LONG BRIDGE PROJECT
Connecting North and South Through our Nation's Capital

Appendix B7:

Conceptual Engineering Construction Cost Estimates Report

LONG BRIDGE PROJECT

Connecting North and South Through our Nation's Capital

Long Bridge Project

Environmental Impact Statement (EIS)

Conceptual Engineering Cost Estimate

Basis of Estimate

June 17, 2019

District Department of Transportation

U.S. Department of Transportation
Federal Railroad Administration

Long Bridge Project EIS

Conceptual Engineering Cost Estimate

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1.0 Introduction and Project Description

The Long Bridge Project consists of potential improvements to the Long Bridge and related railroad infrastructure located between the Rosslyn (RO) Interlocking near Long Bridge Park in Arlington, Virginia, and the L'Enfant (LE) Interlocking near 10th Street SW in the District of Columbia. Phase III includes the development of conceptual engineering for two Action Alternatives that expand the current river crossing from two to four tracks. Order-of-Magnitude (OM) cost estimates were developed based on Conceptual Engineering documents, the Draft Environmental Impact Statement, Basis of Design reports, and project schedule for each of the following Action Alternatives:

1. **Action Alternative A:** Construct a new two-track bridge upstream and maintain the existing two-track bridge.
2. **Action Alternative B:** Construct a new two-track bridge upstream and replace the existing structure with a new two-track downstream bridge.

For both alternatives, the new bridges would be essentially identical to each other in type and size. There are six (6) existing undergrade bridges and three existing overhead bridges and viaducts within the Corridor:

- Long Bridge over Potomac River, Mount Vernon Trail, and Ohio Drive SW
- CSXT Bridge over George Washington Memorial Parkway (GWMP)
- CSXT Bridge over Ohio Drive SW
- CSXT Bridge over I-395
- CSXT Bridge over Washington Channel
- CSXT Bridge over Maine Avenue SW
- Maryland Avenue SW decking (viaduct) over CSXT
- 12th Street SW over CSXT
- 12th Street Expressway over CSXT

In addition, one pedestrian bridge over Maine Avenue SW that connects the Mandarin Oriental Hotel and the SW Riverfront will need to be replaced.

The project will be subject to a risk review workshop. Based on the results of the workshop, the estimate will be revised if necessary. The base year dollars of the estimate are 2019 and the anticipated construction year is 2022 with completion being 2026 for Action Alternative A and 2030 for Action Alternative B. Based on the available information, the following OM cost was estimated for each concept:

Table 1-1 | OM Summary Costs

ALTERNATIVE	DESCRIPTION	OM COST ESTIMATE (2019)
ACTION ALTERNATIVE A	One new bridge upstream and maintain existing Long Bridge for four tracks	**$1.9B**
ACTION ALTERNATIVE B	Two new bridges for four tracks	**$2.8B**

2.0 Technical Baseline

2.1. Project Documents

The Long Bridge Project maintains a Project website at www.longbridgeproject.com . Final documents and public drafts are available under the Project Resources tab of the website. The Draft EIS will be uploaded which will include appendices for the Conceptual Engineering Plans, Structures Study Report, and Basis of Design (BOD) Report.

2.2. Project Design & Estimating

The conceptual level design for both Action Alternatives reflect the information presented in the Long Bridge Project BOD Report. The work along the railroad Corridor includes the following:

- Addition of two new tracks, designed to meet or exceed existing freight and passenger speeds.
- Re-alignment of curves in the existing tracks to optimize the Corridor and bridge construction.
- Addition of a new bridge over the George Washington Memorial Parkway (Action Alternatives A and B) and replacement of the existing bridge over George Washington Memorial Parkway (Action Alternative B only).
- Addition of a new upstream bridge over the Potomac River (Action Alternatives A and B) and replacement of the existing Long Bridge (Action Alternative B only).
- Complete replacement of the railroad bridges over I-395, Ohio Drive SW, Washington Channel, and Maine Avenue SW.
- Addition of a new bridge over the WMATA tunnel portal.
- Crashwall modifications to the piers throughout Maryland Avenue SW and along the retaining wall at the Mandarin Oriental Hotel.
- Addition of new retaining walls throughout the project limits.
- Security enhancements along the railroad Corridor to meet current standards.

The cost estimates for each of the Action Alternatives were prepared by the design teams developing the Action Alternatives. A common set of conceptual unit costs was established by the overall Project team and used as a baseline. Engineers were allowed to adjust costs depending on site conditions, aesthetics, phasing, uniqueness, and other criteria that were likely to be encountered.

3.0 Estimating Methodologies and Standard Cost Categories

The Long Bridge Phase III OM estimates were developed using a combination of conceptual structural estimates, Federal Transit Administration (FTA) Capital Cost Database (CCD), and correlation of other similar project estimates. General quantities were determined from the Conceptual engineering documents dated March 24, 2019. The resulting improvement costs were presented in FTA's Standard Cost Categories (SCC).

Long Bridge OM Estimates are presented in the FTA SCC format. The summary sheets and more detailed information is reflected in the **Action Alternative A Appendix** and the **Action Alternative B Appendix**. In developing the OM Estimate, general assumptions were made based on the level of detail in the Conceptual Engineering plans. The following text reflects the assumptions associated with each OM estimate.

3.1. SCC 10.04 Guideway: Aerial Structures

Aerial structures include any crossings related to widening the tracks from two to four-tracks and may include both CSXT bridges (undergrade) or roadway/pedestrian bridges (overhead). Structural costs include foundations, substructures, superstructure, and perceived means and methods for construction. Considerations for physical constraints, such as limited working space, and maintaining rail and roadway operations during construction were included in the estimate.

- Action Alternative A
    - New CSXT bridge construction over the GWMP, the Potomac River, and the WMATA Tunnel
    - Replacement and widening of several structures along the alignment, including CSXT over I-395, Ohio Drive SW, Washington Channel, and Maine Avenue SW; replacement of the Maine Avenue Pedestrian Bridge; and retaining walls along the Corridor.

- Action Alternative B
    - In addition to the work included with Action Alternative A, Action Alternative B also includes replacement of the existing CSXT Bridge over the GWMP and the Long Bridge.

3.2. SCC 10.08 Guideway: Retained cut or fill

Fill and excavation volumes, including transportation and stockpiling, are included in the estimate under this category. The earthwork required to relocate the Stormwater piping and drainage system under Maryland Avenue SW due to lowering the railroad profile is also included.

3.3. SCC 10.11 Track: Ballasted

New track construction (rails, ties, etc.) and removal of old track were assumed based on new alignments and construction limits. Additionally, temporary track shifts and construction staging were included in this quantity.

3.4. SCC 10.12 Track: Special (Switches, Turnouts)

Special track work is assumed to include all materials, installation, and hardware for switches and turnouts and removal of special track work.

3.5. SCC 10.13 Track: Vibration and noise dampening

Enhancements to the railroad per CSXT requests, including friction modifiers, clearance detectors, fencing, and security costs, are included in this category. Friction modifiers will help to alleviate noise and vibrations near Maryland Avenue SW and clearance detectors will be used in the tight horizontal clearance areas under Maryland Avenue SW. Fencing and security costs were estimated based on additional high-security fencing and lighting in areas where the rail has widened toward existing properties and for safety. Contingencies of 30% and 50% were used, items requiring enhanced design used the higher contingency.

3.6. SCC 10.14 Track: Special Structures

There are several thousand square feet of retaining walls along the Corridor, each of the 17 locations have been identified and retaining walls at these locations have been quantified. Crashwall modifications to the piers along the railroad through Maryland Avenue SW and along the Mandarin Oriental Hotel have also been included, work includes bringing the existing crashwalls up to current design standards.

3.7. SCC 40.01 Demolition, Clearing, Earthwork

Areas for demolition, clearing, and earthwork are based on the same areas required for aerial structures and crashwalls.

3.8. SCC 40.02 Side Utilities, Utility Relocation

General utility work along the Corridor based on the anticipated railroad and roadway improvements, modifications, or relocations associated with the structural work, also includes the Maryland Avenue SW Bridge Stormwater relocations.

3.9. SCC 40.03 Hazardous Material, Contaminated Soil Removal/Mitigation, Ground Water Treatments

Soil testing has not been completed at this time, but estimates are provided based on experience with other railroad projects, accounting for soil contamination, including disposal, stockpiling, and ground water treatment along the entire Corridor.

3.10. SCC 40.04 Environmental Mitigation

Environmental mitigation along the Corridor includes an allowance for the costs relating to hydrology/water resources; wetland impacts; historic/archaeology; and noise, vibration and air quality as a result of construction. Environmental mitigation of the Corridor improvements is assumed to include impacts to environmental features, mitigation from adjacent properties, requirements by regional agencies, and resource impacts. Estimated cost is assumed to include both physical

improvements along the Corridor and contribution to regional credits. The bike-pedestrian connection over the Potomac River has also been included in this section as line item in the detailed summary.

3.11. SCC 40.06 Pedestrian / Bike Access and Accommodation, Landscaping

Includes work to restore the Mount Vernon Trail upon construction completion and for the ADA compliant ramps and stairs leading up to the new pedestrian bridge over Maine Avenue SW to connect the Mandarin Hotel to the Marina. Landscaping work is anticipated at Hancock Park for restoring the park after staging equipment and material has been removed.

