MEMORANDUM OF AGREEMENT
BETWEEN
THE CITY OF CHULA VISTA CALIFORNIA
AND
SAN DIEGO STATE UNIVERSITY RESEARCH FOUNDATION

This Memorandum of Agreement ("Agreement") is between San Diego State University Research Foundation (hereinafter referred to as "SDSURF"), a non-profit corporation under the laws of the State of California, in the City of San Diego, located at 5250 Campanile Drive, San Diego, CA 92182 and the City of Chula Vista, a chartered municipal corporation, located at 276 Fourth Avenue, Chula Vista, CA 91910 hereinafter referred to as "City." SDSURF and City may be referred to herein individually as a "Party" or collectively as the "Parties".

RECITALS

WHEREAS, SDSURF is an auxiliary organization chartered to further the educational, research and community service objectives of San Diego State University, and;

WHEREAS, the University Transportation Center (hereinafter referred to as "UTC") is a program of the SDSURF that has grant funding to conduct research on transportation engineering, and;

WHEREAS, SDSURF proposed to City to utilize City infrastructure to collect and transmit observations and data to UTC's facilities for analysis at no cost to the City; and

WHEREAS, SDSURF will furnish its own equipment while utilizing certain City infrastructure with City's approval; and

WHEREAS, SDSURF's findings will provide the City with valuable insights into pedestrian, bicycle, and vehicular operations at representative intersections in the City; and

WHEREAS, SDSURF represents to the best of its ability that it is experienced and staffed in a manner such that it can conduct the proposed research in accordance with the time frames and the terms and conditions of this Agreement.

NOW, THEREFORE in consideration of the specific responsibilities, budget considerations, fees and agreements contained herein, it is mutually agreed by and between the respective parties as follows:

1.   **Agreements by of the Parties**:
     a. SDSURF shall be solely responsible for the installation, maintenance, removal, and operation of video cameras and other required equipment and collection of data at traffic intersection locations approved by City ("Research Equipment"), in advance and in writing, at its sole discretion.   The video cameras and any other required equipment will be placed only in the location(s) approved by City and will be maintained in good condition at all times during the term of this Agreement. Dr. Arash Jahangiri will serve as SDSURF's project director for the research activities conducted under this Agreement.

b. SDSURF agrees to the best of its ability that the research outlined in Exhibit A shall be performed in accordance with the highest standard of care exercised by members of the profession currently practicing under similar conditions and in similar locations.

c. SDSURF shall comply with any and all applicable federal, state, and local laws, including the Chula Vista Municipal Code.

d. SDSURF shall obtain all permits, at no cost, required by City for the installation, maintenance, removal, and operation of the Research Equipment.

e. City shall, at no cost to SDSURF, allow SDSURF personnel reasonable access to approved traffic intersections for the purpose of installation, maintenance, removal, or operation of Research Equipment and data collection as approved by City; provided, that, nothing contained herein shall require City to provide SDSURF access to any approved intersection in the event of an emergency or other event or circumstance that City determines, in City's sole discretion, would compromise, in any way, the provision of municipal services by City.

f. City shall endeavor to provide 15 days written notification to SDSURF prior to the start of construction or work that may impact data collection. Notice shall be provided to SDSURF Principal Investigator, Dr. Arash Jahangiri by email to ajahangiri@sdsu.edu.

2.   **Effective Dates and Termination:**

a. Unless sooner terminated as provided herein, this Agreement shall continue in full force and effect from September 14, 2020 through September 13, 2023, unless otherwise stipulated in writing, or terminated as specified in Paragraph 2(b) or Paragraph 2(c), below.

b. This Agreement may be terminated at any time upon mutual written agreement between the Parties.

c. City may also suspend or terminate this Agreement at any time and for any reason, with or without cause, by giving specific written notice to SDSURF of such termination or suspension at least fifteen (15) days prior to the effective date thereof. Upon receipt of such notice, SDSURF shall immediately cease all work under the Agreement. City shall remove Research Equipment installed on City infrastructure and shall return the Research Equipment to SDSURF within thirty (30) days of the date of City's notice of termination.

