REHABILITATION OF
OREGON AVENUE, NW
WASHINGTON, DC

ENVIRONMENTAL ASSESSMENT

May 2011
ENVIRONMENTAL ASSESSMENT

FOR THE

REHABILITATION OF OREGON AVENUE, NW
WASHINGTON, DC

Prepared pursuant to 42 U.S.C. 4332(2)(c) by:
U.S. Department of Transportation
Federal Highway Administration

and

District Department of Transportation

In Cooperation with
National Park Service

5/24/11
Date of Approval

Terry Bellamy
Acting Director
District Department of Transportation

5/24/11
Date of Approval

Joseph C. Lawson
Division Administrator
Federal Highway Administration
DC Division Office
SUMMARY

S.1 PREFACE
The Federal Highway Administration (FHWA) and the District Department of Transportation (DDOT), in cooperation with the National Park Service (NPS), are proposing the rehabilitation of the 1.7-mile segment of Oregon Avenue, NW, between Military Road and Western Avenue along the northwestern border of Rock Creek Park. This EA has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508), FHWA’s Environmental Impact and Related Procedures (23 CFR 771), FHWA’s Technical Advisory Guidance for Preparing and Processing Environmental and Section 4(f) Documents (T6640.8A), DDOT’s Environmental Policy and Process Manual, and the NPS Director’s Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-making.

S.2 PURPOSE AND NEED
The purpose of the proposed action is to rehabilitate Oregon Avenue to satisfy operational, safety, and multi-modal transportation needs. Context sensitive solutions will take into account the adjoining land uses - residential developments to the west and Rock Creek Park to the east. The project needs are a culmination of infrastructure deficiencies, including deteriorating pavement, inadequate stormwater drainage, and aging and inadequate structures; safety concerns due to substandard roadway geometrics and the lack of separate facilities for pedestrians and bicycles; gaps in system linkage for pedestrians and bicyclists to parks, schools, and residential areas adjacent to Oregon Avenue and to the Rock Creek Park multi-use trail system; and legislation: the District of Columbia’s Priority Sidewalk Assurance Act of 2010.

S.3 PROJECT BACKGROUND
The rehabilitation of Oregon Avenue was originally placed on DDOT’s schedule of planned improvements because of the apparent needs for roadway repair and the desire for a safer facility. Failing drainage, poor lighting, sight distances, and speeding are creating unsafe conditions. Aging infrastructure has also been cited as a deficiency in the roadway corridor. The culvert carrying Oregon Avenue over Pinehurst Run has been found to be in poor condition with deficiencies in the outlet headwall and abutments due to scour and aging, deterioration of concrete parapets, failed guardrails, and a need for in-stream stabilization (Wilbur Smith Associates, 2003).

The uncontrolled runoff from elevated parcels to the west of the roadway has contributed in large part to the deterioration of this two-lane roadway. The large volume of stormwater has had detrimental effects on the adjacent streambeds in Rock Creek Park, which is owned by NPS and located immediately east of Oregon Avenue over its entire length. The need for a total
solution involving improvements on national park properties has resulted in the NPS serving as a Cooperating Agency in the development of the EA.

**S.4 ALTERNATIVES**

Alternatives development consisted of a three-step collaborative process with the study team, stakeholders, and the public to develop a range of alternatives that incorporate elements to address each of the project’s needs: roadway improvements, stormwater management, and bicyclist and pedestrian facilities. The No Action Alternative, three Candidate Build Alternatives, and four options to complement the proposed improvements in the roadway corridor are analyzed in detail in this EA.

**S.4.1 ALTERNATIVE 1 - NO ACTION ALTERNATIVE**

Under the No Action Alternative (Alternative 1), the improvements to Oregon Avenue would include short-term minor restoration activities (safety and routine maintenance) that maintain the continuing operation of the existing roadway.

While the No Action Alternative does not meet the purpose and need of the project, it provides a basis for comparing the environmental consequences of the Candidate Build Alternatives.

**S.4.2 CANDIDATE BUILD ALTERNATIVES**

Along its 1.7-mile length, Oregon Avenue varies in terms of traffic volumes, function, and character of roadway; therefore, in order to facilitate the development of end-to-end alternatives and the identification of impacts, the corridor was divided into two sections:

- Southern Section - Military Road to Nebraska Avenue
- Northern Section - Nebraska Avenue to Western Avenue

In addition, the width of the DDOT-owned right-of-way ranges from 33 to 90 feet along Oregon Avenue, with an average width of 75 feet along most of the corridor. The narrowest width (33 feet) is located in the southern portion of the corridor, adjacent to St. John’s High School College.

As further described below, multiple cross-sections are proposed for two of the three Candidate Build Alternatives. This approach allowed for the development of end-to-end alternatives that best meet the purpose and need while at the same time fulfilling the requirement to stay within the existing DDOT right-of-way.

No major disruption to the surrounding topography is expected with the proposed action as each of the Candidate Build Alternatives follows the existing roadway alignment. Each alternative remains within DDOT-owned right-of-way with two minor exceptions. There is one small section of the existing roadway where approximately 100 feet of the northbound lane lies within NPS-owned property (see Station 114 – 115 on pages B-4, B-16, and B-28 in Appendix B). This encroachment is the result of inconsistencies in survey bounds that existed when the current Oregon Avenue was constructed. This EA will cover the appropriate action needed from NPS to correct this inconsistency, which may include an easement, land transfer, or permit. The second minor encroachment is located at the base of a private driveway (see Station 154 on pages B-21
and B-33 in Appendix B). Under Alternatives 3 and 4, the continuity of sidewalks or trails and drainage facilities would require an easement to cross this 63-foot stretch of private driveway. Notwithstanding these exceptions and the placement of silt fences and restoration of outfalls during construction, there are no other physical components which would require use of lands within Rock Creek Park or on private property for any of the alternatives.

For any alternative, prior to any land disturbance activities, tree protection measures, protective fencing, and other best management practices (BMPs) would be installed. The existing roadway infrastructure within the project area would be removed including pavement, curb and gutter, inadequate stormwater drainage systems, as well as debris and trees that present a hazard. DDOT would include in the contractor specifications that removed materials be disposed of or recycled in accordance with the DDOT Standard Specifications for Highways and Structures (2009).

All Candidate Build Alternatives would be designed to accommodate widths and weights of utility maintenance vehicles and emergency response vehicles. Grading and placement of clean fill would be necessary to prepare a stable bed for the roadway and to provide adequate drainage conveyance. Existing profile elevations would be raised or lowered in steeper areas to remove blind crests and improve sight distances along the roadway.

Inadequate stormwater outfalls and culverts would be reconstructed and resized to appropriately convey water, including but not limited to the Pinehurst Run culvert. Coping and retaining walls would be incorporated where feasible to minimize the limits of disturbance and footprint of the roadway. Retaining walls would be designed to complement the setting of Rock Creek Park and the surrounding area as well as incorporate construction methods to minimize intrusion into the Park property.

Following construction, additional restoration along Oregon Avenue would include replanting of native tree species and vegetation. Species would be selected in consideration of the natural and cultural landscapes, as well as the aesthetics of Rock Creek Park.

All three Candidate Build Alternatives would be properly signed and marked in accordance with standards of the American Association of State Highway and Transportation Officials (AASHTO), DDOT, and the Manual on Uniform Traffic Control Devices (MUTCD). Features such as signage and lighting would be incorporated into more detailed design plans.

**Alternative 2**

**Alternative 2** is the minimum width alternative that meets the purpose and need of the project. It consists of two 10-foot travel lanes with curb and gutter and a 5-foot sidewalk on the west side and a curb on the east. This alternative has a cross-section width of approximately 27 feet and no additional right-of-way would be required for the entire length of the roadway. Some of the sections of roadway in the narrower Southern Section will, however, require retaining walls estimated at 2 to 5 feet high in order to stay within the right-of-way.

Where possible, both travel lanes would slope from east to west so that all roadway runoff would be directed to the curb and gutter on the west side of the roadway. Stormwater
management would be accomplished through a closed, underground system, which would collect and treat the runoff and direct it to the existing outfall locations along the corridor.

The total estimated construction cost for Alternative 2 is $23.4 million.

**Alternative 3**

**Alternative 3** consists of two cross-sections. In the Southern Section between Military Road and Nebraska Avenue, where most of the existing DDOT-owned right-of-way is only 33-feet wide, Oregon Avenue would be reconstructed similar to Alternative 2, with two 10-foot travel lanes with curb and gutter and a 5-foot sidewalk on the west side and a curb on the east.

In the Northern Section, or north of Nebraska Avenue to Western Avenue, Alternative 3 would transition to a cross-section width of approximately 43 feet and would consist of two 10-foot travel lanes with a 2-foot shoulder, a 10-foot vegetated swale and a 10-foot shared-use path for pedestrians and bicyclists on the west side, and mountable curbing only on the east side.

To match the Southern Section, where possible, both travel lanes would be reverse crowned from east to west. But whereas the runoff will be captured in a closed, underground system in the Southern Section, the roadway runoff in the Northern Section would also incorporate a vegetated swale on the west side of the roadway.

Some of the sections of roadway will require retaining walls in order to stay within the right-of-way and preserve the use of the adjacent homes’ front yards. These walls are estimated at 2 to 5 feet high in the Southern Section and up to 8 feet high in the Northern Section of the project.

The total estimated construction cost for Alternative 3 is $30.5 million.

**Alternative 4**

**Alternative 4** also consists of two cross-sections. In the Southern Section, where the existing right-of-way is 33 feet, Oregon Avenue would be reconstructed similar to Alternative 2, with two 10-foot travel lanes with curb and gutter and a 5-foot sidewalk on the west side and a curb on the east.

In the Northern Section, or north of Nebraska Avenue to Western Avenue, Alternative 4 would have a cross-section width of 44 feet and include two 10-foot travel lanes, a 4-foot bike lane, 10-foot vegetated swale, and 5-foot sidewalk on the west side, and a 4-foot bike lane and mountable curbing on the east side.

Similar to the Southern Section, both travel lanes would slope from east to west so that all roadway runoff would be directed to the west side of the roadway. But whereas the runoff will be captured in a closed, underground system in the Southern Section, the roadway runoff in the Northern Section would be directed to a vegetated swale on the west side of the roadway.

Some of the sections of roadway will require retaining walls in order to stay within the right-of-way and preserve the use of the adjacent homes’ front yards. These walls are estimated at 2 to 5 feet high in the Southern Section and up to 8 feet high in the Northern Section of the project.
The total estimated construction cost for Alternative 4 is $35.3 million.

**OPTIONS**

Several options have been developed that can be incorporated into designs for any of the three Candidate Build Alternatives.

**OPTION A - TRAFFIC CALMING**

Traffic calming measures are being considered to manage travel speeds and improve safety -- two elements of the project’s purpose and need. Possible measures include, but are not limited to, pavement markings and mini traffic circles to provide effective speed control.

The estimated construction cost for a mini traffic circle is $160,000.

**OPTION B - NEBRASKA AVENUE IMPROVEMENTS**

The intersection of Oregon Avenue and Nebraska Avenue/Bingham Drive is currently a four-way stop-controlled intersection with a bifurcated approach on Nebraska Avenue. Two options have been developed for simplifying the intersection and reducing the overall footprint. One option would be to reconstruct the intersection to a conventional four-way stop-controlled intersection. A second option would be to construct a traffic circle. A traffic circle with an outside diameter of 90 to 100 feet would fit within the right-of-way and reduce the overall footprint of the intersection by an amount similar to the conventional four-way intersection.

The estimated construction costs for these two options are $200,000 for the four-way intersection and $275,000 for the traffic circle.

**OPTION C - STORMWATER MANAGEMENT SYSTEMS**

The existing stormwater drainage system along Oregon Avenue is inadequate in several aspects, including roadway ponding, erosion at outfalls downstream through Rock Creek Park, and lack of water quality controls. Existing roadway ponding would be addressed by the installation of an expanded drainage system serving the full length of the project. One component would include interception of the runoff from the upland areas to the west of the project and conveyance of that water to culverts crossing under the roadway and into the existing channels west of the roadway. Another component would be the proposed design of the roadway drainage to meet current design standards. In general, the spread of stormwater onto the proposed roadway would be limited by provisions to collect the water and convey it to the existing outfalls. Systems would include inlets connected to storm sewers for Alternative 2 and the Southern Section in Alternatives 3 and 4. Systems for the Northern Section of Alternatives 3 and 4 would also include roadside swales.

Existing erosion occurring along the outfall channels east of the project would be addressed using several design options. In some locations, the pipe culverts under Oregon Avenue can be replaced to reduce outfall velocities. The outfall erosion would also be mitigated with the application of stormwater management Best Management Practices (BMP).
Guidance from the District Department of the Environment encourages the use of Low Impact Development (LID) techniques to meet an on-site retention standard of 1.2 inches of runoff to the maximum extent possible. As such, water quality would be addressed by a “treatment train” that includes multiple BMP techniques in a series. The wider areas of Candidate Build Alternatives 3 and 4 incorporate a vegetated swale to further augment the “treatment train”. Portions of runoff entering these swales would pass through a grass and soil biofilter prior to entering the under-laying infiltration trench. Several other areas of otherwise unused right-of-way offer the opportunity for rain gardens to further enhance water quality.

The estimated construction costs for these options are included within each alternative’s conceptual construction cost estimate, which are provided in Appendix C.

**OPTION D - PINEHURST RUN CROSSING**

The existing Oregon Avenue crossing over Pinehurst Run consists of a single-cell rectangular concrete culvert, which was rated to be in fair to poor condition in a 2003 culvert inspection report. The existing culvert is undersized and large storms, including the design year storm and 100-year FEMA flood, flow over the roadway. In order to convey these larger storms, the roadway profile must be slightly raised in the area of the culvert and the opening size for the culvert must be increased. Options for its replacement include:

- Replacement with an enlarged box culvert, which would require a three-cell configuration. Cells can be cast in place or provided as precast segments.
- Replacement with a short bridge. Due to site constraints, accelerated bridge construction (ABC) techniques do not seem feasible.
- Replacement by a precast concrete, bottomless culvert. This option would employ commonly-used, but proprietary, precast concrete arches to provide the new opening. One type of these systems is the Conspan Arch. Following site preparation, precast segments are trucked to the site and quickly connected.

All three of these options can incorporate architectural surface treatments to improve aesthetics.

The estimated construction costs for these three options are $290,000 for the three-cell box culvert, $360,000 for the precast concrete, bottomless culvert, and $550,000 for the short bridge.

**5.5 AFFECTED ENVIRONMENT**

Environmental resources were identified and mapped within the project corridor, including natural, cultural, and socioeconomic resources (see Figure S-1). In addition, the existing conditions in the Oregon Avenue project corridor were assessed in terms of the condition of the transportation network, air and noise quality, and energy conservation.

Key natural resources within the project corridor include Pinehurst Run, a perennial stream with a mapped 100-year floodplain, and Rock Creek Park, the only large area of mostly contiguous deciduous forest habitat in the District metropolitan area. A tree survey was conducted as part of this project to determine the number, size, and health (condition) of existing trees along the roadway corridor. The inventory was used to determine the potential
Figure S-1. Existing Environmental Resources in Project Area
impact (direct and indirect) to trees adjacent to the roadway and will help determine the level of replacements required to mitigate any loss.

In terms of cultural resources, the Rock Creek Park Historic District (RCPHD) is listed on the National Register of Historic Places (NRHP) and is immediately adjacent to the Oregon Avenue project corridor. Several contributing elements of the RCPHD are located within the Area of Potential Effects (APE). Additional resources associated with early District of Columbia infrastructure, such as Daniel Road (now Oregon Avenue), roadway guard rails, and water control features, also occur in the APE. Water control features identified along Oregon Avenue include culverts, headwalls, and access manholes that may date to the development of the roadway.

While Rock Creek Park, designated Park/Recreation/Open Space land use, dominates the entire eastern side of the roadway, land use on the western side is predominantly Low and Medium Density Residential, interspersed with two Institutional land areas (St. John’s College High School and Knollwood military retirement facility) and one Park/Recreation/Open Space near Pinehurst Run. Oregon Avenue mainly provides access to these residences and facilities along the roadway. Daily commuters also use one section of Oregon Avenue as a “cut through” route: from Nebraska Avenue to Oregon Avenue to Wise Road (through Rock Creek Park). Existing traffic volumes suggest that there is adequate capacity and no need for capacity improvements on Oregon Avenue.

With the exception of a very short stretch of sidewalk north of Moreland Place, Oregon Avenue currently lacks amenities to serve pedestrians and bicycles. There are no internal linkages or crosswalks for pedestrians to the parks, schools, and residential areas adjacent to Oregon Avenue, nor are there pedestrian connections to serve those who ride the Metrobus E-6 route, which serves seven bus stops in the northern portion of the roadway.

The reconstruction of Oregon Avenue is included in the Transportation Improvement Program (TIP) for the Metropolitan Washington Region (Fiscal Years 2011 to 2016), and the scope of the project is consistent with the regional analysis included in the TIP. The National Capital Region 2010 Constrained Long-Range Transportation Plan (CLRP) and the 2011-2016 TIP have been determined by the Metropolitan Washington Council of Governments (MWCOG) to conform to the intent of the State Implementation Plan (SIP). The Oregon Avenue project is not a project of air quality concern and existing noise levels do not exceed federal noise abatement criteria.

### S.6 SUMMARY OF IMPACTS

The following briefly describes the principal environmental effects of the proposed project. Table S-1, located at the end of this summary, is a matrix showing the comparative effects of the alternatives.

#### S.6.1 NATURAL RESOURCES

Construction of each of the Candidate Build Alternatives would disturb land areas beyond the existing roadway infrastructure. The areas of disturbance range from 1.4 acres for the narrowest alternative (Alternative 2) to approximately 3.4 acres for Alternatives 3 and 4. The
majority of land disturbance will occur within a narrow band along the western edge of the existing roadway – areas that have been previously disturbed during construction of the original roadway and adjacent residences. To minimize off-site impacts, Erosion and Sedimentation Control and Stormwater Management Plans will be developed in accordance with DC Municipal Regulations.

Each of the Candidate Build Alternatives is anticipated to result in improvements to local water quality by incorporating effective stormwater management systems. The proposed systems will reduce the volume and velocity of stormwater runoff entering receiving surface waters by increasing retention and infiltration. The improved stormwater management systems will offset all additional runoff generated through increased impervious areas created by the alternatives.

Primary impacts to Pinehurst Run will be limited to short-term construction activities associated with the replacement of the existing box culvert. There will be a slight increase in stream encroachment due to the widened roadway crossing and associated structure at this location. The proposed alternatives would be 32 to 40 feet wide, or 5 to 13 feet wider than the existing 27-foot crossing. An additional 30 feet of disturbance upstream and downstream (combined) is expected to construct the new crossing.

Minor encroachments on the Pinehurst Run floodplain are anticipated with the Candidate Build Alternatives. Encroachments occur immediately adjacent to the existing roadway and involve between 2,508 square feet (0.06 acres) for Alternative 2 to 6,760 square feet (0.16 acres) for Alternative 4 – the widest alternative. None of the encroachments are expected to cause any increase in backwater elevations. An overall reduction in backwater flooding is expected with the increased capacity provided by the new crossing.

No wetlands, navigable waters, or wild or scenic rivers are located in the immediate project area.

Consultation with the US Fish and Wildlife Service and the National Park Service indicate that there are no threatened or endangered species in the immediate project area.

Construction activities associated with replacing the roadway bed may impact some large trees immediately adjacent to the roadway. Root systems from larger trees are expected to have spread beneath the existing roadway; therefore, damage to these root systems during construction could result in loss of the trees. It is estimated that between 62 and 85 mature trees (specimens with diameters at breast height greater than 6 inches) could be impacted.

