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Association of Metropolitan Planning Organizations

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Sooraz Patro

Alexandria-Pineville Metropolitan Planning Organization/Rapides Area Planning Commission

David Haynes, Kyung-Hwa Kim, Kofi Wakhisi

Atlanta Regional Commission

Eileen Singleton

Baltimore Metropolitan Council

Chris O'Neill

Capital District Transportation Committee

Peter Koeppel

East West Gateway Council of Governments

Bob Hazlett

Maricopa Association of Governments

Mavrick Fitzgerald, Sajid Hossain, Pragati Srivastava

Memphis Urban Area Metropolitan Planning Organization

Chris Johnson

Metro

Eric Hill

- Metroplan Orlando
- Mark Filipi, Amy Vennewitz
 - Metropolitan Council

Tom Bamonte

North Central Texas Council of Governments

Ali Makarachi

Northeast Ohio Areawide Coordinating Agency

Charlie Howard

Puget Sound Regional Council

Tom Bruff

Southeast Michigan Council of Governments

Chris Evilia

Waco Metropolitan Planning Organization

Jeremy Raw

United States Department of Transportation Federal Highway Administration (ex-officio)



AMPO Working Group on Vehicle Connectivity and Automation Meeting Guests

- City of Orlando
- Florida Department of Transportation
- Florida Department of Transportation/ The Central Florida Autonomous Vehicle Partnership
- SUNTRAX, Florida Turnpike Enterprise
- LYNX
- United States Department of Transportation
 Federal Highway Administration

- United States Department of Transportation Federal Highway Administration Resource Center
- United States Department of Transportation Intelligent Transportation System Joint Program Office
- United States Environmental Protection Agency Office of Transportation and Air Quality
- University of Central Florida

AMPO Working Group on Vehicle Connectivity and Automation Symposium/Peer Exchange Participants

Matt Hardy

American Association of State Highway and Transportation Officials

Kyung-Hwa Kim

Atlanta Regional Commission

Eileen Singleton

Baltimore Metropolitan Council

Chris O'Neill

Capital District Transportation Committee

Elizabeth Irvin

Chicago Metropolitan Agency for Planning

Ryan Rice

Colorado Department of Transportation

Steve Cook, Sang Gu Lee, Robert Spotts

Denver Regional Council of Governments

Peter Koeppel

East West Gateway Council of Governments

- Mary Connelly
 - Greater Nashville Regional Council

Hannah Twaddell

ICF

Steven Bayless

Intelligent Transportation Society of America

Bob Hazlett

Maricopa Association of Governments

Maverick Fitzgerald

Memphis Urban Area Metropolitan Planning Organization

Eric Hill

MetroPlan Orlando

Amy Vennewitz

Metropolitan Council

Amanda Graor

Mid-America Regional Council

Steve Douglas

National League of Cities

Erich Zimmermann

National Association of Regional Councils

Tom Bamonte

North Central Texas Council of Governments

Becky Karasko

North Front Range Metropolitan Planning Organization

Jason O'Brien

Pikes Peak Area Council of Governments

Dan Doenges

Regional Transportation Commission Washoe County

Brian Welch

Regional Transportation District (Denver)

Sarah Binkowski

Southeast Michigan Council of Governments

Marco Anderson, Jason Greenspan

Southern California Association of Governments

Chris Evilia

Waco Metropolitan Planning Organization

Jeremy Raw

United States Department of Transportation Federal Highway Administration (ex-officio)

Aaron Bustow

United States Department of Transportation Federal Highway Administration Colorado Division

Drew Cooper

San Francisco County Transportation Authority

Preface

Purpose

Approximately 100 years ago, automobiles were a revolutionary transportation option. Their deployment altered land use and travel patterns and drove the development of transportation infrastructure, policies, and regulations. Today it is vehicle connectivity and automation that is poised to bring the next wave of changes to the transportation system in conjunction with related developments in vehicle electrification, shared mobility, and new mode options such as electric scooters.

While connected vehicles, automated vehicles, and vehicles with elements of both connectivity and automation have distinct characteristics, functionality, opportunities, and challenges, many foresee the convergence of connectivity and automation as being critical to achieving the full-scale benefits of automated vehicle deployment scenarios. Therefore, the focus of this document includes both connectivity and automation.

This document is intended to provide a framework (Framework) as metropolitan planning organizations (MPOs) incorporate vehicle connectivity and automation into their metropolitan transportation planning process and work to guide its deployment to help meet regional transportation needs and goals. It is intended to assist MPOs as they explore the implications of vehicle connectivity and automation for the transportation system, its users, and the concept of mobility. As advancements in technology are occurring at a fast pace, the Framework will be a working document that provides an initial step to exploring the many factors that will shape deployment. The recommendations in this document focus on the aspects of vehicle connectivity and automation that are within the responsibility of MPOs and the scope of the metropolitan planning process.

Assistance/Parti	utomation				
Vehicle Connectivity	Advanced Driver Assistance/Partial Automation				
Vehicle to infrastructure (V2I)	•	Adaptive Cruise Control			
 Information exchange between vehicles and bighway infrastructure to 	1	Automatic Emergency Braking			
provide applications such as red light and stop sign	1	Blind Spot Detection			
violation warnings.	1	Electronic Stability Control			
Vehicle to vehicle (V2V)					
Information exchange between vehicles to	1	Forward Collision Warning			
provide applications such as forward collision warning	1	Lane Departure Warning			
and left turn assist.	1	Lane Keeping Assist			
Vehicle to people (V2P)	•	Rearview Video Systems			
Information exchange between highway infrastructure, vehicles	•	Self-park			
to, for example, provide	•	Traffic Jam Assist			
pedestrians, bicyclists, and drivers.	•	Rear Cross Traffic Alert			

Example Elements of Vehicle Connectivity and Advanced Driver Assistance/Partial Automation

Figure 1

AMPO Vehicle Connectivity and Automation Working Group

The Association of Metropolitan Planning Organizations (AMPO) with the support of the United States Department of Transportation (USDOT) Federal Highway Administration (FHWA) developed the AMPO Vehicle Connectivity and Automation Working Group to be a mechanism to:

- Address knowledge gaps in vehicle connectivity and automation and build technical, institutional, and policy capacity.
- Incorporate vehicle connectivity and automation in the planning process and leverage their benefits.
- Provide a forum to engage MPOs and their partner agencies as vehicle connectivity and automation is piloted and deployed.
- Support the USDOT's vehicle connectivity and automation efforts.

Vehicle Connectivity and Automation



AMPO Vehicle Connectivity and Automation Working Group Meetings

Identifying the Challenges, Opportunities, and Current State of Practice

- April 4-5, 2017 in Arlington, TX (hosted by the University of Texas, Arlington College of Architecture, Planning and Public Affairs).
- Attendee focus: MPOs.

Navigating National Deployment: Coordination with Other Transportation Agencies and Risk Management

- July 31 August 1, 2017 in Cincinnati, OH (in coordination with AASHTO's Conference on Performance-Based Transportation Planning, Financing, and Management.
- Attendee Focus: MPOs and State DOTs.

Planning for Deployment: The Federal Perspective and Coordination and Collaboration with Transportation Stakeholder Associations and Organizations

- November 13-14, 2017 in Washington DC.
- Attendee focus: MPOs, Federal agencies, and transportation stakeholder associations and organizations.

Planning for Deployment: Public and Private Sector Coordination

- March 5-7, 2018 in Orlando, Florida.
- Attendee focus: MPOs and the private sector.

Symposium/Peer Exchange

- November 14-15, 2018 in Denver, Colorado.
- Gather feedback on the Draft National Framework for Regional Vehicle Connectivity and Automation Planning.

The working group is composed of a diverse representation of small, medium, and large MPOs from around the nation. Members have backgrounds in a variety of areas, including policy, operations, modeling, and ITS. The working group's four meetings are documented in white papers that summarize the key discussion items. The working group's efforts culminated in a symposium to share its findings and finalize this Framework.

Introduction

Background

Industry progress, research, and legislation related to vehicle connectivity and automation is occurring at a rapid pace. While elements of vehicle connectivity and automation can be found in the consumer market, there is still considerable uncertainty regarding deployment timelines and scenarios, how they will coexist with other emerging technologies such as vehicle electrification and shared mobility, and, therefore, the impacts on transportation. This uncertainty makes it difficult to represent a future with vehicle connectivity and automation in the long-range planning process, scenario planning, and other MPO products, but MPOs are beginning to explore the potential for significant effects on areas illustrated in Table 1: Potential Impacts of Vehicle Connectivity and Automation on Transportation and Mobility.

Importance of the MPO

The MPO role is critical to the nation. Federal highway and transit statutes require, as a condition for spending federal highway or transit funds in urbanized areas, the designation of MPOs. MPOs have the responsibility for planning, programming, and the coordination of federal highway and transit investments. Their core planning products include the Transportation Improvement Program (TIP), Metropolitan Transportation Plan (MTP), and Public Participation Plan. 80.7% of the United States population is urban and overall the nation's highways move \$11,130 billion of freight each year.¹² MPOs are stewards of the transportation system within urban areas. With their partner agencies, they serve as transportation system planners, managers, operators, and developers who shape the transportation system, maintain safety and equity, and move people and goods regardless of mode choice. MPOs are leaders for their regions and must keep pace with and support emerging technologies, like vehicle connectivity and automation, to improve the transportation system.

United States Census Bureau: Urbanized Areas and Urban Clusters, 2010



Figure 4

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Through MPO policy boards, technical committees, and community outreach, and the development of core MPO products, MPOs build relationships and partnerships with transportation agencies and decision makers, community organizations, and the public by bringing these stakeholders together for dialogue and engagement. This allows them to be a critical venue for sharing community values, concerns, and impacts related to transportation and building consensus on policy and vision across their respective regions.

As vehicle connectivity and automation is deployed, MPOs will work with their partners to explore visions of the desired future of transportation to help understand how vehicle connectivity and automation can help meet regional transportation needs and goals. Through policy development and investment decisions, MPOs can help guide deployment to the desired scenario for the region and nation. They will also have an important role in ensuring all transportation users, including youth, low income, minority, and elderly populations and individuals with disabilities, are provided equal access to the transportation system and the benefits of vehicle connectivity and automation, and do not receive a disproportionate share of any negative consequences. MPOs have the opportunity to help weave vehicle connectivity and automation into the transportation system in a way that is context sensitive to the existing urban fabric and community vision and helps meet regional goals and needs.

Table 1: Potential Impacts of Vehicle Connectivity and Automation on Transportation and Mobility

Impact Area	Benefits/Opportunities	Challenges/Risks	Considerations for the Transportation Planning Process
Safety	 Improved safety by reducing driver error and connecting vehicles to other vehicles, infrastructure and road users. In the long term, there is potential for significant reductions in fatal crashes, approaching zero fatalities. More stakeholder acceptance of vehicle connectivity and automation as crash and fatality rates for highway transportation come in alignment with the rates for other transportation modes Improved communications systems accelerate emergency response 	 Safety in a mixed fleet environment during early deployment stages Vehicle connectivity and automation used to "game" the system and enhance personal advantage at the expense of public safety or efficient system operation Users develop a false sense of security at lower levels of automation Stakeholder acceptance of fatalities and serious injuries in crashes where the cause is not human error or mechanical failure Liability of fatalities and serious injuries in crashes where the cause is not human error or mechanical failure Protection of privacy interests 	 Impact on performance management and target setting
Security	 Improved communication among vehicles, infrastructure, and travelers could enhance security 	 Vehicle connectivity and automation used for illicit purposes Security breaches in vehicles and infrastructure systems could disrupt the transportation system 	 MPO role in cybersecurity when funding technology projects
Operations	 Increased capacity and reduced congestion due to vehicles operating with fewer incidents, reduced headways, and narrower lane widths Rich source of sensor data useful for improved operations and capital investment planning "Surge" pricing associated with shared fleets of connected and/or automated delivers benefits associated with congestion pricing Allowing in-vehicle activities other than driving—reduces costs associated with travel time delays 	 Highway capacity projects being planned or implemented today not cost effective or relevant as vehicle connectivity and automation is more fully deployed Cost of infrastructure and operational improvements necessary to support vehicle connectivity and automation Empty vehicles could cause net increase in traffic and vehicle miles traveled 	 Implications for the existing congestion management process Impact on performance management and target setting

Impact Area	Benefits/Opportunities	Challenges/Risks	Considerations for the Transportation Planning Process
Mobility and mode choice	 Expanded mobility for those currently unable to drive Reduced cost of mobility Improved first and last mile connections with transit More efficient paratransit options Reduced need for personal vehicle ownership and associated expense 	 Decreased/elimination of public transportation service due to shift in mode choice adversely affects transit dependent populations Certain public infrastructure needs and decisions may not be relevant for the future system Increased vehicle miles traveled (VMT) 	• Impact on mode share
Freight	 Improved efficiency through applications such as freight platooning Last mile robotic freight delivery reduces congestion 	 Infrastructure stresses and higher maintenance needs due to increased and concentrated vehicle activity 	 Impact on performance management and target setting
Transportation demand	 More mobility options at lower cost increases economic opportunities Increased use with ridesharing through pricing mechanisms could possibly moderate or decrease growth in vehicle miles traveled With appropriate street design and improvements in safety, walking and bicycling could become more attractive and popular 	 Increased vehicle miles traveled due to improved traffic flow, additional mobility options, and zero occupancy vehicles 	 Incorporation into existing transportation modeling
Infrastructure requirements	 Fewer high capacity infrastructure improvements needed through better operations Infrastructure improvements to help vehicle connectivity and automation (e.g., improved lane markings and pavement maintenance) also help human drivers Connecting vehicles to infrastructure can drive safety/ operations improvements Reduced need for conventional signage such as dynamic message signs 	 Long term infrastructure planning difficult to gauge as capacity needs outside of traditional markets may emerge to accommodate demand Certain current transportation investments may become obsolete Improved infrastructure and infrastructure maintenance are costly 	 Support update of existing or development of federal guidance or standards that enable cohesive, consistent national deployment Incorporation into investment decisions through the MTP, TIP, or project prioritization

Impact Area	Benefits/Opportunities	Challenges/Risks	Considerations for the Transportation Planning Process
Funding and financing	 New funding and financing mechanisms. For example, a shift to fleets of shared electric connected and automated vehicles provides opportunity to move to VMT charging, providing more stable funding source than gas tax Pricing/taxing based on vehicle occupancy level could incentivize increase in average vehicle occupancy Partner with private sector for infrastructure to speed deployment of vehicle connectivity and automation 	 Cost of additional infrastructure required to support vehicle connectivity and automation Current funding and financing mechanisms negatively impacted as individual ownership could transition to shared fleets and on demand services Acceleration of decline in adequacy of the gas tax as revenue source Loss of local revenue due to a decrease in parking, traffic citations, and licensing fees 	 Investment decisions recommended by MPOs should incorporate scenario planning that includes a risk assessment of financial impacts Revenue sources for investments and operations support all modes Support an environment that fosters innovation
New transportation service markets	 Participation by youth and elderly populations in the transportation system Greater mobility with less reliance on caregiver drivers for individuals with disabilities 	 Additional infrastructure and operational capacity needed to meet demand Design and structure for pick-up and drop-off System security and integrity of the ability to provide caregiver notifications 	 Impact on mode share
Equity	 Shared vehicles could give disadvantaged populations access to highway speed travel at lower cost than private vehicle ownership Improved mobility for persons now with limited access to vehicular travel Vulnerable road users benefit from safety improvements built into vehicle connectivity and automation 	 Deployment systematically disadvantaging some transportation system users such as youth, low income, minority, or elderly populations, households who primarily use public transportation, individuals with disabilities or rural communities Impacts to vulnerable road users, including pedestrians, bicyclists, and persons with disabilities To the extent that public infrastructure investment and maintenance is required for deployment, equitably distributing resources and improvements 	 Equity incorporated into the transportation planning process Support equitable deployment scenarios

Impact Area	Benefits/Opportunities	Challenges/Risks	Considerations for the Transportation Planning Process
Data collection, housing, analysis, and sharing	 Vehicle connectivity and automation a potentially rich data source for highway operations and planning. MPOs and other transportation agencies use expanded data to improve their understanding and modeling of transportation demand 	 Ensuring accuracy and proper use of data Cost of managing large amounts of data Institutional capacity to manage and analyze big data Tension between data access, privacy, safety, and security concerns related to any personally identifiable information contained in the data The proprietary nature of private sector data sources 	 Evaluation of current staff resources Identify data sets critical to informing the transportation planning process
Public acceptance	 Public views vehicle connectivity and automation as improving the quality of their highway travel Public embraces ridesharing, increasing average vehicle occupancy and highway system efficiency 	 Public rejects shared vehicle connectivity and automation altogether Public concerns over privacy, safety, and other potential challenges slow adoption 	 Strategies for public outreach
Land use	 Vehicle connectivity and automation have the potential to make cities and urban areas more appealing places to live and work Opportunity to retrofit the built environment to provide more complete streets and maintain and improve a sense of place; opportunity for MPOs to be proactive Shared vehicles reduce need for parking lots/structures, freeing up space for repurposing to other, higher-value uses Metered mobility via fleets prompts people to move residences closer to jobs Highway capacity improvements done via technology instead of physical expansion of roadways 	 Vehicle connectivity and automation induce sprawl and "super-commutes." They also promote gentrification in a way that disproportionately impact the availability of low-income housing Parking/storage for vehicle fleets, especially during periods of low demand for the vehicles/mobility services Land use changes and economic impacts as the need for rest stops, roadside hotels, car repair and service facilities, and gas stations could decline 	 Coordination between land use and transportation While land use impacts are difficult to predict, MPOs can play a role in shaping vehicle connectivity and automation impacts to land use and regional vision Land use as a tool to guide deployment to meet the regional and national vision and goals
Air quality conformity	Improved air quality	• Adverse air quality impacts from VMT increases	 Incorporation into air quality planning

Impact Area	Benefits/Opportunities	Challenges/Risks	Considerations for the Transportation Planning Process
Engagement and coordination	 Building partnerships with local, state, transit, and federal agencies, industry, academia, and stakeholder associations 	 Wide range of knowledge and perceptions of vehicle connectivity and automation Stakeholder acceptance and trust of vehicle connectivity and automation on deployment success Private sector advancements/deployments force policy/ public sector action in undesirable direction 	 Evolving roles and responsibilities of transportation agencies, industry, the federal government Strategies for engagement and outreach to MPO policy boards and committees Strategies for building partnerships
Employment	 New jobs created by vehicle connectivity and automation 	 Staffing reductions and/or repurposing by freight companies, transit providers, taxi and ridesharing services, and related industries as automation increases 	• Changes in employment patterns could impact land use and therefore transportation needs

Recommendations

This section provides recommendations for next steps and resources in four general areas relevant to all MPOs:

- Engagement, Coordination, and Collaboration
- **Policies and Investment Decisions**
- **Other Planning Products and Processes**
- Institutional Readiness

Engagement, Coordination, and Collaboration

Although there is still considerable uncertainty in vehicle connectivity and automation deployment timelines and scenarios, MPOs should engage their policy boards and decision makers, technical committees, citizen committees, the public, and their partners in transportation, academia, stakeholder organizations, and the private sector.

- Advise policy and decision makers as they make policy and investment decisions that shape the transportation system
- Build partnerships to reduce redundancy in activities, efficiently leverage limited financial and staff resources, and move forward in a unified direction
- Inform and share information regarding the current reality of vehicle connectivity and automation deployment to help manage perceptions and expectations and help stakeholders understand the plausible benefits, challenges, and limitations, as well as uncertainties about how these will develop as technology is deployed
- Develop a vision and goals for the desired future of transportation with vehicle connectivity and automation deployed to help understand how it can help meet regional transportation needs and goals
- Incorporate the vision, goals, and community values into the MTP and TIP
- Communicate the vision and goals
- Include equity in communications
- Demonstrate successes with vehicle connectivity and automation

Resources:

The following are provided as a resource for MPOs as they engage their policy boards and decision makers, technical and citizen committees, the public, and their other partners.

Vehicle Connectivity and Automation Resource Packet (Appendix A)

The Vehicle Connectivity and Automation Resource Packet provides a compilation of ongoing activities from transportation agency partners, including federal, state, regional, and local agencies, academia, stakeholder associations, and private industry. Because vehicle connectivity and automation is progressing at a rapid pace, this compilation is not intended to be exhaustive, but provide a broad brush picture of the status of vehicle connectivity and automation across the nation.

Vehicle Connectivity and Automation Fact Sheet: What is vehicle connectivity and automation and what does it mean for transportation? (Appendix B)

The Vehicle Connectivity and Automation Fact Sheet provides a high level overview of vehicle connectivity and automation.

Table 1: Potential Impacts of Vehicle Connectivity and Automation on Transportation and Mobility

Table 1 (pages 9-13) illustrates the potential benefits, opportunities, challenges, and risks for the transportation system and mobility that MPOs are exploring as vehicle connectivity and automation is deployed.

Policies and Investment Decisions

MTP: Because the MTP is critical to setting regional policy, engaging the policy board and community, and guiding long term investment decisions for all modes, the discussion of vehicle connectivity and automation is an essential component of the MTP and its development process. Through the MTP, MPOs and their partners will have the opportunity to set policies and investment decisions that will guide vehicle connectivity and automation deployment towards the scenarios that will best meet the needs of the region. The policies developed by MPOs should support both the existing transportation system and the potential future system with vehicle connectivity and automation deployed.

- Although there is considerable uncertainty in the timeline and scenarios for deployment of vehicle connectivity and automation, it is important to set a framework by starting to discuss how vehicle connectivity and automation fits into the vision for the region and its potential impacts on the transportation system, its users, and mobility. Since vehicle connectivity and automation has the potential to affect all aspects of transportation, vehicle connectivity and automation should be considered during discussions on:
 - Goals and objectives
 - Emerging technologies
 - Existing and future conditions
 - Technical issues
 - Policies and priorities
 - Investment scenarios and financial implications

Policy development

- Develop a vision and goals for the desired future of transportation with vehicle connectivity and automation deployed to help understand how it can help meet regional transportation needs and goals
 - Identify the opportunities and challenges that vehicle connectivity and automation will contribute towards the attainment of the vision and goals.
 - Pursue vehicle connectivity and automation deployment scenarios that meet the vision and goals of the region and do not negatively impact safety, security, operations, reliability, or mobility
 - Identify existing policy tools that support achieving the desired future
 - Assess the proposed/assumed benefits of vehicle connectivity and automation to confirm they are being achieved
- Support an environment that fosters innovation
 - Maintain infrastructure in good condition to support the safe operation and testing of vehicle connectivity and automation
 - Ensure investment decisions support the current transportation system while laying the groundwork for a future whose infrastructure needs may be less or different from that of current vehicles
 - In addition to, or in substitution of, traditional infrastructure improvements, explore the potential to leverage emerging technology to meet transportation system needs
 - Integrate vehicle connectivity and automation-supportive elements into projects. However, be cognizant not to prematurely select a technology (e.g., 5G, DSRC, satellites) before it becomes a market or regulatory standard
 - Share accurate information about roadway conditions, including construction related lane closures, with industry partners or researchers operating automated vehicles within an MPO's region
 - Maintain awareness of locations and types of infrastructure readiness
- Support deployment scenarios that do not systematically disadvantage any transportation system users (such as youth, low income, minority, or elderly populations, households who primarily use public transportation, individuals with disabilities or rural communities) or negatively impact vulnerable road users, including pedestrians, bicyclists and persons with disabilities
- Encourage shared use and other strategies that will mitigate potential increases in transportation demand and vehicle miles traveled
- Support data sharing and explore opportunities for using vehicle connectivity and automation as an additional data source for management of the transportation system
 - With transportation partners, support development of a national voluntary repository of aggregate and secured data that will scrub/clean and secure/protect data (not vulnerable to FOIA)
- Build partnerships and collaborate with transportation partners
- Engage stakeholders for discussions on policy and investment decisions related to vehicle

connectivity and automation

- Facilitate dialogue among the MPO, transit agencies, and the private sector to discuss the future of transit as vehicle connectivity and automation is deployed
- TIP: To be consistent with the direction set by the MTP, vehicle connectivity and automation should be incorporated into the TIP and its development process.
 - Update the TIP process and project evaluation criteria to encourage innovative technology applications
 - Update the TIP process and project evaluation criteria to ensure relevance in evaluating both traditional improvements and emerging technologies
 - Ensure investments for near-term funding to address current needs while also evaluating them against the background of future scenarios with the deployment of vehicle connectivity and automation

Resources:

The following is provided as a resource for MPOs to use as they incorporate discussions of vehicle connectivity and automation into their policies and investment decisions to support both the existing transportation system and the deployment of vehicle connectivity and automation.

- Shared Use Mobility, Transportation Technology, and Intercity Transit Services, FTA June 2018 Under the Technology section, the subsection on MTP Findings (starting on page 191) provides an overview of the current state of the practice in how MPOs are incorporating various emerging technologies, including vehicle connectivity and automation, in their MTP. <u>Shared Use Mobility,</u> <u>Transportation Technology, and Intercity Transit Services, FTA June 2018.</u>
- Impact Areas Worksheet (Appendix C)
 The worksheet is intended to be a tool to help MPOs further explore the potential impacts of vehicle connectivity and automation.

Other Planning Products and Processes

- Use modeling and scenario planning to explore future unknowns
 - Document assumptions and inputs to prevent them from being misunderstood as outputs
 - Be aware of overlaps between scenarios that illustrate impacts shared by scenarios
- Consider different vehicle connectivity and automation deployment scenarios, similar to those used for Metropolitan Transportation Plans, in establishing air quality plans for non-attainment regions to demonstrate opportunities for improving the environment and achieving conformity so not to break the links for qualified transportation funds
- Monitor the status of vehicle connectivity and automation
 - Be aware of the different dimensions of readiness: vehicle systems technology (largely private sector driven), supportive infrastructure, responsive institutions, and community acceptance



- Identify variables such as drivers, levers, and triggers, their tipping points, and data sets to inform them for scenarios to help identify key milestones in the transformative technology
 - Drivers: Aspects of technology and society that are not controlled by transportation agencies (e.g., market share)
 - Levers: Activities over which transportation agencies and their government partners have influence (e.g., investment decisions, land use)
 - Triggers and tipping points: Key points that mark critical shifts in how the transportation system is operating
- Be aware of the potential for vehicle connectivity and automation to support performance measures, target setting, and national goals by providing an additional data source
- Begin to explore the potential for vehicle connectivity and automation to impact air quality and transportation conformity
- Incorporate a discussion of vehicle connectivity and automation into the region's ITS Architecture Plan
- Identify new data sets that are critical to inform decisions in the transportation planning process

Resources:

The following is provided as a resource for MPOs to use as they incorporate vehicle connectivity and automation into other aspects of their planning products and processes.

 Transportation Scenario Planning for Connected and Automated Vehicles (FHWA) Coming soon.

Institutional readiness

- The deployment of vehicle connectivity and automation will require adjustments to MPO organizational processes and structure
 - Identify needs for expanding staff skills sets or restructuring program areas to incorporate vehicle connectivity and automation into MPO processes (e.g., staff capacity for emerging technology or data analysis, interpretation, or visualization)
 - When possible, provide training or participation in regional, state, or national dialogues on vehicle connectivity and automation
 - Encourage staff to monitor the status of vehicle connectivity and automation
 - Ensure staff are aware of how vehicle connectivity and automation impacts their program areas

Resources:

The following is provided as a resource for MPOs to use as they assess their institutional readiness for vehicle connectivity and automation.

Vehicle Connectivity and Automation Resource Packet (Appendix A)

In addition to providing a resource for engagement, coordination, and collaboration, the Vehicle Connectivity and Automation Resource Packet is also a resource for MPO staff as they monitor the status of and participate in dialogues on vehicle connectivity and automation and increase awareness of how vehicle connectivity and automation impact their program area. As previously mentioned, it is meant to provide an overview of ongoing activities related to vehicle connectivity and automation from transportation agency partners, but is not meant to be an exhaustive compilation.

Impact Areas Worksheet (Appendix C)

The worksheet is intended to be a tool to help MPOs further explore the potential impacts of vehicle connectivity and automation.

- Sample Statewide Automated Vehicles Procurement Language (Appendix D)
 Sample Statewide Automated Vehicles Procurement Language used in Texas.
- Table 1: Potential Impacts of Vehicle Connectivity and Automation on Transportation and Mobility In addition to providing a resource for engagement, coordination, and collaboration, Table 1 (pages 9-13) can also help increase awareness of how vehicle connectivity and automation impact MPO program areas.

Appendices





- p. 21 | Appendix A: Vehicle Connectivity and Automation Resource Packet
- p. 32 | Appendix B: Vehicle Connectivity and Automation Fact Sheet: What is vehicle connectivity and automation and what does it mean for transportation?
- p. 35 | Appendix C: Impact Areas Worksheet
- p. 50 | Appendix D: Sample AV Statewide Procurement Language
- p. 94 | Appendix E: AMPO Vehicle Connectivity and Automation Working Group White Papers

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Appendix A

Vehicle Connectivity and Automation Resource Packet

The Vehicle Connectivity and Automation Resource Packet provides a compilation of ongoing activities from transportation agency partners, including federal, state, regional, and local agencies, academia, stakeholder associations, and private industry. Because technology is progressing at a rapid pace, this compilation is not intended to be exhaustive, but provide a broad brush picture of the status of vehicle connectivity and automation across the nation.