3.12. SCC 40.07 Automobile, bus, van accessways including roads, parking lots

Roadway work includes temporary detours, lane shifts and closures, staging areas, temporary access ways, and temporary parking lots. Anticipated areas requiring attention include the GWMP, portions of roads and lots along Ohio Drive SW, Interstate 395/695, Maine Avenue SW, and various staging areas along the Corridor.

3.13. SCC 40.08 Temporary Facilities and other indirect costs during construction

Temporary facilities and other indirect costs include:

- Traffic control and temporary traffic staging;
- Rail traffic control and temporary staging;
- Temporary pedestrian accommodations at the Mount Vernon Trail, Ohio Drive area, Temporary pedestrian crossing and access on Maine Avenue SW, and along D Street;
- Temporary parking areas as required near the Marina, Gravelly Point, and various other staging areas; and
- Temporary staging sites such as at Lots B and C, Portal V access, various sites along the Corridor, barges on the Potomac River, and finger piers along the Potomac River.

3.14. SCC 40.083 Mobilization

Mobilization cost has been included at 8% of construction costs (8% of SCC Sections 10 and 40).

3.15. SCC 50.01 Train Controls and Signals

Includes assumed signal and communication system (signal bridge, CIH, location houses, cables, etc.) for interlocking signals required at the RO, LE North, and LE south.

3.16. SCC 50.05 Communications

Includes communication improvements and modifications along the Corridor.

3.17. SCC 60.01 Purchase of Real Estate

Includes purchasing right-of-way near the Long Bridge Park, Mandarin Oriental Hotel and miscellaneous locations.

3.18. SCC 80 Professional Services

Costs for professional services have been included as a percentage of construction, as specified in **Action Alternative A Appendix** and **Action Alternative B Appendix.**

4.0 Supporting Assumptions/Ground Rules

Assumptions regarding Project construction were made to determine unit costs, including constructing bridges in the water, maintaining railroad operations, phasing, and maintaining roadway operations. Based on the stage of the project, several standard project related items such as roadway, utilities, drainage, maintenance and protection of traffic, erosion and sediment control, etc. lack details for establishing quantities. For the Long Bridge OM estimate, these costs were based on percentages of the associated physical civil and structural improvements.

General assumptions regarding the Project construction include:

- All regulatory approvals and federal, state, and local permits would be obtained prior to mobilization.
- All DDOT, USDOT, FRA, FHWA, and DRPT requirements would be satisfied prior to mobilization.
- Right-of-way and or construction access/easements would be completed prior to mobilization.
- Project construction schedule is anticipated to be 5 years for Action Alternative A and 8 years for Action Alternative B.
- It is assumed that sufficient lay-down and staging areas would be available prior to mobilization and that the Contractor and vendors would have reasonable access to the project.
- Night-time construction activities for both railroad and roadway work would be required for construction on the rail alignments or over roadways.
- Track alignments and bridge design accommodate CSXT criteria, including ballasted deck bridges and E-90 loading.
- Two tracks are to be in service at all times throughout construction.

Engineering judgement was used to determine allocated contingencies. Contingencies vary per location and per item. For this level of analysis, a minimum contingency of 30% was used in the estimate.

Estimates are prepared in base year dollars with the base year defined as the current calendar year (2019). The cost estimate has been projected into the future calendar year of 2024 (anticipated midpoint of construction) by using a cost escalation factor of 3% per year.

5.0 Estimate Limitations

The conceptual cost estimates for the Action Alternatives are based on concept-level designs that are intended to identify major project impacts and improvement needs. The concept-level designs do not include detailed designs of improvements to address specific site constrains and opportunities. Unit cost estimates are based on conceptual level typical sections at each overpass/underpass location.

The conceptual costs were developed to compare their relative magnitudes of cost to each other, and specific risk analyses have not been included at this stage of development. Risks that may impact the overall project cost have been recognized and there is an ongoing effort to resolve them, however, cost impacts have not been realized for these risks at this time. **Table 5-1** documents risks for both Action Alternatives.

Table 5-1 | Risks by Category

Risk Category	Description
Requirements	• The host railroad (CSXT) has a number of railroad-related items to be resolved during additional design iterations. • The host railroad has required two-tracks operational at all times. • Effected railroads have not specified the required final operational needs for interlocking layouts and necessary operational moves for final design or during construction. Additional crossovers will result in alignment modifications resulting in additional impacts and structural needs. • A portion of the project is on NPS Property; they have not yet agreed to allow construction equipment on their property. • Various property owners along the Corridor have been briefed on the project, but may not understand all of the impacts (ie: WMATA, Mandarin Hotel, Marina, Republic Properties, etc.)
Design	• Design exceptions may be required as the vertical clearance for the new bridges do not meet current DDOT standards. • Design considerations include heavy impacts to roadway traffic, which has not been fully vetted by traffic engineers.
Market	• Any delays in railroad operations may have significant impacts to CSXT and other railroad stakeholders. • Acquiring agreements with property owners along the Corridor may take longer than anticipated and have cost repercussions to the overall project. • The DC Metro area is in a period of significant growth and with limited construction firm competition for a project of this size and type which may drive prices up.
Construction	• The host railroad controls work windows and may pose limitations to construction time. • Inadequate capacity of domestic steel fabrication may cause delay in material delivery.

Long Bridge Project

Environmental Impact Statement (EIS)

Conceptual Engineering Cost Estimate

Action Alternative A

June 2019

District Department of Transportation

U.S. Department of Transportation
Federal Railroad Administration

Alternative A Summary Sheet

Long Bridge EIS CE Phase Cost Estimates

6/17/2019

FRA MAIN WORKSHEET

Grantee Name **DC Department of Transportation**

Project Name and Location: **Long Bridge Project, Arlington, VA to Washington, DC**

