

Connected

Summer 2016

A Quarterly Newsletter for Connected Corridors Stakeholders

Update

Lots of changes have happened over the summer for the Connected Corridors Pilot. Joan Sollenberger at Caltrans Headquarters and Sam Esquenazi at Caltrans District 7 both retired. Nick Compin has been promoted to Chief – Office of Strategic Development and Allen Chen has been assigned to fill Sam's role related to CC. A very special thanks to Joan and Sam for their decades of service to the state of California and specifically for spearheading and leading the Connected Corridors Pilot since its inception. Readers can learn more about Allen Chen's vision for the CC Pilot on page 6. Brian Simi has also joined the team as the Acting System Management Principal.

The requirements phase of the Pilot is nearing completion, and work has proceeded into the high-level design and response planning phases. More information on the progress made is on pages 2-5.

Caltrans detector health is improving, and the team is starting to review city sensor data. The I-210 corridor-wide Aimsun traffic simulation model is up and running with over 450 intersections. We will discuss this model in our next newsletter.

IT Series: CC in the Cloud



This new series will focus on how new or growing information technologies work and their relevance to the Connected Corridors program. For this first edition, Greg Merritt with PATH highlights cloud computing.

The formula for success for Connected Corridors includes the use of corridor-scale data analytics and real-time traffic simulations to support analysis and management of the corridor. It's no surprise, then, that Integrated Corridor Management requires some heavy-duty computing horsepower.

Connected Corridors has chosen a cloud computing strategy to meet these computing needs. Cloud computing is an umbrella term used to describe a wide variety of computing services, rather than any particular sort of computer equipment. Why is this distinction important?

Not long ago, individuals and organizations could only meet computing needs by purchasing, configuring, and maintaining their own computer equipment. Whether used to provide file storage, web site hosting, database services, or simulation environments, this expensive physical infrastructure had to be sized to meet peak demand to avoid service interruptions when demand exceeded capacity.

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● IT Series, continued from page 1

Of course, just as a roadway built for peak demand may be nearly empty at 2 a.m., a large physical computing installation may spend much of its time idle and underutilized. Also, given the rapid pace of advancement of computer technology, frequent (and costly) replacements and upgrades are required to be able to run the latest software and services.

Cloud computing providers offer computer resources on a pay-as-you-go basis. Virtual computers can be “turned on” to scale the available computing horsepower to match the current demand, and then, when demand relaxes, the unneeded services can be extinguished to save costs. There is a large and increasing menu of cloud computing services available in a pay-as-you-go arrangement from many large providers, such as Amazon, Google, and Microsoft.

A common concern with cloud computing is security: if an organization runs software and services at an off-site cloud computing provider, how can security be ensured?

Cloud services are designed from beginning-to-end with security features built in, such as separation/isolation of resources, strong encryption, multi-factor authentication, firewalls, logging, and audit trails. They also provide features and tools that can meet the security requirements of multiple industries and even different governments -- health care, education, business (credit cards), U.S. government standards, and so on.

The UC Berkeley Connected Corridors team is developing decision support, data management, and data quality tools. By using the cloud, these tools can be scaled up for use in other corridors and districts. This development is benefiting from ongoing conversations with Caltrans District 7, HQ Traffic Operations, and Caltrans IT, as we work together to ensure that the software and data on which Connected Corridors depends meet the project’s and the organizations’ performance and policy requirements.

Requirements Planning Drawing to a Close; High-Level Design Starting

In the Fall 2015 issue of the Connected newsletter, we reported on the requirements-gathering process and methodology. Following the development of the approach, meetings were set up with stakeholders, including several Caltrans District 7 divisions/functional offices, LA County, and the cities. Then in the Spring 2016 newsletter, we reported on the progress made on the requirements, including holding over 20 meetings with more than 75 stakeholders and the release of the first draft. The document includes three formats – brief summaries, generic explanations, and specific tables for the I-210 Pilot. The varying levels of detail address the different expectations and communication preferences found among the reviewers.

Currently, the I-210 Pilot System Requirements document is undergoing revision. In addition to processing over 544 comments from stakeholders, further refinements are being made. In April, we met with the cities and County to develop a consolidated table of requirements from a previously larger list. In the meeting, agreement was reached on approximately

twenty requirements that were organized into four categories: Sensing and Data; Incident/Event Response Plans; Road Network Management; and Outreach, Agreements, Funding, Personnel. A consolidated table has also been developed and approved for the Caltrans requirements. Additional categories were added to account for the unique needs of Caltrans as the primary managing agency for the I-210 Pilot.

