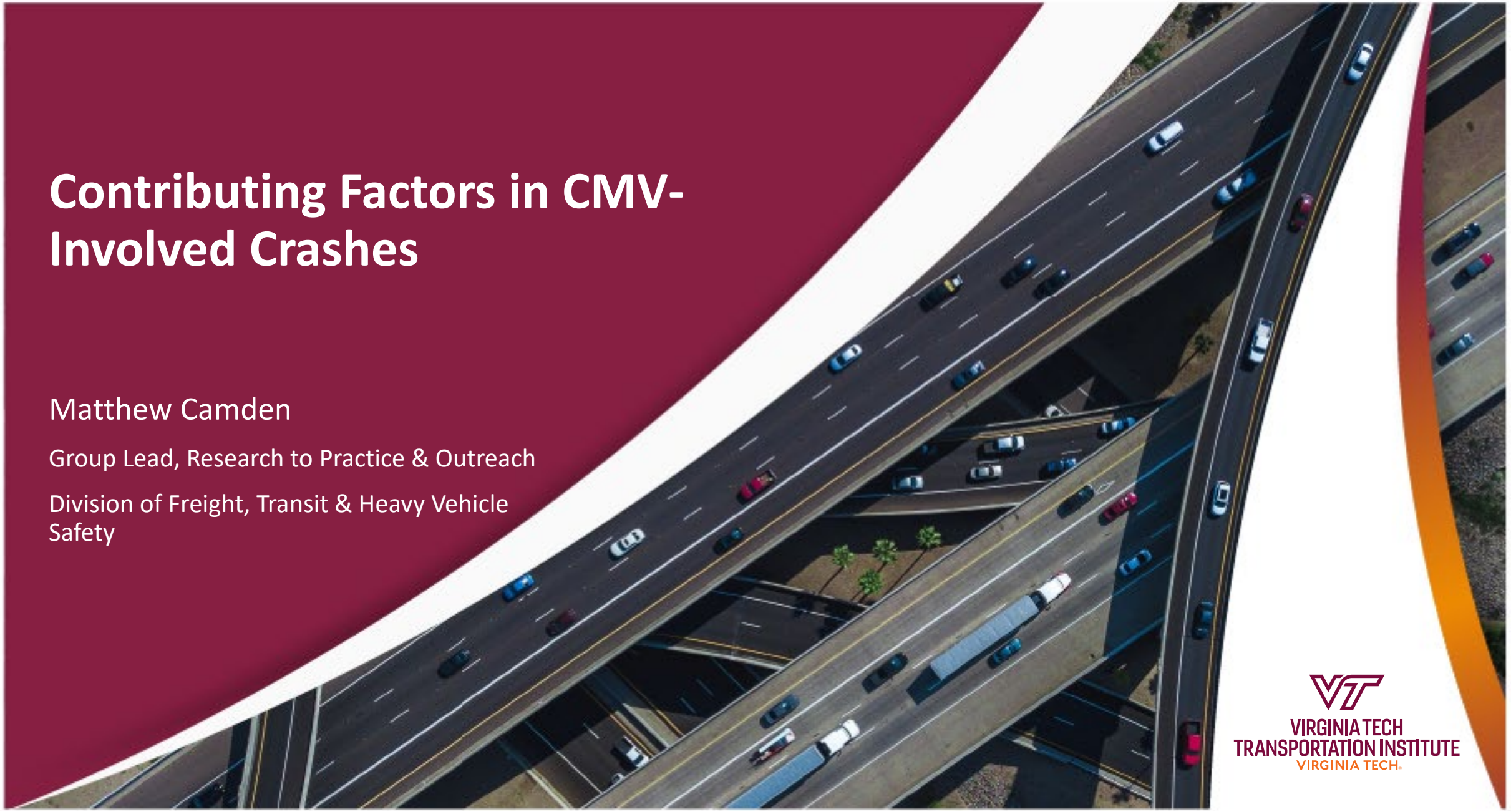
Contributing Factors in CMV-Involved Crashes



