

**SPONSOR: St. Charles County**

**PROJECT DESCRIPTION: Preparing Local Governments for Automated Driving Systems –  
Implementing Work Zone Data Exchange in St. Charles County, Missouri**

**PROJECT NUMBER: ITS-9901(665)**

*THIS CONTRACT* is between St. Charles County, Missouri, hereinafter referred to as the "Local Agency", and The Curators of the University of Missouri, hereinafter referred to as the "University"

*INASMUCH* as funds have been made available by the Federal Highway Administration through its allocated Work Zone Data Exchange Demonstration discretionary grant program funds, coordinated through the Missouri Department of Transportation, the Local Agency intends to collect work zone data, design and deploy web and mobile applications for real-time work zone activity, data, and information, and requires professional engineering services. The University will provide the Local Agency with professional services hereinafter detailed for implementation of the work zone data sharing project and the Local Agency will, subject to actual receipt of the funds from FHWA and/or MoDOT that have been made available, pay the University as provided in this contract. It is mutually agreed as follows:

#### **ARTICLE I – SCOPE OF SERVICES**

University of Missouri Statement of Work and CBB Statement of Work in attachment A.

#### **ARTICLE II - DISADVANTAGED BUSINESS ENTERPRISE (DBE) REQUIREMENTS:**

- A. DBE Goal: The following DBE goal has been established for this Agreement. The dollar value of services and related equipment, supplies, and materials used in furtherance thereof which is credited toward this goal will be based on the amount actually paid to DBE firms. The goal for the percentage of services to be awarded to DBE firms is 0 % of the total Agreement dollar value.
- B. DBE Participation Obtained by University: The University has obtained DBE participation, and agrees to use DBE firms to complete, 0 % of the total services to be performed under this Agreement, by dollar value. The DBE firms which the University shall use, and the type and dollar value of the services each DBE will perform, is as follows:

#### **ARTICLE III-ADDITIONAL SERVICES**

The Local Agency reserves the right to request additional work, and changed or unforeseen conditions may require changes and work beyond the scope of this contract. In this event, a supplement to this agreement shall be executed and submitted for the approval of MoDOT prior to performing the additional or changed work or incurring any additional cost thereof. Any change in compensation will be covered in the supplement.

#### **ARTICLE IV - RESPONSIBILITIES OF LOCAL AGENCY**

The Local Agency will cooperate fully with the University in the delivery of the services, including the following:

- A. make available all information pertaining to the project which may be in the possession of the Local Agency;
- B. provide the University with the Local Agency's requirements for the project;
- C. make provisions for the University to enter upon property at the project site for the performance of its duties;
- D. examine all studies and layouts developed by the University, obtain reviews by MoDOT, and render decisions thereon in a prompt manner so as not to delay the University;
- E. designate a Local Agency's employee to act as Local Agency's Person in Responsible Charge under this contract, such person shall have authority to transmit instructions, interpret the Local Agency's policies and render decisions with respect to matters covered by this agreement (see EPG 136.3).
- F. perform appraisals and appraisal review, negotiate with property owners and otherwise provide all services in connection with acquiring of all right-of-way needed to construct this project.

#### **ARTICLE V - PERIOD OF SERVICE**

The University will commence work within two weeks after receiving notice to proceed from the Local Agency. The general phases of work will be completed in accordance with the following schedule:

- A. Work Zone Data Exchange platform implementation shall be completed and approved by MoDOT by September 30, 2022

The Local Agency will grant time extensions for delays due to unforeseen causes beyond the control of and without fault or negligence of the University. Requests for extensions of time shall be made in writing by the University, before that phase of work is scheduled to be completed, stating fully the events giving rise to the request and justification for the time extension requested.

#### **ARTICLE VI – STANDARDS**

The University shall be responsible for working with the Local Agency in determining the appropriate parameters and specifications for the project using good judgment based on the specific project needs, Local Agency needs, and guidance provided in the most current version MoDOT's Engineering Policy Guide (EPG) Local Public Agency (LPA) Policy (see EPG 136). If the project impacts the state

highway system then the latest version of MoDOT's EPG and Missouri Standard Specifications for Highway Construction shall be used (see EPG 136.7).

## **ARTICLE VII - COMPENSATION**

For services provided under this contract, the Local Agency will compensate the University as follows:

- A. The Local Agency will pay the University a maximum amount of \$148,105, with payments to be made in installments as set forth below.
- B. The total maximum compensation outlined above has been derived from estimates of cost which are detailed in Attachment B. Any major changes in work, extra work, or exceeding of the contract ceiling will require a supplement to this contract, as covered in Article III - ADDITIONAL SERVICES.
- C. Other cost directly attributable to the project but not included within the cost of the tasks such as software and computer time, plus project costs incurred by others on a subcontract basis, said costs to be passed through the University on the basis of reasonable and actual cost as invoiced by the subcontractors.
- D. The payment of costs under this contract will be limited to costs which are allowable under the Code of Federal Regulations (CFR) 23 CFR 172 and 48 CFR 31.
- E. **METHOD OF PAYMENT** - Partial payments for work satisfactorily completed will be made to the University upon receipt of itemized invoices by the Local Agency. Invoices will be submitted no more frequently than once every two weeks and must be submitted monthly for invoices greater than \$10,000. Upon receipt of the invoice and progress report, the Local Agency will, as soon as practical, but not later than 45 days from receipt, pay the University for the services rendered as reflected by the estimate of the portion of the services completed as shown by the progress report, less partial payments previously made. The payment will be subject to final audit of actual expenses during the period of the Agreement.
- F. **PROPERTY ACCOUNTABILITY** - If it becomes necessary to acquire any specialized equipment for the performance of this contract, appropriate credit will be given for any residual value of said equipment after completion of usage of the equipment.

