



**California State University**  
**Transportation Consortium**

**SB 1 Research Activities Summary /  
Research Plan for 2022-2023**

**[transweb.sjsu.edu/csutc](https://transweb.sjsu.edu/csutc)**

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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 <sup>a</sup>
Year 2	37 <sup>b</sup>
Year 3	32 <sup>c</sup>
Year 4	16
Year 5	2
<i>Subtotal</i>	<i>119</i>
<i>Submitted Drafts—In Publication Process</i>	
Year 2	1
Year 3	4 <sup>d</sup>
Year 4	5
Year 5	2
<i>Subtotal</i>	<i>12</i>
<i>Research in Progress</i>	
Year 4 <sup>e</sup>	10
Year 5	25
<i>Subtotal</i>	<i>35</i>

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

<sup>b</sup> 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.

<sup>c</sup> One project was jointly funded between SB1 and MTI's USDOT grant to allow for a more extensive research design.

<sup>d</sup> One project is jointly funded between Years 3 and 4 to allow for a more extensive research design. Recorded here with Year 3 projects in the publication queue.

<sup>e</sup> Two CSULB TRANSPORT projects were terminated. One CSU Fresno project was terminated due to a faculty member leave of absence and a new project was identified.

To date, 119 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 13 unique CSU campuses have received project funding** (based on PI's home campus).

