City of Phoenix Passive Detection Technology for Bikes, Pedestrians and Motorists- Overview and Project Description

Project Description

There are two components to the proposed project. Each is described in detail below.

Component 1: Passive Detection for Bikes and Pedestrians, Grand Canal

The City of Phoenix, in partnership with the University of Arizona, Maricopa Association of Governments (MAG), and business partner Iteris, proposes the implementation of passive pedestrian, bicycle, and motorist detection technology at 10 locations on a portion of the Grand Canal in central Phoenix. Each of these locations currently have high intensity activated crosswalks (HAWKs) installed that will be upgraded to include passive detection. HAWK beacons, as approved by the Federal Highway Administration in 2009, are an excellent tool which facilitate safer and easier passage opportunities for users of all modes. Unlike traditional traffic signals, HAWK beacons only operate once their crossing button has been activated by a pedestrian or cyclist. Once activated, the beacons begin a yellow-red-flashing red sequence to alert motorists of a pedestrian or cyclist who has requested a crossing phase.

Component 2: Passive Detection for Vehicles Using Connected Vehicle Technology, Grand Canal

The City of Phoenix, in partnership with the University of Arizona, Maricopa Association of Governments (MAG), and business partner NoTraffic proposes to install advanced video detection cameras installed at up to 20 intersections to collect traffic videos, run appropriate algorithms, extract traffic counts, and push all data to NoTraffic's cloud-based software. The software will optimize traffic signal operations and provide detailed traffic signal performance measures such as red-light running events, speed data, and real-time alerts.

Transportation Problems to be Addressed

The Arizona Department of Transportation has shown that the traffic related incident and fatality crisis has only continued to grow in recent years. Per their most recent annual report, overall crashes have increased by over 22% in the last year, and fatalities by over 11%. Traffic incident fatalities are currently the number one cause of death for people 54 and younger in the United States.

To better position Phoenix, Arizona as a global competitor on the smart cities stage, the City has proposed upgrades to the existing HAWK beacon technology to augment active detection with passive. This innovative detection strategy has demonstrated the ability to improve safety and provides equitable access to mobility, and better overall integration of traffic systems. Additionally, as a result of the COVID-19 pandemic, pedestrians have become more reluctant to activate push-button systems to request crossing calls. In addition to bypassing this dangerous trend, proper passive detection provides the opportunity to reallocate unused time from other signal phases.

Desired Outcomes for Phase 2 Grant

The long-term vision for these projects is to provide a new standard that will be replicable for the city's remaining 73 of HAWK signals. The desired outcome is not only a reduction in pedestrian and cyclist accidents, but a more reliable experience for those travelers along the corridor. Integration of these technologies in the future with connected vehicles will enhance communication with the intersections optimizing signal timing and improving safety.

On a larger scale, these improvements will provide a better-connected system of intersections. Once tested along the Grand Canal, other pedestrian crossings controlled by HAWKS can benefit from the upgrades. In partnering with MAG (see Appendix III, Letters of Commitment), the City is ensuring that more entities in the region will benefit from this technology and the lessons learned through this pilot application. Partnering with MAG (the regional planning agency for the metropolitan Phoenix area which includes 27 jurisdictions and 3 Native American Nations) provides historically disadvantaged and low-income communities in the region access to these technologies. Ultimately, the information gleaned from this effort can assist other jurisdictions around the country with their implementation of these technologies

Project Location

Phoenix, Arizona is the nation's fifth largest city, encompassing an area of over 500 square miles and housing over 1.6 million people. The projects each involve upgrading HAWK beacons located along the western end of the Grand Canal in Phoenix; the portion of this trail that overlaps with a high number of Census tracts that have been designated as historically disadvantaged. This twelve-mile multi-use recreational trail system serves as a key transportation corridor which provides a unique opportunity for users to safely walk, run, or cycle along a dedicated pathway. Notably, the corridor intersects with other key transportation corridors and modes in the Phoenix area, such as fixed-route and demand-responsive public transportation services.

The HAWK signal locations chosen for these projects were selected based on a combination of criteria. These are the most recently implemented signals, so the new technology will provide the most efficient interface. Their location along the Grand Canal provides an excellent opportunity to better serve populations which rely on public transportation services.

