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## TECHNICAL MEMORANDUM

### TxDOT IAC – Technical Support to the CAV Task Force

**DATE:** November 5, 2020

**TO:** Zeke Reyna, TxDOT  
 Strategic Research Analyst, CAV

**COPY TO:** TTI\_Reports@tti.tamu.edu  
 Tim Hein, Research Development Office, TTI  
 Ed Seymour, Executive Associate Agency Director, TTI  
 Robert Brydia, Senior Research Scientist, TTI

**FROM:** Beverly Kuhn Research Supervisor  
 Senior Research Engineer Texas A&M Transportation Institute

**RE:** Freight and Delivery Subcommittee  
 October 7, 2020 Meeting Notes

**Attendees:**

Aidan Ali-Sullivan	Nuro
Andrea Gold	University of Texas Center for Transportation Research
Ashley Myers	Grace &McEwan
Brent Skorup	Mercatus
Brian Moen	City of Frisco
Captain Steven Rundell	Texas Department of Public Safety
Caroline Mays	Texas Department of Transportation
Chelsey Tanaka	Ike Robotics
Daniel Goff	Kodiak Robotics
DarranAnderson	TxDOT
David Millikan	WGI
David Ruth	Motogo, LLC
Dr. Michael Walton	University of Texas Center for Transportation Research

Ed Seymour	Texas A&M Transportation Institute
Hannah Barron	Austin Transportation
Jeff Dailey	Central Texas Regional Mobility Authority
Jimmy Archer	Texas Department of Motor Vehicles
Jordan Coleman	Kodiak
Katie Herbek	Ford
Kristie Chin	Texas Innovative Alliance
Laura Weis	Michael Baker International
Michael Sanders	Lone Star UAS Center of Excellence and Innovation
Monika Darwish	Embark
Morgan Avera	UT CTR
Paul Avery	AECOM
Payson, Jordan (Alex)	City of Austin
Phillip Kampshoff	McKinsey
Robert Brown	TuSimple
Robert Brydia	Texas A&M Transportation Institute
Thomas Bamonte	North Central Texas Council of Governments
Victor Delagarza	AECOM
Zeke Reyna	TxDOT

**I. Opening Comments/Roll Call – Zeke Reyna / Daniel Goff / Michael Walton**

- Zeke welcomed the group to the 4th Freight and Delivery subcommittee meeting.
- Appreciated everyone participating and eager to hear thoughts shared
- Will continue to use Mural today as the meeting is recorded

**II. Chair Welcoming Statement – Daniel Goff, Kodiak / Michael Walton, University of Texas Center for Transportation Research**

- Thankful for this group and looking forward to this conversation and how positive it can be
- Today are looking for discussion to refine the five major sections of the draft we have developed from our previous meetings
- Think about opportunities that will move the needle
- Consider the infrastructure and be as specific as you possibly can

**III. Review of Task Force Web Site – Robert Brydia, Texas A&M Transportation Institute**

- Want to allow each sub-committee a chance to view and give feedback on the structure and information accessible via our new website developed by TxDOT and TTI which we hope to go live later this month.
- Preview website's four aspects
  - Activities of the Task Force
    - Information about each Sub-Committee
    - Future home of White Papers
    - Meeting Minutes (notes are kept broad – feel free to review)
  - Public
    - What is CAV?
    - What does it mean for them?
    - What does it mean for Texas?
  - Industry (for those new to Texas)
    - For those coming into Texas who want to start CAV trials
    - How do they do that?
    - How do they get information to start?
    - Call out to those who want to share information to enrich others
    - Announcements in Texas
  - Research
    - Map of Deployments Across Texas
    - Agencies involved in doing research (linked)
    - Continually developing resource
- Have FAQ section cross-linked and indexed (continuing to develop/living and active)
- Website is not fully populated yet.
- Please review current website and provide feedback to make this the best it can be
- Please do not share or forward this link.

