

MDOT-MSU Traffic State Monitoring System

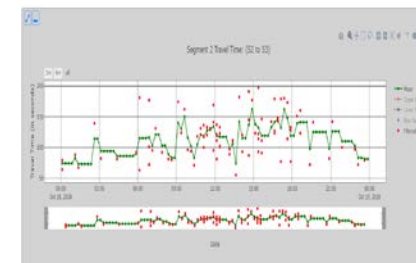
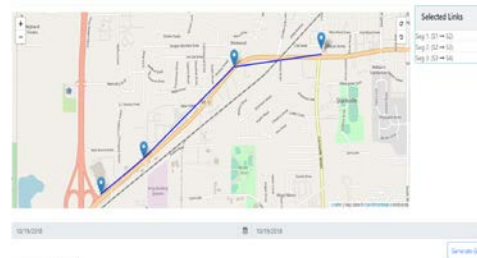
Phase I: Roadway Travel Time Estimation System

2nd Project Progress Meeting

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Mississippi State University

Oct-2018

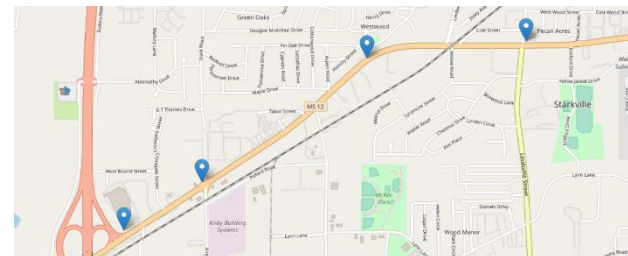


Outline

- Recap
- Milestones
- System architecture
- Demonstration
- Next Steps
- New research ideas

Milestones

- May-2018: 1st Progress debrief meeting
 - Presented the researching findings in the experiment with respect to the wireless antennas
 - Decided to adopt a different wireless antenna configuration
 - Directional wireless antennas instead of omni-directional (Commercial Bluetooth)
 - Decided to compare with a commercial travel time monitoring system deployed at the same locations
- June-2019: MDOT created VPN of MDOT Intranet and allocated four IP addresses for this project
- July-2018: MDOT deployed four directional Wireless antennas along Highway 12 at Starkville for MSU project team and the field devices went live on the same day:
 - @Highway 25
 - @Airport road
 - @Patriot Ave
 - @Louisville Street



