



CHAPTER 6: CORRIDOR PLAN AND GUIDING PRINCIPLES

Building on the previous chapters of this report and the identified transportation network deficiencies, the Study Team developed Guiding Principles for the corridor, in addition to corridor recommendations. For this phase of the study, the public outreach effort included meetings with the Interagency Advisory Group (IAG) and the Community Advisory Panel (CAP) on March 28, 2018 to present the corridor plan and Guiding Principles and obtain feedback, as well as an April 10, 2018 public meeting.

Guiding Principles

The following Guiding Principles for the Hanover Street Corridor Study will inform the selection of corridor options and serve to guide the design-related elements along the Hanover Street corridor. These Guiding Principles establish a framework and serve as a guide for the City of Baltimore to take a proactive approach for future phases of design and construction.

- Historic and cultural context of the Vietnam Veterans Memorial Bridge
 - Aesthetics
 - Architectural importance
 - Cultural and natural resource preservation
 - Bringing back the original purpose of the bridge – connectivity for all travelers; since rehabilitation in 1970, the purpose of the bridge has been almost exclusively to move vehicles
- Community Revitalization
 - Gateway to current and future development
 - Economic and social growth
- Safety
 - Increased space in the corridor for pedestrians and bicycles
 - Using design opportunities to calm traffic (reduce speeds) improves safety for pedestrians and bicyclists
- Connectivity
 - Improved and enhanced multimodal connectivity between pedestrians, bicyclists, transit riders, motor vehicles, and freight operators
 - Remove barriers that block desired movements and gaps that separate people from their desired destinations





- Make connections within and between neighborhoods, as well as between local and regional origins and destinations (residential, retail, employment, and recreation)
- Accessibility
 - Provide the surrounding communities with safe and reliable access to key quality of life resources (retail, employment, and recreation)

Short-Term Bridge Maintenance Work

In advance of corridor recommendations from this study, BCDOT is planning some short-term bridge maintenance work to improve the bridge deck riding surface and guide potential interim improvements prior to a full rehabilitation or replacement.

The current BCDOT short-term plan addresses the roadway portion of the bridge and does not include the moveable span or the adjacent sidewalks:

- Prior to any repairs, a deck investigation will take place consisting of core sampling, Ground Penetrating Radar (GPR), analysis, and report recommendations. Core sampling and GPR are expected to take place in August 2018, testing of materials is expected to take place in September 2018, and the analysis and report recommendations are expected by the end of December 2018.
- Spot bridge deck repairs and an asphalt overlay will be placed over the bridge deck to improve the riding surface of the bridge. The overlay is anticipated to start in late Summer 2018 and due to traffic concerns, work will take place at night and on weekends. The estimated cost of the asphalt overlay project is \$400,000.
- Following the asphalt overlay, BCDOT will use the information gathered from the deck investigation to choose the appropriate option for additional interim repairs.

Corridor Recommendations

Prior to developing corridor recommendations, the following background assumptions were recognized by the Study Team as a result of developer plans and analysis completed in this study:

- This study assumes that a six-lane typical section (three lanes in each direction) north of the Vietnam Veterans Memorial bridge will be in-place for the future based on the Port Covington Master Plan approved by the City of Baltimore
- This study did not evaluate the removal of the one-way pair of Potee Street and Hanover Street, but does not preclude future redevelopment/combination of the two roadways. This assumption was made based on the limitations of the study area, given the study area does not extend south of the one-way pair endpoint.



- Based on the traffic analysis discussed in Chapter 5, the bridge cross section (number of lanes) will not have a significant impact on corridor travel time or queueing since the proposed signalized intersections north of the bridge are the constraints in the corridor.

The recommendations for the various Hanover Street corridor elements are presented below. Additional details and graphical renderings were included in Chapter 5.

