



California State University
Transportation Consortium

SB 1 Research Activities 2018-2019 / Research Plan 2019-2020

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Overview

The California State University Transportation Consortium (CSUTC) unifies and focuses the efforts of four outstanding CSU campuses that represent and support the geographical, cultural, racial, and socioeconomic diversity that makes California, and the CSU system, strong: (1) CSU Chico – California Pavement Preservation Center; (2) CSU Fresno – Fresno State Transportation Institute; (3) CSU Long Beach – Center for International Trade and Transportation/College of Engineering; and (4) San José State University – Mineta Transportation Institute. CSUTC is led by the Mineta Transportation Institute (MTI) at San José State University, a federally-funded University Transportation Center since 1991.

CSUTC researches safe, reliable solutions that increase the mobility of people and goods and strengthen California's economy. CSUTC research aligns with SB1 priorities related to congestion relief (including traffic management systems), trade corridor enhancements, improved transit and rail, pedestrian and cyclist safety projects, as well as maintenance and rehabilitation for California's road and bridge infrastructure. Specifically, CSUTC research is designed to achieve the following objectives:

- **Objective 1:** Leverage new technologies, including vehicle automation, and innovative processes to achieve a seamless, multimodal surface transportation system that integrates with other "smart city" investments.
- **Objective 2:** Develop tools and approaches, such as life-cycle cost analysis, that will identify cost-effective materials and methods to facilitate road and bridge rehabilitation/maintenance decision-making and improve the long-term benefits of transportation investments.
- **Objective 3:** Develop advanced solutions for the application of new materials, design, and technologies to address long-term road and bridge maintenance and pavement/concrete rehabilitation needs.
- **Objective 4:** Create safer communities, increased access to transit, and greater opportunities for use of active transportation modes (i.e., biking and walking) through complete streets and innovative land use planning so that people of all abilities and socioeconomic levels enjoy the same opportunities for learning, living, labor, and leisure.
- **Objective 5:** Maximize opportunities for California's cap-and-trade program to reduce the impact of transportation on climate change.
- **Objective 6:** Promote intermodal connectivity, station development, and innovative finance solutions for multimodal transit centers.

- **Objective 7:** Inform and improve decision-making on transportation-related issues through timely, relevant and nonpartisan public opinion polling of Californians.
- **Objective 8:** Optimize passenger and freight movements to improve mobility of people and goods through development of more accurate data models and advanced congestion management tools to achieve trade and commute corridor improvements.

Highlights from Year 1

This section summarizes Year 1 Consortium research activities. To date, ten reports have been [published to the CSUTC website](#), eleven are in the publication process, and nine are in-process with draft reports anticipated by August 31, 2019.

A. CSUTC Partner Research

CSUs Chico, Fresno, and Long Beach, as well as SJSU/MTI each received dedicated funding for research.

CSU Chico conducted research through the California Pavement Preservation Center and has developed three technical manuals. These manuals are currently in the final stage of review and publication and include:

- Manual for Chip Seals
- Manual for Slurry Surfacing
- Manual for Cape Seals

CSU Fresno held an internal competition and awarded four mini-grants. All four projects have submitted draft reports and are in the publication process.

CSU Long Beach held an internal competition and awarded nine mini-grants. Eight have been published to date and one is in process.

San José State University/Mineta Transportation Institute engaged in a partnership with the University of California to develop the City & County Pavement Improvement Center (CCPIC). CCPIC works closely with local governments to increase pavement technical capability through timely, relevant, and practical support, training, outreach, and research. As part of CCPIC, CSU Chico, Long Beach, and Cal Poly SLO are all engaged in research related to concrete and asphalt. A training program and pavement engineering and management certificate program is under development. In addition, SJSU/MTI funded four research projects. Two reports have been published, with the remaining two in process (draft reports anticipated by August 31, 2019). One of these reports, "[The Future of California Transportation Revenue](#)," was the third most viewed research publication on MTI's website since it was published in October 2018. The findings of this report were presented, at their request, to the California Transportation Commission (CTC) at their December 5, 2018 meeting. Following that presentation, CTC Commissioners requested that MTI/SJSU conduct a review of several ZEV market growth

scenarios to understand the implications of various ZEV penetration rates. That follow-on research “[The Impact of ZEV Adoption on California Transportation Revenue](#)” was published in July 2019.

