects are either medium or medium/low priority. Medium priority projects include two options to address the bottleneck identified in the northbound direction between I-84 westbound on ramp and Sandy and Columbia Boulevards. The medium-low priority projects are variations of high and medium/high priority projects at the northbound bottleneck between Powell Blvd. and Division St. *See attachment for further details.*

I-84 projects

One bottleneck along the I-84 corridor has a project identified for it. The project addresses an eastbound bottleneck between the I-5 southbound/northbound merge and the Grand Avenue on ramp. It is estimated to cost $2.5-3.5 million with a priority level of medium/low. *See attachment for further details.*

I-405 projects

One bottleneck along the I-405 corridor has a project identified for it. The project addresses a southbound bottleneck at the Highway 30 on ramp. It is estimated to cost $2.0-5.4 million with a medium level of priority. *See attachment for further details.*

US 26 projects

There are no preferred solutions indentified for bottlenecks within the US 26 study corridor.

Attachments:

1. C-BOS: Final Priority Project List

Appendix:

A. All Corridors Proposed Improvements Combined

Attachment: C-BOS Final Project Priority List

C-BOS: FINAL PRIORITY PROJECT LIST

Corridor	Direction	Bottleneck	Option	Project	Description	Est. Cost	Traffic Anal. Tool(s)*	Comments/Traffic Analysis Findings	Ranking
I-5									
I-5	SB	6	3a-1	Lower Boones Ferry to Nyberg St. auxiliary Ln	Carry 4th lane from Lower Boones to Nyberg St.	$10M - $12M	HCS	Extension of Opt.3 (OR217 ENTRANCE-ramp thru Carman Dr). Already aux lane between LBF ENTRANCE/EXIT ramps. GOOD traffic benefits.	H
I-5	SB	6	3a-3 *revised 3a-2*	Nyberg St. to I-205 auxiliary lane	Carry 4th lane/aux lane from Lower Boones Ferry Rd. interchange to I-205; maintain auxiliary lane from Nyberg Rd. interchange to I-205. Add 2nd aux lane from Nyberg St. to I-205.	$19M -$20M	HCS	Likely more difficult segment. Seismic retrofit of LBF & Nyberg structures with Bridge $$. Develop Charter/risk assessment. GOOD traffic benefits, but much BETTER traffic benefits with 2nd auxiliary lane from Nyberg St. to I-205. Cost estimate includes 2nd aux lane.	M/H
I-5	NB	2	2a	Reconstruct Lower Boones Ferry EXIT-ramp	Increase EXIT-ramp from 1 lane to 2 lanes	$1M - $2M	HCS	Partially scoped last STIP round. High EXIT-ramp demand. Study as stand-alone option. BEST traffic benefits of I-5NB options in this area.	H
I-5	NB	1	1a	Terwilliger ENTRANCE-ramp/accel lane extension.	Extend Terwilliger ENTRANCE-ramp/accel around curve to address poor sight distance.	$??M	VISSIM	May require ROW, retaining walls. Likely expensive solution. NO discernable traffic benefits, due to back- queuing from north end I-5 (I-5 x I-405). Possibly Safety project benefits.	M
I-5	NB	2	2b-1	Auxiliary lane extension: Nyberg Rd. > Lower Boones Ferry Rd.	Extend auxiliary lane Nyberg Rd. > Lower Boones Ferry Rd (4 lns)	$ NA	VISSIM	Planned seismic retrofit planned for Nyberg St. interchange. NOT GOOD traffic benefits. Eliminates LBF bottleneck, but shifts congestion downstream. Generate cost estimate.	M
I-5	NB	2	2b-2	Auxiliary lane extension: Lower Boones Ferry Rd. > Carman Dr.	Extend auxiliary lane Lower Boones Ferry Rd. > Carman Dr. (4 lns). (merge to mainline before P&WRR U'Xing)	$ NA	VISSIM	Planned seismic retrofit planned for Lower Boones Ferry interchange. Unsure if this phase feasible by itself. NOT GOOD traffic benefits. Nyberg ENTRANCE-ramp and I-205 traffic conflict with LBF EXIT-ramp and Carman Dr. EXIT-ramp demand.	M
I-5	NB	2	2b-1 & 2b-2	Auxiliary lane extension: Nyberg Rd. > Carman Dr.	Extend auxiliary lane Nyberg - Lower Boones Ferry, plus 2-lane EXIT to Lower Boones; aux lane to Carman Dr. & NB LBF ENTRANCE ramp merge; plus exit @ Carman Dr. (no lane drop)	$12.5M-$13.5M	VISSIM	DEA modeling these two segments in combination. LBF bridge widening; LBF ENTRANCE-ramp retaining wall; Nyberg St. WB>NB ramp retaining wall; retaining wall under RR bridge. Consider combination improvements if Option 2a prooves ineffective.	M
I-205									
I-205	NB	3	2	I-84 WB to Sandy Blvd. auxiliary Lane	Add auxiliary lane from I-84 WB ENTRANCE-ramp to Sandy Blvd. EXIT-ramp by widening	$6.7M	VISSIM	Partially scoped last STIP round. Possible sound wall needed. Sandy EXIT ramp geometry issue may require ROW for property impact/MUP. DEA VISSIM modeling/calibration not completed.	M
I-205	NB	3	2A	Aux lane extension to Columbia Blvd. EXIT-ramp.	Extend auxiliary lane from Sandy Blvd. (Option 2) to Columbia Blvd. EXIT-ramp.	$6.5M	VISSIM	Partially scoped last STIP round. On-site WQ may require retaining walls if no regional WQ site in area. DEA VISSIM modeling/calibration incomplete.	M
I-205	SB	8,9	1	I-84 EB ENTRANCE-ramp to Stark/Washington aux lane	Auxiliary lane to match existing auxiliary lane from Stark/Washington to Division/Powell	$4.5M	HCS, E, T	Partially scoped last STIP round. GOOD traffic benefits. 23% of traffic going from I-84 EB > Division/Powell Blvd. EXIT. Aux lane would provide direct connection to this EXIT.	H
I-205	NB	4	1	Powell Blvd. to Division St. auxiliary lane (single-lane EXIT @ Stark/Washington St.)	Add aux lane to match existing auxiliary lane from Division > Stark/Washington (single-ln EXIT-ramp)		HCS, E, T	Original proposal. Expanded to include alternative options (below). MODERATE incremental traffic benefits.	M/L
I-205	NB	4	1a	Powell Blvd. to Division St. auxiliary lane (double-lane EXIT @ Stark/Washington St.)	Add NB aux lane Powell Blvd.ENTRANCE-ramp to Division St.ENTRANCE-ramp; 2-lane EXIT to Washington St.	$6.5M - $7.5M	HCS, E, T	Original proposal to address relatively high crash rates in this segment. Division St. U'Xing widening. LRT rigid frame extension. MODERATE incremental traffic benefits. Two-lane EXIT to Washington St. necessary.	H
I-205	NB	4	1b	Powell Blvd. to Division St. auxiliary lane - Powell Blvd. to Glisan St.	Add aux lane Powell Blvd. to Glisan St. EXIT ramp; NB ENTRANCE-ramp Division St. add/aux lane plus 2-lane EXIT to Washington St.; drop 1-lane at Washington St.; aux lane to Glisan St; 1-lane EXIT/drop lane to Glisan St.	$9.6M - $11.5M	HCS, E, T	Alternative option (new): Powell Blvd. to Glisan St. Division St. U'Xing widening. LRT rigid frame extension. LESS GOOD traffic benefits. Requires weaving over 1 or 2 lanes. May cause queuing. Two-lane EXIT to Washington St. imperative for this option to work properly.	M/L
I-205	NB	4	1c	Powell Blvd. to Division St. auxiliary lane - Powell Blvd. to I-84.	Add aux lane Powell Blvd. to I-84 EXIT ramp; NB ENTRANCE ramp Division St. add/aux lane plus 2-lane EXIT to Washington St.; drop 1-lane at Washington St.; aux lane to Glisan St.; aux lane to I-84 EXIT; 1-lane EXIT/drop lane to I-84.	$12.0M - $13.6M	HCS, E, T	Alternative option (new): Powell Blvd. to I-84. Division St. U'Xing widening. LRT rigid frame extension. BEST traffic benefits if have continuous auxiliary lane Powell Blvd. > I-84. (22%: of traffic from Powell Blvd. > I-84; 68% of traffic from Division St. > I-84.) Two-lane EXIT to Washington St. imperative if this option to work properly.	M/H

C-BOS: FINAL PRIORITY PROJECT LIST

Corridor	Direction	Bottleneck	Option	Project	Description	Est. Cost	Traffic Anal. Tool(s)*	Comments/Traffic Analysis Findings	Ranking
I-205	NB	4	1d	Aux lane extension through Stark/Washington St. interchange to Glisan St. EXIT.	Extend auxiliary lane from existing aux lane at NB Stark/Washington St. EXIT-ramp to NB Glisan St. EXIT-ramp.	$1.7M - $2.0M	HCS, E, T	Alternative option (new): shorter segment extending existing aux lane from NB Stark/Washington St. EXIT-ramp to NB Glisan St. EXIT-ramp. Provides oppt. for longer auxiliary lane segments, however, LESS GOOD traffic benefits due to existing congestion at Powell Blvd. ENTRANCE-ramp not addressed, nor difficult weaving at Division St. ENTRANCE-ramp to Stark/Washington EXIT-ramp.	M/L
I-205	NB `	4	1e	Aux Lane extension through Stark/Washington St. & Glisan St. interchanges to I-84.	Extend auxiliary lane from existing aux lane at NB Stark/Washington St. EXIT-ramp to I-84 WB EXIT-ramp.	$3.2M - $3.7M	HCS, E, T	Alternative option (new): shorter segment extending existing aux lane from NB Stark/Washington St. EXIT-ramp to I-84 WB EXIT-ramp. Oppt. for longer auxiliary lane segments, however, LESS GOOD traffic benefits due to existing congestion at Powell Blvd. ENTRANCE-ramp not addressed, nor difficult weaving at Division St. ENTRANCE-ramp to Stark/Washington EXIT-ramp.	M/L
I-84									
I-84	EB	2	2a	Extend Grand Ave. ENTRANCE-ramp accel lane to 12th Ave. O'Xing	Extend ENTRANCE-ramp, widen mainline, add profile striping, to provide greater separation be-tween merging I-5 SB/I-5 NB > I-84 EB ramp traffic.	$2.7M - $3.5M	HCS	UNCERTAIN traffic benefits. ~400' accel lane currently. ~1,200' to 12th Ave. O'Xing. Recommend 'gap analysis' of accel lane extension @ 500'/1,000', 1,200'. Perhaps have Traffic Unit address as Safety project?	M/L
I-405									
I-405	SB	2	2a	Re-stripe Hwy 30 ENTRANCE-ramp to one-lane merge.	Re-stripe from existing 2-lane parallel merge.	$2.0M - $5.4M	HCS, E	Better lane balance. GOOD traffic benefits in operations and safety. Eliminates the chaotic merger then weave. This should make traffic operate in more organized fashion. Only 11% of traffic from US 30 exits @ Everett St., and 14% of traffic from US 30 exits @ US 26. Review cost estimate --- seems high for re-striping. How far SB does re-striping need to be carried? Field test?	M
US 26									
US 26									

* Analytical tools codes:
VISSIM
HCS
S - Synchro/Sim Traffic
T - Travel Demand Model
E - Engineering Judgement
X - Not supported