Associations

American Association of Motor Vehicle Administrators (AAMVA)

AAMVA "is a tax-exempt, nonprofit organization developing model programs in motor vehicle administration, law enforcement, and highway safety. The association also serves as an information clearinghouse in these areas, and acts as the international spokesman for these interests. AAMVA represents the state and provincial officials in the United States and Canada who administer and enforce motor vehicle laws...The association also serves as a liaison with other levels of government and the private sector."

- Relevance: AAMVA has an Autonomous Vehicles Information Sharing Group, Autonomous Vehicle Best Practices Working Group, and Automated Vehicle Information Library.
- http://www.aamva.org/Autonomous-Vehicle-Information-Library/
- https://www.aamva.org/Autonomous-Vehicle-Best-Practices-Working-Group/

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO is "a nonprofit, nonpartisan association representing highway and transportation departments in the 50 states, the District of Columbia, and Puerto Rico ... Its primary goal is to foster the development, operation, and maintenance of an integrated national transportation system. AASHTO serves as a liaison between state departments of transportation and the Federal government."

- Relevance: AASHTO has a number of working groups that are addressing vehicle connectivity and automation and collectively working on AASHTO policy recommendations.
- <u>https://www.transportation.org</u>

American Planning Association (APA)

The APA "provides leadership in the development of vital communities by advocating excellence in planning, promoting education and citizen empowerment, and providing our members with the tools and support necessary to meet the challenges of growth and change."

- Relevance: Resources developed by the APA include a Research Knowledge Base Collection on Autonomous Vehicles, Preparing Communities for Autonomous Vehicles Report, which summarizes discussions from their October 2017 symposium, and Automated Vehicle Policy Principles.
- https://www.planning.org/resources/av/

American Public Transportation Association (APTA)

APTA is a nonprofit association whose members are public organizations that are engaged in the areas of bus, paratransit, light rail, commuter rail, subways, waterborne passenger services, and high-speed rail. Members also include large and small companies who plan, design, construct, finance, supply, and operate bus and rail services worldwide. Government agencies, metropolitan planning organizations, state departments of transportation, academic institutions, and trade publications are also part of their membership.

- Relevance: APTA has convened a group of practitioners deploying automated vehicle pilot projects and is working with agencies on policy recommendations.
- https://www.apta.com

Governor's Highway Safety Association (GHSA)

The GHSA is "a 501(c)(3) nonprofit representing the state and territorial highway safety offices that implement federal grant programs to address behavioral highway safety issues."

- Relevance: The GHSA has released a report on Preparing for Automated Vehicles: Traffic Safety Issues for States report. They also wrote a joint letter with other stakeholder associations to the United States House of Representatives on the topic of automated vehicle policy.
- https://www.ghsa.org/issues/autonomous-vehicles

I-95 Corridor Coalition

The I-95 Corridor Coalition "is a partnership of transportation agencies, toll authorities, public safety, and related organizations, from the State of Maine to the State of Florida, with affiliate members in Canada. The Coalition provides a forum for key decision makers to address transportation management and operations issues of common interest."

- Relevance: The I-95 Corridor Coalition hosted a conference in June 2016 and a workshop in December 2017 on vehicle connectivity and automation. They also surveyed their members on their existing efforts related to vehicle connectivity and automation.
- http://i95coalition.org/projects/connected-and-automated-vehicles/
- http://i95coalition.org/2018/05/25/i-95-corridor-coalitions-cav-workshop-report-released/

Institute of Transportation Engineers (ITE)

ITE "promotes professional development and career advancement for its members, supports and encourages education, identifies necessary research, develops technical resources including standards and recommended practices, develops public awareness programs, and serves as a conduit for the exchange of professional information."

- Relevance: The ITE Connected Vehicle Support project is a research program managed by the USDOT. As part of this, ITE has developed a task force and discussion group whose membership is open to anyone.
- <u>https://www.ite.org/technical-resources/topics/connected-automated-vehicles/</u>

ITS America

ITS America "advance[s] the research and deployment of intelligent transportation technologies to save lives, improve mobility, promote sustainability, and increase efficiency and productivity by: convening leaders from the public sector, private companies, academia, and research organizations to create an environment that fosters innovation; promoting a legislative and regulatory environment that supports investment in and the deployment of intelligent systems; and conducting research, educating stakeholders, and building awareness of advancements in smart transportation technologies."

- Relevance: A compilation of resources, including comment letters and testimony, is available on their website.
- https://www.itsa.org/connected-vehicle-safety/
- https://www.itsa.org/policy-autonomous-vehicles/
- https://www.itsa.org/policy-connected-vehicles/

National Association of City Transportation Officials

NACTO is "an association of 62 major North American cities and ten transit agencies formed to exchange transportation ideas, insights, and practices and cooperatively approach national transportation issues" whose mission is "to build cities as places for people, with safe, sustainable, accessible and equitable transportation choices that support a strong economy and vibrant quality of life."

- Relevance: NACTO's Blueprint for Autonomous Urbanism is not a design guide, but illustrates vision and policy goals surrounding vehicle connectivity and automation. NACTO also developed a policy statement on autonomous vehicles.
- <u>https://nacto.org/publication/bau/ https://nacto.org/wp-content/uploads/2016/06/NACTO-</u> Policy-Automated-Vehicles-201606.pdf

National Conference of State Legislatures (NCSL)

Representing interests of legislators and staff, the NCSL "mission is to improve the quality and effectiveness of state legislatures, promote policy innovation and communication among state legislatures, and ensure state legislatures have a strong, cohesive voice in the federal system."

- Relevance: The NCSL maintains an autonomous vehicle legislative database.
- <u>http://www.ncsl.org/research/transportation/autonomous-vehicles-self-driving-vehicles-enacted-legislation.aspx</u>

National League of Cities (NLC)

The National League of Cities is "a resource and advocate for the nation's cities and their leaders."

- Relevance: NLC developed the Autonomous Vehicles: A Policy Preparation Guide, and in partnership with the Bloomberg Aspen Initiative on Autonomous Vehicles developed interactive future scenarios for autonomous vehicles.
- https://www.nlc.org/AVPolicy
- http://avfutures.nlc.org/

APPENDIX A

National Operations Center of Excellence (NOCoE)

"A partnership of AASHTO, the Institute of Transportation Engineers, and the Intelligent Transportation Society of America with support from the Federal Highway Administration (FHWA)," NOCoE provides "resources to serve the transportation systems management and operations (TSMO) community" and "technical services such as peer exchange workshops and webinars, ongoing assessments of best practices in the field, and on-call assistance."

- Relevance: Vehicle to Infrastructure Deployment Coalition (V2I DC)
- http://www.transportationops.org/V2I/V2I-overview

SAE International

"SAE International is a global association of more than 128,000 engineers and related technical experts in the aerospace, automotive and commercial-vehicle industries."

- Relevance: Standard J3016_201609: Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles identifies six levels of driving automation and has been adopted by the National Highway Traffic Safety Administration (NHTSA) and the USDOT's Policy on Automated Vehicles.
- https://www.sae.org/standards/content/j3016_201609/

Uniform Law Commission (ULC)

The ULC "provides states with non-partisan, well-conceived and well-drafted legislation that brings clarity and stability to critical areas of state statutory law ... It is a non-profit unincorporated association, comprised of state commissions on uniform laws from each state, the District of Columbia, the Commonwealth of Puerto Rico, and the U.S. Virgin Islands."

- Relevance: The ULC Committee on Highly Automated Vehicles is drafting model legislation for self-driving vehicles.
- http://www.uniformlaws.org/Committee.aspx?title=Highly%20Automated%20Vehicles

Metropolitan Planning Organizations (MPOs), State Departments of Transportation (State DOTs), and other transportation agencies

Arizona

City of Tempe

- Relevance: The City of Tempe has established a Tempe Innovation Steering Committee on Autonomous Vehicles, which is producing a white paper and partnering with the Arizona State University.
- https://ifis.asu.edu/content/cscr-projects

Maricopa County Department of Transportation, Arizona Department of Transportation, and University of Arizona

- Relevance: The Maricopa County Department of Transportation, Arizona Department of Transportation, and University of Arizona developed a Connected Vehicles Program that includes a test bed in Anthem, Arizona and the development of their SmartDrive Program, an application that communicates with emergency responders.
- https://www.maricopa.gov/640/Connected-Vehicles-Program

California

City of Los Angeles Department of Transportation (LADOT)

- Relevance: LADOT has developed a strategy to approach emerging technology, Urban Mobility in a Digital Age. It is focused around three key concepts: data, mobility, and infrastructure.
- <u>http://www.urbanmobilityla.com/strategy/</u>

Contra Costa Transportation Authority

- Relevance: GoMentum Station "is the nation's largest secure testing facility for autonomous and connected vehicle technology. The Contra Costa Transportation Authority and its partners lead a collaborative effort at GoMentum Station, bringing together automobile manufacturers, communications companies, technology companies, researchers and public Colorado agencies with the aim of accelerating the next generation of transportation technologies."
- <u>http://gomentumstation.net/about/</u>

Colorado

Colorado DOT

- Relevance: The Colorado DOT is developing a Smart Mobility Plan, which will be a short term plan for statewide technology deployment and include a technology toolbox.
- <u>https://www.codot.gov/programs/planning/documents/stac-archives/2018-stac/april_2018/april-2018-stac-packet-addendum</u>

Colorado Smart Cities Alliance

• Relevance: The Colorado Smart Cities Alliance is "a statewide, multi-jurisdictional, public-privateacademic coalition seeking to make Colorado a leader in the development of intelligent, 21st century infrastructure, improving everything from transportation and housing to public safety and the environment for the state's 5.5-plus million residents."

<u>http://coloradosmart.city/</u>

Mobility Choice Blueprint

- Relevance: Mobility Choice Blueprint's "mission is to create a mobility vision for metro Denver driven by public and private sectors by developing key strategies to leverage our current assets using new technologies and provide an integrated system of the future for all." Partners include the Colorado DOT, Denver Regional Council of Governments, and the Regional Transportation District.
- https://www.mobilitychoiceblueprint.com/

Florida

Central Florida Automated Vehicle Partnership (CFAVP)

 Relevance: The partners include the Central Florida Expressway, City of Orlando, Florida Agricultural Mechanic University – Florida State University (FAMU-FSU), FDOT, Florida Polytechnic University, Florida Turnpike Enterprise, LYNX, the NASA Kennedy Space Center, and the University of Central Florida. The CFAVP "offers a comprehensive multi-modal environment for research, development, testing, and deployment of emerging mobility technologies and solutions." Projects under the CFAVP include the SUNTRAX testing site, the Driver Assisted Truck Platooning pilot, the PedSafe collision avoidance system, SR434 Connected Vehicle Pilot, and the I-75 FRAME (Florida's Regional Advanced Mobility Elements) project.

- <u>http://centralfloridaavpg.com/ http://www.suntraxfl.com/</u>
- http://www.fdot.gov/traffic/its/projects_deploy/cv/MapLocations/DATP.shtm
- http://www.cflsmartroads.com/projects/CVAV.html

City of Orlando

- Relevance: The City of Orlando was one of five cities recognized as 2017 Smart Cities Council Challenge winners and through their collaboration with the CFAVP.
- http://www.cityoforlando.net/greenworks/smart-cities-initiative/

Florida Automated Vehicles (FAV) Initiative

 Relevance: Led by the FDOT, the "FAV Initiative is helping to educate the public by engaging stakeholders, developing research and pilot projects, and creating awareness of the technologies and how they support FDOT's vision statement."

<u>http://www.automatedfl.com/</u>

LYNX Autonomous Vehicle Initiative

- Relevance: The Autonomous Vehicle Initiative was developed by LYNX, the public transit provider for Orange, Seminole, and Osceola Counties in partnership with the City of Orlando, the Florida Department of Transportation (FDOT), and MetroPlan Orlando. Its objective is to understand the implications of autonomous vehicle technology and its application for future transit service through strategic research and integrated demonstrations. Possible implications identified for future exploration include partnerships, policies, technical issues, financial issues, infrastructure requirements, and workforce needs.
- <u>https://metroplanorlando.org/wp-content/uploads/2018-0622-MetroPlan-TSMO-Automated-</u> <u>Transit-Systems-Jamison.pdf</u>

Miami-Dade MPO

- Relevance: Miami-Dade MPO Connected and Autonomous Vehicle Task Force's mission is "to enhance interagency dialogue and collaboration, and to facilitate connected and automated vehicle project development and deployment within Miami-Dade County.
- http://www.miamidadetpo.org/connected-autonomous-vehicle-program.asp

Georgia

Atlanta Regional Commission (ARC)

- Relevance: In September 2017 and 2018, ARC held ConnectATL, which brought together over 300 local government officials and transportation experts to discuss the emerging transportation technology issues. This event is anticipated to continue annually.
- <u>https://atlantaregional.org/news/transportation-mobility/eight-takeaways-connectatl-arcs-summit-future-mobility/</u>

Illinois and Missouri

East West Gateway Council of Governments (EWGCOG)

- Relevance: EWGCOG released a St. Louis Region Emerging Transportation Technology Strategic Plan in June 2017.
- https://www.ewgateway.org/wp-content/uploads/2017/08/emergingtranstechstratplan.pdf

Kansas and Missouri

Mid-America Regional Council (MARC)

- Relevance: MARC developed an Autonomous and Connected Vehicle Framework that was released in October 2018.
- <u>http://marc.org/Regional-Planning/Innovation/Transportation-Innovation/Autonomous-and-</u> <u>Connected-Vehicle-Framework</u>

Michigan

Michigan DOT

- Relevance: Michigan DOT's Connected Vehicles Concept Program includes the evaluation of three subsystems (on board equipment, roadside equipment, and network subsystem) along with the Connected Vehicles Test Bed.
- <u>http://www.michigan.gov/mdot/0,1607,7-151-9621_11041_38217-,00.html</u>

Southeast Michigan Council of Governments (SEMCOG)

- Relevance: In April 2017, SEMCOG held the Reimagining Transportation: Transforming Southeast Michigan summit, which included panel discussions on vehicle connectivity and automation.
- https://semcog.org/Blog/reimagining-transportation-transforming-southeast-michigan-10132

Minnesota

Governor's Office

• Relevance: In March 2018, Minnesota Governor Mark Dayton issued an executive order to establish an advisory council on vehicle connectivity and automation.

https://www.dot.state.mn.us/newsrels/18/03/7-executiveorder.html

Nevada

Nevada DOT

 Relevance: Nevada DOT strives to be a national leader in testing, licensing, and regulation. Their initiatives include collaboration with the Northern Nevada Intelligent Mobility Living Lab on big data research, working with WayCare to harness in-vehicle data, participating in Audi Countdown to Green, which connects certain Audi models with NDOT's traffic signal network, and partnering with the USDOT, UNR, and National Center for Atmospheric Research on the Integrating Mobile Observations Project Connected Snowplows to test communications for snow plows.

https://www.nevadadot.com/mobility/avcv

New York

New York State Association of Metropolitan Planning Organizations (NYSAMPO)

- Relevance: NYSAMPO is "a coalition of the fourteen MPOs in New York State, which have committed to work together toward common goals." They have eight technical working groups. In October 2017, their Regional Transportation System Management and Operations (RTSMO) Working Group released a whitepaper on Establishing a Regional Planning Framework for Connected and Automated Vehicles.
- <u>http://www.ampo.org/wp-content/uploads/2018/04/Establishing-a-Regional-Planning-</u> <u>Framework-for-CAV-NYSAMPO.pdf</u>

Oregon

Oregon Metro

- Relevance: In June 2018, Oregon Metro released a Draft Emerging Technology Strategy as part of their 2018 long range plan.
- <u>https://www.oregonmetro.gov/sites/default/files/2018/07/02/Metro-Emerging-Tech-Strategy-06-2018-Public-Review-Draft.pdf</u>

Portland Bureau of Transportation

- Relevance: The Portland Bureau of Transportation has launched a Smart Automated Vehicles Initiative (SAVI). As part of this, their City Council adopted a Connected and Automated Vehicles Policies and developed Interim Administrative Rule TRN-14.34 – Connected and Autonomous Vehicles.
- <u>https://www.portlandoregon.gov/transportation/73493</u>

Texas

City of Arlington, Texas

- Relevance: The City of Arlington, Texas has partnered with Drive.ai on a one-year pilot program.
 The pilot will use vehicle connectivity and automation to provide transportation in the city's Entertainment District.
- <u>http://www.arlington-tx.gov/news/2018/08/22/arlington-partners-drive-ai-offer-street-self-driving-vehicle-service/</u>

North Central Texas Council of Governments (NCTCOG)

- Relevance: NCTCOG is including the consideration of vehicle automation as part of its long-term transportation strategy.
- https://www.nctcog.org/trans/plan/vehicles/auto

Waco MPO

- Relevance: The Waco MPO has a Subcommittee on Connected and Automated Vehicles.
- https://www.waco-texas.com/cms-mpo/page.aspx?id=208

Virginia

Virginia DOT

- Relevance: The Virginia DOT has developed a Connected and Automated Vehicle Program and Connected and Automated Vehicle Program Plan.
- http://www.virginiadot.org/programs/connected_and_automated_vehicles.asp

Washington

Puget Sound Regional Council (PSRC)

- Relevance: The topic of the PSRC Regional Freight Mobility Roundtable's October meeting was vehicle connectivity and automation.
- <u>https://www.psrc.org/whats-happening/blog/freight-roundtable-hosts-panel-self-driving-technology</u>

Washington State DOT

- Relevance: Washington State DOT has an internal Cooperative Automated Transportation Work Group and has pilot projects focused on winter operations, traffic signals, and automated work zone vehicles.
- https://www.wsdot.wa.gov/travel/automated-connected/home

Transportation Research Board (TRB)

TRB "facilitates the sharing of information on transportation practice and policy by researchers and practitioners; stimulates research and offers research management services that promote technical excellence; provides expert advice on transportation policy and programs; and disseminates research results broadly and encourages their implementation." TRB administers the NCHRP, which is "sponsored by the member departments (i.e., individual state departments of transportation) of AASHTO, in cooperation with the FHWA."

- Relevance:
 - NCHRP 20-24(98): Connected and Automated Vehicle Research Roadmap and NCHRP 20-102: Impacts of Connected Vehicles and Automated Vehicles on State and Local Transportation Agencies <u>http://apps.trb.org/cmsfeed/TRBNetProjectDisplay.asp?ProjectID=3752</u>
 - NCHRP Research Report 845: Advancing Automated and Connected Vehicles: Policy and Planning Strategies for State and Local Transportation Agencies <u>http://www.trb.org/Main/Blurbs/176418.aspx</u>
 - Strategies to Advance Automated and Connected Vehicles Briefing Document <u>http://www.trb.org/Main/Blurbs/176508.aspx</u>
 - Regional Transportation Systems Management and Operations Committee (AHB10)
 Subcommittee on Connected and Autonomous Vehicles
 <u>https://sites.google.com/site/trbrtsmocommittee/subcommittees/connected-autonomous-vehicles</u>

University Affiliated

Texas A&M Transportation Institute (TTI)

TTI "develops solutions to the problems and challenges facing all modes of transportation. The Institute conducts over 700 research projects annually with over 200 sponsors at all levels of government and the private sector."

- Relevance: Connected Transportation is one of TTI's focus areas. They have several connected transportation facilities including their Campus Transportation Technology Initiative, Connected Infrastructure Lab, Connected Vehicle Assessment Simulation Test Bed, Connected Work Zone, Proving Grounds Research Facility, Texas AV Proving Ground Partnership, and Transit, Bicycle and Pedestrian Safety Test Bed.
- <u>https://tti.tamu.edu/research-focus-areas/connected-transportation/</u>
- https://tti.tamu.edu/research-areas/connected-transportation/
- University of Maryland Center for Advanced Transportation Technology Laboratory (CATT Lab)

CATT Lab's mission "To foster the development and application of innovative approaches to existing and emerging transportation needs through research, education, and deployment assistance."

- Relevance: The CATT Lab's current efforts include focuses on data, Automated Small Vehicle Transportation, and partnership with the I-95 Corridor Coalition.
- http://www.catt.umd.edu/research

University of Michigan MCity Test Facility

The MCity Test Facility is a "proving ground for testing connected and automated vehicles and technologies in simulated urban and suburban driving environments."

https://mcity.umich.edu/our-work/mcity-test-facility/

University of Virginia Center for Transportation Studies

The Center for Transportation Studies research program activities include areas such as ITS, transportation planning and logistics, traffic simulation, freight, safety, sustainable transportation, infrastructure management, and traffic operations.

- Relevance: The Center for Transportation Studies has a Connected Vehicle/Infrastructure University Transportation Center (CVI UTC) Consortium and Connected Vehicle Pooled Fund
- http://www.cvi-utc.org/
- <u>http://www.cts.virginia.edu/cvpfs/</u>

U.S. Department of Transportation (USDOT)

The USDOT was established by an act of Congress on October 15, 1966. Its mission is to "serve the United States by ensuring a fast, safe, efficient, accessible and convenient transportation system that meets our vital national interests and enhances the quality of life of the American people, today and into the future."

- Relevance:
 - USDOT Intelligent Transportation Systems (ITS) Joint Program Office (JPO) Connected Vehicle Basics, Connected Vehicle Research Area, Vehicle-to-Infrastructure (V2I) Resources, Connected Vehicle Pilot Deployment Program, and Low-Speed Automated Shuttles: State of the Practice Final Report
 - https://www.its.dot.gov/cv_basics/cv_basics_20qs.htm
 - https://www.its.dot.gov/research_areas/connected_vehicle.htm
 - www.its.dot.gov/v2i
 - https://www.its.dot.gov/pilots/
 - https://rosap.ntl.bts.gov/view/dot/37060
 - Connected Vehicle Reference Implementation Architecture (CVRIA)_
 - http://local.iteris.com/cvria/
 - USDOT FHWA National Dialogue on Highway Automation
 - https://ops.fhwa.dot.gov/automationdialogue/index.htm
 - Preparing for the Future of Transportation: Automated Vehicles 3.0 (AV 3.0) identifies USDOT Automation Principles, discusses the roles for different levels of government and the private sector in automation, and discusses implementation strategies.
 - <u>https://www.transportation.gov/av/3</u>
 - National Highway Traffic Safety Administration (NHTSA) Automated Vehicles for Safety
 - https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety?_ga=1.36236516.5908
 60771%2520.1489006632

Other

Securing America's Future Energy (SAFE)

SAFE "unites prominent military and business leaders to develop and advocate for policies that improve America's energy security ..."

- Relevance: In June 2018, SAFE released America's Workforce and the Self-Driving Future: Realizing Productivity Gains and Spurring Economic Growth. The research explores the potential future economic and labor market impacts of automated vehicles.
- https://avworkforce.secureenergy.org/

KPMG

KPMG's "U.S. Manufacturing Institute's Automotive Center is an open forum where industry experts share knowledge, gain insights, and collaborate on timely and relevant issues facing the automotive and transportation market."

- Relevance: In 2017, KPGM released Islands of Autonomy: How Autonomous Vehicles Will Emerge in Cities Around the World.
- https://assets.kpmg.com/content/dam/kpmg/za/pdf/2017/11/islands-of-autonomy-web.pdf

Appendix B

What is vehicle connectivity and automation and what does it mean for transportation?

FACT SHEET

Connected vehicles are connected through interoperable wireless communications to other vehicles, transportation infrastructure, and transportation system users.

Automated vehicles use on-board and remote hardware and software to perform driving functions. The National Highway Traffic Safety Administration (NHTSA) has adopted the Society of Automotive Engineers (SAE) Automation Levels.

While there are vehicles in the current fleet with elements of both connectivity and automation, there is still considerable uncertainty in how exactly full scale deployment will play out. Although this makes it difficult to predict its impacts with certainty, transportation agencies are exploring what it means for the transportation system and its users.

Vehicle connectivity and automation has the potential to greatly benefit the transportation system and its users. However, transportation agencies are closely monitoring this technology to ensure its deployment occurs with minimal disruptions and negative impacts to the transportation system and its users.

Example Elements of Vehicle Connectivity and Advanced Driver Assistance/Partial Automation								
Advanced Driver Assistance/Partial Automation								
Adaptive Cruise Control								
Automatic Emergency Braking								
Blind Spot Detection								
Electronic Stability Control								
Forward Collision Warning								
Lane Departure Warning								
Lane Keeping Assist								
Rearview Video Systems								
Self-park								
Traffic Jam Assist								
Rear Cross Traffic Alert								

Potential Opportunities and Challenges as Vehicle Connectivity and Automation is Deployed

Challenges

Source: SAE

- Safety in a mixed fleet environment during early deployment
- Security from vulnerabilities and intrusions to connected elements
- Increased vehicle miles traveled due to improved traffic flow, additional mobility options, and zero occupancy vehicles
- Decrease in public transportation use due to the alternative mode options
- Impacts to current funding and financing mechanisms as individual ownership could transition to shared fleets or on demand services
- Cost of infrastructure required to support the new technology
- Potential for deployment to disadvantage some transportation system users or impact vulnerable road users
- Induce sprawl or encouraging "super-commutes"
- Certain transportation investments may become obsolete

Society of Automative Engineers (SAE) Automation Levels

Potential to retrofit the built environment and provide more complete streets

– for

improvements due to the potential to operate with fewer incidents, decreased following

With appropriate design, moderated or decreased growth in vehicle miles traveled and

Increased efficiency for freight movement through improved efficiency and applications

New funding and financing mechanisms and the potential to leverage private sector



Vehicle Connectivity and Automation



Opportunities

funds

Improved safety due to reduced user error

Improved first and last mile connections with transit

Expanded mobility for those currently unable to drive

distances, and narrower lane widths

such as freight platooning

example to repurpose parking

Additional data source

Increased capacity, reduced congestion, and fewer high capacity

increased ridesharing, public transportation use, bicycling, and walking

Appendix C Impact Areas Worksheet

Impact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
	Improved safety by reducing driver error and connecting vehicles to other vehicles, infrastructure, and road users	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	More stakeholder acceptance of vehicle connectivity and automation as crash and fatality rates for highway transportation come in alignment with the rates for other transportation modes	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
кЕТҮ	Improved communications systems accelerate emergency response	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
SA	Safety in a mixed fleet environment during early deployment stages	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Vehicle connectivity and automation used to "game" the system and enhance personal advantage at the expense of public safety or efficient system operation	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
	Users develop a false sense of security at lower levels of automation	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							

APPENDIX C

Impact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
	Stakeholder acceptance of fatalities and serious injuries in crashes where the cause is not human error or mechanical failure	Opportunity/ benefitChallenge/risk	□Low □Medium □High □Unknown □N/A	□ Low □ Medium □ High □ Unknown □ N/A							
ЕТΥ	Liability of fatalities and serious injuries in crashes where the cause is not human error or mechanical failure	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□ Low □ Medium □ High □ Unknown □ N/A							
SAFI	Protection of privacy interests	Opportunity/ benefitChallenge/risk	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
	Other:	□ Opportunity/ benefit □ Challenge/risk	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
Impact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
	Improved communication among vehicles, infrastructure, and travelers could enhance security	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
JRITY	Vehicle connectivity and automation used for illicit purposes	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
SECU	Security breaches in vehicles and infrastructure systems could disrupt the transportation system	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							

Other:

□ Opportunity/ benefit

□ Challenge/risk

□Low

□ N/A

□Medium

□ High □ Unknown

□Low

□N/A

□Medium

□ High □ Unknown
mpact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
	Increased capacity and reduced congestion due to vehicles operating with fewer incidents, reduced headways, and narrower lane widths	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Rich source of sensor data useful for improved operations and capital investment planning	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
OPERATIONS	"Surge" pricing associated with fleets of connected and/or automated vehicles delivers benefits associated with congestion pricing	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Allowing in-vehicle activities other than driving—reduces costs associated with travel time delays	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Highway capacity projects being planned or implemented today not cost effective or relevant as vehicle connectivity and automation is more fully deployed	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
	Cost of infrastructure and operational improvements necessary to support vehicle connectivity and automation	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Empty vehicles could cause net increase in traffic and vehicle miles traveled	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Other:	□ Opportunity/ benefit □ Challenge/risk	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							

Impact area	lssue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
	Expanded mobility for those currently unable to drive	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Reduced cost of mobility	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
Ш	Improved first and last mile connections with transit	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
ND MODE CHOIC	More efficient paratransit options	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Reduced need for personal vehicle ownership and associated expense	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
BILITY AI	Decreased/elimination of public transportation service due to shift in mode choice adversely affects transit dependent populations	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
ΟW	Certain public infrastructure needs and decisions may not be relevant for the future system	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
-	Increased vehicle miles traveled (VMT)	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
	Other:	□ Opportunity/ benefit □ Challenge/risk	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							

Impact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
	Improved efficiency through applications such as freight platooning	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
GНТ	Last mile robotic freight delivery reduces street congestion	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
FREI	Infrastructure stresses and higher maintenance needs due to increased and concentrated vehicle activity	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
۲ Impact area	Other:	□ Opportunity/ benefit □ Challenge/risk	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
Impact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
TRANSPORTATION DEMAND	More mobility options at lower cost increases economic opportunities	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Increased use with ridesharing through pricing mechanisms could possibly moderate or decrease growth in vehicle miles traveled	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
	With appropriate street design and improvements in safety, walking and bicycling could become more attractive and popular	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							

