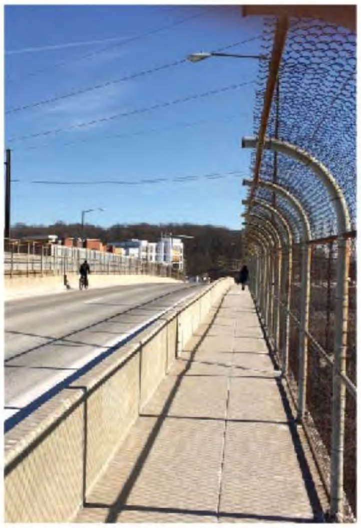
BENNING ROAD & BRIDGES TRANSPORTATION IMPROVEMENTS

CRASH DATA AND SAFETY ANALYSIS TECHNICAL MEMORANDUM

DRAFT MAY 2016



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1.0 Introduction

This crash data and safety analysis technical memorandum identifies existing safety problems along the project corridor. The analysis provides crash data for the study intersections in order to evaluate safety conditions and identify factors contributing to collisions. The analysis is based on data provided by the District Department of Transportation (DDOT) spanning the period from 2011 through 2013 from DDOT's *Traffic Accident Reporting and Analysis System*. Note that no crash data was available at Benning Road and Oklahoma Avenue, Benning Road and 42nd Street, and Benning Road and 44th Street intersections, and thus not included in the analysis.

1.1 Crash Data for Key Intersections

Crash data was provided for twelve key intersections within the study area. The crash data includes type of crashes (e.g., rear end, side swiped), crash severity (e.g., injuries involved), the crash location, and also indicates whether any pedestrians were involved in the accident.

The crash data analysis was performed in two steps. The first step calculated the crash rate at the study intersections and provided a summary of crash data statistics at an intersection level. The second step developed collision diagrams (i.e., visual representation of crashes) at every intersection to identify potential problem areas and safety deficiencies at intersections. Crash rate for intersections is expressed as crashes per million entering vehicles (MEV), and is calculated as follows:

$$Rate = (C * 1{,}000{,}000)/(n * 365 * V)$$

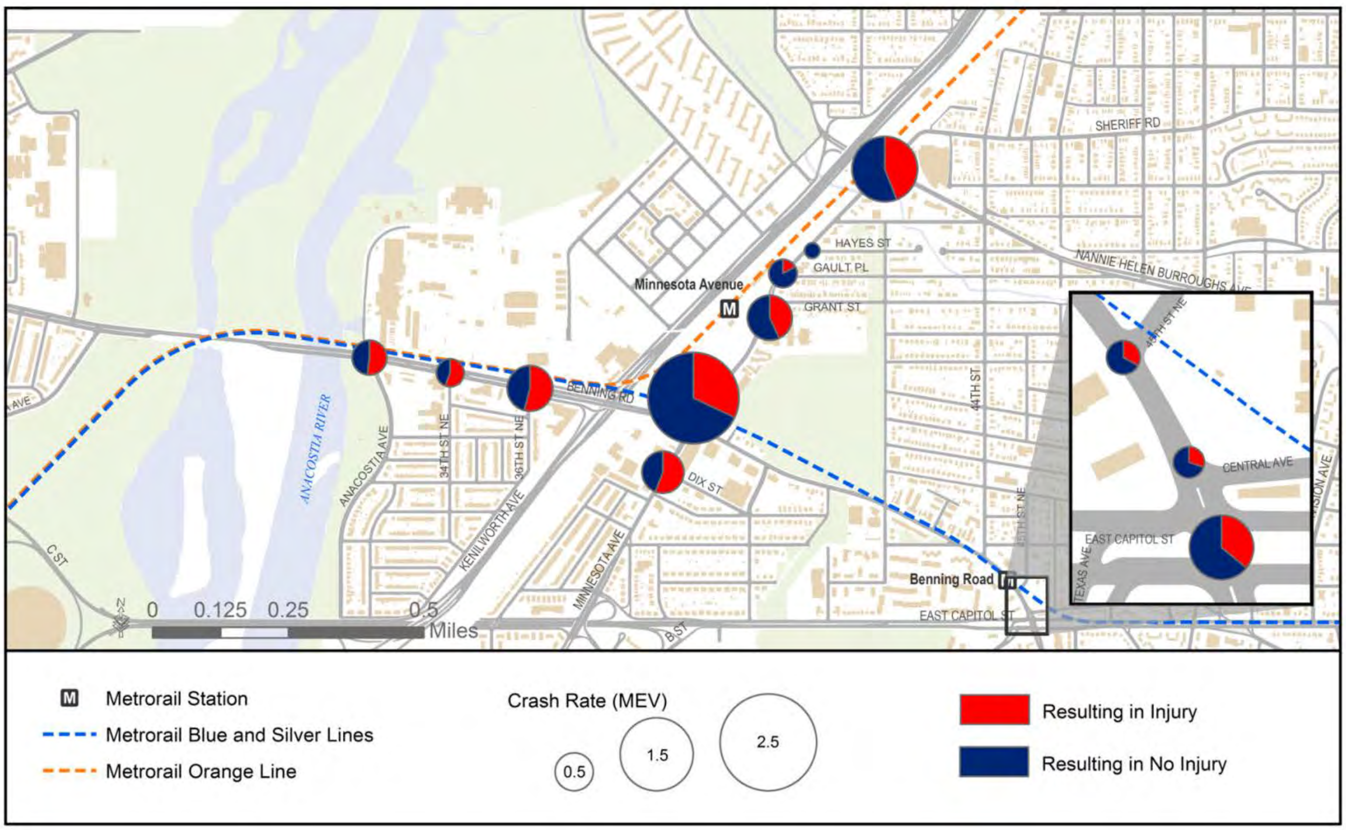
where C is the total number of intersection-related crashes (also known as crash frequency) in the study period, n is the number of years data (i.e., analysis period), and V is the daily traffic volumes entering the intersection. Daily traffic volumes were calculated using the peak-hour traffic volumes entering the intersection and a peak hour factor of daily volumes calculated based on the historic annual average daily traffic (AADT) data. Because crash data includes crashes occurred between 2011 and 2013, Peak-hour traffic volumes from the Feasibility Study were used in the analysis because crash data provided occurred between 2011 and 2013.

The summary of crash rate at the study intersections is provided in **Figure 1**. **Table 1** provides detailed statistics about crash data.

Principal observations from **Figure 1** and **Table 1** include:

- Just over half (7) of the 12 key crash intersections in the study area are located along Benning Road, which is the project corridor for the two Build Alternatives.
- The highest crash rate location is at Benning Road and Minnesota Avenue with an MEV of 2.48.
- The second highest crash rate location is at Benning Road and East Capitol Street with an MEV of 1.51.
- The third highest crash rate location is at Minnesota Avenue and Nannie Helen Burroughs Avenue with an MEV of 1.39.
- The annual average for the number of crashes for the 12 key intersections from 2011 to 2013 was 129, while the annual average for crashes resulting in injury was 50.

Figure 1: Benning Road and Minnesota Avenue Crash Diagram



Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

Table 1: Crash Data Summary at the Study Intersections

Intersection	Number of Crashes	Crash Rate (MEV)	Collision Type (2011-2013)									Crashes Resulting in Injury
			Rear-end	Sideswipe	Right Angle	Head on	Left Turn Hit Veh	Left Turn Hit Ped	Right Turn Hit Veh	Right Turn Hit Ped	Straight Hit Ped	
Benning Rd and Anacostia Ave	23	0.46	52%	17%	17%		4%					12
Benning Rd and 34th St	16	0.31	19%	25%	6%	6%	19%		13%			9
Benning Rd and 36th St	26	0.74	46%	31%	4%	4%	8%					14
Benning Rd and Minnesota Ave	120	2.48	28%	31%	4%	3%	12%	1%	7%	4%	5%	38
Benning Rd and 45th St	12	0.49	25%	42%			8%		8%		8%	4
Benning Rd and Central Ave	10	0.43	30%	40%			10%		10%		10%	3
Benning Rd and East Capitol St	90	1.51	26%	27%	8%	4%	6%		9%	2%	7%	32
Minnesota Ave and Dix St	16	0.64	44%	0%	6%		19%		13%		6%	9
Minnesota Ave and Grant St	16	0.72	44%	19%			13%					7
Minnesota Ave and Hayes St	2	0.11	50%	50%								0
Minnesota Ave and Gault Pl	6	0.32	17%	50%			17%					1
Minnesota Ave and NHB Ave	49	1.39	35%	27%	12%	6%	6%		6%			22

Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

2.0 Relation of Build Alternative Alignments to Key Intersections

Table 2 lists the 12 key intersections, and show which intersections are located along or in close proximity to each of the two Build Alternative alignments. This table also identifies intersections (with an *) that are near to a potential station. Overall, the table shows that six key intersections are closely associated with both Build Alternatives.

Table 2: High Crash Intersections Along the Build Alternatives

Intersection	Build Alternative 1	Build Alternative 2
Benning Rd and Anacostia Ave	X	X
Benning Rd and 34th St	X*	X*
Benning Rd and 36th St	X	X
Benning Rd and Minnesota Ave	X	X
Benning Rd and 45th St	X	X
Benning Rd and Central Ave		
Benning Rd and East Capitol St	X*	X*
Minnesota Ave and Dix St		
Minnesota Ave and Grant St		
Minnesota Ave and Hayes St		
Minnesota Ave and Gault Pl		
Minnesota Ave and NHB Ave		

*Denotes potential station at intersection.

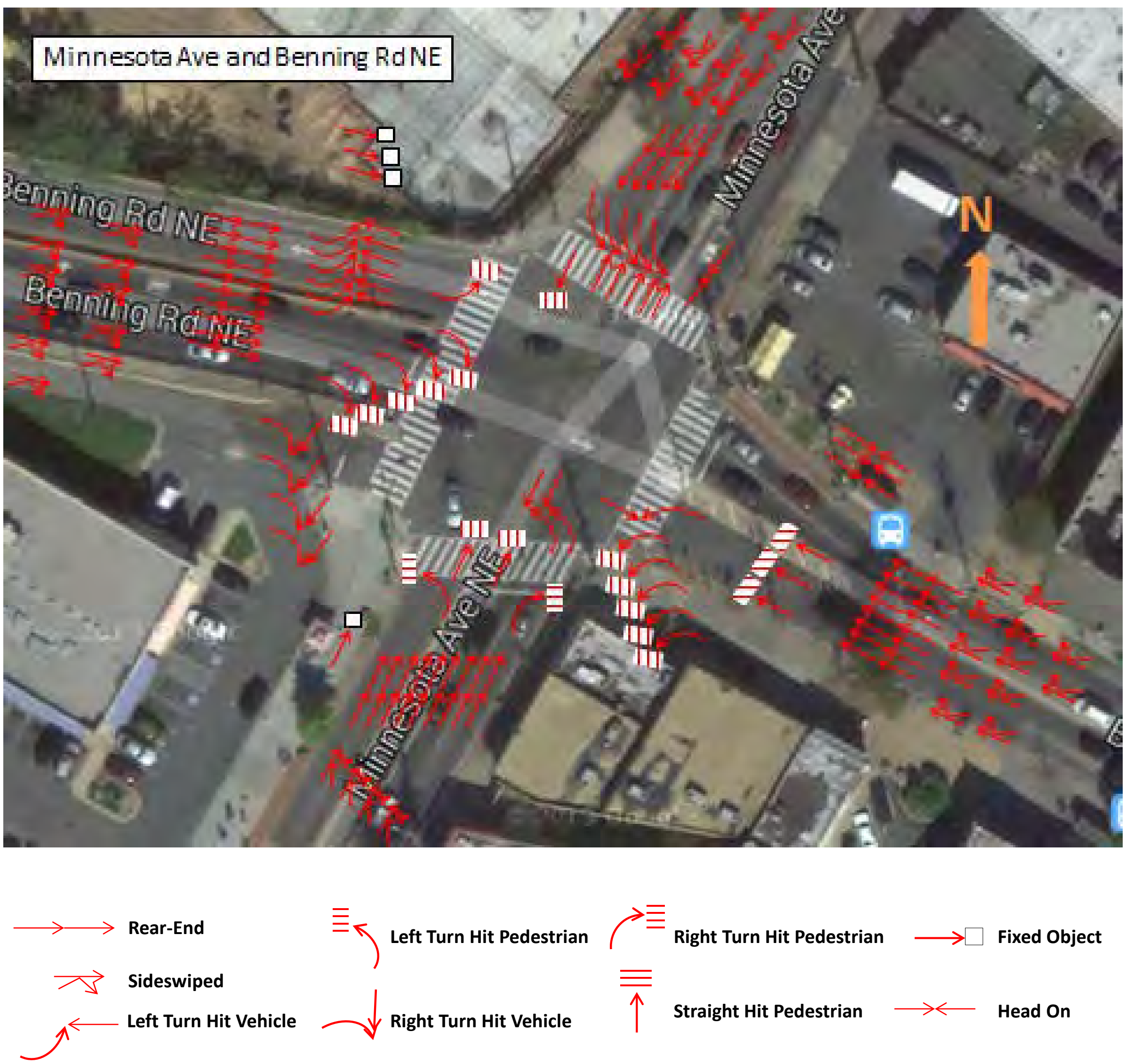
3.0 Intersection Collision Diagrams and Detailed Analysis of Collisions

This section displays collision diagrams for each intersection and provides a brief discussion for the potential causes of crashes. Collision diagrams are prepared to understand the crash pattern, safety problem and also deficiency of the intersection operation. Note that collision discussion is provided only at intersections and approaches for high frequency of crashes.

3.1 Benning Road and Minnesota Avenue Intersection

Figure 2 and **Table 3** provide crash analysis information for the Benning Road and Minnesota Avenue intersection.

Figure 2: Benning Road and Minnesota Avenue Crash Diagram



Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

Table 3: Potential Causes of Crashes at Benning Road and Minnesota Avenue Intersection

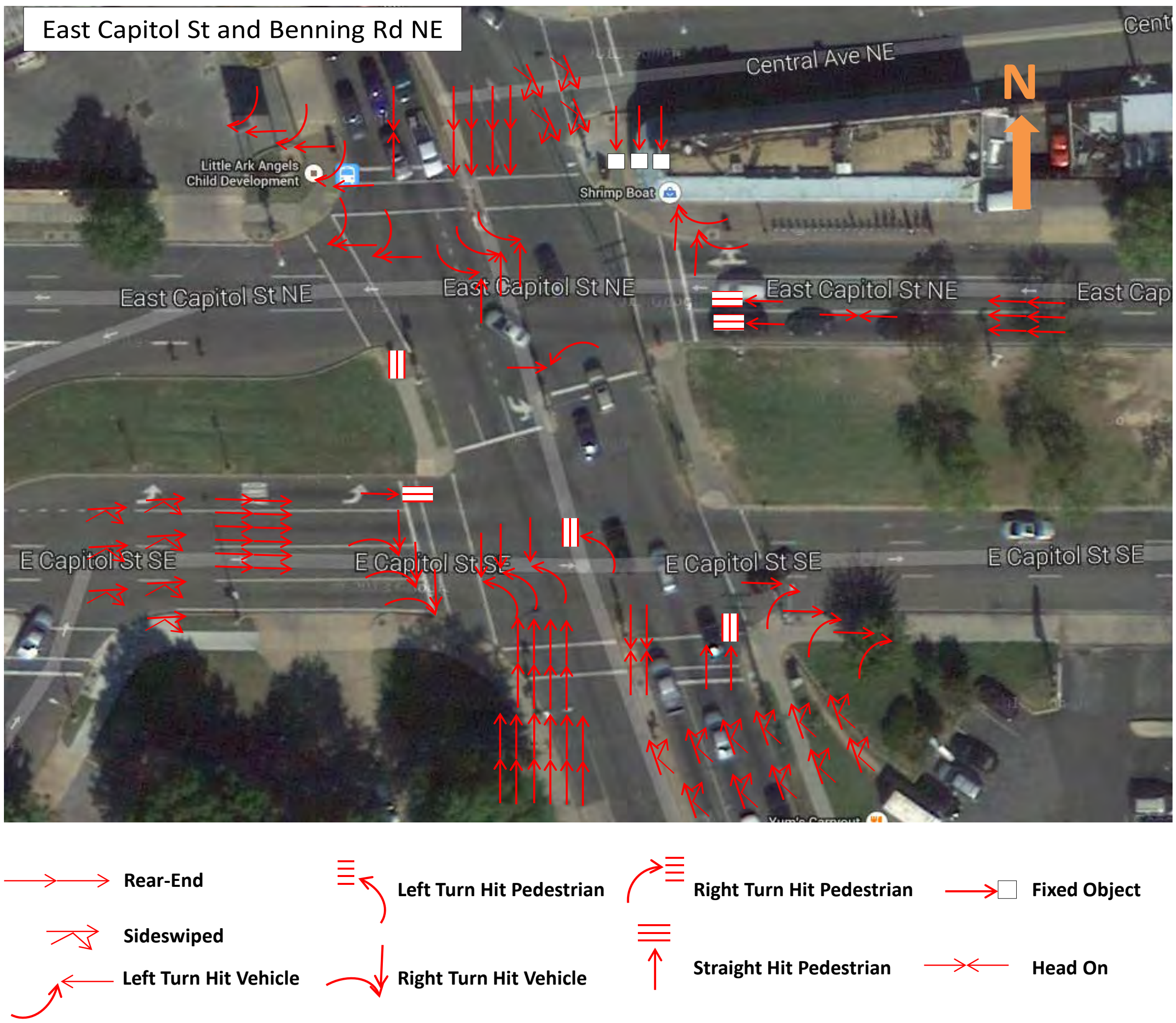
Movement	Collision Type	Potential Causes of Crashes
Eastbound Benning Road	Rear-End	• Speeding (Downhill approach) • Stop and go traffic due to peak hour congestion
	Sideswiped	• Eastbound left turn queue spillover due to heavy left turn volume • Inadequate green time
	Left Turn Hit Vehicle	• Protected and permissive phasing • Not adequate green time during the protected phase leading to more aggressive gap acceptance during the permitted phase
	Right Turn Hit Pedestrians	• Location of crosswalk (not at the tangent point)
Westbound Benning Road	Left Turn Hit Pedestrians	• Only permissive phase is permitted • Heavy opposing through traffic causing more aggressive gap acceptance • Heavy pedestrian volumes crossing the intersection on the south side of the intersection
Northbound Minnesota Avenue	Rear-End	• Stop and go traffic due to peak hour congestion • Speeding and more aggressive behavior due to cycle overflows (i.e., queue cannot clear the intersection in the current cycle)
Southbound Minnesota Avenue	Sideswiped	• Inadequate storage lane, causing queue spillover and lane change for the through vehicles
	Left Turn Hit Vehicle	• Permissive only left turn phasing

Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

3.2 Benning Road and East Capitol Street Intersection

Figure 3 and **Table 4** provide crash analysis information for the Benning Road and East Capitol Street intersection.

Figure 3: Benning Road and East Capitol Street Crash Diagram



Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

Table 4: Potential Causes of Crashes at Benning Road and East Capitol Street Intersection

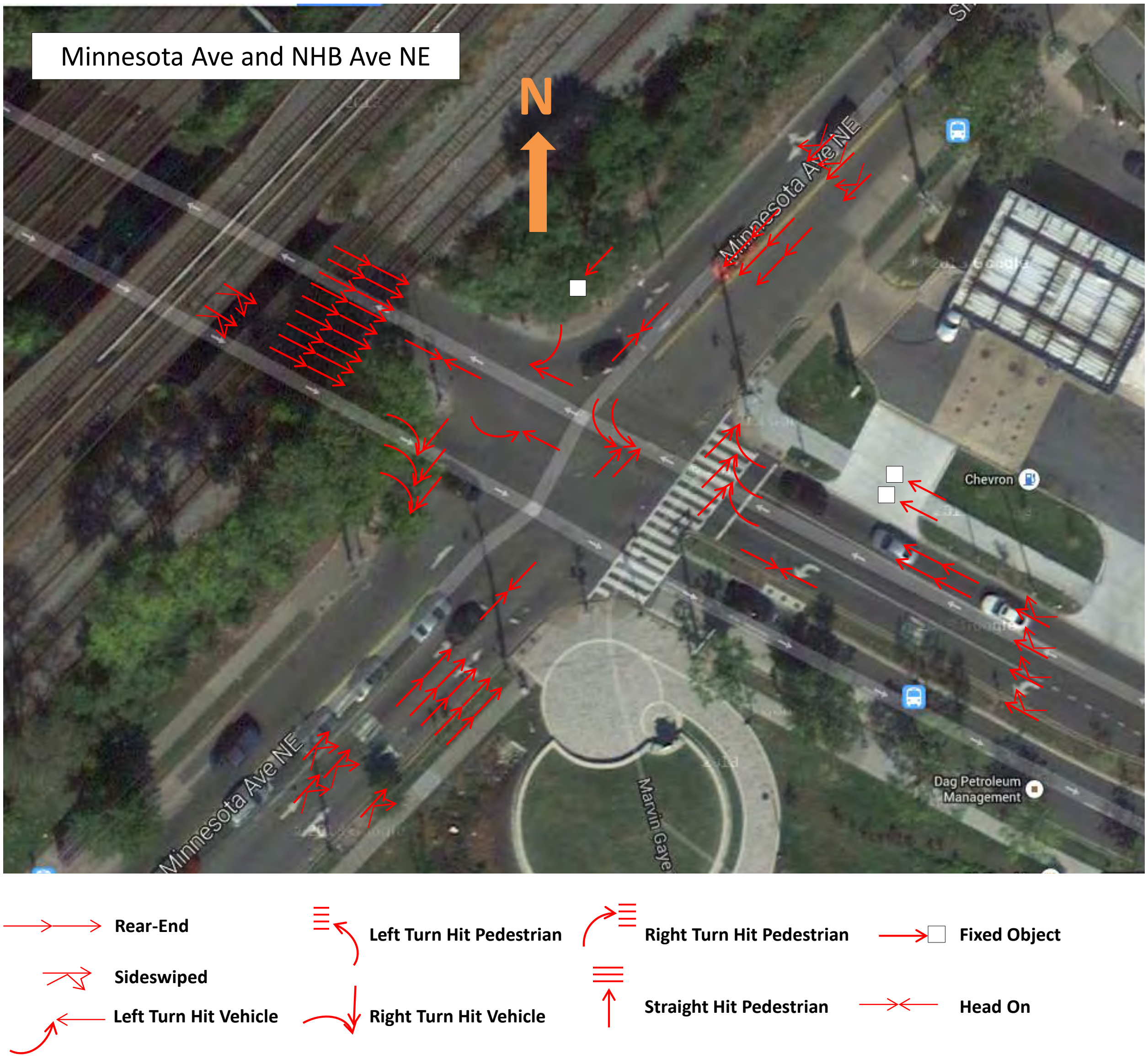
Movement	Collision Type	Potential Causes of Crashes
Northbound Benning Road	Sideswiped	• Inadequate storage space for northbound left turn traffic • Heavy left turn volume in the morning peak hour (450 vehicles) • Split phasing, which may cause lane changes during queue clearance
	Rear-End	• Stop and go traffic due to peak hour congestion • Speeding and more aggressive behavior due to cycle overflows (i.e., queue cannot clear the intersection in the current cycle)
Eastbound East Capitol Street	Rear-End	• Stop and go traffic due to peak hour congestion • Speeding and more aggressive behavior due to cycle overflows (i.e., queue cannot clear the intersection in the current cycle)

Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

3.3 Minnesota Avenue and Nannie Helen Burroughs (NHB) Avenue Intersection

Figure 4 and **Table 5** provide crash analysis information for the Minnesota Avenue and Nannie Helen Burroughs (NHB) Avenue intersection.

Figure 4: Minnesota Avenue and Nannie Helen Burroughs Avenue Crash Diagram



Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

Table 5: Potential Causes of Crashes at Minnesota Avenue and Nannie Helen Burroughs Avenue Intersection

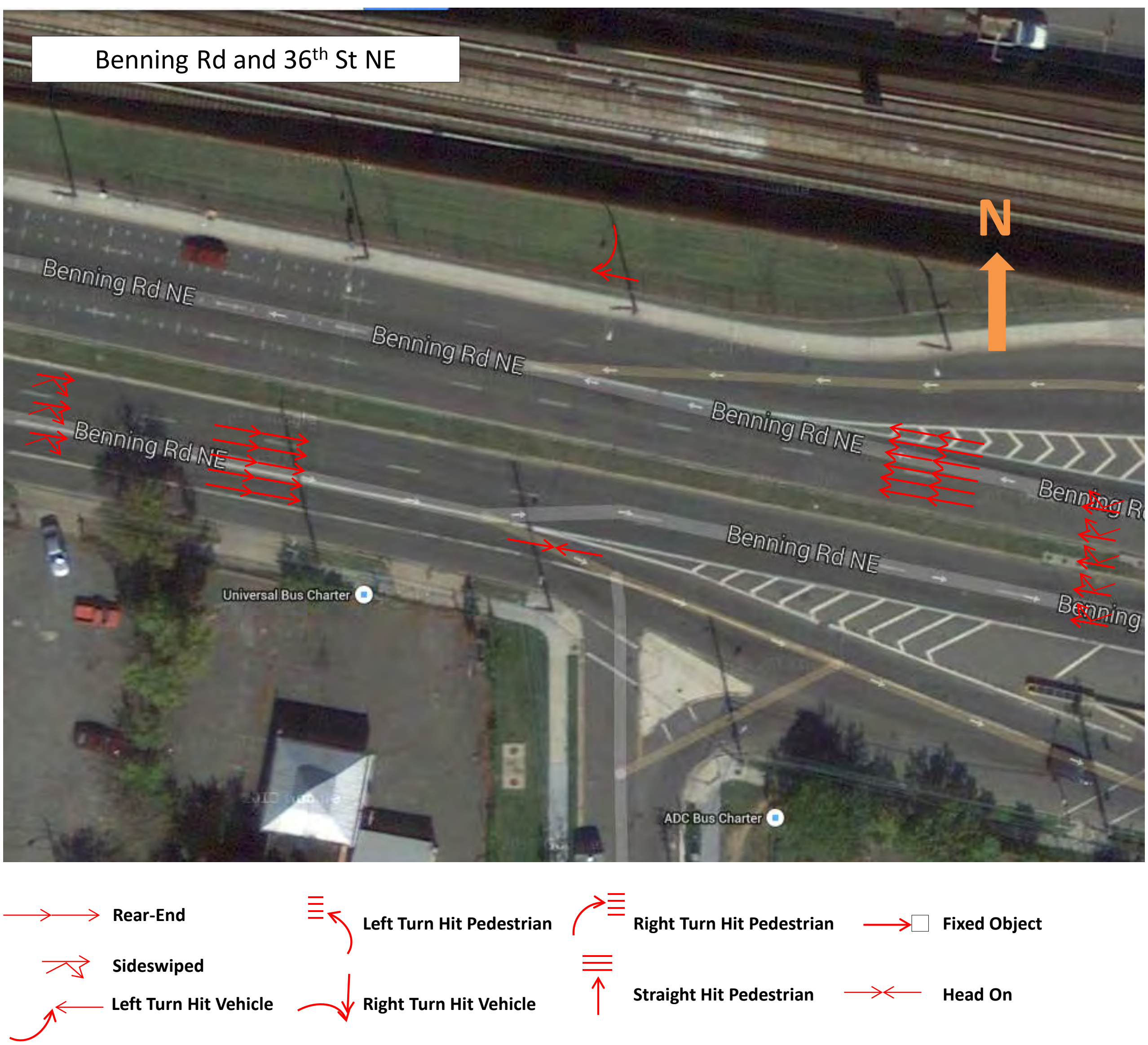
Movement	Collision Type	Potential Causes of Crashes
Eastbound Nannie Helen Burroughs Avenue	Rear-End	• Visibility issues due to the existing bridge • Left turn is shared with through (also lagging left turn), which may cause sudden stops (sideswiped collisions can also be attributed to shared left turn operation)
Northbound Minnesota Avenue	Rear-End	• Stop and go traffic due to peak hour congestion • Speeding and more aggressive behavior due to cycle overflows (i.e., queue cannot clear the intersection in the current cycle)

Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

3.4 Benning Road and 36th Street Intersection

Figure 5 and **Table 6** provide crash analysis information for the Benning Road and 36th Street intersection.

Figure 5: Benning Road and 36th Street Crash Diagram



Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

Table 6: Potential Causes of Crashes at Benning Road and 36th Street Intersection

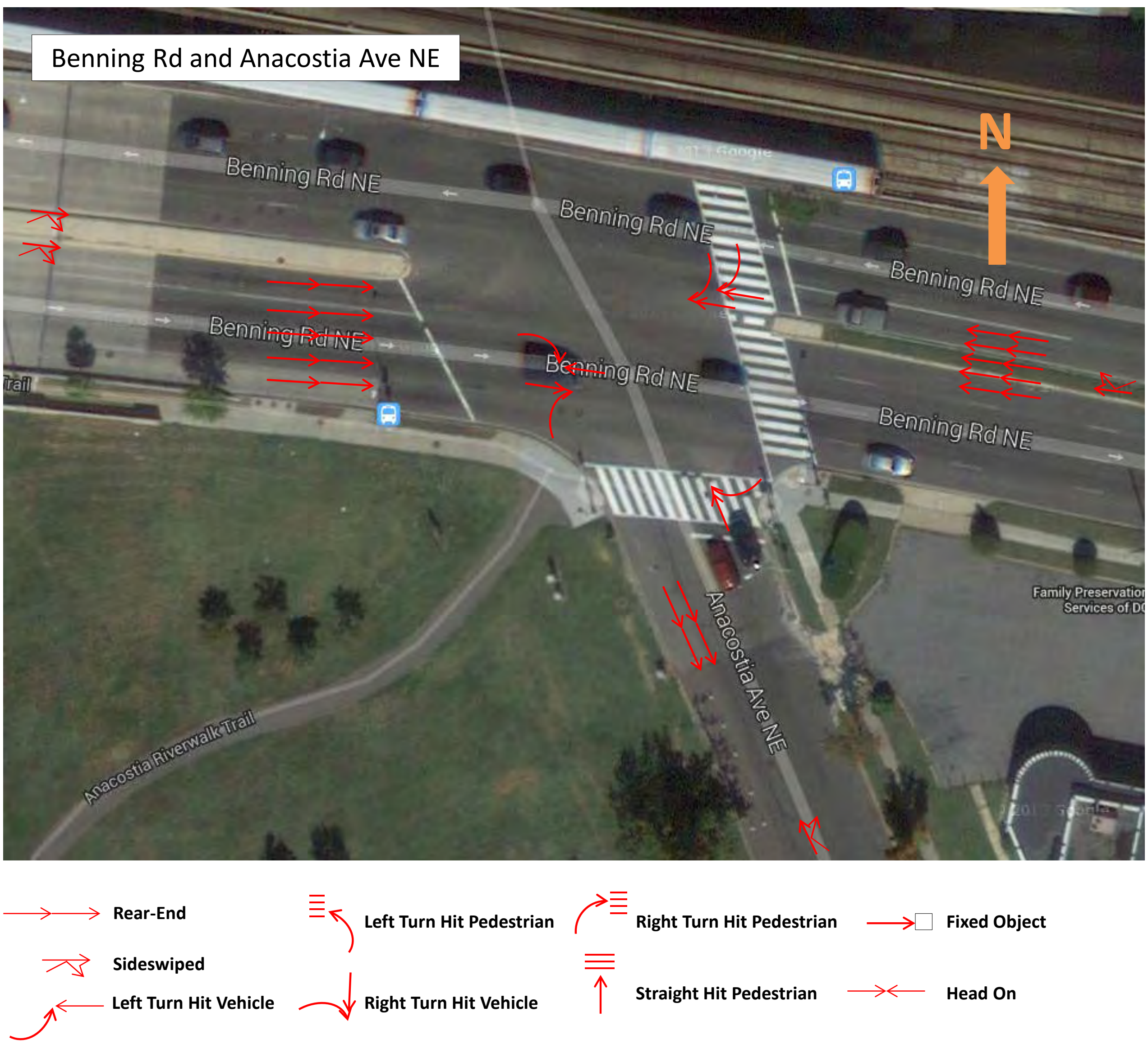
Movement	Collision Type	Potential Causes of Crashes
Eastbound Benning Road	Rear-End	• Lack of proper signage for the off-ramp • Lane change and slowing down to get onto off-ramp
Westbound Benning Road	Rear-End	• Possible conflict with merging traffic (might have also caused sideswiped collisions)

Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

3.5 Benning Road and Anacostia Avenue Intersection

Figure 6 provides crash analysis information for the Benning Road and Anacostia Avenue intersection. No high frequency of crashes is present at the intersection.

Figure 6: Benning Road and Anacostia Avenue Crash Diagram

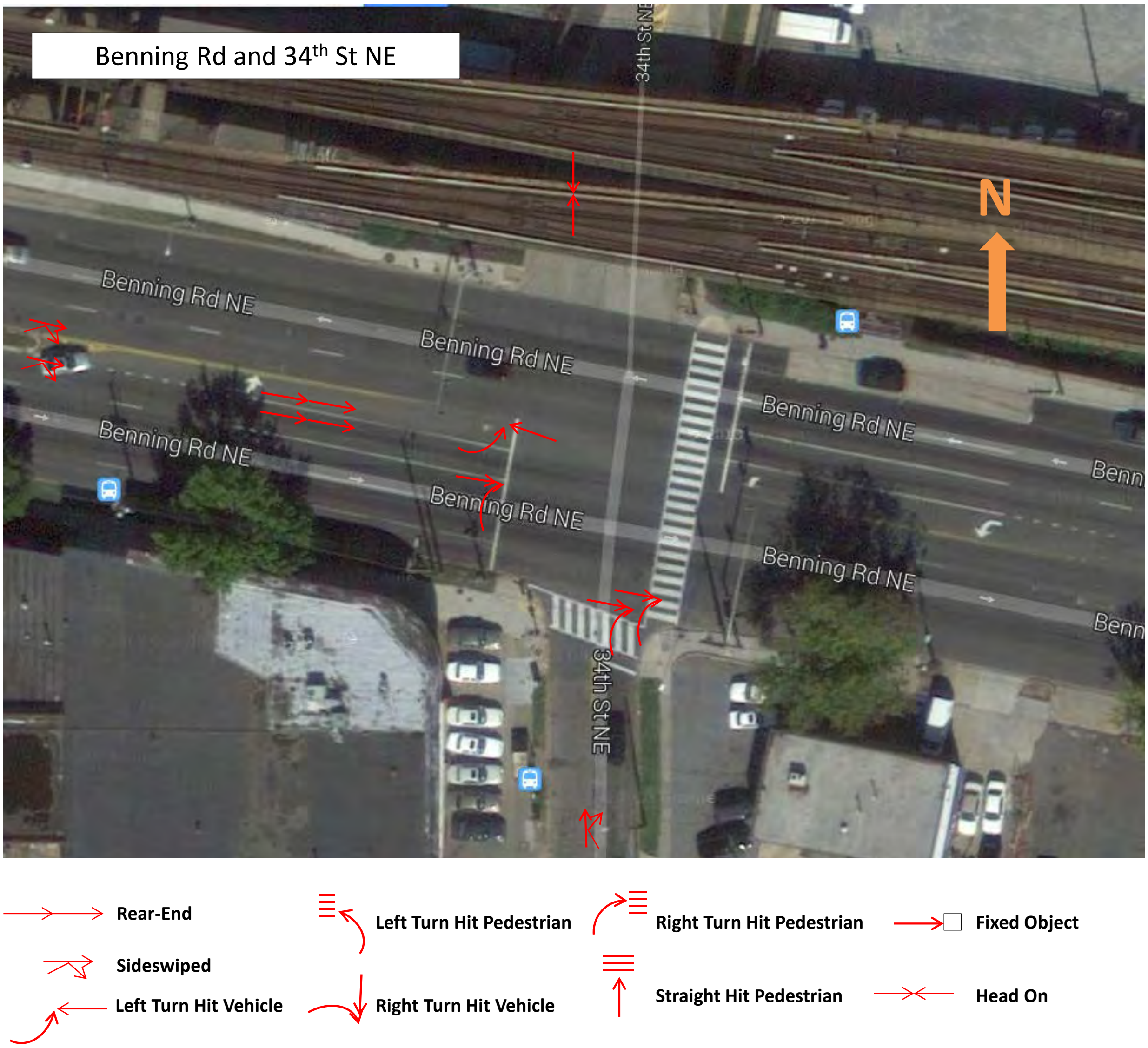


Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

3.6 Benning Road and 34th Street Intersection

Figure 7 provides crash analysis information for the Benning Road and 34th Street intersection. No high frequency of crashes is present at the intersection.

Figure 7: Benning Road and 34th Street Crash Diagram



Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

3.7 Benning Road and 45th Street Intersection

Figure 8 provides crash analysis information for the Benning Road and 45th Street intersection. No high frequency of crashes is present at the intersection.

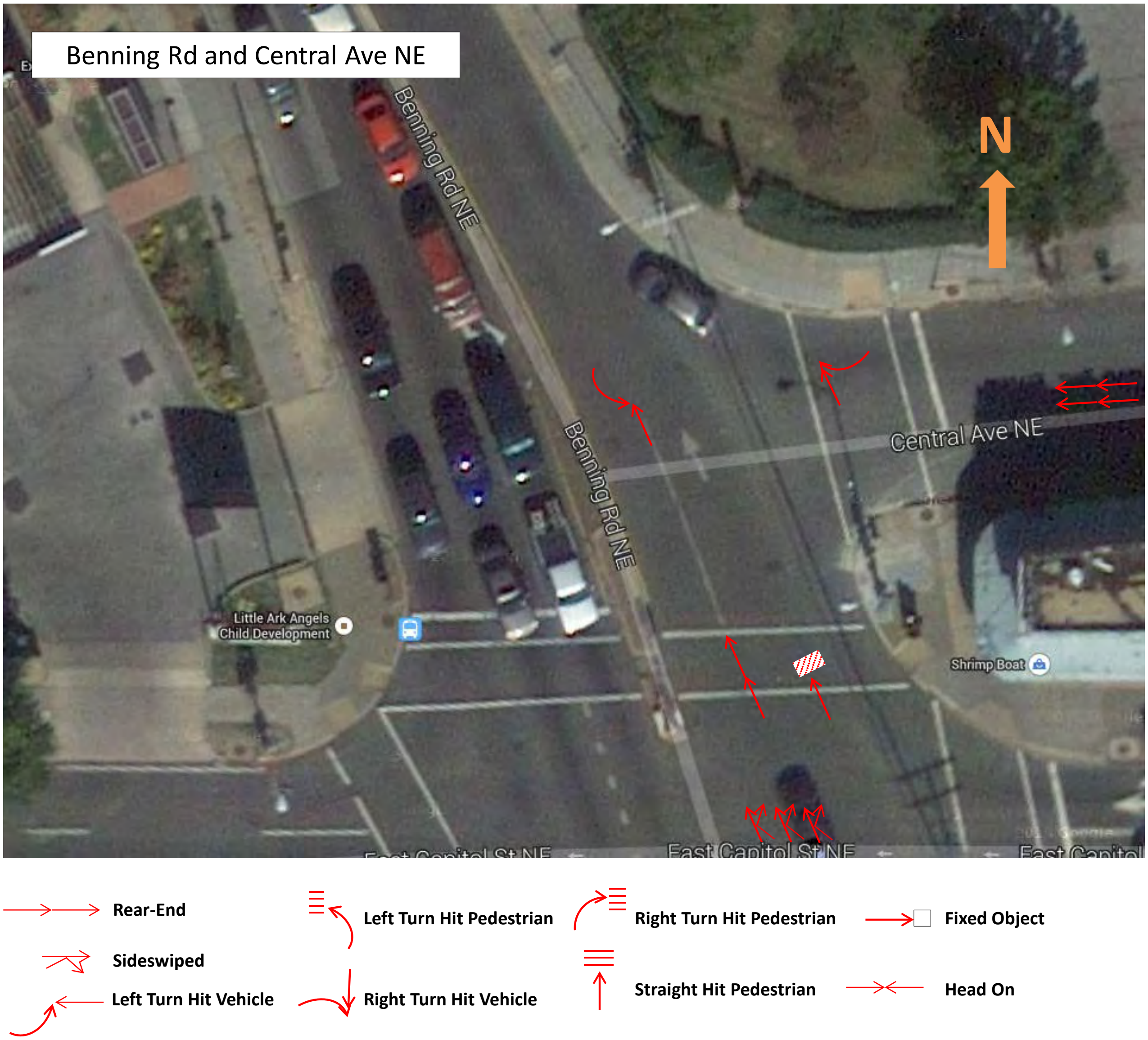
Figure 8: Benning Road and 45th Street Crash Diagram

Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

3.8 Benning Road and Central Avenue Intersection

Figure 9 provides crash analysis information for the Benning Road and Central Avenue intersection. No high frequency of crashes is present at the intersection.

Figure 9: Benning Road and Central Avenue Crash Diagram

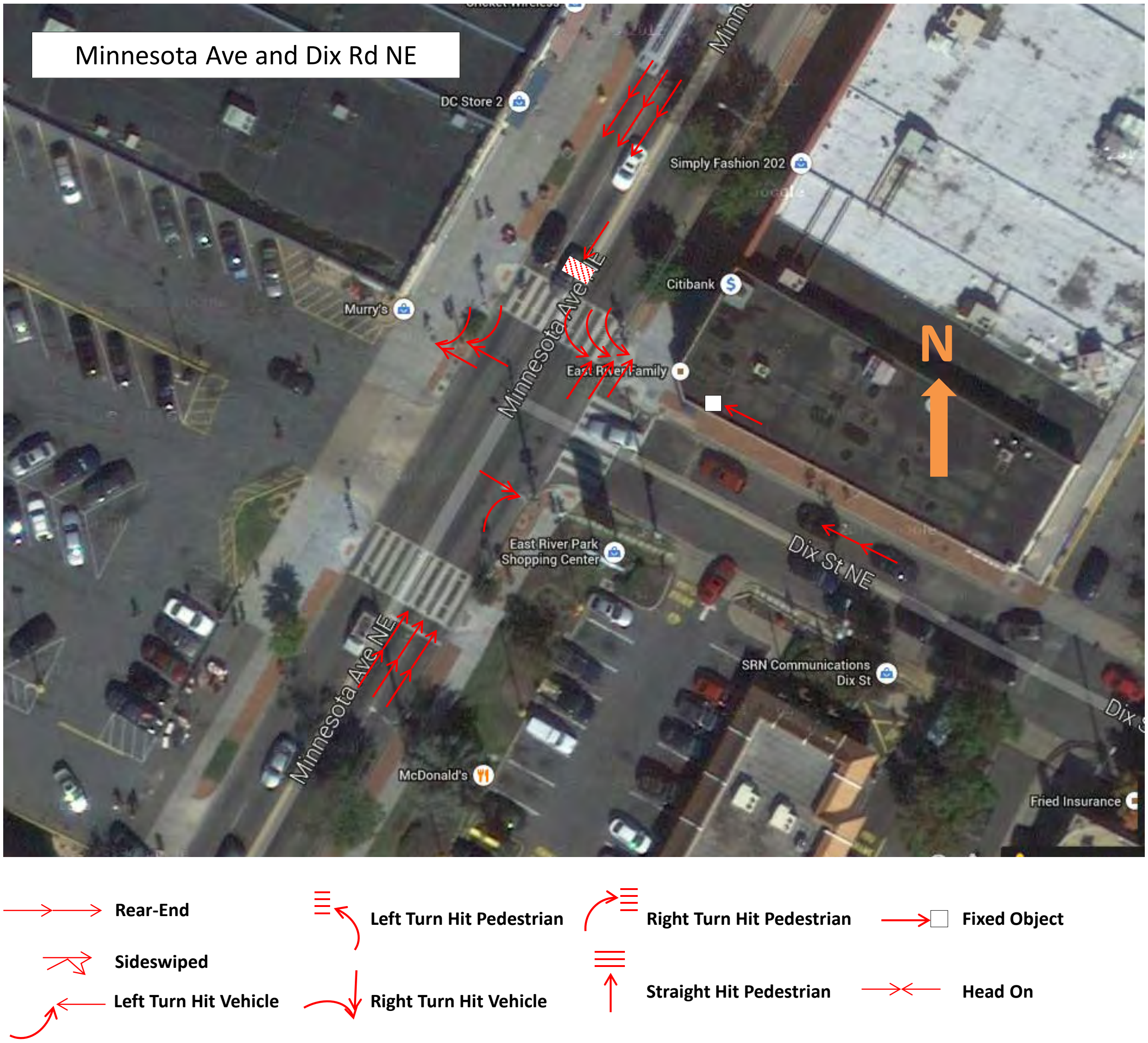


Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

3.9 Minnesota Avenue and Dix Street Intersection

Figure 10 provides crash analysis information for the Minnesota Avenue and Dix Street intersection. No high frequency of crashes is present at the intersection.

Figure 10: Minnesota Avenue and Dix Street Crash Diagram

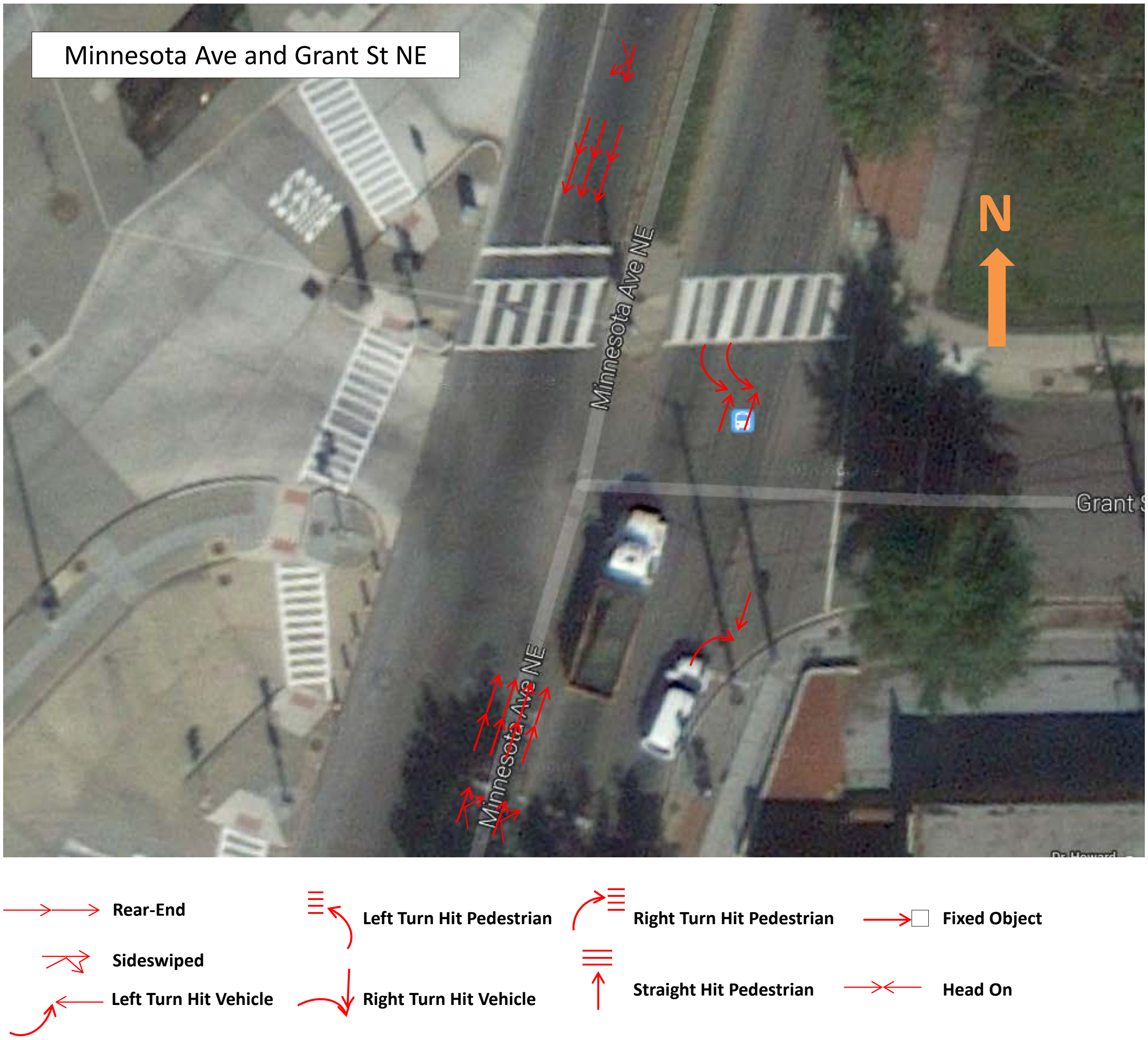


Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

3.10 Minnesota Avenue and Grant Street Intersection

Figure 11 provides crash analysis information for the Minnesota Avenue and Grant Street intersection. No high frequency of crashes is present at the intersection.

Figure 11: Minnesota Avenue and Grant Street Crash Diagram

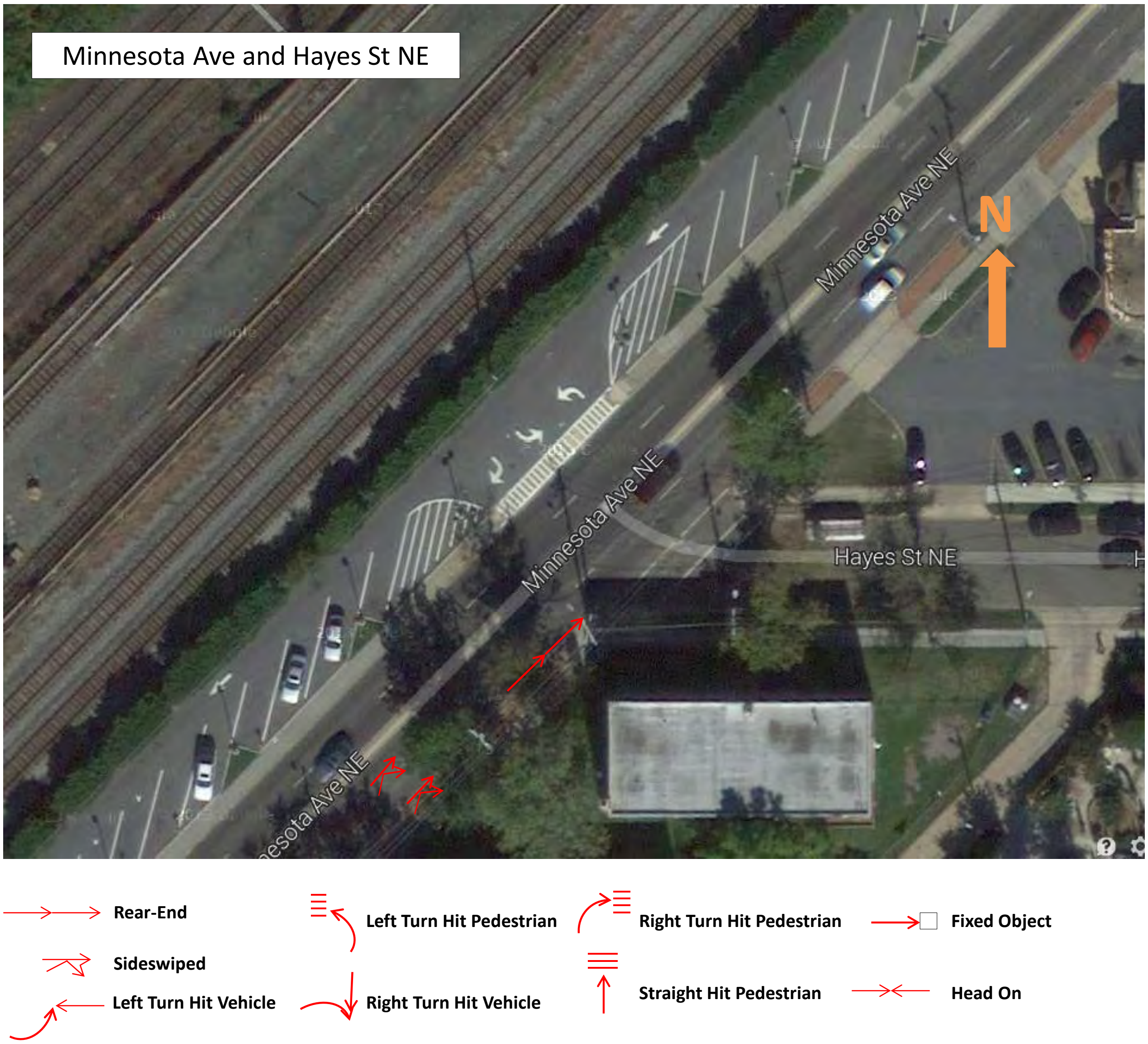


Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

3.11 Minnesota Avenue and Hayes Street Intersection

Figure 12 provides crash analysis information for the Minnesota Avenue and Hayes Street intersection. No high frequency of crashes is present at the intersection.

Figure 12: Minnesota Avenue and Hayes Street Crash Diagram

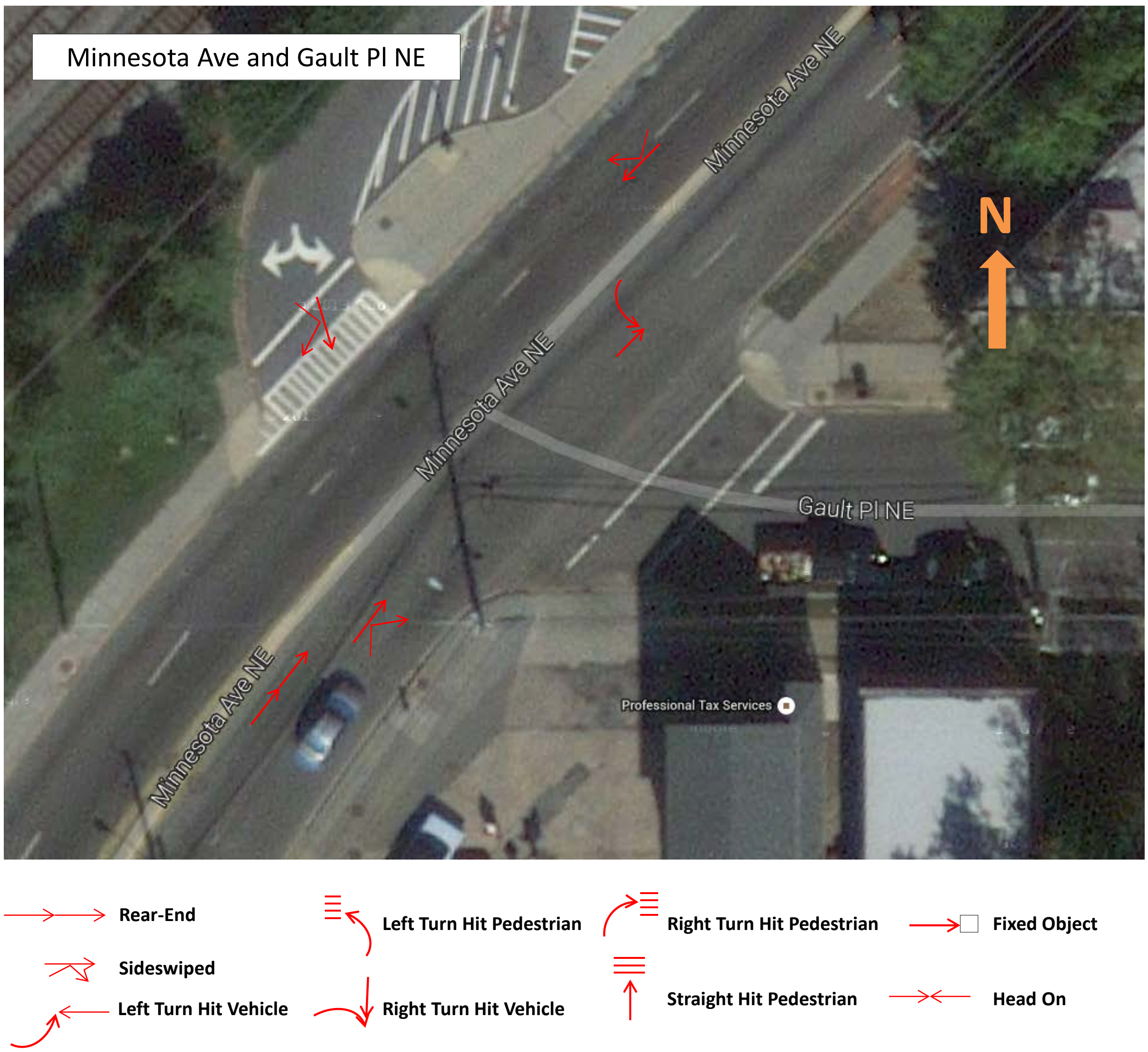


Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

3.12 Minnesota Avenue and Gault Place Intersection

Figure 13 provides crash analysis information for the Minnesota Avenue and Gault Place intersection. No high frequency of crashes is present at the intersection.

Figure 13: Minnesota Avenue and Gault Place Crash Diagram



Source: DDOT, Traffic Safety Statistics Report for the District of Columbia (2011-2013)

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BENNING ROAD & BRIDGES TRANSPORTATION IMPROVEMENTS

General Plans

Draft May 2016

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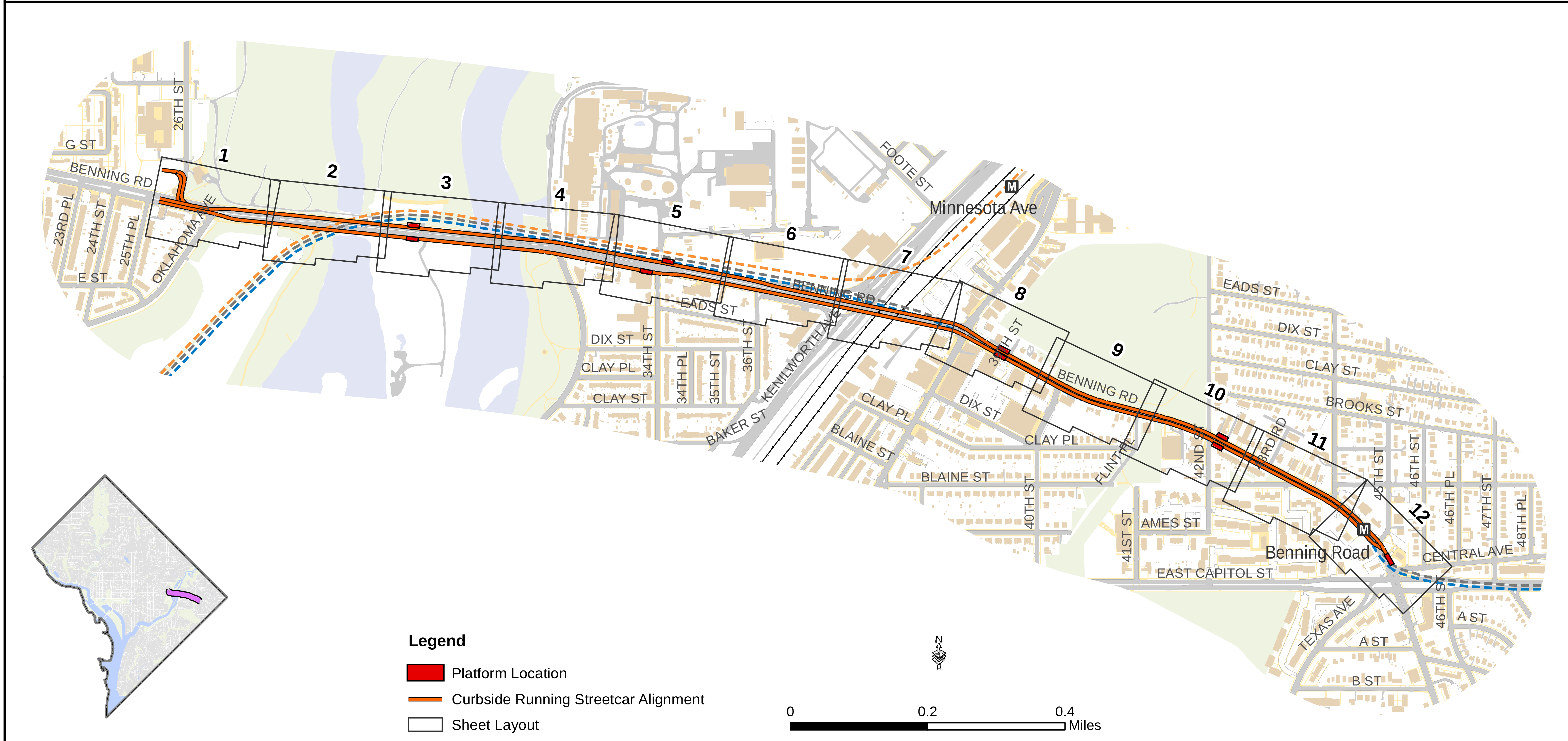

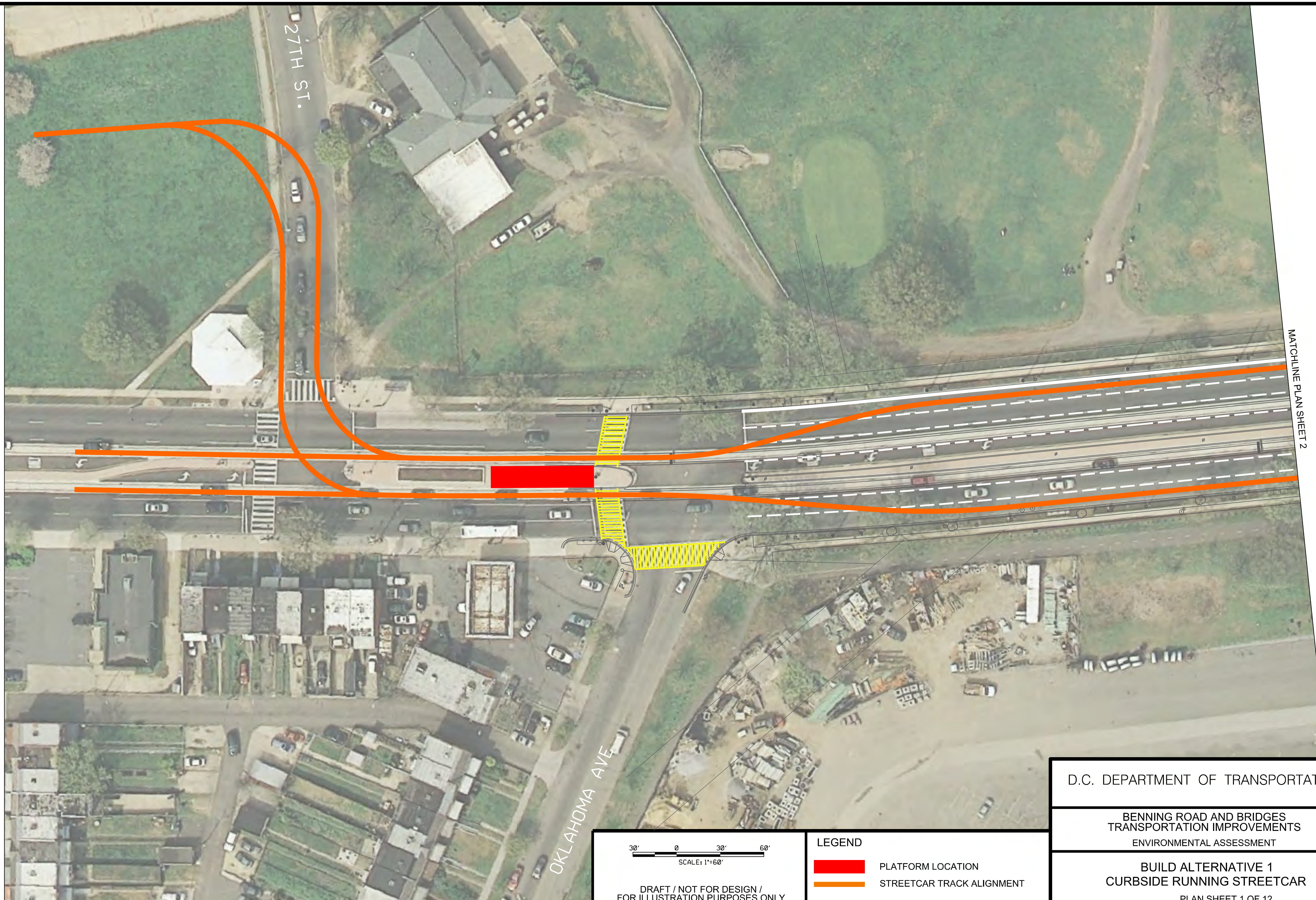

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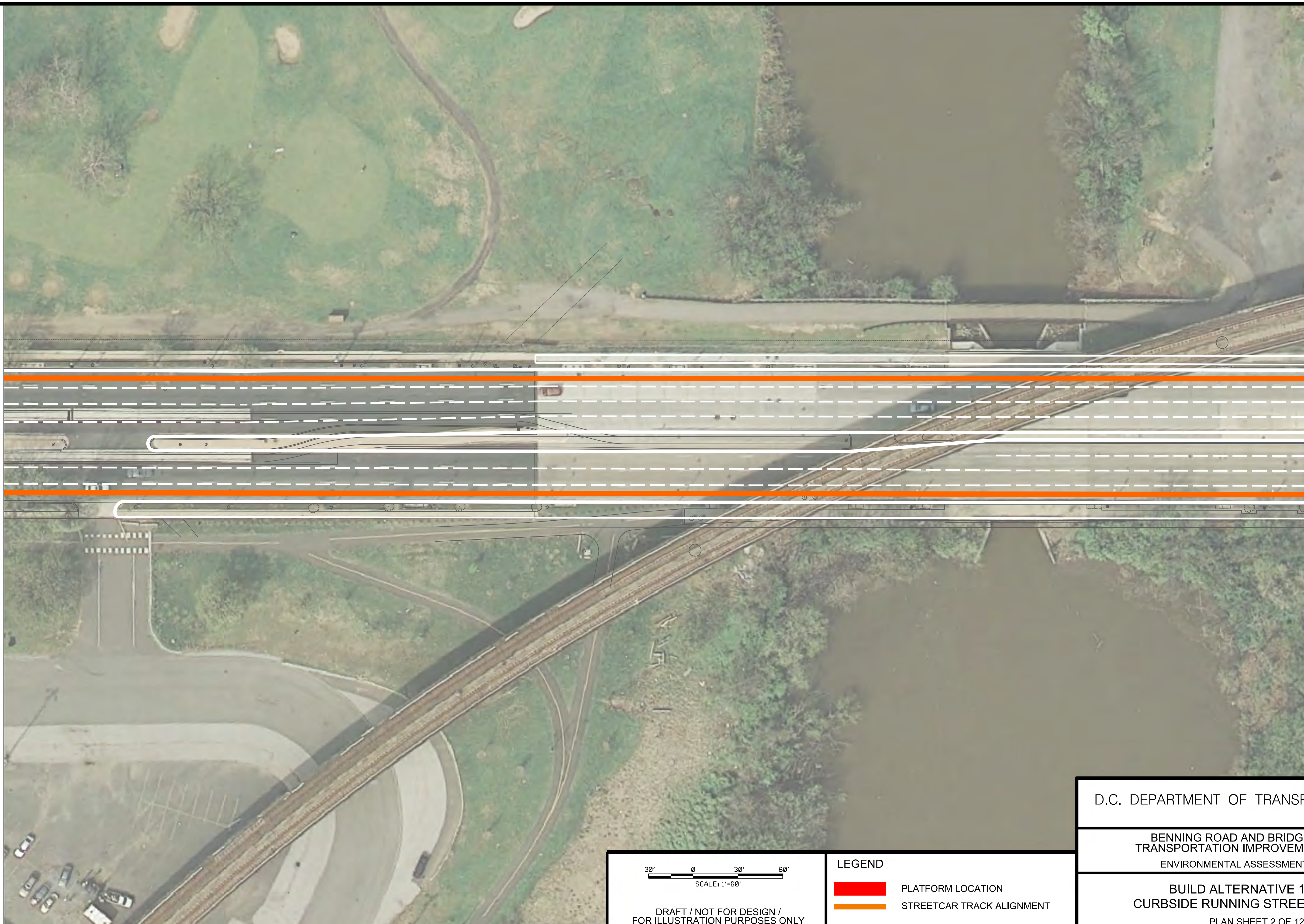

MATCHLINE PLAN SHEET 3

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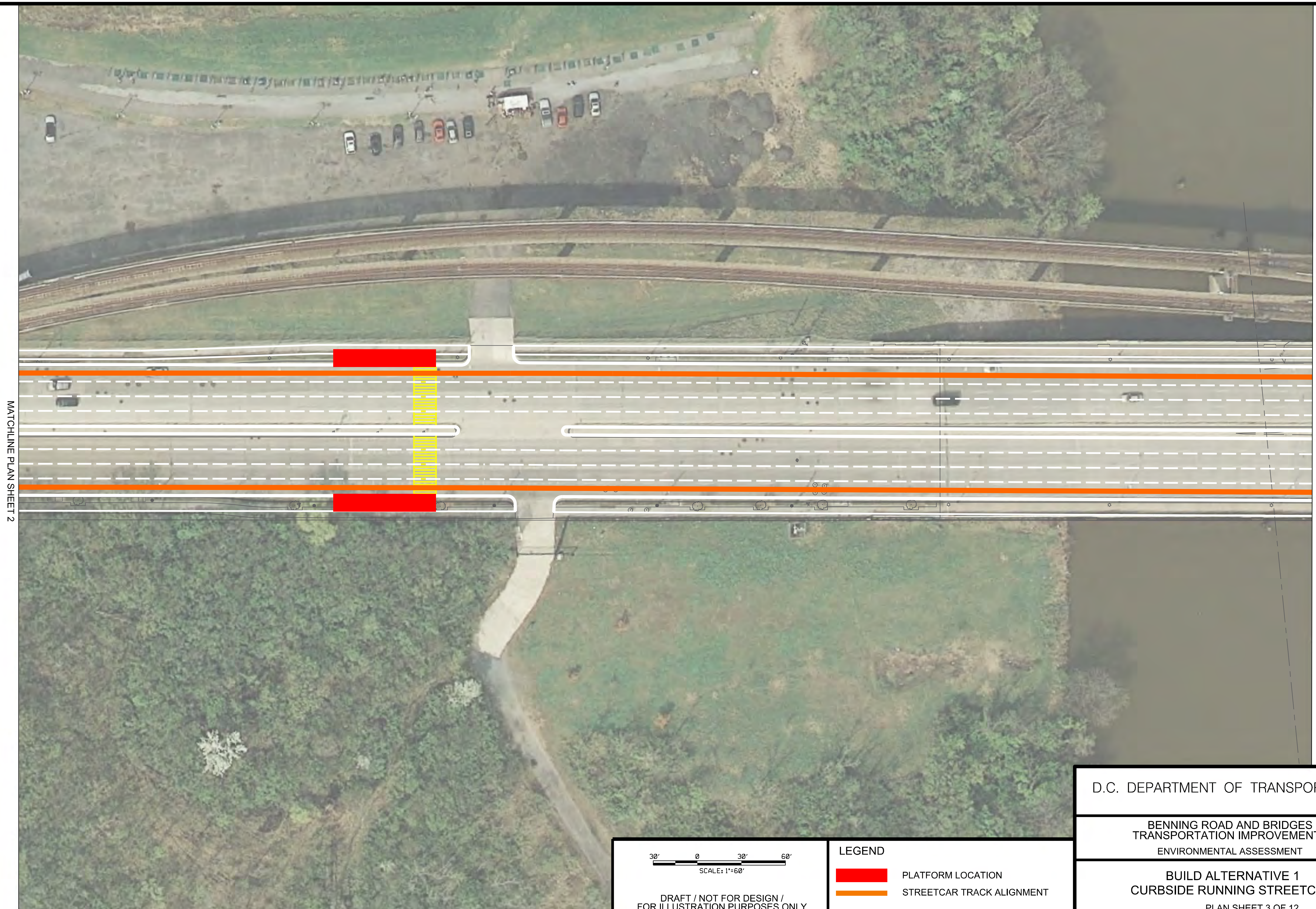

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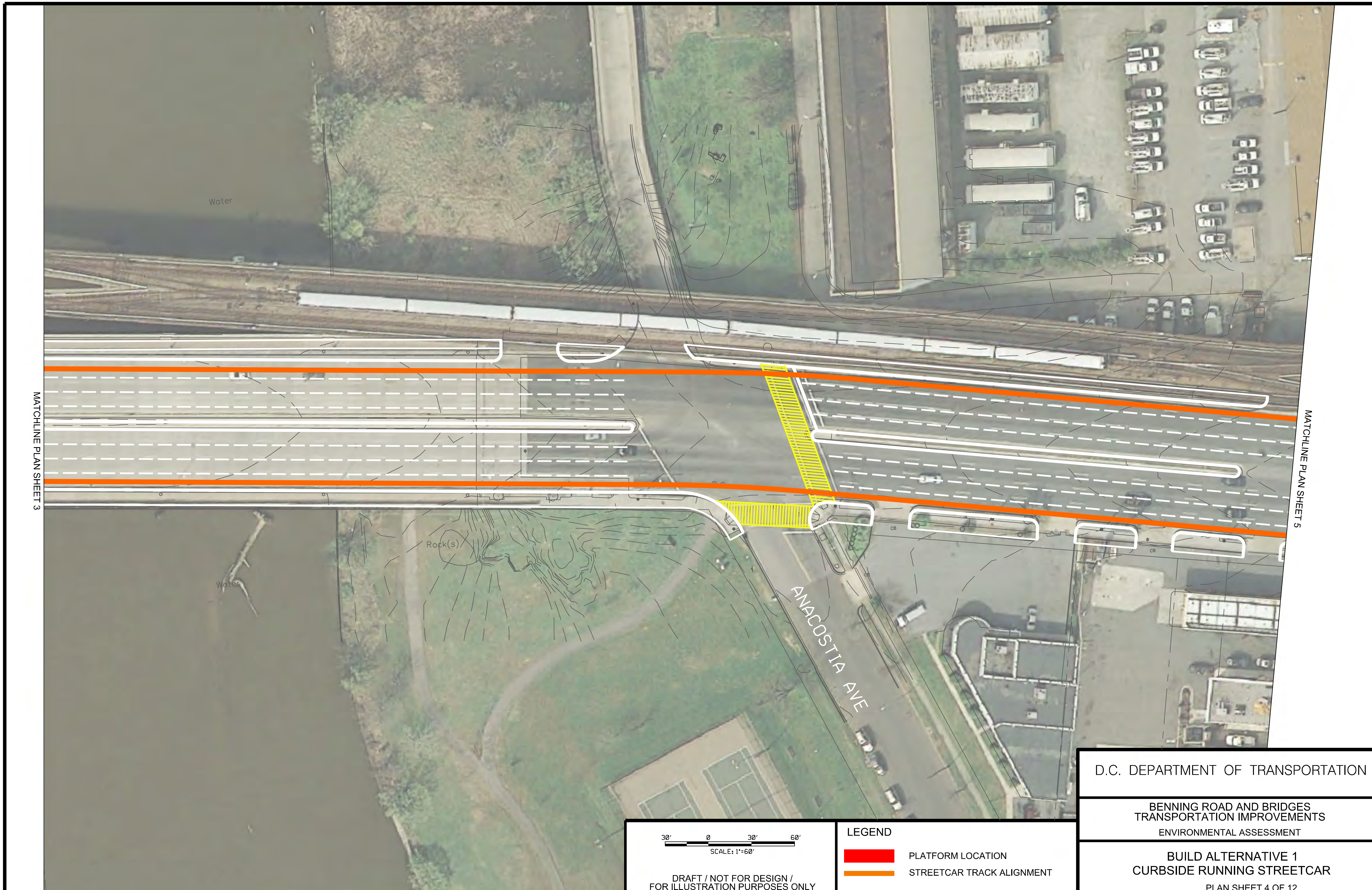

