

Connected Vehicle Data Ecosystem & Applications:

Curve Speed Warning (CSW)

Spot Weather Impact Warning (SWIW)

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ATCMTD – Utah Connected

- **Deployment**
- Data Ecosystem and CSW / SWIW Applications
- Goals
 - More effectively collect and provide real-time information
 - Improve safety
- Objectives
 - Develop and **Deploy** a cloud-based data analytics platform
 - **Deploy** CSW and SWIW applications



Spot Weather Impact Warning (SWIW): Icy Road TIM

- Real-time, data-driven, customized in-vehicle alert to motorists
- Data sources and icy road event criteria
 - Road Weather Information Systems (RWIS)
 - Surface Status = Ice
 - Surface Temp < 32° F
 - V2X Basic Safety Message (BSM)
 - Ambient Temp < 36° F
 - Traction Control, Stability Control, or ABS is engaged
- If icy road event occurs within 1.5 miles of an RSU then that RSU will automatically broadcast an Icy Road TIM



Curve Speed Warning (CSW)

- Customized, in-vehicle alert when approaching a curve too fast
- Align with MUTCD for advanced placement (alert) distance
- List of 25 dangerous curve locations
 - 5 in Big Cottonwood Canyon
 - 3 along interstates in Salt Lake Valley



Big Cottonwood Canyon RSUs



Big Cottonwood Canyon BSMs



Number of Records
4,641,181

Big Cottonwood Canyon BSMs



Number of Records
4,641,181
560,406



- GPS coordinates (0,0) and near (0,0)
- (0,0) issue particularly prevalent and worse when vehicles are in the canyon
- Problem with the dead reckoning algorithm discovered
- Exploring disabling dead reckoning to force OBU to purely use GNSS-based position
- Evaluation of positional accuracy and viable solutions is ongoing