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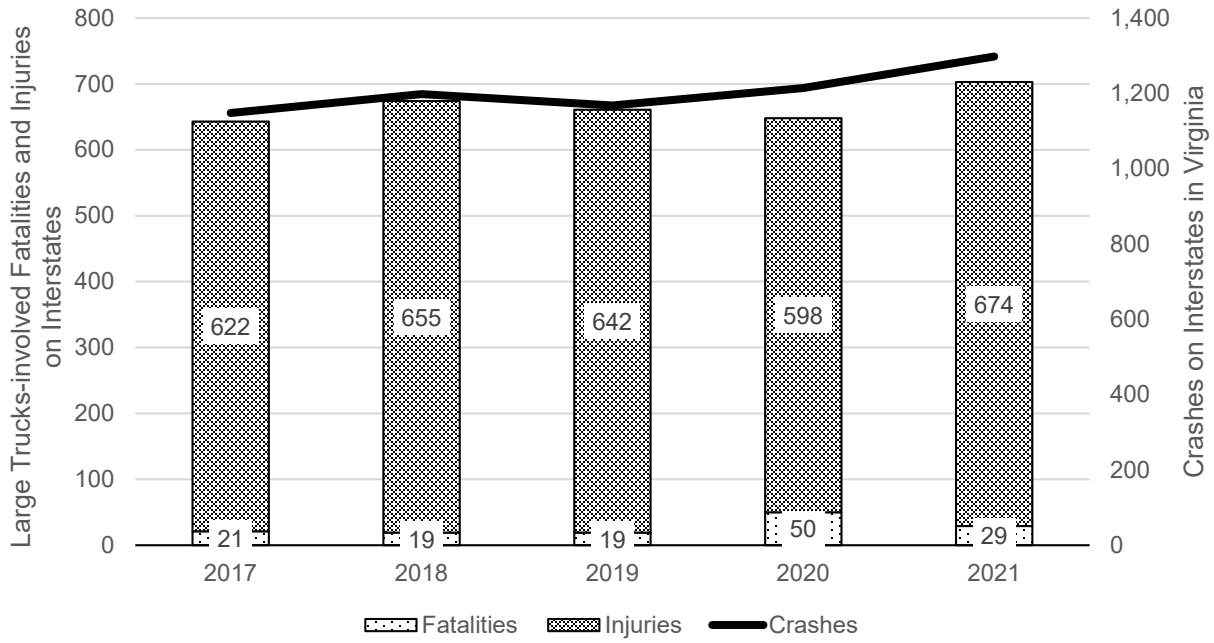
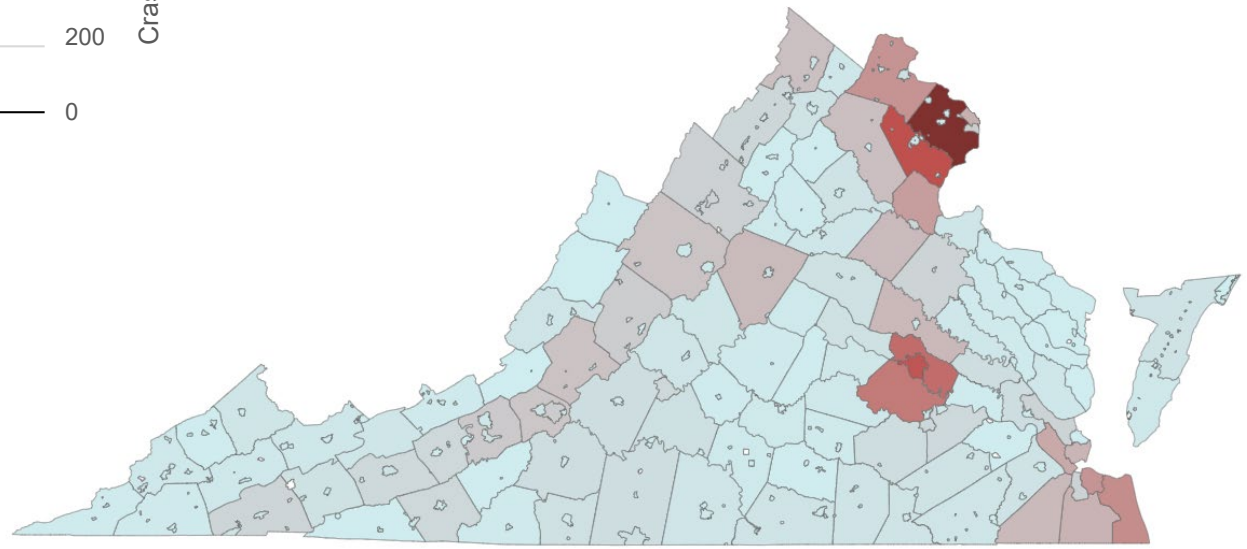
Outlook of CMV Crashes in Virginia