Impact area	lssue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
ORTATION IAND	Increased vehicle miles traveled due to improved traffic flow, additional mobility options, and potentially zero occupancy vehicles	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
TRANSPO DEM	Other:	□ Opportunity/ benefit □ Challenge/risk	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
lmpact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
	Fewer high capacity improvements needed through better operations	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
	Infrastructure improvements to help vehicle connectivity and automation (e.g., improved lane markings and pavement maintenance) also help human drivers	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
	Connecting vehicles to infrastructure can drive safety/operations improvements	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							

□Low

□High

□ N/A

□Low

□High

□N/A

□Medium

□Unknown

□Medium

□Unknown

□Low

□High

□N/A

□Low

□High

□ N/A

□Medium

□Unknown

□Medium

□Unknown

Opportunity/

□ Challenge/risk

Challenge/risk

benefit

benefit

Reduced need for

signs

demand

conventional signage

such as dynamic message

Long term infrastructure

as capacity needs outside

of traditional markets may

emerge to accommodate

Impact area	lssue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
JRE TS	Certain current transportation investments may become obsolete	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
INFRASTRUCTU REQUIREMENT	Improved infrastructure and infrastructure maintenance are costly	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Other:	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							

Impact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
FUNDING & FINANCING	New funding and financing mechanisms. For example, a shift to fleets of shared electric connected and automated vehicles provides opportunity to move to VMT charging, providing more stable funding source than gas tax	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Pricing/taxing based on vehicle occupancy level could incentivize increase in average vehicle occupancy	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Partner with private sector for infrastructure to speed deployment of vehicle connectivity and automation	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Cost of additional infrastructure required to support vehicle connectivity and automation	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							

Impact area	lssue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
NCING	Current funding and financing mechanisms negatively impacted as individual ownership could transition to shared fleets and on demand services	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
JNDING & FINAI	Acceleration of decline in adequacy of the gas tax as revenue source	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Loss of local revenue due to a decrease in parking, traffic citations, and licensing fees	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□ Low □ Medium □ High □ Unknown □ N/A							
Ĩ	Other:	□ Opportunity/ benefit □ Challenge/risk	□Low □Medium □High □Unknown □N/A	□ Low □ Medium □ High □ Unknown □ N/A							

lmpact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
ATION ETS	Participation by youth and elderly populations in the transportation system	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
NEW TRANSPORT	Greater mobility with less reliance on caregiver drivers for individuals with disabilities	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Additional infrastructure and operational capacity needed to meet demand	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							

Impact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
ATION ETS	Design and structure for pick-up and drop-off	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
NEW TRANSPORT/ SERVICE MARKE	System security and integrity of the ability to provide caregiver notifications	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Other:	□ Opportunity/ benefit □ Challenge/risk	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							

Impact area	lssue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
	Shared vehicles could give disadvantaged populations access to highway speed travel at lower cost than private vehicle ownership	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□ Low □ Medium □ High □ Unknown □ N/A							
EQUITY	Improved mobility for persons now with limited access to vehicular travel	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Vulnerable road users benefit from safety improvements built into vehicle connectivity and automation	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							

Impact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
	Deployment systematically disadvantaging some transportation system users such as youth, low income, minority, or elderly populations, households who primarily use public transportation, individuals with disabilities or rural communities	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
ΕQUITY	Impacts to vulnerable road users, including pedestrians, bicyclists and persons with disabilities	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	To the extent that public infrastructure investment and maintenance is required for deployment, equitably distributing resources and improvements	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
	Other:	□ Opportunity/ benefit □ Challenge/risk	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							

mpact area	lssue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
D SHARING	Vehicle connectivity and automation as a potentially rich data source for highway operations and planning. MPOs and other transportation agencies use expanded data to improve their understanding and modeling of transportation demand	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
COLLECTION, HOUSING, ANALYSIS, AN	Ensuring proper use and maintaining accuracy in data sharing	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Cost of managing large amounts of data	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Institutional capacity to manage and analyze big data	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Tension between data access, privacy, safety, and security concerns related to any personally identifiable information contained in the data	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
	The proprietary nature of private sector data sources	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
DATA	Other:	□ Opportunity/ benefit □ Challenge/risk	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							

Impact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
PUBLIC ACCEPTANCE	Public views vehicle connectivity and automation as improving the quality of their highway travel	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Public embraces ridesharing, increasing average vehicle occupancy and highway system efficiency	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Public rejects shared vehicle connectivity and automation altogether	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Public concerns over privacy, safety, and other potential challenges slow adoption	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Other:	□ Opportunity/ benefit □ Challenge/risk	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							

Impact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
LAND USE	Vehicle connectivity and automation have the potential to make cities and urban areas more appealing as places to live	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Opportunity to retrofit the built environment to provide more complete streets and maintain and improve a sense of place; opportunity for MPOs to be proactive	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							

mpact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
LAND USE	Shared vehicles reduce need for parking lots/ structure, freeing up space for repurposing to other, higher-value uses	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Metered mobility via fleets prompts people to move residences closer to jobs	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Highway capacity improvements done via technology instead of physical expansion of roadway	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Vehicle connectivity and automation induce sprawl and encourage "super-commutes." They also promote gentrification in a way that disproportionately impact the availability of low income housing	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
	Parking/storage for fleets, especially during periods of low demand for the vehicles/mobility services	Opportunity/ benefitChallenge/risk	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Land use changes and economic impacts as the need for rest stops, roadside hotels, car repair and service facilities, and gas stations could decline	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							
	Other:	□ Opportunity/ benefit □ Challenge/risk	□ Low □ Medium □ High □ Unknown □ N/A	□Low □Medium □High □Unknown □N/A							

Impact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
AIR QUALITY CONFORMITY	Improved air quality	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
	Adverse air quality impacts from VMT increases	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
	Other:	□ Opportunity/ benefit □ Challenge/risk	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							

Impact area	Issue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
ENGAGEMENT & COORDINATION	Building partnerships with local, state, transit, and federal agencies, industry, academia, and stakeholder associations	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Wide range of knowledge and perceptions of vehicle connectivity and automation	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Stakeholder acceptance and trust of vehicle connectivity and automation on deployment success	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							

Impact area	lssue	Opportunity/ benefit challenge/risk	Likelihood within 10 years	Likelihood beyond 10 years	Alignment with regional needs, vision, goals, and objectives	Conflicts with regional needs, vision, goals, and objectives	Drivers, triggers, or levers	Potential MPO actions	Potential partner actions	Resources needed	Plausible alternate scenarios?
ENGAGEMENT & COORDINATION	Private sector advancements/ deployments force policy/ public sector action in undesirable direction	 Opportunity/ benefit Challenge/risk 	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							
	Other:	Opportunity/ benefitChallenge/risk	□Low □Medium □High □Unknown □N/A	□Low □Medium □High □Unknown □N/A							

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EMPLOYMENT	New jobs created by vehicle connectivity and automation	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Staffing reductions and/or repurposing by freight companies, transit providers, taxi and ridesharing services, and related industries as automation increases	 Opportunity/ benefit Challenge/risk 	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							
	Other:	□ Opportunity/ benefit □ Challenge/risk	□ Low □ Medium □ High □ Unknown □ N/A	□ Low □ Medium □ High □ Unknown □ N/A							

Appendix D Sample Statewide Automated Vehicles Procurement Language



COOPERATIVE PURCHASING PROGRAM

Houston-Galveston Area Council of Governments 3555 Timmons, Suite 120, Houston, TX 77027 Phone: 800-926-0234 Fax: 713-993-4548

www.hgacbuy.org

CONFERENCE INVITATION:

PRE-BID

PRE-PROPOSAL

PROCUREMENT NO: AV11-18

ISSUE DATE: March 29, 2018

CATEGORY: Statewide Automated Vehicle Procurement

PURPOSE OF THE CONFERENCE

Prior to soliciting offerings for the supply of products and/or services described herein, the Houston-Galveston Area Council of Governments (**H-GAC**) will conduct a Conference for interested parties. At the Conference, **H-GAC** staff will solicit comments related to the requirements and specifications contained in this DRAFT document. Participants should be prepared to offer constructive suggestions regarding content and/or format. Information and comments received at the Conference will be considered by **H-GAC** staff when preparing the Invitation To Submit Competitive Responses. The objective is a clearly written and competitive specification.

Please closely study the contents of this document before attending the Conference. Proceedings will move swiftly and there will be no time for an effective review while it is underway. Prior review is important even if you are a previous supplier participant because significant changes may have been made since the last specification for this Product/Service was issued.

Participants should contact **H-GAC** a day or two ahead of the scheduled Conference date to confirm that the published date and time is still in effect.

More than 5,000 local governments, districts, state agencies and authorities participating in the H-GAC Cooperative Purchasing Program purchase products and services thru **H-GAC** contracts.

TENTATIVE PROCUREMENT SCHEDULE AND DETAILS

DRAFT SPECIFICATION / INVITATION:	March 29, 2018					
PRE-BID/PROPOSAL CONFERENCE:	May 2, 2018 @ 9:00 a.m. CT; H-GAC Offices					
FINAL SPECIFICATION / INVITATION:	June 12, 2018					
R esponses D ue:	July 12, 2018 @ 1:00 p.m. CT; H-GAC Clock					
PUBLIC RESPONSE OPENING:	July 12, 2018 @ 2:00 p.m. CT: H-GAC Clock					
R ECOMMENDATIONS TO BOARD :	September 20, 2018					
Contract Start Date & Term:	November 1, 2018 thru October 31, 2020					
The documents comprising this Invitation are	e available via (appropriate box(es) checked):					
🔀 - E-mail	🔀 - Web Download @ https://www.hgacbuy.org					
For questions regarding this Invitation, please contact:						
Name: Bill Burton Pho	one: 832-681-2514 E-mail: wburton@h-gac.com					

CONTENTS OF THIS INVITATION

- SECTION A General Terms & Conditions
- SECTION B Product/Service Specific Requirements (Draft)
- **SECTION C H-GAC** *FORMS* (Draft)
- SECTION D Pro-Forma (Sample) Contract

NOTICE TO MANUFACTURERS

H-GAC is conducting this procurement with the objective of establishing one or more blanket type contracts for use by our Members. Because our Members are located not only in Texas, but throughout the country, we strongly urge you to participate in the process at the manufacturer's level. If you do not sell direct, your dealer network may still service customers while you handle the administrative functions of providing quotes, accepting purchase orders, and collecting payments. If this is not feasible, we will work with you to subsequently assign your contract to your dealers as necessary to service customers.

Whatever approach you choose to take, there is <u>considerable potential sales value</u> because the **H-GAC** Cooperative Purchasing Program is being used not only in the State of Texas, but **NATIONWIDE**. This means that **H-GAC** contractors will have a <u>special advantage</u> available to them in promoting sales to government agencies throughout the country... the ability to sell products without the need for the buyer to duplicate the competitive bidding process and expend all the associated staff time and taxpayer dollars. We believe an **H-GAC** contract would <u>enhance your competitive position</u> in the government marketplace, and are eager to work with you to promote the best interests of our participating local governments and qualifying non-profit organizations.

We look forward to your participation in our process. Please contact the **H-GAC** staff member listed on the cover of this Invitation for additional information.



SECTION A

GENERAL TERMS & CONDITIONS For Bids and Proposals

INVITATION NO. AV11-18

DESCRIPTION: Statewide Automated Vehicle Procurement

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1. INTRODUCTION

The Houston-Galveston Area Council (H-GAC) is a "Government-to-Government" procurement service for States, State Agencies, Local Governments, Districts, Authorities, and qualifying Not-for-Profit Corporations (End Users). End Users become Members of the H-GAC Cooperative Purchasing Program (HGACBuy) by executing an Interlocal Contract, which is free of cost and evergreen unless cancelled. HGACBuy, acting on behalf of Members, is soliciting competitive offerings for the furnishing of products and/or services, as described elsewhere, which MAY be purchased by Members during the contract term. Members using the Program issue purchase orders directly to HGACBuy contractors.

2. DEFINITIONS, ABBREVIATIONS & ACRONYMS

The following definitions, abbreviations and acronyms may be found in these specifications, and shall be interpreted herein as specified below.

Definitions and Abbreviations:

Acceptance. Acceptance takes place when the **End User** agrees with the **Contractor** that the terms and conditions of the contract have been met and verified. Acceptance is not the same as Receipt, and can only occur after intact shipping, inspection by **End User**, and any onsite testing that has been stipulated as part of the order

Aggregate/Single Occurrence. The term "aggregate" in insurance terms is the sum of all claims against a specific policy for a specific loss incident. The term "single occurrence" differentiates between multiple claims and single claims against a specific policy. The inherent value of a policy's aggregate value is less important to an **End User** than is the value of a single claim as stated under "single occurrence."

Approved. Acceptable to the "authority having jurisdiction."

ARO. "After Receipt of Order". Used in conjunction with a defined time period (usually days or weeks) to establish the delivery or lead time pursuant to any individual purchase transaction. In the case of orders for bodies which will be mounted on a customer furnished cab/chassis, the term ARO shall be construed to mean "After Receipt Of Cab/Chassis".

Authority Having Jurisdiction. The authority shall be either H-GAC or the relevant End User based on the requirements as stated in each specification item. Unless specifically stated, the authority shall be H-GAC.

Bidder. Any entity that submits a competitive bid to this Invitation. (See also "Offeror")

Change Order. Request by an **End User** for a change in the composition of an already submitted purchase order, for example to change quantity ordered, add or delete items, etc.

Contract. Specifically, a contract between **H-GAC** and a successful **Offeror** which is executed based on an award made pursuant this Invitation.

Contract Pricing Worksheet. The standard **H-GAC** form to by used by **Contractor** in preparing a quotation to an End User, upon which End User's purchase order will be based. **Contractor** may use another quotation form provided it contains required information, and only if approved by **H-GAC**.

Contractor. The contracted business entity responsible for fulfilling a contract executed pursuant to this Invitation.

Dealer/Distributor. A duly authorized and/or franchised business entity which sells and services a manufacturer's product in a specified marketing area.

Defect. A discontinuity in a part or a failure to function that interferes with the service or reliability for which the part was intended.

Electronic Media. As used herein, means computer based media such as 100mb Zip Disk, CDRom, e-mail, e-mail attachment, file downloaded from the web, etc.

End User. (See "Participant" and "Member")

Listed. Equipment or materials included in a list published by an organization, acceptable to the "Authority Having Jurisdiction" and concerned with product evaluation, that conducts periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or materials meet appropriate standards or has been tested and found suitable for use in a specified manner. NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The "authority having jurisdiction" should utilize the system employed by the listing organization to identify a listed product.

Manufacturer. The person or persons, company firm, corporation, partnership, or other organization responsible for taking raw materials or components and making a finished product.

May. A term indicating a permissive use or an acceptable alternative to a specified requirement.

Member. An authorized Participant in the Program. (See "Participant" and "End User")

Motor Vehicle. The meaning of this term shall be based on the legal definition ascribed to it by the laws and/or regulations of the state in which any specific sale made pursuant to a Contract takes place.

Must. A term indicating a mandatory requirement.

Offer or Offering. Any product or service offered in reply to this Invitation.

Offeror. Any entity that submits a competitive bid or proposal in response to this Invitation. Bidder or Proposer.

Participant. Generally, any qualifying governmental or non-profit entity which has executed an Interlocal Contract for cooperative purchasing services with **H-GAC**.

Product Liability Insurance. Failure of Components and/or assembled equipment resulting in personal injury, disability or death and/or property damage is covered under the product liability insurance provisions.

Product or **Product Item.** Any of the specific goods, materials, equipment or service(s) specified in this Invitation. This term encompasses the base line item itself, and any and all accessories, options, modifications, ancillary services, assembly, testing, etc. that may be included in the delivered Product.

Proposer. Any entity that submits a competitive proposal in response to this Invitation. (See also "Offeror")

Purchaser. The **End User** having responsibility for the specification, requisition, ordering and acceptance of the Product or Service. (See also "**End User**")

Purchasing Authority. The agency that has sole responsibility and authority for negotiating, placing and, if necessary, modifying any solicitation, purchase order, or other award issued by a governing body **[H-GAC]**.

Quotation. See "Contract Pricing Worksheet".

Receipt. Receipt takes place when a Product or Service is delivered to an **End User** and a document is executed that establishes that the Product is now in the possession of the **End User** or that the Service has been completed. Receipt DOES NOT connote or imply Acceptance.

Response. All or part of any offering submitted in response to this Invitation.

Shall. A term indicating a mandatory requirement or action.

Should. A term indicating a recommended or advised response to a specified requirement.

Vendor. A manufacturer's representative or dealer authorized to make sales and supply parts and service.

Acronyms:

 $ANSI = \underline{A}$ merican \underline{N} ational \underline{S} tandards \underline{I} nstitute

 $ASTM = \underline{A}$ merican <u>S</u>ociety for <u>T</u>esting and <u>M</u>aterials

 $ASME = \underline{A}$ merican \underline{S} ociety of \underline{M} echanical \underline{E} ngineers

 $\mathbf{CFR} = \mathbf{U.S.} \ \underline{\mathbf{C}}$ ode of $\underline{\mathbf{F}}$ ederal $\underline{\mathbf{R}}$ egulations

DOJ = U.S. **D**epartment **O**f **J**ustice

DOT = U.S. <u>**D**</u>epartment <u>**O**</u>f <u>**T**</u>ransportation

 $EPA = U.S. \underline{E}$ nvironmental \underline{P} rotection \underline{A} gency **FAA** = Federal Aviation Administration FMVSS = U.S. Federal Motor Vehicle Safety Standards H-GAC = Houston-Galveston Area Council of Governments **IEEE** = Institute of Electrical and Electronics Engineers MVD = Motor Vehicle Division of Texas Department of TransportationNFPA = National Fire Protection Association**NHTSA** = \underline{N} ational \underline{H} ighway \underline{T} raffic \underline{S} afety \underline{A} dministration NIOSH = National Institute For Occupational Safety And Health **NIST** = <u>National Institute of Standards and Technology</u> NTEA = <u>National Truck Equipment Association</u> **OSHA** = U.S. <u>O</u>ccupational <u>Safety</u> and <u>H</u>ealth <u>A</u>dministration **RRC** = <u>Railroad</u> <u>Commission</u> of Texas $SAE = \underline{S}$ ociety of <u>A</u>utomotive <u>E</u>ngineers **TBPC** = $\underline{\mathbf{T}}$ exas $\underline{\mathbf{B}}$ uilding and $\underline{\mathbf{P}}$ rocurement $\underline{\mathbf{C}}$ ommission (formerly GSC) TxDOT = Texas Department Of TransportationUL = Underwriter's Laboratories Inc. VTCS = Vernon's Texas Civil Statutes

3. NON-BINDING ORAL COMMENTS

No <u>oral</u> comment, utterance or response made by any employee, member, or agent of **H-GAC** or any Member of the Cooperative Purchasing Program shall be considered factual or binding with regard to this Invitation, or any contract awarded as a result of this Invitation. Valid and binding terms, conditions, provisions, changes or clarifications, or requests thereof, shall ONLY be communicated <u>written</u> form.

4. STRUCTURE OF RESPONSE

Depending on the Product or Service, market structures and sales practices can differ substantially. For example, dealers may sell into any market or may be restricted to certain territories, manufacturers may sell direct or may be limited by law to selling thru independent dealerships, etc. **H-GAC**'s objective is to ensure that **End Users**, no matter where located, can buy contracted products/services and receive quality and timely service and support, while at the same time allowing for the most appropriate and effective response to this Invitation. Therefore, responses to this Invitation will be accepted in conformance with the following scenarios and requirements:

A. Single Respondent Acting Alone Or As "Lead" For A Group:

Offeror shall complete and sign a **Form A** and, if contracted, shall be solely responsible for all contractual requirements including administration, processing of purchase orders and handling of payments for transactions which may involve other dealers who actually deliver the products or services.

B. Multiple Respondents Acting Jointly:

A single Response shall be submitted, and each party to the Response shall complete and sign a separate **Form A** to be included in the single Response. If the Response is successful each party shall sign a separate contract with **H-GAC** and shall be responsible for compliance with all terms and conditions. Only those which have executed a written contract with **H-GAC** may process purchase orders and payments.

In any event, Offeror may be a party to one, and only one, response.

5. **BASIC REQUIREMENTS & CONDITIONS**

- a. The final requirements and specifications contained herein may be different, perhaps materially, from those in the "Invitation To Attend Pre-Bid / Pre-Proposal Conference", if any. It is **Offeror**'s sole responsibility to thoroughly examine and review all documentation associated with this Invitation, including any Addendums, and to insure that any response submitted complies in every respect with all requirements.
- b. Any Addendum to this Invitation which may be required prior to the Response due date will be delivered to those prospective Offerors of record who have previously obtained a copy of this Invitation from **H-GAC**. Prospective Offerors shall be responsible for obtaining all documents relating to submission of a Response.
- c. **Offeror** shall thoroughly examine any drawings, specifications, schedules, instructions and any other documents, supplied as a part of this Invitation, and is solely responsible for understanding and compliance.

- d. **H-GAC** shall not be liable for **Offeror's** incomplete documentation, or for any costs associated with preparation and submission of any Response hereto. Additionally, all components of any Response become the property of **H-GAC**, and shall be considered to be in the public domain.
- e. **Offeror** shall make all investigations necessary to become thoroughly informed regarding any plan and/or infrastructure that may be required to support delivery of any Product or Service covered by this Invitation. No plea of ignorance by **Offeror** stemming from failure to investigate conditions that may now or hereafter exist, shall be accepted as a basis for varying **H-GAC's** requirements, or **Offeror's/Contractor's** obligations or entitlements.
- f. Requests for changes to the requirements or specifications herein must be in writing (e-mail, fax, letter) and must be received by **H-GAC** no later than fifteen (15) calendar days prior to the Response Due Date. **H-GAC** will review such requests, but may or may not make changes at its sole discretion. Changes, if any, will only be made by written Addendum sent to addressees of record. In any event, it is **Offeror's** sole responsibility to insure that any and all Addendums which may have been issued have been received and addressed.
- g. By submission of a response, **Offeror** expressly understands and agrees that all terms and conditions herein will be part of any subsequent contract that is executed pursuant to this Invitation.
- h. **Offeror** is advised that all **H-GAC** contracts are subject to the legal requirements established in any applicable Local, State or Federal statute.
- i. **Offeror/Contractor** must be in compliance with all licensing, permitting, registration and other applicable legal or regulatory requirements imposed by any governmental authority having jurisdiction. It is **Offeror/Contractor's** responsibility to insure that this requirement is met, and to supply to **H-GAC** upon request, copies of any license, permit or other documentation bearing on such compliance.
- j. Unless otherwise established elsewhere in this Invitation, NO minimum purchase quantities or spending levels are provided or guaranteed by **H-GAC** or any **End User**.
- k. This Invitation is not meant to restrict competition, but rather is intended to allow for a wide range of responses.
- 1. Responses which are 'qualified' with conditional clauses or alterations of or exceptions to any of the terms and conditions in this Invitation may be deemed non-compliant at **H-GAC**'s sole discretion.
- m. The term '**Offeror**', or derivative thereof, shall become synonymous with '**Contractor**' for any successful **Offeror** recommended for a contract pursuant to this Invitation.
- n. **H-GAC** reserves the right to:
 - Reject any and all offers received in response to this Invitation.
 - Reject any part of an offer received in response to this Invitation.
 - Determine the correct price and/or terminology in the event of any discrepancies in any response.
 - Accept a response from, and enter into agreement with, other than the lowest price Offeror.
 - Accept responses and award contracts to as many or as few Offerors as H-GAC may select.
 - Amend, waive, modify, or withdraw (in part or in whole) this Invitation, or any requirements herein.
 - Hold discussions with Offerors, although award may be made without discussion.
 - Request an Offeror to give a presentation of the Response at a time and place scheduled by H-GAC.
 - Exercise any of these rights at any time without liability to any **Offeror**.
- o. H-GAC reserves the right to determine that conditions exist which prevent the public opening of responses on the date and at the time advertised, and to reschedule the public opening for a future date and time. Responses received by H-GAC by the original deadline will be secured unopened until the rescheduled opening date and time, and those having timely submitted such responses will be notified.

6. OFFEROR'S AUTHORIZED SIGNATORY

The signatory shall be authorized to sign and contractually bind **Offeror**, and shall sign any and all Response documentation requiring a signature.

7. SURETY FOR INSURANCE

Contractor shall be responsible for using a surety company properly licensed by any and all states in which Contractor will do business with Participants. The surety company shall not expose itself to any loss on any one risk in an amount exceeding ten percent (10%) of its surplus to policy holders, provided any risk or portion of any risk shall have been reinsured, and such reinsurance shall be deducted in determining the limitation of risk applicable to **H-GAC**'s insurance requirements.

8. CONFIDENTIAL / PROPRIETARY MATERIALS

All documentation submitted as part of **Offeror's** response to this Invitation will be considered to be in the public domain and may be made available to Members and others, after contract award, upon properly submitted request. If **Offeror** submits documents marked "confidential" or "proprietary", the Response may be deemed non-compliant.

9. **REFERENCES**

- a. **Offeror** shall list the names of at least five government agencies within the continental United States which have purchased from **Offeror** products or services similar to those covered by this Invitation, within the last two years. **H-GAC** reserves the right to determine if such products or services are appropriately similar.
- b. **Offeror** may provide reference information in whatever format desired, but each should include the following specific information:
 - Agency name
 - Contact person name
 - Address
 - Phone & Fax numbers
 - Description of product(s) or service(s) and date sold
- c. Other information, including criticism however learned, may be used by **H-GAC** in evaluation of responses.

10. INSURANCE

a. Unless otherwise stipulated in Section B, **Offeror/Contractor** must have the following insurance and coverage minimums:

General liability insurance with a Single Occurrence limit of at least \$1,000,000.00, and a General Aggregate limit of at least two times the Single Occurrence limit.

Product liability insurance with a Single Occurrence limit of at least 1,000,000.00, and a General Aggregate limit of at least two times the Single Occurrence limit for all Products except Automotive Fire Apparatus. For Automotive Fire Apparatus, see Section B – Product Specific of this Invitation.

Property Damage or Destruction insurance is required for coverage of **End User** owned equipment while in **Contractor**'s possession, custody or control. The minimum Single Occurrence limit is \$500,000.00 and the General Aggregate limit must be at least two times the Single Occurrence limit. This insurance may be carried in several ways, e.g. under an Inland Marine policy, as part of Automobile coverage, or under a Garage Keepers policy. In any event, this coverage must be specifically and clearly listed on insurance certificate(s) submitted to **H-GAC**.

- b. Insurance coverage shall be in effect for the length of any contract made pursuant to this Invitation, and for any extensions thereof, plus the number of days/months required to *deliver* any outstanding order after the close of the contract period.
- c. Original Insurance Certificates must be furnished to **H-GAC** on request, showing **Offeror/Contractor** as the insured and showing coverage and limits for the insurances listed above.
- d. If any Product(s) or Service(s) will be provided by parties other than **Offeror/Contractor**, all such parties are required to carry the minimum insurance coverages specified herein, and if requested by **H-GAC**, a separate insurance certificate must be submitted for each such party.
- e. **H-GAC** reserves the right to contact insurance underwriters to confirm policy and certificate issuance and document accuracy.

11. OFFEROR CERTIFICATIONS

Offeror, by submission of a Response hereto, makes the following certifications under penalty of perjury and possible contract termination if any of these certifications are found to be false.

Non-Collusive Response

a. The prices in the Response have been arrived at independently without collusion, consultation, communication, or agreement for the purpose of restricting competition, as to any matter relating to such prices with any other **Offeror** or potential competitor.

- b. The prices which have been quoted in the Response (unless otherwise required by law), have not been knowingly disclosed by **Offeror** and will not be knowingly disclosed by **Offeror** prior to the public response opening, either directly or indirectly, to any other **Offeror** or competitor.
- c. No attempt has been made or will be made by **Offeror** to induce any other person, partnership or corporation to submit or not to submit a response for the purpose of restricting competition.

Non-Biased Specifications

This Invitation contains no requirements considered to be unduly biased in favor of **Offeror** or any other **Offerors** that may be competing for this procurement.

No Financial Interest or Other Conflict

- a. No **H-GAC** officer, employee, Board of Directors member or member of any **H-GAC** board or commission, nor family member of any such person, has a financial interest, direct or indirect, in **Offeror** or in any contract **Offeror** might enter into with **H-GAC**.
- b. No economic or employment opportunity, gift, loan, gratuity, special discount, trip, favor or service has been, or will be, offered or given to any officer, employee, Board of Directors member, or member of any **H-GAC** board or commission, nor to any family member of any such person.

Debarment and Suspension Status

- a. **Offeror** is not currently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transactions by any government agency, nor is **Offeror** an agent of any person or entity that is currently debarred, suspended, proposed for debarment, declared ineligible or voluntarily excluded from covered transaction by any government agency.
- b. **Offeror** has not within a three year period preceding this Invitation been convicted of or had a civil suit judgement renedered against **Offeror** for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain or performing a public 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 statement, or receiving stolen property.
- c. **Offeror** is not presently indicted for or otherwise criminally or civilly charged by a government entity (federal, state, or local) with commission of any of the offenses enumerated above.
- d. Offeror has not, within a three year period preceding this Invitation, had any government (federal, state, or local) transactions terminated for cause or default.

