



California State University
Transportation Consortium

**SB 1 Research Activities Summary /
Research Plan for 2024-2025**

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1. 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 focuses on high priority areas as identified by SB1. These high priority areas include: 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. More information about SB 1 can be found at: <http://rebuildingca.ca.gov/>.

2. Summary of Research Activities

The table below summarizes research publications and research in progress across the Consortium since 2018.

Table 1. Summary of Research Activities Across the California State University Transportation Consortium, by Year

Description	Number
<i>Published Reports and White Papers</i>	
Year 1	32 ^a
Year 2	37 ^b
Year 3	35 ^c
Year 4	31 ^{d,e}
Year 5	26
Year 6	13
<i>Subtotal</i>	<i>174</i>
<i>Submitted Drafts—In Publication Process</i>	
Year 5	5
Year 6	9
Year 7	1
<i>Subtotal</i>	<i>15</i>
<i>Research in Progress</i>	
Year 5	1 ^f
Year 6	18 ^{g,h}
Year 7	26
<i>Subtotal</i>	<i>45</i>

^a One project was jointly funded between Years 1 and 2 to allow for a more extensive research design. Recorded here with Year 1 publications.

^b One project was jointly funded between the Year 2 competitive RFP with supplemental funding from CSULB TRANSPORT Year 3. Recorded here with Year 2 publications.

^c Two projects were jointly funded between SB1 and MTI's USDOT grant to allow for a more extensive research design. One CSULB TRANSPORT project was jointly funded between Years 3 and 4 to allow for a more extensive research design and recorded here with Year 3 publications.

^d One CSU Fresno FSTI project is jointly funded between Years 4 and 5 to allow for more robust data collection. Recorded here with Year 4 projects.

^e One MTI project is a multiyear collaboration between UC Davis' City & County Pavement Improvement Center, which funds projects at three CSU campuses (Chico, Long Beach, and San Luis Obispo).

^f This project was funded through the competitive RFP process and is a targeted research need from Caltrans. Due to construction delays on the project (evaluating a turbo roundabout), the research has been delayed with the final report anticipated in Fall 2024.

^g One MTI project is jointly funded between Years 6 and 7 to allow for more robust data collection. Recorded here with Year 6 projects.

^h One MTI project is jointly funded between SB1 and MTI's USDOT grant to allow for a more extensive research design. The project is a targeted research need identified by Caltrans/Cal-ITP.

To date, 174 white papers and research reports have been [published to the CSUTC website](#). This work demonstrates the breadth of research undertaken system-wide funded through the Consortium. Research reports are peer-reviewed, professionally edited, and formatted with a consistent style to represent CSUTC. ***A total of 16 unique CSU campuses have received project funding*** – 14 based on PI's home campus and two through other opportunities. San Francisco State is receiving SB1 funding through a collaboration with Cal Poly San Luis Obispo as part of the Year 7 competitive RFP, while Sacramento State received funding through MTI's Caltrans USDOT match contract. Other campuses receiving funding through MTI's Caltrans grant include San Diego State, Cal Poly San Luis Obispo, and Cal State Los Angeles – these projects were all originally identified through proposals submitted to the SB1 competitive RFP. Three campuses—Chico, Long Beach, and San Luis Obispo—received additional funding through SB1 via a partnership with UC Davis and the City and County Pavement Improvement Center. Currently, faculty and students from three campuses—Fresno, Long Beach, and Los Angeles—have active project funding through MTI's Caltrans USDOT match. These opportunities all came about as a result of the collaborations and partnerships built through the SB1 CSUTC program.