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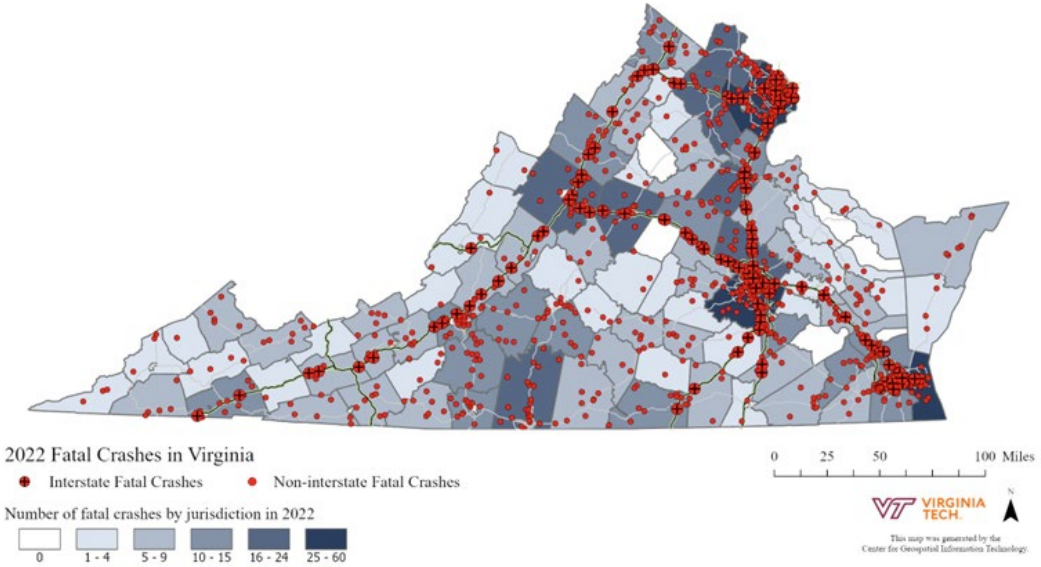
Project Goals

1. Systematically examine CMV crashes to identify crash corridors
2. Identify contributing factors to CMV crashes along the crash corridors
3. Pilot test a targeted enforcement campaign with the VSP with a focus on contributing factors