**S.6.2 Cultural and Paleontological Resources**

Reconstruction of the Pinehurst Run crossing in Candidate Build Alternatives 2, 3, and 4 could result in moderate long-term impacts to archeological resources if such resources are identified along the terraces.

Alterations to a stone and concrete culvert/outfall south of Bingham Drive may result in minor, long-term impacts if this resource is determined to be a contributing element of the Rock Creek
Park Historic District. Temporary visual and audible intrusions to adjacent historic structures, including the stone building at Knollwood, would result in minor, short-term impacts. Overall, construction of all Candidate Build Alternatives could result in both minor, long-term and minor, short-term impacts to historic structures.

No cultural landscapes, ethnographic resources, museum collections, Indian Trust resources and Native American sacred sites, or paleontological resources occur in the project area and no impact to these resources would occur from the No Action or the Candidate Build Alternatives.

S.6.3 Socioeconomic Resources
The Candidate Build Alternatives are expected to have no effect on land use and zoning within the project corridor.

The project will not result in any impacts to low-income or minority populations.

Alternatives have been developed to include design features that maintain the bucolic or rural-like feel of the existing roadway.

The Candidate Build Alternatives will have no impact on local community resources. Improved travelways should prove beneficial to local emergency service providers.

S.6.4 Transportation
The long-term impacts of the Candidate Build Alternatives will include improvements to travel safety of all modes: automobile, bus, bicycle, and pedestrian. Short-term detours will be required during the 3 to 9 month construction periods for the various project sections. Maintenance of traffic and detour plans will be developed to alleviate impacts to local travelers.

S.6.5 Air Quality
The proposed action will not result in any change in roadway capacity or adjacent land uses; therefore, there will be no measurable change in air quality parameters. Short-term impacts associated with construction will be mitigated through implementation of DDOT standard specifications.

S.6.6 Noise
As noted above, the proposed Candidate Build Alternatives will not result in any change in roadway capacity or its horizontal or vertical alignment. Therefore, no appreciable impacts to noise and vibration would occur from implementation of the Candidate Build Alternatives.

S.6.7 Hazardous Waste and Materials
Based on a review of available data and site inspections, no evidence of recognized environmental concerns (hazardous material sites) were identified in the project area.

S.6.8 Indirect and Cumulative Effects
There will be no induced or secondary effects caused by the proposed Candidate Build Alternatives. The proposed project would serve traffic generated by development on adjoining lands and beyond the limits of the project, but it would not cause any further such
development. Moreover, the project is consistent with local comprehensive planning regarding land use goals in the surrounding area and transportation in the project corridor.

Despite the dramatic changes in the landscape that have occurred over time due to human settlement and development in the surrounding area, the intensity of the incremental or cumulative impacts of the project are considered small when reviewed in the context of impacts from other past, present, and reasonably foreseeable future actions and would not rise to a level that would cause significant cumulative impacts.

**S.6.9 Section 4(f) Evaluation**

The proposed Candidate Build Alternatives will not require the use of any Section 4(f) resource.

**Table S-1. Summary of Impacts**

<table>
<thead>
<tr>
<th></th>
<th>ALTERNATIVE 1 NO ACTION</th>
<th>ALTERNATIVE 2</th>
<th>ALTERNATIVE 3</th>
<th>ALTERNATIVE 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional Area of Disturbance (acres)</td>
<td>0</td>
<td>1.37</td>
<td>3.36</td>
<td>3.40</td>
</tr>
<tr>
<td>Pinehurst Run - Limits of Disturbance (linear feet)</td>
<td>0</td>
<td>57</td>
<td>73</td>
<td>74</td>
</tr>
<tr>
<td>Improvements to Stormwater Management</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Pinehurst Run - Floodplain Encroachments (acres)</td>
<td>0</td>
<td>0.06</td>
<td>0.14</td>
<td>0.16</td>
</tr>
<tr>
<td>Wetlands Displaced (acres)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Threatened and Endangered Species</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Loss of Mature Trees</td>
<td>0</td>
<td>62</td>
<td>85</td>
<td>85</td>
</tr>
<tr>
<td>Archeological Resource Impacts</td>
<td>None</td>
<td>Possible moderate, long-term</td>
<td>Possible moderate, long-term</td>
<td>Possible moderate, long-term</td>
</tr>
<tr>
<td>Historic Structure Impacts</td>
<td>None</td>
<td>Minor, long-term and minor, short-term</td>
<td>Minor, long-term and minor, short-term</td>
<td>Minor, long-term and minor, short-term</td>
</tr>
<tr>
<td>Land Use and Zoning</td>
<td>No Change</td>
<td>No Change</td>
<td>No Change</td>
<td>No Change</td>
</tr>
<tr>
<td>Pedestrian Improvements</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Bicyclist Improvements</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Air Quality Impacts</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Noise Impacts</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Hazardous Materials</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Environmental Justice Populations Affected</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Visual Intrusions</td>
<td>No Change</td>
<td>Minor</td>
<td>Minor</td>
<td>Minor</td>
</tr>
<tr>
<td>Construction Costs (millions)</td>
<td>N/A</td>
<td>$23.4</td>
<td>$30.5</td>
<td>$35.3</td>
</tr>
</tbody>
</table>
TABLE OF CONTENTS

SUMMARY....................................................................................................................................S-1
S.1 Preface...................................................................................................................................S-1
S.2 Purpose and Need....................................................................................................................S-1
S.3 Project Background..................................................................................................................S-1
S.4 Alternatives............................................................................................................................S-2
  S.4.1 Alternative 1 – No Action Alternative............................................................................S-2
  S.4.2 Candidate Build Alternatives........................................................................................S-2
S.5 Affected Environment .............................................................................................................S-6
S.6 Summary of Impacts...............................................................................................................S-8
  S.6.1 Natural Resources..............................................................................................................S-8
  S.6.2 Cultural and Paleontological Resources.........................................................................S-9
  S.6.3 Socioeconomic Resources...............................................................................................S-10
  S.6.4 Transportation..................................................................................................................S-10
  S.6.5 Air Quality.......................................................................................................................S-10
  S.6.6 Noise................................................................................................................................S-10
  S.6.7 Hazardous Waste and Materials....................................................................................S-10
  S.6.8 Indirect and Cumulative Effects.....................................................................................S-10
  S.6.9 Section 4(f) Evaluation....................................................................................................S-11

LIST OF FIGURES..........................................................................................................................v

LIST OF TABLES.............................................................................................................................vii

ACRONYMS AND ABBREVIATIONS...........................................................................................ix

CHAPTER 1 – PURPOSE AND NEED ........................................................................................1-1
  1.1 Purpose of the Proposed Action..........................................................................................1-1
  1.2 Needs for the Proposed Action..........................................................................................1-1
    1.2.1 Infrastructure Deficiencies...........................................................................................1-3
    1.2.2 Safety..........................................................................................................................1-5
    1.2.3 System Linkage............................................................................................................1-6
    1.2.4 Legislation..................................................................................................................1-6
Environmental Assessment of Oregon Avenue NW

1.3 Project Overview ........................................................................................................................... 1-7
  1.3.1 Background .......................................................................................................................... 1-7
  1.3.2 Description of the Project Area ........................................................................................ 1-7
1.4 Project Goals ............................................................................................................................... 1-9
1.5 Design Considerations ................................................................................................................. 1-9
  1.5.1 Roadway Considerations ................................................................................................ 1-10
  1.5.2 Bicycle and Pedestrian Considerations ......................................................................... 1-10
  1.5.3 Stormwater Management Considerations ................................................................... 1-10
1.6 Relationship to Other Plans and Studies .................................................................................. 1-10
  1.6.1 District of Columbia Bicycle Master Plan .............................................................. 1-10
  1.6.2 District of Columbia Pedestrian Master Plan .............................................................. 1-11
  1.6.3 Rock Creek Trail Project ............................................................................................... 1-11
  1.6.4 Rock Creek Watershed Implementation Plan .............................................................. 1-11
  1.6.5 Military Road/Missouri Avenue Transportation Study ............................................. 1-11
  1.6.6 Comprehensive Plan of the National Capital .............................................................. 1-12

CHAPTER 2 – ALTERNATIVES AND OPTIONS ........................................................................... 2-1
2.1 Alternatives Development Process ............................................................................................ 2-1
2.2 No Action Alternative ............................................................................................................... 2-4
2.3 Candidate Build Alternatives .................................................................................................. 2-4
  2.3.1 Candidate Build Alternative 2 ......................................................................................... 2-5
  2.3.2 Candidate Build Alternative 3 ......................................................................................... 2-6
  2.3.3 Candidate Build Alternative 4 ......................................................................................... 2-8
2.4 Options ..................................................................................................................................... 2-12
  2.4.1 Option A – Traffic Calming ......................................................................................... 2-12
  2.4.2 Option B – Nebraska Avenue Intersection Improvements ........................................ 2-12
  2.4.3 Option C – Stormwater Management Systems ............................................................ 2-13
  2.4.4 Option D – Pinehurst Run Crossing .............................................................................. 2-16
2.5 Alternatives Eliminated from Consideration ......................................................................... 2-17
  2.5.1 Roadway Alternatives ................................................................................................. 2-17

CHAPTER 3 – AFFECTED ENVIRONMENT ............................................................................ 3-1
3.1 Natural Resources ...................................................................................................................... 3-1
  3.1.1 Geology, Soils, and Topography ................................................................................. 3-1
  3.1.2 Water Resources ......................................................................................................... 3-4
  3.1.3 Wildlife including Threatened and Endangered Species ........................................... 3-8
  3.1.4 Vegetation ...................................................................................................................... 3-9
### Table of Contents

3.2 Cultural and Paleontological Resources ................................................. 3-11
  3.2.1 Area of Potential Effects ................................................................. 3-12
  3.2.2 Cultural Contexts ........................................................................... 3-13
  3.2.3 Archeological Resources ............................................................... 3-14
  3.2.4 Historic Structures ........................................................................ 3-16
  3.2.5 Cultural Landscapes ...................................................................... 3-23
  3.2.6 Ethnographic Resources ............................................................... 3-23
  3.2.7 Museum Collections ...................................................................... 3-24
  3.2.8 Indian Trust Resources and Native American Sacred Sites .......... 3-24
  3.2.9 Paleontological Resources ............................................................. 3-24

3.3 Socioeconomic Resources ..................................................................... 3-25
  3.3.1 Land Use ......................................................................................... 3-25
  3.3.2 Zoning ........................................................................................... 3-25
  3.3.3 Demographics ................................................................................ 3-25
  3.3.4 Environmental Justice ................................................................. 3-26
  3.3.5 Economics and Development ....................................................... 3-26
  3.3.6 Joint Development .......................................................................... 3-27
  3.3.7 Aesthetics and Visual Quality ......................................................... 3-27
  3.3.8 Health and Safety .......................................................................... 3-28
  3.3.9 Community Resources ................................................................... 3-28
  3.3.10 Utilities and Infrastructure ........................................................... 3-28

3.4 Transportation ....................................................................................... 3-30
  3.4.1 Pedestrian and Bicycle Network .................................................... 3-30
  3.4.2 Road Network ................................................................................ 3-31
  3.4.3 Transit ........................................................................................... 3-34

3.5 Air Quality ............................................................................................ 3-34
  3.5.1 Regional Conformity ...................................................................... 3-34
  3.5.2 Project-Level CO Conformity ....................................................... 3-35
  3.5.3 Project-Level Fine Particulate Matter (PM2.5) Conformity .......... 3-35
  3.5.4 Mobile Source Air Toxics ............................................................... 3-36
  3.5.5 Greenhouse Gas (GHG) Impacts .................................................... 3-36

3.6 Noise and Vibration .............................................................................. 3-36
  3.6.1 Noise Criteria ................................................................................ 3-36
  3.6.2 Existing Conditions ........................................................................ 3-36

3.7 Hazardous Waste/Materials ................................................................. 3-39

3.8 Energy Conservation .............................................................................. 3-39
CHAPTER 4 – ENVIRONMENTAL CONSEQUENCES.................................................. 4-1
4.1 Natural Resources .......................................................................................................................... 4-2
  4.1.1 Geology, Soils, and Topography .......................................................... 4-2
  4.1.2 Water Resources .................................................................................. 4-4
  4.1.3 Wildlife including Threatened and Endangered Species ................. 4-11
  4.1.4 Vegetation ............................................................................................ 4-13
4.2 Cultural and Paleontological Resources ................................................................................. 4-14
  4.2.1 Archeological Resources ..................................................................... 4-15
  4.2.2 Historic Structures ............................................................................... 4-19
  4.2.3 Cultural Landscapes ............................................................................ 4-22
  4.2.4 Ethnographic Resources .................................................................... 4-23
  4.2.5 Museum Collections .......................................................................... 4-23
  4.2.6 Indian Trust Resources and Native American Sacred Sites ............ 4-23
  4.2.7 Paleontological Resources ................................................................. 4-23
  4.2.8 Cultural and Paleontological Resources Summary ......................... 4-24
4.3 Socioeconomic Resources ................................................................................................. 4-24
  4.3.1 Land Use ............................................................................................ 4-24
  4.3.2 Demographics ....................................................................................... 4-25
  4.3.3 Environmental Justice ......................................................................... 4-25
  4.3.4 Economics and Development ............................................................ 4-25
  4.3.5 Joint Development ............................................................................... 4-26
  4.3.6 Aesthetics and Visual Quality .............................................................. 4-26
  4.3.7 Health and Safety ................................................................................ 4-27
  4.3.8 Community Resources ........................................................................ 4-28
  4.3.9 Utilities and Infrastructure ................................................................. 4-29
4.4 Transportation ...................................................................................................................... 4-30
  4.4.1 Bicycle and Pedestrian Network ........................................................ 4-30
  4.4.2 Road Network ...................................................................................... 4-31
  4.4.3 Transit .................................................................................................... 4-32
4.5 Air Quality ......................................................................................................................... 4-34
4.6 Noise and Vibration .............................................................................................................. 4-35
4.7 Hazardous Waste and Materials ......................................................................................... 4-37
4.8 Energy Conservation .......................................................................................................... 4-37
4.9 Indirect and Cumulative Effects ......................................................................................... 4-38
4.10 Permits and Authorizations ............................................................................................... 4-41
  4.10.1 Hazardous Materials Sites ................................................................. 4-41
# Table of Contents

4.10.2 Water Quality ................................................................................................................... 4-41
4.10.3 Tree Removal .................................................................................................................... 4-41
4.10.4 Floodplains ................................................................................................................... 4-42
4.10.5 Park .................................................................................................................................... 4-42
4.11 Section 4(f) Evaluation ........................................................................................................ 4-42
4.12 Irreversible and Irretrievable Commitment of Resources .................................................. 4-43

CHAPTER 5 – AGENCY COORDINATION AND PUBLIC INVOLVEMENT ........ 5-1
5.1 Agency Coordination........................................................................................................... 5-1
5.2 Public Involvement ............................................................................................................. 5-2

CHAPTER 6 – LIST OF PREPARERS ..................................................................................... 6-1

CHAPTER 7 – ENVIRONMENTAL ASSESSMENT DISTRIBUTION .................... 7-1

CHAPTER 8 – REFERENCES ................................................................................................ 8-1

CHAPTER 9 – INDEX ............................................................................................................. 9-1

APPENDIX A – IMPROVEMENT CONCEPTS ................................................................................ A-1

APPENDIX B – CONCEPTUAL ALIGNMENT PLANS – CANDIDATE BUILD ALTERNATIVES ........................................................................................................ B-1

APPENDIX C – PROJECT COST ESTIMATE ASSUMPTIONS AND EXCLUSIONS .................................................................................................................. C-1

APPENDIX D – POTENTIAL DETOUR PLANS ........................................................................ D-1

APPENDIX E – AREA OF POTENTIAL EFFECTS – CULTURAL RESOURCES .......... E-1

LIST OF FIGURES
Figure S-1. Existing Environmental Resources in Project Area ................................................ S-7
Figure 1-1. Project Location ........................................................................................................ 1-2
Figure 1-2. Deteriorated Infrastructure along Oregon Avenue ..................................................... 1-3
Figure 1-3. Examples of Drainage Issues ..................................................................................... 1-4
Figure 1-4. Pinehurst Run Culvert ................................................................................................... 1-5
Figure 1-5. Rural-like Setting of Roadway Corridor .................................................................... 1-8
Figure 2-1. “Building Blocks” to Roadway Concepts .................................................................... 2-2
Figure 2-2. Corridor Sections................................................................. 2-3
Figure 2-3. Alternative 2........................................................................... 2-6
Figure 2-4. Typical Sections – Alternative 2 .............................................. 2-7
Figure 2-5. Alternative 3 Roadway between Nebraska Avenue and Western Avenue........... 2-8
Figure 2-6. Typical Sections – Alternative 3 .............................................. 2-9
Figure 2-7. Alternative 4 Roadway between Nebraska Avenue and Western Avenue........... 2-10
Figure 2-8. Typical Sections – Alternative 4 .............................................. 2-11
Figure 2-9. Intersection Options............................................................ 2-13
Figure 2-10. Stormwater Management Elements ...................................... 2-14
Figure 2-11. Stream Crossing Options ................................................... 2-16
Figure 3-1. Water Resources.................................................................... 3-5
Figure 3-2. Ornamental and Natural Landscapes ....................................... 3-10
Figure 3-3. Headwall on the west side of the Culvert South of Bingham Drive ............. 3-18
Figure 3-4. Historic-age Stone Boundary Marker for Rock Creek Park .............. 3-19
Figure 3-5. Modern Boundary Marker..................................................... 3-19
Figure 3-6. Guardrail at Western Avenue ................................................ 3-20
Figure 3-7. Roadway Guardrails along Pinehurst Run .................................. 3-20
Figure 3-8. Brick Manhole and Concrete Headwall in Deer Print Run ............... 3-21
Figure 3-9. Box Culvert over Pinehurst Run ............................................. 3-22
Figure 3-10. Stone Building at the Knollwood Retirement Facility .................... 3-22
Figure 3-11. Rural-like Setting of Oregon Avenue ....................................... 3-27
Figure 3-12. NPS Scenic Easements......................................................... 3-27
Figure 3-13. Lack of Sidewalks along Oregon Avenue................................. 3-31
Figure 3-14. Traffic Volumes ................................................................. 3-33
Figure 3-15. Bus Stop at Unicorn Lane.................................................... 3-34
Figure 3-16. Noise Sensitive Receptor Locations ....................................... 3-38
Figure 4-1. 2030 Traffic Volumes .............................................................. 4-33
Figure A-1. “Building Blocks” to Roadway Concepts .................................. A-1
Figure A-2. Concepts Developed by General Public .................................... A-2
Figure A-3. Concepts Developed by Agency Representatives ...................... A-5
Figure B-1. Key Map ............................................................................... B-1
Figure B-2. Alternative 2........................................................................... B-3
Figure B-2. Alternative 3........................................................................... B-15
Figure B-2. Alternative 4........................................................................... B-27
Figure D-1. Potential Detour – Phase 1....................................................... D-2
Figure D-2. Potential Detour – Phase 2....................................................... D-3
LIST OF TABLES

Table S-1. Summary of Impacts

Table 3-1. Soil Types in Corridor

Table 3-2. Archeological Resources within the Oregon Avenue Archeological APE

Table 3-3. Historic Structures in the Oregon Avenue Architectural APE

Table 3-4. District of Columbia and Area Population

Table 3-5. Intersection Turning Movement Counts

Table 3-6. FHWA Noise Abatement Criteria

Table 3-7. Noise Sensitive Receptor Measurement Levels

Table 3-8. Common Noise Levels

Table 4-1. Areas of Disturbance (in square feet)

