



**CITY OF ELK GROVE
CITY COUNCIL STAFF REPORT**

AGENDA TITLE: Receive the Traffic Congestion Management Plan (TCMP) (CEQA Exempt)

MEETING DATE: April 10, 2019

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RECOMMENDED ACTION:

Staff recommends the City Council receive the Traffic Congestion Management Plan.

BACKGROUND INFORMATION:

The Traffic Congestion Management Plan (TCMP) provides the City of Elk Grove with strategies to meet its goals of improving safety, efficiency and reliability of the transportation network for all modes of transportation. Building upon past and current efforts, the projects and initiatives identified in the TCMP introduce trackable milestones utilized to measure progress towards the City's traffic management goals. The TCMP will evolve as milestones are met, technology changes, and additional needs are identified.

ANALYSIS / DISCUSSION:

Travel demand continues to rise in the City of Elk Grove as the population increases and its economy grows. Traffic congestion occurs when the travel demand exceeds the capacity of the transportation network. The traffic analysis performed for the City's recent General Plan update identifies current and future traffic demand on the City's road network. The traffic analysis shows that under future buildout conditions, traffic congestion in the City will increase. Furthermore, the buildout conditions

assume that all development has occurred pursuant to the General Plan zoning criteria and that all roadways in the City are widened to their ultimate number of travel lanes. This means that under the current General Plan, the future roadway network sizing will be insufficient and travel delays will exceed the City's targeted congestion thresholds. In other words, the City will not be able to simply build its way out of the forecasted congestion issues. As such, additional measures are required to improve the efficiency of the transportation network in order to reduce congestion.

These additional measures come in the form of improved management of the traffic operation system, such as optimizing traffic signal timing and coordination, upgrading traffic signal equipment, collecting better travel pattern data to inform adjustments to the system, and implementing additional traffic monitoring equipment such as cameras and Bluetooth monitors to more readily identify issues causing congestion and addressing those issues quickly.

The objective of the City's TCMP is to support the City's General Plan by better managing congestion (e.g. reduce delays, reduce the number of stops, etc.), and improving safety in a variety of ways ranging from widening roads and increasing capacity to more efficient traffic system management through the use of innovation and technology. This will maximize efficiency, reliability, and sustainability of the road network for all users while reducing impacts on the environment.

ALTERNATIVE ACTIONS:

Rather than continue to include the above-discussed measures in the TCMP, going forward, the City Council could choose to direct staff to record these planned efforts into other documents as appropriate. For example, projects identified in the Roadway Improvements section of the TCMP and many of the Intelligent Transportation Systems initiatives, such as fiber optic expansion and traffic signal coordination, are already identified in the city's Capital Improvement Program and ITS Master Plan respectively. Staff does not support this alternative, as the TCMP consolidates the traffic congestion management program elements into a single reference document, making the program's goals, efforts and implementation easily accessible to the public and other interested parties.

ENVIRONMENTAL REVIEW:

The California Environmental Quality Act (Section 21000, et. seq. of the California Public Resources Code, hereafter CEQA) requires analysis of agency approvals of discretionary “projects.” A “project,” under CEQA, is defined as “the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment.”

The recommended action of receiving the Traffic Congestion Management Plan is not considered a project under CEQA and is therefore not subject to environmental review. Future actions implemented as part of the Traffic Congestion Management Plan may be considered a project under CEQA and should be analyzed if applicable.

FISCAL IMPACT:

Projects and initiatives identified in the TCMP are subject to the availability of funds. The TCMP includes several projects that are identified in the City’s current approved FY2018-2019 Capital Improvement Program and FY18-19 Budget. It also identifies several projects and needs that are not currently funded. As these items become ready for implementation they will be recommended for inclusion in future Public Works budget requests and/or the Capital Improvement Program.

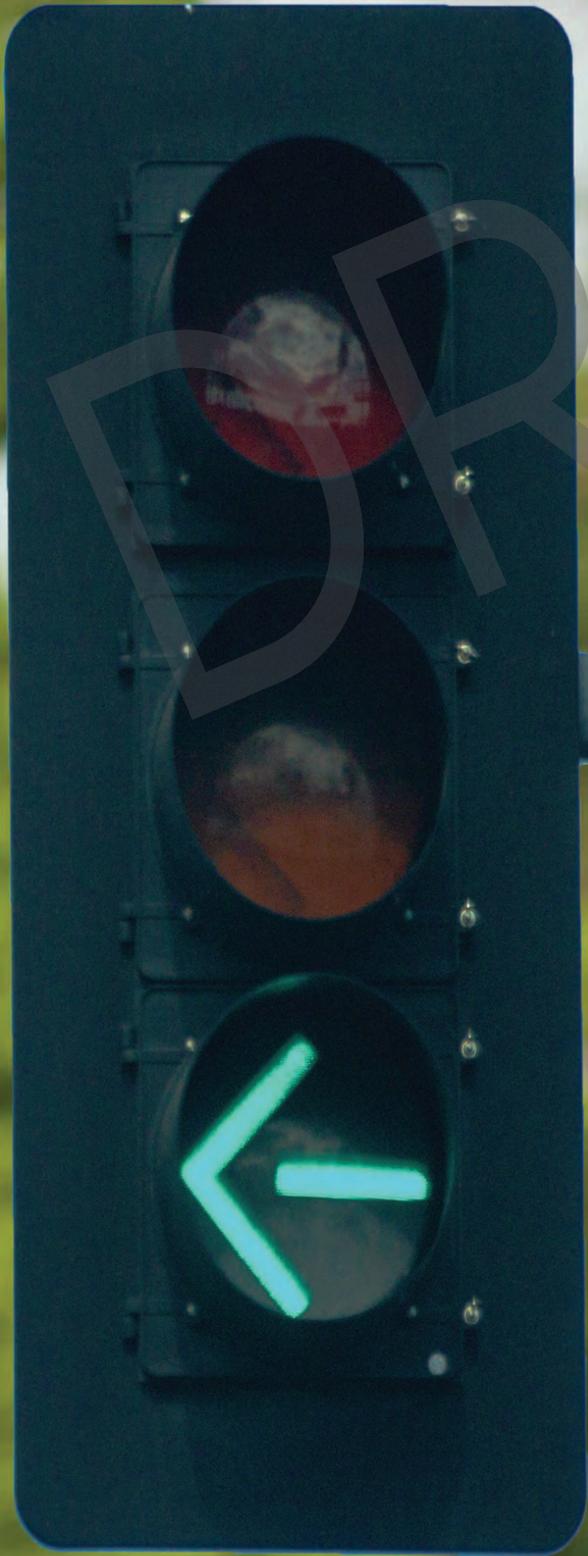
ATTACHMENT:

1. Traffic Congestion Management Plan (TCMP)

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TRAFFIC
CONGESTION
MANAGEMENT
PLAN 2019



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THE NEED FOR CONGESTION MANAGEMENT

Travel demand continues to rise in the City of Elk Grove as the population increases and its economy grows. Traffic congestion occurs when the travel demand exceeds the capacity of the transportation network. Each area of the City has different factors that contribute to traffic congestion. Roads in one area may be affected by issues related to parking, stopping or construction work zones; others by infrastructure bottlenecks that decrease road capacity; and still others by traffic signals that could be better coordinated with existing traffic flow. Traffic in all parts of the city can be affected by poor weather conditions, special events, collisions and other unexpected traffic incidents.

The objective of the Traffic Congestion Management Plan (TCMP) is to support the City's General Plan by better managing congestion (e.g. reduce delays, reduce the number of stops, etc.) and improving safety through innovation and technology. This maximizes efficiency, reliability and sustainability of the road network for all users while reducing impacts on the environment.

DEFINING CONGESTION

In the 2018/19 General Plan Update, the City has established performance targets for determining what areas are congested. These performance targets are expressed as either vehicle delay at intersections or average daily traffic volumes on road segments. Vehicle delay is a measure of the average time a vehicle is stopped at an intersection during the AM or PM peak hours of travel (commute periods). In order for a traffic signal to be considered congested the vehicle delay at the signal during the peak hour(s) must be greater than 55 seconds. For road segments, average daily traffic volumes are compared against the number of travel lanes and the speed limit in order to determine if the segment is congested. A given road segment is considered congested if the average daily traffic volume exceeds the performance target.

Tables 6-3 and 6-4 of the Draft General Plan outline the performance targets used to evaluate if intersections or roads are congested, and are included in Appendix A of the TCMP. Appendix B of the TCMP includes figures showing the level of congestion for intersections and road segments in the City. These figures were developed as part of the 2018/19 General Plan update. The data used to create the figures comes from the SACOG Regional Model and is based on traffic volume data collected from 2014 through 2016. Based on this data, the following locations within the City of Elk Grove currently experience congestion¹:

- A. The intersection of Laguna and Franklin Boulevards (AM and PM peak hour)
- B. The intersection of Bond Road and Elk Grove-Florin Road (AM and PM peak hour)
- C. The intersection of Big Horn Boulevard and Bruceville Road (PM peak hour only)
- D. The segment of Elk Grove-Florin Road from Elk Grove Blvd. to E. Stockton Boulevard
- E. The segment of Grant Line Road from Wilton Road to Sheldon Road

¹As part of the implementation of this TCMP, Public Works is developing a traffic count program to collect and maintain traffic volume and turning movement data. This will allow for periodic reevaluation of road segments and intersections to determine if facilities have become congested or are approaching congestion levels based on the performance targets.

PRIORITIZING CONGESTION RELIEF IMPROVEMENTS

In addition to the segments and intersections currently experiencing congestion, Public Works will be prioritizing and focusing initial traffic congestion relief efforts on major roadways that provide access throughout the city, to State highways, and to neighboring jurisdictions.

