COUNTY COUNCIL OF TALBOT COUNTY
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CHUCK F. CALLAHAN, President
PETE LESHER, Vice President

FRANK DIVILIO
COREY W. PACK
LAURA E. PRICE

March 26, 2021

VIA E-MAIL: info@baycrossingstudy.com
Bay Crossing Study
2310 Broening Highway
Baltimore, MD 21224

RE: Tier 1 Draft Environmental Impact Statement (DEIS)
Chesapeake Bay Crossing Study

On behalf of the Talbot County Council, I am again going on record against the Corridor 8 Chesapeake Bay Crossing proposal moving into the Tier 2 study. Enclosed herewith please find correspondence from Talbot County dated November 27, 2017, December 17, 2019 and August 12, 2020 that I am requesting be made part of the public record.

The County Council discussed the Tier 1 Draft Environmental Impact Statement (DEIS) at its meeting on March 23, 2021. Corridor 8 impacts four of the county's historic villages: Claiborne, Copperville, Tunis Mills and Unionville. These low density historic residential communities are an important component of the county's rural character and are recognized for their significant heritage and pattern of development. The County is committed to protecting these historic communities, some of which are low-income and majority minority populations, and it is distressing that these considerations are not acknowledged in the DEIS.

Additionally, it is important to be cognizant of maintaining traffic flow not only across the Chesapeake Bay, but throughout the U.S. Route 50 corridor. The current traffic flow through Talbot County on U.S. Route 50 is of concern, particularly during the summer months. Consideration should be given for the construction of an overpass at the intersection of U.S. Route 50 and Maryland Route 404 as well as the addition of a third travel lane on U.S. Route 50. With numerous traffic lights between Chapel Road and Dutchmans Lane, significant bottlenecks are occurring both with the traffic flow on U.S. Route 50 and traffic crossing U.S. Route 50. The County has noted for several years, most recently in its 2020 Priority Listing for the Consolidated Transportation Plan to the Maryland Department of the Environment, concerns with the following areas:

US Route 50/MD Route 328 – Goldsborough Street Intersection Improvements
This intersection currently experiences significant traffic volumes for all approaches. The geometric configuration of this intersection possesses many shortcomings on Goldsborough Street, west of US Route 50.

The State should work with the Town of Easton to improve the geometric configuration of this intersection approach and/or provide technical assistance to the Town for diversion of east – west traffic from this intersection.

MD Route 50/MD Route 331 – Dover Street Intersection Improvements
This intersection currently experiences significant traffic volumes for all approaches. The geometric configuration of this intersection possesses many shortcomings on Dover Street, west of US Route 50. The State should work with the Town of Easton to improve the geometric configuration of this intersection approach and/or provide technical assistance to the Town for diversion of east – west traffic from this intersection.

US Route 50/Chapel Road - Intersection Improvements
This intersection currently experiences significant traffic volumes for all approaches. The geometric configuration of this intersection possesses many shortcomings on Chapel Road, west of US Route 50. The State should work with the Town of Easton to improve the geometric configuration of this intersection approach and/or provide technical assistance to the Town for diversion of east – west traffic from this intersection.

In addition, the Maryland Route 33 corridor serves as the sole evacuation route for the populated Bay Hundred peninsula. Additional heavy traffic on this road as a result of an additional Chesapeake Bay crossing would be of significant concern particularly during weather related emergencies. As noted in the 2020 Priority Listing for the Consolidated Transportation Plan:

MD Route 33 Capacity and Evacuation Improvements
During weather-related emergencies such as Tropical Storm Isabel and Hurricane Irene, this corridor experienced areas of significant flooding, limiting ingress and egress from this portion of the county. *The MD Route 33 corridor is the sole evacuation route for this populated neck or peninsula.* Accordingly, elevation modification to eliminate or minimize storm surge road flooding, as well as capacity improvements, should be pursued to protect the lives and safety of citizens in this area. Also, portions of this corridor between the Town of St. Michaels and the Town of Easton experience some weekday capacity issues which are anticipated to increase in the future. Traffic counts show that portions of MD Route 33 have heavy traffic volume, particularly near its intersection with MD Route 322. As an interim measure, the MD Route 33 corridor should be evaluated for any issues or problems that would need to be resolved in future improvements.

In closing, the Talbot County Council is against the Corridor 8 Chesapeake Bay Crossing proposal moving into the Tier 2 study. Thank you for the opportunity to comment.

Sincerely,

COUNTY COUNCIL OF TALBOT COUNTY

Chuck F. Callahan, President

CFC/jkm
Attachments

Cc: Sylvia Mosser, AICP, Maryland Department of Planning

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JENNIFER L. WILLIAMS, President
COREY W. PACK, Vice President

DIRCK K. BARTLETT
CHUCK F. CALLAHAN
LAURA E. PRICE

November 27, 2017

Kevin Reigrut, Executive Director
Maryland Transportation Authority
2310 Broening Highway
Suite 150
Baltimore, MD 21224

Re: Chesapeake Bay Crossing Study – Talbot County

Dear Director Reigrut:

Please consider this letter as the Talbot County Council's formal request that Talbot County be removed from consideration as a corridor for any proposed future capacity expansion across the Chesapeake Bay.

While the County Council recognizes that current and future traffic volumes may warrant the need for an additional crossing, Talbot County's road infrastructure is severely insufficient to handle the anticipated increases in traffic.

Sincerely,
COUNTY COUNCIL OF TALBOT COUNTY

Jennifer L. Williams
President

cc: Pete K. Rahn, Secretary, Maryland Dept. of Transportation
Senator Adelaide Eckardt
Delegate John Mautz, IV
Delegate Christopher Adams

COUNTY COUNCIL OF TALBOT COUNTY

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COREY W. PACK, President
CHUCK F. CALLAHAN, Vice President

FRANK DIVILIO
PETE LESHER
LAURA E. PRICE

December 17, 2019

Melissa Williams, Director of Planning and Program Development
Maryland Transportation Authority
2310 Broening Highway
Baltimore, Maryland 21224

Re: Chesapeake Bay Crossing Study - Corridor 8 Alternative – Items of Consideration Justifying Denial as "Preferred Corridor Alternative"

Dear Ms. Williams:

The Talbot County Council is on record with your office against the Corridor 8 proposal moving into the Tier 2 study and as such has several additional items to submit justifying that position. Specifically, the County's recently updated Comprehensive Plan and related land use documents raise numerous areas of concern that should preclude Corridor 8 Alternative from becoming the "Preferred Corridor Alternative".

The County has adopted a Chesapeake Bay Critical Area Plan which affects all waterfront areas of the County 1,000 feet landward from the shoreline or the inland edge of tidal wetlands. This action to implement the State's Critical Area program effectively converted 57,498 waterfront acres to a very low density of one dwelling unit per 20 acres. These areas are characterized by natural environments such as floodplains and wetlands, agriculture, forestry and fisheries, and critical habitat. It is the County's intent to retain these areas in such uses, in support of the State's efforts regarding the Chesapeake Bay Critical Area.

The upland portions contiguous to the Critical Area are equally important because of the high concentration of sensitive natural areas in close proximity to the tributaries of the Chesapeake Bay. Like the Critical Area, this area also features a mix of agriculture, low-density residential and natural resource areas.

In addition, these narrow land areas have few routes to inland parts of the County. Flooding, traffic and other road obstructions have demonstrated legitimate cause for concern, should development overcome the capacity for safe transit through these areas.

Conserving the agriculture, forestry, recreational and resource conservation uses that form the character of these areas is a high priority. Detailed zoning regulations have been adopted which direct, manage, control and minimize the adverse impacts of growth of these sensitive areas. The Chesapeake Bay Crossing Study Option 8 alignment would bisect and directly impact the County's most environmentally sensitive areas. The County has adopted detailed zoning regulations to direct, manage, control and minimize the adverse impacts of growth on these areas, including regulations in the Rural Conservation (RC) and Western Rural Conservation (WRC) zoning district.

Specific policy statements of the Comprehensive Plan follow as noted:

- The County is committed to protecting these sensitive environmental areas and future development in the sensitive areas should be primarily characterized by open space, agriculture, forestry, and low-density single-family detached homes (Policy 2.27). New development is restricted in sensitive areas and the protection and enhancement of environmental resources should be ensured (Policy 6.27).
- Agriculture and forest cover should remain the dominant land uses (Policy 2.28).
- Development within the 100-year floodplain associated with the Critical Area is also limited to minimize disturbance and protect life and property (Policy 6.23).
- The County also recognizes the importance of stream corridors as water quality buffers and wildlife habitat and encourages their protection in an undisturbed state (Policy 6.24).
- A County objective is to coordinate with federal and state agencies to preserve existing wetlands where possible and goal of "no net loss" of wetlands (Policy 6.30).
- Maintaining natural topography, drainage ways and tree cover should be a priority when determining the location of roads, placement of structures and site improvements (Policy 6.34).
- Forests and vegetation should be preserved in stream corridors to preserve the integrity of associated waterways (Policy 6.29).
- The County directs intense growth and development away from threatened and endangered species habitat and maintain low density conservation zoning in areas where such habitats are identified (Policy 6.35).

In addition to the County Comprehensive Plan, the County's Green Infrastructure Plan identifies multiple focus areas throughout the County. The Green Infrastructure Plan is an inventory of land and water areas that correspond with conservation priorities based on defined attributes. Two areas in particular would be impacted by Option 8; the Claiborne/Eastern Bay Shores and Miles/Wye East River Peninsula focus areas. Through the Plan, the County has identified these focus areas to enable County leaders to make the most educated conservation and land use decisions and to protect the County's valuable ecological, agricultural and aquatic resources.

Greenway hubs are significant areas that provide for wildlife habitat and biodiversity. They also often have scenic qualities, emphasize cultural and historic resources and include places or trails with historic and cultural values providing educational, scenic, recreational or economic benefits to the community.

Corridor 8 would also impact four of the County's historic villages: Claiborne, Copperville, Tunis Mills and Unionville. These villages are notable among the County's residential areas; they are low density historic residential communities that are an important component of the County's rural character and recognized for their significant heritage and pattern of development. The County is committed to safeguarding these attributes and maintaining their sense of place.

It is for the above outlined reasons that the Talbot County Council is against having Corridor 8 selected as the "Preferred Corridor Alternative". The Council stands ready to discuss this matter with any party necessary to further the case against moving forward with Corridor 8.

Sincerely,

COUNTY COUNCIL OF TALBOT COUNTY

Corey W. Pack, President

CWP/jkm

Talbot County Department of Planning and Zoning
215 Bay Street, Suite 2
Easton, Maryland 21601

Phone: 410-770-8030
Email: mverdery@talbotcountymd.gov

FAX: 410-770-8043
TTY: 410-822-8735

August 12, 2020

Heather Lowe, Project Manager
Maryland Transportation Authority
Division of Planning and Program Development
Point Breeze 2310 Broening Highway
Baltimore, MD 21224

Re: Bay Crossing Section 106

Dear Ms. Lowe,

The National Historic Preservation Act mandates the Section 106 process to accommodate historic preservation concerns in consultation with agency officials and other parties with an interest in the effects of the undertaking on historic properties, commencing at the early stages of the project. It is our understanding that the Section 106 process is running parallel to the draft Environmental Impact Statement process. Talbot County and the Historic Preservation Commission appreciates the opportunity to provide comment on the Chesapeake Bay Crossing Study, Tier 1 NEPA (Study).

The Study considers three Corridor Alternatives Reviewed for Analysis (CARA), each two-miles in width and known as the Area of Potential Effects or APE, from an original 14 corridors. It is our understanding that each CARA is designed to connect existing major roadway infrastructure of four lanes or greater and specific roadway alignments for possible crossing locations identified in the Tier 1 Study. Identification of alternative alignments would occur in Tier 2, if Tier 1 concludes with the selection of a Preferred Corridor.

Talbot County's Corridor 8 begins in Annapolis, roughly follows MD 424 and MD 214, crossing the Bay near Mayo, and passing just south of the southern tip of Kent Island, then curves northeast. The corridor returns to land on the Eastern Shore near MD 33, west of St. Michaels. From there, Corridor 8 crosses the Miles River and does not follow the existing roadway network until it ties-in with MD 50 north of Easton.

As a Tier 1 NEPA study, the two-mile wide CARA encompass the area where potential effects from an undertaking may occur. The Area will be re-delineated, based on the location of the alignment alternatives (within the Tier 1 Preferred Corridor) as additional information becomes available about the potential effect on historic properties.

This memo concerns preliminary identification, within Talbot County, of the likely presence of architectural and archaeological (terrestrial and underwater) resources in the APE. The intent was to identify known historic properties and identify the potential for additional properties through recorded or unrecorded resources. In addition to structures, data was reviewed to identify potential underwater archaeological sites not yet recorded by MHT.

Corridor 8 contains the most archaeological resources of the three corridors, with the highest number of NRHP listed or eligible sites, the highest number of unevaluated sites and the highest number of recorded shipwrecks. In total, 17,580 acres may require additional terrestrial survey; the highest among the three corridors.

There are 14 recorded historic properties in Corridor 8 (Table 7-8). Of these, 11 are listed in the National Register of Historic Properties (NRHP) and three have been determined eligible for listing–two by preservation easement. Properties with Maryland Historical Trust (MHT) easements are considered by MHT to be eligible for the NRHP regardless of whether a formal Determination of Eligibility (DOE) has been prepared. In addition, there are 102 resources surveyed for the Maryland Inventory of Historic Properties (MIHP) but not evaluated for NRHP listing, seven roadways listed in the MIHP, and a significant amount (1,115) of unrecorded architectural resources pre-1980.

Buildings in this corridor are also older. Corridor 8 contains 11 18th century resources, the most of the three corridors. There are also 35 19th century resources. The other 96 percent (1,069) of resources are 20th century, only 54 percent (597) of which date to after 1950.

Of serious concern is the impact of Corridor 8, regardless of the final alignment, to the Town of St. Michaels (Town). In the late 1770s, developer James Braddock designed the original street plan of the Town with lots laid out around a central square. The Town is positioned on the Miles River and has a substantial and well-documented stock of historic structures, streetscape, sites and settings. Over 250 structures have been surveyed and documented, forming a largely intact historic district in which houses, churches and commercial structures from the late 19th century and earlier are well represented. The Town includes a protected locally-designated historic area and is a National Register District.

Preservation of these structures and streetscapes, and the Town's historical context not only enhance the historic character of the Town, but are also important to its tourism and marine-based economies. St. Michaels attracts visitors from all over the world, bringing much needed revenue that helps sustain the district. The Town, and Talbot County, are also included in the Stories of the Chesapeake Heritage Area and recognizes St. Michaels as offering a number of heritage resources of importance to the region.

It is of no question that any alignment of a bridge within Corridor 8 will significantly and detrimentally affect the Town's historic recognitions. The juxtaposition of the modern bridge crossing with the Town's view shed from the Miles River and historic harbor will erase the historic context of the Town; the very draw that brings visitors, businesses and cultural attractions to St. Michaels.

Talbot County remains opposed to the Corridor 8 proposal moving into the Tier 2 study. In addition to the effects on cultural, architectural and archeological resources noted in the Tier 1

study; undesirable impacts upon environmental, conservation and infrastructure would result in contrast with the goals and objectives of our Comprehensive Plan. This opposition is outlined in greater detail in the attached December 18, 2019 letter from Talbot County Council President, Corey W. Pack.

Thank you for the opportunity to review and comment. Please contact our department should you require additional information or assistance.

Sincerely,

[redacted]

Planning Officer

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COREY W. PACK, President
CHUCK F. CALLAHAN, Vice President

FRANK DIVILIO
PETE LESHER
LAURA E. PRICE

May 8, 2020

Heather Murphy, Director
Office of Planning and Capital Programming
Maryland Department of Transportation
P.O. Box 548
Hanover, MD 21076

RE: Talbot County – 2020 Priority Listing

Dear Ms. Murphy:

The Talbot County Council endorsed the attached list of priority projects for Talbot County at our meeting on April 28, 2020. Please note that this year's listing includes information not only on roads infrastructure, but Easton Airport safety improvements as well.

The Council looks forward to meeting with you and representatives from the Maryland Department of Transportation this fall for the annual Consolidated Transportation Plan meeting. In the meantime, should you have any questions, please contact Ray Clarke, County Engineer, at (410) 770-8170 or Micah Risher, Airport Manager, at (410) 770-8055.

Sincerely,
COUNTY COUNCIL OF TALBOT COUNTY

Corey W. Pack
President

CWP/jkm
Attachment

Cc: Ian Beam – Rural Area Regional Planner, MDOT
The Honorable Adelaide Eckardt
The Honorable Christopher Adams
The Honorable John Mautz
Ray Clarke, County Engineer
Micah Risher, Easton Airport Manager

TALBOT COUNTY PROJECT PRIORITY LISTING
FOR THE CONSOLIDATED TRANSPORTATION PROGRAM
2020

PRIORITY RANKING	PROJECT DESCRIPTION
1	**MD Route 33 Capacity and Evacuation Improvements** During weather-related emergencies such as Tropical Storm Isabel and Hurricane Irene, this corridor experienced areas of significant flooding, limiting ingress and egress from this portion of the county. *The MD Route 33 corridor is the sole evacuation route for this populated neck or peninsula.* Accordingly, elevation modification to eliminate or minimize storm surge road flooding, as well as capacity improvements, should be pursued to protect the lives and safety of citizens in this area. Also, portions of this corridor between the Town of St. Michaels and the Town of Easton experience some weekday capacity issues which are anticipated to increase in the future. Traffic counts show that portions of MD Route 33 have heavy traffic volume, particularly near its intersection with MD Route 322. As an interim measure, the MD Route 33 corridor should be evaluated for any issues or problems that would need to be resolved in future improvements.
2-A*	**US Route 50/MD Route 328 – Goldsborough Street Intersection Improvements** This intersection currently experiences significant traffic volumes for all approaches. The geometric configuration of this intersection possesses many shortcomings on Goldsborough Street, west of US Route 50. The State should work with the Town of Easton to improve the geometric configuration of this intersection approach and/or provide technical assistance to the Town for diversion of east – west traffic from this intersection.
2-B*	**MD Route 50/MD Route 331 – Dover Street Intersection Improvements** This intersection currently experiences significant traffic volumes for all approaches. The geometric configuration of this intersection possesses many shortcomings on Dover Street, west of US Route 50. The State should work with the Town of Easton to improve the geometric configuration of this intersection approach and/or provide technical assistance to the Town for diversion of east – west traffic from this intersection.
2-C*	**US Route 50/Chapel Road - Intersection Improvements** This intersection currently experiences significant traffic volumes for all approaches. The geometric configuration of this intersection possesses many shortcomings on Chapel Road, west of US Route 50. The State should work with the Town of Easton to improve the geometric configuration of this intersection approach and/or provide technical assistance to the Town for diversion of east – west traffic from this intersection.
3	**US Route 50/MD Route 309/MD Route 662 Intersection Capacity Improvements** As a result of increasing traffic for the growing Easton Airport, Talbot County Community Center and the likely relocation of the Easton Memorial Hospital to Longwoods Road (MD Route 662), one of our top priorities would be the construction of an overpass that meets FAA requirements and serves these facilities. Moreover, MD Route 309 (Cordova Road) is a significant corridor for vehicular traffic from northern Caroline County (Denton, Ridgely, Greensboro, etc.) to Easton and points south along US Route 50. Left turns between MD Route 309 and US Route 50 commonly back up beyond the turn lanes provided. This turn lane shortcoming should be rectified as appropriate. West of this intersection, extending through the adjacent MD 662 intersection, has poor geometry/intersection spacing. For these reasons, capacity and safety improvements in this area would be beneficial.
4	**MD Route 329 (Royal Oak Road) Safety Improvements** This roadway serves as the primary means of ingress and egress for the communities in and around the villages of Royal Oak and Bellevue, in addition to a significant tourism corridor for these communities and beyond. Paralleling MD Route 33, this roadway provides an alternative route for MD Route 33 (see priority number 1 above, evacuation corridor). The importance of this alternative route is compounded considering the aging status of the bridge carrying MD Route 33 over Oak Creek. *An overpass should be planned as a long term solution for Priority Rankings 2-A through 2-C.*

Easton Airport
MDOT Funding Priority
April 21, 2020

Easton Airport - Runway Safety Improvements

Easton Airport has completed an environmental assessment to improve the Runway Safety Area (RSA) of the primary Runway 4/22 and shift the runway 1,900 ft. southwest of the current location. This safety improvement will bring the runway into full compliance with FAA design standards. This is critical for the long term financial sustainability of the airport and economic benefits derived by the County. The airport is now moving into implementing the construction solution and will seek to complete phase 1 of 3 of the Obstruction Removal Program in FY2021.

Classified as a "National" general aviation airport by the FAA, Easton Airport supports the national and state system by providing communities with access to national and international markets in multiple states and throughout the country.

Talbot County is requesting MDOT - Maryland Aviation Administration maximize grant funding for Phase 1 Construction of Easton Airport's Obstruction Removal Program, with an estimated project total cost of $550,000 in FY2021.

EASTON AIRPORT
AVIATION GATEWAY TO THE EASTERN SHORE

1April, 2021

Heather Lowe
Maryland Transportation Authority
2310 Broening Highway
Baltimore, MD 21224

Hello,

Thank you for the opportunity to review the Bay Crossing Study Tier 1 Draft Environmental Impact Statement. I want to congratulate you on your efforts over the past several years and the degree to which you have made it available to the public.

I was somewhat disappointed but not really surprised by your report. A robust connection between the Eastern shore and the rest of Maryland is very important for the future of the state. If it is not successful, the Eastern shore would be better off as part of Delaware. This study should define the best way to accomplish that connection. Therefore I propose that you consider a more-southern corridor. I give more details later in this letter.

I have sent you several long letters during the past reviews of your proposal so I will not repeat those points here. In any event several of my suggestions have already begun to appear: electric cars, self-driving cars, climate change and water level rise.

The evolution to rented car services such as "uber" has been blocked by the Corona virus epidemic. It should restart as the virus epidemic ends. It would cause a decrease in owned automobiles and thus a change in traffic.

I realize that a major concern is the ability to maintain and upgrade the present two bridges, although you hardly mention it. Although this study is about improvement, it also must prevent the present situation from getting worse. But you just need to do it, not use it as a reason to pick a bridge location.

My first concern, which I realize you cannot avoid, is the fact that the future needs have been over-influenced by present bridge users and under-influenced by future bridge users, who may not realize today that they will be needing access by some bridge in the future.

The emphasis on present users will not generate much new traffic. The people who use the present bridges will be happy because their traffic backups will be smaller but they will still only pay one toll per trip. There has to be more emphasis on opening the Eastern shore to new travelers. Their tolls will pay for the new bridge.

Therefore I propose that you consider another option. Following the format of your table 3–1, I would suggest a Corridor 10.5. The major advantage would be that it provide a connection across Chesapeake Bay, midway between the existing bridges and the south end of the bay. At the west end It would connect to the Washington DC beltway and the adjacent Maryland and Virginia communities via Maryland Routes 4 and 260 and also MD 231 and MD 263 from the south. On the Eastern shore it would connect to a short section of Route 343 and thus to US 50 east. to Cambridge, Salisbury and the Eastern shore recreation areas. It should provide access to, not interference with, the Harriet Tubman National Historical Park.

The proposal should be combined with a relocation of US 50. Today that road goes northeast in order to go southeast. It should be relocated to Corridor 10.5 and thus provide a new straightened and shortened major highway East and West. It would take traffic off of the existing bridges in order to make future maintenance of those bridges easier.

My second concern is your method to predict future needs, extrapolation. The major driver of this whole project is the future prediction of automobile traffic across Chesapeake Bay. You are proposing that a new bridge exist in 2040 but almost certainly it would not happen until 2050.

All predictions of the future are wrong because it is impossible to know future events. Nevertheless some prediction must be made. You extrapolate from bridge usage which completely ignores such possible future changes as decreased gasoline use, more public transit, more work at home, etc.

My father was born in 1901. A prediction then of his future life would not have mentioned huge transportation, communications or medical advances. It would not mention World War I (called "the war to end all wars") and the worse World War II, and the Atomic Bomb that did end the era of big wars, and began the continuous brushfire wars that followed, and the evolution of the United States as a major world power. Near the end of his life, he sat in my

living room and witnessed the first murder displayed live on TV (the killing of the assassin of Robert Kennedy).

Changes like this will continue and, although they cannot be predicted exactly, they cannot be ignored. I have attached a fifty year old reference that describes different ways to predict the future and lists their advantages and disadvantages.

One other way to predict the future would be to predict what the situation would be if Chesapeake Bay did not exist. Kent County would be a suburb of Baltimore, Queen Anne's County would be a suburb of Annapolis. In fact that has already started. Talbot County would be a suburb of Washington DC. So there would be three major traffic routes: from Baltimore, Annapolis, and Washington. There would be a new interstate highway running from southwest to northeast possibly called Interstate 99 and incorporating Route 301. There would be a high speed transit system in parallel with it, a bullet train or a mag-lev or suspended from overhead rails. If that is a desirable future, then which bridge location best supports it?

My third comment refers to the decision you made to convert specific bridge landing locations to the second-tier. Although this is natural, some problems with access to the new bridge could affect the choice of the best route and so should be considered now. For example the Annapolis approach is now saturated. There cannot be another bridge there. So what should be done?

I think it is very likely that there will be more rail mass transit in the United States by 2050 and in particular I believe there will be rail access to the Eastern shore. Rail mass transit is very different than bus mass transit. Everyone understands that a bus line Route could be changed at any time. Therefore it has only a small effect on growth patterns. But a rail line is more permanent and will cause new urban development on the Eastern shore.

Because I started out on this project as a citizen representative from Kent County I should make some comments about Kent County. But Kent County hardly appears in the Tier 1 report. There is no effect on Kent County national parks, historic sites, or natural resources because they don't really exist. Instead Kent County should be recognized as a blank empty slate for future use.

During the development of New York City, the decision was made to create Central Park. There was no economic reason to do this. In fact it prevented considerable economic development. Nevertheless it was a brilliant idea and is the essence of Manhattan today. You could consider the empty space of Kent County as the only place where such plans could be held for the future. Surely someone must think about this

Finally there is the consideration of sea level rise and the equivalent rise in the level of Chesapeake Bay. I believe your estimate of 1/8 inch per year will be too low in the future. I think fresh water will become scarcer in the future and so plans for Chesapeake Bay need to consider that. I believe that the idea to change Chesapeake Bay into a lake in order to keep out salt water from the ocean, save freshwater farming and preserve shore lines should be a factor in your plans.

I have tried to be factual and logical in my comments. Before I close I would like to make one emotional comment. When a new bridge opens in 2040 or 2050, the fact that a third bridge was built at the location of the two existing bridges, while ignoring the entire remainder of the bay, will make MTA the laughing stock of Transit Authorities across the nation. Fortunately you and I will be gone then and not have to face this derision.

Thank you for accepting comments from the public and good luck with your future design and development.

The whys behind the hows

Effective application of the many forecasting methods requires a grasp of their underlying philosophies

Ian I. Mitroff University of Pittsburgh
Murray Turoff Office of Emergency Preparedness

Although the engineer does not have to understand Philosophy to do engineering, if he wishes to engage in the technological forecasting and assessment process he must be able to relate what he does to the rest of society—in this case to grasp the underlying philosophy. The principles and methodology cannot be divorced from the plans, policies, and decisions of others. The engineer must be able to communicate his principles and methods—to economists, to sociologists, to planners, and so on.

It is in precisely this area that engineers are having trouble, for such understanding and communication require comprehension of the philosophies that underlie the different specialties and disciplines. If an engineer is to communicate successfully with, say, an economist, he must understand what it means that the economist will tend to use Lockean methods in forecasting whereas the engineer has been trained (primarily) as a Liebnizian.

Moreover, the effective application of the various methodologies of technological forecasting and assessment requires understanding the philosophical underpinnings of these methodologies. It is because such understanding is so widely lacking that trend analysis, Delphi techniques, and the other forecasting methods to be discussed are often misapplied.

No matter how well established the field of technological forecasting becomes, it can never be a purely technical or scientific concern. It will always retain a basic philosophical element expressed by any one of the following questions: What *permits* us to extrapolate from the past or present to the future? What *guarantees* are there that the future will behave like the present or past? What *firm assurance* do we have that the future will behave as our projections (i.e., our models) of it forecast (i.e., predict)?

Whatever approach we take toward answering these questions, our answers will be indicative of a basic philosophical stance, indeed, of a basic image of reality. Yet not only are we generally unaware of the different philosophical images that underlie our various technical models, but each of us has a fundamental image of reality that runs so deep that often we are the last to know that we hold it. As a result, we disagree with our fellows and we experience inner conflicts without really knowing why. What's worse—we ensure this ignorance by hiding behind catchwords and fancy names for techniques. The field of technological forecasting and assessment is no less remiss than many other disciplines in this respect.

One of the basic purposes of this article is to underscore these fundamental differences and conflicts of methodology so that hopefully one can be in a better position to choose explicitly a desired approach.

To accomplish this objective we shall consider some of the more significant philosophical stances taken toward the problem of predicting the future, or, more precisely, toward defining the criteria that would "guarantee" our extrapolation from the present to the future. Also, we shall show that each of these stances differs sharply from the others and that each has its strengths as well as its weaknesses. This awareness constitutes a strength. To show that there is no one mode of extrapolation that can satisfy our every requirement—that there is no one mode that is *best* in all senses and for all circumstances—is not to say that each of these modes is not uniquely or *better* suited for some special set of circumstances.

Bear in mind as we proceed that the question of concern is not how we can know the future with perfect certainty; here the answer clearly is that we can't. However, neither can we know all there is to know about the present with perfect certainty. The real question is what we *can* know of the future, and, even more to the point, how we can prove it. It is on this very issue that the difference between these philosophies, or systems of inquiry, arises.

Leibnizian inquiry systems

The first philosophy to be discussed is that which underlies the major part of theoretical science—the philosophy of Leibniz. The sense of Leibnizian inquiry can be captured rather quickly and generally in

The views expressed in this paper are those of the authors and do not necessarily reflect official policy of the institutions with which they are affiliated.

terms of the following characteristics: Truth is *analytic*; i.e., the truth content of a system is associated *entirely* with its formal content. A model of a system is a *formal model* and the truth of the model is measured in terms of *its* ability to offer a theoretical explanation of a wide range of general phenomena and in *our* ability as model-builders to state clearly the formal conditions under which the model holds. A corollary to this is that the truth of the model does not rest upon *any* external considerations; in other words, the model is independent of the raw data of the external world.

In short, Leibnizian inquiry systems are the epitome of formal, symbolic systems. They will characteristically strive to reduce any problem to a formal mathematical or symbolic representation. The guarantor of such systems traditionally has been the precise specification of what shall count as a proof for a derived theorem or proposition; other guarantor notions include those of internal consistency, completeness, and comprehensiveness.

The laws of physics are examples of Leibnizian truths. Also, computer simulation models of industrial processes are typical of the types of Leibnizian approaches that have been comparatively successful as forecasting tools in industry. One can often model a proposed plant to a sufficient degree to examine alternative configurations before investments are made.

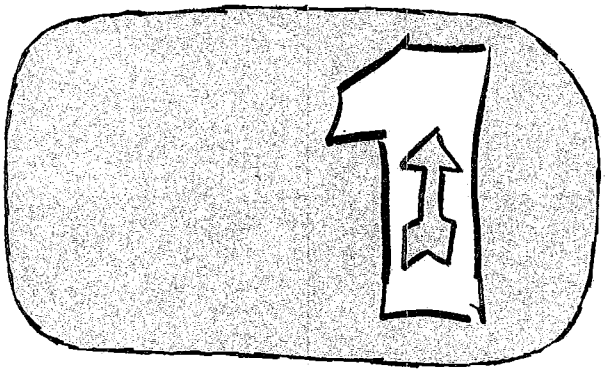
A prime example of Leibnizian inquiry is the field of operations research (OR), in the sense that the major energies of the profession have been almost exclusively directed toward constructing and exploring highly sophisticated formal models. OR is the prime example of Leibnizian inquiry not because there is no utilization of external data whatsoever in OR models, but because much more attention is paid to teaching students of OR how to build sophisticated models than in teaching them equally sophisticated methods of data collection and analysis.

Two specific Leibnizian approaches to technological forecasting are correlation analysis and substitution analysis. Both result from an analogy with classical growth models governing such biological phenomena as the growth of cells and the growth of species. The analogy assumes that, like biological phenomena, technological development passes through some fundamental, characteristic phases, such as birth, growth, and death. For example, the process that governs the rate of transfer of technology can be represented as a diffusion-of-information process that is very close to the kind of diffusion a biological organism goes through in searching for food. As a result of this kind of model, one may infer that certain curves related to the growth of technology are correlated. A common example is the use of the performance of military aircraft at some point in time to infer the performance of civilian aircraft at some later time. The model is predicting the time it will take military technology to diffuse into the civilian market.

The substitution curve analysis also employs the growth analogy, but in quite a different way. The same kind of curve that is characteristically used to describe the growth of a biological population in a space of finite resources is also used to describe the percentage of the market that a new technology has and will assume. Substitution analyses are characteristically given in the form of curves or tables indicating the percentage of substitution that has taken place by a new technology in a certain market in various fixed time periods. The rule of thumb on the part of those who utilize the technique for planning is that by the time the process has reached a substitution level of 15 percent, it is usually irreversible and the resulting forecasting curve is a useful projector of things to come.

Typical substitution curves have been exhibited for such transfers as man-made fibers to natural fibers; water-based paints to oil paints; man-made flooring to all flooring; synthetic rubber to natural rubber; margarine to butter; and vacuum tubes to transistors or transistors to integrated circuits.

The Leibnizian character of these models can be illustrated rather easily by spelling out a number of assumptions that underlie their applicability. These assumptions are usually implicit. For one, it seems to be an implicit assumption that such forecasts can be relied on to predict the future because the models reveal or embody a fundamental, enduring, structural feature of reality; e.g., the supposed basic features that govern the growth of biological phenomena. A second assumption is that the models can be widely applied, again because they supposedly embody a characteristic process that underlies a wide range of technical and social processes. In other words, the assumption is not only that a wide range of processes *can be described* in terms of these models but that the models actually *underlie* the behavior of a large number of processes; i.e., that in some sense the models are *real*. In this sense, the most fundamental unspoken assumption is that as characteristic features of reality the models make possible the data



that are fitted to them; the data do *not* make possible the models. Indeed, the models implicitly assume that for a wide range of phenomena, there can be found the "right kind of data" that will fit the models; hence, their universal applicability is perpetually assured. In this sense, the models take on the tenor of self-fulfilling prophecies.

For which problem situations are Leibnizian analyses most appropriate? First, the situations must be so simple and well understood that they can be modeled. Thus Leibnizian inquiry is best suited to definable, well-structured problems for which there exist an analytic formulation and solution. Second, the modeler must have strong reasons for believing in the assumptions that underlie Leibnizian inquiry. In a

basic sense, the fundamental guarantor of Leibnizian inquiry is the understanding of the model-builder; he must understand the situation completely to believe he has represented it "accurately" and "faithfully."

The abuse of the technique usually occurs when there is not a good understanding (or no attempt to arrive at such) of the particular causal model underlying a particular correlation or substitution result. Without comprehending the relationships in the model that produce the predicted effect, there is always the danger that a sudden change in the nature of the model will invalidate the ability to utilize the projections. For example, the beginning substitution of plastics for metals in cars, as estimated by some forecasters, may be affected strongly, or even reversed in direction, by the recent shift in emphasis on safety.