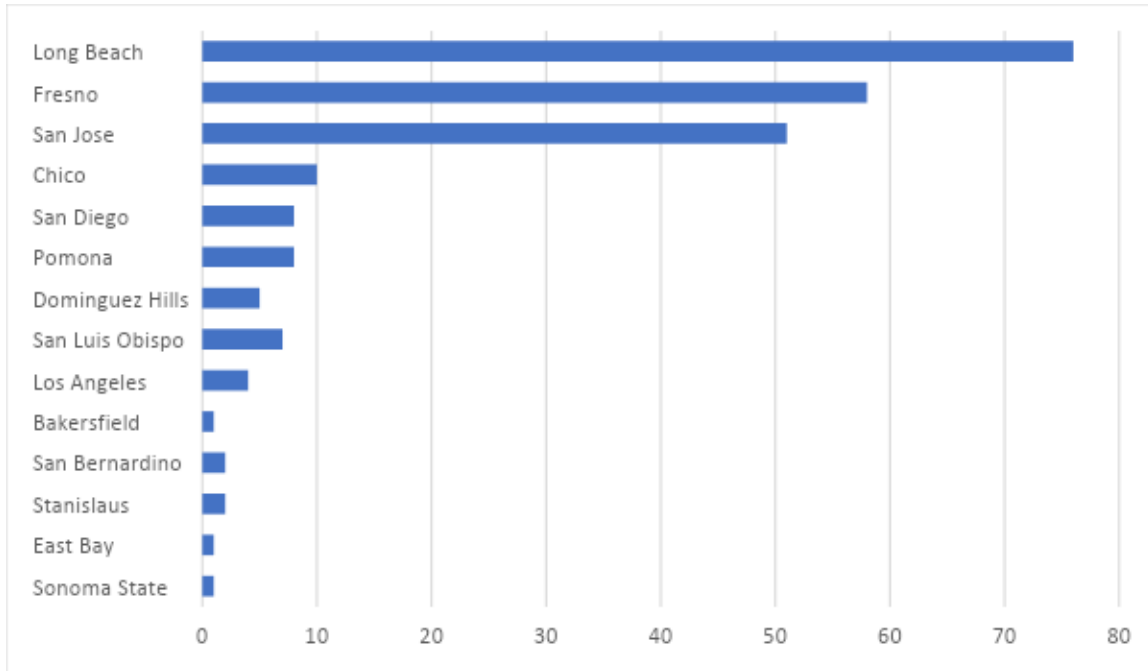


Figure 1 Summary of Funded Projects by Campus^a

^a Based on PI's home campus.

3. Consortium Highlights

Developing a transportation workforce that possesses the skills needed to plan, design, deploy, operate, and maintain transportation systems that may not even exist today presents a unique and exciting challenge. As a Consortium, we engage with industry leaders on an ongoing basis to identify emerging career pathways, continually review and revise our existing K-12 workforce development programs, find creative ways to attract potential entrants, and not only provide participants with the skills they need today but inspire them to lead the way into the future.

Technology Transfer

Faculty and students affiliated with CSUTC engage in a wide range of technology transfer activities including conference presentations, journal publications, media outreach, briefings, and other efforts to ensure that research is accessible to practitioners. Since inception in 2018, there have been **more than 215 presentations by CSUTC researchers at conferences and professional meetings and 62 journal articles or published conference proceedings**. In addition, MTI hosts webinars featuring [CSUTC researchers](#) and provides professional development hours (PDH) needed by many professionals to maintain their certification.

SB1 places a high priority on rehabilitating California's road infrastructure and the CSUTC has been instrumental in supporting that work. CSUTC partner, CSU Chico has made several significant contributions including developing a [smartphone application for pothole](#)

[management](#). This app is designed to facilitate reporting and tracking of pavement potholes as an integral component of a comprehensive Pothole Management System.

CSUTC partner, Fresno State, organized the 2023 [Fresno International Transportation Innovations Summit](#), in October 2023. This event attracted more than 250 participants and featured keynote speakers Gil Peñalosa, Dr. Ismail Zhod, and Dr. Daniel Sperling. Held over four days, the Summit showcased PEDAL Forward, an initiative to transform Fresno into a cycling haven, and highlighted sustainable transportation. The event featured tours, like the Bus Rapid Tour led by Drew Wilson and the E-Planes Tour by Joseph Oldham, and eight breakout sessions covering bicycle education, transportation safety, health innovations, and local challenges. It concluded with an award ceremony recognizing outstanding contributions to transportation, community service, and sustainability.