Appendix A: All Corridors Proposed Improvements Combined

C-BOS: PROPOSED IMPROVEMENTS: ALL CORRIDORS
I-5, I-205, I-84, I-405, US 26

Corridor	Name	Bottle-neck	Study Area	Op-tion	Project Name	Description	Cost Elements	Comments	Priority
	I-84 EB								
I-84 EB	I-5 SB/NB Merge Bottleneck	**2**	I-5 SB/I-5 NB merge @ Grand Ave. ON-Ramp	**2a**	I-5 SB/NB Merge	Add deflectors or profile striping for separation between Grand Ave ON-ramp and I-5 NB > I-84 EB; widen mainline to accommodate barriers and shy distance	**$2.7M - $3.5M:** add 600'L x 25'W roadway length & 800'L x 25'W ramp width ($0.58M); 1,400' L x (4'+10')/2 H retaining walls ($0.59M); sign bridge ($0.5M); 4 light poles ($0.06M); Plus PE/CE/ contingency ($1.4M).	I-5 NB > I-84 EB merges soon upon touching I-84; Grand Ave. ON-Ramp drivers attempt mainline merge sooner than necessary. Will require some cutting-back of existing retaining wall. Considered extending accel lane out further but expensive to widen 12th Ave. O'Xing.	
I-84 EB	Irving St./16th ON-Ramp Bottleneck	**X**	Irving St./ 16th ON-Ramp	**2b**	Irving St./16th Ave. ON-Ramp	Congestion appears only to occur when ramp meters are OFF; consider turning on ramp meter sooner, or extend period longer.	**$0:**	Consider turning on ramp meter sooner, or extend period longer. Need to check ramp meter parameters.	
I-84 EB	Corridor-wide	Corr-Wide	I-5 - I-205	**3c**	Corridor Active Management Signage	Use corridor-wide active management signage to warn of queueing ahead;	**$2M-$4M:**	Funding being pursued for future study of active management signage of major corridors. Future study of region corridors to address implemen-tation of active management/variable speed signage.	
	I-84 WB								
I-84 WB	I-5 to I-84 WB Bottleneck	**4**	Ramp to I-5/I-84 Diverge (MLK/Grand Ave. - RQ)	**4a**	I-84 - I-5 Diverge Ramp Lanes Configuration	I-84WB approach to I-5 NB/I-5 SB split should consider 3-2-1 split @ I-5 diverge, instead of current 3-2-2 split; assign 2-lanes SB & 1 Lane NB (then widen to 2-lanes NB); restripe?	**$800,000:** 1/2 mile sign bridge ($300K); 1 mile sign support ($50K); restriping ($13.6K); plus PE/CE/contin-gency ($436.4K).	Long-term need; long-term solution requires 2-lane I-84 WB to I-5 NB near MLK/ Grand Ave; may conflict with UPRR Graham Line connection; need traffic analysis of lane capacity/demand of different lane split configura-tions. Analysis of the existing lane by lane volumes immediately downstream of the I-84 WB/I-5 NB & SB split shows there is poor lane balance. The middle lane is currently operating at-capacity for a number of hours throughout the day while the outside lane is underutilized. Converting the 3-2-2 lane split into 3-2-1 split (with 1 lane to I-5 NB) at the I-5 diverge will result in much better lane balance and improved traffic flow. Extend exit gore point further to east	
I-84 WB	I-5 NB OFF	**4**	33rd Ave. ON-Ramp - I-5 SB/NB split	**4b**	Signage Upgrade 33rd ON-Ramp/ Glisan St. ON-Ramp - I-5 NB/I-5 SB diverge	Signage is misleading; sight distance issue at curve to I-5 NB; improve signage; may require new/large sign structures;	**$1M-$2M:**	Signage of upcoming I-5 NB/SB split is not clear. Need correct signage showing I-5 NB/SB diverge details, and move further upstream. Need review how to better depict I-5 NB/SB split, and where to place advance signage.	
I-84 WB		**4**	MLK/Grand Ave. - I-5 NB/I-5SB diverge	**4c1**	Signage Upgrade /extend start of ON-Ramp - I-5 NB/I-5 SB diverge. (*no* accommodation for streetcar on MLK/Grand)	Extend gore point east 1,500'; enhance signage on Grand Ave. O'Xing, and sign bridge west of 12th Ave. O'Xing; keep 3-2-2 split. *assume R/R encroachment can be worked out; assume vertical clearance can be maintained; assume bridge supports can be replaced -- need confirm possible.	**$8M-$10M:** Widen 1,500'L x 10'W mainline merge approach ($275K); upgrade signage ($350K); bridge sup-port/column type change ($2M-$3M); plus PE/CE/contingency ($3.1M); **ADD**: 450'L x 10'W WB>NB ramp bridge widening ($900K); plus PE/CE/ contingency ($1.04M).	Uncertain of physical feasibility due to location of support piers close to highway. Need to review O'Xing structure piers for physical feasibility for widening mainline.	
I-84 EB		**new**	MLK/Grand Ave. - I-5 NB/I-5SB diverge	**4c2**	Signage Upgrade /extend start of ON-Ramp - I-5 NB/I-5 SB diverge. (accom-modation for streetcar on MLK/Grand)	Extend gore point east 1,500'; enhance signage on Grand Ave. O'Xing, and sign bridge west of 12th Ave. O'Xing; keep 3-2-2 split. *assume R/R encroachment can be worked out; assume vertical clearance can be maintained; assume bridge span will be replaced and streetcar tracks replaced --- need confirm.	**$9M-$11M:** Option 4c1 costs *plus* : 50' x (12'x4' + 8'x1' + 8'x2') Grand Ave. adjustments ($720K); 50' x (12'x4' + 8'x1' + 8'x2') MLK Blvd. adjustments ($$720K). Plus PE/CE/contingency ($4.6M). Plus streetcar replacement.		

C-BOS: PROPOSED IMPROVEMENTS: ALL CORRIDORS
I-5, I-205, I-84, I-405, US 26

Corridor	Name	Bottle-neck	Study Area	Op-tion	Project Name	Description	Cost Elements	Comments	Priority
I-84 WB	Glisan St. ON-Ramp Bottleneck	**6**	I-205 SB ON-Ramp to Glisan St. ON-Ramp	**6a**	Glisan St. ON-Ramp Signage Improvements	Install a flashing beacon on top of the existing "SLOW" sign or on the Curve Warning sign, and a part-time restriction electronic "Stopped Vehicles Ahead" sign along with loop detectors on the ramp.	**$500K-$1M:**	Poor horizontal curve/sight-distance at point of ON-ramp entrance; structure also causes poor sight-distance; left lane brake lights affects other lanes. The a.m. and p.m. peak hour ramp volume is 450 vph and 480 vph, respectively. The horizontal curve and going under I-84 causes poor sight distance. Analysis of the crash history within the last 5 years reveals that there were ten crashes occurred on the ramp. Seven of the crashes occurred during the time when the ramp meter was not activated, indicating that the crashes occurred during the non-peak period, during which mainline traffic would flow more smoothly. Install improved signage/warning lights to address safety issued. Top 5% SPIS site.	
I-84 WB		**6**	I-205 SB ON-Ramp to Glisan St. ON-Ramp	**6b**	Glisan St. ON-Ramp O'Xing	Replace/reconstruct U'Xing entrance to I-84 with O'Xing to improve sight distance and have WB ON-ramp connect at same elevation as mainline.	**$12M-$13M**: O'Xing = 300' x 30'W ($1.8M-$2.2M); 900'+ ramp ($700K - $1M); 900' x 20' retaining wall ($2.5M); plus PE/CE/contingency ($7M-$7.3M)	Analysis of the crash history within the last 5 years reveals that there were ten crashes occurred on the ramp. Seven of the crashes occurred during the time when the ramp meter was not activated, indicating that the crashes occurred during the non-peak period, during which mainline traffic would flow more smoothly. Top 5% SPIS site.	
I-84 WB		new	I-205 SB ON-Ramp to Glisan St. ON-Ramp	**6d**	Glisan St. ON-Ramp O'Xing	Close ramp.	**$200,000:** scarify ramp pavement; add detour signage	New. Top 5% SPIS site.	
I-84 WB	I-205 SB to I-84 WB Merge Bottleneck	**7**	I-205 SB Ramp to I-84 WB Ramp	**7a** com-bine with 7b	I-205 to I-84 WB Ramp Reconfig-uration	Merge two I-205 NB to I-84 WB flyover lanes together; then merge this lane with I-205 SB ramp to I-84 WB; then add this single lane to I-84 WB main-line; extend accel lane out further; re-stripe NB>WB ramp; separate/re-build some of SB>WB ramp from mainline.	**$3.5M - $4M:** restripe 5,550' of mainline & SB > WB ramp, and 5,600' of NB > WB ramp ($22.3K); widen & pave roadway (1,850'L x 33'W) ($1.3M); construct retaining wall (1,400'L x 5'H) ($350K); plus PE/CE/contingency ($1.5M - $2M).	As described in I-205 Design Panel work: Bottleneck #7 Option #1. Need to model as part of I-205 corridor.	
I-84 WB		**7**	I-205 SB Ramp to I-84 WB Ramp	**7b** (new)	I-205 to I-84 WB Ramp Reconfig-uration	2010 modified proposal: make I-205 SB the add-lane; make I-205 NB into single-lane merge.	Mainly restriping; some pavement widening? $1M - $2M (?)	Modification of 7a as described in I-205 Design Panel work: Bottleneck #7 Option #1. May create negative consequences for I-205 NB. Need to model as part of I-205 corridor.	
I-84 WB	Corridor-wide	Corr-Wide	I-5 to I-205	**8a (new)**	Interchange Entrance Ramp Closures.	Remove selective interchange ramps (Irving St./16th Ave. ON-ramp?; Willow St. ON-ramp?; 58th Ave. ON-ramp?)	**$500K - $1M per ramp:** (scarify pavement; close ramps; detour signage);sign mitigation ($50K-$100K).	May not be politically feasible. Business & neighborhood resistance likely. Politically difficult.	
I-84 WB	Corridor-wide	Corr-Wide	I-5 to I-205	**8b (new)**	Time-of-day, Directional Interchange Ramp Closures.	Install peak period-operated ramp gates to actively manage Entrance to main-line/allow Exit-Only movements during PM peak hours; and manage Exit-Only movements and selective Entrance-Only access during AM peak hours.	**$250K - $350K per ramp site:** (to include gate, cabinet, camera, ptr sign, and communications)	May not be politically feasible. Business & neighborhood resistance likely. Need to model effects of constraining ramp Entrance to mainline by active management of selected ON-ramps. Recommend modeling 4-5 interchange locations for active management. Recommend modeling to test effectiveness of active management of 1/2 or 3/4 or all inbound/ outbound interchange ramps.	
	US 26 EB								
		Signage planned for US 26 EB					Includes CE, PE & Contingency		
US 26 EB	Hwy 217 On-Ramp Bottleneck	**1**	Cedar Hills ON-Ramp to Hwy 217 ON-Ramp/ Lane Drop	**1a**	Hwy 217 to US 26 EB ON-Ramp Striping Modification	Extend solid double line, or separator (profile striping) 3,000' from painted gore past first lane drop. Establishes single lane ON traffic, and prohibits US 26 EB mainline from early weave to outside	**$30K - $50K:** extend 3,000' of solid double line (profile striping) ($12,000); may need to grind pavement and re-pave; traffic staging can be costly; need PE/CE/contingency.	Could reduce motorist merging over: pushes merges farther down the line. Recommend sensitivity modeling to assess how long accel lane needs to be to be beneficial. Identify speed by lane, to help assess effectiveness of extending lane.	

C-BOS: PROPOSED IMPROVEMENTS: ALL CORRIDORS
I-5, I-205, I-84, I-405, US 26

Corridor	Name	Bottle-neck	Study Area	Op-tion	Project Name	Description	Cost Elements	Comments	Priority
US 26 EB		**1**		**1b**	Hwy 217 Guide Signage	Mainline and ramp guide signs on/near OR 217 & US 26; thru traffic merge left.	**$2M-$4M:** Identify number/spacing of improved signage, from OR 217 to I-405.	Might have safety benefits and help with upcoming diverge for US 26/I-405. High crashes: would be beneficial to forewarn drivers about speed differentials. Need better cost estimate of number/spacing of signage. (Canh/Mark/Dennis) Future study of region corridors to address imple-mentation of active management/ variable speed signage (as per OR 217).	
US 26 EB		**1**		**1c**	ATMS	ATM variable signs indicating lane assignments and variable speeds; per lane side or overhead.	**$2M-$4M:** Identify number/location of variable message signs, from OR 217 to I-405.	Might have safety benefits and help with upcoming diverge for US 26/I-405. High crashes: would be beneficial to forewarn drivers about speed differentials. Need better cost estimate of number/ spacing of signage. (Canh/Mark/ Dennis) Future study of region corridors to address imple-mentation of active management/ variable speed signage (as per OR 217).	
US 26 EB		**1**		**1d-2**	Hwy 217 to US 26 EB Merge Lane (re-stripe)	Modify acceleration lane with profile striping, from OR 217 ON to Sylvan/Scholls Ferry OFF.	**< $1M:** restriping/signage	Downscoping of Option # 1d-1 (auxiliary lane). Restripe merge area with 8' solid profile striping, and lane merge arrows.	
US 26 EB	I-405 Diverge Bottleneck	**3**	Skyline/Sch olls Ferry Rd. ON-Ramp to I-405 Diverge	**3a**	Jefferson St. Option	Close Market St. OFF and use Jefferson St. for downtown exit. Open Jefferson St. to two lanes. Several structures; widening not possible.	**< $5M:** signage is ~ $100K - $150K, depending on how many to be installed; cost of mitigation (local street improvements) cannot be assessed at this level (without input from Traffic); cost to remove Market St. OFF-ramp (7,200 sq. ft.) uncertain. Plus PE/CE/contingency.	Perhaps politically unfeasible. Might have issues getting drivers to PGE park. Analyze roundabout. Remove bus stop in intersection. Check timing for trains and driver delay. May need to be combined with other improvements. Insofar as EB US 26 > CBD does not queue back like EB US 26 > I-405 NB & SB; routing traffic to Jefferson St. OFF will *not* gain much benefit. Need start with HCS analysis to assess concerns with overloading local street system (2,200 vph in p.m. peak) (200' blocks); and conflicts with: LRT; round-about; peds., PGE Park; before determining whether to model this option.	
US 26 EB		**3**		**4b**		Realign to outside from diverge with less of an angle to I-405 SB using the same structure. Market St. structure may not be impacted. Combine 14th Ave. & Taylor St.	**$$??:**	Braid Montgomery St. with Taylor St.? Sight distance not particularly an issue: perhaps put up signage saying queue ahead would have same impact and aggressive ramp metering for Montgomery St.ON-ramp. Does not address problem. Congestion problems are primarily generated on I-405, not US 26. Consider in conjunction with I-405 SB corridor bottleneck #4.	
US 26 EB		**3**		**4c**		EB US 26 ramp to SB I-405 widen to south (inside) and realign. New struc-ture under Montgomery St. Improve sight distance and maybe two lanes.	**$$??:**	Does not address the problem. Congestion problems are primarily generated on I-405, not US 26. Consider in conjunction with I-405 SB corridor bottleneck #4.	
	US 26 WB								
US 26 WB	I-405 x US 26 Merge Bottleneck	**6**	I-405 Ramps at US 26 x I-405 Merge	**6a**	Striping Plan	Look at original construction lay-out plans for striping. Perhaps wasn't striped correctly.	**$$??**	Review construction lay-out plans for striping. Recommend sensitivity modeling *to assess* impacts/benefits from enhanced striping.	