Current Phase : **Conceptual Engineering - Action Alternative A**

Today's Date	**5/10/19**
Yr of Base Year $	2019
Yr of Revenue Ops	2026

Standard Cost Category		Unit	Quantity	Base Year Dollars (2019)						YOE Dollars Total
				Without Contingency	Allocated Contingency	**TOTAL**	Unit Cost	Percent of Construction Cost	Percent of Total Project Cost	
10	**Guideway & Track Elements**	**Lineal Miles of Guideway**		**392,276,000**	**120,693,000**	**512,969,000**		57.40%	31.72%	**$630,887,167**
10.010	Guideway: At-grade exclusive right-of-way	Lineal Miles of Guideway								
10.020	Guideway: At-grade semi-exclusive (allows cross-traffic)	Lineal Miles of Guideway								
10.030	Guideway: At-grade in mixed traffic	Lineal Miles of Guideway								
10.040	Guideway: Aerial structure	Lineal Miles of Guideway		350,890,000	105,571,000	456,461,000				
10.050	Guideway: Built-up fill	Lineal Miles of Guideway								
10.060	Guideway: Underground cut & cover	Lineal Miles of Guideway								
10.070	Guideway: Underground tunnel	Lineal Miles of Guideway								
10.080	Guideway: Retained cut or fill	Lineal Miles of Guideway		1,660,000	895,000	2,555,000				
10.090	Track: Direct fixation	Track Miles								
10.100	Track: Embedded	Track Miles								
10.110	Track: Ballasted	Track Miles		12,466,000	4,365,000	16,831,000				
10.120	Track: Special (switches, turnouts)	Track Miles		0	0	0				
10.130	Track: Vibration & Noise Dampening	Track Miles		2,241,000	1,096,000	3,337,000				
10.140	Special Structures	Lineal Miles of Guideway		25,019,000	8,766,000	33,785,000				
20	**Stations, Stops, Terminals, Intermodals**	**Stations**		**0**	**0**	**0**		0.00%	0.00%	**$0**
20.010	At-Grade Station, Stop, Shelter, Mall, Terminal, Platform	Stations								
20.020	Aerial station, stop, shelter, mall, terminal, platform	Stations								
20.030	Underground station, stop, shelter, mall, terminal, platform	Stations								
20.031	Cut and Cover	Stations								
20.032	Bored Earth Soft Soils	Stations								
20.033	Bored Rock Hard Soils	Stations								
20.034	Unspecified	Stations								
20.040	Major stations, landings, terminals: Intermodal, ferry, trolley, etc.	Stations								
20.050	Joint development	Stations								
20.060	Automobile parking multi-story structure	Spaces								
20.070	Elevators, escalators	Number								
20.071	Elevators	Number								
20.072	Escalators	Number								
20.073	Unspecified	Number								
20.080	Passenger Overpass	Number								
20.090	Underground Interconnecting Tunnel	Number								
20.091	Cut and Cover	Number								
20.092	Bored Earth Soft Soils	Number								
20.093	Bored Rock Hard Soils	Number								
20.094	Unspecified	Number								
20.100	Signage and Graphics	Number								
30	**Support Facilities: Yards, Shops, Admin. Bldgs**	**Number**		**0**	**0**	**0**		0.00%	0.00%	**$0**
30.010	Administration Building: Office, sales, storage, revenue counting	Number								
30.011	Administrative Building	Number								
30.012	Central Control Facility	Number								
30.013	Central Revenue Counting Facility	Number								
30.014	Unspecified	Number								
30.020	Light Maintenance Facility	Number								
30.030	Heavy Maintenance Facility	Number								
30.040	Storage or Maintenance of Way Building	Number								
30.050	Yard and Yard Track	Number								
40	**Sitework & Special Conditions**	**Lineal Miles of Guideway**		**285,499,240**	**92,580,000**	**378,079,240**		42.31%	23.38%	**$464,989,776**
40.010	Demolition, Clearing, Earthwork	Lineal Miles of Guideway		3,500,000	1,050,000	4,550,000				
40.020	Site Utilities, Utility Relocation	Lineal Miles of Guideway		10,300,000	4,635,000	14,935,000				
40.021	Urban Replacement In-Kind Public Utilities	Lineal Miles of Guideway								
40.022	Urban Replacement In-Kind Private Utilities	Lineal Miles of Guideway								
40.023	Urban Replacement Betterment Public Utilities	Lineal Miles of Guideway								
40.024	Urban Replacement Betterment Private Utilities	Lineal Miles of Guideway								
40.025	Suburban Replacement In-Kind Public Utilities	Lineal Miles of Guideway								
40.026	Suburban Replacement In-Kind Private Utilities	Lineal Miles of Guideway								
40.027	Suburban Replacement Betterment Public Utilities	Lineal Miles of Guideway								
40.028	Suburban Replacement Betterment Private Utilities	Lineal Miles of Guideway								
40.029	Unspecified	Lineal Miles of Guideway								
40.030	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	Lineal Miles of Guideway		30,000,000	12,000,000	42,000,000				
40.031	HazMat Abatement	Lineal Miles of Guideway								
40.032	Contaminated Soil Removal	Lineal Miles of Guideway								
40.033	Ground Water Treatment	Lineal Miles of Guideway								
40.034	Unspecified	Lineal Miles of Guideway								
40.040	Environmental mitigation, e.g. wetlands, historic/archeologic, parks	Lineal Miles of Guideway		70,750,000	17,688,000	88,438,000				
40.050	Site structures including retaining walls, sound walls	Lineal Miles of Guideway								
40.051	Mechanically Stabilized Earth Walls	Lineal Miles of Guideway								
40.052	Concrete Walls	Lineal Miles of Guideway								
40.053	Other Walls	Lineal Miles of Guideway								
40.054	Unspecified	Lineal Miles of Guideway								
40.060	\	Lineal Miles of Guideway		1,421,000	502,000	1,923,000				
40.070	Automobile, bus, van accessways including roads, parking lots	Spaces		10,000,000	4,500,000	14,500,000				
40.071	Surface Parking Lot	Spaces								
40.072	Auto Access	Stations								
40.073	Bus Access	Spaces								
40.074	Bus Parking and Berthing	Spaces								
40.075	Unspecified	Spaces								
40.080	Temporary Facilities and other indirect costs during construction	Lineal Miles of Guideway		94,250,000	42,413,000	136,663,000				
40.081	Roadway Changes	Lineal Miles of Guideway								
40.082	Third-Party Work	Lineal Miles of Guideway								
40.083	Mobilization	Lineal Miles of Guideway		65,278,240	9,792,000	75,070,240				
40.084	Maintenance of Traffic (Railroad reroute, shutdown, reschedule, stage, phase, worker-protect, work-around)	Lineal Miles of Guideway								
40.085	Unallocated Indirect Costs	Lineal Miles of Guideway								
40.086	Unspecified	Lineal Miles of Guideway								
50	**Systems**	**Track Miles**		**2,000,000**	**600,000**	**2,600,000**		0.29%	0.16%	**$3,197,672**
50.010	Train control and signals	Track Miles		0	0	0				
50.011	Train Control - Wayside	Track Miles								
50.012	Train Control - On Board Systems	Track Miles								
50.013	Train Control - Centralized Systems	Track Miles								
50.014	Unspecified	Track Miles								
50.020	Traffic signals and crossing protection	Track Miles								
50.030	Traction power supply: substations	Track Miles								
50.040	Traction power distribution: catenary and third rail	Track Miles								
50.041	Catenary	Track Miles								
50.042	Third Rail	Track Miles								
50.043	Power Distribution and Connections	Track Miles								
50.044	Unspecified	Track Miles								
50.050	Communications	Lineal Miles of Guideway		2,000,000	600,000	2,600,000				
50.051	Wired	Lineal Miles of Guideway								
50.052	Radio Based	Lineal Miles of Guideway								
50.053	Unspecified	Lineal Miles of Guideway								
50.060	Fare collection system and equipment	Stations								
50.061	Central Revenue Counting Systems	Stations								
50.062	Revenue Collection - In Station	Stations								
50.063	Revenue Collection - On Vehicle	Vehicles								
50.064	Unspecified	Stations								
50.070	Central Control System	Lineal Miles of Guideway								
51	**Construction Subtotal (10-50)**	**Lineal Miles of Guideway**		**679,775,240**	**213,873,000**	**893,648,240**		100.00%	55.25%	**$1,099,074,615**
60	**Row, Land, Existing Improvements**	**Lineal Miles of Guideway**		**11,000,000**	**3,300,000**	**14,300,000**			0.88%	**$17,587,196**
60.010	Purchase or lease of real estate	Lineal Miles of Guideway		11,000,000	3,300,000	14,300,000				
60.011	Full Takes	Lineal Miles of Guideway								
60.012	Part Takes	Lineal Miles of Guideway								
60.013	Easement Acquisitions	Lineal Miles of Guideway								
60.014	Other Rights	Lineal Miles of Guideway								
60.015	Donated Value	Lineal Miles of Guideway								
60.016	Unspecified	Lineal Miles of Guideway								
60.020	Relocation of existing households and businesses	Lineal Miles of Guideway								
60.021	Residential (Owners)	Lineal Miles of Guideway								
60.022	Residential (Tenants)	Lineal Miles of Guideway								
60.023	Business (Owners and Tenants)	Lineal Miles of Guideway								
60.024	Others (Personal Property Moves)	Lineal Miles of Guideway								
60.025	Unspecified	Lineal Miles of Guideway								
60.030	Services	Lineal Miles of Guideway								
60.031	Property Management	Lineal Miles of Guideway								
60.032	Agency	Lineal Miles of Guideway								
60.033	Contractor R/W Services (Title/Appraisal, etc)	Lineal Miles of Guideway								
60.034	Legal Services	Lineal Miles of Guideway								
60.035	Unspecified	Lineal Miles of Guideway								

60.040	Other Real Estate Costs	Lineal Miles of Guideway								
70	**Vehicles**	**Vehicles**							0.00%	**$0**
70.010	Light Rail	Vehicles								
70.011	Static	Vehicles								
70.012	Articulated	Vehicles								
70.013	Unspecified	Vehicles								
70.020	Heavy Rail	Vehicles								
70.021	Small Scale	Vehicles								
70.022	Large Scale	Vehicles								
70.023	Unspecified	Vehicles								
70.030	Commuter Rail	Vehicles								
70.031	Locomotive	Vehicles								
70.032	Passenger Car	Vehicles								
70.033	Bi-Level Passenger Car	Vehicles								
70.034	Self-Propelled Passenger Car	Vehicles								
70.035	Unspecified	Vehicles								
70.040	Bus	Vehicles								
70.041	Small Bus	Vehicles								
70.042	Standard 40 Foot Bus	Vehicles								
70.043	Articulated Bus	Vehicles								
70.044	Unspecified	Vehicles								
70.050	Other Vehicles	Vehicles								
70.060	Non-revenue vehicles	Vehicles								
70.061	Maintenance of Way Vehicles	Vehicles								
70.062	Automobiles	Vehicles								
70.063	Trucks	Vehicles								
70.064	Unspecified	Vehicles								
70.070	Spare parts/ Rotable Components	Vehicles								
70.080	Intercity Passenger Rail	Vehicles								
70.081	Diesel Locomotive	Vehicles								
70.082	Cab Car	Vehicles								
70.083	Bi-Level Coach	Vehicles								
70.084	Single Level Coach	Vehicles								
70.085	DMU	Vehicles								
70.086	EMU	Vehicles								
70.087	Unspecified	Vehicles								
80	**Professional Services**			**384,268,743**	**2,680,945**	**386,949,688**			23.92%	**$475,899,308**
80.000	Planning and Concept Design	0% construction (completed)		0	0	0				
80.010	Preliminary Engineering	2% construction		17,872,965	0	17,872,965				
80.020	Final Design	4% construction		35,745,930	0	35,745,930				
80.030	Project Management for Design and Construction	5% construction		44,682,412	0	44,682,412				
80.031	Agency Project Management	1% construction		8,936,482	0	8,936,482				
80.032	Project Management Oversight Support	1% construction		8,936,482	0	8,936,482				
80.033	Agency Force Account	5% construction		44,682,412	0	44,682,412				
80.034	Unspecified	5% construction		44,682,412	0	44,682,412				
80.040	Construction Administration & Management	6% construction		53,618,894	0	53,618,894				
80.050	Professional Liability and other Non-Construction Insurance	3% construction		26,809,447	0	26,809,447				
80.060	Legal; Permits; Review Fees by other agencies, cities, etc.	3% construction		26,809,447	0	26,809,447				
80.070	Surveys, Testing, Investigation, Inspection	2% construction		17,872,965	0	17,872,965				
80.080	Start up	4% construction		35,745,930	0	35,745,930				
80.081	Training/Start-up			0	0	0				
80.082	Safety Certification			0	0	0				
80.083	Off-Site Vehicle Testing, Test Runs			0	0	0				
80.084	Commissioning			0	0	0				
80.085	Unspecified			0	0	0				
80.090	Other	2% construction		17,872,965	2,680,945	20,553,910				
81	**Subtotal (10-80)**	Lineal Miles of Guideway		1,075,043,983	219,853,945	1,294,897,928			80.06%	**1,592,561,120**
90	**Unallocated Contingency (30%)**	Total Amount		322,513,195	0	322,513,195			19.94%	**317,558,083**
91	**Subtotal (10-90)**	Lineal Miles of Guideway		1,397,557,178	219,853,945	1,617,411,123			100.00%	**1,910,119,203**
100	**Finance Charges**	Total Amount							0.00%	
101	**Total Project Costs (10-100)**	Lineal Miles of Guideway		**1,397,557,178**	**219,853,945**	**1,617,411,123**			100.00%	**1,910,119,203**