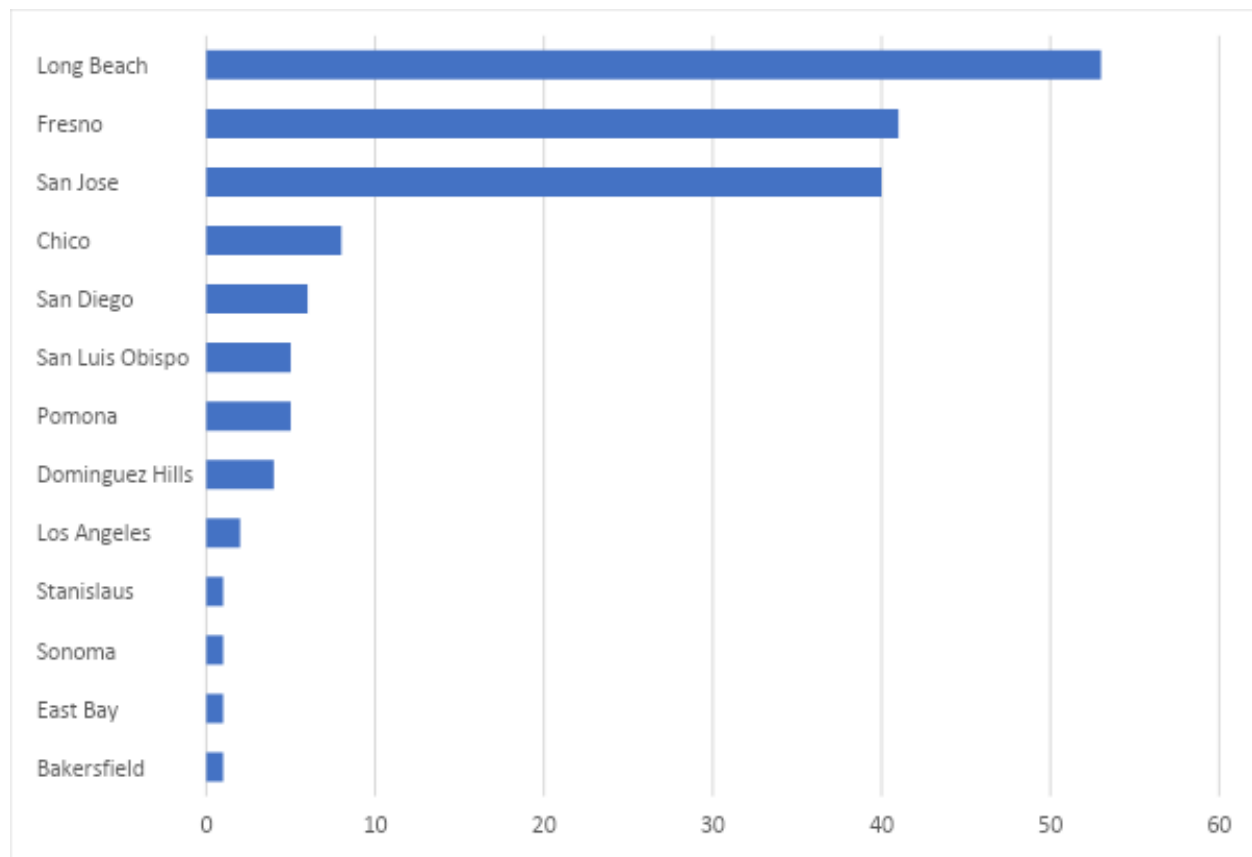


Figure 1 Summary of Funded Projects by Campus<sup>a</sup>

<sup>a</sup> Includes 2 CSULB projects that were terminated. In addition, Sacramento State submitted a proposal during Year 1 which was funded through MTI's Caltrans USDOT match contract rather than through the CSUTC SB1 program.

### 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 and 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 ***nearly 200 presentations by CSUTC researchers at conferences and professional meetings***. In addition, MTI hosts webinars featuring [CSUTC researchers](#) and provides professional development hours (PDH) needed by mainly professionals to maintain their certification.

During this past year, CSUTC researchers and executive leadership have been called upon to share their expertise and knowledge. This is particularly true in the area of innovative transportation finance, which is a key research strength for the Consortium, and MTI especially. MTI's Dr. Asha Weinstein Agrawal was asked by the California Transportation Commission (CTC) to provide guidance on how to establish a road user charge in California to raise revenue equivalent to fuel taxes considering light and heavy-duty vehicles, and other equity considerations. Former CalSTA Director David Kim found Dr. Agrawal's research on road user charges (RUC) so useful that he incorporated the information into a speech he gave to the RUC American Forum in June 2022. Staff from North Carolina DOT and consulting firm Cambriges Systematics have both reached out to indicate how useful her research has been. Last fall, Dr. Agrawal was asked to serve as a member of the California Road User Charge Technical Advisory Committee (TAC), a body established by state law to provide recommendations to CalSTA on the design of California's next RUC pilot programs. [Legislation](#) passed September 2021 to expand the TAC references recent CSUTC research by Dr. Agrawal on "[The Impact of ZEV Adoption on California Transportation Revenue](#)" which was conducted in response to a research request from Senator Jim Beall.

CSUTC research was highlighted during the [7<sup>th</sup> Annual South Bay Economic Forecast](#) held at CSU



Figure SEQ Figure \\* ARABIC 4 Drs. Martinez (far left) and Prager (far right) join Dr. Broadmann at Forum

Dominguez Hills in October 2021. CSUTC researchers and CSUDH faculty involved with this event included Drs. Jose Martinez, Fynnwin Prager, and Jian-yu Ke. Their work on "[Achieving Excellence for California's Freight System: Developing Competitiveness and Performance Metrics; Incorporating Sustainability, Resilience, and Workforce Development](#)" was featured. The event drew more than 200 business leaders, innovators, and city officials to discuss the economic state of the South Bay region.

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. One of the Consortium’s industry partnerships is with Caltrans District 5. District staff has served as external advisors on two CSUTC projects and has been described as a “meaningful academic-industry partnership...that is so vital to improving the safety, efficiency, accessibility, and convenience of California’s transportation system.”

CSULB’s Dr. Hamid Rahai filed Patent No. 11,131,278 on September 28, 2021 for a “System and Method for Reducing NOx Emissions of Cargo Handling Equipment (CHE).” This stems from work Dr. Rahai and his co-author, Dr. Jeremy Bonifacio have conducted as part of the CSUTC, including [“Reducing NOx Emissions of Cargo Handling Equipment \(CHE\) with Huma Air Systems.”](#)

Journalists seek out CSUTC researchers experts on a number of hot transportation topics. One example is research by Dr. Aly Tawfik at CSU Fresno. His research, [COVID-19 Transit Bus Air Circulation and Virus Mitigation Study](#) continues to be covered in the media, including most recently by [CNN](#). CSUTC-MTI research [analyzing parking](#) in the Bay Area was widely covered by outlets including the [San Francisco Examiner](#), [KTVU-FOX](#), and others.