As the Requirements document evolved, its breadth and depth have increased and now go well beyond what is typically included. For example, institutional requirements are new to the process. They tie directly to the approach taken for this document with a focus on “actors” and how they must all work together in an efficient and coordinated manner. The institutional requirements emphasize strategic planning and the organizations and people necessary to execute those plans, and how individuals and groups are structured, funded, motivated, and informed. The core principle is that active collaboration among people and

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● Requirements, continued from page 2

organizations is the cornerstone for a successful ICM effort.

Additionally, the Requirements document must be a living document so that it can evolve as the project evolves. Requirements may change over time, and without the ability to adapt, the systems implemented could quickly become obsolete. By incorporating flexibility, the goal is that the I-210 Pilot can remain relevant, if and when the actors and supporting organizational systems change.

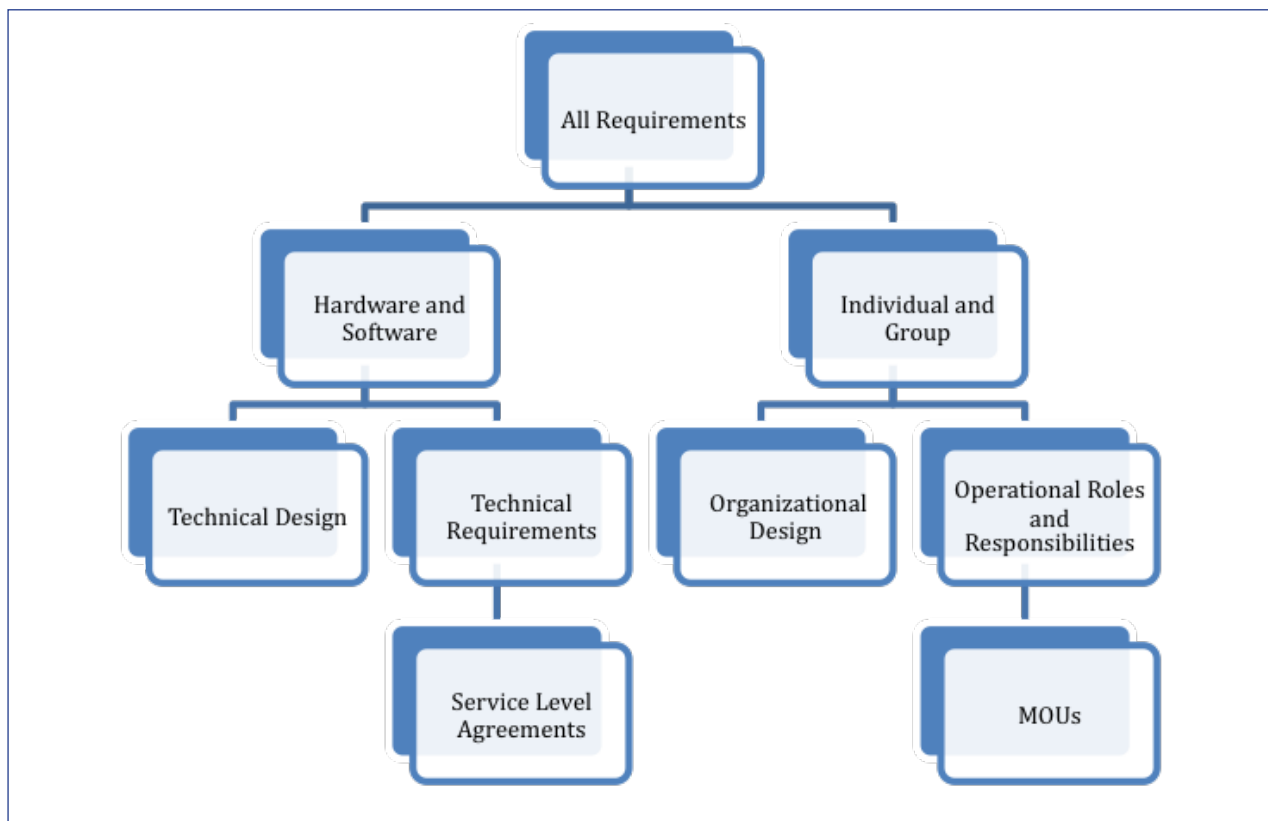
With the requirements well underway, the team is now moving into the next phase of the ICM Pilot: High-Level Design. The Requirements document outlines what the ICM system should do, while the design documents, including both the high-level design and detailed design, outline how the requirements will be met.