Allocated Contingency as % of Base Yr Dollars w/o Contingency	20.45%
Unallocated Contingency as % of Base Yr Dollars w/o Contingency	30.00%
Total Contingency as % of Base Yr Dollars w/o Contingency	50.45%

Alternative A Detail Sheet — Long Bridge EIS CE Phase Cost Estimates

6/17/2019

Grantee Name DC Department of Transportation
Project Name and Location: Long Bridge Project, Arlington, VA to Washington, DC
Current Phase : Conceptual Engineering - Action Alternative A

5/10/2019

SCC	Sub	Description	Quantity	Unit	Unit Cost	Sub-Total	Allocated Contingency Percentage	Contingency	Total	Category Total
10 GUIDEWAY & TRACK ELEMENTS (route miles)										
	10.01 Guideway: At-grade exclusive right-of-way									$ -
	10.02 Guideway: At-grade semi-exclusive (allows cross-traffic) (Not Applicable)									$ -
	10.03 Guideway: At-grade in mixed traffic (Not Applicable)									$ -
	10.04 Guideway: Aerial structure					**$ 350,890,000**		**$ 105,571,000**		**$ 456,461,000**
	10.04.01	George Washington Memorial Parkway Bridge	5,686	SF	$ 3,100	$ 17,627,000	30%	$ 5,289,000	$ 22,916,000	
	10.04.02	Long Bridge	91,152	SF	$ 2,289	$ 208,647,000	30%	$ 62,595,000	$ 271,242,000	
	10.04.03	WMATA Tunnel Bridge	4,750	SF	$ 2,435	$ 11,567,000	30%	$ 3,471,000	$ 15,038,000	
	10.04.04	I-395 Bridge	13,680	SF	$ 2,524	$ 34,529,000	30%	$ 10,359,000	$ 44,888,000	
	10.04.05	Ohio Drive SW Bridge	7,128	SF	$ 1,824	$ 13,002,000	30%	$ 3,901,000	$ 16,903,000	
	10.04.06	Washington Channel Bridge	15,180	SF	$ 2,104	$ 31,939,000	30%	$ 9,582,000	$ 41,521,000	
	10.04.07	Maine Avenue SW Bridge	9,984	SF	$ 3,213	$ 32,079,000	30%	$ 9,624,000	$ 41,703,000	
	10.04.08	Maine Avenue SW Pedestrian Bridge	2,000	SF	$ 750	$ 1,500,000	50%	$ 750,000	$ 2,250,000	
	10.05 Guideway: Built-up fill (Not Applicable)									$ -
	10.05 Guideway: Built-up fill (Not Applicable)									$ -
	10.06 Guideway: Underground cut & cover (Not Applicable)									$ -
	10.07 Guideway: Underground tunnel (Not Applicable)									$ -
	10.08 Guideway: Retained cut or fill					**$ 1,660,000**		**$ 895,000**		**$ 2,555,000**
	10.08.01	Fill	1	LS	$ 1,224,444	$ 1,225,000	50%	$ 613,000	$ 1,838,000	
	10.08.02	Excavation	1	LS	$ 306,111	$ 307,000	50%	$ 154,000	$ 461,000	
	10.08.03	Maryland Avenue SW Bridge Stormwater Excavation	1	LS	$ 127,500	$ 128,000	100%	$ 128,000	$ 256,000	
	10.09 Track: Direct fixation (Not Applicable)									$ -
	10.10 Track: Embedded (Not Applicable)									$ -
	10.11 Track: Ballasted					**$ 12,466,000**		**$ 4,365,000**		**$ 16,831,000**
	10.11.01	New Concrete Tie Track (Rails, Ties, Ballast, Subballast, and OTM)	24,640	TF	$ 425	$ 10,472,000	35%	$ 3,666,000	$ 14,138,000	
	10.11.02	Shift Track	23,032	TF	$ 75	$ 1,728,000	35%	$ 605,000	$ 2,333,000	
	10.11.03	Remove Track	6,640	TF	$ 40	$ 266,000	35%	$ 94,000	$ 360,000	
	10.12 Track: Special (switches, turnouts)					**$ -**		**$ -**		**$ -**
	10.12.01	Install #15 CSXT Turnout - Concrete Ties on Ballast (RO Interlocking)	0	EA	$ 640,000	$ -	35%	$ -	$ -	
	10.12.02	Remove #15 Turnout (RO Interlocking)	0	EA	$ 20,000	$ -	35%	$ -	$ -	
	10.12.03	Remove #20 Turnout (RO Interlocking)	0	EA	$ 20,000	$ -	35%	$ -	$ -	
	10.12.04	Install #15 CSXT Turnout - Concrete Ties on Ballast (LE South Interlocking)	0	EA	$ 640,000	$ -	35%	$ -	$ -	
	10.12.05	Install #15 CSXT Turnout - Concrete Ties on Ballast (LE North Interlocking)	0	EA	$ 640,000	$ -	35%	$ -	$ -	
	10.12.06	Remove #15 Turnout (LE Interlocking)	0	EA	$ 20,000	$ -	35%	$ -	$ -	
	10.13 Track: Vibration and noise dampening					**$2,241,000**		**$1,096,000**		**$ 3,337,000**
	10.13.01	Friction Modifiers	2	EA	$50,000	$ 100,000	30%	$ 30,000	$ 130,000	
	10.13.02	Enhanced Fencing and Security	1	LS	$1,916,000	$ 1,916,000	50%	$ 958,000	$ 2,874,000	
	10.13.03	Security Lighting	1	LS	$25,000	$ 25,000	30%	$ 8,000	$ 33,000	
	10.13.04	Clearance Detectors	2	EA	$100,000	$ 200,000	50%	$ 100,000	$ 300,000	
	10.14 Guideway: Special structures					**$ 25,019,000**		**$ 8,766,000**		**$ 33,785,000**
	10.14.01	Retaining Wall 1	5,491	SF	$ 200	$ 1,099,000	35%	$ 385,000	$ 1,484,000	
	10.14.02	Retaining Wall 2	3,150	SF	$ 200	$ 630,000	35%	$ 221,000	$ 851,000	
	10.14.03	Retaining Wall 3	3,500	SF	$ 200	$ 700,000	35%	$ 245,000	$ 945,000	
	10.14.04	Retaining Wall 4	9,250	SF	$ 200	$ 1,850,000	35%	$ 648,000	$ 2,498,000	
	10.14.05	Retaining Wall 5	9,975	SF	$ 200	$ 1,995,000	35%	$ 699,000	$ 2,694,000	
	10.14.06	Retaining Wall 6	6,408	SF	$ 200	$ 1,282,000	35%	$ 449,000	$ 1,731,000	
	10.14.07	Retaining Wall 7	5,863	SF	$ 200	$ 1,173,000	35%	$ 411,000	$ 1,584,000	
	10.14.08	Retaining Wall 8	1,975	SF	$ 200	$ 395,000	35%	$ 139,000	$ 534,000	
	10.14.09	Retaining Wall 9	1,750	SF	$ 200	$ 350,000	35%	$ 123,000	$ 473,000	
	10.14.10	Retaining Wall 10	11,914	SF	$ 200	$ 2,383,000	35%	$ 835,000	$ 3,218,000	
	10.14.11	Retaining Wall 11	4,532	SF	$ 200	$ 907,000	35%	$ 318,000	$ 1,225,000	
	10.14.12	Retaining Wall 12	19,248	SF	$ 200	$ 3,850,000	35%	$ 1,348,000	$ 5,198,000	
	10.14.13	Retaining Wall 13	3,783	SF	$ 200	$ 757,000	35%	$ 265,000	$ 1,022,000	
	10.14.14	Retaining Wall 14	6,279	SF	$ 200	$ 1,256,000	35%	$ 440,000	$ 1,696,000	
	10.14.15	Retaining Wall 15	3,345	SF	$ 200	$ 669,000	35%	$ 235,000	$ 904,000	
	10.14.16	Retaining Wall 16	3,552	SF	$ 200	$ 711,000	35%	$ 249,000	$ 960,000	
	10.14.17	Retaining Wall 17	5,190	SF	$ 200	$ 1,038,000	35%	$ 364,000	$ 1,402,000	