## **ARTICLE VIII - COVENANT AGAINST CONTINGENT FEES**

The University warrants that it has not employed or retained any company or person, other than a bona fide employee working for the University, to solicit or secure this agreement, and that it has not paid or agreed to pay any company or person, other than a bona fide employee, any fee, commission, percentage, brokerage fee, gifts, or any other consideration, contingent upon or resulting from the award or making of this contract. For breach or violation of this warranty, the Local Agency shall have the right to annul this agreement without liability, or in its discretion to deduct from the contract price

or consideration, or otherwise recover, the full amount of such fee, commission, percentage, brokerage fee, gift, or contingent fee, plus reasonable attorney's fees.

#### **ARTICLE IX - SUBLETTING, ASSIGNMENT OR TRANSFER**

No portion of the work covered by this contract, except as provided herein, shall be sublet or transferred without the written consent of the Local Agency. The subletting of the work shall in no way relieve the University of its primary responsibility for the quality and performance of the work. It is the intention of the University to engage subcontractors for the purposes of:

<b>Sub-Consultant Name</b>	<b>Address</b>	<b>Services</b>
George L. Crawford & Assoc., Inc. d/b/a CBB	12400 Olive Blvd Ste. 430 St. Louis, MO 63141	Data Collection, Testing/ Verification, Performacne Reporting

#### **ARTICLE X - PROFESSIONAL ENDORSEMENT**

All plans, specifications and other documents shall be endorsed by the University and shall reflect the name of the University employee or sub-consultant employee endorsing the work. By signing the submittals the University will be representing to MoDOT that the project is meeting the intent of the federal aid programs.

#### **ARTICLE XI - RETENTION OF RECORDS**

The University shall maintain all records, survey notes, design documents, cost and accounting records, construction records and other records pertaining to this contract and to the project covered by this contract, for a period of not less than three years following final payment by FHWA. Said records shall be made available for inspection by authorized representatives of the Local Agency, MoDOT or the federal government during regular working hours at the University's place of business.

#### **ARTICLE XII - OWNERSHIP OF DOCUMENTS**

Plans, specifications, documents prepared and software purchased under this contract shall be delivered to and become the property of the Local Agency upon termination or completion of work. Basic notes, computations and other data prepared under this contract shall be made available to the Local Agency upon request. All such information produced under this contract shall be available for use by the Local Agency without restriction or limitation on its use. If the Local Agency incorporates any portion of the work into a project other than that for which it was performed, the Local Agency shall save the University harmless from any claims and liabilities resulting from such use.

#### **ARTICLE XIII – SUSPENSION OR TERMINATION OF AGREEMENT**

- A. The Local Agency may, without being in breach hereof, suspend or terminate the University's services under this Agreement, or any part of them, for cause or for the convenience of the Local Agency, upon giving to the University at least thirty (30) days' prior written notice of

the effective date thereof. The University shall not accelerate performance of services during the thirty (30) day period without the express written request of the Local Agency. University may terminate its services under this Agreement, for the convenience of University, upon giving to the Local Agency at least thirty (30) days' prior written notice of the effective date thereof.

- B. Should the Agreement be suspended or terminated for the convenience of the Local Agency, the Local Agency will pay to the University its costs as set forth in Attachment B including actual hours expended prior to such suspension or termination and direct costs as defined in this Agreement for services performed by the University, plus reasonable costs incurred by the University in suspending or terminating the services. The payment will make no other allowances for damages or anticipated fees or profits. In the event of a suspension of the services, the University's compensation and schedule for performance of services hereunder shall be equitably adjusted upon resumption of performance of the services.
- C. The University shall remain liable to the Local Agency for any claims or damages occasioned by any failure, default, or negligent errors and/or omission in carrying out the provisions of this Agreement during its life, including those giving rise to a termination for non-performance or breach by University. This liability shall survive and shall not be waived, or estopped by final payment under this Agreement.
- D. The University shall not be liable for any errors or omissions contained in deliverables which are incomplete as a result of a suspension or termination where the University is deprived of the opportunity to complete the University's services.
- E. Upon the occurrence of any of the following events, the University may suspend performance hereunder by giving the Local Agency 30 days advance written notice and may continue such suspension until the condition is satisfactorily remedied by the Local Agency. In the event the condition is not remedied within 120 days of the University's original notice, the University may terminate this agreement.
  - 1. Receipt of written notice from the Local Agency that funds are no longer available to continue performance.
  - 2. The Local Agency's persistent failure to make payment to the University in a timely manner.
  - 3. Any material contract breach by the Local Agency.