B. CSU Competitive RFP

Ten projects were funded across nine CSU campuses as part of the CSU-wide competitive RFP process for Year 1 (complete project descriptions for all SB1 CSUTC funded research can be found [here](#).) Of these ten projects, four are in the publication process, while six are in process with draft reports due August 31, 2019.

C. Additional Activities

Presentations: CSUTC researchers have also engaged in technology transfer activities, reporting a total of 21 academic and professional presentations (including publications in conference proceedings) since December 2018. Complete presentation details available upon request.

Disclosure of Discovery/Invention: In addition to these accomplishments, CSUTC researcher Dr. Hamid Rahai, with CSU Long Beach, has filed a Disclosure of Discovery/Invention as part of a provisional patent application for his CSUTC-funded study. Specifically, this invention incorporates placement of a vertical rotary cylinder next to the rear sides of a truck to reduce overall drag and increase vehicle fuel efficiency. More information about this research can be viewed in the report “[Numerical Investigations of Air Flow Around a Model Freight Truck with a Rear Active Flow Control](#).” CSUTC is also proud to recognize that Dr. Rahai was [recently named to the National Academy of Inventors](#).

Leveraging Funds: An important component of CSUTC’s overall goal is to leverage the funding received through SB1 to secure additional research funding opportunities for CSU faculty. Dr. Arash Jahangiri, who is currently working on a CSUTC-funded project, was able to use the preliminary results from that research to secure a [\\$400,762 research grant](#) through the USDOT’s University Transportation Centers program.

Workforce Development Event: April 12, 2018 • MTI sponsored the Garrett Morgan Sustainable Transportation Competition to encourage young people to consider careers in transportation. Students from middle schools in California worked with transportation professionals in the classroom to learn about sustainable transportation through a wide range of STEM-focused activities. Each competing student team developed an idea for a sustainable transportation project, which they presented to transportation leaders during the competition. In 2018, the students were addressed by Secretary (ret.) Norman Y. Mineta, Deputy Secretary of Transportation Jeffrey A. Rosen, California Department of Transportation’s Deputy Director of Administration, Cris Rojas, among other transportation leaders. The winning team from Toddy Thomas Middle School in Fortuna, CA was recognized during MTI’s Annual Awards Banquet and Convocation in June 2018.

Year 2 Research Activities

Consortium activities for Year 2 followed a similar pattern as Year 1. First, each partner received a modest amount of funding to complete high-priority research projects aligned with SB1. CSU Fresno and Long Beach both ran internal competitions, while CSU Chico focused on high-priority pavement research through the California Pavement Preservation Center. SJSU/MTI focused on three high priority projects that were identified by key stakeholders – including transit agency CEO’s, members of the California State Legislature, and others. In all, through this dedicated funding, 21 high-priority projects were identified. Second, a CSU-wide competitive RFP process was led by MTI/SJSU. Selected projects are summarized below.

A. CSUTC Partner Research

1. CSU Chico

CSU Chico, through the California Pavement Preservation Center (CPPC), focused their Year 2 research efforts on high-priority pavement research. Specifically, their research investigates the performance of various pavement preservation strategies associated with the environment, pavement type, and traffic conditions. Research results will determine the life extension and economic benefits of various strategies and develop training materials for professionals. Key personnel include: DingXin Cheng, R. Gary Hicks, and Lerosé Lane.

2. CSU Fresno

CSU Fresno, through the Fresno State Transportation Institute (FSTI), conducted an internal competitive RFP, which funded eight research projects. The table below lists project titles and principle investigators.

