



Department of Public Works

June 9, 2017

U.S Department of Transportation
Federal Highway Administration
Office of Operations
1200 New Jersey Avenue, SE
Mail Drop: E86-205
Washington DC, 20590
Attn: David Harris

ADVANCED TRANSPORTATION AND CONGESTION MANAGEMENT TECHNOLOGIES DEPLOYMENT INITIATIVE

To Whom It May Concern,

The City of Chula Vista is pleased to present the Advanced Transportation and Congestion Management Technologies Deployment Initiative grant application proposal for your review. The transportation technology model the City of Chula Vista embodies is a 21st Century approach to today's transportation issues.

The model the City of Chula Vista seeks to deploy is a comprehensive connected-Wi-Fi transportation system that provides streamlined efficiency in traffic management, traffic safety, and data collection and analysis.

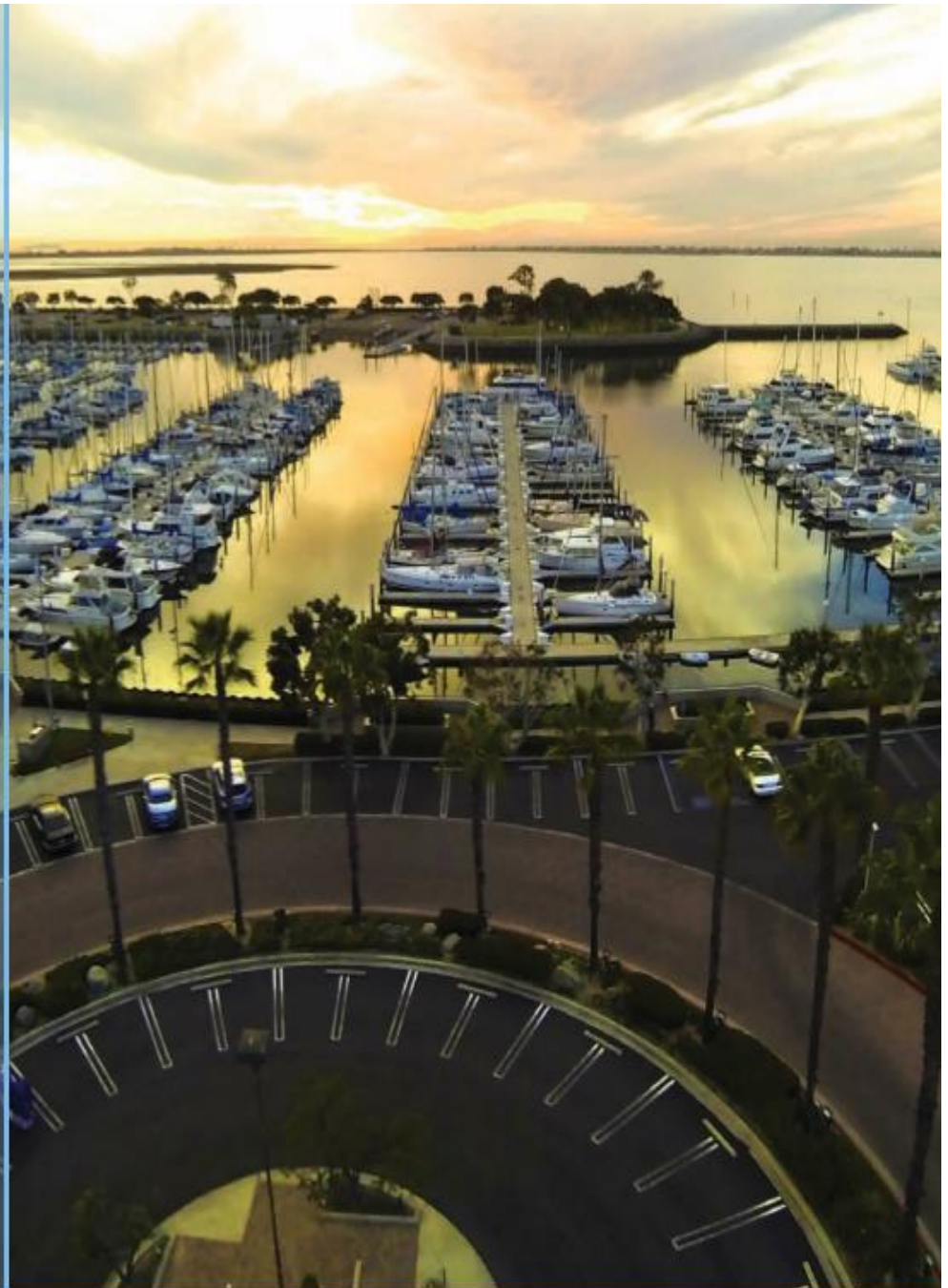
This document will detail the City's vision and goals for the transportation technologies deployed, provide a plan for implementation, and outline a methodology for quantifying system performance, safety, and maintenance.

NOTICE OF FUNDING OPPORTUNITY NUMBER 693JJ317NF0001

We appreciate the opportunity to submit this grant proposal and look forward to partnering with the U.S. Department of Transportation. Please contact me at (619) 476-5368, if you have any questions or if you need additional information. We look forward to hearing from you. Thank you.

Sincerely,

EDDIE FLORES
CITY TRAFFIC ENGINEER



**Grant Proposal
for
U.S. Department of Transportation
Advance Transportation and Congestion
Management Technologies Deployment
(NOFO 693JJ317NF0001)**

VOLUME 1 – TECHNICAL APPLICATION

Project Name:	City of Chula Vista's MAP-21
Eligible Entity Applying to Receive Federal Funding	City of Chula Vista
Total Project Cost (from all sources)	\$17 Million
ATCMTD Request	\$8.5 Million
Local Match	\$8.5 Million
Are matching funds restricted to a specific project component? If so, which one?	No
State(s) in which the project is located	California
Is the project currently programmed in the: <ul style="list-style-type: none"> • Transportation Improvement Program (TIP) • Statewide Transportation Improvement Program (SIP) • MPO Long Range Transportation Plan • State Long Range Transportation Plan 	MPO Long Range Transportation Plan (Bus Rapid Transit Only)
Technologies Proposed to Be Deployed (briefly list)	<ul style="list-style-type: none"> • Bus Rapid Transit Adaptive Signal Control System • Bus and Vehicle Traffic Light Information Systems • Freeway and Arterial Travel Time Information System on City Streets • Public Safety Monitoring and Management Systems <ul style="list-style-type: none"> ○ Closed Circuit Television Cameras ○ GPS Enabled Preemption ○ Uninterruptible Power Supply Traffic Signals ○ Red Light Video Analytics • Signal Management Systems for Traffic Signal Performance, Maintenance, and Data Collection <ul style="list-style-type: none"> ○ Asset Management System ○ Signal Performance Measures ○ Arterial Performance Measures • Mobile Fare Pay for Mass Transit through Wi-Fi Enabled Bus Stops and Traffic Signals • Intelligent Street Lighting

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1.0 CITY OF CHULA VISTA

1.1 Executive Summary

The City of Chula Vista is pleased to present to the U.S. Department of Transportation (DOT) a proposal for the Advanced Transportation and Congestion Management Technology Deployment (ATCMTD) Grant, advertised on April 12, 2017.

The transportation technology model the City of Chula Vista embodies is a 21st Century approach to today's transportation issues. The City of Chula Vista approach represents initiatives founded under the Federal Highway Administration model, Moving Ahead for Progress in 21st Century (MAP-21), regional objectives, and local strategic goals. City of Chula Vista's MAP-21 project sets the course for a streamlined, performance and safety based initiatives that seek to address the many challenges facing the U.S. transportation system. These challenges include improving safety, maintaining infrastructure condition, reducing traffic congestion, improving efficiency of the system, and protecting the environment. The model the City of Chula Vista seeks to deploy is a comprehensive connected-Wi-Fi transportation system that provides streamlined efficiency in traffic management, traffic safety, and data collection and analysis.

This document will detail the City's vision and goals for the transportation technologies deployed, provide a plan for implementation, and outline a methodology for quantifying system performance, safety, and maintenance.

1.2 Introduction

The City of Chula Vista application for FHWA Office of Transportation Management – Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) program funding results:

- ♦ Into results-driven approach to reducing congestion in the Chula Vista region
- ♦ Reduction of traffic crashes
- ♦ Increase in public safety
- ♦ Increase monitoring of the City's traffic management system and its performance
- ♦ Increase of real time information to improve mobility efficiently
- ♦ Reduction of fuel consumption and greenhouse emissions
- ♦ Improvement of the City's traffic signal operations and network

Chula Vista's intends to utilize technology and information to connect our City, both geographically and on the information network. The benefits of this will be significant; vehicles and traffic signals throughout the community will be connected and this will increase public safety, shorten commutes, reduce greenhouse gas emissions, improve public health, and increase mobility at intersections for all modes of travel including motorists, bicyclists, pedestrians, transit, freight, and emergency vehicles. Promoting and providing safe and efficient public transportation between the two urban cores will help the economic vitality of the city and also eliminate barriers that affect low income

households, senior citizens, adolescents, persons with disability and others who may have limited access to cars, which has resulted in diminished access to the local and regional transportation system and connected land use attractions.

Public safety and traffic system efficiency and congestion reduction program are captured in the proposed project application, includes a set of broad, comprehensive and complementary strategies that seek to manage effectively both demand as well as capacities to provide long term solutions to the public safety and congestion problems in Chula Vista region.

The proposed project effect the entire trip chain as the key, using Transportation Demand Management (TDM) tactics coupled with Intelligent Transportation Systems (ITS) technologies that provide for information and communication infrastructure for real-time traveler information, aggressive active demand management multimodal operation, and finally incentives for travelers to avoid congestions. This coordinated multimodal management of the surface transportation system will enable mode and route choice. Moreover, some of the initiatives can be defined as enablers that indirectly affect demand and capacity by providing the necessary support for other applications to evolve out of the connected and automated vehicle industry.

An integrated application of the diverse and wide ranging of strategies proposed in the Chula Vista proposal will offer greater effects on crashes, congestion, fuel consumption, and greenhouse emissions reduction than each of the strategies individually. In the end, the City of Chula Vista plans to design and document the evaluation of these deployments to capture the performance, benefits and costs of individual as well as integrated systems.

The combined effects of new infrastructure provision and more effective use of available proven infrastructure and transportation assets listed below will provide an excellent complement to the demand management activities and public safety:

- ♦ Advance Traveler Information Systems
- ♦ Advanced Transportation Management Technologies
- ♦ Infrastructure Maintenance, Monitoring, and Condition
- ♦ Advanced Public Transportation Systems
- ♦ Transportation System Performance Data Collection, Analysis, and Dissemination Systems
- ♦ Advance Safety Systems
- ♦ Integration of Intelligent Transportation Systems with Smart Grid and Energy Distribution
- ♦ Electronic Pricing and Payment Systems
- ♦ Advanced Mobility and Access Technologies

The Chula Vista region has its institutional structure and regional agreements in place and is confident that it can successfully implement the proposed projects. Chula Vista

and its partners have full commitment and a thorough project plan in place which will ensure the full deployment of the proposed initiatives within the schedule.

1.3 Background

Getting to Know Chula Vista

The City of Chula Vista is located in the southwestern tip of California and is the second largest city in San Diego County with a population of approximately 268,000 people. It is the 14th largest city in the state of California and the 76th largest city in the United States. What makes Chula Vista unique is that it is at the center one of the richest economic and culturally diverse zones in the United States. Located 7.5 miles from downtown San Diego and 7.5 miles from the one of the world's busiest international border crossing at the U.S.-Mexico Border. Chula Vista is approximately 50 square miles, consisting of urban-suburban development and intersected by 3 major freeways and a light rail trolley line with the highest ridership in the region. The City currently maintains and operates nearly 270 traffic signals and 9,500 streetlights.



Commitment to Smart City Initiatives

Chula Vista is a leader in the effective application of advanced technologies and innovative solutions to transportation problems and has a first-class record of delivering results. The City of Chula Vista has significant sustainability goals to bring the latest mobility and access technologies to the City for maximum energy-efficiency and sustainability and public safety outcomes. The City has recently been recognized as a top 10 finalist in the Smart Cities Council Readiness Challenge Grant Program and was selected for Envision America's 2017 Smart City Initiative.

Guided by our Strategic Plan, the Chula Vista local government is a service delivery organization that has long held a philosophy of continuous improvement. Our goals of operational excellence, economic vitality, healthy communities, strong and secure neighborhoods, and connected communities challenges all department heads to deliver evidence based projects that are tracked against performance metrics on the “Plan, Do, Check, and Act” continuous improvement cycle.

In the last 5 years, the City has received U.S. EPA Organizations Leadership Award, Green California Leadership Award, Institute for Local Government Award for “Local Leadership Toward Solving Climate Change”, San Diego Gas & Electric (SDG&E) Excellence in Saving Energy Awards. Chula Vista has a strong



commitment to the environment, conservation and sustainability. The City is considered a regional leader in renewable energy and being the first large City in the county to adopt a climate action plan in 2000. A new, climate action plan will be updated following the events of the Paris Agreement in which 289 U.S. City Mayors recommitted to the goals of the agreement. The City will continue to execute on the 20+ years actions and policies that were laid out to address climate change.