Insurance Coverages

Offeror has and will maintain insurance coverage in accordance with the requirements of this Invitation.

Licensing & Permits

Offeror(s) has (have) all licenses and/or permits, required by any and all governmental entities having jurisdiction, to legally sell the products/services offered.

12. HISTORICALLY UNDERUTILIZED BUSINESS (HUB) PARTICIPATION

- a. To satisfy Texas' statutory requirements [Government Code, Chapter 2161, Subchapter D], **H-GAC** requires all **Offerors** to supply information in any bid/proposal response listing (1) the total number of subcontracts and (2) the total number of HUB contracts applicable to the Products or Services offered in the response. Local governments often require this information for their own reporting requirements prior to placing orders through the **H-GAC** Cooperative Purchasing Program.
- b. **Offeror** must complete **Form B** and include subcontracts with HUB's that provide any materials or services related to sales that may be made thru **H-GAC**'s Cooperative Purchasing Program.

13. NON-RESIDENT RECIPROCAL SALES ACT

As required by Texas Civil Statutes in the award of contracts, an offeror which is not a Texas resident business must determine if its state of residence prohibits award of government contracts to Texas resident offerors without penalty. If **Offeror's** resident state DOES penalize Texas offerors, **Offeror** must provide this information along with a copy of its applicable resident state's statute in the Response.

14. TEXAS MOTOR VEHICLE COMMISSION CODE & LICENSING

Sales of motor vehicles in the State of Texas are subject to the Texas Motor Vehicle Commission Code. If this Invitation includes any motor vehicle to be sold in the State of Texas, **Offeror** certifies by submission of a response hereto that all required Texas Motor Vehicle Commission licenses are in place and current, and that copies of all such licenses <u>have been submitted with the Response</u>. Further, it shall be **Contractor**'s responsibility to keep current all required Texas Motor Vehicle Commission licensing during the term of the contract, and to furnish license copies at any time on request by **H-GAC**. If **Contractor** does not maintain current licensing, **H-GAC** reserves the right to immediately terminate the contract.

NOTE: In accordance with the Texas Motor Vehicle Commission Code, contracts for motor vehicles to be sold within the state of Texas may be made **ONLY** with properly licensed Texas Motor Vehicle Dealers. Therefore, to be considered for a contract covering Texas End Users, the Response must include a **Form A** from a licensed Texas Motor Vehicle Dealer

15. INTENT AND SCOPE OF SPECIFICATIONS

- a. The intent of the specifications herein is to provide **Offeror** with sufficient information concerning the Products/Services to be contracted such that **Offeror** can prepare and submit an acceptable Response.
- b. The specifications may be detailed or general in nature with regard to any particular Product/Service. Where not otherwise specified, details of construction, materials, or the way in which services will be provided, are left to the discretion of the **Offeror**, provided only that any offering shall conform, as a minimum, to best Industry standards and practices and to what is currently being sold in the marketplace.
- c. Responses shall be considered only from **Offerors** that have established good reputations in their markets, and who furnish satisfactory evidence of ability to supply the Products/Services specified herein.
- d. **Offeror** shall show proof of ability to provide to **End Users** prompt and competent service, including parts if applicable, for all Products/Services covered by this Invitation, by proper completion of a Service Organization Document as described elsewhere herein.

16. REQUIREMENTS APPLICABLE TO PHYSICAL GOODS

In the case of physical goods (e.g. equipment, material, supplies, as opposed to services), all Products offered must, unless otherwise stipulated in Section B:

- a. Be new, unused, and not refurbished.
- b. Not be a prototype insofar as the general design, operation and performance. This requirement is NOT meant to preclude **Offeror** from offering new models or configurations which incorporate improvements in a current design or add functionality, but which in such new model or configuration may be new to the marketplace.
- c. Include any and all accessories which may or may not be specifically mentioned herein, but which are normally furnished or which are necessary to make a delivered Product ready for its intended use. Such accessories shall be assembled, installed and adjusted such that the Product is ready for continuous operation at time of delivery.
- d. Have assemblies, sub-assemblies and component parts that are standard and interchangeable throughout the entire quantity of a particular Product as may be purchased simultaneously by any individual **End User**.
- a. Be designed and constructed using current industry accepted engineering and safety practices, and materials.
- b. Be available for inspection at any time prior to or after procurement.

17. PRODUCT CODES

Unless otherwise addressed in Section B of this Invitation, the following requirements shall apply:

- a. Each Product/Service offered shall be uniquely identified using an H-GAC Product Code, which shall be determined as described in Section B of this Invitation. Offeror shall offer <u>ONLY ONE</u> Product for any particular Product Code. For example, Offeror may wish to submit a bid for Product Code ABC and may have another offering that also meets the requirements for ABC. Offeror <u>MAY NOT</u> submit two offerings for ABC. The alternate offering that also meets the requirements for ABC must be offered as an option "upgrade/downgrade" to ABC on Form E.
- b. Pricing for optional upgrades or downgrades to base bid items should be quoted as an "adder" or "deduct" amount as appropriate, to be applied to the offered price of the base Product Item listed on **Form D**.
- c. Base bid items and their associated HGACBuy Product Codes are included in the Section B and/or on Form D.

d. Selection of Product Codes for which to submit an offer is at Offeror's sole discretion.

18. SPECIFIC DESCRIPTIVE REFERENCES

Except for Base Product Items listed on Form **D**, any reference to a specific catalog, data sheet, form, brochure, model name or number, etc. used herein to describe an item such as an option or accessory is only descriptive and is not to be considered restrictive unless otherwise noted. Such references are normally used only to indicate a type, general description, level of quality and/or required performance standards.

19. MANUALS

Unless otherwise specified or superceded herein, each Product delivered under an **H-GAC** contract, and if applicable any options thereto, shall be supplied with at least one (1) copy of a safety and operating manual. The cost of any such manuals must be included in the base price for any Product Item offered hereunder. If more detailed and technically orientated parts and maintenance manuals are available for a Product or option, at a cost, they shall be offered as options on the *FORM* designated herein for such options, or elsewhere in the Response as may be directed herein.

20. STANDARD FEATURES & OPTIONS

The following requirements are applicable primarily to physical goods.

Standard Features

- a. The stated minimum requirements for all Products listed herein include what **H-GAC** considers to be "standard" features. Even though such features might normally be offered as options rather than as standard, they are nonetheless considered to be standard in this Invitation, and must be included in the base price for any Product offered. Such features **SHOULD NOT** be offered as options except as deducts for their omission from the base Product.
- b. If it is unclear in the Response that an **H-GAC** standard feature is included in the base price, it will be assumed that such is the case. If awarded a contract **Offeror** will be expected to sell the Product with all **H-GAC** specified standard features included in the base price.
- c. Any feature or accessory normally offered by manufacturer as "standard" shall be considered a standard feature and shall be included in the base price of any offering, even though not specifically listed as a requirement in H-GAC's specifications. Such features <u>SHOULD NOT</u> be offered as options except as deducts for their omission from the base Product.

Options - General

- a. Options are considered to be any features or accessories, other than **H-GAC**'s and Manufacturer's "standard" features or accessories.
- b. Options should be offered on the *FORMS* designated for quoting options. Each option should be listed and described on a separate line, and should include any Manufacturer's/Dealer's code number. If no Manufacturer's/Dealer's code number exists, **Offeror** should create one.
- c. Prices for all offered options shall be assumed to include any installation or mounting required to make it a fully functional component of the Product, unless otherwise stated in **Offeror's** response.

Required Options

- a. Product specifications in this Invitation may include **H-GAC** "Required Options". If so, **Offeror** must quote a price for <u>ALL</u> such options, and, if there is an **H-GAC** Option Code provided in this Invitation for such options, it <u>MUST</u> be used as part of the description.
- b. For any specific "Required Option", **Offeror** may quote an equivalent so long as its design and performance are as good as, or better than, the specified option item. Responses which do not include pricing for Required Options <u>may be considered non-compliant</u>.

Other Options

a. "Suggested" or "Other" options may be listed for any particular Product in this Invitation, and **Offeror** is encouraged to quote pricing for such options. The extent of offered options in any response may be taken into consideration as part of the award criteria, at **H-GAC**'s sole discretion.

b. **Offeror** is encouraged to include options for non-equipment items that may be applicable to a sale, such as: Extended Warranties, Maintenance Agreements, Buy-back or Trade-In Agreements, Out-of-state Delivery Charges, Quantity or Special Discounts, Extended Training Classes, etc.

Published & Unpublished Options

- a. H-GAC Cooperative Purchasing Program (Program) contracts are awarded through a public competitive bid or proposal (RFP) process. Further to that process, Program policy considers an 'option' listed and priced in a bid or RFP Response: (1) To be a "Published Option"; (2) To be part of any awarded contract; and (3) To be available for purchase by Program members separately and independently from associated base line items. However, since Published Options may have not been subjected to the same scrutiny as the associated base line items, it cannot be concluded they were directly competed. Therefore, pursuant to Local Government Code 252.021(a), purchase of a published option costing more than \$50,000 shall not be allowed. Furthermore, H-GAC reserves the right at its sole discretion to disallow purchase of any Published Option through the Program if deemed contrary to the intent of the law.
- b. Any option that has not been listed and priced in the Response is considered to be an "**Unpublished Option**". Unpublished Options may be sold, but only in connection with the sale of a base Product Item, and only insofar as the total cost of all Unpublished Options remains below twenty five percent (25%) of the total summed cost of the base Product(s) plus any Published Options.
- c. No Published or Unpublished Option may be sold which essentially converts a Product such that it competes with a Product Item awarded to another contractor.

21. WARRANTIES, SALES & SERVICE

Unless otherwise addressed in Section B, the following requirements shall apply:

- a. Offeror must be a properly franchised dealer authorized to sell and service, including warranty service, all products offered and sold in response to the bid invitation or under any **H-GAC** contract.
- b. **Offeror** shall provide detailed <u>Parts and Labor Warranty</u> information with the Response. If **Offeror** submits a warranty with the Response which does not meet the minimum requirements herein, **Offeror** agrees by submission of a Response that such warranty shall be considered to be amended to meet those minimums.
- c. Warranties shall be manufacturer's standard and shall be inclusive of any other warranty requirements which may be stipulated elsewhere herein.
- d. Any warranties offered by a dealer shall be in addition to the manufacturer's standard warranty, and shall not be a substitute for such. **Offeror's** base price for any Product shall be inclusive of the standard warranty.
- e. Complete warranty information will be supplied to End User with each Product sold.
- a. Warranties need not apply to normal maintenance service or adjustments, or to any product reasonably shown to have been repaired or altered in any way so as to affect its stability, or to any product which has been subject to misuse, negligence, or accident.
- f. **Offeror/Contractor** is encouraged to offer extended warranties as an option.
- g. Neither **H-GAC** nor **End User** assume any warranty or liability on **Contractor**'s behalf unless made or assumed in writing, initiated by **Contractor**, and agreed to in writing by **H-GAC** or the **End User** respectively.
- h. **Contractor** shall be responsible for the execution and effectiveness of <u>all</u> product warranty, and shall be the sole source for solution to problems arising from warranty claims. **Contractor** agrees to respond directly to correct warranty claims and to ensure reconciliation of warranty claims that have been assigned to a third party.

22. H-GAC ORDER PROCESSING CHARGE

H-GAC will levy an Order Processing Charge on **Contractor** for each sale done thru the **H-GAC** contract, <u>with the</u> <u>exception of orders for motor vehicles</u>. Any bid pricing submitted will be considered to include the Charge. The amount of the applicable charge shall be per the most current **H-GAC** schedule. For motor vehicle orders, the Processing Charge shall be levied on and paid by the **End User**.

23. PRE-PAYMENTS AND DISCOUNTS

- a. Progress, pre-payment and special discounts of any kind may be offered and detailed in the Response. Such discounts shall be clearly explained, but shall not be a determining factor in awarding contracts except in the case of tie offerings.
- b. Quantity discounts applicable to similar Products sold to one or more **End User** Departments may be offered. Determination as to product similarity shall rest solely with **Contractor**.
- c. For specific purchases, any proposed quantity, pre-payment or special discounts shall be clearly shown on the Contract Pricing Worksheet.

24. INSPECTION / TESTING

All Products sold pursuant to this Invitation shall be subject to inspection/testing by or at the direction of **H-GAC** and/or the ordering **End User**, either at the delivery destination or the place of manufacture. In the event a Product fails to meet or exceed all requirements of this Invitation, and unless otherwise agreed in advance, the cost of any inspection and/or testing, shall be borne by the **Contractor**.

25. PRODUCT DELIVERY

Unless otherwise addressed in Section B, the following requirements shall apply:

- a. Title to goods, and responsibility and liability for loss and/or damage in shipping pass to End User at the delivery destination after receipt and acceptance have taken place. Cost of shipping/delivery shall be paid by End User unless otherwise agreed to by Contractor. If Contractor will be paying for shipping/delivery, shipping terms must be "F.O.B. Destination, Freight Prepaid". If End User will be paying for shipping/delivery, shipping terms must be "F.O.B. Destination Freight Collect".
- b. The details for the application and calculation of shipping and delivery charges must be stated in the Response on **Form E**. Any freight, shipping or delivery charged to **End User** will be prepaid and added to the invoice, and will be clearly shown an any Contract Pricing Worksheet or other quote presented to the **End User**.
- c. The estimated delivery time after receipt of order (ARO), inclusive of Saturdays, Sundays and holidays, for all Products offered must be stated in the Response. Actual delivery for any particular order must be confirmed with **End User** at time of order placement, and must be stated clearly on the Contract Pricing Worksheet.
- d. **Contractor** shall be responsible for delivery and Acceptance according to the requirements of the Contract and the Purchase Order.
- e. Contractor shall advise End User prior to making any shipment/delivery, and shall make such shipment/delivery in accordance with End User's requirements, providing only that such arrangements do not contravene any requirement of the H-GAC contract unless agreed to by Contractor.
- f. The execution of all required tests, certifications and/or licensing, and costs thereof, shall be the responsibility of **Contractor**. Upon request by **End User** or **H-GAC**, **Contractor** shall provide any documentation or certification related to such tests, certifications or licensing.

26. OFFERED PRODUCT ITEM VARIANCES

Any variance in the specifications or performance of Products offered pursuant to this Invitation shall be acceptable to **H-GAC** only insofar as it MEETS or EXCEEDS the specifications and requirements of this Invitation.

27. REQUIREMENTS FOR SUBMISSION OF A RESPONSE

Unless otherwise addressed in Section B, the following requirements shall apply:

- Responses shall be submitted in two complete printed sets including an Original and one (1) Copy in separate <u>"hard side" three-ring binders</u>. The outer spine of each binder shall be labeled showing this Invitation No., Offeror Name, and either "Original" or "Copy", as applicable. The Original printed response will be considered to be the binding Response in case of any conflicts between printed copies and electronic copies. Except for required forms, H-GAC Invitation documents should not be included in the Response.
- b. The Original and the Copy shall be submitted complete, except that the Electronic Media should be submitted only with the Copy.
- c. All required **H-GAC** FORMS and documents shall be properly completed, without exception <u>or Offeror's</u> <u>Response may be deemed non-compliant</u>. **Offeror** may not modify the format of any **H-GAC** FORM in any way. **Offeror** may photocopy or print blank FORMS as needed. Information submitted on the printed copies of the FORMS may not be handwritten except for signatures and initials. It is **Offeror's** responsibility to insure that printed FORMS are clear and legible. <u>Handwritten and illegible entries may be rejected</u>. **Offeror's** printed, stamped or typed name shall appear on every FORM submitted in the Response.
- d. <u>The entire response submission</u> shall also be submitted on electronic media, including all required **H-GAC** *FORMS*. **Offeror** is strongly advised to make and work with <u>copies</u> of the original electronic *FORMS*. The originals can then be used to make additional electronic or printed copies of the blank *FORMS*. Signatures are not required on the electronic *FORMS*.
- e. The Response shall include ample written evidence, in the form of technical specifications, cut/tear sheets, brochures, pictures, drawings, etc., to demonstrate that all specifications herein have been met and/or exceeded.

- f. The Response shall include, in any format desired, an overview of the <u>Service Organization</u> which will support Products sold under any H-GAC contract. <u>The overview must include facility locations</u>, phone numbers and <u>Service Manager names</u>, as well as the following:
 - The procedure to be used by an End User requiring repairs.
 - Typical turn-around time on repairs.
 - Service Department days and hours of operation.
 - Number of qualified / factory trained service personnel normally on hand.
 - Description of the parts inventory on hand.
 - Training services, facilities and personnel available.
- g. Responses shall be enclosed in a sealed package(s) addressed to the Houston-Galveston Area Council, Cooperative Purchasing. The following information shall be stated on the exterior of the package(s):
 - Name and address of **Offeror**.
 - Date and hour of public response opening.
 - Bid/Proposal Invitation number.
 - The statement: "SEALED BID/PROPOSAL, DO NOT OPEN IN MAIL ROOM".

H-GAC shall not be responsible for any Response not properly labeled.

- h. Submission of a COMPLETE Response by telegraphic or electronic transmission is not acceptable. However, Responses may be modified by telegraphic or electronic notice if such notice is received prior to the deadline for submission.
- i. Samples, when required, shall be submitted within the time specified and at no expense to **H-GAC**. If not destroyed or consumed during testing, samples will be returned upon request at **Offeror's** expense.
- j. **Offeror** shall provide firm contract pricing for all Products and Options being offered.
- k. If applicable, responses shall include copies of all current licensing which may be required by the Texas Motor Vehicle Division for execution of sales pursuant to any contract with **H-GAC**.
- 1. Due to the complexity of responses and to aid in evaluation, the Response should contain <u>ALL</u> required information in tabbed sections as detailed below. <u>Omission of any required *FORM* or information will be sufficient grounds for **H-GAC** to consider your response to be non-compliant.</u>

m. First Section:

- Form(s) A Offeror Identification & Signatory: Identifies the offering party(ies), and should be completed by each party to the Response. If awarded, a contract will be executed with each.
- Form B Historically Underutilized Business Enterprises: Used to collect information about disadvantaged and minority suppliers and subcontractors, and to commit Offeror to working with Participants toward their program goals.
- Form C Response Checklist: Certification, and also an aid, to insure that all required information has been included in your Response.
- <u>References</u>, formatted as described elsewhere herein.
- <u>Service Organization Document</u>, formatted as described elsewhere herein.

Second Section:

- Form D Offered Items Pricing: For Bids, contains the list of the Product Items covered by this Invitation. Select the items offered and fill in the price for each. (For RFPs, follow the instructions in Section B as this Form may or may not be used.)
- Form E Published Options: Used to <u>list and price</u> all offered options. List, each on a separate line, all upgrades, downgrades, optional equipment, features, accessories and services which you desire to sell thru the **H-GAC** contract, if awarded. Published catalogs/price sheets may be listed, along with the discount structure that will apply. (For RFPs, follow the instructions in Section B as this **Form** may or may not be used.)

Third Section:

- Technical Specifications, Product Brochures, Tear Sheets, Cut Sheets, Strippers, etc. <u>which clearly list and</u> <u>show all the standard features and capabilities of each Product Item offered on Form D</u>.
- Warranty Documentation, as described elsewhere herein, for all items offered.

Fourth Section:

- Copies of any applicable Texas MVD Licenses.
- Electronic Media, containing the complete response including all required *FORMS*, stored in a pouch or an envelope such that it will not fall out of the binder. (Required in 'Copy' only, not in 'Original'.)
- Form CIQ Conflict Of Interest Questionnaire: Chapter 176 of the Texas Local Government Code requires vendors and consultants contracting or seeking to contract with H-GAC to file a Conflict of Interest Questionnaire (CIQ) if they have an employment or other business relationship with an H-GAC officer or an officer's close family member. The required questionnaire is located at the Texas Ethics Commission website: http://www.ethics.state.tx.us/whatsnew/conflict_forms.htm. It is Bidder's responsibility to download the form and furnish a completed copy with the Response, if it is applicable.
- n. By submittal of Response, Offeror certifies to the best of its knowledge that all information is true and correct.

28. CLARIFICATION TO SPECIFICATIONS & REQUIREMENTS

- a. If Offeror is in doubt as to the meaning of any item in this Invitation, a written request for clarification may be submitted to H-GAC up to fifteen (15) calendar days prior to the deadline for response submission. H-GAC shall not be responsible for late delivery. Requests may be transmitted by FAX or e-mail to the assigned Specification Specialist, and should clearly reference this Invitation number and the specific page and paragraph in question. If there are multiple questions, they should be stated separately and numbered.
- Any interpretation of Invitation documents, if made, will be by written Addendum duly issued. A copy of such Addendum will be mailed or delivered to each person officially on record as having been sent a copy of this Invitation.
 H-GAC will not be responsible for any other explanation or interpretation of the Invitation documents made or given prior to the award of the contract.
- c. <u>Any objections to the Invitation documents must be filed in writing with **H-GAC** on or before fifteen (15) calendar days prior to the deadline for submission of responses.</u>
- d. Prospective offerors are advised that, after a draft specification has been issued, the Pre-Bid/Proposal Conference is the primary forum through which comments and suggestions may be offered for consideration by **H-GAC** prior to issuance of the final invitation and specifications.
- e. All best efforts have been made to insure that the product/service descriptions and associated specification information in Sections B & C are correct, and adequate time has been given to prospective Offerors to point out mistakes. However, if an error remains and is caught by Offeror before the scheduled bid/proposal opening, Offeror shall make note of the required correction in the Response, and shall also notify **H-GAC** prior to the opening of responses.

29. INCONSISTENT INFORMATION

H-GAC review of responses supplied on **H-GAC** *FORMS* is a significant part of the evaluation process. **Offeror** shall state clearly all information required on the *FORMS*. **Offeror**'s information supplied on the *FORMS* shall take precedence in the event any standard "boilerplate" type language included in **Offeror**'s response is inconsistent with the information supplied by **Offeror** on the **H-GAC** *FORMS*. In all cases, information on **H-GAC**'s printed *FORMS* supplied as part of **Offeror**'s response shall take precedence over information supplied on electronic media.

30. REJECTION OF RESPONSES

- a. H-GAC may reject a response if:
 - Offeror misstates or conceals any material fact in the Response, or if,
 - Offeror does not strictly conform to law or the requirements of this Invitation.
- b. **H-GAC** may reject any and all responses, and may reject any part of a response.
- c. **H-GAC, at it's sole discretion,** may also waive any formalities or irregularities in any response, or ask for corrected information except for pricing.

31. WITHDRAWAL OR MODIFICATION OF RESPONSES

Once received by **H-GAC**, responses may be modified or withdrawn <u>prior</u> to the submission deadline only if the request to do so is in writing submitted by **Offeror's** authorized representative. Responses and requests for modification received <u>after</u> the submission deadline will not be accepted. Requests for response withdrawal

received <u>after</u> the submission deadline will be accepted if the request to do so is in writing submitted by **Offeror's** authorized representative.

32. RESPONSE EVALUATION

For Bid Responses:

- a. Section B will state whether the contract will be awarded to the lowest responsible bidder or to the bidder who provides goods or services at the best value for **H-GAC** and its participants.
- b. If the contract will be awarded based on best value, Section B will state any relevant criteria which **H-GAC** will consider.
- c. For each offered Product Item, **H-GAC** may use the offered price, prices for Required Options, and the prices of selected common Published Options to determine the lowest responsible offer.
- d. <u>Failure of Offeror to submit pricing for frequently purchased options and any H-GAC required options may</u> cause response to be considered non-compliant at H-GAC's sole discretion.

For Proposal Responses:

- e. **H-GAC** will evaluate proposals as detailed in Section B.
- f. By submission of a Response Offeror indicates acceptance of the evaluation technique, and recognizes and accepts that **H-GAC** may at it's sole discretion make subjective judgments during the evaluation process.

33. ORDER OF PRECEDENCE PRIOR TO CONTRACT AWARD

In the event of conflict between this document and any references or documents cited herein, this document shall take precedence prior to contract award.

34. AWARD OF CONTRACT

- a. **H-GAC** reserves the right to accept or reject any Product Item or option offered. Additionally, all options included in Offeror's response and accepted by **H-GAC** are understood to be included in any contract.
- b. **H-GAC** shall award contract(s) for line items or groups of line items, at its sole discretion.
- c. With authority granted by the H-GAC Board of Directors, a written contract shall be presented to the successful Offeror(s) and shall be subject to acceptance by the successful Offeror(s) within thirty (30) calendar days after presentation by H-GAC. If a contract is not executed within thirty (30) calendar days, H-GAC may rescind the contract offer and award a contract to the next Offeror in order of rank as determined by H-GAC.
- d. Delivery time and prompt payment discounts, including time allowed for payment, may be considered in tiebreaking of offers which are judged by **H-GAC** to be equal in all other criteria.
- e. The contract shall include the following documents in the stated order of precedence:
 - 1st The contract document signed by **H-GAC** and **Offeror**.
 - 2nd This Invitation and all specifications referenced herein.
 - **3rd Offeror**'s response to this Invitation.

35. PRO-FORMA CONTRACT

This Invitation includes a Pro-Forma (sample) Contract which successful offerors will be expected to sign. The actual final contract will be the same or nearly the same as the Pro-Forma. <u>NOTE: Successful Offerors MAY NOT process any purchase orders until the contract documents have been executed and returned to **H-GAC**.</u>

36. CONTRACT TERM

The contract shall be in effect throughout the period stated elsewhere in the contract documents, and thereafter until such time as any outstanding orders against the contract have been fulfilled. The contract may be extended if deemed by **H-GAC** to be in the best interests of the Program, and subject to mutual agreement of the parties.

37. PERFORMANCE & PAYMENT BOND

H-GAC's contractual requirements DO NOT include a Performance & Payment Bond (PPB), and offered pricing should reflect this cost saving. However, **Contractor** must be prepared to offer a PPB to cover any specific order if so requested by **End User**. **Contractor** shall quote a price to **End User** for provision of any requested PPB, and agrees to furnish the PPB within ten business (10) days of receipt of **End User's** purchase order.

38. CHANGE ORDERS

End Users shall have the right to make additions by addenda for the purpose of clarification or inclusion of additional specifications, qualifications, conditions, etc. Any such addenda shall be made in writing and agreed upon by **Contractor** and the **End User** agency prior to issuance of any Change Order. A copy of any such Change Order shall be furnished by **Contractor** to **H-GAC**.

39. DUPLICATION OF TERMS OR STATEMENTS

Where statements or terms are duplicated or are extremely similar, **H-GAC** and the **End User** reserve the right to use the statement or term most favorable to **H-GAC** and/or the **End User**.

40. PUBLICITY

H-GAC encourages contractors to "market" the Program, and can provide some information and artwork to be used in published promotional materials. However, any publicity or published material released by **Contractor** referencing the contract, whether in the form of a press release, brochure, photographic coverage, or verbal announcement, shall be issued <u>only with prior review and approval by **H-GAC**.</u>

41. TAXES

HGAC and **End User** participants are either units of government or qualified non-profit agencies, and are generally exempt from Federal and State sales, excise or use taxes. **Offeror** <u>shall not</u> include any such taxes in the Response. Further, it shall be the responsibility of **Contractor** to determine the applicability of any taxes to a particular order and act accordingly. Exemption certificates will be provided upon request.

42. DRUG FREE WORKPLACE

Contractor shall provide notice to its employees and sub-contractors, as required under the Drug-Free Workplace Act of 1988. A copy of **Contractor's** Drug-Free Workplace policy shall, on request, be furnished to any **End User**.

43. PRODUCT NOTICES & MAILINGS

H-GAC is <u>NOT</u> the owner of Products sold pursuant to this Invitation, but acts only in the capacity of purchasing agent. In that regard, **Contractor** accepts sole responsibility for insuring that notices and mailings, such as Safety Alerts, Safety Recall Notices and Customer Surveys, are sent directly to the **End User** of record.

44. HANDLING OF ORDERS & PAYMENTS

In general, orders and payments will be handled as described below. More specific instructions and information regarding handling of purchase orders and the Order Processing Charge may be provided after contract award. Established procedures may be changed at any time by **H-GAC** as may be dictated by efficient business practice. The particulars of any sale, e.g. specific products, pricing, delivery, warranty, etc., will be in strict accordance with the terms and conditions of this Invitation and the specific contract awarded to **Contractor**. Beyond that:

- a. For any particular procurement to be made under the provisions of an **H-GAC** contract, **End User** and **Contractor** will discuss requirements and agree as to what will be provided.
- b. **Contractor** will prepare a Contract Pricing Worksheet and provide it to **End User**. The Worksheet will list everything being purchased including the base bid item(s), all published and unpublished options and the delivery date. All pricing shall be per the current contract.
- c. End User will send a purchase document to Contractor, which Contractor will send H-GAC together with the Contract Pricing Worksheet. NOTE: Contractor agrees not to offer, agree to or accept from End User any terms or conditions that conflict with or contravene those in Contractor's H-GAC contract, except for pricing discounts.
- d. **H-GAC** will prepare an "Order Confirmation" and send it to **End User** and to **Contractor**. The Order Confirmation verifies that **Contractor** has a valid **H-GAC** contract and that the order is in compliance with the requirements of the **H-GAC** Cooperative Purchasing Program. **Contractor** will not ship any goods before receipt of both **End User**'s purchase document and **H-GAC**'s Order Confirmation.
- e. On notification that **Contractor** has received an order, **H-GAC** will invoice **Contractor** for the applicable Order Processing Charge. **NOTE:** The Order Processing Charge is charged to **Contractor**, **EXCEPT** in the

case of motor vehicles. For all sales of motor vehicles the Order Processing Charge is levied on the **End User**, collected by **Contractor**, and remitted to **H-GAC** by Contractor.