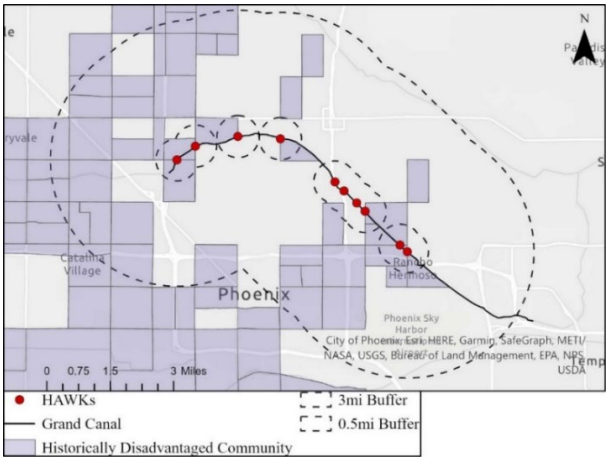


Figure 1: Map of Project Location

Community Impact

The area around the identified HAWKs intersects with historically disadvantaged communities as identified in Figure 1. This figure shows half-mile and three-mile radius buffers of the crossings. The half mile buffer was used for walking distance, and the three-mile buffer was used for cycling.

Potential negative externalities could include an increase to mid-block crossing requests, done by the passive detection system, effectively increasing travel time for vehicles in the area. This might be mitigated however by the optimization of the HAWKs via the same technology. Crossing requests followed by the pedestrian taking a risk and crossing during a natural gap in traffic would be minimized, meaning that unnecessary crossing cycles would be eliminated.

Technical Merit Overview

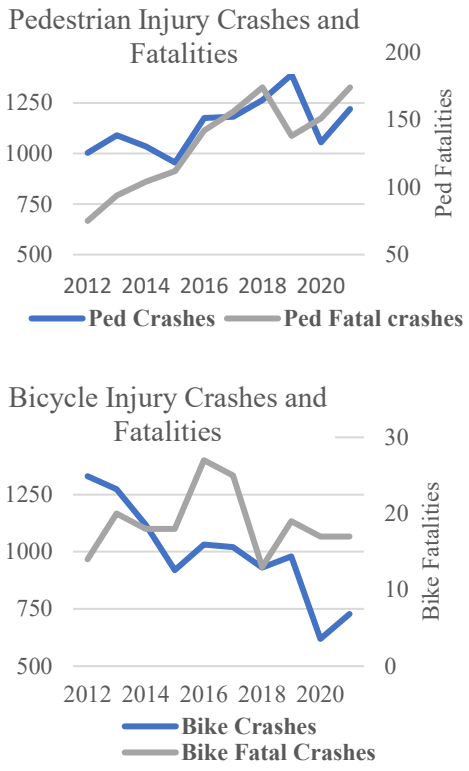
Identification and Understanding of the Problem to be Solved

Bicycle and pedestrian crashes continue to **claim more than 150 lives each year** in the Maricopa region, and pedestrian involved crashes have steadily risen with increases in both injuries and fatalities. According to MAG, pedestrian fatalities have increased by 132 percent from 2012 to 2021. In 2021, **one third of all traffic fatalities** in the MAG region were pedestrians or people riding a bicycle. In the past 5 years ending in 2020, there have been 54 bicycle and pedestrian crashes at the crossings proposed for improvements.

The National Highway Traffic Safety Administration has consistently ranked Phoenix in the top 3 cities in the nation for overall traffic fatalities. In 2021, the City had 231 roadway fatalities: its highest level ever – a 25 percent increase from the 185 fatalities in 2020.

The Phoenix City Council adopted the Vision Zero Road Safety Action Plan September 7, 2022, in response to the increase in crashes (consistent with trends seen across the nation). Vision Zero is built around a core philosophy that traffic-related deaths and serious injuries are preventable.

Figure 2: Key Safety Measures in City of Phoenix



Source: MAG (2021), Fatalities & Injuries Data and Regional Bicycle Safety Analysis. (https://azmag.gov/Programs/Transportation/Safety-Programs/See-Me-AZ)

Appropriateness of Proposed Solution

Against this trend, the City and region are promoting increased active transportation use, with new multimodal facilities. The 'Grand Canalscape' Project represents the first phase of the larger trail and crossing project which will ultimately result in a contiguous trail along the Grand Canal between Glendale and Tempe (communities bordering Phoenix to the west and east, respectively). The Grand

Canalscape Project adds a safe route for bicycle and pedestrian traffic along the Grand Canal bank that includes crossings facilities at the major streets.