3.   **Indemnification:**
a. General. To the maximum extent allowed by law, SDSURF shall protect, defend, indemnify and hold harmless City, its elected and appointed officers, agents, employees and volunteers (collectively, "Indemnified Parties"), from and against any and all claims, demands, causes of action, costs, expenses, (including reasonable attorneys' fees and court

costs), liability, loss, damage or injury, in law or equity, to property or persons, including wrongful death, in any manner arising out of or incident to any alleged acts, omissions, negligence, or willful misconduct of SDSURF, its officials, officers, employees, agents, and contractors, arising out of or in connection with the performance of this Agreement. SDSURF's obligations under this section shall include liability arising from, connected with, caused by or claimed to be caused by the active or passive negligent acts or omissions of the Indemnified Parties which may be in combination with the active or passive negligent acts or omissions of the SDSURF, its employees, agents or officers, or any third party. This indemnity provision does not include any claims, damages, liability, costs and expenses arising from the sole negligence or willful misconduct of the Indemnified Parties.

    b. <u>Costs of Defense and Award</u>. Included in SDSURF's obligations under this Section 3 is SDSURF's obligation to defend, at SDSURF's own cost, expense and risk, any and all suits, actions or other legal proceedings that may be brought or instituted against one or more of the Indemnified Parties. Subject to the limitations in this Section 3, SDSURF shall pay and satisfy any judgment, award or decree that may be rendered against one or more of the Indemnified Parties for any and all related legal expenses and costs incurred by any of them.

    c. <u>Obligations Not Limited or Modified</u>. SDSURF's obligations under this Section 3 shall not be limited to insurance proceeds, if any, received by the Indemnified Parties, or by any prior or subsequent declaration by the SDSURF. Furthermore, SDSURF's obligations under this Section 3 shall in no way limit, modify or excuse any of SDSURF's other obligations or duties under this Agreement.

    d. <u>Enforcement Costs</u>. SDSURF agrees to pay any and all costs City incurs in enforcing SDSURF's obligations under this Section 3.

    e. <u>Survival</u>. SDSURF's obligations under this Section 3 shall survive the termination of this Agreement.

4.   **Insurance:** SDSURF shall agree to provide at its sole cost and expense, coverage for its activities in connection with this Agreement by maintaining in full force and effect programs of insurance and/or self-insurance as follows:

    a. Commercial General Liability insurance providing coverage against claims for Bodily Injury or Death, and Property Damage. Such insurance shall provide protection to the limit of not less than $1,000,000 combined single limit for Bodily Injury and Property Damage.

    b. Workers' Compensation insurance statutory coverage including Employers Liability with limits of not less than $1,000,000.

    c. Automobile Liability with limits not less than $1,000,000 each occurrence, combined single limit for Bodily Injury and Property Damage, including coverage for owned, non-owned and hired vehicles.

SDSURF agrees to provide City all required certificates of insurance naming City, its officers, officials, employees, agents, and volunteers as an additional insureds with respect to work being performed under this Agreement.

SDSURF and City agree that the specified coverage or limits of insurance in no way limit the liability of the City. SDSURF shall notify City at least thirty (30) days prior to cancellation or

non-renewal of any such insurance.

5. **Ownership and Use of Work Product**. All reports, studies, information, data, statistics, forms, designs, plans, procedures, systems and any other materials or properties produced in whole or in part under this Agreement in connection with the performance of the Required Services (collectively "Work Product") shall be the sole and exclusive property of SDSURF. City shall have the non-exclusive right to publish, disclose, distribute, and otherwise use, in whole or in part, any such Work Product, for City's non-commercial government purposes without requiring any permission of SDSURF, except as may be limited by the provisions of the Public Records Act or expressly prohibited by other applicable laws. With respect to computer files containing data generated as Work Product, SDSURF shall make available to City, upon reasonable written request by City, the necessary functional computer software and hardware for purposes of accessing, compiling, transferring, and printing computer files.

6. **Amendment**: This Agreement may be amended, but only in writing signed by both Parties.

7. **Governing Law**: This Agreement shall be governed by and construed in accordance with the laws of the State of California. Any action arising under or relating to this Agreement shall be brought only in San Diego County, State of California.

8. **Administrative Claims Requirements and Procedures**. Claims shall be addressed in accordance with the procedures set forth in Chapter 1.34 of the Chula Vista Municipal Code, as same may be amended, the provisions of which, including such policies and procedures used by City in the implementation of same, are incorporated herein by this reference. Upon request by City, SDSURF shall meet and confer in good faith with City for the purpose of resolving any dispute over the terms of this Agreement.

In witness whereof, the authorized representatives of the parties have executed this Agreement effective on the date of final signature below by and between SDSU Research Foundation and the City of Chula Vista.