- f. Contractor will deliver products/services ordered, and will invoice End User for products/services accepted by End User. (See other Sub-Section herein dealing with Product Delivery.) Contractor will not invoice before shipment has been made.
- g. End User will pay Contractor for those products and/or services ordered which have been received and accepted. Under no circumstances shall any check be made payable to a representative or agent. Should a representative or agent submit an invoice to End User for any cost related to a purchase order issued to Contractor for products/services covered by an H-GAC contract, such invoice shall be forwarded to Contractor and Contractor will take action to correct the error.
- h. Upon delivery of any product/service by **Contractor** and acceptance by **End User**, **Contractor** shall remit to **H-GAC** the full amount of the applicable Order Processing Charge in accordance with the payment terms established in the **H-GAC** contract. Note, the Order Processing Charge is due whether or not **Contractor** has ever received an invoice from **H-GAC**. Sales executed based on the particulars of **Contractor**'s **H-GAC** contract, without payment of the Order Processing Charge, may constitute fraud.

45. PRICE CHANGES

- a. Any permanent increase or decrease in offered pricing for a base contract item or published option is considered to be a price change. Temporary increases in pricing by whatever name (e.g. 'surcharge', 'adjustment', 'equalization charge', 'compliance charge', 'recovery charge', etc.), are also considered to be price changes.
- b. Except in the case of contracted published catalogs and price sheets, prices for Base Bid Items and Published Options are expected to be held firm for a minimum of 90 days from the date an awarded Offeror signs the H-GAC contract. Thereafter, changes will be considered if accompanied by justifying documentation satisfactory to H-GAC. For published catalogs and price sheets which are on an H-GAC contract, requests to amend the contract to reflect any new published catalog or price sheet may be submitted whenever the manufacturer publishes the new document. Any such request must include the new catalog or price sheet.
- c. If **Contractor** routinely offers discounted contract pricing, **H-GAC** may request **Contractor** to accept amended contract pricing equivalent to the routinely discounted pricing.
- d. No price change will be allowed unless it has been reviewed and approved by **H-GAC** in writing. **Contractor** must have received **H-GAC's** written approval of any change prior to charging the new price or using it in any quotation prepared for an End User.
- e. Price change requests must be submitted to **H-GAC** in writing and must be received by **H-GAC** at least thirty (30) calendar days prior to the requested effective date of the change, and must state the time period for which the requested pricing will remain firm.
- f. Price change requests shall include **H-GAC Forms D** and **E**, or whatever documentation was used to submit pricing in the original Response hereto, showing all affected items with current contract price, requested price, and percentage change shown clearly for each. This documentation should be submitted in MSExcel format to facilitate analysis and updating of the website.
- g. Price change requests <u>MUST</u> be supported with substantive documentation (e.g. manufacturer's price increase notices, copies of invoices from suppliers, etc.) showing that **Contractor's** <u>actual</u> <u>costs</u> have increased. The Producer Price Index (PPI) may be used as partial justification, subject to approval by **H-GAC**, but no price increase based solely on an increase in the PPI will be allowed.
- h. All Products shall, at time of sale, be equipped as may be required under any then current applicable local, state, and federal government requirements. If, during the course of any contract, changes are made to such government requirements which cause a manufacturer's costs of production to increase, **Contractor** may increase Product pricing to the extent of **Contractor's** actual cost increase. The increase must be substantiated with support documentation acceptable to **H-GAC** prior to taking effect. Modifications to a Product required to comply with such requirements which become effective <u>after</u> the date of any sale shall be the responsibility of the **End-User**.
- i. In cases involving contract extensions exceeding sixty-one (61) days beyond the stated expiration date of the contract, **Contractor** may request a price change based on the same conditions as stated above. However the thirty (30) day prior notice is waived and **H-GAC** will consider the request immediately on receipt.
- j. H-GAC reserves the right to accept or reject any price change request. Acceptance, if granted, will be in writing and the approved changes will become part of the contract.

46. CONTRACT ITEM CHANGES

- a. If a manufacturer discontinues a contracted item, that item will automatically be considered to be deleted from the contract with no penalty to Contractor. However, **H-GAC** may at it's sole discretion elect to make a contract award to the next low offeror for the item, or take any other action deemed by **H-GAC** to be in the best interests of **End Users**, at its sole discretion.
- b. If a manufacturer makes any change in a contracted item which <u>does not affect the contract price</u>, Contractor shall advise **H-GAC** of the details. If the 'new' item is equal to or better than the originally contracted item, the 'new' item shall be approved as a replacement. Otherwise **H-GAC** may allow or reject the change, or take any other action deemed by **H-GAC** to be in the best interests of **End Users**, at its sole discretion. If the change is rejected there will be no penalty to Contractor.
- c. If a manufacturer makes any kind of change in a contracted item which <u>affects the contract price</u>, Contractor shall advise **H-GAC** of the details. **H-GAC** may allow or reject the change at its sole discretion. If the change is rejected there will be no penalty to Contractor. However, **H-GAC** may elect to make a contract award to the next low offeror for the item, or take any other action deemed by **H-GAC** to be in the best interests of **End Users**, at its sole discretion.
- d. In the case of specifically identified catalogs or price sheets which have been contracted as base bid items or as published options, routine published changes to products and pricing shall be automatically incorporated into the contract. However, **Contractor** must still provide thirty (30) calendar days written notice and an explanation of the changes to products and pricing. **H-GAC** will respond with written approval.

47. FORCE MAJEURE

If either party shall be wholly or partially prevented from the performance of any contractual obligation or duty by reason of or through strikes, stoppage of labor, riot, fire, flood, acts of war, insurrection, accident., order of any court, act of God, or specific cause reasonably beyond the party's control and not attributable to its neglect or nonfeasance, in such event, the time for the performance of such obligation or duty shall be suspended until such disability to perform is removed. Determination of Force Majeure shall rest solely with **H-GAC**..

48. PERFORMANCE UNDER CONTRACT

H-GAC is committed to insuring that **Contractor** provides effective and efficient service to all Participants in the Cooperative Purchasing Program, and expects that certain Performance Conditions must be met. Failure to meet these conditions may result in contract termination. In that regard, **Contractor shall**:

- a. Appoint a dedicated representative to be the contact person and focal point for all matters relating to End User quotations and orders. The representative shall have: A <u>toll free phone number with voice mail</u>; A <u>fax number</u>; A working <u>e-mail address</u>; and A <u>postal address</u>.
- b. Insure that the representative timely monitors all communication modes listed above, and <u>promptly responds to</u> <u>communications</u> from **End Users** and **H-GAC** in any of these modes. Phone calls will be promptly returned, in any event not later than the next business day. Acceptable failure will be due only to Force Majeure.
- c. Maintain <u>sufficient qualified staff</u> to promptly process all communications from **H-GAC** or **End Users**, and to efficiently, effectively and accurately service all requirements of the contract.
- d. As may be requested by **H-GAC**, replace any staff members who are not providing the service and expertise deemed necessary by **H-GAC** for acceptable support of **End Users**.
- e. Properly prepare and provide to **End User** a Contract Pricing Worksheet, or a quotation in other format as approved by **H-GAC**, for each and every order that is to be executed.
- f. Furnish, on request of **H-GAC**, reasonable data, forms and graphic material to be used in brochures or other print media, or on **H-GAC**'s website.
- g. Allow access to **H-GAC** authorized personnel for inspection of operating facilities, and auditing of purchase orders during the contract period, and for a period extending thru the completion of any outstanding orders. Site inspection may be arranged not less than ten (10) calendar days prior, shall include the names of all participants, and shall be at no expense to **Contractor**.
- h. Reporting Requirements:
 - Contractor agrees to submit written quarterly reports to **H-GAC** detailing all transactions during the previous three month period. Such reports shall include, but are not limited to the following:
 - End User name
 - Product/Service purchased, including Product Code if applicable

- End User Purchase Order Number
- Purchase Order Date
- Product/Service dollar amount
- HGACBuy Order Processing Charge amount
- Reports must be provided to **H-GAC** in MSExcel or other acceptable electronic format, and are due by the 30th day of the month following the applicable quarter being reported.
- i. Should **Contractor** default in providing Products or Services as required by this Invitation and the contract, recourse may be exercised thru cancellation of the contract and other legal remedies as may be appropriate.

49. IMPLEMENTATION OF INTERNET BASED E-COMMERCE

H-GAC Cooperative Purchasing has adopted E-Commerce as part of its business model and maintains an internet website at <u>www.HGACBuy.org.</u> At any point in time, various information and process functions may be implemented and made operational thru the website, including but not limited to items such as:

Information Items

- Contract information
- Procurement schedules
- Response requirements & specifications

Functions

- End User product inquiries
- Product configuration and price quotes
- Purchase Orders and Confirmations

- Product and option item catalog listings
- End User & Contractor information
- Shipping/Delivery notices
- Invoice generation
- Payment remittances, etc.

All **H-GAC** Contractors, as a condition of contract, will be required to work with **H-GAC** and it's E-Commerce provider(s) to maximize use of E-Commerce within the context of **H-GAC** Cooperative Purchasing business. Offeror is encouraged to refer to **H-GAC**'s Cooperative Purchasing web site where additional information can be found. If you have any questions, please contact **H-GAC** for assistance.

50. CONTRACTOR ORIENTATION/TRAINING

H-GAC believes that **Contractor's** familiarity with the operational policies and requirements of the Cooperative Purchasing Program is a key factor in achieving **End User** satisfaction. In that regard, the Contact Person listed on **Form A**, or an alternate, shall be required to participate in an **H-GAC** vendor orientation/training as soon as possible after contract award. In addition, any other of Contractor's staff who will be involved in any way with the HGACBuy Program should participate in orientation. The orientation may be presented as a teleconference or webinar, or may be held in **H-GAC**'s offices as may be determined by **H-GAC** and Contractor to be the most efficient and effective form of delivery.

51. LEGAL & CONTRACTUAL REMEDIES

RESOLUTION OF PROTESTED SOLICITATIONS AND AWARDS

Procedure

Any actual or prospective **Offeror** or **Contractor** who is aggrieved in connection with a purchase transaction may file a grievance. The grievance may be filed at any phase of the procurement. In order for an above mentioned party to enter the grievance process, a written complaint must be sent to the Office Services Manger of **H-GAC** by certified mail which identifies the following:

- 1. Name, mailing address and business phone number of the complainant.
- 2. Appropriate identification of the procurement being questioned.
- 3. A precise statement of reasons for the protest.
- 4. Supporting exhibits evidence or documents to substantiate any claims.

The grievance must be based on an alleged violation of **H-GAC**'s Procurement Procedures, a violation of State or Federal law (if applicable), or a violation of applicable grant or contract agreements to which **H-GAC** is a party. Failure to receive a procurement award from **H-GAC** in and of itself does not constitute valid grievance. Upon receipt of grievance, the Office Services Manager will initiate the informal resolution process.

Expedited Resolution

The Procurement Officer or Departmental Manager responsible for the solicitation shall contact the complainant and all interested parties and attempt to resolve the allegations informally within ten (10) working

days from date of complaint. If the allegations are successfully resolved by mutual agreement, documentation will be forwarded to the Office Service Manager of the resolution with specifics on each point addressed in the original complaint.

If the Procurement Officer or Departmental Manager is not successful in resolving the allegations, the complaint along with the comments will be forwarded to the Office Service Manager immediately. The Office Service Manager will review all documentation. All interested parties will be given written notice of the date, time, and place of the hearing and an opportunity to present evidence. A written decision will be issued within five (5) working days after the hearing along with notice of appeal rights.

Appeals

The complainant may appeal the Office Service Manager's decision by submitting a written appeal, within five (5) working days, to the Executive Director of **H-GAC**. The Executive Director, upon receipt of a written notice of appeal, shall contact the complainant and schedule a hearing within ten (10) working days. The Executive Director of **H-GAC** has the option of appointing a Hearing Officer to preside over the hearing. If appointed, the Hearing Officer shall conduct a hearing and forward a summary and recommended resolution to the Executive Director.

The decision reached by the Executive Director or his designee shall be final and conclusive. This decision will be forwarded to the complainant in writing within thirty (30) working days.

The **Contractor** may, if it elects to do so, appeal the final and conclusive decision of the Executive Director to a Court of competent jurisdiction.

RESOLUTION OF CONTRACT DISPUTES

Upon breach or default, **H-GAC** shall give the **Contractor** written notice of default. If the default is not remedied, within a reasonable specified time from date of notification, to the satisfaction and approval of **H-GAC**, default will be declared.

Upon breach of contract or default, **H-GAC** may exercise any and all of its rights afforded by law, including but not limited to those referenced in the General Contract Provisions.

SOLICITATIONS OR AWARDS IN VIOLATION OF THE LAW

Contracts awarded in violation of the competitive process or otherwise in violation of the law are voidable by **H-GAC**.

52. NATIONWIDE SALES OPPORTUNITIES

HGACBuy provides purchasing services to local governments qualifying non-profits throughout the nation, and desires to make established contracts available to them wherever and whenever practicable. Therefore, once a contract is awarded, **Contractor** is expected to expand the scope of its marketing effort to include sales to **End Users** in all areas of the United States, and/or to assign any **H-GAC** contract to another contractor(s) as deemed appropriate by **H-GAC** in the interest of its End Users.

- Contractor may sell through HGACBuy anywhere subject to compliance with applicable laws and regulations. If the market structure in which Contractor operates requires a contract assignment for any particular sale, H-GAC will expect Contractor to assign the contract to a Manufacturer or to another Dealer(s). Such assignment must be approved by H-GAC.
- **Contractor**'s differential costs (e.g. transportation & delivery charges) and allowances (e.g. manufacturer's sales incentives) related to any sale may be charged to buyer.

End of Section A GENERAL TERMS & CONDITIONS

SECTION B – PRODUCT SPECIFIC REQUIREMENTS For **Statewide Automated Vehicle Procurement**

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BACKGROUND & PURPOSE:

HGACBuy is a nationwide governmental Cooperative Purchasing Program that establishes blanket contracts, for a variety of goods and services, for the use of its Membership of more than 5500 local governments, districts, agencies, authorities and not-for-profit corporations in Texas and 49 other states. Any local government or non-profit organization may participate in the Program so long as their state law allows. There is also no cost to join and become a member of the HGACBuy Cooperative Purchasing Program. The Program is funded solely by a small "Order Processing Charge" levied on the contractor.

End Users would contact the awarded **HGACBuy** Contractor and execute a specific purchase order or 'End User Agreement' detailing the services and/or equipment plus charges that apply to that particular agreement. In any case, such specific order/agreement would be based on the terms and conditions of this Invitation and any subsequently executed contract between HGACBuy and the Contractor. HGACBuy makes no express or implied warranties whatsoever that any particular quantity or dollar amount of products and/or related services will be procured through the contract.

Approximately one-third of all trips in the United States have two miles or less. To address this sector of the transportation market **HGACBuy** is seeking proposals from qualified **VENDOR(s)** for:
- 1. The manufacture and delivery through sale or lease of automated vehicles that are designed to serve the short-trip market, including associated maintenance and operations support.
- 2. The provision of transportation services through use of such automated vehicles. Automated vehicles are being tested and deployed in Texas and throughout the world in environments that include office parks, hospitals, university campuses, industrial facilities, entertainment districts, downtowns and "last mile" connections to and from public transit facilities. Automated vehicles may provide enhanced mobility options for those who are unable to drive or do not have access to a standard vehicle. Automated vehicles generally have electric powertrains, which deliver environmental benefits, especially in areas that utilize renewable energy sources to generate electricity. Many automated vehicles are intended for multi-occupant use, which improves roadway capacity without having to physically expand the roadway. Automated vehicles are expected to be significantly safer in operation than human-driven vehicles.

SCOPE OF SERVICES:

HGACBuy is soliciting Proposals for selecting qualified manufacturers and providers of automated vehicles on behalf of Texas local governments and other public entities for automated vehicles, primarily for deployment in a variety of urbanized environments such as universities, downtowns, office campuses, military bases and neighborhood "last mile" connections to transit facilities. **HGACBuy** is requesting written proposals from automated vehicle manufacturers and those who supply transportation services using automated vehicles (**VENDOR**).

The **Section B**, of this RFP, details specific **HGACBuy** minimum requirements and other specifications applicable to automated vehicles/services. The features and performance of any offering are detailed in the requirements and specifications listed or referenced herein. For any required feature stated in general terms, it is understood that OEM standard shall meet the requirement.

Proposers shall demonstrate in any response to this RFP how sales, service, training and support will be provided and achieved. Organization structure, including all sales and support centers should be detailed, including the number and type of employees at each. Local governmental references, including contact and contact information shall also be provided as part of any response.

Our members may want to purchase selected services and or products, or they may be looking for a full turnkey project, necessitating additional services, training and maintenance agreements. Proposers must have the ability to effectively sell and service to **HGACBuy** Members. It is the objective to solicit responses from several providers and to award contracts to those Proposers that meet or exceed the expectations laid out in this RFP.

LEVELS OF AUTOMATION FOR DEFINING DRIVING

SAE International's standard provides and defines the six levels of driving automation, from no automation to full automation. Consistent with industry practices, the standard helps to eliminate confusion by providing clarity and is frequently cited and referred to by industry and media.

In general, SAE J3016TM levels and definitions include:

- Level 0 <u>No Automation</u>: The full-time performance by the human driver of all aspects of the dynamic driving task, even when enhanced by warning or intervention systems
- Level 1 <u>Driver Assistance</u>: The driving mode-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the human driver performs all remaining aspects of the dynamic driving task
- Level 2 <u>Partial Automation</u>: The driving mode-specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the human driver performs all remaining aspects of the dynamic driving task

- Level 3 <u>Conditional Automation</u>: The driving mode-specific performance by an Automated Driving System of all aspects of the dynamic driving task with the expectation that the human driver will respond appropriately to a request to intervene
- Level 4 <u>High Automation</u>: The driving mode-specific performance by an Automated Driving System of all aspects of the dynamic driving task, even if a human driver does not respond appropriately to a request to intervene
- Level 5 <u>Full Automation</u>: The full-time performance by an Automated Driving System of all aspects of the dynamic driving task under all roadway and environmental conditions that can be managed by a human driver

POTENTIAL APPLICATIONS

HGACBuy has identified a variety of potential use cases for automated vehicles in low-speed environments. **VENDORS** should propose automated vehicle solutions for such use cases and other transportation use cases for which the **VENDOR's** automated vehicles may add significant value. These potential use cases include the following:

- Educational campuses: Transportation services in and around the campuses of educational institutions, including transport of students, employees and visitors around campus and to/from nearby parking and transit facilities.
- **Hospital complexes:** Transportation of employees and visitors in and around hospitals and other medical facilities.
- Office and industrial parks: Providing both internal circulation and connection to nearby facilities for the employees of office campuses, large industrial facilities and businesses such as distribution and warehouse operations with goal of giving employees a viable option to function car-free during a normal work day.
- Military bases: Providing mobility services in and around military installations.
- Entertainment districts: Connecting attractions within entertainment districts and connecting the entertainment district to nearby lodging, parking and transit facilities.
- Last mile transit connection: Enhancing access to/from transit facilities by connecting nearby neighborhoods, job sites and other areas with such facilities.
- **Downtown circulators:** Providing access to and around downtown job centers and attractions in cities and towns of various sizes.
- Senior transport: Giving seniors an alternative to driving themselves or relying on third parties for transport so that they are more likely to be able to successfully.
- Medical transport: Providing patients a reliable way to access medical care appointments.
- Municipal fleets: Incorporated automated vehicles into municipal fleets.

This procurement is intended to establish a pool of **VENDORS** who can supply automated vehicles and/or transportation services using automated vehicles. **HGACBuy** will enter into a master agreement with each selected **VENDOR**. Public entities will then order specific automated vehicles or services via their purchase orders with **VENDORS** they determine offer solutions that best fit the needs of their community.

VEHICLE REQUIREMENTS

Any exceptions/clarifications must be noted buy the proposer when providing the required information for Tab E.

Factors that are important to **HGACBuy** and its public entity partners with respect to this procurement include the following:

• Safety: Automated vehicle technology needs to provide safe transportation for users and protect the safety of nearby pedestrians, bicyclists and vehicles.

- **Range and reliability:** Automated vehicles need to have sufficient onboard batteries or quick charging infrastructure to be able to provide reliable service for a minimum 8-12-hour period within an operationally useful service range.
- Cost: Public entities have limited budgets. In this procurement HGACBuy is interested in the "all in" cost of
 operating a VENDOR'S automated vehicle. Such costs include the costs of programming the vehicle,
 programming the route, maintenance, software updates, charging, customer support and onboard staffing, if any.
- Adaptability: The proposed automated vehicle should be able to operate in a variety of environments, ranging from campuses to public streets, although automated vehicles with very specific but useful applications will be considered. Automated vehicles preferably should be able to operate in close proximity with pedestrians, bicycles and other vehicles without requiring dedicated lanes or other special facilities, although vehicles that require dedicated lanes or facilities are not disqualified so long as these requirements are clearly laid out in the **VENDOR'S** RFP response.
- Access: Automated vehicles that provide access to individuals with disabilities are strongly encouraged and may be required by some public entities.
- **Infrastructure:** Automated vehicles that can operate within the current operating environment without the need for major investments in hard or electronic infrastructure are favored. **VENDORS** should outline what infrastructure improvements, if any, are required for the safe and effective operation of their vehicles.
- **Data: VENDORS** should share non-proprietary data about the operation of their vehicles (e.g., number of passengers, average speeds, incidents). Note that **HGACBuy** and its public entity partners have no interest in personally identifiable information about those who ride on VENDOR'S automated vehicles.
- **Privacy/Cybersecurity: VENDORS** should have a plan to protect the privacy of vehicle users (e.g., controls over access to any onboard video) and the security of the software used to operate their automated vehicle, including controls and processes in place to respond to a cyber-attack or other such malicious activity.
- **Insurance: VENDORS** should be prepared to provide proof of insurance offering a level of coverage that meets the insurance requirements under the law applicable to the vehicle type.
- **Climate control:** Texas has sometimes challenging environmental conditions, with extremes of temperature and precipitation. Vehicles must be capable of providing comfortable transportation in a wide range of environmental conditions, including air temperatures that range from 20 degrees to 115 degrees Fahrenheit.
- Support: VENDORS should have robust customer nationwide support, including technical support, mechanics, engineers and programmers.
- User information: VENDORS should have some method for potential users to access information about the location, availability and arrival time of their automated vehicles.
- **Connected Vehicle: VENDORS** should indicate whether and how vehicles connect with each other or the infrastructure using vehicle-to-vehicle and vehicle-to-infrastructure technology (collectively "V2X" such as Dedicated Short-Range Communication ("DSRC") or Cellular-V2X.

COMMITMENT

Offeror is required to make some basic commitments to insure the overall success of this program. By submission of a response, offeror commits to the following:

- **Corporate/Sales Commitment** A commitment that **HGACBuy** has the support of senior management and that **HGACBuy** will be the primary government contracting vehicle when offering services/products awarded from this solicitation to eligible end users nationwide. A further commitment to aggressively market the program, both independently as well in partnership with **HGACBuy**.
- **HUB Participation** It is **H-GAC's** goal to have Historically Underutilized Business Enterprise (HUB) participation in providing services under a contract. IF **Offeror(s)** intends to employ subcontractors in providing services/products related to this solicitation, **Offeror(s)** shall make and demonstrate a good faith effort to include HUB participation under a contract. **Offeror(s)** good faith effort shall include, but is not limited to the following affirmative steps (ref. 2CFR 200.321):

- 1) Placing qualified small and minority businesses and women's business enterprises on solicitation list;
- 2) Assuring that small and minority businesses and women's business enterprises are solicited whenever they are potential sources;
- 3) Dividing total requirements, when economically feasible, into smaller task or quantities to permit maximum participation by small and minority businesses, and women's business enterprises;
- 4) Establishing delivery schedules, where the requirement permits, which encourage participation by small and minority businesses, and women's business enterprises;
- 5) Using the services and assistance as appropriate, of such organizations as the Small Business Administration and the Minority Business Development Agency of the Department of Commerce;

NOTE: The term HUB as used in this solicitation is understood to encompass all programs/business enterprises such as Small Disadvantaged Business (SDB), Disadvantage Business Enterprise (DBE), Minority Owned Business Enterprise (MBE), Women Owned Business Enterprise (WBE) and Disabled Veteran Business Enterprise (DVBE).

AUTOMATED VEHICLE TECHNICAL SPECIFICATIONS

Note: Bidder shall supply a spec/tear sheet for each vehicle platform and/or service bid on Form D. These spec sheets should detail what features are included in the prices quoted on Form D and address the items below:

- Description of vehicle
- Dimensions of vehicle
- Powertrain
- Operating speeds
- Level of automation
- Passenger capacity
- Seating
- Handicapped accessibility (ramp)
- Maintenance of interior climate control in wide range of environmental conditions
- Vehicle service range
- Charging equipment and requirements
- Charging time (for vehicle platforms bid)
- Operating software (for vehicle platforms bid)
- Sensors
- Safety features Both passive (seat belts) and active (AV Systems)
- Passenger security features
- Onboard staffing required
- Remote monitoring and operation capabilities
- Maintenance requirements, covering hardware, software and route
- Warranties
- How Infrastructure requirements to allow or improve deployment is implemented
- How vehicle routing is established during an operation and/or contract
- How Operational requirements and limits are implemented
- Data collected during operations
- Types of operational data **VENDOR** will share with contracting party.
- Security protocols covering data collected during operations
- Operational data **VENDOR** will make available to public entity that has deployed vehicle
- Cybersecurity protections covering operational software
- Connected vehicle capabilities
- "Black Box" event recording capabilities

• Other relevant hardware and software features

CONTRACT PROVISIONS FOR NON-FEDERAL ENTITY CONTRACTS UNDER FEDERAL AWARDS

In addition to other provisions required by the Federal agency or non-Federal entity, all contracts made by the non-Federal entity under the Federal award must contain provisions covering the following, as applicable.

(A) Contracts for more than the simplified acquisition threshold currently set at \$150,000, which is the inflation adjusted amount determined by the Civilian Agency Acquisition Council and the Defense Acquisition Regulations Council (Councils) as authorized by 41 U.S.C. 1908, must address administrative, contractual, or legal remedies in instances where contractors violate or breach contract terms, and provide for such sanctions and penalties as appropriate.

(B) All contracts in excess of \$10,000 must address termination for cause and for convenience by the non-Federal entity including the manner by which it will be effected and the basis for settlement.

(C) Equal Employment Opportunity. Except as otherwise provided under 41 CFR Part 60, all contracts that meet the definition of "federally assisted construction " in 41 CFR Part 60-1.3 must include the equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 FR 12319, 12935, 3 CFR Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."

(D) Davis-Bacon Act, as amended (40 U.S.C. 3141-3148). When required by Federal program legislation, all prime construction contracts in excess of \$2,000 awarded by non-Federal entities must include a provision for compliance with the Davis-Bacon Act (40 U.S.C. 3141-3144, and 3146-3148) as supplemented by Department of Labor regulations (29 CFR Part 5, "Labor Standards Provisions Applicable to Contracts Covering Federally Financed and Assisted Construction"). In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. The non-Federal entity must place a copy of the current prevailing wage determination issued by the Department of Labor in each solicitation. The decision to award a contract or subcontract must be conditioned upon the acceptance of the wage determination. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency. The contracts must also include a provision for compliance with the Copeland "Anti-Kickback" Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. The non-Federal entity must report all suspected or reported violations to the Federal awarding agency.

(E) Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708). Where applicable, all contracts awarded by the non-Federal entity in excess of \$100,000 that involve the employment of mechanics or laborers must include a provision for compliance with 40 U.S.C. 3702 and 3704, as supplemented by Department of Labor regulations (29 CFR Part 5). Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.

(F) Rights to Inventions Made Under a Contract or Agreement. If the Federal award meets the definition of "funding agreement" under 37 CFR §401.2 (a) and the recipient or subrecipient wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of

experimental, developmental, or research work under that "funding agreement," the recipient or subrecipient must comply with the requirements of 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

(G) Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387), as amended—Contracts and subgrants of amounts in excess of \$150,000 must contain a provision that requires the non-Federal award to agree to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).

(H) Debarment and Suspension (Executive Orders 12549 and 12689)—A contract award (see 2 CFR 180.220) must not be made to parties listed on the governmentwide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), "Debarment and Suspension." SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

(I) Byrd Anti-Lobbying Amendment (31 U.S.C. 1352)—Contractors that apply or bid for an award exceeding \$100,000 must file the required certification. Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award. Such disclosures are forwarded from tier to tier up to the non-Federal award.