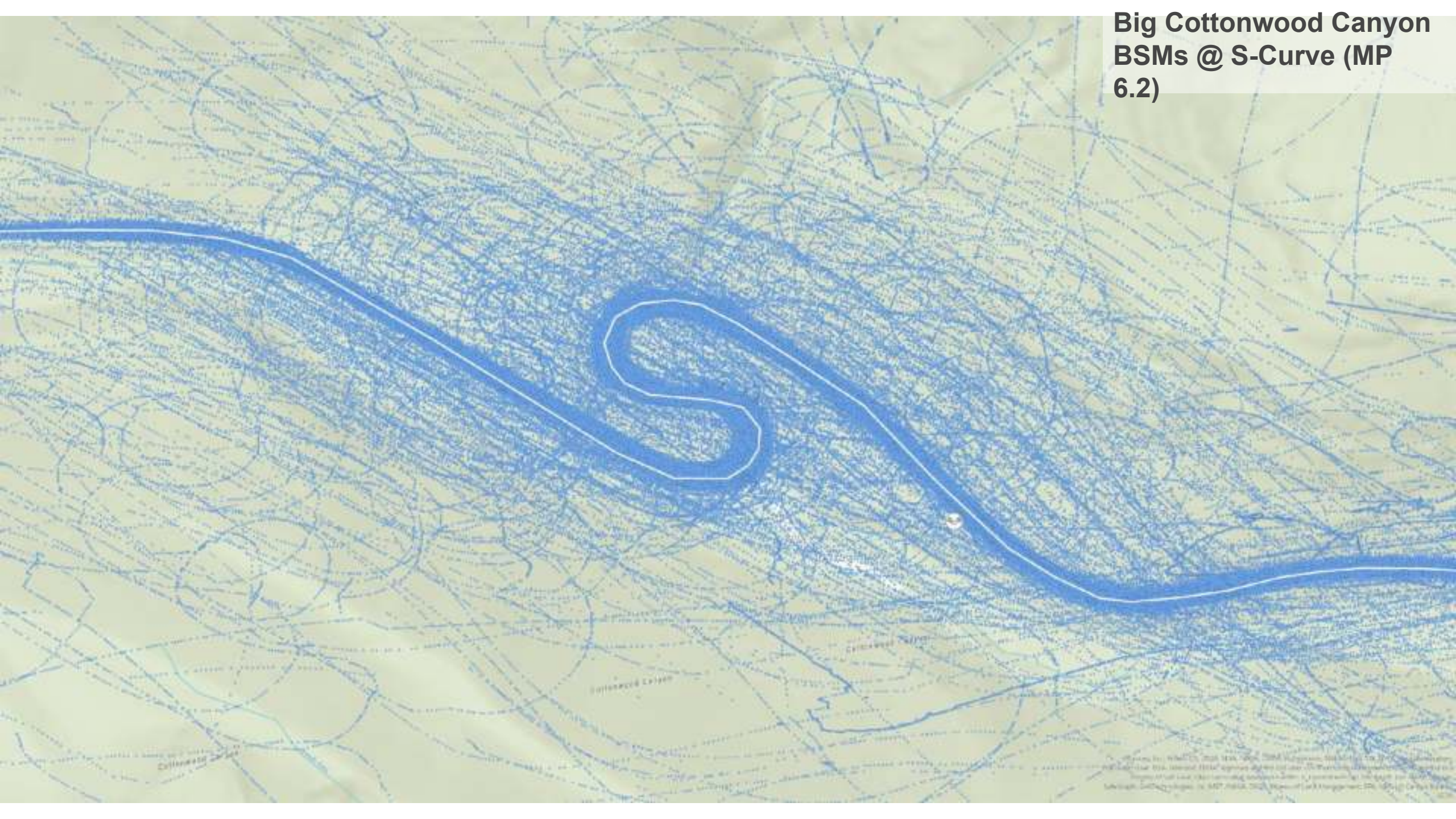


Number of Records
4,641,181
560,406



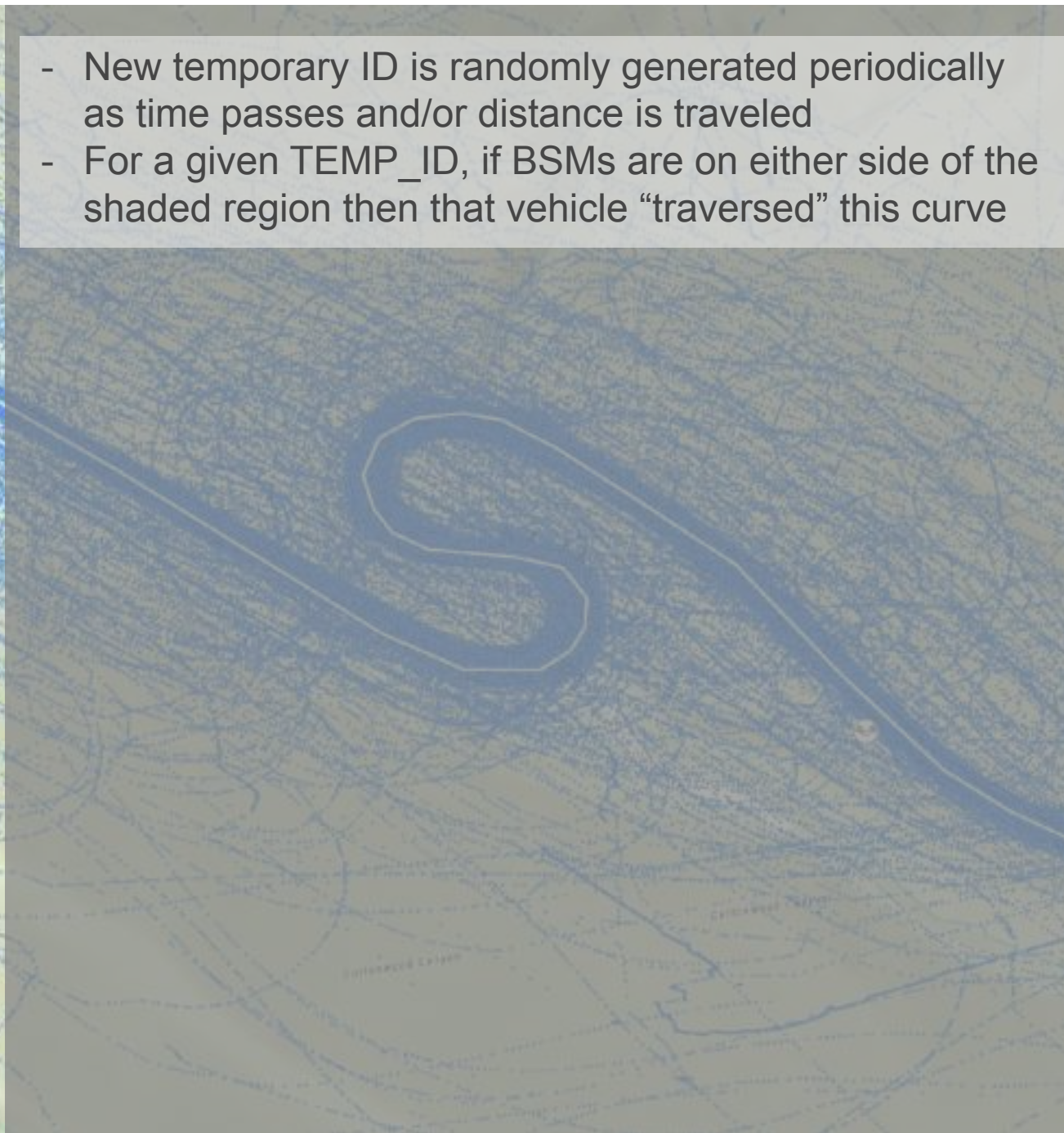
Number of Records
since January 1,
2023
370,370