C-BOS: PROPOSED IMPROVEMENTS: ALL CORRIDORS
I-5, I-205, I-84, I-405, US 26

Corridor	Name	Bottle-neck	Study Area	Op-tion	Project Name	Description	Cost Elements	Comments	Priority
	I-405 SB								
I-405 SB	Hwy 30 ON-ramp Bottleneck	**2**	Hwy 30 ON-Ramp to I-405 SB Merge	**2a (new)**	Hwy 30 ON-Ramp to I-405 SB 2>1 Merge (3-lns SB I-405 @ US 30 Merge)	Restripe for parallel 2-lane merge on Hwy 30 ON-Ramp, to 1-lane before merging with I-405 SB. Re-tain existing Fremont Bridge split (4 to 3+2) and carry 3-lanes I-405 SB to US 30 single-lane merge.	**$2M - $5.4M:**	A merge issue moreso than weave issue. High speed differentials between lanes (outside lanes free flow). Parallel merge. Model for lane balance. (1) A.M. peak hour is the dominant peak hour for this merge/weave section between US30 SB ON-ramp and the exit-ramp to Everett St. The SB mainline a.m. peak hour volume is 3,200-3,600 vph; the US30 SB on-ramp carries about 1,450 vph in the a.m. and the Everett St. exit-ramp volume is 460 vph. The current lane geometry requires traffic in the inside lane of the US30 ON-ramp to merge with the traffic in the outside lane of the SB I-405 mainline. A weaving maneuver for traffic in the outside lane on the US30 ON-ramp heading to SB I-405 can be made downstream of the merging area. Due to the relatively high volume on the SB I-405 mainline, the existing three SB lanes at the US30 SB ON-ramp junction should be maintained.	
		2		**2a (new)**	Hwy 30 ON-Ramp to I-405 SB 2>1 Merge (3-lns SB I-405 @ US 30 Merge) **(continued)**			(2) In addition, analysis of the lane by lane volumes at the west end of the Fremont Bridge shows that the existing upstream 4-2-3 lane split at the WB US30 exit-ramp currently provides good lane balance. Eliminating the "inside merge" conflict would be desirable as a means of enhancing traffic safety and creating a simplified weaving section that would operate at LOS C-D. The Future 2035 a.m. and p.m. Regional Travel Demand Model was reviewed and it shows no significant traffic growth (only an increase of ~100 vph to 150 vph) on the US30 ON-ramp In the past 8-10 years, Region Traffic has eliminated this type of 'tapered inside merge/ convergence' design on various freeways as a means of safety enhance-ment. Sign spacing appears to be adequate with the right lane termination begins at around MP 1.31 and the end of taper at MP 1.01. Freight mobility should not be a problem in terms of accommodating over-dimensional load with the ramp reduced to a single lane. Need to be aware of OR366.215 concerning lane reduction on the US30 ramp	
I-405 SB	Everett St. ON-ramp Bottleneck	**3**	Everett St. ON-Ramp to US 26 OFF-Ramp	**3a**	Static Signage & Sight Distance Improvements	Add additional static signage SB (cantelever sign from side just before Morrison St. O'Xing); extend gore point of Everett St. ON-ramp, to prevent earlier weaving; clear landscaping to improve sight distance.	**$1M:**	Weave problem. Lane drop at Couch St. OFF-ramp. Limited signage preceeding US 26 OFF-ramp. Aim is to get motorists to use left-lane, to improve lane utilization. (restriping and signage costs do NOT incl. any PE/CE/ Contingency costs). Note: no schematic drawn	
I-405 SB		**3**	Everett St. ON-Ramp to US 26 OFF-Ramp	**3b**	Install active variable speed signage by lane.	Use active variable speed signs by lane?	**$2M-$4M**	(restriping and signage costs do NOT incl. any PE/CE/Contingency costs). Need better cost estimate. (Mark/Canh/ Dennis) Note: no schematic drawn	
I-405 SB		**3**	Everett St. ON-Ramp to US 26 OFF-Ramp	**3c**	Extend Everett St. ON-Ramp to US 26 OFF-Ramp Merge/ Gore South	Push Everett St. ON-ramp gore point further south (Alder St.).	**$5K-$15K:** extend double solid line/ profile striping 700' ($2.8K); plus traffic staging; plus PE/CE/contingency ($2.2K-$4.2K);	To be studied further. Need better cost estimate. Note: no schematic drawn.	

C-BOS: PROPOSED IMPROVEMENTS: ALL CORRIDORS
I-5, I-205, I-84, I-405, US 26

Corridor	Name	Bottle-neck	Study Area	Op-tion	Project Name	Description	Cost Elements	Comments	Priority
I-405 SB		**3**	Everett St. ON-Ramp to US 26 OFF-Ramp	**3d2 (new)**	Close Everett St. ON-Ramp.	Close Everett St. ON-ramp. Add 3rd lane @ Couch St. OFF-ramp. Traffic wanting to go to US 26 from Everett St. can go via 13th Ave. > Taylor St./Clay St. > US 26. Traffic wanting to go to I-405 SB from Everett St. can go via 13th Ave. > Montgoverry St. > I-405 SB.	**$??M - $??M:**	New proposal. Need model ramp closure. May be difficult politically to close this ramp.	
I-405 SB		**3**		**3e**		Everett St.ON to 26 OFF. Shoulder widening, restripe, realign; trim landscaping.	**$215K-$270K:**	Improve sight distance.	
I-405 SB	US 26 ON-ramp/Broad way OFF-ramp	**4**	US 26 WB OFF-ramp to Broad-way OFF-ramp	**4b**	Re-order merge priorities of SB I-5/I-405/Naito Parkway.	Re-order merge priorities of SB I-405/SB I-5/SB Naito Parkway, between Freemont Br. & Ross Island Br., to accommodate higher traffic volumes on I-5 SB.	**$50M +/-?:** Re-assign priority merge to higher volume SB I-5 instead of to SB I-405; re-locate SB Naito Parkway to west, under I-405 ramps to merge into SB I-405; maintain 2-lane I-5 SB ON-ramp as 2-lane merge; SB I-405/ SB Naito Parkway merge with SB I-5.	Model different lane configuration to analyze change. Need better cost estimate. Suggest traffic analysis be conducted before cost estimate prepared. Exceeds Study cost limits?	
I-405 SB		**4**	US 26 ON-Ramp to Broadway OFF-Ramp	**4c1**	Montgomery St. ON-Ramp limited to Broadway OFF Ramp only as frontage road to Ross Is Bridge.	Barrier separate Montgomery St. ON-ramp and then use it as a C-D frontage road to Ross Island Bridge. Eliminates conflicts of merge to I-405. Install signage on US 26 to Ross Island Bridge and to CBD.	**$15M:** 325'L x 15'H retaining wall ($488K); reconstruct 12th Ave. O'Xing - 428'L x 51'W x 200'H ($4.4M); assume NB side of wall can remain "untouched" with bridge replace-ment; new 1,000'L x 15'H SB wall for C-D road ($1.5M); 1,000' barrier between I-405 mainline & C-D road ($35K); sign bridge replace ($250K); 1,000' L x 28' roadway widening ($616K);PE/CE/conting ($8.2M).	Come OFF at Market St. from US 26, then get ON Montgomery St. ramp to Ross Island Bridge. SB I-405 motorists would still have choice to Ross Island Bridge & Broadway OFF. Sign for Market St. to Ross Island Bridge	
I-405 SB		**4**		**4c2**	Montgomery St. ON-Ramp closure.	Close Montgomery St. ON-Ramp. Local traffic only.	**$200K:** scarify ramp pavement; add detour signage	Relatively low ramp volumes (~800 vph) may not cause significant merge/weave conflicts. Need model for traffic impacts. The Montgomery St. SB ON-ramp carries about 480 vehicles and 800 vehicles in the a.m. and p.m. peak hour, respectively. The dominant peak hour for I-405 SB is the p.m. peak. With the Montgomery St. on-ramp closed, 22% (200 veh.) divert to Taylor St. ON-ramp and then to Broadway St./Ross Island Br exit; 18% (150 veh.) divert to Broadway St. to head to Ross Island Bridge; and 12% (100 veh.) divert to Broadway St. ON-ramp to I-405 SB. HCM weave analysis does not show significant improvement in terms of LOS based on density in the section between US26 ON-ramp and Broadway St./Ross Island Br. exit-ramp.	
I-405 SB		**4**		**4c2**	Montgomery St. ON-Ramp closure. **(continued)**			However, there would be actual operational benefits: (1) Eliminate the short weave distance of 620' and short separation of 400' between the US26 ON-ramp and Montgomery ON-ramp. (2) Eliminate the weave conflicts. As a result, the mainline I-405 SB should flow better with the Montgomery St. SB ON-ramp closed. This ramp serves traffic from PSU and it is the complimentary ON-ramp to the 12th Ave exit-ramp in the NB I-405 direction. Closing either ramp would be political. The Broadway St. ON-ramp is narrow and functions as a single lane ramp meter. Can it be widened to the inside to allow for two-lane ramp meter to accommodate additional demand with Montgomery St. SB ON-ramp closed?	

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I-5, I-205, I-84, I-405, US 26

Corridor	Name	Bottle-neck	Study Area	Op-tion	Project Name	Description	Cost Elements	Comments	Priority
I-405 SB		**4**		**4e**	SE Broadway left to 6th ON-Ramp NB closure	Eliminate EB > NB left-turn from Broadway to 6th Ave. Restripe NB 6th Ave. lanes from existing 2-lanes to 3-lanes (2 lanes to 6th Ave. ON-ramp; 1 thru lane NB; bike lane)	**$200K:**	People trying to get ON at I-405 NB block intersection for I-405 SB OFF causing back up. Would enhanced green time allow for better movement? Couple with I-405 NB Option 1B.	
I-405 SB						ODOT will be initiating a variable speed project on I-5 & I-405 south end (Broadway to I-5 South)			
	I-5								
I-5	SB Hood Ave. ON-Ramp Bottleneck	**4**	Harbor Drive to Terwilliger	**1b**	Hood to Corbett Lane Extension Widen	Widen to create fourth lane from Hood Ave ON-ramp to Corbett overpass	1,500 ft of Shoulder pavement and possibly walls	May require shifting striping of both the SB & NB lanes.	
I-5		**4**		**3**	I-5/I-405 Merge Lane Extension to Corbett	Lane extension from I-5 to Corbett; widen or contsruct a separate structure for Hood ON-ramp, move Hood ON-ramp downstream	1,200 ft of shoulder widening; 1,200 ft ramp construction; 200 ft bridge widening	May be high cost project.	
I-5		**4**		**4**	Restripe Harbor Drive On-ramp to I-405	Restripe Harbor Drive as a single lane left side merge to the left lane of I-405 rather than dropping I-405 lane	Minor Costs	Improves speed balance and promotes better utilization of left lane, which helps downstream merges.	
I-5		**4**		**7**	Harbor Drive Relaignment	Realign Harbor Drive to outside of I-405. Let I-405 add both lanes	Historical, not from Design Panel		
I-5	NB Terwilliger ON-Ramp Bottleneck	**1**	Terwilliger Curves	**1a**	Terwilliger Ramp Extension (Widen)	Extend Terwilliger ON-ramp through curve	330 ft bridge construc-tion; 1,000 ft ramp construction (+1,000 ft ramp construction for better rearview sight)	Extended accel lane should be barrier separated to prevent early merge.	
I-5		**1**		**2**	ATMS	Install ATMS throughout curves. (extending concept from I-405)	Minor Costs		
I-5	SB Carman Lane Drop Bottleneck	**5**	OR 217 to Lower Boones Ferry	**1**	Ramp Meter	Ramp meter on HWY 217	Minor Costs		
I-5		**5**		**3**	Carman to Lower Boones Aux Lane	Carry 4th lane from Carman to Lower Boones Ferry Rd.	1,200ft of Carman ON-ramp reconstruction; 800 ft of Lower Boones OFF-ramp reconstruction	Project in 2013-2015 STIP.	
I-5	SB Nyberg OFF-Ramp Bottleneck	**6**	Lower Boones Ferry to Nyberg Rd.	**1**	Nyberg Rd.OFF-Ramp Lane Increase	Increase OFF-ramp to Nyberg Rd. from one lane to two.	Ramp reconstruction		
I-5	NB Lower Boones Ferry OFF-Ramp Bottleneck	**2**	Nyberg Rd. to Lower Boones Ferry Rd.	**2a**	Reconstruct Lower Boones Ferry Rd. NB OFF-Ramp	Increase Lower Boones Road OFF-ramp from one lane to two	1,200 ft of ramp reconstruction		
I-5		**2**		**2b**	I-5 SB Aux Lane extension, Nyberg Rd. to Carman Dr.	Extend 4th lane/aux lane from Nyberg through Lower Boones Ferry; Lower Boones Ferry adds 5th lane through Carman Dr. inter-change; Carman Dr. inter-change merges into 5 lanes	6,200 ft of Aux construction; 800ft ramp modification		