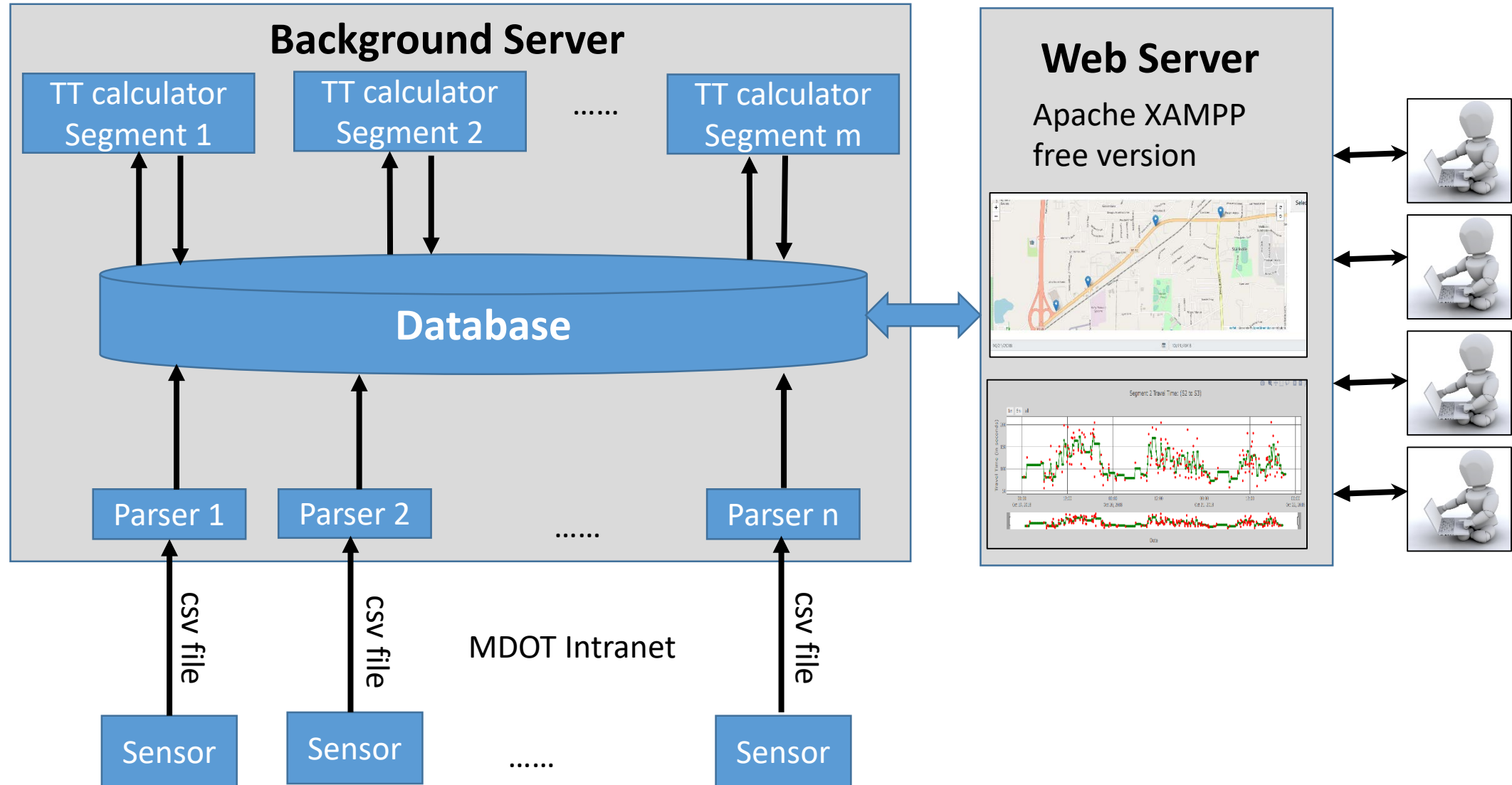
New Progress

- Completely re-designed the wireless sniffing hardware platform
- Designed and built the background database with MySQL
- Developed two computing routines
 - Parsing program
 - Import raw csv files into the background database every 5,10 or 15 minutes
 - Travel time calculation program
 - Calculate travel times of road segments defined by users
- Developed the graphic user interface (ver 0.1)
 - Visualize travel time over time along a selected path

New features of this system

- An integral software-hardware solution
- Highly scalable
 - Maintain the same efficiency at various scales from a few locations to hundreds of locations
- Highly efficient
 - Generation of travel time samples generation is continuous rather than user-driven
 - The active tables will not grow over time
- High-fidelity
 - Responsive time could be reduced to 1 min;
 - Path-based travel time to identify delay locations

System Architecture



System Scalability

- Parallel data log into database
 - The number of active parsers is equal to the number of sensors
 - SQL Database is suitable for simultaneous user accesses.
- Continuous travel time calculation as opposed to “user driven”
 - Active tables could be very concise (only the latest hour of raw data)
 - User-driven travel time calculation is complicated and possible time-consuming
 - Many repetitions
 - Algorithm parallelism is critical
 - Simultaneous calculation for each defined segment

Demonstration

- Pilot Study: On the MSU “Action Lab” Server right now
 - It will be closed and transferred to the MDOT virtual machine.