## 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. To that end, following is a table of CSUTC Executive Director activities, some are continuing while others are new.

Item Number	Organization	Service Role: Karen E. Philbrick, PhD
1	American Public Transportation Association (APTA) Board of Directors	Board Member
2	APTA Mobility Restoration and Recovery Task Force (a COVID-19 Response)	Task Force Advisor
3	American Road and Transportation Builders Association (ARTBA)	Board Member and Executive Committee
4	ARTBA Research and Education Division	President
5	City and County Pavement Improvement Center, UC Davis Institute of Transportation Studies	Executive Committee
6	Council of University Transportation Centers (CUTC)	Past President

Item Number	Organization	Service Role: Karen E. Philbrick, PhD
7	The International Level Crossing Awareness Day (ILCAD 2022)	Committee member Secretary
8	LA Metro Office of Extraordinary Innovation (OEI)	Advisory Board Member
9	Rotary Club of San Jose	President Elect
10	San Jose Spotlight	Transportation Columnist
11	TCRP Panel F-29: Mental Health, Wellness, and Resilience for Transit System Workers	Chair
12	Transit Advisory Committee for Safety (TRACS)	Committee Member (appointed by Secretary Chao)
13	Transportation Learning Center	Board Member
14	Transportation Research Board AR010 Committee: Passenger Rail	Committee Member, Research Subcommittee Chair, and CRC Chair
15	Transportation Research Board AP080 Committee: Transit Safety and Security	Committee Member
16	Women in Transportation Seminar (WTS) International Board	Board Member

## Awards

CSUTC research and researchers continue to receive awards and recognition for their accomplishments. Jose Torres-Aguilera, an undergraduate student a CSULB and a student research assistant working on CSUTC-funded research with Dr. Shailesh Chandra, was selected as one of 24 students from across the U.S. as part of the Transportation Research Board's [2023 Minority Student Fellows Program](#) and will present on their CSUTC research in January at TRB. Edward Clay, a graduate student at Cal Poly Pomona, and a student co-author of the recently released CSUTC publication "[Comprehensive Performance Assessment of Passive Crowdsourcing for Counting Pedestrians and Bikes](#)" was also selected as a 2023 Minority Student Fellow.

CSULB student, Maria El Asmar, was the runner-up award winner for [TRB's 3-Minute Thesis Competition](#) in January 2022. This competition focuses on effective communication of research findings to a general audience. Students from more than 30 universities competed. Maria was a student research assistant with Dr. Shadi Saadeh, who has completed three CSUTC projects and has a fourth in progress.

CSU Fresno's Dr. Aly Tawfik received the ASCE San Francisco Section's 2021 [Outstanding Faculty Advisor Award](#) and the ASCE Fresno Branch's 2021 Outstanding ASCE Section Office Award.

## Workforce Development

CSUTC engages with the future of the transportation workforce in a number of different ways, including through research opportunities. Specifically, all of the Consortium's full-scale research projects are required to include students on the research team. These students benefit from working closely with faculty mentors. Nearly 300 CSU students have participated as research assistants on CSUTC research projects, learning valuable and transferable skills.

The CSUTC-UC partnership to establish the City and County Pavement Improvement Center has **trained over 1050 pavement professionals around the State**. In the past year, 250 individuals attended classes available online. CCPIC offers the most current and comprehensive training curriculum available to California's pavement engineering and management workforce. Courses are intended for engineers, asset managers, upper-level managers, technicians, and construction inspectors, and cover Pavement Fundamentals, Management, Design, Materials, and Construction. This multi-campus partnership involves CSU faculty from SJSU, Cal Poly SLO, CSU Chico, and CSU Long Beach along with UC Davis and UC Berkeley.

CSUTC partner, CSU Chico, held the second Pavement Preservation Academy this year. This certificate program, which consists of four 3-hour modules, was developed using CSUTC funds in 2021. A total of 100 attendees from Caltrans, local agencies, and industry participated this year and 56 passed the final certification exam.

