LONG BRIDGE STUDY

DISTRICT DEPARTMENT OF TRANSPORTATION

LONG BRIDGE STUDY
Bridge Design Workshop Report

March 15, 2013

LONG BRIDGE STUDY

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1. Executive Summary

The District Department of Transportation (DDOT) is committed to developing and maintaining a multi-modal transportation system that delivers safe and efficient ways to move people and goods in the District of Columbia (District). The Long Bridge is an important component of the multi-modal transportation system in the District and is a key element of the national rail in the Northeastern United States.

The Long Bridge is a two track railroad bridge that was constructed in the late 19th and early 20th centuries. It is the only railroad bridge that connects the District of Columbia and the Commonwealth of Virginia. The Long Bridge is currently owned and maintained by CSX Corporation (CSX). The bridge carries traffic from three operators: CSX, Amtrak, and Virginia Railway Express (VRE).

Long Bridge over Potomac River

In 2011, the Federal Railroad Administration (FRA) awarded DDOT a grant to study the short term and long term needs of the bridge. DDOT started this study in August 2012 and initiated public, agency, and stakeholder engagement. On January 24, 2013, DDOT held a bridge workshop for this project. The purpose of this workshop was to engage agency partners and transportation experts to share ideas, identify opportunities and constraints, develop creative solutions, solicit expert advice and direction to develop feasible alternatives for crossing the Potomac River, and conceptualize the potential future of the Long Bridge.

This workshop provided a forum to offer input on bridge design options, bridge architecture, alignment locations, and the configuration of different modal options that

would define the alternatives for the study. The workshop was attended by over 40 agency representatives and transportation experts. The first portion of the workshop included opening remarks from DDOT and FRA followed by a series of presentations that introduced attendees to these concepts. The second portion of the workshop included breakout work sessions to discuss bridge design, bridge architecture, modal options, and alternative alignments. The key findings of the workshop included:

- The Long Bridge is an important railroad crossing in the District and in the national railroad network;
- The current two track system on the bridge provides operational challenges due to the growing freight, commuter, and passenger service demands;
- The bridge structure in the future may need to be replaced;
- The bridge should be able to accommodate the future freight, passenger, and commuter rail needs;
- Provisions should be made to accommodate the future high speed rail;
- The bridge should be able to accommodate both double stacked trains and electrified trains;
- Other transportation modes should also be accommodated;
- The bridge design should support the adjacent land use and should be able to provide connectivity to these land uses; and
- Bridge design and architecture should complement the historic and monumental context of the District.

The workshop represented the beginning of the development of alternatives for the project. The presentations, activities, and recommendations of the bridge workshop are presented in this bridge workshop report.

LONG BRIDGE STUDY

INTRODUCTION

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2. Introduction

DDOT's mission is to develop and maintain a cohesive sustainable transportation system that delivers safe, affordable, and convenient ways to move people and goods, while protecting and enhancing the natural, environmental, and cultural resources of the District. That mission is further supported by providing a cost-effective and reliable rail network that supports freight and passenger rail systems connecting the District of Columbia with surrounding jurisdictions. The Long Bridge Study allows for the exploration of ways to enhance freight and passenger rail movement.

The Long Bridge is a two track railroad bridge that was constructed in the late 19th and early 20th centuries and is owned and maintained by CSX. It is the only railroad bridge that connects the District of Columbia and the Commonwealth of Virginia. The Long Bridge if a part of a major rail corridor in the Northeastern United States and carries traffic from CSX, Amtrak, and VRE.

The structure is composed of 22 through girder spans and a double swing truss for a total of 24 spans and a total length of 2,529 feet. The swing span and 12 piers are from the original 1904 bridge. In 1942, the fixed truss spans were removed, new piers were added to split the original truss spans in half, and the current girder spans were added. Eleven of the structure's pier and the structure's girder spans are from 1942. The addition of the girder spans and piers increased the bridge rating from E60 to E65.

In 2011, DDOT received a grant from the FRA through funding from the American Recovery and Reinvestment Act to complete a comprehensive study of the bridge to include identification of short-term structural remediation requirements and long-term capacity improvements. The Long Bridge Study began in August 2012 and has

included public, agency, and stakeholder engagement.

On January 24, 2013, DDOT held a Bridge Design Workshop to engage agency partners and transportation experts to share ideas, identify opportunities and constraints, develop creative solutions, solicit expert advice and direction to develop feasible alternatives for crossing the Potomac River, and conceptualize the potential future of the Long Bridge. It was attended by over 40 agency representatives and transportation experts that included bridge engineers, transportation planners, transportation engineers, architects, environmental professionals, railroad experts and urban planners. The workshop provided a forum for participants to offer input on bridge design options, bridge architecture, alignment locations, and the configuration of different modal options that would define the alternatives for the study. This workshop marks the beginning of the development of alternatives for the Long Bridge Study.

The workshop began with opening remarks from DDOT, FRA, and the District of Columbia Office of Planning (DCOP) and was followed by presentations about the study before conducting the workshop breakout sessions. This summary document will recap the day and detail the workshop results.

LONG BRIDGE STUDY

WORKSHOP PROCEEDINGS

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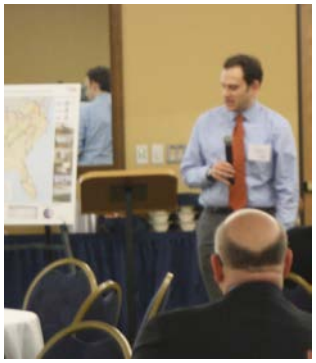
3. Workshop Proceedings

The workshop was divided into two parts. The first portion of the workshop included opening remarks from DDOT, FRA, and DCOP. They were followed by presentations on Bridge Design, Existing Conditions, Bridge Aesthetics, Rail Capacity & Physical Constraints, and Roadway Capacity & Physical & Environmental Constraints. The second portion of the workshop included two breakout working sessions to discuss bridge design, bridge architecture, modal options, and alternative alignments. Breakout Session A was specifically on Bridge Design & Bridge Architecture, while Session B focused on Alignments & Physical Constraints. A summary of the results and recommendations from each session were provided at the end of the workshop. The workshop agenda is provided in the Appendix.

3.1 Opening Remarks

Terry Bellamy, DDOT Director, stated the importance of the development of a balanced multi-modal transportation system that can serve the needs of today and the future. He noted that the Long Bridge is the only railroad crossing on the Potomac River in the District and that this unique study fits perfectly in DDOT's mission of developing and maintaining a sustainable multi-modal transportation system. Mr. Bellamy also expressed DDOT's interest in working as a partnership with neighboring jurisdictions and transportation organizations.

DDOT Chief Engineer Nick Nicholson expressed the importance of river crossings in the District and the opportunity this study presents to evaluate future river crossings. He stressed the future transportation needs such as high speed rail, double stacked trains, electrification of trains, light rail and streetcar systems, transit, and the ability to provide bicycle and pedestrian connections. Mr. Nicholson expressed that this study gives DDOT the opportunity to evaluate those needs to help develop a balanced multi-modal transportation system in the District.



Sam Zimbabwe, Associate Director of DDOT's Policy, Planning and Sustainability Administration, spoke about the significance to DDOT of creating a more efficient transportation system that moves more people in fewer vehicles. He also expressed that this study is a great opportunity to better incorporate freight and passenger rail in the District's transportation vision MOVE DC and other major initiatives and to support a growing regional commuter rail system connecting the District with surrounding jurisdictions.

