Title

Reimagining Sensor Deployment

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Reimagining Sensor Deployment

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Final Report

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Partners for Advanced Transportation Technology works with researchers, practitioners, and industry to implement transportation research and innovation, including products and services that improve the efficiency, safety, and security of the transportation system.

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1. INTRODUCTION

The California Department of Transportation (Caltrans) collects megabytes of data every day using a dedicated traffic sensing infrastructure. The collected data provide support for traffic management and system performance monitoring activities that are crucial for supporting the agency's mission, vision, and strategic goals to strengthen stewardship and drive efficiency. Operating this vast detection system requires extensive resources in the form of engineering and maintenance support, along with millions in capital funds to keep the system running.

Within the above context, alternate hybrid data collection models utilizing purchased or third-party data to augment existing data collection system capabilities may enable a reduction in the number of physical detection stations required while maintaining suitable accuracy for Caltrans' purposes. In addition to the potential for cost savings, the reliance on fewer physical sensors also offers the potential to reduce the exposure of Caltrans employees to the occupational hazard of maintaining roadside detection stations, in alignment with the agency's "safety first" strategic goal.

Most third-party data providers can now provide detailed travel time or speed data on any route over which a sufficient number of vehicles are observed traveling. These vendors also generally provide online platforms allowing their customers to visualize graphically collected data and conduct various analyses using the collected trip data samples and estimated traffic performance statistics. While some issues may remain regarding data quality, largely linked to the size of the data samples collected, and the ability to accurately estimate volumes, data quality is expected to improve over time as mobile devices and connected vehicles continue to proliferate and as data analytical processes are improved.

Recent research (Khan, Fournier, Mauch, Patire, & Skabardonis, 2020) has provided practical methods to integrate third-party data into the existing reporting platform and deliverables such as the Mobility Performance Report (MPR). Based on prior analyses, a hybrid approach was shown to provide better estimates of performance measures compared to using only fixed roadway detection stations. These results hold for analyses focusing either on mainline freeway segments or freeway-to-freeway connectors covering different periods during weekday hours. For almost all tested scenarios, the inclusion of third-party travel-time data has been found to reduce estimation errors. These benefits were also found to hold when the number of fixed detectors is reduced.

This project reimagines sensor deployment in the context of a near-term possibility where third-party data is procured to obtain travel time data and sample flow data across a district or the entire state. In this potential future, the role of dedicated roadside detection stations can be expected to change due to the availability of alternate data sources. For instance, it may no longer be necessary to deploy detection stations at regular spacings to build a detailed picture of traffic conditions along a freeway or within an area. Therefore, a new paradigm is required to guide decisions on where detection stations should be placed to provide the most informational value for Caltrans and other traffic data users.

1.1. CONTEXT OF DIGITAL TRANSPORTATION INFRASTRUCTURE

Digital infrastructure, as opposed to physical infrastructure, refers to data, communications, and computational elements needed to manage the transportation system and support its burgeoning transformation to a connected, automated, and electrified system. This transportation is notably supported by the increasing deployment of the Internet of Things (IoT) and Connected and Automated Vehicle (CAV) technologies, which also have the potential to revolutionize the way we travel. In this context, data should be useful, trustworthy, and reusable. To efficiently support all emerging and envisioned functionalities, it should be possible to measure items of interest once and subsequently use the resulting data many times.

CAVs (including those on the road today) collect a vast amount of data through onboard systems (e.g., RADAR, Light Detection and Ranging (LiDAR), camera). However, this data is not ordinarily shared with other vehicles, roadside infrastructure, or public transportation agencies. This lack of collaboration and continued fragmentation of data may forfeit the opportunity to manage traffic at the systems-level, where significant gains can be made in terms of improving traffic flow and safety, as well as reducing greenhouse gas emissions and vehicle energy use.

Although the scope of this research is limited to freeways and traffic estimation, it is useful to consider a larger context, as illustrated in Figure 1-1.

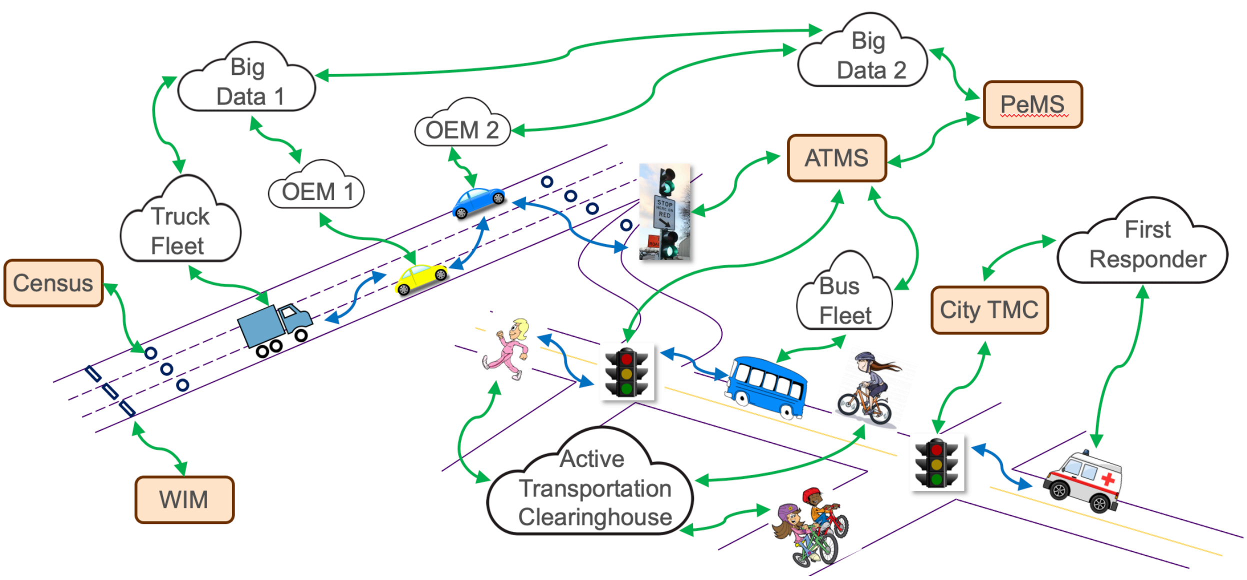


Figure 1-1: Illustration of a Traffic Data Ecosystem

The figure depicts examples of common physical elements found in a transportation network and possible data connections between them (blue arrows) and with data clouds (green arrows) that might, or might not, exist. For instance, the freeway on the upper left side shows loop sensors that may be connected to a Census system or Caltrans Performance Measurement System (PeMS). It also shows Weigh-in-Motion (WIM) sensors that presently archive data in their own system. Passenger cars using the freeway, particularly recent models, likely provide location and status data to original equipment manufacturer (OEM) systems, while commercial trucks may also provide data to logistical fleet systems. Big data aggregators may further purchase data from OEMs and logistics companies, but the exact relationships are fluid and not transparent. The arterial on the lower right side depicts other transportation elements such as pedestrians, bikes, transit, emergency vehicles, and infrastructure elements such as signals and city traffic management centers (TMCs). Although out of scope for this research, these elements present additional opportunities for data gathering and exchange that could improve safety, operations, signal priority, and more.

As noted above, this research is focused on sensors deployed on freeways for better traffic estimation as illustrated in the upper left side of Figure 1-1. This work explicitly considers the need for combining data sets to synthesize better information for better decision-making. Thematically, however, this approach is widely applicable to other parts of the transportation ecosystem.

1.2. BACKGROUND

The problem of determining the best placement of detection stations depends primarily on the goals that one is trying to achieve. This project takes a nuanced view based on existing trends, emerging technologies, recent executive orders and legislation, future applications, and the existing array of sensors that have already been deployed in California.

Key background issues and considerations are described in more detail in the following subsections. This includes:

- Needs for sensors
- Climate change considerations
- Future operational needs
- Emerging third-party data
- Emerging needs for data fusion

1.2.1. NEED FOR SENSORS

Many reasons justify the need to measure the performance of a traffic network. An agency responsible for the operation of such a network needs to build, and subsequently maintain to a satisfactory level, various transportation assets on behalf of the traveling public. To do so requires collecting data supporting the following activities, among potential others:

- Infrastructure inventory status assessment.
- Traffic demand reporting for fund allocations.
- Performance measurements for planning purposes.
- Collection of information to support real-time traffic operations and control activities.

The above requirements generally translate into a need to collect traffic volume and speed data, as well as segment travel time data, from various locations. In turn, this data may be used to assess various metrics of interest, such as delays, vehicle-miles of travel, vehicle-hours of travel, levels of service, average vehicle emissions, and safety metrics. Real-time flow data may further be used to support the operation of dynamic ramp meters, vehicle-actuated traffic signals, and traveler information systems.

Within the above context, sensor placement is largely dependent on the purpose for the data collection, and more specifically on the traveling aspects that are meant to be captured. For instance, regional planning studies may primarily be concerned with the ability to collect flow data from a predefined set of critical locations as well as routing and travel time data between key origins and destinations. However, real-time corridor management applications may on the other hand need to rely on traffic flow and speed data collected near every key interchange, if not all interchanges. Similarly, the operation of ramp meters and actuated traffic signals often requires detailed monitoring of local traffic conditions.

This project recognizes that requirements for real-time operations are more stringent than for traffic studies. For instance, the locations of the ramp meters and their associated sensors are typically determined (as they should be) by operational needs for real-time control. These kinds of decisions are predicated on local traffic needs, not on some global optimization. On the other end, greater flexibility exists regarding sensor placement when considering planning or operational assessment studies. Within this context, this project purposefully does not intend to assess the selection of sensor locations in support of real-time operations but rather chooses to leverage such data for additional purposes.

The key focus of this project is on sensors used to collect data in support of various performance assessments. This includes, among many others, the following reporting needs:

- Mobility performance Report (MPR), which mostly focuses on delays.
- Annual California Public Road Data Report, which focuses on vehicle-miles traveled (VMT) statistics extracted from the Highway Performance Monitoring System,
- California High Occupancy Vehicle (HOV) Facilities Degradation Report, which mostly focused on measuring average vehicle speeds on HOV lanes.

1.2.2. CLIMATE CHANGE CONSIDERATIONS

As a result of climate change and sustainability concerns, Caltrans and the State of California have recently shifted toward a new strategic direction that avoids building new roads that encourage increased vehicular use, and by extension increases in greenhouse gas (GHG) emissions. In the past, building additional lane miles was the standard solution to improve transportation system efficiency and achieve desired levels of service. Moving forward, the construction of new State Highway System (SHS) lane-miles is only to be viewed as a “solution of last resort” when all other options have failed, rather than a standard response to operational and safety problems.

The implementation of senate bill (SB) 743 reflects one aspect of this shift. To better highlight the impacts of a roadway capacity increase on stimulating additional vehicle travel, this bill changed the transportation analysis metric considered in impact assessments following the California Environmental Quality Act (CEQA) from the level of service associated with a given roadway section to the number of VMT. Governor Newsom’s executive order (EO) N-19-19 also articulates the Administration’s objective of reducing overall vehicle use, while the draft Climate Action Plan for Transportation Infrastructure (CAPTI) further reflects the Executive Order’s mandates.

The above changes have created a need to measure VMT and do so regularly and reliably. This need may further become increasingly nuanced in the years to come. For instance, Governor Newsom’s executive order EO-N-79-20 mandates that all new sales of light-duty trucks and passenger cars be zero-emission vehicles by the 2035 model year. Based on this mandate, it will eventually become important to differentiate between VMT impacts linked to gasoline-powered vehicles and impacts linked to vehicles using clean energy sources such as electricity of hydrogen. In response to an increased interest in promoting high-occupancy modes of travel as another way to reduce VMT, it will also likely become increasingly important to differentiate between person-miles of and vehicle-miles of travel.

For now, VMT estimation and reporting remain limited. While average daily traffic counts from the Census program are currently used to provide annual assessments of activities within the State Highway System (SHS), most of the stations from which counts are obtained do not operate continuously. Apart from a small fraction of sensors, counts are typically collected from each location once every three years. In addition, while counts from permanent sensors associated with PeMS could supplement the Census data, data from this system is mainly only collected over freeways.

Implementation of state bill SB-743 implies a requirement for more detailed project-level VMT evaluation, with increased needs for local data collection and before/after studies. In this context, the procurement of rural data is a substantial challenge due to a general sparsity of detailed count data. In addition, changes in travel behavior following the COVID-19 pandemic have created an additional need to reassess daily weekday and weekend traffic demand patterns, as well as patterns over different facility types. This notably implies greater reliance on recent traffic counts.

1.2.3. FUTURE OPERATIONAL NEEDS

Emerging applications such as integrated corridor management (ICM) and proactive traffic management applications require data of an ever-increasing quality to achieve their promised benefits. This is reflected in traffic studies that are increasingly being asked to provide answers to difficult questions. While models could be used to provide some answers, their modeling and analytical capabilities are often limited by the quality of available data. Oftentimes, errors in data are not discovered until the data have already been used to develop and calibrate a model. During this process, it is often discovered that the data that was used is faulty. It is unfortunate when previously accepted performance measures are found to be based on faulty data.

1.2.4. EMERGING THIRD-PARTY DATA

Given the preceding discussion, this project seeks to explore a specific possible future where third-party data are procured and used effectively in decision-making processes.

In recent years, private vendors such as INRIX, Streetlight, HERE, and many others have created online platforms for visualizing data derived from mobile sources such as smartphones, onboard vehicle navigation systems, commercial fleet management systems, etc. The increase in trip data collection capabilities supporting these platforms has been highly correlated with the proliferation of smartphones. The current emergence of connected vehicles further opens the potential for an increased ability to reliably track vehicle movements.

Information collected through these platforms typically consists of the following data:

- Average travel times on roadway segments
- Trip statistics

Travel time over roadway segments is a well-accepted and commonly used metric from third-party data providers as obtaining reasonably reliable travel time stations does not require large data samples. It has been repeatedly established in the literature that a sample penetration rate as low as 2-5% is sufficient for good travel time estimates on freeways. With trip sample penetration rates from mobile devices currently varying between 1% and 35%, with a median of 11.6%, according to a Streetlight market penetration report (StreetLight, 2020), depending on location and time, reasonable travel time estimates can typically be obtained for heavily traveled segments. The reason why accurate travel times can be obtained with limited data is that vehicle speeds are highly correlated. This is because the speed of a following vehicle is often limited by that of its leader and influenced to a certain extent by the speed of vehicles on adjacent lanes. As connected vehicles continue to gain market share, travel time coverage is notably being extended to arterial streets, thus allowing evaluations to be done on an increasing portion of the roadway network.

The ability to analyze sample trips from mobile data is a newer capability. While it is now possible to track trips from a given starting point to a given destination, this ability is limited in part by privacy agreements that only allow anonymized data to be posted on online analytical platforms. This is typically done by masking the actual start and end points of tracked trips or only providing access to aggregated data. A remaining limitation of this type of data is that there is no guarantee that it can sample all trips conducted along a roadway. Data is typically collected from samples of trips that may vary in size depending on location and time. This prevents directly using the collected data as a direct replacement for count data captured by fixed road sensors. While count estimates could be derived from the sampled trips, the data currently being collected will not allow for matching the accuracy provided by fixed sensors.

Despite the above limitation, third-party data is still useful for analyzing routing patterns. Third-party data has long been used to analyze origin-destination patterns within an area. A recent trend is further seeing the introduction of capabilities for analyzing trip patterns on a much smaller scale, such as turning movement patterns at intersections. While the collected data provides a window into trip patterns, uncertainty remains on whether the collected trip samples are unbiased, and representative of the trips made by all types of individuals. The question remains whether more data is collected from certain population groups than others. This is an area of ongoing research.

While some areas of improvement still exist, previous work has shown that it is possible to improve our understanding of traffic movements made within a road network by fusing vendor-based travel time and routing data collected from probe vehicles with flow data collected from infrastructure-based sensors. This was more particularly assessed to be true for the estimation of commonly used performance metrics such as VMT, vehicle-hours traveled (VHT), and delay (Khan, Fournier, Mauch, Patire, & Skabardonis, 2020).

1.2.5. EMERGING NEEDS FOR DATA FUSION

One crucial use for sensor data is to provide normalization factors, and quality checks on private sources of transportation data, i.e., from so-called third-party sources. Private companies provide analyses of travel times, routing, turning ratios, and other metrics based on data collected from probes, connected vehicles, fleet telematics, and other possible sources. However, these data are usually sampled from a limited and likely biased population of travelers, and this bias is unlikely to change quickly in the coming years.

Infrastructure-based sensors collect a complete cross-section of data across a facility, unlike data from third parties. Instead of relying on data samples, these sensors offer the ability to capture information about every vehicle passing a given location, thus providing highly reliable ground truth representations when sensors operate correctly. In this context, sensor data is therefore special and crucially important.

1.3. PURPOSE

This project aims to provide practical guidance to suggest the best placement of fixed detection stations (mostly counting sensors) in a context in which third-party data can be used to increase data collection over a wide geographic coverage. The analysis focused on mainline detector data and large freeway interchanges where variations in flow are expected or observed. This document is the final report for Task ID 3942, also known as the Reimagining Sensor Deployment project.

The purpose of this report is to communicate the core results and recommendations of the research. In addition, it describes the key tasks that have been conducted and their outcomes. The most important outcome is to provide practical guidelines for sensor placement. Toward this end, this research proposes to reorganize the primary organizational unit for freeway data around interchanges, not around freeways. The reason for this is that interchanges are major decision points with various rerouting options and places where freeway flows often change, and therefore, places where sensing data are most useful.

The proposed guidelines are based on two methodologies that can be implemented in stages. In stage 1, interchanges along a freeway are listed and categorized. In stage 2, data from existing sensors are analyzed to find locations where the most significant flow changes occur across one or more analysis periods. In stage 3, data from the various analyses conducted in Stage 2 are combined to produce an aggregated evaluation score for each sensor. This is done through a voting mechanism that provides the basis of a user-customizable prioritization. The process should be interpreted as a way to discover a set of interchanges that need complete instrumentation.

1.4. DOCUMENT ORGANIZATION

This document is organized as follows:

- **Section 2** presents the results of an American Association of State Highway and Transportation Officials (AASHTO) survey deployed to determine the stance of various departments of transportation across North America regarding current and future data collection strategies, expectations for infrastructure-based sensor deployments, and plans for using purchased data from third parties.
- **Section 3** provides a review of prior academic studies on the problem of optimal sensor placement.
- **Section 4** describes initial observations on existing deployments of counting sensors in California and provides an overview of existing sensor coverage for PeMS, Census, and Weigh-in-motion stations.
- **Section 5** explains the data quality assessment performed to select the candidate freeways for in-depth analysis.
- **Section 6** describes the considerations that went into the prioritization methodology developed in this research.
- **Section 7** describes the three stages of the prioritization methodology that was developed:
    - Stage 1: Topological analysis
    - Stage 2: Empirical data analysis
    - Stage 3: Calculation of aggregated score
- **Section 8** concludes with practical guidelines for sensor placement based on the prioritization methodology

2. SURVEY OF DATA TRENDS

This section reports the findings of a survey that was implemented in partnership with Caltrans and the American Association of State Highway and Transportation Officials (AASHTO) Research Advisory Committee (RAC). On November 28, 2022, a survey request was submitted to the AASHTO RAC. The survey itself was administered online using the University of California (UC) at Berkeley Qualtrics survey platform. The last response was received on December 14th, 2022.

2.1. SUMMARY FINDINGS

The survey obtained twenty valid responses from sixteen organizations. This section presents a summary of key findings.

According to the participants, the most important performance measures for decision-making are:

- Vehicle Counts / Annual Average Daily Traffic (AADT); and,
- Vehicle Speeds / Travel Times.

Most participants expect bicycle and pedestrian counts to become more important in the future, while the importance of Vehicle Counts / AADT, Truck Classification / Counts, and VMT/VHT, are expected to stay the same.

Participants unanimously expect more cameras to be deployed in the future, as well as more permanent and temporary sensors. Most expect about the same number of license plate readers, transponder readers, and WIM sensors in the future. However, the stance on inductive loops (whether there will be more or fewer in the future) is mixed. Several participants expect more AI-powered cameras for vehicle classification.

No participant reported that their organization does not purchase data now or does not plan to purchase data in the future. Some of the most popular vendors included INRIX and Streetlight, and some of the most popular information for purchase included:

- Vehicle speeds / Travel times
- Vehicle Flow / Volume
- Origin-Destination Demand Information

Most participants reported that purchased data were moderately to extremely useful. In the future, many participants expect to purchase data including freight movement, bicycle counts, and pedestrian counts.

The most reported intended use for purchased data was to support some type of planning process. Key themes included safety analysis and performance monitoring. Some participants also intend to use purchased data for real-time operations and to reduce dependence on loops.

Participants reported that most organizations use data from multiple sources to calculate performance measures to make business decisions. However, there was a range of opinions about how easy it is to relate multiple data sets for comparison and analysis. Most participants stated that their organization probably has specifications for allowable errors in data.

2.2. DETAILED FINDINGS

This section provides a detailed discussion of the responses to each of the questions of the survey.

From the thirty-nine total responses that were recorded, twenty of them were determined to be valid. The nineteen responses deemed invalid were discarded for the following reasons:

- One response was a test to confirm the correct operation of the survey itself
- Sixteen responses were empty
- One response was left open for three days. It appears that the participant stopped at Question 3 and never returned to the page. It was unclear whether the response that was recorded for Question 3 was finalized as intended.
- One response indicated that their organization purchased data but provided no further details.

2.2.1. SURVEY PARTICIPANTS

The twenty collected valid responses came from sixteen different organizations:

- Two responses were collected from each of the following organizations:
  - Alaska Department of Transportation and Public Facilities
  - Nevada Department of Transportation
  - Virginia Department of Transportation
  - Washington State Department of Transportation

- A single response was collected from each of the following:
  - Arkansas Department of Transportation
  - Delaware Department of Transportation
  - Idaho Transportation Department
  - Iowa Department of Transportation
  - Kentucky Transportation Cabinet
  - Minnesota Department of Transportation
  - New Hampshire Department of Transportation
  - Ohio Department of Transportation
  - Oklahoma Department of Transportation
  - Pennsylvania Department of Transportation
  - South Carolina Department of Transportation
  - Vermont Agency of Transportation

2.2.2. CURRENT RELATIVE IMPORTANCE OF PERFORMANCE MEASURES

Participants were asked to rank the relative importance of several performance measures used for decisions related to traffic operations for their organization. Fifteen participants chose to answer this question. The ranked list by average score is as follows:

1. Vehicle Counts / Annual Average Daily Traffic (AADT)
2. Vehicle Speeds / Travel Times
3. Truck Classification / Counts

4. Vehicle Miles Traveled / Vehicle Hours Traveled (VMT/VHT)
5. Pedestrian Counts
6. Bicycle Counts

Vehicle Counts and AADT were clearly at the top of the list (receiving nine votes as the most important) and were consistently ranked as number one or number two. Vehicle Speeds / Travel Times received six votes as the most important. Except for Vermont, Truck Classification / Counts were consistently ranked as number two or number three. Except for New Hampshire, all participants ranked Pedestrian and Bicycle Counts as either number five or six in order of importance.

2.2.3. FUTURE RELATIVE IMPORTANCE OF PERFORMANCE MEASURES

Participants were asked to project forward over the next ten years and to predict which performance measures were likely to become more important for their organization. Nineteen participants chose to answer this question.

Overall, the vast majority of participants expected bicycle and pedestrian counts to become more important. In addition, a smaller majority expected that Vehicle Speeds / Travel Times would become more important although a slightly smaller number expected their importance to be about the same. For all the remaining measures (Vehicle Counts / AADT, Truck Classification / Counts, VMT/VHT), participants felt their level of importance would not change.

2.2.4. NEW PERFORMANCE MEASURES UNDER CONSIDERATION

Participants were asked whether their organization was considering the use of new performance measures. Nine participants chose to elaborate. Two participants reported that bicycle and pedestrian-related metrics are under consideration such as the Level of Traffic Stress for Pedestrians, and Route directness.

Four participants replied that to their knowledge, no other performance measures are being considered. One participant reported that "Our area only handles motorized counts within the state and does not handle the bicycle/pedestrian counts that could occur."

Four participants responded that delay and/or reliability-related metrics are under consideration such as:

- Winter speeds as it relates to vehicle speeds and travel times
- Vehicle Travel Time Reliability-Related Performance Measures
    - 80th percentile Travel Time Index,
    - Vehicle Delay during Unreliable Conditions

2.2.5. INFRASTRUCTURE-BASED SENSORS

Participants were asked to provide rough estimates of the number of permanently deployed infrastructure-based sensors maintained by their organizations. Fifteen participants answered this question.

Table 2-1: Deployments of permanent sensors

Organization	Inductive Loops	Radar	License plate readers	Transponder readers (FasTrak/EZ-Pass)	Cameras	Weigh-in-Motion Sensors	Interstate/ expressway lane miles[1]
Alaska Department of Transportation and Public Facilities	250	10	1	0	0	8	2,377
Arkansas Department of Transportation	0	3	0	6	300	50	3,947
Delaware Department of Transportation	2,000	259	0	5,000	313	10	549
Idaho Transportation Department	151	72	0	0	0	26	2,775
Iowa Department of Transportation	150	350	15	0	550	50	3,311
Kentucky Transportation Cabinet	11,500	250	17	39	250	13	6,443
Minnesota Department of Transportation	3000	450	0	74	1,100	24	5,193
Nevada Department of Transportation	123	0	0	0	3	13	3,015
New Hampshire Department of Transportation	200	100	0	9	200	10	1,405
Ohio Department of Transportation	500	6500	0	0	1,100	0	12,193
Pennsylvania Department of Transportation	128	1	0	0	0	21	11,766
South Carolina Department of Transportation	166	1				19	4,434
Vermont Agency of Transportation	120	50	0	0	90	90	1,320
Virginia Department of Transportation	300	200	0		0	3	7,554
Washington State Department of Transportation	11,930	40	30	30	930	14	7,203

[1] Information about interstate / expressway lane-miles was not asked in the survey. For comparison purposes, it is displayed in Table 2-1. The values were calculated by adding the lane miles for "interstate" and "other freeways and expressways" as reported on October 26, 2021 in the FHWA statistics according to https://www.fhwa.dot.gov/policyinformation/statistics/2020/

2.2.6. FUTURE EXPECTATIONS OF INFRASTRUCTURE-BASED SENSORS

Participants were asked to project forward over the next ten years and to comment on whether they expected more of the same sensors or alternative types to be used. For each type, participants indicated whether more or fewer were expected to be actively deployed. Sixteen participants answered this question.

Across the board, all sixteen expected more cameras to be deployed. Vast majorities expected more of both permanent and temporary sensors. Regarding license plate readers, transponder readers, and WIM sensors, the majority expect about the same number to be deployed. The stance toward inductive loops was split: five participants reported that they expected fewer, four about the same, and six more.

2.2.7. DEPLOYMENT OF NEW SENSOR TYPES

Participants were asked whether new sensor types were under consideration for deployment. Ten participants chose to elaborate. Four participants mentioned video and/or AI-powered cameras. Two participants mentioned needs for more WIM bending plate sensors for classification and weight enforcement. Three participants mentioned WIM alternatives for classification such as:

- An artificial intelligence camera that collects classification in the FHWA 13 classes
  - Developed by International Road Dynamics
  - First full permanent site planned for 2023
- Camera-based vehicle classification -- Leetron Vision
- IRD side-shot classifiers with cameras and IR imaging for temporary vehicle classification

Participants also mentioned the following sensors and applications for consideration:

- Bluetooth and WIFI
- LiDAR Sensors for traffic signal detection
- Connected and Automated Vehicles (CAV) and transit priority detection for signal optimization related to CAV/Transit
- Work zone/school zone automated speed enforcement technology
- Replacing existing radars with better radars having more immediate access and refined data

2.2.8. CURRENT PURCHASE OF DATA FROM PRIVATE VENDORS

All fourteen participants reported that their organization purchased data from private vendors. No one answered in the negative. The two most popular vendors are INRIX and Streetlight.

Table 2-2: Current purchases of data from private vendors

Vendor	Number of participants who purchase data from vendor
HERE	5
INRIX	9
TomTom	1
StreetLight	7
Citilabs	0
Replica	0
Waze	3
Other	5

Other vendors from whom data are purchased include:

- Wejo
- Southern Traffic Services
- The Traffic Group
- Surface Transportation Board
- RITIS

2.2.9. CURRENT DATA TYPES PURCHASED FROM PRIVATE VENDORS

Of the fourteen participants who purchased data, thirteen chose to elaborate on what data types are purchased. The most popular purchases are vehicle speeds and travel times.

Table 2-3: Current types of data purchased

Information type purchased	Number of participants who purchased this type of information
Vehicle Flow / Volume	7
Vehicle speeds / Travel times	12
VMT / VHT	4
Trip and Mode Choice	2
Origin-Destination Demand Information	7
Intersection Turning Counts	3
GPS Traces	2
Freight Movement	1
Bicycle Counts	2
Pedestrian Counts	3
Other	3

In addition, three participants indicated the following types of purchased data:

- Consultants to collect ped/bike/intersection count data per project need
- Incident detection (Waze & Wejo)
- Hourly volume, speed, vehicle classification, and WIM

2.2.10. CURRENT USEFULNESS OF PURCHASED DATA

Thirteen participants rated the usefulness of the purchased data. Most rated the data as moderately or extremely useful.

Table 2-4: Usefulness of purchased data

Usefulness of purchased data	Number of participants who provided this rating
Extremely useless	0
Moderately useless	1
Slightly useless	0
Neither useful nor useless	1
Slightly useful	0

Moderately useful	5
Extremely useful	6
Don't know	0

2.2.11. EXPECTED FUTURE PURCHASE OF DATA FROM PRIVATE VENDORS

All fifteen participants reported their organization intends to purchase data from private vendors in the future. No one answered in the negative. The two most popular vendors are expected to be INRIX and Streetlight. Three participants expect to purchase Wejo or connected vehicle data.

Table 2-5: Expected future purchases of data from private vendors

Vendor	Number of participants who expect to purchase data from this vendor
HERE	2
INRIX	8
TomTom	2
StreetLight	10
Citilabs	0
Replica	0
Waze	3
Other	7

Other vendors from whom data are expected to be purchased include:

- Wejo
- Michelin DDI
- Southern Traffic Services
- Abley Safe Curves

2.2.12. EXPECTED FUTURE DATA TYPES PURCHASED FROM PRIVATE VENDORS

All of the fourteen participants who expect to purchase data in the future elaborated on what data types they expect to purchase. The most popular purchase is expected to be vehicle speeds and travel times.

Table 2-6: Expected types of data for future purchase

Information type purchased	Number of participants who purchased this type of information
Vehicle Flow / Volume	11
Vehicle speeds / Travel times	12
VMT / VHT	4
Trip and Mode Choice	4
Origin-Destination Demand Information	10
Intersection Turning Counts	5
GPS Traces	2
Freight Movement	7

Bicycle Counts	6
Pedestrian Counts	6
Other	4

In addition, four participants indicated the following types of purchased data:

- Safety data
- Conflation services
- Connected vehicle data
- Hourly volume, speed, vehicle classification, and WIM; bicycle and pedestrian data

2.2.13. INTENDED USES OF PURCHASED DATA

Eleven participants reported how their organization intends to use purchased data. The most often cited purpose was to support some type of planning process. Key themes included safety analysis and performance monitoring. Some participants also intend to use purchased data for real-time operations and to reduce dependence on loops. Specific uses included the following:

- Prioritization within the Long-Range Plan process
- General planning and work zone-related data. Detouring optimization and overall TMP planning for construction projects
- We want to use it to support our ramp meeting operation. We and to lessen our dependence on loop detectors
- Planning for mobility and safety
- Network management, work zone safety, construction planning, highway safety, performance measures
- The purchased data will be used for Improvement Alternatives Analytics, Performance Monitoring, Decision Making on Transportation Systems Management and Operations (TSMO)-related projects, etc.
- To meet federal reporting requirements of Model Inventory of Roadway Elements (MIRE) 2.0 and to inform decision-making and planning
- Planning studies (origin-destination); bottleneck identification; corridor operational analysis; Planning & Environmental Linkage (PEL) studies
- real-time operations/monitoring (incident detection, travel times, etc.), work zone analysis, vehicle volumes (AADTs) and planning activities
- To calculate performance measures
- Planning studies, operational analysis, safety analysis, resiliency, project identification, design decisions, infrastructure needs, project scheduling, freight bottleneck analysis, etc.

2.2.14. USING DATA FROM MULTIPLE SOURCES

Participants reported that most organizations use data from multiple sources to calculate performance measures to make business decisions. However, there was a range of opinions about how easy it is to relate multiple data sets for comparison and analysis. Most participants stated that their organization probably has specifications for allowable errors in data.

Table 2-7: Data usage and error specifications

Response	Does your organization use data from multiple (internal and external) sources to calculate performance measures to make business decisions?	For the data your organization collects, is it easy to relate multiple datasets from multiple (internal and external) sources for comparison and analysis?	Does your organization have specifications for allowable errors in purchased data, infrastructure-based sensor data, and in performance measures?
Definitely not	1	3	0
Probably not	0	3	2
Might or might not	3	3	3
Probably yes	3	4	7
Definitely yes	9	2	2
Don't' know	0	0	0
All answers	16	15	14

3. REVIEW OF SENSOR PLACEMENT LITERATURE

The purpose of this literature review is to take an inventory of the types of sensor location problems that have been investigated in academic publications. Sensors are deployed for multiple purposes and researchers have attempted to optimize their placement to collect travel time information, locate bottlenecks, or estimate Origin Destination (OD) demands. Some of the literature considers the impacts of measurement errors and sensor failures. In addition, some optimization formulations incorporate a budget intended to limit the maximum number of sensors or their total cost.

3.1. OVERVIEW

One general category of the literature focuses on vehicular flows. For example, (Gentili & Mirchandani, 2012) provides an extensive literature review of this field and synthesizes a framework to organize previous work in this area. In this framework, there are two main categories of inquiry: (1) the Sensor Location Flow-Observability problem; and (2) the Sensor Location Flow-Estimation problem. The former observability problem attempts to find a unique solution to determine all the flows in the system while also optimizing (in some sense) the allocation of sensors. The latter estimation problem attempts not to find a unique solution, but rather to improve the quality of some flow-related estimates such as OD trips, link flows, or route flows.

The observability problem receives a good deal of attention. Subsequent works such as (Xu, Lo, Chen, & Castillo, 2016) and (Shao, Xie, & Sun, 2021) propose approaches to minimize the effect of measurement error that could propagate into the inference of flows on unmeasured links.

For the estimation problem, a great deal of work focuses on determining the best link-counting locations for OD estimation. For example, (Zhou & List, 2010) proposes a Kalman filtering framework to combine both automatic vehicle identification (AVI) and counting sensor data with prior OD information. It considers the structure of uncertainty in historical demand as well as sensor measurement errors. The objective function is to minimize expected uncertainty in the OD demand estimate subject to a budget constraint. The solution method involves stochastic optimization and beam search. One limitation is that the method assumes that the market penetration of "tagged" AVI vehicles is representative of the overall population. In practice, the algorithm prioritizes the largest OD pairs.

The OD demand estimation problem is also considered in (Fei & Mahmassani, 2011). This article considers the information available from counting sensors. The objective function is to maximize the link informational gains from each sensor that is placed. As formulated, it is a binary integer nonlinear programming (BINLP) problem. The proposed heuristic greedy solution method provides near-optimal results and recognizes budget constraints. The article further defines the notion of eigenvolumes and eigenlinks. An eigenlink is a virtual link that captures an element of demand variance in the OD matrix, while an eigenvolume is the volume on the associated eigenlink. The intuition offered by the authors is that sensors should be placed by finding and reducing demand variances. Sensors should be placed on the most "unstable" links that exhibit high variability in demands and flows. The first sensor should be placed on a link to capture the largest demand variance. The second sensor should be placed to capture the remaining variance not accounted for by the first sensor, and so on. The authors compare the process to a kind of dimensionality reduction problem similar to Principle Component Analysis (PCA).

Instead of OD demand estimation, (Liu & Danczyk, 2009) considers the challenge of placing counting sensors to find freeway bottlenecks. The chief consideration is to find places where the velocity changes. The authors define the notion of a benefit factor used to determine the relative value of a pair of sensors for recognizing a bottleneck. The objective function maximizes this benefit factor, defined as a non-negative speed difference between adjacent sensors and divided by the distance between cells. The analytical model includes constraints for the total cost and the number of sensors. The formulation is limited to a unidirectional freeway. It requires modeling the freeway using the cell transmission model (CTM) or some method to calculate link velocities. The velocities are then used to calculate the benefit factor. A genetic algorithm is used to solve the nonlinear mixed-integer optimization problem.

The travel time estimation problem is investigated in (Zhan & Ran, 2022). However, the article considers both fixed and mobile data sources. Its objective is to minimize the sum of two things: the average travel time mean absolute percentage error (MAPE) of all segments and the variance of the segment length. The solution method has two parts. For fixed sensors, a genetic algorithm is employed. For mobile sensors, a simulation method is used to determine a point of diminishing returns from probe data. Regarding the role of mobile sensors for travel time estimation, this article finds diminishing returns at about a 6% penetration rate. One limitation of this work is that it only considers a unidirectional freeway with no network effects.

The application of travel time estimation using infrastructure-based AVI or speed sensors is explored in (Dehestani Bafghi & Ahmadi, 2022). The article considers the possibility of one or multiple sensor failures. Its objective is to minimize a combination of travel time error and OD coverage. The authors chose a floating search method that uses a feature reduction technique to reduce the number of combinations of sensor failures that need to be considered in the search space. One limitation is that the method assumes only one path for each OD pair.

3.2. SENSOR PLACEMENT GUIDELINES

This section describes guidelines for sensor placement found in the literature, mostly having to do with the set of literature concerned with origin-destination matrix estimation (ODME).

3.2.1. INTRODUCTION OF GUIDELINES FOR ODME

The first formulation of maximal possible relative error (MPRE) is credited to (Yang & Zhou, 1998). This MPRE concept is then employed to establish four location guidelines (or "rules") to determine the optimal number and locations of traffic counting sensors. This list is expanded to a total of eight guidelines in (Gentili & Mirchandani, 2012). Although these guidelines are often referred to as "rules", one should be mindful of the underlying assumptions that went into their development.

- **Guideline 1 (OD Covering Rule)**: Traffic counting sensors should be allocated on a road network so that for every OD pair, at least some proportion of trips is observed. A criterion to maximize could be the number of OD pairs covered by a set of sensors.
- **Guideline 2 (maximal flow fraction rule)**: Traffic counting sensors should be allocated so that the flow fraction observed for any OD pair is maximized. A criterion to maximize could be the sum of the maximum flow fractions (on a link) over all the OD pairs.

- **Guideline 3 (route covering rule or OD separation rule)**: Traffic counting sensors should be allocated on a road network so that for every OD pair, all the routes connecting them are covered. This guideline is more demanding than Guideline 1. A criterion to be maximized could be the total number of routes covered by a set of sensors.
- **Guideline 4 (maximal observed flow rule)**: For a fixed number of links to be observed, the chosen links should intercept as much flow as possible. This simple rule would prioritize the links with the highest flows, regardless of the additional information that might be obtained from them.
- **Guideline 5 (maximal OD demand fraction rule)**: Traffic counting sensors should be allocated so that the demand fraction observed for any OD pair is maximized. This is similar to Guideline 2, except that instead of using flow fractions calculated as ratios using the flows on each link, this criterion uses demand fractions calculated using the number of trips for each OD pair itself.
- **Guideline 6 (maximal net route flow captured rule)**: For a fixed number of links to be observed, the chosen links should intercept as much net route flow as possible. What this means is that multiple counting of the same vehicle should be avoided. The net flow intercepted by the observed links should be maximized. Formulations involve maximizing the sum of route flows observed on each route.
- **Guideline 7 (maximal net OD trips captured rule)**: For a fixed number of links to be observed, the chosen links should intercept as many net OD trips as possible. This formulation also avoids multiple counting's of the same vehicle. Formulations involve maximizing the sum of trips observed on each link.
- **Guideline 8 (link independence)**: Traffic counting sensors should be allocated such that traffic counts on observed links are linearly independent. In other words, avoid sensing links that do not provide additional information. What this means is that one should avoid a fully accounted traffic volume (FATV) as described in (Khan, Fournier, Mauch, Patire, & Skabardonis, 2020).

3.2.2. DISCUSSION OF GUIDELINES

Many of the above guidelines assume some prior knowledge. One type of knowledge is that of an OD matrix of all trips over some period. The period could be an entire day or a peak period of interest. In general OD matrices may be time-dependent and an optimal allocation of sensors for a morning peak might not be optimal for an afternoon peak. Another type of knowledge is that of a prior assignment of demand onto routes. This traffic assignment in general is also time dependent. In congested networks, a given OD trip during an off-peak period is likely to use a different route than during a peak period.

Computational experiments to compare the performance of alternate formulations have been noted in the literature (Gentili & Mirchandani, 2012). One interesting finding is that a simple model that maximizes Guideline 4 often provides "surprisingly good results," even without regard to link flow dependencies or double counting. It is possible to obtain superior performance using more complex models and more complex solution methods. One numerical improvement is noted for strategies that aim to reduce the uncertainties in route flow estimates.

In an ideal world, Guideline 8 seems sensible. In practice, however, measurement errors, sensor failures, and misconfiguration problems make Guideline 8 useless and unproductive. It is far better to have available a method to check that data are correct and usable (Khan, Fournier, Mauch, Patire, &

Skabardonis, 2020), and so a certain level of redundancy is of critical importance for any real decision-making.

For freeway traffic, one simple and implementable strategy could be to focus not on links but on major freeway interchanges. Rank all the interchanges that serve the greatest volume of traffic, and then instrument each interchange to comply with Guideline 3, thus implementing a set of graph cuts to cover the possible routes, while ignoring Guideline 8. The benefit would be to get the maximum information about route flows at places where route flows can change due to congestion, incidents, and planned events.

4. OBSERVATIONS ON EXISTING DEPLOYMENT OF COUNTING SENSORS

This section provides a review of the existing sensor deployment within California. It begins with a high-level description of PeMS, Census, and Weigh-in-Motion (WIM) sensors. It then synthesizes some basic characteristics of typical sensor configurations. Finally, some challenges involving sensor coverage and redundancy are discussed. These include:

- A common lack of sensing on freeway auxiliary lanes, thus preventing a proper accounting of the complete cross-section of vehicular flow
- Inconsistent coverage of major freeway-freeway interchanges
- Possible redundancies in mainline coverage where the information gain from the installed sensors is minimal given the presence of other nearby sensors and the possibility of data fusion with third-party vendor data

4.1. EXISTING SENSOR COVERAGE

This section presents a summary of the existing sensor deployment within California. This includes reviews of the following data sources:

- Traffic sensors connected to the Performance Measuring System (PeMS)
- Sensors used by the Traffic Census Program
- Weigh-In-Motion (WIM) stations

4.1.1. PEMS STATIONS

Sensors connected to the PeMS network are used to monitor traffic continuously. These sensors primarily consist of inductive loop detectors embedded in the pavement but also include other types of detection technologies such as magnetometers and radars, where the use of inductive loops proved to be difficult. Figure 4-1 to Figure 4-4 show the extent of detection coverage within the various regions of California.

Key observations from the sensor deployment are as follows:

- Detection stations are mainly deployed along freeways, with some additional stations along key urban and rural state routes.
- There are no detection stations in the northern part of California. The northernmost sensors are near Orland along Interstate 5 (I-5) and Chico along State Route 99 (SR-99).
- Several Caltrans districts have no PeMS sensors. These are typically rural districts. They include District 1 (Eureka), District 2 (Redding), and District 9 (Bishop).
- Freeway stations generally include sensors located on the mainline
- Sensors are often installed on freeway on-ramps and off-ramps in urban areas. However, not all interchanges will typically have ramp sensors. Some interchanges may have on-ramp sensors only, off-ramp sensors only, or no sensors at all.

It is currently estimated that PeMS is connected to over 40,000 individual detectors. However, due to various reasons, data is not typically collected from all sensors. As a result of a range of potential technical issues, sensors may stop operating. While there is a goal to try to repair non-operating sensors, months or years can elapse before problematic sensors are repaired.

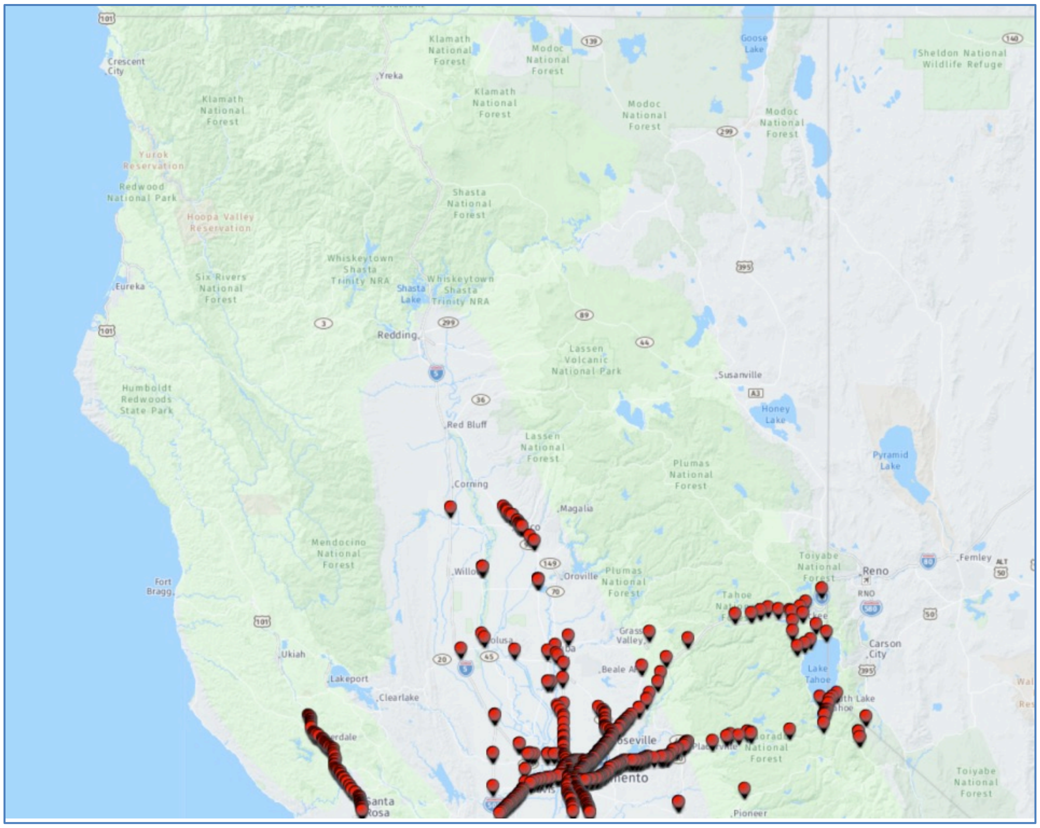


Figure 4-1: PeMS Sensors – Sacramento and Northern California Area

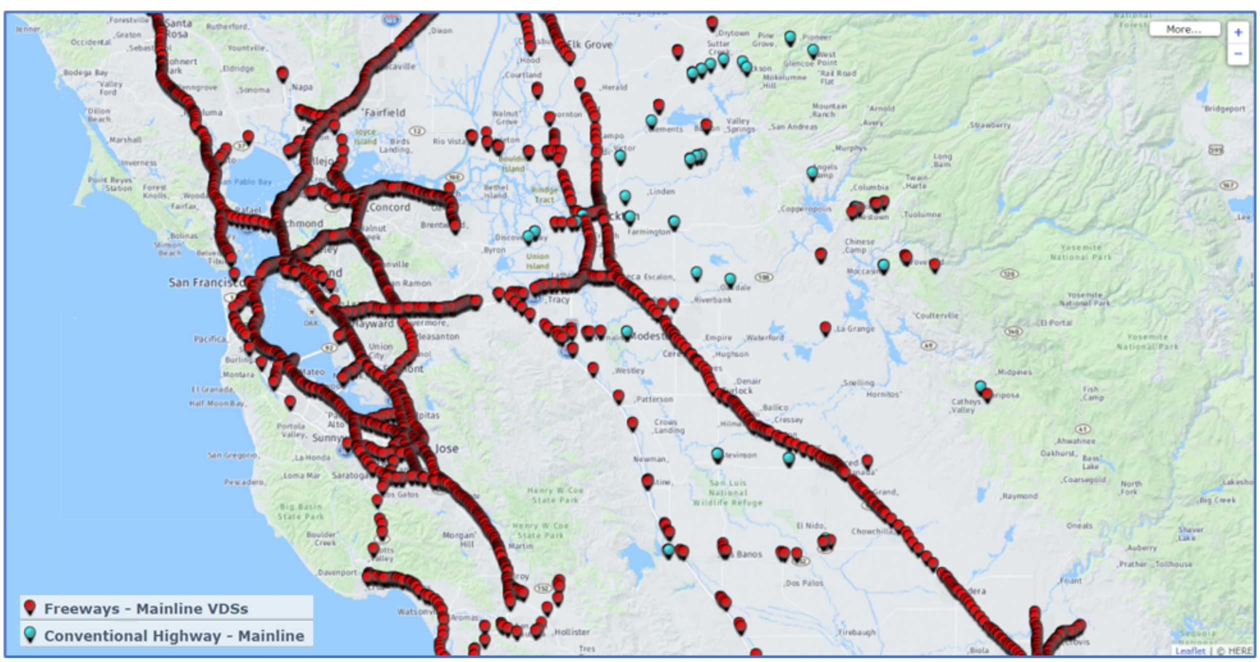


Figure 4-2: PeMS Sensors – San Francisco Bay and Northern Central Valley Areas

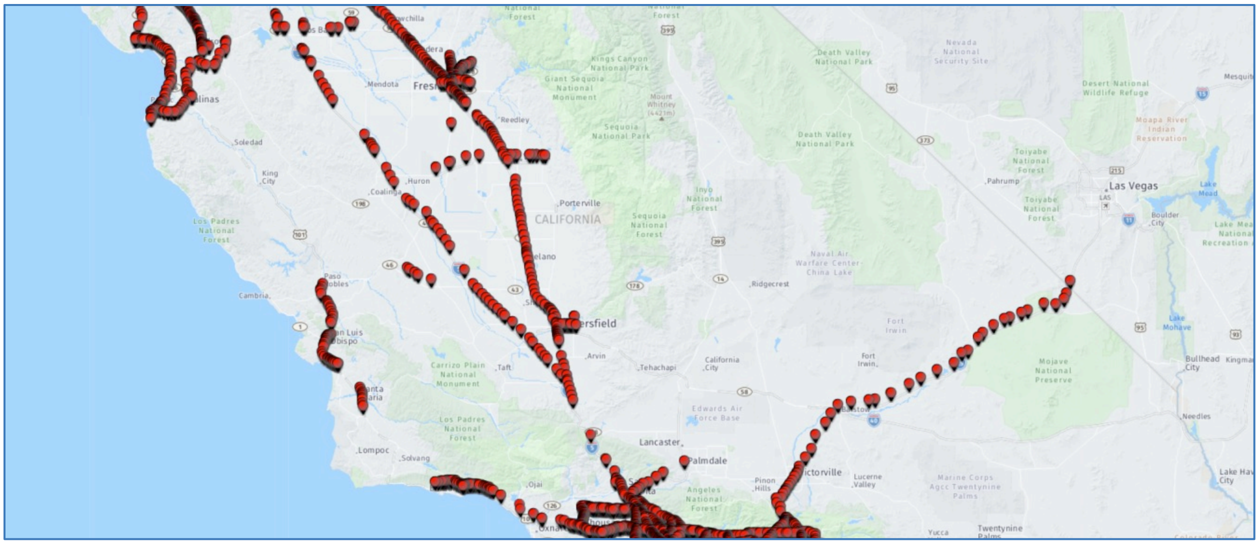


Figure 4-3: PeMS Sensors – Central Coast and Southern Central Valley Areas

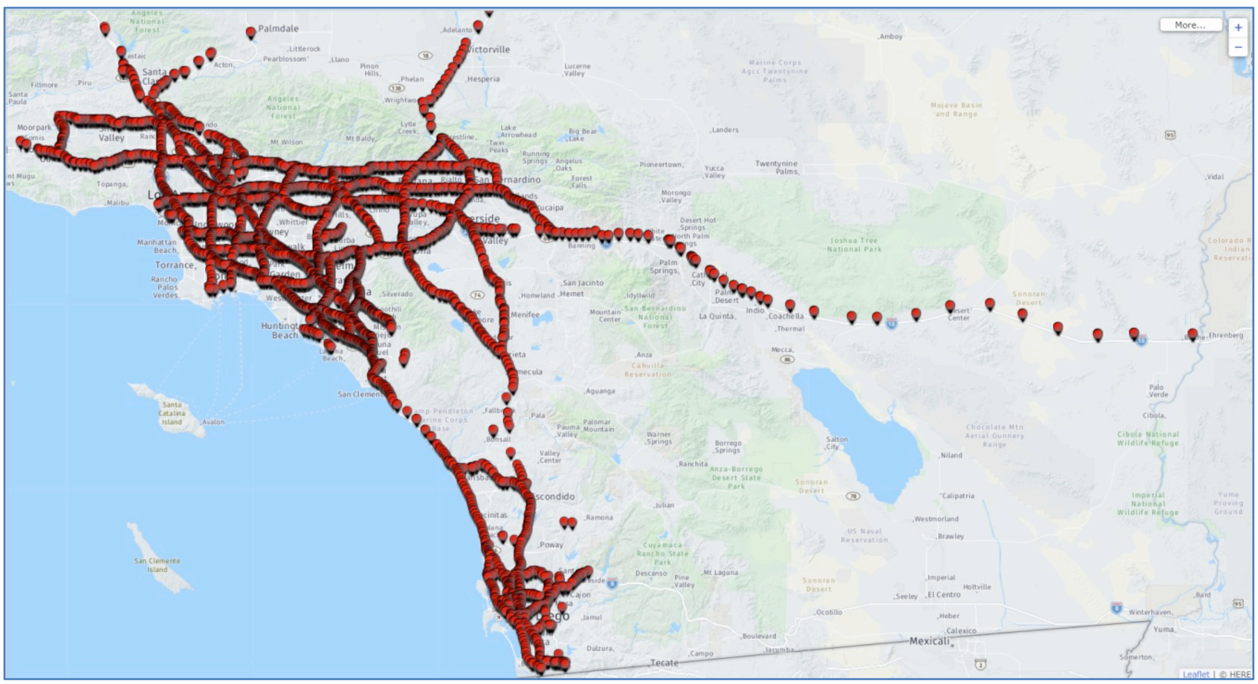


Figure 4-4: PeMS Sensors – Los Angeles, San Diego, and Southland Areas

4.1.2. TRAFFIC CENSUS STATIONS

To support various federal and state reporting programs, Caltrans conducts traffic counts at various locations within the state in addition to using data from PeMS stations. Figure 4-5 illustrates the locations where Census counts are typically made. These include approximately 7,100 count locations spread along freeways and state routes in urban, suburban, and rural areas.

Figure 4-5: Traffic Census Locations within California

Depending on the location, observed data may be available every day or for only specific days during the year. This is due to how the Traffic Census program operates. Due to limited resources, traffic counting is typically performed using electronic instruments that are moved from one location to another in a program of continuous traffic count sampling that aims to revisit each important location every three years. Only stations with strategic importance will have permanent counting instrumentations. On the other end of the spectrum, remote count locations may only be revisited when a notable change in traffic is assumed to have occurred. This results in some remote stations not to have been revisited for over 10 years. For the years when a traffic count is not performed at a given location, either the previous year's data is used and reported, or growth factors calculated using control station data are applied and an estimated volume is generated and reported.

4.1.3. WEIGH-IN-MOTION STATIONS

To monitor truck traffic, Caltrans maintains a network of weigh-in-motion stations spread across the state. Figure 4-6 presents a photo of a typical station. These usually consist of bending plates on frames embedded in concrete. As a vehicle travels over the plate, the weight associated with each axle is determined based on the degree of bending in the plate. This can be done while the vehicle is traveling at normal traffic speed. Inductive loops are further installed before and after the WIM sensor array to measure vehicle speed and overall vehicle length.

Figure 4-6: Weigh-in-Motion Station at Loleta on US-101

Caltrans currently maintains a network of 114 weigh-in-motion stations spread across all districts. Stations are typically installed along well-known heavily truck-traveled routes, typically in rural areas or at the edge of urban areas.

4.2. TYPICAL FREEWAY SENSOR PLACEMENTS

This section provides a brief assessment of potential issues associated with existing sensor placement along freeways. This review focuses on identifying locations with the following conditions:

- Freeway mainline
- HOV/ High-Occupancy Toll (HOT) lanes
- Ramps
- Connectors

The review is based more specifically on a visual assessment of detector placements along the following freeways:

- District 3: I-5, I-80, I-205, US-50, and SR-99
- District 4: I-580, I-80, US-101
- District 6: I-5, SR-180, SR-199
- District 7: I-210, SR-91
- District 8: I-10, I-15, I-40
- District 11: I-5, I-805, SR-94

4.2.1. FREEWAY MAINLINE COVERAGE

Most urban freeways have a relatively high density of mainline sensors. The most common setup in a given direction is to have sensors between the off-ramp and on-ramp of an interchange, typically at some short distance upstream of the on-ramp, as shown in Figure 4-7. The high frequency of this setup comes from the use of the mainline sensors to support dynamic on-ramp metering, where the rate at which vehicles are allowed on the freeway is adjusted based on observed traffic conditions on the freeway. Since most urban freeways have ramp meters, the presence of mainline sensors near each interchange is therefore generally expected in such an environment.

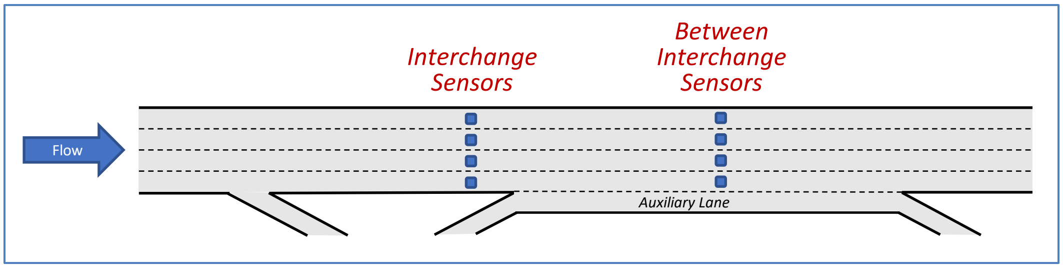


Figure 4-7: Typical Freeway Mainline Sensor Placements

In addition to sensors at a freeway interchange, mainline sensors may also be located between ramps. The primary purpose of these sensors is to collect information on traffic between interchanges.

In general, as shown in Figure 4-7, auxiliary lanes are not typically covered by sensors, regardless of their length. This is problematic for use cases relying on the ability to obtain complete traffic flows across freeway cross-sections as the current setup will not necessarily capture all the freeway through traffic, particularly where the auxiliary lane is used as a passing lane by the through traffic. In addition, it causes discrepancies between the number of lanes in PeMS meta-data and the number of lanes in Google Streetview, or traffic models used to simulate the freeway segments in question.

4.2.2. HOV/HOT LANE COVERAGE

Sensor placement along HOV lanes typically follows the placement of mainline sensors. As illustrated in Figure 4-8, HOV lane sensors are usually placed as an extension of the mainline setup.

