Connected

Spring 2017

A Quarterly Newsletter for Connected Corridors Stakeholders

Center to Center (C2C) Communications Update

One of the most important components of the CC Pilot is the communication between the traffic control systems from the cities, Caltrans, and LA County, and the cloud-based ICM system, specifically its Data Hub and Corridor Management System, (shown in the ITS Architecture diagram on page 2). The exchange of information will allow the Data Hub to receive data from the various traffic signals, sensors, and other installed equipment and to send data back out to the traffic management centers and supporting equipment with response plan information. In the ITS Architecture diagram, the green boxes show the various centers that need to be integrated with the ICM system.

C2C communications need to be consistent to ensure easy integration with the Corridor Management System (purple box in the diagram) and an easier state-wide rollout. We will be using industry standard TMDD data formats and communication technologies for all components of the ITS Architecture (see side box for more information).

The original plan was to use LA County's Information Exchange Network (IEN) for the exchange of data. However, the IEN upgrades already underway will not be completed in the time frame necessary to maintain the Pilot's current schedule. Therefore, the team has been working with the three vendors who currently provide traffic management software to one or more of the CC stakeholders, to implement C2C connections directly. Pasadena uses Transparity by McCain; Arcadia and Caltrans use TranSuite by TransCore; and LA County, Monrovia, and Duarte use KITS by Kimley-Horn. All three system vendors are working with stakeholders to understand the detailed requirements and provide an appropriate C2C interface. The challenge for the vendors, and for Connected Corridors, is to completely standardize these interfaces so that vendors participating in the proof of concept (see article on page 2) can easily interface without custom development.

PATH will be handling the purchasing of all three software upgrades and has begun the pre-purchasing work necessary. The goal is to have software delivered by the end of 2017.

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"Center-to-center (C2C) communications span the entire ITS domain, covering the exchange of data between computers physically located in different transportation management center facilities. Such facilities include: traffic management centers, transit management centers, public safety, incident management centers, parking management centers, and so forth. C2C standards enable this data exchange, specifying what information is exchanged, how and when it is exchanged, and the underlying transport mechanisms. The two categories for C2C communications standards are generally referenced as informational and protocol standards. The Traffic Management Data Dictionary (TMDD) is an information standard, while National Transportation Communications for ITS Protocol (NTCIP) standards address protocol standards." - U.S. Department of Transportation

"The Traffic Management Data Dictionary (TMDD) Standards were developed to support center-to-center communications as part of the regional deployment of ITS in order for centers to cooperate in the management of a corridor, arterial, incident mitigation, event management, etc. Hence the TMDD provides the dialogs, message sets, data frames, and data elements to manage the shared use of these devices and the regional sharing of data and incident management responsibility." – Institute of Transportation Engineers (ITE)

Proof of Concept Process Begins

Following the completion of the System Requirements in 2016, the CC Pilot team assigned requirements to various subsystems as shown in the diagram below. The team determined that the Corridor Management subsystem would need to be filled by a commercial off-the-shelf, or COTS, software package. The Corridor Management system is the primary user interface and allows for management of the response plan lifecycle and ICM system. To ensure the I-210 Pilot has an opportunity to evaluate the most innovative systems available, the team is inviting vendors to participate in a proof of concept pilot with their COTS product. Responses to the solicitation for participation are due on June 5.

The diagram below shows the ICM system architecture with the major subsystems: Data Hub (red), Decision Support (blue), and Corridor Management System (purple). The green boxes are external systems that will communicate with the core ICM systems. The Data Hub, Decision Support, and Corridor Management systems will run in the Amazon cloud.

Caltrans will use the information gained from the proof of concept to validate and update the requirements so they can be used in the purchase of the final Corridor Management System. This purchase will follow standard Caltrans purchasing requirements with the issuance of an RFP and the selection of the vendor determined to best meet the requirements. Participation in the proof of concept is not a requirement for participation in a future procurement process, and there is no financial compensation to vendors for participating. However, vendors will benefit from the additional exposure to the California market and will be better positioned to meet the final requirements of the system.

PATH, under contract to Caltrans, will lead the COTS proof of concept process. The team has created a tentative timeline that anticipates three products to be piloted. However, PATH will determine the final number of vendors after reviewing both the responses and the team's available integration resources.