**Big Cottonwood Canyon
BSMs @ S-Curve (MP
6.2)**



Big Cottonwood Canyon BSMs @ S-Curve (MP 6.2)

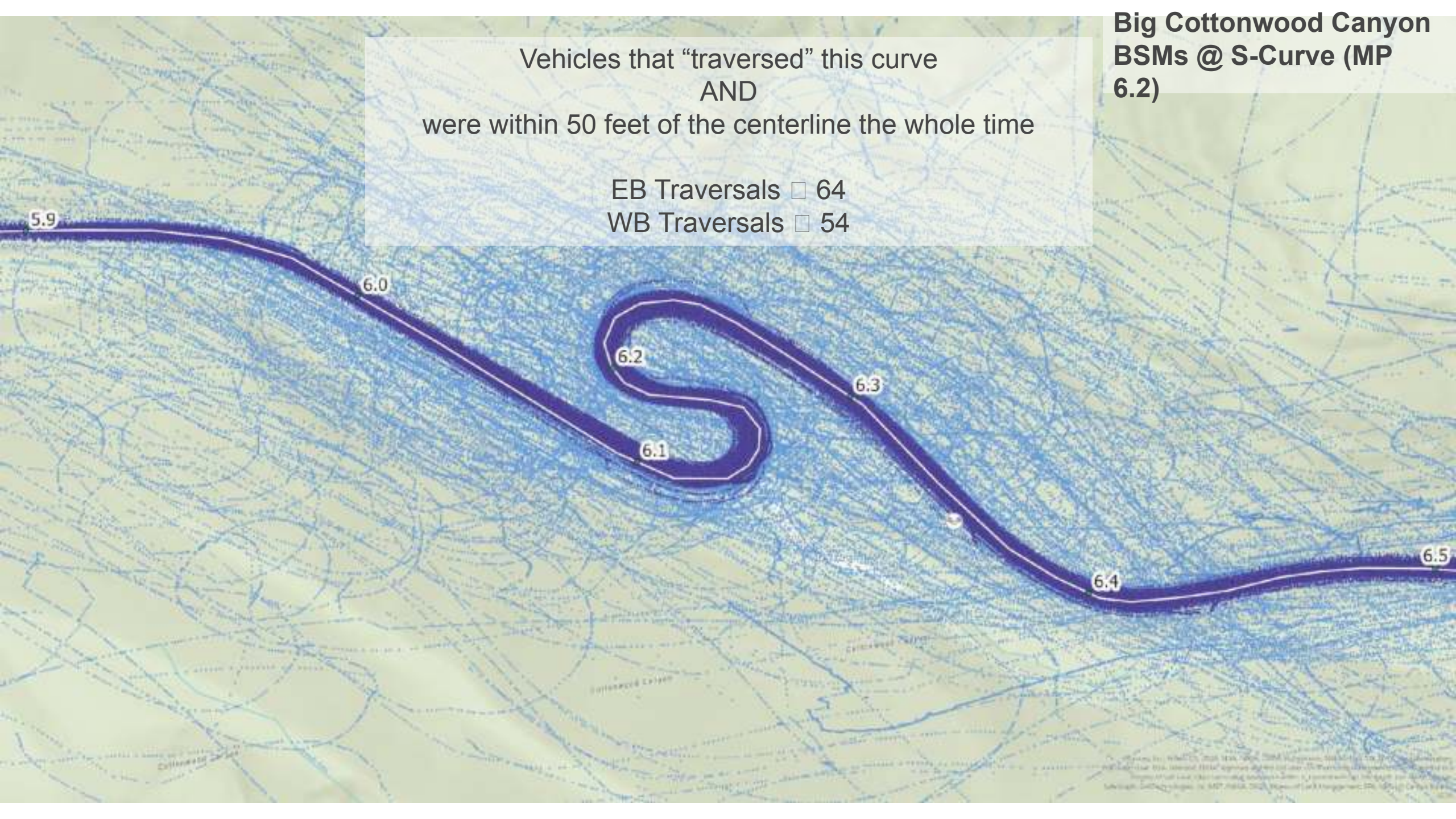
- New temporary ID is randomly generated periodically as time passes and/or distance is traveled
- For a given TEMP_ID, if BSMs are on either side of the shaded region then that vehicle “traversed” this curve



