3 Needs Assessment

The traffic systems communications needs assessment is based on two primary criteria: existing system deficiencies that require more immediate attention and the needs of the long-term future transportation network. Existing system deficiencies and needs have been identified through an extensive review of the existing conditions including the traffic communications system, central systems, ITS elements, and traffic operations. The City's future transportation network was researched to identify the new infrastructure needs and subsequently prioritize opportunities to improve the traffic communication system. New roads and traffic signals provide opportunities to expand, modernize, or build new communications system technology and infrastructure that meet both immediate and future needs. The communications system needs include considerations for speed, bandwidth, reliability, redundancy, networking capabilities, gaps in communication due to infrastructure and/ or media deficiencies, and new locations requiring service. The following sections present the existing system deficiency identification and future roadway network assessment.

3.1 Stakeholder Outreach

Outreach and coordination meetings were conducted with several other City departments to acquire additional information and documentation on existing and future traffic systems in the City. The City's Geographic Information System (GIS) Department provided relevant GIS shapefiles and information. The Information Technology (IT) Department provided information on communications connectivity within the City's Traffic Signal Communications Center (TSCC) and existing and future system support requirements. Staff from the City's Development Services Department and Economic Development Department provided documentation and information for both in-construction and future improvement projects and master plans throughout the City that will affect traffic systems in Chula Vista. Additionally, SANDAG's 2050 Regional Transportation Plan (RTP) Revenue Constrained Plan for Arterial Projects was researched.

3.2 Deficiency Identification

Communications deficiencies have been identified for traffic communications, central systems, field elements, and traffic operations based upon analysis of the existing communications systems conditions. Existing communications media and protocols, both City-owned and leased, currently limit the City's ability to monitor and manage traffic systems in real-time. Deficiencies and needs were identified based on the capabilities of the existing elements and the functionality necessary to efficiently and effectively operate the various systems and operations.

3.2.1 Traffic Communications System Deficiencies

Communications system deficiencies were identified and are listed as follows.

- Existing single-mode fiber optic network utilizes low speed (1,200 bps) Serial communications.

- Existing wireless radio communications are Serial and have low bandwidth capabilities.
- Extensive gaps in City-owned communication infrastructure due to missing physical connections centrally and/ or locally. Only 24 of the City's 267 existing traffic signals have a physical link to the TSCC.
- Leased communications are costly, reliant on the third-party owner for communications repairs, and have limited communications capabilities such as low-speeds, low-bandwidth, and are analog-based. Approximately 90% of the City's existing traffic signals communicate on leased lines, limiting the entire traffic signal communications network to analog.
- Operation and maintenance costs for the existing leased line telecommunications network is expensive, currently costing the City approximately $75,000 per year, and incapable for supporting existing and future traffic systems and ITS applications.
- Two traffic signals are offline and unable to communicate with the City's TSCC through leased line communications due to the third-party owner's inability to make adequate repairs to the network.
- Video detection feeds are unable to be viewed remotely due to physical gaps in communication infrastructure to the TSCC and bandwidth limitations associated with leased line communications and/ or Serial wireless radio communications.
- Existing traffic signal communications system bandwidth is unable to accommodate current and future high bandwidth required by ITS applications such as real-time video monitoring of the traffic on the city streets.
- Modern devices with desired capabilities do not support the legacy communication protocols.

3.2.2 Central Systems Deficiencies

The City remodeled and built a new TSCC data center and Traffic Management Center through a separate design-build task with STC Traffic. The project was completed in early 2017 and resolved the primary central systems deficiencies. Remaining central system deficiencies were identified as follows.

- The QuicNet4+ Regional Arterial Management System (RAMS) currently utilized is outdated and does not offer the functionality provided in modern systems that are becoming industry standard. It is also unable to communicate with Advanced Traffic Controllers (ATC).
- The Sydney Coordinated Adaptive Traffic System (SCATS) is outdated and subject to down time due to the legacy protocols, low-speed (1,200 bps) connection, and bandwidth limitations associated with leased line communications. The SCATS system is no longer operational.