There is no way in the correlation or substitution analyses to predict specific technological breakthroughs. Therefore, all predictions hold only until a new technology or new synthesis of technology appears on the scene to begin a new set of curves. For example, predictions based upon core memory technology for computers will not necessarily predict the effect of introducing bubble memory technology. (However, once bubble memories are on the market a substitution process may become observable.)

Lockean inquiry systems

Lockean philosophy underlies the major part of empirical science, and its sense can be rather quickly and generally grasped in terms of the following characteristics: Truth is *experiential*; the truth content of a system is associated *entirely* with its empirical content. A model of a system is an *empirical model* and its truth is measured in terms of *our* ability (1) to reduce every complex proposition to its simple empirical referents (simple observations) and (2) to ensure the validity of each of the simple referents by means of the widespread, freely obtained agreement between different human observers.

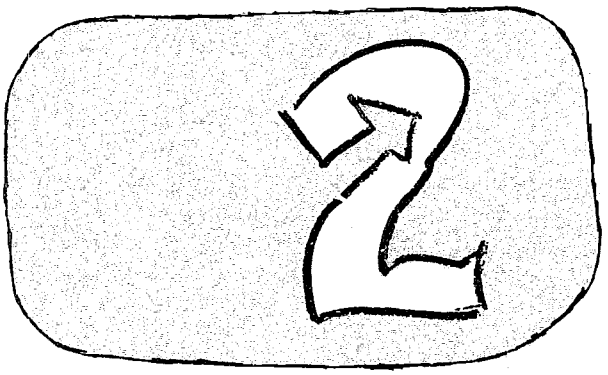
A corollary is that the truth of the model does not rest upon the prior assumption of any theory. The only general propositions that are accepted are those justified through direct observation.

Lockean inquiry systems are the epitome of experimental, *consensual* systems. They start from a set of elementary empirical judgments ("raw data," observations, sensations) and build up a network of ever-expanding, increasingly more general factual propositions. Whereas in Leibnizian inquiry the networks are theoretically, deductively derived, in a Lockean system they are empirically, inductively derived. The guarantor of such systems has traditionally been the function of human agreement—an empirical generalization is judged "objective," "true," or "factual" if there is sufficient widespread agreement on it by a group of "experts." The final information content of a Lockean system is identified almost exclusively with its empirical content.

Statistics provide a good example of Lockean methodology. In statistics the data vote, in a sense, on their own degree of validity in terms of probabilities, correlation coefficients, confidence limits, variances, etc. A human may then judge if the degree of validity is sufficient to infer a prediction. Pure experimentation, in the sense of measuring phenomena, is a typical Lockean endeavor. Many of the current generation of predictive economic models are basically Lockean in nature, since they rest largely on regression analyses of historical data.

In technological forecasting, trend extrapolation and regression analysis are simple and common examples of Lockean inquiry. In the typical application of trend extrapolation, the performance over time of various technological indicators (e.g., computer speed, aircraft carrying capacity, material strength, energy production) is plotted and then the curves are extrapolated to give future trends.

Even where the curve extrapolation procedure is governed by complex mathematical considerations, the process is still essentially Lockean. The reason is



that except for the possibility of statistical considerations, no theoretical model of the underlying phenomenon is used to guide the collection of the initial data or subsequent analysis, and, in this case, the extrapolation procedure. In other words, the activities of theoretical explanation or justification, raw data collection, and curve extrapolation are assumed to be separable or independent of one another. However, in a fundamental sense this is not, and never can be, the case. They may not be related by an explicit well-developed formal theory, but they are related nonetheless. One cannot consistently maintain that one can know *very little* of what the future will be like, and then argue that one knows with confidence that such and such a data set is a "relevant" and "reasonable" data base upon which to base a projection of what the future will be like. The point is that to make the judgment that a particular data set is *relevant* to a projection of the future is to articulate a theory—at the very least, a point of view—with respect to what the future will be like.

A more recent and far more interesting example of Lockean inquiry is the Delphi technique, first pioneered by Dalkey, Helmer, and Rescher at RAND. In very simple terms, Delphi is a procedure for fostering a communication process among a large group of individuals. In assessing the potential development of a technical area, a large group (typically in the tens or hundreds) is asked to "vote" on when they think certain events will occur. A major premise underlying the approach is the assumption that a large number of expert judgments is required to treat any issue adequately. (A face-to-face exchange among the group members would be inefficient or impossible because of the cost and time in bringing them together.)

The Delphi procedure is about as pure and perfect a Lockean procedure as one could hope to find. For one, the "raw data inputs" are the opinions or judgments of the experts. For another, *the validity of the resulting judgment of the entire group is typically measured in terms of the explicit degree of consensus among the experts.* The feature that serves to distinguish the Delphi from an ordinary polling procedure is the feedback of the information gathered from the group and the opportunity of the individuals to modify or refine their judgments based upon their reaction to the collective views of the group. Secondary characteristics are various degrees of anonymity enjoyed by the individual, and collective responses that avoid undesirable psychological effects with respect to the individual participant.

The strength of Lockean inquiry lies in its ability to sweep in rich sources of experimental data. Indeed, the sources are so rich that they literally overwhelm the current analytical capabilities of most Leibnizian systems. The weaknesses are those that beset all empirical systems. Although experience is undoubtedly rich, it can also be extremely fallible and misleading. The judgments that typically survive a Delphi procedure may not be the best judgments but represent, rather, the position of minimum compromise. As a result, the surviving judgments may lack the significance that extreme or conflicting positions may possess. Further, the "raw data," "facts," or "simple observables" of the empiricist on deeper analysis have *always* proved to be exceedingly complex and hence further divisible into other entities thought to be indivisible or simple, ad infinitum.

More troublesome still is the almost extreme and unreflective reliance on agreement as the sole or major principle for producing information, and even truth, out of raw data. Agreement may stifle conflict and debate when they are needed most, and its cost can be prohibitive. As a result, Lockean systems are best suited for working on well-structured problem situations for which there exists a *strong consensual* position on the nature of the problem situation. If these conditions or assumptions cannot be met or justified by the decision-maker—for example, if it seems too risky to base projections of what the future will be like on the judgments of experts, no matter how strong the agreement beween them—then some alternate system or inquiry may be called for, as in the previous case of the Leibnizian inquirer.

Kantian inquiry

The last two sections have illustrated the difficulties that arise from emphasizing one of the components of a tightly coupled system of inquiry to the detriment of the other components. Leibnizian inquiry emphasizes theory to the detriment of data and Lockean inquiry emphasizes data to the detriment of theory. When translated into practice, what often results is highly sophisticated models with little or no concern for the difficult problems associated with the collection of data or the seemingly endless proliferation of data with little regard for the dictates of currently existing models.

The recent controversy surrounding the attempts of Jay Forrester and Dennis Meadows, at M.I.T., to build a "world model" is a good illustration of the strong differences between these two points of view. The work of Forrester and Meadows represents an almost pure Leibnizian approach to the modeling of large complicated systems. Their model is, in effect,

I. Five philosophical approaches underlying technological forecasting

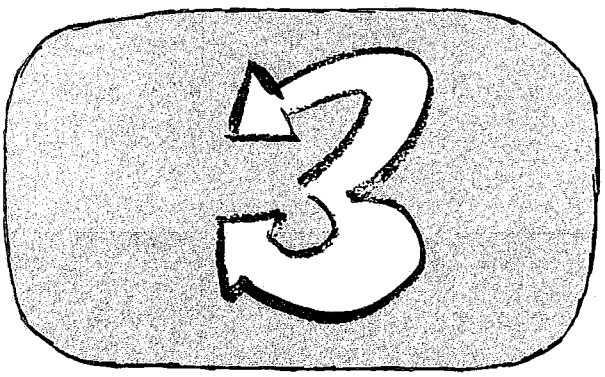
Inquirer Approach	Characteristics of Problem for Which Approach Is Suited	Forecasting Techniques	Examples
Leibniz	Well-defined Analytical	Simulation, modeling Correlation analyses Substitution analyses	Simulation of an electronic system, transportation system, factory, etc.
Locke	Well-defined Experimental	Regression analyses Consensus Delphis Trend extrapolation	Forecasting of specific technical developments—i.e., a low-cost home computer terminal
Kant	Definable Defined objective Mixed analytical and experimental	Normative forecasting Gaming Cost-benefit analyses Scenarios Morphological analyses	Defining and evaluating the alternatives to meet a given objective
Hegel	Ill-defined Opposing objectives Intuitive or synthetic reasoning required	Policy Delphis and structured discussion systems	Developing an alternative decision out of conflicting ones
Singer	Ill-defined Unclear objective Multidisciplinary aspects Reflective reasoning required	NONE	Finding the forecasting methodology that applies to a particular problem

data independent. One can criticize the model on pure Leibnizian grounds, e.g., whether the internal theory and structure of the model are sound with respect to current economic and social theory, and some of the critics have chosen to do this. However, it would seem that more often than not the critics have chosen to offer a Lockean critique, i.e., that some other way, say, using accurate statistical data, is a better way to build a sound forecast model of the world. Although this is a legitimate method of criticism, to a large extent it only further exacerbates the differences between the two approaches. Hence it misses the real point, which is not whether the Forrester–Meadows approach *is* the correct Leibnizian approach, or whether there is *a* correct Lockean approach, but rather whether *any* Leibnizian or Lockean approach acting independently of the other could ever possibly be "correct."

Forrester and Meadows seek to validate their approach through the robustness and richness of their *model,* and their Lockean critics attempt to establish the validity of their approach through the priority and "regularity" of the statistical *data* to which they appeal. If the debate proves anything, it raises the serious question as to whether an advanced society can continue to rely on purely Leibnizian or Lockean efforts for its planning. To really evaluate the relative merits of separate Leibnizian or Lockean inquirers, it is necessary to go to a philosophy that incorporates both, such as the Kantian inquirer.

The sense of Kantian inquiry can be rather quickly grasped from the general characteristic that truth is *synthetic*; i.e., the truth content of a system is not located in either its theoretical or its empirical components, but in *both.*

A corollary is that neither the data input nor the theory has priority. Theories or general propositions are built up from data, and in this sense theories are dependent on data, but data cannot be collected without the prior assumption of some theory of data



collection (a theory of "how to make observations," "what to observe," etc.), and in this sense data depend on theories. *Theory and data are inseparable.*

An important feature of Kantian inquiry is that for any problem, one must build *at least two* alternate representations or models. The hope is that out of these alternate representations, or fact nets, of a decision-maker's or client's problem, there will be one that is "best" for representing the problem. The defect of Leibnizian and Lockean inquiry is that they give only one view of the problem. Kantian inquiry attempts to give *many* explicit views. The guarantor of such systems is the degree of fit or match between the underlying theory (theoretical predictions) and the data collected under the presumption of that theory.

Kantian inquiry places such heavy emphasis on alternate models because, in dealing with problems such as the nature of the future, the real problem is how to get as many perspectives as possible on the nature of the subject problem. Problems like the future cannot be formulated and solved via a single well-structured approach. In dealing with the future, we are not dealing with the concrete realities of human existence, but, if only in part, with hopes, dreams, plans, and aspirations. Since different men rarely share the same aspirations, it seems that the best way to "analyze" aspirations is to compare as many of them as we can. If the future is 99 percent aspiration or plan, it would seem that the best approach is *to draw forth explicitly as many different aspirations or plans for the future as possible.* In short, we want to examine as many different *alternate* futures as we can.

In the field of technological forecasting, normative forecasting, planning programming budgeting systems (PPBS), and cost-effectiveness or cost-benefit analysis are all examples of Kantian inquiry, although at such a low level as to be almost more Leibnizian than Kantian in nature. The Kantian element these approaches share is the fact that they are all concerned with *alternate paths* or *methods* of getting from a present state to a future state characterized by certain objectives, needs, or goals (or vice versa). When these various planning vehicles have failed, it has often been a problem of unclear or fuzzy objectives or poor compatibility among data, models, and objectives. Furthermore, the systems are usually applied with a questionable and implicit Leibnizian assumption that all benefit or effectiveness measures can be expressed in dollars.

In recent years, there have been a number of Delphi studies that more actively take on the characteristics of Kantian inquiry. These differ fundamentally from the original Delphis, which were strongly Lockean in orientation. The initial Delphis were characterized by a strong emphasis on the use of consensus by a group of "experts" as *the* means to converge on a *single* model or position on some issue. In contrast, the explicit purpose of a Kantian Delphi is to elicit alternatives on which to base a comprehensive overview of the issue. In terms of communication processes, although a "consensus" or Lockean Delphi is better suited to setting up a communication structure among an already informed group that possesses the same general core of knowledge, a Kantian or "contributory" Delphi attempts to design a structure that allows many "informed" individuals in different disciplines or specialties to contribute information or judgments to a problem area that is much broader in scope than the knowledge that any one of the individuals possesses.

This type of Delphi has been applied to conceptualizing such problems as: (1) defining a structural model for material flows in the steel industry; (2) examining the present and the potential role of the

Recommended Reading

The references listed below are intended to provide the reader with general reviews, further background, and some specific examples of topics covered in the article. On the subject of inquiry systems the best place to seek further explanation would be:

Churchman, C. W., *The Design of Inquiring Systems.* New York: Basic Books, 1971.

Those interested in attempts to construct formal mathematical representations of inquiry systems are directed to the following three articles:

Mitroff, I. I., "A communication model of dialectical inquiring systems—A strategy for strategic planning," *Management Sci.*, vol. 17, no. 10, pp. B-634-B-648, June 1971.

Mitroff, I. I., and Betz, F., "Dialectical decision theory: A meta-theory of decision making, " *Management Sci.*, to be published.

Mitroff, I. I., "Epistemology as a basis for building a generalized model of general policy-sciences models, " *Management Sci.* (special issue on "The Philosophy of Science of Management Science"), to be published.

The first book to organize into one source many of the fundamentals of technological forecasting and to attempt to provide a conceptual framework was

Jantsch, E., *Technological Forecasting In Perspective.* Organization for Economic Co-operation and Development (OECD), 1967.

Some more recent books are:

Ayres, R. U., *Technological Forecasting and Long-Range Planning.* New York: McGraw-Hill, 1969.

Cetron, M., and Ralph, C., *Industrial Applications of Technological Forecasting, Its Utilization in R & D Management.* New York: Wiley-Interscience, 1971.

Martino, J., *Technological Forecasting for Decision-making.* New York: American Elsevier, 1972.

A short review of the Delphi method may be found in

Turoff, M., "Delphi and its potential impact on information systems, "*Proc. Fall Joint Computer Conference,* vol. 39, AFIPS Press (American Federation of Information Processing), 1971.

A comprehensive guide to the Delphi technique will be found in

Linstone, H., and Turoff, M., The Delphi Method and Its Application. New York: American Elsevier, Fall 1973.

The *Journal of Technological Forecasting and Social Change* (American Elsevier Publishing Co.) is one of the best sources for articles of a specific nature on methodology. Examples pertaining to techniques mentioned in this article include:

Roberts, E. B., "Exploratory and normative technological forecasting: A critical appraisal," vol. 1, no. 2, Fall 1969.

Martino, J., "Correlation of technological trends," vol. 1, no. 4, Spring 1970.

Turoff, M., "The design of a policy Delphi," vol. 2, no. 2, 1970.

Martino, J., "Examples of technological trend forecasting for research and development planning," vol. 2, no. 3/4, 1970.

Fisher, J. C., and Pry, R. H., "A simple substitution model of technological change," vol. 3, no. 1, 1971.

Turoff, M., "An alternative approach to cross impact analysis," vol. 3, no. 2, 1972.

The Futures Journal of Forecasting and Planning (IPC Science and Technology Press Ltd., U.K.) is a good source for papers on the results from technology forecasting and assessment studies.

The magazine of the World Future Society (Washington, D.C.) provides a source of general review articles for the intelligent layman; e.g., the December 1971 issue (vol. 5, no. 6) was devoted to technology assessment.

Listed below are several other items related to the topics covered and which the authors recommend as reading material. Those by Mishan and Schultz are rather down-to-earth discussions in the general areas of planning, assessment, and technology, and should effectively illustrate some of the differing philosophies and views possible on these subjects.

Ackoff, R. L., "Towards a system of systems concepts," *Management Sci.*, vol. 17, no. 11, pp. 661–671, July 1971.

Churchman, C. W., Ackoff, R. L., and Arnoff, E. L., *Introduction to Operations Research.* New York: Wiley, 1957.

De Jouvenel, B., *The Art of Conjecture.* New York: Basic Books, 1967.

Helmer, O., "On the epistemology of the inexact sciences, "*Management Sci.*, vol. 6, 1959.

Mason, R. O., "A dialectical approach to strategic planning, "*Management Sci.*, vol. 15, no. 8, pp. B-403–B-414, Apr. 1969.

Mishan, E. J., *Technology and Growth.* New York: Praeger, 1969.

Schultz, C. L., *The Politics and Economics of Public Spending.* Washington, D.C.: Brookings, 1964.

mentally retarded in society; (3) forecasting the future characteristics of recreation and leisure; and (4) examining the past history of the internal combustion engine for a clue to significant events possibly affecting its future. Although all of these Delphis had specific forecasting objectives, the problems are so broad that the objectives could not be achieved if the parties to the Delphi were from the same specialized interest group. (For example, educators, psychiatrists, parents, and teachers all have different and valid perspectives to contribute to the definition of the "problem" of the mentally retarded.) Thus, the goal, at least in the initial stages, is not to reach consensus on a single definition but rather to elicit many diverse points of view and potential aspects of the problem. In essence, the objective is to establish how to fit the pieces of a jigsaw together, and even to determine if it is one or many puzzles.

Kantian inquiry is best suited to problems that are inherently ill-structured; i.e., the kinds of problems that are inherently difficult to formulate in pure Leibnizian or Lockean terms because their nature does not admit of a clear consensus or a simple analytic attack. On the other hand, the Kantian inquiry is not applicable to the kinds of problems that admit of a single clear formulation because here the proliferation of alternate models may be too costly or time consuming. Kantian inquiry may also overwhelm those who are used to "the single best model" approach to any problem. Of course, this in itself is not necessarily bad if it helps to teach those who hold this belief that there are some kinds of problems for

which there is no one best approach. Social problems inherently seem to be of this kind and thus to call for a Kantian approach. The concept of "technology assessment" as a vehicle for determining the relationships between technology and social consequences would also seem to imply the necessity of at least a Kantian approach. Many efforts labeled as assessments have proved inadequate because they were conducted as Leibnizian or Lockean inquiries.

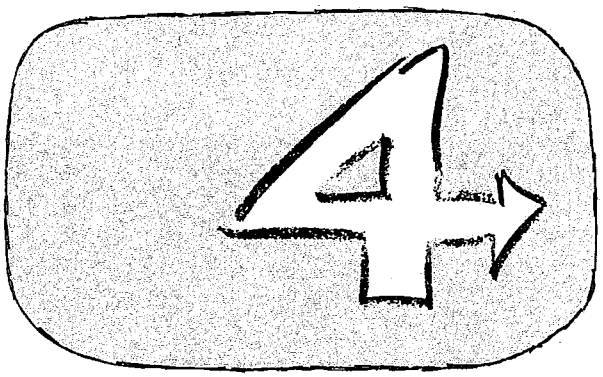
Hegelian inquiry

The fourth in our spectrum of inquiry systems is the Hegelian, or dialectical, inquiry. Its basic idea is that truth is conflictual, that is, the truth content of a system is the result of a highly complicated process that depends on the existence of a plan and a diametrically opposed counterplan. The plan and the counterplan represent strongly divergent and opposing conceptions of the whole system. Their function is to engage each other in an unremitting debate over the "true" nature of the whole system, in order to draw forth a new plan that will hopefully reconcile (synthesize, encompass) the plan and the counterplan. A corollary to this is that by itself the data input sector is totally meaningless and only becomes meaningful—i.e., "information"—by being coupled to the plan and the counterplan.

Thus, Hegelian inquiry systems are the epitome of conflictual, synthetic systems. They build at least two, completely antithetical, representations of any problem. Hegelian inquiry starts by identifying or creating two strongly opposing Leibnizian models of a problem that constitute the contrary underlying assumptions regarding the problem's theoretical nature. Both of these Leibnizian representations are then applied to the same Lockean data set in order to demonstrate that the same data set can be used to support either theoretical model. The point is that data are *not* information; *information results from the interpretation of data.* It is intended that out of a dialectical confrontation between opposing interpretations (e.g., the opposing "expert" views of a situation), the underlying assumptions of both Leibnizian models (or opposing policy experts) will be brought to the surface for conscious examination by the decision-maker, who is dependent upon his experts for advice. It is also hoped that as a result of witnessing the dialectical confrontation between experts or models, the decision-maker will be in a better position to form his own view (build his own model or become his own expert) on the problem that is a "creative synthesis" of the two opposing views. Whereas in the Lockean inquiry the guarantor is agreement, in the Hegelian it is intense conflict—the presumption that conflict will expose the assumptions underlying an expert's point of view that are often obscured *precisely because of* the agreement between experts.

Hegelian inquiry is best suited for studying ill-structured problems. These are the problems that, precisely because of their poor structure, will produce intense debate over their "true" nature. Conversely, it is not recommended for well-structured, clear-cut problems because here conflict may be a time-consuming nuisance.

Except for the policy Delphi concept of Turoff, the use of conflict as a methodology is conspicuously absent in the field of technological forecasting. In the "policy Delphi" the communication process is designed to produce the best pro or con arguments underlying various policy alternatives or resource-allocation alternatives. In a non-Delphi (face-to-face) mode one of the most interesting applications can be found in the activity of corporate or strategic planning. In an important case study, Richard Mason literally pioneered the development of what may be termed the dialectical inquiring system (DIS).



The situation encountered by Mason was one in which the nature of the problem prevented traditional well-structured technical approaches to planning (Leibnizian and Lockean) from being used. Mason studied a company where two strongly opposing groups of top executives had almost completely contrary views about the fundamental nature and management of their organization. Faced with a crucial decision concerning the company's future, each group offered fundamentally differing plans as to how to cope with the situation. Neither plan could be proved or "checked out" by performing any technical study, since each plan rested on a host of assumptions, many of them unstated, that could probably never be verified in their entirety even if sufficient time had been available. Indeed, if the executives wanted to be around in the future to check on how well their assumptions turned out, they had to make a decision in the present. It was at this point that the company agree to let Mason try the DIS.

After careful study and extensive interviews with both sides, Mason assembled both groups of executives and made the following presentation: First, he laid out side by side on opposite halves of a display board what he took to be the underlying assumptions on which the two groups were divided. Thus, for every assumption of the one side there was an opposing assumption for the other side. Next, Mason took a typical set of characteristic operating data on the present state of the company (profit, rate of return on investment, etc.) and showed *that every piece of data could be used to support either the plan or the counterplan; i.e., there was an interpretation of the data that was consistent with both plans.* Hence, the real debate was never really over the data, as the executives had previously thought, but over the underlying assumptions. Finally, as a result of witnessing this, both groups were asked *if they, not Mason,* could now formulate a new plan that encompassed their old plans. Fortunately they could, and because of the intense

and heated debate that took place, both groups felt they had achieved a better examination of their proposed course of action.

Of course, such a procedure does not guarantee an optimal solution. But then, the DIS is most applicable to those situations in which the problem cannot be formulated in pure Leibnizian terms for which a unique optimal solution can be derived. DIS is most appropriate for precisely those situations in which there is no better tool to rely on than the opinions of opposing experts. Where the future is 99 percent opinion and assumption, the DIS may be most apt.

The DIS and policy Delphis differ fundamentally from other techniques and procedures that make use of conflict. In an ordinary courtroom debate, for instance, both sides are free to introduce whatever supporting data and opposing arguments they wish. Thus, the two are confounded. In a DIS or a policy Delphi the opposing arguments are kept strictly apart from the data so that the crucial function of the opposing arguments can be explicitly demonstrated. This introduces an element of artificiality that real debates do not have, but then it also introduces a strong element of structure and clarity that nakes this use of conflict much more controlled and systematic. In essence, the Hegelian inquiry process dictates a conceptual communication structure that relates the conflict to the data and the objectives. Under this conception of inquiry, conflict is no longer antithetical to Western science's preoccupation with objectivity; indeed, conflict actually serves objectivity in this case. This perhaps will be puzzling to those who have been brought up on the idea that objectivity is that upon which men agree and not on what they disagree. Although the Hegelian inquirer does not always lead to a new agreement, or a new plan, when it does the agreement is likely to be stronger.

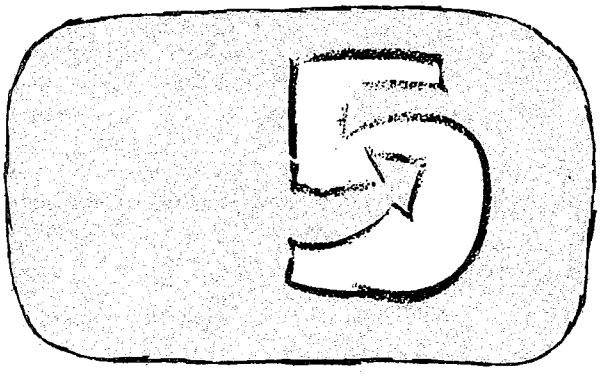
The Singerian system of inquiry

The most complicated of the inquirers discussed here, and hence the most difficult to describe fully, is based on the philosophy of the early 20th century American pragmatist, Edgar Singer. Its main features are as follows: Truth is *pragmatic;* that is, the truth content of a system is relative to the overall goals and objectives of the inquiry. A model of a system is teleological or explicitly goal-oriented, in the sense that the truth of the model is measured with respect to its ability to articulate certain systems objectives, to create several alternate means for securing these objectives, and finally, at the "end" of the inquiry, to specify new goals that remain to be accomplished by some future inquiry. Singerian inquirers thus never give final answers to any question, although at any point they seek to give a refined, specific response.

As a corollary, Singerian inquiry systems are the most strongly coupled of all the inquirers. No single aspect of the system has any fundamental priority over any of the other aspects. The system forms an inseparable whole. Singerian inquiry takes holistic thinking so seriously that it constantly attempts to sweep in new variables and additional components to broaden the base of concern. For example, it is an explicit postulate of Singerian inquiry that the system designer is a fundamental part of the system, and as a result his psychology and sociology must be explicitly considered as one of the system components.

Singerian inquirers are the epitome of synthetic, multimodel, *interdisciplinary* systems. In effect, Singerian inquiry constitutes a theory about all the other inquirers (Leibnizian, Lockean, Kantian, Hegelian), and forms a theory about how to manage their application.

Singerian inquiry systems contain some rather distinctive features that none of the others possess. One is that they speak almost exclusively in the language of commands; for example, "*Take* this model of the system as the true mode." The point is that all of the models, laws, and facts of science are only approximations. The "hard facts" and "firm laws" of science are only "facts" and "laws" if we are willing to accept certain strong assumptions about the nature of the reality underlying the measurement of the facts and the operation of the laws. The thing that serves to legitimize these assumptions is the command, in whatever form it is expressed, to take them seriously ("*Take* this as the true model underlying the phenomenon in question so that with this model as a background we can do such and such experiments"). Thus, for example, the Bohr model of the atom is not a "factually real description of the atom" but if we regard it as such we can perform certain experiments and make certain theoretical predictions that we would be unable to do without the model. What Singerian inquirers do is to draw these hidden commands out of every system so that the analyst is hopefully in a better position to choose his commands carefully.



Singerian inquiry also greatly expands on the potential set of system designers and users. In the extreme, the set is broadened to include all of mankind, since in an age of larger and larger systems nearly everyone is affected by or affects every other system. Singerian inquirers attempt to base their forecast of the future on the projections of as many diverse disciplines, professions, and personalities as possible.

As far as we know, Singerian inquiry is virtually absent from the field of technological forecasting and assessment. However, the implication of Singerian inquiry for technological forecasting is that the supposed "fundamental polarity of exploratory and normative technological forecasting" completely breaks down. According to conventional wisdom, "exploratory technological forecasting starts from today's assured basis of knowledge and is oriented toward the future, whereas

normative technology forecasting first assesses future goals, needs, desires, missions, etc., and works backward to the present." (Jantsch; see "Recommended Reading.") However comforting this sounds, it ignores the basic Singerian point that every description of the present ("today's assured basis of knowledge") is based on some normative conception of the future (i.e., "future goals, needs, desires, missions, etc."). In Singerian terms, it is incredibly naive to take as "fundamental polarities" that which fundamentally interacts. Our normative plans for the future are idealized plans for expanding our knowledge of "what is known in the present." One of the reasons why man has always been interested in the future is that he has always been dissatisfied with that which he has and knows in the present. Our plans for the future express what we wish the present were like.

The strength of Singerian inquiry is that it gives the broadest possible modeling of any inquirer on any problem. The weakness is the potentially prohibitive costs involved in such comprehensive modeling efforts. However, given the increased fear and concern with our environment, we may no longer have the choice but to pay the price. We may no longer be able to afford the continued "luxury" of building large-scale Leibnizian and Lockean technological models devoid of the serious and explicit ethical considerations that can be handled with Singerian inquiry.

A look at structure

Having now examined five philosophies of forecasting, we will turn briefly to a consideration of what might be called its structure (and assessment).

The actual process of conducting a technological forecasting or assessment study can be said to concern itself with six basic types of information:

1. Feasible technological developments. Feasible usually means, in this context, technically feasible if the "required" resources are invested or available.
2. Potential applications. This is any possible application of the previous technological developments without regard to their "good" or "bad" values.
3. Significant applications. This is some subset of "all" potential applications or a transformation to some set that is significant to the study's intent.
4. Potential consequences. Any consequences, "good" or "bad," that may affect opinions of scenarios about the future, or our interpretation of the past.
5. Policy or resource allocation issues. The decision questions under examination or arising as a result of observing potential consequences.
6. Potential resolutions of issues. The controls that can be imposed to affect the likelihood of various developments, applications, and consequences.

In practice, most technological forecasting and assessment studies focus attention on one of these six categories and treat the others with various degrees of implicitness or explicitness. We are in a situation today very reminiscent of the blind man and the elephant. It is common to find engineering forecasting studies that focus only on the first or second elements—developments and applications—with little reference to the other items. In contrast, those who look at the assessment elephant from the view of the social sciences usually focus on the consequences and policy issues. Frequently the new technological assessment efforts are looked upon as an entirely different breed of animal from the "classical" technological forecasting used for organizational planning purposes. It is interesting, therefore, that one observation we can make explicitly from this structure is that the *only* evident distinction between the two is in how we define the scope of the "potential consequences." In forecasting, we are concerned with the effects on the organization (profits, markets, mission objectives, etc.); and in the assessment the effects of concern are those on society (changes in lifestyle, job markets, education, pollution, etc.).

There are two considerations that considerably complicate the deceivingly simple structure for technological forecasting and assessment. The first is the problem of "enumeration"—how does one attempt to ensure that all relevant pieces of information are included in the analysis? The morphological approach to this is the process of finding a model for classifying "all" items within a category into some finite set of subcategories that span the region of interest. In many cases these subcategories are tied to specific ranges of physical parameters such as velocity, frequency of radiation, weight, etc. Although this approach works well when talking about developments or applications, immediate difficulties or disagreements arise when one moves into the area of consequences or policy.

The second aspect of complication lies in attempting to describe the interactions, interrelationships, and causal effects among these various enumerated items. Our view of the future is dependent upon our view of the present and the resulting view of the past. Given *ten* events about the future there are about *ten million* relationships that could, in principle, be described among this small event set. Many of the techniques in forecasting are merely attempts to define a less involved and approximate structure that is sufficient for picking out the significant interactions in any set of items. These approaches fall broadly into two general categories: matrix and network representations. Some of the names under which these two approaches are often disguised are cross impact, cross support, management matrices, relevance trees, decision networks or trees, and patterns.

When a well-understood structure exists that is fairly sparse with respect to interactions among the items, then a network or tree structure is often used. When the structure is not well understood or not sparse, various matrix methods are usually employed for defining the structure. If a good morphological set has been defined, the techniques for defining these relationships may be applied to the elements of the morphological representation, as opposed to the original information items. Since there are an unlimited number of ways we can model the future, there exists a rich and growing literature on these morphological and impact or relationship techniques. For the limited objectives of this discussion, a concept of the inquiry process associated with each step in the technological forecasting and assessment cycle should be sufficient to provide the reader with a perspective for evaluating these various techniques.

The process of delineating and examining techno-

Philosophical role playing in the executive suite

In any discussion involving such topics as planning and assessment it is not difficult to relate the statements and questions raised to the various philosophies of inquiry. Consider, for example, a group of managers discussing a prospective project. A Lockean manager might well begin with the typical intuitive assertion:

"Give me these particular people and I'll be able to do the job."

If Leibniz were in the room he would probably respond with:

"You do the job with the people you have!"

Underlying this reply is a model that a certain number of people working a certain number of hours will be able to do a certain job, and this is independent of the data (in this case of who does the work).

In contrast, Kant, who is interested in objectives, would probably ask:

"Why do you want to do the job?"

and Hegel would pose a significant variation of Kant's question:

"What are the advantages of *not* doing the job?"

Hegel wants to be sure that the opposing view is recognized and that we might not be better off by not doing the job.

Finally, there is Singer, who, unless he happens to be the boss, is usually the person most prone to getting fired. Because Singer tends to reflect on what is taking place and seek out the hidden assumptions or underlying psychology, he has a tendency to discover what most individuals have subconsciously agreed not to discuss. In this case he might very well wish to broaden the discussion by asking:

"Why do you have the people you have if they cannot do the job?"

logical developments and applications can be handled by setting up a Leibnizian or Lockean inquirer that utilizes various implicit future scenarios and representations of the past as the raw data input. The problem of determining "significant" applications and the resulting potential consequences dictates at least the use of a Lockean inquirer and possibly a Kantian inquirer. Especially when the problem is more of an assessment than a forecast, the Kantian approach should be mandatory for this part of the cycle. In the area of policy and resource allocation, either a Kantian or Hegelian process would seem to be appropriate. At this point most study efforts usually terminate. However, the forecasting process is best viewed as a continuous cycle with two important feedback loops: the overall inquiry process should cause us both to examine the past for its possible reinterpretation, and to reconceive our conceptualization of the future. The two of these taken together represent a Singerian process that ties all the other elements of the system together into a continuous reflective cyclic process.

When technology forecasting and assessment are viewed from this perspective, the process of studying the future becomes inseparable from the process of studying the past. A good forecaster should therefore be a good historian.

Finally . . .

In conclusion, we would point out that what separates science from mythology is not the subject matter of an inquiry but the approach. Something is a science if it can show (1) what that something needs to control, and (2) how to control it so that someone can study it in a controlled and systematic or scientific way. In the field of technological forecasting we are just beginning to be aware of the first part, i.e., that the number of things we need to control (study) in order to make forecasts is indeed large. At the very minimum we need not only sweep in the things that the physical and social sciences study, but those that the humanities study as well, such as ethics.