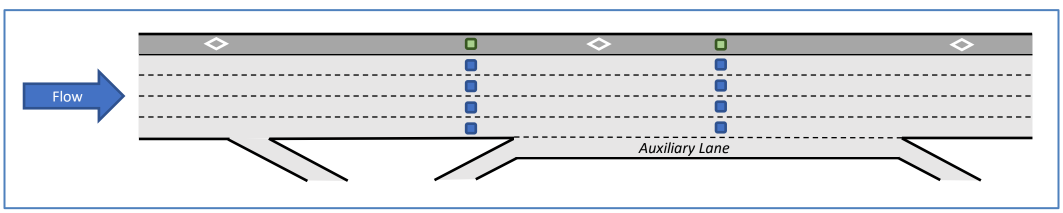


Figure 4-8: Typical HOV Sensor Placement

4.2.3. RAMP COVERAGE

Typically, on-ramps with active ramp metering have installed traffic sensors. For the other on-ramps and off-ramps, the presence of sensors depends on the freeway section:

- Some sections will have sensors installed on virtually all on-ramps and off-ramps. These are typically urban freeways with significant congestion.
- Some sections may have sensors installed only on on-ramps or off-ramps.
- Some sections may have irregular partial deployment at selected on-ramps and off-ramps.

- Some sections may have no ramp sensors at all. These tend to be rural sections but can also be urban sections.

4.2.4. CONNECTORS

Key urban freeway-to-freeway interchanges tend to have sensors installed on their various connectors, while rural interchanges tend not to have sensors. However, this rule is not uniform, as some urban interchanges have partial coverage and others have no coverage at all.

4.3. CHALLENGES WITH DETECTOR PLACEMENT

This section provides a brief assessment of potential issues associated with existing freeway sensor placement along freeways. This review focuses on identifying locations with the following conditions:

- Mainline sensor redundancy
- Partial ramp coverage
- Interchanges with inadequate coverage

4.3.1. MAINLINE COUNT REDUNDANCY

Sensor redundancy defines situations where multiple freeway sensors are expected to give identical counts. A typical situation would be the one illustrated in Figure 4-9, where two or more sensors exist between two freeway interchanges. In this case, because traffic cannot enter or exit the freeway between the sensors, the same volume would be expected to be produced by each sensor. If the main purpose behind the sensor installation is to provide volume counts between the two ramps, then a single location would suffice. A redundancy can therefore be assumed to exist in geometric configurations shown in Figure 4-9.

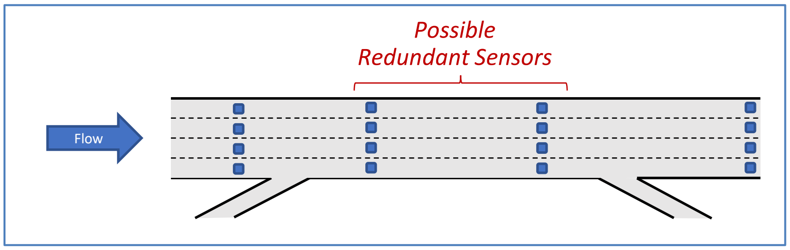


Figure 4-9: Examples of Redundant Sensors

A review of the freeways identified in the introduction to this section indicates that while sensor redundancy is not a widespread issue, it is nonetheless an issue that can affect a sizeable number of locations. Figure 4-10 and Figure 4-11 illustrate a few examples of potential redundancies across various segments. The diagrams are taken from the detector strip maps produced by PeMS. Since the diagrams do not represent ramps without sensors, these were manually added and shown in light grey. In each diagram, the redundant sensors from a count standpoint are marked by a red circle. For each segment, redundancy was determined by verifying sensor locations using aerial photos from Google Maps or snapshots from Google Streetview.

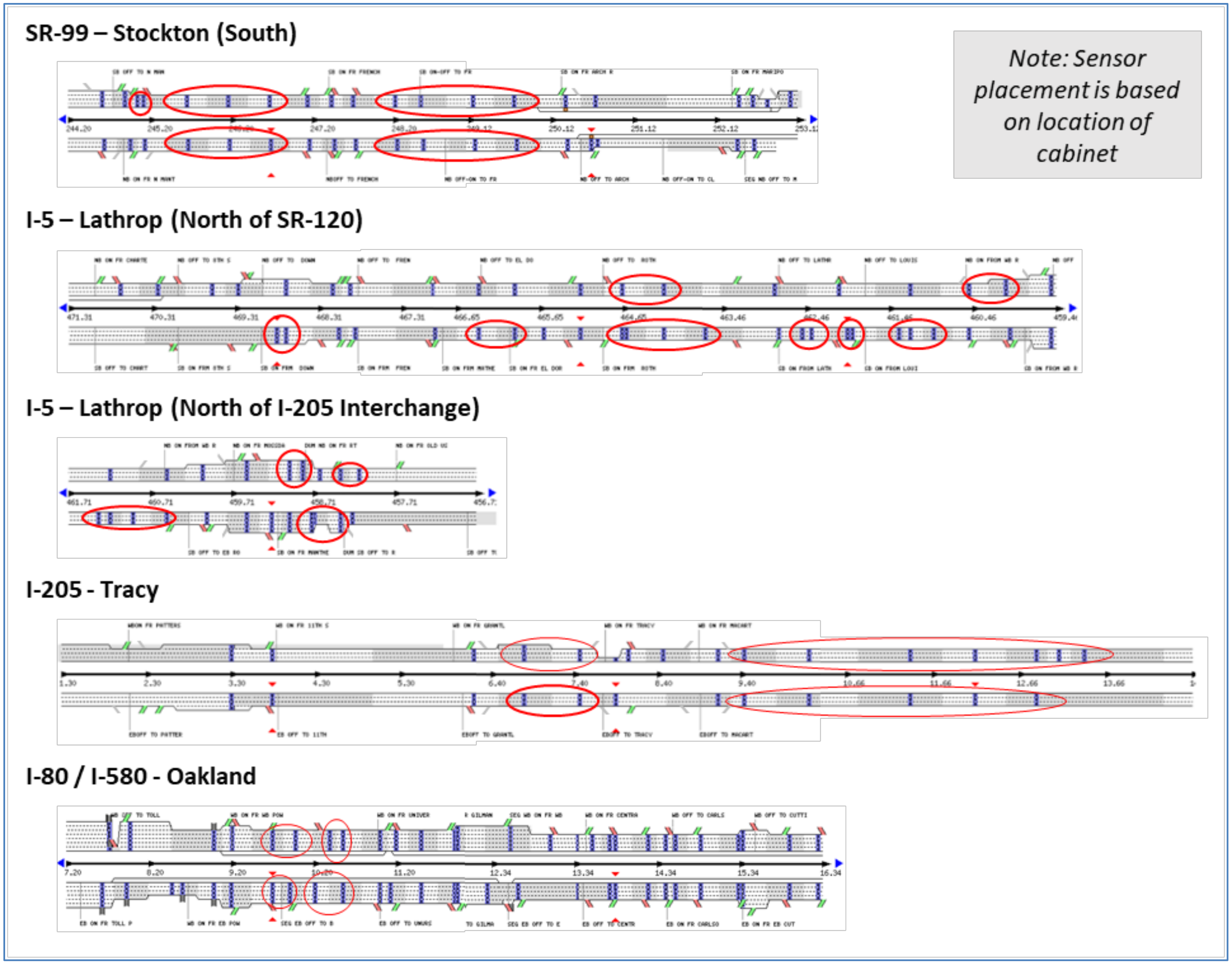


Figure 4-10: Typical HOV Sensor Placement – Example Set 1

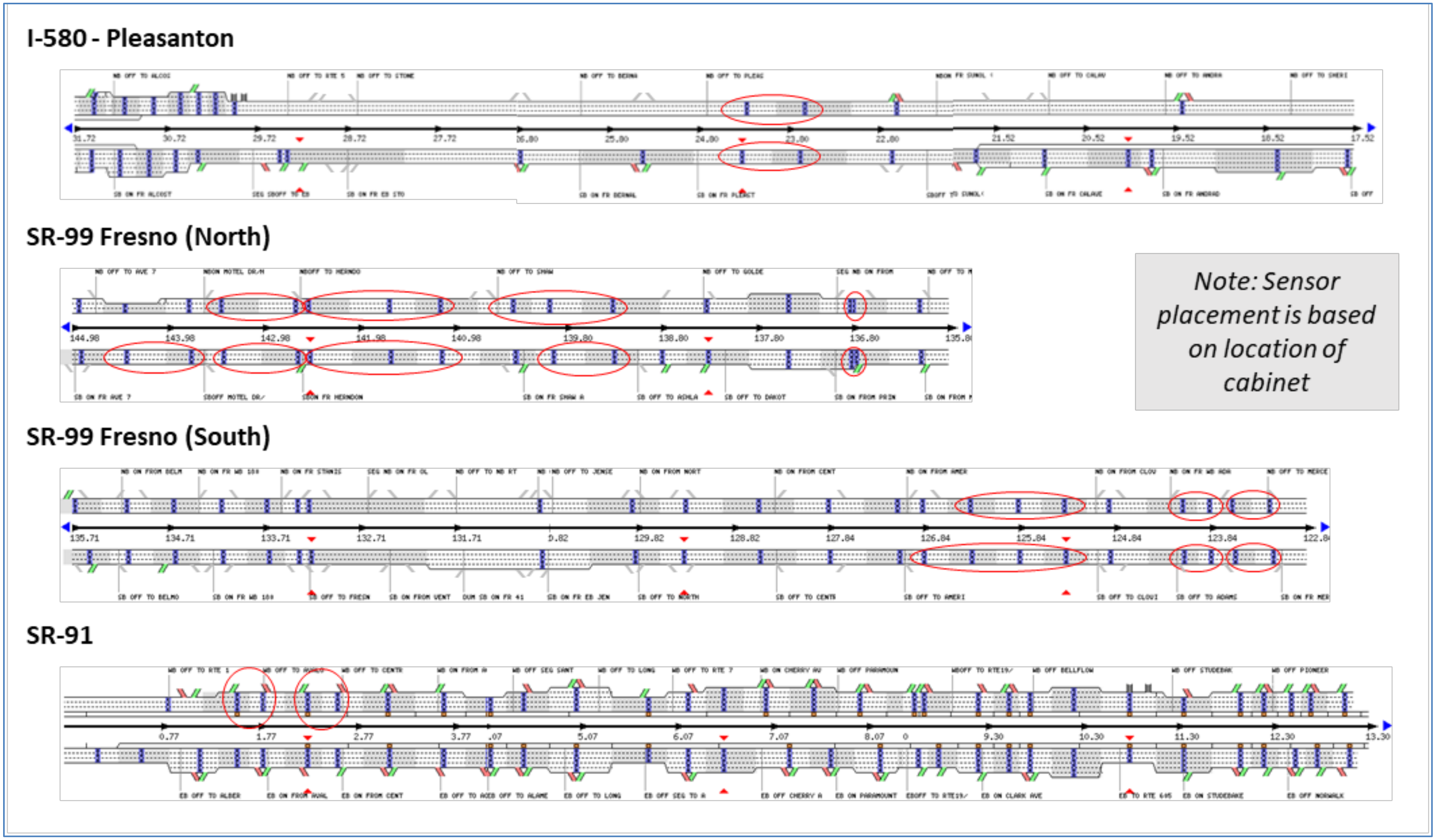


Figure 4-11: Typical HOV Sensor Placement – Example Set 2

As can be observed, sensor redundancy varies significantly across the various sections reviewed. Some sections, like I-80/I-580 in the middle of the figure and SR-91 at the bottom, have very few potentially redundant sensors. Other sections, like various SR-99 sections, have a significant number of potential redundancies.

While all the illustrated freeway sections in Figure 4-10 and Figure 4-11 are in urban or suburban areas, the issue of sensor redundancy is not limited to these areas. Figure 4-12 illustrates four rural freeway sections with potentially redundant sensors. These include I-5 near Buttonwillow, SR-99 north of Bakersfield, I-10 east of Palm Spring, and I-15 through the Mojave Desert. All the locations indicated by red circles are freeway segments that have multiple sensors between successive on-ramps and off-ramps.

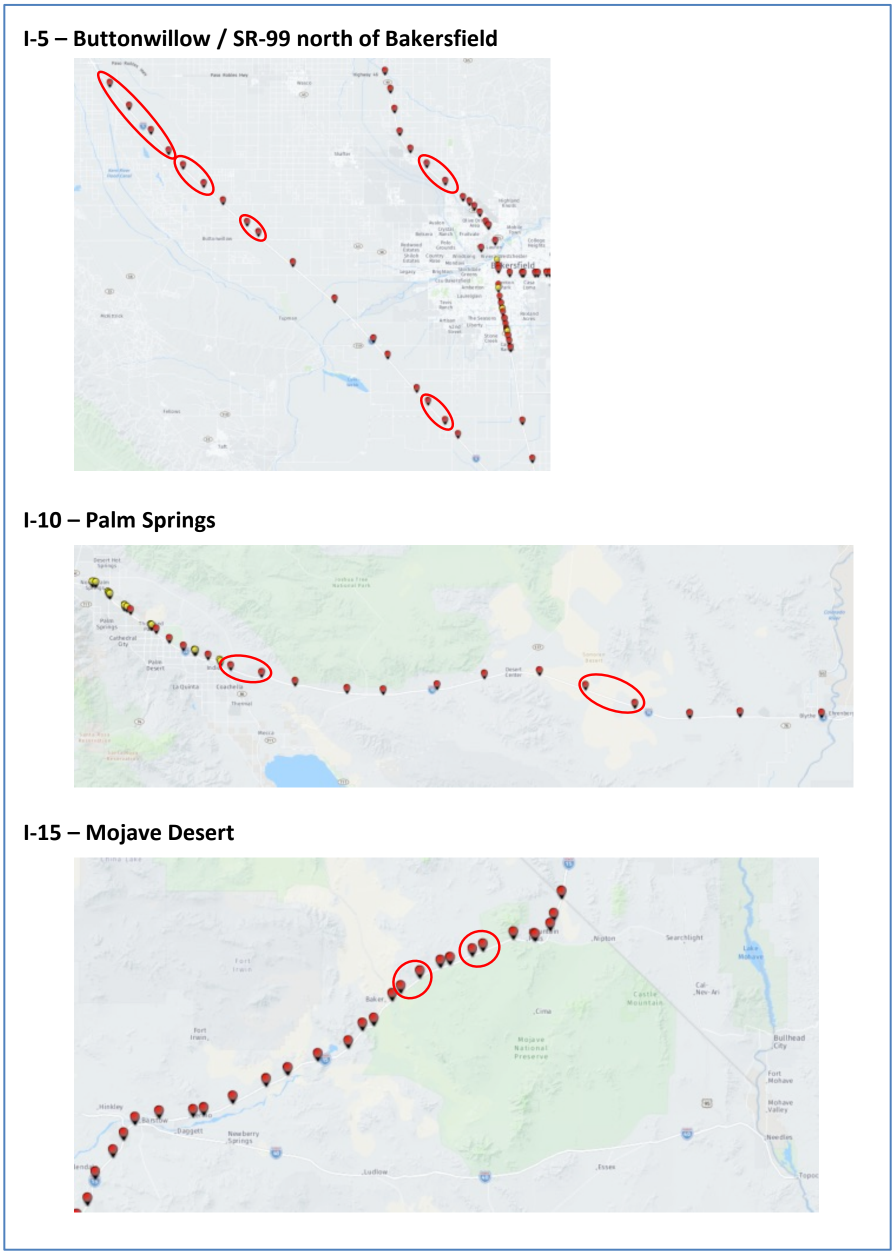


Figure 4-12: Rural Freeway Sections with Potentially Redundant Sensors

In some cases, the apparent redundancy may be explained by one of the following reasons:

- Desire to monitor in some detail the location of congestion between interchanges or ramps. In this case, while the multiple sensors may provide similar counts, the interest may be in monitoring the speeds returned by each sensor to assess the location of the back of a queue or congested area.
- Installation of a new set of sensors next to an old set of sensors without deactivation of the old set within the data collection system.

4.3.2. PARTIAL/NO RAMP COVERAGE

Many freeway sections have partial to no ramp coverage. One example is provided in Figure 4-13. The figure illustrates sensor placement along the section of I-580 leading to the Richmond-San Rafael Bridge in the San Francisco Bay Area. On the western portion of the section, sensors in the eastbound direction only cover on-ramps while sensors only cover off-ramps in the westbound direction. On the eastern section, several ramps are not covered at all. While the numerous mainline sensors enable an analyst to build a picture of traffic along the freeway itself, the partial ramp setup makes it difficult to fully evaluate traffic entering and exiting the freeway.

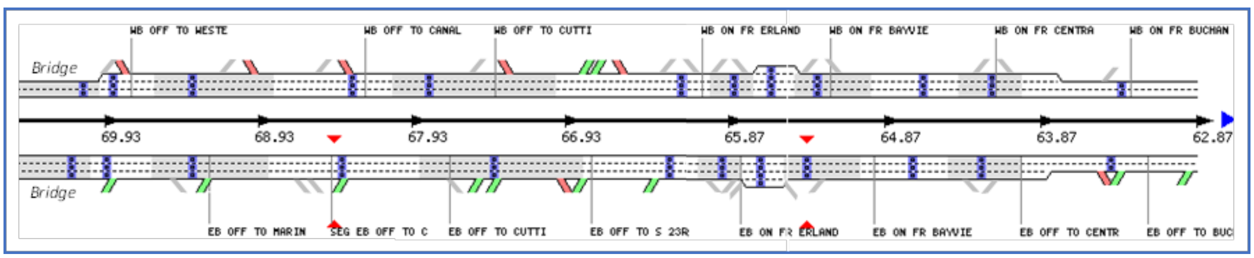


Figure 4-13: Ramp sensors along the Richmond section of I-580

One potential justification for the lack of sensors at some ramps may be associated with the low volumes expected for those ramps. If a ramp is to serve only a small number of vehicles daily, not knowing how many vehicles use the ramp will then have a relatively limited impact on traffic analyses. However, a lack of sensors at interchanges carrying significant traffic volumes is more problematic if there is an interest in analyzing traffic movements on a larger scope than the freeway mainline.

Within the example of Figure 4-13, the lack of sensors on some of the corridor's on-ramps and off-ramps mainly limits the ability to understand where traffic is entering and exiting the freeway where there are multiple ramps between two adjacent mainline sensors. Where a single ramp exists, it is sometimes possible to determine the ramp volume by comparing the volumes recorded at the two nearby mainline sensors, as long as the data are accurate.

Figure 4-14 illustrates three additional examples of key interchanges without sensors. In the three illustrated cases, the lack of sensors on the interchanges with regional state routes limits the ability to assess how traffic from the various state routes interacts with the freeway traffic.

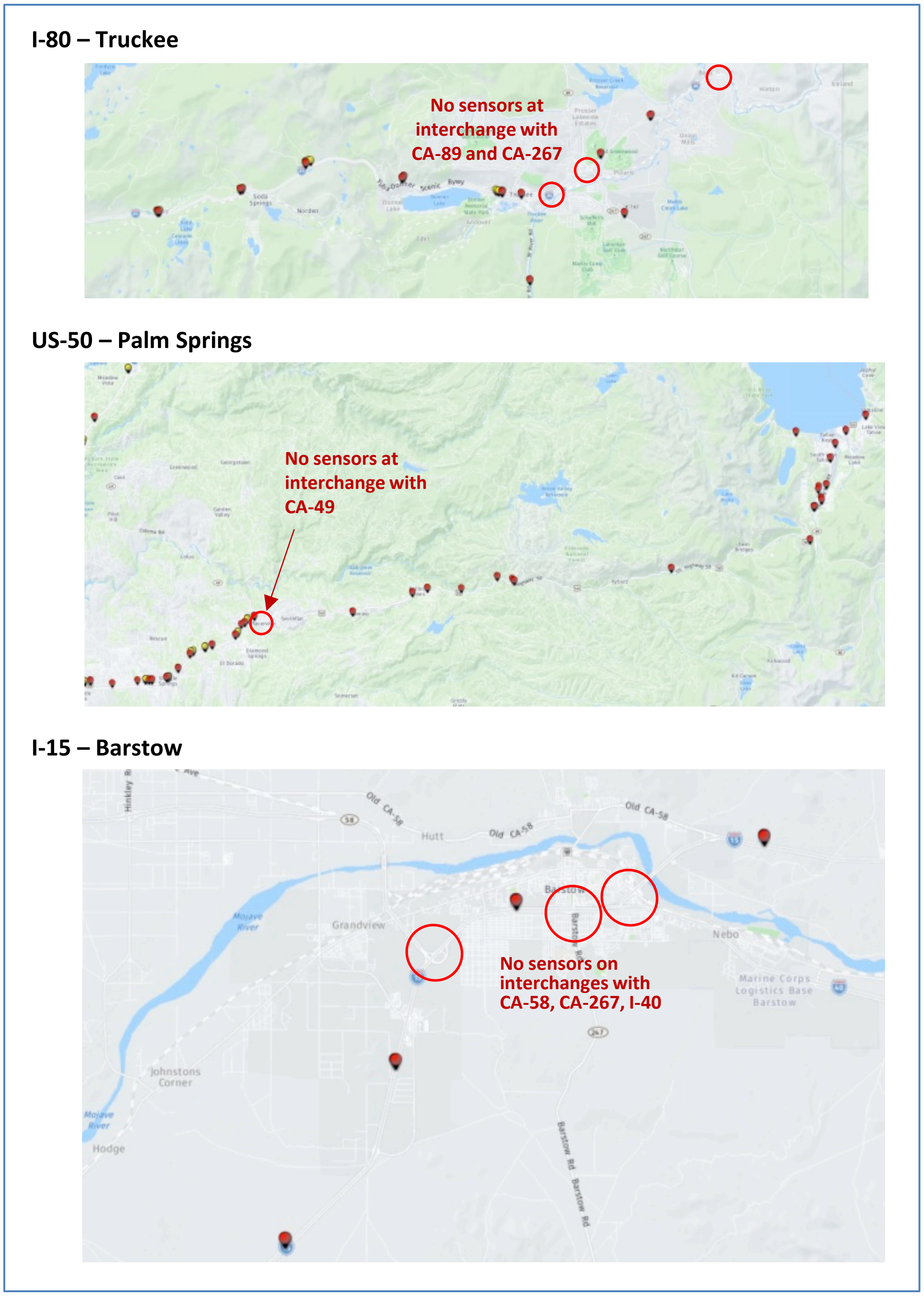


Figure 4-14: Rural State Route Interchanges without Sensors

4.3.3. PARTIAL/NO FREEWAY-FREEWAY INTERCHANGE COVERAGE

Similar to ramp coverage, the deployment of sensors within freeway-to-freeway interchanges can vary significantly. Some interchanges have sensors on all connectors, while others have partial or no coverage. An example is provided in Figure 4-15, which illustrates sensor placement along the section of SR-91 in Los Angeles extending from the I-710 to the I-5 freeways. As indicated, this section features a freeway-to-freeway interchange with no detector coverage (the interchange with I-710), an interchange with missing coverage on some of the connectors (the interchange with I-605), and a fully covered interchange (the one with I-5).

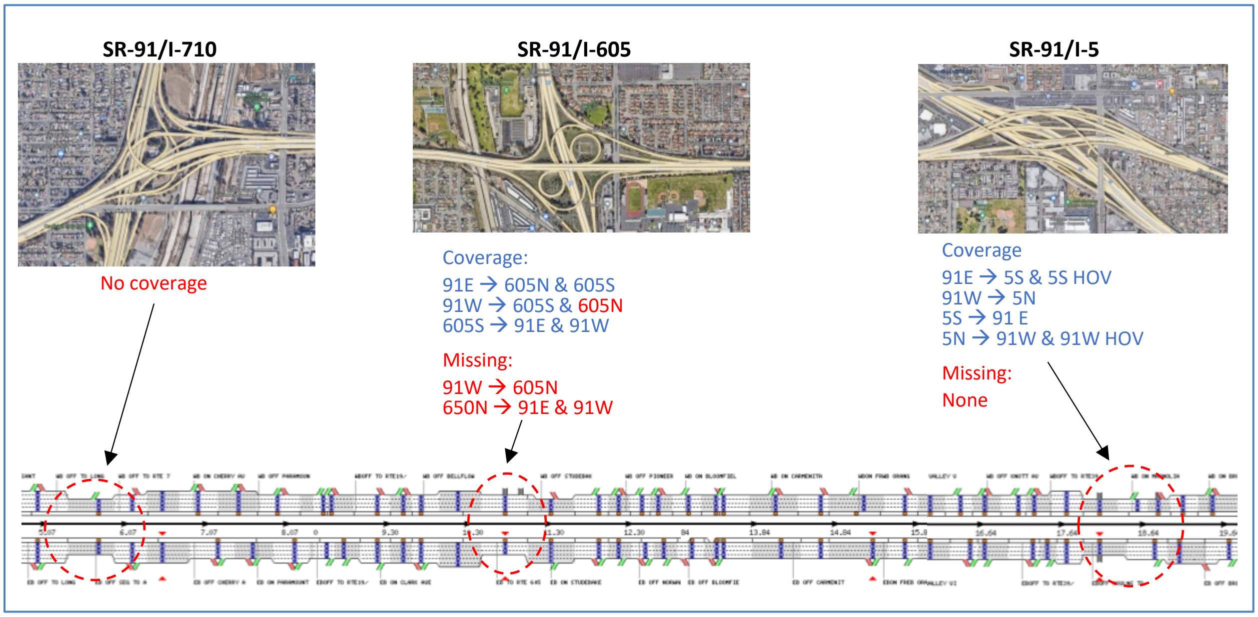


Figure 4-15: Sensor Coverage at Three Freeway Interchanges along SR-91

5. SELECTION OF FREEWAYS FOR ANALYSIS

This section summarizes the investigations that were made to identify representative corridors for detailed analysis. The objective was to select a set of corridors with adequate availability of quality data covering typical urban, suburban, and rural environments. Particular attention was also paid to including facilities with a high-occupancy vehicle (HOV)/ high-occupancy toll (HOT) lane, major freeway-to-freeway connectors, and other significant on-ramps and off-ramps. The overall goal was to select a useful set of facility types with significant interest to Caltrans.

Based on the previous analyses, and discussions with Caltrans staff, the following corridors were selected for project analyses:

- I-880, I-680, and I-280 corridors in the San Francisco Bay Area.
- I-5, SR-99, and I-205 in the area around Modesto, Tracy, and Stockton.
- I-5, SR-91, SR-55, and SR-57 around the Anaheim triangle.

Details of the analyses that were conducted to arrive at the above selection and provided below. This is split into an initial analysis focusing on the quality of the returned data by stations across a corridor, followed by a more detailed assessment of traffic statistics across successive stations.

5.1. INITIAL ANALYSIS

The initial analysis for corridor selection focused on a simple review of PeMS data quality. This was done by outputting the detector health summary report produced by PeMS for the various LDS stations along each corridor of interest. An example of data query setup is shown in Figure 7-7. Since PeMS can only do this analysis for a single day, reports were typically extracted for a given weekday in October or November 2022. Some variations occurred in the selected dates across corridors due to sensors coming online or offline. The goal was to try to select a day with a maximum number of sensors operating correctly.

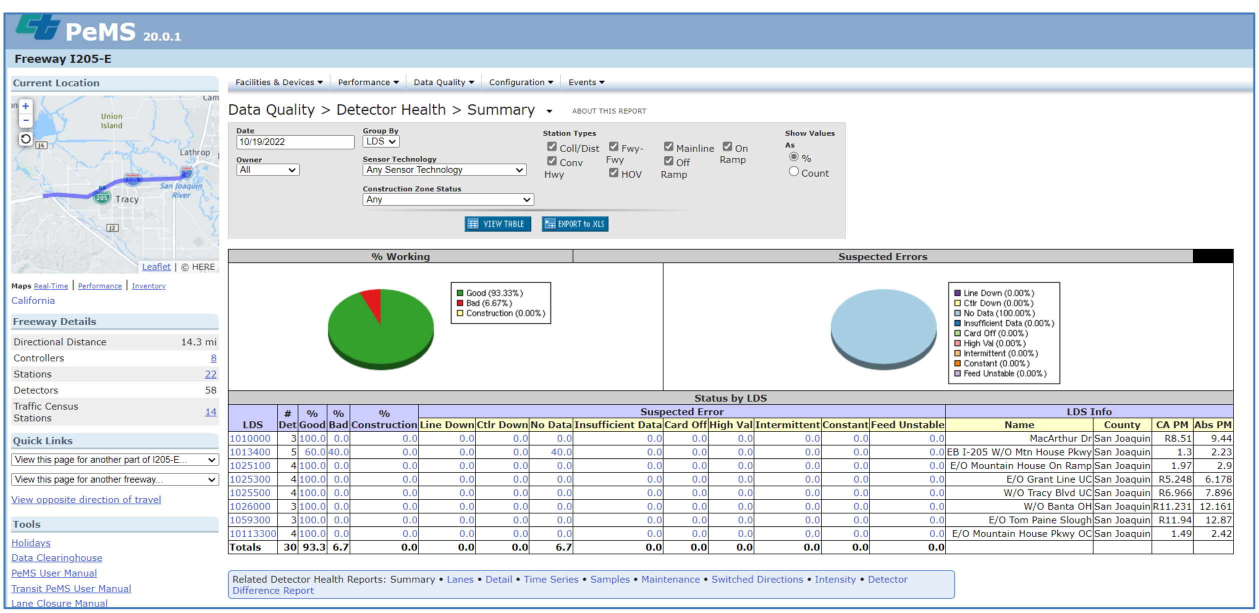


Figure 5-1: PeMS Detector Health Summary Report Example

Data were extracted for most freeways in the San Francisco, Sacramento, Central Valley, and Los Angeles areas. For each corridor, a station was assumed to produce good data only if it returned at least 80% of observed data. This means that only stations where at least 4 out of 5 sensors working correctly were assumed to produce good data. Conversely, any station where one sensor is not working out of two, three, or four was considered as returning bad data.

In the analyses, an observation threshold lower than 80% was not considered due to potential issues associated with PeMS data imputation method. While the data imputation method coded with PeMS often produces reasonable estimates if only one sensor is not working, it also often produces unrealistically high or low estimates when several sensors in succession are not working. The focus was on finding sections with a high number of stations showing good data. It was not to find segments where all stations work perfectly, but segments where a majority of sensors return good data.

Figure 5-2 to Figure 5-5 illustrate the result of the analyses. Each figure only illustrates the corridors for which segments with good data were identified. Segments with the highest proportions of good sensors are shown in dark green. Segments in lighter green represent sections with a fair ratio of good sensors but with some problematic sections. Sections shown in dark orange are those that were deemed to return insufficient data. Within each corridor, the yellow circles represent the freeway-to-freeway interchanges, while the blue circles represent interchanges with non-freeway state routes or key major arterials.

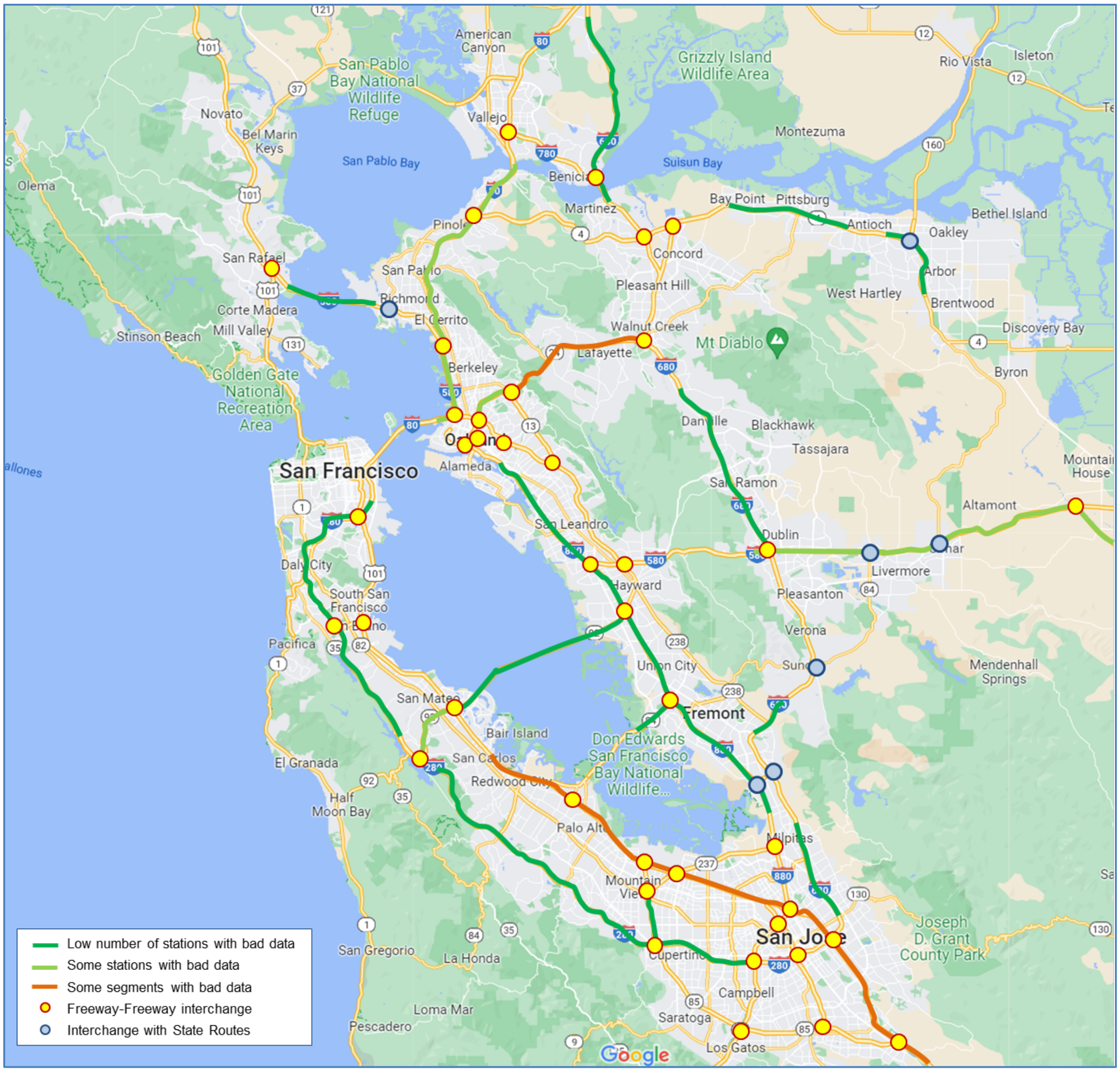


Figure 5-2: Corridor Data Quality Analysis – San Francisco Bay Area

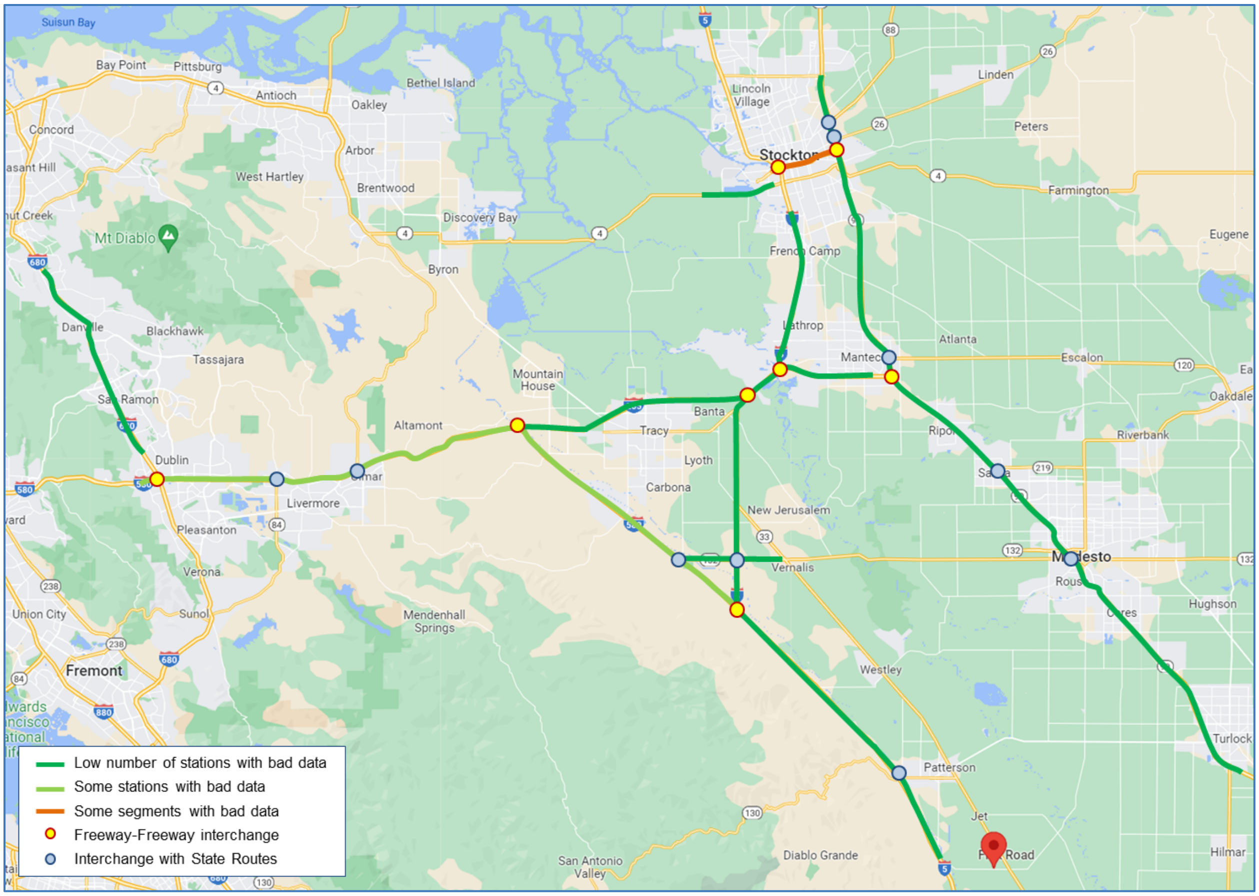


Figure 5-3: Corridor Data Quality Analysis – Stockton/Tracy/Modesto Area

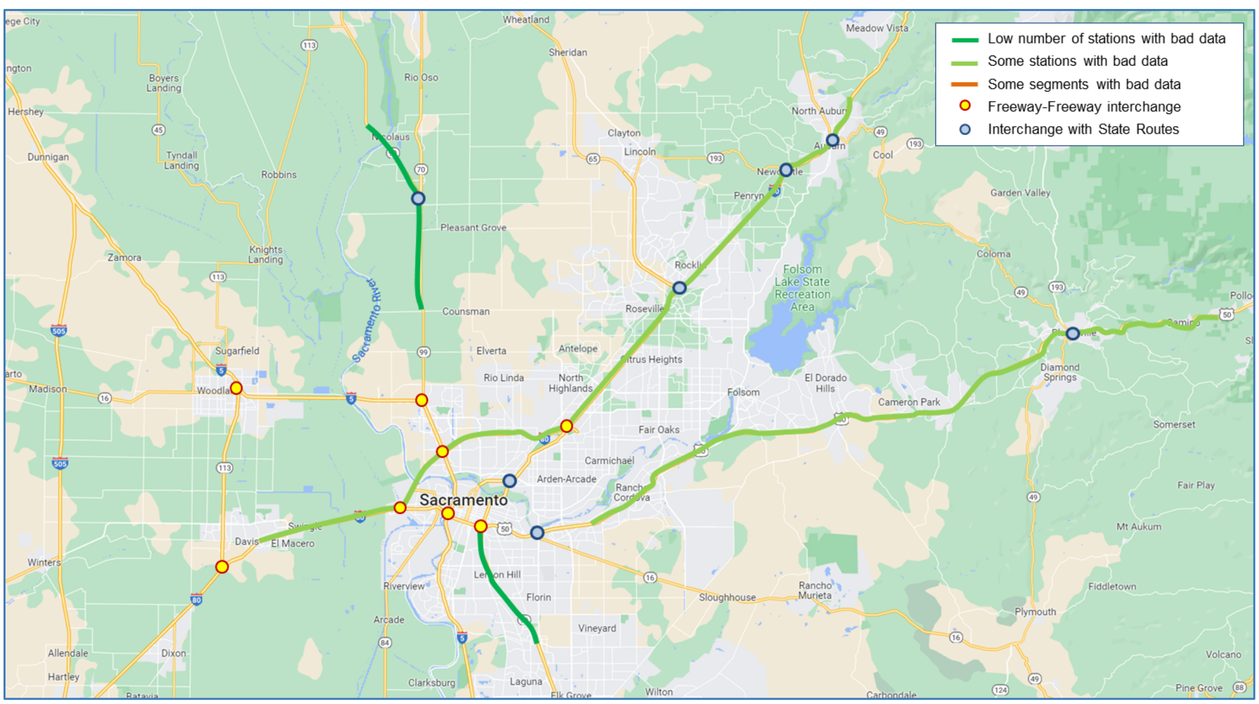


Figure 5-4: Corridor Data Quality Analysis – Sacramento Area

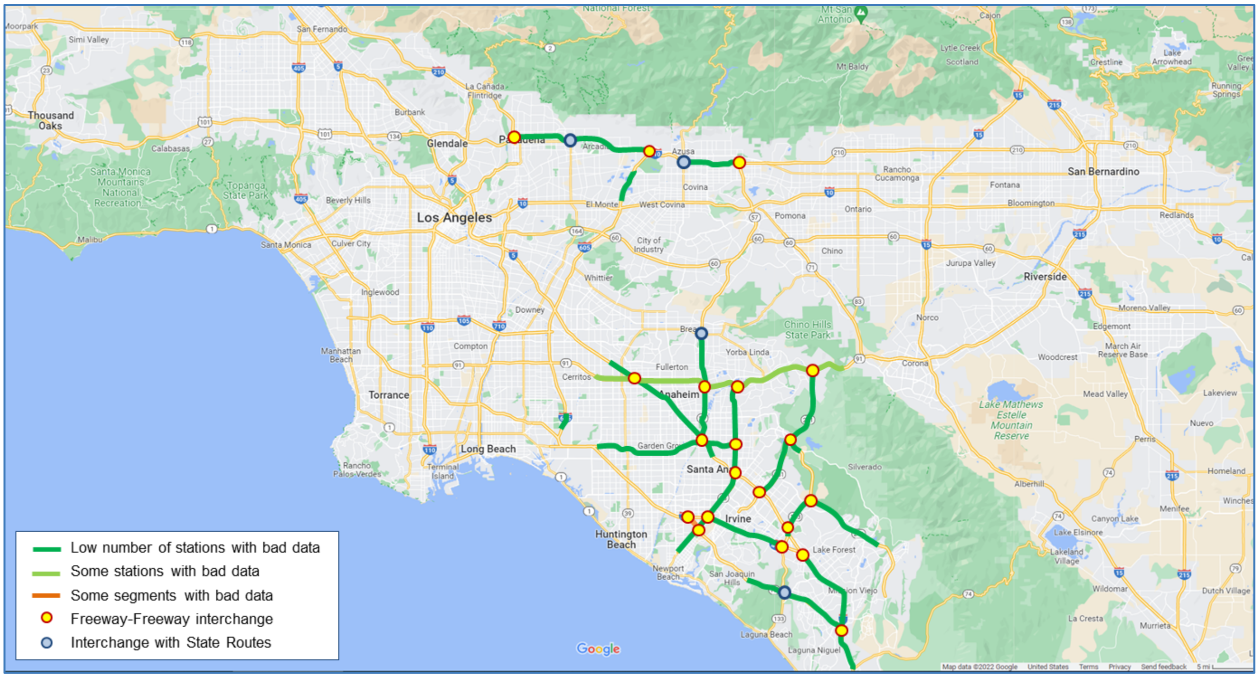


Figure 5-5: Corridor Data Quality Analysis – Los Angeles Area

5.2. DETAILED CORRIDOR DATA QUALITY ASSESSMENT

The second step of the analysis focused on a review of the spatial flow variability across each of the corridors that have been flagged as potentially having good data. As illustrated in Figure 5-6, this was done by mapping on a graph the volumes returned by each station along a freeway, while distinguishing sensors producing good and bad data, still using the 80% observed data threshold to categorize good and bad stations.

Figure 5-6 to Figure 5-10 show the diagrams that were produced for I-5 around Anaheim, SR-99 around Modesto and Stockton, I-880 and I-650 in the San Francisco Bay Area, and I-205 through Tracy in the northern Central Valley. Each graph shows the observed/estimated flows over a particular hour, in this case, either 12:00 Noon or 5:00 PM.

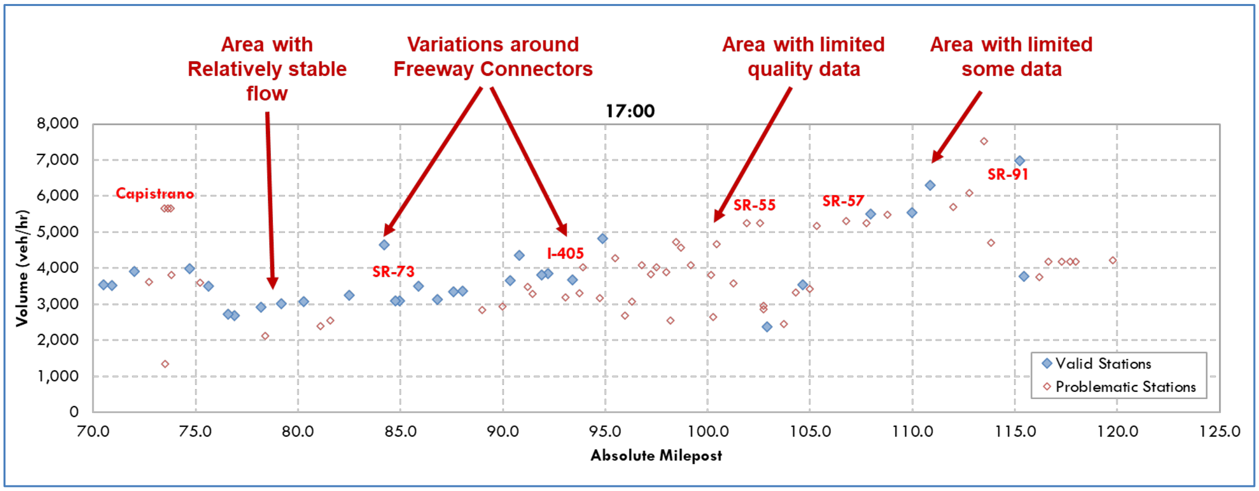


Figure 5-6: Spatial Corridor Data Analysis – I-5 North, Anaheim Area

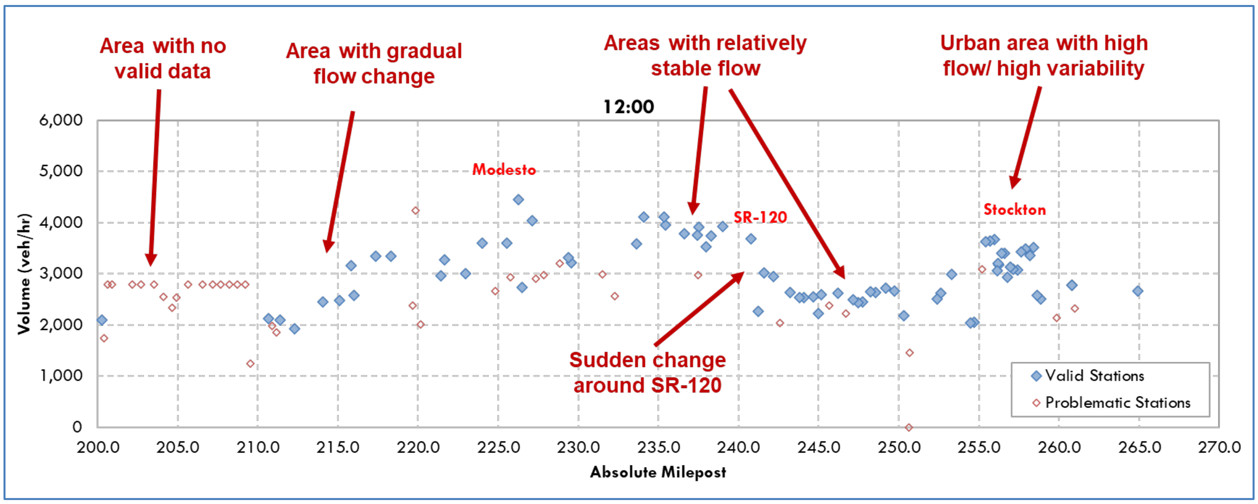


Figure 5-7: Spatial Corridor Data Analysis – SR-99 North, Modesto/Stockton

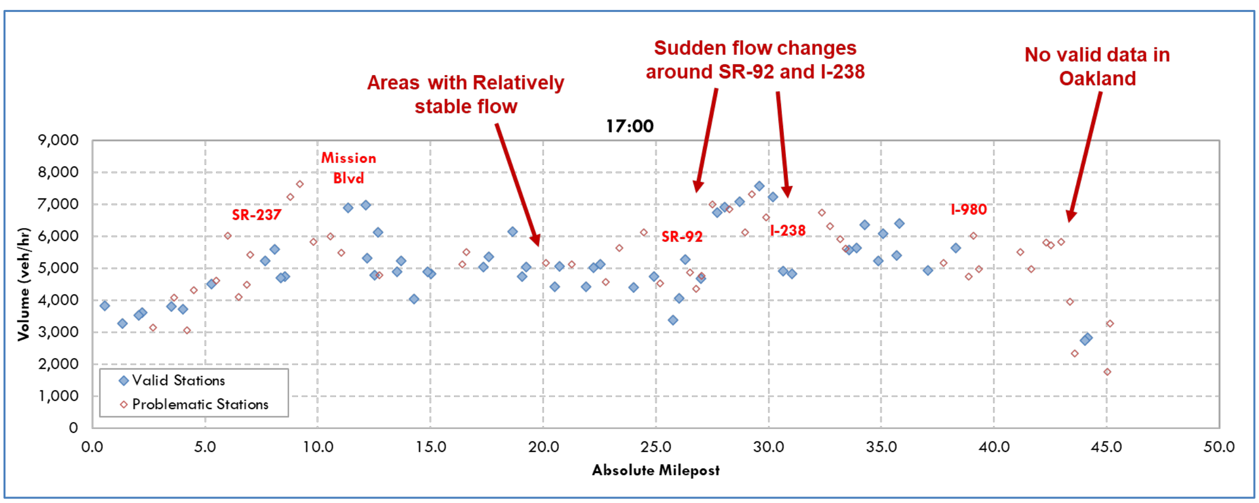


Figure 5-8: Spatial Corridor Data Analysis – I-880 North, San Francisco Bay Area

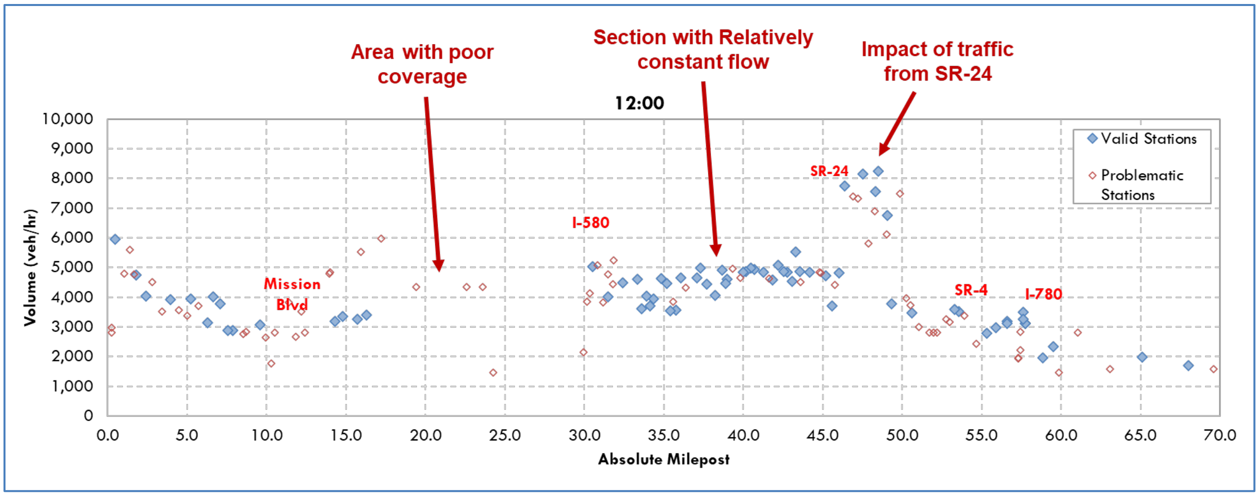


Figure 5-9: Spatial Corridor Data Analysis – I-680 North, San Francisco Bay Area

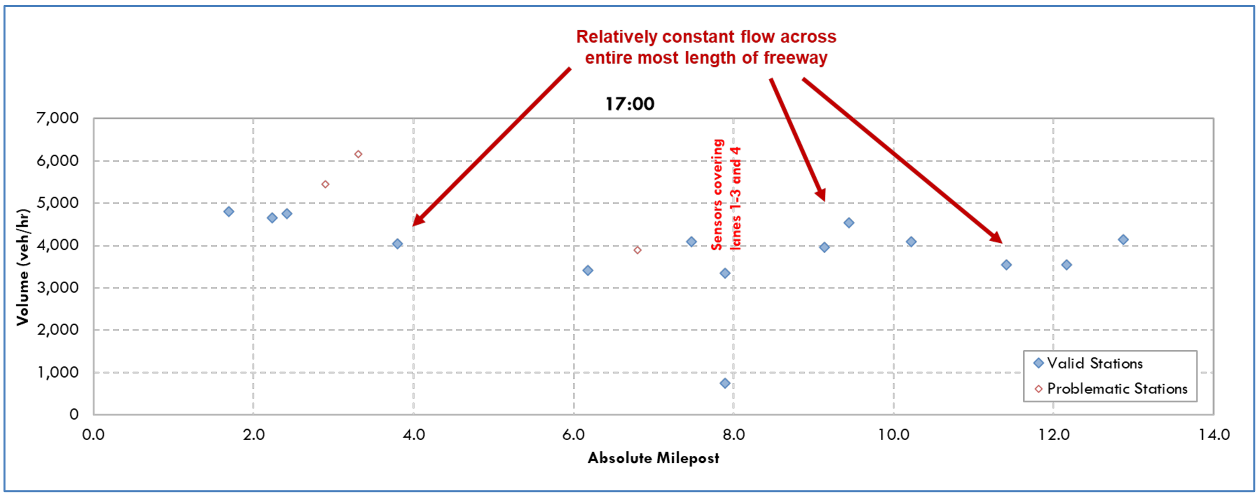


Figure 5-10: Spatial Corridor Data Analysis – I-205 East, Tracy Area, Central Valley

The focus here was to use the illustrated data to identify sections of potential interest for further analyses. A particular interest was to map sections with relatively constant flow across stations, which can be expected in rural areas (such as along some sections of SR-99 in rural areas) or on urban/suburban freeways used mainly as pass-through facilities (such as the I-205 in Tracy), as those sections have a high probability of having redundant sensors. Identifying sections with highly variable flows was also important, as these might be sections for which a higher density of sensors may need to be kept.

6. CONSIDERATIONS FOR SENSOR PLACEMENT

This section provides considerations for sensor placement along freeways. Sensors under consideration are fixed infrastructure-based sensors such as loops, or radar devices meant to measure vehicle flows and that may also measure or estimate speeds and road occupancy. Use cases under consideration may include real-time operations, performance monitoring, modeling, and emerging applications.

Although not discussed in detail, this research did touch lightly on vehicle classification and the specialized weigh-in-motion (WIM) sensors that perform that data collection. Classification data and other flow data can naturally be used together to draw inferences about the movement of trucks that might not be measured directly. This kind of use case is just one example that illustrates the utility of combining multiple data sets.

The work documented in this report took a unique big-picture approach, taking a holistic view of multiple applications while considering the broad context of Digital Transportation Infrastructure (DTI). Digital infrastructure, as opposed to physical infrastructure, refers to data, communications, and computational elements needed to manage the transportation system and support its burgeoning transformation to a connected, automated, and electrified system. In this context, data should be useful, trustworthy, and reusable. It should also be possible to measure elements of interest once and subsequently use the resulting data many times. This work explicitly considers the need for combining data sets to synthesize better information for better decision-making.

6.1. SUMMARY OF USE CASES

This section describes the set of use cases that were considered during the project to prioritize the importance of infrastructure-based sensors. Two operational use cases include ramp metering and integrated corridor management. Many other cases focus on performance monitoring, such as HOV degradation reporting, Census reporting, Mobility Performance reporting (MPR), and truck movement monitoring. Additional uses include traffic modeling for either planning or operations, and emerging applications that employ data fusion.

6.1.1. RAMP METERING

For ramp metering, the goal of sensing is to collect enough information about prevailing conditions around each ramp to set or select an appropriate local metering rate to achieve a given desired operational goal for the facility. Sensing may support various metering algorithms ranging in complexity. Depending on the algorithm, system-wide and local traffic data may be needed in addition to time-of-day information to set the appropriate metering rate.

Typical deployment patterns for sensors in California employ mainline sensors, on-ramp sensors at the metering stop lane to monitor arriving and departing vehicles, and queue sensors near the upstream beginning of the ramp to relax ramp metering if queues threaten to impede traffic on local arterials. Many ramps will also have additional sensors near their downstream end to count traffic, although these are typically not used for metering purposes. All the sensors used on a ramp must provide accurate, real-time data for the ramp metering algorithms to work as intended.

6.1.2. INTEGRATED CORRIDOR MANAGEMENT

Integrated Corridor Management (ICM) refers to a system for proactive traffic management that may be deployed to achieve a wide range of operational goals. Possible goals for sensing in this context include congestion monitoring, incident detection, incident verification, incident impacts analysis, post-incident traffic incident management (TIM) performance analysis, support for decision-making, and response plan deployment. Response plans may include temporary operational modifications to ramp metering or nearby traffic signals to mitigate congestion during planned or unplanned events.

In this context, typical deployment patterns for sensors will include what is already needed for ramp metering but may also include additional sensors on the freeway mainline, off-ramps, HOV lanes, freeway collector/distributors, and local arterials used as alternate routes.

6.1.3. HOV DEGRADATION

The goal of HOV lanes is to encourage carpooling. States also use them to promote the adoption of clean-air vehicles, as exemplified by the carpool sticker program in California that allows vehicles that do not meet the standard HOV lane requirements to use them for some years. However, an HOV lane is only successful if it actually yields time savings for travelers. To ensure that HOV lanes maintain a certain level of performance, State Departments of Transportation are required to monitor their operational performance and submit yearly operational reports about performance degradation to the Federal Highway Administration (FHWA). According to subsection (d) of 23 U.S.C. § 166, an HOV facility is considered 'degraded' if the average traffic speed during the morning or evening weekday peak hour period is less than 45 mph for more than 10 percent of the time over a consecutive 180-day period.

To perform the required monitoring, sensors are typically deployed along HOV facilities. Deployment of HOV sensors may depend on the Caltrans district and the configuration of the HOV lanes themselves. For example, in Caltrans District 7, HOV lanes are designed as limited access facilities with traffic only allowed to enter or exit at certain gates. This theoretically limits the number of sensors required for performance assessment to key locations between gates. However, HOV sensors are often placed in the middle of the gates. Such sensors do not measure HOV inflow or outflow at the gate, but rather produce a count value that is confounded by lane-changing of vehicles into and out of the HOV lane or lanes. On the other hand, HOV lanes in Caltrans District 4 mainly have continuous access and are active only during specific portions of the day, reverting to general use outside of restricted hours. In this case, a higher density of detectors is usually used as traffic conditions can change anywhere. This has resulted in the deployment of HOV detectors that are typically configured in line with the detectors of the general-purpose lanes.

6.1.4. CENSUS

Census monitoring is another federal requirement that supports the allocation of federal transportation funding. In this case, the goal of sensing is to take a statistical sample of traffic volumes across the state over a range of facilities to estimate average annual daily traffic (AADT) statistics and quantify total yearly vehicle miles traveled (VMT) across the State Highway System (SHS).