	10.14.18	Maryland Avenue SW Crashwalls	6,010	SF	$ 397	$ 2,386,000	35%	$ 836,000	$ 3,222,000	
	10.14.19	Mandarin Oriental Hotel Crashwalls	4,000	SF	$ 397	$ 1,588,000	35%	$ 556,000	$ 2,144,000	
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number) (Not Applicable)										
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS (Not Applicable)										
40 SITEWORK & SPECIAL CONDITIONS										
	40.01 Demolition, Clearing, Earthwork					**$ 3,500,000**		**$ 1,050,000**		**$ 4,550,000**
	40.01.01	George Washington Memorial Parkway Bridge	0	LS	$ -	$ -	30%	$ -	$ -	
	40.01.02	Long Bridge	0	LS	$ -	$ -	30%	$ -	$ -	
	40.01.03	WMATA Tunnel Bridge	0	LS	$ -	$ -	30%	$ -	$ -	
	40.01.04	I-395 Bridge	1	LS	$ 500,000	$ 500,000	30%	$ 150,000	$ 650,000	
	40.01.05	Ohio Drive SW Bridge	1	LS	$ 250,000	$ 250,000	30%	$ 75,000	$ 325,000	
	40.01.06	Washington Channel Bridge	1	LS	$ 500,000	$ 500,000	30%	$ 150,000	$ 650,000	
	40.01.07	Maine Avenue SW Bridge	1	LS	$ 1,000,000	$ 1,000,000	30%	$ 300,000	$ 1,300,000	
	40.01.08	Maine Avenue SW Pedestrian Bridge	1	LS	$ 500,000	$ 500,000	30%	$ 150,000	$ 650,000	
	40.01.09	Maryland Avenue SW Crashwalls	1	LS	$ 500,000	$ 500,000	30%	$ 150,000	$ 650,000	
	40.01.10	Mandarin Oriental Hotel Crashwalls	1	LS	$ 250,000	$ 250,000	30%	$ 75,000	$ 325,000	
	40.02 Site Utilities, Utility Relocation					**$ 10,300,000**		**$ 4,635,000**		**$ 14,935,000**
	40.02.01	Maryland Avenue SW Bridge Stormwater Relocation	1	LS	$ 300,000	$ 300,000	45%	$ 135,000	$ 435,000	
	40.02.02	Project Utility Work	1	LS	$ 10,000,000	$ 10,000,000	45%	$ 4,500,000	$ 14,500,000	
	40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments					**$ 30,000,000**		**$ 12,000,000**		**$ 42,000,000**
	40.03.01	Disposal of Contaminated Soil	1	LS	$ 10,000,000	$ 10,000,000	30%	$ 3,000,000	$ 13,000,000	
	40.03.02	Project Soil Mitigation	1	LS	$ 20,000,000	$ 20,000,000	45%	$ 9,000,000	$ 29,000,000	
	40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks					**$ 70,750,000**		**$ 17,688,000**		**$ 88,438,000**
	40.04.01	Aesthetic Design of Structures	1	LS	$ 1,000,000	$ 1,000,000	25%	$ 250,000	$ 1,250,000	
	40.04.02	Restoration of vegetation	1	LS	$ 250,000	$ 250,000	25%	$ 63,000	$ 313,000	
	40.04.03	Bike-Pedestrian Crossing	1	LS	$ 50,000,000	$ 50,000,000	25%	$ 12,500,000	$ 62,500,000	
	40.04.04	Permanent Mitigation (Historic Properties & Tree Protection)	1	LS	$ 10,000,000	$ 10,000,000	25%	$ 2,500,000	$ 12,500,000	
	40.04.05	Minimize Noise and Vibration during Construction	1	LS	$ 500,000	$ 500,000	25%	$ 125,000	$ 625,000	
	40.04.06	Location of Construction Access and Staging	1	LS	$ 7,500,000	$ 7,500,000	25%	$ 1,875,000	$ 9,375,000	
	40.04.07	Temporary Mitigation (Archarological Resources)	1	LS	$ 1,500,000	$ 1,500,000	25%	$ 375,000	$ 1,875,000	
	40.05 Site structures including retaining walls, sound walls									$ -
	40.06 Pedestrian / bike access and accommodation, landscaping					**$ 1,421,000**		**$ 502,000**		**$ 1,923,000**
	40.06.01	Restore Mount Vernon Trail	650	LF	$ 250	$ 163,000	30%	$ 49,000	$ 212,000	
	40.06.02	Maine Avenue SW Pedestrian Approach Ramps and Stairs	3,030	SF	$ 250	$ 758,000	30%	$ 228,000	$ 986,000	
	40.06.03	Hancock Park Landscaping (near 9th St)	1	LS	$ 500,000	$ 500,000	45%	$ 225,000	$ 725,000	
	40.07 Automobile, bus, van accessways including roads, parking lots					**$ 10,000,000**		**$ 4,500,000**		**$ 14,500,000**
	40.07.01	Final Paving to Access Roads and Main Roads	1	LS	$ 10,000,000	$ 10,000,000	45%	$ 4,500,000	$ 14,500,000	
	40.08 Temporary Facilities and other indirect costs during construction					**$ 94,250,000**		**$ 42,413,000**		**$ 136,663,000**
	40.08.01	Traffic control and temporary traffic staging	1	LS	$ 20,000,000	$ 20,000,000	45%	$ 9,000,000	$ 29,000,000	
	40.08.02	Rail traffic control and temporary staging	1	LS	$ 30,000,000	$ 30,000,000	45%	$ 13,500,000	$ 43,500,000	
	40.08.03	Temporary Pedestrian Accomodations	1	LS	$ 2,250,000	$ 2,250,000	45%	$ 1,013,000	$ 3,263,000	
	40.08.04	Temporary Parking Lots	1	LS	$ 6,000,000	$ 6,000,000	45%	$ 2,700,000	$ 8,700,000	
	40.08.05	Temporary Staging Sites	1	LS	$ 36,000,000	$ 36,000,000	45%	$ 16,200,000	$ 52,200,000	
	40.083 Mobilization					**$ 65,278,240**		**$ 9,792,000**		**$ 75,070,240**
	40.083	Mobilization (assume 8% of construction costs)	8.00	%	$ 815,978,000	$ 65,278,240	15%	$ 9,792,000	$ 75,070,240	
50 SYSTEMS										
	50.01 Train control and signals					**$ -**		**$ -**		**$ -**
	50.01.01	Interlocking Signals (RO, LE North, LE South)	1	LS	$ -	$ -	30%	$ -	$ -	
	50.02 Traffic signals and crossing protection (Not Applicable)									$ -
	50.03 Traction power supply: substations (Not Applicable)									$ -
	50.04 Traction power distribution: catenary and third rail (Not Applicable)									$ -
	50.05 Communications					**$ 2,000,000**		**$ 600,000**		**$ 2,600,000**
	50.05.01	Communications	1	LS	$ 2,000,000	$ 2,000,000	30%	$ 600,000	$ 2,600,000	
	50.06 Central Control (Not Applicable)									$ -
60 ROW, LAND, EXISTING IMPROVEMENTS										
	60.01 Purchase or lease of real estate					**$ 11,000,000**		**$ 3,300,000**		**$ 14,300,000**
	60.01.01	Proposed Right of Way	1	LS	$ 11,000,000	$ 11,000,000	30%	$ 3,300,000	$ 14,300,000	
	60.02 Relocation of existing households and businesses									$ -