Faisal Hameed, Manager of DDOT's Project Development and Environment Division, described the importance of the Long Bridge and the study for DDOT. He also elaborated the importance of the bridge workshop in developing future plans for this important rail corridor. He asked workshop participants to think about how this bridge fits with the future needs of the District, its importance in the regional connectivity, and its significance in the national railroad network. Mr. Hameed urged participants to share

all possible ideas about the bridge and its future and think outside the box.

Mr. Hameed described how this study fits with the completed and ongoing efforts in and around the District including:

- moveDC
- NCPC SW Ecodistrict
- DC Office of Planning Maryland Avenue Southwest Plan
- Union Station Redevelopment Corporation Master Plan
- National Gateway Initiative (Virginia Avenue Tunnel)
- NEC Future
- National Capitol Regional Freight Plan 2010
- Virginia Department of Rail and Public Transportation Statewide Rail Plan
- National Rail Freight Infrastructure Capacity and Investment Study 2007

Randall Brown, FRA Regional Manager for Railroad Development for the Southeast Region, provided an overview that highlighted high-speed intercity passenger rail (HSR), which will be an important component of the Long Bridge Study. He stated that projections show there are currently 80+ trains per day crossing the Long Bridge, and that number is predicted to grow to 140+ trains per day within the next 20 years.

He noted that approximately two-thirds of these trains are passenger trains, and one-third of these trains are freight trains. Mr. Brown discussed the growth of high-speed intercity passenger rail and the importance of the Long Bridge in linking the Northeast and Southeast high-speed rail corridors. He mentioned that the Long Bridge serves all commuter, passenger, and freight service on the east coast through this one crossing.

Director of the District of Columbia Office of Planning Harriet Tregoning spoke about the importance of considering all modes in the Long Bridge Study and workshop. She stated the need to look towards the future growth of District and sustainable transportation modes that will serve the area's expanding population.

Lezlie Rupert, DDOT Project Manager for the Long Bridge Study, described the project and outlined the activities that are part of the study. She stated that the purpose of the project is to complete a comprehensive study of the bridge to include identification of short-term structural remediation requirements and long-term capacity improvements, identify and analyze alternatives that meet the short-term and long-term multi-modal needs of the region.

She outlined the study area and stated that the project is scheduled to be completed in the Fall/Winter of 2013. She mentioned the Long Bridge Study will include data collection, transportation analysis and evaluation, alternatives development, and environmental screening. Ms. Rupert explained there has been one public meeting, an interagency meeting, a site tour, and other technical workshops since that project began in September 2012. She also stated that technical work has included an initial structural assessment of the bridge as conducted by boat to determine the structural condition of the bridge's substructure and superstructure, and work will continue to compile several reports including an existing conditions report, a data inventory report, a load/capacity rating report, and an alternatives report. Ms. Rupert mentioned the project will continue with additional public and interagency meetings and culminate with a final report detailing the study process, recommendations for alternatives, and recommendations for future environmental analysis.

The FRA and DDOT overviews were followed by Vic Siaurusaits, consultant team project manager who introduced the project team, agenda for the workshop, breakout sessions and the topic presentations of the different elements of bridge design and the development of multimodal alternatives. The following section summarizes the presentations.

3.2 Presentations

The presentation on Bridge Design identified major elements of bridges specifically at river crossings. The elements acknowledged in the presentation included span lengths and configurations, heights, setting, and impact to the surrounding environment. The presentation discussed basic bridge structure types, which included arch, through arch, suspension, cable stayed, truss, extradosed, and moveable bridges. It emphasized that the best structures effectively balance cost, schedule, maintenance, aesthetics, and constructability.

Example arch bridge

Example through arch bridge

Example vertical lift bridge

Example extradosed bridge

The presentation on the Existing Condition of the Long Bridge detailed the results of the initial bridge structural assessment conducted in October 2012 and information obtained from the original bridge drawings. The presentation explained that the Long Bridge is comprised of 22 through girder spans and a double span swing truss for a total of 24 spans. It stated that two of the through girder spans are between Potomac Island and the District waterfront at the mouth of the Tidal Basin, a typical girder span

measures approximately 100 feet, and each of the two swing truss spans are approximately 140 feet for a total bridge length of over 2,500 feet.

The Bridge Architecture and Aesthetics presentation discussed bridge design options and treatments available for the existing Long Bridge or a new bridge structure. The presentation mentioned specific bridges in the District of Columbia, including the Francis Scott Key Bridge, Arlington Memorial Bridge, and Pennsylvania Avenue Bridge, that are representative of the visual context of the city and are of typical design for the city. Bridge examples were shown from other countries including Germany, England, Holland, and Australia. The presentation stated elements that should be considered for bridge aesthetics, which include shape, color, texture, ornamentation, signing, lighting, and landscaping. Participants were urged to consider all elements during the workshop and were advised to remember that bridge appearance has value that may not be quantifiable. The presentation concluded by stating that in bridge design all options for aesthetics should be considered before the cost is calculated because the incremental cost of aesthetic improvements can be small.

The presentation on Rail Capacity and Physical Constraints shifted discussions on physical characteristics to discussions on operations and alignments. It stated different criteria that define safe and efficient train operations, which included mix of passenger and freight movements, train lengths, speeds, number of tracks, and station/yard locations. Discussions of bridge alignments included the expansion of the existing structure and a new bridge on a new alignment. It was noted that during the presentation issues related to constructability and maintenance of rail traffic during construction are paramount, and bridge approaches, abutments, and impacts to the surrounding built environment will be important considerations for every alternative.

The presentation included additional information detailing Roadway Capacity and

Environmental Constraints that could influence the Long Bridge Study alternatives. It stated there are roadway, residential, and business considerations that will need to be addressed related to different bridge alignments along with environmental constraints and NEPA implications that will determine the steps following this study. Specific environmental considerations that were stated during the presentation include parklands, historical properties, wetlands, noise, vibration, view sheds, and surrounding real estate.

3.3 Breakout Sessions

Two breakout sessions were held concurrently during the workshop. The first session focused on bridge design and aesthetics, while the second session focused on alignments and landside implications of the existing structure and possible new alignments. The two concurrent sessions were held once in the morning and once in the afternoon. The afternoon breakout session followed a brief presentation that introduced attendees to elements of the project. The concepts, bridge criteria, and working maps from the breakout sessions are included in the Appendix.

3.3.1 Bridge Design and Architecture Breakout Session

The breakout session for design and architecture was moderated by John Dietrick, Frank Russo, and Fred Gottemoeller. The goal of the session was to solicit feedback on general bridge architecture and design elements. The following sections summarize the comments obtained during the design and architecture breakout session.

Architecture and Aesthetics:

During this session, participants discussed bridge forms as well as general architectural and aesthetic elements. Attendees had differing opinions on possible bridge configurations; some participants thought a new bridge should be more emblematic and monumental than the existing structure, while others felt it should be as unobtrusive as possible and not make a dramatic statement so there is no competition with the architecture and view shed of the District's monumental core. Even amongst those who felt a new bridge should be emblematic, there was general agreement that an expanded or new bridge should not detract from or obstruct existing view sheds or be defined as a part of the "monumental" architecture of the city.

Several comments stated that the industrial look and history of the truss should be memorialized in some way, and it was understood that the existing bridge may remain in part or in whole. It was recognized that many local bridges over the Potomac River are deck supported with arch-shaped superstructures, and there was general agreement that this arch-bridge form represents a positive aesthetic appearance.

Some participants stated that a new bridge structure should consider the types of bridges currently present in the District. One attendee commented that the need for a signature bridge is typically driven by technical challenges at the site, and that Potomac River poses no such challenges; therefore, a long span-complex bridge is not required for the current project site conditions. There was no strong preference for a signature bridge during this breakout session. Participants thought the introduction of a dramatic signature bridge may seem contrived and incompatible with this site.