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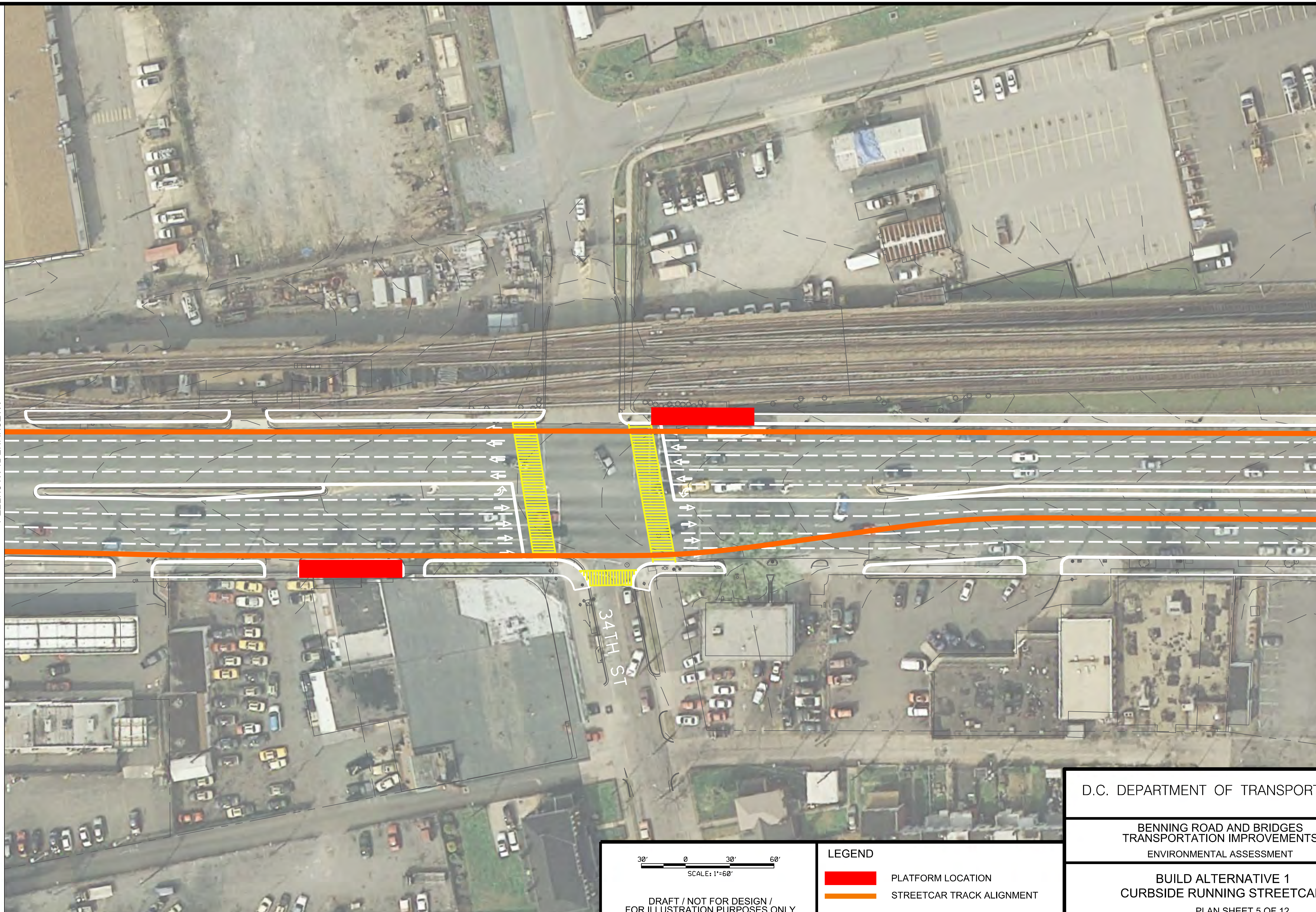

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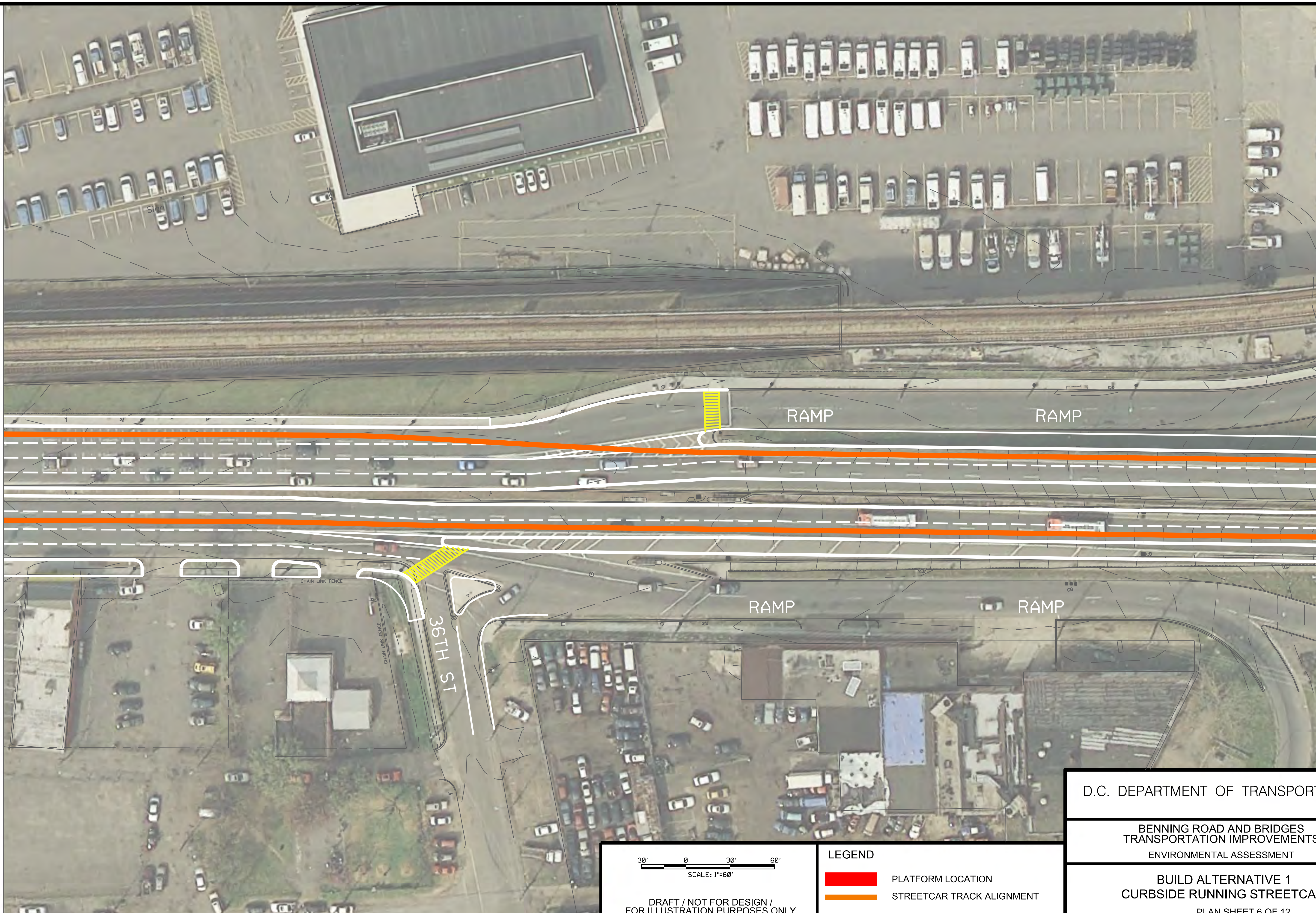

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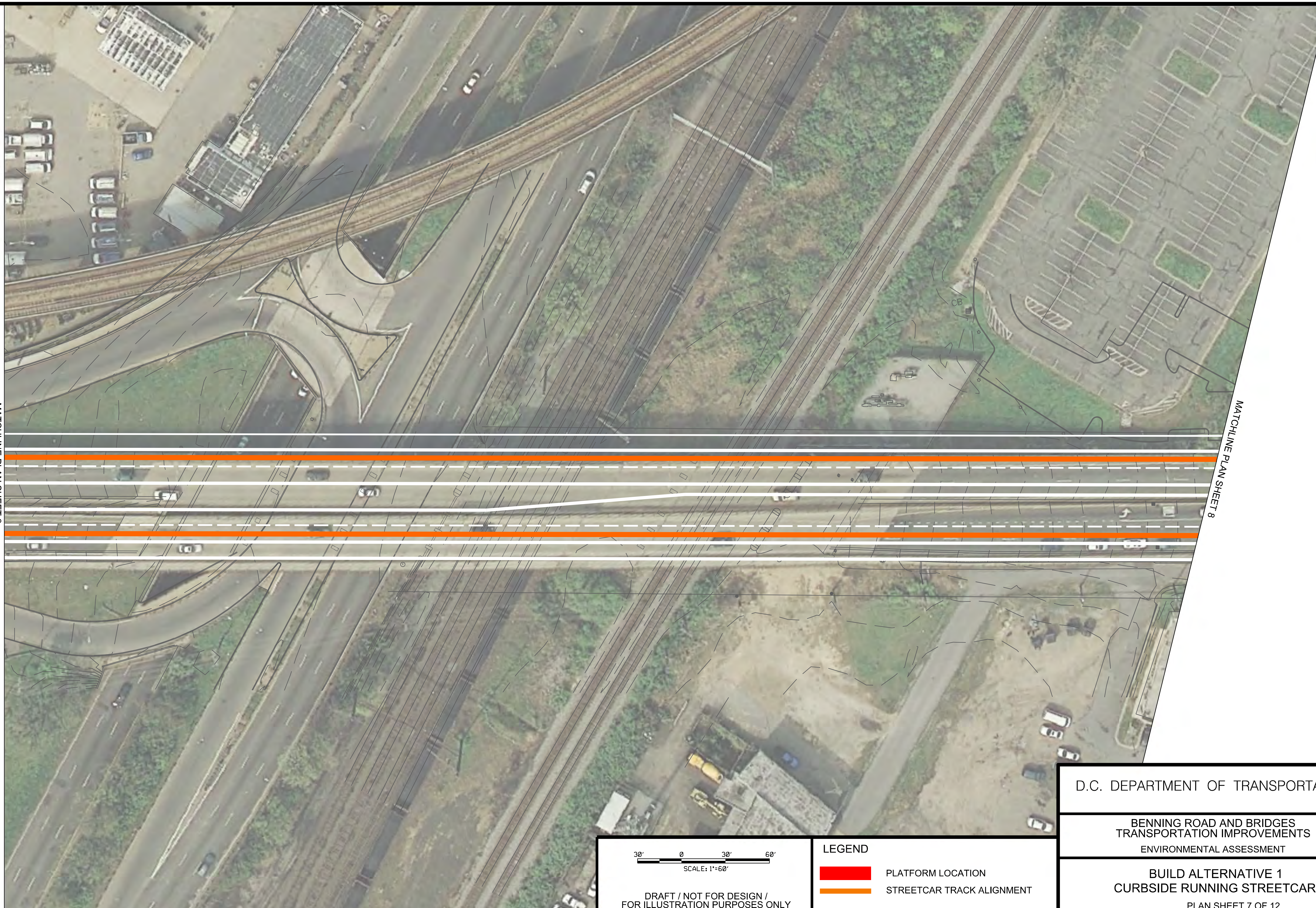

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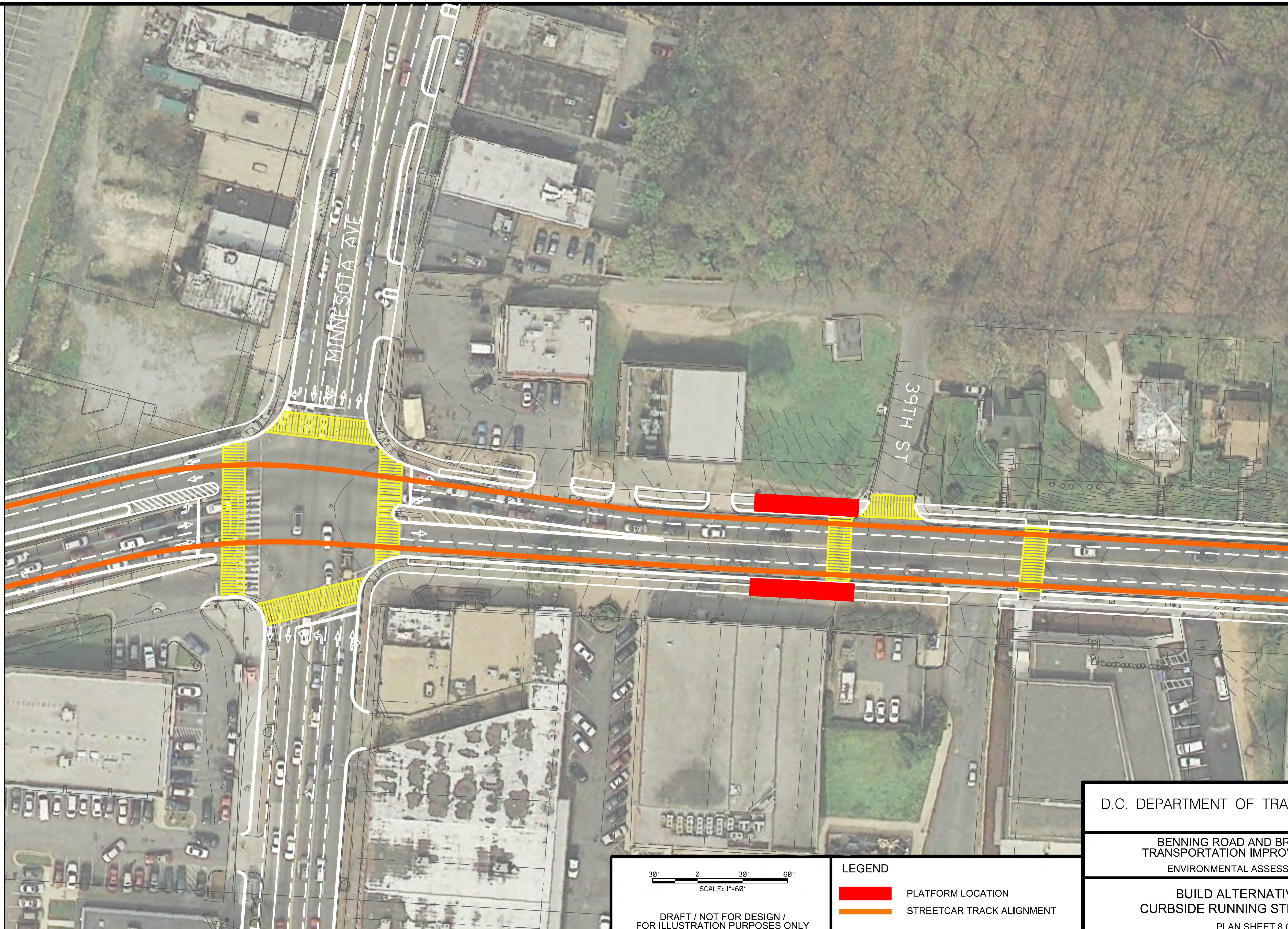

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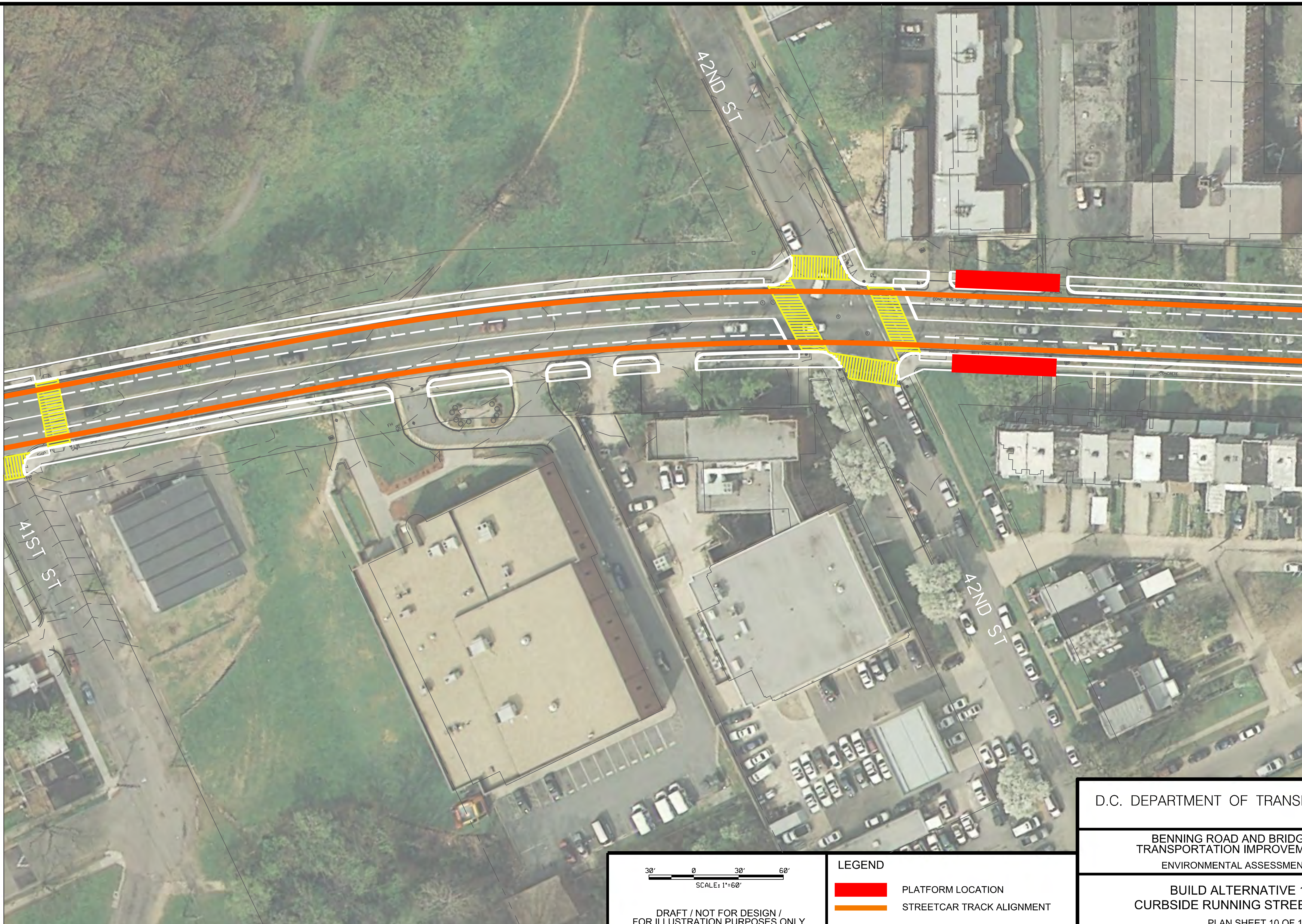

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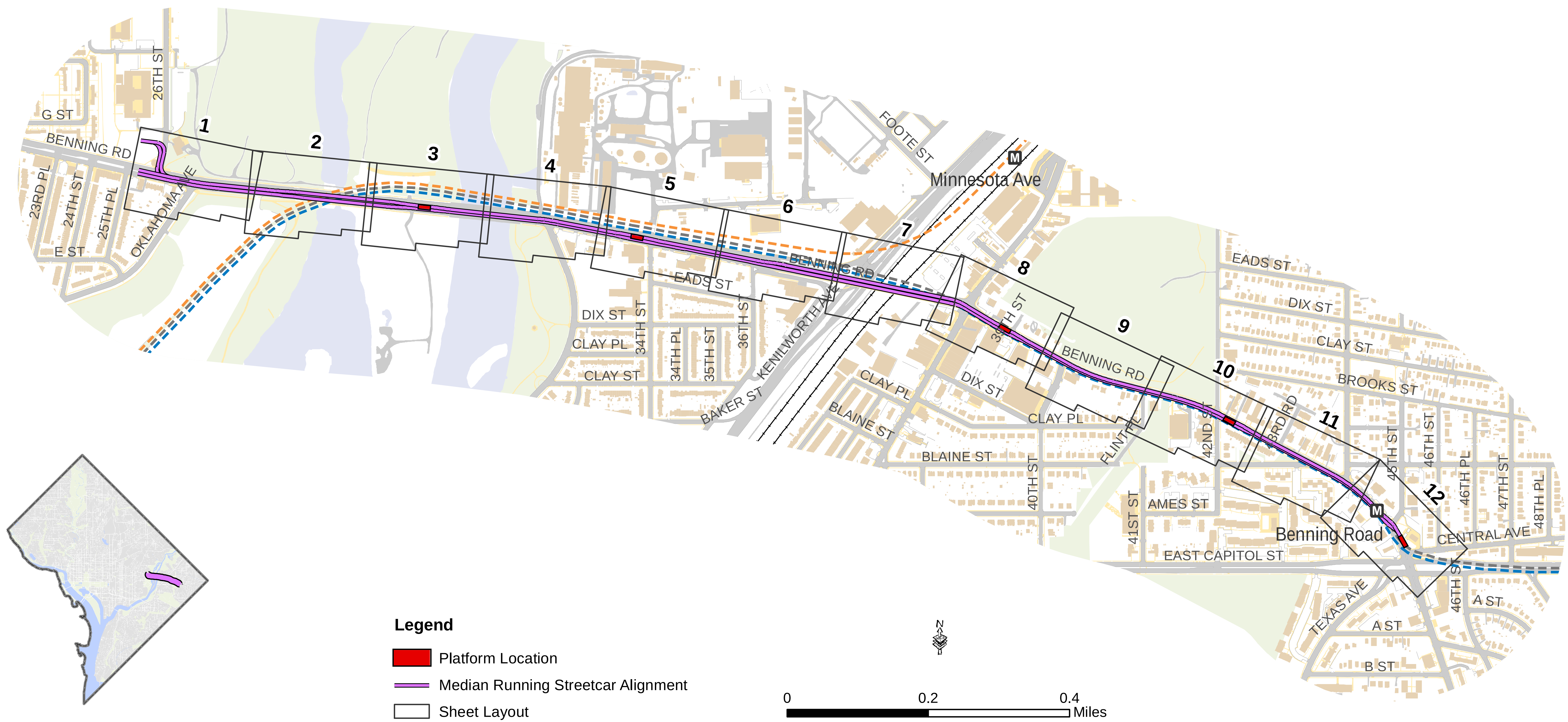
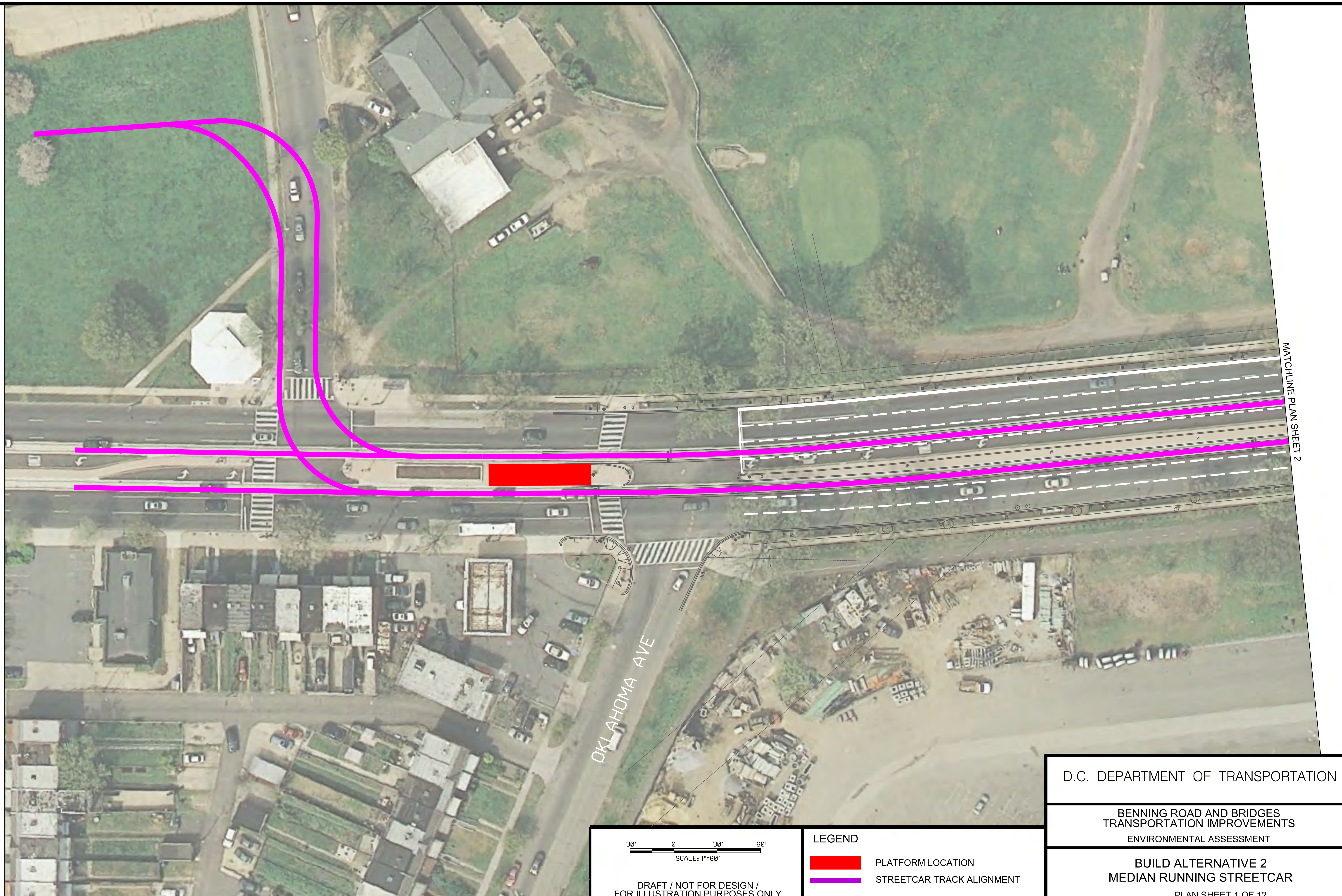
BUILD ALTERNATIVE 2: MEDIAN RUNNING STREETCAR

GENERAL PLANS





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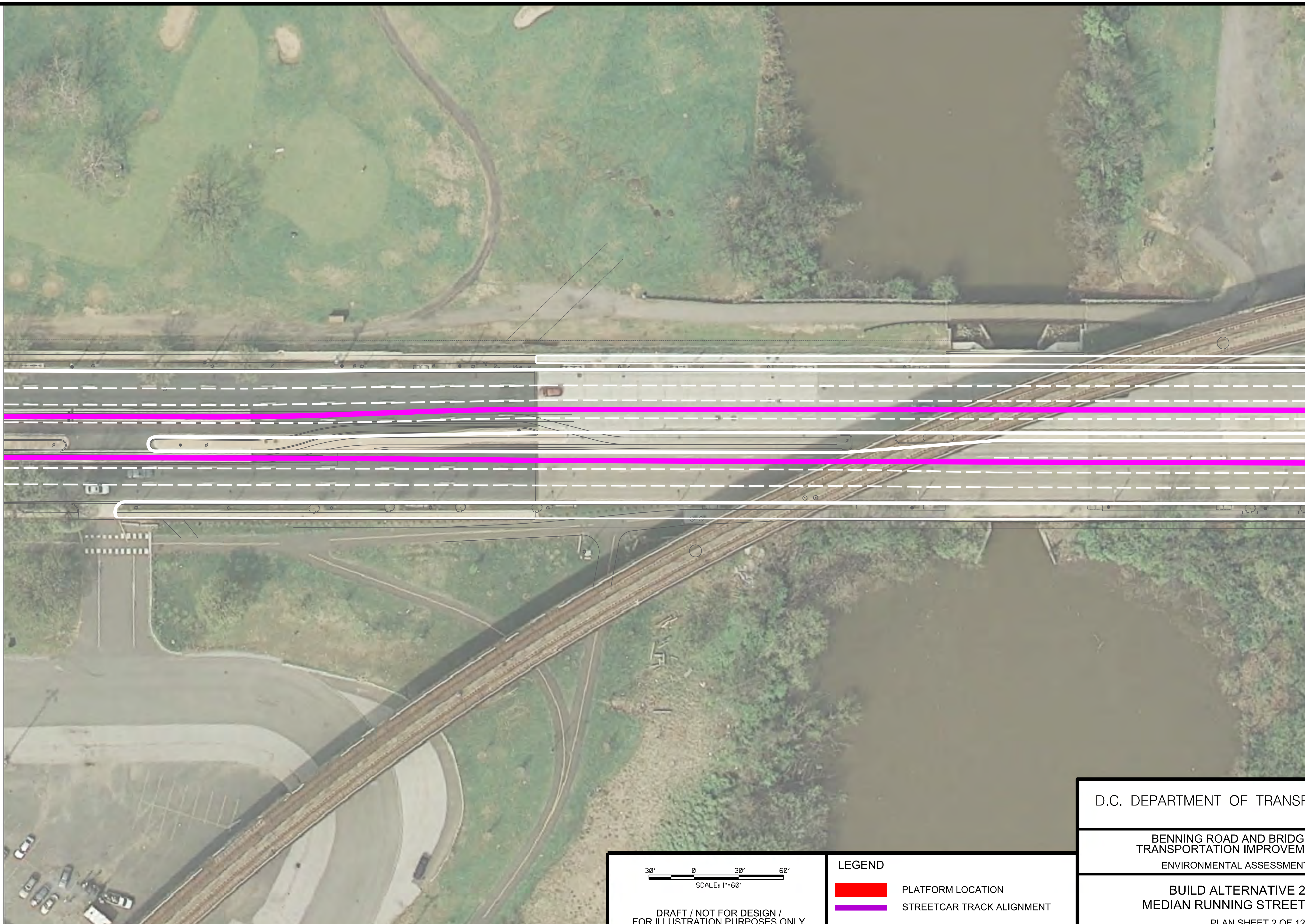

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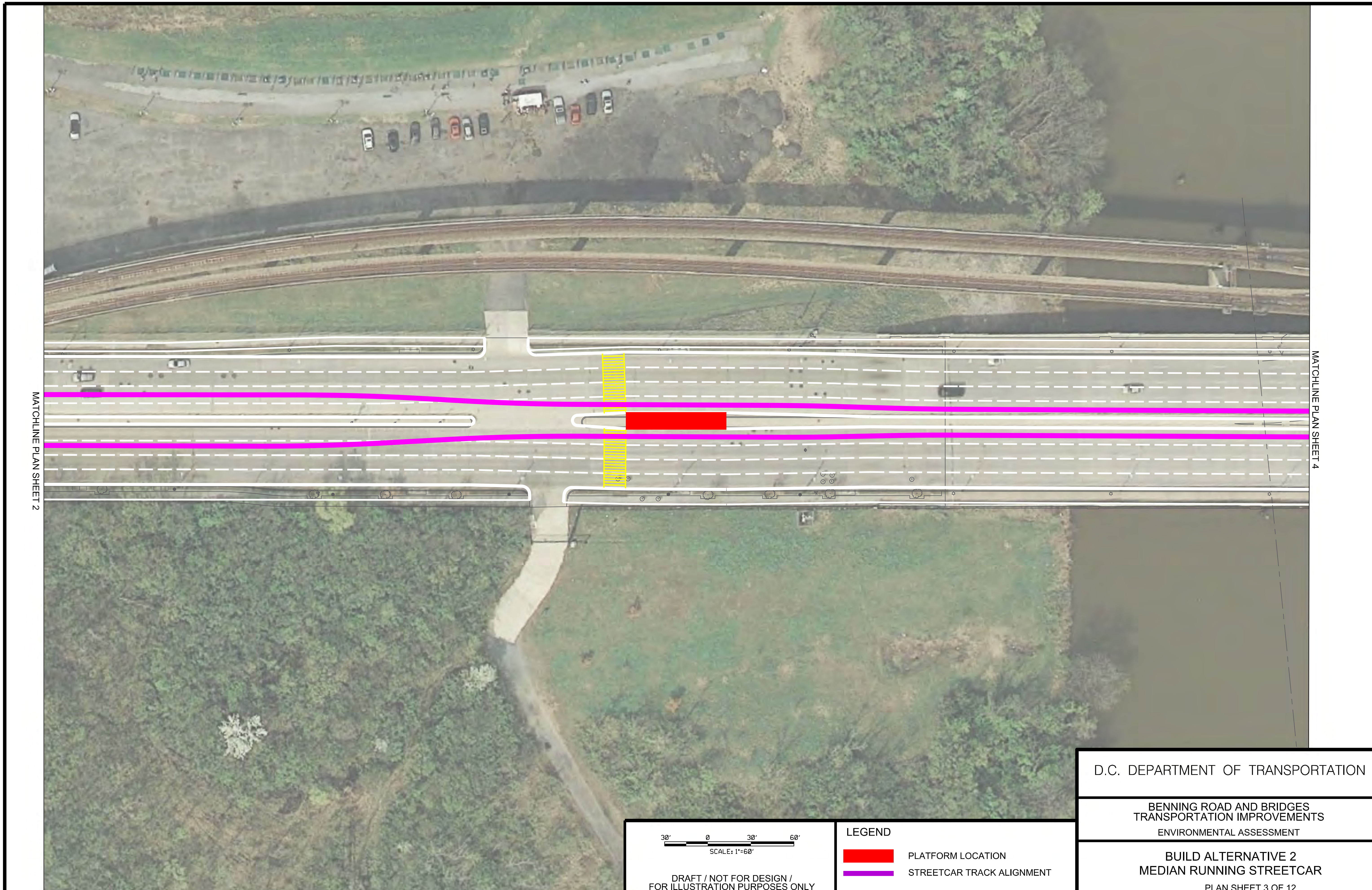
MEDIAN RUNNING STREETCAR

PLAN SHEET 2 OF 12



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FOR ILLUSTRATION PURPOSES ONLY

LEGEND

PLATFORM LOCATION

STREETCAR TRACK ALIGNMENT

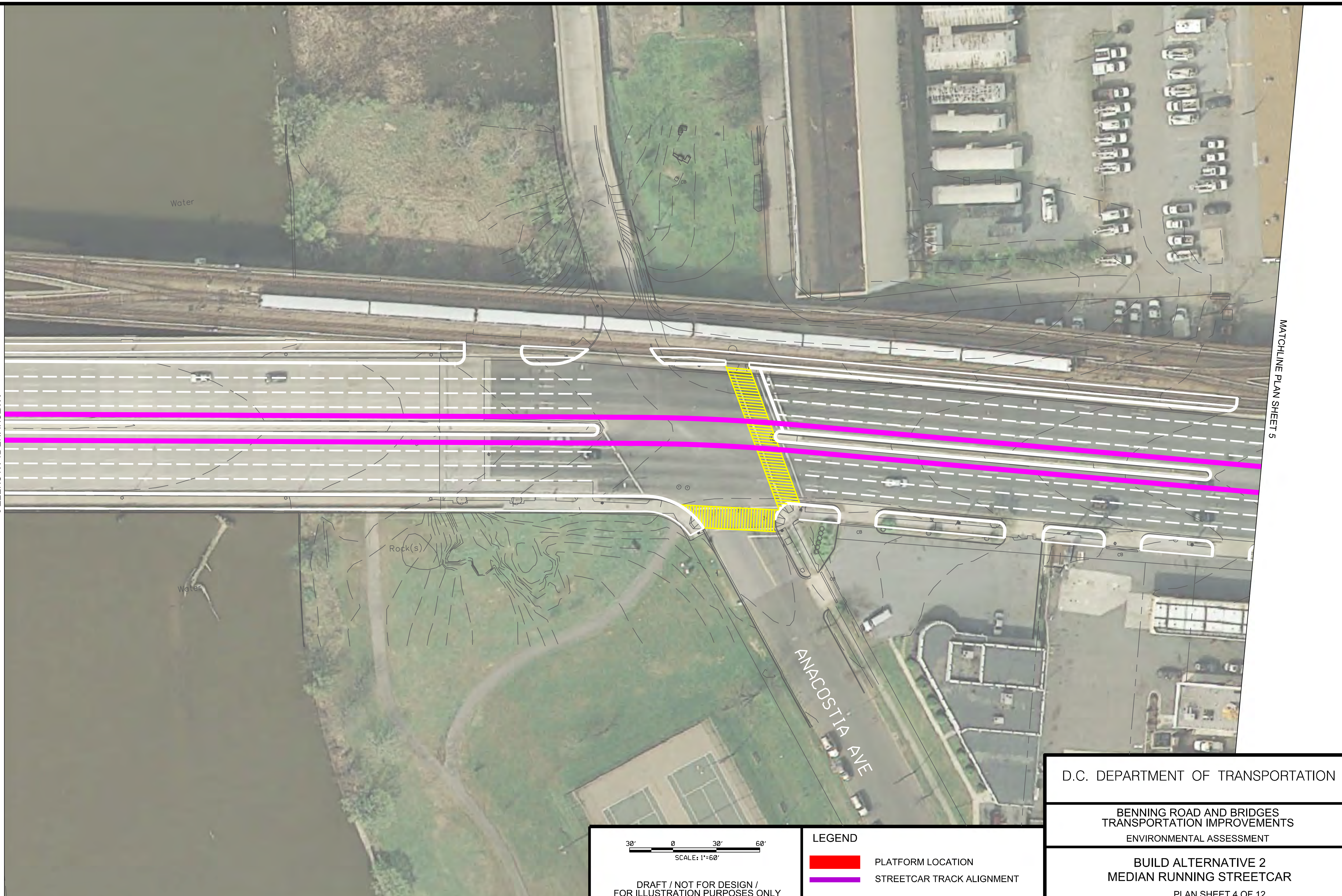
D.C. DEPARTMENT OF TRANSPORTATION

BENNING ROAD AND BRIDGES
TRANSPORTATION IMPROVEMENTS

ENVIRONMENTAL ASSESSMENT

BUILD ALTERNATIVE 2
MEDIAN RUNNING STREETCAR

PLAN SHEET 3 OF 12



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PLATFORM LOCATION

STREETCAR TRACK ALIGNMENT

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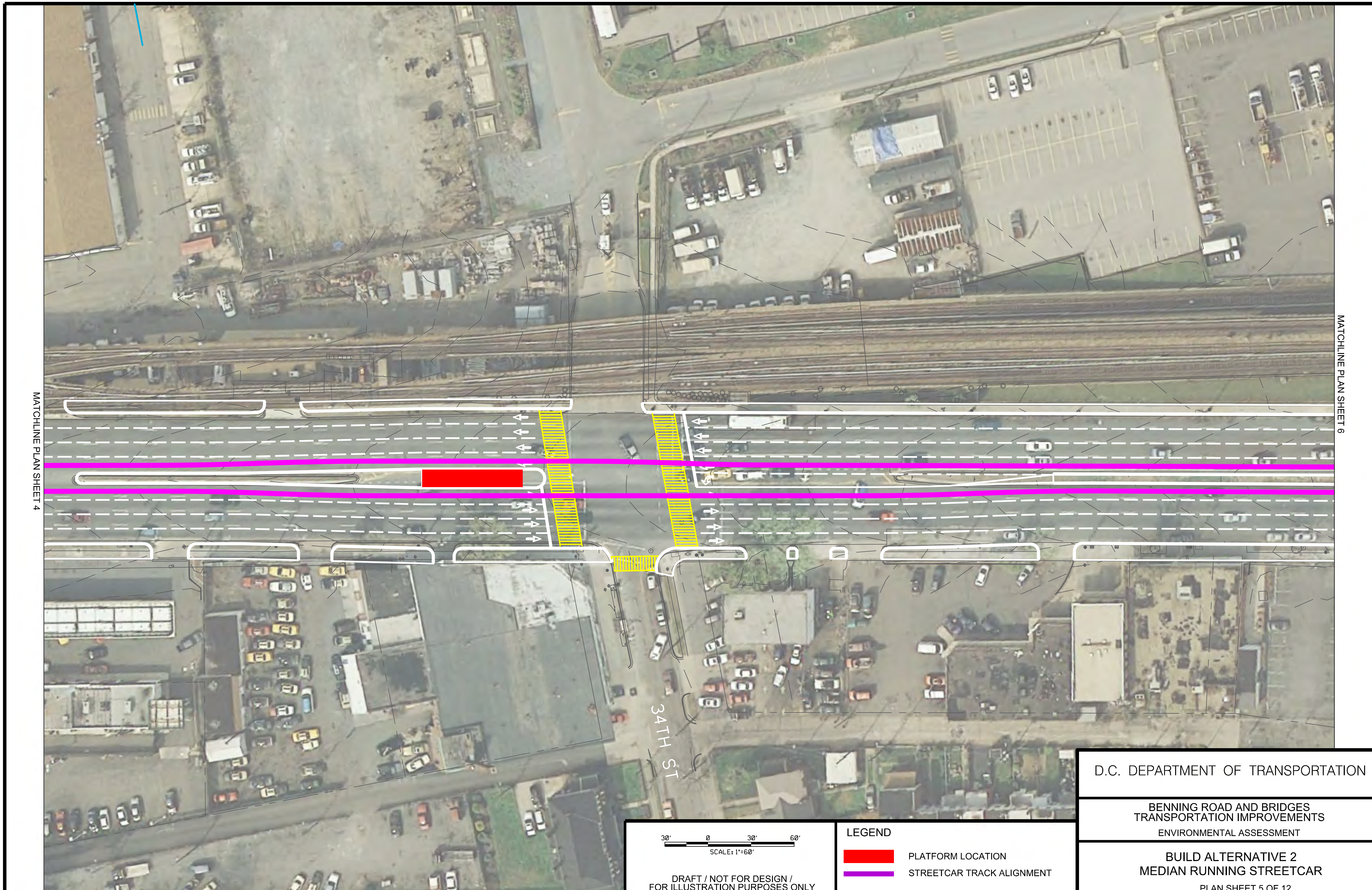

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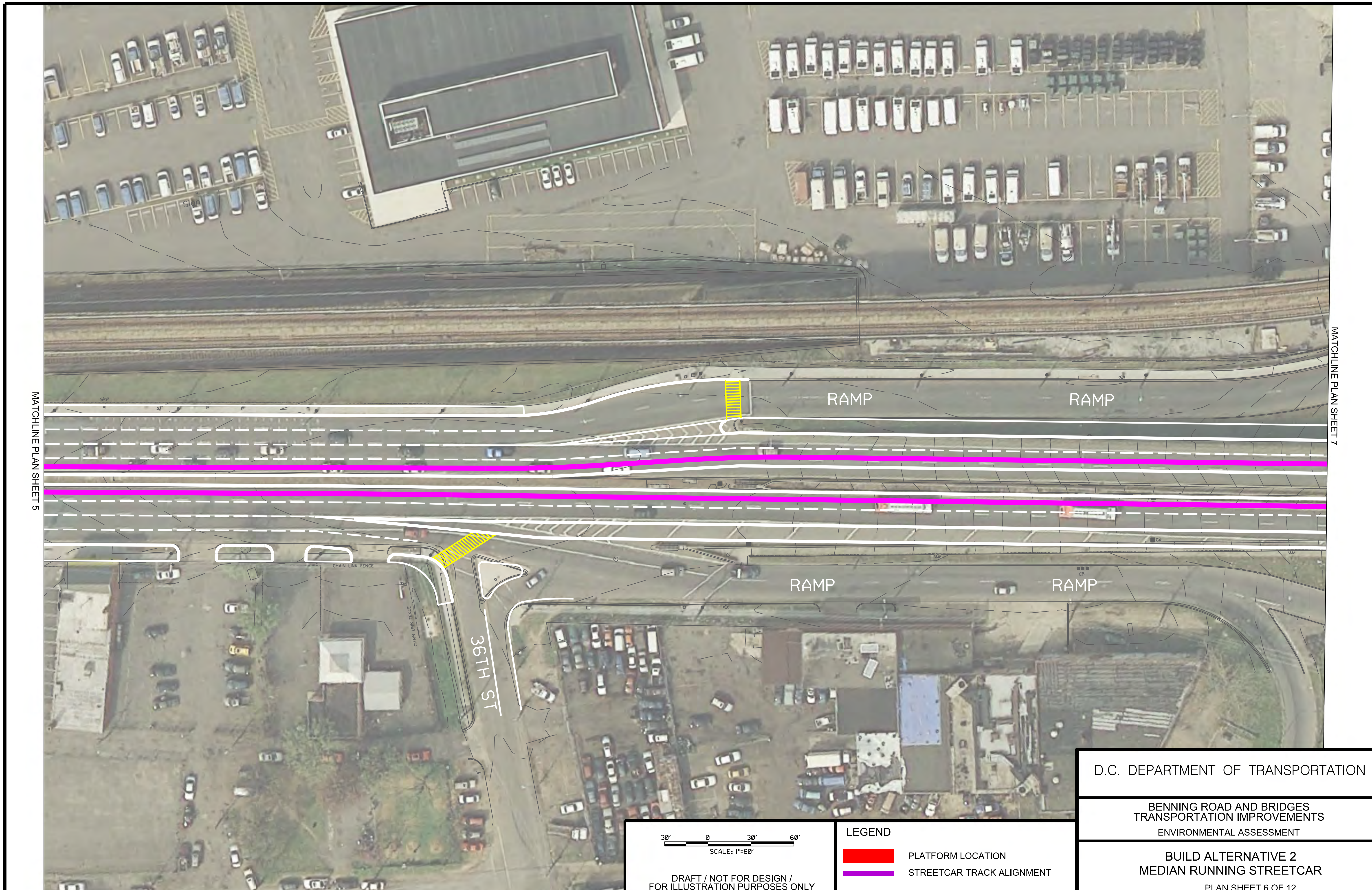

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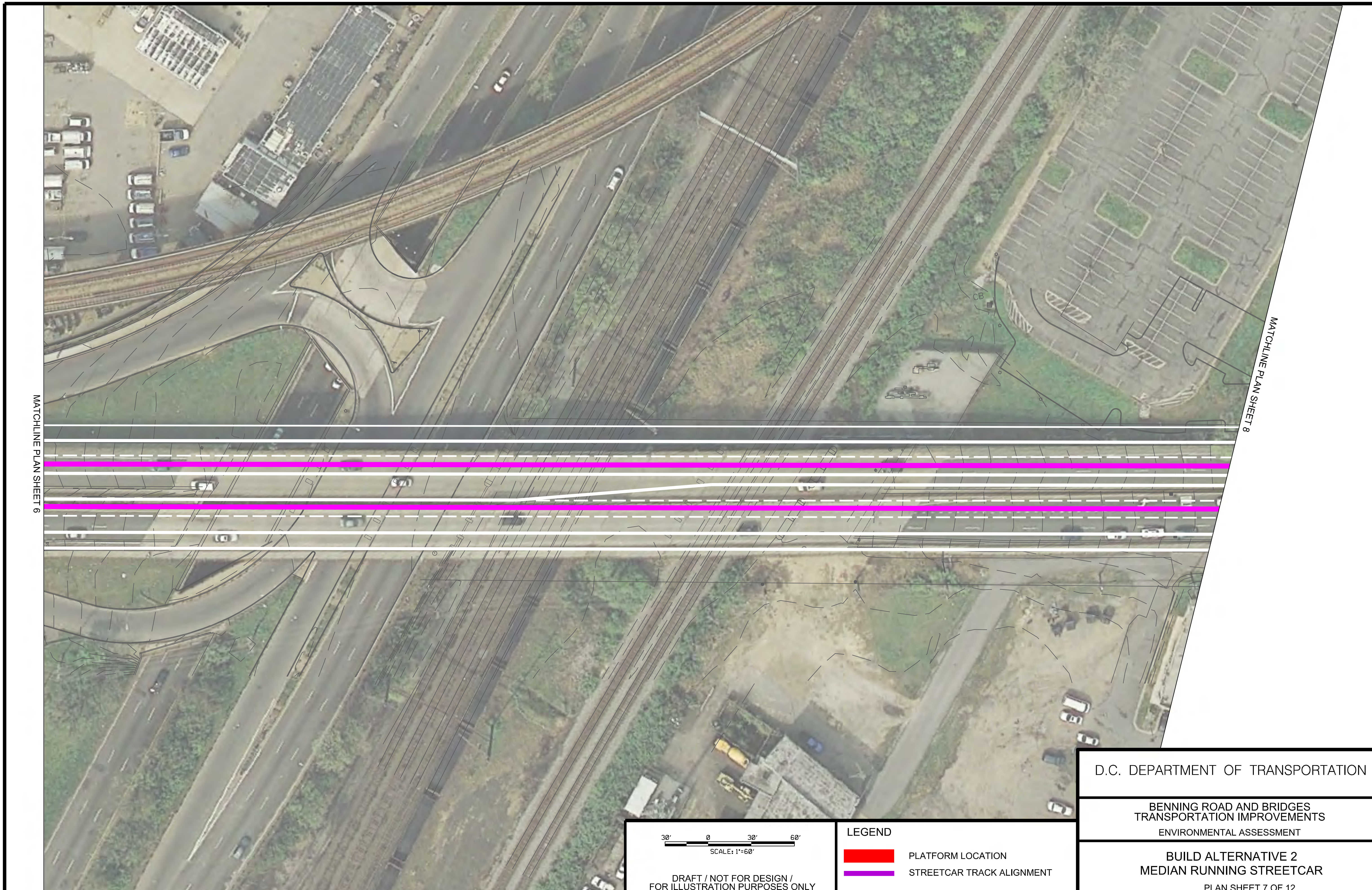

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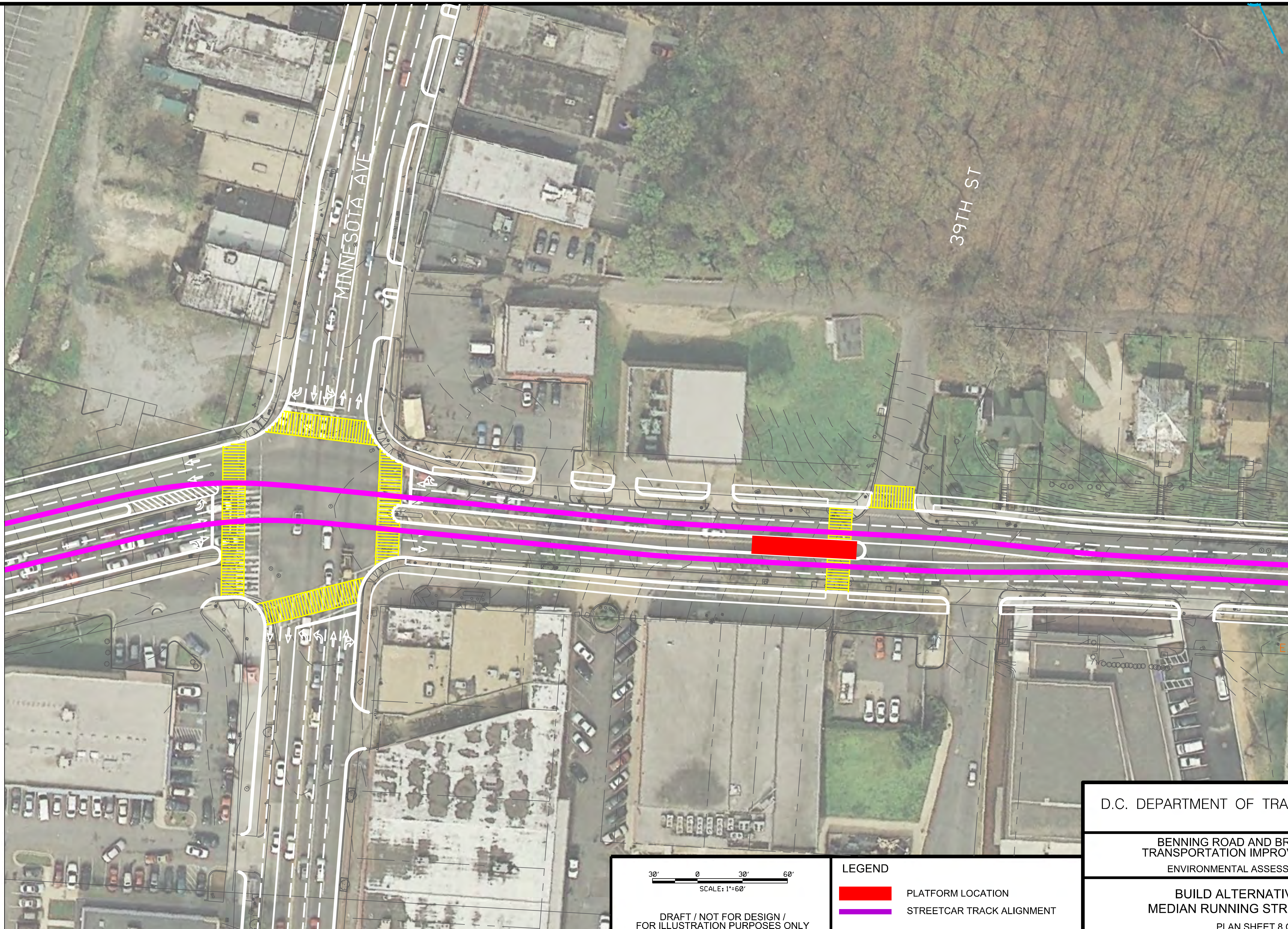
PLAN SHEET 7 OF 12



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D.C. DEPARTMENT OF TRANSPORTATION

BENNING ROAD AND BRIDGES
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ENVIRONMENTAL ASSESSMENT

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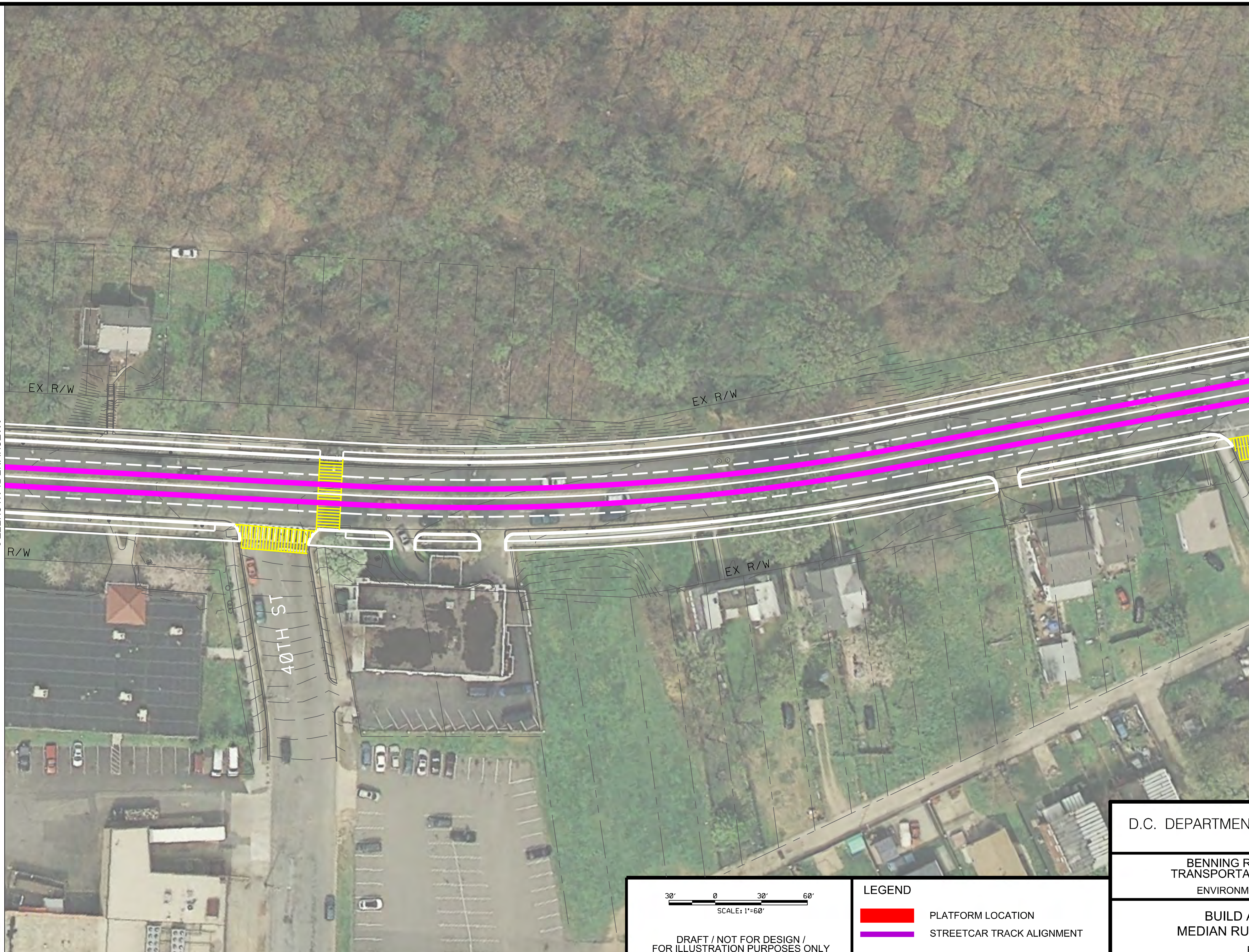

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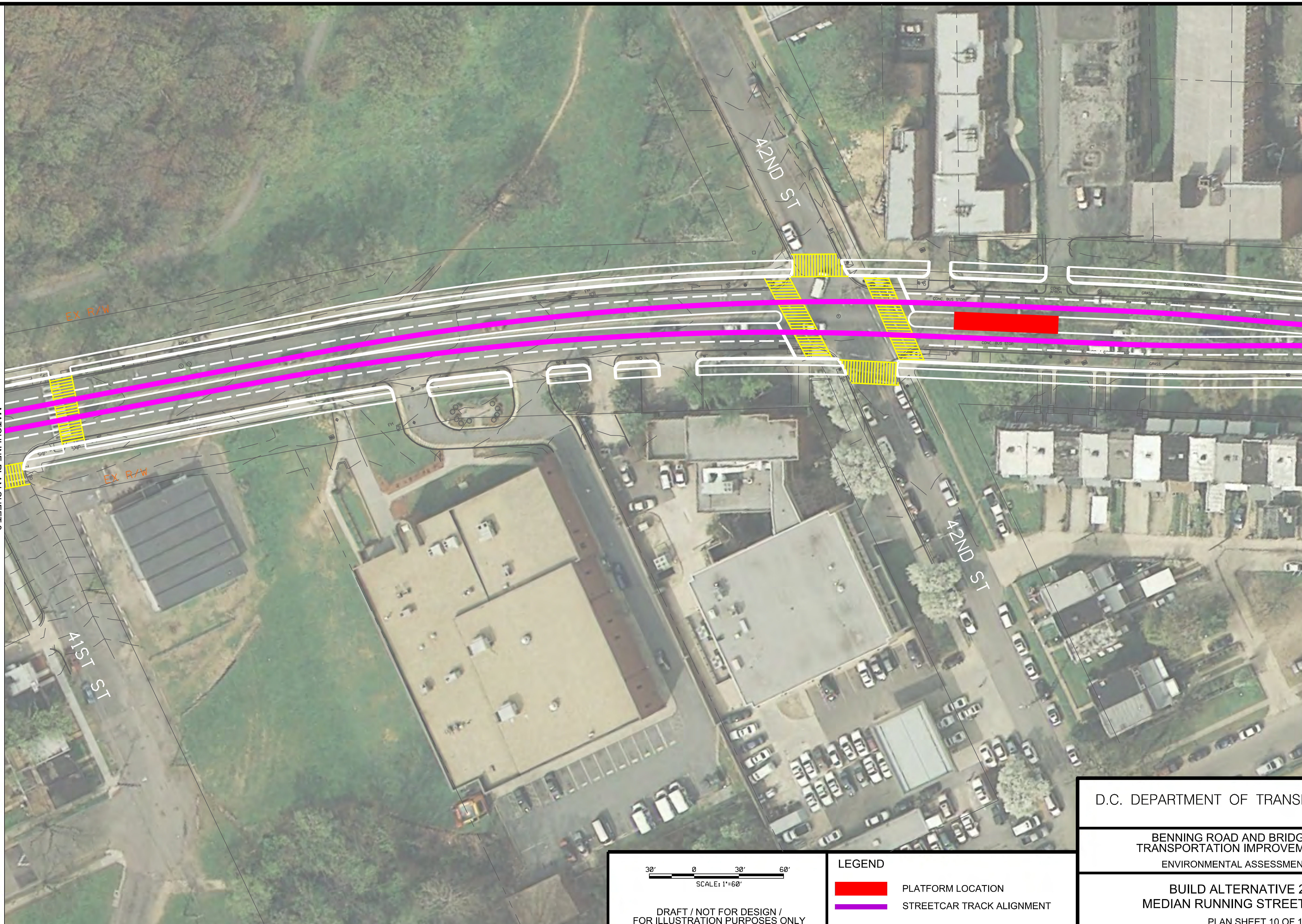
PLAN SHEET 9 OF 12



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PLATFORM LOCATION

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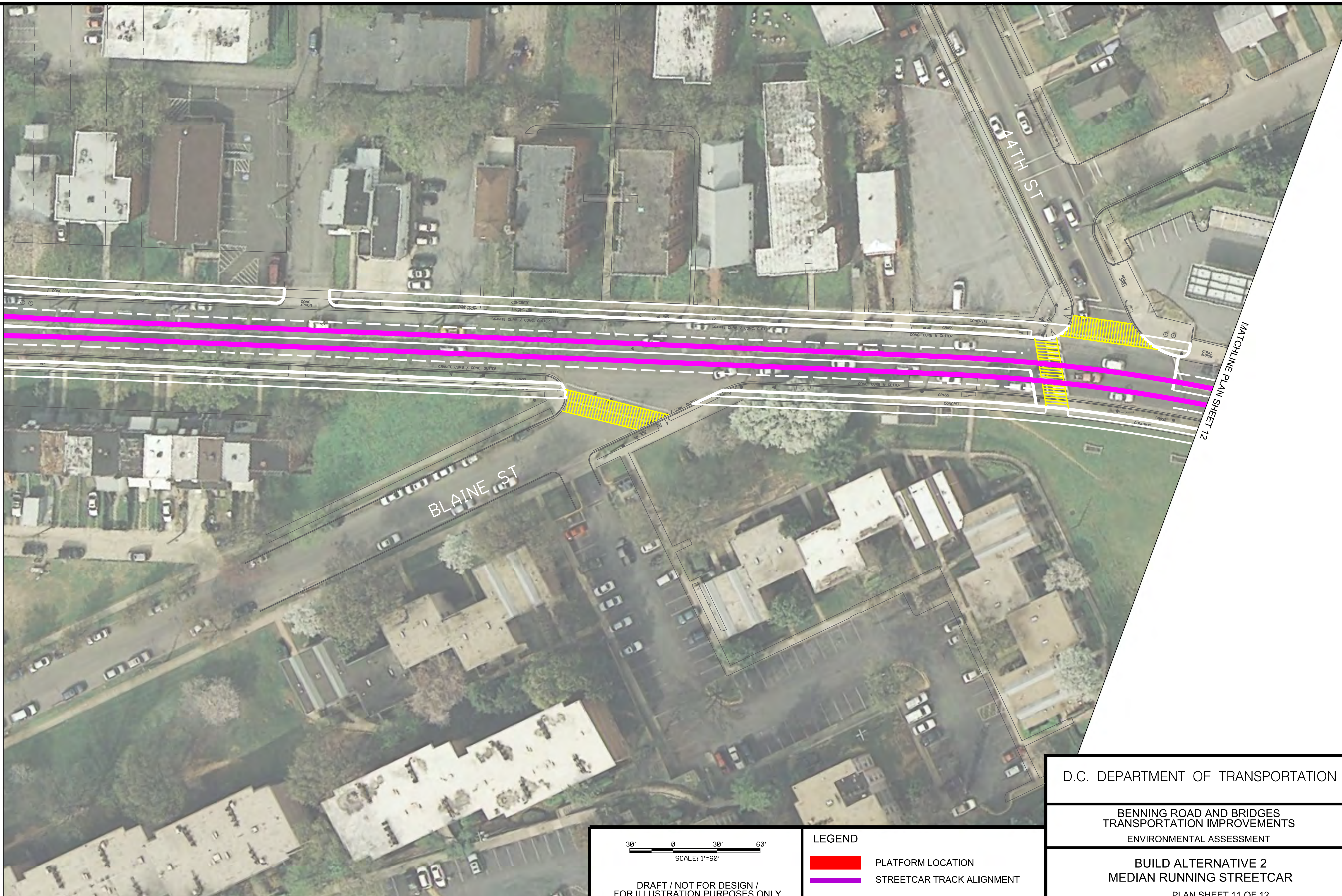
PLAN SHEET 10 OF 12



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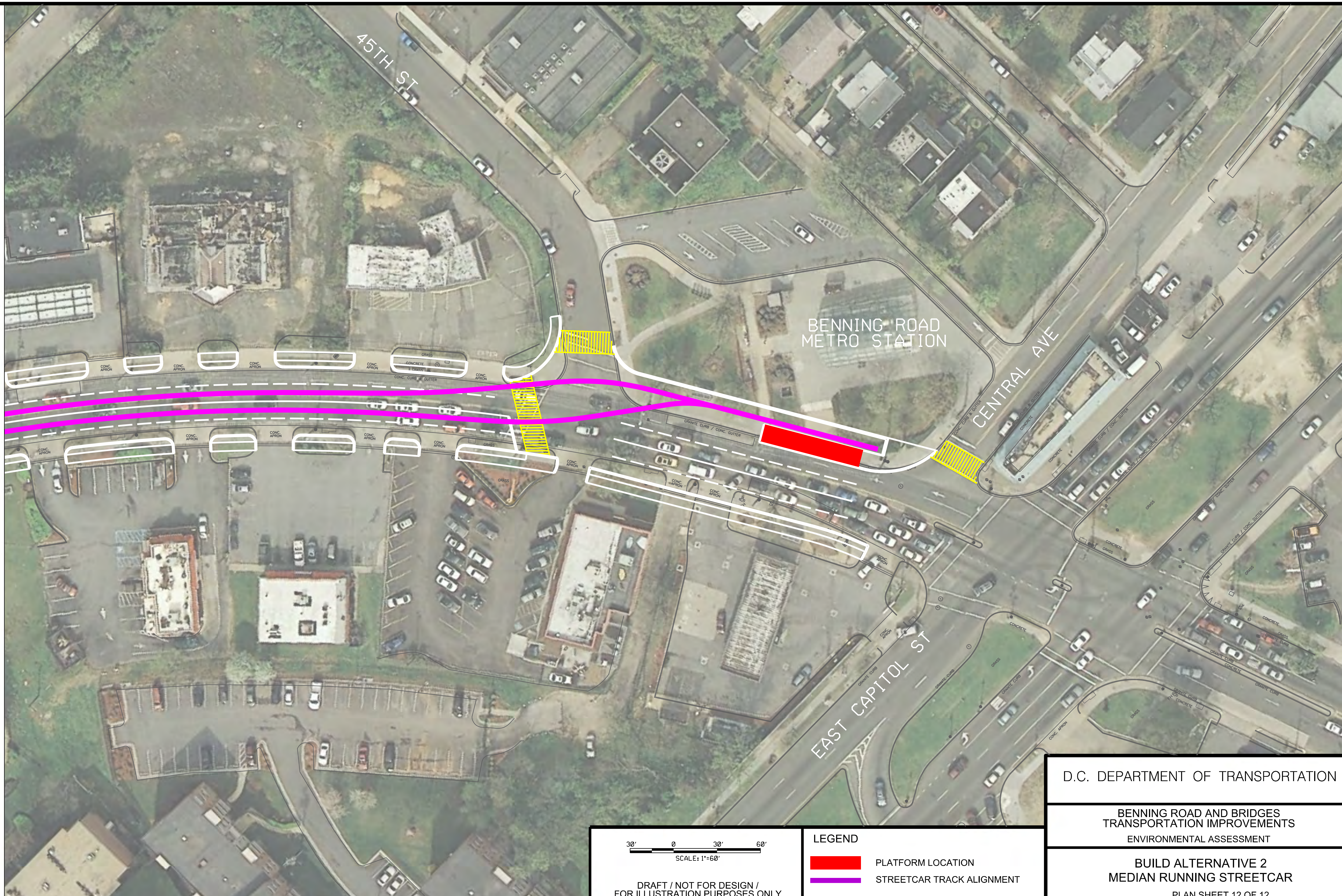

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ENVIRONMENTAL ASSESSMENT

BUILD ALTERNATIVE 2
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BENNING ROAD & BRIDGES TRANSPORTATION IMPROVEMENTS

COST ESTIMATES

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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

BENNING ROAD & BRIDGES TRANSPORTATION IMPROVEMENTS

MAINTENANCE OF TRAFFIC CONCEPT PLAN

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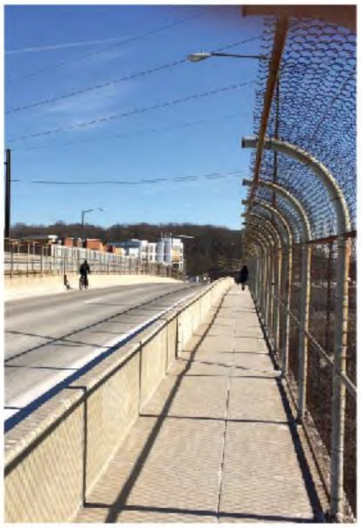

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1.0 Introduction and Purpose

Temporary traffic impacts due to the project's construction include extended travel times, reduced speed limits, temporary elimination of on-street parking. Lane closures are also anticipated due to the replacement of the Viaduct Bridges, track construction and intersection improvements. This Maintenance of Traffic (MOT) concept plan describes key strategies and factors to facilitate traffic flow and safety through and around work zones.

As the design of the project is advanced, a more detailed MOT plan would be developed based on the construction phasing for the project. Construction phasing must be sequenced in a manner that maintains services of major transportation facilities while preserving access to adjacent developments.

The MOT plan would include details on how all modes (automobiles, transit, pedestrians, and bicycles) would be accommodated in each phase and address how access, parking, and loading/unloading operations would be provided or maintained. The MOT plan would also include a demolition plan, which would provide a basis for determining the staging areas for the contractor of the major infrastructure elements. Staging is defined as the positioning of equipment and materials during construction. Phasing is defined as the sequencing of construction activities to complete the project. The following topics are the basis of the MOT Plan:

- Phasing Plan
- Staging Areas
- Work Hour Limitations/Restrictions
- Coordination with Local Churches
- Minnesota Avenue Intersection
- Pedestrian Safety and Access
- Project Coordination
- Potential Alternative Routes
- Traffic approaching the construction areas from the north, south, east and west.

Each topic is discussed in more detail in the following sections.

1.1 Phasing Plan

Phasing of construction activities will be sequenced according to the Phasing and Staging Plan as shown in **Figure 1**. The plan maintains services of major transportation facilities while preserving access to adjacent developments. The demolition plan, which will provide a basis for determining the staging areas for the contractor, will influence the construction phasing of the major infrastructure elements.

Figure 1: Staging and Phasing Plan

As the project is constructed, one lane of traffic would be maintained on Benning Road in each direction, whether for roadway or bridge work. The roadway work would be constructed in three major stages to accommodate two-way traffic at all times. Pedestrian access and safe mobility would also be accounted for throughout construction. Since vehicle, pedestrian and worker safety is paramount, construction warning signs must be installed to alert all users of construction activities in the area. Use of variable message boards and flagmen would be used to maintain safe travel throughout the corridor. A safety officer shall be designated for the project to ensure compliance with the phasing plan.

General staging of the Viaduct Bridges typically necessitates that the widened side of the bridge to be replaced first. This provides for one existing half of the Viaduct to remain intact maintaining a pedestrian sidewalk and one lane of traffic each way while the other half is removed and replaced. Once the new half of the Viaduct Bridge is built, pedestrian access and vehicle traffic would be moved onto it to allow for removal and replacement of the remaining half of the existing Viaduct Bridge.

There would be additional staging and brief closures at the major intersections that could be scheduled during weekend hours. This is primarily to facilitate installation of the streetcar tracks.

The duration of the construction is anticipated to be 36 months.

2.0 Staging Areas

To minimize the disruption caused by construction vehicles and equipment, the staging areas should be close to the road or structure that is under construction. This is difficult due to the dense urban setting that the Benning Road corridor is set in. Towards Oklahoma Avenue, the south side of Benning Road has Anacostia Park Section F where the Capitol Grand Prix was held. This site could possibly be used for staging or storage. Additionally, near 42nd Street there is open private land to the north of Benning Road that could be negotiated for temporary construction staging.

3.0 Work Hour Limitations/Restrictions

Although a construction schedule has not been developed, the project would likely limit night-time construction activities along certain sections of the project. The proximity of private residences may limit night-time construction activities, especially from Minnesota Avenue to the Benning Road Metrorail Station. However, night work may be necessary for girder erection and other activities that would require lane closures. For the less residential project sections, provisions to allow night work could also shorten construction duration and limit overall inconvenience to the community.

4.0 Coordination with Local Churches

On account of active religious congregations within the project area, close coordination is recommended to minimize disturbance to church activities. During initial public outreach, concern was raised that construction activities could impact several churches along Benning Road, and in particular funerals which utilize Benning Road for hearse loading and unloading. A more detailed and current assessment should be conducted after developing the construction schedule so that regular church activities and schedule disruptions are kept to a minimum.

5.0 Minnesota Avenue Intersection

Bridge reconstruction and track work installation near and through the intersection is expected to make certain turning movements temporarily inaccessible during construction. Likewise, utility relocations would also impact vehicular movements. Alternate routes should be well established and clearly marked to minimize this disruption. Alternative routes have been identified and are described in **Section 9** of this document.

6.0 Pedestrian Safety and Access

Throughout construction, safe pedestrian access must be maintained. The south side of Benning Road supports a moderate amount of pedestrian traffic west of Minnesota Avenue. Both the north and south sides of Benning Road support pedestrian movement east of Minnesota Avenue. When the project moves forward to implementation, the project would need to incorporate safety and access considerations into the final design and construction requirements to prevent unmonitored pedestrian access. Safety fencing, signing, temporary curb ramps, and well-delineated, well-lit pedestrian paths would be necessary to safely accommodate pedestrian and bicycle traffic. Specifically, there is a need to maintain pedestrian access over the Benning Road Viaduct Bridge during construction so that at no time is this pedestrian movement prohibited.

7.0 Maintenance of Access Plan

Construction along Benning Road would require a Maintenance of Access (MOA) Plan to maintain pedestrian and vehicular access to residences, businesses and other properties during project construction. Bus stop accessibility would have to be maintained during construction and would need to be addressed particularly for the curb running streetcar alternative (Build Alternative 1).