In parallel, a document entitled

“I-210 Pilot System Requirements: Job Descriptions and Duties/Tasks” has been prepared, which identifies approximately twenty job roles from the larger Requirements document—roles that oversee all the non-automated tasks, which must be carried out by people. The document is intended as an easy reference for corridor stakeholders and others. For example, the role of Corridor Manager has 54 tasks the person in that job is expected to perform to meet the requirements. The tasks can come from any of the requirements’ characteristics, including the overall description, quality metrics, problem identification and resolution, or maintenance needs. They include the Corridor Manager’s direct responsibilities, as well as those performed in coordination with other personnel such as the Outreach and Communications

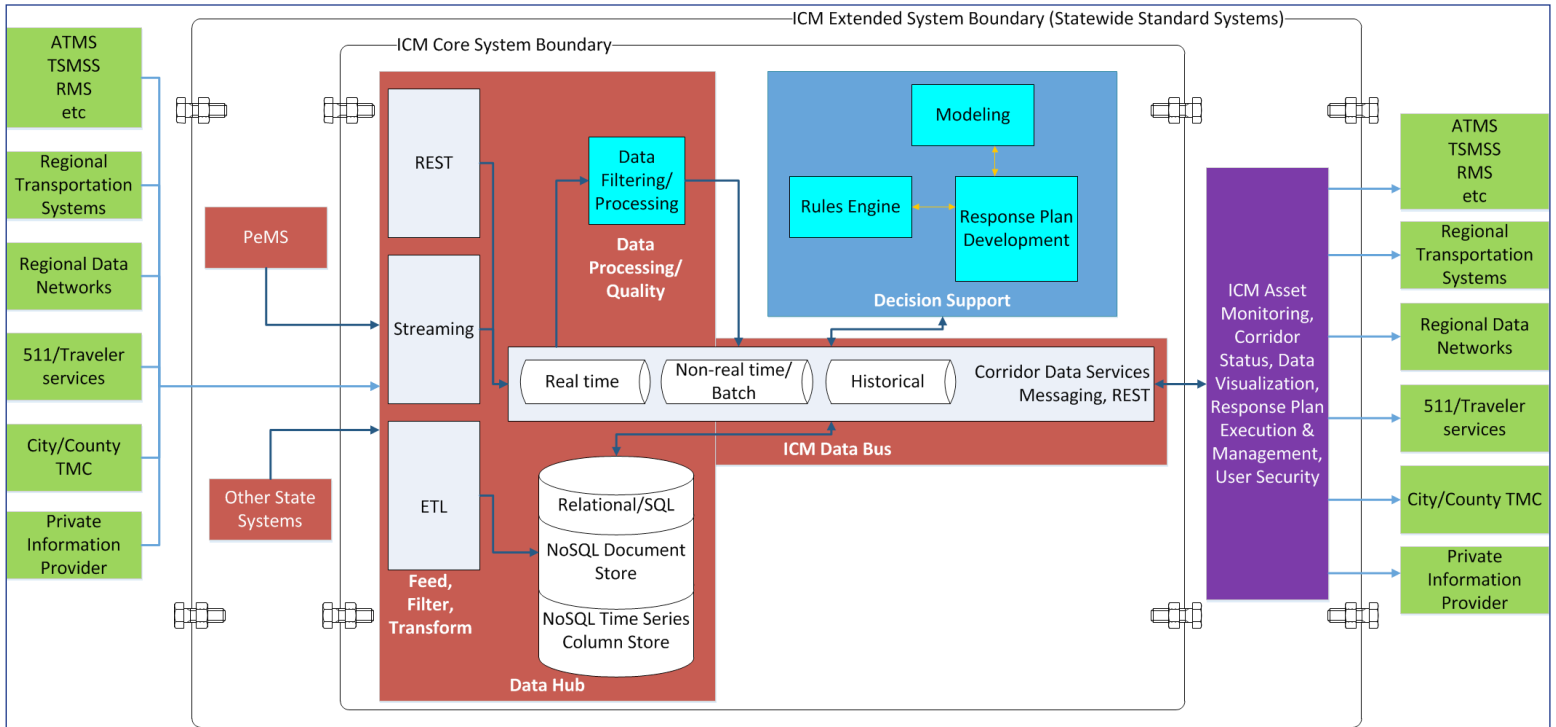
Manager, Corridor Technical Manager, Corridor Data Analyst, Traffic Engineer, etc. The document is designed to be used to define the basic knowledge, skills, and abilities (KSAs) required of personnel participating in an ICM effort and also as a template for other ICM teams.