H-GAC ORDER PROCESSING CHARGE:

H-GAC will assess a **1.5%** Purchase Order Processing Charge on each order placed with a contractor through the Program as detailed below. This Cooperative Purchasing Program is supported solely by this processing fee.

Leased Vehicles - The **H-GAC** fee (leased units) shall cover the entire term of the Lease and the fee payment shall be made to **H-GAC** in a lump-sum amount up front and not carried over the term of the lease (For Example: 1000.00/mo. x 24 months (Term) = $24,000 \times 1.5\% = 360.00$ (H-GAC Fee). If the End User decides to purchase the vehicle; either at the end of the leasing term or prior to the end of the leasing term, this process shall be at the sole discretion of the End User and Contractor and no additional **H-GAC** fees shall be assessed. Nor shall **H-GAC** reimburse fees to End Users when the leasing term has been prematurely cut short for whatever reason.

Purchased Vehicles – Vehicle sales will not include the 1.5% fee. Sales of motor vehicles are subject to a \$600 flat fee, per Purchase Order amount separate from the price of the vehicle(s).

Fee is calculated from awarded bid pricing before additional discounts (if any) have been applied.

Competitive Pricing:

By submission of a response, Offeror certifies that offered pricing is as good as or better than pricing offered to local government customers thru any other program under normal circumstances. If such is not the case, Offeror shall explain how offered pricing differs from "best" pricing, and by how much.

Note: On each purchase order under this contract, H-GAC will invoice contractors directly for the 1.5% H-GAC Purchase Order Processing Charge. It is Bidder's responsibility to take this into Consideration when preparing Form D and E bid pricing, building this fee into Base Unit and options pricing accordingly.

Procurement Process:

The **HGACBuy** procurement process operates generally as follows:

- a) End User/Buyer contacts Contractor and discusses requirements.
- b) Contractor prepares an **HGACBuy** Contract Pricing Worksheet for End User/Buyer, based on **H-GAC** contract.
- c) End User/Buyer sends a purchase order to Contractor, and Contractor faxes a copy to **H-GAC** along with the Contract Pricing Worksheet.
- d) For each purchase order received, H-GAC will prepare an "Order Confirmation" and transmit it to both End User/Buyer and Contractor. The Order Confirmation verifies that Contractor has a valid H-GAC contract and that the order is being handled legally thru the HGACBuy Program.
- e) **H-GAC** will invoice Contractor for the Order Processing Charge.
- f) Contractor delivers the ordered product (s) and invoices End User/Buyer.
- g) End User/Buyer pays Contractor for products(s) received and accepted.
- h) Contractor remits Order Processing Charge to H-GAC.

STRUCTURE OF RESPONSE AND REQUIRED INFORMATION:

The following core areas must be addressed <u>specifically</u> in any response to this RFP:

- Proposals (1-original and 1-copy), marked accordingly and in <u>hard-sided 3-ring binders</u>, shall be organized in tabbed sections, each containing ALL required information and/or FORMS as described below.
- In addition, complete responses shall also be provided in an electronic format such as; CD, thumb-drive, flash-drive, etc., such that the entire response can be uploaded to H-GAC's data system and be made available to End Users as may be requested. <u>A single electronic copy of the solicitation will suffice and should be put with/in the copy binder.</u>
- Forms D, D1 & E must be provided in an Excel format. NOTE: Keep in mind, the 3-ringed binder marked ORIGINAL is locked away and the entire evaluation process is done from the COPY as well as the electronic copy. Therefore, the 3-ringed binder marked copy must be an *exact duplicate of the original* including all the signatures and other markings.

Proposer shall provide the information described below, <u>labeled and tabbed to correspond with the designated Segment</u> (<u>Tab</u>) <u>Headings (A thru F) being bid</u>. The requested information within each of these Tabs (A-F) items must be addressed completely. <u>It is this information that will be evaluated and determine the proposers final score</u>.

It is extremely important to set-up the binders as instructed. Responses not organized in the prescribed manner may be eliminated from consideration.

Proposal Format

Tab A: H-GAC Forms

Place the completed Forms A, B, C, W-9, CIQ, Form 1295 and Form HB 89.

As a "Business Entity", all vendors must:

- (1) **Complete Form 1295 electronically** with the Texas Ethics Commission using the online filing application, which can be found at <u>http://www.ethics.state.tx.us/whatsnew/elf_info_form1295.htm</u>
 - All vendors must complete Form 1295, even if no interested parties exist.

- In Section 2, insert "HGACBuy"
- In Section 3, insert **HGACBuy** RFP No. **AV09-18**.
- (2) Print a copy of the completed form (make sure that it has a computer-generated certification number in the "Office Use Only" box)
- (3) Have an authorized agent of the business entity sign the form.
- (4) Submit the completed, signed, notarized Form 1295, with the certification of filing, by including the form to your proposal in Tab A H-GAC Forms of the solicitation.

HGACBuy must acknowledge the receipt of the filed Form 1295 by notifying the Texas Ethics Commission of the receipt of the filed Form 1295 no later than the 30'th day after receipt by **HGACBuy**. After **HGACBuy** acknowledges the Form 1295, the Texas Ethics Commission will post the completed Form 1295 to its website within seven business days after receiving the notice from **HGACBuy**.

Tab B: Products & Pricing

<u>Place the completed Forms D, D1 & E behind this TAB as required</u>. Contractor shall use the subject Forms to price the products and services they intend to provide to End Users thru an **HGACBuy** contract. **VENDOR** shall not reformat the forms. Pricing on Form D should be completed with fully burdened pricing per unit to include all necessary elements such as but not limited to labor, materials, overhead, and fee/profit needed to perform all of the services described in this solicitation.

Vendor shall list each vehicle platform covered in their response on Form D for this proposal.

Proposer MUST provide all pricing (Forms D/D1 & E) in an electronic format (excel format).

- a. Form **D** Proposers shall provide the below information:
 - Manufacturer / Vendor
 - Vehicle Name / Model
 - Level of Automation Driving (0-5)
 - Seating Capacity
 - Propulsion System
 - Top Speed (mph)
 - Included Services and Features Proposer shall provide in detail the services and features of the vehicle platform and/or service being bid, including any maintenance and operations support. Technical Specifications along with these products and/or services included in this price should also be detailed on Form D and/or an Attached Addendum.
 - Lease Price For each vehicle platform, the VENDOR must provide a firm-fixed base lease price for (1) year of operations beginning from the date of the VENDOR'S response to this RFP. <u>This price should</u> be the all-inclusive cost to deploy, operate and maintain the automated vehicle.
 - **Purchase Price** Vendors may, but are not required to include a firm fixed price (1 year) for the outright sale of their automated vehicles. This price should include any annual software license and maintenance fee.
 - Licensing/Inspection Vendor shall have vehicle properly inspected and licensed to meet the Motor Vehicle requirements of the state in which the vehicle is originally sold.
- b. **Form D1** Proposers shall provide those Transportation Services associated to automated vehicles (e.g. Test Beds, Pilot Programs, Mobility Services and Turn-Key package for vehicles and associated support).
- c. Form E Options offered by the contractor such as quantity/volume discounts (e.g. 5, 10, 15 vehicles) and/or training fees should be put on this form. Vendor shall price any one-time fees for things such as site assessment/operations planning, site-setup, operator training, project management and shipping as an option on Form E (irrespective of purchase or lease).

d. <u>Bid Pricing</u> shall be exclusive of <u>freight charges</u>, which will be addressed at the time of each individual lease and/or purchase, as a Purchase Order line item, specific to the individual end user. <u>Freight Charges should be quoted on Form E</u>. Vendors offering <u>Transportation Services</u> that include automated vehicles, the price should include the all-in cost of operating the automated vehicle.

<u>Note</u>: Lease and Purchase pricing should be based on a single unit over a (1) year timeframe. **Vendor** may offer different lease durations and vehicle quantity rates as options on **Form E**.

<u>Note</u>: Both price change requests and contract changes to this contract are acceptable and will be processed as detailed in Section A, Terms & Conditions.

Tab C: Technical Specifications

Proposer shall place the completed spec sheets for each line item (vehicle platform and/or service) bid on **Forms D** & **D1** behind this tab. These spec sheets should detail the features and any products/services that are included in the prices being quoted.

Tab D: Vendor Qualification/Experience

Provide detailed company information including:

- 1. Ownership, history and current organization.
- 2. Location of sales and support offices, telephone numbers and type of employees at each and other matters **VENDOR** deems pertinent and introductory in nature.
- 3. If a joint venture or partnership is proposed, introduce all joint venture or partnerships members and their associated qualifications.
- 4. Vendors shall specify any direct experience in projects of similar size, scope and complexity.
- 5. **VENDOR** shall provide detail regarding response time and availability as it relates to technical support, mechanics, engineers and programmers.

Tab E: Automated Vehicle Requirements

Proposer shall address compliance with <u>each</u> of the factors detailed under the Vehicle Requirements Section in this proposal (See pg. 3).

Tab F: Value of Proposed Solution

In this Tab, **VENDORS** and/or Transportations Service providers should describe in detail the transportation use cases the automated vehicles they propose as responsive to this RFP can address. Vendors shall demonstrate how sales, service, training and support will be provided and achieved. **HGACBuy**'s members are interested in deploying automated vehicles to address real-life transportation needs. **VENDORS** should outline the kinds of transportation needs their automated vehicles can effectively address. Substantial weight will be given to descriptions of real-life transportation needs and how automated vehicles currently or in the near future can address those needs in a cost-effective manner. This is especially important for **VENDORS** who are offering transportation services using automated vehicles.

EVALUATION OF PROPOSALS:

Evaluation of proposals will be based solely on the judgment and determination of the **H-GAC** staff. <u>Proposals will be evaluated in two stages.</u>

The <u>first stage</u> will be a general subjective evaluation of the completeness of the proposal, considering all requirements for submission detailed in Section A, General Terms & Conditions. Proposals deemed to be responsive will then be passed to the second stage. (Pass/Fail)

The <u>second stage</u> of evaluation will involve consideration of the criteria specified below. There will be a maximum score of 100 points. <u>Proposers scoring the minimum 70 points or above may be offered a contract, but the number of contracts offered in any Product Category will be based solely on **H-GAC**'s determination of what best serves the interests of Program Participants.</u>

PROPOSAL EVALUATION TABLE

Proposal Evaluation Criteria	Weight
H-GAC Forms (Tab A):	Pass/Fail
Products and Pricing on Form D (Tab B):	30
Technical Specifications (Tab C):	20
Qualifications / Experience (Tab D):	20
Automated Vehicle Requirements (Tab E)	20
Value of Proposed Solution (Tab F):	10
	100

CONFIDENTIAL DATA

Each **VENDOR** may clearly mark each page of its proposal that contains trade secrets or other confidential commercial or financial information that **VENDOR** believes should not be disclosed to a third party. Disclosure of such information shall be determined in accordance with the Texas Public Information Act in the event of a request from the public for such information.

CONTRACT PERIOD

The initial contract term will be 24 months. Any contact may be extended by mutual agreement of H-GAC / HGACBuy and the Contractor.

CONTRACT AWARDS

HGACBuy may recommend one or more contract awards as may be determined necessary to serve the best interests of the Program, at **HGACBuy's** sole discretion. On approval of an award recommendation by the **H-GAC** Board, a contract may be offered to the recommended awardee(s). If the parties are unable to come to agreement on the contract, **H-GAC** may withdraw the offer at **H-GAC**'s sole discretion.

Specifications prepared by

Houston-Galveston Area Council Cooperative Purchasing Program

For questions about this Invitation, please contact: Bill Burton Ph: 832-681-2514 FX: 713-993-4548 Email: wburton@h-gac.com



SECTION C - H-GAC FORMS

(Rev 12/02/09)

For Use In Responding To Competitive Bid And Proposal Invitations

Invitation No.: AV11-18

Title: Statewide Automated Vehicle Procurement

This Section contains the following H-GAC FORMS.

FORM	DESCRIPTION
Form A:	Offeror Identification and Authorized Signatory
Form B:	Historically Underutilized Business Enterprises
Form C:	Response Checklist
Form D/D1:	Offered Items Pricing
Form E:	Published Options
Form W-9	Request for Taxpayer Identification Number and Certification
Form CIQ	Conflict of Interest Questionnaire
Form 1295	Certificate of Interested Parties
HB 89	Prohibition on Contracts with Companies Boycotting Israel

These *FORMS* are hereby made available in electronic format. They should be copied to Offeror's computer for completion and/or printout as required. The *FORMS* <u>may not</u> be changed or altered in any way, except as may be specified on the *FORM*.

ALL completed *FORMS* must also be submitted electronically on electronic media (DVD, CDRom, flash/thumb drive), excepting of course for signatures. The printed "Original" of the response will be considered as the official copy in case of any discrepancy between the electronic version and the printed Original.

APPENDIX D

FORM A - OFFER (DO NOT har	DR IDENTIFICATION & AUT dwrite this Form. Information	HORIZED SIGNATORY must be typed in.)	Invitation No.: AV11-18
Invitation Title:	Statewide Automated Vehicle Pr	ocurement	
Offeror Company:			
1 2	(Legal nam	e of business which will appear on contra	act, if awarded)
Offeror Status:	Manufacturer	Dealer/Distributor	Contract Other
Response Type(1):	☐ Single Offeror Acting Alone Or As Lead	□ Multiple Offerors Acting Jointly	
Contract Signatory(2):		Title:	
Mailing Address(3):			
	Street/PO Box	City	State & Zip
Physical Address:			
	Street	City	State & Zip
Phone:		Fax:	
Email Address:			
Federal Tax ID No.:		Web Page URL:	
(1) If Joint Offeri	ng, all parties must submit a signe	ed Form A. A contract will be off	ered to each.
(2) Person who w	ill sign final contract documents i	f an award is made.	
(3) Address to wh	ich final contract documents wou	ld be sent for signature.	
	Member	r Contact Information	
Contact Person(4):		Title:	
Mailing Address:			
	Street/PO Box	City	State & Zip
Physical Address:			-
•	Street	City	State & Zip
Toll Free Phone:		Fax:	
Email Address:			
(4) Person who E	nd Users will contact for product :	information and to get pricing que	otes.
	_		
The Signatory belo	v, on behalf of Offeror:		
- Acknowledges hav	ng thoroughly reviewed the Invita	ation;	
- Attests to having the	e authority to sign this response a	nd commit Offeror to honor all re	quirements;
- Makes, under pena	ty of perjury, all required Offeror	Certifications as detailed in Gen	eral Terms;
- Certifies that all inf	ormation provided in this Respon	se is true and correct.	
Signature:		Title:	
Printed Name:		Date:	

FORM B - HISTORICALLY UNDERUTILIZED BUSINESS ENTERPRISES

Procurement No.: AV11-18

APPENDIX D

Title: Statewide Automated Vehicle Procurement

Offeror:

Most, if not all, of the Members of HGACBuy are subject to various requirements relative to purchasing goods and services from Historically Underutilized Business Enterprises (HUBs)(See Note 1). These requirements are promulgated by federal and state governmental authorities, and include measureable criteria such as 'percentage of total dollars spent directed to HUBs', 'number of HUB contractors used', 'HUB subcontractors employed by primary contractors', etc. These requirements are generally formalized in goal oriented programs.

HGACBuy is comitted to promoting full and equal business opportunities for HUB contractors, and to assisting Cooperative Purchasing Program (COOP) Members in meeting mandated HUB goals. In that regard, Contractor shall make a good faith effort to use the services of Certified/Listed (See Note 2) HUBs whenever possible.

As part of a good faith effort, Contractor agrees to work with and assist HGACBuy Members in meeting HUB targets and goals, as may be required by any rules, processes or programs they might have in place. Such assistance may include such things as compliance with reporting requirements, provision of documentation, consideration of 'Certified/Listed' subcontractors, provision of documented evidence that an active participatory role for a HUB entity was considered in a procurement transaction, etc.

Note 1: There are many designations other than "HUB" used across the country within various jurisdictions. Examples include terms such as Disadvantaged Business Enterprise (DBE), Minority Owned Business Enterprise (MBE), Woman Owned Business Enterprise (WBE), Small Disadvantaged Business (SDB), Small, Woman or Minority-owned Business (SWAM), etc. Regardless of the formal designation, the overall objective of the relavant programs is basically the same, i.e. to insure that disadvantaged and underutilized members of the business community receive a fair share of public spending. The term HUB as used herein shall be understood to encompass all such programs/business enterprises, no matter what terminology is used by the Member.

Note 2: The terms "Certified" and "Listed" as used in conjunction with HUB programs relate to the process of HUB qualification review. Jurisdictions usually require that companies claiming HUB status be reviewed and confirmed as meeting certain minimum requirements to claim that status, and that the review and confirmation process be carried out by certain designated entities. They are then "Certified" or "Listed" by having their name included on an official listing published by the Certifying or Listing Authority.

Accepted and Agreed By:	
Title:	Date:
HUB Status Of Offeror	
Offeror is a HUB, as detailed below.	
Designation(s):	
Certifying/Listing Authority(s):	
Subcontracts	
On a separate sheet, list any subcontractors that would be employed in providing produc	ts or services related to this procurement.
Include subcontractor name, designation (HUB, DBE, etc.) and certifying/listing authority	,
Subcontractor List attached. No Subcontractors will be used.	

APPENDIX D

Procurement No.: AV11-18

FORM C - RESPONSE CHECKLIST

Title: Statewide Automated Vehicle Procurement

Offeror:

This *FORM* is provided to help insure that all required Response elements have been completed and included, or certified as being available upon request. **Responses that do not comply with all requirements may be considered non-compliant.** Offeror's signatory must review each item below, and certify by initialing in the space to the right.

Thi	s Response Includes:	Init.
1	An "Original" hard copy of the <u>COMPLETE</u> submission, including all required <i>FORMS</i> , plus one <u>COMPLETE</u> copy, each in a separate hard-sided 3-ring binder.	
2	A copy of the <u>COMPLETE</u> submission, including all required <i>FORMS</i> , in electronic format (CD, DVD, flash drive). Forms D & E must be provided in the original excel format.	
3	An originally signed Form A from all entities who are party to this submission and who should be offered a contract if this submission is successful.	
	A Form W-9 - Request for Taxpayer Identification Number and Certification shall be provided from each entity that has submitted a Form A for this submission (See Attachment)	
	Form CIQ (Conflict of Interest Questionaire) completed and signed and provided from each entity that has submitted a Form A for this submission (See Attachment)	
	Form 1295 Form (Certificate of Interested Parties) must be filled out electronically with the Texas Ethics Commisions's online filing application, printed out, signed and provided from each entity that has submitted a Form A for this submission (See Attachment)	
	HB 89 Verification Form - completed and signed and provided from each entity that has submitted a Form A for the submission (See Attachment)	
4	The required list of References .	
5	Details of "Service Organization", including locations, hours, personnel and parts/service availability. (Applies to hard goods only.)	
6	Complete Warranty Documentation for all Products offered.	
7	The manufacturer's latest Specification Documents detailing standard features, operating characteristics, etc., for all products offered.	
9	If the Non-Resident Reciprocal Bid Act applies, a copy of your state statute and a determination of the status of Texas bidders/proposers in your home state. If not applicable, indicate "N/A"	
11	A Bid/Proposal Bond , or Cashier's Check in the amount of \$3000 . (A percentage bond is NOT acceptable.)	Not Required

FORM D - PRODUCTS and SERVICES Offerings (Tab B)												
Offeror Name	:											
Invitation No.	: AV11-18 Statewide Automated Vehicle Procurement											
NOTES:	 Remember to bid op On Form D, fill-in be based the purchase Note: Vendors may, Note: Vendors shall provinformation on an separation of the s	ptions and accessor the Sales Price and <u>or leasing of a sing</u> but are not required rovide Lease Prici ided a detailed desc arate document. & Features to be q lot apply under a sp	ies on Form F applicable Lea <u>cle unit</u> . to include a fi ng in the space cription of the uoted as option ecific heading	ase Costs (monthly rm fixed price (1 y es below for each v vehicle services and ns on Form E. - N/A) under the corres ear) for the outrig ehicle platform b d features include	sponding headings. <u>Addition</u> ght sale of their automated vel id. <u>This price should be the a</u> ed in the bid price. If the spac	al lease duration: nicles. This price <u>Il-inclusive cost</u> æ below is insuff	s and vehicle qu e should include to deploy, oper ficient, simply p	iantities can be e any annual sof ate and maintain put "See Attache	bid as options o 'tware license an n a single automa ed Document" in	n Form E. Pri d maintenace fe ated vehicle. the cell and pro	cing below to ve. ovide the
Manufacturer/ Vendor	Vehicle Name/Model	Level of Automation Driving (0,1,2,3,4,5)	Seating Capacity	Propulsion System	Top Speed (mph)	Included Services & Features (See Note #3)	Purchase Price	Monthly Lease Cost / Term in Months				
								1 Year	1 Year 2 Years 3 Years 4 Years 5 years			5 years

FORM D1 - PRODUCTS and SERVICES Offerings (Tab B)								
Offeror Name:								
Invitation No.:	AV11-18 Statewide Automated Vehicle Procurement							
NOTES:	 Proposer shall provided a detailed description of the transportation services that they can provide for these vehicle platforms. Areas such as: AV test beds Pilot programs Mobility Services Partner with AV companies to put turn-key package together for vehicles and associated support. Any options or accessories not listed on Form D1 should be listed and priced on Form E. If something does not apply under a specific heading - N/A 							
Manufacturer/ Vendor	Transportation Services	Purchase Price		Monthly L	ease Cost / Ter	m in Months		
			1 Year	2 Years	3 Years	4 Years	5 years	

FORM E - P	JBLISHED OPTIONS	Procurement No.:	AV11-18	
Offeror Name:				
Notes: (Important)	 Use a single Form E for ALL Option/Accessory items and quote each multiple Form E's Add or insert additional lines as necessary. Completely describe each item. Include the manufacturer's code or paunique code or part number so that it can be identified in any subsequest completely describe each item. 	on a single, separate line. rt number. Each item lista ontract.	DO NOT use ed MUST have a	
Code or Part No.	Option Description			



SECTION D ProForma (Sample Contract)

This is a <u>sample</u> of the contract that will be sent to you for execution IF you are recommended for a contract award. Do NOT complete and return with your Response.

A CONTRACT BETWEEN HOUSTON-GALVESTON AREA COUNCIL, Houston, Texas AND

ARTICLE 1: SCOPE OF SERVICES

The parties have entered into a _____ Contract to become effective as of _____, and to continue through _____ (the "Contract"), subject to extension upon mutual agreement of the CONTRACTOR and H-GAC. H-GAC enters into the Contract as Agent for participating governmental agencies, each hereinafter referred to as END USER, for the purchase of

_____ offered by the **CONTRACTOR**. The **CONTRACTOR** agrees to sell _____ through the **H-GAC** Contract to **END** USERS.

ARTICLE 2: THE COMPLETE AGREEMENT

The Contract shall consist of the documents identified below in order of precedence:

- 1. The text of this Contract form, including but not limited to, Attachment A
- 2. General Terms and Conditions
- 3. Bid Specifications No:_____, including any relevant suffixes
- 4. **CONTRACTOR's** Response to Bid No:_____, including but not limited to, prices and options offered

All of which are either attached hereto or incorporated by reference and hereby made a part of this Contract, and shall constitute the complete agreement between the parties hereto. This Contract supersedes any and all oral or written agreements between the parties relating to matters herein. Except as otherwise provided herein, this Contract cannot be modified without the written consent of both parties.

ARTICLE 3: LEGAL AUTHORITY

CONTRACTOR and **H-GAC** warrant and represent to each other that they have adequate legal counsel and authority to enter into this Contract. The governing bodies, where applicable, have authorized the signatory officials to enter into this Contract and bind the parties to the terms of this Contract and any subsequent amendments thereto.

ARTICLE 4: APPLICABLE LAWS

The parties agree to conduct all activities under this Contract in accordance with all applicable rules, regulations, directives, issuances, ordinances, and laws in effect or promulgated during the term of this Contract.

ARTICLE 5: INDEPENDENT CONTRACTOR

The execution of this Contract and the rendering of services prescribed by this Contract do not change the independent status of **H-GAC** or **CONTRACTOR**. No provision of this Contract or act of **H-GAC** in performance of this Contract shall be construed as making **CONTRACTOR** the agent, servant or employee of **H-GAC**, the State of Texas or the United States Government. Employees of **CONTRACTOR** are subject to the exclusive control and supervision of **CONTRACTOR**. **CONTRACTOR** is solely responsible for employee payrolls and claims arising therefrom.

ARTICLE 6: END USER AGREEMENTS

H-GAC acknowledges that the **END USER** may choose to enter into an End User Agreement with the **CONTRACTOR** through this Contract and that the term of said Agreement may exceed the term of the **H-GAC** Contract. However this acknowledgement is not to be construed as **H-GAC's** endorsement or approval of the End User Agreement terms and conditions. **CONTRACTOR** agrees not to offer to, agree to or accept from **END USER** any terms or conditions that conflict with or contravene those in **CONTRACTOR's H-GAC** contract. Further, termination of this Contract for any reason shall not result in the termination of the underlying End User Agreements entered into between **CONTRACTOR** and any **END USER** which shall, in each instance, continue pursuant to their stated terms and duration. The only effect of termination of this Contract is that **CONTRACTOR** will no longer be able to enter into any new End User Agreements with END **USERs** pursuant to this Contract. Applicable **H-GAC** order processing charges will be due and payable to **H-GAC** on



any End User Agreements surviving termination of this Contract between H-GAC and CONTRACTOR.

ARTICLE 7: SUBCONTRACTS & ASSIGNMENTS

CONTRACTOR agrees not to subcontract, assign, transfer, convey, sublet or otherwise dispose of this Contract or any right, title, obligation or interest it may have therein to any third party without prior written notice to **H-GAC**. **H-GAC** reserves the right to accept or reject any such change. **CONTRACTOR** shall continue to remain responsible for all performance under this Contract regardless of any subcontract or assignment. **H-GAC** shall be liable solely to **CONTRACTOR** and not to any of its Subcontractors or Assignees.

ARTICLE 8: EXAMINATION AND RETENTION OF CONTRACTOR'S RECORDS

CONTRACTOR shall maintain during the course of its work, complete and accurate records of items that are chargeable to **END USER** under this Contract. **H-GAC**, through its staff or its designated public accounting firm, the State of Texas, or the United States Government shall have the right at any reasonable time to inspect copy and audit those records on or off the premises of **CONTRACTOR**. Failure to provide access to records may be cause for termination of this Contract. **CONTRACTOR** shall maintain all records pertinent to this Contract for a period of not less than five (5) calendar years from the date of acceptance of the final contract closeout and until any outstanding litigation, audit or claim has been resolved. The right of access to records is not limited to the required retention period, but shall last as long as the records are retained. **CONTRACTOR** further agrees to include in all subcontracts under this Contract, a provision to the effect that the subcontractor agrees that **H-GAC'S** duly authorized representatives, shall, until the expiration of five (5) calendar years after final payment under the subcontract or until all audit findings have been resolved, have access to, and the right to examine and copy any directly pertinent books, documents, papers, invoices and records of such subcontractor involving any transaction relating to the subcontract.

ARTICLE 9: REPORTING REQUIREMENTS

CONTRACTOR agrees to submit reports or other documentation in accordance with the General Terms and Conditions of the Bid Specifications. If **CONTRACTOR** fails to submit to **H-GAC** in a timely and satisfactory manner any such report or documentation, or otherwise fails to satisfactorily render performance hereunder, such failure may be considered cause for termination of this Contract.

ARTICLE 10: MOST FAVORED CUSTOMER CLAUSE

If **CONTRACTOR**, at any time during this Contract, routinely enters into agreements with other governmental customers within the State of Texas, and offers the same or substantially the same products/services offered to **H-GAC** on a basis that provides prices, warranties, benefits, and or terms more favorable than those provided to **H-GAC**, **CONTRACTOR** shall notify **H-GAC** within ten (10) business days thereafter of that offering and this Contract shall be deemed to be automatically amended effective retroactively to the effective date of the most favorable contract, wherein **CONTRACTOR** shall provide the same prices, warranties, benefits, or terms to **H-GAC** and its **END USER**. **H-GAC** shall have the right and option at any time to decline to accept any such change, in which case the amendment shall be deemed null and void. If **CONTRACTOR** is of the opinion that any apparently more favorable price, warranty, benefit, or term charged and/or offered a customer during the term of this Contract is not in fact most favored treatment, **CONTRACTOR** shall within ten (10) business days notify **H-GAC** in writing, setting forth the detailed reasons **CONTRACTOR** believes aforesaid offer which has been deemed to be a most favored treatment, is not in fact most favored treatment. **H-GAC**, after due consideration of such written explanation, may decline to accept such explanation and thereupon this Contract between **H-GAC** and **CONTRACTOR** shall be automatically amended, effective retroactively, to the effective date of the most favored agreement, to provide the same prices, warranties, benefits, or terms to accept such explanation and thereupon this Contract between **H-GAC** and **CONTRACTOR** shall be automatically amended, effective retroactively, to the effective date of the most favored agreement, to provide the same prices, warranties, benefits, or terms to **H-GAC**.