Table 4-2. Pinehurst Run Limits of Disturbance (in linear feet)

Table 4-3. Floodplain Encroachments (in square feet)

Table 4-4. Comparison of Water Treatment System Capabilities (Infiltration Volumes in cubic feet)

Table 4-5. Utility Relocations

Table 4-6. Construction Phasing / Maintenance of Traffic

Table 4-7. Existing and Year 2030 Intersection Levels of Service

Table 4-8. Summary of Cumulative Effects

Table C-1. Conceptual Level Cost Estimate

Table C-2. Conceptual Construction Cost Estimate – Alternative 2

Table C-3. Conceptual Construction Cost Estimate – Alternative 3

Table C-4. Conceptual Construction Cost Estimate – Alternative 4

Table D-1. Construction Phasing / Maintenance of Traffic
# ACRONYMS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
</tr>
<tr>
<td>ABC</td>
<td>Accelerated Bridge Construction</td>
</tr>
<tr>
<td>ACHP</td>
<td>Advisory Council on Historic Preservation</td>
</tr>
<tr>
<td>ADA</td>
<td>Americans with Disabilities Act</td>
</tr>
<tr>
<td>ADT</td>
<td>Average Daily Traffic</td>
</tr>
<tr>
<td>AIRFA</td>
<td>American Indian Religious Freedom Act of 1978</td>
</tr>
<tr>
<td>ANC</td>
<td>Advisory Neighborhood Commission</td>
</tr>
<tr>
<td>APE</td>
<td>Area of Potential Effects</td>
</tr>
<tr>
<td>ARPA</td>
<td>Archeological Resources Protection Act of 1979</td>
</tr>
<tr>
<td>BLM</td>
<td>Bureau of Land Management</td>
</tr>
<tr>
<td>BMP</td>
<td>Best Management Practices</td>
</tr>
<tr>
<td>BOR</td>
<td>Bureau of Reclamation</td>
</tr>
<tr>
<td>CAA</td>
<td>Clean Air Act of 1970</td>
</tr>
<tr>
<td>CAAA</td>
<td>1990 Clean Air Act Amendments</td>
</tr>
<tr>
<td>CEQ</td>
<td>Council on Environmental Quality</td>
</tr>
<tr>
<td>CERCLA</td>
<td>Comprehensive Environmental Response, Compensation, and Liability Act</td>
</tr>
<tr>
<td>CFA</td>
<td>Commission of Fine Arts</td>
</tr>
<tr>
<td>CFR</td>
<td>Code of Federal Regulations</td>
</tr>
<tr>
<td>cf</td>
<td>Cubic Feet</td>
</tr>
<tr>
<td>cfs</td>
<td>Cubic feet per second</td>
</tr>
<tr>
<td>CLRP</td>
<td>Constrained Long Range Plan</td>
</tr>
<tr>
<td>CO</td>
<td>Carbon monoxide</td>
</tr>
<tr>
<td>CWA</td>
<td>Clean Water Act</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>KV</td>
<td>Kilovolt</td>
</tr>
<tr>
<td>LID</td>
<td>Low Impact Development</td>
</tr>
<tr>
<td>LOS</td>
<td>Level of Service</td>
</tr>
<tr>
<td>LWCF</td>
<td>Land and Water Conservation Fund</td>
</tr>
<tr>
<td>MOA</td>
<td>Memorandum of Agreement</td>
</tr>
<tr>
<td>mph</td>
<td>Miles per Hour</td>
</tr>
<tr>
<td>MSAT</td>
<td>Mobile Source Air Toxics</td>
</tr>
<tr>
<td>msl</td>
<td>Mean sea level</td>
</tr>
<tr>
<td>MUTCD</td>
<td>Manual on Uniform Traffic Control</td>
</tr>
<tr>
<td>MWCOG</td>
<td>Metropolitan Washington Council of Governments</td>
</tr>
<tr>
<td>NAAQS</td>
<td>National Ambient Air Quality Standards</td>
</tr>
<tr>
<td>NAGRA</td>
<td>Native American Graves Protection and Repatriation Act of 1990</td>
</tr>
<tr>
<td>NCPC</td>
<td>National Capital Planning Commission</td>
</tr>
<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
</tr>
<tr>
<td>NHPA</td>
<td>National Historic Preservation Act</td>
</tr>
<tr>
<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration</td>
</tr>
<tr>
<td>NOI</td>
<td>Notice of Intent</td>
</tr>
<tr>
<td>NOx</td>
<td>Nitrogen Oxides</td>
</tr>
<tr>
<td>NPDES</td>
<td>National Pollutant Discharge Elimination System</td>
</tr>
<tr>
<td>NPS</td>
<td>National Park Service</td>
</tr>
<tr>
<td>NRCS</td>
<td>Natural Resources Conservation Service</td>
</tr>
<tr>
<td>NRHP</td>
<td>National Register of Historic Places</td>
</tr>
<tr>
<td>NRI</td>
<td>National Rivers Inventory</td>
</tr>
<tr>
<td>NWI</td>
<td>National Wetlands Inventory</td>
</tr>
<tr>
<td>ORV</td>
<td>Outstandingly Remarkable Values</td>
</tr>
<tr>
<td>PEPCO</td>
<td>Potomac Electric Power Company</td>
</tr>
<tr>
<td>PM2.5</td>
<td>particulate matter less than or equal to 2.5 microns</td>
</tr>
<tr>
<td>Acronym</td>
<td>Definition</td>
</tr>
<tr>
<td>---------</td>
<td>------------</td>
</tr>
<tr>
<td>PM10</td>
<td>particulate matter less than or equal to 10 microns</td>
</tr>
<tr>
<td>PRPA</td>
<td>Paleontological Resources Protection Act of 2009</td>
</tr>
<tr>
<td>RCPHD</td>
<td>Rock Creek Park Historic District</td>
</tr>
<tr>
<td>SDWA</td>
<td>Safe Drinking Water Act</td>
</tr>
<tr>
<td>sf</td>
<td>Square Feet</td>
</tr>
<tr>
<td>SIP</td>
<td>State Implementation Plan</td>
</tr>
<tr>
<td>SWDC</td>
<td>Special Waters of the District of Columbia</td>
</tr>
<tr>
<td>TIP</td>
<td>Transportation Improvement Program</td>
</tr>
<tr>
<td>TMDL</td>
<td>Total Maximum Daily Load</td>
</tr>
<tr>
<td>USACE</td>
<td>U.S. Army Corps of Engineers</td>
</tr>
<tr>
<td>USDA</td>
<td>U.S. Department of Agriculture</td>
</tr>
<tr>
<td>USDOT</td>
<td>U.S. Department of Transportation</td>
</tr>
<tr>
<td>USFWS</td>
<td>U.S. Fish and Wildlife Service</td>
</tr>
<tr>
<td>USGS</td>
<td>U.S. Geological Survey</td>
</tr>
<tr>
<td>VOC</td>
<td>Volatile Organic Compound</td>
</tr>
<tr>
<td>vpd</td>
<td>Vehicles per Day</td>
</tr>
<tr>
<td>WASA</td>
<td>District of Columbia Water and Sewer Authority (now DC Water)</td>
</tr>
<tr>
<td>WMATA</td>
<td>Washington Metropolitan Area Transit Authority</td>
</tr>
<tr>
<td>WOUS</td>
<td>Waters of the United States</td>
</tr>
<tr>
<td>WPD</td>
<td>Watershed Protection Division</td>
</tr>
</tbody>
</table>
1 PURPOSE AND NEED

The Federal Highway Administration (FHWA) and the District Department of Transportation (DDOT), in cooperation with the National Park Service (NPS), are proposing the rehabilitation of the 1.7-mile segment of Oregon Avenue, NW, between Military Road and Western Avenue along the northwestern border of Rock Creek Park (see Figure 1). FHWA has oversight responsibility for the Federal-aid program and is participating in the funding of the project. The existing two-lane Oregon Avenue lies entirely within DDOT right-of-way and is maintained by DDOT. The eastern edge of roadway borders Rock Creek Park, which is owned and maintained by the National Park Service.

This Environmental Assessment (EA) will analyze a range of alternatives for improvements to the roadway that would address deficiencies in the existing roadway infrastructure and stormwater management systems; improve the safety of motorists, pedestrians, and bicyclists; and enhance linkages with respect to serving pedestrian and bicycle travel. With minor exceptions, the proposed improvements would occur within the existing DDOT right-of-way.

The EA has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations (40 CFR 1500-1508), FHWA’s Environmental Impact and Related Procedures (23 CFR 771), FHWA’s Technical Advisory Guidance for Preparing and Processing Environmental and Section 4(f) Documents (T6640.8A), DDOT’s Environmental Policy and Process Manual, and the NPS Director’s Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-making. The project will also include the evaluation of potential effects to cultural resources in accordance with Section 106 of the National Historic Preservation Act.

1.1 PURPOSE OF THE PROPOSED ACTION

The purpose of the proposed action is to rehabilitate Oregon Avenue to satisfy operational, safety, and multi-modal transportation needs. Context sensitive solutions will take into account the adjoining land uses - residential developments to the west and Rock Creek Park to the east.

1.2 NEEDS FOR THE PROPOSED ACTION

The needs for improvements to Oregon Avenue relate primarily to deficiencies in the existing roadway infrastructure and stormwater management system; the safety of motorists, pedestrians, and bicyclists; and linkages with respect to serving pedestrian and bicycle travel.
Figure 1-1. Project Location
1.2.1 Infrastructure Deficiencies

There are a number of deficiencies with respect to the current physical condition of Oregon Avenue, including deteriorating pavement and substandard roadway geometry, inadequate stormwater drainage, and aging and inadequate structures, as described further below.

Roadway Pavement and Geometry

With respect to its physical condition, the existing Oregon Avenue roadway is deteriorated and crumbling in many locations (see Figure 1-2), a problem exacerbated by stormwater drainage issues. The existing roadway has an apparent failed base, inadequate pavement, and roadway width less than required by current roadway design standards. Asphalt curb is provided sporadically along the roadway, and a sidewalk is currently available only in front of a few homes on the west side of the roadway near Moreland Place. The pictures in Figure 1-2 illustrate the deteriorating pavement, side-slope erosion, steep roadway slopes, and the impact of ponding runoff due to inadequate stormwater management.

Figure 1-2. Deteriorated Infrastructure along Oregon Avenue
The majority of Oregon Avenue is classified as a collector roadway. Based on roadway design standards developed to provide for safe travel, the minimum design speed for a collector roadway is 30 miles per hour (mph) with a posted speed limit of 25 mph (DC Department of Transportation Design and Engineering Manual). While Oregon Avenue is currently posted for 25 mph, the roadway geometrics at two locations require speed reductions (to either 20 mph or 15 mph). In addition, four of 16 vertical curves\(^1\) on Oregon Avenue do not meet the minimum requirements for this design speed and afford limited sight distance. The geometrics of the roadway reflect the topography within the study area, which is dominated by rolling hills.

**STORMWATER DRAINAGE**

The existing stormwater drainage system includes several storm sewer systems collecting runoff from the highlands to the west of the project; these systems flow to existing outfall channels that flow through Rock Creek Park to the east. Other upland areas to the west drain directly to the roadway. The roadway drainage system consists of a few catch basins in the areas where there are existing storm sewer systems, and these basins discharge into the park via existing outfalls. The remainder of the roadway runoff, and off-site runoff from upstream parcels on the west side of the roadway, drains along the roadside cut-slopes, across the pavement, and then ultimately flows into Rock Creek Park.

This uncontrolled runoff has contributed in large part to the deterioration of the roadway. Local residents have described the roadway as unsafe because of these drainage issues; the lack of adequate stormwater management combined with the topography results in areas along the roadway where ponding often occurs and where ice sheets form in the winter (in particular, at the intersections with Moreland Place and Western Avenue). **Figure 1-3** shows some examples of stormwater runoff and ponding within the roadway corridor.

---

\(^1\) A vertical curve is a civil engineering term used to describe the smooth curve that is inserted between two sections of a road that are at different slopes in order to avoid an abrupt transition in passing from one to the other.
**Roadway Structures**

Oregon Avenue crosses over Pinehurst Run on a single-cell concrete box culvert that is aging and substandard in terms of condition and its ability to convey floodwaters from major periodic storms (see Figure 1-4). An inspection of the culvert conducted in 2003 found the structure to be in poor condition with deficiencies in the outlet headwall and abutments due to scour and aging, deterioration of concrete parapets, failed guardrails, and a need for in-stream stabilization (Wilbur Smith Associates, 2003).

![Figure 1-4. Pinehurst Run Culvert](image)

**1.2.2 Safety**

Oregon Avenue can generally be characterized as a low-speed roadway (posted at 25 miles per hour) with a mix of straight and curved roadway sections. Rolling topography and steep grades play a role with respect to both the vertical geometrics of the roadway itself as well as adjacent lands, resulting in areas with limited sight distances that adversely affect the safety of motorists, pedestrian, and bicyclists. As a result, several locations on the roadway have advisory speed limits of 15 miles per hour in order to allow vehicles to safely navigate the curves in the roadway and minimize incidences of running off the road or suddenly coming upon pedestrians, bicyclists, or other vehicles using the roadway. Poor lighting within the roadway corridor also reduces available reaction time for the motorists, bicyclists, and pedestrians.

Safety is a primary concern on Oregon Avenue due to the lack of separate facilities for pedestrians and bicycles and due to speeding along the roadway, as reported by local residents. The lack of both sidewalks and areas for bicycles to travel means that the roadway is shared by motorized vehicles, bicycles, and pedestrians. Pedestrians walking within the project area (for exercise and recreation; to bus stops, schools, and Rock Creek Park; or to visit neighbors) must
walk within the roadway. The fact that users of each mode must be aware of two other types of users within a constrained roadway corridor exacerbates safety concerns substantially.

The topography of the area also creates safety issues on Oregon Avenue with respect to drainage and the accommodation of stormwater. While pooling of water does not present a major concern for the relatively slow-moving vehicles on Oregon Avenue, it does present safety concerns to motor vehicles when the water freezes during winter months and to bicyclists year-round.

1.2.3 System Linkage

As a roadway that is designated as a collector over most of its length, Oregon Avenue serves its intended function of providing access to residences along the roadway. In addition, daily commuters also use Oregon Avenue as a “cut through” route: Nebraska Avenue to Oregon Avenue to Wise Road (through Rock Creek Park). Additional vehicular linkages or capacity are neither needed nor intended for this roadway. The roadway, however, does not provide needed (and planned) linkages for both pedestrians and bicycles.

With the exception of a very short stretch of sidewalk north of Moreland Place, Oregon Avenue currently lacks amenities to serve pedestrians and bicycles. An off-street multi-use path (Pinehurst Trail) parallels Oregon Avenue on the east side of the road within the boundaries of Rock Creek Park. The trail has limited connectivity to Oregon Avenue due to differences in vertical elevation between the roadway and the trail. In addition, along most of its length, the trail is over 50 feet to the east of the roadway, which limits its use for day-to-day activities. Oregon Avenue is included in the DC Bicycle Master Plan as an on-street bicycle route that provides for needed linkages for bicycle travel within this portion of the District. Improvements to enhance its ability to safely carry bicycles are needed to support the viable use of Oregon Avenue as a key linkage in the overall bicycle system.

There are no internal linkages or crosswalks for pedestrians to the parks, schools, and residential areas adjacent to Oregon Avenue, nor are there pedestrian connections to serve those who ride the Metrobus E-6 route, which serves seven bus stops in the northern portion of the roadway.

1.2.4 Legislation

As described in FHWA Technical Advisory T6640.8a, federal, state, and local government mandates are appropriate elements of the need for a proposed action. A key piece of local legislation related to the need for improvements to Oregon Avenue is the District of Columbia’s Priority Sidewalk Assurance Act of 2010 (Law #L18-0227) enacted on July 7, 2010 and effective September 24, 2010. This law requires the installation of sidewalks “to ensure a safe and accessible environment for pedestrians and persons with disabilities.” The law requires that, for roadways with no sidewalks on either side of the roadway, reconstruction shall include installation of a sidewalk. It further states that, for “roadways that are missing sidewalks, but are not undergoing major construction, sidewalk installation shall be prioritized for the following areas: (1) Missing sidewalks in school areas; (2) Routes that provide access to parks and recreational facilities; (3) Transit stops; (4) Locations where the absence of a sidewalk
creates substantial pedestrian safety risks; and (5) Roadway segments for which residents petitioned to have sidewalks.” Oregon Avenue meets the criteria for prioritization based on considerations 1, 2, 3, and 4.

1.3 PROJECT OVERVIEW

1.3.1 BACKGROUND

The rehabilitation of Oregon Avenue was originally placed on DDOT’s schedule of planned improvements because of the apparent needs for roadway repair and the desire for a safer facility. Local residents have described the roadway as unsafe because of drainage issues, as well as poor lighting and the tendency for drivers to exceed the posted speed limit.

The uncontrolled runoff from elevated parcels to the west of the roadway has contributed in large part to the deterioration of this two-lane roadway. The large volume of stormwater has also had detrimental effects on the adjacent streambeds in Rock Creek Park. Extensive erosion at culvert outfalls as well as at streambeds of the receiving waterways has been attributed to the high, erosive powers of the stormwater. The need for a total solution involving improvements on national park properties has resulted in the NPS serving as a Cooperating Agency in the development of the EA. Other notable environmental issues associated with this project include Section 106 (cultural resources), Section 4(f) resources (cultural resources and parklands), habitat concerns (fish and wildlife), water quality, and residential concerns (noise and visual intrusion and bike/pedestrian safety).

Aging infrastructure has also been cited as a deficiency in the roadway corridor. The culvert carrying Oregon Avenue over Pinehurst Run has been found to be in poor condition with deficiencies in the outlet headwall and abutments due to scour and aging, deterioration of concrete parapets, failed guardrails, and a need for in-stream stabilization (Wilbur Smith Associates, 2003). Improvement opportunities for this bridge culvert will be addressed as a part of the upgrades planned for Oregon Avenue.

The District Department of the Environment (DDOE) is currently working with the NPS in conducting stream restoration projects within Rock Creek Park in the vicinity of Oregon Avenue. An EA is being prepared for this project and is being closely coordinated with DDOT’s proposed roadway improvements on Oregon Avenue.

1.3.2 DESCRIPTION OF THE PROJECT AREA

Oregon Avenue is a two-lane roadway located in northwest Washington, DC, extending from Military Road to the Maryland state line at Western Avenue, a distance of approximately 1.7 miles. As shown in Figure 1-1, Rock Creek Park (owned by NPS) is located immediately east of Oregon Avenue over its entire length, which creates a bucolic or rural-like setting in the project area, as shown in Figure 1-5. Rock Creek Park is one of the largest forested urban parks in the United States, nearly a mile wide in some places, and contains a wide variety of natural, historical, and recreational features in the midst of Washington, DC. It is this rural-like context within an otherwise urbanized area that residents suggest make this roadway very unique.
Areas to the west of Oregon Avenue include the neighborhoods of Chevy Chase, Barnaby Woods, and Hawthorn; St. John’s College High School; the Knollwood retirement community; and a short section of NPS property on the south side of Beech Drive.

At its southernmost point, Oregon Avenue intersects with Military Road at a signalized intersection. South of Military Road, the roadway continues as Glover Road. St. John’s College High School is located in the northwest quadrant of the intersection, and Rock Creek Park lies to the northeast and continues along the length of the roadway corridor.

North of St. John’s College High School is the residential neighborhood of Chevy Chase. Nebraska Avenue, one of the streets in this neighborhood that continues into Rock Creek Park as Bingham Drive, was recently upgraded to include an updated intersection with Oregon Avenue, which features two rain gardens for stormwater mitigation. Knollwood, a military retirement residence, is located in the northeast corner of Chevy Chase on Oregon Avenue between Nebraska Avenue and Tennyson Street.
The neighborhood of Barnaby Woods is situated in the center of the project corridor, north of Tennyson Street. It is bordered on the north by Pinehurst Parkway Park, an arm of NPS land that extends west from Rock Creek Park.