These major roadways include:

- A. Laguna Boulevard from I-5 to Hwy 99
- B. Bond Road from Hwy 99 to Bradshaw Road
- C. Elk Grove Boulevard from I-5 to Grant Line Road
- D. Sheldon Road from Bruceville Road to Bradshaw Road
- E. Grant Line Road from Hwy 99 to Calvine Road
- F. Kammerer Road from I-5 to Hwy 99 (future roadway)
- G. Franklin Boulevard from Whitelock Parkway to the Sacramento City Limit
- H. Bruceville Road from Kammerer Road to the Sacramento City Limit
- I. Big Horn Boulevard from Bilby Road to Bruceville Road
- J. Elk Grove Florin from E. Stockton to Calvine Road
- K. Waterman Road from Grant Line Road to Calvine Road
- L. Bradshaw Road from Grant Line Road to Calvine Road

Further prioritization of individual road segments and or refined corridors may be made based on identified needs. In the 2018 survey, “Traffic in the City”, conducted by the Public Works Department, 109 participants identified 4 road segments as the primary corridors that should receive congestion relief improvements. Each of these segments is included within the major roadways listed above. In order of priority/concern, these road segments are:

- 1. Elk Grove Boulevard from Franklin Boulevard to Elk Grove-Florin Road
- 2. Laguna Boulevard/Bond Road from Franklin Boulevard to Elk Grove-Florin Road
- 3. Bruceville Road from Laguna Boulevard to Sheldon Road
- 4. Elk Grove Boulevard from Elk Grove-Florin Road to Waterman Road (Old Town Area)

Funding for updated traffic signal corridor coordination plans for Elk Grove Boulevard and Laguna Boulevard/Bond Road is included in the FY2019-FY2024 Capital Improvement Program. See the Congestion & Engineering Studies Section of this TCMP for more information on these efforts.

VISION AND GOALS

VISION

The TCMP incorporates the needs of all travelers including pedestrians, cyclists, public transit users, and drivers – as well as goods movement and emergency services. It is important to ensure that the projects identified in the TCMP consistently address the needs of these road users. To accomplish this, the City has developed a Vision Statement and goals for the TCMP.

The overall vision of the TCMP is:

“Improve the safety, efficiency, and reliability of the transportation network for all users”

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GOALS

The Vision of the TCMP is supported by the following goals and measurable objectives:

Goals	Objectives
1 Improve safety of the transportation network	1.1 Reduce the number of traffic collisions 1.2 Reduce collision severity and fatalities
2 Maximize the transportation system efficiency and reliability	2.1 Expand traffic communication network 2.2 Reduce delays 2.3 Reduce travel time 2.4 Reduce vehicle operational costs 2.5 Improve Travel Time Reliability on major corridors
3 Improve ability to adapt to changing traffic conditions	3.1 Reduce duration of traffic incidents and events through improved incident detection, response and clearance times 3.2 Improve the ability to collect and process traffic data to allow for real time adjustments of the transportation system

PROJECTS AND INITIATIVES

The TCMP builds on the successes from previous transportation projects and identifies new capital projects, tools, and the operational support (such as staff and services) needed to maintain these initiatives. The proposed projects and initiatives identified within the Plan will support the Plan's goals and objectives and will emphasize the following specific outcomes:

- A. Documenting and taking advantage of the lessons learned during the execution and deployment of previous transportation related projects.
- B. Taking a more proactive approach to traffic management on arterial roads by keeping the City's Traffic Management Center (TMC) open for more hours during the week.
- C. Applying evolving technology to traffic and congestion management, from wireless communication to advanced sensors to social media.
- D. Providing a "tool kit" from which activities can be chosen and applied to the unique road contexts around the City.
- E. Placing an emphasis on forward-thinking technologies, such as Connected Vehicle readiness and Big Data analysis.
- F. Ensuring existing and new transportation infrastructure is resilient in the event of emergencies such as flooding and power failures.
- G. Strengthening partnerships and information sharing, to improve efficiency and coordination of the City's and region's transportation network.
- H. Ensuring that all new systems and procedures are adequately supported operationally.

This report provides a general overview of the of City of Elk Grove's Congestion Relief Plan. Amongst the many projects completed so far, this report highlights the key accomplishments to-date, and the next steps moving forward.

Public Works has assigned 7 categories for the various projects and initiatives identified within the TCMP. Each category supports one or more of the TCMP's Goals and Objectives as identified below:

Intelligent Transportation Systems

TCMP Goals & Objectives Supported:

2.1, 2.2, 2.3, 2.4, 2.5, 3.1, 3.2

Congestion & Engineering Studies

TCMP Goals & Objectives Supported:

1.1, 1.2, 2.2, 2.3, 2.5, 3.2

Incident & Event Response

TCMP Goals & Objectives Supported:

1.2, 2.2, 2.3, 3.1, 3.2

Support of All Modes of

Transportation

TCMP Goals & Objectives Supported:

2.2, 2.4, 4.2

Traffic Management Center

TCMP Goals & Objectives Supported:

2.1, 2.5, 3.1, 3.2

Roadway Improvements

TCMP Goals & Objectives Supported:

1.1, 1.2, 2.2, 2.3, 3.1

State of Good Repair

TCMP Goals & Objectives Supported:

1.1, 1.2, 2.2, 2.3, 2.5

The above categories complement and intersect with one another, and together produce a comprehensive approach to managing traffic congestion.



FISCAL AND PHYSICAL CONSTRAINTS

Projects and initiatives identified in this TCMP are subject to the availability of funds. Furthermore, the General Plan dictates the ultimate capacity (number of lanes) of the roadways within the City of Elk Grove as well as the surrounding land use designations. Once buildout conditions are reached, Public Works cannot add capacity (lanes) without approved revisions to the General Plan. This may result in the need to accept a certain amount of traffic congestion on roadways that are at capacity. The TCMP identifies strategies and technologies that will help alleviate congestion, but the TCMP should not be interpreted as a guarantee to mitigate all congestion occurring within the City.



INTELLIGENT TRANSPORTATION SYSTEMS

Intelligent Transportation Systems (ITS) use advances in technology to monitor and operate the transportation system. Currently the City of Elk Grove has 149 signalized intersections and pedestrian crossings that are used to control traffic on roadways. ITS improvements made by the City to date allow for communication with and monitoring of traffic signals. These improvements include the incorporation of video detection at 20 intersections, installing traffic monitoring cameras at 41 intersections, upgraded traffic signal controllers at 40 intersections and completion of signal interconnect for all 149 signals. The City has also made efforts to establish a fiber optic communications network to allow for increased signal communication and data processing capabilities resulting in faster response times and better management capabilities.

While the City has made progress in implementing a viable ITS network, several additional improvements must be made in order for the network to operate at maximum efficiency. Also, these systems will require regular maintenance and upgrades. The projects and initiatives identified under this category will continue to strengthen the City's ITS, helping to manage traffic congestion by:

- Improving monitoring capabilities to reduce response times to unexpected traffic incidents (e.g. congestion, collisions)
- Improving coordination of traffic signals with traffic flows
- Increasing the amount and quality of traffic information for improved planning, prioritizing and performance evaluation
- Increasing the efficiency of communication across the City's network of computers and traffic signals
- Maintaining its equipment in a state of good repair to avoid system breakdown

ITS KEY ACCOMPLISHMENTS TO DATE

Established the Traffic Management Center (Tmc)

ITS Phase 1¹ established the initial framework for the TMC with the deployment of a workstation, central traffic signal system, designated staff and traffic signal communication at 21 major intersections. The TMC provides an essential role in monitoring the safety and operations of the City's roadway network.

Upgrading Traffic Signal Cabinets and Controllers

Traffic signal controllers are the brains behind traffic signal operation. Advanced controllers provide data that allows staff in the Traffic Management Center (TMC) to diagnose and correct issues with the traffic signals. These controllers require periodic upgrading and newer, more advanced traffic signal controllers would allow the City to operate a modern traffic signal system with high resolution vehicle detection and data tracking. This would provide TMC staff with the resources to diagnose issues with malfunctioning traffic signals and refine timing and coordination plans accordingly.

Parts of ITS Phases 1, 2, and 4, as well as other City projects, included the replacement of outdated signal cabinets and controllers to provide high resolution data retrieval and vehicle detection at major signalized intersections. These projects resulted in a total of 40 updated controllers with the capability to collect high resolution data.

In Fiscal Year 2018-19 Public Works began a new maintenance program for replacing/upgrading traffic signal controllers. The program is designed to replace all of the City's signal controllers on a regular cycle every ten years. This program results in roughly 15 controllers being replaced every year. The cost to replace a single controller is estimated at \$5,000, resulting in a \$75,000 annual cost, which will be budgeted for annually. Initial efforts will focus on the East-West Corridors providing access to Hwy 99.

Traffic Signal Coordination

Time of day signal coordination plans have been developed for some of the major corridors in the City. This improves operations for commuters, students, and residents by reducing travel times during peak travel demand periods. Corridors with coordination plans include Elk Grove Boulevard (I-5 to Grant Line Road), Laguna Boulevard /Bond Road (I-5 to Grant Line Road), Franklin Boulevard (Elk Grove Boulevard to Big Horn Boulevard), and Bruceville Road (Elk Grove Boulevard to Big Horn Boulevard).

Installed Video Detection at 20 Intersections

As part of ITS Phase 4, twenty traffic signal locations were changed from loop detection to video detection. In addition to providing more accurate detection of bicyclists and motorcycles; video detection allows for the collection of more accurate turning movement count data allowing for fine-tuned traffic signal timing.

