WASHINGTON STATE
AUTONOMOUS VEHICLE
WORK GROUP

MEETING SUMMARY

Washington State AV Work Group - Infrastructure and Systems Subcommittee
September 11th, 2020 | 9:00 am – 12:00 pm
Remote Participation | Meeting Materials available here[1]

Attendees:

First Name	Last Name	Organization
Robert	Acevedo	HDR
Jenna	Adams-Kalloch	Oregon Department of Transportation
Bruce	Agnew	ACES Northwest
Tom	Alberg	ACES Northwest
Amanda	Anderson	Peloton Technology
Ted	Bailey	Washington State Department of Transportation (WSDOT)
Justin	Belk	WSDOT
Jason	Beloso	WSDOT
Debi	Besser	Washington Traffic Safety Commission
Sarah	Boden	Beeline Mobility
Daniela	Bremmer	WSDOT
Brian	Brooke	Sound Transit
Christopher	Case	WSDOT
Mike	Ennis	Association of Washington Business
Mariya	Frost	Washington Policy Center
Jacob	Greig	Liftango
Reema	Griffith	Washington State Transportation Commission (WSTC)
Taylor	Gygi	Local Motors
Eric	Hahn	City of Vancouver
Tamara	Jones	WSTC
Scott	Kuznicki	ACES Northwest
Bobby	Lauterjung	Beeline Mobility
Tony	Leingang	WSDOT
Loreana	Marciante	HNTB
Doug	McClanahan	WSDOT
Dan	McReynolds	Parametrix
Olivia	Meza	Benton-Franklin Council of Governments
John	Milbrath	AAA Washington
Kyle	Miller	WSDOT
Bryan	Mistele	ACES Northwest

[1] Meeting materials: https://avworkgroupwa.org/committee-meeting/infrastructure-and-systems-subcommittee-meeting-10

First Name	Last Name	Organization
Markell	Moffett	WSP USA
Jeff	Peterson	First Transit
Eric	Pierson	City of Chelan
Dana	Quam	Washington House of Representatives Senior Counsel
Nick	Sams	Beeline Mobility
Michael	Villnave	Federal Highway Administration
Shannon	Walker	Seattle DOT
Brian	Walsh	WSDOT
Andrea	Weckmueller-Behringer	Walla Walla Valley Metropolitan Planning Organization
Ian	Wesley	WSDOT
Ryan	Wheaton	Pierce Transit
Bryce	Yadon	Futurewise
Kim	Zentz	Urbanova

WELCOME, INTRODUCTIONS, OPENING REMARKS

Mike Ennis & Ted Bailey

- Roger Millar is unable to attend due to fire and smoke events and related emergencies
- Overview of agenda
- Go-To-Webinar remote participation process
    - Breaking after each agenda items for questions and comments
    - Use chat/questions box if you have questions
    - Use the "raise your hand" feature to be unmuted for verbal questions/comments
    - Encouraged to show video when you are speaking, after raising your hand
- Reminder that between this meeting and the next subcommittee meeting on December 11th, there are two Executive Committee meetings – the last 2 of the year
    - Members are encouraged to bring up any items for discussion or action to bring to the Executive Committee so the subcommittee can take the appropriate steps today

Topic closed.

PUBLIC COMMENT

- No public comment.

Topic closed.

Educational Topic: Mercer Island AV Shuttle

Bobby Lauterjung (Beeline Mobility) & Taylor Gygi (Local Motors)

- Local Motors overview
    - Autonomous shuttle manufacturer
    - "Olli" is a 3D printed self-driving level 4 shuttle, supported in low speed environments, first deployed in 2015
- Beeline Mobility overview

- A collective commute and mobility program architect company launching and bringing to market forward thinking technologies
- Commute solutions provider specializing in the design, operations, and ongoing management of mobility programs for private companies, cities, and more
    - Contributing to the traffic demand management community
    - Reimagining the daily commute
    - Protecting the environment
    - Improving quality of life
- Autonomous vehicle (AV) objective is to roll out first mile / last mile programs to communities – Mercer Island's shuttle service is a great proof of concept use case to replicate success across the country
    - AVs are paramount to increase public transit ridership, restoring faith and attracting folks who historically have driven themselves to work
- Local Motors is a preferred manufacturer for Beeline Mobility – Local Motor's technology and actual implementation cases surpass other solutions