During this past year, CSUTC researchers and executive leadership have been called upon to share their expertise and knowledge. CSU Long Beach's Dr. Amr Morsy was asked to convene a technical session on advances in geotechnical infrastructure assessment and monitoring by the American Geophysical Union in December 2023. In addition, Dr. Morsy will serve on the conference organizing committee for the GeoExtreme 2025 Conference to be held in Long Beach. Dr. Forouzan Golshani (CSU Long Beach) was invited to give the keynote address at the IEEE 14th Annual Computing and Communication Workshop and Conference in January 2024.

Dr. Hamid Rahai, with CSU Long Beach, has filed four patents/provisional patent applications during the past year. These include:

- Optimized End Plates for Vertical Axis Wind Turbine (Rahai, H.R.; Torres, Leovigildo; and Moffit, Ryan) – patent application filed August 2023.
- Reducing Aerodynamic Drag with Half-Stepped Cylinder Sheets (Rahai, H.R. and Moffit, R.) – provisional patent application filed March 2024.
- Guide-Vane Enclosure for Vertical-Axis Wind Turbine System (Rahai, H.R. and Moffit, R.) – provisional patent application filed March 2024.
- Optimized Airfoil with Cylindrical Leading Edge and Stinger Trailing Edge (Rahai, H.R. and Torres, Leovigildo) – patent application filed April 2024.

One of the ways CSUTC ensures that research meets the needs of industry professionals statewide is by requiring that all proposals include a letter of support from a professional willing to serve as an external advisor throughout the research process. This requirement not only ensures that the research teams understands and can respond to industry needs, but also leads to a greater likelihood that the research will be used by professionals.

Journalists seek out CSUTC researchers experts on a number of hot transportation topics. MTI's Executive Director, Dr. Karen Philbrick, was featured in a July 2024 episode of [Transit Unplugged podcast](#) where she discussed her chapter contribution in *The New Future of Public Transportation* book. Dr. Philbrick was also interviewed about MTI's innovative programs in addressing the workforce shortage across the transportation industry in an episode of [Infrastructure Momentum Makers](#).

MTI leveraged its industry partnership with the Santa Clara Valley Transportation Authority and Orloff Marketing, a local San Jose marketing company, to produce short videos promoting riding public transportation to the 41st San Jose Fountain Blues Foundation Blues & Brews Festival. The videos aimed to discourage driving while impaired and encourage safer mode of transportation on several VTA bus and light rail lines to the venue. Videos [1](#) and [2](#) are available on YouTube.



Leadership

CSUTC partners bring an outstanding record of state, national and international leadership and success in advancing transportation policy and generating solutions. Since forming, we have advised our state's policy makers through such diverse venues as testimony; conference panels; briefings of senior policy makers and through board and committee service. Thought leadership and the representation of the CSU SB1 funded research and workforce development portfolio in multiple venues is critically important.

CSUTC researchers have demonstrated their leadership contributions in a number of ways this year. As a result of the expertise developed at CSU Chico in pavement presentation, several members of their research team have been invited by Caltrans to join a group of leading subject matter experts on the development of a Technical Advisory Guide Manual on flexibility pavement presentation. Dr. Hovannes Kulhandjian (CSU Fresno) was invited to serve as guest editor for an MDPI Special Issue on Advances in Intelligent Transportation Systems. In addition, MTI's Dr. Hilary Nixon was recently elected to serve as Treasurer for the Council of University Transportation Centers. CSU San Bernardino's Dr. Kimberly Collins was invited to Caltrans' Zero Emission Vehicle Technical Advisory Committee on her CSUTC-funded research that was a targeted research need submitted by the California State Transportation Agency (CalSTA).

MTI's Executive Director, Dr. Karen Philbrick, was elected to the American Public Transportation Foundation Board, was reelected President of the American Road and Transportation Builders Association Research and Education Division, and was elected as a Director for the American Public Transportation Association High-Speed and Intercity Passenger Rail Committee. She also

pavement professionals with the latest information and guidance to preserve and extend the lifespan of California’s road infrastructure.

Students at Fresno State had the opportunity to present research posters as part of the CSUTC Research Project Presentation. Events such as these provide valuable opportunities for students to gain important skills and demonstrate their interest in future transportation/research careers.