This document is still in draft form and will likely be refined further as comments are received, including organizing the tasks into the requirement categories used in the System Requirements document (Institutional Support, Corridor Monitoring, Real-time Incident/Event Monitoring, Data Management Functions, and so on). The job descriptions and duties/tasks will help the I-210 Pilot and other ICM projects have the necessary personnel in place to design, implement, operate, and maintain an effective ICM effort.



High-level Design Based upon Requirements

Proposed ICM Architecture



As of the end of July, Caltrans management – including Mike Nguyen (Chief, Division of Infrastructure) and Tom Hallenbeck (Division Chief, Division of Traffic Operations) – has expressed support and interest in the ICM core architecture and the cloud-based technical design. The table above shows the proposed ICM architecture. Stay tuned for more details on this architecture in the next Connected newsletter.

Improvements Abound for All Types of Travelers Around Gold Line

With the opening of the Foothill Gold Line extension at the beginning of March, the newly serviced cities have been busy making each station inviting, and upgrading surrounding facilities to ensure the safety of all travelers. From a new shuttle service in Arcadia to Monrovia's largest Public Works project, Station Square, the I-210 Pilot cities with new stations each have something to be proud of.

In June, Arcadia Transit began offering a fixed-route, fixed-schedule shuttle service that connects riders to Arcadia's Gold Line station and other popular destinations throughout Arcadia. There are three shuttle lines (Red, Green, and Blue), and the cost is 50 cents per ride, with one free transfer.

The City of Arcadia is also in the process of completing pedestrian improvements around the Arcadia Gold Line station to connect with key destinations in the city's downtown, such as restaurants, retail shops, hotels, other transit stops, recreation centers, and potential future mixed-use sites. The funding was awarded by Metro and focuses on the streets surrounding the station, including Santa Clara Street from Santa Anita



Avenue to Second Avenue, First Avenue from Wheeler Avenue to Colorado Blvd., and Wheeler Avenue from Santa Anita Avenue to its easterly terminus. In addition, bicycle facility improvements will be made to extend the bike lanes surrounding the station and connect with other local and regional bike routes in the vicinity.

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● Gold Line, continued from page 4

In Duarte, the city is completing a \$1.65 million Active Transportation Program (ATP) project which includes citywide way-finding signage, sidewalks, and bike paths on Duarte Road between Mountain Avenue and Hope Drive, bike paths on Highland Avenue, and closing a block-long gap with a new sidewalk on the west side of Highland Avenue. Additionally, funding has been requested through the ATCMTD grant submitted recently by Caltrans to upgrade two intersections near the station with “high visibility” crosswalks.

In Monrovia, the Station Square Transit Village is a dynamic transit-oriented community that contains a large public plaza, a concert amphitheater, playgrounds, water features, and green space surrounding the station. Breaking ground in 2014, the City of Monrovia made substantial infrastructure improvements to the area, including widened sidewalks, extra street lighting, landscaped medians, and way-finding signs to improve safety for pedestrians and bicyclists. The city is also working with multiple partners to bring additional businesses into the area. Furthermore, a 25,000 square foot food hall concept, called The Lumber Yard, is planned along Pomona Avenue as a vibrant gathering place for artisanal and independent food businesses.

All of these improvements and changes are even more important given the higher-than-expected ridership numbers. The first month of service saw 4,000 to 5,000 riders at the new stations each weekday, and for the month of June, weekday ridership on the Gold Line increased by almost 18 percent from the previous year. Also



in June, Metro changed the Gold Line schedule so that all Gold Line trains continue to the end of the extension every seven minutes in the morning and afternoon peak hours on weekdays. Trains previously ran every six minutes during peak hours



between East Los Angeles and Pasadena and every 12 minutes between Pasadena and Azusa.