The two remaining central system deficiencies are being resolved through implementation of two new state-of-the-art systems in 2017, (1) a new Transparity RAMS system and (2) a new central traffic management system (ATMS.now) and SynchroGreen™ Adaptive Traffic Control System (ATCS).

3.2.3 Field Elements and Traffic Operations Deficiencies

The City uses multiple systems and strategies to manage traffic operations throughout Chula Vista including traffic signal timing and coordination, grade crossing preemption, emergency vehicle preemption, transit signal priority, and data acquisition. Each system has been reviewed and deficiencies identified include:

- There are 22 existing coordinated corridors throughout the City. Many have inconsistent coordination plans. This is a symptom of a lack of reliable communications to traffic signals to monitor and verify that signal timing is as designed and TOD plans are providing efficient and effective traffic progression.
- Type 170 controllers are outdated and do not provide modern communication protocols or functionality required to perform advanced traffic operations.
- Emergency Vehicle Preemption equipment is antiquated (up to 15 years old), Infrared-based, relies on line-of-sight, and is susceptible to illegal emitters. Unauthorized preemption drastically impacts coordinated corridors, as recovery can take a significant amount of time, causing unnecessary impacts to traffic signal operations on critical corridors throughout Chula Vista.
- Traffic measurement devices currently communicate through a third-party owned cellular network and the traffic data is hosted through an outside party server.
- Traffic signals lack stand-alone battery back-up units for emergency power during power outages.
- Field elements lack the ability to communicate with the element, view the element status, and remotely manage and control the element.
- City staff does not have the communication system necessary to monitor and control traffic in real time through video and data acquisition.

3.2.4 Communications Gap Identification

Gaps in communications infrastructure were identified through analysis of the Master Plan GIS map, which geographically presents the existing traffic systems. Although the City currently has established communications to approximately 95% of the 267 existing traffic signals, only 9% are communicating on City-owned infrastructure and the remaining traffic signals communicate via leased lines. The high operating and maintenance costs associated with these leased lines, as well as the limited communication capabilities due to obsolete technology, makes the existing communications network an impractical and unsustainable model for the City of Chula Vista's existing and future transportation system needs.

Communications gap identification includes considerations for gaps between traffic signals locally and gaps between traffic signals and the TMC. Based on the existing communications system in Chula Vista, gaps were categorized as follows:

- Gaps due to lack of infrastructure.
- Gaps due to leased infrastructure.
- Gaps due to combination of leased and City-owned infrastructure.

3.2.4.1 Infrastructure Gaps

Gaps due to a lack of infrastructure include signalized locations with no existing City-owned or leased communications infrastructure. There are 13 offline traffic signals in the City that cannot be monitored remotely from the TMC and City staff must be dispatched to verify signal operations in the field. This is an inefficient use of both City time and resources. Of the 13 offline traffic signals, 11 are caused by gaps in communication infrastructure and 2 are leased infrastructure locations that require repairs.

3.2.4.2 Leased Gaps

Gaps due to leased infrastructure include signalized intersections that communicate with the TMC through a third-party owned POTS leased network. There are 102 telephone drop traffic signals, including 11 SCATS signals, in the City with the majority located in the downtown area between I-5 and I-805.

3.2.4.3 Combination Infrastructure and Leased Gaps

Communications gaps that are caused by a combination of leased and City-owned infrastructure include traffic signals that are interconnected by City-owned twisted pair copper wire to a traffic signal communicating on leased lines. These signals are currently connected to telephone drops due to a lack of a direct communications link to the City's TMC. There are 124 traffic signals, including 1 SCATS signal, on the City-owned copper wire based analog multi-drop network.

Table 3-1 provides a summary of the traffic signal communication system deficiencies and **Figure 3-1** presents the City's communications gaps[1].