Installed Communication Lines Between City Traffic Signals

Various Capital Improvement projects including ITS Phases 1-4 provided connections for all 149 City operated traffic signals to the traffic communication network and the TMC. Communication between signals and the TMC allows staff to monitor all traffic signals in the City, reducing the time needed to respond to malfunctioning signals and traffic incidents.

Installed Additional Traffic Monitoring Cameras at 15 Intersections

Additional traffic monitoring cameras allow city staff to remotely monitor congestion and make signal timing changes to address problems as they are occurring. The total number of intersections with traffic monitoring cameras is now 41.

¹ITS Phase 1, 2, and 3 are also known as ITS Phase 1A, 1B, and 1C respectively.

ITS PROJECTS AND INITIATIVES

Update ITS Master Plan

The City's current ITS Master Plan is dated November 2004. As part of the SACOG Smart Region Plan the City will be receiving a "pull out" plan that will serve as the City of Elk Grove's new ITS Master Plan. However, Public Works may need to identify how to phase the implementation of the projects recommended in the Smart Region/ITS Plan.

The cost for PW staff to identify phasing of improvements would be supported by department operations budgets.

Update to Video Vehicle Detection for All Signals

Video detection offers several benefits compared to loop detection, including better detection of bicyclists and motorcycles, more accurate turning movement count data, the ability to adjust loops during nearby construction activities. Video detection is also less likely to be damaged and need replacement by construction and or utility work performed near the traffic signal. The estimated cost of installing video detection at an intersection is \$40,000 and is similar to the estimated cost to replace all of the traffic loops at an existing intersection. Currently 127 traffic signals do not have video detection and it will cost \$5.1 Million to upgrade the detection.

Implementation of this program will take several years to complete and will be phased and funded by a variety of means including:

- New construction: as new traffic signals are constructed video detection will be incorporated into the project instead of traffic loops.
- In conjunction with maintenance and CIP projects.
- Dedicated video detection installation projects funded through grants, if available.

Expand Traffic Communication Network and Increase Bandwidth

Currently the traffic communication network consists primarily of copper connections, with some fiber optic. Copper connections provide limited bandwidth, restricting communication with all of the devices currently deployed (especially traffic monitoring cameras). As additional equipment is installed, including connected vehicle devices, the bandwidth needs on the communication network will increase significantly.

The City has installed approximately 38,000 feet of fiber optic lines with data connections between City Hall and the Corporation Yard and the Civic Center. This fiber is connected to the traffic network through a main hub at the intersection of Bond Road and East Stockton Boulevard, but only 4 signals are directly connected to the fiber optic network. SACOG has awarded a grant to the City that will add a series of "mini hubs" enabling the connection of additional traffic signals and other traffic control devices (i.e. traffic cameras) and increasing the overall bandwidth available. This will serve as the first phase of an initiative to construct a comprehensive fiber optic network.

The cost for the first phase funded by the SACOG grant is estimated at \$830,000. The cost for the buildout of the fiber optic network is unknown at this time, but is estimated to exceed \$15M. Implementation of 5G wireless or some other form of wireless mesh network may reduce or eliminate the need to build out a fiber optic network. These options can be evaluated as these technologies become available.

Install Additional Traffic Monitoring Cameras

Additional traffic monitoring cameras will allow city staff to remotely monitor congestion from the TMC and make signal timing changes to address problems as they are occurring. Purchasing and installing additional cameras cost \$15,000 per intersection. Currently there are not cameras at 108 signalized intersections or the two roundabouts along Sheldon Road. Installing traffic monitoring cameras at all of these locations would cost \$1.65 million. This cost does not include the cost for increasing the communication bandwidth, which would also be necessary in order to receive the high resolution video.

Prior to additional cameras being installed the traffic network should be upgraded to assure adequate bandwidth is available to operate these cameras. Thus, installing the additional cameras should wait until the bandwidth is available.

Implement Pilot Program for Remote Traffic Monitoring Tools to Monitor Traffic Flow

Public Works currently conducts manual travel time studies to determine travel times through road corridors, to verify that signal coordination is working correctly, and identify intersections that need to have their signal timing adjusted. This is labor intensive and results in limited sample sizes due to the limited number of studies that can be implemented in a given year. Automating this process using remote traffic monitoring tools to collect real time data from vehicles on the road would be a more cost effective solution and provide real time data that is more detailed and accurate. New devices such as Bluetooth readers can collect data for longer periods of time and provide origin/destination data to help identify corridor needs and future capital improvements. These devices could be controlled and monitored from the TMC.

PW traffic engineering staff is currently working with vendors to establish a pilot program for evaluating the benefits of installing Bluetooth readers. The study corridor for the pilot program will be Laguna Boulevard from I-5 to Hwy 99. The costs of the hardware range from \$8,000 to \$15,000 per intersection and typically include a cloud based computing system with per site (intersection) licensing for the monitoring service, which will need to be renewed every 3-5 years. This project is being recommended for inclusion in the 2019-2024 Capital Improvement Program to install antennas at 5 locations and is estimated to cost \$120,000 to design, implement, and test. The ongoing costs will need to be budgeted in future Public Works operations budgets.

Implement Pilot Project For Permissive Left-Turn Phasing

Permissive left-turns (allowing left-turning traffic to yield to oncoming traffic at signalized intersections) could help reduce overall delays at signalized intersections by eliminating an unnecessary phase. The majority of the intersections in the city do not allow permissive left turns. The first step would be to initiate a pilot project to incorporate permissive left-turns and utilize flashing yellow arrows to indicate that the movement is allowed.

Implementation of this initiative would also require a public outreach and education campaign. Costs for this effort are currently being developed for consideration in the 2019-2024 Capital Improvement Program.



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CONGESTION AND ENGINEERING STUDIES

The focus of this strategy is to keep the City of Elk Grove's signal timing plans current and its traffic management strategies up-to-date. Recommended projects and activities under this category will help manage traffic congestion by:

- Improving the ability of TMC operators to respond effectively to changing traffic conditions with pre-prepared plans;
- Maintaining coordination as new traffic signals and new operational features are added to the network;
- Identifying practical solutions to key roadway corridor congestion and safety concerns, through advanced technologies/systems or applying current solutions in innovative ways; and
- Exploring integrated approaches that look at multiple traffic corridors as one system, thus optimizing flow across all corridors.

CONGESTION AND ENGINEERING STUDIES ACCOMPLISHMENTS TO DATE

Review Traffic Signal Timing Plans on a Regular Basis

Staff reviews all traffic signal timing plans in the City periodically in accordance with the guidelines set forth in the California Manual on Uniform Traffic Control Devices (CAMUTCD).

Conduct Travel Times Studies

Every 3-4 months Public Works Staff conduct travel time studies along the Laguna/Bond and Elk Grove Boulevard corridors to review the traffic signal coordination and make adjustments as necessary.

Increased Traffic Engineering Resources

In 2019 Public Works established professional service contracts with 5 traffic engineering firms in order to keep up with the City's growing traffic management and engineering needs and to implement the TCMP. These firms augment City staff and allow Public Works to better respond to fluctuating work flow demands and bring new ideas to the table to help with addressing the City's transportation needs.

CONGESTION AND ENGINEERING STUDIES PROJECTS AND INITIATIVES

Update Coordination Plans

The coordination plans used for the City's major arterials were created in 2008. There is a need to develop new timing plans based on current traffic volumes. This will include evaluating current conditions and implementing changes to the current signal phasing and coordination plans. This will also include creating additional time of day coordination plans for mornings, afternoons, nights, and weekends as needed.

The 2018-2023 Capital Improvement Program funds coordination efforts in 2 phases:

- WTR050 - Funded in the 2018/19 Fiscal Year, this project will provide coordination improvements for Elk Grove Blvd and Laguna Blvd./Bond Rd. from Bruceville Road to Elk Grove-Florin Road.
- WTR051 - Funded in the 2020/21 Fiscal Year, this project will provide coordination improvements for Elk Grove Blvd and Laguna Blvd./Bond Rd. from I-5 to Bruceville Road

Contract for Regular Traffic Volume Data Collection

Regular traffic volume collection will help the City identify congested areas and better allocate resources to addressing these locations. Staff has identified 61 locations that would be counted on a three year rotating basis and 150 locations that will be counted on a 5 year basis, as well as 15-20 intersections turning movement counts to be done annually. This data will allow for the monitoring of traffic volumes over longer periods of times and help identify and prioritize future CIP projects.

In FY19/20, Public Works intends to solicit proposals for a contract with a qualified firm to collect this data.

Connected Vehicles and Autonomous Vehicles

Industry reviews suggest that the introduction of "connected" and "autonomous" vehicles will improve safety and mobility on urban streets, and that these vehicles may be widely available for purchase within 10 years. In anticipation, Public Works has been actively monitoring the developments of regulations and standards to make sure that we are ready to accommodate these vehicles. Development of an autonomous and connected vehicle readiness plan will be completed in 2019. The cost of developing the plan is \$48,000 and is funded through the Public Works department operations budget.



INCIDENT AND EVENT RESPONSE

The projects and initiatives under this category focus on reducing the duration of incidents and minimizing congestion that can result. Each is designed to strengthen management and response to traffic incidents caused by vehicle collisions as well as road closures due to events and or road construction. Recommended projects and activities under this strategy will help manage traffic congestion by:

- Strengthening relationships among key agencies - e.g., Traffic Management Center, emergency services, towing industry, road maintenance, etc.- to improve coordination, reduce response and clearance times and improve safety of field personnel.
- Educating motorists to move their vehicles out of the flow of traffic after minor collisions.
- Improving the coordination and management of construction work zones across the City;
- Improving information available to travelers about traffic conditions and detours associated with work zones;
- Improving information available to TMC operators for use in monitoring contractor activities and adjusting signal timing plans accordingly; and
- Encouraging contractors to participate as much as possible in minimizing the impact of work zones on traffic.