In the end, it is the philosophical ability to be self-reflective that separates science from mythology. Self-reflection implies a realization that as much as our inquiry models describe and represent reality, they also describe and represent us, our psychology. Thus, for example, reflection points out that the mathematical type (the Leibnizian analyst) has an incessant need to reduce every problem to a mathematical one, even where it is not appropriate or efficient; the realist (Lockean) exclusively associates reality with facts or hard data even where the data are limited and confining; the idealist (Kantian) associates reality with possibilities even where they are not feasible; the pragmatist (Singerian) associates reality with the feasible or the do-able, even when it is not worth doing; and the conflictual (Hegelian) restricts reality to that which survives a strong debate even where a debate is not called for. The difference between science and mythology is that the former, unlike the latter, attempts to study itself—to raise to consciousness its underlying premises and psychology. In short, a scientist understands the philosophy underlying what he is doing. Applying "scientific" methods without this understanding is the application of a methodology.

A more detailed version of this paper will be found in the *Journal of Technological Forecasting and Social Change*, vol. 5, no. 1, Fall 1973.

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Murray Turoff is currently with the Systems Evaluation Division in the Office of Emergency Preparedness of the Executive Office of the President. He has been associated with the Institute for Defense Analyses and IBM. His principal areas of professional interest are Delphi design, information systems, modeling, simulation, gaming, and technological forecasting. Dr. Turoff currently teaches a course in technological forecasting at the American University. He received the Ph.D. in physics from Brandeis University and the B.A. degree in mathematics and physics from the University of California at Berkeley. He has, however, been working primarily in operations research and computer applications since 1964, and is the author of a number of papers.

04/20/21

From: [redacted]

re: Corridor 8 - Mayo to Eastern Shore
Bay Bridge 3rd Span

Good Day,

Would like to express my opinion to an area I'm familiar with the Mayo peninsula - note this means one way in and one way out. I've lived here since 1983 and come in on these same 2 roads thousands of times. The road has not changed other than getting paved & our traffic during certain times is terrible. (You can sit for 2 long.) But the road has not changed. We have had issues for years with traffic too long & truthfully I'm a lil afraid Emergency Vehicles won't be able to get in when needed. (We do not have shoulders) So whom ever came and suggested this area did not do their research at all. We have summer boat traffic plus they have a park which has brought in new traffic Triton Beach We vote No. Thank you, [redacted]

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April 22, 2021

VIA EMAIL (info@baycrossingstudy.com)
AND FIRST-CLASS MAIL
Bay Crossing Study
2310 Broening Higway
Baltimore, Maryland 21224

Re: Comments of Queen Anne's Conservation Association on Bay Crossing Study Tier 1 Draft Environmental Impact Statement

To Whom It May Concern:

The Draft Environmental Impact Statement (DEIS) published in February of this year makes clear two inconvenient truths. The first is that the Bay Crossing Study (BCS) that began in 2016 has never demonstrated the need for a new, third span. The second truth revealed by the DEIS is that the Maryland Transportation Authority (MDTA) has never given adequate attention, either in the BCS or in actual practice, to available options for better management of traffic on the Bay Bridge's two existing spans.

Last year Queen Anne's Conservation Association (QACA) commissioned an analysis by independent traffic engineers (AKRF Study) of the Purpose and Need Assessment (PNA) published by MDTA in 2019. The AKRF Study, submitted herewith and incorporated herein by reference, concluded that contrary to the PNA, no new Bay crossing will be needed until sometime after 2065. In the course of reaching this conclusion, AKRF showed in detail that MDTA's forecasts in the PNA of traffic growth on the Bay Bridge are unrealistically high, as its earlier forecasts have consistently been. The MDTA forecasts are unreliable because they use outdated traffic data and are methodologically unsound, and because they ignore the effects of available traffic management improvements.

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The DEIS does not go a single step beyond the defective PNA.[1] All of the shortcomings of the PNA are carried over into the DEIS – and made more glaring by the DEIS's failure to correct them, notwithstanding the passage of time. That the PNA is unreliable, and that available traffic management techniques have not been utilized to ease Bay Bridge congestion, are fully demonstrated by the AKRF Study. In the following discussion of the DEIS, QACA links some of the main AKRF findings about the PNA's defects directly to their reappearance in the DEIS. For the full picture, however, we urge MDTA and other readers of these Comments to consult the AKRF Study itself.

1. The traffic growth projections in the DEIS take account of neither the Bay Bridge's recent traffic history, nor the effects on traffic of the pandemic, increased telecommuting, and future economic recessions.

The DEIS projects Bay Bridge traffic growth by 2040 of 22.9 percent for an average non-summer weekday and 14.1 percent for a summer weekend.[2] On their face, these projections are called into question by the historical fact that there has been effectively *no change* in annual or average daily traffic on the Bridge from 2007 to 2017.[3] This recent decade of no growth is depicted in the two charts below, using the latest available traffic data in the DEIS.

[1] See DEIS 2.1: "This chapter is a summary of the Bay Crossing Study Purpose and Need document."
[2] BCS Traffic Analysis Technical Report, Jan. 2021, p. 22.
[3] DEIS, Figure 2-1, Table 2-1: Annual Chesapeake Bay Bridge Volume, pp. 2-2, 2-3

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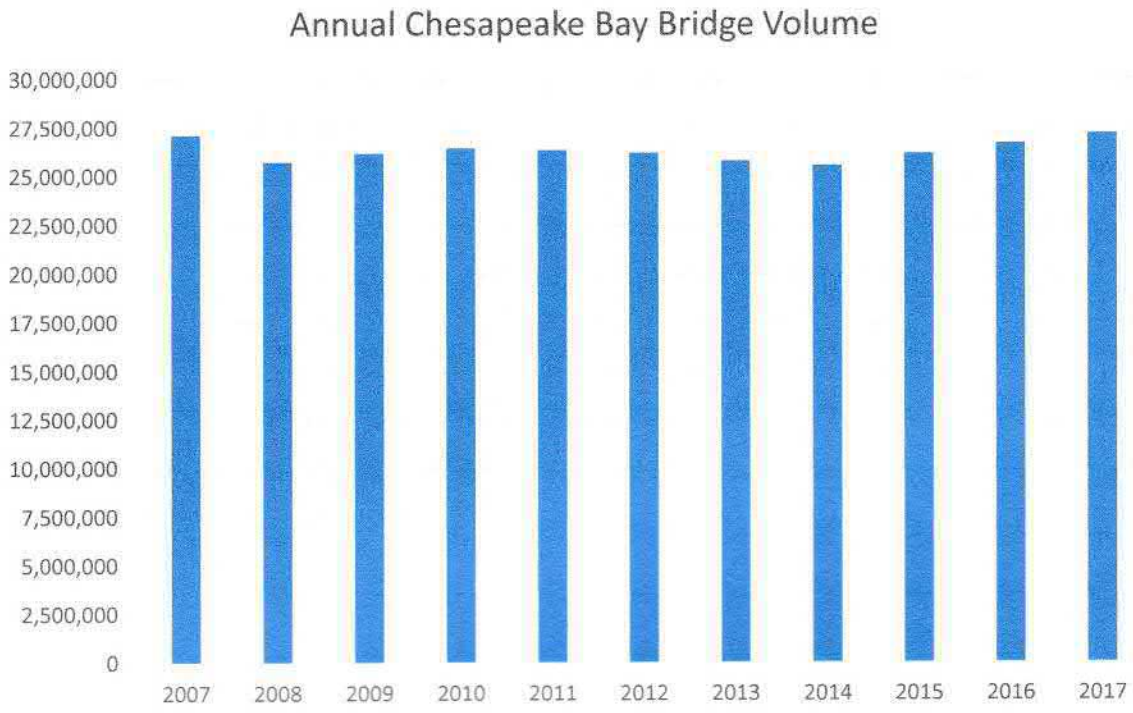
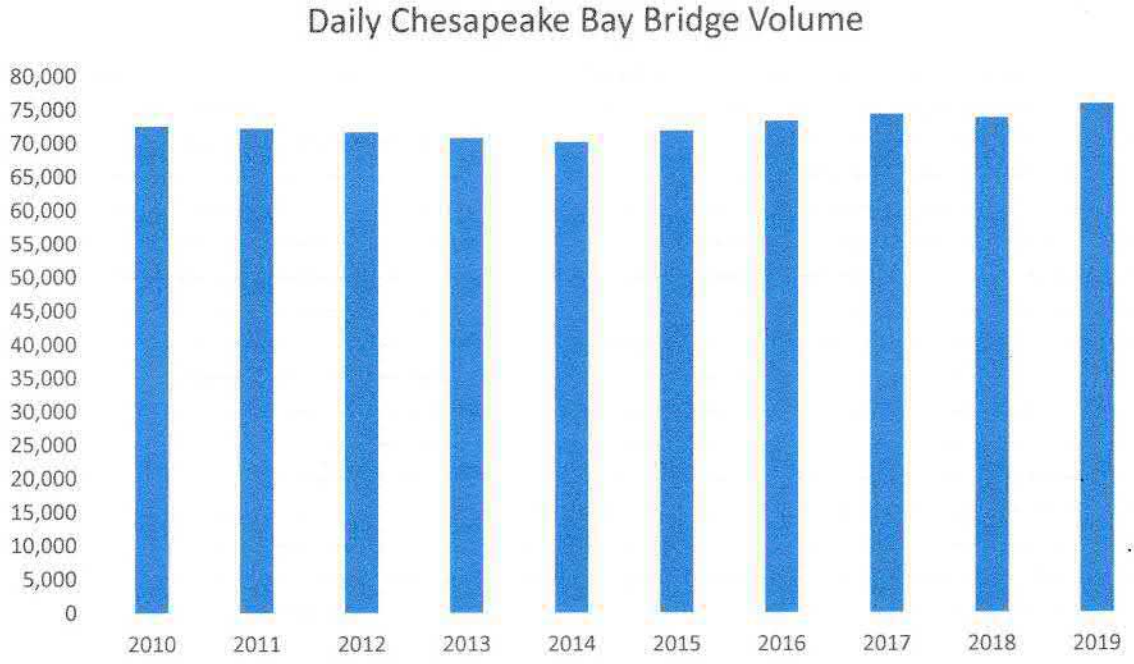


Source: DEIS, Figure 2-1, p. 2-2, modified to show 2007 to 2017 only.



Source: Maryland DOT Annual Average Daily Traffic (AADT) Locator—US-50 from Anne Arundel-Queen Anne's County line to MD Route 8.

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Why has traffic on the Bridge been flat for a decade? Obviously the "Great Recession" of 2008-2009 reduced motor vehicle travel for years, and reduced traffic is likely to continue in future years as the result of COVID-19 and the rise of telecommuting. The DEIS, like the PNA, ignores these hugely important real-life events, and in so doing it inevitably overestimates future demand for travel across the Bridge.

Realizing that it has to acknowledge in some fashion the COVID elephant in the room, MDTA tries to escape with a poor excuse: "At this time, there is no definitive traffic model that would predict how the pandemic will affect long-term traffic projections . . . ."[4] One is inclined to simply respond that if that's true, maybe you shouldn't be doing these Bridge traffic forecasts at all. But it must also be said that throughout the pandemic there have been traffic count data collected on the Bay Bridge. These data do exist, in the form of the eastbound daily tolls collected by MDTA – the same toll collections that are relied on for the traffic statistics in Table 2-1 of the DEIS. Moreover, there have been past economic recessions that stalled traffic growth – as the Great Recession did with Bridge traffic, as well as the economic downturn resulting from the pandemic. The traffic effects produced by these other recessions and the continuing increase in telecommuting, along with the omitted traffic counts, could and should have been incorporated into whatever model MDTA is using to generate its predictions of Bay Bridge traffic. Since these data sources and necessary modeling inputs have been ignored, the DEIS projections of future Bay Bridge traffic are entirely unpersuasive.

2. The conclusions in the DEIS about future traffic congestion on the Bridge are founded on outdated speed and traffic count data.

The DEIS, in projecting degrees of future congestion, presents speed data from 2016 and traffic counts collected in 2017 – data that are now five and four years old, respectively.[5] It is, however, normal practice in publishing a transportation-related EIS to present traffic data collected within the last three years, or at least to amend the outdated information to reflect more recent traffic conditions. The DEIS tacitly admits its Bridge traffic data are stale and have been overtaken by events such as the

[4] DEIS, Executive Summary, p. 1.
[5] BCS Traffic Analysis Technical Report, Jan. 2021, p. 9.

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introduction of cashless tolling, when it promises that they will be updated in the future.[6] That is all well and good – but it doesn't update the DEIS, and it does reveal, once again, the flakiness of the foundations on which the claimed need for a third span currently rests.

3. By arbitrarily picking out a single unrepresentative data point, the DEIS makes future summer weekend traffic congestion look worse than it will be.

The DEIS reports that the summer weekend traffic counts on the bridge were collected during a seven-day period in early August 2017.[7] Since only one weekend can occur within any single seven day period, the DEIS portrayal of summer weekend conditions is based on just one weekend in just one year. But in fact summer weekend traffic counts are available for several years, not just for 2017.[8] These data should obviously have been added in to arrive at an accurate picture of average summer weekend traffic conditions.[9]

As it happens, the singular set of counts on the August 2017 weekend record *much higher* daily traffic volumes than the historical averages recorded for summer weekend traffic. Using that single summer weekend traffic count as the starting point to project the 2040 future summer weekend traffic conditions makes the future traffic conditions appear much worse than if the starting point were based on an average summer weekend. The DEIS, like the PNA before it, stands revealed as a document advocating, rather than objectively assessing, the need for a new Bay crossing.

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[6] The BCS Traffic Analysis Technical Report states: "Following completion of the Draft Tier 1 EIS, and prior to the preparation of the Final Tier 1 EIS, additional data collection will be performed to determine the effects of All Electronic Tolling (AET) on eastbound operations. In addition, if a Tier 2 Study is performed, the capacity analyses performed at that time for then-existing conditions would reflect updated volumes resulting from full use of AET." (p. 7) This assertion is repeated in the context of the traffic methodologies used to establish the capacity analysis for the existing bridge. (p. 12)

[7] BCS Traffic Analysis Technical Report, Jan. 2021, p. 15 and Table 4-1.

[8] See AKRF Study, p. 6.

[9] This is what the AKRF Study did when it demonstrated that summer weekend traffic growth by 2040 would be less than one-third of what MDTA is predicting, even disregarding the effects of increased post-COVID telecommuting and improved traffic management. See p. 6 and Table 1.

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4. The DEIS uses obsolete traffic data, collected before all electronic tolling was introduced in May of 2020, to claim that present and projected eastbound traffic queues support the need for a third span.

The DEIS states that after the implementation of all electronic tolling (AET) in May of 2020 "delays in the eastbound direction are anticipated" during peak periods[10], but it does not quantify these remaining (and presumably reduced) delays. Instead, all consideration of the beneficial effects of AET is postponed, to be addressed only "as needed" in a possible later NEPA document.[11] Nevertheless, the DEIS plunges ahead to make overblown claims about the existing and projected eastbound queues, using traffic counts and speed data pre-dating the current reality of all electronic tolling on the Bridge.[12]

As a purported justification for this irregular procedure, the DEIS claims that "[s]ince the Draft EIS has been in development at the same time that AET has been put in place at the Bay Bridge, it was not feasible to include information regarding its impact on Bridge traffic in the Draft EIS".[13] This clearly won't do. The effect of AET on traffic queue length could readily have been estimated by MDTA from an earlier study of its own which found that AET would produce up to an 80 percent reduction in queue lengths at the Bridge. That quite "feasible" calculation would reduce the 2040 eastbound summer weekend queue projected in the DEIS from 13 miles to 2.6 miles -- *less than* the 4 miles cited as the current condition, and not a happy result for the case the DEIS is trying so hard to make.[14]

5. The DEIS does not adequately consider the alternative of not building an additional Bay Bridge span.

Adequate consideration of the "no build" alternative to constructing another Bay crossing is legally required.[15] The DEIS does not meet this

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[10] BCS Traffic Analysis Technical Report, Jan. 2021, pp. 11-12.
[11] DEIS, p. 3-1.
[12] See, *e.g.*, DEIS, pp. 2-10, 2-11: "The current summer weekend vehicle queues of up to four miles eastbound are projected to increase to nearly 13 miles in 2040. . . . During average weekdays, current evening eastbound queues of up to one mile are expected to increase to five miles in 2040 . . . ."
[13] DEIS, p. 3-1.
[14] For the full discussion, see AKRF Study, pp.14-15, A-23, A-24.
[15] See Federal Highway Administration, NEPA Implementation (1992): "In the draft EIS stage, all reasonable alternatives should be discussed at a comparable level of detail. . . . The 'no-build'

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requirement. The "no build" alternative is not properly characterized or discussed when, as in the DEIS, available strategies to better manage traffic operations and demand under that alternative are excluded from consideration.[16]

In discussing the no-build alternative, the DEIS states that "transportation system management/travel demand management (TSM/TDM) measures such as improvements to the contraflow operation on the existing bridge may be implemented".[17] It says that specific examples of TSM/TDM improvements "could include" implementing all electronic tolling and variable tolls.[18] But it then cuts off further discussion by saying that if TSM/TDM improvements are implemented, that will be done "separately from the Bay Crossing Study".[19] In telling contrast, the AKRF Study directly addresses TSM/TDM measures and indicates the potential they have for lowering peak period congestion.[20] In excluding TSM/TDM, the DEIS fails to provide the consideration of the "no build" alternative that NEPA requires.

6. QACA, as a conservation organization, deplores the fact that what purports to be an *Environmental Impact* Statement has so little to say about the environmental consequences of building a third Bay Bridge.

We reiterate that the most important point to be made about the DEIS is that it exposes both the flimsiness of the State's case for building another multi-billion dollar bridge and its failure to give attention to better managing traffic on the two bridges that it already has. QACA must also, however, note the failure of the DEIS as an environmental impact

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alternative must always be included."
https://www.environment.fhwa.dot.gov/legislation/nepa/overview_project_dev.aspx, accessed April 6, 2021.

[16] *Ibid.:* "Transportation System Management must be included as an alternative or design option where applicable."

[17] DEIS, p. 3-1.

[18] DEIS, p. 3-2.

[19] Ibid. Similarly, in the Executive Summary, the DEIS puts off any consideration of TSM/TDM until a possible future (Tier 2) NEPA evaluation. DEIS, p. 6. The DEIS's aversion to talking about TSM/TDM goes so far as to require its authors to say that their studied avoidances "do not preclude such improvements from future implementation". DEIS, p. 3-2.

[20] See AKRF Study, pp. 14-15, A-23, A-24 (all electronic tolling); pp. 15-16, A-26, A-27 (variable tolls); pp. 16-18, A-29 to A-32 (actively managed lanes).

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statement -- namely, that, despite its title, it doesn't consider environmental impacts.

The DEIS offers no more than an inventory of potentially affected environmental assets in each of the three corridors under discussion, from which it concludes that a new bridge in its preferred corridor (Corridor 7) will have the least impact because there are fewer environmental assets there than in the other two corridors (6 and 8). But the DEIS is deficient because, as presented, it is an environmental impact statement that does not attempt to state even approximately what the environmental impacts of the proposed project in the preferred corridor will be.

We are not making this up. Here is what the DEIS itself says in its section on "Environmental Considerations":

"The environmental inventory within the two-mile wide corridors, however, *does not provide the level of specificity needed to determine actual environmental impacts*. Specific impacts would be largely determined by the alignment of a new crossing, which would be developed during a future Tier 2 study."[21] (Emphasis supplied.)

In the DEIS's now familiar pattern of kicking the can down the road, "actual environmental impacts" are for some time later, not now (just like realistic traffic counts and improved traffic management). The fact that different alignments will have somewhat different impacts is no excuse for not considering impacts now: one could have posited the most probable alignments, or an environmentally worst-case alignment, and then done the kind of analysis and evaluation for each that good practice in preparing an EIS requires.

As we said above, because of these deferrals and exclusions, the DEIS that is before us, the one upon which the public has been invited to comment, does not give the degree of consideration to the no-build alternative that is legally required. Accordingly, notwithstanding the refusal of the DEIS to discuss the environmental impacts of a third span, QACA wishes to assert that these impacts will be significant and are an important reason why the no-build alternative should have been adequately discussed (and, we submit, preferred).

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[21] DEIS, p. 5-64-77.

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We can begin with the DEIS's inventories of what will be potentially impacted[22]:

- Corridor 7 contains 10,870 acres of mapped tidal wetlands (9,600 acres of open water and 1,270 acres of coastal wetlands), constituting 34% of the total corridor.
- 3,460 acres of natural oyster bars and 5,140 acres of Chesapeake Bay Critical Area Resource Conservation Areas are located within the corridor.
- 6,900 acres of forest interior dwelling species (FIDS) habitat and 2,180 acres of Sensitive Species Projects Review Areas (SSPRAs) are in the corridor.
- Federally-listed aquatic species in the corridor include shortnose and Atlantic sturgeon and four species of sea turtles. Federally-listed terrestrial species include Northern long-eared bat and state-listed Delmarva fox squirrel.
- Essential Fish Habitat (EFH) for several species of finfish (9,600 acres) constitutes 34% of the corridor. There are also 270 acres of submerged aquatic vegetation (SAV) in the corridor.
- Anadromous fish species such as striped bass and shad migrate through the corridor to get to and from their spawning areas. Several large marine mammals, including the bottlenose dolphin, are known to spend a portion of their life cycle in the Bay, and in recent years there have been a large number of dolphin sightings in the vicinity of the Bridge.[23]

How will building a third span impact these "environmental assets" of the Bay? Two bridge-related activities that can result in major impacts to water quality and natural resources are dredging and pile-driving. To start with dredging: the dredging associated with bridge construction is an activity that causes sediment resuspension, turbidity, and destruction of

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[22] DEIS, Table 4-20, p. 4-44; p.

[23] The DEIS, as we have said, never gets nearly specific enough to mention the increased number of dolphin recorded in the vicinity of the Bridge in 2018 (University of Maryland Dolphin Watch) or the 193 individual dolphin with 27 mother and calf pairs that have been reported at the mouth of the Potomac River (Potomac-Chesapeake Dolphin Project).

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bottom habitat, producing impacts on water quality, fish, mammals, sea turtles, and benthic resources such as oysters.

The DEIS, however, provides no information about what level of dredging will be needed for a new bridge. While the specific alignments under consideration may not be known, it is not plausible to think that no amount of dredging will be needed. A reasonable worst case of dredging volumes could have been estimated, thereby informing an impact assessment. Are we talking thousands of cubic yards, tens of thousands of cubic yards, hundreds of thousands, or perhaps more than a million cubic yards? With that kind of information, surely not too difficult to assemble, the impacts to resources such as oyster habitat, Essential Fish Habitat, and the level and types of mitigation required to offset these impacts, could have been approximated and evaluated.

As to pile-driving, there is a large body of scientific literature finding that the elevated sound levels produced by pile-driving can result in adverse effects on marine mammals and anadromous fish. Since species such as striped bass and shad have been documented to pass through the proposed bridge construction area to and from their spawning grounds, they are at substantial risk of impacts associated with elevated sound exposure. Depending on the levels and duration of the elevated sounds, pile-driving can result in behavioral or physiological impacts or even mortality. It is likely that any bridge alignment will be driving several hundred or possibly thousands of piles over multiple years. How many and how long? The DEIS doesn't even ballpark any of this – so once again we can't evaluate what the impacts will be or how they might be mitigated (or, crucially, how important it would be to avoid them altogether by preferring the no-build scenario).

We offer the foregoing as no more than little indicators of what this DEIS leaves out with respect to the Bay-related impacts of a third span. We don't even touch on the impacts to the land areas on both shores that will result from highway alterations to accommodate eight lanes of bridge traffic. Yet those land impacts, on flora, fauna and human beings, may well be greater even than the Bay impacts.

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Conclusion

For the reasons set forth in these Comments, QACA concludes that the Bay Crossing Study Tier 1 DEIS as presented is inadequate and must be revised to better address the need for a third span, using corrected traffic forecasting methodologies and taking into account post-COVID telecommuting, the institution last year of all electronic tolling, and implementation by MDTA of improved traffic management strategies, all as set forth in the AKRF Study submitted herewith. QACA also recommends that MDTA suspend any future activities towards advancing a Tier 2 study until these deficiencies are addressed.

Respectfully submitted,

QUEEN ANNE'S CONSERVATION ASSOCIATION
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April 26, 2021

VIA EMAIL (info@baycrossingstudy.com)
AND FIRST-CLASS MAIL
Bay Crossing Study
2310 Broening Higway
Baltimore, Maryland 21224

Re: Comments of Queen Anne's Conservation Association on Bay Crossing Study Tier 1 Draft Environmental Impact Statement

To Whom It May Concern:

On behalf of Queen Anne's Conservation Association, its constituent members, supporters and donors, enclosed please find Comments by the Association and the attached AKRF Study to be included as part of the record regarding the Bay Crossing Study Tier 1 Draft Environmental Impact Statement.

Very truly yours,

[redacted]

Enclosures

CHESAPEAKE BAY BRIDGE CROSSING TRANSPORTATION STUDY

Prepared for

Queen Anne's Conservation Association

Prepared by

AKRF, Inc.

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410 712 4848
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Offices in New York • New Jersey • Pennsylvania • Maryland • Connecticut

December 15, 2020

Executive Summary

Queen Anne's Conservation Association ("QACA") has engaged AKRF, Inc. ("AKRF"), a regionally respected environmental planning and engineering services firm (whose nearest office is in Hanover, MD) to conduct an independent study to determine whether there is a current need for replacement of the Chesapeake Bay Bridge Crossing from a traffic operations perspective. This study reviews and evaluates the methods, results, and conclusions stated in the Purpose and Need Assessment document dated February 2019, which was prepared by the Maryland Transportation Authority (MDTA). This study presents independent results in two broad categories traffic growth forecasting, and relevant transportation trends and improvements.

The traffic growth forecasting method used by MDTA is a regional travel demand model, which has complicated inputs for population, demographics, origin-destination patterns, and other unknown factors. AKRF does not have access to this model or the assumptions used to forecast traffic at the existing bridge crossing, so our estimates rely on historic growth trends over more than 15 years for summer weekend traffic and the last five years for weekday traffic to present an independent traffic growth forecast.

The MDTA model starts with existing traffic count data from 2017 that leads to biased findings because it only captures one day of weekend traffic from August, which was much higher than an average summer weekend day according to AKRF's research. The Purpose and Need Assessment bases several conclusions on the 2040 forecasted summer weekend conditions which show a high number of hours of traffic congestion and many miles of traffic queues in that document. It is typically not acceptable to rely on one day of traffic counts when there could be a daily fluctuation in traffic that is above or below average. It is customary to use multiple days of traffic count data to present average conditions as has been done in the AKRF study. Furthermore, AKRF has only presented average daily weekend traffic for a particular year if historic counts were available for at least one full weekend in the average summer month of July. For weekday conditions, MDTA used multiple days of counts in 2017, while AKRF used the Maryland Department of Transportation's (MDOT's) reported annual average weekday daily traffic for the bridge, which is already smoothed out using seasonal adjustment factors according to an accepted methodology to eliminate daily traffic fluctuations.

Next, the assumptions in the MDTA model do not indicate whether important trends or other factors such as increased telecommuting or economic recessions were taken into account, nor whether planned or available improvements such as cashless toll collection, improved management of the reversible lane, or variable tolling to reduce congestion were included. It can only be assumed that these trends and improvements were not considered in the model, which then presents future traffic and congestion levels that are higher than may actually materialize. In particular, telecommuting is likely to permanently change from the previous share of five percent of the workforce to a much higher number since a large number of employers and employees have adjusted to a new paradigm in 2020.

The long-term influence of the COVID-19 pandemic on traffic and travel patterns is not yet understood. However, there are discussions of COVID-19 in this study, and an alternate set of traffic forecasts reflecting potential economic downturns is included. The Purpose and Need Assessment does not mention economic recessions or the traffic growth-stagnating effects typically following them. Should two modest economic downturns occur between 2019 and 2040 as is assumed in the alternate traffic forecasts, these may result in the Purpose and Need Assessment's traffic projections being an even larger overestimate of what actual traffic will be.

According to the independent conclusions of AKRF in this study, the levels of traffic and congestion shown to demonstrate the need for a replacement bridge using 2040 projections may not be reached until late this century or beyond. Additionally, according to the 2015 Life Cycle Cost Analysis Study by MDTA, the bridge can be safely maintained through 2065 with currently programmed and anticipated rehabilitation and maintenance work. That study states that beyond 2065, the bridge may require major rehabilitation but would not be structurally deficient or functionally obsolete. Therefore, based on the conclusions of AKRF's study of traffic congestion and operations on the bridge, and MDTA's Life Cycle Study of the bridge's structural integrity, there will not likely be a need for a replacement bridge by 2040 for either traffic or structural purposes.

Table of Contents

Introduction

This report presents an independent study to determine whether there is a current need for replacement of the Chesapeake Bay Bridge Crossing from a traffic operations perspective. The study reviews and evaluates the methods, results, and conclusions stated in the Purpose and Need Assessment document dated February 2019, prepared by the MDTA. This report also considers and relies on results of comprehensive research efforts identifying strategies used at comparable facilities in the region, and available traffic data from MDOT on the Bay Bridge from 2003 to 2018. These findings are then also compared to traffic projections in the 2004 Transportation Needs Report and 2015 Life Cycle Cost Analysis Study. The above three studies and 2019 Open House materials that were provided on the "baycrossingstudy.com" website at the time of preparation of this report are included as the Maryland government agency reports.

For each of the improvements and/or trends that are considered, this report presents up to three types of traffic metrics for comparison, all of which are used by the Purpose and Need Assessment to justify a bridge replacement:

- **Traffic Volumes:** Anticipated growth of typical weekday and/or summer weekend traffic, shown in the units of "vehicles per hour" or "vehicles per day," as applicable;
- **Queue Length:** The line of cars spilling back from the toll plaza in the eastbound direction, shown in the units of miles; and
- **Traffic Congestion:** Hours of the day where the bridge traffic demand would exceed the traffic capacity in either direction of the crossing.

Traffic Volume Growth Forecasting

The AKRF volume projections utilize a 2018 base year calculated from recent traffic data available from MDOT and consider historic traffic trends from 2003 to 2018. In contrast, the Purpose and Need Assessment utilizes 2017 base year traffic counts and the Baltimore Metropolitan Council InSITE travel demand model to develop future volumes. However, the input for the base year in the model used for the Purpose and Need Assessment was based on very limited data and resulted in an overestimate of traffic for summer weekends. By applying more realistic traffic growth to the bridge based on historic trends, the AKRF projection indicates that the average weekend daily traffic could be approximately 31,000 vehicles per day lower, and typical weekday daily traffic could be approximately 3,000 vehicles per day lower by 2040 when compared to the Purpose and Need Assessment (see **Table 1**).

Table 1
Comparison of Chesapeake Bay Bridge Daily Traffic Volume Projections

	Actual Traffic Volumes	AKRF Traffic Volume Projection^		Bay Crossing Study Purpose and Need Assessment (2019)			Life Cycle Cost Analysis (2015)			Bay Bridge Transportation Needs Projection (2004)		
	2018	2040	%Growth	2017	2040	%Growth	2013	2040	%Growth	2001	2025	%Growth
Weekday	75,750	81,487	8%	68,598†	84,276	23%	86,200*	113,100*	31%*	61,000	86,000	41%
Weekend	100,286*	104,219*	4%*	118,597*†	135,280*	14%*	90,200*	118,400*	31%*	95,000*	135,000*	41%

NOTES:

^ Developed by AKRF, based on 2009-2018 annual average daily traffic data and 2003-2019 Automatic Traffic Recorder data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge.

* Traffic volume for summer day

† 2017 Purpose and Need Assessment traffic volumes are based on multiple day count data for weekdays, not annual average daily traffic, and single-day count data collected in August for weekends

Since actual daily weekday and weekend data were available for 2018, those data were used to establish the 2018 baseline for comparison to 2040 conditions. As shown in Table 1, each subsequent MDTA study from the earliest one in 2004 to the most recent one in 2019 has lowered the expected percentage growth of traffic for its study horizon, as evidenced by the increasingly flatter slope of each line with the release of each subsequent MDTA study. The AKRF projections appear to be even more realistic. These projections and growth rates are illustrated in Figure 1 and explained in greater detail below.

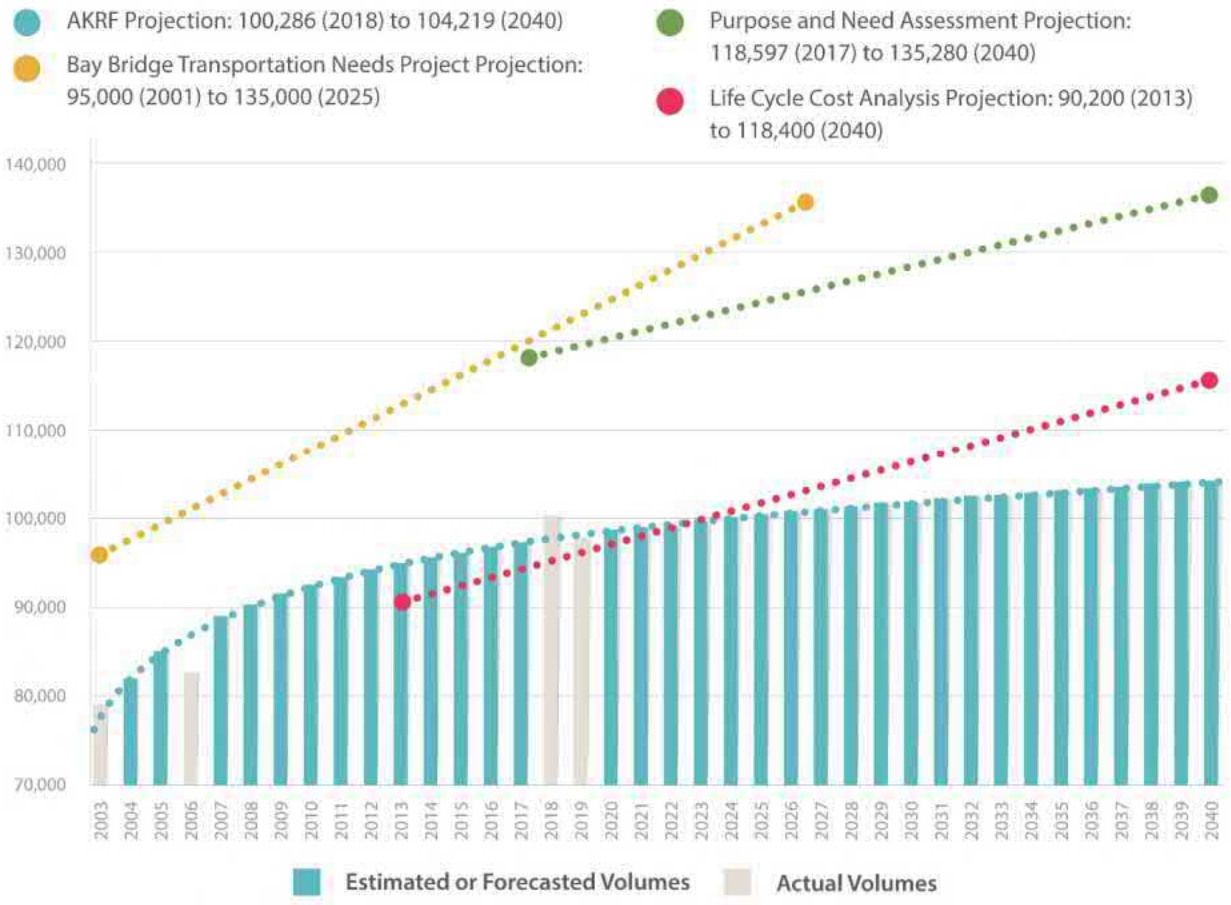


Figure 1. Comparison Graph of AKRF Realistic Traffic Projections to Previous MDTA Studies, Summer Weekend Daily Traffic in Vehicles Per Day

For the purposes of projecting realistic traffic volumes to 2040, a conservative assumption that the pattern of traffic growth observed using summer weekend daily traffic from 2003, 2006, 2018, and 2019 (years for which adequate data were available to present average summer weekend daily conditions) would continue to 2040 was applied. The best fit for these data was not a linear slope, but a logarithmic curve that smooths out as time goes on. The same curve was also used to estimate summer weekend daily traffic for the interim years between 2003 and 2018 for which data were not available. With a logarithmic curve, certain years of actual data can fall below the curve (such as 2006) or above the curve (such as 2018), but the overall correlation of the fitted curve with the data was found to be strong enough for it to be applied for the traffic volume projections[1]. As shown in **Figure 1**, the Purpose and Need Assessment begins with a much higher baseline data point for summer weekend daily traffic (118,600 vehicles a day). This is because the Purpose and Need Assessment used only a one-day sample of data in August of 2017 to report average summer weekday 2017 existing traffic volumes which

[1] The R-squared value, which is a measure of the variation of actual summer weekend traffic volume data to the logarithmic trendline, was determined to be 0.90. This reflects a strong correlation with the actual data, since the R-squared value ranges from 0 to 1, and values closer to 1 reflect greater correlation between fitted trendlines and observed data.

resulted in a much higher traffic volume than for an average 2017 summer weekend day. The difference in these starting points translates to much higher 2040 traffic projections in the Purpose and Need Assessment than would reasonably be expected, which is used to support the need for a bridge replacement. None of the projections shown in **Table 1** and **Figure 1** (including AKRF's) consider the effect on traffic volume associated with the current COVID-19 pandemic, or another recession or two that could occur between 2019 and 2040. The 2007-2008 financial crisis resulted in a decrease in average annual daily traffic (AADT) by 5.4 percent in 2008 according to data from the Purpose and Need Assessment, shown in **Figure 2**.