Table 3-1 Traffic Signal Communications Infrastructure and Deficiencies Summary

Number	DESCRIPTION	QUANTITY
-	City of Chula Vista Total	267
1	Analog Fiber Optic Communication	24
2	Serial Wireless Radio Communication	4
3	Leased Copper-Based Communication	102
4	City-Owned Infrastructure on Leased Copper-Based Communication	124
5	No Communication Due to Infrastructure Gap	11
6	No Communication Due to Leased Infrastructure Repair	2
7	Analog Video Detection	155
8	Lack of Remote CCTV Monitoring	267
9	Lack of Limited Service and/or Post-Preemption Sequence	5
10	IR-Based Emergency Vehicle Preemption	267
11	Leased Cellular-Based Communications	46*
12	Type 170 Controllers	255
13	Lack of Stand-Alone Battery Back-Up	267

*Traffic Measurement Devices are located nearby signalized intersections

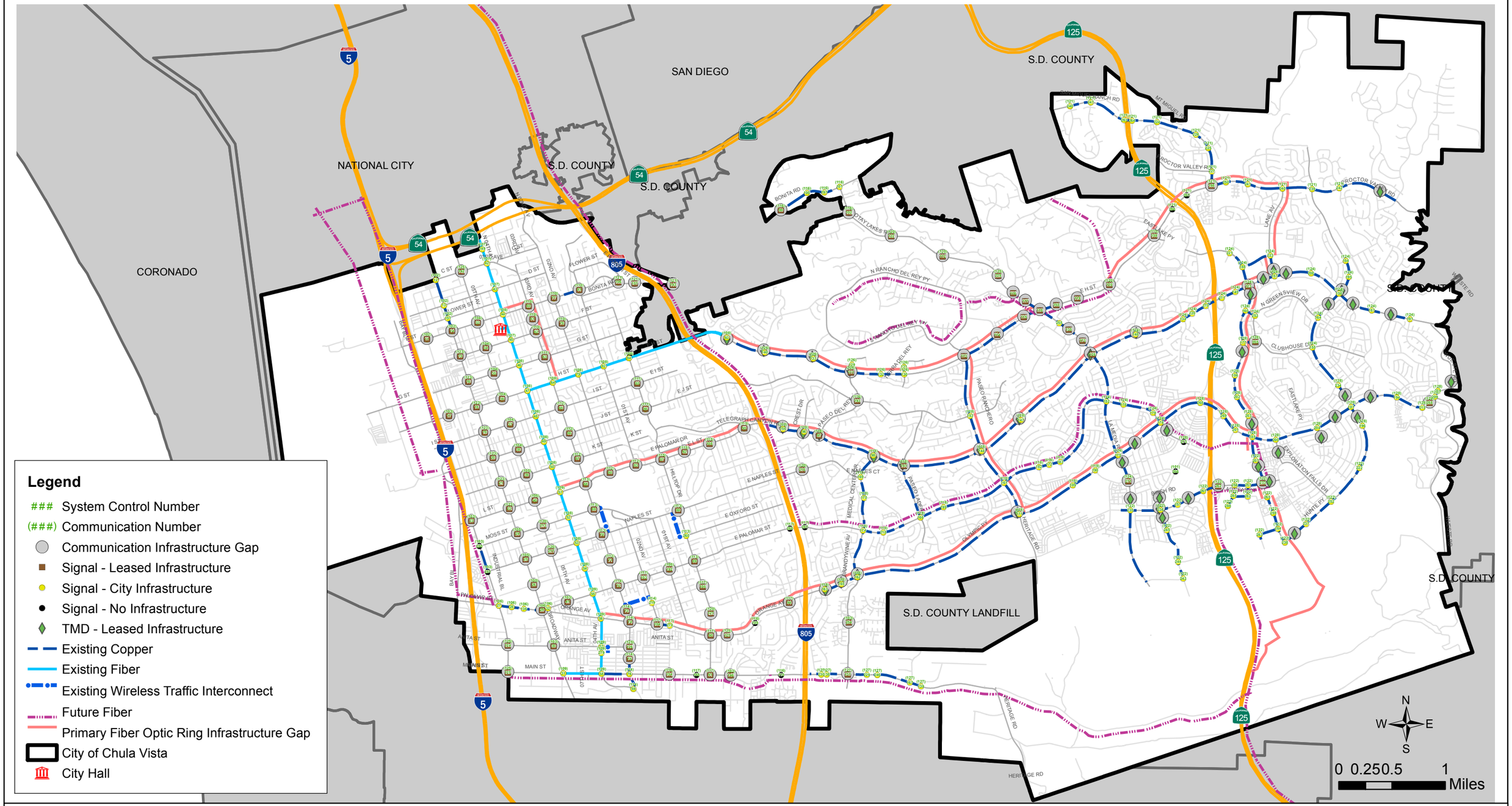


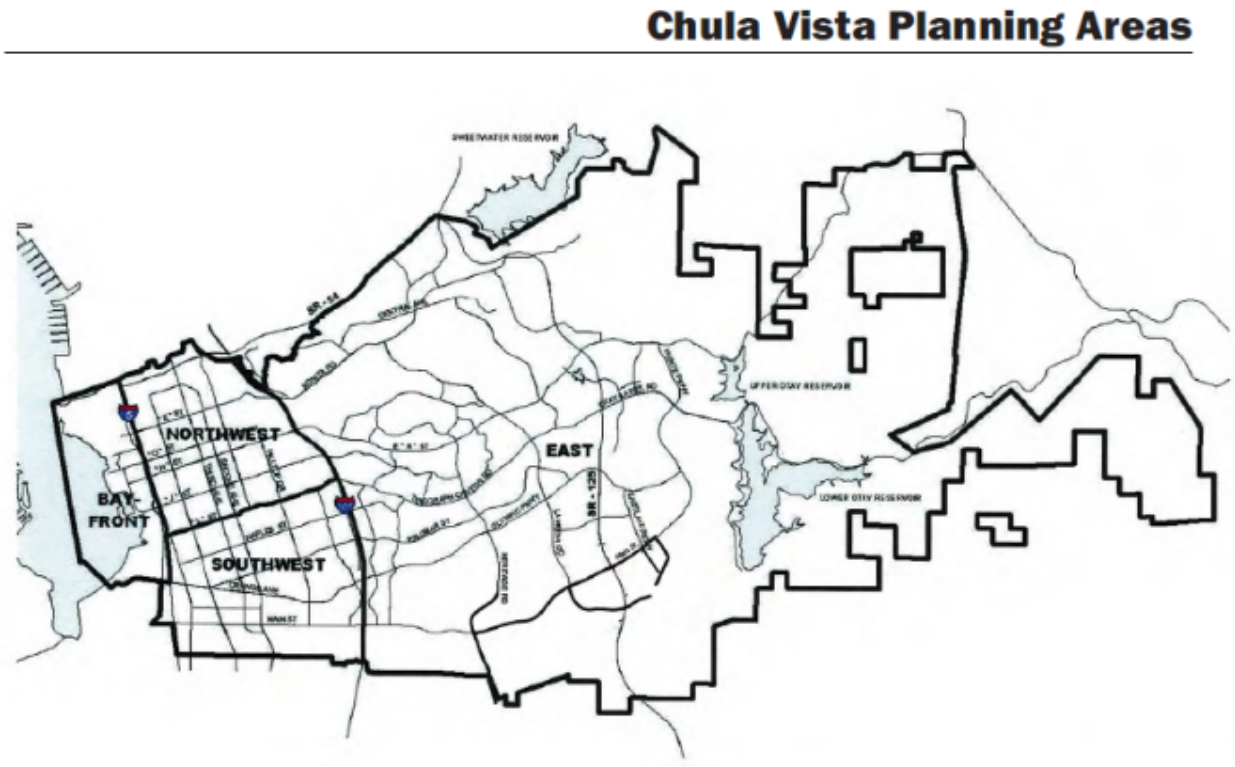
Figure 3-1 Communication Gaps

3.3 Future Roadway Projects

Relevant information for future roadway projects throughout Chula Vista was researched in documentation provided by the City's Public Works, Engineering and Development Services Departments. The documents provided information on new traffic signals, new roadways, and planned roadway widenings. The documents researched include:

- Otay Ranch Villages Sectional Planning Area (SPA) Plans.
- University Villages Project Environmental Impact Report (EIR).
- Bayfront Master Plan.
- Chula Vista Main Street Streetscape Master Plan.
- Urban Core Specific Plan.