INCIDENT AND EVENT RESPONSE ACCOMPLISHMENTS TO DATE

Incident Response

During normal business hours the TMC staff monitors the traffic network and adjusts signal timing as needed to alleviate traffic congestion during incidents and events.

Traffic signal timing can be modified for events that are occurring outside of normal business hours based on anticipated needs.

Encroachment Permits

The City requires all contractors performing work within the public right of way (encroachment) to obtain an encroachment permit. The encroachment permit application requires submittal of traffic control plans detailing how the contractor will handle traffic impacts during the work. Public Works staff reviews the traffic control plans to ensure they are safe and efficient and disrupt traffic as little as possible.

Coordinating Appropriate Working Hours with Inspectors to Reduce Impact to Traffic Flow During Peak Hour

Currently, staff evaluates traffic control plans for construction activities in and near the roadways. This includes evaluating specific plans to minimize the impact to the traveling public as well as assuring coordination between projects in the same area.

Holiday Season Road Closure Moratorium

Annually, from Thanksgiving to the end of the calendar year, the City places a moratorium on construction related lane or road closures along major arterial roads and near commercial district concentrations.

Traffic Alerts

Public Works coordinates with other City departments including Police and Public Affairs in order to alert motorists of road closures and major traffic incidents. Traffic Alerts are issued to the public through the Public Affairs office via the City's website and social media accounts. Public Works issues additional road closure notifications to other agencies and emergency service providers such as Elk Grove Unified School District, Cosumnes Community Services District (Parks and Fire), and local utilities.

INCIDENT AND EVENT RESPONSE PROJECTS AND INITIATIVES

Inclusion in Regional 511

SACOG has implemented a regional 511 traffic information system. This program could be used both as a tool to provide driver alerts regarding traffic incidents and allow for local agency information sharing relating to road closures and detours. In order for this type of program to be effective information needs to be added to it by the local agencies. Integrating this task with the other TMC duties would streamline this process. Traffic information is relayed to drivers through third party phone apps such as Waze, Google Maps, Sac 511, or by calling 511 and listening to the recording.

Develop a Comprehensive Road Closure Policy

Due to increased traffic, the City's procedures for issuing road closure permits needs to be evaluated. The Road Closure Policy will identify major intersections and roadway segments where road closures during standard permitted hours would cause a significant negative impact on traffic operations. Appropriate alternative road closure hours will be assigned for these facilities.



SUPPORT OF ALL MODES OF TRANSPORTATION

Encouraging people to use modes other than their private vehicles – such as walking, cycling or public transit – is an important traffic management strategy as it reduces the number of vehicle trips. The City of Elk Grove is already actively promoting all modes of transportation through its General Plan and other initiatives such as the Bicycle, Pedestrian and Trails Master Plan. Projects and initiatives under this category support those efforts and help manage traffic congestion by:

- Improving the effectiveness and coordination of traffic management activities involving public transit vehicles and active transportation modes; and
- Exploring the most creative and effective use of typical street design standards and traffic engineering techniques to provide a more balanced use of the road right-of-way

SUPPORT OF ALL MODES OF TRANSPORTATION ACCOMPLISHMENTS TO DATE

Evaluate Traffic Signal Timings for All Modes

The City is completing a comprehensive update of the traffic signal timing plans to assure that adequate time is provided for both pedestrians and cyclists.

Bicycle, Pedestrian, and Trails Master Plan

The City actively incorporates bicycle and pedestrian facilities into roadway projects. In addition, bicycle and pedestrian specific projects are constructed yearly as funding is made available.

Completed Trails Projects

The city has completed several major trail projects over the past 5-years, including:

- Elk Grove Creek Trail Crossing at State Route 99
- Laguna Springs/Gateway Corporate Center Area Trail
- Gilliam Drive Trail Connector
- Laguna Creek Trail - Camden South Spur
- Laguna Creek Trail - Camden North Spur
- Laguna Creek Open Space Preserve Trail

SUPPORT OF ALL MODES OF TRANSPORTATION PROJECTS AND INITIATIVES

Develop a Bus Rapid Transit Plan

The City is in the process of developing a feasibility study for a Bus Rapid Transit route that would run primarily on Big Horn Boulevard and would connect Consumes River College to the City of Elk Grove, including the Civic Center.

Bicycle detection

Identify outdated or non-operational bicycle detection and incorporate replacement project into the City's CIP. The project will encourage the use of bicycle facilities by providing safe movements through signalized intersections.

Pedestrian detection

Evaluate existing pedestrian detection at signalized intersections and locations identified in the ADA transition plan and create a project for consideration as part of the future CIP. The project will encourage the use of the pedestrian transportation network by increasing safety and efficiency for pedestrians at signalized intersections.

Projects in Development

There are several trail projects that are currently in the planning phases and are expected to be completed over the next 5 years including:

- Laguna Creek Trail and Bruceville Road SRTS Improvements
- Laguna Creek Trail - Camden Lake to East Stockton Blvd/State Route 99
- Whitehouse Creek Trail Connection
- Elk Grove Creek Trail Gap Closure (Laguna Springs to Oneto Park)
- Strawberry Creek Trail - Monterey Trail HS to Jones Park
- Elk Grove Creek Trail - Emerald Vista to Elk Grove-Florin
- Laguna Creek Trail - Crossing at State Route 99



TRAFFIC MANAGEMENT CENTER

The Traffic Management Center (TMC) is the City's nerve center for traffic and congestion management. The TMC allows Public Works staff to remotely monitor traffic conditions and coordinate traffic control devices and field operations. Activities under this category focus on ensuring the TMC is equipped with the necessary staff, equipment, and technology to effectively support the City's traffic management needs. This would reduce traffic congestion by:

- Improving incident detection and monitoring of the transportation network, allowing TMC operators to respond to changes in traffic conditions more rapidly; and
- Strengthening a regional approach to traffic and congestion management resulting from incidents in other jurisdictions and vice versa.

TRAFFIC MANAGEMENT CENTER ACCOMPLISHMENTS TO DATE

Relocated the Traffic Management Center (TMC) to City Hall

The City relocated the TMC to City Hall and updated the video wall, workstations, and all related supporting software and technology. By having traffic engineering staff located in the same building as the City Traffic Engineer, along with updated workstations, the city can better manage the traffic signals in the network and respond to congestion issues.

Cross Training of Existing Staff

With the TMC being relocated to City Hall there was an opportunity to train two additional employees to assist with the operation of the TMC. This has allowed for more coverage in the TMC.

TRAFFIC MANAGEMENT CENTER PROJECTS AND INITIATIVES

Develop a Procedures Manual

With additional staff able to work in the TMC there is a need to formalize policies and procedures relating to the operation of the network and reporting of issues that occur. These policies will be prepared by July of 2019.

Staffing Plan for Expanded TMC Monitoring

Currently the TMC is staffed during normal business hours (8:00 am to 5:00PM Monday through Friday) with limited coverage during the morning and evening commute periods (rush hour). Calls and issues that are reported after hours are being forwarded to Police Dispatch in the case of an emergency or dealt with the next business day.

Staff recommends expanding the operation hours of the TMC from 7:00 AM to 6:00 PM Monday through Friday to provide increased level of service and coverage during the morning and evening rush hour. This would result in the need for an additional 20 hours of consultant staff time per week. Funding for this additional time will be requested as part of the FY 2019-2020 budget process.

As the City continues to grow and traffic patterns change, Public Works will consider additional staffing changes based on specific traffic condition demands. This may include increased TMC coverage on weekdays or adding weekend and or holiday coverage.

Incorporate Automated Traffic Signal Performance Measures (ATSPM)

One of the benefits of the high resolution data that can be collected by modern traffic signal controllers is the ability to implement Automated Traffic Signal Performance Measures (ATSPM). These measures are tools that allow for the proactive evaluation of traffic signal performance to help TMC staff identify problems and implement solutions in real time. As controllers are upgraded they will have the ability to provide the data that is necessary to implement ATSPM. Public Works intends to begin implementation of a pilot program to study the benefits of ATSPM for Elk Grove in the 19-20 fiscal year.

The costs to implement the ATSPM is unknown at this time.



PROJECT

ROADWAY IMPROVEMENTS

As the City continues to grow, additional roads and access routes will be needed to connect new developments to the City's transportation network and alleviate traffic impacts on existing corridors. Projects and initiatives under this category focus on programming and constructing roadway improvements that will reduce congestion by:

- Improving access to the transportation network both within the City and regionally.
- Creating alternative routes that reduce traffic impacts on existing corridors.
- Creating alternative routes that allow for better incident management.
- Adding multi-modal facilities that improve user choice when selecting a mode of travel.
- Adding capacity to existing corridors where needed.
- Implementing alternative road and intersection configurations such as complete streets and roundabouts.

COMPLETED PROJECTS

New Growth Area (NGA) Roads (Year Opened: 2019)

Two new roads were constructed within the South East Policy Area (SEPA), also known as the New Growth Area. These critical road segments include:

- Big Horn Boulevard from Whitelock Parkway to Bilby Road
- Bilby Road from Bruceville Road to Big Horn Boulevard

This provides additional connections to the South East Policy Area. It also provides an alternative north south corridor between Whitelock Parkway and Bilby Road that could reduce traffic on Bruceville Road and Whitelock Parkway.

Waterman Road Reconstruction (Year Opened: 2018)

Waterman from Bond to Sheldon was reconstructed and bike lanes were added.

Bradshaw Road and Sheldon Road Roundabout (Year Opened: 2018)

The installation of a roundabout at this intersection has reduced queuing and delays from the previous all way stop controls at the intersection.