Project Title	PI
A Green Transportation Allocation Optimization Model to Develop a Fair Community Opportunity Framework for Fresno, California	Chihhao Wang
Development of Reduced Chemical Kinetic Models for the Numerical Simulation of Combustion and Emissions Behavior of Representative Conventional and Bio-derived Transportation Fuels	Mazen Eldeeb
Effective Communication Message Strategy for Enhancing Traffic Safety in Fresno County: The Role of Time Horizon, Locus of Control, and Regulatory Focus	Samer Sarofin
Effective Lessons Plans in Transportation (ELPT) for California Schools	Douglas Singleton
Fresno State Transportation Challenge	Christian Wandeler
Securing the Emerging Autonomous and Connected Vehicles for Greater Community Livability	Shahab Tayeb
Visible Light Communications Framework for Intelligent Transportation Systems	Hovannes Kulhandjian

Walking for Transportation or Recreation: Do We Need Different Planning Strategies to Promote Them?	Hongwei Dong
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3. CSU Long Beach

CSU Long Beach ran an internal competitive RFP through TRANSPORT, Transportation Research & Training, a collaboration between the College of Engineering and the Center for International Trade & Transportation. Nine projects were selected for funding. The table below lists project titles and principle investigators.

Project Title	PI
A Multi-Modal Approach for Monitoring Driving Behavior and Emotions	Vahid Balali
Evaluating Crowdsourcing as a VMT Reduction Tool to Support Smart Cities Initiatives	Shailesh Chandra
Freight Demand Model for Southern California Freeways with Owner-Operated Trucks	Joseph Kim
Numerical Investigations of Transient Wind Shear from Passing a Vehicle near a Road Structure	Hamid Rahai
Parking Automation Infrastructure	Mahdi Yoozbashizadeh
Performance Testing of Hot Mix Asphalt Containing Biochar	Shadi Saadeh
Southern California Regional Transit Training Consortium (SCRTTC) Needs Assessment and Gap Analysis Project	Tom O'Brien
Stability of Fiber-reinforced Bridge Bearings Under Compression and Shear Loads	Andrea Calabrese
Wave Method for Structural Health Monitoring and Damage Detection in Bridges	Mehran Rahmani

4. San José State University (Research and Workforce Development Activities)

SJSU, through the Mineta Transportation Institute, is currently working on three research projects and a collaboration with the University of California through the City & County Pavement Improvement Center. MTI has also retained a small component (~10% of funding) to respond to high priority research needs as identified by the California State Legislature.

Project Title	PI
Evaluating Financing Mechanisms and Economic Benefits to Fund Grade Separation Projects	Shailesh Chandra (note, CSULB faculty, expertise in this area, high priority research identified by industry)
Local Government Funding in California: How Housing Bond and Sales Tax Proposals Could Effect Transportation	Asha W. Agrawal (note, high priority research)

	requested by Senator Beall)
Research to Support the Implementation of Electric Buses in California – Developing Resiliency Using Big Data and Machine Learning	Frances Edwards (note, high priority research requested by CSUTC Advisory Board members)

In addition to these research projects, MTI once again hosted the annual Garrett Morgan Sustainable Transportation Competition. This year [Juan Crespi Middle School](#), [Toddy Thomas Middle School](#), [MacArthur Fundamental Intermediate School](#), [California Montessori Project-Capitol Campus](#), [Sutter Middle School](#), and [Hazelton Middle School](#) registered to compete. This year's winners demonstrated that the future is in good hands with California Montessori taking first place with their project "Eagle Ride: A School-Scale Mobility App".

Similarly, MTI hosted [The Intersection between Transportation and Housing: Building Blocks to the Future](#) event in San Francisco, CA on June 21, 2019. [View recording.](#)

Description: While the San Francisco Bay Area is booming with jobs and (for many) high wages, people are increasingly priced out of the housing market and the region is losing people to fill jobs that are essential to California's economy. In response to this crisis, we have seen a proliferation of transit-oriented projects (TODs) which place high-density housing above or adjacent to transit centers. TODs provide easy mobility while offering less-costly living space.