The deployment of sensors for this purpose need not be continuous, such as 24 hours per day across 365 days per year. Within California, data is typically collected over a three-year cycle, with data collected at each site of interest once every three years across a few days. While data at some locations may be collected continuously, these sites are a slim minority. Sites with low traffic may further only be sampled when noticeable changes in traffic are observed, resulting in long intervals between updates. This kind of information, having broad coverage, may have other useful applications when combined with other data.

6.1.5. MOBILITY PERFORMANCE REPORTING

In prior years, the Mobility Performance Report (MPR) was generated quarterly using outputs automatically generated from the Performance Measurement System (PeMS). The report summarizes key performance measures such as VMT (vehicle miles traveled), VHT (vehicle hours traveled), and VHD (vehicle hours of delay). The goal of sensing in this context is to obtain an overall picture of system performance over each district.

Interestingly, the MPR only uses PeMS data from mainline and HOV sensors and ignores data on adjacent freeway facilities such as on-ramps, off-ramps, and connectors. One previous study (Khan, Fournier, Mauch, Patire, & Skabardonis, 2020) estimated that this methodology neglects 15-20% of Caltrans right-of-way (ROW) lane-miles in urban freeways.

6.1.6. TRUCK MONITORING AND PROJECTED MAINTENANCE

There are multiple goals for truck monitoring including the enforcement of weight limits, projection of overall wear and tear on the road to project future requirements for maintenance and pavement rehabilitation, and design of road upgrades or new roads for accommodating changing truck traffic.

One goal of sensing in this context is to perform vehicle classification. Another is to provide some underlying data to quantify truck movements that can be used to predict future travel needs and maintenance costs.

Within California, vehicle classification is typically obtained from the two following sources:

- Weigh-in-motion (WIM) stations installed across the state
- Census traffic sensing stations with classification capabilities

All mainline WIM sensors used by Caltrans are bending plates on frames embedded in concrete. As a vehicle travels over the plate, the weight associated with each axle is determined based on the degree of bending in the plate. This can be done while the vehicle is traveling at normal traffic speed. Inductive loops are further installed before and after the WIM sensor array to measure vehicle speed and overall vehicle length.

WIM stations typically gather and store data on a 24/7 basis. This is accomplished in the roadside cabinet. Information captured at the WIM stations is then automatically sent to a data management system hosted on a Caltrans server that allows data to be queried based on location or date. Information typically collected from each passing truck by WIM stations includes:

- Axle spacing
- Axle weights
- Gross vehicle weight
- Caltrans vehicle classification
- Vehicle speed
- Vehicle overall length
- Weight violation flag

- Day/time of observation
- Direction of travel
- Lane of travel

Fairly comprehensive data is also obtained from Census stations with vehicle classification capabilities. This includes vehicle classification counts by hour, day of the week, day of the month, direction of travel, and lane of travel. Weights are not obtained due to the lack of capability for measuring this characteristic.

6.1.7. MODELING

There are many different types of traffic models built for different purposes. Planning models (typically static, macro-level models) benefit from the types of data discussed here but are not the focus of the present work. Dynamic traffic models are increasingly built at larger scales and are needed to create so-called "digital twins" for emerging transportation applications. Dynamic traffic models may be used to evaluate the benefits of proposed transportation projects, select desired alternative scenarios, or be used as a permanent component of an ICM project.

The goal of sensing in this context is to provide underlying data to build and calibrate models so that they can recreate realistic congestion and travel patterns. Typical data will include flows, speeds, travel times, and turning ratios. As models get geographically larger, there are specific challenges around routing, especially when multiple routing options are feasible and driver choices are influenced by localized congestion, especially at major freeway-freeway interchanges and decision points.

6.1.8. EMERGING USES

Emerging applications for sensor data relate to the burgeoning digitization of transportation, and new possibilities to manage the transportation system at an unprecedented level to achieve strategic goals such as improved safety as well as targets for equity and environmental sustainability.

One crucial use for sensor data is to provide normalization factors, and quality checks on private sources of transportation data—from so-called third-party sources. Private companies provide analyses of travel times, routing, turning ratios, and other metrics based on data collected from probes, connected vehicles, fleet telematics, and other potential sources. However, these data are usually sampled from a limited and likely biased population of travelers, with a bias that is unlikely to change quickly in the coming years.

Unlike tracking data from third-party vendors, infrastructure-based sensors collect a complete cross-section of data across a facility. Instead of relying on data samples, these sensors offer the ability to capture information about every vehicle passing a given location and thus reliable ground truth estimates when they are operating adequately. Sensor data is therefore special and crucially important for the reliable monitoring of transportation systems.

When data from fixed sensors and third-party sources are fused, the potential exists to improve the quality of information available and decision-making outcomes for all the use cases listed above. This is incredibly important. However, this is only possible if enough dedicated sensor data exist, and if the sensor data are made to be trustworthy and reusable.

6.2. DATA CHALLENGES

Referring back to Figure 1-1, the main idea is to be able to benefit from the promise of DTI—to have the ability to gather and exchange data that can be used to manage traffic at the systems level. This is where significant gains can be made in terms of improving traffic flow and safety, reducing vehicle energy use and greenhouse gas emissions, and more. The very first step towards this goal is to generate and have data that are suitable for machine-to-machine interfaces.

Physical sensor placement is inextricable from knowing the sensor placement. In other words, the actual location of the sensor must be known in both the physical and digital worlds. Not only is it crucial for sensors to be positioned in the correct location, but it is crucial to be able to know with high confidence and detail exactly where a sensor is and what it measures: This is the key to reusability and data fusion.

Existing challenges impeding data usage and data fusion include the following limitations on sensor location meta-data:

- Meta-data are insufficient for machine-to-machine interfaces
- Meta-data contain only minimal detail—enough for a human to find and service
- Meta-data are insufficient at major freeway-freeway interchanges
- Meta-data could be wrong
- Few automated checks are implemented to maintain the quality of meta-data
- Data availability can be low

These challenges and their effect on several use cases are described below.

6.2.1. DATA CHALLENGES RELATED TO REAL-TIME OPERATIONS

Typical sensor installations for ramp metering are adequate for local ramp metering control but are often not sufficient for applications requiring more details, or an integration with multiple systems or multiple jurisdictions such as in ICM systems. For instance, data collection from queue sensors located near the upstream beginning of a ramp is typically not available in PeMS or in conjunction with mainline or on-ramp data.

It is also quite common to have a lack of sensing on auxiliary freeway lanes. This defeats the purpose of mainline freeway monitoring as vehicles can use facilities as a passing lane instead of their intended purpose as entry or exit lanes. The main value of mainline traffic monitoring is being able to measure the entire cross-section of traffic to generate an unbiased estimate of flow at a particular point on the freeway network. This is notably crucial for cross-checking or calibrating third-party data.

Another challenge is that data availability and quality can be highly variable. A particularly useful time to collect data is during construction projects so that traffic can be monitored, and congestion mitigated. However, local electrical power is typically shut off as a safety measure during construction, and without local power, sensors are rendered inoperable. Often, temporary lane shifts also result in traffic passing between sensors instead of on top of them. To compensate for this, Caltrans may install temporary sensing where necessary. Having the possibility to use multiple data sources during construction projects would greatly improve monitoring capabilities when and where they are most needed. Data availability and quality can also be impacted by copper theft, vandalism, or signal loss due to communications, modem, network, server, or other failure. Redundant systems would add a layer of robustness.

Another challenge is the highly variable accuracy of sensor location meta-data over multiple-year timespans. Primarily, this is because there is a lack of automated means for meta-data accuracy checking. Meta-data errors can be introduced during maintenance or after new construction is completed. A typical error is that sensors in the same controller can have their labels swapped. When this happens, a sensor may be assumed to be localized on the other side of the freeway, in the wrong lane, or on an adjacent HOV facility.

6.2.2. PERFORMANCE MONITORING

When it comes to performance monitoring, the main challenges are that the data sources are fragmented and difficult to relate and use together. Depending on whether the data are housed in PeMS, WIM systems, or separate Census systems, access may be limited, and the meta-data may be insufficient to connect the measurement data with their location on a traffic network or a shared data layer where the relationships between the data can be automatically determined. Better information and more accurate reports can be generated when data are integrated with other sources.

Below are some examples of elements that may affect performance monitoring:

- **Inaccuracies in meta-data.** As mentioned above, monitoring and yearly reporting of HOV lane degradation is a federal requirement. However, meta-data inaccuracies confound the collection of this data. One example of a common mislabeling problem is when the HOV lane sensor is mislabeled as a general-purpose lane sensor. A previous study (Fournier, Farid, & Patire, 2023) estimated that 5% to 8% of HOV sensors in Caltrans District 7 are mislabeled in this way. One potential fix would be to have automated systems to check meta-data accuracy such as those implemented in the above study.

- **Unequal coverage of off-ramps, on-ramps, and freeway collectors.** Knowing the level of traffic coming onto or leaving a freeway, particularly at busy interchanges, helps understand how a freeway functions in context. Unfortunately, not all freeways are instrumented the same way. While many urban freeways have sensors on all on-ramps and off-ramps, such as the I-210 freeway in Pasadena, others, such as the I-580 freeway in Richmond, may only have sensors on off-ramps or on-ramps. Other freeways may have no ramp sensors.

- **Limited number of WIM stations.** Only 140 WIM stations have been installed across California, mainly along key transportation corridors used by trucking companies. Most of the stations are located along freeways and major highways in rural areas and at the edge of urban areas. In addition to the limited number of stations, various technical issues may prevent data collection from existing stations. As an example, only 54 of the 140 WIM stations installed across California were successfully transmitting data in September 2022.

- **Limited data availability from truck weigh stations.** While many weigh stations exist across the state, very limited data is typically obtained from these facilities. Weigh stations are normally operated by the California Highway Patrol (CHP), not Caltrans. While all stations have scales, some facilities may not be operating all the time. Their operational hours are based on need and are typically determined based on average daily truck traffic, peak truck traffic hours, and seasonal needs. In addition, based on discussions with commercial vehicle enforcement facility (CVEF) operators, information about passing trucks is typically only recorded for vehicles flagged with a violation.

6.2.3. MODELING

Traffic modeling, especially mesoscopic or microscopic modeling requires high-quality data for calibration. For large models of extended geographical scope, there are specific challenges related to routing and the selection of routes for origin-destination (OD) pairs where multiple routing options are feasible and affected by localized traffic congestion.

These routing challenges are particularly difficult at major freeway-freeway interchanges with multiple flyovers and idiosyncratic connectivity to local streets. One typically requires having reasonable knowledge of split ratios (the percentage of vehicles that turn or go straight) at network decision points. For this reason, model calibration stands to benefit from having both fixed sensor data as well as third-party data to cross-check and validate the routing choices of modeled vehicles.

7. SENSOR PRIORITIZATION METHODOLOGY

7.1. STAGE 1: PRIORITIZATION BASED ON ROAD TOPOLOGY

This section describes a prioritization framework for sensors based on road topology, and specifically considering freeway-freeway interchanges. It also discusses some user inputs that are required to support the voting process described in the subsequent stage.

To help determine the relative importance of the various interchanges found along a given freeway, the following simple categorization based solely on the number of connectors was developed:

- Type 1: 1-2 connectors
- Type 2: 3-4 connectors
- Type 3: 5-7 connectors
- Type 4: 8 connectors
- Type 5: 9+ connectors

Examples of interchanges belonging to Types 1, 2, 3, and 4 are shown in Figure 7-1. These categorizations do not include at-grade intersections controlled by traffic lights, stop signs, or yield signs.

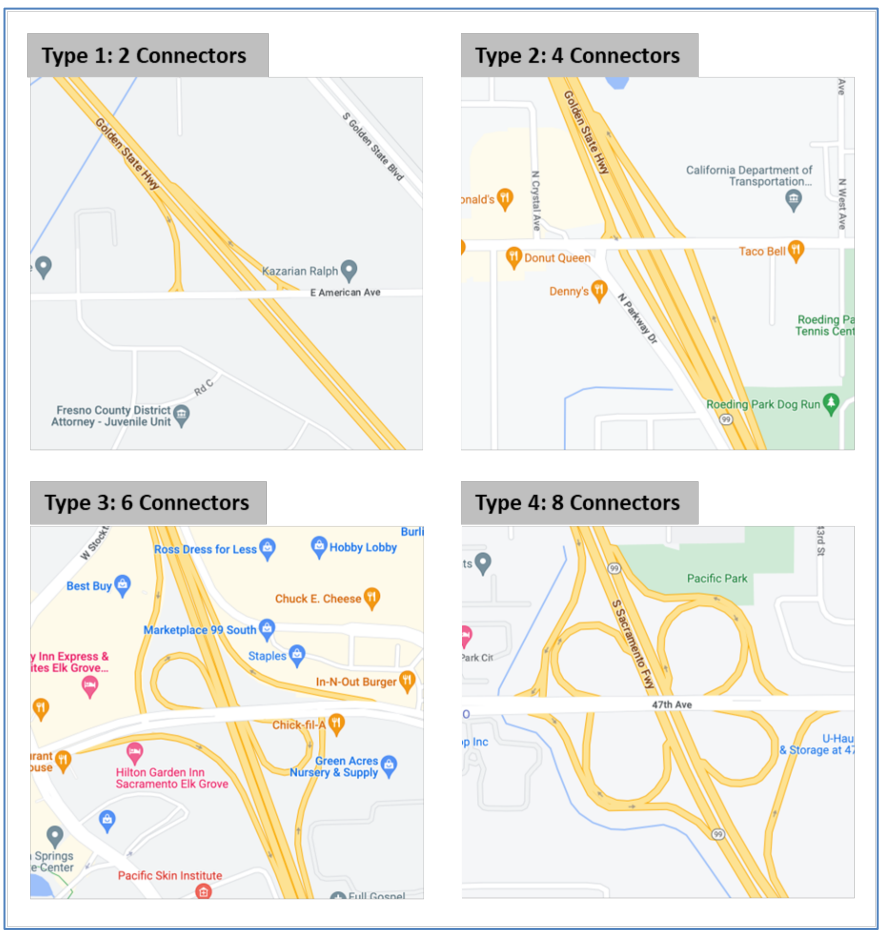


Figure 7-1: Examples of Freeway Interchanges

The overall goal is to prioritize candidate locations for sensors in a simple and straightforward manner whilst considering multiple purposes for the data. When considering interchanges, one useful metric is the number of connectors or ramps that provide connectivity from the subject freeway to the other freeway or local arterials. One challenge with this metric is that it is subject to some level of interpretation. While complex interchanges are often associated with high-traffic locations, some interchanges may exhibit a simple layout due to geometrical constraints, such as diamond interchanges connecting an elevated freeway in a dense urban setting.

In some examples, it might be difficult to decide whether a particular set of on- and off-ramps constitute a specific interchange or are instead part of a nearby interchange. In such a case, some engineering judgment may be required to determine the specific case at hand. Consider the example of Figure 7-2, illustrating the ramps between I-280, I-880, SR-17, and Stevens Creek Boulevard in San Jose. Of particular interest is the illustrated blue path from Stevens Creek Boulevard to Moorpark Avenue. This path utilizes a connector that could be used to take SR-17 south but instead merges onto I-280 before taking the next exit. In this case, the combination of ramps around Stevens Creek Boulevard and the I-280 / I-880 / SR-17 interchange can be considered to belong to a single interchange. In the methodology presented in this document, the general guidance to address such an issue is that if it is difficult to decide whether a particular collection of connectors constitutes one or two interchanges the collection should then be counted as a single interchange.

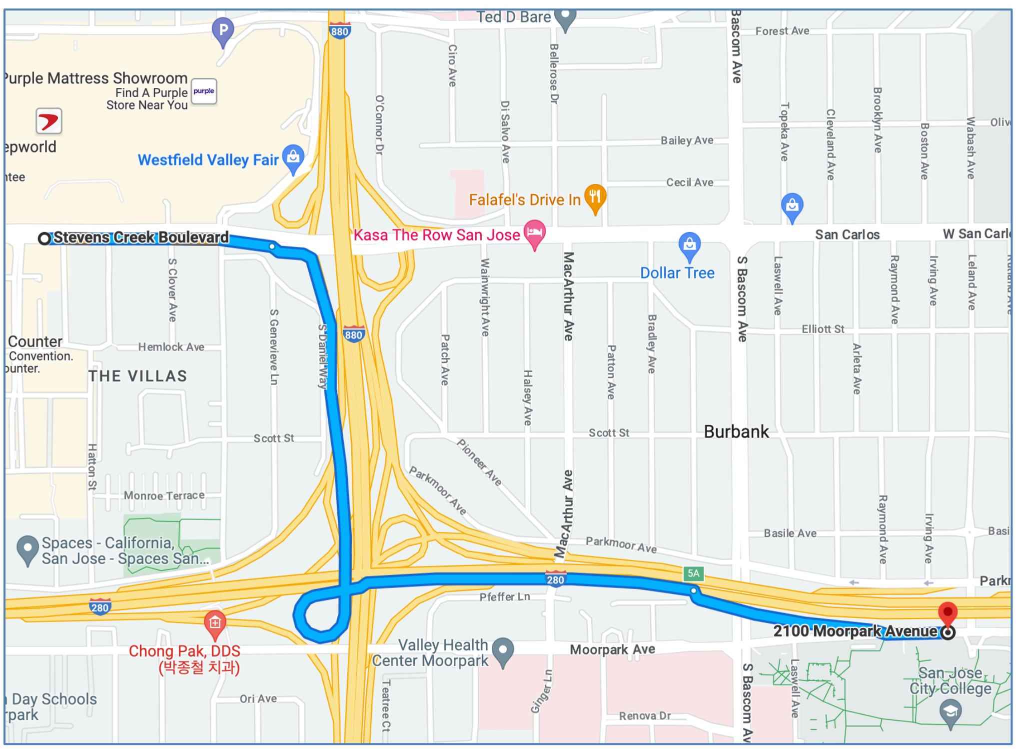


Figure 7-2: Example of a Large, Complex Freeway-Freeway Interchange

Using the above framework, the proposed methodology for categorizing interchanges proceeds as follows:

1. Obtain a facilities spreadsheet from PeMS. Be certain it is bidirectional and includes all PeMS sensor types such as HV, OR, FR, ML, etc. This spreadsheet will be used to keep track of the topology features.

2. Start at the beginning of the spreadsheet. Using an online map, identify the first interchange and count the number of connectors.
3. Associate the PeMS sensors with the interchange; label them with a number starting with one and incrementing upward.
4. Add columns for the number of connectors and categorization of interchange type to the spreadsheet.
5. Continue this process for each successive interchange, labeling each one.

Note that in general, not all interchanges will be included in the PeMS facilities spreadsheet. However, it provides a good first start. Additional interchanges should be added to the spreadsheet with postmile locations so they can be considered.

A facilities spreadsheet for all sensors in a district can be obtained from the PeMS website (https://pems.dot.ca.gov/) by using the Data Clearinghouse accessed through the "Clearinghouse" link in the lower left of the front page. The Clearinghouse interface is displayed in Figure 7-3. From here one can select the district, by using "district" dropdown list, specify the file type, by selecting "Station Metadata" from the "Type" dropdown list, and click the "submit" button.

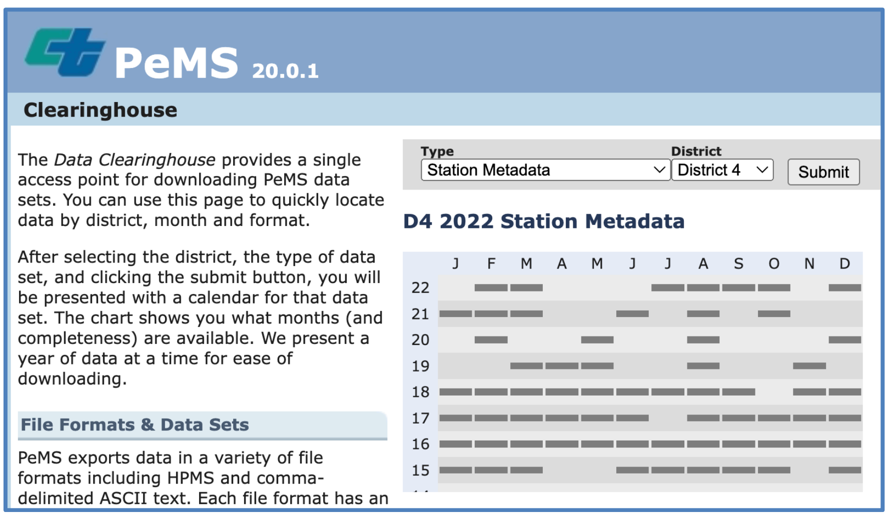


Figure 7-3 Image of PeMS Clearinghouse for Facilities Station Metadata

	ID	Fwy	Dir	State_PM	Abs_PM	Latitude	Longitude	Type	Name
5	408917	880	S	0.07	0.07	37.318301	-121.94031	OR	SB 280 on
16	408916	880	S	0.08	0.08	37.318458	-121.9403	OR	SB 880 on
19	401611	880	S	0.11	0.11	37.318919	-121.94031	ML	Stevens Creek Blvd
22	408915	880	S	0.11	0.11	37.318919	-121.94031	FF	SB 280
25	408914	880	S	0.12	0.12	37.319065	-121.94032	FF	NB 280
31	408910	880	N	0.16	0.16	37.319644	-121.94018	FR	Stevens Creek off
35	408909	880	N	0.18	0.18	37.319935	-121.94021	OR	SB 280 on
47	408908	880	N	0.23	0.23	37.320661	-121.94029	OR	NB 280 on
49	408907	880	N	0.31	0.31	37.321822	-121.94043	ML	SB/NB 280 rm-n-fly/diag
50	408912	880	S	0.45	0.45	37.323856	-121.9408	FR	N. Monroe St off
51	408905	880	N	0.47	0.47	37.32414	-121.94064	OR	Stevens Creek Blvd on loop
72	408906	880	N	0.48	0.48	37.324285	-121.94065	OR	Stevens Creek Blvd on diag

Figure 7-4 Example of facilities spreadsheet for I-880 sorted by absolute postmile

The station metadata is downloaded as a text file. It can be opened in a spreadsheet program such as Excel. At this point one can filter on the freeway (column B), and sort by absolute postmile (column H) as displayed in Figure 7-4.

As described above, additional columns for interchange category, number of connections, and intersection number can be added by the analyst. These additional data are obtained by inspecting an online map. They can be entered into the appropriate rows of the spreadsheet. When this process is completed, the spreadsheet will have multiple rows per interchange.

For visualization purposes, multiple entries corresponding to the same interchange can be dropped and the result can be plotted on a map. Figure 7-5 is the result of this process for I-880 and a portion of SR-99. Large red dots correspond to the largest (Type 5) interchanges and the small green dots correspond to the smallest (Type 1) interchanges. A color gradient is further used to illustrate interchanges associated with intermediate types.

Figure 7-5: Categorization of Interchanges on I-880 (left) and SR-99 (right)

Having performed this analysis, the large red dots correspond to major interchanges where sensor data is valuable and important. However, the string of green dots in Oakland toward the northern end of I-880 is deceptive. In this dense downtown area, there is no space for large interchanges. The freeway is elevated, and the Posey Tube provides underwater access to Alameda. The connectors and ramps are attached to arterial streets, but this complexity is not captured in this methodology. For this reason, it is important to consider other user input as well as existing sensor data to add more context.

Considering the discussion in the previous section, several use cases may specifically demand supporting instrumentation. Below are a few examples, among potential others:

- If there is a local need for ramp metering, then these interchanges will need to be flagged.
- HOV lanes still require their own dedicated sensors because third-party data does not yet distinguish reliably traffic on separate, but adjacent, lanes.
- If there is a plan for ICM, then additional sensing locations will further need to be flagged in alignment with the goals of the ICM.

All of the above factors must be considered in their local context and flagged. This provides a topological priority for sensing that is considered in the next stage.

7.2. STAGE 2: PRIORITIZATION OF MAINLINE SENSORS BASED ON EMPIRICAL ANALYSIS

This section describes a methodology to select key interchanges for instrumentation. It does this by combining the topological features, above, with an empirical analysis of mainline sensor data. The process involves calculating a set of metrics and then using a weighted sum to vote for the most important sensors. Key steps in the process can be summarized as follows:

1. Gather mainline data over desired weekday and weekend periods
    a. Select one week over each of the spring, summer, and fall seasons
    b. Select time-of-day periods corresponding to AM peak, midday, and PM peak
2. Filter out data where less than 80% of values are actually measured
3. Assess hourly flow variations across stations
4. Calculate the following metrics for successive sensors along the freeway and organize them in a spreadsheet
    a. flow changes
    b. distance to the last station with valid data
    c. cumulative flow change
    d. absolute cumulative flow change
5. Collect topological priorities from stage one and insert them into the spreadsheet
6. For each metric assign a voting weight and calculate the final score

The list of final scores is the prioritization for the mainline sensors on the freeway. By proxy, this corresponds to key interchanges. All of this is described in detail below.

7.2.1. FREEWAY DATA COLLECTION

To evaluate current monitoring capabilities along each reviewed freeway, hourly traffic flows reported by PeMS stations along each freeway are collected using a Time of Day Contours analysis. This data collection is intended to obtain average daily traffic flow profiles for each station reporting valid data along a freeway. Comparison of the resulting profiles allows assessment of reported traffic flow variations on an hourly basis across successive stations.

Figure 7-6 and Figure 7-7 illustrate the typical analysis setup that was used to obtain average weekday and average weekend profiles. Due to limitations in PeMS analysis capabilities, which restrict time-of-day contour analyses to cover a minimum of two days and a maximum of 7 days, average weekday profiles were obtained by considering data from all weekdays in a single week while average weekend profiles were obtained by considering data from both a Saturday and Sunday in a single weekend.

To assess potential seasonal effects, data were further collected to cover the following periods:

- Spring (typically mid-March)
- Summer (typically mid-July)
- Fall (typically mid-September)

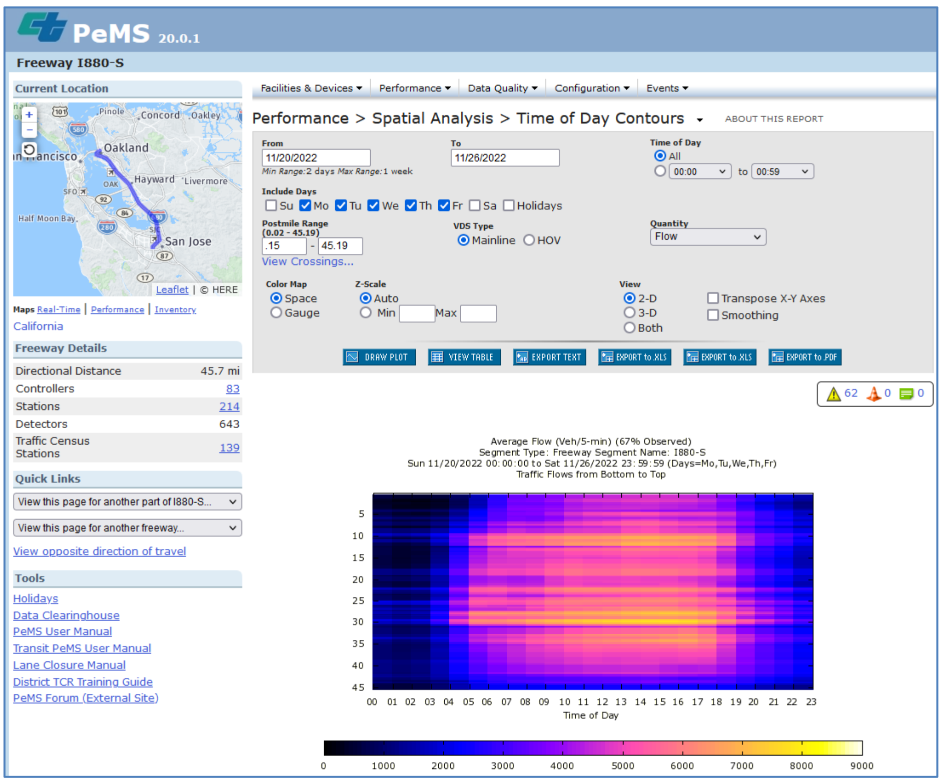


Figure 7-6: PeMS Data Collection Setup Example – Weekday Analysis

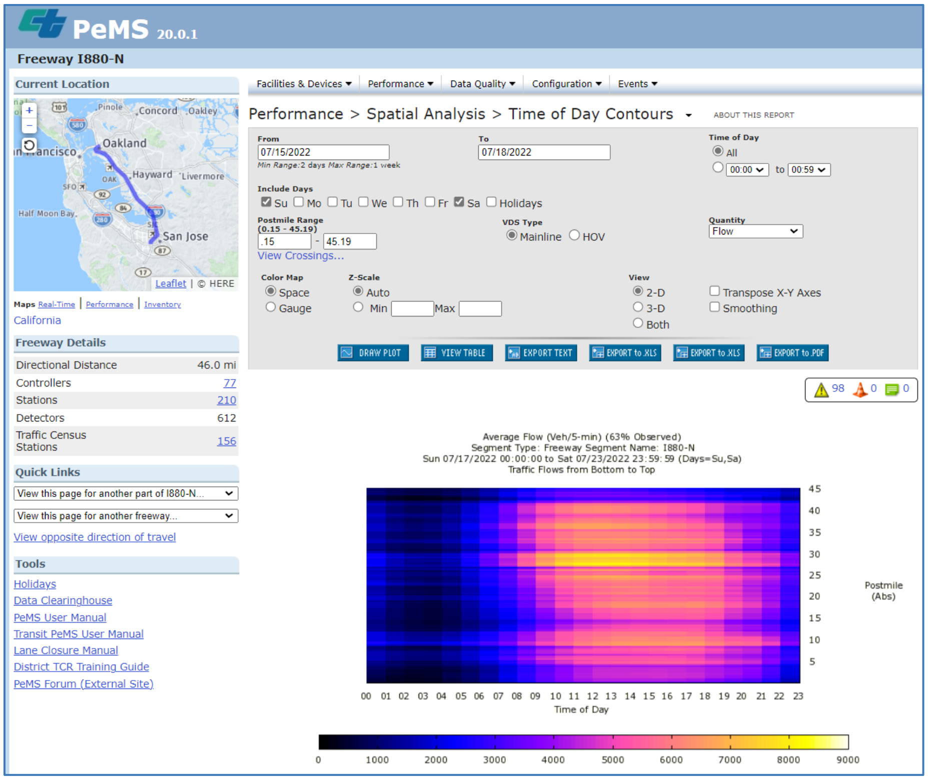


Figure 7-7: PeMS Data Collection Setup Example – Weekend Analysis

Because of detection issues, such as stations suddenly experiencing data reporting issues, data from all freeways were not necessarily collected on the same week or weekend. Efforts were made to select weeks or weekends with good data coverage falling within a relatively close range. Table 7-1 indicates the specific dates from which data were collected for the various analyses conducted as part of this project.

Table 7-1: PeMS Data Collection Periods

Freeway	Weekday Profiles			Weekend Profiles		
	Spring	Summer	Fall	Fall	Spring	Summer
I-880	3/14/2022	7/18/2022	9/24/2022	3/12/2022	7/16/2022	9/24/2022
I-680	3/14/2022	7/18/2022	9/19/2022	3/12/2022	7/16/2022	9/17/2022
I-280	3/14/2022	7/18/2022	9/26/2022	3/12/2022	7/16/2022	9/24/2022
I-205	3/21/2022	7/18/2022	9/19/2022	3/12/2022	7/16/2022	9/24/2022
I-5 District 10	3/14/2022	7/25/2022	9/19/2022	3/12/2022	7/23/2022	9/24/2022
I-5 Central Valley	3/13/2023	07/17/2023	09/19/2022	3/18/2023	07/22/2023	09/17/2022
I-5 District 12	3/7/2022	7/25/2022	9/19/2022	3/5/2022	7/23/2022	9/24/2022
SR-120	3/14/2022	7/18/2022	9/19/2022	3/12/2022	7/16/2022	9/24/2022
SR-91	3/14/2022	7/25/2022	9/19/2022	3/12/2022	7/23/2022	9/24/2022
SR-99	3/14/2022	7/18/2022	9/19/2022	3/12/2022	7/16/2022	9/24/2022
SR-57	3/14/2022	7/18/2022	9/26/2022	3/12/2022	7/16/2022	10/01/2022
SR-55	3/14/2022	7/18/2022	9/18/2022	3/12/2022	7/16/2022	9/24/2022

An example of collected data is shown in Figure 7-8. The figure shows the hourly flows that were returned by PeMS for the fall 2022 analysis period for each station along I-880 North from the absolute milepost 0.31 to the absolute milepost 24.48. The corresponding VDS number is shown on the left in Column C, and the percent of observed data associated with the station over the analysis period is shown in Column D.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC
			Validity																									
			Threshold																									
			80		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Abs PM	CA PM	VDS	)bserved		Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow	Flow
0.31	.31	408907	0.0		796	719	699	733	989	1,533	2,090	2,639	3,011	2,690	2,608	2,611	2,609	2,638	2,683	2,632	2,657	2,581	2,440	2,121	1,868	1,612	1,315	1,031
0.54	.54	400951	100.0		332	223	211	290	836	2,166	3,425	4,785	5,566	4,468	4,203	4,185	4,160	4,134	4,379	4,285	4,365	4,303	3,788	2,989	2,441	1,883	1,272	768
1.33	1.33	400057	100.0		351	223	213	288	821	2,083	3,262	4,413	5,042	4,164	3,955	3,982	4,020	4,075	4,212	4,048	4,148	3,907	3,722	3,188	2,650	2,062	1,344	871
2.04	2.04	400147	100.0		532	368	395	459	1,114	2,510	3,695	4,805	5,231	4,501	4,399	4,487	4,497	4,364	4,576	4,490	4,719	4,566	4,239	3,734	3,193	2,506	1,679	1,181
2.20					.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2.70	2.7	400343	86.7		487	339	332	387	835	2,014	2,966	3,970	4,624	3,897	3,729	3,805	3,899	4,014	4,128	3,916	4,034	3,832	3,866	3,337	2,810	2,240	1,443	1,018
3.51	3.51	401560	0.0		863	713	694	733	1,039	1,766	2,386	3,124	3,652	3,223	3,167	3,287	3,367	3,483	3,495	3,266	3,305	3,116	3,340	3,031	2,689	2,277	1,662	1,313
3.61	3.61	422357	0.0		745	460	406	562	1,305	2,838	3,705	4,291	4,391	3,555	3,454	3,365	3,488	3,644	3,760	3,865	3,792	3,735	3,419	3,333	3,127	2,716	2,158	1,452
4.02	4.02	400045	0.0		431	239	188	227	487	1,152	1,973	2,720	2,808	2,682	2,664	2,709	2,807	2,900	3,188	3,257	3,300	3,288	2,934	2,463	2,015	1,720	1,309	857
4.21	4.21	400122	0.0		705	668	649	707	1,494	2,363	2,867	3,600	3,672	3,443	3,453	3,477	3,571	3,624	3,551	3,257	3,504	3,592	3,443	2,964	2,575	2,122	1,482	1,012
4.50	4.5	401541	100.0		671	476	489	781	1,939	3,306	4,123	5,136	5,360	4,923	4,814	4,847	5,003	5,143	5,161	4,707	5,040	5,112	4,767	4,105	3,518	2,881	1,970	1,324
5.27	5.27	422359	100.0		622	439	441	724	1,782	3,128	4,046	4,646	4,720	4,400	4,283	4,369	4,509	4,621	4,697	4,404	4,677	4,725	4,310	3,734	3,199	2,632	1,828	1,224
5.50	5.5	402281	0.0		1,257	1,082	1,084	1,363	2,344	3,408	4,091	4,877	4,703	4,265	4,301	4,393	4,389	4,429	4,428	4,369	4,570	4,573	4,399	4,080	3,591	3,100	2,413	1,872
6.00	6	402283	0.0		1,074	696	606	839	1,996	4,204	6,000	6,503	6,217	6,041	5,835	5,646	5,616	5,665	5,927	5,986	6,084	6,028	5,454	4,699	3,938	3,590	2,873	1,920
6.50	6.5	402285	0.0		1,319	1,131	1,163	1,402	2,111	3,100	3,800	4,143	4,404	3,916	3,880	3,964	4,090	3,990	4,135	4,350	4,374	4,356	4,079	3,415	3,055	2,639	2,145	1,749
6.86	6.86	423139	85.0		799	577	600	880	1,860	3,088	3,985	4,470	4,619	4,304	4,160	4,230	4,454	4,497	4,691	4,624	4,637	4,635	4,232	3,714	3,155	2,577	1,864	1,324
7.00	7	402286	0.0		1,459	1,231	1,253	1,500	2,323	3,581	4,467	4,919	5,156	4,748	4,867	5,046	5,257	5,163	5,419	5,567	5,912	5,973	5,417	4,092	3,638	3,110	2,493	2,018
7.65	7.65	400088	100.0		747	503	501	779	1,829	3,223	4,196	4,724	4,759	4,488	4,487	4,612	4,781	5,009	5,246	5,006	5,382	5,373	4,832	3,890	3,289	2,710	1,911	1,359
8.10	8.1	413026	40.0		1,212	987	998	1,248	2,148	3,484	4,378	5,002	5,052	4,750	4,701	4,896	5,125	5,184	5,482	5,472	5,794	5,845	5,314	4,329	3,583	3,040	2,288	1,800
8.36	8.36	401464	0.0		678	552	554	752	1,276	2,036	2,695	3,079	3,348	2,906	2,858	2,988	3,139	3,272	3,493	3,758	3,799	3,895	3,456	2,811	2,289	1,839	1,390	1,014
8.55	8.55	401489	100.0		676	470	458	730	1,623	2,730	3,547	4,032	4,157	3,891	3,700	3,782	3,903	4,299	4,681	4,616	4,663	4,665	4,179	3,586	3,008	2,428	1,734	1,161
8.77	8.77	401538	66.7		1,059	793	779	1,071	2,082	3,314	4,297	5,016	5,236	4,739	4,537	4,689	4,977	5,618	6,317	6,342	6,277	6,264	5,473	4,589	4,024	3,288	2,387	1,713
9.20	9.2	402290	0.0		2,095	1,824	1,818	2,097	3,186	4,322	5,272	6,120	6,570	5,791	5,686	5,869	6,210	6,698	7,123	7,004	7,062	7,281	6,575	5,649	4,998	4,304	3,355	2,650
9.80	9.8	402292	0.0		1,864	1,583	1,523	1,732	2,414	3,206	4,180	4,942	5,345	4,792	4,569	4,743	4,999	5,678	6,123	5,943	5,922	5,974	5,571	5,011	4,206	3,596	2,958	2,485
10.55	R.05	401643	100.0		932	554	488	759	1,743	3,145	4,357	5,280	5,584	5,094	4,727	4,878	5,169	6,130	6,723	6,472	6,378	6,350	5,791	5,014	4,080	3,315	2,415	1,726
11.05	R.55	402800	0.0		1,795	1,506	1,443	1,652	2,352	3,170	4,162	4,729	5,272	4,795	4,562	4,750	5,006	5,703	6,158	5,973	5,949	5,998	5,584	4,661	4,145	3,566	2,911	2,430
11.40	R.9	402828	0.0		1,232	661	479	436	739	1,658	3,133	4,564	4,855	4,668	4,632	4,878	5,277	5,671	6,252	6,124	5,911	5,736	5,762	5,319	4,484	3,913	3,146	2,285
12.15	R1.65	407219	0.0		1,869	1,579	1,577	1,961	3,104	4,855	5,487	6,280	6,981	6,512	5,642	5,700	6,040	6,713	7,631	7,621	7,483	7,521	6,991	5,612	4,367	3,736	3,083	2,544
12.20	R1.7	402789	100.0		701	428	398	691	1,689	3,563	4,718	5,373	5,393	4,853	4,443	4,433	4,585	5,052	5,704	5,600	5,615	5,582	5,136	4,157	3,155	2,476	1,971	1,352
12.53	2.3	408755	100.0		677	406	391	587	1,298	2,515	3,351	4,015	4,077	3,691	3,428	3,613	3,926	4,463	5,106	5,242	5,179	5,047	4,636	3,917	3,130	2,520	1,831	1,335
12.66	2.43	402802	100.0		848	534	506	800	1,798	3,540	4,868	5,773	5,999	5,027	4,502	4,796	5,174	5,835	6,646	6,717	6,584	6,245	6,083	5,057	3,963	3,164	2,289	1,648
12.73	2.5	408756	100.0		681	411	395	594	1,291	2,490	3,328	3,983	4,058	3,687	3,405	3,592	3,918	4,467	5,071	5,184	5,133	4,959	4,589	3,900	3,134	2,538	1,837	1,332
13.51	3.28	400189	100.0		730	480	427	578	1,235	2,629	3,671	4,521	4,567	3,823	3,622	3,943	4,181	4,729	5,205	5,002	5,285	5,156	4,917	4,121	3,414	2,743	1,997	1,461
13.70	3.47	400309	100.0		772	517	455	623	1,269	2,702	3,790	4,640	4,717	3,963	3,790	4,148	4,417	4,973	5,419	5,210	5,545	5,430	5,172	4,304	3,548	2,848	2,088	1,553
14.26	4.03	400417	100.0		531	334	297	446	814	1,645	2,353	2,969	2,989	2,465	2,313	2,581	2,845	3,166	3,836	4,080	4,004	3,931	3,886	3,129	2,567	2,017	1,501	1,073
14.89	4.66	400249	100.0		762	513	469	593	1,111	2,571	3,623	4,245	4,121	3,585	3,361	3,629	3,842	4,325	4,849	4,748	5,144	5,097	4,872	4,068	3,284	2,670	2,009	1,487
15.03	4.8	401639	0.0		1,761	1,475	1,423	1,548	2,214	4,420	5,703	6,108	6,141	5,426	5,063	5,388	5,656	6,141	6,034	5,222	5,735	5,719	5,548	5,397	4,259	3,679	3,009	2,495
16.41	6.18	400662	0.0		1,029	629	551	687	1,174	2,533	3,858	4,999	4,975	4,777	4,959	5,455	5,791	6,150	6,635	6,329	6,942	7,251	6,668	5,643	4,648	3,501	2,457	1,752
16.60	6.37	400141	100.0		935	568	496	647	1,163	2,718	4,028	4,702	4,551	4,087	4,041	4,459	4,724	5,179	5,640	5,497	5,871	5,844	5,514	4,892	4,074	3,180	2,316	1,691
17.36	7.13	400761	100.0		880	515	435	590	1,092	2,642	4,008	4,764	4,513	3,868	3,750	4,060	4,305	4,723	5,165	5,129	5,365	5,340	5,043	4,445	3,729	2,929	2,198	1,591
17.59	7.36	400490	0.0		1,490	1,155	1,073	1,217	1,611	3,129	4,348	5,273	5,316	4,526	4,523	4,692	4,893	5,217	5,350	5,385	5,330	5,428	5,201	4,983	4,149	3,390	2,725	2,089
18.66	8.43	401888	100.0		1,133	682	567	772	1,314	3,051	4,739	5,764	5,908	4,902	4,941	5,218	5,568	6,096	6,534	6,733	6,516	6,676	6,397	5,950	4,953	3,821	2,803	1,924

Percent Observed Data
Between 80% and 95%
Less than 80%

Flow Values
Lowest Value
50th Percentile
Highest Value

Figure 7-8: PeMS Data Collection Example – I-880 N, Fall 2022 Period

7.2.2. DATA VALIDATION CHECK

The percent of observed data is used in the analyses as a filter to remove stations for which too many measurements may be missing. While PeMS has an internal process to input missing data, this process often results in a significant underestimation or overestimation of measured flows. For the analyses, an 80% threshold was used as a validity threshold, as indicated at the top of Column C in Figure 7-8. This means that data from any station with less than 80% observed values were removed from consideration.

Higher or lower validity thresholds can be used if necessary. Using a threshold higher than 80% could focus the analysis on sensors operating correctly but could also cause large gaps to be produced between valid stations. On the other hand, using a lower threshold could result in considering more stations, but could also result in inaccurate data at some stations leading to false conclusions. In this case, 80% was deemed as a good compromise between the two approaches.

7.2.3. ASSESSING HOURLY FLOW VARIATIONS ACROSS STATIONS

The first stage of the analysis is a comparison of observed flows across successive detection stations. This analysis is based on the hypothesis that successive stations covering significant variations in flows may provide more valuable information than stations returning similar flow levels as their immediate neighbors.

Figure 7-9 illustrates the result of the data processing for the sample of Figure 7-8. The numbers in each row represent the ratio of flow at the current station compared to the nearest upstream station with valid data. For instance, a value of 1.28 means that the measured flows at a given station correspond to 128% of the observed flows at the previous valid stations. Similarly, a value of 0.84 indicates that flows at a station correspond to 84% of flows at the previous valid station. Ratios shown in Columns AG to BD are for each hour of the day, while the ratio in Column BF represents the average ratio across the daytime period considered, in this case, 5 AM to 8 PM.

AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ
Offsets Valid	Ref	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		Avg Ratio		Milepost	Dist	Description
0	0	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		0.31	0.00	I-280
1	-1	0.42	0.31	0.30	0.40	0.85	1.41	1.64	1.81	1.85	1.66	1.61	1.60	1.59	1.57	1.63	1.63	1.64	1.67	1.55	1.41	1.31	1.17	0.97	0.74		1.62		0.54	0.23	
1	-1	1.06	1.00	1.01	0.99	0.98	0.96	0.95	0.92	0.91	0.93	0.94	0.95	0.97	0.99	0.96	0.94	0.95	0.91	0.98	1.07	1.09	1.10	1.06	1.13		0.96		1.33	0.79	Bascom Ave
1	-1	1.52	1.65	1.86	1.59	1.36	1.20	1.13	1.09	1.04	1.08	1.11	1.13	1.12	1.07	1.09	1.11	1.14	1.17	1.14	1.17	1.20	1.22	1.25	1.36		1.12		2.04	0.71	The Alamada
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		2.20	0.16	
1	-2	0.92	0.92	0.84	0.84	0.75	0.80	0.80	0.83	0.88	0.87	0.85	0.85	0.87	0.92	0.90	0.87	0.85	0.84	0.91	0.89	0.88	0.89	0.86	0.86		0.86		2.70	0.50	Coleman Ave
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		3.51	0.81	
0	-2	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		3.61	0.10	
0	-3	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		4.02	0.41	US-101
0	-4	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		4.21	0.19	
1	-5	1.38	1.41	1.47	2.02	2.32	1.64	1.39	1.29	1.16	1.26	1.29	1.27	1.28	1.28	1.25	1.20	1.25	1.33	1.23	1.23	1.25	1.29	1.37	1.30		1.29		4.50	0.29	Gish Rd
1	-1	0.93	0.92	0.90	0.93	0.92	0.95	0.98	0.90	0.88	0.89	0.89	0.90	0.90	0.90	0.91	0.94	0.93	0.92	0.90	0.91	0.91	0.91	0.93	0.92		0.91		5.27	0.77	Brokaw Rd
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		5.50	0.23	
0	-2	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		6.00	0.50	
0	-3	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		6.50	0.50	
1	-4	1.28	1.31	1.36	1.22	1.04	0.99	0.98	0.96	0.98	0.98	0.97	0.97	0.99	0.97	1.00	1.05	0.99	0.98	0.98	0.99	0.99	0.98	1.02	1.08		0.99		6.86	0.36	
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		7.00	0.14	
1	-2	0.93	0.87	0.83	0.89	0.98	1.04	1.05	1.06	1.03	1.04	1.08	1.09	1.07	1.11	1.12	1.08	1.16	1.16	1.14	1.05	1.04	1.05	1.03	1.03		1.09		7.65	0.65	Great Mall Pkwy
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		8.10	0.45	Calaveras Blvd
0	-2	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		8.36	0.26	SR-237
1	-3	0.90	0.93	0.91	0.94	0.89	0.85	0.85	0.85	0.87	0.87	0.82	0.82	0.82	0.86	0.89	0.92	0.87	0.87	0.86	0.92	0.91	0.90	0.91	0.85		0.86		8.55	0.19	
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		8.77	0.22	
0	-2	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		9.20	0.43	
0	-3	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		9.80	0.60	
1	-4	1.38	1.18	1.07	1.04	1.07	1.15	1.23	1.31	1.34	1.31	1.28	1.29	1.32	1.43	1.44	1.40	1.37	1.36	1.39	1.40	1.36	1.37	1.39	1.49		1.33		10.55	0.75	Dixon Landing
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		11.05	0.50	
0	-2	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		11.40	0.35	
0	-3	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		12.15	0.75	
1	-4	0.75	0.77	0.81	0.91	0.97	1.13	1.08	1.02	0.97	0.95	0.94	0.91	0.89	0.82	0.85	0.87	0.88	0.88	0.89	0.83	0.77	0.75	0.82	0.78		0.93		12.20	0.05	Mission Blvd
1	-1	0.97	0.95	0.98	0.85	0.77	0.71	0.71	0.75	0.76	0.76	0.77	0.81	0.86	0.88	0.90	0.94	0.92	0.90	0.90	0.94	0.99	1.02	0.93	0.99		0.83		12.53	0.32	Warren Ave
1	-1	1.25	1.32	1.29	1.36	1.38	1.41	1.45	1.44	1.47	1.36	1.31	1.33	1.32	1.31	1.30	1.28	1.27	1.24	1.31	1.29	1.27	1.26	1.25	1.23		1.34		12.66	0.13	
1	-1	0.80	0.77	0.78	0.74	0.72	0.70	0.68	0.69	0.68	0.73	0.76	0.75	0.76	0.77	0.76	0.77	0.78	0.79	0.75	0.77	0.79	0.80	0.80	0.81		0.74		12.73	0.07	
1	-1	1.07	1.17	1.08	0.97	0.96	1.06	1.10	1.14	1.13	1.04	1.06	1.10	1.07	1.06	1.03	0.96	1.03	1.04	1.07	1.06	1.09	1.08	1.09	1.10		1.06		13.51	0.78	Fremont Blvd
1	-1	1.06	1.08	1.06	1.08	1.03	1.03	1.03	1.03	1.03	1.04	1.05	1.05	1.06	1.05	1.04	1.04	1.05	1.05	1.05	1.04	1.04	1.04	1.05	1.06		1.04		13.70	0.19	
1	-1	0.69	0.65	0.65	0.72	0.64	0.61	0.62	0.64	0.63	0.62	0.61	0.62	0.64	0.64	0.71	0.78	0.72	0.72	0.75	0.73	0.72	0.71	0.72	0.69		0.67		14.26	0.56	
1	-1	1.44	1.54	1.58	1.33	1.36	1.56	1.54	1.43	1.38	1.45	1.45	1.41	1.35	1.37	1.26	1.16	1.28	1.30	1.25	1.30	1.28	1.32	1.34	1.39		1.37		14.89	0.63	Auto Mall Pkwy
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		15.03	0.14	
0	-2	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		16.41	1.38	Stevenson Blvd
1	-3	1.23	1.11	1.06	1.09	1.05	1.06	1.11	1.11	1.10	1.14	1.20	1.23	1.23	1.20	1.16	1.16	1.14	1.15	1.13	1.20	1.24	1.19	1.15	1.14		1.15		16.60	0.19	
1	-1	0.94	0.91	0.88	0.91	0.94	0.97	1.00	1.01	0.99	0.95	0.93	0.91	0.91	0.91	0.92	0.93	0.91	0.91	0.91	0.91	0.92	0.92	0.95	0.94		0.94		17.36	0.76	Mowry Ave
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		17.59	0.23	
1	-2	1.29	1.33	1.30	1.31	1.20	1.15	1.18	1.21	1.31	1.27	1.32	1.29	1.29	1.29	1.27	1.31	1.21	1.25	1.27	1.34	1.33	1.30	1.28	1.21		1.26		18.66	1.07	Central Ave

AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ
Offsets		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23		Avg				
Valid	Ref																										Ratio		Milepost	Dist	Sensor Name
0	0	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		0.31	0.00	SB/NB 280 rm-n-fly/diag
1	-1	0.42	0.31	0.30	0.40	0.85	1.41	1.64	1.81	1.85	1.66	1.61	1.60	1.59	1.57	1.63	1.63	1.64	1.67	1.55	1.41	1.31	1.17	0.97	0.74		1.62		0.54	0.23	Stevens Creek Blvd
1	-1	1.06	1.00	1.01	0.99	0.98	0.96	0.95	0.92	0.91	0.93	0.94	0.95	0.97	0.99	0.96	0.94	0.95	0.91	0.98	1.07	1.09	1.10	1.06	1.13		0.96		1.33	0.79	Bascom Ave rm-n-diag
1	-1	1.52	1.65	1.86	1.59	1.36	1.20	1.13	1.09	1.04	1.08	1.11	1.13	1.12	1.07	1.09	1.11	1.14	1.17	1.14	1.17	1.20	1.22	1.25	1.36		1.12		2.04	0.71	The Alameda rm-n-loop
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		2.20	0.16	The Alameda rm-n-diag
1	-2	0.92	0.92	0.84	0.84	0.75	0.80	0.80	0.83	0.88	0.87	0.85	0.85	0.87	0.92	0.90	0.87	0.85	0.84	0.91	0.89	0.88	0.89	0.86	0.86		0.86		2.70	0.50	Coleman Ave rm-n-diag
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		3.51	0.81	1st St rm-n-loop
0	-2	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		3.61	0.10	N 1st St rm-n-diag
0	-3	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		4.02	0.41	SB 101 rm-n-loop
0	-4	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		4.21	0.19	NB 101 rm-n-diag
1	-5	1.38	1.41	1.47	2.02	2.32	1.64	1.39	1.29	1.16	1.26	1.29	1.27	1.28	1.28	1.25	1.20	1.25	1.33	1.23	1.23	1.25	1.29	1.37	1.30		1.29		4.50	0.29	Gish Rd rm-n-diag
1	-1	0.93	0.92	0.90	0.93	0.92	0.95	0.98	0.90	0.88	0.89	0.89	0.90	0.90	0.90	0.91	0.94	0.93	0.92	0.90	0.91	0.91	0.91	0.93	0.92		0.91		5.27	0.77	Brokaw Rd rm-n-loop
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		5.50	0.23	4A5324 loc 91
0	-2	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		6.00	0.50	4A5324 loc 92
0	-3	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		6.50	0.50	4A5324 loc 93
1	-4	1.28	1.31	1.36	1.22	1.04	0.99	0.98	0.96	0.98	0.98	0.97	0.97	0.99	0.97	1.00	1.05	0.99	0.98	0.98	0.99	0.99	0.98	1.02	1.08		0.99		6.86	0.36	Montague Expwy rm-n-diag
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		7.00	0.14	4A5324 loc 94
1	-2	0.93	0.87	0.83	0.89	0.98	1.04	1.05	1.06	1.03	1.04	1.08	1.09	1.07	1.11	1.12	1.08	1.16	1.16	1.14	1.05	1.04	1.05	1.03	1.03		1.09		7.65	0.65	Great Mall Pkwy rm-n-loop
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		8.10	0.45	Calaveras Blvd/EB 237
0	-2	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		8.36	0.26	EB 237 rm-n-loop
1	-3	0.90	0.93	0.91	0.94	0.89	0.85	0.85	0.85	0.87	0.87	0.82	0.82	0.82	0.86	0.89	0.92	0.87	0.87	0.86	0.92	0.91	0.90	0.91	0.85		0.86		8.55	0.19	Calaveras Blvd rm-n-diag
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		8.77	0.22	EB 237 rm-n-fly
0	-2	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		9.20	0.43	4A5324 loc 96
0	-3	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		9.80	0.60	4A5324 loc 98
1	-4	1.38	1.18	1.07	1.04	1.07	1.15	1.23	1.31	1.34	1.31	1.28	1.29	1.32	1.43	1.44	1.40	1.37	1.36	1.39	1.40	1.36	1.37	1.39	1.49		1.33		10.55	0.75	Dixon Landing Rd rm-n-coll
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		11.05	0.50	N of Dixon Landing Rd
0	-2	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		11.40	0.35	Dixon Landing and Gateway Blvd
0	-3	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		12.15	0.75	S of Mission Blvd
1	-4	0.75	0.77	0.81	0.91	0.97	1.13	1.08	1.02	0.97	0.95	0.94	0.91	0.89	0.82	0.85	0.87	0.88	0.88	0.89	0.83	0.77	0.75	0.82	0.78		0.93		12.20	0.05	oppo Mission Blvd rm-s-fly
1	-1	0.97	0.95	0.98	0.85	0.77	0.71	0.71	0.75	0.76	0.76	0.77	0.81	0.86	0.88	0.90	0.94	0.92	0.90	0.90	0.94	0.99	1.02	0.93	0.99		0.83		12.53	0.32	Warren Ave rm-n-loop
1	-1	1.25	1.32	1.29	1.36	1.38	1.41	1.45	1.44	1.47	1.36	1.31	1.33	1.32	1.31	1.30	1.28	1.27	1.24	1.31	1.29	1.27	1.26	1.25	1.23		1.34		12.66	0.13	N of Warren Ave
1	-1	0.80	0.77	0.78	0.74	0.72	0.70	0.68	0.69	0.68	0.73	0.76	0.75	0.76	0.77	0.76	0.77	0.78	0.79	0.75	0.77	0.79	0.80	0.80	0.81		0.74		12.73	0.07	Mission Blvd rm-n-diag
1	-1	1.07	1.17	1.08	0.97	0.96	1.06	1.10	1.14	1.13	1.04	1.06	1.10	1.07	1.06	1.03	0.96	1.03	1.04	1.07	1.06	1.09	1.08	1.09	1.10		1.06		13.51	0.78	Fremont Blvd rm-n-loop
1	-1	1.06	1.08	1.06	1.08	1.03	1.03	1.03	1.03	1.03	1.04	1.05	1.05	1.06	1.05	1.04	1.04	1.05	1.05	1.05	1.04	1.04	1.04	1.05	1.06		1.04		13.70	0.19	Fremont Blvd rm-n-diag
1	-1	0.69	0.65	0.65	0.72	0.64	0.61	0.62	0.64	0.63	0.62	0.61	0.62	0.64	0.64	0.71	0.78	0.72	0.72	0.75	0.73	0.72	0.71	0.72	0.69		0.67		14.26	0.56	oppo at the truck scales
1	-1	1.44	1.54	1.58	1.33	1.36	1.56	1.54	1.43	1.38	1.45	1.45	1.41	1.35	1.37	1.26	1.16	1.28	1.30	1.25	1.30	1.28	1.32	1.34	1.39		1.37		14.89	0.63	Auto Mall Pkwy rm-n-loop
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		15.03	0.14	Auto Mall Pkwy rm-n-diag
0	-2	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		16.41	1.38	Stevenson Blvd rm-n-loop
1	-3	1.23	1.11	1.06	1.09	1.05	1.06	1.11	1.11	1.10	1.14	1.20	1.23	1.23	1.20	1.16	1.16	1.14	1.15	1.13	1.20	1.24	1.19	1.15	1.14		1.15		16.60	0.19	Stevenson Blvd rm-n-diag
1	-1	0.94	0.91	0.88	0.91	0.94	0.97	1.00	1.01	0.99	0.95	0.93	0.91	0.91	0.91	0.92	0.93	0.91	0.91	0.91	0.91	0.92	0.92	0.95	0.94		0.94		17.36	0.76	Mowry Ave rm-n-loop
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		17.59	0.23	Mowry Ave rm-n-diag
1	-2	1.29	1.33	1.30	1.31	1.20	1.15	1.18	1.21	1.31	1.27	1.32	1.29	1.29	1.29	1.27	1.31	1.21	1.25	1.27	1.34	1.33	1.30	1.28	1.21		1.26		18.66	1.07	500' N of Central Ave
1	-1	0.76	0.78	0.79	0.78	0.84	0.88	0.83	0.81	0.78	0.76	0.80	0.80	0.80	0.79	0.77	0.74	0.78	0.77	0.78	0.75	0.77	0.79	0.79	0.82		0.79		19.06	0.40	THORNTON AVE
1	-1	1.08	1.06	1.09	1.08	1.10	1.08	1.09	1.09	1.08	1.08	1.08	1.09	1.08	1.08	1.07	1.06	1.07	1.07	1.07	1.07	1.07	1.07	1.07	1.07		1.08		19.26	0.20	Thornton Ave rm-n-diag
0	-1	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00		0.00		20.13	0.87	oppo S of Decoto Rd / Rt 84
1	-2	1.05	1.12	1.17	1.12	1.03	0.89	0.91	0.88	0.86	0.91	0.95	0.94	0.92	0.92	0.90	0.90	0.90	0.90	0.92	0.92	0.93	0.94	0.98	0.97		0.91		20.51	0.38	Decoto Rd rm-n-loop

Flow Ratio with Previous Sensor with Valid Data
- Less and 10%
- Between 10% and 15%
- Greater than 15%

Sensor near Key Interchange

Figure 7-9: Processed Data – I-880 N, Fall 2022 – First Analysis Step

For each row, the reference station used in the calculations may be the one immediately upstream or could be several physical stations away. Data from Column AF identifies the reference station used in the calculations. For instance, a value of "-1" indicates that the station immediately upstream is used while a value of "-2" indicates that the second upstream station is used. Jumps across existing stations happen due to stations considered as returning no valid data based on the selected PeMS data validity threshold, in this 80% of observed values.