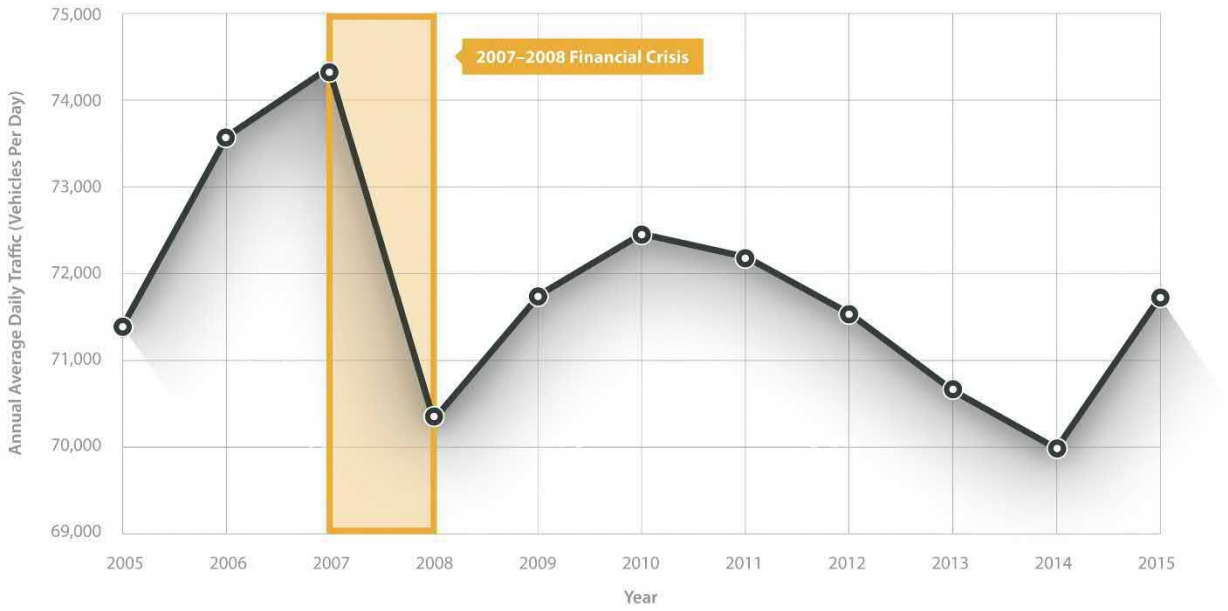


Figure 2. 2005-2015 Annual Average Daily Traffic, Weekdays and Weekends Combined

Additional recession events would result in reducing the traffic volumes even further. In a scenario where there would be two hypothetical economic downturns between 2019 and 2040, traffic volumes are anticipated to stagnate for several years similar to the pattern shown in **Figure 2** following the 2007-08 financial crisis. **Figures 3 and 4** show the weekday and weekend projected daily traffic volumes, respectively, after factoring in two economic downturns. The first economic downturn was assumed to occur in 2020-2022 due to the 2020 coronavirus pandemic. Traffic volumes would decline in 2020 due to the pandemic and then it was assumed for the purposes of the projection that they would sharply recover but remain stagnant from 2021-2022, though it should be noted that as of September, 2020 there remains significant uncertainty over how quickly the economy, and traffic volumes in general, is expected to recover. The second economic downturn was assumed to occur in 2030-2032, and traffic volumes would also stagnate over this period. Assuming that the same pattern of traffic volume growth would occur during interim years, this would result in a slightly lower projected 2040 traffic volumes and growth rates, as shown in **Table 2**.

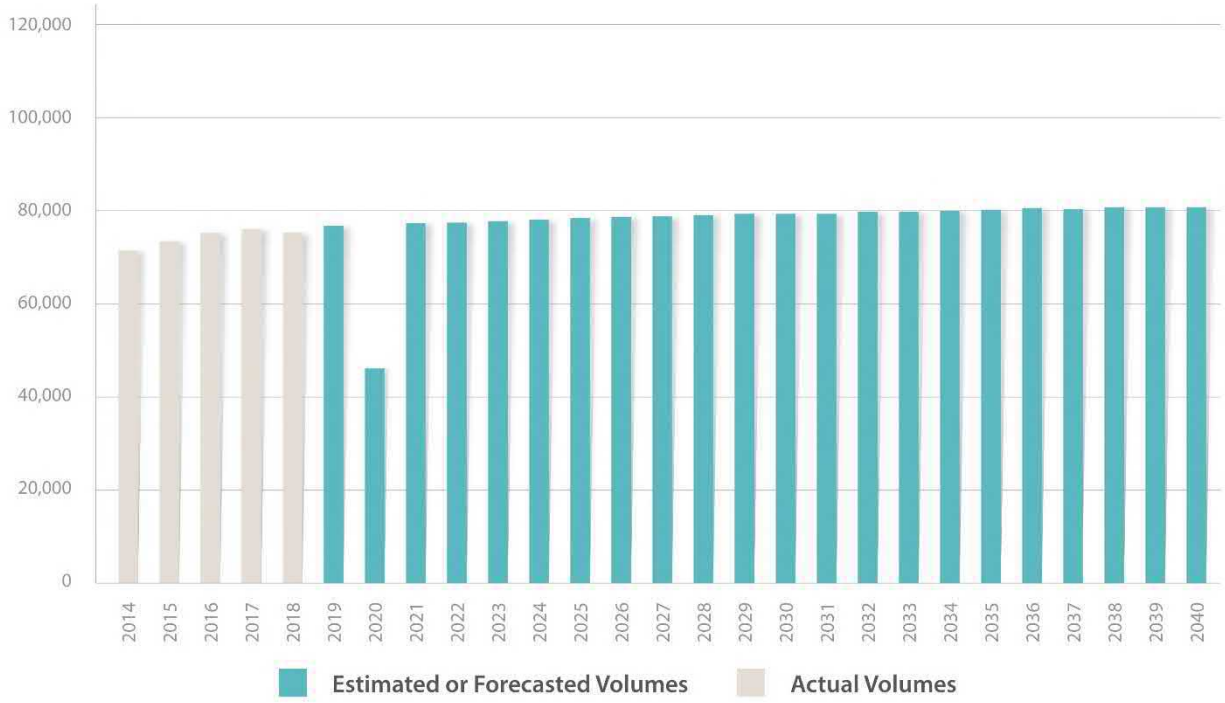


Figure 3. Weekday Annual Average Daily Traffic projections assuming two hypothetical recessions

- 2020-2022: COVID-19 induced recession resulting in 40 percent decline in 2020 traffic volume and stagnation in recovery of traffic volumes in 2021-22
- 2030-2032: Hypothetical recession resulting in a two-year stagnation of traffic volumes

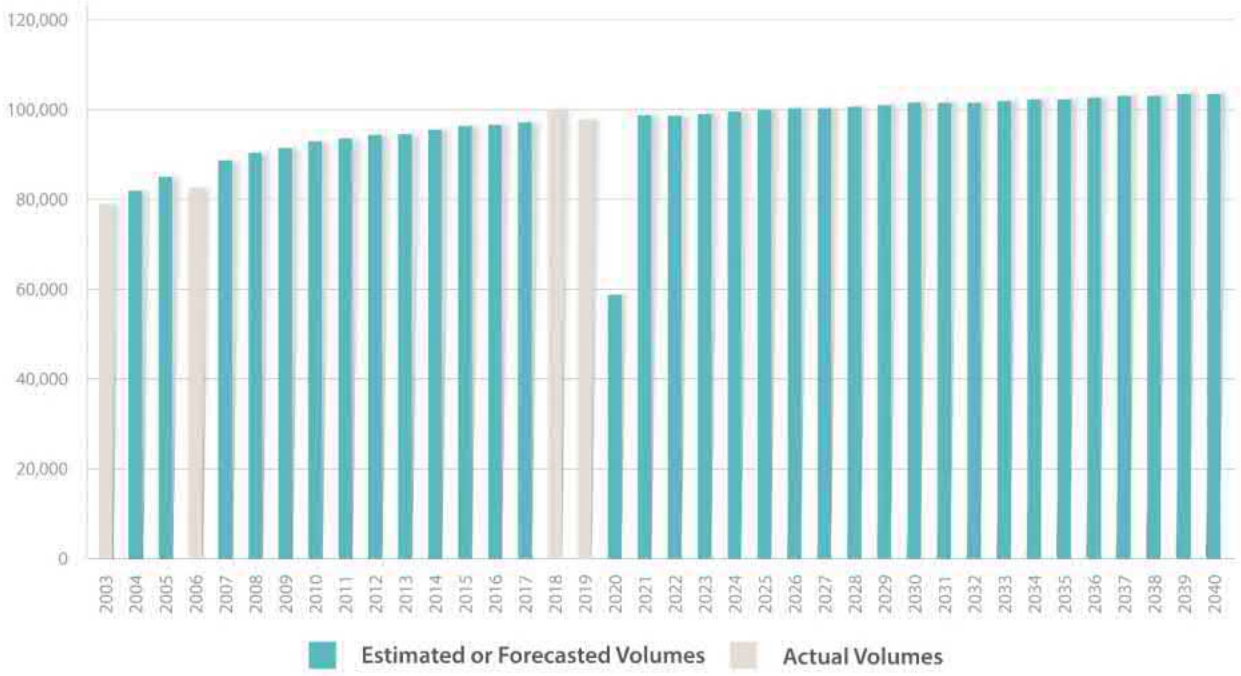


Figure 4. Summer Weekend Annual Average Daily Traffic projections assuming two hypothetical recessions

- 2020-2022: COVID-19 induced recession resulting in 40 percent decline in 2020 traffic volume and stagnation in recovery of traffic volumes in 2021-22
- 2030-2032: Hypothetical recession resulting in a two-year stagnation of traffic volumes

Table 2
Comparison of Chesapeake Bay Bridge Daily Traffic Volume Projections (with economic downturns assumed)

	Actual Traffic Volumes	AKRF Traffic Volume Projection, With Economic Downturns Assumed		Bay Crossing Study Purpose and Need Assessment (2019)			Life Cycle Cost Analysis (2015)			Bay Bridge Transportation Needs Projection (2004)		
	2018	2040	%Growth	2017	2040	%Growth	2013	2040	%Growth	2001	2025	%Growth
Weekday	75,750	81,137	7%	68,598†	84,276	23%	86,200*	113,100*	31%*	61,000	86,000	41%
Weekend	100,286*	103,596*	3%*	118,597*†	135,280*	14%*	90,200*	118,400*	31%*	95,000*	135,000*	41%

NOTES:

^ Developed by AKRF, based on 2009-2018 average annual daily traffic data and 2003-2019 Automatic Traffic Recorder data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge. Assumes a COVID-19 recession from 2020-2022 resulting in temporary decline in traffic volume and subsequent two-year recovery, and a hypothetical recession in 2030-2032 resulting in a flattening of traffic volume over two-year period.

* Traffic volume for summer day

† 2017 Purpose and Need Assessment traffic volumes are based on multiple day count data for weekdays, not average annual daily traffic and single-day count data collected in August for weekends

According to the MDOT data, during an average summer weekend day in 2018, hourly traffic volumes were below the traffic capacity under ideal traffic conditions on the Chesapeake Bay Bridge during 22

hours (92 percent) of the day, as indicated in **Figure 5**. This does not suggest that there were not bridge delays during more than two hours on specific high traffic days in the summer of 2018. Under conditions where this average delay was exceeded, it was because of the constraints of the toll plaza, certain days where the average summer weekend daily traffic was exceeded, and/or the presence of non-recurring delays such as traffic incidents and emergencies which temporarily reduced the capacity of the bridge or nearby highway connections. However, the figure illustrates that when presenting average summer weekend daily traffic in 2018, only two hours of the day exceeded the bridge capacity that year. Replacing the Chesapeake Bay Bridge should not be based on unique traffic conditions that occur only over a relatively small percentage of the time, but must consider entire seasonal averages over many years of historic data, in addition to transportation trends and improvements, as discussed in this report.

2018 Summer Weekend Day—Chesapeake Bay Bridge Capacity

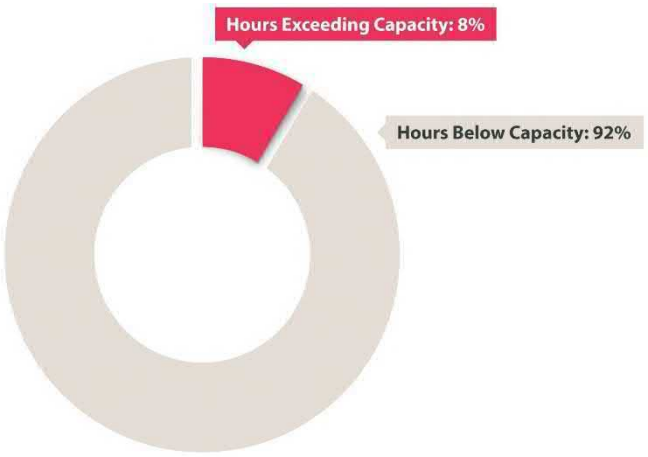


Figure 5. Actual 2018 Volumes

If more realistic growth forecasting is applied to the expected number of hours in a day that the bridge would exceed its traffic capacity, the AKRF volume projection estimates indicate that capacity on the Chesapeake Bay Bridge could be exceeded for only 12 percent of a typical summer day in 2040, compared to 58 percent of a summer day according to the Purpose and Need Assessment traffic volume projections, shown in **Figures 6** and **7**.

2040 Summer Weekend Day—Chesapeake Bay Bridge Capacity

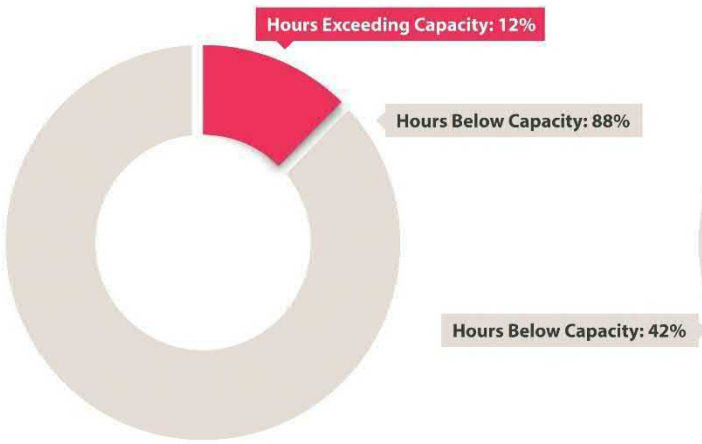


Figure 6. 2040 AKRF Volume Projections

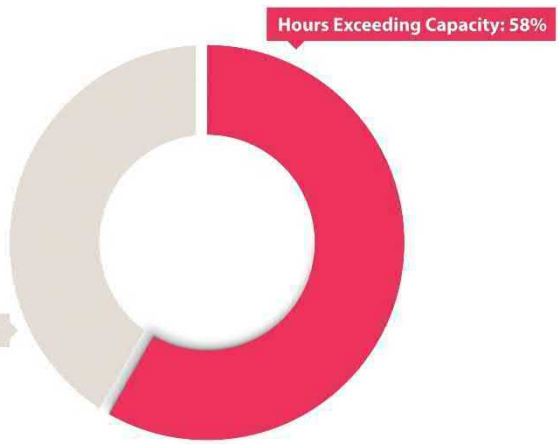


Figure 7. 2040 Purpose and Need Assessment Volume Projections

Although under the AKRF projection, bridge capacity would be exceeded for 12 percent of a typical summer day in 2040, it is AKRF's opinion that this projected capacity exceedance, which is of modest proportions, would likely be even lower than 12 percent considering the operational improvements and mobility trends discussed in the next section of this study..

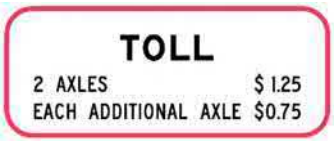
Trends and Improvements

In addition to traffic growth comparisons, this report presents several traffic operational improvements and mobility trends that could be considered to prolong the life of the bridge. The additional improvements and/or trends analyzed in this report which presumably were not included in the traffic projections in the Purpose and Need Assessment but should be considered in the DEIS are:

- **Telecommuting**, which gained traction among all regional workers between 2000 and 2016 (the most recent year for which census commuting data is available) in the Washington D.C. and Baltimore Metropolitan areas, Queen Anne's County, and Anne Arundel County;

- **Cashless Tolling**, or converting the eastbound Bay Bridge toll plaza to all electronic toll collection which occurred in May 2020;

- **Congestion Pricing**, which uses variable tolls by time of day/year to manage peak period congestion and induce some motorists with flexibility in their travel plans to shift their trip to off-peak times; and



- **Managed Lanes**, a dynamic management tool using real-time data to allow MDTA to better decide when the reversible lane should be used, or if the reversible lane or other lanes should have higher tolls, or require high occupancy vehicles to use it during peak conditions to reduce overall traffic congestion on the Bay Bridge.

These improvements and/or trends are not new to the D.C./Baltimore Metro area, and each are available tools with a proven record for reducing peak period traffic congestion, which could extend the life of the bridge. If implemented in combination, there would be even greater benefits. The results of individual studies for each of the potential improvements and their effects on different metrics for traffic operations are presented below, with supporting materials provided in the appendices.

Telecommuting

If the percent of the region's workforce that chooses to telecommute increased from five percent today to 10 percent in 2040 as a reasonable assumption for more aggressive adoption of telecommuting **(See Appendix 2**), typical weekday daily traffic volumes on the Chesapeake Bay Bridge according to AKRF projections would increase by only four percent from 2018 to 2040, compared to eight percent if the share of the workforce that telecommutes were to continue to grow at the steady rate of three percent per year as for the past decade. These volumes and growth rates are compared to the Purpose and Need Assessment forecasted traffic volume growth rate of 23 percent from 2017 to 2040, as shown in **Table 3.**

Table 3

Comparison of Chesapeake Bay Bridge Daily Traffic Volume Projections

	Actual Traffic Volumes	Current AKRF Traffic Volume Projection*		AKRF Traffic Volume Projection with Accelerated Growth in Telecommuting**			Bay Crossing Study Purpose and Need Assessment (2019)†		
	2018	2040	%Growth	2018	2040	%Growth	2017	2040	%Growth
Weekday	75,750	81,487	8%	75,454	78,339	4%	68,598	84,276	23%

NOTES:

* Developed by AKRF, based on 2009-2018 annual average daily traffic data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge, 2018 base year.

** Developed by AKRF, based on 2009-2018 annual average daily traffic data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge and Reverse Journey-to-Work (RJTW) census data from the 2006-10 and 2012-16 American Community Survey for the Baltimore and Washington D.C. Metropolitan Statistical Areas, 2018 base year.

† Purpose and Need Assessment traffic volumes are based on multiple day count data for weekdays in 2017, not annual average daily traffic, and single-day count data collected in August of 2017 for weekends.

The effects of telecommuting cannot readily be applied to summer weekend days since they are outside normal working hours. However, there may be latent positive effects on Friday evening and Sunday afternoon summer weekend traffic since, with greater freedom and encouragement by employers to allow employees to telecommute as has happened during the COVID-19 pandemic, a short weekend vacation could be extended to a four-day weekend or longer vacation through telecommuting. These "long weekends" would have the effect of lowering the peak traffic demand on summer weekend days.

Cashless Tolling

In 2014, MDTA published its *All Electronic Tolling Conversion and Prioritization Study* which studied the potential conversion of various tolled facilities under its jurisdiction, including the Chesapeake Bay Bridge. In 2019 when the Purpose and Need Assessment was presented, it did not include the benefits of all electronic toll collection, also known as "cashless tolling," which resulted in a greatly overestimated queue length in the Purpose and Need Assessment. In 2020, MDTA implemented cashless tolling on the Bay Bridge. The Purpose and Need Assessment states that the vehicle queues are projected to increase from four miles in 2017 to 13 miles in 2040 for a summer weekend and from one mile to five miles for an average weekday evening, in the eastbound direction. Applying the estimated peak queue length reductions reported for the Chesapeake Bay Bridge from the *All Electronic Tolling Conversion and Prioritization Study* for a summer Friday and an average weekday evening, the 2040 vehicle queues could be reduced to 2.6 miles during a summer weekend peak period and 1.5 miles during an average weekday evening, shown in **Table 4**.

Table 4

Chesapeake Bay Bridge Eastbound Projected Queues – All Electronic Tolling

Scenario	Weekday Queue (miles)	Summer Weekend Queue* (miles)
Existing[1]	1	4
Future 2040[1]	5	13
Future 2040 with All Electronic Tolling	1.5	2.6

NOTES: *Weekend also includes Friday

SOURCES: [1]Chesapeake Bay Crossing Study Purpose and Need Assessment

As shown in **Table 4**, when applying MDTA's Chesapeake Bay Bridge traffic queue projection for cashless tolling, the summer weekend queues in 2040 would be shorter than they were reported to be in the existing condition according to the Purpose and Need Assessment. The MDTA-projected 1.5-mile weekday queue and 2.6-mile summer weekend day queue with cashless tolling would likely be even lower in 2040 if the results would have been modeled by MDTA considering AKRF's more realistic traffic growth projections. Although there could be queues of traffic approaching the bridge even with cashless tolling in 2040, it is AKRF's opinion that this measure, taken together with the other measures described in this section, will reduce peak period traffic congestion and likely substantially prolong the life of the bridge.

Congestion Pricing

"Congestion pricing" is varying the cost of a toll based on real-time traffic demand to manage traffic congestion. Several variable tolling case studies researched for this report show that peak hour traffic operational improvements in travel times and reduction in traffic volumes can be expected after the implementation of a variable tolling system. For example, based on a variable tolling plan for all bridge and tunnel crossings between New York and New Jersey, a post-implementation study by the New Jersey Department of Transportation showed traffic could potentially be reduced by up to 6.78 percent during a weekday peak period or 2.50 percent during a weekend peak period. If variable tolling is implemented on the Chesapeake Bay Bridge, benefits may be experienced in periods where traffic demand exceeds traffic capacity, including the weekday AM and PM peak hours and the summer weekend peak period. The potential effects of these traffic reductions using the New Jersey Department of Transportation findings are shown in **Table 5**.

Table 5
Variable Tolling Volume Projection

Time Period	AKRF Hourly Traffic Volume Projection (vehicles per hour)				
	Without Variable Tolling[1]			With Variable Tolling	
	2018	2040	%Growth	2040	%Growth
Weekday – Westbound AM	3,305	3,555	7.6	3,314	0.3
Weekday – Eastbound AM	1,468	1,580	7.6	1,473	0.3
Summer Weekend – Eastbound	3,362	3,584	6.6	3,494	3.9
Summer Weekend – Westbound	4,098	4,368	6.6	4,259	3.9

SOURCES:

[1] Based on traffic growth rates developed by AKRF, based on 2001-2019 Automatic Traffic Recorder counts and 2009-2018 annual average daily traffic data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge.

Since there are few alternative mode choices for the Chesapeake Bay Bridge other than taking owned, rented, or for-hire private passenger vehicles, it is conservatively assumed that variable tolling would not noticeably reduce overall annual growth as a congestion management measure by itself, since the same number of vehicular trips would make the journey with variable tolls in place, but at different times of day or days of the same week. However, there could be modest benefits associated with variable tolling to induce ride sharing which could slightly reduce overall average daily traffic volumes.

Although there could be certain times of the day where the bridge capacity is exceeded even with variable tolling in 2040, it is AKRF's opinion that this measure, properly implemented and taken together with the other measures described in this section, will reduce peak period traffic congestion and likely substantially prolong the life of the bridge.

Managed Lanes

Managed lanes are a congestion management strategy that involves the application of lane use restrictions or lane tolls to increase the efficiency of a highway facility. A managed lane employs the use of pricing, vehicle eligibility, and/or access control. Examples of managed lanes include high-occupancy vehicle (HOV) lanes, high-occupancy toll (HOT) lanes, express lanes, reversible lanes, and bus- or truck-exclusive lanes. The Chesapeake Bay Bridge currently uses a reversible lane as a managed lane strategy to redistribute roadway capacity from the westbound direction to the eastbound direction during peak periods. However, the lane is reversed using a fixed schedule and is not actively managed using real-time data.

Using regionally comparable results of a managed lane study of I-66 in Virginia, the application of managed lanes at the Chesapeake Bay Bridge could result in a reduction of 2.7 percent of vehicles during summer weekends during peak hours. On the Chesapeake Bay Bridge, depending on the managed lane strategies implemented (e.g., a high-occupancy vehicle or high-occupancy toll lane at certain times), motorists during summer weekend peak times could be incentivized to change their

behavior to take fewer single-occupant vehicle trips, or change their behavior to shift their trip to an off-peak time when there are no managed lane restrictions, resulting in a reduction in traffic during summer weekends during peak hours. The potential reduction in summer weekend traffic is expressed in **Table 6** as vehicles per hour compared to bridge capacity.

Table 6

Summer Weekend Managed Lanes Volume Projection

Hour	AKRF Summer Weekend Hourly Traffic Volume Projection (vehicles per hour)^					
	Without Actively Managed Lanes				With Actively Managed Lanes	
	2018		2040		2040	
	EB	WB	EB	WB	EB	WB
12-1 PM	2,727	4,098	2,906	4,368	2,828	4,250
1-2 PM	2,888	3,942	3,078	4,201	2,995	4,088
2-3 PM	2,885	3,663	3,075	3,904	2,992	3,799
3-4 PM	3,295	3,423	3,512	3,648	3,417	3,550

NOTES:

EB = Eastbound

WB = Westbound

Volume exceeds capacity (EB capacity: 3,800 vph, WB capacity: 3,900 vph)

^Developed by AKRF, based on 2009-2018 annual average daily traffic and Automatic Traffic Recorder data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge.

The benefit of managed lanes is shown in **Table 7** as volume-to-capacity (V/C) ratios; a V/C ratio greater than 1.0 indicates that the capacity of the bridge would be exceeded by traffic demand, resulting in traffic congestion.

Table 7

Summer Weekend Managed Lanes Volume-to-Capacity Projection

Hour	AKRF Summer Weekend Hourly Volume-to-Capacity Projection					
	Without Actively Managed Lanes				With Actively Managed Lanes	
	2018		2040		2040	
	EB	WB	EB	WB	EB	WB
12-1 PM	0.72	1.08	0.76	1.15	0.74	1.12
1-2 PM	0.76	1.04	0.81	1.11	0.79	1.08
2-3 PM	0.76	0.96	0.81	1.03	0.79	1.00
3-4 PM	0.87	0.90	0.92	0.96	0.90	0.93

NOTES:

EB = Eastbound

WB = Westbound

V/C ratio exceeds 1.00, indicating that the projected volume exceeds capacity (EB capacity: 3,800 vph, WB capacity: 3,900 vph)

As shown in **Table 6** and **Table 7**, the application of managed lanes along the Chesapeake Bay Bridge could result in reduced 2040 projected peak hour traffic volumes in the eastbound direction during summer weekends, and could potentially reduce the number of hours when 2040 projected weekday volumes exceed capacity. Although there could be certain times of the day where the bridge capacity is exceeded even with managed lanes in 2040, it is AKRF's opinion that this measure, properly implemented and taken together with the other measures described in this section, will reduce peak period traffic congestion and likely substantially prolong the life of the bridge.

Cumulative Effects and Conclusion

The effects of each individual improvement and/or trend on traffic volume forecasts, toll plaza queues, and traffic congestion show that by applying more realistic assumptions such as realistic growth, telecommuting, or cashless tolling, and implementing appropriate congestion mitigation strategies such as congestion pricing or managed lanes, the projected traffic conditions in the Purpose and Need Assessment would not be reached in 2040. Two cumulative effects analyses are presented:

(1) a typical weekday traffic volume projection showing the number of years it would take to reach the projected 2040 daily volumes presented in the Purpose and Need Assessment of 84,276 vehicles per day (shown in **Table 1**) if more realistic growth and continued natural growth in telecommuting were assumed; and

(2) a summer weekend peak hour volume-to-capacity comparison showing the number of years it would take to reach the projected 2040 daily congested hours exceeding bridge capacity shown in **Figure 6** according to the Purpose and Need Assessment if the benefits of congestion pricing and managed lanes benefits were assumed.

The results of these studies show that by assuming more realistic traffic growth trends, when combined with commonly-used, implementable traffic congestion-reducing tools, the Chesapeake Bay Bridge would not reach the metrics presented in the Purpose and Need Assessment until late this century or beyond.

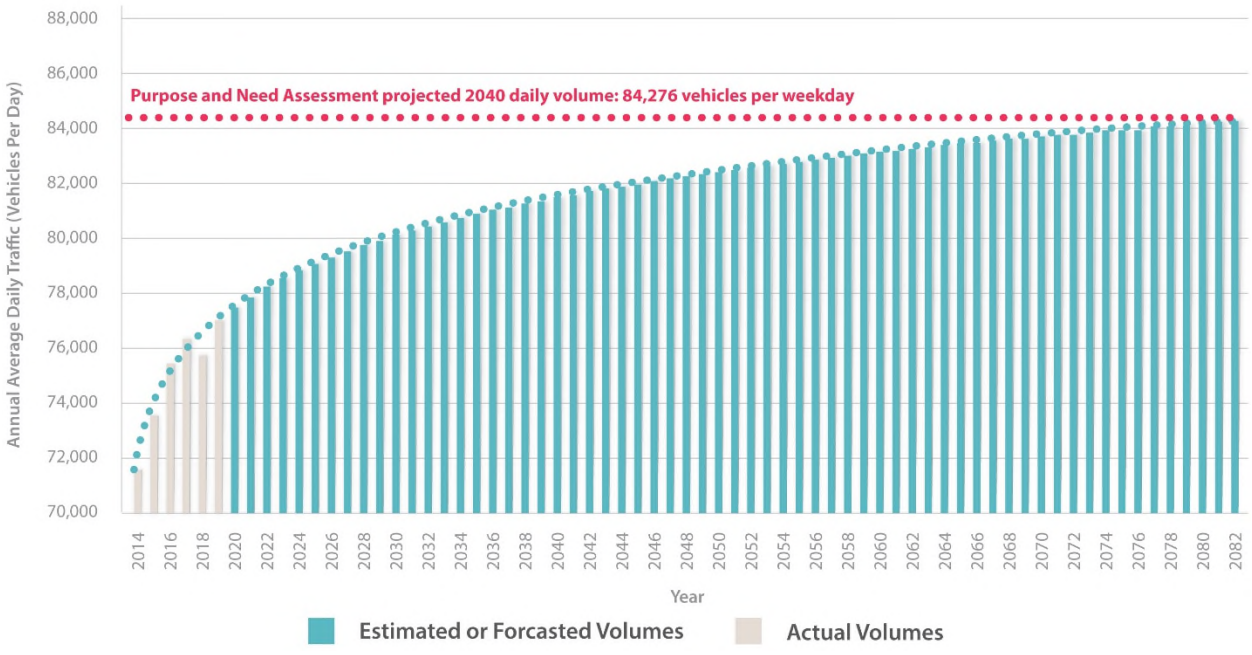


Figure 8. Estimated Number of Years to Reach Purpose and Need Weekday Daily Projected Traffic Volumes per AKRF Realistic Traffic Growth Forecasts and Continued Telecommuting Trends

As shown in **Figure 8**, based on the more realistic traffic volume growth rates, the projected weekday daily traffic volume of approximately 84,276 vehicles in 2040 would not be attained until the year 2082. The estimates presented in **Figure 8** assume a continuous, steady growth in telecommuting; if the growth rate in telecommuting were to accelerate even more rapidly when compared to the rate of growth in recent years, then it could potentially take even longer to attain the projected weekday daily traffic volume from the Purpose and Need Assessment's forecasts for 2040. Furthermore, these projections did not include potential reductions in traffic volume growth that will occur as a result of the COVID-19 pandemic and any future recessions likely to occur and last a year or more between 2019 and 2040.