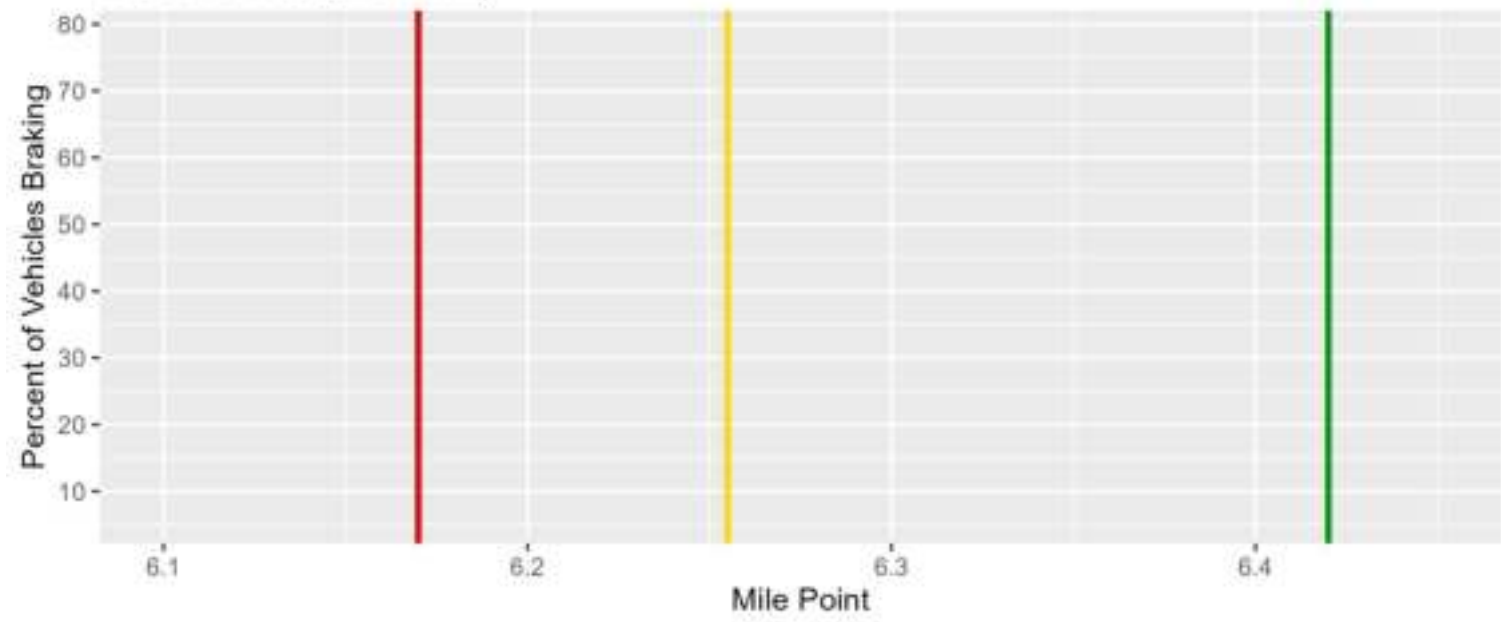
Big Cottonwood Canyon BSMs @ S-Curve (MP 6.2)

Vehicles that "traversed" this curve
AND
were within 50 feet of the centerline the whole time