On each row for which flow differentials are calculated, the following color scheme is further used to help visualize flow changes across stations:

- Green: Change in flow less than 10% (ratios between 0.90 and 1.10)
- Yellow: Change in flow between 10% and 15% (ratios between 0.85 and 0.90, or 1.10 and 1.15)
- Red: Change in flow greater than 15%

7.2.4. ASSESSING STATION IMPORTANCE

The second step of the analysis focuses on identifying stations meeting one or more of the following relevancy criteria:

- **Network Topology:** Intersections or sensors considered necessary to monitor traffic regardless of the flow level being measured. This includes, among potential others, sensors identified as important based on road topology analysis in the methodology of stage one, sensors that support ramp metering operations, sensors attached to weigh-in-motion stations, or sensors marking the start or end of a corridor.
- **Major Flow Change:** Sensor capturing a major shift in observed traffic volume with the previous upstream sensor with valid data. In the example, this is taken to be a flow differential of 15% or more.
- **Medium Flow Change:** Sensor capturing a moderate shift in observed traffic volume with the previous upstream sensor with valid data. In the example, this is taken to be a flow differential of 10 to 15%.
- **Distance with Last Station with Valid Data:** Consideration of distance between the current sensor and the closest upstream station with valid data. This is to ensure that a certain maximum distance is not exceeded between successive stations with valid data, i.e., that a certain minimum density of sensors remains considered. The distance threshold can be set based on the environment. In the example, a uniform 15-mile threshold is used for illustrative purposes. However, a shorter 5-mile threshold could be used instead in urban environments, while a longer threshold could be used in rural environments. In practice, this criterion could be set to consider stations without valid data (those with less than 80% observed data) to ensure that a minimum coverage is maintained.
- **Cumulative Flow Change:** Summation of observed flow changes since the last upstream station marked as important, based on the previously listed criteria. As illustrated in Figure 7-10 this criterion helps capture gradual increases or decreases in traffic flows occurring across several stations, such as what might occur when approaching an urban area. The figure shows flow differentials for 13 successive stations. Station #1 is flagged as important since it is the first in the sequence. Station #7 is then flagged based on the fact that its cumulative flow difference with Station #1 exceeds 15%. This causes a reset of the cumulative differential calculations, illustrated by the down arrow. Station #12 is then similarly flagged based on the fact that its cumulative flow differential with station #7 again exceeds 15%.

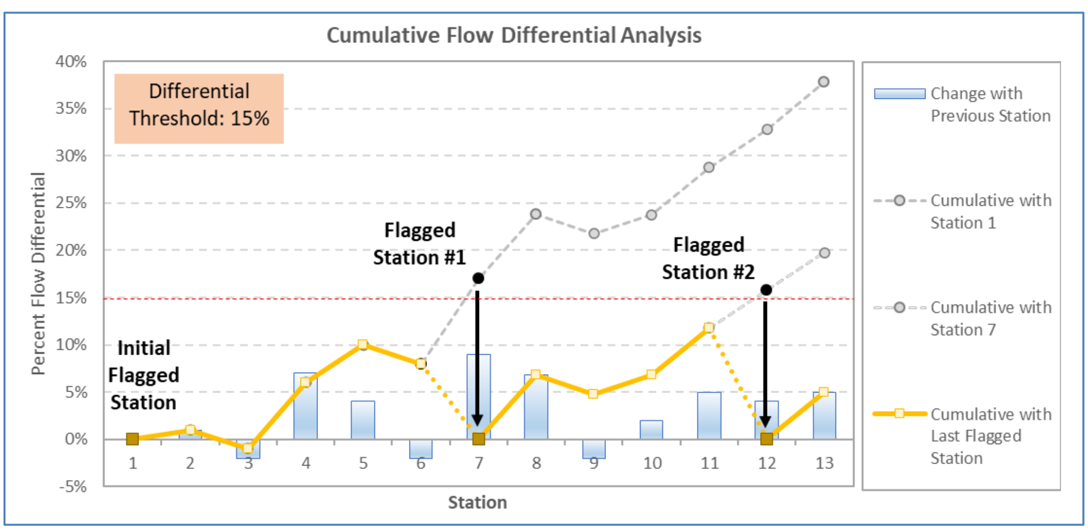


Figure 7-10: Cumulative Flow Change Analysis Principle

- **Absolute Cumulative Flow Change:** Summation of absolute observed flow change since the last upstream station marked as important. This criterion is similar to the Cumulative Flow Change, except that helps capture spatial flow variations that may not result in gradual flow increases or decreases. An example is shown in Figure 7-11. This figure shows flow differentials for 13 successive stations, with Station #1 flagged based on the fact it is the first in the sequence. In this case, Station #6 is flagged based on the fact that the summation of absolute flow differences across successive stations between Stations #1 and #6 exceeds 15% even though the actual flow differential between Stations #1 and #6 is almost nil. This causes a reset of the absolute cumulative differential calculations, as illustrated by the down arrow. Station #12 is then similarly flagged based on the fact that the summation of the absolute flow differentials between stations #6 and #12 again exceeds 15%.

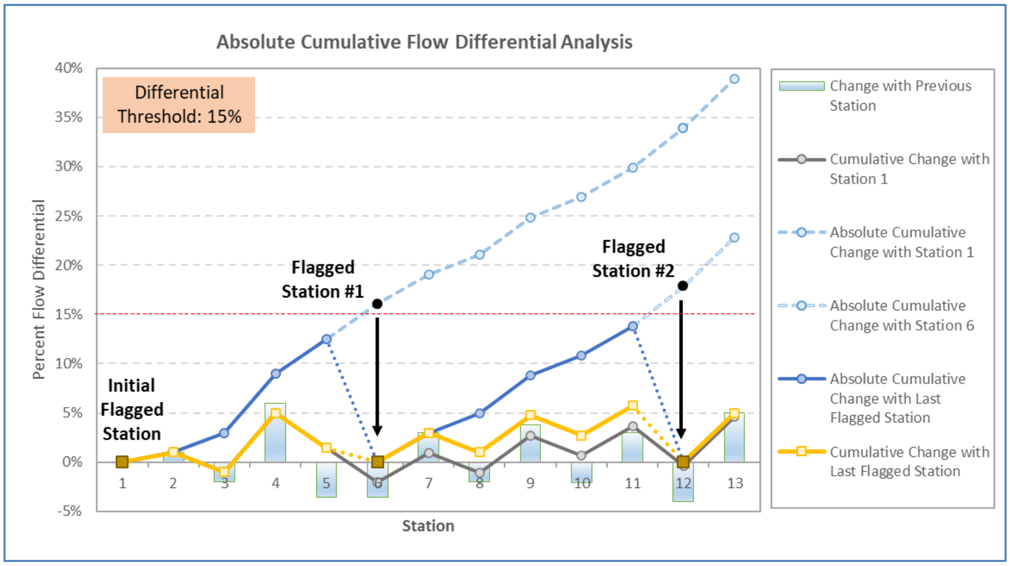


Figure 7-11: Absolute Cumulative Flow Change Analysis Principle

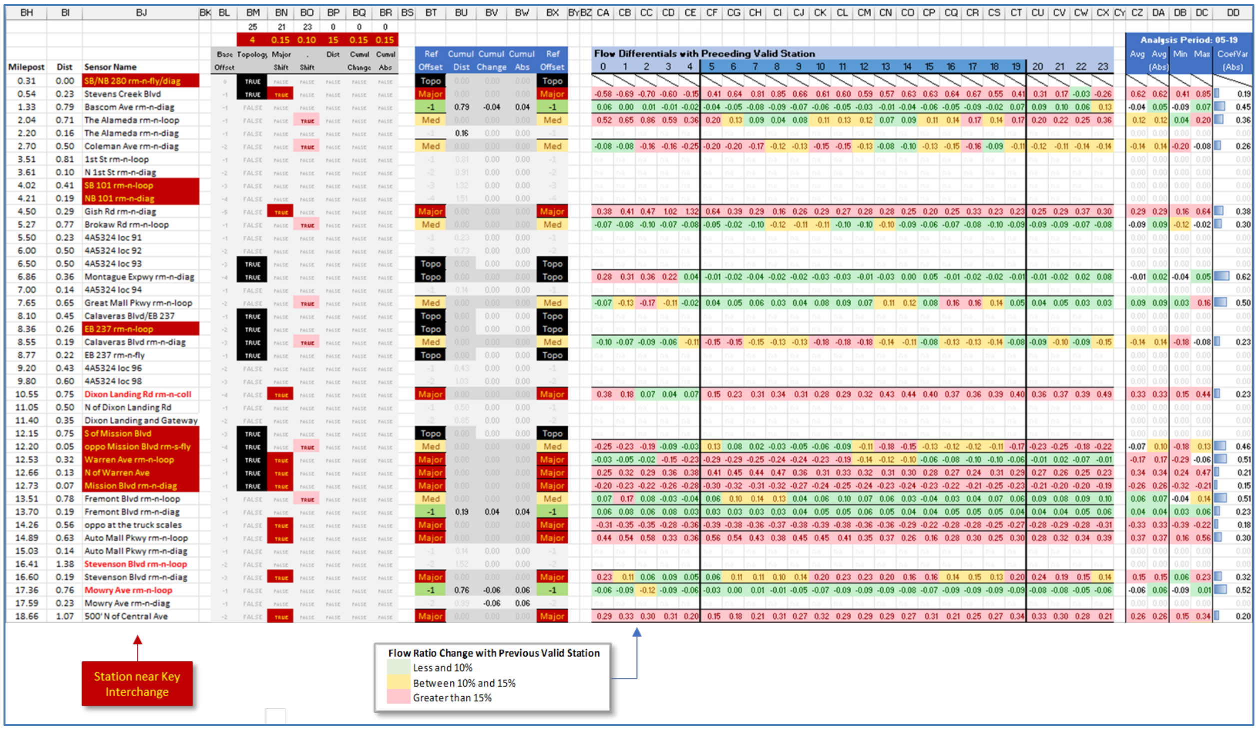


Figure 7-12: Processed Data – I-880 N, Fall 2022 – Second Analysis Step

The result of this analysis for the sample data of Figure 7-8 and Figure 7-9 is shown in Figure 7-12, for an analysis over the 5 AM to 8 PM period. Source spreadsheets are available separately. The descriptions here provide an overview of the spreadsheet layout. Key results of the analysis are shown in the following columns:

- **Evaluation Criteria Application Results**
  - **Column BL:** Reference station offset, i.e., location of last upstream station flagged.
  - **Column BM:** Indication whether a network topology criterion is applied to the station.
  - **Column BN:** Indication of major change in traffic flow compared to the upstream reference station, considered here to be a 15% difference.
  - **Column BO:** Indication of a medium change in traffic flow compared to the upstream reference station, taken here to be a 10-15% difference.
  - **Column BP:** Indication whether the station exceeds the set 15-mile distance threshold.
  - **Column BQ:** Indication whether the cumulative flow differential since the last flagged station exceeds 15%.
  - **Column BR:** Indication whether the summation of absolute flow differentials between successive stations since the last flagged station exceeds 15%.

- **Summary Results**
  - **Column BT:** Preliminary identification of stations flagged based on the Network Topology, Major Flow Change, and Medium Flow Change criteria. Stations marked in red are those with a major change in flow, while those marked in yellow as associated with a medium change, and those marked in green with a minor change. The number shown in the cell represents the reference station against which flow comparison is made. Any station associated with a major or medium flow change results in a reset of

the reference offset, i.e., in being used as a reference for the next comparison. This can be observed by the reference number dropping back to -1 on the next row.

- **Columns BU-BW:** Results of calculations of cumulative distance, cumulative flow change, and summation of absolute flow changes.
- **Column BX:** Final determination of flagged stations based on all evaluation criteria.

- **Station Statistics**
  - **Columns CA to CX**: Flow differential with previous reference station. This is the same data as in Figure 7-9 but reconfigured to show positive or negative differences.
  - **Columns CZ to DD:** Statistics regarding the data contained in the analysis interval are considered to help understand variability within the data. This includes:
    - Average flow change with the previous station with valid data.
    - Absolute value of flow change with the previous station with valid data.
    - Observed minimum and maximum flow changes.
    - Coefficient of variation of observed changes based on the analysis of absolute values.

7.2.5. CONSIDERATION OF ALTERNATE ANALYSIS PERIODS

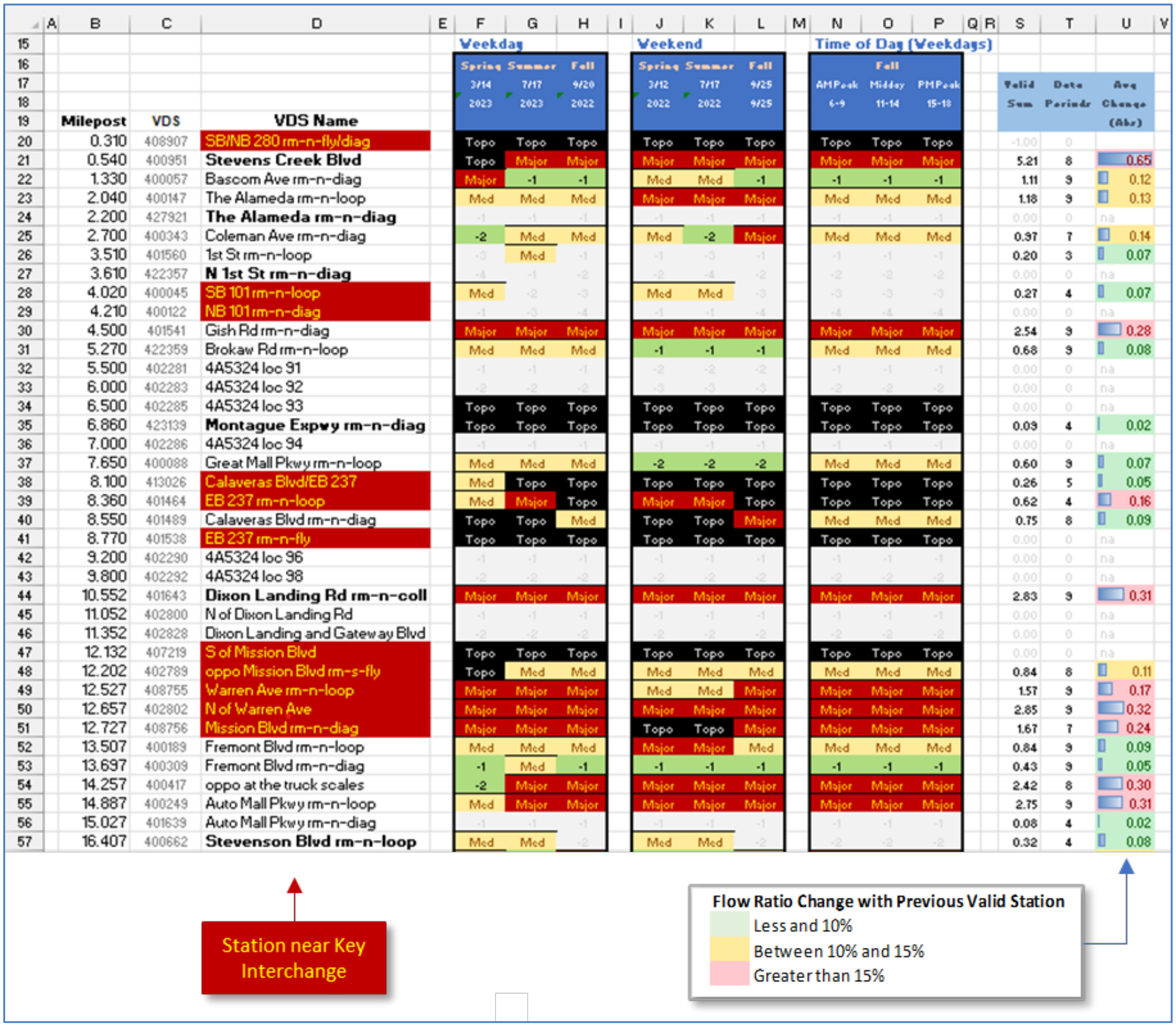
The methodology outlined in the previous section indicates what to do to analyze station importance based on observed traffic flow data associated with a given period. In practice, there might be an interest in assessing station importance associated with various periods of the day, weekdays, or seasons to see if the consideration of alternate periods may affect the identification of stations representing a major or medium shift in flow.

For the analyses conducted as part of this project, corridor analyses were conducted over each of the following periods:

- Average daytime performance analyses (5 AM – 8 PM)
  - Weekdays
    - Spring
    - Summer
    - Fall
  - Weekend
    - Spring
    - Summer
    - Fall

- Time-of-day performance analyses
  - Weekday AM peak, 6 AM – 8 AM
    - Fall
  - Weekday Midday, 11 AM – 1 PM
    - Fall
  - Weekday PM Peak, 3 PM – 5 PM
    - Fall

An example is shown in Figure 7-13, using the same data from I-880 North as in previous figures. The data shown in columns F to P, are simply a copy of the data from column BX in Figure 7-12 for each analysis period considered. The data from columns T and U further capture the average observed absolute change in flow at the station compared to the flow at the previous valid station. This is essentially an average of the data of Column DA in Figure 7-12 across all analysis periods.



	Milepost	VDS	VDS Name	Weekday Spring 3/14 2023	Weekday Summer 7/17 2023	Weekday Fall 9/20 2022	Weekend Spring 3/12 2022	Weekend Summer 7/17 2022	Weekend Fall 9/25 9/25	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Valid Sum	Data Periods	Avg Change (Abs)
20	0.310	408907	SB/NB 280 rm-n-fly/diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	-1.00	0	
21	0.540	400951	Stevens Creek Blvd	Topo	Major	Major	Major	Major	Major	Major	Major	Major	5.21	8	0.65
22	1.330	400057	Bascom Ave rm-n-diag	Major	-1	-1	Med	Med	-1	-1	-1	-1	1.11	9	0.12
23	2.040	400147	The Alameda rm-n-loop	Med	Med	Med	Major	Major	Major	Med	Med	Med	1.18	9	0.13
24	2.200	427921	The Alameda rm-n-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.00	0	na
25	2.700	400343	Coleman Ave rm-n-diag	-2	Med	Med	Med	-2	Major	Med	Med	Med	0.97	7	0.14
26	3.510	401560	1st St rm-n-loop	-3	Med	-1	-1	-3	-1	-1	-1	-1	0.20	3	0.07
27	3.610	422357	N 1st St rm-n-diag	-4	-1	-2	-2	-4	-2	-2	-2	-2	0.00	0	na
28	4.020	400045	SB 101 rm-n-loop	Med	-2	-3	Med	Med	-3	-3	-3	-3	0.27	4	0.07
29	4.210	400122	NB 101 rm-n-diag	-1	-3	-4	-1	-1	-4	-4	-4	-4	0.00	0	na
30	4.500	401541	Gish Rd rm-n-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	2.54	9	0.28
31	5.270	422359	Brokaw Rd rm-n-loop	Med	Med	Med	-1	-1	-1	Med	Med	Med	0.68	9	0.08
32	5.500	402281	4A5324 loc 91	-1	-1	-1	-2	-2	-2	-1	-1	-1	0.00	0	na
33	6.000	402283	4A5324 loc 92	-2	-2	-2	-3	-3	-3	-2	-2	-2	0.00	0	na
34	6.500	402285	4A5324 loc 93	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	0.00	0	na
35	6.860	423139	Montague Expwy rm-n-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	0.09	4	0.02
36	7.000	402286	4A5324 loc 94	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.00	0	na
37	7.650	400088	Great Mall Pkwy rm-n-loop	Med	Med	Med	-2	-2	-2	Med	Med	Med	0.60	9	0.07
38	8.100	413026	Calaveras Blvd/EB 237	Med	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	0.26	5	0.05
39	8.360	401464	EB 237 rm-n-loop	Med	Major	Topo	Major	Major	Topo	Topo	Topo	Topo	0.62	4	0.16
40	8.550	401489	Calaveras Blvd rm-n-diag	Topo	Topo	Med	Topo	Topo	Major	Med	Med	Med	0.75	8	0.09
41	8.770	401538	EB 237 rm-n-fly	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	0.00	0	na
42	9.200	402290	4A5324 loc 96	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.00	0	na
43	9.800	402292	4A5324 loc 98	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.00	0	na
44	10.552	401643	Dixon Landing Rd rm-n-coll	Major	Major	Major	Major	Major	Major	Major	Major	Major	2.83	9	0.31
45	11.052	402800	N of Dixon Landing Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.00	0	na
46	11.352	402828	Dixon Landing and Gateway Blvd	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.00	0	na
47	12.132	407219	S of Mission Blvd	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	0.00	0	na
48	12.202	402789	oppo Mission Blvd rm-s-fly	Topo	Med	Med	Med	Med	Med	Med	Med	Med	0.84	8	0.11
49	12.527	408755	Warren Ave rm-n-loop	Major	Major	Major	Med	Med	Major	Major	Major	Major	1.57	9	0.17
50	12.657	402802	N of Warren Ave	Major	Major	Major	Major	Major	Major	Major	Major	Major	2.85	9	0.32
51	12.727	408756	Mission Blvd rm-n-diag	Major	Major	Major	Topo	Topo	Major	Major	Major	Major	1.67	7	0.24
52	13.507	400189	Fremont Blvd rm-n-loop	Med	Med	Med	Major	Major	Med	Med	Med	Med	0.84	9	0.09
53	13.697	400309	Fremont Blvd rm-n-diag	-1	Med	-1	-1	-1	-1	-1	-1	-1	0.43	9	0.05
54	14.257	400417	oppo at the truck scales	-2	Major	Major	Major	Major	Major	Major	Major	Major	2.42	8	0.30
55	14.887	400249	Auto Mall Pkwy rm-n-loop	Med	Major	Major	Major	Major	Major	Major	Major	Major	2.75	9	0.31
56	15.027	401639	Auto Mall Pkwy rm-n-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.08	4	0.02
57	16.407	400662	Stevenson Blvd rm-n-loop	Med	Med	-2	Med	Med	-2	-2	-2	-2	0.32	4	0.08

Figure 7-13: Summary Compilation – I-880 N

7.3. STAGE 3: AGGREGATE EVALUATION SCORES

The final part of the analysis consists of assigning an average evaluation score to each station along a corridor based on the results of the empirical evaluations described in the previous sections. This is done to help summarize the potentially different importance status assigned to each station across various analysis periods. As an example, several stations in the example of Figure 7-13 were on occasion flagged as capturing major shifts in flow during some analysis periods and capturing a medium shift during other periods. It is also done to help account for the fact that analyses may not always be possible across all evaluation periods due to fluctuations in data availability and validity. The goal here is to combine all these individual evaluations into an average score that could help determine the general importance of each station based on available evaluation results.

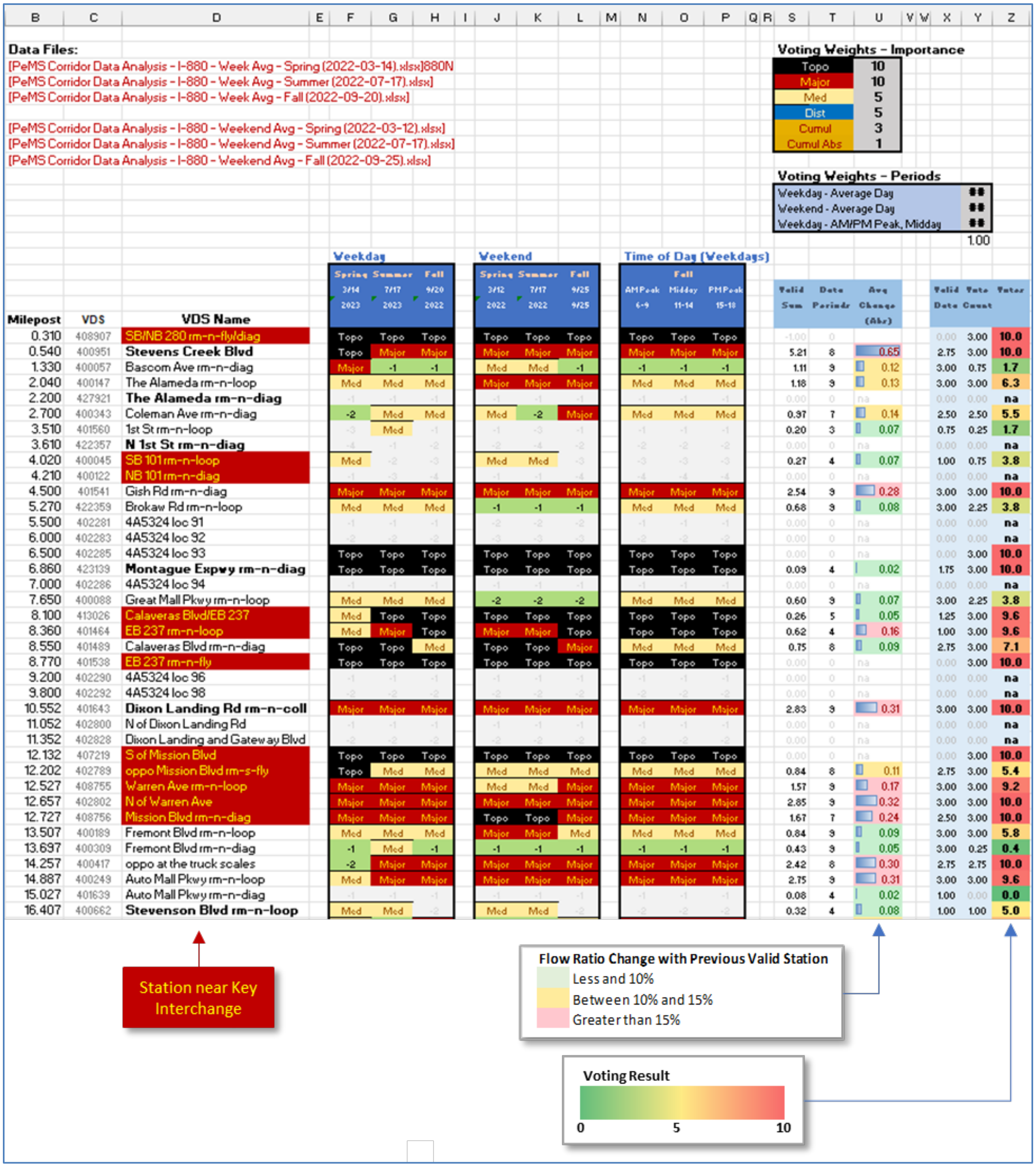
To perform the evaluation, a customizable voting mechanism assigning weights to each station based on the following two dimensions was developed:

- Weights according to reason a particular station was flagged as important during the empirical evaluation:
    - Network topology
    - Major flow changes
    - Medium flow changes
    - Distance to the previous station with valid data
    - Cumulative flow change
    - Absolute Cumulative Flow Change
- Weights according to analysis period:
    - Weekdays
        - Average daytime analyses
        - Time-of-day analyses (AM Peak, Midday, PM Peak)
    - Weekends
        - Average daytime analyses

Figure 7-14 illustrates an application of the voting mechanism to the data of Figure 7-13 considering sensor prioritization along I-880 North across various analysis periods. The voting mechanism used in this case uses the following weights:

- Weights varying between 1 and 10 for the assigned importance within each evaluation period. In this case, the highest weights are assigned to stations flagged as capturing a major or medium change in traffic flows. Lower weights are assigned to stations flagged based on distance or cumulative flow changes.
- Weights varying between 0.25 and 0.50 for the specific evaluation period considered. In this case, it is assumed that analysts would normally put more emphasis on peak weekday traffic periods and other periods.

The resulting evaluation scores are shown in Column Z, with a color gradient highlighting the stations with high (red), medium (yellow), and low (green) scores. Stations for which there were no evaluation periods with valid data, and thus for which it was not possible to conduct empirical evaluations, are shown with a "na" indication.



Data Files:
[PeMS Corridor Data Analysis - I-880 - Week Avg - Spring (2022-03-14).xlsx]880N
[PeMS Corridor Data Analysis - I-880 - Week Avg - Summer (2022-07-17).xlsx]
[PeMS Corridor Data Analysis - I-880 - Week Avg - Fall (2022-09-20).xlsx]

[PeMS Corridor Data Analysis - I-880 - Weekend Avg - Spring (2022-03-12).xlsx]
[PeMS Corridor Data Analysis - I-880 - Weekend Avg - Summer (2022-07-17).xlsx]
[PeMS Corridor Data Analysis - I-880 - Weekend Avg - Fall (2022-09-25).xlsx]

Voting Weights – Importance

Topo	10
Major	10
Med	5
Dist	5
Cumul	3
Cumul Abs	1

Voting Weights – Periods

Weekday - Average Day	##
Weekend - Average Day	##
Weekday - AM/PM Peak, Midday	##
	1.00

Milepost	VDS	VDS Name	Weekday Spring 3/14 2023	Weekday Summer 7/17 2023	Weekday Fall 9/20 2022	Weekend Spring 3/12 2022	Weekend Summer 7/17 2022	Weekend Fall 9/25 9/25	Time of Day (Weekdays) Fall AMPeak 6-9	Fall Midday 11-14	Fall PMPeak 15-18	Valid Sum	Data Periods	Avg Change (Abs)	Valid Data	Vote Count	Votes
0.310	408907	SB/NB 280 rm-n-fly/diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	-1.00	0		0.00	3.00	10.0
0.540	400951	Stevens Creek Blvd	Topo	Major	Major	Major	Major	Major	Major	Major	Major	5.21	8	0.65	2.75	3.00	10.0
1.330	400057	Bascom Ave rm-n-diag	Major	-1	-1	Med	Med	-1	-1	-1	-1	1.11	9	0.12	3.00	0.75	1.7
2.040	400147	The Alameda rm-n-loop	Med	Med	Med	Major	Major	Major	Med	Med	Med	1.18	9	0.13	3.00	3.00	6.3
2.200	427921	The Alameda rm-n-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.00	0	na	0.00	0.00	na
2.700	400343	Coleman Ave rm-n-diag	-2	Med	Med	Med	-2	Major	Med	Med	Med	0.97	7	0.14	2.50	2.50	5.5
3.510	401560	1st St rm-n-loop	-3	Med	-1	-1	-3	-1	-1	-1	-1	0.20	3	0.07	0.75	0.25	1.7
3.610	422357	N 1st St rm-n-diag	-4	-1	-2	-2	-4	-2	-2	-2	-2	0.00	0	na	0.00	0.00	na
4.020	400045	SB 101 rm-n-loop	Med	-2	-3	Med	Med	-3	-3	-3	-3	0.27	4	0.07	1.00	0.75	3.8
4.210	400122	NB 101 rm-n-diag	-1	-3	-4	-1	-1	-4	-4	-4	-4	0.00	0	na	0.00	0.00	na
4.500	401541	Gish Rd rm-n-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	2.54	9	0.28	3.00	3.00	10.0
5.270	422359	Brokaw Rd rm-n-loop	Med	Med	Med	-1	-1	-1	Med	Med	Med	0.68	9	0.08	3.00	2.25	3.8
5.500	402281	4A5324 loc 91	-1	-1	-1	-2	-2	-2	-1	-1	-1	0.00	0	na	0.00	0.00	na
6.000	402283	4A5324 loc 92	-2	-2	-2	-3	-3	-3	-2	-2	-2	0.00	0	na	0.00	0.00	na
6.500	402285	4A5324 loc 93	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	0.00	0	na	0.00	3.00	10.0
6.860	423139	Montague Expwy rm-n-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	0.09	4	0.02	1.75	3.00	10.0
7.000	402286	4A5324 loc 94	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.00	0	na	0.00	0.00	na
7.650	400088	Great Mall Pkwy rm-n-loop	Med	Med	Med	-2	-2	-2	Med	Med	Med	0.60	9	0.07	3.00	2.25	3.8
8.100	413026	Calaveras Blvd/EB 237	Med	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	0.26	5	0.05	1.25	3.00	9.6
8.360	401464	EB 237 rm-n-loop	Med	Major	Topo	Major	Major	Topo	Topo	Topo	Topo	0.62	4	0.16	1.00	3.00	9.6
8.550	401489	Calaveras Blvd rm-n-diag	Topo	Topo	Med	Topo	Topo	Major	Med	Med	Med	0.75	8	0.09	2.75	3.00	7.1
8.770	401538	EB 237 rm-n-fly	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	0.00	0	na	0.00	3.00	10.0
9.200	402290	4A5324 loc 96	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.00	0	na	0.00	0.00	na
9.800	402292	4A5324 loc 98	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.00	0	na	0.00	0.00	na
10.552	401643	Dixon Landing Rd rm-n-coll	Major	Major	Major	Major	Major	Major	Major	Major	Major	2.83	9	0.31	3.00	3.00	10.0
11.052	402800	N of Dixon Landing Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.00	0	na	0.00	0.00	na
11.352	402828	Dixon Landing and Gateway Blvd	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.00	0	na	0.00	0.00	na
12.132	407219	S of Mission Blvd	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	0.00	0	na	0.00	3.00	10.0
12.202	402789	oppo Mission Blvd rm-s-fly	Topo	Med	Med	Med	Med	Med	Med	Med	Med	0.84	8	0.11	2.75	3.00	5.4
12.527	408755	Warren Ave rm-n-loop	Major	Major	Major	Med	Med	Major	Major	Major	Major	1.57	9	0.17	3.00	3.00	9.2
12.657	402802	N of Warren Ave	Major	Major	Major	Major	Major	Major	Major	Major	Major	2.85	9	0.32	3.00	3.00	10.0
12.727	408756	Mission Blvd rm-n-diag	Major	Major	Major	Topo	Topo	Major	Major	Major	Major	1.67	7	0.24	2.50	3.00	10.0
13.507	400189	Fremont Blvd rm-n-loop	Med	Med	Med	Major	Major	Med	Med	Med	Med	0.84	9	0.09	3.00	3.00	5.8
13.697	400309	Fremont Blvd rm-n-diag	-1	Med	-1	-1	-1	-1	-1	-1	-1	0.43	9	0.05	3.00	0.25	0.4
14.257	400417	oppo at the truck scales	-2	Major	Major	Major	Major	Major	Major	Major	Major	2.42	8	0.30	2.75	2.75	10.0
14.887	400249	Auto Mall Pkwy rm-n-loop	Med	Major	Major	Major	Major	Major	Major	Major	Major	2.75	9	0.31	3.00	3.00	9.6
15.027	401639	Auto Mall Pkwy rm-n-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.08	4	0.02	1.00	0.00	0.0
16.407	400662	Stevenson Blvd rm-n-loop	Med	Med	-2	Med	Med	-2	-2	-2	-2	0.32	4	0.08	1.00	1.00	5.0

Figure 7-14: Evaluation Results – I-880 N

8. PRACTICAL GUIDELINES FOR SENSOR PLACEMENT

In the context of DTI and emerging needs for greater connectivity and more diverse sources of data, new strategies are needed to benefit from the data made possible by fixed infrastructure sensors. This research proposes to leverage the strengths of different data types to "get the most bang for the buck."

Fixed sensors are not generally needed where the intent is primarily to monitor traffic congestion. Private sources of data do have limitations regarding latency but do provide broad coverage and useful samples of traffic speeds and travel times. One notable exception is when the intent is to monitor speed on a specific lane, for example in the case of HOV performance reporting. Private third-party data may be used to cover specific situations such as:

- Monitoring locations of congestion hotspots, and extent of queues, through monitoring of speeds
- Obtaining routing patterns from the location
- Checking relative intensity of traffic across locations to validate other observed data

8.1. BASIC CONSIDERATIONS

8.1.1. INTERCHANGES AS AN ORGANIZATIONAL UNIT FOR FREEWAY DATA

One crucial outcome of this research is the proposal to reorganize the primary organizational unit for freeway data around major interchanges, not around freeways. The reason is that interchanges are places of major decision points, rerouting options, and places where flows change, and therefore where sensing data are most useful. A secondary organizational unit could be so-called FATVs (fully accounted traffic volumes)--a concept explored in a separate study (Khan, Fournier, Mauch, Patire, & Skabardonis, 2020). A tertiary organizational unit for convenience could be freeways. In this structure, groups of interchanges would constitute the main groupings of freeway data and multiple freeways could be associated with the same interchange. This would be an improvement on the current existing meta-data system.

8.1.2. KEY TACTICAL CONSIDERATIONS

Fixed-sensor data can provide complete traffic cross-sections of counts. This is only possible if all lanes, including auxiliary lanes, are instrumented. This is a crucial advantage of infrastructure-based sensing. In order to benefit, auxiliary lanes must be instrumented together with mainline lanes.

HOV facilities need their own instrumentation, but it is better not to instrument at the center of an HOV access gate. A preferred method would be to instrument in the actual HOV lane before or after the gate.

At any interchange of significance, all connectors, on-ramps, off-ramps, etc. should be instrumented.

It is especially valuable if traffic signal data at the entrance/exits of ramps are also available and integrated into a system for freeway traffic situational awareness and monitoring.

8.1.3. LOCAL FACTORS AS KEY DETERMINANTS OF SENSOR PRIORITY

Sensors required to support freeway operations (ramp metering, HOV monitoring, WIM support) and for which data cannot be reliably obtained through other means (e.g., t party) constitute a minimum set needed.

8.1.4. MAXIMUM DISTANCE BETWEEN SENSORS

The allowed distance between sensors depends on location and is only necessary to maintain a minimum density of sensors. In urban areas, it is likely that the presence of major interchanges, and data variations, will obviate the need for a maximum distance metric in this methodology. However, for rural areas with little data, it might be useful to set a target. Rough target distances might be on the order of 5 miles for an urban area, but more like 15-20 miles in a rural setting dominated by through traffic.

8.2. HOW TO USE THE PROPOSED METHODOLOGY

The suggested practice is to locate the most important freeway-to-freeway interchanges and to completely instrument them. This allows for better monitoring of area/regional trip patterns. Busy local interchanges are important in the sense that on-ramp/off-ramp data collected there facilitate a better understanding of local traffic patterns and can help explain why congestion or other problems exist at a given location. Complex interchanges often will be associated with busy interchanges.

8.2.1. SUMMARY OF METHODOLOGY

The proposed methodology can be summarized by the application of the following three analytical stages:

- Stage 1
  - For a freeway, generate a list of interchanges and categorize them
  - Collect local factors, such as the need for ramp metering
  - Incorporate these needs as topological features of importance in stage 2
- Stage 2
  - Gather data as described and follow the process to prioritize sensors based on quantitative analysis of each period considered
- Stage 3
  - Combine results from all evaluated periods to develop an aggregate prioritization

At the end of this, what is achieved should be interpreted not as a list of mainline positions, but as a list of interchanges of importance. Each interchange of high priority should be completely instrumented. Sensor location meta-data should organized so that it is possible to associate sensors with interchanges, FATVs, and freeways. This will enable the possibility to implement automatic error checking, and also make it easier to integrate the data with other sources.

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APPENDIX A. CORRIDOR ANALYSIS RESULTS

This appendix presents the results of the prioritization analyses that have been conducted for the following corridors:

- I-5 Central Valley
- I-5 District 10
- I-5 District 12
- I-205
- I-280
- I-680
- I-880
- SR-55
- SR-57
- SR-91
- SR-99
- SR-120

			Weekday			Weekend			Time of Day (Weekdays)			
			Spring	Summer	Fall	Spring	Summer	Fall	Spring			
			3/13/2023	7/17/2023	9/19/2022	3/18/2022	7/23/2022	9/17/2022	AM Peak 6-9	Midday 11-14	PM Peak 15-18	Votes
Milepost	VDS											
221.29	601284	JNO RTE 99 JCT - I5 NB	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
225.09	601283	JNO RTE 166 - I5 NB	Med	-1	-1	-1	-1	-1	Med	Med	Med	3.2
227.98	601282	3.21 MI N-O RTE 166 - I5 NB	-1	-2	Med	-2	-2	-2	-1	-1	-1	0.4
233.36	601341	HERRING RD NB	-2	-3	Med	-3	-3	-3	-2	-2	-2	0.4
234.98	601281	3.62 MI S-O RTE 223 - I5 NB	-3	-4	-1	-4	-4	-4	-3	-3	-3	0.0
237.19	601357	1.34 MI S OF RTE 223 NB (BEAR BL	-4	Dist	-2	Dist	Dist	Dist	-4	-4	-4	1.7
238.64	601309	JCT RTE 223 BEAR MTN BLVD 5 NB	-5	-1	-3	-1	-1	-1	-5	-5	-5	0.0
242.43	619999	S OF RTE 119 NB	Dist	-2	Med	-2	Med	Med	Dist	Dist	Dist	4.2
244.29	601310	RTE 119 SEP 5 NB	Med	Med	Med	-3	Med	-1	Med	Med	Med	4.2
246.42	601179	I-5 AT SR 43 - NB	-1	-1	-1	-4	-1	-2	-1	-1	-1	na
249.04	601516	N OF RTE 43 - I5 NB	Med	-2	Med	-5	-2	-3	Med	Med	Med	3.3
253.76	601518	N OF STOCKDALE HWY - I5 NB	Major	Major	Major	Med	Med	Major	Major	Major	Major	9.2
257.69	601280	JNO RTE 58 - I5 NB	Med	Med	-1	Med	Med	-1	Med	Med	Med	5.0
258.97	601519	N OF SR 58 (REST AREA) - I5 NB	-1	-1	Med	-1	-1	-2	-1	-1	-1	2.5
261.74	601315	7TH STANDARD RD 5 NB	-2	-2	Med	-2	-2	Med	-2	-2	-2	0.8
263.92	601392	0.5 MI NO BUTON WILLOW DR NB	Med	Med	Med	-3	Med	-1	Med	Med	Med	4.2
266.30	601241	S-O LERDO HWY - I5 NB	-1	-1	-1	-4	-1	-2	-1	-1	-1	0.0
268.04	601279	N-O LERDO HWY - I5 NB	Med	Med	Med	-5	-2	Med	Med	Med	Med	4.2
270.34	601278	AT MERCED - I5 NB	-1	-1	-1	-6	-3	-1	-1	-1	-1	0.0
273.12	619991	5.4 MI NO LERDO HWY (AT CANAL) N	-2	-2	-2	Dist	-4	-2	-2	-2	-2	0.4
275.67	601277	S-O RTE 46 - I5 NB	-3	-3	-3	-1	-5	-3	-3	-3	-3	0.0
282.26	601318	LOST HILLS RD 5 NB	Med	Major	Med	Med	Med	Med	Med	Med	Med	5.4
287.52	601189	TWISSELMAN RD - NB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
289.62	619972	2 MILE NO TWISSELMAN RD - NB	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
293.32	601391	11 MI SO UTICA NB	-3	-3	-3	-3	-3	-3	-3	-3	-3	0.0
296.14	601734	I5 8 MILES SO UTICA - NB	Med	-4	Med	Major	-4	Med	Med	Med	Med	4.6
299.26	601326	WATERLOO AVE OC - IB NB	Med	Med	Major	Major	Med	Major	Med	Med	Med	6.3
301.59	601390	SOUTH OF UTICA NB	Med	Med	Med	Major	Med	Med	Med	Med	Med	5.4
304.50	601505	I-5 JSO UTICA AVE NB	-1	-1	Med	-1	-1	Med	-1	-1	-1	5.0
305.66	601506	N OF UTICA	-2	-2	Med	Med	-2	Med	-2	-2	-2	1.3
315.19	601389	AT QUINCY AVE NB	-3	-3	-1	-1	-3	-1	-3	-3	-3	na
317.24	601589	I-5 1.9 MI S-O RTE 269 NB	Dist	Dist	-2	Med	Dist	Med	Dist	Dist	Dist	4.6
319.11	601590	I-5 AT RTE 269 NB	-1	Med	-3	-1	Med	-1	-1	-1	-1	5.0
327.32	601388	N OF JAYNE AVE NB	-2	-1	Dist	-2	Med	-2	-2	-2	-2	5.0
330.26	601591	I-5 3.5 MI S-O 198 NB	Med	-2	-1	-3	-1	-3	Med	Med	Med	2.9
333.62	601592	I-5 JSO RTE 198 NB	Med	Med	Med	Med	-2	Med	Med	Med	Med	5.0
342.49	601731	I5 NB SOUTH OF COALINGA-MENDOTA	-1	Major	Major	-1	Dist	Major	-1	-1	-1	8.8
343.39	601387	0.11 MI N-O JEFREY OC NB	Major	-1	-1	Major	-1	-1	Major	Major	Major	6.7
344.50	601732	I5 NB NORTH OF COALINGA-MENDOTA	-1	-2	-2	-1	-2	-2	-1	-1	-1	0.0
345.18	601386	3.17 MI S-O JCT 33 NB	-2	-3	-3	-2	-3	-3	-2	-2	-2	0.0
349.53	601335	JNO RTE 33 (NEXT TO CMS 26) NB	-3	-4	-4	-3	-4	Med	-3	-3	-3	0.4
368.23	601340	N-O PANOCHE RD NB	-4	-5	-5	-4	-5	-1	-4	-4	-4	na
371.01	601336	I-5 S-O RUSSELL AVE NB	Dist	Dist	Dist	Med	Med	Dist	Dist	Dist	Dist	5.0
373.30	601384	AT JENSEN AVE NB	-1	-1	-1	-1	Med	-1	-1	-1	-1	0.4
375.43	601383	N-O CALIFORNIA NB	Med	-2	-2	-2	-1	Med	Med	Med	Med	4.4
378.99	601337	SHIELDS AVE OC 5 NB	Med	-3	-3	Med	-2	-1	Med	Med	Med	5.0
384.91	601338	NEES AVE OC 5 NB	-1	Med	-4	-1	Med	-2	-1	-1	-1	5.0
385.55	10143810	S-O Ericca Rest Area	-2	-1	-5	-2	-1	-3	-2	-2	-2	na
390.09	1031610	S-O Off Ramp to Vista Point Rd	-3	-2	-6	-3	-2	-4	-3	-3	-3	na
390.42	1031710	N-O On Ramp from Vista Point Rd	-4	-3	-7	-4	-3	-5	-4	-4	-4	na
391.20	1031810	S-O SR 165-Mercy Springs Rd	-5	-4	-8	Med	Med	-6	-5	-5	-5	1.0
391.54	10133010	N-O SR 165	-6	-5	-9	-1	-1	-7	-6	-6	-6	na
402.50	1032010	S-O SR 152	-7	-6	-10	-2	-2	-8	-7	-7	-7	na
406.99	1032510	N-O SR 33	-8	-7	-11	-3	-3	-9	-8	-8	-8	na
408.57	1032710	N-O Truck Scales	-9	-8	-12	-4	-4	-10	-9	-9	-9	na
417.13	10132110	S-O SR 140	-10	Med	-13	-5	Med	Med	-10	-10	-10	5.0
428.09	10126910	S-O Fink Rd	-11	-1	-14	-6	-1	Med	-11	-11	-11	5.0
433.70	1007810	Sperry Ave	Major	Major	Major	Major	Major	-1	Major	Major	Major	10.0
440.64	10112310	N-O Howard Rd	-1	Med	-1	Med	Med	Med	-1	-1	-1	1.8
445.04	1015110	Westley Rest Area	-2	-1	Major	-1	Major	-1	-2	-2	-2	10.0
445.40	1015210	Westley Rest Area	-3	-2	-1	-2	-1	-2	-3	-3	-3	na
445.84	1091810	N-O I-580	Major	Major	Med	Major	Major	Major	Major	Major	Major	9.6
449.59	10119610	N-O SR 132	Med	-1	Major	Med	-1	-1	Med	Med	Med	4.5
452.13	10156010	Jct SR 33	-1	Med	-1	-1	Med	-2	-1	-1	-1	5.0
458.14	1015810	S-O Jct SR EB I-205	-2	-1	-2	-2	-1	-3	-2	-2	-2	na
458.37	1015910	S-O Jct SR EB I-205	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
458.62	1016010	S-O Jct SR EB I-205	-1	Med	-1	Med	Major	Med	-1	-1	-1	2.1
458.99	10127210	S-O Manthey Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
459.52	1048010	N-O Mossdale Rd	Major	-1	-1	Major	-1	-1	Major	Major	Major	10.0
460.06	1048610	N-O Jct EB SR 120	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
460.50	1048210	N-O Jct SR 120	Med	Med	Med	Med	Med	Major	Med	Med	Med	5.4

Figure A-1: Evaluation Results – I-5 N Central Valley

			Weekday			Weekend			Time of Day (Weekdays)			
			Spring	Summer	Fall	Spring	Summer	Fall	Spring			
			3/13/2023	7/17/2023	9/19/2022	3/18/2022	7/23/2022	9/17/2022	AM Peak 6-9	Midday 11-14	PM Peak 15-18	Votes
Milepost	VDS											
460.92	1001510	N-O Jct SR 120	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
460.50	1001710	N-O Jct SR 120	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
460.01	1001810	N-O Jct WB SR 120	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
459.52	1001910	N-O Mossdale Rd	Major	Major	-1	Major	Major	-1	Major	Major	Major	10.0
459.21	1003410	S-O Mossdale Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
458.99	10127310	S-O Manthey Rd	-1	-1	-1	-1	Med	-1	-1	-1	-1	0.4
458.72	1003510	S-O Manthey Rd	-2	-2	-2	-2	-1	-2	-2	-2	-2	0.0
458.69	10119710	Jct SR 205	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
458.37	10120810	S-O Jct SR EB I-205	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
458.22	1003610	S-O Jct SR WB I-205	-1	-1	-1	-1	-1	Med	-1	-1	-1	0.4
458.22	10121710	S-O Paradise Cut	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
452.13		Jct SR 33	-1	Major	-1	-1	Major	-1	-1	-1	-1	10.0
449.51	10119510	N-O SR 132	Major	-1	-2	Major	-1	-2	Major	Major	Major	8.0
445.80	1091610	N-O I-580	Med	Med	Major	-1	-2	Major	Med	Med	Med	5.0
445.34		Westley Rest Area	-1	-1	-1	-2	-3	-1	-1	-1	-1	na
444.98		Westley Rest Area	-2	-2	-2	-3	-4	-2	-2	-2	-2	na
440.57	10112510	N-O Howard Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
433.64	1007910	Sperry Ave	Med	Major	Med	Med	Med	Med	Med	Med	Med	5.4
428.17	10120010	Fink Rd	Major	Med	Major	Med	Med	Med	Major	Major	Major	8.3
417.16	1034110	S-O SR 140	-1	-1	-1	-1	Med	-1	-1	-1	-1	2.5
408.32	1034010	N-O Truck Scales	-2	-2	-2	-2	-1	-2	-2	-2	-2	na
407.00	1033810	N-O SR 33	-3	-3	-3	-3	-2	-3	-3	-3	-3	na
402.25	1033310	S-O SR 152	-4	-4	-4	-4	-3	-4	-4	-4	-4	na
391.48	10133110	N-O SR 165	-5	-5	-5	-5	-4	-5	-5	-5	-5	na
391.10	1033110	S-O SR 165-Mercy Springs Rd	Med	Med	-6	Med	Med	-6	Med	Med	Med	5.0
385.49	10143910	S-O Ericca Rest Area	-1	-1	-7	-1	-1	-7	-1	-1	-1	na
384.85	602338	NEES AVE OC 5 SB	-2	-2	Med	-2	Med	Med	-2	-2	-2	3.8
378.92	602337	SHIELDS AVE OC 5 SB	-3	-3	-1	-3	-1	-1	-3	-3	-3	na
375.37	602383	N-O CALIFORNIA SB	Dist	-4	Med	-4	-2	Med	Dist	Dist	Dist	5.0
373.24	602384	AT JENSEN AVE SB	Med	Med	-1	Med	Med	-1	Med	Med	Med	4.2
370.94	602336	I-5 S-O RUSSELL AVE SB	-1	-1	-2	-1	Med	-2	-1	-1	-1	0.4
368.16	602340	N-O PANOCHE RD SB	-2	-2	-3	-2	-1	-3	-2	-2	-2	0.0
349.46	602335	JNO RTE 33 (NEXT TO CMS 26) SB	Med	Med	Med	Med	Med	-4	Med	Med	Med	5.0
345.11	602386	3.17 MI S-O JCT 33 SB	-1	Med	Med	-1	-1	Med	-1	-1	-1	1.3
344.43	602732	I5 NB NORTH OF COALINGA-MENDOTA	-2	-1	-1	-2	-2	-1	-2	-2	-2	0.0
343.31	602387	0.11 MI N-O JEFREY OC SB	-3	-2	-2	-3	-3	-2	-3	-3	-3	0.0
342.42	602731	I5 NB SOUTH OF COALINGA-MENDOTA	-4	-3	-3	-4	-4	-3	-4	-4	-4	0.0
333.55	602592	I-5 JSO RTE 198 SB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
330.19	602591	I-5 3.5 MI S-O 198 SB	Major	Major	Med	Major	Major	Major	Major	Major	Major	9.6
327.25	602388	N OF JAYNE AVE SB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
319.04	602590	I-5 AT RTE 269 SB	-2	Med	Med	-2	Med	-2	-2	-2	-2	3.8
317.18	602589	I-5 1.9 MI S-O RTE 269 SB	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
315.13		AT QUINCY AVE SB	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
305.59	602506	N OF UTICA	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
304.44	602505	I-5 JSO UTICA AVE SB	-3	-3	-3	-3	-3	-3	-3	-3	-3	na
301.52	602390	SOUTH OF UTICA SB	Med	Med	Med	Med	Dist	Med	Med	Med	Med	5.0
299.20	602326	WATERLOO AVE OC - I5 SB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
296.08	602734	I5 8 MILES SO UTICA - SB	Med	-2	Med	Major	-2	Med	Med	Med	Med	4.6
293.25	602391	11 MI SO UTICA SB	-1	-3	Med	-1	-3	Med	-1	-1	-1	5.0
289.55		2 MILE NO TWISSELMAN RD - SB	-2	-4	-1	-2	-4	-1	-2	-2	-2	0.0
287.46		TWISSELMAN RD - SB	-3	-5	-2	-3	Med	-2	-3	-3	-3	2.5
282.12	602318	LOST HILLS RD SB	Med	Dist	-3	Major	Med	-3	Med	Med	Med	4.6
275.60	602277	S-O RTE 46 I5 SB	Med	Major	Med	Major	Major	Med	Med	Med	Med	6.3
273.06	629991	5.4 MI NO LERDO HWY (AT CANAL) S	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
270.27	602278	AT MERCED - I5 SB	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
267.97	602279	N-O LERDO HWY - I5 SB	-3	-3	-3	-3	-3	-3	-3	-3	-3	0.0
266.23	602241	S-O LERDO HWY - I5 SB	-4	-4	Med	-4	-4	Med	-4	-4	Cumul Abs	1.0
263.87	602392	0.5 MI NO BUTON WILLOW DR SB	-5	-5	-1	-5	-5	-1	-5	-5	-1	0.0
261.64	602315	7TH STANDARD RD 5 SB	Med	Cumul Abs	Med	Med	Med	-2	Med	Med	Med	4.3
258.89	602519	N OF SR 58 (REST AREA) - I5 SB	-1	-1	Med	-1	-1	-3	-1	-1	-1	2.5
257.62	602280	JNO RTE 58 - I5 SB	-2	Dist	-1	-2	-2	-4	-2	-2	-2	0.5
253.67	602518	N OF STOCKDALE HWY - I5 SB	-3	Med	-2	Med	Med	-5	-3	-3	-3	1.5
248.97	602516	N OF RTE 43 - I5 SB	Major	Med	Major	Med	Med	Med	Major	Major	Major	8.3
246.38		I-5 AT SR 43 - SB	-1	Med	-1	-1	Major	-1	-1	-1	-1	7.5
244.21	602310	RTE 119 SEP 5 SB	Med	Med	Med	-2	Major	-2	Med	Med	Med	4.6
242.36	629999	S OF RTE 119 SB	-1	-1	Med	Med	Med	Med	-1	-1	-1	1.7
238.57	602309	CT RTE 223 BEAR MTN BLVD 5 SB	-2	-2	-1	-1	-1	-1	-2	-2	-2	0.0
237.12	602357	1.34 MI S OF RTE 223 SB (BEAR BL	-3	-3	Med	-2	Med	Med	-3	-3	-3	1.3
234.93	602281	3.62 MI S-O RTE 223 - I5 SB	-4	-4	-1	-3	-1	-1	-4	-4	-4	0.0
233.28	602341	HERRING RD SB	Med	-5	Med	-4	-2	-2	Med	Med	Med	3.3
227.89	602282	3.21 MI N-O RTE 166 - I5 SB	-1	Med	Med	-5	-3	-3	-1	-1	-1	0.8
225.01	602283	JNO RTE 166 - I5 SB	-2	-1	Med	Dist	-4	-4	-2	-2	-2	0.9
221.20	602284	JNO RTE 99 JCT - I5 SB	-3	Med	Major	-1	Dist	Med	-3	-3	-3	6.3