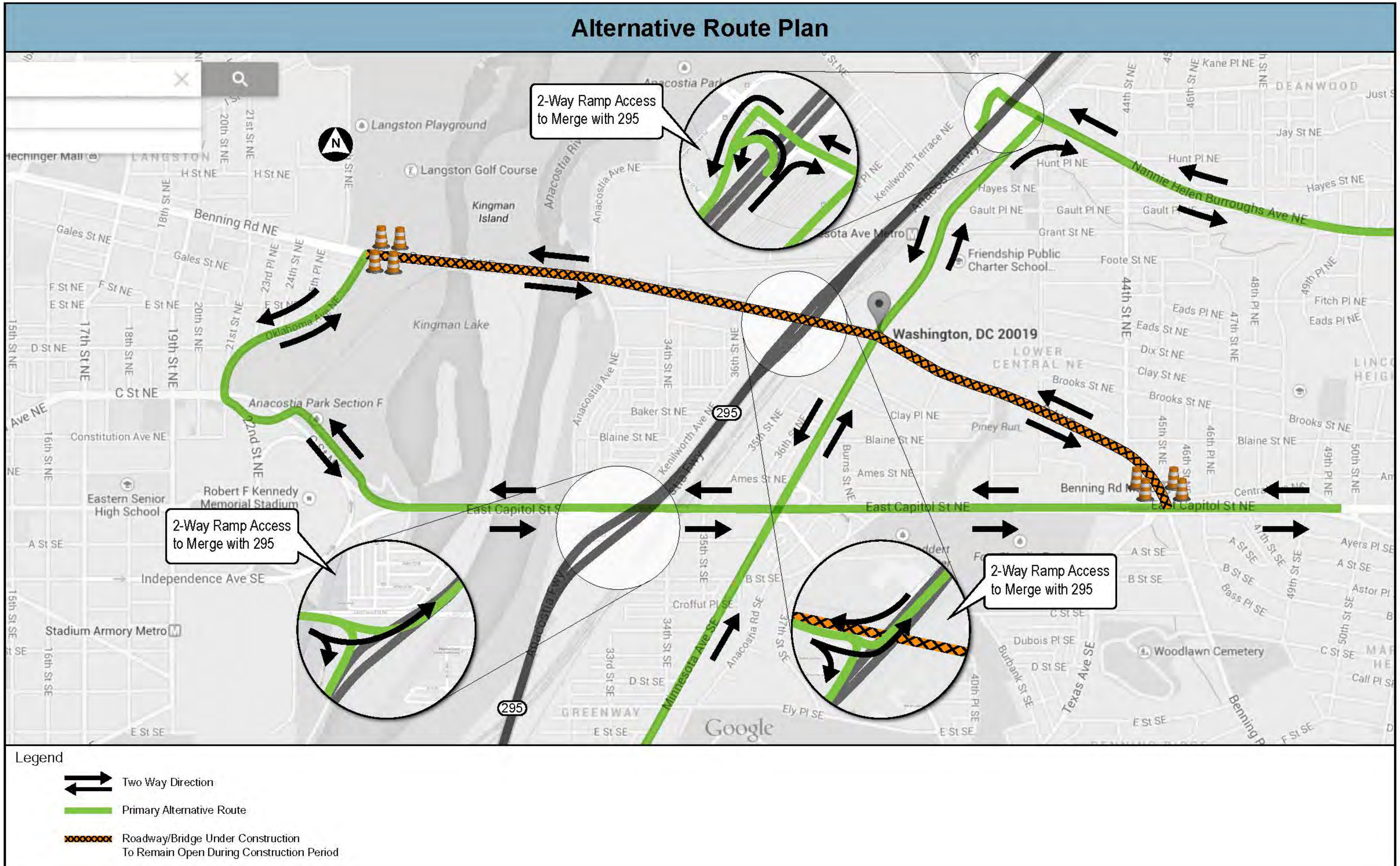
8.0 Project Coordination

Project coordination has the potential to reduce mobility and safety impacts of work zone activities. Coordinating, sequencing, and scheduling of construction projects would be conducted to minimize motorist delay and impacts on potentially affected businesses and communities. Coordination with non-highway transportation facilities including transit would also be conducted.

9.0 Potential Alternative Routes

The MOT plan would not include a detour plan, i.e., the complete closure of Benning Road during construction operations. It would, however, include an alternate route plan to minimize disruptions and delays through the work zone for the duration of the project. If during design, it is determined that full closure of Benning Road in the work zone is preferred, then it may occur intermittently or during off-peak hours, nights and weekends. The following alternate routes, shown in **Figure 2**, have been identified for traffic during construction to help minimize disruptions and delays.

Figure 2: Alternative Route Plan



10.0 Traffic Approaching East and West

East Capitol Street between Benning Road and C Street: East Capitol Street is a principal arterial and would serve as a primary alternative route to AM and PM traffic going into downtown DC via Anacostia Freeway (DC-295). The intersection of Benning Road and East Capitol Street is a three-lane roadway in both directions separated by a median. Some segments of the median are concrete while other segments are grass. Sidewalks are provided and well-delineated on both sides of East Capitol Street to shield pedestrians from motorists. The segment of East Capitol Street where it crosses over the Anacostia River (Whitney Young Memorial Bridge) continues as a three-lane roadway in both directions with a narrow concrete median and guardrails to protect vehicles and pedestrians. West of the bridge, East Capitol Street terminates at C Street.

C Street; Oklahoma Avenue and 21st Street: C Street is classified as a minor arterial road. It is a three-lane one directional roadway with a sidewalk on the north side. It merges with 21st Street on a circular alignment with the Robert F. Kennedy Memorial Stadium at the center of the roadway. This alternative route would serve AM and PM traffic coming to and from East Capitol Street to connect to Benning Road via 21st Street and Oklahoma Avenue.

Oklahoma Avenue is classified as a collector road between 21st Street and Benning Road. It is a two lane roadway (one lane in each direction) with parking and sidewalks along both sides. It is also a marked bicycle route. The distance from C Street and Oklahoma Avenue is approximately 0.43 miles, making it a short distance for vehicles to access the west section of Benning Road.

21st Street is classified as a collector road between Oklahoma Avenue and Benning Road. It is a two lane roadway (one lane in each direction) with parking and sidewalks along both sides. 21st Street terminates at Oklahoma Avenue, making Benning Road accessible via 21st Street.

11.0 Traffic Approaching North and South

Kenilworth Avenue (DC-295) between Nannie Helen Burroughs Avenue and Benning Road On-Ramp: Kenilworth Avenue is classified as an Other Freeway and Expressway. It will serve as a primary alternate route for local traffic approaching Benning Road from local neighborhoods in close proximity to the study area via Minnesota Avenue and Nannie Helen Burroughs Avenue for both AM and PM traffic during the construction activities on the Viaduct Bridge over DC-295.

Nannie Helen Burroughs Avenue is classified as a minor arterial roadway and has a concrete median to separate vehicles in both directions of traffic flow at the interchange. It lies below the DC-295 off ramp and Kenilworth Avenue via a four-leg signalized intersection.

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BENNING ROAD & BRIDGES TRANSPORTATION IMPROVEMENTS

TRANSPORTATION TECHNICAL MEMORANDUM

DRAFT MAY 2016

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1.0 Introduction

This technical memorandum provides an overview of transportation analyses conducted for the Benning Road and Bridges Transportation Improvements Environmental Assessment (EA). This memorandum describes the technical methodologies and presents results of the traffic analysis, including the ridership projections for the proposed Benning Road Streetcar Extension. The rest of this memorandum is organized as follows:

- Methodology
- Existing Conditions
- Opening Year 2018 Conditions
- Design Year 2040 Conditions

2.0 Methodology

Travel demand forecasts were prepared for the study area that reflect both the regional context and localized land use and transportation characteristics. These forecasts are used to test the general capacity and connectivity of the existing and planned transportation networks, and serve as inputs to the detailed traffic simulation model. Detailed information regarding travel demand forecasting and traffic analysis is provided in the following sections.

2.1 Travel Demand Forecast

The travel demand forecasting model for the Benning Road EA was developed based on the Version 2.3.52 regional travel demand model produced and distributed by the Metropolitan Washington Council of Governments (MWCOG). The MWCOG model is a four-step travel demand model that was designed to estimate travel in the Washington Metropolitan area at a regional scale. The four basic steps incorporated into the MWCOG regional model are:

- Trip Generation
- Trip Distribution
- Mode Choice
- Trip Assignment.

Travel demand forecasting models are designed and developed to model traffic on an "average" weekday. As such, the traffic generated by the model is related to the types of trips that are taken on a daily basis, such as work, shopping, and school. These types of trips are generated based on the land use characteristics associated with each of the traffic analysis zones. The number of trips generated by and attracted to each zone is proportional to the amount of activity (residents and jobs) in the zone.

Aside from residents and employment, other types of land uses can also cause travel not captured by the five trip purposes used in the travel demand forecasting process. Tourist attractions, such as monuments or museums, or airports can cause travel demand out of proportion to the number of jobs located nearby. The MWCOG model accounts for many of these trips separately and includes separate trip tables for visitor and airport trips. It should be noted that while the forecasting model does address some of these special types of trips, it is still accounting for them on an “average weekday” and does not address peak seasons or special events.

Based on this methodology, this study developed the Benning Road model to include forecasts for traffic and transit volumes on facilities throughout the region, including Metrorail station boardings, bus ridership, and roadway volumes which are used as inputs to a traffic micro-simulation model, VISSIM.

Several changes and improvements were made to the standard regional model in order to estimate travel demand accurately at a detailed level for highway and transit facilities in the study area. Of primary concern was the ability to forecast changes in travel patterns at a small scale based on new development proposals and local roadway configurations. To accommodate this need, the Benning Road model developed a finer system of Traffic Analysis Zones (TAZs) and a finer roadway network that includes many additional roadways in the study area. These improvements are discussed further in the following sections.

2.1.1 Traffic Analysis Zones

All travel forecasting models, including the MWCOG and Benning Road Study models, use a system of TAZs to represent the structure of the region they represent. These zones are typically smaller in denser, more populated areas, and larger in lower density, more rural areas. Origins and destinations for all travel are assigned to these TAZs based on development patterns, land use, and demographic data.

The project team reviewed the existing development patterns within the extended study area so as to create a finer zone structure that would better represent changes to local travel demand and transit access. Since walking distances to or from the proposed streetcar has a significant impact on the probability that a given trip will choose the streetcar alternative, the 11 MWCOG TAZs within the study area were disaggregated into 31 analysis zones for the Benning Road model.

The final zone structure used for the Benning Road model includes a total of 3710 internal zones, as compared to 3675 for the MWCOG model. The full MWCOG model structure, including all scripts and input files, was updated to accommodate these additional zones.

2.1.2 Transportation Networks

Travel demand forecasting models use roadway and transit networks to represent the transportation system in the study area. Both the MWCOG roadway and transit networks were updated to match the new structure of the Benning Road model, as detailed below.

2.1.2.1 Roadway Network

Along with a more detailed zone structure, a more detailed roadway network was needed to accurately capture travel on the facilities in the study area. The MWCOG roadway networks are designed to represent regional traffic flows, and as such include mostly regional facilities. Freeways, expressways, arterials and collectors are included in the MWCOG network. Smaller, local streets are typically not included because they are usually at a smaller scale than the zone structure and are therefore represented by the centroid connectors. With the finer zone structure implemented for the Benning Road model, local roadways were added to the roadway network (**Figure 1**).

2.1.2.2 Transit Network

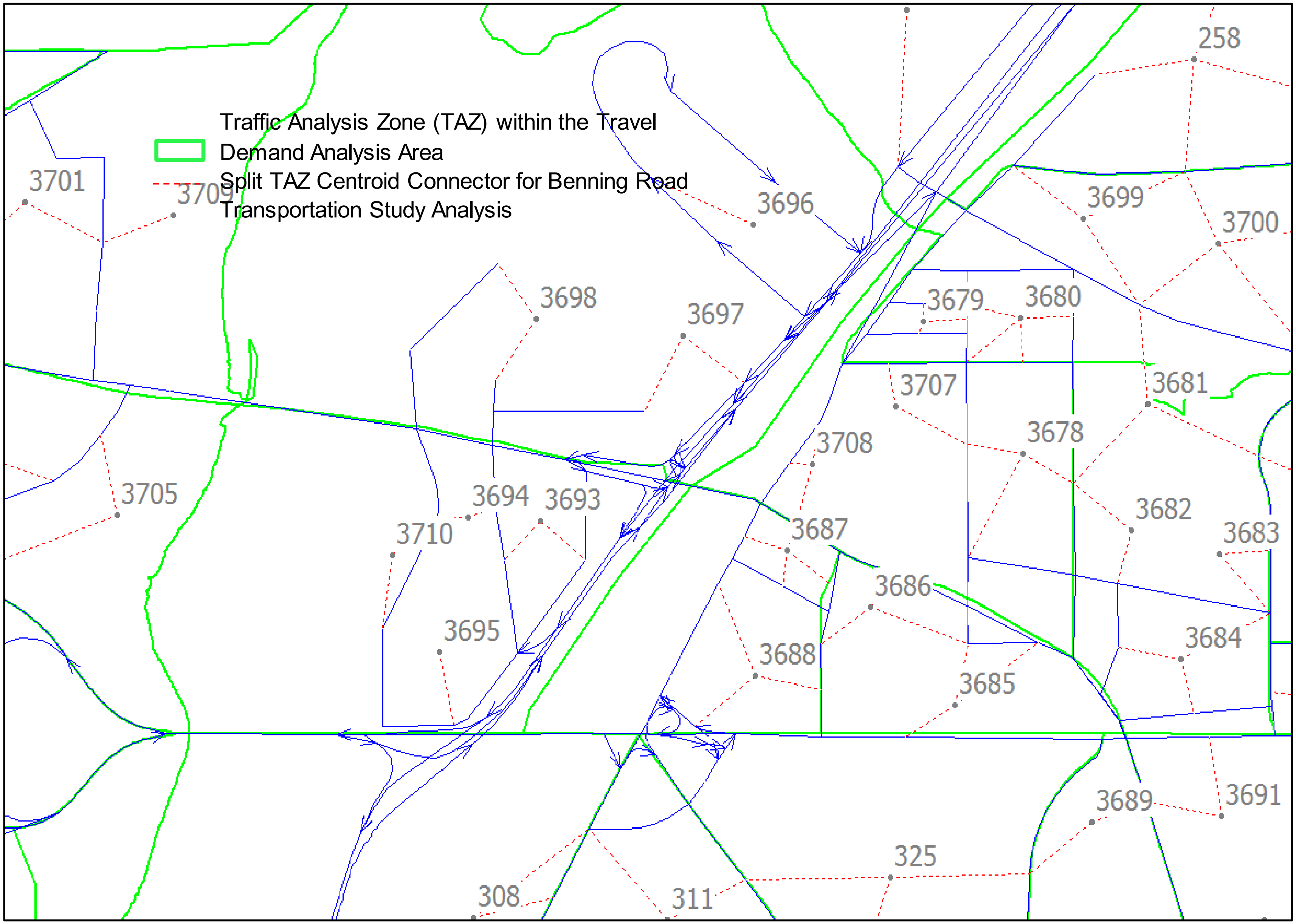
Transit networks including stop locations, bus and rail frequencies, and routing was the final major input to the travel demand forecasting model. This data is collected by MWCOG from individual service providers. The Benning Road forecasting model uses the MWCOG transit network for the appropriate analysis year adapted to operate on the modified roadway network.

2.1.2.3 Land Use

Land use data is an important input into the travel demand forecasting process and indicates the quantity and density of residents and jobs throughout the model region. Existing and forecasted land use information is developed through a coordinated regional process led by MWCOG. The MWCOG Round 8.2 Cooperative Land Use Forecasts was the most current data source at the start of this project, and was used as the basis for all land use calculations for the Benning Road model. Variables calculated in the land use data include:

- Households
- Population (both in households and in group)
- Employment in several sectors:
    - Industrial
    - Retail
    - Office
    - Other (i.e. hotels)
- Income distribution of residents

Figure 1: Study Area Traffic Analysis Zones (TAZ)



2.1.2.4 Model Validation

After the Benning Road travel demand forecasting model was constructed using a finer zone structure and more detailed roadway network, the model was validated to ensure that the model results accurately represented the traffic counts collected in the field. Several checks were performed to evaluate how well the model was recreating the existing conditions based on state-of-the-practice validation techniques, including those outlined in the Travel Model Validation and Reasonableness Checking Manual.

In addition to the model improvements highlighted above, more localized changes were made to fine-tune the distribution of traffic within the study area. This was done through the implementation of turning penalties to specific turning movements (particularly left turns). Locations for turning movement penalties were identified by comparing turning estimates to the traffic counts at seven key intersections in the study area. This allows for a better estimation of changes in traffic patterns caused by localized changes in roadway, transit, or land use conditions.

Several other checks were used to validate the Benning Road forecasting model for 2010. Transit ridership was also validated by comparing actual Metrorail boarding counts with the model results. Screenlines and signalized intersections traffic counts were constructed around the study area to validate the estimated amount of traffic entering and leaving the study area. Counts and estimated traffic volumes were compared at these screenlines and critical intersections.

2.2 Traffic Analysis

VISSIM micro-simulation model is used to analyze intersection conditions as well as the operations of the proposed Benning Road Streetcar extension. VISSIM is a multi-modal microscopic simulation model with the capability of simulating urban traffic and public transit operations, including various transit vehicle types, transit routes, and dwell time of passengers. The simulation is used to evaluate the traffic conditions in the future years as well as the operation of streetcar and its potential impacts on traffic.

2.2.1 Data Sources for VISSIM Analysis

Primary inputs to develop a VISSIM network include lane configuration, traffic volumes, transit information, and traffic signal timing/phasing information.

2.2.1.1 Lane Configuration

The number of lanes, length of turning lanes, and turning lane configurations were obtained using geographic information systems (GIS) data. GIS data was verified through field observations.

2.2.1.2 Traffic Volumes

Intersection turning movement counts including pedestrian and bicycle volumes were collected for the morning peak period (6:30 AM to 9:30 AM), midday (11 AM to 1 PM), and evening peak period (4 PM to 7 PM) at the study intersections. **Figure 2** shows the study intersections along

Benning Road and Minnesota Avenue. The study intersections along Benning Road and Minnesota Avenue include 11 signalized intersections and four unsignalized intersections.

The signalized intersections are:

1. Benning Road and 26th Street
2. Benning Road and Oklahoma Avenue
3. Benning Road and Anacostia Avenue
4. Benning Road and 34th Street
5. Benning Road and Minnesota Avenue
6. Benning Road and 42nd Street
7. Benning Road and 44th Street
8. Benning Road and East Capitol Street
9. Minnesota Avenue and Dix Street
10. Minnesota Avenue and Grant Street
11. Minnesota Avenue and Nannie Helen Burroughs Avenue

The unsignalized intersections are:

1. Benning Road and 45th Street
2. Benning Road and Central Avenue
3. Minnesota Avenue and Gault Place
4. Minnesota Avenue and Hayes Street

Counts were collected on Thursday, January 7, 2014 and included cars, trucks, pedestrians, and bicycles. 48 hours tube counts were conducted for two consecutive days (Thursday, January 7 and Friday, January 8) for on- and off-ramps, and along Benning Road and Minnesota Avenue, and included speed, vehicle classification, and traffic volume.

Intersection turning movement counts indicated significantly lower volumes along Benning Road than the 2010 and 2012 traffic volumes due to the ongoing construction at the intersection of 26th Street and Benning Road. **Figure 3** to **Figure 5** show the comparison of 2010/2012 traffic volumes (obtained for the Feasibility Study[1]) and the 2014 traffic counts at several locations along Benning Road and Minnesota Avenue. For comparison purposes, 2010/2012 volumes were projected to 2014 using the growth rate obtained by Washington Metropolitan Council of Governments (MWCOG) 2010 and 2020 models.

[1] http://www.dcstreetcar.com/wp-content/uploads/2013/04/Benning-Rd-Streetcar-Extension-Executive-Summary-April-2013-Final.pdf

Figure 2: Study Intersections along Benning Road and Minnesota Avenue

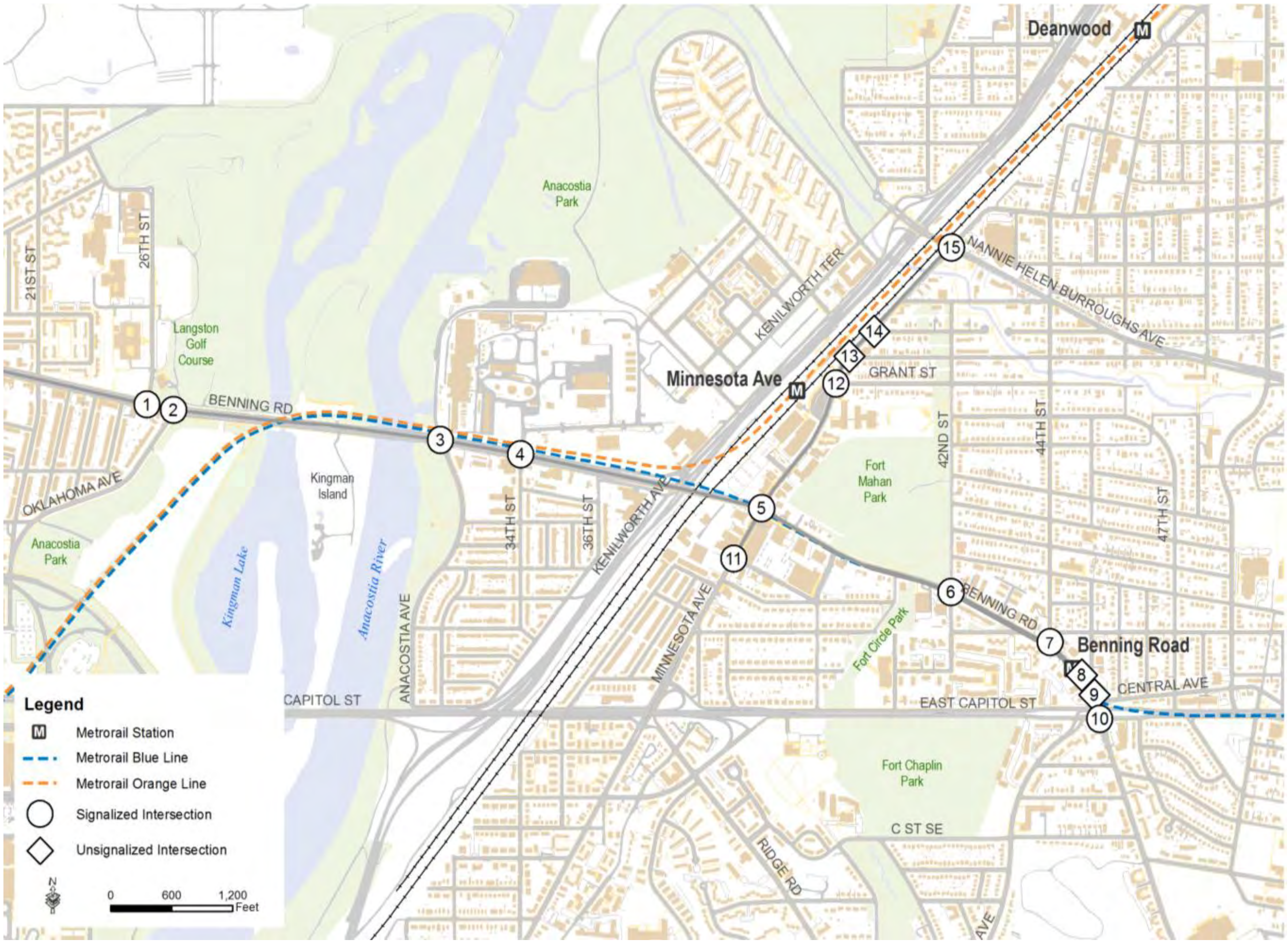


Figure 3: Comparison of 2010/2012 and 2014 traffic counts (1 of 3)

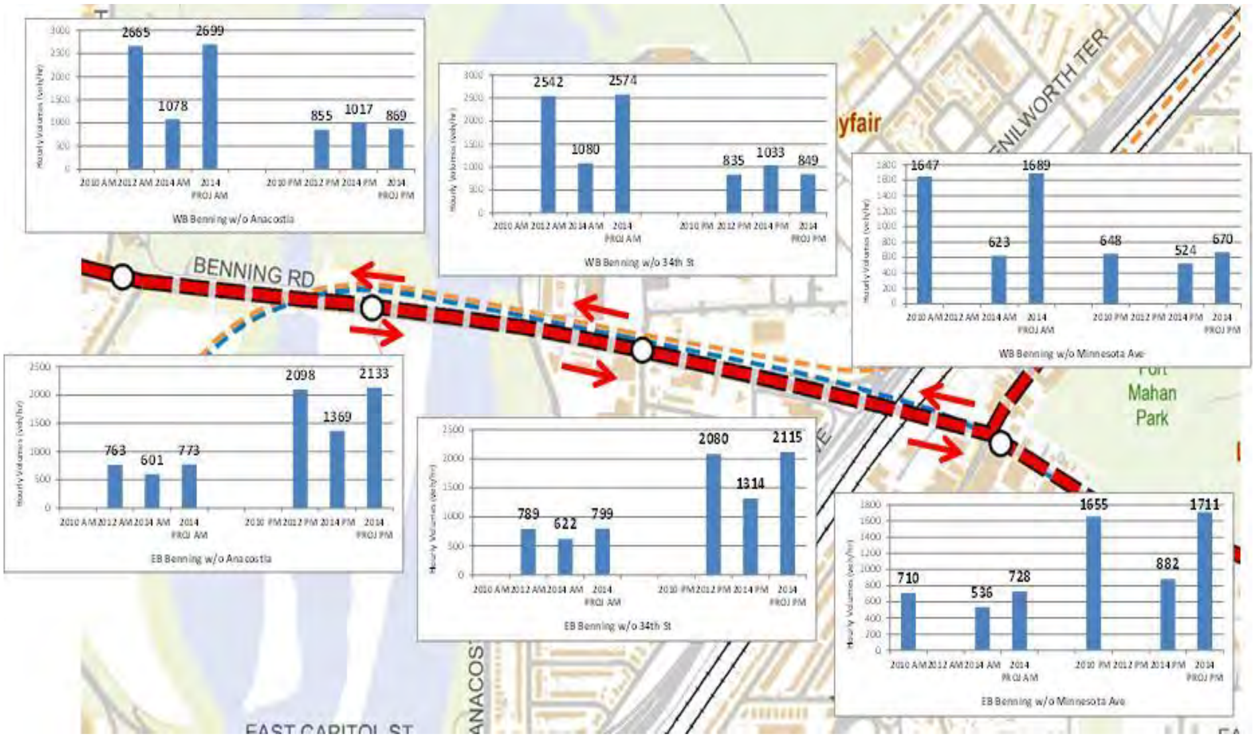


Figure 4: Comparison of 2010/2012 and 2014 traffic counts (2 of 3)

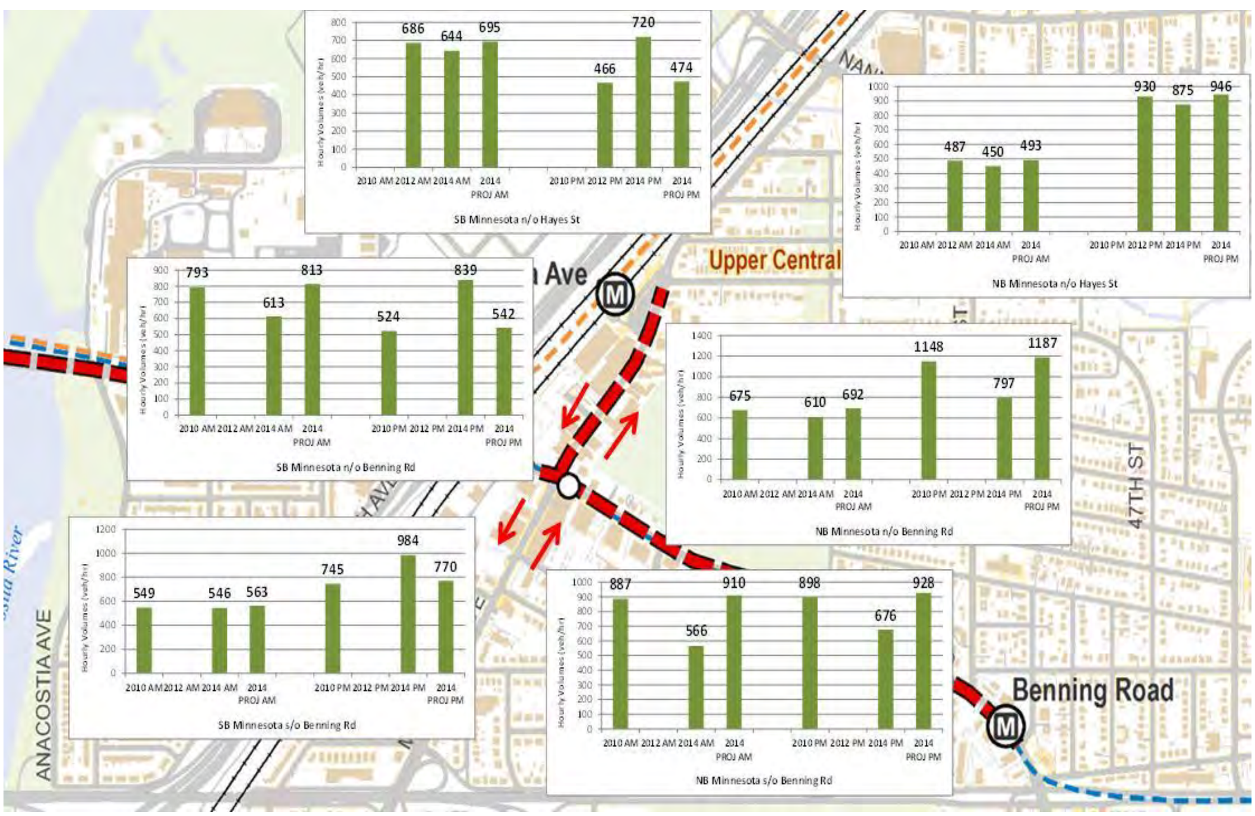
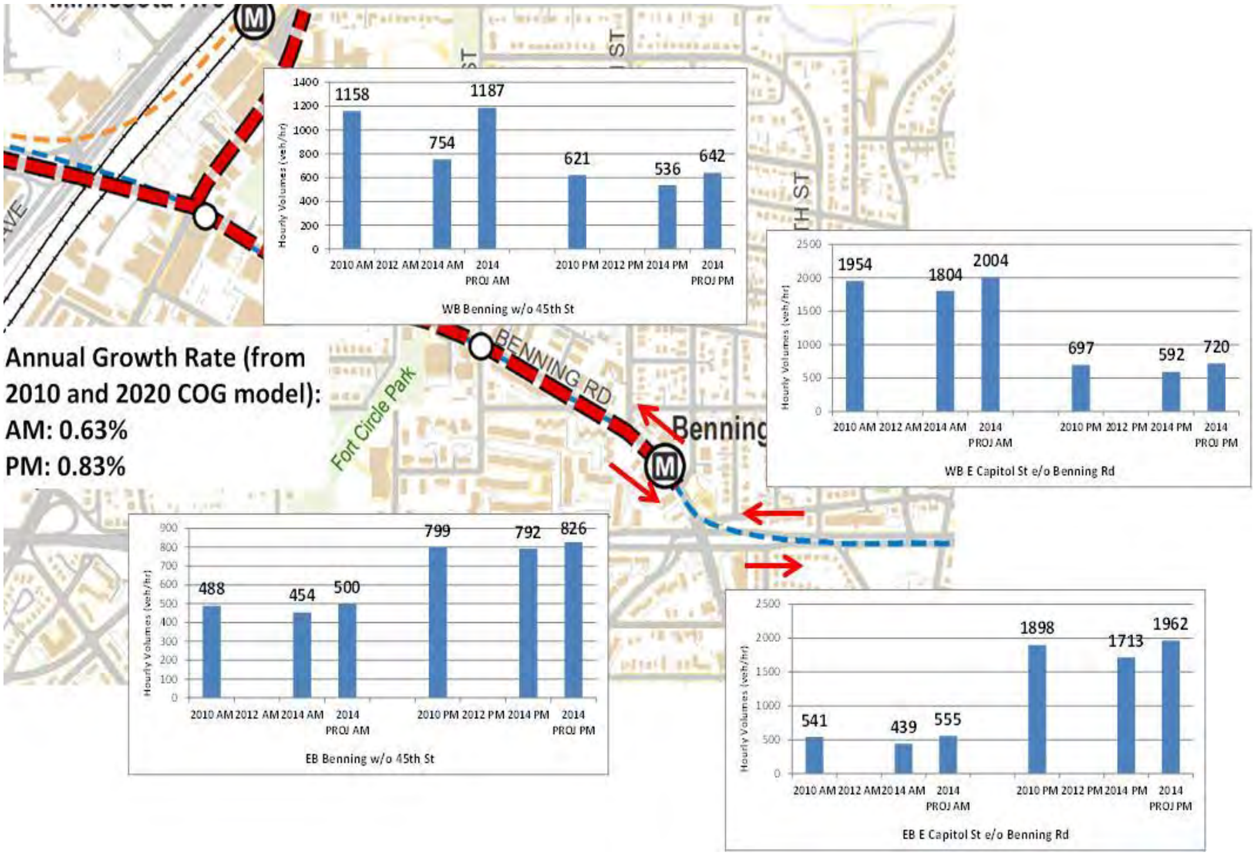


Figure 5: Comparison of 2010/2012 and 2014 traffic counts (3 of 3)



The westbound traffic volumes in the morning peak (peak direction) and eastbound traffic volumes in the evening peak (peak direction) on Benning Road are significantly lower in 2014 compared to 2010/2012 counts as a result of construction. Therefore, 2014 projected volumes, projected from 2010/2012 counts based on annual growth rates developed from MWCOG model, were used in the development and analysis of VISSIM model.

2.2.1.3 Transit Information

Washington Metropolitan Area Transit Authority (WMATA) bus routes were identified as serving the study area during the peak hours. Data corresponding to the arrival time and headway for each bus route, route alignments, and bus stops were determined from the bus schedule information available on the WMATA website[2].

2.2.1.4 Signal Timing Information

Timing plans for signalized intersections in the study area were obtained from the District Department of Transportation (DDOT) and used for modeling signal operations in VISSIM. Two primary types of traffic signal control in the study area include fixed-time (i.e., pre-timed) and coordinated actuated operation.

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[2] www.wmata.com

2.2.2 VISSIM Model Development

- In addition to the data sources described above, the following inputs and assumptions were considered in the development of the VISSIM model:
- Segments where on-street parking is restricted during the peak periods were modeled as travel lanes during the morning and evening peak hour in VISSIM (e.g., east of 42nd Street and Benning Road intersection)
- Bicycles were not considered in the model due to their very low volumes (typically fewer than 5 bicycles per hour both for the morning and evening peak hours)
- Pedestrians were included in the model as they may have significant impacts on intersection capacity, particularly at locations where there is heavy turn volumes (e.g., Benning Road and Minnesota Avenue intersection)
- Dwell time for buses at transit stops were modeled using Automated Passenger Counting (APC) data provided by WMATA. The total number of boarding and alighting at each bus stop were identified through APC data. A higher dwell time (30 seconds with 15 seconds variation) was assumed for bus stops with higher boarding and alighting volumes (greater than 5 passengers per bus). If the total number of boarding and alighting per bus is less than 5 passengers, a lower dwell time (15 seconds with 5 seconds variation) was assumed.
- For dwell time modeling at the streetcar stops under the Build Scenario, an hourly rate of passenger boarding and alighting at each transit stop, obtained from the projected 2040 ridership numbers, was coded in VISSIM. The following dwell time factors for the streetcar were applied for this study:

Table 1: Dwell Time Parameters for the Modeling of Streetcar in VISSIM

Streetcar Dwell Time Parameters	Time (in seconds)
Clearance Time	3.0
Unit Boarding Time	1.4
Unit Alighting Time	1.1

The total dwell time at each streetcar stop was then calculated using the "*Additive Method*", as shown below:

Dwell Time = Clearance Time + (Number of Boarding Passengers * Unit Boarding Time) + (Number of Alighting Passengers * Unit Alighting Time)

2.2.3 VISSIM Model Calibration

For the purpose of this study, queue lengths and traffic volumes were used to calibrate the VISSIM model. The calibration was performed using the 2010/2012 field data as well as the calibrated VISSIM model developed for the Feasibility Study since 2014 traffic counts were significantly lower due to construction and did not reflect typical traffic conditions.

At critical intersections (i.e., intersections with long queue lengths and temporary cycle overflows where some vehicles are unable to clear the intersection in the first cycle), observed queue lengths from the simulation model using VISSIM's default driving behavior parameters were consistent both with 2010/2012 field data and the calibrated Feasibility Study VISSIM model. Moreover, the traffic volumes from the simulation model at different locations matched the projected 2014 volumes that were used in the development of VISSIM model. As a result, VISSIM's default driving behavior parameters in the simulation model were kept the same and the same parameters were used for the future No Build and Build analysis.

2.2.4 VISSIM Model Performance Measures

To assess the traffic conditions at the study intersections, the following performance measures obtained from VISSIM were studied:

- Delay and level of service (LOS) by movement, approach, and intersection,
- Maximum queue length by movement

Ten simulation runs were performed to take into account the randomness of traffic. **Table 2** shows the LOS criteria at signalized and unsignalized intersections, as described in the Highway Capacity Manual 2010[3] . The LOS ranges from A through F, with LOS A representing free flow conditions and LOS F indicating forced flow ("jammed").

Table 2: LOS Criteria at Signalized and Unsignalized Intersections

Signalized		Unsignalized	
Delay (seconds/vehicle)	**LOS**	**Delay (seconds/vehicle)**	**LOS**
<= 10	A	<= 10	A
> 10 – 20	B	> 10 – 15	B
> 20 – 35	C	> 15 – 25	C
> 35 – 55	D	> 25 – 35	D
> 55 – 80	E	> 35 – 50	E
> 80	F	> 50	F

For the evaluation of the future streetcar alternatives, average speed for the streetcar was considered as the performance measure.

[3] *Transportation Research Board, Highway Capacity Manual, 2010.*

3.0 Existing (2014) Conditions

This section describes the existing transportation conditions in the study area with the first sub-section focusing on the travel demand forecasting and the second sub-section focusing on the results of the existing traffic analysis.

3.1 Existing Travel Demand Forecasting

Existing conditions analysis is based on the traffic data and observations from site visits and results of the validated travel demand model. 2010 MWCOG Regional Travel Demand model ("Base Model") was used to reflect the existing conditions.

3.1.1 Model Inputs

The two major inputs in the modeling process used in this study are land use data and transportation networks. To develop the existing conditions scenario, models were calibrated to match existing traffic counts using the inputs outlined below.

3.1.2 Existing Land Use

For the existing conditions, the study used the MWCOG Round 8.2 Cooperative Land Use Forecasts for 2010. **Table 3** shows the total population and employment by sector in the study area in 2010.

Table 3: Existing Population and Employment Condition

	2010 Total
Households	16,948
Population	43,148
Employment	12,222

3.1.3 Existing Transportation Network

The transportation networks used in the model represent the current roadway and transit systems in the study region. **Figures 6** and **7** show the roadway and transit network in the study area, respectively. The network has a grid layout with additional diagonals along portions of Benning Road and East Capitol Street. The grid is organized into a hierarchy of expressway, arterial, collectors and local streets.

The travel demand forecasting model used the MWCOG 2010 roadway network for the region outside of the travel demand analysis area. The MWCOG 2010 transit network was also used to represent the existing transit service in the region.

Figure 6: Existing Roadway and Lane Configurations

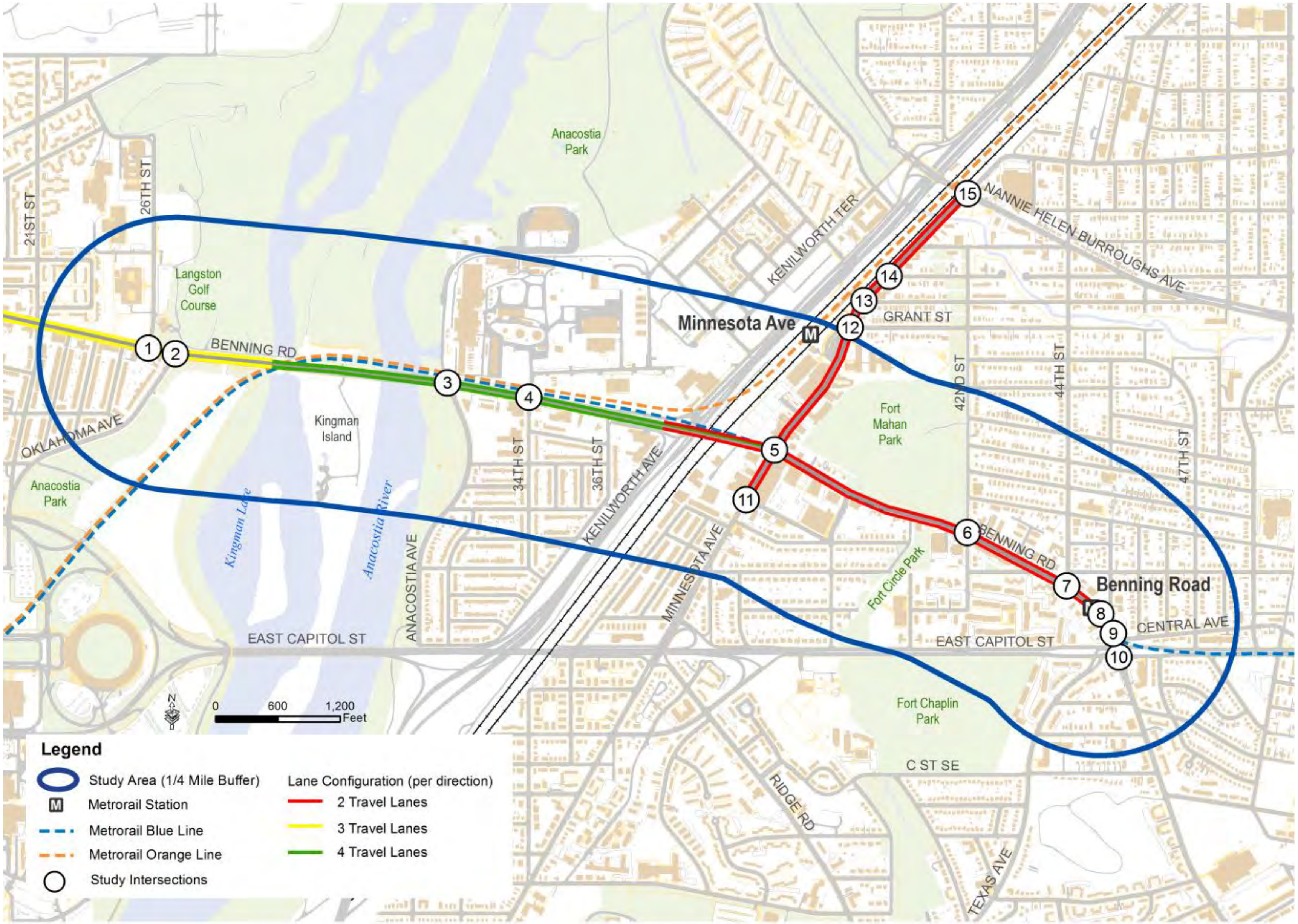
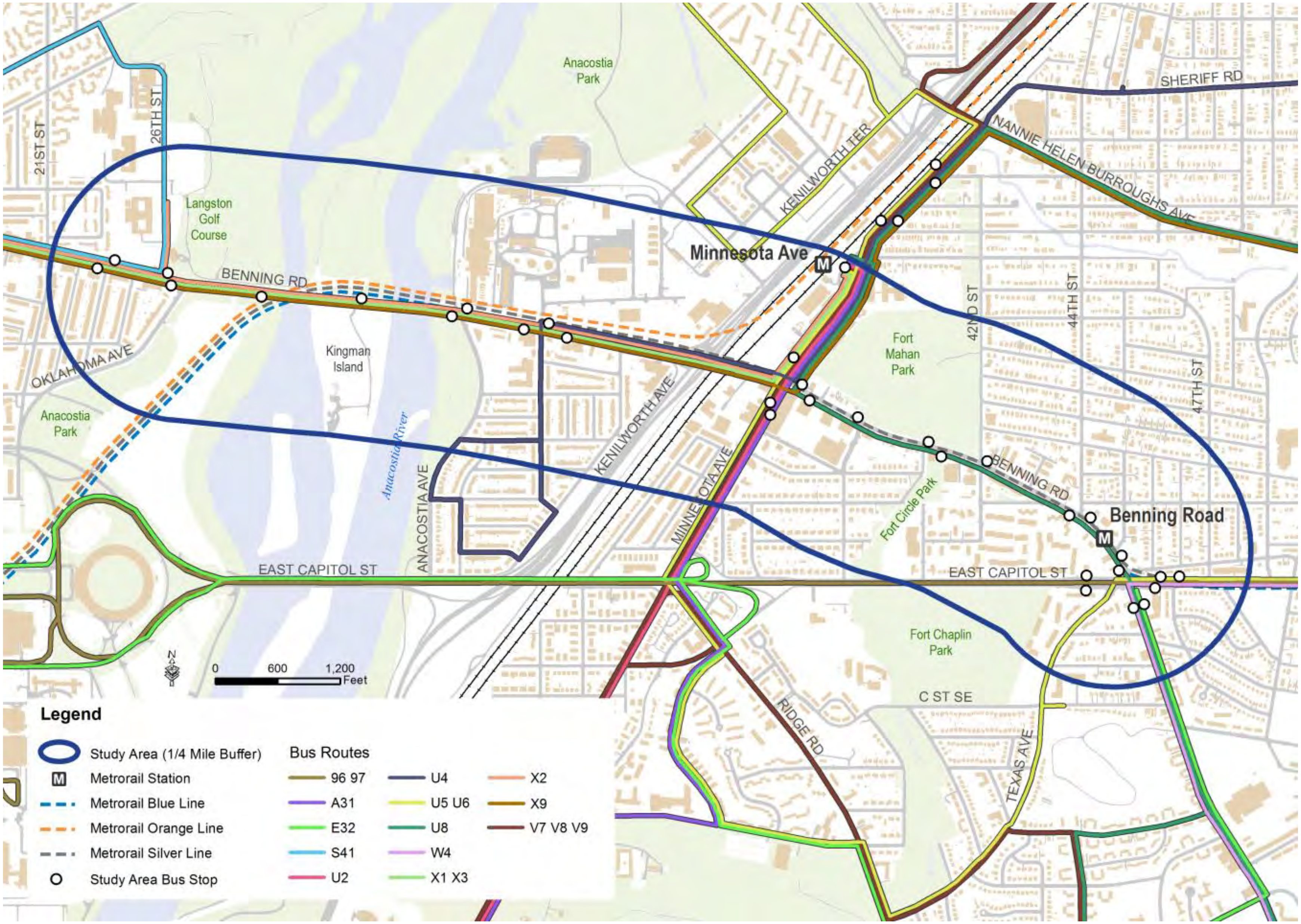


Figure 7: Existing Transit Services



3.2 Existing VISSIM Simulation Modeling

This section provides an assessment of existing traffic conditions in the study area. The traffic data collected within the study area for the analysis of existing conditions included traffic volume counts, pedestrian and bicycle counts, and historic crash data.

3.2.1 Existing Intersection Volumes

Figure 8 shows the existing (2014) morning and evening peak hour traffic volumes at the study intersections. During the morning peak hour, the traffic is heaviest in the "inbound" or the westbound direction along Benning Road. In the evening peak hour, the travel pattern reverses in which people travel in the "outbound" direction.

3.2.2 Existing Intersection Conditions

Figure 9 shows the intersection LOS at the study intersections under existing conditions during the morning and evening peak hours.

Results show that none of the intersections operate with LOS F under the existing conditions. Benning Road and East Capitol Street is the only intersection that operates with LOS E in the morning and evening peak hours. **Table 4** provides delay and LOS by movement for the critical intersections for the morning and evening peak hours. **Table 5** shows the associated maximum queue lengths by movements. Critical intersections are defined as those with intersection LOS E or worse. Delay and queuing results for the existing conditions for all study intersections are provided in **Attachment A**.

Table 4: Existing (2014) Peak Hour (AM and PM) Delay and Level of Service (LOS) at the Critical Intersections

Intersection	Traffic Control	Peak Hour	Intersection		Northbound		Southbound		Westbound		Eastbound	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Road and East Capitol Street	Signalized	AM	69	E	93	F	62	E	62	E	92	F
Benning Road and East Capitol Street	Signalized	PM	59	E	104	F	60	E	55	D	50	D

Table 5: Existing (2014) Peak Hour (AM and PM) Maximum Queue Length (feet) at the Critical Intersections

Intersection	Peak Hour	Northbound			Southbound			Westbound			Eastbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Benning Road and East Capitol Street	AM	940	940	940	285	285	295	950	950	950	430	430	430
Benning Road and East Capitol Street	PM	535	535	695	535	535	535	270	270	270	695	695	695

Figure 8: Existing (2014) Morning and Evening Peak Hour Intersection Traffic Volumes

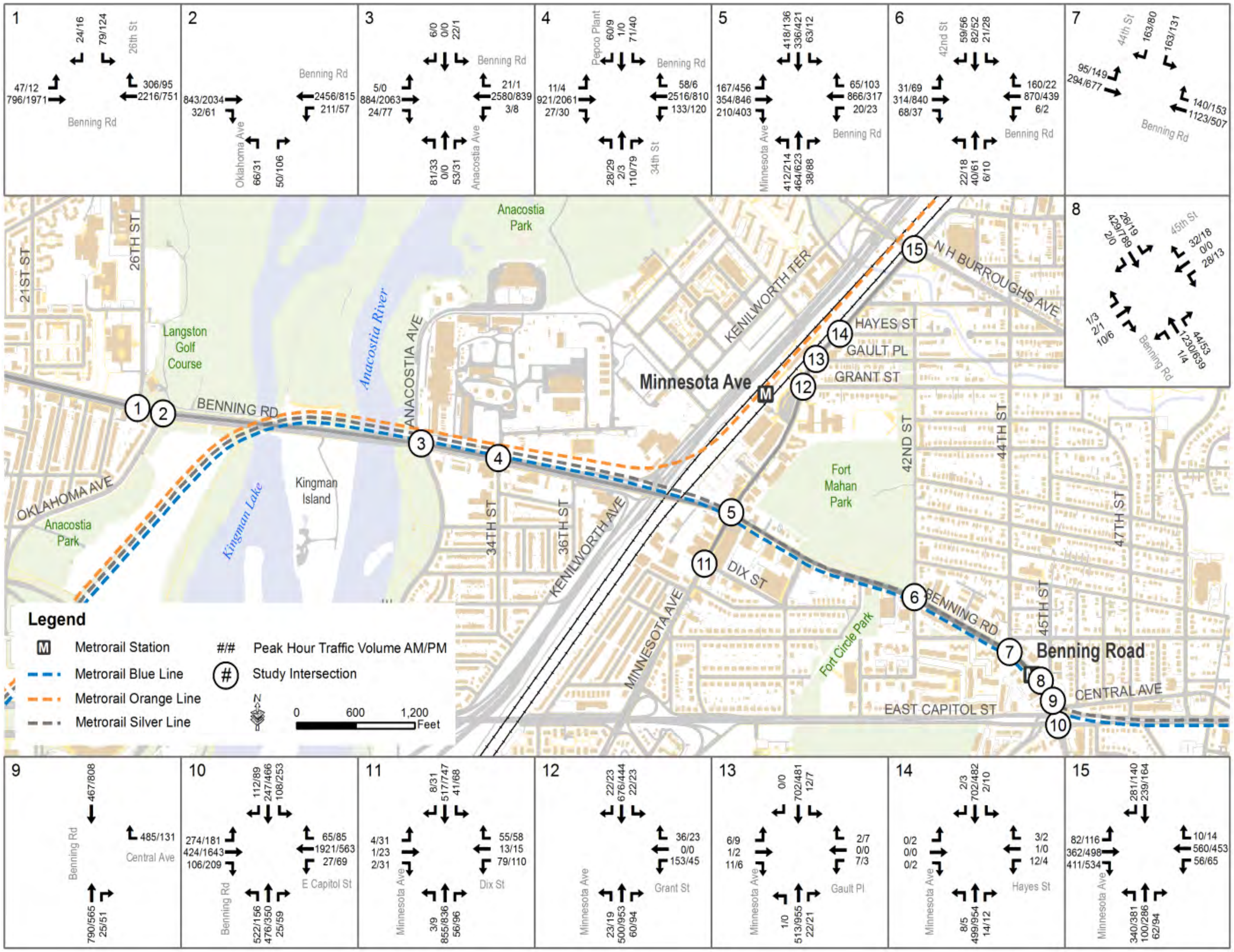
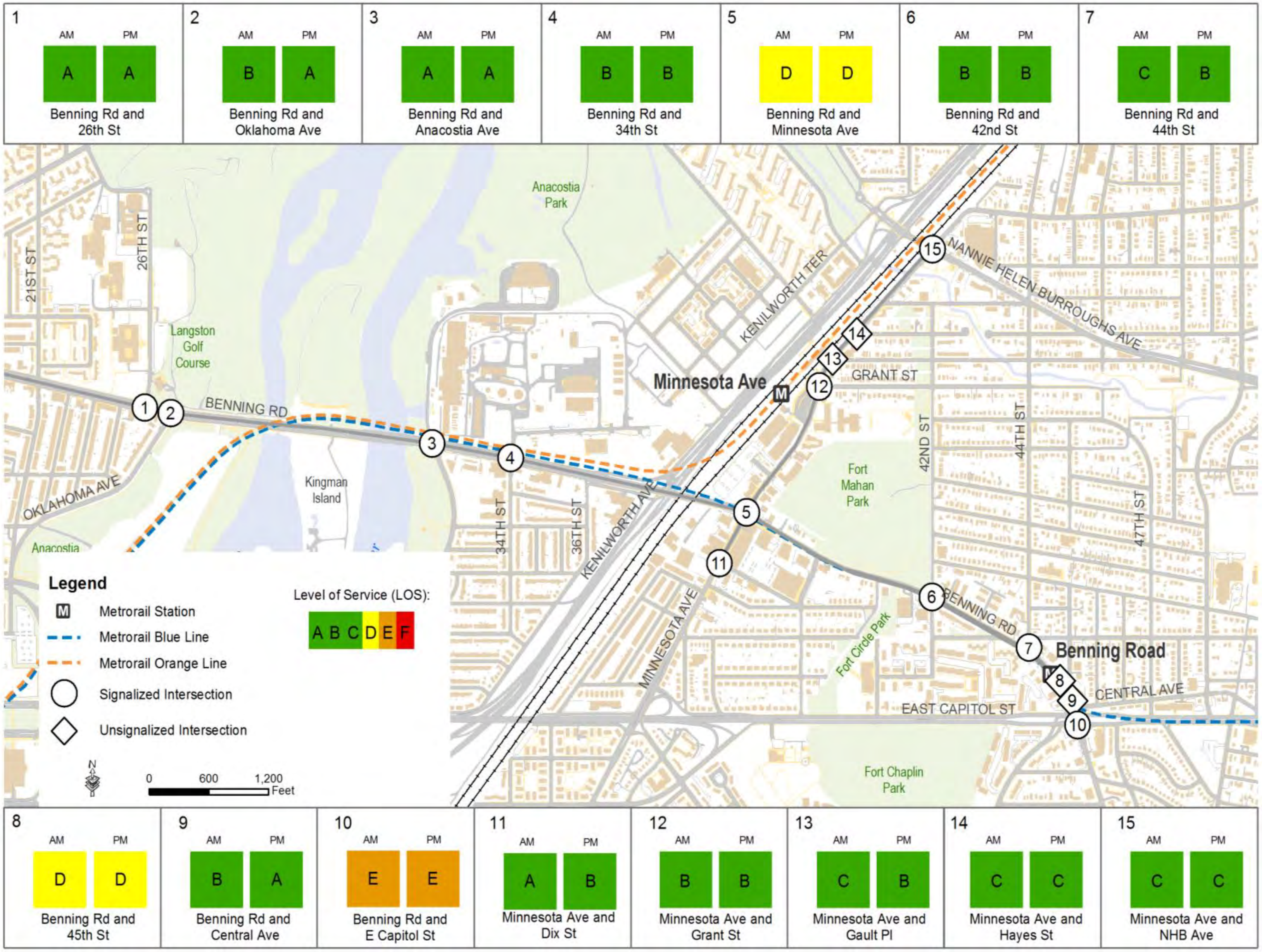


Figure 9: Existing Morning and Evening Peak Hour Intersection Level of Service (LOS)



3.2.3 Existing Traffic Safety Conditions

Detailed crashed data analysis was performed based on a three year crash data (2011 – 2013) provided by DDOT. The data included type of crashes (e.g., rear end, side swiped), crash severity (e.g., injuries involved), the crash location, and also indicates whether any pedestrians were involved in the accident. The analysis indicated that Benning Road and Minnesota Avenue, Benning Road and East Capitol Street, and Minnesota Avenue and Nannie Helen Burroughs intersections are the three intersections with the highest crash rates. Detailed information regarding these calculations and analysis can be found in **Appendix A**, *Crash Data and Safety Analysis Technical Memorandum*.

4.0 Opening Year 2018 Conditions

It was assumed that the extension of Benning Road Streetcar from Oklahoma Avenue to Benning Road Metrorail station would be fully operational in 2018. Traffic and transit operations during the morning and evening peak hours were evaluated for the opening year 2018. A future No Build scenario was analyzed for the year 2018 to serve as a baseline comparison for the Build Alternatives. No Build refers to planned and/or programmed highway, transit, High-Occupancy Vehicle (HOV), and bicycle and pedestrian projects defined in the Financially Constrained Long-Range Plan (CLRP).

For the Build scenario, two streetcar alternatives were developed and tested. The first alternative considered curb side operation, while the second alternative assumed median running operation, with both alternatives terminating at the Benning Road Metrorail station.

4.1 Opening Year 2018 No Build Travel Demand Forecasting

The two major inputs into the demand modelling process used in this study were land use data and transportation networks. For the No Build scenario, both inputs were based on regionally accepted baseline conditions including the MWCOG Round 8.2 Cooperative Land Use Forecasts and the regional CLRP.

4.1.1 2018 No Build Land Use

For the opening year 2018 No Build scenario, the regional land use was determined based on the MWCOG Round 8.2 Cooperative Land Use Forecasts for 2010 and 2020, using linear interpolation to derive growth rates and estimate the data for 2018. Regionally, the model shows a growth of 3.4 percent in number of households, 2.9 percent in population, and 11 percent in employment over the baseline conditions (2010). **Table 6** highlights the total population and employment by sector within a half-mile of the study corridor for 2018.

Table 6: 2018 No Build Population and Employment Growth

	2010 Total	Growth Factor	2018 Total
Households	16,948	3.4%	17,516
Population	43,148	2.9%	44,421
Total Employment	12,222	11.0%	13,562

4.1.2 2018 No Build Transportation Network

The transportation network for the 2018 No Build scenario includes the changes proposed in the 2020 CLRP. The CLRP includes a range of planned improvements to the roadway and transit networks throughout the metropolitan region. Within the study area, the only one change to the roadway network identified in the CLRP is the removal of one of the three lanes in each direction along East Capitol Street between 40th Street and Southern Avenue to improve pedestrian safety[4]. As a result, East Capitol Street will operate with two through lanes in both directions between 40th Street and Southern Avenue.

4.1.2.1 Metrorail

Regional Metrorail service improvements provide some changes to the services provided at the two stations within the study area. **Table 7** summarizes the peak and off-peak headways of the assumed Metrorail system in 2020.

Table 7: Peak and Off-Peak Headways of Metrorail Lines (2020)

Line	Terminus A	Terminus B	Peak Headway (minutes)	Off-Peak Headway (minutes)
Blue	Franconia/Springfield	Largo	7	12
Orange	Vienna	New Carrollton	6	12
Silver	Wiehle-Reston East	Largo Town Center	6	12

4.1.2.2 Local Bus

Local bus service in the study area is provided primarily by Metrobus. **Table 8** summarizes the peak and off-peak headways for the local routes serving the study area. The table shows morning peak frequencies; evening peak frequencies are assumed to be directionally reversed.

Table 8: Local Bus Frequency (2020)

Route	Direction	Morning Peak Headway (minutes)	Off-Peak Headway (minutes)
96,97	Eastbound	20	60
	Westbound	20	60
U2	Westbound	30	30
	Southbound	30	30
U4	Clockwise	12	30
U5,U6	Northbound	30	38
	Southbound	30	38
U8	Northbound	12	12
	Southbound	60	-
V7,8,9	Eastbound	20	30
	Westbound	20	27
W4	Southbound	30	60
	Northbound	12	60
X1,X3	Eastbound	30	-
	Westbound	15	-
X2	Eastbound	6	8
	Westbound	7	9
X9	Eastbound	15	15
	Westbound	15	15

[4] http://www.mwcog.org/clrp/projects/new/proposed_2013.asp

4.2 Opening Year 2018 No Build VISSIM Simulation Modeling

This section describes the development of the 2018 No Build VISSIM model and provides an assessment of No Build traffic conditions in the study area. To reflect the change proposed in the CLRP, the VISSIM model was updated at East Capitol Street and Benning Road intersection to accommodate the through-lane reduction on East Capitol Street.

4.2.1 2018 No Build Intersection Traffic Volume Development

The 2018 No Build future year intersection traffic volumes were developed using a growth rate obtained from MWCOG Version 2.3 regional travel demand model. A comparison of MWCOG model link volumes was performed to develop growth rates. These growth rates were averaged and applied to the 2014 traffic volumes. Except for East Capitol Street, results indicated an annual growth of 0.75 percent along the corridor, which corresponds to a 3 percent increase in traffic volumes between the years of 2014 and 2018. Traffic volumes on East Capitol Street remained the same or decreased as a result of the through-lane reduction. **Figure 10** shows the projected peak hour traffic volumes for the opening year 2018.

4.2.2 2018 No Build Intersection Conditions

Under the No Build traffic analysis, split times and offsets for the traffic signals were optimized while maintaining existing cycle lengths. **Figure 11** displays No Build intersection LOS at the study intersections during the morning and evening peak hours for opening year 2018.

Benning Road and East Capitol Street intersection operate with LOS F both in the morning and evening peak hour. Degraded intersection LOS (LOS F) compared to the existing conditions (LOS E) can be attributed to the removal of one through lanes in each direction on East Capitol Street. Results also show that Benning Road and 44th Street and Benning Road and 45th Street intersections operate with LOS F in the evening peak hour due to the queue spillback from Benning Road and East Capitol Street intersection, reducing westbound Benning Road capacity at these intersections.

Figure 10: 2018 No Build Morning and Evening Peak Hour Intersection Traffic Volumes

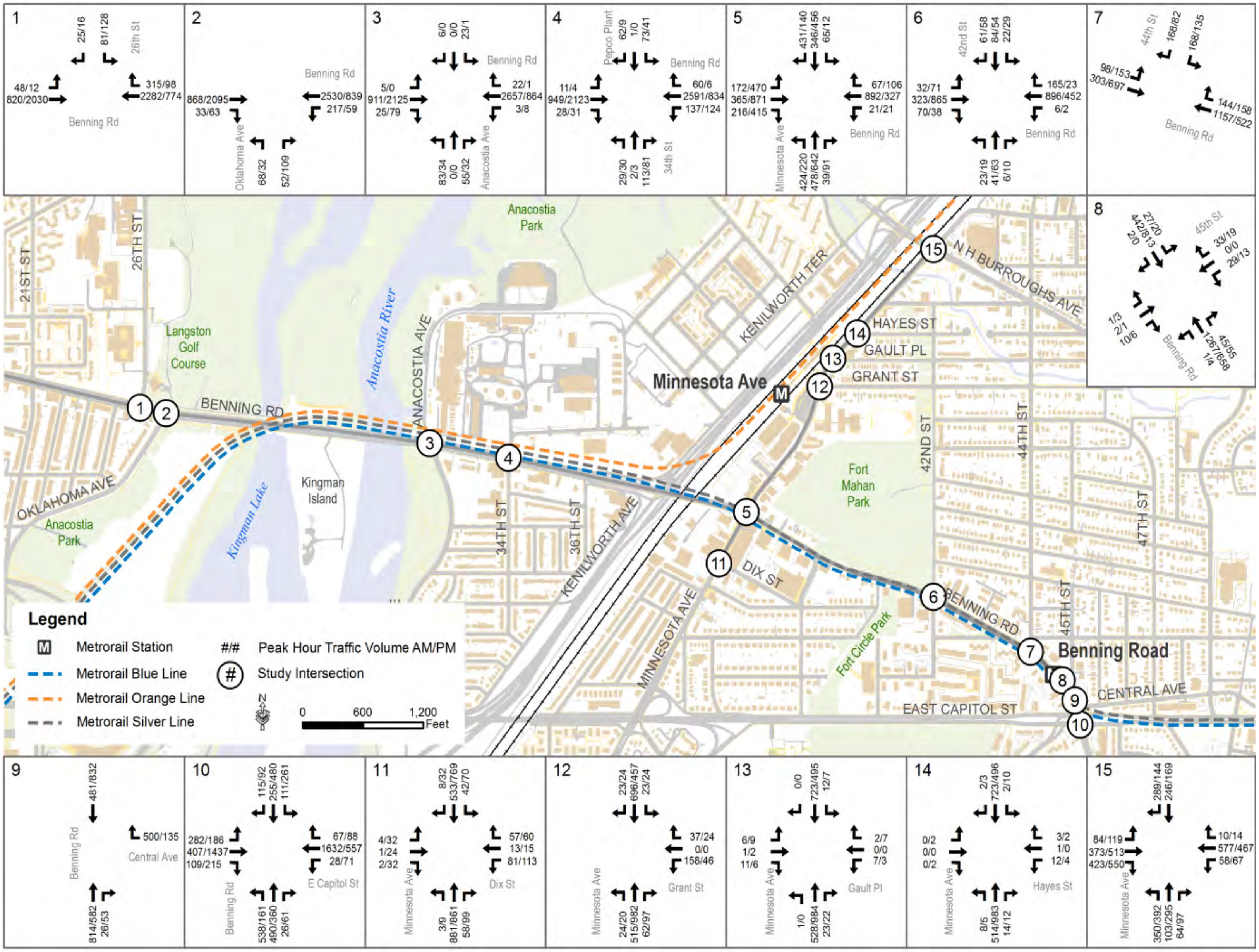


Figure 11: 2018 No Build Morning and Evening Peak Hour Intersection Level of Service (LOS)

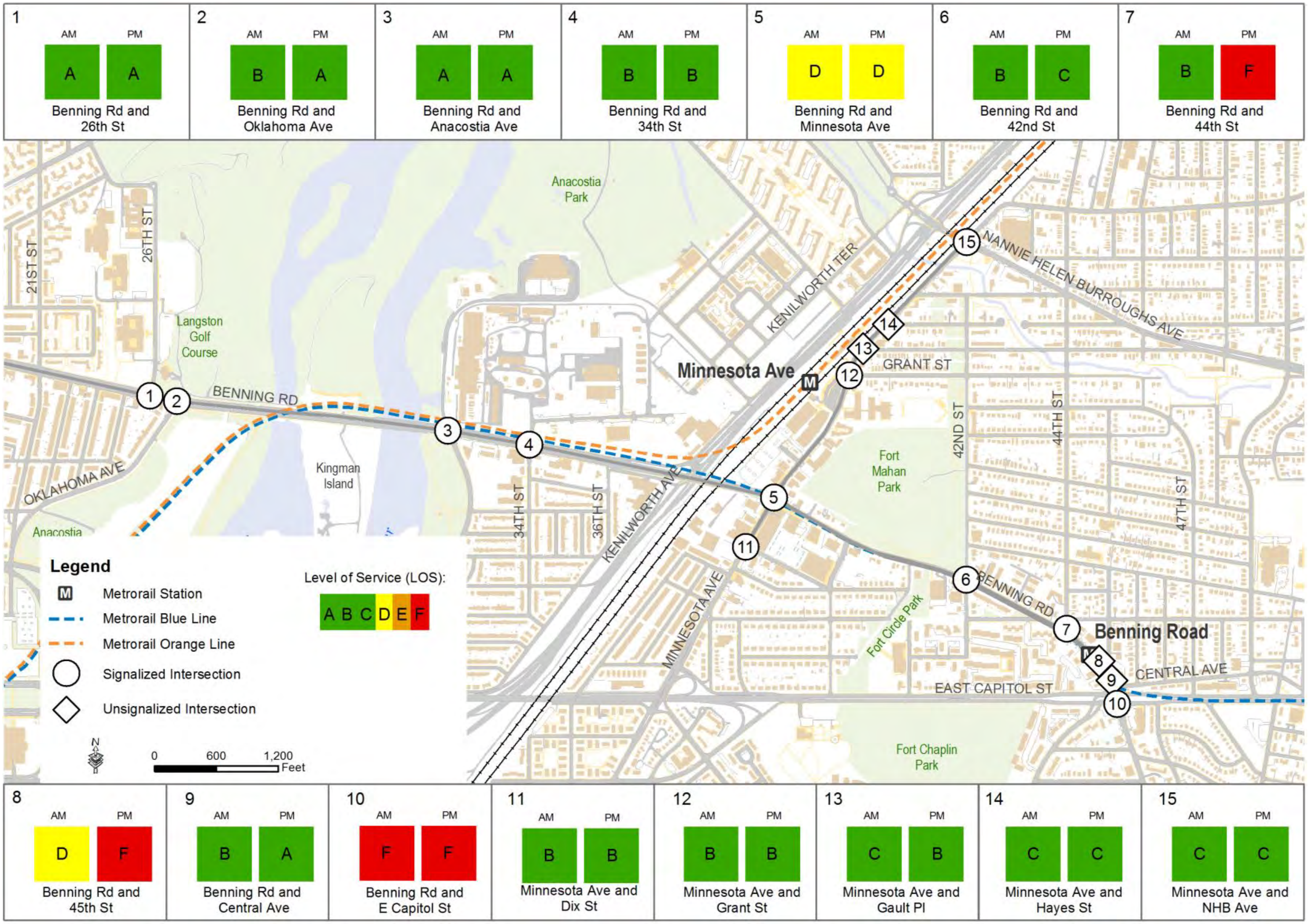


Table 9 provides delay and LOS by movement for the critical intersections for the 2018 No Build scenario in the morning and evening peak hours. **Table 10** shows the associated maximum queue lengths by movements. Delay and queuing results for all study intersections for the Opening Year 2018 No Build conditions are provided in **Attachment B**.

Table 9: 2018 No Build Peak Hour (AM and PM) Delay and Level of Service (LOS) at the Critical Intersections

Intersection	Traffic Control	Peak Hour	Intersection		Northbound		Southbound		Westbound		Eastbound	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and E Capitol St	Signalized	AM	180	F	282	F	65	E	127	F	383	F
Benning Rd and 44th St	Signalized	PM	84	F	19	B	146	F	40	D	-	-
Benning Rd and 45th St*	Unsignalized	PM	108	F	1	A	108	F	48	E	39	E
Benning Rd and E Capitol St	Signalized	PM	161	F	260	F	77	E	251	F	142	F

* Stop-controlled intersection, in which intersection LOS is expressed in terms of the average vehicle delay of the worst movement

Table 10: 2018 No Build Peak Hour (AM and PM) Maximum Queue Length (feet) at the Critical Intersections

Intersection	Peak Hour	Northbound			Southbound			Westbound			Eastbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Benning Rd and E Capitol St	AM	1,130	1,130	1,130	290	290	300	1,675	1,675	1,675	1,465	1,465	1,465
Benning Rd and 44th St	PM	-	230	230	1,005	1,005	-	255	-	255	-	-	-
Benning Rd and 45th St	PM	135	125	125	495	500	480	75	45	75	40	20	40
Benning Rd and E Capitol St	PM	305	950	1,470	950	950	305	1,470	1,030	1,030	1,470	950	950

4.3 Opening Year 2018 Build Travel Demand Forecasting

A future Build scenario, which included a streetcar on Benning Road, was analyzed for the year 2018 to test the alternatives developed as part of the Benning Road EA. This scenario combined regional baseline assumptions with a more fine-grained roadway system to predict travel patterns, transit usage and vehicular turning movements in the study area.

4.3.1 2018 Build Land Use

For the Build scenario, the regional land use of the travel demand analysis area was the same as for the No Build scenario, using the MWCOG Round 8.2 Cooperative Land Use Forecasts for 2020.

4.3.2 2018 Build Transportation Network

The transportation networks in the Build Scenario is based on the regional CLRP transportation networks which is the same as the No Build scenario, except the Benning Road Streetcar Extension, extending the H/Benning Streetcar Line to the Benning Road Metrorail station. The proposed frequency of service for the line is 10 minutes in both directions through the entire service day.

4.3.3 2018 Build Ridership Forecasting

Table 11 summarizes the streetcar ridership under the No Build (terminating at Oklahoma Avenue) and the Build (includes extension to Benning Road Metrorail station) scenarios. It is important to note that the MWCOG regional model can only place transit stops at network nodes. Since MWCOG model does not have a node on 5th Street, the streetcar stop at 5th Street and H Street was not modeled. However, it is believed that the zone connectors providing access to the 3rd Street and 8th Street stations (i.e., neighboring stations) are adequate for transit access to all of the trips generated in the adjacent zones and it is unlikely this stop would have increased total streetcar ridership.

Table 11: 2018 No Build and Build Streetcar Ridership

	Peak		Off-Peak		Daily	
Stop	No Build	Build	No Build	Build	No Build	Build
Union Station	242	627	288	555	530	1182
3rd Street and H Street, NE	76	77	136	153	212	230
8th Street and H Street, NE	30	61	63	168	93	229
13th Street and H Street, NE	39	78	49	124	87	202
15th Street and Benning Road, NE	18	18	17	49	35	67
19th Street and Benning Road, NE	111	249	103	207	213	456
Oklahoma Avenue and Benning Road, NE	64	136	69	126	133	261
Kingman Island and Benning Road, NE	-	11	-	37	-	47
34th Street and Benning Road, NE	-	101	-	150	-	251
Minnesota Avenue and Benning Road, NE	-	13	-	110	-	122
42nd Street and Benning Road, NE	-	10	-	72	-	82
Benning Road Metrorail Station	-	209	-	360	-	569
Total	**580**	**1,590**	**725**	**2,111**	**1,303**	**3,698**

It is projected that in 2018, the Benning Road Extension would carry approximately 2,400 daily riders. These values are in addition to the projected initial Oklahoma Avenue to Union Station H/Benning Streetcar segment daily ridership of 1,300.

Table 12 provides the total daily bus ridership by bus route serving the study area under the No Build and the Build scenarios. **Table 13** shows daily ridership by route that occurs only within the study area.