The northern end of the project area serves as the eastern edge of Hawthorn. The main east-west roadway in this neighborhood is Chestnut Street, which originates in Maryland as Winnett Road and continues through Rock Creek Park as Wise Road. The northern limit of the project and this neighborhood is Western Avenue, after which Oregon Avenue continues as Daniel Road in Maryland.

1.4 PROJECT GOALS

Project goals were established by the study team to aid in the development of improvement concepts for Oregon Avenue. These goals were developed by considering the purpose and need, agency/public comments, and project area constraints. The goals for the Oregon Avenue project are listed below:

- Create a safe facility for all users of the roadway (motorists, pedestrians, bicyclists, etc.)
- Effectively manage stormwater runoff
- Avoid/minimize use of parkland by staying within the DDOT right-of-way to the extent possible
- Preserve and protect environmental resources – both man-made and natural – and retain the current context of the corridor
- Provide improved access to Rock Creek Park
- Utilize environmentally sensitive materials and practices

In addition to the project goals, the proposed improvements for Oregon Avenue consider design criteria outlined in the American Association of State and Highway Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities (AASHTO, 1999); DDOT Design and Engineering Manual, Chapter 28 (DDOT, 2009b); DDOT Bicycle Master Plan (Toole Design, 2005); DDOT Bicycle Facility Design Guide (DDOT, 2005a); DDOT Environmental Policy and Process Manual; the Manual on Uniform Traffic Control Devices (MUTCD) Traffic Controls for Bicycle Facilities, Part 9 (FHWA, 2003); District of Columbia Pedestrian Master Plan (DDOT, 2009e); AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities, (AASHTO, 2009); and other design guidance.

1.5 DESIGN CONSIDERATIONS

Based on data collection, field observation, and input from the project’s stakeholders, the study team formulated an array of considerations to help with the development of concepts and options for the proposed improvements to Oregon Avenue. Field reviews were conducted with DDOT and NPS staff to gain first-hand knowledge about issues in the roadway corridor. Stakeholder input was gathered at agency and public scoping meetings. Finally, data collection and research, as documented by the environmental conditions and considerations presented in
Chapter 3, were used to best address necessary Oregon Avenue improvements while incorporating community needs and resource preservation.

The following considerations led to the formation of concepts that were carried forward for detailed study or dismissed (see Chapter 2 for a discussion of the Proposed Action and Alternatives).

### 1.5.1 Roadway Considerations
Roadway improvements consist of reconstructing the roadway subgrade, repaving, and realigning to improve sight distances as necessary. The width of the roadway’s travel surface varies depending on the inclusion of various elements. These elements include:

- Varying lane widths – 10, 11, and 12 feet
- Travel lanes with and without shoulders, curbs and gutter
- Shared travel lanes that include bike lanes

### 1.5.2 Bicycle and Pedestrian Considerations
In order to accommodate other modes of transportation, consideration was given to bicyclist and pedestrian facilities.

- Bike lanes – on and off the travel lanes
- Sidewalks and walking trails
- Shared-use paths for walking and biking

### 1.5.3 Stormwater Management Considerations
Stormwater runoff can be controlled by a series of improvements that are located on or adjacent to the roadway. Within the roadway, curb and gutter can be incorporated to convey waters to storm sewers. Adjacent to the roadway, the project may implement Low Impact Development (LID) principles and practices so that water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within the ecosystem and watershed. There are many practices that can be used to adhere to these principles and include, but are not limited to, the following:

- Vegetated grass swales
- Bioretention cells or swales
- Rain gardens

### 1.6 Relationship to Other Plans and Studies
The project is consistent with the District’s planning documents and projects, including the following.

#### 1.6.1 District of Columbia Bicycle Master Plan
The DDOT 2005 Bicycle Master Plan includes several core goals and recommendations in order to establish a world-class bicycle transportation system in the District of Columbia. Several
strategies are named to increase bicyclist safety and security while improving the connectivity and accessibility of destinations and activity centers within the District of Columbia. The proposed improvements to Oregon Avenue, which will enhance pedestrian and bicycle facilities along the roadway, is consistent with the first goal of the plan: to provide “more and better facilities.”

1.6.2 District of Columbia Pedestrian Master Plan

The proposed improvements to Oregon Avenue are consistent with the District of Columbia Pedestrian Master Plan, which seeks to reduce the number of pedestrian/motor vehicle crashes and increase pedestrian activity by making walking a comfortable and accessible mode of travel throughout all parts of the District. The Plan also encourages improved facilities and policies to promote the benefits of walking for transportation, recreation, and health. The project will add pedestrian facilities along the entire length of the roadway to ensure a safe and accessible environment for pedestrians and persons with disabilities.

1.6.3 Rock Creek Trail Project

DDOT and NPS are developing plans to rehabilitate the Rock Creek Multi-Use Trail and Rose Park Trail in Rock Creek Park from M Street, NW on the south end to Broad Branch Road/Beach Drive on the north end, including a spur trail along the Piney Branch Parkway. The design plan will address several key elements, including development of new trail connections. The proposed improvements to Oregon Avenue would provide improved access to and from the multi-use trail system in Rock Creek Park.

1.6.4 Rock Creek Watershed Implementation Plan

The District Department of the Environment Watershed Protection Division (WPD) operates under a mission to conserve the soil and water resources of the District of Columbia and to protect its watersheds from nonpoint source pollution. Consistent with that mission, WPD has prepared a Rock Creek Watershed Implementation Plan (DDOE, 2010). The plan states that “(t)he Watershed Implementation Plan is an effort to create a watershed-based non-point source pollution control plan that meets EPA’s requirements for acceptance while providing a realistic and adaptable guide for agencies responsible for the restoration of Rock Creek at the local level.”

The proposed improvements to Oregon Avenue are consistent with the District’s goals of improving water quality and managing nonpoint source pollution. An important component in addressing these issues is managing the large quantities of uncontrolled and untreated stormwater runoff flowing into Rock Creek due to impervious surfaces. Stormwater management for this project would support the goals set forth in the Rock Creek Watershed Implementation Plan by following its recommendations, including implementation of low impact development projects, bioretention measures, erosion and sediment control, restoration of eroded stream banks, and tree plantings.

1.6.5 Military Road/ Missouri Avenue Transportation Study

The proposed improvements to Oregon Avenue are consistent with the Military Road/Missouri Avenue Transportation Study’s recommendations to reduce the speed of vehicles traveling west
along Military Road exiting Rock Creek Park. The speed limit is reduced in this area and slower traffic in the school zone is important for safety. It also recommends the consideration of a bike path along Military Road easterly through Rock Creek Park, which could tie into the pedestrian and bicycle facilities proposed as part of this project.

1.6.6 **Comprehensive Plan of the National Capital**

The *Comprehensive Plan of the National Capital*, which was first adopted in 1984 and 1985 and is updated periodically, is a general policy document that provides overall guidance for future planning and development of the city. The plan is comprised of two parts, the District Elements and the Federal Elements, which are adopted by the DC Council and the National Capital Planning Commission (NCPC), respectively.

The proposed improvements to Oregon Avenue support the *Comprehensive Plan of the National Capital: District Elements*’ 13 citywide elements that provide goals, objectives, and policies for land use issues that impact the whole city, e.g., transportation, environment, parks and open space, historic resources, cultural resources, arts, and culture. The plan contains recommendations for maintaining these goals including:

- Increasing investment in bus and rail transit, pedestrian and bicycle facilities, and other modes of travel to solve the region’s traffic problems and sustain economic growth;
- Promoting natural resource conservation and environmental sustainability by protecting, restoring, and enhancing earth, water, air, and biotic resources of the District;
- Protecting, maintaining, and improving social, economic, historic, and physical qualities of residential neighborhoods;
- Improving the connections between different transportation modes, improving traveler safety and security, and increasing system efficiency;
- Improving connections to the city’s celebrated spaces, such as Rock Creek Park;
- Retaining historic and unique qualities of Washington’s streetscapes; and,
- Encouraging land use patterns and land uses that reduce air pollution and facilitate pedestrian and bicycle travel.

The proposed improvements to Oregon Avenue are consistent with each of these plan goals.
This chapter documents the process used to develop improvement concepts for Oregon Avenue and describes the resulting project alternatives and options, which were developed in accordance with the goals established to meet the project purpose and need. In this EA, a No Action Alternative and three Candidate Build Alternatives are considered for the rehabilitation of Oregon Avenue.

### 2.1 Alternatives Development Process

While the main purpose of the project is to reconstruct Oregon Avenue and control stormwater runoff, other elements are also being studied for inclusion within the roadway cross-section, including bicycle and pedestrian facilities. With regard to the latter, recent DC legislation (see Section 1.2.4) has prompted the need for pedestrian accommodations within the corridor. Furnishing sidewalks along Oregon Avenue would also conform to the District’s Complete Street Program, a policy document that encourages the provision of sidewalks along DC streets.

Alternatives development consisted of a three-step collaborative process with the study team, stakeholders, and the public to develop a range of alternatives that incorporate elements to address each of the project’s needs:

- Roadway elements
- Stormwater and drainage elements
- Bicyclist and pedestrian elements

The first step in the process included an agency coordination meeting and a public scoping meeting. At these two meetings, input was gathered from the stakeholders and public on the perceived deficiencies and problems within the roadway corridor. In addition, the study team collected information on desirable roadway, stormwater management and drainage, and pedestrian and bicyclist elements that would improve roadway operations and safety.

Following the development of a long list of project elements, the next step in the process involved a second round of agency and public meetings. These subsequent meetings were held to provide the stakeholders and public an opportunity to mix-and-match the various roadway, stormwater management, and pedestrian and bicycle elements to develop roadway cross-section concepts. The concepts were developed using a series of “building blocks” that included various roadway widths, sidewalks, bike lanes, and stormwater management elements (curbs, swales and rain gardens), as shown in Figure 2-1.
The concepts that were developed at the meetings were placed in a scaled tray that reported the width of the resulting concept. The width of the concepts was then compared to existing DDOT-owned right-of-way along the entire roadway corridor. The existing right-of-way ranges from 33 feet to 90 feet wide. This part of the exercise demonstrated what concepts could be constructed within the existing DDOT right-of-way and which would require right-of-way acquisition. Eight different concepts were developed at the public meeting ranging in width from 31 to 44 feet. In addition, five concepts were developed by agency representatives, ranging from 31 to 49 feet. All of the concepts are included in Appendix A.

These concepts served as the foundation for the final step in the process: the development of three Candidate Build Alternatives that consider the agency and public input as well as meet the project’s purpose and need. The three alternatives, described in detail in the subsequent sections, were developed for the purposes of identifying topography constraints and cut/fill needs, footprint, and environmental impacts, as discussed further in Chapter 4.

Along its 1.7-mile length, Oregon Avenue varies in terms of traffic volumes, function, and character of roadway. Therefore, in order to facilitate the development of end-to-end alternatives and the identification of impacts, the corridor was divided into two sections as shown in Figure 2-2 and described below:

- Southern Section - Military Road to Nebraska Avenue
- Northern Section - Nebraska Avenue to Western Avenue
Figure 2-2. Corridor Sections
In the Southern Section and between Chestnut Street/Wise Road and Western Avenue, traffic volumes are less than 5,000 vehicles per day (vpd), while volumes are greater than 8,000 vpd between Nebraska Avenue and Chestnut Street/Wise Road due to commuter traffic. The higher volumes [and speeds] in this area create an environment that is unsafe for walking and cycling, particular during the peak commuting periods of the day.

The topography and roadway cross-section also vary along the corridor, with the Southern Section exhibiting the steepest longitudinal cross slope. As noted above, the DDOT-owned right-of-way ranges from 33 to 90 feet along Oregon Avenue, with an average width of 75 feet along most of the corridor. The narrowest width (33 feet) is located at the southern end of the corridor, adjacent to St. John’s High School College, which will limit the types of improvements at this end of the corridor.

Given these varying features, one cross-section may not be appropriate for the full length of the roadway and the project considered variable cross-sections based on the project purpose and need and the available right-of-way. Each of the proposed end-to-end alternatives is described further below.

### 2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative (Alternative 1), the improvements to Oregon Avenue would include short-term minor restoration activities (safety and routine maintenance) that maintain the continuing operation of the existing roadway.

While the No Action Alternative does not meet the purpose and need of the project, it provides a basis for comparing the environmental consequences of the Candidate Build Alternatives.

### 2.3 CANDIDATE BUILD ALTERNATIVES

The three proposed Candidate Build Alternatives will address deficiencies in the existing roadway infrastructure and stormwater management systems; improve the safety of motorists, pedestrians, and bicyclists; and enhance linkages with respect to serving pedestrian and bicycle travel. No major disruption to the surrounding topography is expected with the proposed action as each of the Candidate Build Alternatives follows the existing roadway alignment. Each alternative remains within DDOT-owned right-of-way with two minor exceptions. There is one small section of the existing roadway where approximately 100 feet of the northbound lane lies within NPS-owned property (see Station 114 – 115 on pages B-4, B-16, and B-28 in Appendix B). This encroachment is the result of inconsistencies in survey bounds that existed when the current Oregon Avenue was constructed. This EA will cover the appropriate action needed from NPS to correct this inconsistency, which may include an easement, land transfer, or permit. The second minor encroachment is located at the base of a private driveway (see Station 154 on pages B-21 and B-33 in Appendix B). Under Alternatives 3 and 4, the continuity of sidewalks or trails and drainage facilities would require an easement to cross this 63-foot stretch of private driveway. Notwithstanding these exceptions and the placement of silt fences and restoration of outfalls during construction, there are no other physical components which would require use of lands within Rock Creek Park or on private property for any of the alternatives.

Following the sections that describe the three Candidate Build Alternatives are discussions of several options that could be incorporated as part of any alternative. Options include traffic
calming (Option A), Nebraska Avenue intersection improvements (Option B), stormwater management systems (Option C), and replacement of the Pinehurst Run crossing (Option D).

For any alternative, prior to any land disturbance activities, tree protection measures, protective fencing, and other best management practices (BMPs) would be installed. The existing roadway infrastructure within the project area would be removed including pavement, curb and gutter, inadequate stormwater drainage systems, as well as debris and trees that present a hazard. DDOT would include in the contractor specifications that removed materials be disposed of or recycled in accordance with the DDOT Standard Specifications for Highways and Structures (2009).

All Candidate Build Alternatives would be designed to accommodate widths and weights of utility maintenance vehicles and emergency response vehicles. Grading and placement of clean fill would be necessary to prepare a stable bed for the roadway and to provide adequate drainage conveyance. Existing profile elevations would be raised or lowered in steeper areas to remove blind crests and improve sight distances along the roadway.

Inadequate stormwater outfalls and culverts would be reconstructed and resized to appropriately convey water, including but not limited to the Pinehurst Run culvert. Coping and retaining walls would be incorporated where feasible to minimize the limits of disturbance and footprint of the roadway. Retaining walls would be designed to complement the setting of Rock Creek Park and the surrounding area as well as incorporate construction methods to minimize intrusion into the Park property.

Following construction, additional restoration along Oregon Avenue would include replanting of native tree species and vegetation. Species would be selected in consideration of the natural and cultural landscapes, as well as the aesthetics of Rock Creek Park.

All three Candidate Build Alternatives would be properly signed and marked in accordance with standards of the American Association of State Highway and Transportation Officials (AASHTO), DDOT, and the Manual on Uniform Traffic Control Devices (MUTCD). Features such as signage and lighting would be incorporated into more detailed design plans.

The following subsections describe the three proposed Candidate Build Alternatives for the rehabilitation of Oregon Avenue. Alignment plans for each of the three Candidate Build Alternatives are presented in Appendix B and detailed cost estimates are presented in Appendix C.

### 2.3.1 Candidate Build Alternative 2

**Alternative 2** is the minimum width alternative that meets the purpose and need of the project. It consists of two 10-foot travel lanes with curb and gutter and a 5-foot sidewalk on the west side and a curb on the east, as shown in Figure 2-3.

This alternative has a cross-section width of approximately 27 feet and no additional right-of-way would be required for the entire length of the roadway, as shown in Figure 2-4. The proposed curb on the eastern edge is expected to prevent the edge of the new roadway from unraveling and prevent tree roots from spreading underneath the roadway base, as well as
protect side slopes from stormwater runoff. In addition, curbs provide the additional benefit of traffic calming.

Where possible, both travel lanes would slope from east to west so that all roadway runoff would be directed to the curb and gutter on the west side of the roadway. Stormwater management would be accomplished through a closed, underground system, which would collect and treat the runoff and direct it to the existing outfall locations along the corridor. Additional details on this stormwater management system are provided in Section 2.4.3 Stormwater Management Systems. The locations of the outfalls are shown in Figure B-2 in Appendix B.

Some of the sections of roadway in the narrower Southern Section will require retaining walls in order to stay within the right-of-way. The walls are estimated at 2 to 5 feet high. The location and height of these walls are also shown in Figure B-2 in Appendix B. Runoff from uphill areas behind the walls would be collected and conveyed to existing outfalls via channels or storm sewers.

Sidewalk treatments, the selection of which will take place during final design, will be in keeping with the context of the project setting. Treatments include trail-like designs or the use of colored concrete or pavers.

The total estimated construction cost for Alternative 2 is $23.4 million.

### 2.3.2 Candidate Build Alternative 3

Alternative 3 consists of two cross-sections. In the Southern Section between Military Road and Nebraska Avenue, where most of the existing DDOT-owned right-of-way is only 33-feet wide, Oregon Avenue would be reconstructed similar to Alternative 2, with two 10-foot travel lanes with curb and gutter and a 5-foot sidewalk on the west side and a curb on the east, as described above and shown in Figure 2-3.

In the Northern Section, or north of Nebraska Avenue to Western Avenue, Alternative 3 would transition to a cross-section width of approximately 43 feet and would consist of two 10-foot travel lanes with a 2-foot shoulder, a 10-foot vegetated swale and a 10-foot shared-use path on the west side, and mountable curbing only on the east side, as shown in Figure 2-5. The typical cross-sections along the entire length of the roadway are shown in Figure 2-6. As noted above, the proposed curb on the eastern edge is expected to prevent the edge of the new roadway from unraveling; prohibit tree roots from spreading underneath the roadway base, and control runoff. In addition, the curb provides the added benefit of traffic calming.
Alternatives and Options

Figure 2-4. Typical Sections – Alternative 2

Note: The three illustrations shown above are representative of the typical cross-sections for this alternative; however, they will vary slightly depending on the physical features along the roadway. More specific information on the cross-section by location on Oregon Avenue can be found in Appendix B.
To match the Southern Section, where possible, both travel lanes would be reverse crowned from east to west. But whereas the runoff will be captured in a closed, underground system in the Southern Section, the roadway runoff in the Northern Section would also incorporate a vegetated swale on the west side of the roadway. Additional details on both stormwater management systems are provided in Section 2.4.3 Stormwater Management Systems. Runoff that is collected will be directed to the existing outfall locations along the corridor, which are shown in Figure B-3 in Appendix B.

Some of the sections of roadway will require retaining walls in order to stay within the right-of-way and preserve the use of the adjacent homes’ front yards. These walls are estimated at 2 to 5 feet high in the Southern Section and up to 8 feet high in the Northern Section of the project. The location and height of these walls are shown in Figure B-3 in Appendix B. Runoff from uphill areas behind the walls would be collected and conveyed to existing outfalls via channels or storm sewers.