The City of Chula Vista General Plan organizes the City into a hierarchy of geographic areas for policy purposes. From the largest to the smallest, the areas include: Planning Area, Subarea, District, and Focus Area. Chula Vista's four Planning Areas are: Bayfront, Northwest, Southwest, and East. Each planning area has an Area Plan that is incorporated into the Land Use and Transportation Element. Research was conducted for planned projects that would impact Chula Vista's future roadway network.



3.3.1 Future Traffic Signals

Research of the above documentation identified 96 traffic signals that are planned for future construction. The future traffic signals were documented on a dynamic layer in GIS with the attribute table detailing the intersection location. The following are the developments associated with the future traffic signals.

- The Chula Vista Bayfront Master Plan (CVMBP) is a joint master plan by the Port of San Diego, City of Chula Vista, and Pacifica Companies to develop a 500-plus acre public area along the San Diego Bay. Seven new traffic signals will be installed in the Bayfront area[2].
- The Chula Vista Main Street Streetscape Master Plan develops a Complete Street plan for Main Street between Industrial Boulevard and the I-805. The roadway plan identifies 6 new signalized intersections along Main Street between Jacqua Street and Otay Valley Road/ Maple Drive[3].
- The Eastern area of the City has developed thousands of acres of formerly undeveloped land since the mid-1970s. The area comprises six master planned communities including: Sunbow, Rancho del Rey, Eastlake, Rolling Hills Ranch, San Miguel Ranch, and Otay Ranch. Five of the six communities are either built-out or nearing completion. Otay Ranch is in the development process and is the largest master planned community in Chula Vista with 83 planned new traffic signals[4].

3.3.2 Future Traffic Communications Systems

The City plans to construct several new traffic system communications paths. The following describes the future paths by communications medium.

3.3.2.1 Future Copper Wire Interconnect

New copper wire based interconnect will be installed to close the communications infrastructure gap between East H Street/ Tierra Del Rey and East H Street/Paseo Ranchero on the future adaptive traffic signals project identified in Section 3.3.3[5].

3.3.2.2 Future Single-mode Fiber Interconnect

New fiber routes will be constructed in conjunction with the following projects:

- The South Bay Rapid project installs new City-owned conduit and single-mode fiber optic cable along portions of I-805, East Palomar Street, Eastlake Parkway, Birch Road, and SR-125.
- The Main Street Fiber Optic Project installs new conduit and fiber, with City-owned inner-duct and dedicated fiber, along Main Street from Industrial Boulevard to SR-125.
- In the Rancho Del Rey area, new conduit and single-mode fiber optic cable will be installed along portions of North Rancho Del Rey Parkway, South Rancho Del Rey Parkway, Ridgeback Road, Otay Lakes Road, East H Street, and Corral Canyon Road.

3.3.2.3 Future Wireless Interconnect

New wireless interconnect will be installed at the following locations:

- Industrial Boulevard and L Street (Drop) to Industrial Boulevard and Naples Street.
- 4th Avenue and L Street (Existing Fiber) to Hilltop Drive and L Street.
- 3rd Avenue and H Street (Existing Fiber) to 3rd Avenue and I Street.

3.3.3 Future Adaptive Traffic Control System

Grant funding from the Highway Safety Improvement Program (HSIP) will implement an Adaptive Traffic Control System (ATCS) at 28 signalized intersections on East H Street, Paseo Ranchero, Otay Lakes Road, and Telegraph Canyon Road. Twelve of the 28 project signals are existing SCATS signals that are being replaced with the new ATSC system and 16 are non-adaptive signals. The traffic signal communications will be upgraded to an Ethernet/IP network. The SynchroGreen™ ATCS system was selected and implementation is anticipated in mid to late 2017.