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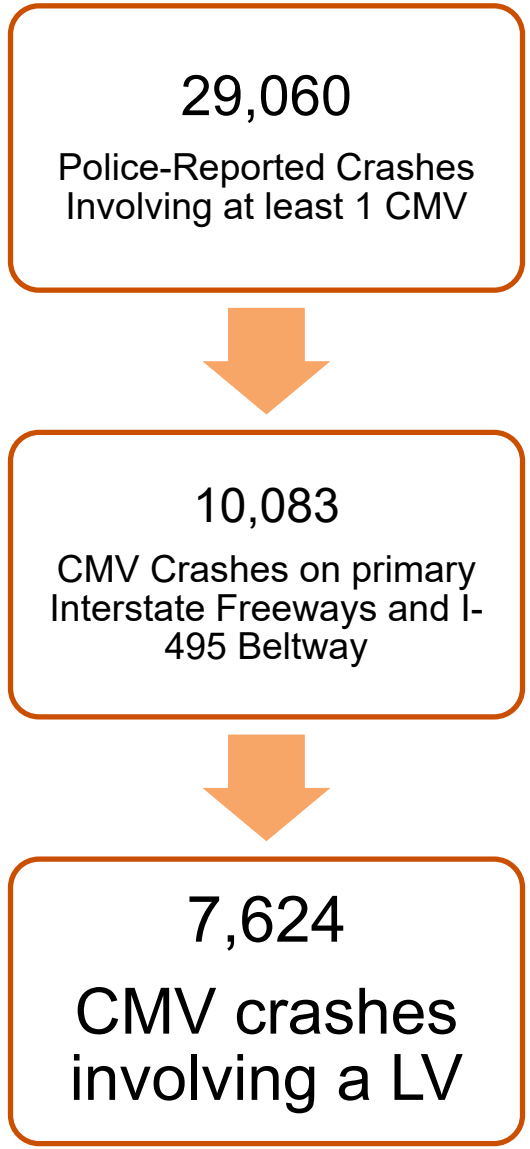
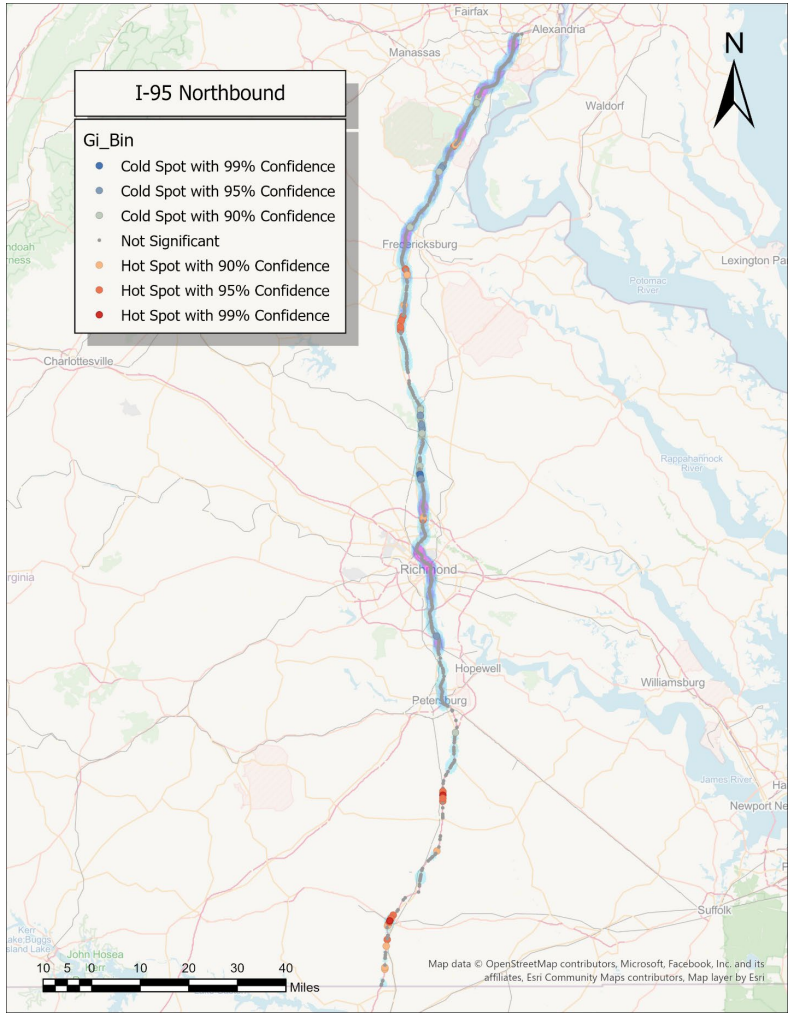
How did we do it?