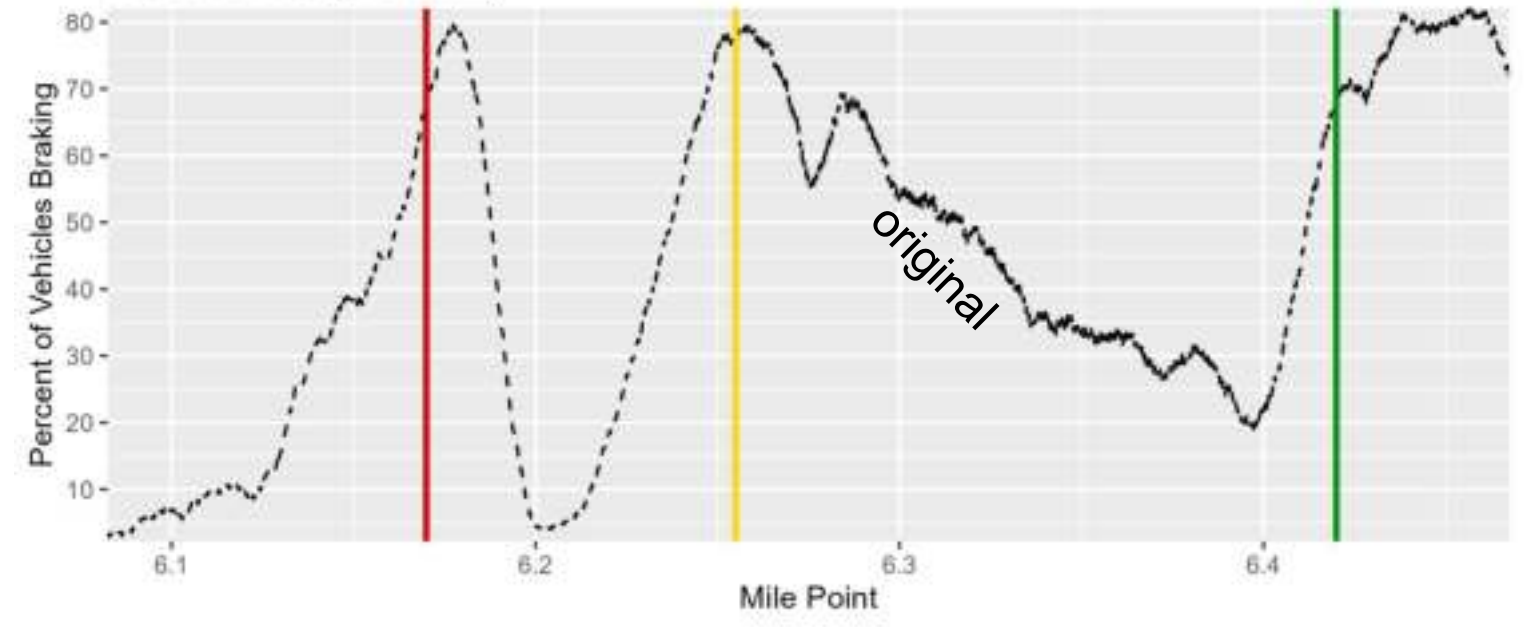
EB Traversals 64
WB Traversals 54



S-Curve WB (Downhill)



S-Curve WB (Downhill)