Chula Vista is a regionally designated Smart Growth City; has a successful track record of integrating public transportation into its General Planning process, with the Metropolitan Transportation Systems (MTS) “Blue Line” consistently recording the region’s highest ridership of any light rail line in the Region. The City continues its engagement with Regional programs, regularly partnering with the City of San Diego, City of National City, MTS, and the San Diego Port Authority to deliver improved services to its residents and the region.

More recently, the City became one of ten Autonomous Vehicle Proving Grounds. Working under a strong emphasis on the use of technology to provide a better quality of life, the City of Chula Vista, Caltrans District 11, and San Diego Association of Governments (SANDAG) submitted for and was approved by USDOT as an autonomous vehicle proving ground to showcase the advancements in automated vehicles. With this designation, the City of Chula Vista has received approval from the USDOT to host proving ground activities on all her streets, roads, and other facilities.

Proven Track Record

Our commitment to improvements in transportation and traffic safety is highlighted in our success in acquiring transportation grant funding in recent years. Nearly 60 million dollars of federal funds have been awarded to the City of Chula Vista within the last decade. A detailed description of grant award funding is provided in Volume 2 of this application. Some notable highlights include total project funding of:

- ♦ Active Transportation Grants, \$740K
- ♦ Safe Routes to School, nearly \$1M
- ♦ Highway Safety Improvement Program, \$7.9M
- ♦ Community Development Block Grant, \$1.3M
- ♦ Highway Bridge Program, \$43.3M
- ♦ Smart Growth Incentive Program, \$4.2M

The projects funded under these grants demonstrate the City’s pledge to providing quality service delivery in transportation to the citizens of Chula Vista. These projects also represent the City’s ability to manage projects and extensive experience in successfully delivering federally funded projects. The City is fully committed and looking forward to the opportunity to collaborate with the US Department of Transportation in meeting the ATMCTD initiatives with the projects presented in this proposal.

2.0 SCOPE AND SUMMARY

2.1 Project Location

The proposed advanced transportation technologies improvements will impact the entire Chula Vista transportation network including the highways intersecting within city limits. The improvements do not have any legal, regulatory, legislative, or institutional challenges. The proposed work is within city limits and does not require Right-of-Way acquisition as the improvements are within existing infrastructure. The City will however need to acquire encroachment permits when the scope of work encroaches within Caltrans jurisdiction.



A particular focus was made into providing solutions within the western region of Chula Vista as it faces the most transportation, environmental, and social economic challenges. Considered the Western Urban Core, bounded by interstate 5 and 805, represents the most urbanized area of Chula Vista. The Western Urban Core has the most concentration of low-income dwellings, highest concentration of crime spots, and traffic collisions.

2.2 Visions, Goals, and Objectives (MAP-21)

The City of Chula Vista's vision in "Moving Ahead for Progress in 21st Century" is to improve the quality of life for Chula Vista residents by investing in performance- and outcome-based strategies that leverage intelligent transportation technologies with sustainably measures that addresses the transportation barriers and challenges faced with today. The goal is to establish a system model which improves public safety, reduces traffic congestion, maximizes investments and system efficiency, and protects the environment. The objective is to deploy advance transportation technologies and implement a strategic plan that encompasses the City's vision of a 21st Century transportation system. The City's objectives is summarized below and shown in Appendix A: Project Concepts.

Chula Vista's MAP-21 Project

Mass Transit Deployments:	
<i>Challenge:</i>	Increase Ridership, Accessibility, and Efficiency in Mass Transit
<i>Technology Solutions:</i>	Implement Adaptive Signal Control, GPS-Enabled TSP, Traffic Light Information System
<i>ATCMTD Initiatives</i>	<ul style="list-style-type: none">◆ Advanced Traveler Information Systems◆ Advanced Transportation Management Technologies◆ Advanced Public Transportation Systems◆ Transportation System Performance Data Collection, Analytics, and Dissemination◆ Electronic Pricing and Paying Systems◆ Advance Mobility and Access Technologies

<i>Performance:</i>	Measure, track bus travel times, speeds, and stops; gather and share data with transit agency and compare results
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Traffic Congestion Management Deployments:

<i>Challenge:</i>	Inefficiencies in the transportation system that successfully manages vehicle travel time & delay, signal timing efficiency and responsiveness, and alternative route selection including special events
<i>Technology Solutions:</i>	Implement Changeable Message Signs at critical outbound locations, Travel Time Data Collection System, Adaptive Signal Control, Signal Performance Measures at all signals
<i>ATCMTD Initiatives</i>	<ul style="list-style-type: none"> ♦ Advanced Traveler Information Systems ♦ Advanced Transportation Management Technologies ♦ Transportation System Performance Data Collection, Analytics, and Dissemination
<i>Performance:</i>	Collect and analyze hi-resolution vehicle count data and vehicle travel time information; utilize an advance central traffic management system to monitor and optimize signal timing operations

Traffic Safety & Public Safety Deployments:

<i>Challenge:</i>	Reducing traffic collisions at intersections, improving response times of emergency vehicles, support of emergency evacuation operations, crime prevention
<i>Technology Solutions:</i>	Implement GPS-Enabled EVPE, CCTV's, Red Light Running Analytic Software, Traffic Signal Information System, Uninterruptible Power Supply, and Intelligent Street Lighting
<i>ATCMTD Initiatives</i>	<ul style="list-style-type: none"> ♦ Advanced Transportation Management Systems ♦ Advance Safety Systems ♦ Integration of Intelligent Transportation with Smart Grid and other energy distribution
<i>Performance:</i>	Monitor, track EVPE travel times, speeds, and stops; collect, analyze and share data of red light running and identify locations for enforcement; monitor energy savings and pollutants from street lights;

Communication System Deployments:

<i>Challenge:</i>	Provide a comprehensive, high capacity communication network that meets transportation needs of the public and City operators
<i>Technology Solutions:</i>	Implement fiber and wireless communication and convert Ethernet-over-copper where applicable; deploy Wi-Fi hotspots at traffic signals
<i>Performance:</i>	Monitor links and data usage through network management

Asset Management System Deployments:

<i>Challenge:</i>	Ability to systematically manage the inventory and life expectancy of transportation devices and equipment
<i>Technology Solutions:</i>	Implement barcoding registry system and inventory management system; install cabinet health devices
<i>ATCMTD</i>	<ul style="list-style-type: none"> ♦ Infrastructure Maintenance, Monitoring, and Condition

<i>Initiatives</i>	
<i>Performance:</i>	Monitor assets through active reporting

2.3 Stakeholders

Letters of support of the various stakeholders and partners are posted on the City website at:

<http://www.chulavistaca.gov/departments/public-works/engineering/traffic-engineering/atcmdt-letters-of-support>

2.3.1 San Diego Association of Governments

SANDAG with representatives from County government and eighteen cities in the County, conducts research and serves as the forum for decision-making on regional issues, such as growth, transportation and land use in San Diego County. The City of Chula Vista is a member of SANDAG and participates in the research and programs conducted by the agency.

2.3.2 Metropolitan Transit System (MTS)

MTS provides bus and rail services directly or by contract with private operators. MTS coordinates all services and determines the routing, stops, frequencies and hours of operation. The MTS light rail service operates with a total of 53 stations and 54.3 miles of rail. The MTS Bus services almost 100 fixed bus routes and Americans with Disabilities Act (ADA) complementary paratransit service (MTS Access). Fixed route bus services include local, urban, express, premium express and rural routes. MTS contracts with the San Diego & Imperial Valley (SD&IV) Railroad and the Pacific Imperial Railroad, Inc. (PIR) to provide freight service to San Diego shippers over SD&AE right-of-way.

2.3.3 California Department of Transportation (Caltrans)

Caltrans is the state agency responsible for highway, bridge and rail transportation planning, construction and maintenance. Caltrans District 11 is located in the southernmost part of California, and includes San Diego County and Imperial County. District 11 oversees approximately 1000 miles of freeways and highways, both urban and rural. The district is also involved with local agencies to develop a diverse multimodal transportation system including light rail, transit, commuter rail and high-occupancy vehicle programs and facilities.

3.0 FINANCIAL SYSTEMS & FUNDING

All federal funding received will be through the City of Chula Vista. The City has identified the following funding sources as the local match of \$8.5 Million for the project:

- ◆ General Fund
- ◆ Transportation Sales Tax
- ◆ Billboard Reserve Fund
- ◆ Transportation Development Impact Fee
- ◆ Western Transportation Development Impact Fee
- ◆ Traffic Signal Fee

A description of each of the funding sources is detailed in Volume 2 of this application including the financial state of the City.

The City will follow and comply with all Federal accounting rules, procedures, reporting and grant management requirements.

The project account will be set up and will be used to establish the main project grant ID and fund numbers, including cost share funds within the city financial system software. This process is used to establish expenditure authorizations for the project.

The City has an accounting structure that provide accurate and complete information about all financial transactions related to any federally-supported projects. This includes both expenditures of grant funds and cost share expenses. Grant expenditure records will be detailed as the cost categories indicated in the approved project budget (including project cost share) and all actual expenditures are to be compared with the budgeted amount and to report accurately all funds that are spent. Also, we will keep a log of all invoices and partial payments as part of the project life. The City will submit invoices for reimbursement of participating costs (costs eligible for federal reimbursement). Amounts claimed will reflect the cost of completed work, which has been paid for. The City will claim all reimbursable work as required by the project federal agreement. All invoices and partial payments will be certified and signed by the appropriate responsible persons in the City.

4.0 KEY PERSONNEL & RESUMES

4.1 Organizational Chart & Roles

The team members assigned to this project represents experienced, talented professionals of City staff capable of delivering a successful project. Each has a proven reputation for professional excellence and achievement of project success with the highest quality of work. The figure shown in the following page is the proposed organizational structure and key members of the project.



