

SUMMARY AND CONCLUSIONS

4.1 Study Area

The Bay Bridge study area extends a distance of 5.8 miles along U.S. Route 50/301, between the Oceanic Drive overpass in Anne Arundel County and the MD 8 overpass in Queen Anne's County. Within the study limits, U.S. Route 50/301 includes two parallel steel bridge structures, collectively known as the Bay Bridge, that span 4.3 miles, from shore to shore, across the Chesapeake Bay. It is the only roadway crossing of the Chesapeake Bay in Maryland.

The areas in the vicinity of the Bay Bridge have seen high levels of population and employment growth for the past several decades. This growth is projected to increase for the next ten years at a pace greater than the rest of the Baltimore-Washington region.

The Bay Bridge serves as a critical link in connecting several priority funding areas (PFA) on either side of the Chesapeake Bay. These PFAs, targeted for future economic development and growth, include the City of Annapolis and the community of Arnold, in Anne Arundel County on the west side of the Bridge and portions of Kent Island, Stevensville, and Grasonville, in Queen Anne's County on the east side of the bridge.

4.2 Roadway Geometry

The eastbound bridge was opened over 50 years ago and originally served traffic in both the eastbound and westbound directions. It now carries two lanes of eastbound traffic. The second bridge opened 30 years ago and carries three lanes of westbound traffic. This lane configuration represents normal operating conditions. Contraflow lane operation is used during periods of peak congestion, incident response, or construction and maintenance activities.

U.S. 50/301 is a six-lane divided highway on both approaches to the Bay Bridge. There is an 11-lane toll plaza west of the Bridge that provides one-way toll collection for eastbound vehicles. There are also transition areas on each side of the bridge to allow for contraflow operations. The transition and lane shift designs meet current minimum American Association of State Highway and Transportation Officials (AASHTO) standards and allow for a smooth transition of traffic to/from either bridge.

From a geometric review standpoint, the three percent grade on the eastbound and westbound bridges is within desirable AASHTO guidelines for urban arterials. However, the steepness of the grade in combination with a stop condition for traffic passing through the eastbound toll plaza, results in heavy vehicles traveling below the posted speed causing some delay for all vehicles using the eastbound bridge. AASHTO guidelines recommend minimal safety offsets on long span bridges. Both bridges have approximately one-foot offsets between travel lanes and the bridge rails leaving no room for disabled vehicles to pull out of the traveled lanes. Disabled vehicles routinely block traffic. The loss of a lane due to a disabled vehicle or other incident management activities can have a significant impact on the vehicular capacity of the bridges.

4.3 Travel Patterns

On an average summer Saturday, 82 percent of the eastbound traffic using the Bay Bridge comes from the Baltimore-Washington metropolitan area. Twenty-four percent of the traffic is destined to Queen Anne's and Kent counties with another 24 percent destined to other locations on Maryland's Eastern Shore, excluding Ocean City. Ocean City and the Delaware Beach resorts attract 23 percent and 20 percent of the traffic, respectively. During the summer Saturday, 83 percent of the trips begin at home and 37 percent are destined to recreation or tourism activities.

On an average weekday 93 percent of eastbound traffic using the Bay Bridge comes from the Baltimore-Washington metropolitan area. Fifty-two percent of the traffic is destined to Queen Anne's and Kent counties with another 35 percent destined to Maryland's Eastern Shore, including Ocean City. On an average weekday, 85 percent of the trips began at work or home and 77 percent end at work or home.

4.4 Travel Demand and Traffic Operations

The Bay Bridge carries approximately 53 percent more traffic on an average Saturday in summer (92,000 vehicles) than on an average weekday (60,000 vehicles). By 2025, the daily volumes are expected to increase to approximately 135,000 vehicles on an average Saturday in summer and 86,000 vehicles on an average weekday.

Trucks account for approximately five percent of total traffic on an average summer Saturday and approximately 14 percent on an average weekday. The trucks travel predominantly in the non-peak periods; however, the truck percentage of 14 percent for an average weekday significantly exceeds the Statewide average of four percent on other urban arterials.

The increased volumes of traffic on summer weekends cause the section of U.S. Route 50/301 approaching the toll plaza to experience significant congestion queuing. The queues usually start to build on Friday around midday and last into the evening (approximately 6 to 7 PM). The queues tend to be longer during summer holiday weekends such as Memorial Day and Independence Day. These queues occur even when all eleven-toll lanes are open and contraflow operations are used to maximize the Bridge's vehicular capacity in the peak direction of travel.

By the year 2025, the eastbound bridge is expected to operate at level of service (LOS) "E" or "F" for several hours during the PM peak period for an average weekday. On an average Saturday in summer, the eastbound bridge is expected to operate at LOS "F"

between the hours of 10 AM and 10 PM when the bridges are operated under normal conditions. The westbound bridge is expected to operate at LOS “D” or better for most of the day, under normal conditions.