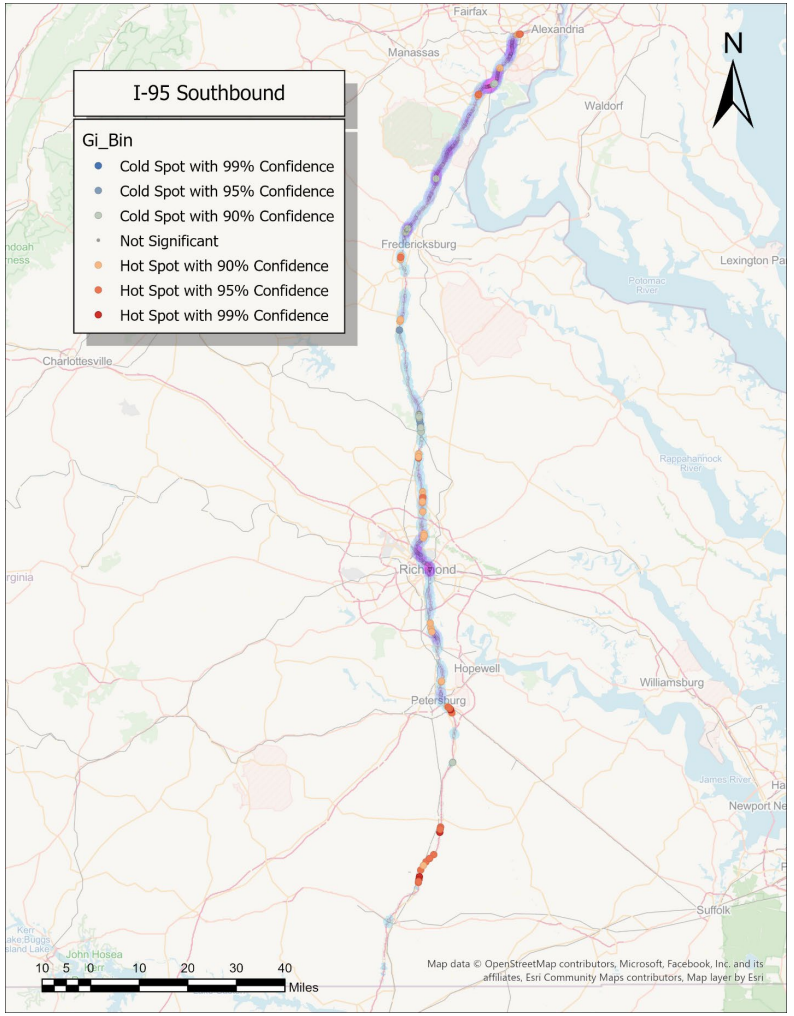
1. Link 2016-2021 crash data
   - VADMV, VDOT, & Virginia Road Centerline
   - Environmental, roadway, vehicle, and driver factors with crashes involving at least 1 CMV
2. Getis Ord Gi* analysis for hot and cold spots
   - All roadways
   - Distracted-related crashes on I-95
3. Series of logistic regression models on KABCO severity
4. Targeted enforcement campaign in I-95 surround distraction-related hot spots in May 2024



I-95 Hot and Cold Spots

42 total hot spots along Virginia Interstates and





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Description of Crashes

- CMV crashes resulted nearly 10% of people with a fatal or suspected serious injury
- CMV drivers were only killed or seriously injured in 2.5% of crashes
- 94% of CMV drivers were indicate as wearing a seat belt at the time of crash

Crash Type	Number of Crashes	Percentage of Crashes
Rear End	3453	34.25%
Sideswipe - Same Direction	2916	28.92%
Fixed Object - Off Road	1707	16.93%
Angle	1430	14.18%
Non-Collision	171	1.70%
Other	164	1.63%
Fixed Object in Road	69	0.68%
Head On	50	0.50%
Deer	37	0.37%
Sideswipe - Opposite Direction	27	0.27%
Pedestrian	24	0.24%
Backed Into	24	0.24%
Other Animal	11	0.11%

Fatal to CMV Driver

Coefficients	Estimate	Odds ratio (if significant)	Std. Error	z-value	p-value
Intercept	-7.081		0.617	-11.470	<0.001
CMV driver belt use					
Belted	Baseline				
Unbelted	3.825	45.851	0.314	12.193	<0.001
Alcohol and other drugs by CMV driver					
No alcohol or other drug use suspected	Baseline				
Alcohol or other drug use suspected or confirmed	2.317	10.145	0.789	2.936	0.003
CMV driver age					
Other age	Baseline				
Age 55 to 64	0.750	2.117	0.299	2.504	0.012
Age 65 or older	1.134	3.108	0.449	2.525	0.012
Year of crash					
Not 2020	Baseline				
2020	0.766	2.152	0.302	2.536	0.011
CMV driver distraction					
No non-cell phone related distraction on crash report	Baseline				
Non-cell phone related distraction on crash report	1.008	2.741	0.368	2.740	0.006
Work zone related					
Not work zone related	Baseline				
Work zone related	0.976		0.603	1.617	0.106

Description of Crashes

Driver Factor	Count and Proportion of CMV Drivers	Count and Proportion of LV Drivers	OR	95% CI
Drinking Alcohol	5 (0.07%)	238 (2.50%)	38.365	15.814 – 93.076
Drug Use	2 (0.17%)	166 (0.73%)	4.371	2.361 – 8.092
Sleep/Fatigue	44 (0.58%)	339 (3.52%)	6.279	4.580 – 8.609
Any Distraction	344 (4.33%)	805 (8.16%)	1.965	1.725 – 2.237
Cell Phone Related	6 (0.08%)	54 (0.55%)	7.288	3.134 – 16.949
External Distraction	58 (0.73%)	55 (0.56%)	-	-
Fatigue-Related Distraction	35 (0.44%)	235 (2.38%)	5.519	3.864 – 7.882
Internal, Vehicle-Related	10 (0.13%)	55 (0.56%)	4.452	2.268 – 8.739