Roadway

- Concrete pavement reconstruction north of the bridge to Cromwell Street and south of the bridge to Waterview Avenue to repair and slow future pavement damage due to truck traffic
- Asphalt overlay of remaining roadway within the corridor
- Clean all existing inlets, pipes, and bridge scuppers and inspect the existing storm drain system to determine the extent of repair or replacement that would be necessary
- Upgrade traffic signals/mast arms and pedestrian signals that do not meet current design standards as needed
- Remove channelized/free-right turn movements

Pedestrian

- Add pedestrian lighting
- Enhance crosswalks to increase visibility
- Debris should be cleared from all sidewalks
- Reconstruct the stairwell connecting Hanover Street to the Gwynns Falls Trail
- Upgrade sidewalk bump-outs to provide ADA clearance around utility poles and signs

Bicycle

- Provide barrier separated bike and pedestrian facilities on the bridge and bike lanes or separated trails on the approaches to the bridge
- Potential opportunity for emerging bike facility technology, such as bike signals
- Provide connections to planned separated bike facilities as identified in the 2017 Separated Bike Lane Network Addendum to the Bike Master Plan providing all ages bicycle access to South Baltimore
- Provide connections to the Gwynns Falls Trail and Middle Branch Park making key connections for the Baltimore Greenway Trails Network that will create a 35 mile trail loop for Baltimore City





Transit

- Continue to evaluate transit enhancements once the impacts of BaltimoreLink have been quantified
- As needed, bus stops are recommended to have sidewalk access, a concrete pad connecting the sidewalk to the curb for boarding, clear signage, adequate lighting, benches, trash receptacles, and a shelter

Urban Design

- Bridge architecture and previously unused space under the bridge creates the opportunity for a unique urban space
- Outdoor art gallery with recreation amenities
- Provide access to the bridge deck with a sculptural staircase
- Enhanced living shoreline to complement West Covington Park
- Enhanced public recreation space under the bridge

Bridge Structures

Following the BCDOT's planned short-term maintenance work (asphalt overlay) to improve the riding surface and any additional potential interim work that is deemed necessary following the deck testing and analysis, the recommendation for the Vietnam Veterans Memorial Bridge is the long-term major rehabilitation option "Option 3 – Four Lane Section with Fixed Span in the Closed Position," as described and in Chapter 5 and shown in **Figure 6-1** below.

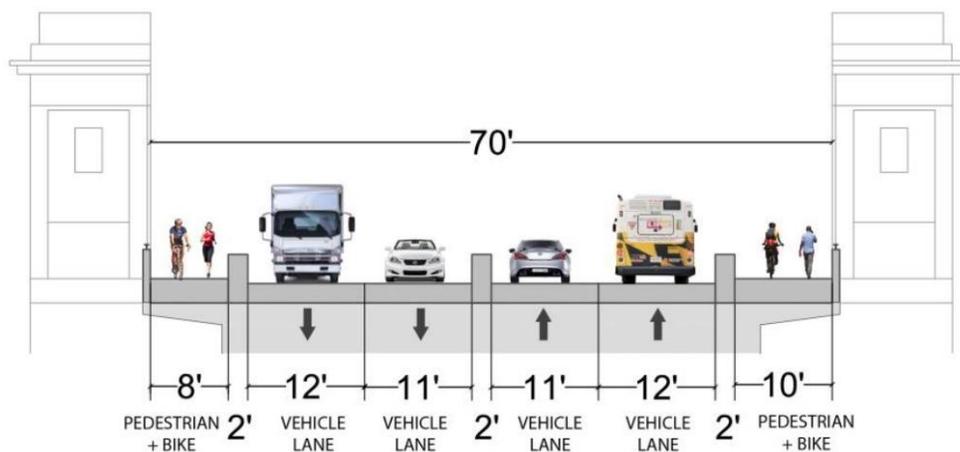


FIGURE 6-1: FOUR LANE SECTION WITH FIXED SPAN IN THE CLOSED POSITION



Key aspects of this recommendation include:

- No formal decisions regarding the bridge have been made as part of this planning study recommendation and taking the study through the National Environmental Policy Act (NEPA) process is necessary
- Total estimated cost to rehabilitate the bridge to achieve the recommended typical section and permanently fix the movable span in the closed position (2018 \$): \$50.0 million
- Specialized engineering work/structural analysis is required to demonstrate that a suitable additional service life (of approximately 75 years) can be achieved prior to selecting rehabilitation as the preferred option
- Permanently fixing the movable span in the closed position would allow the grid deck to be filled and BCDOT will significantly save on annual maintenance costs associated with steel grate deck and the mechanical and electrical operating systems
- Approval from the United States Coast Guard will be required to permanently fix the movable span in the closed position
- 2040 traffic analysis shows that the proposed signalized intersections north of the bridge are the constraints in the corridor (see Chapter 5 for additional details). Although the bridge cross section affects storage space, travel times are consistent regardless of the cross section (i.e. a four-lane bridge would basically have the same impact on traffic as a six-lane bridge).
- Enhanced pedestrian and bicycle space in each direction (eight feet and 10 feet), traveling in the same direction as traffic, using the existing bridge width and removing the center reversible travel lane

Corridor Cost Estimates

The cost estimates previously discussed in Chapter 5 were only related to the rehabilitation or replacement of the Vietnam Veterans Memorial Bridge and did not include additional corridor elements. This section presents the costs of the remaining non-bridge elements and is broken down into two options – Low and High – recognizing that Baltimore City may not have available funding to implement all elements that were shown in project urban design renderings. Additionally, it is assumed that improvements to Hanover Street north of the bridge will be included as part of the Port Covington development.

Itemized cost developments for the two corridor options (non-bridge elements) are presented in **Appendix E**. Note that costs shown below are rounded up for reporting to reflect this stage of planning.





Low Option

With the Low Option, in conjunction with the bridge improvements not included in the corridor estimate, the north and south roadway approaches will also have proposed improvements described as follows:

North of bridge: From the north end of the bridge for approximately 375 feet to Cromwell Street, the existing northbound and southbound roadway pavement will be removed and replaced with new curb and gutter and concrete pavement to provide for a low maintenance solution to pavement rutting. New pavement markings will be implemented, as well as enhanced crosswalks. Pedestrian pavement will be coordinated with adjacent development and trails and new sidewalk will be provided where necessary to meet Americans with Disabilities Act (ADA) compliance. Some street trees will be added where space and conditions allow. Bus stop amenities (shelters, benches, bike racks, waste and recycling receptacles) will be provided, where applicable. Traffic signal upgrades are included.

South of bridge: From the south end of the bridge for approximately 800 feet to Waterview Avenue, the existing northbound and southbound roadway pavement will be removed and replaced with new curb and gutter and concrete pavement to provide for a low maintenance solution to pavement rutting. The northbound buffered bike lane will be extended to the bridge and a southbound buffered bike lane will be added to connect to new bike facilities, as identified in the recommended bridge option. New sidewalk will replace non-compliant sidewalk where necessary to meet ADA standards and enhanced crosswalks are included. Between Waterview Avenue and Reedbird Avenue, the northbound and southbound lanes will receive mill and overlay. The deteriorated staircase leading to the Gwynns Falls Trail on the southern side of the bridge will be reconstructed. Street trees will be added where space and conditions allow. Stormwater quality improvements and storm drainage features will be added or repaired. Bus stop amenities (shelters, benches, bike racks, waste and recycling receptacles) will be provided, where applicable. Traffic signal upgrades are included.

Generally, other items in the corridor will remain. Roadway lighting, utilities, and signing will remain.

The total estimated cost of the Low Option is \$9.0 million.

High Option

With the High Option, enhancements are proposed to all areas including intersections, bus stops, the waterfront spaces below each bridge landing, and the bridge itself, as follows:

- Intersections improvements will include improvements for pedestrian safety and convenience by reshaping the intersecting curbs to calm turning traffic, removing channelized/free-right turns, providing high visibility crosswalks, and providing pedestrian-scaled lighting.
- The North Arcade – the unique bridge architecture creates area for usable recreational amenities under the bridge that can be changed seasonally in previously unused space. Special paving, site furniture, and artistic treatments will further enhance the space. Lighting will provide for public safety as well as accentuate the character of the space. New sculptural





staircases will allow pedestrian access to and from the bridge from ground level. A living shoreline will be constructed to complement the character of West Covington Park.

