Traffic Improvement After Francis Scott Key Bridge Collapse

C13 - Mobility2

Andrew Lising, Yi Moh, Emely Prudencio

DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING

A. JAMES CLARK SCHOOL OF ENGINEERING

Problem Definition

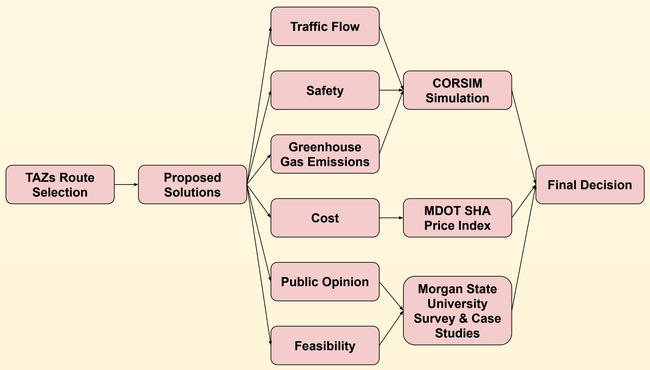
On March 26, 2024, the Francis Scott Key Bridge collapsed after a container ship collision, forcing over 34,000 daily commuters to reroute through already burdened corridors such as I-95 and I-895. This sudden shift has intensified traffic congestion and raised concerns about the long-term mobility of workers, especially those who rely on efficient access to their jobs across the region. Our team is focused on addressing these impacts by exploring practical traffic solutions, such as shifting peak travel hours, implementing stoplights at key entrances, and introducing High Occupancy Vehicle (HOV) lanes. Using CORSIM traffic simulations, we are evaluating how these strategies could help ease congestion and support more reliable commutes throughout the affected network.

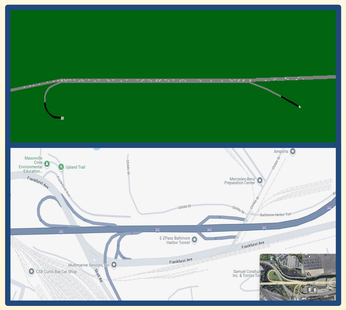
Analysis

3 Proposed Solutions:

1. **Stop Lights** – Added at tunnel entrances to improve traffic congestions and control flow
2. **HOV Lanes** – Converted the left lane to HOV to encourage carpooling.
3. **Peak Hour Shift** – Reducing flow to 80% during peak hours using toll adjustments.

Origin Destination Map for 2020 Baltimore TAZs





I-895 Northbound Simulation Model vs Real World

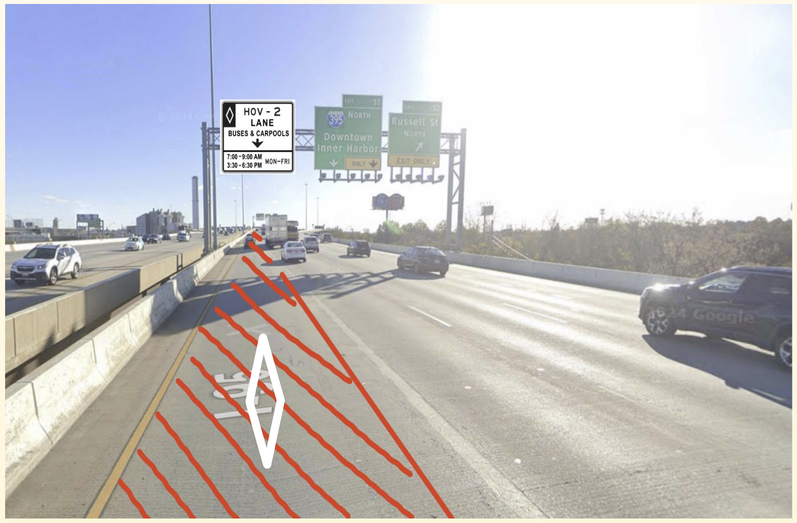
Alternatives Review

Analysis Metrics	Stoplights	HOV Lanes	Peak Hour Shift
Traffic Flow	3	2	1
Safety	1	3	2
Cost	3	2	1
Emissions	3	1	2
Public Opinion	2	1	3
Feasibility	2	1	3

A decision matrix was used to rank and compare the solutions based on the analysis metrics.

A ranking of 1-3 with 1 being the best and 3 being the worst.

Final Design



Proposed HOV-2 Lane on Existing Lane (I-95 NB Shown)

Final Analysis

	I-95 NB	I-95 SB	I-895 NB	I-895 SB
Cost Estimation	$696,276.00		$940,852.55	
Length Applied *(mi)*	8		12.5	
Emissions *(grams/hr)*	12,675,288	13,849,800	41,675,952	17,498,956
Average Speed *(mi/hr)*	38.18	23.40	32.39	51.95
Travel Time *(min/veh-mi)*	1.57	2.56	1.85	1.15

After careful analysis of our test results, we find that our HOV Lanes solution to be the most effective based on our metrics and the given circumstances. The conversion of existing lanes to HOV lanes would best offer improvements on traffic flow, safety, and environmental impacts during the peak hours of I-95 and I-895 until the Francis Scott Key Bridge replacement will be fully operational.

Key Aspects

- Transforming the most left existing lane into HOV-2 Lanes
- Restricts heavy vehicles to stay on the right lanes
- Applies during 7:00AM - 9:00 AM, and 3:00PM - 5:00PM
- Does not apply in the Baltimore Harbor Tunnel and Fort McHenry Tunnel

Acknowledgements

This project was facilitated by Professor Terry Yang, Dr. Deb Niemeier, and the University of Maryland Civil and Environmental Engineering Department.