C-BOS: PROPOSED IMPROVEMENTS: ALL CORRIDORS
I-5, I-205, I-84, I-405, US 26

Corridor	Name	Bottle-neck	Study Area	Op-tion	Project Name	Description	Cost Elements	Comments	Priority
I-5		**2**		**2b-1 (new)**	Lower Boones Ferry Rd,. to Nyberg Rd. Aux Lane	Carry 4th lane/aux lane from Lower Boones Ferry Rd. to Nyberg St. interchange	TBD		
I-5		**2**		**2b-2 (new)**	Nyberg Rd. to I-205 Aux Lane	Carry 4th lane/aux lane from Nyberg St. interchange to I-205	TBD		
	I-205								
I-205	SB I-84 WB OFF-Ramp Bottleneck	**7**	I-205 to I-84 WB Ramp Reconfigura-tion	**1**	I-205 to I-84 WB Ramp Reconfiguration	Merge two I-205 NB to I-84 WB flyover lanes together, then merge this lane with I-205 SB to I-84 WB lane, then add this single lane to I-84 WB	Mainly restriping, minimal pavement -- less than **$1M**	Proposal modified: make I-205 SB the add-lane, and make I-205 NB into a single-lane merge. Could create negative consequences for I-205 NB.	
I-205		**7**	I-84/I-205 SB Braid	**2**	I-84/I-205 SB Braid	Braid I-84 WB to I-205 SB movement with I-205 SB to I-84 WB movement	Structures -- 8,400' SF bridge for weave, 83,000 cu yds earthwork, 75,000 sf retaining wall, 130,000 sf pavement: TOTAL **$34.6M**	May be expensive project for benefit generated.	
I-205		**7**	I-84 WB Approach to I-205 Widening	**4**	I-84 WB Approach to I-205 Widening	I-84 WB 4-lane approach currently a 2/2 split -- left two lanes go to I-205 NB/SB, right two lanes continue on I-84 WB. Change to 3/2 split, with three lanes providing access to I-205 NB/SB	Sign bridge, 2,000 SF retaining wall, 5,000 cu yds earthwork, additional lane 40,000 sf: TOTAL **$3.2M**		
I-205		**7**		**5**	Review signing				
I-205	SB Stark/Wash-ington ON-Ramp Bottleneck; SB Division /Powell OFF-Ramp Bottleneck	**8,9**	EB I-84 ON-Ramp to Division/ Powell OFF-Ramp	**1**	Auxiliary Lane, I-84 EB ON-ramp to Division / Powell OFF-ramp	Constructs new aux lane from I-84 EB ON-ramp to Stark/Washington on-ramp (already an aux lane between Stark/Washington and Division/ Powell)	**$4.5M**		
I-205		**8,9**		**1A**	I-84 EB Approach to I-205 SB Reconfiguration	Reconfigures the three lanes eastbound approaching I-205 SB to a 2-2 split (2 lanes southbound onto I-205 SB)	TBD	Appears to conflict with current RTP project that carries third I-84 EB lane to I-205 NB OFF-ramp. Project would preclude having a third lane EB on I-84 beyond the I-205 SB OFF-ramp. Does not relate directly to I-205 operation.	
I-205		**8,9**		**2**	Second Aux Lane, Washington / Stark ON-ramp to Division / Powell OFF-ramp	Constructs additional aux lane between Stark / Washington and Division/Powell (assumes that first aux lane has been carried through from I-84 EB ON-ramp, as in Option 1)	**$27.4M**	Cannot drop two lanes at Powell/Division --- so would have to be a 5>4/2 split, necessitating a fourth lane all the way to Foster Rd. Widening should be to the inside.	
I-205	NB Division & Powell ON-Ramp Bottleneck	**4**	Aux Lane, Powell ON-Ramp to Division ON-Ramp	**1**	Aux Lane, Powell ON-ramp to Division ON-ramp	Constructs/stripes new auxiliary lane from NB Powell ON-ramp to the aux lane that begins at the Division ON-ramp	TBD		

C-BOS: PROPOSED IMPROVEMENTS: ALL CORRIDORS
I-5, I-205, I-84, I-405, US 26

Corridor	Name	Bottle-neck	Study Area	Op-tion	Project Name	Description	Cost Elements	Comments	Priority
I-205		**4**	Aux Lane, Powell ON-Ramp to Division ON-Ramp	1a	Powell Blvd. to Division St. auxiliary lane (double-lane EXIT @ Stark/Washington St.)	Add NB aux lane Powell Blvd.ENTRANCE-ramp to Division St.ENTRANCE-ramp; 2-lane EXIT to Washington St.	$6.5M - $7.5M	Original proposal to address relatively high crash rates in this segment. Division St. U'Xing widening. LRT rigid frame extension. MODERATE incremental traffic benefits. Two-lane EXIT to Washington St. necessary.	
I-205		**4**	Aux Lane, Powell ON-Ramp to Division ON-Ramp	1b	Powell Blvd. to Division St. auxiliary lane - Powell Blvd. to Glisan St.	Add aux lane Powell Blvd. to Glisan St. EXIT ramp; NB ENTRANCE-ramp Division St. add/aux lane plus 2-lane EXIT to Washington St.; drop 1-lane at Washington St.; aux lane to Glisan St; 1-lane EXIT/drop lane to Glisan St.	$9.6M - $11.5M	Alternative option (new): Powell Blvd. to Glisan St. Division St. U'Xing widening. LRT rigid frame extension. LESS GOOD traffic benefits. Requires weaving over 1 or 2 lanes. May cause queuing. Two-lane EXIT to Washington St. imperative for this option to work properly.	
I-205		**4**	Aux Lane, Powell ON-Ramp to Division ON-Ramp	1c	Powell Blvd. to Division St. auxiliary lane - Powell Blvd. to I-84.	Add aux lane Powell Blvd. to I-84 EXIT ramp; NB ENTRANCE ramp Division St. add/aux lane plus 2-lane EXIT to Washington St.; drop 1-lane at Washington St.; aux lane to Glisan St.; aux lane to I-84 EXIT; 1-lane EXIT/drop lane to I-84.	$12.0M -$13.6M	Alternative option (new): Powell Blvd. to I-84. Division St. U'Xing widening. LRT rigid frame extension. BEST traffic benefits if have continuous auxiliary lane Powell Blvd. > I-84. (22%: of traffic from Powell Blvd. > I-84; 68% of traffic from Division St. > I-84.) Two-lane EXIT to Washington St. imperative if this option to work properly.	
I-205		**4**	Aux Lane, Powell ON-Ramp to Division ON-Ramp	1d	Aux lane extension through Stark/Washington St. interchange to Glisan St. EXIT.	Extend auxiliary lane from existing aux lane at NB Stark/Washington St. EXIT-ramp to NB Glisan St. EXIT-ramp.	$1.7M - $2.0M	Alternative option (new): shorter segment extending existing aux lane from NB Stark/Washington St. EXIT-ramp to NB Glisan St. EXIT-ramp. Provides oppt. for longer auxiliary lane segments, however, LESS GOOD traffic benefits due to existing congestion at Powell Blvd. ENTRANCE-ramp not addressed, nor difficult weaving at Division St. ENTRANCE-ramp to Stark/Washington EXIT-ramp.	
I-205		**4**	Aux Lane, Powell ON-Ramp to Division ON-Ramp	1e	Aux Lane extension through Stark/Washington St. & Glisan St. interchanges to I-84.	Extend auxiliary lane from existing aux lane at NB Stark/Washington St. EXIT-ramp to I-84 WB EXIT-ramp.	$3.2M - $3.7M	Alternative option (new): shorter segment extending existing aux lane from NB Stark/Washington St. EXIT-ramp to I-84 WB EXIT-ramp. Oppt. for longer auxiliary lane segments, however, LESS GOOD traffic benefits due to existing congestion at Powell Blvd. ENTRANCE-ramp not addressed, nor difficult weaving at Division St. ENTRANCE-ramp to Stark/Washington EXIT-ramp.	
I-205		**4**	Aux lane, Stark/ Washington OFF-ramp to Glisan OFF-ramp	**2a**	Aux lane, Stark / Washington OFF-ramp to Glisan OFF-ramp	Constructs/stripes new auxiliary lane from existing upstream aux lane at NB Stark/Washington OFF-ramp to Glisan OFF-ramp	TBD		
I-205		**4**	Aux Lane, Washington / Stark ON-ramp to I-84 WB OFF-ramp	**2b**	Aux Lane, Washington / Stark ON-ramp to I-84 WB OFF-ramp	Constructs/stripes new auxiliary lane from NB Stark/Washington ON-ramp to I-84 WB OFF-ramp.			
I-205	NB Foster Rd. ON-Ramp Bottleneck	**5**	Foster Rd. to Powell Blvd.	**1**	Aux Lane, Foster ON-ramp to Powell OFF-ramp	Constructs/stripes new NB auxiliary lane from Foster ON-ramp to Powell OFF-ramp.	88,000 SF pavement, 13,000 cu yds earthwork, 32,000 sf wall -- TOTAL **$10.5M**		
I-205	NB I-84 WB ON-Ramp Bottleneck	**3**	EB I-84 OFF-Ramp to Airport Way	**1**	Northbound Aux Lane from I-84 EB ON-ramp (Restripe)	Aux/add lane from I-84 EB ON-ramp to Sandy Blvd. OFF-ramp by restriping	Restriping -- under **$1M**		

C-BOS: PROPOSED IMPROVEMENTS: ALL CORRIDORS
I-5, I-205, I-84, I-405, US 26

Corridor	Name	Bottle-neck	Study Area	Op-tion	Project Name	Description	Cost Elements	Comments	Priority
I-205	NB I-84 WB ON-Ramp Bottleneck	**3**	Northbound Aux Lane from I-84 EB ON-ramp (Widen)	**2**	Northbound Aux Lane from I-84 EB ON-ramp (Widen)	Aux/add lane from I-84 EB ON-ramp to Sandy Blvd. OFF-ramp by widening	TOTAL **$10.6M**	Models the same as Option 1.	
I-205		**3**	Aux lane extension to Columbia WB OFF-ramp	**A**	Aux lane extension to Columbia WB OFF-ramp	Extends aux lane from option 1/2 from Sandy OFF-ramp to Columbia OFF-ramp	TOTAL **$8.4M**		
I-205		**3**	Aux lane extension to Airport Way WB OFF-ramp	**B1**	Aux lane extension to Airport Way WB OFF-ramp	Extends aux lane from Option A from Columbia OFF-ramp to Airport Way WB OFF-ramp (aux lane already in place between Columbia ON-ramp and Airport Way WB OFF-ramp)	TOTAL **$4.9M**	Possible railroad coordination issues.	
I-205		**3**	Additional aux lane between Columbia on-ramp and Airport Way WB OFF-ramp	**B2**	Additional aux lane between Columbia on-ramp and Airport Way WB OFF-ramp	Constructs new aux lane (fifth lane) from Columbia ON-ramp to Airport Way WB OFF-ramp	Two new lanes from Columbia OFF-ramp to Airport Way WB OFF-ramp, TOTAL **$16.1M**	Possible railroad coordination issues.	
I-205	Milwaukie Expy ON-ramp to Gladstone/82nd Dr. OFF-ramp	**10**	I-205 Aux Lanes: Gladston to OR 212/224	**1**	I-205 Aux Lanes: Gladston to OR 212/224	Auxiliary lanes in both directions -- OR 212/224 to Gladston interchange (82nd Dr.)	Previously estimated at **$18.5M,** covers both directions	Historical. Not from Design Panel.	
I-205	Abernethy Bridge to Stafford Rd. interchange	**11**	I-205 Climbing Lanes, Abernethy Br. To 10th	**1**	I-205 Climbing Lanes, Abernethy Br. To 10th	New SB truck climbing lane from Abernethy Bridge to 10th St.	Previously estimated at **$56.8M,** covers both directions.	Designers believe this climbing lane can be 'shoe-horned' into existing pavement at significalntly lower cost than what was estimated previously.	

CHAPTER 5: APPENDICES

5.2 Appendix A: Technical Memoranda

A.1 Technical Memoranda 1 & 2: Methodology and Assumptions (known and available data)

A.2 Technical Memoranda 3: Bottleneck Identification and Diagnosis

A.3 Technical Memoranda 4 & 5: Corridor Design Review

A.4 Technical Memoranda 6: Evaluation Framework for Investments to Improve Freeway Operations at Bottlenecks on I-5 & I-205

A.5 Technical Memoranda 7: Design Panel Results

A.6 Technical Memoranda 8: Feasibility Review

A.7 Technical Memoranda 9: Summary of Operations Result

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DAVID EVANS
AND ASSOCIATES INC.

MEMORANDUM

DATE:	December 26, 2012
TO:	ODOT Project Management Team
FROM:	Scott Harmon, PE, PTOE
	Shelly Alexander, PE
SUBJECT:	**TM 9 - Summary of Operational Results**
PROJECT:	Corridors Bottlenecks Operations Analysis (C-BOS)
PROJECT NO:	ODOT 0000-0674
COPIES:	File

INTRODUCTION

The Corridors Bottlenecks Operations Study (the C-BOS) project is intended to provide spatial and temporal evaluation of freeway operations along five metro area corridors (I-5, I-205, I-84, I-405 and US 26) and correlate locations of congestion with potential mitigation measures/projects. After conducting the feasibility review (TM 8 Feasibility Review) of potential design projects and creation of a smaller, more focused list, operational benefits such as travel performance were considered. The analysis of operational benefits was conducted by both the Oregon Department of Transportation (ODOT) and the consultant. The purpose of this technical memorandum is to summarize the travel performance results of the project performance modeling prepared by the consultant.

This is the ninth technical memorandum for this project.

Evaluated Projects
In addition to the 18 recommended projects identified in TM 8, three additional projects were evaluated on an accelerated schedule and are currently built or are funded and programmed for construction. The 21 recommended projects are listed below and in attached Regional Recommended Project List. Eight projects were evaluated by DEA and summarized in this memorandum.

Recommended Projects

- I-5: Bottleneck-1, Project 1a (DEA evaluated)
- I-5: Bottleneck-2, Project 2a (DEA evaluated)
- I-5: Bottleneck-2, Project 2b-1 (DEA evaluated)
- I-5: Bottleneck-2, Project 2b-2 (DEA evaluated)
- I-5: Bottleneck-2, Project 2b-1 & 2b-2
- I-5: Bottleneck-5, Project 3 (DEA evaluated)
- I-5: Bottleneck-6, Project 3a-1
- I-5: Bottleneck-6, Project 3a-3 revised 3a-2
- I-205: Bottleneck-3, Project 2 (DEA evaluated)

Recommended Projects (continued)

- I-205: Bottleneck-3, Project 2a (DEA evaluated)
- I-205: Bottleneck-4, Project 1
- I-205: Bottleneck-4, Project 1a
- I-205: Bottleneck-4, Project 1b
- I-205: Bottleneck-4, Project 1c
- I-205: Bottleneck-4, Project 1d
- I-205: Bottleneck-4, Project 1e
- I-205: Bottlenecks-8&9, Project 1
- I-84: Bottlenecks-2, Project 2a
- I-84: Bottleneck-4, Project 4a
- I-84: I-205 Bottleneck-3, Project 1 (DEA evaluated)
- I-405: Bottleneck-2, Project 2a

Modeling Performance Metrics

This section describes the methodology used to evaluate the operational benefits of the recommended projects. The consultant evaluated eight of the twenty-one projects using one of the following traffic modeling software packages:

- VISSIM-a microsimulation analysis tool, or
- Highway Capacity Software (HCS)-an automated application of the Highway Capacity Manual

Models were developed based on existing field conditions for both analysis tools. Building on the existing conditions models, project models were created based on the recommended project description. Both models were assessed to determine anticipated queue length, duration of queue (VISSIM analysis only), speed, and density.