- The South Arcade – this area offers a significant opportunity to improve public safety, enhance neighborhood amenities, and provide new multimodal connectivity. A terraced amphitheater overlook will provide panoramic views of the Baltimore skyline and the Middle Branch. New accessible paths will seamlessly connect pedestrians from the bridge deck to the waterfront. At the water's edge, a promenade deck will be created to provide a signature space unique to Baltimore. New tree plantings at the top of the amphitheater terraces will provide shade and be designed to maximize ground plain visibility and picnic amenities. Artistic lighting will accentuate the signature bridge architecture and simultaneously provide for public safety and a new nighttime destination.
- Bus stop improvements will include shelters, seating, bike racks, waste and recycling receptacles, and pedestrian-level lighting, where applicable.

North of bridge: From the north end of the bridge for approximately 375 feet to Cromwell Street, existing northbound and southbound roadway pavement will be removed and replaced with new curb and gutter and concrete pavement to provide for a low maintenance solution to pavement rutting. New pavement markings will be implemented. Pedestrian pavement will be coordinated with adjacent development and trails and new sidewalk will be provided where necessary to meet ADA compliance. Street trees will be added where space and conditions allow.

South of bridge: From the south end of the bridge for approximately 800 feet to Waterview Avenue, existing northbound and southbound roadway pavement will be removed and replaced with new curb and gutter and concrete pavement to provide for a low maintenance solution to pavement rutting. Between Waterview Avenue and Reedbird Avenue, the northbound and southbound lanes will receive mill and overlay and new pavement and stamped asphalt crosswalk markings will be implemented. The northbound buffered bike lane will be extended to the bridge and a southbound buffered bike lane will be added to connect to new bike facilities, as identified in the recommended bridge option. New sidewalk will replace non-compliant sidewalk where necessary to meet ADA compliance. The deteriorated staircase leading to the Gwynns Falls Trail on the southern side of the bridge will be replaced. Street trees will be added where space and conditions allow. Stormwater quality improvements and storm drainage features will be added or repaired.

Generally, other items in the corridor will be upgraded or added, including:

- Traffic signals (including mast arms)
- Roadway and pedestrian lighting
- Utilities
- Signing and marking
- Stormwater management





- Bridge up-lighting
- Vietnam Veterans Memorial Bridge memorial markers on Hanover Street

The total estimated cost of the High Option is \$26.0 million.

Public Outreach

For this phase of work, the Study Team met with the Interagency Advisory Group (IAG) and the Community Advisory Panel (CAP) to present the Guiding Principles and corridor recommendations and obtain feedback. The team met with the IAG and CAP on March 28, 2018 to review information from this chapter. Guiding Principles and corridor recommendations information was presented at a Public Meeting held on April 10, 2018 at MedStar Harbor Hospital. The Study Team reviewed the project background, the City's planned short-term maintenance work, bridge options evaluated, Guiding Principles, corridor recommendations, and discussed next steps.

Next Steps / Key Factors to Advance the Project

The Study Team has identified the following overall next steps and key factors to advance the Hanover Street Corridor Study:

- Structural studies / testing and analysis
 - Necessary to confirm feasibility of the recommended rehabilitation option
 - Schedule: estimated 6 months from approval to start
- Perform National Environmental Policy Act (NEPA) Study *(additional information included below)*
 - Necessary for a formal decision / preferred alternative since the current planning study is deliberative
 - Schedule: estimated 18-24 months from approval to start
- Obtain approval to permanently fix the movable bridge span in the closed position from the US Coast Guard *(additional information included below)*
 - Schedule: coordination to begin during the NEPA Study
- Funding opportunities, grants, etc.
 - Better Utilizing Investments to Leverage Development (BUILD) grants
 - Infrastructure For Rebuilding America (INFRA) grants
 - Seek funding assistance from the State





- Transportation Alternatives Program (TAP) funds could be sought for public recreation amenities surrounding the bridge and separate from any bridge improvement project.

