CITY OF SACRAMENTO
ITS MASTER PLAN

FINAL | FEBRUARY 2019

Contents

Appendices

Table of Figures

Table of Tables

LIST OF ABBREVIATIONS

ATMS – Advanced Traffic Management System

ATP – Active Transportation Program

ATSPM – Automated Traffic Signal Performance Measures

AV – Autonomous Vehicle

AVL – Automatic Vehicle Location

CAD – Computer-Aided Dispatch

CCTV – Closed Circuit Television

CIP – Capital Improvement Program

CMS – Changeable Message Signs

CV – Connected Vehicle

EVP– Emergency Vehicle Preemption

GPS – Global Positioning System

HAR – Highway Advisory Radios

ITS – Intelligent Transportation Systems

O&M – Operations and Maintenance

RT – Sacramento Regional Transit

SACOG – Sacramento Area Council of Governments

SR – State Route

TOC – Traffic Operations Center

TMS – Traffic Management System

TSP – Transit Signal Priority

V2I – Vehicle-to-Infrastructure

V2X – Vehicle-to-Everything

1 EXECUTIVE SUMMARY

The **City of Sacramento** represents the largest transportation jurisdiction in the region. The City's transportation system plays an integral role facilitating the movement of people and goods between and through the surrounding cities. With transportation systems being asked to support more functions than ever before, agencies are leveraging technology and data solutions to help plan, build, maintain, and operate their future transportation networks.

This **ITS Master Plan** provides the framework necessary to improve mobility throughout the City's transportation network. This framework assists with prioritizing the following aspects: mobility, incident response, efficient maintenance, and cost savings. Intelligent Transportation System (ITS) investments are low-cost compared to capacity-related projects, such as expanding roads, and offer significant benefits to the transportation system and its users.

Vision

This City of Sacramento ITS Master Plan integrates technology, presenting the City's current and future needs with a focus on effective investments in transportation to improve system performance, safety, and sustainability. This Plan builds upon the City's existing ITS network and envisions a strategy to systematically implement innovative technologies to address the following overarching mission statement:

To **improve system performance**, **safety**, **sustainability**, and **reliability** by **ensuring efficient investments** in regional smart transportation projects.

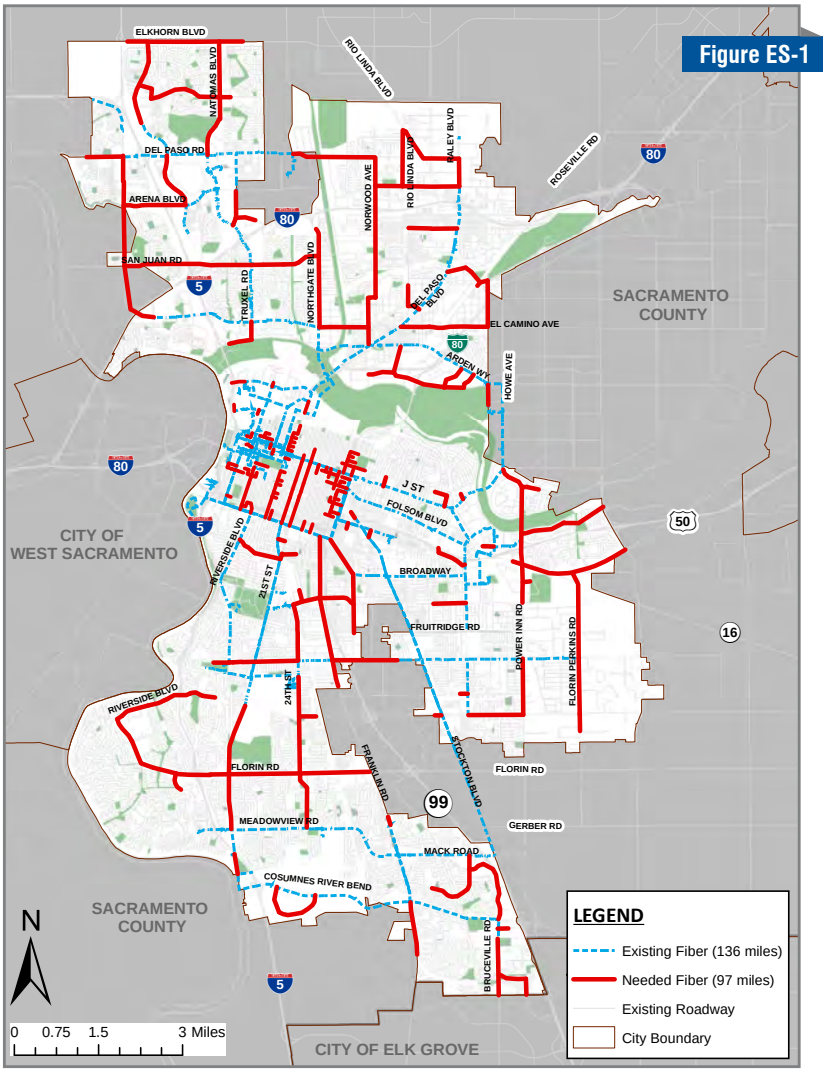
Goals and Objectives

This Plan identifies projects that enable the City to expand its technology infrastructure, improve operations, and advance its institutions. The following objectives were defined for the Plan:

- ***Identify infrastructure and equipment needed*** *to build a comprehensive, modern, and reliable traffic signal system*
- ***Identify programmatic initiatives to*** *efficiently maintain and operate traffic signals and smart infrastructure while also planning for future technology*
- ***Develop strategies to incorporate*** *traffic performance measure data and analytics tools for operations analysis and project planning*
- ***Create a system*** *that allows for data-driven decision making*
- ***Develop a staffing plan to include*** *recommendations on staffing levels and skillsets*
- ***Improve City readiness*** *for connected vehicles and connected-infrastructure*
- ***Develop real-time*** *transportation data dashboard GUI*
- ***Address traffic signal*** *detection issues*
- ***Improve light rail interaction*** *on streets and at gated crossings*
- ***Integration of various transportation*** *data sets to provide a single data clearinghouse and real-time performance dashboard*

State of the ITS

Figure ES-1 shows the type and locations of the City's existing and needed fiber optic infrastructure as part of the traffic signal communications network.



761 TOTAL TRAFFIC SIGNALS

14 "HAWK" PEDESTRIAN HYBRID BEACONS

44 FLASHING BEACONS

58% OF THESE ASSETS ARE CURRENTLY NETWORKED TO THE TRAFFIC OPERATIONS CENTER

CABINETS NEAR END-OF-LIFE

CABINETS

house and protect ITS infrastructure at local intersections

CONTROLLERS NEAR END-OF-LIFE

CONTROLLERS

the computer or "brain" of a traffic signal at local intersections

SWITCHES END-OF-LIFE

NETWORK SWITCHES

allow ITS equipment and controllers to communicate over the fiber optic network

DETECTION END-OF-LIFE

VEHICLE DETECTION

detects vehicles at local intersections allowing efficient operation and traffic data collection

WITHOUT BBS

BATTERY BACKUP

emergency backup power for signals and ITS equipment in the event of a power outage

WITHOUT EVP

EMERGENCY VEHICLE PREEMPTION

provides emergency responders with green lights and stops conflicting traffic from obstructing their route

WITHOUT CCTV

TRAFFIC MONITORING

live video feeds at local intersections allowing monitoring of traffic and incidents from the TOC and City network

EXECUTIVE SUMMARY

Needs Assessment

Sacramento's ITS needs were developed based on stakeholder input and were compiled and categorized by the following distinctions:

INFRASTRUCTURE (D)
field infrastructure, communications equipment, data, systems/software

OPERATIONAL (O)
operational improvement projects and processes, staffing

INSTITUTIONAL (I)
policies, agreements, funding/programming mechanisms, reporting/documenting, training

Strategies and Solutions

The following table summarizes the strategies to address the City's needs.

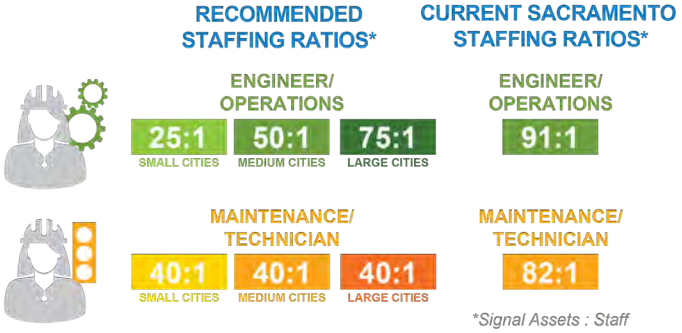
STRATEGY	NEEDS ADDRESSED	STRATEGY	NEEDS ADDRESSED
1A	Upgrade Communications Network - Install New Fiber-Optic Cable and Conduit	10	ATMS Upgrades and Add-ons
1B	Upgrade Communications Network - Replace Copper SIC with Fiber-Optic Cable	11	ITS Asset Management System
1C	Upgrade Communications Network - Install Wireless Communications at Isolated Intersections	12	ATSPM Deployment
2	Modernize Traffic Signal Controller Cabinets	13	Analytics Software and Performance Dashboard for Real-Time Operations Decision Making
3	Modernize Traffic Signal Controllers	14	Implement Citywide Traffic Signal Retiming Program
4A	Deploy Modern Advance Detection Equipment	15	Implement Transit Signal Priority
4B	Deploy Modern Stop Bar Detection Equipment	16	TOC Upgrade
4C	Pilot Technology for Advance Detection	17	Establish CAD System and TOC Connections for Automated Alerts and Notifications
5	Deploy CCTV Equipment	18	Establish Agency Network Security Policies and Procedures
6	Share CCTV Monitoring with Partner Agencies	19	Update Existing, and Develop New ITS Standards and Specification Materials
7	Traffic Signal and ITS Equipment Replacement Program	20	Improve Crash Data Collection and Analysis
8	Pilot Connected Vehicle Infrastructure	21	Traffic Signal Communications Network Documentation
9	Acquire and Integrate Third-Party Real-Time Traffic Operations Data	22	Deploy CMS

ITS Projects

A summary of implementation projects with associated costs is presented in Section 7.

Operations and Maintenance

To effectively operate and maintain the various project elements and projects identified in this Plan, the City must be adequately staffed and prepared to sustain the system after deployment. Operations and maintenance procedures are essential to define the appropriate staffing levels, training, operational processes, and maintenance levels necessary to sustain an effective system.



2 Introduction

The City of Sacramento has the largest transportation jurisdiction in the region. The City's transportation system plays an integral role facilitating the movement of people and goods between surrounding cities. With transportation systems expected to support more functions than ever before, agencies are leveraging technology and solutions to help plan, build, maintain, and operate their transportation networks.

This plan provides the City of Sacramento with the framework necessary to improve mobility throughout the transportation network. This framework will prioritize the following aspects: mobility, incident response, efficient maintenance, and cost savings. Intelligent Transportation System (ITS) investments are low-cost compared to capacity-related projects, such as expanding roads, and offer significant benefits to the broad transportation system and its users.

Transportation management is increasingly relying on technology, software, and applications. The future of transportation includes connected vehicles, autonomous vehicles, data-driven decision making and a focus on more effective operations and management of the transportation systems. ITS programs will continue to mature in their ability to actively manage traffic, incidents, events, and work zones.

There is an expectation from travelers that a City's transportation system can efficiently and safely move people. This plan provides the path forward to maximize the utility of the City's ITS program by developing a solid foundation of strategic and necessary infrastructure enhancements that will improve the City's operations and management capabilities.

3 Goals and Objectives

The City of Sacramento is well-positioned to advance transportation technology and embrace regional initiatives stemming from the area's diversity, economic activity, and evolving technological needs.

This City of Sacramento ITS Master Plan integrates technology, presenting the City's current and future needs with a focus on effective investments in transportation to improve system performance, safety, and sustainability. It builds upon the City's existing Intelligent Transportation Systems (ITS) network and envisions a strategy to systematically implement innovative technologies to address the following overarching mission statement:

MISSION STATEMENT

To improve system performance, safety, sustainability, and reliability by ensuring efficient investments in regional smart transportation projects.

3.1 Concept of Operations

The City of Sacramento, SACOG, and member-agencies have developed a Smart Region/ITS program that promotes coordination of operation and infrastructure of the transportation system between agency stakeholders. The program accommodates innovative technology to promote system-wide modernization, including reliable communications between stakeholders, sharing of real-time traffic data, improved transit operation, inclusion of active transportation, integrated corridor management, ITS maintenance strategies, improved central management systems, and traveler information services that provide real-time incident and traffic information.

The City of Sacramento has an influential role in the Region's transportation technology evolution, including an ability to effectively operate the transportation system in a proactive manner consistent with the City's and Region's priorities.

The City envisions a transportation system that uses technology to improve mobility and safety. Advancements in technology allows the City to maximize the existing right-of-way to effectively and safely move people. This system will be able to process substantial amounts of data effectively, allowing data driven decisions about where resources should be allocated. Additionally, data such as traffic counts, traffic signal performance measures, vehicle crashes, work orders, and customer complaints can be compiled in the system to deliver valuable performance metrics. This plan provides the framework to enable the City to achieve these overarching goals of a fully functional ITS.

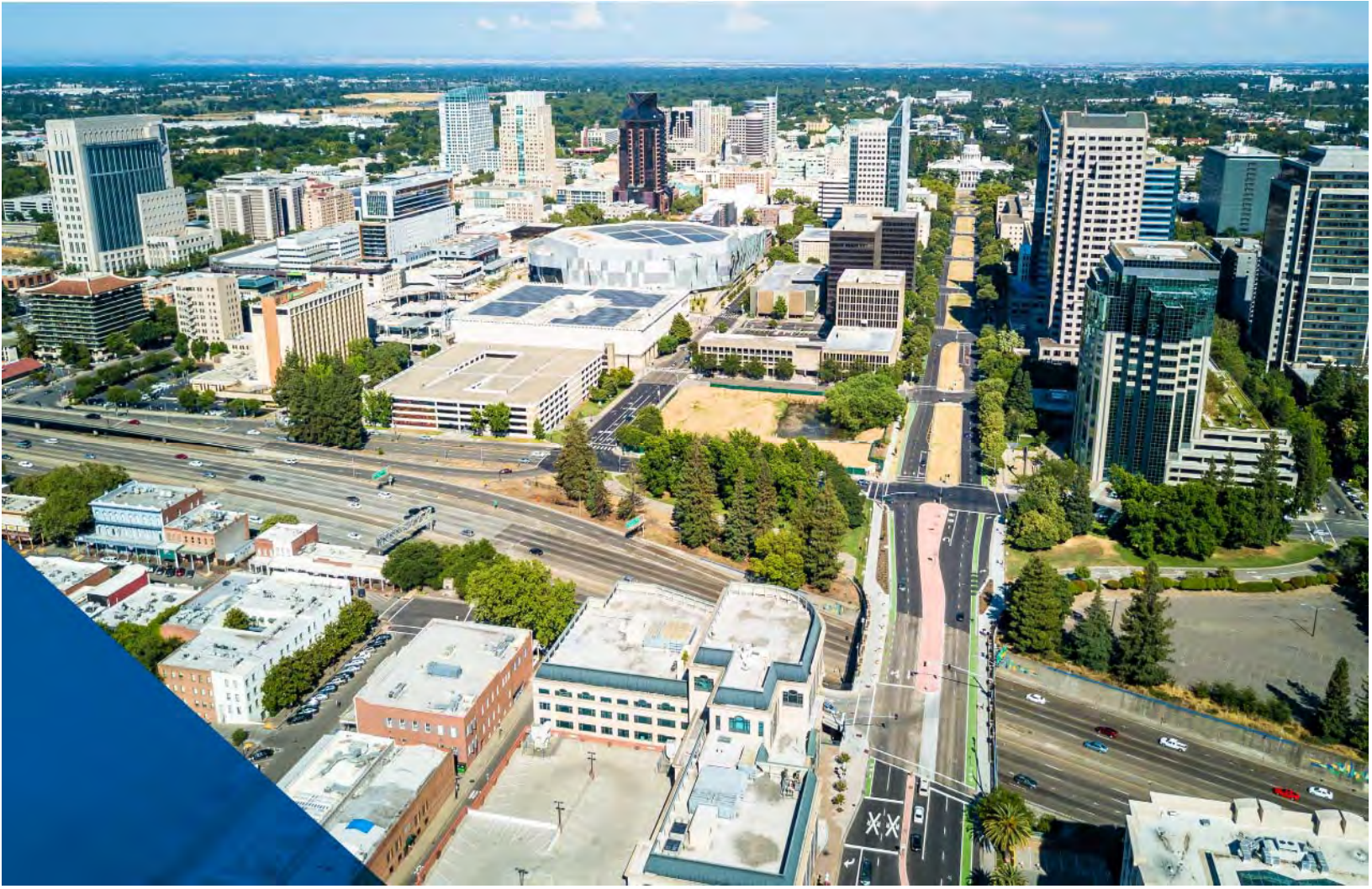
3.2 Local Goals and Objectives

The goal for this plan is to define technologies and set priorities for the implementation of technology to increase the safety, efficiency, and reliability of the City's transportation system. In addition, this plan develops a set of projects that enables the City of Sacramento to expand its technology infrastructure, improve operations, and advance its institutions while integrating with SACOG's Smart Region goals. The following objectives were defined for this Plan:

- ***Identify infrastructure and equipment*** *needed to build a comprehensive, modern, and reliable traffic signal system;*
- ***Identify new programs*** *to efficiently maintain and operate traffic signals and smart infrastructure while also planning for future technology. Such initiatives include:*
  - *Infrastructure Replacement Program*
  - *Preventative Maintenance Program*
  - *Traffic Signal Retiming Program*
  - *Technology Education and Piloting Program*
- ***Develop strategies*** *to incorporate traffic performance measure data and analytics tools for operations analysis and project planning;*
- ***Create a system*** *that allows for data-driven decision making;*

- ***Develop a staffing plan*** *to include recommendations on staffing levels and skillsets;*
- ***Improve City-readiness*** *for connected-vehicles and connected-infrastructure;*
- ***Develop real-time transportation data*** *dashboard GUI;*
- ***Address traffic signal*** *detection issues;*
- ***Improve light rail interaction*** *on streets and at gated crossings;*
- ***Integrate various transportation data sets*** *to provide a single data clearinghouse and real-time performance dashboard.*

These primary objectives are important considerations because they provide guidelines for identifying projects and creating performance measures to evaluate program efficacy.



4 Existing ITS Deployments

This section summarizes the existing transportation technology deployed in Sacramento. It is focused largely on the traffic signal equipment, the transportation communications network, and the City's Traffic Operations Center (TOC) and systems. In addition, current technology and data practices from an institutional level, including asset management and maintenance, design development, and data collection, are presented. A thorough understanding of existing conditions is essential in the identification of strategies and projects to address the City's needs.

4.1 Traffic Signals

Traffic signals consist of standards or poles, signal indications, conduit, conductors, controllers, and controller cabinets. To improve efficiency and operations, other technologies have become common at traffic signals. Examples of these include vehicle, pedestrian, and bicycle detection, emergency vehicle preemption, and traffic monitoring cameras.

As of the writing of this document, the City of Sacramento of owns, operates, and maintains 819 total signals, consisting of:

- ***761 traffic signals***
- ***14 high-intensity activated crosswalks (HAWK)***
- ***44 flashing beacons***

Figures 1 and **2** provide the type and locations of the City's existing traffic signal assets.

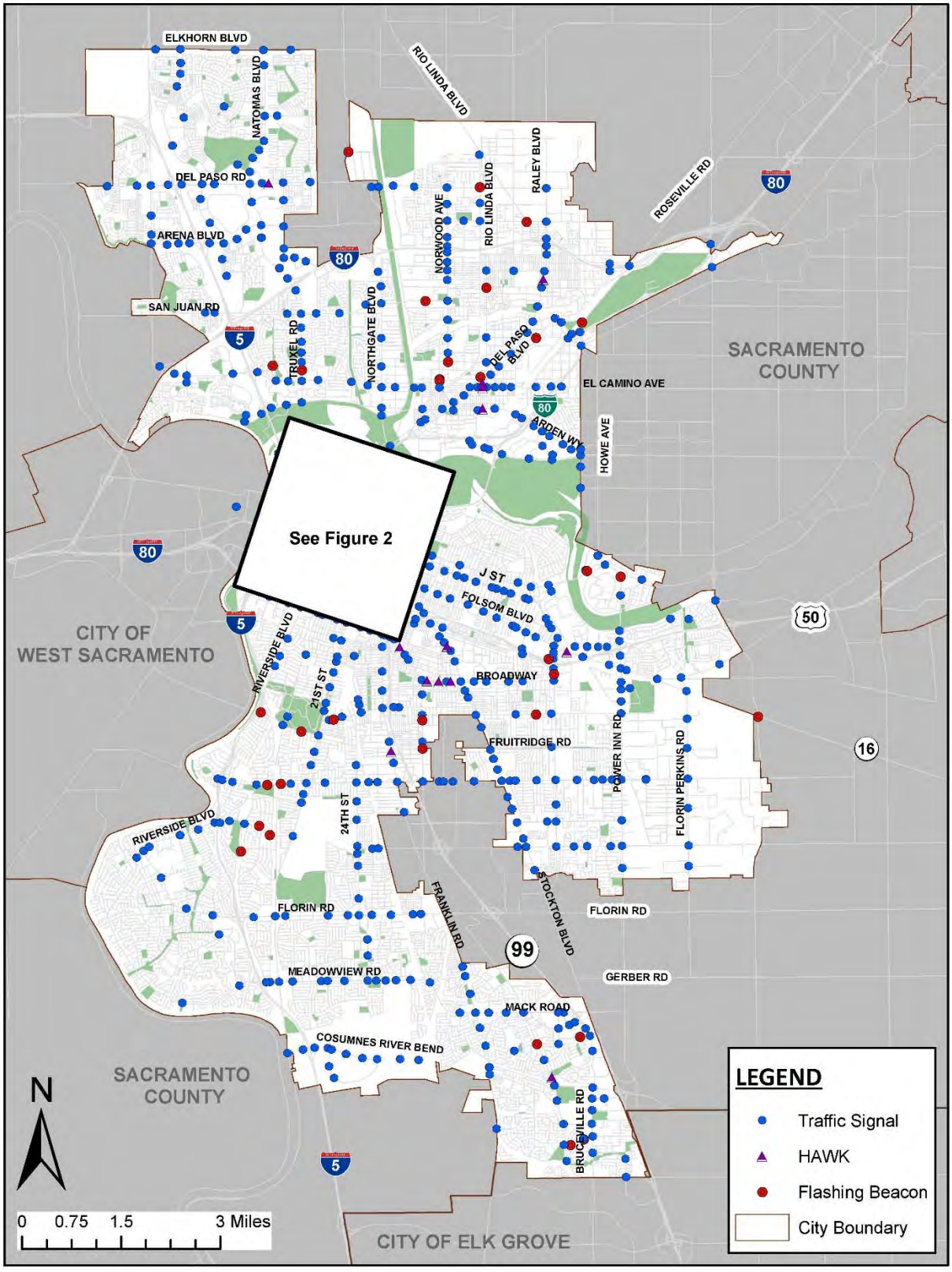


Figure 1 – City of Sacramento Traffic Signal Assets

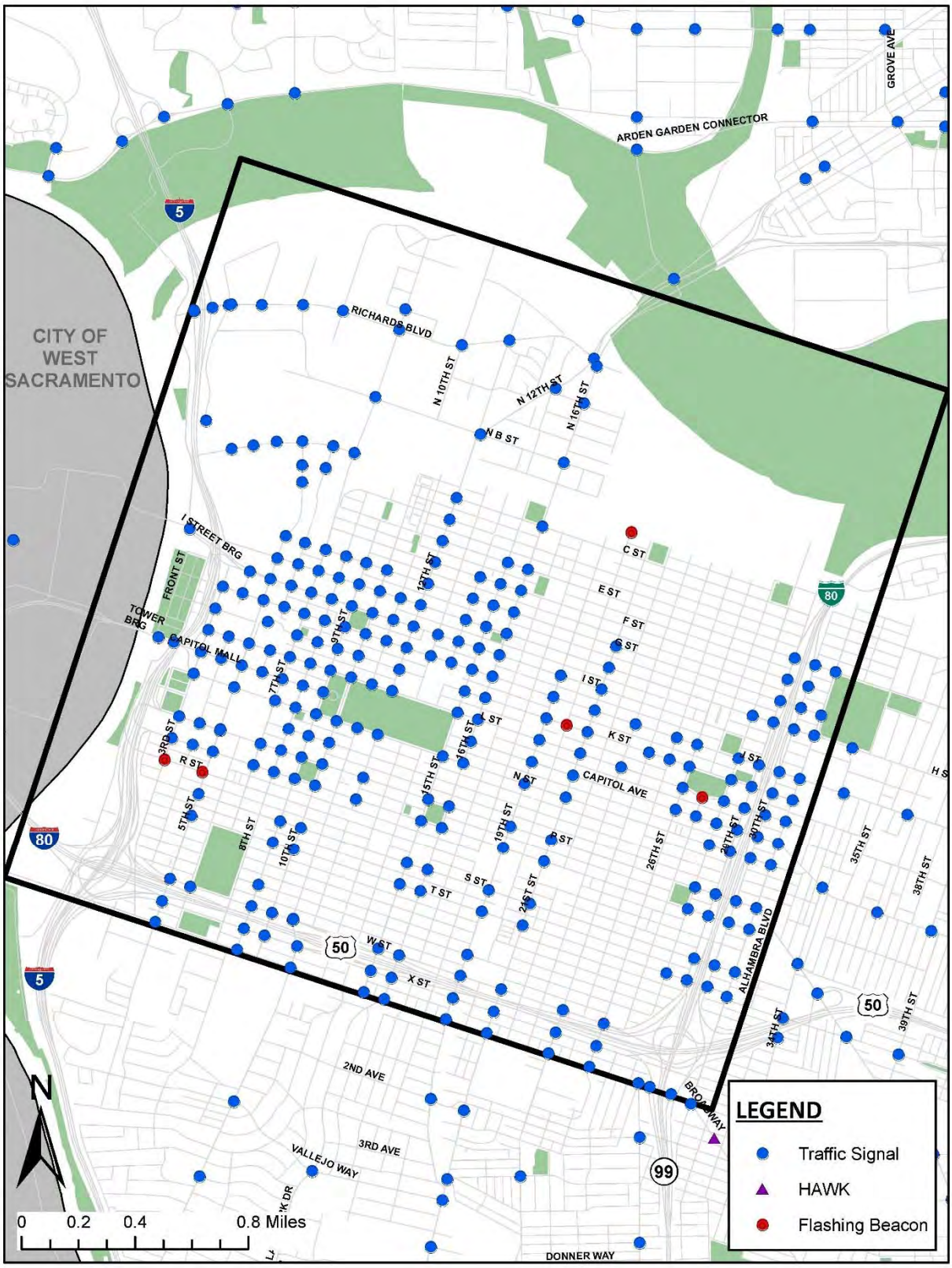


Figure 2 – City of Sacramento Traffic Signal Assets (CBD)

The following subsections give an overview of the state of traffic signal infrastructure equipment deployed in Sacramento.

Traffic Signal Controller Cabinets

Traffic signal controller cabinets house and protect the electrical components necessary to operate and control a traffic signal. They also provide a means for each piece of equipment to communicate with each other. Advancements in traffic signal and communications standards require increased functionality from a traffic signal controller cabinet. Older controller cabinets offer little to no flexibility for technology upgrades.

Type 332L Cabinet

CABINETS NEAR END-OF-LIFE

A variety of traffic signal controller cabinets are deployed throughout the City of Sacramento ranging in age and model type. A sizable percentage of traffic signals have cabinets that have surpassed their usable life or are not capable of supporting replacement components or future traffic signal technology. Controller cabinets that don't meet current 332 or NEMA TS2 standards are considered end-of-life. These legacy cabinets represent nearly sixty percent of the City's total cabinet inventory.

Traffic Signal Controllers

Traffic signal controllers are the brain of a traffic signal and work to regulate the sequence and timing of signal indications. Outdated controllers limit the ability to deploy advanced technology and improve signal efficiency. A variety of traffic signal controllers are deployed throughout the City. Seventy percent of traffic signal controllers in the City have exceeded their anticipated useful life and should be replaced.

SIGNAL CONTROLLERS NEAR END-OF-LIFE

Vehicle Detection

Approximately sixty-five percent of the City's traffic signals have some form of vehicle detection. There is currently a mix of three detection types deployed in the City: inductive loops, video, and radar.

The City operates fixed-time, semi-actuated, and fully-actuated traffic signals. Most fixed-time signals are in the Central Business District (CBD) and do not have detection. Semi-actuated traffic signals have detection only deployed on the minor side streets and fully-actuated traffic signals have detection in all directions. When an intersection approach has detection, it consists of either stop bar detection or stop bar and advance detection. Detection is one of the most important components of a traffic signal, providing the abilty to operate efficiently and collect data.

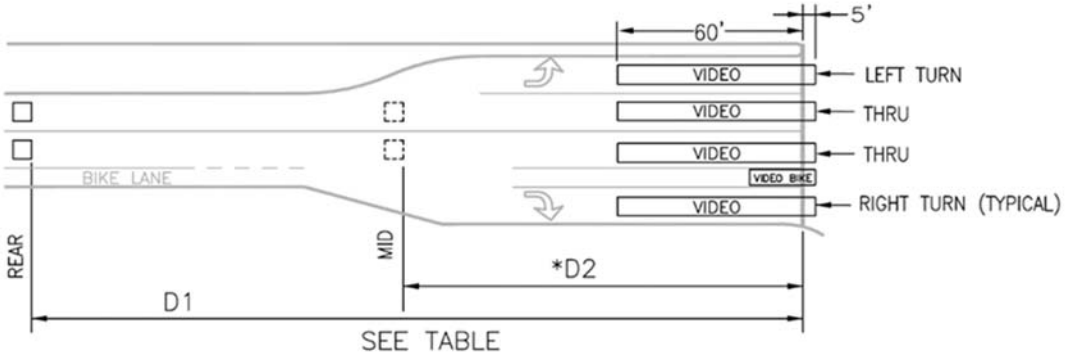
Advance Detection

Advance detection is placed between 175' and 405' prior to the intersection and is used to improve safety by providing dilemma zone protection. The City deploys advance signal detection at intersections which operate at speeds over 25 mph, however, much of the City's advance detection was placed to an older standard that does not provide dilemma zone protection to current standards. Reliable and accurate advance detection is the most valuable system for a traffic signal. In addition to improving safety and efficiency at the signal, advance detection can be utilized to collect corridor data such as vehicle speeds and flows. Many of the City's existing advance detection has all inductive loops connected on one channel, which does not allow the detection to collect useful traffic data. These installations are considered end-of-life.

The City has beta tested radar technology for advance detection, but they have been determined to not meet the City's needs. These systems are considered end-of-life.

The City is open to new technologies for advance detection, but the current City standard for advance detection is inductive loops.

The City has conducted tests of other technologies but have not yet determined any to be as accurate and reliable as loops. Testing of a new detection system is currently underway at one intersection in the City.



Excerpt from the City of Sacramento Standard Detector Layout

Stop Bar Detection

Stop bar detection is detection located near the intersection and allows the signal to know when vehicles are present and need a green indication. Four hundred and seventy (470) traffic signals employ in-pavement **inductive loop detection** for stop bar detection. Inductive loop technology is reliable for stop bar detection but offers limited flexibility for future modifications to intersections like geometric changes, deployment of advanced signal systems such as adaptive control or automated traffic signal performance measures. The City's current standard for stop bar detection is video detection. **Video detection** is used at 245 intersections, however many of these locations only have detection on one or two intersection approaches. Video detection is not installed in the pavement. Instead, virtual detection zones are programmed and can be modified at any time, even from the City's Traffic Operations Center (TOC) with good communications. The latest generation of video detection has significant improvements in accuracy, installation, programming and data collection. It also can provide reliable bicycle detection. The older generation systems are now considered end-of-life. Overall, accurate stop bar

detection improves the operational efficiency of signalized intersections and serves as the primary source of traffic data in Sacramento.

Emergency Vehicle Preemption

Infrared EVP Detectors

Emergency vehicle preemption (EVP) equipment is used to detect the approach of emergency responders and provide their approach a green indication, thus dramatically improving emergency response times. Preemption systems require cooperation from both the traffic department and the fire department. Traffic signals require detection equipment and programming to operate preemption, and fire department vehicle must be equipped with emitters to notify the traffic signal of their approach. There are EVP systems deployed at 292 traffic signals throughout the City of Sacramento, of which, 135 are GPS-radio based systems, and 157 locations utilize infrared systems.

Battery Back-Up Systems

Redundant electrical design in the form of uninterruptable power supply (UPS) systems are becoming standard equipment at new traffic signals. Back-up power is especially important at grade-crossings where power outages can create very hazardous situations. Forty-four (44) signals in Sacramento have battery back-up systems (BBS) which provide continuous power to a traffic signal for several hours after power has been lost.

Traffic Monitoring Cameras

CCTV Camera

There are 122 existing closed-circuit television (CCTV) traffic monitoring cameras deployed at traffic signals in the City. **Appendix A, Exhibits A1** and **A2,** map the distribution of cameras in Sacramento. The majority are located in the downtown area and on primary arterials. Forty-four (44) of the City's 122 CCTV cameras have reached the end of their life expectancy and will likely require replacement soon.