As part of their participation, vendors agree:
- There will be no charge for integration and use of software during the pilot.
- Software will run in the Amazon cloud.
- Vendors will meet requirements listed as "essential" in the requirements document.
- Vendors are free to meet as many of the non-essential requirements listed in the requirements document as they wish.

I-210 Pilot stakeholders agree to:
- Utilize and evaluate the software. An evaluation plan will be developed to ensure consistency in the evaluation process.
- Pay for Amazon cloud usage costs associated with the pilot.
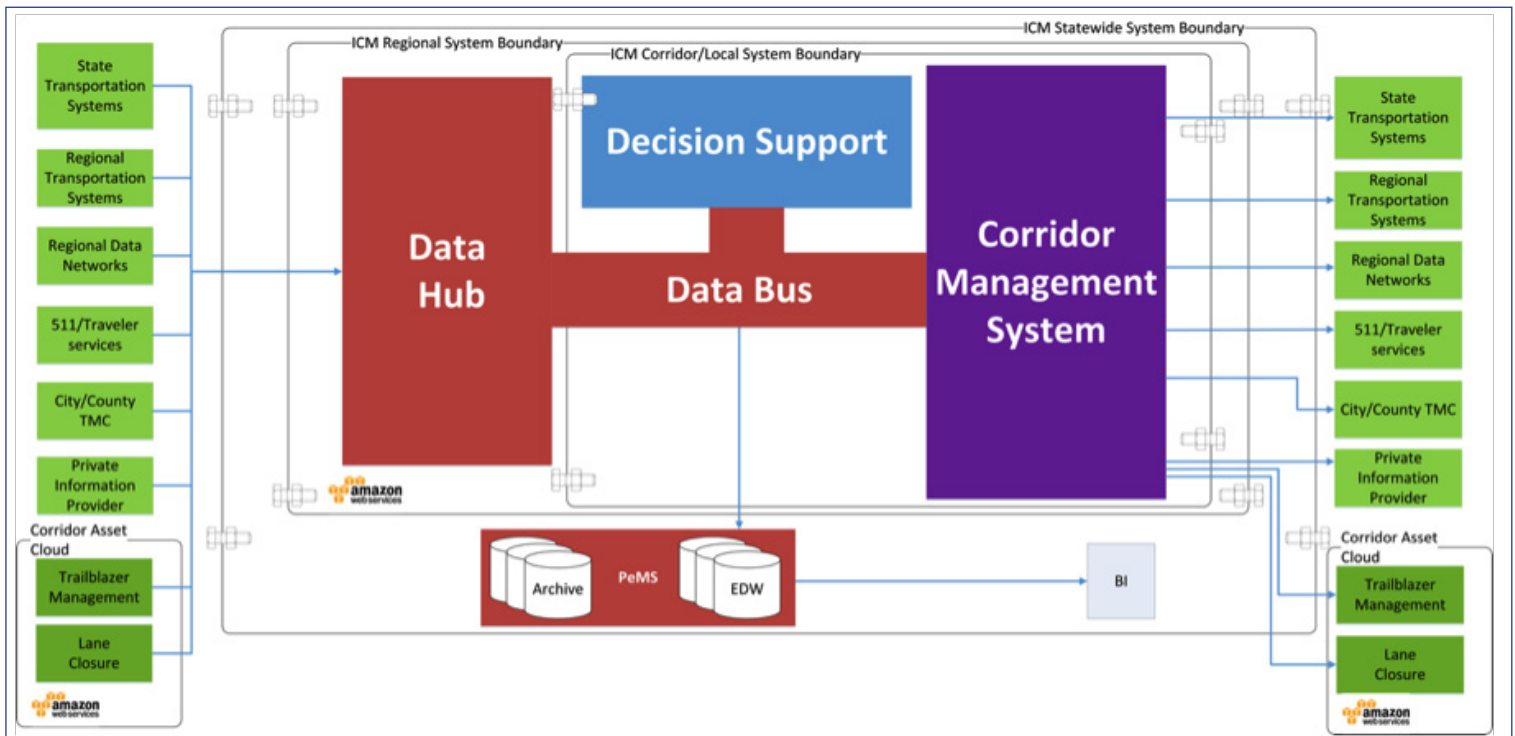
ITS Architecture Diagram

● C2C Communications, continued from page 1

In March and April, meetings were held with the vendors to discuss their current capabilities and a plan forward. As of May 1, we have received initial information for all of the vendors and are finalizing the detailed requirements that will allow us to quickly move forward with the necessary purchase orders. The team is also finishing up with initial evaluation of McCain's reference C2C implementation.