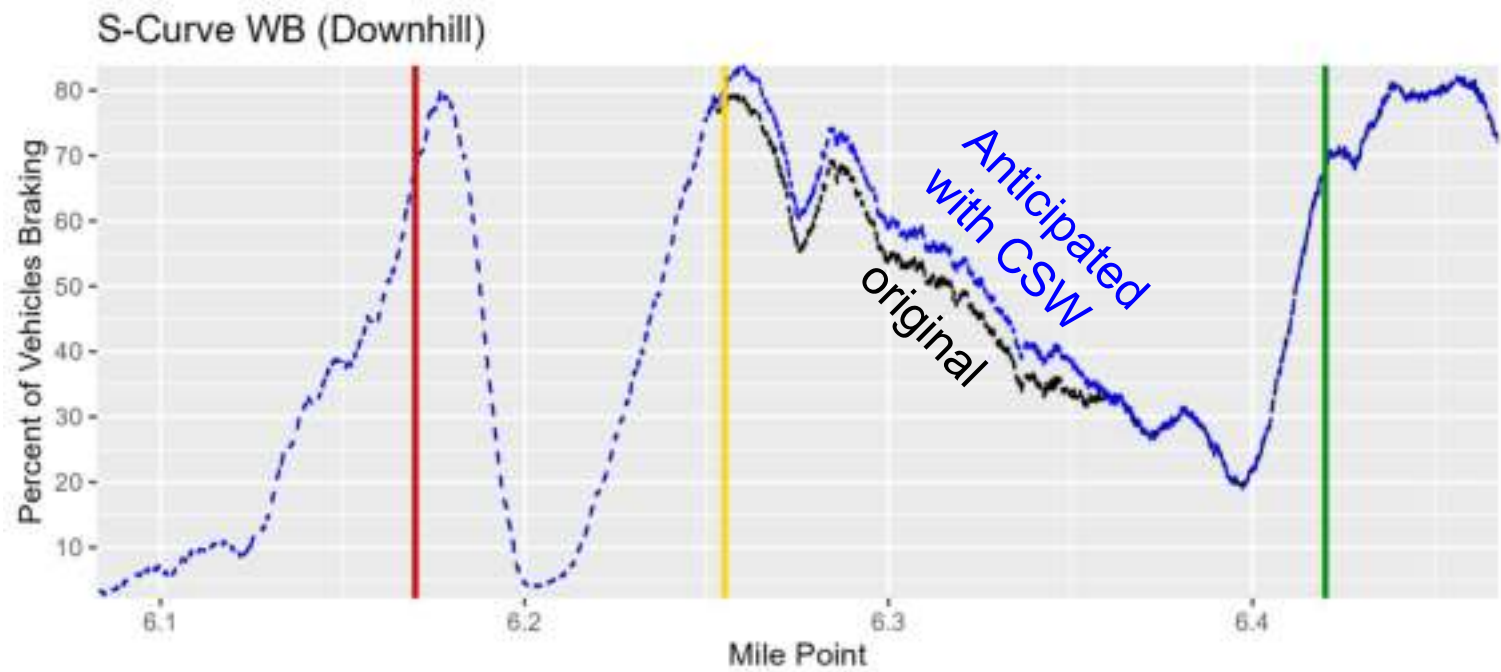


HYPOTHESIS

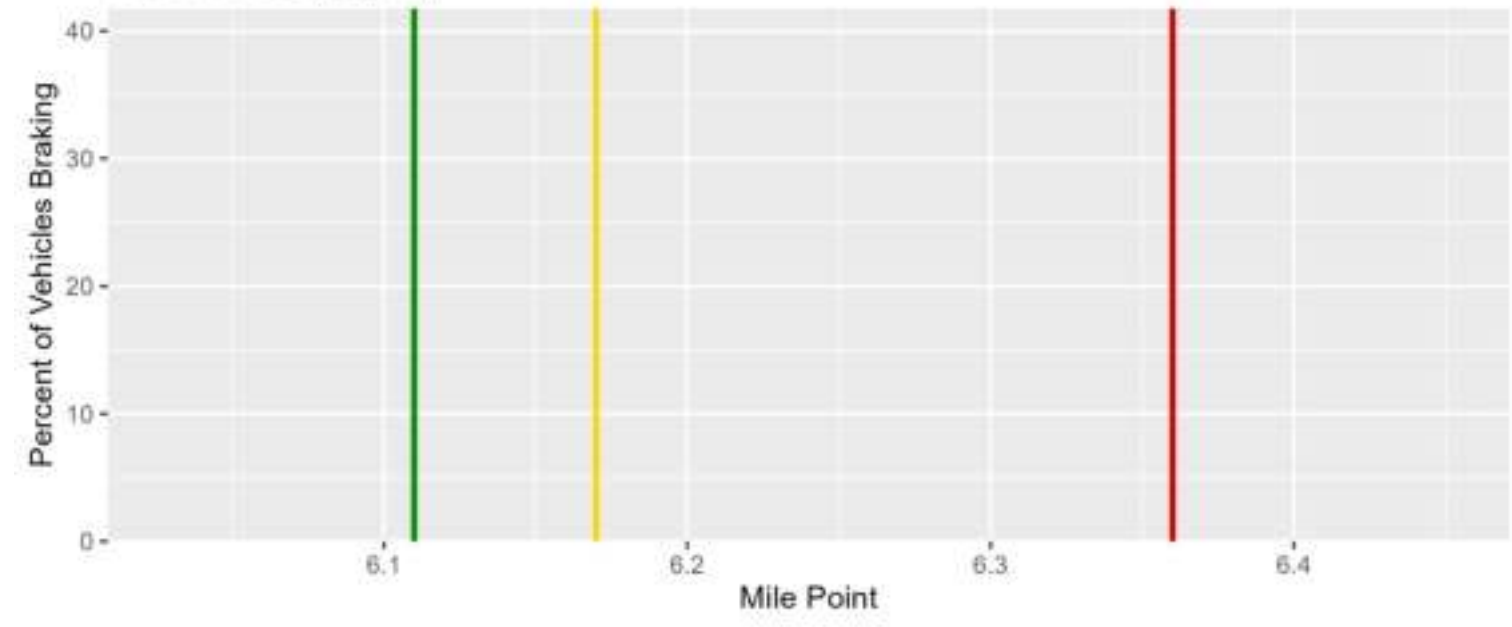
- A portion of drivers that receive the CSW will brake sooner than the average driver