Key to the success of this system are the HAWK signals, developed to facilitate safe crossings of the arterial street network where they intersect the Grand Canalscape Project. However, with the advent of Covid-19 and concerns with 'touch', it was observed that the signals were not being activated for safe pedestrian crossing. In addition, in Arizona's summer heat (over 100 days when the weather tops 100°F and an average of 20+ days a year of 110°F weather), pedestrians and cyclists will often take their chances with traffic as opposed to waiting for a safe-crossing cycle.

Passive detection of pedestrians and bikes at HAWK crossings in Phoenix is one of the technologies the City and MAG have evaluated as part of MAG's '*Emerging Technologies Pilot'*. This pilot project demonstrated that both the new timing scheme and advanced detection technology are effective in reducing pedestrian delay by 48 percent.

Expected Benefits

The Grand Canal Passive Detection Pilot Project for Bikes, Pedestrians, and Vehicles addresses many of the DOT's Strategic Goals and Innovation Principles and Program Priorities:

- **Safety**: passive detection of bikes and pedestrians will result in greater compliance with signals and safer crossing conditions. Passive detection will improve outcomes by customizing the signal cycle to each crossing. Video detection also improves safety for vulnerable populations, by extending crossing time when needed for elderly or disabled pedestrians.
- **Reliability and resiliency**; the technology has been demonstrated to work with existing signal controllers and is replicable and scalable.
- **Equity and access**; the technology is being piloted in a minority and low-income area, connecting, and expanding access for underserved or disadvantaged populations that are often denied access to the rewards of technological improvements. The Grand Canal is a good transportation investment due to its central location, connection to the region's transit "spine" and high traffic arterials.
- **Climate**: by fostering active transportation, the project reduces reliance on vehicular travel, potentially reducing the vehicle miles traveled in the region. In addition, the improved efficiency of arterial street operation reduces congestion.
- **Partnerships**: collaborating with MAG and the University of Arizona strengthens partnerships that are necessary for objective evaluation to help refine this proven approach to safety and efficiency. Larry Head, University of Arizona, and project leaders at the City and MAG have worked together with ITERIS previously to deliver successful pilot studies.
- **Integration**: the proposed solution represents a demonstrable improvement over status quo - the innovation results in a 48 percent reduction in pedestrian delay and is readily adapted to existing controllers and equipment.

Project Readiness Overview

Feasibility of Work Plan

There are two components to the proposed project. Following is a description of the tasks associated with each.

Component 1 Scope of Work: Passive Detection for Bicyclists and Pedestrians

- Advanced detection cameras will be procured and installed on signal mast arms on both directions of mainlines street for vehicle detections
- No-contact push buttons will be procured and installed on the pedestrian push button or signal poles close to the ramps serving and facilitating the crossing the pedestrians and bicyclists at HAWK locations. Appropriate signage will be installed for public information and awareness so that they can use no-contact push buttons to request crossing phase.
- Video detection cameras facing towards ramps and crosswalks will be procured and installed on the signal and luminaire mast arms (as appropriate) to ensure coverage on the ramps as well as the crosswalk for passive pedestrian and bicyclist detections on both ramp areas as well as crosswalks.
- Roadside Units (RSUs) will be procured and installed at the HAWK locations to be able to detect certain applications in roadway users mobile phone devices. The University of Arizona (UA) team will support the COP team by developing the geofencing program which will be installed into the RSUs to detect pedestrians and bicyclists near ramp area.
- A total of 10 HAWK locations are identified in census tracts designated as Historically Disadvantaged along the Grand Canal. These provide safe accessibilities to the community as well as encourage more active transportation activities. A performance evaluation study and report will be produced to track the pedestrian and vehicular delay while the equipment is installed, and all features are enabled. Additionally, the increase in number of pedestrian and bicyclists as an outcome of this project will be tracked.
- COP will procure a contractor for the purchase and installation of the equipment. Administrative personnel from the city will lead this effort while the contactor will perform the construction/installation activities. The COP IT personnel will work with the technology provider and contractor and provide access through the city firewall. This will ensure the connectivity and access to the City network and smooth flow of data which will ultimately enable the city to get the full benefit of the technologies.

Component 2 Scope of Work: Passive Detection for Vehicles Using Connected Vehicle Technology

- Video cameras which are capable of collecting traffic videos, running appropriate algorithms, and extracting traffic counts and pushing the data to NoTraffic compatible clould-based software will be procured and installed at each intersection. It is assumed that four cameras will be required at four approaches to collect traffic data.
- NoTraffic Adaptive system which is a cloud-based software will be procured. The COP IT personnel will work with the technology provider and contractor to ensure that the City can access the cloud-based software. This will ensure the connectivity and access to the City network and smooth flow of data which will ultimately enable the city to get the full benefit of the technologies.