**ARTICLE XIV - DECISIONS UNDER THIS CONTRACT**

The Local Agency will determine the acceptability of work performed under this contract, and will decide all questions which may arise concerning the project. The Local Agency's decision shall be final and conclusive.

## **ARTICLE XV - SUCCESSORS AND ASSIGNS**

The Local Agency and the University agree that this contract and all contracts entered into under the provisions of this contract shall be binding upon the parties hereto and their successors and assigns.

## **ARTICLE XVI - COMPLIANCE WITH LAWS**

The University shall comply with all federal, state, and local laws, ordinances, and regulations applicable to the work, including but not limited to Title VI and Title VII of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d, 2000e), as well as with any applicable titles of the Americans with Disabilities Act (42 U.S.C. 12101, et seq.) and non-discrimination clauses incorporated herein, and shall procure all licenses and permits necessary for the fulfillment of obligations under this contract.

## **ARTICLE XVII - RESPONSIBILITY FOR CLAIMS AND LIABILITY**

The University agrees, to the extent permitted by Missouri law and without waiving sovereign immunity, to save harmless the Local Agency, MoDOT and FHWA from all claims and liability due to its negligent acts or the negligent acts of its employees, agents or subcontractors.

## **ARTICLE XVIII - NONDISCRIMINATION**

The University, with regard to the work performed by it after award and prior to completion of the contract work, will not discriminate on the ground of race, color or national origin in the selection and retention of subcontractors. The University will comply with state and federal related to nondiscrimination, including but not limited to Title VI and Title VII of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d, 2000e), as well as with any applicable titles of the Americans with Disabilities Act (42 U.S.C. 12101, et seq.). More specifically, the University will comply with the regulations of the Department of Transportation relative to nondiscrimination in federally assisted programs of the Department of Transportation, as contained in 49 CFR 21 through Appendix H and 23 CFR 710.405 which are herein incorporated by reference and made a part of this contract. In all solicitations either by competitive bidding or negotiation made by the University for work to be performed under a subcontract, including procurements of materials or equipment, each potential subcontractor or supplier shall be notified by the University's obligations under this contract and the regulations relative to non-discrimination on the ground of color, race or national origin.

## **ARTICLE XIX – LOBBY CERTIFICATION**

CERTIFICATION ON LOBBYING: Since federal funds are being used for this agreement, the University's signature on this agreement constitutes the execution of all certifications on lobbying which are required by 49 C.F.R. Part 20 including Appendix A and B to Part 20. University agrees to abide by all certification or disclosure requirements in 49 C.F.R. Part 20 which are incorporated herein by reference.

## **ARTICLE XX – INSURANCE**

- A. The University shall maintain commercial general liability, automobile liability, and worker's compensation and employer's liability insurance in full force and effect to protect the University from claims under Worker's Compensation Acts, claims for damages for personal injury or death, and for damages to property arising from the negligent acts, errors, or omissions of the University

and its employees, agents, and Subconsultants in the performance of the services covered by this Agreement, including risks insured against in commercial general liability policies. This requirement of insurance may also be satisfied through a program of self-insurance.

- B. The University shall also maintain professional liability insurance to protect the University against the negligent acts, errors, or omissions of the University and those for whom it is legally responsible, arising out of the performance of professional services under this Agreement.
- C. The University's insurance coverage shall be for not less than the following limits of liability:
  - 1. Commercial General Liability: \$1,000,000 per person up to \$3,000,000 per occurrence;
  - 2. Automobile Liability: \$1,000,000 per person up to \$3,000,000 per occurrence;
  - 3. Worker's Compensation in accordance with the statutory limits; and Employer's Liability: \$1,000,000; and
  - 4. Professional ("Errors and Omissions") Liability: \$1,000,000, each claim and in the annual aggregate. The University's maximum liability will be \$1,000,000 annual aggregate.
- D. The University shall, upon request at any time, provide the Local Agency with (i) certificates of insurance, or (ii) certification by the University of its participation in a bona-fide self insurance program, evidencing the University's commercial general or professional liability ("Errors and Omissions") coverage and evidencing that they and all other required insurance are in effect as to the services under this Agreement.
- E. Any insurance policy required as specified in (ARTICLE XX) shall be written by a company which is incorporated in the United States of America or is based in the United States of America. Each insurance policy must be issued by a company authorized to issue such insurance in the State of Missouri. The Automobile & General Liabilities policies shall be endorsed to include the County as an additional insured and provide for 30 days advance written notice of any material change. A Waiver of Subrogation in favor of the County shall be endorsed on each of the policies. The required insurance shall be primary insurance with respect to any other insurance or self-insurance programs maintained by the County. A Certificate of Insurance evidencing the above coverage(s) together with a copy of the required endorsements shall be provided to the County prior to commencement of any work. It shall be the University's responsibility to keep the respective insurance policies and coverages current and in force for the life of the contract. The insurance requirements of this section may also be satisfied through a combination of a self-insurance plan and excess liability coverage.

## **ARTICLE XXI - ATTACHMENTS**

The following exhibits are attached hereto and are hereby made part of this contract:

Attachment A – Scope of Service

Attachment B – Estimate of Cost

Attachment C – Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions.

Attachment D – Certification Regarding Debarment, Suspension, and Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions.