Many influential factors:

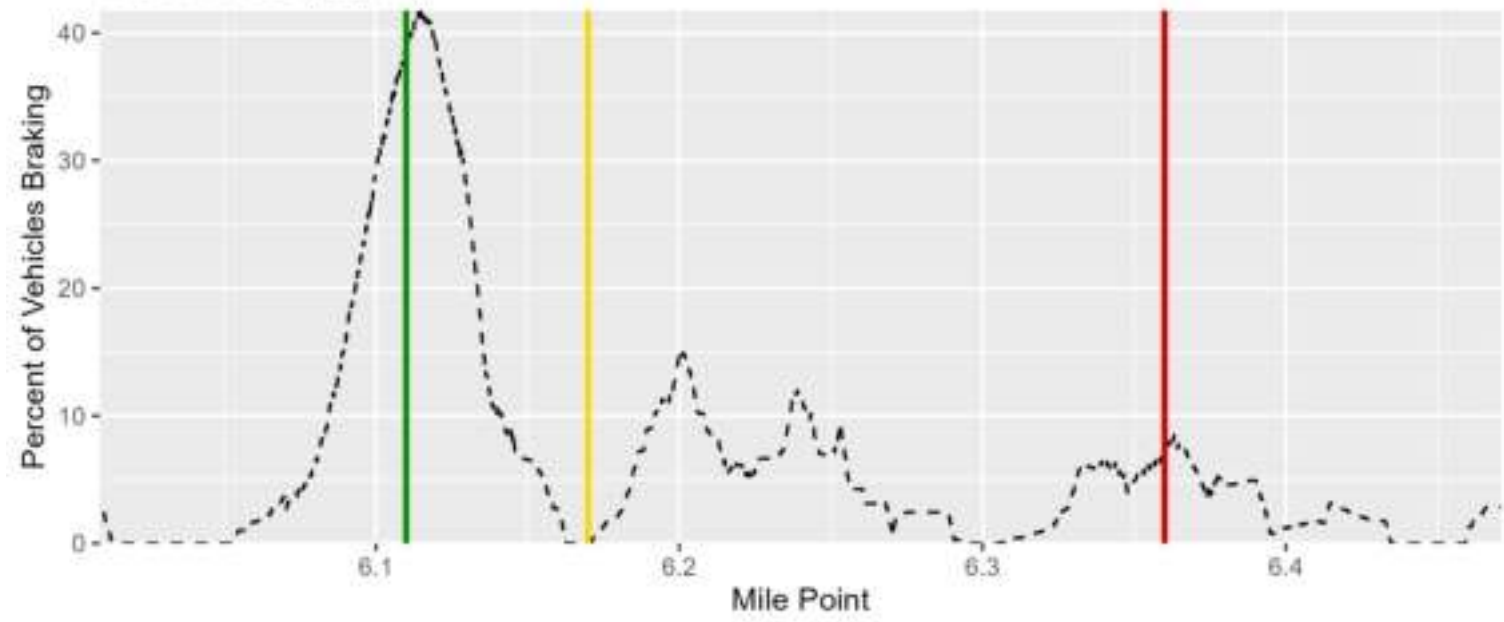
- Sample size
- Positional accuracy
- Driver familiarity
- Challenging OBU-vehicle integration



S-Curve EB (Uphill)



S-Curve EB (Uphill)



Lessons Learned

- Critical experience is gained as you deploy in the “real world” and analyze “real data”
- Strong skillset needed to design, architect, manage, analyze data
- Multi-disciplinary deployment team enhances success
- Need to dramatically increase the penetration rate of CVs and fully realize the V2X safety potential – OEM adoption

Thank you!