- A total of 20 intersections are assumed to be integrated in this project to enable the adaptive system.
- COP will procure a contractor for the purchase and installation of the equipment. Administrative personnel from the city will lead this effort while the contactor will perform the construction/installation activities.
- The University of Arizona (UA) team will support the COP team with the evaluation of the technology. A series of performance indicators will be developed with at least travel time reductions, pedestrian and cyclist accident reductions and speed enhancement in the list. The team will track and report the performance of the grid with the NoTraffic adaptive technology running on it.

Legal, policy, and regulatory requirements

There are no legal, policy or regulatory requirements that must be met on the local, regional, or state level for these proposed projects.

Required Exemptions, Waivers, Permits, or Special Permissions to Conduct Project

The City of Phoenix intends to partner with two key vendors in order to test the related technology with one another. In the event of a grant award, the City will submit a Public Interest Findings letter to the USDOT that will include the following justification. All vendors have provided a letter of commitment that may be found in Appendix III.

NoTraffic

The City of Phoenix has an existing NoTraffic demonstration on Glendale Avenue from Central Avenue to SR-51 that will be expanded in order to evaluate the technology in a grid setting. There are features available in the existing system that were not evaluated as part of the original pilot. This project will evaluate the additional features at all intersections.

Iteris

The City of Phoenix concluded a research project with multiple vendors to use technology to reduce pedestrian and vehicular delay at High-intensity Activated Cross Walks (HAWKs) at 5 locations. The research concluded that the Iteris detection system provided the best results. This grant will further evaluate 10 additional intersections utilizing the Iteris detection system.

Performance Metrics

The primary overall goals of the proposed projects are to reduce pedestrian and vehicular delay as well as increase pedestrian-vehicular safety. The initial performance measures will be developed upon the start of the pilot. Key focus areas include: 1) Reduction in pedestrian and cyclist delay at 10-HAWK intersection along Grand Canal, 2) Maintenance or reduction in vehicular delay and travel times at proposed intersections along the Grand Canal, and 3) Improve traffic signal operations and safety at the 20 locations within the vicinity of the Glendale Avenue corridor and the State Route 51 interchange.

Development of Workforce Training

It is not anticipated that workforce training initiatives will be a part of the Phase 1 project.

Community engagement and partnerships

Reflects community-centered approach

The City of Phoenix recently undertook a widespread community outreach effort in support of the Road Safety Action Plan[1] (RSAP). Over 2,500 Phoenix residents provided input. Testing the combination of HAWK and connected vehicle technology at intersections regularly used by the region's most vulnerable populations is in direct response to the needs defined by the RSAP. Due to the lack of contact necessary with the signals, these technologies will assist persons with disabilities as well as those with limited English proficiency to better navigate the canal crossings and adjacent intersections.

The City of Phoenix is committed to understanding the impacts of the proposed projects. Prior to the project's implementation, the City will host a series of educational workshops informing citizens on how to use the technology. Additionally, the City will conduct both "before" and "after" community surveys to understand the users, their understanding of the system, and any benefits or drawbacks experienced as a result of the project.

Build and Maintain Sustainable Partnerships Across Sectors and Jurisdictions, Key Partners

The City, in conjunction with the Maricopa Association of Governments and in partnership with the University of Arizona, have brought together the vendors of the cutting edge, passive detection technology, with the best researchers in the country to implement the proposed projects. This team has worked together for years on similar projects throughout the region.

Leadership and Qualifications

Our team of international connected vehicle and passive detection expertise are committed to the proposed project and will remain a part of the team through both the Phase 1 pilot and Phase 2 implementation of the project. Our team will be led by Simon Ramos, an ITS expert with the City of Phoenix. Simon will work closely with Dr. Larry Head of the University of Arizona, Iteris and NoTraffic to organize and carry out the field research and pilot project. Results will be reviewed by Vladimir Livshits with the Maricopa Association of Governments as well as additional City of Phoenix staff specializing in bike, pedestrian, and connected vehicle operations. Bios for this team are included in Appendix I.

Benefits to Historically Disadvantaged Communities

The proposed project and location of HAWK signals and connected vehicle technologies was chosen to benefit Historically Disadvantaged Communities. Every signal location and intersection lie within a half-mile walk of a census tract designated as Historically Disadvantaged. Additionally, census data indicates that, within a one-mile radius of the Grand Canal, those who depend on a walk or bike path to commute to work is double the percentage of the region as a whole: 4.0% versus 1.6% regionally. Within the same radius, individuals living below the poverty level is also more than double the percentage regionally: 33% versus 16.7% regionally.[2]

[1] Street Transportation Road Safety Action Plan (phoenix.gov)

[2] Source: 2009-2013 American Community Survey 5-Year Estimates.