The Parties accept the following definition of routine: A prescribed, detailed course of action to be followed regularly; a standard procedure. *EXCEPTION: This clause shall not be applicable to prices and price adjustments offered by a bidder, or contractor, which are not within bidder's control [example; a manufacturer's bid concession], or to any prices offered to the Federal Government and its agencies.*

ARTICLE 11: SEVERABILITY

All parties agree that should any provision of this Contract be determined to be invalid or unenforceable, such determination shall not affect any other term of this Contract, which shall continue in full force and effect.

ARTICLE 12: DISPUTES

Any and all disputes concerning questions of fact or of law arising under this Contract, which are not disposed of by agreement, shall be decided by the Executive Director of **H-GAC** or his designee, who shall reduce his decision to writing and provide notice thereof to **CONTRACTOR**. The decision of the Executive Director or his designee shall be final and conclusive unless,



within thirty (30) days from the date of receipt of such notice, **CONTRACTOR** requests a rehearing from the Executive Director of **H-GAC**. In connection with any rehearing under this Article, **CONTRACTOR** shall be afforded an opportunity to be heard and offer evidence in support of its position. The decision of the Executive Director after any such rehearing shall be final and conclusive. **CONTRACTOR** may, if it elects to do so, appeal the final and conclusive decision of the Executive Director to a court of competent jurisdiction. Pending final decision of a dispute hereunder, **CONTRACTOR** shall proceed diligently with the performance of this Contract and in accordance with **H-GAC'S** final decision.

ARTICLE 13: LIMITATION OF CONTRACTOR'S LIABILITY

Except as specified in any separate writing between the **CONTRACTOR** and an **END USER, CONTRACTOR's** total liability under this Contract, whether for breach of contract, warranty, negligence, strict liability, in tort or otherwise, but excluding its obligation to indemnify **H-GAC** described in Article 14, is limited to the price of the particular products/services sold hereunder, and **CONTRACTOR** agrees either to refund the purchase price or to repair or replace product(s) that are not as warranted. In no event will **CONTRACTOR** be liable for any loss of use, loss of time, inconvenience, commercial loss, lost profits or savings or other incidental, special or consequential damages to the full extent such use may be disclaimed by law. **CONTRACTOR** understands and agrees that it shall be liable to repay and shall repay upon demand to **END USER** any amounts determined by **H-GAC**, its independent auditors, or any agency of State or Federal government to have been paid in violation of the terms of this Contract.

ARTICLE 14: LIMIT OF H-GAC'S LIABILITY AND INDEMNIFICATION OF H-GAC

H-GAC's liability under this Contract, whether for breach of contract, warranty, negligence, strict liability, in tort or otherwise, is limited to its order processing charge. In no event will **H-GAC** be liable for any loss of use, loss of time, inconvenience, commercial loss, lost profits or savings or other incidental, special or consequential damages to the full extent such use may be disclaimed by law. Contractor agrees, to the extent permitted by law, to defend and hold harmless **H-GAC**, its board members, officers, agents, officials, employees, and indemnities from any and all claims, costs, expenses (including reasonable attorney fees), actions, causes of action, judgments, and liens arising as a result of **CONTRACTOR's** negligent act or omission under this Contract. **CONTRACTOR** shall notify **H-GAC** of the threat of lawsuit or of any actual suit filed against **CONTRACTOR** relating to this Contract.

ARTICLE 15: TERMINATION FOR CAUSE

H-GAC may terminate this Contract for cause based upon the failure of **CONTRACTOR** to comply with the terms and/or conditions of the Contract; provided that **H-GAC** shall give **CONTRACTOR** written notice specifying **CONTRACTOR'S** failure. If within thirty (30) days after receipt of such notice, **CONTRACTOR** shall not have either corrected such failure, or thereafter proceeded diligently to complete such correction, then **H-GAC** may, at its option, place **CONTRACTOR** in default and the Contract shall terminate on the date specified in such notice. **CONTRACTOR** shall pay to **H-GAC** any order processing charges due from **CONTRACTOR** on that portion of the Contract actually performed by **CONTRACTOR** and for which compensation was received by **CONTRACTOR**.

ARTICLE 16: TERMINATION FOR CONVENIENCE

Either **H-GAC** or **CONTRACTOR** may cancel or terminate this Contract at any time by giving thirty (30) days written notice to the other. **CONTRACTOR** may be entitled to payment from **END USER** for services actually performed; to the extent said services are satisfactory to **END USER**. **CONTRACTOR** shall pay to **H-GAC** any order processing charges due from **CONTRACTOR** on that portion of the Contract actually performed by **CONTRACTOR** and for which compensation is received by **CONTRACTOR**.

ARTICLE 17: CIVIL AND CRIMINAL PROVISIONS AND SANCTIONS

CONTRACTOR agrees that it will perform under this Contract in conformance with safeguards against fraud and abuse as set forth by **H-GAC**, the State of Texas, and the acts and regulations of any funding entity. **CONTRACTOR** agrees to notify **H-GAC** of **any** suspected fraud, abuse or other criminal activity related to this Contract through filing of a written report promptly after it becomes aware of such activity.

ARTICLE 18: GOVERNING LAW & VENUE

This Contract shall be governed by the laws of the State of Texas. Venue and jurisdiction of any suit or cause of action arising under or in connection with this Contract shall lie exclusively in Harris County, Texas. Disputes between END USER and CONTRACTOR are to be resolved in accord with the law and venue rules of the state of purchase. CONTRACTOR shall immediately notify **H-GAC** of such disputes.



SECTION D ProForma (Sample Contract)

ARTICLE 19: PAYMENT OF H-GAC ORDER PROCESSING CHARGE

CONTRACTOR agrees to sell its products to **END USERS** based on the pricing and other terms of this Contract, including, but not limited to, the payment of the applicable **H-GAC** order processing charge. On notification from an **END USER** that an order has been placed with **CONTRACTOR**, **H-GAC** will invoice **CONTRACTOR** for the applicable order processing charge. Upon delivery of any product/service by **CONTRACTOR** and acceptance by **END USER**, **CONTRACTOR** shall, within thirty (30) calendar days or ten (10) business days after receipt of payment, whichever is less, pay **H-GAC** the full amount of the applicable order processing charge, whether or not **CONTRACTOR** has received an invoice from **H-GAC**. For sales made by **CONTRACTOR** based on this contract, including sales to entities without Interlocal Contracts, **CONTRACTOR** shall pay the applicable order processing charges to **H-GAC**. Further, **CONTRACTOR** agrees to encourage entities who are not members of **H-GAC's** Cooperative Purchasing Program to execute an **H-GAC** Interlocal Contract. **H-GAC** reserves the right to take appropriate actions including, but not limited to, contract termination if **CONTRACTOR** fails to promptly remit **H-GAC's** order processing charge. In no event shall **H-GAC** have any liability to **CONTRACTOR** for any goods or services an **END USER** procures from **CONTRACTOR**.

ARTICLE 20: LIQUIDATED DAMAGES

Any liquidated damages terms will be determined between **CONTRACTOR** and **END USER** at the time **END USER's** purchase order is placed.

ARTICLE 21: PERFORMANCE BONDS FOR INDIVIDUAL ORDERS

Except as described below for fire apparatus, **CONTRACTOR** agrees to provide a Performance Bond at the request of **END USER** within ten (10) days of receipt of **END USER's** purchase order.

It shall be standard procedure for every order received for fire apparatus that a Performance Bond in the amount of the order be provided to the **END USER**. Failure of **CONTRACTOR** to provide such performance bond within ten (10) days of receipt of **END USER's** order may constitute a total breach of contract and shall be cause for cancellation of the order at **END USER's** sole discretion. **END USER** may choose to delete the requirement for a Performance Bond at **END USER's** sole discretion. If the bond requirement is waived, **END USER** shall be entitled to a price reduction commensurate with the cost that would have been incurred by **CONTRACTOR** for the bond.

ARTICLE 22: CHANGE OF CONTRACTOR STATUS

CONTRACTOR shall immediately notify H-GAC, in writing, of ANY change in ownership, control, dealership/franchisee status, Motor Vehicle license status, or name, and shall also advise whether or not this Contract shall be affected in any way by such change. H-GAC shall have the right to determine whether or not such change is acceptable, and to determine what action shall be warranted, up to and including cancellation of Contract.

ARTICLE 23: LICENSING REQUIRED BY TEXAS MOTOR VEHICLE BOARD [IF APPLICABLE]

CONTRACTOR will for the duration of this Contract maintain current licenses that are required by the Texas Motor Vehicle Commission Code. If at any time during this Contract period, any **CONTRACTOR'S** license is not renewed, or is denied or revoked, **CONTRACTOR shall** be deemed to be in default of this Contract unless the Motor Vehicle Board issues a stay or waiver. Contractor shall promptly provide copies of all current applicable Texas Motor Vehicle Board documentation to **H**-**GAC** upon request.

IN WITNESS WHEREOF, the parties have caused this Contract to be executed by their duly authorized representatives.

Signed for Houston-Galveston Area Council, Houston, Texas:				
-	Jack Steele, Executive Director			
Attest for Houston-Galveston Area Council, Houston, Texas:				
	Deidre Vick, Director of Public Services			
	Date:	, 20		
Signed for				
Printed Name & Title:	Date:	20		
Attest for				
Printed Name & Title:	Date:	, 20		

Appendix E AMPO Vehicle Connectivity and Automation Working Group White Papers

Identifying the Challenges, Opportunities, and Current State of Practice

AMPO Connected and Autonomous Vehicles Working Group Meeting 1: April 4-5, 2017 in Arlington, Texas

Approximately 100 years ago, automobiles were a revolutionary transportation option. The deployment of this technology drove infrastructure development, the development of transportation policies and regulations, and altered land use and travel patterns. The deployment of the automobile resulted in considerable economic benefits and improved the quality of life for the majority of the American population. Today, we are faced with what some see as the connected and autonomous vehicle (C/AV) revolution. While some C/AV technologies are already in use, there is considerable debate on the exact timeline for full scale deployment of these technologies and the impacts they will have on the transportation system and society. Regardless of these unknowns, C/AV has the potential to bring major changes as well as considerable benefits for the American population.

Metropolitan planning organizations (MPOs) are stewards of the transportation system within their metropolitan planning areas. They work with other stakeholder agencies to ensure its safe operation, and therefore are focusing on the safe deployment of C/AV technologies with minimal disruptions or negative impacts to the transportation system and its users. MPOs are also leaders in the field of transportation. They must keep pace with, leverage, and support emerging technologies, like C/AV, and their potential to improve the transportation system. In addition, MPOs must maintain communications with their stakeholders to inform them about C/AV and other transportation related issues while understanding stakeholder values related to these topics.

With this in mind, the Association of Metropolitan Planning Organizations (AMPO) has assembled a Technical Working Group to identify how to best leverage the benefits of C/AV development and deployment. In early 2017, AMPO mobilized the C/AV Technical Working Group to support MPOs as they incorporate C/AVs into their planning process and products. The Working Group will hold four meetings over the course of approximately one year with its efforts culminating in a national symposium. The goals of the Working Group are to be a mechanism to:

- Build technical, institutional, and policy capacity
- Leverage C/AV benefits
- Address knowledge gaps

- Advance C/AV in planning
- Support the United States Department of Transportation's (USDOT) C/AV efforts

The AMPO C/AV Technical Working Group held its first meeting from April 4-5, 2017 in Arlington, Texas. The group was hosted by the University of Texas at Arlington's College of Architecture, Planning, and Public Affairs (CAPPA) and the North Central Texas Council of Governments (NCTCOG). This meeting identified current policy, practice, and activities at MPOs, as well as challenges and needs, opportunities, and next steps. Its discussions focused solely on the MPO perspective. Subsequent meetings will incorporate coordination with other C/AV stakeholders, such as State DOTs and industry.

Many MPOs have encountered challenges as they try to incorporate C/AV into their scenario planning and long range planning processes and MPO products. A summary of these challenges is presented below. It is important to recognize that within each of these challenges lies opportunity. Throughout the national discussion there is a tendency to refer to C/AV and other transportation related emerging technologies as disruptive, carrying a negative connotation. Yet, the future of C/AV deployment and impacts is not set in stone. MPOs have a great opportunity to influence how these challenges are handled, and to shape the future of our nation's transportation system. The private sector has been moving quickly towards development and implementation of C/AV technologies, so the efforts and products of this Working Group are critical for MPOs to have as soon as possible.

Many of the challenges with C/AV relate to the unknowns surrounding their implementation and deployment. The unknowns make it difficult to have confidence in how to represent a future with C/AV technology in the long-range planning process, in scenario planning, and in MPO products, such as the Metropolitan Transportation Plan and Transportation Improvement Program (TIP). How can an agency or organization plan for something when there is so much uncertainty? Despite the many unknowns, MPOs can still make confident decisions by focusing on what we do know about these technologies, understanding what kinds of things MPOs and other transportation agencies can influence (or might want to), exploring the desired future (and perhaps the undesirable) through scenario planning, and building the MPOs capacity to develop suitable technical, institutional, and policy responses as the C/AV technologies emerge.

While MPOs will not be able to know the future of C/AV implementation with certainty, existing tools such as scenario planning can help MPOs initiate discussions in the metropolitan transportation plan with decision makers, policy makers, and stakeholders about the range of possible outcomes, as well as strategies for identifying and implementing timely responses when these are needed. Scenario planning can be challenging because the data, processes, and questions we are seeking to answer are formulated in terms of our past experience and priorities. Using scenario planning to assess plausible future outcomes and the consequences of different scenarios will help MPOs understand which elements of the system may change, which may remain constant, and which are most critical with respect to adjusting the types of investment and investment priorities the MPO is considering. The scenarios can also reveal the "levers" that might speed or delay the emergence of C/AV technology, as well as decisions that C/AV technology might affect. Using the outcomes of these exercises, MPOs can independently and collaboratively with other transportation agencies and stakeholders identify the desired future for C/AV deployment and implementation from the perspective of transportation needs, desired outcomes, and the feasible levers of influence. The above process will need to be done in planning cycles to revisit what we know, what has changed, and how this affects our strategy as transportation agencies. This information will enable MPOs to plan and make investments for a C/AV future that optimizes the benefits of this technology for the transportation system and users.

Some of the specific challenges the Working Group identified are the following:

Challenge: Unknowns and Uncertainty – What is the timeline for deployment? There are vehicles with connected and autonomous vehicle technology features in the fleet today. However, it is difficult to predict when full fleet penetration will occur and how deployment will be phased in. It is also difficult to predict how deployment will be phased in on a nationwide scale. There are currently numerous pilots, but they mainly focus on a regional scale.

Challenge: Unknowns and Uncertainty – What are the implications of C/AV deployment for safety and security? There is much speculation that the deployment of C/AVs will drastically improve safety by reducing user error. There are concerns about ensuring safety during deployment and especially under the conditions of a mixed fleet environment and that existing standards, guidance, and requirements keep pace with the deployment to maintain the safety of the transportation system. There are also concerns about ensuring security to prevent vulnerabilities and intrusion that could disrupt the transportation system.

Challenge: Unknowns and Uncertainty – How will C/AV technology impact capacity and congestion? A possible outcome of C/AV implementation and deployment is reduced incidents related to user error and a more efficient traffic flow thereby increasing capacity, reducing congestion, and encouraging an increase in vehicle miles traveled. Project development for large scale transportation projects can often encompass a ten-year time frame. Transportation agencies can use the scenario planning process described earlier to help understand future transportation needs to help prevent the projects they are planning or implementing today from being obsolete when C/AVs are more fully deployed.

Challenge: Unknowns and Uncertainty – How will C/AVs impact mobility and mode options for transportation system users and the transport of goods? C/AVs may expand mobility for those currently unable to drive. Related specifically to the transit mode, there are a wide range of scenarios: at one end, C/AVs could increase transit efficiency through better first and last mile connections, while at the other end, C/AVs could eliminate the need for transit systems entirely by providing shared mobility on demand everywhere at affordable prices. For freight transport, it is possible that C/AV technology will have a positive effect on throughput using applications such as freight platooning.

Since C/AVs have the potential to drastically change mobility and mode options, what impact will they have on land use and equity? There are some concerns that without strong land use planning and policy, C/AVs could induce sprawl and encourage "super- commutes" or conversely that C/AVs could promote gentrification, but in doing so disproportionately impact the availability of low income housing. While C/AVs could enhance equitable access to transportation, some fear that building or adapting facilities specifically for such vehicles will systemically disadvantage some users of the system, such as youth, low income, minority, and elderly populations, households who primarily use public transportation, and rural communities.

Challenge: Unknowns and Uncertainty – What are the implications to funding and the operation, structure, roles, and responsibilities of transportation agencies? What is the estimated cost for the infrastructure required to support this technology? Who will pay for its implementation? How will C/AV technology impact current funding and financing mechanisms? MPOs develop long range plans which forecast needs, priorities, revenue, and sometimes projects using a twenty-year horizon. How will the roles and responsibilities of transportation agencies, the federal government, and industry evolve? How will existing standards and policies evolve with C/AV implementation? Technology can move at a fast pace so there will be a need to provide consistency in deployment of C/AV infrastructure. Existing standards and guidebooks, such as the Manual on Uniform Traffic Control Devices and A Policy on Geometric Design of Highways and Streets, will need to be updated to be relevant to and provide guidance on a transportation system designed to accommodate C/ AVs. How will C/AV technology fit into the performance management provisions required by USDOT, which are currently being implemented? While C/AV may assist transportation agencies with meeting targets, adjustments to the measures and processes may need to be made once C/AVs are more fully deployed.

Challenge: Data. There is already a prolific amount of data relating to roadway condition and operations from a diverse range of sources. Transportation agencies collect data relating to the physical condition and operation of their assets. Private companies, such as Inrix, Waze, and TomTom, collect data that support planning as well as traffic management and operations. The piloting and deployment of C/AVs provides yet another data source. While this is an opportunity to use the data to help with the management of the transportation system, develop partnerships, and even provide a potential source of funding, it is also a challenge to share and best utilize data coming from different data owners. How will MPOs handle the exponential increase in data quantity from C/AVs? How can new types of data be used by MPOs (i.e., windshield wiper use, brake use, etc.)? How much will C/AV data cost? How will privacy concerns be addressed and will there be pushback from travelers on using this data? Given the organizational structure of MPOs, there is an opportunity to serve as the regional clearinghouse for data. However, collecting, cleaning, maintaining, and utilizing such a massive amount of data will require significant staffing and financial resources and is often not typically a function performed by MPOs or other transportation agencies. There are also challenges in extracting useful information from the available data, and fully understanding its implications for planning.

Challenge: Coordination with Stakeholders. MPOs are required to coordinate with their stakeholders. This includes sharing information to inform them of issues, gathering feedback to understand stakeholder concerns and values, and including them in the development of the metropolitan transportation plan and TIP. MPO stakeholders have a wide range of knowledge and views towards C/AVs. Regarding knowledge of C/AVs, some stakeholders are not aware that there are cars in the current fleet with C/AV technology features, while others follow the issue closely and are well versed on the subject. Regarding perceptions towards C/AVs, some MPOs have encountered stakeholders who view C/AV technology as having more negative impacts than positive and believe the deployment should be prevented, while other stakeholders whole-heartedly support C/AV technology and feel it will be the solution to all challenges facing the transportation system. MPOs have an opportunity to share information regarding the current reality of C/AV deployment and manage perceptions so stakeholders are able to understand the plausible benefits, challenges, and limitations of the technology, as well as uncertainties about how these will develop as the technology is deployed. Gaining support from stakeholders and building or strengthening partnerships can serve as important strategies to help maintain confidence in MPOs as they prepare for C/AV technology deployment and implementation.

Challenge: Staying Informed. C/AV technology is a fast-paced issue. There are pilots, test beds, and research, legislation and policy formation, and industry progress occurring nationwide. This can make it challenging for MPOs and their stakeholder agencies, who are tasked with numerous other responsibilities, to keep up with the plethora of information available, to evaluate it effectively, and incorporate it into their investment decisions. In addition, MPOs focus on medium and long term (i.e., 5 years, 20 years) while C/AV technologies change monthly.

Challenge: Role of the Private Sector. The private sector, including automobile manufacturers, automotive aftermarket suppliers, and technology companies, has been focused on developing and implementing C/AV technologies for the last several years. MPOs should work to include these new stakeholders in the planning process to ensure regional plans and projects are coordinated with private sector plans and to help MPOs stay informed.

Challenge: MPO Technical, Institutional, and Policy Capacity. Since C/AV technology is an emerging issue and the many unknowns make it difficult to incorporate into the planning process, MPOs are still building technical, institutional, and policy capacity. MPOs have been vocal about the need for training about the technology and about planning strategies to address it, for increased availability of best practices or case studies, and for peer exchanges.

In order to better understand the role that MPOs will serve in the deployment and development of C/AV technology the Working Group developed the following graphic, which shows how C/AV technology may impact the metropolitan planning process and provides insight as to how C/AV technology can be incorporated into planning products.



Based on the AMPO C/AV Working Group Meeting #1, the following recommendations were developed to help MPOs build their technical, institutional, and policy capacity related to C/AV technology implementation and deployment.

Training and Technical Assistance: The Working Group recommended that training and technical assistance in the form of best practices, case studies, research, peer exchanges, workshops, and coordination with U.S. DOT and university transportation centers or research institutes be developed to assist them in incorporating C/AVs into their planning processes and products. Specific focus areas discussed are listed below. For a compilation of existing resources, see the C/AV Working Group Meeting #1 Read-ahead Packet and Resources attachment. In addition, the U.S. DOT is developing additional resources especially related to deployment timelines and scenario planning for C/AV. The following areas of concern will need to be discussed (and revisited as C/AV technologies become more widespread):

- Analysis of the potential impacts of C/AV on travel demand, travel patterns, land use, housing location choices, and mode share
- Case study demonstrating the funding and piloting of a C/AV related project through the metropolitan transportation plan and TIP
- Data collection, management, analysis, and reporting
 - Roles and responsibilities for transportation agencies and others in the C/AV field
 - Data needs determination
 - Funding data needs
 - Incorporation of data into scenario planning and transportation demand models
- Existing and possible future expansions or development of new funding sources
- Identification of infrastructure needs and cost estimates for these needs
- Deployment of C/AVs beyond the regional scale
- Incorporation of C/AV technology into the metropolitan transportation plan and TIP, including development and use of criteria related to C/AV for project evaluation, prioritization, and performance assessment
- Incorporation of C/AV technology into scenario planning, including how to use scenarios to handle future uncertainty
- Identification of a spectrum of plausible scenarios for C/AVs using scenario planning
- Risk assessment for C/AV—specific areas discussed within this topic include overbuilt infrastructure and the potential implications of altered travel patterns, such as vehicle occupancy of less than one and potential increased vehicle miles traveled and wear and tear on roads
- Timeline for realistic phased deployment of C/AVs

Information Exchange: The Working Group recommended developing a mechanism, such as a clearinghouse or digest through a partnership with a university transportation center or a newsletter, to help facilitate their ability to gather and interpret information related to C/AV status and research. They also recommended the development of a template, which they coined "C/AV 101," to help them educate and share information with stakeholders. They advised that several templates would need to be developed to target various stakeholder groups, including board members and other decision and policy makers and the public.

Regulations and Guidance: The Working Group emphasized the need for consistent guidance at the national level from the U.S. DOT and its operating administrations to ensure consistent implementation and deployment of C/AV technology nationwide. They also stressed the importance of coordination and consistency at the regional and state levels.

This is the first in a series of four whitepapers that will be developed by the Working Group over the course of 2017-18. Each of the four whitepapers and related meeting materials will be made available on the AMPO website and can be found at www.ampo.org.

Navigating National Deployment: Coordination with Other Transportation Agencies and Risk Management

AMPO Connected and Autonomous Vehicles (C/AV) Working Group Meeting 2:

July 31, 2017 - August 1, 2017 in Cincinnati, Ohio

The AMPO C/AV Technical Working Group held its second meeting from July 31, 2017 - August 1, 2017 in Cincinnati, Ohio. The first day of meetings was held in coordination with the American Association of State Highway and Transportation Official's (AASHTO) Conference on Performance-Based Transportation Planning, Financing, and Management. AASHTO and AMPO's C/AV Working Groups held a joint meeting entitled "Transporting Cars, People, and Planning into the Self-Driving Future." The meeting discussed how public agencies are addressing C/AV technology and specifically focused on coordination opportunities with state and local transportation agencies. The AMPO C/AV Working Group met on the second day to further discuss coordination opportunities and identify risks associated with C/AV deployment and implementation. This white paper summarizes the discussions of both meetings. The objectives of the meetings included identifying:

- C/AV policy development and implementation, especially focused on the opportunities and challenges of navigating regulatory concerns;
- Incorporation of C/AV technology into the planning process at State DOTs, metropolitan planning organizations (MPOs), and localities related to partnership opportunities and areas where partnership is needed to facilitate C/AV deployment and implementation;
- Actions that State DOTs, MPOs, and other transportation agencies can take now to prepare for C/AV technology;
- The risks associated with C/AV deployment and implementation and potential strategies to manage those risks; and
- Resources to assist MPOs and other transportation agencies moving forward.

The discussion of ongoing activities related to C/AV technology emphasized the need for coordination among State DOTs, MPOs, and other transportation agencies to provide opportunities to increase awareness of C/AV related activities being undertaken by the public and private sector, build synergy among these efforts, reduce redundancy in activities, and efficiently use and leverage limited financial and staff resources. Coordination could help transportation agencies move forward as leaders and with a unified direction for deployment and implementation. Effective coordination could also ensure the technology best supports the operation of the transportation system and the needs of its users.

The participants identified unique characteristics and opportunities within the structure and core functions of MPOs and State DOTs to determine how to best focus their efforts related to C/AV technology. MPOs are stewards of the transportation system within their metropolitan planning areas. The MPO process already functions as a unique forum for discussion, building partnerships, and achieving consensus on policy and vision across a wide range of agencies, stakeholders, and decision makers through MPO policy boards, technical committees, and community meetings as well as the development of planning products, including the Transportation Improvement Program (and metropolitan transportation plan. These venues could provide a forum for regional stakeholders and policy makers to discuss and work through challenges and opportunities associated with C/AV technology and its impact on the transportation system. MPOs can also use these activities to strengthen existing partnerships, invite new partners, and engage these partners on critical C/AV topics. These activities also provide an opportunity to educate stakeholders on the status of C/AV technology and its benefits to the transportation system, and highlight the MPO's value to the region and state.

The discussion on coordination needs and opportunities went beyond state and local transportation agencies to identify additional stakeholders at the regional, state, and national levels. The participants were interested in how the roles and responsibilities of transportation agencies and their partnerships may evolve especially relating to the private sector.

- Other government agencies (e.g., federal agencies and emergency management)
- Private organizations (e.g., original equipment manufacturers and insurance agencies)
- Associations (e.g., the Institute for Transportation Engineers [ITE])

The discussion highlighted the opportunity for coordination with the freight industry in particular. Since C/AVs have the potential to increase capacity and reduce congestion, they could improve the movement of freight by reducing bottlenecks. Many feel C/AV technology cannot move forward without vehicle electrification, or at least will not achieve its full potential without it. C/AV technology and electrification could benefit freight movement by supporting the advancement of truck platooning and virtual weigh stations, which have the potential to expedite transport while facilitating compliance.¹

Under the topic of coordination, federal partnerships and navigating regulatory concerns were discussed. The participants discussed government regulation of C/AV technology and identified possible areas of standardization that would aid implementation and deployment. Many expressed the need for overarching guidance at the federal level to support consistent expansion of existing efforts across municipal and state borders and to help facilitate uniform, efficient, and effective C/AV deployment and implementation nationally. At the same time participants cautioned that flexibility in regulations, policy, and guidance must be provided to ensure that C/AV technology is not constrained by regulations, especially those that were developed for human-operated vehicles.

1. https://ops.fhwa.dot.gov/publications/fhwahop09051/sec04.htm

Because the full range of implications of C/AV technology is unknown, the participants posed questions and identified risks that need to be explored further. They suggested understanding societal adaptation to past technologies and examining what helped spur their widespread implementation. For example, what made communities give up parking to implement electric vehicle charging stations, airports to provide free cell phone charging stations, or businesses to provide free Wi-Fi in public spaces? Were there financial incentives, pressure relating to maintaining or creating a desired image, a desire to keep up with "cutting edge" technologies, or all of the above? Or in the case of cell phones, how was regulation handled in relation to earlier services such as land line phones, or earlier uses of the radio spectrum? Some of the specific risks explored include the following:

Safety – As discussed during the AMPO C/AV Working Group Meeting #1, while many predict that C/AV technology will dramatically improve safety, there are concerns with ensuring safety during deployment, especially under mixed fleet conditions. A further concern is maintaining security to prevent vulnerabilities and intrusions to vehicles and connected elements of infrastructure that could disrupt the transportation system. The participants also explored stakeholder acceptance and expectations related to safety. Will enough stakeholders trust (and continue to trust) the concept of C/AVs to carry through on the regulatory and system support required for full deployment? Since it is not realistic to expect an elimination of crashes and fatalities, how will stakeholders accept fatalities and serious injuries due to C/AV crashes where the cause is not human error or mechanical failure? What are the liability concerns related to such crashes?