Figure A-2: Evaluation Results – I-5 S Central Valley

Milepost	VDS	Location	Weekday			Weekend			Time of Day (Weekdays)			Votes
			Spring	Summer	Fall	Spring	Summer	Fall	Fall			
			3/14/2023	7/25/2023	9/19/2022	3/12/2022	7/23/2022	9/24/2022	AM Peak 6-9	Midday 11-14	PM Peak 15-18	
385.55	10143810	S-O Ericca Rest Area	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
390.09	1031610	S-O Off Ramp to Vista Point Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
390.42	1031710	N-O On Ramp from Vista Point Rd	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
391.10	1031810	S-O SR 165-Mercy Springs Rd	-3	-3	-3	-3	-3	-3	-3	-3	-3	na
391.54	10133010	N-O SR 165	-4	-4	-4	-4	-4	-4	-4	-4	-4	na
402.41	1032010	S-O SR 152	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
406.75	1032410	N-O SR 33	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
407.17	1032510		-2	-2	-2	-2	-2	-2	-2	-2	-2	na
408.45	1032610	N-O Truck Scales	-3	-3	-3	-3	-3	-3	-3	-3	-3	na
408.72	1032710		-4	-4	-4	-4	-4	-4	-4	-4	-4	na
417.13	10132110	S-O SR 140	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
417.23	1032810		-1	-1	-1	-1	-1	-1	-1	-1	-1	na
428.09	10126910	S-O Fink Rd	Major	Med	Major	Med	-2	Med	Major	Major	Major	8.6
433.70	1007810	Sperry Ave	-1	Med	-1	-1	Major	-1	-1	-1	-1	7.5
440.64	10112310	N-O Howard Rd	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
445.84	1091810	Westley Rest Area	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
449.51	10119610	N-O I-580	Major	Topo	Topo	Med	Topo	Topo	Topo	Topo	Topo	9.6
458.14	1015810	N-O SR 132	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
458.37	1015910	S-O Jct SR EB I-205	-2	Major	Major	Major	Major	Major	Major	Major	Major	10.0
458.62	1016010	S-O Jct SR EB I-205	Major	-1	-1	Med	Med	Med	-1	-1	-1	2.1
458.83	1016110	S-O Jct SR EB I-205	-1	-2	-2	-1	-1	-1	-2	-2	-2	na
458.99	10127210	S-O Manthey Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
459.52	1048010	N-O Mossdale Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
460.06	1048610	N-O Jct EB SR 120	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
460.50	1048210	N-O Jct SR 120	Major	Med	Med	Med	Major	Major	Med	Med	Med	6.3
461.20	1048310	S-O Louise Ave	Major	Major	-1	Major	Major	-1	-1	-1	-1	10.0
462.06	10121610	Louise Ave	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
462.83	10141410	S-O Lathrop Rd	Med	Med	Med	Med	-1	Med	Med	Med	Med	4.6
464.15	10121210	N-O Lathrop Rd	Med	-1	-1	Med	-2	Med	-1	-1	-1	1.3
464.65	10121410	S-O Roth Rd	-1	-2	-2	-1	-3	-1	-2	-2	-2	0.0
465.15	10121110	N-O Roth Rd	-2	-3	-3	-2	-4	-2	-3	-3	-3	0.0
465.94	10121310	N-O Eldorado St	-3	Med	Cumul Abs	-3	Cumul Abs	-3	Cumul Abs	Cumul Abs	Cumul Abs	1.1
466.37	10121010	N-O Eldorado St	Med	-1	Med	-4	-1	-4	Med	Med	Med	3.3
466.93	10120910	Mathews Rd	-1	-2	-1	-5	-2	-5	-1	-1	-1	0.0
467.93	1096710	S-O French Camp Rd	Med	-3	-2	Med	Med	Cumul Abs	-2	-2	-2	1.3
468.14	1096310	N-O French Camp Rd	-1	Med	Med	-1	Major	-1	Med	Med	Med	5.6
468.70	1007410	French Camp Turnpike	Major	-1	Major	Med	-1	Med	Major	Major	Major	9.0
469.27	1021310	N-O French Camp Slough	-1	-2	-1	-1	-2	-1	-1	-1	-1	na
469.59	1021410	N-O Downing Ave UC	-2	-3	-2	-2	-3	-2	-2	-2	-2	na
470.24	1021510	N-O Eighth St UC	-3	-4	-3	-3	-4	-3	-3	-3	-3	na
470.69	1016610	S-O Charter Way	Med	Major	Med	Med	Major	Med	Med	Med	Med	5.8
471.47	1027410	Off to Fresno Ave	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
472.96	10115310	N-O Fremont St- Pershing Ave	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
473.42	1022010	N-O Monte Diablo Ave UC	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
475.39	1022210		-2	-2	-2	-2	-2	-2	-2	-2	-2	na
476.85	1022410	N-O Benjamin Holt Drive	-3	-3	-3	-3	-3	-3	-3	-3	-3	na
477.20	10115010	N-O Benjamin Holt Drive	-4	Med	-4	-4	-4	-4	-4	-4	-4	2.5
478.19	1022610	Hammer Lane UC	-5	-1	-5	-5	-5	-5	-5	-5	-5	na
478.52	1073410	N-O Hammer Lane	-6	-2	-6	-6	-6	-6	-6	-6	-6	na
479.52	1077110	S-O Eight Mile Rd	-7	-3	-7	-7	-7	-7	-7	-7	-7	na
480.01	1077210	N-O McAuliffe Rd	-8	-4	-8	-8	-8	-8	-8	-8	-8	na
480.48	1077310	S-O Eight Mile Rd	-9	-5	-9	-9	-9	-9	-9	-9	-9	na
483.57	1022910	N-O Van Ruiten UC	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
486.59	1077910	S-O Turner Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
486.81	1073210	S-O Turner Rd	Major	Major	Major	Med	Med	Major	Major	Major	Major	9.2
487.20	1078010	N-O Turner Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
487.72	1078110	S-O Woodbridge Rd	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
488.19	1078210	N-O Woodbridge Rd	-3	-3	-3	-3	-3	-3	-3	-3	-3	na
491.38	10125010	Beaver Slough	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
496.79	10146610	Sac-SJ County Line	Med	Med	Med	-1	-1	Med	Med	Med	Med	4.2

Figure A-3: Evaluation Results – I-5 N District 10

Milepost	VDS	Location	Weekday Spring 3/14/2023	Weekday Summer 7/25/2023	Weekday Fall 9/19/2022	Weekend Spring 3/12/2022	Weekend Summer 7/23/2022	Weekend Fall 9/24/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Votes
496.79	10146710	Sac-SJ County Line	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
491.38	10125110	Beaver Slough	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
488.19	1078310	N-O Woodbridge Rd	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
487.69	1078410	S-O Woodbridge Rd	-3	-3	-3	-3	-3	-3	-3	-3	-3	na
487.17	1078510	Turner Rd	-4	-4	-4	-4	-4	-4	-4	-4	-4	na
486.81	1073310	S-O Turner Rd	-5	-5	Med	-5	-5	-5	Med	Med	Med	5.0
486.58	1078610	S-O Turner Rd	-6	-6	-1	-6	-6	-6	-1	-1	-1	na
483.57	1024810	N-O Van Ruiten UC	-7	-7	Major	-7	-7	-7	Major	Major	Major	10.0
480.46	1078710		-8	-8	-1	-8	-8	-8	-1	-1	-1	na
479.47	1077410	S-O Eight Mile Rd	-9	-9	-2	-9	-9	-9	-2	-2	-2	na
478.52	1073510	N-O Hammer Lane	Major	Major	-3	Major	Major	Major	-3	-3	-3	10.0
478.15	1024510	S-O Hammer Lane UC	-1	Major	-4	-1	Med	Major	-4	-4	-4	8.3
477.20	10115110	N-O Benjamin Holt Drive	Med	Med	-5	Med	Med	Med	-5	-5	-5	5.0
476.60	1024210	Swain Rd UC	Major	Major	-6	Major	Major	Major	-6	-6	-6	10.0
475.48	1024110	S-O March Lane UC	Major	-1	-7	Med	-1	-1	-7	-7	-7	7.5
473.42	1023910	Monte Diablo Ave	Major	Major	-8	Major	Major	Major	-8	-8	-8	10.0
472.96	10115210	N-O Fremont St- Pershing Ave	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
471.97	1023710	Off Ramp to SR 4	Major	Major	Topo	Major	Major	Major	Topo	Topo	Topo	10.0
468.81	1017010	S-O Downing Ave	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
468.70	1007510	French Camp Turnpike	Major	Major	-1	Major	Major	Major	-1	-1	-1	4.2
468.06	1096010	N-O French Camp Rd OC	-1	-1	Med	-1	-1	-1	Med	Med	Med	3.2
467.87	1096510	S-O French Camp Rd	-2	-2	Med	-2	-2	-2	Med	Med	Med	2.9
466.90	1000110	N-O Mathews Rd	-3	Major	-1	-3	Major	-3	-1	-1	-1	2.0
466.37	1000210	N-O Eldorado St	Major	Major	-2	Major	Major	Major	-2	-2	-2	4.2
465.94	1000310	N-O Eldorado St	Major	Major	-3	Major	Major	Major	-3	-3	-3	4.2
465.59	1000410	N-O Roth Rd	Med	-1	Med	-1	-1	-1	Med	Med	Med	4.0
465.15	1000510	N-O Roth Rd	-1	-2	Med	-2	-2	-2	Med	Med	Med	3.2
464.65	1000610	S-O Roth Rd	-2	-3	-1	-3	-3	-3	-1	-1	-1	0.0
464.60	1000710	N-O Lathrop Rd	-3	Med	-2	-4	-4	Med	-2	-2	-2	0.8
464.15	1000810	N-O Lathrop Rd	Med	-1	-3	-5	Med	Med	-3	-3	-3	1.3
463.66	1000910	N-O Lathrop Rd	Med	Med	-4	Cumul Abs	Med	Med	-4	-4	-4	4.2
462.78	1001010	S-O Lathrop Rd	-1	Med	Med	-1	Med	Med	Med	Med	Med	5.0
462.50	1001210	S-O Lathrop Rd	-2	-1	-1	-2	-1	-1	-1	-1	-1	0.0
462.39	1001110	S-O Lathrop Rd	-3	-2	Med	-3	-2	-2	Med	Med	Med	4.4
461.96	1001310	S-O Louise Ave	Med	Med	-1	-4	Med	Med	-1	-1	-1	1.7
461.90	10121510	Louise Ave	-1	-1	Med	-5	-1	-1	Med	Med	Med	2.9
461.34	1001410	S-O Louise Ave	-2	-2	Med	-6	-2	-2	Med	Med	Med	2.9
461.20	1001610	S-O Louise Ave	-3	-3	-1	-7	-3	-3	-1	-1	-1	0.0
460.92	1001510	N-O Jct SR 120	Med	Med	-2	Cumul Abs	-4	-4	-2	-2	-2	0.9
460.50	1001710	N-O Jct SR 120	Med	Med	-3	-1	-5	Med	-3	-3	-3	1.3
460.01	1001810	N-O Jct WB SR 120	-1	-1	Major	-2	-6	-1	Major	Major	Major	5.8
459.52	1001910	N-O Mossdale Rd	-2	-2	-1	Med	Med	-2	-1	-1	-1	2.0
459.21	1003410	S-O Mossdale Rd	-3	-3	Major	Med	Med	-3	Major	Major	Major	6.7
458.99	10127310	S-O Manthey Rd	-4	Cumul Abs	-1	-1	-1	Cumul Abs	-1	-1	-1	0.2
458.72	1003510	S-O Manthey Rd	Med	-1	-2	Med	-2	Med	-2	-2	-2	1.5
458.69	10119710	Jct SR 205	-1	Med	Major	-1	Med	-1	Major	Major	Major	6.7
458.37	10120810	S-O Jct SR EB I-205	-2	-1	Major	-2	-1	-2	Major	Major	Major	10.0
458.22	1003610	S-O Paradise Cut	Major	Major	-1	Major	Major	Major	-1	-1	-1	4.2
458.22	10121710	S-O Jct SR WB I-205	-1	-1	Major	-1	-1	-1	Major	Major	Major	10.0
449.51	10119510	N-O SR 132	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
445.80	1091610	N-O I-580	-1	-1	Major	-1	-1	-1	Major	Major	Major	10.0
440.57	10112510	N-O Howard Rd	-2	Major	Major	-2	-2	-2	Major	Major	Major	8.9
433.64	1007910	Sperry Ave	-3	-1	Med	-3	-3	-3	Med	Med	Med	5.0
428.17	10120010	Fink Rd	-4	-2	Major	-4	-4	-4	Major	Major	Major	10.0
417.16	1034110	S-O SR 140	-5	-3	-1	-5	-5	-5	-1	-1	-1	na
417.07	10132210		-6	-4	-2	-6	-6	-6	-2	-2	-2	na
408.32	1034010	N-O Truck Scales	Major	Major	-3	Major	Major	Major	-3	-3	-3	10.0
408.28	1033910		-1	-1	-4	-1	-1	-1	-4	-4	-4	na
407.00	1033810		Major	Major	-5	Med	Med	Med	-5	-5	-5	7.0
406.67	1033710	N-O SR 33	-1	-1	-6	-1	-1	-1	-6	-6	-6	na
402.25	1033310	S-O SR 152	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
391.48	10133110	N-O SR 165	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
391.10	1033110	S-O SR 165-Mercy Springs Rd	Med	Med	-2	Med	Med	Med	-2	-2	-2	5.0
385.49	10143910	S-O Ericca Rest Area	-1	-1	-3	-1	Med	-1	-3	-3	-3	1.0

Figure A-4: Evaluation Results – I-5 S District 10

Milepost	VDS		Weekday			Weekend			Time of Day (Weekdays)			Votes
			Spring	Summer	Fall	Spring	Summer	Fall	Fall			
			3/7/2023	7/25/2023	9/19/2022	3/5/2022	7/23/2022	9/25/2022	AM Peak 6-9	Midday 11-14	PM Peak 15-18	
72.91	1204198	S. LUIS REY	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
73.52	1204211	MAGDALENA	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
74.09	1204230	EL CAMINO REAL	Med	-1	Med	-1	-1	-1	Med	Med	Med	4.4
74.73	1204244	PRESIDIO	Med	Med	Med	Med	Med	-2	Med	Med	Med	4.6
75.06	1204255	PALIZADA	-1	-1	-1	-1	-1	Cumul	-1	-1	-1	0.3
75.49	1210908	PICO 1	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
75.82	1204268	PICO 2	Major	Major	Major	Med	Med	Med	Major	Major	Major	8.8
76.28	1204279	HERMOSA 1	Med	Med	Med	-1	-1	-1	Med	Med	Med	3.8
76.36	1213215	HERMOSA 2	-1	-1	-1	-2	-2	-2	-1	-1	-1	0.0
76.96	1221232	S OF VAQUERO	Med	Med	Med	Med	-3	-3	Med	Med	Med	4.2
77.66	1204301	N OF VAQUERO	-1	-1	-1	-1	-4	-4	-1	-1	-1	0.0
77.99	1204316	ESTRELLA1	-2	-2	-2	-2	Cumul Abs	Cumul Abs	-2	-2	-2	0.2
78.15	1204328	ESTRELLA2	Med	Cumul Abs	Med	Med	Med	-1	Med	Med	Med	4.3
78.73	1204340	SACRAMENTO	-1	-1	-1	-1	-1	-2	-1	-1	-1	na
79.17	1204372	LAS RAMBLES	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
79.72	1204384	CAPISTRANO	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
80.25	1204395	AEROPUERTO	Med	Med	Med	Major	Major	Med	Med	Med	Med	5.8
80.90	1204409	S JUAN CREEK	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
81.41	1210926	PLAZA	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
81.93	1220030	ORTEGA 1	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
81.95	1204422	ORTEGA 2	Med	-3	Med	Major	-3	Med	Med	Med	Med	4.6
82.36	1210974	EL HORNO	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
82.66	1210991	SERRA PARK	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
83.31	1204436	JUNIPERO SERRA	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
83.63	1204447	TRABUCO	Med	-2	Med	-2	-2	Med	Med	Med	Med	5.0
84.17	1204453	WILDWOOD	-1	Med	-1	-3	Med	-1	-1	-1	-1	0.9
84.52	1211107	S OF 73	Med	Med	Med	-4	Med	Med	Med	Med	Med	5.0
84.81	1222006	MVDS at Avery 1	-1	-1	-1	-5	-1	-1	-1	-1	-1	na
85.31	1221985	MVDS at AVERY	-2	-2	-2	-6	-2	-2	-2	-2	-2	na
85.31	1204472	AVERY PARK	-3	-3	-3	-7	-3	-3	-3	-3	-3	na
85.96	1204486	MVDS S-O Crown Va	-4	-4	-4	-8	-4	-4	-4	-4	-4	na
85.96	1222018	CROWN VA1	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
86.13	1204501	CROWN VA2	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
86.14	1222023	MVDS Crown Valley 2	Med	Major	Med	-2	Major	Major	Med	Med	Med	6.4
86.72	1213570	FAIRCOURT	Major	-1	Major	-3	-1	Major	Major	Major	Major	10.0
87.39	1204515	OSO PARK1	Med	-2	Med	-4	-2	-1	Med	Med	Med	4.4
87.42	1221811	OSO 1	Major	Med	Major	Med	Med	Major	Major	Major	Major	8.8
87.61	1204532	OSO PARK2	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
87.65	1221803	OSO 2	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
88.06	1213700	CERVANTES	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
88.73	1221835	LA PAZ 1	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
88.77	1204546	LA PAZ 1	-3	-3	-3	-3	-3	-3	-3	-3	-3	na
88.95	1204559	LA PAZ 2	-4	-4	-4	-4	-4	-4	-4	-4	-4	na
89.03	1221843	LA PAZ 2	Major	Major	Major	-5	Major	Major	Major	Major	Major	10.0
89.69	1204571	ALICIA 1	-1	-1	-1	-6	-1	-1	-1	-1	-1	na
89.89	1204586	ALICIA 2	-2	-2	-2	-7	-2	-2	-2	-2	-2	na
90.43	1213527	ANKERTON	-3	-3	-3	-8	-3	-3	-3	-3	-3	na
90.87	1204615	EL TORO 1	-4	-4	-4	-9	-4	-4	-4	-4	-4	na
91.08	1204632	EL TORO 2	-5	-5	-5	-10	-5	-5	-5	-5	-5	na
91.59	1204638	RED ROBIN	-6	-6	-6	-11	-6	-6	-6	-6	-6	na
92.26	1204672	LAKE FOR2	Major	-7	Major	-12	-7	Major	Major	Major	Major	10.0
92.50	1204682	OLDFIELD	-1	Major	-1	Major	Major	-1	-1	-1	-1	2.5
92.85	1204697	BAKE 1	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
93.20	1204699	BAKE 2	Major	Topo	Major	Major	Topo	Topo	Major	Major	Major	10.0
93.51	1204703	At 405	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
94.36	1204731	ALTON 2	Major	-1	Major	-1	-1	Major	Major	Major	Major	10.0
94.46	1204750	ALTON 3	-1	Major	-1	Major	Major	-1	-1	-1	-1	10.0
95.01	1204766	BARRANCA	Major	Med	Major	Med	Med	Topo	Major	Major	Major	8.8
95.31	1204787	S OF 133	Med	Topo	Med	Med	Topo	Topo	Med	Med	Med	6.3
95.46	1204808	N OF 133	Topo	Topo	Topo	Med	Topo	Topo	Topo	Topo	Topo	9.6
95.76	1204825	S OF SAND CNYN	Major	-1	Major	Major	Med	Med	Major	Major	Major	9.1
95.95	1220011	SAND CANYON 1	-1	-2	-1	Med	Med	Med	-1	-1	-1	3.8
96.31	1204861	SAND CANYON 2	Med	-3	Med	-1	-1	-1	Med	Med	Med	3.3
96.76	1204878	N OF SAND CNYN	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
97.34	1204924	JEFFREY 1	Med	Med	Med	-1	-1	Med	Med	Med	Med	4.2
97.41	1204937	JEFFREY 2	-1	-1	-1	-2	-2	-1	-1	-1	-1	0.0
98.06	1204950	YALE	-2	-2	-2	-3	-3	-2	-2	-2	-2	0.0
98.82	1204982	CULVER 1	-3	-3	-3	-4	-4	-3	-3	-3	-3	na
99.07	1205012	CULVER 2	-4	-4	-4	Med	-5	Med	-4	-4	-4	1.0
99.80	1205045	JAMBOREE 1	-5	-5	-5	-1	-6	-1	-5	-5	-5	na
99.81	1205071	JAMBOREE 2	-6	-6	-6	-2	-7	-2	-6	-6	-6	na
100.35	1205088	TUSTIN RANCH	Med	Med	Med	-3	Med	Med	Med	Med	Med	5.0
101.49	1205135	RED HILL	-1	-1	-1	-4	-1	Med	-1	-1	-1	0.4
102.04	1205152	NEWPORT*	Topo	Topo	Topo	Med	Med	Med	Topo	Topo	Topo	8.8
102.25	1205157	B ST.	Topo	Topo	Topo	Med	Topo	Med	Topo	Topo	Topo	9.2
102.45	1205165	S OF 55	Med	Med	Med	Major	Med	Med	Med	Med	Med	5.4
102.65	1205168	N OF 55	Topo	Major	Topo	Topo	Major	Topo	Topo	Topo	Topo	10.0
103.05	1205175	1ST	-1	Major	-1	Med	Major	-1	-1	-1	-1	8.3
103.48	1205193	4TH	-2	-1	-2	Major	-1	-2	-2	-2	-2	10.0
103.65	1205204	CONCORD	-3	Med	-3	-1	Med	-3	-3	-3	-3	5.0
103.85	1205215	GRAND 1	-4	-1	-4	Major	-1	-4	-4	-4	-4	3.3
103.98	1205225	GRAND 2	-5	-2	-5	Major	-2	-5	-5	-5	-5	10.0
104.75	1205262	17TH 2	Major	-3	Major	Major	-3	Med	Major	Major	Major	7.9
104.85	1205269	17TH 3	-1	-4	-1	-1	-4	-1	-1	-1	-1	na
105.45	1205290	MAIN 2	-2	-5	-2	-2	-5	-2	-2	-2	-2	na
106.05	1205303	S OF 22	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
106.45	1205320	LA VETA	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
106.55	1205330	N OF 57	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
107.25	1205375	CHAPMAN 2	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
107.35	1205341	STATE COLLEGE	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
107.85	1205380	GENE AUTRY	Med	Topo	Med	Topo	Med	Med	Med	Med	Med	5.8
108.65	1212001	ORANGEWOOD 2	Major	Med	Major	Med	Major	Major	Major	Major	Major	9.2
108.73	1205409	KATELLA	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
108.85	1212115	ANAHEIM 2	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
109.25	1212216	S OF HARBOR	Med	Med	Med	Med	-1	-1	Med	Med	Med	4.2
109.63	1205432	HARBOR	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
109.95	1205452	BALL	-1	-1	-1	-1	Med	-1	-1	-1	-1	0.5
110.35	1205473	SOUTH 2	-2	Med	-2	Med	-1	-2	-2	-2	Cumul	1.3
111.15	1205493	LINCOLN	Cumul Abs	-1	Cumul Abs	-1	-2	Cumul Abs	Cumul Abs	Cumul Abs	-1	0.6
111.55	1212649	EUCLID 1	-1	-2	-1	-2	-3	-1	-1	-1	-2	0.0
111.85	1205517	EUCLID 2	Med	Med	Med	Major	Med	Med	Med	Med	Med	5.4
112.29	1205528	CRESCENT	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
112.75	1212588	BROOKHURST 1	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
112.95	1205553	BROOKHURST 2	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
113.23	1205562	LA PALMA	-2	Med	-2	-2	-2	-2	-2	-2	-2	0.4
113.59	1205567	GILBERT	Med	Med	Med	Major	Med	Major	Med	Med	Med	5.8
114.05	1205590	MAGNOLIA	Med	Med	Med	Major	Major	Major	Med	Med	Med	6.3
114.15	1214005	N OF MAGNOLIA	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
114.77	1205607	ORANGETHORPE 2	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
114.95	1216505	N OF ORANGETHORPE	Med	Topo	Med	Med	Med	Med	Med	Med	Med	5.4
115.26	1205623	STANTON	Med	Med	Med	Major	Med	Med	Med	Med	Med	5.4
115.53	1205636	BEACH 1	Med	Med	Med	Major	Major	Major	Med	Med	Med	6.3
115.85	1205658	BEACH 2	-1	-1	-1	Major	-1	-1	-1	-1	-1	10.0
116.15	1216538	Western	-2	Med	-2	-1	Major	-2	-2	-2	-2	5.0
116.60	1205680	ARTESIA 2	-3	Major	-3	-2	-1	-3	-3	-3	-3	10.0

Figure A-5: Evaluation Results – I-5 N District 12

Milepost	VDS	Location	Weekday Spring 3/7/2023	Weekday Summer 7/25/2023	Weekday Fall 9/19/2022	Weekend Spring 3/5/2022	Weekend Summer 7/23/2022	Weekend Fall 9/24/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Votes
72.91	1204198	S. LUIS REY	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
73.52	1204211	MAGDALENA	Med	Major	-1	Med	Med	-1	-1	-1	-1	6.3
74.09	1204230	EL CAMINO REAL	-1	Med	-2	Med	Med	-2	-2	-2	-2	1.3
74.73	1204244	PRESIDIO	Med	-1	-3	Med	-1	-3	-3	-3	-3	0.8
75.06	1204255	PALIZADA	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
75.49	1210908	PICO 1	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
75.82	1204268	PICO 2	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
76.28	1204279	HERMOSA 1	Med	Med	Med	Topo	Topo	Topo	Med	Med	Med	6.3
76.36	1213215	HERMOSA 2	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
76.96	1221232	S OF VAQUERO	Med	Major	Major	Major	Major	Major	Major	Major	Major	9.6
77.66	1204301	N OF VAQUERO	Med	Med	Med	Med	Major	Major	Med	Med	Med	5.8
77.99	1204316	ESTRELLA1	-1	-1	-1	Med	Med	Med	-1	-1	-1	1.3
78.15	1204328	ESTRELLA2	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
78.73	1204340	SACRAMENTO	Med	-1	-1	Med	-1	-1	-1	-1	-1	0.8
79.17	1204372	LAS RAMBLES	Med	-2	Med	-1	-2	-2	Med	Med	Med	4.0
79.72	1204384	CAPISTRANO	Med	-3	Med	Med	-3	Med	Med	Med	Med	4.2
80.25	1204395	AEROPUERTO	-1	-4	-1	-1	Med	-1	-1	-1	-1	0.4
80.90	1204409	S JUAN CREEK	-2	-5	-2	-2	-1	-2	-2	-2	-2	0.0
81.41	1210926	PLAZA	-3	-6	-3	-3	-2	-3	-3	-3	-3	0.0
81.93	1220030	ORTEGA 1	Major	Cumul Abs	-4	Major	-3	Med	-4	-4	-4	2.2
81.95	1204422	ORTEGA 2	Med	Topo	Topo	Major	Med	Topo	Topo	Topo	Topo	9.2
82.36	1210974	EL HORNO	Topo	Topo	Med	Topo	Topo	Topo	Med	Med	Med	7.1
82.66	1210991	SERRA PARK	Topo	Med	Med	Med	Med	Med	Med	Med	Med	5.4
83.31	1204436	JUNIPERO SERRA	Major	Major	Med	Major	Med	Med	Med	Med	Med	6.3
83.63	1204447	TRABUCO	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
84.17	1204453	WILDWOOD	Topo	Med	Med	Topo	Med	Med	Med	Med	Med	5.8
84.52	1211107	S OF 73	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
84.81	1222006	MVDS at Avery 1	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
85.31	1221985	MVDS at AVERY	Topo	Topo	Major	Topo	Topo	Major	Major	Major	Major	10.0
85.31	1204472	AVERY PARK	Med	Med	Major	Med	Med	Major	Major	Major	Major	8.3
85.96	1204486	MVDS S-O Crown Va	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
85.96	1222018	CROWN VA1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
86.13	1204501	CROWN VA2	Major	Major	Major	Med	Med	Med	Major	Major	Major	8.8
86.14	1222023	MVDS Crown Valley 2	Major	Major	Major	Major	Major	-1	Major	Major	Major	10.0
86.72	1213570	FAIRCOURT	Med	-1	-1	-1	-1	-2	-1	-1	-1	1.3
87.39	1204515	OSO PARK1	-1	Med	-2	Med	-2	-3	-2	-2	-2	2.5
87.42	1221811	OSO 1	-2	-1	-3	-1	-3	-4	-3	-3	-3	0.0
87.61	1204532	OSO PARK2	-3	-2	-4	-2	-4	-5	-4	-4	-4	0.0
87.65	1221803	OSO 2	-4	-3	-5	-3	-5	-6	-5	-5	-5	0.0
88.06	1213700	CERVANTES	Major	Major	Topo	Major	Major	Topo	Topo	Topo	Topo	10.0
88.73	1221835	LA PAZ 1	Topo	Topo	Major	Med	Topo	Major	Major	Major	Major	9.6
88.77	1204546	LA PAZ 1	Med	Med	Med	Med	Med	Topo	Med	Med	Med	5.4
88.95	1204559	LA PAZ 2	Major	Major	Major	Major	Major	Topo	Major	Major	Major	10.0
89.03	1221843	LA PAZ 2	-1	-1	-1	-1	-1	Major	-1	-1	-1	0.8
89.69	1204571	ALICIA 1	-2	-2	-2	-2	-2	-1	-2	-2	-2	0.0
89.89	1204586	ALICIA 2	-3	-3	-3	-3	-3	-2	-3	-3	-3	na
90.43	1213527	ANKERTON	Med	-4	Med	Med	-4	Major	Med	Med	Med	5.5
90.87	1204615	EL TORO 1	-1	-5	-1	-1	-5	-1	-1	-1	-1	na
91.08	1204632	EL TORO 2	-2	-6	-2	-2	-6	-2	-2	-2	-2	na
91.59	1204638	RED ROBIN	Med	Med	Med	Med	Major	Major	Med	Med	Med	5.8
92.26	1204672	LAKE FOR2	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
92.50	1204682	OLDFIELD	-2	-2	-2	-2	-2	Med	-2	-2	-2	0.4
92.85	1204697	BAKE 1	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
93.20	1204699	BAKE 2	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
93.51	1204703	At 405	Major	-2	Major	Med	Med	Major	Major	Major	Major	9.1
94.36	1204731	ALTON 2	Major	Topo	Major	Med	Med	Med	Major	Major	Major	8.8
94.46	1204750	ALTON 3	Med	Topo	Med	Med	Topo	Topo	Med	Med	Med	6.3
95.01	1204766	BARRANCA	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
95.31	1204787	S OF 133	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
95.46	1204808	N OF 133	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
95.76	1204825	S OF SAND CNYN	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
95.95	1220011	SAND CANYON 1	Topo	Major	Major	Topo	Major	Major	Major	Major	Major	10.0
96.31	1204861	SAND CANYON 2	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
96.76	1204878	N OF SAND CNYN	Major	-1	-1	Major	-1	-1	-1	-1	-1	1.7
97.34	1204924	JEFFREY 1	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
97.41	1204937	JEFFREY 2	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
98.06	1204950	YALE	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
98.82	1204982	CULVER 1	-3	-3	-3	-3	-3	-3	-3	-3	-3	na
99.07	1205012	CULVER 2	Med	Major	-4	Med	Major	-4	-4	-4	-4	7.5
99.80	1205045	JAMBOREE 1	-1	-1	-5	-1	-1	-5	-5	-5	-5	na
99.81	1205071	JAMBOREE 2	-2	-2	-6	-2	-2	-6	-6	-6	-6	na
100.35	1205088	TUSTIN RANCH	Med	-3	-7	Med	-3	-7	-7	-7	-7	5.0
101.49	1205135	RED HILL	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
102.04	1205152	NEWPORT*	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
102.25	1205157	B ST.	-2	Med	-2	-2	Major	-2	-2	-2	-2	1.3
102.45	1205165	S OF 55	-3	-1	-3	-3	-1	-3	-3	-3	-3	na
102.65	1205168	N OF 55	-4	Med	Med	-4	Med	Major	Med	Med	Med	5.5
103.05	1205175	1ST	-5	-1	-1	-5	-1	-1	-1	-1	-1	na
103.48	1205193	4TH	-6	-2	Med	-6	-2	Major	Med	Med	Med	5.6
103.65	1205204	CONCORD	-7	-3	-1	-7	-3	-1	-1	-1	-1	na
103.85	1205215	GRAND 1	Med	Med	Med	-8	Major	-2	Med	Med	Med	4.6
103.98	1205225	GRAND 2	-1	-1	-1	-9	-1	-3	-1	-1	-1	na
104.75	1205262	17TH 2	-2	-2	-2	-10	-2	-4	-2	-2	-2	na
104.85	1205269	17TH 3	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
105.45	1205290	MAIN 2	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
106.05	1205303	S OF 22	-2	Med	Med	-2	Med	Med	Med	Med	Med	5.0
106.45	1205320	LA VETA	-3	-1	-1	-3	-1	-1	-1	-1	-1	na
106.55	1205330	N OF 57	Major	-2	Med	-4	-2	-2	Med	Med	Med	5.6
107.25	1205375	CHAPMAN 2	-1	-3	-1	-5	-3	-3	-1	-1	-1	na
107.35	1205341	STATE COLLEGE	-2	Major	Major	-6	Major	Major	Major	Major	Major	10.0
107.85	1205380	GENE AUTRY	-3	-1	-1	-7	-1	-1	-1	-1	-1	0.0
108.65	1212001	ORANGEWOOD 2	Med	Major	Major	-8	Major	Major	Major	Major	Major	8.8
108.73	1205409	KATELLA	-1	Major	Major	-9	Major	Major	Major	Major	Major	10.0
108.85	1212115	ANAHEIM 2	Major	Med	Med	Major	Med	Med	Med	Med	Med	5.8
109.25	1212216	S OF HARBOR	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
109.63	1205432	HARBOR	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
109.95	1205452	BALL	Med	-2	-2	Med	Med	Med	-2	-2	-2	1.7
110.35	1205473	SOUTH 2	Major	Med	Major	Med	Med	Med	Major	Major	Major	8.3
111.15	1205493	LINCOLN	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
111.55	1212649	EUCLID 1	-1	-1	-1	-1	-1	Med	-1	-1	-1	0.4
111.85	1205517	EUCLID 2	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
112.29	1205528	CRESCENT	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
112.75	1212588	BROOKHURST 1	Med	Major	Med	Major	Major	Major	Med	Med	Med	6.7
112.95	1205553	BROOKHURST 2	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
113.23	1205562	LA PALMA	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
113.59	1205567	GILBERT	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
114.05	1205590	MAGNOLIA	Major	Med	Med	Med	Med	Med	Med	Med	Med	5.4
114.15	1214005	N OF MAGNOLIA	Med	Med	Med	Med	-1	Med	Med	Med	Med	4.6
114.77	1205607	ORANGETHORPE 2	-1	-1	-1	-1	-2	-1	-1	-1	-1	0.0
114.95	1216505	N OF ORANGETHORPE	-2	-2	-2	Major	Major	Major	-2	-2	-2	10.0
115.26	1205623	STANTON	Major	Major	Major	Med	Med	Med	Major	Major	Major	8.8
115.53	1205636	BEACH 1	Med	Med	-1	Med	Med	-1	-1	-1	-1	5.0
115.85	1205658	BEACH 2	-1	-1	-2	-1	-1	-2	-2	-2	-2	0.0
116.15	1216538	Western	-2	-2	Major	-2	-2	Med	Major	Major	Major	6.3
116.60	1205680	ARTESIA 2	-3	Med	-1	-3	Med	-1	-1	-1	-1	5.0

Figure A-6: Evaluation Results – I-5 S District 12

Milepost	VDS	Location	Weekday			Weekend			Time of Day (Weekdays)			Votes
			Spring 3/21/2023	Summer 7/18/2023	Fall 9/19/2022	Spring 3/12/2022	Summer 7/16/2022	Fall 9/24/2022	Fall AM Peak 6-9	Fall Midday 11-14	Fall PM Peak 15-18	
			Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	
1.69	1014510	**W/O Mtn House Pkwy OC**	-1	-1	-1	-1	-1	-1	-1	-1	-1	10.0
2.23	1013410	**W/O Mtn House Pkwy OC**	Med	Med	Med	-2	-2	-2	Med	-2	-2	0.0
2.42	10113310	**E/O Mountain House Pkwy OC**	Major	-1	Major	-3	-3	-3	Med	Major	Major	2.1
2.90	1025110	**E/O Mountain House Pkwy**	-1	-2	-1	-4	-4	-4	-1	-1	-1	8.8
3.31	404583		Major	Med	Major	Med	Med	Med	Med	Med	Major	na
3.80	10122410	W/O 11th St	Med	Med	Med	Med	Med	Med	Med	Med	Med	6.7
6.18	1025310	E/O Grant Line UC	Major	-1	-1	Major	-1	Med	-1	-1	-1	5.0
6.80	10121910	W/O Corral Hollow Rd	-1	Major	Major	-1	Major	Med	Major	Major	Major	8.3
7.47	10121810	W/O Tracy Blvd	Med	Med	Med	-2	Med	-1	-1	-1	Med	7.9
7.90	1025510	W/O Tracy Blvd UC	Major	Major	Major	Major	Major	Major	Major	Major	Major	2.5
7.90	10122010		Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
9.13	1025710	**W/O Mac Arthur Drive UC**	Med	-1	Major	Med	-1	Med	Major	Major	Major	10.0
9.44	1010010	**MacArthur Dr**	-1	Med	Med	-1	-2	Med	Med	-1	-1	8.5
10.22	1025810	W/O Paradise Rd OC	-2	Major	Major	-2	Med	Med	Major	Med	Major	2.1
11.41	1025910	El Rancho Rd UC	-3	-1	-1	-3	-1	-1	-1	-1	-1	8.0
12.16	1026010	W/O Banta OH	-4	Major	Major	-4	Med	Med	Major	Med	Major	0.0
12.87	1059310	E/O Tom Paine Slough										6.7

Figure A-7: Evaluation Results – I-205 E

Milepost	VDS	Location	Weekday			Weekend			Time of Day (Weekdays)			Votes
			Spring 3/21/2023	Summer 7/18/2023	Fall 9/19/2022	Spring 3/12/2022	Summer 7/16/2022	Fall 9/24/2022	Fall AM Peak 6-9	Fall Midday 11-14	Fall PM Peak 15-18	
			Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	
12.87	10120610	E-O Tom Paine Slough	-1	Major	Major	-1	Med	Med	Major	Med	Major	10.0
12.16	10120510	W-O Banta OH	-2	-1	-1	-2	-1	-1	-1	-1	-1	8.0
11.41	1027310	El Rancho Rd UC	-3	Major	Major	-3	Med	Med	Major	Med	Major	0.0
10.22	1027210	W-O Paradise Rd OC	-4	-1	-1	-4	-1	-1	-1	-1	-1	6.7
9.44	1010110	**MacArthur Dr**	Med	Med	Med	-5	-2	-2	Med	-2	Med	0.0
9.13	1027110	**E-O Mac Arthur Drive UC**	-1	Med	Med	-6	-3	-3	-1	-3	Med	2.9
8.47	1059210	E-O Holly Drive OC	Med	Med	Med	Med	Cumul Abs	Med	Major	Med	Med	1.7
8.05	1026910	E-O Tracy Blvd UC	Major	Major	Major	Major	Major	Major	Major	Major	Major	5.5
7.90	10122110		Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
7.47	1026810	W-O Tracy Blvd	-1	-1	-1	-1	-1	-1	-1	-1	-1	10.0
6.80	1072810	W-O Corral Hollow Rd	Major	Med	Major	Major	Major	Major	Major	Major	Major	0.0
6.18	1026710	W-O On Ramp from Naglee Rd	Med	Med	Med	Med	Med	Med	-1	Med	-1	9.6
3.80	10122210	W-O 11th St	Major	-1	-1	Major	-1	-1	-2	-1	-2	3.3
3.31	405692	E of Hansen Rd	-1	Major	Major	-1	Major	Major	Major	Major	Major	10.0
2.90	10122610	**E-O Mountain House Pkwy**	Major	Major	Major	Med	Med	Med	Major	Major	Major	8.3
2.11	1013510	**W-O Mtn House Pkwy OC**	Med	Med	Major	-1	-1	-1	Major	-1	-1	8.8
1.69	1014610	**W-O Mtn House Pkwy OC**										3.3

Figure A-8: Evaluation Results – I-205 W

			Weekday			Weekend			Time of Day (Weekdays)			
			Spring	Summer	Fall	Spring	Summer	Fall	Fall			
			3/14/2023	7/18/2023	9/26/2022	3/12/2022	7/16/2022	9/24/2022	AM Peak 6-9	Midday 11-14	PM Peak 15-18	Votes
Postmile (	VDS	Location										
0.18	401403	US 101 IC (McLaughlin Ave)	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
0.48	401655	McLaughlin Ave rm-n-loop/diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
0.56	401808	oppo McLaughlin Ave off-s-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
1.29	403402	oppo S 11th St rm-s-diag	Major	Major	Med	Med	Major	Med	Med	Med	Med	6.3
1.59	400799	10TH ST	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
1.85	400953	4TH ST/REED ST	-1	Med	Med	-1	Med	Med	Med	Med	Med	5.0
2.05	401810	N of 1st St	-2	-1	-1	-2	-1	-1	-1	-1	-1	na
2.32	413878	Almaden Blvd rm-n-diag	Major	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
2.77	414284	NB 87/SB 87 rm-n-fly/diag	Med	Major	Major	Med	Major	Major	Major	Major	Major	9.2
2.85	401942	BIRD AVE	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
2.97	413877	Bird Ave rm-n-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
3.91	414694	Meridian Ave rm-n-loop	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
4.47	401167	Leigh Ave OC	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
4.54	405701	Menker Ave rm-n-slip	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
5.33	407710	17/880 IC	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
6.08	401400	Bascom & Leland	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
6.14	400714	Winchester Blvd rm-n-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
7.47	400414	Saratoga Ave rm-n-diag	Major	-1	-1	Major	-1	-1	-1	-1	-1	10.0
9.01	400560	Stevens Creek Blvd rm-n-diag	Med	Major	Major	Med	Major	Major	Major	Major	Major	9.2
9.80	400499	WOLFE RD	Med	Major	Major	Major	Major	Major	Major	Major	Major	9.6
10.91	419057	De Anza Blvd rm-n-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
12.39	401845	SB 280 / NB 85 & NB 280 / SB85	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
14.28	400726	200' N of St. Joseph Ave	-1	Major	Major	-1	Major	#VALUE!	Major	Major	Major	10.0
28.04	403318	3000' S of Canada rd oc	-2	Major	Major	-2	Major	Major	Major	Major	Major	10.0
33.27	400319	SR 92	-3	-1	-1	-3	-1	#VALUE!	-1	-1	-1	na
37.56	403320	3000' N of Hayne rd oc	Major	Med	Med	Major	Med	Med	Med	Med	Med	5.8
41.16	403323	Larkspur ave on-n-diag	-1	-1	-1	-1	-1	#VALUE!	-1	-1	-1	na
43.73	400276	Sneath Ln rm-n-diag/loop	Major	Major	Topo	Major	Major	#VALUE!	Topo	Topo	Topo	10.0
44.49	401213	Avalon Dr off-n-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
45.12	401016	Westborough Blvd. rm-n-loop	-1	-1	-1	-1	-1	#VALUE!	-1	-1	-1	0.0
45.50	400028	Westborough Blvd	-2	-2	-2	-2	-2	#VALUE!	-2	-2	-2	na
46.42	403327	oppo Hickey blvd off-n-diag	Med	Med	Med	Med	Med	Major	Med	Med	Med	5.4
46.67	400703	Hickey Blvd. rm-n-loop	-1	Major	Major	-1	Major	#VALUE!	Major	Major	Major	10.0
47.29	400338	Serramonte Blvd rm-n-diag	Med	-1	-1	Med	-1	#VALUE!	-1	-1	-1	5.0
50.78	404617	Sickles Ave UC	Med	Major	Major	Med	Major	#VALUE!	Major	Major	Major	9.1
51.48	404618	1000' S of San Jose Ave OC	-1	-1	-1	-1	-1	#VALUE!	-1	-1	-1	na
52.01	400156	Havelock St	-2	-2	-2	-2	-2	#VALUE!	-2	-2	-2	na
52.60	400676	S of Monterey Blvd	Major	Med	Med	Major	Med	#VALUE!	Med	Med	Med	5.9
53.07	401486	Mission St OC	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
53.43	400575	S of St. Mary's POC	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
53.83	400322	oppo Alemany Blvd	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
56.48	400573	18 TH ST / PENNSYLVANIA	-2	-2	-2	-2	-2	-2	-2	-2	-2	na

Figure A-9: Evaluation Results – I-280 N

Abs PM	VDS	Location	Weekday Spring 3/14/2023	Weekday Summer 7/18/2023	Weekday Fall 9/26/2022	Weekend Spring 3/12/2022	Weekend Summer 7/16/2022	Weekend Fall 9/24/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Votes
56.49	400231	18th St / Pennsylvania	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
53.84	401018	Alemany Blvd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
53.43	400552	oppo S of St. Mary's POC	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
53.08	401470	MISSION ST OC	-1	Major	-1	-1	Major	Major	-1	-1	-1	10.0
52.61	400318	SOUTH OF MONTEREY	-2	-1	-2	-2	-1	-1	-2	-2	-2	na
52.02	400397	HAVELOCK ST	-3	-2	-3	-3	-2	-2	-3	-3	-3	na
51.62	400746	Geneva Ave on-s-diag	-4	-3	-4	-4	-3	-3	-4	-4	-4	na
51.49	404648	oppo 1000' S of San Jose Ave	-5	-4	-5	-5	-4	-4	-5	-5	-5	na
50.79	404647	oppo Sickles Ave UC	Med	Major	Med	Med	Major	Major	Med	Med	Med	6.3
49.55	403902	John Daly Blvd rm-s-diag	Major	Major	Major	Major	Major	#VALUE!	Major	Major	Major	10.0
47.80	401512	Sullivan Ave rm-s-diag	Major	Major	Major	Major	Major	#VALUE!	Major	Major	Major	10.0
47.64	403910	NB 1 rm-s-diag	Topo	Topo	Topo	Topo	Topo	#VALUE!	Topo	Topo	Topo	10.0
46.65	403908	Hickey Blvd rm-s-diag	Med	Med	Med	Med	Med	#VALUE!	Med	Med	Med	5.0
46.42	403328	oppo Hickey blvd off-n-diag	Major	Med	Med	Major	Med	#VALUE!	Med	Med	Med	5.9
45.12	403906	Westborough Blvd rm-s-diag	Major	Med	Med	Major	Med	#VALUE!	Med	Med	Med	5.9
44.50	403904	Avalon Dr rm-s-diag	Major	-1	Med	Major	-1	Med	Med	Med	Med	6.0
41.16	403324	Larkspur ave on-n-diag	-1	-2	-1	-1	-2	#VALUE!	-1	-1	-1	na
37.56	403321	3000' N of Hayne rd oc	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
33.33	400350	SR 92	-1	-1	-1	-1	-1	#VALUE!	-1	-1	-1	na
28.04	403319	3000' S of Canada rd oc	Med	Med	Med	Med	Med	Major	Med	Med	Med	5.4
14.28	400807	200' N OF ST JOSEPH AVE	Major	-1	Major	Major	-1	Med	Major	Major	Major	9.5
12.39	401846	SB 280/NB 85 & NB 280/SB85	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
11.84	404640	SB & NB 85	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
10.69	400823	De Anza Blvd rm-s-diag	Med	Major	Med	Med	Major	Med	Med	Med	Med	5.8
9.69	400673	Wolfe Rd rm-s-loop	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
9.60	400084	Wolfe Rd rm-s-loop	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
8.36	400429	LAWRENCE EXPWY	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
7.16	400292	Saratoga ave rm-s-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
6.08	401388	BASCOM & LELAND	Med	Med	-1	Med	Med	-1	-1	-1	-1	5.0
5.48	407711	17/880 IC	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
4.47	401163	LEIGH AVE OC	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
4.38	403419	Menker Ave rm-s-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
3.97	401327	400' S OF MERIDIAN AVE	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
3.92	403414	Southwest Expwy/Meridian Ave	Med	Topo	Topo	Major	Topo	Topo	Topo	Topo	Topo	9.6
2.97	402067	oppo Bird Ave off-n-diag	Major	Med	Med	Major	Med	Topo	Med	Med	Med	6.3
2.85	401943	Bird Ave	Topo	Med	Topo	Topo	Med	Med	Topo	Topo	Topo	8.8
2.84	403412	Bird Ave rm-s-diag	Med	Topo	Med	Med	Topo	Topo	Med	Med	Med	6.3
2.44	403409	NB 87/SB 87 rm-s-	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
2.05	401811	N OF 1ST STREET	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
2.01	403406	S 1st St rm-s-loop	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
1.52	403404	S 7th St rm-s-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
1.29	403401	S 11th St rm-s-diag	-2	-2	Med	-2	-2	-2	Med	Med	Med	2.9
0.56	401809	McLaughlin Ave off-s-diag	-3	-3	-1	-3	-3	-3	-1	-1	-1	na
0.18	401391	US 101 IC (McLaughlin Ave)	-4	-4	-2	-4	-4	-4	-2	-2	-2	na

Figure A-10: Evaluation Results – I-280 S

Milepost	VDS		Weekday Spring 3/14/2023	Weekday Summer 7/18/2023	Weekday Fall 9/18/2022	Weekend Spring 3/12/2022	Weekend Summer 7/16/2022	Weekend Fall 9/17/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Votes
0.24	407172	S. King Rd off-n-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
0.27	407173	S. King Rd off-n-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
0.47	407165	S. King Rd rm-n-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
1.05	407167	Jackson Ave off-n-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
1.41	407170	E. Capitol Expwy rm-n-loop	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
1.65	407176	Alum Rock Rd rm-n-loop	Major	Topo	Major	Major	Topo	Topo	Major	Major	Major	10.0
1.78	407177	Alum Rock Rd rm-n-diag	Med	Major	Med	Major	Med	Med	Major	Med	Med	6.7
2.43	407179	McKee Rd rm-n-diag	Topo	Med	Topo	Topo	Med	Med	Topo	Topo	Topo	8.8
2.80	407180	N of McKee Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
3.41	407181	oppo S of Berryessa Rd	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
3.93	407157	Berryessa Rd rm-n-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
4.48	407155	Hotstteter Rd rm-s-loop-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
5.01	407153	oppo N Capitol Ave rm-s-diag	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
5.21	407174	N Capitol Ave rm-n-diag	Major	-3	Major	Med	-3	-3	-3	Major	Major	5.4
5.70	407161	N of N Capitol Ave	-1	-4	-1	-1	-4	-4	-4	-1	-1	na
6.29	407152	Landess Ave rm-n-diag	Major	Major	Major	Major	Major	Major	Major	Major	Med	9.2
6.62	407151	oppo N of Landess Ave	-1	Major	-1	-1	Med	Major	-1	-1	-1	8.3
7.09	407150	oppo S of Wrigley Way	Major	-1	Major	Major	-1	-1	Med	Major	Major	6.7
7.57	407148	Calaveras Rd on-n-loop	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
7.89	407163	Calaveras Rd rm-n-diag	Topo	Topo	Topo	Med	Topo	Topo	Topo	Topo	Topo	9.6
8.54	407162	Jacklin Rd rm-n-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
8.72	403244	1200' N of Jacklin Rd	Major	-2	Major	Med	-2	Med	Med	Major	Major	7.3
9.60	400870	SB Dixon Rd	-1	-3	-1	-1	-3	Med	-1	-1	-1	0.4
9.95	411716	Scott Creek Rd rm-s-diag	-2	-4	-2	-2	-4	-1	-2	-2	-2	na
10.28	400232	Scott Creek Rd rm-n-diag	-3	-5	-3	-3	-5	-2	-3	-3	-3	na
10.51	403246	1700' N of Scott Creek Rd	-4	Med	-4	-4	Med	-3	-4	-4	-4	5.0
11.41	401583	125' N of DWR u-c	-5	-1	-5	-5	-1	-4	-5	-5	-5	na
11.86	403250	200' S of E Warren Ave UC	-6	Major	-6	-6	Med	-5	-6	-6	-6	7.5
12.21	403257	Mission Blvd on-n-loop	-7	-1	-7	-7	-1	-6	-7	-7	-7	na
12.41	400376	Mission Blvd rm-n-coll	-8	-2	-8	-8	-2	-7	-8	-8	-8	na
13.95	413980	Auto Mall Pkwy rm-n-loop	Major	Major	Major	Major	Major	-8	Major	Med	-9	7.3
13.98	402794	oppo N of Auto Mall Pkwy	-1	-1	-1	-1	-1	-9	-1	-1	-10	na
14.30	413983	1800' N of Auto Mall Pkwy	Med	Major	Med	Major	Major	Med	-2	-2	Cumul Abs	3.9
14.80	413984	4500' N of Auto Mall Pkwy	-1	-1	-1	-1	-1	-1	-3	-3	-1	0.0
15.73	413985	Washington Blvd rn-n-diag	Major	-2	Major	Major	-2	-2	-4	Major	Major	5.8
15.94	402796		-1	-3	-1	-1	-3	-3	-5	-1	-1	na
16.30	402799	Mission Blvd rm-n-loop	Major	-4	Major	Major	-4	-4	Med	Major	Major	6.7
17.23	427137	Vargas Rd rm-n-loop	-1	-5	-1	-1	-5	-5	-1	-1	-1	na
19.42	425327	Andrade Rd rm-n-diag	-2	-6	-2	-2	-6	-6	-2	-2	-2	na
22.59	427133	Koopman Rd rm-n-diag	-3	-7	-3	-3	-7	-7	-3	-3	-3	na
23.61	427152	oppo 1.7 mi S of Sunol Blvd	-4	-8	-4	-4	-8	-8	-4	-4	-4	na
24.25	427153	1.0 mi S of Sunol Blvd	-5	-9	-5	-5	-9	-9	-5	-5	-5	na
29.94	401608	EB 580 conn-n-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
30.15	401697	EB 580 rm-n-diag	Major	Major	Major	Med	Med	Med	Major	Med	Major	7.9
30.34	401582	Dublin Blvd rm-n-loop	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
30.54	401587	2500' N of I-580	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
30.84	401594	500' N OF AMADOR VALLEY BLVD	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
31.16	400335	3900' S of Alcosta Blvd	Med	-2	Med	-2	-2	-2	-2	-2	-2	1.1
31.48	400546	2200' S OF ALCOSTA BLVD	-1	Med	-1	Major	Major	Med	-3	-3	-3	7.5
31.50	401434	Alcosta Blvd rm-n-diag	Med	Med	Med	Med	Major	Major	Med	Med	Major	6.7
31.79	401593	Alcosta Blvd. rm-s-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
31.83	401359	2300' N of Alcosta Blvd	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
32.41	401917	S of Pine Valley Rd	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
33.32	401102	oppo 150' N of Montevideo UC	Med	-1	Med	Med	-1	Med	-1	-1	-1	1.7
33.60	400880	2500' S of Bollinger Canyon Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
33.90	400212	2000' S of Bollinger Canyon Rd	Med	Major	Med	Med	Med	Med	Med	Med	Med	5.4
34.15	406906	Bollinger Canyon Rd on-n-loop	Med	Med	Med	-1	-1	-1	-1	-1	Med	2.1
34.36	401487	Bollinger Canyon Rd rm-n-diag	Med	-1	Med	-2	-2	Med	-2	-2	Med	2.1
34.82	401279	2000' of Norris Canyon Rd	Major	Major	Major	Med	Major	Major	Major	Major	Major	9.6
35.17	401955	500' S OF NORRIS CANYON RD	-1	-1	-1	-1	Med	Med	-1	-1	-1	0.8
35.40	401468	oppo Crow Canyon Rd rm-s-diag	-2	Major	-2	-2	Med	Major	-2	-2	-2	8.3
35.58	401441	Crow Canyon rd rm-n-loop	Major	-1	Major	Major	-1	-1	Major	Major	Major	10.0
35.78	400118	Crow Canyon Rd on-n-diag	-1	-2	-1	-1	-2	-2	-1	-1	-1	0.0
36.08	400988	2700' N of Crow Canyon Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
36.39	401107	oppo 1600' S of Greenbrook Dr.	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
37.07	401098	oppo 1800' N of Greenbrook Dr.	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
37.32	401422	oppo 3500' N of Greenbrook Dr.	Med	Med	Med	Med	Med	Major	Med	Major	Med	6.3
37.68	400152	oppo 2100' S Sycamore Valley	Med	Med	Med	Med	Med	Med	Med	Major	Med	5.8
38.24	400972	Sycamore Valley Rd rm-n-diag	-1	-1	-1	-1	-1	Med	-1	-1	-1	5.0
38.67	400090	2000' N OF Sycamore Valley Rd	Med	-2	Med	-2	-2	Major	Med	-2	-2	2.5
38.88	400554	DIABLO RD ON-S-DIAG	-1	-3	-1	-3	-3	-1	-1	Cumul Abs	-3	0.2
38.96	401314	Diablo Rd on-n-diag	-2	Cumul Abs	-2	-4	-4	-2	-2	-1	Cumul Abs	0.3
39.35	400207	1300' S of El Cerro Blvd	-3	-1	-3	-5	-5	-3	-3	-2	-1	na
39.81	401112	EL CERRO BLVD ON-N-DIAG	-4	-2	-4	-6	-6	-4	-4	-3	-2	na
39.99	401104	1000' S OF EL PINTADO RD - S	-5	-3	-5	Cumul Abs	Cumul Abs	-5	-5	-4	-3	0.2
40.18	400712	EL PINTADO WY ON-N-DIAG	-6	-4	-6	-1	-1	-6	-6	-5	-4	0.0
40.47	400450	1500' N OF EL PINTADO RD	-7	Med	-7	-2	-2	-7	-7	-6	-5	2.5
40.68	407463	5000' S of Stone Valley Rd	Cumul Abs	Med	Cumul Abs	-3	Med	-8	-8	-7	-6	1.0
41.28	407462	2500' S of Stone Valley Rd	-1	-1	-1	-4	-1	Cumul Abs	-9	-8	-7	0.1
41.62	401724	Oppo Stone Valley Rd ON-S-Diag	-2	-2	-2	-5	-2	-1	-10	-9	-8	na
41.86	401924	Stone Valley Rd on-n-diag	-3	-3	-3	-6	-3	-2	-11	-10	-9	0.0
42.18	401444	2400' SOUTH OF LIVORNA RD	-4	Med	-4	-7	-4	-3	-12	-11	-10	0.4
42.53	400636	oppo Livorna Rd on-s-diag	-5	-1	-5	-8	Cumul Abs	Cumul Abs	-13	-12	-11	0.7
42.75	400933	Livorna Rd on-n-diag	-6	-2	-6	-9	-1	-1	-14	Cumul Abs	Cumul Abs	0.3
43.07	401373	1000' N of Livorna Rd	Med	Major	Med	Med	Med	Med	Major	Med	-1	5.4
43.31	400785	3300' N of Livorna Rd	Major	Major	Major	Major	Major	Major	Med	Major	Major	9.2
43.54	400150	oppo 3000' S of Rudgear Rd	-1	Major	-1	-1	Major	Major	-1	-1	-1	10.0
43.61	400303	oppo Rudgear Rd on-s-diag	-2	-1	-2	-2	-1	-1	-2	-2	-2	na
44.16	401566	Rudgear Rd rm-n-fly	-3	Major	-3	-3	Med	-2	-3	-3	-3	5.0
44.81	404683	Newell ave	-4	-1	-4	-4	-1	-3	-4	-4	-4	na
44.86	400211	oppo 1700' N of South Main St.	-5	Med	-5	Major	Med	Med	-5	-5	-5	6.3
45.19	400025	NEWELL AVE	Major	Med	Major	Med	Med	Med	Major	Major	Major	8.3
45.59	404694	Olympic Blvd rm-n-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
45.76	400801	Mt Diablo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
46.02	401095	Oakland Blvd & Almond Ave	Major	Major	Major	Major	Major	Major	Topo	Major	Major	10.0
46.38	401542	oppo Ygnacio Valley Rd	Topo	Topo	Topo	Topo	Topo	Major	Topo	Topo	Topo	10.0
46.91	400078	N Main St off-n-loop	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
47.23	400814	N. Main St. rm-n-diag	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
47.54	401407	Between Treat & Main St.	Major	Major	Major	Major	Major	-3	Major	Major	Major	9.2
47.87	407464	Treat Blvd-Geary Rd off-n-diag	-1	-1	-1	-1	-1	-4	-1	-1	-1	na
48.29	404684	Buskirk Ave rm-n-diag	Med	-2	Med	Med	-2	Med	Med	Med	Med	5.0
48.30	404696	Oak Park Rd-Coggins Dr	Med	-3	Med	Med	-3	Med	-1	Med	Med	3.3
48.50	400505	100' N of Oak Park Blvd	-1	-4	-1	-1	-4	Med	-2	-1	-1	5.0
49.01	401762	Contra Costa Blvd	-2	-5	-2	-2	-5	-1	-3	-2	-2	na
49.09	401778	Contra Costa Blvd	Med	Med	Med	Med	Med	Med	-4	Med	Med	4.2
49.33	401770	Monument Blvd rm-n-diag	Major	Major	Major	Major	Major	Major	Med	Major	Major	9.2
49.86	420614	oppo S 242-Monument off gore	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
50.25	420613	oppo SR 242	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
50.51	401742	oppo Willow Pass Rd on-s-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
50.60	400184	WILLOW PASS ON-N-DIAG	Major	Med	Major	Major	Major	Major	Major	Med	-2	7.1
51.05	407452	S of Concord Ave off	-1	-1	-1	-1	-1	-1	-1	-1	-3	na
51.72	407457	Concord Ave rm-n-diag	-2	-2	-2	Med	-2	-2	-2	-2	-4	5.0
51.97	407455	S of Center Ave UC	-3	-3	-3	-1	-3	-3	-3	-3	-5	na
52.18	407456	N of Center Ave UC	-4	-4	-4	-2	-4	-4	-4	-4	-6	na
52.78	401718	EB 4 on-n-loop	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
53.01	405924	WB 4 on-n-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
53.31	401113	2200' N of Hwy 4-N of Blum Ave	Major	Major	Major	Med	Med	Med	Major	Med	Med	7.1
53.57	401780	ARTHUR RD	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
53.90	404687	Pacheco Blvd Off ramp	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
54.67	404690	1900' N of Arthur Rd UC	Med	-3	Med	-3	-3	-3	Med	-3	-3	2.2
55.31	401768	N of Service Rd UC	Major	Major	Major	Major	Major	-4	Major	Med	Med	8.2
55.90	402411	Waterfront rm-n-loop	Med	Med	Med	Med	Med	-5	Med	Med	-1	4.1
56.59	402540	New Benicia Bridge Pier 5	Med	-1	Med	Med	-1	Med	-1	-1	Med	2.5
56.59	402541	New Benicia Bridge Pier 5	-1	-2	-1	-1	-2	-1	-2	-2	-1	0.0
57.30	402151	New Benicia Bridge Pier 7	-2	Med	-2	-2	Med	-2	-3	-3	-2	0.8
57.30	402152	New Benicia Bridge Pier 7	-3	-1	-3	-3	-1	Major	Cumul Abs	Cumul Abs	-3	1.4
57.45	402153	New Benicia Bridge Pier 9	-4	-2	-4	-4	-2	-1	-1	-1	-4	na
57.45	402154	New Benicia Bridge Pier 9	-5	-3	-5	-5	-3	-2	-2	-2	-5	na
57.60	402155	New Benicia Bridge Pier 11	-6	Med	-6	-6	-4	Major	-3	-3	-6	1.3
57.60	402156	New Benicia Bridge Pier 11	Med	Med	Med	Major	Major	Major	Med	Med	Med	6.3
57.75	402157	New Benicia Bridge Pier 13	Major	Major	Major	Major	Major	Major	Major	Med	Med	8.3
57.75	402158	New Benicia Bridge Pier 13	-1	-1	-1	-1	-1	Med	-1	-1	-1	0.4
58.86	407460	oppo Bayshore Rd on-s-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
59.49	400295	Industrial Rd - Park Rd	Major	Major	Major	Major	Major	Major	Major	Major	Med	9.2
59.88	404692	3100' S of Lake Herman Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
61.06	400369	Lake Herman Rd	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
63.09	400287	Parish Rd	-3	-3	-3	-3	-3	-3	-3	-3	-3	na
65.10	401424	Marshview Rd	Med	Med	Med	Major	Major	Major	Major	Major	-4	7.1
67.99	400551	Gold Hill Rd oc	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
69.59	400805	S of Cordelia Rd-Bridgeport Av	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0

