

Appendix

B

Design Criteria

Report



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**Project Parameters for the Development of  
the Conceptual Plans for the Pennsylvania  
and Minnesota Avenues, SE Intersection  
Improvements Environmental Assessment  
(Design Criteria Report)**

HNTB Corporation

May 2013

**Pennsylvania and Minnesota Avenues, SE  
Intersection Improvement Project  
Environmental Assessment**



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## 1.0 DESIGN CRITERIA REPORT

### 1.1 Introduction

HNTB Corporation is developing conceptual engineering design plans for the two build alternatives for the Pennsylvania and Minnesota Avenues, SE Intersection Improvement Project as part of the Environmental Assessment (EA) study phase for the District Department of Transportation (DDOT) in Washington, DC. The two build alternatives being studied in the EA consist of a “Revised Square Alternative” and a “Conventional Intersection Alternative”. Conceptual engineering design plans have been developed for both alternatives consisting of horizontal and vertical alignments, typical sections, plans, profiles, pavement marking and maintenance of traffic during construction.

The purpose of this memorandum is to outline the framework and basis for preparation of the two build alternatives’ Conceptual Plans including operational, geometric and design parameters. The project parameters include the items below. The plans are developed using the current design requirements and best available information at this point in the project, and additional items will likely surface during subsequent phases of design.

- DDOT Design Standards and Guidelines
- AASHTO Policy and Standards
- Critical design elements
- Non-standard project elements or design requirements
- Assumptions
- Constraints
- Potential design exceptions

The Conceptual Plans will serve as a foundation for the subsequent preliminary engineering and development of detailed constructions plans for the Selected Alternative, and are intended to provide a basis for the following:

- Development of order-of-magnitude estimates for project construction costs;
- Sufficient engineering design to develop a constructible and feasible solution;
- Identification of issues that may affect construction costs, constructability, schedule and phasing, right-of-way acquisition requirements, environmental impacts and environmental commitments; and
- Identify potential design exceptions.

### 1.2 Project Description

The proposed project is located at the western end of the Pennsylvania Avenue, SE Great Streets corridor at the intersection of Pennsylvania Avenue with Minnesota Avenue, SE, in the immediate vicinity of Twining Square Park, also referred to as L’Enfant Square in the Great Streets Framework Plan. The project area is a complex and congested intersection consisting of two separate signalized intersections that are separated by 250 feet. The project intersection carries traffic to and from the bridges that cross the Anacostia River, as well as Minnesota Avenue SE. The proposed action includes improvements to the

intersection to improve safety, mobility, and connectivity for pedestrians and motorists. A land transfer from National Park Service (NPS) to DDOT would be necessary, pending National Capital Planning Commission (NCPC) approval, to carry out the proposed intersection improvements. Proposed improvements would not impact any private right-of-way.

The project is intended to:

- Improve pedestrian and vehicular safety;
- Create a consolidated, usable park space;
- Improve multimodal connectivity and access; and
- Support land use and community needs.

### **1.3 Codes, Manuals, Drawings and Construction Specifications**

The following codes, engineering manuals, standard drawings and construction specifications will be used to guide the development of the two Build Alternative Conceptual Plans.

- 2011 AASHTO Policy on Geometric Design of Highways and Streets
- 2010 Highway Capacity Manual
- 2009 FHWA Manual on Uniform Traffic Control Devices
- 2009 District of Columbia Department of Transportation Standard Specifications for Highways and Structures
- 2009 District of Columbia Department of Transportation Design and Engineering Manual
- 2009 District of Columbia Department of Transportation Standard Drawings
- 2012 Stormwater Guidebook published by the District of Columbia, Department of Environment
- 2003 District of Columbia Standards and Specifications for Soil Erosion and Sediment Control
- 2003 Soil Erosion and Siltation Control Handbook published by District of Columbia
- DDOT Design and Engineering Manual, Version 3 Draft (2013)
- DDOT Low Impact Development (LID) Details

### **1.4 Roadway Network Assumptions**

The two build alternatives' Conceptual Plans will be designed under the assumption that the 11<sup>th</sup> Street Bridges Project is completed (anticipated September 2015).

### **1.5 Traffic Capacity**

The project improvements do not include any major capacity enhancements within the project limits. Modifications to the intersection provide adequate and context-sensitive connectivity with the surrounding community and transportation network, while improving pedestrian, bicycle and vehicular safety and accessibility. While the project is intended to improve multi-modal safety and accessibility while consolidating green space and driving economic development, all alternatives, including the no-build alternative, are expected to operate at a level of service F in the design year (2040).