Perform National Environmental Policy Act Study

A critical next step towards an improved Hanover Street Corridor will be compliance with the National Environmental Policy Act (NEPA) and related requirements that fall under the NEPA “umbrella”. The level and complexity of the required NEPA documentation is dictated by the specific characteristics of the proposed action. Typically, new highways and bridges on a new location will trigger the most rigorous and time-consuming level of NEPA documentation, an Environmental Impact Statement (EIS). Conversely, certain activities including bridge rehabilitation, reconstruction, and replacement and the construction of bicycle and pedestrian lanes are eligible for a Categorical Exclusion (CE), subject to Federal Highway Administration (FHWA) approval. A CE will still require documentation and compliance with all other applicable regulations. Lastly, if the proposed action does not qualify for a CE and if it is uncertain whether the action would result in a significant impact to the human, natural, and cultural environment, then an Environmental Assessment (EA) is prepared. The end result of an EA is either a Finding of No Significant Impact (FONSI) or the discovery of significant impacts that would trigger a decision to prepare an EIS.

The Hanover Street Corridor Study has resulted in a fairly broad range of possible proposed actions that could possibly require any one of the above described NEPA actions. The following table explores the possibilities for NEPA compliance:

Proposed Action	Possible NEPA Class of Action	Typical Schedule (months)	Considerations / Justifications
Re-decking of the existing bridge surface	CE	9	Bridge rehabilitation is specifically stated as an action eligible for a CE (assuming no significant impact)
Rehabilitation of the existing bridge to remove the reversible travel lane and expand pedestrian / bicycle space	CE	9	Bridge rehabilitation and pedestrian / bicycle facilities are specifically stated as an action eligible for a CE (assuming no significant impact)
Rehabilitation of the existing bridge to remove sidewalks, create an additional travel lane for vehicles, and construct a separate pedestrian / bicycle bridge adjacent to the existing bridge	EA	18-24	Bridge rehabilitation is specifically stated as an action eligible for a CE (assuming no significant impact). Construction of entirely new bridge would warrant consideration of preparing an EA as significance of impact is likely unknown.
Demolish the existing bridge and construct a new bridge with enhanced pedestrian / bicycle space	EA	18-24	Overall scope and scale of the proposed action is not eligible for CE. Demolition of the existing historic bridge and construction of an entirely new bridge would warrant consideration of preparing an EA.





Obtain Approval to Permanently Fix the Movable Bridge Span in the Closed Position

In order to obtain approval to fix the movable bridge span in the closed position, coordination and discussion will be necessary with all necessary agencies requiring vessel access (Baltimore City, MDTA, MDOT MTA, etc.) regarding the required bridge clearance if a fixed span is in-place. The formal determination process is then conducted through the US Coast Guard (USCG). Additional information is included below.

According to National Oceanic and Atmospheric Administration (NOAA) chart 12281, the Vietnam Veterans Memorial Bridge offers a vertical clearance of 38 feet above mean high water at the center of the bascule span and a minimum of 23 feet through the central width of 150 feet when in the closed position.

The Vietnam Veterans Memorial Bridge is subject to federal operating regulations promulgated at 33 CFR 117, offering bridge closure periods during business rush hours. Even though the bridge has not been opened recently for a vessel, the USCG will look to potential for future navigation. The relatively high vertical clearance of the Vietnam Veterans Memorial Bridge should bode well for the potential to convert the bridge to a fixed structure, added to the fact that other than the upstream marina, there are not any recreational boater destinations. However, permanently fixing the bridge in the closed position is often viewed cautiously by the USCG given the relatively short time in which no openings have been requested and the continuation of recreational boating in the vicinity.

Regardless of the potential bridge options, the following steps regarding navigation impacts should be taken:

1. Review bridge opening logs for the Vietnam Veterans Memorial Bridge (and possibly the CSX swing bridge) for the past five years.
2. Confirm current drawbridge operating regulations for Hanover Street and the CSX swing bridge.
3. Identify vessels homeporting at the upstream marina (Middle Branch Marina) with vessel clearance requirements and potentially map the existing channel depth.
4. Interview local harbormaster (potentially the Baltimore harbormaster or marine police) to help identify waterway users and emergency marine service needs.
5. Interview local marine police and fireboat for required access upstream of Hanover Street and type of marine equipment used.
6. Research plans for potential development upstream of the bridge (particularly parks and recreational marine activities) and identify zoning and authorized land uses.
7. Identify upstream property owners and potential for conversion to marine use. This includes MDOT MTA and MDTA access to upstream light rail and highway structures.
8. Meet with USCG and Army Corps of Engineers for their navigational input and waterway plans, if any.
9. Field visit(s) to area may be necessary.