“The Metro Gold Line Extension has been a resounding success since it opened March 5, with trains consistently running at full occupancy,” said Mark Ridley-Thomas, L.A. County Supervisor and Metro Board chair. “The line has been so successful that it has pushed us to up our game in order to meet our riders’ expectations.”

The success of the Gold Line extension has resulted in parking constraints, primarily near the new end of the line. Both Azusa station garages are often filling up on weekdays before 7 a.m., but Metro officials remind drivers that spaces remain available at the other new stations as well as at the Sierra Madre Villa station, formerly the end of the line. Furthermore, travelers are encouraged to consider alternative modes of travel to access the station to avoid parking altogether. The City of Glendora even began offering its own shuttle service to the Downtown Azusa station. The shuttle runs every 30 minutes during the a.m. and p.m. peak hours with two routes—one from the Crowther Teen and Family Center and the second from the Transit Parking Plaza.

With so many improvements around the stations already implemented and even more amenities planned in the future, in addition to Phase 2 of the extension, the Gold Line is on track to be a tremendous success for decades to come.

All images and ridership numbers courtesy of LA Metro.

Q & A with Allen Z. Chen

In this fourth installment of the Question and Answer series, we spoke with Allen Z. Chen, who became the new Connected Corridors Pilot Technical Director following Sam Esquenazi's retirement in June. Although Allen has been involved in the I-210 Pilot by providing system and technological assistance, we wanted to learn more about him and his vision for Connected Corridors.

Allen started his career with Caltrans in the San Francisco Bay Area (District 4) in 1988 as a Transportation Engineer-Electrical, transferring to District 7 just two years later. He was promoted to Senior Transportation Electrical Engineer in 1998 in the Office of ITS. Allen has many years of experience in successful management of multiple Intelligent Transportation Systems (ITS) projects at District 7, using a systems engineering approach and technology solutions. Throughout his career, Allen has managed numerous complex and innovative studies and projects including planning, design, and construction oversight of the Los Angeles Regional Transportation Management Center (LARTMC) project; the Dynamic Corridor Congestion Management (DCCM) project; and the development of District 7's Advanced Transportation Management System (ATMS). Several of Allen's projects have garnered state and federal recognition.

Allen is a graduate of California State University, Los Angeles, where he earned his Bachelor and Master of Electrical Engineering degrees. He has been a registered Professional Engineer since 1993.

In your long career, what is one accomplishment you are particularly proud of?

For over 20 years, I participated in and managed the development of District 7's ITS program from conception to final deployment, a massive undertaking resulting in a \$250 million investment throughout the

freeway system. The development of an Advanced Transportation Management System (ATMS) through a complete systems engineering process with the ability to meet Caltrans' Transportation Management Center operational needs was challenging, but also a very rewarding experience. This system is still used as the core technology system in District 7's TMC and has also been used as a blueprint for other Caltrans TMCs throughout the state.

What do you hope to achieve in your new role as the Connected Corridors Technical Director?

This project goes beyond the usual freeway management. It's much bigger, with the broader goal of managing an entire corridor. To do this, I plan to continue the work that has already begun — reaching out to the local communities and partnering with the cities, the County, and transit agencies to provide a seamless, multimodal transportation system that meet the needs of the local community. I also want to ensure that the technical application meets the Connected Corridors operational needs, as I believe this is critical to the success of the Pilot.

You mention partnering. Why are partnerships so important to Caltrans?

Not a single trip starts and ends on our freeway system. To provide a seamless transportation system, Caltrans needs to provide a multimodal corridor-wide transportation solution. This is what Connected Corridors aims to do, and there-

fore, Caltrans must work with other transportation agencies and local communities. Caltrans cannot do this job alone.

What changes have you seen or see happening in the future at Caltrans to implement more transportation systems management and operations (TSM&O) projects and/or policies?

Caltrans has made organizational changes to meet this new business requirement. We've assigned a Corridor Manager to oversee corridor performance, monitor the amount of investment needed for long-term planning, and to better coordinate with stakeholders and other transportation agencies. In the future, I think there will be an even greater need for technological solutions to better manage our transportation system assets and help agencies make better operational investment decisions to improve efficiency, reliability, safety, and mobility for all modes of transportation.