Figure A-11: Evaluation Results – I-680 N

			Weekday			Weekend			Time of Day (Weekdays)			
			Spring	Summer	Fall	Spring	Summer	Fall	Fall			
			3/14/2023	7/18/2023	9/18/2022	3/12/2022	7/16/2022	9/17/2022	AM Peak 6-9	Midday 11-14	PM Peak 15-18	Votes
Milepost	VDS	Location										
69.70	401488		Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
68.10	400462	Gold Hill Rd oc	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
65.21	401421	Marshview Rd	Med	Med	Med	Med	Med	Med	Med	Major	Major	6.7
63.20	400044	Parish Rd										na
61.17	400961	LAKE HERMAN RD										na
59.99	404709	3100' S of Lake Herman Rd										na
59.60	400265	Industrial Rd - Park Rd	Med	Med	Med	Med	Med	Med	-4	-4	Med	3.3
59.02	407476	old Benicia Bridge toll plaza										na
58.97	407477	Bayshore Rd on-s-diag	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
57.54	402413	WB 780										0.0
57.45	402465	Old Benicia Bridge Pier 5										na
57.33	402466	Old Benicia Bridge Pier 8										na
57.03	402542	Old Benicia Bridge Pier 11										na
56.85	402543	Old Benicia Bridge Pier 13										na
56.73	402545	South of Benicia Bridge										na
56.36	402412	1400' N of Marina Vista Ave	-7	Major	Major	-7	-7	Major	Major	Major	Major	10.0
56.02	400756	Marina Vista Ave rm-s-diag										na
55.36	401750	oppo N of Service Rd UC	Major	Major	Major	Major	Major	-2	Med	Major	Major	8.3
54.72	404730	1900' N of Arthur Rd UC										0.0
54.15	404728	Pacheco Blvd on ramp										na
53.95	404727	Pacheco Blvd Off ramp	Med	-3	-3	Med	-3	-5	-3	-3	-3	5.0
53.62	401720	Arthur Rd	Med	Med	-4	-1	Med	Med	-4	-4	-4	1.7
53.33	401100	2200' N of Hwy 4-N of Blum Ave	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
53.03	401496	EB 4 on-s-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
53.00	405930	WB 4 conn-s-loop	Med	Med	Med	Major	Major	Med	Med	Med	Med	5.8
53.00	405931	W4 on loop	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
52.23	407473	oppo N of Center Ave UC	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
52.02	407471	N of Concord Ave	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
51.72	407479	Concord Ave on-s-loop	-3	-3	-3	-3	-3	-3	-3	-3	-3	na
51.10	407469	oppo S of Concord Ave off	Major	Major	-4	Major	Major	-4	-4	-4	-4	10.0
50.85	401748	WILLOW PASS RD ON-S-LOOP	Med	Med	Major	Med	Med	Major	Major	Major	Major	8.3
50.55	401774	Willow Pass Rd on-s-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
50.31	420643	SR 242	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
49.90	420645	oppo SB 242-Monument off gore	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
49.69	400110	GREGORY LN OFF-S-DIAG	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
49.37	401734	oppo Monument Blvd rm-n-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
49.13	400037	Monument Blvd rm-s-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
48.94	401280	Contra Costa Blvd rm-s-diag	-1	Major	Major	-1	Major	Major	Major	Major	Major	10.0
48.53	400193	oppo 100' N of Oak Park Blvd	Med	Major	Major	Major	Major	Major	Major	Major	Major	9.6
48.02	401283	TREAT BLVD - GEARY RD	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
47.84	401522	Treat Blvd rm-s-diag	-2	Major	Major	-2	Major	Major	Major	Major	Major	10.0
47.57	400883	Between Treat & Main St	-3	-1	-1	-3	-1	-1	-1	-1	-1	na
47.31	400208	N. Main St off-s-diag	-4	Major	Major	Major	Major	Major	Major	Major	Major	10.0
47.04	427183	N Main St	-5	-1	-1	-1	-1	-1	-1	-1	-1	na
47.03	407475	oppo N Main St	-6	-2	Major	-2	-2	Major	Med	Major	Major	8.8
46.41	401111	Ygnacio Valley Rd	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
46.27	401056	Oakland-Trinity Ave	Med	Major	Major	Major	Major	Major	Major	Major	Major	9.6
46.05	401110	oppo Oakland Blvd & Almond Ave	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
45.46	402072	Olympic Blvd on-s-loop	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
45.22	401818	Newell Ave	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
44.93	401344	1700' N of South Main St.	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
44.65	401840	S Main St off-s-loop	-2	-2	-2	Major	-2	-2	-2	-2	-2	10.0
44.56	400774	S Main St off-s-loop	-3	-3	-3	-1	-3	Major	-3	-3	-3	10.0
44.40	401889	S Main St	-4	-4	Major	-2	-4	Major	Major	Major	Major	10.0
44.20	401519	oppo Rudgear rd rm-n-fly	-5	-5	-1	-3	-5	-1	-1	-1	-1	na
43.65	401794	Rudgear Rd on-s-diag	-6	-6	-2	-4	-6	-2	-2	-2	-2	na
43.58	400749	3000' S of Rudgear Rd	-7	Med	Med	-5	Major	Major	-3	-3	Major	5.0
43.35	400169	oppo 3300' N of Livorna Rd	Major	Med	Major	Major	Med	Major	Med	Med	Major	7.5
43.11	401366	oppo 1000' N of Livorna rd	Med	Med	Med	Med	Med	-1	Med	Med	-1	3.8
42.86	401484	oppo Livorna Rd on-n-diag	Major	Major	Major	Med	Med	Med	Med	Major	-2	6.3
42.57	400053	Livorna Rd on-s-diag	-1	Med	Med	-1	Med	Med	Med	-1	Cumul Abs	3.2
42.22	401437	2400' South of Livorna Rd	-2	Med	Med	-2	Major	Major	Major	Med	Med	5.8
41.90	401925	Oppo Stone Valley Rd on-n-diag	-3	-1	-1	-3	-1	-1	-1	-1	-1	0.0
41.66	401744	Oppo Stone Valley Rd on-s-diag	-4	-2	-2	-4	-2	-2	-2	-2	-2	0.0
41.32	407486	2500' S of Stone Valley Rd	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
40.72	407487	5000' S of Stone Valley Rd	Med	-1	-1	Med	Med	Med	-1	-1	-1	1.7
40.51	400393	1500' N of El Pintado Rd	-1	Med	-2	-1	-1	-1	-2	-2	-2	0.5
40.22	400852	Oppo El Pintado Wy on-n-diag	-2	Med	-3	-2	-2	-2	-3	-3	-3	0.4
40.03	401097	1000' S of El Pintado Rd	-3	-1	-4	-3	-3	-3	-4	-4	-4	0.0
39.85	401999	El Cerro Blvd on-n-diag	-4	-2	-5	-4	-4	-4	-5	-5	-5	na
39.51	401124	S OF EL CERRO BLVD	-5	-3	-6	-5	-5	-5	-6	-6	-6	na
39.39	400401	1300' S OF EL CERRO BLVD	-6	-4	-7	-6	-6	-6	-7	-7	-7	na
39.00	401328	Diablo Rd on-n-diag	Med	-5	Cumul Abs	-7	-7	Med	-8	Cumul Abs	-8	1.1
38.71	400767	2000' N OF SYCAMORE VALLEY RD	Med	Med	Med	-8	-8	-1	Med	-1	Cumul Abs	2.3
38.28	400437	Sycamore Valley Rd	-1	-1	Med	-9	-9	Med	Med	-2	Med	3.8
37.72	400741	2100' S Sycamore Valley Rd	-2	Med	Major	Med	-10	Med	Med	Major	Major	6.8
37.36	401420	3500' N of Greenbrook Dr.	Med	-1	-1	Med	-11	-1	-1	-1	-1	0.8
37.11	401114	1800' N of Greenbrook Dr.	-1	-2	-2	-1	-12	-2	-2	-2	-2	0.0
36.43	401103	1600' S of Greenbrook Dr.	-2	-3	-3	Med	-13	-3	-3	-3	-3	5.0
36.12	400958	2700' N of Crow Canyon Rd	-3	-4	-4	Med	Cumul Abs	Med	-4	-4	-4	0.9
35.76	400105	Crow Canyon Rd on-n-diag	Major	Major	Major	Med	Med	Med	Major	Major	Med	7.9
35.60	401950	Crow Canyon Rd rm-s-loop	-1	-1	-1	Med	-1	-1	-1	-1	-1	1.3
35.39	400446	Crow Canyon Rd rm-s-diag	-2	-2	Med	-1	Med	-2	Med	-2	-2	2.0
35.21	401956	500' S of Norris Canyon Rd	Major	Med	Med	Major	Med	Med	Med	Major	Med	6.7
34.86	401288	2000' OF NORRIS CANYON RD	-1	-1	-1	Med	Med	Med	-1	-1	-1	1.4
34.39	401347	Bollinger Canyon Rd on-s-loop	Med	Med	-2	Med	-1	-1	-2	-2	-2	3.8
34.18	401461	BOLLINGER CANYON RD ON-S-DIAG	Med	Med	-3	Med	Med	Med	-3	-3	-3	2.1
33.94	400553	2000' S OF BOLLINGER CANYON RD	-1	-1	Med	Med	-1	Med	-4	-4	-4	1.3
33.64	400696	2500' S OF BOLLINGER CANYON RD	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
33.36	401126	150' N OF MONTEVIDEO UC	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
32.45	401918	S of Pine Valley Rd	Med	-1	-1	Med	-1	-1	-1	-1	-1	0.8
31.87	401356	oppo 2300' N of Alcosta Blvd	Major	Major	Major	Major	Major	Major	Med	Major	Major	9.2
31.84	401588	Alcosta Blvd. rm-s-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
31.53	400818	2200' S of Alcosta Blvd	Major	Med	Major	Med	Major	Major	Major	Major	Major	9.2
31.52	402103	San Ramon Valley Blvd rm-s-hoo	Major	Med	Med	Major	Major	Major	Med	-1	-1	5.0
31.21	401722	3900' S of Alcosta Blvd	Major	-1	-1	Major	-1	-1	-1	-2	-2	10.0
30.89	401580	500' N of Amador Valley Blvd	-1	-2	-2	-1	-2	-2	-2	-3	-3	na
30.59	401590	oppo 2500' N of I-580	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
30.35	401705	Dublin Blvd rm-s-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
29.44	403352	Stoneridge Dr rm-s-loop	Med	Med	Med	Major	Major	Major	Med	Med	-1	5.4
29.36	401596	Stoneridge Dr rm-s-diag	-1	-1	-1	-1	-1	-1	-1	-1	-2	na
26.76	403349	Bernal Ave rm-s-diag	Med	Med	Med	Med	-2	Med	-2	Med	-3	2.9
25.40	403346	Sunol Blvd rm-s-loop	-1	-1	-1	-1	-3	-1	-3	-1	-4	0.0
24.30	427184	oppo 1.0 mi S of Sunol Blvd	-2	-2	-2	-2	-4	-2	-4	-2	-5	na
23.66	427182	1.7 mi S of Sunol Blvd	-3	-3	-3	-3	-5	-3	-5	-3	-6	na
22.64	427168	oppo Koopman Rd rm-n-diag	-4	-4	-4	-4	-6	-4	-6	-4	-7	na
21.72	403343	Vallecitos rm-s-fly	-5	-5	-5	-5	-7	-5	-7	-5	-8	na
20.95	403340	Paloma rd rm-s-diag	-6	-6	-6	-6	-8	-6	-8	-6	-9	na
20.02	403338	900' N of Andrade rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
19.76	403337	Andrade rd rm-s-diag	Med	-1	Major	Med	-1	Major	Major	Major	Med	6.7
18.36	403334	Sheridan rd rm-s-diag	-1	-2	Major	-1	-2	-1	Major	Major	Med	6.7
17.58	403332	Vargas rd rm-s-diag	Med	-3	Major	Med	-3	Major	Major	Med	Med	5.8
16.33	402798	Mission Blvd rm-s-diag	Major	Med	Med	Major	-4	-1	-1	-1	Med	3.3
15.87	402797	N of Palm Ave	Major	-1	-1	Major	-5	Med	-2	-2	-1	2.1
15.30	402795	Washington Blvd	-1	-2	-2	-1	-6	-1	-3	-3	-2	na
14.78	414016	oppo 4500' N of Auto Mall Pkwy	-2	-3	-3	-2	-7	-2	Cumul Abs	Cumul Abs	-3	0.5
14.28	414015	oppo 1800' N of Auto Mall Pkwy	-3	-4	-4	-3	Cumul Abs	-3	-1	-1	-4	0.1
13.96	403226	N of Auto Mall Pkwy	-4	-5	-5	-4	-1	-4	-2	-2	-5	na
13.89	402793	Auto Mall Pkwy rm-s-diag	-5	-6	-6	-5	-2	-5	-3	-3	-6	na
12.39	400566	Mission Blvd on-s-loop	Major	-7	-7	Major	-3	-6	-4	-4	-7	10.0
12.19	403254	Mission Blvd rm-s-coll	-1	Major	Major	Med	Major	Major	Major	Major	Major	8.8
11.84	403251	200' S OF E WARREN AVE UC	-2	Major	-1	-1	Major	-1	-1	-1	-1	10.0
11.39	400602	125' N OF DWR UC	-3	-1	-2	-2	-1	-2	-2	-2	-2	na
10.49	403247	1700' N of Scott Creek Rd	-4	Med	-3	-3	Med	-3	-3	-3	-3	5.0
10.26	400695	oppo Scott Creek Rd rm-n-diag	-5	-1	-4	-4	-1	-4	-4	-4	-4	na
9.95	403169	Scott Creek Rd rm-s-diag	-6	-2	-5	-5	-2	-5	-5	-5	-5	na
9.60	400791	SB Dixon Rd	Major	Med	Major	Med	Med	Med	-6	Med	Major	5.8
8.72	403245	oppo 1200' N of Jacklin Rd	Med	-1	-1	Med	-1	-1	-7	-1	-1	0.8
8.48	403243	Jacklin Rd rm-s-diag	Major	Med	-2	-1	-2	-2	-8	-2	-2	3.8
8.03	403240	Calaveras Blvd rm-s-loop	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
7.57	403237	Calaveras Blvd rm-s-diag	Topo	Med	Topo	Topo	Major	Major	Topo	Topo	Topo	9.6
7.09	407184	S of Wrigley Way	Major	Major	Med	Major	Major	Major	-1	Major	Med	7.1
6.62	407185	N of Landess Ave	-1	-1	-1	-1	-1	-1	-2	-1	-1	0.0
6.04	407190	Montague Expwy rm-s-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
5.70	407191	oppo N of N Capitol Ave	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
5.01	407200	N Capitol Ave rm-s-diag	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
4.48	407186	Hotstteter Rd rn-s-loop-diag	-3	-3	-3	-3	-3	-3	-3	-3	-3	na
3.71	407187	Berryessa Rd rm-s-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
3.41	407207	S of Berryessa Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
2.80	407206	oppo N of McKee Rd	-2	-2	-2	Major	-2	-2	-2	-2	-2	10.0
2.22	407204	McKee Rd rm-s-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
1.80	407202	oppo Alum Rock Rd rm-n-diag	Major	Major	Major	Med	Major	Major	Med	Major	Major	8.8
1.39	407197	Alum Rock Rd rm-s-loop	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
1.34	407196	E. Capitol Expwy rm-s-loop	Med	Med	Med	Med	Med	Med	Med	Topo	Med	5.8
0.97	400535	Jackson Ave rm-s-diag	Major	-1	-1	Major	-1	-1	-1	-1	-1	10.0
0.47	407194	S. King Rd off-s-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
0.20	418817	King Rd rm-s-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
0.19	400665	King Rd rm-s-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0

Figure A-12: Evaluation Results – I-680 S

Milepost	VDS		Weekday Spring 3/14/2023	Weekday Summer 7/17/2023	Weekday Fall 9/20/2022	Weekend Spring 3/12/2022	Weekend Summer 7/17/2022	Weekend Fall 9/25/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Votes
0.310	408907	SB/NB 280 rm-n-fly/diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
0.540	400951	Stevens Creek Blvd	Topo	Major	Major	Major	Major	Major	Major	Major	Major	10.0
1.330	400057	Bascom Ave rm-n-diag	Major	-1	-1	Med	Med	-1	-1	-1	-1	1.7
2.040	400147	The Alameda rm-n-loop	Med	Med	Med	Major	Major	Major	Med	Med	Med	6.3
2.200	427921	The Alameda rm-n-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
2.700	400343	Coleman Ave rm-n-diag	-2	Med	Med	Med	-2	Major	Med	Med	Med	5.5
3.510	401560	1st St rm-n-loop	-3	Med	-1	-1	-3	-1	-1	-1	-1	1.7
3.610	422357	N 1st St rm-n-diag	-4	-1	-2	-2	-4	-2	-2	-2	-2	na
4.020	400045	SB 101 rm-n-loop	Med	-2	-3	Med	Med	-3	-3	-3	-3	3.8
4.210	400122	NB 101 rm-n-diag	-1	-3	-4	-1	-1	-4	-4	-4	-4	na
4.500	401541	Gish Rd rm-n-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
5.270	422359	Brokaw Rd rm-n-loop	Med	Med	Med	-1	-1	-1	Med	Med	Med	3.8
5.500	402281	4A5324 loc 91	-1	-1	-1	-2	-2	-2	-1	-1	-1	na
6.000	402283	4A5324 loc 92	-2	-2	-2	-3	-3	-3	-2	-2	-2	na
6.500	402285	4A5324 loc 93	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
6.860	423139	Montague Expwy rm-n-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
7.000	402286	4A5324 loc 94	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
7.650	400088	Great Mall Pkwy rm-n-loop	Med	Med	Med	-2	-2	-2	Med	Med	Med	3.8
8.100	413026	Calaveras Blvd/EB 237	Med	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	9.6
8.360	401464	EB 237 rm-n-loop	Med	Major	Topo	Major	Major	Topo	Topo	Topo	Topo	9.6
8.550	401489	Calaveras Blvd rm-n-diag	Topo	Topo	Med	Topo	Topo	Major	Med	Med	Med	7.1
8.770	401538	EB 237 rm-n-fly	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
9.200	402290	4A5324 loc 96	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
9.800	402292	4A5324 loc 98	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
10.552	401643	Dixon Landing Rd rm-n-coll	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
11.052	402800	N of Dixon Landing Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
11.352	402828	Dixon Landing and Gateway Blvd	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
12.132	407219	S of Mission Blvd	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
12.202	402789	oppo Mission Blvd rm-s-fly	Topo	Med	Med	Med	Med	Med	Med	Med	Med	5.4
12.527	408755	Warren Ave rm-n-loop	Major	Major	Major	Med	Med	Major	Major	Major	Major	9.2
12.657	402802	N of Warren Ave	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
12.727	408756	Mission Blvd rm-n-diag	Major	Major	Major	Topo	Topo	Major	Major	Major	Major	10.0
13.507	400189	Fremont Blvd rm-n-loop	Med	Med	Med	Major	Major	Med	Med	Med	Med	5.8
13.697	400309	Fremont Blvd rm-n-diag	-1	Med	-1	-1	-1	-1	-1	-1	-1	0.4
14.257	400417	oppo at the truck scales	-2	Major	Major	Major	Major	Major	Major	Major	Major	10.0
14.887	400249	Auto Mall Pkwy rm-n-loop	Med	Major	Major	Major	Major	Major	Major	Major	Major	9.6
15.027	401639	Auto Mall Pkwy rm-n-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
16.407	400662	Stevenson Blvd rm-n-loop	Med	Med	-2	Med	Med	-2	-2	-2	-2	5.0
16.597	400141	Stevenson Blvd rm-n-diag	Med	-1	Major	-1	-1	Med	Major	Major	Major	6.7
17.357	400761	Mowry Ave rm-n-loop	-1	Med	-1	-2	-2	-1	-1	-1	-1	0.5
17.587	400490	Mowry Ave rm-n-diag	-2	-1	-2	Med	Med	-2	-2	-2	-2	2.5
18.657	401888	500' N of Central Ave	-3	Major	Major	Major	Major	Major	Major	Major	Major	10.0
19.057	400137	THORNTON AVE	Med	Major	Major	Major	Major	Major	Major	Major	Major	9.6
19.257	400716	Thornton Ave rm-n-diag	Med	-1	-1	-1	-1	Med	-1	-1	-1	0.8
20.127	401545	oppo S of Decoto Rd / Rt 84	-1	-2	-2	-2	-2	-1	-2	-2	-2	na
20.507	401011	Decoto Rd rm-n-loop	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
20.717	400674	Decoto Rd rm-n-diag	Med	Major	Med	Major	Major	Major	Med	Med	Med	6.7
21.277	400539	PASEO PADRE PKWY	-1	-1	-1	Med	Med	Med	-1	-1	-1	1.4
21.887	400534	ALVARADO-FREMONT BLVD	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
22.227	401062	N of Alameda Flood Control	-1	Major	-1	Med	Med	-1	-1	-1	-1	6.7
22.527	401529	Bet Alvarado/Niles & Alvarado	Med	-1	Med	-1	-1	Med	Med	Med	Med	3.8
22.777	401613	oppo 2500' N of Alameda Creek	-1	-2	-1	-2	-2	-1	-1	-1	-1	na
23.367	400536	Alvarado-Niles Rd rm-n-diag	-2	Med	Med	Med	Med	Med	Med	Med	Med	5.0
24.007	400488	Whipple Rd rm-n-coll	Med	Major	-1	Major	Major	-1	-1	-1	-1	8.8
24.477	401561	oppo North of Ward Creek	-1	Major	Med	Major	Major	Med	Med	Med	Med	6.4
24.917	400611	Industrial Pkwy rm-n-diag	Med	Med	Major	Med	Med	Med	Major	Major	Major	7.9
25.177	400928	oppo 2200' N of Industrial	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
25.767	400284	Tennyson Rd off-n-diag	Major	Med	Major	Major	Major	Major	Major	Major	Major	9.6
26.027	400041	TENNYSON RD	Major	Med	Major	Major	Major	Major	Major	Major	Major	9.6
26.317	408133	N of Eldridge POC	-1	Major	-1	Major	Major	-1	-1	-1	-1	10.0
26.507	408135	oppo 1000' S of Jackson/SR-92	-2	-1	-2	-1	-1	-2	-2	-2	-2	na
26.787	417665	oppo EB 92 rm-s-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
26.997	412637	SR 92 rm-n-fly	Med	Topo	Med	Topo	Topo	Topo	Med	Med	Med	6.7
27.027	417666	Jackson St rm-n-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
27.497	408134	1200' N of Jackson St	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
27.707	400685	oppo Winton Ave on-s-coll/diag	Topo	Major	Med	Med	Med	Topo	Med	Med	Med	6.3
28.047	401003	Winton Ave rm-n-coll	Major	Topo	Major	Topo	Topo	Major	Major	Major	Major	10.0
28.257	400898	2000' N of Winton Ave	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
28.707	400275	A St rm-n-diag	Med	-2	-2	-2	-2	Med	-2	-2	-2	0.8
28.947	400939	1900' N of A St	-1	-3	-3	-3	-3	-1	-3	-3	-3	na
29.267	400180	oppo 900' S of Hacienda Ave	-2	-4	-4	-4	-4	-2	-4	-4	-4	na
29.597	400529	oppo Hacienda Ave OC	-3	-5	-5	-5	-5	-3	-5	-5	-5	0.0
29.907	400990	100' S of Paseo Grande	Med	-6	Med	-6	-6	Med	Med	Med	Med	5.0
30.187	400515	oppo Hesperian Blvd off-n-diag	Topo	Topo	Med	Topo	Topo	Major	Med	Med	Med	7.1
30.647	400252	Lewelling Blvd rm-n-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
31.047	400788	NB 238/Washington Ave	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
32.357	401517	S of Marina Blvd	-1	-1	Major	-1	-1	Major	Major	Major	Major	10.0
32.727	401871	oppo 200' N of Fairway/Aladdin	-2	-2	Med	-2	-2	-1	Med	Med	Med	4.4
33.187	400574	Marina Blvd rm-n-diag	-3	-3	-1	-3	-3	-2	-1	-1	-1	na
33.427	401629	Williams St OC	Major	Major	-2	Major	Major	Med	-2	-2	-2	3.8
33.577	400422	Davis St off-n-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
33.917	400333	Davis St rm-n-loop/diag	-1	-1	-1	-1	-1	Med	-1	-1	-1	0.4
34.257	410363	RR UH	-2	-2	-2	-2	-2	-1	-2	-2	-2	na
34.877	400360	98th Ave rm-n-loop	-3	Med	Med	Med	Med	Med	Med	Med	Med	5.0
35.067	400955	98th Ave rm-n-diag	-4	Major	Major	Major	Major	Major	Major	Major	Major	10.0
35.737	400495	Hegenberger Rd rm-n-loop	-5	-1	-1	-1	-1	-1	-1	-1	-1	na
35.817	400608	Hegenberger Rd rm-n-diag	Major	Med	Med	Med	Med	Med	Med	Med	Med	5.4
37.067	400949	66th Ave/Coliseum Wy	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
37.757	400678	oppo High St rm-s-diag	Major	Med	Major	Major	Major	Major	Major	Major	Major	9.6
38.297	400341	42nd/High St rm-n-diag	Med	Major	Med	-1	-1	#VALUE!	Med	Med	Med	4.5
38.877	400607	oppo 29th Ave rm-s-diag	-1	-1	-1	-2	-2	#VALUE!	-1	-1	-1	na
39.107	400094	23th Ave/Kennedy St rm-s-loop	-2	-2	-2	-3	-3	#VALUE!	-2	-2	-2	na
39.327	400682	23rd Ave rm-n-fly/diag	Med	Major	Med	-4	-4	#VALUE!	Med	Med	Med	4.5
41.187	408138	Oak St off-n-diag	-1	-1	-1	-5	-5	#VALUE!	-1	-1	-1	0.0
41.647	400980	Jackson St rm-n-diag	-2	-2	-2	-6	-6	#VALUE!	-2	-2	-2	na
42.327	401333	Adeline St rm-s-diag	-3	-3	-3	-7	-7	#VALUE!	-3	-3	-3	na
42.537	401142	oppo Market St rm-s-diag	-4	-4	-4	-8	-8	#VALUE!	-4	-4	-4	na
42.987	404746	Union St on-n-diag	-5	-5	-5	-9	-9	#VALUE!	-5	-5	-5	na
43.377	400218	2400' S of 7th St	-6	-6	-6	-10	-10	#VALUE!	-6	-6	-6	na
43.577	400983	oppo 7th St rm-s-diag	-7	-7	-7	-11	-11	#VALUE!	-7	-7	-7	na
44.027	400765	1400' N of 7th St	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
44.147	400923	2000' N of 7th St/Grand Ave	Med	-1	Med	-1	-1	Med	Med	Med	Med	3.8
45.027	400844	W Grand Ave rm-n-diag	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
45.167	401143	34th & Wood St	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0

Figure A-13: Evaluation Results – I-880 N

Milepost	VDS		Weekday Spring 3/14/2023	Weekday Summer 7/17/2023	Weekday Fall 9/20/2022	Weekend Spring 3/12/2022	Weekend Summer 7/17/2022	Weekend Fall 9/25/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Votes
45.167	401156	**oppo 34th & Wood St**	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
45.027	400659	**oppo W Grand Ave rm-n-diag**	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
44.087	400242	oppo 2000' N of 7th St/Grand	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
44.027	400093	oppo 1400' N of 7th St	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
43.577	400300	**7th St rm-s-diag**	-1	Med	-1	-1	Med	-1	-1	-1	-1	5.0
43.377	400454	oppo 2400' S of 7th St	-2	-1	-2	-2	-1	-2	-2	-2	-2	na
42.987	404761	oppo Union St on-n-diag	-3	-2	-3	-3	-2	-3	-3	-3	-3	na
42.977	401708	**Union Street off-s-diag**	-4	-3	-4	-4	-3	-4	-4	-4	-4	na
42.537	401141	Market St rm-s-diag	-5	-4	-5	-5	-4	-5	-5	-5	-5	na
42.327	401339	Adeline St rm-s-diag	-6	-5	-6	-6	-5	-6	-6	-6	-6	na
42.127	401714	Castro St	-7	-6	Major	-7	-6	Med	Major	Major	Major	9.4
41.537	400609	Broadway rm-s-diag	-8	-7	Major	Major	-7	Major	Major	Major	Major	10.0
41.187	400835	Oak St rm-s-diag	Major	Major	-1	Med	Major	-1	-1	-1	-1	2.9
39.327	401710	oppo 23rd Ave rm-n-fly/diag	-1	-1	-2	-1	-1	-2	-2	-2	-2	na
39.107	400570	**23th Ave/Kennedy St rm-s-loop**	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
38.877	400669	29th Ave rm-s-diag	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
38.297	400190	42nd/High St rm-n-diag	Med	Major	Med	-2	-2	Major	Med	Med	Med	5.0
37.757	400498	High St rm-s-diag	Med	Major	Med	-3	-3	#VALUE!	Med	Med	Med	4.5
36.557	400956	66th Ave rm-s-loop/diag	Med	-1	Med	-4	-4	#VALUE!	Med	Med	Med	3.6
35.757	400793	Hegenberger Rd rm-s-loop	-1	-2	Med	Major	Med	Med	Med	Med	Med	5.0
35.567	400740	Hegenberger Rd rm-s-diag	Major	Med	Major	Major	Med	Med	Major	Major	Major	8.8
34.977	400134	**98th Ave rm-s-loop**	-1	Major	Med	Major	Med	Major	Med	Med	Med	6.4
34.827	400442	98th Ave rm-s-diag	Major	Med	-1	Major	-1	Med	-1	-1	-1	2.5
34.257	410370	RR UH	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
33.757	400228	**Davis St rm-s-loop/diag**	Med	-1	Med	Med	Med	Med	Med	Med	Med	4.6
33.577	400192	oppo davis st off-n-diag	Med	-2	Med	Med	Med	-1	Med	Med	Med	4.2
33.427	401621	oppo Williams St OC	-1	-3	-1	-1	-1	Med	-1	-1	-1	0.4
32.947	400942	Marina Blvd rm-s-diag	Major	Med	-2	Med	Med	-1	-2	-2	-2	6.3
32.727	400091	200' N of Fairway/Aladdin Dr	-1	-1	Med	-1	-1	-2	Med	Med	Med	4.4
32.357	401068	oppo S of Marina Blvd	-2	Major	-1	Med	Med	-3	-1	-1	-1	5.0
30.877	400225	Washington Ave rm-s-loop	Major	Major	Major	Major	Topo	Major	Major	Major	Major	10.0
30.557	401072	**SB 238 rm-s-fly**	Topo	Med	Topo	Topo	Major	Topo	Topo	Topo	Topo	9.6
30.187	400486	Hesperian Blvd rm-s-diag	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
29.907	400146	100' S OF PASEO GRANDE	-1	-1	Med	Med	-1	Med	Med	Med	Med	5.0
29.597	400312	Hacienda Ave OC	-2	-2	-1	-1	Med	-1	-1	-1	-1	2.5
29.267	400666	900' S of Hacienda Ave	-3	-3	-2	-2	-1	-2	-2	-2	-2	na
28.947	400383	1900' N OF A ST	-4	-4	-3	-3	-2	-3	-3	-3	-3	na
28.477	400670	**A St rm-s-diag**	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
28.217	400463	2000' N OF WINTON AVE	-1	Major	Major	Major	Major	Major	Major	Major	Major	10.0
28.047	400321	**Winton Ave rm-n-coll**	Major	Topo	Topo	Med	Topo	Med	Topo	Topo	Topo	9.2
27.707	401475	Winton Ave rm-s-coll/diag	Med	Topo	Topo	Med	Topo	Topo	Topo	Topo	Topo	9.2
27.497	408141	1200' N of Jackson St	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
26.927	400427	Jackson St rm-s-fly	Major	Med	Major	Major	Major	Major	Major	Major	Major	9.6
26.787	417676	**EB 92 rm-s-diag**	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
26.507	408142	1000' S of Jackson/SR-92	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
26.317	408140	oppo N of Eldridge POC	-2	Med	-2	-2	Med	-2	-2	-2	-2	5.0
26.027	400634	TENNYSON RD	Med	Topo	Med	Med	Topo	Med	Med	Med	Med	5.8
25.727	400681	Tennyson Rd rm-s-coll	Med	Topo	Topo	Major	Topo	Topo	Topo	Topo	Topo	9.6
25.177	400038	2200' N of Industrial Pkwy	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
24.767	401450	Industrial Pkwy rm-s-loop	Med	Med	Med	Major	Med	-2	Med	Med	Med	5.0
24.477	401240	**North of Ward Creek**	Major	Med	Major	Med	Med	Med	Major	Major	Major	8.3
24.007	401716	Whipple Rd rm-n-coll	Major	Major	-1	Major	Major	-1	-1	-1	-1	10.0
23.767	400006	Whipple Rd rm-s-diag	-1	-1	Major	-1	-1	Major	Major	Major	Major	10.0
23.327	400853	Alvarado-Niles Rd rm-s-loop	-2	-2	Major	-2	-2	Med	Major	Major	Major	7.5
23.167	400067	Alvarado-Niles Rd rm-s-diag	-3	-3	-1	Med	-3	-1	-1	-1	-1	0.4
22.777	401614	**2500' N of Alameda Creek**	-4	-4	-2	-1	-4	-2	-2	-2	-2	na
22.527	401038	Alvarado/Niles Rd & Alvarado B	Med	Med	Med	Major	Major	Med	Med	Med	Med	5.8
22.227	401073	**oppo N Alameda Flood Control**	-1	-1	-1	-1	Med	-1	-1	-1	-1	2.5
21.817	400839	Alvarado-Fremont Blvd	-2	-2	Med	Med	-1	Med	Med	Med	Med	4.5
21.647	400565	Alvarado-Fremont Blvd	Major	Med	-1	Major	Major	-1	-1	-1	-1	2.9
21.277	400186	600' N of Paseo Padre Pkwy	-1	-1	-2	-1	Med	-2	-2	-2	-2	2.5
20.547	400686	Decoto Rd rm-s-loop	-2	-2	Major	-2	-1	Med	Major	Major	Major	9.4
20.347	400451	Decoto Rd rm-s-diag	Med	-3	Major	-3	Med	Med	Major	Major	Major	7.1
20.127	401557	S of Decoto Rd / Rt 84	-1	-4	-1	-4	-1	-1	-1	-1	-1	na
19.097	400248	Thornton Ave rm-s-loop	-2	-5	-2	-5	-2	Med	-2	-2	-2	0.4
18.907	400810	Thornton Ave rm-s-diag	-3	-6	Med	-6	-3	Med	Med	Med	Med	4.0
17.527	401362	Mowry Ave rm-s-loop	Med	Med	Med	Major	Med	Med	Med	Med	Med	5.4
17.297	400576	Mowry Ave rm-s-diag	-1	-1	Med	Major	Med	Med	Med	Med	Med	5.0
16.527	400778	Stevenson Blvd rm-s-loop	Med	-2	-1	Major	-1	-1	-1	-1	-1	3.8
16.257	400468	Stevenson Blvd rm-s-diag	-1	Med	-2	Major	-2	-2	-2	-2	-2	5.0
15.007	400739	Auto Mall Pkwy rm-s-loop	Med	Major	Major	Major	Major	Major	Major	Major	Major	9.6
14.807	400363	Auto Mall Pkwy rm-s-diag	Med	-1	-1	Med	-1	-1	-1	-1	-1	0.8
14.257	400698	AT THE TRUCK SCALES	-1	Med	Med	-1	Med	Med	Med	Med	Med	5.0
13.467	400941	**Fremont Blvd rm-s-loop**	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
13.277	400409	**Fremont Blvd rm-s-diag**	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
12.657	402803	**oppo N of Warren Ave**	Med	Med	Med	Topo	Topo	Med	Med	Med	Med	5.8
12.547	408757	**Warren Ave rm-s-loop**	Major	Med	Major	Major	Major	Major	Major	Major	Major	9.6
12.202	402788	**Mission Blvd rm-s-fly**	Topo	Med	Med	Topo	Med	Med	Med	Med	Med	5.8
12.182	407221	**oppo S of Mission Blvd**	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
11.362	402829	Dixon Landing and Gateway Blvd	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
11.052	402801	oppo N of Dixon Landing Rd	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
10.542	401637	Dixon Landing Rd rm-s-loop	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
10.210	401642	Dixon Landing Rd rm-s-diag	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
9.800	402293	4A5324 loc 98	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
9.300	402291	4A5324 loc 96	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
8.100	402119	**Calaveras Blvd/EB 237**	Major	Major	Topo	Major	Major	Major	Topo	Topo	Topo	10.0
7.530	402238	Great Mall Pkwy rm-s-diag	Med	Major	Major	Major	Med	Major	Major	Major	Major	9.2
7.000	402287	4A5324 loc 94	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
6.540	402120	**Montague Expressway**	Major	Med	Med	#VALUE!	Med	Med	Med	Med	Med	5.5
6.250	423148	oppo Montague Expwy rm-n-diag	Topo	Topo	Topo	#VALUE!	Topo	Topo	Topo	Topo	Topo	10.0
6.000	402284	4A5324 loc 92	[illegible]	[illegible]	[illegible]	#VALUE!	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
5.500	402282	4A5324 loc 91	[illegible]	[illegible]	[illegible]	#VALUE!	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
5.220	402121	Brokaw Rd rm-s-diag	Major	-3	-3	#VALUE!	Med	Med	-3	-3	-3	1.7
4.390	400971	Old Bayshore Hwy	Med	-4	Med	Med	-1	-1	Med	Med	Med	4.1
4.130	404759	**NB 101 rm-s-loop**	[illegible]	[illegible]	[illegible]	#VALUE!	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
3.940	400479	**SB 101 rm-s-diag**	[illegible]	[illegible]	[illegible]	#VALUE!	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
3.640	400030	N First St rm-s-loop	[illegible]	Med	[illegible]	[illegible]	Med	[illegible]	[illegible]	[illegible]	[illegible]	5.0
3.440	401440	N First St rm-s-diag	Med	[illegible]	[illegible]	Major	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	3.8
2.750	403225	Airport Blvd rm-s-diag	Major	Med	Major	Med	Med	Major	Major	Major	Major	8.8
2.720	403265	Coleman Ave rm-s-loop	Major	-1	-1	Med	Med	Med	-1	-1	-1	2.1
2.550	400508	Coleman Ave rm-s-diag	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
2.100	400253	The Alameda rm-s-loop	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0.0
1.940	400709	The Alameda rm-s-diag	Med	Med	Med	Med	-3	Med	Med	Med	Med	4.6
1.280	400514	Bascom Ave rm-s-loop	Med	-1	Med	Med	-4	Med	Med	Med	Med	5.0
1.250	400723	Bascom Ave rm-s-diag	Med	-2	-1	-1	-5	-1	-1	-1	-1	0.5
0.540	408911	Stevens Creek Blvd	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
0.110		Stevens Creek Blvd	#VALUE!	#VALUE!	Topo	#VALUE!	Topo	Topo	#VALUE!	#VALUE!	#VALUE!	10.0

Figure A-14: Evaluation Results – I-880 S

Milepost	VDS	Location	Weekday Spring 3/14/2023	Weekday Summer 7/16/2023	Weekday Fall 9/19/2022	Weekend Spring 3/12/2022	Weekend Summer 7/16/2022	Weekend Fall 9/24/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Votes
2.77	1203021	VICTORIA1	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
3.07	1203035	VICTORIA2	Major	-1	-1	Major	-1	-1	-1	-1	-1	10.0
3.59	1203057	FAIR 1	Major	Major	Major	Major	Major	Major	Major	Med	-2	7.5
3.97	1203071	FAIR 2	-1	-1	-1	-1	-1	-1	-1	-1	-3	0.0
4.58	1203082	BRISTOL (Before SR-73)	Med	Med	Med	Med	Med	Med	Med	Major	Major	6.7
4.70	1210205	BAKER 1 (After SR-73)	Med	Major	Major	Med	Major	Med	Major	Major	Major	8.8
5.06	1210190	BAKER 2	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
5.51	1210172	PAULARINO 1 (I-405)	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
5.87	1203090	PAULARINO 2 (I-405)	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
6.10	1214373	AIRPORT AT 55 NB (I-405)	Topo	Major	Major	Topo	Major	Major	Major	Major	Major	10.0
6.35	1214321	MAIN (I-405)	Topo	Major	Major	Topo	Major	Major	Major	Major	Major	10.0
6.94	1203124	MACARTHU1	Major	Major	Major	Major	Med	Major	Major	Med	Major	8.8
7.10	1203148	MACARTHU2	-1	Med	Major	-1	Med	Major	Major	Major	Med	8.0
7.85	1203172	DYER 1	-2	Major	-1	-2	-1	-1	-1	-1	-1	10.0
8.12	1203184	DYER 2	Major	Major	-2	Major	Med	-2	-2	-2	-2	8.8
8.60	1214253	WARNER	-1	Major	Major	-1	Med	Med	Med	Med	Major	7.0
9.41	1203221	EDINGER 2	Med	Med	Major	Med	Med	Major	Major	Major	Major	8.3
9.84	1203254	MCFADDEN	Med	Med	Med	Med	Med	Major	Med	Med	Major	6.3
10.18	1209860	N OF 5 OFF	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
10.38	1209873	S OF 5	Med	Med	Med	Med	Med	Med	Topo	Topo	Topo	7.5
10.48	1209888	N OF 5	Med	Med	Med	Med	Med	Major	Med	Med	Topo	6.3
10.82	1203288	FOURTH 1	Topo	Med	Med	Topo	Med	Med	Med	Med	Topo	6.7
11.08	1203303	FOURTH 2	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
11.72	1203331	17TH 1	Med	Med	Med	Med	Med	Med	Med	Major	-1	5.0
11.98	1203342	17TH 2	Major	Major	Major	Major	Major	Major	Major	Major	Med	9.2
12.28	1215811	SANTA CLARA	-1	Med	Med	-1	Med	-1	Med	-1	Med	3.5
12.68	1212938	FAIRHAVEN (SR-22)	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
13.18	1212885	LA VETA (SR-22)	Med	Med	-1	Med	Med	-1	-1	-1	-1	5.0
13.88	1203400	CHAPMAN 2	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
14.38	1212842	Walnut	Med	Med	Med	Med	Med	Med	Med	Med	-1	4.2
14.58	1212863	COLLINS	-1	-1	Med	-1	-1	Med	Major	Med	-2	5.0
15.20	1203428	KATELLA	Major	Major	Med	Major	Major	Med	-1	Med	Major	6.7
15.38	1212916	KATELLA 2	-1	-1	-1	-1	Med	-1	-2	-1	-1	0.4
15.78	1212901	TAFT	-2	-2	-2	-2	Med	-2	Cumul Abs	-2	-2	0.6
16.18	1212955	MEATS	-3	-3	-3	-3	Med	-3	-1	-3	-3	0.4
17.10	1203468	LINCOLN 2	Med	Med	Med	Med	Med	Med	-2	Cumul	Cumul	3.5

Figure A-15: Evaluation Results – SR-55 N

Milepost	VDS	Location	Weekday Spring 3/14/2023	Weekday Summer 7/16/2023	Weekday Fall 9/19/2022	Weekend Spring 3/12/2022	Weekend Summer 7/16/2022	Weekend Fall 9/24/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18
16.69	16.69	LINCOLN 1	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo
16.18	16.18	MEATS	Med	Major	Major	Med	Med	Major	Major	Major	Major
15.78	15.78	TAFT	Med	Major	Med	Med	Med	Med	-1	Major	Med
15.20	15.20	KATELLA 1	-1	-1	-1	-1	-1	-1	-2	-1	-1
14.58	14.58	COLLINS	Med	-2	Major	Med	-2	Major	Med	Major	Major
14.38	14.38	Walnut	-1	Med	-1	-1	Med	-1	-1	-1	-1
13.73	13.73	CHAPMAN 2	Med	-1	Med	Med	Med	Med	Med	Med	Med
13.49	13.49	CHAPMAN 1	-1	Major	Med	-1	Med	-1	-1	Med	Med
13.18	13.18	FAIRHAVEN (SR-22)	Major	Major	-1	Major	Major	-2	-2	-1	-1
12.68	12.68	FAIRHAVEN (SR-22)	Major	Major	Major	Major	Med	Major	Major	Major	Major
12.28	12.28	SANTA CLARA	-1	Major	Major	-1	Major	Major	Major	Major	Major
11.60	11.60	17TH 1	Major	-1	Med	Major	Major	Med	Med	Med	Med
10.82	10.82	FOURTH 1	Topo	Med	Major	Topo	Major	Major	Major	Major	Major
10.48	10.48	N OF 5	Major	Topo	Major	Major	Major	Major	Major	Major	Major
10.38	10.38	S OF 5	Major	Major	Major	Major	Major	Major	Major	Major	Med
9.84	9.84	MCFADDEN	Major	Med	Major	Major	Major	Major	Major	Major	Major
9.19	9.19	EDINGER 1	-1	-1	-1	-1	-1	-1	-1	-1	-1
8.60	8.60	WARNER	-2	Major	Med	-2	Med	Med	Major	Med	Major
8.12	8.12	DYER 2	-3	Med	-1	-3	-1	-1	-1	-1	-1
7.62	7.62	DYER 1	-4	Med	Major	-4	Med	Med	Major	Major	Major
7.03	7.03	MACARTHU2	Med	Major	Med	Med	Med	-1	-1	-1	-1
6.88	6.88	MACARTHU1	-1	Med	-1	-1	-1	-2	-2	-2	-2
6.35	6.35	MAIN (I-405)	Topo	Major	Major	Topo	Major	Major	Major	Major	Major
5.87	5.87	PAULARINO 2 (I-405)	Major	Major	Major	Major	Med	Major	Major	Major	Med
5.51	5.51	PAULARINO 1 (I-405)	Major	Major	Major	Major	Major	Major	Major	Major	Major
5.06	5.06	BAKER 2 (SR-73)	Major	Med	Major	Major	Major	Major	Major	Major	Major
4.70	4.70	BAKER 1 (SR-73)	Topo	Med	-1	Topo	Med	Topo	-1	-1	-1
4.58	4.58	BRISTOL (SR-73)	Topo	Topo	-2	Topo	Topo	Topo	-2	-2	-2
3.97	3.97	FAIR 2 (SR-73)	Med	-1	Med	Med	Med	Med	Med	Med	Med
3.59	3.59	FAIR 1	-1	Med	-1	-1	-1	Med	-1	-1	-1
3.07	3.07	VICTORIA2	Major	Med	Major	Major	Major	Major	Major	Major	Major
2.77	2.77	VICTORIA1	Major	Major	Major	Major	Major	Major	Major	Major	Major

Figure A-16: Evaluation Results – SR-55 S

			Weekday			Weekend			Time of Day (Weekdays)			
			Spring	Summer	Fall	Spring	Summer	Fall	Fall			
			3/14/2023	7/16/2023	9/26/2022	3/12/2022	7/16/2022	10/1/2022	AM Peak 6-9	Midday 11-14	PM Peak 15-18	Votes
Milepost	**VDS**	**Location**										
0.37	1211907	CHAPMAN OFF	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
0.49	1202011	CHAPMAN 1	Med	Major	Med	Med	Med	Med	Topo	Topo	Topo	7.9
0.66	1202024	CHAPMAN 2	Med	Med	Major	Major	Major	Major	Major	Med	Major	8.3
0.95	1202053	ORANGEWO1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
1.05	1202067	ORANGEWO2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
1.47	1213618	STADIUM	-3	-3	-3	Med	-3	-3	-3	-3	-3	0.4
1.77	1202093	KATELLA 1	-4	-4	Med	Med	Med	Med	-4	-4	Med	2.5
2.01	1202118	KATELLA 2	-5	-5	-1	Med	Med	Med	-5	-5	-1	1.3
2.17	1213741	DOUGLASS	-6	-6	-2	-1	-1	-1	Cumul Abs	-6	-2	0.2
2.65	1202146	BALL 1	Med	Med	Med	-2	-2	-2	Med	Cumul Abs	Med	3.1
2.83	1202172	BALL 2	Med	Med	-1	Med	-3	-3	-1	-1	-1	1.3
3.17	1213105	Wagner	Major	Major	Major	Major	Major	Med	Major	Major	Major	9.6
3.67	1213122	South	Med	Med	Med	Med	Med	-1	-1	-1	-1	2.1
4.00	1202201	LINCOLN 1	Med	Med	-1	-1	Med	Med	-2	-2	-2	5.0
4.17	1202230	LINCOLN 2	-1	-1	-2	-2	Med	-1	-3	-3	-3	1.3
4.37	1213036	UNDERHILL	Med	Med	-3	Med	Med	-2	-4	-4	-4	5.0
4.67	1213041	LA PALMA	Major	Major	Topo	Major	Major	Topo	Topo	Topo	Topo	10.0
4.97	1213672	N of 91	Topo	Topo	Major	Topo	Topo	Major	Major	Major	Major	10.0
5.38	1221212	LA JOLLA	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
5.77	1202263	ORANGETHORPE	Med	Med	Med	Med	Med	Med	Med	-1	-1	3.3
6.27	1219462	PLACENTIA	Med	Med	-1	Med	Med	-1	-1	-2	-2	5.0
7.02	1202308	NUTWOOD	Med	Med	-2	Med	Med	-2	-2	-3	-3	5.0
7.57	1202337	YORBA LI1	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
7.76	1202365	YORBA LI2	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
8.12	1213087	Bastanchury	Med	Med	Med	Med	Med	-2	-2	-2	Med	2.9
8.37	1202380	ROLLING HILLS	-1	-1	Med	Med	Med	Med	Med	Med	-1	3.3
9.07	1202408	IMPERIAL1	Major	Major	-1	Major	Major	-1	-1	-1	-2	10.0
9.32	1202436	IMPERIAL2	-1	-1	-2	Med	Med	-2	-2	-2	-3	2.5
10.37	1221922	57 NB LAMBER MVDS	-2	-2	-3	-1	-1	-3	-3	-3	-4	na
10.43	1202464	LAMBERT	-3	-3	-4	-2	-2	-4	-4	-4	-5	na
11.27	1211870	TONNER	Med	Med	-5	-3	Med	-5	-5	-5	-6	5.0
12.44	774826	S-O BREA CANYON RD	-1	-1	-6	-4	-1	-6	-6	-6	-7	na
13.08	763539	BREA CANYON	-2	-2	-7	-5	-2	-7	-7	-7	-8	na
14.43	774854	N-O COLD SPRING LN	-3	-3	-8	-6	-3	-8	-8	-8	-9	na
14.86	769068	PATHFINDER	-4	-4	-9	-7	-4	-9	-9	-9	-10	na
15.22	763553	PATHFINDER	-5	-5	-10	-8	-5	-10	-10	-10	-11	na
15.80	774813	N-O PATHFINDER	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
16.62	774866	S-O SUNSET CROSSING	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
17.09	763558	SUNSET CROSSING	-1	-1	-1	Major	-1	-1	-1	-1	-1	10.0
17.43	774877	STATE ST	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
17.98	763563	TEMPLE 1	-1	-1	-1	Major	-1	-1	-1	-1	-1	10.0
18.17	763568	TEMPLE 2	-2	-2	-2	-1	-2	-2	-2	-2	-2	na
18.62	774841	N-O POMONA	-3	-3	-3	-2	-3	-3	-3	-3	-3	na
19.12	716203	CAMPUS	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
19.74	774902	RTE 10 EB	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
20.52	764096	VIA VERDE	-1	-1	-1	Major	-1	-1	-1	-1	-1	10.0
21.54	718356	LOMA VISTA	-2	-2	-2	-1	-2	-2	-2	-2	-2	na
21.96	718053	COVINA BL	-3	-3	Major	Med	-3	Major	Major	Major	Major	9.4
22.32	774799	E-O CIENEGA AVE	Major	Major	Major	-1	Major	Med	Major	Major	Major	9.5
22.44	718051	ARROW HWY	-1	-1	-1	Major	-1	-1	-1	-1	-1	10.0
23.20	764089	AUTO CENTER	Major	Major	Med	Med	Major	Med	Med	Major	Topo	7.9

Figure A-17: Evaluation Results – SR-57 N

Milepost	VDS	Location	Weekday Spring 3/14/2023	Weekday Summer 7/16/2023	Weekday Fall 9/26/2022	Weekend Spring 3/12/2022	Weekend Summer 7/16/2022	Weekend Fall 10/1/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Votes
23.28	774890	AUTO CENTER	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
23.00	774891	W/O GLADSTONE ST	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
23.00	718050	W/O GLADSTONE ST	Med	Med	Med	Med	Med	Med	Major	Topo	Topo	7.5
22.72	768779	ARROW HWY 2	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
22.50	774800	ARROW HWY 1	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
22.40	718052	E/O CIENEGA AVE	Major	-3	-3	Major	-3	-3	-3	-3	-3	10.0
21.86	763649	COVINA	Major	-4	Med	Major	-4	-4	Med	-4	-4	3.5
21.62	718054	LOMA VISTA	-1	-5	-1	-1	-5	-5	-1	-5	-5	na
20.66	774901	VIA VERDE	-2	-6	-2	-2	-6	-6	-2	-6	-6	na
19.82	764420	RTE 10 EB	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
19.20	774842	CAMPUS	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
18.70	763573	N/O POMONA	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
18.18	763578	TEMPLE 2	Major	-2	-2	Major	-2	-2	-2	-2	-2	10.0
17.87	774878	TEMPLE 1	-1	-3	-3	-1	-3	-3	-3	-3	-3	na
17.51	763583	STATE ST	Major	-4	-4	Major	-4	-4	-4	-4	-4	10.0
16.94	774865	SUNSET CROSSING	-1	-5	-5	-1	-5	-5	-5	-5	-5	na
16.70	774812	S/O SUNSET CROSSING	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
15.88	763590	N/O PATHFINDER	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
14.90	774855	PATHFINDER	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
14.51	763970	N/O COLD SPRING LN	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
13.16	774827	BREA CANYON	-3	-3	-3	-3	-3	-3	-3	-3	-3	na
12.52	1202475	S/O BREA CANYON RD	-4	-4	-4	-4	-4	-4	-4	-4	-4	na
11.41	1202451	TONNER	-5	-5	-5	-5	-5	-5	-5	-5	-5	na
10.05	1221932	LAMBERT	Major	-6	-6	Major	-6	-6	-6	-6	-6	10.0
10.05	1202422	57 SB LAMBERT MVDS	-1	-7	-7	-1	-7	-7	-7	-7	-7	na
9.29	1202394	IMPERIAL2	Major	-8	-8	Major	-8	-8	-8	-8	-8	10.0
9.08	1202373	IMPERIAL1	Med	Med	-9	Med	Med	-9	-9	-9	-9	5.0
8.45	1213088	ROLLING HILLS	Major	Major	Med	Major	Major	-10	Med	Med	-10	5.4
8.20	1202353	Bastanchury	-1	Med	Med	Med	-1	Major	Med	Med	-11	4.5
7.72	1202322	YORBA LI2	Med	Major	-1	Med	Med	-1	-1	-1	-12	6.3
7.53	1202290	YORBA LI1	Med	Med	-2	Med	Med	-2	-2	-2	-13	5.0
6.76	1202278	NUTWOOD	-1	-1	-3	-1	-1	-3	-3	-3	-14	0.0
6.53	1219461	CHAPMAN 3	Med	-2	Med	-2	-2	Med	Major	Med	Major	5.4
6.35	1202248	PLACENTIA	Major	Major	-1	Med	Major	-1	-1	-1	-1	8.8
5.81	1218170	ORANGETHOR	-1	-1	Med	-1	Med	Med	-2	-2	-2	1.3
5.46	1213673	LA JOLLA	Med	Med	Med	Med	-1	-1	Med	Cumul	Med	3.8
5.05	1213721	N of 91	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
4.75	1213133	LA PALMA	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
4.45	1202215	UNDERHILL	Major	Major	-1	Major	Major	-1	-1	-1	-1	10.0
4.18	1202186	LINCOLN 2	Med	Med	-2	Med	Med	-2	-2	-2	-2	5.0
4.00	1213121	LINCOLN 1	-1	-1	Major	-1	-1	Major	Major	Major	Major	6.7
3.75	1213106	South	-2	-2	Med	-2	Med	Med	Med	Med	-1	2.9
3.25	1202160	Wagner	-3	-3	-1	-3	-1	-1	-1	-1	-2	0.0
2.80	1202132	BALL 2	Major	Major	Major	Med	Med	Major	Major	Med	Major	8.3
2.62	1213742	BALL 1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
2.25	1202105	DOUGLASS	Med	Med	Med	-2	Med	-2	Med	-2	-2	2.5
1.93	1202078	KATELLA 2	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
1.75	1213624	KATELLA 1	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
1.55	1202040	STADIUM	-1	Major	Major	Med	Major	Major	Major	Major	Med	8.6
0.90	1201998	ORANGEWOOD	-2	Major	Major	Major	Major	Major	Med	Major	Major	8.3
0.43	1211954	CHAPMAN 1	Med	Major	Major	Med	Med	Med	Med	Major	Med	6.7
0.15	1201988	RTE 22 & 5	Major	Topo	Topo	Major	Topo	Topo	Topo	Topo	Topo	10.0