Finally, at the request of the California Transportation Commission, CSUTC Executive Director, Dr. Karen Philbrick, moderated a panel on "Transportation Infrastructure Resiliency" at the CTC Transportation Policy Forum on July 29, 2019 in Sacramento.

B. CSU-wide Competition RFP Process

MTI/SJSU, in collaboration with the CSU Chancellor's Office, implemented the Year 2 CSU-wide RFP process using the following approach.

- Research needs statements solicited from Caltrans, VTA, County of Santa Clara Public Health Department, CSUTC partners, TRB's Rail Committee, MTI's Board of Trustees, and others.
- RFP (available on InfoReady) distributed to CSU campuses on November 19, 2018 with a deadline to submit on January 15, 2019.
- Evaluation rubric based on criteria and weighting listed in the RFP developed for reviews.
- Proposals categorized by objective and assigned to subject matter experts for initial review. A total of 30 non-CSU affiliated subject matter experts were identified for this first stage of review.
- The 20 top-scored proposals were then reviewed by panel of five professionals composed of three non-CSU-affiliated academics and two professionals representing

Caltrans and the California Transportation Commission. The panel met via teleconference on March 14, 2019.

- Final set of 10 proposals selected for funding.
- Announcements regarding funding decisions sent to PIs on March 18, 2019.
- Subcontract agreements have been executed for all but one project as of July 31, 2019.

Summary of Proposals Received

A total of 42 proposals were received from thirteen CSU campuses (see Figure 1).