4.2 Traffic Signal Communications Network

The City's traffic signal communications network allows for remote monitoring and modification to the City's traffic signals and traffic monitoring cameras. In addition to supporting traffic, the network is used by other City departments as well.

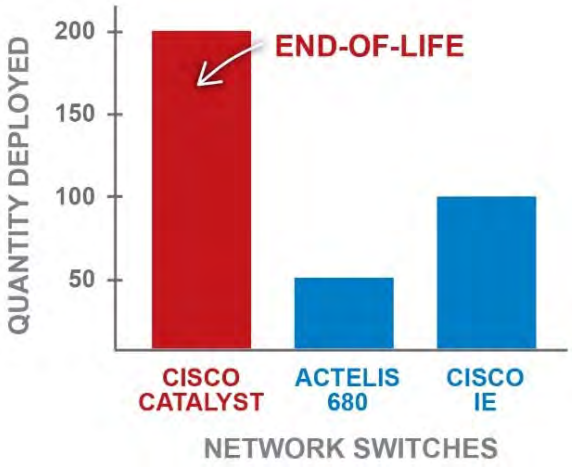
Communications Media and Conduit System

The traffic signal communications network consists of a mix of copper signal interconnect cable (SIC) and fiber-optic cable. SIC is a legacy technology which transmits serial communications over shielded copper conductors. Copper SIC was a cost-effective communications technology at one time, but even with updated communications equipment, copper SIC has limited speed, range, and bandwidth. There are approximately 98 miles of SIC distributed throughout the City.

There are approximately 136 miles of City-owned fiber throughout the City. **Appendix A, Exhibits A3** and **A4**, show the routing of fiber-optic cable and copper signal interconnect cable in the City's traffic signal communications network.

Communications Equipment

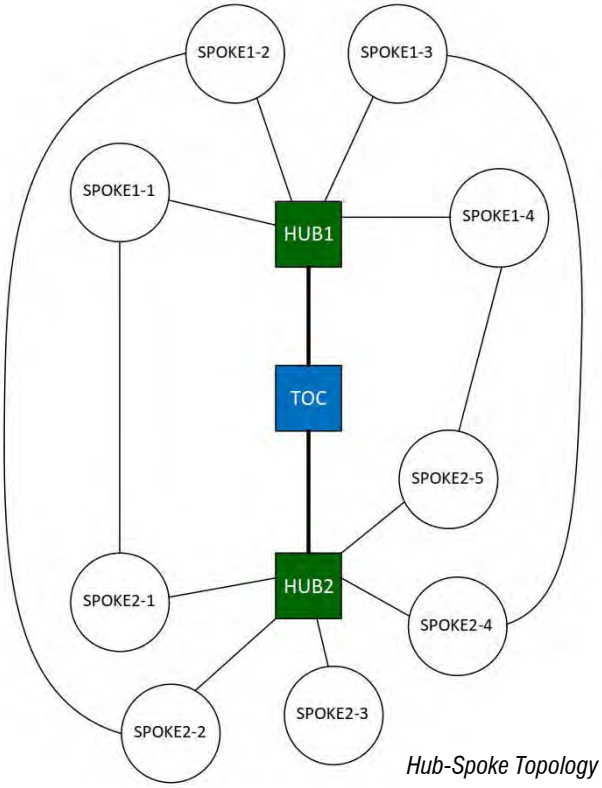
Network switches and communications hubs are deployed throughout the City to allow for IP-based communications across the traffic signal communications network. There are 324 network switches deployed at traffic signals and fiber communications hubs. Of these, approximately sixty percent have exceeded their anticipated useful life.



Communications Hubs

The City's traffic signal communications network is structured in a star topology, also known as a hub-spoke distribution, with some interconnected rings for redundancy. Communications hubs are distributed throughout the City. These communications hubs aggregate signal data in their area and transmit that data through back to the City's Traffic Operations Center. Communications equipment in the hub cabinets is environmentally-hardened and can support up to 60 intersections. Each fiber channel supports a maximum five intersections. The City currently has 12 communications hubs at the following locations:

1. Sacramento City Hall
2. 12th Street and I Street
3. Alhambra Boulevard and N Street
4. Broadway and 19th Street
5. 5th Street and Capitol Mall
6. Elvas Avenue and 65th Street
7. Stockton Boulevard and Broadway
8. Stockton Boulevard and Fruitridge Road
9. Cosumnes River Boulevard and Franklin Boulevard
10. Arden Way and Del Paso Boulevard
11. Truxel Road and Arena Boulevard
12. Railyards Boulevard and 5th Street



Hub-Spoke Topology

4.3 Traffic Operations Center

Overview and Existing Infrastructure

The City of Sacramento operates and monitors its transportation network from the its Traffic Operations Center (TOC) located in Sacramento City Hall. Staff monitor traffic signal operations and traffic conditions via three console workstations, two cubicle workstations, and a video wall display comprised of a 2 by 4 array of 55-inch monitors.

Behind the video wall, an equipment room houses video and networking equipment. The communication network, fed from a 144-strand fiber-optic trunk cable, links directly to this room. A Cisco Catalyst 4503-E core switch directs incoming signal controller and traffic monitoring information to the TOC data center and vice versa. Legacy traffic signal communications equipment is also located in the TOC and provides serial communications to legacy controllers. Other equipment at the TOC includes a Network Time Sensor (GPS clock) and several hub switches for the City's downtown traffic signal controllers. Additionally, there are several servers, both hardware and virtualized, that manage traffic signal communications, the CCTV camera system, windows active directory, and SQL databases. The TOC sytems are connected to a UPS and to City Hall's generator-based electrical back-up system.

Typical Traffic Operations Center (TOC) rendering showing Workstations and a Video Wall

The TOC has some inadequacies for a City of the size and profile of Sacramento. The TOC operates through a single core switch, creating a single point of failure that could take the entire system down. An additional core switch is recommended to provide network redundancy. The TOC is not set-up well to utilize collected traffic data and would benefit from systems to automate the input and streamline the use of data. Controller testing is an important task TOC staff perform. There isn't currently a convenient or efficient station for this to occur. A dedicated bench testing area, with connectivity to the ATMS is recommended. The TOC also lacks enough seating for current operations staff, which is likely to be exacerbated as more signals come online. The TOC is isolated from other transportation and City staff. The TOC and staff have functioned as the City's Emergency Operations Center (EOC). This role ads to the value of the TOC, but modification is necessary to provide this level of support without disrupting current staff job functions.

Traffic Operations Center (TOC) Connectivity and Systems

Four hundred and seventy-three (473) City traffic signals are connected to the TOC via the traffic signal communications network. However, 197 of these traffic signals communicate over serial and DSL connections, limiting their bandwidth and speed. Traffic signals connected to the TOC are managed by an Advanced Traffic Management System (ATMS). The City of Sacramento currently uses **TransSuite ATMS** software by TransCore. Traffic data is stored on separate City-owned servers. The system was last updated in 2017 and is compatible with the City's standard traffic signal controller models.

Traffic monitoring data from the CCTV camera network is compiled and maintained by **Milestone** software. An 860 MHz communications link exists in the TOC which connects the Police and Fire Departments to the TOC. The Police Department uses this direct link to video from the TOC in support of the City's Real-Time Crime Center (RTCC) used to aid officers in the management of large events and critical incidents throughout the City. This direct access to traffic department's monitoring cameras provides police officers with three-times the number of camera feeds they would otherwise have access to. Currently, City video is not available for public use.

Operations and Monitoring

Operators typically staff the TOC on weekdays between 7:00 A.M. and 9:00 A.M. and between 4:00 P.M. and 6:00 P.M.

4.4 Asset Management and Maintenance Systems

Transportation assets are managed internally on multiple platforms. A master inventory of signals and signal equipment is maintained with multiple spreadsheets. Inventory information is relatively complete for equipment such as controllers and vehicle detection but is incomplete or missing for details like the age of assets and communications networking information. Georeferenced locations of assets are hosted on different platforms including Google Earth and GIS shapefiles.

> "Asset Management tools and technologies may be helpful, but **the engagement of the workforce, the clarity of leadership, and the collaboration between different departments and functions are the real differentiators** of a leading asset management organization."
>
> *- Institute of Asset Management*

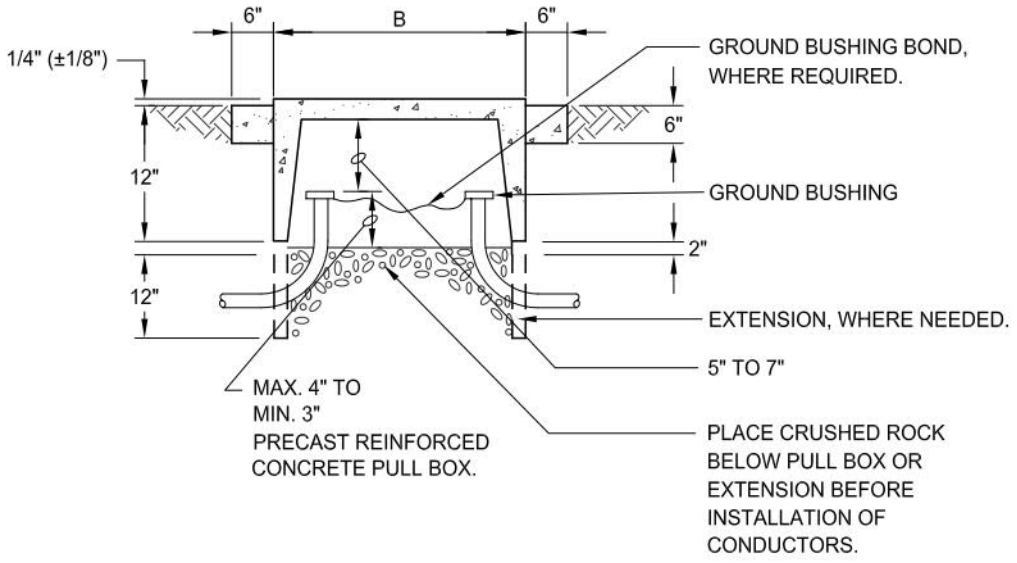
A work order system is in place; however, it is not linked to the asset inventory system or a public comment or complaint tracking system. This creates inefficiencies for staff as they must extract information from one source and document it in another, both of which may or may not have complete information.

Physical maintenance of the infrastructure is scheduled and completed by twenty staff. The maintenance department operates largely in a reactive capacity and primarily services grievances from the public. Routine and preventative maintenance of traffic signals, CCTV cameras, and other transportation assets is a lower

priority and is rarely completed. The City of Sacramento does not have a traffic signal equipment replacement plan in place.

4.5 Design Standards

The City has adopted standard drawings for several traffic signal elements. These include street lighting, inductive loop detection, pedestrian push button posts, infrared emergency vehicle preemption, electrical conduit installation, and pull box installation. Standards for newer technology like video detection, communications equipment, fiber-optic cabling infrastructure, and CCTV cameras do not currently exist.



Excerpt from City of Sacramento Drawing No. E-210 "Concrete Pull Box"

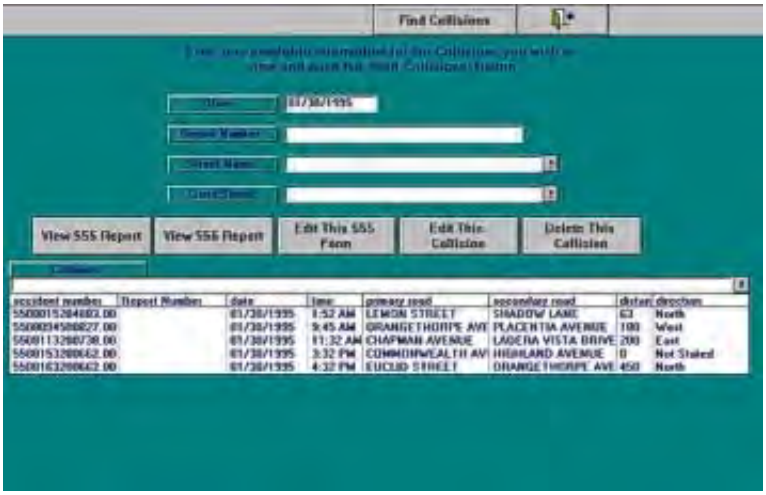
Standards hierarchy follows City of Sacramento standards and specifications and then the State of California standards and specifications.

4.6 Data Collection and Analysis

Sacramento collects data for various transportation applications. Traffic counts are an important metric in transportation planning and signal design. Historical traffic counts from City streets are manually entered and stored in a public, online clearinghouse. However, the City does not have an established program for routine collection of traffic counts, including counts for bicyclists and pedestrians, or a system in place that tracks and analyzes volume changes over time. Traffic count data is not integrated on any mapping platform.

The City has begun to collect and analyze high resolution traffic signal data. This data is collected and aggregated based on conditions at individual signals across the City, however, this is recent technology and the City is currently in beta testing phase at 10 locations. The data is stored in a database and is displayed using a free software package development by Utah DOT. Although the data is useful for operators, the system is not currently used by any other groups. This could be a result of the usability of the software or the limited size of the deployment.

Traffic collision history is a metric used for evaluating safety at intersections and corridors. The City utilizes **Crossroads** traffic collision database to manage its traffic collision data. The data is manually entered from police reports. Currently, police reports are only taken at collisions that involve injuries, leaving a large void in the total crash data information. Additionally, the available crash data is not mappable, reducing staffs' ability to analyze trends. The data is currently used to inform traffic safety studies or to supplement grant funding applications. Due to limited staff resources, collision data is rarely used in proactive ways such as identifying high-frequency collision locations or incident trends.



Crossroads Software Traffic Collision Database Screenshot

5 Needs Assessment

This section presents a summary of the needs identified for the City of Sacramento's intelligent transportation system. These needs were developed based on input from the City stakeholders and were compiled and categorized by the following distinctions:

- **Infrastructure (D)** – field infrastructure, communications equipment, data, systems/software
- **Operational (O)** – operational improvement projects and processes, staffing
- **Institutional (I)** – policies, agreements, funding/programming mechanisms, reporting/documenting, training

The needs associated under each of these categories are summarized below.

5.1 Infrastructure Needs

D1. There is a need to connect all traffic signals with fiber-optic cable - Only 276 of 775 traffic signals in the City are connected to the TOC via fiber-optic cable. High speed and high bandwidth communications is critical for the City to achieve its transportation goals.

D2. There is a need to monitor real-time traffic conditions - Sacramento does not have comprehensive or widespread device coverage to collect traffic data like speed, queues, and delay. Real-time data informs decision making allowing staff to react to actual conditions and make the most beneficial changes possible.

D3. There is a need to support active transportation - Investing in bicycle and pedestrian facilities increases safety for users and leads to a healthier public. Bicycle corridors in Sacramento do not have bicycle detection or bicycle signal timing to meet bicycle requirements per the updated MUTCD guidance.

D4. There is a need for redundancy in the traffic signal communications network - The communications network has minimal redundancy as it branches out from the central business district. Much of the system consists of isolated spurs rather than rings. In addition, the Traffic Operations Center is supported by a single core switch with no back-up. Failure of this switch would bring down the entire system.

D5. There is a need to replace aging traffic signal infrastructure - Many traffic signals are operating near end-of-life. Signals rely on equipment with outdated functional capabilities or are no longer supported by vendors. Old traffic signal poles are not structurally capable of supporting additional technology deployments.

D6. There is a need for adequate communications bandwidth - Half of the City's communications network relies on copper signal interconnect cable which is limiting in capacity for future technology support and the City's data needs.

D7. There is a need for additional communication hubs - There is a need to deploy more communications hubs to support the transportation communications system. Each hub supports up to sixty traffic signals. Additonal hubs are necessary for the City to expand its system.

D8. There is a need for an advanced asset management and maintenance system - The transportation division lacks a modern and reliable asset inventory system. Assets are managed manually using spreadsheets not tied to a maintenance or replacement tracking system. Inventory and maintenance of new deployments is an integral component for a successful ITS.

D9. There is a need for central system management of tools and data to support operations - The central system (ATMS) lacks functionality required by TOC operators and needs updates and add-ons to address the City's needs.

D10. There is a need to collect, analyze, and use signal performance measures - There is currently a lack of performance measurement and analysis capabilities. Performance measures are used to evaluate the effectiveness of the City's projects and programs.

D11. There is a need for spare equipment inventory to prevent system and signal downtime - The inventory of spare ITS equipment is unknown or non-existent. This does not allow for proper programming of replacement needs causing maintenance staff to operate primarily in a reactionary capacity.

D12. There is a need for timely emergency notifications - The City does not have automated emergency notifications capabilities which greatly reduce timely responsiveness.

D13. There is a need to reduce the impact of light rail preemption on traffic mobility - Light rail preemption in the downtown grid and on corridors adjacent to light rail lines knocks the signal system out of coordination, adversely affecting vehicular traffic.

D14. There is a need to share data between agencies that share congested corridors - The City shares numerous major corridors with adjacent jurisdictions and there is a lack of information sharing across jurisdictions to provide for the most efficient operations.

D15. There is a need to utilize data (crash records, traffic counts, corridors speeds, congestion data, work orders) to support planning purposes - The amount of data currently collected is limited, and the use of that data is also limited. The City's current data systems and tools are not user-friendly and are very labor intensive to make use of. Modern and integrated systems will aid the City in the collection and application of traffic data allowing informed decisions regarding the transportation system.

D16. There is a need for Connected Vehicle (CV) technology readiness - Infrastructure and systems are not currently able to support CV deployments or data.

D17. There is a need for a programmatic citywide traffic signal retiming plan - Signal retiming is not surveyed or updated at regular intervals. By developing a retiming strategy and utilizing modern technology, signal timing can be improved continually instead of every few years.

D18. There is a need to improve advance vehicle detection - New advance detection technology can more effectively prevent dilemma zone conflicts and improve signal operation efficiency. Modern advance detection can also be utilized to collect corridor data such as vehicle speeds and flows.

5.2 Operational Needs

O1. There is a need for improvements to the Traffic Operations Center (TOC) - The TOC is undersized for a City the size of Sacramento and the staff that operates it. There is not enough workstation space for the recommended staff levels, and there is no designated area to perform bench testing of controllers.

O2. There is a need for additional traffic operations staff - There is a lack of sufficient staffing to support traffic operations functions, limiting the staff to operating the City's ITS responsively rather than proactively.

O3. There is a need to standardize operating and maintenance procedures for ITS - Maintenance is performed at random intervals and usually initiated by public complaints. There are inconsistent procedures for operations and maintenance of ITS.

O4. There is a need to improve operations downtown, including light rail operation - Downtown Sacramento is not operationally efficient due to the various, uncoordinated modes of traffic competing for right-of-way and priority.

5.3 Institutional Needs

I1. There is a need for a high security and tamper-proof network - The City's assets are vulnerable to basic cyber-attacks which leave the entire system exposed. Edge switches dispersed at traffic signals across the City provide potential access points into the City's network.

I2. There is a need for Connected Vehicle (CV) technology policy - City policies and codes currently do not support or address CV.

I3. There is a need for a reliable funding strategy - The City lacks reliable funding mechanisms to support Smart City, Smart Region, and ITS initiatives, limiting its ability to address challenges.

I4. There is a need for ITS standards - Deployment of a wide variety of ITS devices and subsystems has created system integration, maintenance, and system management challenges. Standardizing the City's ITS and deploying consistently from now forward will eventually alleviate these challenges.

I5. There is a need to promote and support Vision Zero - There is a lack of intentional strategic investments in ITS to support Vision Zero initiatives.

The strategies to address these needs are discussed in further detail in the next section.

6 Strategies and Solutions

This section presents strategies to address the City's needs presented in the previous section. Some of these strategies are meant to be standalone solutions to City needs while others are most valuable combined with other strategies and assembled into more complex projects.

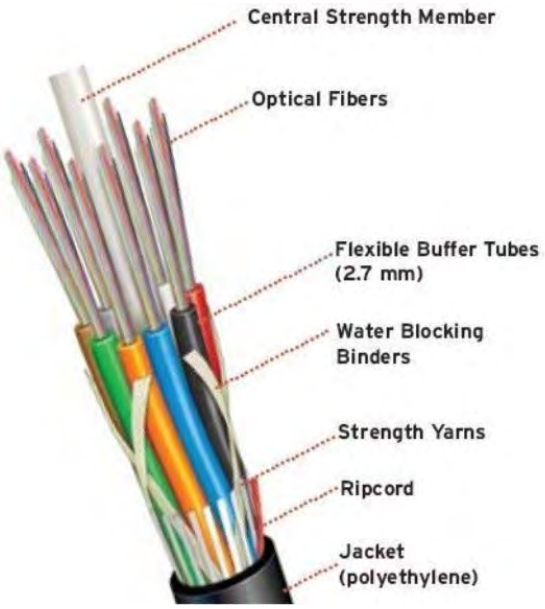
Strategy #1A

Upgrade Communications Network - Install New Fiber-Optic Cable and Conduit

Description – Eliminate communications gaps that exist along key corridors. Utilize fiber-optic cable to achieve high bandwidth, high speed, reliable communications coverage. Connect to ITS devices and traffic signals along the key corridors.

Scope/Limits – Install fiber-optic cable and new communications conduit, as necessary, to City traffic signals not currently connected. Fiber trunk cables should be installed where multiple traffic signals (more than five) will be connected. Distribution, or branch, cables should be installed to connect isolated intersections (less than five). This strategy includes connecting all signals on these segments to the TOC by installing fiber equipment in traffic signal controller cabinets. All necessary splicing and testing to accomplish this strategy is included. Conduit for fiber-optic cable should be installed as a minimum of two 2" conduits, providing for future expansion.

Fiber-Optic Cable – New fiber-optic network installations should consist of two types of fiber cable, trunk cable (typically 48, 96, and 144-strand single mode fiber-optic cable) and distribution cable (typically 12 or 24-strand single mode fiber-optic cable). The cable sizes recommended within this Plan are anticipated to be sufficient for the anticipated communication needs of the City, but may be increased or decreased depending on cost, procurement, and timeline for any given corridor or segment of new fiber-optic cable to be installed.



Fiber-Optic Cable Components

Trunk cables are recommended to be 144-strand cables, to allow for expansion of the system. Many cities and counties choose to allocate fiber to share with City departments and partner agencies as well, and extra capacity will allow for these possibilities in the future. The distribution cables, also referred to as branch cables, are typically spliced to the trunk cable. They are recommended to be 12 or 24-strand cables. Like the larger trunk cables, sufficiently sized branch cables will enable additional connections in the future.

Fiber-Optic Cable Routing - The routing of the fiber-optic cable in the communications system should form a series of "rings," also referred to as a ring topology, with main corridors handling most of the trunk cable rings to provide redundancy in the network. This is essential in the event of a severed trunk cable or equipment failure to keep the network online. A complete ring will offer an alternate route for the communication of intersections or equipment on either side of the break.

Strategy #1B

Upgrade Communications Network - Replace Copper SIC with Fiber-Optic Cable

Description – Replace existing copper signal interconnect cables with fiber-optic cable to achieve high bandwidth, high speed, reliable communications coverage. Connect to ITS devices and traffic signals along the corridors.

Scope/Limits – 98 miles of existing legacy copper SIC will be replaced with fiber-optic cable. The existing signal interconnect conduit is assumed to support the switchover to fiber cabling, though pull boxes and conduit sweeps will likely require modification to make them fiber-ready. This strategy includes connecting all signals on these segments to the TOC by installing fiber equipment in traffic signal controller cabinets. All necessary splicing and testing to accomplish this strategy is included.

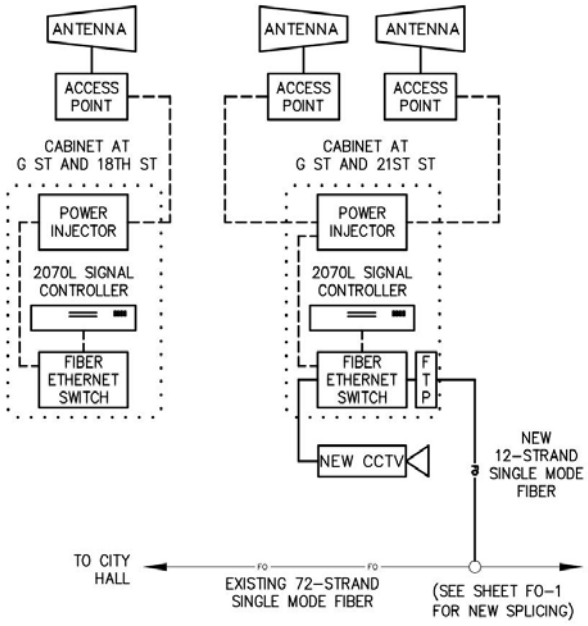
Strategy #1C

Upgrade Communications Network - Install Wireless Communications at Isolated Intersections

Description – Eliminate communications gaps that exist along key corridors. Utilize wireless communications to connect remote traffic signals and ITS devices to the communications network without the expending the high cost of fiber infrastructure.

Scope/Limits – Install and configure wireless communications equipment at remote City traffic signals and ITS devices not currently connected. Remote locations should be connected via wireless technology to the nearest, or most appropriate, fiber access-point. From there, data will be sent to the TOC over the existing fiber-optic network.

Wireless Communications – Wireless systems offer moderate bandwidth at distances of up to 20 miles, however, they require unobstructed lines of sight between antennas to achieve the best results. They are also susceptible to interference and require more maintenance than underground cable systems. Although they cannot match in speed and capacity of fiber-optic interconnect, this alternative can provide satisfactory communications to meet short-term needs at a very low cost. Inexpensive wireless options available to the City include, leased wireless (cellular) technology or City-procured wireless technology that uses radios and antennas mounted on traffic signal poles.



The leased wireless option requires the procurement of services from a cellular provider with service level agreements on the performance of the wireless connection (e.g., bandwidth). For the City-owned wireless option, there are licensed and unlicensed radio spectrum that can be used. It is common for traffic signal and ITS networks to utilize the unlicensed spectrum, particularly the frequencies in the ISM (Industrial, Scientific and Medical) bands.

Strategy #2

Modernize Traffic Signal Controller Cabinets

Description – Upgrade traffic signal controller cabinets to support modern equipment with communications and monitoring capabilities. New controller cabinets should be at a minimum NEMA TS-2 Type 1, 332L, 332LX, or ATC cabinets, depending on the installation location, intersection characteristics, and controller type. Type 332 cabinets are used in the central business district (CBD) and NEMA Type R cabinets are utilized elsewhere.

Scope/Limits – Approximately sixty percent of the City's controller cabinets are legacy or end-of-life.

Strategy #3

Modernize Traffic Signal Controllers

Description – Upgrade traffic signal controllers to provide open architecture for a wide variety or ITS applications. New controllers should support IP communications, provide high-resolution controller data, capable of dynamic management of signal phases. Controllers should be Linux-based NEMA ATC, 2070 ATC, 2070LX, or comparable.

Scope/Limits – There are 581 traffic signals operating with legacy controllers throughout the City. Approximately, 150 of these are within the CBD and are programmed to be replaced through a grant program. The City should replace as many controllers as feasible to attempt to catch-up and build a solid foundation of modern controllers.

Strategy #4A

Deploy Modern Advance Detection Equipment

Description – Deploy new modern advance detection equipment at signalized intersection locations currently operating with substandard or no advance detection. The detection device should be able to detect vehicles, speed, and predict vehicle arrival at the intersection to support dynamic split adjustments.

Scope/Limits – Within the City, 247 traffic signals are operating by way of vehicle loop detection and 297 signals have no detection at all. Almost all signals within the downtown grid have no detection. With the introduction of bicycle lanes and corridors throughout the City, modern detection must have the ability to detect and discriminate bicycles from other vehicles on the road. The systems will have the ability to collect real-time turning movement counts for planning purposes and signal timing as well as be the ability to collect traffic operations data such as speed and queues which will allow for ATSPM analysis.

Advance Detection – The City deploys advance signal detection at intersections which operate at speeds greater than 25 miles per hour. The current City standard for advance detection is inductive loops. Loops are accurate and reliable for advance detection and should continue to be deployed at this juncture. Loops, however, are limited in their benefit to future applications like ATSPMs and dynamic split control. The City has conducted tests of other technologies but have not yet been satisfied with them. The City should continue testing advance radar detection systems until they find an agreeable technology. A radar system with trajectory tracking and user discrimination capability will provide more useful data for the City than inductive loops.

Strategy #4B

Deploy Modern Stop Bar Detection Equipment

Description – Deploy modern video detection systems at signalized intersection locations currently operating with inductive loop detection or no detection. Accurate stop bar detection improves operational efficiency of signalized intersections and serves as the primary source of traffic data in Sacramento. Video detection systems require cameras to be mounted on traffic signal poles such that they have a view of all legs of the intersection. The system should be able to discriminate between vehicles, bicycles, and pedestrians. Video detection will have the ability to collect turning movement counts to support signal timing development, and act as traffic monitoring cameras if none exist at the intersection.

Scope/Limits – Four hundred and seventy (470) traffic signals employ in-pavement inductive loop detection and another 297 traffic signals have no detection. The City should plan to install video detection at as many signals as feasible, but 20 traffic signals per year should be an attainable goal. This strategy entails the procurement and installation of detection cameras or sensors and cabling, and the configuration of camera control units and virtual detection zones.

Video Detection – Video detection systems are non-intrusive systems that utilize programmable, virtual detection zones that can be adapted to changing conditions and patterns. They can be used to support emerging systems such as automated traffic signal performance measures (ATSPMs), and alternate timing modes such as dynamic all-red, and bicycle signal timing.

Strategy #4C

Pilot Technology for Advance Detection

Description – Identify and deploy innovative advance detection equipment at signalized intersections in the City as part of a pilot program. The City will use the results of the pilot program to consider implementing a new City standard for advance detection at traffic signals.

Scope/Limits – Advance detection technology should be deployed at up to ten (10) signalized intersection in the City. The intersection should have communications in place to allow for remote monitoring of the detection technology. The detection devices should be able to detect vehicles, speed, and predict vehicle arrival at the intersection, at a minimum. Detection devices should be tested for a minimum of six months and through varying weather conditions.

Strategy #5

Deploy CCTV Equipment

Description – Deploy new CCTV equipment at signalized intersection locations that currently do not have traffic monitoring capabilities. CCTV deployment requires cameras to be mounted on traffic signal or street lighting poles and connected to the traffic signal communications network in the controller cabinets. CCTV video provides real-time streaming video allowing traffic operations staff to view road network conditions and to share information about real-time conditions with partner departments, such as public safety, that may need to

respond to an incident or event. The new CCTV will need to be integrated into the City's video management system for viewing and control.

Scope/Limits – Sacramento has 121 CCTV cameras deployed throughout the City. New CCTV cameras will be deployed at all intersections without monitoring in place and with connection to the traffic signal communications network. Priority will be given to locations on primary corridors and intersections with high incident rates. CCTV cameras will be IP-based, high definition, pan-tilt-zoom, with WDR (Wide Dynamic Range) functionality. The City should plan to deploy approximately 60 CCTV cameras per year to establish monitoring capabilities at all intersections within 10 years.

Strategy #6

Share CCTV Monitoring with Partner Agencies

Description – Utilizing a robust communications center-to-center network between agencies, CCTV streaming video images should be shared between regional agencies. Shared control of CCTV may not be desirable nor feasible but could be allowed through this center-to-center asset viewing capability.

Scope/Limits – A network will be set up on a regional basis to share CCTV imagery between agencies.

Strategy #7

Traffic Signal and ITS Equipment Replacement Program

Description – An equipment replacement program is a proactive approach to operating, maintaining, and budgeting the routine replacement of traffic signal and ITS equipment. The replacement program will establish policies, procedures, and budgets for the systematic replacement of failed and end-of-life equipment. Replacing out-of-date and unreliable equipment is a critical component in developing a comprehensive, modern and reliable traffic signal system. While this Plan focuses on technology infrastructure at traffic signals such as controllers, communications equipment, CCTV, and detection systems, other traffic infrastructure, such as traffic signal poles, should be included in the replacement program.

Scope/Limits – The City will develop a traffic signal and ITS equipment replacement program that promotes regular replacement of outdated equipment and establishes spare inventory to efficiently replace failed equipment. The program will establish equipment replacement rates, spare equipment guidelines, extended budgets, and define staff responsibilities.

End-of-Life Equipment Replacement – The City should program the costs associated with replacing traffic signal and ITS equipment. As time passes, overall performance of equipment will degrade and/or fail as it reaches the end of its useful service life. When this occurs, devices will need to be replaced. It should be expected that some assets will fail early, and others may continue to function past their average life expectancy.

Excluding assets that can be replaced under warranty, the City should plan for a certain number of assets to fail each year and should expect that number to increase over time. Eventually, the total number of failures per year for an asset type will level off at a number that is approximately equal to the total number of devices of a particular asset type divided by the average life expectancy of that asset:

Average asset failures per year = total number of assets / asset life expectancy

Considering the installation dates of existing ITS equipment, and the expected lifespan of each device, the City should initiate a replacement strategy to proactively procure and upgrade/replace legacy equipment. The following replacement quantities should be a starting point and are based on the end-of-life ITS equipment devices currently operating in Sacramento. Once additional ITS devices are installed and connected to the network these rates should be increased proportionally.

- *Replace 20 Cabinets per year*
- *Replace 50 Controllers per year*
- *Replace 10 CCTV cameras per year*
- *Replace 20 Video Detection Units per year*
- *Replace 25 communication switches (intersection) per year*

For other traffic signal equipment, opportunities for replacement and upgrades should be evaluated in conjunction with the recommended corridor enhancement projects recommended as a part of this Plan.