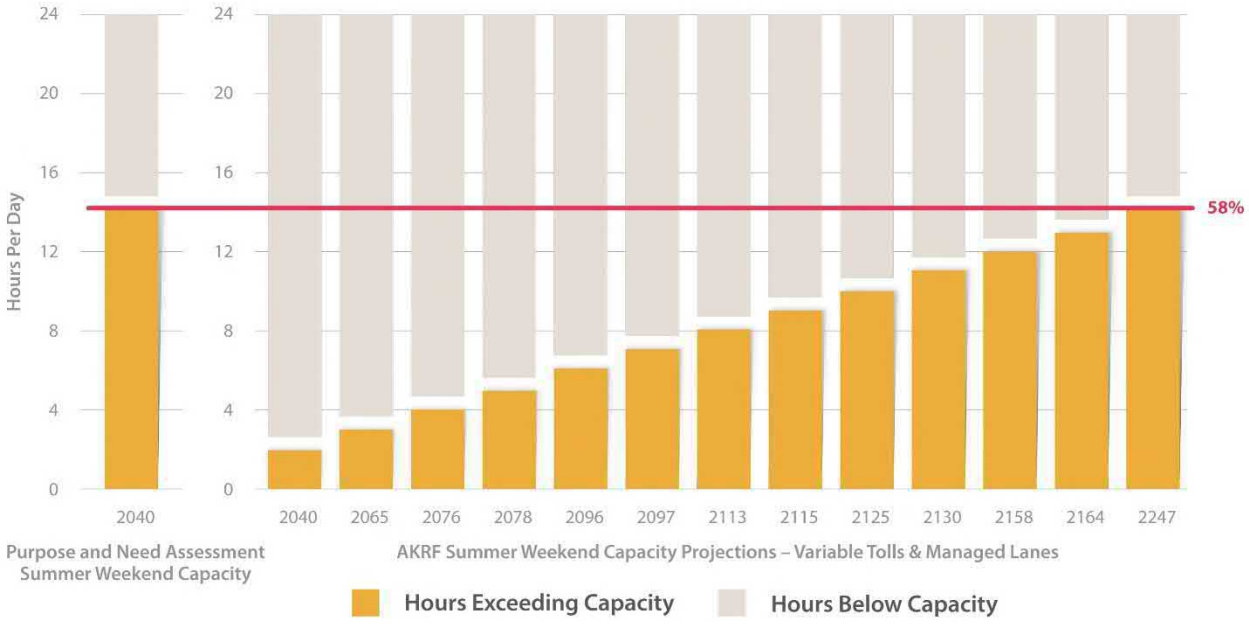


Figure 9. Estimated Years to Reach Purpose and Need Summer Weekend Daily Projected Traffic Congestion per AKRF Realistic Traffic Growth Forecasts with Variable Tolls and Managed Lanes Implemented

As shown in **Figure 9**, the Purpose and Need Assessment projects that in 2040, the bridge's traffic demand would exceed its capacity 58 percent of the time during a typical summer weekend day. However, using AKRF's realistic traffic growth and including the beneficial traffic congestion-reducing effects of variable tolls and managed lanes, in 2040 it would exceed its capacity only eight percent of the time. Furthermore, it would take until the year 2247 to reach the 2040 projections of the Purpose and Need Assessment. Much of this is owed to the higher than average counts that were collected and used as typical summer weekend daily traffic in the Purpose and Need Assessment. Even without actively managed lanes and variables tolls, the bridge would still only exceed its capacity 12 percent of the time in 2040 on summer weekends.

As previously stated, according to the 2015 Life Cycle Cost Analysis Study by MDTA, the bridge can be safely maintained through 2065 with currently programmed and anticipated rehabilitation and maintenance work, and beyond 2065, the bridge may require major rehabilitation but would not be structurally deficient or functionally obsolete. Therefore, based on the conclusions of AKRF's study of

traffic congestion and operations on the bridge, and MDTA's Life Cycle Study of the bridge's structural integrity, there will not likely be a need for a replacement bridge by 2040 for either traffic or structural purposes.

APPENDIX 1
REALISTIC TRAFFIC GROWTH FORECASTING

REALISTIC TRAFFIC VOLUME GROWTH FORECASTING

Using publicly available data on annual average daily traffic (AADT) and automatic traffic recorder (ATR) counts from the Maryland Department of Transportation (MDOT), traffic projections were developed in comparison with those from the Purpose and Need Assessment. These projections are referred to as "AKRF Traffic Volume Projections." The available data[1] provides AADT and weekday AADT for roadway segments across the state of Maryland, including the Chesapeake Bay Bridge in both directions, from 2009 to 2018, and weekday and summer weekend ATR counts along the Chesapeake Bay Bridge from 2001 to 2019. The ATR count and weekday AADT data were then used to develop an estimate of the weekday and summer weekend AADT for the Chesapeake Bay Bridge in both directions.

In contrast, the Purpose and Need Assessment used a sample of one day of data in August 2017 to report 2017 existing weekend traffic volumes which resulted in a much higher than average summer weekend day. The AKRF estimates for 2018 reported daily summer weekend traffic of approximately 100,300 vehicles per day on average, and the Purpose and Need Assessment reported 2017 daily summer weekend traffic of approximately 118,600 vehicles per day. Similarly, the Purpose and Need Assessment did not use the MDOT data for weekdays even though weekday AADT is available for the bridge. Rather than use AADT and/or several days or weeks of ATR counts to normalize the traffic data, those volumes are based on single-day ATR counts in May and August 2017. As shown in **Figure 1**, summer weekends averaged annually for the month of July have only surpassed 100,000 vehicles per day one year, in 2018.

[1] https://data.imap.maryland.gov/datasets/3f4b959826c34480be3e4740e4ee025f_1, http://maps.roads.maryland.gov/itms_public/

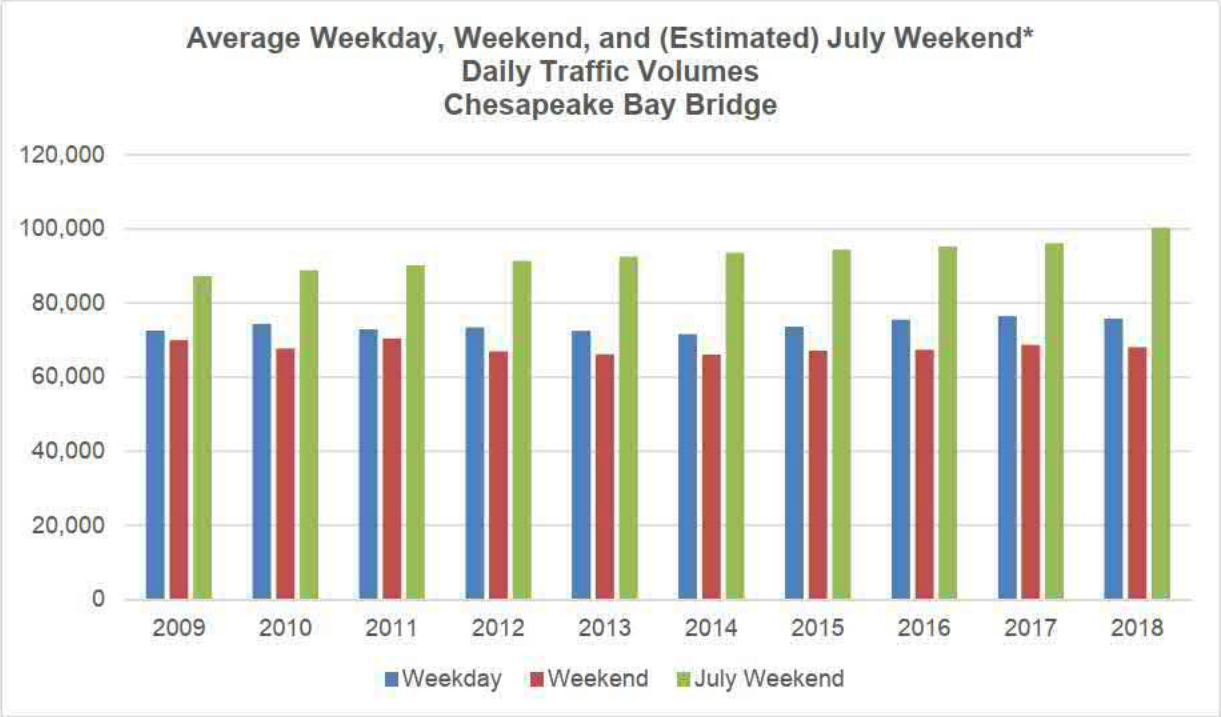


Figure 1. Chesapeake Bay Bridge annual average daily traffic volumes – weekday and weekend day. Source: Maryland Department of Transportation.
*July weekend traffic volumes for years between 2009 and 2018 were estimated, based on ATRcounts on the Chesapeake Bay Bridge on July weekends in 2003, 2006, 2018, and 2019.

For the purposes of projecting traffic volumes to 2040, a conservative assumption that the pattern of traffic growth observed from 2014 to 2018 would continue to 2040 was applied for weekday traffic volumes. The 2040 traffic volumes were projected using a logarithmic trendline that follows the pattern of traffic volume growth observed from 2014 to 2018, as shown in **Figure 2** for weekday traffic volumes. For weekend traffic volumes, the logarithmic trendline based on available July weekend traffic counts in 2003, 2006, 2018, and 2019 was applied to project traffic volumes to 2040, and to estimate traffic volumes for interim years between 2003 and 2019. The 2040 traffic volume projections are shown in **Figure 3** for weekend daily traffic volumes.

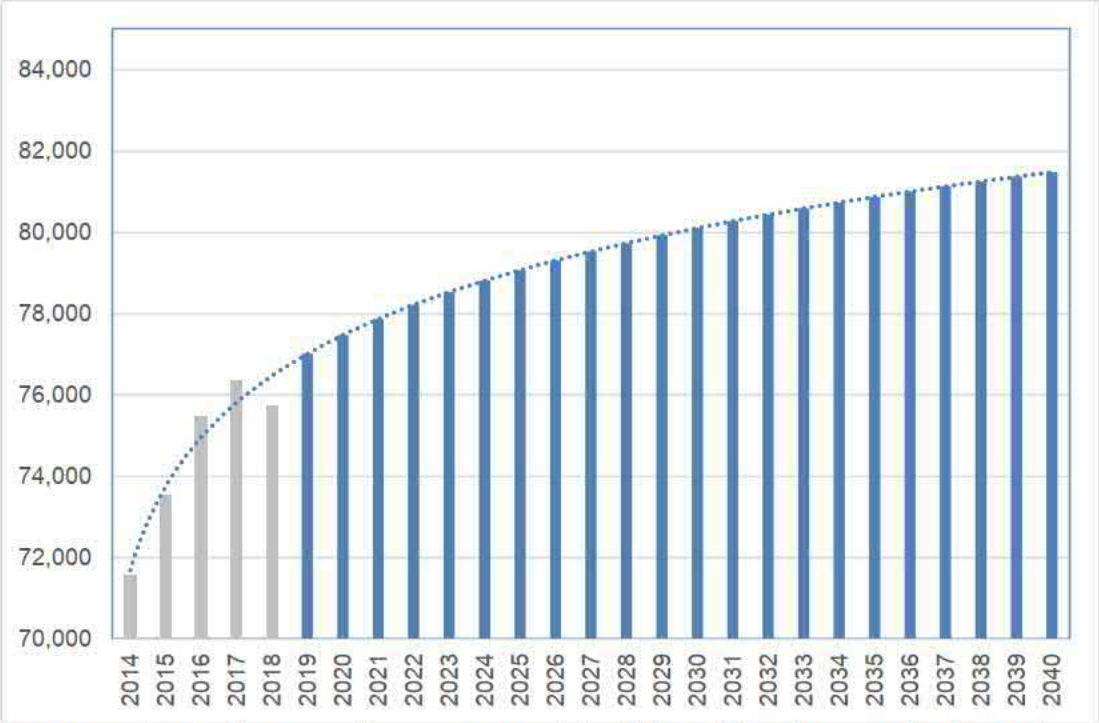


Figure 2. Chesapeake Bay Bridge average weekday daily traffic volumes projections using a logarithmic trendline from 2018 to 2040. The 2014 to 2018 weekday daily traffic volume data are based on data from the Maryland Department of Transportation. Gray bars are for actual data, and blue bars are for estimated daily traffic.

With a logarithmic curve, certain years of actual data can fall below the curve (such as 2006) or above the curve (such as 2018), but the overall correlation of the fitted curve with the data was found to be strong enough for it to be applied for the traffic volume projections. The R-squared value, which is a measure of the variation of actual summer weekend traffic volume data to the logarithmic trendline, was determined to be 0.90. This reflects a strong correlation with the actual data, since the R-squared value ranges from 0 to 1, and values closer to 1 reflect greater correlation between fitted trendlines and observed data.

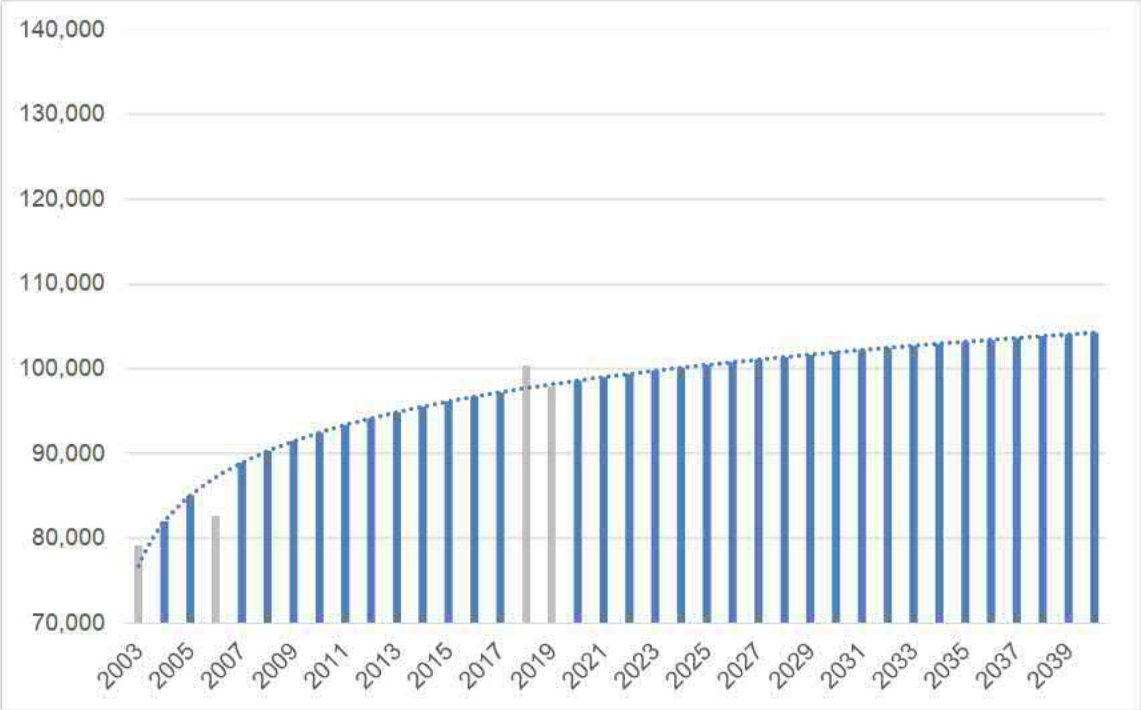


Figure 3. Chesapeake Bay Bridge average summer weekend daily traffic volumes projections using a logarithmic trendline from 2018 to 2040. The 2003, 2006, 2018, and 2019 summer weekend daily traffic volume data was determined using July weekend traffic count data from the Maryland Department of Transportation, the only years for which July weekend traffic count data were available. NOTE: Data for interim years without available data between 2003 and 2018 were also estimated based the logarithmic trendline. Gray bars are for actual data, and blue bars are for estimated daily traffic.

Similarly, the population of Queen Anne's County has grown only modestly over the past decade, as shown in **Figure 4**; population over the past 20 years in the county grew primarily during the 2000s, but has remained relatively flat during the 2010s. Overall, traffic volumes on the Chesapeake Bay Bridge, particularly on weekdays, have been well-correlated with the population of Queen Anne's County, and based on population trends over the past 20 years, it is unlikely that traffic volumes would increase on a linear or exponential pattern, but rather continue at a logarithmic pattern of growth, which would eventually be limited by the capacity of the bridge during certain times of the day/year.

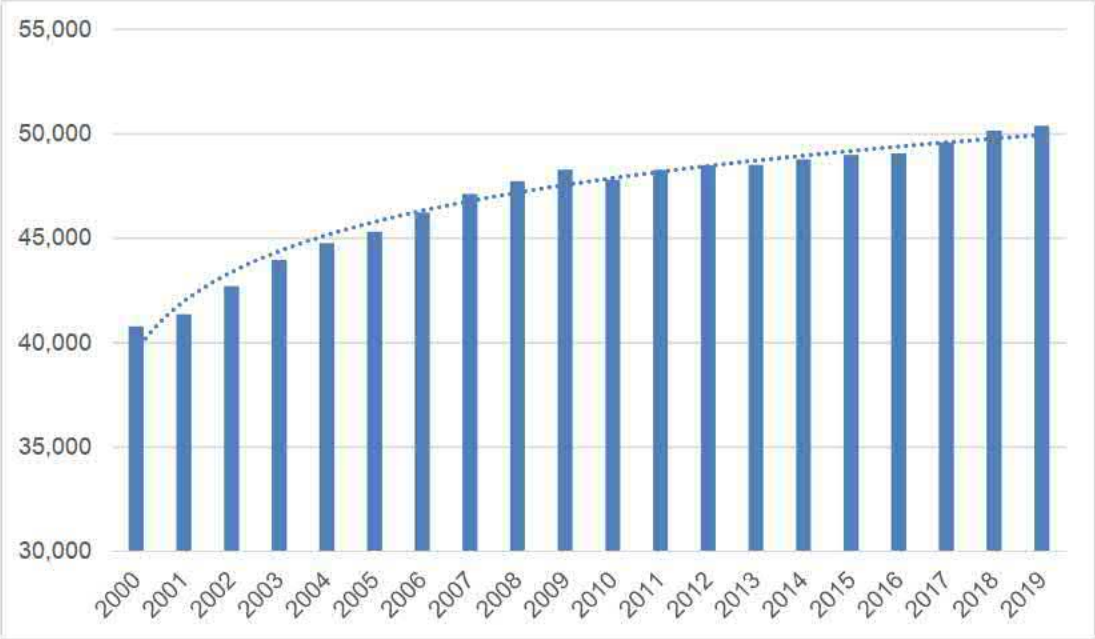


Figure 4. Population of Queen Anne's County, 2000 to 2019. Source: U.S. Census Bureau

According to AKRF projections, the growth rate from 2018 to 2040 for typical weekday traffic would be approximately 8 percent, compared to the 23 percent forecasted in the Purpose and Need Assessment. The AKRF projected 2040 summer weekend daily traffic volumes are forecasted to increase by approximately 4 percent from 2018 to 2040, compared with 14 percent (and starting at a much higher daily traffic baseline) in the Purpose and Need Assessment. The AKRF projections are based on historic traffic and show relatively more modest growth compared to those presented in the Purpose and Need Assessment, and much more modest growth when compared to previous studies.

Table 1 below compares these traffic growth rates with those presented in the Purpose and Need Assessment as well as previous studies. These projections indicate that even if one were to assume that the traffic volume growth in recent years on the Chesapeake Bay Bridge would be sustained from 2017 to 2040, it would be anticipated to grow at a more modest rate than the rate projected in the Purpose and Need Assessment.

Table 1
Comparison of Chesapeake Bay Bridge Traffic Volume Projections

	AKRF Traffic Volume Projection^			Bay Crossing Study Purpose and Need Assessment (2019)			Life Cycle Cost Analysis (2015)			Bay Bridge Transportation Needs Projection (2004)		
	2018 Actual	2040	%Growth	2017	2040	%Growth	2013	2040	%Growth	2001	2025	%Growth
Weekday	75,750	81,487	8%	68,598†	84,276	23%	86,200*	113,100*	31%*	61,000	86,000	41%
Weekend	100,286*	104,219*	4%*	118,597*†	135,280*	14%*	90,200*	118,400*	31%*	95,000*	135,000*	41%

NOTES:
^Developed by AKRF, based on 2009-2018 AADT data and 2003-2019 ATR data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge.
*Traffic volume for summer day
†2017 Purpose and Need Assessment traffic volumes are based on single-day count data collected in May and August, not AADT

Since actual daily weekday and weekend data were available for 2018, those data were used to establish the 2018 baseline for comparison to 2040 conditions. The trends shown in **Table 1** indicate that the Maryland Transportation Authority volume projections have overestimated traffic growth in its past studies. Although the previous bridge studies have lowered the projected growth rate of traffic in each subsequent study, historic trends indicate that realistic growth projections will be even lower, even without accounting for the traffic growth-stalling effects of an economic recession or two between 2018 and 2040.

TRAFFIC VOLUME PROJECTIONS WITH POTENTIAL ECONOMIC DOWNTURNS

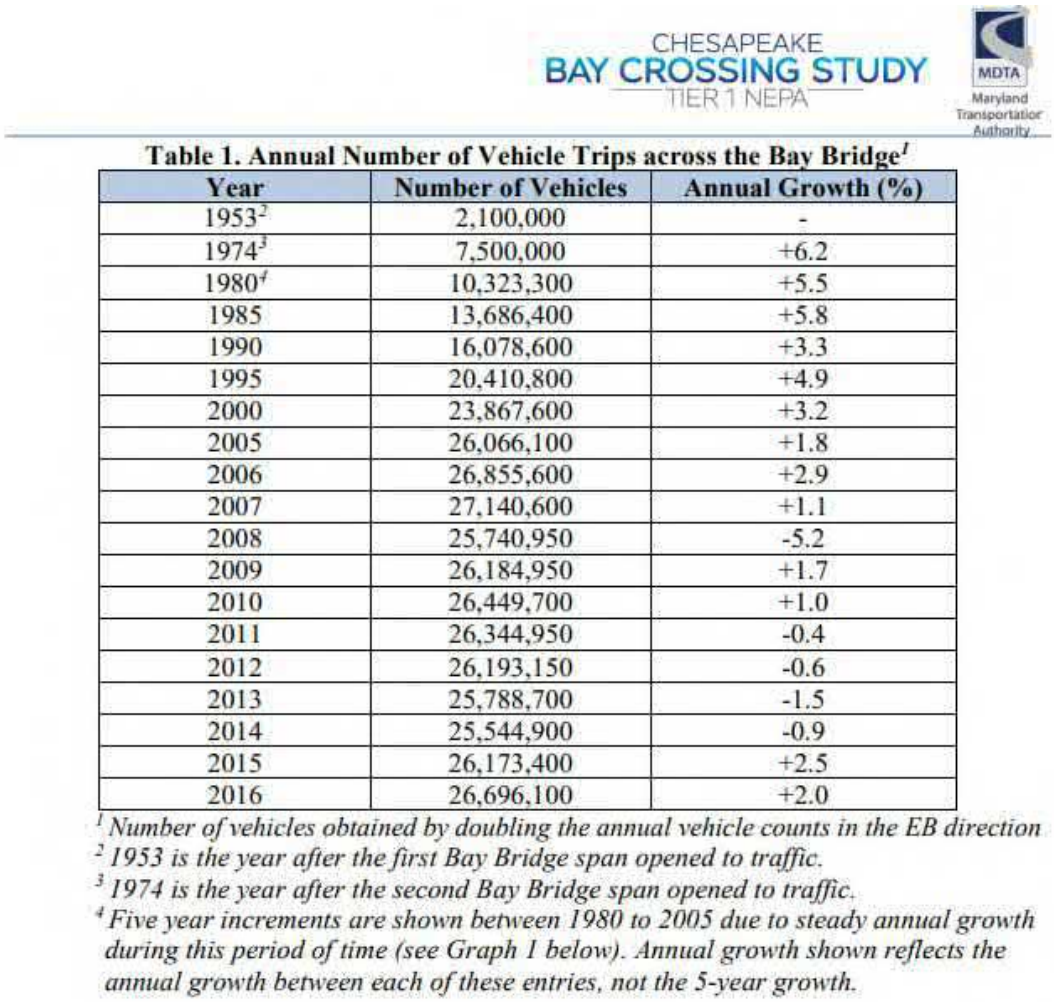
As shown in the table from the Purpose and Need Assessment in **Figure 5**, the economic downturn of 2007 to 2009 resulted in a 5.2percent reduction in traffic in 2008, and subsequent stagnation of traffic volumes on the Chesapeake Bay Bridge from 2009 to 2014. The traffic volume projections presented in **Figures 2 and 3** do not account for the potential for cyclical fluctuations in traffic volumes due to economic recessions, and assumes a continuous growth in a logarithmic pattern. The effect of economic recessions could further result in an even more stagnant trend in the growth in traffic volumes by 2040. The potential effects of hypothetical economic recessions were then factored into the projections, as described and summarized below:

The traffic volume projections in **Figures 2 and 3** were adjusted to account for two potential recessions:

- 2020-2022 economic recession, caused by the 2020 coronavirus pandemic
    - This recession would result in an approximately 40 percent decline in average weekday and weekend daily traffic volumes in 2020, consistent with the Institute of Transportation Engineers' studies in other major American metropolitan areas during the pandemic.[1]
    - Although there is significant uncertainty over how quickly the economy will recover from the coronavirus pandemic, it was assumed that traffic volumes would return to baseline levels by 2021, but would stagnate for a two-year period due to the effects of the economic downturn.
- A hypothetical 2030-2032 economic recession, resulting in a two-year period of stagnation in traffic volumes due to the effects of the economic downturn.

The traffic volume forecasts for the interim years would continue to follow the same logarithmic growth pattern used to develop those presented in **Figures 2 and 3**. The traffic volume projections with potential economic downturns are presented in **Figures 6 and 7. Table 2** compares the traffic volume projection with economic downturns assumed with comparable projections from the Purpose and Need Assessment and other recent studies, and shows that if there were to be several economic downturns in the future with a stagnation effect on traffic volumes, weekday daily traffic volumes are expected to continue to grow by 7 percent by 2040. Summer weekend daily traffic volumes are forecast grow by 3, compared to 4 percent by 2040.

[1] "COVID-19 Traffic Volume Trends." https://www.ite.org/about-ite/covid-19-resources/covid-19-traffic-volume-trends/



CHESAPEAKE BAY CROSSING STUDY
TIER 1 NEPA

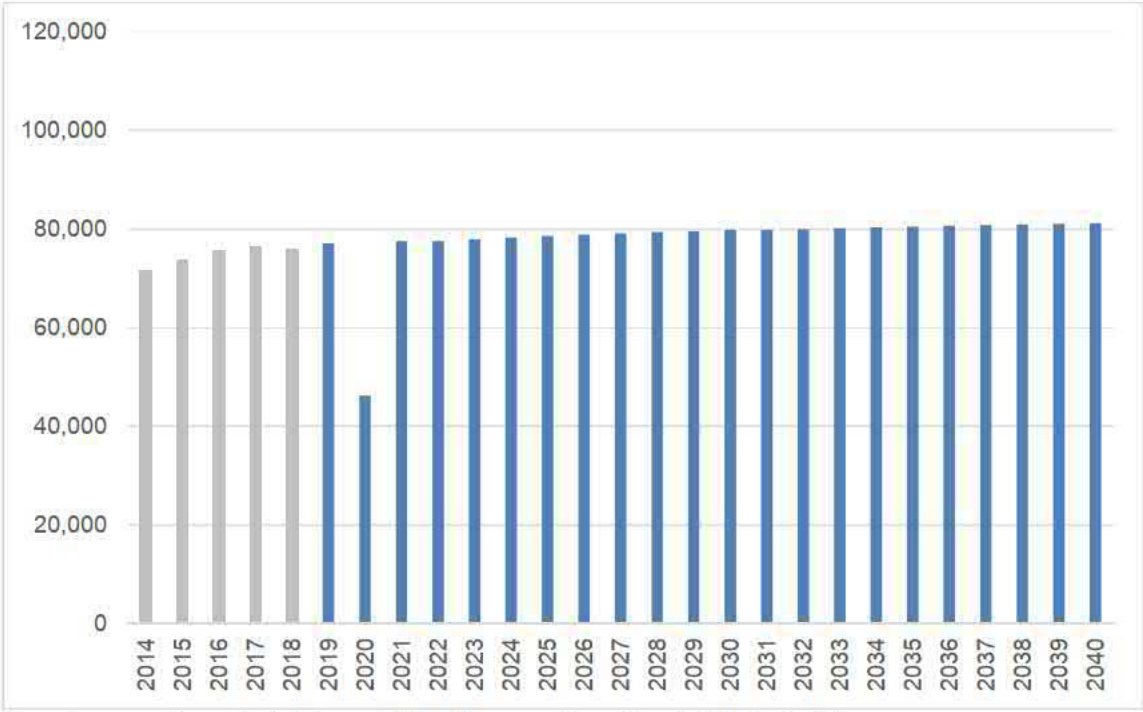
MDTA Maryland Transportation Authority

Table 1. Annual Number of Vehicle Trips across the Bay Bridge[1]

Year	Number of Vehicles	Annual Growth (%)
1953[2]	2,100,000	-
1974[3]	7,500,000	+6.2
1980[4]	10,323,300	+5.5
1985	13,686,400	+5.8
1990	16,078,600	+3.3
1995	20,410,800	+4.9
2000	23,867,600	+3.2
2005	26,066,100	+1.8
2006	26,855,600	+2.9
2007	27,140,600	+1.1
2008	25,740,950	-5.2
2009	26,184,950	+1.7
2010	26,449,700	+1.0
2011	26,344,950	-0.4
2012	26,193,150	-0.6
2013	25,788,700	-1.5
2014	25,544,900	-0.9
2015	26,173,400	+2.5
2016	26,696,100	+2.0

[1] Number of vehicles obtained by doubling the annual vehicle counts in the EB direction
[2] 1953 is the year after the first Bay Bridge span opened to traffic.
[3] 1974 is the year after the second Bay Bridge span opened to traffic.
[4] Five year increments are shown between 1980 to 2005 due to steady annual growth during this period of time (see Graph 1 below). Annual growth shown reflects the annual growth between each of these entries, not the 5-year growth.

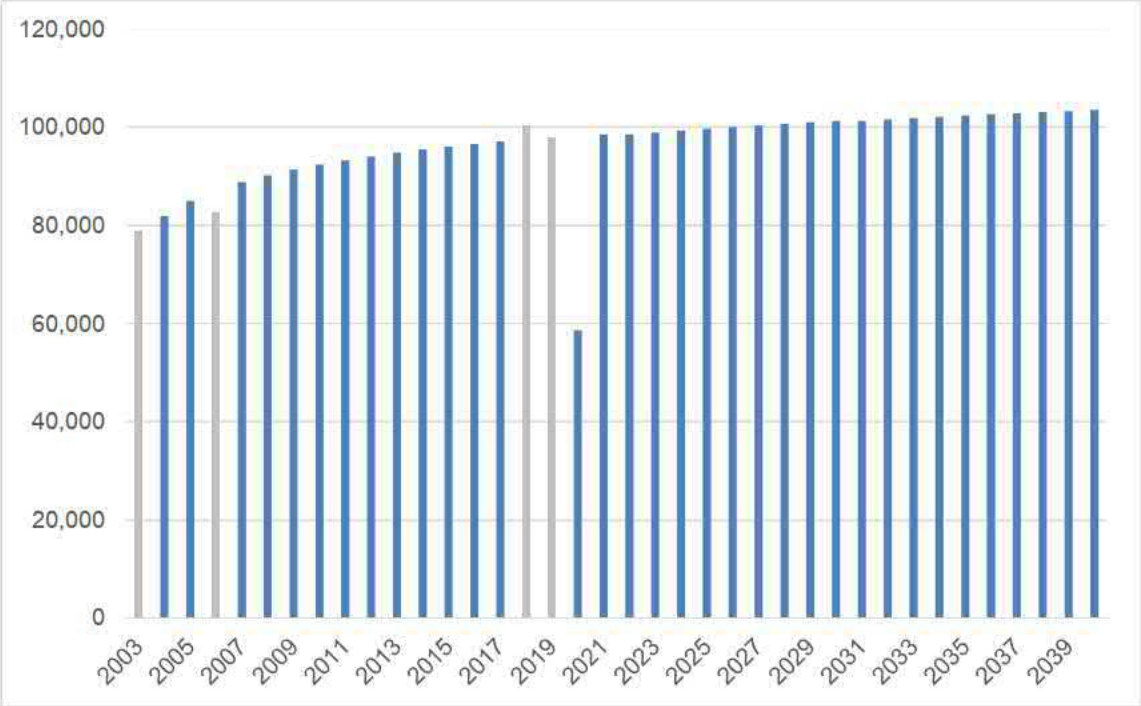
Figure 5. Screenshot of Table 1 from the Purpose and Need Assessment showing annual vehicle trips on the Chesapeake Bay Bridge by year.



Gray bars are for actual data, and blue bars are for estimated daily traffic.

Figure 6. Weekday AADT projections assuming two hypothetical recessions:

- 2020-2022: COVID-19 induced recession resulting in 40 percent decline in 2020 traffic volume (based on ITE COVID-19 traffic volume studies during pandemic) and stagnation in recovery of traffic volumes in 2021-22
- 2030-2032: Hypothetical recession resulting in a two-year stagnation of traffic volumes



Gray bars are for actual data, and blue bars are for estimated daily traffic.

Figure 7. Summer Weekend AADT projections assuming two hypothetical recessions:

- 2020-2022: COVID-19 induced recession resulting in 40 percent decline in 2020 traffic volume (based on ITE COVID-19 traffic volume studies during pandemic) and stagnation in recovery of traffic volumes in 2021-22
- 2030-2032: Hypothetical recession resulting in a two-year stagnation of traffic volumes

Table 2

Comparison of Chesapeake Bay Bridge Traffic Volume Projections (with economic downturns assumed)

	AKRF Traffic Volume Projection, With Economic Downturns Assumed^			Bay Crossing Study Purpose and Need Assessment (2019)			Life Cycle Cost Analysis (2015)			Bay Bridge Transportation Needs Projection (2004)		
	2018 Actual	2040	%Growth	2017	2040	%Growth	2013	2040	%Growth	2001	2025	%Growth
Weekday	75,750	81,137	7%	68,598†	84,276	23%	86,200*	113,100*	31%*	61,000	86,000	41%
Weekend	100,286*	103,596*	3%*	118,597*†	135,280*	14%*	90,200*	118,400*	31%*	95,000*	135,000*	41%

NOTES:
^Developed by AKRF, based on 2009-2018 AADT data and 2003-2019 ATR data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge. Assumes a COVID-19 recession from 2020-2022 resulting in temporary decline in traffic volume and subsequent two-year recovery, and a hypothetical recession in 2030-2032 resulting in a flattening of traffic volume over two-year period.
*Traffic volume for summer day
†2017 Purpose and Need Assessment traffic volumes are based on multiple day count data for weekdays, not weekday AADT, and single-day count data collected in August for weekends

APPLICATION OF REALISTIC TRAFFIC GROWTH

According to the 2015 *US 50/301 William Preston Lane Jr. Memorial (Bay) Bridge Life Cycle Cost Analysis* report, the maximum vehicular flow to achieve an acceptable Level of Service (LOS) D is 3,800 vehicles per hour (vph) in the eastbound direction and 3,900 vph in the westbound direction. These are daily average values factoring in the contraflow lane, which yields slightly different characteristics by direction according to the Maryland Transportation Authority report.

The AKRF hourly projected volumes for the 2017/2018 and 2040 conditions were calculated based on the weekday and summer weekend hourly volume distribution from historical ATR data from MDOT. Using the maximum vehicular flow as the theoretical capacity of the bridge, **Table 3** shows the projected hourly volumes and highlights the hours that capacity is exceeded, and **Table 4** shows the same highlighted cells but expressed as a volume-to-capacity (V/C) ratio. When the V/C ratio exceeds 1.0, the capacity of the facility is exceeded and delays and queues of traffic form approaching the bridge.

Based on the traffic volume projections developed for the Purpose and Need Assessment, traffic volumes would exceed bridge capacity for two hours (4 PM to 6 PM) on an average weekday in 2040, and for an average summer weekend day for 13 hours (8 AM to 10 AM, 11 AM to 10 PM) in 2017 and 14 hours (8 AM to 10 PM) in 2040. Under AKRF projections, traffic volumes are expected to exceed bridge capacity for two hours (4 PM to 6 PM) on an average weekday in 2040, and for an average summer weekend day for two hours (12 PM to 2 PM) in 2018 and three hours (12 PM to 3 PM) in 2040.

