Research Background

- Various benefits of autonomous vehicles have been recognized in the literature.
- The impact of this technology on the pavement infrastructure has not been addressed.
- Autonomous trucks (AT) could potentially impact pavement systems by positioning themselves within the lane of pavements inherently different than non-autonomous trucks (NAT).

Truck Wander Distribution

- Wander is the lateral traffic distribution over a pavement cross-section.

Evaluation of Damage Profile

- $EF = \frac{N_f}{N_r}$ (reference case)
- $EF = \frac{N_f}{N_r}$ (zero wander) = 2.2
- $EF = \frac{N_f}{N_r}$ (uniform distribution) = 0.6

These EF were used to adjust the traffic volume inputs for the Pavement ME Design software.

Analysis Methodology

- The Pavement ME Design software was used for flexible pavement analysis and design process.

- Normal, uniform distribution and zero wander of trucks result in different damage profiles.

- From the damage profiles, the concept of Equivalency Factor (EF) was developed to directly account for a uniform or zero wander distribution of loadings in the Pavement ME Design software.

Concluding Remarks

- A potential for substantially greater damage to pavement infrastructure exists with highly controlled autonomous trucks.
- Planning/programming for locating and then distributing these trucks can also result in substantial performance increases and/or cost savings.
- Benefits from these controlled positioning approaches can are seen at volumes as low as 10% when a segregation approach is adopted and at 30% when an integration approach is followed.