Long Bridge Project

Environmental Impact Statement (EIS)

Conceptual Engineering Cost Estimate

Action Alternative B

June 2019

District Department of Transportation

U.S. Department of Transportation
Federal Railroad Administration

Alternative B Summary Sheet

Long Bridge EIS CE Phase Cost Estimates

6/17/2019

FRA MAIN WORKSHEET

Grantee Name **DC Department of Transportation**

Project Name and Location: **Long Bridge Project, Arlington, VA to Washington, DC**

Current Phase : **Conceptual Engineering - Action Alternative B**

Today's Date **5/10/19**

Yr of Base Year $ 2019

Yr of Revenue Ops 2027

Standard Cost Category		Unit	Quantity	Base Year Dollars (2019)						YOE Dollars Total
				Without Contingency	Allocated Contingency	TOTAL	Unit Cost	Percent of Construction Cost	Percent of Total Project Cost	
10	**Guideway & Track Elements**	**Lineal Miles of Guideway**		**619,870,000**	**189,506,000**	**809,376,000**		63.10%	34.96%	**$1,025,293,301**
10.010	Guideway: At-grade exclusive right-of-way	Lineal Miles of Guideway								
10.020	Guideway: At-grade semi-exclusive (allows cross-traffic)	Lineal Miles of Guideway								
10.030	Guideway: At-grade in mixed traffic	Lineal Miles of Guideway								
10.040	Guideway: Aerial structure	Lineal Miles of Guideway		569,143,000	171,046,000	740,189,000				
10.050	Guideway: Built-up fill	Lineal Miles of Guideway								
10.060	Guideway: Underground cut & cover	Lineal Miles of Guideway								
10.070	Guideway: Underground tunnel	Lineal Miles of Guideway								
10.080	Guideway: Retained cut or fill	Lineal Miles of Guideway		2,128,000	1,128,000	3,256,000				
10.090	Track: Direct fixation	Track Miles								
10.100	Track: Embedded	Track Miles								
10.110	Track: Ballasted	Track Miles		20,877,000	7,308,000	28,185,000				
10.120	Track: Special (switches, turnouts)	Track Miles		0	0	0				
10.130	Track: Vibration & Noise Dampening	Track Miles		2,241,000	1,096,000	3,337,000				
10.140	Special Structures	Lineal Miles of Guideway		25,481,000	8,928,000	34,409,000				
20	**Stations, Stops, Terminals, Intermodals**	**Stations**		**0**	**0**	**0**		0.00%	0.00%	**$0**
20.010	At-Grade Station, Stop, Shelter, Mall, Terminal, Platform	Stations								
20.020	Aerial station, stop, shelter, mall, terminal, platform	Stations								
20.030	Underground station, stop, shelter, mall, terminal, platform	Stations								
20.031	Cut and Cover	Stations								
20.032	Bored Earth Soft Soils	Stations								
20.033	Bored Rock Hard Soils	Stations								
20.034	Unspecified	Stations								
20.040	Major stations, landings, terminals: Intermodal, ferry, trolley, etc.	Stations								
20.050	Joint development	Stations								
20.060	Automobile parking multi-story structure	Spaces								
20.070	Elevators, escalators	Number								
20.071	Elevators	Number								
20.072	Escalators	Number								
20.073	Unspecified	Number								
20.080	Passenger Overpass	Number								
20.090	Underground Interconnecting Tunnel	Number								
20.091	Cut and Cover	Number								
20.092	Bored Earth Soft Soils	Number								
20.093	Bored Rock Hard Soils	Number								
20.094	Unspecified	Number								
20.100	Signage and Graphics	Number								
30	**Support Facilities: Yards, Shops, Admin. Bldgs**	**Number**		**0**	**0**	**0**		0.00%	0.00%	**$0**
30.010	Administration Building: Office, sales, storage, revenue counting	Number								
30.011	Administrative Building	Number								
30.012	Central Control Facility	Number								
30.013	Central Revenue Counting Facility	Number								
30.014	Unspecified	Number								
30.020	Light Maintenance Facility	Number								
30.030	Heavy Maintenance Facility	Number								
30.040	Storage or Maintenance of Way Building	Number								
30.050	Yard and Yard Track	Number								
40	**Sitework & Special Conditions**	**Lineal Miles of Guideway**		**357,013,000**	**112,361,000**	**469,374,000**		36.59%	20.27%	**$594,588,940**
40.010	Demolition, Clearing, Earthwork	Lineal Miles of Guideway		24,360,000	7,308,000	31,668,000				
40.020	Site Utilities, Utility Relocation	Lineal Miles of Guideway		12,300,000	5,535,000	17,835,000				
40.021	Urban Replacement In-Kind Public Utilities	Lineal Miles of Guideway								
40.022	Urban Replacement In-Kind Private Utilities	Lineal Miles of Guideway								
40.023	Urban Replacement Betterment Public Utilities	Lineal Miles of Guideway								
40.024	Urban Replacement Betterment Private Utilities	Lineal Miles of Guideway								
40.025	Suburban Replacement In-Kind Public Utilities	Lineal Miles of Guideway								
40.026	Suburban Replacement In-Kind Private Utilities	Lineal Miles of Guideway								
40.027	Suburban Replacement Betterment Public Utilities	Lineal Miles of Guideway								
40.028	Suburban Replacement Betterment Private Utilities	Lineal Miles of Guideway								
40.029	Unspecified	Lineal Miles of Guideway								
40.030	Haz. mat'l, contam'd soil removal/mitigation, ground water treatments	Lineal Miles of Guideway		40,000,000	15,750,000	55,750,000				
40.031	HazMat Abatement	Lineal Miles of Guideway								
40.032	Contaminated Soil Removal	Lineal Miles of Guideway								
40.033	Ground Water Treatment	Lineal Miles of Guideway								
40.034	Unspecified	Lineal Miles of Guideway								
40.040	Environmental mitigation, e.g. wetlands, historic/archeologic, parks	Lineal Miles of Guideway		70,750,000	17,688,000	88,438,000				
40.050	Site structures including retaining walls, sound walls	Lineal Miles of Guideway		0	0	0				
40.051	Mechanically Stabilized Earth Walls	Lineal Miles of Guideway								
40.052	Concrete Walls	Lineal Miles of Guideway								
40.053	Other Walls	Lineal Miles of Guideway								
40.054	Unspecified	Lineal Miles of Guideway								
40.060	Pedestrian / bike access and accommodation, landscaping	Lineal Miles of Guideway		1,421,000	502,000	1,923,000				
40.070	Automobile, bus, van accessways including roads, parking lots	Spaces		5,000,000	2,250,000	7,250,000				
40.071	Surface Parking Lot	Spaces								
40.072	Auto Access	Stations								
40.073	Bus Access	Spaces								
40.074	Bus Parking and Berthing	Spaces								
40.075	Unspecified	Spaces								
40.080	Temporary Facilities and other indirect costs during construction	Lineal Miles of Guideway		109,500,000	49,275,000	158,775,000				
40.081	Roadway Changes	Lineal Miles of Guideway								
40.082	Third-Party Work	Lineal Miles of Guideway								
40.083	Mobilization	Lineal Miles of Guideway		93,682,000	14,053,000	107,735,000				
40.084	Maintenance of Traffic (Railroad reroute, shutdown, reschedule, stage, phase, worker-protect, work around)	Lineal Miles of Guideway								
40.085	Unallocated Indirect Costs	Lineal Miles of Guideway								
40.086	Unspecified	Lineal Miles of Guideway								
50	**Systems**	**Track Miles**		**3,000,000**	**900,000**	**3,900,000**		0.30%	0.17%	**$4,940,403**
50.010	Train control and signals	Track Miles		0	0	0				
50.011	Train Control - Wayside	Track Miles								
50.012	Train Control - On Board Systems	Track Miles								
50.013	Train Control - Centralized Systems	Track Miles								
50.014	Unspecified	Track Miles								
50.020	Traffic signals and crossing protection	Track Miles								
50.030	Traction power supply: substations	Track Miles								
50.040	Traction power distribution: catenary and third rail	Track Miles								
50.041	Catenary	Track Miles								
50.042	Third Rail	Track Miles								
50.043	Power Distribution and Connections	Track Miles								
50.044	Unspecified	Track Miles								
50.050	Communications	Lineal Miles of Guideway		3,000,000	900,000	3,900,000				
50.051	Wired	Lineal Miles of Guideway								
50.052	Radio Based	Lineal Miles of Guideway								
50.053	Unspecified	Lineal Miles of Guideway								
50.060	Fare collection system and equipment	Stations								
50.061	Central Revenue Counting Systems	Stations								
50.062	Revenue Collection - In Station	Stations								
50.063	Revenue Collection - On Vehicle	Vehicles								
50.064	Unspecified	Stations								
50.070	Central Control System	Lineal Miles of Guideway								
51	**Construction Subtotal (10-50)**	**Lineal Miles of Guideway**		**979,883,000**	**302,767,000**	**1,282,650,000**		100.00%	55.40%	**$1,624,822,645**
60	**Row, Land, Existing Improvements**	**Lineal Miles of Guideway**		**11,000,000**	**3,300,000**	**14,300,000**			0.62%	**$18,114,812**
60.010	Purchase or lease of real estate	Lineal Miles of Guideway		11,000,000	3,300,000	14,300,000				
60.011	Full Takes	Lineal Miles of Guideway								
60.012	Part Takes	Lineal Miles of Guideway								
60.013	Easement Acquisitions	Lineal Miles of Guideway								
60.014	Other Rights	Lineal Miles of Guideway								
60.015	Donated Value	Lineal Miles of Guideway								
60.016	Unspecified	Lineal Miles of Guideway								
60.020	Relocation of existing households and businesses	Lineal Miles of Guideway								
60.021	Residential (Owners)	Lineal Miles of Guideway								
60.022	Residential (Tenants)	Lineal Miles of Guideway								
60.023	Business (Owners and Tenants)	Lineal Miles of Guideway								
60.024	Others (Personal Property Moves)	Lineal Miles of Guideway								
60.025	Unspecified	Lineal Miles of Guideway								
60.030	Services	Lineal Miles of Guideway								
60.031	Property Management	Lineal Miles of Guideway								
60.032	Agency	Lineal Miles of Guideway								
60.033	Contractor R/W Services (Title/Appraisal, etc)	Lineal Miles of Guideway								
60.034	Legal Services	Lineal Miles of Guideway								
60.035	Unspecified	Lineal Miles of Guideway								
60.040	Other Real Estate Costs	Lineal Miles of Guideway								