Table 3

Hourly Traffic Volume Projections and Capacity Projections

	AKRF Traffic Volume Projection (vph)^								Bay Crossing Study Purpose and Need Assessment (2019) (vph)							
	Weekday				Summer Weekend				Weekday				Summer Weekend			
	2018 Actual		2040		2018 Actual		2040		2017		2040		2017		2040	
Time	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12 AM	271	172	292	186	550	652	587	695	246	156	302	192	651	771	743	879
1 AM	209	149	225	161	401	474	427	505	189	135	233	166	474	560	541	639
2 AM	169	155	181	167	230	298	245	318	153	141	188	173	272	353	310	402
3 AM	180	261	194	281	251	250	268	267	163	236	201	290	297	296	339	337
4 AM	267	715	287	769	311	314	331	334	242	647	297	795	367	371	419	423
5 AM	490	1,875	527	2,017	634	522	675	556	444	1,698	545	2,086	749	617	855	704
6 AM	994	2,883	1,069	3,102	1,349	809	1,438	862	900	2,611	1,106	3,208	1,595	956	1,820	1,091
7 AM	1,468	3,305	1,580	3,555	2,627	1,201	2,800	1,281	1,330	2,993	1,634	3,677	3,107	1,421	3,544	1,621
8 AM	1,629	2,823	1,752	3,037	3,260	1,892	3,475	2,017	1,475	2,556	1,812	3,140	3,854	2,238	4,397	2,553
9 AM	1,702	2,352	1,831	2,531	3,248	2,680	3,462	2,856	1,542	2,130	1,894	2,617	3,840	3,168	4,381	3,615
10 AM	2,002	2,066	2,154	2,222	3,012	3,209	3,210	3,420	1,813	1,871	2,227	2,298	3,561	3,794	4,063	4,328
11 AM	2,212	2,022	2,379	2,175	3,173	3,601	3,382	3,839	2,003	1,831	2,461	2,249	3,751	4,258	4,280	4,858
12 PM	2,216	2,047	2,383	2,202	2,727	4,098	2,906	4,368	2,006	1,854	2,465	2,277	3,224	4,846	3,678	5,528
1 PM	2,274	2,075	2,446	2,232	2,888	3,942	3,078	4,201	2,059	1,879	2,530	2,308	3,414	4,660	3,895	5,317
2 PM	2,506	2,129	2,696	2,290	2,885	3,663	3,075	3,904	2,270	1,928	2,788	2,369	3,411	4,331	3,891	4,941
3 PM	3,254	2,113	3,500	2,274	3,295	3,423	3,512	3,648	2,946	1,914	3,620	2,351	3,896	4,047	4,444	4,617
4 PM	3,736	2,072	4,019	2,228	3,362	3,348	3,584	3,569	3,383	1,876	4,157	2,305	3,976	3,959	4,536	4,516
5 PM	3,582	1,986	3,854	2,137	2,808	3,458	2,993	3,686	3,244	1,799	3,986	2,210	3,320	4,088	3,788	4,664
6 PM	3,040	1,654	3,271	1,779	2,393	3,589	2,550	3,825	2,753	1,498	3,383	1,840	2,829	4,244	3,227	4,841
7 PM	2,066	1,279	2,222	1,375	1,987	3,409	2,118	3,634	1,871	1,158	2,298	1,423	2,349	4,031	2,680	4,599
8 PM	1,725	1,023	1,855	1,100	1,596	3,515	1,701	3,747	1,562	926	1,919	1,138	1,887	4,156	2,153	4,742
9 PM	1,295	826	1,394	889	1,291	3,330	1,376	3,549	1,173	748	1,441	919	1,526	3,937	1,741	4,491
10 PM	947	545	1,019	586	1,010	1,579	1,076	1,683	858	494	1,053	606	1,194	1,867	1,362	2,130
11 PM	675	313	726	337	932	816	993	870	611	284	751	349	1,102	965	1,257	1,101
Total	38,909	36,840	41,856	39,632	46,220	54,072	49,262	57,634	35,236	33,363	43,291	40,986	54,646	63,934	62,344	72,937

NOTES:

EB = Eastbound

WB = Westbound

vph = vehicles per hour

Volume exceeds capacity (EB capacity: 3,800 vph, WB capacity: 3,900 vph)

^Developed by AKRF, based on 2009-2018 AADT and ATR data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge.

Table 4

Hourly Traffic Volume-to-Capacity Ratio Projections

	AKRF Traffic Volume Projection V/C								Bay Crossing Study Purpose and Need Assessment (2019) V/C							
	Weekday				Summer Weekend				Weekday				Summer Weekend			
	2018 Actual		2040		2018 Actual		2040		2017		2040		2017		2040	
Time	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB	EB	WB
12 AM	0.07	0.04	0.08	0.05	0.14	0.17	0.15	0.18	0.06	0.04	0.08	0.05	0.17	0.20	0.20	0.23
1 AM	0.06	0.04	0.06	0.04	0.11	0.12	0.11	0.13	0.05	0.03	0.06	0.04	0.12	0.14	0.14	0.16
2 AM	0.04	0.04	0.05	0.04	0.06	0.08	0.06	0.08	0.04	0.04	0.05	0.04	0.07	0.09	0.08	0.10
3 AM	0.05	0.07	0.05	0.07	0.07	0.06	0.07	0.07	0.04	0.06	0.05	0.07	0.08	0.08	0.09	0.09
4 AM	0.07	0.18	0.08	0.20	0.08	0.08	0.09	0.09	0.06	0.17	0.08	0.20	0.10	0.10	0.11	0.11
5 AM	0.13	0.48	0.14	0.52	0.17	0.13	0.18	0.14	0.12	0.44	0.14	0.53	0.20	0.16	0.23	0.18
6 AM	0.26	0.74	0.28	0.80	0.36	0.21	0.38	0.22	0.24	0.67	0.29	0.82	0.42	0.25	0.48	0.28
7 AM	0.39	0.85	0.42	0.91	0.69	0.31	0.74	0.33	0.35	0.77	0.43	0.94	0.82	0.36	0.93	0.42
8 AM	0.43	0.72	0.46	0.78	0.86	0.49	0.91	0.52	0.39	0.66	0.48	0.81	1.01	0.57	1.16	0.65
9 AM	0.45	0.60	0.48	0.65	0.85	0.69	0.91	0.73	0.41	0.55	0.50	0.67	1.01	0.81	1.15	0.93
10 AM	0.53	0.53	0.57	0.57	0.79	0.82	0.84	0.88	0.48	0.48	0.59	0.59	0.94	0.97	1.07	1.11
11 AM	0.58	0.52	0.63	0.56	0.84	0.92	0.89	0.98	0.53	0.47	0.65	0.58	0.99	1.09	1.13	1.25
12 PM	0.58	0.52	0.63	0.56	0.72	1.05	0.76	1.12	0.53	0.48	0.65	0.58	0.85	1.24	0.97	1.42
1 PM	0.60	0.53	0.64	0.57	0.76	1.01	0.81	1.08	0.54	0.48	0.67	0.59	0.90	1.19	1.03	1.36
2 PM	0.66	0.55	0.71	0.59	0.76	0.94	0.81	1.00	0.60	0.49	0.73	0.61	0.90	1.11	1.02	1.27
3 PM	0.86	0.54	0.92	0.58	0.87	0.88	0.92	0.94	0.78	0.49	0.95	0.60	1.03	1.04	1.17	1.18
4 PM	0.98	0.53	1.06	0.57	0.88	0.86	0.94	0.92	0.89	0.48	1.09	0.59	1.05	1.02	1.19	1.16
5 PM	0.94	0.51	1.01	0.55	0.74	0.89	0.79	0.95	0.85	0.46	1.05	0.57	0.87	1.05	1.00	1.20
6 PM	0.80	0.42	0.86	0.46	0.63	0.92	0.67	0.98	0.72	0.38	0.89	0.47	0.74	1.09	0.85	1.24
7 PM	0.54	0.33	0.58	0.35	0.52	0.87	0.56	0.93	0.49	0.30	0.60	0.36	0.62	1.03	0.71	1.18
8 PM	0.45	0.26	0.49	0.28	0.42	0.90	0.45	0.96	0.41	0.24	0.51	0.29	0.50	1.07	0.57	1.22
9 PM	0.34	0.21	0.37	0.23	0.34	0.85	0.36	0.91	0.31	0.19	0.38	0.24	0.40	1.01	0.46	1.15
10 PM	0.25	0.14	0.27	0.15	0.27	0.40	0.28	0.43	0.23	0.13	0.28	0.16	0.31	0.48	0.36	0.55
11 PM	0.18	0.08	0.19	0.09	0.25	0.21	0.26	0.22	0.16	0.07	0.20	0.09	0.29	0.25	0.33	0.28

NOTES:
EB = Eastbound
WB = Westbound
V/C = Volume to Capacity Ratio
V/C ratio exceeds 1.00, indicating that the projected volume exceeds capacity (EB capacity: 3,800 vph, WB capacity: 3,900 vph)

Subsequently, for the 2040 summer weekend volume projections, the AKRF estimates indicate that capacity on the Chesapeake Bay Bridge would be exceeded for 12 percent of the day, compared to 58 percent of the day according to the Purpose and Need Assessment traffic volume projections, shown in **Figure 8** and **Figure 9**.

Figure 8
AKRF Volume Projections – 2040 Summer Weekend– Chesapeake Bay Bridge Capacity

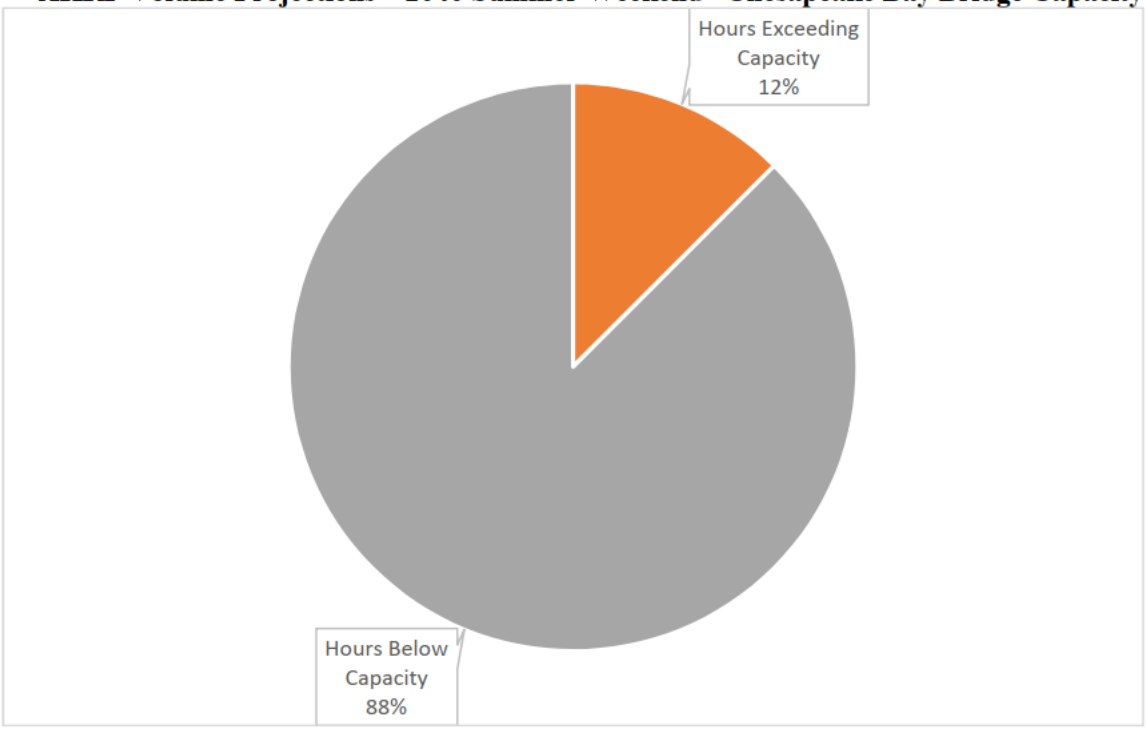
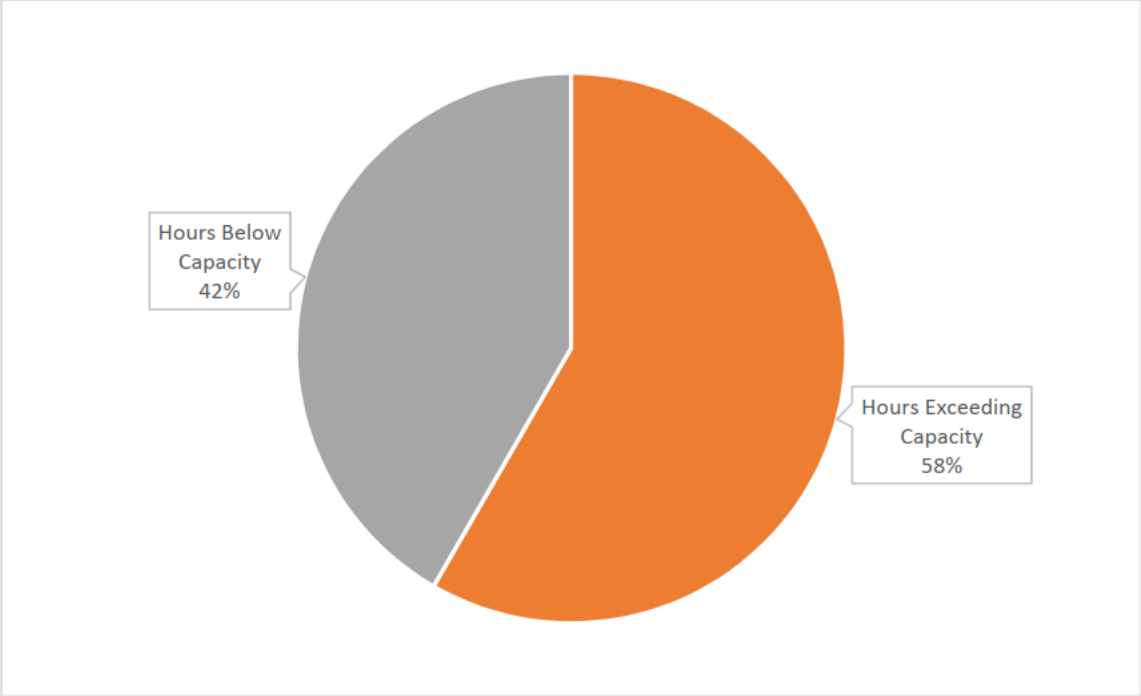


Figure 9
Purpose and Need Assessment Volume Projections – 2040 Summer Weekend– Chesapeake Bay Bridge Capacity



APPENDIX 2
TELECOMMUTING

TELECOMMUTING AND WORKING FROM HOME

According to Figure 3 in the Purpose and Need Assessment, approximately 49 percent of non-summer weekday westbound Chesapeake Bay Bridge traffic originates in Queen Anne's County, while 41 percent is destined for Anne Arundel County; approximately 44 percent of non-summer weekday eastbound bridge traffic originates in Anne Arundel County, while 47 percent is destined for Queen Anne's County. This is an indication that on a typical non-summer weekday, a significant portion of bridge traffic is "local" and likely made up of work-related trips. Many types of work-related trips have the potential to be replaced by telecommuting, as is being proven during the COVID-19 pandemic. Below, research on telecommuting worker population statistics as reported by Census data are presented.

Even if the population of Queen Anne's County, Anne Arundel County, and the surrounding region was assumed to grow at a faster rate than it did over the past 20 years, the corresponding effect on traffic volumes could be partially offset by a substantial rise in telecommuting. The ability for workers, particularly those employed in professional services industries, to tele-commute has already had a modest effect in limiting the growth in commuting by car in Queen Anne's County, Anne Arundel County, and the surrounding region. From 2000 to 2016, the workforce of Queen Anne's County and Anne Arundel County increased by 20 percent and 15 percent, respectively. The workforce of the Washington D.C. and Baltimore metropolitan regions increased by 24 percent and 12 percent, respectively. In comparison, the growth in the number of commuters traveling by car to work over this period was more modest, as shown in **Table 2**.

Table 2

Comparison of Growth in Telecommuting and Car Commuting in Region

	2000	2010	2016	Percent Growth 2000-2016
Workers Telecommuting				
Queen Anne's County	1,150	1,580	1,800	57%
Anne Arundel County	8,765	10,593	14,500	65%
Washington DC Metropolitan Area	93,460	127,540	163,855	75%
Baltimore Metropolitan Area	38,590	48,605	60,060	56%
Workers Commuting By Car				
Queen Anne's County	18,950	21,095	22,135	17%
Anne Arundel County	232,780	242,510	257,315	11%
Washington DC Metropolitan Area	2.18 million	2.36 million	2.52 million	15%
Baltimore Metropolitan Area	1.06 million	1.13 million	1.17 million	10%
Total Workforce				
Queen Anne's County	20,850	23,590	25,060	20%
Anne Arundel County	255,860	270,361	293,520	15%
Washington DC Metropolitan Area	2.67 million	3.04 million	3.32 million	24%
Baltimore Metropolitan Area	1.22 million	1.32 million	1.38 million	12%
Source: U.S. Census Bureau - 2000 Census, 2006-10 and 2012-16 American Community Survey				

As shown in the above table, the greater increase in telecommuter workforce from 2000 to 2016 (57 percent) in Queen Anne's County compared to total workforce growth over the same period (20 percent) means that telecommuting worker growth is outpacing total workforce growth at a rate of almost 3 to 1. The increasing percentage of telecommuters to total workforce (7 percent in 2016 compared to 5 percent in 2000) also shows that telecommuting is on the rise. In Anne Arundel County, the telecommuter workforce grew at an even faster rate from 2000 to 2016 (65 percent), compared to total workforce growth over the same period (15 percent). The telecommuter worker growth in Anne Arundel County outpaced total workforce growth at a rate of 5 to 1. Similar trends of substantial growth in telecommuting relative to growth in commuting by car and growth in the total workforce were also pertinent to the wider region, in both the Baltimore and Washington D.C. metropolitan areas, indicating that this trend was not exclusive to the counties on either end of the Chesapeake Bay Bridge.

The COVID-19 pandemic has permanently changed employers' and employees' attitudes about telecommuting, as evidenced by polls. A poll conducted by Gallup found that in April 2020, a maximum of 63 percent of the surveyed American workforce worked from home due to the pandemic. Due to the COVID-19 pandemic, a growing number of the workforce, particularly those employed in professional services industries, are becoming increasingly accustomed to working from home, and may choose to continue to do so going forward, instead of commuting to work. The Gallup poll also found that approximately 49 percent of respondents would prefer to continue to work from home, and 59 percent of respondents would prefer to work remotely as much as possible rather than return to work at the office. Additionally, research has shown that the implementation of travel demand programs, such as incentivizing workers to telecommute, has had a statistically significant effect on reducing the likelihood that the worker commutes by driving alone.

As shown in the trends from 2000 to 2016, while this potential sustained growth in telecommuting may not necessarily mean that traffic volumes would remain steady over the long term in Queen Anne's County, Anne Arundel County, and the surrounding region, it could help offset the effects of population growth in the region on traffic volumes, as it would reduce the share of the workforce that drives to work.

APPLICATION OF TELECOMMUTING

Based on the telecommuting trends in the surrounding region described above, AKRF traffic volume projections were developed for the year 2040, in a scenario where telecommuters in the Baltimore-Washington region would consist of approximately 10 percent of the workforce by 2040, compared to 5 percent in 2016. This scenario assumes that due to advances in technology and changes in workplace policies and individual preferences, telecommuting will continue to grow to a level where it would be adopted by a growing share of the workforce. While the COVID-19 pandemic in 2020 may have accelerated this trend, with potentially more than 10 percent of the workforce choosing or being required to telecommute, this scenario conservatively assumes that trend to be short-term and temporary in nature due to an external shock, and would eventually return closer to the pre-pandemic telecommuting rate. The doubling of the share of the workforce choosing to telecommute in the Baltimore-Washington region from 2016 to 2040 is assumed to be influenced more by longer term external forces such as improved access to high-speed internet and broadband infrastructure and other technological advances that allow on-site work to be conducted remotely, and changing societal norms and workplace

policies that are more receptive toward remote work. The methodology for applying this scenario to the traffic volume projections is described in detail below.

METHODOLOGY

- As shown in **Table 3** below, the share of telecommuters in the Baltimore-Washington D.C. region grew by about 3 percent per year from 2010 to 2016. In comparison, the share of workers commuting by car in the region declined by about 0.3 percent per year from 2010 to 2016.
- Two-way weekday traffic volumes on the Chesapeake Bay Bridge over the same period from 2010 to 2016 were compared to this growth in telecommuting in the region. Based on weekday annual average daily traffic (AADT) data from the Maryland Department of Transportation, two-way traffic volumes on the Chesapeake Bay Bridge totaled 74,362 in 2010. In 2016, two-way traffic volumes totaled 75,454. From 2010 to 2016, the weekday daily traffic volumes on the bridge increased by approximately 180 vehicles per year.
- From 2016 to 2040, the traffic volume projections developed in **Table 1** already account for continuous growth in telecommuters among the workforce, albeit at a similar rate (3 percent) as what was observed from 2010 to 2016.
- As mentioned previously, the growth in telecommuting in the workforce is not assumed to be inversely proportional to the actual traffic volume on the Chesapeake Bay Bridge. While the COVID-19 pandemic resulted in declines in traffic volume due to a widespread adoption of remote work, this is not considered to be reflective of typical patterns and long-term trends, and is treated as a temporary condition due to an external shock. Under steady-state conditions, traffic volumes are expected to grow, even with the increase in telecommuting, as the population of the region increases. As shown in **Table 2**, although the number of telecommuters in the region increased substantially from 2000 to 2016, the number of car commuters also increased in raw numbers. However, as shown in **Table 3**, a greater share of the workforce chose to telecommute, while a smaller share of the workforce chose to commute by car.
- Therefore, for the purposes of applying the 10 percent telecommuting share scenario to the traffic volume projections, the growth in telecommuting was assumed to be inversely proportional to the growth in the traffic volume on the Chesapeake Bay Bridge, rather than the traffic volume itself.
- Assuming that the number of telecommuters in the Baltimore-Washington D.C. region would increase from 5 percent of the workforce in 2016 to 10 percent of the workforce in 2040, that would translate to an annual growth rate in the telecommuting share of 4.5 percent per year, which would be compared to the growth rate of 3 percent per year from 2010 to 2016. Therefore, this scenario assumes that due to technological advances and changing societal norms, the rate of growth in telecommuting in the region would accelerate from 2016 to 2040.
- Assuming that the annual rate of growth in the share of telecommuters in the workforce is inversely proportional to the annual growth in traffic volumes on the Chesapeake Bay Bridge, the annual increase of 180 vehicles per weekday on the Chesapeake Bay Bridge from 2010 to 2016 was multiplied by the ratio in the telecommuting growth rate to arrive at an annual increase of 120 vehicles per weekday from 2016 to 2040, as shown in the calculation below:

(Increase of **180** vehicles per weekday on bridge from 2010 to 2016)

x

[(**3 percent** annual growth rate in telecommuting from 2010 to 2016)
/
(projected **4.5 percent** annual growth rate in telecommuting from 2016 to 2040)]

=

(Increase of **120** vehicles per weekday on bridge from 2016 to 2040)

Table 3
Share of Workforce in Telecommuting and Car Commuting in Region

	2010	2016	Annual Growth 2010-2016
Workers Telecommuting (% of Total Workforce)			
Baltimore and Washington DC Metropolitan Areas (combined)	4.0%	4.8%	3.0%
Queen Anne's County	6.7%	7.2%	1.2%
Anne Arundel County	3.9%	4.9%	4.3%
Washington DC-Arlington-Alexandria Metropolitan Statistical Area	4.2%	4.9%	2.8%
Baltimore-Columbia-Towson Metropolitan Statistical Area	3.7%	4.4%	3.2%
Workers Commuting By Car (% of Total Workforce)			
Baltimore and Washington DC Metropolitan Areas (combined)	80.1%	78.6%	-0.3%
Queen Anne's County	89.4%	88.3%	-0.2%
Anne Arundel County	89.7%	87.7%	-0.4%
Washington DC-Arlington-Alexandria Metropolitan Statistical Area	77.5%	76.0%	-0.3%
Baltimore-Columbia-Towson Metropolitan Statistical Area	85.9%	85.0%	-0.2%
Source: U.S. Census Bureau - 2000 Census, 2006-10 and 2012-16 American Community Survey			

2040 TRAFFIC VOLUME PROJECTION

After applying the annual increase of 120 vehicles per weekday from 2016 to 2040 to the 2016 traffic volume of 75,454 and the 24 year-period from 2016 to 2040, the estimated 2040 traffic volume would be approximately 78,300. Therefore, if the percent of the region's workforce that choose to telecommute increases from 5 percent today to 10 percent in 2040, weekday traffic volumes on the Chesapeake Bay Bridge according to AKRF projections would increase by approximately 4 percent from 2016 to 2040. If the share of the workforce that telecommutes were to grow at a steady rate (similar to that of the past decade) from 2016 to 2040, and not at the forecasted accelerated rate in the AKRF scenario, the 2040 projected traffic volume would be approximately 81,500, and a 2016 to 2040 traffic volume increase of 8 percent. Both these forecasted traffic volume growth rates are well below the Purpose and Need Assessment forecasted traffic volume growth rate of 23 percent from 2017 to 2040, as shown in **Table 4.**

Table 4

Comparison of Chesapeake Bay Bridge Traffic Volume Projections

	AKRF Traffic Volume Projection with Accelerated Growth in Telecommuting**			AKRF Traffic Volume Projection*			Bay Crossing Study Purpose and Need Assessment (2019)		
	2018	2040	%Growth	2018 Actual	2040	%Growth	2017	2040	%Growth
Weekday	75,454	78,339	4%	75,750	81,487	8%	68,598	84,276	23%

NOTES:

*Developed by AKRF, based on 2009-2018 AADT data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge.

**Developed by AKRF, based on 2009-2018 AADT data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge and Reverse Journey-to-Work (RJTW) census data from the 2006-10 and 2012-16 American Community Survey for the Baltimore and Washington D.C. Metropolitan Statistical Areas.

APPENDIX 3
CASHLESS TOLLING

ALL ELECTRONIC TOLLING, AKA "CASHLESS TOLLING"

The Chesapeake Bay Crossing Study Purpose and Need Assessment conducted transportation analyses for travel time, level of service, and planning time index using an existing condition representing an eastbound 11-lane toll plaza with a combination of manual and electronic toll lanes. The analyzed conditions do not represent the current condition of the Chesapeake Bay Bridge with All electronic toll (AET), resulting in a potential overestimation of the future transportation conditions and the need for additional capacity on the Chesapeake Bay Bridge. AET collection was fully implemented at the Chesapeake Bay Bridge (US 50/301) corridor in early May 2020, during the COVID-19 pandemic and ahead of scheduled implementation in summer 2020. The former 11-lane toll plaza was demolished to install the transponder and video identification system. The system implemented on the Chesapeake Bay Bridge uses toll transponders to charge drivers when possible and video technology to identify and bill vehicles without toll transponders; this form of tolling is also known as cashless or open-road tolling.

AET CAPACITY AND BENEFITS

Prior to the implementation of AET, a combination of manual and electronic toll collection lanes were utilized for toll collection at the bridge. According to the Tri-State Transportation Campaign May 2004 report on open-road tolling, *The Open Road*, mixed manual and electronic collection lanes will process approximately 700 vehicles per hour (vph), electronic tolling lanes in a traditional toll plaza will process approximately 1,200 vph, and open-road rolling processes 1,800 vehicles per hour. The conversion of the Chesapeake Bay Bridge to AET would reduce the toll plaza bottleneck and increase roadway capacity, resulting in improved travel speeds and times at the bridge. Because the stop-and-go traffic at the toll plaza and weaving movements between toll lanes would be all but eliminated, the potential for crashes would also be greatly reduced, according to *Toll Collection Technology and Best Practices* by the Center for Transportation Research at The University of Texas at Austin, January 2007.

In fall 2016, the Massachusetts Department of Transportation implemented all electronic tolling on the Massachusetts Turnpike (I-90), which connects western Massachusetts and the western Boston suburbs with downtown Boston. The *All Electronic Tolling 6-Month Progress Report* published in May 2017 indicated that a comparison of January 2016 pre-AET and January 2017 post-AET resulted in up to 11 minutes of travel time savings per vehicle during the morning rush hour. Similar findings were also determined for February 2016 and February 2017. The Massachusetts Department of Transportation observed reduced congestion and increased safety as a result of AET implementation.

APPLICATION OF ALL ELECTRONIC TOLLING

The January 2014 *AET Conversion and Prioritization Study* for the Maryland Transportation Authority studied the potential conversion of various tolled facilities under the jurisdiction of the Maryland Transportation Authority. The report stated that with the implementation of AET, average peak travel times at the Chesapeake Bay Bridge would decrease by 70 percent, average peak queue lengths would decrease by 80 percent, and maximum peak queue lengths would decrease by 72 percent on a summer Friday, according to VISSIM microsimulation model results. Other Maryland Transportation Authority facilities were projected to see a reduction of 10 to 29 percent in weekday average peak travel times and a reduction of 8 to 83 percent in weekday average peak delays.

The Chesapeake Bay Crossing Purpose and Need Assessment states that the vehicle queues are projected to increase from four miles in 2017 to 13 miles in 2040 for a summer weekend and from one mile to five miles for an average weekday evening, in the eastbound direction.

Applying the peak queue lengths reductions for a summer Friday and an average weekday evening presented in the *AET Conversion and Prioritization Study*, the 2040 vehicle queues could be reduced to 2.6 miles during a summer weekend peak period and 1.5 miles during an average weekday evening, shown in **Table 1**.

Table 1

Bay Bridge Eastbound Projected Queues – All Electronic Tolling

Scenario	Weekday Queue (miles)	Summer Weekend Queue* (miles)
Existing[1]	1	4
Future 2040[1]	5	13
Future 2040 with AET	1.5	2.6

NOTES: *Weekend also includes Friday

SOURCES: [1]Chesapeake Bay Crossing Study Purpose and Need Assessment

APPENDIX 4
CONGESTION PRICING

VARIABLE TOLLS AKA "CONGESTION PRICING"

Variable tolling, a form of congestion pricing, is a congestion management strategy intended to reduce peak hour travel by encouraging drivers to use alternative modes of transportation or travel during off-peak periods, reducing roadway demand during critical peak periods. Variable tolling is an appropriate countermeasure to reduce congestion on bridge crossings such as the Chesapeake Bay Bridge, since the bridge currently experiences peak directional traffic flows, a portion of which are discretionary and can be made at other times than the extreme peak periods. Variable tolling has incentivized a portion of motorists to travel during off-peak times, making variable tolling an effective tool in managing congestion during peak times.

CASE STUDIES

Port Authority of New York and New Jersey Crossings

The Port Authority of New York and New Jersey (PANYNJ) has a variable tolling plan for all bridge and tunnel crossings between New York and New Jersey, with discounted tolls during off-peak hours. Variable tolling at PANYNJ facilities has been in place since March 2001, and was studied by the New Jersey Department of Transportation (NJDOT) in connection with Rensselaer Polytechnic Institute, Rutgers University, and FHWA. The 2005 study found the implementation of variable tolling resulted in a reduction of weekday peak period traffic by between 0.06 and 6.78 percent at various PANYNJ crossings. This supporting the findings of a separate study by Mark Muriello, et al. in the Transportation Research Record that peak period traffic declined by 5.7 percent at PANYNJ crossings. A reduction of 0.28 to 2.50 percent in weekend peak period traffic was also observed at PANYNJ crossings. Overall, the study found that variable tolling led to a decrease in peak period traffic during weekdays and weekends.

New Jersey Turnpike (I-95)

Similar to the PANYNJ, the New Jersey Turnpike Authority has a variable tolling plan along the New Jersey Turnpike (I-95) by time of day with discounted off-peak tolls, which was introduced in September 2000. A study was conducted by the NJDOT in connection with Rensselaer Polytechnic Institute, Rutgers University, New Jersey Turnpike Authority, and FHWA that evaluated the impacts of variable tolling along the New Jersey Turnpike. The study compared the traffic conditions of October 1998 to June 2001 for an evaluation of the first phase of variable tolling. During the first phase, traffic volumes increased along the New Jersey Turnpike by an overall 4.81 percent increase in traffic demand. The percent share of morning and evening peak hour traffic decreased by 1.7 percent and 3.7 percent, respectively, whereas the percent share of off-peak traffic increased by 1.1 percent. Traffic volumes increased at a lower rate during the peak period at 6.27 percent during the morning peak period and 4.17 percent during the evening peak period, compared to an increase of 9.4 percent during the off-peak period.

Highway 407, Ontario, Canada

The Ontario Ministry of Transportation Highway 407 Express Toll Route utilizes variable tolling by time of day and by season. A study conducted by the Canadian Centre for Economic Analysis found that traffic speeds along Highway 407 consistently exceed that of alternate routes, with 85 percent of vehicles traveling at or over 100 kilometers per hour during peak hours at free-flow conditions. This results in a travel time savings of 52 percent during morning peak hours and 65 percent during evening peak hours, resulting in a cumulative time savings of 30.4 million hours per year.

APPLICATION OF VARIABLE TOLLING

The variable tolling case studies show that peak hour traffic operational improvements in travel times and reduction in traffic volumes can be expected after the implementation of a variable tolling system. Based on the PANYNJ study by NJDOT, traffic could potentially be reduced by up to 6.78 percent during a weekday peak period or 2.50 percent during a weekend peak period on the Chesapeake Bay Bridge if variable tolling is implemented, shown in **Table 1**.

Table 1

Variable Tolling Volume Projection

Time Period	Hourly Traffic Volume Projection (vehicles per hour)				
	Without Variable Tolling[1]			With Variable Tolling	
	2018 Actual	2040	%Growth	2040	%Growth
Weekday – Westbound AM	3,305	3,555	7.6	3,314	0.3
Weekday – Eastbound AM	1,468	1,580	7.6	1,473	0.3
Summer Weekend – Eastbound	3,362	3,584	6.6	3,494	3.9
Summer Weekend – Westbound	4,098	4,368	6.6	4,259	3.9

SOURCES:
[1] Based on traffic growth rates developed by AKRF, based on 2001-2019 ATR counts and 2009-2018 AADT data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge.

Since there are few alternative mode choices for the Chesapeake Bay Bridge other than taking owned, rented, or for-hire private passenger vehicles, it is conservatively assumed that variable tolling would not noticeably reduce overall annual growth if used as a congestion management measure by itself, since the same number of vehicular trips would make the journey with variable tolls in place, but at different times of day or days of the same week.

APPENDIX 5
MANAGED LANES

MANAGED LANES

Managed lanes are a congestion management strategy that involves the application of lane use restrictions or lane tolls to increase the efficiency of a highway facility. A managed lane employs the use of pricing, vehicle eligibility, and/or access control to limit highway ingress and egress. Examples of managed lanes include high-occupancy vehicle (HOV) lanes, high-occupancy toll (HOT) lanes, express lanes, reversible lanes, and bus- or truck-exclusive lanes. The Chesapeake Bay Bridge currently uses a reversible lane as a managed lane strategy to redistribute roadway capacity from the westbound direction to the eastbound direction during peak periods. However, the lane is reversed using a fixed schedule and is not actively managed using real-time data.