Spare Inventory – An inventory of replacement devices, equipment, and spare parts should always be maintained to allow for timely replacements or repairs of failed or damaged equipment. The replacement program should support a spare inventory of approximately ten percent of the total number of traffic signal and ITS devices. The City should maintain two to three percent of the total deployment for adequate spare devices to have on hand for maintenance purposes, plus an open Purchase Order for seven to eight percent (totaling 10 percent total).

Strategy #8

Pilot Connected Vehicle Infrastructure

Description – Deploy CV equipment (5G) at signalized intersections. This strategy would initiate a pilot program of key corridors that supports City-owned CV technology and would require procuring CV equipment to be installed at signalized intersections along priority corridors. Expansions to this pilot program would be assumed after the pilot project completion. This strategy does not include the push of specific CV data to vehicles using the system, but rather making the CV infrastructure available for agencies or the region to utilize when CV software and data are more robust and available.

Scope/Limits – The City of Sacramento will pilot the procurement and implementation of 5G equipment as part of a long-range vision to deploy vehicle-to-infrastructure technology at all signals. The City should evaluate this technology at various locations throughout the city to allow for a thorough evaluation of applications and capabilities. Pilot locations should target areas that serve transit and active-transportation modes as well as different roadway operations such as in the CBD and major arterials.

Connected Vehicles – Connected Vehicle (CV) technology will enable cars, trucks, buses, and other vehicles to "talk" to each other, to infrastructure (traffic signals), and with other road users (pedestrians with compatible smartphones) using built-in, or add-on devices that continuously share important safety and mobility information. CV technology enables communications among vehicles, infrastructure, and personal communications devices operated by passengers, pedestrians, bicyclists, or other road users.

The use of connected vehicles and technology will provide several benefits to the City. This includes benefits in the areas of Safety, Mobility and the Environment. More specifically, connected vehicles provide the following benefits:

Safety

- *Reductions in crashes with combinations of safety and road weather applications including:*
- *Red Light Violation Warning and Pedestrian in Signalized Crosswalk Warnings*
- *Grade Crossing Warnings*
- *Curve Speed Warnings*
- *Weather Warnings*

Mobility

- *Applications that are effective in prioritizing signal timing and reducing travel time and overall delay with the following:*
- *Combinations of signal control applications such as Intelligent Traffic Signal Systems, Transit Signal Priority and Freight Signal Priority*
- *The Incident Scene Pre-Arrival Staging Guidance for Emergency Responders*
- *Cooperative adaptive cruise control and speed harmonization*

Environmental

- *Applications have potential congestion and lane management capabilities and can reduce fuel consumption and emissions through:*
- *Optimized signal operations and freeway lane management applications*
- *Low Emissions Zone applications*

Strategy #9

Acquire and Integrate Third-Party Real-Time Traffic Operations Data

Description – Acquisition of third-party data on a regional level to collect and distribute real-time data on the transportation network to utilize for real-time operations improvements. The system must be integrated into the City's existing ATMS in a way that ensures the data is useful and provides actionable information. This strategy will be leveraged by the City to use this third-party data for real-time operational decision-making purposes.

Scope/Limits – The City will receive third-party real-time traffic data, such as origin-destination (OD) and travel time, to monitor conditions and evaluate travel characteristics for planning and operational purposes. Sacramento will receive a local subscription as part of the master Regional subscription.

Strategy #10

ATMS Upgrades and Add-ons

Description – Upgrade the City's Advanced Traffic Management System (ATMS) to incorporate new functionality. Additional data to incorporate into ATMS upgrade includes, real-time volume and delay, emergency vehicle activations, transit signal priority logs, adaptive signal performance measures, emergency notifications, weather notifications, and equipment maintenance status and alerts. Additional modules may be needed to support travel time devices and connected vehicle technology, among others.

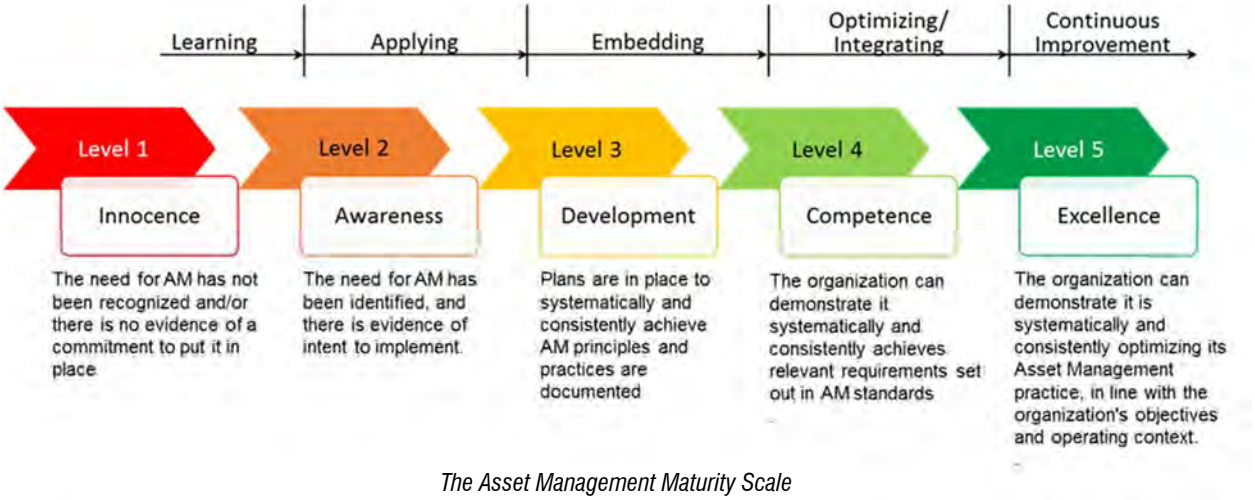
Scope/Limits – Procurement of ATMS add-on modules and software updates to systems to incorporate new functionality including modules with the following capabilities:

- *Adaptive Signal Control*
- *Asset Management*
- *Data-to-Web*
- *ATSPM*
- *EVP*
- *TSP*
- *Data Recovery*
- *CCTV*

Strategy #11

ITS Asset Management System

Description – Procure and implement an asset management system. Includes software, installation, integration, and data migration and population. In addition to the procurement of the physical system, the City should develop an asset management program with policies that ensure continuous updating and monitoring of the City's ITS assets. This strategy will require additional staffing or staff time for the development, administration, and maintenance of the program.



The Asset Management Maturity Scale

Scope/Limits – The City will transition the collection, storage, and analysis of assets from existing spreadsheet software methods to a new comprehensive, secure, and georeferenced asset manager.

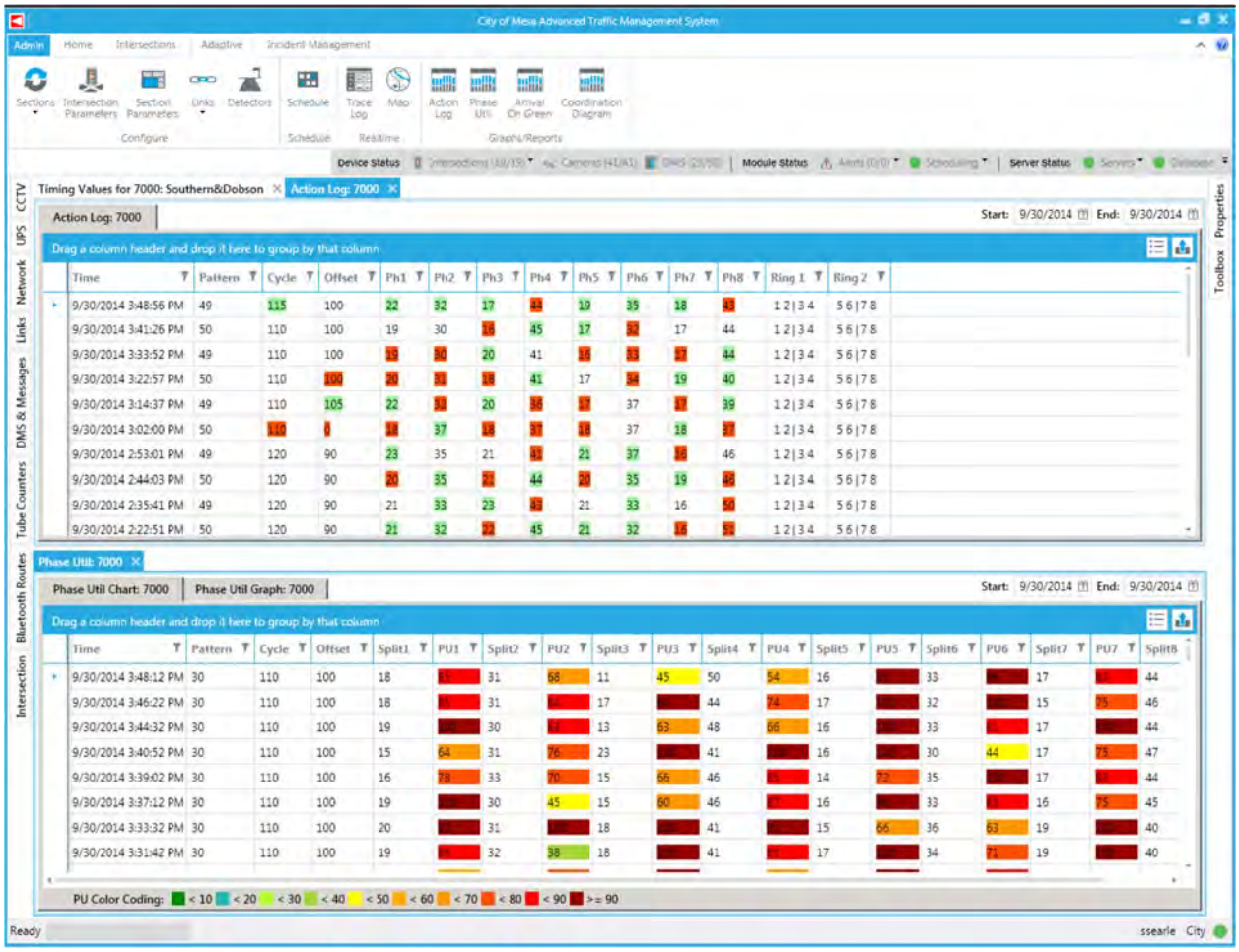
Once a desired platform is selected, staff will need to program time to transition all assets into the new management system. The software will have standardized and pre-populated fields to ensure data is categorized in simple and meaningful groups. The system should have the ability for staff to create, track, and close maintenance orders or be compatible with a separate system that has this functionality. In addition, the system should be capable of tracking and scheduling preventative maintenance on user-defined intervals. The system should store equipment details including make, model, age, install date, traffic count data, electronic as-builts and record drawings, signal timing data, photographs, and maintenance and operations notes.

Strategy #12

ATSPM Deployment

Description – Implement an Automated Traffic Signal Performance Measure (ATSPM) system. ATSPMs consist of high-resolution data-logging capability added to existing traffic signal infrastructure and data analysis techniques. This provides the information needed to proactively identify and correct deficiencies, improve signal timing and coordination, and collect ongoing performance measures to demonstrate the effectiveness of optimization efforts.

Scope/Limits – Plan, procure, implement and integrate an ATSPM system at City traffic signals. ATSPM systems require four components: advanced high-resolution traffic signal controllers with built-in data loggers, accurate vehicle detection, reliable communications to traffic signals, and an ATSPM server and software. An advanced controller collects accurate data from the detection system and combines it with signal operations information. This data is sent over the traffic signal communications network to the ATSPM server and input to the software. The software can store the detection and controller data in a database and includes algorithms to analyze the data. The software should have the necessary graphic user interface (GUI) to allow efficient use of and distribution of the data. Strategies #1, #3, and #5 focus on implementing communications, controllers, and detection. This strategy focuses on developing City standards, policies, and procedures for ATSPM and implementing and integrating the system itself. An important consideration is, the outputs of any ATSPM system are only as good as the data inputs. The most important inputs for the traffic signal system are advance and stop bar vehicle detection. In order to develop an effective ATSPM system, expanding the City's quantity of reliable and accurate vehicle detection should be a top priority.

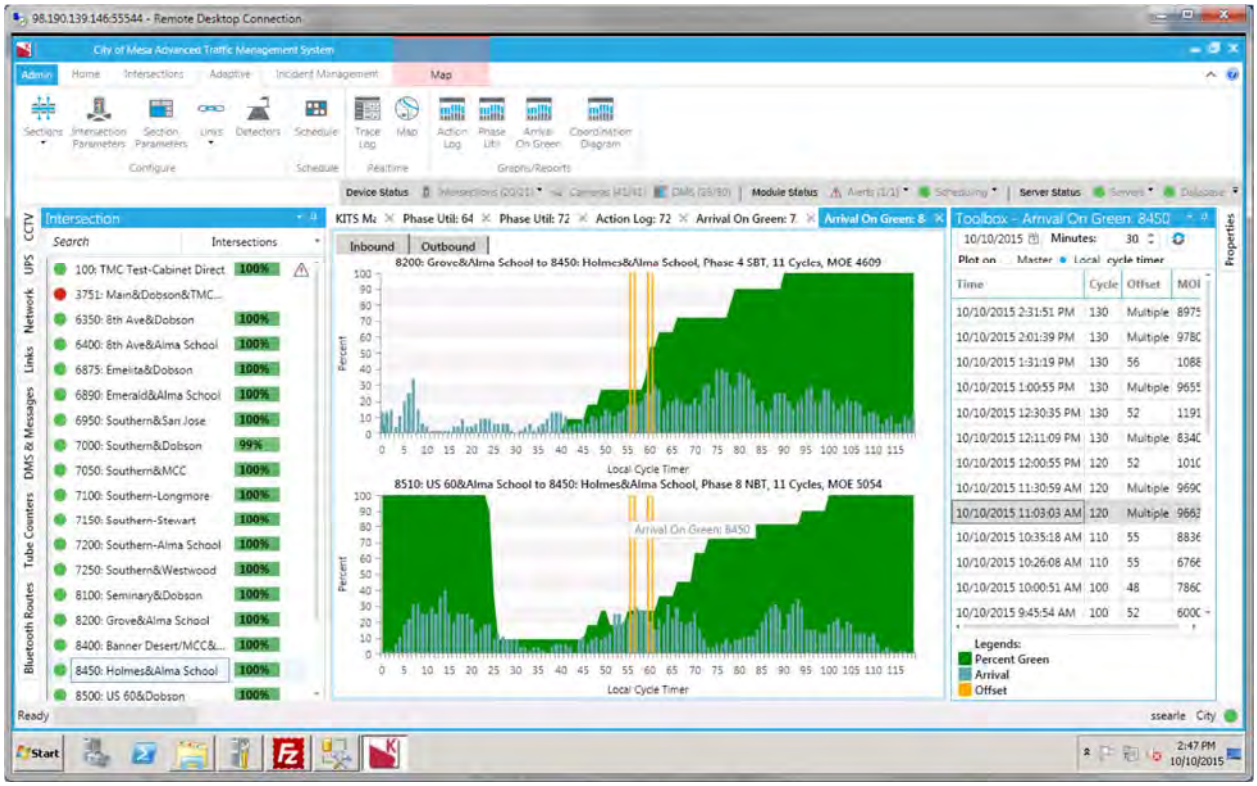


Phase Utilization Output

Strategy #13

Analytics Software and Performance Dashboard for Real-Time Operations Decision Making

Description – Integrate analytics software with the ATMS to collect, analyze, and display traffic data for real-time operations decision making. This will include software and server improvements and identifying staff to be responsible for verifying system outputs. System should be set up to provide reports and alerts to TOC operators when preset thresholds are surpassed or events occur. Data inputs should include, at a minimum, volume, occupancy, speed, and signal timing and sequence. Outputs should include, but not be limited to, performance measures, travel time, queueing, phase utilization, intersection and corridor delay, real-time comparisons to historical data, corridor throughput, and arrivals on green and red.



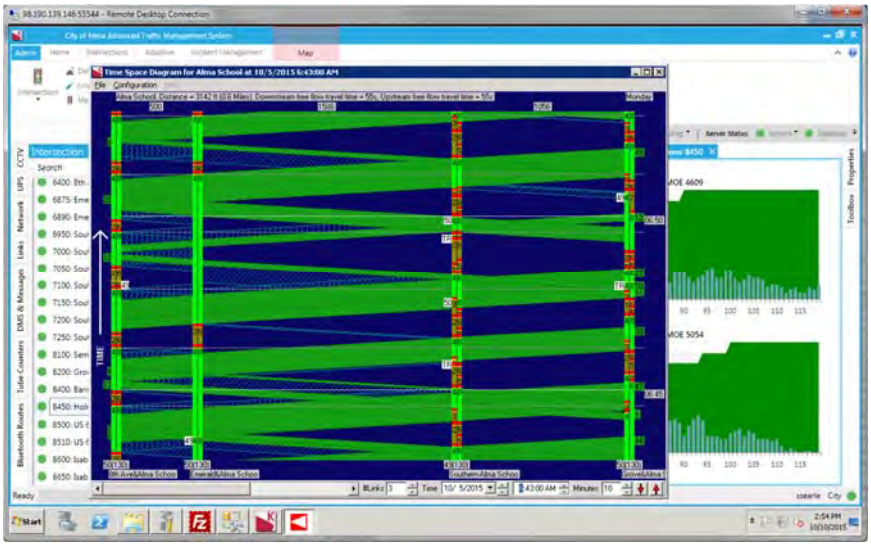
Arrivals on Green Performance Output

Scope/Limits – Procure, implement and integrate software and dashboard. This software will generate automated alerts, provide summary reports on traffic operations, and provide recommendations for improvements to City staff.

Performance Dashboard – A performance dashboard is a management tool that helps capture, track, analyze, and visualize key performance indicators and metrics as they relate to the transportation system. The analytic software should include a performance dashboard for staff to monitor the system in real-time. The performance dashboard should be fully customizable to meet the City's needs, be capable of integration into the City's ATMS, provide data monitoring in real-time, and have an organized, intuitive, and useful display or 'dashboard' for staff to quickly access preset views and reports. It should integrate data from across the transportation division's systems into one location for monitoring and reference. This data should include, performance outputs, system equipment status, crash data and reports, outstanding work orders, transit schedules, public comments and complaints, traffic monitoring video, weather conditions, incident notifications, and construction related lane closure details.

Strategy #14

Implement Citywide Traffic Signal Retiming Program



Time-Space Diagram

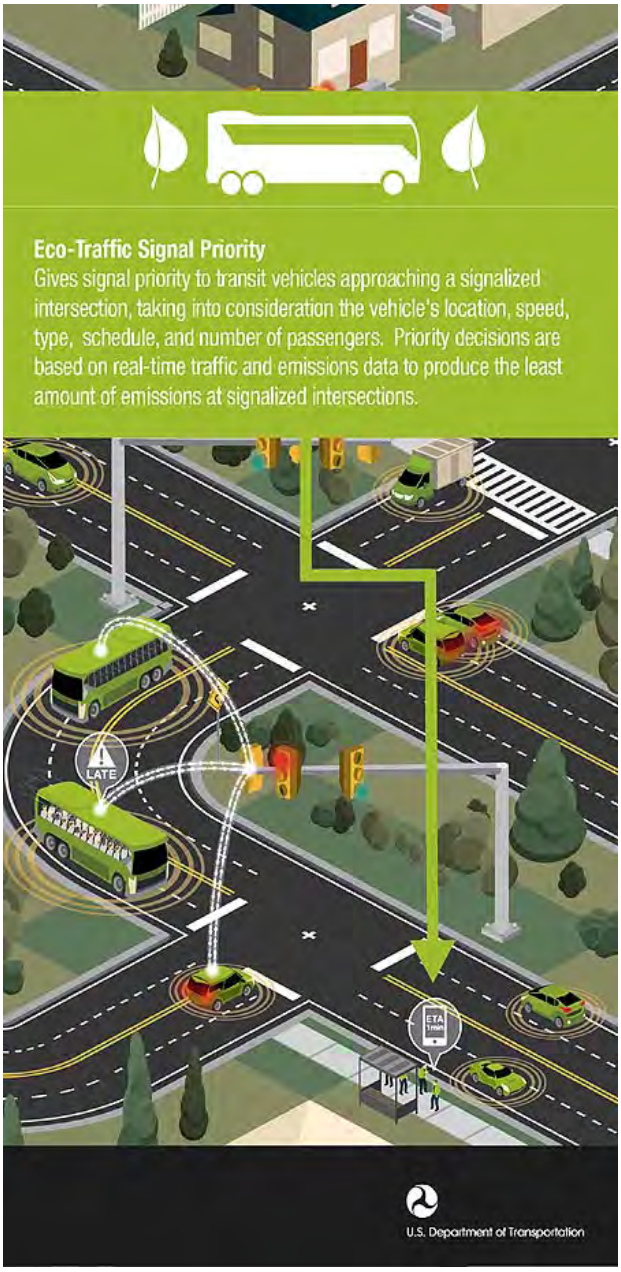
Description – Establish a comprehensive citywide signal retiming program to ensure signal timing plans represent current traffic conditions. Develop guidelines and schedules for the evaluation, modeling, and implementation of updated signal plans for all signals. Signal timing plans need to be developed based on current traffic turning movement counts and modeling outputs. Once timing modifications are developed, they will be uploaded to the signal controllers through the ATMS. Ongoing evaluation of corridors is recommended. Fine-tuning of signal timing plans should be completed as it is important to confirm the modeling assumptions and parameters translated correctly to the project corridor.

Scope – The City will develop a citywide traffic signal retiming program. Development and continuing execution of the program requires additional staffing, or staff time. However, utilizing newly implemented technology to retime the City's signals will improve the ability to see the impacts and reduce the cost previously associated with signal retiming. This could bring an effort that was traditionally contracted out, in-house, but consultants can also utilize the system. The program should utilize newly collected traffic data, including ATSPMs, to inform retiming priorities as well as timing modifications. Major corridor coordination timing should be evaluated on an annual basis to determine if timing modifications are warranted.

Strategy #15

Implement Transit Signal Priority

Description – Implement transit signal priority (TSP) along key transit routes where congestion has made the reliability of transit service challenging. Deployment of TSP requires a partnership between the City and Regional Transit (RT).



Scope/Limits – Transit signal priority will be deployed on major bus transit corridors to increase reliability, improve travel time, and reduce delays. Deployment of a TSP system requires a partnership between the City of Sacramento and RT. TSP timing, maintenance policies, levels of signal priority, and a concept of operations must be agreed upon by both agencies for the system to be successful. If desired, policy and levels of priority provided could consider the number of passengers on each transit vehicle to most efficiently move people through traffic signals, and not just provide one base level of priority to transit users. The strategy includes installation of TSP equipment at traffic signals and on transit vehicles, modification to signal timing on TSP corridors, and the installation and integration of a TSP ATMS module to provide for monitoring and modifications from the TOC.

Strategy #16

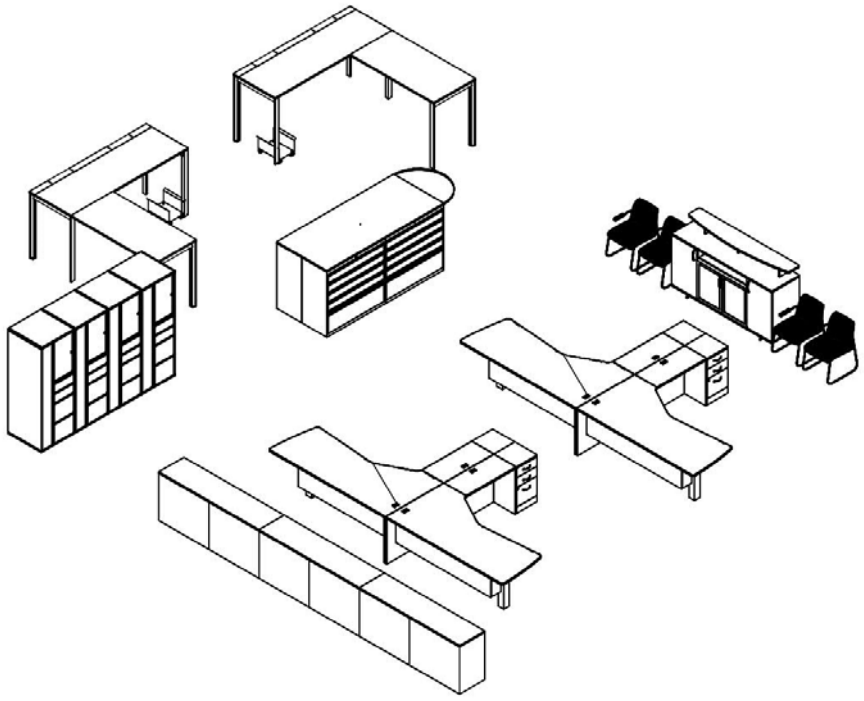
TOC Upgrade

Description – Upgrade the existing Traffic Operations Center (TOC) including a video wall, extra screens for viewing only, network equipment, workstation layouts, workstation equipment, file storage, bench testing of equipment, network room rack space, cooling and fire suppression systems, and other characteristics of a TOC that require consideration. Additional staff need to be accommodated and access to systems warrants a reallocation of space within the existing TOC. The existing TOC is a good foundation but has some inadequacies for a City of the size and profile of Sacramento. The TOC also lacks enough seating for staff, which is likely to be exacerbated as more signals come online. In addition, there are plans to use the TOC as the City's Emergency Operations Center (EOC) which will require additional functionality and workstations. This strategy includes design, procurement, installation, and integration of new TOC components to upgrade and expand the

agency's existing TOC to modern standards and functionality to support the City's increasingly connected transportation system, Emergency Operations Center requirements, and Smart Region initiatives.

Scope/Limits – Design and implement improvements to the existing TOC. The new build-out will have capacity for future staff growth and storage space for future technology requirements. They City will likely need to contract with an appropriate design consultant for planning and design of the TOC upgrades. Some of the critical elements that should be considered for the upgraded TOC include.

- *Workstations*
- *Video Wall and Viewing Distance*
- *Redundant Networking Equipment*
- *Virtualized Servers*
- *Bench Testing Connections and Space*
- *Emergency Operations Center Needs*



Typical TOC Layout (for reference only)

Strategy #17

Establish CAD System and TOC Connections for Automated Alerts and Notifications

Description – Establish filtered Computer Aided Dispatch (CAD) system access at the TOC to see when incidents are restricting lanes and warrant traffic management measures. This strategy will involve communications between the public safety network and the TOC. The CAD system will need to be filtered to anonymous data for lane restriction and location information only, and separate monitors and server will be required at the TOC because CAD will not be integrated into the ATMS system for viewing.

or

Integrate public safety CAD system with the ATMS. This would involve a significant software integration process to update the public safety CAD system to allow it to data push in a specific format to support viewing via the ATMS. Software and servers will need to be installed at TOC to support the connection and integration.

Scope/Limits – Integrate Sacramento County Sheriff CAD system with City's ATMS and TOC. This scope of work includes software integration to update Sacramento County Sheriff CAD system and City's ATMS to allow data push from sheriff CAD system to the ATMS and view the data in the ATMS interface. The scope includes purchase, installation, configuration and integration of servers and software required at City's TOC.

Strategy #18

Establish Agency Network Security Policies and Procedures

Description – Network security training will be a requirement for personnel involved in using, accessing, or securing the City's ATMS, transportation network, traffic signal controllers, and ITS systems. This will involve an update of City networking security procedures and policies. Security training will be provided on a regular basis. This will also include updating procurement specifications to require vendors or firms furnishing new technology to provide training on the functionality and security standards involved with the technology. The City's IT department will be responsible for keeping these policies and procedures up to date with current security requirements of Sacramento's Enterprise System.

Scope/Limits – The Traffic Division will work with City IT staff to establish standard network security policies and procedures for operations and maintenance of the ATMS, the communications network, controllers, and ITS systems, as well as the collection, storage, and dissemination of traffic data.

Strategy #19

Update Existing, and Develop New ITS Standards and Specification Materials

Description – In order to develop a solid foundation for ITS deployment and increase the efficiency of all facets of the transportation system, standardizing the City's traffic signal control and ITS equipment is recommended. Standards to consider include collection of high-resolution traffic condition data and future connected vehicle infrastructure. During the development of ITS standards, it is important to complete a thorough review of current deployments to verify interoperability and identify migration challenges.

Scope/Limits – The City will develop standard details and specifications for design and installation of traffic signal control and ITS equipment.

Strategy #20

Improve Crash Data Collection and Analysis

Description – Improve existing procedures for collecting complete, comprehensive, and accurate crash data for the purposes of identifying, evaluating, and planning safety enhancements. Crash data will be collected with planning and analysis use in mind. This may include developing or procuring a crash data application with features that allow for quick geospatial analysis and automated alerts or diagnostic reports. Staff training and improvements to internal procedures may be required as part of this strategy.

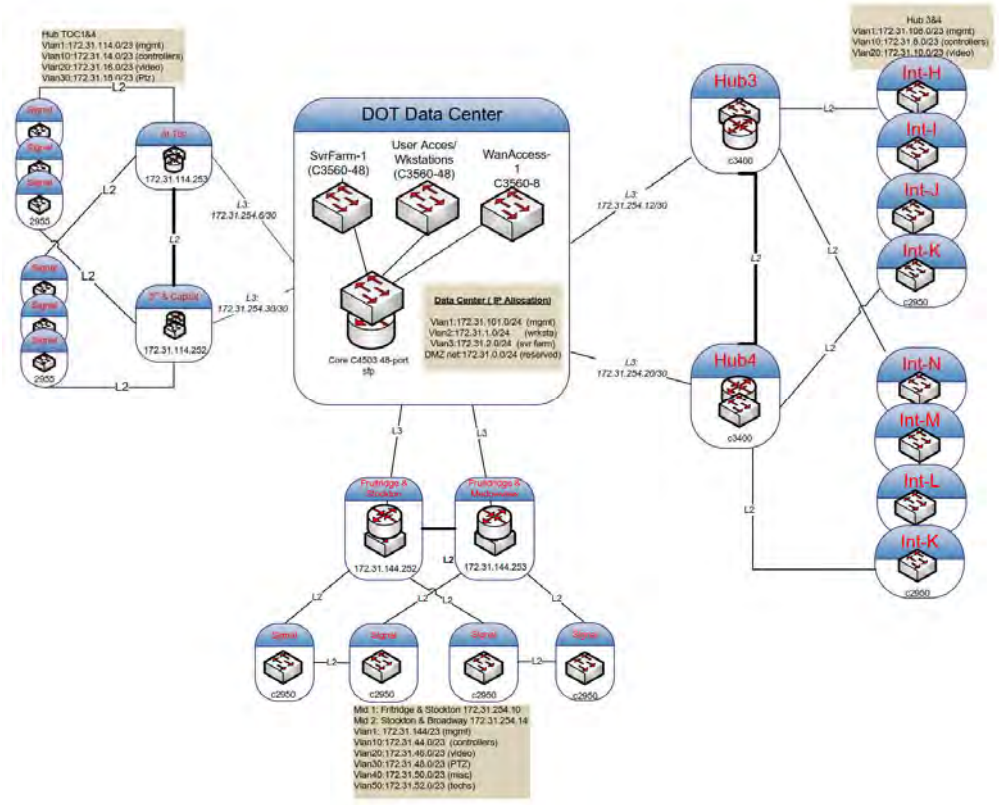
Scope/Limits – The City will evaluate the effectiveness of Crossroads crash data application and establish better procedures for the collection of crash data. The Fire Department and Police Department CAD systems should be considered for additional sources of data. A new system may be deemed necessary. The system

should be web-based allowing access to data from a variety of applications, most importantly from the Performance Dashboard. Staff will focus on developing analysis procedures, such as collision heat maps, to quickly identify and evaluate problem locations.

Strategy #21

Traffic Signal Communications Network Documentation

Description – Existing documentation of the traffic signal communications network resides in multiple spreadsheets and KML files. The City should collect all available network data and compile it into a useful database and network architecture diagram. All networking and ITS devices should be included and a consistent and expandable IP scheme, including VLANs will be established. This scheme currently exists, but having clear



documentation of the system will provide efficiency during expansion and deployment of new devices as well as aid staff tasked with maintaining the network. As additional fiber-optic routes and ITS devices come online, accurate and detailed records of system architecture and addressing will become even more critical for maintaining a robust and reliable system.

Scope – The City will develop thorough documentation of the traffic signal communications network. The documents should be continually updated as the network expands, and new devices come online.

Strategy #22

Deploy CMS

Description – Deploy Changeable Message Signs (CMS) at key locations within the City. CMS equipment will require devices to be mounted cantilever, on a pole, or over the travel lane. CMS provides the traveling public with on-road information pertinent to their travel. The CMS will need to be integrated into the central management system to allow TOC operators to post relevant messages.

Scope/Limits – Deploy CMS at strategic decision locations to relay traveler information to drivers.

7 ITS Projects

7.1 ITS Project Development

The previous information gathering efforts and the needs assessment guided the development of the City of Sacramento's implementation projects. To support development and expansion of the City's transportation network, several deployment parameters were considered in conjunction with previously discovered information to formulate the overarching implementation criteria. These include:

- ***Emerging Technologies*** *– Projects include provisions for CV technology, multimodal considerations (including transit), and other important initiatives that are advancing innovative technology deployment*
- ***Emergency/Disaster Preparedness*** *– Strategies facilitate the ability to improve the effectiveness of emergency and disaster response.*
- ***Data Availability*** *– The type and quality of available data, how data set can be improved and/or expanded, and how data can be effectively leveraged once it has been analyzed.*

- ***Project Dependencies*** *– Certain project elements must be constructed before other elements can be advanced.*
- ***Overlap with Other Projects*** *– Other projects within the same project area offer efficiencies for construction.*
- ***Safety*** *– Strategy contributes to improved safety.*

Strategies have been developed that will address infrastructure/data, operational, and institutional stakeholder and system needs; and to satisfy this implementation criteria.