CSUTC's workforce development efforts also emphasize engaging with K-12 students and teachers. CSUTC partner, CSU Long Beach, held a middle school bootcamp to introduce students to GIS and robotics in May 2022. Dr. Tom O'Brien with Rio Hondo College to design curriculum, arrange for instructors, and recruit student participants. Twelve students participated and pre- and post-assessments were administered to gather data on student knowledge acquisition as well as interests and future career plans. MTI developed a set of free [elementary school-level lesson plans](#) on sustainable transportation and climate change, transportation, and high speed rail. These latter plans were reviewed by the California High Speed Rail Authority and found so valuable that the Authority distributed them to their education partners statewide.

Several CSU Fresno students involved in the CSUTC program have had the opportunity to present research at conferences including the ASCE 2022 International Conference on Transportation & Development (Seattle, WA); Central California Research Symposium (Fresno, CA); and TRB Annual Meeting (Washington, DC). These provide students with opportunities to gain valuable feedback on their research, practice their presentation skills, and network with transportation professionals.



Figure CSU Fresno students present at ICTD. L-R Marina Lima, Dr. Aly Tawfik, Alyssa Nishikawa, Michelle Larsen, Patrick Reilly



## Leveraging Funding

An important focus for the Consortium is to secure additional funding to support transportation research. CSUTC partner, CSU Chico, leveraged their SB1 funding to secure a three-year grant from CalRecycle to study using recycled tire rubber in asphalt pavement applications. MTI, as a result of successfully leading multi-institution consortia such as CSUTC and the USDOT-funded Mineta Consortium for Transportation Mobility, was awarded a two-year, *\$4.6M grant from the Federal Railroad Administration to establish a Climate Change and Extreme Events Training and Research Program*.

## 4. Year 5 Detailed Research Activities

Consortium activities for Year 5 followed a similar pattern as the previous three 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 transit agencies, members of the California State Legislature, and others. 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 5 research efforts on two major areas: professional development training through the Pavement Preservation Academy and development of a new pavement preservation manual focused on drone surveying techniques. Key personnel include: DingXin Cheng, R. Gary Hicks, Lerosé Lane, and Roger Smith. The work conducted by CSU Chico is highly regarded by transportation professionals—[TR News](#), a leading publication from the National Academies of Sciences, Engineering, and Mathematics, featured Dr. Cheng’s work as the lead article in the May/June 2022 issue that focused on pavement preservation, maintenance and rehabilitation.

#### 2. CSU Fresno

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

Project Title	PI
A Gravity Model Integrating Transportation Investments and Land-Use Planning for Sustainable Development: Case Study of Fresno, California	Chihhao Wang
AI-based Bridge and Road Inspection Framework using Drones	Hovannes Kulhandjian
Extending the Service-Life of Bridges using Sustainable and Resilient Abutment Systems: An Experimental Approach to	Fariborz Tehrani

Electrochemical Characterization of Lightweight Mechanically Stabilized Earth	
Mapping of Pavement Condition using SmartPhone/Tablet LiDAR Case study: Sensor Performance Comparison	Scott Peterson
Recognizing the Potential to Reduce GHG Emissions Through Air Transportation Electrification	Julio Roa
Smart Transportation in Small Urban and Rural Communities in California's Central Valley	Hongwei Dong
Spatio-Temporal Analysis of the Roadside Transportation-Related Air Quality (StarTraQ 2022): Data-driven Exposure Analysis by Transportation Modes	Jaymin Kwon

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

Project Title	PI
Curriculum Evaluation of the Academy of Global Logistics Program: Connections to STEM Education	Ann Kim
Economic Evaluation of Route Choice Characteristics for Company Truck Drivers and Owner-Operated Truck Drivers in Southern California Freeways	Joseph Kim
Electrical Vehicle Charging Infrastructure Design and Operations	Yu Yang
Equity in Learning Opportunities for Middle School Students: Connecting Communities and Transportation Through GIS	Tom O'Brien
Evaluating Automated Truck Platoon (ATP) Deployment for the Los Angeles-Inland Empire Trade Corridor Enhancement	Shailesh Chandra
Fiber-Based Seismic Damage and Collapse Assessment of Reinforced Concrete Single-Column Pier-Supported Bridges Using Damage Index	Yu-Fu Ko
Investigation of the Self-Healing Capacity of Cracked Concrete by Sprayed Bacteria Immobilized in Food Waste Biochar	Andrea Calabrese
Statistical Evaluation of IDEAL-CT Test for Asphalt Concrete Using Discrete Element Method	Shadi Saadeh
System-of-Systems Integration for Civil Infrastructures Resiliency Toward Multi-Hazard Events	Vahid Balali
Virus Control Aboard a Commuter Bus	Hamid Rahai

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

SJSU, through the Mineta Transportation Institute, has undertaken two large-scale projects.