FEASIBILITY REVIEW

The feasibility review process identified a list of 21 projects (18 from the recommended project list, 3 accelerated projects) to move forward for traffic analysis assessment. (See Attachment 1 for the recommended list of projects.) The following sections categorize the projects based on corridor (I-5, I-205, I-84, I-405 and US 26) and provide a brief description of the findings of the eight projects evaluated by DEA (Table 1,
Table 2, and Table 3). The table tracks the project by Bottleneck identification (ID) number and tracking ID. The Bottleneck ID is comprised of two components: the corridor and the bottleneck number. The ID corresponds to graphics presented in the Appendix which provide more detail and a graphical representation of the analysis.

I-5 Projects

Eight projects were identified for I-5, five of which were evaluated by the consultant using traffic modeling software (shown in Table 1 and Figure 1 through Figure 3). ODOT evaluated one of the eight projects as summarized at the end of this section. The two remaining projects shown below were not analyzed.

- Auxiliary Lane: Nyberg St. to I-205 (I-5 southbound, bottleneck ID B6, tracking ID 3a-3)
- Auxiliary Lane: Nyberg St. to Carman Dr. (I-5 northbound, bottleneck ID B2, tracking ID 2b-1 & 2b-2)

The consultant used the VISSIM software to evaluate queue, duration, and speed for all five projects. The five projects included:

Freeway Entrance Ramp: Terwilliger Blvd. - (bottleneck ID-B1, tracking ID 1a)
This project would extend the Terwilliger ON ramp /acceleration lane on I-5 northbound around the curve to address poor sight distance. Additional concerns within the area include significant congestion and the steep grade of the roadway. It has the potential to reduce the crashes in this area by reducing the complexity of the merge maneuver. Currently drivers must navigate a long horizontal curve while merging into traffic or while accommodating merging traffic.

Freeway Exit Ramp: Lower Boones Ferry Rd. - (bottleneck ID B2, tracking ID 2a)
This project would increase the I-5 northbound OFF ramp capacity from one lane to two and responds to the high exiting traffic volume. Additionally, the extra exit lane would be a choice lane providing an opportunity to reduce the weaving conflicts and congestion in this section of I-5 when approaching the exit. The proposed improvement would serve a higher number of vehicles which are then anticipated to increase the congestion in the right-most lane between the Lower Boones Ferry Road ON ramp and the Carman Drive OFF ramp (left-most lane may be sporadically impacted).

Auxiliary Lane: Nyberg St. to Lower Boones Ferry Rd. - (bottleneck ID B2, tracking ID 2b-1)
Two projects evolved from the northbound I-5 two-lane Lower Boones Ferry OFF ramp (tracking ID 2a) analysis. The first project would include the two-lane OFF ramp at the Lower Boones Ferry Road exit and extend the auxiliary lane from the westbound Nyberg Road ON ramp to the Lower Boones Ferry Road ON ramp. While the proposed project would address the bottleneck at the Lower Boones Ferry Road OFF ramp, it would also shift the queuing on I-5 further north to the Carman Drive OFF ramp.

Auxiliary Lane: Lower Boones Ferry Rd. to Carman Dr. - (bottleneck ID B2, tracking ID 2b-2)
Two projects evolved from the northbound I-5 two-lane Lower Boones Ferry OFF ramp (tracking ID 2a) analysis. The second project would include an extension of the eastbound Nyberg Road auxiliary lane to the Lower Boones Ferry Road ON ramp as well as adding an auxiliary lane (5th lane) at Lower Boones Ferry Road, rather than Carman Drive, that ends at Highway 217. Carman Drive traffic would have to merge with mainline traffic instead of having their own lane as they do today. There is no expected benefit from this project based on the analysis results.

Auxiliary Lane: Carman Dr. to Lower Boones Ferry Rd. - (bottleneck ID B5, tracking ID 3, Constructed)
This project has been constructed along I-5 in the southbound direction. It extended the current lane drop at the Carman Drive OFF ramp through the Carman Drive ON ramp and terminates at the Lower Boones Ferry Road OFF ramp, thus achieving a longer auxiliary lane for Highway 217 ON ramp traffic. The project is expected to reduce or eliminate the queuing on I-5 from the Highway 217 merge, reduce the queuing on Highway 217 approaching I-5, and introduce queuing between Carman Drive and Lower Boones Ferry Road.

Table 1: I-5 Simulation Results

Bottleneck ID	Tracking ID	Project Description	Existing Conditions	Summary of Simulation Results
I-5: B-1	1a	Freeway Entrance Ramp: Terwilliger Blvd.	Significant congestion, long sweeping horizontal curvature which limits sight distance, steep grade	No discernable traffic benefits due to downstream queue impacts. May have safety benefits by reducing complexity of the merge maneuver.(See Figure 1)
I-5: B-2	2a	Freeway Exit Ramp: Lower Boones Ferry Rd.	A combination of the high volume of traffic entering from the two Nyberg Street ON ramps, the high volume of traffic exiting at Lower Boones Ferry and the associated weaving maneuvers that happen between the Nyberg and Lower Boones interchanges.	Option 2a is expected to reduce the queuing at the Lower Boones Ferry OFF ramp and increase the number of served vehicles. The increased number of vehicles is expected to increase the congestion in the right-most lane between the Lower Boones Ferry Road ON ramp and Carman Drive OFF ramp (the left-most lane may be sporadically impacted). (See Figure 2)
I-5: B-2	2b-1	Auxiliary Lane: Nyberg St. to Lower Boones Ferry Rd.	A combination of the high volume of traffic entering from the two Nyberg Street ON ramps, the high volume of traffic exiting at Lower Boones Ferry and the associated weaving maneuvers that happen between the Nyberg and Lower Boones interchanges.	Option 2b-1 is expected to eliminate the bottleneck at Lower Boones Ferry Road and shift the location of the queuing on I-5 to the Carman Drive OFF Ramp. (See Figure 2)
I-5: B-2	2b-2	Auxiliary Lane: Lower Boones Ferry Rd. to Carman Dr.	A combination of the high volume of traffic entering from the two Nyberg Street ON ramps, the high volume of traffic exiting at Lower Boones Ferry and the associated weaving maneuvers that happen between the Nyberg and Lower Boones interchanges.	No discernable traffic benefits (See Figure 2)

Bottleneck ID	Tracking ID	Project Description	Existing Conditions	Summary of Simulation Results
I-5: B-5	3	Auxiliary Lane: Carman Dr. to Lower Boones Ferry Rd.	High mainline volumes, 217 traffic that merges quickly and does not fully utilize auxiliary lane, resulting queues along both I-5 and Hwy 217	Elimination of queuing along I-5 and reduction of queuing along Hwy 217. May contribute to queuing downstream between Lower Boones Ferry Road and Carman Drive (See Figure 3)

Source: VISSIM analysis

ODOT conducted further analysis of one project:

Auxiliary Lane: Lower Boones Ferry Rd. to Nyberg St. - (Bottleneck ID B6, tracking ID 3a-1)
Along I-5, this project would continue a fourth southbound lane between the Lower Boones Ferry Road off- and on- ramps, require Lower Boones Ferry Road ON ramp traffic to merge (currently use the auxiliary lane), and provide a continuous lane from Highway 217 to the Nyberg Street exit.

<u>I-205 Projects</u>
Nine projects were identified for I-205, of which two were evaluated by the consultant using traffic modeling software (shown in Table 2 and Figure 4). ODOT evaluated two additional projects as summarized at the end of this section. The five remaining projects shown below were not analyzed.

- Auxiliary Lane: Powell Blvd. to WB I-84 (I-205 northbound, bottleneck ID B4, tracking1c)
- Auxiliary Lane: Powell Blvd. to Division St. (I-205 northbound, ID B4, tracking 1)
- Auxiliary Lane: Powell Blvd. to Glisan St. (I-205 northbound, ID B4, tracking 1b)
- Auxiliary Lane: Stark/Washington St. Interchange to Glisan St. (I-205 northbound, bottleneck ID B4, 1d)
- Auxiliary Lane: Stark/Washington St. to Glisan St. Interchanges to I-84 (I-205 northbound, bottleneck ID B4, tracking ID 1e)

The consultant used the VISSIM software to evaluate queue, duration, and speed for the following two projects:

Auxiliary Lane: I-84 WB to Sandy Blvd. - (bottleneck ID-B3, tracking ID 2)
This project is located along I-205 in the northbound direction and would extend the current acceleration lane from the westbound I-84 ON ramp downstream to the Sandy Boulevard/Highway 30 OFF ramp.

Auxiliary Lane: Sandy Blvd. to Columbia Blvd. - (bottleneck ID-B3, tracking ID 2a)
This project is located along I-205 in the northbound direction and would create an acceleration lane from the westbound I-84 ON ramp downstream to the Columbia Boulevard/Highway 30 OFF ramp. This is an extension of the acceleration lane presented in the previous project (bottleneck ID-B-3, tracking ID 2) between the Sandy Boulevard/Highway 30 OFF ramp to the Columbia Boulevard/Highway 30 OFF ramp.

Table 2: I-205 Simulation Results

Bottleneck ID	Tracking ID	Project Description	Existing Conditions	Summary of Simulation Results
I-205: B-3	2	Auxiliary Lane: I-84 WB to Sandy Blvd.	Closely spaced, high volume on-ramps from I-84 (~1000' between gore points) are compounded by a nearby downstream high volume OFF ramps serving Highway 30 (less than ½ mile). Congestion from further downstream (weave between Sandy/Columbia on and Airport OFF ramps as well as the Glen Jackson Bridge) spills into the ramp area	Little to no benefit during the peak hour (slight reduction in overall extent of queuing). Additional capacity allows a higher volume of vehicles to arrive earlier downstream at bottleneck 1 resulting in an earlier activation of bottleneck 1. (See Figure 4)
I-205: B-3	2a	Auxiliary Lane: Sandy Blvd. to Columbia Blvd.	Closely spaced, high volume on-ramps from I-84 (~1000' between gore points) are compounded by a nearby downstream high volume OFF ramps serving Highway 30 (less than ½ mile). Congestion from further downstream (weave between Sandy/Columbia on and Airport OFF ramps as well as the Glen Jackson Bridge) spills into the ramp area	Eliminates bottleneck 3. Additional capacity allows a higher volume of vehicles to arrive earlier downstream at bottleneck 1 resulting in an earlier activation of bottleneck 1. Overall, considering bottlenecks 1, 2, and 3 there is a slight reduction in the extent and duration of queuing during the peak period. Project has potential to allow more vehicles to access I-205 from I-84 within the peak hour. (See Figure 4)

Source: VISSIM analysis

ODOT conducted further analysis of 2 projects including:

Auxiliary Lane: Powell Blvd. to Washington St. - (Bottleneck ID B4, tracking ID 1a)
This project is located along I-205 in the northbound direction and would extend the existing acceleration lane from the Powell Boulevard ON ramp to match the auxiliary lane at the Division Street ON ramp and provide a two-lane exit at Stark/Washington Street. The proposed project is intended to allow motorists additional time/distance to find gaps and safely weave over lanes and expected to reduce congestion and enhance stable traffic flow.

Auxiliary Lane: I-84 EB Entrance ramp to Stark/Washington St. - (Bottleneck ID B8, 9, tracking ID 1)
This project is located along I-205 in the southbound direction and would extend the existing acceleration lane from the I-84 EB ON ramp to match the auxiliary lane at the Stark/Washington Street

ON ramp. The proposed project is intended to reduce congestion, improve lane balance and travel time reliability, and sustain stable traffic flow.

I-84 Projects

Three projects were identified for I-84. The first project addresses a bottleneck on I-84. The second is designed to improve congestion on I-84 as a result of a bottleneck on northbound I-205, which impacts flow on I-84. The third project considered striping modifications in the westbound direction of I-84 at the split to I-5 (single lane I-5 NB OFF ramp) and signage to improve traffic flow, but was not modeled. ODOT evaluated the first project for the bottleneck on I-84, while the consultant evaluated the second project on I-84 as a result of congestion on I-205 using traffic modeling software (shown in Table 3 and Figure 5). The consultant used the HCS software to evaluate queue, duration, and speed for the project. A description of the project is provided below:

Auxiliary Lane: Halsey St. to I-205 - (bottleneck ID I-84: I-205 B3, tracking ID 1, funded, in final design)
This project is located along I-84 in the eastbound direction and would extend the current lane drop at the Halsey Street OFF ramp to the I-205 NB OFF ramp. The proposed project is expected to reduce the queuing (by 1 mile in the outer lane, ½ mile in middle lane), provide an improved route for through vehicles in the outer lane, increase speed in the slowest area (approximately 5 mph), and decrease the number of congested hours in the outer lane.