This is a vital issue the team is working on as without C2C communications, the Pilot cannot be implemented. We appreciate Kimley-Horn's, TransCore's, and McCain's time in working with us to develop viable solutions and ensure a timely deployment of the I-210 Pilot. We will continue to provide updates on this important matter at stakeholder meetings and in future Connected newsletter editions.

New Tool Helping Caltrans Monitor PeMS Sensor Health

A new web-based visualization tool developed by PATH is now being used to track PeMS (Performance Measurement System) average weekly sensor availability. The need for accurate and reliable data has been a recurring theme in this newsletter, and this new tool is another mechanism the CC team has to monitor data quality. Every week, the tool automatically updates with the aggregated status of each sensor category along I-210, I-605, and SR-134 within the corridor pilot area, as well as a section of I-10.

Arterial sensor health from Arcadia is also viewable in another tab on the website. For now, however, arterial data is updated manually. The goal is to eventually make available all arterial sensor health data within the corridor.

Caltrans and PATH jointly review and discuss sensor health on a weekly call and see where improvements can be made. "One of the great things about the tool is that we can now have an active conversation about the issues," says Anthony Patire. "When there are communications failures affecting a section of freeway, it becomes immediately obvious on the website, thus enabling a constructive conversation with folks responsible for system monitoring."

PATH is continuing to work on expanding the amount of data and level of detail available through the tool.

Caltrans (freeways)	Arcadia	Pasadena	Summary					

Weekly Average Sensor Availability — I-210 / Westbound PM 25 - PM 43.25
Hover over cells to view units in detector-days.

	CD	CH	Fwy-Fwy	HOV	Mainline	Off Ramp	On Ramp	Total
30 31 1 2 3 4 5	0.0%		100.0%	69.5%	76.8%	91.4%	87.2%	78.7%
November 6 7 8 9 10 11 12	0.0%		100.0%	73.3%	81.2%	91.4%	87.2%	82.1%
13 14 15 16 17 18 19	0.0%		100.0%	76.3%	81.1%	88.1%	86.7%	82.0%
20 21 22 23 24 25 26	0.0%		100.0%	62.0%	66.2%	63.3%	62.2%	65.7%
27 28 29 30 1 2 3	0.0%		100.0%	72.6%	73.5%	72.4%	70.4%	73.5%
December 4 5 6 7 8 9 10	0.0%		100.0%	78.2%	78.6%	83.3%	79.1%	79.4%
11 12 13 14 15 16 17	0.0%		100.0%	75.2%	78.3%	74.8%	77.0%	77.7%
18 19 20 21 22 23 24	0.0%		100.0%	71.8%	81.4%	82.4%	83.7%	80.7%
25 26 27 28 29 30 31	0.0%		100.0%	71.1%	81.0%	90.0%	85.7%	81.3%
January 1 2 3 4 5 6 7	0.0%		100.0%	71.4%	81.7%	86.2%	85.2%	81.4%
8 9 10 11 12 13 14	0.0%		42.9%	53.0%	63.1%	71.4%	66.8%	62.1%
15 16 17 18 19 20 21	0.0%		42.9%	50.4%	60.1%	70.5%	65.8%	59.7%
22 23 24 25 26 27 28	0.0%		100.0%	73.3%	82.8%	90.0%	91.3%	83.3%
29 30 31 1 2 3 4	0.0%		100.0%	75.2%	83.4%	89.5%	94.4%	84.2%
February 5 6 7 8 9 10 11	0.0%		85.7%	80.5%	85.5%	96.7%	96.4%	86.9%
12 13 14 15 16 17 18	0.0%		100.0%	87.2%	89.8%	86.9%	94.4%	89.7%
19 20 21 22 23 24 25			100.0%	88.0%	89.5%	84.8%	94.9%	89.6%
26 27 28 1 2 3 4			100.0%	84.2%	83.2%	77.0%	86.2%	83.4%
March 5 6 7 8 9 10 11			100.0%	75.9%	77.2%	69.6%	76.0%	76.7%
12 13 14 15 16 17 18			100.0%	78.6%	80.3%	72.8%	80.6%	79.8%
19 20 21 22 23 24 25			100.0%	86.8%	87.1%	83.3%	88.3%	87.1%
26 27 28 29 30 31 1			100.0%	85.7%	86.5%	81.7%	88.3%	86.4%
April 2 3 4 5 6 7 8			100.0%	85.3%	86.8%	79.0%	87.8%	86.2%

Screenshot of the web-based visualization tool. Drop-down menus at the top select freeway and postmile range. Each row corresponds to one week. Each column corresponds to one sensor category. Each value in the table corresponds to the percentage of loops providing data for that week calculated as the number of received detector-days of data divided by total possible detector-days of data.