Some workshop participants thought that if a new bridge is of a deck type with the railway crossing over the supporting elements, consideration should be given to adding aesthetics below the structure using shape or lighting and possibly adding monumental or art features above the deck. There was a comment from a participant stating that a new bridge should feature structural elements that are not right angles. An arch shaped bridge or a bridge containing curved elements was perceived by participants as echoing the themes of domed monuments such as the Jefferson Memorial.

It was noted that no bridges in the District are supported above the deck other than the existing swing span truss of the Long Bridge. In consideration of this, participants commented that an above-deck supported bridge may appear out of place, particularly in such close proximity to the other neighboring bridges, which are below-deck supported.

Context

The context of the Long Bridge was discussed pertaining to the bridge's relationship to adjacent bridges and to other features that the bridge may impact such as local parks, roads, and the Potomac River. It was acknowledged by participants that the existing bridge is an industrial and historic railroad element within the District limits and consideration should be made for keeping the existing bridge.

The workshop participants noted that in the future, other adjacent bridge structures will

need to be replaced; therefore, a decision will need to be made whether this first bridge should set an aesthetic theme for the crossing or if it should be muted and more consistent with the existing aesthetics of this crossing. Some participants emphasized the bridge's importance to views from the river and riverbanks since this bridge is the first bridge seen on the Potomac when entering from the south. The impacts of the spans over Potomac Park and the George Washington Parkway were specifically mentioned as requiring careful planning.

There was discussion on the different vantage points of the Long Bridge. One perspective mentioned is from the adjacent 14th Street Bridges and the WMATA Bridge. There were differing opinions on the type of bridge that might be suitable for this location, and there was concern that the bridge should not block the view shed from the 14th Street Bridge and should consider the view shed along the trail systems located on both sides of the Potomac River. It was noted by participants that there are various protected view sheds that must be considered when selecting a new bridge type for this crossing location. Participants felt the bridge should be designed to fit in with the parks and recreation uses on both sides of the Potomac River and should consider the interaction of the industrial use of the bridge, the park, and the recreational uses during the design process.

In addition to the visual context, safety, ease of use, and access for pedestrians and bicyclists was also discussed. Participants stated that a large number of people use the Mount Vernon Trail and cross the river using the 14 Street Bridge each day; therefore, way finding and welcoming elements could be provided for those pedestrian and bicycle movements.

Participants mentioned that the impact of the bridge on waterfront development and land uses should be considered. With the redevelopment of the SE Waterfront and the continued growth of business, residential, and commercial activity in the vicinity of the L'Enfant station, it was stated that considerable assessment of impacts due to a new alignment will need to occur. Workshop participants noted that activities on the District and Virginia sides of the Potomac River provide a need for connections of modes other than freight and passenger rail, and both sides of the river and the riverbed are the responsibility of the National Park Service (NPS).

3.3.2 Bridge Alignment and Landside Considerations Breakout Session

Ideas in this session flowed from the need to connect all modes in the corridor and the need to serve the anticipated increased passenger and freight rail demand across the Potomac River. Alignment ideas brainstormed were weighed against potential impacts to the existing government, business, residential, and recreational users. The breakout session facilitators utilized maps of the corridor and aerial photography to provide

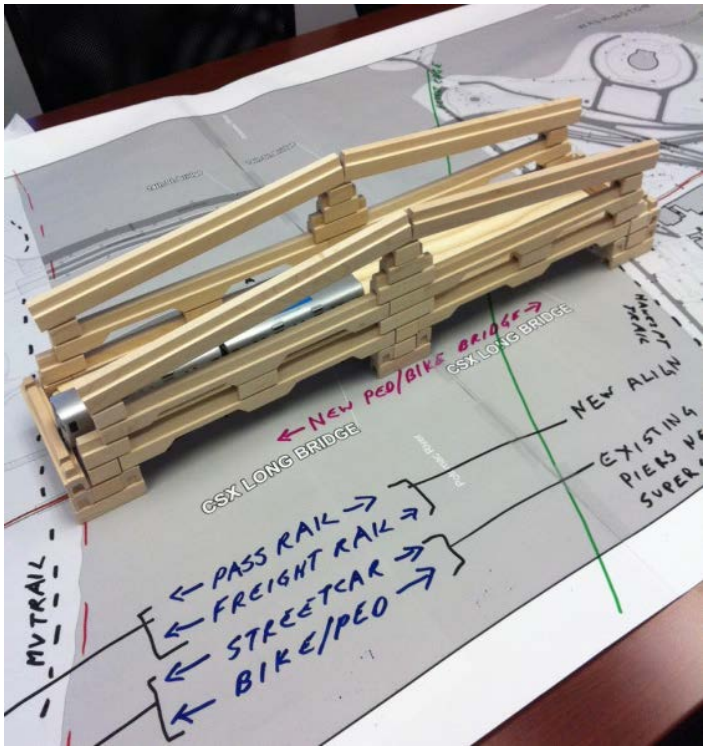
detailed information about the corridor.

During the session, questions were raised by participants pertaining to the allowable dimensions of an expanded or new bridge, the proximity to existing structures, the historic corridors along the riverfront, and the footprint of the existing railroad right-of-way. It was discussed that alternatives on new alignments would require considerable engineering and impact assessment. The following sections summarize the comments obtained during the bridge alignment and landside considerations breakout session organized by potential impacts.

Dimension

Workshop participants discussed that the dimensional window of any structure would consider a minimum height of 20 feet from the bottom of the span beam to the water, which is the current height of the Long Bridge spans, and a maximum height of 75-80 feet which would be measured to any highest point along the bridge.

However, the minimum and maximum heights of the bridge need to follow the laws and regulations. The bridge is on a navigation channel; therefore, the vertical and horizontal clearances have to be based on United States Coast Guard requirements. Due to the close proximity of the bridge to the National Airport's approach path, the maximum height of the bridge is determined from the Federal Aviation Administration's regulations. Participants also encouraged the review of height restrictions on George Washington Parkway, which currently only allows non-commercial vehicles.



There was discussion amongst participants that several parkway overpasses show damage from being struck by large vehicles. It was stressed that vertical changes and connectivity among the different modes using the bridge is critical to the definition of the best alternative for the study.

Proximity

Although the analysis for the project has not yet determined the number of tracks that will be needed in the future, workshop participants assumed four tracks on the alignment for the sake of discussion. Participants asked questions about the proximity of a new bridge to the existing WMATA Bridge and the impacts of the geometry of nearby rail bridges over roadways such as the George Washington Parkway due to any widening or relocation of the existing Long Bridge alignment.

History

Some participants shared that riverfronts in the study area are historical corridors and any changes would need to carefully consider potential impacts. In addition, it was noted that NPS has jurisdiction over the riverbed, as well.

Right-of-Way

Workshop participants discussed the challenges of right-of-way to expansion in order to accommodate additional tracks.

Accessibility

Mapping on the Virginia side of the Long Bridge during the breakout session focused on the planned reconstruction of Long Bridge Park and the associated recreational facilities and aquatic center. Participants indicated that the construction of the park would eliminate the current access road to the existing railroad right-of-way. Participants think it is important to maintain an access point for maintenance and emergency functions. Other participants thought that this study should analyze ways to tie the planned trails and bike paths into the Mount Vernon Trail. It was also noted during the session that considerations for the vertical connections between riverside trail and existing and potential new river crossing structure are key issues just as they were important for the connection between the Mount Vernon Trail and the 14th Street Bridge.