CMV Work zone Crashes

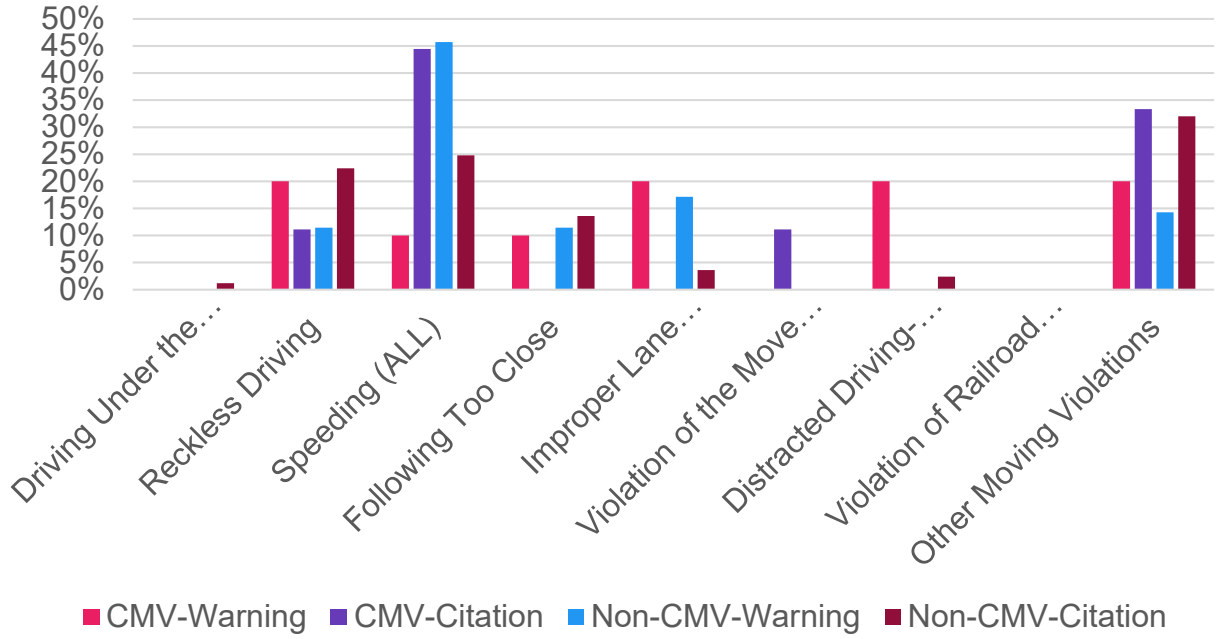
- CMV crashes in the advanced warning area are 2.4x more likely to result in an injury compared to other locations
- Lane closures were 1.46x more likely to result in an injury compared to shoulder or median work zones