Table 12: 2018 No Build and Build Route Level Daily Bus Ridership

Bus Route	Peak	Off-Peak	Daily
2018 No Build Bus Ridership			
X1,X3	1,792	0	1,792
X2	6,321	5,224	11,545
X9	1,931	1,160	3,091
U2	351	338	689
U4	24	4	28
U5,U6	498	819	1,317
U8	114	505	619
96,97	6,249	1,882	8,131
V7,V8,V9	2,368	1,603	3,971
W4	4,887	4,110	8,997
Total	**24,535**	**15,645**	**40,180**
2018 Build Bus Ridership			
X1,X3	1,769	0	1,769
X2	5,965	4,309	10,274
X9	1,869	1,081	2,950
U2	349	332	681
U4	24	4	28
U5,U6	497	778	1,275
U8	88	334	422
96,97	6,101	1,792	7,893
V7,V8,V9	2,362	1,605	3,967
W4	5,031	4,274	9,305
Total	**24,055**	**14,509**	**38,564**
Percent Different Compared to No Build	**2%**	**7%**	**4%**

Table 13: 2018 No Build and Build Daily Bus Ridership that Occurs within the Study Area

Bus Route	Peak	Off-Peak	Daily
2018 No Build Bus Ridership only within the Study Area			
X1,X3	826	0	826
X2	3,537	3,306	6,843
X9	286	255	541
U2	238	122	360
U4	6	2	8
U5,U6	337	372	709
U8	14	34	48
96,97	733	200	933
V7,V8,V9	528	266	794
W4	1020	606	1,626
Total	**7,525**	**5,163**	**12,688**
2018 Build Bus Ridership only within the Study Area			
Bus Route	**Peak**	**Off-Peak**	**Daily**
X1,X3	805	0	805
X2	2,766	2,511	5,277
X9	254	220	474
U2	237	117	354
U4	6	2	8
U5,U6	334	338	672
U8	10	25	35
96,97	667	174	841
V7,V8,V9	525	265	790
W4	1,106	718	1,824
Total	**6,710**	**4,370**	**11,080**
Percent Different Compared to No Build	**11%**	**15%**	**13%**

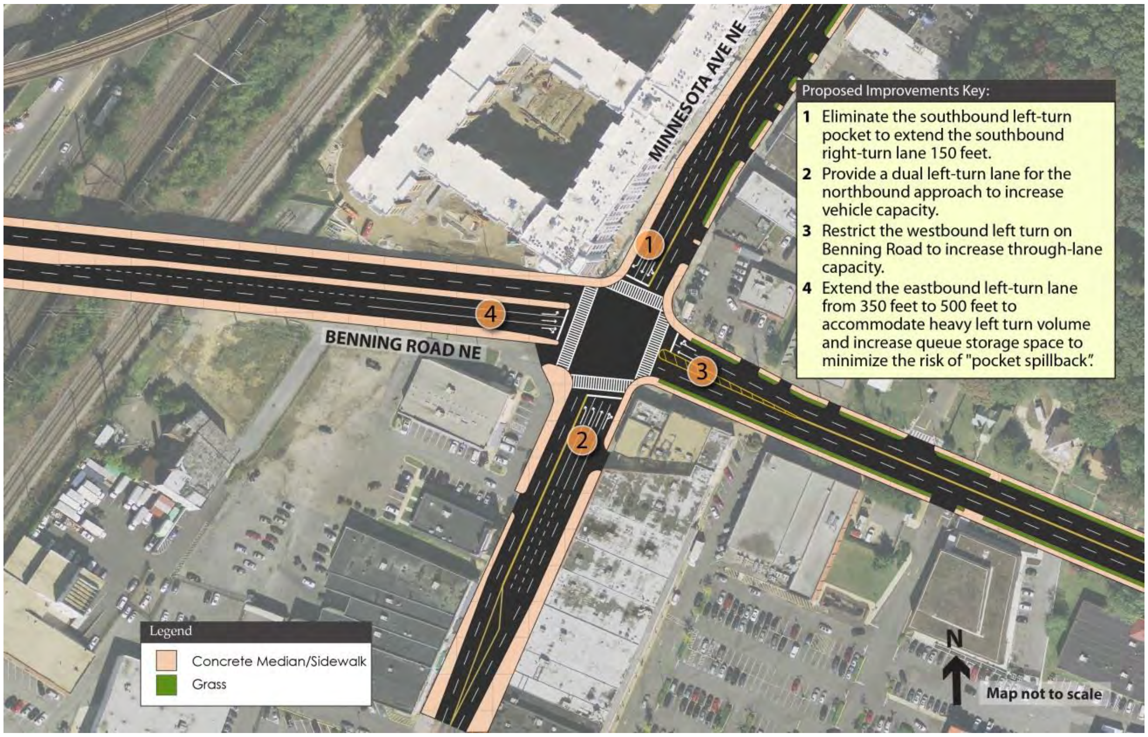
Compared to the 2018 No Build scenario, the total daily bus ridership in the study area would decrease by approximately 13 percent (about 1,500 riders) in the Build scenario (**Table 13**). This decrease can be explained by the introduction of the streetcar service, which offers faster service and higher frequency, in particular during the off-peak periods because the streetcar will operate with the same 10-min headway both during the peak and off-peak, thereby reducing passenger waiting time between the Benning Road Metrorail station and Union Station.

4.4 Opening Year 2018 Build VISSIM Simulation Modeling

The Build scenario assumes the same transportation network as in the No Build with the exception of two changes: (1) the introduction of the streetcar from 26th Street to Benning Road Metrorail station and (2) proposed lane changes at the intersection of Benning Road and Minnesota Avenue to improve traffic operations. Intersection improvements at Benning Road and East Capitol Street intersection to reduce vehicular delay are beyond the scope and therefore not considered in this study.

The proposed lane configuration at Benning Road and Minnesota Avenue intersection is shown in **Figure 12**. Although the simulation results for the 2018 No Build scenario indicated LOS D (about 50 seconds intersection delay) at the Benning Road and Minnesota Avenue intersection, this is close to the LOS E threshold of 55 seconds. Further, visual observations and sensitivity tests showed potential capacity failure at this intersection, in particular for the southbound Minnesota Avenue intersection. Therefore, the proposed lane configuration changes are found to be more effective in 2040. This will be discussed in further detail in Section 5.

Figure 12: Proposed Lane Configuration at Benning Road and Minnesota Avenue Intersection



The proposed improvements include:

- Eliminating the southbound left turn pocket on Minnesota Avenue in order to provide a southbound right turn pocket lane (in 2018, the southbound Minnesota Avenue approach is projected to carry approximately 430 right turn vehicles versus 65 left turn vehicles in the morning peak hour);
- Providing a dual left turn lane for the northbound approach on Minnesota Avenue to increase vehicle capacity, in particular in the morning peak (approximately 425 vehicles are projected to make a left turn from Minnesota Avenue to westbound Benning Road);
- Restricting the westbound left turn on Benning Road to increase through-lane capacity; and
- Extending the eastbound left turn pocket lane on Benning Road from 350 feet to 500 feet to accommodate heavy left turn volume in the evening peak hour (approximately 470 vehicles are projected in 2018) and increasing queue storage space to minimize the risk of "pocket spillback" (i.e., left turn vehicles spilling from pocket lane onto the adjacent through lane).

The Build scenario also considered special transit-only signals at certain intersections to allow the streetcar transition. The intersections where transitions occur for curb running and median running streetcar alignments are described below:

Eastbound Curb Running Streetcar Alignment

- Benning Road and Oklahoma Avenue intersection: Transition from the recently constructed median tracks onto curb running alignment.
- Benning Road and 34th Street intersection: Transition from the curb lane onto the third lane to continue in curb lane on the eastbound viaduct.
- Benning Road and 45th Street intersection: Transition from the curb lane onto the Benning Road Station terminus. This transition would require signalization of the intersection as it currently operates as an unsignalized intersection.

Westbound Curb Running Streetcar Alignment

- Benning Road and 45th Street intersection: Transition from the Benning Road Station terminus onto the curb track.
- Benning Road and 36th Street intersection: Transition from curb tracks to curb tracks. Only Kenilworth Avenue westbound on-ramp traffic would be stopped to allow the streetcar to make this transition.

Eastbound Median Running Streetcar Alignment

- Benning Road and 45th Street intersection: Transition from the median tracks onto the Benning Road Station Terminus.

Westbound Median Running Streetcar Alignment

- Benning Road and 45th Street intersection: Transition from the median tracks onto the Benning Road Station Terminus.
- Benning Road and Kingman Island intersection: Transition from the fourth lane onto the third lane to align the operation with the recently constructed median tracks at Benning Road and Oklahoma Avenue intersection. This would require a new signalized intersection at Kingman Island to stop westbound traffic and allow the transition.

4.4.1 2018 Build Intersection Traffic Volume Development

MWCOG model forecasts indicated that the reduction in automobile trips due to people switching from automobiles to transit with the introduction of streetcar is not substantial. To plan on the conservative side, the same traffic volume projections developed for the No Build model is used in the Build VISSIM model (**Figure 10**).

4.4.2 2018 Build Intersection Conditions

Figures 13 and 14 provide intersection LOS at the study intersections during the morning and evening peak hours with the curb running and median running alignment, respectively. Note that the traffic control type at Benning Road and 45th Street intersection was changed from unsignalized to signalized control to accommodate the transition of the streetcar at the Benning Road Metrorail station.

Figure 13: 2018 Build Curb Running Alignment Morning and Evening Peak Hour Intersection Level of Service (LOS)

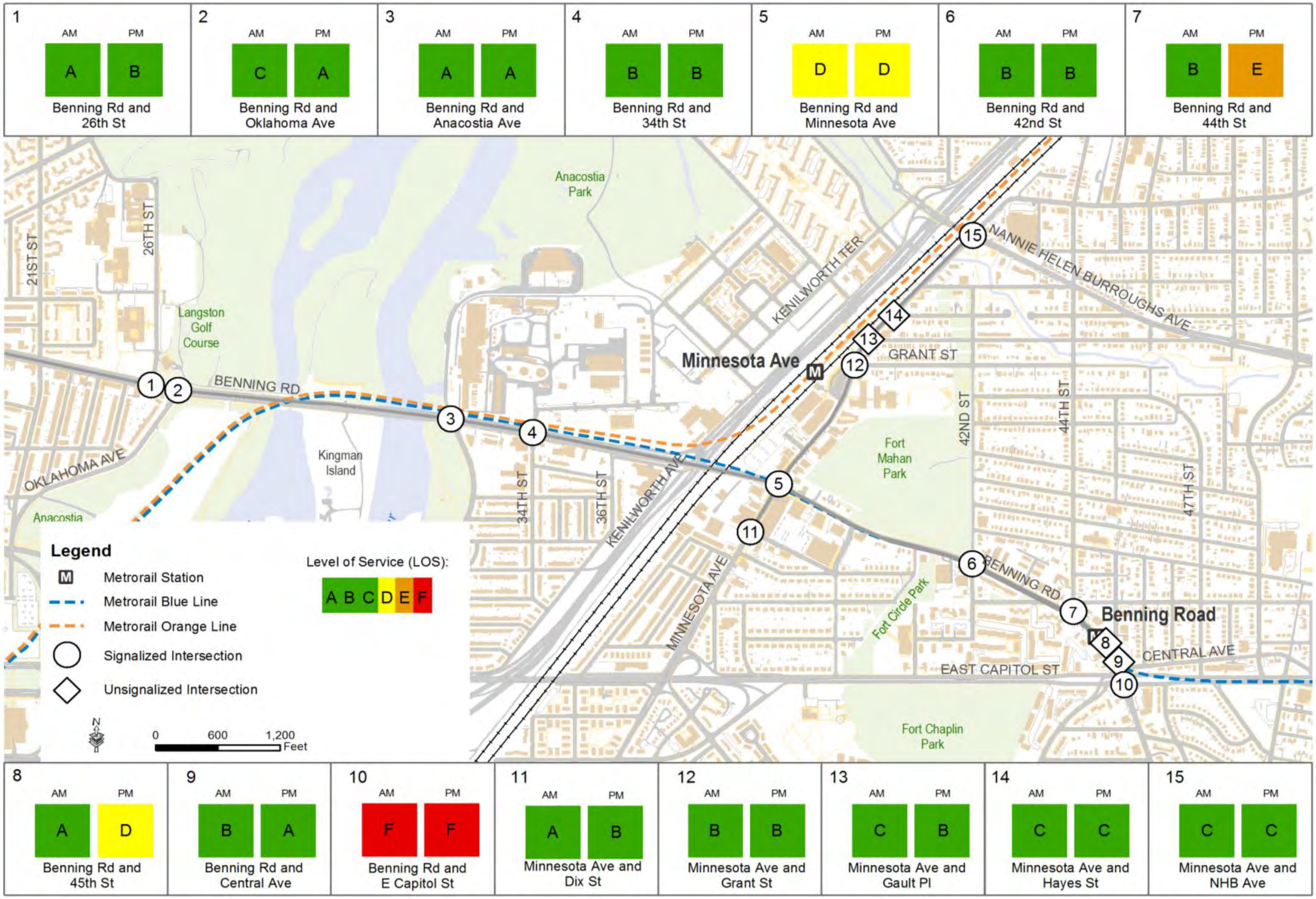
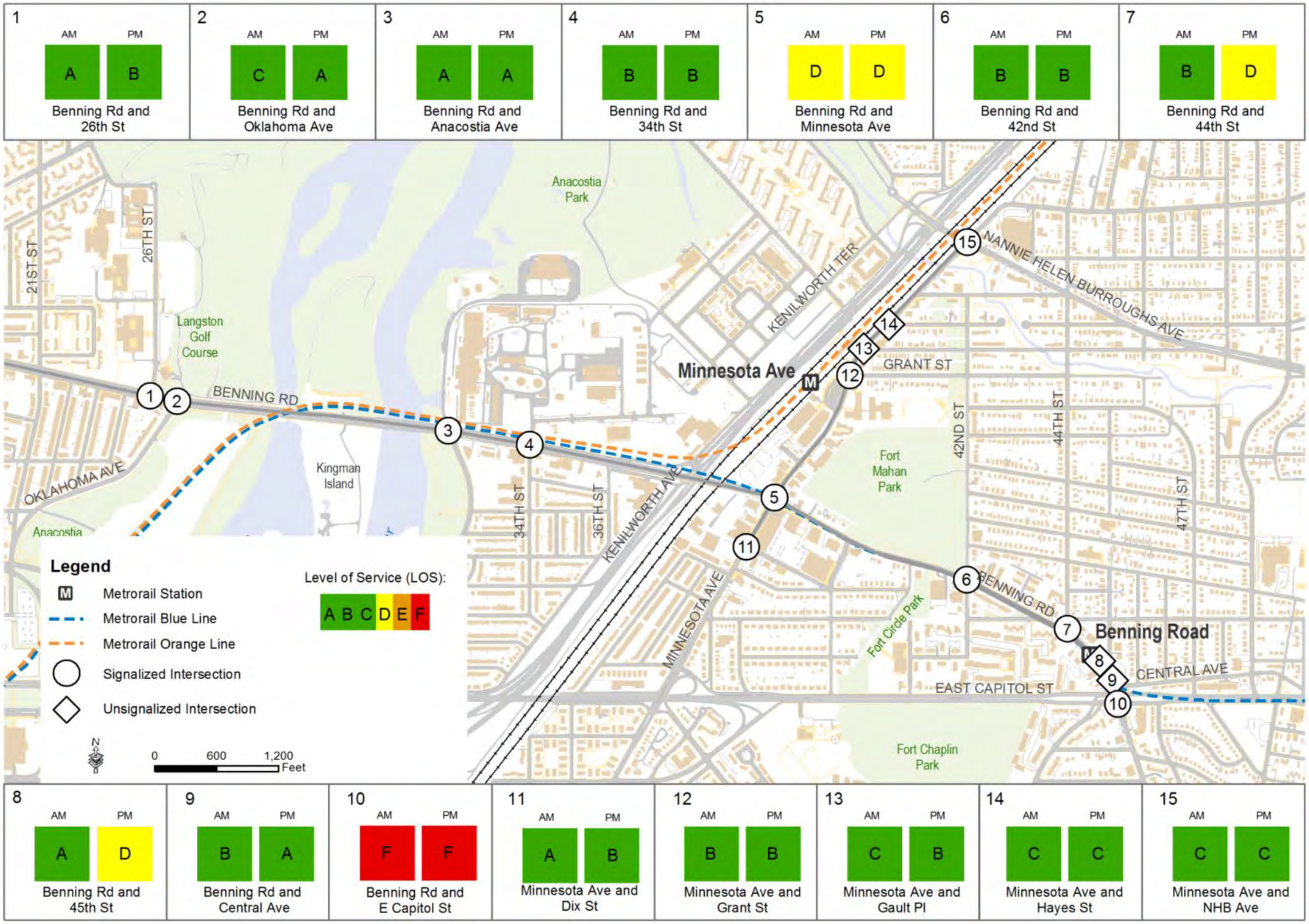


Figure 14: 2018 Build Median Running Alignment Morning and Evening Peak Hour Intersection Level of Service (LOS)



The findings of the 2018 Build traffic analysis are summarized below:

- Benning Road and East Capitol Street intersection operates with LOS F in the morning peak and evening peak hour under both streetcar alignments.
- Intersection LOS at Benning Road at 44th Street improves from LOS F to LOS E in the evening peak hour with the curb running alternative and from LOS F to LOS D in the median running alternative. This improvement can be attributed to the signal timing modifications at Benning Road and East Capitol Street intersection to favor the operation of streetcar (southbound approach) as a means of congestion protection for transit. Note that the change is more pronounced in the evening peak hour since the southbound approach is the critical approach during the evening peak.
- Signal timing modifications at the Benning Road and East Capitol Street intersection to improve streetcar operation (in particular in the evening peak) causes higher delay for vehicular traffic at this intersection (see **Table 14** and **Table 16** below).
- During the evening peak hour, the Benning Road and 44th Street intersection operates with LOS D in the median running alternative and LOS E in the curb running alternative. The improved LOS can be explained by the impact of streetcar transition at Benning Road and 45th Street intersection. While the curb running alternative requires transition from the inner lane, which stops southbound Benning Road, the median running alternative can run concurrently with the southbound general traffic because the transition is from the outside lane.
- The operational enhancements at Benning Road and 45th Street intersection from LOS F to LOS E can be attributed to the change in intersection control type (conversion from unsignalized to signalized) and signal timing modifications at Benning Road and East Capitol Street intersection, which limit the extent of queue spillback to upstream intersections.
- The operation of streetcar and transitions at most intersections results in typically very marginal increase in intersection delay.

Table 14 provides delay and LOS by movement for the critical intersections for the 2018 Build curb running alternative. **Table 15** displays the associated queue lengths by movement. **Tables 16** and **17** provide delay and queuing results for the median running alternative, respectively. Note that Benning Road and 44th Street intersection results are also included for comparison purposes.

Attachment B provides the detailed delay and queuing results for all study intersections for the curb running and median running Build Alternatives.

Table 14: 2018 Build Curb Running Alignment Peak Hour (AM and PM) Delay and Level of Service (LOS) at the Critical Intersections

Intersection	Traffic Control	Peak Hour	Intersection		Northbound		Southbound		Westbound		Eastbound	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Road and East Capitol Street	Signalized	AM	181	F	285	F	62	E	127	F	386	F
Benning Road and 44th Street	Signalized	PM	60	E	18	B	99	F	35	C	-	-
Benning Road and 45th Street	Unsignalized	PM	55	D	3	A	99	F	28	C	34	C
Benning Road and East Capitol Street	Signalized	PM	166	F	287	F	69	E	251	F	148	F

Table 15: 2018 Build Curb Running Alignment Peak Hour (AM and PM) Maximum Queue Length (feet) at the Critical Intersections

Intersection	Peak Hour	Northbound			Southbound			Westbound			Eastbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Benning Road and East Capitol Street	AM	1,070	1,070	1,070	320	320	330	1,675	1,675	1,675	1,465	1,465	1,465
Benning Road and 44th Street	PM	-	235	235	830	830	-	255	-	255	-	-	-
Benning Road and 45th Street	PM	135	135	135	470	470	470	105	55	85	30	30	30
Benning Road and East Capitol Street	PM	1,015	1,015	1,015	365	365	375	1,030	1,030	1,030	1,465	1,465	1,465

Table 16: 2018 Build Median Running Alignment Peak Hour (AM and PM) Delay and Level of Service (LOS) at the Critical Intersections

Intersection	Traffic Control	Peak Hour	Intersection		Northbound		Southbound		Westbound		Eastbound	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Road and East Capitol Street	Signalized	AM	184	F	280	F	61	E	127	F	423	F
Benning Road and 44th Street	Signalized	PM	48	D	21	C	71	E	34	C	-	-
Benning Road and 45th Street	Unsignalized	PM	48	D	4	A	84	F	35	D	36	D
Benning Road and East Capitol Street	Signalized	PM	168	F	267	F	70	E	266	F	154	F

Table 17: 2018 Build Median Running Alignment Peak Hour (AM and PM) Maximum Queue Length (feet) at the Critical Intersections

Intersection	Peak Hour	Northbound			Southbound			Westbound			Eastbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Benning Road and East Capitol Street	AM	1,075	1,075	1,075	320	320	330	1,675	1,675	1,675	1,465	1,465	1,465
Benning Road and 44th Street	PM	-	255	255	800	800	-	255	-	255	-	-	-
Benning Road and 45th Street	PM	155	155	155	455	455	455	105	55	85	30	30	30
Benning Road and East Capitol Street	PM	980	980	980	365	365	375	1,085	1,085	1,085	1,470	1,470	1,470

4.4.3 2018 Build Streetcar Operations

To evaluate the operation of the streetcar alignments, average travel speeds were obtained from the VISSIM simulation model. VISSIM travel time segments are defined from 20th Street to Benning Road Metrorail station in the eastbound direction and from Benning Road Metrorail Station to 26th Street in the westbound direction. **Table 18** provides average travel time and speed for the curb running and median running streetcar alignment in the morning and evening peak hours.

Table 18: 2018 Average Travel Time and Speed for the Streetcar Alignments in the Morning and Evening Peak Hour

Direction	Peak Hour	Travel Time (min)	Speed (mph)
Curb Running Streetcar Alignment			
Eastbound	AM	10.0	12.8
Westbound*	AM	10.9	10.3
Eastbound*	PM	13.9	9.2
Westbound	PM	9.6	11.7
Median Running Streetcar Alignment			
Eastbound	AM	8.9	14.3
Westbound*	AM	9.8	11.4
Eastbound*	PM	11.2	11.4
Westbound	PM	8.3	13.4

*indicates the peak (critical) direction during that peak hour.

Results show that the curb running alignment operates with relatively slower speeds compared to the median alignment during the both peak hours. This can be attributed to the higher number of transitions for the curb running alignment, which increases intersection delay as no signal pre-emption was provided for the special streetcar signals to limit the disruption of general traffic. Another important finding is that the average streetcar speed is generally higher than 10mph, faster than the typical peak period bus speeds in downtown Washington DC[5], as a result of off-board fare collection, level boarding, and relatively larger spacing between streetcar stations.

Table 19 shows station to station travel times for both streetcar alternatives in 2018 based on VISSIM results. Vehicle travel times along Benning Road for the same travel segments were also presented in **Table 20** for comparison purposes.

[5] http://www.wmata.com/pdfs/planning/November2009_AMSpeedMap.pdf

Table 19: 2018 Station to Station VISSIM Travel Time Results for Curb Running and Median Running Streetcar Alternatives

Segment	Curb Running Streetcar		Median Running Streetcar	
	Travel Time (min) – AM Peak Hour	Travel Time (min) – PM Peak Hour	Travel Time (min) – AM Peak Hour	Travel Time (min) – PM Peak Hour
Eastbound Direction				
20th Street to Oklahoma Avenue	0.7	0.8	0.7	0.8
Oklahoma Avenue to Kingman Island	2.0	2.1	1.5	1.2
Kingman Island to 34th Street	1.0	1.3	1.0	1.1
34th Street to Minnesota Avenue	3.3	3.6	2.4	2.4
Minnesota Avenue to 42nd Street	1.0	1.3	1.0	1.1
42nd Street to Benning Road Metrorail Station	2.0	4.9	2.3	4.5
TOTAL	**10.0**	**13.9**	**8.9**	**11.2**
Westbound Direction				
Benning Road Metrorail Station to 42nd Street	2.0	1.6	2.0	1.5
42nd Street to Minnesota Avenue	2.0	1.2	1.7	1.2
Minnesota Avenue to 34th Street	2.3	3.0	2.0	2.4
34th Street to Kingman Island	1.4	1.2	1.1	1.2
Kingman Island to Oklahoma Avenue	2.7	2.2	2.5	1.4
Oklahoma Avenue to 26th Street	0.5	0.4	0.5	0.7
TOTAL	**10.9**	**9.6**	**9.8**	**8.3**

Table 20: 2018 Corridor Vehicle Travel Times under Curb Running and Median Running Alternatives

Segment	Curb Running Streetcar		Median Running Streetcar	
	Travel Time (min) – AM Peak Hour	Travel Time (min) – PM Peak Hour	Travel Time (min) – AM Peak Hour	Travel Time (min) – PM Peak Hour
Eastbound Direction				
20th Street to Benning Road Metrorail Station	6.3	9.9	6.1	9.0
Westbound Direction				
Benning Road Metrorail Station to 26th Street	6.0	5.3	5.9	5.3

5.0 Design Year 2040 Conditions

This section describes transit and general traffic conditions in the study area for the design year 2040. Similar to the opening year analysis, curb running and median running streetcar alternatives were tested as part of the Build scenario and their impact on general traffic is evaluated.

5.1 Design Year 2040 No Build Travel Demand Forecasting

For the 2040 No Build scenario, both inputs were based on regionally accepted baseline conditions for 2040, including the MWCOG Round 8.2 Cooperative Land Use Forecasts and the regional CLRP.

5.1.1 2040 No Build Land Use

The regional land use was determined based on the MWCOG Round 8.2 Cooperative Land Use Forecasts for 2040. Regionally, this represents growth of approximately 30 percent in population and 59 percent in employment over the existing conditions. **Table 21** shows the total population and employment by sector in the study area for 2040.

Table 21: 2040 No Build Population and Employment Growth

	2010	Growth between 2010-2040	2040
Households	16,948	41.4%	23,960
Population	43,148	29.6%	55,918
Total Employment	12,222	59.2%	19,459

5.1.2 2040 No Build Transportation Network

As discussed in the 2018 No Build Transportation Network Section (Section 4.1.2), the only change to the roadway network in the study area is the removal one of the three lanes in each direction along East Capitol Street from 40th Street to Southern Avenue to improve pedestrian safety. As a result, East Capitol Street will operate with two through lanes in both directions between 40th Street and Southern Avenue.

5.1.2.1 Metrorail

Regional Metrorail service improvements provide some changes to the services provided at the two stations within the study area. **Table 22** summarizes the peak and off-peak headways of the assumed Metrorail system in 2040.

Table 22: Peak and Off-Peak Headways of Metrorail Lines (2040)

Line	Terminus A	Terminus B	Peak Headway (minutes)	Off-Peak Headway (minutes)
Blue	Franconia/Springfield	Largo	7	12
Orange	Vienna	New Carrollton	6	12
Silver	VA 772	Armory	7	12

5.1.2.2 Local Bus

Local bus service in the study area is provided primarily by Metrobus. **Table 23** summarizes the peak and off-peak headways for the local routes serving the study area. The table shows morning peak frequencies; evening peak frequencies are assumed to be directionally reversed.

Table 23: Local Bus Frequency (2040)

Route	Direction	Morning Peak Headway (minutes)	Off-Peak Headway (minutes)
96,97	Eastbound	20	60
	Westbound	20	60
U2	Westbound	20	30
	Southbound	30	30
U4	Clockwise	12	30
U5,U6	Northbound	30	38
	Southbound	14	14
U8	Northbound	12	12
	Southbound	60	-
V7,8,9	Eastbound	20	30
	Westbound	20	27
W4	Southbound	30	60
	Northbound	12	60
X1,X3	Eastbound	30	-
	Westbound	15	-
X2	Eastbound	6	8
	Westbound	7	9
X9	Eastbound	10	15
	Westbound	10	15

5.2 Design Year 2040 No Build VISSIM Simulation Modeling

This section describes the development of the 2040 No Build VISSIM model and provides the summary of traffic analysis. Similar to the 2018 VISSIM models, the number of through lanes on East Capitol Street is reduced from three lanes to two lanes in both directions to accommodate the changes that are described in CLRP.

5.2.1 2040 No Build Intersection Traffic Volume Development

MWCOG Version 2.3 regional travel demand model outputs were used to develop 2040 No Build future year intersection traffic volumes. A comparison of 2010 and 2040 link volumes was performed to develop growth rates. These growth rates were averaged and applied to the existing (2014) traffic volumes.

Based on the forecast growth rates, with the exception of Benning Road and East Capitol Street intersection traffic volumes in the simulation model under the No Build conditions were increased by 0.55 percent annually, which corresponds to an increase of approximately 15 percent between 2014 and 2040. At Benning Road and East Capitol Street intersection, while the volumes on Benning Road increased by 0.55 percent annually, East Capitol Street traffic volumes were kept constant in the morning peak and decreased by 0.2 percent annually in the evening peak as a result of East Capitol Street through lane reduction, as indicated in CLRP. **Figure 15** shows the projected peak hour traffic volumes for the year 2040.

5.2.2 2040 No Build Intersection Conditions

To accommodate the future year volumes, split timing and offsets for traffic signals were optimized at critical intersections while maintaining the existing cycle length. **Figure 16** displays intersection LOS at the study intersections for the morning and evening peak hours.

The following intersections operate with LOS F in the morning peak hour:

- Benning Road and Minnesota Avenue (Intersection #5)
- Benning Road and 45th Street (Intersection #8)
- Benning Road and E Capitol Street (Intersection #10)

The following intersections operate with LOS F in the evening peak hour:

- Benning Road and 45th Street (Intersection #8)
- Benning Road and E Capitol Street (LOS F, Intersection #9)

Benning Road and Minnesota Avenue in the morning peak hour, and Benning Road and East Capitol Street intersection in the morning and evening peak hour, operate with LOS F due to heavy traffic volumes and inadequate capacity. LOS F at Benning Road and 45th Street intersection may be explained by the long queues at the downstream link and queue spillback from Benning Road and East Capitol Street intersection, resulting in significant reduction in intersection capacity.

Table 24 provides delay and LOS by movement for the critical intersections for the 2040 No Build for the morning and evening peak hours. **Table 25** shows the associated maximum queue lengths by movements. Delay and queuing results for all study intersections for the 2040 No Build conditions are provided in **Attachment C**.

Figure 15: 2040 No Build Morning and Evening Peak Hour Intersection Traffic Volumes

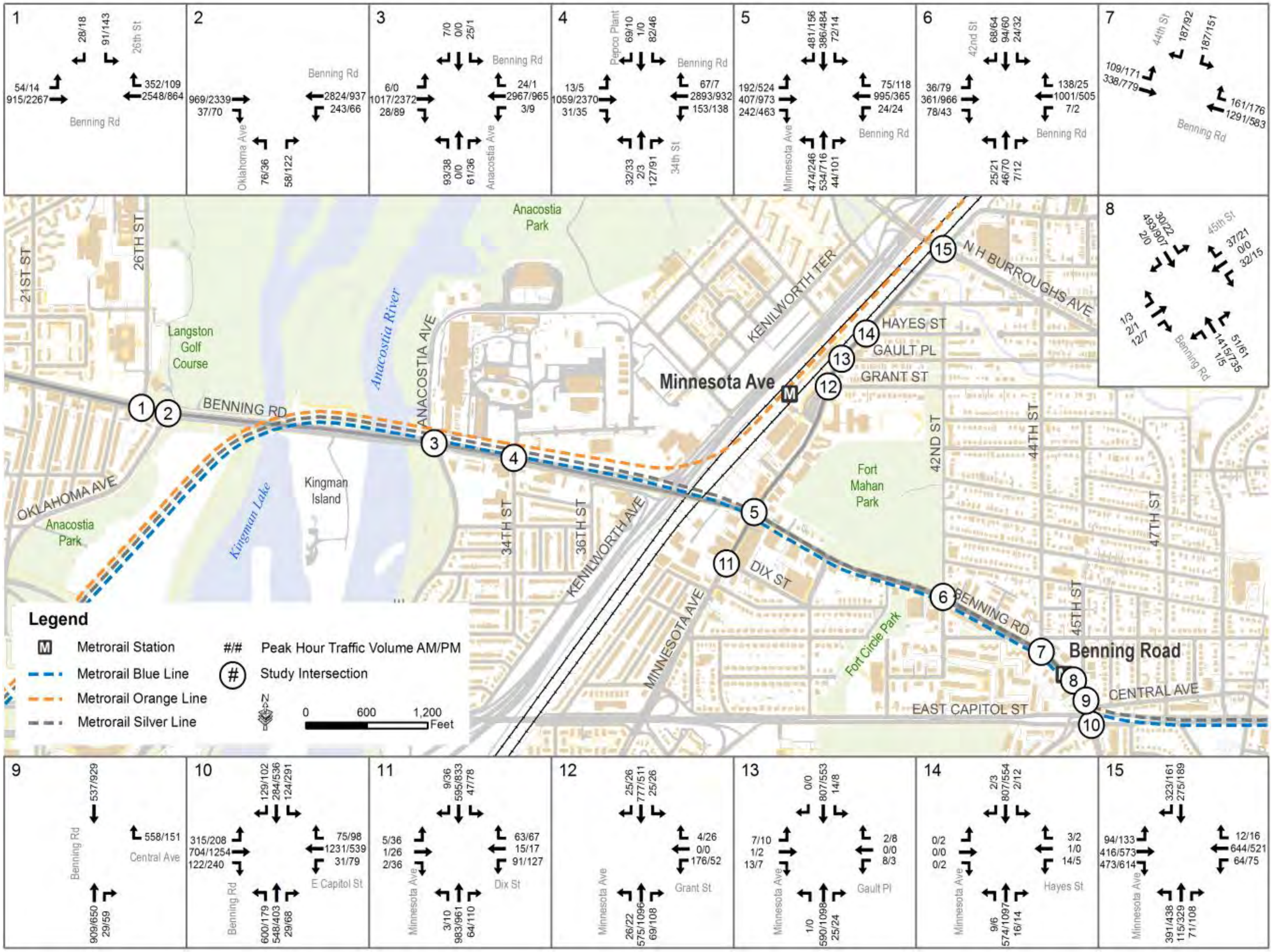


Figure 16: 2040 No Build Morning and Evening Peak Hour Intersection Level of Service (LOS)

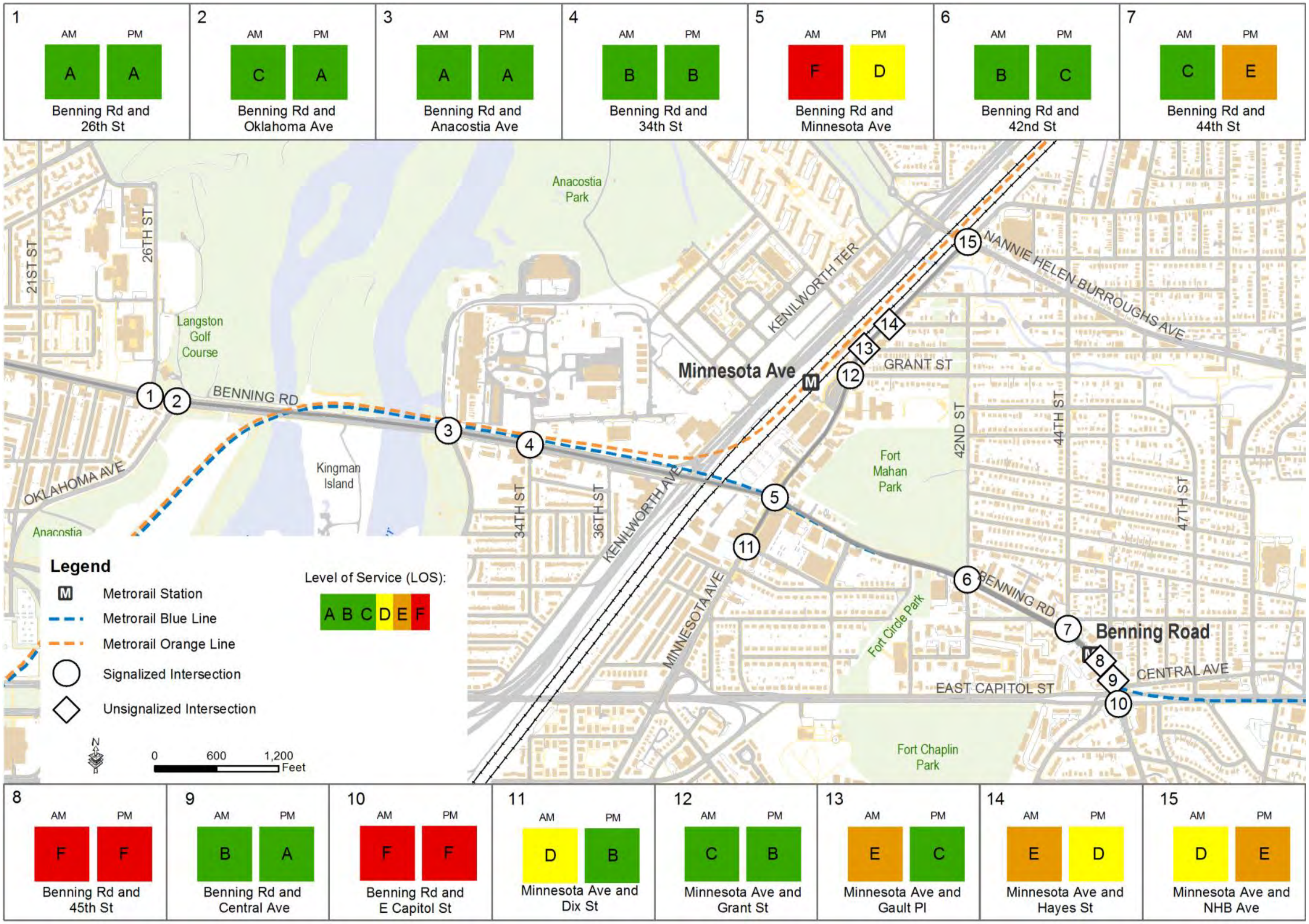


Table 24: 2040 No Build Peak Hour (AM and PM) Delay and Level of Service (LOS) at the Critical Intersections

Intersection	Traffic Control	Peak Hour	Intersection		Northbound		Southbound		Westbound		Eastbound	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Road and Minnesota Avenue	Signalized	AM	84	F	54	D	176	F	63	E	47	D
Benning Road and 45th Street*	Unsignalized	AM	146	F	2	A	29	D	146	F	18	C
Benning Road and East Capitol Street	Signalized	AM	187	F	252	F	80	E	206	F	264	F
Minnesota Avenue and Gault Place*	Unsignalized	AM	49	E	1	A	20	C	29	D	49	E
Minnesota Avenue and Hayes Street*	Unsignalized	AM	37	E	2	A	9	A	37	E	-	-
Benning Road and 44th Street	Signalized	PM	63	E	20	B	105	F	33	C	-	-
Benning Road and 45th Street*	Unsignalized	PM	82	F	1	A	82	F	47	E	29	D
Benning Road and East Capitol Street	Signalized	PM	198	F	340	F	65	E	374	F	162	F
Minnesota Avenue and NHB Avenue	Signalized	PM	64	E	61	E	33	C	27	C	94	F

* Stop-controlled intersection, in which intersection LOS is expressed in terms of the average vehicle delay of the worst movement

Table 25: 2040 No Build Peak Hour (AM and PM) Maximum Queue Length (feet) by Movement at the Critical Intersections

Intersection	Peak Hour	Northbound			Southbound			Westbound			Eastbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Benning Road and Minnesota Avenue	AM	565	385	385	1,335	1,540	1,540	660	660	660	450	345	345
Benning Road and 45th Street	AM	205	200	200	300	300	285	245	220	245	40	25	45
Benning Road and East Capitol Street	AM	1,075	1,075	1,075	300	300	310	1,675	1,675	1,675	715	715	715
Minnesota Avenue and Gault Place*	AM	50	45	45	250	245	280	85	-	85	110	105	110
Minnesota Avenue and Hayes Street*	AM	100	100	100	210	195	195	65	50	70	-	-	-
Benning Road and 44th Street	PM	320	305	305	60	420	355	290	290	290	1,560	1,560	1,560
Benning Road and 45th Street	PM	135	125	125	1,290	1,290	1,270	105	80	105	40	20	40
Benning Road and East Capitol Street	PM	1,070	1,070	1,465	1,070	1,070	1,070	555	555	555	1,465	1,465	1,465
Minnesota Avenue and NHB Avenue	PM	715	715	715	-	200	220	205	205	225	910	910	910

5.3 Design Year 2040 Build Travel Demand Forecasting

2040 Build travel demand model combined regional baseline assumptions for 2040 with the Benning Road Streetcar Extension.

5.3.1 2040 Build Land Use

For the Build scenario, the regional land use of the travel demand analysis area was the same as for the No Build scenario, using the MWCOG Round 8.2 Cooperative Land Use Forecasts for 2040.

5.3.2 2040 Build Transportation Network

The transportation networks in the Build Scenario are the same as for the No Build scenario with the exception of Benning Road Streetcar Extension, extending the H/Benning Streetcar Line to the Benning Road Metrorail station.

5.3.3 2040 Build Ridership Forecasting

Table 26 summarizes the streetcar ridership under the No Build and the Build scenarios in 2040. As described in the 2018 Streetcar ridership section (Section 4.3.3), the 5th Street and H Street stop was not modeled since the MWCOG regional model does not have a node on 5th Street and H Street.

Table 26: 2040 No Build and Build Streetcar Ridership

	Peak		Off-Peak		Daily	
Stop	No Build	Build	No Build	Build	No Build	Build
Union Station	629	1110	942	1845	1571	2955
3rd Street and H Street, NE	298	322	619	758	917	1079
8th Street and H Street, NE	105	138	282	543	387	681
13th Street and H Street, NE	145	198	234	426	378	623
15th Street and Benning Road, NE	45	52	92	180	137	231
19th Street and Benning Road, NE	183	343	266	387	448	729
Oklahoma Avenue and Benning Road, NE	113	155	174	287	287	442
Kingman Island and Benning Road, NE	-	43	-	316	-	359
34th Street and Benning Road, NE	-	193	-	436	-	629
Minnesota Avenue and Benning Road, NE	-	32	-	351	-	383
42nd Street and Benning Road, NE	-	47	-	347	-	393
Benning Road Metrorail Station	-	321	-	890	-	1211
Total	**1,518**	**2,954**	**2,609**	**6,766**	**4,125**	**9,712**

Based on the ridership forecasts prepared for the project, the Benning Road Streetcar Extension segment is projected to have approximately 5,600 daily riders by 2040. These values are in addition to the projected initial Oklahoma Avenue to Union Station H/Benning Streetcar segment daily ridership of 4,125.

Table 27 provides the route level total daily bus ridership for the buses serving the study area and **Table 28** shows total daily bus ridership within the study area, excluding boardings occurring outside of the study area.

Table 27: 2040 No Build and Build Route Level Daily Bus Ridership

Bus Route	Peak	Off-Peak	Daily
2040 No Build Bus Ridership – Route Level			
X1,X3	1,941	0	1,941
X2	7,799	6,685	14,484
X9	2,688	2,351	5,039
U2	475	490	965
U4	37	6	43
U5,U6	578	1,069	1,647
U8	146	661	807
96,97	7,353	2,093	9,446
V7,V8,V9	3,368	2,193	5,561
W4	5,989	5,498	11,487
Total	**30,374**	**21,046**	**51,420**
2040 Build Bus Ridership – Route Level			
X1,X3	1,911	0	1,911
X2	7,482	5,169	12,651
X9	2,622	2,122	4,744
U2	472	486	958
U4	33	5	38
U5,U6	579	998	1,577
U8	118	462	580
96,97	7,207	1,973	9,180
V7,V8,V9	3,364	2,223	5,587
W4	6,164	5,782	11,946
Total	**29,952**	**19,220**	**49,172**
Percent Different Compared to No Build	**1%**	**9%**	**4%**

Table 28: 2040 No Build and Build Daily Bus Ridership in the Study Area

Bus Route	Peak	Off-Peak	Daily
2040 No Build Bus Ridership in the Study Area			
X1,X3	929	0	929
X2	4,431	4,596	9,027
X9	463	528	991
U2	291	164	455
U4	10	2	12
U5,U6	390	446	836
U8	19	59	78
96,97	805	221	1,026
V7,V8,V9	656	355	1,011
W4	**1,176**	**794**	**1,970**
Total	**9,170**	**7,165**	**16,335**
2040 Build Bus Ridership in the Study Area			
Bus Route	Peak	Off-Peak	Daily
X1,X3	898	0	898
X2	4,186	3,032	7,218
X9	423	423	846
U2	291	154	445
U4	15	3	18
U5,U6	387	392	779
U8	13	32	45
96,97	735	180	915
V7,V8,V9	655	379	1,034
W4	1,297	991	2,288
Total	8,900	5,586	14,486
Percent Different Compared to No Build	**3%**	**22%**	**11%**

Compared to the No Build scenario, the total daily bus ridership within the study area is projected to decrease by approximately 11 percent by 2040 under the Build scenario with the introduction of Benning Road Streetcar Extension (**Table 28**). The regional forecasting model indicates that the reduction in bus ridership is more pronounced in the off-peak periods, which can be attributed to the premium, high-frequency service that will be offered by the streetcar at all times of the day (10-minute headway throughout the entire service day).

5.4 Design Year 2040 Build VISSIM Simulation Modeling

The Build scenario for design year 2040 assumes the same transportation network as in the 2018 Build scenario (Section 4.3). The changes compared to the 2040 No Build model are summarized below:

- Proposed lane configuration changes at Benning Road and Minnesota Avenue intersection (**Figure 12**); and
- Extension of the streetcar to Benning Road Metrorail Station.

The same transitions and special transit-only signals described for the 2018 scenario (Section 4.3) are considered in the 2040 traffic analysis.

5.4.1 2040 Build Intersection Traffic Volume Development

The regional model forecasts indicated that the reduction in automobile trips due to people switching from automobiles to transit with the introduction of streetcar is not substantial. To perform the most conservative traffic analysis, the same traffic volume projections developed for the 2040 No Build model were used in the Build VISSIM model (**Figure 15**).

5.4.2 2040 Build Intersection Conditions

Figure 17 and **Figure 18** provide 2040 Build intersection LOS at the study intersections during the morning and evening peak hours with the curb running and median running alignment, respectively. Note that similar to the 2018 traffic analysis, the traffic control type at Benning Road and 45th Street intersection was changed from unsignalized to signalized control to accommodate the transition of the streetcar at Benning Road Metrorail Station.

Figure 17: 2040 Build Curb Running Alignment Morning and Evening Peak Hour Intersection Level of Service (LOS)

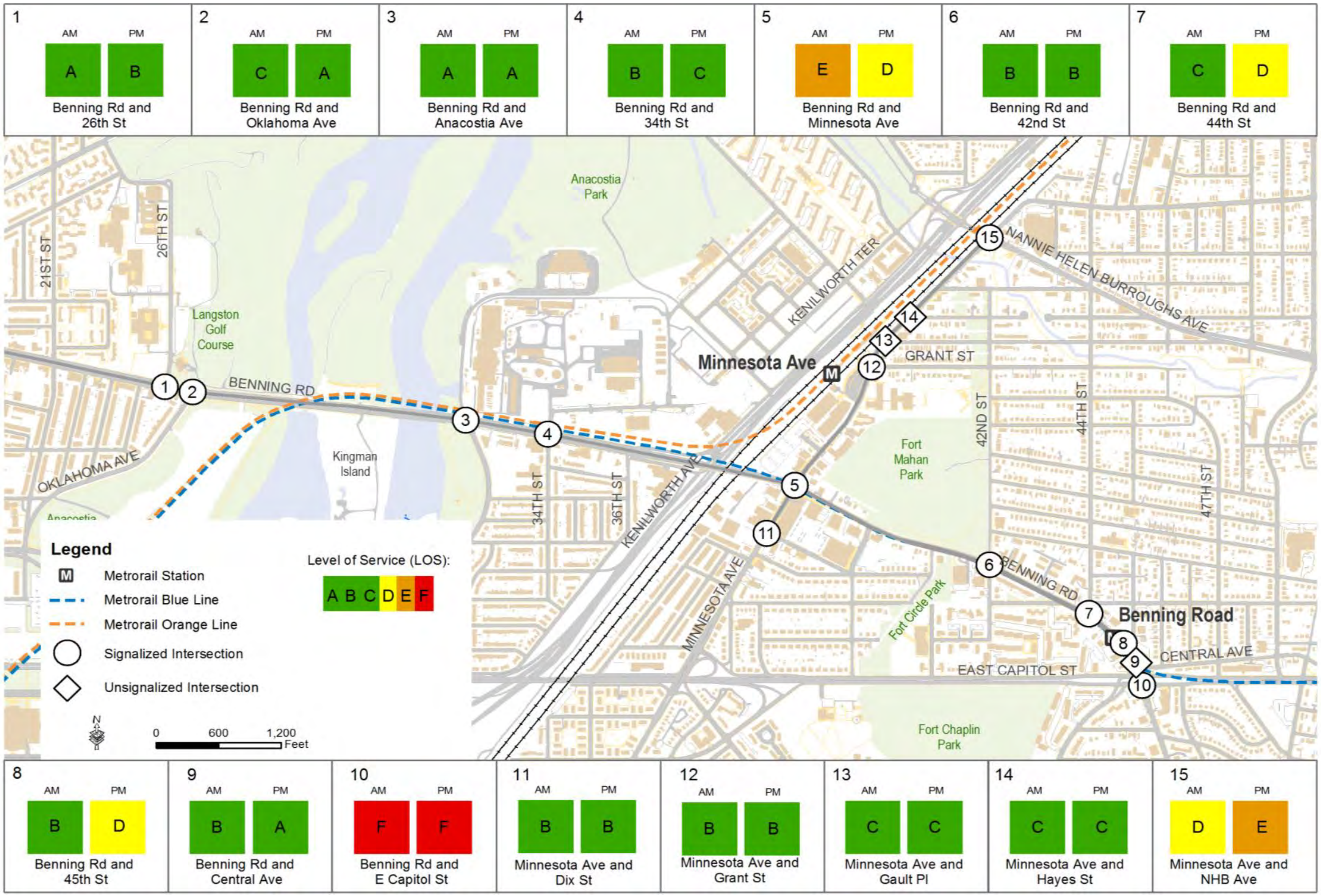
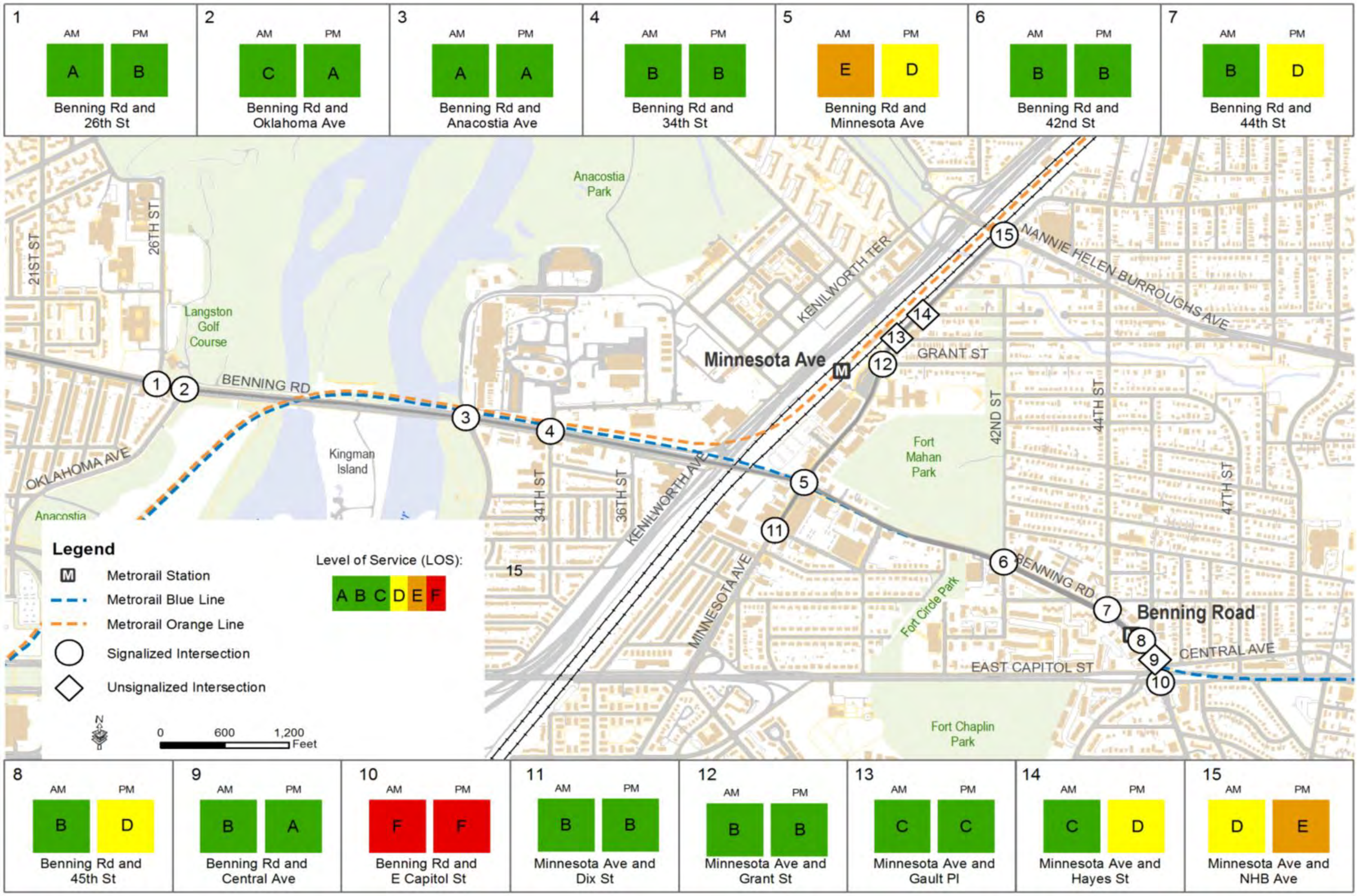


Figure 18: 2040 Build Median Running Alignment Morning and Evening Peak Hour Intersection Level of Service (LOS)



The findings of the 2040 Build traffic analysis are summarized below:

- Benning Road and East Capitol Street intersection operates with LOS F in the morning and evening peak hour under both streetcar alignments.
- Compared to the 2040 No Build scenario, intersection LOS at Benning Road at 44th Street improves from LOS E to LOS D in the evening peak hour under both the curb running and median running alternatives. This improvement is explained by the signal timing changes at Benning Road and East Capitol Street intersection to favor the operation of streetcar (southbound approach) and limit the congestion on Benning Road.
- Signal timing modifications at Benning Road and East Capitol Street intersection to improve streetcar operation (in particular in the evening peak) cause higher delay at this intersection (see **Table 29** and **Table 31** below).
- The LOS improvement at Benning Road and 45th Street intersection from LOS F to LOS D in the evening peak can be attributed to the change in intersection control type (conversion from unsignalized to signalized) and signal timing changes at Benning Road and East Capitol Street intersection, which limit the extent of queue spillback to upstream intersections.
- The operation of streetcar and transitions at most intersections results in very little impact on vehicular delay.

Table 29 provides delay and LOS by movement for the critical intersections for the 2040 Build curb running alternative. **Table 30** displays the associated queue lengths by movement. **Tables 31** and **32** provide delay and queuing results for the median running alternative, respectively. Note that Benning Road and 44th Street intersection results are also included for comparison purposes.

Attachment C provides delay and queuing results for all study intersections for both the curb running and median running alternative.

Table 29: 2040 Build Curb Running Alignment Peak Hour (AM and PM) Delay and Level of Service (LOS) at the Critical Intersections

Intersection	Traffic Control	Peak Hour	Intersection		Northbound		Southbound		Westbound		Eastbound	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Road and Minnesota Avenue	Signalized	AM	73	E	63	E	105	F	70	E	51	D
Benning Road and East Capitol Street	Signalized	AM	189	F	256	F	75	E	198	F	287	F
Benning Road and East Capitol Street	Signalized	PM	214	F	384	F	54	D	424	F	158	F
Minnesota Avenue and NHB Avenue	Signalized	PM	66	E	68	E	32	C	27	C	93	F

Table 30: 2040 Build Curb Running Alignment Peak Hour (AM and PM) Maximum Queue Length (feet) by Movement at the Critical Intersections

Intersection	Peak Hour	Northbound			Southbound			Westbound			Eastbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Benning Road and Minnesota Avenue	AM	545	265	265	1345	1345	1345	-	745	745	480	325	325
Benning Road and East Capitol Street	AM	1,075	1,075	1,075	350	350	360	1,675	1,675	1,675	1,465	1,465	1,465
Benning Road and East Capitol Street	PM	1,070	1,070	1,070	365	365	375	1,675	1,675	1,675	1,465	1,465	1,465
Minnesota Avenue and NHB Avenue	PM	810	810	810	-	190	210	205	205	225	950	950	950

Table 31: 2040 Build Median Running Alignment Peak Hour (AM and PM) Delay and Level of Service (LOS) at the Critical Intersections

Intersection	Traffic Control	Peak Hour	Intersection		Northbound		Southbound		Westbound		Eastbound	
			Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Road and Minnesota Avenue	Signalized	AM	72	E	59	E	110	F	67	E	49	D
Benning Road and East Capitol Street	Signalized	AM	191	F	256	F	71	E	198	F	299	F
Benning Road and East Capitol Street	Signalized	PM	218	F	442	F	57	E	427	F	167	F
Minnesota Avenue and NHB Avenue	Signalized	PM	67	E	68	E	33	C	28	C	96	F

Table 32: 2040 Build Median Running Alignment Peak Hour (AM and PM) Maximum Queue Length (feet) by Movement at the Critical Intersections

Intersection	Peak Hour	Northbound			Southbound			Westbound			Eastbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Benning Road and Minnesota Avenue	AM	525	335	335	1355	1355	1360	-	705	705	470	310	310
Benning Road and East Capitol Street	AM	1,075	1,075	1,075	345	345	355	1,675	1,675	1,675	1,470	1,470	1,470
Benning Road and East Capitol Street	PM	1,075	1,075	1,075	350	350	360	1,675	1,675	1,675	1,465	1,465	1,465
Minnesota Avenue and NHB Avenue	PM	775	775	775	-	205	225	210	210	230	975	975	975

5.4.3 2040 Build Streetcar Operations

The operation of the streetcar alignments was evaluated based on the average travel speeds which were obtained from the VISSIM simulation model. VISSIM travel time segments were defined from 20th Street to Benning Road Metrorail Station in the eastbound direction and from Benning Road Metrorail Station to 26th Street in the westbound direction. **Table 33** provides average travel time and speed for the curb and median running streetcar alignments in 2040 during the morning and evening peak hours.

Table 33: 2040 Average Travel Time and Speed for the Streetcar Alignments in the Morning and Evening Peak Hour

Direction	Peak Hour	Travel Time (min)	Speed (mph)
Curb Running Streetcar Alignment			
Eastbound	AM	10.3	12.5
Westbound*	AM	11.5	9.7
Eastbound*	PM	13.2	9.7
Westbound	PM	9.8	11.4
Median Running Streetcar Alignment			
Eastbound	AM	9.2	13.9
Westbound*	AM	10.3	10.9
Eastbound*	PM	11.6	11.0
Westbound	PM	8.3	13.4

*indicates the peak (critical) direction during that peak hour.

Similar findings, as reported in the 2018 Build section, were obtained from the analysis. The curb running alignment operates with relatively slower speeds compared to the median alignment during the both peak hours due to the higher number of transitions for the curb running alignment. Moreover, results suggest that with the increase in background traffic in 2040, streetcar travel times would generally increase with the exception of eastbound travel times during the evening peak hour, where this can be attributed to the 2040 MWCOG projections. MWCOG model projected lower traffic volumes in 2040 on East Capitol Street compared to 2018 projections due to the through lane reduction on East Capitol Street. As a result, more green time could be allocated to Benning Road approach at Benning Road and East Capitol Street intersection in 2040 (due to lower East Capitol Street volumes), limiting congestion and queue spillback on Benning Road approach, thereby improving travel times.

Table 34 shows station to station travel times for streetcar alternatives in 2040 based on the VISSIM output. Vehicle travel times obtained from VISSIM along Benning Road for the same travel segments were also included in **Table 35** for comparison purposes.

Table 34: 2040 Station to Station VISSIM Travel Time Results for Curb Running and Median Running Streetcar Alternatives

	Curb Running Streetcar		Median Running Streetcar	
Segment	Travel Time (min) – AM Peak Hour	Travel Time (min) – PM Peak Hour	Travel Time (min) – AM Peak Hour	Travel Time (min) – PM Peak Hour
Eastbound Direction				
20th Street to Oklahoma Avenue	0.7	0.8	0.7	0.8
Oklahoma Avenue to Kingman Island	2.0	2.1	1.5	1.2
Kingman Island to 34th Street	1.0	1.3	1.1	1.2
34th Street to Minnesota Avenue	3.3	3.8	2.5	2.7
Minnesota Avenue to 42nd Street	1.0	1.2	1.0	1.3
42nd Street to Benning Road Metrorail Station	2.2	3.9	2.3	4.4
TOTAL	**10.3**	**13.2**	**9.2**	**11.6**
Westbound Direction				
Benning Road Metrorail Station to 42nd Street	2.1	1.7	2.1	1.5
42nd Street to Minnesota Avenue	2.3	1.3	1.7	1.2
Minnesota Avenue to 34th Street	2.4	3.0	2.2	2.4
34th Street to Kingman Island	1.4	1.2	1.1	1.1
Kingman Island to Oklahoma Avenue	2.8	2.2	2.6	1.4
Oklahoma Avenue to 26th Street	0.5	0.4	0.6	0.8
TOTAL	**11.5**	**9.8**	**10.3**	**8.3**

Table 35: 2040 Corridor Vehicle Travel Times under Curb Running and Median Running Alternatives

	Curb Running Streetcar		Median Running Streetcar	
Segment	Travel Time (min) – AM Peak Hour	Travel Time (min) – PM Peak Hour	Travel Time (min) – AM Peak Hour	Travel Time (min) – PM Peak Hour
Eastbound Direction				
20th Street to Benning Road Metrorail Station	6.8	9.3	6.7	9.3
Westbound Direction				
Benning Road Metrorail Station to 26th Street	6.4	5.3	6.2	5.3

Attachment A – Existing (2014) Results

Table A-1: Existing Morning Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	8.2	A	-	-	36.4	D	7.2	A	8.0	A
Benning Rd and Oklahoma Ave	Signalized	13.8	B	23.6	C	-	-	15.2	B	7.9	A
Benning Rd and Anacostia Ave	Signalized	7.9	A	42.8	D	37.3	D	7.3	A	3.5	A
Benning Rd and 34th St	Signalized	13.0	B	14.3	B	34.7	C	11.5	B	15.0	B
Benning Rd and Minnesota Ave	Signalized	49.7	D	29.4	C	47.2	D	67.4	E	34.3	C
Benning Rd and 42nd St	Signalized	10.5	B	38.0	D	35.5	D	6.3	A	5.8	A
Benning Rd and 45nd St*	Un-signalized	31.7	D	1.9	A	5.4	A	31.7	D	14.2	B
Benning Rd and Central Ave*	Un-signalized	12.1	B	-	-	-	-	12.1	B	-	-
Benning Rd and E Capitol St	Signalized	68.9	E	93.2	F	62.4	E	62.5	E	92.0	F
Minnesota Ave and Dix St	Signalized	9.5	A	8.1	A	8.9	A	20.6	C	17.7	B
Minnesota Ave and Grant St	Signalized	15.1	B	13.1	B	10.7	B	39.4	D	-	-
Minnesota Ave and Gault Pl*	Un-signalized	20.5	C	0.4	A	1.4	A	20.5	C	18.0	C
Minnesota Ave and Hayes St*	Un-signalized	15.4	C	1.4	A	0.9	A	15.4	C	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	30.5	C	38.8	D	29.6	C	27.5	C	27.9	C
Benning Road and 44th St	Signalized	20.1	C	9.9	A	43.7	D	31.0	C	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay.

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table A-2: Existing Morning Peak Hour Maximum Queue Length (feet)

Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	124	-	151	-	299	282	84	118	-
Benning Rd and Oklahoma Ave	104	-	121	-	-	-	632	632	-	-	160	153
Benning Rd and Anacostia Ave	184	-	174	64	-	55	443	443	443	117	117	103
Benning Rd and 34th St	125	125	133	123	123	110	120	399	399	33	187	162
Benning Rd and Minnesota Ave	516	209	209	304	644	648	666	666	666	285	303	303
Benning Rd and 42nd St	105	105	120	197	197	212	188	188	202	117	117	152
Benning Rd and 45nd St	189	183	183	173	169	157	104	77	103	41	25	44
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	321	-	-	-
Benning Rd and E Capitol St	938	938	938	286	286	295	952	952	952	430	430	430
Minnesota Ave and Dix St	191	191	191	164	164	164	115	115	115	22	22	22
Minnesota Ave and Grant St	84	202	202	191	191	191	235	-	235	-	-	-
Minnesota Ave and Gault Pl	44	35	35	124	119	150	53	-	49	110	105	108
Minnesota Ave and Hayes St	53	53	53	13	0	0	41	23	45	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	479	479	479	-	272	290	237	237	257	371	371	371
Benning Road and 44th St	-	300	300	325	325	-	300	-	300	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south

Table A-3: Existing Evening Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	8.7	A	-	-	40.4	D	3.3	A	8.0	A
Benning Rd and Oklahoma Ave	Signalized	3.8	A	15.6	B	-	-	4.5	A	2.8	A
Benning Rd and Anacostia Ave	Signalized	3.4	A	30.8	C	45.6	D	2.9	A	2.8	A
Benning Rd and 34th St	Signalized	12.5	B	18.1	B	34.7	C	11.5	B	15.0	B
Benning Rd and Minnesota Ave	Signalized	45.7	D	29.4	C	47.2	D	59.0	E	34.3	C
Benning Rd and 42nd St	Signalized	10.3	B	35.8	D	30.5	C	4.8	A	7.6	A
Benning Rd and 45nd St*	Un-signalized	32.9	D	0.9	A	30.5	D	32.9	D	21.2	C
Benning Rd and Central Ave*	Un-signalized	4.7	A	-	-	-	-	4.7	A	-	-
Benning Rd and E Capitol St	Signalized	58.5	E	103.7	F	60.1	E	54.7	D	50.3	D
Minnesota Ave and Dix St	Signalized	10.4	B	8.4	A	9.4	A	21.9	C	18.3	B
Minnesota Ave and Grant St	Signalized	13.6	B	13.1	B	8.4	A	34.6	C	-	-
Minnesota Ave and Gault Pl*	Un-signalized	13.7	B	0.5	A	1.2	A	9.6	A	13.7	B
Minnesota Ave and Hayes St*	Un-signalized	23.0	C	1.4	A	2.8	A	23.0	C	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	34.3	C	46.7	D	25.9	C	26.6	C	31.5	C
Benning Road and 44th St	Signalized	16.3	B	10.2	B	19.5	B	23.0	C	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay
Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table A-4: Existing Evening Peak Hour Maximum Queue Length (feet)

Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	182	-	208	-	149	132	25	279	-
Benning Rd and Oklahoma Ave	72	-	90	-	-	-	107	107	-	-	248	241
Benning Rd and Anacostia Ave	103	-	93	13	-	0	115	115	115	257	257	243
Benning Rd and 34th St	124	124	132	72	72	31	140	128	128	21	468	443
Benning Rd and Minnesota Ave	256	266	266	65	391	343	280	280	280	1297	1220	1220
Benning Rd and 42nd St	138	138	153	159	159	174	130	130	144	303	303	337
Benning Rd and 45nd St	120	113	113	405	398	389	72	45	70	37	20	40
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	77	-	-	-
Benning Rd and E Capitol St	535	535	693	535	535	535	270	270	270	693	693	693
Minnesota Ave and Dix St	154	154	154	170	170	170	138	138	138	83	83	83
Minnesota Ave and Grant St	93	366	366	142	142	142	101	-	101	-	-	-
Minnesota Ave and Gault Pl	42	34	34	100	95	123	55	-	51	83	94	76
Minnesota Ave and Hayes St	64	64	64	33	16	16	40	21	44	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	549	549	549	-	164	182	193	193	213	584	584	584
Benning Road and 44th St	-	202	202	365	365	-	167	-	166	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Attachment B – Opening Year 2018 Results

Table B-1: 2018 No Build Morning Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	8.3	A	-	-	36.2	D	7.3	A	8.0	A
Benning Rd and Oklahoma Ave	Signalized	15.6	B	23.2	C	-	-	17.8	B	7.8	A
Benning Rd and Anacostia Ave	Signalized	7.9	A	40.3	D	38.0	D	7.3	A	3.9	A
Benning Rd and 34th St	Signalized	13.1	B	15.1	B	33.6	C	11.0	B	15.6	B
Benning Rd and Minnesota Ave	Signalized	48.7	D	39.6	D	62.8	E	54.6	D	36.2	D
Benning Rd and 42nd St	Signalized	11.0	B	38.5	D	34.4	C	7.1	A	6.0	A
Benning Rd and 45nd St*	Un-signalized	32.2	D	1.3	A	6.2	A	32.2	D	12.6	B
Benning Rd and Central Ave*	Un-signalized	11.3	B	-	-	-	-	11.3	B	-	-
Benning Rd and E Capitol St	Signalized	179.8	F	281.9	F	64.5	E	127.2	F	382.6	F
Minnesota Ave and Dix St	Signalized	11.3	B	11.5	B	8.7	A	20.5	C	18.7	B
Minnesota Ave and Grant St	Signalized	15.5	B	14.0	B	10.7	B	38.9	D	-	-
Minnesota Ave and Gault Pl*	Un-signalized	23.1	C	0.4	A	1.6	A	23.1	C	13.8	B
Minnesota Ave and Hayes St*	Un-signalized	16.3	C	1.6	A	0.9	A	16.3	C	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	31.2	C	41.3	D	29.0	C	27.5	C	28.8	C
Benning Road and 44th St	Signalized	18.2	B	18.5	B	11.5	B	25.0	C	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table B-2: 2018 No Build Morning Peak Hour Maximum Queue Length (feet)

Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	138	-	165	-	305	288	73	117	-
Benning Rd and Oklahoma Ave	103	-	120	-	-	-	766	766	-	-	179	172
Benning Rd and Anacostia Ave	206	-	196	72	-	63	421	421	421	114	114	100
Benning Rd and 34th St	153	153	161	133	133	115	123	381	381	30	206	181
Benning Rd and Minnesota Ave	523	247	247	353	725	736	564	564	564	306	298	298
Benning Rd and 42nd St	118	118	133	199	199	214	236	236	250	143	143	178
Benning Rd and 45nd St	146	140	140	144	144	128	108	81	107	41	24	44
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	303	-	-	-
Benning Rd and E Capitol St	1131	1131	1131	290	290	301	1674	1674	1674	1463	1463	1463
Minnesota Ave and Dix St	277	277	277	164	164	164	121	121	121	22	22	22
Minnesota Ave and Grant St	85	195	195	210	210	210	245	-	245	-	-	-
Minnesota Ave and Gault Pl	22	16	16	126	121	148	53	-	49	102	102	103
Minnesota Ave and Hayes St	48	48	48	19	9	9	43	24	47	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	472	472	472	-	272	290	234	234	255	372	371	372
Benning and 44th St	-	352	352	177	177	-	274	-	273	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table B-3: 2018 No Build Evening Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	8.9	A	-	-	40.6	D	3.4	A	9.0	A
Benning Rd and Oklahoma Ave	Signalized	3.8	A	15.2	B	-	-	4.5	A	2.8	A
Benning Rd and Anacostia Ave	Signalized	3.6	A	32.2	C	44.5	D	2.8	A	3.1	A
Benning Rd and 34th St	Signalized	13.2	B	18.7	B	33.4	C	9.0	A	14.4	B
Benning Rd and Minnesota Ave	Signalized	39.9	D	29.9	C	36.6	D	54.6	D	43.1	D
Benning Rd and 42nd St	Signalized	27.5	C	35.3	D	33.7	C	5.4	A	36.2	D
Benning Rd and 45nd St*	Un-signalized	107.6	F	0.9	A	107.6	F	47.4	E	39.3	E
Benning Rd and Central Ave*	Un-signalized	4.5	A	-	-	-	-	4.5	A	-	-
Benning Rd and E Capitol St	Signalized	160.7	F	259.5	F	77.0	E	251.1	F	141.8	F
Minnesota Ave and Dix St	Signalized	11.0	B	8.7	A	10.4	B	22.0	C	19.1	B
Minnesota Ave and Grant St	Signalized	13.6	B	14.7	B	8.6	A	30.0	C	-	-
Minnesota Ave and Gault Pl*	Un-signalized	14.4	B	0.5	A	1.4	A	9.6	A	14.4	B
Minnesota Ave and Hayes St*	Un-signalized	21.3	C	1.6	A	2.8	A	21.3	C	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	33.2	C	39.7	D	31.2	C	26.8	C	32.2	C
Benning Road and 44th St	Signalized	83.4	F	19.3	B	145.9	F	40.4	D	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table B-4: 2018 No Build Evening Peak Hour Maximum Queue Length (feet)

Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	192	-	219	-	140	123	18	273	-
Benning Rd and Oklahoma Ave	73	-	90	-	-	-	108	108	-	-	248	241
Benning Rd and Anacostia Ave	114	-	104	11	-	0	110	110	110	258	258	243
Benning Rd and 34th St	118	118	126	76	76	29	128	115	115	16	474	449
Benning Rd and Minnesota Ave	280	277	277	59	375	335	274	274	274	908	971	971
Benning Rd and 42nd St	135	135	151	174	174	189	129	129	147	768	768	803
Benning Rd and 45nd St	133	127	127	496	499	480	74	47	73	37	21	40
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	78	-	-	-
Benning Rd and E Capitol St	307	948	1,469	948	948	307	1,469	1,028	1,028	1,469	948	948
Minnesota Ave and Dix St	170	170	170	217	217	217	154	154	154	90	90	90
Minnesota Ave and Grant St	89	374	374	159	159	159	104	-	104	-	-	-
Minnesota Ave and Gault Pl	22	13	13	121	116	142	55	-	51	78	88	79
Minnesota Ave and Hayes St	110	110	110	30	12	12	40	21	44	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	460	460	460	-	186	205	184	184	204	619	618	619
Benning Road and 44th St	-	231	231	1,007	1,007	-	255	-	255	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table B-5: 2018 Build Curb Running Alternative Morning Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	7.5	A	-	-	28.5	C	6.0	A	9.3	A
Benning Rd and Oklahoma Ave	Signalized	25.0	C	21.9	C	-	-	29.5	C	12.1	B
Benning Rd and Anacostia Ave	Signalized	7.2	A	32.8	C	32.9	C	3.7	A	12.5	B
Benning Rd and 34th St	Signalized	12.5	B	16.8	B	35.2	D	12.1	B	10.1	B
Benning Rd and Minnesota Ave	Signalized	54.2	D	44.0	D	72.2	E	61.0	E	37.4	D
Benning Rd and 42nd St	Signalized	11.4	B	38.6	D	34.5	C	7.7	A	6.2	A
Benning Rd and 45nd St	Signalized	8.0	A	5.8	A	10.5	B	21.3	C	26.0	C
Benning Rd and Central Ave*	Un-signalized	11.1	B	-	-	-	-	11.1	B	-	-
Benning Rd and E Capitol St	Signalized	180.5	F	284.5	F	62.2	E	127.2	F	386.2	F
Minnesota Ave and Dix St	Signalized	9.1	A	7.5	A	8.9	A	20.3	C	18.0	B
Minnesota Ave and Grant St	Signalized	15.5	B	13.8	B	10.9	B	39.0	D	-	-
Minnesota Ave and Gault Pl*	Un-signalized	20.7	C	0.5	A	1.6	A	20.7	C	14.2	B
Minnesota Ave and Hayes St*	Un-signalized	15.4	C	1.7	A	0.9	A	15.4	C	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	30.7	C	37.9	D	29.1	C	27.6	C	29.6	C
Benning Road and 44th St	Signalized	17.1	B	15.9	B	11.6	B	27.7	C	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table B-6: 2018 Build Curb Running Alternative Morning Peak Hour Maximum Queue Length (feet)

Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	124	-	151	-	302	285	90	127	-
Benning Rd and Oklahoma Ave	115	-	98	-	-	-	740	740	-	-	209	214
Benning Rd and Anacostia Ave	186	-	176	65	-	-	281	281	281	173	173	159
Benning Rd and 34th St	155	155	163	155	155	127	295	384	384	40	217	192
Benning Rd and Minnesota Ave	364	207	207	785	785	921	-	581	581	304	283	283
Benning Rd and 42nd St	118	118	133	198	198	213	241	241	255	149	149	180
Benning Rd and 45nd St	246	246	246	163	163	163	70	70	70	38	38	38
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	257	-	-	-
Benning Rd and E Capitol St	1072	1072	1072	320	320	330	1674	1674	1674	1463	1463	1463
Minnesota Ave and Dix St	191	191	191	169	169	169	121	121	121	22	22	22
Minnesota Ave and Grant St	94	227	227	203	203	203	245	-	245	-	-	-
Minnesota Ave and Gault Pl	-	47	47	117	112	-	53	-	49	104	102	103
Minnesota Ave and Hayes St	71	67	67	8	3	3	43	24	47	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	466	466	466	-	274	292	230	230	251	401	400	401
Benning and 44th St	-	392	392	148	148	-	295	-	294	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table B-7: 2018 Build Curb Running Alternative Evening Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	10.5	B	-	-	40.5	D	3.7	A	11.3	B
Benning Rd and Oklahoma Ave	Signalized	7.5	A	21.4	C	-	-	9.3	A	5.8	A
Benning Rd and Anacostia Ave	Signalized	4.5	A	32.2	C	44.6	D	2.9	A	4.3	A
Benning Rd and 34th St	Signalized	19.4	B	18.1	B	36.8	D	12.3	B	22.3	C
Benning Rd and Minnesota Ave	Signalized	41.9	D	36.7	D	45.8	D	52.4	D	40.9	D
Benning Rd and 42nd St	Signalized	19.1	B	35.3	D	33.3	C	5.4	A	21.8	C
Benning Rd and 45nd St	Signalized	54.8	D	3.0	A	99.2	F	28.0	C	34.4	C
Benning Rd and Central Ave*	Un-signalized	4.2	A	-	-	-	-	4.2	A	-	-
Benning Rd and E Capitol St	Signalized	165.9	F	286.8	F	69.1	E	251.0	F	148.2	F
Minnesota Ave and Dix St	Signalized	11.5	B	8.7	A	11.6	B	22.1	C	19.1	B
Minnesota Ave and Grant St	Signalized	14.9	B	16.9	B	8.0	A	30.0	C	-	-
Minnesota Ave and Gault Pl*	Un-signalized	12.4	B	1.0	A	1.2	A	11.6	B	12.4	B
Minnesota Ave and Hayes St*	Un-signalized	19.9	C	1.9	A	2.5	A	19.9	C	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	32.6	C	39.5	D	27.8	C	27.1	C	31.7	C
Benning Road and 44th St	Signalized	60.0	E	18.4	B	99.4	F	34.7	C	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table B-8: 2018 Build Curb Running Alternative Evening Peak Hour Maximum Queue Length (feet)

Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	191	-	218	-	157	140	41	285	-
Benning Rd and Oklahoma Ave	102	-	85	-	-	-	122	122	-	-	287	290
Benning Rd and Anacostia Ave	114	-	104	11	-	-	105	105	105	273	273	260
Benning Rd and 34th St	116	116	124	78	78	29	210	148	148	8	566	542
Benning Rd and Minnesota Ave	194	273	273	446	446	285	-	291	291	833	982	982
Benning Rd and 42nd St	135	135	151	168	168	183	140	140	154	592	592	626
Benning Rd and 45nd St	136	136	136	469	469	469	105	57	85	29	29	29
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	68	-	-	-
Benning Rd and E Capitol St	1,017	1,017	1,017	363	363	373	1,032	1,032	1,032	1,466	1,466	1,466
Minnesota Ave and Dix St	171	171	171	255	255	255	154	154	154	90	90	90
Minnesota Ave and Grant St	86	607	607	141	141	141	104	-	104	-	-	-
Minnesota Ave and Gault Pl	-	97	97	97	95	-	55	-	51	74	97	69
Minnesota Ave and Hayes St	131	126	126	31	9	9	40	21	44	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	435	435	435	-	192	210	183	183	203	582	582	582
Benning and 44th St	-	234	234	830	830	-	254	-	255	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table B-9: 2018 Build Median Running Alternative Morning Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	7.8	A	-	-	28.6	C	6.5	A	9.1	A
Benning Rd and Oklahoma Ave	Signalized	21.2	C	22.3	C	-	-	24.6	C	11.1	B
Benning Rd and Anacostia Ave	Signalized	7.3	A	32.7	C	32.9	C	3.7	A	12.6	B
Benning Rd and 34th St	Signalized	12.2	B	17.5	B	35.7	D	12.1	B	8.5	A
Benning Rd and Minnesota Ave	Signalized	53.7	D	43.8	D	71.3	E	60.8	E	37.0	D
Benning Rd and 42nd St	Signalized	11.4	B	38.6	D	34.3	C	7.7	A	6.0	A
Benning Rd and 45nd St	Signalized	8.2	A	6.4	A	9.7	A	22.9	C	25.2	C
Benning Rd and Central Ave*	Un-signalized	11.4	B	-	-	-	-	11.4	B	-	-
Benning Rd and E Capitol St	Signalized	184.0	F	280.4	F	60.5	E	126.8	F	423.2	F
Minnesota Ave and Dix St	Signalized	9.0	A	7.5	A	8.7	A	20.3	C	18.6	B
Minnesota Ave and Grant St	Signalized	15.3	B	13.6	B	10.7	B	39.0	D	-	-
Minnesota Ave and Gault Pl*	Un-signalized	19.6	C	0.5	A	1.6	A	19.6	C	12.9	B
Minnesota Ave and Hayes St*	Un-signalized	15.8	C	1.6	A	0.9	A	15.8	C	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	31.4	C	41.9	D	28.7	C	27.5	C	29.6	C
Benning Road and 44th St	Signalized	15.3	B	13.4	B	11.0	B	26.9	C	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table B-10: 2018 Build Median Running Alternative Morning Peak Hour Maximum Queue Length (feet)

Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	124	-	151	-	307	290	83	129	-
Benning Rd and Oklahoma Ave	115	-	97	-	-	-	632	632	-	-	206	211
Benning Rd and Anacostia Ave	186	-	176	65	-	-	286	286	286	168	168	154
Benning Rd and 34th St	155	155	163	165	165	121	266	365	365	205	205	178
Benning Rd and Minnesota Ave	353	204	204	772	772	907	-	602	602	303	302	302
Benning Rd and 42nd St	118	118	133	199	199	214	207	207	221	145	145	176
Benning Rd and 45nd St	248	248	248	182	182	182	71	71	71	36	36	36
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	295	-	-	-
Benning Rd and E Capitol St	1,076	1,076	1,076	319	319	329	1,674	1,674	1,674	1,466	1,466	1,466
Minnesota Ave and Dix St	174	174	174	177	177	177	121	121	121	22	22	22
Minnesota Ave and Grant St	95	270	270	213	213	213	245	-	245	-	-	-
Minnesota Ave and Gault Pl	-	43	43	125	120	-	53	-	49	106	102	107
Minnesota Ave and Hayes St	70	65	65	15	6	6	42	24	46	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	508	508	508	-	275	293	230	230	251	399	398	399
Benning and 44th St	-	374	374	166	166	-	293	-	295	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table B-11: 2018 Build Median Running Alternative Evening Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	10.3	B	-	-	41.8	D	4.1	A	10.8	B
Benning Rd and Oklahoma Ave	Signalized	6.1	A	19.9	B	-	-	7.1	A	4.8	A
Benning Rd and Anacostia Ave	Signalized	4.5	A	32.2	C	44.5	D	3.0	A	4.3	A
Benning Rd and 34th St	Signalized	17.0	B	20.0	B	37.6	D	12.0	B	18.7	B
Benning Rd and Minnesota Ave	Signalized	42.8	D	37.1	D	67.3	E	52.4	D	42.3	D
Benning Rd and 42nd St	Signalized	13.4	B	35.5	D	41.7	D	5.1	A	12.2	B
Benning Rd and 45nd St	Signalized	48.0	D	3.9	A	78.6	E	35.2	D	35.7	D
Benning Rd and Central Ave*	Un-signalized	4.5	A	-	-	-	-	4.5	A	-	-
Benning Rd and E Capitol St	Signalized	167.9	F	267.4	F	69.4	E	266.2	F	153.8	F
Minnesota Ave and Dix St	Signalized	11.4	B	8.5	A	35.9	D	22.0	C	19.0	B
Minnesota Ave and Grant St	Signalized	14.8	B	16.6	B	28.6	C	30.0	C	-	-
Minnesota Ave and Gault Pl*	Un-signalized	13.8	B	0.9	A	11.2	B	9.7	A	13.8	B
Minnesota Ave and Hayes St*	Un-signalized	22.4	C	1.9	A	21.4	C	22.4	C	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	33.0	C	41.4	D	-	-	27.0	C	30.5	C
Benning Road and 44th St	Signalized	47.4	D	20.6	C	92.7	F	33.9	C	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table B-12: 2018 Build Median Running Alternative Evening Peak Hour Maximum Queue Length (feet)

Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	192	-	219	-	189	172	41	277	-
Benning Rd and Oklahoma Ave	101	-	84	-	-	-	175	175	-	-	284	287
Benning Rd and Anacostia Ave	114	-	104	11	-	-	103	103	103	278	278	263
Benning Rd and 34th St	123	123	131	78	78	27	197	134	134	506	506	480
Benning Rd and Minnesota Ave	189	279	279	452	452	260	-	270	270	862	1031	1031
Benning Rd and 42nd St	135	135	151	168	168	183	132	132	146	398	398	432
Benning Rd and 45nd St	153	153	153	453	453	453	106	57	86	29	29	29
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	70	-	-	-
Benning Rd and E Capitol St	981	981	981	363	363	373	1,083	1,083	1,083	1,469	1,469	1,469
Minnesota Ave and Dix St	165	165	165	270	270	270	154	154	154	90	90	90
Minnesota Ave and Grant St	97	605	605	153	153	153	104	-	104	-	-	-
Minnesota Ave and Gault Pl	-	94	94	108	103	-	55	-	51	79	93	73
Minnesota Ave and Hayes St	104	100	100	36	20	20	40	21	44	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	458	458	458	-	181	199	183	183	203	559	558	559
Benning and 44th St	-	253	253	799	799	-	255	-	256	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Attachment C – Design Year 2040 Results

Table C-1: 2040 No Build Morning Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	9.6	A	-	-	36.2	D	8.8	A	8.8	A
Benning Rd and Oklahoma Ave	Signalized	26.7	C	24.5	C	-	-	32.5	C	9.9	A
Benning Rd and Anacostia Ave	Signalized	8.9	A	43.7	D	39.0	D	8.4	A	4.5	A
Benning Rd and 34th St	Signalized	14.3	B	15.0	B	33.5	C	12.5	B	16.4	B
Benning Rd and Minnesota Ave	Signalized	84.3	F	54.0	D	175.7	F	62.5	E	46.6	D
Benning Rd and 42nd St	Signalized	11.7	B	39.7	D	36.4	D	7.7	A	6.0	A
Benning Rd and 45nd St*	Un-signalized	146.4	F	2.2	A	28.7	D	146.4	F	18.1	C
Benning Rd and Central Ave*	Un-signalized	11.2	B	-	-	-	-	11.2	B	-	-
Benning Rd and E Capitol St	Signalized	186.5	F	251.9	F	79.7	E	206.0	F	263.6	F
Minnesota Ave and Dix St	Signalized	35.4	D	52.7	D	10.0	B	23.5	C	22.5	C
Minnesota Ave and Grant St	Signalized	31.0	C	16.6	B	37.5	D	54.4	D	-	-
Minnesota Ave and Gault Pl*	Un-signalized	49.0	E	0.5	A	19.5	C	29.0	D	49.0	E
Minnesota Ave and Hayes St*	Un-signalized	37.4	E	2.4	A	8.6	A	37.4	E	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	41.6	D	73.4	E	30.1	C	28.3	C	39.6	D
Benning Road and 44th St	Signalized	22.0	C	22.9	C	12.5	B	30.3	C	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table C-2: 2040 No Build Morning Peak Hour Maximum Queue Length (feet)

Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	143	-	170	-	306	289	99	135	-
Benning Rd and Oklahoma Ave	110	-	128	-	-	-	1,071	1,071	-	-	213	206
Benning Rd and Anacostia Ave	207	-	197	78	-	69	470	470	470	135	135	120
Benning Rd and 34th St	149	149	157	158	158	130	103	425	425	39	219	194
Benning Rd and Minnesota Ave	563	385	385	1,334	1,542	1,542	662	662	662	452	345	345
Benning Rd and 42nd St	129	129	144	224	224	239	223	223	238	133	133	167
Benning Rd and 45nd St	206	200	200	302	302	286	245	218	244	42	25	45
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	331	-	-	-
Benning Rd and E Capitol St	1,073	1,073	1,073	297	297	307	1,674	1,674	1,674	1,469	1,469	1,469
Minnesota Ave and Dix St	613	613	613	181	181	181	137	137	137	24	24	24
Minnesota Ave and Grant St	148	235	235	311	311	311	308	-	308	-	-	-
Minnesota Ave and Gault Pl	51	44	44	250	245	278	87	-	84	111	105	111
Minnesota Ave and Hayes St	99	99	99	209	197	197	67	48	71	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	633	633	633	-	312	330	276	276	296	511	510	511
Benning and 44th St	-	450	450	188	188	-	331	-	330	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table C-3: 2040 No Build Evening Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	9.7	A	-	-	41.4	D	3.5	A	10.0	B
Benning Rd and Oklahoma Ave	Signalized	4.1	A	17.3	B	-	-	4.9	A	3.0	A
Benning Rd and Anacostia Ave	Signalized	3.8	A	33.3	C	44.6	D	2.8	A	3.3	A
Benning Rd and 34th St	Signalized	14.1	B	19.9	B	34.6	C	9.5	A	15.3	B
Benning Rd and Minnesota Ave	Signalized	49.4	D	34.4	C	39.0	D	54.1	D	60.4	E
Benning Rd and 42nd St	Signalized	22.2	C	35.8	D	35.8	D	5.5	A	26.6	C
Benning Rd and 45nd St*	Un-signalized	81.7	F	1.1	A	81.7	F	46.6	E	28.8	D
Benning Rd and Central Ave*	Un-signalized	5.3	A	-	-	-	-	5.3	A	-	-
Benning Rd and E Capitol St	Signalized	197.9	F	340.0	F	64.6	E	374.2	F	162.4	F
Minnesota Ave and Dix St	Signalized	13.5	B	9.5	A	15.2	B	23.8	C	18.9	B
Minnesota Ave and Grant St	Signalized	16.8	B	18.7	B	10.3	B	30.8	C	-	-
Minnesota Ave and Gault Pl*	Un-signalized	16.3	C	2.0	A	1.7	A	12.2	B	16.3	C
Minnesota Ave and Hayes St*	Un-signalized	27.4	D	3.9	A	7.7	A	27.4	D	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	64.2	E	61.4	E	32.5	C	27.2	C	93.4	F
Benning Road and 44th St	Signalized	63.2	E	19.7	B	104.9	F	32.8	C	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table C-4: 2040 No Build Evening Peak Hour Maximum Queue Length (feet)

Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	206	-	233	-	162	145	23	311	-
Benning Rd and Oklahoma Ave	85	-	102	-	-	-	138	138	-	-	257	250
Benning Rd and Anacostia Ave	113	-	103	11	-	0	114	114	114	292	292	278
Benning Rd and 34th St	142	142	150	75	75	33	139	130	130	15	531	505
Benning Rd and Minnesota Ave	358	336	336	57	460	377	274	274	274	1,418	1,412	1,412
Benning Rd and 42nd St	144	144	159	186	186	201	143	143	161	612	612	646
Benning Rd and 45nd St	149	143	143	499	502	483	82	55	81	37	21	40
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	93	-	-	-
Benning Rd and E Capitol St	309	1,066	1,467	1,066	1,066	309	1,467	1,555	1,555	1,467	1,066	1,066
Minnesota Ave and Dix St	192	192	192	306	306	306	165	165	165	90	90	90
Minnesota Ave and Grant St	78	680	680	172	172	172	114	-	114	-	-	-
Minnesota Ave and Gault Pl	99	88	88	134	129	162	61	-	57	100	97	96
Minnesota Ave and Hayes St	171	171	171	42	29	29	41	22	45	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	696	696	696	-	204	223	205	205	226	973	973	973
Benning Road and 44th St	-	254	254	894	894	-	252	-	252	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table C-5: 2040 Build Curb Running Alternative Morning Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	8.6	A	-	-	29.0	C	7.2	A	10.0	B
Benning Rd and Oklahoma Ave	Signalized	30.9	C	22.9	C	-	-	37.5	D	12.5	B
Benning Rd and Anacostia Ave	Signalized	7.6	A	33.8	C	30.8	C	4.0	A	13.0	B
Benning Rd and 34th St	Signalized	13.2	B	15.7	B	34.8	C	12.8	B	10.7	B
Benning Rd and Minnesota Ave	Signalized	72.6	E	62.7	E	104.6	F	69.6	E	51.3	D
Benning Rd and 42nd St	Signalized	12.2	B	39.8	D	36.6	D	8.1	A	6.9	A
Benning Rd and 45nd St	Signalized	14.0	B	8.3	A	25.1	C	25.4	C	31.1	C
Benning Rd and Central Ave*	Un-signalized	12.4	B	-	-	-	-	12.4	B	-	-
Benning Rd and E Capitol St	Signalized	188.9	F	255.5	F	74.6	E	197.9	F	286.6	F
Minnesota Ave and Dix St	Signalized	16.1	B	18.2	B	11.3	B	21.6	C	19.5	B
Minnesota Ave and Grant St	Signalized	16.9	B	14.8	B	12.3	B	41.2	D	-	-
Minnesota Ave and Gault Pl*	Un-signalized	21.9	C	0.5	A	1.8	A	21.9	C	18.6	C
Minnesota Ave and Hayes St*	Un-signalized	19.2	C	1.8	A	0.9	A	19.2	C	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	42.0	D	71.2	E	31.4	C	28.2	C	41.1	D
Benning Road and 44th St	Signalized	24.4	C	24.9	C	12.6	B	36.6	D	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table C-6: 2040 Build Curb Running Alternative Morning Peak Hour Maximum Queue Length (feet)

Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	140	-	166	-	301	284	109	141	-
Benning Rd and Oklahoma Ave	114	-	96	-	-	-	983	983	-	-	231	236
Benning Rd and Anacostia Ave	199	-	189	68	-	-	306	306	306	196	196	181
Benning Rd and 34th St	163	163	171	142	142	110	346	399	399	49	241	216
Benning Rd and Minnesota Ave	545	264	264	1,344	1,344	1,346	-	747	747	478	324	324
Benning Rd and 42nd St	129	129	144	224	224	239	238	238	252	148	148	179
Benning Rd and 45nd St	262	262	262	224	224	224	77	77	77	40	40	40
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	332	-	-	-
Benning Rd and E Capitol St	1,076	1,076	1,076	350	350	360	1,674	1,674	1,674	1,467	1,467	1,467
Minnesota Ave and Dix St	347	347	347	199	199	199	144	144	144	24	24	24
Minnesota Ave and Grant St	102	251	251	267	267	267	288	-	288	-	-	-
Minnesota Ave and Gault Pl	-	63	63	128	123	-	55	-	51	108	104	107
Minnesota Ave and Hayes St	97	92	92	15	4	4	47	28	50	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	630	630	630	-	304	322	278	278	298	504	504	505
Benning and 44th St	-	484	484	188	188	-	387	-	386	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table C-7: 2040 Build Curb Running Alternative Evening Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	11.9	B	-	-	41.6	D	4.3	A	12.9	B
Benning Rd and Oklahoma Ave	Signalized	7.7	A	23.1	C	-	-	9.7	A	5.9	A
Benning Rd and Anacostia Ave	Signalized	4.9	A	33.4	C	44.6	D	2.7	A	4.9	A
Benning Rd and 34th St	Signalized	21.9	C	19.9	B	37.4	D	12.2	B	25.9	C
Benning Rd and Minnesota Ave	Signalized	53.9	D	44.6	D	46.1	D	54.3	D	61.8	E
Benning Rd and 42nd St	Signalized	13.7	B	35.5	D	35.1	D	5.2	A	12.2	B
Benning Rd and 45nd St	Signalized	41.0	D	3.6	A	70.5	E	28.8	C	28.4	C
Benning Rd and Central Ave*	Un-signalized	4.8	A	-	-	-	-	4.8	A	-	-
Benning Rd and E Capitol St	Signalized	214.1	F	445.9	F	54.3	D	424.1	F	158.3	F
Minnesota Ave and Dix St	Signalized	13.5	B	9.4	A	15.4	B	23.8	C	18.9	B
Minnesota Ave and Grant St	Signalized	15.7	B	17.6	B	9.1	A	30.6	C	-	-
Minnesota Ave and Gault Pl*	Un-signalized	18.4	C	1.3	A	1.4	A	13.1	B	18.4	C
Minnesota Ave and Hayes St*	Un-signalized	24.5	C	3.1	A	4.0	A	24.5	C	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	65.9	E	68.1	E	31.9	C	27.1	C	92.8	F
Benning Road and 44th St	Signalized	50.6	D	19.6	B	78.8	E	30.3	C	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table C-8: 2040 Build Curb Running Alternative Evening Peak Hour Maximum Queue Length (feet)

Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	204	-	231	-	198	181	22	342	-
Benning Rd and Oklahoma Ave	112	-	95	-	-	-	118	118	-	-	290	293
Benning Rd and Anacostia Ave	113	-	103	11	-	-	116	116	116	325	325	311
Benning Rd and 34th St	141	141	149	75	75	33	207	153	153	13	639	614
Benning Rd and Minnesota Ave	258	333	333	527	527	247	-	284	284	1,507	1,531	1,531
Benning Rd and 42nd St	144	144	159	186	186	201	140	140	154	432	432	466
Benning Rd and 45nd St	156	156	156	459	459	459	108	60	88	29	29	29
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	79	-	-	-
Benning Rd and E Capitol St	1,072	1,072	1,072	364	364	374	1,673	1,673	1,673	1,465	1,465	1,465
Minnesota Ave and Dix St	209	209	209	322	322	322	165	165	165	90	90	90
Minnesota Ave and Grant St	86	696	696	173	173	173	114	-	114	-	-	-
Minnesota Ave and Gault Pl	-	164	164	108	103	-	55	-	51	100	98	92
Minnesota Ave and Hayes St	138	133	133	34	19	19	42	23	46	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	811	811	811	-	192	210	207	207	227	952	952	952
Benning and 44th St	-	275	275	810	810	-	228	-	228	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table C-9: 2040 Build Median Running Alternative Morning Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	8.9	A	-	-	28.9	C	7.7	A	10.0	B
Benning Rd and Oklahoma Ave	Signalized	28.0	C	23.0	C	-	-	33.7	C	11.7	B
Benning Rd and Anacostia Ave	Signalized	7.5	A	33.8	C	30.8	C	4.0	A	12.6	B
Benning Rd and 34th St	Signalized	13.0	B	16.7	B	35.0	D	13.1	B	9.1	A
Benning Rd and Minnesota Ave	Signalized	71.7	E	59.1	E	109.6	F	66.5	E	49.4	D
Benning Rd and 42nd St	Signalized	12.2	B	39.7	D	36.4	D	8.2	A	6.5	A
Benning Rd and 45nd St	Signalized	12.4	B	7.2	A	22.2	C	25.1	C	28.9	C
Benning Rd and Central Ave*	Un-signalized	11.4	B	-	-	-	-	11.4	B	-	-
Benning Rd and E Capitol St	Signalized	190.8	F	256.0	F	70.9	E	198.0	F	298.6	F
Minnesota Ave and Dix St	Signalized	14.2	B	15.3	B	10.7	B	21.2	C	18.6	B
Minnesota Ave and Grant St	Signalized	16.5	B	14.9	B	11.4	B	41.3	D	-	-
Minnesota Ave and Gault Pl*	Un-signalized	21.9	C	0.5	A	1.7	A	21.9	C	16.3	C
Minnesota Ave and Hayes St*	Un-signalized	19.3	C	1.9	A	0.9	A	19.3	C	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	40.3	D	67.4	E	31.7	C	28.3	C	38.0	D
Benning Road and 44th St	Signalized	18.7	B	17.3	B	11.8	B	31.9	C	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table C-10: 2040 Build Median Running Alternative Morning Peak Hour Maximum Queue Length (feet)

Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	140	-	166	-	306	289	108	140	-
Benning Rd and Oklahoma Ave	112	-	95	-	-	-	955	955	-	-	229	234
Benning Rd and Anacostia Ave	199	-	189	68	-	-	336	336	336	197	197	183
Benning Rd and 34th St	163	163	171	151	151	119	355	407	407	230	230	204
Benning Rd and Minnesota Ave	526	336	336	1,353	1,353	1,362	-	707	707	471	308	308
Benning Rd and 42nd St	129	129	144	224	224	239	230	230	243	149	149	180
Benning Rd and 45nd St	268	268	268	256	256	256	81	81	81	39	39	39
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	307	-	-	-
Benning Rd and E Capitol St	1,075	1,075	1,075	343	343	353	1,674	1,674	1,674	1,469	1,469	1,469
Minnesota Ave and Dix St	332	332	332	178	178	178	137	137	137	24	24	24
Minnesota Ave and Grant St	108	226	226	267	267	267	288	-	288	-	-	-
Minnesota Ave and Gault Pl	-	38	38	131	126	-	55	-	51	109	103	105
Minnesota Ave and Hayes St	82	77	77	19	11	11	46	27	50	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	626	626	626	-	301	320	275	275	296	521	520	521
Benning and 44th St	-	452	452	167	167	-	372	-	374	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table C-11: 2040 Build Median Running Alternative Evening Peak Hour Intersection Delay and Level of Service (LOS)

Intersection	Traffic Control	Intersection		Northbound Approach		Southbound Approach		Westbound Approach		Eastbound Approach	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Benning Rd and 26th St	Signalized	11.6	B	-	-	41.0	D	4.3	A	12.5	B
Benning Rd and Oklahoma Ave	Signalized	6.2	A	22.2	C	-	-	7.0	A	4.8	A
Benning Rd and Anacostia Ave	Signalized	4.8	A	33.4	C	44.5	D	2.8	A	4.7	A
Benning Rd and 34th St	Signalized	19.1	B	20.6	C	36.3	D	12.2	B	21.6	C
Benning Rd and Minnesota Ave	Signalized	52.3	D	44.9	D	46.0	D	52.0	D	58.7	E
Benning Rd and 42nd St	Signalized	13.3	B	35.4	D	35.0	C	5.2	A	11.5	B
Benning Rd and 45nd St	Signalized	40.5	D	4.1	A	68.3	E	31.9	C	31.4	C
Benning Rd and Central Ave*	Un-signalized	4.8	A	-	-	-	-	4.8	A	-	-
Benning Rd and E Capitol St	Signalized	217.5	F	442.2	F	56.7	E	426.3	F	166.9	F
Minnesota Ave and Dix St	Signalized	12.9	B	9.3	A	14.1	B	23.8	C	18.9	B
Minnesota Ave and Grant St	Signalized	15.4	B	17.3	B	8.4	A	30.6	C	-	-
Minnesota Ave and Gault Pl*	Un-signalized	16.1	C	1.2	A	1.4	A	13.0	B	16.1	C
Minnesota Ave and Hayes St*	Un-signalized	25.5	D	3.2	A	3.4	A	25.5	D	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	Signalized	67.1	E	68.0	E	32.7	C	27.6	C	95.5	F
Benning Road and 44th St	Signalized	45.7	D	21.0	C	66.7	E	32.5	C	-	-

* Indicates unsignalized intersections, for which intersection LOS is expressed in terms of the average vehicle delay of the worst approach delay

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

Table C-12: 2040 Build Median Running Alternative Evening Peak Hour Maximum Queue Length (feet)

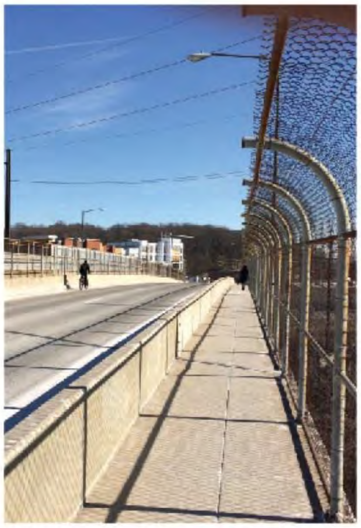
Intersection	Northbound			Southbound			Westbound			Eastbound		
	L	T	R	L	T	R	L	T	R	L	T	R
Benning Rd and 26th St	-	-	-	204	-	231	-	192	175	21	352	-
Benning Rd and Oklahoma Ave	108	-	91	-	-	-	156	156	-	-	290	292
Benning Rd and Anacostia Ave	113	-	103	11	-	-	97	97	97	338	338	324
Benning Rd and 34th St	142	142	150	73	73	33	200	140	140	599	599	574
Benning Rd and Minnesota Ave	267	338	338	447	447	295	-	282	282	1,413	1,543	1,543
Benning Rd and 42nd St	144	144	159	186	186	201	138	138	152	408	408	442
Benning Rd and 45nd St	167	167	167	447	447	447	107	59	87	29	29	29
Benning Rd and Central Ave	-	-	-	-	-	-	-	-	82	-	-	-
Benning Rd and E Capitol St	1,077	1,077	1,077	351	351	362	1,674	1,674	1,674	1,465	1,465	1,465
Minnesota Ave and Dix St	194	194	194	260	260	260	165	165	165	90	90	90
Minnesota Ave and Grant St	87	628	628	149	149	149	114	-	114	-	-	-
Minnesota Ave and Gault Pl	-	143	143	114	109	-	55	-	51	92	91	84
Minnesota Ave and Hayes St	115	111	111	34	17	17	41	22	45	-	-	-
Minnesota Ave and Nannie Helen Burroughs Ave	773	773	773	-	207	225	208	208	228	977	977	977
Benning and 44th St	-	260	260	783	783	-	284	-	284	-	-	-

Note: Benning Road is considered east-west at all intersections except for at 44th Street, 45th Street, and E Capitol Street where it is considered to be running north-south.

BENNING ROAD & BRIDGES TRANSPORTATION IMPROVEMENTS

NRCS Soil Resource Report

Draft May 2016



United States Department of Agriculture

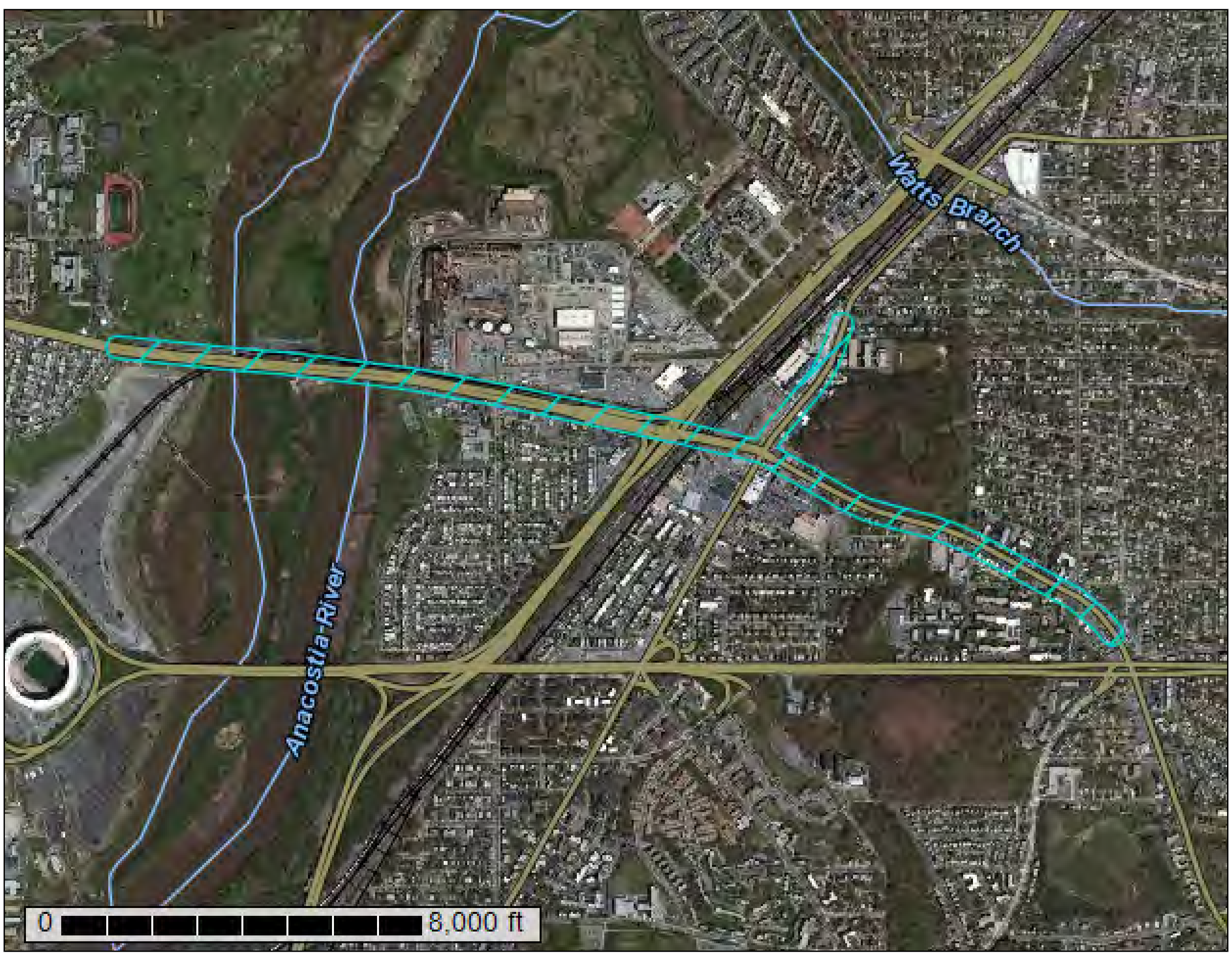
Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

District of Columbia

Benning Road Streetcar EA



February 16, 2014

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:15,300 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 200, 400, 800, 1200

Feet: 0, 500, 1000, 2000, 3000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: District of Columbia
Survey Area Data: Version 6, Dec 13, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 14, 2011—Nov 12, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

District of Columbia (DC001)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
GeB	Galestown-Urban land complex, 0 to 8 percent slopes	2.9	5.8%
KmB	Keyport-Urban land complex, 0 to 8 percent slopes	0.2	0.5%
MvC	Muirkirk variant complex, 8 to 15 percent slopes	5.6	11.2%
MvD	Muirkirk variant complex, 15 to 40 percent slopes	1.8	3.6%
U1	Udorthents	13.0	25.8%
U5	Udorthents, clayey	4.0	7.9%
U6	Udorthents, smoothed	4.4	8.8%
U11B	Udorthents, deep, 0 to 8 percent slopes	0.0	0.1%
Ub	Urban land	13.2	26.3%
UfC	Urban land-Christiana complex, 8 to 15 percent slopes	0.1	0.2%
UmB	Urban land-Galestown complex, 0 to 8 percent slopes	0.8	1.7%
UyC	Urban land-Sunnyside complex, 8 to 15 percent slopes	1.4	2.8%
W	Water	2.5	5.1%
WpB	Woodstown-Urban land complex, 0 to 8 percent slopes	0.2	0.3%
Totals for Area of Interest		**50.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

District of Columbia

GeB—Galestown-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

Elevation: 10 to 330 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 45 to 63 degrees F
Frost-free period: 160 to 250 days

Map Unit Composition

Urban land: 40 percent
Galestown and similar soils: 40 percent
Minor components: 20 percent

Description of Galestown

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 3s
Hydrologic Soil Group: A

Typical profile

0 to 1 inches: Loamy sand
1 to 21 inches: Sand
21 to 40 inches: Sand
40 to 70 inches: Sand

Description of Urban Land

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 inches to

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: D

Minor Components

Unnamed soils

Percent of map unit: 10 percent

Sassafras

Percent of map unit: 5 percent

Rumford

Percent of map unit: 5 percent

KmB—Keyport-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

Elevation: 10 to 350 feet
Mean annual precipitation: 38 to 48 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 150 to 250 days

Map Unit Composition

Urban land: 40 percent
Keyport and similar soils: 40 percent
Minor components: 20 percent

Description of Keyport

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.5 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: C

Typical profile

0 to 10 inches: Fine sandy loam
10 to 48 inches: Silty clay loam
48 to 80 inches: Stratified silt loam to sandy loam

Description of Urban Land

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 inches to

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: D

Minor Components

Muirkirk variant
Percent of map unit: 5 percent

Sunnyside
Percent of map unit: 5 percent

Christiana
Percent of map unit: 5 percent

Unnamed soils
Percent of map unit: 5 percent

MvC—Muirkirk variant complex, 8 to 15 percent slopes

Map Unit Setting
Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 48 to 61 degrees F
Frost-free period: 160 to 240 days

Map Unit Composition
Muirkirk variant and similar soils: 100 percent

Description of Muirkirk Variant

Properties and qualities
Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.4 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: A

Typical profile
0 to 11 inches: Loamy sand
11 to 31 inches: Sandy loam
31 to 60 inches: Clay

MvD—Muirkirk variant complex, 15 to 40 percent slopes

Map Unit Setting

Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 48 to 61 degrees F
Frost-free period: 160 to 240 days

Map Unit Composition

Muirkirk variant and similar soils: 100 percent

Description of Muirkirk Variant

Properties and qualities

Slope: 15 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7e
Hydrologic Soil Group: A

Typical profile

0 to 11 inches: Loamy sand
11 to 31 inches: Sandy loam
31 to 60 inches: Clay

U1—Udorthents

Map Unit Composition

Udorthents and similar soils: 100 percent

Description of Udorthents

Properties and qualities

Slope: 0 to 10 percent
Depth to restrictive feature: 10 inches to
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: D

U5—Udorthents, clayey

Map Unit Setting

Mean annual precipitation: 38 to 44 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 150 to 220 days

Map Unit Composition

Udorthents and similar soils: 100 percent

Description of Udorthents

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 10 inches to
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.7 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: C/D

Typical profile

0 to 2 inches: Clay loam
2 to 65 inches: Clay

U6—Udorthents, smoothed

Map Unit Composition

Udorthents and similar soils: 100 percent

Description of Udorthents

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 10 inches to
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: C

U11B—Udorthents, deep, 0 to 8 percent slopes

Map Unit Setting

Mean annual precipitation: 38 to 44 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 150 to 220 days

Map Unit Composition

Udorthents and similar soils: 100 percent

Description of Udorthents

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 inches to
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.2 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: C/D

Typical profile

0 to 6 inches: Sandy loam
6 to 30 inches: Clay loam
30 to 80 inches: Gravelly loam

Ub—Urban land

Map Unit Setting

Frost-free period: 175 to 220 days

Map Unit Composition

Urban land: 100 percent

Description of Urban Land

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 inches to

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: D

UfC—Urban land-Christiana complex, 8 to 15 percent slopes

Map Unit Setting

Elevation: 10 to 350 feet
Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 48 to 61 degrees F
Frost-free period: 150 to 240 days

Map Unit Composition

Urban land: 75 percent
Christiana and similar soils: 5 percent
Minor components: 20 percent

Description of Urban Land

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: 10 inches to

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: D

Description of Christiana

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 10.6 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: C

Typical profile

0 to 10 inches: Silt loam
10 to 75 inches: Silty clay

Minor Components

Muirkirk variant

Percent of map unit: 5 percent

Sunnyside

Percent of map unit: 5 percent

Keyport

Percent of map unit: 5 percent

Unnamed soils

Percent of map unit: 5 percent

UmB—Urban land-Galestown complex, 0 to 8 percent slopes

Map Unit Setting

Elevation: 10 to 330 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 45 to 63 degrees F
Frost-free period: 160 to 250 days

Map Unit Composition

Urban land: 70 percent
Galestown and similar soils: 10 percent
Minor components: 20 percent

Description of Urban Land

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 inches to

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: D

Description of Galestown

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 99.90 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.1 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 3s
Hydrologic Soil Group: A

Typical profile
0 to 1 inches: Loamy sand
1 to 21 inches: Sand
21 to 40 inches: Sand
40 to 70 inches: Sand

Minor Components

Woodstown
Percent of map unit: 5 percent

Sassafras
Percent of map unit: 5 percent

Rumford
Percent of map unit: 5 percent

Unnamed soils
Percent of map unit: 5 percent

UyC—Urban land-Sunnyside complex, 8 to 15 percent slopes

Map Unit Setting
Elevation: 10 to 350 feet
Mean annual precipitation: 35 to 55 inches
Mean annual air temperature: 48 to 61 degrees F
Frost-free period: 150 to 240 days

Map Unit Composition
Urban land: 70 percent
Sunnyside and similar soils: 10 percent
Minor components: 20 percent

Description of Urban Land

Properties and qualities
Slope: 8 to 15 percent
Depth to restrictive feature: 10 inches to

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: D

Description of Sunnyside

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.6 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B

Typical profile

0 to 5 inches: Fine sandy loam
5 to 28 inches: Sandy clay loam
28 to 60 inches: Loamy fine sand

Minor Components

Christiana

Percent of map unit: 5 percent

Muirkirk variant

Percent of map unit: 5 percent

Keyport

Percent of map unit: 5 percent

Unnamed soils

Percent of map unit: 5 percent

W—Water

Map Unit Composition

Water: 100 percent

Description of Water

Properties and qualities

Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

WpB—Woodstown-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

Elevation: 10 to 330 feet
Mean annual precipitation: 35 to 50 inches
Mean annual air temperature: 45 to 57 degrees F
Frost-free period: 160 to 250 days

Map Unit Composition

Woodstown and similar soils: 45 percent
Urban land: 40 percent
Minor components: 15 percent

Description of Woodstown

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.3 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 2w
Hydrologic Soil Group: C

Typical profile

0 to 7 inches: Sandy loam
7 to 11 inches: Sandy loam
11 to 29 inches: Sandy clay loam
29 to 45 inches: Sandy loam
45 to 80 inches: Loamy sand

Description of Urban Land

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: 10 inches to

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 8s
Hydrologic Soil Group: D

Minor Components

Sassafras

Percent of map unit: 10 percent

Unnamed soils

Percent of map unit: 5 percent

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Building Site Development

This folder contains a collection of tabular reports that present soil interpretations related to building site development. The reports (tables) include all selected map units and components for each map unit, limiting features and interpretive ratings. Building site development interpretations are designed to be used as tools for evaluating soil suitability and identifying soil limitations for various construction purposes. As part of the interpretation process, the rating applies to each soil in its described condition and does not consider present land use. Example interpretations can include corrosion of concrete and steel, shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping.

Roads and Streets, Shallow Excavations, and Lawns and Landscaping (Benning Road Streetcar EA Soils Report 2/16/14)

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. This table shows the degree and kind of soil limitations that affect local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Information in this table is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this table. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Report—Roads and Streets, Shallow Excavations, and Lawns and Landscaping (Benning Road Streetcar EA Soils Report 2/16/14)

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–District of Columbia							
Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
GeB—Galestown-Urban land complex, 0 to 8 percent slopes							
Galestown	40	Not limited		Very limited		Very limited	
				Unstable excavation walls	1.00	Low exchange capacity	1.00
						Aluminum saturation	1.00
						Droughty	0.99
Urban land	40	Not rated		Not rated		Not rated	
Unnamed soils	10	Not rated		Not rated		Not rated	
Rumford	5	Not limited		Somewhat limited		Very limited	
				Unstable excavation walls	0.06	Low exchange capacity	1.00
Sassafras	5	Somewhat limited		Somewhat limited		Very limited	
		Frost action	0.50	Dusty	0.02	Low exchange capacity	1.00
				Unstable excavation walls	0.01	Aluminum saturation	0.14
						Dusty	0.02

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–District of Columbia							
Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
KmB—Keyport-Urban land complex, 0 to 8 percent slopes							
Keyport	40	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	0.99	Low exchange capacity	0.75
		Low strength	1.00	Dusty	0.04	Dusty	0.04
		Shrink-swell	0.01	Unstable excavation walls	0.01		
Urban land	40	Not rated		Not rated		Not rated	
Christiana	5	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Too clayey	0.64	Low exchange capacity	0.75
		Frost action	0.50	Dusty	0.06	Too clayey	0.50
		Shrink-swell	0.50	Unstable excavation walls	0.01	Dusty	0.06
Muirkirk variant	5	Not limited		Somewhat limited		Not limited	
				Too clayey	0.50		
				Unstable excavation walls	0.01		
Sunnyside	5	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Dusty	0.01	Dusty	0.01
				Unstable excavation walls	0.01		
Unnamed soils	5	Not rated		Not rated		Not rated	
MvC—Muirkirk variant complex, 8 to 15 percent slopes							
Muirkirk variant	100	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
				Too clayey	0.50		
				Unstable excavation walls	0.01		
MvD—Muirkirk variant complex, 15 to 40 percent slopes							
Muirkirk variant	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Too clayey	0.50		
				Unstable excavation walls	0.01		
U1—Udorthents							
Udorthents	100	Not rated		Not rated		Not rated	

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–District of Columbia							
Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
U5—Udorthents, clayey							
Udorthents	100	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Dusty	0.06	Too clayey	0.50
		Shrink-swell	0.50	Slope	0.04	Dusty	0.06
		Slope	0.04	Too clayey	0.03	Slope	0.04
				Unstable excavation walls	0.01		
U6—Udorthents, smoothed							
Udorthents	100	Not rated		Not rated		Not rated	
U11B—Udorthents, deep, 0 to 8 percent slopes							
Udorthents	100	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Dense layer	0.50	Low exchange capacity	1.00
				Dusty	0.04	Aluminum saturation	0.11
				Unstable excavation walls	0.01	Dusty	0.04
Ub—Urban land							
Urban land	100	Not rated		Not rated		Not rated	

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–District of Columbia							
Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
UfC—Urban land-Christiana complex, 8 to 15 percent slopes							
Urban land	75	Not rated		Not rated		Not rated	
Christiana	5	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Too clayey	0.64	Low exchange capacity	0.75
		Slope	0.63	Slope	0.63	Slope	0.63
		Frost action	0.50	Dusty	0.06	Too clayey	0.50
		Shrink-swell	0.50	Unstable excavation walls	0.01	Dusty	0.06
Keyport	5	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	0.99	Low exchange capacity	0.75
		Low strength	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Dusty	0.04	Dusty	0.04
		Shrink-swell	0.01	Unstable excavation walls	0.01		
Muirkirk variant	5	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
				Too clayey	0.50		
				Unstable excavation walls	0.01		
Sunnyside	5	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Frost action	0.50	Dusty	0.01	Dusty	0.01
				Unstable excavation walls	0.01		
Unnamed soils	5	Not rated		Not rated		Not rated	

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–District of Columbia							
Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
UmB—Urban land-Galestown complex, 0 to 8 percent slopes							
Urban land	70	Not rated		Not rated		Not rated	
Galestown	10	Not limited		Very limited		Very limited	
				Unstable excavation walls	1.00	Low exchange capacity	1.00
						Aluminum saturation	1.00
						Droughty	0.99
Rumford	5	Not limited		Somewhat limited		Very limited	
				Unstable excavation walls	0.06	Low exchange capacity	1.00
Sassafras	5	Somewhat limited		Somewhat limited		Very limited	
		Frost action	0.50	Dusty	0.02	Low exchange capacity	1.00
				Unstable excavation walls	0.01	Aluminum saturation	0.14
						Dusty	0.02
Unnamed soils	5	Not rated		Not rated		Not rated	
Woodstown	5	Somewhat limited		Somewhat limited		Very limited	
		Frost action	0.50	Depth to saturated zone	0.99	Low exchange capacity	1.00
				Unstable excavation walls	0.01	Aluminum saturation	0.23
				Dusty	0.01	Dusty	0.01

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–District of Columbia							
Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
UyC—Urban land-Sunnyside complex, 8 to 15 percent slopes							
Urban land	70	Not rated		Not rated		Not rated	
Sunnyside	10	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Frost action	0.50	Dusty	0.01	Dusty	0.01
				Unstable excavation walls	0.01		
Christiana	5	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Too clayey	0.64	Low exchange capacity	0.75
		Slope	0.63	Slope	0.63	Slope	0.63
		Frost action	0.50	Dusty	0.06	Too clayey	0.50
		Shrink-swell	0.50	Unstable excavation walls	0.01	Dusty	0.06
Keyport	5	Very limited		Somewhat limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	0.99	Low exchange capacity	0.75
		Low strength	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Dusty	0.04	Dusty	0.04
		Shrink-swell	0.01	Unstable excavation walls	0.01		
Muirkirk variant	5	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
				Too clayey	0.50		
				Unstable excavation walls	0.01		
Unnamed soils	5	Not rated		Not rated		Not rated	
W—Water							
Water	100	Not rated		Not rated		Not rated	

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–District of Columbia							
Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
WpB—Woodstown-Urban land complex, 0 to 8 percent slopes							
Woodstown	45	Somewhat limited		Somewhat limited		Very limited	
		Frost action	0.50	Depth to saturated zone	0.99	Low exchange capacity	1.00
				Unstable excavation walls	0.01	Aluminum saturation	0.23
				Dusty	0.01	Dusty	0.01
Urban land	40	Not rated		Not rated		Not rated	
Sassafras	10	Somewhat limited		Somewhat limited		Very limited	
		Frost action	0.50	Dusty	0.02	Low exchange capacity	1.00
				Unstable excavation walls	0.01	Aluminum saturation	0.14
						Dusty	0.02
Unnamed soils	5	Not rated		Not rated		Not rated	

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BENNING ROAD & BRIDGES TRANSPORTATION IMPROVEMENTS

USFWS IPaC Search Results

Draft May 2016

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U.S. Fish and Wildlife Service

Trust Resources List

This resource list is to be used for planning purposes only — it is not an official species list.

Endangered Species Act species list information for your project is available online and listed below for the following FWS Field Offices:

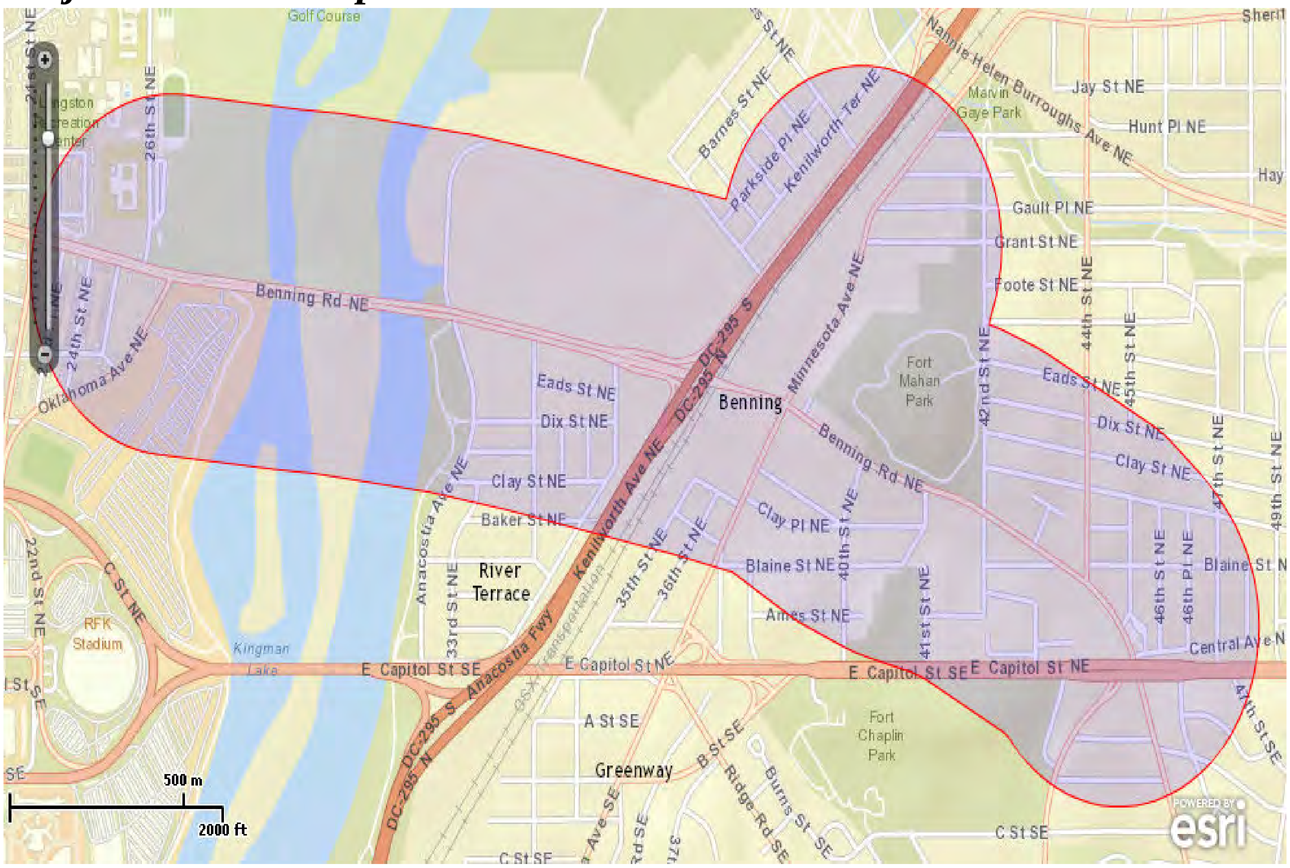
Chesapeake Bay Ecological Services Field Office
177 ADMIRAL COCHRANE DRIVE
ANNAPOLIS, MD 21401
(410) 573-4599

Project Name:

Benning Road and Bridge Transportation Improvements Environmental Assessment

Trust Resources List

Project Location Map:



Project Counties:

District of Columbia, DC

U.S. Fish and Wildlife Service

Trust Resources List

Geographic coordinates (Open Geospatial Consortium Well-Known Text, NAD83):

MULTIPOLYGON (((-76.9422362 38.8994232, -76.9420303 38.8987312, -76.9420011 38.898021, -76.9421498 38.8973201, -76.9424107 38.8966926, -76.9418659 38.8965548, -76.9405401 38.8961335, -76.9366986 38.8945302, -76.9362654 38.8942737, -76.9351326 38.8935025, -76.9344243 38.892848, -76.9339448 38.8922443, -76.9336252 38.8915792, -76.9334777 38.8908781, -76.9335081 38.890168, -76.9336269 38.8897031, -76.9338223 38.8892542, -76.9342515 38.8886279, -76.9346211 38.888252, -76.935285 38.8877666, -76.9357896 38.8875035, -76.9363339 38.8872941, -76.937204 38.8870883, -76.9381088 38.8870192, -76.9390134 38.8870893, -76.9398832 38.887296, -76.9404271 38.887506, -76.9411657 38.8879202, -76.9418972 38.8884999, -76.9445297 38.8895842, -76.945008 38.8897312, -76.9468598 38.8901217, -76.9484227 38.8906264, -76.9489433 38.8908287, -76.9508929 38.8917246, -76.9527885 38.892071, -76.9583703 38.8929777, -76.9609531 38.8933343, -76.9647228 38.8937022, -76.9700993 38.8941008, -76.9709846 38.8942624, -76.971545 38.894444, -76.9720703 38.8946811, -76.972773 38.8951321, -76.9731728 38.8954886, -76.9735097 38.8958829, -76.9737779 38.8963081, -76.9740416 38.8969881, -76.9741206 38.8974581, -76.9740906 38.8981683, -76.9738839 38.8988602, -76.9735084 38.8995073, -76.9729785 38.9000847, -76.9723147 38.9005702, -76.9715424 38.9009452, -76.9706914 38.9011953, -76.9697942 38.9013108, -76.9690314 38.9013005, -76.96389 38.9009222, -76.9596544 38.9005125, -76.9565878 38.9000917, -76.9511165 38.8992031, -76.9507878 38.8998651, -76.9503072 38.9004683, -76.949907 38.9008246, -76.9492038 38.901275, -76.9484016 38.9016096, -76.947827 38.9017617, -76.9469298 38.9018771, -76.9463231 38.9018768, -76.9457216 38.9018146, -76.9448516 38.901608, -76.9443076 38.901398, -76.9438034 38.9011344, -76.9431401 38.9006484, -76.9427711 38.9002721, -76.942468 38.8998613, -76.9422362 38.8994232)))

Project Type:

Transportation

Endangered Species Act Species List (USFWS Endangered Species Program).

There are no listed species found within the vicinity of your project.

Critical habitats within your project area:

There are no critical habitats within your project area.

U.S. Fish and Wildlife Service

Trust Resources List

FWS National Wildlife Refuges ([USFWS National Wildlife Refuges Program](#)).

There are no refuges found within the vicinity of your project.

FWS Migratory Birds ([USFWS Migratory Bird Program](#)).

The protection of birds is regulated by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. For more information regarding these Acts see http://www.fws.gov/migratorybirds/RegulationsandPolicies.html.

All project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project. To meet these conservation obligations, proponents should identify potential or existing project-related impacts to migratory birds and their habitat and develop and implement conservation measures that avoid, minimize, or compensate for these impacts. The Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

For information about Birds of Conservation Concern, go to
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Management/BCC.html.

Migratory birds of concern that may be affected by your project:

There are **12** birds on your Migratory birds of concern list. The Division of Migratory Bird Management is in the process of populating migratory bird data with an estimated completion date of August 1, 2014; therefore, the list below may not include all the migratory birds of concern in your project area at this time. While this information is being populated, please contact the Field Office for information about migratory birds in your project area.

Species Name	Bird of Conservation Concern (BCC)	Species Profile	Seasonal Occurrence in Project Area
American Oystercatcher (*Haematopus palliatus*)	Yes	species info	Year-round
American bittern (*Botaurus lentiginosus*)	Yes	species info	Wintering
Audubon's Shearwater (*Puffinus lherminieri*)	Yes	species info	Wintering

Black-billed Cuckoo (*Coccyzus erythropthalmus*)	Yes	species info	Breeding
cerulean warbler (*Dendroica cerulea*)	Yes	species info	Breeding
Least Bittern (*Ixobrychus exilis*)	Yes	species info	Breeding
Purple Sandpiper (*Calidris maritima*)	Yes	species info	Wintering
Rusty Blackbird (*Euphagus carolinus*)	Yes	species info	Wintering
Short-billed Dowitcher (*Limnodromus griseus*)	Yes	species info	Wintering
Snowy Egret (*Egretta thula*)	Yes	species info	Breeding
Wood Thrush (*Hylocichla mustelina*)	Yes	species info	Breeding
Worm eating Warbler (*Helmitheros vermivorum*)	Yes	species info	Breeding

NWI Wetlands (USFWS National Wetlands Inventory).

The U.S. Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of wetlands in the U.S., via the National Wetlands Inventory Program (NWI). In addition to impacts to wetlands within your immediate project area, wetlands outside of your project area may need to be considered in any evaluation of project impacts, due to the hydrologic nature of wetlands (for example, project activities may affect local hydrology within, and outside of, your immediate project area). It may be helpful to refer to the USFWS National Wetland Inventory website. The designated FWS office can also assist you. Impacts to wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes. Project Proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

Data Limitations, Exclusions and Precautions

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery and/or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Exclusions - Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Precautions - Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

The following wetland types intersect your project area in one or more locations:

Wetland Types	NWI Classification Code	Total Acres
Freshwater Emergent Wetland	PEM5C	0.7823
Riverine	R1USN	12.4671
Riverine	R1UBV	470.3107

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United States Department of the Interior
U.S. Fish & Wildlife Service
Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401
410/573 4575

Online Certification Letter

Today's date: 7/31/2014

Project: Benning Road and Bridge Transportation Improvements Environmental Assessment

Dear Applicant for online certification:

Thank you for using the U.S. Fish and Wildlife Service (Service) Chesapeake Bay Field Office online project review process. By printing this letter in conjunction with your project review package, you are certifying that you have completed the online project review process for the referenced project in accordance with all instructions provided, using the best available information to reach your conclusions. This letter, and the enclosed project review package, completes the review of your project in accordance with the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended (ESA).This letter also provides information for your project review under the National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, 83 Stat. 852), as amended. A copy of this letter and the project review package must be submitted to this office for this certification to be valid. This letter and the project review package will be maintained in our records.

Based on this information and in accordance with section 7 of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.), we certify that except for occasional transient individuals, no federally proposed or listed endangered or threatened species are known to exist within the project area. Therefore, no Biological Assessment or further section 7 consultation with the U.S. Fish and Wildlife Service is required. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination may be reconsidered.

This response relates only to federally protected threatened or endangered species under our jurisdiction. For additional information on threatened or endangered species in Maryland, you should contact the Maryland Wildlife and Heritage Division at (410) 260-8540. For information in Delaware you should contact the Delaware Natural Heritage and Endangered Species Program, at (302) 653-2880. For information in the District of Columbia, you should contact the National Park Service at (202) 535-1739.

The U.S. Fish and Wildlife Service also works with other Federal agencies and states to minimize loss of wetlands, reduce impacts to fish and migratory birds, including bald eagles, and restore habitat for wildlife. Information on these conservation issues and how development projects can avoid affecting these resources can be found on our website (www.fws.gov/chesapeakebay)

We appreciate the opportunity to provide information relative to fish and wildlife issues, and thank you for your interest in these resources. If you have any questions or need further assistance, please contact Chesapeake Bay Field Office Threatened and Endangered Species program at (410) 573-4527.