Both FSTI and MTI hosted [National Summer Transportation Institutes](#) for students. FSTI focused on middle school students, and also held two additional summer camps for the Madera Unified School District. Meanwhile, MTI hosted a three-week, non-residential program for high school students, all of whom successfully earned three-units of CSU environmental studies credits. In addition to the environmental studies class, MTI partnered with the California High-Speed Rail Authority, SJSU Aviation & Technology, Transbay Joint Powers Authority, and Santa Clara Valley Transportation Authority to provide students with behind-the-scenes tours of current and future transportation infrastructure, and also hands-on experiences. Further successes are documented in the program [report](#).

MTI partnered with local and community-based organizations to build the future transportation workforce pipeline by offering learning, development, and advancement activities. Such collaborations include providing financial support for professional networking opportunities in the transportation industry and sponsoring undergraduate and graduate SJSU students to attend the Conference of Minority Transportation Officials (COMTO) NorCal’s Women Who Move the Bay and American Society of Civil Engineers (ASCE) San Jose Student Scholarship Gala. MTI also partnered with the Resource Area for Teaching (RAFT) to engage one hundred English Language Development and Leadership students at Herbert Hoover Middle School, a Title I school in San José, through a hands-on “found engineering” activity. To celebrate Engineers Week 2024, MTI provided financial support and organizing assistance to ASCE San Jose Younger

Members Forum to engage 260 elementary, middle, and high school students through engineering hands-on activities, guest lectures, and field trips.



In May of 2023, MTI collaborated with North Coast Opportunities (NCO) Walk and Bike Mendocino program to educate 4th and 5th-grade students at Nokomis Elementary School in Ukiah, CA, about the importance of wearing a helmet and other bike and pedestrian safety issues. MTI's funding also allowed NCO to distribute more than 50 helmets to students, who learned about local helmet laws and safe routes to schools and practiced riding their bikes while following the rules of the road. This collaboration continues with NCO delivering their program at Grace Hudson Language Academy in the Spring of 2024 and planning to deliver another program at the beginning of the Fall semester.



Another notable success from the CSUTC partnership is the selection of CSU Long Beach to serve as home for the California Local Technical Assistance (CALTAP) program. CALTAP is a federal (US DOT Federal Highway Administration) and state (Caltrans) funded program that delivers training and technical assistance to local governments (cities, counties, regional governments, and tribal nations) and their partners in the area of transportation throughout California. CSULB is the administrative home of the Center and also designs and delivers training. During the past year, CALTAP hosted 12 different web-based trainings and events with more than 3,300 participants—more than 2,800 were from municipal and county governments

and 200 came from rural counties or counties with large rural areas (Imperial, Calaveras, Butte, Humboldt, Madera, Mendocino, Nevada, Placer, and Tulare).

Leveraging Funding

An important focus for the Consortium is to secure additional funding to support transportation research. CSUTC partner, CSU Chico, was awarded a \$1.4M contract (2023-2026) from Caltrans for the California Pavement Preservation Center. CSU Long Beach received \$1.5M (2023-2025) from Caltrans for the Joint Training & Certification Program, Phase IV. MTI received 429K to deliver additional leadership academies to management staff at BART and the Metropolitan Transportation Commission. Additionally, MTI received 150K in FTA funding to continue working on transit assault.

As recently reported, MTI— as a result of successfully leading multi-institution consortia such as CSUTC—was awarded a ten-year, \$15M grant from the US Department of Transportation to lead a new university transportation center (UTC) grant. MTI is also a partner on two additional USDOT UTC grants as well as a partner on a new \$17M grant from the Federal Railroad Administration.

A hallmark of the CSUTC program is investing in CSU faculty to build research expertise in capacity.

4. Year 7 Detailed Research Activities

Consortium activities for Year 7 followed a similar pattern as the previous years. 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 and workforce development activities through the California Pavement Preservation Center. SJSU/MTI focused on high priority projects that were identified by key stakeholders – including California Department of Housing & Community Development, City of San Jose, the California State Senate Transportation Committee, and California State Senator Min. 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), is focusing their Year 7 research efforts to develop pavement distress identification methods using computer vision and machine learning. The research will be used to develop performance models for various pavement preservation strategies including microsurfacing, chip seals, and cape seals.