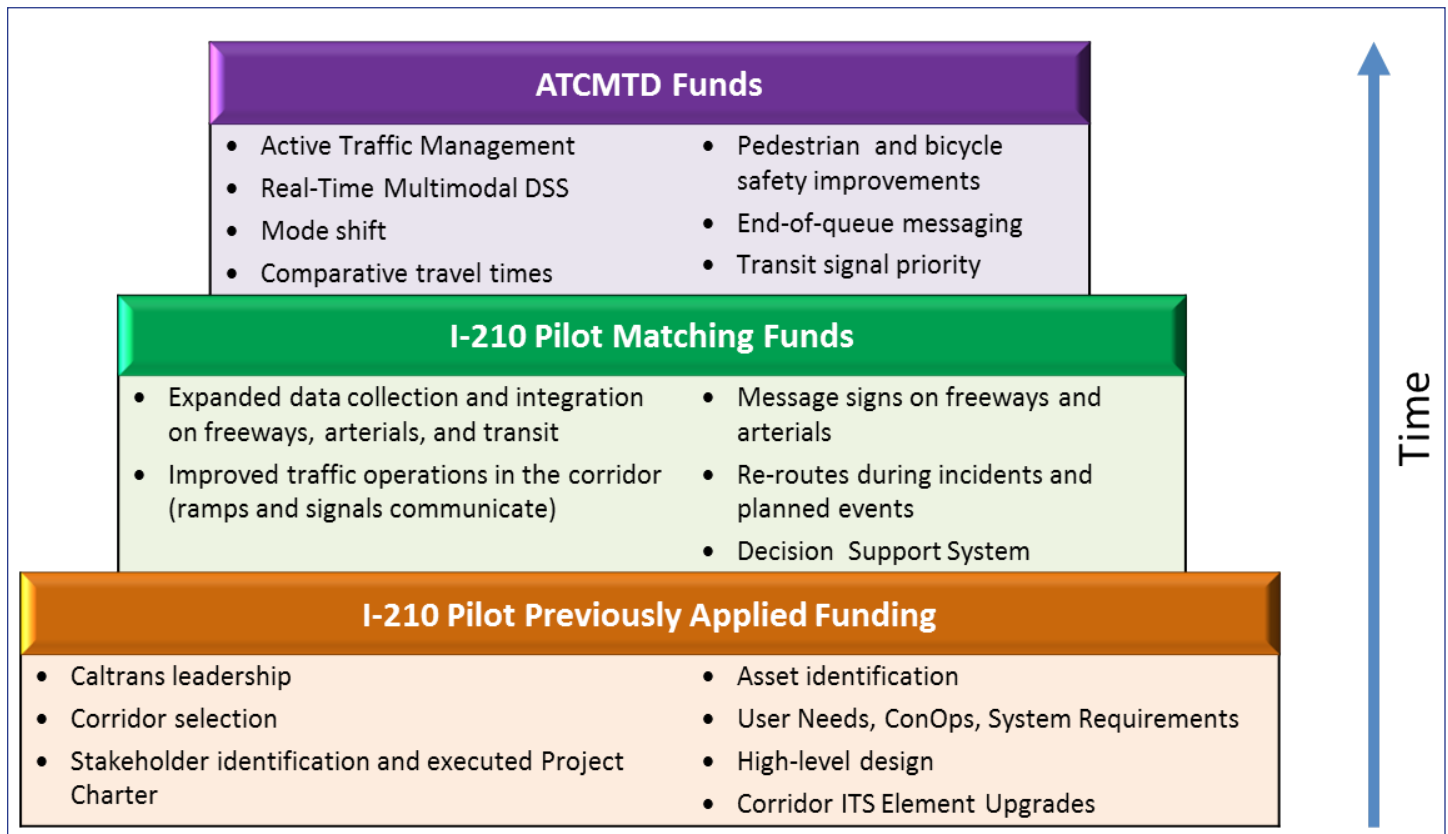
What has most impressed you about the Connected Corridors Pilot thus far?

This project is a first step moving Caltrans Traffic Operations toward a multimodal solution working together with all the corridor transportation agencies, law enforcement, and emergency operators. I'm very glad to be a part of the solution and working with the numerous stakeholders who are such an important part of ensuring the Pilot's deployment and success.

Caltrans Applies for \$9 Million through New US DOT Initiative

Earlier this summer, the team worked diligently to prepare a grant application for the U.S. Department of Transportation's new Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) initiative. The program will be awarding up to \$12 million to five to ten applicants with a total of \$60 million per fiscal year for the next five years.