Attachment E – DBE Contract Provisions

Attachment F – Fig. 136.4.15 Conflict of Interest Disclosure Form

IN WITNESS WHEREOF, the parties hereto have executed this agreement on the date last written below.

Executed by the County this day of, 20 \_\_\_\_\_

Executed by the University this day of, 20 \_\_\_\_\_

THE CURATORS OF THE  
UNIVERSITY OF MISSOURI

ST. CHARLES COUNTY, MISSOURI

By \_\_\_\_\_  
Michelle L. Leaton  
Title: Pre-Award Manager

By \_\_\_\_\_  
Steve Ehlmann  
Title: County Executive

ATTEST:

ATTEST:

By \_\_\_\_\_  
Hannah Clampitt  
Title: Pre-Award Manager

By \_\_\_\_\_  
County Registrar

CERTIFICATE OF DIRECTOR OF FINANCE

I certify that there is a balance otherwise unencumbered to the credit of the appropriation to which this contract is chargeable, and a cash balance otherwise unencumbered in the treasury to the credit of the fund from which payment is to be made, each sufficient to meet this obligation.

SIGNED: \_\_\_\_\_  
Tracy Bayne, Acting Director of Finance

DATED: \_\_\_\_\_



# ATTACHMENT A

## Scope of Services

### University of Missouri Statement of Work

The University of Missouri (MU) team will be involved in all three project tasks. They will play a support role in **Task 1** on the collection of work zone data from agencies. They will work with the SCCMO and CBB partners in deploying the mobile and web applications that will help collect work zone data from participating agencies in the GGL corridor.

MU will lead **Task 2** on deploying a database for hosting data from the different sources, build a pipeline for ensuring that the data feeds are compliant with WZDx specifications, and finally share the feeds with data consumers via an API. As described in the detailed Work Plan in the proposal, this task consists of **two subtasks** – 2.1. Database Development and Integration and 2.2. Feed Standardization and Realtime API Development. In **subtask 2.1.**, the MU team will design and deploy a database to store and integrate the work zone data collected from the different sources. We propose to leverage a real-time, cloud-based database to support the backend. Next, planned work zone activity data (from the web application) and actual work zone field data (from ATMS and mobile app) will be pushed through an integration process before it is shared with users. The integration pipeline will compare data from the different sources, use complementary information to validate required information, and combine unique data elements to create a consistent and complete work zone database. Google's Firebase will be used to deploy the database due to its scalability, speed and flexibility with unstructured data.

In **subtask 2.2.**, the MU team will develop procedures for standardizing the integrated work zone activity data to ensure compliance with the WZDx specifications. It also streamlines protocols for sharing the data with different types of users. The standardization process involves two main steps: First, *The Feed Validator* – this step verifies that the feed contains all the required data elements such as road names, geometry, location, direction, events, lane restrictions, etc., are captured and defined in accordance with the specification. Feeds without required data elements will be flagged, additional information will be requested from data provider before feed is shared. Second, *The Feed Formatter* - this step makes data available in output formats consistent with the WZDx specifications such as GEOJSON and XML. Additionally, it ensures that the correct data types are used to define each data element. Standardized, WZDx-compliant, work zone activity data will be made available to data consumers including third party users, and automated driving systems and devices via a representative state transfer (REST) API.

MU will also lead **Task 3** on Data Feed Testing, Documentation, Code Release. The WZDx-compliant data feed, as well as the mobile and web applications deployed will be tested for accuracy, consistency, timeliness, ease of use, and functionality. Specifically, the geolocation accuracy of sensors, and latencies in data transfer will be tested. The entire data ecosystem development process will be carefully documented; from the selection of database management architectures to the details of app modules. The comprehensive documentation includes descriptions of the development platforms, tools, software specifications process, and details of the mobile and web app development. For each individual software module, best practices in software engineering will be followed, such as the specification of data flow, variables, file sharing, routines, and scripts. All software code will contain extensive and appropriate comments to allow anyone outside the development team the ability to quickly understand the code. The team will share both mobile and web app development code via GitHub for other agencies to use. The mobile app will also be made freely available through Apple's App store and Google's Play store.

The MU team will also assist SCCMO with timely project reports (quarterly reports, draft final reports, etc) and attend project kickoff and other meetings with FHWA, as needed.

## CBB Statement of Work

CBB will be involved in all three project tasks.

CBB will lead in **Task 1** on the collection of work zone data from agencies including working with SCCMO and MU to deploy mobile and web applications that will help collect work zone data from participating GGL partner agencies. CBB will work closely with Gateway Green Light (GGL) partner agencies to obtain this data. GGL is a cooperative effort with St. Charles County, MoDOT, and the Cities of Cottleville, Dardenne Prairie, Lake Saint Louis, O'Fallon, St. Charles, St. Peters, Weldon Spring, and Wentzville to improve transportation safety, efficiency, and access throughout St. Charles County. The program helps synchronize traffic signals, coordinate incident response, and enhance travel reliability on streets throughout the county. GGL does this through a network of coordinated ITS technologies and strong interagency cooperation.