7.2 Estimates of Cost

Planning level cost estimates were prepared to reflect an order-of-magnitude cost for each project. A summary of specific costs and considerations related to implementation is provided in **Appendix E – Cost Assumptions**. These assumptions include a detailed breakdown of capital component costs and acknowledges the project development, design, construction, integration, and operations and maintenance costs associated with each project. The cost information is a planning-level estimate to deploy each project, based on available current (2019) pricing information for similar technology projects in the region.

Throughout the development of projects, a distinction was made between projects that carry a cost and those that carry little to no cost. Projects that have costs may require initial capital investments and subsequent ongoing operations and maintenance (O&M) costs. Examples of these projects would be the deployment of new field infrastructure or upgrades to existing traffic operations systems. No cost projects tend to fall more into the institutional category and can be deployed with little to no cost and no future O&M costs. Examples of these projects would be the creation of a set of security guidelines, an interjurisdictional agreement, changes to a policy, or modernizing City standards and specifications.

7.3 ITS Project Elements

The following projects aim to develop a technologically modern, fully-developed transportation system for the City of Sacramento through the implementation of large scale projects. However, it is unlikely that all the improvements will be completed as part of major corridor improvement projects. Because of this, it is beneficial to describe the elements that will be standardized across projects and future deployments allowing the City to develop their system as funding and opportunities arise. The following provides detail on technology recommendations and guidelines for the City of Sacramento when implementing projects to aid planners, engineers, and developers in the build-out of smart technology at traffic signal locations.

The technologies, standards, and practices recommended for future traffic signal projects in the City are summarized below as “ITS Requirements”. To assist the City effectively allocate funding, large or small, an equipment inventory summarizing the status of each of these elements is provided in **Appendix F – Status of Smart Traffic Signal Equipment.**

City of Sacramento - ITS Requirements

Traffic Signal Controller Cabinet

Traffic signal controller cabinets should be at least either NEMA TS-2, Type 1 cabinets, 332L, 332LX, or ATC cabinets, depending on the installation location, intersection characteristics, and controller type. NEMA cabinets should be a minimum Type R to provide for future technology deployments.

Traffic Signal Controller

Traffic signal controllers should be at least either NEMA TS-2 compatible or Model 2070 ATC type controller with Linux based operating system. Controllers should communicate via Ethernet and should meet AB3418, NTCIP 1202, and NTCIP 1207 standards.

Vehicle Detection

Stop bar vehicle detection should be provided by non-intrusive methods, either video or radar technologies. The detectors should be able to detect and discriminate between vehicles and bicycles. The systems must meet bicycle detection requirement *Assembly Bill AB-1581* and the *CAMUTCD*. Advance vehicle detection is required on approaches with speeds over 25 mph or as required by the City. The City should continue to test video and radar technologies for advance detection. When a reliable and accurate advance detection system, capable of providing vehicle ETA at a minimum, is found to be acceptable to staff, the City should standardize on it in place of its current standard inductive in-pavement loops.

Traffic Monitoring Camera

Traffic monitoring cameras, or closed-circuit television (CCTV) cameras should be pan-tilt-zoom (PTZ) type, high definition (HD), and Internet Protocol (IP) compatible. Traffic monitoring cameras should be deployed at all traffic signals unless otherwise directed.

Ethernet Switch

Ethernet switches are required at traffic signals and should be Layer 2 with a minimum of two (2) Gbps small form-factor pluggable (SFP) ports capable of accepting optical transceivers for communications over fiber-optic cable. In addition, switches should have a minimum of eight (8) 100 Mbps RJ45 Ethernet ports for other signal appurtenances.

Emergency Vehicle Preemption

New emergency vehicle preemption systems are required and should be GPS and/or radio based and should be compatible with the City's and the City of Sacramento Fire Department's existing system. The system's phase selector or discriminator should be IP addressable for remote monitoring and programming.

Battery Back-up System

Battery back-up systems should include a NEMA 3R enclosure capable of housing all components. The system should include at a minimum a ruggedized Uninterruptible Power Supply (UPS), a bypass switch, and batteries rated for outdoor use and the traffic signal's design load. The UPS should be IP-addressable for remote monitoring. BBS should be installed at all traffic signals unless otherwise directed.

7.4 ITS Projects List

A summary of projects with associated costs are presented in Table 1 – ITS Project Summary**Table 1.**

Table 1 – ITS Project Summary

Project #	Project Name and ID	Project Description	Planning Level Cost Estimate
1	**Downtown Grid Major Corridors** *(Project G1)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 1 mile of communications conduit, 7.5 miles of fiber-optic cable, and 136 traffic signal upgrades)*	$9,600,000
2	**Natomas Blvd. ITS Project** *(Project B)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 4 miles of fiber-optic cable, and 18 traffic signal upgrades)*	$1,700,000
3	**Del Paso Blvd. ITS Project** *(Project H)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 3.5 miles of communications conduit, 4.5 miles of fiber-optic cable, and 29 traffic signal and upgrades)*	$4,600,000
4	**J St. ITS Project** *(Project J)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 2 miles of communications conduit, 5 miles of fiber-optic cable, and 36 traffic signal upgrades)*	$5,000,000

Project #	Project Name and ID	Project Description	Planning Level Cost Estimate
5	**Riverside Blvd. ITS Project** *(Project R)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 7.5 miles of communications conduit, 11 miles of fiber-optic cable, and 24 traffic signal upgrades)*	$8,900,000
6	**Bruceville Rd. ITS Project** *(Project L)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 2.5 miles of communications conduit, 7 miles of fiber-optic cable, and 23 traffic signal upgrades)*	$4,700,000
7	**El Camino Ave. ITS Project** *(Project F)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 6 miles of communications conduit, 8 miles of fiber-optic cable, and 35 traffic signal upgrades)*	$6,500,000
8	**Downtown Grid Capitol Mall and Southside Park** *(Project G2)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 1 mile of communications conduit, 1.5 miles of fiber-optic cable, and 53 traffic signal upgrades)*	$3,700,000
9	**Folsom Rd. ITS Project** *(Project K)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 0.5 miles of communications conduit, 2 miles of fiber-optic cable, and the 24 traffic signal upgrades)*	$2,000,000

Project #	Project Name and ID	Project Description	Planning Level Cost Estimate
10	**Franklin Blvd. ITS Project** *(Project P)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 5 miles of communications conduit, 7 miles of fiber-optic cable, and the 46 traffic signal upgrades)*	$7,000,000
11	**Del Paso Road ITS Project** *(Project C)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 0.5 miles of communications conduit, 2 miles of fiber-optic cable, and 13 traffic signal upgrades)*	$1,700,000
12	**Downtown Grid: Midtown Secondary Arterials** *(Project G3)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 0.5 miles of communications conduit, 4.5 miles of fiber-optic cable, and 73 traffic signal upgrades)*	$4,800,000
13	**Fruitridge Road ITS Project** *(Project O)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 2 miles of communications conduit, 4 miles of fiber-optic cable, and 26 traffic signal upgrades)*	$3,800,000
14	**Arden Way ITS Project** *(Project I)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 1.5 miles of communications conduit, 3 miles of fiber-optic cable, and 25 traffic signal upgrades)*	$2,800,000

Project #	Project Name and ID	Project Description	Planning Level Cost Estimate
15	**Elkhorn Blvd. ITS Infrastructure Project** *(Project A)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 4 miles of new communications conduit, 6.5 miles of fiber-optic cable, and 14 traffic signal upgrades)*	$5,300,000
16	**San Juan Rd. ITS Project** *(Project E)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 3.5 miles of communications conduit, 6 miles of fiber-optic cable, and 14 traffic signal upgrades)*	$4,400,000
17	**Meadowview Rd./ Franklin Rd. ITS Project** *(Project S)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 2 miles of communications conduit, 1 miles of fiber-optic cable, and 40 traffic signal upgrades)*	$3,200,000
18	**Arena Blvd. ITS Project** *(Project D)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately* 2 miles of communications conduit, 3 miles of fiber-optic cable, and 19 *traffic signal upgrades)*	$2,900,000
19	**Florin Perkins Rd. ITS Project** *(Project M)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of	$4,200,000

Project #	Project Name and ID	Project Description	Planning Level Cost Estimate
		updated signal timing and coordination. *(approximately 1.5 miles of communications conduit, 6 miles of fiber-optic cable, and 30 traffic signal upgrades)*	
20	**24th St. ITS Project** *(Project Q)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 0.5 miles of communications conduit, 3.5 miles of fiber-optic cable, and 11 traffic signal upgrades)*	$2,000,000
21	**Norwood Ave. ITS Project** *(Project G)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 1 mile of communications conduit, 1.5 miles of fiber-optic cable, and 18 traffic signal upgrades)*	$3,100,000
22	**Stockton Blvd. ITS Project** *(Project N)*	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 0.5 miles of communications conduit, 0.5 miles of fiber-optic cable, and 25 traffic signal upgrades)*	$2,400,000
23	**Downtown Grid Railyards Blvd.** (Project G4)	Project includes enhanced communication infrastructure through installation of new fiber-optic cable and replacement of existing copper signal interconnect; installation of new cabinets and controllers, deployment of modern video detection; installation of CCTV cameras; study and implementation of updated signal timing and coordination. *(approximately 1 mile of communications conduit, 5 miles of fiber-optic cable, and 18 traffic signal and upgrades)*	$800,000
24	**Asset Management Project**	Upgrade asset management system and maintenance work order system	$150,000

Project #	Project Name and ID	Project Description	Planning Level Cost Estimate
25	**ATMS Upgrades**	Procurement of upgrades and add-ons for ATMS to incorporate new functionality. Integrate back end software linked to ATMS to analyze data for real-time operations	$250,000
26	**Spare Equipment Project**	Procure spare ITS equipment	$1,200,000
27	**Staffing**	Increase Staffing Levels to Improve Real-Time Operations	Salary-dependent
28	**CAD System and TOC Connections**	Establish CAD System and TOC Connections for Automated Alerts/Notifications	$900,000
29	**Infrastructure Replacement Program**	Develop an Infrastructure Replacement Plan for end-of-life equipment	N/A
30	**Preventative Maintenance Program**	Develop a Preventative Maintenance Plan for traffic signal equipment and communications equipment	N/A
31	**Traffic Signal Retiming Program**	Develop an internal Traffic Signal Retiming Program to direct when and where to perform retiming of City corridors.	N/A
32	**Technology Education and Piloting Program**	Develop a Technology Education and Piloting Program to educate staff on new City technologies and provide direction on testing innovative technologies	N/A

8 Operations and Maintenance

To effectively operate and maintain the various project elements and projects identified in this plan, the City of Sacramento must be adequately staffed and prepared to sustain the system after deployment. Operations and maintenance procedures are essential to define the appropriate staffing levels, training, operational processes, and maintenance levels necessary to sustain an effective system.

8.1 Staffing

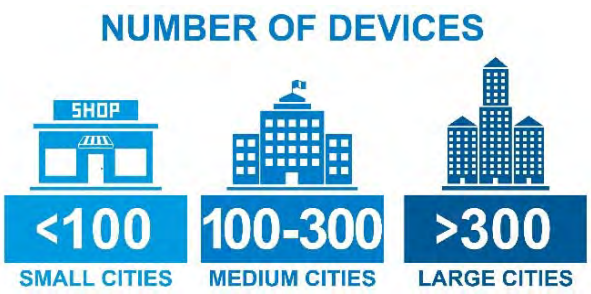
The successful implementation of operations and maintenance strategies is largely dependent on providing appropriate staffing to perform these strategies.

Inventory of transportation assets in the City has steadily increased without a corresponding increase in staff to operate and maintain them. This has created a situation where the City is understaffed for operations as well as for maintenance of the traffic signal and ITS network infrastructure.

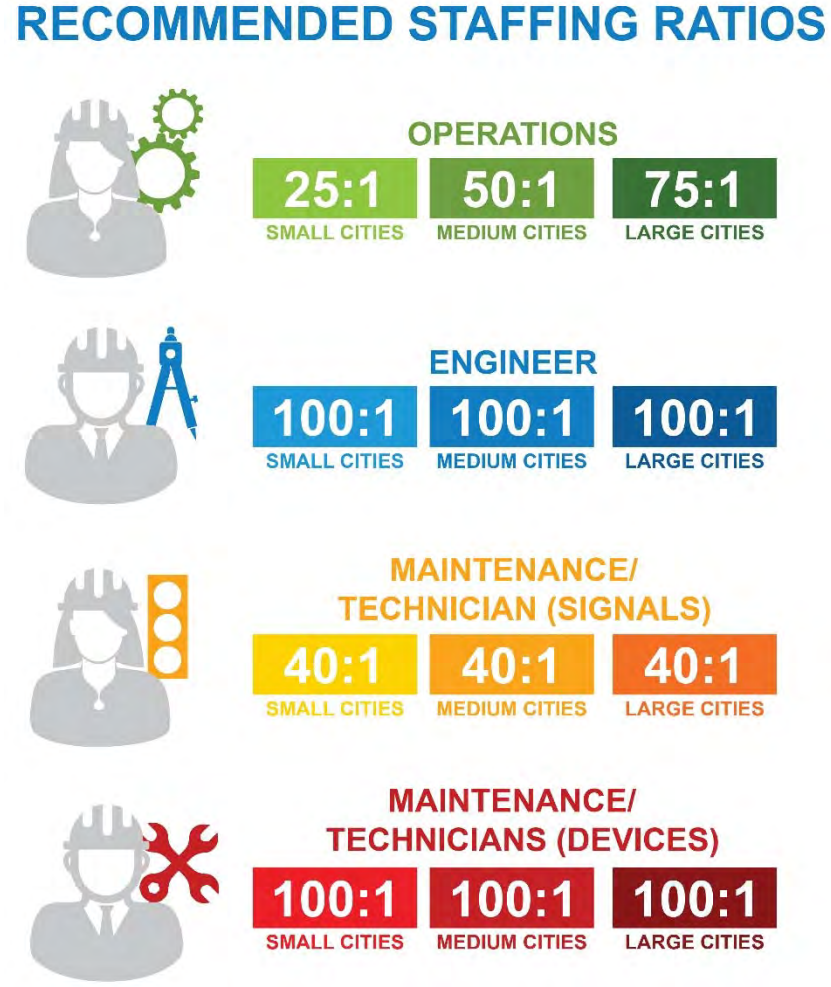
Staffing for ITS

The City of Sacramento should follow a staffing plan that addresses five key objectives:

1. Ensure appropriate staffing levels based on increasing and aging assets;
2. Employs staff with the requisite knowledge, skills, and ability in appropriate positions;
3. Ensure the organization adapts to changes internally and externally;
4. Provide a systematic approach for human resource management; and
5. Provide a shared vision of human resource functions.



The following provides recommended ratios for the number of devices or signals to warrant one staff person for small, medium, and large jurisdictions based on the total number of devices or signals the jurisdiction is expected to operate and maintain. Operations staff are responsible for daily monitoring and use of transportation management assets. Engineers are responsible for conducting analysis of system performance and developing solutions. Maintenance staff are responsible for preventative and routine servicing of field assets.



Staffing Considerations

Deploying additional ITS infrastructure and functionalities desired by the City and recommended in this Plan will exacerbate the City's staffing shortage. To combat this, a process must be put in place to identify and account for staffing needs for the City's ITS infrastructure. A process should be put in place, as part of the capital project programming process for traffic signals and other ITS communications projects, that requires consideration of staffing resources needed to operate and maintain the new infrastructure in addition to existing infrastructure.

When pursuing additional or adjusted staffing to account for ITS improvements, the City should consider the following:

> ***Heightened Skill Set*** – Central management systems are undergoing fundamental changes, including the introduction of more sophisticated technologies, a shift to integrated operations (multiagency, multimodal), and improvements to customer service capabilities. The increased demand for services

and changes to central management system operations influence the required staffing skillsets. In many cases, personnel required to manage intelligent transportation systems have an Information Technology (IT) background and skillsets that includes network management, software development, database administration, or application troubleshooting. Although engineering experience or a professional license may be warranted for specific activities, such as signal timing development, an engineer may not always be necessary to fulfill City functions. Sacramento should consider a combination of personnel skillsets to fulfill its operations and maintenance needs.

Redundant Support Structure – It is important to foster and maintain staff skills and redundancy through greater training and cross-training so more than one person possesses the knowledge and skillset required to operate and maintain the City's ITS equipment and systems.

Central System Management Architecture – Another factor that has a significant impact on staff planning is whether the central management system operations will function only out of the City's Traffic Operations Center (TOC) through the workstations and video wall, or if the central management system will also be operated on a virtual basis in other City offices and facilities. This will determine if the TOC will need permanent operations staff, or if staff will be able to support traffic operations when not on-site.

TOC positions are based on old classifications that do not cover all of a modern TOC's job duties. Job classifications should be reviewed and modified to match the needs of the City's transportation system. Review of other similar sized agencies should be conducted. Positions such as ITS engineer, traffic operations engineer, or traffic operations specialist should be considered.

8.2 Maintenance Plan

A maintenance plan prescribes preventative maintenance and defines the criteria for replacement of infrastructure. The number of devices and systems to be maintained in the City is expected to increase in the near-term based on the programmed ITS infrastructure projects. These devices and systems need to be appropriately maintained to provide accurate, reliable, and timely information.

Maintenance activities fall into two categories: preventive and responsive. Preventive maintenance involves the periodic calibrating, cleaning, or fine-tuning of equipment to prolong the acceptable performance of the equipment. Responsive maintenance involves the troubleshooting, repair, or replacement of failed equipment, usually prioritized based on severity of the failure.

Preventative Maintenance

Preventative maintenance is performed to ensure the reliability and longevity of the mechanical and electrical operations of the system and will reduce equipment failures, responsive maintenance, road user costs, and liability exposure. The City should develop a maintenance checklist for maintenance crews to use and develop a schedule for when the periodic check-ups should take place. Preventative maintenance activities and frequency varies by device, device components, and system. The following graphic provides a typical checklist and

intervals. The City should review and revise the preventative maintenance procedures on an annual basis to ensure new issues are being addressed and equipment is being properly maintained.

Preventative Maintenance Checklist

Interior Cabinet Check	Annually	Monthly	Weekly
Clean Cabinet Interior	✓		
Check controller lamp and door switch	✓		
Check filter	✓		
Check door fit and gasket	✓		
Check locks and hinges	✓		
Check/verify for cabinet timing and log sheet	✓		
Check field block terminal connections	✓		
Signal controller battery backup check	✓		
Certify conflict monitor	✓		
Check all detectors	✓		
Exterior Cabinet Field Check			
Check condition of cabinet exterior	✓		
Check all signal indications	✓		
Check all pedestrian indications	✓		
Check pole conditions and hand hole covers	✓		
Check all signal head back plates and visors	✓		
Check alignment of signals and pedestrian heads	✓		
Check condition of pull boxes and lids	✓		
Intersection Field Check			
Visual check of all traffic signs at intersection	✓		
Visual check of intersection luminaires	✓		
Visual check of all traffic loops	✓		
Visual check of other traffic system related cabinets	✓		

Responsive Maintenance

To address responsive maintenance, the City must develop contingency plans to address inevitable unforeseen device failures. Devices may inadvertently be damaged or may unexpectedly fail due to unforeseen device malfunctions. To address these issues, the City should budget for an inventory of spare equipment for future replacement of failed equipment. The City should maintain two to three percent of the total deployment for adequate spare devices to have on hand for maintenance purposes, plus an open purchase order for seven to eight percent (totaling 10 percent total).

Maintenance Tracking

The City should deploy a maintenance tracking system to keep a database of maintenance activities that have occurred on each device and system. The tracking database should include, at a minimum, the following maintenance activities:

- *Failure detection;*
- *Work order creation;*
- *Dispatched resources;*
- *Response activities;*
- *Diagnosis;*
- *Interim repairs; and*
- *Work order close out.*

Maintenance tracking will allow the City to identify devices that are unreliable, inaccurate, or frequently malfunction. This tracking will also allow the City to identify appropriate cases for technology replacements where maintenance of an existing technology may be costlier than upgrading to a newer technology. Developing and reviewing periodic reports is critical to identifying frequently failing devices for replacement.

9 Performance Metrics

Performance metrics are used to evaluate and demonstrate the effectiveness of the City of Sacramento's ITS projects in addressing local and regional objectives. Recommended data types, data sources, and calculations to evaluate performance of projects are provided in **Table 2**. As projects are delivered, the City of Sacramento can use these metrics as a guideline to evaluate projects.

Table 2 – Performance Metrics to Perform Project Evaluations

Objective	Performance Metric	Data Type	Source	Calculation
	Reduced Travel Time	Travel Time	Sacramento TOC	Travel time in minutes between Point A and Point B prior to and after project implementation
	Increased Transit Ridership	Sales/Revenue	Transit Provider Records	Count ridership levels before and after project

Objective	Performance Metric	Data Type	Source	Calculation
Address **smart** transportation **strategies** for urban, suburban, and rural communities				implementation, calculate percentage change
	Incident detection by CCTV cameras	CCTV Images	Sacramento TOC	Count incidents that are detected via CCTV camera before being identified by public
	Accurate Travel Time Estimates (particularly focused on rural and suburban communities with commuting needs)	Travel Times	Sacramento TOC	Compare travel times estimated and actual travel times to verify accuracy for those commuting into urban centers from rural or suburban communities
Prepare for **smart** region **infrastructure** adapting to new technology	Number of hours (in 6-month intervals) of continued education or training completed by staff	Training Hours	CE courses, Vendor Training Seminars, etc.	Count hours staff spent attending new technology trainings or pursuing certifications
	System Readiness for Connected Vehicle Technology Integration	CV Technology (Device and Data)	Sacramento TOC	When applicable, monitor CV technology integration and compare qualitatively or quantitively with other region's technology integration experiences
	Increase Capacity of Communications Network	Fiber/Wireless/ Bandwidth Usage	Sacramento TOC	Measure communications network capacity before and after ITS device deployment
Reduce user frustration by providing **consistency and reliability**	Reduced Downtime	System Errors/ Failure	System Operations	Compare Downtime Incident Occurrences before and after project implementation
	Reduced Public Complaints	Public Complaints	TOC and other Operator Records	Compare the amount of public complaints related to inconsistency/unreliability from before and after implementation project
	Reduce Response Time to Device Failures	Response Time	TOC and Dispatch Records	Measure reduction in response times before and after project implementation
	Increase percent of field device that are operational	Operational Devices	Asset Management System	Calculate percent of devices that are operational based on total devices in the inventory. Compare that figure to the same percentage ratio prior to implementation project

Objective	Performance Metric	Data Type	Source	Calculation
Proactively improve transportation system **safety**	Reduced vehicle-to-vehicle crashes	Crash Records	Crash Record System	Calculate percentage change of crashes before and after implementation
	Reduced vehicle-to-bicycle crashes	Crash Records	Crash Record System	Calculate percentage change of crashes before and after implementation
	Reduced vehicle-to-pedestrian crashes	Crash Records	Crash Record System	Calculate percentage change of crashes before and after implementation
	Reduced Safety Incidents Involving Transit Operations	Transit Incident Records	Transit Provider Records	Count amount of safety incidents involving transit operations after project implementation and compare to before implementation
Improve **traveler information** and dissemination to public and within region	Reduced vehicle traffic (congestion) due to CMS Message	Traffic Volume	Sacramento TOC	Difference between Pre/Post CMS Traffic Volumes on Corridor and Alternate Corridor
	Increased Social Media Presence via Agency Managed Apps/Websites	Social Media Posts and Push Notifications (Facebook, twitter)	PR/PIO Records	Track social media outputs, compare to posts prior to implementation strategies
	Increased Partnerships between Third Party Data Companies and Public Agencies	Partnerships	Institutional Policies/Documents	Count the number of private party/public agency data sharing agreements that have occurred since implementing strategies
	Increased 511 Inputs (on all available platforms)	Website Updates, Radio Updates, and Push Notifications	511 System/ Records	Count traveler information inputs that are sent out through 511 systems and compare it to counts prior to implementation
	Increased 511 Usage/Subscriptions	App Download/Website Usage	App/Website Management	Count of 511 website views
Disaster preparedness	Improved Emergency Response Time	Travel Time	Sacramento TOC	Time between initial notification to first responder arrival
	Improved Incident Clearing Times	Incident Response and Clearing Times	Sacramento TOC	Compare time it takes to respond to and clear an incident before and after strategy implementation

10 Next Steps

This document, as adopted by City Council, provides focused direction to City staff to implement the strategies, priorities, and investments outlined in the Plan. The outcome of this ITS Master Plan is a roadmap of strategies and projects that the City of Sacramento can follow to systematically implement technology projects that achieve local and regional objectives through expansion of infrastructure, integration of systems and subsystems, and deployment and readiness for emerging technologies.

This Plan assists City staff with the following:

- *Provides a guide to decision making when programming local dollars at the beginning of each fiscal year, either for direct local expenditure, or set aside for grant match.*
- *Assists in determining which projects, both specific and those strategies more programmatic in nature, can be submitted for federal and state grant opportunities.*

- *Serves as a tool to identify standard CIP improvements, with a focus at the onset of the projects' development, serving as a policy document which helps avoid project development surprises.*
- *Helps to communicate to SACOG and other state/federal grantors that the City has an ITS policy on which the elected leaders have agreed and invested.*
- *Establishes a framework for project prioritization.*
- *Assists with internal workload prioritization.*

This plan and the associated tools should remain a living set of resources that staff can update as projects are implemented or expanded, agency priorities change, or other changes occur that impact the region or the City of Sacramento. In addition, it is particularly important to maintain a process to update the Plan because of the deployment phasing methodology used.

10.1 Plan Components to Update

Deployment Phasing – It will be particularly important to update the Plan to reflect projects that have been completed. Priorities across projects may also change and should be reflected in the document. As time goes by and projects shift from phase to phase, updating will provide an opportunity to evaluate if new projects are available based on emerging technology, increased staffing levels, and so on.

Funding Opportunities – Funding opportunities are always changing. Existing programs or grants may expire, while new ones may emerge. It is imperative that funding opportunities are kept current to maximize the opportunity to utilize new funding sources. In addition, it will continue to be important to leverage emerging opportunities for third party or private sector support.

Equipment Replacement Strategies – The success of this Plan is largely based on ensuring that all equipment continues to work effectively and efficiently. Legacy equipment should be continuously updated or replaced to accommodate emerging technology and enhanced system functionality.

Operations and Maintenance – Adequate staffing levels allow for optimal functionality. As the plan grows and progresses, staffing levels must continue to reflect the need for sustaining a functioning system.

APPENDICES

Appendix A – Existing Conditions

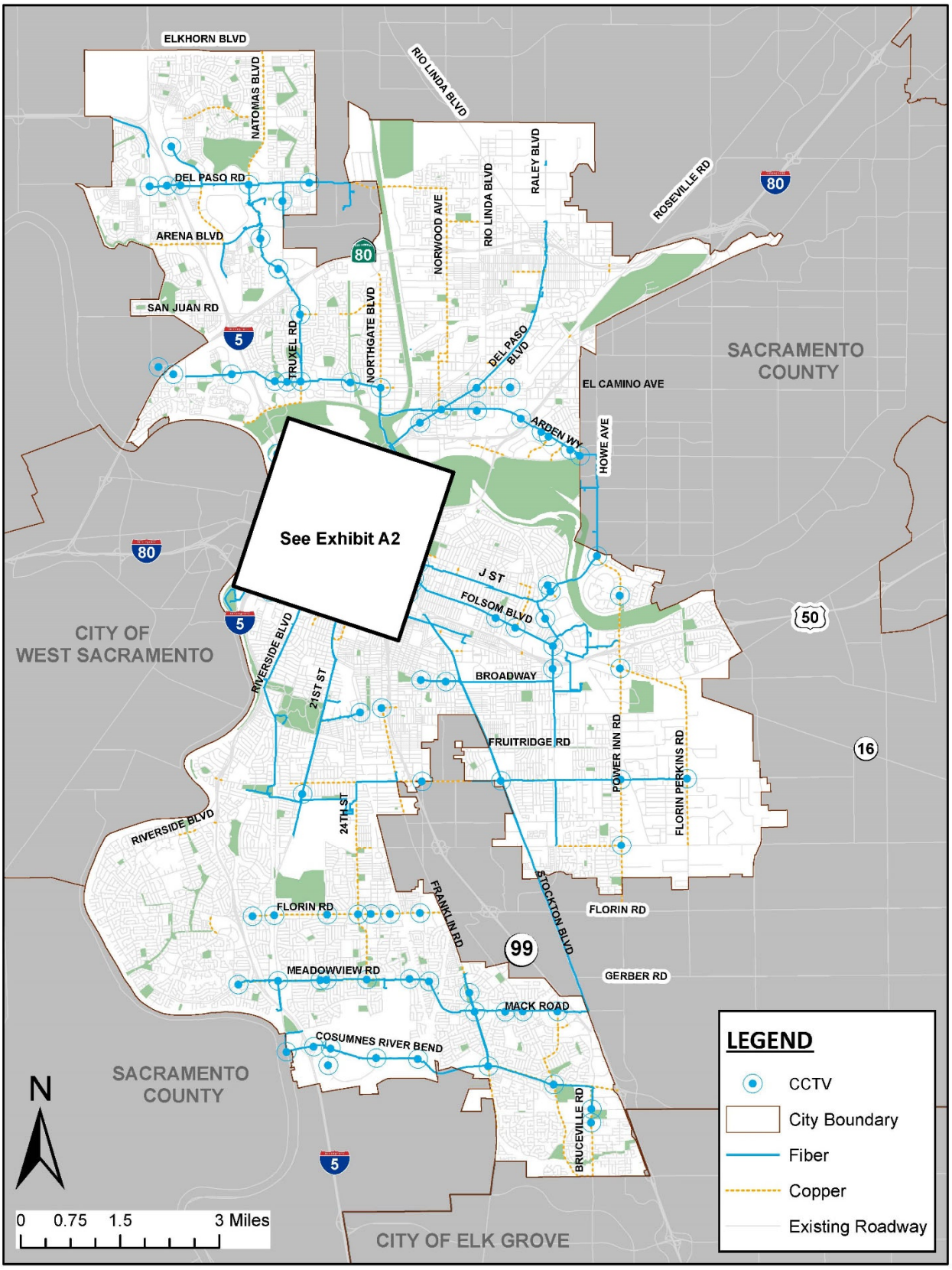


Exhibit A1 –
City of Sacramento Traffic Signal Assets

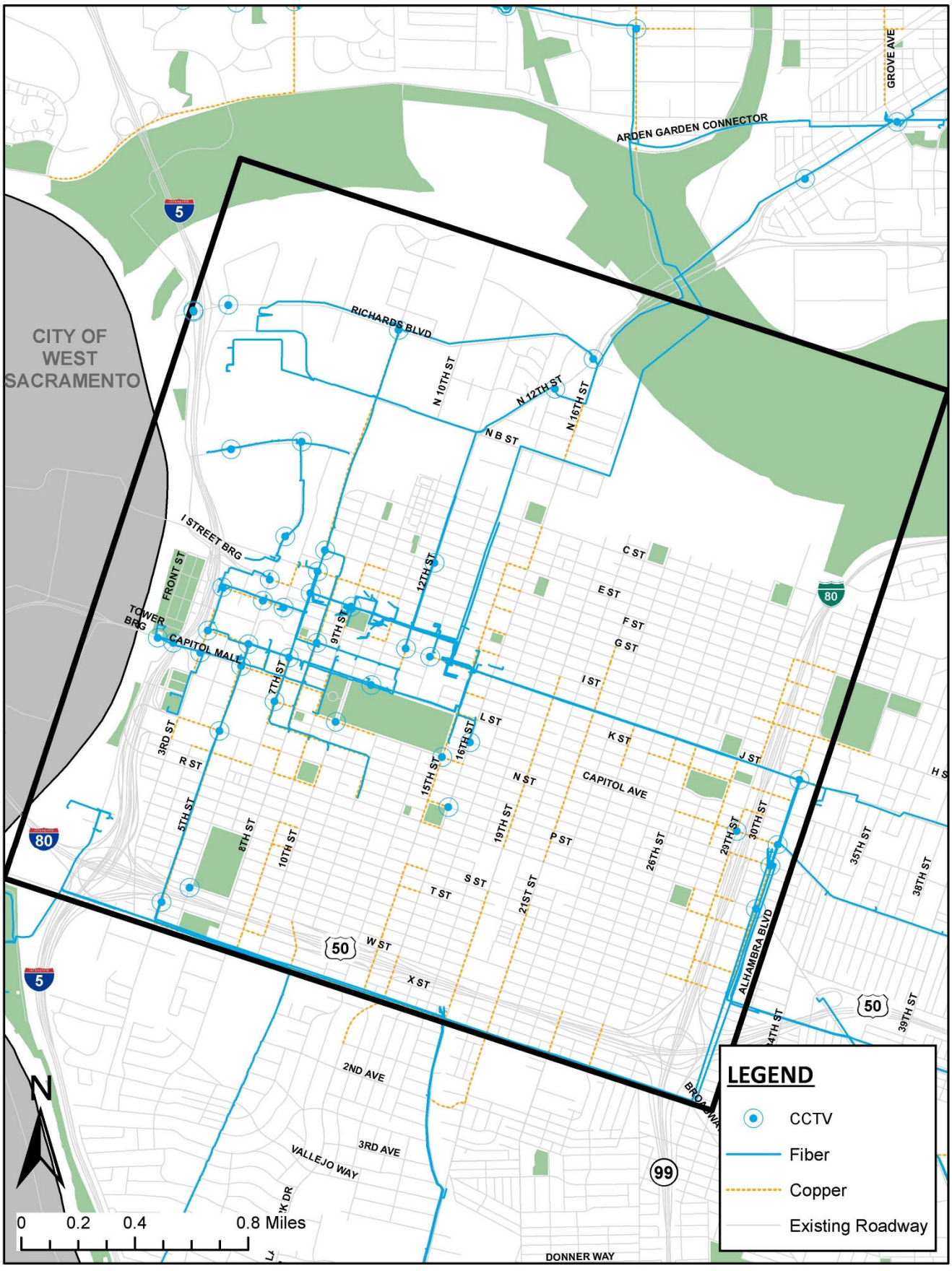
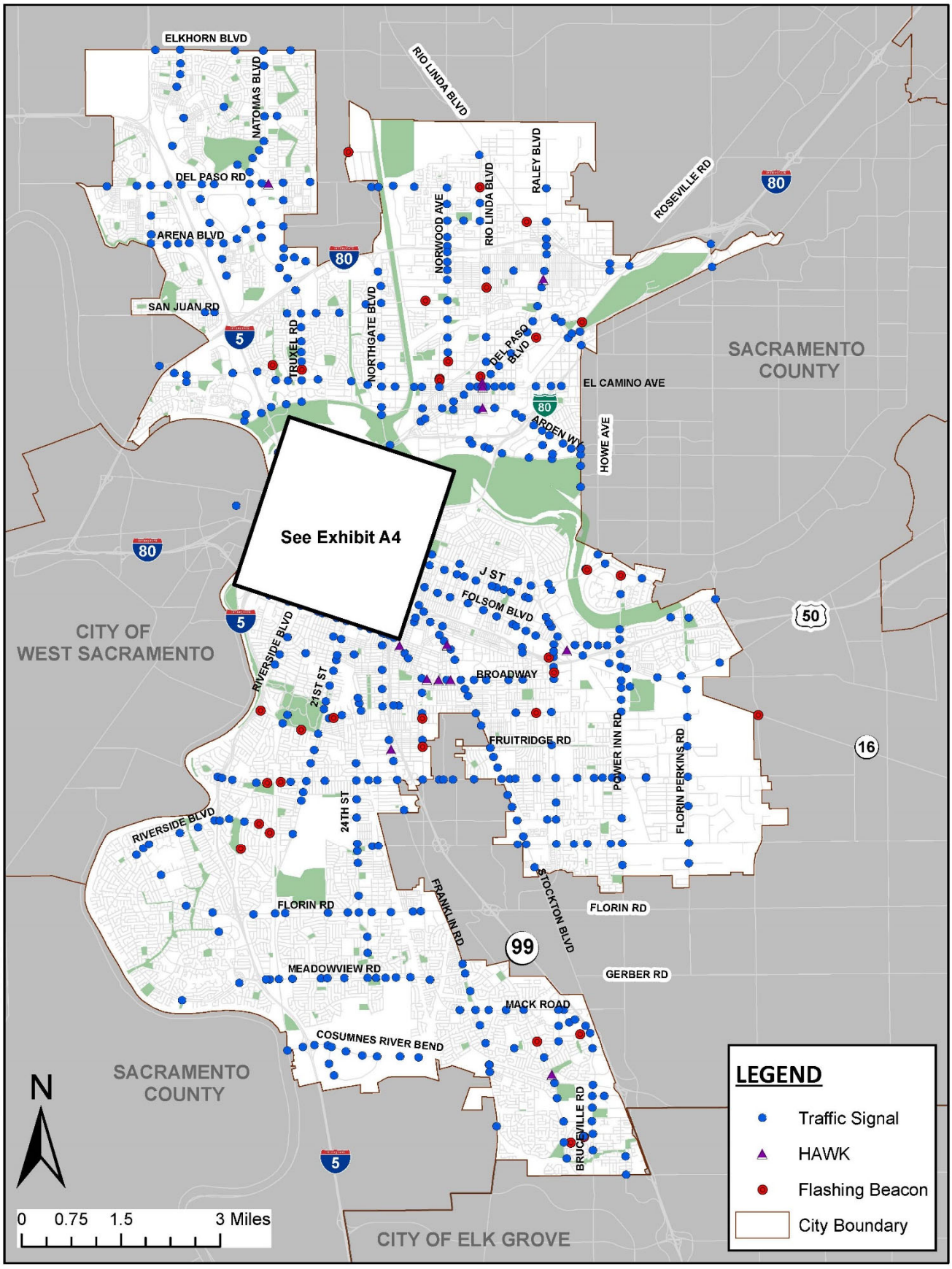