Multi-Modal Connectivity

The workshop participants discussed in detail the expectations for accommodating different heavy rail, light rail, and motorized and non-motorized modes that could use this crossing. It was stated that current pedestrian and bicycle traffic on the 14th Street Bridge need to be considered to determine if the Long Bridge Study should provide an option for a new pedestrian and bicycle connection across the Potomac River. Some

attendees view this study as an opportunity to better connect pedestrian and bicycle commuters closer to their destinations in the District. Attendees pointed out that there are existing bicycle paths and trails on the District side of the river that need to be assessed to determine if pedestrian and bicycle users will be able to access their indented destinations. Similarly, attendees also stated that connections on the Virginia side need to be assessed with facilities such as the Mount Vernon Trail and other new developing trails at the Long Bridge Park and Aquatic Center.

Attendees asked the project team to consider other studies that recommend multi-modal river crossing projects in the vicinity of the Long Bridge. In addition, the participants discussed the proposed plans for expanding the streetcar system in the District. It was noted that DC's Transit Future System Plan identifies a plan for streetcar in the vicinity of the Long Bridge Study along M Street SE/SW that would terminate close to the SW Waterfront. Participants stated that since streetcar is a surface mode, accommodations for other transit and motorized and non-motorized modes need to be considered in new river crossing alternatives.

Safety

Participants discussed the proximity of non-heavy rail activity to heavy rail operations. The discussion focused on issues related to derailment, vibration, flying debris, and pedestrian interference with track operations. Participants indicated that any construction within 50 feet of rail structures would require special crash provisions and approvals, and it was not clear at this time what specific security constraints are required between heavy rail and other modes. There was some consensus during the breakout session that it may be possible for different modes to share space if a new bridge structure was built to specific safety requirements and contained structural elements such as double stacking with heavy rail on the bottom portion of the bridge and pedestrian, bicycle, and streetcar traffic above on the top portion. Examples were shown such as the Harpers Ferry Bridge in West Virginia that contains heavy rail, pedestrian, and bicycle traffic in shared space and a Steel Bridge in Portland, Oregon.

Example multi-modal bridges

Capacity and Operations

The workshop participants discussed and agreed that the future operations of heavy rail on the Long Bridge would require additional rail tracks. There was also discussion on the need for a three or four track system. The option of interchangeable use of the four tracks was also introduced. Moderators indicated that operational capacity analysis was underway to determine the number of tracks needed based on future demand. Some participants expressed interest in future expansion of passenger and commuter service in both directions across the bridge as well as future expansion of the length of diesel fleet trains. It was noted that commuter rail has historically grown at 2% per year, while intercity rail has grown approximately 3% per year.

Attendees discussed whether the existing structure should be removed or renovated if a new parallel structure was built. Several different options were discussed, which included expanding the existing structure with additional piers and spans for a four track system, providing space for streetcar, pedestrian, and bicycle modes on the outsides of the heavy rail track bed, double stacking the existing structure with streetcar, pedestrian, and bicycle modes on the upper level, and providing new 2-4 track alignments. Some participants also indicated that bi-level gallery cars are operated, which would be problematic with overhead electrification catenary such as the catenary system needed for streetcar. Other participants indicated that they operate both diesel and electric fleet and would be considering some pass-through service from Maryland to Union Station to Virginia in the future.

There was also discussion amongst participants of a possible new Metro station on the yellow line prior to going underground on the Potomac Park Island. In addition, participants noted that the current VRE station at L'Enfant Plaza should be considered as a future two-sided passenger station with possibly having freight trains pass through the middle.

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LONG BRIDGE STUDY

WORKSHOP RECOMMENDATIONS

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4. Workshop Recommendations

A number of bridge concepts and bridge alignments were considered in the workshop. During both breakout sessions, participants expressed the importance of sizing consideration for the crossing to meet the design, aesthetic, and alignments needs of all agencies and stakeholders.

Recommendations and concepts from the Bridge Design and Architecture breakout session and the Bridge Alignment and Landside Considerations breakout session discussions included:

- The Long Bridge is an important railroad crossing in the District and in the national railroad network;
- The current two track system on the bridge provides operational challenges due to the growing freight, commuter, and passenger service demands;
- The bridge structure in the future may need to be replaced;
- The bridge should be able to accommodate the future freight, passenger, and commuter rail needs;
- Provisions should be made to accommodate the future high speed rail;
- The bridge should be able to accommodate both double stacked trains and electrified trains;
- Other transportation modes should also be accommodated;
- The bridge design should support the adjacent land use and should be able to provide connectivity to these land uses; and
- Bridge design and architecture should complement the historic and monumental context of the District.

The location or expansion of the existing bridge or the placement of a new alignment was considered for both upstream and downstream locations. There was general consensus that an upstream option should not go beyond the current 14th Street Bridge. The concerns for a downstream option were related more to view shed impacts.

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LONG BRIDGE STUDY

NEXT STEPS

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5. Next Steps

Following this workshop, the Long Bridge Study project team will focus on the technical elements of the study to develop several concept alternatives. The concept alternatives will be shared with the agencies and public and based on the feedback and purpose and need of the project some of the alternatives will move forward for analysis. Design, operations, and environmental data will be collected to analyze the alternatives. The team will use freight, passenger, and commuter rail as well as non-rail mode demand forecasting to develop future needs. The forecasted data will be used to develop the operational requirements, which will help guide the refinement of alternatives. Additional criteria to screen alternatives will be developed from geometric criteria that will define the horizontal and vertical limits of each alternative which will also include bridge types.

Recommendations and findings from the Long Bridge Study will be presented at public and stakeholder meetings. Project team recommendations guided by input from the public, agencies, and stakeholders will come together and conclude in the preparation of the final report.

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APPENDICES

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Appendix A:
Attendance List

Bridge Design Workshop - Attendance List

Agency	Attendees
Amtrak	Drew Galloway
Arlington County	Dan Malouff
Commission of Fine Arts	Tony Simon
CSX Corporation	Steve Flippin Chuck Gullackson
District Department of Transportation	Terry Bellamy Austina Casey Othman Chebli Eulois Cleckley Shannon Hake Faisal Hameed Jamie Henson Carl Jackson Rick Kenney Kristin Kersavage Ronaldo "Nick" Nicholson Lezlie Rupert Jim Sebastian Sam Zimbabwe
Federal Railroad Administration	Randy Brown Richard Cogswell Adam Denton
General Services Administration	Rodney Moulden
Metro Washington Aviation Administration	Mike Hines
Department of the Navy	Janell Herring
National Capital Planning Commission	Ken Walton Michael Weil
National Park Service	David Hayes Thomas Sheffer Luis Teran
Office of Planning	Dan Emerine Harriott Tregoning Joyce Tsepas
Virginia Department of Transportation	Edmund Okerchiri
Virginia Department of Rail and Public Transportation	Tim Roseboom
Virginia Railway Express	Doug Allen Christine Hoeffner

Project Team	Attendees
Michael Baker Jr., Inc.	Khoss Babaei John Coleman John Dietrick Fred Gottemoeller Tony Hofmann Gary Landschoot Susan Manes Alissa McDonnell-Ellison Paul Prideaux Frank Russo Vic Siaurusaitis Dave Thompson David Wilcock
Sharp & Company	Charise Geiling Shelley Johnson Susan Sharp

Transportation Industry	Attendees
Parsons	Steve Walters
Jacobs	Elliott Mandel
AECOM	Mike Jelen
CH2M Hill	Kathleen Penney Chris Conroy
Parsons Brinckerhoff	Greer Gillis
Greenhorne & O'Mara	John Wiser
HNTB	John Whitney Dan Staron
HDR	Adeel Mysorewala