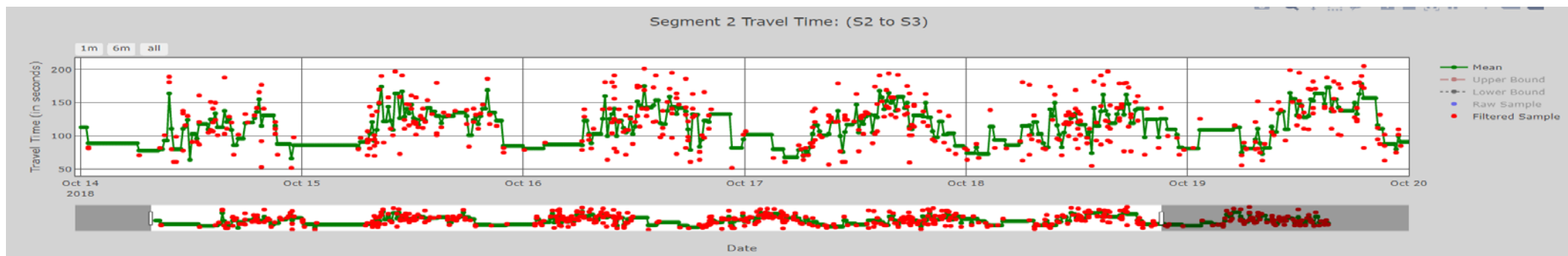
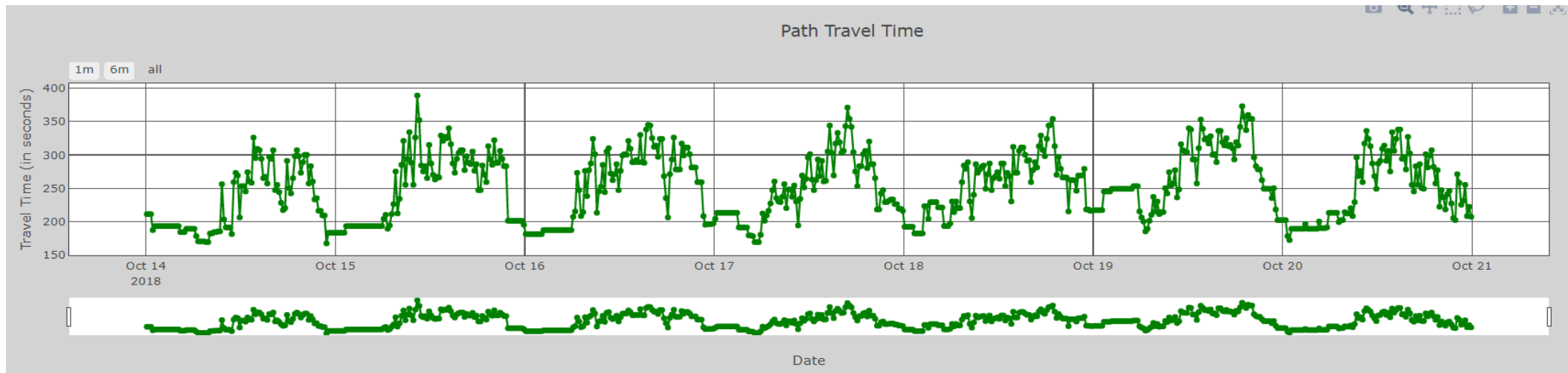
<http://actionlab.cee.msstate.edu:8080/wifi-sensor/home.php>

Demonstration

- Background Database

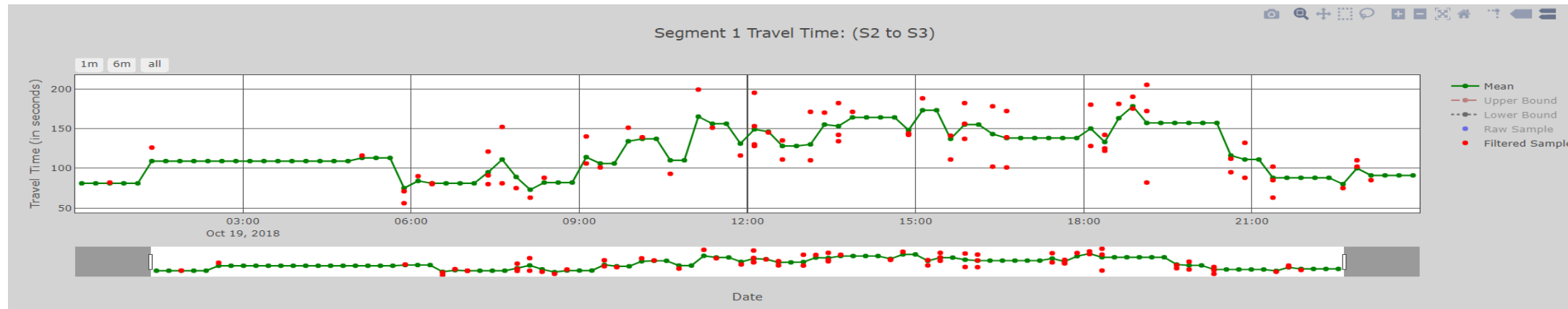
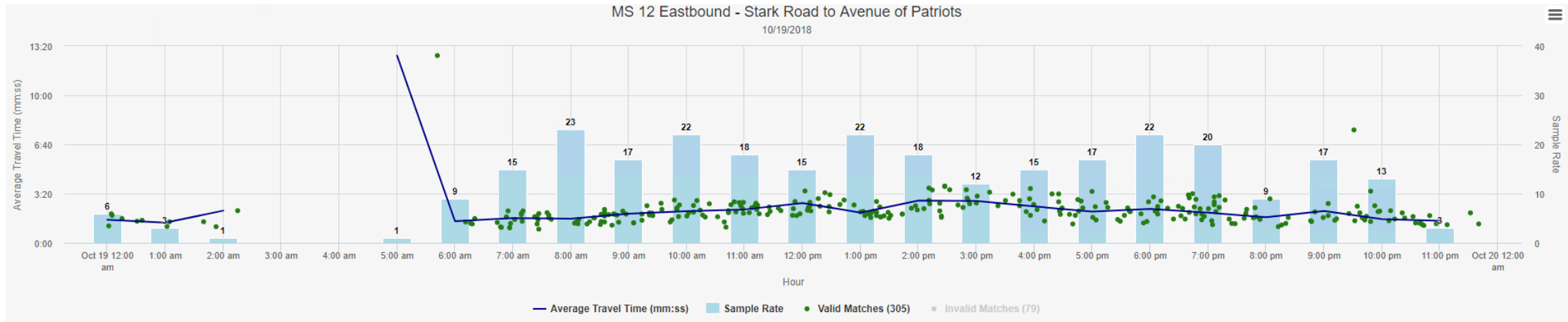
Demonstration--front graphic user interface