In addition, CSU Chico will conduct a fourth year of the successful [Pavement Preservation Academy](#). Key personnel include: DingXin Cheng, R. Gary Hicks, Lerose Lane, and Roger Smith.

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 principal investigators.

Project Title	PI
Acquisition of Intra-Vehicular Network Testbed	Shahab Tayeb
Deep Learning for Traffic Congestion Forecasting: Unveiling Predictive Models for Enhanced Urban Mobility Planning	Jorge Pesantez
Evaluation of the Impacts of “Q” Bus Rapid Transit System on Blackstone Avenue	Yertai Tanai
Fresno City Bike Campus Design Development	Holly Sowles
Roadside Asset Extraction from Mobile LiDAR Point Cloud Data	Yushin Ahn
Spatio-Temporal Analysis of the Roadside Transportation-Related Air Quality 2024: Time-series Analysis	Jaymin Kwon
Strategized Reduction of Greenhouse Gas Emissions Through Predicting and Extending the Service Life of Concrete Pavements and Bridges	Fariborz Tehrani
Wildfire Emergency Response and Evacuation Framework Using Drones: Phase I	Hovannes Kulhandjian

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. Six projects were selected for funding. The table below lists project titles and principal investigators.

Project Title	PI
ECO-DRIVE: Efficient Car Operations via Data-Driven Routing to Impede Vehicle Emissions	Tairan Liu
Evaluation of Long-Term Performance of Transportation Earthworks Prone to Weather-Driven Deterioration Under Changing Climate	Amr Morsy
Fuel Cell System Development for Heavy-Duty Vehicles	Yu Yang
Hydrogen Fuel Cell Application for Port Drayage Trucks: Integrated transportation and energy modeling	Shams Tanvir
Reducing Ambient NOx with an Environmental Artificial Tree (EAT)	Hamid Rahai
Sustainable Frameworks and Life Cycle Assessment for Reinforced Concrete Bridges for Sustainability in Transportation	Yu-Fu Ko

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

SJSU, through the Mineta Transportation Institute, has undertaken four projects. MTI continues with a focus on responding to high-priority research needs. Year 7 projects are in direct response to requests from California Department of Housing & Community Development, City of San Jose, the California State Senate Transportation Committee,

and California State Senator Min. Regarding the latter, Senator Min introduced [SB 381](#), which passed in October 2023. That legislation directs MTI, in consultation with relevant stakeholders, to “conduct a study on electric bicycles to inform efforts to improve the safety of users of the transportation system, and to submit a report of the findings from the study to the Legislature.” This is a concrete example of how the SB1 CSUTC program is directly responding to research needs of the California State Legislature to help inform policy and regulations.

Project Title	PI
An Evaluation of the 2024 Viva CalleSJ Event	Richard Kos, Hilary Nixon
An Empirical Investigation into Affordable Transit-Oriented Development (A-TOD) in California: Applying Classification and Scoring Systems	Ahoura Zandiatashbar
Exploring E-Bike Safety Performance Data and Policy Options	Asha W. Agrawal
The Role of Artificial Intelligence in Transportation	Adam Cohen

In addition to these research projects, MTI once again hosted the annual Garrett Morgan Sustainable Transportation Competition. This year, sixteen teams from across the country entered the competition with the winning team coming from Kennedy Middle School in Cupertino, California. MTI compiled a [video with highlights](#) from the 2024 competition. The USDOT Office of Research and Technology invited the top three teams from Cupertino, Fremont, and Mountain House, California to present their projects to the Planning Team Principals during their monthly meeting in June 2024.