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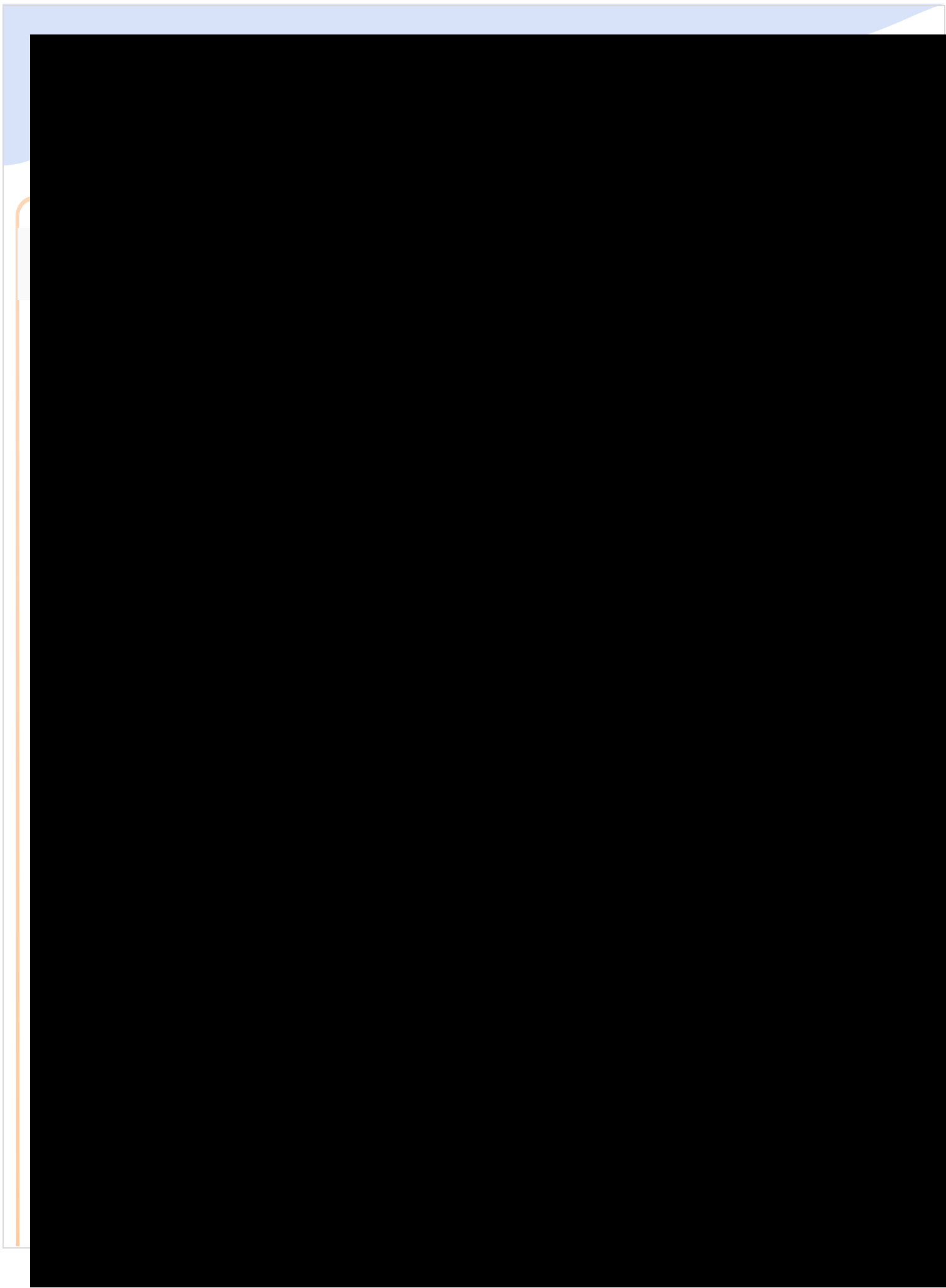
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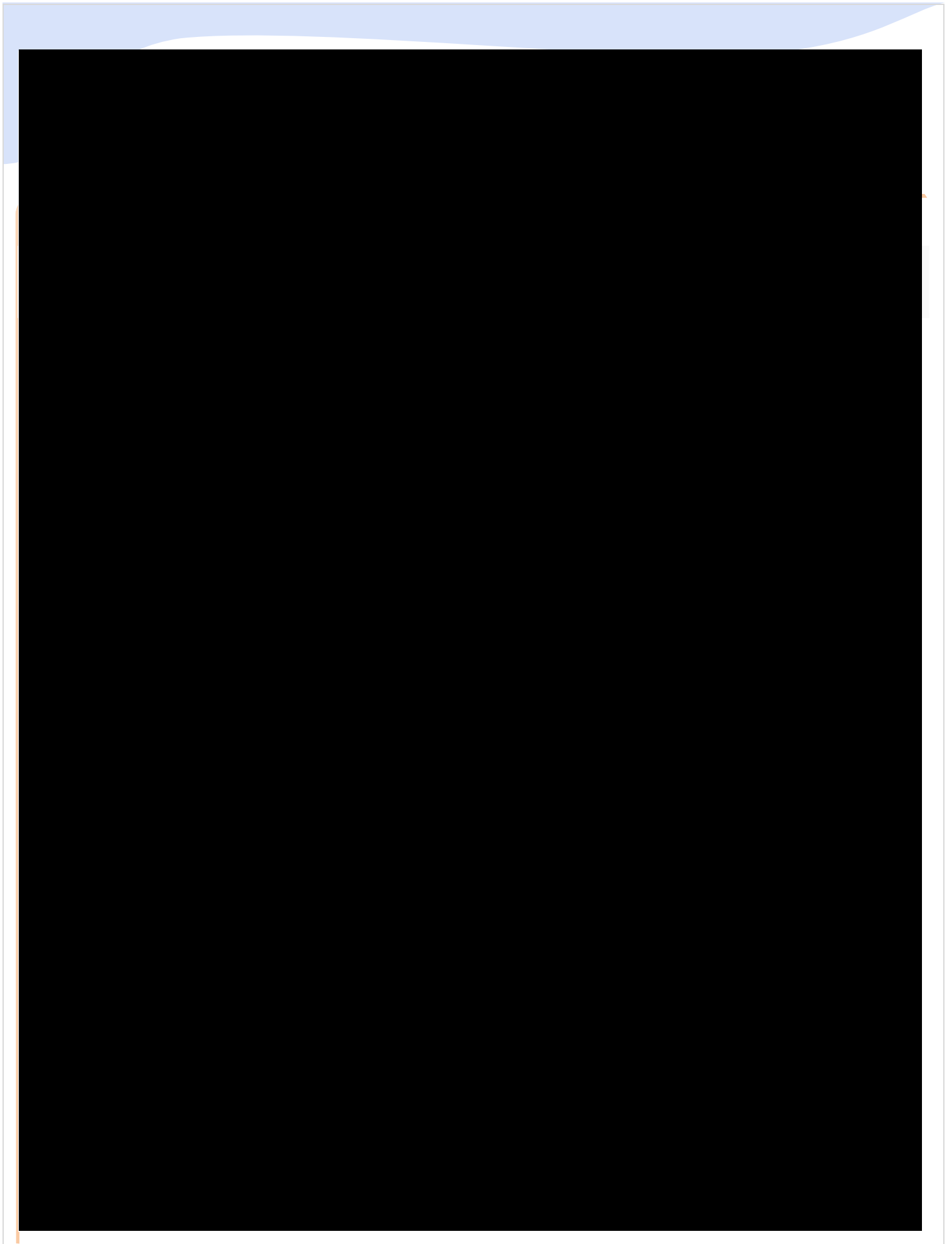
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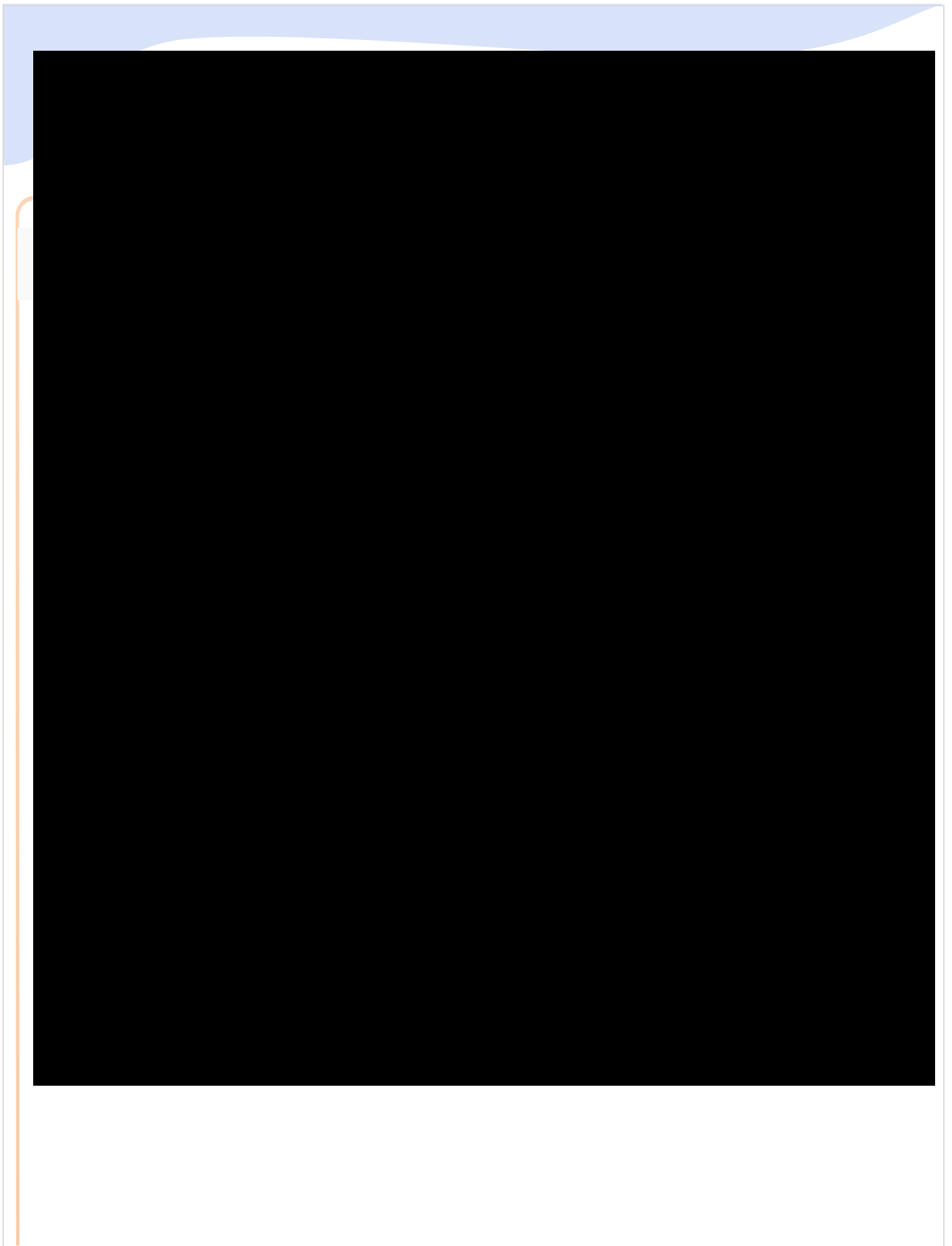
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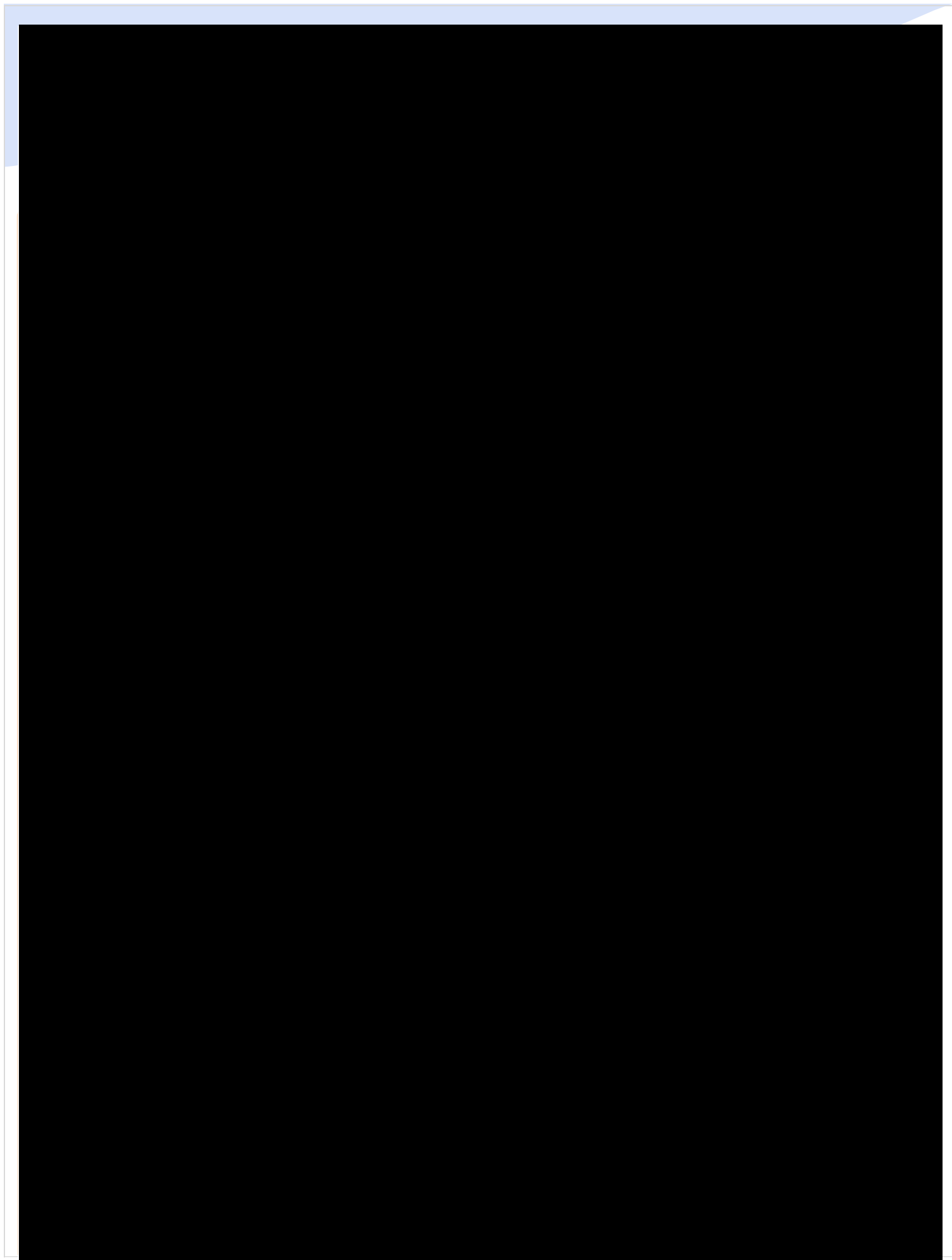