MTI continued with its multi-year collaboration with the University of California through the City & County Pavement Improvement Center (CCPIC) This partnership is unique in that the funds come from MTI but are used to support researchers at three other CSU campuses (Chico, Long Beach and San Luis Obispo).

MTI continues with a focus on responding to high-priority research needs. In response to a request from State Senator Min and the California Assembly Transportation Committee, MTI has been asked to develop a survey for transit agencies statewide to assist with gathering data to inform efforts to improve the safety of riders and reduce street harassment on public transit.

MTI has also undertaken the following three projects:

Project Title	PI
An Equity Analysis of California Household Fuel Consumption by Income and Place	Asha W. Agrawal
Routes to Lower Greenhouse Gas Emissions from Freight Transportation in the City of San José	Serena Alexander
Challenges to Electric Vehicle Adoption	Adam Cohen

In addition to these research projects, MTI once again hosted the annual Garrett Morgan Sustainable Transportation Competition. This year, teams from across the country entered the competition with the winning team coming from the Fremont Unified School District in Fremont, California. The team, InnovantBots, developed a project involving programmable lane-control bollards designed to ease traffic congestion.



*Figure Students from Fremont Unified School District with Dr. Philbrick and Caltrans representatives receive their award certificates*

MTI again hosted the [Mineta National Transportation Policy Summit](#) in partnership with the Commonwealth Club of California on June 3, 2023. This year's theme was Mapping the Route to Equitable Road User Charges and our special guest was **U.S. Congressman Peter DeFazio**. The keynote address was provided by **U.S. Department of Transportation Deputy Secretary Polly Trottenberg**. The program focused on how to replace fuel taxes with other broad-based, reliable sources of transportation revenue, particularly given the accelerating transition to electric vehicles. A key emphasis in the discussions was on considerations of the equity implications of any new charges on drivers. Panelists included: Dr. Asha Weinstein Agrawal, Director of MTI's National Transportation Finance Center and SJSU professor; James Corless, Executive Director, Sacramento Area Council of Governments; Reema Griffith, Executive Director, Washington State Transportation

Commission; and Hasan Ikhata, Executive Director, San Diego Association of Governments. The panel was moderated by Stephanie Wiggins, CEO, Los Angeles County Metropolitan Transportation Authority (LA Metro).

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.

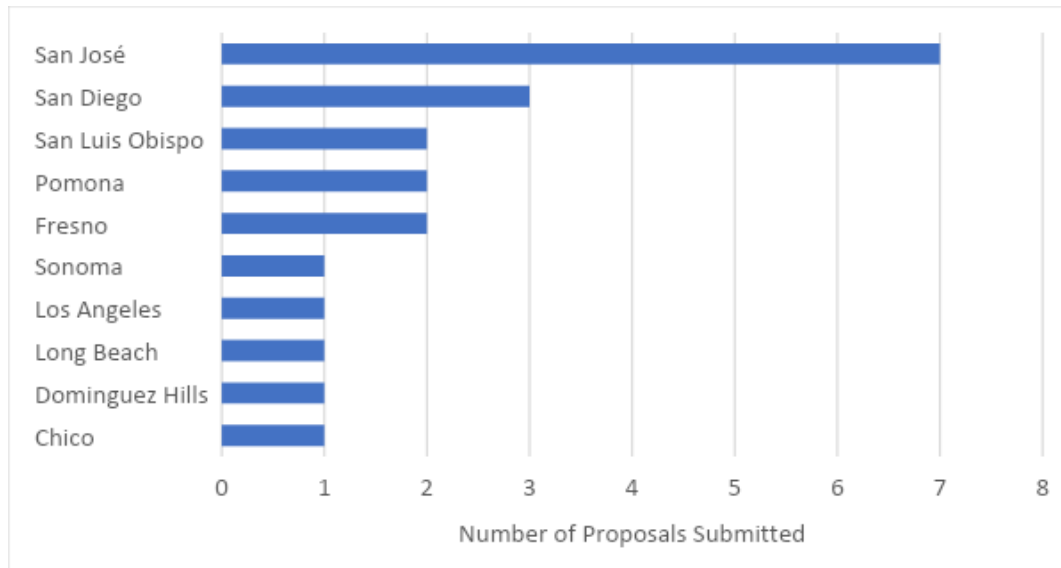
## **B. CSU-wide Competitive RFP Process**

MTI/SJSU, in collaboration with the CSU Chancellor's Office, implemented the Year 6 CSU-wide RFP process using the following approach.