Surface treatments for the multi-purpose trail will be suitable for both pedestrians and cyclists. The selection of treatment types, which will be in keeping with the context of the project setting, will take place during final design.

The total estimated construction cost for Alternative 3 is $30.5 million.

2.3.3 Candidate Build Alternative 4

Similar to Alternative 3, Alternative 4 also consists of two cross-sections. In the Southern Section, where the existing right-of-way is 33 feet, Oregon Avenue would be reconstructed similar to Alternative 2, with two 10-foot travel lanes with curb and gutter and a 5-foot sidewalk on the west side and a curb on the east, as described above and shown in Figure 2-3.

In the Northern Section, or north of Nebraska Avenue to Western Avenue, Alternative 4 would have a cross-section width of 44 feet and include two 10-foot travel lanes, a 4-foot bike lane, 10-foot vegetated swale, and 5-foot sidewalk on the west side, and a 4-foot bike lane and
Figure 2-6. Typical Sections - Alternative 3

Note: The three illustrations shown above are representative of the typical cross-sections for this alternative; however, they will vary slightly depending on the physical features along the roadway. More specific information on the cross-section by location on Oregon Avenue can be found in Appendix B.
mountable curbing on the east side only, as shown in Figure 2-7. The typical cross-sections along the entire length of the roadway are shown in Figure 2-8. The proposed curb on the eastern edge is expected to provide improved runoff control, as well as prevent the edge of the new roadway from unraveling and prevent tree roots from spreading underneath the roadway base. In addition, the curb provides the added benefit of traffic calming.

Figure 2-7. Alternative 4 Roadway between Nebraska Avenue and Western Avenue

Similar to the Southern Section, both travel lanes would slope from east to west so that all roadway runoff would be directed to the vegetated swale on the west side of the roadway. But whereas the runoff will be captured in a closed, underground system in the Southern Section, the roadway runoff in the Northern Section would be directed to a vegetated swale on the west side of the roadway. Additional details on both stormwater management systems are provided in Section 2.4.3. Stormwater Management Systems. Runoff that is collected will be directed to the existing outfall locations along the corridor, which are shown in Figure B-4 in Appendix B.

Some of the sections of roadway will require retaining walls in order to stay within the right-of-way and preserve the use of the adjacent homes’ front yards. These walls are estimated at 2 to 5 feet high in the Southern Section and up to 8 feet high in the Northern Section of the project. The location and height of these walls are shown in Figure B-4 in Appendix B. Runoff from uphill areas behind the walls would be collected and conveyed to existing outfalls via channels or storm sewers.

Sidewalk treatments, the selection of which will take place during final design, will be in keeping with the context of the project setting. Treatments include trail-like designs or the use of colored concrete or pavers.

The total estimated construction cost for Alternative 4 is $35.3 million.
Figure 2-8. Typical Sections - Alternative 4

Note: The three illustrations shown above are representative of the typical cross-sections for this alternative; however, they will vary slightly depending on the physical features along the roadway. More specific information on the cross-section by location on Oregon Avenue can be found in Appendix B.
2.4 Options
Several options have been developed that can be incorporated into designs for any of the three Candidate Build Alternatives. These options are described below and are included as optional build elements in the assessment of impacts presented in Chapter 4.

2.4.1 Option A – Traffic Calming
Oregon Avenue is heavily traveled between Nebraska Avenue and Wise Road, with motorists often travelling above the posted speed limit. Traffic calming measures are being considered to manage travel speeds and improve safety, two elements that meet the project’s purpose and need. Possible measures include, but are not limited to, traffic circles and pavement markings to provide effective speed control. Each of these roadway features is described further below.

Potential locations for traffic circles are at the intersections of Oregon Avenue with Chestnut Street/Wise Road and Nebraska Avenue/Bingham Drive. The traffic circle at Chestnut Street/Wise Road would be smaller, or a “mini” traffic circle, due to the lower traffic volumes and smaller amount of right-of-way at that location. Currently, in an attempt to control speeds, these intersections are managed with four-way stop traffic controls. Mini traffic circles have become more common throughout North America and are increasingly used in lieu of four-way stop control.

Mini traffic circles offer several advantages over four-way stop control in low traffic volume locations such as Oregon Avenue:

- Stop signs are often ignored on low volume roads, resulting in an increase in the number of accidents. In contrast, mini traffic circles are more visible and force traffic to slow. Traffic circles minimize “t” collisions, thus reducing the severity of accidents that do occur.
- Traffic circles can also be used as part of the stormwater management strategy, with the center island serving as a rain garden.
- Traffic circles can be incorporated in the overall landscaping for the roadway and help to create the “feeling” that drivers are in a residential area.

Roadway pavement markings are being used in many areas to help control speeds. Studies have shown that pavement markings can influence driver behavior by creating the sense that the travel lane is narrower or by simply alerting the driver to an upcoming condition. In the case of Alternative 4, colored pavement could be utilized within the bike lanes.

The estimated construction cost for the mini traffic circle is approximately $160,000.

2.4.2 Option B – Nebraska Avenue Intersection Improvements
The intersection of Oregon Avenue and Nebraska Avenue/Bingham Drive is currently a four-way stop-controlled intersection with a bifurcated approach on Nebraska Avenue. Traffic to and from the north on Oregon Avenue uses the north approach and traffic to and from the south on Oregon Avenue and Bingham Drive uses the south approach. A rain garden is located
in the triangular area between the two approaches. The current configuration imposes a large footprint on the neighborhood and is confusing to many motorists.

Two options have been explored for simplifying the intersection and reducing the overall footprint. One option would be to reconstruct the intersection to a conventional four-way stop-controlled intersection, as shown in Figure 2-9. However, like many four-way stop intersections on low volume roadways, compliance with the stop control would continue to be an issue with many motorists “rolling” through the intersection.

A second option would be to construct a traffic circle, also shown in Figure 2-9. A traffic circle with an outside diameter of 90 to 100 feet would fit within the right-of-way and reduce the overall footprint of the intersection by an amount similar to the conventional four-way intersection. Speeds would be limited to approximately 15 mph through the circle. A rain garden in the circle could be used to help create the feeling of a more rural or park-like setting. Accident rates have been shown to be lower with traffic circles than that experienced at four-way stop intersections and tend to be less severe as “T” collisions are eliminated.

Both of the options for the Nebraska Avenue intersection are also shown as part of Alternative 2 on Sheet 5 of Figure B-2 in Appendix B. With slight modifications, both configurations can also be incorporated in Alternatives 3 and 4.

The estimated construction costs for these two options are $200,000 for the four-way intersection and $275,000 for the traffic circle.

2.4.3 Option C - Stormwater Management Systems

The existing stormwater drainage system along Oregon Avenue is inadequate in several aspects including:

- Roadway ponding, which is occurring at low areas with no, or inadequate, conveyance to drainage outfalls;
- Erosion at outfalls downstream through Rock Creek Park, which is being caused by outfall velocities that exceed what the outfall channels can accommodate; and
- Lack of water quality controls.
Existing roadway ponding would be addressed by the installation of an expanded drainage system serving the full length of the project. One component would include interception of the runoff from the upland areas to the west of the project and conveyance of that water to culverts crossing under the roadway and into the existing channels west of the roadway. Another component would be the proposed design of the roadway drainage to meet current design standards. In general, the spread of stormwater onto the proposed roadway would be limited by provisions to collect the water and convey it to the existing outfalls. Systems would include inlets connected to storm sewers for Alternative 2 and the Southern Section in Alternatives 3 and 4. Systems for the Northern Section of Alternatives 3 and 4 would also include roadside swales (Figure 2-10).

Existing erosion occurring along the outfall channels east of the project would be addressed using several design options. In some locations, the pipe culverts under Oregon Avenue can be replaced to reduce outfall velocities. The downstream channels can be stabilized using techniques developed for a nearby project through the park; these techniques would include reconstruction of the headwalls and installation of “sand seepage berms” within the channel for a reach downstream of the headwalls (Figure 2-10). The outfall erosion would also be mitigated with the application of stormwater management Best Management Practices (BMP) described below for water quality. These proposed BMPs have the added effect of reducing peak outfall volumes and velocities that also serve to mitigate downstream erosion. The northernmost outfall for the project has a singular issue: current runoff from Oregon Avenue and

Figure 2-10. Stormwater Management Elements
Western Avenue enters the park but no defined channel exists. The drainage system for this northernmost outfall would incorporate a “level spreader” device to preserve non-erosive sheet flow into this area of the park (Figure 2-10).

The existing Oregon Avenue stormwater system includes a rain garden at Nebraska Avenue but few other components to address water quality (Figure 2-10). Guidance from the District Department of the Environment encourages the use of Low Impact Development (LID) techniques to meet an on-site retention standard of 1.2 inches of runoff to the maximum extent possible.\(^1\) Limits on the feasibility of infiltration can be caused by impervious under-laying soils or high water tables; neither situation has yet been identified but more detailed soil studies would be conducted along with future engineering.

Because of limited right-of-way, the systems to be designed for Oregon Avenue can address water quality for runoff from the roadway itself but cannot address water quality for the larger upstream runoff areas to the west; runoff from those areas would be conveyed directly to culverts under the roadway. Barring limits on infiltration, a drainage system can be designed for Oregon Avenue that can retain the first 1.2 inches of rainfall within the proposed right-of-way for the Candidate Build Alternatives.

Water quality would be addressed by a “treatment train” that includes multiple BMP techniques in a series. Runoff from the roadway would be directed to systems on the western edge of the proposed roadway. For all of the Candidate Build Alternatives, the runoff can be collected in inlets with dynamic separator inserts to filter out particulates. Dynamic separators can accommodate inflow areas of up to ½ acre, similar to a traditional inlet, and can be maintained using equipment currently in use for older sand filter systems. Removal of particulates is vital for reducing clogging of downstream systems and prolonging the period between maintenance of other parts of the “treatment train”.

The most important part of the “treatment train” would be an infiltration trench to store and infiltrate runoff into the under-laying soil in lieu of towards piped outfalls. Components of the infiltration trench would include gravel wrapped by a geotextile filter and an embedded perforated pipe. The embedded perforated pipe can be over-sized to retain and store the first 1.2 inches of rainfall until it can infiltrate into the soil. The downstream end of the perforated pipe would include a weir to ensure storage yet allow larger storms to pass to the downstream outfall.

The wider areas of Candidate Build Alternatives 3 and 4 incorporate a vegetated swale to further augment the “treatment train”. Portions of runoff entering these swales would pass through a grass and soil biofilter prior to entering the under-laying infiltration trench. Several other areas of otherwise unused right-of-way offer the opportunity for rain gardens to further enhance water quality.

---

\(^1\) Memorandum dated March 8, 2011 from Sheila Besse, DDOE, to Faisal Hameed, DDOT, documenting comments on the Environmental Assessment for the Rehabilitation of Oregon Avenue.
No new culverts are being proposed for the alternatives. In the absence of culverts along the north end of the roadway, an infiltration trench or level spreaders will be proposed to convey stormwaters.

The estimated construction costs for these options are included within each alternative’s conceptual construction cost estimate, which are provided in Appendix C.

### 2.4.4 Option D – Pinehurst Run Crossing

The existing Oregon Avenue crossing over Pinehurst Run is 27-feet wide and consists of a single-cell rectangular concrete culvert, which was rated to be in fair to poor condition in a 2003 culvert inspection report. The existing culvert is undersized and large storms, including the design year storm and 100-year FEMA flood, flow over the roadway. In order to convey these larger storms, the roadway profile must be slightly raised in the area of the culvert and the opening size for the culvert must be increased.

Options for its replacement, which can be used for any of the Candidate Build Alternatives, are shown in Figure 2-11 and include:

- **Replacement with an enlarged box culvert.** For this solution, a three-cell configuration would be required. Each cell would be approximately 6 feet high and 12 feet wide. The upstream and downstream channel would be flared to accommodate the widened flow width for the crossing. One cell bottom would be constructed lower to allow for a natural bottom to form and to accommodate fish passage during low flow conditions. Cells can be cast in place or provided as precast segments.

- **Replacement with a short bridge.** The opening for this option would be approximately 36 feet. Abutments would be constructed on each side of the stream and the opening spanned by girders and concrete deck. A low-flow channel would be maintained under the bridge and the overbanks would be lowered to accommodate the flow of larger storms. Due to site constraints, accelerated bridge construction (ABC) techniques do not seem feasible.

- **Replacement by a precast concrete, bottomless culvert.** This option would employ commonly-used, but proprietary, precast concrete arches to provide the new opening. One type of these systems is the Conspan Arch. Following site preparation, precast segments are trucked to the site and quickly connected.

![Figure 2-11. Stream Crossing Options](image-url)
The widths of the new crossing for Alternatives 2, 3, and 4 are estimated to be 32, 37, and 40 feet, respectively. All three of these options can incorporate architectural surface treatments to improve aesthetics.

The estimated construction costs for these three options are $290,000 for the three-cell box culvert, $360,000 for the precast concrete, bottomless culvert, and $550,000 for the short bridge.

2.5 Alternatives Eliminated from Consideration

During the alternatives development process, several alternative strategies and concepts were considered but eliminated, as described further in the following section.

2.5.1 Roadway Alternatives

During the collaborative alternatives development process, the study team worked with stakeholders and the public to develop a range of alternatives that incorporate elements to address each of the project’s needs. Alternative concepts that were considered but then dropped from consideration included speed tables, one-way traffic flow, potential widening, improved alignment and profile to allow increased speeds, and the provision of pedestrian facilities on both sides of Oregon Avenue.

Speed tables are short stretches of the road that are raised slightly to control speeds. They can be designed for a targeted speed, and pavement markings or textured materials can be used to further enhance their effectiveness. In the case of Oregon Avenue, speed tables were considered for crosswalk locations and upstream of bus stops; however, this alternative was eliminated due to their effects on emergency service vehicles and buses.

Converting existing Oregon Avenue to one-way traffic flow was eliminated from consideration due to lack of access to the residences along Oregon Avenue and to the adjacent residential areas that currently use Oregon Avenue for access.

Improvements to increase roadway vehicular capacity were dropped from consideration as current and future travel demands do not indicate a lack of capacity. Traffic volumes south of Nebraska Avenue and north of Wise Road are projected to remain below 5,000 vehicles per day (vpd), and volumes between Nebraska Avenue and Wise Road are projected to remain below 10,000 vpd. Similarly, TDM and transit alternatives for this low-capacity roadway were also eliminated from further consideration.

Upgrading Oregon Avenue to typical collector roadway design standards was eliminated from consideration early in the study due to the potential impacts on the adjacent neighborhoods. Collector roadways are typically designed using a 35 mph design speed (minimum 30 mph) with 12-foot travel lanes and grades less than 4%. Findings from alignment and profile studies suggest that major earthwork and extensive regrading with frequent use of retaining walls would be required to achieve these design standards. Such improvements would not be in keeping with the topography and character of the neighborhood, and given the relatively low traffic volumes on the roadway (under 10,000 vpd), they were dropped from further consideration. A 25 mph design can be achieved in the roadway corridor, and when combined with traffic calming measures, speeds can be controlled to address the project’s safety concerns.
The provision of a sidewalk or shared-use path on the east side of Oregon Avenue was eliminated as there are no residences on the east side of the roadway and the multi-purpose trail in Rock Creek Park addresses recreational needs. The National Park Service indicated that it did not wish to have an adjoining sidewalk constructed on Rock Creek Park property.
3 AFFECTED ENVIRONMENT

Environmental resources were identified and mapped within the project corridor. These environmental considerations are based on guidelines established by the Federal Highway Administration (FHWA) Technical Advisory T 6640.8A – *Guidance for Preparing Environmental and Section 4(f) Documents* and the National Park Service (NPS) Director Order #12 - *Conservation Planning, Environmental Impact Analysis, and Decision-Making*. The environmental data and findings presented herein were gathered from federal, state, and local agencies; previous area studies; various existing literature and websites (see Chapter 8 References); aerial photography; and field surveys of the project area.

3.1 NATURAL RESOURCES

3.1.1 GEOLOGY, SOILS, AND TOPOGRAPHY

**GEOLGY**

This project is located in the Piedmont province on the edge of the Coastal Plains province. The region is made up of late Proterozoic and Paleozoic igneous rock (formed by molten rock that has come to the surface and cooled) and metamorphic rock (physically and/or chemically changed due to heat and pressure) that has been strongly weathered and is buried under 2 to 20 meters of soil. The metamorphic rock is very complex due to the number of times it has been altered and often contains mineral deposits including gold, talc, kyanite, slate, and feldspar (William and Mary, 2009).

The project corridor crosses several times over the boundary of two of the US Environmental Protection Agency’s (EPA) Level IV Ecoregions: the Piedmont Uplands (Ecoregion 64c) and the Chesapeake Rolling Coastal Plain (EPA Ecoregion 65n)(Woods, et al., 1999).

The Piedmont Uplands (part of the Piedmont, a Level III Ecoregion) is composed of hills, irregular plains, and isolated ridges. Ultisol formations are common and have developed from weathered parent material; they are typically clay-rich, acidic, and relatively low in base saturation. Streams have silt, sand, gravel, and rubble-bottom materials and bedrock is only occasionally exposed. Differences in stream gradient, due to topography, greatly affect fish habitat (Woods, et al., 1999).

The Chesapeake Rolling Coastal Plain (part of the Southeastern Plains, a Level III Ecoregion) is a rolling, hilly, dissected portion of the Inner Coastal Plain that is made up of sedimentary material. Stream margins can be swampy and stained water can occur. Parts of the Fall Zone are included in the westernmost portion of the Rolling Coastal Plain; here aquatic habitats vary between the islands, pools, swampy streams, and cascades (Woods, et al., 1999).
SOILS

Analysis of soil maps along the project corridor reveals that the majority of the soils have a moderate to high erosion potential, as described in Table 3-1. Areas where construction is expected to occur have been previously disturbed and are considered urban or cut/fill land. These locations are not rated for characteristics of concern for sensitive soil types.