As described in the detailed Work Plan in the proposal, this task consists of **two subtasks** – 2 Subtask 1.1: Design and Deploy Web Application and Subtask 1.2 Deploy Mobile App for WZDx. In task 1.1 the team will build a web/desktop application to capture planned work zone activity data. The university of Missouri team currently hosts and manages transportation data for various State agencies in Missouri (including St. Charles and others in the St. Louis region) through TITAN and DASH , ; data platforms for storing, retrieving, integrating and analyzing massive transportation data. The proposed web application will be integrated into this already existing effort by SSCMO, GGL, MoDOT, and East West Gateway Council of Governments, to enable us to take advantage of the platform's resources for work zone data collection, archival and thereby speeding the development process.

Subtask 1.2 deploys a mobile application for real-time work zone data collection in the field to address data gaps in pre-planned work zone data and provide more up to date information. The project team members from University of Missouri have developed and deployed SWIZAPP, a mobile application for work zone activity data collection as part of a Smart Work Zone Deployment Initiative pooled-fund study. The current version of the app is able to capture several of the data elements defined in the WZDx specifications including geolocation, lane status, type of work, workers' presence and some geometric attributes. New functionalities will be added to the mobile app to enable SCCMO and partnering agencies to capture a broad range of data elements specified in the WZDx dictionaries.

CBB will support MU in **Task 2** in the deployment of a database for hosting data from the different sources, building a pipeline to ensure data feeds are compliant with WZDx specifications, and sharing the feeds with data consumers via an API. As described in the detailed Work Plan in the proposal, this task consists of **two subtasks** – 2.1. Database Development and Integration and 2.2. Feed Standardization and Realtime API Development. In **subtask 2.1.**, CBB will support MU in the design and deployment of a database to store and integrate the work zone data collected from the different sources. Planned work zone activity data (from the web application) and actual work zone field data (from ATMS and mobile app) will be pushed through an integration process before it is shared with users. The integration pipeline will compare data from the different sources, use complementary information to validate required information, and combine unique data elements to create a consistent and complete work zone database.

In **subtask 2.2.**, CBB will support MU in the development of procedures for standardizing the integrated work zone activity data to ensure compliance with the WZDx specifications. This work will also streamline protocols for sharing the data with different types of users. The standardization process involves two main steps: First, *The Feed Validator* – this step verifies that the feed contains all the required data elements such as road names, geometry, location, direction, events, lane restrictions, etc., are captured and defined in accordance with the specification. Feeds without required data elements will be flagged, additional information will be requested from data provider before feed is shared. Second, *The Feed Formatter* - this step makes data available in output formats consistent with the WZDx specifications such as GEOJSON and XML. Additionally, it ensures that the correct data types are used to define each data element. Standardized, WZDx-compliant, work zone activity data will be made available to data consumers including third party users, and automated driving systems and devices via a representative state transfer (REST) API.

CBB will support MU in **Task 3: Data Feed Testing, Documentation, and Code Release**. The WZDx-compliant data feed, as well as the mobile and web applications deployed will be tested for accuracy, consistency, timeliness, ease of use, and functionality. Specifically, the geolocation accuracy of sensors, and latencies in data transfer will be tested. The entire data ecosystem development process will be carefully documented; from the selection of database management architectures to the details of app modules. The comprehensive documentation includes descriptions of the development platforms, tools, software specifications process, and details of the mobile and web app development. For each individual software module, best practices in software engineering will be followed, such as the specification of data flow, variables, file sharing, routines, and scripts. All software code will contain extensive and appropriate comments to allow anyone outside the development team the ability to quickly understand the code. The team will share both mobile and web app development code via GitHub for other agencies to use. The mobile app will also be made freely available through Apple's App store and Google's Play store.

Finally, CBB will assist SCCMO with timely project reports (quarterly reports, draft final reports, etc.) and attend project kickoff and other meetings with FHWA, as needed.

# ATTACHMENT B

## Estimate of Cost

<b>Proposal Title:</b> Preparing Local Governments for Automated Driving Systems -- Implementing WZDx in St. Charles County, Missouri <b>Project Dates:</b> 11/1/2020 - 12/31/2021					<b>MU Budget</b>
<b>Expense Categories</b>	<b>Person Months (project)</b>		<b>Monthly Salary</b>		<b>14 months</b>
<i>Escalation for senior personnel salaries (starts year 1):</i>					1.03
<b>Senior Personnel (role, name, SS/AY/CY)</b>					
1. PI: Yaw Adu-Gyamfi	0.9		10,495.00		9,729
2. Co-I: Praveen Edara	0.25		20,029.83		5,158
3. Co-I: Carlos Sun	0.25		15,450.58		3,979
<b>Total Senior Personnel</b>					<b>18,866</b>
<i>Escalation for GRA stipends (starts year 1):</i>					1.03
<b>Student Personnel</b>					
2. GRA (Ph.D.) - CENGR	Effort	# Each	Campus Min.	Months	
0.5 FTE (100% effort), 12 months	100%	1	2,003.00	12	24,757
<b>Total Student Personnel</b>					<b>24,757</b>
<b>Total All Personnel</b>					<b>43,623</b>
<i>Escalations start year 1:</i>					
<b>Fringe Benefits / Tuition</b>					
	Escalation	Credits	Campus	Engr.	
FRINGE Benefits on Full-time					6,763
Medical Insurance for GRAs (AY20-21)	1.03		4,032.00		4,032
Tuition (campus) for GRAs (AY20-21)	1.03	19	394.90		7,503
Tuition (Engr) for GRAs (AY20-21)	1.03	19		218.90	4,159
<b>Total Fringe Benefits / Tuition</b>					<b>22,457</b>
<b>Total Personnel, Fringe, GRA Tuition</b>					<b>66,080</b>
<b>Materials and Supplies</b>					<b>2,574</b>
<b>Total Direct Costs</b>					<b>68,654</b>
<b>Modified Total Direct Cost Base (MTDC)</b>					<b>56,992</b>
<b>Facilities &amp; Administrative (F&amp;A) Costs</b>					<b>31,346</b>
<i>Applicable Rate:</i>					55.00%
<b>Total Project Costs</b>					<b>100,000</b>
<b>FULL-TIME FRINGE rates, agreement date 2/28/2020</b>					<b>35.85%</b>