- Mercer Island Use Cases
    - Fair and equitable accessibility
        - There are low income and underserved communities in an otherwise well-to-do area
        - Underserved populations to benefit from proposed system
            - Shorewood Apartments is on the route – Residents currently must walk uphill almost the entire way to the Park-n-Ride, there is no closer transit stop
            - Covenant Living at the Shores Retirement and Assisted Living Community – A mile away from the Community Center, City Hall, and other key community centers
        - Supports daily commuters going to city hall and surrounding business community
    - Renew public commitment to mass transit and reduce drive-alone rates
        - How do we change behavior on a broad scale and encourage people back on to public transit
        - Looking to take the fear of the pandemic and replace it with best practices, education, and forward-thinking technology to increase accessibility and play on the intrigue of AVs on our roadways
    - Scalability and sustainability
        - Reduce drive-alone habits and environmental impacts they have on the planet
        - Olli uses 3D printed sustainability practices for over 80% of the vehicle
            - Local Motors uses microfactories with a low carbon footprint; Don't have multi-billion dollar facilities and retooling to produce a vehicle
            - Small facilities in local environments, vehicles customized to those regions
                - A public transit vehicle needed in Mercer Island may not be the same as in Arizona
            - Local Motors owned the largest 3D printer up until 2 weeks ago

        - Able to print two AV shuttles in ten hours
- AV shuttle service for Mercer Island
    - Conceptual route – 5 stops, 2.5 miles each way, 6 loops per AM/PM, 20 minutes average, maximum 8 passengers
    - Route feeds everything to/from the Park-n-Ride
        - Park-n-Ride is the main conduit on and off the island to downtown which offers better fair and equitable access to better paying jobs and opportunities
        - Anticipating the light rail station to be opening at the end of 2021
            - *Note: Corrected – Light rail station opens in 2023*
    - Community engagement and training
        - Virtual webinars or on-site as we are able
        - Work with stakeholders to have the engagement they need to change behavior and make a difference in the community
- Cost for a 12-month 1 vehicle pilot
    - Mercer Island is a unique opportunity – Several years back Mercer Island and Sound Transit settled a lawsuit that resulted in Mercer Island receiving a settlement earmarked for certain types of projects such as first mile/last mile to be spent by 2023/24
        - Budget almost completely covers the first year of AV shuttle service investment
    - Monthly price is $19,000; Term price is $231,000; Setup costs are $63,000
    - Plan is for 1 AV shuttle with 2 safety stewards – Wanted to plan something that was achievable from a funding perspective and still beneficial to the city
    - Term pricing includes the Olli vehicle lease, safety steward labor, project management services, utilities, and parts maintenance
    - Shuttles will be built to be minimally invasive on infrastructure
    - Looking at options for liability, specifically the one left turn on the route – Single stop sign turning left into unprotected lanes
        - Olli can make an unprotected left turn
        - Left turns into unprotected lanes is a liability concern because of human driven vehicles – Encountering human driven vehicles that do not have the same technology
        - We are site prepping every turn and straight away – Taking into account what each maneuver would look like, working with insurers to make sure we are fully covered
        - This is not an infrastructure or technology barrier, but a liability concern for human driven vehicles
        - Discussing with stakeholders if it would be better to add a two-way stop or a stop light, putting options on the table to make it easier
- Project timeline and next steps:
    - Began discussions with Mercer Island in 2017
    - Co-founded Beeline Mobility in 2019
    - 2020 (present) – Completed service planning, have had discussions with King County Metro

        - Was supposed to have a funding request meeting that was postponed another few months because of the pandemic
    - 2021 – Planned funding request meeting with Mercer Island Mayor and Council Members
        - Also plan to fund service, implement, and launch the service in 2021

