

MOU Signed!

On November 16th, 2018, a major project milestone was reached when the Memorandum of Understanding (MOU) for the I-210 CC Pilot was signed by all core stakeholders. The core stakeholders include Caltrans, the Cities of Arcadia, Duarte, Monrovia, and Pasadena, Los Angeles County, and Los Angeles Metropolitan Transportation Authority on behalf of RIITS (Regional Integration of Intelligent Transportation Systems).

The MOU outlines the roles and responsibilities of the seven agencies as they work together to manage and operate the Connected Corridors project. Last Fall, stakeholders began to discuss the growing need of having a signed MOU so that each agency could agree on the deployment of both response plans and associated ITS equipment.

In partnership with PATH, Caltrans District Traffic Management Office Chief Mort Fahrtash drafted the document and met with the individual stakeholders to refine the terms of the MOU. Some of the

responsibilities the MOU outlines include each agencies commitment to:

- Share real-time transportation data
- Maintain the health of their jurisdiction's signal systems and sensors to support high-quality reporting
- Review and approve incident response plans and reroute strategies
- Permit and facilitate the installation and operation of new and/or upgraded equipment procured by Caltrans
- Work together in the development of proposed coordinated timing plans for use during incidents for all signals on agreed upon reroutes
- Populate the road closure system with their events and activities
- Attend regular stakeholder meetings and provide input on updates to the system and its supporting networks

Additionally, Caltrans District 7 commits to maintaining

○ **Continued on page 5**

Major Milestones

The development team has recently reached several significant and critical milestones. These include:

1. Established connectivity with Arcadia and received Arcadia intersection data using the new Transcore/C2C interface.
2. Established connectivity with Caltrans ATMS and began integration work with the Parsons/C2C interface.
3. Completed development of the automated deployment function for the secure AWS environment. This allows us to deploy the entire system within an AWS virtual private cloud within a few hours, as well as deploy changes as they are developed and tested.
4. Completed development of the software, tools, and methods used to operate within a secure, private Caltrans networking space within the AWS cloud. This was particularly difficult to achieve and deserves a special thank you to our AWS and D7 partners who helped us make this milestone.

These four milestone achievements are critical steps to a successful launch and have resulted from a lot of hard work from many different partners, including Caltrans HQ & District 7, Arcadia, LA County, LA Metro, RIITS, Parsons, Transcore, AWS personnel, and the CC staff. Thanks to everyone who made these critical steps successful.

Congratulations to Ali Zaghari at Caltrans District 7. Ali was recently selected as the National Operations Center of Excellence's (NOCoe) 2019 TSMO Champion.

Key Caltrans Staff Join CC Team



Monica Kress, Deputy Division Chief for Mobility
– Caltrans Headquarters
– Division of Traffic Operations

Monica Kress has worked for Caltrans since 1991, when she earned a B.S. degree in Electrical Engineering and Computer Science from UC Davis. Her first

assignment was with the Transportation Laboratory in Sacramento when the concepts of Intelligent Transportation Systems (ITS) and automated vehicles were just being developed. She's been a registered California Professional Electrical Engineer since 1997 and earned her Project Management Certificate from California State University, Sacramento in 2005.

In what eventually became the Division of Research, Innovation, and System Information (DRISI), Monica was involved in automated vehicle development programs, ITS technologies, and other strategic development as an Electrical Engineer. Monica worked with PATH at UC Berkeley and the AHMCT Program at UC Davis, engaging universities in research and development projects, including the 1997 Automated Vehicle Demonstration in San Diego. In 2001, she promoted to Senior Engineer and then to a variety of Office Chief positions in the Division of Traffic Operations. She led statewide teams who supported Transportation Management Centers, District Traffic Managers, and daily operations in every Caltrans district. Over her 13 years in Traffic Operations, Monica and her staff were an important part of many notable programs and projects including:

- Developing and deploying the Lane Closure System and the Traffic Management Plan
- Approval and funding of District 7's and District 8's Transportation Management Centers
- Express Lane development in multiple districts
- Developing QuickMap and other technology innovations such as the Model 2070 controllers and Ramp Metering Program
- National operations committees and forums

In 2014, Monica joined the Project Delivery Division of Caltrans, as the Assistant Division Chief of Headquarter's Project Management (HQPM). She helped

lead Portfolio Management of Caltrans' \$9B+ Capital Delivery portfolio and adapted policies and processes for over 9,000 Capital Outlay Support staff, enabling them to implement new accountability measures and funding programs provided by legislation; the most notable being Senate Bill 1 (2017). She developed a Five-Year Strategic Plan for HQPM, evolved several of the offices and services to meet business needs for capital project delivery, and most importantly, worked closely with Division Chiefs, CTC Staff, FHWA, and the CA Department of Finance.

In November 2017, Monica went to District 10 where? on a rotation as the District's Deputy of Program Project Management. Her team there managed over 300 projects in the central valley and foothills and partnered with eight counties and countless cities.

Monica returned to HQ's Division of Traffic Operations last August as the Deputy Division Chief for Mobility where her focus is on "moving people and goods" through transportation system management and new technologies. In addition to traditional ITS implementations, the Division is focusing on pursuing more innovative strategies such as Connected Corridors, managed lanes, asset management, and connected and automated vehicles.



Ken Young, Office Chief – Office of Corridor Management – Caltrans District 7

Ken's career with Caltrans began in 1989 as a student assistant with District 7. Upon graduating with a Bachelor of Science in Civil Engineering from California State Polytechnic University, Pomona in 1995, Ken

joined the City of Pasadena, where he gained valuable experience in the areas of traffic, design, maintenance, and surveying. Thereafter, he joined ASL Consulting Engineers and integrated the experienced gained with the City towards his work on land development projects.

In 1998, Ken rejoined District 7 in the Division of Operations. In conjunction with the rotation program, he was able to build on his experience in Operations with investments in Design and Construction. Upon

○ **Continued on page 3**

● New Team Members, continued from page 2

obtaining his civil engineering license in 2001, he managed the safety and operations of Interstate 5 and State Route 126 in the Santa Clarita Valley. Integral in this experience was the collaboration with internal and external partners and stakeholders towards the planning, design, and construction of a modern roundabout at a local interchange. In conjunction with the Department's partnership with UC Berkeley Extension, he also functioned as the team leader on a traffic analysis project focused on mitigating bottleneck locations.

In 2005, Ken was promoted to Senior Transportation Engineer within the Office of Traffic Investigations and was responsible for geographical areas encompassing over twenty routes in urban and rural jurisdictions. Through the Highway Safety Improvement and Capital Outlay Support (COS) Programs, Ken's team made notable contributions to many projects including the I-5, I-10, and SR-60 High Occupancy Vehicle (HOV) corridors. In partnership with headquarters, he has served as the District functional manager of the safety monitoring programs and the District representative towards the development and implementation of Caltrans current Strategic Management Plan's safety and health goals. Ken has also represented Caltrans in numerous tort cases and public forums.

Under District 7's Traffic Operations Office reorganization, Ken was promoted to the new position of Office Chief for the Office of Corridor Management covering the eastern territory (all of Los Angeles County east of I-5 and north of 60) in July 2017. Ken is focused on improving the safety and efficiency of the eastern corridors and building stronger partnerships with local and regional stakeholders. He is in the trenches on a daily basis helping to push forward important improvements for the I-210 Pilot including the TSMSS upgrade and the Call for Projects contracts.

Ken believes the work the team is doing now is laying a strong foundation for Connected Corridors. Caltrans has shifted its focus to become more proactive and to work with partners to achieve greater efficiencies throughout the system.