Appendix B:
Agenda

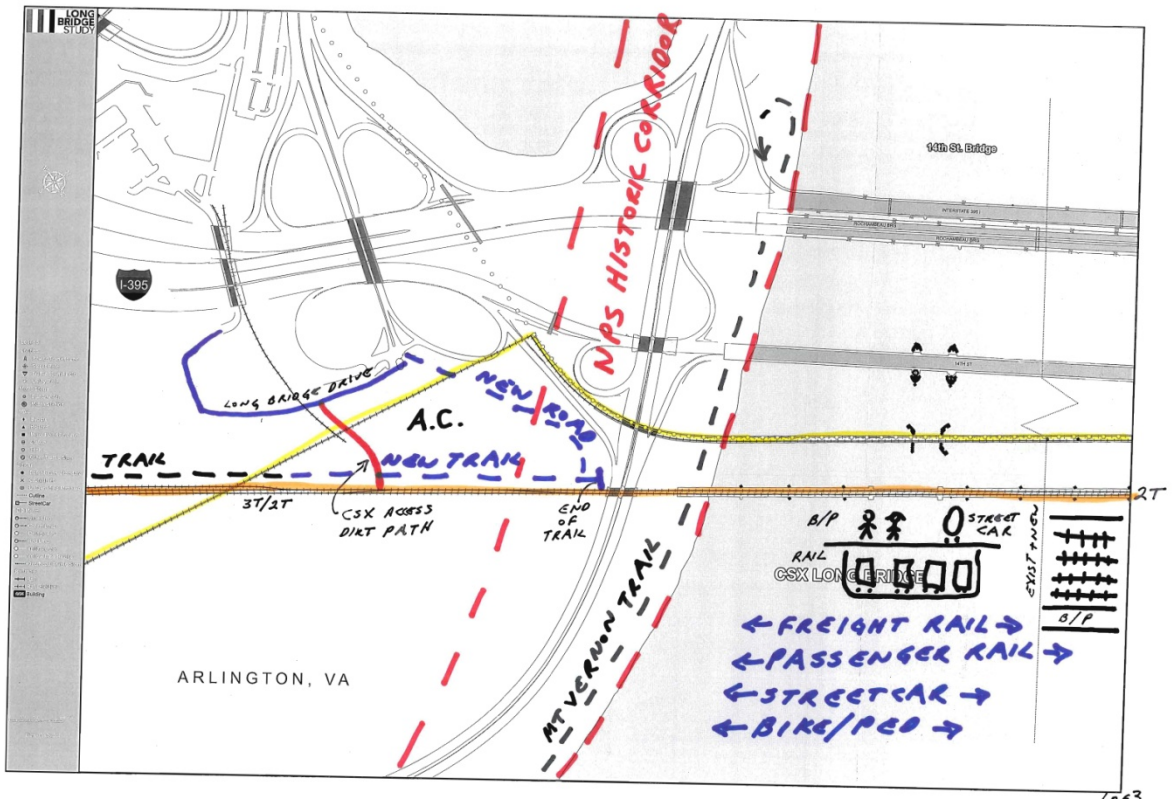
Long Bridge Study
Bridge Workshop

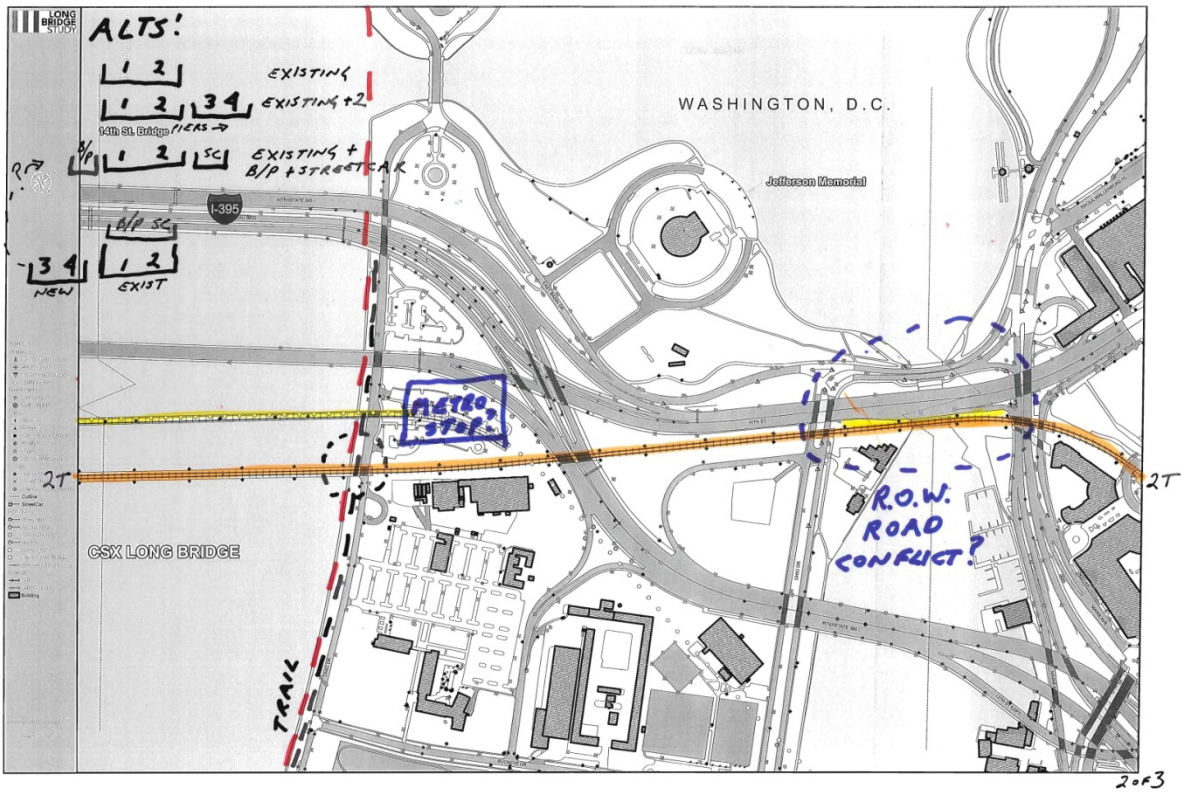
January 24, 2013
9:00 am – 2:00 pm
Washington Navy Yard Catering and Conference Center
1454 Parsons Avenue, Building 211 - Washington Room