- Questions/Discussion:
    - Will Sound Transit be able to engage in the evaluation?
        - Yes, we want to make sure these projects align with regional mobility plans and goals, work with regional and local stakeholders
            - We are continuing to build momentum talking about this project, building support. We are at the point now where we Mercer Island needs to commit. If they do, we will bring King County Metro, WSDOT, Sound Transit, etc. to determine what feasibility studies need to be done to make this happen
    - Is there a driver or attendant in the vehicle at all?
        - Yes, Olli requires an operator, called a Safety Steward, on board when traveling on public or private roads – Steward can take full control when needed
            - Local Motors appreciates the work the Washington Department of Licensing has done with the AV self-certification process – Local Motors is self-certified
    - Are there any local ordinances or state statutes standing in your way of going forward?
        - No state statutes in the way; There is federal regulation that we are working with the National Highway Traffic Safety Administration (NHTSA) and US Department of Transportation (USDOT) on - Domestically manufactured vehicles must adhere to the Federal Motor Vehicle Safety Standards (FMVSS)
            - FMVSS are human-centric; Olli does not have human-centric aspects such as wipers, steering wheel, etc. – Does not make sense for an automated rideshare shuttle
            - Working with NHTSA and USDOT for domestic manufacturers to have exemptions or to create a new class of vehicle for these types of situations
        - Need true buy in from King County Metro to approve the service
            - In a King Country Metro report of Community Connection Programs, the Mercer Island Community Shuttle had the highest ridership, the lowest cost, vehicle utilization at 76%, and a 100% satisfaction rating – Same community would have access to this AV shuttle service
        - There may be a state law preventing private companies from providing transit services on public roadways
            - Need King County Metro to approve this as a privatized project, to operate under their umbrella; Cannot charge for ridership, the pilot has to be considered free for riders
                - Looking to have free rides for a year, then evaluate expansion to integrate with the ORCA card
    - Does the entirety of the route have sidewalks and crosswalks, things for interactions with humans? Are there gaps for safety, from a user and interactive perspective?
        - The route is one-way each direction with minimal infrastructure

        - Very little traffic
        - Speed limits are adequate for the low-speed shuttle
        - Crosswalks are appropriately places
        - Almost a prime route from a structural perspective
    - There is the I-90 bypass for bicyclists, pedestrians, dogwalkers that is adjacent to the route…Not full sidewalks but a good option to travel off street

Topic Closed.

Educational Topic: Work Zone Data Exchange / iCone Pilot

Tony Leingang (WSDOT) & Justin Belk (WSDOT)

- Presenter introductions:
    - Tony Leingang: Incident management and operations for WSDOT; also working nationally on the Work Zone Data Initiative
    - Justin Belk: Traffic operations, traffic management centers and ITS operations, CAT initiatives
- Why work zone data is important:
    - Safety
    - Vulnerability
    - Risky roadway scenarios
    - Changing conditions -familiarity issues
    - Risk of workers, maintenance, utility, construction staff…vulnerable next to the roadway
    - Solution…Work Zone Database (WZDB)
        - Provides for planning and coordinating work zone impacts
        - Communicate and disseminate work zone information to the public
    - Seeing more distracted drivers, opportunities for increased connectivity to real-time alerts in vehicles about work zones
    - As vehicles drive themselves, need to be aware of conditions ahead
- Where did WSDOT start?
    - Problem – Conflicts between construction and maintenance operations; Missing reliable public information
        - Did our best to plan and coordinate on the maintenance side
        - Conflicts occur, such as maintenance going out to an area and finding a contractor already there working on a different project
    - Solution – Better coordination, a way to resolve conflicts; Provide a way to plan and coordinate work zone impacts in advance
    - Opportunities to combine work zone activities, reduce public impacts
        - Coordinate multiple types of work in the same location for one big weekend closure instead of several smaller closures spread out