3.3.4 Future Coordinated Corridors

Four new traffic signal coordination networks are planned, in addition to the 22 existing corridors on the streets listed below and shown on **Figure 3-2**.

- East H Street: Bonita Vista High School Driveway to Eastlake Drive.
- Eastlake Parkway: Greensgate Drive to Commercial Driveway.
- East Palomar Street: I-805 to Olympic Parkway.
- Otay Lakes Road: Allen School Lane to Bonita Vista Middle School Driveway.

Document Path: S:\Projects\Chula Vista\0347_Chula Vista Traffic Signal Communications Master Plan\04 Design\GIS\MXD Files\Chula Vista Comm MP (10.3).mxd

Legend

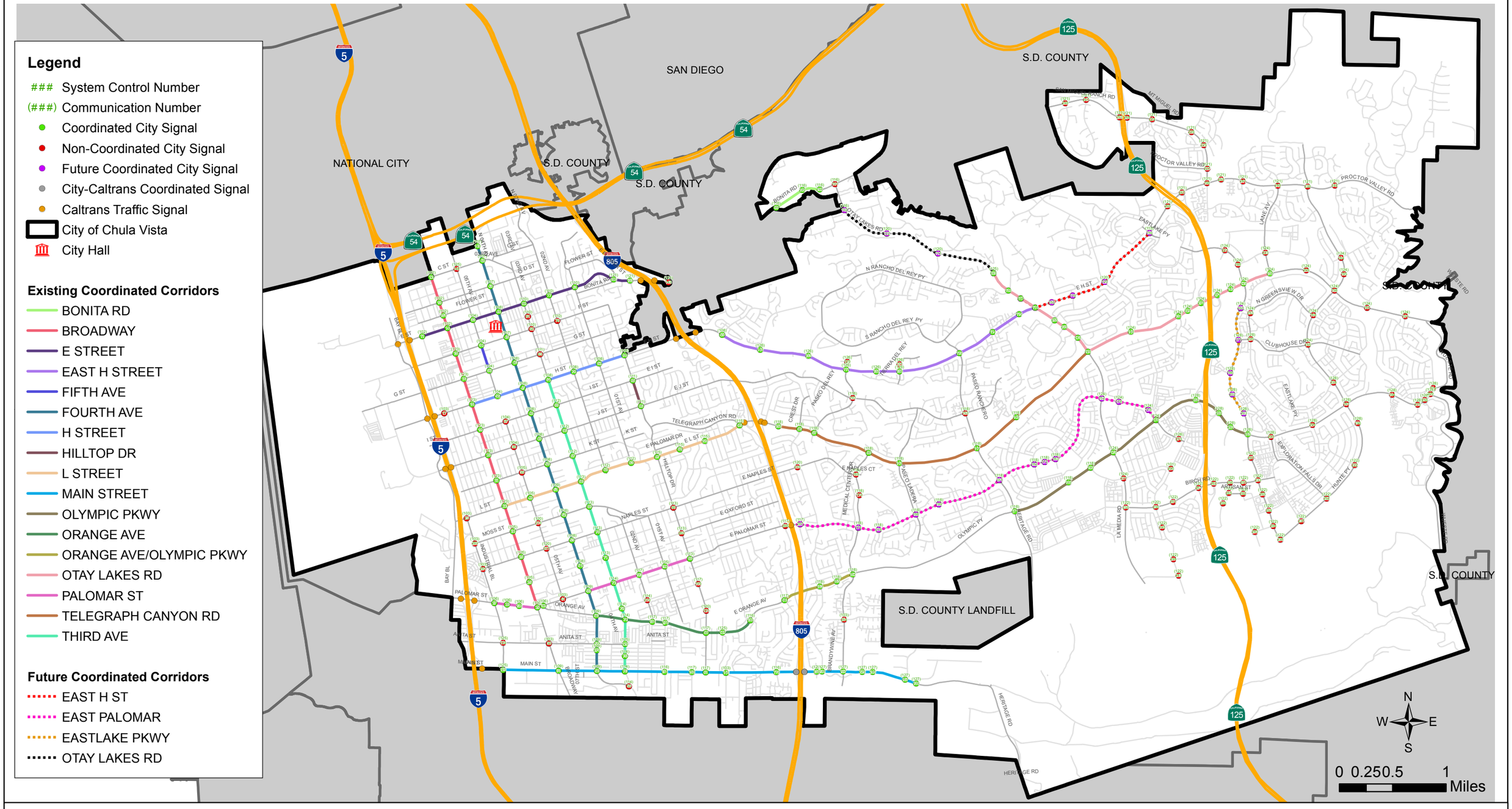
- ### System Control Number
- (###) Communication Number
- Coordinated City Signal
- Non-Coordinated City Signal
- Future Coordinated City Signal
- City-Caltrans Coordinated Signal
- Caltrans Traffic Signal
- City of Chula Vista
- City Hall