Appendix I: Bios of Key Staff

Simon Ramos, P.E.| Field Services Superintendent
City of Phoenix, Street Transportation Department

Licensed Professional Engineer with strong background in transportation/traffic engineering, traffic operations, traffic maintenance, intelligent transportation systems (ITS), and electronics engineering technology. strong project management skills as well as providing technical support and guidance on these topics throughout Arizona.

Relevant Expertise: Oversee the design and operations of traffic signals, traffic signal, ITS, and related traffic management activities. Represents the City of Phoenix on regional committees. Project Manager of ITS projects and research.

EDUCATION:
University of Arizona

B.S. Civil Engineering

ITT Technical Institute (1999) Associate's Degree in Electronics Engineering

Professional Engineer (PE) License # 59592 Arizona 2015

Marielle Brown| Active Transportation Program Manager
City of Phoenix, Street Transportation Department

Manages the City's Active Transportation Program, including prioritizing tasks, overseeing the program's budget and staff. Managed projects, including setting priorities and timelines, coordinating public outreach, presenting at public meetings, and managing consultants.

Relevant Expertise: Lead the planning process to update the City's Comprehensive Bicycle Master Plan with a city-wide, public-facing Active Transportation Plan. As Director of Policy and Strategy with St. Louis' *Trailnet*, led the public campaign to guide the development of a vision and priorities for the program. At St. Louis planning department responsible for staff and managing federal grant requirements, budgeting, and timelines.

EDUCATION:

Portland State University Portland, Oregon

Master of Urban and Regional Planning, Concentration in Transportation

Bachelor of Arts, Sociology

Reed Henry, P.E.| Roadway Safety Engineer
City of Phoenix, Street Transportation Department

Licensed Professional Engineer with strong background in Transportation/Traffic Engineering and Safety.

Relevant Expertise: Responsible for the development and implementation of the City's Road Safety Action Plan.
Former Deputy State Roadway Engineer with the Arizona Department of Transportation (ADOT), responsible for managing the Roadway

EDUCATION:

University of Arizona

B.S. Civil Engineering

University of Phoenix

MBA

Standards Section, Pavement Design Section and Predesign Section. Former State Safety Engineer with ADOT responsible for the identification, programming, and design of traffic safety projects.	
Vladimir Livshits, P.E.| Director of Transportation Technologies and Services Maricopa Association of Governments Licensed Professional Engineer with strong background in Transportation/Traffic Engineering, Traffic Operations, Traffic Maintenance, Intelligent Transportation Systems (ITS), and Electronics Engineering Technology (EET). Strong project management skills as well as providing technical support and guidance throughout AZ. Relevant Expertise:	**EDUCATION:**
Bruce Littleton, P.E.| Deputy Street Transportation Director City of Phoenix, Street Transportation Department 47 years of traffic engineering experience with 22 years at management level in all facets of traffic engineering. This includes all traffic control devices, signs, signals, and pavement markings, and all aspects from traffic engineering design to construction and maintenance. ITS initiatives have included participating in the development of the Phoenix ITS Strategic Plan. Knowledgeable of the MUTCD, participating for numerous years on the National Committee for Uniform Traffic Control Devices as a member of the Signals Technical Subcommittee. **Relevant Expertise:** Deputy Director of Traffic Services Division, I commit the resources of the Division that includes the Signal Shop responsible for the construction and maintenance of all active traffic signal and ITS devices, and the Advanced Traffic Management System.	**EDUCATION:** **Bates College, Lewiston, ME Mathematics** **Arizona PE #54530 PTOE**
Dr. Larry Head | Professor of Systems and Industrial Engineering University of Arizona Larry Head is a Professor of Systems and Industrial Engineering at the University of Arizona. He has over 30 years of academic and industry experience related to systems engineering, engineering management, adaptive traffic signal control and signal priority, and connected and automated vehicle systems. He currently serves on the Arizona Governor's Task Force for Self -Driving Vehicles, is a member of the Transportation Research Board (TRB) Traffic Signal Systems Committee and the Intelligent Transportation Systems Committee.	**EDUCATION:** **University of Arizona** **Ph.D. Systems and Industrial Engineering** **M.S. Systems Engineering** B.S. Systems Engineering

Appendix II: Budget Narrative

Following are brief descriptions of the project costs, classified by Cost Categories:

Administrative and Legal Expenses:
Total: $393,000
The city requires 30% of total federal funds for contract administration which includes coordination on finance, managing contractor and vendor personnel and their performance, project schedule, handling invoicing, reviewing compliances, as well as internal coordination among different parties in the city that are involved with the project.