    - WZDB initial built in the Filemaker Pro platform in the 2000s
        - Storing information coming in various ways – Spreadsheets, phone calls, emails - All centralized in one location
- WZDB Today:
    - Started in the Olympic Region, has since grown to other regions
    - In 2017, several cross regional impacts occurred and pushed the value of this data into needing to be a statewide application
    - Redeveloped WZDB into a SQL database to interact with other databases to provide information and grow to statewide
    - Basic forms and reports deployed in July 2019, statewide implementation in Fall 2019
    - Dynamic mapping and visualization available Spring 2020
    - Goal was to build a form for users
        - Use cases such as utilities, temporary work zone commercial vehicle restrictions, etc.
        - Form is clickable and easy to reorganize quickly, filtering by region or state routes
        - Provides contact information of who to call if something happens – Contractor contacts as well as emergency callouts, in order of priority
        - Provides information on what the traffic impact is, type of work zone, a description of the work being done, commercial vehicle restrictions, etc.
    - Visual mapping
        - Visually display what the work is, when it is scheduled
        - Details on temporary commercial restrictions
        - Color coded by type – Construction, maintenance, utilities, special events, etc.
        - How and who to contact
- Want to control costs and reduce impacts to the public
- Agency alignment with FHWA Goals and Work Zone Data Initiative
    - By first cone down, information and actual conditions communicated in real-time and ability to track historical data as well
    - Partner engagement
        - 7 states – Northwest Passage pooled fund, coordinate on overlapping projects
            - Open specifications
            - As we get planned activities and incidents as they occur, the data gets into the database, can cross state and digital boundaries, able to be picked up by any navigation or mapping company as well as connected and autonomous vehicles
                - Leveraging existing partnerships, relationships, and resources to reach a common goal
                - Intent is to improve safety – Secondary crashes are causing issues downstream – Distractions cause incidents behind the queue, this can provide vehicles and drivers alerts ahead of time to reduce secondary crashes

- Putting work zone information to work
    - Build on existing WSDOT applications and workflows
        - Build automated connectivity into the system so existing and future data sources can ingest planning level information into a real-time use environment
        - Currently produce weekly construction report a week in advance
        - Take that planning level information and put it into mix of data from live work zones, publish to the public and eventually connected and automated technologies
        - Build historical data and improve things as time goes on
    - Use existing off-the-shelf products
    - Learn and develop specifications
- WSDOT Pilot – Transit Work Zone Data through roadside units to WAZE – iCone Pilot project
    - iCone has existing agreement with WAZE; Devices send alerts to the WAZE app
    - WSDOT-confirmed notification increases the credibility of the alert to mark the beginning and end of work zones
- Smart work zone applications
    - Lessons learned and capabilities can be included in future specifications
    - Start messaging based on real-time activity of zipper merges
    - Protect workers on site – Work presence is a safety issue
        - Investigating smart personal protective equipment, such as smart vests, smart glasses, artificial intelligence technology apps
        - Equipment and applications to help inform the person on the ground, able to define and where the worker is and movement such as sending an alert if a worker steps into an open lane of traffic
- Next steps
    - Continue to develop the WZDB data for use in Traffic Management Center apps and beyond
    - Bring in roadside unit data through iCone
    - Need to include arterial impacts and inputs from all users, hopefully will get a more holistic set of data out there
    - Push incident information from onboard vehicle devices into Traffic Management Center tools to public facing systems (e.g. 511, email, twitter) in prep for future of connected/automated vehicles
- Questions:
    - Are there barriers to funding this? If there were an iCone type of cone requirement for every work zone, what comes to mind for the scalability to that kind of requirement?
        - Getting adoption from contractors, conducting iCone testing on WSDOT maintenance vehicles and crews
            - If we can get it to work in-house, we can incorporate into specifications for third party contractors

        - iCone is only one technology solution. As we develop internal tools like the WZDB and how it connects outward, we have an eye on open data specifications and being as technology neutral as we can
        - If WSDOT gets grant funding, can look to incorporate not just iCone but other technologies as well – Cannot always specify a certain product or brand, need to keep it open for fair competition
        - Looking to leverage existing relationships and partnerships as much as we can, main point is to keep traffic moving safely and efficiently
            - Don't always have dedicated funding. As we work this type of thing into construction specifications, hopefully it brings acceptance up and costs down
    - As an example, an AV is traveling on the freeway following the painted line, it encounters a construction zone and because it kept following the uninterrupted line, it plows into the construction zone, could this technology prevent that?
        - As AVs deploy more technology to detect conditions and surroundings, if we can put information out there for them to intake, will help alleviate the concern
        - Vehicles encountering that type of situation now are being operated inappropriately as level 3 vehicles – These are level 1 or 2 vehicles with lane keeping assist, adaptive cruise control, auto-pilot, etc.
            - Drivers become inattentive, the vehicles goes further than it should without human intervention - Liability is on the driver for inappropriate operation
            - Goal is to find where these areas (e.g. work zones) are to communicate to the fleet of vehicles so they do not go into this type of scenario – Want to geofence / limit when technology can operate without a driver
        - If we can make audible notifications to drivers with enough time to make a decision, these types of situations could be reduced or prevented
            - We need to get to smarter work zone devices to map the edge line that may not be the painted line
            - If you are going to alter conditions, WSDOT needs to know
    - How will this work with a mobile operation?
        - Maintenance crew will have the iCone devices and move it as the mobile operation moves, the waypoint on the map will move automatically, and the shadow vehicle can also broadcast in advance

Topic Closed.