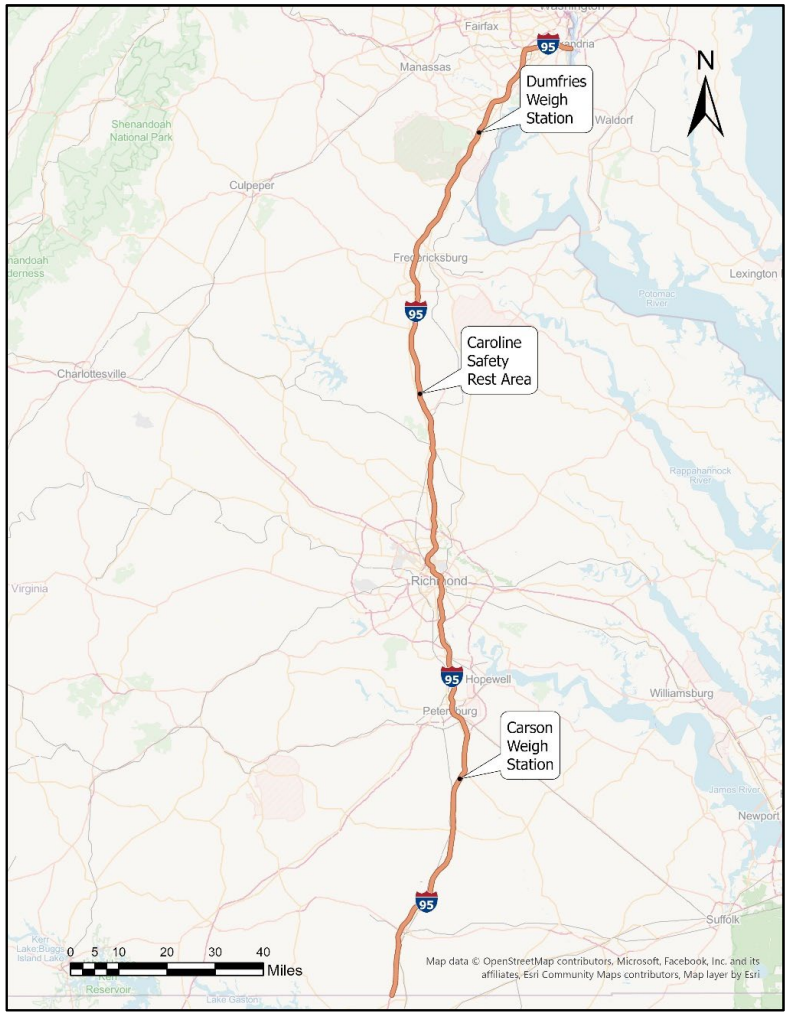
Work Zone Location	Number of K Injury Work Zone Crashes (% of Condition)	Number of ABCO Injury Work Zone Crashes	Number of KABC Injury Work Zone Crashes	Number of O Injury Work Zone Crashes
Advance Warning Area	5 (2.62%)	186 (97.38%)	80 (41.88%)	111 (58.12%)
Transition Area	0 (0.00%)	158 (100.00%)	57 (36.08%)	101 (63.92%)
Activity Area	13 (1.51%)	850 (98.49%)	309 (35.81%)	554 (64.19%)
Termination Area	0 (0.00%)	40 (100.00%)	9 (22.50%)	31 (77.50%)

Work Zone Type	Number of K Injury Work Zone Crashes (% of Condition)	Number of ABCO Injury Work Zone Crashes (% of Condition)	Number of KABC Injury Work Zone Crashes (% of Condition)	Number of O Injury Work Zone Crashes (% of Condition)
Lane Closure	7 (2.22%)	308 (97.78%)	133 (42.22%)	182 (57.78%)
Lane Shift/ Crossover	0 (0.00%)	75 (100.00%)	26 (34.67%)	49 (65.33%)
Work on Shoulder or Median	9 (1.20%)	742 (98.80%)	250 (33.29%)	501 (66.71%)
Intermittent or Moving Work	2 (2.47%)	79 (97.53%)	32 (39.51%)	49 (60.49%)
Other	0 (0.00%)	30 (100.00%)	14 (46.67%)	16 (53.33%)

VSP Piloted Targeted Enforcement – Operation Safe DRIVE

Result	Total
Total CMVs Inspected	197
Out-of-Service Drivers	23
Out-of-Service Vehicles	29
Moving Violation Inspections	15
Inspection Non-Moving Violations	221





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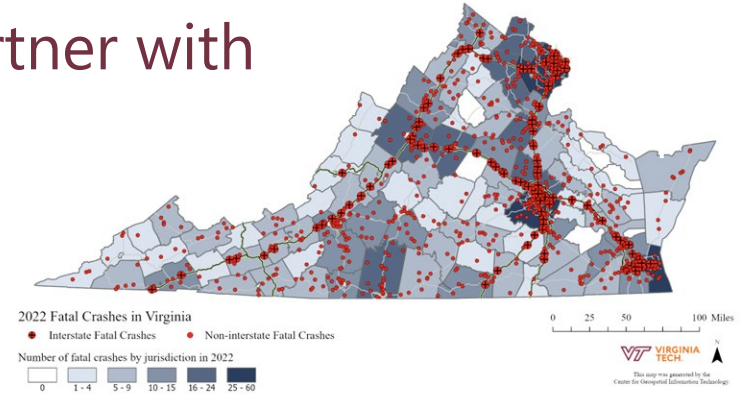
Summary

1. Seat belt use and impairments are key factors associated with CMV driver fatalities
2. Analysis can focus on identify when/where specific crashes occur and develop interventions specifically targeting those areas.
3. Support past efforts illustrating the importance of LV drivers in preventing CMV crashes
4. Provides an example for how law enforcement can partner with academia to improve CMV safety



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