Alternative B Summary Sheet

Long Bridge EIS CE Phase Cost Estimates

6/17/2019

70	Vehicles	Vehicles							0.00%	$0
70.010	Light Rail	Vehicles								
70.011	Static	Vehicles								
70.012	Articulated	Vehicles								
70.013	Unspecified	Vehicles								
70.020	Heavy Rail	Vehicles								
70.021	Small Scale	Vehicles								
70.022	Large Scale	Vehicles								
70.023	Unspecified	Vehicles								
70.030	Commuter Rail	Vehicles								
70.031	Locomotive	Vehicles								
70.032	Passenger Car	Vehicles								
70.033	Bi-Level Passenger Car	Vehicles								
70.034	Self-Propelled Passenger Car	Vehicles								
70.035	Unspecified	Vehicles								
70.040	Bus	Vehicles								
70.041	Small Bus	Vehicles								
70.042	Standard 40 Foot Bus	Vehicles								
70.043	Articulated Bus	Vehicles								
70.044	Unspecified	Vehicles								
70.050	Other Vehicles	Vehicles								
70.060	Non-revenue vehicles	Vehicles								
70.061	Maintenance of Way Vehicles	Vehicles								
70.062	Automobiles	Vehicles								
70.063	Trucks	Vehicles								
70.064	Unspecified	Vehicles								
70.070	Spare parts/ Rotable Components	Vehicles								
70.080	Intercity Passenger Rail	Vehicles								
70.081	Diesel Locomotive	Vehicles								
70.082	Cab Car	Vehicles								
70.083	Bi-Level Coach	Vehicles								
70.084	Single Level Coach	Vehicles								
70.085	DMU	Vehicles								
70.086	EMU	Vehicles								
70.087	Unspecified	Vehicles								
80	**Professional Services**			**551,539,500**	**3,847,950**	**555,387,450**			23.99%	**$703,548,205**
80.000	Planning and Concept Design	0% construction (completed)		0	0	0				
80.010	Preliminary Engineering	2% construction		25,653,000	0	25,653,000				
80.020	Final Design	4% construction		51,306,000	0	51,306,000				
80.030	Project Management for Design and Construction	5% construction		64,132,500	0	64,132,500				
80.031	Agency Project Management	1% construction		12,826,500	0	12,826,500				
80.032	Project Management Oversight Support	1% construction		12,826,500	0	12,826,500				
80.033	Agency Force Account	5% construction		64,132,500	0	64,132,500				
80.034	Unspecified	5% construction		64,132,500	0	64,132,500				
80.040	Construction Administration & Management	6% construction		76,959,000	0	76,959,000				
80.050	Professional Liability and other Non-Construction Insurance	3% construction		38,479,500	0	38,479,500				
80.060	Legal; Permits; Review Fees by other agencies, cities, etc.	3% construction		38,479,500	0	38,479,500				
80.070	Surveys, Testing, Investigation, Inspection	2% construction		25,653,000	0	25,653,000				
80.080	Start up	4% construction		51,306,000	0	51,306,000				
80.081	Training/Start-up			0	0	0				
80.082	Safety Certification			0	0	0				
80.083	Off-Site Vehicle Testing, Test Runs			0	0	0				
80.084	Commissioning			0	0	0				
80.085	Unspecified			0	0	0				
80.090	Other	2% construction		25,653,000	3,847,950	29,500,950				
81	**Subtotal (10-80)**	Lineal Miles of Guideway		1,542,422,500	309,914,950	1,852,337,450			80.01%	**2,346,485,662**
90	**Unallocated Contingency (30%)**	Total Amount		462,726,750	0	462,726,750			19.99%	**469,007,159**
91	**Subtotal (10-90)**	Lineal Miles of Guideway		2,005,149,250	309,914,950	2,315,064,200			100.00%	**2,815,492,822**
100	**Finance Charges**	Total Amount							0.00%	
101	**Total Project Costs (10-100)**	Lineal Miles of Guideway		**2,005,149,250**	**309,914,950**	**2,315,064,200**			100.00%	**2,815,492,822**

Allocated Contingency as % of Base Yr Dollars w/o Contingency	20.09%
Unallocated Contingency as % of Base Yr Dollars w/o Contingency	30.00%
Total Contingency as % of Base Yr Dollars w/o Contingency	50.09%

Alternative B Detail Sheet — Long Bridge EIS CE Phase Cost Estimates

6/17/2019

Grantee Name DC Department of Transportation
Project Name and Location: Long Bridge Project, Arlington, VA to Washington, DC
Current Phase : Conceptual Engineering - Action Alternative B