Summary

Building on the previous chapters of this report and the identified transportation network deficiencies, the Study Team developed Guiding Principles for the corridor, developed corridor recommendations and cost estimates, and identified next steps / key factors to advance the project.

The Guiding Principles establish a framework and serve as a guide for the City of Baltimore to take a proactive approach for future phases of design and construction and include:

- Historic and cultural context of the Vietnam Veterans Memorial Bridge
- Community Revitalization
- Safety
- Connectivity
- Accessibility

Corridor Recommendations discussed in this chapter are briefly summarized below. The costs of the corridor non-bridge elements were broken down into two options – Low and High – recognizing that the City may not have available funding to implement all elements that were shown in project urban design renderings. The total estimated cost of the Low Option is \$9.0 million and the total estimated cost of the High Option is \$26.0 million.

Roadway

- Concrete pavement reconstruction north of the bridge to Cromwell Street and south of the bridge to Waterview Avenue
- Asphalt overlay of remaining roadway within the corridor
- Clean all existing inlets, pipes, and bridge scuppers and inspect the existing storm drain system
- Upgrade traffic / pedestrian signals as needed
- Remove channelized / free-right turn movements

Pedestrian

- Add pedestrian lighting
- Enhance crosswalks to increase visibility
- Clear debris from all sidewalks
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Bicycle

- Provide barrier separated bike and pedestrian facilities on the bridge and bike lanes or separated trails on the approaches to the bridge
- Potential opportunity for emerging bike facility technology, such as bike signals
- Provide connections to planned separated bike facilities as identified in the 2017 Separated Bike Lane Network Addendum to the Bike Master Plan providing all ages bicycle access to South Baltimore
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Transit

- Continue to evaluate transit enhancements once the impacts of BaltimoreLink have been quantified
- Enhanced bus stops could include sidewalk access, benches, trash receptacles, and a shelter

Urban Design

- Bridge architecture and previously unused space creates the opportunity for a unique urban space
- Outdoor art gallery with recreation amenities
- Provide access to the bridge deck with a sculptural staircase
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- Enhanced public recreation space under the bridge

Bridge Structures

- After BCDOT's planned short-term maintenance work (asphalt overlay) to improve the riding surface and any additional potential interim work that is deemed necessary following the deck testing and analysis
- Recommend the long-term major rehabilitation option "Option 3 – Four Lane Section with Fixed Span in the Closed Position"
- Total cost (2018 \$): \$50.0 million





Key aspects of this recommendation include:

- Specialized engineering work / structural analysis is required to demonstrate that a suitable additional service life (of approximately 75 years) can be achieved prior to selecting rehabilitation as the preferred option
- Permanently fixing the movable span in the closed position would allow the grid deck to be filled and the BCDOT will significantly save on annual maintenance costs associated with steel grate deck and the mechanical and electrical operating systems
- Approval from the United States Coast Guard will be required to permanently fix the movable span in the closed position
- 2040 traffic analysis shows that the proposed signalized intersections north of the bridge are the constraints in the corridor. Although the bridge cross section affects storage space, travel times are consistent regardless of the cross section (i.e. a four-lane bridge would basically have the same impact on traffic as a six-lane bridge).
- Enhanced pedestrian and bicycle space in each direction (eight feet and 10 feet) using the existing bridge width and removing the center reversible travel lane

The overall next steps and key factors to advance the Hanover Street Corridor Study identified by the Study Team include:

- Structural studies / testing and analysis
 - Necessary to confirm feasibility of recommended rehabilitation option
- Perform National Environmental Policy Act (NEPA) Study
 - Necessary for a formal decision / preferred alternative since the current planning study is deliberative
- Obtain approval to permanently fix the movable bridge span in the closed position from the US Coast Guard
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