Exhibit A2 –
City of Sacramento Traffic Signal Assets (CBD)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NORWOOD AVE
RIO LINDA BLVD
SAN JUAN RD
TRUXEL RD
NORTHGATE BLVD
DEL PASO BLVD
SACRAMENTO COUNTY
EL CAMINO AVE
ARDEN WY
HOWE AVE
See Exhibit A4
J ST
FOLSOM BLVD
CITY OF WEST SACRAMENTO
RIVERSIDE BLVD
21ST ST
BROADWAY
FRUITRIDGE RD
POWER INN RD
FLORIN PERKINS RD
24TH ST
RIVERSIDE BLVD
FLORIN RD
FRANKLIN RD
STOCKTON BLVD
FLORIN RD
MEADOWVIEW RD
GERBER RD
MACK ROAD
COSUMNES RIVER BEND
SACRAMENTO COUNTY
BRUCEVILLE RD
CITY OF ELK GROVE
N
0 0.75 1.5 3 Miles
LEGEND
Traffic Signal
HAWK
Flashing Beacon
City Boundary

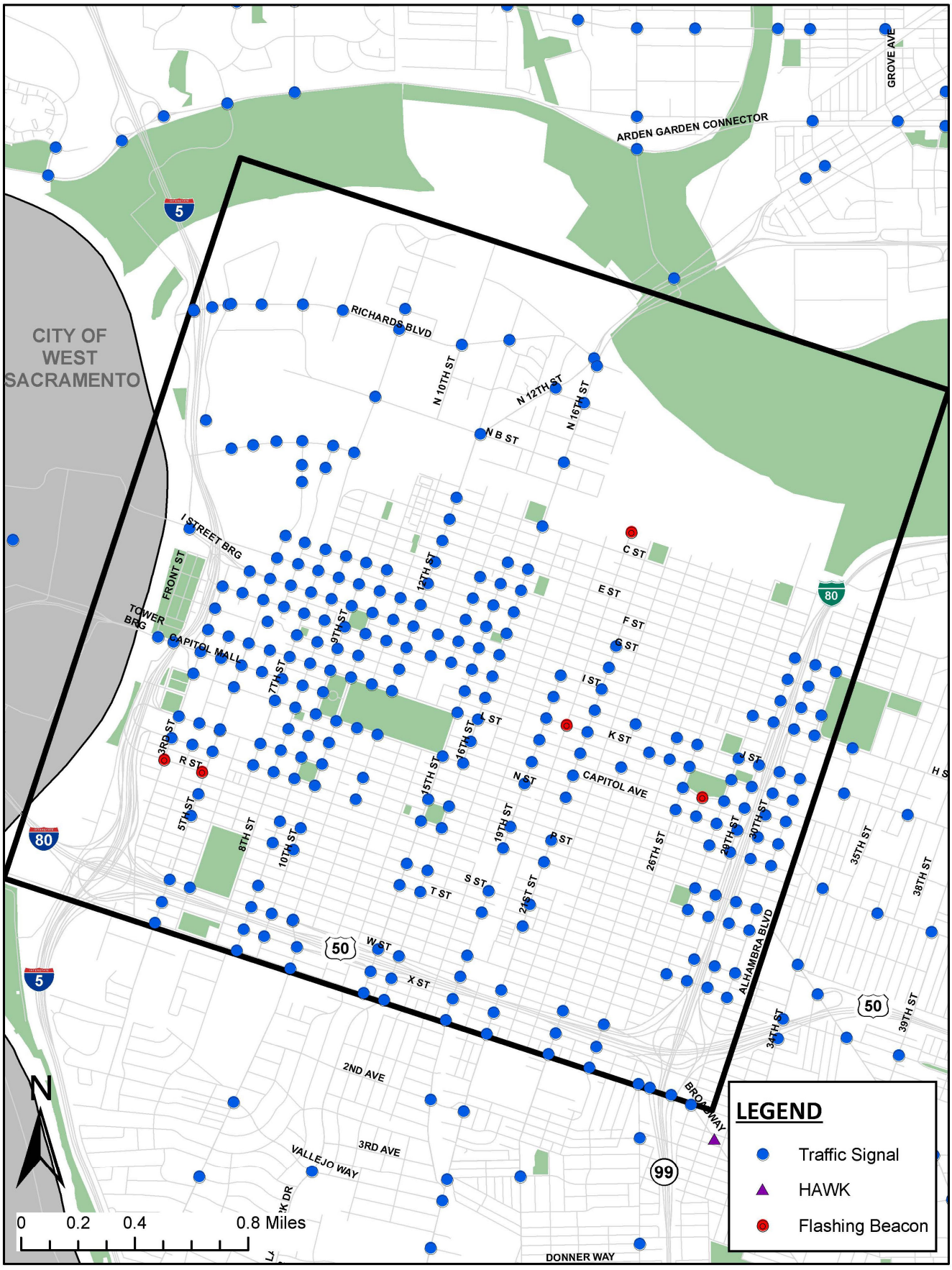


Exhibit A4 –
Existing Signal Assets and Communications Infrastructure

Appendix B – Determining The Path Forward

There are many directions that the City could move toward in implementing solutions to address the established needs. While some needs point to specific types of strategies, others are more difficult to solve and will require a combination of infrastructure, operations, and institutional processes to be implemented.

Traffic operations and management technology is constantly advancing and evolving, which makes it an important consideration during the formulation of implementation strategies. It is crucial that the implementation process takes full advantage of the existing ITS technologies available while also formulating strategies that align with where technological advancements may be heading. The following are current technology trends that were evaluated for applicability in addressing needs as defined for the Smart Region Program:

- **Big Data** is becoming readily available as more data is acquired from connected field infrastructure on a near-real-time-basis as well as additional data-rich information from new sources such as probe vehicles, fleet vehicles, and connected vehicles becomes more mainstream. Big Data is about predictive analytics; or more simply, improving our ability to predict and anticipate outcomes. Historically, transportation data has been difficult and costly to obtain but as it becomes increasingly available through GPS, phone apps, and many other sources this is quickly changing. Big Data is already changing the way we plan, analyze, and operate our transportation, and big data will play a large role in affecting the use of regional communications networks and regional data sharing systems.

- **Transportation Network Carriers (TNCs**) pair passengers with drivers who provide on-demand service, most often via websites or mobile apps. Services such as Uber and Lyft are examples of the sharing economy. Increasingly, transit providers, including Sacramento Regional Transit (RT), are beginning to provide on-demand transportation services to augment their systems. These services have the potential to address the long-standing challenge of first-mile, last-mile service to expand the reach of existing bus and light rail service.

- **Connected Vehicle (CV)** readiness, both in terms of infrastructure and institutions, was identified as a need and yet full connected vehicle CV deployment is gradually becoming a reality in the industry. As a result, it is important that the partner agencies are equipped with the infrastructure and projects needed to adapt to those changes and needs. It is important to recognize the changing landscape of technology options with connected vehicles because the federal guidelines have not been finalized. Agency adoption of providing data to or collecting data from a connected vehicle will need to have benefits outlined and likely deployed on a scalable basis until more formal guidelines for adoption and expectations are defined.

- **Autonomous Vehicle (AV)** readiness, in terms of institutions and policies, was identified as a need as AVs are being tested on more and more roadways throughout the Country. Although functioning autonomously, there may be a variety of useful data that could be provided to the vehicle, collected by the vehicle, or shared between AVs that could require an agency role and responsibility."

- **Vehicle-to-Everything (V2X) Communications** is becoming a highly-desirable system feature that establishes an exchange of data between vehicles (cars, bicycles, pedestrians, transit) and field infrastructure. One example includes Signal Phase and Timing data that enables subscribed vehicles to display when a downstream traffic signal will change. Another example is collecting vehicle location information for collision avoidance or for origin-destination analysis. Applications designed for pedestrian and bicyclists mobility may be utilized to connect location and route information with transportation infrastructure and operations.

- **Smart Wayfinding and Citizen Engagement Platforms** offer new, interactive ways for municipalities, business improvement districts, and marketing organizations to communicate with the public. Citizens and visitors use touchscreen displays to access a wide variety of information ranging from smart wayfinding and transit planning to locating nearby businesses and entertainment. Cities have the ability to broadcast important service announcements and relay emergency alerts enhancing public safety.

- **Adaptive Traffic Signal Control** enables traffic signals to proactively adjust signal timing parameters to accommodate unplanned variances in traffic demand. There are several adaptive systems in the market, each of which tends to accommodate specific corridor needs (e.g., maximize throughput, minimize side-street delay).

- **Automated Traffic Signal Performance Measures (ATSPM)** is a software module add-on to many traffic signal software applications that processes and analyzes traffic signal data to display and report performance metrics of an individual traffic signal, corridor, and/or across the traffic signal network. This feature enables agencies to proactively identify trouble areas, report on corridor performance, and facilitate efficient traffic management.

- **Internet of Things (IoT)**, often referred to as "connected devices", are items are embedded with technology such that objects can exchange and collect data. From a streetlight bulb that notifies that it needs changing to roadway sensors that monitor traffic speeds, the opportunities to collect and use data to improve the maintenance and operations of the transportation system are rapidly expanding.

- **Electrification** is a consideration for the future. The transportation sector is responsible for approximately 36 percent of California's Green House Gas (GHG) emissions (50 percent when you include refineries) and more than 80 percent of NOx and particulate emissions. In conjunction with the continued addition of renewable energy sources as the basis for electrification, the positive impact of air quality will be significant. As the location of charging stations continues to expand, electric vehicles will also become increasingly easy to own and operate.

- **Multi-Modal Considerations** are important when considering that municipalities and transit providers are also faced with the challenge of embracing technological advancements. These technologies are aimed at improving bicycle and pedestrian safety and mobility, as well as maximizing the efficiency and convenience of transit service. Technological advancements that provide more meaningful real-time and situational awareness information for multi-modal users include detection techniques, minimizing conflicts at traffic signals, fleet management, mobile traveler information, and Automatic Vehicle Location (AVL), among other methods. Multi-modal transportation users are diverse in their ability to provide information as well as receive it, and service providers are already applying technology in equipment as well as systems to provide a greater experience for the user.

- **Third Party Data**, such as purchased third-party probe traffic data, gives an agency a cost-effective opportunity to monitor and analyze street networks where physical data collection devices are not installed or where installing sensors is not feasible. Data can be used to supplement or compare with existing data collection methods to aid staff in the decision-making process of where staff resources are best used.

- **Vehicle Miles Traveled (VMT)** and the future of transportation funding and investments are a major factor in the development of strategies. Passed in 2013, California Senate Bill (SB) 743 mandated changes to the way local jurisdictions meet California Environmental Quality Act (CEQA) guidelines regarding transportation impacts. VMT, rather than delay as measured by Level of Service, is now the accepted, and certified, metric for evaluating a project's environmental impacts. Furthermore, industry experts agree the path to meeting state greenhouse gas reduction goals must include VMT reduction. To achieve this, agencies need the capability to collect VMT data (traffic volumes over time and space), procedures to analyze the VMT data, and strategies to develop and implement projects and policies to reduce VMT.

- **Bikeshare/Scootershare** provides a critical connectivity option for local and regional trips and has the potential to significantly reduce traffic, VMT, and parking demand.

- **Open Data** and allowing public access to collected traffic data increases public transparency between government and its citizens. Open and available data has the potential to spur innovation generating more advanced intelligent traffic services. The protection of personal privacy and the release of sensitive information remain important factors when considering the release of traffic data.

- **SharedStreets API (Application Programming Interface)** allows for the management of transportation assets is an important role for the City's transportation division. The locations of these assets and their relationships to other assets can provide vital insights into the transportation system that can both improve operational and planning outcomes. This open source effort is used to establish consistency between data sets so that they can be used collaboratively to gain greater insights.

- **Variable Message Signs (VMS)** s, electronic and extinguishable, allow an agency the ability to provide enhanced, real-time safety and guidance information to motorists about planned and unplanned traffic events.

- Traffic Collision Analysis, such as Crossroads, are useful tools for a City to manage and understand collision history so appropriate and targeted measures can be taken to prevent them in the future. These software databases not only store data but give staff an efficient way of analyzing the data, developing queries, creating maps, charts, and graphs, and producing reports.

Determining the priority of which strategies are applicable to the SACOG region requires a careful evaluation of not only the existing conditions of the region (the infrastructure available, the data available, and the propensity for agencies to adopt certain technologies over others), but also the available technology trends that lend themselves toward potentially being solutions to the needs of the SACOG region.

Appendix C – Proposed Project Limits and Communications Buildout

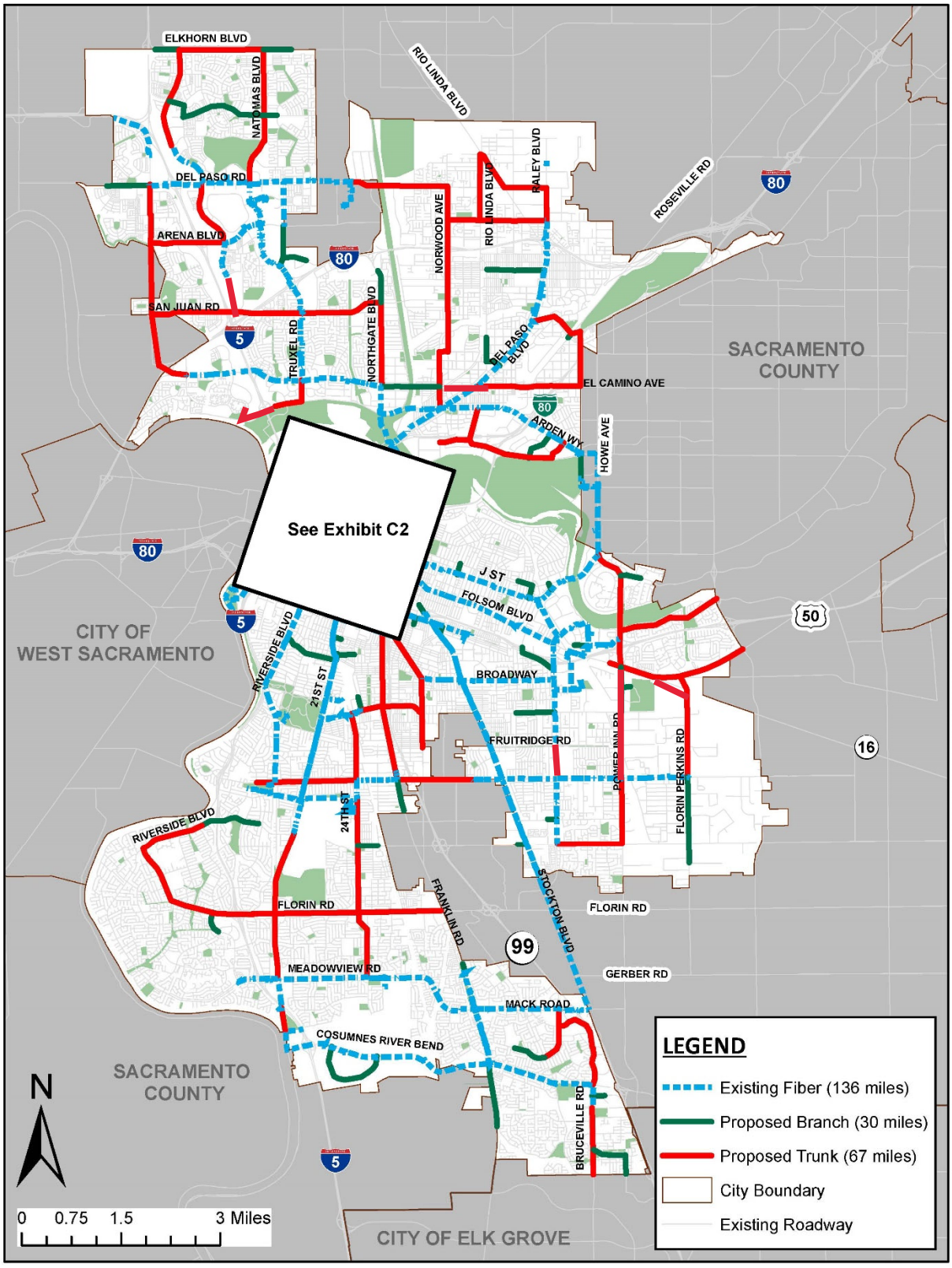


Exhibit C1 –
Fiber-Optic Communications Buildout

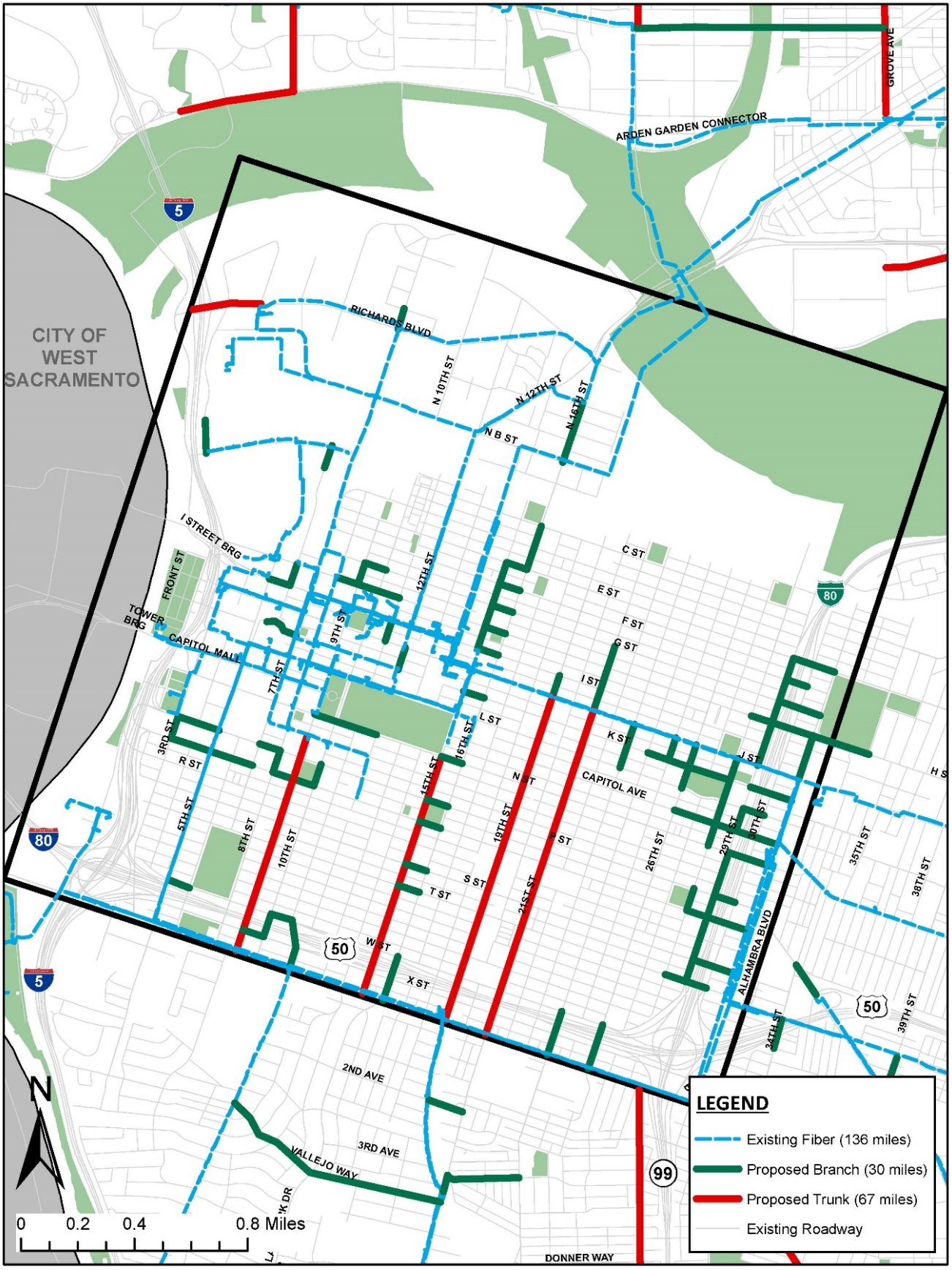
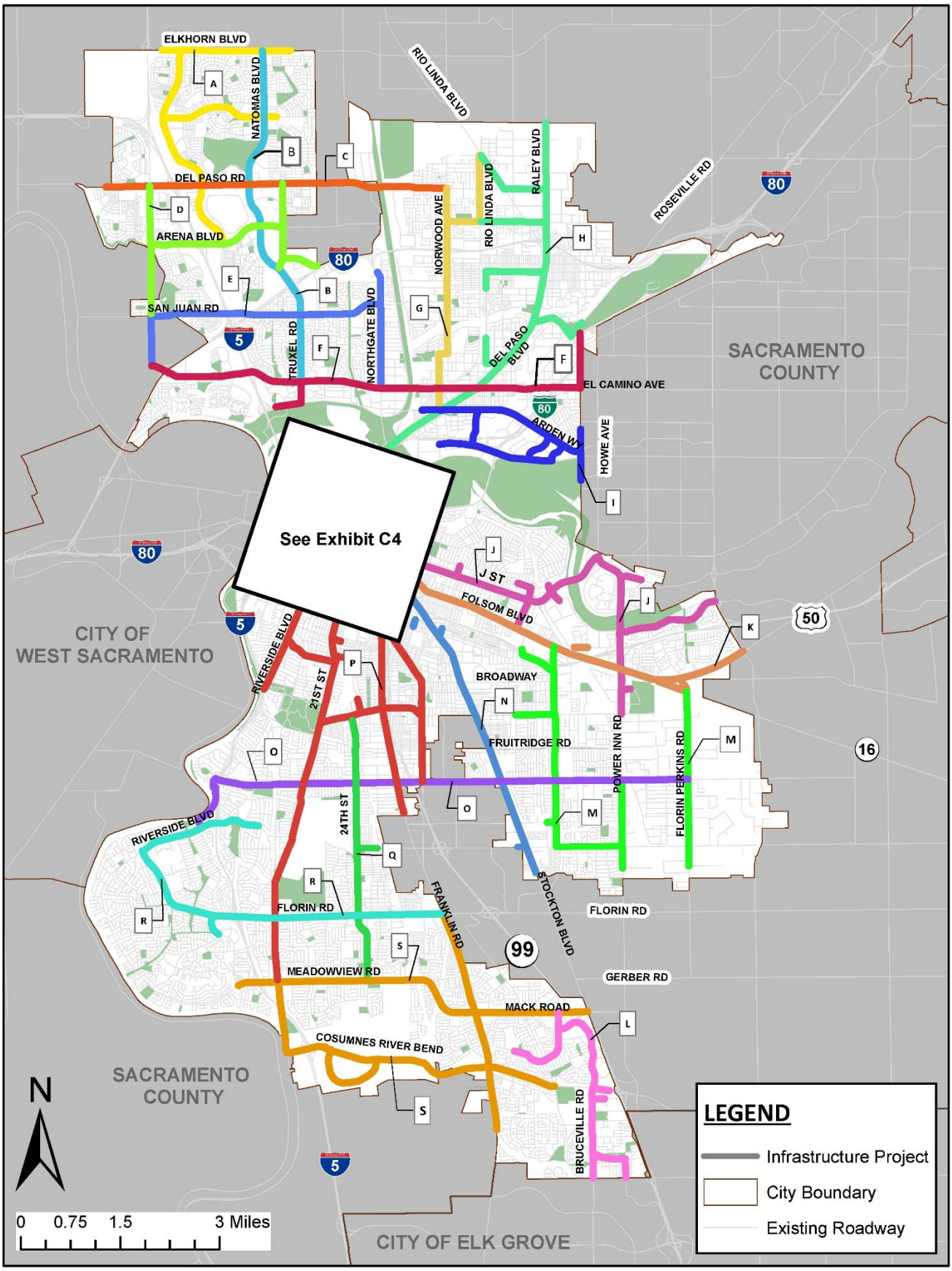


Exhibit C2 –
Fiber-Optic Communications Buildout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SACRAMENTO COUNTY
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FLORIN RD
FRANKLIN RD
STOCKTON BLVD
MEADOWVIEW RD
GERBER RD
MACK ROAD
COSUMNES RIVER BEND
SACRAMENTO COUNTY
BRUCEVILLE RD
CITY OF ELK GROVE
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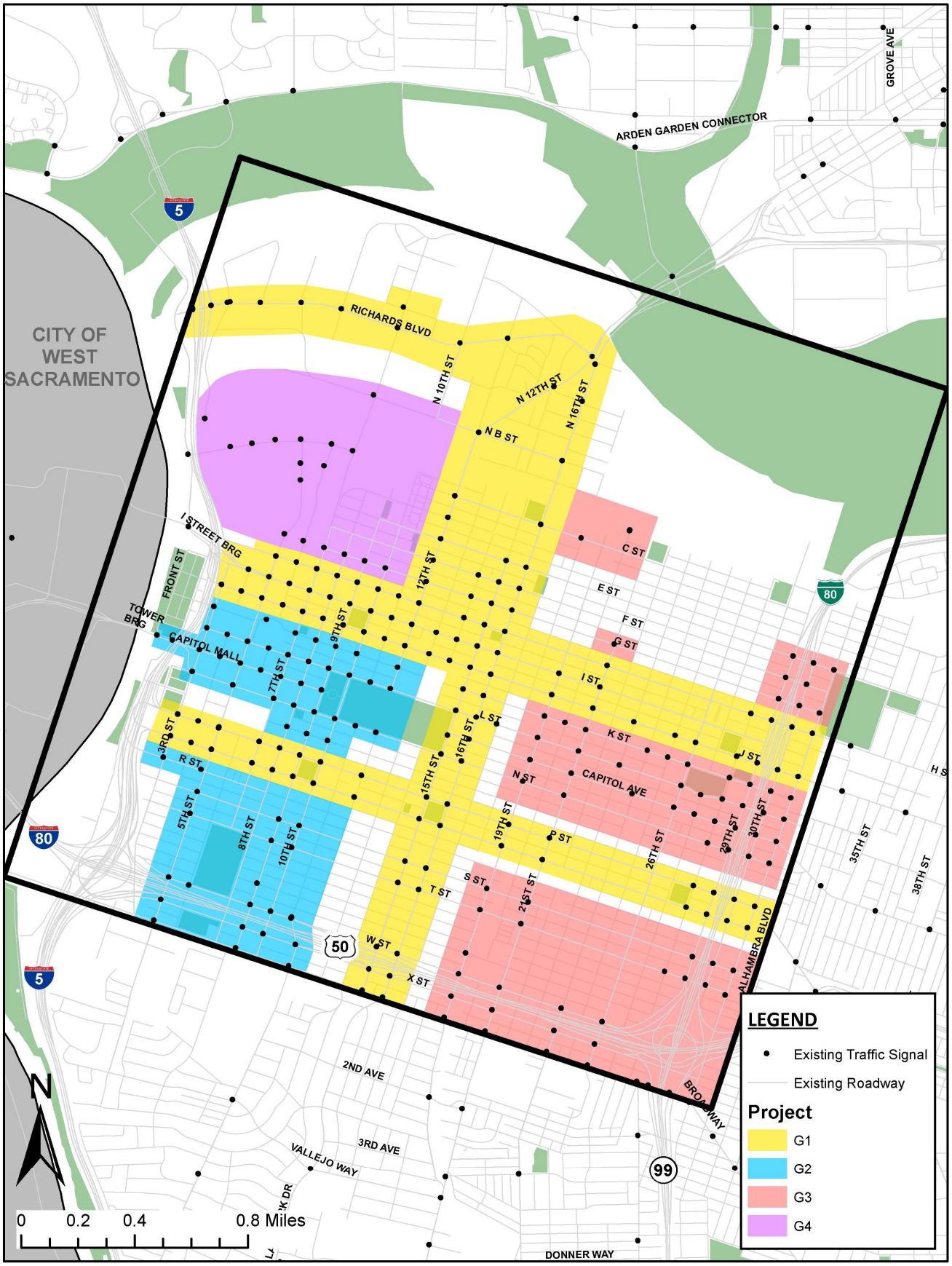
LEGEND
Infrastructure Project
City Boundary
Existing Roadway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GROVE AVE
RICHARDS BLVD
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N 16TH ST
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FRONT ST
TOWER BRG
CAPITOL MALL
3RD ST
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P ST
R ST
S ST
T ST
W ST
X ST
CAPITOL AVE
ALHAMBRA BLVD
BROADWAY
2ND AVE
3RD AVE
VALLEJO WAY
DONNER WAY
5
80
50
99
N
0 0.2 0.4 0.8 Miles
LEGEND
Existing Traffic Signal
Existing Roadway
Project
G1
G2
G3
G4