Table 3-1. Soil Types in Corridor

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>PERCENT OF CORRIDOR</th>
<th>DESCRIPTION</th>
<th>CONSTRUCTION LIMITATIONS</th>
<th>HYDROLOGIC SOIL GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ashe loam (AsD) 15-40% slopes</td>
<td>2.3</td>
<td>Somewhat excessively drained soil that occurs on ridge tops and side slopes in strongly dissected areas of the Piedmont Plateau. High erosion potential.</td>
<td>Very limited due to slope, frost action, and depth to bedrock</td>
<td>B</td>
</tr>
<tr>
<td>Brandywine gravelly loam (BrC) 8-15% slopes</td>
<td>6.3</td>
<td>Somewhat excessively to excessively drained soil that occurs on ridge tops and side slopes in strongly dissected areas of the Piedmont Plateau. Moderate erosion potential.</td>
<td>Limited due to slope</td>
<td>A</td>
</tr>
<tr>
<td>Brandywine gravelly loam (BrD) 15-40% slopes</td>
<td>9.6</td>
<td>Somewhat excessively to excessively drained soil that occurs on ridge tops and side slopes in strongly dissected areas of the Piedmont Plateau. High erosion potential.</td>
<td>Very limited due to slope</td>
<td>A</td>
</tr>
<tr>
<td>Brandywine - Urban Land Complex (BtB) 0-8% slopes</td>
<td>3.4</td>
<td>Brandywine soils that have been graded or otherwise altered for residential, commercial, or industrial development. Moderate erosion potential.</td>
<td>Not limited</td>
<td>A</td>
</tr>
<tr>
<td>Brandywine - Urban Land Complex (BtC) 8-15% slopes</td>
<td>30.7</td>
<td>Brandywine soils that have been graded or otherwise altered for residential, commercial, or industrial development. Moderate to high erosion potential.</td>
<td>Somewhat limited due to slope, frost action, and depth to bedrock</td>
<td>A</td>
</tr>
<tr>
<td>Brandywine - Urban Land Complex (BtD) 15-40% slopes</td>
<td>1.6</td>
<td>Brandywine soils that have been graded or otherwise altered for residential, commercial, or industrial development. Severe erosion potential.</td>
<td>Very limited due to slope, frost action, and depth to bedrock</td>
<td>A</td>
</tr>
<tr>
<td>Codorus silt loam (Ck)</td>
<td>2.8</td>
<td>Moderately well-drained soil that occurs on ridgetops and sideslopes in strongly dissected areas of the Piedmont Plateau. Severe erosion potential.</td>
<td>Very limited due to frost action, flooding, and depth to saturation</td>
<td>C</td>
</tr>
<tr>
<td>Glenelg loam (GgC) 8-15% slopes</td>
<td>6.4</td>
<td>Well-drained soil that occurs on ridgetops and sideslopes in strongly dissected areas of the Piedmont Plateau. Moderate erosion potential.</td>
<td>Somewhat limited due to slope, low strength, and frost action</td>
<td>B</td>
</tr>
<tr>
<td>Glenelg loam (GgD) 15-25% slopes</td>
<td>0.6</td>
<td>Well-drained soil that occurs on ridgetops and sideslopes in strongly dissected areas of the Piedmont Plateau. Moderate erosion potential.</td>
<td>Very limited due to slope, low strength and frost action</td>
<td>B</td>
</tr>
<tr>
<td>Glenelg variant silt loam (GIB) 0-8% slopes</td>
<td>5.4</td>
<td>Moderately well-drained soil that occurs on ridgetops and sideslopes in strongly dissected areas of the Piedmont Plateau. Moderate erosion potential.</td>
<td>Very limited due to frost action, low strength and depth to saturation</td>
<td>B</td>
</tr>
</tbody>
</table>
### Affected Environment

<table>
<thead>
<tr>
<th>SOIL TYPE</th>
<th>PERCENT OF CORRIDOR</th>
<th>DESCRIPTION</th>
<th>CONSTRUCTION LIMITATIONS</th>
<th>HYDROLOGIC SOIL GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenelg variant-Urban land complex (GmB)</td>
<td>1.3</td>
<td>Glenelg soils that have been graded or otherwise altered for residential,</td>
<td>Not rated</td>
<td>B</td>
</tr>
<tr>
<td>0-8% slopes</td>
<td></td>
<td>commercial, or industrial development.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manor loam (MbC)</td>
<td>14.3</td>
<td>Well-drained to somewhat excessively drained soil that occurs on ridgetops</td>
<td>Somewhat limited due to frost action and low</td>
<td>B</td>
</tr>
<tr>
<td>8-15% slopes</td>
<td></td>
<td>and sideslopes in strongly dissected areas of the Piedmont Plateau.</td>
<td>strength</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Moderate to high erosion potential.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manor loam (MbD)</td>
<td>7.5</td>
<td>Well-drained to somewhat excessively drained soil that occurs on ridgetops</td>
<td>Very limited due to slope and frost action</td>
<td>B</td>
</tr>
<tr>
<td>15-40% slopes</td>
<td></td>
<td>and sideslopes in strongly dissected areas of the Piedmont Plateau.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Severe erosion potential.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manor - Urban Land Complex (MdC)</td>
<td>1.0</td>
<td>Well-drained to somewhat excessively drained Manor soils, most areas of</td>
<td>Somewhat limited due to slope, frost action,</td>
<td>B</td>
</tr>
<tr>
<td>8-15% slopes</td>
<td></td>
<td>which have been graded, cut, filled, or otherwise disturbed during</td>
<td>low strength, and depth to bedrock</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>urbanization.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sassafras gravelly sandy loam (ScD)</td>
<td>0.1</td>
<td>Well-drained soil that occurs on ridgetops and sideslopes in strongly</td>
<td>Very limited due to slope and frost action</td>
<td>B</td>
</tr>
<tr>
<td>15-40% slopes</td>
<td></td>
<td>dissected areas of the Piedmont Plateau. High erosion potential.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Udorthents, loamy (U4)</td>
<td>3.7</td>
<td>Well drained soil that occurs on ridgetops and sideslopes in strongly</td>
<td>Somewhat limited due to slope</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>dissected areas of the Piedmont Plateau. High erosion potential.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Udorthents, loamy, smoothed (U9)</td>
<td>3.1</td>
<td>Well drained soil that occurs on ridgetops and sideslopes in strongly</td>
<td>Not limited</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>dissected areas of the Piedmont Plateau. High erosion potential.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: USDA, 2009

The rating for the project corridor soils for construction of local streets is approximately 62 percent “somewhat limited” and 30 percent “very limited”. These ratings indicate that there are one or more factors that should be taken into consideration when used for that specified purpose. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance of the soil can be expected. (USDA, 2009)

**TOPOGRAPHY**

Topography on and adjacent to the project corridor is dominated by low, rolling hills. Some sharper changes in topography exist along streams and rivers where erosion has removed the topsoil and exposed the bedrock. Steep grades on much of the west side of Oregon Avenue increase stormwater velocity as the runoff flows east and downward from the neighborhoods, across Oregon Avenue, and into Rock Creek Park. Unimpeded, the high velocity causes erosion as it leaves the pavement. This erosion exposes and degrades roadway infrastructure and erodes the soil, which makes it difficult for plants to root and grow.
AGRICULTURAL LANDS, PRIME AND UNIQUE FARMLAND SOILS

In recognition of the need to identify and preserve lands that are important for the production of the nation’s food supply and major cash crops, the Natural Resources Conservation Service (NRCS) and the federal, state and local governments have coordinated to inventory important farmlands. Important farmlands fall into two nationwide categories, Prime and Unique Farmland, and can also be recognized on the state or local levels as Farmland of State or Local Importance.

The project is located in a highly urbanized area that has already been developed or designated as park land. There is no mapped Prime or Unique Farmland in the project vicinity, and none of the land within the project area is available to be farmed. In addition, no Agricultural or Forestal Districts occur in the project vicinity.

3.1.2 WATER RESOURCES

Section 404 of the Federal Water Pollution Control Act of 1972, also referred to as the Clean Water Act, provides protection for Waters of the United States (WOUS). WOUS can be generally defined as all navigable waters and waters that have been or can be used for interstate or foreign comers, their tributaries, and any waters that, if impacted, could affect the former, including wetlands. Impacts to wetlands are considered separately from other WOUS for permitting processes. For this reason, existing wetlands and open waters will be addressed independently of streams in this report.

Water resources are regulated by several federal and local laws and regulations including the Clean Water Act; Code of Federal Regulations (CFR) Part 122.26 – Storm Water Discharges; Safe Drinking Water Act of 1974; DC Water Pollution Control Act of 1984; DC Storm Water Permit Compliance Amendment Act of 2000; and Title 21 of DC Municipal Regulations (Chapter 11-Water Quality Standards and Chapter 19 – Water Quality Monitoring Regulations). Construction projects can affect these ecosystems and water quality by eliminating resources, increasing runoff, adding pollutants, and altering hydrology.

Oregon Avenue crosses several water resources, as depicted in Figure 3-1. These features are discussed in greater detail below.

DRINKING WATER AND GROUNDWATER

In 1974, the Safe Drinking Water Act (SDWA) was passed by Congress to regulate the public drinking water supply. The 1996 Amendments mandate that states assess, delineate, and map protection areas for their public drinking water sources and determine potential risks to those sources. Source water protection is not specifically mandated by the SDWA; however, states, tribes, and communities are encouraged to use this information to protect the sources from pollution of major concern and may pass local regulations (EPA, 2004a). The project area is serviced by public water and there are no private wells or source waters located along the project corridor. No sole source aquifers are located in the project vicinity.

Groundwater of the Piedmont Physiographic Province occurs in crystalline-rock aquifers, which consist of bedrock overlain by unconsolidated material called regolith. Due to the low permeability of the underlying bedrock, water is generally found in the regolith layer or along
Figure 3-1. Water Resources

Legend:
- Stream
- Floodplain

Intermittent Stream

Perennial Stream

Floodplain

Affected Environment
fractures in the rock. Recharge areas generally include the entire land surface, except for lower parts of valleys where it discharges in seeps, springs, and baseflow for steams.

The project is located in a stream valley with recharge areas uphill to the west and discharges in the form of springs and streams to the east. West of the project area is a high percentage of impermeable surface, which does not allow for rainwater to recharge naturally. Excess stormwater flows unchecked and unfiltered into ephemeral drainages directly into the local stream system.

**SURFACE WATER**

The project corridor is crossed by Pinehurst Run, a perennial stream with a mapped 100-year floodplain (see Figure 3-1). This stream is classified as a riverine, upper perennial, unconsolidated bottom (R3UB) by the Cowardin Classification System. Several tributaries to Rock Creek are also located in the project corridor along the east side of the alignment that are fed by storm sewers and springs. Some of these streams historically originated to the west of Oregon Avenue; however, they have since been channelized and now first daylight at storm sewer outfalls. One of these tributaries has been unofficially named Deer Print Run by NPS staff (drainage just northeast of Daniel Lane). All of these streams would be classified under the Cowardin Classification System as riverine, intermittent, streambed (R4SB).

The streams in the area are mostly spring-fed headwater intermittent streams that convey water for the majority of the year. Over the years, increased impervious surfaces and lack of stormwater mitigation has led to water volumes and velocities during storm events that are too high for the existing natural channels to convey. As a result, erosion has occurred, damaging infrastructure and affecting sensitive habitats downstream.

**FLOODPLAINS**

The project area crosses one Federal Emergency Management Agency (FEMA)-mapped 100-year floodplain for Pinehurst Run (see Figure 3-1). Currently, Oregon Avenue crosses this stream by way of a concrete box culvert.

**WATER QUALITY**

According to *Title 21 of the DC Municipal Regulations, Chapter 11, Water Quality Standards as amended October 4, 2005*, tributaries to Rock Creek are considered Special Waters of the District of Columbia (SWDC). Waters designated as SWDC have quality better than needed for their current use or have scenic or aesthetic importance and shall be maintained at or above the existing level. All streams located in the project vicinity are tributaries to Rock Creek.

In compliance with Sections 303(d), 305(b) and 314 of the federal Clean Water Act and the Safe Drinking Water Act, it is the responsibility of the District to develop a prioritized list of water bodies that currently do not meet water quality standards. The 303(d) list includes those water bodies and watersheds that exhibit levels of impairment requiring investigation and restoration. The EPA-approved list does not include any impaired waters within the project vicinity; however, local water quality is affected by drainage issues from uncontrolled runoff that is causing erosion and allowing for roadway contaminates to flow directly into adjacent streams.
WETLANDS

Wetlands provide valuable habitat for fish and wildlife; improve water quality; perform important hydrologic functions, such as regulating storm flow; maintain food chain and nutrient cycling functions; serve socioeconomic roles; and may support rare and endangered species. Executive Order 11990, Protection of Wetlands, mandates that each federal agency take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance their natural values.

Wetlands are currently defined by the US Army Corps of Engineers (USACE) (33 CFR 328.3[b]) and the EPA (40 CFR 230.3[t]) as "areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

There are no wetlands located in the project area according to National Wetlands Inventory (NWI) maps and field reviews.

NAVIGABLE WATERS

The Potomac River, downstream of the project area, is a traditional navigable water and Pinehurst Run (crossed by Oregon Avenue) is a perennial tributary to this traditional navigable water and as such is, by definition, Waters of the US. No waters in the immediate project vicinity are designated as navigable waters.

WILD AND SCENIC RIVERS

In 1968, Congress passed the Wild and Scenic Rivers Act to preserve rivers with outstanding natural, cultural, and recreational values in a free-flowing condition. In accordance with this law, federal projects are prohibited from supporting actions such as dams or other in-stream activities that would impact a river’s free-flowing condition, water quality, or other outstanding resource values.

According to the National Park Service, no Wild or Scenic Rivers are located in the project vicinity; however, Rock Creek, from the Porter Street Crossing to the Maryland border (downstream from the project area), is listed on the National Rivers Inventory (NRI) for recreational and historic values. Rivers on the NRI list are free-flowing rivers that possess one or more Outstandingly Remarkable Values (ORVs) and that could potentially qualify as national wild, scenic, or recreational rivers (NPS, 2009a).

COASTAL ZONE

Federal actions occurring within or with the likelihood to affect any land or water use, or natural resource of a designated coastal zone, including cumulative and secondary effects, must be consistent with a federally approved Coastal Zone Management Plan (CZMP) according to Section 307 of the Federal Coastal Zone Management Act of 1972, as amended (CZMA), and National Oceanic and Atmospheric Administration (NOAA) regulations (15 CFR part 930).
The District of Columbia does not have a designated Coastal Zone and has not developed a Coastal Zone Management Plan under the Coastal Zone Management Act. The Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), however, amended the CZMA to clarify that federal consistency requirements apply when any federal activity, regardless of location, affects any land or water use or natural resource of the coastal zone.

**CHESAPEAKE BAY PROTECTION**

The District has been a partner of the EPA’s Chesapeake Bay Program since its inception in 1983. President Obama’s Executive Order in 2009 on the Chesapeake Bay included goals for restoring clean water by reducing nitrogen, phosphorus, sediment, and other pollutants; recovering habitat by restoring a network of land and water habitats to support priority species and other public benefits; sustaining fish and wildlife; and conserving land and increasing public access.

The District achieved its goal of reducing the controllable portion of nitrogen and phosphorus by 40 percent. In June of 2000, partners of the Chesapeake Bay Program adopted a new agreement in which the District plans to further reduce nutrient loading and control sediment by limiting its contribution of pollutants to 2.4 million pounds/year of nitrogen, 0.34 million pounds/year of phosphorus, and 0.006 tons/year of sediment (DDOE, 2011).

**MARINE AND ESTUARINE RESOURCES**

There are no marine or estuarine resources located in the project vicinity.

**3.1.3 WILDLIFE INCLUDING THREATENED AND ENDANGERED SPECIES**

Wildlife in the project area includes species adapted to urban/suburban conditions as well as some more secretive species in Rock Creek Park, such as rabbits, whitetail deer, turtles, eastern grey squirrels, red fox, grey fox, coyote, and a number of common bird species. Green areas on the west (residential) side of the corridor consist of mainly turf grass with a few trees and are of minimal wildlife value.

Rock Creek Park provides habitat for at least one federally-listed endangered species, Hay’s Spring Amphipod (*Stygobromus hayi*), and endemic amphipods in springs and groundwater within the park. A search of databases and communication with park officials indicate that none of these are known to occur in the project vicinity. The US Fish and Wildlife Service (USFWS) have indicated that no other proposed or federally listed endangered or threatened species are known to exist within the project area. Therefore, it is not expected that this project will have any effect on protected species and no further coordination under Section 7 is required (Miranda, 2011).

**WILDLIFE AND WATERFOWL Refuges**

No wildlife or waterfowl refuges are located in the project vicinity.

**ANADROMOUS FISH, TROUT WATERS, AND SHELLFISH**

According to Rock Creek Park natural resources specialists, no anadromous fish have been noted this far upstream in the Rock Creek drainage area, although fish ladders have been in
place downstream for four years and the habitat is suitable for spawning. Rock Creek does not support trout and there are no shellfish of concern within the project vicinity (RCNP, 2010b).

### 3.1.4 Vegetation

Rock Creek Park is the only large area of mostly contiguous deciduous forest habitat in the District metropolitan area, and the adjacent forests play a major factor in defining the character of Oregon Avenue. The Oregon Avenue right-of-way is owned by the District of Columbia, but lands adjacent to the roadway on the eastern edge (and a short segment on the western edge) are administered by NPS.

As with all NPS units, management of the park is guided by numerous congressional acts and executive orders, in addition to the establishing legislation. Some of these laws and executive orders are applicable primarily to units of the national park system. These include the 1916 Organic Act creating the NPS and the General Authorities Act of 1970 relating to the management of the national park system.

The Organic Act created the NPS in 1916. This act defines the NPS’ mission to "conserve the scenery and the natural and historic objects and the wildlife [in national parks, monuments, and reservations] and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." Protection of the deciduous forest has been a long-term management goal at Rock Creek Park. Protection has included such actions as minimizing or avoiding clearing of trees, suppressing wildfires, and controlling the presence and distribution of invasive species.

The 1890 legislation establishing Rock Creek Park states that the area is to be “perpetually dedicated and set apart as a public park or pleasure ground for the benefit and enjoyment of the people of the United States.” It specifies that the park is to “provide for the preservation from injury or spoliation of all timber, animals, or curiosities within said park, and their retention in their natural condition, as nearly as possible.” It directs park managers to provide for public recreation, specifically to “lay out and prepare roadways and bridle paths, to be used for driving and for horseback riding, respectively, and footways for pedestrians.”

The land within the entire project corridor has been previously disturbed. Green areas on the west (residential) side of the roadway consist of landscaped lawns and grass area with sporadic patches of trees. The east (park) side of the roadway is forested; however, it has been previously disturbed due to roadway and trail construction and sewer and power line maintenance. Much of the area has been taken over by invasives.

**Trees and Shrubs**

The forested areas along the east side of the roadway corridor are mostly dominated by beech and oak with some large patches of tulip poplar forest (NPS, 2009b). Trees vary in age, size and condition as a result of the various roadway and utility maintenance operations over the years (see Figure 3-2). These activities have required the periodic removal and trimming of trees and occasionally have harmed root systems, which has led to the declining health of some individual trees. A tree survey was conducted along the roadway corridor to determine the
Figure 3-2. Ornamental and Natural Landscapes
number, size, and health (condition) of the existing trees. The inventory will be used to
determine the potential impact (direct and indirect) to trees adjacent to the roadway and help
determine the level of replacements required to mitigate any loss (see Chapter 4).

**INVASIVE SPECIES**

Invasive species are non-native plant, animal, or microbial species that cause, or have the
potential to cause, economic or ecological harm or harm to human health (Presidential
Executive Order 13112). Seeds and propagules of invasive species may be transported from one
place to another on construction equipment that has not been properly cleaned before transport.
Disturbed areas are also easily colonized by invasive species if not properly seeded with a cover
crop after earthwork has been completed.

Rock Creek Park is exposed to continuous threats from aggressive and exotic invasive plant
species due to its proximity to urban development. According to park officials, over 30 percent
of the approximately 650 species of plants that have been identified in the park are introduced.
Similarly, the forested areas adjacent to the roadway already support several species and are
susceptible to additional invasive species as well.

**UNIQUE ECOSYSTEMS, BIOSPHERE RESERVES, WORLD HERITAGE SITES**

According to the United Nations online list of World Heritage Sites and Biosphere Reserves and
conversations with Rock Creek Park staff, there are no Unique Ecosystems, Biosphere Reserves,
or World Heritage Sites located within the project vicinity (UNESCO, 2010; Rock Creek Park,
2010).

### 3.2 CULTURAL AND PALEONTOLOGICAL RESOURCES

Cultural and paleontological resources include four major groups of resources: prehistoric and
historic archeological, architectural, Native American, and paleontological resources. Cultural
resources are prehistoric and historic sites, structures, districts, artifacts, or any other physical
evidence of human activity considered important to a culture, subculture, or community for
traditional, religious, scientific, or any other reason. Paleontological resources are the physical
remains, impressions, or traces of plants or animals from a former geologic age and are not
associated with human activity. Cultural resources are discussed here in terms of archeological
resources, including both prehistoric and historical occupations; historic structures; cultural
landscapes; ethnographic resources; museum collections; and Indian Trust Resources and
Native American Sacred Sites, including Traditional Cultural Properties. Paleontological
resources are discussed as a separate category.

