

Contra Costa Transportation Authority and Metropolitan Transportation Commission's **Innovate 680 Advanced Transportation and Congestion Management Technologies Deployment Initiative Grant Application**

Response to Notice of Funding Opportunity (NOFO) # 693JJ317NF0001



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June 12, 2017

Project Name:

Contra Costa Transportation Authority and
Metropolitan Transportation Commission's
**Innovate 680 Advanced Transportation and
Congestion Management Technologies
Deployment Initiative**



Eligible Entity Applying to Receive Federal Funding	Contra Costa Transportation Authority (CCTA)
Total Project Cost (from all sources)	\$ 39,000,000
ATCMTD Request	\$ 12,000,000
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:	
• Transportation Improvement Program (TIP)	Yes
• Statewide Transportation Improvement Program (STIP)	Yes
• MPO Long Range Transportation Plan	Yes
• State Long Range Transportation Plan	Yes
Technologies Proposed to Be Deployed (briefly list)	Mobile Application Shared Autonomous Vehicles Decision Support System Dedicational Short Range Communication Cybersecurity Adaptive Ramp Metering



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Table of Contents

EXECUTIVE SUMMARY	1
1 Project Narrative	6
1.1 Innovate 680.....	6
Introduction – Long term corridor goals.....	6
Enhanced Transportation Demand Strategies	7
New 511 Transportation App For Transportation and Demand Management	8
Shared Mobility Program.....	9
Provide FM/LM Connections	10
SAVs – First Mile/Last Mile Connection	10
Innovative Operational Strategies.....	12
Decision Support System (DSS).....	13
Incident Management.....	15
Adaptive Ramp Metering (ARM).....	17
Prepare Corridor (and our Transportation Network) for the Future	18
DSRC and Mobile Software App (V2I).....	19
Cybersecurity	20
Complete the I-680 HOV/Express Lanes in Contra Costa County.....	21
Cool Corridor “Hot Spots”.....	21
Increase Efficiency of Bus Services	21
1.2 Agreement Entities.....	22
1.3 I-680 Corridor	22
1.4 Real World Issues and Challenges.....	23
1.5 Transportation Systems & Services	23
1.6 Operations & Maintenance	24
1.7 Legislation and Regulations.....	24
1.8 Performance Measures.....	24
1.9 Expected Benefits	24

1.10	Innovate 680 Partners Ecosystem	24
1.11	Existing Assets.....	25
1.12	Supporting Programs	25
2	Staffing Description	26
2.1	Management Structure and Key Personnel.....	26
2.2	Primary POC	27
2.3	Leadership Staff Bios.....	27
2.4	Key Implementation Staff bios	27
3	Funding Description and Schedule	29
Appendix A - Resumes		

EXECUTIVE SUMMARY

The San Francisco Bay Area is a global leader in the field of Connected Autonomous Vehicles (CAV). The center of our CAV work is GoMentum Station, recognized as one of the ten United States Department of Transportation (USDOT) Autonomous Vehicle Proving Ground (AVPG) locations. The Bay Area is at the epicenter of technological development, and we are leading the way in “redefining mobility” by utilizing advanced transportation technologies. Building on our current success at GoMentum Station and throughout the Bay Area, our impact in advancing transportation technologies goes beyond the Bay Area Region. The GoMentum Station Program has partners throughout the world and we expect to have a profound impact on communities throughout the Bay Area and United States by improving mobility, enhancing Vision Zero safety efforts, addressing climate change, creating ladders of opportunity, and providing USDOT with a congestion management deployment model that can be replicated elsewhere in the United States.

The Contra Costa Transportation Authority (CCTA) and GoMentum Station are pleased to submit this proposal in partnership with the San Francisco Bay Area Metropolitan Transportation Commission (MTC), and with implementation support from the California Department of Transportation (Caltrans).

We applaud the USDOT’s leadership in promoting innovative transportation solutions through the Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) program. The goals of this program are consistent with our mission and the innovative solutions proposed for I-680, which is one of the most congested corridors in San Francisco Bay Area.

Lead Agencies - CCTA is a public agency formed by Contra Costa County voters in 1988 to manage the County’s transportation sales tax program. CCTA is responsible for maintaining and improving the County’s transportation infrastructure projects and programs that connect our communities, foster a strong economy, increase sustainability, and safely and efficiently get people where they need to go. CCTA is also the County’s designated Congestion Management Agency (CMA), responsible for putting programs in place to keep traffic levels manageable.

MTC is the transportation planning, financing, and coordinating agency for the nine-county San Francisco Bay Area. It serves as the metropolitan planning organization (MPO), as a toll authority, and as the Service Authority for Freeways and Expressways (SAFE).

GoMentum Station is a recently formed non-profit entity in California (2014) and now is one of the ten USDOT designated AVPG facilities in the United States and one of the largest CAV testbeds in the world with on-going active testing. Based in Concord, California, GoMentum Station is where CCTA and partners lead and facilitate a collaborative partnership among multiple auto manufacturers, Original Equipment Manufacturers (OEMs) and Tier-1 suppliers; technology and communications companies; Roadway Equipment Vendors (REVs); analytic companies, insurance companies; researchers and academic institutions; public agencies, and professional organizations.

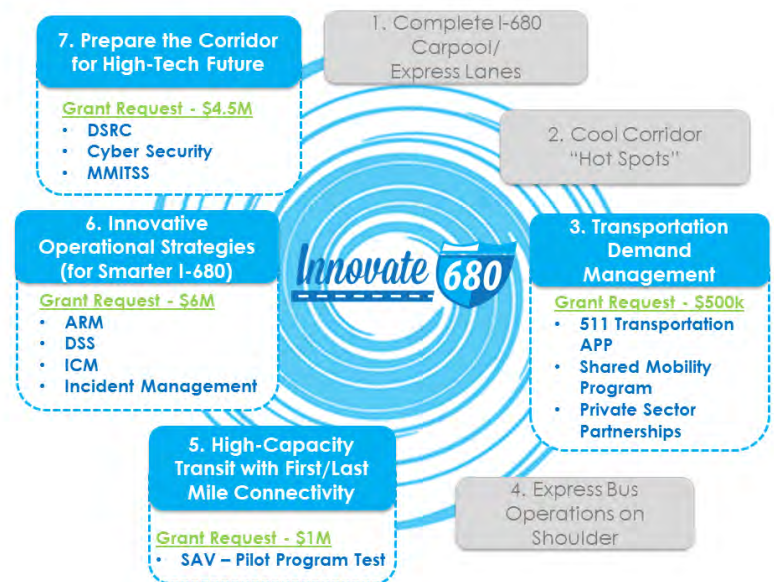
Challenges - Interstate 680 is one of the major north-south corridors in Contra Costa County and has been one of the 5th most congested corridors in San Francisco Bay Area for the last ten years. The corridor experiences significant delays and inconsistent flow of traffic in both directions, and these delays are expected to continue in the foreseeable future. Expanding and widening I-680 is an expensive option, and building additional rail service in the Corridor would cost billions of dollars. Neither option is financially feasible or would adequately address our congestion problem.

Goals – In addressing our short-term (next four years) congestion challenges, we have collectively developed the following goals for I-680:

- Improve safety, efficiency, and reliability on I-680
- Develop and integrate advanced transportation technologies to manage congestion
- Shift people from Single Occupant Vehicles (SOV) to shared mobility
- Accommodate the high percentage of residents who do not have access to transit with alternative modes of transportation through on-demand mobility
- Provide mobility for residents who have limited or no access to vehicles, including the disabled and elderly

Solutions – The **overall** *Innovate 680* program includes the seven strategies shown here within an innovative Transportation System Management & Operations (TSM&O) approach.

Each of the seven strategies includes multiple integrated elements to address our congestion challenges and deliver benefits to travelers. The ATCMTD funding request focuses on the four corridor strategies that can be implemented within four years:



Short-Term Strategies – Four Year Implementation Period

Figure A

This ATCMTD grant request will focus on the *Innovate 680* strategies which utilize advanced technologies to improve corridor mobility, reliability, economic vitality, sustainability, safety, and air quality while providing long term and sustainable solutions. The selected short-term strategies and technology elements are:

Corridor Strategy 3: Enhance Transportation Demand Management (TDM) Strategies

The 511 Contra Costa program is the travel demand management team for Contra Costa County. It has committed funding through 2024 and it is expanding its capability's through Transportation Network Companies (TNCs) and other private sector partners. ATCMTD funding will support the expanded shared mobility programs, expanded public/private innovative

technology solutions and the development of a new App for smartphones to facilitate non-SOV trips in the I-680 Corridor.

Corridor Strategy No. 5: Provide First Mile/Last Mile Connections

This strategy includes piloting Shared Autonomous Vehicle (SAV) service to BART, a program that is currently underway to shift travelers from Single Occupant Vehicles (SOV). This would build on a comprehensive SAV program being implemented at GoMentum Station.

Corridor Strategy No. 6: Innovative Operational Strategies

This strategy includes advancing Integrated Corridor Management (ICM)/Active Traffic Management (ATM) in the I-680 Corridor to another level and building on our current success along the recently completed I-80 Corridor ICM project. This will include but is not limited to building a proactive Decision Support System (DSS) and providing Adaptive Ramp Metering (ARM) to accompany the current ATM system and building a next generation Transportation Management Center that can accommodate CAV and Smart City elements.

Corridor Strategy No. 7: Prepare the Corridor for a High-Tech Future

This strategy will prepare the freeway and arterial corridors for CAV and Vehicle-to-Infrastructure (V2I) connectivity utilizing Dedicated Short Range Communications (DSRCs), On-Board Units (OBUs) and Roadside Units (RSUs) consistent with USDOT/FHWA strategies in implementation of Connected Vehicles (CV) applications. This strategy will also include implementation of a cybersecurity protocol for all deployed technology components.

Longer Term Strategies

Corridor strategies 1, 2, and 4 shown in Figure A are part of the longer-term *Innovate 680* program and are not part of this funding request. The short-term strategies selected in Figure A, will complement the longer-term strategies from a Corridor perspective. More detailed information on the longer-term strategies can be found in Section 1.1.

