**Business Case for Utilizing Highway Median Shoulders for Connected and Autonomous Vehicle (CAV) Deployment**

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1. **INTRODUCTION AND LITERATURE**
   - Connected and Autonomous Vehicles (CAVs) are expected to play a significant role in future mobility.
   - CAVs are expected to cause a 22 percent increase in highway capacity at 50 percent market penetration rate.
   - In near-term CAVs need accommodation, like HSR, for successful deployment.
   - Retrofit highway median shoulder to use for CAV operations.

2. **MARKET PENETRATION**
   - "One of the greatest deterrents to progress in this field is consumer acceptance" - U.S. Transportation Secretary Elaine Chao.
   - Consumer acceptance of CAVs is critical for successful deployment.

3. **HYPOTHESIS AND PROOF OF CONCEPT**
   - Does low CAV market penetration (40%) coupled with human drivers unpredictability increase delay in congested corridors?
   - CAVs are able to operate in narrow lanes - 8 to 9 feet.
   - Retrofit highway median shoulders and use them exclusively for CAVs.
   - CAVs are expected to play a significant role in future mobility.
   - Modeled conversion of I-95 southbound inside shoulder to CAV only HSR between the Fort McHenry Tunnel and I-695 interchange.

4. **METHODOLOGY**
   - CAVs are able to operate in narrow lanes - 8 to 9 feet.
   - Retrofit highway median shoulders and use them exclusively for CAVs.
   - Implement speed harmonization strategy to reduce construction costs by minimizing the need for cross slope adjustments.
   - Modeled conversion of I-95 southbound inside shoulder to CAV only HSR between the Fort McHenry Tunnel and I-695 interchange.

5. **BENEFIT-COST ANALYSIS**
   - For the cost estimation converted to $67,000 per mile.
   - With addition of dynamic signs, approximately $20M.

6. **CONCLUSION AND FUTURE WORK**
   - It is practical to use highway median shoulders as dedicated HSR for CAVs.
   - Retrofitting highway median shoulders to serve CAVs is economically viable.
   - The dedicated HSR can be used as managed lane with lane control system to allow for emergency responses and incident management prioritization.
   - Estimate induced capacity by connected and autonomous vehicles.
   - Model connected trucks and their impacts on traffic operations.

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**What impact could low CAV % have on corridors?**

**How can this increased delay be mitigated?**

**CAV HSR lane decreases delay & increases throughput**

**Economical solution to maximize CAV benefit**