Q & A with Rafael Molina

In this sixth installment of the Question and Answer series, we spoke with Rafael Molina to discuss the roles and responsibilities being worked on for the Pilot.

You are new to the position as the "Corridor Managers' Manager" in District 7. What other positions have you held at Caltrans and how have they helped prepare you for this new role?

It's been about nine months since I was appointed to this position. Perhaps to some, I may still be considered new, but I don't feel that way any longer. I have indeed held other positions at Caltrans, from student assistant to a senior level engineer and various acting assignments at the managerial level along the way. I believe all of these positions have contributed to my development as a professional. But it's not just the technical experience obtained from the various positions I've held in the Divisions of Construction; Design; Maintenance; Planning; Project Management; and presently in Traffic Operations. I would be remiss if I did not also take a moment to acknowledge the fact I've had an opportunity to work with a variety of dedicated professionals whom I've been able to learn from as well. In short, I've always been able to adapt to changes in my work environment; this ability helps me, as I am managing a newly created office, so one could say I'm leading the way into an uncharted territory.

What has been the most challenging component of your job in the past six months?

As with any limited resource, time constraints can pose a significant challenge. Even simple tasks can become challenging if the time constraints are substantial enough. The I-210 Pilot is clearly a priority for me and my organization, but this is simply one aspect of the day-to-day functions I manage. As a result, I leverage my multi-tasking abilities to ensure that I am able to deliver all of the tasks that have been assigned to me or my office.

Caltrans is the leader of the I-210 Pilot. How has D7 adapted to this new role as a corridor manager rather than as a road/bridge builder?

From an organization perspective, I would suggest the role of road/bridge building is passé. In our District, it's widely accepted that the days of strict capacity expansion have ended. That approach has been replaced with a Transportation System Management and Operations (TSMO) environment where the focus is on integrating and optimizing the performance of our existing multi-modal infrastructure.

Although interrelated, the I-210 Pilot and corridor management are two distinct efforts. My Division is currently undergoing a realignment that embraces the principles of corridor management and TSMO. Although organizational changes can bring about uncertainty, our staff is generally embracing our new corridor manager paradigm. For us, the corridor manager role involves an adjustment of our internal culture, whereby there will be greater end-to-end accountability and responsibility for staff as it relates to corridor safety and operations within their assigned corridors.

In coordination with PATH, you have been working on the Job Descriptions and Duties/Tasks document. You've currently assigned four positions/offices to the Caltrans roles identified in the Job Descriptions document. Can you tell us a little bit more about these positions and the other positions that still need to be covered?

One of the intended benefits of the Job Descriptions and Duties/Tasks document is that it identifies typical tasks or duties that need to be performed on the I-210 Pilot and it further identifies the position, or in our jargon, the "classification" that will perform them. This document is a work in progress and my efforts to date have entailed the identification of the appropriate functional group within Caltrans that would be charged with those tasks. The aforementioned four functional groups are all within the Division of Traffic Operations, more specifically the Offices of Corridor Management, System Performance, Intelligent Transportation Systems, and finally our System Management Principal Engineer. At this time, most of the positions identified have been at the senior engineer level.

Through a separate effort, an assessment has been conducted to identify the required knowledge, skills, and abilities (KSAs) that are needed for typical integrated corridor management applications. This will enable us to determine if there is a gap in KSAs between what would theoretically be required by corridor management staff and what our own workforce actually possess. Since this KSA gap analysis has not been completed, it is premature to speculate on the types of positions we may need to hire in the future. Additionally, as we continue

● Q&A, continued from page 4

to explore the system requirements, it's possible that our Information Technology (IT) group, as well as our headquarters counterparts, may have some input in identifying the appropriate classifications we may need to hire.

