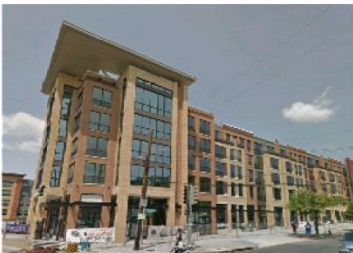


BENNING ROAD & BRIDGES TRANSPORTATION IMPROVEMENTS

COST ESTIMATES

DRAFT MAY 2016



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1.0 Introduction

Budget-level cost estimates were prepared for each Build Alternative. These estimates include capital costs of roadway, bridge and streetcar elements/infrastructure, as well as the operation and maintenance (O&M) costs of streetcar, and contingencies for design and construction management and inspection. Costs were based on available DDOT construction pricing, similar projects and engineering judgment. To ensure accuracy, quantities were derived directly from the conceptual designs for each Build Alternative.

Costs associated with utility impacts and relocation are not included in the estimate. Similarly, cost for right-of-way and support facilities have not been calculated and are not included in the cost estimate.

This report has been divided into three main sections:

1. Roadway and Bridge/Structural Improvement Capital Costs
2. Streetcar Capital Costs (using FTA Standard Cost Category (SCC) Format)
3. Operations and Maintenance

A summary of these costs are listed below in **Table 1**.

Table 1: Cost Estimate Summary

Item	Build Alternative 1	Build Alternative 2
Roadway and Bridge Capital Costs	\$115,947,498	\$118,275,137
Streetcar Capital Costs	\$56,652,305	\$56,234,123
Total Capital Costs	\$172,599,803	\$174,509,260
Operations and Maintenance	\$4,389,270	\$4,389,270

Source: Benning Road and Bridges Transportation Improvements EA Project Team

2.0 Roadway and Bridge/Structural Improvements

Table 2 and **3** detail the budget-level cost estimates for roadway and bridge capital costs for Build Alternative 1 and Build Alternative 2, respectively.

Items associated with roadway improvements include pavement removal, roadway, sidewalk, streetscape, and traffic signals. Appropriate percentage factors were used to account for drainage, signing and striping, and non-streetcar related electrical and lighting. These improvements also include replacement of all bus stops, ADA improvements and a pedestrian crossing at Kingman Island. Full depth pavement is assumed for entire project area. Roadside planting strip assumes one tree every fifty feet and the median landscape assumes use of perennials as opposed to woody/shrub treatment.

To facilitate streetcar infrastructure and improve pedestrian facilities, the bridges and structures within the project corridor require repair and/or replacement. Costs include retaining wall work, modifications to Bridge No. 52 (over Anacostia River) and Bridge No. 77 (over Kingman Island), and full replacement of the Viaduct over CSX and DC-295 (Bridge No. 503). The cost for full replacement includes demolition and new substructure and superstructure.

These estimates include factors for engineering and construction management/construction inspection (CMI).

To account for construction contingencies and maintenance of traffic, appropriate percentage factors were used based on the project subtotal for roadway and bridge construction. These costs were applied to compute mobilization. Mobilization is calculated only for the roadway and bridge construction items using the DDOT formula for a project greater than one million dollars. Costs for design fee and construction management and inspection are computed using the construction subtotal inclusive of mobilization.

Table 2: Build Alternative 1 Roadway and Structures Cost Estimate

Item	Description	Unit	Quantity	Unit Price	Total
1	Hard Surface Removal	SY	65,923	\$45	\$2,966,525
2	Median Removal	SF	23,537	\$20	\$470,740
3	Curb Removal	LF	22,852	\$15	\$342,780
4	Sidewalk Removal	SF	89,940	\$20	\$1,798,800
5	Full Depth Pavement	SY	50,524	\$150	\$7,578,567
6	Median Curb	LF	8,398	\$30	\$251,940
7	Curb & Gutter	LF	18,907	\$30	\$567,210
8	Curb Ramps	EA	41	\$500	\$20,500
9	Proposed Sidewalk	SY	12,916	\$45	\$581,215
10	Driveway/Parking Lots Entrances	EA	64	\$1,500	\$96,000
11	Bus Stops	EA	22	\$10,000	\$220,000
12	New Traffic Signals Major	EA	2	\$250,000	\$500,000
13	New Traffic Signals Minor	EA	1	\$150,000	\$150,000
14	Existing Traffic Signal Reconfiguration	LS	1	\$1,394,000	\$1,394,000