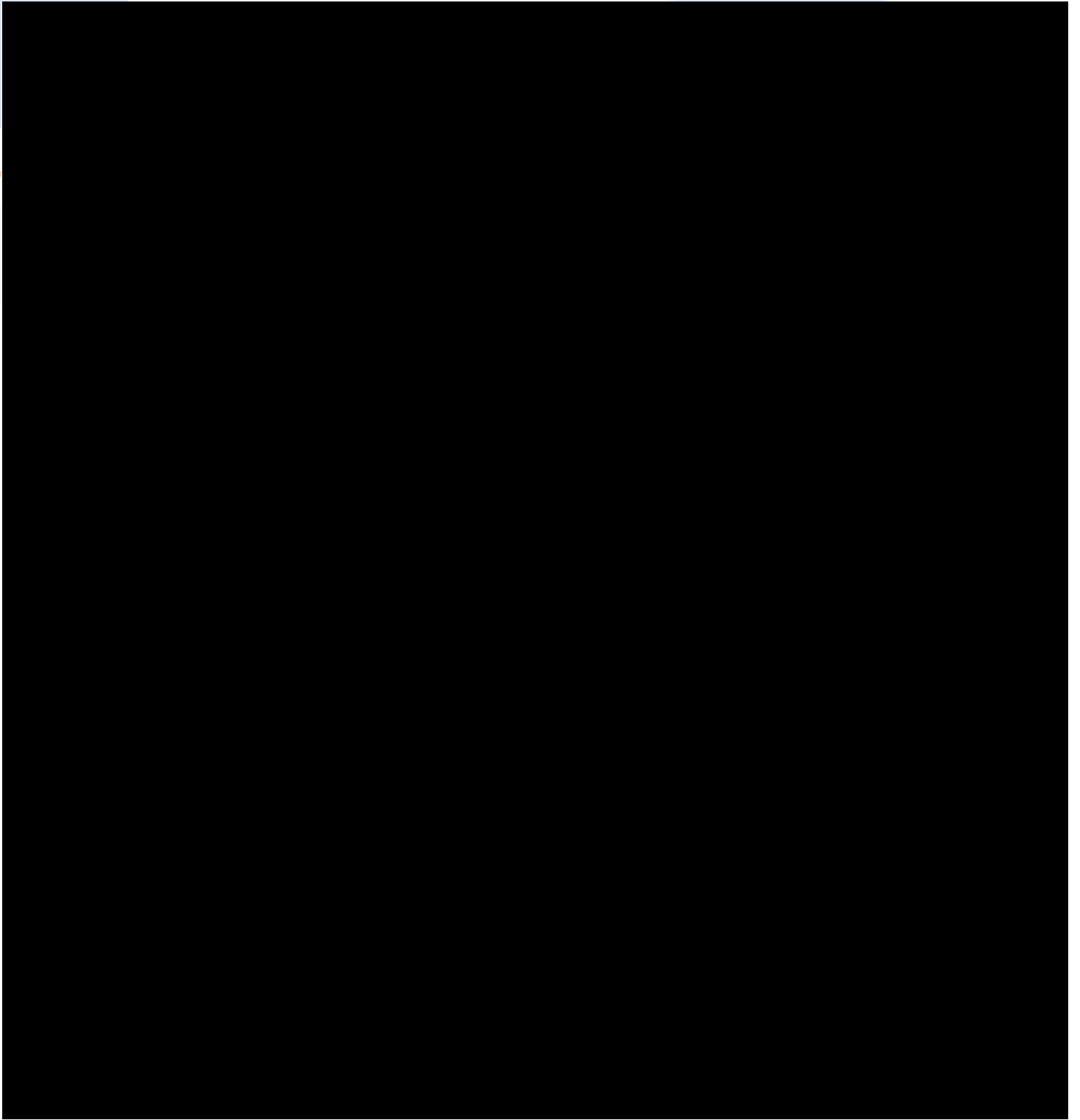
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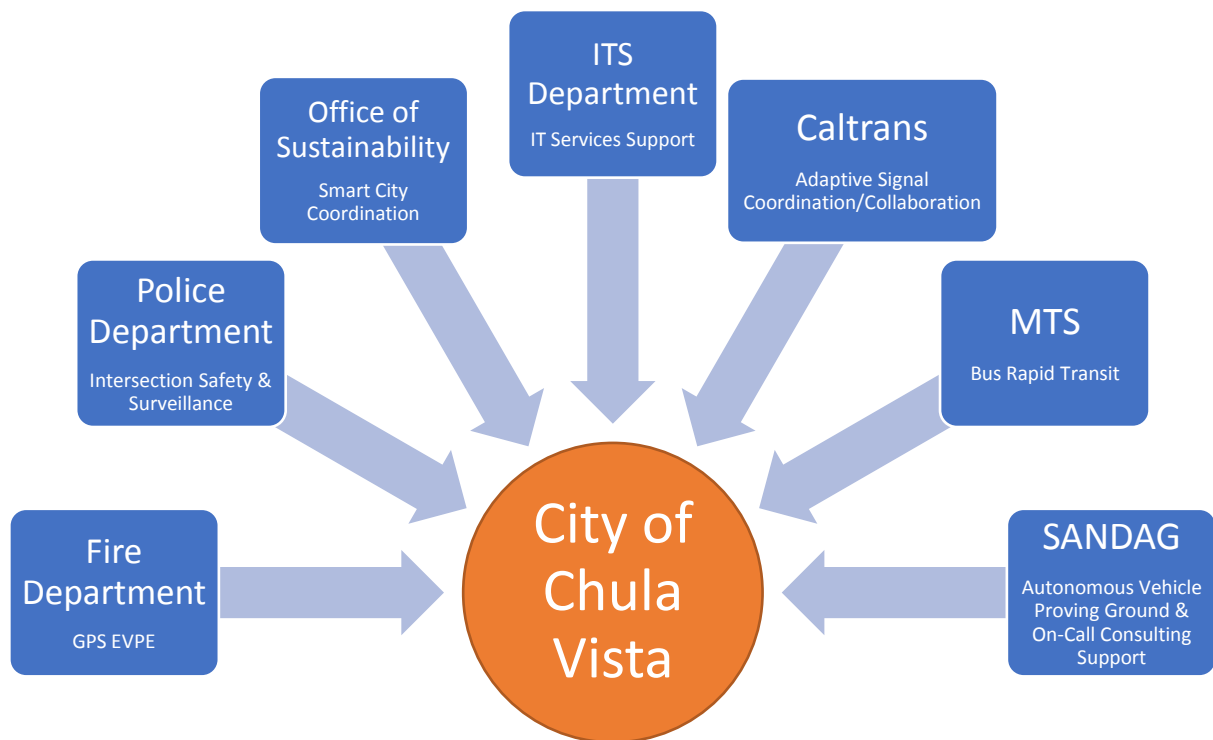
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4.2 Partners

The implementation of the project will require interjurisdictional and interdepartmental collaboration and support. The City has identified the following services and partners during the project implementation: City staff in Engineering Department, Department of Public Works, Department of Information Technology Services (ITS), Fire and Police Departments, Community Development Department (Sustainability Program), Finance Department, and outside agencies such as Caltrans, MTS, and SANDAG.

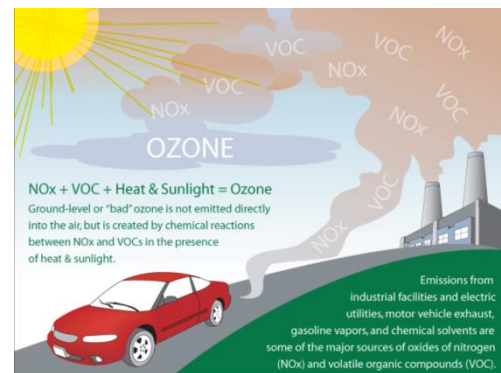


5.0 EXISTING CONDITIONS & PROBLEMS

5.1 Environmental Challenges

The San Diego metropolitan area (which includes Chula Vista) is ranked number seven for the highest level of ozone pollution in the nation.¹ Chula Vista has been hit especially hard by the negative impacts of ozone and other greenhouse gases. For example, the City has the highest number of emergency room visits (per 100,000 population) in the region due to asthma-related disease.² In addition, the City also has the highest number of deaths in the county due to chronic disease (cancer, heart disease & stroke, type II diabetes, and lung disease).³ Stroke and lung disease are directly caused and/or exacerbated by ozone and greenhouse gases.

Cars and trucks are some of the main culprits and emitters of gasses such as nitrogen oxides, volatile organic compounds, and carbon monoxide that lead to high levels of pollutions in our region. These gases, when they come in contact with sunlight, create ozone which leads to respiratory diseases and stroke. As part of this grant, Chula Vista proposes a number of solutions (Section 6.1) to strategically reduce fuel consumption, ozone levels, and other vehicle emissions, to provide cleaner air for our citizens. As a secondary, but very important benefit, our proposed solutions will also create a smarter, safer, and more efficient transportation system for all our users.



5.2 Socioeconomic Challenges

The City, as many other cities in the country, faces a number of social and economic challenges. However, one unique challenge and reality, is that the City faces a digital, education, social, and economic divide. In 1986, the City essentially became divided at the I-805 freeway with an “older” and lower income community on the west side and a new more affluent and modern community on the east side. With more, and newer, development on the east side, the eastern portion of the City benefits from newer infrastructure, newer and better equipped schools, as well as higher household income levels. On the west side, the higher density, lower income, and infrastructure-challenged community feels disconnected and, in many cases, “second-fiddle” to their counterparts in the east.



¹ American Lung Association, 2017, <http://www.lung.org/assets/documents/healthy-air/state-of-the-air/state-of-the-air-2017.pdf>

² County of San Diego Health and Human Service Agency, June 2012, http://www.sandiegocounty.gov/content/dam/sdc/hhsa/programs/phs/documents/CHS-ChronicDiseaseAtlas_Asthma_2012.pdf

³ County of San Diego Health and Human Service Agency, 2014, http://www.sandiegocounty.gov/content/dam/sdc/hhsa/programs/phs/CHS/3-4-50/3-4-50_South_Brief_2015.pdf

Although, the City has a number of programs, and funding, such as Measure P (special sales tax to fund aging/obsolete infrastructure over the next 10 years), these efforts have not been sufficient.

Recent history shows that large numbers of school-age students on the west side have applied for (and received) transfers from their district-assigned home schools to attend the higher-rated schools in the east. This creates a transportation challenge for the students and their families. In addition, as the 2nd largest city in the county, approximately 20% of Chula Vista's 268,000 residents will be disabled or aged 65+ years by 2030. To be successful, the City must improve access to all modes of transportation for this increasingly vulnerable community. Through this grant, we are proposing a number of solutions (Section 6.2 & 6.4) with enhancements to public transportation, digital/internet/education accessibility, and more, primarily on the west side, to try to bridge that gap and help bring the two communities closer together so we can become ONE again.

5.3 Mass Transit Challenges

Buses have long been recognized as a mass transit solution that provides efficiency in transportation mobility and relieving traffic congestion. It has become the City's focus to continue promoting mobility and accessibility in the development of transportation facilities and land use. This commitment spawns from the City's Strategic Plan Goal to "Ensure a sustainable and well-maintained infrastructure to provide a safe and appealing communities to live, work, and play". The City believes continued investments in mass transit provide sustainable benefits that are integral to a healthy and connected community.

With buses as the primary mode of mass transit options available to Chula Vista residents, Chula Vista has an above average usage of public transportation when compared regionally within the San Diego County.⁴ The potential to increase public ridership is apparent with the growing need. The City has four high frequency bus routes and a future bus rapid transit route under construction:

High Frequency Routes/Corridors:

- Route 932: Broadway between Northern City Limits to Southern City Limits
- Route 929: Third Avenue between Northern City Limits to Southern City Limits
- Route 709: H Street/East H Street between Interstate 5 to Southwestern College
- Route 932, 701, 704: Main Street between Hollister Street to Brandywine Avenue

Future Bus Rapid Transit Corridor:

- Southbay Bus Rapid Transit: I-805/East Palomar to Otay Mesa Transit Center/US-Mexico Border

⁴ County of San Diego, 2017,
http://www.sandiegocounty.gov/content/dam/sdc/hhsa/programs/phs/CHS/demographics/2015_Demographic_Profiles.pdf



Each of the high frequency routes have been designated by SANDAG as future regional bus rapid transit corridors. Two in particular have been identified as the top-ten most congested affected routes in the region which includes Route 929 and Route 709. The two bus routes represent a heavily used transit network due to its connectivity to the US-Mexico Border and a community college

located along the eastside of Chula Vista. Bus Route 709 is interconnected with the San Diego Blue Line Trolley which is located near Interstate 5 and is considered the regions highest ridership trolley service.

Recently, SANDAG conducted a planning study called “Improving Bus Operations and Traffic (IBOT)” which identified in the region where transit signal priority (TSP) technology would boost the efficiency of the transit system. The study consisted of a multi-dimensional analysis framework for all transit runs across the San Diego County to identify where reliability of transit service is being affected by congestion. Using automated passenger count to assess ridership, automated vehicle location (AVL) data to measure bus delay, signal timing and block length, and driver & passenger feedback surveys; the IBOT study identified H Street, Route 709 and Third Avenue, Route 929 as the two of the top-ten corridors that would most benefit from TSP implementation. The study conducted a cost-benefit analysis and found that implementing TSP on these corridors will improve transit operations, reduce transit trip times, and improve overall mobility.⁵ The results of this study have made evident the need to expand and implement TSP operations in Chula Vista. This need can be accomplished through the application of this grant.

5.4 Traffic Congestion Management Challenges

Historically, the City’s planning model spurred the development of suburbs outside the urban core that are characterized by separated land uses, especially between residential and non-residential uses. Zoning ordinances were used to create barriers to protect residential communities from mixed land-uses. This “conventional” planning model of separation was enabled by the automobile and the building of automobile-centric transportation infrastructure. This has included freeways that bifurcated the west and east side of City, large arterials, and wide local roads. This impact is felt today with average daily traffic volumes of major arterials reaching 30,000-50,000 vehicles. This has spurred a growing problem with managing traffic with infrastructure as the first line of defense.