> *Kaizen is a Japanese word for "continue improvement." In business, Kaizen refers to activities that continuously improve all functions and involve all employees.*

How do you see your role expanding or evolving in the next year or so leading up to the launch of the I-210 Pilot?

I don't envision my role changing significantly, as I will continue to collaborate with our partners and stakeholders along the I-210 corridor. However, it's difficult to predict what kinds of "unknown" risk events may oc-

cur between now and our launch next year. With this in mind, being flexible and adaptable has always served me well and I envision that I will adapt as needed to enhance our chances for a successful launch.

What do you think is the next step for Caltrans and Connected Corridors after the launch of the I-210 Pilot?

Although I look forward to the launch next year, I don't see it as a destination; our Connected Corridors efforts won't end there. I think it will be important for us to take a *Kaizen approach and continually make adjustments as needed along the I-210 Pilot corridor. Furthermore, I expect that we will be able to leverage our experiences from this particular Pilot and apply them throughout our District as appropriate. Clearly, a successful Pilot will pave the road for smoother implementations for other Connected Corridors across our entire multimodal transportation system.

● Proof of Concept, continued from page 2

- Not share with other vendors any product details that are not available through normal use of the system.
- Work with vendors to provide appropriate and reasonable interactions with media, customers, and prospects.
- Assuming a successful pilot, Caltrans agrees to enter into a procurement process starting in 2018 and resulting in an RFP in 2019. Note that Caltrans cannot guarantee these dates.
- Caltrans HQ agrees to publicize the use of vendor products to other corridor projects in California.

In asking vendors to participate without payment, Caltrans understands that every effort must be made to ensure that the integration of the COTS system with the rest of the Connected Corridors system requires as little customization as possible. With this in mind, the corridor stakeholders have identified an essential set of requirements they believe can be met by COTS ICM system vendors without requiring extensive product customization. The project is also using standard TMDD data formats, communication technologies, and center-to-center (C2C) interfaces which we believe most COTS vendors currently support. While the

requirements document is the final source of requirements, the major requirements areas are:

- Geospatial, tabular, 2D, and time series visualizations of transportation networks, ITS assets, and associated state and status data
- Incident and event characterization
- Response plan implementation
- Communication with the DSS and the Data Hub
- System management and security

More detailed information about the Corridor Management System requirements the can be found on the I-210 Pilot website at http://ccdocs.berkeley.edu/content/corridor-management-subsystem-proof-concept.

As this is a pilot, it is important that all vendors and stakeholders understand that unexpected issues and challenges will arise and that all stakeholders and vendors will provide a best-effort, positive approach to resolving these issues. There is much to be learned by all participants, and our goal is to ensure that all vendors emerge from the process with valuable knowledge and exposure to the California market and that the CC Pilot is positioned for long term success.

For questions regarding the proof of concept please contact Lisa Hammon at lisahammon@berkeley.edu.

# California Passes Massive Roads Bill including new Congested Corridors Program

In April, the California Legislature passed Senate Bill 1 titled the Road Repair and Accountability Act of 2017. Authored by Senator Jim Beall and Assemblymember Jim Frazier, the bill raises the base excise tax on gasoline by 12 cents per gallon, the first increase in 23 years. Other new or revised revenue sources are expected to generate approximately five billion dollars a year and will fund road maintenance, safety projects, Complete Streets including active transportation projects, Self-Help Counties, and bridge and culvert maintenance and rehabilitation.

Additionally, the bill establishes the new "Solutions for Congested Corridors Program" with $250 million in annual funding to focus on multi-modal solutions for the most congested corridors in California. The California Transportation Commission (CTC) will appropriate the funding for the program, and eligible projects include improvements to state highways, public transit facilities, local streets and roads, bicycle and pedestrian facilities, and restoration or preservation work that protects critical local habitat or open space. Highway capacity expansion projects are limited to just a few exceptions,including high-occupancy vehicle (HOV) lanes and high-occupancy toll (HOT) lanes. Regional transportation agencies and Caltrans can nominate projects; however, projects nominated only by Caltrans cannot receive more than 50% of the program's annual funding. This limitation is meant to encourage collaboration between Caltrans and regional or local agencies. "Caltrans has worked hard to prioritize and work with partner agencies. SB1 provides new programming opportunities for us to continue existing relationships and build new ones across the state," said Dr. Nicholas Compin, Chief, Caltrans Office of Strategic Development, and Statewide Connected Corridors Program Manager.