Sincerely,

Genevieve LaRouche
Field Supervisor

BENNING ROAD & BRIDGES TRANSPORTATION IMPROVEMENTS

HAZARDOUS MATERIALS

DRAFT MAY 2016




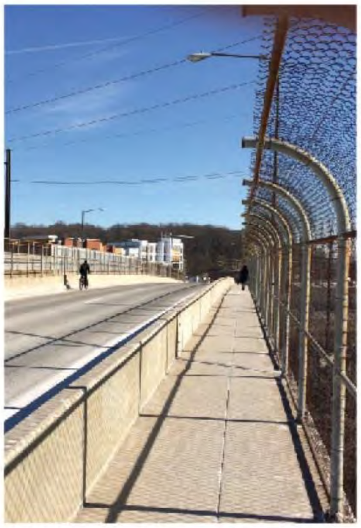


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Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
8	Spingarn SHS	2500 Benning Road, NE	RCRA - CESQC, DC UST	Generates and/or accumulates the following: ignitable hazardous waste; corrosive hazardous waste; reactive hazardous waste; explosive hazardous waste; and mercury. EDR did not identify any violations; however, there is no record of off-site disposal. Two 10,000 gallon heating oil USTs were identified on the property as permanently out of use. No regulatory status or closure documentation was provided.	The presence of hazardous materials and lack of disposal documentation may have resulted in improper disposal and impacted the property. Furthermore, a lack of regulatory information regarding the presence of previous USTs may have impacted the property.
9	Potomac Electric Power Company	3400 Benning Road, NE	RCRA LQG/NLR, NY Manifest, NJ Manifest, US AIRS	EDR reported this property generates and/or accumulates PCB waste (≥ 500 ppm) and lead; however, records indicate the material is transported to a TSDF under proper manifest. Property was identified as having actual or potential emissions above applicable major source thresholds. With the exception of one event, EDR did not report compliance violations. The aforementioned violation was for emissions and procedural compliance. No additional information was provided by EDR.	The generation and temporary staging of PCB waste ≥ 500 ppm has the potential to impact the property.
11	Unknown	2501 Benning Road, NE	DC Historic UST	EDR reported one 2,000 gallon heating oil UST located on the property. No additional information is provided by EDR.	The presence of a former UST on the property with no closure information may have impacted the property.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
12	Langston Golf Course	2600 Benning Road, NE	DC LUST, DC UST, DC RGA LUST, ERNS	EDR reported a leaking gasoline USTs on the property in 1991 and 1997 that impacted the soil. The regulatory status of these LUST cases is closed. One 500 gallon gasoline UST was identified on the property by EDR. No additional information was provided. In 1993, a regulator reservoir for a pole mounted transformer fell to ground and leaked when the pole was struck by an auto. EDR reported 69 gallons of transformer oil leaked and may have reached the Anacostia River; however, no indication of reaching the river was observed by Pepco employees. Pepco cleaned up the spill.	Previous soil impact from two LUST cases was reported. The regulatory status is closed; however, impacted soil may be encountered during construction activities. Additionally, impacted soil may be encountered resulting from the transformer oil spill in 1993.
14	Carter Woodson	4095 Minnesota Avenue, NE	DC UST	EDR reported one 15,000 gallon heating oil UST on the property as permanently out of use. No additional information was provided. It should be noted that this database listing is suspected to be the Friendship Collegiate Academy (Edison Friendship-Woodson Campus).	The presence of a former UST on the property with no closure information may have impacted the property.
17	Woodson Junior High School	4101 Minnesota Avenue, NE	RCRA NonGen/NLR	Generates and/or accumulates the following: ignitable hazardous waste; corrosive hazardous waste; and reactive hazardous waste. EDR did not identify any violations; however, there is no record of off-site disposal.	The presence of hazardous materials and lack of disposal documentation may have resulted in improper disposal and impacted the property.
18	Cowboys Cleaners	Not listed	FINDS	EDR identified the property in the FINDS database	The identification of a dry cleaners in the area of EDR ID 10 may have impacted the property.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
21	Stadium Exxon (also listed as Prices Esso Station)	2651 Benning Road, NE	ICIS, FINDS, US Historic Auto Station, DC UST, DC LUST, RCRA-CESQG, NJ Manifest	EDR reported a violation of the clean air act. No additional information was provided by EDR. The property reportedly has been a gas/service station since 1940 with the following USTs currently or previously in use: 6,000 gallon gasoline; 10,000 gallon gasoline; 6,000 gallon gasoline; and 1,000 gallon waste oil. Impacted soil was identified during a waste oil UST closure in 1996 with a regulatory status of closed. There is an open case for soil and groundwater impact that was reported in 2009. Ignitable and corrosive hazardous waste is generated and/or accumulated at the site; however, these wastes are disposed of at a TSDF under proper manifest with no violations other than administrative.	The presence of an active and former LUST case indicates there may be impact to the property.
22	No Name	Corner of Benning Avenue and Oklahoma Avenue	ERNS	Release reported in 1994 indicates antifreeze (ethylene glycol) has continually been dumped on this property and in the street for over a year. It should be noted that the report indicates the property is an Exxon station and it is suspected that is the station identified above. No additional information provided.	No volume or remedial activities were provided by EDR; therefore, there is a potential this may have impacted the property and/or street.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
23	Sims Service Station (also listed as Benning Road Shell, DAG Petroleum Management, Inc. and Lees Automotive)	3355 Benning Road, NE	US Historic Auto Station, ICIS, FINDS, DC UST, US AIRS, RCRA NonGen/NLR,	EDR reported the property has been a gas/service station since 1960 through the present time with the following USTs previously or currently in use: one-500 gallon gasoline; two-12,000 gallon gasoline; four-2,000 gallon gasoline; and one 8,000 gallon diesel. EDR reported a clean air act violation; however, no additional information was provided. Generates and/or accumulates the following: ignitable hazardous waste; cadmium; lead; benzene; 1,4-dichlorobenzene; tetrachloroethylene; and trichloroethylene. Two administrative violations were reported by EDR. The property was not identified in a disposal manifest database.	The presence of a gas/service station since 1960 and no reported disposal procedures for hazardous waste may have impacted the property.
24	Sulli's Sunoco (also listed as Sunoco Service Station, Auto Care, Inc.)	3341 Benning Road, NE	US Historic Auto Station, DC UST, DC Historic UST, RCRA NonGen/NLR, FINDS, US AIRS	EDR reported the property has been a gas/service station since 1954 through the present time. According to EDR, three gasoline and one waste oil UST are permanently out of use on the property. No additional information was provided. Generates and/or accumulates ignitable hazardous waste with no violations reported. The property was not identified in a disposal manifest database. It is suspected that this listing is part of the above listing for Sims Service Station.	The presence of a gas/service station since 1954 and no reported disposal procedures for hazardous waste may have impacted the property.
25	George B Holmes	3339 Benning Road, NE	US Historic Auto Station	EDR reported the property has been a gas/service station since 1940 through the present time assuming this property is the same as Sulli's Sunoco and Sims Service station, which is likely based on site reconnaissance and historical information.	The presence of a gas/service station since 1940 may have impacted the property.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
26	National Park Service (also listed as Kenilworth Maintenance Yard, DC Transfer Station)	3200 Benning Road, NE	ICIS, DC LUST, RCRA NonGen/NLR, ERNS, DC UST, FINDS	EDR identified the property in the ICIS database for a UST violation. No additional information was provided by EDR. Soil impact from a gasoline and diesel USTs were reported in 1990; however, the case is closed. In addition, soil impact was reported in 1999 from a gasoline UST; however, the case is closed. Generates and/or accumulates the following: ignitable hazardous waste; corrosive hazardous waste; and methylbenzene. Administrative violations were reported by EDR. The property was not identified in a disposal manifest database. According to the ERNS database, 40 gallons of transformer oil that contains PCBs was released from an out of service transformer that was damaged. The spill reporter indicated the damaged transformer may have as much as 250 gallons of mineral oil and was still slowly leaking. EPA Region III was contacted and some containment was conducted with sorbents. The ERNS database indicates spill may get into storm drains and discharge to the Anacostia River if it rains. The following USTs were identified by EDR as permanently out of use: two-4,000 gallon gasoline; two-6,000 gallon gasoline; one-2,000 gallon gasoline; one-10,000 gallon gasoline; two-4,000 gallon diesel; two-6,000 gallon diesel; one-1,000 gallon diesel; one-10,000 gallon heating oil; and one-5,000 gallon heating oil. No additional information regarding the aforementioned USTs was provided by EDR.	The presence of former LUST cases, the mineral oil spill and USTs may have impacted the property.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
28	Pepco Benning Road Generating Station	3300 Benning Road, NE	HMIRS, ERNS, PA Manifest, EPA Watch List, FINDS, RCRA-LQG, PADS, DC LUST	In 2000, 5 gallons of fuel oil were released from a transport tanker due to a defective fitting. No response action was reported by EDR. In 2001, 0.5 gallons of fuel oil was released while unloading and overflowing the tank. The release was contained and no further action was performed. In 1990, EDR reported 1,000 gallons of hydrochloric acid cleaning solution leaked form a valve on a line going to a boiler. Approximately 100 gallons was mixed with water and released into the storm drain. The remaining volume was returned to the boiler or recovered with sorbents. This property is listed in the PA Manifest database for transport and disposal of material containing lead. In 2012, the property was identified by the EPA for potential clean water act violations. In 1990, one gallon of transformer oil that contains PCBs was released on concrete from a damaged inactive transformer. Solvents were used to clean up the release. The following is generated and/or accumulated on the property: ignitable hazardous waste; corrosive hazardous waste; lead; benzene; carbon tetrachloride; reactive hazardous waste; cadmium; mercury; spent halogenated solvents; spent non-halogenated solvents; and methylbenzene. Based on a review of manifest data provided by EDR, lead and ignitable hazardous waste have/are properly disposed. Additional manifest data was not provided by EDR for the remaining hazardous waste. The property has received numerous violations and underwent compliance inspections. During the removal of a waste oil tank in 1989 soil impact was reported; however, the regulatory status is closed.	The property is on the EPA watch list, is a RCRA LQG with undocumented disposal records based on data provided, and on the LUST and PADS database.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
29	No Name	3937 Benning Road, NE	DC Historic UST	EDR reported a UST is or has been located on the property. No additional information is provided.	The presence of a UST without any closure documentation may have impacted the property.
30	Benning Branch Library	3935 Benning Road, NE	DC LUST, DC UST, DC RGA LUST	Soil contamination was reported during the closure of a waste oil UST in 2009. The regulatory status is closed. One-3,000 gallon heating oil UST was reported as permanently out of use; however, no closure documentation is provided. This property is suspected to be part of the above property located at 3937 Benning Road, NE.	The listing on the LUST database and potential UST on the property indicates impact is likely.
31	East River Park Limited Partnership	3919 Benning Road, NE	ICIS, FINDS, DC UST	EDR reported one-5,000 gallon diesel UST on the property. No additional information was provided by EDR.	The presence of a UST may have impacted the property.
32	Mary's Progressive Dry Cleaners	3907 Benning Road, NE	US Historic Cleaners	EDR identified a dry cleaners on the property from at least 2001 through 2002	The presence of a historic dry cleaners and the absence of disposal records indicates there may be impact on the property.
33	Paul's Esso Service Station (also listed as Benning Amoco Service Station and Elbee All American Service Station)	3901 Benning Road, NE	DC Historic UST, US Historic Auto Station	EDR reported a gas/service station on the property from at least 1943 through 1964. No additional information was provided.	The presence of USTs may have impacted the property.
34	Shop Express/Prev Chevron	3900 and 3908 Benning Road, NE	DC LUST, DC RGA LUST	EDR reported an open case at this property as a result of a gasoline release in 2008. Soil and groundwater impact was identified.	An open case with soil and groundwater impact.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
35	Watson Brothers Texaco (also listed as Penfield Brothers, Benning Service Station)	4001 Minnesota Avenue, NE	US Historic Auto Station	EDR reported the property has been a gas/service station from at least 1943 through 1960. No additional information was provided by EDR	The presence of a historic gas/service station may have impacted the property.
36	No Name	4008-4010 Minnesota Avenue, NE	DC Brownfields	The property was identified by EDR as a Brownfield. Brownfield properties are historically impacted properties that have or are being re-developed.	The identification of the property on the Brownfield database indicates the property is likely impacted.
37	No Name	4012 Minnesota Avenue, NE	DC Brownfields	The property was identified by EDR as a Brownfield. Brownfield properties are historically impacted properties that have or are being re-developed. It is suspected that this property is associated with the above property located at 4008-4010 Minnesota Avenue, NE.	The identification of the property on the Brownfield database indicates the property is likely impacted.
38	No Name	4016-4018 Minnesota Avenue, NE	DC Brownfields	The property was identified by EDR as a Brownfield. Brownfield properties are historically impacted properties that have or are being re-developed. It is suspected that this property is associated with the above property located at 4012 Minnesota Avenue, NE.	The identification of the property on the Brownfield database indicates the property is likely impacted.
39	San Wah	4016 Minnesota Avenue, NE	US Historic Cleaners	EDR reported the property has been a dry cleaners from at least 1948 through 1954. It is suspected that this property is associated with the above Brownfield property located at 4016-4018 Minnesota Avenue, NE.	The presence of a historic dry cleaners and the absence of disposal records indicates there may be impact on the property.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
40	Partk 7 Apt	4020 Minnesota Avenue, NE	DC UST	EDR Reported one-1,000 gallon heating oil UST is permanently out of use on the property. No additional information was provided.	The presence of a UST and no closure information indicates that impact may be present.
41	No Name	4024 Minnesota Avenue, NE	DC Brownfields	The property was identified by EDR as a Brownfield. Brownfield properties are historically impacted properties that have or are being re-developed. It is suspected that this property is associated with the above properties located at 4008 through 4020 Minnesota Avenue, NE.	The identification of the property on the Brownfield database indicates the property is likely impacted.
42	No Name	4030 Minnesota Avenue, NE	DC Brownfields	The property was identified by EDR as a Brownfield. Brownfield properties are historically impacted properties that have or are being re-developed. It is suspected that this property is associated with the above properties located at 4008 through 4024 Minnesota Avenue, NE.	The identification of the property on the Brownfield database indicates the property is likely impacted.
43	No Name	4032 Minnesota Avenue, NE	DC Brownfields	The property was identified by EDR as a Brownfield. Brownfield properties are historically impacted properties that have or are being re-developed. It is suspected that this property is associated with the above properties located at 4008 through 4030 Minnesota Avenue, NE.	The identification of the property on the Brownfield database indicates the property is likely impacted.
44	No Name	4036 Minnesota Avenue, NE	DC Brownfields	The property was identified by EDR as a Brownfield. Brownfield properties are historically impacted properties that have or are being re-developed. It is suspected that this property is associated with the above properties located at 4008 through 4032 Minnesota Avenue, NE.	The identification of the property on the Brownfield database indicates the property is likely impacted.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
45	No Name	4042 Minnesota Avenue, NE	DC Brownfields	The property was identified by EDR as a Brownfield. Brownfield properties are historically impacted properties that have or are being re-developed. It is suspected that this property is associated with the above properties located at 4008 through 4036 Minnesota Avenue, NE.	The identification of the property on the Brownfield database indicates the property is likely impacted.
46	Douglas Development Corporation	4045 Minnesota Avenue, NE	DC LUST, DC RGA LUST	The property was identified by EDR as a LUST case resulting from soil impact in 1998. The case is closed and no additional information was provided by EDR.	The listing of the property on the LUST database indicates impact may be present.
47	Autozone # 1151	4045 Minnesota Avenue, NE	RCRA - CESQG	Generates and/or accumulates corrosive hazardous waste and mercury. No violations were reported by EDR. The property was not identified in a disposal manifest database.	The presence of hazardous materials and lack of disposal documentation may have resulted in improper disposal and impacted the property.
48	No Name	4046 Minnesota Avenue, NE	DC Brownfields	The property was identified by EDR as a Brownfield. Brownfield properties are historically impacted properties that have or are being re-developed. It is suspected that this property is associated with the above properties located at 4008 through 4042 Minnesota Avenue, NE.	The identification of the property on the Brownfield database indicates the property is likely impacted.
49	No Name	4048 Minnesota Avenue, NE	DC Brownfields	The property was identified by EDR as a Brownfield. Brownfield properties are historically impacted properties that have or are being re-developed. It is suspected that this property is associated with the above properties located at 4008 through 4046 Minnesota Avenue, NE.	The identification of the property on the Brownfield database indicates the property is likely impacted.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
50	Gill's Valet	4051 Minnesota Avenue, NE	FINDS, US AIRS	EDR identified this property as a drycleaner with no compliance violations.	The presence of a drycleaner on the property and lack of disposal documentation indicates improper disposal could have occurred.
51	No Name	4052 Minnesota Avenue, NE	DC Brownfields	The property was identified by EDR as a Brownfield. Brownfield properties are historically impacted properties that have or are being re-developed. It is suspected that this property is associated with the above properties located at 4008 through 4048 Minnesota Avenue, NE.	The identification of the property on the Brownfield database indicates the property is likely impacted.
52	No Name	4063 Minnesota Avenue, NE	US Historic Cleaners	EDR reported a dry cleaners has been located on the property from at least 1999 through 2007. No additional information was provided by EDR.	The presence of a drycleaner on the property and lack of disposal documentation indicates improper disposal could have occurred.
53	No Name	4065 Minnesota Avenue, NE	DC Historic UST	A 2,000 gallon heating oil UST was reported on the property. No additional information was provided.	The presence of a former UST on the property with no closure information may have impacted the property.
54	River Terrace Valet	3427 & 3429 Benning Road, NE	US Historic Cleaners	EDR reported a dry cleaners has been located on the property from atleast 1954 through 1964. No additional information was provided by EDR.	The presence of a drycleaner on the property and lack of disposal documentation indicates improper disposal could have occurred.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
55	Costa's Service Station	3401 Benning Road, NE	US Historic Auto Station	EDR reported a gas/service station has been located on the property from at least 1948 through 2010. No additional information has been provided by EDR.	The presence of a historic gas/service station may have impacted the property.
56	Transco, Inc. (also listed as Distric Cab)	3399 Benning Road, NE	FINDS, DC UST, DC Historic UST, RCRA-CESQG, NJ Manifest	EDR reported one-5,000 gallon waste oil and one-5,000 gallon heating oil UST are located on the property. The waste oil UST is reportedly permanently out of use. No additional information was provided by EDR. Generates and/or accumulates ignitable hazardous waste and spent halogenated solvents. Administrative and compliance violations were reported. Manifest data was provided by EDR; however, waste codes were not provided and it is unclear what waste stream was disposed of.	The presence of former USTs on the property with no closure information may have impacted the property. The generation and/or accumulation of ignitable hazardous waste and spent halogenated solvents with no documented disposal information is of concern.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
57	Pepco Transformer Station	3400 Benning Road, NE	FINDS, ERNS, EPA Watch List,	In November 2011, a response was conducted following a release of 500 gallons of fuel oil to the ground surface from equipment failure on a tanker truck. No additional information was provided by EDR. In December 2010, a sheen was identified on the Anacostia River. The source was unknown and the DC Department of Energy investigated. No additional information was provided by EDR. The property was identified on the FINDS database as the following: hazardous waste biennial reporter; electric generator; criteria and hazardous air pollutant inventory; and greenhouse gas reporter. The property was identified on the EPA Watch List as a Clean Air Act facility. In August 2001, a transformer was damaged and approximately 78 gallons of oil was released. EDR reported an unknown volume entered a storm drain and the remaining was contained by boom. The DC DOH was notified. No additional information was provided by EDR.	The identification of the property as a hazardous waste biennial reporter and electric generator may have residual impacts on the property. Furthermore, the reported November 2011 release and no documented recovery activities suggest that impact may remain.
58	Pepco	Foote Street, NE	DC UST	EDR reported one-2,000 gallon gasoline UST and one-2,000 gallon diesel UST permanently out of use. No additional information was provided by EDR.	The presence of USTs with no closure information may have impacted the property.
59	Smart Esso Service Station	3465 Benning Road, NE	DC Historic UST, US Historic Auto Station	EDR reported a UST on the property and a historic gas/service station in 1960. No additional information was provided by EDR.	The reported historic gas/service station and former UST may have impacted the property.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
60	Dynasty Auto Body & Transmission	3621 Benning Road, NE	RCRA NonGen/NLR	Generates and/or accumulates the following: ignitable hazardous waste; benzene; tetrachloroethene; trichloroethene; and spent non-halogenated solvents. Compliance and administrative violations were reported by EDR. The property was not identified in a disposal manifest database.	The lack of disposal documentation suggests there may be a possibility of improper disposal resulting in impact to the property.
61	Farr Chase Rear	3617 Benning Road, NE	US Historic Auto Station	EDR reported an automobile repair facility in 1931 on the property. No additional information was provided by EDR.	The presence of a former service station and lack of additional information is of concern.
62	River Terrace Elementary School	420 34th Street, NE	DC UST, RCRA NonGen/NLR	EDR reported one-4,000 gallon heating oil UST that is temporarily out of use is located on the property. No additional information was provided by EDR. Generates and/or accumulates ignitable and corrosive hazardous waste. No violations were reported by EDR. The property was not identified in a disposal manifest database.	The presence of a UST and lack of disposal documentation for the reported hazardous waste may have impacted the property.
63	Warehouse (also listed as Ricks Auto Clinic)	3705 Benning Road, NE	DC UST, RCRA NonGen/NLR, FINDS	EDR reported two-3,000 gallon gasoline USTs on the property with a status of permanently out of use. Generates and/or accumulates the following: ignitable hazardous waste; benzene; and tetrachloroethene. Administrative violations were reported by EDR. The property was not identified in a disposal manifest database.	The presence of a UST and lack of disposal documentation for the reported hazardous waste may have impacted the property.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
64	No Name	3701 Benning Road, NE	DC Historic UST	EDR reported a UST is located on the property. No additional information was provided.	The presence of a UST may have impacted the property.
65	Benning Service Station	3902 Benning Road, NE	US Historic Auto Station	EDR reported the property was a gas/service station in 1940.	The presence of a historic gas/service station may have impacted the property.
66	Woolworth's	3932 Minnesota Avenue, NE	DC UST, DC Historic UST, DC LUST, DC RGA LUST	One-1,500 gallon heating oil UST was reported as permanently out of use and in 1997 as a LUST case for soil contamination; however, the case is closed.	Reported soil contamination.
67	Trak Auto (also listed as Supertrak #624)	3925 Minnesota Avenue, NE	DC UST, RCRA NonGen/NLR, FINDS	EDR reported one-500 gallon waste oil UST permanently out of use. No additional information was provided. EDR did not report hazardous waste generated or stored. No violations were reported.	The presence of a UST may have impacted the property.
68	Senator Square Apartments	3948 Minnesota Avenue, NE	DC UST	EDR reported one 2,000 gallon heating oil UST located on the property with a status of permanently out of use. No additional information is provided by EDR.	The presence of a previous UST may have impacted the property.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
69	No Name	4001 Benning Road, NE	ERNS	EDR reported a Pepco transformer was damaged due to high winds in April 2007 resulting in a release of 75 gallons of transformer oil of which 25 gallons reached the storm drain and discharged to the Anacostia River. Absorbent booms were applied during the response. No additional information was provided.	An unknown volume of transformer oil was either recovered or released to the ground surface.
70	Rainbow Cleaners	3915 Dix Street, NE	US Historic Cleaners	EDR reported the property was a dry cleaners from at least 2001 through 2012. No additional information was provided.	The presence of a drycleaner on the property and lack of disposal documentation indicates improper disposal could have occurred.
71	Apartment Building	4321 Brooks Street, NE	DC UST	EDR reported one-8,000 gallon heating oil UST is located on the property and currently in use. No additional information was provided.	The presence of a UST may have impacted the property.
72	CVS Pharmacy #0022	320 40th Street, NE	RCRA-LQG, PA Manifest	Generates and/or accumulates the following: ignitable hazardous waste; corrosive hazardous waste; mercury; silver; and pharmaceuticals. No violations reported. The property was identified on the PA Manifest database; however, specific hazardous waste disposal listings were not on the database.	The lack of specific hazardous waste stream disposal documentation indicates there may be improper disposal.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
73	Safeway Store # 1177	320 40th Street, NE	RCRA-CESQG	Generates and/or accumulates mercury on the property. No violations were reported. The property was not listed on a disposal database.	The lack of disposal documentation indicates there may be improper disposal.
74	No Name	4228 Benning Road, NE	DC Historic UST	EDR reported one 2,000 gallon heating oil UST currently in use is located on the property. No additional information was provided.	The presence of a UST may have impacted the property.
75	Laundry Center	4449 Benning Road, NE	US Historic Cleaners	EDR reported the property was a former dry cleaner in 1964. No additional information was provided.	The presence of a former dry cleaner may have impacted the property.
76	Action Auto Service Station	4435 Benning Road, NE	US Historic Auto Station	EDR reported a gasoline station was located on the property from at least 1954 through 1964. No additional information was provided.	The presence of a former gas station may have impacted the property.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
77	No Name	4425 Benning Road, NE	DC Historic UST	EDR reported a former or current UST is located on the property. No additional information was provided.	The presence of a former or current UST may have impacted the property.
78	Citgo (also listed as Sunoco Service Station and Rodney's Sunoco Service Station)	4400 Benning Road, NE	US AIRS, RCRA NonGen/NLR, DC LUST, DC UST, DC RGA LUST, US Historic Auto Station	Identified on the AIRS database for potential uncontrolled hydrocarbon emissions (< 100 tons/yr). No violations reported. EDR reported ignitable hazardous waste is generated and/or accumulated on the property. No violations or record of disposal was reported. Soil and groundwater impact was identified on the property as a result of leaking gasoline and waste oil USTs; however, the case was closed in 1998. EDR reported four 10,000 gallon and one 4,000 gallon gasoline USTs are permanently out of use on the property. One 8,000 gallon and one 12,000 gallon gasoline USTs are reportedly in use on the property. The property was reportedly a gas/service station from at least 1960 through the present time.	Soil and groundwater impact has been identified on the property.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
79	Former Amoco Oil Company (also listed as Jessie's Service Station)	4430 Benning Road, NE	DC LUST, DC UST, DC RGA LUST, US Historic Auto Station	The property reportedly has an open LUST case for soil and groundwater impact resulting from a gasoline UST closure. One-500 gallon gasoline and five-1,000 gallon gasoline USTs were reported as permanently out of use. EDR reported the property was used as a gasoline/service station from atleast 1940 through 1964.	Soil and groundwater impact has been identified on the property.
81	Spur Oil Company	4413 Benning Road, NE	US Historic Auto Station	EDR reported a gasoline station was located on the property from at least 1960 through 1964.	The presence of a former gas station may have impacted the property.
82	No Name	4409-4417 Benning Road, NE	DC Historic UST	EDR reported two-15,000 gallon heating oil USTs currently in use on the property. No additional information was provided.	The presence of heating oil USTs with no regulatory status is of concern.
83	Electronic Cleaners	4407 Benning Road, NE	EDR US Historic Cleaners	EDR reported a dry cleaners was located on the property from at least 1954 through 1960. No additional information was provided.	The presence of a former dry cleaner may have impacted the property.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
84	Dingo Ho Modern Laundry	4380 Benning Road, NE	EDR US Historic Cleaners	EDR reported a dry cleaners was located on the property from at least 1954 through 1964. No additional information was provided.	The presence of a former dry cleaner may have impacted the property.
85	United Health Care at East of the River (Ward 6)	123 45th Street, NE	PA Manifest, RCRA-CESQG	EDR reported the following hazardous waste is generated and/or accumulated on the property: ignitable hazardous waste; mercury; and silver; however, disposal records were only identified for silver. No violations were reported.	The lack of disposal documentation for ignitable hazardous waste and mercury indicate improper disposal may have occurred and impacted the property.
86	DPW-FMA 6th District Fuel Site	100 42nd Street, NE	DC RGA LUST, DC LUST, DC UST, RCRA-CESQG	EDR identified a closed LUST case reported in June 1989 for gasoline impacted soil and groundwater. EDR reported three 10,000 gallon gasoline USTs and one-1,000 gallon diesel UST permanently out of use. One 10,000 gallon gasoline and one-10,000 gallon diesel UST were reported as currently in use on the property. EDR reported ignitable hazardous waste and mercury is generated and/or accumulated on the property. No violations were reported and no disposal documentation was identified.	Soil and groundwater impact has been identified on the property.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
89	Exxon 2-7707 (also listed as Musolino's Service Station)	4501 Benning Road, NE	DC UST, US Historic Auto Station, DC LUST, DC RGA LUST, RCRA NonGen/NLR	EDR reported two-8,000 gallon gasoline and one-10,000 gallon gasoline USTs currently in use on the property. One 1,000 gallon waste oil UST was identified on the property. The property was reported as a gasoline/service station from at least 1940 through the present time. EDR reported a closed LUST case for soil and groundwater contamination from a gasoline UST. Ignitable hazardous waste and benzene is generated and/or accumulated on the property; however, no violations were reported. The property was not identified on a disposal database.	Soil and groundwater impact has been identified on the property.
90	Kerns Service Station	4500 Benning Road, NE	US Historic Auto Station	The property was identified as a gas/service station from at least 1940 through 1964. No additional information was provided.	The property may have been impacted by the historic gas/service station.
91	No Name	17 46th Street, NE	DC Historic UST	A 2,000 gallon heating oil UST currently in use was reported on the property. No additional information was provided.	The presence of a current or historic UST may have impacted the property.

Table I-1: EDR-Listed Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Database	EDR Summary	Rationale
92	Benco Shopping	4510 - 4528 Benning Road, SE	DC VCP	EDR reported trichloroethene impacted soil and groundwater on the property. A no further action was issued in May 2009.	Soil and groundwater impact has been identified on the property.
93	No Name	4525 East Capitol Street, SE	DC UST, DC Historic UST	EDR reported one-1,000 gallon waste oil UST is permanently out of use on the property. No additional information was provided.	The presence of a former UST on the property with no closure information may have impacted the property.
94	Humble Oil Station	4500 Benning Road, SE	DC UST, DC Historic UST	EDR reported two-8,000 gallon gasoline and one-4,000 gallon gasoline USTs are permanently out of use on the property. No additional information was provided.	The presence of former USTs on the property with no closure information may have impacted the property.

Table I-2: Other Recognized Environmental Condition Sites

REC #	Facility Name	Physical Address	Database	Data Source
95	Power Fuel & Transport LLC Gas Station	4519 Benning Rd	2013 List of District Open LUST-Voluntary Remediation Action Program (VRAP) Cases	8/10/2012 Case Number:2012023 Facility ID: 7-000208 company Name: Power Fuel & Transport LLC Gas Station Address 4519 Benning Rd Notification Date of Regulatory Action Required : 8/7/2012 Soil and GW impacts
96	CSX Benning Yard	Alexandria Extension of the CSX Capital Subdivision	NA	NA

The following RECs have been added based on the March 2016 review of the District of Columbia Department of Consumer and Regulatory Affairs database on underground storage tanks (USTs) and leaking underground storage tanks (LUSTs), and RCRA list of EPA regulated facilities as identified in the Envirofacts database and ICIS (the permit compliance system used by the EPA).

Table I-3: March 2016 Update of Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Rationale		
97	Shirlington Petroleum – Benning Road BP	1950 Benning Rd NE	The presence of a former UST on the property with no closure information may have impacted the property. However this site is near the outer perimeter of the study area boundary away from Benning Road.		

Table I-3: March 2016 Update of Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Rationale		
98	Landmark Petroleum – Valero	3710 Minnesota Av NE	The presence of a former UST on the property with no closure information may have impacted the property. However this site is near the outer perimeter of the study area boundary away from Benning Road.		
99	Samad Corporation – Minnesota Avenue CITGO	3820 Minnesota Av NE	The presence of a former gas station with UST fuel storage tanks may have impacted the property.		
100	Dag Petroleum Suppliers LLC	3830 Minnesota Av NE	The presence of a former gas station with UST fuel storage tanks may have impacted the property.		

Table I-3: March 2016 Update of Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Rationale		
101	Bank of America Benning Road Parking Lot	3829 Minnesota Avenue NE	This property is identified as a RCRA small quantity generator and may store hazardous waste materials on the property.		
102	Bank of America – Benning Road / Minnesota Avenue	3821 Minnesota Avenue NE	This property is identified as a RCRA small quantity generator and may store hazardous waste materials on the property.		
103	Bass circle apartments	4505 Benning Road NE	This property is identified as a RCRA small quantity generator and may store hazardous waste materials on the property.		

Table I-3: March 2016 Update of Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Rationale		
104	Phelps Ace High School	704 26th St NE	This property is identified as a RCRA small quantity generator and may store non-halogenated solvents, paint and coating materials.		
105	Plummer Elementary School	4601 Texas Avenue SE	This property is identified as a RCRA small quantity generator and may store ignitable wastes, lead-containing waste material.		
106	Safeway Store #1177	322 40th St NE	This property is identified as a RCRA small quantity generator and may store mercury wastes.		

Table I-3: March 2016 Update of Recognized Environmental Conditions Sites

REC #	Facility Name	Physical Address	Rationale		
107	Smothers Elementary School	4400 Brooks St NE	This property is identified as a RCRA small quantity generator and may store ignitable wastes, lead-containing waste material.		
108	Two Rivers Public Charter School	820 26th St NE	This property is identified as a RCRA small quantity generator and may store ignitable wastes, lead-containing waste material.		

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Benning Road
Washington, DC 20002

Inquiry Number: 3839903.5s
January 28, 2014

EDR DataMap™ Corridor Study

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

TARGET PROPERTY INFORMATION

ADDRESS

WASHINGTON, DC 20002
WASHINGTON, DC 20002

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records within the requested search area for the following databases:

FEDERAL RECORDS

NPL	National Priority List
Proposed NPL	Proposed National Priority List Sites
Delisted NPL	National Priority List Deletions
NPL LIENS	Federal Superfund Liens
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CERC-NFRAP	CERCLIS No Further Remedial Action Planned
LIENS 2	CERCLA Lien Information
CORRACTS	Corrective Action Report
RCRA-TSDF	RCRA - Treatment, Storage and Disposal
RCRA-SQG	RCRA - Small Quantity Generators
US ENG CONTROLS	Engineering Controls Sites List
US INST CONTROL	Sites with Institutional Controls
US CDL	Clandestine Drug Labs
US BROWNFIELDS	A Listing of Brownfields Sites
DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites
LUCIS	Land Use Control Information System
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
DEBRIS REGION 9	Torres Martinez Reservation Illegal Dump Site Locations
ODI	Open Dump Inventory
US MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
SSTS	Section 7 Tracking Systems
MLTS	Material Licensing Tracking System
RADINFO	Radiation Information Database
RAATS	RCRA Administrative Action Tracking System
RMP	Risk Management Plans
2020 COR ACTION	2020 Corrective Action Program List
LEAD SMELTERS	Lead Smelter Sites
PRP	Potentially Responsible Parties
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
COAL ASH DOE	Steam-Electric Plant Operation Data

US FIN ASSUR - Financial Assurance Information
FEMA UST - Underground Storage Tank Listing
COAL ASH EPA - Coal Combustion Residues Surface Impoundments List
FEDERAL FACILITY - Federal Facility Site Information listing
US HIST CDL - National Clandestine Laboratory Register
PCB TRANSFORMER - PCB Transformer Registration Database

STATE AND LOCAL RECORDS

DC SHWS - This state does not maintain a SHWS list. See the Federal CERCLIS list and Federal NPL list.
MD SHWS - Notice of Potential Hazardous Waste Sites
MD SWF/LF - Permitted Solid Waste Disposal Facilities
MD UIC - Underground Injection Wells Database
MD SWRCY - Recycling Directory
MD OCPCASES - Oil Control Program Cases
MD HIST LUST - Recovery Sites
MD UST - Registered Underground Storage Tank List
MD HIST UST - Historical UST Registered Database
DC AST - List of Aboveground Storage Tanks
MD AST - Permitted Aboveground Storage Tanks
MD ENG CONTROLS - Engineering Controls Site listing
MD INST CONTROL - Voluntary Cleanup Program Applicants/Participants
MD VCP - Voluntary Cleanup Program Applicants/Participants
MD DRYCLEANERS - Registered Drycleaning Facilities
MD BROWNFIELDS - Eligible Brownfields Properties
MD NPDES - Wastewater Permit Listing
MD AIRS - Permit and Facility Information Listing
MD LEAD - Lead Inspection Database
DC RGA LF - Recovered Government Archive Solid Waste Facilities List
MD LRP - Land Restoration Program
MD RGA LUST - Recovered Government Archive Leaking Underground Storage Tank
MD RGA HWS - Recovered Government Archive State Hazardous Waste Facilities List
MD RGA LF - Recovered Government Archive Solid Waste Facilities List

TRIBAL RECORDS

INDIAN RESERV - Indian Reservations
INDIAN ODI - Report on the Status of Open Dumps on Indian Lands
INDIAN LUST - Leaking Underground Storage Tanks on Indian Land
INDIAN UST - Underground Storage Tanks on Indian Land
INDIAN VCP - Voluntary Cleanup Priority Listing

EDR PROPRIETARY RECORDS

EDR MGP - EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified.

Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

EXECUTIVE SUMMARY

FEDERAL RECORDS

RCRA-LQG: RCRAInfo is EPA’s comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

A review of the RCRA-LQG list, as provided by EDR, and dated 09/10/2013 has revealed that there are 2 RCRA-LQG sites within the searched area.

Site	Address	Map ID	Page
POTOMAC ELEC PWR CO BENNING	***3300 BENNING RD N E***	***14***	***166***
CVS PHARMACY #0022	320 40TH STREET NE	27	221

RCRA-CESQG: RCRAInfo is EPA’s comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 09/10/2013 has revealed that there are 11 RCRA-CESQG sites within the searched area.

Site	Address	Map ID	Page
MINNESOTA AVENUE EXXON	***4100 HUNT PLACE, N. E.***	***1***	***4***
SPINGARN SHS	2500 BENNING ROAD	5	38
BROWNE JUNIOR HIGH SCHOOL (PUB	26TH STREET & BENNING R	7	85
PHELPS CAREER CENTER HIGH SCHO	704 26TH STREET NE	7	89
FRIENDSHIP COLLEGIATE ACADEMY	4095 MINNESOTA AVENUE N	10	93
STADIUM EXXON	***2651 BENNING ROAD NE***	***11***	***105***
AUTOZONE #1151	4045 MINNESOTA AVENUE N	15	185
TRANSCO INC	***3399 BENNING ROAD NE***	***16***	***193***
SAFEWAY STORE #1177	322 40TH STREET NE	27	224
UNITY HEALTH CARE AT EAST OF T	123 45TH STREET NE	30	237
DPW - 6TH DISTRICT FUELING SIT	100 42ND STREET NE	31	240

RCRA NonGen / NLR: RCRAInfo is EPA’s comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 09/10/2013 has revealed that there are 13 RCRA NonGen / NLR sites within the searched area.

Site	Address	Map ID	Page
GREENHOUSE BROTHERS	***4001 GAULT PLACE, N. E.***	***3***	***31***
POTOMAC ELECTRIC POWER CO	***12319 OVER POND WAY***	***6***	***40***

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
WOODSON JUNIOR HIGH SCHOOL (PU	4101 MINNESOTA AVENUE N	10	98
LEES AUTOMOTIVE	3355 BENNING RD NE	13	138
SUNOCO SERVICE STATION	***3341 BENNING RD NE***	***13***	***141***
KENILWORTH MAINTENANCE YARD	3200 BENNING RD NE	13	147
DYNASTY AUTO BODY & TRANSMISSI	3621 BENNING ROAD NE	18	208
RIVER TERRACE ELEMENTARY SCHOO	420 34TH STREET NE	19	212
RICKS AUTO CLINIC	***3705 BENNING RD NE***	***20***	***214***
SUPERTRAK #624	***3925 MINNESOTA AVENUE N***	***23***	***218***
SUNOCO SERVICE STATION	***4400 BENNING RD NE***	***29***	***228***
BASS CIRCLE APARTMENTS	4505 BENNING ROAD NE	33	248
EXXONMOBIL CORP #27707	4501 BENNING ROAD NE	33	252

ERNS: The Emergency Response Notification System records and stores information on reported releases of oil and hazardous substances. The source of this database is the U.S. EPA.

A review of the ERNS list, as provided by EDR, and dated 09/30/2013 has revealed that there are 9 ERNS sites within the searched area.

Site	Address	Map ID	Page
Not reported	2600 BENNING RD., NE	9	92
Not reported	CORNER BENNING AVE. & O	12	133
Not reported	3200 BENNING RD. N.E.	13	149
Not reported	3300 BENNING RD NE	14	155
Not reported	3300 BENNING RD N.E.	14	166
Not reported	3400 BENNING ROAD NE	16	204
Not reported	3400 BENNING ROAD NE	16	204
Not reported	3400 BENNING RD. NE	16	207
Not reported	4001 BENNING RD	24	220

HMIRS: The Hazardous Materials Incident Report System contains hazardous material spill incidents reported to the Department of Transportation. The source of this database is the U.S. EPA.

A review of the HMIRS list, as provided by EDR, and dated 09/30/2013 has revealed that there are 2 HMIRS sites within the searched area.

Site	Address	Map ID	Page
Not reported	3300 BENNING ROAD	14	155
Not reported	3300 BENNING ROAD	14	155

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

A review of the DOT OPS list, as provided by EDR, and dated 07/31/2012 has revealed that there is 1 DOT OPS site within the searched area.

Site	Address	Map ID	Page
WASHINGTON GAS LIGHT CO	4414 BENNING ROAD, NE	29	232

EXECUTIVE SUMMARY

FTTS: FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act) over the previous five years. To maintain currency, EDR contacts the Agency on a quarterly basis.

A review of the FTTS list, as provided by EDR, and dated 04/09/2009 has revealed that there is 1 FTTS site within the searched area.

Site	Address	Map ID	Page
FRIENDSHIP EDISON PCS - WOODSO	***4095 MINNESOTA AVE NE***	***10***	***95***

HIST FTTS: A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

A review of the HIST FTTS list, as provided by EDR, and dated 10/19/2006 has revealed that there is 1 HIST FTTS site within the searched area.

Site	Address	Map ID	Page
FRIENDSHIP EDISON PCS - WOODSO	***4095 MINNESOTA AVE NE***	***10***	***95***

ICIS: The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

A review of the ICIS list, as provided by EDR, and dated 07/20/2011 has revealed that there are 6 ICIS sites within the searched area.

Site	Address	Map ID	Page
EDISON FRIENDSHIP - WOODSON CA	4095 MINNESOTA AVE, NE	10	94
STADIUM EXXON	2651 BENNING ROAD, N. E	11	101
BENNING ROAD SHELL	3355B BENNING ROAD NE	13	133
NATL PARK SVC	3200 BENNING RD., NE	13	145
SOLID WASTE REDUCTION CENTER	3200 BENNING ROAD NE	13	153
EAST RIVER PARK LIMITED PARTNE	3919 BENNING ROAD, NE	15	178

PADS: The PCB Activity Database identifies generators, transporters, commercial storers and/or brokers and disposers of PCBs who are required to notify the United States Environmental Protection Agency of such activities. The source of this database is the U.S. EPA.

A review of the PADS list, as provided by EDR, and dated 06/01/2013 has revealed that there is 1 PADS site within the searched area.

Site	Address	Map ID	Page
POTOMAC ELEC PWR CO BENNING	***3300 BENNING RD N E***	***14***	***166***

EXECUTIVE SUMMARY

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

A review of the FINDS list, as provided by EDR, and dated 03/08/2013 has revealed that there are 23 FINDS sites within the searched area.

Site	Address	Map ID	Page
FRIENDSHIP EDISON COLLEGIATE A	4095 MINNESOTA AVE, NE	10	95
FRIENDSHIP EDISON PCS (WOODSO	4100 MINNESOTA AVENUE,	10	97
COWBOYS CLEANERS	1115 COKER ST	10	100
STADIUM EXXON	2651 BENNING ROAD, N. E	11	103
DAG PETROLEUM MANAGEMENT INCOR	3355 BENNING ROAD NORTH	13	134
BENNING ROAD SHELL	3355B BENNING ROAD NE	13	135
SW ROOFING	25330 FIVE POINTS RD	13	136
SUNOCO SERVICE STATION	***3341 BENNING RD NE***	***13***	***141***
AUTO CARE INCORPORATED	3341 BENNING ROAD N.E.	13	143
SOLID WASTE REDUCTION CENTER	3200 BENNING ROAD NE	13	151
MELMS GRAVEL	48W760 MELMS RD	13	152
NATL PARK SVC	3200 BENNING RD., NE	13	154
PEPCO- BENNING GENERATING PLAN	3300 BENNING ROAD N.E.	14	166
EAST RIVER PARK LIMITED PARTNE	3919 BENNING ROAD, NE	15	178
RYANS EXPRESS DRY CLEANERS	216 BENDER RD.	15	184
GILL’S VALET	***4051 MINNESOTA AVENUE,***	***15***	***187***
TRANSCO INC	3399 BENNING ROAD NE	16	192
PEPCO TRANSFORMER STATION	3400 BENNING ROAD	16	203
PEPCO KENILWORTH FUELING STATI	3400 BENNING ROAD, NE	16	204
POTOMAC POWER RESOURCES BENNIN	3400 BENNING ROAD NE	16	205
DYNASTY AUTO BODY & TRANSMISSI	3621 BENNING ROAD NE	18	210
RICKS AUTO CLINIC	***3705 BENNING RD NE***	***20***	***214***
SUPERTRAK #624	***3925 MINNESOTA AVENUE N***	***23***	***218***

US AIRS: The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

A review of the US AIRS list, as provided by EDR, and dated 10/23/2013 has revealed that there are 8 US AIRS sites within the searched area.

Site	Address	Map ID	Page
MINNESOTA AVENUE EXXON	***4100 HUNT PLACE, N. E.***	***1***	***4***
GREENHOUSE BROTHERS	***4001 GAULT PLACE, N. E.***	***3***	***31***
PEPCO BENNING ROAD STATION	***3400 BENNING ROAD, NE***	***6***	***43***
STADIUM EXXON	***2651 BENNING ROAD NE***	***11***	***105***
DAG PETROLEUM MANAGEMENT INC.	3355 BENNING ROAD, N.E.	13	136
AUTO CARE INCORPORATED	3341 BENNING ROAD N.E.	13	144
GILL’S VALET	***4051 MINNESOTA AVENUE,***	***15***	***187***

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Site	Address	Map ID	Page
CITGO	4400 BENNING RD NE	29	226

EPA WATCH LIST: EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

A review of the EPA WATCH LIST list, as provided by EDR, and dated 06/30/2013 has revealed that there are 2 EPA WATCH LIST sites within the searched area.

Site	Address	Map ID	Page
PEPCO - BENNING	3300 BENNING ROAD, N.E.	14	165
PEPCO BENNING ROAD STATION	3400 BENNING ROAD, NE	16	207

STATE AND LOCAL RECORDS

DC SWF/LF: Solid Waste Facility Listing.

A review of the DC SWF/LF list, as provided by EDR, and dated 11/18/2010 has revealed that there is 1 DC SWF/LF site within the searched area.

Site	Address	Map ID	Page
BENNING ROAD TRANSFER STATION	3200 BENNING RD., NE	13	152

DC LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Consumer and Regulatory Affairs' District of Columbia LUST Cases list.

A review of the DC LUST list, as provided by EDR, and dated 10/01/2013 has revealed that there are 13 DC LUST sites within the searched area.

Site	Address	Map ID	Page
LANGSTON GOLF COURSE	***2600 BENNING RD NE***	***9***	***92***
EXXON S/S #2-1931	***2651 BENNING RD NE***	***11***	***131***
KENILWORTH MAINT. YARD	***3200 BENNING RD, NE***	***13***	***146***
NATIONAL PARK SERVICE	3200 BENNING RD., NE	13	154
BENNING ROAD GEN. STA.	***3300 BENNING RD, NE***	***14***	***177***
BENNING BRANCH LIBRARY	***3935 BENNING RD NE***	***15***	***177***
SHOP EXPRESS / PREV CHEVRON	***3900 & 3908 BENNING RD.***	***15***	***180***
DOUGLAS DEVELOPMENT CORP.	***4045 MINNESOTA AVENUE,***	***15***	***184***
WOOLWORTHS	***3932 MINNESOTA AVENUE,***	***23***	***217***
SUNOCO SERVICE STATION	***4400 BENNING RD NE***	***29***	***228***

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
AMOCO OIL CO (FORMER)	***4430 BENNING RD NE***	***29***	***231***
DPW-FMA 6TH DISTRICT FUEL SITE	***100 42ND ST NE***	***31***	***239***
EXXON	***4501 BENNING RD, NE***	***33***	***251***

DC UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Consumer & Regulatory Affairs' D.C. UST Database List.

A review of the DC UST list, as provided by EDR, and dated 10/01/2013 has revealed that there are 27 DC UST sites within the searched area.

Site	Address	Map ID	Page
BIG D LIQUORS	4169 MINNESOTA AV NE	2	31
MT VERNON UNITED METHODIST CHU	4147 MINNESOTA AV NE	3	37
SPINGARN HIGH SCHOOL	2500 BENNING RD NE	5	40
LANGSTON GOLF COURSE	***2600 BENNING RD NE***	***9***	***92***
CARTER WOODSON	4095 MINNESOTA AV NE	10	96
EXXON S/S #2-1931	***2651 BENNING RD NE***	***11***	***131***
BENNING ROAD SHELL	3355 BENNING RD NE	13	134
UNKNOWN	***3341 BENNING RD NE***	***13***	***140***
DC TRANSFER STATION	3200 BENNING RD NE	13	150
BENNING BRANCH LIBRARY	***3935 BENNING RD NE***	***15***	***177***
EAST RIVER PARK SHOPPING CENTE	3919 BENNING RD NE	15	179
PARTK 7 APT	4020 MINNESOTA AV NE	15	182
DISTRICT CAB	***3399 BENNING RD NE***	***16***	***192***
PEPCO	FOOTE ST NE	16	207
AUTO CARE	3621 BENNING RD NE	18	211
RIVER TERRACE ELEMENTARY SCHOO	420 34TH ST NE	19	212
WAREHOUSE	3705 BENNING RD NE	20	214
WOOLWORTH'S	***3932 MINNESOTA AV NE***	***23***	***217***
TRAK AUTO	3925 MINNESOTA AV NE	23	218
SENATOR SQUARE APARTMENTS	3948 MINNESOTA AV SE	23	220
APARTMENT BUILDING	4321 BROOKS ST NE	26	221
SUNOCO SERVICE STATION	***4400 BENNING RD NE***	***29***	***228***
AMOCO OIL CO (FORMER)	***4430 BENNING RD NE***	***29***	***231***
DPW-FMA 6TH DISTRICT FUEL SITE	***100 42ND ST NE***	***31***	***239***
EXXON S/S #2-7707	4501 BENNING RD SE	33	249
UNKNOWN	***4525 E CAPITOL ST SE***	***35***	***255***
HUMBLE OIL STATION	***4500 BENNING RD SE***	***35***	***255***

DC HIST UST: During the process of the database upgrade, all facilities that the UST Program was unable to confirm their existence were removed from the working revelation UST Database before the conversion and put into an excel spreadsheet. These facilities became known as "Project Unknown". This listing is not current and has been not updated.

A review of the DC HIST UST list, as provided by EDR, and dated 12/31/1999 has revealed that there are 15 DC HIST UST sites within the searched area.

Site	Address	Map ID	Page
UNKNOWN	2501 BENNING RD NE	8	91
UNKNOWN	***3341 BENNING RD NE***	***13***	***140***

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
UNKNOWN	3937 BENNING RD NE	15	177
UNKNOWN	3901 BENNING RD NE	15	179
UNKNOWN	4065 MINNESOTA AV NE	15	191
DISTRICT CAB	***3399 BENNING RD NE***	***16***	***192***
UNKNOWN	3465 BENNING RD NE	17	208
UNKNOWN	R 3701 BENNING RD NE	21	216
WOOLWORTH'S	***3932 MINNESOTA AV NE***	***23***	***217***
UNKNOWN	4228 BENNING RD NE	28	225
UNKNOWN	4425 BENNING RD NE	29	226
UNKNOWN	4409-17 BENNING RD NE	29	234
UNKNOWN	17 46TH ST NE	34	254
UNKNOWN	***4525 E CAPITOL ST SE***	***35***	***255***
HUMBLE OIL STATION	***4500 BENNING RD SE***	***35***	***255***

PA MANIFEST: Hazardous waste manifest information.

A review of the PA MANIFEST list, as provided by EDR, has revealed that there are 6 PA MANIFEST sites within the searched area.

Site	Address	Map ID	Page
PHELPS HIGH SCHOOL	704 26TH STREET NE	7	88
PEPCO BENNING ROAD GENERATING	3300 BENNING ROAD NE	14	155
CVS PHARMACY 0022	320 40TH ST NE	27	223
UNITY HEALTH CARE AT EAST OF T	123 45TH STREET NE	30	235
BENNING ELEMENTARY SCHOOL	100 41ST STREET NE	32	241
BASS CIRCLE APARTMENTS	4505 BENNING RD NE	33	244

NY MANIFEST: Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

A review of the NY MANIFEST list, as provided by EDR, has revealed that there are 2 NY MANIFEST sites within the searched area.

Site	Address	Map ID	Page
POTOMAC ELECTRIC POWER CO	***12319 OVER POND WAY***	***6***	***40***
PEPCO BENNING ROAD STATION	***3400 BENNING ROAD, NE***	***6***	***43***

NJ MANIFEST: Hazardous waste manifest information.

A review of the NJ MANIFEST list, as provided by EDR, has revealed that there are 4 NJ MANIFEST sites within the searched area.

Site	Address	Map ID	Page
MINNESOTA AVENUE EXXON	***4100 HUNT PLACE, N. E.***	***1***	***4***
PEPCO BENNING ROAD STATION	***3400 BENNING ROAD, NE***	***6***	***43***
STADIUM EXXON	***2651 BENNING ROAD NE***	***11***	***105***
TRANSCO INC	***3399 BENNING ROAD NE***	***16***	***193***

EXECUTIVE SUMMARY

DC VCP: The Voluntary Cleanup Program oversees owner or developer initiated voluntary remediation of contaminated lands and buildings that return actual or potentially contaminated properties to productive uses.

A review of the DC VCP list, as provided by EDR, and dated 06/25/2013 has revealed that there is 1 DC VCP site within the searched area.

Site	Address	Map ID	Page
BENCO SHOPPING	4510-4528 BENNING ROAD,	35	254

DC BROWNFIELDS: A listing of potential brownfields site locations.

A review of the DC BROWNFIELDS list, as provided by EDR, and dated 09/13/2013 has revealed that there are 15 DC BROWNFIELDS sites within the searched area.

Site	Address	Map ID	Page
Not reported	4098 MINNESOTA AV NE	10	96
Not reported	4100 MINNESOTA AV NE	10	96
Not reported	4108 MINNESOTA AV NE	10	101
Not reported	4112-4114 MINNESOTA AV	10	101
Not reported	4008 - 4010 MINNESOTA A	15	181
Not reported	4012 MINNESOTA AV NE	15	181
Not reported	4016 - 4018 MINNESOTA A	15	182
Not reported	4024 MINNESOTA AV NE	15	182
Not reported	4030 MINNESOTA AV NE	15	183
Not reported	4032 MINNESOTA AV NE	15	183
Not reported	4036 MINNESOTA AV NE	15	183
Not reported	4042 MINNESOTA AV NE	15	183
Not reported	4046 MINNESOTA AV NE	15	186
Not reported	4048 MINNESOTA AV NE	15	186
Not reported	4052 MINNESOTA AV NE	15	190

DC RGA LUST: The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists.

A review of the DC RGA LUST list, as provided by EDR, has revealed that there are 13 DC RGA LUST sites within the searched area.

Site	Address	Map ID	Page
LANGSTON GOLF COURSE	***2600 BENNING RD NE***	***9***	***92***
EXXON S/S #2-1931	***2651 BENNING RD NE***	***11***	***131***
KENILWORTH MAINT. YARD	***3200 BENNING RD, NE***	***13***	***146***
BENNING ROAD GEN. STA.	***3300 BENNING RD, NE***	***14***	***177***
BENNING BRANCH LIBRARY	***3935 BENNING RD NE***	***15***	***177***
SHOP EXPRESS / PREV CHEVRON	***3900 & 3908 BENNING RD.***	***15***	***180***
DOUGLAS DEVELOPMENT CORP.	***4045 MINNESOTA AVENUE,***	***15***	***184***
WOOLWORTHS	***3932 MINNESOTA AVENUE,***	***23***	***217***
SUNOCO SERVICE STATION	***4400 BENNING RD NE***	***29***	***228***
AMOCO OIL CO (FORMER)	***4430 BENNING RD NE***	***29***	***231***
Not reported	100 42ND STREET, NE	31	239
DPW-FMA 6TH DISTRICT FUEL SITE	***100 42ND ST NE***	***31***	***239***

EXECUTIVE SUMMARY

Site	Address	Map ID	Page
EXXON	***4501 BENNING RD, NE***	***33***	***251***

EDR PROPRIETARY RECORDS

EDR US Hist Auto Stat: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR US Hist Auto Stat list, as provided by EDR, has revealed that there are 19 EDR US Hist Auto Stat sites within the searched area.

Site	Address	Map ID	Page
RHODES SERVICE STATION	4169 MINNESOTA AVE NE	2	31
HOLLANDS SHELL SERVICE STATION	4131 MINNESOTA AVE NE	4	37
PRICE S ESSO STATION	2651 BENNING RD NE	11	104
SIMS SERVICE STATION	3355 BENNING RD NE	13	133
SULLI S SUNOCO	3341 BENNING RD NE	13	140
HOLMES GEO B	3339 BENNING RD NE	13	145
PAUL S ESSO SERVICE STATION	3901 BENNING RD NE	15	180
WATSON BROTHERS TEXACO CO	4001 MINNESOTA AVE NE	15	180
COSTAS SERVICE STATION	3401 BENNING RD NE	16	191
SMART ESSO SERVICE STATION	3465 BENNING RD NE	17	208
Not reported	3621 BENNING RD NE	18	211
FARR CHAS E REAR	3617 BENNING RD NE	18	212
BENNING SERVICE STATION	3902 BENNING RD NE	22	216
ACTION AUTO SERVICE STATION	4435 BENNING RD NE	29	226
RODNEY S SUNOCO SERVICE STATIO	4400 BENNING RD NE	29	231
JESSIE S SERVICE STATION	4430 BENNING RD NE	29	234
SPUR OIL CO	4413 BENNING RD NE	29	234
MUSOLINO S SERVICE STATION	4501 BENNING RD NE	33	250
KERNS SERVICE STATION	4500 BENNING RD NE	33	253

EDR US Hist Cleaners: EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR US Hist Cleaners list, as provided by EDR, has revealed that there are 13 EDR US

EXECUTIVE SUMMARY

Hist Cleaners sites within the searched area.

Site	Address	Map ID	Page
MAYFAIR VALET SHOP	3920 HAYES ST NE	2	30
Not reported	4001 GAULT PL NE	3	37
GREENHOUSE BROS	4132 MINNESOTA AVE NE	4	37
ACME REAR	4100 MINNESOTA AVE NE	10	97
Not reported	3907 BENNING RD NE	15	179
SAN WAH	4016 MINNESOTA AVE NE	15	182
Not reported	4063 MINNESOTA AVE NE	15	190
RIVER TERRACE VALET	3429 BENNING RD NE	16	191
RIVER TERRACE VALET	3427 BENNING RD NE	16	191
Not reported	3915 DIX ST NE	25	220
LAUNDRY CENTER	4449 BENNING RD NE	29	225
ELECTRONIC CLEANERS	4407 BENNING RD NE	29	235
DINGO HO MODERN LAUNDRY	4380 BENNING RD NE	29	235

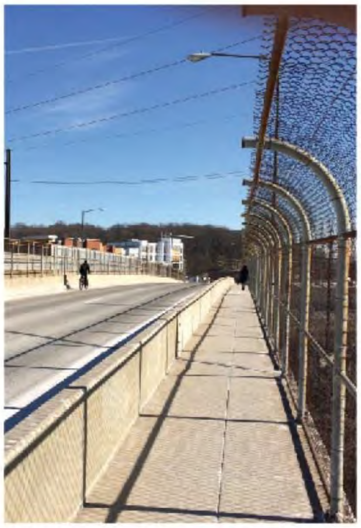
EXECUTIVE SUMMARY

Please refer to the end of the findings report for unmapped orphan sites due to poor or inadequate address information.

BENNING ROAD & BRIDGES TRANSPORTATION IMPROVEMENTS

NOISE AND VIBRATION TECHNICAL MEMORANDUM

DRAFT MAY 2016



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EXECUTIVE SUMMARY

Purpose

The purpose of this report is to document potential impacts related to noise and vibration due to the operation and construction of the Benning Road and Bridges Transportation Improvements project (the "Project"), along with any potential mitigation measures, as necessary.

Methodology

A noise and vibration assessment was prepared in accordance with the National Environmental Policy Act (NEPA) and the guidelines set forth by the Federal Transit Administration's (FTA) *Transit Noise and Vibration Impact Assessment* (May 2006).

Environmental Consequences

The No Build Alternative would not introduce new sources of noise or vibration from the Project, and as a result, no noise impacts or vibration impacts are expected under the No Build Alternative. In most cases, Project noise levels from streetcar operations under Build Alternative 1 are predicted to be well below the existing ambient noise levels due to the slower travel speeds. Similarly, Project noise levels from streetcar operations under Build Alternative 2 are predicted to be lower than Build Alternative 1 due to the greater distance between the source and the receptors. However, both Build Alternatives are predicted to result in both noise and vibration impacts.

Under Build Alternative 1, exceedances of the FTA *severe* impact criteria are predicted at four residences (Category 2 land uses) due to track switches for the 26th Street track to the Car Barn. Additionally, exceedances of the FTA *moderate* impact criteria are also predicted at nine other residences under Build Alternative 1. Exceedances of the FTA *frequent* vibration criteria are predicted at 40 residences and one institutional receptor (Dorothy I. Height/Benning Neighborhood Library) along Benning Road less than 50 feet from the proposed Build Alternative 1 alignment. Temporary noise and vibration impacts would also be associated with the construction of the Project.

Under Build Alternative 2, exceedances of the FTA *severe* criteria are predicted at four residences (Category 2 land uses) due to track switches for the 26th Street track to the Car Barn. Additionally, exceedances of the FTA *moderate* impact criteria are also predicted at five other residences under Build Alternative 2. Exceedances of the FTA *frequent* vibration criteria are also predicted at 20 residences and one institutional receptor (Dorothy I. Height/Benning Neighborhood Library) along Benning Road less than 50 feet from the proposed Build Alternative 2 alignment. Temporary noise and vibration impacts would also be associated with the construction of the Project.

Mitigation

Since operational noise and vibration impacts are predicted for both Build Alternatives, mitigation is required. Candidate control measures to mitigate the predicted noise impacts include track control devices to eliminate or reduce the onset and severity of wheel squeal, larger radius track curves, and specification of streetcar vehicles that operate routinely without wheel squeal along curves with radii less than 100 feet. Control measures to mitigate the predicted vibration impacts include speed reductions and ballast mats to decouple the proposed track from the underlying track bed.

Similarly, appropriate noise and vibration control measures would be implemented by DDOT's contractors to minimize any potential impacts during temporary construction activities. Proposed mitigation measures include substituting equipment with lower noise and vibration levels or conducting a pre-construction survey of any buildings potentially susceptible to construction vibration. Implementation of proposed mitigation measures would ensure potential impacts to sensitive and/or historic buildings would be reduced to a less than significant level.

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List of Tables

Acronyms

BMP	Best Management Practices
CLRP	Constrained Long Range Plan
dB	decibels, linear or unweighted
dBA	A-weighted decibels
DDOT	District Department of Transportation
EA	Environmental Assessment
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
ips	inches per second
L_{dn}	Average Day-Night Noise Level
L_{eq}	Average Hourly Equivalent Noise Level
L_{max}	Maximum Noise Levels
µips	micro inches per second
mph	miles per hour
NEPA	National Environmental Policy Act
OCS	Overhead Contact System
RMS	Root Mean Squared
ROW	Right of Way
SEL	Sound Exposure Level
TIP	Transportation Improvement Program
TPSS	Traction Power Substation
VdB	Vibration velocity levels in Decibels
VHT	Vehicle Hours Traveled
VMT	Vehicle Miles Traveled

1.0 Introduction

1.1 Project Overview

The District Department of Transportation (DDOT), in conjunction with the Federal Highway Administration (FHWA), is proposing transportation improvements (the "proposed action") along the Benning Road corridor in Washington, DC. The proposed action would improve transportation infrastructure conditions; enhance safety and operations along the corridor and at key intersections; enhance pedestrian and bicycle facilities; and extend streetcar transit service. FHWA is the lead federal agency with DDOT (the Applicant) as joint lead. The agencies are preparing an Environmental Assessment (EA) for the project in accordance with the National Environmental Policy Act (NEPA) as well as other federal and local laws.

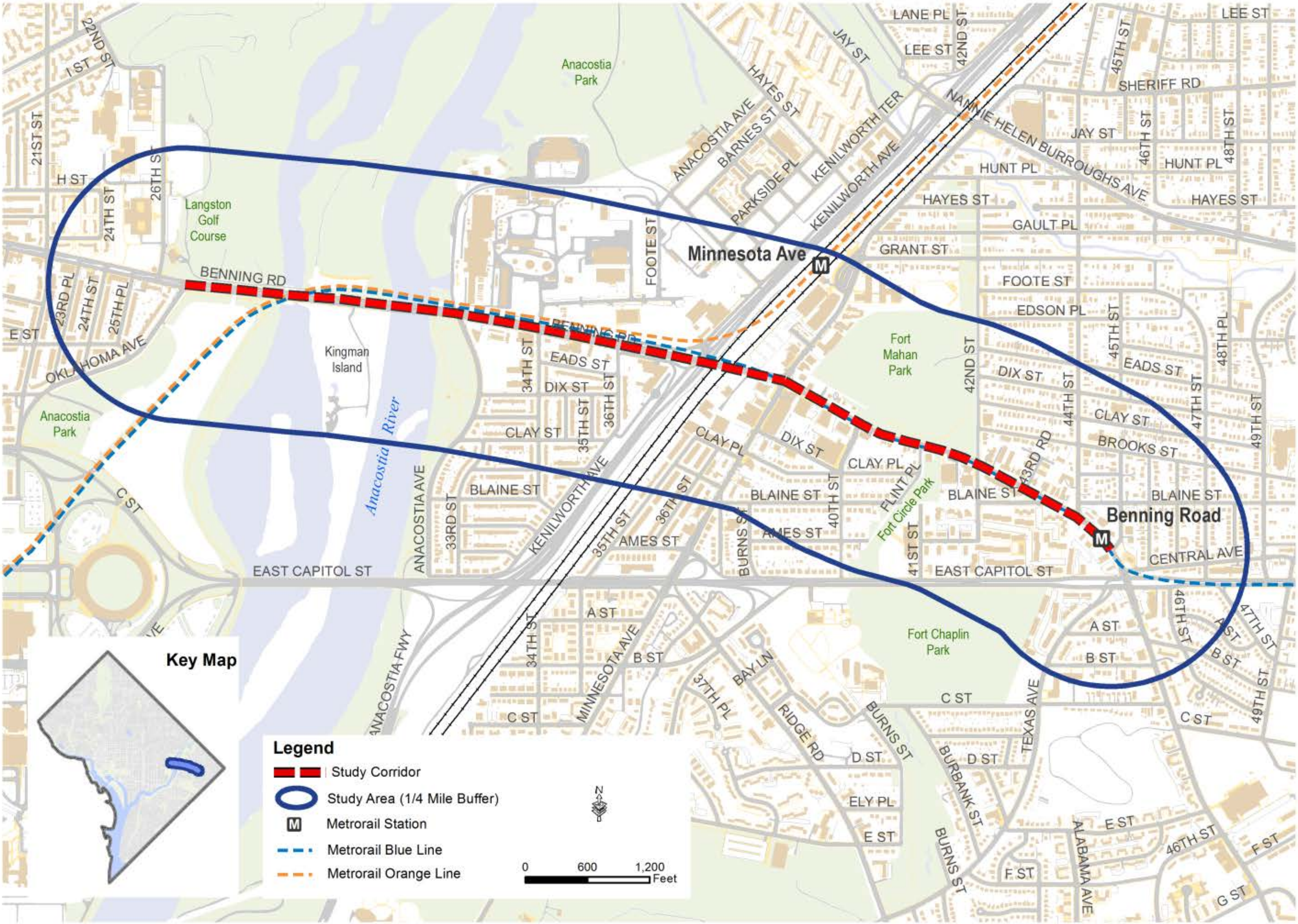
The Benning Road corridor is located within the Northeast section of Washington, DC and is approximately two miles long. The project study area is shown in **Figure 1**. The western terminus for the project is the intersection of Benning Road and Oklahoma Avenue. This intersection is also the eastern terminus of one of the District's initial streetcar lines, the H/Benning Streetcar Line. The eastern terminus for the project is the Benning Road Metrorail Station. The proposed improvements are anticipated to be predominantly within the existing right-of-way. The project is included in the adopted National Capitol Region Transportation Planning Board's Transportation Improvement Program (TIP) and the Constrained Long Range Plan (CLRP).

The purpose of the Benning Road and Bridges Transportation Improvements project is to address deficiencies in transportation infrastructure conditions, improve safety conditions and operations for both motorized and non-motorized access, and to provide for increased mobility and accessibility by improving transit operations and options between the intersection of Benning Road and Oklahoma Avenue and the Benning Road Metrorail Station.

1.2 Purpose of Report

The purpose of this technical report is to describe noise and vibration effects associated with the Project, including proposed mitigation measures, as necessary. The noise and vibration evaluation includes an assessment of the Project's impacts on sensitive receptors along the proposed streetcar alignment and associated facilities.

Figure 1: Project Study Area



1.3 Regulatory Setting

The Federal Noise Control Act of 1972 (Public Law 92-574) requires that all federal agencies administer their programs in a manner that promotes an environment free from noises that could jeopardize public health or welfare. The operational impacts were evaluated using the guidelines set forth by the FTA's guidance manual on *Transit Noise and Vibration Impact Assessment* (May 2006).

2.0 Methodology

2.1 Metrics and Criteria

2.1.1 Human Perception of Noise

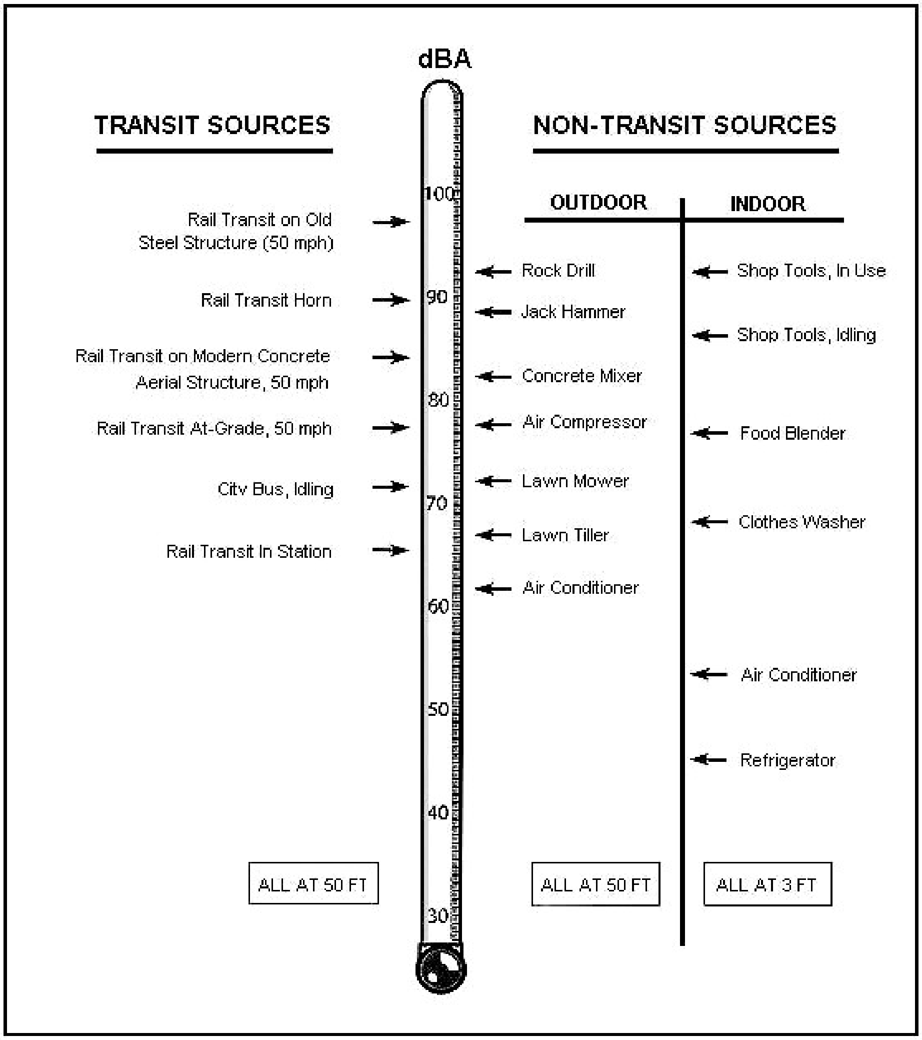
Noise is "unwanted sound" and, by this definition, the perception of noise is a subjective process. Several factors affect the actual level and quality of sound (or noise) as perceived by the human ear and can generally be described in terms of loudness, pitch (or frequency), and time variation. The loudness, or magnitude, of noise determines its intensity and is measured in decibels (dB) that can range from below 40 dB (e.g., the rustling of leaves) to over 100 dB (e.g., a rock concert). Pitch describes the character and frequency content of noise, such as the very low "rumbling" noise of stereo subwoofers or the very high-pitched noise of a piercing whistle. Finally, the time variation of noise sources can be characterized as continuous, such as with a building ventilation fan; intermittent, such as for trains passing by; or impulsive, such as pile-driving activities during construction.

Various sound levels are used to quantify noise from transit sources, including a sound's loudness, duration, and tonal character. For example, the A-weighted decibel (dBA) is commonly used to describe the overall noise level because it more closely matches the human ear's response to audible frequencies. Since the A-weighted decibel scale is logarithmic, a 10 dBA increase in a noise level is generally perceived as a doubling of loudness, while a 3 dBA increase in a noise level is just barely perceptible to the human ear. Typical A-weighted sound levels from transit and other common sources are documented in FTA's guidance manual on *Transit Noise and Vibration Impact Assessment* (May 2006) and are shown in **Figure 2**.

Several A-weighted noise descriptors are used to determine impacts from stationary and transit-related sources, including:

- **Maximum Noise Levels (L_{max}):** represents the maximum noise level that occurs during an event such as a bus or train passby;
- **Average Hourly Equivalent Noise Level (L_{eq}):** represents a level of constant noise with the same acoustical energy as the fluctuating noise levels observed during a given interval, such as one hour (Leq(h)); and
- **Average 24-hour day-night noise level (L_{dn}):** includes a 10-decibel penalty for all nighttime activity between 10:00 p.m. and 7:00 a.m.

Figure 2: Typical A-Weighted Noise Levels



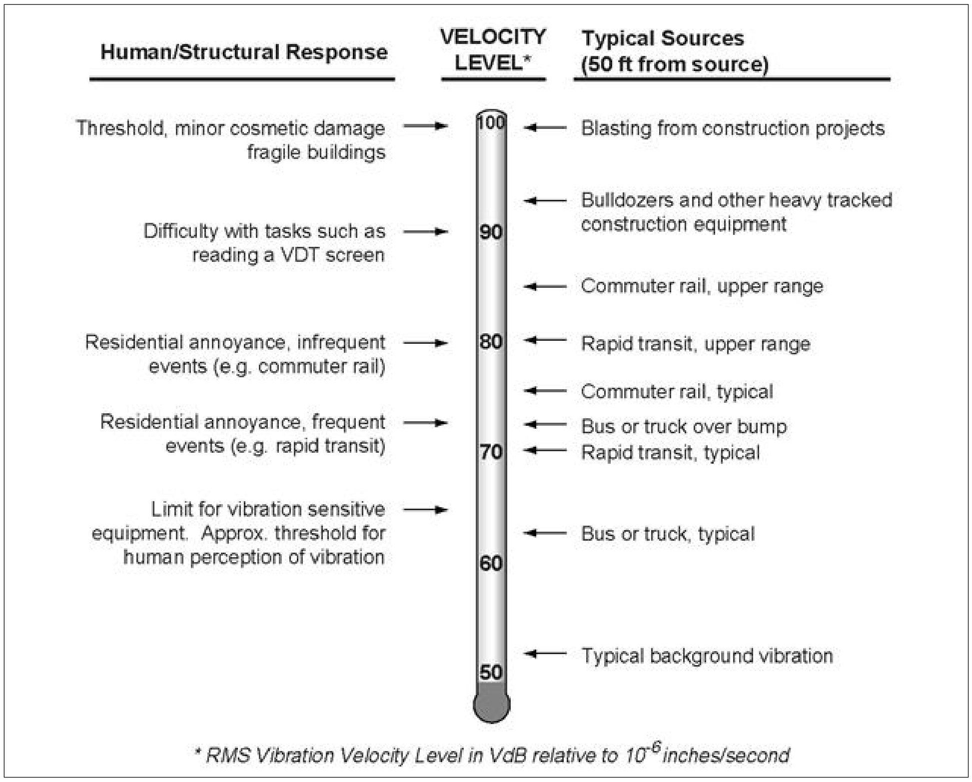
2.1.2 Human Perception of Vibration

Unlike noise, which travels in air, transit vibration typically travels along the surface of the ground. Depending on the geological properties of the surrounding terrain and the type of building structure exposed to transit vibration, vibration propagation can be more or less efficient. Buildings with a solid foundation set in bedrock are "coupled" more efficiently to the surrounding ground and experience relatively higher vibration levels than buildings located in sandier soil. Heavier buildings (such as masonry structures) are less susceptible to vibration than wood-frame buildings because they absorb more vibration energy.

Vibration induced by passing vehicles can generally be discussed in terms of displacement, velocity, or acceleration. However, human responses and responses by monitoring instruments and other objects are most accurately described with velocity. Therefore, the vibration velocity level is used to assess vibration impacts from transit projects.

To describe the human response to vibration, the average vibration amplitude (called the root mean square, or RMS, amplitude) is used to assess impacts. The RMS velocity level is expressed in inches per second (ips) or vibration velocity levels in decibels (VdB). All VdB vibration levels are referenced to one micro-inch per second (μips). Similar to noise decibels, vibration decibels are dimensionless because they are referenced to (i.e., divided by) a standard level (such as 1×10^{-6} ips in the United States). This convention allows compression of the scale over which vibration occurs, such as 40 to 100 VdB rather than 0.0001 ips to 0.1 ips. Typical RMS vibration levels from transit and other common sources are documented in FTA's guidance manual on *Transit Noise and Vibration Impact Assessment* (May 2006) and are shown in **Figure 3**.

Figure 3: Typical Ground-Borne Vibration Levels



2.2 Evaluation Criteria

2.2.1 Operational Noise Criteria

FTA's guidance manual, *Transit Noise and Vibration Impact Assessment* (May 2006), presents the basic concepts, methods, and procedures for evaluating the extent and severity of noise impacts from transit projects. Transit noise impacts are assessed based on land use categories and sensitivity to noise from transit sources under the FTA guidelines. As shown in **Figure 4**, the FTA noise impact criteria are defined by two curves that allow increasing project noise levels as existing noise increases up to a point, beyond which impact is determined based on project noise alone. FTA land use categories and required noise metrics are shown in **Table 1**.

Figure 4: FTA Project Noise Impact Criteria

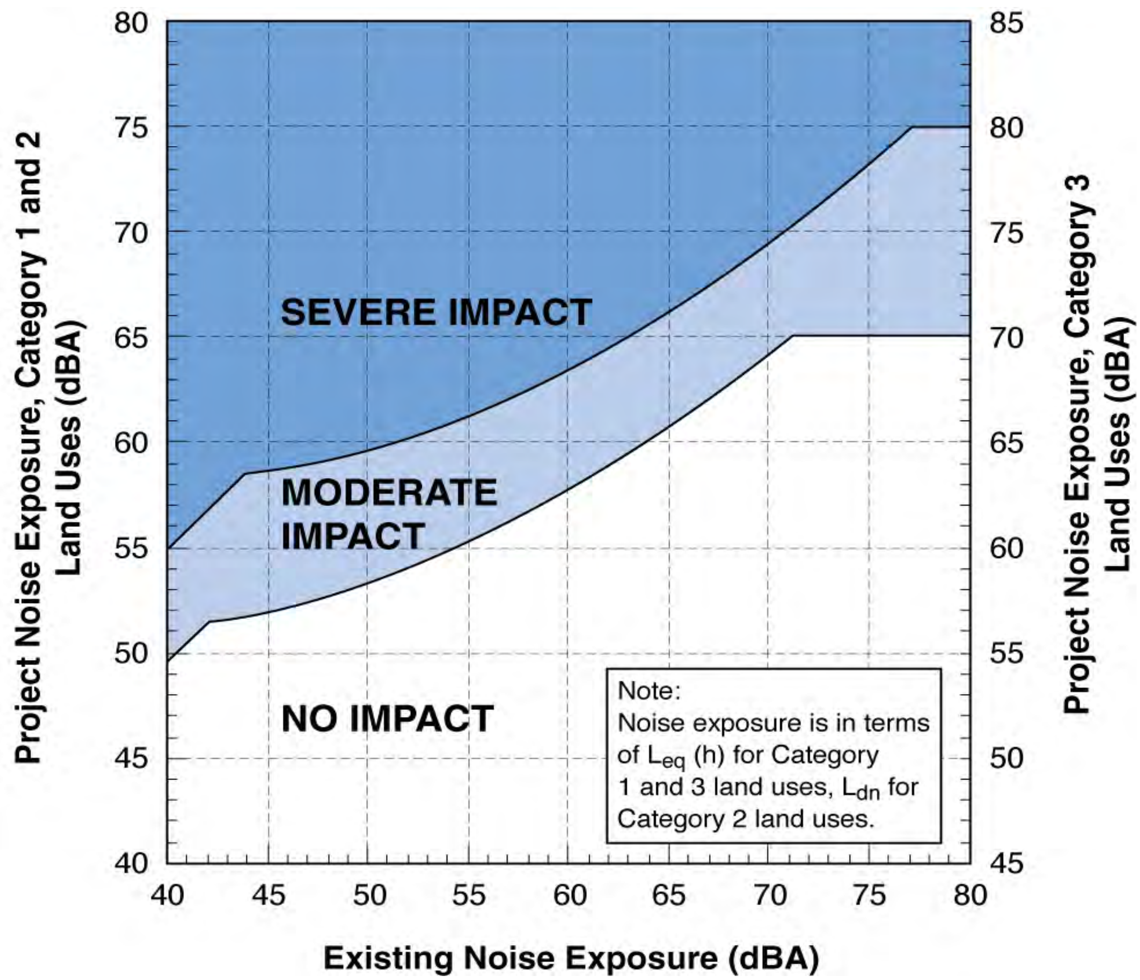


Table 1: FTA Land Use Categories and Noise Metrics

Land Use Category	Noise Metric	Description
1	L_{eq}(h)	Tracts of land set aside for serenity and quiet, such as outdoor amphitheaters, concert pavilions, and historic landmarks.
2	L_{dn}	Buildings used for sleeping such as residences, hospitals, hotels, and other areas where nighttime sensitivity to noise is of utmost importance.
3	L_{eq}(h)	Institutional land uses with primarily daytime and evening uses including schools, libraries, churches, museums, cemeteries, historic sites, and parks, and certain recreational facilities used for study or meditation.

SOURCE: *Transit Noise and Vibration Impact Assessment*, FTA, Washington, DC, May 2006.

FTA noise criteria are delineated into two categories: *moderate* and *severe* impacts. The *moderate* impact threshold defines areas where the change in noise is noticeable, but may not be sufficient to cause a strong, adverse community reaction. The *severe* impact threshold defines the noise limits above which a substantial percentage of the population would be highly annoyed by new noise. The level of impact at any specific site can be established by comparing the predicted future Project noise level to the existing noise level at the site.

As shown in **Table 1**, the average day-night noise level over a 24-hour period (or L_{dn}) is used to characterize noise exposure for residential areas (FTA Land Use Category 2). The L_{dn} descriptor describes a receiver's cumulative noise exposure from all events over a full 24 hours, with events between 10:00 p.m. and 7:00 a.m. increased by 10 decibels to account for greater nighttime sensitivity to noise. For other noise sensitive land uses, such as schools and libraries (FTA Land Use Category 3) and outdoor amphitheaters (FTA Land Use Category 1), the average hourly equivalent noise level (or $L_{eq}(h)$) is used to represent the facility's peak operating period.

2.2.2 Operational Vibration Criteria

FTA vibration criteria for evaluating ground-borne vibration impacts from train passbys at nearby sensitive receptors are shown in **Table 2**. These vibration criteria are related to ground-borne vibration levels that are expected to result in human annoyance, and are based on RMS velocity levels expressed in VdB referenced to one micro inch per second (μips). FTA's experience with community response to ground-borne vibration indicates that when there are only a few train events per day, it would take higher vibration levels to evoke the same community response that would be expected from more frequent events. This is taken into account in the FTA criteria by distinguishing between projects with frequent, occasional, and infrequent events, where the frequent events category is defined as more than 70 events per day. Similarly, the occasional events category is defined as between 30 and 70 events per day while the infrequent events category is defined as less than 30 events per day. To be conservative, the FTA frequent criteria were used to assess ground-borne vibration impacts along the Project study area.

The vibration criteria levels shown in **Table 2** are defined in terms of human annoyance for different land use categories such as high sensitivity (Category 1), residential (Category 2), and institutional (Category 3). In general, the vibration threshold of human perceptibility is approximately 65 VdB.

Table 2: Ground-Borne RMS Vibration Impact Criteria for Annoyance during Operations and Construction (VdB)

Receptor Land Use		RMS Vibration Levels (VdB)			Ground-borne Noise Levels (dBA)		
Category	**Description**	**Frequent Events**	**Occasional Events**	**Infrequent Events**	**Frequent Events**	**Occasional Events**	**Infrequent Events**
1	Buildings where low vibration is essential for interior operations	65	65	65	N/A	N/A	N/A
2	Residences and buildings where people normally sleep	72	75	80	35	38	43
3	Daytime institutional and office use	75	78	83	40	43	48
Specific Buildings	TV/Recording Studios/Concert Halls	65	65	65	25	25	25
	Auditoriums	72	80	80	30	38	38
	Theaters	72	80	80	35	43	43

SOURCE: *Transit Noise and Vibration Impact Assessment*, FTA, Washington, DC, May 2006.

For at-grade (i.e., at ground level) or above-grade (i.e., elevated above ground) transit systems, the FTA ground-borne noise criteria are typically not applied, except for buildings that have sensitive interior spaces and that are well insulated from exterior noise. In general, airborne noise often masks ground-borne noise for above ground transit systems.

2.3 Assessment Methodology

Noise impacts were evaluated using the FTA's "Detailed Assessment" guidelines to more accurately reflect the type of input data available. However, noise impacts from stationary sources (such as the maintenance facility) were evaluated using the FTA's "General Assessment" guidelines to reflect a single large stationary source (FTA 2006). Similarly, although baseline vibration measurements were not conducted, operational vibration impacts were evaluated using the FTA's "General Assessment" guidelines to reflect average or typical ground conditions. A detailed and refined vibration monitoring program may be necessary during later stages of design to verify (or dismiss) any impacts that were predicted using the default FTA guidelines.

In general, when exceedances of the Project impact criteria are predicted, mitigation measures are identified and evaluated qualitatively to determine whether they are both "feasible" (able to provide adequate noise reduction benefits) and "reasonable" (mitigation is cost-effective based on the benefit provided).

Additionally, since the proposed streetcar service's greatest impact would likely occur during nighttime at residences and during the peak traffic hours at non-residential receptors, two sets of impact assessment criteria were used. FTA evaluation criteria were used to assess 24-hour impacts at residences and hotels during the most sensitive nighttime period when people are sleeping and daytime peak-hour impacts at institutional receptors such as at churches, schools, historic sites, etc.

2.3.1 H Street Streetcar Project Assumptions

Since the Project would extend streetcar transit service east of downtown Washington, noise from the Build Alternative was evaluated using the FTA prediction procedures and modeling assumptions from the original H Street streetcar study. The H Street Study included vibration measurements to develop a ground-propagation model, which was used to assess project impacts as a comparison to the default FTA ground-surface vibration curves.

2.3.2 Existing Conditions

To determine the existing background noise levels at sensitive receptors near the proposed Project, a noise-monitoring program was conducted at two representative locations shown in **Figure 5**. Noise levels were measured from April 9 to April 10, 2014 during various periods of the day in accordance with FTA guidelines to determine the average ambient conditions on a typical weekday.

The noise measurements documented existing noise sources along the Project study area, including traffic along Benning Road, Anacostia Freeway (Route 295), other major cross streets and Metro Orange, Silver and Blue Line train operations. The 24-hour day-night noise level (or L_{dn}) is used to describe existing noise at residences and other FTA Category 2 land uses. Similarly, peak-hour equivalent noise levels (L_{eq}) are reported for non-residential or institutional receptors such as schools, libraries or churches. All noise levels are reported in A-weighted noise levels (or dBA) for comparison with the FTA criteria.