Why Innovate 680?

We are in a unique position to carry out *Innovate 680* for the following reasons:

Collaboration at all levels. In the last 18 months, we have built unprecedented collaboration and consensus with secured commitment at all levels of local government and with private enterprises in our community. This includes our key stakeholders (MTC and Caltrans); Bay Area Air Quality Management District (BAAQMD); Bay Area Rapid Transit (BART); all bus transit properties (County Connection, Tri-Delta Transit, and Livermore Valley Transit Authority); local jurisdictions; legislative and community leaders; a major developer along the corridor (Sunset development); and a number of private entities including Stantec, Bishop Ranch, EasyMile, BestMile, First Transit, Cisco, HERE and Telegra. (See letter of commitment on page 5 from MTC and Caltrans and all other letters of support in Volume 2 -Appendix D.)

The GoMentum Station program is now an international Autonomous Vehicle Proving Ground (AVPG) and a leading CAV deployment facility and is built for the sole purpose of addressing the significant congestion, safety, and air quality challenges in our community and beyond. The *Innovate 680* project will directly leverage the success of the comprehensive GoMentum Station programs. GoMentum Station is already up and running, exceeding the USDOT goal of being operational by January 2018.

Shared Autonomous Vehicle (SAV) In early 2016, CCTA through the GoMentum Station program launched a comprehensive project with the goal of shifting the traffic from Single Occupancy Vehicles (SOVs) to transit and increasing transit accessibility globally. This innovative implementation of First Mile (FM) /Last Mile (LM) SAVs is the first in North America with full public-private commitment and participation. This program is on-going and we expect to go through full commercialization and implementation in 2019.

New Innovative Operational Strategies (IOS) are a suite of technology-based solutions that when integrated and managed, maximize the efficiency of the roadway system. These strategies will build upon the TSM&O toolbox in new and innovate ways that include advanced ICM, ATM, ATMS and next-generation TMCs with fully equipped DSS.

SPaT Challenge – If funded through the ATCMTD Program we will meet and exceed the AASHTO SPaT Challenge along Ygnacio Valley Road and San Ramon Boulevard, two major arterials within the I-680 Corridor.

Cost: The cost of the short-term program elements is estimated to be \$39,000,000. We are seeking \$12,000,000 in funding from the USDOT through this grant application. We have \$16,000,000 in public funding programed to the *Innovate 680* program and a commitment of \$11,000,000 in local private funding. Short-term program costs are shown below:

Table 1 - Innovate 680 Program Costs (\$ million)

Comprehensive <i>Innovate I-680</i> Strategies	Cost of Short Term Elements	Grant Proposal Request	Committed Public Funds CCTA and MTC (Short Term)	Committed Private Funds (Short Term)
Enhance TDM Strategies	\$2.00	\$0.50	\$1.50	-
Provide FM/LM Connections	\$3.75	\$1.00	-	\$2.75
Innovative Operational Strategies	\$21.75	\$6.00	\$9.00	\$6.75
Prepare Corridor for the Future	\$11.50	\$4.50	\$5.50	\$1.50
Total	\$39.00	\$12.00	\$16.00	\$11.00

CCTA, GoMentum Station, our co-sponsor MTC and our other partners are committed to the delivery of this project. Investing in the approach and strategies here will produce a return on investment for the USDOT through a scalable and replicable model for next-generation regional corridor projects. The remainder of this grant proposal is structured as prescribed by the NOFO and illustrates in detail our vision, strategy, and execution for *Innovate 680*.

The seven strategies envisioned for the I-680 Corridor are intended to be complementary and to ultimately be implemented as an integrated suite of corridor improvements. However, each corridor strategy can provide independent utility and is scalable to allow deployment based on available funds, economic conditions, regulatory requirements, and other factors that may influence project delivery. Our goal is to have scalability and replicability for each program element as well as the overall integrated corridor vision.

Several factors will be considered during the project development phase and as part of the project evaluation so that each strategy can be developed with a goal of successful replication in other corridors. Technical factors to be considered and evaluated will include software integration, emerging technologies, interoperability, and maximizing the use of existing infrastructure.



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Letter of Commitment
June 12, 2017


A Bay Area partnership has been formed between the Contra Costa Transportation Authority (CCTA), the Metropolitan Transportation Commission (MTC) and the California Department of Transportation (Caltrans) to cooperatively plan and implement advanced technologies to address congestion, mobility and safety in the I-680 Corridor. *Innovate 680* will harness the power of emerging technologies to actively manage and operate this congested corridor. I-680 is a well-traveled north-south corridor in the heart of Contra Costa County that connects to economic employment and housing centers in the North Bay and Silicon Valley in the South Bay.


CCTA's mission for *Innovate 680* is to develop the Bay Area's first connected corridor of the future. CCTA would integrate and deploy advanced technologies such as Dedicated Short Range Communications (DSRC), Decision Support Systems (DSS), cyber security systems, Connected Autonomous Vehicle (CAV) technologies, on-demand mobility, enhanced Transportation Demand Management (TDM), Transportation Management Center (TMC) with Smart City Lab and shared autonomous vehicles strategies.


MTC, as a co-sponsor, will deploy emerging technologies, new data and mobile applications integrated with existing Freeway Service Patrol technologies to improve the traditional incident response methods. These new systems would improve incident response times, tow operator safety and work zone communications, thereby resulting in decreased congestion in the corridor. MTC has committed resources to ensure the successful implementation of connected incident management systems as part of *Innovate 680* with plans to implement throughout the Bay Area region.

As the owner and operator of the State Highway system, Caltrans is committed to implementing advanced Adaptive Ramp Metering (ARM) in the corridor. Combining decision support systems with ARM brings dynamic responsiveness to the system in managing congestion on both I-680 and local roads.

We support the CCTA's grant application for the Advanced Transportation and Congestion Management Technologies Deployment program for *Innovate 680*. We are committed to working cooperatively and providing the necessary resources on the effective deployment of integrated advanced technologies along I-680 as outlined in this application.


Steve Heminger
Executive Director
MTC


Randell H. Iwasaki
Executive Director
CCTA


Bijan Sartipi
District 4 Director
Caltrans

1 Project Narrative

1.1 Innovate 680

INTRODUCTION – LONG TERM CORRIDOR GOALS

Contra Costa County has a population of over 1.1 million residents in 19 cities and is located east of San Francisco Bay. The county has an extensive transportation network including major freeways, regional rail service, and various bus operations. Due to its strategic location, the County has experienced significant growth resulting in noticeable degradation in travel times and transit service reliability and an increase in traffic collisions. This reality has particularly impacted the disadvantaged members of the community who have limited transportation alternatives and rely on public transit to a greater degree than members with higher incomes. CCTA, in collaboration with key regional partners and local jurisdictions, has developed an “integrated systems solutions” approach to solving our mobility challenges that employs several advanced technology strategies.

The Vision of the *Innovate 680* program is to harness new techniques and strategies to provide the most efficient modern transportation for travels on the I-680 Corridor. Our Mission is to manage the I-680 Corridor by providing alternate modes of transport for all travelers along the Corridor in the short-term and modernize the Corridor for more sustainable transportation in the future.

Figure 1 – Innovate 680 Corridor Map



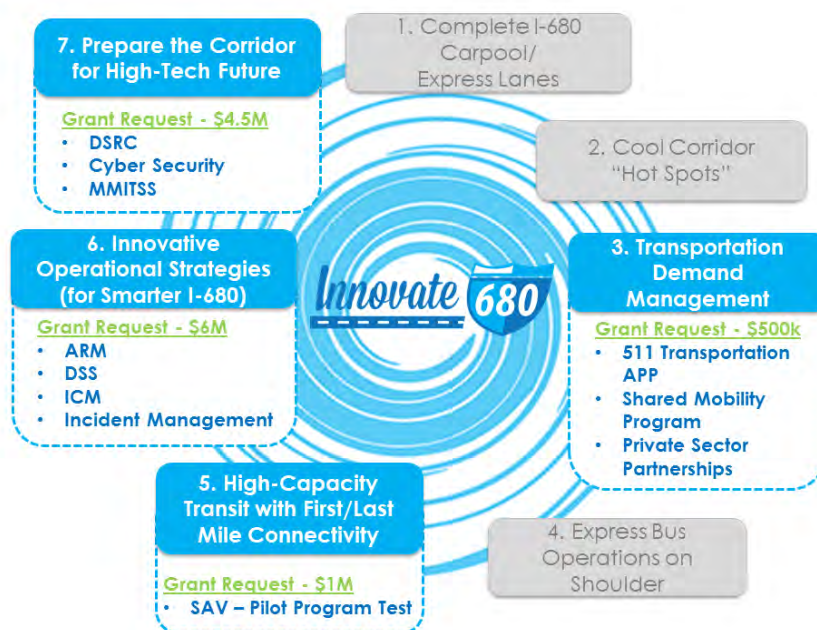
I-680 Corridor


- ✓ 5th worst Bay Area Commute
- ✓ 68% increase in AM Peak Traffic Volumes (2000-2012)
- ✓ 53% of vehicle trips originate from outside Contra Costa County

The seven strategies shown in Figure 2 make up the full *Innovate 680* Program. The focus of this grant application is on the four strategies that can be implemented in the next four years. The implementation of these strategies will be integrated with the longer-term vision that will complete the comprehensive vision for the corridor as shown in Figure 2.

Each of the seven strategies includes multiple actions that need to be taken to address operational challenges and deliver the benefits to travelers. The strategies encompass the short-term, mid-term and long-term vision for the corridor.

Figure 2 - The Seven Component Strategies of the *Innovate 680* Program



The key elements of this grant request are identified in the following sections with the following symbol: 

The focus of this grant application is to advance critical short-term solutions by utilizing advanced technology and preparing the Corridor for future projects.