The bill also authorizes annual appropriations of $5 million and $2 million to the University of California and the California State University, respectively, for the purpose of conducting transportation research and transportation-related workforce education, training, and development. A visit to UC Berkeley and the Institute of Transportation Studies in October 2015 by Assemblymember Frazier, Contra Costa Transportation Authority Executive Director Randell Iwasaki, and Assembly Transportation Committee Chief Consultant Janet Dawson, with ITS Director Alex Bayen, PATH Director Tom West, and other staff members, showcased the Connected Corridors program and sparked the interest of Assemblymember Frazier. "Tireless efforts on the part of the University of California, ITS, and many others throughout the state, have paid off with this extensive funding bill and $5M per year for transportation research at the University of California," said Dr. Alexandre Bayen, ITS Director at UC Berkeley.

We would like to thank Assemblymember Frazier, Senator Beall, and Ms. Dawson for their work on SB1 and working hard to improve transportation services and infrastructure throughout California.
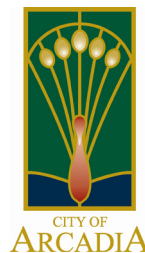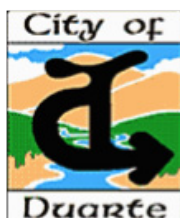
Update on the I-210 Pilot Arterial Improvements

In 2015, Caltrans (in cooperation with the I-210 Pilot stakeholders) was awarded funding from LA Metro through their Call for Projects for arterial improvements in the Signal Synchronization & Bus Speed Improvements category. The application included items in each of the corridor cities.

A year prior, Caltrans received over $24 Million in State Highway Operation and Protection Program (SHOPP) funds for freeway improvements. These improvements are underway, and the components in the I-210 Pilot project area should be complete around the end of September 2017. One of the key SHOPP improvements is upgrading the communication system to all fiber optic communications on the freeway.

The Call for Projects funding and together with the SHOPP funding will work in tandem to improve the infrastructure on both the arterials and freeway and ensure a robust corridor management program can be implemented. Over the past several months, Caltrans has met with the stakeholders to refine the list of upgrades which are intended to improve regional arterial traffic flows and provide real-time traveler information in the I-210 corridor in the cities of Pasadena, Arcadia, Monrovia, Duarte, and LA County. Upgrades include:

- Installing CCTV cameras and changeable message signs
- Upgrading traffic signal controllers and detection at various on and off ramps
- Replacing loop detectors for the ramp meters and vehicle detection stations
- Modifying a traffic signal system in Duarte and installing new wireless broadband communication to the LA County system (and bringing other traffic signals in the corridor in Monrovia, Duarte, and LA County onto the County network)
- Installing Bluetooth devices to supplement existing arterial coverage to improve travel time information on the arterials
- Installing traffic signal firmware, controller, or cabinet upgrades; and video cameras for traffic detection
- Deploying a motorist guidance signing system on the arterials to dynamically assist motorists in navigating through detours during major incidents or events
- Adding roadside environmental stations for monitoring and evaluating air pollutants

More than 20 arterials were studied and identified as arterials for these improvements, including Mountain Street, Fair Oaks Avenue, Corson Street, Lake Avenue, Sierra Madre Boulevard, Huntington Drive, Duarte Drive, Santa Clarita, Myrtle, and Buena Vista.

The project is currently scheduled to start in July 2017 and be completed in the second half of 2018.