## **1.6 Road Geometry**

The roadway geometry generally conforms to the aforementioned policy and standards, with the various criteria outlined in **Table 1**. The proposed typical roadway cross sections are included in the conceptual plans. Critical design elements and non-standard project elements or design requirements are outlined below.

### **1.6.1 Design Speed**

Pennsylvania Avenue is classified as a Primary Arterial and has a posted speed of 30 mph. Minnesota Avenue is classified as a Minor Arterial and has a posted speed of 25 mph. Design speed for both roadways will be 5 mph higher than posted speed. Local roadways, including L'Enfant Square and 25th Street will have a design speed of 20 mph.

All streets are designed based on their roadway classification and in accordance with the DDOT Design and Engineering Manual.

### **1.6.2 Profiles/ Alignments**

Items affecting the profiles and alignments are noted below.

- Existing Right of Way limits;
- Existing sidewalk and adjacent building grades; and
- Minimizing reconstruction limits, utilizing existing pavement widening.

## **1.7 Mapping**

The two build alternatives' conceptual plans are prepared using mapping provided by GSA and DDOT. Mapping consists of aerial orthomosaic photography and topographic mapping prepared from aerial photography dated 6-21-2006 and ground survey prepared by Aero-Metric and Maddox Engineers and Surveyors, completed 2008. Mapping coordinates based on Maryland State Plane Coordinate System, NAD 1983/84; vertical datum based on DC Engineers Datum.

## **1.8 Right of Way**

Right of Way (ROW) lines depicted on the conceptual plans are taken from highway as-built drawings, plat maps and District of Columbia GIS ROW data provided by DDOT. However, because no formal survey was performed or provided for ROW, the ROW lines shown may vary.

The two build alternatives' Conceptual Plans were developed to stay within the existing ROW whenever possible and minimize temporary construction easements. As noted above, because of the proposed reconfiguration of the intersection, a land transfer from NPS to DDOT would be required for both build alternatives.

## **1.9 Drainage and Storm Water Management**

Design criteria for proposed drainage facilities will be in accordance with the criteria and guidelines provided in the 2009 Design and Engineering Manual published by the District of Columbia, Department of Transportation.

Erosion and sediment control criteria will be in accordance with the 2003 District of Columbia Standards and Specifications for Soil Erosion and Sediment Control published by the Department of Health and the 2003 Soil Erosion and Siltation Control Handbook published by District of Columbia.

Design to meet storm water quality requirements will be based on 2012 Stormwater Guidebook published by the District of Columbia, Department of Environment. Supplementing this, the DDOT Design and Engineering Manual, Version 3 Draft (2013), and DDOT Low Impact Development (LID) Details will be referred for stormwater management design.

Storm water quality requirements will be based on providing water quality improvements for the pavement areas within the project site. This requirement will be met using a variety of BMP facilities such as DDOT/DC Water quality control structures and other features. Storm water quantity control will not be required due to proximity of the Anacostia River and less than a 10% increase in impervious pavement area anticipated.

## **1.10 Utilities**

Utilities are plotted based on utility designation to a quality level C. Level C designation data is obtained from surveying and plotting aboveground utility features and information derived from records research. Located utilities are marked, field-tied to project monumentation, and mapped onto plan documents.

A more detailed survey, including subsurface utility locating and mapping will be performed as design development advances. Because utility mapping has not been performed, likely utility conflicts will occur.

## **1.11 Geotechnical**

No geotechnical information is available at this time and geotechnical investigation will not be completed for the development of the two build alternatives' Conceptual Plans.

It will be assumed that the geotechnical conditions will be representative of those encountered in the project proximity, and future geotechnical investigation and design will be required to confirm this assumption.

## **1.12 Hazardous Materials**

Hazardous Materials investigations will not be completed as part of the Conceptual Plans development.

## **1.13 Construction**

### **1.13.1 Maintenance of Traffic**

The two build alternatives' Conceptual Plans will be developed based on the following Maintenance of Traffic assumptions:

- Maintain three lanes of traffic in each direction on Pennsylvania Avenue through the project area;
- Maintain two lanes of traffic in each direction on Minnesota Avenue through the project area;
- Maintain all turning movements during all phases of project construction (note, temporary, short-duration lane closures are anticipated during construction);
- Maintain pedestrian and bicycle access through the project area;
- Maintain full access to bus stops, businesses and residences during construction, and;
- Minimize impacts to the local community during construction.