Enhanced Transportation Demand Strategies

The enhanced Transportation Demand Management (TDM) element is a set of programs and strategies that aims to reduce the number of vehicles using the I-680 Corridor. This base program is currently funded until FY 2024; additional funding is needed to deploy expanded technology elements to increase the benefits of the program. By reducing demand, TDM encourages more efficient use of our existing transportation infrastructure “supply” without costly expansions required to support additional capacity. The new CCTA strategies will take these programs to the next level by incorporating advanced technology strategies in partnership with the private sector. We realize that changes in technology, worker demographics, societal views of transportation, and commute patterns will require a fresh approach to applying TDM strategies. Key to the success of this program is the fact that we will be accomplishing this in collaboration with the private sector and leveraging their investment.

The overall goal of the TDM program is to provide real time travel and transit data to the I-680 Corridor users, enabling them to choose non-SOV modes of travel. The expected benefits of the TDM program includes reductions in congestion, parking demand, air pollution, and travel costs for commuters.

The following are advanced technology elements of our Enhanced TDM strategy that have been selected as part of our grant application:



NEW 511 TRANSPORTATION APP FOR ACTIVE TRANSPORTATION AND DEMAND MANAGEMENT

Emerging information and communication technology tools will allow us to improve transportation mode choice options by providing real-time traffic conditions, transit schedules and other navigational tools.

Innovate 680 will deploy a new 511 App in partnership with the private sector to provide real-time travel information about the I-680 corridor, including alternative mode recommendations, shared mobility options, transit travel time comparisons, carpool lane travel times, projected bicycling times along parallel routes and dedicated bike/pedestrian routes such as the Iron Horse Trail. The Enhanced 511 App will be able to allow travelers to adjust routes, departure times and modes with a goal of reducing peak period travel times and improving the safety of all modes of travel including bicycle, pedestrian and shared trips. The new 511 App will be developed to provide the following:

- Real-time travel times by mode and costs, with the ability to select shared rides within the App
- All ongoing local and regional SOV trip reduction promotions, as well as day-of-the week specials, and Guaranteed Ride Home options
- Promotion of single-trip rideshare apps (Scoop, Uber Pool, Lyft Line, Chariot, and other van-based micro transit options). CCTA has signed a contract with Scoop and has already noticed an encouraging uptick in users
- Bikeshare station locations, costs and availability along the corridor
- EV charging station locations, costs, and availability along the corridor
- A ride matching database
- Incentive programs to promote changes to travel behavior in real-time
- User engagement to collect feedback for improving the App to determine what works, what does not, and how the App can be improved.

A key to our 511 App will be data sharing. Through our public/private partnerships currently in place at GoMentum, we will facilitate data sharing in the corridor that will provide a more comprehensive data set for our new 511 App. We recently reached an agreement with the American Automobile Association (AAA) of Northern California that will allow us to utilize their vast consumer advocate and market research services. AAA has 55 million users nationwide and 11 million members in California. We will utilize AAA services to disseminate the information and programs available to their targeted I-680 users in Northern California.

New Programs Toolbox



Figure 3 - TDM Toolbox

Desired Outcome

The enhanced 511 App will provide travelers with mobility options prior to making a trip by allowing individuals to make informed decisions about mode choice, travel time, and cost per trip. Having competitive alternative modes (personal bike, bikeshare, car share, shared rides, micro transit, express and bus-on-shoulder) provide more viable options than ever before for travel along the I-680 corridor. Additional benefits come in the form of reduced vehicle miles traveled (VMT), greenhouse emissions and personal transportation expenses.

Timeline

CCTA will begin the development of this mobile application over the next two years and expects initial deployment in 2019.



SHARED MOBILITY PROGRAM

Shared mobility will be the cornerstone of the TDM element for the I-680 corridor. Car sharing, bike sharing, ride sourcing, and alternative transit services are example of shared modes of transportation that can offer significant benefits to residents and commuters along the I-680 corridor. Our App will facilitate dynamic real-time ride-sharing that can be coordinated through existing TNCs such as Scoop, Uber, and Lyft. This program will partner with local jurisdictions, transit agencies, and business centers to locate carshare and bikeshare stations in key locations to support non-SOV travel in and along the I-680 corridor. Leveraging matching funds, the public sector can attract viable ride sourcing and shared mobility partners to the area. This will provide incentives for the public to use shared mobility and ride sourcing solutions.

The shared mobility elements for the *Innovate 680* TDM include:

- Car share (Zipcar, Car2go, etc.) stations situated near transit, employment centers, and central business districts
- Deployment of Bikeshare stations situated near transit, employment centers, central business districts, and the Iron Horse Trail trailheads by private partners
- Coordination and best fit matching of ride sourcing provider services into a single I-680 program (as in Uber Pool, Lyft Line, Scoop, Carzac, etc.)
- Incorporation of micro transit into the I-680 program
- Access to a rideshare database

Desired Outcome

Shared mobility options provide first/last mile mobility while reducing the demand for the single occupant vehicle. Bikeshare can be effective in providing first/last mile options between transit stations and business centers or central business districts and high density residential buildings in the Corridor. By incorporating the rideshare and ride hailing providers into a single I-680 program, the public can more easily access a single program with a variety of options. This will increase the ease-of-use for many residents in the area and assist business centers with the outreach and education on TDM options to employees.

Micro transit provides point-to-point single day or subscription service between transit, neighborhoods, employment centers, and park-and-ride lots. Using the App, commuters can reserve a seat for a trip at a specific time in the future.

Timeline

Elements of the shared mobility program have already started to be deployed throughout the I-680 corridor. CCTA will continue the deployment of the remaining programs by utilizing advanced technologies and anticipates completion within the next four years.

Provide FM/LM Connections



SAVS – FIRST MILE/LAST MILE CONNECTION

The objective of the CCTA/GoMentum Station SAV Test Bed is to address the critical FM/LM service challenge faced by many of the area's transit operators and riders in order to create safer, more reliable, more accessible and environmentally friendly travel options, and to shift travelers from SOV to transit to address our ever-growing congestion in the I-680 Corridor. To be successful in congestion management, we need to address our transit accessibility issue. A high percentage of Contra Costa County residents do not have access to basic transit services or stations and must use their personal vehicles to access the transit network. Using SAVs to take passengers to and from key transit hubs such as BART stations, Amtrak stations, and bus stations, and the Central Business District, is a FM/LM solution that can increase transit ridership and reduce traffic by using multimodal options to meet mobility needs. The SAV program benefits include:

- Significant expansion of transit services accessibility including disadvantaged groups
- Mode shift from SOV to transit and shared-ride
- Enhanced trip reliability and inter-service connectivity
- Environmentally friendly due to the use of zero GHG emissions electric vehicles
- Operational flexibility to adapt to local needs

In September 2016, CCTA, through the GoMentum Station Program led the way and launched an unprecedented comprehensive SAV project by importing the first two, 6-seat autonomous vehicles, (produced by EasyMile) to North America in partnership with several public and private entities. While building consensus with our key public sector partners including BART, the Bay Area Air Quality Management District (BAAQMD), and cities and transit operators in Contra Costa County, it has become apparent that our region strongly supports building a countywide network of SAVs to address the FM/LM challenges while also helping to improve our transit services in a safe, cost-effective and environmentally responsible manner with the ultimate goal of shifting travelers from SOV to transit. This will achieve two of our goals, in terms of congestion reduction and enhanced mobility, while also lowering GHG emissions. This project has five private sector and four public sector partners with financial



Figure 4 – FM/LM Task Management

commitments and a signed MOU in-place and is proceeding as scheduled. Work is in progress to add three additional public sector partners. The task management chart in Figure 5 shows the critical path for the project and what has been accomplished to date.

Desired Outcome

Safety: Safety, reliability and accessibility are the most important benefits associated with planned SAV deployments, given that over 90% of traffic incidents are caused by human error. Additional benefits include transit accessibility, health and economic benefits.

Numerous studies have documented the direct safety benefits in comparison with driver-operated vehicles.

Transit Ridership: Based on analysis conducted for CCTA, the deployment of SAV shuttles as part of this application could be expected to serve 3,360 daily trips. Assuming 250 days a year of operation, the annual trip total would be 840,000 annual boardings.

Accessibility: Aside from providing first mile/last mile services, SAV shuttles can also address mobility requirements in urban settings such as business parks, college campuses and large residential developments throughout communities along the I-680 Corridor. For example, in Walnut Creek, CA residents face daily challenges finding parking spaces for inter-city trips and/or access to and from transit stations. SAV shuttles can address these challenges in a very efficient, reliable, safe and environmentally friendly manner. They can be especially effective in areas not served by traditional bus service and to help connect those centers with transportation hubs and address the “transit accessibility” issue which affects high percentage of Contra Costa county residents.

Environmental Benefits: The fact that SAVs are zero GHG emission vehicles played a key role in the BAAQMD’s decision to provide \$1 million in funding for the proposed CCTA Model Deployment project with additional funding planned for the subsequent three years.

New Travel Options: SAV shuttles can serve as new modes of transit with dynamic routing, combining the best features of Uber/Lyft type services with traditional fixed-route operations.

Timeline

CCTA is scheduled to complete testing of SAVs in the Bishop Ranch business park in 2018. Current testing will be expanded to public areas of the business park and to the downtown area in the City of Dublin. We expect to begin procurement and commercialization with full deployment in 2019/2020.

Lead

GoMentum Station is leading this effort with the following public and private partners, all of whom have contributed cash or in-kind services to this program:



SAV testing at GoMentum Station, Concord Ca.

- Integrated Corridor Management (ICM)

- Active Traffic Management (ATM)
- Advanced Traffic Management Systems (ATMS)

The operational and support environment for *Innovate 680* strategies includes the implementation of adaptive ramp metering, queue warning systems, in-vehicle driver information systems and virtual windshield display; dynamic lane use management, decision support systems; and sensor and communications infrastructure and its instrumentation. IOS maximizes the efficiency and travel reliability of the I-680 Corridor.