Figure A-18: Evaluation Results – SR-57 S

Milepost	VDS	Location	Weekday Spring 3/14/2023	Weekday Summer 7/25/2023	Weekday Fall 9/19/2022	Weekend Spring 3/12/2022	Weekend Summer 7/23/2022	Weekend Fall 9/24/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Votes
0.11	716272	VERMONT (I-110)	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
0.56	716273	FIGUEROA	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
1.16	717367	MAIN	Major	Topo	Topo	Major	Topo	Topo	Topo	Topo	Topo	10.0
1.55	717369	AVALON 1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
1.81	718130	AVALON 2	-2	Major	Major	Med	Major	Major	Major	Major	Major	8.8
2.27	717376	CENTRAL 1	Med	-1	-1	-1	-1	-1	-1	-1	-1	2.5
2.58	717373	CENTRAL 2	-1	Med	Med	-2	Med	Med	-2	-2	Major	3.3
3.11	717379	WILMINGTON	Major	-1	Med	Major	Med	Med	-3	Med	Major	5.9
3.67	717381	ACACIA	-1	-2	-1	Med	-1	-1	-4	-1	-1	2.5
4.13	717383	ALAMEDA	Med	Med	Med	Major	Med	Med	Cumul Abs	-2	Major	4.8
4.48	717387	SANTA FE	Med	-1	-1	Med	-1	-1	-1	-3	-1	5.0
5.03	717390	LONG BEACH 1	-1	-2	Med	Med	-2	Major	Med	Med	Major	6.7
5.78	717393	ATLANTIC 1 (I-710)	Major	Major	Topo	Major	Med	Topo	Topo	Topo	Topo	9.6
6.20	717396	ATLANTIC 2	Major	Major	Topo	Major	Major	Topo	Topo	Topo	Topo	10.0
6.57	716296	ORANGE	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
7.26	717402	CHERRY	-2	-2	-2	-2	Major	-2	-2	-2	-2	10.0
7.69	717406	PARAMOUNT	-3	-3	-3	Med	-1	-3	-3	-3	-3	2.5
8.21	765467	DOWNEY 2	-4	Major	Med	-1	Major	Major	-4	Med	Med	5.5
8.59	718326	LAKEWOOD 1	-5	-1	-1	-2	-1	-1	-5	-1	-1	na
8.80	717418	LAKEWOOD 2	-6	-2	-2	-3	-2	-2	-6	-2	-2	na
9.22	717420	CLARK	-7	Major	Major	-4	Major	Med	Major	Major	-3	6.3
9.54	768898	BELLFLOWER 1	-8	-1	-1	-5	-1	-1	-1	-1	-4	0.0
9.76	717426	BELLFLOWER 2	-9	-2	-2	-6	-2	-2	-2	-2	-5	0.0
10.22	716312	CALIFORNIA	-10	-3	-3	-7	-3	-3	-3	-3	-6	na
10.80	716313	W OF 605	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
11.37	766209	STUDEBAKER	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
11.96	717431	PIONEER 1	-1	-1	-1	Med	-1	-1	-1	-1	-1	2.5
12.21	717434	PIONEER 2	-2	-2	-2	-1	Med	Med	-2	-2	-2	0.8
12.54	717436	NORWALK 1	-3	-3	-3	-2	-1	-1	-3	-3	-3	0.0
12.77	717439	NORWALK 2	-4	-4	-4	-3	-2	-2	-4	-4	-4	na
13.11	717441	BLOOMFIELD	-5	Major	Major	-4	Med	Med	Major	Major	Major	9.0
13.41	759980	SHOEMAKER	-6	Med	-1	-5	-1	-1	-1	-1	-1	0.5
13.50	768223	ARTESIA										na
14.21	717443	183RD	Major	-2	-3	Major	-3	-3	-3	-3	-3	1.8
14.70	773363	CARMENITA	-1	-3	-4	-1	-4	-4	-4	-4	-4	0.0
15.34	1203495	ORANGETHORPE	Med	Med		Med	Med	Med				5.0
15.74	1203506	VALLEY VIEW	Med	Med		Med	Med	Med				5.0
16.06	1213891	HOLDER		Major			Med	Med				6.7
16.55	1203536	KNOTT 1										na
16.73	1203561	KNOTT 2	Med	Major		Med	Major	Major				8.0
17.32	1203589	BEACH 1	Med	Med		Med	Med	Med				5.0
17.50	1203615	BEACH 2										na
17.74	1214063	E OF STANTON	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
18.14	1214118	W OF 5	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
18.82	1203642	MAGNOLIA	Major	Topo	Major	Major	Topo	Major	Major	Major	Major	10.0
19.13	1203654	GILBERT	Major	Major	Med	Major	Major	-1	Med	-1	-1	4.6
19.74	1203679	BROOKHURST	Med				Med	Med				5.0
20.77	1203704	EUCLID		Med				Med				2.0
22.28	1203762	LEMON										0.0
22.55	1213060	EAST										na
22.72	1203788	EAST	Med	Med			Med	Med				5.0
23.14	1203793	ACACIA	Med	Med	Major	Med	-1	Med	Major	Major	Major	7.5
23.72	1203825	STATE COLL										0.0
23.87	1213986	PLACENTIA				Major		Med				7.5
24.42	1203831	W OF 57	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
24.67	1203850	E OF 57	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
25.19	1203866	LA PALMA	Major			Med						7.5
25.67	1203886	GLASSELL1	Major	Major	Major	Major	Med	Med	Major	Major	Major	9.2
25.85	1203922	GLASSELL 2	Med	Med	Med	Med	Med	Med	Major	Major	Med	6.7
26.23	1203927	GROVE	Major	Major	Major	Med	Med	Med	Med	-1	Major	6.3
26.73	1203957	TUSTIN (Before SR-55)	Med	Med	Med	Major	-1	Major	Med	Major	-1	5.9
28.45	1203984	LAKEVIEW1 (After SR-55)	Major	Major	Major	Major	Major	Major	Med	Major	Med	8.3
28.64	1204010	LAKEVIEW2	Topo	Med	Med	Topo	Topo	Topo	Med	Topo	Topo	8.3
29.21	1208108	W OF IMPERIAL	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
29.86	1204038	IMPERIAL1	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
30.07	1204064	IMPERIAL2	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
30.55	1208121	E OF IMPERIAL	Med	Med	Med	-2	-2	-2	Med	-2	-2	2.1
31.14	1208147	MIDPOINT	-1	-1	-1	-3	-3	-3	-1	-3	-3	0.0
31.72	1208161	W OF SCALES	-2	Med	Med	-4	Med	Med	Med	Med	Med	5.0
32.80	1204091	WEIR CNYN1	Med	-1	-1	Med	-1	-1	-1	-1	-1	5.0
32.99	1204117	WEIR CNYN2	-1	Major	Major	-1	Major	-2	Major	Major	Major	10.0
33.48	1208180	East OF WEIR	-2	Med	Med	-2	Med	Med	-1	-1	Major	4.0
34.14	1208199	West OF GYPSUM (SR-241)	Topo	Med	Med	Topo	Topo	Topo	Med	Topo	Topo	8.3
34.75	1204142	GYPSUM 1 (SR-241)	Med	Topo	Topo	Med	Topo	Topo	Topo	Topo	Topo	9.2
34.95	1204153	GYPSUM 2 (SR-241)	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
35.39	1208226	E OF GYPSUM	Topo	Major	Major	Topo	Major	Major	Major	Major	Major	10.0
36.35	1213680	W of COAL	-1	-1	Med	-1	-1	-1	-1	-1	Med	1.5
36.48	1204181	COAL	-2	Major	Major	-2	Major	Major	Major	Major	-1	8.0
36.76	1208240	E OF COAL	-3	Major	Major	-3	Major	Major	Major	Major	Major	10.0
38.23	823180	GREEN RIVER	Major	-1	-1	Major	-1	-1	-1	-1	-1	10.0
38.30	801422	GREEN RIVER	-1	-2	Major	-1	-2	Major	Major	Major	Major	10.0
38.80	801428	.45 W/O RTE 71 91 EB VDS	-2	-3	-1	-2	-3	-1	-1	-1	-1	na
39.21	823858	ROUTE 71	-3	-4	-2	-3	-4	-2	-2	-2	-2	na
39.77	801435	ROUTE 91 from RTE 71	-4	-5	-3	-4	-5	-3	-3	-3	-3	na
40.29	801442		Major	-6	Major	Major	-6	Major	-4	Major	Major	6.7
40.92	822370	SERFAS CLUB	-1	-7	-1	-1	-7	-1	-5	-1	-1	na
40.96	801449	SERFAS CLUB	-2	-8	Major	-2	-8	Med	Med	Major	Major	8.1
41.69	825802	Paseo Grande	-3	-9	-1	-3	-9	-1	-1	-1	-1	0.0
42.19	801464	.02 E/O SMITH 91 EB VDS	Med	-10	Med	Med	Med	-2	Med	-2	-2	2.7
42.64	801471	LINCOLN	-1	-11	-1	-1	-1	-3	-1	-3	Cumul Abs	0.2
42.85	801473	LINCOLN	-2	-12	-2	-2	-2	-4	-2	-4	-1	0.0
43.62	820549	MAIN	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
43.80	801485	MAIN	Topo	Topo	Topo	Topo	Topo	Major	Topo	Topo	Topo	10.0
43.96	826582		-1	-1	Major	-1	-1	Med	Major	Major	Major	9.4
44.10	801488	MAIN EB CONNECTOR 91	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
45.59	817546	.09 E/O EAST GRAND 91 EB VDS	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
46.43	827490		Major	-1	Major	Major	-1	Major	Major	Major	Major	10.0
46.49	806674	MCKINLEY 91 EB	-1	-2	-1	-1	-2	Med	-1	-1	-1	0.6
46.57	801493	MCKINLEY LOOP ON 91 EB VDS	-2	-3	Med	-2	-3	Med	-2	-2	-2	1.3
46.79	823031	MCKINLEY 91 EB VDS	Med	-4	-1	Major	-4	-1	-3	-3	-3	7.5
48.07	822589	PIERCE 91 WB	Med	Major	-2	-1	Major	-2	-4	-4	-4	8.3
48.56	801502	MAGNOLIA 91 EB VDS	-1	-1	Med	Med	-1	-3	Med	-5	-5	1.7
49.27	820356	LA SIERRA 91 WB	Med	Med	Med	Med	Med	Med	Major	Cumul Abs	-6	4.3
49.51	801509	LA SIERRA 91 EB VDS	-1	Med	-1	-1	Med	Med	-1	-1	-7	5.0
50.36	801512	TYLER 91 WB	Major	Major	Major	Major	Major	Major	Med	Major	Major	9.2
50.41	801515	TYLER 91 EB VDS	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
51.40	824978	Van Buren Loop EB on 91	Med	-1	-1	Med	Med	Med	-1	-1	-1	1.7
51.44	801520	VAN BUREN	Med	Med	Med	Med	Med	Med	Med	-2	-2	3.3
52.06	801523	.11 E/O JACKSON 91 EB VDS	-1	-1	-1	-1	-1	-1	-1	-3	-3	na
52.91	801528		-2	-2	-2	-2	-2	-2	-2	-4	-4	na
53.05	801530	ADAMS 91 WB	-3	-3	-3	-3	-3	-3	-3	-5	-5	na
53.59	801533	ADAMS 91 EB VDS	-4	-4	-4	-4	-4	-4	-4	-6	-6	na
53.93	801536	.09 E/O JEFFERSON 91 EB VDS	Med	Med	Med	Med	Med	Med	Major	Cumul Abs	Med	5.2
54.10	801538	MADISON 91 WB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
54.62	801541	3000 FT W/O ARLINGTON 91 EB VDS	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
55.07	801544	ARLINGTON	-3	-3	-3	-3	-3	-3	-3	-3	-3	0.0
55.09	826399	Jane St 91 EB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
55.27	801546	ARLINGTON	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
55.69	801550		-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
55.87	801552	CENTRAL	Major	Med	Major	Med	Med	Med	Major	Med	Major	7.5
56.45	801555	CENTRAL EB ON	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
56.45	801556		Major	Major	Major	Major	Major	Med	Major	Major	Med	8.8
57.24	801560	14TH 91 WB	Major	Major	Major	Major	Major	Med	Major	Major	-1	7.9
57.42	801562	14TH EB ON 91 EB VDS	Major	-1	-1	Major	Major	-1	-1	-1	-2	10.0
57.57	801566	TENTH ST 91 EB	Major	Med	Med	Major	Major	Med	-2	-2	Med	4.6
57.95	807830	7th/Mission Inn	Major	Major	Major	Med	Major	Major	Major	Major	Major	9.6

Figure A-19: Evaluation Results – SR-91 E

			Weekday			Weekend			Time of Day (Weekdays)			
			Spring	Summer	Fall	Spring	Summer	Fall	Fall			
			3/14/2023	7/25/2023	9/19/2022	3/12/2022	7/23/2022	9/24/2022	AM Peak 6-9	Midday 11-14	PM Peak 15-18	Votes
Milepost	VDS	Location										
57.66	801565	9TH WB ON 91 WB VDS	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
57.51	801563	14TH 91 EB	Major	Major	-1	Major	Med	-1	-1	-1	-1	8.8
57.33	801559	14TH WB ON 91 WB VDS	Med	Med	-2	Med	Med	-2	-2	-2	-2	1.7
55.95	801553	CENTRAL	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
55.77	801549	CENTRAL	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
55.36	801547	ARLINGTON	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
55.18	826405	Jane St 91 WB	-3	-3	-3	-3	-3	-3	-3	-3	-3	0.0
55.15	801543	ARLINGTON WB ON	-4	-4	-4	-4	-4	-4	-4	-4	-4	0.0
54.18	801539	MADISON 91 EB	-5	-5	-5	-5	-5	-5	-5	-5	-5	na
54.02	801535	MADISON 91 WB VDS	-6	-6	-6	-6	-6	-6	-6	-6	-6	0.0
53.68	801534	500 FT E/O JEFFERSON	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
53.14	801531	ADAMS 91 WB	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
53.00	801527	ADAMS 91 WB VDS	Major	Major	Major	Major	Med	Major	Major	Major	Major	9.6
52.14	820846	JACKSON ST 91 WB	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
51.53	801521	VAN BUREN	Med	Med	Med	Med	Med	Med	Med	-2	Med	4.2
51.50	801517	VAN BUREN 91 WB VDS	Med	Med	Med	Med	Med	Med	Med	-3	-1	3.3
50.49	801516	TYLER 91 EB	-1	-1	-1	-1	-1	-1	-1	-4	-2	na
50.44	801511	TYLER 91 WB VDS	Med	Med	Med	Med	Med	Med	Med	-5	-3	3.3
49.60	820364	LA SIERRA 91 EB	-1	-1	-1	-1	-1	-1	-1	-6	-4	0.0
49.36	801505	LA SIERRA 91 WB VDS	-2	-2	Med	-2	-2	-2	-2	Cumul Abs	Med	1.4
48.65	819114	MAGNOLIA 91 WB	-3	-3	Med	Med	Med	Med	-3	-1	-1	1.7
48.48	801499	MAGNOLIA 91 WB VDS	-4	-4	-1	-1	-1	-1	-4	-2	-2	0.0
48.15	801496	PIERCE 91 WB VDS	Cumul Abs	Cumul Abs	Med	-2	-2	-2	Cumul Abs	-3	Med	1.6
46.88	826227		-1	-1	-1	-3	-3	-3	-1	-4	-1	na
46.52	801490	MCKINLEY 91 WB VDS	Med	-2	Med	-4	-4	-4	Med	Cumul Abs	-2	2.2
45.68	826233	MAIN EB CONNECTOR 91 WB	Topo	Med	Med	Topo	Med	Med	Med	Topo	Med	6.7
44.05	826663	MAIN	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
43.89	820559	MAIN	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
43.70	801481	MAIN	Major	Topo	Topo	Major	Topo	Topo	Topo	Topo	Topo	10.0
42.93	801475	LINCOLN	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
42.73	801469	LINCOLN	-2	-2	Major	Med	-2	Major	Major	Major	Major	8.5
42.28	826816	SMITH AVE 100 FT E/O 91 WB	Med	-3	-1	-1	Major	-1	-1	-1	-1	1.4
41.78	826865	MAPLE	-1	-4	-2	-2	-1	-2	-2	-2	-2	0.0
41.64	801455		-2	-5	-3	-3	-2	-3	-3	-3	-3	na
41.01	801445	SERFAS CLUB	-3	-6	-4	-4	-3	-4	-4	-4	-4	na
40.38	826803		Med	Major	Med	-5	Med	Med	Major	-5	Cumul Abs	4.3
39.86	826857	ROUTE 91 from RTE 71	-1	-1	-1	-6	-1	-1	-1	-6	-1	na
39.29	801431	ROUTE 71	-2	Major	-2	-7	Major	Major	-2	-7	-2	10.0
38.88	826789	ROUTE 71 91 WB	-3	-1	-3	-8	-1	-1	-3	-8	-3	na
38.38	823132	GREEN RIVER	-4	-2	-4	-9	-2	-2	-4	-9	-4	na
38.31	801418	GREEN RIVER	Med	-3	-5	Med	-3	-3	-5	-10	-5	5.0
36.85	1208260	E OF COAL	-1	Med	-6	-1	-4	-4	-6	-11	-6	1.7
36.51	1221092	COAL	-2	-1	Major	-2	-5	-5	-7	Major	Major	5.0
36.41	1213686	W of COAL	-3	Med	Med	-3	Med	Med	Major	-1	Med	5.0
36.25	1204168	COAL	-4	Med	Med	-4	Med	Med	Major	-2	-1	4.0
35.46	1208230	E OF GYPSUM (SR-241)	Topo	Topo	Major	Topo	Med	Major	Major	Major	Major	9.6
34.61	1204159	GYPSUM 1 (SR-241)	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
34.21	1208208	West OF GYPSUM (SR-241)	Topo	Med	Major	Topo	Med	Major	Major	Med	Major	8.3
33.52	1208190	East OF WEIR	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
32.84	1204105	WEIR CNYN2	-2	Major	Med	-2	Major	Major	Med	Major	Med	7.5
32.67	1204076	WEIR CNYN1	-3	Major	Major	-3	Major	Major	Med	Major	Med	8.0
31.76	1208176	W OF SCALES	-4	-1	-1	-4	Major	Major	-1	-1	-1	10.0
31.18	1208151	MIDPOINT	Med	Med	Med	Med	Med	Med	-2	Med	Med	4.2
30.59	1208134	E OF IMPERIAL	-1	-1	-1	-1	-1	-1	-3	-1	-1	0.0
30.00	1204052	IMPERIAL2	Med	Med	Med	Med	Med	Med	Major	-2	Med	5.0
29.91	1220832	IMPERIAL1	Major	Med	Major	Med	Med	Med	Med	-3	Major	5.8
29.79	1204023	IMPERIAL1	Major	Major	Major	Med	Med	Med	Med	-4	Major	6.3
29.25	1208110	W OF IMPERIAL	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
28.55	1203998	LAKEVIEW2	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
28.36	1203972	LAKEVIEW1 (Before SR-55)	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
26.77	1203944	TUSTIN (After SR-55)	Med	Med	Med	Major	Major	Med	Med	Major	-1	5.8
26.27	1203931	GROVE	Med	Med	Med	-1	-1	-1	-1	Med	-2	2.1
25.81	1203909	KRAEMER 2	Med	Med	Major	Med	Med	Med	Major	Med	Major	7.1
25.72	1203896	KRAEMER 1	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
24.83	1203871	LA PALMA	Topo	Major	Major	Major	Major	Major	Major	Major	Major	10.0
24.71	1203861	E OF 57	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
24.56	1203845	W OF 57	Major	Major	Major	Major	Major	Med	Major	Major	Major	9.6
23.91	1213985	PLACENTIA	-1	Major	Major	Major	Major	Major	Major	Major	Major	10.0
23.55	1203813	STATE COLLEGE	-2	Major	-1	-1	-1	-1	-1	-1	-1	10.0
23.18	1203799	ACACIA	Major	Major	Med	Major	Major	Major	Med	-2	-2	5.4
22.59	1203774	EAST	-1	-1	-1	-1	-1	-1	-1	-3	-3	na
22.32	1212725	LEMON	-2	Med	-2	-2	Med	Med	-2	-4	-4	3.8
21.54	1203718	HARBOR 1	Med	Med	Med	-3	Med	Med	Major	-5	Med	5.0
20.52	1203692	EUCLID	-1	-1	-1	-4	-1	-1	-1	-6	-1	na
19.53	1203665	BROOKHURST	-2	-2	-2	Major	Med	Major	-2	-7	-2	8.3
19.17	1203649	GILBERT	-3	-3	-3	-1	-1	-1	-3	-8	-3	na
18.86	1213398	MAGNOLIA	Major	Topo	Major	Major	Topo	Major	Major	Major	Major	10.0
18.61	1203631	MAGNOLIA	Topo	Major	Topo	Topo	Major	Topo	Topo	Topo	Topo	10.0
18.14	1214117	W OF 5	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
17.74	1214062	E OF STANTON	-1	Major	Major	-1	Major	Major	Major	Major	Major	10.0
17.34	1203604	BEACH 2	-2	Med	Med	-2	Med	Med	-1	-1	Med	3.0
17.14	1203573	BEACH 1	-3	-1	-1	-3	Med	-1	-2	-2	-1	0.5
16.73	1203549	KNOTT 2	Major	-2	-2	Major	-1	-2	-3	-3	-2	4.0
16.43	1203524	KNOTT 1	Med	-3	-3	Med	-2	-3	-4	-4	-3	5.0
16.06	1213892	HOLDER	Med	-4	-4	Med	-3	Cumul Abs	-5	-5	-4	2.2
15.74	1203513	VALLEY VIEW	Major	-5	-5	Major	-4	-1	-6	-6	-5	10.0
15.23	1203481	ORANGETHORPE	-1	Med	-6	-1	Med	Med	-7	-7	-6	3.0
14.70	773362	CARMENITA	-2	Med	Med	-2	-1	-1	Major	Med	Major	5.0
14.14	717442	183RD	-3	-1	-1	-3	-2	-2	-1	-1	-1	na
13.50	768222	ARTESIA	-4	-2	-2	-4	-3	-3	-2	-2	-2	0.0
13.40	766555	SHOWMAKER	-5	-3	-3	-5	-4	-4	-3	-3	-3	0.0
13.06	717440	BLOOMFIELD	-6	Med	Med	-6	-5	-5	-4	Cumul Abs	Med	2.2
12.70	717438	NORWALK 2	-7	-1	-1	-7	Cumul	-6	-5	-1	-1	0.4
12.50	717435	NORWALK 1	Major	Med	-2	Med	-1	Med	Cumul	-2	-2	2.6
12.21	717433	PIONEER 2	-1	-1	-3	-1	-2	-1	-1	-3	Cumul	0.6
11.96	717428	PIONEER 1	-2	-2	-4	-2	-3	-2	-2	-4	-1	0.0
11.37	766211	STUDEBAKER	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
10.80	716314	W OF 605	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
10.22	716311	CALIFORNIA	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
9.76	768907	BELLFLOWER 2	Med	-2	Med	Med	Med	Med	Med	-2	-2	3.2
9.54	717424	BELLFLOWER 1	-1	-3	-1	-1	-1	Med	-1	-3	-3	0.5
9.22	717421	CLARK	-2	Med	-2	-2	-2	-1	-2	-4	-4	0.4
8.65	717416	LAKEWOOD 2	-3	-1	-3	-3	-3	Major	Cumul Abs	-5	-5	1.0
8.55	717413	LAKEWOOD 1	Med	-2	-4	Med	-4	-1	-1	-6	-6	5.0
8.00	717410	DOWNEY 1	-1	Med	Med	Med	Med	Med	Major	Major	-7	5.4
7.51	717404	PARAMOUNT	-2	-1	-1	Med	-1	-1	-1	-1	-8	1.7
7.01	717399	CHERRY	-3	-2	-2	-1	Med	-2	-2	-2	-9	2.5
6.57	716295	ORANGE	-4	Med	Med	Med	-1	Med	-3	-3	Med	2.5
6.20	717397	ATLANTIC 2 (I-710)	Major	Major	Topo	Major	Major	Topo	Topo	Topo	Topo	10.0
5.78	717392	ATLANTIC 1 (I-710)	Major	Major	Topo	Major	Major	Topo	Topo	Topo	Topo	10.0
5.03	718327	LONG BEACH	[illegible]	[illegible]	[illegible]	[illegible]	Major	[illegible]	[illegible]	[illegible]	[illegible]	10.0
4.48	717388	SANTA FE	Major	[illegible]	[illegible]	Major	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.0
4.13	717384	ALAMEDA	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
3.67	717380	ACACIA	Major	[illegible]	[illegible]	Major	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.0
3.10	717378	WILMINGTON	Major	[illegible]	[illegible]	Major	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.0
2.58	717374	CENTRAL 2	Med	Major	Major	Med	Major	Major	Major	Major	Major	9.2
2.27	717375	CENTRAL 1	Med	[illegible]	[illegible]	Med	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.0
1.81	765591	AVALON 2	Med	Med	Med	-1	Med	Med	-2	-2	-2	2.1
1.55	717368	AVALON 1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
0.84	717365	MAIN	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
0.56	764425	FIGUEROA (I-110)	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0

Figure A-20: Evaluation Results – SR-91 W

			Weekday			Weekend			Time of Day (Weekdays)			
			Spring	Summer	Fall	Spring	Summer	Fall	Fall			
			3/14/2023	7/18/2023	9/19/2022	3/12/2022	7/16/2022	9/24/2022	AM Peak 6-9	Midday 11-14	PM Peak 15-18	Votes
MilePost	VDS	Location										
1.618	601376	99/I5 Interchange	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
3.482	601931	RTE 99 JSO RTE 166 OC NB	Med	-1	Med	-1	-1	Med	Med	Med	Med	5.0
6.306	601932	RTE 99 JNO DAVID RD NB	-1	Major	Major	-2	Med	Med	Major	Major	Major	9.0
8.137	601382	AT SANDRINI OC NB	Med	-1	-1	Major	-1	-1	-1	-1	-1	7.5
11.482	601359	RTE 99 AT UNION OFF-RAMP NB	Med	-2	-2	Med	-2	-2	-2	-2	-2	5.0
17.824	629971	NORTH OF CURNOW RD	Major	Major	-3	Med	Major	-3	-3	-3	-3	8.8
18.403	629972	N OF RTE 119 UC	Major	-1	-4	Major	-1	-4	-4	-4	-4	5.0
18.835	619973	N OF MCKEE RD	-1	Major	Major	-1	Major	Major	Major	Major	Major	10.0
19.282	601272	HOSKINGS AVE LP - 99 SB	-2	-1	-1	-2	-1	-1	-1	-1	-1	na
19.462	601274	HOSKINGS AVE DT - 99 NB	-3	-2	-2	-3	-2	-2	-2	-2	-2	na
19.880	619975	BERKSHIRE RD	-4	Major	-3	-4	Major	-3	-3	-3	-3	10.0
20.349	619976		-5	-1	-4	-5	-1	-4	-4	-4	-4	na
20.350	629977	FAIRWIEW RD	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
21.213	619978	S OF PACHECO RD	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
21.696	619979		-2	-2	-2	-2	-2	-2	-2	-2	-2	na
23.302	619980	S OF PLANZ RD	Med	Med	Major	Med	Med	Major	Major	Major	Major	8.3
24.648	629992	N OF RTE 58 OC AT SB OFF-RAMP	-1	Major	-1	-1	Major	-1	-1	-1	-1	10.0
24.932	601358	S OF PALM AVE 99 NB	-2	-1	Major	-2	Med	Major	Major	Major	Major	8.5
27.076	629995		Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
28.622	603260	SR99 at Olive Drive	-1	Major	Major	-1	Major	Major	Major	Major	Major	10.0
29.022	601934	RTE 99 N/O OLIVE DR NB	-2	Major	Major	-2	Major	Major	Major	Major	Major	10.0
29.992	601368	S OF RTE 65	Major	Major	Major	Major	Major	-1	Major	Major	Major	10.0
30.712	601369	JNO RTE 65	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
31.313	629989	S OF 7TH STANDARD RD	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
31.976	619990	N OF 7TH STANDARD RD	Major	Med	Major	Major	Med	Med	Major	Major	Major	8.8
33.849	601360	RTE 99 N/O 7TH STANDARD NB	-1	Major	Med	-1	Major	Major	Med	Med	Med	5.4
35.579	611361	RTE 99 S/O LERDO HWY NB	-2	-1	-1	-2	-1	-1	-1	-1	-1	0.0
37.449	601380	JNO LERDO HWY OC NB	-3	Med	Med	-3	Med	-2	Med	Med	Med	3.8
39.749	601939	RTE 99 S/O MERCED AVE NB	Cumul Abs	-1	-1	-4	-1	-3	-1	-1	-1	0.1
41.775	601940	RTE 99 S/O KIMBERLINA RD NB	-1	-2	Med	Med	-2	Cumul Abs	Med	Med	Med	4.1
43.520	601373	S OF RTE 46 NB	-2	Med	-1	-1	-3	-1	-1	-1	-1	0.4
45.180	601374	AT RTE 46 NB	Med	Med	Med	Med	Cumul Abs	Med	Med	Med	Med	4.7
46.690	601943	RTE 99 1.5 MI N/O RTE 46 NB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
48.530	601375	N OF WHISLER RD NB	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
50.520	601944	RTE 99 KERN AVE PED OC NB	Cumul Abs	-3	Med	Cumul Abs	-3	Med	Med	Med	Med	3.5
51.255	601106	RTE 99 JSO ELMO NB	-1	-4	-1	-1	-4	-1	-1	-1	-1	na
53.326	601379	N OF POND RD OC 99 NB	-2	-5	-2	Med	-5	-2	-2	-2	-2	5.0
55.250	601945	RTE 99 S/O WOOLOMES AVE NB	Med	Med	-3	Med	Dist	-3	-3	-3	-3	5.0
55.910	601946	RTE 99 S/O FIRST AVE NB	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
56.580	601947	RTE 99 N/O RTE 155 NB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
57.330	601948	RTE 99 S/O CECIL AVE NB	Major	Major	Major	Med	Med	Med	Major	Major	Major	8.8
58.801	601904	RTE 99 N/P COUNTY LINE RD NB	Med	-1	-1	Med	Med	Med	-1	-1	-1	1.7
61.351	601381	S OF AVENUE 24 NB	-1	-2	Med	-1	-1	-1	Med	Med	Med	2.9
63.911	601929	RTE 99 S/O AVE 48 NB	-2	-3	-1	-2	-2	-2	-1	-1	-1	0.0
66.075	601930	RTE 99 N/O AVE 56 OC NB	Med	Med	Med	-3	Med	Med	Med	Med	Med	4.6
67.631	601915	RTE 99 JSO AVENUE 72 NB	-1	-1	-1	-4	-1	-1	-1	-1	-1	0.0
69.721	601941	S OF AVE 96/TERRA BELLA AVE - 99	-2	-2	-2	-5	-2	-2	-2	-2	-2	0.0
70.931	601916	RTE 99 .2 MI N/O AVE 96/TERRA BE	-3	-3	-3	-6	-3	-3	-3	-3	-3	na
72.031	601917	RTE 99 N/O PIXLEY NB	-4	-4	-4	-7	-4	-4	-4	-4	-4	0.0
74.143	601918	RTE 99 1/4 MI N/O AVE 120 (HESSE	-5	-5	-5	-8	Med	-5	-5	-5	-5	1.7
76.231	601919	RTE 99 0.6 MI S/O SR 190 NB	-6	-6	-6	Dist	Med	-6	-6	-6	-6	0.8
78.001	601920	RTE 99 N/O AVE 152 OC NB	-7	Med	Med	-1	Med	Med	Med	Med	Med	5.0
80.601	601921	RTE 99 1.3 MI S/O AVE 184 NB	-8	-1	-1	-2	-1	-1	-1	-1	-1	0.0
82.021	601926	RTE 99 JNO AVE 184 NB	Med	-2	-2	-3	-2	-2	-2	-2	-2	0.4
84.272	601942	N/O AVE 200 OC NB	-1	Med	Med	-4	Med	Med	Med	Med	Med	4.2
86.221	601927	RTE 99 N/O PAIGE AVE NB	Med	Med	Med	-5	Med	-1	Med	Med	Med	4.2
94.772	601408	S/O CALDWELL 99 NB	Major	Major	Major	Med	Med	Med	Major	Major	Major	8.8
96.121	601378	S/O RTE 198 NB	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
98.295	601377	S/O AVE 304 NB	Med	Med	Med	Topo	Topo	Topo	Med	Med	Med	6.3
100.665	601402	99 AT AVE 320 NB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
101.798	619913	99 AT AVE 328 - NB	-2	Med	Med	-2	Med	Med	Med	Med	Med	5.0
103.025	601912	1.25 MI N/O AVE 328 NB	-3	-1	-1	-3	-1	-1	-1	-1	-1	na
104.115	601913	1.18 MI S/O AVE 352 NB	-4	-2	-2	-4	-2	-2	-2	-2	-2	na
105.465	601914	N/O AVE 352 NB	-5	-3	-3	-5	-3	-3	-3	-3	-3	na
106.457	619912	99 AT AVE 360 - NB	-6	Med	Med	Med	Med	Med	Med	Med	Med	4.6
107.115	601403	AT MERRIT DR NB	Med	-1	-1	-1	Med	Med	-1	-1	-1	1.3
107.335	601404	N/O MERRIT DR NB	-1	Med	Med	-2	Med	Med	Med	Med	Med	4.2
107.784	619914	99 N/O AVE 368 - NB	-2	-1	-1	-3	-1	-1	-1	-1	-1	0.0
108.735	601405	AT AVE 376 NB	-3	-2	-2	-4	-2	-2	-2	-2	-2	na
110.192	601367	S/O AVE 384 NB	-4	-3	-3	-5	-3	Med	-3	-3	-3	1.0
112.365	601406	JNO MENDOCINO AVE NB	-5	-4	-4	-6	-4	-1	-4	-4	-4	0.0
113.721	601327	NB 99 N/O SIERRA (JCT 201)	Med	Med	Med	Med	-5	Med	Med	Med	Med	4.6
116.093	601324	NB 99 AT MOUNTAIN VIEW	-1	-1	-1	-1	-6	-1	-1	-1	-1	0.0
116.575	601328	NB 99 JNO MOUNTAIN VIEW	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
123.210	602928	S/O MERCED AVE 99 SB	Major	Major	-1	Major	Major	-1	-1	-1	-1	10.0
123.600	601901	MERCED AVE 99 NB	-1	-1	-2	-1	-1	-2	-2	-2	-2	na
123.840	601902	N OF MERCED AVE 99 NB	Med	Med	Major	Med	Med	Major	Major	Major	Major	8.3
124.120	601423	RTE 99 AT ADAMS NB	Med	-1	-1	Med	Med	Med	-1	-1	-1	1.7
124.890	601105	CLOVIS AVE 99 NB	-1	-2	-2	-1	-1	-1	-2	-2	-2	na
125.360	601905	N OF CLOVIS AVE 99 NB	-2	Med	-3	-2	-2	-2	-3	-3	-3	2.5
125.840	601906	N OF LINCOLN AVE 99 NB	-3	-1	Med	-3	-3	Med	Med	Med	Med	3.3
126.340	601907	N OF JEFFERSON AVE 99 NB	-4	-2	-1	-4	-4	-1	-1	-1	-1	0.0
126.840	601908	AMERICAN AVE 99 NB	-5	-3	-2	Med	-5	Med	-2	-2	-2	1.0
127.100	601909	N OF AMERICAN AVE 99 NB	-6	-4	-3	Med	-6	Med	-3	-3	-3	0.8
127.810	601910	CHESTNUT AVE 99 NB	Med	Cumul Abs	Med	Med	Med	Med	Med	Med	Med	4.7
128.540	601911	CENTRAL AVE 99 NB	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
129.304	629951	CEDAR AVE	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
129.860	629952	ORANGE AVE	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
130.818	619953	JENSEN AVE	Med	Med	Major	Med	Med	Med	Major	Major	Major	7.9
133.234	601737	TUOLUMNE ST NB	Major	Major	Major	Med	Major	Major	Major	Major	Major	9.6
133.351	601425	STANISLAUS ST 99 NB	Major	-1	-1	Med	Med	-1	-1	-1	-1	6.7
133.668	601513	S/O EL DORADO ST OC NB	Med	Major	Major	Med	Med	Major	Major	Major	Major	8.8
134.150	601432	RTE 99 JSO RTE 99/180 JCT NB	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
134.650	601433	RTE 99 N/O NIELSEN AVE NB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
135.141	629961	N OF BELMONT AVE	Med	Med	-1	Med	Med	-1	-1	-1	-1	5.0
135.680	601263	OLIVE AVE 99 SB	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
136.092	603264	McKINLEY AVE 99 SB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
136.784	603265	CLINTON AVE 99 SB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
136.820	601266	CLINTON AVE/GOLDEN STATE 99 NB	Med	-1	-1	-1	-1	-1	-1	-1	-1	0.4
137.460	601434	NB RTE 99 S/O CLINTON	-1	-2	-2	Med	-2	-2	-2	-2	-2	2.5
138.321	603267	GOLDEN STATE BLVD 99 SB	Major	Med	Med	Med	Med	-3	Med	Med	Med	5.0
139.300	601436	N OF ASHLAN AVE 99 NB	Major	Med	Med	Med	Med	Med	Med	Med	Med	5.4
139.961	619966	GETTYSBURG AVE	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
140.340	601314	SHAW AVE 99 NB	Med	Med	-2	Med	Med	-2	-2	-2	-2	1.7
141.120	601312	BARSTOW AVE 99 NB	-1	-1	-3	-1	-1	-3	-3	-3	Cumul Abs	0.3
141.650	619968		Med	-2	-4	Major	-2	-4	-4	-4	-1	7.5
142.500	601308	Herndon Ave. 99 NB	Med	Major	-5	Med	Major	-5	-5	-5	-2	2.5
142.634	603239	HERNDON AVE 99 SB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
143.410	601313	N/O HERNDON AVE NB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
143.750	601316	AT SAN JOAQUIN RIVER NB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
144.419	601925	99 N/O SAN JOAQUIN RIVER NB	Med	-1	-1	-1	-1	Major	-1	-1	-1	7.5
144.900	601311	AT AVENUE 7	Med	Med	Med	-2	Med	Major	Med	Med	Med	5.0
146.239	601442	RTE 99 AT AVE 8 NB	-1	-1	-1	-3	-1	-1	-1	-1	-1	0.0
147.509	601922	AVENUE 9 99 NB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
148.885	601923	N OF AVENUE 9 (AVE 10) 99 NB	Major	Major	-1	Major	Major	-1	-1	-1	-1	10.0
150.092	601924	AVENUE 11 99 NB	-1	-1	Major	-1	-1	Major	Major	Major	Major	6.7
150.922	601443	RTE 99 S/O AVENUE 12 NB	-2	-2	-1	-2	-2	-1	-1	-1	-1	0.0
151.532	601320	RTE 99 AT AVE 12 NB	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
152.717	601935	AT AVENUE 13 NB	Med	Med	Med	Med	-1	-1	Med	Med	Med	4.2
153.748	601301	GATEWAY DR SR 99 SB	Med	Med	Med	-1	-2	Med	Med	Med	Med	4.2
154.199	601302	MADERA AVE. 99 NB	-1	-1	-1	Med	-3	-1	-1	-1	-1	2.5
154.589	601303	N/O MADERA AVE 99 NB	-2	-2	-2	-1	-4	-2	-2	-2	-2	na
155.148	601304	2nd ST SR 99 NB	-3	-3	-3	-2	-5	-3	-3	-3	-3	na
155.728	601385	N OF FRESNO RIVER 99 SB	Major	-4	Med	Major	-6	Med	Med	Med	Med	6.0
156.123	601305	0.2 MI N/O AVE 15 1/2 (CLEVE) 99	-1	-5	Major	-1	-7	Major	Major	Major	Major	10.0

Figure A-21: Evaluation Results – SR-99 N – Part 1

MilePost	VDS	Location	Weekday Spring 3/14/2023	Weekday Summer 7/18/2023	Weekday Fall 9/19/2022	Weekend Spring 3/12/2022	Weekend Summer 7/16/2022	Weekend Fall 9/24/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Votes
156.809	601306	N/O AVE 16 99 NB	-2	-6	Major	-2	-8	Major	Major	Major	Major	10.0
157.225	601936	S/O AVENUE 17 NB	Med	Med	Major	Med	Med	Major	Major	Major	Major	8.3
158.136	601937	AT AVE 17 NB	-1	-1	Med	-1	-1	Med	Med	Med	Med	5.0
160.632	601307	RTE 99 AVE 18 1/2 NB	Major	Med	-1	Med	Med	-1	-1	-1	-1	2.1
160.633	602307	RTE 99 AVE 18 1/2 SB	-1	-1	-2	-1	-1	-2	-2	-2	-2	na
162.404	601317	RTE 99 S/O AVE 20 1/2 NB	Med	-2	Med	-2	-2	-3	Med	Med	Med	3.3
164.547	601321	RTE 99 AT AVE 21 1/2 NB	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
166.027	601319	RTE 99 N/O AVE 22 1/2 NB	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
167.537	601322	RTE 99 S/O AVE 24 NB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
168.418	612427	Ave 24 1/2 SB 99	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
170.237	601323	RTE 99 S/O RTE 233 NB	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
172.167	601366	AT MINTURN RD (RD 15 OC) NB	-3	-3	Med	-3	-3	Med	Med	Med	Med	5.0
173.474	1034410		-4	-4	-1	-4	-4	-1	-1	-1	-1	na
173.976	10106010	Chowchilla Weigh Station	Med	Med	-2	-5	Med	-2	-2	-2	-2	1.3
174.337	1034510	N/O On Ramp from Truck Inspecti	-1	-1	-3	-6	-1	-3	-3	-3	-3	na
174.913	10105010	S/O Harvey Pettit Rd	Major	Major	Major	Med	Med	Med	Major	Major	Major	8.8
175.447	10105210	N/O Harvey Pettit Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
175.514	10105410	N/O Harvey Pettit Rd	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
176.480	10105610	S/O Sandy Mush Rd	-3	-3	-3	-3	-3	-3	-3	-3	-3	0.0
176.896	10108010	N/O Plainsburg Rd OC	-4	Med	-4	-4	Med	Med	-4	-4	-4	1.4
177.575	10106410	S/O Buchanan Hollow Rd	Med	Med	-5	-5	-1	-1	-5	-5	-5	2.5
178.082	10106610	S/O Athlone Rd	Med	Med	Cumul Abs	Med	Med	Med	-6	Cumul Abs	Cumul Abs	2.5
179.091	1094910	N/O Athlone Rd	-1	-1	-1	Med	Med	-1	Cumul Abs	-1	-1	1.0
179.571	1095010	N/O Athlone Rd	-2	-2	-2	-1	-1	-2	-1	-2	-2	0.0
180.068	1095210	N/O Le Grand Rd Off Ramp	Cumul Abs	-3	Cumul Abs	-2	Med	Med	-2	-3	Cumul Abs	1.4
180.808	1095410	N/O Le Grand Rd	Med	Cumul Abs	Med	-3	Med	Med	Med	Med	Med	4.3
184.119	1013010	S/O Mission Ave	-1	-1	-1	-4	-1	-1	-1	-1	-1	na
184.403	1013110	S/O Mission Ave	-2	-2	-2	-5	-2	-2	-2	-2	-2	na
184.652	1013210	S/O Mission Ave	-3	-3	-3	-6	-3	-3	-3	-3	-3	na
184.879	1013310	S/O Mission Ave	-4	-4	-4	-7	-4	-4	-4	-4	-4	na
185.830	1016810	S/O Gerard Ave	-5	Major	Med	-8	Med	Med	Med	Med	Med	5.5
186.304	1034610	S/O Off Ramp to Childs Ave	-6	-1	-1	-9	-1	-1	-1	-1	-1	na
186.418	1034710	N/O On Ramp from Childs Ave	-7	-2	-2	-10	-2	-2	-2	-2	-2	na
187.113	1034810	S/O Off Ramp to SR 140	-8	-3	-3	-11	-3	-3	-3	-3	-3	na
187.274	1034910	N/O Off Ramp to 16th St	-9	-4	-4	-12	-4	-4	-4	-4	-4	na
187.407	1035010	N/O On Ramp from SR 140	-10	-5	-5	-13	-5	-5	-5	-5	-5	na
187.643	1035110		-11	-6	-6	-14	-6	-6	-6	-6	-6	na
187.654	10107810	S/O G St	-12	-7	-7	-15	-7	-7	-7	-7	-7	na
187.903	1035210	S/O Off Ramp to SR 59/J St	-13	-8	-8	-16	-8	-8	-8	-8	-8	na
188.293	1035310	S/O On Ramp from SR 59/J St	-14	-9	-9	-17	-9	-9	-9	-9	-9	na
188.583	1035410	S/O Off Ramp to R St	-15	-10	-10	-18	-10	-10	-10	-10	-10	na
189.384	1035510	N/O On Ramp from Jct SR 140/ SR	-16	-11	-11	-19	-11	-11	-11	-11	-11	na
189.746	1008010	Jct SR 140 West SR 59 North	-17	-12	-12	-20	-12	-12	-12	-12	-12	na
191.707	1035610	S/O Franklin Rd	-18	-13	-13	-21	-13	-13	-13	-13	-13	na
191.840	1035710		-19	-14	-14	-22	-14	-14	-14	-14	-14	na
193.192	10110410	S/O Atwater-Merced Expressway	Major	Med	Major	Major	Med	Major	Major	Major	Major	9.2
193.514	10110010	N/O Atwater-Merced Expressway	-1	-1	-1	-1	Med	-1	-1	-1	-1	2.5
194.759	1036010	Buhach Rd	-2	-2	-2	-2	-1	-2	-2	-2	-2	na
196.125	1036110	Applegate Rd	-3	-3	-3	-3	-2	-3	-3	-3	-3	na
196.283	1036210	N/O Applegate Rd	-4	-4	-4	-4	-3	-4	-4	-4	-4	na
197.199	1036310	N/O On Ramp from Atwater Blvd	-5	-5	-5	-5	-4	-5	-5	-5	-5	na
198.708	1075910	N/O Westside Blvd	Major	Major	Med	Med	Major	Med	Med	Med	Med	6.3
200.264	1014710	S/O Sultana Dr/Liberty Ave OC	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
200.399	1014010	S/O Sultana Dr/Liberty Ave OC	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
200.639	1014110	N/O Sultana Dr/Liberty Ave On Ra	-3	-3	-3	-3	-3	-3	-3	-3	-3	0.0
200.894	1014210	N/O Sultana Dr/Liberty Ave OC	Cumul Abs	-4	-4	-4	-4	-4	-4	-4	-4	0.5
202.153	1036410	S/O Hammatt Ave	-1	-5	-5	-5	-5	-5	-5	-5	-5	na
202.699	1036510	S/O Main St	-2	-6	-6	-6	-6	-6	-6	-6	-6	na
203.508	1036610	S/O Winton Pkwy	-3	-7	-7	-7	-7	-7	-7	-7	-7	na
204.102	1036710	N/O Winton Pkwy	-4	-8	-8	-8	-8	-8	-8	-8	-8	na
204.642	1007010	S/O Merced River	-5	-9	-9	-9	-9	-9	-9	-9	-9	na
204.949	1036810	Merced River	-6	-10	-10	-10	-10	-10	-10	-10	-10	na
205.669	1036910	N/O Collier Rd	-7	-11	-11	-11	-11	-11	-11	-11	-11	na
206.562	1037010		-8	-12	-12	-12	-12	-12	-12	-12	-12	na
207.194	1037110	N/O South Ave	-9	-13	-13	-13	-13	-13	-13	-13	-13	na
207.680	1037210	N/O Shanks Rd	-10	-14	-14	-14	-14	-14	-14	-14	-14	na
208.238	1037310	S/O Bradbury Rd	-11	-15	-15	-15	-15	-15	-15	-15	-15	na
208.747	1058410		-12	-16	-16	-16	-16	-16	-16	-16	-16	na
209.226	1058210	S/O Off Ramp to Bradbury Rd	-13	-17	-17	-17	-17	-17	-17	-17	-17	na
209.561	1037410	S/O to Golden State Blvd	-14	-18	-18	-18	-18	-18	-18	-18	-18	na
210.670	1004010	N/O Griffith Rd OC	-15	-19	-19	Med	Med	Med	-19	-19	-19	1.3
210.912	1004110	Turlock Rest Stop	Med	-20	-20	Med	-1	-1	-20	-20	-20	5.0
211.162	1004210	Turlock Rest Stop	Med	-21	-21	Med	Med	-2	-21	-21	-21	3.8
211.412	1004310	N/O Golf Rd OC	-1	Cumul Abs	-22	-1	Med	-3	-22	-22	-22	0.5
212.306	10134110	S/O Lander Ave	-2	-1	-23	-2	-1	Med	Cumul Abs	-23	-23	0.6
214.070	10134710	S/O West Main St	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
215.118	10135310	S/O Fulkerth Rd	Med	-1	-1	-1	-1	-1	-1	-1	-1	0.4
215.841	1076910	N/O Fulkerth Rd	Major	Major	Major	Med	Major	Major	Major	Major	Major	9.6
216.022	10135610	S/O Monte Vista Ave	Major	Major	Major	Med	Med	Med	Major	Major	Major	8.8
217.355	10135910	S/O Taylor Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
218.326	10136210	S/O Keyes Rd	Med	-1	-1	-1	-1	-1	-1	-1	-1	0.4
219.653	1011410	S/O Faith Home Rd OC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
219.853	1011510	N/O Faith Home Rd OC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
220.153	1011610	S/O Mitchell Rd	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
221.408	10137010	W/O Mitchell Rd	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
221.638	10116410	Service Rd OC	-1	Med	Med	Med	-1	-1	Med	Med	Med	3.8
222.968	10116610	Whitmore Ave OC	Cumul Abs	-1	-1	-1	-2	-2	-1	-1	-1	0.1
224.007	1047710	Hatch Rd/ 9th St	-1	Major	Major	-2	Major	Major	Major	Major	Major	10.0
224.824	1058510	N/O 9th St	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
225.533	10117110	Crows Landing Rd OC	Major	-2	-2	Major	-2	-2	-2	-2	-2	1.7
225.771	1058910	N/O Crows Landing	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
226.255	10139010	N/O Tuolumne Blvd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
226.514	10128610	5th Street	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
227.131	10139710	N/O K St S/O L St	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
227.350	1005010	Maze Blvd	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
227.859	10115510	Kansas Ave	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
228.827	10133210	N/O Woodland Ave	Med	-3	-3	Med	-3	-3	-3	-3	-3	0.8
229.391	10140110	S/O Briggsmore Ave	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
229.580	10115810	N/O Carpenter Rd/Briggsmore Ave	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
231.519	10128910	Beckwith Rd	Med	[illegible]	[illegible]	Med	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	5.0
232.281	1058010	S/O On Ramp from Pelandale Ave	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
233.653	10109610	N/O SR 219/Broadway Ave	Major	Med	Med	Major	Med	Med	Med	Med	Med	5.8
234.083	10109810	N/O SR 219/Broadway Ave	Major	Med	Med	Med	Med	Major	Med	Med	Med	5.8
235.332	1005210	Hammett Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
235.427	10142510	S/O On From Hammett Rd	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
236.603	1074410	N/O On from Main St	-3	Med	-3	-3	-3	-3	-3	-3	-3	0.4
237.413	1059810	S/O On Ramp from Milgeo Ave	-4	-1	-4	-4	-4	-4	-4	-4	-4	0.0
237.490	1013610	Milgeo OC	-5	Med	-5	-5	Med	-5	-5	-5	-5	0.4
237.520	1006210	Milgeo Ave	-6	Med	-6	-6	-1	-6	-6	-6	Cumul Abs	0.8
237.955	1060010	N/O Off Ramp to Jack Tone Rd	Cumul Abs	Med	Med	Med	Med	Med	Med	Med	Med	4.7
238.310	1060210	S/O On Ramp from Jack Tone Rd	-1	Med	-1	-1	Med	-1	-1	-1	-1	0.8
238.999	10111110	N/O Jack Tone Rd	-2	-1	-2	-2	Med	-2	-2	-2	-2	0.4
240.782	1060510	S/O On Ramp from Austin Rd	-3	-2	Cumul Abs	-3	-1	Cumul Abs	Cumul Abs	Cumul Abs	Cumul Abs	0.8
241.227	10100710	S/O SR 120	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
241.614	1097010	Jct SR 120	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
242.191	1098210	S/O Yosemite Ave	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
242.568	1097510	N/O Yosemite Ave	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
243.241	1098010	Cottage Ave OC	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
243.793	1099710	N/O Louise Ave	-1	-1	-1	-1	-1	Med	-1	-1	-1	0.5
244.099	1099910	N/O Louise Ave	-2	-2	-2	-2	-2	Med	-2	-2	-2	0.4
244.646	10104710	S/O Lathrop Rd	-3	-3	-3	-3	-3	-1	-3	-3	-3	0.0
244.966	10100610	S/O Lathrop Rd OC Ramp	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
245.150	10104410	N/O Lathrop Rd	Major	Med	Major	Med	Med	Med	Major	Major	Major	8.3
245.680	10111310	N/O Lathrop Rd	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Major	[illegible]	[illegible]	[illegible]	3.3

Figure A-22: Evaluation Results – SR-99 N – Part 2

246.191	10104210	S/O French Camp Rd	-2	-2	-2	-2	Med	Major	-2	-2	-2	1.3
246.702	1099210	S/O French Camp Rd	-3	-3	-3	Med	-1	-1	-3	-3	-3	2.5
247.174	10102110	S/O French Camp Rd OC	-4	-4	-4	Med	-2	-2	-4	-4	-4	0.4
247.477	10100210	N/O French Camp Rd OC	-5	-5	-5	-1	-3	-3	-5	-5	-5	0.0
247.736	10101710	N/O French Camp Rd	-6	-6	-6	-2	-4	-4	-6	-6	-6	0.0
248.245	1099110	S/O Little John Creek	Med	Med	Med	-3	Med	-5	Med	Med	Med	4.2
248.567	10102010		-1	-1	-1	-4	-1	-6	-1	-1	-1	0.0
249.202	1099410	S/O Arch Rd	-2	-2	-2	-5	-2	-7	-2	-2	-2	0.0
249.708	10100010	S/O Arch Rd	-3	-3	-3	-6	-3	-8	-3	-3	-3	0.0
250.328	10103910	S/O Arch Rd	Med	Med	Major	Med	Med	Med	Major	Major	Major	7.9
250.621		N/O Arch Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
250.693	10103810	N/O Arch Rd	-2	-2	-2	-2	Major	-2	-2	-2	-2	10.0
252.402	10117510	S/O Mariposa Rd OC	Med	Med	-3	Med	Major	Med	-3	-3	-3	6.0
252.602	10117910	N/O Mariposa Rd OC	-1	-1	-4	-1	-1	-1	-4	-4	-4	0.0
253.316	10118810	N/O Golden Gate Ave OC	Med	Med	-5	Med	Med	Med	-5	-5	-5	5.0
254.470	10129410	S/O Jct. SR 4 West	Major	Major	-6	Major	Major	Major	-6	-6	-6	10.0
254.680	10129110	N/O Jct. SR 4 West	-1	-1	-7	-1	-1	-1	-7	-7	-7	0.0
255.210	10107010	N/O Fremont St	-2	-2	-8	Major	-2	-2	-8	-8	-8	10.0
255.413	1017510	N/O Fremont St	-3	Major	-9	Med	Major	Major	-9	-9	-9	8.8
255.678	1017610	S/O Waterloo Rd	-4	-1	-10	-1	-1	-1	-10	-10	-10	0.0
255.959	1017710	S/O Waterloo Rd	-5	-2	-11	-2	-2	-2	-11	-11	-11	0.0
256.165	10114610	N/O Waterloo Rd OC	-6	Med	-12	Med	Med	Med	-12	-12	-12	5.0
256.207	1017810	N/O Waterloo Rd	-7	-1	-13	-1	-1	-1	-13	-13	-13	0.0
256.224	10107410	N/O SR 88/ Waterloo Rd	-8	-2	-14	-2	-2	-2	-14	-14	-14	0.0
256.415	1017910	N/O Waterloo Rd	-9	-3	-15	-3	-3	Med	-15	-15	-15	1.3
256.612	1018110	S/O Off Ramp to Cherokee Rd	-10	-4	-16	-4	-4	-1	-16	-16	-16	0.0
256.798	10107210	N/O Cherokee Rd OC	-11	Med	-17	Med	Med	Med	-17	-17	-17	5.0
256.963	1018210	N/O On Ramp from Cherokee Rd	-12	-1	-18	-1	-1	-1	-18	-18	-18	0.0
257.163	1018310	S/O Wilson Way OC	-13	-2	-19	-2	-2	-2	-19	-19	-19	0.0
257.421	1018410	S/O Wilson Way OC	-14	-3	-20	-3	-3	-3	-20	-20	-20	0.0
257.656	1018510	N/O Off Ramp to Wilson Way	-15	Med	-21	Med	Med	Med	-21	-21	-21	5.0
257.896	1018610	N/O Off Ramp to Wilson Way	-16	-1	-22	-1	-1	-1	-22	-22	-22	0.0
258.171	1018710	S/O On Ramp from Hammer Lane	-17	Med	-23	-2	Major	Med	-23	-23	-23	6.7
258.409	1018810	S/O On Ramp from Hammer Lane	Major	Med	Major	Med	Med	Med	Major	Major	Major	8.3
258.652	1018910	S/O Off Ramp to Hammer Lane	-1	Major	-1	Major	Major	Major	-1	-1	-1	10.0
258.860	10107610	N/O E.Hammer Lane OC	-2	-1	-2	-1	Med	-1	-2	-2	-2	1.3
259.836	1014310	Morada Lane	-3	-2	-3	-2	-1	-2	-3	-3	-3	na
260.806	1013810	S/O Eight Mile Rd	Major	Med	Major	-3	-2	-3	Major	Major	Major	7.1
260.810	1013710	N/O Morada OC	-1	-1	-1	-4	-3	-4	-1	-1	-1	0.0
260.984	1013910	S/O Eight Mile Rd	-2	-2	-2	-5	-4	-5	-2	-2	-2	0.0
264.910	1006410	South Lodi OC	Med	-3	-3	-6	-5	-6	-3	-3	-3	2.5
265.502	1071410	S/O On from Kettleman Ln	-1	-4	-4	-7	-6	-7	-4	-4	-4	na
267.095	1068610	N/O Off Ramp to Turner Rd	-2	-5	-5	-8	-7	-8	-5	-5	-5	na
268.224	1006610	Woodbridge Rd OC	-3	Med	Med	-9	Med	Med	Med	Med	Med	5.0
268.466	1062410	Acampo Road	-4	-1	-1	-10	-1	-1	-1	-1	-1	na
271.457	1062910	N/O Jahant Road	-5	-2	-2	-11	-2	-2	-2	-2	-2	na
272.336	1063310	S/O Collier Rd	-6	-3	-3	-12	-3	-3	-3	-3	-3	na
273.555	1063510	S/O Liberty Rd	-7	-4	-4	-13	-4	-4	-4	-4	-4	na
274.660	3414051	99NB at Crystal Way	Med	Med	Med	Med	-5	Med	Med	Med	Med	4.6
275.400	319091	A St	Med	-1	-1	-1	-6	-1	-1	-1	-1	0.4
278.243	3414064	99NB JNO Twin Cities	Major	Major	Med	Med	Major	Med	Med	Med	Med	6.3
283.360		99NB at Eschinger Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
284.473	317146	99NB at Eschinger Rd CCTV	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
284.660	317143	99NB at Grant Line	Med	Med	Med	-1	-1	Med	Med	Med	Med	4.2
285.401	317862	WB Grantline Rd	Med	Med	Med	Med	-2	-1	Med	Med	Med	4.2
286.472	319390	99NB at JNO Grant Line	-1	-1	-1	-1	-3	-2	-1	-1	-1	na
287.071	319480	JSO Elk Grove Blvd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
287.071	319481	E Stockton Blvd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
287.271	313190	E Stockton Blvd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
287.271	314730		-1	-1	-1	-1	-1	-1	-1	-1	-1	na
287.759	314697	Red Fox	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
287.759	314698	Red Fox	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
288.233	313166	99NB at Laguna	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
288.379	313172	WB Laguna Blvd	Major	Med	Major	Major	Major	Major	Major	Major	Major	9.6
288.884	313178	99NB at Laguna Creek Bridge	Major	Major	Major	Major	-1	Major	Major	Major	Major	10.0
289.258	317960	99NB at Sheldon Rd	Major	Major	Major	Major	-2	Major	Major	Major	Major	9.2
289.450	317948	WB Sheldon Rd	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
290.624	312648	EB Calvine Rd	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
290.737	312651	99NB at Calvine Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
291.631	312233	99NB at Stockton Blvd	-1	-1	-1	Med	Med	-1	-1	-1	-1	0.8
292.023	312382	EB Mack Rd	-2	-2	-2	-1	-1	-2	-2	-2	-2	0.0
292.365	312386	WB Mack Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
292.769	312388	Tangerine Ave	Med	Major	Major	Med	Major	Major	Major	Major	Major	9.2
293.046	317910	Pomegranate Ave	-1	Med	-1	-1	Med	Med	-1	-1	-1	1.3
293.412	312421	Orange Ave	-2	-1	-2	Med	Med	Med	-2	-2	-2	1.3
293.967	312422	99NB at Florin Rd	Med	Med	Med	Med	Major	Med	Med	Med	Med	5.4
294.153	312425	99NB at Florin Rd	Med	Med	Med	Topo	Topo	Topo	Med	Med	Med	6.3
294.666	312513	99NB at Maynard Way	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
295.223	312514	EB 47th Ave	Major	Topo	Major	Major	Topo	Major	Major	Major	Major	10.0
295.421	312520	99NB at 47th Ave	Med	Topo	Med	Topo	Topo	Topo	Med	Med	Med	6.7
296.010	312523	Martin L King Jr	-1	Major	-1	-1	Major	-1	-1	-1	-1	1.7
296.291	312525	EB Fruitridge	-2	-1	-2	-2	-1	-2	-2	-2	-2	0.0
296.507	312527	WB Fruitridge	-3	-2	-3	-3	-2	-3	-3	-3	-3	0.0
297.478	3070092	14th Ave-NB 99	Med	-3	Med	Med	Med	-4	Med	Med	Med	4.5
297.672	312562	99NB at 12th Ave	Major	-4	Major	Major	-1	Med	Major	Major	Major	9.5
297.889	318566	99NB at 8TH AVE POC	-1	Med	-1	-1	Med	-1	-1	-1	-1	0.8
298.615	312566	99NB at Broadway (US-50)	Major	Major	Major	Major	Topo	Major	Major	Major	Major	10.0
299.036	317876		Major	[illegible]	[illegible]	Major	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.0
299.036			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
299.569	3044091	99NB at Ternhaven Way (I-5 Split)	Major	#VALUE!	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.0
300.085	316827	Elkhorn Blvd	Major	#VALUE!	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	10.0
301.996	3050041	99NB at W Elverta	Med	Major	Major	Med	Major	Major	Major	Major	Major	9.2
302.300	3050031	99NB at W Elverta	-1	#VALUE!	-1	-1	-1	-1	-1	-1	-1	0.0
302.708	316835	N. of W Elverta Rd	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
304.632	3050081	WB W. Riego Rd	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
304.744	316851	N. of W Reigo Rd	Med	Major	Major	-1	Major	Major	Major	Major	Major	9.5
306.551	316862	Sankey Rd	-1	Med	Major	-2	Med	Med	Major	Major	Major	8.5
309.083	317038	Howsley Rd UC	Med	-1	-1	-3	-1	-1	-1	-1	-1	0.5
310.692	316922	N. of W. Catlett Rd	-1	-2	-2	-4	-2	-2	-2	-2	-2	0.0
311.291	3415021	99NB JCT 99 and 70	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
313.157	316932	N. of Striplin Rd	Major	-1	-1	-1	-1	-1	-1	-1	-1	0.9
314.541	316940	N. of Powerline Rd	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
323.372	3415051	99NB at Tudor Rd	Major	Major	Major	Med	Major	Major	Major	Major	Major	9.6
334.100	3415064	99NB JSO Butte House	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
356.613	3410015	99NB LEAD AT 99NB JCT 99 and 162	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
356.775	3410011	99NB TRAIL AT 99NB JCT 99 and 16	-1	-1	-1	-1	-1	Med	-1	-1	-1	0.4
369.062	3410024	99NB 99SB at JSO Durham	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
371.271	3011012	99NB at JSO Neal Rd	-1	Major	Major	-1	Med	Major	Major	Major	Major	9.5
375.502	3016021	99NB at JSO Skyway CCTV	Major	Major	Major	-2	-1	-1	Major	Major	Major	10.0
375.524	3016051	99NB at JSO Skyway CMS	Med	Med	Med	Major	Med	Med	Med	Med	Med	5.4
376.091		99NB at Skyway	-1	Major	Major	-1	Major	Major	Major	Major	Major	10.0
376.166	3016061	99NB at Skyway CCTV	Major	-1	-1	Major	-1	-1	-1	-1	-1	1.7
376.305	318509	99NB at Skyway	Major	Major	Major	Med	Major	Major	Major	Major	Major	9.6
377.072	3016071	99NB at E 20th St NB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
377.194	3001021	99NB at E 20th St	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
378.034	3001091	99NB AT JSO COHASSET RD	-2	-2	Major	-2	-2	-2	Major	Major	Major	10.0
379.525	3016092	99NB at 99SB JSO E Eaton Rd NB M	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
381.598	3017031	99NB JSO E Eaton Rd	Major	Major	-1	Major	Major	Major	-1	-1	-1	4.2
381.598		99NB at JNO Eaton Rd	-1	-1	Major	-1	-1	-1	Major	Major	Major	8.8
382.268	3410034		[illegible]	Major	[illegible]	[illegible]	Major	Major	[illegible]	[illegible]	[illegible]	10.0
382.495	3017042		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	na
383.254	3017052	99NB at Garner Ln CCTV	Major	-2	-3	-4	-2	-2	-3	-3	-3	1.1