2.3.3 Noise Modeling Assumptions

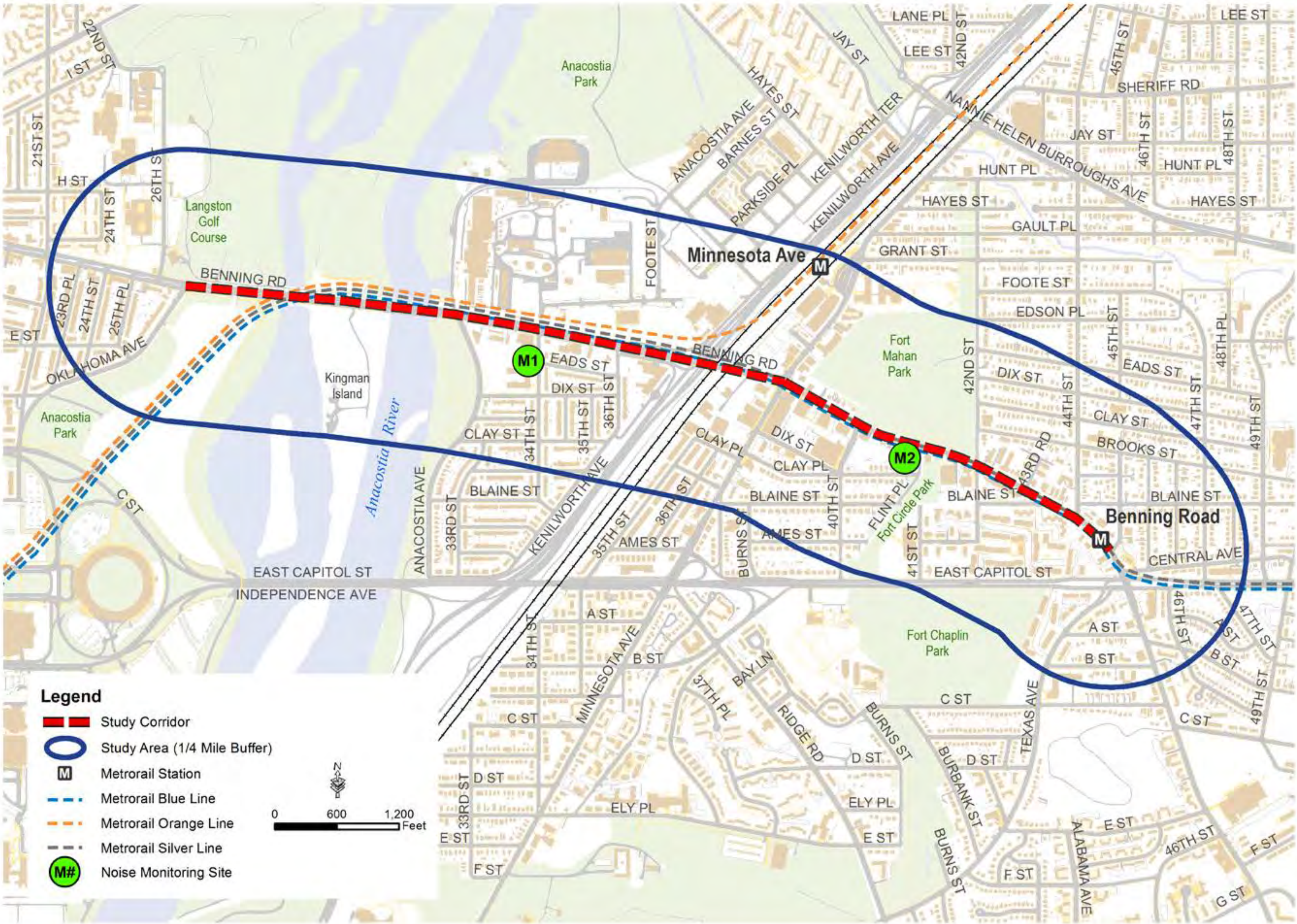
The various noise modeling assumptions, noise levels for each of the proposed noise sources (including train passbys, warning bells, etc.), and other operating characteristics (such as average dwell times, source heights, etc.) are described below. These data are based on default FTA data, as well as information included in the *Benning Road Operations Plan Report* (2014). Streetcar operations data are summarized in **Table 3** for various peak and off-peak periods of the day. This service frequency is representative of a typical weekday, which includes an operating period between 5:00 a.m. and 12:00 a.m. The service frequency was used to predict future noise levels under the Build Alternative.

Table 3: Streetcar Operating Characteristics under Build Alternative

Time Period	Hours of Operation	Headways / Frequency of Service (minutes) (1)	Number of Vehicles
AM Off-Peak	5:00 a.m. - 7:00 a.m.	10	1
Daytime Peak	7:00 a.m. - 7:00 p.m.	10	1
PM Off-Peak	7:00 p.m. - 9:00 p.m.	10	1
Evening	9:00 p.m. - 12:00 a.m.	10	1

Source: AECOM, September 2014.

Figure 5: Noise Monitoring Locations



Noise modeling assumptions for this analysis included the following:

- Total daily operations were determined based on 10-minute headways for all periods of the day, including both peak and off-peak periods, daytime and nighttime. This service frequency was used to predict future noise levels under the Build Alternative.
- A one-vehicle streetcar train was assumed for all periods of the day and night including peak and off-peak periods. Based on information reported in the *Noise and Vibration Technical Report for H Street/Benning Road Streetcar Project* (April 2013), the project-specific source noise level of 79 dBA sound exposure level (SEL) (75 dBA L_{max}) was assumed for all streetcar passbys (50 feet and 25 mph). The Project is consistent with what was done previously by using the same reference noise and vibration level.
- The streetcar reference noise was adjusted for receptor distances only as the H Street reference levels already account for the maximum speed of 25 miles per hour (mph) and embedded track. For a conservative or worst-case estimate, no adjustments were applied for ground attenuation effects (i.e., assume acoustically hard ground).
- At each of the designated station stops, an FTA default source noise level of 70 dBA L_{max} was assumed for all streetcar events, with an average idling time of 30 seconds to account for the noise contribution from stationary or auxiliary vehicle noise (such as rooftop mechanical equipment).
- Although train operating speeds are expected to vary by location depending on traffic congestion, a maximum speed of 25 mph was applied to the entire corridor to be consistent with the speed limitations established by the H Street study.
- Since the streetcar is proposed for operations in mostly mixed-traffic, dedicated signal phases are proposed at some intersections where the rail vehicles must cross active roadways. As a result of the proposed protected streetcar signal phases at intersections, on-board warning devices or bells would only be sounded as part of DDOT's standard operating procedures if the streetcar starts from a complete stop at a red signal. Similarly, streetcar warning bells would also be sounded upon arriving at and departing from stations.
- On-board warning horns would only be used during emergency situations and were not considered as part of this analysis because they would not occur as part of standard operating procedures.
- Several track switches were identified along the proposed Project alignment particularly at junctions and crossovers at the tail ends of the proposed Project alignment. As a result, potential impacts due to track switches and other special track work were also evaluated as part of this analysis. Streetcar noise levels were adjusted by 6 dBA to account for all proposed crossovers and frogs.
- Streetcars are designed to operate in tight urban environments without wheel squeal along tight-radius curves. To be consistent with the original H Street report, wheel squeal could occur at curves with a radius less than 400 feet. Therefore, an adjustment of 10 dBA was applied to the streetcar noise levels to account for wheel squeal at the western-most end of the corridor at Sta. No. 10+00 and 12+00. Wheel squeal impacts at the 26th Street track curve leading to the Car Barn were evaluated based on streetcar operations equal to ten percent of the total daily operations. This value is a reasonable estimate to reflect the limited level of activity accessing or egressing the Car Barn.
- Although traction power substations (TPSS) may be utilized along the Project alignment as indicated in the original H Street study, the noise impact from these units is expected to comply

with the DDOT limit of 50 dBA at 50 feet. As a result, noise from TPSS was not evaluated as part of this assessment because there is no potential for impact given the high ambient background measured in the Project study area.

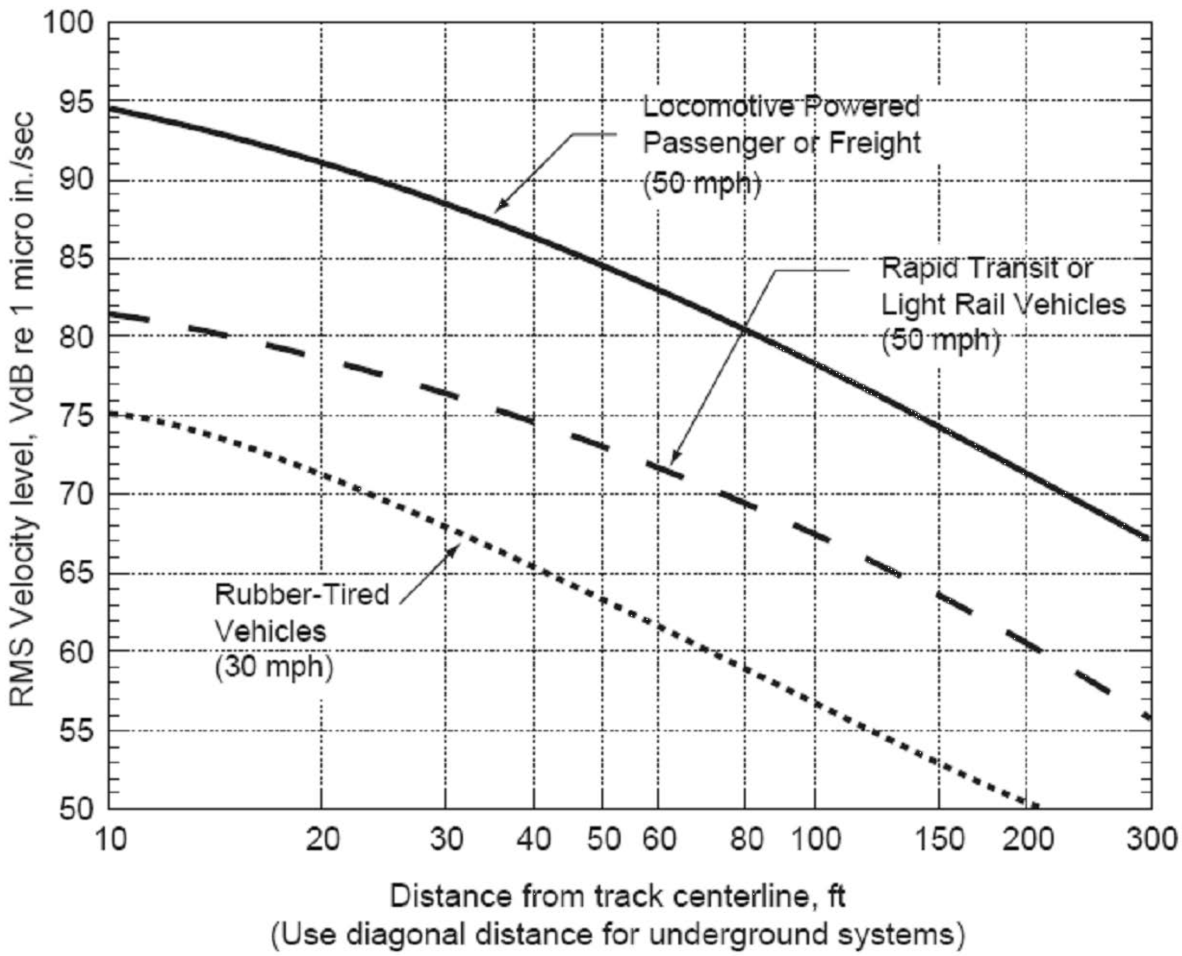
- Noise from existing buses at proposed streetcar stops was included as part of the baseline noise monitoring (i.e., existing conditions). Therefore, existing bus noise was not included as a separate and additional source of noise as part of this Project because they currently operate along the Project study area and would continue to do so with only minor modifications. As a result, no new noise is proposed as a result of existing bus operations.
- Impacts due to the proposed maintenance facility were evaluated as part of the original H Street study. No additional maintenance facility is proposed along the Project.

2.3.4 Vibration Modeling Assumptions

Future ground-borne vibration levels from streetcar passbys were predicted using the default ground surface vibration curves in FTA's guidance manual on *Transit Noise and Vibration Impact Assessment* (May 2006) and are shown in **Figure 6**. These curves were adjusted to reflect local conditions (where applicable) such as changes in train speed, special track work such as switches, and different receptor building construction types (for example, masonry versus timber).

Future ground-borne vibration levels from streetcar passbys were also predicted using the measured data reported in the original H Street report. Specifically, maximum vibration levels from Sites V-3 and V-4 of the H Street study were used to compare with the default FTA ground-surface curves.

Figure 6: FTA Generalized Ground Surface Vibration Curves



3.0 Affected Environment

A noise and vibration monitoring program was conducted to document existing conditions at sensitive receptors along the Project study area.

3.1 Noise

As summarized below in **Table 4**, the measured day-night noise levels along the Project study area ranges from 64-65 dBA in the vicinity of Receptor M1 (residences adjacent to the River Terrace Elementary School along 34th Street NE) and 65-73 dBA at Receptor M2 (residences along Benning Road opposite Fort Mahan). In general, the measured noise levels are representative of heavy traffic along downtown urban streets.

Table 4: Baseline Noise Monitoring Results (in dBA)

ID[1]	Receptor Description	FTA Land Use Category	L_{eq}	L_{dn}
M1	River Terrace Elementary School, 34th Street NE	3	66 - 67	64 - 65
M2	Residences, Benning Road at 41st Street opposite Fort Mahan Park	2	67 - 75	65 - 73

Source: AECOM, October 2014.

[1]See Figure 5 for noise monitoring locations.

Similarly, peak-hour noise levels at institutional receptors along the Project study area, including Receptor M1 (River Terrace Elementary School along 34th Street NE), range from 66-67 dBA, which are representative of active downtown urban land uses.

The sound-level meters that were used to measure current noise conditions (Brüel & Kjær Model 2236 and Larson Davis Model 820) meet or exceed the American National Standards Institute (ANSI) standards for Type I accuracy and quality. The sound-level meters were calibrated using a Brüel & Kjær Model 4231 before and after each measurement. All measurements were conducted according to *ANSI Standard S1.13-2005, Measurement of Sound Pressure Levels in Air* (March 5, 2010). All noise levels are reported in dBA, which best approximates the sensitivity of human hearing.

3.2 Vibration

Existing vibration along the Project study area is currently affected by vehicular roadway traffic, particularly cars, trucks, and buses. If exceedances of the FTA impact criteria are predicted using worst-case or conservative estimates, a detailed vibration monitoring program is recommended to document the actual ground propagation characteristics in the vicinity of the predicted impacts. A detailed vibration monitoring program is typically conducted during final design before 30 percent submittals are prepared.

4.0 Environmental Consequences

This section evaluates potential operational impacts, temporary construction impacts, and indirect and cumulative effects due to noise and vibration.

4.1 No Build Alternative

4.1.1 Noise

Future noise levels under the No Build Alternative are anticipated to be similar to those under existing conditions. The Project study area is characterized by urban communities that include major highways such as Anacostia Freeway (DC-295) and arterials such as Benning Road and Minnesota Avenue. Irrespective of other projects in the CLRP, ambient noise under the No Build Alternative is anticipated to be essentially the same as under existing condition without either of the Build Alternatives. For example, to increase noise levels by 3 dBA, the threshold where most listeners detect changes requires a doubling of the traffic volumes. However, only marginal increases in traffic levels are predicted in the Project study area between now and 2035, resulting in slightly higher congestion and lower average travel speeds. Therefore, no noise impacts are expected under the No Build Alternative.

4.1.2 Vibration

Future vibration levels under the No Build Alternative are expected to be similar to those currently experienced under existing conditions. Traffic, including heavy trucks and buses, rarely creates perceptible ground-borne vibration unless vehicles are operating very close to buildings or there are irregularities in the road, such as potholes or expansion joints. The pneumatic tires and suspension systems of automobiles, trucks, and buses eliminate most ground-borne vibration. No vibration impacts associated with the No Build Alternative are expected since no Project elements would be built.

4.2 Build Alternative 1

4.2.1 Noise

Since many of the noise-sensitive sites for this Project are residences and apartments, the L_{dn} descriptor was used to reflect the particularly heightened sensitivity to nighttime noise. Predicted noise levels under Build Alternative 1 are shown in **Table 5**. The table compares the existing noise levels of representative receptor locations to the noise levels predicted for Build Alternative 1. The L_{dn} day-night noise levels at residences along the proposed Build Alternative 1 alignment are predicted to range from 53 dBA at Receptor M1 (residences along 34th Street) to 59 dBA at Receptor M2 (residences along Benning Road). Neither of these noise levels is predicted to exceed the FTA impact criteria.

Table 5: Predicted Noise Levels at Select Receptors for Build Alternative 1 (dBA)

ID	Receptor Description	FTA Cat.	Noise		FTA Criteria		
			Existing	Build	*Moderate*	*Severe*	Impact
M1	Residences adjacent to the River Terrace Elementary School, 34th Street	3	65	53	61	66	No
M2	Residences, Benning Road at 41st Street opposite Fort Mahan Park	2	71	59	65	70	No

Source: AECOM, October 2014.

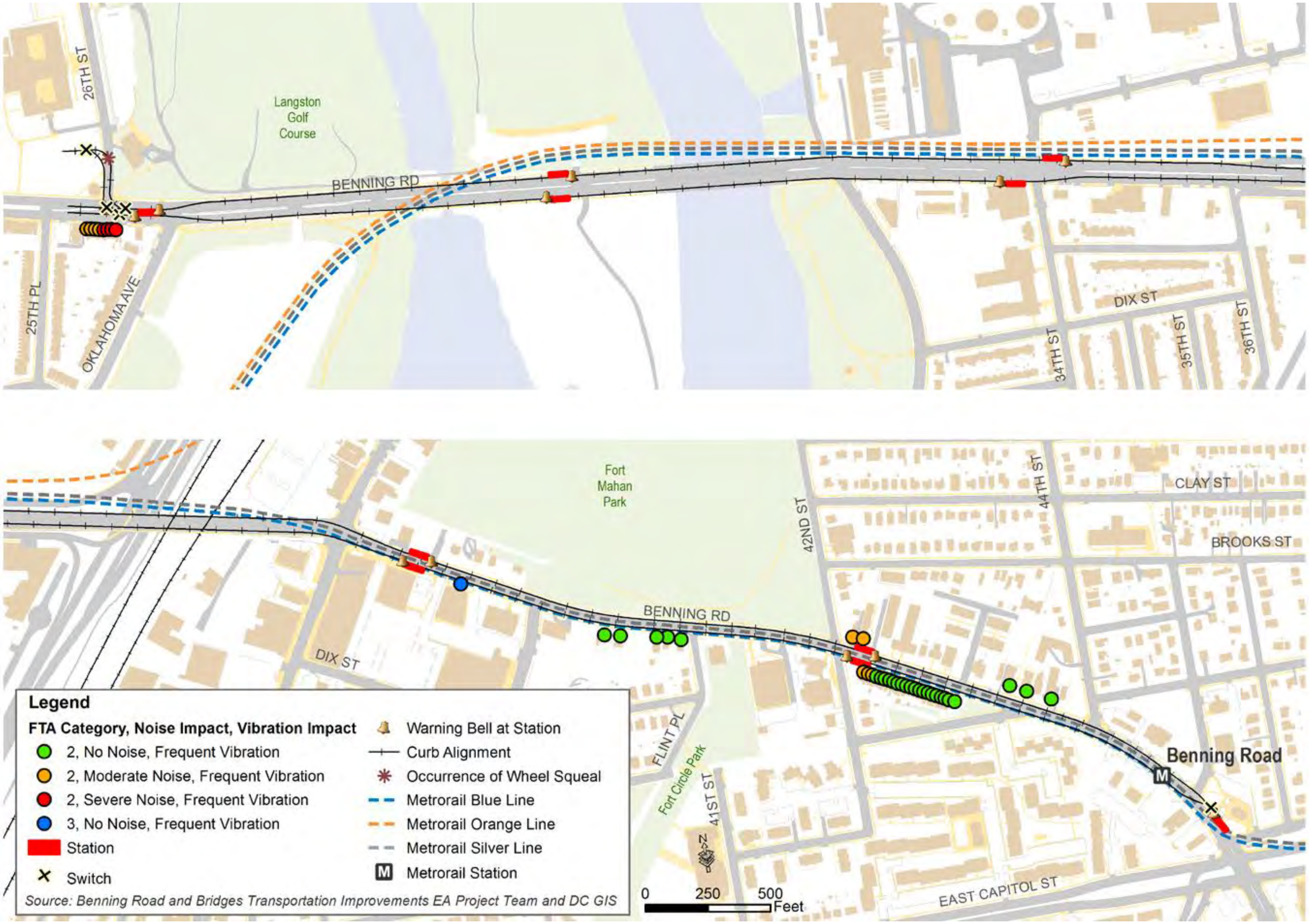
As shown in **Table 6**, corridor wide, however, exceedances of the FTA *severe* impact criteria are predicted at four residences (or FTA Category 2 land uses) in the vicinity of the track switches at the curve for the 26th Street Car Barn. Additionally, exceedances of the FTA *moderate* impact criteria are also predicted at nine other residences under Build Alternative 1 (four at the 26th Street Car Barn switches and five near the 42nd Street station due to rail transit idling). No exceedances of the FTA noise impact criteria are predicted at any Category 1 or 3 land uses. The predicted noise impacts for receptors along the Build Alternative 1 alignment are shown in **Figure 7**.

Table 6: Total Number of Noise and Vibration Impacts Predicted Build Alternative 1

Metric	Noise Impacts			Vibration Impacts	
Cat.	No Impact	*Moderate*	*Severe*	Per H St Report	Per Default FTA
1	0	0	0	0	0
2	164	9	4	40	6
3	12	0	0	1	0

Source: AECOM, June 2015.

Figure 7: Build Alternative 1 Noise and Vibration Modeling Results



4.2.2 Vibration

Significant vibration impacts due to streetcar passbys are unlikely due to the slow travel speeds expected along the in-street running rail corridor. Streetcars are generally lighter than typical light rail transit vehicles for which the FTA has developed reference ground-surface vibration curves. Vibration impacts resulting from steel wheel on steel rail interactions were evaluated using maximum corridor speeds of 25 mph. Although conservative modeling assessment were applied, only six exceedances of the FTA vibration "annoyance" impact criteria for *frequent* events were predicted at any residences or other FTA Category 2 land uses using the FTA default ground-surface curves. However, exceedances of the FTA impact criteria are predicted using the measured data reported in the 2009 H Street report.

As shown in **Table 7**, the maximum vibration levels using the H Street study information along the proposed Build Alternative 1 are predicted to range from 58 VdB at Receptor M1 (residences along 34th Street) to 75 VdB at Receptor M2 (residences along Benning Road). The default FTA ground-surface vibration levels are predicted to range from 67 VdB at Receptor M2 to 68 VdB at Receptor M1. The Project vibration level at Receptor M2 is predicted to exceed the FTA impact criterion of 72 VdB using the H Street study data.

Table 7: Predicted Vibration Levels at Select Receptors for Build Alternative 1 (VdB)

ID	Receptor Description	FTA Cat.	Build Alternative		FTA Criteria	
			H St Report	Default FTA	*Frequent*	Impact
M1	Residences adjacent to the River Terrace Elementary School, 34th Street	2	58	68	72	No
M2	Residences, Benning Road at 41st Street opposite Fort Mahan Park	2	75	67	72	Yes (H St)

Source: AECOM, October 2014.

As shown in **Table 6**, corridor wide exceedances of the FTA *frequent* impact criterion of 72 VdB are predicted at 40 residences (or Category 2 land uses) along Benning Road less than 50 feet from the proposed Curb Alignment. Similarly, only one exceedance of the FTA impact criterion of 75 VdB is predicted at an institutional receptor (Dorothy I. Height/Benning Neighborhood Library). No exceedances of the FTA vibration impact criteria are predicted at any Category 1 land use under Build Alternative 1. The predicted vibration impacts for Build Alternative 1 are shown graphically in **Figure 7**.

4.3 Build Alternative 2

4.3.1 Noise

Since many of the noise-sensitive sites for this Project are residences and apartments, the L_{dn} descriptor was used to reflect the particularly heightened sensitivity to nighttime noise. Predicted noise levels for Build Alternative 2 are shown in **Table 8**. The table provides noise levels for representative receptor locations along the proposed Build Alternative 2 alignment in comparison to existing conditions. The L_{dn} day-night noise levels at residences for Build Alternative 2 are predicted to range from 53 dBA at Receptor M1 (residences along 34th Street) to 58 dBA at Receptor M2 (residences along Benning Road). Neither of these noise levels is predicted to exceed the FTA impact criteria.

Table 8: Predicted Noise Levels at Select Receptors for Build Alternative 2 (dBA)

ID	Receptor Description	FTA Cat.	Noise		FTA Criteria		
			Existing	Build	*Moderate*	*Severe*	Impact
M1	Residences adjacent to the River Terrace Elementary School, 34th Street	3	65	53	61	66	No
M2	Residences, Benning Road at 41st Street opposite Fort Mahan Park	2	71	58	65	70	No

Source: AECOM, June 2015.

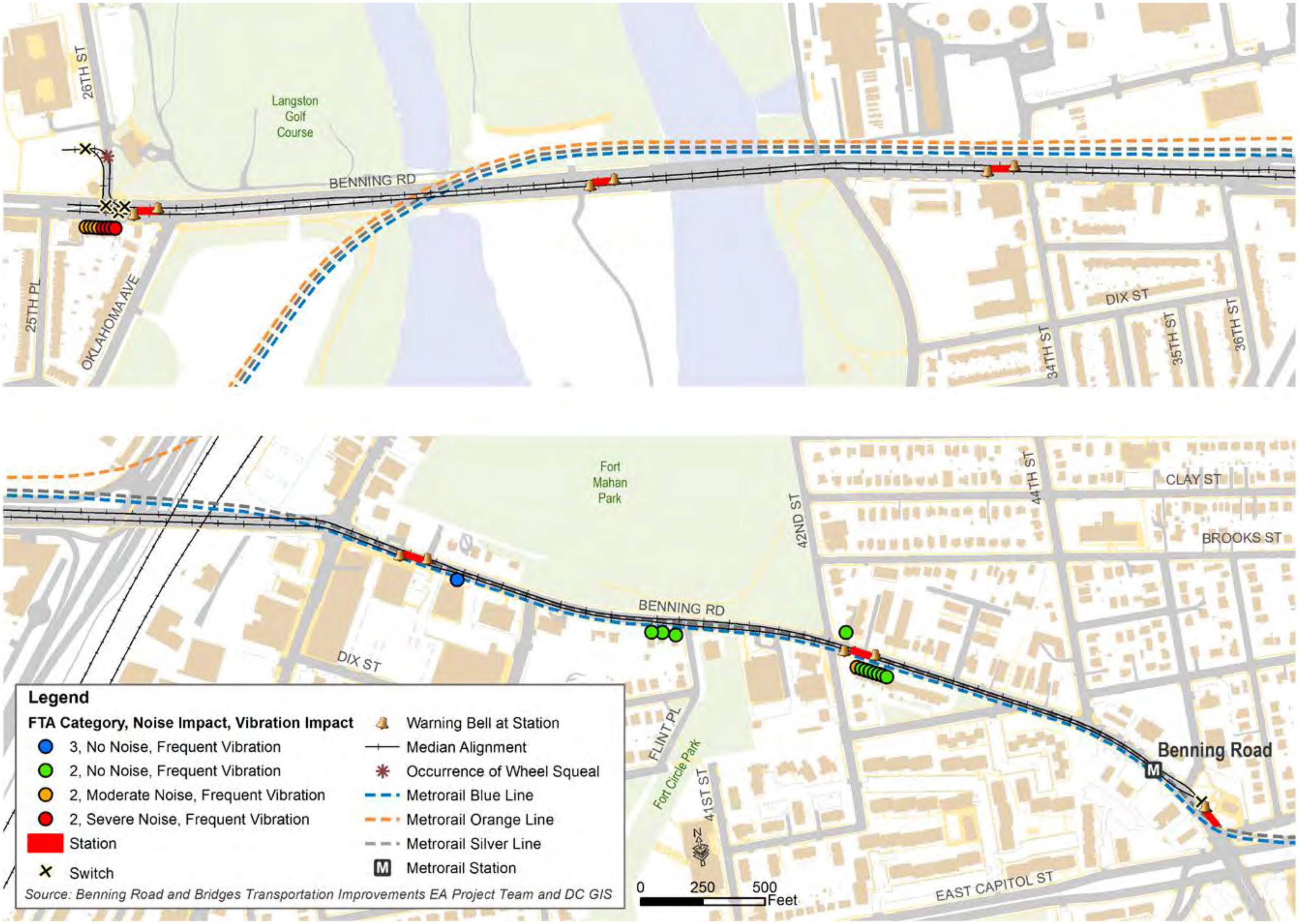
As shown in **Table 9**, corridor wide exceedances of the FTA *severe* noise impact criteria are predicted at four residences (or FTA Category 2 land uses) in the vicinity of the track switches at the curve for the 26th Street Car Barn. Additionally, exceedances of the FTA *moderate* impact criteria are also predicted at five other residences under Build Alternative 2 (four at the 26th Street Car Barn switches and one near the 42nd Street station due to rail transit idling). No exceedances of the FTA noise impact criteria are predicted at any Category 1 or 3 land uses under Build Alternative 2. The predicted noise impacts for Build Alternative 2 are shown graphically in **Figure 8**.

Table 9: Total Number of Noise and Vibration Impacts Predicted for Build Alternative 2

Metric	Noise Impacts			Vibration Impacts	
Cat.	*No Impact*	*Moderate*	*Severe*	*Per H St Report*	*Per Default FTA*
1	0	0	0	0	0
2	168	5	4	20	6
3	12	0	0	1	0

Source: AECOM, October 2014.

Figure 8: Build Alternative 2 Noise and Vibration Modeling Results



4.3.2 Vibration

Significant vibration impacts due to streetcar passbys are unlikely due to the slow travel speeds expected along the in-street running rail corridor. Streetcars are generally lighter than typical light rail transit vehicles for which the FTA has developed reference ground-surface vibration curves. Vibration impacts from streetcars due to steel wheel on steel rail interactions were evaluated using maximum corridor speeds of 25 mph. Although conservative modeling assessment were applied, only six exceedances of the FTA vibration "annoyance" impact criteria for *frequent* events were predicted at any residences or other FTA Category 2 land uses using the FTA default ground-surface curves. However, exceedances of the FTA impact criteria are predicted using the measured data reported in the 2009 H Street report. Although the data from the H Street report reflect measured vibration levels collected at sites outside the project area, the ground propagation relationships established by these measurements may be used as a reasonable estimate of the future vibration levels expected in the current project area.

As shown in **Table 10**, the maximum vibration levels using the H Street study information along Build Alternative 2 are predicted to range from 57 VdB at Receptor M1 (residences along 34th Street) to 72 VdB at Receptor M2 (residences along Benning Road). The default FTA ground-surface vibration levels are predicted to range from 67 VdB at Receptor M2 to 68 VdB at Receptor M1. The Project vibration level at Receptor M2 is predicted to exceed the FTA impact criterion of 72 VdB using the H Street study data.

Table 10: Predicted Vibration Levels at Select Receptors for Build Alternative 2 (VdB)

ID	Receptor Description	FTA Cat.	Build Alternative		FTA Criteria	
			H St Report	Default FTA	*Frequent*	Impact
M1	Residences adjacent to the River Terrace Elementary School, 34th Street	2	57	68	72	No
M2	Residences, Benning Road at 41st Street opposite Fort Mahan Park	2	72	67	72	Yes (H St)

Source: AECOM, October 2014.

As shown in **Table 9**, corridor wide exceedances of the FTA *frequent* impact criterion of 72 VdB are predicted at 20 residences (Category 2 land uses) along Benning Road less than 50 feet from the proposed alignment. Similarly, only one exceedance of the FTA impact criterion of 75 VdB is predicted at an institutional receptor (Dorothy I. Height/Benning Neighborhood Library). No exceedances of the FTA vibration impact criteria are predicted for any Category 1 land uses. The predicted vibration impacts for Build Alternative 2 are shown graphically in **Figure 8**.

4.4 Construction Impacts

Noise levels from construction activities, although temporary, could be a nuisance at nearby sensitive receptors such as residences, hotels, and schools. Noise levels during construction would vary depending on the types of construction activity and equipment used for each stage of work. Heavy machinery, the major source of noise in construction, would be constantly moving and not usually at one location for very long. For example, Project construction activities would include embedding track, rehabilitating bridges, relocating utilities, reconstructing street intersections, constructing stations stops, and other ancillary facilities (i.e., overhead contact system [OCS] poles, TPSS, etc.).

Activities associated with construction staging and/or material lay down areas could result in adverse noise impacts if located in noise-sensitive areas. For that reason, noise-sensitive areas should be avoided to the maximum extent possible. Similarly, there would also be the potential for noise increases along detour routes and truck haul routes.

This analysis makes conservative assumptions regarding construction noise and vibration in order to ensure that potential maximum adverse impacts are analyzed and disclosed consistent with NEPA requirements. However, temporary noise and vibration impacts associated with construction would be refined in later stages of Project design when a detailed construction plan is more fully developed.

The bulk of the construction would normally occur during daylight hours when some residents are not at home, when residents who are at home are less sensitive to construction activities, and when other community noise sources contribute to higher ambient noise levels. However, some construction activities may also occur during the nighttime and on weekends to complete the Project sooner and reduce the overall duration of impact on the community.

Most construction activities are generally expected to last less than 6 months at any one location, depending on the type of activity, and the overall Project construction period is expected to last a couple of years. During this timeframe, noise impacts are expected along the Project, particularly at sensitive receptors adjacent to the alignment and facilities. Therefore, DDOT is committed to minimizing impacts in the community by requiring construction contractors to implement appropriate noise control measures that would eliminate impacts and minimize extended disruption of normal activities.

4.5 Indirect and Cumulative Effects

Noise levels within the study area would be somewhat increased by the presence of the Project due to the operation of transit vehicles. Any other planned projects in the study area would also increase noise because they would more than likely result in increased travel and construction activities. However, no exceedances of the FTA's *severe* noise criteria are predicted using worst-case modeling assumptions. Since the Project would provide an alternative source of transportation for many other planned projects as well as to other destinations in the area, the Project should reduce the numbers of auto trips and the noise levels associated with those foregone auto trips. Therefore, the Benning Road and Bridges Transportation Improvements project would not contribute to adverse cumulative impacts and may provide a beneficial overall effect.

5.0 Mitigation

5.1 Operations

Since operational noise and vibration impacts are predicted under both Build Alternatives, an evaluation of potential mitigation measures is required. However, before any noise or vibration control measures are committed to, additional evaluations are recommended to verify or dismiss the predicted impacts. For example, vibration measurements could be conducted along the recently constructed initial operating segment specifically at track switches to document the actual levels. This empirically collected data could then be used to validate the current FTA prediction model to verify or dismiss the predicted impacts.

Noise impacts due to track switches may be eliminated or reduced in severity by installing "spring frogs", pointless switches or other controls (such as a "well-designed flange-bearing frog" as recommended in the H Street study) that would eliminate the gap in the rail and thereby the impulsive or impact noise from the steel wheel striking the rail gap. These control measures would reduce noise levels due to this source approximately 6 dBA.

Noise impacts due to potential wheel squeal may be eliminated or reduced in severity by increasing the radius of the track curves, applying slip-stick modifiers to "grease" the contact points between the steel wheels and the steel rail heads or to procure streetcar vehicles that can operate effectively along tracks with radii less than 100 feet without causing wheel squeal to occur. These control measures would reduce noise levels due to this source approximately 10 dBA.

Vibration impacts due to streetcar passbys may be eliminated by applying slower train speeds (e.g., less than 25 mph) particularly in the vicinity of residences less than 50 feet from the proposed track alignment. Other vibration control measures include ballast mats (or other resilient material that would "decouple" the embedded track from the underlying track bed) as well as the aforementioned noise control measures at switches (e.g., installation of spring frogs, pointless switches, and flange-bearing frogs). These control measures would reduce vibration levels due to this source approximately 10 VdB.

Noise impacts due to rail transit idling at stations may be eliminated or reduced in severity by integrating noise barriers or shrouds into the station structure. Alternative measures where source controls are not practical or feasible include wayside treatments such as residential sound insulation, including acoustical windows and doors. These control measures would reduce noise levels due to this source approximately 7-10 dBA.

5.2 Construction

In accordance with DDOT's project goals to minimize impacts in the community, the selected construction contractor is encouraged to use Best Management Practices (BMPs) to ensure construction-related noise levels do not exceed the District of Columbia's *Noise Control Act* (DC Municipal Regulations, Chapter 20-27). The District of Columbia's Noise Control Act limits construction noise to 80 dBA at any sensitive receptor during the daytime and evening period from 7:00 am to 7:00 pm and 55 dBA at residences during the nighttime period from 9:00 pm to 7:00 am.

Consistency with the goals of the local ordinances and implementation of BMP would ensure that noise and vibration levels associated with construction of the project would not result in a significant adverse impact to sensitive land uses as classified by the FTA (e.g., residences, hospitals, hotels and schools).

Typical types of BMPs the selected contractor would use, as needed, to be consistent with the goals of the applicable local ordinances include, but are not limited to, the following:

- Submit noise and vibration control plans to demonstrate that each new phase of work would comply with the local noise criteria;
- Placement of temporary noise barriers around the construction site;
- Placement of localized barriers around specific items of equipment or smaller areas;
- Use of alternative back-up alarms/warning procedures;
- Higher performance mufflers on equipment used during nighttime hours; and
- Portable noise sheds for smaller, noisy, equipment, such as air compressors, dewatering pumps and generators.

BMPs for vibration include the following control measures:

- Less vibration-intensive construction equipment or techniques shall be used near vibration sensitive locations.
- Heavily laden vehicles shall be routed away from vibration-sensitive locations.
- Earthmoving equipment shall be operated as far as possible from vibration sensitive locations.
- Construction activities that produce vibration, such as demolition, excavation, earthmoving, and ground impacting shall be sequenced so that the vibration sources do not operate simultaneously.
- Devices with the least impact shall be used to accomplish necessary tasks.

All mitigation measures would be confirmed during later stages of design when the details of the Project construction activities are developed and finalized as part of the construction bid contracts.

6.0 References

ANSI. American National Standard S12.9-1992/Part 2. *Quantities and Procedures for Description and Measurement of Environmental Sound*. Part 2: Measurement of Long-term, Wide-Area Sound. Standards Secretariat, Acoustical Society of America, New York, NY.

ANSI. American National Standard S12.9-1993/Part 3. *Quantities and Procedures for Description and Measurement of Environmental Sound*. Part 3: Short-Term Measurements with an Observer Present. Standards Secretariat, Acoustical Society of America, New York, NY.

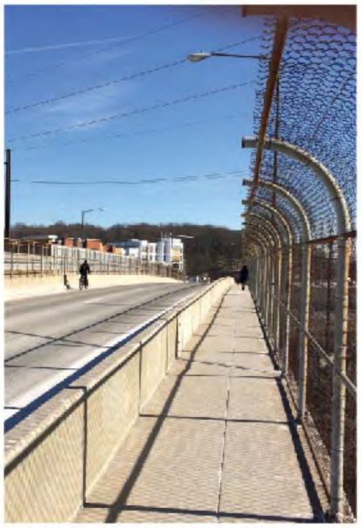
U.S. Department of Transportation, Federal Transit Administration (FTA). 2006. FTA-VA-90-1003-06. *Transit Noise and Vibration Impact Assessment*. Office of Planning and Environment. Washington, DC.

U.S. Department of Transportation, Federal Railroad Administration (FRA). 2006. 49 CFR 222 and 229. *Use of Locomotive Horns at Highway-Rail Grade Crossings; Final Rule*. August 17, 2006. Washington, DC.

BENNING ROAD & BRIDGES TRANSPORTATION IMPROVEMENTS

AIR QUALITY TECHNICAL MEMORANDUM

DRAFT MAY 2016



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EXECUTIVE SUMMARY

An air quality analysis was conducted to evaluate the potential for impact as a result of the Benning Road and Bridges Transportation Improvements project (the "Project"). This analysis was conducted in accordance with the guidelines established by the Environmental Protection Agency (EPA) and District Department of Transportation (DDOT). The EPA is the federal agency that develops and enforces the regulations that help govern air quality on a national level and provides guidance at the state level. Air quality impacts are typically evaluated against the National Ambient Air Quality Standards (NAAQS), which were established as part of the 1970 federal Clean Air Act (CAA) to protect the public health.

In accordance with EPA and DDOT guidance under the CAA transportation conformity rule, an air quality assessment typically consists of a hot spot analysis, which is an intersection assessment and a dispersion modeling analysis for computing carbon monoxide (CO) concentrations at candidate intersections along the corridor. Motor vehicles emit CO at the highest rates when they are operating at low speeds or idling. For this reason, the potential for adverse air quality impacts is greatest at intersections where traffic is most congested. For modeling purposes, only the worst-case condition (or the alternative with the highest congestion) was modeled between the two Build Alternatives.

Under the Build Alternatives in the 2018 build year and 2040 horizon year, the maximum one-hour CO concentration in the project study area is predicted to be 5.8 parts per million (ppm) in 2018 build year at Site 1, Benning Road and East Capitol Street. The maximum predicted eight-hour CO concentration is 4.4 ppm and occurred at the same intersection in 2018. All predicted CO concentrations for the 2018 and 2040 Build Alternatives are less than the NAAQS of 35 ppm for a one-hour average and 9 ppm for an eight- hour average.

As a result, no impacts are predicted as a result of the Benning Road and Bridges Transportation Improvements project. Therefore, no operational air quality mitigation measures are required. Therefore the project would be in conformance with the CAA transportation conformity rule requirements.

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Acronyms

CAA	Clean Air Act
CLRP	Constrained Long Range Plan
CO	Carbon Monoxide
DCMR	District of Columbia Municipal Regulations
DDOE	District Department of the Environment
DDOT	District Department of Transportation
EA	Environmental Assessment
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
LOS	Level of Service
MOVES	Motor Vehicle Emissions Simulator
MWCOG	Metropolitan Washington Area Council of Governments
MVEB	Motor Vehicle Emissions Budget
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act (NEPA)
NO_2	Nitrogen Dioxide
NO_x	Oxides of Nitrogen
O_3	Ozone
PM	Particulate Matter
POM	polycyclic organic matter
ppm	parts per million
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_x	Oxides of Sulfur
TIP	Transportation Improvement Program
TPB	Transportation Planning Board
ULSD	Ultra-Low Sulfur Diesel

1.0 Introduction

1.1 Project Overview

The District Department of Transportation (DDOT), in conjunction with the Federal Highway Administration (FHWA), is proposing transportation improvements (the "proposed action") along the Benning Road corridor in Washington, DC. The proposed action would improve transportation infrastructure conditions; enhance safety and operations along the corridor and at key intersections; enhance pedestrian and bicycle facilities; and extend streetcar transit service. FHWA is the lead federal agency with DDOT (the Applicant) as joint lead. The agencies are preparing an Environmental Assessment (EA) for the project in accordance with the National Environmental Policy Act (NEPA) as well as other federal and local laws.

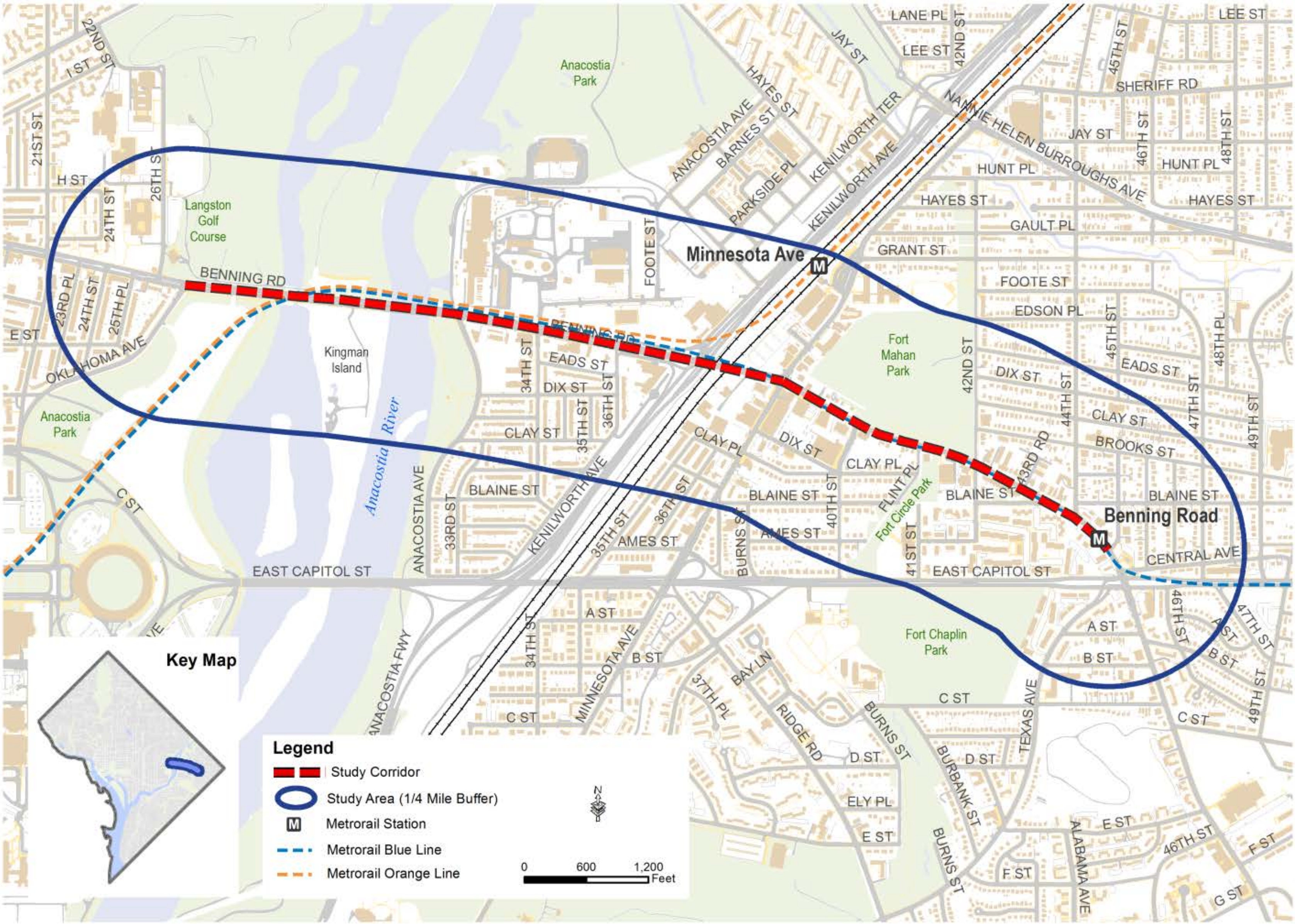
The Benning Road corridor is located within the Northeast section of Washington, DC and is approximately two miles long. The project study area is shown in **Figure 1**. The western terminus for the project is the intersection of Benning Road and Oklahoma Avenue. This intersection is also the eastern terminus of one of the District's initial streetcar lines, the H/Benning Streetcar Line. The eastern terminus for the project is the Benning Road Metrorail Station. The proposed improvements are anticipated to be predominantly within the existing right-of-way. The project is included in the adopted National Capitol Region Transportation Planning Board's Transportation Improvement Program (TIP) and the Constrained Long Range Plan (CLRP).

The purpose of the Benning Road and Bridges Transportation Improvements project is to address deficiencies in transportation infrastructure conditions, improve safety conditions and operations for both motorized and non-motorized access, and to provide for increased mobility and accessibility by improving transit operations and options between the intersection of Benning Road and Oklahoma Avenue and the Benning Road Metrorail Station.

1.2 Purpose of Report

The purpose of this technical report is to describe air quality effects associated with the Benning Road and Bridges Transportation Improvements project ("the Project"), including proposed mitigation measures, as necessary. The air quality evaluation includes an assessment of the Project's impacts on sensitive receptors along the proposed streetcar alignment and associated facilities.

Figure 1: Project Study Area



2.0 Pollutants and Regulatory Setting

2.1 Relevant Pollutants

"Air Pollution" is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity or vigor of crops or natural vegetation, or reducing human or animal health. Regulations for air pollutant emissions exist to protect human health and welfare, and the environment.

The federal agency that develops and enforces the regulations that help govern air quality is the Environmental Protection Agency (EPA). The 1970 federal Clean Air Act (CAA) established National Ambient Air Quality Standards (NAAQS) to protect the public health. Eight air pollutants have been identified by the EPA as being of concern nationwide: carbon monoxide, sulfur oxides, hydrocarbons, nitrogen oxides, ozone, particulate matter sized 10 micrometers or less, particulate matter sized 2.5 micrometers or less, and lead. The sources of these pollutants, their effects on human health, and their concentrations in the atmosphere vary considerably. Below is a brief description of each pollutant.

- **Ozone (O_3)** is a strong oxidizer and a pulmonary irritant that affects the respiratory mucous membranes, other lung tissues, and respiratory functions. Exposure to ozone can impair the ability to perform physical exercise, can result in symptoms such as tightness in the chest, coughing, and wheezing, and can ultimately result in asthma, bronchitis, and emphysema. Motor vehicles do not emit ozone directly. Emissions of volatile organic compounds (VOC) and nitrogen oxides (NOx), which are the precursor pollutants to ozone formation, react in the presence of sunlight to form ozone in the atmosphere. These reactions occur over periods of hours to days during atmospheric mixing and transport downwind. Accordingly, ozone and its precursors VOC and NOx are regulated at the regional level as part of the Metropolitan Washington Council of Governments' (MWCOG) transportation plan.
- **Carbon Monoxide (CO)** is a colorless and odorless gas, which is a product of incomplete combustion. CO is absorbed by the lungs and reacts with hemoglobin to reduce the oxygen carrying capacity of the blood. At low concentrations, CO has been shown to aggravate the symptoms of cardiovascular disease, can cause headaches, nausea, and at sustained high concentration levels, can lead to coma and death. CO concentrations are not related to ozone levels. CO concentrations tend to be highest in localized areas because they are most affected by local traffic congestion, since motor vehicles are a major source of CO emissions.
- **Particulate matter (PM_{10} and $PM_{2.5}$)** is made up of small solid particles and liquid droplets. PM_{10} refers to particulate matter with an aerodynamic diameter of 10 microns and smaller, and $PM_{2.5}$ refers to particulate matter with an aerodynamic diameter of 2.5 microns and smaller. Particulates enter the body by way of the respiratory system. Particulates over 10 microns in size are captured in the nose and throat and are readily expelled from the body. Particles smaller than 10 microns, and especially particles smaller than 2.5 microns, can reach the air ducts (bronchi) and the air sacs (alveoli). Particulates, especially $PM_{2.5}$, have been associated with increased incidence

of respiratory diseases such as asthma, bronchitis, and emphysema; cardiopulmonary disease; and cancer. The majority of PM emissions from mobile sources are attributed to diesel vehicles.

- **Sulfur dioxide (SO_2)** is a gas that is formed during the combustion of fuels containing sulfur compounds. SO_2 can cause irritation and inflammation of tissues with which the pollutant comes into contact. Inhalation can cause irritation of the mucous membranes causing bronchial damage, and SO_2 can exacerbate pre-existing respiratory diseases such as asthma, bronchitis, and emphysema. Exposure to SO_2 can cause damage to vegetation, corrosion to metallic materials, and soiling of clothing and buildings. Due to the implementation of EPA's Ultra-Low Sulfur Diesel Fuel Requirements taking effect since 2006, SO_2 is not expected to be a concern as a result of the project.
- **Lead (Pb)** is no longer considered to be a pollutant of concern for transportation projects. The major source of lead emissions to the atmosphere had been from motor vehicles burning gasoline with lead-containing additives. However, lead emissions have nearly been eliminated with the conversion to unleaded gasoline nationwide.
- **Mobile Source Air Toxics (MSAT)** are a subset of the 187 air toxics defined by the Clean Air Act. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., locomotives, airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries). The EPA currently includes 21 air toxics in the full list of MSATs, and identifies seven of those as primary MSATs. The seven primary MSATs are benzene, formaldehyde, naphthalene, diesel particulate matter/diesel exhaust gases, acrolein, 1, 3-butadiene, and polycyclic organic matter (POM). Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil, diesel fuel, or gasoline. Currently, no established ambient air quality standards exist for MSATs.

2.2 Pollutants of Concern

The pollutants that are most important for this air quality assessment are those that are traceable principally to motor vehicle engines and electrical power plants. In the study area, ambient concentrations of CO and O_3 are predominantly influenced by roadway motor vehicle activity. Emissions of VOCs, NOx, PM_{10}, and $PM_{2.5}$ come from both mobile and stationary sources while emissions of SOx and Pb are associated mainly with various stationary sources. Pollutant emissions from electric-powered transit vehicles are expected to be minor and generally occur well outside the study area. Emissions are expected to be minor partly because of the small proportion of expected future train activity compared with existing and future roadway motor vehicle activity in the project study area. Electricity purchased from the national electrical grid may be produced by either fossil-fueled plants or renewable energy plants, or even both.

CO is the primary pollutant used to indicate the potential for adverse air quality impacts from motor vehicles in general, and at roadway intersections in particular. CO is used as an indicator because roadway motor vehicles produce most of the ambient CO, and emission rates of CO from vehicles are relatively high in comparison to emissions of other pollutants. The federal and state ambient air quality standards are set up in such a way that, should adverse impacts occur, the CO standard would most likely be exceeded first.

Similarly, $PM_{2.5}$ is also evaluated especially since the project is located in a nonattainment area. However, since $PM_{2.5}$ is most prevalent in diesel-powered vehicles, the onset of impact from the Benning Road and Bridges Transportation Improvements project is remote because the project is not of air quality concern as defined by the transportation conformity rule as defined in 40 CFR 93.123(b)(1).

Similarly, because O_3 is a regional pollutant that is formed in the presence of VOC and NOx, O_3 is evaluated indirectly through its precursors. However, because the CO standard would be exceeded first before either NO_2 or VOCs, only CO is typically evaluated at intersection hot spots. As a result, concentrations of O_3 are typically measured directly in the atmosphere rather than through modeling predictions.

2.3 Regulatory Setting

The Federal Railroad Administration (FRA) *Procedures for Considering Environmental Impacts* (FRA Docket No EP-1, Notice 5, May 26, 1999), states under the topic of Air Quality, "There should be an assessment of the consistency of the alternatives with Federal and State plans for the attainment and maintenance of air quality standards."

The Clean Air Act (CAA), as amended, is the basis for most federal air pollution control programs. Under the CAA, the EPA regulates air quality nationally. The EPA delegates authority to the District Department of the Environment (DDOE) for monitoring and enforcing air quality regulations in the District of Columbia. The Washington, DC-MD-VA Region State Implementation Plan (SIP), developed in accordance with the CAA, contains the major state-level requirements with respect to transportation in general. The MWCOG is responsible for preparing the SIP and submitting it to the EPA for approval.

2.4 Evaluation Criteria

Under the authority of the CAA, the EPA established a set of National Ambient Air Quality Standards (NAAQS) for various "criteria" air pollutants. **Table 1** lists the NAAQS for the seven criteria pollutants: O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and Pb. Any project constructed in the District of Columbia has to achieve compliance with these standards.

Areas where ambient concentrations of a criteria pollutant are below the corresponding NAAQS are designated as being in "attainment". Areas where a criteria pollutant level exceeds the NAAQS are designated as being in "nonattainment." A maintenance area is one that has been re-designated from nonattainment status and has an approved maintenance plan under Section 175 of the CAA. Where insufficient data exist to determine an area's attainment status, the area is designated unclassifiable or in attainment. O_3 nonattainment areas are categorized as marginal, moderate, serious, severe, or extreme. CO and PM_{10} nonattainment areas are categorized as moderate or serious. The proposed action would take place in the District of Columbia, an area designated as:

- A moderate nonattainment area for O3.
- A moderate nonattainment area for PM2.5.
- A maintenance area for CO.

- An attainment area for all other criteria pollutants.

Under the CAA, federal agencies are responsible to ensure that a proposed project conforms to the SIP. The EPA also developed the CAA transportation conformity rule (40 CFR 51.390 and Part 93), applicable to transportation projects funded and approved by FHWA and/or FTA in nonattainment and maintenance areas for the transportation related criteria pollutants: O_3, $PM_{2.5}$, PM_{10}, NO_2 and CO. The transportation conformity rule requires the analysis of project-related air emissions to show the project would not cause or contribute to any new violations of NAAQS and would be in conformance of the corresponding SIPs and the established motor vehicles emissions budget (MVEB). The National Capital Region Transportation Planning Board (TPB) is responsible for developing the SIP-conforming Transportation Improvement Program (TIP) to address mobile source emissions within the region. Two levels of transportation conformity exist:

- Regional conformity: Applicable to metropolitan transportation plans and TIPs. For the metropolitan Washington region, the transportation plan is known as National Capital Region's Financially Constrained Long-Range Transportation Plan (CLRP) and the FY 2013-2018 Transportation Improvement Program is the current TIP. The regional conformity determination must show the total emissions from on-road travel on the region's transportation system are within the MVEB outlined in the SIP and are consistent with the goals for air quality found in the SIP. The regional emissions analysis must include all federally funded projects; non-federally funded projects considered regionally-significant projects; and non-federally funded and/or non-regionally significant projects that will affect vehicle travel in the area. Regional conformity determination is made by the TPB. Because the proposed project is listed in an approved CLRP (Project #1669) and TIP (Project #5754), the project has met the regional conformity determination (See **Attachment B**).
- Project-level conformity: For specific transportation projects, the conformity determination must show the individual project is consistent with the regional conformity determination and that potential localized emissions impacts are addressed and are consistent with goals for air quality found in the SIP. The state or local transportation agency is responsible for the project-level conformity determination. The analysis described in this document is for meeting the project-level conformity requirement through a hot spot analysis.

Table 1: National Ambient Air Quality Standards

Pollutant	Standard Type	Averaging Period	Standard Value[a]
Carbon Monoxide (CO)	Primary[b]	8-Hour average	9 ppm (10 mg/m^3)[c]
	Primary	1-Hour average	35 ppm (40 mg/m^3)
Nitrogen Dioxide (NO_2)	Primary and Secondary	Annual arithmetic mean	53 ppb [d]
	Primary	1-Hour average	100 ppb
Ozone (O_3)	Primary and Secondary	8-Hour average	0.075 ppm (155 µg/m^3) [e]
Sulfur Dioxide (SO_2)	Primary	Annual arithmetic mean	0.03 ppm (80 µg/m^3)
	Primary	24-Hour average[g]	0.14 ppm (365 µg/m^3)
	Secondary	3-Hour average	0.5 ppm (1300 µg/m^3)
	Primary	1-Hour Average[h]	75 ppb (0.075 ppm)
Particulate Matter (PM_{10})	Primary and Secondary	24-Hour average	150 µg/m^3 [f]
Particulate Matter ($PM_{2.5}$)	Primary and Secondary	Annual arithmetic mean	12 µg/m^3
		24-Hour average	35 µg/m^3
Lead (Pb)	Primary and Secondary	3-month rolling average	0.15 µg/m^3

NOTES:

a. Short-term standards (1 to 24 hours) are not to be exceeded more than once per calendar year.
b. Former national secondary standards for carbon monoxide have been repealed.
c. Concentrations are shown in parts per million (ppm), milligrams per cubic meter (mg/m^3) or micrograms per cubic meter (µg/m^3).
d. The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
e. Maximum daily one-hour (eight-hour) average. The ozone standard is attained when the expected number of days with maximum hourly (eight-hourly) average concentrations above the value of the standard, averaged over a three year period, is less than or equal to one. The O_3 criterion was updated by the EPA on May 27, 2008 from 0.08 to 0.075 ppm.
f. For each particle size, the annual PM standard is met when the three-year average of the annual mean concentration is less than or equal to the value of the standard. The 24-hour PM_{10} ($PM_{2.5}$) standard is met when the three-year average of the annual 99th (98th) percentile values of the daily average concentrations is less than or equal to the value of the standard.
g. National standards are block averages rather than moving averages.
h. Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb.
i. CO, NO_2, O_3, and PM are transportation related pollutants

Source: 40 CFR 50, National Primary and Secondary Ambient Air Quality Standards.

3.0 Methodology

In accordance with EPA and DDOT guidance, analysis methodology typically consists of a hot spot analysis, which is an intersection assessment and a dispersion modeling analysis for computing CO concentrations at candidate intersections along the corridor. Motor vehicles emit CO at the highest rates when they are operating at low speeds or idling. For this reason, the potential for adverse air quality impacts is greatest at intersections where traffic is most congested. Using the traffic analysis prepared for the project, intersections are screened or selected based on congestion and volumes. The intersection screening methods are based on EPA criteria in the *Guidelines for Modeling Carbon Monoxide from Roadway Intersections*[1]. The study area for air quality is the intersections modeled.

At each of the intersections selected for detailed air quality modeling, maximum one-hour and eight-hour CO concentrations were predicted at several receptor locations in the vicinity of the intersection where the maximum concentrations would be expected and where the public would have reasonable access. The traffic data used in the air quality analysis were based on traffic volumes and growth projection included in the *Benning Road Extension Project Traffic Report* [AECOM, October 2014].

The MWCOG inputs included model year registration distributions and vehicle mix corresponding to the greater metropolitan Washington area. The MWCOG input values for the Project corridor were applied to all intersections.

EPA's Motor Vehicle Emissions Simulator (MOVES) program, MOVES2010b, was used to develop the emission factors for free flowing traffic and idling queue traffic at intersections. Based on traffic forecasts provided, the analysis was conducted for the AM and PM peak hours for the build year (Year 2018) and the horizon year (Year 2040). MWCOG has not established the MOVES input file specifically applicable for predicting emissions factors for the build year 2018. Therefore, the analysis was conducted conservatively by applying the available 2017 emission factors to the 2018 traffic forecasts to predict CO concentrations for the build year 2018.

In predicting travel link specific emission factors using MOVES, the free flow travel speed at each intersection was assumed to be 5 miles per hour to conservatively account for the congestion at the analyzed intersection and the idling queue speed was assumed 0 miles per hour.

Maximum one- and eight-hour CO concentrations were estimated using EPA's CAL3QHC Version 2.0 dispersion model[2]. Specific modeling inputs were selected in accordance with EPA/DDOT guidance. Consistent with EPA's 1992 guidelines, eight-hour CO concentrations were estimated by multiplying the modeled one-hour results by a persistence (scale) factor of 0.7 based on local monitored data. Total CO concentrations were derived by adding to the modeled

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[1] Guidelines for Modeling Carbon Monoxide from Roadway Intersections, US Environmental protection Agency, Office of Air Quality Planning and Standards, Research Triangle, NC, November 1992.

[2] User's Guide to CAL3QHC Version 2: A Modeling Methodology for Predicting Pollutant Concentration near Roadway Intersections, U.S. EPA-454/R-92-006, June 1993.

maximum concentrations a background level to account for sources of CO other than the traffic at the intersection being modeled. Background levels of 2.3 ppm for one hour and 1.9 ppm for eight hours were applied to all modeled concentrations. These background concentrations, which are based on ambient data from the closest monitoring site, 420 34th Street, were held constant for all analysis years and project alternatives.

4.0 Affected Environment

The District Department of the Environment (DDOE) develops and implements plans and programs to meet and maintain federal and DC air quality standards. The DDOE monitors air quality to ensure that the District meets and maintains national air quality health standards. The DDOE protects and manages the region's air resources in accordance with the District's Air Pollution Control Act of 1984 (effective March 15, 1985) and Amendments as described in Title 20 of the District of Columbia Municipal Regulations (DCMR).

Based on recent monitoring data, no exceedances of the NAAQS have been reported through 2012 (the last period for which a full year of data is available) except one ozone violation on August 21, 2012. This violation of the ozone NAAQS is currently being validated by the DDOE.

Recent monitored values of secondary particulate precursors, such as nitrogen dioxide (NO_2) and sulfur dioxide (SO_2), are decreasing. This downward trend in NO_2 and SO_2 may be due to the ultra-low sulfur diesel (ULSD) fuel that has been produced in the last few years and has been required of all manufacturers by December 1, 2010. The ULSD fuel has a sulfur content of only 15 ppm compared to the previous diesel fuel, which had a sulfur content of 500 ppm.

5.0 Environmental Consequences

This section includes a discussion of the potential operational impacts, as well as an assessment of temporary construction impacts and indirect and cumulative effects.

5.1 No Build Alternative

Without the project under the No Build Alternative, air quality is expected to be similar to the existing conditions. With the exception of the ozone violation in August 2012 and $PM_{2.5}$ in recent years, no exceedances of the NAAQS were reported. As a result, the project area is located in a region that has been designated by the EPA as in attainment for all criteria pollutants except ozone and particulate matter ($PM_{2.5}$).

5.2 Build Alternatives

The project is located in the District of Columbia, which is in attainment or unclassifiable for all National Ambient Air Quality Standards (NAAQS) except ozone and PM2.5; therefore, the transportation conformity rules apply. However, the proposed project is included in and consistent with the MWCOG financially Constrained Long-Range Transportation Plan (CLRP) (see **Attachment B**).

5.2.1 Build Alternative 1

5.2.1.1 CO Hot Spot Analysis

Hot Spot Screening

EPA's *Guidelines for Modeling Carbon Monoxide from Roadway Intersections* was used to select the worst-case CO hot spot analysis intersections through a screening process, Based on the highest approaching traffic volume and level of service (LOS) for the year 2040 condition at each intersection (shown in **Table 2**), two worst-case signalized intersections, Benning Road and East Capitol Street and Benning Road and Minnesota Avenue, were screened out for a further hot spot dispersion modeling analysis.

CO Concentration Modeling and Results

The EPA CAL3QHC model was used to predict the AM and PM peak hour CO concentrations for 2018 and 2040 based on the traffic forecasts performed at two worst-case intersections. The CO modeling incorporated the emission factors discussed above, the projected traffic volumes, the intersection phasing data, and the worst-case meteorological conditions. **Figure 2** and **Figure 3** depict geometric model configurations developed at the two intersections.

Table 2: Intersection Screening

No.	Intersection	Traffic Control	Level of Service				Total Traffic Volume		Screening			
			Curb Alignment		Median Alignment		No Build		Build LOS of D/E/F		Traffic Volume Rank for Intersections with LOS of D/E/F	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	Benning Rd and 26th St	Signalized	A	B	A	B	3988	3415	No	No	-	-
2	Benning Rd and Oklahoma Ave	Signalized	C	A	C	A	4207	3570	No	No	-	-
3	Benning Rd and Anacostia Ave	Signalized	A	A	A	A	4251	3511	No	No	-	-
4	Benning Rd and 34th St	Signalized	B	C	B	B	4529	3670	No	No	-	-
5	Benning Rd and Minnesota Ave	Signalized	E	D	E	D	3902	4160	Yes	Yes	**2**	**1**
6	Benning Rd and 42nd St	Signalized	B	B	B	B	1885	1879	No	No	-	-
7	Benning Rd and 45th St	Unsignalized	-	-	-	-	-	-	-	-	-	-
8	Benning Rd and Central Ave	Unsignalized	-	-	-	-	-	-	-	-	-	-
9	Benning Rd and E Capitol St	Signalized	F	F	F	F	4192	3997	Yes	Yes	**1**	**2**
10	Minnesota Ave and Dix St	Signalized	B	B	B	B	1878	2337	No	No	-	-
11	Minnesota Ave and Grant St	Signalized	B	B	B	B	1709	1867	No	No	-	-
12	Minnesota Ave and Gault Pl	Unsignalized	-	-	-	-	-	-	-	-	-	-
13	Minnesota Ave and Hayes St	Unsignalized	-	-	-	-	-	-	-	-	-	-
14	Minnesota Ave and NHB Ave	Signalized	D	E	D	E	2878	3157	Yes	Yes	**3**	**3**
15	Benning and 44th St	Signalized	C	D	B	D	2273	1952	Yes	Yes	4	4

Figure 2: Benning Road and East Capitol Street Intersection Model Configuration

Figure 3: Benning Road and Minnesota Avenue Intersection Model Configuration

Under the Build Alternative 1, traffic volumes in the study area would be expected to remain the same as under the No Build Alternative. Although congestion is expected to increase slightly due to the addition of the streetcar corridor through the intersections, the average intersection delay times are also only expected to increase slightly between the No Build and Build Alternatives. For example, the average AM peak-hour delay at the most congested intersection (Benning Road and East Capitol Street) is predicted to increase less than two percent between the No Build and Build Alternative. Therefore, the concentrations under Build Alternative 1 are expected to be essentially the same as under the No Build Alternative.

The predicted worst-case CO concentrations for Build Alternative 1 under 2018 and 2040 as summarized in **Table 3** are well below the NAAQS of 35 ppm for one-hour average and 9 ppm for eight- hour average.

Table 3: Predicted Hot Spot Worst-Case CO Concentration Levels

Intersection	CO Concentrations (ppm)			
	Build - 2018		Build - 2040	
	1-hour	8-hour	1-hour	8-hour
Benning Rd and Minnesota Ave	4.9	3.7	3.7	2.9
Benning Rd and East Capitol St	5.8	4.4	3.8	3.0

5.2.1.2 $PM_{2.5}$ Hot Spot Analysis

In determining whether a $PM_{2.5}$ hot spot analysis is required for the proposed Benning Road and Bridges Transportation Improvements project, the transportation conformity guidelines for determining localized CO, PM_{10}, and $PM_{2.5}$ concentrations (hot-spot analysis), as described in 40 CFR 93.123, were reviewed. According to these guidelines, the Benning Road and Bridges Transportation Improvements project would not exceed the relevant criterion in 40 CFR 93.123(b)(1)(iii). Specifically, the project would not create "new bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location." Based on Appendix A of EPA's *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in* $PM_{2.5}$ *and* PM_{10} *Nonattainment and Maintenance Areas* (March 2010), an example of a project that is not an air quality concern under 40 CFR 93.123(b)(1) would be a "new or expanded highway project that primarily services gasoline vehicle traffic (i.e., does not involve a significant number or increase in the number of diesel vehicles), including such projects involving congested intersections operating at Level-of-Service D, E, or F."

Although existing buses would serve the new streetcar system, these existing bus routes currently operate in the project area and would simply supplement the new streetcar service as part of their existing routes. Even if the future bus dwell times at the streetcar stops would be slightly longer than at a current bus stop, this slight increase would not result in a "significant number of diesel vehicles congregating at a single location" as defined by 40 CFR 93.123.

Therefore, based on the insignificant level of bus service proposed at the stations, neither a qualitative nor a quantitative $PM_{2.5}$ hotspot analysis is required for this project since it is not a project of local air quality concern under 40 CFR 93.123(b)(1). The CAA Amendments and the transportation conformity requirements are met without a hotspot analysis since this project has been found not to be of air quality concern under 40 CFR 93.123(b)(1). Therefore, the project meets statutory and regulatory transportation conformity requirements for $PM_{2.5}$ without a hot-spot analysis.

5.2.1.3 MAST Impact Analysis

FHWA's *Interim Guidance Update on MSAT Analysis in NEPA* (December 2012) establishes a three-tiered approach to determine the level of MSAT analysis required by a project-level study. Project requirements are assessed following the *Interim Guidance*. According to the *Interim Guidance*, the category of exempt projects or projects with no meaningful potential MSAT effects includes:

- Projects qualifying as a categorical exclusion under 23 CFR 771.117(c);
- Projects exempt under the Clean Air Act conformity rule under 40 CFR 93.126; or
- Other projects with no meaningful impacts on traffic volumes or vehicle mix.

Additionally, the guidance indicates that "for projects with negligible traffic impacts, regardless of the class of NEPA environmental document, no MSAT analysis is required." The *Interim Guidance* also notes that "the types of projects categorically excluded under 23 CFR 771.117(d) or exempt from conformity rule under 40 CFR 93.127 do not warrant an automatic exemption from an MSAT analysis, but they usually will have no meaningful impact." Projects in this category do not require either a qualitative or a quantitative analysis for MSATs, although documentation of the project category is required.

Since the Project falls into the category of resulting in no meaningful impacts on traffic volumes or vehicle mix, no qualitative or a quantitative analysis for MSATs is required under Build Alternative 1.

5.2.1.4 Conclusions

Based on the above analysis, the proposed Build Alternative 1 would have no significant project-level adverse impacts on air quality with respect to CO, $PM_{2.5,}$ and MSATs. Therefore the project under this alternative would be in conformance with the CAA transportation conformity rule requirements.

5.2.2 Build Alternative 2

5.2.2.1 CO Hot Spot Analysis

Under Build Alternative 2, traffic volumes in the study area would be expected to remain the same as under the No Build Alternative and Build Alternative 1. Although congestion is expected to increase slightly due to the addition of the streetcar corridor through the intersections, the average intersection delay times are also only expected to increase slightly between the No Build and each Build Alternative (i.e., the Curb Alignment or Median Alignment Alternative). Therefore, the worst-case build alternative CO concentrations (summarized in **Table 2)** under the build alternatives would remain the same for Build Alternative 2 under 2018 and 2040 conditions. The CO concentrations are well below the NAAQS of 35 ppm for one-hour average and 9 ppm for eight-hour average.

5.2.2.2 PM2.5 Hot Spot Analysis

In determining whether a $PM_{2.5}$ hot spot analysis is required for the proposed Benning Road and Bridges Transportation Improvements project, the transportation conformity guidelines for determining localized CO, PM_{10}, and $PM_{2.5}$ concentrations (hot-spot analysis) as described in 40 CFR 93.123, were reviewed. According to these guidelines, the Benning Road and Bridges Transportation Improvements project would not exceed the relevant criterion in 40 CFR 93.123(b)(1)(iii). Specifically, the project would not create "new bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location." Based on Appendix A of EPA's *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (March 2010), an example of a project that is not an air quality concern under 40 CFR 93.123(b)(1) would be a "new or expanded highway project that primarily services gasoline vehicle traffic (i.e., does not involve a significant number or increase in the number of diesel vehicles), including such projects involving congested intersections operating at Level-of-Service D, E, or F."

Although existing buses would serve the new streetcar system, these existing bus routes currently operate in the project area and would simply supplement the new streetcar service as part of their existing routes. Even if the future bus dwell times at the streetcar stops would be slightly longer than at a current bus stop, this slight increase would not result in a "significant number of diesel vehicles congregating at a single location" as defined by 40 CFR 93.123.

Therefore, based on the insignificant level of bus service proposed at the stations, neither a qualitative nor a quantitative $PM_{2.5}$ hotspot analysis is required for this project since it is not a project of local air quality concern under 40 CFR 93.123(b)(1). The CAA Amendments and the transportation conformity requirements are met without a hotspot analysis since this project has been found not to be of air quality concern under 40 CFR 93.123(b)(1). Therefore, the project meets statutory and regulatory transportation conformity requirements for $PM_{2.5}$ without a hot-spot analysis.

5.2.2.3 MAST Impact Analysis

FHWA's *Interim Guidance* establishes a three-tiered approach to determine the level of MSAT analysis required by a project-level study. Project requirements are assessed following the *Interim Guidance*. According to the I*nterim Guidance*, the category of exempt projects or projects with no meaningful potential MSAT effects includes:

- Projects qualifying as a categorical exclusion under 23 CFR 771.117(c);
- Projects exempt under the Clean Air Act conformity rule under 40 CFR 93.126; or
- Other projects with no meaningful impacts on traffic volumes or vehicle mix.

Additionally, the guidance indicates that "for projects with negligible traffic impacts, regardless of the class of NEPA environmental document, no MSAT analysis is required." The *Interim Guidance* also notes that "the types of projects categorically excluded under 23 CFR 771.117(d) or exempt from conformity rule under 40 CFR 93.127 do not warrant an automatic exemption from an MSAT analysis, but they usually will have no meaningful impact." Projects in this category do not require either a qualitative or a quantitative analysis for MSATs, although documentation of the project category is required.