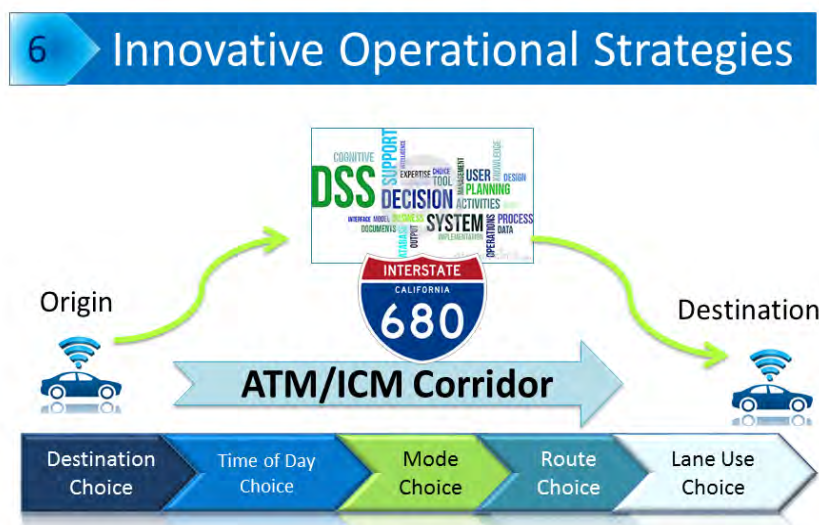


Figure 6 - DSS Processing

The following provides additional detail on advanced technology elements of our IOS strategies that have been selected as part of our grant application.



DECISION SUPPORT SYSTEM (DSS)

DSS is an advanced software tool that mimics human experts and assists with analysis/decision making. By aggregating information through the DSS, route travel times, traffic and transit conditions, and alternate transportation modes can be disseminated to stakeholders and users to aid in travel and planning decisions in real time.

The DSS will play a key role in providing complete information and analysis regarding Incident Management. The DSS platform digitally connects all systems and elements and facilitates interaction between all system elements. This feature enables 24/7 traffic and system management capable of detecting emergencies and traffic disturbances in real time, immediately executing emergency procedures, and dispatching information to all involved agencies and first responders as they develop.

The DSS will support on-line and off-line functions for the early incident detection, the determination of the impact area, the formulation and implementation of proper traffic diversion emergency plans based on a set of parameters such as the incident severity level, the estimated duration and the current traffic volumes across the road network. This system will be built on the Caltrans District-4 newly upgraded ATMS system and will be housed in the new CCTA sub-regional TMC currently under planning and development.

The Figure 7 shows additional features of DSS complementing the current Caltrans District 4 ATMS.

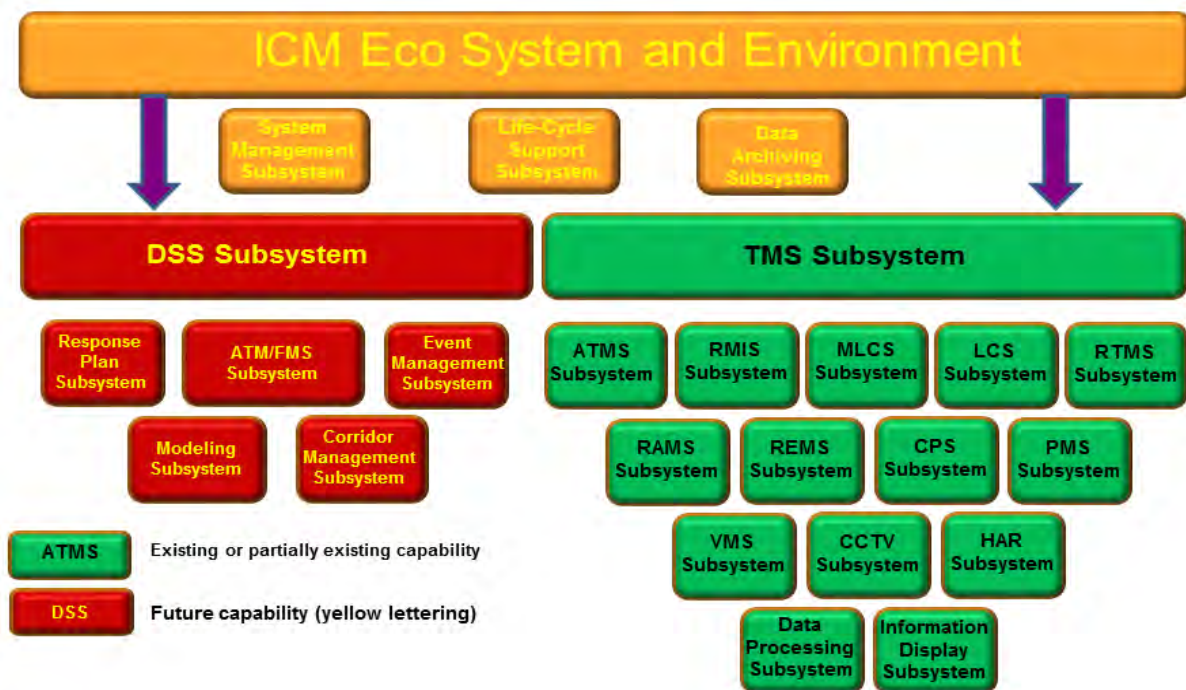


Figure 7 - Current DSS Status

Desired Outcome

The DSS will collect available real time data throughout the Corridor. The DSS “brain” will synthesize the collected data, allowing the system to be predictive. The DSS utilizes software that can evolve with advancements in technology so as not to become outdated during its lifetime. The implementation of DSS is the first major upgrade in a multi-year evolutionary process that will allow CCTA and Caltrans to expand the current ATMS capabilities in Northern California for regional interoperability and managing congestion proactively in real time.

Timeline

Initial DSS modules will be deployed in the next two to four years. The complete system is modular and will be completed as funds become available.

Lead

CCTA in partnership with MTC, Caltrans and private partners will lead the implementation the DSS.

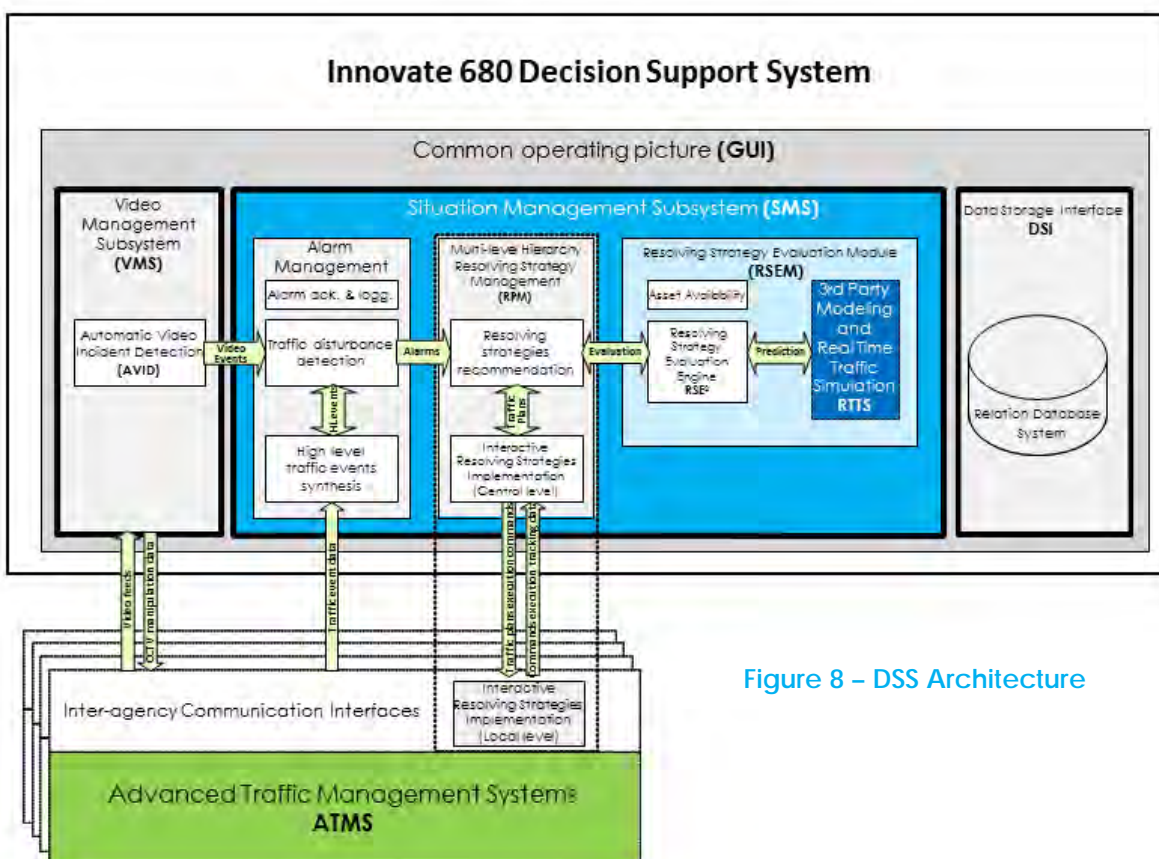


Figure 8 – DSS Architecture



INCIDENT MANAGEMENT

The Bay Area Freeway Service Patrol (FSP) is a congestion management program implemented by the MTC Service Authority for Freeways and Expressways (MTC SAFE), Caltrans and the California Highway Patrol (CHP). The FSP program keeps our air clean, motorists safe, and the Bay Area moving. FSP drivers rove the freeways during hours of peak congestion, providing quick and efficient response to incidents. Their work mitigates safety hazards, reduces recurrent congestion and decreases auto emissions due to inefficient vehicle flow.

Despite the benefits and successes of the Bay Area Freeway Service Patrol there are a number of improvements to the program that will be implemented as part of the proposed ATCMTD funded project. This project will deploy and integrate emerging technologies, external data sources and new mobile applications within the existing systems to improve the traditional incident response methods used by the FSP program to reduce overall incident detection, verification, response and recovery time. We believe these applications will improve the FSP program's impact on mobility while reducing the fleet's currently unavoidable environmental impacts. The other major goal of technology facilitation and upgrade is to improve the safety of FSP tow operations through enhanced monitoring and messaging to other vehicles.