Managing this work has required Caltrans' District 7 Division of Operations to take on new responsibilities. Coordinating meetings with the cities, preparing the Funding Agreement with LA Metro, overseeing the construction work, and managing a project outside of Caltrans' right of way are tasks that are either rare or completely new for the agency. However, these tasks are
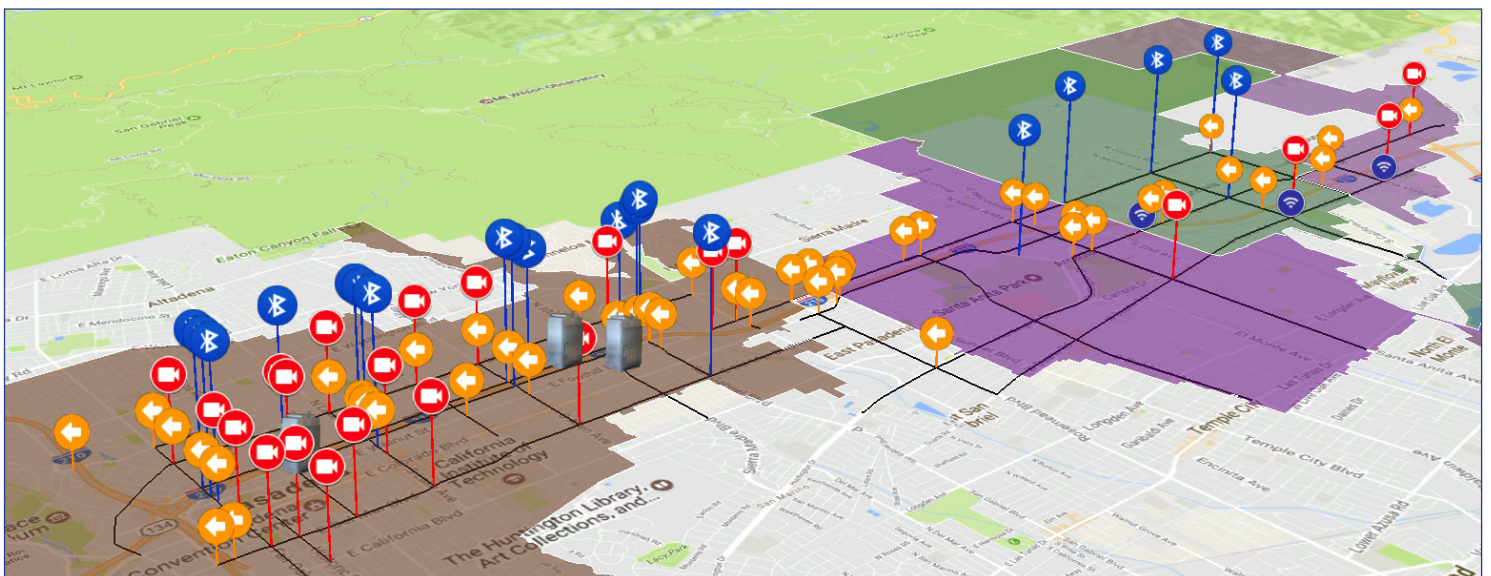
The current map showing the various Call for Projects improvements: Bluetooth and other communications (blue), cameras (red), and changeable message signs (orange). This map is still in draft form.

essential for corridor management. Caltrans has embraced their new role and is fully committed to successful implementation of the CC I-210 Pilot. Additionally, Caltrans plans to implement other corridor projects around the state using templates provided by the I-210.

Current Model Presented to Stakeholders

In March, Anthony Patire and Francois Dion updated stakeholders on the progress of the simulation model of the I-210 corridor. Participants had the opportunity to look at the model and provide feedback as to how accurate they believed it to be given their individual experiences. The AM peak period model is the farthest along, but the PM peak period model is close behind. In each of the meetings, a two hour am/pm simulation was shown and then compared with Google traffic. Stakeholders were pleasantly surprised at the amount of detail captured in the model including all transit and bus stops and even school zone locations and hours. Stakeholders were able to ask questions about the model and were asked about the types of incidents and response plans they would like to see. "The ability of the model to simulate incidents and response plans is an exciting step forward," says Steve Gota, Deputy Executive Officer at LA Metro. "For the first time, we now have the ability to visually demonstrate the benefits that can be achieved through this multi-agency partnership. I wish we had a model this detailed and complete for every major transportation corridor in Los Angeles."

The model will continue to be used and updated through the entire lifecycle of the Pilot. Its five primary purposes are:

- Pre-planning— to inform and validate the process of building incident response plans
- Real-time— to score a response plan for use by the Decision Support System when the Pilot is deployed
- Retrospective— to improve response plans and prediction capabilities and post-incident evaluations
- Special planning— to inform other special planning needs
- Outreach and stakeholder support— to visually demonstrate progress and build confidence

The biggest limitation with the model is the available data, particularly data that can be used to determine flow patterns along arterials, such as where do trips originate, which routes are taken, etc. New sensors, one of the improvements funded through Metro's Call for Projects, will help fill some critical gaps, and the team continues to work with stakeholders to fix existing sensors. The new PeMS sensor tool, as discussed on page 3, has been useful by helping to identify sensor issues and improve the data received. Every bit of data helps and grows the reliability of the model.