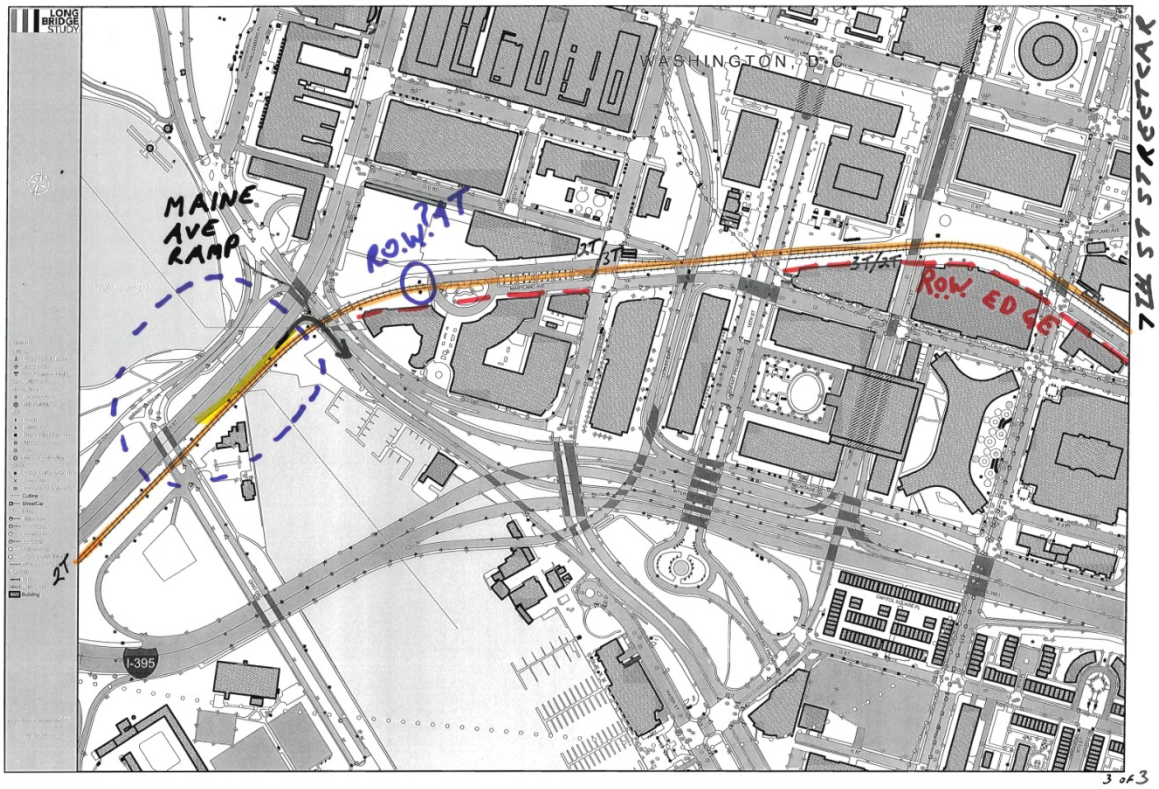
9:00 – 9:30	Welcome Opening Remarks Overview of Study Purpose
9:30 – 9:40	Bridge Design
9:40 – 9:50	Existing Conditions
9:50 – 10:00	Bridge Architecture
10:00 – 10:10	Rail Capacity & Physical Constraints
10:10 – 10:20	Roadway Capacity & Physical & Environmental Constraints
10:20 – 10:30	BREAK
10:30 – 11:45	Working Session 1 A – Bridge Design & Bridge Architecture B – Alignments & Physical Constraints
11:45 – 12:15	LUNCH (Video Tour)
12:15 – 1:30	Working Session 2 A – Bridge Design & Bridge Architecture B – Alignments & Physical Constraints
1:30 – 1:40	BREAK
1:40 – 2:00	Present Recommendations

Adjourn

Appendix C:
Site and Alternative Alignments Maps


LONG BRIDGE STUDY
NPS HISTORIC CORRIDOR
14th St. Bridge
I-395
LONG BRIDGE DRIVE
NEW ROAD
A.C.
TRAIL
NEW TRAIL
3T/2T
CSX ACCESS DIRT PATH
END OF TRAIL
MT VERNON TRAIL
B/P
STREET CAR
RAIL
CSX LONG BRIDGE
EXIST TRK
B/P
2T
←FREIGHT RAIL→
←PASSENGER RAIL→
←STREETCAR→
←BIKE/PED→
ARLINGTON, VA


LONG BRIDGE STUDY
ALTS!
1 2
EXISTING
1 2 3 4
EXISTING +2
14th St. Bridge
FLYERS
B/P 1 2 SC
EXISTING + B/P + STREETCAR
I-395
B/P SC
3 4 NEW
1 2 EXIST
WASHINGTON, D.C.
Jefferson Memorial
METRO STOP?
2T
CSX LONG BRIDGE
R.O.W. ROAD CONFLICT?
TRAIL
2 OF 3


LONG BRIDGE STUDY
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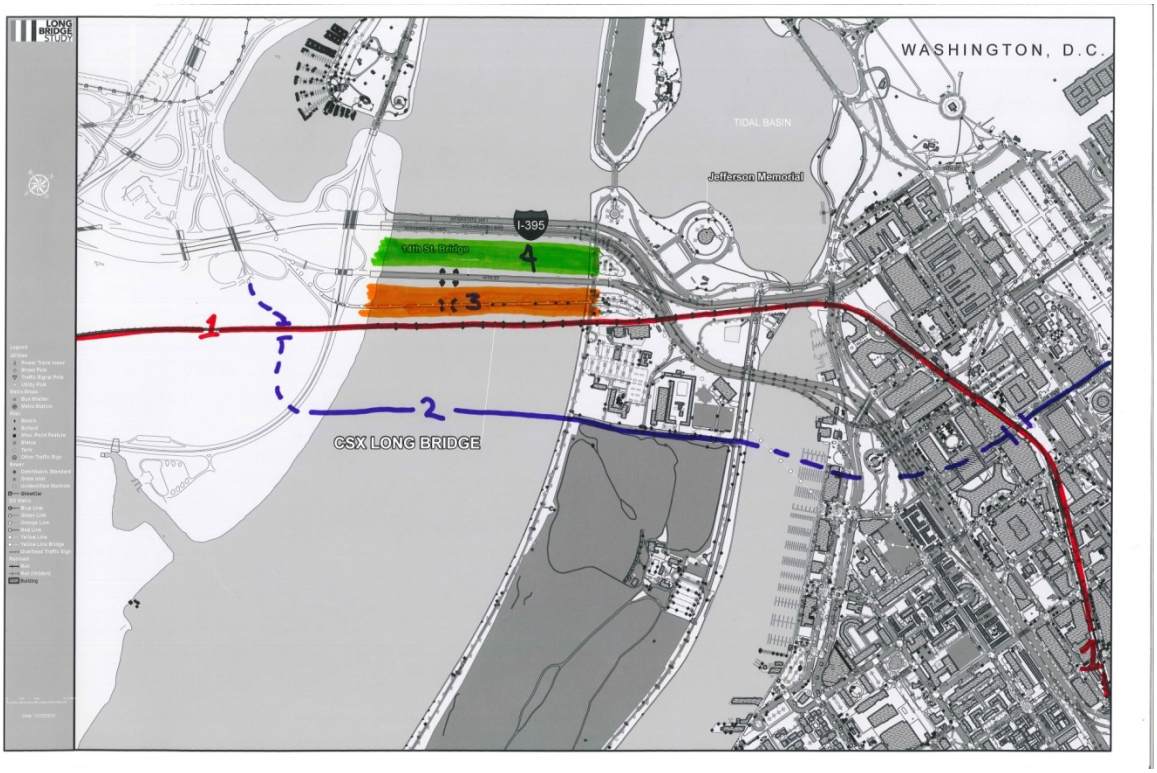
MAINE AVE RAMP
ROW?
ROW EDGE
7TH ST STREETCAR
I-395
3 of 3


LONG BRIDGE STUDY
WASHINGTON, D.C.
TIDAL BASIN
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I-395
4
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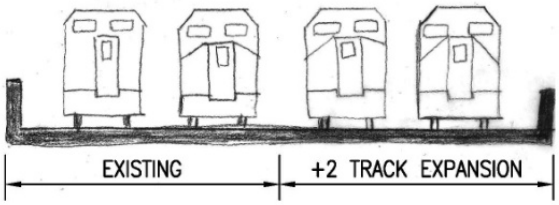
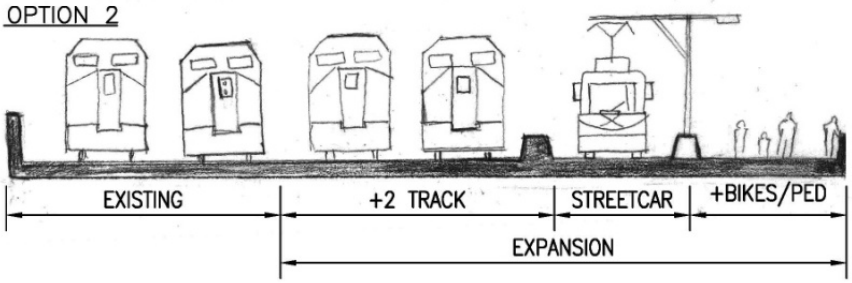
CSX LONG BRIDGE