New Technology Facilitation and Upgrade - The following are advanced technology concepts included as part of this application

Real-Time Incident Fusion Database - This strategy involves providing incident alerts from third party data services Waze (crowd-sourced data) and our partner HERE (vehicle sensor data) to FSP vehicle drivers through their existing tablet computer while providing more timely information to the FSP drivers resulting in more focused incident search patterns that could improve the FSP program's ability to identify and quickly respond to freeway incidents. This data will also be made available to the Decision Support System (DSS) to support the other short-term *Innovate 680* elements as well as the wider IOS strategies.

Video Incident Detection Software – This strategy involves the implementation of video incident detection software. The software implements and utilizes artificial intelligence and machine learning algorithms, enabling superior detection performance and low false alarms ratio, eliminating traditional VID industry problems (shadows and camera shaking).

Enhanced FSP Monitoring - This strategy is focused on providing MTC SAFE with improved abilities to monitor FSP vehicle performance. Each FSP vehicle would be equipped with a connected camera device as well as vehicle telematics to monitor the vehicle's operations.

FSP and Incident Management Task Force (IMTF) Incident Scene Communications - This strategy involves an existing first responder application by the MTC-led Incident Management Task Force (IMTF). Information transmitted from the FSP vehicle, including image data, will be sent to an upgraded IMTF mobile application server for dissemination to responders in the area. The mobile application allows responders to snap a simple photo of an incident scene, quickly add key details, and instantly send to a pre-defined group through a secure server. The application automatically captures the GPS location and arrival time for each responder, and participants receive customized alerts when new information is ready for viewing.

Innovative Operational Models -

This strategy is focused on collecting additional data and applying new metrics that can be used for managing the FSP in a more efficient manner, including potentially the use of staged vehicles, dynamic patrol patterns and real-time response prioritization that is tied to system intelligence on optimizing congestion reduction. The fused incident database would offer MTC SAFE a rich data set on incidents occurrence and clearance that originates from a source independent of FSP drivers. All can be accomplished through implementing DSS software.

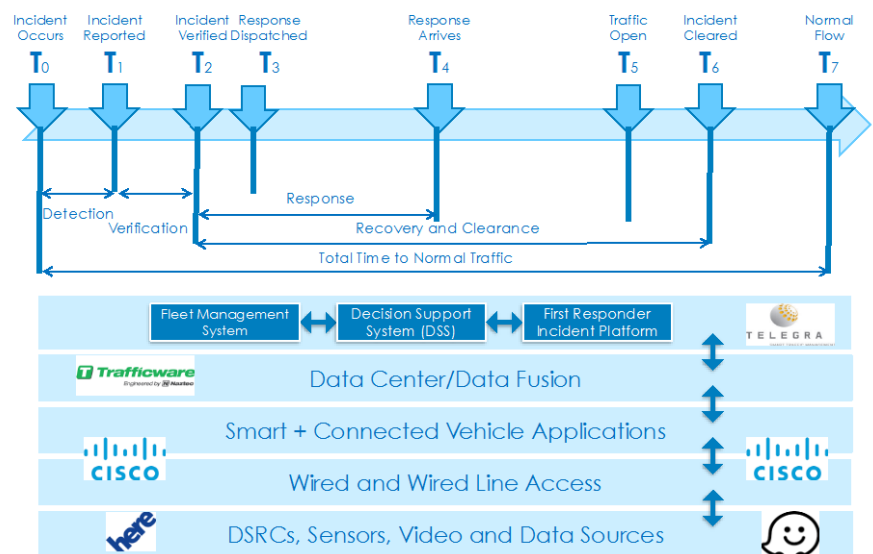


Figure 9 - Incident Management Technology Facilitations

Desired Outcome

The Incident Management strategies should reduce non-recurrent congestion through faster incident clearance, reduce time motorists wait on the freeway, improve the utilization of the FSP resource, improve first responder readiness, and reduce the risk of collisions involving FSP vehicles and operators. The other desired outcome is for the Traffic Fusion Database to provide highly accurate and timely incident and traffic data for the new 511 App and future freeway management strategies under *Innovate 680*.

The system will be implemented to reduce incident related congestion which is directly linked to achieving the goals of reliable freeway travel times and improved safety. The initial pilot deployment area will include approximately 12 miles of I-680 in Contra Costa County between Bollinger Canyon Road in San Ramon and Ygnacio Valley Road in Walnut Creek.

Timeline

Most of the different strategies envisioned can be deployed as pilots within 10-18 months and all of them within two (2) years. After the pilot period, MTC and its partners will evaluate what should be continued and/or extended to other corridors.

Lead

MTC and private partners will lead the implementation the Incident Management strategy.



ADAPTIVE RAMP METERING (ARM)

Current studies led by CCTA indicate that implementation of ramp metering along the I-680 corridor is feasible and will reduce mainline congestion during peak periods. Caltrans has a long history of successful implementation of ramp metering programs in Northern California. The most recent implementation includes implementation of ARM utilizing “Fuzzy Logic” as part of the I-80 ICM/ATM project. *Innovate 680* will build on the current success of the I-80 project in combination with other strategies with the integration of the DSS to more proactively manage the onset of congestion for recurrent and non-recurrent scenarios. The CCTA’s current study also provides an important step for implementation and preliminary data to help prioritize ramp metering installation along the corridor, which will be delivered in phases. Segments along I-680 which have the highest levels of mainline congestion and incidents would provide the highest priority for ARM implementation and potentially the highest benefit in terms of mainline travel time reductions and are included as part of this grant request.

Phased implementation of the various ramp improvement elements is possible either per direction or by segment based on congestion levels, potential benefits and funding available. A DSS is proposed to be included in the project to determine optimal operational strategies in the corridor.

This grant application seeks to implement the initial phase of adaptive ramp metering along NB I-680 corridor between Bollinger Canyon Road and Ygnacio Valley Road.

Desired Outcome

ARM, along with implementation of DSS and other innovate operational strategies in the corridor will improve traffic operations, eliminate stop and go traffic, provide for more balanced

flow of traffic, reduce delays, improve safety by reducing rear end accidents, and improve travel time reliability for buses and carpoolers.

Timeline

Design and construction of the ARM system along the NB section of I-680 will be completed in three to four years.



Prepare Corridor (and our Transportation Network) for the Future

Transportation technology is evolving quickly, and several connected vehicle applications are already being tested with positive results around the globe. CCTA, through the GoMentum Station Program, is leading the way in the nation and around the globe with comprehensive CV applications and AV technologies. “Level 2” and “Level 3” autonomous vehicles (providing at least two simultaneously autonomous features and full autonomous control in certain conditions, respectively) are currently available, and new features are being introduced by auto manufacturers and technology companies on a weekly basis. In the very near future, we will likely see CV applications and AV technologies implemented on our roadway infrastructure system in an evolutionary process.

CCTA is preparing the I-680 Corridor to accommodate the evolution of CV applications and AV technologies for improved traffic flow by building new and upgraded vehicle-to-infrastructure (V2I) and vehicle-to-vehicle (V2V) communications. CCTA will build on its experience managing the largest secure test bed in the country, GoMentum Station (www.gomentumstation.net) which is now an international CAV test bed and is one of the 10 USDOT designated test facilities. The *Innovate 680* programs can directly leverage the success of the comprehensive GoMentum Station programs; GoMentum Station is already up and running and exceeding the USDOT goal of being operational by January 2018. The operational and support environment for implementation of this strategy include: Prototype implementation of applicable CV applications, provisions of full coverage of DSRC along the I-680 Corridor and Ygnacio Valley Road (arterial), implementation of Multi-Modal Intelligent Traffic Signal Systems (MMITSS), provision of Advance Traffic Controllers (ATCs), installation of roadway sensors including camera systems with automated incident detection integrated with the DSRC RSUs, and provisions of V2I safety application.

The ultimate goal of this program is to increase throughput, from 2,000 vehicles per hour per lane to 3,300 in the next 15 to 20 years, improve safety and incident prevention, reduce the need for new infrastructure, improve travel time reliability, and improve energy efficiency and air quality with reductions in greenhouse emissions.

The objectives of this strategy as part of the ATCMTD grant request are to

CV Applications

V2I Safety	V2V Safety	Road Weather	Environment	Agency Data	Mobility	Smart Roadside	New Apps	NEED	Project/ Location
								Congestion/Safety	I-680 NB
								Congestion/Safety	I-80 NB
								Congestion/Safety	160
								Congestion/Safety	C/W ATSS
								Safety	
								Mobility	
								Mobility/Accessibility	
								Congestion/Safety	CVO Opt.
								Congestion/Safety	Next Gen ATIS

Figure 10 - CV Applications and Needs

support the proposed short-term ATM strategies as well as prepare the corridor for future CV applications and AV technology.

The following are advanced technology elements of these strategies that will be implemented as part of our grant application within the next four years:



DSRC AND MOBILE SOFTWARE APP (V2I)

Innovate 680 will continue to install 5.9 ghz DSRC in roadside equipment and integrate with signal controllers throughout the corridor and will meet and exceed USDOT SPaT challenge in 2019. DSRC equipment will also be installed in public transit vehicles that service the corridor as well as selected automobiles.

The Corridor already has four DSRCs installed on Ygnacio Valley Road going through the final stage of prototype testing. Upon completion of this phase we intend to install DSRCs along the entire arterial corridor of Ygnacio Road that includes full coverage of 27 intersections. The I-680 Corridor is equipped with fiber trunk line and will be equipped for full coverage of DSRCs along the entire corridor. Installation will be on every light pole (approximately 300 units) with Road Side Units (RSUs) that can provide full coverage. Additionally, we will equip up to 3% (4,000) of vehicles along the corridor with On-Board-Unit (OBU) including the Vehicle Awareness Device (VAD), the Aftermarket Safety Device (ASD) and the next-generation Common, Off the Shelf Aftermarket Safety Device (COTS ASD). The OBU installation is expected to support a variety of automotive safety and commercial applications and number of GoMentum Station Program CV applications.