In 1988, the City of Chula Vista formed the Growth Management Oversight Commission (GMOC). The GMOC was to monitor growth by establishing a set of standards of city services that protect the “quality of life” of residents. One of the established standards includes maintaining the Level of Service (LOS) of city streets by measuring average speeds. Through the years, the City has actively monitored traffic conditions and

⁵ SANDAG, IBOT, Nov 2016, http://sandag.org/uploads/publicationid/publicationid_2014_20482.pdf

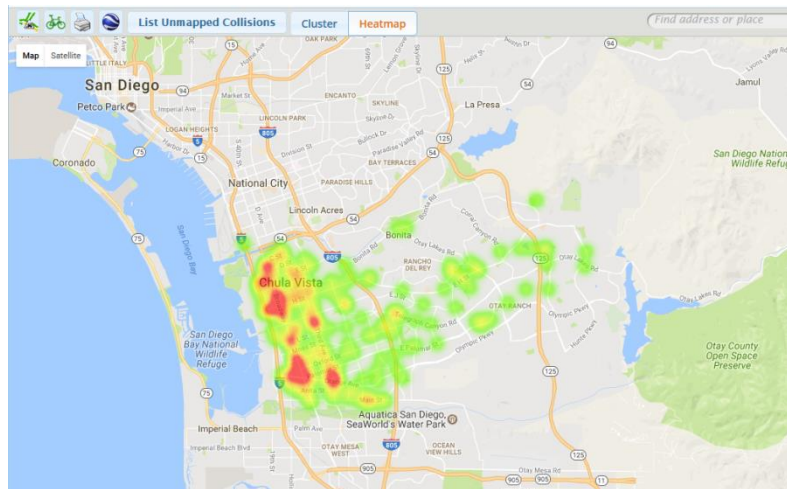
identified problem areas as the City grew. Increasingly, however, mitigating traffic congestion required a two-fold approach in infrastructure and non-infrastructure improvements. It is therefore the City's focus to implement technologies that can mitigate the traffic capacity issues faced today.

The continuing problem areas in Chula Vista include the trolley grade crossings, community college traffic, and traffic near interstate freeways. These roadways represent roadways which have exceeded capacity. Chula Vista is ready to implement strategies that mobilize traffic more effectively through route alternative solutions to improved signal operations.

5.5 Traffic & Public Safety-Related Challenges

5.5.1 Intersection Safety

An analysis of the Statewide Integrated Traffic Records System (SWITRS) over the last five years reports that a total of 6,088 persons were involved in 4,231 collisions on Chula Vista roads. The most prevalent type of collisions was classified as “C – Rear End” (34%) closely followed by “D – Broadside” (26.2%), with the primary collision factor identified as “Traffic Signals and Signs” (at intersections) in 368 of the total collisions. The figure to the right provides a visual representation of the

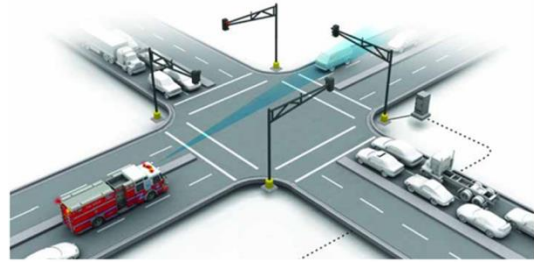


locations in the network where these crashes have occurred in the same time period. Note that the highest number of crashes took place along Broadway which is a main corridor that runs north-south in the western side of the city. This roadway has a very high pedestrian activity with commercial and retail opportunities. A number of improvements have been implemented on this corridor over the years; from traffic signal modifications and improved signage and striping to periodic police enforcement on the lookout for speeding and red light-running offenders with limited success. Our safety-focused proposal to address this ongoing issue would establish a Smart Corridor equipped with cutting-edge technology to enhance safety and efficiency in this area (Section 6.3).

5.5.2 Emergency Fire Response

The time it takes an ambulance/fire truck to respond to an emergency call is critical. Seconds are precious and can be the difference between life and death and/or loss of property. A measure of every Fire Department's effectiveness is their fire response time.

The City Fire Department fire response goal is 7 minutes 80 percent of the time, but, according to the City's Growth Management Oversight Commission (GMOC), our Fire Department has not met that goal for the past six years. As a point of reference, the National Fire Protection Association's "gold standard" for fire response time is under 6 minutes 90 percent of the time. In May 2017, Chula Vista's firefighter union president stated that our Fire Department has the worst fire response time in the state of California. To put this in a more real life/death perspective, with every minute it takes for Fire/ambulance to arrive to a cardiac event, a patient's chance of surviving drops 7 to 10 percent, according to the Sudden Cardiac Arrest Foundation. Therefore, it is absolutely critical that we address the fire response time in our city. Through the use of new technologies and transportation system improvements, we are able to provide solutions to significantly improve fire response times in our city (Section 6.3.3).



5.5.3 Street Lighting Systems

The City has a Chief Sustainability Officer who leads the City's Smart Cities program and manages the conservation and environmental services divisions who develop and implement the cities climate adaptation plan. In addition, Chula Vista has been a regional leader in energy savings and conservation for over a decade with the deployment of one of the first citywide LED street light implementations in the county. The installation of citywide LED street lights presented the City with a great opportunity to be more environmentally friendly in its approach to the use of energy conservation and significant savings versus the traditional High Pressure Sodium (HPS) lighting. However, at this



time, adaptive/intelligent street lighting systems have become available and represent a terrific option to reduce energy consumption, enhance asset management, and provide a receptacle for many advanced technology systems with various benefits to the community and various City departments. Through this grant, the City proposes a strategic deployment of intelligent and eco-friendly solutions with a suite of sensors to assist in the monitoring of various traffic and environmental issues (Section 6.3.1).

5.6 Infrastructure and Maintenance Challenges

Chula Vista size and population will continue to grow as large undeveloped areas along the southeastern boundary and Bayfront are poised for development. This will mean more

roads, more traffic, and increase in transportation demand management. It is therefore imperative that systems are in place to manage the various existing assets as well as those deployed under this grant. Monitoring these assets will be essential in preventative maintenance and prolonging the life of the systems deployed.

While it is important to integrate new technologies with existing assets and save on costs, it is also important to identify technologies that have become obsolete. Chula Vista's biggest challenge is to replace existing obsolete traffic controllers, communication equipment, and/or antiquated pole equipment. The asset management system and proposed improvements under the ATCMTD grant will help bridge the gap, allowing system operators to effectively maintain system health.

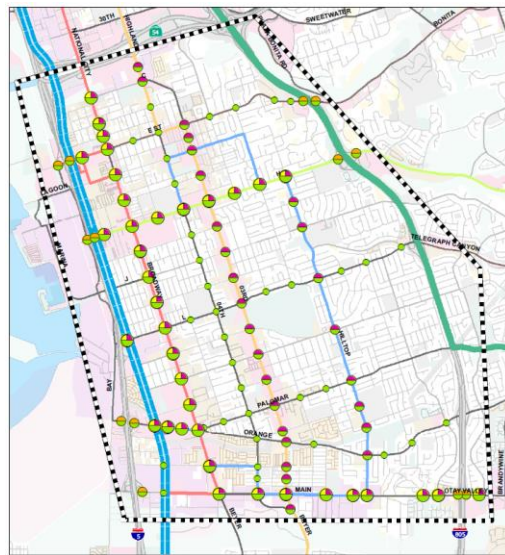
6.0 PROJECT IMPLEMENTATION/SOLUTIONS

6.1 Traffic Congestion Management Solutions

6.1.1 Adaptive Signal Control System

Adaptive traffic control systems is the most requested type of “Smart” technology in Chula Vista according to a recent survey conducted by the consultant that is developing the City's Smart City Strategic Action Plan.

Given this information, and our knowledge of the City network, we are proposing an expansion to our 28-signal adaptive traffic control system (located on the eastern part of the City) by enhancing over 50 traffic signals with adaptive capabilities. These systems will be deployed on the H Street, Broadway, Third Avenue, and Main Street corridors. These corridors are gateways to the City and will carry some of the most impacted bus routes in the county. In addition, signalized intersections that interact with railroad crossings on E Street, H Street, and Palomar Street will also be outfitted with adaptive traffic control systems to reduce congestion, provide immediate signal recovery following a railroad pre-emption event, and enhance safety at these intersections.

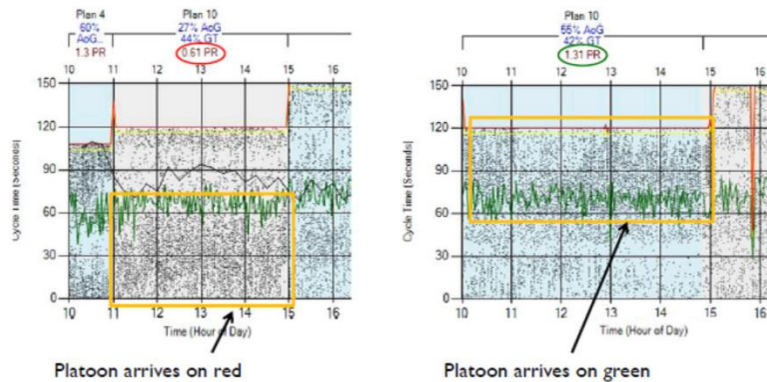


In line with our “Climate Action Plans,” these improvements will result in a tremendous reduction in fuel consumption and vehicle emissions that lead to high ozone levels. According to recent adaptive traffic control systems studies in San Diego, CA and Farmington, NM, adaptive traffic control systems have been proven to reduce vehicle emissions by up to 30 percent and travel times by over 40 percent.⁶

⁶ AECOM, Effectives Study East Main Street, September 2015

6.1.2 Signal Performance Measures

Through the installation of new Advanced Transportation Controllers (ATC), and using existing vehicle detection, the City will use an Automated Traffic Signal Performance Measurement System (ATSPMs) to collect and display high-resolution data that will serve as the framework for improved signal timing, enhanced safety, reduced fuel consumption, and better use of resources in our city.



As the signal timing is regularly optimized, traffic flow becomes more predictable and orderly, minimizing traffic congestion, and as a result improving safety at intersections. Traffic signal timing improvements using high-resolution data have accounted for reductions of 10 to 50 percent in the number of severe crashes at intersections and significant reductions in delays and travel times.

6.1.3 Advanced Traveler Information Systems

Transportation system users currently rely on the radio and various apps that provide travel time and general incident-related data. An enhanced system where drivers, cyclists, and pedestrians can make better commuting choices based on real-time information is key in order to create an environment where users are able to make decisions which result in a safer commute, reduction in GHG emissions and travel times.

In order to accomplish this objective, the City proposes the installation of a number of data collection devices throughout the City that will link to various CMS which will provide the user with alternate routes during incidents on the road. These signs will be placed at strategic locations on major corridors such as H Street, Main Street, Telegraph Canyon Road, Fourth Avenue, near the I-5, I-805, SR-125, and SR-54 in order to facilitate the safe and efficient flow of traffic during traffic incidents, special events, and/or emergency response events.

As most major cities, the City of Chula Vista encounters traffic challenges near the entrance/exit to major freeways. The CMS signs would draw travel, congestions, speed, data from the Wi-Fi/Bluetooth data collection devices and automatically post appropriate messages based on a pre-approved library of messages. This information will allow system users to make alternate route choices which will result in less congestion, faster travel times, and a reduction in the number of crashes that may occur due to the high traffic queues and driver frustration due to long delays.

In addition, given the location and weather characteristics of southern California, the City of Chula Vista has been susceptible to wildfires over the years. The most recent large wildfire took place in 2007 when thousands of residents were ordered to evacuate the eastern part of the City. The availability of the proposed CMS signs will allow City staff to implement appropriate messages to support these large evacuations and create a safer and more efficient environment for the community in these extremely hectic and uncertain moments.

CMS signs will also assist our Police Department in the safer and more efficient implementation of traffic control for the numerous events that take place at the Mattress Firm Amphitheater off Main Street. With a capacity of over 20,000 people, the amphitheater is home to dozens of musical acts, school graduations and other special events throughout the year. The proposed CMS signs will provide valuable information to drivers for a safer and more comfortable experience as they navigate the City's only reversible lane street configuration (Main Street) on their way to/from the amphitheater.

6.2 Mass Transit Solutions

6.2.1 Bus Rapid Transit Transportation System

The City seeks to deploy the following systems within the bus transit network to assist public transportation system operators or other shared mobility entities in managing and optimizing the provision of public transportation and mobility services:

6.2.1.1 Bus Rapid Transit Adaptive Signal Control

Adaptive signal control technology will be deployed to improve the mass transit network along four high frequency bus transit corridors in the City of Chula Vista. The deployment of an advance transportation management system such as adaptive signal control technology will provide an advance public transportation system that enhances reliability of transit service and reducing congestion. This endeavor will encompass regional objectives and goals that benefit the region in delivering an efficient bus rapid transit system.