Appendix D:
Concept Cross Sections

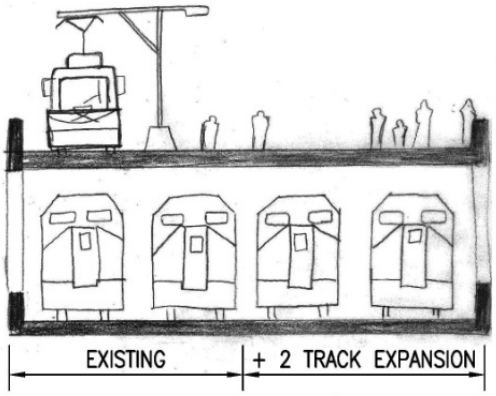
OPTION 1



OPTION 2



OPTION 3



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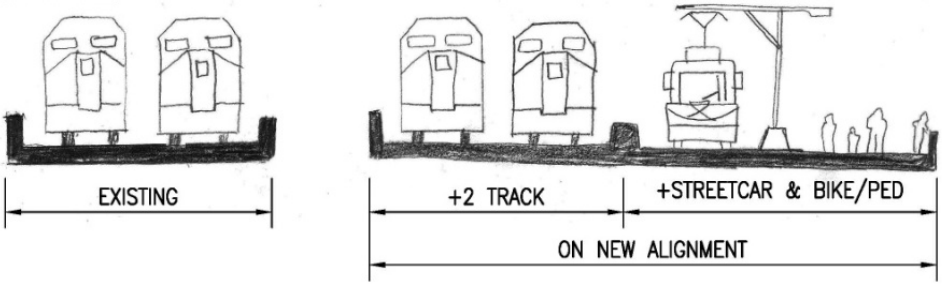

Appendix E:
Existing Bridge Conditions

1. Background

1.1 Configuration and Layout of Current Bridge

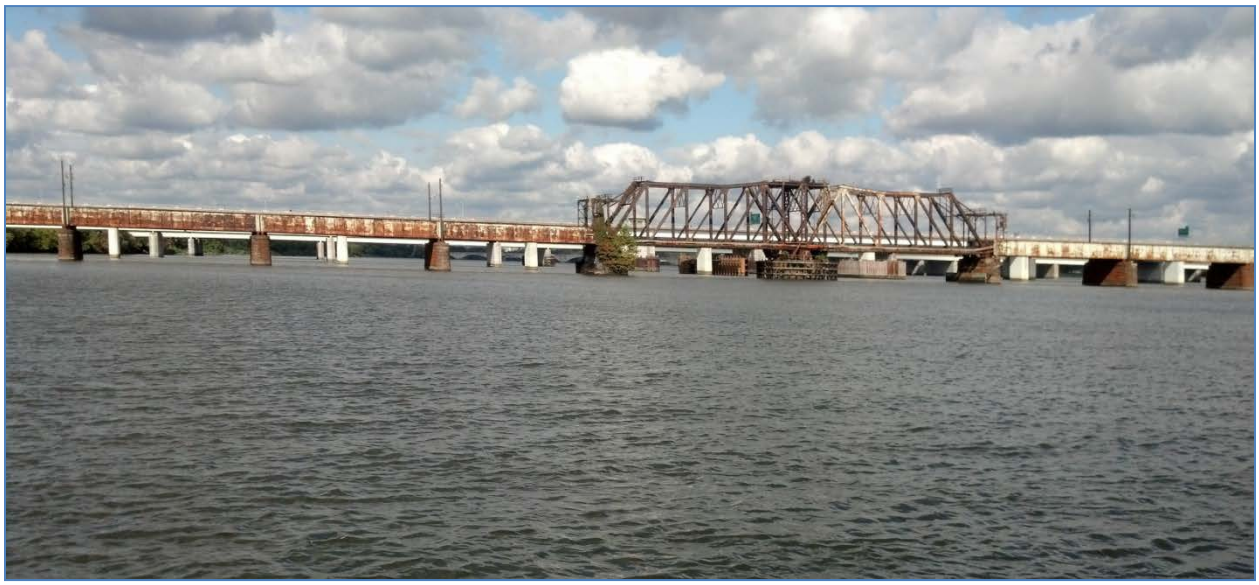

Figure 1 – Existing Through Girder and Truss Swing Spans

The current Long Bridge is comprised of 22 through girder spans and a double span swing truss for a total of 24 spans over the Potomac River. It contains elements of the 1904 bridge (the swing span and twelve piers) and of the 1942 bridge (the girder spans and eleven piers). Long Bridge carries two tracks with a width of 36'-6" (measured between the centerline of the girders), but narrows down to 28'-8" at the swing trusses. There is no reserve width to add additional tracks. The vertical clearance is limited to 21' at the swing trusses (measured from the top of the track to the bottom of lateral bracing). Figure 1 shows several of the through girder "approach spans" as well as the main swing span truss over the navigation channel. The through girder spans vary from 85 – 108 feet in length while the truss span measures 280 feet in total length and provides two 100 foot wide navigation channels. Note that there is an additional two span bridge that crosses the tidal basin between Potomac Island and the District of Columbia as shown in Figure 2. This additional two span bridge is included in the existing conditions assessment. The plan and elevation of the Long Bridge over the Potomac River are shown in Figures 3 and 4, respectively.

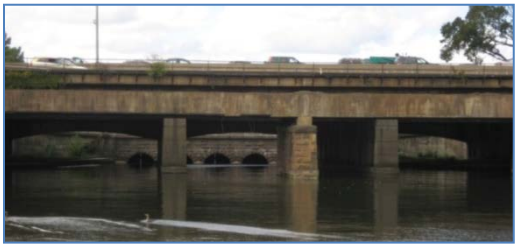

Figure 2 – Tidal Basin Spans

1.2 Potomac River Hydrology

Washington, D.C. (District of Columbia) is located within the Chesapeake Bay drainage basin on the dividing line between the Piedmont and Coastal province. The topography within the District of Columbia ranges in elevation from sea level along the tidal portions of the Anacostia and Potomac Rivers to an elevation as high as 414 feet North American Vertical Datum of 1988 (NAVD88) at Tenleytown. Interstream ridges are highest in the part of the Piedmont within the northwest part of the city. These ridges descend gradually to the coastal plains to the south and east, where elevations rarely exceed 230 feet NAVD88. Average annual precipitation in the District of Columbia is about 43 inches with precipitation fairly well distributed throughout the year.