During periods of peak flow in both directions, it is anticipated that contraflow operations will slightly improve the LOS for four of the 12 hours (6 PM to 10 PM) in the eastbound direction and a majority of the hours remain at undesirable levels of service. In the westbound direction the LOS deteriorates to undesirable levels for seven hours of the summer Saturday due to the contraflow operations on the bridge. Westbound congestion is a result of the contraflow operations due to the reduction from three to two westbound lanes.

These levels of service are based on an unconstrained hourly volume assignment that does not take into account congestion on the adjacent street network, at the toll plaza or on the Bridge. Under constrained traffic conditions, it is expected that the hours of congestion will increase due to peak spreading (drivers selecting alternative travel times to avoid peak congestion). In addition, it is anticipated that some drivers would select alternative routes or cancel certain types of discretionary trips. The future constrained traffic can be expected to result in longer queues and increased travel times in the vicinity of the Bay Bridge. These longer queues will be compounded by the other existing and growing queues along the US 50 corridor.

4.5 Maintenance

Based on the current condition of the eastbound bridge deck and the projected increases in traffic volumes, it is anticipated that the deck will require rehabilitation by 2018. Depending on the type and method of construction, the rehabilitation could require long-term single lane closures or complete nighttime bridge closures of the eastbound bridge. Because the bridge is projected to carry significant traffic volumes by 2018, the rehabilitation would likely result in substantial travel time delays.

4.6 Safety

Accident data analyzed for the period from January 1999 to October 2002 show a total of 402 accidents in the study area. Approximately 60 percent of the collisions are rear-end accidents which are frequently associated with traffic congestion. The study area’s rate for rear-end collisions is significantly higher than the Statewide rates for both urban and rural arterials.

Approximately 39 percent of the accidents occur in the summer months of June, July, and August, which account for approximately 35 percent of the annual Vehicle Miles of Travel (VMT). Of these summer accidents, 60 percent occurred on a Friday, Saturday, or Sunday. Approximately half of the total accidents occur on weekends (Friday, Saturday, Sunday) with 45 percent of them occurring on Fridays. The total daily traffic volume on an average Friday in the summer is approximately 40 percent higher than the average annual daily traffic.

Approximately 27 percent of accidents involve trucks resulting in a truck accident rate that is significantly higher than the statewide rate for the urban portion of the study area and slightly over the statewide rate for the rural portion of the study area. This

correlates with a higher than average percent of trucks in the study area (five percent for average Saturday in summer and 14 percent for average weekday).

Almost 90 percent of the accidents occur under dry weather conditions and 85 percent occur during the day indicating that neither wet pavement nor lighting is a major contributor to accidents in the study area.

While the largest number of accidents occurs on the bridge structure, the largest occurrence of accidents in proportion to the length of the segment occurs on the west approach roadway. Thirty-five percent of the accidents on the west approach roadway occurred in the immediate vicinity of the tollbooths and were mostly fixed object collisions. Another concentration of accidents occurred at the beginning of the bridge.

Finally, the probable cause listed on the police reports for 53 percent of the accidents was “failure to give full attention” which may be a result of drivers being distracted by the volume of traffic, geometric conditions, other vehicle occupants, in-vehicle electronic devices, scenery and/or unfamiliar roadways. In addition, eastbound drivers traveling through the toll plaza can be distracted while trying to find money for the toll or putting away change and/or receipts.

4.7 Conclusion

The transportation needs identified in this study primarily relate to capacity, safety, and maintenance requirements. The existing needs are projected to continue and worsen into the future.

The Bay Bridge currently experiences LOS “E/F” in the eastbound direction for several hours during the summer weekend peak periods. By 2025, it is anticipated to operate at LOS “E/F” for an extended period of time (12 hours a day) on summer Saturdays and for several hours during average weekday PM peak periods. The westbound bridge is expected to operate at LOS “D” or better for most of the day, under normal conditions.

The current contraflow lane operation that is used to increase peak direction capacity is not expected to mitigate the LOS. During periods of peak flow in both directions, it is anticipated that contraflow operations would improve the LOS for four of the 12 hours in the eastbound direction and in the westbound direction the LOS is anticipated to deteriorate to LOS “F” for seven hours on summer Saturdays. Westbound congestion is a result of the contraflow operations when westbound traffic is restricted to two rather than three travel lanes on the bridge.

The future constrained traffic can be expected to result in longer queues and increased travel times in the vicinity of the Bay Bridge. These longer queues will be compounded by the other existing and growing queues along the US 50 corridor.

The bridge capacity is reduced by the lack of a climbing lane for trucks, which make up more of the vehicle composition than on similar types of facilities. In addition, the bridge’s lack of shoulders to accommodate disabled vehicles outside the travel lanes further reduces capacity.

Approximately 60 percent of the collisions in the study area are rear-end accidents which are frequently associated with traffic congestion. The study area’s rate for rear-

end collisions is significantly higher than the Statewide rates for both urban and rural arterials.

Finally, planned future maintenance and rehabilitation of the eastbound Bay Bridge could require long-term single lane closures or complete nighttime bridge closures of the eastbound bridge which would likely result in substantial travel time delays.

The transportation needs for the Bay Bridge outlined in this report should be looked at in the context of the larger transportation facility along the US 50 corridor.