City of Chula Vista: **SDSU Research Foundation**:

Maria Kachadoorian   Renée Lechner
City Manager   Director, Sponsored Research
                                                      Administration

Date: _____   Date_____

Description of Research to be Conducted

Transportation safety planning challenges in the era of smart cities entail understanding safety impacts from disruptive technologies, measuring the effectiveness of safety countermeasures, proactively identifying high crash risk locations, etc. Recent advancement in communication technologies and big data analytics enables us to deal with these challenges in a computationally efficient way. Traditional transportation management centers (TMCs) have limited capability to utilize large amounts of data to properly evaluate transportation safety. The goal of this project is to develop an intelligent transportation management center (ITMC) that adopts automated video data analysis to evaluate safety. The proposed ITMC demonstrates how intelligent transportation systems (ITS) technologies and big data analytics can be utilized to proactively assess transportation safety at signalized intersections. Conventional methods of traffic safety risk assessment at signalized intersections, measured by number of roadway crashes per unit of exposure, would require a long observation time as crashes are rare events. The proposed ITMC adopts safety surrogate measures (SSMs) to identify near crash situations that can be applied in proactive risk calculations.

To tackle the big data problem, the proposed ITMC will adopt disruptive technologies that perform machine learning in situ to detect road users in real-time. Known as inferencing at the edge, these technologies allow one to perform computationally intensive artificial intelligence (AI) calculations on the device without needing to transfer streaming video to a centralized facility to perform calculations.

The ITMC will create a testbed that can be used by students, faculty, public agencies, and industry to develop solutions to many transportation safety problems as well as mobility and environment problems in a long term. For instance, exposure data, is an essential part of safety risk assessments. However, most existing bicycle and pedestrian networks are not equipped to routinely collect count data, such as is typically collected for vehicular networks (e.g., via loop detectors). Given this lack of exposure data, local agency staff are not able to accurately assess which facilities are in highest need of improvement. The ITMC will provide an opportunity to obtain exposure data for all road users from video data to support estimation of traffic volumes. ITMC can also be adopted to understand safety impacts of disruptive technologies and measure the effectiveness of safety countermeasures. Results from proactive safety analysis before and after implementing a countermeasure or adopting a new technology can reveal the safety benefits.

The research team has identified 5 intersections in the city of Chula Vista as suggested by the city staff. The team will instrument these intersections with cameras (and potentially with connected vehicle technology) and radio antennas with capability of collecting video data and transferring it to SDSU. These intersections are presented in Figure 1.
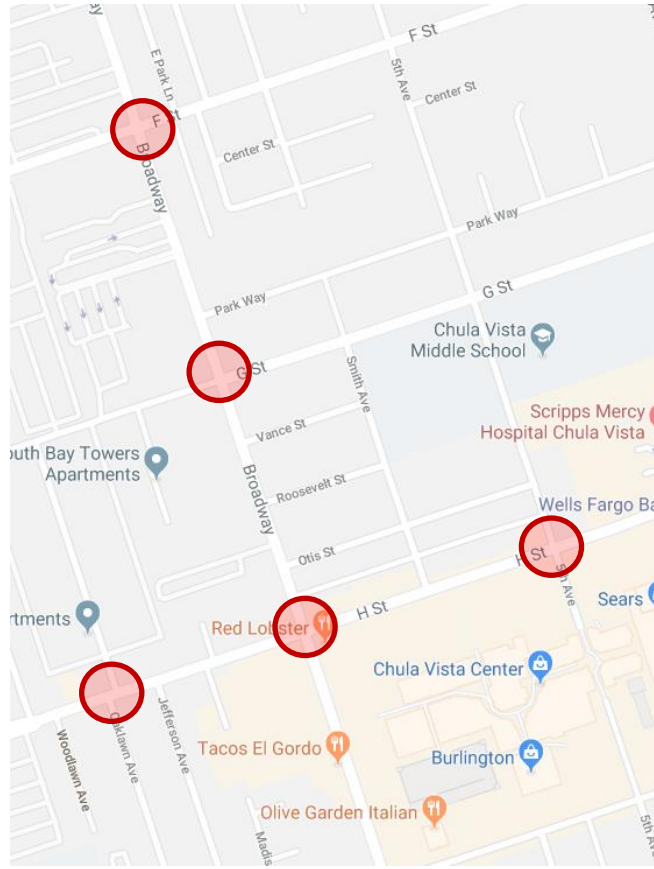
Figure 1 Selected intersection locations in the city of Chula Vista

The project team will adopt two approaches to develop the ITMC: (1) a centralized system that collects data from all intersections and transfers data to a central location at SDSU. Data analyses will be conducted in the central location; (2) a distributed system that provides the capability to each individual intersection for analyzing data in situ. This approach deals with big data problem by assigning data analysis tasks to individual intersection infrastructure instead of transferring large video files to a central location, which is costly especially in a large road network. The team will design, implement, and fabricate in situ field-programmable gate array (FPGA)-based inferencing systems that can be placed at selected intersections to perform real-time, local object detection and classification, which will contribute to safety surrogate measure analysis. The two approaches will be compared to identify advantages and disadvantages. In addition, a video wall will be built in the SDSU Smart Transportation Analytics Research (STAR) lab for reviewing video streams and data visualization.