The proposed scope of work includes installing new Advance Transportation Controllers (ATC) with adaptive signal control at the intersections and a new central system. These improvements will provide the operations needed to dynamically change the timing of the signals to achieve optimum performance of the bus rapid corridors.

The ability of a signal to adjust signal timing in real-time or in advance of bus priority activation has always been a challenge in controlling signals with bus priority. Commonly, signals would respond to a bus priority call by either extending the green or truncating vehicles phases to ensure buses remain on schedule by advancing through the intersection. The challenge that faces operators is to have a system that systematically balances the timing between vehicles, pedestrians, and buses by holistically creating or adjusting timing along a corridor of signals. The enhanced capabilities of an adaptive

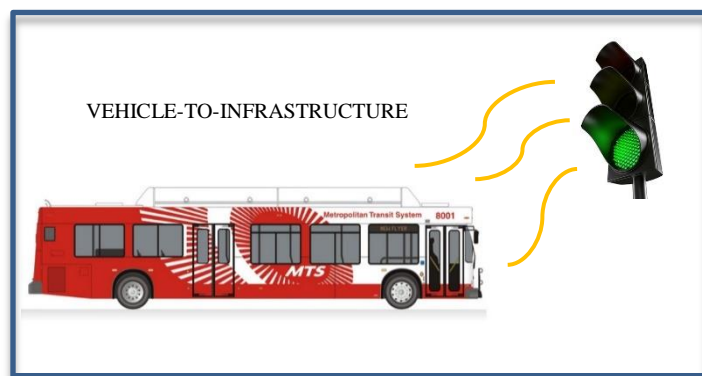
system provide the tools and features not typically found in basic traffic signal controllers. Bus priority operations can be enhanced by an adaptive system in two major ways: (1) improve recovery time of signals in resuming normal operations following a bus priority call, and (2) provide system triggers which allows operators to dynamically change signal timing along an entire network of signals.

Due to the priority given to buses at signals, this typically disrupts normal operations that can affect vehicle progression and green time. The adaptive system would assist in improving the time required for a signal to resume normal operations after a bus priority activation. This can be accomplished by the system by changing offsets or cycle times that ensure coordination or minimum phase green times is maintained at the intersection and/or holistically within the network. The adaptive system also provides the opportunity to set system triggers which allows intersections to communicate with adjacent signals to determine the appropriate timing plan or provide downstream advanced priority operations. Deploying an adaptive system with these technological capabilities provides the ability to more effectively manage traffic and create a more efficient, reliable signal system for bus rapid transit.

6.2.1.2 *Bus Traffic Light Information System*

To further enhance the reliability and operability of the bus transit network, the City seeks to deploy a Traffic Light Information System which provides a dashboard display of signal timing information to bus operators. This technology is most notably utilized as a vehicle-to-infrastructure communication system that provides vehicles an on-board display of remaining green time information. Current practice shows its application towards general traffic vehicles, however, this technology can be very useful if applied towards mass transit buses.

The City seeks to implement this technology along the four bus rapid transit corridors. Transmission of signal timing information and communication between buses with traffic signals will be accomplished through the installation of advanced transportation controllers at each of the intersections. The



deployment of this technology has most recently been seen in the City of Las Vegas and City of Palo Alto. The City of Chula Vista would like to showcase once again the potential of this technology and how it can be applied towards the mass transit system. Bus operators would essentially gain similar benefits from this technology. Traffic Information Systems would communicate with the bus and receive real-time information from the advanced transportation controllers. The bus would display on its driver instrument cluster the time remaining until the signal changes. The additional information

would assist the operator in making better driving decisions when accelerating or decelerating through an intersection. The on-board information can also be used to help optimize routes and provide an avenue for bus operators and traffic signal engineers to work together with the data shared. This will enable cross jurisdictional coordination and ultimately improve transit priority operations.

6.2.1.3 Wi-Fi Enabled Bus Stops

To encourage the use and ridership of mass transit, the City seeks to offer its users free Wi-Fi enabled bus stops through its comprehensive communication network. In the age of “Internet-of-Things”, also known as IoT, the ability for devices to connect to the internet has shown boundless opportunities for the transportation technology environment and its users. The City would leverage IoT devices to improve rider experience by achieving two objectives: (1) provide accessibility to an electronic paying system at bus stops and (2) increase accessibility to free public Wi-Fi. The City believes deploying these measures will help to improve the mass transit experience and ultimately increase public usage.

One of the challenges that faces mass transit is to provide an electronic paying system that is quick and easy to use. With the modernization of smart phones, users can pay electronically using the Wi-Fi provided at bus stops for bus fares. This method of payment can help to streamline fare collections by expediting the payment process with a quick scan of personal phones. This will help to reduce the time between the loading and unloading of passengers at bus stops and help better time efficiency of the transit network. Payment-by-phone can be accomplished today through either a transit agency app or third-party vendor (i.e. Apply Pay, Samsung Pay, Masterpass, etc.) Currently, the MTS agency is utilizing a smart card paying system called the “Compass Cloud”.

The Compass Cloud is a mobile ticketing app which enables users to purchase fare tickets or passes and use immediately through their personal smart phones. The Compass Cloud is currently accepted everywhere in the San Diego Metropolitan Area and is widely used. The opportunity to provide added accessibility to the internet through Wi-Fi-equipped bus stops will help to encourage the use of an electronic paying system that is available today.



A free public Wi-Fi will also help to assist the population of underprivileged users which may not have access to the internet or is limited by their service provided. Users can rest assure their data rates will not be affected when connecting to the free public Wi-Fi service while using the Compass Cloud. The free internet service will help to promote a more user friendly, accessible public transportation system that enhances rider experience. Users will also benefit from internet access to help perform internet driven activities that are vital in today’s modern world. This includes access to internet services from health

care, to education, to communication with family or friends, to professional networking. The added convenience of a free public Wi-Fi will help to ease idle time of passengers and also provide increased connectivity to vital public services and communication.

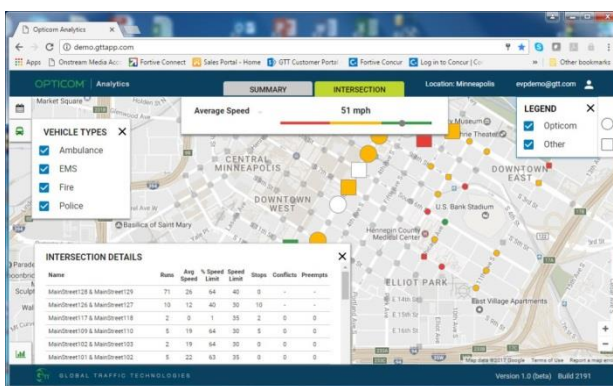
Implementation of Wi-Fi services at City bus stops would be accomplished in cooperation with MTS. Existing bus stops will be retrofitted with communication equipment to establish Wi-Fi connectivity. The installation would include a router, modem or wireless radio (when connecting to a traffic signal), and standalone power supply. Internet access will be provided through a third-party service provider on a dedicated, managed network requiring user registration. This process will help to manage network capacity and provide data to the City and Transit Operators regarding the usage of the system.

6.2.1.4 *Global Positioning System*

Advance transit operations will be achieved through the deployment of a Global Positioning System (GPS) technology. The GPS enabled system will provide enhanced Transit Signal Priority (TSP) operations that boost the efficiency of the transit system in reducing transit travel time. The TSP operations, coupled with GPS, would be deployed along the bus rapid corridors. By implementing TSP technology, transit travel times are expected to be reduced up to 10 percent during peak hours.⁷

The GPS TSP will also serve to help increase transit efficiency by streamlining data acquisition and analysis of bus priority operations. The proposed technology also provides a long-term solution in maintaining system performance of the transit network.

By implementing a GPS based bus rapid system, traffic engineers can systematically record and track bus priority operations at every intersection. This information can be viewed live or historically through a GPS management system. The system would provide information regarding vehicle run times, speed, and priority activation calls. The



data collected will help system operators to help optimize bus routes and identify trouble spots within the City. Modern GSP TSP systems like Global Traffic Technologies (GTT) systems are equipped with management tools and data analytic features that help to optimize transit operations by collecting and disseminating data into user-friendly graphs, charts, and interactive maps.

Several examples include displaying map data regarding vehicle speeds at intersections, number of stops, and travel time runs. The City believes the proposed technology will

⁷ SANDAG, November 2016, http://sandag.org/uploads/publicationid/publicationid_2014_20482.pdf

help to advance the collection of data that is necessary to maintaining bus serviceability and reliability.

The deployment of a GPS bus rapid system would require equipping the existing traffic signal cabinets with GPS detector cards and antennas and retrofitting MTS buses with new GPS transmitters. The scope of work would also include programming and system integration of GPS devices, software, and installation of a new server or cloud-based operating system.

6.3 Traffic & Public Safety-Related Solutions

6.3.1 Intersection Safety

In January 2017, USDOT named Chula Vista, in partnership with SANDAG and Caltrans, as one of ten Autonomous Vehicle Proving Ground sites in the nation. The City understands that with this designation, one of the expectations is that we welcome the use

of advanced technology for transportation applications. We completely embrace that expectation and, as part of this grant, the City will establish a Smart Corridor on the entire length of Broadway (4 miles) to help address a number of crash hot spots and to set a path for a replicable system that can be deployed in other parts of our city and/or anywhere in the world. Having received the



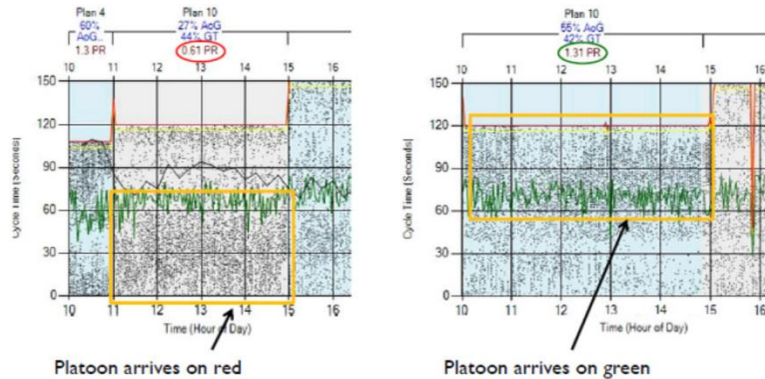
Federal designation as an Autonomous Vehicle Proving Ground, we know that we must interact with vehicles in a different way. Using the skill of the international Standards Development Organizations (SDO), the City will instrument the corridor with advanced digital infrastructure at each signalized intersection. This infrastructure will deliver precise signal operations data to these vehicles including the exact geometry of the intersection, and signal phase and timing information.

Non-autonomous vehicles, on this corridor and throughout the city, will also be able to receive information from our traffic signals via a Smartphone app or onboard displays which are included in a number of late-model vehicles. These vehicles will be able to survey our traffic signal infrastructure and view the Signal Phasing and Timing (SPaT) information as they approach a signalized



intersection. This technology provides drivers an enhanced level of service that can result in better decision making and a reduction in red light running.

In addition, through the installation of new Advanced Transportation Controller, and using existing vehicle detection, the City will use an Automated Traffic Signal Performance Measurement System (ATSPMs) to collect and display high-resolution data that will serve as the framework for improved signal timing, enhanced safety, reduced fuel consumption, and better use of resources in our city. As the signal timing is regularly optimized, traffic flow becomes more predictable and orderly, minimizing traffic congestion, and as result improving safety at intersections. Traffic signal timing improvements using high-resolution data have accounted for reductions of 10 to 50 percent in the number of severe crashes at intersections.



All of the data that will be available through the installation of new sensors, traffic signal controllers, and traffic monitoring systems will provide a more complete set of information for the City's Data-Driven Safety Analysis (DDSA) efforts.

6.3.2 Red Light Running Prevention & Analytics Using CCTV's

Closed Circuit Television (CCTV) cameras have become more advanced and affordable in recent years. As a result, Chula Vista has adopted a policy of installing a CCTV camera at every new traffic signal as part of its Capital Improvements Program (CIP) and as a requirement to land developers. The purpose of these cameras is to assist City staff in their traffic monitoring efforts and make best use of available time and resources.

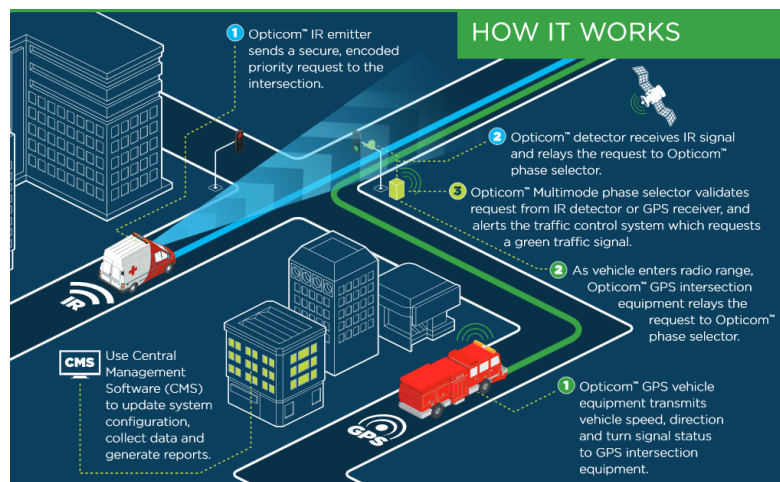
A relatively untapped function of these cameras is their sophisticated built-in analytics systems. Given that most of these ITS cameras were born out of the police/security surveillance and/or military world, they are excellent at tracking vehicles. Through this grant, the City will install dozens of CCTV at strategic locations to capture and analyze red light running patterns at signalized intersections. Using the cameras' advanced analytics; we will be able to determine when/where vehicles are running red lights (or speeding) so that our police department can focus their enforcement efforts. As we struggle with limited staff and budgets, it is critical that we use technology to enhance safety AND maximize the return on our investments.