Table 3: I-84 Simulation Results

Bottleneck ID	Tracking ID	Project Description	Existing Conditions	Summary of Simulation Results
I-205: B-3	1	Auxiliary Lane: Halsey St. to I-205	High exiting volumes to a congested facility (I-205) reduces ramp flow. Slower ramp speeds impact mainline I-84 between the I-205 exit points and increases competition with through traffic for available lane capacity.	Allows better separation between movements (lane alignment). Provides queue storage for I-205 NB exiting traffic east of the Halsey Street exit. Less constricted flow for through vehicles is anticipated. (See Figure 5)

Source: HCS analysis

ODOT conducted analysis of one project along I-84, a brief description is provided below:

Acceleration Lane: Grand Avenue Entrance ramp - (Bottleneck ID B2, tracking ID 2a)
This project is located along I-84 in the westbound direction and would extend the current acceleration lane for the Grand Avenue ON ramp to the west, closer to the 16th Street/Irving Street ON ramp.

I-405 Projects

One bottleneck was identified for I-405. ODOT is evaluating the operational benefits for re-striping the Highway 30 Entrance Ramp to One-lane Merge (I-405: B2, tracking ID 2a) project.

US 26 Projects

There are no preferred projects identified for bottlenecks within the US 26 study corridor.

Attachment:

Regional Recommended Project List

Appendix:

Figure 1 Freeway Entrance Ramp: Terwilliger Blvd. - (I-5:B1, 1a)

Figure 2 Freeway Exit Ramp: Lower Boones Ferry Rd (I-5:B2)
Auxiliary Lanes: Nyberg St. to Lower Boones Ferry Rd., (I-5: 2b-1) and
Auxiliary Lanes: Lower Boones Ferry Rd. to Carman Dr. - (I-5: 2b-2)

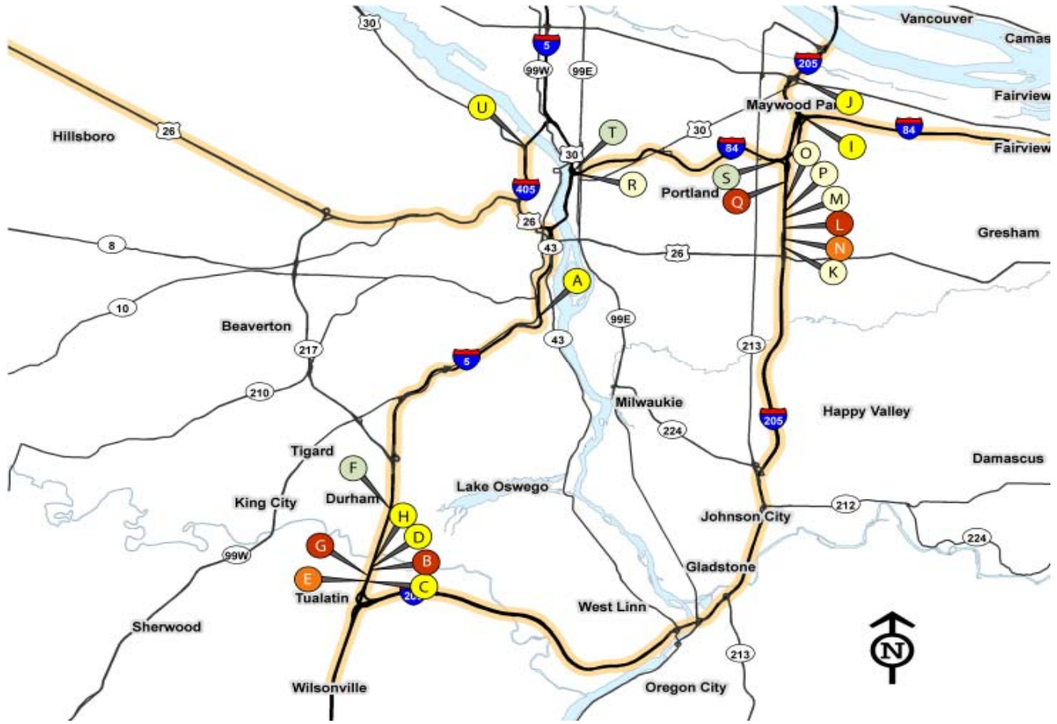
Figure 3 Auxiliary Lane: Carman Dr. to Lower Boones Ferry Rd. (I-5:B5, built)

Figure 4 Auxiliary Lane: I-84 WB to Sandy Blvd., (I-205: B3, 2)and
Auxiliary Lane: Sandy Blvd. to Columbia Blvd. (I-84 WB to Columbia) - (I-205: B3, 2a)

Figure 5 Auxiliary Lane: Halsey St. to I-205 - (I-84: I-205 B3, 1)

Attachment: Regional Recommended Project List

Regional Recommended Projects



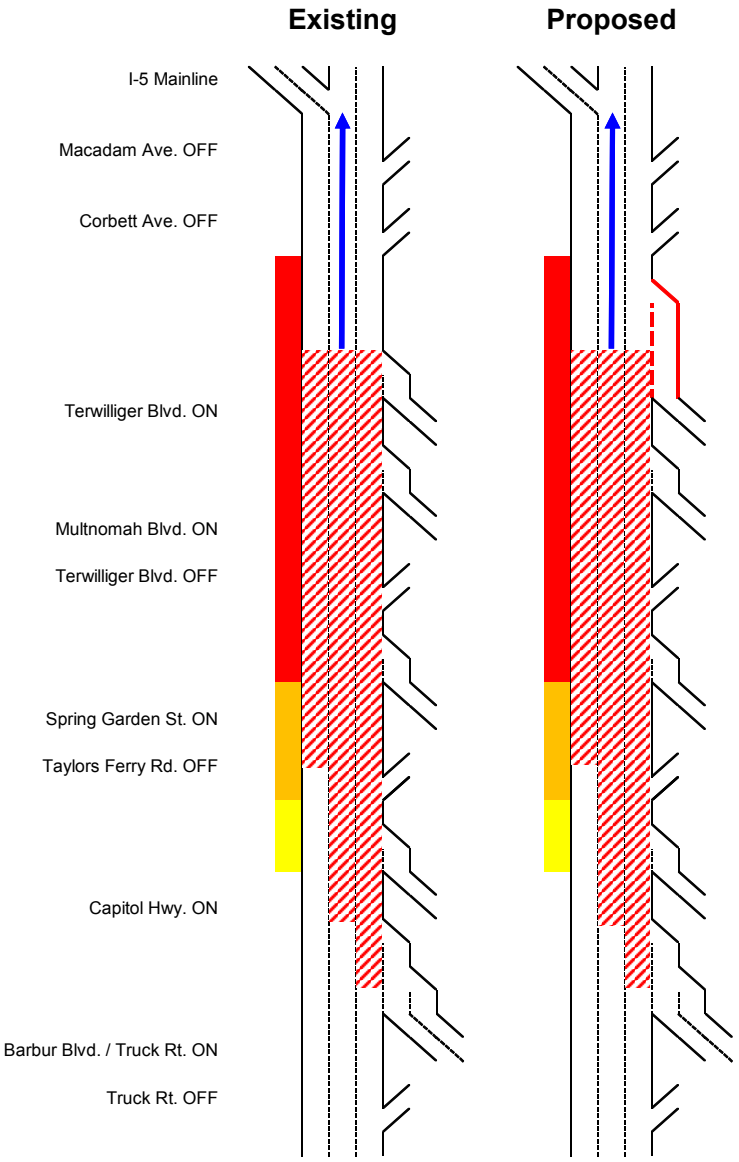
Map ID	Bottleneck ID	Potential Solution (H/M/L)	Recommended Projects	Est. Cost	See Project sheet on page #
I-5					
A	I-5: B1	M	Freeway Entrance Ramp: Terwilliger Blvd.	ODOT to Provide	Page | 4-10
B	I-5: B2	H	Freeway Exit Ramp: Lower Boones Ferry Rd.	$1M - $2M	Page | 4-11
C	I-5: B2	M	Auxiliary Lane: Nyberg St. to Lower Boones Ferry Rd.	ODOT to Provide	Page | 4-12
D	I-5: B2	M	Auxiliary Lane: Lower Boones Ferry Rd. to Carman Dr.	ODOT to Provide	Page | 4-13
E	I-5: B2	M	Auxiliary Lane: Nyberg St. to Carman Dr.	$12.5M - $13.5M	Page | 4-9
F	I-5: B5	Const. 2012	Auxiliary Lane: Carman Dr. to Lower Boones Ferry Rd.	$1.25M	Page | 4-14
G	I-5: B6	H	Auxiliary Lane: Lower Boones Ferry Rd. to Nyberg St.	$10M - $12M	Page | 4-15
H	I-5: B6	M/H	Auxiliary Lane: Nyberg St. to I-205	$19M -$20M	Page | 4-16
I-205					
I	I-205: B3	M	Auxiliary Lane: I-84 WB to Sandy Blvd.	$6.7M	Page | 4-23
J	I-205: B3	M	Auxiliary Lane: Sandy Blvd. to Columbia Blvd.	$6.5M	Page | 4-24
K	I-205: B4	M/L	Auxiliary Lane: Powell Blvd. to Division St.	ODOT to Provide	Page | 4-25
L	I-205: B4	H	Auxiliary Lane: Powell Blvd. to Washington St.	$6.5M - $7.5M	Page | 4-26
M	I-205: B4	M/L	Auxiliary Lane: Powell Blvd. to Glisan St.	$9.6M - $11.5M	Page | 4-27
N	I-205: B4	M/H	Auxiliary Lane: Powell Blvd. to WB I-84	$12.0M - $13.6M	Page | 4-28
O	I-205: B4	M/L	Auxiliary Lane: Stark/Washington St. Interchange to Glisan St.	$1.7M - $2.0M	Page | 4-29
P	I-205: B4	M/L	Auxiliary Lane: Stark/Washington St. & Glisan St. Interchanges to I-84	$3.2M - $3.7M	Page | 4-30
Q	I-205: B8/B9	H	Auxiliary Lane: I-84 EB Entrance Ramp to Stark/Washington St.	$4.5M	Page | 4-31
I-84					
R	I-84: B2	M/L	Acceleration Lane Addition: Grand Avenue Entrance Ramp	$2.7M - $3.5M	Page | 4-39
S	I-84: B3	Const. 2013	Auxiliary Lane: Halsey St. to I-205	$1.0M	Page | 4-37
T	I-84: B4	Final Plans	Re-stripe: I-5 NB/I-5 SB Diverge	ODOT to Provide	Page | 4-38
I-405					
U	I-405: B2	M	Re-stripe: US 30 Entrance Ramp to One-lane Merge	$2M - $5.4M	Page | 4-45

Legend

- High
- Medium-High
- Medium
- Medium-Low
- Funded or Programmed Projects
- Recommended project location (pin color corresponds with project priority)

Appendix

I-5 Northbound - Freeway Entrance Ramp: Terwilliger Blvd.



Existing

Queue: Currently the Terwilliger Boulevard ON Ramp merges into the I-5 mainline at the beginning of a long sweeping horizontal curve. Compounding this congestion is the presence of a rather steep grade, and high volumes of mainline and ON Ramp traffic. The individual Terwilliger ON Ramp queue is masked by the congestion emanating from I-5 as it approaches downtown Portland and the I-5/I-405 split. The downtown Portland queue extends back to the just north of the Barbur Boulevard ON Ramp. Simulation model testing has shown that when ignoring the downstream bottleneck, the resulting Terwilliger queue backs to the Taylors Ferry OFF Ramp.
Duration: The duration of the queue at the Terwilliger Boulevard ON Ramp is approximately 1.5 hours (7:15-8:45 AM daily during the workweek).

Proposed

Description: The proposed project will extend the current acceleration lane at the Terwilliger Boulevard ON Ramp around the horizontal curve to allow drivers to navigate the curve and then merge into the mainline traffic instead of having to do both at once.
Benefits:

Queue - The proposed project was modeled with both aggressive and passive driver behaviors. Operations within the merge area were similar under both driver behavior assumptions with any differences in operations masked by the downstream congestion. The extent and duration of the queue is similar under the proposed and the existing conditions.

Duration - The proposed lane configurations would move the merge area closer to the downstream bottleneck, it would in return be impacted by the downstream bottleneck for approximately 30 minutes longer during the AM peak period.

Speed - Travel speeds within the study area are not expected to change with the proposed project.

Density - VISSIM traffic modeling supports the findings showing a similar density of (55pc/h/in) within the merge area.