5/10/2019

SCC	Sub	Description	Quantity	Unit	Unit Cost	Sub-Total	Allocated Contingency Percentage	Contingency	Total	Category Total
10 GUIDEWAY & TRACK ELEMENTS (route miles)										
	10.01 Guideway: At-grade exclusive right-of-way									$ -
	10.02 Guideway: At-grade semi-exclusive (allows cross-traffic) (Not Applicable)									$ -
	10.03 Guideway: At-grade in mixed traffic (Not Applicable)									$ -
	10.04 Guideway: Aerial structure					**$ 569,143,000**		**$ 171,046,000**		**$ 740,189,000**
	10.04.01	George Washington Memorial Parkway Bridge	11,372	SF	$ 3,100	$ 35,254,000	30%	$ 10,577,000	$ 45,831,000	
	10.04.02	Long Bridge	182,304	SF	$ 2,245	$ 409,273,000	30%	$ 122,782,000	$ 532,055,000	
	10.04.03	WMATA Tunnel Bridge	4,750	SF	$ 2,435	$ 11,567,000	30%	$ 3,471,000	$ 15,038,000	
	10.04.04	I-395 Bridge	13,680	SF	$ 2,524	$ 34,529,000	30%	$ 10,359,000	$ 44,888,000	
	10.04.05	Ohio Drive SW Bridge	7,128	SF	$ 1,824	$ 13,002,000	30%	$ 3,901,000	$ 16,903,000	
	10.04.06	Washington Channel Bridge	15,180	SF	$ 2,104	$ 31,939,000	30%	$ 9,582,000	$ 41,521,000	
	10.04.07	Maine Avenue SW Bridge	9,984	SF	$ 3,213	$ 32,079,000	30%	$ 9,624,000	$ 41,703,000	
	10.04.08	Maine Avenue SW Pedestrian Bridge	2,000	SF	$ 750	$ 1,500,000	50%	$ 750,000	$ 2,250,000	
	10.05 Guideway: Built-up fill (Not Applicable)									$ -
	10.05 Guideway: Built-up fill (Not Applicable)									$ -
	10.06 Guideway: Underground cut & cover (Not Applicable)									$ -
	10.07 Guideway: Underground tunnel (Not Applicable)									$ -
	10.08 Guideway: Retained cut or fill					**$ 2,128,000**		**$ 1,128,000**		**$ 3,256,000**
	10.08.01	Fill	1	LS	$ 1,500,000	$ 1,500,000	50%	$ 750,000	$ 2,250,000	
	10.08.02	Excavation	1	LS	$ 500,000	$ 500,000	50%	$ 250,000	$ 750,000	
	10.08.03	Maryland Avenue SW Bridge Stormwater Excavation	1	LS	$ 127,500	$ 128,000	100%	$ 128,000	$ 256,000	
	10.09 Track: Direct fixation (Not Applicable)									$ -
	10.10 Track: Embedded (Not Applicable)									$ -
	10.11 Track: Ballasted					**$ 20,877,000**		**$ 7,308,000**		**$ 28,185,000**
	10.11.01	New Concrete Tie Track (Rails, Ties, Ballast, Subballast, and OTM)	45,000	TF	$ 425	$ 19,125,000	35%	$ 6,694,000	$ 25,819,000	
	10.11.02	Shift Track	17,272	TF	$ 75	$ 1,296,000	35%	$ 454,000	$ 1,750,000	
	10.11.03	Remove Track	11,400	TF	$ 40	$ 456,000	35%	$ 160,000	$ 616,000	
	10.12 Track: Special (switches, turnouts)					**$ -**		**$ -**		**$ -**
	10.12.01	Install #15 CSXT Turnout - Concrete Ties on Ballast (RO Interlocking)	0	EA	$ 640,000	$ -	35%	$ -	$ -	
	10.12.02	Remove #15 Turnout (RO Interlocking)	0	EA	$ 20,000	$ -	35%	$ -	$ -	
	10.12.03	Remove #20 Turnout (RO Interlocking)	0	EA	$ 20,000	$ -	35%	$ -	$ -	
	10.12.04	Install #15 CSXT Turnout - Concrete Ties on Ballast (LE South Interlocking)	0	EA	$ 640,000	$ -	35%	$ -	$ -	
	10.12.05	Install #15 CSXT Turnout - Concrete Ties on Ballast (LE North Interlocking)	0	EA	$ 640,000	$ -	35%	$ -	$ -	
	10.12.06	Remove #15 Turnout (LE Interlocking)	0	EA	$ 20,000	$ -	35%	$ -	$ -	
	10.13 Track: Vibration and noise dampening					**$2,241,000**		**$1,096,000**		**$3,337,000**
	10.13.01	Friction Modifiers	2	EA	$50,000	$100,000	30%	$30,000	$130,000	
	10.13.02	Enhanced Fencing and Security	1	LS	$1,916,000	$1,916,000	50%	$958,000	$2,874,000	
	10.13.03	Security Lighting	1	LS	$25,000	$25,000	30%	$8,000	$33,000	
	10.13.04	Clearance Detectors	2	EA	$100,000	$200,000	50%	$100,000	$300,000	
	10.14 Guideway: Special structures					**$ 25,481,000**		**$ 8,928,000**		**$ 34,409,000**
	10.14.01	Retaining Wall 1	5,491	SF	$ 200	$ 1,099,000	35%	$ 385,000	$ 1,484,000	
	10.14.02	Retaining Wall 2	3,150	SF	$ 200	$ 630,000	35%	$ 221,000	$ 851,000	
	10.14.03	Retaining Wall 3	3,500	SF	$ 200	$ 700,000	35%	$ 245,000	$ 945,000	
	10.14.04	Retaining Wall 4	9,250	SF	$ 200	$ 1,850,000	35%	$ 648,000	$ 2,498,000	
	10.14.05	Retaining Wall 5	9,975	SF	$ 200	$ 1,995,000	35%	$ 699,000	$ 2,694,000	
	10.14.06	Retaining Wall 6	7,488	SF	$ 200	$ 1,498,000	35%	$ 525,000	$ 2,023,000	
	10.14.07	Retaining Wall 7	7,095	SF	$ 200	$ 1,419,000	35%	$ 497,000	$ 1,916,000	
	10.14.08	Retaining Wall 8	1,975	SF	$ 200	$ 395,000	35%	$ 139,000	$ 534,000	
	10.14.09	Retaining Wall 9	1,750	SF	$ 200	$ 350,000	35%	$ 123,000	$ 473,000	
	10.14.10	Retaining Wall 10	11,914	SF	$ 200	$ 2,383,000	35%	$ 835,000	$ 3,218,000	
	10.14.11	Retaining Wall 11	4,532	SF	$ 200	$ 907,000	35%	$ 318,000	$ 1,225,000	
	10.14.12	Retaining Wall 12	19,248	SF	$ 200	$ 3,850,000	35%	$ 1,348,000	$ 5,198,000	
	10.14.13	Retaining Wall 13	3,783	SF	$ 200	$ 757,000	35%	$ 265,000	$ 1,022,000	
	10.14.14	Retaining Wall 14	6,279	SF	$ 200	$ 1,256,000	35%	$ 440,000	$ 1,696,000	
	10.14.15	Retaining Wall 15	3,345	SF	$ 200	$ 669,000	35%	$ 235,000	$ 904,000	
	10.14.16	Retaining Wall 16	3,552	SF	$ 200	$ 711,000	35%	$ 249,000	$ 960,000	
	10.14.17	Retaining Wall 17	5,190	SF	$ 200	$ 1,038,000	35%	$ 364,000	$ 1,402,000	
	10.14.18	Maryland Avenue SW Crashwalls	6,010	SF	$ 397	$ 2,386,000	35%	$ 836,000	$ 3,222,000	
	10.14.19	Mandarin Oriental Hotel Crashwalls	4,000	SF	$ 397	$ 1,588,000	35%	$ 556,000	$ 2,144,000	
20 STATIONS, STOPS, TERMINALS, INTERMODAL (number) (Not Applicable)										
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS (Not Applicable)										
40 SITEWORK & SPECIAL CONDITIONS										
	40.01 Demolition, Clearing, Earthwork					**$ 24,360,000**		**$ 7,308,000**		**$ 31,668,000**
	40.01.01	George Washington Memorial Parkway Bridge	1	LS	$ 350,000	$ 350,000	30%	$ 105,000	$ 455,000	
	40.01.02	Long Bridge	1	LS	$ 20,509,200	$ 20,510,000	30%	$ 6,153,000	$ 26,663,000	
	40.01.03	WMATA Tunnel Bridge	0	LS	$ -	$ -	30%	$ -	$ -	
	40.01.04	I-395 Bridge	1	LS	$ 500,000	$ 500,000	30%	$ 150,000	$ 650,000	
	40.01.05	Ohio Drive SW Bridge	1	LS	$ 250,000	$ 250,000	30%	$ 75,000	$ 325,000	
	40.01.06	Washington Channel Bridge	1	LS	$ 500,000	$ 500,000	30%	$ 150,000	$ 650,000	
	40.01.07	Maine Avenue SW Bridge	1	LS	$ 1,000,000	$ 1,000,000	30%	$ 300,000	$ 1,300,000	
	40.01.08	Maine Avenue SW Pedestrian Bridge	1	LS	$ 500,000	$ 500,000	30%	$ 150,000	$ 650,000	
	40.01.09	Maryland Avenue SW Crashwalls	1	LS	$ 500,000	$ 500,000	30%	$ 150,000	$ 650,000	
	40.01.10	Mandarin Oriental Hotel Crashwalls	1	LS	$ 250,000	$ 250,000	30%	$ 75,000	$ 325,000	
	40.02 Site Utilities, Utility Relocation					**$ 12,300,000**		**$ 5,535,000**		**$ 17,835,000**
	40.02.01	Maryland Avenue SW Bridge Stormwater Relocation	1	LS	$ 300,000	$ 300,000	45%	$ 135,000	$ 435,000	
	40.02.02	Project Utility Work	1	LS	$ 12,000,000	$ 12,000,000	45%	$ 5,400,000	$ 17,400,000	
	40.03 Haz. mat'l, contam'd soil removal/mitigation, ground water treatments					**$ 40,000,000**		**$ 15,750,000**		**$ 55,750,000**
	40.03.01	Disposal of Contaminated Soil	1	LS	$ 15,000,000	$ 15,000,000	30%	$ 4,500,000	$ 19,500,000	
	40.03.02	Project Soil Mitigation	1	LS	$ 25,000,000	$ 25,000,000	45%	$ 11,250,000	$ 36,250,000	
	40.04 Environmental mitigation, e.g. wetlands, historic/archeologic, parks					**$ 70,750,000**		**$ 17,688,000**		**$ 88,438,000**
	40.04.01	Aesthetic Design of Structures	1	LS	$ 1,000,000	$ 1,000,000	25%	$ 250,000	$ 1,250,000	
	40.04.02	Restoration of vegetation	1	LS	$ 250,000	$ 250,000	25%	$ 63,000	$ 313,000	
	40.04.03	Bike-Pedestrian Crossing	1	LS	$ 50,000,000	$ 50,000,000	25%	$ 12,500,000	$ 62,500,000	
	40.04.04	Permanent Mitigation (Historic Properties & Tree Protection)	1	LS	$ 10,000,000	$ 10,000,000	25%	$ 2,500,000	$ 12,500,000	
	40.04.05	Minimize Noise and Vibration during Construction	1	LS	$ 500,000	$ 500,000	25%	$ 125,000	$ 625,000	
	40.04.06	Location of Construction Access and Staging	1	LS	$ 7,500,000	$ 7,500,000	25%	$ 1,875,000	$ 9,375,000	
	40.04.07	Temporary Mitigation (Archarological Resources)	1	LS	$ 1,500,000	$ 1,500,000	25%	$ 375,000	$ 1,875,000	
	40.05 Site structures including retaining walls, sound walls									$ -
	40.06 Pedestrian / bike access and accommodation, landscaping					**$ 1,421,000**		**$ 502,000**		**$ 1,923,000**
	40.06.01	Restore Mount Vernon Trail	650	LF	$ 250	$ 163,000	30%	$ 49,000	$ 212,000	
	40.06.02	Maine Avenue SW Pedestrian Approach Ramps and Stairs	3,030	SF	$ 250	$ 758,000	30%	$ 228,000	$ 986,000	
	40.06.03	Hancock Park Landscaping (near 9th St)	1	LS	$ 500,000	$ 500,000	45%	$ 225,000	$ 725,000	
	40.07 Automobile, bus, van accessways including roads, parking lots					**$ 5,000,000**		**$ 2,250,000**		**$ 7,250,000**
	40.07.01	Final Paving to Access Roads and Main Roads	1	LS	$ 5,000,000	$ 5,000,000	45%	$ 2,250,000	$ 7,250,000	
	40.08 Temporary Facilities and other indirect costs during construction					**$ 109,500,000**		**$ 49,275,000**		**$ 158,775,000**
	40.08.01	Traffic control and temporary traffic staging	1	LS	$ 22,500,000	$ 22,500,000	45%	$ 10,125,000	$ 32,625,000	
	40.08.02	Rail traffic control and temporary staging	1	LS	$ 30,000,000	$ 30,000,000	45%	$ 13,500,000	$ 43,500,000	
	40.08.03	Temporary Pedestrian Accomodations	1	LS	$ 3,000,000	$ 3,000,000	45%	$ 1,350,000	$ 4,350,000	
	40.08.04	Temporary Parking Lots	1	LS	$ 9,000,000	$ 9,000,000	45%	$ 4,050,000	$ 13,050,000	
	40.08.05	Temporary Staging Sites	1	LS	$ 45,000,000	$ 45,000,000	45%	$ 20,250,000	$ 65,250,000	
	40.083 Mobilization					**$ 93,682,000**		**$ 14,053,000**		**$ 107,735,000**
	40.083	Mobilization (assume 8% of construction costs)	0.08	%	$ 1,171,015,000	$ 93,682,000	15%	$ 14,053,000	$ 107,735,000	
50 SYSTEMS										
	50.01 Train control and signals					**$ -**		**$ -**		**$ -**
	50.01.01	Interlocking Signals (RO, LE North, LE South)	0	LS	$ 10,000,000	$ -	30%	$ -	$ -	
	50.02 Traffic signals and crossing protection									$ -
	50.03 Traction power supply: substations (Not Applicable)									$ -
	50.04 Traction power distribution: catenary and third rail (Not Applicable)									$ -
	50.05 Communications					**$ 3,000,000**		**$ 900,000**		**$ 3,900,000**
	50.05.01	Communications	1	LS	$ 3,000,000	$ 3,000,000	30%	$ 900,000	$ 3,900,000	
	50.06 Central Control (Not Applicable)									$ -
60 ROW, LAND, EXISTING IMPROVEMENTS										
	60.01 Purchase or lease of real estate					**$ 11,000,000**		**$ 3,300,000**		**$ 14,300,000**
	60.01.01	Proposed Right of Way	1	LS	$ 11,000,000	$ 11,000,000	30%	$ 3,300,000	$ 14,300,000	
	60.02 Relocation of existing households and businesses									$ -