

1 Introduction

The City of Chula Vista Traffic Signal Communications Master Plan establishes the planning framework for implementing state-of-the-art communications technology and Intelligent Transportation Systems (ITS) elements to meet the City’s immediate and long-term traffic system needs. The City has placed great emphasis on immediate and long-range planning in its continued effort to strike a balance between quality of life and growth. The Master Plan is a central element to the City’s overall planning framework and establishes a proactive approach to better serve the public through state-of-the-art traffic systems technology.

The Master Plan was initiated to address two overarching needs: (1) the immediate need to replace the existing obsolete systems that inhibit staff’s ability to efficiently manage the traffic signal system and (2) address the long term need to establish a future-proof platform that supports growth and enables the City to implement and utilize future transportation systems technology. The Master Plan provides concepts, assessments, and illustrations in one comprehensive guiding document for staff’s use in preparing the future City traffic signal communication system and ITS infrastructure.

1.1 City Setting




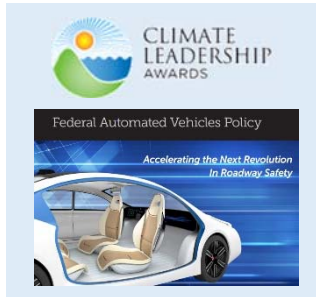
The City of Chula Vista has a population of over 260,000 people¹, covers an area of 52.1 square miles², is the 2nd largest City in San Diego County³, and is the 14th largest City in the State of California⁴. Chula Vista is also the fastest growing City in the San Diego Region with large areas of planned development. To give the City’s growth context, the City’s General Plan anticipates a population of over 300,000 residents by 2030, and an additional 100 new traffic signals.



1.2 City Initiatives

The City promotes the orderly management of growth in a manner that maintains a balance between quality of life, the environment and economic stability by applying the General Plan and related supporting

plans. The City is a recognized leader in conservation and renewable energy implementing policies that have led Chula Vista to become a smarter city, with development practices now delivering many Smart City initiatives. A sample of Chula Vista’s Smart City initiatives include:

- The **Bayfront Smart City** which brings the latest in infrastructure technology for maximum energy efficiency and sustainability outcomes to the largest waterfront development on the West Coast⁵. 
- One of the densest networks of **Electric Vehicle (EV)** charging stations in the Country⁶.
- Constructed and opened a new state-of-the-art **Traffic Management Center** and **Traffic Signal Communication Center** in January 2017.
- Implementation of a new state-of-the-art **Adaptive Traffic Control System (ATCS)**. 
- The **ACT Chula Vista** citizen web portal connecting citizens with each other and City services creating a web-based connected community platform⁷. 
- Competed for the USDOT’s Smart City Challenge in 2016 which became the impetus for Chula Vista being selected as an “Autonomous Vehicle Proving Ground” in January 2017 – one of ten sites chosen by the USDOT to collaborate and test the practicality of autonomous cars on public roads.
- Received the 2014 EPA Center for Corporate Leadership, Climate Leadership Award for exemplary climate actions. 

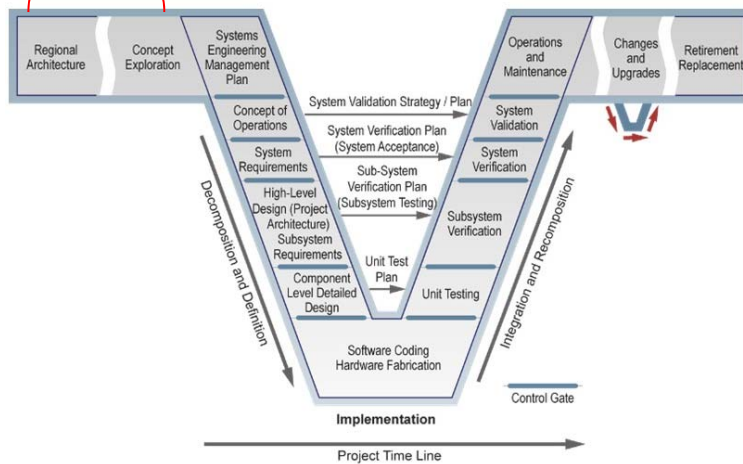
The Master Plan connects into and supports many existing forward reaching initiatives in the City’s planning structure including:

- City of Chula Vista General Plan.
- Chula Vista Bayfront Master Plan.
- City of Chula Vista Climate Action Plan.
- City of Chula Vista Clean Transportation Energy Roadmap.
- City of Chula Vista Strategic Plan.
- City of Chula Vista City Operations Sustainability Plan.
- City of Chula Vista Growth Management Program.
- City of Chula Vista Neighborhood Traffic and Pedestrian Safety Program.
- City of Chula Vista Pedestrian Master Plan.
- City of Chula Vista Bikeway Master Plan.



1.3 Consistency with Regional, State, and National Architectures and Plans

Master Planning



The "V" Diagram is the standard way to represent the systems engineering process for ITS projects. Following this process reduces risk, controls cost and schedule, improves quality, and results in a system that meets the user needs⁸.

The Master Plan is the earliest planning stage (pre-design) of the systems engineering process and presents high-level concepts and architecture and supports initial needs identification. The Master Plan lays the groundwork for

capital improvement programming, prioritization, and budgeting for future identified projects through subsequent parts of the systems engineering process.