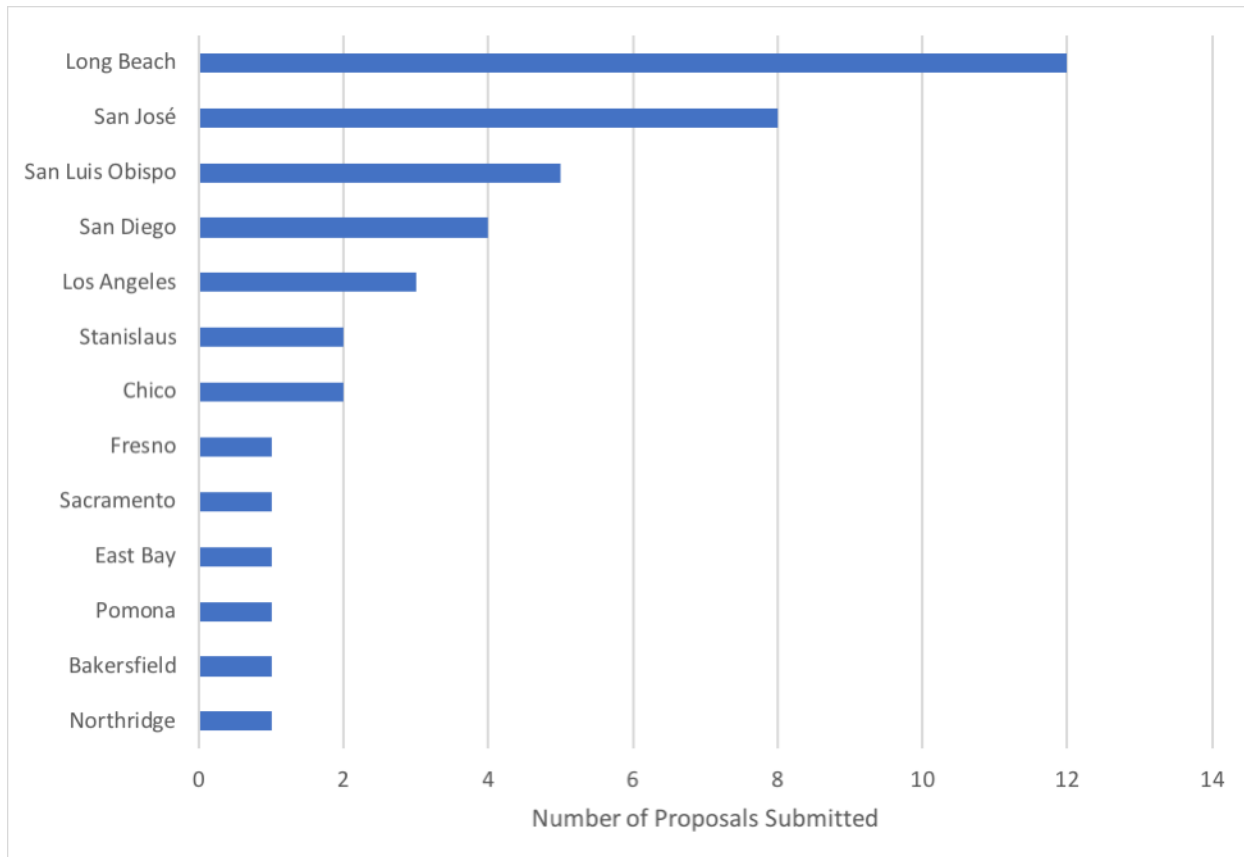


Figure 1 Summary of Proposal Submissions, by Campus

Summary of Proposals Awarded

Ten projects were selected for funding by the review panel and eight CSU campuses are represented among the PIs; in addition, several of the proposals involve multi-campus research teams. Interagency agreements were processed between the SJSU Research Foundation and the respective campus Offices of Sponsored Programs. MTI provided each PI with detailed information regarding managing their project and submitting regular progress reports.

Title	PI	CSU Affiliation	Award \$
2019 Northern San Joaquin Valley Commuter Study: A Look at Perceptions and Behavior Change	Gokce Soydemir	CSU Stanislaus	\$73,972.00
An Eco-Driving System for Connected Automated Vehicles based on Multi-Objective	Anurag Pande	Cal Poly San Luis Obispo	\$75,000.00
AV-exclusive Lane on an Existing Smart Freeway	Mehran Mazari	CSU Los Angeles	\$74,999.00
Developing Specification for Use of Intelligent Compaction Technology	Ke Huang	San Diego State University	\$74,877.00
Enhancement of Asphalt Performance by Graphene-based Bitumen Nanocomposites	Ehsan Barjasteh	CSU Long Beach	\$47,145.00
Enhancement of Multimodal Traffic Safety in High Quality Transit Areas	Yongping Zhang	Cal Poly Pomona	\$73,353.00
Framework for Evaluation of Retrofit Needs for Overpass Bridges to Achieve Desired Level of Post-Earthquake Functionality	Vesna Terzic	CSU Long Beach	\$74,266.00
Impact of Right-of-way Adaptation to Automated Vehicles on Driver Behavior	Sahar Ghanipoor Machiani	San Diego State University	\$74,999.00
Infrastructure Academy Transportation Program	Hassan Hashemian	CSU Los Angeles	\$75,000.00
Southern California Regional Workforce Development Needs Assessment for Transportation and Supply Chain Industries	Tom O'Brien	CSU Long Beach	\$75,000.00

C. Final Publication Process

All research projects undertaken as part of the CSUTC prepare a final report. Research teams submit a draft version of the report to MTI. MTI then takes the lead on completing a technical peer review of the report, professional editing and formatting, and publication of the final report on the CSUTC website. Finally, to move research results into practice, a robust technology transfer program is used, including promotion via press releases, social media, newsletters, as well as the CSU Transportation Research Spotlight in Sacramento.

Year 3 Planned Research Activities

Consortium activities for Year 3 will follow a similar pattern as Years 1 and 2. CSU Long Beach and CSU Fresno will both run internal grant competitions. CSU Chico, through their California Pavement Preservation Center, will conduct a larger-scale research project focused on the

performance of pavement preservation strategies. This is a continuation of previous work funded through the Consortium. MTI will continue with research and successful workforce development programs started in Year 2 including a visiting scholar series targeted at transportation professionals and a Mobility Leader program that brings together students and high-profile transportation leaders.

MTI will also lead and manage the annual CSU-wide competition RFP.