Project Benefits Summary:

- Potential reduction in crashes as drivers are not attempting to merge while navigating a long horizontal curve

LEGEND
Speeds as low as:

- < 10 MPH
- 11 - 20 MPH
- 21 - 30 MPH
- 31 - 40 MPH

Influenced by a bottleneck outside of this study area

Source: VISSIM analysis

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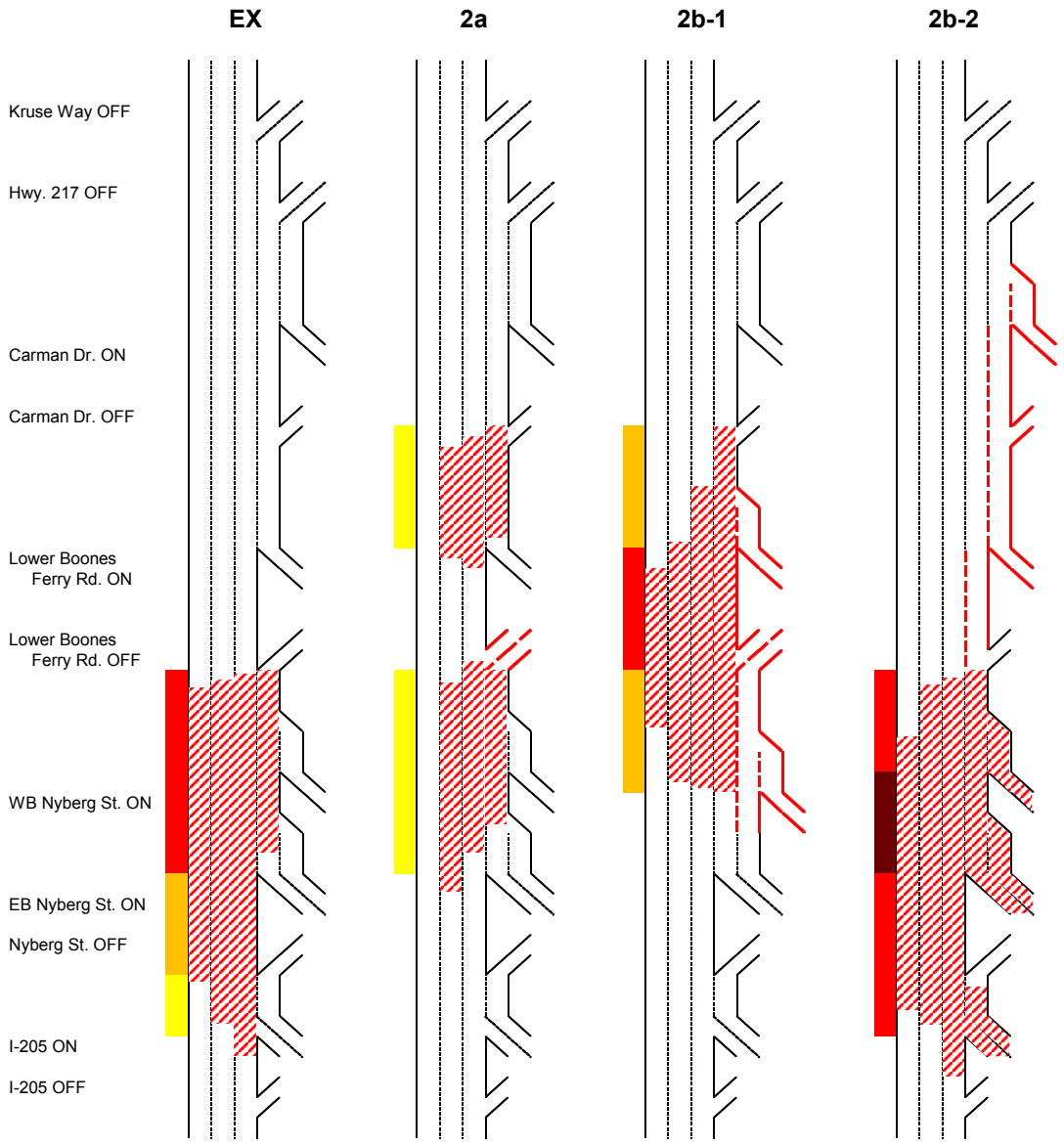
FIGURE 1

I-5 Northbound - Freeway Entrance Ramp: Terwilliger Blvd.

I-5 Northbound - Lower Boones Ferry Rd. Options



LEGEND
Speeds as low as:

- < 10 MPH
- 11 - 20 MPH
- 21 - 30 MPH
- 31 - 40 MPH

Influenced by a bottleneck outside of this study area

* **NOTE:** Queuing extends from downstream/adjacent bottleneck.

Source: VISSIM analysis

EX: Existing Lane Configurations

2a: Construct a 2-Lane Off-Ramp to Lower Boones Ferry

2b-1: Add an Auxiliary Lane from Nyberg On-Ramp through the Lower Boones Ferry On-Ramp

2b-2: Extend Auxiliary Lane from Lower Boones Off-Ramp through Carman On-Ramp

DAVID EVANS AND ASSOCIATES INC.

FIGURE 2

I-5 Northbound - Lower Boones Ferry Rd. Options

Existing

Queue: Currently the queuing starts between the Lower Boones Ferry OFF Ramp and the Westbound Nyberg St. ON Ramp; however the end of the queue is inconclusive. Original observations suggest that the queue ends before the I-205 ON ramp. Subsequent observations have lead to the conclusion that the queue extends back to and slightly through the ramp from I-205 southbound to I-5 northbound. The cause of the queuing is a combination of the high volume of traffic entering from the two Nyberg Street ON ramps, the high volume of exiting traffic at Lower Boones Ferry and the associated weaving maneuvers that happen between the Nyberg and Lower Boones interchanges.

Duration: The duration of the queue at the Lower Boones Ferry Road OFF Ramp is approximately 1.25 hours (7:15-8:30 AM daily during the workweek).

Speed: Speeds between the Nyberg and Lower Boones Ferry interchanges drop to as slow as stop and go conditions in some lanes. The segment as a whole averages between 11 and 20 mph during the peak of congestion.

Density: Vissim traffic modeling supports the queuing shown on the graphic with an average density of 86 veh/mi/in in the four lane segment between the Nyberg ON Ramps and the Lower Boones Ferry OFF Ramps.

Proposed Option 2a

Description: Option 2a will convert the current OFF Ramp to Lower Boones Ferry Road from a one-lane diverge to a two-lane off ramp where the right most lane is an exit only lane and the adjacent lane is a choice lane (diverge or remain on I-5 NB).

Benefits: **Queue** - Option 2a helps to alleviate queuing on I-5, but does not remove congestion from all lanes. The expected extent of queuing under Option 2a would extend back to the eastbound Nyberg Street ON Ramp to I-5 northbound. In this section, congestion is worst in the right lane. The left-most lane is periodically slowed, but average peak hour travel speeds in the left most lane do not drop below 35 mph. With less congestion, this segment is able to serve a higher number of vehicles. The higher number of served vehicles, in turn, leads to a higher number of vehicles reaching the section of I-5 between the Lower Boones Ferry and Carman Drive interchanges. This section then suffers from congestion as the right-most travel lane drops to stop and go conditions while the left-most lane is sporadically impacted. **Duration** - It is anticipated that the queue would be shorter in duration by approximately 30 minutes. While the new congestion at the Carman Drive OFF Ramp would last between 30 minutes and 1 hour. **Speed** - Average speeds within the congested areas are expected to increase to between 31 and 40 MPH **Density** - VISSIM traffic modeling supports these benefits showing a decrease in density (86 veh/mi/in to 52 veh/mi/in) in the four lane segment between the Nyberg ON Ramps and the Lower Boones Ferry OFF Ramps, but a slight increase in density (30 veh/mi/in to 35 veh/mi/ln) in the four lane segment between the Lower Boones Ferry ON Ramp and the Carman Drive OFF Ramp.

Proposed Option 2b-1

Description: Option 2b-1 will extend the auxiliary lane that currently connects the eastbound Nyberg ON Ramp to the Lower Boones Ferry OFF Ramp. The Lower Boones Ferry OFF Ramp would be reconstructed as a two-lane OFF Ramp. An additional lane would be added through the Lower Boones Ferry interchange, and the Lower Boones Ferry ON Ramp would merge into the fourth lane instead of adding a fourth lane, as it does today.

Benefits: **Queue** - Option 2b-1 is expected to eliminate the bottleneck at Lower Boones Ferry and shift the location of the queuing on I-5 to the Carman Drive OFF Ramp. Queuing on the I-5 mainline under Option 2b-1 is expected to emanate from the area just upstream of the Carman Drive OFF Ramp and extend back through the Lower Boones Ferry Interchange to the westbound Nyberg to I-5 northbound ON Ramp. **Duration** - It is anticipated that the queue would be similar in duration as the existing at approximately 1.25 hours. **Speed** - Average speeds within the congested areas are expected to be similar to existing at between 11 and 20 mph. **Density** - VISSIM traffic modeling supports the above findings showing an average density of (63 veh/mi/ln) in the four lane segment between the Lower Boones Ferry Ramps.

Proposed Option 2b-2

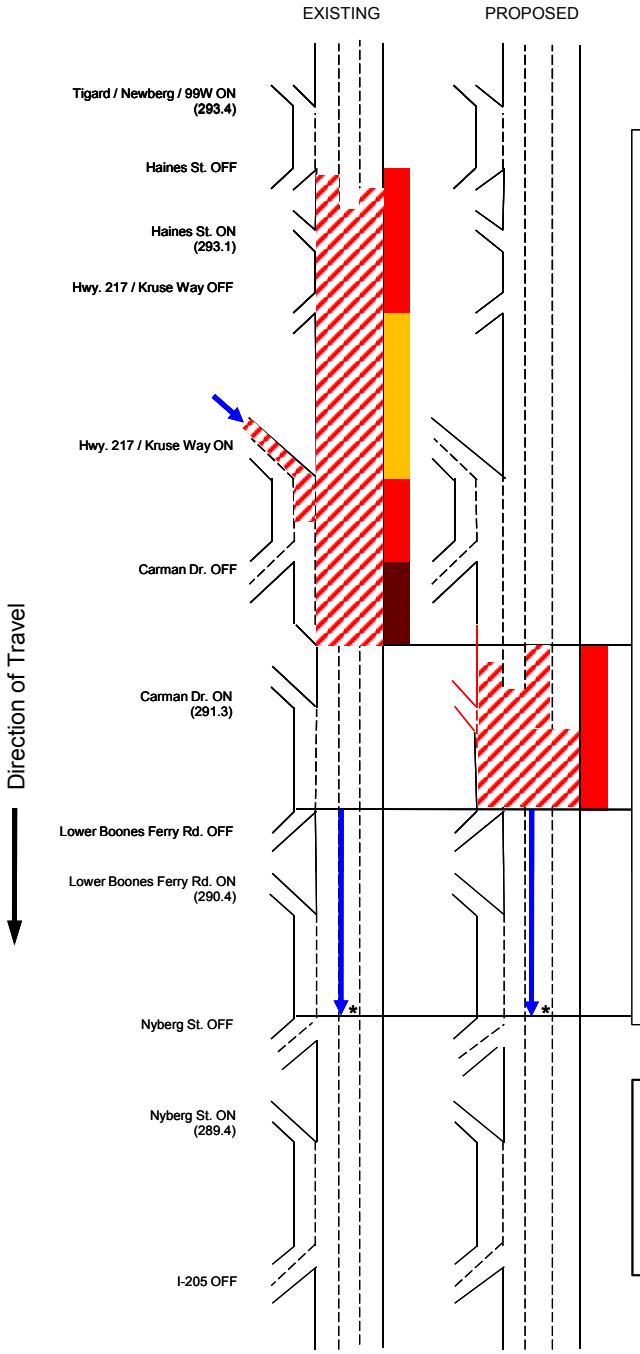
Description: Option 2b-2 will extend the auxiliary lane that currently connects the Nyberg and Lower Boones Ferry Ramps through the Carman Drive Interchange. The Lower Boones Ferry OFF Ramp would be fed from a single choice lane, the Lower Boones Ferry ON Ramp would add the fifth lane to I-5, and the Carman Drive on ramp would have to merge into the fifth lane instead of adding the fifth lane as it does under existing conditions.

Benefits: **Queue** - No benefit. Option 2b-2 is expected to increase the severity of the queuing on I-5 as drivers overload the right most lanes between the Nyberg and Lower Boones Ferry ramps. The expected extents of queuing on the I-5 mainline under Option 2b-2 are expected to be similar to that of the existing conditions, however travel speeds are expected to be slower. The mainline queuing is also expected to extend back onto both of the Nyberg Street ON Ramps as well as southbound I-205 ramp to I-5 northbound. **Duration** - It is anticipated that the queue would be longer in duration by approximately 1.5 hours. **Speed** - Average speeds within the congested areas are expected to decrease to less than 10 mph. **Density** - VISSIM traffic modeling supports the above findings showing an increase in density (86 veh/mi/ln to 93 veh/mi/ln) in the four lane segment between the Nyberg ON Ramps and the Lower Boones Ferry OFF Ramps.

Project Benefits Summary:

2a - Less congestion, more vehicles served, and faster travel speeds.
2b-1 - Eliminates Lower Boones Ferry Bottleneck, but shifts congestion downstream.
2b-2 - No benefits. Increases congestion.

I-5 Southbound -
Auxiliary Lane: Carman Dr. to Lower Boones Ferry Rd.



Existing

Queue: Currently the Carman Drive Lane Drop results in queues extending to approximately the Haines St. OFF Ramp in all lanes. The cause of the queuing is a combination of the high volume of traffic from Hwy. 217 merging onto I-5 and the tendency of the majority of those drivers to merge quickly onto I-5 thus not fully utilizing the entire extent of the auxiliary lanes. An additional bottleneck exists downstream at the Nyberg St. OFF Ramp; however, the section of roadway between the two bottlenecks is relatively unimpacted (speed greater than 35 MPH).
Duration: The duration of the queue at the Carman Drive Lane Drop is approximately 2.25 hours (3:30-5:45 PM daily during the workweek), while the adjacent bottleneck at Nyberg St. lasts approximately 2.5 hour (3:30-6:00PM daily during the workweek).

Proposed

Description: The proposed project will extend the current lane drop at Carman Drive, through the Carman Drive ON Ramp providing a short acceleration lane for the Carman Drive ON ramp. The auxiliary lane terminates at the Lower Boones Ferry Road OFF Ramp.

Benefits:

Queue-The proposed project should eliminate queuing on I-5 from the Hwy. 217 merge and reduce the queuing on Hwy. 217 approaching I-5. The proposed project does result in a queue forming to the south between Lower Boones Ferry Rd. and Carman Dr. (a section with current speeds at or above 35 MPH). The length of the queue is anticipated to extend to/just beyond the Carmen Drive ON Ramp, which is approximately one mile shorter than the existing queue length. The location of the new queue will likely be adjacent to the existing queue from the downstream Nyberg St. OFF Ramp. The combination of the two queues may generate a longer queue than shown here.
Duration-It is anticipated that the queue will be shorter in duration by approximately 1 hour. The downstream bottleneck and queue at the Nyberg St. OFF Ramp is anticipated remain constant (~2.5 hrs).
Speed- Speeds are expected to become more consistent at 11-20 MPH (instead of the wide range currently experienced-0-35 MPH) with the average speed at the slowest point in the queue being about 4 mph faster.
Density-VISSIM traffic modeling supports these benefits showing a decrease in density (55pc/h/ln to 40 pc/h/ln) around the Carman Drive Lane Drop over a section of approximately 2 miles in length and an increase in density between the Carman Drive Lane Drop and the Lower Boones Ferry Road OFF Ramp (42 pc/h/ln to 56 pc/h/ln) of less then one mile in length.