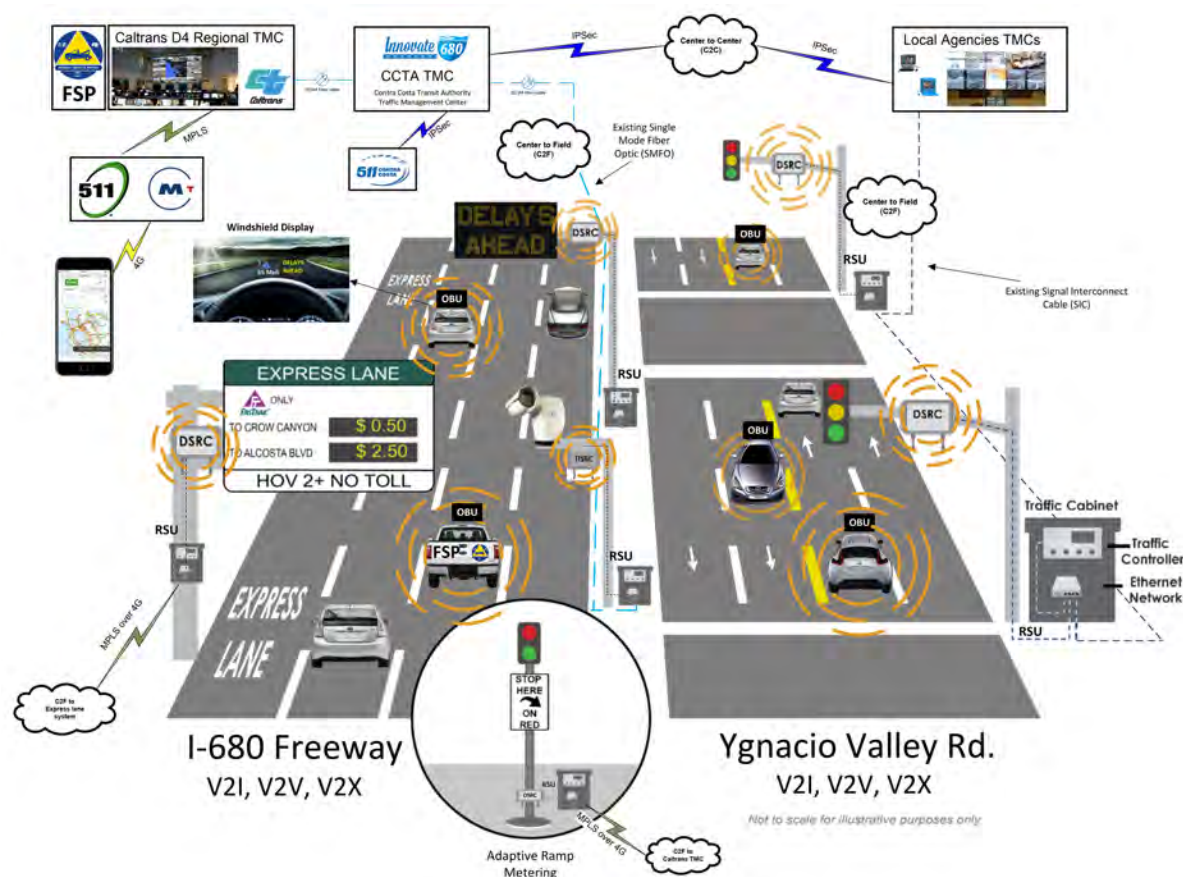
OBUs are expected to provide a flexible, open platform for deploying ITS applications such as tolling for I-680 HOT lanes, mobility and safety. Additionally, the generic OBU features an automotive-grade dual core 1GHz processor, 1 GB of memory, 8GB on-board storage, multiple radios (DSRC, WiFi, BT and cellular) and a GPS receiver. The OBU can be powered using a range of input voltages (including vehicle 12V and 24V battery) as well.

Desired Outcome

DSRC provides V2V and V2I communication that allows for the active receivers and broadcasting of safety, route, and roadway information. Through secure links, this information can also be sent to a central location and used to provide real-time travel information via mobile software applications for both agencies and public users. DSRC data will feed into and complement both the DSS and Incident Management program to help provide real-time data.

I-680 will help create a connected vehicle environment that can support future vehicle-to-infrastructure applications to improve the traffic environment in a variety of ways.

Figure 11 – Innovate 680 's Future



Timeline

Preparing the corridor for inevitable future CAVs will be an ongoing activity as funding becomes available. We expect most of the instrumentation, specifically the implementation of DSRCs to be completed by 2019 both in the freeway corridor and along arterials.

Lead

CCTA, in partnership with GoMentum Station and private partners, will lead the implementation.



CYBERSECURITY

Recognizing the increasing cybersecurity threat to our transportation network, the *Integrate 680* program will implement a comprehensive cybersecurity program that leverages industry standards and best practices to protect the systems that will be deployed and that will provide early identification of potential threats. Our cybersecurity program will include coordination with project partners during project development as well as ongoing cyber incident response planning throughout the deployment and operation of the program. Our program will follow the U.S. Department of Homeland Security cybersecurity framework for transportation systems and will include:

- Early identification of cybersecurity risks to our systems, assets and data

- Development of appropriate safeguards to protect critical infrastructure
- Development and implementation of action plans to respond to any detected threats
- Development and implementation of protocols to restore data or services that may be impacted by a cybersecurity event

The following other core strategies of *Innovate 680* are not part of our grant application and will be completed in the long term as part of other projects.

Complete the I-680 HOV/Express Lanes in Contra Costa County

The goal of the I-680 HOV/express lanes is to provide a travel time advantage compared to the general-purpose lanes for those willing to pay a fee, travel by transit, carpool, vanpool or use a motorcycle. Tolls for solo drivers are dynamic, increasing as traffic congestion increases and decreasing as congestion decreases. Tolls will be collected through the existing FasTrak® system used throughout the Bay Area.

CCTA and its partner, the Metropolitan Transportation Commission (MTC), and Caltrans will complete the implementation of 35 miles of express lanes along southbound I-680 Corridor by early 2020.

Cool Corridor “Hot Spots”

“Hot spots” are traffic bottlenecks that recur and worsen daily congestion. In the I-680 Corridor, hot spots include congestion caused by the “gap” in the carpool/express lane on northbound I-680, high-volume weaving areas in and around State Route 24, North Main Street, Lawrence Way and Treat Boulevard.

CCTA and its partner, the Metropolitan Transportation Commission (MTC), Caltrans and local jurisdictions will continue with required hot spots improvements that will be completed over the next 15 years.

Increase Efficiency of Bus Services

This strategy aims to increase efficiency of bus services in the Corridor through improving and increasing express bus service (through fewer stops and longer freeway segments), implementing bus operations on shoulders along I-680, and increasing technology-based intermodal transit centers and managed parking lots along the Corridor for passenger pick-up and drop-off. To increase efficiency, segments of the I-680 shoulder would be modified so buses could use these lanes to bypass congestion in the normal lanes during morning and afternoon commute hours. By providing real-time incident information through CVs and DSS, bus drivers would be alerted to potential shoulder blockages prior to their arrival.

CCTA will continue to enable convenient access to high-capacity transit by expanding FM and LM mobility-on-demand options, adding additional high-capacity buses to meet demand and identifying locations for parking along the Corridor for improved access to multi-modal transportation. The initial demonstration project is expected to be completed by 2020 from Bollinger Canyon to Ygnacio Valley Road in Walnut Creek with full implementation by 2024.

CCTA in partnership with MTC and Caltrans will lead the implementation for this strategy.

1.2 Agreement Entities

The Contra Costa Transportation Authority (CCTA) is a public agency formed by Contra Costa voters in 1988 to manage the county's transportation sales tax program and to lead countywide transportation planning.

CCTA is responsible for maintaining and improving the County's transportation system by planning, funding, and delivering critical transportation infrastructure projects and programs that connect our communities, foster a strong economy, increase sustainability, and safely and efficiently get people where they need to go. CCTA is also the county's designated Congestion Management Agency (CMA), responsible for putting programs in place to keep traffic levels manageable.

CCTA will rely upon the technology and program management expertise of a team of internal staff and consultants for this model deployment. CCTA, as the entity that will enter into the agreement with FHWA, will manage all program funding as it has done on multiple complex transportation projects with various federal, state and regional organizations in the past.

Managing the Program and Funding:

The Project Manager is the primary point of contact for all aspects of the program. For grant-funded projects, CCTA uses a team approach to manage the funding element, bringing together project scope and budget knowledge from the Project Manager; accounting expertise from CCTA finance staff; and grants compliance knowledge from the Funding Manager. The team maintains ongoing coordination and will meet on a monthly basis to discuss budget, review cost eligibility, and/or address any potential issues.

Additionally, CCTA maintains a strong working relationship with the State DOT (Caltrans) Office of Local Assistance, working to identify and resolve in advance any questions or issues that might impede effective implementation of the grant activities. For common activities, such as federal procurements, DBE considerations, and invoicing, the Local Assistance Procedures Manual provides detailed guidance and is the process to which CCTA adheres.

CCTA's accounting system has the ability to track and report on grant-funded projects, and the "project coding" module within the system is structured to provide summary reports by fund source.

Lastly, CCTA has appropriate work flow and monitoring controls in place to ensure that staff time is charged correctly, that contracts are in conformance with the monetary limits established in CCTA's Procurement Policy, annual budget, and budget amendment as applicable, and only eligible costs are assigned for grant reimbursement.

1.3 I-680 Corridor

Contra Costa County has a population of over 1.1 million residents in 19 cities and is located east of San Francisco Bay. The county has an extensive transportation network including major freeways, regional rail service, and various bus operations. Due to its strategic location, the county has experienced significant growth resulting in noticeable degradation in travel times, incidents and transit service reliability.

Graphical descriptions of the Corridor were presented in Sections 1.1.