Procedures for the identification, evaluation, and treatment of cultural resources are contained
in a series of federal and state laws and regulations and agency guidelines. Archeological,
architectural, and Native American resources are protected by a variety of laws and their
implementing regulations: the National Historic Preservation Act (NHPA) of 1966, as amended
in 2006; the Archeological and Historic Preservation Act of 1974; the Archeological Resources
Protection Act (ARPA) of 1979; the American Indian Religious Freedom Act (AIRFA) of 1978;
and the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990. The
Advisory Council on Historic Preservation (ACHP) further guides treatment of archeological and architectural resources through the regulations Protection of Historic Properties (36 CFR 800).

The improvements for Oregon Avenue are being sponsored by FHWA and involves federal assistance and federal permitting, licensing, or approval (36 CFR 800.16(y)). As a result, the project is under the purview of Section 106 of the NHPA. Section 106 of the NHPA governs federal actions that could affect historic properties. Historic properties are the subset of cultural resources listed in or eligible for inclusion in the National Register of Historic Places (NRHP). Section 106 requires federal agencies to take into account the effects of their undertakings, including licensing and approvals, on NRHP-eligible resources and to afford the ACHP and other interested parties a reasonable opportunity to comment.

The significance of historic properties is judged by the property’s ability to meet the four criteria for inclusion in the NRHP (36 CFR 60.4):

- Association with events that made a significant contribution to the patterns of our history;
- Association with the lives of persons significant in our past;
- Sites that embody characteristics of a type, period, or methods of construction or that represent the work of a master, possess high artistic value, or represent a distinguishable entity; or
- Have yielded, or may be likely to yield, information important to prehistory or history.

Properties may be eligible for the NRHP for contribution at the national, state, or local level. In order for a structure to be listed in the NRHP, it must possess historic integrity of those features necessary to convey its significance in accordance with NRHP guidelines; these include location, design, setting, workmanship, materials, feeling, and association.

### 3.2.1 Area of Potential Effects

The Area of Potential Effects (APE) was established in coordination with the District of Columbia Historic Preservation Office (DCHPO). As defined by 36 CFR 800.16(d) of Section 106 of the NHPA, the APE represents the “…geographic area or areas within which an undertaking could cause changes in the character or use of historic properties, if any such exists.”

The APE for archeological resources for the Oregon Avenue improvements is basically defined as 50 feet east of the existing right-of-way line on the east side of the road, with the exception of six areas, and the existing right-of-way line on the west side of Oregon Avenue, with the exception of two areas. On the east side, the APE was extended an additional 50 feet by 100 feet (approximately) at each of the six outfall locations. On the west side, at the Pinehurst Run area, the APE was extended an additional 50 feet west of the existing right-of-way and at the intersection with Nebraska Avenue, the APE was expanded to include the recently reconfigured traffic island. The 50-foot wide corridor along the length of the project area east of the existing right-of-way line is NPS land in Rock Creek Park. This APE is considered sufficient to include
all proposed repairs or modifications to the seven existing outfalls (six on the east side and one on the west), to incorporate any possible construction staging areas on the east side of the road, and to accommodate any modifications and/or replacement of the box culvert carrying Oregon Avenue over Pinehurst Run that may involve ground disturbing activities.

The APE for architectural resources extends a variable distance west of the existing right-of-way line on the west side of the road to coincide with the western parcel boundary for the first row of houses on the west side of Oregon Avenue and, in areas where side streets intersect Oregon Avenue, the first house in from Oregon Avenue. Generally, land use adjacent to the western side of the right-of-way consists of residential structures but also includes athletic and recreational fields associated with a private secondary school, waterways and parkland around Pinehurst Run, and a portion of a military retirement facility, Knollwood. This APE is considered sufficient to address any possible visual or audible intrusions from construction or operations.

The APE for archaeological and architectural resources is depicted in Appendix E.

### 3.2.2 Cultural Contexts

Detailed cultural contexts for Rock Creek Park, adjacent to the project area, were developed as part of a four-year program to identify and evaluate archeological resources, which included archival research, selected archeological survey, and re-documentation of known archeological resources in the park. The research was conducted by the Louis Berger Group on behalf of the NPS. Volume I of the report “Bold, Rocky, and Picturesque” Archeological Overview and Assessment and Archeological Identification and Evaluation Study of Rock Creek Park, District Of Columbia provides an overview of the prehistoric and historic past of the park and cultural resources that have been identified within (Bedell et al., 2008). The area around Rock Creek Park was favorable for human occupation throughout the prehistoric, contact, and historic periods, and remains from all periods have been identified in the park.

**Prehistoric Background**

The prehistoric cultural sequence of the District of Columbia and the Middle Atlantic region in general is conventionally divided into three broad periods reflecting widespread developments in the environment, as well as technological and social adaptations. Following Griffin’s (1967) chronology for eastern North America, these periods are referred as the Paleoindian (circa [ca.] 10,000-8000 B.C.), the Archaic (ca. 8000-1000 B.C.), and the Woodland (ca. 1000 B.C. to A.D. 1600). The Archaic and Woodland periods are further divided into three subperiods (Early, Middle, and Late) based on changes in style or other attributes in projectile points and ceramics.

Prehistoric artifacts have been discovered along stream terraces and floodplains along Rock Creek and its tributaries since the late 19th to early 20th centuries as the area drew the particular interest of William Henry Holmes (1897), whose studies of lithic reduction influenced the development of archaeology in the region. As a result of the NPS’s four-year program to identify and evaluate archeological resources, twenty archeological sites within one-half mile of the project area were documented in the study (Fiedel et al., 2004, 2005, 2006, 2008). Of the six prehistoric sites identified in the vicinity of the project area, none are clearly associated with a
Environmental Assessment of Oregon Avenue NW

particular period; however, on the basis of tool fragments or material type, a temporal association of at least two of the sites with Late Archaic or Early Woodland periods is possible.

**HISTORIC BACKGROUND**

The historic period of the Oregon Avenue project area has been divided into general cultural sequences based on previously identified resources in the area and known past uses of the adjacent Rock Creek Park. Broadly, the periods include pre-military occupation, Civil War occupation, the establishment of a national park, and development of DC infrastructure adjacent to the park.

In the historic overview of Rock Creek Park, the historic background of the general area was divided into several broad themes in roughly chronological order beginning with the Potomac Frontier, documenting the early contact between Native Americans and Europeans in the area; the establishment of a Rangers’ Fort; granting of patents and tenants; early settlement in the area in the eighteenth century; farming and milling in the eighteenth and nineteenth century; the Civil War period, including the establishment of nearby Fort DeRussy and associated structures, Battery Kemble, and the Battle of Fort Stevens; the post-war period; the creation of Rock Creek Park in 1890; and the modern uses and changes to the park (Bedell et al., 2008). Additional historic developments include the creation of portions of the Oregon Avenue roadway (formerly Daniel Road, also referred to as Daniels Road) sometime prior to 1885, the installation of infrastructure for water and sewage systems, and road improvement and expansion projects in the early part of the 20th century into modern times.

Archeological sites related to early farms, plantations, and mills have been identified in the park. Civil War-related resources have been identified in the general area including forts, earthworks, gun emplacements, probable camps, ditches, and there may also be traces present of the Battle of Fort Stevens. Remains of Fort DeRussy and its outworks may be present near the project area. Structures associated with early roadway development and improvements, including a box culvert from the early 20th century, have also been identified in the project area.

**3.2.3 ARCHEOLOGICAL RESOURCES**

Archeological resources include both prehistoric and historic resources. Prehistoric resources are physical properties resulting from human activities predating written records. These archeological sites are the loci of human behavior as indicated by concentrations of artifacts, features, or floral and faunal remains. Prehistoric land use patterns were more closely related to local environmental conditions than are most modern settlements. Historic resources are physical properties that post-date the existence of written records and include features such as trails, roadbeds, building foundations, and refuse concentrations.

No archeological investigations have been previously conducted of the current project area; however, archeological studies have been conducted in the adjacent Rock Creek Park since W.H. Holmes excavations at Piney Branch Quarry in 1889 (Moran, 1997). Recent archeological investigations that have been conducted adjacent to the proposed project area include survey of 31 erosion control and bank stabilization sites along Rock Creek (Inashima, 1985); a four-year study of selected areas of Rock Creek Park covering several areas immediately adjacent to the
project area (Fiedel et al., 2004, 2005, 2006, 2008); and a Phase I archeological survey along portions of Bingham and Milkhouse Runs undertaken as part of the Oregon Avenue Regenerative Stormwater Conveyance Project proposed by the District Department of the Environment (DDOE) in cooperation with the NPS (Gibb and Michailof, 2010).

The NPS four-year program to identify and evaluate archeological resources (described above in Section 3.2.2) documented twenty archeological sites within one-half mile of the project area (Fiedel et al., 2004, 2005, 2006, 2008). Of these, only two sites are within the archeological APE for Oregon Avenue: 51NW143 and 51NW199 (Table 3-2).

Site 51NW143, the Oregon Avenue Site, is a large prehistoric upland base camp identified from surface and subsurface collection of lithic material, predominately quartzite, and probably represents a Late Archaic or Early Woodland occupation. Site 51NW143 is considered eligible for listing in the NRHP (Fiedel et al., 2008).

Site 51NW199 is a historic site that may represent the remains of an 18th century colonial domestic site, possibly attributed to the tenancy of William Hall, which archival research indicates occurred in the vicinity. Most of the landform is now underneath the roadway or outside the park, so if the location was a farm site, it has been heavily disturbed and is not considered eligible for the NRHP (Fiedel et al., 2008).

Table 3-2. Archeological Resources within the Oregon Avenue Archeological APE

<table>
<thead>
<tr>
<th>SITE NUMBER</th>
<th>SITE NAME</th>
<th>SITE TYPE</th>
<th>NRHP ELIGIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>51NW143</td>
<td>Oregon Avenue Site</td>
<td>Prehistoric</td>
<td>Eligible</td>
</tr>
<tr>
<td>51NW199</td>
<td>Hall Tenancy Site</td>
<td>18th-c. domestic</td>
<td>Not Eligible</td>
</tr>
</tbody>
</table>

Archeological Potential. The archeological APE is bounded by a steep landscaped slope in front of mostly residential properties west of Oregon Avenue and Rock Creek Park to the east. The majority of the roughly level land is covered by Oregon Avenue. As a result of the prior disturbance from road and infrastructure development, and ongoing erosion from stormwater runoff in the project area, there is limited potential that intact archeological deposits will occur.

Several tributaries of Rock Creek intersect the project area, the largest of which is Pinehurst Run. Because waterways served as both a transportation corridor and source of food for Native Americans occupying the region, small prehistoric sites such as hunting stands or limited use activity areas may be located on terraces of small streams like Pinehurst Run. Prehistoric artifacts have been found in these locations since the late 19th to early 20th centuries but none were found on the Pinehurst Run floodplain just on the east side of Oregon Avenue (Inashima, 1985; Fiedel et al., 2008). The DCHPO indicates a potential for lithic quarries to occur in upland stream valleys in or near the project area; however, no quartzite quarries are expected north of the confluence of Rock Creek and Broad Branch (Fiedel et al., 2008: 23); therefore, the potential for resources of this type in the current project area is limited.

A potential for previously unrecorded Civil War-related resources to occur in the project area was identified by the DCHPO. Based on the proximity of Fort DeRussy, east of Oregon
Avenue, and the extent of associated outworks documented in a map from 1865 (Barnard 1865), it is possible that unidentified archeological resources associated with the fort and Civil War occupation of the area may occur; however, development of Oregon Avenue (formerly Daniel Road) in the area west of the fort, in the southern part of the project area, most likely disturbed any remains that occurred in this area.

3.2.4 Historic Structures

The term “historic structures” encompasses resources purposefully erected to serve some human activity and are typically classified as buildings, structures, objects, or districts. These structures may consist of residential buildings (e.g., farmhouses, plantation manors, and associated outbuildings, including sheds and barns); industrial structures, such as mills and millraces; commercial buildings (e.g., stores, banks, and other business-related office buildings); transportation structures, such as bridges; and resources related to water control and distribution.

The Rock Creek Park Historic District (RCPHD) is listed on the NRHP and is immediately adjacent to the current project corridor. Several contributing elements of the RCPHD are located within the APE. Additional resources associated with early District of Columbia infrastructure, such as Daniel Road (now Oregon Avenue), roadway guard rails, and water control features, also occur in the APE. Water control features identified along Oregon Avenue include culverts, headwalls, and access manholes and may date to the development of the roadway and are likely not associated with the development of Rock Creek Park. At least one culvert dates to as early as 1908. Records of DC Water (formerly the DC Water and Sewer Authority [WASA]) indicate that several elements associated with stormwater outfall date to the 1920s. A summary of historic structures identified in the Oregon Avenue project area is included in Table 3-3.

Rock Creek Park Historic District

The RCPHD consists of 1,754 acres of land dominated by picturesque landscapes featuring forested areas, streams, valleys, meadows, and sloping hills. The park meets NRHP Criteria A, B, and C under the themes of architecture, community planning and development, conservation, entertainment and recreation, industry, landscape architecture, military, and horticulture. Important persons associated with the history of the park include Joshua Pierce and landscape architects Frederick Law Olmsted, Jr. and John C. Olmsted. The park as a whole retains a high degree of integrity of design, workmanship, location, feeling, association, and setting.

The RCPHD was originally defined as 31 contributing elements and 59 non-contributing elements (Bushong, 1990a and 1990b). Nine of the 31 contributing resources are also individually listed on the NRHP (NPS, 2002); only one of these, Fort DeRussy, is located in the within 500 feet of the project area. Two of the 31 contributing elements constitute categories or systems of resources - the circulation network (historic roads and trails) and culverts and retaining walls. Additional resources, in particular the boundary monuments delineating the
boundary of the park, were observed during field investigations, but have not been defined as contributing resources to the historic district.

### Table 3-3. Historic Structures in the Oregon Avenue Architectural APE

<table>
<thead>
<tr>
<th>RESOURCE</th>
<th>DATE OF CONSTRUCTION</th>
<th>DESCRIPTION</th>
<th>NRHP STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rock Creek Park Historic District (RCPHD)</td>
<td>1791-1941</td>
<td>NPS managed park</td>
<td>Listed</td>
</tr>
<tr>
<td>Circulation Network – Historic Roads and Trails</td>
<td>1830-1941</td>
<td>Wise Road and Bingham Drive</td>
<td>Contributing resource to RCPHD</td>
</tr>
<tr>
<td>Culverts and Retaining Walls</td>
<td>ca. 1900-1941</td>
<td>Masonry construction</td>
<td>Contributing resource to RCPHD</td>
</tr>
<tr>
<td>Culvert south of Bingham Drive</td>
<td>Unknown</td>
<td>Unknown</td>
<td>Stone veneer masonry construction; located in Rock Creek Park; if constructed between 1901 and 1941, may be a contributing resource to the RCPHD</td>
</tr>
<tr>
<td>Boundary Monuments</td>
<td>ca. 1890s/1920s</td>
<td>Stone and wooden boundary markers</td>
<td>Unevaluated resource type in ROCR</td>
</tr>
<tr>
<td>Daniel Road (Oregon Avenue)</td>
<td>By 1885</td>
<td>Road; Portions of the road constructed by 1885; northern portion after 1945</td>
<td>Not eligible</td>
</tr>
<tr>
<td>Roadway Guard Rails</td>
<td>Unknown</td>
<td>Concrete posts</td>
<td>Likely associated with development of DC roads; not associated with RCPHD; not eligible</td>
</tr>
<tr>
<td>Brick storm drain access manhole at “Deer Print Run”</td>
<td>Unknown</td>
<td>Manhole exposed due to soil erosion</td>
<td>Likely not associated with RCPHD; not eligible</td>
</tr>
<tr>
<td>Concrete headwall in “Deer Print Run”</td>
<td>Unknown</td>
<td>Concrete headwall</td>
<td>Likely not associated with RCPHD; not eligible</td>
</tr>
<tr>
<td>Box culvert carrying Oregon Avenue over Pinehurst Run</td>
<td>1908</td>
<td>Concrete beam and slab on masonry abutment</td>
<td>Likely not associated with RCPHD; not eligible</td>
</tr>
<tr>
<td>Culvert with wingwalls for pipe outfall into Pinehurst Run</td>
<td>Unknown</td>
<td>Concrete wingwall</td>
<td>Likely not associated with RCPHD; not eligible</td>
</tr>
<tr>
<td>St. John’s College High School (portion)</td>
<td>1959</td>
<td>Athletic/Recreational Fields</td>
<td>School buildings outside of APE; not eligible</td>
</tr>
<tr>
<td>Knollwood</td>
<td>Post 1919</td>
<td>Residence/Retirement Facility</td>
<td>Potentially eligible (DCHPO determination)</td>
</tr>
<tr>
<td>Residences</td>
<td>1936-2007</td>
<td>Various</td>
<td>Most (n=43) are at least 50 years of age; many have been altered</td>
</tr>
</tbody>
</table>

Two roads contributing to the RCPHD, Wise Road and Bingham Drive, intersect the project area at Oregon Avenue. In addition, some hiking and equestrian trails that do not have individual names but comprise the 15.5 miles of unsurfaced trails in Rock Creek Park are part of the circulation network. The modern asphalt-paved walking/bike trail paralleling Oregon
Environmental Assessment of Oregon Avenue NW

Avenue just inside the Park does not appear to be a segment of a trail contributing to the NRHP-listed RCPHD.

In 1998, Rock Creek Park personnel inventoried outfalls in a List of Classified Structures for the preparation of a Cultural Landscape Inventory (The Louis Berger Group, Inc., 2005). The List of Classified Structures provides an overview of the types of culverts located throughout the park, including circular concrete units, vitrified terra cotta or clay pipes, stone abutments with circular openings, cast iron pipes, corrugated metal pipes, concrete arches, concrete box culverts, and brick abutments (The Louis Berger Group, Inc., 2005).

In 2004, an architectural feature assessment of 166 culvert locations was conducted along the Rock Creek and Potomac Parkway and Beach Drive in Rock Creek Park (The Louis Berger Group, Inc., 2005). Culverts were further divided into their components – inlets and outfalls. Only 20 outfalls and 11 culverts incorporating masonry construction representing the period of construction from ca. 1900-1941 were recommended as contributing elements to the Rock Creek Park and/or the Rock Creek and Potomac Parkway Historic Districts.

Masonry construction was further subdivided into three major subtypes, including stone veneer, stone parapet headwalls, and stone headwalls surrounding concrete or terra cotta pipes. Other noted types include a box culvert with stone veneer abutments and parapets and a stone veneer arch. Information on the types of culverts contributing to the RCPHD may be applied to inlets and outfalls that do occur in the project area.

Additional resources that may be associated with Rock Creek Park are also identified below.

**Culvert south of Bingham Drive.** A four-sided masonry construction culvert occurs on the south side of Bingham Drive, NW in Rock Creek Park, within 50 feet of Oregon Avenue (see Figure 3-3). This resource is identified in the NPS Geographic Information System (GIS). It is unknown whether this culvert was among the outfalls documented by the NPS in 1998, and it was not documented in the 2004 survey by the Louis Berger Group (The Louis Berger Group, Inc. 2005). The culvert consists of three storm drain/sewer pipes, one 30 in. diameter pipe and two 36 in. diameter pipes, draining through three culvert openings into a tributary of Rock Creek.