Waterman Road and Sheldon Road Roundabout (Year Opened: 2016)

The installation of a roundabout at this intersection has reduced queuing and delays from the previous all way stop controls at the intersection.

Bond Road and Bader Road Intersection Improvements (Year Opened: 2016)

The Project replaced an all way stop with a traffic signal at this rural intersection.

Grant Line Road Widening Phase 1 – E Stockton Blvd. to Waterman Rd. (Year Opened: 2016)

Grant Line Rd was widened from 2 to 4 lanes and a bridge was constructed to create a grade separated over-crossing of the Union Pacific Railroad.

Elk Grove Blvd/Hwy 99 Interchange Modifications (Year Opened: 2015)

The interchange was modified to relocate the northbound on-ramp to E. Stockton Boulevard eliminating a signalized left turn on Elk Grove Boulevard

Sheldon Road at Hwy 99 Interchange Reconstruction (Year Opened: 2010)

The existing 2-lane overpass, which was built in the 1950s, was widened to a six lane bridge. The on/off ramps were also reconstructed, including the realignment and widening of the intersection of Sheldon Road and E Stockton Boulevard.

Grant Line Road at Hwy 99 Interchange Reconstruction (Year Opened: 2008)

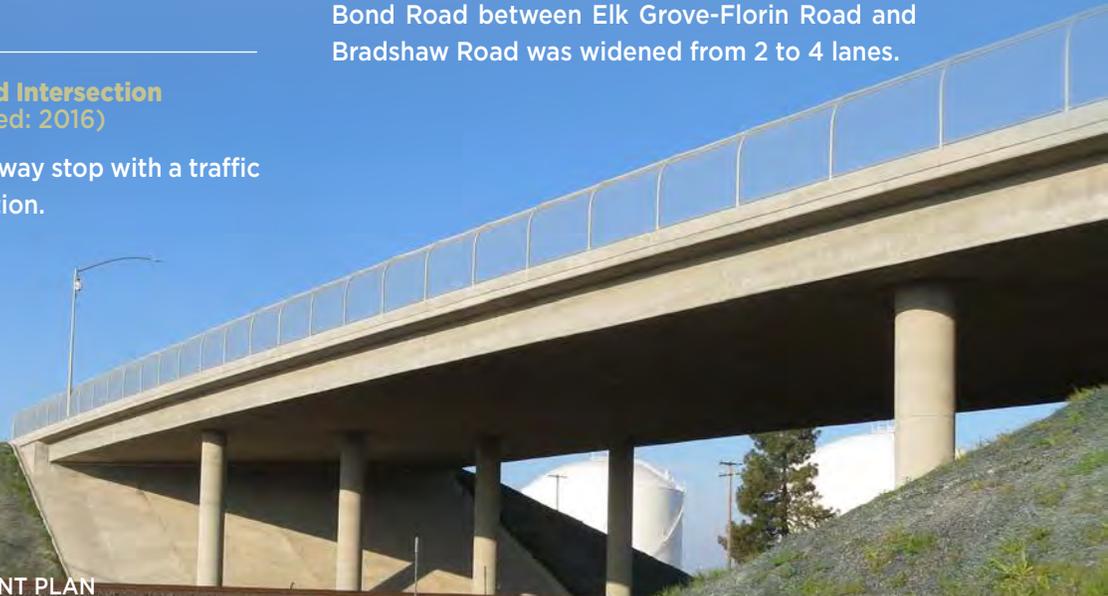
The Grant Line Road bridge overpass was widened to a six lane road and the hook ramps were replaced with a partial cloverleaf with the freeway off-ramps being signalized.

Sheldon Road Widening (Year Opened: 2007)

Sheldon Road between Bruceville Road and Elk Grove-Florin Road was widened from 2 to 4 lanes.

Bond Road Widening (Year Opened: 2006)

Bond Road between Elk Grove-Florin Road and Bradshaw Road was widened from 2 to 4 lanes.



FUTURE PROJECTS

Kammerer Road Extension

This project will ultimately create a 4 lane expressway connecting I5 at the Hood/Franklin Interchange to Grant Line Road at the Hwy 99 interchange. This road will provide additional access for Elk Grove Residents to the larger region and is part of the larger South East Connector Project providing access from I5 to Folsom.

Due to funding constraints the project will be constructed in phases with the first phase being completion of a two lane roadway from Lent Ranch Road to Big Horn Blvd. Public Works staff is working on securing construction funding for the remaining phases.

Grant Line Road Widening Phase 2 - Waterman Road to Bradshaw Road)

This project will widen Grant Line Road to 4 lanes from Waterman Road to Bradshaw Road and install traffic signals at the intersections of Grant Line Road with Mosher Road and Bradshaw Road. Once completed this project will provide enhanced access at the signalized intersections and reduce congestion along this section of the corridor.

This project is currently being designed and construction is scheduled to begin in 2020.

Hwy 99 Auxiliary Lanes

Currently an auxiliary lane exists in the southbound direction between the Sheldon on ramp and Laguna/Bond off ramp. The proposed project will install auxiliary lanes between each of the 5 interchanges on Hwy 99 between Grant Line Road and Calvine Road in both the south and north bound directions.

Caltrans is the leading agency for this project. The project is currently unfunded.

Whitelock Parkway at Hwy 99 Interchange

This project will construct an interchange along Hwy 99 at Whitelock Parkway, creating an additional point of freeway access for the city. The project is currently funded for environmental and design only.

I-5 High Occupancy Vehicle (HOV) Lanes

This project will install HOV or carpool lanes on I5 from Elk Grove Boulevard north to Hwy 50. It will also reconstruct a portion of the freeway from Laguna Boulevard to the American River.

Caltrans is the lead agency for the project. The project is funded and construction is scheduled to begin in 2019.

Old Town Area Street Scope Phase 2

The proposed Project would create streetscape and infrastructure improvements to an approximately 2,400 foot segment of Elk Grove Boulevard between School Street on the West and Waterman Road to the east. The project is funded and construction is scheduled to begin in 2021.

Grant Line Operational Improvement (Bond to Sheldon Road) - Phase 1

This project will evaluate and implement intersection modifications along Grant Line Road through Sheldon. This project will be partially funded through impact fees and Staff is pursuing grant funding for the remainder.

Bruceville from Laguna Boulevard to the Sacramento City Limit.

This project will widen the road to 6 lanes. It is being partially constructed by development.

Lotz Parkway Extension

This project would extend Lotz Parkway from Whitelock Parkway to Kammerer Road. It is being partially constructed by private development.

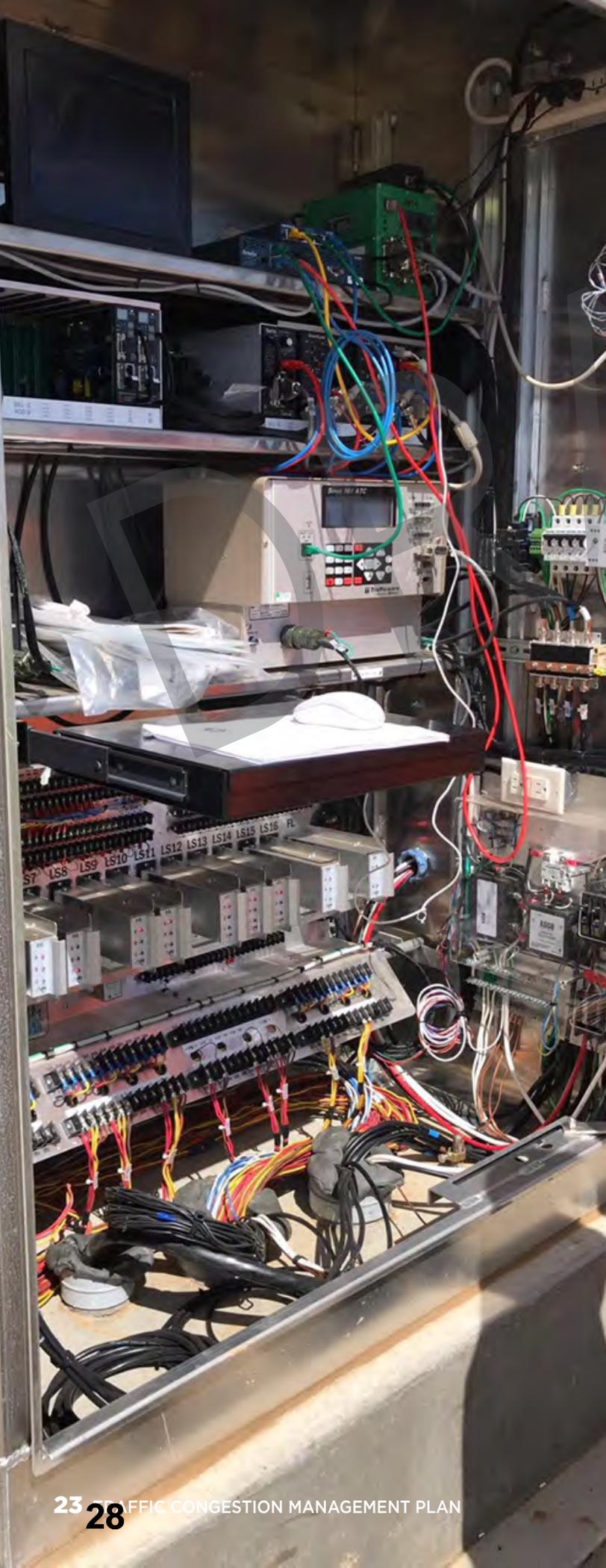
Big Horn Boulevard Extension

This project would extend Big Horn Boulevard from Bilby road to Kammerer Road. It will be partially constructed by private development.