Item	Description	Unit	Quantity	Unit Price	Total
15	Pedestrian Crossing at Kingman Island	EA	1	\$30,000	\$30,000
16	Roadside Plant Strips	SF	33,771	\$10	\$337,710
17	Misc. Public Realm Improvements	LS	1	N/A	\$50,000
18	Median Landscaped	SY	3,735	\$20	\$74,700
19	Drainage (20% of roadway subtotal)	LS	1	N/A	\$3,486,137
20	Signing & Striping (5% of roadway subtotal)	LS	1	N/A	\$871,534
21	Electrical/Lighting (10% of roadway subtotal)	LS	1	N/A	\$1,743,069
TOTAL ROADWAY CONSTRUCTION COST					\$23,531,427
22	STRUCTURES				
	Retaining Wall	LS	1	\$500,000	\$500,000
	Bridge No. 52 (over Anacostia River)	LS	1	\$1,600,000	\$1,600,000
	Bridge No. 77 (over Kingman Island)	LS	1	\$200,000	\$200,000
	Bridge No. 503 (Viaduct-Full Replacement)	SF	44,555	\$630	\$28,069,753
TOTAL STRUCTURES CONSTRUCTION COST					\$30,369,753
SUBTOTAL CONSTRUCTION COST					\$53,901,180
23	CONSTR. AND ENG. CONTINGENCY				
	MOT	30% of Items 1-22			\$16,170,354.06
	Contingency	30% of Items 1-22			\$16,170,354.06
	Mobilization	DDOT Formula			\$4,342,094.42
TOTAL CONSTRUCTION COST					\$90,583,983
24	ENGINEERING				
	Preliminary Engineering	5% of Items 1-23			\$4,529,199
	Final Engineering	8% of Items 1-23			\$7,246,719
	Construction Engineering	15% of Items 1-23			\$13,587,597
TOTAL ENGINEERING COST					\$25,363,515
TOTAL ROADWAY & BRIDGE COST					\$115,947,498

Source: Benning Road and Bridges Transportation Improvements EA Project Team

Table 3: Build Alternative 2 Roadway and Structures Cost Estimate

Item	Description	Unit	Quantity	Unit Price	Total
1	Hard Surface Removal	SY	65,923	\$45	\$2,966,525
2	Median Removal	SF	23,537	\$20	\$470,740
3	Curb Removal	LF	22,852	\$15	\$342,780
4	Sidewalk Removal	SF	89,940	\$20	\$1,798,800
5	Full Depth Pavement	SY	55,358	\$150	\$8,303,733
6	Median Curb	LF	7,541	\$30	\$226,230
7	Curb & Gutter	LF	18,917	\$30	\$567,510
8	Curb Ramps	EA	41	\$500	\$20,500
9	Proposed Sidewalk	SY	12,764	\$45	\$574,365
10	Driveway/Parking Lots Entrances	EA	64	\$1,500	\$96,000
11	Bus Stops	EA	22	\$10,000	\$220,000
12	New Traffic Signals Major	EA	1	\$250,000	\$250,000
13	New Traffic Signals Minor	EA	0	\$150,000	\$0
14	Existing Traffic Signal Reconfiguration	LS	1	\$1,394,000	\$1,394,000
15	Pedestrian Crossing at Kingman Island	EA	1	\$30,000	\$30,000
16	Roadside Plant Strips	SF	38,094	\$10	\$380,940
17	Misc. Public Realm Improvements	LS	1	N/A	\$50,000
18	Median Landscaped	SY	2,841	\$20	\$56,813
19	Drainage (20% of roadway subtotal)	LS	1	N/A	\$3,549,787
20	Signing & Striping (5% of roadway subtotal)	LS	1	N/A	\$887,447
21	Electrical/Lighting (10% of roadway subtotal)	LS	1	N/A	\$1,774,894
TOTAL ROADWAY CONSTRUCTION COST					\$23,961,064
22	STRUCTURES				
	Retaining Wall	LS	1	\$500,000	\$500,000
	Bridge No. 52 (over Anacostia River)	LS	1	\$1,600,000	\$1,600,000
	Bridge No. 77 (over Kingman Island)	LS	1	\$200,000	\$200,000
	Bridge No. 503 (Viaduct-Full Replacement)	SF	45,591	\$630	\$28,722,538
TOTAL STRUCTURES CONSTRUCTION COST					\$31,022,538
SUBTOTAL CONSTRUCTION COST					\$54,983,602
23	CONSTR. AND ENG. CONTINGENCY				
	MOT	30% of Items 1-22			\$16,495,080.55
	Contingency	30% of Items 1-22			\$16,495,080.55
	Mobilization	DDOT Formula			\$4,428,688.15
TOTAL CONSTRUCTION COST					\$92,402,451
24	ENGINEERING				
	Preliminary Engineering	5% of Items 1-23			\$4,620,123
	Final Engineering	8% of Items 1-23			\$7,392,196
	Construction Engineering	15% of Items 1-23			\$13,860,368
TOTAL ENGINEERING COST					\$25,872,686
TOTAL ROADWAY & BRIDGE COST					\$118,275,137