6.3.3 GPS-Enabled Emergency Fire Response System

The City's substandard performance in fire response time must be immediately addressed. With the worst fire response time in the state, Chula Vista's deployment of a citywide GPS-enabled emergency fire response system at all signalized intersections will make a significant impact and provide better and faster service to our citizens at the times when they are in need of immediate/critical assistance. GPS-enabled emergency response systems have improved fire/ambulance vehicles' response times by as much as 30 percent.⁸ Given the City's, roadway network, population density, and budget limitations for the addition of more fire stations and fire personnel, a GPS-enabled fire response system becomes a tremendous opportunity for the City to take advantage of a proven technology with a history of successful deployments throughout the country.

The deployment of this system would be extremely efficient as it would be completed in combination with the deployment of our proposed transit signal priority enhancements.

Our new GPS-enabled system would repurpose some of our existing intersection infrared emergency vehicle pre-emption technology and allow us to implement a dual system (infrared & GPS) which would support our surrounding neighbors' fire/ambulance vehicles (still using infrared emitters) to provide aid to Chula Vista's Fire



Department in times of need. The GPS-enabled system does not require line-of-sight and provides a less abrupt traffic signal pre-emption event which lead to the increased levels of performance and safety at intersections.

Using the same in-cabinet equipment as the transit signal priority system, we are able to provide a mutli-benefit system to our community and set a definite path for future freight priority applications as well (using low priority signal similar to transit signal priority).

6.3.4 Closed Circuit Television Cameras for Public Safety

As the city deploys CCTV cameras to support traffic monitoring and management efforts, we see an opportunity to support other City departments and provide superior levels of service to our community. As noted earlier, ITS CCTV cameras are essentially



⁸ Clark County Fire Department, GPS Fire Response, <http://www.clarkcountynv.gov/fire/Pages/default.aspx>

surveillance cameras that have been augmented to provide transportation-related analytics and, in some cases, ruggedized to survive more harsh outdoor environments.

The installation of high-definition ITS cameras will allow the traffic engineering branch to share video and information with our police, fire, and others in case of emergencies and/or for response to specific incidents or to support specific surveillance efforts. With new ITS cameras that can provide 360-degree views and also provide pan-tilt-zoom (PTZ) capabilities, modern cameras are able to serve many needs and requirements in one solution.

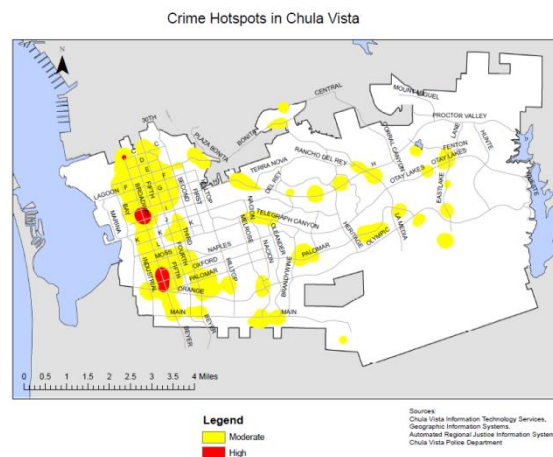
6.3.5 *Intelligent Street Lighting for Public Safety*

In recent years, the enhancements to street lighting systems have gone beyond the improvements in lighting and fixture technology; they have become a true intelligent and extremely valuable tool to support many other aspects of transportation, public safety, communications, and more.

Chula Vista has been a leader in the use of LED technology and with our Smart City Initiative; we continue to look for ways to use this type of infrastructure to enhance the levels of service provided to our residents. Using funds from the ATCMTD grant, we will install adaptive nodes, upgraded street light fixtures, a myriad of sensors, and an intelligent street light management system to oversee all of this technology.

The City has already adopted the use of the 7-pin connector on all of its new fixtures and is in the process of completing tests/demonstrations on two different types of intelligent street light technology. Given our work on these two test beds, we are confident on what these systems represent and we are capable of taking full advantage of the benefits that they have to offer.

The efforts associated with this grant will focus our deployment of new street lights in the high crime areas of the City with the placement of some street lights at other strategic locations to support our traffic data collection efforts as well as vehicle emission and particles measurement endeavors. As shown on the map to the right, most of our high crime areas are on the western portion of the City. Additional/improved lighting systems will bring an enhancement to our residents' quality of life and allow us to deploy technology such as the "shot spotter" at certain locations to help our police department track down and reduce crime in those areas.



These intelligent street lights are essentially communication hubs so, in addition to the work described above, they will also open up many other possibilities such as the expansion of our municipal Wi-Fi network and the deployment of sensors and communications systems to support autonomous vehicle testing and demonstrations in the near future.

6.3.6 Pedestrian Traffic Light Information System

With vehicle-to-infrastructure technology available today through advance transportation controllers, the City seeks to deploy a Traffic Light Information System to address pedestrian safety at signalized intersections or mid-block crosswalks. According to SWITRS data from 2007 to 2016, pedestrian collisions are on the rise in Chula Vista. The traffic light information system will help to provide on-board notification to approaching vehicles when a pedestrian light is on at an intersection or crosswalk. This would aid to alert drivers to watch for pedestrian when approaching an intersection or midblock crosswalk. The information would be transmitted to the vehicle similar to the application mentioned previously (i.e. green time remaining). In contrast, the information transmitted would be regarding the on and off state of the pedestrian indication.

6.4 Connected Wi-Fi Signals

As a city focused on providing the best quality services to our residents and maximizing our resources, Chula Vista will install a fast, 1-Gig, municipal Wi-Fi solution throughout the city. The municipal Wi-Fi will be created using traffic signal cabinets as “hot spots” with repeater sites near/at bus stops to provide connectivity to its residents. Our new intelligent street lights will serve as excellent repeater sites and/or hot spots for our Wi-Fi deployment.



Given the density of our population (especially low income) and traffic signals on the west side of the City, the Wi-Fi implementation will be particularly strong in this area and serve a number of purposes including providing connectivity (or improved connectivity) to the more disadvantaged communities in the City and the following:

- ♦ Disaster relief/emergency evacuations
- ♦ Educational opportunities
 - Students (of all ages) can study online and/or receive assistance with homework online
- ♦ Employment search/research
- ♦ Improved access to health services/accounts
 - Individuals & families can view/schedule appointments
 - Individuals/families can access online workshops and other information to encourage a healthier lifestyle
- ♦ Improved access to City services
 - Connect to City's ACT Chula Vista App to report maintenance/operational issues
 - Access a variety of services on the City's website:
<http://www.chulavistaca.gov/>

In addition, this Wi-Fi network will be dual-purpose. It will also provide connectivity, on a separate-secure network, to City staff operating in the field throughout the City. This will allow for greater levels of efficiency as staff, at various levels/disciplines, is able to quickly access information/data to update or issue new requests on the various City asset/data management systems.

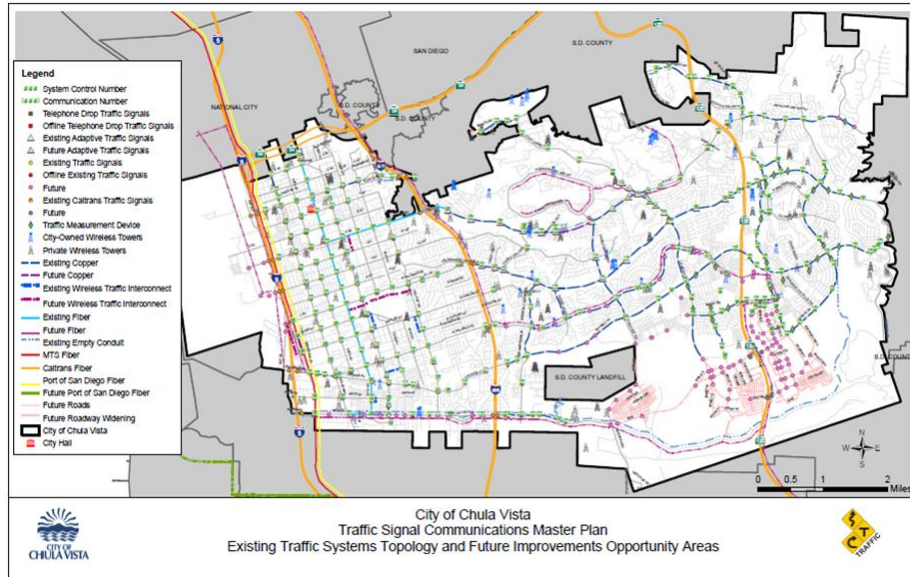
The new Wi-Fi system will also provide connectivity to advanced transportation technology, such as autonomous and automated vehicles, which may operate on a W-Fi system.

Finally, where others have struggled/failed in their “free” Wi-Fi installations, Chula Vista will succeed in the implementation of the municipal Wi-Fi because of the following:

- ♦ Partner with local vendors/providers for the implementation of the network
- ♦ Leverage existing wireless and fiber communications infrastructure
- ♦ Add-on to the communications equipment that is part of the traffic signal communications infrastructure
- ♦ Establish strategic “hot spots” and repeater sites to serve the public, primarily on the west side of the city, rather than a citywide network with complete coverage
- ♦ Design the network with scalability in mind for future expansion as the City continues its path to a Smart City

6.5 Communications Systems Upgrades

Chula Vista completed its Traffic Signal Communications Master Plan in June 2017. This Master Plan was an ambitious and necessary endeavor for the City. Although over 90 percent of the City’s 267 traffic signals are connected to a central master traffic signal system. These connections are over old telephone lines with 56k modems. This type of communications is extremely costly, limiting, and obsolete. Using the Master Plan as a guide, the City has started the process to abandon the costly telephone line communications and switch to cellular communications (as an intermediate step). In addition, the City has adopted new specifications and standards of communications and transportation system technologies for all new projects moving forward.



Through the ATCMTD grant, the City will deploy a high-capacity wireless radio communications system on the west side of the city which will carry/support:

- ◆ Traffic signal data
- ◆ HD ITS cameras
- ◆ Data collection systems
- ◆ Intelligent street light technologies
- ◆ Municipal Wi-Fi
- ◆ Other Smart City applications

The proposed wireless network would tie into existing City fiber optics (along 4th Avenue and H Street) and, also, to privately-owned fiber optics systems in the City. Note that the City has initiated conversations with local vendors to discuss opportunities to partner up in order to provide system redundancy and lower our deployment costs.

On the east side, we will also establish a high capacity network. However, given the existing conditions, we are able to repurpose some of our existing infrastructure to:

- ◆ Repurpose existing copper to implement Ethernet-over-copper applications
- ◆ Install fiber optic cable in existing conduits
- ◆ Install high-capacity radios to tie into the City's existing pump station radio network which is currently being upgraded

The extensive privately-owned (empty) conduit network throughout the City will provide an opportunity for us to meet our goal of establishing a fully-connected, redundant, reliable, and robust transportation system network with opportunities to support other departments/agencies citywide. This new network will be the foundation for our Smart City deployments which will best make use of cutting-edge technology to maximize the use of our City resources and provide a better quality of life to our residents through transportation.

6.6 Asset Management Systems

6.6.1 Traffic Signal Communications & Wi-Fi Devices

IP based traffic signal communication equipment and Wi-Fi devices will be managed through an IT inventory management system. The proposed system will provide a centralized system that includes software audit & inventory, asset management, active directory management, and Simple Network Management Protocol (SNMP).

Fiber optic infrastructure will be managed utilizing an Optical Time Domain Reflector system that provide reporting and alerting of fiber optic link status and testing.

6.6.2 Signal Pole and ITS Cabinet Equipment

Traffic signal pole and cabinet equipment will be managed through a mobile asset management system with an integrated barcoding registry system and maintenance log tracker. The system will allow maintenance operators to quickly inventory assets, provide remote monitoring, and report and query assets. In addition, cabinet health devices similar to DA-300 will be installed to monitor critical traffic equipment and intersection faults.

7.0 PROJECT SCHEDULE

The implementaion schedule of the proposed solutions is detailed in Appendix B of this proposal.