CASE STUDIES

SR-91 Express Lanes, California

According to the Federal Highway Administration (FHWA) *Congestion Pricing: A Primer*, the benefits of managed lanes include improvement in transit service and ridership, increase in carpooling, and increased travel speeds to free-flow conditions. California's SR-91 tolled express lanes, which has variable tolling based on time-of-day and roadway congestion with no or discounted tolls for carpooled vehicles, a 40 percent increase in carpool was observed within three months of opening in 1995. Furthermore, peak period travel speeds in the express lanes remained close to free-flow at 60 to 65 miles per hour while speeds in the free lanes were less than 20 miles per hour.

State of California Department of Transportation District 7 (Los Angeles and Ventura Counties)

The State of California Department of Transportation (Caltrans) District 7 has 557 miles of managed lane facilities (as of 2016), including SR-91. The *2016 Managed Lane Annual Report* prepared by Caltrans District 7 shows that since 1992, the managed lane system has resulted in an increase of 86 percent of carpools on managed lanes from 1992 to 2016. Conversely, carpools on highways without managed lanes has decreased by 44 percent during the same time period. During a peak hour, an average Caltrans District 7 managed lane facility carries approximately 33 percent of the entire highway's traffic while utilizing 20 percent of the roadway space.

Atlanta Regional Managed Lane System

The Georgia Department of Transportation highway network includes 55 miles of express lanes and 74 miles of HOV lanes, for a total of 129 managed lanes as of 2017. The I-85 Express Lanes, which are dynamically priced HOT lanes, opened in 2011. Travel speeds in peak hour directions on the Express Lanes generally exceeded the general travel lanes by 8 to 15 miles per hour throughout all of 2016. The Atlanta Regional Managed Lane System Plan analyzed the impact of the proposed expansion of the managed lane system, and showed an 83 percent reduction in delay for future scenarios for managed lane users and an 8 percent system-wide reduction in vehicle delay for all highway users.

I-66 Express Lanes, Virginia

The 2019 I-66 Inside the Beltway Corridor Performance Report provides an initial evaluation of the impacts of managed lanes along the I-66 corridor, comparing 2015 and 2019 performance metrics. After implementation of express lane variable tolling, I-66 in Virginia experienced an increase of 1.2 percent in the number of people in morning rush hour traffic with a decrease of 2.7 percent in the associated number of vehicles, indicating a decrease in vehicle usage and increase in transit and HOV usage. Single-occupancy vehicle usage decreased by 1.7 percent,

resulting in an increase in HOV usage by 1.2 percent and increase in transit usage by 0.4 percent.

APPLICATION OF MANAGED LANES

Although these case studies of managed lanes have achieved varied operational results, they have shown at least moderate success in improving rush hour traffic conditions or by encouraging carpooling. The case studies showed that managed lanes, in particular HOV and HOT lanes, are successful in increasing the percentage of carpooled road users, by 40 percent on SR-91 in California within the first three months of implementation, by 86 percent over 14 years throughout Caltrans District 7, and by 1.2 percent in Virginia over 4 years. Travel speed on managed lanes, particularly on express lanes, exceed general travel lanes by up to 40 miles per hour in the case of SR-71 and by 8 to 15 miles per hour in the Atlanta Regional Managed Lane System.

Using the conservative and regionally comparable results of a managed lane study of I-66 in Virginia, the application of managed lanes at the Chesapeake Bay Bridge could result in a reduction of 2.7 percent of vehicles during weekdays or summer weekends during peak hours. On the Chesapeake Bay Bridge, depending on the managed lane strategies implemented, motorists during peak times could be incentivized to change their behavior to take fewer single-occupant vehicle trips, or change their behavior to shift their trip to an off-peak time when there are no managed lane restrictions, resulting in a 2.7 percent reduction in traffic, as shown in **Table 1**. Traffic volumes are presented in vehicles per hour (vph).

Table 1
Weekday Managed Lanes Volume Projection

	AKRF Weekday Hourly Traffic Volume Projection (vph)^					
	Without Actively Managed Lanes				With Actively Managed Lanes	
	2018 Actual		2040		2040	
Hour	EB	WB	EB	WB	EB	WB
7-8 AM	1,468	3,305	1,580	3,555	1,537	3,459
8-9 AM	1,629	2,823	1,752	3,037	1,705	2,955
4-5 PM	3,736	2,072	4,019	2,228	3,910	2,168
5-6 PM	3,582	1,986	3,854	2,137	3,750	2,079

NOTES:
EB = Eastbound
WB = Westbound
vph = vehicles per hour
Volume exceeds capacity (EB capacity: 3,800 vph, WB capacity: 3,900 vph)
^Developed by AKRF, based on 2009-2018 AADT and ATR data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge.

Using the same assumptions, **Table 2** shows the effects on volume-to-capacity by direction for key peak hour periods.

Table 2

Weekday Managed Lanes Volume-to-Capacity Projection

Hour	AKRF Weekday Hourly V/C Projection					
	Without Actively Managed Lanes				With Actively Managed Lanes	
	2018 Actual		2040		2040	
	EB	WB	EB	WB	EB	WB
7-8 AM	0.39	0.85	0.42	0.91	0.40	0.91
8-9 AM	0.43	0.72	0.46	0.78	0.45	0.78
4-5 PM	0.98	0.53	1.06	0.57	1.03	0.57
5-6 PM	0.94	0.51	1.01	0.55	0.99	0.55

NOTES:
EB = Eastbound
WB = Westbound
V/C = Volume to Capacity Ratio
V/C ratio exceeds 1.00, indicating that the projected volume exceeds capacity (EB capacity: 3,800 vph, WB capacity: 3,900 vph)

As shown in **Table 1** and **Table 2**, the application of managed lanes along the Chesapeake Bay Bridge could result in weekday peak hour traffic volume reductions, and potentially reducing the number of hours when 2040 projected weekday volumes exceed capacity (from two hours to one hour).

Table 3 and **Table 4** show the volume reduction and capacity improvements that may be incurred by applying the 2.7 percent peak hour traffic reduction to the summer weekday peak periods.

Table 3

Summer Weekend Managed Lanes Volume Projection

Hour	AKRF Summer Weekend Hourly Traffic Volume Projection (vph)^					
	Without Actively Managed Lanes				With Actively Managed Lanes	
	2018 Actual		2040		2040	
	EB	WB	EB	WB	EB	WB
12-1 PM	2,727	4,098	2,906	4,368	2,828	4,250
1-2 PM	2,888	3,942	3,078	4,201	2,995	4,088
2-3 PM	2,885	3,663	3,075	3,904	2,992	3,799
3-4 PM	3,295	3,423	3,512	3,648	3,417	3,550

NOTES:
EB = Eastbound
WB = Westbound
vph = vehicles per hour
Volume exceeds capacity (EB capacity: 3,800 vph, WB capacity: 3,900 vph)
^Developed by AKRF, based on 2009-2018 AADT and ATR data available from the Maryland Department of Transportation for the Chesapeake Bay Bridge.

Table 4

Summer Weekend Managed Lanes Volume-to-Capacity Projection

Hour	AKRF Summer Weekend Hourly V/C Projection					
	Without Actively Managed Lanes				With Actively Managed Lanes	
	2018 Actual		2040		2040	
	EB	WB	EB	WB	EB	WB
12-1 PM	0.72	1.08	0.76	1.15	0.74	1.12
1-2 PM	0.76	1.04	0.81	1.11	0.79	1.08
2-3 PM	0.76	0.96	0.81	1.03	0.79	1.00
3-4 PM	0.87	0.90	0.92	0.96	0.90	0.93

NOTES:
EB = Eastbound
WB = Westbound
V/C = Volume to Capacity Ratio
V/C ratio exceeds 1.00, indicating that the projected volume exceeds capacity (EB capacity: 3,800 vph, WB capacity: 3,900 vph)

As shown in **Table 3** and **Table 4**, the application of managed lanes along the Chesapeake Bay Bridge may also result in summer weekend peak hour traffic volume reductions, potentially reducing the number of hours when 2040 projected summer weekend volumes exceed capacity (from three hours to two hours).

Secretary Gregory Slater
Office of Secretary
Harry R. Hughes Department of Transportation Building
7201 Corporate Center Drive
Hanover, MD 21076

May 3rd, 2021

Dear Secretary Slater,

As a resident of the Broadneck Peninsula in Anne Arundel County, I have concerns about the completion of the Chesapeake Bay Bridge crossing study that recently recommended building a third span at the current Sandy Point site.

The Bay Bridge Crossing Study is inadequate. It has not given proper consideration to factors other than traffic volume. This Tier 1 NEPA study should be stopped until the critical issues outlined below have been properly studied and evaluated by the Maryland Transportation Authority (MDTA). In short, the MDTA must not produce a Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) until this is done.

- The primary issue is that the Purpose and Need is too limited. The Purpose and Need statement's key metric of minimizing the congestion in Corridor #7 is procedurally and legally too limited in its objectives. There are two major failings of the Purpose and Need Statement and the NEPA Study:

1. A study of all the costs of the approach road corridors on either side of the potential crossing sites was not conducted. These important roadways/highways that feed traffic to/from the bridge must be studied and evaluated in any site selection process, but this key requirement was not included in this NEPA DEIS Report.

2. The Purpose and Need statement is poorly implemented. This is a critical piece of the report that allows for an informed selection. It must include not only traffic volume but requires the overall evaluation of the favorable and harmful effects on the region, our State capitol, the value of having multiple avenues of access across the Bay, and the effect on Baltimore/Washington commuters and those living on Eastern Shore of Maryland who don't cross the bridge. Without this evaluation, the federal highway administration will not be able to tell if a proper selection has been made.

Additional Concerns:

- Anne Arundel County, the Broadneck Peninsula, and Queen Anne County would be the most affected communities in the 13 County NEPA study area that focuses solely on the selection of Corridor #7. It did not include any of the concerns or input by there entities when selecting Corridor #7.

- The NEPA study did not provide any information concerning the shore-side construction and quality of life impacts of selecting this corridor versus any other corridor.

- It did not indicate whether the proposed bridge would be a replacement bridge or a parallel and additional bridge. It is unrealistic to build a third span in Corridor 7, because it would be pointless to maintain two old bridges.

- The NEPA study did not indicate any of the Corridor #7 costs and timelines or impacts of huge infrastructure requirements to rebuild Kent Island roadways, Anne Arundel County roadways, Queen Anne County bridges, and Severn River bridges to accommodate a new Chesapeake Bay Bridge span and related traffic.

- This is a $5 billion+ proposed structure projected to last for 100 or more years with regional and multi-state transportation impacts. The Purpose and Need criteria presented in developing the objectives of the long-term impact of selecting the existing corridor, and excluding all other corridors, have not been sufficiently developed to execute a FEIS/Record of Decision.

- A myriad of unknowns have not been considered or revealed. The decision to lock in Corridor #7 for subsequent Tier 2 preliminary design work is premature without knowing and evaluating the extensive shore-side impacts:

• Will this be a parallel structure to the existing structure and maintain the existing structures?

• How many additional Bay crossing and support or safety lanes are required on this new bridge?

• How many additional lanes will be required on Route 50 west and east of the new structure to provide for the additional bridge lanes?

• Will the Severn River Bridge and the Kent Narrows Bridge require additional lanes when a new Chesapeake Bay bridge is in place?

• What happens to all of the parallel service roads, such as East College Parkway, Whitehall Road, and all of Route 18 on Kent Island?

• What will be the impact on feeder arterials, such as College Parkway, Route 2 North and Route 2 south, Route 8, and many other roads?

• What is an order of magnitude estimate of the Eminent Domain land-takes to accommodate a new bridge?

- No consideration is given to an alternative corridor placement for safety, evacuation, military action, or an alternative choice in the event the existing structure is damaged or blocked for any reason.

- No consideration of providing greater state-wide economic benefits and advantages in another corridor location were considered. Furthermore, the existing corridor is not the most direct path to the Eastern Shore's Ocean City environs and attractions.

- A pause in the NEPA evaluation should be taken because the COVID pandemic has impacted traffic volume and travel patterns that may impact all projections of traffic volumes. And the data used for the traffic evaluation was inadequate, extremely limited to not much more than a one week snapshot in time, leaving the validity of traffic projections in considerable doubt.

The NEPA EIS/ROD decisions should be put on hold until a full complement of key issues are evaluated in this decision making process. The decision to select Corridor #7 is not simply a reduction of traffic on the existing structures. It requires the answers to the questions raised above which in fact may point to another alternative corridor. Another alternative may be the most logical, least disruptive, most cost-effective, most environmentally sound, and provide greater state-wide economic benefits.

Please have this process reconsidered and do it right.

Sincerely,

[redacted]

5/6/2021

Bay Crossing Study
2310 Broening Highway
Baltimore, MD 21224
Email: info@baycrossingstudy.com

Dear Bay Crossing Study:

I have several concerns about the conclusions of the Tier 1 NEPA study recommending the Third Bay bridge location at corridor 7.

1) *My first, and primary, concern is that the NEPA study was tasked with a self-limiting, overly constrained purpose*, as stated below:

The purpose of the study is to consider two-mile-wide corridors to provide additional capacity and access across the Chesapeake Bay to improve mobility, travel reliability and safety at the existing William Preston Lane, Jr. Memorial (Bay) Bridge, while considering financial viability and environmental responsibility.

The flaw in the purpose statement is that it is too narrowly focused on "at the existing William Preston Lane, Jr. Memorial Bridge". On such a long term (100 year useful life) strategic decision, a broader purpose should of been defined, such as:

The purpose of the study is to consider two-mile-wide corridors to provide additional capacity and access across the Chesapeake Bay to improve mobility, travel reliability and safety ***with the objective of maximizing the economic development for the citizens of the State of Maryland over the next century****, while considering financial viability and environmental responsibility.*

Defining the stated purpose .... at the existing William Preston Lane, Memorial Bridge....., pre-ordained the study's conclusion that the only answer would be to build another bridge in Corridor 7. A more strategic study purpose of maximizing the long term economic development for the citizens of the State of Maryland, could have resulted in a different corridor solution, perhaps corridor 12/13. This corridor selection would provide a significant economic engine to drive incremental development in Southern Maryland on the western shore and the Cambridge area on the eastern shore. In addition, it would siphon significant weekend volume from the DC metro area, alleviating the existing bridge congestion during summer months to acceptable levels. Over the long term, providing an alternative Bay crossing midway down the Bay (corridor 12/13) would disperse the intensity of the development activity at the current Bay Bridge, thereby, reducing traffic congestion. The value of incremental economic development activity resulting from other potential alternate corridors was not adequately addressed in the current NEPA study. The study failed to quantify and include the substantial incremental long term economic benefit that could be realized by developing a new corridor to the ocean resorts.

In summary, while the existing recommendation of Corridor 7 might minimize the cost for a new bridge to achieve its misstated purpose of alleviating traffic on the existing bridges, it fails to maximize the "revenue" side of the equation, that being the potential incremental economic development opportunities of opening a new corridor to the ocean beaches for the State of Maryland. A wise business decision should look at both the "revenue" and "expense" side in order to maximize return. Unfortunately, in this case, the Tier 1 NEPA study only focused on the "expense" side and not the "revenue" economic development side, especially as it relates to the various potential new corridors.

2) ***My second concern is "how good is good enough"***. The proposed recommendation of Corridor 7 (page 11 of Virtual Information Room) shows 2040 Non-summer weekend and Summer weekend reductions of (35)% and (33)%, respectively **versus 2017 data**. That seems like over-delivering. I think most citizens would except a 2040 Level of Service (LOS) substantially closer to 2017 levels (i.e. 10-15% reduction versus 2017 levels), which could be easily achieved with other potential corridors while also providing broader economic development across the state.

3) ***My final concern is that any cost benefit analysis for Corridor 7 needs to include the negative life quality issues for citizens of Queen Anne's County***, especially those located in and around the Kent Island area. As a citizen of Queen Anne's County, living only 500 yards from RT 50, I am very familiar with the pros and cons of the existing Bridge and freeway system. Many years ago, we often slept with the windows open, but now road noise precludes that. In addition, county citizens on Kent Island are adversely impacted by the exiting freeway system which bisects the island and provides no access across overpasses for pedestrian or cyclists, basically splitting the single island into two. In addition, the lack of an access road or pedestrian walkway on the south side of Rt 50 at Cox Creek, makes the resulting two islands into three. The poor design of the existing freeway system bisecting Kent Island severely restricts movement of local citizenry, impedes connectivity, and adversely impacts our health (air, noise and "active" transportation options like walking and cycling). The State's assessment of Indirect and Cumulative effects (page 18 of Virtual Information Room) which should recognize these overdevelopment concerns, seems instead to be biased to taking the easy way out as it relates to the Eastern Shore impacts. The study dismisses alternate corridors due to their perceived adverse "substantial increase in residential growth and development demand", while instead recommending that QAC and corridor 7 bear the burden as it is "more compatible with existing and planned land uses". As a QAC resident this feels like the State is "piling on" to our community to bear the transportation needs for the entire Eastern shore. Our citizens would appreciate and expect a more holistic and balanced perspective.

In conclusion, I ask the NEPA study to consider more thoroughly whether they have defined the correct study purpose, appropriately assessed what is "good enough" and acknowledge the burden being asked of Queen Anne's County residents.

Sincerely,

[redacted]

cc: QAC Commissioners (email:qaccommissionersandadministrator@qac.org)

THE COMMISSIONERS OF ST. MICHAELS

SETTLED 1670-1680

INCORPORATED 1804

300 MILL STREET
P.O. BOX 206
ST. MICHAELS, MD 21663

TELEPHONE: 410.745.9535

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May 7, 2021

The Town of St. Michaels and its environs are unquestionably the essence of all that is special about Maryland's Eastern Shore. Our historic structures, old world charm, and abundant natural resources attract visitors from around the world. We offer guests and residents alike a unique and satisfying refuge. In the interest of preserving this treasure, and for many other reasons, we the Commissioners of St. Michaels urge MDTA to eliminate consideration of Corridor 8 for a new bay crossing.

Corridor 8 is the most costly and environmentally destructive of the three remaining options. At upwards of $15-billion-dollars it is twice as expensive as Corridors 6 and 7. Corridor 8 would also disturb and destroy more of our natural resources than the other two: 20,400 acres of open water, 6,500 acres of natural oyster bars, and 8,600 acres of forested land.

Corridor 8 crosses land just north of St. Michaels. It may be tempting to add an interchange there, but such access would be disastrous for St. Michaels. Since there's only one way in and one way out, our town struggles with traffic as is. Adding more traffic to access a bay crossing would bring us to a standstill.

We applaud the MDTA's selection of Corridor 7 as the Recommended Preferred Corridor Alternative, and encourage you to remain on that course.

Respectfully,

The Commissioners of St. Michaels
Joyce Harrod
Jaime Windon
Mike Bibb
Tad duPont
David Breimhurst

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EASTERN SHORE
LAND CONSERVANCY

May 10, 2021

Ms. Heather Lowe
Maryland Transportation Authority
Point Breeze
2310 Broening Highway
Baltimore, MD 21224

RE: Eastern Shore Land Conservancy's Comments on the Chesapeake Bay Crossing Study Tier 1 NEPA Draft Environmental Impact Statement

Dear Ms. Lowe,

Recognizing the expressed need for a new auto-oriented Chesapeake Bay Bridge Crossing, Eastern Shore Land Conservancy (ESLC) suggests alternative solutions to provide additional support for corridor management. Based upon the results published in the Tier 1 Draft Environmental Impact Statement (DEIS), ESLC opposes the construction of a new auto-oriented Chesapeake Bay Bridge crossing and advocates for the exploration of other alternatives not thoroughly pursued in the Tier 1 DEIS. In addition to this, we call for updates to the Tier 1 study that include the analysis of recent data from 2017-2021 due to the unprecedented changes in the past year and a half and the creation of a Tier 2 study which further explores the costs and impacts associated with the selected Corridor Alternative as well as other alternatives that were or were not listed in the Tier 1 DEIS. In order to reduce the risk and impact of the sustained and duplicative traffic congestion issues on a new structure, it would be best to optimize the current infrastructure first, through the adoption of current and future technologies before any new span is strongly considered. ESLC calls for an approach to transportation planning that optimizes current infrastructure, encourages transformational improvements in transit and travel demand and considers the future consequences of new transportation investments on the communities, landscape and climate vulnerabilities of the Eastern Shore. Improved access for cross-Bay travel should not sacrifice the environment, safety, economy and quality of life of Maryland's communities and citizens.

Updating the Tier 1 DEIS

ESLC urges an update to the data used in the Tier 1 DEIS to properly reflect bridge usage over the last four years. While the DEIS was published in February of 2021, it relies on data collected in 2017 for the Bay Crossing Study (BCS). During the COVID-19 pandemic, we have faced unprecedented changes. Many workplaces have switched to operating virtually and many expect a hybrid work environment to become the norm, with less commuters using roads, greatly reducing previously seen congestion levels. In May 2020, we saw the adoption of all electronic tolling (AET) and the retirement of the iconic toll plaza where congestion for eastbound traffic typically agglomerated, as can be seen in the photo on page 1 of the Executive Summary of the Tier 1 DEIS. In that same photo, beyond the toll plaza and on the bridge itself, there is no congestion. The Tier 1 DEIS refers to the adoption of AET and claims that it was not feasible to include this information regarding its impact on Bridge traffic in the DEIS.

Based upon the obsolete data used in the Tier 1 DEIS as well as the drastic changes to commuting that have been made during the COVID-19 pandemic, ESLC supports the re-drafting or updating of the Tier 1 DEIS to better reflect these new traffic patterns. We firmly believe that the commuting habits that have become the norm over the last year and a half and the future adoption of hybrid, virtual work will alter the projections that were originally listed in the Tier 1 DEIS.

Allocating Funding for and Completing a Tier 2 DEIS

After the re-drafting of the Tier 1 DEIS and if a Corridor Alternative is chosen, ESLC advocates for the creation of a Tier 2 DEIS or a similar alternative to further explore the cost, engineering and environmental impacts that such alternatives would entail. The Tier 1 DEIS fails to report on actual environmental impacts and says that such impacts would be reported in a Tier 2 DEIS. While no funding has been secured for this study to occur, it is imperative that this more in-depth analysis ensue and be presented to the public.

In the Tier 2 DEIS, alternatives other than the Corridor Alternative should be strongly and appropriately considered. ESLC suggests adopting aggressive corridor management strategies that are listed in the following section. ESLC also suggests the implementation of a high-speed railway system that will efficiently transport commuters and tourists between the eastern and western shores of Maryland. This method will prove to be more efficient, both limiting emissions and minimizing congestion. We encourage the exploration of a high-speed railway system which runs over the Chesapeake Bay, relying on existing high-speed railway infrastructure along the 95 corridor. Should the high-speed railway option be chosen, improvements must be made to high-speed railways infrastructure down the Delmarva Peninsula. In addition to a high-speed railway system, ESLC advocates for the consideration of other Model and Operational Alternatives (MOAs) such as Bus Rapid Transit. ESLC will remain engaged and active in conversations concerning alternatives to building a new auto-oriented bridge span.

Adopting Aggressive Corridor Management Strategies

With the opposition ESLC has to any new auto-oriented Chesapeake Bay Bridge Span, we find it best to research and implement a suite of aggressive corridor management strategies to improve cross-Bay access for commuters, beach-travelers, commercial freight and others who rely on the Chesapeake Bay Bridge for cross-Bay travel.

Consistent with our mission, ESLC believes in maximizing the infrastructure that we already have. We advise adopting aggressive corridor management such as:

I. Additional contraflow lanes for: bus rapid transit, emergency vehicles, etc. to ensure that those who need to cross the bridge for work or emergency can get there safely and on time
II. Free weekend toll for off-peak hours
III. The ability to register for a time for your vehicle to cross the bay at a discounted toll rate
IV. Incentives for ridesharing

While residents on both sides of the Bay see the collective benefits of a thriving Eastern Shore, the current Bay Bridge spans have led to immense housing sprawl and thousands of acres of habitat, farmland and sensitive landscapes being permanently lost to development on the Eastern Shore. Any new bridge crossing location would also dramatically affect the working landscapes, ecological balance and overall rural character of the region. In the event that a new Bay Bridge is approved, the State siting decision should carefully weigh and balance the potential negative and positive environmental and economic impacts that such a span will have on the local site and the Delmarva region as a

whole. ELSC remains opposed to the creation of an auto-oriented Chesapeake Bay Bridge Crossing and will continue to be engaged in this ongoing conversation.

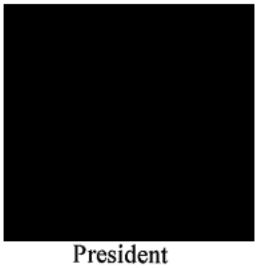
With an emphasis on updates to the Tier 1 DEIS, the creation of a Tier 2 DEIS and aggressive corridor management, ESLC calls for a more future-oriented, people-centric approach to transportation planning, that is cost-sensitive and environmentally-friendly–specifically one that: 1) makes the most out of the existing infrastructure; 2) encourages transformational improvements in transit and travel demand; and 3) considers the future consequences of new transportation investment on the communities, landscape and climate vulnerabilities of the Eastern Shore.

Improved access for cross-Bay travel should not sacrifice the environment, safety, economy and quality of life of Maryland's communities and citizens. Therefore, ESLC encourages the State to allocate resources towards alternatives that will improve access between the eastern and western shores of Maryland.

Sincerely,

Eastern Shore Land Conservancy

Policy Manager



President

ANNE ARUNDEL COUNTY
MARYLAND

Office of the County Executive
STEUART PITTMAN

Anne Arundel County
Office of County Executive Steuart Pittman
Bay Crossing Study DEIS
May 10, 2021

Anne Arundel County's review of the Bay Crossing Study (BCS) Tier 1 DEIS revealed that the study is flawed, and doesn't justify its purpose or the need for a third span. The County's comment on the DEIS, a review required under the National Environmental Policy Act (NEPA), raises serious concerns about appropriately addressing traffic congestion, travel demand, and impacts to sensitive environmental resources which adversely affect communities.

The County finds this study to be a blueprint for projecting sprawl development. For the reasons outlined in the comment below, the County is reaffirming its opposition to the study, which should be paused and not advanced to the Final Environmental Impact Study (FEIS). The DEIS demonstrates the lack of need for a multi-billion dollar taxpayer-funded third span.

Traffic Assumptions

Traffic growth projections in the DEIS do not consider the Bay Bridge's recent traffic history, including the effects the COVID-19 pandemic had on traffic, increased telecommuting, and future economic activity.

- The DEIS projects traffic growth by 2040 of 22.9% for an average non-summer weekday and 14.1% for a summer weekend. These projections should be called into question by the historical fact that there has been no material change in annual or average daily traffic on the Bridge from 2007 to 2017.
    - The Annual Chesapeake Bay Bridge Volume data (page 2-2, 2-3, which goes up to 2017) shows a decline in traffic in 2007-2017 and that it flattened during the Great Recession in 2008-2009.
    - The traffic on the bridge has been flat for decades based on this data.
    - The study overstates future growth in the number of vehicles that will be crossing the water.

- The DEIS should address dramatic reductions in traffic demands as a result of the COVID-19 pandemic, which produced noticeable declines in traffic delays, energy consumption, and emissions.

- Traffic data has been collected throughout the pandemic; yet there is no pandemic-related data in the study.
- MDTA did not collect eastbound daily tolls.
- Travel patterns and volumes have changed significantly since the beginning of the pandemic, and the study should have reflected these adjustments in patterns.

- The DEIS, in projecting future degrees of congestion, presents data from 2016 and traffic counts collected in 2017 - data that is now nearly a half-decade out of date..

    - General practice when publishing transportation-related DEIS is to present traffic data collected within the preceding three years.
    - The DEIS should amend the outdated information to reflect more recent traffic counts and conditions.
    - The DEIS anticipates delays in the eastbound direction, but does not quantify delays after the implementation of all electronic tolling (AET) in May 2020, a significant change for the flow of eastbound traffic.
    - All consideration of the benefit effects of AET is postponed to be addressed only "as needed" in a possible later NEPA document, ensuring a significant change that could reasonably affect the outcome of this study is instead not contemplated by the study at all.

The DEIS traffic projections are based on data that just doesn't make the case to allocate resources for building a multi-billion dollar third span. It makes claims about the existing and projected eastbound queues, using traffic counts and speed data pre-dating the current reality of AET on the Bridge. The effect of AET on traffic queue length could have been estimated by MDTA from an earlier study, which found that AET would produce up to 80% reduction in queue lengths at the Bridge. This feasible calculation would reduce 2040 eastbound summer weekend queues projected in the DEIS from 13 miles to 2.6 miles - less than 4 miles cited as the current condition, and not a favorable result for the case the DEIS is trying to make.

A smart growth strategy would take into account the efficient use of transportation corridors and use of public transit and other innovative transportation options to minimize the use of automobiles and to protect environmentally sensitive areas. This study does none of this - it should be paused.

Purpose and Need Assessment

The DEIS purpose and need is not justified and appears to be centered solely on the bridge itself, rather than addressing the need to accommodate travel from the Western Shore of the Chesapeake Bay, including Northern Virginia, West Virginia, Washington D.C., and Pennsylvania to the Eastern Shore of Maryland. In other words, the DEIS purpose and need focuses on moving cars, not on moving people.

Public statements made by the Governor of Maryland prior to the completion of the study that "there is only one option I will ever accept" calls into question the undue influence about whether the NEPA study was adequately followed. Typically, a robust scientific NEPA analysis is conducted before selecting a preferred alternative. The Governor's statement calling out a preferred corridor prior to the completion of the study undermines confidence in what really drove the purpose and need - the corridor selection rather than scientific analysis.

Current and future traffic congestion on and near the existing Chesapeake Bay Bridge was the primary concern behind the crossing's purported purpose and need. This primary concern ignored the entire transportation network of Central Maryland and the Eastern Shore, and was driven by questionable assumptions of population growth and sprawling new developments on the Eastern Shore. The study shows very small increases in traffic volumes in recent years, calling into question the larger increases projected in future years. Sufficient detail on the Origin and Destination analysis and the summertime traffic projections were not provided in the DEIS or Appendices to adequately determine how these assumptions were generated.

This study missed the mark on justifying a clear and concise purpose and need..

Environmental Impacts

The DEIS fails to address the environmental impacts of constructing a new bridge across the Chesapeake Bay. Below are a few of the impacts that the DEIS lists but does not discuss adequately:

- The DEIS Corridor 7 contains approximately 6,640 acres of mapped 100-year FEMA floodplain, and intersects the largest area of floodplain of three corridors. Based on the distribution of 100-year FEMA floodplain within the limits of Corridor 7, the area with the highest potential for impacts is located within the eastern section of the corridor between Kent Island and the Eastern Shore.
- The DEIS Corridor 7 contains approximately 9,810 acres of land that fall within the limits of the Critical Area. The majority is classified as Resource Conservation Area (RCA - the most restrictive critical area classification), but the corridor also contains relatively high levels of both Limited Development Area (LDA) and Intensely Developed Area (IDA).
- The DEIS offers generalized descriptions of the environmental assets in the preferred corridor for the new bridge. The sketches within the study show the environmental impacts of a third span will likely be significant.
- Evaluation of these impacts with much more specificity should be revealed in this study and not postponed to a later EIS.
- The preferred Corridor 7 contains 10,870 acres of mapped tidal wetlands (9,600 acres of open water and 1,270 acres of coastal wetlands). These tidal wetlands constitute approximately 34% of the total corridor. Similarly, 3,460 acres of valuable oyster resources and 5,140 acres of (RCA)
- Corridor 7 contains the highest amount of land area susceptible to sea level rise based on the projections for 2050 and 2100. The highest concentrations are located within the

section of the corridor that spans Kent Island and at Kent Narrows and the Chester River in the eastern portion of the corridor.

- Corridor 7 contains 6,900 acres of forest interior dwelling species (FIDS) habitat, which represents 25% of the total corridor study area, and 2,180 acres of Sensitive Special Projects Areas. These areas contain biological resources that require conservation and protection.

The study is silent on possible significant adverse effects to fish, wildlife, plant habitat, and increased flooding within the critical area, postponing these concerns to a later date rather than addressing them directly. And it provides no alternatives that could be taken to reduce and mitigate these impacts.

No-Build Alternative

The DEIS calls for "updates as needed during Tier 2" to reflect future projects that were not planned and programmed as of Project Scoping in 2017. In other words, it never seriously examined the alternative of not building an additional Bay Bridge span.

Federal guidelines require EIS to address the no-build alternative and rigorously explore and objectively evaluate all reasonable alternatives. The DEIS does not meet this requirement. The no-build alternative is not properly characterized or discussed when, as in the DEIS, available strategies to better manage traffic operations and demand under that alternative are excluded from consideration.

The DEIS states that "transportation system management/travel demand management (TSM/TDM) measures such as improvements to contraflow operation on the existing bridge may be implemented. It says specific examples of TSM/TDM improvements "could include" implementing all electronic tolling and variable tolls. Nevertheless, it then cuts off further discussion by stating that if TSM/TDM improvements are implemented, that will be done "separately from the Bay Crossing Study". It also states that a combination of alternatives, such as MOAs in combination with a recommended corridor alternative, will be evaluated in "Tier 2" to determine whether such a combination could satisfy the transportation needs in combination with alternative alignments.

In contrast, the AKRF Study directly addresses TSM/TDM measures and indicates the potential they have for lowering peak period congestion.

This section of the DEIS study does not comply with Federal statute - it lacks justification, and is not comprehensive and specific as possible to even be considered for a Tier 2 evaulation.

Stakeholder Involvement

Anne Arundel County and Queens Anne's County should have been consulted throughout this process due to the significant impacts a potential crossing will have on transportation networks, development plans, and surrounding communities. However, neither jurisdiction was involved in the process and was only provided notice at the same time and degree as the general public.

Conclusion

The unstated goal of this study is not to analyze relevant data and information to determine whether or not an additional span across the Chesapeake Bay is the appropriate long-term solution to traffic congestion. If that were the goal, the concerns noted above provide immediate cause to pause this process rather than move to the FEIS stage.

Instead, the goal of this study is to demonstrate that the only possible solution to traffic congestion on the Bay Bridge is to build another bridge. But the study fails in this aim, too, by using out-of-date data, by not adjusting analysis based on massive changes in traffic patterns over the last year, by failing to account for myriad environmental impacts, and by declining to fully consider a no-build alternative.

The failure of this multi-million dollar taxpayer-funded study to adequately assess any options other than the one supported by the Governor raises serious questions about motive. Maryland used to lead the nation in smart growth planning, the concept whereby development is targeted to areas where infrastructure exists, and transportation investments are placed where development is targeted. Building this span rejects that history, in support of a project that will inevitably lead to more sprawl.

Let's stop pretending that this kind of transportation investment is our future. Let's stop this project.

If you have any questions regarding these comments please contact Ms. Lori Rhodes, Deputy Chief Administrative Officer for Land Use.