Educational Topic: Striping and Pavement Markings

Doug McClanahan & Brian Walsh (WSDOT)

- Presenter introductions:
    - Doug McClanahan: State Traffic Analysis Engineer, State Delineation and Markings Engineer
    - Brian Walsh: State Traffic Design and Operations Manager

- Standards and guidelines
    - FHWA manages the Manual on Uniform Traffic Control Devices (MUTCD) and oversees the process for consistency across the system, across all 50 states
        - Local jurisdictions also take emphasis to follow MUTCD
        - AV groups invested in the process
    - National committee on uniform traffic control devices
        - Pavement markings committee
        - Expect vehicles to lean heavily on this
        - Required to put striping on all roadways
        - Many organizations involved – AASHTO, AAA, APTA, ITSA, IBTTA, NACTO, ITE, etc.
- Proposals for change
    - Switching normal lines from 4 to 6-inch lines – Studies and practical experience indicate that 6-inch lines is a heavy option
        - Machine vision is able to pick up nuisances, able to pick out where they are at in the system
    - Wide lines – 8 inches or more in width when used with 4-inch normal lines and 10 inches or more in width when used with 6 in normal lines
    - Broken line: Length and Spacing
        - Interstates, freeways, and expressways – Recommended
        - Currently a 40-foot pattern
        - Recommending switch to 15-foot line segments with 25-foot gaps
    - Exit ramps
        - In many of the AV technologies, the vehicle wants to follow the off ramps
        - Dotted edge line extensions, changed from optional to required
        - Focusing on exit ramps, will get to on ramps
        - WSDOT already does this in some places, such as foggy areas
    - Beads
        - Historically, lines and markings with glass beads have not worked well when wet, especially at night
        - Plan to mix beads that work when wet with those that work when dry, find the right mix
        - Composite beads cost has come down, mix required to achieve day/night wet/dry contrast and visibility
        - WSDOT budgets aren’t changing for this – We cannot jump into this yet, would need help to get it done
        - With brighter striping and markings, driver can shift attention towards watching for wildlife, pedestrians, bicycles, signs
            - Better for AVs as well so it can focus on looking for these items as well

- Opportunities to do different treatments in different locations

- Striping and marking investments are least cost/highest return investments for keeping vehicles safely on the road
  - WSDOT moving forward with dotted extension lines (edge) for off ramps
    - Starting off with paint and glass bead approach
    - Discussing other approaches such as durables

- Questions/Discussion:
  - These specifications and maintenance are changing at a national level. Studies show a 20% reduction in rural run-off-roads, yielding a 37% savings of fatalities – a 78 to 1 benefit cost
    - Lower levels of AVs can use these improvements now
  - Slides showing the difference between the night and day beads is very persuasive, suggest this subcommittee put forward a recommendation for additional funding for lane striping
    - Mechanisms for how striping is funded needs to be explored by WSDOT – There are different ways striping could get funded, need to make sure we are moving the right money around for the right projects
  - If WSDOT pursues these improvements, both conventional and automated vehicles benefit
    - From a cost perspective, there is not a big jump in cost when talking about saving lives and long-term viability of the roadway system
  - AVs will be on local roads as well – What is being done at the local level?
    - Over 4,000 local jurisdictions nationwide; Over 400 in WA
      - Some states control all of their roadways; WA is unique with large local areas with large roadway activity
      - Local jurisdictions have more flexibility with the MUTCD
        - WA State has control over cities under 27,500 population (Note: See RCW 47.24.020, Jurisdiction control-Exception)
        - Bigger cities, over 27,500, are in charge of their own processes
          - Some formally adopt the MUTCD, others may apply it
          - WA State does not have control over the majority of roadways but has the highest volume roadways – Looking at starting this on limited access roadways
    - There are different standards locally that need to be considered/thought about – e.g. If an AV technology is looking for fog lines/stripes, some local areas' last mile may not have that deployed

Topic Closed.