## BUDGET JUSTIFICATION

### **Personnel**

Salaries are based on current salaries, and include a 3% increase each year.

#### *Senior Personnel:*

Dr. Adu-Gyamfi will serve as the MU PI for the project. Drs. Edara and Sun will serve as co-PI and provide assistance on all tasks. Drs. Adu-Gyamfi and Sun are 9-month appointments. Dr. Edara is on a 12-month appointment.

#### *Student Personnel:*

Graduate Research Assistant (GRA) salaries depend on the scholastic level of the student, and represent 0.5 FTE. Support is requested for 1 PhD level GRA to assist with tasks 2 and 3 of the project (web and mobile app development and data feed generation and testing).

### **Fringe Benefits**

*Full-time Employees:* Fringe benefit rates for the University of Missouri is approved by the Department of Health and Human Services, the university's federal cognizant agency, and are adjusted annually. The approved fiscal year 2021 fringe benefit for full-time campus employees is 35.85% on all sponsored agreements, including 7.65% FICA. Multiple year proposals include a 3% increase each year.

*GRA Tuition Remission:* Tuition for graduate students is estimated with a course load of 22 credit hours per year. The campus per credit hour fee for 2020-2021 is \$ 394.90 and the College of Engineering per credit hour course fee is \$218.90, both with 3% increases per year.

*GRA Medical Insurance:* Medical insurance is provided to GRAs at a cost of \$4,032 for academic year 2020-2021, with a 3% increase each subsequent year.

### **Other Direct Costs**

*Materials and Supplies:* Materials and supplies are defined as tangible property, other than equipment, costing less than \$5,000. Cloud computing costs of \$2,574 will allow to develop and test the web and mobile applications and work zone data feeds. These supplies will be used solely to accomplish the aims of this project.

### **Facilities and Administrative Costs**

The University of Missouri negotiates its indirect rate agreement with the U.S. Department of Health and Human Services (DHHS), Region VII. The indirect rate for on-campus research is 55% MTDC for the period 7/1/2016-6/30/2020. The DHHS contact is Arif Karim, phone 214-767-3261.

*Modified Total Direct Costs (MTDC):* Equipment valued over \$5,000, participant support, animal per diem costs, and tuition costs are exempt from F&A costs. F&A charges are applied on the first \$25,000 of subcontracts.

CBB Budget  
 Proposal Title: Preparing Local Governments for Automated Driving Systems – Implementing WZDx in St. Charles County, Missouri  
 Project Dates: 1/1/2020 - 12/31/2021

Overhead  
 Fixed Fee  
 159.22%  
 12%

**FIRM:**

**George L Crawford & Associates, Inc dba CBB**

TASK	SR ENG V		SR ENG III		Staff ENG		HOURS SUBTOTAL	LABOR SUBTOTAL	OTHER DIRECT COSTS		Total Unloaded
	HRS	\$	HRS	\$	HRS	\$			ITEM	COST	
<b>Task 1: Data Collector Design and Deployment</b>	40	\$2,500	40	\$2,000	80	\$2,400	160	\$6,900	Mileage	\$86	\$6,986
<b>Task 2: Database Development, Feed Standardization and Data Sharing</b>	32	\$2,000	32	\$1,600	40	\$1,200	104	\$4,800	Mileage	\$58	\$4,858
<b>Task 3: Data Feed Testing, Documentation, Code Release</b>	32	\$2,000	32	\$1,600	40	\$1,200	104	\$4,800	Mileage	\$58	\$4,858
<b>SUBTOTAL</b>	104	\$6,500	104	\$5,200	160	\$4,800	368	\$16,500		\$201	\$16,701
<b>Subtotal (Raw Labor)</b>		\$6,500		\$5,200		\$4,800		\$16,500			
<b>Overhead (154.55%)</b>		\$10,349		\$8,279		\$7,643		\$26,271			
<b>"Loaded" SUBTOTAL</b>		\$16,849		\$13,479		\$12,443		\$42,771			
<b>Fixed Fee (12%)</b>		\$2,022		\$1,618		\$1,493		\$5,133			
<b>TOTAL</b>	104	\$18,871	104	\$15,097	160	\$13,936	368	\$47,904		\$201	\$48,105

## **CBB BUDGET JUSTIFICATION**

### **Personnel**

Salaries are based on current salaries.