Source: Benning Road and Bridges Transportation Improvements EA Project Team

3.0 Streetcar Capital Costs

Capital cost estimates for the streetcar were determined based on quantities associated with each Build Alternative and are presented in FTA Standard Cost Category (SCC) Format. These costs are summarized below in **Table 4**.

Table 4: Streetcar Capital Costs

FTA Standard Cost Categories (SCC)	Build Alternative 1	Build Alternative 2
10 GUIDEWAY & TRACK ELEMENTS	\$10,550,500	\$10,567,000
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	\$8,310,000	\$0
10.02 Guideway: At-grade semi-exclusive (allows cross-traffic)	\$377,500	\$8,684,000
10.04 Guideway: Aerial structure	\$835,500	\$835,500
10.01 Guideway: At-grade exclusive right-of-way	\$302,500	\$302,500
10.12 Track: Special (switches, turnouts)	\$0.00	\$170,000.00
10.12 Track: Special (switches, turnouts)	\$600,000.00	\$450,000.00
10.12 Track: Special (switches, turnouts)	\$125,000.00	\$125,000.00
20 STATIONS, STOPS, TERMINALS, INTERMODAL	\$2,010,000	\$1,720,000
30 SUPPORT FACILITIES: YARDS, SHOPS, ADMIN. BLDGS	\$0	\$0
40 SITEWORK & SPECIAL CONDITIONS (MOT and Mobilization)*	\$10,000,000	\$10,000,000
40.08 Temporary Facilities and other indirect costs during construction	\$10,000,000	\$10,000,000
50 SYSTEMS	\$3,700,000	\$3,700,000
Construction Subtotal (10-50)**	\$26,260,500	\$25,987,000
60 ROW, LAND, EXISTING IMPROVEMENTS	\$0 (Not included)	\$0 (Not included)
70 VEHICLES (3)	\$15,000,000	\$15,000,000
80 PROFESSIONAL SERVICES (applies to Cats. 10-50)	\$10,241,595	\$10,134,930
80.01 Project Development	\$1,838,235	\$1,819,090
80.02 Engineering	\$2,100,840	\$2,078,960
80.03 Project Management for Design and Construction	\$1,050,420	\$1,039,480
80.04 Construction Administration & Management	\$3,939,075	\$3,898,050
80.05 - 80.08 Other Soft Costs	\$1,313,025	\$1,299,350
Subtotal (10-80)	\$51,502,095	\$51,121,930
90 UNALLOCATED CONTINGENCY	\$5,150,210	\$5,112,193
TOTAL PROJECT COST (10-90)	\$56,652,305	\$56,234,123

Notes:

* Costs shown for Category 40 are only for MOT and mobilization related to streetcar costs. Please refer to separate Roadway and Bridge cost estimates for these sitework associated costs.