Project Benefits Summary:

- Queue reduced by 1 mile
- Increase of 4 MPH in the slowest areas
- Congested hours (peak periods) reduced by 1 hour
- Increased reliability, less fluctuation in speed
- Potential reduction in crashes near OR 217 ON Ramp

LEGEND
Speeds as low as:

- < 10 MPH
- 11 - 20 MPH
- 21 - 30 MPH
- 31 - 35 MPH

Influenced by a bottleneck outside of this study area

*** NOTE:** Queuing extends from downstream/adjacent bottleneck.

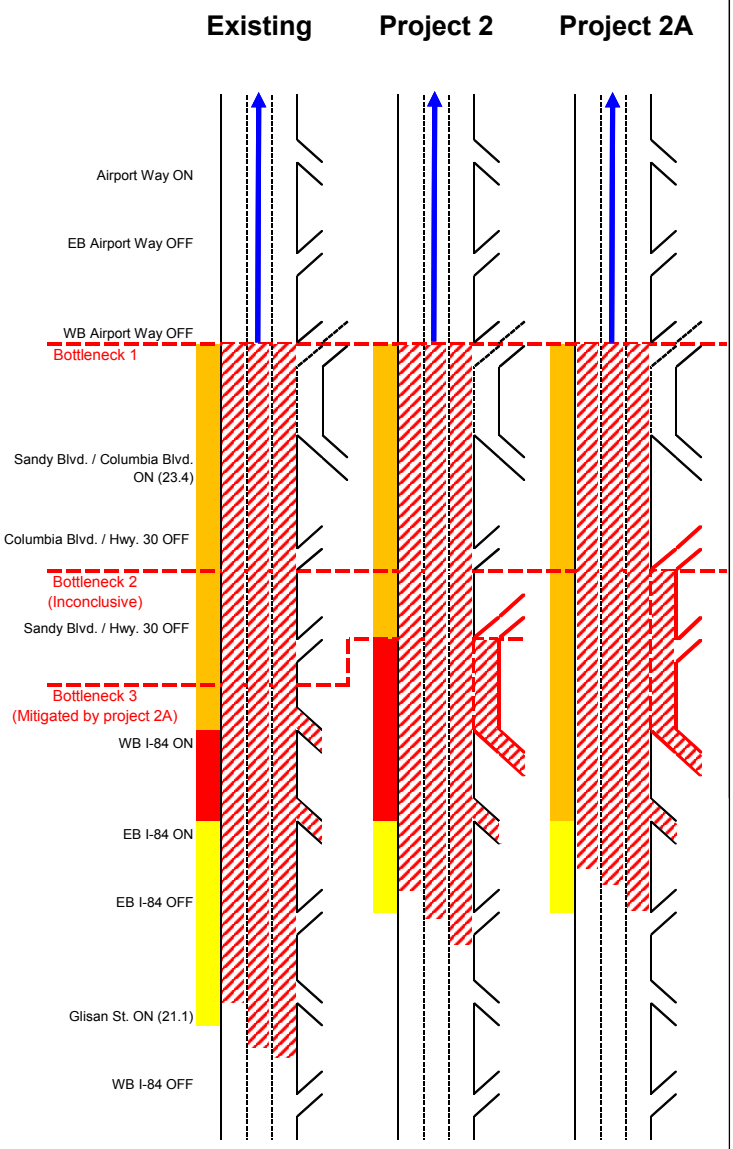
Source: VISSIM analysis

DAVID EVANS AND ASSOCIATES INC.

FIGURE 3

I-5 Southbound - Auxiliary Lane: Carman Dr. to Lower Boones Ferry Rd.

I-205 Northbound - Auxiliary Lanes (I-84 to Columbia Blvd.)



Existing

Queue: Currently both the I-84 eastbound and westbound ON Ramps merge into the three lane I-205 mainline with only about 1000' separating the gore points. Compounding this congestion is the presence of the Sandy Blvd./Highway 30 OFF Ramp less than one half mile downstream. The individual ON Ramp queues are masked by the congestion emanating from both the downstream weave area between the Sandy Blvd/Columbia Blvd ON Ramp and the Airport Way OFF Ramp (Bottleneck 1) as well as the congestion on the Glen Jackson Bridge. When downstream congestion is not present, free-flow speeds resumes after passing the Columbia Blvd/Hwy 30 OFF ramp.

Duration: The duration of the queue in the area of the I-84 ON Ramps is approximately 5.25 hours daily (6:45-8:30 AM and 3:00-6:30 PM daily during the workweek).

Speed: Travel speeds Between the I-84 merges and the Sandy OFF Ramp drop to as low as 5 mph during the peak period.

Density: A calibrated Vissim model suggested a peak hour density of 104 veh/mi/ln.

Proposed Project 2

Description: The proposed project will extend the current acceleration lane from the westbound I-84 ON Ramp downstream to the Sandy Blvd/Hwy 30 OFF ramp.

Benefits:

Queue - The project would shift the bottleneck downstream to the Sandy Blvd OFF Ramp (as indicated by the average speeds), which reduces queuing during off-peak period. During peak periods queuing is relatively unchanged due to downstream bottlenecks.

Duration - The duration of the queue within the proposed project area is expected to slightly decrease to a three hour period from 3:30 to 6:30 PM.

Speed - Travel speeds between the I-84 merges and the Sandy OFF Ramp drop to as low as 8 mph during the peak period.

Density - VISSIM traffic modeling shows relatively no change in peak hour density with 106 veh/mi/ln.

Proposed Project 2A

Description: The proposed project builds upon Project 2 by extending the auxiliary lane from westbound I-84 ON Ramp all the way to the Columbia Hwy OFF Ramp.

Benefits:

Queue - The project would eliminate Bottleneck 3, which reduces queuing during off-peak period. The project does allow vehicles to arrive at the downstream bottleneck earlier in the peak period, which increases congestion at Bottleneck 1.

Duration - The duration of the queue within the proposed project area is expected to slightly decrease to a two hour period from 3:45 to 5:45 PM.

Speed - Travel speeds Between the I-84 merges and the Sandy OFF Ramp drop to as low as 15 mph during the peak period.

Density - VISSIM traffic modeling shows a slightly improved density of 97 veh/mi/ln. More vehicles would be able to merge onto I-205 from I-84 compared to existing.

Project Benefits Summary:

Project 2 - Little to no benefits within the projects extents during the peak hour. Additional capacity of the project allows a higher volume of vehicles to get to downstream bottleneck #1 earlier in the peak period resulting in earlier activation of bottleneck 1. Slight reduction in the overall extent of queuing.

Project 2A - Eliminates bottleneck 3 . Additional capacity of the project allows a higher volume of vehicles to get to downstream bottleneck 1 earlier in the peak period, resulting in earlier activation of bottleneck #1. Slight reduction in overall extent and duration of queuing, has the potential to allow more vehicles to access I-205 from I-84 within the peak hours.

LEGEND

Speeds as low as:

- < 10 MPH
- 11 - 20 MPH
- 21 - 30 MPH
- 31 - 40 MPH

Influenced by a bottleneck outside of this study area

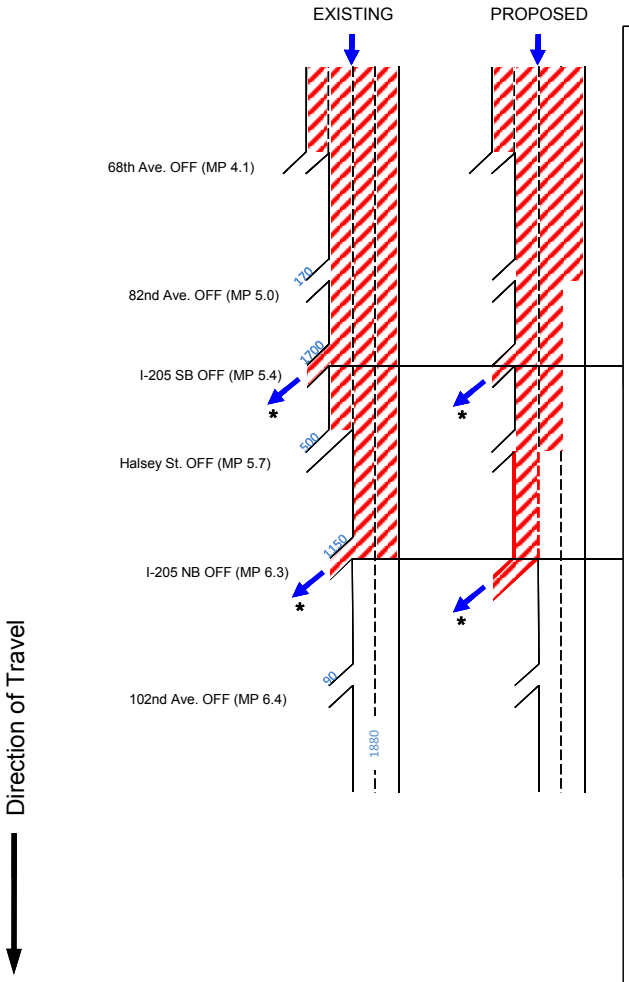
Source: VISSIM analysis

DAVID EVANS AND ASSOCIATES INC.

FIGURE 4

I-205 Northbound - Auxiliary Lanes (I-84 to Columbia Blvd.)

I-84 Eastbound - Auxiliary Lane: Halsey St. to I-205



Existing

Queue: For the I-205 SB OFF ramp the queue builds in the right-most lane with some more aggressive drivers sneaking up to this exit in the middle lane looking for gaps provided by trucks (and others). The middle and left-most lanes serve through traffic and those destined for exits further east, including the I-205 NB OFF Ramp. As the afternoon peak continues the I-205 SB OFF Ramp gaps become fewer (for the sneaking vehicles) resulting in the middle-lane experiencing higher densities (slower speeds). Downstream the I-205 NB OFF Ramp also has a high exiting volume, most of which align in the middle lane (through the I-205 SB and Halsey St. OFF Ramps) to avoid congestion in the right lane. Congestion in the middle lane, from the I-205 SB OFF Ramp "sneakers", pushes some of the vehicles destined for I-205 NB OFF Ramp (that would otherwise use the middle lane) to the left-most lane (and direct competition with through trips) in order to by-pass the I-205 SB OFF Ramp queue. Once past the exit to the I-205 NB OFF Ramp speeds increase (density and v/c ratios decrease).

Duration: The duration of the queue along I-84 between the I-205 SB & NB OFF Ramps is assumed to be equivalent to the congestion duration documented along I-205 (and connecting ramps to I-84), approximately 3.5 hrs (3:00-6:30PM during the workweek).*-Source: I-205 Bottleneck graphics, bottlenecks #3 and #8.*

Proposed

Description: Currently the right-most lane of the 3 lane cross-section ends at the Halsey St. OFF Ramp. The proposed improvement would extend this lane east to the I-205 NB OFF Ramp.

Benefits:

Queue-The proposed project will allow better lane alignment for the major eastbound movements (I-205 SB OFF, I-205 NB OFF, and through traffic). The 3-lane section in the vicinity of the I-205 SB OFF Ramp is anticipated to operate similar to the current conditions in the right lane with "sneaker" vehicles using the middle lane. The proposed project would provide the greatest benefit to the one mile segment between the I-205 SB and NB OFF ramps. The additional lane in this section is expected to allow for I-205 NB OFF Ramp traffic to queue in the right-most lane south of the Halsey St. OFF Ramp, with some spillover into the middle lane beginning west of Halsey St. The left-lane queue is anticipated to shrink to around the 82nd Ave OFF Ramp, thus providing a less constricted route for through vehicles east of 82nd Ave compared to current conditions.

Duration-It is anticipated that the queue along I-84 in the right-most lanes will be constant in duration (3.5 hrs) because the source of the queue is not on I-84, rather I-205. The queue/delay for through trips is anticipated to noticeably decrease .

Speed- Speeds in the two right-most lanes are expected to be relatively similar due to spillback from I-205, however, the speed for through trips will increase approximately 5 MPH.

Density-HCS traffic modeling supports these benefits showing an improvement in density (36 pc/h/ln to 22 pc/h/ln) at the Halsey St. OFF ramp over a section of 1500 feet in length. The density leading into the segment between Halsey St. OFF Ramp and the I-205 NB OFF Ramp also shows an improvement in density (22.0 pc/h/ln to 14.6 pc/h/ln).

Volume-Traffic volumes are not anticipated to change with the proposed project. Ramp demand volumes are shown on the left side of the queuing figures.

Project Benefits Summary:

- Queue reduced by 1 mile in outer lane, 1/2 mile in middle lane, thus providing an improved route for through vehicles
- Increase of 5 MPH in slowest area
- Significant decrease in congested hours in outer lane

LEGEND

Travel speeds less than 35 MPH

170 OFF Ramp/Mainline demand volume (2008 ODOT Flow Maps)

Influenced by a bottleneck outside of this study area

*** NOTE:** Queuing extends from downstream/adjacent bottleneck.

Source: HCS analysis

DAVID EVANS AND ASSOCIATES INC.

FIGURE 5

I-84 Eastbound - Auxiliary Lane: Halsey St. to I-205