Ken has over 20 years of experience in working to improve the safety and reliability of the transportation systems in Los Angeles County. He looks forward to seeing the success of Connected Corridors first on the I-210 corridor and then throughout the state.



Rupinder Jawanda, Senior Transportation Planner – Caltrans Headquarters – Division of Traffic Operations

Rupinder Jawanda joined the Connected Corridors team in November 2017 and currently serves as Caltrans Headquarters lead for the I-210 Pilot and statewide

program development. Since 2009, Rupinder has worked in a variety of positions at Caltrans including both Forecasting and Modeling, and System Planning in District 3, and now Traffic Operations at Caltrans Headquarters. She received her Bachelors of Science from CSU Chico in Finance and her Masters in Urban Land Development from CSU Sacramento.

Prior to her work at Caltrans, Rupinder worked for a real estate developer and builder in the Sacramento region, and interned for local Congresswoman Matsui and former state Assemblymember Gorell. For the past three years, Rupinder has served as a Commissioner for the Sutter County Local Agency Formation Commission. She is also a Board Member for both the Women in Transportation Seminar (WTS) Sacramento Chapter and the Urban Land Institute Sacramento Chapter's Young Leader's Group.

Although her Senior Transportation Planner position is not new, the position is now much more focused on Connected Corridors and advancing the CC Program throughout the state. Rupinder provides technical and non-technical assistance to the Districts for CC implementation in addition to developing statewide policy and guidance to grow the program over the next decade. Rupinder currently serves on numerous Technical Advisory Committees, is responsible for analyzing legislative bills for the office of System Performance programs, and was instrumental in the latest submission of the ATCMTD grant.

Rupinder adds how great it has been to join a fully engaged team with strong leadership and close collaboration with the I-210 Pilot stakeholders. "California is often a trailblazer in technology and innovation and with the Pilot, Caltrans is reasserting its role as a national leader in innovative transportation solutions," says Rupinder. "I look forward to being a part of numerous Connected Corridor successes including the I-210 Pilot."

Rules, Estimation, Prediction, Oh My!

As the I-210 Pilot progresses to actual response plan implementation, there is a new focus on rules creation, traffic state estimation, and prediction of traffic metrics. This article discusses each of these processes and how they come together to enable traffic management thereby improving mobility and traffic safety.

Rules and facts are used by the rules engine to generate viable response plans. Rules and facts include the reroute inventory, signal timing plans, dynamic message sign notices, time of day and day of the week considerations, lane closure information, and scoring criteria. The rules and facts have been developed with stakeholder input including the reroutes and signal timing plans.

The rules engine acts as a type of strainer, taking all of the known facts about an incident, as well as certain known facts about the corridor at that particular time and day, and returns only the response plans that are a fit for the given incident. Facts about the incident include the location, the expected duration, the number of lanes blocked and the time and day of the incident. Facts about the corridor include current lane closures, system assets available to use, routes that are unavailable due to time of day such as a school zone, and even who to notify for each suggested response plan.

After determining which response plans are viable for a specific incident, the rules engine then ranks each

response plan based on the scoring criteria rules. Scoring criteria have been developed through stakeholder discussions and traffic modeling. The criteria include reroute proximity and length, queue growth over a one hour horizon, how much additional capacity the reroute provides to the advantaged movements, and the potential secondary impacts to the disadvantaged movements.

For the soft launch, the rules engine will be fully functional and able to use the real time availability of control devices in determining available routes. The response plans are scored and the highest ranked plans are presented to the stakeholders for approval.

Estimation is a process that uses real-time data from freeway and arterial sensors to create a picture of the current traffic condition of the corridor. It determines the speed, volume, and queue at multiple locations on the network, including locations where sensors are lacking or the data the sensor reports is inaccurate. Thus, the estimation process fills in missing data elements and attempts to eliminate bad data. In the future, an estimation capability will enable a corridor manager to monitor, in real time, detailed status of the corridor. In addition, following an incident, estimation permits detailed metrics on the impacts of congestion and the outcomes of a response plan.