Since the proposed project falls into the category of resulting in no meaningful impacts on traffic volumes or vehicle mix, no qualitative or a quantitative analysis for MSATs is required under Build Alternative 2.

5.2.2.4 Conclusions

Based on the above analysis, the proposed Build Alternative 2 would have no significant project-level adverse impacts on air quality with respect to CO, $PM_{2.5}$, and MSATs. Therefore the project under this alternative would be in conformance with the CAA transportation conformity rule requirements.

5.3 Construction Impacts

Direct emissions from construction equipment are not expected to produce adverse effects on local air quality provided that all equipment is properly operated and maintained. If required, traffic management techniques are available during the construction period that would mitigate increased emissions from traffic congestion due to lane closures, detours, and construction vehicles accessing sites.

5.4 Indirect and Cumulative Effects

Indirect impacts are those which are caused by a proposed action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects can be linked to direct effects in a causal chain. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air, water, or other natural systems, including ecosystems. The terms secondary effects or secondary impacts are often used interchangeably with indirect effects by the FHWA.

Based on the traffic analysis and the current attainment status, no adverse air quality impacts are expected, either directly or indirectly, due to the implementation and improvements proposed as part of the Benning Road and Bridges Transportation Improvements project.

6.0 Mitigation

6.1 Operational

Since the project is located in an area that has been designated by the EPA as in attainment for all criteria pollutants except ozone and particulate matter, no exceedances of the NAAQS are expected. Similarly, based on the detailed traffic assessment, any increases in congestion between the No Build and the Build Alternatives are expected to be minor and are not expected to result in exceedances of the NAAQS. Therefore, no air quality mitigation measures are currently required.

6.2 Temporary Construction

Air quality impacts due to temporary construction activities are possible particularly on dry and windy days. Mitigation techniques could include development of site-specific traffic management plans; temporary signage and other traffic controls; designated staging areas, worker parking lots (with shuttle bus service if necessary), and truck routes; and prohibition of construction vehicle travel during peak traffic periods.

Potential fugitive dust impacts would be mitigated through good "housekeeping" practices such as water sprays during demolition; wetting, paving, or landscaping exposed earth areas; covering dust-producing materials during transport; limiting dust-producing construction activities during high wind conditions; and providing street sweeping and tire washes for trucks leaving the site.

7.0 Summary

The Benning Road and Bridges Transportation Improvements project is located in an area that has been designated by the EPA as in attainment for all criteria pollutants except ozone and $PM_{2.5}$. Additionally, predicted traffic under the each build alternative is expected to be equal to or increase marginally as a result of new streetcar service. Therefore, no exceedances of the NAAQS are expected under the Build Alternatives. As a result, no operational mitigation measures are required.

8.0 References

40 CFR 50, National Primary and Secondary Ambient Air Quality Standards.

District Department of Transportation, *Draft Hot-Spot Analysis Guide*, December 2013.

District Department of Transportation, *2nd Edition Environmental Manual, Chapter 14 Air Quality Policy and Regulations*, June 20, 2012.

National Capital Region Transportation Planning Board/Metropolitan Washington Council of Governments, *FY 2013-2018 Transportation Improvement Program (TIP) for Metropolitan Washington Region*, Accessed http://www.mwcog.org/clrp/ in November 2014.

National Capital Region Transportation Planning Board/Metropolitan Washington Council of Governments, *CLRP Long-Range Transportation Plan*, Accessed http://www.mwcog.org/clrp/ in November 2014.

US Environmental Protection Agency, *Guidelines for Modeling Carbon Monoxide from Roadway Intersections*, Office of Air Quality Planning and Standards, Research Triangle, NC, November 1992.

US Environmental Protection Agency, *CLA3QHC User's guide*, September 1995.

US Environmental Protection Agency, *MOVES2010b User's Guide,* June 2012.

US Environmental Protection Agency, *Guidance document for Using MOVES in Project-Level Carbon Monoxide Analyses,* December 2010.

US Environmental Protection Agency, *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas,* December 2010.

Attachment A: Air Quality Input Data

- Table A-1 Peak Hour Traffic Volumes
- Table A-2 Red Time and Intersection Cycle Time (in sec)

Table A-1: Peak Hour Traffic Volumes

Intersection	Period	Northbound			Southbound			Westbound			Eastbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Benning Rd and E Capitol St	2018 AM Peak	538	468	26	111	255	115	28	1632	67	282	407	109
Benning Rd and Minnesota Ave		424	478	39	65	346	431	0	892	67	172	365	216
Benning Rd and E Capitol St	2018 PM Peak	161	360	61	261	480	92	71	557	88	186	1437	215
Benning Rd and Minnesota Ave		220	642	91	12	456	140	0	327	106	470	871	415
Benning Rd and E Capitol St	2040 AM Peak	600	548	29	124	284	129	31	1231	75	315	704	122
Benning Rd and Minnesota Ave		474	534	44	72	386	481	192	407	242	0	995	75
Benning Rd and E Capitol St	2040 PM Peak	179	403	68	291	536	102	79	539	98	208	1254	240
Benning Rd and Minnesota Ave		246	246	246	246	246	246	246	246	246	246	246	246

Table A-2: Red Time and Intersection Cycle Time (in sec)

Intersection	Intersection Cycle Length (s)	RED TIMES FOR EACH MOVEMENT (s)											
		Northbound			Southbound			Westbound			Eastbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
NO BUILD (2018) AM													
Benning Road and E Capitol St	120	92	92	92	100	100	100	72	72	72	96	96	96
Benning Road and Minnesota Avenue	120	102	55	55	73	73	56	82	82	82	103	65	65
NO BUILD (2018) PM													
Benning Road and E Capitol St	120	101	101	101	92	92	92	95	95	95	72	72	72
Benning Road and Minnesota Avenue	120	106	65	65	79	79	43	91	91	91	84	55	55
BUILD (2018) AM CURB RUNNING													
Benning Road and E Capitol St	120	92	92	92	100	100	100	72	72	72	96	96	96
Benning Road and Minnesota Avenue	120	100	55	55	75	75	58	82	82	82	103	65	65
BUILD (2018) PM CURB RUNNING													
Benning Road and E Capitol St	120	101	101	101	91	91	91	95	95	95	73	73	73
Benning Road and Minnesota Avenue	120	107	66	66	79	79	42	91	91	91	83	54	54
BUILD (2018) AM MEDIAN RUNNING													
Benning Road and E Capitol St	120	92	92	92	100	100	100	72	72	72	96	96	96
Benning Road and Minnesota Avenue	120	100	55	55	75	75	58	82	82	82	103	65	65
BUILD (2018) PM MEDIAN RUNNING													
Benning Road and E Capitol St	120	101	101	101	91	91	91	95	95	95	73	73	73
Benning Road and Minnesota Avenue	120	107	66	66	79	79	42	91	91	91	83	54	54
NO BUILD (2040) AM													
Benning Road and E Capitol St	120	88	88	88	100	100	100	84	84	84	88	88	88
Benning Road and Minnesota Avenue	120	102	55	55	73	73	56	82	82	82	103	65	65
NO BUILD (2040) PM													
Benning Road and E Capitol St	120	100	100	100	89	89	89	96	96	96	75	75	75
Benning Road and Minnesota Avenue	120	106	65	65	79	79	43	91	91	91	84	55	55
BUILD (2040) AM CURB RUNNING													
Benning Road and E Capitol St	120	88	88	88	100	100	100	83	83	83	89	89	89
Benning Road and Minnesota Avenue	120	100	56	56	76	76	59	81	81	81	103	64	64

Intersection	Intersection Cycle Length (s)	RED TIMES FOR EACH MOVEMENT (s)											
		Northbound			Southbound			Westbound			Eastbound		
		LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
BUILD (2040) PM CURB RUNNING													
Benning Road and E Capitol St	120	101	101	101	88	88	88	97	97	97	74	74	74
Benning Road and Minnesota Avenue	120	107	66	66	79	79	42	91	91	91	83	54	54
BUILD (2040) AM MEDIAN RUNNING													
Benning Road and E Capitol St	120	88	88	88	100	100	100	83	83	83	89	89	89
Benning Road and Minnesota Avenue	120	100	56	56	76	76	59	81	81	81	103	64	64
BUILD (2040) PM MEDIAN RUNNING													
Benning Road and E Capitol St	120	101	101	101	88	88	88	97	97	97	74	74	74
Benning Road and Minnesota Avenue	120	107	66	66	79	79	42	91	91	91	83	54	54

Attachment B: CLRP & TIP Items

Submitting Agency:	DDOT	Secondary Agency:	
Agency Project ID:		CLRP ID:	1669
Project Name:	Streetcar		
Project Type:	Transit		
Facility:	Streetcar Project		
From:	Citywide		
To:			
Jurisdiction:	District of Columbia		
Description:	The streetcar system will consist of modern low-floor vehicles operating on surface tracks that are embedded in the street pavement. Currently, the District is planning to conduct additional planning and environmental review process for streetcar extensions as proposed in the District of Columbia Analysis DC Streetcar Phase 1 proposed network plan, that include: - Benning Road extension (Oklahoma Ave - Benning Road Metro Station) - MLK extension (Howard Road - 11th Street bridge) - Union Station to Mount Vernon Square - K Street Centerway In addition, the District hopes to begin construction soon after the planning and environmental process completion of the Benning Road extension.	ProposedStopLocations_Apr082010_Map.pdf	

show **PROJECT PHASES TIP**

show **PROJECT PHASES CONFORMITY**

Project Length:		Project expected to be complete in:	2017
Bicycle/Pedestrian Accommodations:	No bicycle/pedestrian accommodations included	This project was completed in:	
Cost: (in $1,000s)	$54,000	This is an ongoing project and has no completion date:	☐

Congestion Management Information

Do traffic congestion conditions necessitate the proposed project?	☐
If so, is the congestion recurring or non-recurring?	Non-Recurring
If the congestion is on another facility, please identify it:	
Is this a capacity-increasing project on a limited access highway or other principal arterial?	☐
Project is exempt from the Congestion Management Process because:	

SAFETEA-LU Planning Factors

planning factors that are addressed by this project:

- ☑ Support the **economic vitality** of the metropolitan area, especially by enabling global competetiveness, productivity, and efficiency.
- ☑ Increase the **safety** of the transportation system for all motorized and non-motorized users.
  - ☐ Is this project being proposed specifically to address a safety issue?
  - If yes, briefly describe (in quantifiable terms, where possible) the nature of the safety problem:
- ☐ Increase the ability of the transportation system to support **homeland security** and to safeguard the personal security of all motorized and non-motorized users.
- ☑ Increase **accessibility and mobility** of people and freight.
- ☑ Protect and enhance the **environment**, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns.
- ☑ Enhance the **integration and connectivity** of the transportation system, across and between modes, for people and freight.
- ☐ Promote efficient system **management and operation**.
- ☐ Emphasize the **preservation** of the existing transportation system.

Environmental Mitigation

- ☐ Have any potential mitigation activities been identified for this project?
- If yes, what types of mitigation activities have been identified?

9/11/2014

DRAFT FOR PUBLIC COMMENT

DISTRICT OF COLUMBIA
TRANSPORTATION IMPROVEMENT PROGRAM
CAPITAL COSTS (in $1,000)

FY 2015 - 2020

DC Circulator - National Mall Area Route

TIP ID: 6104 Agency ID: Title: DC Circulator - National Mall Area Route Complete: Total Cost: $34,500

	Source	Fed/St/Loc	Previous Funding	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	Source Total
Facility: From: To:	DC	0/100/0		9,800 e	10,500 e	7,100 e	7,100 e			34,500
									Total Funds:	*34,500*

Description: This area would be served either by two separate routes, or one route. Analysis has been done on both.

DC Circulator New Buses for Replacement and Expansion

TIP ID: 6105 Agency ID: Title: DC Circulator New Buses for Replacement and Expansion Complete: Total Cost: $8,925

	Source	Fed/St/Loc	Previous Funding	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	Source Total
Facility: From: To:	DC	0/100/0	21,539 e	4,200 e						4,200
									Total Funds:	*4,200*

Description: Additional Circulator buses must be purchased in order to expand service to additional routes.

DC Circulator Expansion - Phase I

TIP ID: 6103 Agency ID: Title: DC Circulator Expansion - Phase I Complete: Total Cost: $62,593

	Source	Fed/St/Loc	Previous Funding	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	Source Total
Facility: From: To:	DC	0/100/0	1,576 e	15,091 e	15,450 e	15,828 e	16,224 e			62,593
									Total Funds:	*62,593*

Description: Implement the Phase I DC Circulator routes as identified in the DC Circulator 10-Year Transit Development Plan

M Street SE/SW Premium Transit Environmental Work

TIP ID: 6112 Agency ID: Temp02 Title: M Street SE/SW Streetcar Complete: Total Cost: $128,250

	Source	Fed/St/Loc	Previous Funding	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	Source Total
Facility: From: To:	DC	0/100/0	2,500 a	3,750 a			20,750 c	43,750 c	57,500 c	125,750
									Total Funds:	*125,750*

Description: This funding will implement the environmental study work for the M Street SE/SW corridor

Streetcar

TIP ID: 5754 Agency ID: CM080A Title: Benning Road Extension Complete: Total Cost: $82,750

	Source	Fed/St/Loc	Previous Funding	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	Source Total
Facility: Streetcar Line	CMAQ	80/20/0	3,200 a							
From: To:	DC	0/100/0	2,000 a	7,250 c	15,750 c	28,500 c	29,250 c			80,750
									Total Funds:	*80,750*

Description: The Benning Road Streetcar Extension is a 1.95-mile surface fixed guide way transit line that includes electrically powered streetcar vehicles operating along tracks located within the existing street and travel lanes. The NEPA study will address potential impacts of the project, as well as, preliminary engineering (conceptual) for the line.

Transit DDOT - Bicycle/Pedestrian Accommodations Included a - PE b - ROW Acquisition c - Construction d - Study e - Other D - 22

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BENNING ROAD & BRIDGES TRANSPORTATION IMPROVEMENTS

AGENCY CORRESPONDENCE

DRAFT MAY 2016

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Attachment A – General Project Correspondence

The Project Initiation Scoping Letter sent on 2/18/14 was sent to the following agencies:

Agency	Date and Purpose	Response
Department of Parks and Recreation	2/18/14 Scoping Letter from DDOT	None
Department of Public Works	2/18/14 Scoping Letter from DDOT	None
District Department of the Environment	2/18/14 Scoping Letter from DDOT	None
District of Columbia Housing Authority	2/18/14 Scoping and Section 106 Initiation Letter from DDOT	None
District of Columbia Historic Preservation Office	2/18/14 Scoping Letter from DDOT	3/25/14 response from C. Andrew Lewis accepting invitation (see Appendix L)
Department of Housing and Community Development	2/18/14 Scoping Letter from DDOT	3/11/14 response from Paul Walker (see Appendix L)
District of Columbia Office of Planning	2/18/14 Scoping Letter from DDOT	None
DC Water and Sewer Authority	2/18/14 Scoping Letter from DDOT	None
DC Fire and EMS Department	2/18/14 Scoping Letter from DDOT	None
Office of United Communications	2/18/14 Scoping Letter from DDOT	None
Metropolitan Washington Council of Governments	2/18/14 Scoping Letter from DDOT	None
National Capital Planning Commission	2/18/14 Scoping Letter from DDOT 5/4/14 Invitation from DDOT to become a cooperating agency to the project	None
National Oceanic and Atmospheric Administration	2/18/14 Scoping Letter from DDOT	None
U.S. Department of Agriculture	2/18/14 Scoping Letter from DDOT	None
U.S. Department of the Army, Corp of Engineers	2/18/14 Scoping Letter from DDOT	None
U.S. Department of Transportation, Federal Transit Administration	2/18/14 Scoping Letter from DDOT 5/4/14 Invitation from DDOT to become a cooperating agency to the project	None
U.S. Commission of Fine Arts	2/18/14 Scoping Letter from DDOT	None
U.S. Department of the Interior –National Park Service, National Capital Region	2/18/14 Scoping Letter from DDOT 5/4/14 Invitation from DDOT to become a cooperating agency to the project	None
U.S. Department of the Interior –National Park Service, National Capital Parks (East)	2/18/14 Scoping Letter from DDOT	None
U.S. Fish and Wildlife Service –Northeast (Region 5)	2/18/14 Scoping Letter from DDOT	None
U.S. Environmental Protection Agency –Office of Environmental Programs (Region 3)	2/18/14 Scoping Letter from DDOT	None
Washington Metropolitan Area Transit Authority	2/18/14 Scoping Letter from DDOT	None

d. **Infrastructure Project Management Administration**

February 18, 2014

[AGENCY CONTACT NAME]
[AGENCY]
[ADDRESS]
[CITY], [STATE] [ZIP CODE]

Subject: Benning Road and Bridge Transportation Improvements Environmental Assessment & Section 106 Evaluation

Dear [AGENCY CONTACT NAME]:

The District Department of Transportation (DDOT) and the Federal Highway Administration (FHWA) are preparing an Environmental Assessment in accordance with the National Environmental Policy Act for transportation improvements on Benning Road, between 26th and East Capitol Streets NE, and on Minnesota Avenue, between the Benning Road intersection and the Minnesota Avenue Metrorail Station (see attached location map). The project will also include the assessment of historic resources in accordance with the Section 106 of the National Historic Preservation Act. The majority of proposed improvements would occur within the existing right-of-way and would address Safety, Roadway and Bridge conditions, Multi-modal Transportation Improvements, Transit needs, and pedestrian safety and access.

Please provide us your comments or suggestions regarding the assessment of environmental and cultural resources for this project. Your input will allow us to comprehensively address all potential impacts as the process moves forward. The agency scoping meeting for the project will be held on Tuesday March 4, 2014 at 9:00 am at DDOT Office, Conference Room 439, 55 M St, SE, Washington DC 20003 as part of the monthly DDOT Interagency meeting.

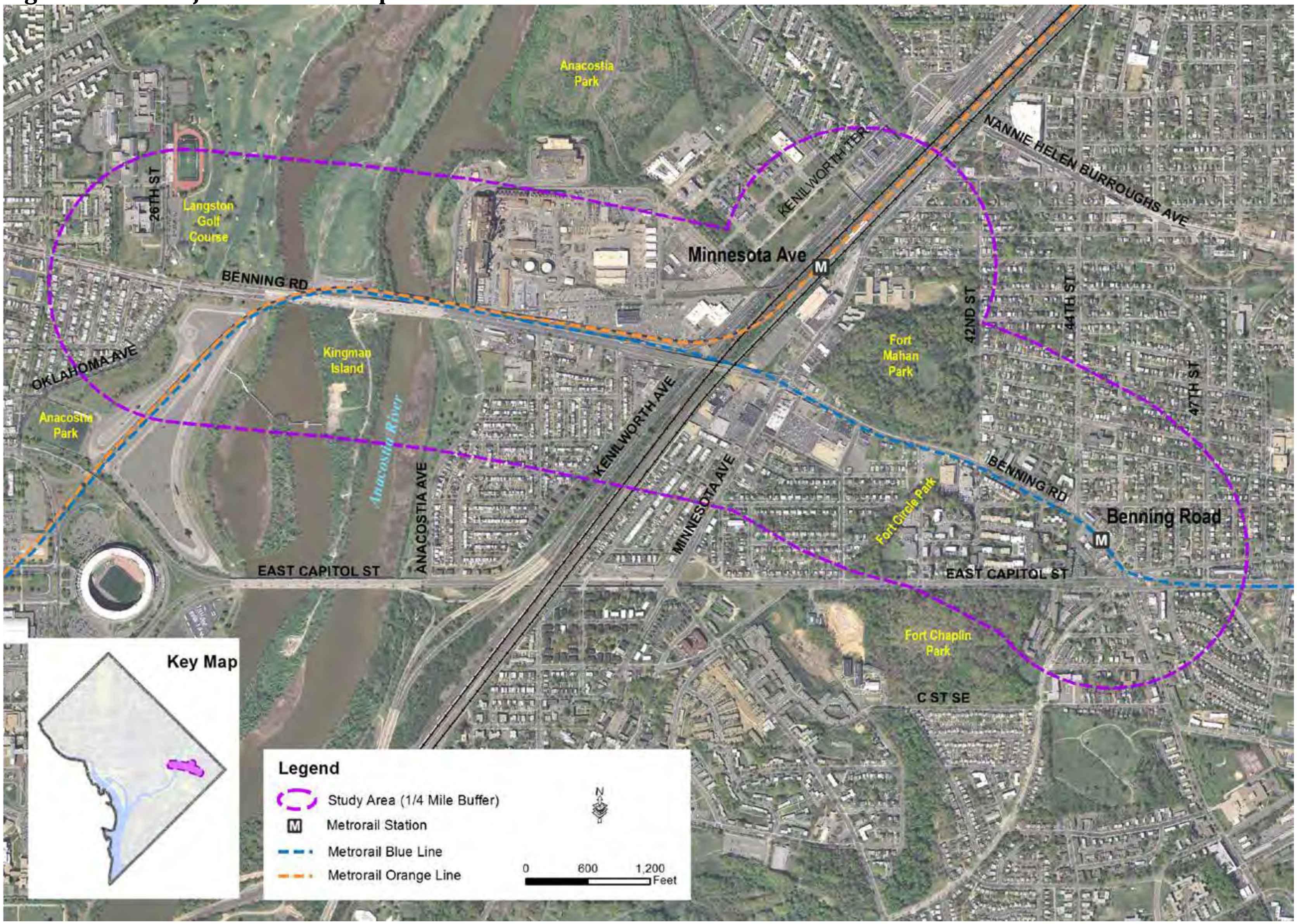
If you have any questions, please feel free to contact me at Clarence.Dickerson@dc.gov. We respectfully request that you email your comments to our consultant team, Karl Kratzer at Karl.Kratzer@aecom.com.

Sincerely,

Clarence Dickerson
Project Manager, Benning Road and Bridge Transportation Improvements EA

cc: Michael Hicks (FHWA)
Dan Koenig (FTA)
Faisal Hameed (DDOT)

Figure 1: Project Location Map



From:	Walker, Paul K (DHCD)
To:	Clarance.Dickerson@dc.gov; Kratzer, Karl
Cc:	Anyaegbunam, Oke (DHCD)
Subject:	Benning Rd and Bridge Transportation Inmprovements Environmental Assessment
Date:	Tuesday, March 11, 2014 12:36:34 PM

Clarence and Karl

I have read and reviewed the DDOT attachment that was sent to Robert Trent, former Chief of Staff here at the Department of Housing and Community Development. At this time we have no issues, comments or suggestion regarding the assessment of the environment and cultural resources for this project.
Thank you for your consideration in this matter.

Sincerely
Paul Walker
Architect
Development Finance Division
Deparment of Housing and Community Developemnt

GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF TRANSPORTATION

d. Infrastructure Project Management Administration

May 4, 2014

Peter May
Associate Regional Director - Land, Resources, and Planning
U.S. Department of Interior - NPS, National Capital Region
1100 Ohio Drive, SW
Washington, DC 20242

Subject: Invitation to become a Cooperating Agency on the Benning Road and Bridge Transportation Improvements Project

Dear Mr. May:

The District Department of Transportation (DDOT) and the Federal Highway Administration (FHWA) are preparing an Environmental Assessment in accordance with the National Environmental Policy Act for transportation improvements on Benning Road, between 26th and East Capitol Streets NE, and on Minnesota Avenue, between the Benning Road intersection and the Minnesota Avenue Metrorail Station (see attached location map). The project will also include the assessment of historic resources in accordance with the Section 106 of the National Historic Preservation Act. The majority of proposed improvements would occur within the existing right-of-way and would address Safety, Roadway and Bridge conditions, Multi-modal Transportation Improvements, Transit needs, and pedestrian safety and access.

With this letter, we extend the National Park Service (NPS) an invitation to become a cooperating agency with FHWA in the development of the NEPA document for the Benning Road and Bridge Transportation Improvements project in accordance with 40 CFR 1501.6 of the Council on Environmental Quality's Regulations for Implementing the Procedural Provision of NEPA. Pursuant to Section 1305(c) of Moving Ahead for Progress in the 21st Century (MAP-21), cooperating agencies are responsible to carry out their obligations under applicable laws concurrently with the lead agency's environmental review process, unless doing so would impair their ability to conduct needed analysis or otherwise carry out those obligations; and for formulating and implementing administrative, policy, and procedural mechanisms to enable the agency to ensure completion of the environmental review process in a timely, coordinated, and environmentally responsible manner. We suggest that your agency's role in the development of this project should include the following activities as they relate to your area of expertise:

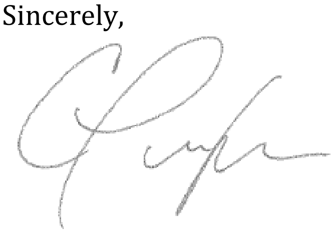
1. Provide meaningful and early input on defining the project purpose and need, determining the range of alternatives to be considered, and the methodologies and level of detail required in the alternatives analysis.
2. Participate in monthly coordination meetings and quarterly interdisciplinary team meetings, as appropriate.
3. Timely review and comment on the pre-draft and pre-final NEPA documents to reflect views and concerns of your agency on the adequacy of the document, alternatives considered, and the anticipated impacts and mitigation.

Please provide a written response indicating NPS' acceptance or denial of this invitation no later than 30 days from the date of receipt of this letter. If you accept, please accept the appropriate contact person within your organization for future coordination. If your agency declines, the response should state the reason(s) for declining the invitation, specifically stating in the response that it:

- Has no jurisdiction or authority with respect to the project;
- Has no expertise or information relevant to the project; and
- Does not intend to submit comments on the project.

If you have any questions or would like to discuss the project or our agencies' respective roles in more detail, please feel free to contact me at Clarence.Dickerson@dc.gov.

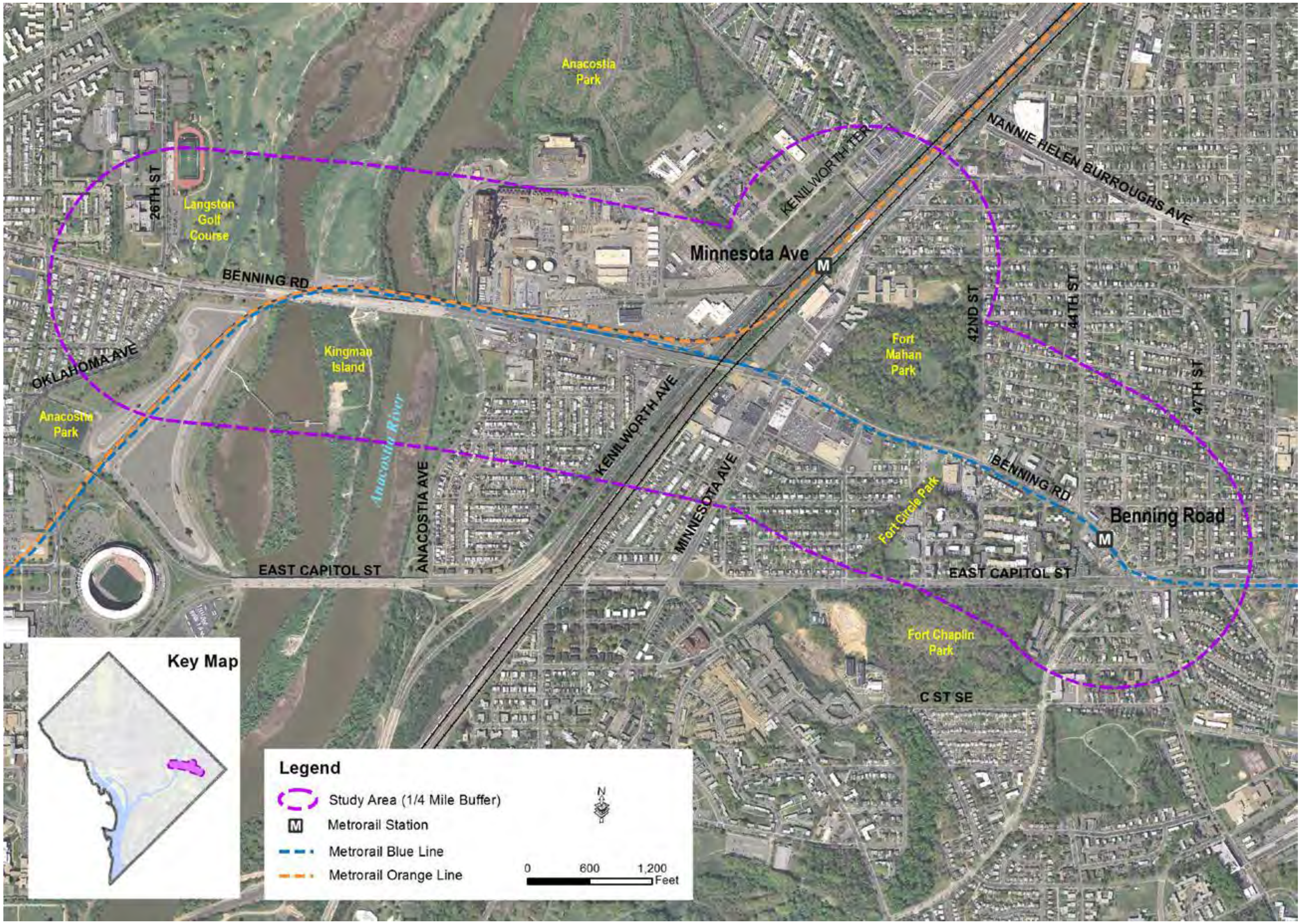
Sincerely,



Clarence Dickerson
Project Manager, Benning Road and Bridge Transportation Improvements EA

cc: Michael Hicks (FHWA)
Faisal Hameed (DDOT)

Figure 1: Project Location Map



GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF TRANSPORTATION

d. Infrastructure Project Management Administration

May 4, 2014

Marcel Acosta
Executive Director
National Capital Planning Commission
401 9th Street, NW, Suite 500
Washington, DC 20004

Subject: Invitation to become a Cooperating Agency on the Benning Road and Bridge Transportation Improvements Project

Dear Mr. Acosta:

The District Department of Transportation (DDOT) and the Federal Highway Administration (FHWA) are preparing an Environmental Assessment in accordance with the National Environmental Policy Act for transportation improvements on Benning Road, between 26th and East Capitol Streets NE, and on Minnesota Avenue, between the Benning Road intersection and the Minnesota Avenue Metrorail Station (see attached location map). The project will also include the assessment of historic resources in accordance with the Section 106 of the National Historic Preservation Act. The majority of proposed improvements would occur within the existing right-of-way and would address Safety, Roadway and Bridge conditions, Multi-modal Transportation Improvements, Transit needs, and pedestrian safety and access.

With this letter, we extend the National Park Service (NPS) an invitation to become a cooperating agency with FHWA in the development of the NEPA document for the Benning Road and Bridge Transportation Improvements project in accordance with 40 CFR 1501.6 of the Council on Environmental Quality's Regulations for Implementing the Procedural Provision of NEPA. Pursuant to Section 1305(c) of Moving Ahead for Progress in the 21st Century (MAP-21), cooperating agencies are responsible to carry out their obligations under applicable laws concurrently with the lead agency's environmental review process, unless doing so would impair their ability to conduct needed analysis or otherwise carry out those obligations; and for formulating and implementing administrative, policy, and procedural mechanisms to enable the agency to ensure completion of the environmental review process in a timely, coordinated, and environmentally responsible manner. We suggest that your agency's role in the development of this project should include the following activities as they relate to your area of expertise:

4. Provide meaningful and early input on defining the project purpose and need, determining the range of alternatives to be considered, and the methodologies and level of detail required in the alternatives analysis.
5. Participate in monthly coordination meetings and quarterly interdisciplinary team meetings, as appropriate.
6. Timely review and comment on the pre-draft and pre-final NEPA documents to reflect views and concerns of your agency on the adequacy of the document, alternatives considered, and the anticipated impacts and mitigation.

Please provide a written response indicating NPS' acceptance or denial of this invitation no later than 30 days from the date of receipt of this letter. If you accept, please accept the appropriate contact person within your organization for future coordination. If your agency declines, the response should state the reason(s) for declining the invitation, specifically stating in the response that it:

- Has no jurisdiction or authority with respect to the project;
- Has no expertise or information relevant to the project; and
- Does not intend to submit comments on the project.

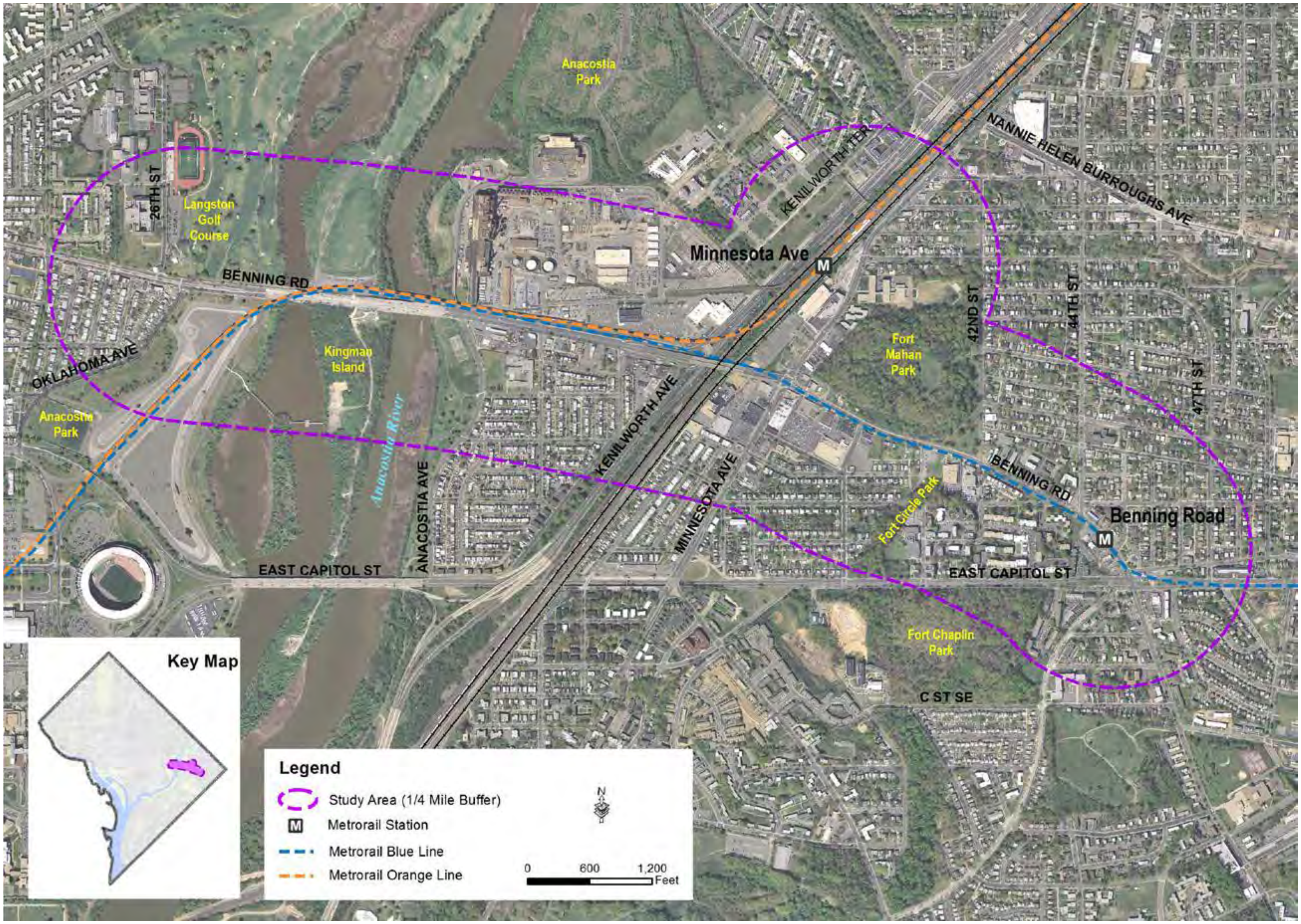
If you have any questions or would like to discuss the project or our agencies' respective roles in more detail, please feel free to contact me at Clarence.Dickerson@dc.gov.

Sincerely,

Clarence Dickerson
Project Manager, Benning Road and Bridge Transportation Improvements EA

cc: Christine Saum (NCPC)
Elizabeth Miller (NCPC)
Michael Hicks (FHWA)
Faisal Hameed (DDOT)

Figure 1: Project Location Map



d. **Infrastructure Project Management Administration**

May 4, 2014

Daniel Koenig
Environmental Protection Specialist
Federal Transit Administration I DC Metro
1990 K Street, NW I Suite 510
Washington, DC 20006

Subject: Invitation to become a Cooperating Agency on the Benning Road and Bridge Transportation Improvements Project

Dear Mr. Koenig:

The District Department of Transportation (DDOT) and the Federal Highway Administration (FHWA) are preparing an Environmental Assessment in accordance with the National Environmental Policy Act for transportation improvements on Benning Road, between 26th and East Capitol Streets NE, and on Minnesota Avenue, between the Benning Road intersection and the Minnesota Avenue Metrorail Station (see attached location map). The project will also include the assessment of historic resources in accordance with the Section 106 of the National Historic Preservation Act. The majority of proposed improvements would occur within the existing right-of-way and would address Safety, Roadway and Bridge conditions, Multi-modal Transportation Improvements, Transit needs, and pedestrian safety and access.

With this letter, we extend the National Park Service (NPS) an invitation to become a cooperating agency with FHWA in the development of the NEPA document for the Benning Road and Bridge Transportation Improvements project in accordance with 40 CFR 1501.6 of the Council on Environmental Quality's Regulations for Implementing the Procedural Provision of NEPA. Pursuant to Section 1305(c) of Moving Ahead for Progress in the 21st Century (MAP-21), cooperating agencies are responsible to carry out their obligations under applicable laws concurrently with the lead agency's environmental review process, unless doing so would impair their ability to conduct needed analysis or otherwise carry out those obligations; and for formulating and implementing administrative, policy, and procedural mechanisms to enable the agency to ensure completion of the environmental review process in a timely, coordinated, and environmentally responsible manner. We suggest that your agency's role in the development of this project should include the following activities as they relate to your area of expertise:

7. Provide meaningful and early input on defining the project purpose and need, determining the range of alternatives to be considered, and the methodologies and level of detail required in the alternatives analysis.
8. Participate in monthly coordination meetings and quarterly interdisciplinary team meetings, as appropriate.
9. Timely review and comment on the pre-draft and pre-final NEPA documents to reflect views and concerns of your agency on the adequacy of the document, alternatives considered, and the anticipated impacts and mitigation.

Please provide a written response indicating NPS' acceptance or denial of this invitation no later than 30 days from the date of receipt of this letter. If you accept, please accept the appropriate contact person within your organization for future coordination. If your agency declines, the response should state the reason(s) for declining the invitation, specifically stating in the response that it:

- Has no jurisdiction or authority with respect to the project;
- Has no expertise or information relevant to the project; and
- Does not intend to submit comments on the project.

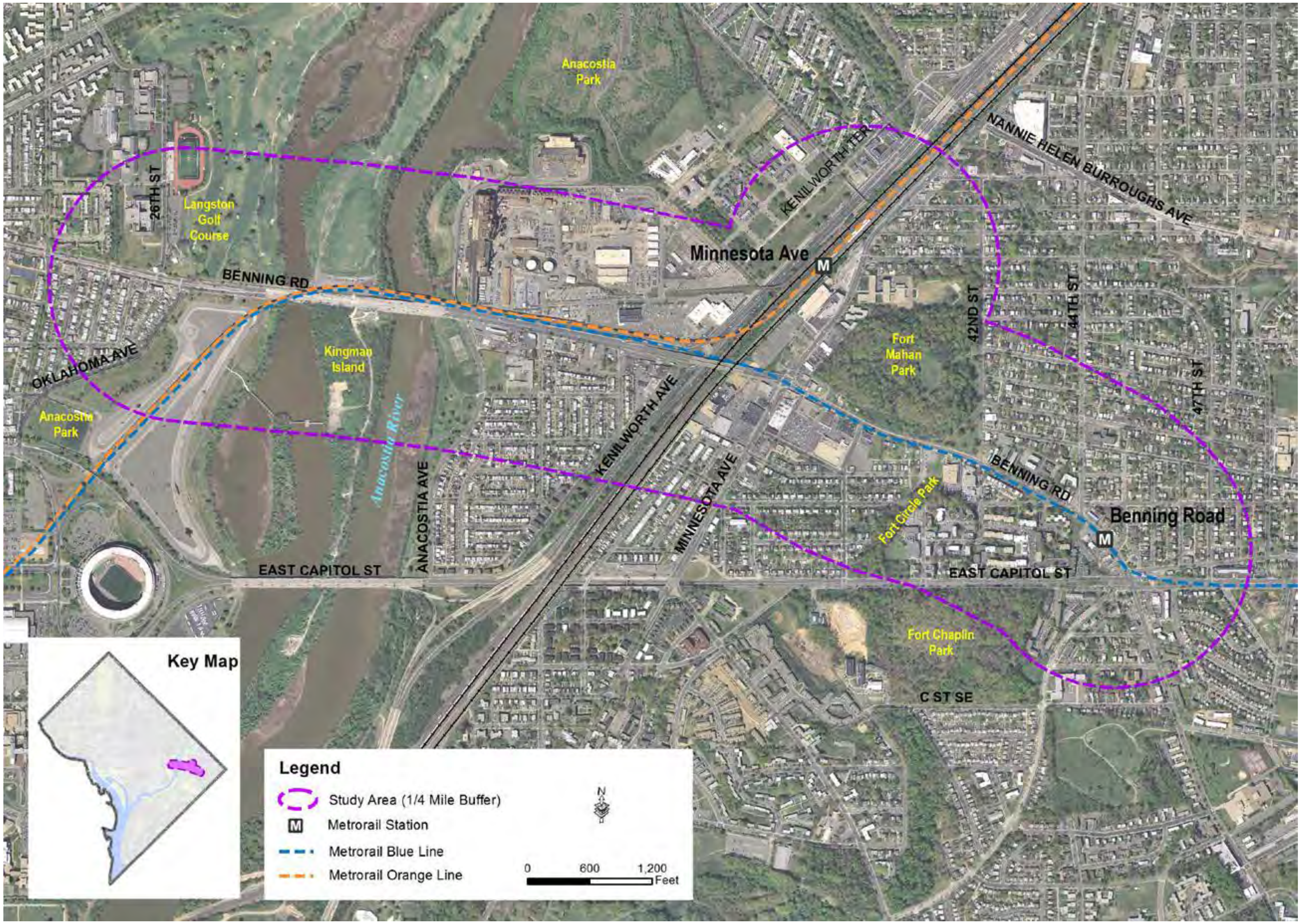
If you have any questions or would like to discuss the project or our agencies' respective roles in more detail, please feel free to contact me at Clarence.Dickerson@dc.gov.

Sincerely,

Clarence Dickerson
Project Manager, Benning Road and Bridge Transportation Improvements EA

cc: Michael Hicks (FHWA)
Melissa Barlow (FTA)
Faisal Hameed (DDOT)

Figure 1: Project Location Map



Attachment B – Section 106 Correspondence

d. Infrastructure Project Management Administration

February 18, 2014

Mr. David Maloney
District of Columbia State Historic Preservation Office
1100 4th Street, SW
Suite E650
Washington, DC 20024

Subject: Benning Road and Bridge Transportation Improvements Environmental Assessment and Section 106 Evaluation

Dear Mr. Maloney:

The District Department of Transportation (DDOT), in cooperation with the Federal Highway Administration (FHWA) is preparing an Environmental Assessment (EA) for the Benning Road and Bridge Transportation Improvements Project in accordance with the National Environmental Policy Act (NEPA). The project will also consider effects to historic properties in accordance with the requirements of Section 106 of the National Historic Preservation Act (16 USC §470) and its implementing regulations (36 CFR Part 800). The purpose of this letter is to initiate Section 106 consultation for the Benning Road and Bridge Transportation Improvements Project.

The Benning Road and Bridge Transportation Improvements Project is located in Northeast Washington, DC. The project area extends from the intersection of Benning Road and Oklahoma Avenue to the Minnesota Avenue and Benning Road Metrorail Stations (see attached location map). The majority of proposed improvements would occur within the existing right-of-way and would address Safety, Roadway and Bridge conditions, Multi-modal Transportation Improvements, Transit needs, and pedestrian safety and access. The agency scoping meeting for the project will be held on Tuesday March 4, 2014 at 9:00 am at DDOT Office, Conference Room 439, 55 M St, SE, Washington DC 20003 as part of the monthly DDOT Interagency meeting.

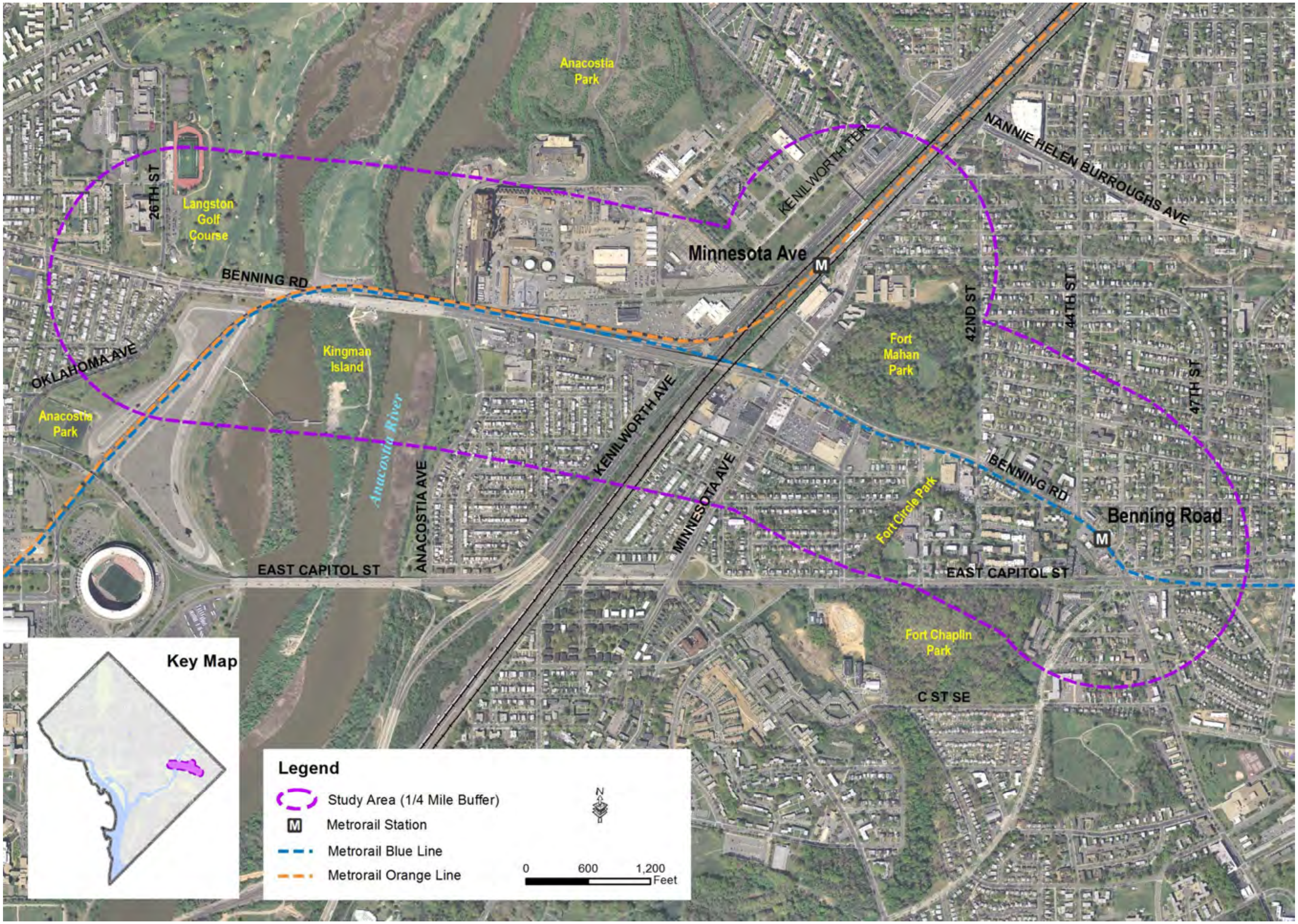
We will contact you shortly to set up meetings to discuss this project. Please contact me if you have additional questions or comments. Thank you very much, and we look forward to working with you on this project.

Sincerely,

Clarence Dickerson
Project Manager,
202-671-4586

Cc: Faisal Hameed, DDOT
Mike Hicks, FHWA
Daniel Koenig, FTA
Andrew Lewis, DC SHPO
Jennifer Hirsh, NCPC
David Hayes, NPS
Carol Legard, ACHP

Figure 1: Project Location Map



GOVERNMENT OF THE DISTRICT OF COLUMBIA
STATE HISTORIC PRESERVATION OFFICER

March 25, 2014

Mr. Clarence Dickerson
Project Manager
District Department of Transportation
Infrastructure Project Management Administration
55 M Street, SE
Suite 400
Washington, DC 20003

RE: Initiation of Section 106 Consultation for the Benning Road and Bridge Transportation Improvements Project (Benning Road Extension)

Dear Mr. Dickerson:

Thank you for initiating consultation with the DC State Historic Preservation Office (SHPO) regarding the above-referenced undertaking which we understand is to be carried out with assistance from the Federal Highway Administration and the Federal Transit Administration. We are writing in accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, to provide our initial comments regarding effects on historic properties.

Based upon a review of your submittal and recent discussions with DDOT staff, we understand that the project will involve a variety of transportation-related improvements designed to facilitate an extension of the forthcoming "One City Streetcar Line" from the intersection of 26th Street and Benning Road, NE to locations near the Benning Road and/or Minnesota Avenue Metro Stations. Since the project is still in the early planning phases, a draft Area of Potential Effect (APE) has yet to be prepared but, by referring to the "Study Area" shown in the image to the right, we identified several known historic properties and several which we believe should be evaluated using our Determination of Eligibility Form in order to determine whether they are eligible for listing in the National Register of Historic Places. The known historic properties and those recommended for evaluation are listed on the following pages.

1100 4th Street, SW, Suite E650, Washington, D.C. 20024 Phone: 202-442-7600, Fax: 202-442-7638

The listed/eligible properties include:

1. The Langston Terrace Dwellings at 21st Street and Benning Road, NE
2. Spingarn High School at 2500 Benning Road, NE
3. The Brown, Phelps, and Young Schools just to the north of Spingarn
4. The Langston Golf Course
5. The Anacostia Park Historic District
6. The Senator Theater Entrance Pavilion at 3950 Minnesota Avenue, NE
7. Fort Circle Parks Historic District/Fort Mahan
8. Engine Company No. 27 at 4201 Minnesota Avenue, NE
9. Mayfair Mansions at Kenilworth Avenue, Jay and Hayes Streets, NE

The properties recommended for evaluation using a DOE Form include:

1. The Pepco Power Plant Complex at Benning Road
2. 3341 Benning Road, NE: a streamlined currently building known as the "Washington Insurance"
3. 3439 Benning Road, NE: a mid-1940s automobile-related shopping complex
4. 3445 Benning Road, NE: a substantially altered, but relatively early building
5. 4202 Benning Road, NE: potentially associated with late 19th century African-American Community/designed by African-American architects
6. 4208 Benning Road, NE: Potentially associated with late 19th century African-American Community/designed by African-American architects
7. 4248 Benning Road, NE: a building with some modest architectural detail
8. 4270 Benning Road, NE: "New Mount Calvary Baptist Church" may have been relocated from the east side of East Capitol and the former site of Payne's Cemetery.
9. 4510 East Capitol Street, NE: the "Shrimp Boat" was constructed c. 1953 and already considered a "landmark" of sorts by the local community.

Please note that additional survey and/or DOEs may be recommended after we learn more about the scope of the project, review a draft APE, and consider the comments of the consulting parties.
Also note that, depending upon the extent and location of ground disturbing activities associated with the project, archaeological survey may be required in order to determine the potential for effects on archaeological resources.

We look forward to consulting further with all parties to continue the Section 106 review of this undertaking. If you should have any questions or comments regarding this matter, please contact me at andrew.lewis@dc.gov or 202-442-8841 (for historic built environment) or Ruth Trocolli at ruth.trocolli@dc.gov or 202-442-8836 (for archaeology). Otherwise, thank you for providing this initial opportunity to review and comment.

Sincerely,

Andrew Lewis

C. Andrew Lewis
Senior Historic Preservation Specialist
DC State Historic Preservation Office

14-069

GOVERNMENT OF THE DISTRICT OF COLUMBIA
STATE HISTORIC PRESERVATION OFFICER

August 20, 2014

Mr. Clarence Dickerson
Project Manager
District Department of Transportation
Infrastructure Project Management Administration
55 M Street, SE
Suite 400
Washington, DC 20003

RE: Continuation of Section 106 Consultation for the Benning Road and Bridge Transportation Improvements Project (Benning Road Extension)

Dear Mr. Dickerson:

Thank you for providing additional information about the above-referenced undertaking. Based upon our review of the supplemental documentation and the discussions held during our recent monthly meetings with DDOT, we are writing in accordance with Section 106 of the National Historic Preservation Act to provide further comments regarding the identification of, and potential effects on, historic properties.

We have reviewed the revised Area of Potential Effect (APE) for the project (shown in the image below) and concur that it should be generally sufficient to take into account the direct and indirect effects of the project, based upon the information we have reviewed to-date. However, we recommend that the schools along 26th Street, NE (i.e. Spingarn, Brown, Phelps and Young) be included in the APE since their location atop the hill provides an unobstructed view of the project area along Benning Road. These properties have already been determined eligible for listing in the National Register of Historic Places as a historic district that has yet to be named. If necessary, the APE can be further revised at a later time to address other potential historic properties that may be affected by the project.

As you may recall, the following properties were recommended for evaluation using a Determination of Eligibility (DOE) Form in our letter of March 25, 2014:

1. The Pepco Power Plant Complex at Benning Road
2. 3341 Benning Road, NE: a streamlined currently building known as the "Washington Insurance"
3. 3439 Benning Road, NE: a mid-1940s automobile-related shopping complex
4. 3445 Benning Road, NE: a substantially altered, but relatively early building
5. 4202 Benning Road, NE: potentially associated with late 19th century African-American Community/designed by African-American architects
6. 4208 Benning Road, NE: Potentially associated with late 19th century African-American Community/designed by African-American architects
7. 4248 Benning Road, NE: a building with some modest architectural detail
8. 4270 Benning Road, NE: "New Mount Calvary Baptist Church" may have been relocated from the east side of East Capitol and the former site of Payne's Cemetery.
9. 4510 East Capitol Street, NE: the "Shrimp Boat" was constructed c. 1953 and already considered a "landmark" of sorts by the local community.

Since our initial letter, the project consultants have identified a number of other properties within the APE that are 50 years old or older and recommended for survey. Based upon our review of those properties, we offer the following comments:

10. Call boxes along Benning Road, NE: evaluate with a DOE.
11. 4001 Benning Road, NE: evaluate with a DOE.
12. 3399 Benning Road, NE: evaluate with a DOE.
13. 3621 Benning Road, NE: no need to evaluate with a DOE. No distinction or integrity.

14(a). Vicinity of 3700 Benning Road, NE: evaluate with a DOE.

14(b). 3703-05 Benning Road, NE: previously considered as part of DC Warehouse Survey. Not identified as eligible, but may have potential for significance based upon more in-depth research. Evaluate with a DOE.

15. 3917 Benning Road, NE: no need to evaluate with a DOE. No distinction or integrity.
16. 3919 Benning Road, NE: no need to evaluate with a DOE. Extensively altered. No integrity.
17. 3934 Benning Road, NE: no need to evaluate this particular residence.
18. 3938 Benning Road, NE: most likely the work of African-American Architect Lewis Giles (see attached partial bio). Evaluate with a DOE.
19. 3940 Benning Road, NE: most likely the work of African-American Architect Gus Bull (see attached partial bio). Evaluate with a DOE.
20. 3942 Benning Road, NE: no need to evaluate this particular residence.
21. 4035-4037 Benning Road, NE: no need to evaluate this particular residence.
22. 4049 Benning Road, NE: no need to evaluate this particular residence.
23. 4053 Benning Road, NE: most likely the work of African-American Architect Lewis Giles (see attached partial bio). Evaluate with a DOE.
24. 4057 Benning Road, NE: no need to evaluate this particular residence.
25. 4061 Benning Road, NE: no need to evaluate this particular residence.

26. 4145 Benning Road, NE: previously determined unlikely to be eligible based on cursory review. Additional research would be beneficial. Evaluate with a DOE.
27. 4201-4243 Benning Road, NE: part of historically black community called "Capital View." Evaluate with a DOE.
28. 4228 Benning Road, NE: most likely the work of African-American Architect R. C. Archer (see attached partial bio). Evaluate with a DOE.
29. 4234 Benning Road, NE: most likely the work of African-American Architect Lewis Giles (see attached partial bio). Evaluate with a DOE.
30. 4236 Benning Road, NE: most likely the work of African-American Architect Cyril Bow (see attached partial bio). Evaluate with a DOE.
31. 4244 Benning Road, NE: no need to evaluate this particular residence.
32. 4246 Benning Road, NE: no need to evaluate this particular residence.
33. 4254 Benning Road, NE: most likely the work of African-American Architect Lewis Giles (see attached partial bio). Evaluate with a DOE.
34. 4256-4264 Benning Road, NE: evaluate with a DOE. May date to 1954 and fall outside the scope of "Apartment Buildings in Washington DC 1880-1945" Multiple Property Document.
35. 4280 Benning Road, NE: most likely the work of George T. Santmyers. Evaluate with a DOE. May date to 1942 and fall within the scope of "Apartment Buildings in Washington DC 1880-1945" Multiple Property Document.
36. 4280 Benning Road, NE: no need to evaluate this particular residence.
37. 4414 Benning Road, NE: previously determined ineligible. No longer extant.
38. 4430 Benning Road, NE: No longer extant.
39. 4212 East Capitol Street, NE: evaluate with a DOE.

We look forward to continuing consultation. To that end, some additional information about the above-referenced architects may be available in our files. We will be pleased to make this information available for purposes of completing the requested DOE Forms. And as for archaeology, much of the project area has not been surveyed. Please remember to begin identifying staging areas and other sites where ground disturbing activities may be anticipated outside of the existing streets. We will provide additional comments regarding the need for any archaeological survey after more specificity about project-related ground disturbance can be established.

If you should have any questions or comments regarding this matter, please contact me at andrew.lewis@dc.gov or 202-442-8841 (for historic built environment) or Ruth Trocolli at ruth.trocolli@dc.gov or 202-442-8836 (for archaeology). Otherwise, thank you for providing this additional opportunity to review and comment.

Sincerely,

Andrew Lewis

C. Andrew Lewis
Senior Historic Preservation Specialist
DC State Historic Preservation Office

14-069

LEWIS WENTWORTH GILES, SR. (1894-1974)

Lewis Wentworth Giles was born in 1894 in Amelia County, in southside Virginia southwest of Richmond. Although Giles has been little studied, he appears to have been one of Washington's most prolific early 20th century African American architects. By 1908, Giles had moved to Washington where he attended Armstrong Technical School, graduating in 1913.[1] He attended the University of Illinois from 1914 to 1917[2] but was drafted into the army before he could graduate.[3] He worked for African American architect Isaiah T. Hatton (see biography) from 1918 until Hatton's untimely death in 1921.[4] Giles appears to have continued Hatton's practice from office space in the Pythian (True Reformer Building) at 12th and U Street, NW.[5] In 1929, he moved his practice to his Deanwood residence at 4428 Hunt Place, NE, where he remained through 1950. Like a number of African American architects, Giles did not seek registration until 1950, when the law changed to require architectural registration for preparation of plans for buildings over 2 stories or 1000 sq. ft. Giles' son, Lewis Giles, Jr. (see biography), also went to the University of Illinois and became an architect. Lewis Giles, Sr. died in 1974.[6]

Sources:	D.C. Board of Examiners and Registrars of Architects Case Files; D.C. City Directories; D.C. Engineer's Records for Isaiah T. Hatton; Lee, J.V. "Deanwood Historic Study: The Role of Black Architects in the Development of Deanwood;" Oral interview with Lewis Giles, Jr.
Illustrations:	Material from Lewis Giles, Sr. scrapbook
Further work:	Incorporate material from oral interview with Lewis Giles, Jr. Incorporate material from Lewis Giles, Sr. scrapbook

BB: 10/16/95

GUS BULL

Gus Bull was listed as an architect in the 1936 City Directory. His residence was located at 2224 12th Place, N.W. In 1933, the Board of Architectural Registration noted that "the name G.N. Bull, Architect" was printed on Romulus Archer's letterhead and wrote Archer that "Mr. Bull is not entitled to any designation which would indicate or imply that he is an architect or a registered architect."[1] Bull designed houses in Deanwood.[2]

Sources: D.C. City Directories; D.C. Board of Examiners and Registrars of Architects Case File for Romulus Archer; Lee, J.V. "Deanwood Historic Study: The Role of Black Architects in the Development of Deanwood."

Illustration: None

BB: 10/9/95

ROMULUS C. ARCHER, JR. (1890-1968)

Romulus Cornelius Archer, Jr. was born in Norfolk, Virginia in 1890 and died in Washington, D.C. in 1968. Both his father and uncle were contractors in Virginia.[1] Archer worked as a carpenter before he became an architect.[2] He was the son of Romulus C. Archer, a contractor who was listed in the 1908 Norfolk City Directory as a plasterer.[3] Archer attended Norfolk public schools, graduating from high school in June 1908. He enrolled in Norfolk Mission College for two terms (1908-1910) and in another school for three terms (1911-1913).[4] He then attended Columbia University's School of Architecture for one year in 1913.[5]

In his application for registration, Archer stated that he began the practice of architecture in 1915.[6] Archer joined the Army in 1916 and served as a bandsman in World War I.[7] From June 1921 through November 15, 1921, Archer worked in the Supervising Architect's office in the U.S. Treasury Department. He opened his own office in Washington in December 1921, producing designs for churches, educational buildings, and small commercial structures. Archer was among the first African American architects to be registered in the District of Columbia. His registration number was 117, dated January 15, 1926. Archer's letterhead for that year listed "branches" in Norfolk and Durham.[8]

During World War II Archer worked as a drafting instructor for the government.[9] In addition to his registration in the District, Archer was registered to practice architecture in Maryland, North Carolina, and Virginia. In 1954 he received the Washington Board of Trade Award for Superior Design and in 1964 the "Y" Men named him "Citizen of the Year" for providing employment opportunities for minorities.[10] Gus Bull, Victor Agebite,

Continued Next Page

Leroy Brown, and John Nixon were among the African Americans who worked in Archer's office.[11]

Archer was a member of the National Technical Association and served as the organization's treasurer for a number of years. He was also a member of the Florida Avenue Baptist Church, which he joined in 1921. Archer was married to Louise Archer, a teacher who was a native of Fayetteville, North Carolina. At the time of her death in 1948, she resided in Durham, North Carolina.[12] Both she and Archer are buried in Arlington National Cemetery.

Sources: Arlington National Cemetery Burial Records (Arlington National Cemetery Adminstration); D.C. City Directories; D.C. Board of Examiners and Registrars of Architects Case Files; Ethridge, Harrison Mosley. "The Black Architects of Washington, D.C., 1900-Present. Ph.D. Dissertation, Catholic University of America, 1979; Oral Interview with John H. Nixon, July 1994; "Romulus C. Archer, Jr., 77, Architect Here for 40 Years." *Evening Star,* December 1, 1968; Wells, John. "The Virginia Architects, 1820-1955," mss. of forthcoming book, courtesy of the author; Wirz, Hans and Richard Striner. *Washington Deco: Art Deco in the Nation's Capital.* Washington: Smithsonian Institution Press, 1984.

Illustrations: Photo with obit

Further Work: Check Board of Trade files -- bldg for 1954 award
Check 1964 NTA Bulletin for Obituary

CYRIL G. BOW

Originally from Syracuse, New York, Cyril Bow received his B. Arch. from Cornell University. For many years he was the chief draftsman in the office of Albert I. Cassell.[1]

His wife, Marguerite Smith Bow, was a music teacher in the Washington public schools for 33 years (Wormley, Young and Phillips schools). She graduated from Miner Normal School and Howard University School of Music (1924). The Bows were members of St. Mary's Episcopal Church. Mrs. Bow died in 1945 and was buried in Harmony Cemetery.[2]

Sources:	Obituary of wife Marguerite Smith Bow. *Washington Post* and *Washington Star*, July 8, 1945; Julian Euell. Oral history interview with Clarence B. Wheat, ; Historic American Buildings Survey documentation for Founders Library compiled by Harrison M .Ethridge; National Technical Association, *National Technical Year Book, 1936-37*, Detroit, 1937; National Technical Association, *National Technical Association Directory, 1949*.
Illustrations:	None
Further Research:	Call St. Mary's.

HE: 10/16/95

U.S. Department of Transportation
Federal Highway Administration

District of Columbia Division
(202) 219-3570 FAX 219-3545

1990 K Street, NW
Suite 510
Washington, DC 20006-1103

March 16, 2015

In Reply Refer To: HFO-DC

Mr. David Maloney
District of Columbia Historic Preservation Office
1100 4th Street, SW
Suite E650
Washington, DC 20024

Dear Mr. Maloney:

In the enclosed District Department of Transportation (DDOT) letter dated February 18, 2014, DDOT stated the purpose of the letter was to "initiate Section 106 consultation for the Benning Road and Bridge Transportation Improvements Project". As stated in 36 CFR 800.1: (a) *Purposes of the section 106 process. Section 106 of the National Historic Preservation Act requires* ***Federal agencies*** *to take into account the effects of their undertakings on historic properties and afford the Council a reasonable opportunity to comment on such undertakings.* 36 CFR 800.2(a) states: ***Agency official****. It is the statutory obligation of the Federal agency to fulfill the requirements of section 106 and to ensure that an agency official with jurisdiction over an undertaking takes legal and financial responsibility for section 106 compliance in accordance with subpart B of this part.* Agency as defined in 36 CFR 800.16(b) means: agency as defined in 5 U.S.C. 551 which states: (1) "agency" means each authority of the Government of the United States, whether or not it is within or subject to review by another agency, **but does not include**— *(D) the government of the District of Columbia.*

In the future, please be aware that DDOT has **no authority** to initiate the Section 106 process as stated in the referenced February 18, 2014 letter. While the letter includes me as one of those copied on the correspondence, I never received a copy of the letter and only became aware of it during my recent review of Appendix F of the *Benning Road and Bridge Transportation Improvements Project Environmental Assessment*. To my knowledge, this is the first instance of this type of breach regarding the Section 106 process with regards to an action being proposed by DDOT. The Section 106 process for the noted Environmental Assessment was not initiated with your receipt of the February 18, 2014 letter; it is being formerly initiated with this letter.

While the breach in process was unfortunate it appears, based on the information contained in Appendix F, that a substantial body of work has already been developed regarding the historic resources the proposed undertaking may have an effect on. The DDOT letter dated February 18, 2014 included a project location map. Your response to that letter, dated March 25, 2014, inclusive of a follow-up response dated August 20, 2014 (both enclosed) demonstrate the current level of involvement by your office concerning the identification of historic resources inclusive of an Area of Potential Effects and a Determination of Eligibility Form. This formal initiation of the Section 106 process post the work already accomplished will not negate activities accomplished to date. There will have to be consultations with your office on this undertaking; a plan to involve the public and an identification of consulting parties. I understand DDOT has scheduled a meeting with Andrew Lewis of your staff on March 17, 2015 to discuss this project; my intention is to attend that meeting and engage in consultations with Andrew on this project at that time.

If there are questions or comments, please contact me at 202-219-3513 or michael.hicks@dot.gov. Thank you for your cooperation in this undertaking.

Sincerely,

Michael Hicks
Environmental Manager

Enclosures:

Cc: Andrew Lewis, DC SHPO
Clarence Dickerson, DDOT

GOVERNMENT OF THE DISTRICT OF COLUMBIA
STATE HISTORIC PRESERVATION OFFICER

April 8, 2015

Mr. Michael Hicks
Environmental Manager
U.S. Department of Transportation
Federal Highway Administration
District of Columbia Division
1990 K Street, NW
Suite 510
Washington, DC 20006-1103

RE: Formal Initiation of Section 106 Consultation for the Benning Road and Bridge Transportation Improvements Project (Benning Road Extension)

Dear Mr. Hicks:

Thank you for your letter of March 16, 2015 which served to formally initiate consultation with the District of Columbia State Historic Preservation Officer (DC SHPO) regarding the above-referenced undertaking. As you are aware, we have been working with DDOT over the last several months to carry out preliminary identification and evaluation efforts that will assist FHWA in meeting its obligations under Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800.

Of particular note are a number of Determination of Eligibility (DOE) Forms that were prepared by the project consultants and forwarded to our office for review. We appreciate that the forms were thoroughly researched and well-written. Our overall recommendations regarding National Register eligibility are summarized in the attached table. More detailed comments have been incorporated directly into the DOEs which we will forward electronically.

We look forward to consulting further with FHWA and all parties to continue the Section 106 review process. If you should have any questions or comments regarding this matter, please contact me at andrew.lewis@dc.gov or 202-442-8841 (for historic built environment) or Ruth Trocolli at ruth.trocolli@dc.gov or 202-442-8836 (for archaeology). Otherwise, thank you for providing this opportunity to review and comment.

Sincerely,

C. Andrew Lewis
Senior Historic Preservation Specialist
DC State Historic Preservation Office

14-069

DC SHPO Recommendations Regarding the Determinations of Eligibility for the Benning Road and Bridge Transportation Improvements Project (Benning Road Extension)

	Recommended Eligible by DC SHPO	Recommended Ineligible by DC SHPO
1		217-223 42nd Street NE
2		227 - 231 42nd Street NE
3	3300 Benning Road NE; PEPCO Power Plant Bld 32	
4		3341 Benning Road NE
5		3399 Benning Road, NE; District Cab Company
6		3423 - 3439 Benning Road, NE
7		3455 Benning Road, NE; Benning Liquors
8		3701 Benning Road, NE; A. Loeffler Sausage & Provisions Co.
9	3938 Benning Road, NE	
10		3940 Benning Road, NE; Kerrick House
11	4001 Benning Road, NE; Stewarts Funerals	
12		4053 Benning Road, NE
13		4145 Benning Road, NE; Police Station/MPD HQ
14	4201 - 4243 Benning Road, NE	
15		4202 Benning Road, NE; Mike's Market; Sherman's Market
16	4208 Benning Road, NE	
17	4228 Benning Road, NE; Benning Road Apartments	
18		4234 Benning Road, NE
19	4236 Benning Road, NE	
20		4248 Benning Road, NE
21		4254 Benning Road, NE
22		4256 - 4264 Benning Road, NE
23	4270 Benning Road, NE; New Mt. Calvary Baptist Church	
24	4274 Benning Road, NE	
25		4510 Benning Road, NE; The Shrimp Boat Restaurant
26		B&O Railroad Alexandria Branch
27	B&P Railroad	
28	Fire and Police Call Boxes along Benning Road, NE	

4212 East Capitol Street, NE – Fort Chaplin Park Apartments also determined ineligible

U.S. Department of Transportation
Federal Highway Administration

District of Columbia Division
(202) 219-3570 FAX 219-3545

1990 K Street, NW
Suite 510
Washington, DC 20006-1103

July 27, 2015

In Reply Refer To: HFO-DC

Dear Consulting Party to the Benning Road and Bridges Improvement Project:

The Federal Highway Administration (FHWA), in conjunction with District Department of Transportation (DDOT), is preparing an Environmental Assessment (EA) for the Benning Road and Bridges Transportation Improvements Project in accordance with the National Environmental Policy Act (NEPA). The referenced project is located within the Northeast section of Washington, DC and is approximately two miles long. The western terminus for the project is the intersection of Benning Road and Oklahoma Avenue and the eastern terminus is the Benning Road Metrorail Station. The purpose of the proposed project is to address deficiencies in transportation infrastructure conditions, improve safety conditions and operations for both motorized and non-motorized access, and to provide for increased mobility and accessibility by improving transit operations and options within the Benning Road corridor. The proposed improvements are anticipated to be predominantly within the existing DDOT right-of-way.

The project also considers effects to historic properties in accordance with the requirements of Section 106 of the National Historic Preservation Act (16 U.S.C. §470) and it's implementing regulations (36 CFR Part 800). FHWA formally initiated the Section 106 process for Benning Road & Bridge Transportation Improvement Project in March 2015. Organizations and individuals with a possible interest in the project are being contacted to solicit their views of the proposed project's potential effects to historic resources; therefore, this is an opportunity for you or your organization to participate in the consultation process. Section 106 of the National Historic Preservation Act pursuant to 36 CFR 800 requires Federal agencies to take into account the effects of their undertakings on historic properties. The views of consulting parties on findings and determinations regarding historic properties affected by the project are being requested. Those parties that express an interest in the Section 106 consultation process regarding this project will be invited to review cultural resource reports and make comments and suggestions regarding strategies to avoid, minimize, or mitigate adverse impacts to historic resources.

Please notify FHWA by letter if you wish to participate as a Consulting Party. Digital copies of letters accepting consulting party status transmitted by email are acceptable. In your response, please provide contact information for yourself or your agency/organization representative. Your reply is being requested within 30 days of receipt of this letter. Hardcopies should be sent to:

Federal Highway Administration
ATTN: Mr. Michael Hicks
Federal Highways Administration
District of Columbia Division
1990 K Street, N.W. Suite 510
Washington, DC 20006-1103

If you have any questions or require additional information, please contact Michael Hicks of my staff at (202) 219-3513 or email Michael.Hicks@dot.gov; or contact Clarence Dickerson (DDOT) at (202) 671-4586 or email Clarence.Dickerson@dc.gov.

Sincerely,

Joseph C. Lawson

Joseph C. Lawson
Division Administrator

Cc: Clarence Dickerson, DDOT
Andrew Lewis, DC SHPO
Saadat Khan, DDOT
Angela Jones, AECOM

The Committee of 100 on the Federal City

www.committeeof100.net

945 G Street, N.W.
Washington, D.C. 20001
202.681.0225
info@committeeof100.net

September 19, 2015

Federal Highway Administration
Attn: Mr. Michael Hicks
District of Columbia Division
1990 K Street, NW, Suite 510
Washington, DC 20006-1103
Michael.Hicks@dot.gov

RE: Section 106 Consulting Party Invitation for Benning Road & Bridge Transportation Improvement Project Environmental Assessment

Dear Mr. Hicks,

In response to Mr. Joseph Lawson's letter of July 27, 2015 inviting the Committee of 100 on the Federal City to serve as a Section 106 Consulting Party on the referenced project, this letter serves as the Committee of 100's acceptance. We are pleased to have been invited and look forward to participating in the Section 106 process for this important project.

The Committee of 100 on the Federal City has long been concerned with protecting and enhancing, in our time, the various elements of the L'Enfant Plan (1791-92) and the planning work of the McMillan Commission (1901-02) even as the city continues to evolve in the 21st century.

Official written correspondence should be sent to our mailing address as noted herein. Please send e-mails to the following addresses to help us ensure adequate representation at all meetings and distribution of documents within the Committee of 100:

Primary Representative: Monte Edwards monte.edwards@verizon.net
Secondary Representative: Meg Maguire megmaguireconsultant@msn.com
C100 Executive Staff: Byron Adams Badamsc100@verizon.net

Sincerely,

Meg Maguire
Transportation Subcommittee

Cc, Nancy MacWood, Sarah Campbell