Educational Topic: Washington State Autonomous Vehicle Corridors / an ACES Northwest Network Research Report

Bruce Agnew, Scott Kuznicki, Tom Alberg, & Bryan Mistele (ACES Northwest Network)

- Tom Alberg and Bryan Mistele are the co-chairs of the ACES Northwest Network
- Feedback from the co-chairs on Work Group activities:

    - Interested in seeing more interaction between the Executive Committee and subcommittees
    - Pleased at the subcommittee and Executive Committee levels to see more presentations from OEMs, tech platforms, other industry presenters
    - Interested in harmonization of regulations between states – This is not a single state issue
    - Appreciate Secretary Millar's involvement at the WASHTO level for AVs, being a leader to make sure we are coordinating with other states
- ACES Northwest Network is working hard in 2020 to continue a program of action for fundamental challenges in mobility, energy, and transportation
    - ACES for All Community Listening Session – A community event on sustainability, equity, cooperation, accessibility in transportation, etc.
    - Electrify SeaTac – Significant efforts are underway to increase access to EV charging, current work including a demonstration project related to electrified aircraft
    - Exploring mobility marketplaces – Mobility hubs of the future, utilizing private investment to make sure they are viable without expending public dollars, using spaces such as parking lots that may no longer be needed
    - Upcoming event: The Future of Commuting – Changes to how people get around are happening, need to be responsive to those market forces and have a flexible roadway system
- Data and analysis
    - Freight is integral to economy
        - Two large ports under northwest seaport alliance to optimize movement
        - State motorway system plays a critical role in moving freight through the system
        - Autonomous Vehicle Plan for the I-5 Seattle/Vancouver BC Corridor published
        - INRIX released the Automated Freight Corridor Assessment
        - INRIX also recently released COVID-19's Impact on Freight
- Motorways…where could we potentially deploy demonstration corridors?
    - controlled/managed access – Includes freeways, nearly all interstates and many toll roads
        - Motorways incur over half the overall fatality rate
        - Heavy vehicles keep right
        - Left lane reserved for higher speed passing only
        - Safe for speeds exceeding 85mi/hr in many segments
    - Ideal for vehicles that use logic/computers to operate
    - WA has implemented managed lanes, opportunity for AV demonstrations
    - Motorways are critical to commerce, backbone of the transportation system, carry far more traffic than other modes
- Road users today
    - Distracted, impaired, rushed
    - Traveling at new times of day with different needs
        - Different locations, longer distances, etc.
    - Humans and machines, assisted by technology

- Vehicles equipped with AV technology Levels 1 and 2 are often being used as levels 3 or sometimes 4
- ADAS is already here in millions of vehicles
- Freight provides interstate, regional, intermodal, cross border
  - Dramatic increase in delivery services
- Shared drive services – public transit, numerous options for this
  - Private providers
  - Employer shuttle services
- Want equity for all users so they can get where they're going reliably, with expectations of reliability and safety

- What happens if we start to improve way roadways with technology?
  - Safety improvements – Reduce cost of crashes, freeing up resources for improvements and maintenance
  - Infrastructure for both people and machines, for both today and tomorrow
  - Connectivity, both physical and digital, is a key function of the transportation network
  - Probability of safe operations of AVs and conventional vehicles is high
  - Shared ride services will be able to employ new ADAS features to increase safety benefits, comfort and efficiency
- What do AVs need?
  - Machine vision – Visible light cameras, LIDAR, positing data, conflict avoidance
  - Communications – Low latency with possibilities for C-V2X, 5G or DSRC; IoT for work zone performance
  - Energy – Solar photovoltaics coupled with energy storage, leased state land for new fuel depots to prepare for an electric vehicle future
- Demonstration corridor features
  - Motorways: I-5, I-90, a portion of SR-18
  - All lanes and exit ramps will have capabilities
  - Can the State adopt motorway operational philosophies that promote safety as a function of efficiency, better enforcement of motorway rules (e.g. keep right except to pass), and can improve ADAS to adapt to the environment?
  - Enhanced markings and delineations
    - Improved signage consistency
    - Wider lane lines
    - Marking of ramp terminal
    - High-definition mapping localization
  - Optimized for safety and efficiency
    - Reduce congestion that causes crashes, driver of safety disbenefits
    - Improve predictability