Existing Coordinated Corridors

- BONITA RD
- BROADWAY
- E STREET
- EAST H STREET
- FIFTH AVE
- FOURTH AVE
- H STREET
- HILLTOP DR
- L STREET
- MAIN STREET
- OLYMPIC PKWY
- ORANGE AVE
- ORANGE AVE/OLYMPIC PKWY
- OTAY LAKES RD
- PALOMAR ST
- TELEGRAPH CANYON RD
- THIRD AVE

Future Coordinated Corridors

- EAST H ST
- EAST PALOMAR
- EASTLAKE PKWY
- OTAY LAKES RD



CITY OF CHULA VISTA

Figure 3-2 Future Coordinated Corridors

TRAFFIC

3.3.5 Future Roadways

The Otay Ranch Villages Sectional Planning Area (SPA) plans and documentation provided by the City's Public Works and Engineering Departments were researched for future roadway construction. The new roadways are anticipated in the East subarea for Otay Ranch Villages 3, 8 East, 8 West, 9, and 10. A dynamic layer in GIS documents the location, street names, and associated project in the attribute table.

3.3.6 Future Roadway Widening

Specific Plans and Master Plans throughout the City were researched to identify future roadway widening projects which can provide potential opportunities to expand the traffic communications systems infrastructure. The Chula Vista Urban Core Specific Plan Mobility Element Section 3 outlined Future Conditions and Street Improvement Opportunities including:

- **Widening of E Street between Woodlawn Avenue and I-5** to serve traffic needs, reduce queues in the westbound direction, and improve operations at the I-5 Northbound ramp at Woodlawn Avenue.
- **Widening of H Street from 3rd Avenue to Broadway** to accommodate buildout traffic, improve segment operations, and reach the ultimate classification of H Street per the General Plan.
- **Widening of Broadway between E Street and F Street** to accommodate a consistent configuration along Broadway between C Street and L Street including a raised medians and bike lanes.

Appendix C contains the complete list of future transportation projects and traffic signals within the City.

3.4 SANDAG 2050 RTP

The SANDAG 2050 Regional Transportation Plan (RTP) was referenced to gather information on future roadway projects that are planned to be constructed over the next 33 years. RTP Appendix A (2050 RTP Projects, Costs, and Phasing) was researched to obtain additional information for each respective project. Due to funding limitations and uncertainties, only arterial projects contained in the revenue constrained plan were inventoried. Within the City of Chula Vista, two projects have been identified and summarized in Table A.8 (Phased Arterial Projects – Revenue Constrained Plan) including:

- **Willow Street Bridge Project**: Replace and widen the existing bridge, including shoulders, on Willow Street from Bonita Road to Sweetwater Road. This project is currently in construction.
- **North Fourth Avenue and Brisbane Street Project**: Widen Fourth Avenue to add an additional lane on the east side of the roadway.

The Future Road Network for the City of Chula Vista is illustrated in **Figure 3-3**.