MTI hosted the [Mineta National Transportation Policy Summit](#) in partnership with the Commonwealth Club World Affairs on May 17, 2024. This year’s theme was Beyond the Pump: Rethinking Transportation Funding Without the Fuel Tax. While the climate benefits from booming electric vehicle sales, the nation’s transportation system faces an unfortunate predicament: less gasoline and diesel purchased means dwindling fuel tax revenue. Fuel tax revenue provides a core funding source for operating, maintaining, and improving transportation systems, so policymakers must find a replacement as soon as possible. This event explored such options as mileage fees, higher annual vehicle fees, or abandoning the user-pay principle and relying on general fund revenue. Speakers included: Dr. Asha Weinstein Agrawal, Director of MTI’s National Transportation Finance Center and SJSU professor; Carlos Braceras, Executive Director, Utah Department of Transportation; Jeff Davis, Senior Fellow, Eno Center for Transportation; Tim Gatz, Executive Director, Oklahoma Department of Transportation; David “Davey” S. Kim, MTI Trustee; Senior Vice President & Principal, WSP; and Ed Sniffen, Director, Hawaii Department of Transportation.

As lead institution for CSUTC, MTI also works to engage, connect, and promote research and researchers across the Consortium. MTI continues to expand a [section of the Consortium website](#) to highlight the wide range of expertise and CSU campus

involvement. This information helps direct media representatives to CSU researchers for interviews, and also serves as a means to develop research collaborations across institutions.

B. CSU-wide Competitive RFP Process

MTI/SJSU, in collaboration with the CSU Chancellor’s Office, implemented the Year 7 CSU-wide RFP process using the following approach outlined in Figure 5.

Figure 5 Overview of the Year 7 Competitive RFP Process



As part of the first stage of RFP development, MTI solicited research needs from a wide range of stakeholders including the California State Legislature, CalSTA, California Transportation Commission, California Association of Councils of Government, California Department of Housing and Community Development, Caltrans, California Air Resources Board, and many others. A total of 7 research needs were received and incorporated into the RFP. The RFP was posted to the Chancellor’s Office InfoReady site in December 2023 and an announcement was broadly distributed to all 23 campuses and the Chancellor’s Office for dissemination.

Proposals were received January 22, 2024. MTI coordinated with 23 subject matter experts to conduct initial proposal reviews. After this first stage of review, the final review panel which includes representation from CalSTA, Caltrans, California Transportation Commission, and California-based academic institutions (non-CSU) select the final proposals to fund. Subcontracts were then issued to campuses with a start date of June 1, 2024.

Each project starts with a kick-off meeting with MTI, external advisors, and the research team. Projects typically take 12 months to complete. Once draft reports are submitted to MTI, each one is peer reviewed, and edited and formatted prior to publication. Finally, MTI engages in a comprehensive technology transfer program to disseminate findings. This program includes a press release, newsletter article, targeted outreach to key stakeholders, and a social media campaign.

Summary of Proposals Received

A total of 30 proposals were received from eleven CSU campuses (see Figure 6). Seven of the submissions were collaborative proposals involving two CSU campuses.