        - Lengthen acceleration and deceleration lanes
        - Reduce weaving and braided ramps
        - Improve compliance for lane use by heavy vehicles
        - Failsafe areas at ramp terminals and ahead of critical areas where we will see change in automated driving modes, couple with DOT investments; Crash investigation sites, safe places to park vehicles to wait for law enforcement
    - Communications
        - Low latency, high reliability communications
        - Central spine of fiber optic capacity
        - Leased space in cabinets for a variety of vendors
        - Technology and protocol agnostic approach
        - Coupled with growth of commercial cellular
        - Builds out IoT wide-area networking capabilities for work zones, public transit, etc. preparing for AV futures
    - Charging
        - New partnerships with solar photovoltaic energy production and storage
        - Opportunities to generate revenue for rest areas and truck parking areas in public-private partnerships with existing service providers – provide shade, amply space for charging stations, etc.
    - Work zone integration – Opportunities for private equity investments in work zones
    - Wide variety of advocates and partners
        - West Coast Green Highway
        - West Coast Clean Transit Corridor
        - Western Governors Association Electrification Roadmap
        - Cascade Chapter, Association of Unmanned Systems International
        - 5GAA Automotive Association
        - Institute of Transportation Engineers
- A message from Tom Alberg, co-founder of the ACES Northwest Network
    - ACES is an alliance of leading technology companies working together to accelerate the adoption of automated, connected, electric, shared vehicles and technologies (ACES)
    - Proposal to test AVs on I-5 between Seattle and British Columbia
        - Proposed by Craig Mundy, former chief technologist at Microsoft, and Tom Alberg in 2016/17 in report and articles
    - Background on proposal:
        - Governor Inslee issued an Executive Order in 2017 to support and promote testing and operation of AVs
        - In 2018, researchers at INRIX identified I-5 as the best route to introduce AV trucks
        - Development of level 4 and 5 AVs has been slower than anticipated

        - Level 2 and 3 advanced driving safety features are rapidly becoming ubiquitous in new vehicles
        - I-5 is already in effect the test beds for AVs, many owners of Tesla, Audi, etc. vehicles with autonomous features like stay-in-lane, adjusting speed, automatic stopping, etc. – Vehicles are already driving autonomously on these freeways
        - Trucking is likely to be one of the first beneficiaries of AV as a controlled group with financial motivation
    - Growing number of AV tests in other states
        - Michigan teaming with several technology and automobile companies to retrofit a 40 mile stretch of two freeways outside Detroit, exclusively for self-driving vehicles
            - State of Michigan wants to recapture/keep primacy as the leading automobile/truck industry state in the country, which was rapidly lost to Silicon Valley
        - Waymo is testing PACCAR trucks (Peterbuilt) in Texas and Arizona on I-10, I-20 and I-45, focusing on Dallas and Phoenix
    - Propose an I-5 AV Demonstration Corridor Task Force be appointed
        - Local companies with strong interest in autonomy, such as PACCAR, INRIX, Amazon
        - State agencies
        - Rather than the state or the private industry work in their siloes, it is helpful to get the private and public together to work on a detailed proposal to test a limited number of AVs and connected trucks on I-5, focusing on issues like safety and helping recommend standards
    - ACES identified with autonomous, but also has C (connected), E (electric) and S (shared) - Relevant here is C and E
        - It is important to our efforts to test on I-5
        - Looking for electric charging stations at rest areas – maximizing availability to commercial trucks and vehicles without the need to exit I-5 and pull onto a road with a major intersection to access
        - Wireless connections between vehicles – Advantage to vehicles to communicate with each other, roadside signs and signals, etc.
        - Puget Sound Energy is investing in charging stations
        - Amazon's trucking fleet has ordered 100,000 electric trucks
- Questions:
    - None.

Final Comments on Educational Topics:

- We have one more meeting this year, after the final Executive Committee meeting
    - As a subcommittee, we should take look at the presentations we heard today and put together a recommendation package we could propose to the Executive Committee
        - Work zone communications

        - Line striping
        - Feasibility study / demonstration corridor pilot program
    - **ACTION ITEM**: Subcommittee staff to discuss with co-chairs; co-chairs may consider a potential short meeting date/time or email exchange to discuss potential recommendations
        - Would need to define what those recommendations would be and the timing for getting subcommittee consensus in time to bring a future Executive Committee meeting.