Mr. Shawn Leight will serve as the CBB's Project Manager. Mr. Greg Owens and Dr. Mirza Sharif will lead the various technical aspects of the project. Shawn Leight is a principal of the firm and Greg Owens an associate.

### **Fringe Benefits**

Fringe benefit rates for CBB are adjusted annual and approved by MoDOT. Our latest approval letter is dated April 30, 2019. Our current fringe benefit rate is 72.51%.

### **Administrative Costs**

Administrative overhead rates for CBB are adjusted annually and approved by MoDOT. Our latest approval letter is dated April 30, 2019. Our current administrative overhead rate is 86.71%.

### **Other Direct Costs**

CBB does not anticipate any direct costs for this project other than mileage. CBB bills mileage at the annual IRS rate, currently \$0.575/mile.



## ATTACHMENT C

### CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS - PRIMARY COVERED TRANSACTIONS

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#### INSTRUCTIONS FOR CERTIFICATION

1. By signing and submitting this proposal, the prospective primary participant is providing the certification set out below.
2. The inability of a person to provide the certification required below will not necessarily result in denial of participation in this covered transaction. The prospective participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective primary participant to furnish a certification or an explanation shall disqualify such person from participation in this transaction.
3. The certification in this clause is a material representation of fact upon which reliance was placed when the department or agency determined to enter into this transaction. If it is later determined that the prospective primary participant knowingly rendered an erroneous certification in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause of default.
4. The prospective primary participant shall provide immediate written notice to the department or agency to whom this proposal is submitted if at any time the prospective primary participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
5. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," "proposal" and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549. You may contact the department or agency to which this proposal is being submitted for assistance in obtaining a copy of those regulations.
6. The prospective primary participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction.
7. The prospective primary participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Covered Transaction" provided by the department or agency entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
8. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the

method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to check the Nonprocurement List at the Excluded Parties List System.  
<https://www.epls.gov/epl/search.do?page=A&status=current&agency=69#A>.

9. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.
10. Except for transactions authorized under paragraph 6 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default.

#### **Certification Regarding Debarment, Suspension, and Other Responsibility Matters -Primary Covered Transactions**

1. The prospective primary participant certifies to the best of its knowledge and belief, that it and its principals:
  - a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;
  - b. Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
  - c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and
  - d. Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
2. Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

## ATTACHMENT D

### CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION--LOWER TIER COVERED TRANSACTIONS

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#### INSTRUCTIONS FOR CERTIFICATION

1. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.
2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.
3. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
4. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations.
5. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
6. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Nonprocurement List at the Excluded Parties List System.  
<https://www.epls.gov/eplsearch.do?page=A&status=current&agency=69#A>.
8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which normally possessed by a prudent person in the ordinary course of business dealings.
9. Except for transactions authorized under paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended,

debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

**Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Covered Transactions**

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.
2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

**Attachment E**  
**Disadvantage Business Enterprise Contract Provisions**

1. Policy: It is the policy of the U.S. Department of Transportation and the Local Agency that businesses owned by socially and economically disadvantaged individuals (DBE's) as defined in 49 C.F.R. Part 26 have the maximum opportunity to participate in the performance of contracts financed in whole or in part with federal funds. Thus, the requirements of 49 C.F.R. Part 26 and Section 1101(b) of the Transportation Equity Act for the 21st Century (TEA-21) apply to this Agreement.

2. Obligation of the Engineer to DBE's: The Engineer agrees to assure that DBEs have the maximum opportunity to participate in the performance of this Agreement and any subconsultant agreement financed in whole or in part with federal funds. In this regard the Engineer shall take all necessary and reasonable steps to assure that DBEs have the maximum opportunity to compete for and perform services. The Engineer shall not discriminate on the basis of race, color, religion, creed, disability, sex, age, or national origin in the performance of this Agreement or in the award of any subsequent subconsultant agreement.

3. Geographic Area for Solicitation of DBEs: The Engineer shall seek DBEs in the same geographic area in which the solicitation for other subconsultants is made. If the Engineer cannot meet the DBE goal using DBEs from that geographic area, the Engineer shall, as a part of the effort to meet the goal, expand the search to a reasonably wider geographic area.

4. Determination of Participation Toward Meeting the DBE Goal: DBE participation shall be counted toward meeting the goal as follows:

A. Once a firm is determined to be a certified DBE, the total dollar value of the subconsultant agreement awarded to that DBE is counted toward the DBE goal set forth above.

B. The Engineer may count toward the DBE goal a portion of the total dollar value of a subconsultant agreement with a joint venture eligible under the DBE standards, equal to the percentage of the ownership and control of the DBE partner in the joint venture.

C. The Engineer may count toward the DBE goal expenditures to DBEs who perform a commercially useful function in the completion of services required in this Agreement. A DBE is considered to perform a commercially useful function when the DBE is responsible for the execution of a distinct element of the services specified in the Agreement and the carrying out of those responsibilities by actually performing, managing and supervising the services involved and providing the desired product.