#### **IV. Review of White Paper Progress and Next Steps**

- Initial Meeting
- Topic Discussion
- Voted on topics
- Developed an Outline
- Received Feedback on Outline
- Draft White Paper
- Under Review: this is where we are today
  - We want to ensure that we get your feedback on the elements that included in the White Paper and how we can refine this document, enduring that it meets the objectives that were set out when we determined this topic
  - On the Mural Board, you will see the main topics of the White Paper (Level 1 Headings)
  - We will start with Public Agency Roles and Responsibilities, as the front matter is fairly self-explanatory, and the Executive Summary will not be finalized until the rest of content is complete. But, do not feel that if you have a comment, we need to go in order of the headings.
- Opportunities

## V. White Paper Draft – Facilitated Discussion

- Acknowledgements
- Disclaimer
- Texas CAV Task Force Charter
- List of Terms and Acronyms
- Executive Summary
- Part One – Introduction
  - Note in "Ground Based Freight" (p4), that there are increased safety needs since we are dealing with heavier loads.
  - Make sure we don't undermine that the industry is well aware of the risks. Focus on automated trucks comes from a simpler ODD.
  - "stuff" will be moved around first, before "people" - may need to examine wording in this section. Could be "potential", etc.
  - Most likely to produce revenue to support development.
  - movement of goods presents a quicker 'to market' opportunity than movement of people
  - Sub-section: a Deployment Epicenter (p5) Question related to stating numbers in the deployments. May need to date specify. May want to consider pointing people to the website for the deployment map.
  - under last mile, automation is mainly focused on PDD. Do we need to bring out the short-haul aspect as a stand-alone? Some statements say that short haul (Class 8) isn't really a focus at this time given the complexities of driving in an urban center.
  - Starship was at University of Houston and UTD in Richardson in 2019-2020 school year, and Frisco summer 2020
  - Freight routes: "Many"
  - under warehouse and intermodal, mention other aspects as well in the text. Ports, etc.
    - Drones?
  - DSRC: Adjust wording
  - Freight Vehicle Lineup: Low Speed Vehicles: More appropriate to say it could be a full sedan or a purpose-built vehicle that are zero occupant.: Last sentence of may transition to carry passengers may not be accurate. May need to strike that last sentence. Having it in there de-emphasizes the business use case
  - Automated truck subsection: Strike number, use at highway speed. Strike automated runs and say regularly.
  - Evolving policy landscape: language seems aspirational. Language could point out that developers have applied for exemptions and a number have been approved. So, it is concrete?
  - In the heavy-duty truck space, most developers are building off of FMVSA compliant trucks
  - The is also a at least one company with a bicycle lane-based delivery bot, Refraction AI <https://refraction.ai/>
- Part Two - Long-Haul
  - Average age of truck driver is 50-52. Citation needed. ATA might state 49

- Mention that there's work going on currently. Don't rely specifically on CA.
- Maybe use the word "challenging" instead of dangerous or hazardous
- Infrastructure close-up: insert a sentence about improving the quality of striping for both humans and AT and is a relatively inexpensive (cost-effective) and rapidly delivered low-cost safety improvement
- Be careful about the words we use associated with safety. use a positive tone rather than negative.
- transfer hubs: more reviews would be needed to use these facilities
- Per point on striping--Is there some data on the (incremental) cost of installing and maintaining good striping? Might be useful to compare that cost against the cost of supplying and maintaining a full-fledged CV/RSU-based environment
- Sentence add-on to Transfer Hub section: In doing this redesign, it will be important to design facilities so that automated vehicles can enter and exit a facility while safely bypassing areas frequented by pedestrians, passenger vehicles, and other actors.
- In some companies, AT not used commonly, but autonomous and self-driving is not used. "Automated truck" is the term that some companies use. Other companies use different terminologies. (ADS equipped, highly automated, etc.)
- FMCSA and FMVSA are all working roadside inspections.
- Opportunities: combining transfer hubs into challenging roadway environment muddies both. break into two.
  - Potential language:
    - Develop infrastructure standards for lane striping, work zones, and lane closures.
    - Prioritize research to address challenging roadway environments such as forced merges and work zones
    - Explore potential models for transfer hubs.
    - Collaborate with AT companies to update roadway design practices.
- TXDOT, DPS, and industry pilot around operationalizing AT inspection processes would be valuable
- Private sector infrastructure operators (parking, truck stops, etc.) could be incentivized to create truckports
- Part Three - Warehouses, Distribution Centers, and Intermodal Facilities
  - Adding text to this section about ports, truck stops, etc. (other types of infrastructure)
  - Mobility innovation zone is interesting and important. Add a little bit more about how it can help figure out the interplay between all these pieces.
  - Rail and air cargo and sea ports may need to be called out as well.
- Part Four - Last-Mile
  - p. 21 (Delivery Vehicles) - Nuro secured a federal EXEMPTION not "waiver"
  - Signalized intersection crossing challenge needs to be addressed. Pedestrians are important, but not the only challenge.