In addition to filling data gaps and bringing new data sources online, the team will be building the response plans. The model will be used to simulate how each response plan might change travel conditions during a given incident.

The model will continue to be a work in progress even after deployment. Since the model covers a large network, it requires ongoing management to refine and maintain. However, the benefits of an accurate, refined model are long-lasting.
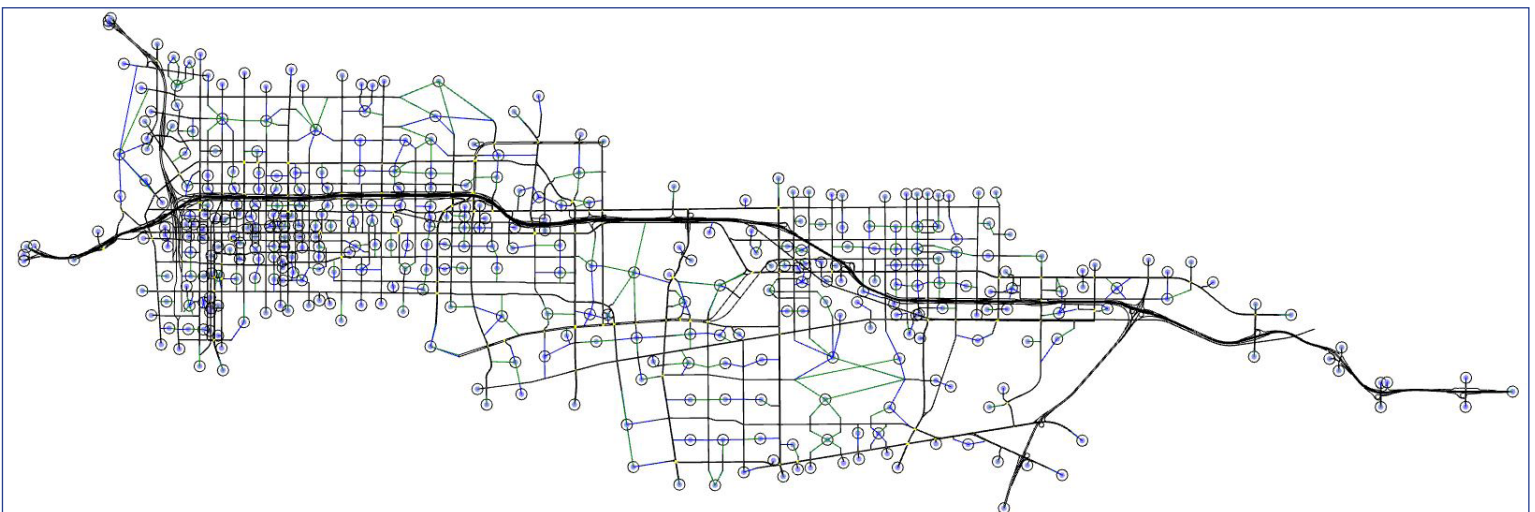
A screenshot of the I-210 corridor model shown to stakeholders

Other Noteworthy News

- Congratulations to Homar Noroozi for his appointment to the position of System Management Principal in the Caltrans District 7 Division of Traffic Operations and Allen Z. Chen for his appointment to the position of Chief, Office of ITS also in the District 7 Division of Traffic Operations. Both of these appointments became effective March 20, 2017.
- Congratulations also to Greg Merritt with PATH. He is this year's recipient of the UC Berkeley Institute of Transportation Studies (ITS) Culture of Excellence Award. Greg will be celebrated at an ITS event this December.
- Connected Corridors will be a part of two sessions at ITS California's Annual Conference and Exhibition in San Francisco in September 2017. Our abstract titled "Changing a State One Corridor at a Time" was accepted and will be a part of a session moderated by Alan Clelland, and Greg Merritt will be speaking at another session titled "Cloud, Internet of Things (IoT), Cyber Security."
- In April, the US DOT issued a notice of funding opportunity (NOFO) for the Advanced Transportation and Congestion Management Technologies Deployment (ATCMTD) Initiative. This is the program's second year of funding. In 2016, Caltrans' application for Connected Corridors was 'highly recommended,' but not ultimately funded. The team is already beginning to work on an application for this year and will be reaching out soon to our stakeholders for input and letters of support.

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.