1.3.1 San Diego Region Intelligent Transportation Systems (ITS) Strategic Plan

The San Diego Region ITS Strategic Plan provides a unified vision for regional ITS investment strategies that regional transportation agencies prioritized for funding and implementation⁹. The ITS Strategic Plan provides policy guidance and articulates the common vision for the employment of ITS technologies to improve mobility, safety, efficiency, and reliability throughout the region and is a supporting document to **San Diego Forward** (The Regional Plan) and the **SANDAG 2050 Regional Transportation Plan (RTP)**¹⁰. The Master Plan will advance the regional goals to the next level in Chula Vista by identifying specific ITS technologies, deployment strategies, and the resources required.



1.3.2 California Strategic Highway Safety Plan (SHSP)

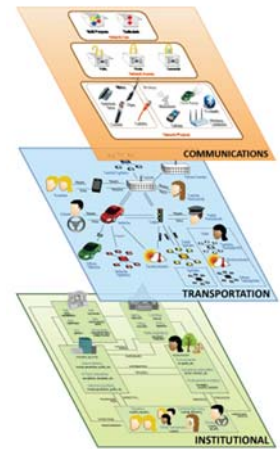


The California Strategic Highway Safety Plan (SHSP) identifies signal timing and ITS tools as appropriate safety countermeasures for intersection crashes¹¹. The **California Local Roadway Safety Manual** also identifies improved signal timing, coordination, and operation as a safety benefit to address locations that have a crash history at multiple signalized intersections¹². The Master Plan recommends systems necessary for

implementing traffic signal control strategies, including coordinated traffic signal operations. This will maximize throughput, minimize stops and reduce delay on roadways. In turn, there will be fewer intersection red-light violations, a reduction in aggressive driver behavior, and a decrease in intersection crashes.

1.3.3 National ITS Architecture

The National ITS Architecture provides a common framework for planning, defining, and integrating ITS. It is a mature architecture that reflects the contributions of a broad cross-section of the ITS community (e.g., transportation practitioners, systems engineers, system developers, technology specialists). It is comprised of three primary layers: communications, transportation, and institutional which set the building block for ITS development¹³.



The Master Plan addresses the communication layer of the National Architecture. Communications systems are the wireline and wireless systems and equipment that provide paths and connections to transmit information. The City relies on the communications system to support management and operation of the many functional aspects of the City’s transportation system.

1.4 Purpose and Goals

The purpose of the Master Plan is to guide the replacement of existing obsolete systems that inhibit staff’s ability to efficiently manage the traffic signal system and to establish a platform for the City to implement and utilize future transportation systems technology. The plan represents a significant opportunity for the City of Chula Vista to advance traffic signal communications systems and supporting elements to the technological forefront. An intelligent traffic signal communication system is beneficial in many ways and promotes: increased roadway safety, shortened commute times, travel reliability, reduced greenhouse gasses, and economic and sustainable growth. The Master Plan will open doors to opportunities including: access to grant funding, coordination with various projects and developments, cost savings on leased communications for numerous City needs, providing a future proof platform, and advancing related Smart City and Climate Action initiatives. The Master Plan ultimately improves mobility through robust communications and enhanced traffic signal management and operations for all modes of transportation including motorists, bicyclists, pedestrians, transit, and emergency vehicles.

1.5 Objectives

The traffic signal communication system is essential for Chula Vista to provide a proactive approach to traffic management and all around better service to the traveling public. The plan provides a framework to strategically achieve the following primary objectives:

- Develop system topology and network architecture for a future-proof city-owned communication platform concept.
- Leverage existing communications infrastructure investments to support new systems and technologies.
- Establish resolutions for existing system deficiencies.

- Eliminate 3rd party service for traffic signal communications.
- Identify current and future traffic system needs and leverage new technology to meet the needs.
- Incorporate recommendations into other City planning and development projects.
- Support other City departments communication system needs.
- Identify connections to City initiatives including Smart City and Climate Action that will benefit from the Master Plan.
- Identify potential partnerships with regional public agencies and private entities to advance master plan implementation.
- Establish consistent ITS infrastructure improvements through the various capital improvement channels.
- Develop an implementation prioritization and phasing strategy.
- Estimate order of magnitude costs, assess resources, and system benefits.

1.6 Document Organization

The remainder of this document is organized into three sections as described below:

Existing Systems Assessment

Presents the extensive research and corresponding inventories completed for existing traffic systems throughout the City including: communications systems, central systems, field elements and traffic operations, and staff organization. The results of the existing systems assessment are presented on system architecture maps and schematics in the Appendix.

Needs Assessment

This section is divided into two primary subsections: existing system deficiencies and future roadway network needs. The existing system deficiencies and needs build on the existing systems assessment. The City's future transportation network plans are also presented to identify where the traffic signal communications infrastructure will be required. The results of the existing deficiency and future transportation network research are summarized on figures and maps included in the section.

Future System Architecture and ITS Elements

This section presents the network and ITS elements, standardization, topology, physical and logical requirements to achieve the future communication system concept. Several architecture examples are provided to demonstrate system connectivity and resiliency. This section also presents the communication system relation to Chula Vista Smart City transportation initiatives. A schematic detailing the future traffic system communications architecture concept is provided in the Appendix.

Implementation Phasing and Cost-Benefit Analysis

Presents a strategic implementation phasing plan that includes deployment prioritization and phasing. Order of magnitude cost estimates for technical solutions to communications deficiencies are presented for each phase, and the phased future traffic signal communication map concept is provided. This section also presents an analysis of the costs and benefits associated with implementation of the Master Plan recommendations by deployment phases. The timeframe for each implementation phase is dependent on available funding and is subject to acceleration as additional funds are made available.