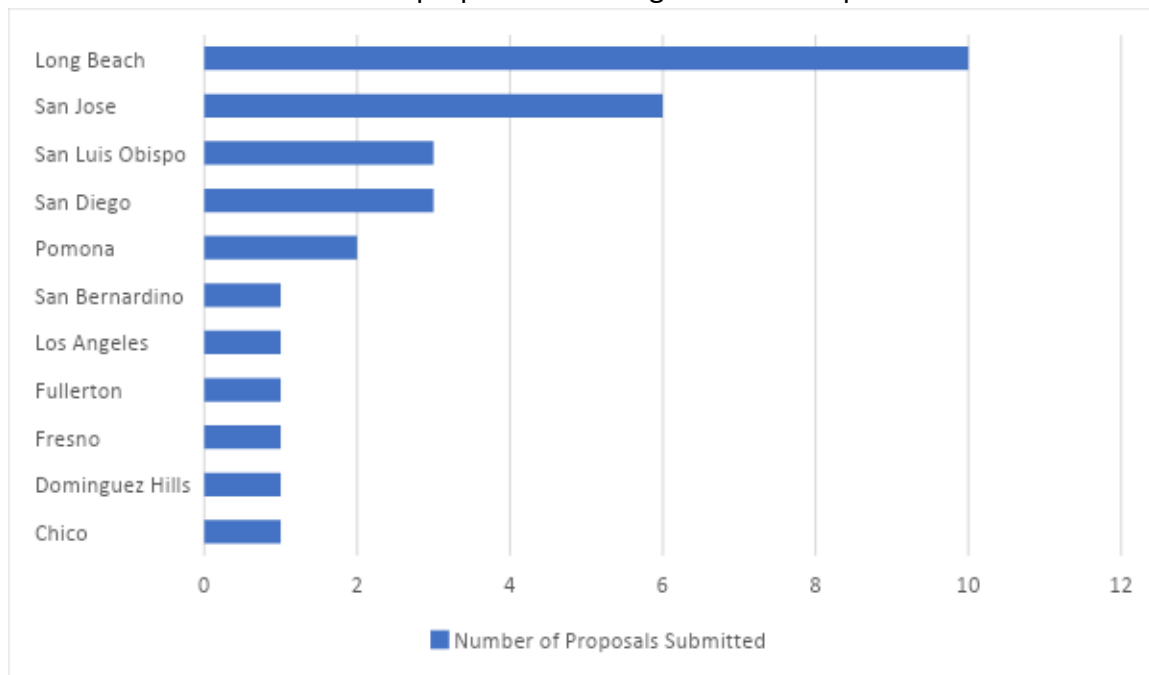


Figure 6 Summary of Proposal Submissions, by Campus

Summary of Proposals Awarded

Table 1, below, identifies all projects selected through the competitive RFP process.

For the Year 7 CSU-wide program, six different campuses are represented as project leads. In addition, three of the projects listed in Table 1 include multi-campus research teams. External advisor represent a number of key California stakeholders including the California State Senate Transportation Committee, Caltrans, California Air Resources Board, and the California Department of Housing and Community Development.

Nine projects were selected for funding by the review panel and six CSU campuses are represented among the PIs. Subcontracts have all been issued between the SJSU Research Foundation and the respective campus Offices of Sponsored Programs. MTI held a kick-off meeting with each PI and the project’s external advisor with detailed information regarding managing their project and submitting regular progress reports. In addition, one project is

under further review and revisions for likely funding. The PI is from CSU Fullerton, which would be a new campus participating in the CSUTC program.

Table 1 Research Projects Funded through the CSU Competitive RFP Process (Year 6)

Title	PI	CSU Affiliation	Award \$
A Holistic Inquiry of Intelligent Speed-Assist Technology: Safety Impacts, Technology Implementation, and Challenges	Sahar Ghanipoor Machiani	San Diego	\$75,000.00
A Hydrogen Hub Blueprint for the California Supply Chain	Tyler Reed	Long Beach	\$33,750.00
Alternative Project Delivery Methods in California Transportation Agencies: The Path Forward	Ghada Gad	Pomona	\$74,996.00
Climate Change Impacts on Long-Term Performance and Service Life of California Transportation Earthworks Prone to Weather-Driven Deterioration	Amr Morsy	Long Beach	\$75,000.00
Equitable Estimation of Accurate High-Injury Network (HIN) for Vulnerable Road Users (VRUs)	Anurag Pande	San Luis Obispo	\$74,996.00
Mitigating Negative Consequences of New Housing in Disadvantaged Communities	Shishir Mathur	San José	\$68,752.08
The Detection of and Contributing Factors to Residential Infill Development in a High-Quality Transit Area (HQT): An Application of Deep Learning	Do Hyung Kim	Pomona	\$74,991.00
Use of Polymer Fiber to Improve Mechanical Properties of HMA Containing Recycled Asphalt Pavement (RAP)	Ashraf Rahim	San Luis Obispo	\$74,983.00
Workforce Development Academy for Youth at CSULA	Hassan Hashemian	Los Angeles	\$75,000.00

C. Final Publication Process

All research projects undertaken as part of the CSUTC result in a final report. Research teams submit a draft version of the report to MTI and MTI manages a technical peer review, 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, and newsletters.

CSUTC remains dedicated to addressing the complex nature of today's mobility challenges to advance the body of usable transportation knowledge and identify implementable solutions for California.