Architectural and Engineering Fees:
Total: $100,000
University of Arizona (UA) and City of Phoenix have a master agreement in place to enable UA assist City of Phoenix with these projects using SMART Grant support. The architectural and engineering fees includes developing geofencing software application which would detection presence of pedestrians and bicyclists near HAWK push button areas and put call for crossings. The services also include working with the technology vendors, obtaining and accessing the platform, collecting, and analyzing data related to bicyclists, pedestrians, and vehicles counts, signal timing, travel time, number of stops, emissions, fuel consumptions, and overall performance of the technologies in full filling the expectations in enhancing safety and mobility. The team will also prepare reports documenting the study methodology, raw data, and findings.

Construction Cost:
Total: $242,000
The city is planning on procuring the construction services from a contractor using either an existing contract mechanism (i.e., Job order contract (JOC)) or through a new contract (i.e., standalone contract for these two sub projects only). The construction services would include but not limited to purchasing the proposed equipment from the vendors, installation of the equipment on signal mast arms, signal poles, luminaire mast arms, controller cabinet, and system integrations, as appropriate to enable the equipment functional.

Equipment:
Total: $968,000
Two sub projects are identified under this project/SMART Grant: enhancing HAWK efficiency with the application of connected vehicle, advanced vehicle detection and passive pedestrian detection; and virtual traffic management center (TMC), and adaptive traffic signal system on arterial corridor. The following equipment is planned to be procured:

- advanced vehicle video detection system
- video detection system for crosswalks
- video detection system for ramp area
- roadside unit (RSU) for pedestrian and vehicle detections
- on board Unit (OBU) for emergency vehicles
- no contact pedestrian push buttons
- software platform to process the data
- virtual TMC

- communication system to bring local signal data to cloud-based platform
- necessary miscellaneous equipment to attach the equipment with existing infrastructure such as signal mast arms, signal poles, luminaire mast arms, and controller cabinet
- necessary software add-ons to enable the system working

Contingencies:
Total: $262,000
20% contingency is assumed on the total cost of the equipment and construction. This amount will serve as a cushion to accommodate any uncertainties in terms of increased equipment costs or service cost for installations and overall constructions.

Figure 3: Project Budget, SF-424

APPLICANT'S NAME__CITY OF PHOENIX_____			
			OMB Approval No
BUDGET INFORMATION - Construction Programs			
NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case, you will be notified.			
COST CLASSIFICATION	a. Total Cost	b. Costs Not Allowable for Participation	c. Total Allowable Costs (Columns a-b)
1 Administrative and legal expenses	$393,000.00	$0.00	$393,000.00
2 Land, structures, rights-of-way, appraisals, etc.	$0.00	$0.00	$0.00
3 Relocation expenses and payments	$0.00	$0.00	$0.00
4 Architectural and engineering fees	$100,000.00	$0.00	$100,000.00
5 Other architectural and engineering fees	$0.00	$0.00	$0.00
6 Project inspection fees	$0.00	$0.00	$0.00
7 Site work	$0.00	$0.00	$0.00
8 Demolition and removal	$0.00	$0.00	$0.00
9 Construction	$242,000.00	$0.00	$242,000.00
10 Equipment	$968,000.00	$0.00	$968,000.00
11 Miscellaneous	$0.00	$0.00	$0.00
12 SUBTOTAL	$1,703,000.00	$0.00	$1,703,000.00
13 Contingencies	$262,000.00	$0.00	$262,000.00
14 SUBTOTAL	$1,965,000.00	$0.00	$1,965,000.00
15 Project (program) income	$0.00	$0.00	$0.00
16 TOTAL PROJECT COSTS (*subtract #15 from #14)*	$1,965,000.00	$0.00	$1,965,000.00
FEDERAL FUNDING			
17 Federal assistance requested, calculated as follows: (Consult Federal agency for Federal percentage share.) Enter the resulting Federal share.	Enter eligible costs from line 16c Multiply X _100_%		$1,965,000.00

Appendix III: Letters of Commitment

SYSTEMS AND INDUSTRIAL ENGIENERING
Engineering Building #20
1127 E James E Rogers Way
PO Box 210020
Tucson, AZ 85721-0020