Bilby Road Extension

This project would extend Bilby Road from Big Horn Boulevard to Promenade Parkway. It is being partially constructed by private development.





STATE OF GOOD REPAIR

As part of the City's day-to-day work, repairs and maintenance of road surfaces, signs, pavement markings and traffic systems are completed to provide a safe and reliable travel environment for Elk Grove. These maintenance efforts assist by removing sources of congestion and improving safety, and reliability of the transportation system, thereby supporting several of the TCMP goals and objectives.

STATE OF GOOD REPAIR KEY ACCOMPLISHMENTS TO DATE

Replace Traffic Signal Cabinets

20 intersections were outfitted with new controllers and cabinets as part of ITS Phase 4. This provides improved operation of traffic signals, traffic monitoring cameras and vehicle detection. Seven cabinets still need to be replaced.

Traffic Signal Battery Backup Maintenance Program

All of the traffic signals in the City have battery backup systems in place that require periodic maintenance and replacement of the batteries in order to assure their operation when they are needed. Currently batteries are checked as part of recurring preventative maintenance of the traffic signal. Typically the batteries have an operational life of 5-7 years and require replacement at the end of that life. Currently Operations and Maintenance (O&M) staff replaces the batteries over a 5 year cycle.

Traffic Sign Program

The City is estimated to have nearly 20,000 regulatory, warning, guide and directional signs. The sign material typically has a useful life of 10-12 years. Currently O&M staff replaces critical regulatory and warning signs over a 10 year cycle. Programmed sign replacements reduce liability and improve the safety of drivers and pedestrians.

Markings and Long Line Striping

Many streets within the City have roadway markings and/or long line striping. Regular maintenance is needed to ensure that the markings and striping are visible. Currently the markings and striping are maintained through inspections and received complaints.

Upgrading Traffic Signals Cabinets and Controllers

Traffic signal controllers are the brains behind traffic signal operation. Advanced controllers provide data that allows staff in the Traffic Management Center (TMC) to diagnose and correct issues with the traffic signals. These controllers require periodic upgrading and newer, more advanced traffic signal controllers would allow the City to operate a modern traffic signal system with high resolution vehicle detection and data tracking. This would provide TMC staff with the resources to diagnose issues with malfunctioning traffic signals and refine timing and coordination plans accordingly.

Parts of ITS Phases 1, 2, and 4, as well as other City projects, included the replacement of outdated signal cabinets and controllers to provide high resolution data retrieval and vehicle detection at major signalized intersections. These projects resulted in a total of 40 updated controllers with the capability to collect high resolution data. Currently there are 112 controllers that need to be upgraded at a cost of \$5000 each. The total cost to upgrade the controllers is \$560,000.

In Fiscal Year 2018-19 Public Works began a new maintenance program for replacing/upgrading traffic signal controllers. The program is designed to replace all of the City's signal controllers on a regular cycle every ten years. This program results in roughly 15 controllers being replaced every year. The cost to replace a single controller is estimated at \$5,000, resulting in a \$75,000 annual cost, which will be budgeted for annually.

Annual Pavement Management Program

The City is responsible for the maintenance of nearly 1,150 lane miles of road. Each year, preventive maintenance treatments and repairs are performed on various City streets. These projects extend the life of the pavement and reduce future costs by avoiding more costly rehabilitation or replacement projects.

A map showing current pavement condition and scheduled projects for the next 5 years can be found online on the Public Works Website.

STATE OF GOOD REPAIR PROJECTS AND INITIATIVES

Development of Programmed Maintenance Plans

Staff is working on the development of programmed maintenance plans for City assets. Programmed maintenance limits downtime, reduces liability, and associated costs.

Computerized Maintenance Management System (CMMS)

O&M staff is currently in the process of upgrading its work order system with a system capable of improving efficiencies, reducing costs, and implementing programmed maintenance. The benefit of programmed maintenance is predictive maintenance, which maintains, repairs, and/or replaces assets or equipment prior to failure. The CMMS will improve the maintenance of critical assets ensuring that equipment remains in operation with limited interruption creating a more reliable transportation system.



CONCLUSION

The Traffic Congestion Management Plan provides the City of Elk Grove with strategies to meet its goals of improving safety, efficiency and reliability of the transportation network for all modes of transportation. Building upon the extensive accomplishments to date, the projects and initiatives identified in the TCMP introduce trackable milestones utilized to measure progress towards the City's goals. The TCMP will evolve as milestones are met, technology changes, and additional initiative needs are identified.

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APPENDIX A

TABLE 6-3: VEHICULAR DESIGN CONSIDERATIONS: INTERSECTION PERFORMANCE TARGETS

Intersection Control	Intersection Control (Delay in Seconds)
Stop (Side-Street & All-Way)	< 35.1
Signal	< 55.1
Roundabout	< 35.1

TABLE 6-4: VEHICULAR DESIGN CONSIDERATIONS: SEGMENT PERFORMANCE TARGETS

Facility Type	Number of Lanes	Median	Speed (MPH)	Average Daily Traffic Design Target (Number of Vehicles)
Arterial or Arterial/Collector	2	No	25	13,600
			30	14,600
			35	15,700
			40	16,600
			45	17,700
		55	18,600	
		Yes	25	14,300
			30	15,600
			35	16,500
			40	17,500
	45		18,600	
	4	No	30	29,800
			35	31,600
			40	33,500
			45	35,300
		Yes	30	31,400
			35	33,300
			40	35,300
			45	37,200
	5	Yes	45	45,600
6	Yes	30	46,400	
		35	48,900	
		40	51,500	
		45	54,000	
7	Yes	45	59,400	
8	Yes	45	64,800	
		55	72,000	
Expressway	4	Yes	55	64,800
	6	Yes	55	97,200
Freeway	4	Yes	55+	74,400
	6	Yes	55+	111,600
	8	Yes	55+	148,800