Figure A-23: Evaluation Results – SR-99 N – Part 3

Milepost	VDS	Location	Weekday Spring 3/14/2023	Weekday Summer 7/18/2023	Weekday Fall 9/19/2022	Weekend Spring 3/12/2022	Weekend Summer 7/16/2022	Weekend Fall 9/24/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Votes
383.232	3017051	99SB at Garner Ln CCTV	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
382.241	3017041	99SB at JNO Eaton Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
381.573	3410031	99SB at 99SB JSO E Eaton Rd MVDS	-2	Major	Major	-2	Major	Major	Major	Major	Major	10.0
381.573	3017021	99SB at 99SB JSO E Eaton Rd NB M	Major	-1	-1	Major	-1	-1	-1	-1	-1	1.7
381.571	3017032	99NB at 99SB JSO E Eaton Rd MVDS	-1	Major	Major	-1	Major	Major	Major	Major	Major	8.3
381.568	3017022	99SB JSO E Eaton Rd	Major	-1	Major	Major	-1	Major	Major	Major	Major	10.0
380.438	3016011	99NB at Southgate CCTV	-1	-2	Major	-1	-2	Major	Major	Major	Major	10.0
379.820	3016101	WB COHASSET RD 99SB LOOP	-2	Major	Med	-2	-3	Major	Med	Med	Med	6.1
379.820	3016102	WB COHASSET RD 99SB LOOP	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
379.496	3016091	99SB AT JSO COHASSET RD	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
377.049	3016072	99NB at E 20th St SB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
376.268		99SB at Skyway	-1	-1	Major	-1	Major	Major	Major	Major	Major	10.0
376.148	318510	99NB at Skyway CCTV	Major	Med	Med	Major	Major	Major	Med	Med	Med	6.7
376.060		EB Skyway to 99NB Loop - OS	-1	Major	-1	-1	Major	Major	-1	-1	-1	10.0
375.494	3016052	99SB at JSO Skyway CMS	Major	Med	Major	Major	Major	Major	Major	Major	Major	9.6
375.471	3016022	99SB at JSO Skyway CCTV	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
374.920	3016012	99SB at Southgate CCTV	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
371.245	3011011	99SB at JSO Neal Rd	-3	Major	Med	-3	Med	Med	Med	Med	Med	5.5
369.031	3410021	99SB at JSO Durham	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
356.756	3410014	99SB LEAD AT 99NB JCT 99 and 162	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
356.587	3410016	99SB TRAIL AT 99NB JCT 99 and 16	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
334.070	3415061	99SB JSO Butte House	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
323.345	3415054	99SB at Tudor Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
315.271	3423061	99SB JSO Garden Hwy UC	Med	Major	Major	Med	Major	Major	Major	Major	Major	9.2
314.516	316944	N. of Powerline Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
313.132	316936	N. of Striplin Rd	Major	-2	-2	Major	-2	-2	-2	-2	-2	1.7
311.284	3415024	99SB JCT 99 and 70	Major	Med	Med	Major	Med	Med	Med	Med	Med	5.8
310.667	316928	N. of W. Catlett Rd	-1	Major	Major	-1	Major	Major	Major	Major	Major	10.0
309.058	317042	Howsley Rd UC	Major	-1	-1	Major	-1	-1	-1	-1	-1	1.7
306.526	316916	Sankey Rd	-1	-2	Med	-1	-2	-2	Med	Med	Med	3.5
304.719	316856	N. of W Reigo Rd	Major	Major	Major	Major	Med	Med	Major	Major	Major	9.2
304.550	3050101	WB W.Riego Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
304.359	3050091	EB W. Riego Rd	Med	Med	Major	Med	Med	Med	Major	Major	Major	7.9
302.683	316839	N. of W Elverta Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
302.106	320552	99SB at W Elverta	-2	Med	-2	-2	-2	-2	-2	-2	-2	0.4
301.816	3050011	99SB at W Elverta	-3	-1	-3	-3	-3	-3	-3	-3	-3	0.0
300.099	3044101	WB W. Elkhorn Blvd-SB99	-4	-2	-4	-4	-4	-4	Cumul Abs	-4	-4	0.2
300.058	317045	Elkhorn Blvd	Med	-3	-5	Med	-5	-5	-1	-5	-5	5.0
299.542	3044092	99SB at Ternhaven Way (I-5 Split)	Major	Major	-6	Major	Major	Major	-2	-6	-6	10.0
299.240	317877		Major	-1	-7	Major	-1	#VALUE!	-3	-7	-7	10.0
298.301	3070053	Broadway Street-SB99 (US-50)	Major	Major	Topo	Major	Major	Major	Topo	Topo	Topo	10.0
297.864	312564	99SB at 8TH AVE POC	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
297.641	318859	14th Ave-SB 99	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
297.453	3070083	14th Ave-SB 99	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
297.031	317896	21st Ave UC	-3	-3	-3	-3	-3	-3	-3	-3	-3	na
296.265	313144	Fruitridge Rd	-4	Med	Med	-4	Med	Med	Med	Med	Med	5.0
295.985	318035	Martin L King Jr	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
295.985	318036	Martin L King Jr	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
295.409	3070073	WB 47th Ave-SB99	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
295.283	312517	EB 47th Ave	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
294.690	318029	99SB at Maynard Way	Med	Major	Major	Med	Major	Major	Major	Major	Major	9.2
294.012	3046032	EB Florin Rd-SB99	Topo	Topo	Major	Topo	Topo	Major	Major	Major	Major	10.0
293.386	317974	Oranage Ave	Med	Major	Med	Med	Major	Med	Med	Med	Med	5.8
293.021	312420	Pomegranate Ave	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
292.742	317903	Tangerine Ave	-2	Major	Major	-2	Major	Major	Major	Major	Major	8.3
291.990	319075	Bruiceville Rd	Major	Major	-1	Major	Major	-1	-1	-1	-1	10.0
291.947	314501		Med	-1	Major	Med	Med	-2	Major	Major	Major	7.7
291.502	314617	Stockton Blvd	-1	-2	Major	-1	Major	Major	Major	Major	Major	9.0
290.763	314681	99SB at Calvine Rd	Med	Major	Major	Med	Major	Major	Major	Major	Major	9.2
290.675	316399	99SB at Cosumnes	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
289.962	312570	99NB at Jacinto Rd	Med	Med	Med	Med	-2	Med	Med	Med	Med	4.6
289.962	314625	99SB at Jacinto Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
289.098		99SB at Sheldon Rd	-1	Major	Major	-1	Major	Major	Major	Major	Major	10.0
288.858	317934	99SB at Laguna Creek Bridge	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
288.340	3019101	99SB at Laguna	-1	Major	-1	-1	Major	Major	-1	-1	-1	10.0
288.209	314689	EB Laguna Blvd	-2	Major	Major	-2	-1	-1	Major	Major	Major	8.9
286.447	317869	JSO Elk Grove Blvd	-3	-1	-1	-3	-2	-2	-1	-1	-1	na
286.447	317870	JSO Elk Grove Blvd	-4	-2	-2	-4	-3	-3	-2	-2	-2	na
285.380	317861	99SB at JNO Grant Line	Major	Med	Major	Major	Major	Major	Major	Major	Major	9.6
284.566	317139	99SB at Grant Line	-1	Major	Major	-1	Med	Major	Major	Major	Major	7.9
284.400	317141	EB Grantline Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
283.411		99SB at Eschinger Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
278.214	3414061	99SB JNO Twin Cities	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
275.106	319100	C St	Med	Med	Med	Med	-3	-3	Med	Med	Med	4.2
274.638	3414054	99SB at Crystal Way	Med	-1	-1	Med	Cumul Abs	-4	-1	-1	-1	0.9
273.758	1063910	S/O Liberty Rd	-1	-2	-2	-1	-1	-5	-2	-2	-2	na
271.571	1064110	S/O Jahant Road	-2	-3	-3	-2	-2	-6	-3	-3	-3	na
269.476	1064610	S/O Acampo Rd	-3	-4	-4	-3	-3	-7	-4	-4	-4	na
268.199	1006710	Woodbridge Rd OC	-4	-5	Med	-4	Dist	Dist	Med	Med	Med	3.8
267.395	1067610	S/O Turner Rd	-5	-6	-1	-5	-1	-1	-1	-1	-1	na
264.885	1006510	South Lodi OC	Med	-7	-2	Med	-2	-2	-2	-2	-2	5.0
262.834	1017110	S/O Armstrong Rd OC	Med	Major	Major	Med	Major	Major	Major	Major	Major	9.2
262.546	1017210	S/O Armstrong Rd OC	-1	Med	Med	-1	Med	Med	Med	Med	Med	4.2
262.326	1017310	S/O Armstrong Rd OC	-2	Med	Med	-2	Med	Med	Med	Med	Med	4.2
262.061	1017410	S/O Armstrong Rd OC	-3	-1	-1	-3	-1	-1	-1	-1	-1	0.0
259.811	1014410	Morada Lane	-4	-2	-2	-4	-2	-2	-2	-2	-2	na
258.627	10111510	N/O On from Hammer Lane	-5	Med	-3	-5	Med	-3	-3	-3	-3	3.3
258.572	10113810	S/O Hammer Lane OC	-6	-1	-4	-6	-1	Med	-4	-4	-4	1.7
257.884	1019110	S/O Hammer Lane OC	-7	Major	-5	-7	Major	Major	-5	-5	-5	10.0
257.641	1019210	S/O Calaveras River OC	-8	-1	-6	-8	-1	-1	-6	-6	-6	0.0
257.396	1019310	S/O Wilson Way OC	-9	Med	-7	-9	Med	Med	-7	-7	-7	5.0
257.138	1019410	S/O Wilson Way OC	-10	-1	-8	-10	-1	-1	-8	-8	-8	0.0
256.922	1019510	N/O Cherokee Rd OC	-11	-2	-9	-11	-2	-2	-9	-9	-9	0.0
256.634	1019610	S/O Cherokee Rd OC	-12	-3	-10	-12	-3	-3	-10	-10	-10	0.0
256.542	10114010	S/O Cherokee Rd OC	-13	-4	-11	-13	-4	-4	-11	-11	-11	0.0
256.388	1019710	S/O On Ramp from Cherokee Rd	-14	-5	-12	-14	-5	-5	-12	-12	-12	0.0
256.177	1019810	S/O Off Ramp to Waterloo Rd/SR	-15	-6	-13	-15	-6	-6	-13	-13	-13	0.0
256.109	10114210	S/O Waterloo Rd OC	-16	-7	-14	-16	-7	-7	-14	-14	-14	0.0
256.057	10114410	S/O Waterloo Rd OC	-17	Cumul Abs	-15	-17	Cumul Abs	-8	-15	-15	-15	0.7
255.905	1047610	S/O SR 88	-18	-1	-16	-18	Med	Med	-16	-16	-16	3.3
255.892	1019910	S/O On Ramp from EB Waterloo Rd	-19	-2	-17	-19	-1	-1	-17	-17	-17	0.0
255.388	1018010	N/O Fremont St	-20	-3	-18	-20	-2	Med	-18	-18	-18	1.7
255.150	1020010	S/O On Ramp from WB Fremont St/	-21	Med	-19	-21	Med	Med	-19	-19	-19	5.0
255.145	10114810	N/O Fremont St	-22	Major	-20	-22	Med	Major	-20	-20	-20	8.3
254.895	1020110	S/O On Ramp from EB Fremont St/	-23	Med	-21	-23	Med	Med	-21	-21	-21	5.0
254.655	10129210	N/O Jct. SR 4 West	Major	Major	-22	Major	Major	Major	-22	-22	-22	10.0
254.635	10129310	West to Jct. SR 4	Major	Major	-23	Major	Major	Major	-23	-23	-23	10.0
254.445	10129510	S/O Jct. SR 4 West	Major	Major	-24	Major	Major	Major	-24	-24	-24	10.0
253.319	10118610	N/O Golden Gate Ave OC	Major	Major	-25	Major	Major	Major	-25	-25	-25	10.0
253.039	10118410	Farmington Rd	-1	Med	-26	-1	Med	Med	-26	-26	-26	3.0
252.762	10118310	Off to Mariposa Rd	Major	Major	-27	Major	Major	Major	-27	-27	-27	10.0
252.578	10118110	N/O Mariposa Rd OC	Major	Major	-28	Major	Major	Major	-28	-28	-28	10.0
252.408	10117710	S/O Mariposa Rd OC	-1	-1	-29	-1	-1	-1	-29	-29	-29	0.0
250.668	10103710	N/O Arch Rd	-2	-2	-30	-2	Med	-2	-30	-30	-30	5.0
250.303	10104010	S/O Arch Rd	-3	-3	-31	-3	-1	-3	-31	-31	-31	na
249.683	10100110	S/O Arch Rd	Med	Major	Med	Med	Med	Med	Med	Med	Med	5.4
249.177	1099510	S/O Arch Rd	-1	Med	-1	-1	-1	-1	-1	-1	-1	0.4
248.542	10101910	S/O Little John Creek	-2	-1	-2	-2	-2	-2	-2	-2	-2	0.0
248.220	1099010	S/O Little John Creek	-3	-2	-3	-3	-3	-3	-3	-3	-3	0.0
247.711	10101510	N/O French Camp Rd	Med	-3	-4	Med	-4	-4	-4	-4	-4	5.0
247.444	10100410	N/O French Camp Rd OC	-1	Med	Med	-1	-5	Med	Med	Med	Med	3.8
247.149	10102310	S/O French Camp Rd OC	-2	-1	-1	-2	-6	-1	-1	-1	-1	0.0
246.677	1099310	S/O French Camp Rd	-3	Med	-2	-3	Cumul Abs	-2	-2	-2	-2	0.5
246.166	10104310	S/O French Camp Rd	-4	-1	-3	-4	-1	-3	-3	-3	-3	0.0
245.655	10111410	N/O Lathrop Rd	-5	-2	Med	-5	-2	Major	Med	Med	Med	3.8

Figure A-24: Evaluation Results – SR-99 S - Part 1

Milepost	VDS	Location	Weekday Spring 3/14/2023	Weekday Summer 7/18/2023	Weekday Fall 9/19/2022	Weekend Spring 3/12/2022	Weekend Summer 7/16/2022	Weekend Fall 9/24/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Votes
245.125	10104510	N/O Lathrop Rd	Major	Major	Med	Major	Med	Med	Med	Med	Med	6.3
245.045	10101110	N/O Lathrop Rd OC	-1	Med	-1	-1	-1	-1	-1	-1	-1	0.4
244.902	10101310	S/O Lathrop Rd OC	-2	-1	Med	-2	-2	-2	Med	Med	Med	4.4
244.621	10104910	S/O Lathrop Rd	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
244.074	1099810	N/O Louise Ave	-1	Major	-1	-1	-1	-1	-1	-1	-1	0.8
243.768	1099610	N/O Louise Ave	-2	-1	-2	-2	-2	-2	-2	-2	-2	0.0
243.216	1097910	Cottage Ave OC	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
242.543	1097710	N/O Yosemite Ave	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
242.166	1098410	S/O Yosemite Ave	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
241.589	1097210	Jct SR 120	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
241.202	10100910	S/O SR 120	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
240.827	1031010	Austin Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
240.425	10106810	S/O Austin Rd OC	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
239.820	1065410		-2	#VALUE!	-2	-2	-2	#VALUE!	-2	-2	-2	na
239.822	1076410	S/O Austin Rd	Med	Med	Med	Med	-3	#VALUE!	Med	Med	Med	4.2
238.974	10111210	N/O Jack Tone Rd	Med	#VALUE!	-1	Med	-4	#VALUE!	-1	-1	-1	0.8
238.756	1076510	N/O Off to Jack Tone Rd	Med	#VALUE!	-2	Med	-5	#VALUE!	-2	-2	-2	0.8
238.374	1065210	S/O Off Ramp to Jack Tone Rd	-1	#VALUE!	-3	-1	-6	#VALUE!	-3	-3	-3	na
238.179	1076610	S/O On from Jack Tone Rd	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
237.866	1065010	N/O On Ramp from Jack Tone Rd	-1	#VALUE!	-1	-1	Med	#VALUE!	-1	-1	-1	0.4
237.495	1006310	Milgeo Ave	-2	Major	Major	-2	Major	Med	Major	Major	Major	9.5
236.561	10142710	N/O On From Main St	Med	Med	-1	Med	Med	#VALUE!	-1	-1	-1	1.7
235.307	1005310	Hammett Rd	Med	Major	Med	Med	Med	#VALUE!	Med	Med	Med	5.0
235.152	10142210	N/O On From Hammett Rd	-1	-1	-1	-1	-1	#VALUE!	-1	-1	-1	0.0
234.058	10109910	N/O SR 219/Broadway Ave	-2	-2	-2	-2	-2	#VALUE!	-2	-2	-2	0.0
233.625	1076310	N/O SR 219/Kiernan Ave	-3	-3	-3	-3	-3	#VALUE!	-3	-3	-3	na
233.548	10108810	S/O SR 219/Broadway Ave	Major	Major	Major	Major	Med	Med	Major	Major	Major	9.2
232.256	1057910	S/O On Ramp from Pelandale Ave	-1	-1	-1	-1	-1	#VALUE!	-1	-1	-1	na
231.494	10129010	Beckwith Rd	Major	Major	Major	Major	Med	Med	Major	Major	Major	9.2
229.555	10116010	N/O Carpenter Rd/Briggsmore Ave	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
228.802	10133310	N/O Woodland Ave	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
227.834	10115410	Kansas Ave	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
227.325	1005110	Maze Blvd	-2	-2	-2	-2	-2	-2	-2	-2	-2	na
227.105	10139510	N/O K St S/O L St	Major	Med	Major	Major	Med	Med	Major	Major	Major	8.8
226.489	10128710	5th Street	Major	Major	Major	Major	Med	Med	Major	Major	Major	9.2
226.252	10138710	N/O Tuolumne Blvd	Major	Major	Major	Major	Med	Med	Major	Major	Major	9.2
225.746	1059010	N/O Crows Landing	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
225.508	10116810	Crows Landing Rd OC	Med	Med	Med	Med	Med	Major	Med	Med	Med	5.4
224.799	1058610	N/O 9th St	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
223.982	1047810	Hatch Rd/ 9th St	-2	Med	Med	-2	Med	-2	Med	Med	Med	4.5
222.943	10116710	Whitmore Ave OC	Major	Med	Med	Major	Med	Med	Med	Med	Med	5.8
221.613	10116510	Service Rd OC	Med	-1	Med	Med	-1	-1	Med	Med	Med	3.8
221.387	10137210	W/O Mitchell Rd	Med	-2	-1	Med	-2	Med	-1	-1	-1	1.5
220.228	1011010	S/O Mitchell Rd	-1	-3	-2	-1	-3	-1	-2	-2	-2	na
219.928	1011110	S/O Mitchell Rd	-2	-4	-3	-2	-4	-2	-3	-3	-3	na
219.728	1011210	N/O Faith Home Rd OC	-3	-5	-4	-3	-5	-3	-4	-4	-4	na
219.528	1011310	S/O Faith Home Rd OC	-4	-6	-5	-4	-6	-4	-5	-5	-5	na
218.299	10136410	S/O Keyes Rd	Med	Med	Med	Med	Med	Major	Med	Med	Med	5.4
217.323	10128310	Taylor Rd	-1	-1	Med	-1	-1	-1	Med	Med	Med	2.9
216.510	10133610	N/O Monte Vista Ave	Major	Med	Med	Major	Med	Med	Med	Med	Med	5.8
215.816	1077010	N/O Fulkerth Rd	Major	Major	Major	Major	Med	Major	Major	Major	Major	9.6
214.093	10135010	N/O West Main St	-1	-1	Major	-1	-1	Major	Major	Major	Major	10.0
212.238	10134410	S/O Lander Ave	Major	-2	Med	Major	-2	Med	Med	Med	Med	6.0
209.490	1059110	S/O Golden State Blvd	Med	Major	-1	Med	Major	-1	-1	-1	-1	7.5
209.465	1040110		-1	-1	-2	-1	-1	-2	-2	-2	-2	na
209.201	1058110	S/O Off Ramp to Bradbury Rd	-2	-2	-3	-2	-2	-3	-3	-3	-3	na
208.722	1058310	S/O Bradbury Rd	-3	-3	-4	-3	-3	-4	-4	-4	-4	na
208.117	1040010	N/O Shanks Rd	-4	-4	-5	-4	-4	-5	-5	-5	-5	na
207.563	1039910		-5	-5	-6	-5	-5	-6	-6	-6	-6	na
207.118	1039810	N/O South Ave	-6	-6	-7	-6	-6	-7	-7	-7	-7	na
206.514	1039710	S/O On Ramp from South Ave	-7	-7	-8	-7	-7	-8	-8	-8	-8	na
205.564	1039610	N/O Collier Rd	-8	-8	-9	-8	-8	-9	-9	-9	-9	na
204.905	1039510	Merced River	-9	-9	-10	-9	-9	-10	-10	-10	-10	na
204.617	1007110	S/O Merced River	-10	-10	-11	-10	-10	-11	-11	-11	-11	na
203.953	1039410	N/O Winton Pkwy	-11	-11	-12	-11	-11	-12	-12	-12	-12	na
203.395	1039310	S/O Winton Pkwy	-12	-12	-13	-12	-12	-13	-13	-13	-13	na
202.575	1039210	S/O Hammatt Ave	-13	-13	-14	-13	-13	-14	-14	-14	-14	na
201.977	1039110		-14	-14	-15	-14	-14	-15	-15	-15	-15	na
201.485	1027510	N/O of Hunter Rd	Med	-15	-16	Med	-15	-16	-16	-16	-16	5.0
201.233	1027610	Hunter Rd	-1	Med	Med	-1	-16	-17	Med	Med	Med	4.0
200.991	1027710	N/O Sultana Dr	-2	-1	-1	-2	Med	Med	-1	-1	-1	0.8
200.802	1027810	Sultana Dr	-3	-2	-2	-3	-1	-1	-2	-2	-2	0.0
198.683	1075710	N/O Westside Blvd	-4	-3	-3	-4	-2	-2	-3	-3	-3	na
197.996	1076110	S/O Westside Blvd	-5	-4	-4	-5	-3	-3	-4	-4	-4	na
197.557	1039010	N/O Off Ramp to Atwater Blvd	-6	-5	-5	-6	-4	-4	-5	-5	-5	na
196.180	1038910	N/O On Ramp from Atwater Blvd	-7	-6	-6	-7	-5	-5	-6	-6	-6	na
195.979	1038810	Applegate Rd	-8	-7	-7	-8	-6	-6	-7	-7	-7	na
193.489	10110210	N/O Atwater-Merced Expressway	Major	Med	Med	Major	Med	-7	Med	Med	Med	5.4
193.167	10110610	S/O Atwater-Merced Expressway	-1	-1	-1	-1	-1	-8	-1	-1	-1	na
190.496	1038410	N/O Off Ramp to 16th St	-2	-2	-2	-2	-2	-9	-2	-2	-2	na
189.721	1008110	Jct SR 140 West SR 59 North	-3	-3	-3	-3	-3	-10	-3	-3	-3	na
189.386	1038310	N/O Off Ramp to Jct SR 140/SR 5	-4	-4	-4	-4	-4	-11	-4	-4	-4	na
189.251	1038210	S/O On Ramp from R St	-5	-5	-5	-5	-5	-12	-5	-5	-5	na
188.590	1038110	N/O Off Ramp to SR 59/ J St	-6	-6	-6	-6	-6	-13	-6	-6	-6	na
187.577	10106210	S/O G St	-7	-7	-7	-7	-7	-14	-7	-7	-7	na
187.351	1037810	N/O Off Ramp to EB SR 140	-8	-8	-8	-8	-8	-15	-8	-8	-8	na
186.975	1037710	S/O On Ramp from EB SR 140	-9	-9	-9	-9	-9	-16	-9	-9	-9	na
186.630	1037610	N/O Off Ramp to Childs Ave	-10	-10	-10	-10	-10	-17	-10	-10	-10	na
186.220	1037510	S/O On Ramp from Childs Ave	-11	-11	-11	-11	-11	-18	-11	-11	-11	na
185.805	1016910	S/O Gerard Ave	-12	Major	Major	-12	Med	Major	Major	Major	Major	9.5
185.671	1016210	S/O Gerard Ave	-13	-1	-1	-13	-1	-1	-1	-1	-1	na
185.430	1016310	S/O Gerard Ave	-14	-2	-2	-14	-2	-2	-2	-2	-2	na
185.188	1016410		-15	-3	-3	-15	-3	-3	-3	-3	-3	na
184.944	1016510	S/O Mission Ave	-16	-4	-4	-16	-4	-4	-4	-4	-4	na
182.049	1095810	Lingard Rd	Major	Med	Med	Major	Med	Med	Med	Med	Med	5.8
181.689	1095710	S/O Lingard Rd	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
181.241	1095610	S/O Worden Ave	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
180.781	1095510	N/O Le Grand Rd	-3	-3	-3	-3	-3	-3	-3	-3	-3	0.0
180.043	1095310	N/O Le Grand Rd Off Ramp	-4	-4	-4	-4	Med	-4	-4	-4	-4	0.4
179.546	1095110	N/O Athlone Rd	-5	-5	-5	-5	-1	-5	-5	-5	-5	0.0
178.057	10106710	S/O Athlone Rd	-6	-6	-6	-6	-2	-6	-6	-6	Cumul Abs	0.2
177.550	10106510	S/O Buchanan Hollow Rd	Cumul Abs	-7	-7	Cumul Abs	-3	-7	-7	-7	-1	0.5
176.871	10108210	N/O Plainsburg Rd OC	-1	-8	Cumul Abs	-1	-4	-8	-8	Cumul Abs	-2	0.3
176.455	10105810	S/O Sandy Mush Rd	-2	Cumul Abs	-1	-2	-5	-9	Cumul Abs	-1	-3	0.3
175.489	10105510	N/O Harvey Pettit Rd	Major	Med	-2	Major	Med	-10	-1	-2	-4	7.5
175.422	10105310	N/O Harvey Pettit Rd	-1	-1	-3	-1	-1	-11	-2	-3	-5	0.0
174.888	10105110	S/O Harvey Pettit Rd	-2	-2	-4	-2	-2	Med	-3	-4	-6	1.7
174.312	10108710	N/O On Ramp from Truck Inspecti	-3	-3	-5	-3	-3	-1	-4	-5	-7	na
173.951	10106110	Chowchilla Weigh Station	-4	-4	-6	-4	-4	-2	-5	-6	-8	0.0
173.449	10108510		-5	-5	-7	-5	-5	-3	-6	-7	-9	na
172.143	602366	AT MINTURN RD (RD 15 OC) NB	-6	-6	-8	-6	-6	-4	-7	-8	-10	0.0
170.233	602323	RTE 99 S/O RTE 233 SB	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
168.379	622427	Ave 24 1/2 SB 99	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
167.527	602322	RTE 99 S/O AVE 24 SB	-2	-2	-2	-2	Med	-2	-2	-2	-2	0.4
166.003	602319	RTE 99 N/O AVE 22 1/2 SB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
164.523	602321	RTE 99 AT AVE 21 1/2 SB	Major	Med	Med	Major	Med	Med	Med	Med	Med	5.8
162.384	602317	RTE 99 S/O AVE 20 1/2 SB	Major	Major	Med	Major	Med	Med	Med	Med	Med	6.3
158.097	602937	AT AVE 7 SB	-1	-1	Med	-1	-1	Med	Med	Med	Med	5.0
157.187	602936	S/O AVENUE 17 SB	Med	Med	-1	Med	Med	-1	-1	-1	-1	1.7
156.785	602306	N/O AVE 16 99 SB	-1	-1	Major	-1	-1	Major	Major	Major	Major	10.0
156.087	602305	0.2 MI N/O AVE 15 1/2 (CLEVE) 99	-2	-2	Major	-2	-2	Major	Major	Major	Major	10.0
155.713	602385	N OF FRESNO RIVER 99 SB	Major	-3	Med	Major	-3	Med	Med	Med	Med	6.0
155.173	602304	2nd ST SR 99 SB	-1	-4	-1	-1	-4	-1	-1	-1	-1	na
154.565	602303	N/O MADERA AVE 99 SB	-2	-5	-2	-2	-5	-2	-2	-2	-2	na

Figure A-25: Evaluation Results – SR-99 S - Part 2

Milepost	VDS	Location	Weekday Spring 3/14/2023	Weekday Summer 7/18/2023	Weekday Fall 9/19/2022	Weekend Spring 3/12/2022	Weekend Summer 7/16/2022	Weekend Fall 9/24/2022	Time of Day (Weekdays) Fall AM Peak 6-9	Time of Day (Weekdays) Fall Midday 11-14	Time of Day (Weekdays) Fall PM Peak 15-18	Votes
154.175	602302	MADERA AVE. 99 SB	Major			Major						10.0
153.724	602301	GATEWAY DR SR 99 SB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
152.685	602935	AT AVENUE 13 SB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
151.508	602320	RTE 99 AT AVE 12 SB										na
150.899	602443	RTE 99 S/O AVENUE 12 SB	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
150.068	602924	AVENUE 11 99 SB	-3	-3	-3	-3	-3	-3	-3	-3	-3	0.0
148.862	602923	N OF AVENUE 9 (AVE 10) 99 SB										0.0
147.485	602922	AVENUE 9 99 SB	Med	Med	Med	Med	-5	-5	Med	Med	Med	4.2
146.215	602442	RTE 99 AT AVE 8 SB	-1	-1	-1	-1	Cumul Abs	Cumul Abs	-1	-1	-1	0.2
144.876	602311	AT AVENUE 7 SB	Major	-2	Med	Major	Major	Med	Med	Med	Med	6.4
144.395	602925	99 N/O SAN JOAQUIN RIVER SB	Med			Med		Med				5.0
143.727	602316	AT SAN JOAQUIN RIVER SB	-1	Major	-2	-1	Med	Med	-2	-2	-2	1.7
143.386	602313	N/O HERNDON AVE SB		Med			Major					7.5
142.606	601239	HERNDON AVE 99 SB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
142.476	602308	Herndon Ave. 99 SB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
141.626	629968		Med			Med						5.0
141.096	602312	BARSTOW AVE 99 SB										na
140.316	602314	SHAW AVE 99 NB	Major	Med	Med	Major	Med	Med	Med	Med	Med	5.8
140.305	601269	SHAW AVE 99 SB										0.0
139.923	629966	GETTYSBURG AVE	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
139.276	602436	N OF ASHLAN AVE 99 SB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
138.775	601268	ASHLAN AVE 99 SB	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
138.295	601267	GOLDEN STATE BLVD 99 SB	Major	Med	Med	Major	Med	Med	Med	Med	Med	5.8
137.461	602434	RTE 99 N/O CLINTON	Major			Major						10.0
136.796	605266	CLINTON AVE/GOLDEN STATE 99 NB	Major	Major		Major						10.0
136.795	604266	CLINTON AVE/GOLDEN STATE 99 NB	Major	Major	Major	Major	Med	Med	Major	Major	Major	9.2
136.747	601265	CLINTON AVE 99 SB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
136.065	601264	McKINLEY AVE 99 SB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
135.525	601262	OLIVE AVE 99 SB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
135.115	619961	N OF BELMONT AVE	Med	Med		Med	Med					5.0
134.626	602433	RTE 99 N/O NIELSEN AVE SB	Med	Med	Med	Med	Med	Topo	Med	Med	Med	5.4
134.126	602432	RTE 99 JSO RTE 99/180 JCT SB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
133.645	602513	S/O EL DORADO ST OC SB	Med	Med	Med	Med	Topo	Topo	Med	Med	Med	5.8
133.326	602425	STANISLAUS ST 99 SB	Med			Med	Med					5.0
133.210	602737	TUOLUMNE ST SB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
130.789	629953	JENSEN AVE	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
129.825	619952	ORANGE AVE										na
129.315	619951	CEDAR AVE	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
128.516	602911	CENTRAL AVE 99 SB	-1	-1	-1	-1	-1	-1	-1	-1	-1	na
127.786	602910	CHESTNUT AVE 99 SB	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
127.076	602909	N OF AMERICAN AVE 99 SB	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
126.816	602908	AMERICAN AVE 99 NB	Major	-1	Major	Major	-1	Major	Major	Major	Major	10.0
126.316	602907	N OF JEFFERSON AVE 99 NB	Major	-2	Major	Major	-2	Major	Major	Major	Major	8.3
125.816	602906	N OF LINCOLN AVE 99 NB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
125.336	602905	N OF CLOVIS AVE 99 SB	-1	Med	-1	-1	Med	-1	-1	-1	-1	5.0
124.866	602105	CLOVIS AVE 99 SB	-2	-1	-2	-2	-1	-2	-2	-2	-2	na
124.096	602423	RTE 99 AT ADAMS SB	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
123.816	602902	N OF MERCED AVE 99 SB	Med	-1	-1	Med	Med	-1	-1	-1	-1	3.8
123.572	602901	MERCED AVE 99 SB	-1	-2	-2	-1	-1	-2	-2	-2	-2	na
123.165	601928	S/O MERCED AVE 99 NB	Major	Major	-3	Major	Major	-3	-3	-3	-3	10.0
116.556	602328	SB 99 JNO MOUNTAIN VIEW	Med	Med	Major	Med	Med	Major	Major	Major	Major	8.3
116.065	602324	SB 99 AT MOUNTAIN VIEW	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
113.692	602327	SB 99 N/O SIERRA (JCT 201)	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
112.339	602406	JNO MENDOCINO AVE SB	-2	Med	Med	-2	-2	-2	Med	Med	Med	4.4
110.156	602367	S/O AVE 384 SB	Med	Med	-1	Med	-3	Med	-1	-1	-1	4.0
108.711	602405	AT AVE 376 SB	-1	-1	-2	-1	-4	-1	-2	-2	-2	na
107.753	629914	99 N/O AVE 368 - SB	-2	-2	-3	-2	-5	-2	-3	-3	-3	0.0
107.311	602404	N/O MERRIT DR SB	-3	-3	-4	-3	-6	-3	-4	-4	-4	0.0
107.091	602403	AT MERRIT DR SB	-4	Med	Med	-4	Med	Med	Med	Med	Med	4.2
106.429	629912	99 AT AVE 360 - SB	Cumul Abs	-1	-1	Cumul Abs	-1	Med	-1	-1	-1	0.6
105.441	602914	N/O AVE 352 SB	-1	-2	-2	-1	-2	-1	-2	-2	-2	na
104.091	602913	1.18 MI S/O AVE 352 SB	-2	-3	-3	-2	-3	-2	-3	-3	-3	na
103.001	602912	1.25 MI N/O AVE 328 SB	-3	-4	-4	-3	-4	-3	-4	-4	-4	na
101.769	629913	99 AT AVE 328 - SB	-4	-5	-5	-4	-5	-4	-5	-5	-5	na
100.641	602402	99 AT AVE 320 SB	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
98.271	602377	S/O AVE 304 SB	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
96.097	602378	S/O RTE 198 SB	Med	Topo	Topo	Med	Med	Med	Topo	Topo	Topo	8.3
94.748	602408	S/O CALDWELL 99 SB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
86.197	602927	RTE 99 N/O PAIGE AVE SB	Major	Major	Major	Major	Med	Med	Major	Major	Major	9.2
84.246	602942	N/O AVE 200 OC SB	-1	Major	Major	-1	Major	Major	Major	Major	Major	8.3
81.997	602926	RTE 99 JNO AVE 184 SB	-2	Major	Major	-2	Major	Major	Major	Major	Major	8.3
80.589	602921	RTE 99 1.3 S/O AVE 184 SB	-3	-1	-1	-3	-1	-1	-1	-1	-1	na
77.977	602920	RTE 99 N/O AVE 152 OC SB	-4	-2	Med	-4	-2	-2	Med	Med	Med	3.5
76.207	602919	RTE 99 0.6 S/O SR 190 SB	Med	Med	Med	Med	-3	-3	Med	Med	Med	4.2
74.119	602918	RTE 99 1/4 MI N/O HESSE AVE OC S	-1	-1	-1	-1	-4	-4	-1	-1	-1	0.0
72.007	602917	RTE 99 N/O PIXLEY SB	-2	-2	-2	-2	-5	-5	-2	-2	-2	0.0
70.907	602916	RTE 99 .2 MI N/O AVE 96/TERRA BE	-3	-3	-3	-3	-6	-6	-3	-3	-3	na
69.697	602941	S OF AVE 96/TERRA BELLA AVE - 99	-4	-4	-4	-4	-7	-7	-4	-4	-4	0.0
67.576	602915	RTE 99 JSO AVENUE 72 SB	-5	-5	-5	-5	-8	-8	-5	-5	-5	0.0
66.051	602930	RTE 99 N/O AVE 56 OC SB	-6	-6	Med	-6	Dist	Dist	Med	Med	Med	3.8
63.886	602929	RTE 99 S/O AVE 48 SB	Med	Med	Med	Med	-1	Med	Med	Med	Med	5.0
61.327	602381	S OF AVENUE 24 SB	-1	-1	Med	-1	Med	-1	Med	Med	Med	3.3
58.777	602904	RTE 99 N/O COUNTY LINE RD SB	-2	-2	Med	-2	-1	-2	Med	Med	Med	2.9
57.306	602948	RTE 99 S/O CECIL AVE SB	-3	-3	-1	-3	-2	Med	-1	-1	-1	0.4
56.556	602947	RTE 99 N/O RTE 155 SB	Major	-4	Major	Major	-3	Major	Major	Major	Major	10.0
55.886	602946	RTE 99 S/O FIRST AVE SB	Med	-5	Med	Med	-4	Med	Med	Med	Med	5.0
55.226	602945	RTE 99 S/O WOOLOMES AVE SB	Major	Major	-1	Major	Med	-1	-1	-1	-1	8.8
53.302	602379	N OF POND RD OC 99 SB	-1	-1	-2	-1	-1	-2	-2	-2	-2	na
51.231	602106	RTE 99 JSO ELMO SB	-2	Med	Major	-2	-2	Med	Major	Major	Major	6.7
50.496	602944	RTE 99 KERN AVE PED OC SB	-3	-1	-1	-3	-3	-1	-1	-1	-1	0.0
48.515	602375	N OF WHISLER RD SB	-4	-2	-2	-4	-4	-2	-2	-2	-2	0.0
46.666	602943	RTE 99 1.5 MI N/O RTE 46 SB	-5	-3	-3	-5	-5	-3	-3	-3	-3	0.0
45.145	602374	AT RTE 46 SB	-6	-4	-4	-6	-6	-4	-4	-4	-4	0.0
43.521	602373	S/O RTE 46 SB	Med	Med	Med	Med	Med	-5	Med	Med	Med	4.6
41.776	602940	RTE 99 S/O KIMBERLINA RD SB	-1	-1	Med	-1	-1	Cumul Abs	Med	Med	Med	3.6
39.750	602939	RTE 99 S/O MERCED AVE SB	-2	Med	-1	-2	Med	-1	-1	-1	-1	0.8
37.450	602380	JNO LERDO HYW OC SB	Med	Med	Med	Med	-1	Med	Med	Med	Med	4.6
35.580	622361	RTE 99 S/O LERDO HWY SB	Major	Major	Major	Major	Major	Med	Major	Major	Major	9.6
33.850	602360	RTE 99 N/O 7TH STANDARD SB	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
31.982	629990	N OF 7TH STANDARD RD	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
31.312	619989	S OF 7TH STANDARD RD	Major	-3	Major	Major	-3	Major	Major	Major	Major	10.0
30.713	602369	JNO RTE 65	Major	Med	-1	Major	-4	-1	-1	-1	-1	8.3
29.993	602368	S OF RTE 65	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
29.023	602934	RTE 99 N/O OLIVE DR SB	-1	Major	Major	-1	Major	Major	Major	Major	Major	10.0
28.622	601260	SR99 at Olive Drive	-2	Major	Major	-2	Major	Major	Major	Major	Major	10.0
27.074	619985	N OF GILMORE SB	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
24.934	602358	S OF PALM AVE 99 SB	-1	Major	Major	-1	Major	Major	Major	Major	Major	10.0
24.647	619982	N OF RTE 58 OC AT SB OFF-RAMP	-2	Major	-1	-2	Major	-1	-1	-1	-1	10.0
22.302	629980	S OF PLANZ RD	Med	Med	Major	Med	Med	Major	Major	Major	Major	8.3
21.697	629979		Med	-1	-1	Med	-1	-1	-1	-1	-1	5.0
21.217	629978	S OF PACHECO RD	-1	-2	-2	-1	-2	-2	-2	-2	-2	na
20.928	619977	FAIRWIEW RD	Med	Major	Major	Med	Major	Med	Major	Major	Major	8.8
20.348	629976		Major	-1	-1	Major	-1	-1	-1	-1	-1	10.0
19.881	629975	BERKSHIRE RD	Major	Major	-2	Major	Major	-2	-2	-2	-2	10.0
19.405	601273	HOSKINGS AVE LP - 99 SB	Major	Major	Med	Major	Major	Major	Med	Med	Med	7.1
19.292	601271	HOSKINGS AVE 99 SB	-1	Med	Med	-1	Med	-1	Med	Med	Med	3.8
18.836	629973	N OF MCKEE RD	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
18.402	619972	N OF RTE 119 UC	Major	Major	-1	Major	Major	-1	-1	-1	-1	10.0
17.823	619971	NORTH OF CURNOW RD	Major	-1	-2	Major	-1	-2	-2	-2	-2	10.0
11.483	602359	RTE 99 AT UNION OFF-RAMP SB	Med	Major	-3	Med	Major	-3	-3	-3	-3	7.5
8.134	602382	AT SANDRINI OC SB	Med	-1	-4	Med	-1	-4	-4	-4	-4	5.0
6.295	602932	RTE 99 JNO DAVID RD SB	-1	Med	Major	-1	Med	Major	Major	Major	Major	9.0
3.483	602931	RTE 99 JSO RTE 166 SB	Med	-1	Med	Med	-1	Med	Med	Med	Med	5.0
1.561	602376	99/I5 Interchange	-1	Med	Med	-1	Med	-1	Med	Med	Med	5.0

Figure A-26: Evaluation Results – SR-99 S - Part 3

Milepost	VDS	Location	Weekday: Spring 3/14/2023	Weekday: Summer 7/18/2023	Weekday: Fall 9/18/2022	Weekend: Spring 3/12/2022	Weekend: Summer 7/16/2022	Weekend: Fall 9/17/2022	Time of Day (Weekdays) Fall: AM Peak 6-9	Time of Day (Weekdays) Fall: Midday 11-14	Time of Day (Weekdays) Fall: PM Peak 15-18	Votes
0.00	1048710	Jct SR I-5	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
0.42	1057010	Mossdale E-O Jct I-5	-1	Major	Major	Major	Major	Major	Major	Major	Major	10.0
1.77	10112910	McKinley Ave UC	-2	-1	-1	-1	-1	-1	-1	-1	-1	0.0
2.22	10113010	W-O Airport Way	Major	-2	Med	-2	-2	-2	-2	-2	-2	1.3
2.85	10113110	Airport Way OC	Major	Major	Major	Major	Major	Major	Med	Major	Major	9.2
3.34	10113210	W-O Union Ave	Major	-1	Major	Major	Major	Major	Major	Major	Major	10.0
3.83	1004510	Union Rd OC	Major	-2	Major	Major	Major	Major	Major	Major	Major	9.2
4.28	1004410	W-O Main St	Major	-3	Major	Major	-1	Major	Major	Major	Major	10.0
4.56	1003710	W-O Main St	Major	Med	Major	Major	Med	Major	Major	Major	Major	9.2
4.82	1003810	E-O Main St	Med	Med	Med	Med	Med	Med	Med	Med	Med	5.0
5.57	1003910	E-O Main St	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
47.59	1082210	W-O La Grange Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
47.68	1082410	E-O La Grange Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
71.89	10141510	E-O Ferretti Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
71.89	10141710	W-O Ferretti Rd	Major	Major	Med	Major	Major	Major	Med	-1	-1	5.4
72.37	10141910	Tenaya School	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
77.96	10145710	E-O Hells Hollow Rd	Major	Major	Major	Major	Major	Major	Major	Major	Med	9.2

Figure A-27: Evaluation Results – SR-120 E

Milepost	VDS	Location	Weekday: Spring 3/14/2023	Weekday: Summer 7/18/2023	Weekday: Fall 9/18/2022	Weekend: Spring 3/12/2022	Weekend: Summer 7/16/2022	Weekend: Fall 9/17/2022	Time of Day (Weekdays) Fall: AM Peak 6-9	Time of Day (Weekdays) Fall: Midday 11-14	Time of Day (Weekdays) Fall: PM Peak 15-18	Votes
72.44	10142010	Tenaya School	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	Topo	10.0
71.95	10141610	W-O Ferretti Rd	Major	Major	Major	Major	Major	Major	Major	Med	Major	9.2
71.95	10141810	E-O Ferretti Rd	Major	Major	Major	Major	Major	Major	Major	-1	Major	8.3
47.75	1082510	E-O La Grange Rd	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
47.65	1082310	W-O La Grange Rd	Major	Major	Major	Med	Med	Med	Major	Major	Major	8.8
5.25	10127810	E-O Main St	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
5.08	1002010	E-O Main St	Med	-1	-1	Med	-1	Med	-1	-1	-1	5.0
4.57	1002110	W-O Main St	-1	Med	Med	-1	Med	-1	Med	Med	Med	3.8
4.28	1002310	W-O Main St	Major	-1	Major	Major	-1	Med	Major	Major	Med	8.5
4.06	1002210	E-O Union Ave	Med	Med	-1	Med	Med	-1	-1	-1	-1	1.7
3.83	1002410	Union Rd OC	-1	Major	-2	-1	Major	-2	-2	-2	-2	1.7
3.34	1002510	W-O Union Ave	Med	-1	Med	-2	Major	Med	Med	-3	Med	4.1
2.85	1002610	Airport Way OC	-1	Major	-1	-3	-1	-1	-1	-4	-1	0.8
2.22	1002710	W-O Airport Way	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0
1.77	1002810	McKinley Ave UC	-1	-1	-1	-1	-1	-1	-1	-1	-1	0.0
1.27	1002910	Wyche OH	-2	-2	-2	-2	-2	-2	-2	-2	-2	0.0
0.78	1003010	W-O Yosemite Ave	-3	-3	-3	Med	-3	-3	-3	-3	-3	0.4
0.43	1003110	E-O Jct SR NB I-5	Med	Med	-4	-1	Med	-4	-4	-4	-4	3.8
0.42	1056910	Mossdale E-O Jct I-5	-1	-1	Med	-2	-1	-5	-5	-5	Med	1.4
0.05	1003210	W-O Jct SR NB I-5	Major	Major	Major	Major	Major	Major	Major	Major	Major	10.0

Figure A-28: Evaluation Results – SR-120 W

APPENDIX B. SURVEY QUESTIONS

Introduction

Why do we need a questionnaire/survey?

Increasing numbers of private firms are leveraging "big data" to provide continually expanding varieties of products, apps, and traffic data solutions. A hybrid data approach with purchased data used to augment existing data collection systems may be the way of the future. A key question being asked by Caltrans is: “How does the availability of privately-sourced traffic data affect traffic sensor deployment strategies of other agencies and state DOTs (Departments of Transportation)?” This questionnaire/survey is designed to address this question.

Who will receive the questionnaire/survey?

This survey is intended for transportation agencies and state DOTs in North America. The project team will reach out to agencies who collect and process data for traffic operations and for reporting purposes.

What kinds of data are covered by this questionnaire/survey?

This survey is focused on the collection of traditional traffic data such as flow, speeds, and densities that are used to calculate performance measures such as vehicle miles and vehicle hours traveled. However, it also includes questions related to more inclusive measures of travel activity including bikes and pedestrians.

Who is sponsoring the study?

The California Department of Transportation (Caltrans) is sponsoring this study. Caltrans collects gigabytes of data every day using dedicated traffic sensing infrastructure. The data provide support for traffic management and system performance monitoring that are crucial for supporting Caltrans mission, vision, and strategic goals to strengthen stewardship and drive efficiency.

How will the results of the study be used?

Caltrans and other State and local agencies may use the information derived from this study to inform decisions regarding their future portfolio of data sources including private "big data" vendors and targeted deployments of traffic sensors.

Who is conducting the study?

California PATH at the University of California Berkeley is a pioneering research organization that has been dedicated to transportation systems operations and traffic engineering since 1986. In partnership with Caltrans, a research team from California PATH will conduct the survey, collect responses, and consolidate the inputs into a summary report.

What are the next steps following the questionnaire/survey?

We estimate the survey will take about 10 minutes to complete. In each question, there may be multiple levels of information that are relevant to the question. The questions asked during the survey may be personalized depending on answers to prior questions. If you need further explanation or clarification regarding the survey questions or the research project itself, please email <melissa.clark@dot.ca.gov>.

Thank you for your time and consideration.

Q2: Select your organization from the list. If your organization is not listed, please select "other"

- Please enter the name of your organization

Performance Measures

Q3: Please rank the relative importance of the following performance measures used for decisions related to traffic operations for your organization today.

- Vehicle Counts / Annual Average Daily Traffic (AADT)
- Truck Classification / Counts
- Vehicle Speeds / Travel Times
- Vehicle Miles Traveled / Vehicles Hours Traveled (VMT/VHT)
- Bicycle Counts
- Pedestrian Counts

Q4: Over the next 10 years, and for your organization, will certain performance measures become more or less important for decision making? If so, which ones?

	Expect more important	Expect about the same	Expect less important
Vehicle Counts / Annual Average Daily Traffic (AADT)			
Truck Classification / Counts			
Vehicle Speeds / Travel Times			
Vehicle Miles Traveled / Vehicle Hours Traveled (VMT/VHT)			
Bicycle Counts			
Pedestrian Counts			

Q5: Is your organization considering the use of new performance measures, not listed? If so, please specify.

Infrastructure-based sensors

The term infrastructure-based sensor refers to a physical sensor such as an inductive loop, radar, or camera that is installed along the right-of-way to obtain traffic data. This data is distinct from "big data" obtained through GPS-based apps or navigational devices that provide location data to third parties. Infrastructure-based sensors can be installed permanently or deployed temporarily, over a study period.

Q7: How many permanently deployed infrastructure-based sensors does your organization maintain? Please provide approximate numbers that provide a good order-of-magnitude.

- Inductive Loops
- Radar
- License plate readers
- Transponder readers (**FasTrak**/EZ-Pass)
- Cameras
- Weigh-in-Motion Sensors

Q8: Over the next 10 years, and for your organization, will more of the same detectors or alternative detectors to be deployed widely? Please indicate for each sensor type, whether more or fewer are expected to be actively deployed in the future.

	Expect more	**Expect about the same**	**Expect fewer**
Overall total number of permanent sensors			
Inductive loops			
Radar			
License plate readers			
Transponder readers (**FasTrak**/EZ-Pass)			
Cameras			
Weigh-in-Motion Sensors			
Temporary sensors			

Q9: Is your organization considering new sensor types for deployment? If so, which ones?

Purchasing Data from Vendors

Increasing numbers of private firms utilize “big data” to provide continually expanding varieties of products, apps, and traffic and mobility data.

Q11: Does your organization purchase data from private vendors?

- Yes
- No
- Don’t know

Q12: From whom does your organization purchase data?

- HERE Technologies
- INRIX
- TomTom
- StreetLight
- Citilabs
- Replica
- Waze
- Other (please specify)

Q13: What kinds of data does your organization purchase?

- Vehicle Flow /Volume
- Vehicle speeds / Travel times
- Vehicle Miles Traveled /Vehicle Hours Traveled (VMT / VHT)
- Trip and Mode Choice
- Origin-Destination Demand Information
- Intersection Turning Counts
- GPS Traces
- Freight movement
- Bicycle counts
- Pedestrian counts
- Other (Please specify)

Q14: Has the purchased data been useful?

- Extremely useless
- Moderately useless
- Slightly useless
- Neither useful nor useless
- Slightly useful
- Moderately useful
- Extremely useful
- Don't know

Future Plans for Purchasing Data

Q15: In the future, does your organization intend to purchase data from private vendors?

- Yes
- No
- Don't know

Q16: From whom does your organization expect to purchase data?

- HERE Technologies
- INRIX
- TomTom
- StreetLight
- Citilabs
- Replica
- Waze
- Other (please specify)

Q13: What kinds of data does your organization intend to purchase?

- Vehicle Flow /Volume
- Vehicle speeds / Travel times

- Vehicle Miles Traveled /Vehicle Hours Traveled (VMT / VHT)
- Trip and Mode Choice
- Origin-Destination Demand Information
- Intersection Turning Counts
- GPS Traces
- Freight movement
- Bicycle counts
- Pedestrian counts
- Other (Please specify)

Q18: How does your organization intend to use this data?

Data Analysis

Raw field data is typically filtered and aggregated to generate performance measures. High quality data from infrastructure-based sensors can be used to scale or to calibrate data from other sources.

Q20: For the data your organization collects, is it easy to relate multiple datasets from multiple (internal and external) sources for comparison and analysis?

- Definitely not
- Probably not
- Might or might not
- Probably yes
- Definitely yes
- Don't know

Q21: Does your organization use data from multiple (internal and external) sources to calculate performance measures to make business decisions?

- Definitely not
- Probably not
- Might or might not
- Probably yes
- Definitely yes
- Don't know

Q22: Does your organization have specifications for allowable errors in purchased data, infrastructure-based sensor data, and in performance measures?

- Definitely not
- Probably not
- Might or might not
- Probably yes
- Definitely yes
- Don't know

Thank you

Q23: Thank you for completing this survey. May we contact you/interview your agency further to help clarify any questions or consider your agency for a potential use case write-up? If so, please provide your contact Information.

- First name
- Last name
- Title
- Organization
- Email
- Phone
- Optional comment