Topic Closed.

AV WORK GROUP EC POLLING REPORT AND RESULTS MATRIX

Overview

Markell Moffett (WSP USA) & Daniela Bremmer (WSDOT)

- At the June 24th Executive Committee meeting, a work session was held to identify focus areas and priorities for the Work Group moving forward
- The results of the work session were synthesized into a report that highlights prioritized actions within broader focus areas for subcommittees and the Work Group as a whole to focus on for the duration of the Work Group (sunsets in 2023)
- A recommendations matrix was also developed to provide context on how each subcommittee can support or lead each of the prioritized actions
- The subcommittee will incorporate some of the actions within the matrix into a work plan for next year, 2021.
- Subcommittee support staff have categorized the actions recommended to the subcommittee by what is achievable
    - Green – Action makes sense, subcommittee can pursue during 2021
    - Yellow – Needs some focus and refinement, timing, and resources
    - Red – Heavy lift – Requires discussion, needs focus and resources
- Executive Committee discussing this further at the September 23rd meeting
- Request to subcommittee for feedback on this, is this something we can move forward with or something we want to discuss further first?
    - Recommendation to hold another meeting to discuss, focusing on paint striping and work zone related actions

Feedback and Discussion

Mike Ennis (WA Association of Businesses) & Ted Bailey (WSDOT)

- Recommendations Matrix – On the action to develop a prioritized list of topics needing legislative reform… This is not intended to remove local control. This is intended to identify statutes and regulations that need reform, such as the TV Screen RCW the Safety subcommittee has reviewed for reform

- On the action for prioritizing a list of near-term infrastructure investments, we will need to narrow the scope – It is one thing to collect info, it is another thing to go and develop a prioritization process, reach out to companies, etc.
    - Suggestion for a different approach – Start looking at the utilization of the right-of-way itself and identify what infrastructure needs to be installed
- **ACTION ITEM**: All subcommittee members to take a look at the polling results report and recommendation matrix. If there is something the co-chairs should discuss with the Executive Committee, please send to subcommittee staff by the end of next week
    - Note: If you have ideas to rephrase or have additional topics of interest that are not identified, please send those as well to help draft the 2021 work plan

Topic Closed.

OTHER TOPICS / ROUNDTABLE DISCUSSION

Mike Ennis (WA Association of Businesses) & Ted Bailey (WSDOT)

- Noticed that in work zones, a vehicle can sometimes follow the line into barrels. WSDOT has black temporary tape that is flat that could help - There is no test data to back that statement up, but it is possible to look into – using the black tape in front of the barrels
- Wanted to bring a representative from USDOT/FHWA to talk about work they are doing to develop a National Concept of Operations for Highway Automation and use cases for the types of infrastructure needed – Could dovetail to things we discussed today
    - Maybe a good presentation topic for our Quarter 1 2021 subcommittee meeting - Which corridors do you focus on first? Shared use? Local goods/delivery?
- Looking at the Recommendations Matrix from the Transportation Commission, there is an action for an Education Plan – Is there a plan / discussion to accelerate that?
    - Currently a driver has to read through the vehicle owner's manual to get any information on advanced driver assistive systems
    - The Safety Subcommittee proposed an education and outreach plan; No current movement but still on the subcommittee's radar
        - It is one thing to share basic information on what we are learning via the WA AV website, sharing with policymakers. It is another thing to work with AAA, rental car companies, and dealerships on this type of education and outreach
        - This is a heavy lift that is needed nationwide – A partnership for AV education among academic, private sector, etc. sharing the load of the communication
        - One purpose of the Executive Committee and Subcommittees is that education element – Bringing together stakeholders to discuss AVs and its impacts

Topic Closed.

MEETING ADJOURNED.

Upcoming Meetings:

- September 23rd, 2020, Autonomous Vehicle Work Group Executive Committee, Virtual Webinar

- November 12th, 2020, Autonomous Vehicle Work Group Executive Committee, Virtual Webinar
- December 11th, 2020: Infrastructure and Systems Subcommittee, Virtual Webinar

Resources: New WA State AV Work Group website: https://avworkgroupwa.org/