Environmental Justice and Equity - The participants shared the concern of ensuring all transportation users, including youth, low income, minority, and elderly populations and individuals with disabilities are provided equal access to the transportation system and the benefits of C/AV technology, and do not receive a disproportionate share of any negative consequences as C/AVs are deployed and implemented. While C/AV technology could improve access for those currently unable to operate a motor vehicle, such as individuals with disabilities and seniors, there is concern regarding how implementation and deployment will be phased in to communities around the nation. To the extent C/AVs require public infrastructure investment and maintenance for deployment, it will be challenging to distribute resources and improvements equitably to ensure that all communities are capable of supporting C/AV use, and that lower income communities are not the last to receive access to the technology. By law, publicly supplied or subsidized C/AV services must be equally available to all populations. Private services supplied by C/AV operators must also be provided on a non-discriminatory basis. For example, how can equitable access be ensured in terms of cost structures and services provided by transportation service providers and other organizations whose core priority is profitability rather than provision of services? How can equitable access be ensured when access to the service happens through technologies such as cellular data services that may not be as widely available in lower income communities?

Vulnerable road users, including pedestrians, bicyclists and persons with disabilities may also be negatively affected by C/AV deployment, from the perspective both of equity and safety.² For example, it has been predicted that the deployment of C/AVs may necessitate non-motorized modes to carry transponders to communicate with technology and ensure their visibility. While the transponder could be incorporated into something such as a cell phone or perhaps small standalone beacon devices, it remains a challenge to distributed such devices equitably, especially to youth, elderly, and homeless populations, and to ensure their use. It is not clear (as with many aspects

of modern connected technologies) whether such devices would be accepted by the general population or whether they might be perceived as too invasive. These concerns could be significant enough to deter people from transitioning to C/AVs.

Stakeholder Expectations, Acceptance, and Unpredictability – As discussed in the AMPO C/AV Working Group Meeting #1, stakeholders have a wide range of knowledge and views of C/AVs – including unrealistic expectations regarding C/AV technology as a mechanism to solve all transportation problems. Through their existing processes, transportation agencies can assist in educating their stakeholders about the known and unknown characteristics of the new technologies, and in developing realistic expectations. Concerns were also raised that C/AVs will be used for illicit purposes or that some transportation system users will attempt to "game" the system by using the technology to behave illegally or in ways that enhance personal advantage at the expense of public safety and efficient system operation. For example, there are concerns with keeping the technology installed in vehicles and elements of roadway infrastructure secure from intrusions: even in the absence of malicious cyberattacks and intrusions, access to signal phasing and timing systems or "insider" knowledge of AV algorithms must be prevented. The participants also explored whether the safety expectations of C/AVs could promote unsafe pedestrian behaviors by giving pedestrians a false sense of security.

Data Sharing – The discussions also identified data sharing as both a risk and an opportunity. While data is essential to planning and operations for the public and private sector, sharing data can be a risk depending on its use, accuracy, and whether the user understands the limitations of the data and uses it appropriately. In addition, there is tension between data access, privacy, safety, and security concerns related to personal information contained in the data. The proprietary nature of private sector data sources also poses a challenge to public agencies that might benefit from access to such data for system management, and to private firms who fear the disclosure of trade secrets or market position as well as exposure to regulation. Agencies suggested it would be beneficial if the private sector (e.g., auto manufacturers, ride sharing companies, and providers of travel navigation apps) could assemble a scrubbed version of data for transportation agencies to use for planning purposes. Still, the allure of data collected in large quantities by the private sector is great. Current data resources used by planning agencies often include public surveys (e.g., household travel surveys, on-board transit surveys, and commercial vehicle surveys). But these surveys are costly and therefore may only be conducted every five to ten years (or even less frequently), and finding other more plentiful and less expensive sources of data is desirable.

Incorporation into Current Planning Process and Decision Making – The significant amount of uncertainty in exactly how C/AV implementation and deployment will occur and its implications for travel behavior and current funding and financing mechanisms makes it challenging for transportation agencies to incorporate C/AVs into long range planning. Travel behavior is likely to be different in ways we do not currently understand. Will we make more trips, longer trips, or trips to destinations different than those we frequent today? What might the cost structure be for C/AV trips? Tools such as scenario planning may help us frame the problems, but they cannot help with the key unknowns. Thus, a significant challenge is how transportation agencies can ensure that today's investment decisions will remain useful in the future? How can transportation agencies position themselves to ensure future needs are met as land use, travel demand needs, and mode splits change?

The discussions at the joint AASHTO/AMPO workshop closed with the identification of actions transportation agencies can take now to prepare for C/AV technology and of resources to assist transportation agencies moving forward. Participants concluded that it will be important to have discussions related to the overarching community visions and goals for each region. How do these visions and goals evolve with the introduction of C/AVs and the implications they have for human behavior? How can C/AVs support or impede these visions and goals? Based on these discussions, transportation agencies can identify policies and actions to encourage the positives and discourage the negatives. Although it will be impossible to fully assess the implications, these discussions can help identify critical elements and make near-term decisions that will remain relevant in the fact of various possible future developments.

Internally, transportation agencies can conduct self-assessments to identify strengths and gaps related to C/AV implementation and deployment. They can also dedicate staff and restructure organizationally to ensure staff resources are allocated to monitoring status of C/AV technology, coordinating with government and nongovernment stakeholders, and including C/AV discussions in the State and MPO planning process and documents. Transportation agencies can continue to build and strengthen partnerships and become more proactive in areas where their existing core functions, roles, and responsibilities naturally allow them to do so. In this way, they can keep their stakeholders engaged and ensure C/AV technology is visible and effectively addressed on MPO agendas, in the planning process, and MPO products. MPOs can explore the application of C/AV technology in daily business practices and the transportation system, and the question of what technologies can be implemented today to facilitate the transportation system in meeting the needs of transportation system users and best advancing system efficiency and safety. Such decisions are not always grand in scope or scale. For example, applications of C/AV technology in enhancing work zone safety or connecting automated snow plows with detailed infrastructure awareness could improve safety and efficiency in operations and maintenance.

The continued use of scenario planning in transportation planning to explore levers of change and plausible future scenarios was emphasized as a valuable tool. Scenario planning and computer models do not show the future, but can help transportation agencies understand what might happen under various deployment scenarios, the risks associated with those scenarios, and through commonalities between scenarios and the present and future, the importance of specific technological and social developments in moving from the present to the various possible futures. The participants also suggested framing transportation planning in terms of creating access and mobility for people and goods, significantly enhancing mobility to those who have considerable limitations such as the legally blind or paraplegics, creating an environment that can evolve and change as C/AVs are implemented and deployed, and embracing C/AV incrementally as they are deployed, and as the benefits and challenges become clearer.

The participants identified many resource needs to assist MPOs as they incorporate C/AV technology into their planning process and products, including:

- A better understanding of infrastructure investment needs and costs;
- A "C/AV 101" template or toolkit that could be used to educate and share information with stakeholders. Several variations of the template or toolkit will probably be required to target different stakeholder groups, from board members and other decision and policy makers to

members of the public, as well as for stakeholders interested in different issue such as cybersecurity or environmental justice;

- A template or framework for inclusion of C/AV considerations into MPO products and investment decisions. The participants suggested identifying key questions and considerations to include as discussion items in the metropolitan transportation plan;
- How to incorporate risk related to C/AV technology into transportation planning and investment decisions. The participants suggested identifying events, milestones, or other factors that can be used to foreshadow the course of future development, or as "triggers," or leading indicators suggesting what actions should be taken in the planning process, as well as methods to identify strategies or products to manage those risks should certain types of development start to emerge;
- The option to include a shorter horizon for long range planning since the technology is moving quickly;
- Support from the federal government to promote data sharing among the public and private sector (with reasonable safeguards against the unauthorized release of personal or proprietary information) to assist transportation agencies in accessing data for planning and operations;
- Overarching guidance at the federal level that provides flexibility and supports expansion of existing efforts across municipal and state borders and to help facilitate uniform, efficient, and effective C/AV deployment and implementation nationally;
- Sharing of best practices as well as lessons learned among transportation agencies on topics including policies, partnerships, and data;
- Clarifying roles for federal, state, and local agencies and for the private sector in ensuring the safe and efficient operation of the transportation system; and
- Better venue for dialogue and coordination with technology drivers and companies.

This is the second in a series of four whitepapers that will be developed by the AMPO C/AV Working Group over the course of 2017-18. Each of the four whitepapers and related meeting materials will be made available on the AMPO website and can be found at <u>www.ampo.org</u>.

Planning for C/AV Deployment:

The Federal Perspective and Coordination and Collaboration with Transportation Stakeholder Associations and Organizations

AMPO Connected and Autonomous Vehicles (C/AV) Working Group Meeting 3:

November 13-14, 2017 in Washington, DC

The AMPO C/AV Technical Working Group held its third meeting from November 13-14, 2017 in Washington, DC. The first day of the meeting was a focused discussion between the AMPO C/AV Working Group and its federal partners in the United States Department of Transportation (U.S. DOT) and United States Environmental Protection Agency (U.S. EPA). The second day of meetings included the federal partners along with a diverse group of AMPO's peer agencies, such as the Conference on Minority Officials, Eno Center for Transportation, I-95 Corridor Coalition, Institute of Transportation Engineers C/AV Task Force, National Organization of Development Organizations, National Association of Regional Councils, and Transportation Research Board. The objectives of the meetings were to identify:

- The roles, responsibilities, relationships, and opportunities for collaboration between local, regional, and federal agencies and peer associations and organizations on issues related to C/AVs
- Topics of concern to these partners, their relevance to MPOs, and potential for collaboration on topics identified as high priority areas
- Gather perspectives on issues already identified as concerns for MPOs in earlier working group meetings, including:
 - Challenges, concerns, and needs as C/AVs are addressed in the transportation planning process, such as:
 - Training, tools, and technical capacity building
 - Data collection, analysis, and modeling
 - Staffing and resources
 - Policy level structure and guidance
 - Differences in planning and infrastructure needs, challenges, potential benefits, and applications of CV and AV
 - Strategies for incorporating C/AVs in metropolitan transportation plan and Transportation Improvement Program (TIP)
 - Strategies for establishing effective planning practices and scenario planning processes
 - Key triggers (e.g., adoption rate and introduction of emerging technology) in C/AV deployment and implementation
 - Current or upcoming projects and initiatives or opportunities for coordination and collaboration among meeting attendees

The meeting opened with the agencies providing an update of the status of activities, opportunities, challenges, and needs related to C/AVs in their agencies and organizations. The discussion highlighted the congruence of opportunities, challenges, and needs shared by the diverse attendees participating in AMPO's C/AV Working Group meeting series. Topics discussed during this meeting overlapped in some cases with topics identified at the previous working group meetings, including:

- Institutional readiness
 - Staff capacity building
 - Incorporating C/AV into organizational processes and structure
- Integration into the transportation planning process
 - Need for a C/AV vision for the region and nation
 - Policies and investment strategies to support both current needs and the vision for the desired future
 - "Future-proofing" investment decisions so they will not be rapidly outdated by the introduction and implementation of new technology
 - Balancing the needs, priorities, and maturity levels of the different states (especially for multistate MPOs)
- Engaging policy boards and stakeholders on C/AV technology
 - Raising awareness
 - Educating and informing
 - Managing expectations
- Potential C/AV impacts on revenue sources
 - AV electrification and gas tax revenue
 - Changes in VMT or road usage (e.g. zero-occupant vehicles)
 - New approaches to tolling and revenue collection
- Managing uncertainty of the impacts of C/AV deployment scenarios on the regional and national transportation system
 - Potential indirect impacts include
 - Land use and built environment changes
 - Repurposing/reclaiming parking
 - Managing pickup/drop off activity with shared AVs
 - Shift in balance between personal travel and goods movement
- Modeling benefits and limitations
 - Models are helpful (if they are not too complicated) in assessing a range of "what ifs" related to future scenarios
 - Models are built on expectations derived from our knowledge of past behavior and may be misleading when applied to a future with considerably more uncertainty

- Documentation is critical to prevent model assumptions and inputs from being misunderstood as outputs
 - There is evidence of a "herd effect" in how models are set up (where different models start using assumptions because others used them previously, without any clear rationale for using that specific assumption in the first place).
- Models can help understand the "limits of the possible" (e.g. bottlenecks in pick-up/drop-off capacity for shared AVs)
- No amount of modeling can reduce the intrinsic uncertainty of how people will respond to and use the new technologies as they are deployed in greater and greater numbers
- Equity and Environmental Justice considerations in deployment and transportation system investments
- Cybersecurity for vehicles and data
- Data Management
 - Collection, storage, analysis, and sharing of data generated by C/AV vehicles and infrastructure
 - Data generated by public infrastructure as a potential revenue source
 - Exploring quid pro quo arrangements with communications providers (e.g. trading right-of-way access for access to data and information channels)
- Freight
 - Deployment timelines and needs may differ compared to lightweight vehicles and transit
 - Automation of freight and delivery may significantly change personal shopping travel
- Transit
 - Deployment timelines and needs may differ compared to lightweight vehicles and freight
 - Cost effectiveness of certain types of services may change (e.g. paratransit, last-mile access)
 - Relationship between app-enabled private transport and public transit may become more complex, and require new approaches to funding, revenue management, and interoperability
- Transportation Network Companies/ridesharing
 - Relationship to transit is complex (see above)
 - May entail shifts in ownership and use of private vehicles
 - May continue to be disruptive even without C/AV

The attendees also discussed many new topics. A significant new item discussed by the working group was C/AV deployment impact on infrastructure stresses and loadings. The U.S. DOT is conducting research to explore how the platooning of vehicles may affect loadings on bridges and ramps, which is especially of concern for long span bridges and ramps. In order to reduce loadings, it may be necessary for vehicle platoons to increase following distances prior to arriving at long span bridges and ramps. Attendees also explored the possibility for existing spans to be reinforced and design guidelines updated. In addition, the driving precision of C/AVs may allow them to track with much greater precision within a lane, which has the potential to increase stresses on pavements and an increase in
rutting. This could also necessitate a careful examination of current design practices.

The attendees also discussed the importance of considering the full range of emerging technologies (e.g., Smart Cities, electrification, shared carpooling, and crowdsourcing) and the potential for their impacts to coalesce for a larger scale of influence not only on the transportation system, but also on air quality and other secondary impacts. As technology spurs changes to vehicles (e.g., efficiency), mode choice, fuels, technology, travel demand, and land use and the built environment will be significantly impacted. Attendees also expressed concern that different technologies (e.g. connected vehicles, automated vehicles, and cooperative automated vehicles) are often bundled together for discussion, even though their needs, benefits, impacts and potential deployment scenarios and timeframes are likely to be quite different.

The discussion moved to the impacts of C/AV technology on the performance measures implemented by MAP-21 and the FAST Act. The attendees identified potential opportunities for C/AV technology to aid in achievement of the measures, such as improved safety and reduced congestion due to less frequent incidents caused by human error, but identified uncertainty in congestion and air quality impacts related to vehicle miles traveled in C/AV deployment and adoption scenarios. Attendees also wondered how the measures may need to evolve as deployment and implementation of C/AV moves forward.

In trying to address the uncertainty in deployment and implementation, attendees suggested three strategies. The first to make investment decisions that support the future transportation system with or without C/AVs—ensuring the community understands that what is implemented today will make their lives better today and in the future as technology is deployed and implemented. Second, to make investment decisions that support and guide the transportation system to the desired future. Finally, to identify specific elements to help guide incorporation of C/AV technology into transportation planning processes and stakeholder involvement:

- Potential deployment scenarios (e.g., early adoption and contained deployment scenarios such as low speed automated shuttles serving corporate or academic campuses, mixed fleet scenarios, and full deployment/market share penetration)
 - Explore in terms of different MPO contexts, for example, the differences in impacts, adoption, and potential MPO actions on major city centers, mid-sized city centers, suburbs, corporate/ university campuses, major highways/urban areas, and rural areas.
- "Drivers": aspects of technology and society that are not controlled by transportation agencies (e.g., market share)
- "Levers": activities that transportation agencies and their government partners have influence over (e.g., land use and investment decisions)
- Triggers, tipping points, and timelines: key moments that define important shifts in how the transportation system is operating (due to the presence or absence of expected effects from "drivers" or "levers")
- Four dimensions of readiness: vehicle systems technology (largely private sector driven), supportive infrastructure, responsive institutions, and community acceptance.

A major focus of the meeting was potential collaboration and partnerships to address the issues brought up by the meeting participants. Attendees identified the need for support at the federal level which might include:

- New policies and regulations, as well as adjustments to existing policies and regulations
- Guidance for planning and investment decisions to ensure interoperability, safety, equity, and consistency in national deployment and implementation
- Guidance on effective use of funding and investment as the technology spurs significant changes to the transportation system.

At the state, local, and regional levels, the attendees suggested establishing policies that might:

- Help manage land use and the built environment,
- Manage congestion, spikes in VMT, and air quality impacts
- Maintain the transportation agency's role as stewards of the transportation system who ensure all modes and users (especially vulnerable road users such as bicyclists, pedestrians, and persons with disabilities) have access to a safety, equitable, and efficient transportation system.

At all levels an overarching vision is needed at the national level, consistent with the federal planning factors, and; at the state, regional, and local levels to guide specific investments and policies. However, while guidance, policies, and visions are needed, attendees recognized that it is important to provide flexibility and not stifle the potential applications and benefits of C/AV technology.

Based on the discussion, the attendees identified the following as high priority tools and resource needs:

Development of a matrix, such as the following one, that identifies issues related to C/AV deployment and implementation, the associated impacts (benefits and consequences), potential MPO actions, and opportunities for partnerships.

lssue	Impacts (benefits and consequences)	Likelihood of impact	Intensity of impact	Importance regionally/ nationally	Role/potential actions of MPO	Role/potential actions of MPO partners

- Identification of C/AV deployment scenarios to assist MPOs as they explore the uncertainty of C/AV technology in their transportation planning processes (foundational work on such scenarios is underway at FHWA for release in 2018)
- Identification of the high priority leadership roles for MPOs and their partners related to C/AV deployment and implementation, including in areas that have not traditionally been their purview, such as coordination of public and private activities.
- Identification, for example in the form of a matrix, the specific drivers, levers, and dimensions of readiness described above:

	Likely associated outcomes	Triggers	Tipping points	Timeline (near-, mid- or long-term)	Role/potential actions of MPO	Role/potential actions of MPO partners
Drivers						
Levers						
Dimensions of Readiness						
Vehicle systems technology						
Infrastructure						
Institutional						
Community						

- Development of a vision for the transportation system at different scales (national, state, regional, and local).
- Development of a self-evaluation kit for MPOs related to C/AV deployment and implementation.
- Establishment of a forum for regular dialogue among MPOs and their partners, for example in the form of a quarterly conference call.
- Development of venues and resources for capacity building
- At the federal level, development of an integrated source for notices on available resources, ongoing activities, and other materials.
- Development of Federal guidance for priority investment decisions through public involvement at national, state and regional level, and through consultation with private sector stakeholders

This is the third in a series of four whitepapers that will be developed by the AMPO C/AV Working Group over the course of 2017-18. Each of the four whitepapers and related meeting materials will be made available on the AMPO website and can be found at <u>www.ampo.org</u>.

Planning for C/AV Deployment: Public and Private Sector Coordination

AMPO Connected and Autonomous Vehicles (C/AV) Working Group Meeting 4:

March 5-7, 2018 in Orlando, FL

The AMPO C/AV Technical Working Group held its fourth and final meeting from March 5-7, 2018 in Orlando, Florida. The objectives of the meeting were to:

- Share initiatives in Florida involving partnerships between the public and private sectors
- Discuss the relationship between the public and private sectors and identify how to establish effective partnerships and coordination practices between them.

During the meeting, the AMPO C/AV Technical Working Group heard presentations from:

- The Central Florida Autonomous Vehicle Partnership (CFAVP)
- The City of Orlando
- The Florida Department of Transportation (FDOT)
- The Florida Turnpike Enterprise
- LYNX, the public transit provider for Orange, Seminole and Osceola counties
- SUNTRAX
- The University of Central Florida (UCF)

The following is a brief summary of initiatives shared by the presenters. The presentations in their entirety can be found on the AMPO C/AV working group <u>web page</u>.

The City of Orlando's Smart and Sustainable City initiative is helping to accomplish their vision to "become the most environmentally friendly, socially inclusive, technology-enabled, and economically vibrant city in the southeast" and "one of the most sustainable and resilient cities in the nation."³ The initiative is building partnerships and employing information and communications technology to enhance infrastructure, livability, workability, sustainability, and resilience. They were one of five cities nationwide recognized as 2017 Smart Cities Council Readiness Challenge winners. As part of this program, they developed a smart cities roadmap and framework, which include focus areas of public safety, solid waste, energy and green building, and transportation. Within the transportation focus area, their activities include:

- Partnering with General Motors, the FDOT, the American Automobile Association, and the UCF on research and development for in-vehicle navigation systems.
- Achieving bronze level Bicycle Friendly Community designation from the League of American Bicyclists through implementing thirty bike share stations with 300 bicycles, over 350 miles of urban trials, bike lanes, and signed routes, and six bicycle repair stations.

3. Chris Castro, "Smart ORL: The Future of Urban Sustainability" (presentation, AMPO Connected and Autonomous Vehicles Working Group Meeting, Orlando, FL, March 5-7, 2018).

- Deploying electric vehicles for the City Hall motor pool and electric vehicle charging stations within the city
- Testing electric vehicle buses for LYNX and LYMMO
- Being recognized as one of ten United State Department of Transportation Autonomous Vehicle Proving Grounds through the collaboration with the CFAVP. The CFAVP "offers a comprehensive multi-modal environment for research, development, testing and deployment of emerging mobility technologies and solutions."² The partners include Florida's turnpike, FDOT, the City of Orlando, LYNX, the NASA Kennedy Space Center, Florida Polytechnic University, UCF, Florida Agricultural Mechanic University - Florida State University (FAMU-FSU), and the Central Florida Expressway Authority.
- Developing the Autonomous Vehicle Mobility Initiative (AVMI) with the FDOT, MetroPlan Orlando, and LYNX. The objective of AVMI initiative is to understand the implications of autonomous vehicle technology and its application for future transit service through strategic research and integrated demonstrations at different levels of autonomy. Possible implications identified for exploration include partnerships, policies, technical issues, financial, infrastructure requirements, and workforce needs. The effort also seeks to deploy an autonomous shuttle pilot.



Source: Florida Department of Transportation⁴

Two other partnerships in the region are the SR434 pilot and I-75 Florida's Regional Advanced Mobility Elements (FRAME), which fall under the Advanced Transportation and Congestion Management Technologies Deployment Grant, and SUNTRAX. The partner agencies under the SR434 pilot and I-75 FRAME include the FDOT, MetroPlan Orlando, the UCF, the City of Orlando, the CFAVP, Orange County, Osceola County, Seminole County, LYNX, Maitland, and the City of Winter Park. They seek to address pedestrian and bicyclists safety, vehicular safety, mobility for users who choose not to drive, emerging technology, crash related congestion, and congestion during peak hours using connected vehicle and other technologies.

SUNTRAX is a partnership between Florida Polytechnic University, the FDOT, CFAVP, and Florida's Turnpike. Its vision is not to become a continuously evolving, internationally recognized center for the development of Automated Driving Systems. Phase 1 of the initiative is underway and construction of Phase 2 will begin at the end of this year. Both phases are expected to open in 2020.

4. Mike Shannon, "Connected/Autonomous Vehicle (CAV) Technology" (presentation, AMPO Connected and Autonomous Vehicles Working Group Meeting, Orlando, FL, March 5-7, 2018).



Source: SUNTRAX⁵

In addition to the initiatives it is partnering in above, the FDOT is also leading several C/AV efforts. The Florida Turnpike Enterprise, part of the FDOT, is underway with:

- A 143-mile pilot project for driver assistive truck platooning
- The Coastal Connector: Florida's Next Generation Corridor is a high level study evaluating new transportation corridor alternatives
- The seven-mile Colonial Parkway Future Technology Corridor, includes smart intersections, incident detection systems, fully connected vehicles, automated vehicle detection, and dynamic/adaptive signals.

The FDOT also has several connected vehicle data initiatives, including:

- ITS input quality assurance
- Automated traffic signal performance measures and intersection movement counts
- A data sandbox to facilitate data sharing and collection
- A regional integrated corridor management system

After learning about the project level efforts, the working group heard from the UCF about their research on general crash avoidance effectiveness estimation, crash reduction prediction, and specifically connected vehicle technology and its safety benefits under fog conditions and reduced visibility conditions. Their research shared that since nearly 90% of crashes are caused by driver physiological conditions or driver error, there are opportunities for connected vehicle technology and driver assistive to reduce, but not eliminate crashes. Their findings include:

- The connected vehicle and driver assistance technology perform better for heavy trucks than light vehicles avoiding 40.88% of heavy vehicle crashes compared to 32.99% of light vehicle crashes.
- None of the tested connected vehicle and driver assistance technology had an effectiveness greater than 70%.

After the presentations, the working group discussed the role of the MPO in C/AV technology. MPOs play a critical role in transportation planning and the economy as over three quarters of the population live under the boundaries of an MPO. In carrying out transportation planning, they help share community values, concerns, and impacts and serve as a venue for building relationships

5. Paul Satchfield, "SUNTRAX: Accelerating the Future of Transportation" (presentation, AMPO Connected and Autonomous Vehicles Working Group Meeting, Orlando, FL, March 5-7, 2018).

and partnerships by bringing stakeholders together for dialogue and engagement. While the message from the private sector to transportation agencies has generally been to do nothing more than maintain infrastructure in good condition and provide data on events such as closures and construction, the MPOs confirmed the approach discussed in their previous meetings:

- Maintain an environment that fosters innovation
- Establish a desired vision of the future transportation system with C/AVs
- Based on the vision, identify actions (i.e., policies and investment decisions) within the metropolitan planning process and products to support the desired future
- Through scenario planning and exploratory modeling, understand plausible deployment scenarios and their range of implications and risks to the transportation system, specific modes, and the behavior of transportation
- Educate and inform MPO policy boards, other relevant decisions makers, and MPO stakeholders on C/AV status and critical issues
- Help ensure equity, safety, and traffic operations are maintained

The working group identified additional strategies including:

- Do not prematurely select a preferred technology (e.g., 5G vs. DSRC)
- Expand MPO staff skills to include expertise in planning for and managing emerging technologies
- Make investment decisions that support both the current and future transportation system
- To help address uncertainty, explore the future in incremental transitions—for example, looking at the next five years, up to ten years in the future, and finally the full twenty years out.
 - This could be visualized as a cone of uncertainty with the narrowest part of the cone representing the present and the greatest overlap of potential future scenarios. The height and width of the cone would represent time and uncertainty respectively
 - Scenario planning may help narrow the cone
 - Potential investment decisions could be identified as projects common to all or most of the cone or projects at the narrow end of the cone that support both the current and future transportation system
 - Needs at the widest end of the cone could be thought of more generally by program type or corridor need (e.g., capacity improvements along a corridor within certain mileposts)



Source: Maricopa Association of Governments. Scenarios depicted are for illustrative purposes only.

The working group then discussed the relationship between the public and private sectors and how to establish effective partnerships and coordination practices between them. To be most effective, they felt that transportation agencies (federal, state, regional, and local levels) should establish regular coordination practices among themselves and other agencies (e.g., transit and land use agencies, emergency response, and academia) and stakeholders to keep informed on the status of C/AVs in their region and the nation. Based on the presentations, they identified key private sector partners to coordinate and build partnerships with, including:

2	Automakers/original equipment manufacturers	Freight and logistics companies	
1	Tier one suppliers	Developers	
1	Technology manufacturing companies	Proving ground operators and designe	rs
i,	Technology firms	Toll operators	

In building partnerships, the working group specifically identified the need for collaboration between MPOs, transit agencies, and the private sector to begin discussing the future of transit as C/AV technology is deployed. There are some predictions that C/AVs will remove the need for transit and therefore feel further transit investments should be a low priority. However, others feel transit will continue to play a critical role in providing mobility for transportation users and shaping land use, and see C/AV technology as helping to expand transit access by improving first and last mile connections. In these discussions, MPOs can help share the value that transit provides to mobility and equity.

The working group discussion continued by identifying what they as transportation agencies need from the private sector. Their needs were primarily related to data sharing opportunities. The private sector and new technology can generate an immense amount of data. For example, new technology could provide real time data sources such as windshield wipers turning on and off as well as non-real time data like origins and destinations. As discussed during previous working group meetings, addressing data quality, security, and privacy concerns continue to be a concern. The working group suggested the development of a national voluntary repository of aggregate and secured data. Through this repository, data would be scrubbed of personal information, secured, and not be vulnerable to Freedom of Information Act requests.

This is the final paper in a series of four whitepapers that will be developed by the AMPO C/AV Working Group over the course of 2017-18. Each of the whitepapers and related meeting materials will be made available on the AMPO website and can be found at <u>www.ampo.org</u>. Following the completion of the whitepaper series, AMPO will develop a national framework for regional C/AV planning that will be shared and vetted at a workshop with C/AV stakeholders. The framework will be provided on the AMPO website in 2019.



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444 North Capitol Street, NW Suite 532, Washington, D.C. 20001 202.624.3680 | www.ampo.org