May 10, 2021

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Re: Comments on 3rd Bay Crossing Draft Environmental Impact Statement

Our position

The undersigned organizations, having considered all the alternatives contained in the Chesapeake Bay Crossing Draft Environmental Impact Statement (DEIS), strongly support the **"no build" alternative.** We ask that the Final Environmental Impact Statement contain a full evaluation of how an electric bus/minibus and van rapid transit (BRT) system together with Transportation System Management/Transportation Demand Management (TSM/TDM) and an electric ferry system could best be combined into a fully-integrated, flexible solution that is a viable alternative to a new bay crossing.

How alternatives were considered

The DEIS was supposed to comply with the National Environmental Policy Act and consider a reasonable range of alternatives. Unfortunately, it did not do so. Instead, the DEIS authors adopted a conclusions-first approach that eliminated serious consideration of any alternative other than what they wanted – a 3rd bay crossing corridor selected from among 14 corridors considered. The way the study's purpose and need criteria were written, each alternative had to provide:

- adequate capacity,
- dependable and reliable travel times,
  flexibility to support maintenance and incident management in a safe manner, and
- financial viability (i.e., be fully self-funding).

Modal and operational alternatives (MOAs) such as BRT, a ferry service, and TSM/TDM were each considered only as a stand-alone alternative so were eliminated from consideration because they were not viable by themselves. A combination of the MOA in an integrated solution would have met the above criteria and would have done so in a safe, equitable, and much more environmentally friendly manner than how traffic is handled now. Unfortunately, the Maryland Transportation Authority (MDTA) structured the study to prohibit consideration of such an alternative.

Why no-build is the best alternative

There are a number of reasons why "no-build" should be the preferred alternative, and that significant improvements should instead be made in existing infrastructure and traffic management processes.

1. **The impact of climate change on our future growth patterns can't be ignored**

Climate change is already happening and may fundamentally alter growth of and traffic to Eastern Shore communities. According to the Maryland Department of the Environment, "With 3,100 miles of shoreline, Maryland is the fourth most vulnerable state to suffer the effects of sea-level rise associated with climate change. Rising sea levels and increased storm intensity could have devastating and far reaching impacts on the Atlantic coast and the Chesapeake Bay ecosystem that affect the environmental, recreational and economic benefits enjoyed by Maryland and her visitors."[1]

Projections of future growth in traffic to the Eastern Shore are not reliable because they are based on past experience, before climate change became so evident and before the COVID-19 pandemic dramatically reduced daily commuting. How much traffic growth will be affected in the future by continuing telework is not known.

With climate change already underway, traffic growth projections being unreliable, and increasingly adverse impacts on our states' shoreline being inevitable, planning to build another multi-billion dollar bay crossing just isn't prudent.

2. **A 3rd bay crossing would increase global warming emissions**

Transportation is the largest source of climate-damaging greenhouse gases in our state. The plan to add more driving lanes by building a 3rd bay crossing represents an outdated business-as-usual "car-centric" model that has contributed to where we are today. U.N. Secretary General Antonio Guterres warned leaders at the White House Summit in April that the world is

[1] https://mde.maryland.gov/programs/Air/ClimateChange/Pages/index.aspx

"racing toward a threshold of catastrophe" unless it moves more rapidly to address climate change.[2]

The Maryland Department of Transportation (MDOT) periodically cites an academic study that showed limiting vehicle idling in traffic congestion (by adding more traffic lanes) can cut carbon emissions. However, an author of that study debunked that claim and said it doesn't mean adding more lanes will clean the air. [3]

3. Traffic congestion would occur with a 3rd bay crossing

Numerous academic studies and many years of practical experience have shown that expanding highways and bridges "induces demand", that is, attracts more drivers because they believe their travel will be faster.[4] This means traffic congestion will occur again in the future after billions of dollars have been wasted building a new bridge. That money could be better spent for other purposes, such as building the Red Line in Baltimore, or creating electric bus/minibus and van rapid transit and electric ferry systems to cross the bay and lessen the number of cars seeking to cross the 2 bridges.

Attracting more drivers also would lead to increased sprawl development on the Eastern Shore with the new households adding even more traffic onto our roadways. This is contrary to what needs to happen to reduce emissions from the transportation sector to lessen climate change.

4. More drivers generate more health-damaging air pollution

The increasing number of vehicles that would use a 3rd bay crossing would generate increasing amounts of health-damaging air pollution in addition to greenhouse gases. Traffic-related air pollution causes or exacerbates serious illnesses ranging from heart disease, strokes and dementia to lung cancer, asthma and various respiratory illnesses, and cuts short an estimated 58,000 American lives every year.[5]

5. A 3rd bay crossing would damage the bay

Even though Corridor 7, the preferred alternative described in the DEIS, would have the smallest environmental impact of all the corridors studied, it still would affect more than

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[2] https://www.washingtonpost.com/climate-environment/2021/04/22/biden-climate-summit/

[3] https://www.baltimoresun.com/news/environment/bs-md-highway-pollution-20190604-story.html

[4] James M.B.Volker, Amy E. Lee, Susan Handy. *Induced Vehicle Travel in the Environmental Review Process*. Transportation Research Record: Journal of the Transportation Research Board, June 2020

[5] https://usa.streetsblog.org/2013/10/22/mit-study-vehicle-emissions-cause-58000-premature-deaths-yearly-in-u-s/

10,000 acres of tidal wetlands and more than a thousand acres each of non tidal wetlands, oyster resources, and other sensitive areas, according to the Chesapeake Bay Foundation.

Also, the increasing amount of air pollution (that contains nitrogen oxides) generated in the watershed area by the increasing number of vehicles would be bad news for the Bay and its tributaries. Roughly one-third of the nitrogen pollution in the bay comes from the air.[6] Excess nitrogen can fuel the growth of algae blooms, which can block sunlight from reaching underwater grasses and create low-oxygen "dead zones" that suffocate marine life.

6. **"No build" plus an integrated solution make the most sense**

We are not just recommending "no build" and ignoring existing traffic congestion. Rather, we are saying the no build alternative should be selected AND that an integrated solution of modal and operational alternatives should also be implemented. The solution should include an electric bus/minibus and van rapid transit system, in combination with a robust electric ferry system, together with a number of options offered by TSM and TDM. An integrated solution of MOAs would inevitably offer significant flexibility, capacity, dependable and reliable travel times, and would be far more equitable and environmentally responsible than any other alternative considered.

To reduce emissions from the transportation sector and lessen traffic across the existing bridges, we must make it easier for people not to use their cars. An electric bus/minibus and van rapid transit system that has vehicles departing from population centers west of the bay, that has vehicle stops at a limited number of population centers on the eastern shore, and that runs more frequently when demand is greatest, could be very popular. Another benefit of transit is that it is accessible to lower income and other residents who don't own a car.

TSM options that could be used include tolls priced to encourage off-peak travel, lower-priced or possibly no tolls for high occupancy vehicles, traffic signal coordination, and proven techniques for managing traffic congestion. TDM options could include high occupancy vehicle lanes, creating more park and ride locations, incentivizing employers to offer flexible schedules, telework and transit subsidies, and incentivizing property rental companies to offer weekly rental periods that start and end on different weekdays.

Conclusion

In summary, the Bay Crossing DEIS used a conclusions-first approach that eliminated consideration of reasonable alternatives to ensure selection of an alternative that MDTA wanted - a new bay crossing corridor. Consequently, the DEIS conclusions are seriously flawed. The no-build alternative, together with implementation of an integrated solution comprised of an electric bus/minibus and van rapid transit system, TSM/TDM, and an electric ferry service, would address current and future traffic congestion at the current bay bridges in a much more

[6] https://www.cbf.org/issues/agriculture/nitrogen-phosphorus.html

cost effective, equitable, and environmentally friendly manner than how traffic is now handled there.

Organizations submitting this comment include:

350 Montgomery County
ArchPlan Inc.
Cedar Lane Unitarian Universalist Church Environmental Justice Ministry
Central Maryland Transportation Alliance
Coalition for Smarter Growth
Downtown Residents Advocacy Network (Baltimore)
IndivisibleHoCoMD Climate Action Team
Labor Network for Sustainability (LNS)
League of Women Voters of Maryland
Maryland Campaign for Environmental Human Rights
Maryland Conservation Council
Maryland Sierra Club
MLC Climate Justice Wing
NAACP Maryland State Conference
Solutionary Rail
Takoma Park Mobilization Environment Committee
Washington Area Bicyclist Association

CHESAPEAKE BAY FOUNDATION
Saving a National Treasure

May 10, 2021

Ms. Heather Lowe
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RE: CHESAPEAKE BAY CROSSING STUDY: TIER 1 NEPA
DRAFT ENVIRONMENTAL IMPACT STATEMENT

Dear Ms. Lowe:

The Chesapeake Bay Foundation appreciates this opportunity to comment on the Bay Crossing Study's Draft Environmental Impact Statement Tier I NEPA report.

Established more than 50 years ago to Save the Bay, CBF currently represents approximately 94,000 members in Maryland. Our education department operates 15 field programs for students and teachers across the Chesapeake Bay watershed. Several of these facilities, as well as other CBF landholdings, are located near or within the Corridor Alternatives Retained for Analysis (CARA). In addition, our land and oyster restoration programs have created and enhanced oyster reefs in the Chesapeake Bay and its tributaries and established riparian buffers, wetlands, and forests throughout the Maryland portion of the watershed.

CBF provided detailed comments on the purpose, need and scope for the Bay Crossing Study on December 15, 2017. We appreciated the opportunity to meet with you and other members of the project team shortly thereafter. We were encouraged to see several of our concerns noted in the Draft Environmental Impact Statement (draft EIS), especially the potential for a new bridge to generate excessive development pressure on rural, working lands. Elimination of Corridors 1-5 and 9-14, along with the recommendation not to advance Corridors 6 and 8 will avoid potentially extreme consequences for water quality and communities in those locations.

<u>However, the draft EIS fails to address several key issues and CBF remains concerned about the potential environmental impacts of a new span across the Bay in any location.</u> Temporary and permanent direct impacts of a new bridge, plus intensification of access routes and increased development pressure could irrevocably harm the Bay and many communities along the route. **Stakeholders are entitled to a quantitative accounting of these potential impacts. In contrast, on many NEPA-required issues the draft EIS retreats to a speculative narrative that fails to provide an actionable statement of potential impact.**

The draft EIS must incorporate recent trends to estimate changes in demand for crossing capacity in future years, and more fully quantify the direct effects, indirect effects, and water quality implications of the Maryland Transportation Authority (MDTA) Recommended Preferred Corridor Alternative. At present, the study does not:

I. Account for post-pandemic changes in travel demand and recent improvements to transportation systems management (TSM) on the existing bridge;
II. Quantify potential indirect effects due to induced growth;
III. Reflect the likely scope of access improvements and their associated impacts;
IV. Account for water quality impacts to impaired waters.

Given these omissions, the draft EIS inappropriately disqualifies the no-build alternative, other modal options, and their potential combinations. As such, CBF respectfully requests that MDTA hold the study unless and until these omissions can be cured with updated travel patterns, quantifiable growth impact forecasts, full scoping of access improvements, and accounting associated with the Chesapeake Bay Total Maximum Daily Load (TMDL).

I. The draft EIS is incomplete without accounting for post-pandemic changes in travel demand and recent improvements to transportation systems management (TSM) on the existing bridge.

The traffic projections in the draft EIS do not account for the dramatic decrease in travel during the COVID-19 pandemic and, more consequentially, potential permanent shifts in post-pandemic travel patterns. While the study could not reasonably have foreseen a global pandemic at the outset, it is not appropriate to continue the study as if nothing has changed. In California, aggregated cell phone data show a sustained 33% drop in commutes to and from work. These same data show a 26% decrease in retail trips and an 11% reduction in grocery and pharmacy trips (numbers correlated with an increase in online shopping and delivery services).[1] Experts suggest that as many as 30% of employees will work at least partially remotely by the end of 2021 in a new, post-pandemic normal.[2] Telework alone could significantly increase localized employment opportunities and result in the leveling off of cross-Bay weekday traffic growth in the future.

The draft EIS also fails to provide sufficient evidence for disqualifying transportation systems management (TSM) as part of an alternative to a build option. The draft does not appear to provide a quantified estimate for changes in level of service (LOS) resulting from TSM strategies. In addition, the draft EIS mentions but does not account for improvements in service from the actual recent installation of all-electronic tolling on the eastbound span. Anecdotally, it appears that this change has resulted in a very substantial LOS improvement on weekday evenings, especially when contra-flow is in effect on the westbound span.

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[1] Reese, Phillip. "Cell Data Offers Look at California Pandemic Travel Patterns." *Government Technology:* March 16, 2021. Accessed online at https://www.govtech.com/analytics/cell-data-offers-look-at-california-pandemic-travel-patterns.html

[2] Lister, Kate. "Work-At-Home After Covid-19—Our Forecast." *Global Workplace Analytics:* Accessed May 6, 2021 online at https://globalworkplaceanalytics.com/work-at-home-after-covid-19-our-forecast

The origin-destination study in the draft EIS reveals that nearly half of all weekday trips over the Bridge are local to Anne Arundel and Queen Anne's counties. Even on a summer Sunday, more than one quarter of trips are local to these counties. These figures suggest that telework and transit alternatives may be sufficient to offset a future with comparatively reduced demand due to durable changes in commutes and shopping behavior. This potential is buttressed by the fact that Average Daily Traffic (ADT) on the Bay Bridge has been flat for a decade, and that state growth projections for future travel demand on the Bridge have consistently overshot reality by a wide margin.[3] Predictions of continuing and persistent increases to 2040 (almost a 23 percent growth for non-summer weekday, and a 14 percent growth for summer weekend day) also fail to factor road (and beach-town) capacities and congestion as themselves limiting factors during summer weekends. MDTA should not advance the draft EIS without observing and accounting for changes in demand due to these factors, and increased efficiency from TSM improvements.

II. The draft EIS is incomplete without quantifying potential indirect effects from land development and examining alternatives for managing induced demand.

The draft EIS is rightly concerned about the potential indirect effects of induced development activity from the addition of travel capacity across the Chesapeake Bay. CBF agrees with MDTA's conclusion that constructing additional lanes will spur land development at a pace and extent greater than the no-build option.

However, the draft EIS provides no quantifiable account of the potential development activity that the agency expects to result from any of the corridor alternatives, including the Recommended Preferred Alternative. It is therefore not possible for the agency or stakeholders to use the DEIS to weigh the purported benefits of new construction against the potential impacts of this development activity. Nor can the agency or stakeholders effectively compare the Recommended Preferred Alternative to the no-build option. MDTA could reasonably provide quantifiable growth projections and associated impact statements in the draft EIS. Multiple growth projection models are currently in operation at the University of Maryland Center for Smart Growth, the Maryland Department of Planning (MDP), and the Chesapeake Bay Program (CBP). These models can test multiple scenarios with differing assumptions about demand and infrastructure improvements. These models can also incorporate local land use planning and zoning, and MDP's model can provide granular, parcel-level projections about the amount and intensity of future growth generated by each scenario. At least some of these tools should be in reach of the Bay Crossing Study as MDP is a coordinating agency on this project.

[3] The 2004 Needs Assessment projected traffic counts of approximately 135,000 vehicles per day at the Bay Bridge by the year 2025. In 2015, MDTA revised projected traffic at the Bridge down to 92,800 vehicles per day by 2040 – less than half the original projected increase over nearly twice the time.[2] The actual average daily traffic at the eastbound toll plaza was 73,100 in 2016, which is less than the number of vehicles that crossed the Bridge in 2007.

The use of one or more growth models would also enable MDTA to robustly evaluate land use policy changes as a no-build alternative in conjunction with transit, TSM, and telework. Demand may be reduced if local jurisdictions partner to manage future growth in a way that minimizes the need for cross-Bay travel. Mixed-use zoning could provide employment and commercial opportunities that are currently only available to Eastern Shore residents by crossing the Bridge. In addition, compact development in growth areas and robust protections from sprawl in rural districts would help support transit alternatives.

III. The draft EIS lacks analysis of direct effects if the evaluation of access improvements is limited to the current corridor boundaries.

It is not clear whether the Corridor boundaries shown on the draft EIS maps mark the limits of analysis for the impacts from access improvements required to serve a new span across the Bay. If so, we believe those limits are too narrowly construed and should be substantially expanded along the feeder routes. We restate from our prior comment letter that NEPA regulations require MDTA to evaluate all connected, cumulative and similar actions associated with proposed alternatives.[4] Among other criteria, actions are considered connected when they "cannot or will not proceed unless other actions are taken previously or simultaneously," or when they "are interdependent parts of a larger action and depend on the larger action for their justification."[5] MDTA's 2015 *Life Cycle Cost Analysis* clearly states that the efficacy of expanded capacity across the Bay is dependent upon improvements to access corridors, stating that:

> If improvements were only made to the Bay Bridge, they would not address the potential capacity limitations of US 50/301 on both sides of the bridge and would, therefore, not provide the regional transportation improvements needed to accommodate future traffic demand.[6]

As an example, the 2006 Task Force report stated that for a southern crossing between Calvert and Dorchester counties, "MD 4 would need to be upgraded with one to two additional lanes in each direction with greater controls of access from I-495 to Prince Frederick (32 miles). An access-controlled freeway could be needed around Prince Frederick."[7] This expansion would be on top of the four-lane divided highway that already exists for much of its length.

Similarly, changes in traffic flow resulting from the Recommended Preferred Alternative are likely to extend for many miles beyond the US-50 / I-97 and US-50 / US-301 splits. Lengthy vehicle queues are already common at traffic signals along US-50 at MD 213, MD 404, and intersections at the approach to the Town of Easton. If LOS is substantially improved at the Bridge without capacity expansions at these other intersections, the problem will simply move 'downstream' and these intersections (possibly also the intervening linear segments) would fail at an increased rate. A reasonably foreseeable next

[4] 40 C.F.R. §1508.25(a).
[5] 40 C.F.R. § 1508.25(a).
[6] MDTA (2015). p. 1.
[7] MDTA (2006). p. 12.

step would be to substantially intensify this entire portion of the US-50 corridor or build another regional bypass. In either case, the need for these changes would be driven directly by the Recommended Preferred Alternative. Therefore, their direct and indirect impacts – which would likely be substantial -- must be evaluated in this EIS.

IV. The draft EIS is incomplete without accounting for nutrient and sediment discharges to impaired waters, and their expected water quality impacts.

The Chesapeake Bay and its tributaries affected by the Recommended Preferred Alternative are impaired by excess nitrogen, phosphorus, and sediment. These impairments required the development of a Chesapeake Bay Total Maximum Daily Load (TMDL) for these pollutants. Maryland was also required to adopt a series of Watershed Implementation Plans to provide reasonable assurance that the pollution reduction targets in the Bay TMDL would be achieved.

Under the TMDL framework, it is highly likely that expanded travel capacity across the Bay will result in new pollution loads from construction activity, land conversion and future growth that increase the total load flowing into several Bay segments. As stated in our prior comment letter, construction of a new crossing and associated improvements along access corridors could result in significant short term increases in pollution loads including nutrients, sediment, and toxic contaminants. In fact, the Chesapeake Bay Watershed Model recognizes construction activity among the highest loading non-agricultural sources of nitrogen, phosphorus, and sediment on a per-acre basis.[8] Systemic, long term increases in pollution loads could result from the conversion, filling, or degradation of porous, bio-active resource lands such as forests, wetlands, pastures, hay fields and mixed open areas along the route. Growth and development induced by the project is likely to increase pollution loads through additional wastewater flows, increased stormwater volumes, and new sources of air deposition from associated vehicle trips and energy consumption.

The Clean Water Act requires that new or expanding loads to an impaired waterbody be accounted for and fully offset so there is no increase in pollution. As drafted, the EIS does not include such an accounting among the corridor and no-build alternatives, nor does it outline options to offset these loads. The federal-state Chesapeake Bay Program partnership maintains tools that can assist agencies in quantifying the potential changes in pollution loads due to construction, changes in land cover, and air emissions. Many of the coordinating agencies on this project are also CBP partners with access to these tools.

Conclusions

CBF believes the EIS is deficient as currently drafted and improperly disqualifies the no-build alternative on its own and in combination with telework, transportation systems management, transit, and land use strategies. If MDTA wishes to proceed, a revised EIS must properly observe and integrate current travel patterns, quantify induced growth and

[8] Chesapeake Bay Program (2017). *Phase 6 Watershed Model – Section 2 – Average Loads - Draft Phase 6.*

its likely effects, describe the full scope and both direct and indirect effects of access improvements, and account for nutrient and sediment discharges under the Bay TMDL.

Once again, we appreciate the opportunity to comment on this DEIS. Please do not hesitate to contact my office at [redacted] if you have any questions or would like to discuss this matter in further detail.

Sincerely,

Executive Director Maryland Office
Chesapeake Bay Foundation

Queen Anne's County

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May 10, 2021

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Re: Bay Crossing Study Tier I NEPA Study

Dear Secretary Slater:

The Queen Anne's County Commissioners have been monitoring the progress of the Bay Crossing Study, Tier I NEPA process conducted by the Maryland Transportation Authority (MDTA) and the Federal Highway Administration (FHWA). The purpose of the study is to consider corridors for providing additional capacity across the Chesapeake Bay in order to improve mobility, travel reliability and safety at the existing Bay Bridge. Based on four years of review and evaluation this State and Federal process has selected Corridor 7 from Anne Arundel County to Kent Island as the preferred alternative to locate a future bay crossing.

As projected in the Bay Bridge Life Cycle Cost Analysis and the Bay Crossing Study, traffic impacts and congestion within the Bay Bridge corridor will continue to deteriorate. The delays on this primary transportation and freight corridor impact the daily operations of many Maryland residents and businesses but impacts a disproportionate number of Queen Anne's County residents. For many years in the Annual CTP letter to MDOT, the Queen Anne's County Commissioners have identified the need for additional capacity crossing the bay as a top priority to reduce congestion and increase mobility in and through Queen Anne's County.

It was anticipated that Corridor 7, the existing bay crossing location, would be identified by State and Federal agencies as the preferred alternative to add capacity and reduce congestion due to the:

- Existing road infrastructure at the current location
- Lack of road infrastructure at other locations
- Relief of congestion and backups at the existing Bay Bridge compared to other corridors
- Estimated cost based on length of crossing
- Need to plan for replacement of older bridges
- Better compatibility with existing land-use patterns likely resulting in fewer indirect effects than other locations
- Lower environmental impacts than other corridors

As the first step in the planning process, The Tier I NEPA Study only identifies a 2-mile-wide corridor where a future crossing may go. The next step in the planning process is a Tier II NEPA study to review potential bridge and road alignments and the associated impacts within the corridor. The details related to a new bridge and highway improvements, such as the specific location, number of lanes, highway widening, right of way acquisition, integration with existing roads and bridges, will be part of the Tier II study. This leaves many aspects related to a future bay crossing and corridor undecided. Therefore, with significant details to be considered during future study, Queen Anne's County must be included as a decision maker in future Tier II NEPA process. This is vital to protect the interest of citizens, businesses, commuters, emergency services, and commerce of Queen Anne's County. Specifically, the County would like to ensure that its standing plans, codes, and guiding policy documents are considered in greater detail during the Tier II NEPA process. These documents include but are not limited to the following:

- Comprehensive Plan
  - Appendix 4 (Master Roadway and Transportation System)
  - Sustainable Growth Management Strategy
  - Transportation Element (Guiding Principles, Vision, and Objectives)
- Community Plans
- Kent Island Transportation Plan
- Sea Leve Rise and Coastal Vulnerability assessment and implementation Plan (with Vulnerability Viewer)

The Tier II NEPA process is not funded; therefore, it is unknown when the multi-year process would start or be completed. Any new construction resulting in new capacity crossing the bay is many years away. Nonetheless, many highway improvements to meet current and long term demand need to be funded and constructed immediately. With MDTA and FHWA selection of Corridor 7, it is essential that this decision be supported with engineering and construction funding for projects currently identified on US 50, US 301, MD 18 and MD 8. It is prudent to begin funding all improvements within the County included in the adopted Federal Long Range Transportation Plan (LRTP), State of Maryland Transportation Plan (2040 MD), Consolidated Transportation Plan (CTP), MDOT Priority Project Ranking (Chapter 30), the County Priority Letter and Kent Island Transportation Plan (KITP) which in part include:

- US 50 widening and interchanges on US 50 from US 301 to MD 404 (2040 MD, CTP & Priority Letter)
- Widening and improvements to MD 18 (Priority Letter, LRTP, KITP, Chapter 30)
- MD 8 widening and Interchange Improvements (KITP)(LRTP)
- Construct at grade intersection safety improvements on the US 301 corridor (Priority Letter)
- US 50 & Dundee Road Overpass on Kent Island (KITP)

Additional vital road improvements along the entire length of Corridor 7 will be identified by Queen Anne's County as a specific road alignment is considered during Tier II NEPA.

As planning for a bay crossing moves through the NEPA process the County will continue to monitor traffic volumes as well as any changes in travel patterns. The County Commissioners remain committed to work with MDOT on congestion management strategies so citizens can move throughout the County on local roads while through traffic is directed to remain on US 50 & 301.

We look forward to continued cooperation with MDOT to implement needed transportation improvements and find transportation solutions to best serve our citizens.

QUEEN ANNE'S COUNTY
BOARD OF COUNTY COMMISSIONERS

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MDTA Note: Received 5/10/2021

Kent Conservation & Preservation Alliance
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Maryland Transportation Authority
Federal Highway Administration

Comments of Kent Conservation and Preservation Alliance on Bay Crossing DEIS

The Draft Environmental Impact Statement (DEIS) has been released for the Tier 1 NEPA study of a Bay Bridge crossing eliminating Corridor 6, the crossing that would have spanned from Anne Arundel County, near Pasadena, to Kent County, below Rock Hall. The other corridor under consideration that was also eliminated was Corridor 8 from Anne Arundel to Talbot County. This left the Maryland Transportation Authority (MDTA) and the Federal Highway Administration (FHWA) with a choice between building a new span at the current crossing location, or not building. Unfortunately, in our opinion, the wrong decision was made.

Of importance to the citizens of Kent County, of course, is the fact that the MDTA concurred with KCPA's assessment that a bridge from the Western Shore into Kent County would extract too great a toll on cultural, historic and environmental assets, as well as inflict undue development pressures. Clearly the impact that a new crossing will have on the environment, Chesapeake Bay and land and people on both sides of the Bay will be severe.

Queen Anne's Conservation Association (QACA) commissioned a study by the environmental planning and engineering services firm AKRF to conduct an independent study to determine whether there is a current need for any new Chesapeake Bay Bridge. The conclusion of the study was that the MDTA's traffic modeling is flawed and that the modeling forecasts of future traffic growth were overestimated. We request that MDTA investigate and reconcile the discrepancies between AKRF's and MDTA's studies.

Kent Conservation and Preservation Alliance fought to protect Kent County, but we have always maintained that the no build option should be completely explored and disproven before rejecting it.. KCPA is not convinced that this has been done and we join with others in opposing moving forward with a Tier 2 NEPA study at this time.

The expediency of transporting people to the beaches of Ocean City will come with a major environmental footprint. If the citizens of Maryland are fully informed about the impacts we think they may not consent to paying for the destruction.

Kent Island Heritage Society

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Statement on the Bay Crossing Tier 1 NEPA Study

May 10, 2021

The Kent Island Heritage Society Board of Directors stands opposed to the recommendation of the Bay Crossing Tier 1 NEPA Study that the third Bay Bridge should be located in Corridor 7, across Kent Island. The mission of the Kent Island Heritage Society is to discover, identify, restore, and preserve the heritage of Kent Island. This proposal is a clear threat to preserving the heritage of Kent Island.

The Corridor 7 option adjacent and to the north of the current westbound span, would necessarily require a huge swath of Sandy Point State Park on the Western Shore and Terrapin Park on Kent Island on the Eastern Shore. It would incorporate the existing road network from west of the Severn River in Annapolis to the 50/301 split in Queenstown, with a great deal of necessary expansion. This option incorporates a two mile wide swath along the existing corridor to facilitate the additional infrastructure that would be required. The exact location(s) within this swath, roughly 1 mile north and south of the existing highway would be left to the discretion of the State and Federal decision makers, during the Tier 2 process, requiring a “just trust us” approach. Based on recent experience with MDTA and SHA, that trust is just not there. Few Kent Islanders think that the Corridor 7 option is reasonable or responsible.

We will focus our comments to the Eastern Shore side. If you look at Corridor 7 across Kent Island you are impacting and potentially destroying the historic, cultural, and economic heart and soul of Kent Island, and a large number of residences as well.This area includes a number of historic sites in the nationally recognized Stevensville Historic District, the Stevensville Cemetery, and many historic assets along the route and in the unique Kent Narrows location. Hundreds of businesses located on both sides of Rt. 50 would be in jeopardy and as mentioned, many hundreds of residences would likely be destroyed. The corridor includes many parks and public assets, including several QA County Public Schools, the Kent Island Library, the Kent Island Volunteer Fire Dept, the Anne Arundel Medical Center, two of the Island’s largest churches and the famous Cross Island Trail from Kent Narrows to Terrapin Park, following the route of the historic railroad line across the Island. Also included would be many thousands of acres of environmental destruction and degradation, both land and water based. In short, Kent Island would be gutted.

We have studied the details of the Tier 1 Study, and have also reviewed the very detailed analysis and critique offered by the Queen Anne's Conservation Association (QACA). We have also reviewed the critique presented by professional traffic engineer and analyst, Kent Island resident, David Humphries. Frankly, they both make a great deal more sense than the State's Tier 1 Study. They both argue that the emphasis is primarily on questionable traffic analysis and projections with no real analysis of any of the so-called "corridors". The QACA critique convincingly argues that, in what is supposed to be an Environmental Impact Study, there is no legitimate analysis of the real environmental impact other than the assertion that such details could be determined in the next Tier 2 Study!

These are well thought out, documented analyses by professionals, particularly the painstaking detail of the QACA critique. But the concerned non-technical citizens of the Kent Island Heritage Board have come to the same conclusion. The Corridor 7 option across Kent Island is not logically supported, and just makes no sense. .

Furthermore, the public statement made about a year and a half ago that Corridor 7 would be the only option that would be supported undermined confidence in the veracity of the study. That statement led many to believe that conclusion was known from the beginning and that the study was done to rationalize the final decision.

Many Islanders are aware of the local historic hero, Senator James Kirwan, who stood up 100 years ago to defend against the Federal plan to take over Kent Island in 1917 at the onset of World War.1.The Island was to become a bomb testing site and munitions depot. After a huge local protest, It was ultimately moved north to a place called Aberdeen. We are reminded of that time and that threat.

Given the tremendous potential for the destruction of so much of Kent Island, including its rich and unique history, of the four options presented the only conclusion is the no build option, with the recommendation to go back and restart the process. In the meantime, MDTA should do everything possible to maximize the capacity of the existing spans, using all viable modern traffic management technologies and transportation options. The focus should be on repair or replacement as necessary of the existing spans while another "corridor" at a second distant location is studied and identified.

Sincerely,

[redacted]
[redacted], President
Kent Island Heritage Society

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[redacted] email Comments

BAY CROSSIN STUDY DEIS

MAY 10, 2021

The current DEIS report does not provide sufficient information to select the Preferred Alternative as the location for a new or expanded replacement of the Bay Bridge. The location of a new or replacement structure cannot and should not be confirmed for the current preferred location (Alternative 7) or ANY of the alternatives, based on the information presented in the DEIS.

The problems with the draft study are many. Not only are there many pieces of this puzzle that don't fit, but many key parts of the puzzle are missing. The difficulties started with MDTA's selected approach to do this study. It elected to employ a minimalist expenditure by using a Tier 1(location) and separating the Tier 2 (configuration/financing) from the NEPA process. Rather than engaging the more conventional, comprehensive approach, but more costly NEPA process. Even though eventually the preliminary engineering and environmental analysis cost will be the same, or greater than the conventional approach, when both Tier 1 and Tier 2 elements are completed. This Tier 1 only deals with the locational issue, but many of the details necessary to make the decision are not presented. In this case the "devil is in the detail."

There are five (5) KEY elements in this report that have to be resolved before a decision on a corridor location can be made. None have been presented in the draft document. They are:

1. **The Purpose and Need, or objective of the study was so limited to traffic only considerations, that it skewed the number and elements of the alternatives. Its key metric was traffic impacts at the existing bridge. No broader Quality of Life impacts for the communities, counties, region and the state for this multi-billion dollar project that will impact the region and the state for the next 50 to 100 years were considered. Safety, redundancy, growth and development, commerce, tourism and creating a more direct destination travel route to the major Eastern Shore tourism destinations were not considered. This occurred because the counties were not at the**

decision table when MDTA'S Purpose and Need was developed. A revised Purpose and Need must strike a balance between traffic impacts on the existing structures and the more comprehensive region and state-wide benefits.

2. **No roadway dimension and impact information is presented. Consequently it is impossible to evaluate the workability of the selected "preferred" alternatives. No details on the bridge, nor the access roads, nor any description or order of magnitude cost for the bridge or extensive infrastructure changes that will be required to feed the traffic to and from the bridge were provided. Nor any overlays of the changes needed to the feeder and service roads. The excuse that this information will be presented in Tier 2 is unacceptable as this information is needed to evaluate the corridor selection now, not years from now. Once this corridor is selected, no other corridors will be considered now or in the future. Regarding this element MDTA decision put's the proverbial "cart before the horse."**
3. **Based on the lack of information there is no justification to exclusively pursue the detailed and costly engineering, environmental and financial Tier 2 analysis for the MDTA selected corridor. The cost of this Tier 2 NEPA multiyear process will likely be in the range of $30 million or more. Consequently a combined Tier 1 FEIS and Record of Decision and advancement to Tier 2 should NOT proceed until a range of alternatives are evaluated consistent with a revised comprehensive and expanded Purpose and Need element.**
4. **The compounded comprehensive impacts (sprawl, air pollution, etc.) on the landing sites, both the Broadneck Peninsula and Kent Island/Stevensville communities have not been factored in the selection decision. Unreasonable traffic congestion that prevents access to homes, shopping, commerce and hospitals will be further degraded. The latent demand "if you build it they will come" is totally unpredictable, but history will likely be repeated as the traffic volume increases over the life (say 70 or more years) of a new bridge.**

5. **The impacts of the COVID pandemic have not been evaluated. This includes travel volume, travel patterns and the related corridor impact analysis. Until we know if the changes are only a temporary "blip" or more permanent, the analysis should pause for at least 12 months to evaluate this issue. The multi-billion dollar price tag of a new bridge, and the local, regional and state impacts warrant this pause.**

The MDTA/FHWA action plan should halt the existing effort and pursue a revised DEIS to include the missing elements described above. Concurrently it should immediately begin the process to identify northern and/or southern alternative corridor(s), consistent with an expanded Purpose and Need. Here the selected corridor should complement travel on the existing 50/301 corridor. A complementary comprehensive corridor analysis for each alternative also needs to be presented. A bridge located some distance from the existing structures would likely have a lower profile(fewer lanes),with less obtrusive infrastructure changes, and reduce traffic on the Anne Arundel and Queen Anne's counties Route 50 corridor. Two separate corridors across the bay will serve to balance each other in times of heavy travel demand, provide for incidents that stop or detain traffic, provide for weather related evacuations, maintenance and other unforeseen stoppages. Further two distant corridors would better serve the mobility, safety, growth and development needs of the region and the state.

I urge the MDTA and FHWA to acknowledge and include these comments in a revised DEIS.

Thank You.

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