### **1.14 Design Exceptions/Design Waivers**

The two build alternatives' Conceptual Plans have been developed to avoid any Design Exceptions. It may be necessary, as design is developed further to entertain the use of design exceptions to avoid or minimize further impacts to NPS lands, private properties or other existing facilities.

**Table 1**  
Design Criteria - Pennsylvania and Minnesota Avenues, SE Intersection Improvements

Criteria	Reference		Pennsylvania Avenue, SE	Minnesota Avenue, SE	L'Enfant Square, SE	25th Street, SE
	Manual	Page				
Functional Classification	DDOT Functional Classification Map (2011) DDOT DEM	30-2	Principal Arterial	Minor Arterial	Local Street	Local Street
<b>Element of Design</b>						
Design Speed	DDOT DEM	30-3.4	Des. Speed = 35, Posted = 30	Des. Speed = 30, Posted = 25	20	20
Stopping Sight Distance (Min)	AASHTO 2011	3-4	200	155	115	115
Design Vehicle			CITYBUS	CITYBUS	CITYBUS	CITYBUS
<b>Horizontal Elements</b>						
Maximum Superelevation	DDOT DEM	30-9	4%	4%	4%	4%
Minimum Radius	AASHTO 2011	3-44	371 Ft.	250 Ft.	86 Ft.	86 Ft.
<b>Vertical Elements</b>						
Maximum Grade	DDOT DEM	30-13	6%	7%	8%	8%
Minimum Vertical Curve Length (Crest)	DDOT DEM	30-13	110 Ft.	70 Ft.	50 Ft.	50 Ft.
Minimum K Value	AASHTO 2011	3-155	19	12	7	7
Minimum Vertical Curve Length (Sag)	DDOT DEM	30-13	90 Ft.	60 Ft.	50 Ft.	50 Ft.
Desirable K Value	AASHTO 2011	3-161	49	37	17	17
Minimum Curve Length (Comfort)	AASHTO 2011	3-160	$L=AV^2/46.5$	$L=AV^2/46.5$	$L=AV^2/46.5$	$L=AV^2/46.5$
Minimum Vertical Clearance						
Over Freeways and Interchange Ramps	DDOT DEM	15-6	16.5 Ft.	16.5 Ft.	16.5 Ft.	16.5 Ft.
Local Roadways	DDOT DEM	15-6	14.5 Ft.	14.5 Ft.	14.5 Ft.	14.5 Ft.
Pedestrian Overpasses	DDOT DEM	15-6	17.5 Ft.	17.5 Ft.	17.5 Ft.	17.5 Ft.
<b>Cross Sectional Elements</b>						
Minimum Lane Width	DDOT DEM	30-17	10 Ft.	10 Ft.	10 Ft.	10 Ft.
<b>Parking</b>						
Minimum Parking Lane Width	AASHTO 2011 DDOT DEM	4-73 30-16	8 Ft.	8 Ft.	8 Ft.	8 Ft.
Driving & Parking Lane Width Together	DDOT DEM	30-16	19 Ft.	19 Ft.	19 Ft.	19 Ft.
Clear Zone / Lateral Clearance	AASHTO 2011 AASHTO RDG	3-14 437, 481	1.5 Ft. (with Curb)	1.5 Ft. (with Curb)	1.5 Ft. (with Curb)	1.5 Ft. (with Curb)
Lateral Clearance at Intersections, Driveways	AASHTO RDG	3-13	3 Ft. (with Curb)	3 Ft. (with Curb)	3 Ft. (with Curb)	3 Ft. (with Curb)
<b>Shoulder Width</b>						
Right Side	AASHTO 2011	4-19, 7-30	N/A	N/A	N/A	N/A
Left Side	AASHTO 2011	4-19, 7-30	N/A	N/A	N/A	N/A
<b>Side Slopes</b>						
Inside Clear Zone						
Recoverable Fill Slope	AASHTO RDG	3-11	4:1	4:1	4:1	4:1
Beyond Clear Zone	DDOT DEM	37-2, 3	3:1 F; 2:1 C	3:1 F; 2:1 C	3:1 F; 2:1 C	3:1 F; 2:1 C

**Legend**

DDOT DEM	DDOT Design and Engineering Manual, 2009
AASHTO 2011	AASHTO - A Policy on Geometric Design of Highways and Street, 2004
AASHTO 2011	AASHTO - A Policy on Geometric Design of Highways and Street, 2011
AASHTO RDG	AASHTO Roadside Design Guide, 2011