APPENDIX D - PRIORITIZATION SUMMARY

Table 1: Prioritization Summary

Project ID	Strategy Description	Address multijurisdictional networking	Adapt to new technology	Improve reliability and consistency of driver trips	Safety	Improve traveler information and dissemination	Disaster preparedness	Contribute to operational and institutional efficiency	Enhances major corridors	Extent that project achieves local objectives	Other projects rely on this project	Total Strategy Score Compared to Objectives	Priority No.
		10	13	10	13	10	5	10	10	14	5	100	
A	**Elkhorn Blvd ITS Infrastructure Project** -Replace existing copper signal interconnect with fiber-optic cable (2.31 Miles) -Install new fiber-optic cable (4.15 Miles) -Replace Signal Cabinet and Controllers (12 Signals) -Deploy New Video Detection (8 Signals) -Deploy CCTV Cameras(15 Signals) -Update Signal Timing (12 Signals)	2	4	2	2	2	2	2	2	2	1	55.25	15
B	**Natomas Blvd ITS Project** -Replace existing copper signal interconnect with fiber-optic cable (2.08 Miles) -Install new fiber-optic cable (0 Miles) -Replace Signal Cabinet and Controllers (15 Signals) -Deploy New Video Detection (7 Signals) -Deploy CCTV Cameras(22 Signals) -Update Signal Timing (15 Signals)	2	4	3	3	2	2	3	3	3	2	70.75	2
C	**Del Paso Rd ITS Project** -Replace existing copper signal interconnect with fiber-optic cable (1.47 Miles) -Install new fiber-optic cable (0.63 Miles) -Replace Signal Cabinet and Controllers (11 Signals) -Deploy New Video Detection (6 Signals) -Deploy CCTV Cameras(13 Signals) -Update Signal Timing (11 Signals)	2	4	3	2	3	2	2	3	2	1	62.75	11
D	Arena Blvd ITS Project -Replace existing copper signal interconnect with fiber-optic cable (1.1 Miles) -Install new fiber-optic cable (1.87 Miles) -Replace Signal Cabinet and Controllers (14 Signals) -Deploy New Video Detection (5 Signals) -Deploy CCTV Cameras(15 Signals) -Update Signal Timing (14 Signals)	1	4	2	2	2	2	2	2	2	1	52.75	18

Project ID	Strategy Description	Address multijurisdictional networking	Adapt to new technology	Improve reliability and consistency of driver trips	Safety	Improve traveler information and dissemination	Disaster preparedness	Contribute to operational and institutional efficiency	Enhances major corridors	Extent that project achieves local objectives	Other projects rely on this project	Total Strategy Score Compared to Objectives	Priority No.
		10	13	10	13	10	5	10	10	14	5	100	
E	San Juan Rd ITS -Replace existing copper signal interconnect with fiber-optic cable (2.66 Miles) -Install new fiber-optic cable (3.4 Miles) -Replace Signal Cabinet and Controllers (8 Signals) -Deploy New Video Detection (6 Signals) -Deploy CCTV Cameras(15 Signals) -Update Signal Timing (8 Signals)	2	4	2	2	2	2	2	2	2	1	55.25	16
F	El Camino Ave ITS Project Along El Camino Ave and Orchard Ln -Replace existing copper signal interconnect with fiber-optic cable (1.86 Miles) -Install new fiber-optic cable (5.98 Miles) -Replace Signal Cabinet and Controllers (7 Signals). -Deploy New Video Detection (10 Signals) -Deploy CCTV Cameras(17 Signals) -Update Signal Timing (7 Signals)	1	4	2	3	3	3	4	3	2	2	68.5	7
G	Norwood Ave ITS Project -Replace existing copper signal interconnect with fiber-optic cable (3.95 Miles) -Install new fiber-optic cable (1.06 Miles) -Replace Signal Cabinet and Controllers (10 Signals) -Deploy New Video Detection (11 Signals) -Deploy CCTV Cameras(16 Signals) -Update Signal Timing (10 Signals)	0	4	2	2	2	2	2	1	2	1	47.75	21
H	Del Paso Blvd ITS Project -Replace existing copper signal interconnect with fiber-optic cable (0.75 Miles) -Install new fiber-optic cable (3.3 Miles) -Replace Signal Cabinet and Controllers (8X Signals) -Deploy New Video Detection (20 Signals) -Deploy CCTV Cameras(30 Signals) -Update Signal Timing (8 Signals)	3	4	2	3	2	2	3	3	3	2	70.75	3

Project ID	Strategy Description	Address multijurisdictional networking	Adapt to new technology	Improve reliability and consistency of driver trips	Safety	Improve traveler information and dissemination	Disaster preparedness	Contribute to operational and institutional efficiency	Enhances major corridors	Extent that project achieves local objectives	Other projects rely on this project	Total Strategy Score Compared to Objectives	Priority No.
		10	13	10	13	10	5	10	10	14	5	100	
I	Arden Way ITS Project -Replace existing copper signal interconnect with fiber-optic cable (1.74 Miles) -Install new fiber-optic cable (1.21 Miles) -Replace Signal Cabinet and Controllers (17 Signals) -Deploy New Video Detection (13 Signals) -Deploy CCTV Cameras(18 Signals) -Update Signal Timing (17 Signals)	3	4	2	2	2	2	2	2	2	1	57.75	14
J	J St ITS Project -Replace existing copper signal interconnect with fiber-optic cable (3.38 Miles) -Install new fiber-optic cable (1.59 Miles) -Replace Signal Cabinet and Controllers (27 Signals) -Deploy New Video Detection (35 Signals) -Deploy CCTV Cameras(37 Signals) -Update Signal Timing (27 Signals)	3	4	2	3	3	2	4	1	3	1	69.5	4
K	Folsom Rd ITS Project -Replace existing copper signal interconnect with fiber-optic cable (1.5 Miles) -Install new fiber-optic cable (0.60 Miles) -Replace Signal Cabinet and Controllers (6 Signals) -Deploy New Video Detection (14 Signals) -Deploy CCTV Cameras(15 Signals) -Update Signal Timing (6 Signals)	2	4	2	2	2	2	3	3	3	2	65	9
L	Bruceville Rd ITS Project -Replace existing copper signal interconnect with fiber-optic cable (4.32 Miles) -Install new fiber-optic cable (2.48 Miles) -Replace Signal Cabinet and Controllers (14 Signals) -Deploy New Video Detection (13 Signals) -Deploy CCTV Cameras(20 Signals) -Update Signal Timing (12 Signals)	4	4	3	2	2	2	3	2	3	1	68.75	6

Project ID	Strategy Description	Address multijurisdictional networking	Adapt to new technology	Improve reliability and consistency of driver trips	Safety	Improve traveler information and dissemination	Disaster preparedness	Contribute to operational and institutional efficiency	Enhances major corridors	Extent that project achieves local objectives	Other projects rely on this project	Total Strategy Score Compared to Objectives	Priority No.
		10	13	10	13	10	5	10	10	14	5	100	
M	Florin Perkins ITS Project -Replace existing copper signal interconnect with fiber-optic cable (4.39 Miles) -Install new fiber-optic cable (1.56 Miles) -Replace Signal Cabinet and Controllers (13 Signals) -Deploy New Video Detection (18 Signals) -Deploy CCTV Cameras(29 Signals) -Update Signal Timing (13 Signals)	2	4	1	2	3	1	2	1	2	1	51.5	19
N	Stockton Blvd ITS Project -Replace existing copper signal interconnect with fiber-optic cable (0.13 Miles) -Install new fiber-optic cable (0.35 Miles) -Replace Signal Cabinet and Controllers (19 Signals) -Deploy New Video Detection (21 Signals) -Deploy CCTV Cameras(26 Signals) -Update Signal Timing (19 Signals)	1	2	1	2	3	2	3	1	2	1	46.25	22
N	Fruitridge Rd ITS Project -Replace existing copper signal interconnect with fiber-optic cable (2.14 Miles) -Install new fiber-optic cable (1.97 Miles) -Replace Signal Cabinet and Controllers (9 Signals) -Deploy New Video Detection (20 Signals) -Deploy CCTV Cameras(24 Signals) -Update Signal Timing (9 Signals)	1	4	3	2	3	2	2	3	2	2	61.5	13
O	Franklin Blvd ITS Project -Replace existing copper signal interconnect with fiber-optic cable (1.96 Miles) -Install new fiber-optic cable (5.1 Miles) -Replace Signal Cabinet and Controllers (22 Signals) -Deploy New Video Detection (30 Signals) -Deploy CCTV Cameras(39 Signals) -Update Signal Timing (22 Signals)	1	4	4	3	2	2	3	2	2	2	64.75	10

Project ID	Strategy Description	Address multijurisdictional networking	Adapt to new technology	Improve reliability and consistency of driver trips	Safety	Improve traveler information and dissemination	Disaster preparedness	Contribute to operational and institutional efficiency	Enhances major corridors	Extent that project achieves local objectives	Other projects rely on this project	Total Strategy Score Compared to Objectives	Priority No.
		10	13	10	13	10	5	10	10	14	5	100	
Q	24th St ITS Project -Replace existing copper signal interconnect with fiber-optic cable (3.06 Miles) -Install new fiber-optic cable (0.51 Miles) -Replace Signal Cabinet and Controllers (6 Signals) -Deploy New Video Detection (9Signals) -Deploy CCTV Cameras(12 Signals) -Update Signal Timing (6 Signals)	0	4	2	2	1	2	2	2	2	2	49	20
R	Riverside Blvd ITS Project -Replace existing copper signal interconnect with fiber-optic cable (3.48 Miles) -Install new fiber-optic cable (7.66 Miles) -Replace Signal Cabinet and Controllers (9 Signals) -Deploy New Video Detection (13 Signals) -Deploy CCTV Cameras(18 Signals) -Update Signal Timing (9 Signals)	1	4	2	3	3	2	4	3	3	1	69.5	5
S	Meadowview Rd/Franklin Rd ITS Project -Replace existing copper signal interconnect with fiber-optic cable (0.94 Miles) -Install new fiber-optic cable (1.83 Miles) -Replace Signal Cabinet and Controllers (6 Signals) -Deploy New Video Detection (19 Signals) -Deploy CCTV Cameras(22 Signals) -Update Signal Timing (6 Signals)	1	4	2	2	2	2	2	2	2	2	54	17
G1	Downtown Grid: Primary Corridors -Replace existing copper signal interconnect with fiber-optic cable (0.6 Miles) -Install new fiber-optic cable (0.8 Miles) -Deploy New Video Detection (126 Signals) -Deploy CCTV Cameras(113 Signals)	2	4	4	4	2	3	4	4	4	1	85	1

Project ID	Strategy Description	Address multijurisdictional networking	Adapt to new technology	Improve reliability and consistency of driver trips	Safety	Improve traveler information and dissemination	Disaster preparedness	Contribute to operational and institutional efficiency	Enhances major corridors	Extent that project achieves local objectives	Other projects rely on this project	Total Strategy Score Compared to Objectives	Priority No.
		10	13	10	13	10	5	10	10	14	5	100	
G2	Downtown Grid: Capitol Mall and Southside Park -Replace existing copper signal interconnect with fiber-optic cable (1.2 Miles) -Install new fiber-optic cable (0.3 Miles) -Deploy New Video Detection (53 Signals) -Deploy CCTV Cameras(42 Signals)	0	4	3	3	2	3	3	3	3	1	65.75	8
G3	Downtown Grid: Midtown Midtown Secondary Arterials -Replace existing copper signal interconnect with fiber-optic cable (3.9 Miles) -Install new fiber-optic cable (0.2 Miles) -Deploy New Video Detection (61 Signals) -Deploy CCTV Cameras(66 Signals)	0	4	3	3	2	2	3	2	3	1	62	12
G4	Downtown Grid: Railyards Blvd -Install new fiber-optic cable (0.2 Miles) -Deploy New Video Detection (6 Signals) -Deploy CCTV Cameras(15 Signals)	1	4	2	1	1	2	1	1	2	0	40.75	23

APPENDIX E - COST ASSUMPTIONS

Table 1: Cost Summary

Infrastructure Projects															
Project ID	Strategies Addressed	Project Description	Video Detection	Updated Signal Timing	Controller Upgrade	Intersection Fiber Equipment Upgrade	CCTV	CMS	Communication (Miles)		Communication Hub	Connected Vehicle Technology	TSP/ EVP	5G Technology	Planning Level Cost
									New	Replace					
Communication Gap Closures, Communications Equipment Upgrade, Upgrade to Fiber															
A	D1, D2, D3, D4, D5, D6,	Elkhorn Blvd ITS Infrastructure Project - Along Elkhorn Blvd and E Commerce Way	8	12	12	16	16		4.15	2.31					$ 5,300,000
B		Natomas Blvd ITS Project - Along Natomas Blvd, Truxel Blvd, Club Center Drive	7	15	15	15	20		0.00	2.08					$ 1,700,000
C		Del Paso ITS Project	6	11	11	9	13		0.63	1.47					$ 1,700,000
D		Arena Blvd ITS Project - Along Arena Blvd, Gateway Park Blvd, N. Freeway Blvd, El Centro Rd, E Commerce Wy	6	14	14	14	15		1.87	1.10					$ 2,900,000
E		San Juan Rd ITS Project - Along San Juan Rd, Northgate Blvd	5	8	8	12	12		3.40	2.66					$ 4,400,000
F		El Camino Ave ITS Project - Along El Camino Ave and Orchard Ln	10	7	7	9	17		5.77	1.86					$ 6,500,000
G		Norwood Ave ITS Project - Along Norwood Ave and Rio Linda Blvd	11	10	10	16	16		1.06	3.95					$ 3,100,000
H		Del Paso Blvd ITS Project	20	8	8	6	30		3.30	0.75					$ 4,600,000
I		Arden Way ITS Project - Arden Way ITS Project - Along Arden Way, Exposition Blvd, Heritage Lane	13	17	17	11	18		1.21	1.74					$ 2,800,000
J		J St ITS Project - Along J Street (East of I-80), Carlson Dr, Fair Oaks Blvd	35	27	27	16	35		1.72	3.38					$ 5,000,000
K		Folsom Rd ITS Project - Along Folsom Blvd	14	6	6	9	15		0.60	1.50					$ 2,000,000
L		Bruceville Rd ITS Project - Along Bruceville Rd, Center Pkwy	13	12	14	20	20		2.48	4.32					$ 4,700,000
M		Florin Perkins ITS Project - Along Florin Perkins Rd, Power Inn Rd, 65th Expressway	18	13	13	17	29		1.56	4.39					$ 4,200,000
N		Stockton Blvd ITS Project - Along Stockton Blvd	21	19	19	25	26		0.35	0.13					$ 2,400,000
O		Fruitridge Rd ITS Project - Along Fruitridge Rd	20	9	9	11	24		1.97	2.14					$ 3,800,000
P		Franklin Blvd/24th St ITS Project - Along Franklin Blvd, Broadway, and MLK Jr -	30	22	22	37	39		5.10	1.96					$ 7,900,000
Q		24th St ITS Project - Along 24th Street, 47th Ave	9	6	6	8	12		0.51	3.06					$ 2,000,000
R		Riverside Blvd/Florin Rd ITS Project - Along Riverside Blvd, 43rd/Blair, and Pocket Rd	13	9	9	19	18		7.66	3.48					$ 8,900,000
S		Meadowview Rd/Franklin Rd ITS Project - Along Meadowview Rd and Mack Rd	19	6	6	11	22		1.83	0.94					$ 3,200,000
G1		Downtown Grid Primary Corridors: H, I, J Streets, 15th & 16th Street, P and Q Streets, Richards Blvd	126	136	Completed by Others	8	113		0.80	6.30					$ 9,600,000
G2		Downtown Grid: Captitol Mall and Southside Park	53	75		6	42		0.30	1.20					$ 3,700,000
G3		Downtown Grid: Midtown	61	48		6	66		0.20	3.90					$ 4,800,000
G4		Downtown Grid: Railyards Blvd	6	18		3	15		0.20	0.00					$ 800,000
Pilot CV/AV Technology and 5G Wireless Communication															
S1	D1, D4, D6, D16, I2, I5	Pilot 5G and DSRC Technology (4 locations each)	25				15								$ 1,200,000
Asset Management of Field Devices - 10% of Total Devices (Based on Existing Conditions)															
P1	D2, D3, D11, I5,	Procure Spare CCTV and Video Detection Equipment										4		4	$ 50,000

Non-Infrastructure Projects				
Project ID	Strategies Addressed	Project Description		Planning Level Cost
N/A	I5, I7, I10	Upgrade asset management system and maintenance work order system		$ 150,000
	D6, D7, D8, D9, D11, D14, 08	Procurement of upgraded ATMS to incorporate new functionality		$ 500,000
	D4, O1	Establish VPN to City workstations and other appropriate devices		$ 10,000
	D9	Integrate back end software linked to ATMS to analyze data for real-time operations		$ 200,000
	O3	Increase Staffing Levels to Improve Real-Time Operations		*Salary-dependent*
	O8	Establish CAD System and TOC Connections for Automated Alerts/Notifications		$ 900,000

APPENDIX F - Status of Smart Traffic Signal Equipment

Intersection ID	Street 1	Street 2	Type	Cabinet Type	Controller Model	Switch Installed	CCTV	Detection: Loops	Detection: Video or Radar	EVP - GPS	Battery Back Up
SLS00001	3RD ST	CAPITOL MALL	Traffic Signal	332	2070	Y	Y	Y	N	N	N
SLS00002	4TH ST	CAPITOL MALL	Traffic Signal	332	170	N	N	N	N	N	N
SLS00003	5TH ST	CAPITOL MALL	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00004	6TH ST	I ST	Traffic Signal	G	ATCeX	N	N	N	N	N	N
SLS00005	6TH ST	CAPITOL MALL	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00007	7TH ST	H ST	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00008	7TH ST	I ST	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00009	7TH ST	J ST	Traffic Signal	332	2070	Y	N	N	N	N	Y
SLS00010	7TH ST	K ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00011	7TH ST	L ST	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00012	7TH ST	CAPITOL MALL	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00013	8TH ST	I ST	Traffic Signal	332	2070	Y	N	N	N	N	Y
SLS00014	8TH ST	J ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00015	8TH ST	K ST	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00016	8TH ST	L ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00017	9TH ST	H ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00018	9TH ST	I ST	Traffic Signal	336	2070	Y	Y	N	N	N	N
SLS00019	9TH ST	J ST	Traffic Signal	336	2070	Y	N	N	N	N	N
SLS00020	9TH ST	K ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00021	9TH ST	L ST	Traffic Signal	336	2070	Y	N	N	N	N	N
SLS00022	9TH ST	CAPITOL MALL	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00023	9TH ST	N ST	Traffic Signal	G	ATCeX	Y	N	N	N	N	N
SLS00024	9TH ST	P ST	Traffic Signal	G	ASC/2	N	N	N	N	N	N
SLS00025	9TH ST	T ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00026	9TH ST / MUIR WY	BROADWAY	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00027	19TH ST	Q ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00028	10TH ST	I ST	Traffic Signal	336	2070	Y	N	N	N	N	N
SLS00029	10TH ST	J ST	Traffic Signal	336	2070	N	N	N	N	N	N
SLS00030	10TH ST	K ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00031	10TH ST	L ST	Traffic Signal	336	2070	Y	N	N	N	N	N
SLS00032	10TH ST	N ST	Traffic Signal	G	ATCeX	Y	Y	N	N	N	N
SLS00033	10TH ST	P ST	Traffic Signal	G	ASC/2	N	N	N	N	N	N
SLS00034	10TH ST	T ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00036	11TH ST	J ST	Traffic Signal	336	2070	Y	N	N	N	N	N
SLS00038	11TH ST	L ST	Traffic Signal	336	2070	Y	Y	N	N	N	N
SLS00039	11TH ST	N ST	Traffic Signal	G	ATCeX	N	N	N	N	N	N
SLS00040	12TH ST	NORTH B ST / DOS RIOS ST	Traffic Signal	332	2070	Y	N	N	Y	N	N
SLS00041	12TH ST	E ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00042	12TH ST	F ST	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00043	12TH ST	H ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00044	12TH ST	I ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00045	12TH ST	J ST	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00046	12TH ST	K ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00047	12TH ST	L ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00048	12TH AV / SUTTERVILLE RD	FRANKLIN BL	Traffic Signal	332	2070	Y	Y	N	Y	Y	N
SLS00049	15TH ST	BROADWAY	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00050	15TH ST	H ST	Traffic Signal	332	2070	N	N	N	N	N	N
SLS00051	15TH ST	I ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00052	15TH ST	J ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00053	15TH ST	K ST	Traffic Signal	332	2070	N	N	N	N	N	N
SLS00054	15TH ST	L ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00055	15TH ST	N ST	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00056	15TH ST	P ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00057	15TH ST	T ST	Traffic Signal	332	2070-ATC	Y	N	N	N	N	N
SLS00058	16TH ST / LAND PARK DR	BROADWAY	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00059	16TH ST	E ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00060	16TH ST	F ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00061	16TH ST	H ST	Traffic Signal	332	2070	N	N	N	N	N	N
SLS00062	16TH ST	I ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00063	16TH ST	J ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00064	16TH ST	K ST	Traffic Signal	332	2070	N	N	N	N	N	N
SLS00065	16TH ST	L ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00066	16TH ST	CAPITOL AV	Traffic Signal	332	2070	Y	Y	Y	N	N	N
SLS00067	16TH ST	N ST	Traffic Signal	332	170	Y	N	N	N	N	N
SLS00068	16TH ST	P ST	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00069	16TH ST	T ST	Traffic Signal	332	170	Y	N	N	N	N	N
SLS00070	19TH ST / FREEPORT BL	BROADWAY	Traffic Signal	332	170	Y	N	Y	Y	Y	N
SLS00071	21ST ST	H ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00072	21ST ST	I ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00073	21ST ST	J ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00074	21ST ST	K ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00075	21ST ST	L ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00076	21ST ST	CAPITOL AV	Traffic Signal	G	390	N	N	N	N	N	N
SLS00077	21ST ST	P ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00078	21ST ST	T ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00079	21ST ST	BROADWAY	Traffic Signal	332	170	N	N	N	N	N	N
SLS00080	28TH ST	H ST	Traffic Signal	G	390	N	N	N	N	Y	N
SLS00081	29TH ST	G ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00082	30TH ST	G ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00084	29TH ST	E ST	Traffic Signal	332	2070	N	N	N	N	Y	N
SLS00085	29TH ST	F ST	Traffic Signal		390	N	N	N	N	N	N
SLS00086	29TH ST	H ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00087	29TH ST	N ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00088	29TH ST	J ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00089	29TH ST	K ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00090	29TH ST	L ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00091	29TH ST	CAPITOL AV	Traffic Signal	G	ASC/3	Y	Y	N	N	N	N
SLS00092	29TH ST	P ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00093	29TH ST	T ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00095	30TH ST	E ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00096	30TH ST	F ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00097	30TH ST	H ST	Traffic Signal	332	170	N	N	N	N	Y	N
SLS00098	30TH ST	N ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00099	30TH ST	J ST	Traffic Signal	332	170	N	N	Y	N	Y	N

Intersection ID	Street 1	Street 2	Type	Cabinet Type	Controller Model	Switch Installed	CCTV	Detection: Loops	Detection: Video or Radar	EVP - GPS	Battery Back Up
SLS00100	30TH ST	K ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00101	30TH ST	L ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00102	30TH ST	CAPITOL AV	Traffic Signal	G	390	N	N	N	N	N	N
SLS00103	30TH ST	P ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00104	30TH ST	T ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00105	HWY 99 NB	BROADWAY	Traffic Signal	332	170	N	N	N	N	Y	N
SLS00106	34TH ST	STOCKTON BL	Traffic Signal		390	N	N	N	N	N	
SLS00107	34TH ST	BROADWAY	Traffic Signal	G	390	N	N	N	N	N	N
SLS00108	35TH ST / 3RD AV	BROADWAY	Traffic Signal	G	390	N	N	N	N	N	N
SLS00109	39TH ST	H ST	Traffic Signal	G	ASC/2	N	N	Y	N	N	N
SLS00110	39TH ST	J ST	Traffic Signal	G	ASC/2	Y	N	N	N	Y	N
SLS00111	39TH ST	FOLSOM BL	Traffic Signal	332	2070	Y	N	Y	N	Y	N
SLS00112	39TH ST / MILLER WY	STOCKTON BL	Traffic Signal	G	ATCeX	N	N	N	N	N	N
SLS00113	65TH ST EXWY	FOLSOM BL	Traffic Signal	R	ATCeX	Y	Y	Y	N	N	N
SLS00114	ALHAMBRA BL	H ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00115	ALHAMBRA BL	G ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00116	ALHAMBRA BL	J ST	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00117	ALHAMBRA BL	L ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00118	ALHAMBRA BL	CAPITOL AV / FOLSOM BL	Traffic Signal	332	2070	Y	Y	N	Y	Y	N
SLS00119	ALHAMBRA BL	P ST / STOCKTON BL	Traffic Signal	332	2070	Y	Y	N	Y	Y	N
SLS00120	ALHAMBRA BL	BROADWAY	Traffic Signal	R	390	N	N	N	N	N	N
SLS00121	MARTIN LUTHER KING BL	BROADWAY	Traffic Signal	R	ATCeX	Y	Y	Y	Y	N	N
SLS00122	STOCKTON BL	BROADWAY	Traffic Signal	R	ASC/2	N	N	N	Y	Y	N
SLS00123	JIBBOOM ST	I ST BRIDGE	Traffic Signal	332	170	N	N	Y	N	N	N
SLS00124	RIVERSIDE BL	BROADWAY	Traffic Signal	TS2	ATCeX	N	N	Y	N	Y	N
SLS00125	STOCKTON BL	T ST / GERBER AV	Traffic Signal	R	ASC/3	N	N	Y	N	Y	N
SLS00126	STOCKTON BL	FRUITRIDGE RD	Traffic Signal	R	ATCeX	Y	Y	Y	N	N	N
SLS00127	STOCKTON BL	14TH AV	Traffic Signal	G	ASC/2	N	N	Y	N	N	N
SLS00128	12TH ST	N ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00129	9TH ST	Q ST	Traffic Signal	G	ASC/2	N	N	N	N	N	N
SLS00130	10TH ST	Q ST	Traffic Signal	G	ASC/2	N	N	N	N	N	N
SLS00131	15TH ST	Q ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00132	16TH ST	Q ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00133	21ST ST	Q ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00134	29TH ST	Q ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00135	30TH ST	Q ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00136	34TH ST	FOLSOM BL	Traffic Signal	332	2070	Y	N	Y	N	Y	N
SLS00137	36TH ST	FOLSOM BL	Traffic Signal	332	2070	Y	N	Y	N	Y	N
SLS00138	47TH ST	FOLSOM BL	Traffic Signal	332	2070	Y	N	Y	N	Y	N
SLS00139	51ST ST	FOLSOM BL	Traffic Signal	332	2070	Y	Y	Y	N	Y	N
SLS00140	55TH ST	FOLSOM BL	Traffic Signal	332	2070	Y	N	Y	N	N	N
SLS00141	59TH ST	FOLSOM BL	Traffic Signal	332	2070	Y	N	Y	Y	Y	N
SLS00142	24TH ST	BROADWAY	Traffic Signal	M	390	N	N	Y	N	Y	N
SLS00143	21ST ST	2ND AV	Traffic Signal	332	2070	N	N	N	N	Y	N
SLS00145	FREEPORT BL	WELLER WY / McCLATCHY HIGH	Traffic Signal	332	2070	N	N	Y	N	N	N
SLS00146	FREEPORT BL	COLLEGE AV	Traffic Signal	332	2070	N	N	Y	N	N	N
SLS00147	FREEPORT BL	13TH AV	Traffic Signal	332	2070	N	N	Y	N	N	N
SLS00148	FREEPORT BL	SUTTERVILLE RD (E)	Traffic Signal	332	2070	N	N	Y	N	N	N
SLS00149	FREEPORT BL	SUTTERVILLE RD (W)	Traffic Signal	332	2070	N	N	Y	N	N	N
SLS00150	5TH ST	P ST	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00151	7TH ST	G ST	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00152	5TH ST	I ST	Traffic Signal	R	ATCeX	Y	Y	Y	N	N	N
SLS00153	15TH ST	G ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00154	16TH ST	G ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00155	12TH ST	G ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00156	13TH ST	J ST	Traffic Signal	R	ATCeX	Y	Y	N	N	N	N
SLS00157	14TH ST	J ST	Traffic Signal	336	2070	Y	N	N	N	N	N
SLS00159	11TH ST	I ST	Traffic Signal	336	2070	Y	N	N	N	N	N
SLS00160	33RD ST	J ST	Traffic Signal	G	ASC/2	Y	N	N	N	N	N
SLS00161	36TH ST	J ST	Traffic Signal	G	ASC/2	Y	N	N	N	Y	N
SLS00162	40TH ST	J ST	Traffic Signal	332	2070	Y	N	Y	N	N	N
SLS00163	43RD ST	J ST	Traffic Signal		ASC/2	Y	N	N	N	Y	N
SLS00164	47TH ST	J ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00165	51ST ST	J ST	Traffic Signal	G	ASC/2	Y	N	N	N	N	N
SLS00166	RODEO WY	J ST	Traffic Signal	G	ASC/2	Y	N	N	N	N	N
SLS00167	55TH ST	J ST	Traffic Signal	G	ASC/2	Y	N	N	N	N	N
SLS00168	3RD ST	J ST	Traffic Signal	R	ASC/3	Y	Y	Y	N	N	N
SLS00169	STOCKTON BL	COLONIAL WY	Traffic Signal	G	390	N	N	Y	N	N	N
SLS00170	CARLSON DR	J ST	Traffic Signal	R	2070	Y	Y	Y	Y	Y	N
SLS00171	43RD ST	FOLSOM BL	Traffic Signal	332	2070	Y	N	Y	Y	Y	N
SLS00172	60TH ST	FOLSOM BL	Traffic Signal	332	2070	Y	N	Y	N	Y	N
SLS00173	LAND PARK DR	VALLEJO WY	Traffic Signal	G	390	N	N	Y	N	N	N
SLS00174	FREEPORT BL	MEADOWVIEW RD	Traffic Signal	332	2070	Y	Y	Y	Y	Y	N
SLS00175	5TH ST	L ST	Traffic Signal	336	2070	Y	Y	N	N	N	N
SLS00176	6TH ST	L ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00177	24TH ST	FRUITRIDGE RD	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00178	FREEPORT BL	WENTWORTH AV / STACIA WY	Traffic Signal	332	2070	N	N	Y	N	Y	N
SLS00179	FREEPORT BL	IRVIN WY / HARIAN WY	Traffic Signal	332	2070	N	N	Y	N	Y	N
SLS00180	FREEPORT BL	FRUITRIDGE RD	Traffic Signal	332	2070	N	N	Y	N	Y	N
SLS00181	FREEPORT BL	35TH AV	Traffic Signal	332	2070	N	N	Y	N	Y	N
SLS00182	STOCKTON BL	JANSEN	Traffic Signal	TS2	ATCeX	N	N	Y	N	N	N
SLS00183	STOCKTON BL	MCMAHON	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00184	STOCKTON BL	LEMON HILL	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00185	STOCKTON BL	ELDER CREEK / 47TH AV	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00186	FRANKLIN BL	FRUITRIDGE RD	Traffic Signal	R	390	N	N	Y	Y	Y	N
SLS00187	FRANKLIN BL	21ST AV	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00188	HERITAGE LN	EXPOSITION BL	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00189	RIVERSIDE BL	MARIAN WY	Traffic Signal	G	Basic II	N	N	N	N	N	N
SLS00191	FRANKLIN BL	7TH AVE / 8TH AVE	Traffic Signal	G	390	N	N	Y	N	N	N
SLS00193	53RD ST	H ST	Traffic Signal	G	Basic II	N	N	N	N	N	N
SLS00194	9TH ST	V ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00195	LOWELL ST / WALLACE AV	FRUITRIDGE RD	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00196	POWER INN RD	FRUITRIDGE RD	Traffic Signal	TS2	ATCeX	Y	Y	Y	Y	Y	N
SLS00197	RIVERSIDE BL	7TH AVE / 8TH AV	Traffic Signal	R	ASC/2	N	N	N	Y	N	N
SLS00198	ARDEN WY	ETHAN WY / EXPOSITION BL	Traffic Signal	R	ASC/2	Y	Y	Y	Y	N	N
SLS00199	13TH ST	I ST	Traffic Signal	336	2070	Y	N	N	N	N	N
SLS00200	5TH ST	J ST	Traffic Signal	336	2070	Y	Y	N	N	N	N