Ofc: 520-621-2264
Fax: 520-621-6555

http://sie.arizona.edu/k-larry-head

THE UNIVERSITY OF ARIZONA
College of Engineering

November 15, 2022

K. Larry Head, Ph.D.
University Of Arizona
Tucson, Arizona 85721

November 18, 2022

Dear Secretary Buttigieg,

I am writing on behalf of the University of Arizona, Department of Systems and Industrial Engineering, which is recognized internationally for our contributions to the interdisciplinary design of large-scale complex systems involving people, technology and information. We are looking forward to working with the City of Phoenix on the U.S. Department of Transportation SMART Grant application, *Grand Canal Passive Detection Pilot Project for Bikes, Pedestrians, and Vehicles*, if this project is selected for funding.

To support the project and its partners, this letter represents the University of Arizona's willingness to participate in and negotiate a contract with the City of Phoenix to provide technical assistance and research collaboration to bolster the City of Phoenix's Vision Zero approach to improve safety for all users of Phoenix's roadways.

Leading this effort is Larry Head, professor and Director of the Craig M Berge Engineering Design Program. Dr. Head's research and applied engineering focus on those areas central to this pilot project: intelligent systems, connected vehicles, urban traffic operations, transportation modeling, and Intelligent Transportation Systems.

The University of Arizona is interested in evaluating passive detection technologies for detection of pedestrians, bicycles, and motor vehicles at HAWK pedestrian crossings and in the evaluation of the NoTraffic adaptive traffic signal system that the city plans on deploying on a cooridor of 20 traffic signals.

Our common interest in this area is new, specific, and measurable in the following ways:

- The University is involved in research and application of technologies that support the City of Phoenix's goal of engineering strategies to reduce fatal and serious injury crashes, based on focus areas and targeted locations.

SYSTEMS AND INDUSTRIAL ENGIENERING
Engineering Building #20
1127 E James E Rogers Way
PO Box 210020
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http://sie.arizona.edu/k-larry-head

THE UNIVERSITY OF ARIZONA
College of Engineering

- The University's applied research in the area of pedestrian detection and connected vehicles aligns with the City of Phoenix's goal of identifying safety-focused strategies to address pedestrian and bicycle safety.

- Engaging the University of Arizona in this pilot project advances the applied research efforts of the University in a practical way that benefits the City of Phoenix by supporting their efforts to improve roadway safety.

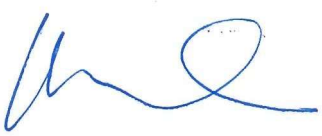
- This approach leverages the University's knowledge and experience to address road safety. Building partnerships between the University and the City through these types of projects supports the transfer of innovation developed at the University to the direct benefit of the residents of Phoenix.

- These types of project offers the University the opportunity to apply their research and proven innovations to real-world problems.

- Working with the University allows for the public and transparent evaluation of this pilot project to demonstrate benefits that are transferrable to other municipalities focused on improving safety.

- This type of project will be useful to transportation engineers, planners, and safety professionals who are involved in improving pedestrian safety and mobility in the City as well as the entire metropolitan Phoenix area.

In conclusion, the University of Arizona, Department of Systems and Industrial Engineering involvement in this USDOT SMART Pilot project will provide an opportunity to document and present real world data on the applicability of this passive pedestrian, bicycle, and motorist detection technology to improve roadway safety and efficiency for all users.
Sincerely,



K. Larry Head, Ph.D.
Professor, Department of Systems and Industrial Engineering

MARICOPA ASSOCIATION of GOVERNMENTS

302 N. First Avenue, Suite 300 ▲ Phoenix, Arizona 85003
602-254-6300 ▲ mag@azmag.gov ▲ azmag.gov

November 17, 2022

The Honorable Pete Buttigieg
Secretary
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

Dear Secretary Buttigieg:

I am writing in support of the City of Phoenix SMART Grant application project: "Grand Canal Passive Detection Pilot Project for Bikes, Pedestrians, and Vehicles". The Maricopa Association of Governments (MAG) provides forum for local governments in the greater Phoenix region. MAG conducts regional planning and makes policy decisions in several core areas, including safe and smart travel.

MAG is a regional data hub and routinely acquires, collects, analyzes, and applies for planning, design, and operation purposes various transportation data. The project scope builds on successful technology pilots that MAG conducted in close partnership with MAG member agencies, including the City of Phoenix. We commit to supporting the project development by sharing experiences from the relevant technology pilots; supporting project data analysis; providing technical and methodological input during the project.