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APPENDIX B

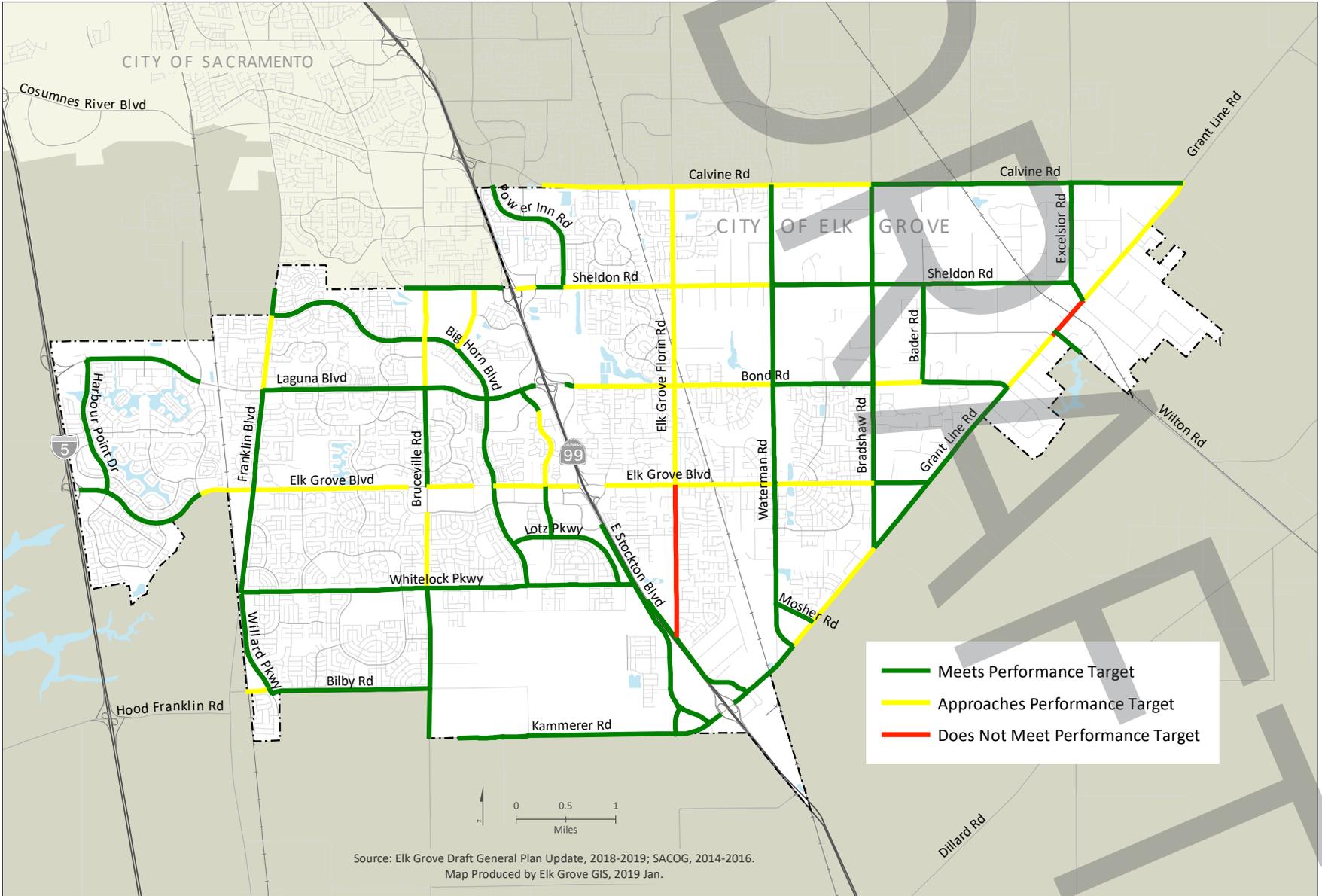


Figure 1: Existing Roadway Traffic Conditions

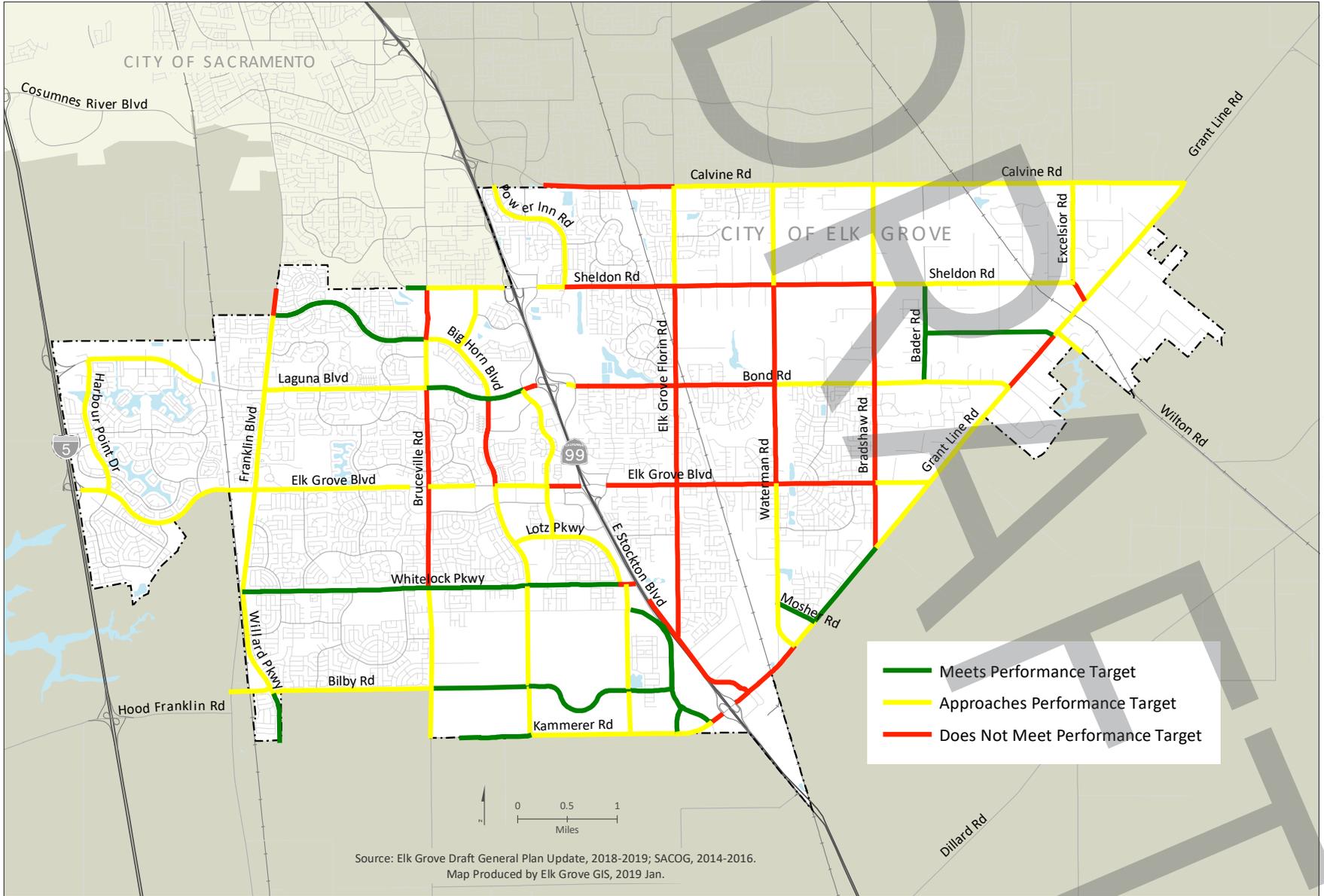


Figure 2: Roadway Traffic Conditions at General Plan Buildout

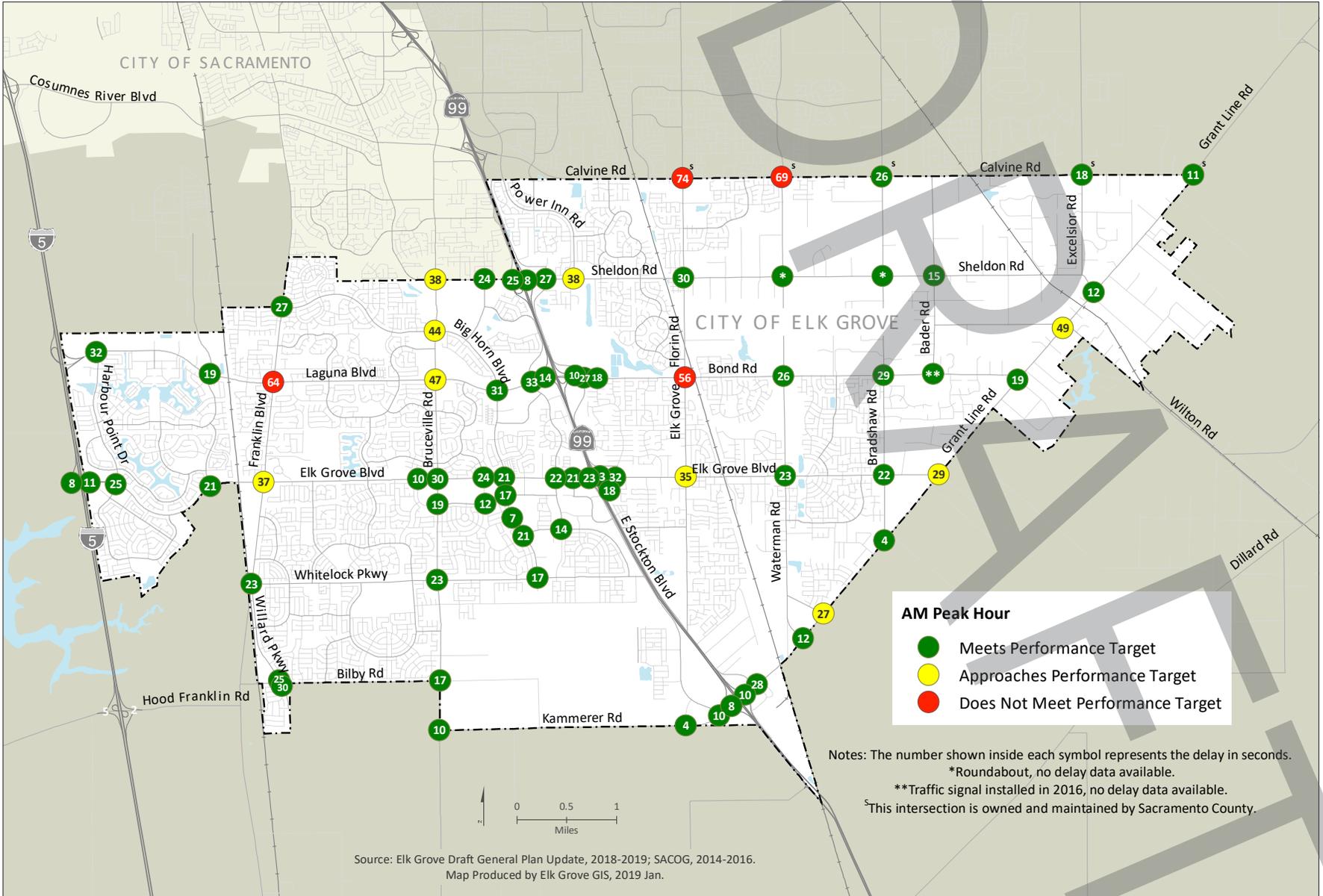


Figure 3: Existing Intersection Traffic Conditions (AM Peak Hour)