Intersection ID	Street 1	Street 2	Type	Cabinet Type	Controller Model	Switch Installed	CCTV	Detection: Loops	Detection: Video or Radar	EVP - GPS	Battery Back Up
SLS00202	5TH ST	BROADWAY	Traffic Signal	G	390	N	N	N	N	N	N
SLS00203	5TH ST	Q ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00205	21ST ST	N ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00206	39TH ST	T ST	Traffic Signal	G	390	N	N	N	N	N	Y
SLS00208	CARLSON DR	H ST	Traffic Signal	R	ATCeX	Y	Y	Y	N	N	Y
SLS00209	34TH ST	T ST	Traffic Signal	G	ASC/2	N	N	N	N	N	N
SLS00210	59TH ST	BROADWAY	Traffic Signal	TS2	ATCeX	N	N	N	Y	Y	N
SLS00211	62ND ST / ORTEGA ST	FRUITRIDGE RD	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00213	NORTHGATE BL	WEST EL CAMINO AV	Traffic Signal	R	ATCeX	Y	Y	Y	N	Y	N
SLS00214	DOS RIOS ST	RICHARDS BL	Traffic Signal	R	ASC/3	Y	N	Y	N	N	N
SLS00215	16TH ST	NORTH B ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00216	16TH ST	C ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00217	FRANKLIN BL	2nd AV	Traffic Signal	G	390	N	N	N	N	N	N
SLS00218	FRANKLIN BL	5th AV	Traffic Signal	G	390	N	N	N	N	N	N
SLS00219	STOCKTON BL	21ST AV / PERRY AV	Traffic Signal	R		N	N	Y	N	Y	N
SLS00220	7TH ST	N ST	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00221	7TH ST	P ST	Traffic Signal	G	ASC/2	N	N	N	N	N	N
SLS00222	7TH ST	Q ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00223	8TH ST	G ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00224	8TH ST	H ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00225	8TH ST	CAPITOL MALL	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00226	8TH ST	N ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00227	8TH ST	P ST	Traffic Signal	G	ASC/2	N	N	N	N	N	N
SLS00228	8TH ST	Q ST	Traffic Signal	G	ASC/2	N	N	N	N	N	N
SLS00229	9TH ST	S ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00230	10TH ST	S ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00231	15TH ST	S ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00232	16TH ST	S ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00233	21ST ST	S ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00234	29TH ST	S ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00235	30TH ST	S ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00236	65TH ST EXWY	14TH AV	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00237	65TH ST EXWY	21ST AV	Traffic Signal	TS2	ATCeX	Y	N	Y	N	Y	N
SLS00238	65TH ST EXWY	FRUITRIDGE RD	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00239	12TH AV	HWY 99 S/B OFFRAMP	Removed			N	N	N	N	N	
SLS00240	12TH AV	HWY 99	Traffic Signal	332	170	N	N	Y	N	N	N
SLS00241	34TH ST	HWY 50	Traffic Signal	G	390	N	N	N	N	N	N
SLS00244	MARYSVILLE BL	GRAND AV	Traffic Signal	R	ASC/3	Y	N	Y	N	Y	N
SLS00245	HERITAGE LN	ARDEN WY	Traffic Signal	R	ASC/2	Y	Y	Y	Y	N	Y
SLS00246	65TH ST EXWY	MCMAHON DR	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00248	FREEPORT BL	FLORIN RD	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00249	24TH ST	FLORIN RD	Traffic Signal	R	ATCeX	Y	Y	Y	N	Y	N
SLS00250	HELEN WY	FRUITRIDGE RD	Traffic Signal	336	2070	N	N	N	N	N	N
SLS00251	Landpark Dr / DEL RIO	SUTTERVILLE RD	Traffic Signal		390	N	N	Y	Y	N	N
SLS00252	65TH ST EXWY	BROADWAY	Traffic Signal	R	ATCeX	Y	N	Y	N	N	N
SLS00253	59TH ST	S ST	Traffic Signal	R	ASC/2	N	N	N	Y	N	N
SLS00254	56TH ST	H ST	Traffic Signal	G	ASC/2	N	N	Y	N	N	N
SLS00255	CHALLENGE WY	ARDEN WY	Traffic Signal	R	ASC/2	Y	N	Y	Y	N	N
SLS00258	RIO LINDA BL	ELEANOR AV	Traffic Signal	R	390	N	N	Y	N	N	Y
SLS00259	DEL PASO BL	ELEANOR AV/ GLENROSE AV	Traffic Signal	R	ASC/3	Y	N	Y	Y	N	N
SLS00260	MARYSVILLE BL	PALO VERDE	Traffic Signal	G	ASC/2	Y	N	Y	N	N	N
SLS00261	MARYSVILLE BL	ARCADE BL	Traffic Signal	R	ASC/3	Y	N	Y	N	Y	N
SLS00262	MARYSVILLE BL	SOUTH AV	Traffic Signal	R	ASC/3	Y	N	N	N	Y	N
SLS00263	65TH ST EXWY	LEMON HILL AV	Traffic Signal	TS2	ATCeX	Y	N	Y	N	Y	N
SLS00264	MARCONI CIR W	AUBURN BL	Traffic Signal	R	ASC/3	N	N	N	Y	N	N
SLS00265	I-80 / CONNIE DR	MARCONI AV	Traffic Signal	332	2070	N	N	Y	Y	N	N
SLS00266	CONNIE DR	I-80 AUBURN BL OFF RAMP	Traffic Signal	332	2070	N	N	Y	N	N	N
SLS00268	SEAMAS AV	LONSDALE DR	Traffic Signal		390	N	N	Y	N	N	
SLS00269	MONTEREY WY	FRUITRIDGE RD	Traffic Signal	M	390	N	N	Y	N	N	
SLS00270	HOWE AV	COLLEGE TOWN DR / HWY 50 OFF RAM	Traffic Signal	332	ASC/2	Y	N	Y	N	Y	N
SLS00271	DEL PASO BL	BAXTER AV / BARSTOW ST	Traffic Signal	332	2070	Y	Y	Y	Y	Y	N
SLS00272	DEL PASO BL	ARDEN WY	Traffic Signal	332	2070	Y	Y	Y	Y	Y	N
SLS00275	DEL PASO BL	FAIRFIELD ST	Traffic Signal	R	ASC/3	Y	N	Y	N	Y	Y
SLS00276	DEL PASO BL	EL CAMINO AV	Traffic Signal	R	ASC/3	Y	Y	Y	Y	Y	Y
SLS00277	RIO LINDA BL	EL CAMINO AV	Traffic Signal	G	390	N	N	Y	N	N	N
SLS00278	NORWOOD AV	LAS PALMAS AV	Traffic Signal	G	ASC/2	N	N	N	N	N	Y
SLS00279	ROYAL OAKS DR /BEAUMONT ST	ARDEN WY	Traffic Signal	R	ASC/2	Y	Y	Y	N	N	N
SLS00280	LEXINGTON ST	EL CAMINO AV	Traffic Signal	R	390	N	N	Y	Y	N	N
SLS00281	HOWE AV	FAIR OAKS BL	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00282	GROVE AV	EL CAMINO AV	Traffic Signal	R	390	N	N	Y	Y	N	N
SLS00283	21ST ST	FLORIN RD	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00284	3RD ST	P ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00285	5TH ST	N ST	Traffic Signal	G	ATCeX	Y	N	N	N	N	N
SLS00286	24TH ST	FERNANDEZ DR	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00287	24TH ST	GLEN ELLEN CIR/ EDNA ST	Traffic Signal	R	ATCeX	N	N	Y	N	N	
SLS00288	16TH ST	SPROULE AV/ BASLER ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00289	12TH ST	SPROULE AV/ SUNBEAM AV	Traffic Signal	332	2070	Y	Y	Y	N	N	N
SLS00291	65TH ST EXWY	ELDER CREEK RD	Traffic Signal	TS1	ATCeX	Y	N	Y	Y	Y	N
SLS00292	3RD ST	L ST	Traffic Signal	332	2070	Y	Y	N	N	N	Y
SLS00293	3RD ST	N ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00294	24TH ST	47TH AV	Traffic Signal	M	390	N	N	Y	N	N	N
SLS00295	5TH ST	W ST	Traffic Signal	332	2070	N	N	N	N	N	N
SLS00296	5TH ST	X ST	Traffic Signal	332	2070	Y	Y	N	N	N	N
SLS00297	5TH ST	S ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00298	5TH ST	T ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00299	9TH ST	W ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00300	9TH ST	X ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00301	10TH ST	W ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00302	10TH ST	X ST	Traffic Signal	G	390	N	N	N	N	N	Y
SLS00303	15TH ST	W ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00304	15TH ST	X ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00305	16TH ST	W ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00306	16TH ST	X ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00307	21ST ST	W ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00308	21ST ST	X ST	Traffic Signal	G	390	N	N	N	N	N	Y
SLS00309	LUTHER BURBANK HS	FLORIN RD	Traffic Signal	R	ATCeX	N	N	Y	N	Y	
SLS00310	10TH ST	H ST	Traffic Signal	G	390	N	N	N	N	N	N

Intersection ID	Street 1	Street 2	Type	Cabinet Type	Controller Model	Switch Installed	CCTV	Detection: Loops	Detection: Video or Radar	EVP - GPS	Battery Back Up
SLS00311	21ST ST	G ST	Traffic Signal		390	N	N	N	N	N	N
SLS00312	24TH ST	SUTTERVILLE RD	Removed			N	N	N	N	N	
SLS00313	SOUTH LAND PARK DR	FRUITRIDGE RD	Traffic Signal	R	ASC/3	N	N	Y	Y	N	N
SLS00314	FLORIN PERKINS RD	FRUITRIDGE RD	Traffic Signal	R	ATCeX	Y	Y	Y	N	Y	N
SLS00315	28TH ST	J ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00316	28TH ST	L ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00317	28TH ST	CAPITOL AV	Traffic Signal	G	390	N	N	N	N	N	N
SLS00318	28TH ST	N ST	Traffic Signal	G	390	N	N	N	N	N	Y
SLS00319	28TH ST	Q ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00320	28TH ST	T ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00321	ALHAMBRA BL	N ST	Traffic Signal	G	390	N	Y	N	N	N	N
SLS00322	STOCKTON BL	X ST	Traffic Signal	R	ASC/3	N	N	Y	Y	N	N
SLS00324	HOWE AV / POWER INN RD	FOLSOM BL	Traffic Signal	R	ASC/2	Y	Y	Y	N	Y	N
SLS00325	POWER INN RD	14TH AVE	Traffic Signal	R	ASC/2	Y	N	Y	Y	N	Y
SLS00326	70TH / 71ST ST	FRUITRIDGE RD	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00327	SOUTH LAND PARK DR	43rd AV	Traffic Signal		ASC/2	N	N	Y	Y	N	N
SLS00328	FREEPORT BL	BLAIR AV	Traffic Signal	332	2070	N	N	Y	N	Y	N
SLS00329	LONGVIEW DR	I-80 EB	Traffic Signal	D	390	N	N	Y	N	N	N
SLS00330	LONGVIEW DR	I-80 WB	Traffic Signal	D	390	N	N	Y	N	N	N
SLS00331	WINTERS ST	I-80 WB	Traffic Signal	332	2070	N	N	Y	Y	N	N
SLS00332	WINTERS ST	I-80 E/B /GRAND AV	Traffic Signal	332	2070	N	N	Y	Y	N	N
SLS00333	RALEY BL	I-80 EAST	Traffic Signal	D	ASC/2	Y	N	Y	N	Y	N
SLS00334	RALEY BL	I-80 WEST	Traffic Signal	G	ASC/2	Y	N	Y	N	Y	N
SLS00335	MARTIN LUTHER KING BL	21st AV	Traffic Signal	G	ASC/2	N	N	Y	N	N	N
SLS00338	3RD ST	Q ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00339	TAMOSHANTER	FLORIN RD	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	
SLS00340	AMHERST	FLORIN RD	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	
SLS00341	24TH ST	MEADOWVIEW RD	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00342	FRANKLIN BL	BROOKFIELD	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00343	59TH ST	T ST	Traffic Signal	D	390	N	N	Y	N	N	N
SLS00344	35TH ST	STOCKTON BL / HWY 50	Traffic Signal	R	390	N	N	N	N	Y	Y
SLS00345	HOWE AV	AMERICAN RIVER DR	Traffic Signal	TS2	ASC/3	Y	N	Y	Y	Y	N
SLS00346	HOWE AV	UNIVERSITY AVE	Traffic Signal	TS2	ASC/3	Y	N	Y	Y	N	N
SLS00347	POWER INN RD	ELDER CREEK RD	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00348	65TH ST EXWY	S ST / HWY 50	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00349	65TH ST EXWY	HWY 50 E/B	Traffic Signal	332	ATCeX	Y	Y	Y	N	Y	N
SLS00350	HOWE AV	HWY 50 E / B OFF RAMP	Traffic Signal	332	ASC/2	N	N	Y	N	Y	N
SLS00351	ALTA ARDEN EXWY	ARDEN WY	Traffic Signal	R	ASC/2	Y	Y	N	Y	N	N
SLS00352	24TH ST	4TH AV	Traffic Signal	G	ASC/2	N	N	Y	N	N	N
SLS00353	RIVERSIDE BL / 11 St	W ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00354	RIVERSIDE BL	X ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00355	26TH ST	BROADWAY	Traffic Signal	G	390	N	N	N	N	N	N
SLS00356	FRANKLIN BL	BROADWAY	Traffic Signal	G	390	N	N	N	N	N	Y
SLS00358	NORTHGATE BL	HAGGIN AV	Traffic Signal	G	390	N	N	Y	N	N	N
SLS00363	BLUMENFELD DR / HARVARD ST	ARDEN WY	Traffic Signal	R	ASC/2	Y	N	Y	Y	N	N
SLS00364	JACKSON HWY / NOTRE DAME	FOLSOM BL	Traffic Signal	R	ATCeX	N	N	Y	N	N	Y
SLS00365	FLORIN PERKINS RD / JULLIARD DR	FOLSOM BL	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00366	WISSEMANN DR	FOLSOM BL	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00367	HORNET DR	COLLEGE TOWN Dr	Traffic Signal	R	390	N	N	Y	Y	N	N
SLS00368	65TH ST EXWY	ELVAS AV	Traffic Signal	R	2070	N	N	Y	N	N	N
SLS00370	MARTIN LUTHER KING BL	FRUITRIDGE RD	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00371	44TH ST	FRUITRIDGE RD	Traffic Signal	M	ATCeX	Y	N	Y	N	N	N
SLS00372	FLORIN PERKINS RD	JACKSON RD	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00373	SOUTH LAND PARK DR	FLORIN RD	Traffic Signal	TS2	ATCeX	Y	Y	Y	N	Y	N
SLS00374	RIO LINDA BL	GRAND AV	Traffic Signal	R	ATCeX	N	N	Y	Y	N	Y
SLS00375	MARTIN LUTHER KING BL	12TH / 14TH AV	Traffic Signal		390	N	N	Y	N	N	N
SLS00376	RALEY BL	BELL AV	Traffic Signal	R	ASC/3	Y	N	Y	Y	Y	N
SLS00377	JACKSON RD	EAST OF FLORIN PERKINS	flasher			N	N	N	N	N	
SLS00378	I-5 NB	SEAMAS AV	Traffic Signal	P	ASC/2	N	N	Y	N	N	N
SLS00379	I-5 SB	SEAMAS AV	Traffic Signal	P	390	N	N	Y	N	N	N
SLS00380	I-5 NB	43RD AV	Traffic Signal	342 (XL)	2070	N	N	N	Y	N	Y
SLS00381	I-5 SB	43rd AV	Traffic Signal	342 (XL)	2070	N	N	N	Y	Y	N
SLS00384	SUTTERVILLE RD	I- 5 EAST SIDE	flasher			N	N	N	N	N	
SLS00385	26TH ST	CAPITOL AV	Traffic Signal	G	390	N	N	N	N	N	N
SLS00386	19TH ST	I ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00387	19TH ST	J ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00388	19TH ST	K ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00389	19TH ST	L ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00390	19TH ST	CAPITOL AV	Traffic Signal	G	390	N	N	N	N	N	N
SLS00391	19TH ST	N ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00392	19TH ST	P ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00393	19TH ST	S ST	Traffic Signal	G	390	N	N	N	Y	N	N
SLS00394	19TH ST	T ST	Traffic Signal	G	390	N	N	N	N	Y	Y
SLS00395	19TH ST	W ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00396	19TH ST	X ST	Traffic Signal	G	390	N	N	N	N	N	Y
SLS00397	FREEPORT BL	2nd AV	Traffic Signal	332	2070	N	N	Y	Y	N	N
SLS00398	28TH ST	K ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00399	15TH ST	F ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00400	Detriot Bl / Light Rail Station	Meadowview Rd	Traffic Signal	TS2	ATCeX	Y	Y	Y	N	Y	N
SLS00401	29TH ST / INDIAN LN	FLORIN RD	Traffic Signal	R	ATCeX	N	Y	Y	Y	Y	N
SLS00402	DEL PASO BL	OXFORD ST	Traffic Signal	R	ASC/3	Y	N	Y	Y	N	N
SLS00403	CHALLENGE WY	EXPOSITION BL	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00404	GLENBROOK PK	LA RIVIERA DR	Traffic Signal	G	390	N	N	Y	N	N	N
SLS00405	24TH ST	X ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00406	GLORIA DR	43rd AV	Traffic Signal	R	ASC/2	N	N	Y	Y	N	N
SLS00407	OCCIDENTAL / DRWY	LA RIVIERA DR	Traffic Signal	D	ASC/2	N	N	Y	N	N	N
SLS00408	UNIVERSITY / MUNROE	AMERICAN RIVER DR	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00409	ALHAMBRA BL	E ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00410	ALHAMBRA BL	S ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00411	ALHAMBRA BL	T ST	Traffic Signal	R	390	N	N	N	N	N	N
SLS00412	RIO LINDA BL	MARSVILLE BL	Traffic Signal	R	ASC/3	N	N	N	N	N	N
SLS00413	6TH ST	J ST	Traffic Signal	336	2070	Y	Y	Y	N	N	N
SLS00414	43RD AV	HOLSTEIN WY	flasher			N	N	N	N	N	
SLS00415	4TH ST	L ST	Traffic Signal	336	2070	Y	N	Y	N	N	N
SLS00416	3RD ST	K ST	Traffic Signal	G	ASC/2	N	N	Y	N	N	N
SLS00417	MARYSVILLE BL	LOS ROBLES BL	Traffic Signal	R	ASC/3	Y	N	Y	N	Y	Y
SLS00418	CENTER PKWY	MACK RD	Traffic Signal	R	ATCeX	Y	Y	Y	N	Y	N

Intersection ID	Street 1	Street 2	Type	Cabinet Type	Controller Model	Switch Installed	CCTV	Detection: Loops	Detection: Video or Radar	EVP - GPS	Battery Back Up
SLS00419	La Mancha / Valley Hi Dr	Mack Rd	Traffic Signal	TS2	ATCeX	Y	Y	Y	Y	Y	N
SLS00420	56TH ST	J ST	Traffic Signal	332	2070	N	N	Y	N	N	N
SLS00421	33RD ST	12th AV	Traffic Signal	332	170	N	N	Y	N	N	N
SLS00422	CADILLAC DR / CAMPUS COMMONS	FAIR OAKS BL	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00423	NORTHGATE BL	JEFFERSON AV	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00424	25TH ST	K ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00425	14TH ST	F ST	Traffic Signal	332	170	N	N	N	N	N	N
SLS00426	14TH ST	G ST	Traffic Signal	G	390	N	N	N	N	N	Y
SLS00427	14TH ST	H ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00428	14TH ST	I ST	Traffic Signal	336	2070	Y	N	N	N	N	N
SLS00429	FREEPORT BL	14TH AV	Traffic Signal	332	2070	N	N	N	N	Y	N
SLS00430	DEL PASO BL	ARCADE BL	Traffic Signal	R	ASC/2	N	N	Y	N	Y	Y
SLS00431	GREENHAVEN DR	RIVERSIDE BL	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00432	RIVERSIDE BL	FLORIN RD	Traffic Signal	R	ASC/3	N	N	Y	Y	N	N
SLS00433	GLORIA DR	FLORIN RD	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00434	AMERICAN RIVER, EAST OF	FAIR OAKS BL	flasher			N	N	N	N	N	
SLS00435	GREENHAVEN DR	FLORIN RD	Traffic Signal	R	ATCeX	N	N	Y	N	Y	N
SLS00436	Bus 80 WB	EL CAMINO AV	Traffic Signal	332	2070	N	N	Y	Y	N	N
SLS00437	Bus 80 EB	EL CAMINO AV	Traffic Signal	332	2070	N	N	Y	Y	N	N
SLS00438	I-5 NB offramp	RICHARDS BL	Traffic Signal	332	2070	Y	Y	Y	Y	N	N
SLS00439	84TH ST / ARMY DEPOT	FRUITRIDGE RD	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00440	FOOD LINK DR / P & G TRUCK GATE	FRUITRIDGE RD	Traffic Signal	R	ATCeX	Y	N	Y	Y	Y	N
SLS00441	24TH ST	57TH AV	Traffic Signal	R	390	N	N	N	N	N	N
SLS00442	I-80 EB	ARDEN WY	Traffic Signal	332	2070	Y	Y	Y	Y	Y	N
SLS00443	I-80 WB	ARDEN WY	Traffic Signal	332	2070	Y	N	Y	Y	Y	N
SLS00444	9TH ST	G ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00445	10TH ST	G ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00446	24TH ST	GARDENDALE RD / 68TH AV	Traffic Signal	TS2	ATCeX	Y	N	Y	Y	N	N
SLS00447	Tamoshanter Wy / 22nd St	Meadowview Rd	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00448	RIVERSIDE BL	VALLEJO WY	Traffic Signal	P	390	N	N	Y	N	N	N
SLS00449	58TH ST	14TH AV	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00450	12TH ST	C ST	Traffic Signal	332	2070	Y	N	N	N	Y	N
SLS00451	FRANKLIN BL	MACK RD	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00452	20TH ST	180' NORTH OF C ST.	flasher			N	N	N	N	N	
SLS00453	20TH ST	585' NORTH OF C ST.	removed			N	N	N	N	N	
SLS00454	HOWE AV	SWARTHMORE	Traffic Signal	R	ASC/2	Y	Y	Y	N	N	N
SLS00455	NORTH 7TH ST	Richards BL	Traffic Signal	R	ATCeX	Y	Y	Y	Y	N	N
SLS00456	SNRR BIKEWAY CRSG	EL CAMINO AV	Traffic Signal	G	390	N	N	N	N	N	N
SLS00457	3RD ST	I ST / J ST PARKING LOT ENTRY	removed			N	N	N	N	N	
SLS00458	NORWOOD AV	HARRIS AV	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00459	FREEPORT BL	VALLEJO WY	Traffic Signal	332	2070	N	N	Y	N	Y	N
SLS00460	VALLEY HI DR	BRUCEVILLE RD / BAMFORD DR	Traffic Signal	R	390	N	N	Y	Y	Y	N
SLS00461	TRUXEL RD	NEWBOROUGH DR	flasher			N	N	N	N	N	
SLS00462	ALHAMBRA BL	K ST	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00463	MARYSVILLE BL 150' WCL	BELL AV	flasher			N	N	N	N	N	
SLS00464	24TH ST	W ST	Traffic Signal	G	390	N	N	Y	N	N	N
SLS00465	26TH ST	X ST	Traffic Signal	G	390	N	N	Y	N	N	N
SLS00466	26TH ST	W ST	Traffic Signal	G	390	N	N	Y	N	N	N
SLS00467	NORTHGATE BL	POTOMAC AV	Traffic Signal	R	ASC/3	N	N	Y	Y	N	N
SLS00468	ROSEVILLE RD	MARCONI Cir	Traffic Signal	R	ASC/2	N	N	Y	Y	N	N
SLS00469	25TH ST	J ST	Traffic Signal	G	390	N	N	Y	N	N	N
SLS00470	ALHAMBRA BL	Q ST	Traffic Signal	G	ATCeX	N	N	Y	Y	N	N
SLS00471	KENWOOD ST	MARCONI AV	Traffic Signal	R	ASC/2	N	N	Y	N	N	N
SLS00473	4TH ST	J ST	Traffic Signal	336	2070	Y	N	Y	N	N	Y
SLS00474	RIVERSIDE BL	HAVENSIDE DR	Traffic Signal	R	390	N	N	N	N	N	N
SLS00475	Brookfield Dr / Nixos Wy	Meadowview Rd	Traffic Signal	R	ATCeX	Y	Y	Y	N	N	
SLS00476	AMHERST ST	MEADOWVIEW RD	Traffic Signal	R	ATCeX	Y	N	Y	N	N	N
SLS00477	AMERICAN	WEST EL CAMINO AV	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	Y
SLS00478	TRUXEL RD	WEST EL CAMINO AV	Traffic Signal	R	ATCeX	Y	Y	Y	Y	N	N
SLS00479	AZEVEDO DR	WEST EL CAMINO AV	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00480	4TH ST	P ST	Traffic Signal	G	390	N	N	Y	N	N	N
SLS00481	EVERGREEN ST	ARDEN WY	Traffic Signal	332	2070	Y	N	Y	Y	N	N
SLS00482	18TH ST	C ST	removed			N	N	N	N	N	
SLS00483	DEL PASO BL	HWY 160	Traffic Signal	332	2070	Y	N	Y	N	Y	N
SLS00484	OXFORD ST	ARDEN WY	Traffic Signal	332	2070	Y	N	Y	Y	N	Y
SLS00485	EVERGREEN ST	EL CAMINO AV	Traffic Signal	R	ASC/2	N	N	Y	Y	N	N
SLS00486	24TH ST	50TH AV	Traffic Signal	D	ASC/3	N	N	Y	N	Y	N
SLS00487	21ST ST	SUTTERVILLE RD	Traffic Signal		170	N	N	N	N	N	
SLS00488	12TH ST	P ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00489	12TH ST	Q ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00491	8TH ST	O ST	Traffic Signal	332	170	Y	N	N	N	N	N
SLS00492	9TH ST	O ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00493	10TH ST	O ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00494	56TH ST/ FAIRGROUNDS	BROADWAY	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00495	HAVENSIDE DR	FLORIN RD	Traffic Signal	R	ASC/3	N	N	Y	N	N	N
SLS00496	WATT AV	LA RIVIERA DR	Traffic Signal	R	ASC/3	N	N	Y	Y	N	N
SLS00497	FLORIN PERKINS RD	ELDER CREEK RD	Traffic Signal	R	390	N	N	Y	Y	N	Y
SLS00498	FRANKLIN BL	38TH AV	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00499	28TH ST	FRUITRIDGE RD	Traffic Signal	R	ASC/2	N	N	Y	N	N	N
SLS00500	NORTHGATE BL	SAN JUAN RD	Traffic Signal	TS2	ATCeX	N	N	Y	Y	N	N
SLS00501	VAN NESS	EL CAMINO AV	Traffic Signal	R	390	N	N	Y	Y	N	N
SLS00502	HOWE AV OFFRAMP	LA RIVIERA DR	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00503	ROSEVILLE RD	RT DRWY	Traffic Signal	332	2070	N	N	Y	Y	N	N
SLS00504	ALTA VALLEY	BRUCEVILLE	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00505	CENTER PKWY	VALLEY HI DR	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00506	TRUXEL RD	BREWERTON DR	Traffic Signal	TS2	ATCeX	N	N	Y	Y	N	N
SLS00507	FLORIN PERKINS RD	THYS CT / ARMY DEPOT	Traffic Signal	R	390	N	N	Y	N	N	Y
SLS00508	MARTIN LUTHER KING BL	9TH AV	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00511	DEL PASO BL	Lampasas/Evergreen	Traffic Signal	R	ASC/3	Y	N	Y	Y	N	N
SLS00512	Tangerine	Mack Rd	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00513	56TH / 57 ST, BETWEEN	FOLSOM BL	removed			N	N	N	N	N	
SLS00514	21ST ST	MEADOWVIEW RD	Traffic Signal	R	ATCeX	Y	Y	Y	N	N	N
SLS00515	24TH ST	MATSON DR / 69TH AV	Traffic Signal	D	ASC/3	N	N	Y	Y	N	N
SLS00516	STOCKTON BL	LAWRENCE	Traffic Signal	R	ASC/2	N	N	Y	N	N	N
SLS00517	63RD ST	LEMON HILL	Traffic Signal	G	390	N	N	Y	N	N	N
SLS00518	EAST COMMERCE WY	ARENA BL	Traffic Signal	TS2	ATCeX	N	N	Y	Y	Y	N
SLS00519	TRUXEL RD	ARENA BL	Traffic Signal	R	ASC/2	Y	N	Y	Y	N	N

Intersection ID	Street 1	Street 2	Type	Cabinet Type	Controller Model	Switch Installed	CCTV	Detection: Loops	Detection: Video or Radar	EVP - GPS	Battery Back Up
SLS00520	NATOMAS PARK	GARDEN HWY	Traffic Signal	R	390	N	N	Y	Y	N	N
SLS00521	GATEWAY OAKS DR	WEST EL CAMINO AV	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00522	NORTH 3RD ST	RICHARDS BL	Traffic Signal	R	ASC/3	Y	N	Y	Y	N	N
SLS00523	CENTER PKWY	EHRHARDT AV	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00524	GATEWAY OAKS	GARDEN HWY	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00525	I-5 NB	GARDEN HWY	Traffic Signal	332	2070	N	N	Y	Y	N	N
SLS00526	I-5 SB	GARDEN HWY	Traffic Signal	332	2070	N	N	Y	Y	N	N
SLS00527	FRANKLIN BL	VALLEY HI DR	Traffic Signal	R	ATCeX	N	N	Y	N	Y	N
SLS00528	VALLEY HI DR	MEADOW PARK WY	Traffic Signal	M	390	N	N	Y	N	N	N
SLS00529	BICENTENNIAL CIR	FOLSOM BL	Traffic Signal	332	2070	N	N	Y	N	N	N
SLS00530	HORNET DR	FOLSOM BL	Traffic Signal	R	390	N	N	Y	Y	N	N
SLS00531	POWER INN RD	LEMON HILL	Traffic Signal	R	ATCeX	Y	N	Y	Y	Y	N
SLS00532	6TH ST	H ST	Traffic Signal	332	2070	Y	N	Y	N	N	N
SLS00533	33RD ST	H ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00534	FRANKLIN BL	26TH AVE	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00535	NORWOOD BYPS	GROVE AV	flasher	Tesco		N	N	N	N	N	
SLS00536	NORWOOD BYPS	NORWOOD AV	flasher	Tesco		N	N	N	N	N	N
SLS00537	NORWOOD AV	LINDLEY DR	Traffic Signal	R	390	N	N	Y	Y	N	N
SLS00538	RIO LINDA BL	SOUTH AV	flasher	Tesco		N	N	N	N	N	
SLS00539	3RD ST	R ST	flasher			N	N	N	N	N	
SLS00540	POCKET RD	I-5 S / B	removed	332		Y	N	N	N	N	
SLS00541	SUNRISE SOUTH DR/COUGAR	ELDER CREEK RD	Traffic Signal	R	390	N	N	Y	Y	Y	N
SLS00542	DEL PASO BL	MARYSVILLE BL	Traffic Signal	R	ASC/3	Y	N	Y	Y	Y	N
SLS00543	AZEVEDO DR	BANNON CREEK PKWY	flasher			N	N	N	N	N	
SLS00544	NORWOOD AV	GRAND AV	Traffic Signal	R	390	N	N	Y	Y	N	N
SLS00545	NORWOOD AV	SILVER EAGLE RD	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00546	BRIDGEFORD DR	San Juan RD	Traffic Signal	R	ASC/2	N	N	Y	Y	N	Y
SLS00547	12TH ST	D ST	Traffic Signal	332	2070	Y	N	N	N	N	N
SLS00548	ROSEVILLE RD	CONNIE DR	flasher			N	N	N	N	N	
SLS00549	NORWOOD AV	I 80 WEST	removed			N	N	N	N	N	
SLS00550	28TH ST	P ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00551	11TH ST	H ST	Traffic Signal	G	390	N	N	N	N	N	Y
SLS00552	CENTER PKWY	VALLEY GREEN	flasher			N	N	N	N	N	
SLS00553	29TH ST	MEADOWVIEW RD	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00554	Greenhaven Dr	Pocket Rd	Traffic Signal	R	ATCeX	Y	Y	Y	N	Y	N
SLS00555	LUTHER DR	FLORIN RD	Traffic Signal	R	ATCeX	N	Y	Y	Y	Y	N
SLS00556	KELTON WY	MAIN AV	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00557	NORTHGATE BL	ROSIN CT	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00558	ENRICO	FRUITRIDGE RD	Traffic Signal	G	ASC/2	Y	N	N	N	N	N
SLS00559	42ND ST/ DEL NORTE	FRUITRIDGE RD	Traffic Signal	M	ASC/3	Y	N	Y	N	N	N
SLS00560	TRUXEL RD	GARDEN HWY	Traffic Signal	R	390	N	N	Y	Y	N	N
SLS00561	STONE CREEK DR / SEAMIST DR	WEST EL CAMINO AV	Traffic Signal	TS2	ATCeX	Y	N	Y	Y	N	N
SLS00562	POWER INN RD	CUCAMONGA AV	Traffic Signal	R	ASC/2	Y	N	Y	N	N	N
SLS00564	FRANKLIN BL	EHRHARDT AV	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00565	49TH ST	BROADWAY	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00566	CENTER PKWY	COSUMNES RIVER BLVD	Traffic Signal	TS2	ATCeX	Y	Y	Y	Y	Y	Y
SLS00567	BRUCEVILLE RD	COSUMNES RIVER BLVD	Traffic Signal	TS2	ATCeX	Y	N	Y	Y	Y	N
SLS00568	RALEY BL	MAIN AV	Traffic Signal	R	ASC/3	N	N	Y	N	N	N
SLS00569	MARYSVILLE BL	NORTH AV	Traffic Signal	R	ASC/3	Y	N	Y	N	Y	N
SLS00570	NORWOOD AV	I-80 WEST	Traffic Signal	332	2070	N	N	Y	N	N	N
SLS00571	NORWOOD AV	I-80 EAST	Traffic Signal	332	2070	N	N	Y	N	N	N
SLS00572	45TH ST	X ST	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00573	PELL DR	MAIN AV	Traffic Signal	R	ASC/2	N	N	Y	Y	N	N
SLS00574	79TH ST	FRUITRIDGE RD	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00575	NORWOOD AV	ELEANOR AV	flasher	Tesco		N	N	N	N	N	N
SLS00576	NORWOOD AV	JESSIE AV	Traffic Signal	R	ASC/3	N	N	Y	N	N	N
SLS00577	HERITAGE LN	RESPONSE RD	Traffic Signal	R	ASC/2	N	N	Y	N	N	N
SLS00578	Deer Creek Rd	Mack Rd	Traffic Signal	R	ATCeX	Y	N	Y	N	N	N
SLS00579	50TH ST	BROADWAY	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00580	STOCKTON BL	FOWLER AV / RIZA AV	Traffic Signal		390	N	N	N	N	N	
SLS00581	I-5 SB offramp	Pocket Rd	Traffic Signal	332	2070	Y	N	Y	Y	Y	N
SLS00582	SORENTO RD	BARROS DR	flasher			N	N	N	N	N	
SLS00583	WOODBINE AV	47TH AV	Traffic Signal	R	ASC/3	N	N	Y	N	N	N
SLS00584	NORWOOD AV	BELL AV	Traffic Signal	R	ASC/2	N	N	Y	N	N	N
SLS00585	Alma Vista Wy	POCKET RD/ MEADOWVIEW ROAD	Traffic Signal	R	ATCeX	Y	N	Y	N	N	N
SLS00586	I-5 NB	WEST EL CAMINO AV	Traffic Signal	332	2070	Y	N	Y	N	Y	N
SLS00587	HWY 99 SB	Mack Rd	Traffic Signal	332	2070	Y	N	Y	N	Y	N
SLS00588	STEMMLER DR	ARENA BL	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00589	FRANKLIN BL	CALVINE RD	Traffic Signal	R	ASC/3	N	N	Y	Y	Y	N
SLS00590	VALLEY HI DR	GRANDSTAFF DR	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00591	LAND PARK DR	ZOO PED CRSG	Traffic Signal	G	390	N	N	Y	N	Y	N
SLS00592	27TH ST	L ST	flasher			N	N	N	N	N	
SLS00593	NORWOOD AV	MAIN AV	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00594	DRY CREEK RD	GRAND AV	Traffic Signal	R	ASC/2	N	N	Y	N	N	N
SLS00595	TRIBUTE RD	EXPOSITION BL	Traffic Signal	R	ASC/3	N	N	Y	N	Y	N
SLS00596	ROSIN BL / ISHI CIR	SAN JUAN RD	Traffic Signal	R	390	N	N	Y	Y	N	N
SLS00597	TRUXEL RD	SAN JUAN RD	Traffic Signal	R	ASC/3	Y	Y	Y	Y	N	N
SLS00598	RIO LINDA BL	BELL AV	Traffic Signal	R	ASC/3	N	N	Y	Y	Y	N
SLS00599	POWER INN RD	BERRY AV	Traffic Signal	R	ATCeX	Y	N	Y	Y	Y	N
SLS00600	LEISURE LN	EXPOSITION BL	Traffic Signal	332	2070	N	N	Y	N	N	N
SLS00601	LAWRENCE DR / VISTA AV	FRUITRIDGE RD	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00602	ETHAN WY	ARDEN FAIR MALL	Traffic Signal	R	390	N	N	Y	Y	N	N
SLS00603	FRANKLIN BL	COSUMNES RIVER BLVD	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00604	FRANKLIN BL	ARMADALE WY	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00605	CENTER PKWY	CALVINE RD	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00606	TRUXEL RD	I-80 WB	Traffic Signal	332	ASC/2	Y	N	Y	N	Y	N
SLS00607	TRUXEL RD	I-80 EB	Traffic Signal	332	ASC/2	Y	N	Y	N	Y	N
SLS00608	14TH ST	43RD AV W/B	flasher			N	N	N	N	N	
SLS00609	CENTER PKWY	LAGUNA VILLAGE DRWY	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00610	EXPO PKWY	EXPOSITION BL	Traffic Signal	R	ASC/2	N	N	Y	Y	N	N
SLS00611	48TH ST	J ST	Traffic Signal	G	ASC/2	Y	N	Y	N	N	Y
SLS00612	FLORIN PERKINS RD	BELVEDERE AV	Traffic Signal	R	ATCeX	N	N	Y	N	N	N
SLS00613	NORTH 5TH ST	RICHARDS BL	Traffic Signal	R	ASC/3	Y	N	Y	Y	N	N
SLS00614	SEQUOIA PACIFIC	RICHARDS BL	Traffic Signal	R	ASC/3	Y	N	Y	Y	N	N
SLS00615	BUSINESS 80 (WB-CCF)	EXPOSITION BL	Traffic Signal	332	2070	N	N	Y	N	N	N
SLS00616	BUSINESS 80 (EB-CCF)	EXPOSITION BL	Traffic Signal	332	2070	N	N	Y	N	Y	N
SLS00617	FAIRWEATHER DR / MORELL ST	WEST EL CAMINO AV	Traffic Signal	R	ATCeX	Y	Y	Y	N	Y	N