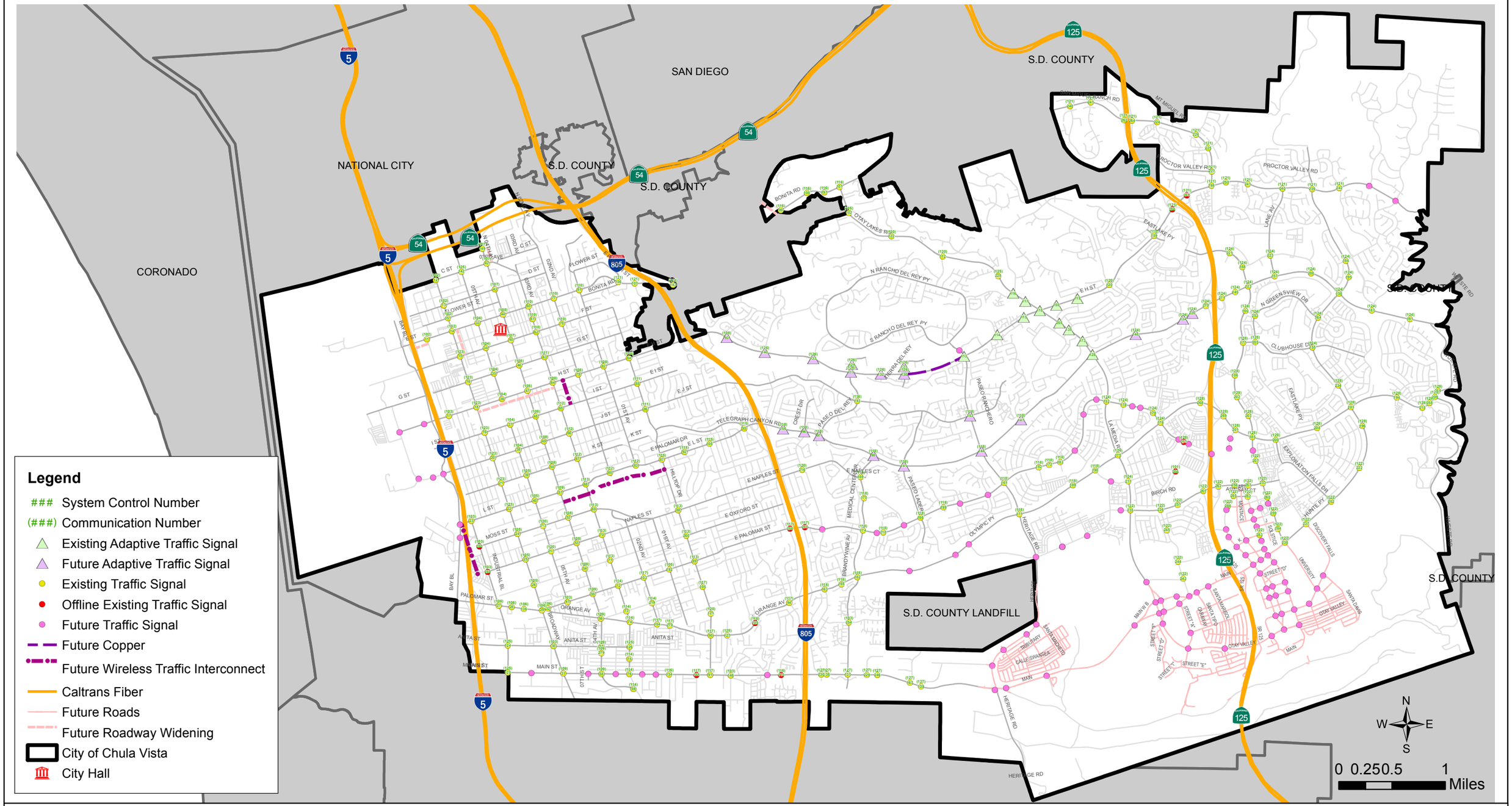


Figure 3-3 Future Roadway Network