1.4 Real World Issues and Challenges

The deployment of these advanced technologies in Contra Costa County will require a thorough and comprehensive approach to minimize disruptions to existing services. This includes addressing issues and challenges that may arise from implementing SAVs for the first time in our region. Aside from technical challenges which will be thoroughly evaluated during testing, we expect operational, institutional and physical issues as well. These areas are described below:

- **Institutional Issues:** bringing together different agencies to share and execute a common vision in addressing our transportation and mobility challenges.
- **Operational Issues:** ensuring institutional integration is supported by well-organized and open flow of information and processes throughout the model deployment project implementation. Interoperability will be a key issue in addressing our operational challenges.
- **Physical Integration:** Ensuring these systems are thoroughly tested and all necessary integration and system management and operations components are in place and compatible with legacy systems.

Accessibility for all transportation users is a key goal of this mode shift and model deployment effort. Acknowledging the importance of public awareness and education, we will work closely with our public-sector partners during the planning and implementation phases of the model deployment.

1.5 Transportation Systems & Services

While much of Contra Costa County is within a few miles of high-frequency BART rail service, the terrain and density of Contra Costa makes frequent transit service difficult. It would be particularly expensive to operate high-frequency service to many areas of the county. Many bus riders today must wait up to an hour for a local bus, especially in off-peak hours. Transit subsidies are required to pay for the bulk of both fixed-route and bus transit operations.

Four operators provide fixed-route service within Contra Costa County. These are shown in Table 2.

Table 2: Annual Passengers by Bus Operating Agency

System	Annual Passengers In Contra Costa County
AC Transit*	6,900,000
County Connection	3,297,000
Tri-Delta Transit	2,741,000
WestCAT	1,282,000
Total	14,220,000

* assumed 12.5% of AC Transit trips in Contra Costa County

Based on 2014 census data, Contra Costa County has estimated population of 1,111,339 people, this works out to approximately 13 annual boarding per resident.

1.6 Operations & Maintenance

Under existing agreements, Caltrans will operate and maintain the *Innovate 680* technology equipment deployed within the State Highway. Local Agencies will operate and maintain technology deployed on local streets. CCTA will operate and maintain the ATDM programs and MTC will operate and maintain the incident management program.

1.7 Legislation and Regulations

California's proposed autonomous vehicle regulations do not allow operation of vehicles without provisions for a steering wheel, gas and brake pedals in the event a driver needs to take control. The SAV shuttles proposed as part of this application need to go through technical, legislative, regulatory, certification and market acceptance processes before full operational deployment in Contra Costa County. Acknowledging this, the CCTA has been actively working to address these requirements.

Assembly Bill 1592 was signed into law in 2016 and will allow operation in Contra Costa County of low-speed, multi-passenger autonomous vehicles that are not equipped with a steering wheel, brake pedal, accelerator or operator. We are working closely with the NHTSA and the California DMV to allow for testing of SAVs on public roads and plan to achieve all regulatory approval before full implementation of the SAVs in 2019/2020.

1.8 Performance Measures

Our team has extensive experience in defining and quantifying measures of performance for transit, City street networks, and freeways. We use the latest technology to improve the quality and volume of data in a cost-effective manner and improve the efficiency of post-processing analysis. The measures of performance we use are selected according to the unique needs of each situation to illustrate the effectiveness of the system elements or strategies being tested and to be able to be quantified using the resources available. In addition, our survey designs and data collection techniques provide reliable conclusions and statistical validity by use of a variety of tests that can be repeated.

1.9 Expected Benefits

The expected benefits of each deployed technology are described in detail in section 1.1, as part of each strategy.

1.10 Innovate 680 Partners Ecosystem

Building private-public partnerships in pursuit of mobility for everyone is a hallmark of CCTA and the GoMentum Station program. We have consistently advocated such partnerships to ensure the highest return for our transportation investment dollars and to also achieve broad consensus to ensure public acceptance.

Furthermore, as stated in the introduction section, *Innovate 680* has secured the financial and institutional support of multiple agencies with a direct stake in the successful outcome of our proposed deployment. These partnerships will ensure sustainable deployment over the next four years and beyond consistent with available funding and agency coordination requirements. We look forward to having USDOT as one of our partners as these projects have enormous potential

for replication throughout the country. Letters of support from our partners are included in Volume 2 - Appendix D.

On the public-sector side, CCTA worked closely with MTC and Caltrans to develop the long-term and sustainable partnership that will result in the countywide deployment of these advanced technologies. We also have a consensus and commitment from all Cities along the *Innovate 680* Corridor. As discussed in the funding section of this grant proposal, CCTA was successful in securing financial commitments from these public agencies and private entities that will form the core part of our local match contributions.

1.11 Existing Assets

In establishing the *Innovate 680* approach, the existence of substantive ITS equipment is a great benefit. Caltrans District 4 has made a substantive investment in ITS devices, power, conduits and communications in the Corridor.

Fiber Optic Communications

Caltrans has installed, and maintains, an existing 72 strand fiber optic trunk cable and associated network devices on I-680 from the Alameda/Contra Costa County line to North Main Street in Walnut Creek. MTC has a project in construction to replace and extend this 72-strand fiber cable with a 144 strand trunk cable (of which 72 strands are for Caltrans' use) on I-680 from the Alameda/Contra Costa County Line to the Benicia – Martinez Bridge Toll Plaza Building.

Vehicle Detection

There are 155 mainline vehicle detection stations in the corridor, using in-pavement inductance loop technology standard for Caltrans freeway ITS programs. Each station has two detectors per lane, spaced about a car length apart to allow for speed measurement as well as traffic volume counts. Traffic density can also be detected by these stations. This equates to about three stations per mile, which is high density of detection for open freeway by Caltrans standards.

Closed Circuit Televisions (CCTV)

There are 41 CCTV camera locations in the I-680 Corridor in Contra Costa County. The effective viewing distance of these cameras is approximately one half mile. Cameras spaced one mile apart would therefore have full coverage of the space between them. The average spacing of the 41 CCTV cameras on I-680 is 0.6 miles, and only six locations are spaced greater than one mile, the greatest of these being 1.21 miles.

1.12 Supporting Programs

Leveraging advanced technologies to enhance safety and mobility is a central theme in our long-range planning efforts. This is consistent with and builds upon our past investments in ITS programs such as the GoMentum Station for CV/AV testing and commercialization as well as innovative operational strategies such as ICM and ATM projects. Two such nationally significant ICM/ATM projects in Contra Costa County include the I-80 and SR-4 projects.

CCTA is preparing for a future of innovative mobility services by forging industry partnerships and exploring new funding opportunities. These include our existing local sales tax measures which have funded a significant portion of our projects over time as well as pursuing other grant funding for implementation of technology-centric projects. Our plan is to start deployment of

2

2.1 Management Structure and Key Personnel

Implementation of the proposed advanced technology project requires a management structure and key personnel who are highly qualified and act as a team. Our management structure includes the executive staff of each of the key implementing agencies who will provide guidance and leadership to the program. The management team will meet quarterly to review program status. Our project delivery team consists of technical experts that have worked together previously to successfully deliver multi-jurisdiction ITS projects in the Bay Area.

Bios for key staff are included below:

2.2 Primary POC

Tim Haile, P.E.
Deputy Executive Director, Projects
Contra Costa Transportation Authority
2999 Oak Road, Suite 100
Walnut Creek, CA 94597
925-256-4700, thaile@ccta.net

2.3 Leadership Staff Bios

[Redacted text block]

2.4 Key Implementation Staff bios

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3 Funding Description and Schedule

Private Sector Funding Source Contributions

Non Federal	Funding Sources			Committed/Pledged
	Contribution Amount	Contribution Type Cash	In Kind	
CCTA/MTC	\$16,000,000	\$16,000,000	\$0	Committed
Bishop Ranch/ Sunset Dev.	\$1,300,000	\$500,000	\$800,000	Committed
Stantec	\$940,000	\$160,000	\$780,000	Committed
AAA	\$500,000	\$250,000	\$250,000	Pledged
First Group/First Transit	\$730,000	\$125,000	\$605,000	Committed
GoMentum	\$2,500,000	\$2,500,000	\$0	Committed
Telegra	\$1,000,000	\$0	\$1,000,000	Committed
Easy Mile	\$1,940,000	\$140,000	\$1,800,000	Committed
HERE	\$500,000	\$0	\$500,000	Pledged
Cisco	\$940,000	\$0	\$940,000	Pledged
Best Mile	\$200,000	\$50,000	\$150,000	Committed
Trafficcast	\$250,000	\$125,000	\$125,000	Pledged
Amber Mobility	\$200,000	\$50,000	\$150,000	Pledged
Total	\$27,000,000	\$19,900,000	\$7,100,000	

Funding Plan by Strategy, Source and Year

Comprehensive Innovate I-680 Strategies	Funding (\$x1000)				Total
	Year One FY 18/19	Year Two FY 19/20	Year Three FY 20/21	Year Four FY 21/22	
Enhance TDM Strategies					
ATCMTD	\$ 375	\$ 125	\$ -	\$ -	\$ 500
In-Kind Contribution	\$ 1,125	\$ 375	\$ -	\$ -	\$ 1,500
Total	\$ 1,500	\$ 500			\$ 2,000
Provide FM/LM Connections					
ATCMTD	\$ 267	\$ 533	\$ 200	\$ -	\$ 1,000
In-Kind Contribution	\$ 733	\$ 1,467	\$ 550	\$ -	\$ 2,750
Total	\$ 1,000	\$ 2,000	\$ 750		\$ 3,750
Innovative Operational Strategies					
ATCMTD	\$ 910	\$ 1,214	\$ 3,034	\$ 842	\$ 6,000
In-Kind Contribution	\$ 2,390	\$ 3,186	\$ 7,966	\$ 2,208	\$ 15,750
Total	\$ 3,300	\$ 4,400	\$ 11,000	\$ 3,050	\$ 21,750
Prepare Corridor for the Future					
ATCMTD	\$ 704	\$ 900	\$ 2,348	\$ 548	\$ 4,500
In-Kind Contribution	\$ 1,096	\$ 1,400	\$ 3,652	\$ 852	\$ 7,000
Total	\$ 1,800	\$ 2,300	\$ 6,000	\$ 1,400	\$ 11,500
ATCMTD Total	\$ 2,256	\$ 2,772	\$ 5,582	\$ 1,390	\$ 12,000
In-Kind Total	\$ 5,344	\$ 6,428	\$ 12,168	\$ 3,060	\$ 27,000
Total	\$ 7,600	\$ 9,200	\$ 17,750	\$ 4,450	\$ 39,000