This commitment is new, specific, and measurable in the following ways:

- Relevant – MAG has extensive experience with passive data collection, crowdsourced and connected data acquisition and analysis, computer vision technologies and machine learning as applicable for transportation applications.
- Public – We are committed to collaboration and sharing information from this project.
- High Impact – MAG conducted technology pilots aimed at collecting and analyzing multimodal data for transportation safety and mobility applications.

In conclusion, MAG supports the City of Phoenix proposal and commits to being a part of the project team should the grant be awarded.

Sincerely,

Eric J. Anderson
Executive Director
Maricopa Association of Governments

iteris®

949.270.9400
iteris.com

1700 Carnegie Avenue, Suite 100
Santa Ana, CA 92705

11/16/2022

Secretary, Pete Buttigieg
U.S. Secretary of Transportation
U.S. Department of Transportation
1200 New Jersey Avenue, SE
Washington, DC 20590

Re: Grand Canal Passive Detection Pilot Project for Bikes, Pedestrians, and Vehicles with City of Phoenix

Dear Secretary Buttigieg,

I am writing on behalf of Iteris, Inc., a pioneer and leader in smart mobility, providing industry-leading technologies and services that help cities, states and commercial enterprises make mobility safe, efficient, and sustainable for everyone. Iteris combines leading software, hardware and services on a platform that is built to enable the future of smarter and better-connected transportation. We commit to working with the City of Phoenix on the U.S. Department of Transportation SMART Grant application, *Grand Canal Passive Detection Pilot Project for Bikes, Pedestrians, and Vehicles.*

To support the project and its partners, Iteris, Inc. commits to supporting the City of Phoenix's Vision Zero approach to improve safety for all users of Phoenix's roadways by offering (for purchase) the technology and technical support for the passive detection system proposed in the SMART Grant application.

In conclusion, the City of Phoenix's involvement in this USDOT SMART Pilot project will provide an opportunity to document and present real world data on the applicability of this passive pedestrian, bicycle, and motorist detection technology to improve roadway safety and efficiency for all users.

Sincerely,

Carly Randazzo

Carly Randazzo
Western Regional Sales Director
Roadway Sensor

November 17, 2022

Secretary Pete Buttigieg, U.S. Secretary of Transportation
U.S. Department of Transportation
1200 New Jersey Ave, SE
Washington, DC 20590

Dear Secretary Buttigieg:

I am writing to support the City of Phoenix's SMART Grant application for the *Grand Canal Passive Detection Pilot Project for Bikes, Pedestrians, and Vehicles*. This project will improve safety and promote equitable access for workers, students, and recreational users of the regional canal path system within the City of Phoenix. By using this technology solution, integrating the canal path infrastructure with the street system in a safe manner will not only advance the City's safety commitment to Vision Zero, but it will also reduce traffic congestion and emissions at the intersections. Additionally, the City of Phoenix and NoTraffic have a close and effective partnership developed over the last 4 years while working on another high-impact project in conjunction with the Maricopa Association of Governments using NoTraffic technology to autonomously optimize traffic flow on a major commuter corridor.

I have had the pleasure of working with the City of Phoenix as a former Director of the Arizona Department of Transportation, as a former Deputy Secretary of the United States Department of Transportation, and in my current role as an Advisory Board member of NoTraffic. The City is recognized regionally and nationally as a transportation innovation leader and is an ideal candidate to bring real change in roadway safety and traffic operations by leveraging the latest innovations in traffic management and multi-modal roadway detection technologies such as those developed by NoTraffic.

NoTraffic U.S. Inc. is a pioneer and leader in connected mobility, providing industry-leading technologies and services that enable cities, states, and commercial enterprises to make mobility safe, equitable, and sustainable for everyone. NoTraffic provides a turnkey traffic management platform that was built to enable the future of smarter and connected transportation, all while solving the traffic challenges of today.

To ensure the success of the project and its partners, NoTraffic commits to supporting the City of Phoenix's Vision Zero approach to improve safety for all Phoenix roadway users, including buses, cars, pedestrians, and bicycles, by providing the technology and technical support for the passive detection system proposed in the SMART Grant application.

In conclusion, the City of Phoenix's involvement in this USDOT SMART Pilot project will provide an opportunity to document and present real-world data on the applicability of these transportation technologies to improve roadway safety, access, and efficiency for all users.

Sincerely,

Victor Mendez
Advisory Board Member
NoTraffic U.S. Inc.