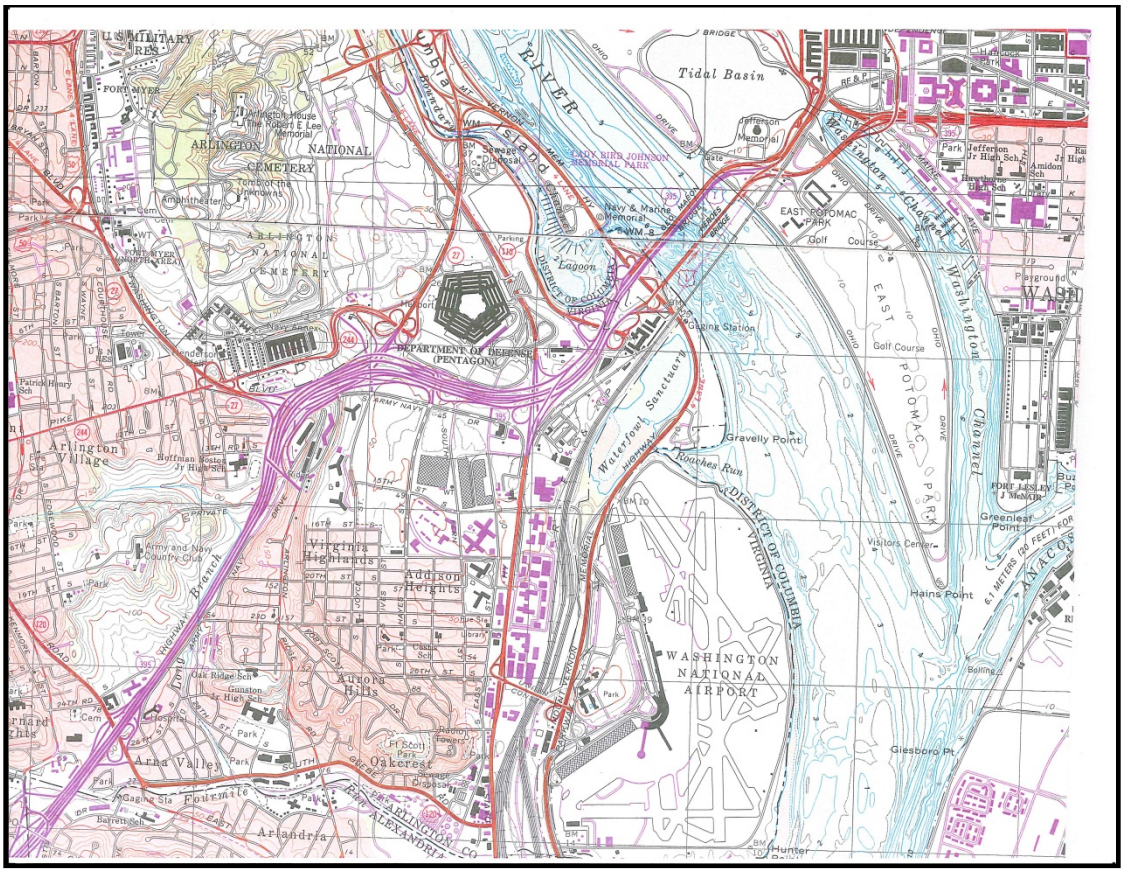

Figure 3 – USGS Hydrology Map

Water surface elevations on the Potomac reflect both riverine and tidal conditions. Tidal influences from the Chesapeake Bay along the Potomac River extend from the confluence with the Bay upstream to approximately 3,000 feet downstream of Long Bridge in the District as reflected in the effective Flood Insurance Study (FIS) for the District of Columbia, Washington, D.C., dated September 27, 2010. According to the FIS, the flood frequency analysis of annual peak discharge for the riverine portion of the

Potomac River is based on the USGS gage near Little Falls Pumping Station (USGS Station No. 01646500). The drainage area for the Potomac at this gage is 11,560 square miles. The peak discharges for various flood events associated with riverine conditions are listed in Table 1.

Table 1 – Peak Discharges for Potomac River at Little Falls

Percent Chance Annual Exceedance	Recurrence Interval	Discharge (cfs)
10	10	240,000
2	50	395,000
1	100	475,000
0.2	500	698,000

Within the tidal influenced portion of the Potomac River, the flood elevations as reported in the FIS are based on a stage-frequency analysis of water surface elevations recorded at the National Ocean Service (NOS) Gage No. 8594900 located at Haines Point as shown in Table 2.

Table 2 – Water Surface Elevations for Tidal Influenced Portion of Potomac River at Haines Point

Percent Chance Annual Exceedance	Recurrence Interval	Water Surface Elevation (feet NAVD88)
10	10	5.8
2	50	8.9
1	100	10.5
0.2	500	14.7

1.3 Geological Structure of the Potomac River

The structure of the Potomac River bed is comprised of two layers of soil overlying rock in descending order. Review of historical geologic surveys and as-built drawings from the construction of the Long Bridge defines the composition of each of these three layers.

Based upon the soundings shown on the construction as-builts, the uppermost **soil** is composed of gravel, sand, silt, and clay as well as a stratum referred to as "dark mud," which is likely a very soft silt or clay. These soils have been identified as alluvium and

artificial rock and can be found in the first one to forty feet from the top of the riverbed. Geologic investigators historically have defined these soils as shown in Table 3.

Table 3 – Alluvium and Fill Soils

Source	River Bed Description
Fleming et al. (1994)	Along the edges of the river is primarily artificial fill. Within the river itself, the soil is composed of gray to gray-brown gravel, sand, silt, and clay derived from upgradient terrace, colluvium, saprolite, and fresh crystalline rock deposits – referred to as the Holocene Age Q1 Formation.
Froelich & Hack (1975)	This stratum is referred to as alluvial gravel, sand, silt, and clay with thicknesses ranging from a veneer to 25 feet or more, also intermixed with artificial fill, mainly river dredgings, along edges of the river.
Johnston (1958)	Johnston refers to this material as the Pamlico Formation and Recent alluvium, described as fine sandy loams, sands, and clays, and to a limited extent, gravels.

The second layer underlying the alluvium soils are the Coastal Plain **sediments** of the Cretaceous Age Potomac Group, including the Patuxent Formation, Arundel Clay, and Patapsco Formation. The three layers are typically defined by two units as shown in Table 4.

Table 4 – Potomac River Soil Layers

Soil Layer	
Upper Soil Layer – Patapsco Formation and Arundel Clay	Comprised of silty and sandy clays with minor amounts of sand and gravel. The clay is mainly mottled red and green, or gray to black and locally carbonaceous.
Lower Soil Layer – Patuxent Formation	Consists primarily of fluviatile, channel-fill, sand and gravel facies, with local lenticular bodies of silt and clay.

The soundings on the construction as-builts indicate primarily sand and gravel sequences, followed by hard white and red clay, and soft, micaceous rock (saprolite). According to Fleming etal (1994), the soil formations are undifferentiated in the Washington West quadrangle area. These sedimentary layers can be found forty to 100 feet from the top of the riverbed.

Underlying the Potomac Group sediments are the Piedmont basement rock formations as defined in Table 5.

Table 5 – Potomac River Rock Layer

Source	Basement Piedmont Rock Description
Fleming et al. (1994)	Metasedimentary Mather Gorge-Sykesville and Northwest Branch-Laurel motifs. The motifs are intruded by rocks of the Georgetown and Dalecarlia Intrusive Suites, Kensington Tonalite, Clarendon Granite, undifferentiated granitoids, and several quartz bodies.
Froelich & Hack (1975)	Referred to these rocks as metamorphosed igneous and sedimentary rocks of the Wissahicken Formation of the Glenarm Series, including quartzose boulder gneiss, mica schist and impure quartzite. The schists and gneisses are intimately associated with mafic igneous rocks of the Georgetown Complex, and with ultramafic rocks (soapstone, serpentinite, etc.). The metamorphic and mafic rocks are intruded by younger igneous rocks, mainly quartz diorites of the Georgetown and Kensington gneisses.

These igneous and metamorphic rocks are found in north-trending belts, which plunge to the south. The crystalline rocks are variably cleaved and foliated and jointed. The depth to the Piedmont basement rock is approximately 100 to 150 feet below mean sea level.

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LONG BRIDGE STUDY

DISTRICT DEPARTMENT OF TRANSPORTATION

LONG BRIDGE STUDY

Bridge Design Workshop Report

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