- Research needs statements solicited from California Air Resources Board, California State Assembly Transportation Committee, Caltrans, Fresno Council of Governments, LA Metro, Silicon Valley Bicycle Coalition, and SPUR. Fourteen targeted research needs were incorporated into the final RFP.
- RFP (available on InfoReady) distributed to CSU campuses on December 9, 2021 with a deadline to submit February 11, 2022.
- Evaluation rubric based on criteria and weighting listed in the RFP developed for reviews. *Proposals submitted based on targeted research needs received a 10% bonus on their rubric score.*
- 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.
- Seven proposals were selected for funding, including targeted research needs from the following key stakeholders: California Air Resources Board, California Assembly Transportation Committee, Caltrans District 5, and LA Metro.
- Subcontract agreements have been issued and work is underway.

## **Summary of Proposals Received**

A total of 21 proposals were received from ten CSU campuses (see Figure 4).



*Figure 6 Summary of Proposal Submissions, by Campus*

### Summary of Proposals Awarded

Seven projects were selected for funding by the review panel and five CSU campuses are represented among the PIs. Subcontracts are in process between the SJSU Research Foundation and the respective campus Offices of Sponsored Programs. MTI held a kick-off meeting with each PI with detailed information regarding managing their project and submitting regular progress reports. Since a smaller number of proposals were approved for funding this cycle by the review panel, MTI has reached out to stakeholders including CalSTA and the California Assembly Transportation Committee to identify additional targeted research needs. A second round of proposals will be requested, specifically from CSU campuses who have not yet received funding through the CSUTC program, in order to identify research teams to conduct these new studies.

Title	PI	CSU Affiliation	Award \$
A Guide to Navigating Existing and Emerging Sources of Local VMT and Travel Data	Do Kim & So Ra Baek	Cal Poly Pomona	\$74,867
Evaluation of California's Active Transportation Program (ATP)	Bruce Appleyard	SDSU	\$74,840
Evaluation of Turbo Roundabouts	Anurag Pande	Cal Poly SLO	\$74,966
Examining the Externalities of Highway Capacity Expansions in California: An Analysis of Land Use and Land Cover (LULC) and Urban Heat Island (UHI) Effect Using Remote Sensing Technology	Bo Yang & Serena Alexander	SJSU	\$74,937
Governing Structures for Successful Regional Transit Coordination and Their Formation	Charles Rivasplata	SJSU	\$75,000

Reducing Vehicles Miles Traveled Through In-fill: How Regional and Local Plans are Addressing Housing Needs While Mitigating Negative Unintended Impacts on Disadvantaged Communities	Shishir Mathur	SJSU	\$74,997
Should State Land in Southern California be Allocated to Warehousing Goods or Housing People? Analyzing Transportation, Climate, and Unintended Consequences of Supply Chain Solutions	Tianjun Lu	CSU Dominguez Hills	\$74,986

In addition, *MTI received a specific request from CalSTA to solicit proposals from CSU researchers to develop an evaluation plan for SB 1046.* An RFP was developed for this targeted research need and distributed to CSU campuses in October 2021. Four proposals were received from four CSU campuses (Long Beach, Pomona, San Jose, San Luis Obispo). Proposals were reviewed by subject matter experts and staff at CalSTA; a research team from San José State University led by Dr. Maria Chierichetti was selected to develop the plan. The project was fast-tracked to meet CalSTA’s timeline and the [final technical report](#) was published in July 2022.

### **C. Final Publication Process**

All research projects undertaken as part of the CSUTC results 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, newsletters, as well as the CSU Transportation Research Spotlight in Sacramento.

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.