D. A Engineer may count toward the DBE goal its expenditures to DBE firms consisting of fees or commissions charged for providing a bona fide service, such as professional, technical, consultant, or managerial services and assistance in the procurement of essential personnel, facilities, equipment, materials or supplies required for the performance of this Agreement, provided that the fee or commission is determined by MoDOT's External Civil Rights Division to be reasonable and not excessive as compared with fees customarily allowed for similar services.

E. The Engineer is encouraged to use the services of banks owned and controlled by socially and economically disadvantaged individuals.

5. Replacement of DBE Subconsultants: The Engineer shall make good faith efforts to replace a DBE Subconsultant, who is unable to perform satisfactorily, with another DBE Subconsultant. Replacement firms must be approved by MoDOT's External Civil Rights Division.

6. Verification of DBE Participation: Prior to final payment by the Local Agency, the Engineer shall file a list with the Local Agency showing the DBEs used and the services performed. The list shall show the actual dollar amount paid to each DBE that is applicable to the percentage participation established in this Agreement. Failure on the part of the Engineer to achieve the DBE participation specified in this Agreement may result in sanctions being imposed on the Commission for noncompliance with 49 C.F.R. Part 26 and/or Section 1101(b) of TEA-21. If the total DBE participation is less than the goal amount stated by the MoDOT's External Civil Rights Division, liquidated damages may be assessed to the Engineer.

Therefore, in order to liquidate such damages, the monetary difference between the amount of the DBE goal dollar amount and the amount actually paid to the DBEs for performing a commercially useful function will be deducted from the Engineer's payments as liquidated damages. If this Agreement is awarded with less than the goal amount stated above by MoDOT's External Civil Rights Division, that lesser amount shall become the goal amount and shall be used to determine liquidated damages. No such deduction will be made when, for reasons beyond the control of the Engineer, the DBE goal amount is not met.

7. Documentation of Good Faith Efforts to Meet the DBE Goal: The Agreement goal is established by MoDOT's External Civil Rights Division. The Engineer must document the good faith efforts it made to achieve that DBE goal, if the agreed percentage specified is less than the percentage stated. The Good Faith Efforts documentation shall illustrate reasonable efforts to obtain DBE Participation. Good faith efforts to meet this DBE goal amount may include such items as, but are not limited to, the following:

A. Attended a meeting scheduled by the Department to inform DBEs of contracting or consulting opportunities.

B. Advertised in general circulation trade association and socially and economically disadvantaged business directed media concerning DBE subcontracting opportunities.

C. Provided written notices to a reasonable number of specific DBEs that their interest in a subconsultant agreement is solicited in sufficient time to allow the DBEs to participate effectively.

D. Followed up on initial solicitations of interest by contacting DBEs to determine with certainty whether the DBEs were interested in subconsulting work for this Agreement.

E. Selected portions of the services to be performed by DBEs in order to increase the likelihood of meeting the DBE goal (including, where appropriate, breaking down subconsultant agreements into economically feasible units to facilitate DBE participation).

F. Provided interested DBEs with adequate information about plans, specifications and requirements of this Agreement.

G. Negotiated in good faith with interested DBEs, and not rejecting DBEs as unqualified without sound reasons, based on a thorough investigation of their capabilities.

H. Made efforts to assist interested DBEs in obtaining any bonding, lines of credit or insurance required by the Commission or by the Engineer.

I. Made effective use of the services of available disadvantaged business organizations, minority contractors' groups, disadvantaged business assistance offices, and other organizations that provide assistance in the recruitment and placement of DBE firms.

8. Good Faith Efforts to Obtain DBE Participation: If the Engineer's agreed DBE goal amount as specified is less than the established DBE goal given, then the Engineer certifies that good faith efforts were taken by Engineer in an attempt to obtain the level of DBE participation set by MoDOT's External Civil Rights.

**Attachment F – Fig. 136.4.15**  
**Conflict of Interest Disclosure Form for LPA/Consultants**  
Local Federal-aid Transportation Projects

**Firm Name (Consultant):** The Curators of the University of Missouri

**Project Owner (LPA):** St. Charles County, Missouri

**Project Name:** Preparing Local Governments for Automated Driving Systems – Implementing Work Zone Data Exchange in St. Charles County, Missouri

**Project Number:** ITS-9901(665)

As the LPA and/or consultant for the above local federal-aid transportation project, I have:

1. Reviewed the conflict of interest information found in Missouri’s Local Public Agency Manual (EPG 136.4)
2. Reviewed the Conflict of Interest laws, including 23 CFR § 1.33, 49 CFR 18.36.

And, to the best of my knowledge, determined that, for myself, any owner, partner or employee, with my firm or any of my sub-consulting firms providing services for this project, including family members and personal interests of the above persons, there are:

- No real or potential conflicts of interest  
If no conflicts have been identified, complete and sign this form and submit to LPA
- Real conflicts of interest or the potential for conflicts of interest  
If a real or potential conflict has been identified, describe on an attached sheet the nature of the conflict, and provide a detailed description of Consultant’s proposed mitigation measures (if possible). Complete and sign this form and send it, along with all attachments, to the appropriate MoDOT District Representative, along with the executed engineering services contract.

LPA

Consultant

Printed Name: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_