- EB Travel time for a week (Oct-14~Oct-20)



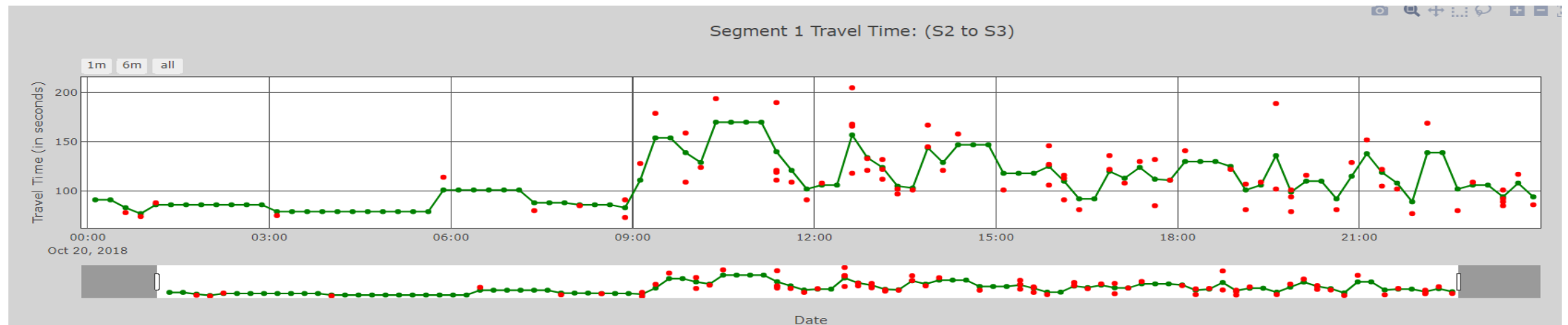
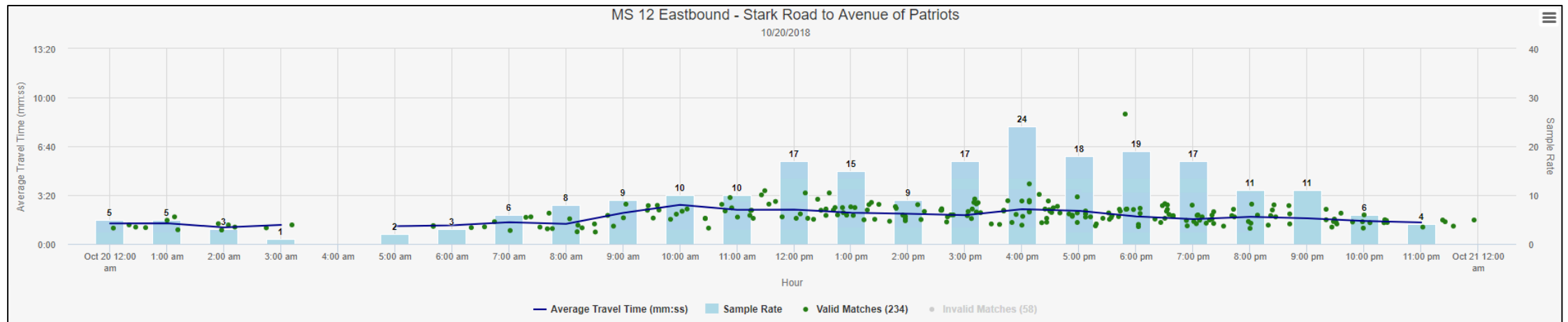
Cross Comparison with Velocity[®]

- Oct-19-2018 (Friday)



Cross Comparison with Velocity[®]

- Oct-20-2018 (Saturday)



Next Steps

- A trend curve will be added
- MDOT preferences?
- Traffic signal event data log and visualization
 - MDOT favorite figures
 - Will discuss during the 3rd project progress meeting

New research needs?

- Any other research needs from MDOT?
- New Locations?
- Turning movement counts (O-D)?
- Traffic Safety performance monitoring?
 - A new investigation? Run light running, prevailing speed, dilemma zone protection?
- NCHRP idea submission (by AASHTO member states): ATC traffic signal system study?
 - Deadline: November-1st