8.0 Performance Monitoring Plan

8.1 Traffic Congestion

A variety of software models will be utilized to calculate traffic congestion levels in the City. In addition, advanced data collection systems that collect and report travel time data will provide valuable information to our engineers (and residents) as they optimize the system. With the installation of ITS traffic monitoring cameras, City staff will be able to, in real time, evaluate and respond remotely to traffic challenges throughout the City. The City has been working towards and is ready to play a key role in the transportation system's innovations arena (City's brand new TMC to the right).

A fully connected network of traffic signals, sensors, and traffic monitoring cameras will be critical to the successful deployment of a transportation system that will be a model to others in the region, and the rest of the country.



8.2 Ozone Emissions

Chula Vista will utilize a number of software models to estimate vehicle emissions and ozone using its new data collection devices, traffic signal central system, and ATC controllers. In addition, to more accurately and to confirm that data, the City proposes the use of gas and particle emission measuring sensors on all of the intelligent street lights that are being installed as part of this grant. The City will deploy intelligent street lights with these sensors at various locations, throughout the City, to assist with the data collection and reporting efforts.

8.3 *Emergency Vehicle Response Times*

The Fire Department, in collaboration with the traffic engineering branch, will work together to gather fire response times. The Fire Department is already required to report its fire response times to the City's GMOC group. However, in addition, to measure the effectiveness of this deployment we will use the GPS-enabled system's analytics to report on aggregated travel time of response calls across all preemption equipped vehicles. We will provide the necessary reports to USDOT, as needed.

8.4 Intersection Safety

Chula Vista will use Data-Driven Safety Analysis (DDSA) tools to perform annual reviews of its high crash locations in order to provide an enhanced level of service and safety to the road users. In addition, semi-annual evaluations will be conducted for intersections with high crash rates within the past three years. These thorough evaluations, and the use of advanced technology, will result in a safer transportation safety for all users.

8.5 Mass Transit

Bus transit travel times, speeds, and number of stops will be utilized to measure the effectiveness of the GPS EVPE system including analyzing signal timing and vehicle delay logs from the adaptive signal control system. The City will collaborate closely with MTS staff to identify troubles spots and gather feedback from bus operators. A Chula Vista-MTS working group will be formed and will meet yearly to discuss system operations once fully implemented.

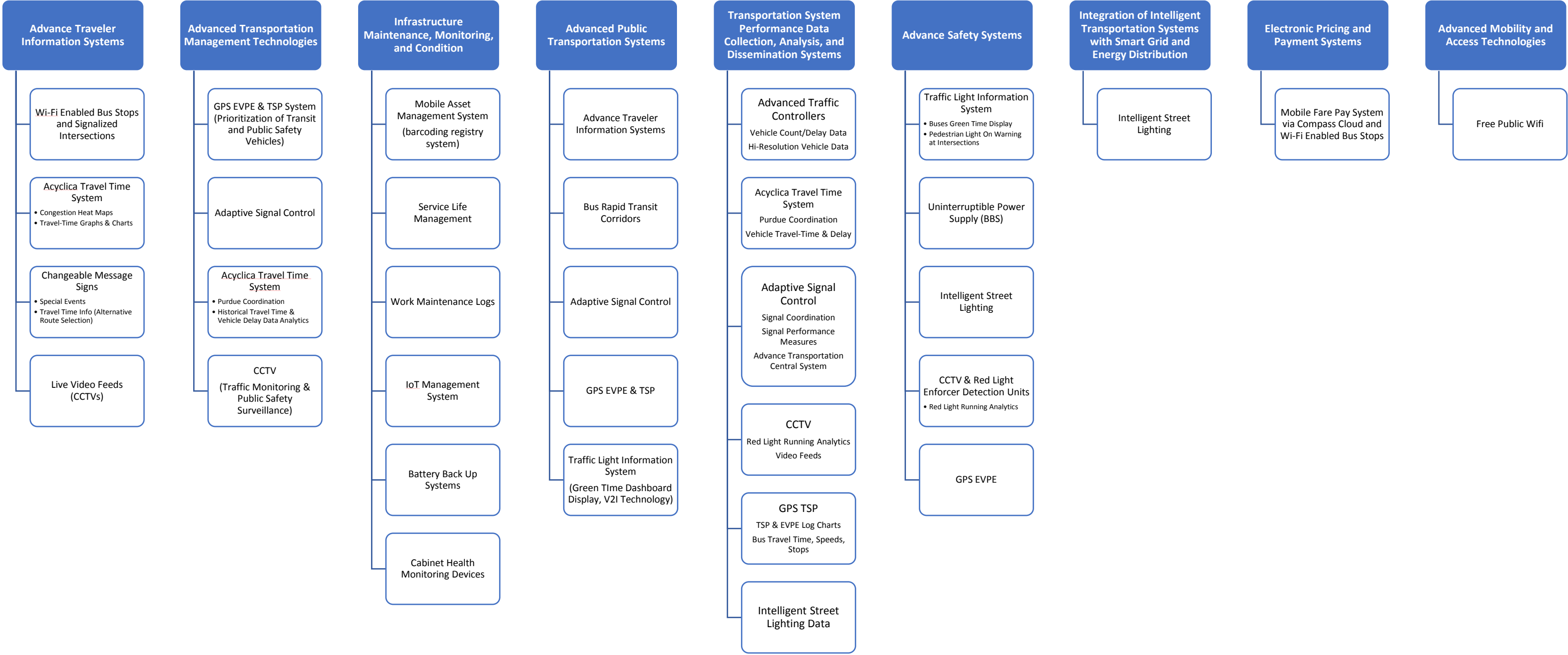
8.6 Energy Conservation

Chula Vista will utilize various software models to estimate energy usage as it relates to vehicle fuel consumption and other transportation-related uses. However, it will rely on its new intelligent street lighting system to report on actual electricity usage given that this new system will allow for dimming and motion-activated lighting controls.



APPENDIX A: Project Concepts

ATCMTD GRANT INITIATIVES & CITY OF CHULA VISTA’S MAP-21 PROJECT



APPENDIX B: Project Schedule



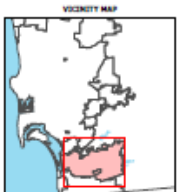
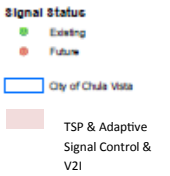
Project Schedule

	YEAR 1				YEAR 2				YEAR 3				YEAR 4			
	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4
Program Award and Agreement																
Preliminary Engineering and Environmental																
Traffic Engineering and Design																
Construction Engineering																
Project Implementation																
Kick-off Meeting																
Monthly Progress Reports																
Annual Reports																
Traffic Signal Controllers																
Adaptive Traffic Signal Control System - Consultant																
Controller Data Conversion																
Advance Transportation Management System																
Traffic Light Information System (V21)																
Communication System Infrastructure Upgrades																
Wireless Communication System																
Public Wi-Fi																
Street Lights																
Traffic Signal System and Equipment Upgrades																
Emergency Vehicle Preemption System																
Changeable Message Signs/Travel Time System																
Bus Signal Priority and Vehicle Traffic Light Information System																
Systems Optimization and Final Inspection																
Notice of Acceptance																
Project Closeout																

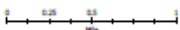
NOTE: The performance evaluation of advanced transportation technology deployment will start upon completion of the project.

APPENDIX C: Project Maps

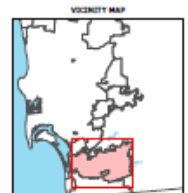
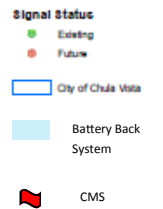
TSP & Adaptive Signal Control & V2I Deployments



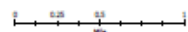
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CMS, Battery Back Ups

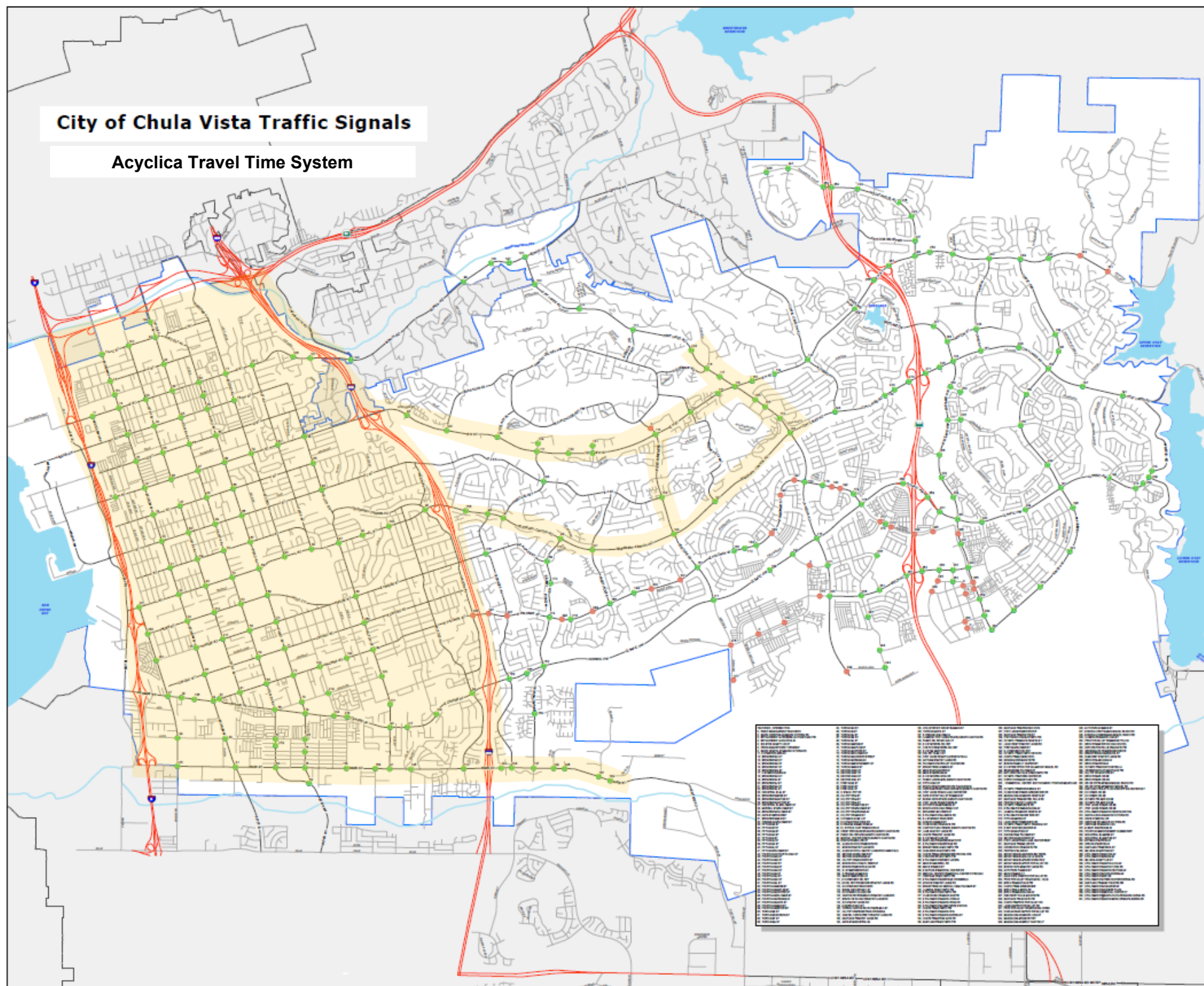


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City of Chula Vista Traffic Signals

Acyclica Travel Time System

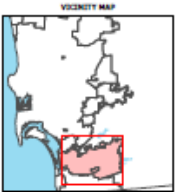


Signal Status

- Existing
● Future

 City of Chula Vista

Acyclica Travel
Time System



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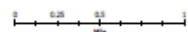
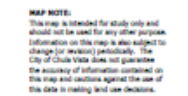


CHULA VISTA
GEOGRAPHIC INFORMATION SYSTEMS

Wi-Fi Signals & Bus Stops

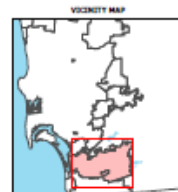
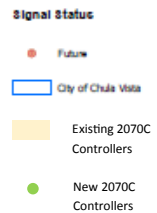
● Existing
● Future

Wi-Fi Signals & Bus Stops

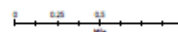


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2070C Controller Upgrades

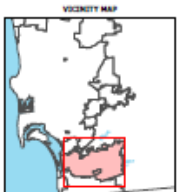
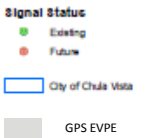


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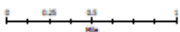


CHULA VISTA
GEOGRAPHIC INFORMATION SYSTEM

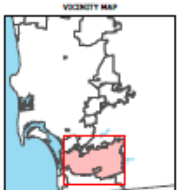
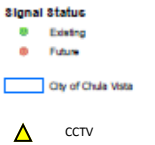
GPS EVPE



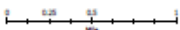
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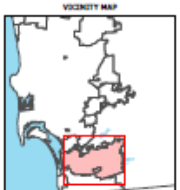
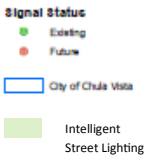
CCTV Deployments



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Intelligent Street Lighting



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