Intersection ID	Street 1	Street 2	Type	Cabinet Type	Controller Model	Switch Installed	CCTV	Detection: Loops	Detection: Video or Radar	EVP - GPS	Battery Back Up
SLS00618	62ND ST	14TH AV	flasher			N	N	N	N	N	
SLS00619	TRUXEL RD	PEBBLEWOOD DR	Traffic Signal	R	ASC/3	Y	N	Y	Y	N	N
SLS00620	BINGHAMTON DR	SAN JUAN RD	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00621	TRUXEL RD	ATEWAY PARK BL/ NATOMAS MARKET I	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00622	CHALLENGE WY	RESPONSE RD	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00623	23RD ST	J ST	Traffic Signal	G	390	N	N	N	N	Y	N
SLS00624	26TH ST	J ST	Traffic Signal	G	390	N	N	N	N	Y	N
SLS00625	23RD ST	L ST	Traffic Signal	G	390	N	N	N	N	Y	N
SLS00626	24TH ST	K ST	Traffic Signal	G	390	N	N	N	N	N	N
SLS00627	26TH ST	L ST	Traffic Signal	N	390	N	N	N	N	Y	N
SLS00628	SILVER EAGLE RD	MABEL ST	flasher			N	N	N	N	N	
SLS00629	STOCKTON BL	2nd AV	Traffic Signal	R	ASC/3	N	N	Y	Y	Y	N
SLS00630	TRUXEL RD	ARENA COMMONS DR	Traffic Signal	R	ASC/3	Y	N	Y	Y	Y	N
SLS00631	NORTHGATE BL	PATIO AV	Traffic Signal	R	ASC/3	N	N	Y	N	N	N
SLS00632	FRANKLIN BL	CREEKS EDGE	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00633	BERCUT DR	RICHARDS BL	Traffic Signal	R	ASC/3	Y	Y	Y	Y	N	N
SLS00634	TRUXEL RD	NATOMAS CRSNG DR	Traffic Signal	R	ASC/2	Y	N	Y	Y	Y	N
SLS00635	INNOVATOR DR	NATOMAS CRSG DR	NTO			N	N	N	N	N	
SLS00636	POWER INN RD	RAMONA AV	Traffic Signal	R	ASC/2	Y	N	Y	Y	Y	N
SLS00637	GREENHAVEN DR	WINDBRIDGE DR / CORPORATE WY	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00638	COLFAX ST	Arden Wy	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00639	Northgate BL	ARDEN GARDEN CO	Traffic Signal	R	390	N	N	Y	Y	N	N
SLS00640	JACINTO AV SOUTH SIDE	SEAFORD DR, 150' E/O	flasher			N	N	N	N	N	
SLS00641	JACINTO AV NORTH SIDE	DARTFORD DR, 300' E/O	flasher			N	N	N	N	N	
SLS00642	SEARS DRWY	ARDEN WY	Traffic Signal	R	ASC/2	Y	Y	Y	Y	N	N
SLS00643	TRUXEL RD / NATOMAS BL	DEL PASO RD	Traffic Signal	R	ASC/2	Y	Y	Y	Y	Y	Y
SLS00644	NATOMAS BL	ELKHORN BL	Traffic Signal	R	390	N	N	Y	N	Y	Y
SLS00645	Orchard LN	WEST EL CAMINO AV	Traffic Signal	R	ATCeX	Y	N	Y	Y	Y	N
SLS00646	Coral Gables Ct	Meadowview Rd	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00647	STATE UNIVERSITY DR EAST	FOLSOM BL	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00648	POWER INN RD	LIGHT RAIL DRWY	Traffic Signal		ASC/2	Y	N	Y	N	Y	
SLS00649	65TH ST EXWY	Q ST	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00650	62ND ST	ELVAS AV	Traffic Signal	R	2070	Y	N	Y	N	Y	N
SLS00651	TRUXEL RD	PEBBLESTONE WY	Traffic Signal	R	ASC/3	Y	N	Y	Y	Y	N
SLS00653	TRUXEL RD	TERALBA WY / MILL OAK WY	Traffic Signal	R	ASC/3	Y	N	Y	Y	N	N
SLS00654	WOODBINE AV	FLORIN RD	Traffic Signal	R	ATCeX	N	Y	Y	Y	Y	N
SLS00656	19TH ST	V ST	Traffic Signal	R	390	N	N	N	N	N	Y
SLS00657	EL CENTRO RD	SAN JUAN RD	NTO			N	N	N	N	N	
SLS00658	NATOMAS BL	PARKWAY PLAZA APTS	Traffic Signal	R	ASC/3	Y	N	Y	N	Y	N
SLS00659	NORTH 10TH ST	RICHARDS BL	Traffic Signal	R	ASC/3	Y	N	Y	N	N	N
SLS00660	FAIRBAIRN WTP DRWY	COLLEGE TOWN Dr	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00661	15TH ST	E ST	Traffic Signal	332	170	N	N	Y	N	N	N
SLS00662	RANCHO ADOBE / RING DR	ELDER CREEK RD	Traffic Signal	R	390	N	N	Y	Y	Y	N
SLS00663	BRUCEVILLE RD	HWY 99 S/B OFFRAMP	Traffic Signal	332	2070	N	N	Y	N	N	N
SLS00664	NORWOOD AV	MOREY AV	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00665	56TH ST	FOLSOM BL	Traffic Signal	R	2070	Y	Y	Y	N	N	N
SLS00667	NATOMAS BL	CLUB CENTER DR	Traffic Signal	R	ASC/2	Y	N	Y	Y	Y	N
SLS00668	ETHAN WY	HURLEY WY	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00669	ETHAN WY	ALTA ARDEN EXWY	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00670	CENTER PKWY	JACINTO RD	Traffic Signal	R	ASC/3	N	N	Y	N	Y	N
SLS00671	FRONT ST	CAPITOL MALL	Traffic Signal	332	2070	Y	Y	Y	Y	N	Y
SLS00672	WIRE DR	47TH AV	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00673	BLACKROCK DR	DEL PASO RD	Traffic Signal	R	ASC/3	Y	Y	Y	Y	Y	N
SLS00674	GATEWAY PARK BL	DEL PASO RD	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00675	TOWN CENTER DR	DEL PASO RD	Traffic Signal	R	ATCeX	Y	N	Y	Y	Y	N
SLS00676	EAST COMMERCE WY	DEL PASO RD	Traffic Signal	R	2070	Y	N	Y	N	N	N
SLS00677	PLACE SOUTH ENTRY /CENTERPOINTE	DEL PASO RD	Traffic Signal	R	390	N	N	Y	Y	Y	N
SLS00678	NATOMAS BL	PARK PLACE / NEW MARKET DR	Traffic Signal	R	390	Y	N	Y	N	Y	N
SLS00679	NORTHGATE BL	MAIN / DEL PASO RD	Traffic Signal	R	ASC/2	N	N	Y	Y	N	Y
SLS00680	TRUXEL RD	PROSPER RD	Traffic Signal	R	ASC/2	Y	Y	Y	Y	Y	N
SLS00681	15TH ST	CAPITOL AV	NTO			N	N	N	N	Y	
SLS00682	17 ST	L ST	NTO			N	N	N	N	Y	
SLS00683	SUN RIVER DR.	ELDER CREEK RD	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00684	24TH ST	26th AV / IRVIN WY	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00685	RIVERSIDE BL	LELANDHAVEN WAY (EAST OF)	Traffic Signal	G	390	N	N	N	N	N	N
SLS00686	TRUXEL RD	TERRACINA DR	Traffic Signal	R	ASC/2	Y	N	Y	Y	Y	N
SLS00687	24TH ST	23RD AV	NTO			N	N	N	N	N	
SLS00688	I-5 NB	ARENA BL	Traffic Signal	332	ASC/2	N	N	Y	N	Y	N
SLS00689	I-5 SB	ARENA BL	Traffic Signal	332	ASC/2	N	N	Y	N	Y	N
SLS00690	DUCKHORN DR	ARENA BL	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00691	NATOMAS BL	NORTH BEND DR	Traffic Signal		ASC/3	Y	N	Y	Y	N	N
SLS00692	EAST COMMERCE WY	BENEFIT WY	Traffic Signal	R	390	N	N	Y	N	N	N
SLS00693	BRUCEVILLE RD	TIMBERLAKE	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00695	STATE UNIVERSITY DR EAST	COLLEGE TOWN DR / ST UNIV DR SOUT	Traffic Signal	R	ASC/3	N	N	Y	N	N	N
SLS00697	15TH AV	MARTIN LUTHER KING JR BL	flasher			N	N	N	N	N	
SLS00698	MARTIN LUTHER KING JR BL	23rd AV	flasher			N	N	N	N	N	
SLS00699	NORTHBOURGH DR	ELKHORN BLVD	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00700	SAGEVIEW DR	ELKHORN BLVD	Traffic Signal	R	ASC/2	N	N	Y	Y	N	N
SLS00701	NORTHVIEW DR	WEST EL CAMINO AV	Traffic Signal	R	ATCeX	Y	N	Y	N	N	N
SLS00702	GATEWAY PARK BL	ARENA BL /N MARKET BL	Traffic Signal	R	ASC/2	N	N	Y	Y	N	N
SLS00703	NATOMAS BL	BRIDGECROSS DR / ROSE ARBOR DR	Traffic Signal	R	ASC/2	N	N	Y	N	N	N
SLS00704	NATOMAS BL	NORTH PARK DR	Traffic Signal	R	ASC/2	N	N	Y	Y	N	N
SLS00705	EL CENTRO RD	DEL PASO RD	Traffic Signal	R	ASC/2	Y	Y	Y	Y	N	N
SLS00706	BRUCEVILLE RD	WYNDHAM	Traffic Signal	R	ASC/3	N	N	N	Y	Y	N
SLS00707	EAST COMMERCE WY	ELKHORN BLVD	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00708	65TH ST EXWY	4TH AV	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00709	842' EOC SouthLand Park Dr	FRUITRIDGE RD	flasher			N	N	N	N	N	N
SLS00710	EAST COMMERCE	GREG THATCH CIR	NTO			N	N	N	N	N	
SLS00712	NEW MARKET DR	HIGH SCHOOL ACCESS	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00713	NORWOOD AV	GRACE AV	Traffic Signal	R	390	N	N	Y	N	Y	N
SLS00714	N 7TH ST	N B ST	Traffic Signal	332	2070	Y	N	Y	Y	N	N
SLS00715	RIO LINDA BL	MAIN AV	flasher			N	N	N	N	N	
SLS00716	ELVAS AV	ST FRANCIS HS DRWY SO. (320' N 62 ST	Traffic Signal	R	ATCeX	Y	N	Y	N	Y	N
SLS00717	ELVAS AV	ST FRANCIS HS DRWY NO. (800' N 62 ST	Traffic Signal	R	ATCeX	Y	Y	Y	N	Y	N
SLS00718	Meadowview Ped Crsg E of 24th st	Meadowview Rd	Traffic Signal	G	ASC/2	Y	N	Y	N	Y	N
SLS00719	TAYLOR ST	BELL AV	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00720	HOWE AVE N/B	AMERICAN RIVER DR (south of)	flasher			N	N	N	N	N	

Intersection ID	Street 1	Street 2	Type	Cabinet Type	Controller Model	Switch Installed	CCTV	Detection: Loops	Detection: Video or Radar	EVP - GPS	Battery Back Up
SLS00721	STOCKTON BL	9TH AV (bet 9th and 10th	Traffic Signal	G	390	N	N	Y	N	Y	N
SLS00722	STOCKTON BL	FRUITRIDGE RD (north of)	Traffic Signal	G	390	N	N	Y	N	Y	N
SLS00723	STOCKTON BL	17TH AV (south of)	Traffic Signal	G	390	N	N	Y	N	N	Y
SLS00724	FLORIN PERKINS	23rd AVE	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00725	S ST. (6301)	SMUD PED CRSG	flasher			N	N	N	N	N	
SLS00726	4th STREET WALKWAY	Q ST	Traffic Signal	G	390	N	N	Y	N	Y	N
SLS00727	EAST COMMERCE WY	ARCO MAIN ENTRY	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00728	EAST COMMERCE WY	GREG THATCH CIR NORTH /MACON DR	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00729	EAST COMMERCE WY	GREG THATCH CIR /CLIFF HOUSE	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00730	DANBROOK DR \ REGENCY PARK DR	CLUB CENTER DR	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00731	BRUCEVILLE RD	W. STOCKTON BL	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00732	KASTANIS WY	W. STOCKTON BL	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00733	BRUCEVILLE RD	DAMASCUS	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00734	BRUCEVILLE RD	JACINTO RD	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00735	BRUCEVILLE RD	CALVINE RD	Traffic Signal	R	ASC/2	Y	Y	Y	Y	Y	N
SLS00736	BRUCEVILLE RD	CONSUMNES RIVER COLLEGE DRWY.	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00737	Country Courthouse Driveway	CUCAMONGA AV	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00738	GATEWAY PARK BL	N. FREEWAY	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00739	N. FREEWAY	PROMENADE CIR WEST	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00740	N. FREEWAY	PROMENADE CIR EAST	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00741	EL CENTRO RD	ARENA BL / NATOMAS CENTRAL DR	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00742	RT CRSG (800' W/O 28TH ST)	FRUITRIDGE RD	Traffic Signal	R	ASC/3	N	N	Y	N	Y	N
SLS00743	27TH ST	47TH AV	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00744	GILGUNN	FRUITRIDGE RD	flasher			N	N	N	N	N	
SLS00745	N 12TH /N 16TH	Richards BL	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	Y
SLS00746	INNOVATOR DR	ARENA BL	Traffic Signal	R	ASC/2	Y	N	Y	Y	Y	N
SLS00747	NORTHBOURGH DR	CLUB CENTER DR	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00748	JACINTO RD	DARTFORD DR.	Traffic Signal	R	ASC/2	N	N	N	Y	Y	Y
SLS00749	MILL CREEK	WEST EL CAMINO AV	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00750	26TH ST	K ST	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00751	24TH ST	CAPITOL AVE	NTO			N	N	N	N	N	
SLS00752	23rd ST	SUTTERVILLE RD	Traffic Signal	332	170	N	N	Y	Y	Y	N
SLS00753	TRUXEL RD	NO. MARKET PLACE NORTH ENTRANCE	Traffic Signal	R	ASC/2	Y	Y	Y	Y	N	N
SLS00754	DUCKHORN DR/TOLLIVER	SAN JUAN RD	Traffic Signal	R	ASC/2	N	N	Y	Y	N	N
SLS00755	MIRAMONTE / SODA	SAN JUAN RD	Traffic Signal	R	ASC/2	N	N	Y	Y	N	N
SLS00756	BUCHMAN CR / MYNA	SAN JUAN RD	Traffic Signal	R	ASC/2	N	N	N	Y	N	N
SLS00757	RALEY BL	ASCOT	NTO			N	N	N	N	N	
SLS00758	STATE UNIVERSITY DR SOUTH	STADIUM	Traffic Signal	R	ASC/2	N	N	Y	N	N	N
SLS00759	DEL PASO BL	PALO VERDE AV	flasher			N	N	N	N	N	
SLS00761	KOKOMO / MABRE DRIVE	CLUB CENTER DR	Traffic Signal		ATCeX	N	N	N	N	N	
SLS00762	STOCKTON BL	SHERMAN WY	HAWK	Power box	Spot Devices	N	N	Y	N	N	N
SLS00763	MAIN AV BRIDGE	LEVEE ACCESS RD	Traffic Signal	G	ASC/2	N	N	Y	N	N	N
SLS00764	GATEWAY PARK BL	RALEY DRIVEWAY 500' NO. OF Freeway	Traffic Signal	R	ASC/2	N	N	Y	Y	N	N
SLS00765	BRADFORD/WILKINSON	FRUITRIDGE RD	Traffic Signal	R	ATCeX	Y	N	N	Y	Y	N
SLS00766	MASTERS ST	LEWIS STEIN RD/JOCELYN	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00767	East Commerce Wy	MIKE WALDRON/MAGUITTE WY	Traffic Signal	R	ASC/2	N	N	Y	Y	N	N
SLS00768	GATEWAY PARK BL	TERRACINA DR	Traffic Signal	R	ASC/2	Y	Y	Y	Y	N	N
SLS00769	SHELDON RD	LEWIS STEIN RD	Traffic Signal		N/A	N	N	N	N	N	N
SLS00770	COLFAX ST	EL CAMINO AV	Traffic Signal	R	ASC/3	N	N	Y	Y	N	N
SLS00771	21st ST	4TH AV/FREEPORT	Traffic Signal		ASC/2	N	N	N	N	N	
SLS00772	POCKET RD	WEST SHORE DR	Traffic Signal	R	ASC/2	N	N	Y	N	Y	N
SLS00773	EAST COMMERCE WY	NATOMAS CRSG DR	Traffic Signal	R	ASC/2	N	N	Y	N	N	N
SLS00774	EAST COMMERCE WY	AMELIA EARHART ST	Traffic Signal	R	ASC/2	N	N	Y	Y	N	N
SLS00775	EL CENTRO RD	MANERA RICA / SNOWY EGRET BLVD	Traffic Signal	R	ASC/2	N	N	N	Y	N	N
SLS00776	RIO LINDA BL	2534 - FS# 20	flasher			N	N	N	N	N	
SLS00777	24TH ST	HOGAN DRIVE / 48TH AVE	Traffic Signal	R	ASC/2	N	N	N	Y	Y	N
SLS00778	SALLY RIDE WY	ARENA BL	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00779	HOVNANIAN DR	DEL PASO RD	Traffic Signal	R	ASC/2	N	N	N	Y	N	N
SLS00780	TS PRKWY EAST / HIGH SCHOOL ENTR	DEL PASO RD	NTO			N	N	N	N	N	
SLS00781	ROADGATE DR / NATOMAS CENTRAL D	DEL PASO RD	Traffic Signal	R	ASC/2	N	N	N	Y	Y	N
SLS00782	STOCKTON BL	DIAS AVE	Traffic Signal	R	ASC/2	N	N	N	Y	Y	N
SLS00783	EAST COMMERCE WY	NORTH PK	Traffic Signal	R	ASC/3	Y	Y	Y	Y	Y	N
SLS00784	WYNDHAM DR	etween ARROYO VISTA & BRUCEVILLE R	flasher			N	N	N	N	N	
SLS00785	ORCHARD LN	BANDARAS DR	Traffic Signal	R	ASC/2	N	N	Y	Y	Y	N
SLS00786	5TH ST PED CROSSING	R ST	flasher			N	N	N	N	N	
SLS00787	20TH ST	K ST	flasher			N	N	N	N	N	
SLS00788	17TH AV	SUTTERVILLE RD	flasher			N	N	N	N	N	
SLS00789	SOUTH LAND PARK DR	Between 43RD & 47TH AV	flasher			N	N	N	N	N	
SLS00790	BRUCEVILLE RD	KAISER SOUTH DWY	Traffic Signal	R	ASC/3	N	N	Y	Y	Y	N
SLS00792	42ND ST	BROADWAY	Traffic Signal	R	ASC/3	Y	Y	Y	Y	Y	N
SLS00793	FRANKLIN BL	BOYCE DR	Traffic Signal	R	ASC/3	Y	Y	Y	Y	Y	N
SLS00794	22ND ST	SUTTERVILLE RD	flasher			N	N	N	N	N	
SLS00795	65th St	4TH AVENUE (720' EAST OF 65TH ST)	flasher			N	N	N	N	N	
SLS00796	27TH ST	CAPITOL AV	Traffic Signal	332	2070	Y	N	Y	Y	N	N
SLS00797	I-80 WB	WEST EL CAMINO AV	Traffic Signal	332	2070	Y	Y	Y	N	Y	N
SLS00798	I-80 EB	WEST EL CAMINO AV	Traffic Signal	332	2070	Y	Y	Y	N	Y	N
SLS00799	I-5 SB	DEL PASO RD	Traffic Signal	332	2070	Y	Y	Y	N	Y	N
SLS00800	I-5 NB	DEL PASO RD	Traffic Signal	332	2070	Y	Y	Y	N	Y	Y
SLS00801	JIBBOOM ST	RAILYARDS Bl	NTO			N	N	N	N	N	
SLS00802	BERCUT DR	SOUTH PARK ST	Traffic Signal	332	2070	N	N	Y	Y	Y	N
SLS00803	6TH ST	W ST	Traffic Signal	332	2070	Y	Y	N	N	Y	N
SLS00804	NORWOOD AV	FAIRBANKS AV	Traffic Signal	R	ASC/3	N	N	Y	N	Y	N
SLS00805	EL CENTRO RD	S DRIVEWAY (235' N OF GARDENDELL R	Traffic Signal	332	2070	N	N	Y	N	Y	N
SLS00806	7TH ST	F ST	Traffic Signal	332	2070	Y	N	N	N	Y	N
SLS00807	DEL PASO BL	COLFAX STREET / SOUTHGATE RD	Traffic Signal	332	2070	Y	N	Y	Y	Y	N
SLS00808	NORTH 7TH ST	SIGNATURE ST / TOWNSHIP NINE AV	Traffic Signal	332	2070	N	N	Y	Y	Y	N
SLS00809	FLORIN PERKINS RD	MORRISON CREEK DR	Traffic Signal	R	ASC/3	N	N	Y	Y	Y	N
SLS00810	I-5 SB	Richards Bl	Traffic Signal	332	2070	Y	Y	Y	Y	Y	N
SLS00811	RIVERSIDE BL	PARK RIVIERA WY	Traffic Signal	R	ASC/3	N	N	Y	Y	Y	N
SLS00812	4TH ST	I ST	Traffic Signal	332	2070	Y	N	N	Y	Y	N
SLS00813	HWY 99	ELKHORN BLVD	Traffic Signal	332	2070	N	N	N	Y	Y	N
SLS00815	EL CAMINO AV	BOXWOOD ST	Traffic Signal	R	ASC/3	Y	N	Y	Y	Y	N
SLS00816	GATEWAY OAKS DR	RIVER PLAZA DR	Traffic Signal	R	ASC/3	N	N	Y	Y	Y	N
SLS00818	FREEPORT BL	CLAUDIA DR	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00820	FREEPORT BL	COSUMNES RIVER BLVD	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00821	I-5 SB OFF RAMP	COSUMNES RIVER BLVD	Traffic Signal	332	2070	Y	N	Y	N	Y	N
SLS00822	I-5 NB OFF RAMP	COSUMNES RIVER BLVD	Traffic Signal	332	2070	Y	Y	Y	N	Y	N

Intersection ID	Street 1	Street 2	Type	Cabinet Type	Controller Model	Switch Installed	CCTV	Detection: Loops	Detection: Video or Radar	EVP - GPS	Battery Back Up
SLS00823	COMMERCIAL DRIVEWAY	COSUMNES RIVER BLVD	Traffic Signal	R	ATCeX	Y	N	Y	Y	Y	N
SLS00824	DELTA SHORES CIRCLE	COSUMNES RIVER BLVD	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00825	STREET A	COSUMNES RIVER BLVD	Traffic Signal		ATCeX	N	N	Y	Y	Y	N
SLS00826	STREET B	COSUMNES RIVER BLVD	Traffic Signal		ATCeX	N	N	Y	Y	Y	N
SLS00827	24TH STREET	COSUMNES RIVER BLVD	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00828	FRANKLIN BOULEVARD	COSUMNES RIVER BLVD	Traffic Signal		ATCeX	N	N	Y	Y	Y	N
SLS00829	STREET D	COSUMNES RIVER BLVD	Traffic Signal	332	2070	N	N	Y	Y	Y	N
SLS00830	STREET E	COSUMNES RIVER BLVD	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00831	SUTTERVILLE ROAD	CROCKER DRIVE	Traffic Signal	R	ASC/3	Y	Y	Y	Y	Y	N
SLS00832	COMMERCIAL DRIVEWAY	CROCKER DRIVE	Traffic Signal	R	ASC/3	Y	N	Y	Y	Y	N
SLS00833	10TH AVENUE	CROCKER DRIVE	Traffic Signal	R	ASC/3	Y	N	Y	Y	Y	N
SLS00834	6TH STREET	CAMILLE LANE	Traffic Signal	332	2070	Y	N	Y	Y	Y	N
SLS00835	FRUITRIDGE ROAD	58TH STREET	Traffic Signal	R	ASC/3	Y	N	Y	Y	Y	N
SLS00836	6TH STREET	G STREET	Traffic Signal	332	2070	Y	N	Y	Y	Y	N
SLS00837	CENTER PARKWAY	ARROYO VISTA DRIVE	HAWK		ASC/3	N	N	Y	Y	Y	N
SLS00838	CAPITOL AV	2ND ST	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00839	RIO LINDA BL	ACACIA AV	Traffic Signal	332	2070	Y	N	Y	Y	N	N
SLS00840	43RD AV	RIVERSIDE BL	NTO			N	N	Y	Y	N	N
SLS00841	RIO LINDA BL	FRAYNE	Traffic Signal	332	2070	N	N	Y	Y	N	N
SLS00842	5TH ST	H ST	Traffic Signal	R	ATCeX	Y	N	Y	Y	Y	N
SLS00843	5TH ST	G STREET	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00844	5TH ST	STEVENS ST	Traffic Signal	332	2070	Y	N	Y	Y	Y	N
SLS00845	5TH ST	CAMILLE LANE	Traffic Signal	332	2070	Y	N	Y	Y	Y	N
SLS00846	RAILYARD BOULEVARD	HUNTINGTON ST	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00847	RAILYARD BOULEVARD	CROCKER DRIVE	Traffic Signal	332	2070	N	N	Y	Y	Y	N
SLS00848	RAILYARD BOULEVARD	STANFORD ST	Traffic Signal	R	ATCeX	N	N	Y	Y	Y	N
SLS00849	RAILYARD BOULEVARD	5TH ST	Traffic Signal	332	2070	Y	Y	Y	Y	Y	N
SLS00850	RAILYARD BOULEVARD	6TH ST	Traffic Signal	332	2070	N	N	Y	Y	Y	N
SLS00851	RAILYARD BOULEVARD	7TH ST	Traffic Signal	R	ATCeX	Y	N	Y	Y	Y	N
SLS00852	MEADOWVIEW RD	MANORSIDE DR	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00853	FRANKLIN BOULEVARD	CRC FRANKLIN STATION ACCESS	Traffic Signal	R	ATCeX	Y	N	Y	Y	Y	N
SLS00854	STOCKTON BL	8TH AV	Traffic Signal	332	2070	N	N	Y	Y	Y	N
SLS00856	DELTA SHORES CIRCLE SOUTH	STREET D NORTH	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00857	DELTA SHORES CIRCLE SOUTH	STREET D SOUTH	Traffic Signal	R	ATCeX	Y	N	Y	Y	Y	N
SLS00858	MACK RD	SUMMERSDALE WY	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00859	EL CAMINO AV	CLAY ST	Traffic Signal	R	ATCeX	Y	Y	Y	Y	Y	N
SLS00860	ETHAN WY	HARDEN LANE	Traffic Signal	R	ATCeX	Y	N	Y	Y	Y	N
SLS00861	5th	DOWNTOWN Arena Exit	Traffic Signal	R	ATCeX	Y	N	Y	Y	Y	N
SLS00862	FOLSOM BL	ELVAS	HAWK	332	2070	N	N	Y	Y	Y	N
SLS00864	Marysville Blvd	Roanoke	HAWK	332	2070	Y	N	Y	Y	N	
SLS00865	Del Paso Blvd	Plaza Ave	HAWK	332	2070	Y	N	Y	Y	N	
SLS00866	El Camino Ave	Empress St	HAWK	332	2070	Y	N	Y	Y	N	
SLS00867	ARDEN WAY	EMPRESS St	HAWK	332	2070	Y	N	Y	Y	N	
SLS00868	Broadway	1st Ave	HAWK	332	2070	Y	N	Y	Y	N	
SLS00869	Broadway	39TH ST	HAWK	332	2070	Y	N	Y	Y	N	
SLS00870	Broadway	SANTA CRUZ WAY	HAWK	332	2070	Y	N	Y	Y	N	
SLS00871	Broadway	43RD ST	HAWK	332	2070	Y	N	Y	Y	N	
SLS00872	FRANKLIN BLVD	ATLAS AVE	HAWK	332	2070	N	N	Y	Y	N	
SLS00873	Del Paso Road	Natomas Canal	HAWK	333		Y	N	Y	Y	N	
SLS00999						Y	N	Y	Y	N	