- P. 21 "this restriction significantly limits the SUCCESS of these vehicles"- word success is problematic. Appropriate language would be " this restriction limits the geographic reach of these vehicles"
- Infrastructure close-up: the discussion of dedicated lanes for PDD wasn't caught up in the opportunities and should be examined for inclusion.
- P. 21 Opportunities section 3rd bullet: language is problematic; would suggest something more positive like " Support the development of policy which allows AVs to operate in state without inapplicable equipment requirements" or something to that effect
- infrastructure close-up: Legged robots vs. wheeled robots. Does there need to be any distinction in this section--previous sections had distinction.
- Confusion over how raising or lowering the minimum speed enables/disables access to delivery locations. Sentence needs to be re-examined to clarity. this would also modify the first recommendation.
- Opportunities: Don't state a number in the first one.
- PDDs may need to be a classification concern to be sorted out. Opportunities should be applicable to LSV (low speed vehicles) not PDD.
- 2nd opportunity: where does this arise from? Are we doing signage now for specific deployment? Is this a standard or an encouragement? Consider the potential use of and changes to MUTCD that would accommodate this.
- 3rd bullet in opportunities: clarification on what policy at what level. May not need to state steering wheel and brake pedal. If the equipment is not necessary for an AV to operate, then it isn't necessary to have it on the vehicle.
- 2nd bullet. Is signing on route or vehicles? MUTCD? needs clarification. consider the use of the word potential instead of encourage.
- Part Five - A Changing Workforce
  - "Disrupted but not displaced": second to last sentence - would like to add that greater demand for short-haul driving could be a way that the job becomes more appealing (in addition to remote operations).
  - Drayage is potentially another complex environment where human jobs can be created
  - opportunities to create jobs in industries that support/share supported by trucking. As trucking becomes more efficient, economy becomes more efficient and potentially creates jobs.
  - statement of impact of jobs is relative to long-haul trucking. Do we want to make a statement of we're not replacing a current work-force--it creates an opportunity for new jobs in this space and all the supporting functions?
  - under disrupted but not displaced: 1st point may need to be last. The 2nd and 3rd have a bit more immediate impact.
  - Avoid words like "risk", "job loss" It's not a proven fact that losses will occur.
  - technology will enhance the driving experience for drivers. We see tis in working from home. Are we focusing too narrowly on the negatives?
  - last mile industry does not eliminate any existing workforce- there is not a workforce of full-time employees delivering groceries. Tech has opportunity

to create new jobs to support last mile delivery at the retail outlet and also as staff working in the last mile industry

- Part Six - Connected Freight
  - connected information is valuable to humans now and will augment and enhance ADS trucking in the future
  - Concern was expressed over the statement or indication that a dual-mode device would be optimum. Statement was made that a preference would be a federal mandate/guidance. No consensus as of yet.
  - Opportunity may exist for discussing how this information and benefits could be expanded and provided with more impact.
  - Potential fix for the second to last sentence in the Infrastructure Close Up subsection: "Ideally, the CV ecosystem would operate on a single common frequency across all states, which would simplify the hardware and software required on both the vehicle and infrastructure sides. Many CV benefits, especially deriving from V2V communication, accrue only at high penetration rates on a common frequency. If a common frequency is not agreed upon, DSRC and 5G may be able to coexist through the use of dual-mode devices, which are currently under development. "
  - Concern was expressed over the statement or indication that a dual-mode device would be optimum. Statement was made that a preference would be a federal mandate/guidance. No consensus as of yet
- References

#### **VI. Next Steps – Daniel Goff / Michael Walton / Zeke Reyna**

- We will start modifying the document with these comments. We expect it to take another 3 weeks of writing.
- If you have additional comments, please email them so we can look them over as well.
- Once we prepare the next revision, there are two options, based on what the subcommittee would like to do:
  - Send out revised version via email, subcommittee can review it, submit final thoughts, and accept it in the way in which it was written. We can then finalize it and get it into editorial review, 508 compliance production and give it to the Task Force
  - Or, if you feel that there are enough changes that warrant another meeting, even if it is brief, we can schedule that.
- Once it is agreed upon, it goes to the Chair who presents it to the Full Task Force.
- While we want the committee to all see the next draft and have input, committee cannot foresee another meeting.

#### **VII. Closing Remarks – Daniel Goff / Michael Walton**

- Thank everyone for their participation
- Have food for thought for next stage of writing.
- Do not hesitate to continue to send thoughts via email
- Great job to authors of paper and great discussion by committee