On behalf of the stakeholders, Caltrans requested close to \$9.2 million to support expanding the I-210 Pilot to include additional safety enhancements and new multimodal and demand management strategies. For the 50% match requirement, a combination of SHOPP funding for the freeway improvements and LA Metro 2015 Call for Projects funding for the arterials is being used. The figure below shows how the new funding will build on existing funding to implement a more robust program.



Since this is a new program created by the FAST (Fixing America's Surface Transportation) Act, it was unknown just how much interest there would be or how many projects were close enough to deployment to apply, but it is likely that it will be highly competitive. The Connected Corridors team is confident the I-210 Pilot is a great fit and aligns with the initiative's vision and goals. "Caltrans together with Metro, LA County, the Cities of Pasadena, Monrovia, Duarte, Arcadia, technology providers and PATH are well positioned to build on existing investments and broaden progressive transportation management and innovative safety measures along Interstate 210's multimodal transportation corridor in the San Gabriel Valley," said Caltrans District 7 Interim Principal Engineer Homar Noroozi. "The operational and safety strategies will complement Metro's Gold Line light rail system that serves this key economic, transport, and commerce corridor."

Specifically, the ATCMTD funding will support:

- Installation of queue warning information devices at strategic locations along the I-210, to reduce traffic speeds on the approach of congested areas and the likelihood of primary collisions along the freeway.
- Adding Transit Signal Priority equipment at key intersections in the corridor to provide extended green time and/or shorter red lights to reduce bus delays.

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● ATCMTD Grant, continued from page 7

- Installation of bike and pedestrian sensors at key intersections within the corridor to ensure that pedestrian and cyclist needs are adequately considered and to reduce injuries and fatalities.
- Improvements to crosswalks in Duarte, where the recent opening of the Gold Line light-rail service has increased conflicts between cars, cyclists, and pedestrians.
- Deployment of High-Intensity Activated Crosswalk Beacons (or similar technology) at existing crosswalks in Arcadia and Duarte to increase visibility for pedestrians along arterials that may be used as reroutes for free-way traffic.
- Real-time message generation on signs, through 511, and via third-party navigation providers.
- Improvements to maintenance of ITS devices and communication and software elements.
- Development and deployment of a Multimodal Real-Time Decision Support System (MRTDSS).

A funding announcement is expected in September. Thanks to everyone who assisted in the preparation of the application and for providing letters of support.

Aligning Goals for ATCMTD Grant

The goals of the Connected Corridors program are closely aligned with those of the Advanced Transportation and Congestion Management Technologies Deployment initiative, listed below:

- Reduced costs and improved return on investments, including through the enhanced use of existing transportation capacity;
- Delivery of environmental benefits that alleviate congestion and streamline traffic flow
- Measurement and improvement of the operational performance of the applicable transportation networks
- Reduction in the number and severity of traffic crashes and an increase in driver, passenger, and pedestrian safety
- Collection, dissemination, and use of real time transportation related information to improve mobility, reduce congestion, and provide for more efficient and accessible transportation, including access to safe, reliable, and affordable connections to employment, education, healthcare, freight facilities, and other services
- Delivery of economic benefits by reducing delays, improving system performance and throughput, and providing for the efficient and reliable movement of people, goods, and services;
- Integration of advanced technologies into transportation system management and operations
- Demonstration, quantification, and evaluation of the impact of these advanced technologies, strategies, and applications towards improved safety, efficiency, and sustainable movement of people and goods
- Reproducibility of successful systems and services for technology and knowledge transfer to other locations facing similar challenges

Contacts

If you have questions about the status of the I-210 Pilot or any of the information discussed in this newsletter, please do not hesitate to contact us.

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About

Connected Corridors is a collaborative effort to research, develop, test, and deploy a framework for corridor transportation system management in California. Our aim is to fundamentally change the way the state manages its transportation challenges for years to come. Starting with a pilot on Interstate 210 in the San Gabriel Valley, the Connected Corridors program will expand to multiple corridors throughout California over the next ten years. As an Integrated Corridor Management (ICM) program, Connected Corridors looks at the entire multimodal transportation network and all opportunities to move people and goods in the most efficient manner possible.

CONNECTED is a quarterly newsletter with updates and stories about the Connected Corridors program. For more information on the program or the newsletter, please visit our website at connected-corridors.berkeley.edu.