** Utility relocation costs are NOT included in estimate

Source: Benning Road and Bridges Transportation Improvements EA Project Team

Estimate assumed the purchase of three new streetcar vehicles to account for the service extension to the Benning Road Metrorail Station associated with this project. Other items associated with streetcar costs are platforms (including fare collection), trackwork for both normal and special segments, propulsion system allowance, and miscellaneous infrastructure.

3.1 Category 10 – Guideways and Track Elements

This category includes the trackwork and slab for the streetcar. Values were used per linear foot based on the system wide streetcar studies. Items included: Single Track Feet Curbside Running, Single Track Feet Median Running, Single Track Feet on Aerial Structure, Single Track Feet (CBTC) -Dedicated Guideway, 25 Meter Turnout, 20 Meter Turnout, and Track Diamond.

3.2 Category 20 – Stations

This category includes side and center platforms and message boards for each platform type. Cost for fare collection is included in the platform cost.

3.3 Category 30 – Yard and Shop (Maintenance Facilities)

No costs are included for this category as it is assumed that the streetcar could be maintained in existing facilities.

3.4 Category 40 – Sitework and special conditions

This category only includes maintenance of traffic and contractor mobilization associated with streetcar infrastructure construction. Construction costs for roadway and sitework, as well as bridge reconstruction, is accounted in separate cost estimates. Construction costs for utility relocations are not included in this cost estimate.

3.5 Category 50 – Systems

This category includes a lump sum cost for propulsion system and accommodation for miscellaneous streetcar infrastructure.

3.6 Category 60 – Right-of-way

At this time, no costs have been included for right-of-way as the design intent is to remain within public space. However, limited right-of-way may be required and will be determined in subsequent project phases.

3.7 Category 70 – Vehicles

For streetcars, a lump sum of \$3 Million per vehicle in 2014 dollars was used.

3.8 Category 80 – Professional Services

The following percentages of Category 10-50 costs (including contingencies) are used:

- PE and Planning – 7%
- Final Design – 8%
- Program Management – 4%
- Construction Administration and Management – 15%
- Other soft costs – 5%

This totals 39%; the percentage being used in the system wide streetcar studies.

3.9 Category 90 –Unallocated Contingency

An unallocated contingency of 10% is used for Categories 10-80.

4.0 Operations and Maintenance

The methodology used to compute O&M costs is on an annualized cost per revenue hour and mile basis. As provided by DDOT, the 2009 cost per mile was \$5.23 and the 2010 cost per hour was \$216.81; both were escalated at 3% to 2014 values of \$6.06 and \$244.02, respectively. The total revenue hours due to the streetcar extension is based on the number of streetcars (round trip time divided by headway) required by period, multiplied by the hours per period and then annualized. These hour-based costs have been added to mileage-based costs to determine total annualized O&M cost.

The following were used as inputs in determining operating costs for Build Alternatives 1 and 2:

- Headway:
 - Service at 10 minute headways during all hours of streetcar operation.
- Hours of Operation:
 - Monday-Thursday 6 AM to 12 AM
 - Friday 6 AM to 2 AM
 - Saturday 6 AM to 2 AM
 - Sunday 8 AM to 10 PM
- Modified Annualization (operating days):
 - 204 weekdays
 - 52 Fridays
 - 52 Saturdays
 - 58 Sundays

Annual operations costs for each of the two Build Alternatives are summarized below in **Table 5**.

Table 5: Annual Operations Cost Estimate

	Build Alternative 1	Build Alternative 2
Annual Revenue Miles	180,600	180,600
Unit Cost per Revenue Mile	\$6.06	\$6.06
Mileage Based Annual Cost	\$1,094,978	\$1,094,978
Annual Revenue Hours	13,500	13,500
Unit Cost per Revenue Hour	\$244.02	\$244.02
Hourly Based Annual Cost	\$3,294,291	\$3,294,291
Total Annual O&M Costs 2014 dollars	\$4,389,270	\$4,389,270

Source: Benning Road and Bridges Transportation Improvements EA Project Team