Prediction takes the current state of the corridor and utilizes a traffic model (Aimsun for the I-210 Pilot) to determine how a particular response plan will affect corridor conditions going forward. The current state of the corridor is provided by the estimation engine and the response plan is provided by the rules engine. The prediction model calculates metrics of the likely effects of implementing the given response plan. These metrics include delay savings and increased throughput. The addition of a prediction capability will enable traffic engineers to compare the

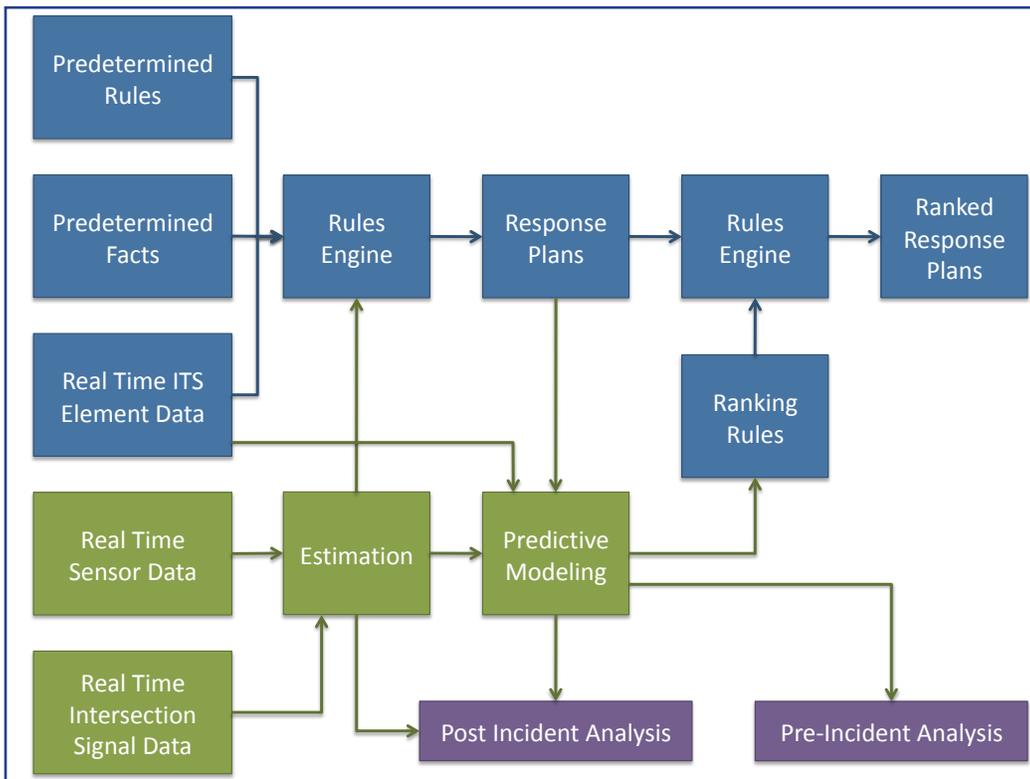


Diagram showing the relationship between the rules engine, estimation, and predictive modeling.

○ Continued on page 6

Good Progress Made on C2C Communications

Establishing communications between stakeholder traffic operations centers and the cloud-based core ICM system is an essential component of any ICM project including Connected Corridors. For the I-210 Project, these interfaces connecting the core system with our stakeholders are called Center to Center (C2C) communications. These interfaces will allow for data and commands to be exchanged between the ICM core system components (DSS, Data Hub, and CMS) and the stakeholder systems controlling field ITS elements. The equipment in the field includes traffic control systems, changeable message signs, ramp signals, as well as air quality stations.

Information is collected constantly in real time from the ITS elements. When a response plan is generated for an incident, the Decision Support System can then know which elements are available and what options are available (signal plans for instance). Once the response plan has been generated and approved, the CMS sends commands to these elements, changing their state (signals, ramps, signs, etc) to ensure all network capacity is being utilized.