Project Schedule by Program Element

Program Element	Start Date	End Date	FY 18/19	FY 19/20	FY 20/21	FY 21/22	Deliverable
Program Management							
Project Management, Agreements	7/1/2018	6/30/2022					Meetings, budget, schedule, funding agreement, PMP
Environmental Clearance	7/1/2018	7/1/2019					Environmental Clearance
Invoicing and Reporting	7/1/2018	6/30/2022					Monthly invoicing and reporting
Enhance TDM Strategies							
Outreach and Stakeholder Input	7/1/2018	12/1/2018					Outreach Plan
Develop Transportation App	10/1/2018	7/1/2019					511 Corridor App
Shared Mobility Program	1/1/2019	7/1/2020					TNC & private sector agreements, bikeshare/carshare programs
Provide FM/LM Connections							
Develop Implementation & Procurement Plan	7/1/2018	1/1/2019					SAV PMP, Procurement Plan
Procurement	3/1/2019	9/1/2019					Procurement documents, procurement of vehicles and services
Integration and Testing	9/1/2019	7/1/2020					Test plans, field testing of vehicles
Deployment and Validation	8/1/2020	8/1/2021					Operations and oversight of SAVs
Innovative Operational Strategies/Prepare Corridor for the Future							
Project Development	7/1/2018	12/1/2019					Concept of operations, interagency agreements, systems engineering
Procurement	12/1/2019	7/1/2021					RFP/bid docs, contract award
Integration and Testing	8/1/2020	12/1/2021					Test plans, field test, acceptance
Deployment and Validation	1/1/2021	7/1/2022					Expanded FSP, DSS, DSRC, ICM/ATM elements, Final Report

Appendix A Resumes



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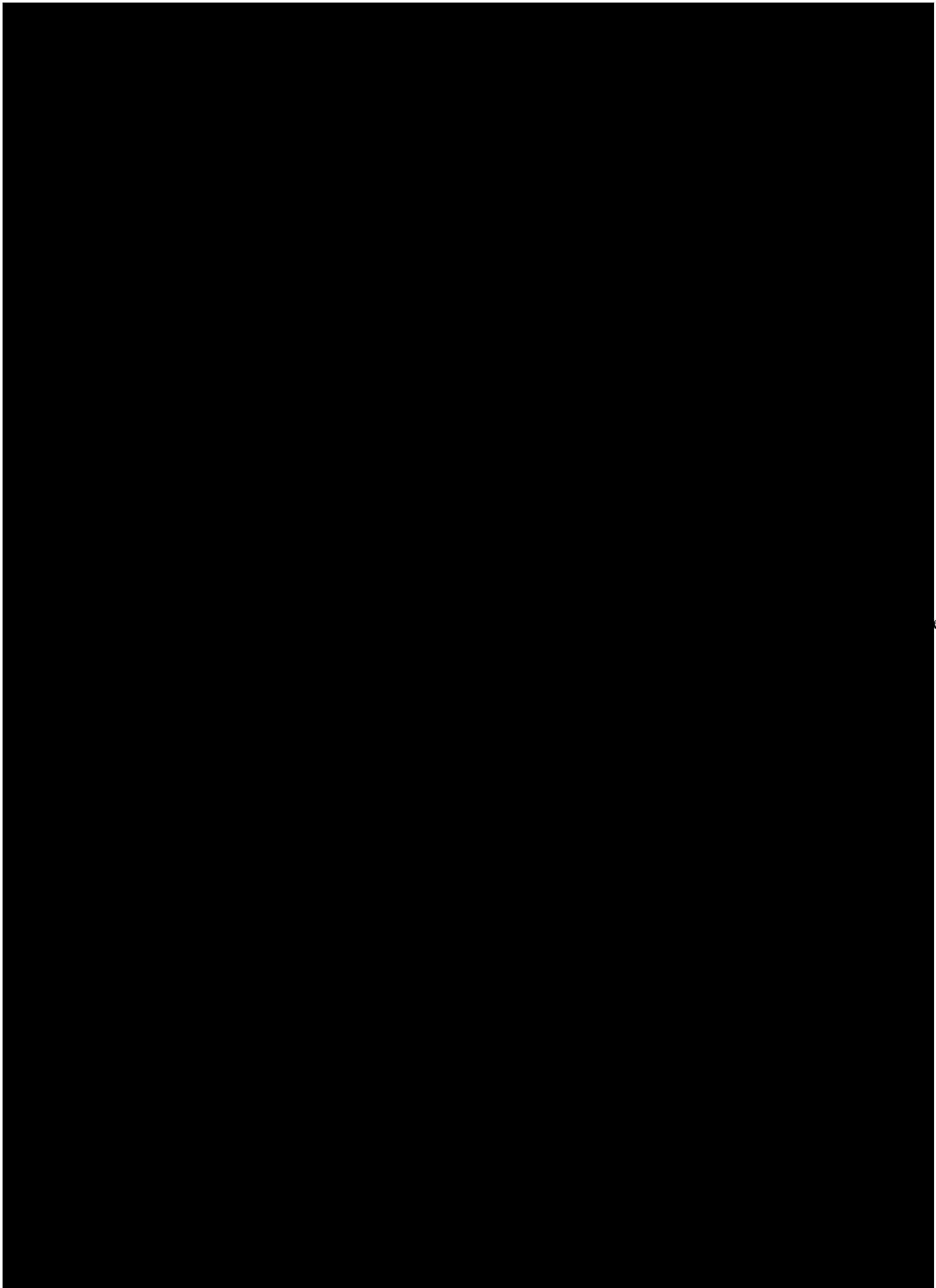
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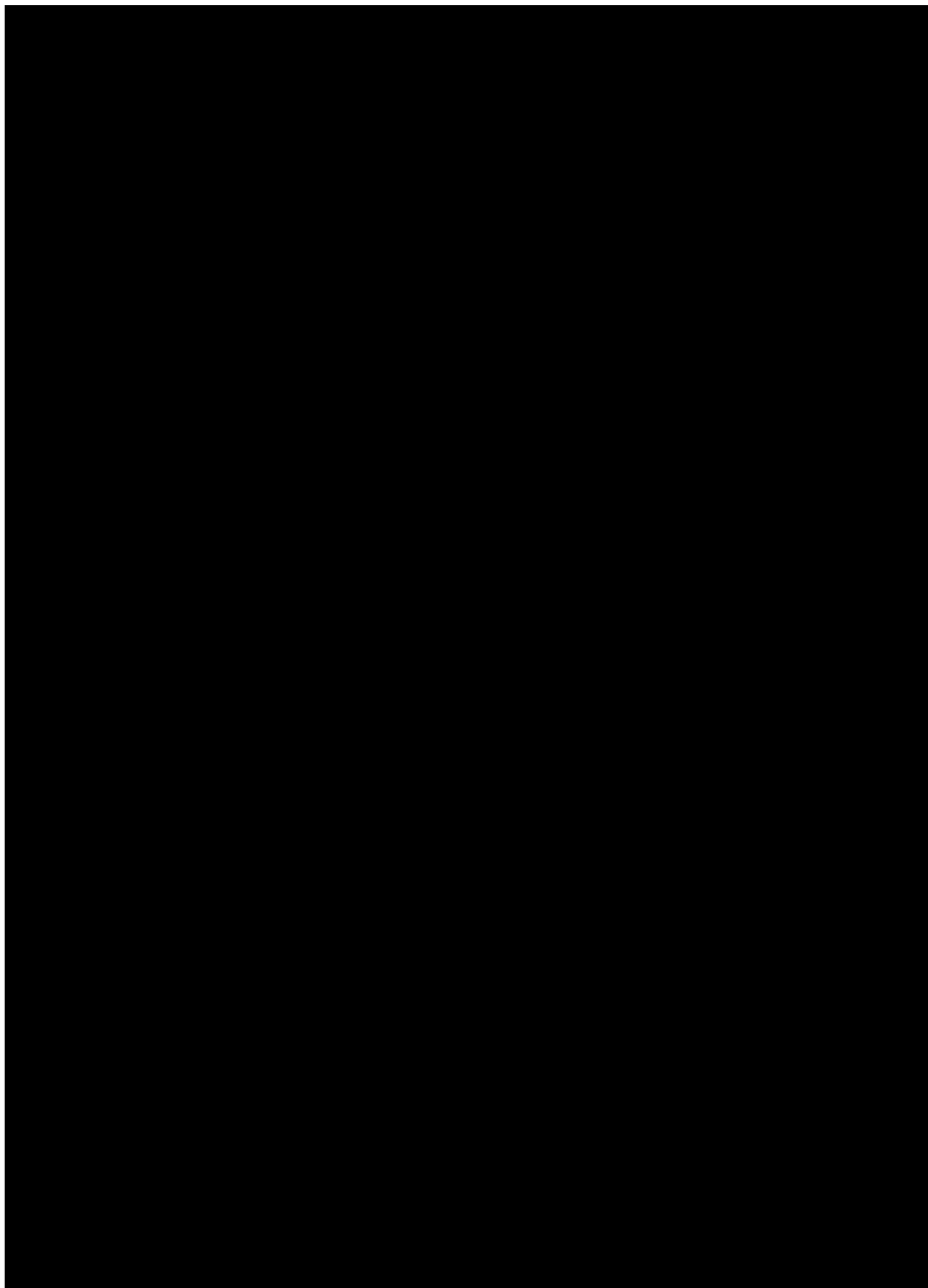
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