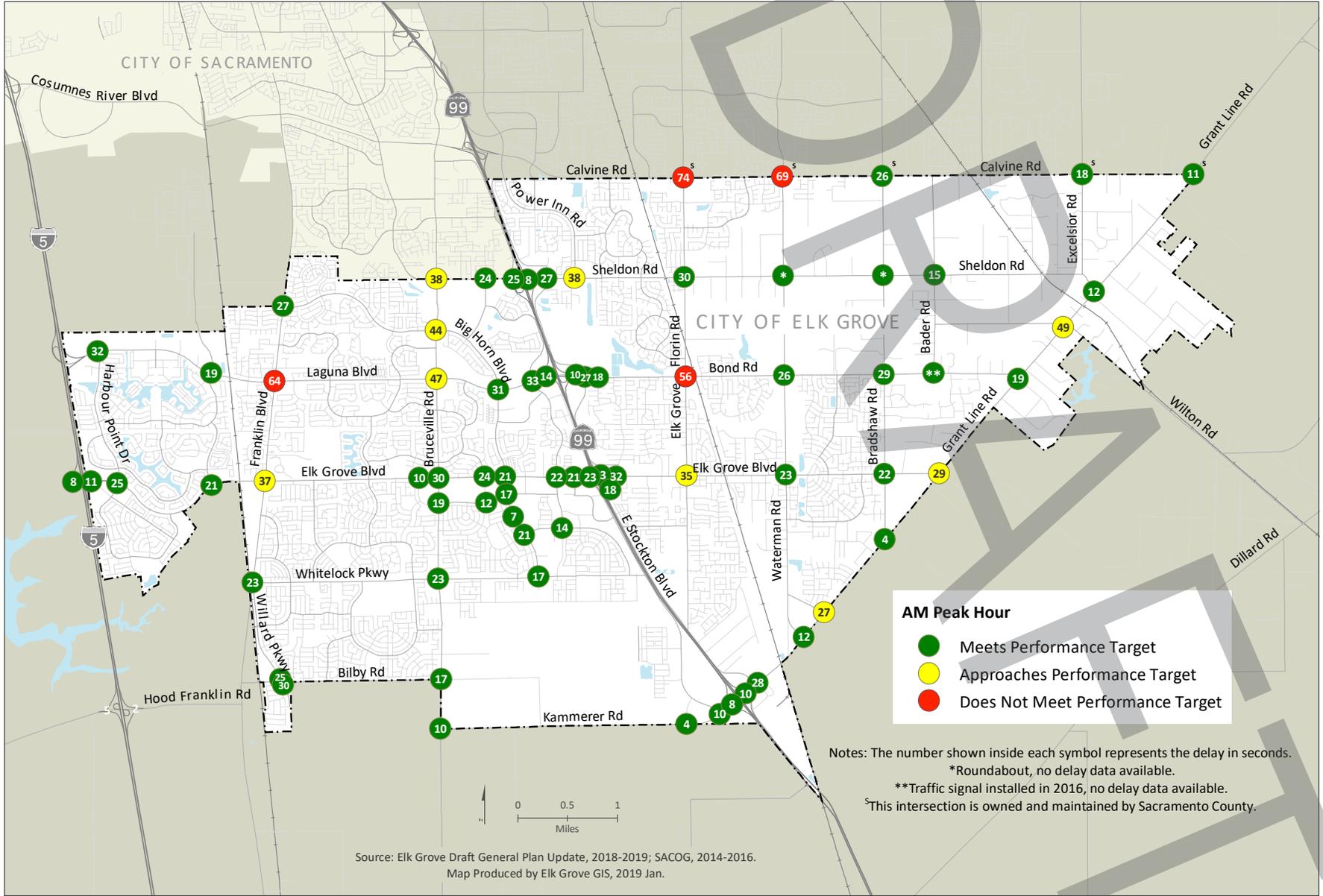


Figure 4: Existing Intersection Traffic Conditions (PM Peak Hour)

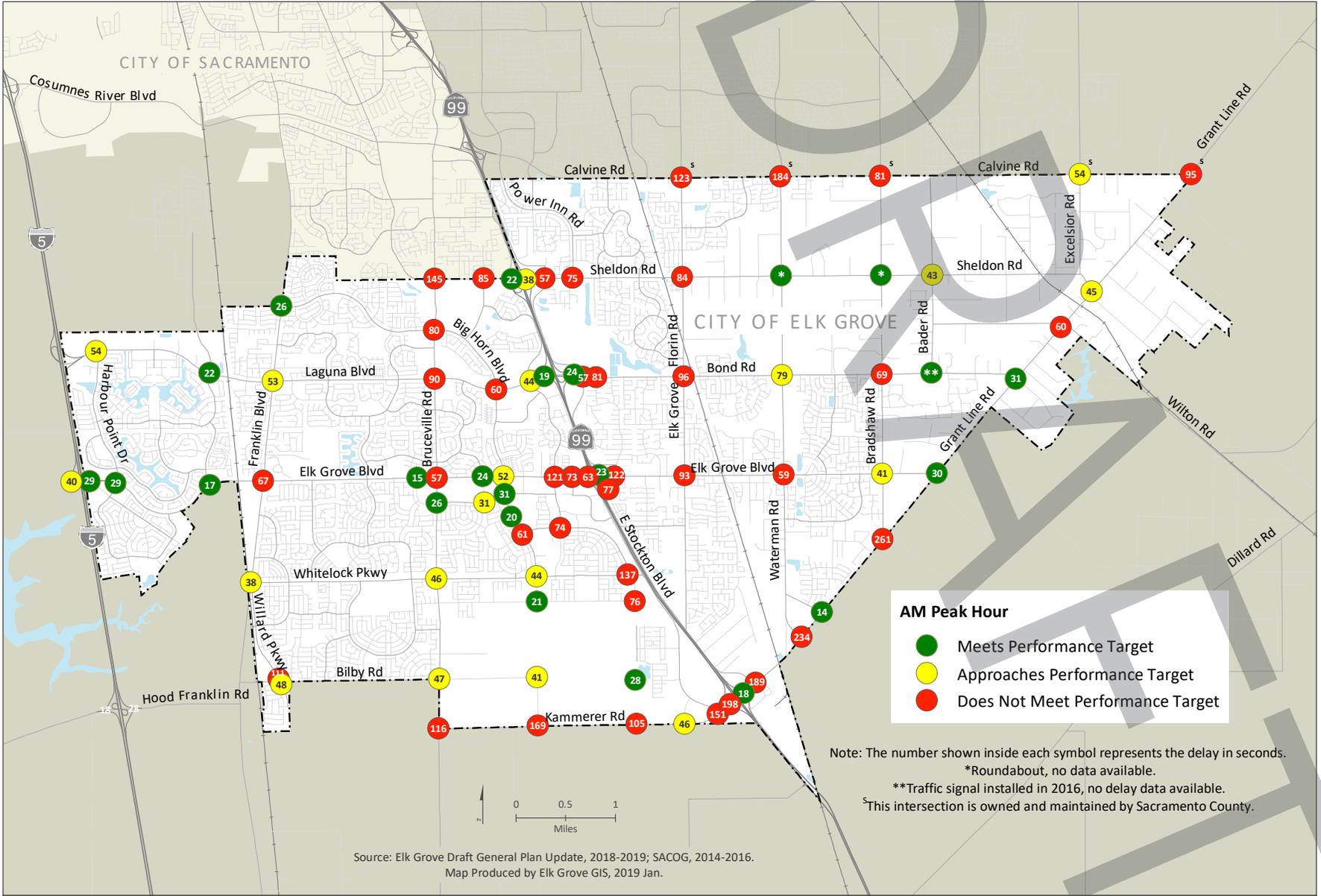


Figure 5: Intersection Traffic Conditions at General Plan Buildout (AM Peak Hour)

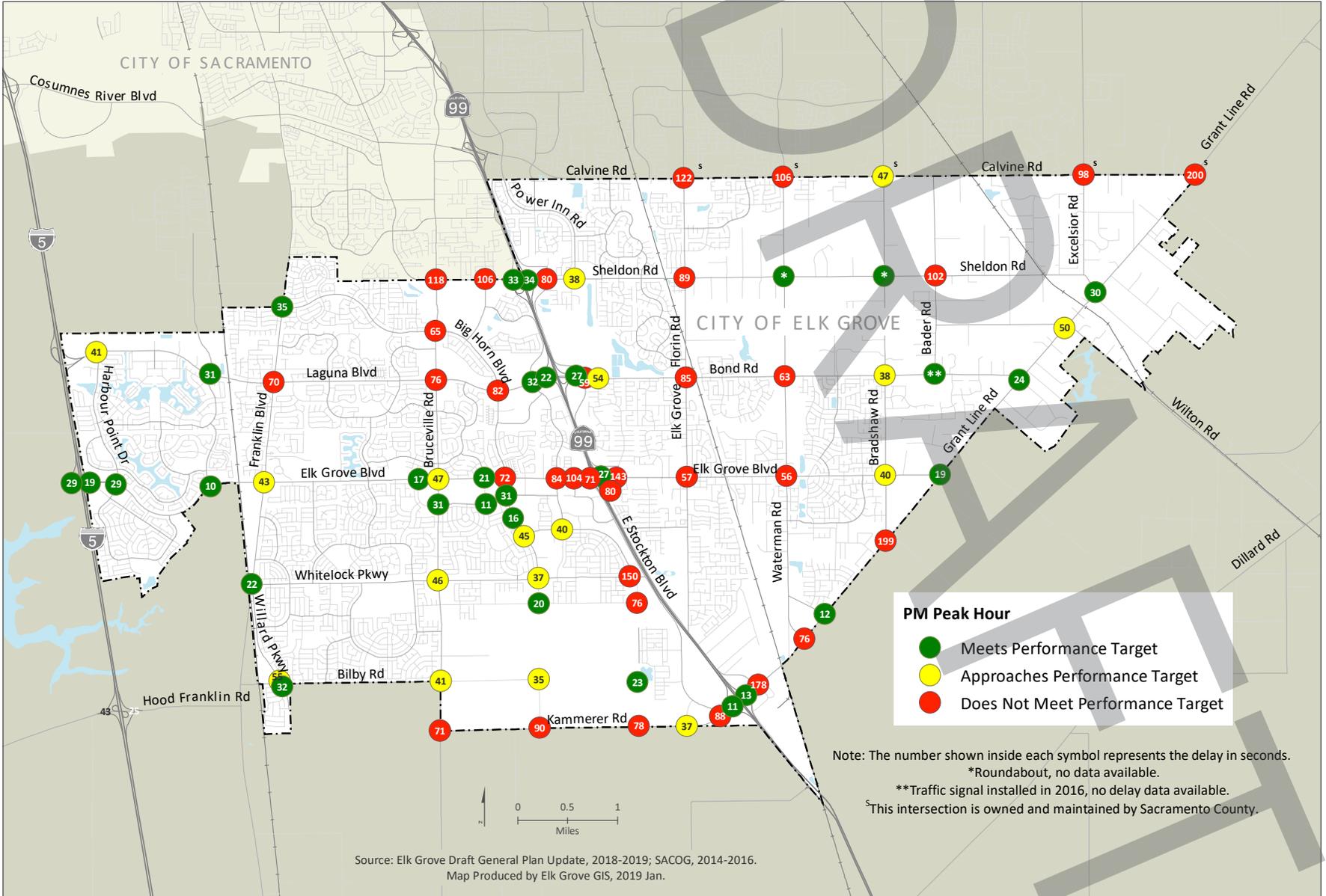


Figure 6: Intersection Traffic Conditions at General Plan Buildout (PM Peak Hour)