Over the last eight months, significant progress has been made on the C2C interfaces and we are happy to report the current status of each system:

- TransCore – TransSuite: The TransSuite system is

used to provide two separate C2C interfaces. The first, which is now operational, connects the City of Arcadia's TransCore system to the ICM core system. The second, which is not yet operational, connects the Caltrans TSMSS system (a version of TransCore) to the ICM core system.

- ATMS: This system controls Caltrans' changeable message signs and ramp meters. The C2C interface, connecting the ATMS to the ICM core system, was released and tested in July and August respectively. Integration work is ongoing.
- Kimley-Horn – KITS: The KITS system will provide the interface between the core ICM system and LA County, the City of Duarte, and the City of Monrovia. Their architecture and design has been approved and the system is now being developed.
- McCain – Transparency: The Transparency system will provide the connection between the core ICM system and the City of Pasadena. The design is currently being finalized.
- Dynamic Message Signs: The final C2C connection is between the dynamic message sign central control software and the ICM core system. The contract for development of this interface has not yet been awarded, so more information on this is forthcoming.

● MOU, continued from page 1

and operating the I-210 Pilot ICM system and its supporting infrastructure and systems. "The MOU marks a new beginning of Caltrans partnership with the stakeholders," says Mort. "The best part for me, of developing the MOU, was being able to meet and talk with our partners on their terms, and be able to listen to their perspectives and concerns."

The MOU process solidifies the stakeholders' commitment to the project and focuses the team on the upcoming launch. Additionally, the MOU discussions led to the resolution of issues related to the Call for Projects equipment and helped to refine how traffic will be rerouted during an incident. "The final execution of these MOUs reaffirms a strong pledge from all project stakeholders to continue working together to address the significant transportation challenges in the I-210 corridor, a commitment we hope spreads across the Los Angeles County region," adds Deputy Executive Officer

Steve Gota with LA Metro.

A very special thank you from Caltrans District 7 and personally from Mort to each of the core stakeholders for your effort in executing the MOU: The City of Arcadia, the City of Duarte, the City of Monrovia, the City of Pasadena, the Los Angeles County Department of Public Works, and the Los Angeles County Regional Integration of Intelligent Transportation Systems.

In addition to our core stakeholders, we would like to thank our key stakeholders: the California Highway Patrol, Caltrans Headquarters, Foothill Transit, Los Angeles County Metropolitan Transportation Authority, the Los Angeles County Service Authority for Freeway Emergencies, Pasadena Area Rapid Transit System, the Southern California Association of Governments, the San Gabriel Valley Council of Governments, UC Berkeley Partners for Advanced Transportation Technology (PATH), and the US Department of Transportation.

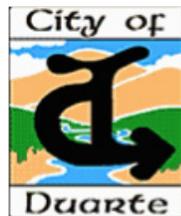
● Rules Engine, continued from page 4

expected outcome of the response plan with the actual outcome and to refine and improve response plan elements for future use.

Once estimation and prediction are available, they may be used as additional inputs into the rules, thereby enhancing the response plan selection process. We are researching how the estimation and prediction results may be used to determine if a given response plan is affecting traffic as anticipated and desired.

Estimation and prediction, however, will take longer to develop than the basic rules engine components and will be added to the Decision Support System in late 2019 through 2020. Although neither are required for launch, both estimation and prediction are important tools that will add value to the project once functional.

If you have additional questions about rules, estimation, or prediction, please contact Anthony Patire at adpat@berkeley.edu.



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.

Allen Chen
Caltrans District 7
213.897.8922
allen.z.chen@dot.ca.gov

Michelle Harrington
Connected Corridors/PATH
mgharrington1@berkeley.edu

Ed Alegre
LA Metro
213.922.7902
alegree@metro.net

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 biannual 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.