The headwall of the culvert is parallel to Oregon Avenue and contains a square uncovered opening, the largest of the three. An additional opening is located on the south wingwall as a narrow, linear, horizontally-oriented opening. The third opening is round, covered by a square metal grate in the angled wall on the northwest corner. The north wingwall occurs parallel to Bingham Drive, consists of dry-laid irregular stone, sloping from west to east, and contains no openings. The three
walls containing openings appear to be mortared stone veneer applied to a concrete structure, consistent with common masonry construction styles of culverts contributing to the Rock Creek Park Historic District (The Louis Berger Group, Inc. 2005). The south wingwall is “stepped” as it slopes down from the road grade to the channel. On the interior of the culvert, both the north and south sides are lined with poured concrete that slopes down from the wingwalls to the bottom of the channel. Debris from failed portions of the walls and carried in from storm events occurs in the channel.

**Boundary Monuments.** At least two stone boundary monuments, possibly dating to the initial establishment of the park in the 1890s, mark the border of Rock Creek Park and occur immediately adjacent to the Oregon Avenue project area where the District of Columbia and Rock Creek Park boundaries meet (Figure 3-4). Additional wooden posts serving as boundary markers were also identified and may date to a later time period (1920s). Modern monuments delineate the official boundary and are co-located with some of these older boundary markers (Figure 3-5).

**DC ROADWAY/INFRASTRUCTURE-RELATED RESOURCES**

**OREGON AVENUE (FORMERLY DANIEL ROAD)**

Oregon Avenue itself is outside of Rock Creek Park and not part of its circulation network. The majority of the road pre-dates the creation of the park. The southern portion of the alignment that is Oregon Avenue appears on maps as early as 1885 and was called Daniel Road, but did not extend to the district boundary at that time (USGS 1885). Beginning at Military Road, the road curved slightly to the west, then extended almost due north, before terminating at the intersection of what is now Wise Road. By 1890, the park commission, while scouting out Rock Creek Park, reportedly traveled on Daniel Road up to the district line, suggesting that the road had been extended by that time (Davis 1996); however, as late as 1945, the northern portion of the road to the district boundary appears on maps as a dashed line, indicating it may still have been an unimproved route (USGS 1945).
1945, the name of the road was changed to Oregon Avenue, a name originally given to what is now Swann Street in the DuPont Circle area of Washington, DC. Sometime after 1945, the northern portion of the road, from Wise Road to Western Avenue, was improved. The earliest constructed house in the segment north of Wise Road dates to 1950.

Previous alterations have resulted in diminished aspects of integrity to the historic road. The southern portion of the roadway retains its location; however, the northern portion was extended sometime after 1945 and historic alignment of the roadway has probably already been widened from a single lane to two lanes over time. The original surface treatment materials and design of the roadway have likely evolved from dirt to gravel and then to pavement. Elements of the rural setting, historic feeling, and association with parkland remain intact because the eastern side of the roadway still bounds an undeveloped, wooded setting that was designated a national park soon after the road was constructed; however, previous additions of curbing, catchment basins, and sidewalks in portions of the alignment as well as the intensive residential development on the western side of the roadway beginning in the 1950s have somewhat altered the rural character of the area to a more suburban neighborhood. As a result of these previous alterations, the road is not likely to be eligible for the NRHP.

**Roadway Guard Rails**

Several concrete posts occur along Oregon Avenue: at the north end, near Western Avenue, and near the box culvert over Pinehurst Run (Figures 3-6 and 3-7). Metal cable or wooden boards hung between posts suggest their function as guard rails. These posts are not documented as resources that are part of Rock Creek Park and may have been installed as part of the development of Oregon Avenue after 1945. Although the roadway guard rails may be older than 50 years, they represent ancillary or support features associated with roadway operations and are not likely to be considered NRHP-eligible as a crucial element of the DC roadway system (NRHP Criterion A). In addition, they do not embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a
master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C).

**ROADWAY WATER CONTROL FEATURES**

Water control features identified within the APE along the east side of Oregon Avenue include culverts, headwalls, and access manholes. These resources likely date to the development or improvement of the roadway and are not associated with the development of Rock Creek Park. Records of DC Water (formerly WASA) indicate that several elements associated with stormwater outfall date to the 1920s.

**Brick storm drain access manhole at Deer Print Run.** Along the east side of Oregon Avenue, just north of Daniel Lane, a brick manhole for access to a storm drain occurs at the location of an outfall into a small tributary informally named Deer Print Run (Figure 3-8). The use of red brick for a manhole may suggest that this feature is older than 50 years and may be associated with early stormwater systems. Heavy water runoff in this area has exposed the manhole shaft; the manhole cover and several courses of brick have been toppled into the channel below. The brick storm drain access manhole represents one of many similar ancillary features of the city’s storm drain system and is not likely to be considered NRHP-eligible as a critical element of the DC stormwater system (NRHP Criterion A). In addition, it does not embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C).

**Concrete headwall in Deer Print Run.** A concrete headwall in the middle of the Deer Print Run channel may also be associated with water conveyance under the roadway and through the channel (Figure 3-8). The concrete headwall represents a small ancillary feature associated with the DC stormwater system and is not considered NRHP-eligible.

Additional culverts occur in the APE approximately 200 feet south of Beech Street, NW.

**Box Culvert at Pinehurst Run.** A box culvert carrying Oregon Avenue over Pinehurst Run was constructed in 1908 of concrete beam and slab on masonry abutment (Wilbur Smith Associates, 2003). As shown in Figure 3-9, the structure is a rectangular concrete box measuring 34 feet and 4 inches long (across the road). The inlet (upstream) side of the culvert measures 14 feet 5 inches wide and 4 feet 9 ¾ inches high; the outlet (downstream) measures 14 feet 10 inches wide and 5 feet 7 inches high in drawings. A concrete parapet or balustrade on each side of the
roadway comprises a portion of the headwall. The remainder of the headwalls are constructed of concrete blocks; smaller stone blocks occur next to the concrete on the northeast face of the structure. Although the box culvert at Pinehurst Run was constructed in 1908, it represents a support feature associated with roadway operations and is not likely to be considered NRHP-eligible as a crucial element of the DC roadway system (NRHP Criterion A). In addition, it does not embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C).

**Pinehurst Run Concrete Outfall.** A concrete wingwall outfall for a storm drain conveys water into Pinehurst Run on the east side of Oregon Avenue just south of the box culvert and is of unknown age but likely post-dates the box culvert. The concrete outfall represents a small ancillary feature associated with the DC stormwater system and is not considered NRHP-eligible.

**INSTITUTIONAL AND RESIDENTIAL RESOURCES**

**St. Johns College High School**

The 27-acre former Airlie Estate, located north of Military Road and bounded on the west by 27th Street and on the east by Oregon Avenue, was purchased for the expansion of an established Washington, DC private school in 1946. By 1959, the new school was opened. Athletic fields for students attending the school occur along its eastern boundary with Oregon Avenue. The fields consist of grass or turf-covered ground for soccer and baseball and include only limited structures or facilities (e.g., dugouts, bleachers, lighting) to accommodate sporting events. Although the fields and facilities may be more than 50 years old, these are only ancillary or support structures and are not considered NRHP-eligible.

**Knollwood**

Knollwood is a military retirement community for retired officers and female relatives located on 16 acres west of Oregon Avenue, NW. Opened in 1962, the facility consists of a large, modern dormitory-like residential structure, situated in the center of the parcel, with several modern buildings attached or immediately surrounding. East of the large main building is a smaller stone building that may predate the use of the facility as a retirement home (Figure 3-10). Information from the DCHPO indicates that the structure is more than 50 years old.
and is potentially eligible for the NRHP. Preliminary archival research suggests that portions of the parcel containing the retirement community had been previously developed. Two frame houses and one frame garage or stable occurred on parcels comprising the campus by 1903 and by 1919 an additional frame garage/stable had also been constructed (Baist 1903 and 1919). The frame house on the parcel owned in 1919 by Philip Maurs [Mauro] occurs in the approximate location as the present-day stone building. The stone building was likely constructed sometime after 1919.

**Residences**

Sixty-nine residential structures occur along Oregon Avenue. The majority (n=43) of houses are more than 50 years old but many have been altered since their original construction. The houses are not likely to be individually eligible nor are they likely to comprise an historic district that would be eligible for the NRHP, as indicated by the DCHPO.

### 3.2.5 Cultural Landscapes

Cultural landscapes, as defined by the Secretary of the Interior’s *Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*, consist of “a geographic area (including both cultural and natural resources and the wildlife or domestic animals therein) associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values.” In 1997, a cultural landscape inventory was conducted for Rock Creek Park (NPS 2003a,2003b). Based on the preliminary research gathered during this inventory, Linnaean Hill and Pierce Mill were identified as component landscapes of Rock Creek Park (NPS 2003a, 2003b). As a result, Rock Creek Park met the criteria for significance and integrity for listing on the NRHP as a historic-designed landscape. Specific elements of the cultural landscape do not occur in the APE. The Linnaean Hill and Pierce Mill component landscapes are not located within the APE.

The NPS is currently conducting a Historic Trails Component Landscape study; a final report will be available in 2012 (Monteleone 2011). Contributing features are likely to include specific trail alignments, trail materials, other small features such as steps, and vegetation consisting of understory and canopy such as large and/or unusual tree species. Although the Historic Trails Component Landscape is unlikely to identify any open vistas, historic natural views will be identified from specific points along each historic trail in several directions, reflecting the forested areas, streams, valleys, meadows, and sloping hills that characterize the themes of conservation and entertainment and recreation.

The Oregon Avenue trail parallels Oregon Avenue between Military Road and Wise Road. This trail has not been identified as a historic trail (Bushong 1990a) and may not be considered part of the future Historic Trails Component Landscape.

### 3.2.6 Ethnographic Resources

Ethnographic resources are defined in NPS Director’s Order 28 as any “site, structure, object, landscape or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it.”

Ethnographic resources are not known to exist in the proposed project area.
3.2.7 **Museum Collections**

The archeological collections from Rock Creek Park archeological sites are retained at the Museum Resource Center of the NPS, National Capital Region in Landover, Maryland. The other museum collections associated with Rock Creek Park are located at the Rock Creek Park Nature Center on Glover Road, NW and the Old Stone House in Georgetown. The proposed project does not affect any buildings where museum collections are or could be stored or any static displays of large scale artifacts.

3.2.8 **Indian Trust Resources and Native American Sacred Sites**

Indian trust assets are owned by American Indians but held in trust by the United States. Requirements are included in the Secretary of the Interior’s Secretarial Order No. 3206, “American Indian Tribal Rites, Federal – Tribal Trust Responsibilities, and the Endangered Species Act,” and Secretarial Order No. 3175, “Departmental Responsibilities for Indian Trust Resources.”

No Indian trust resources or Native American sacred sites occur within the proposed project area.

3.2.9 **Paleontological Resources**

Paleontological resources include casts, molds, and trace fossils such as burrows and tracks. Fossil localities typically include surface exposures, areas where subsurface deposits are exposed by ground-disturbing activities, and circumstances affording special environments for preservation such as caves, peat bogs, and tar pits. Paleontological resources are important mainly for their potential to provide scientific information on paleoenvironments and the evolutionary history of plants and animals.

Paleontological resources are generally not afforded the same degree of protection as cultural resources and few legal mandates exist for the management of paleontological resources. Unlike cultural resources, paleontological resources are not viewed as nonrenewable. Theoretically, there are finite numbers of fossils, but they are continually being exposed by natural processes of erosion. Fossils are not all considered extremely valuable, and their removal generally does not diminish the research potential of a deposit (National Research Council 1987:11-13).

Prior to 2009, the treatment of paleontological resources was regulated in some states by state law and both the U.S. Forest Service and the Bureau of Land Management implemented internal regulations to protect vertebrate and unique fossils and control the use of this resource type. Additionally, some fossil localities may have qualified for recognition under the National Natural Landmarks Program.

The Paleontological Resources Protection Act (PRPA) of 2009 (part of the Omnibus Public Land Management Act) requires the Secretaries of the Interior and Agriculture to manage and protect paleontological resources on federal lands under the stewardship of the Bureau of Land Management (BLM), the National Park Service (NPS), the Bureau of Reclamation (BOR), the Fish and Wildlife Service, and the U.S. Forest Service. The PRPA includes provisions for the casual or hobby collecting of common invertebrate and plant fossils without a permit on some federal lands (those managed by the BLM, BOR, and U.S. Forest Service); criminal and civil penalties for unauthorized collection; and the confidentiality of paleontological localities.
Casual collecting is not allowed within the National Parks or other lands managed by the NPS. Paleontological resources are not protected by legislation on private lands.

The BLM has also established the Potential Fossil Yield Classification (PFYC) system for use in broad approach planning efforts and for evaluating specific impacts. The PFYC identifies the fossil potential in geological formations and the associated risks for impacts (BLM 2010).

The only fossiliferous formation within Rock Creek Park is the Cretaceous Period Potomac Formation which typically occurs in the higher elevations; deposits include unconsolidated sand, gravel, silt, and clay (NPS 2009; Southworth and Denenny 2006). The Potomac Formation is associated with dinosaur and plant fossils, which include some of the oldest known flowering plant fossils, found throughout the National Capital Region (NPS 2009). Based on the BLM’s PFYC system, the Potomac Formation would be designated a Class 3a, moderate potential to contain vertebrate fossils in widely scattered contexts (BLM 2010).

The Cretaceous Period Potomac Formation has several surface manifestations in the Oregon Avenue project area. Based on Southworth and Denenny (2006), the Potomac Formation outcrops in the project area near the intersection of Oregon Avenue and Tennyson Street and south of Wise Road, both in Rock Creek Park. No known paleontological localities associated with the Potomac Formation occur in Rock Creek Park (Monteleone 2011) and no localities are expected in the project area.

3.3 SOCIOECONOMIC RESOURCES

3.3.1 LAND USE

This project is located in the Rock Creek West Planning Area, which is characterized by stable and well-maintained neighborhoods. Land uses within the project corridor are predominantly Low Density Residential with two Institutional land areas, some Park/Recreation/Open Space that connects to the west side of the corridor, and one section of Medium Density Residential along the western side of the corridor. The entire eastern side of the corridor is designated Park/Recreation/Open Space (DC Government 2007a, 2007b, 2007c).

Local comprehensive plans and land use maps were used to determine future land use along Oregon Avenue. Future land uses in all areas are expected to remain similar to the existing land uses.

3.3.2 ZONING

The area to the east and the south of Oregon Avenue is federally owned park land and as such is not zoned. The entire west side of the roadway corridor is zoned at R-1-A for single-family residential detached dwellings. Residences in this area are zoned for a minimum lot width of 75 feet and maximum lot occupancy of 40 percent, resulting in a very rural feel to the neighborhood (DCOZ, 2011).

3.3.3 DEMOGRAPHICS

The Oregon Avenue roadway corridor is located entirely within Census Tract 15.00. As shown in Table 3-4, this census tract has experienced consistent growth in population over the past
twenty years, with a higher rate of growth within the past ten. The predominant race within Census Tract 15.00 is non-Hispanic white, representing approximately 79 percent of the total population (NeighborhoodInfoDC, 2011).

### Table 3-4. District of Columbia and Area Population

<table>
<thead>
<tr>
<th>AREA</th>
<th>1990 POPULATION</th>
<th>2000 POPULATION</th>
<th>2010 POPULATION</th>
<th>% POPULATION CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington, DC</td>
<td>606,900</td>
<td>572,059</td>
<td>601,723</td>
<td>-5.7% 5.2%</td>
</tr>
<tr>
<td>Census Tract 15.00</td>
<td>5,570</td>
<td>5,649</td>
<td>5,911</td>
<td>1.4% 4.6%</td>
</tr>
</tbody>
</table>

Source: NeighborhoodInfoDC, 2011

#### 3.3.4 Environmental Justice

Presidential Executive Order (EO) 12898, *General Actions to Address Environmental Justice In Minority Populations and Low-Income Populations*, directs Federal agencies to identify and address as appropriate, disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority populations and low-income populations. The process to identify potential disproportionate impacts associated with the proposed action was as follows:

- Identification of the potentially affected population in the study area;
- Characterization of the study area with respect to minorities and low-income populations;
- Determination of potentially significant adverse impacts of the proposed action and alternatives; and
- Evaluation of the potential for disproportionately high and adverse impacts on minority populations and low-income populations in proximity of the alternate sites.

The demographic census data along the construction alignment were examined to determine the presence of any potential Title VI populations and any minority and low-income populations. Census Tract 15.00 was included in the data.

In total, the minority population in Census Tract 15.00 is considerably lower than that of the District of Columbia. Minorities make up approximately 21 percent of the population in this census tract compared with the District, which has a total minority population of approximately 64 percent (NeighborhoodInfoDC, 2011). Poverty levels along the alignment are also much lower than that of the District (3.2% as compared to 18%).

Based on the low levels of minority and low income populations in the area surrounding the proposed project, there are not anticipated to be any disproportionately high or adverse impacts on these populations.

#### 3.3.5 Economics and Development

The average family income in Census Tract 15.00 (2005 to 2009, in 2010 dollars) is $261,516 as compared to the District-wide average of $115,016 (NeighborhoodInfoDC, 2011). As noted in
the previous section, the poverty rate in Census Tract 15.00 is 3.2 percent as compared to the District average of 18 percent.

3.3.6 **JOINT DEVELOPMENT**

Joint development projects are commercial, residential, industrial, or mixed use developments that are undertaken in concert with transit facilities. Currently, there are no proposed or existing joint developments in the vicinity of Oregon Avenue.

3.3.7 **AESTHETICS AND VISUAL QUALITY**

Oregon Avenue is a relatively low-speed two-lane roadway with a combination of vertical and horizontal curves and both natural and landscaped vegetation that provides a somewhat rural feel within the District. The roadway is bordered on the west by single family residential homes with landscaped vegetation, including trees, shrubs, and lawns. The east side of the road consists of forested lands of Rock Creek Park, much of which is in a relatively natural state. The narrow pavement, lack of sidewalks, curbs, and gutters, and large trees with canopies that reach over the roadway also contribute to the relatively rural visual character of the roadway (see Figure 3-11).

**SCENIC EASEMENTS**

The NPS maintains scenic easements on the three easternmost residential properties that abut the south side of Pinehurst Parkway Park, shown in Figure 3-12. The easements restrict the use of these properties in order to preserve the scenic quality of the area.
3.3.8 Health and Safety

Oregon Avenue currently has inadequate facilities for pedestrians and non-motorized vehicle use. There are no sidewalks, bus pull-outs or waiting areas, marked crossings, or bike lanes currently provided in the roadway corridor.

Uncontrolled runoff from elevated parcels to the west of the roadway has contributed in large part to the deterioration of this two-lane roadway. Local residents have described the roadway as unsafe because of these drainage issues, as well as poor lighting and the tendency for drivers to exceed the 25-mph posted speed limit. As described in Chapter 2, poor drainage and rolling topography result in areas along the roadway where ponding often occurs and where ice sheets form in the winter (in particular, at the intersections with Moreland Place and Western Avenue).

3.3.9 Community Resources

Three community facilities are located along the project corridor. Knollwood, a military retirement community, and St. John’s College High School are located adjacent to the project corridor. Rock Creek Park Community Garden is located within the park southeast of Northampton Street. The garden features 120 plots and provides communal tools and water for gardeners to use. The garden is situated to the east of the Pinehurst Trail, away from Oregon Avenue.

Emergency Services

Emergency services in the area are provided by the District Fire and Emergency Medical Services Department. The closest police and fire departments are located on the east side of Rock Creek Park in Brightwood at 6001 Georgia Avenue, NW and 5760 Georgia Avenue, NW, respectively. To access the area, emergency vehicles would travel west along Military Road, NW to Oregon Avenue.

Schools

The 27-acre former Airlie Estate, located north of Military Road and bounded on the west by 27th Street and on the east by Oregon Avenue, is the location of St. John’s College High School. It serves approximately 1,100 students in Grades 9 through 12.

Parks and Recreational Resources

Oregon Avenue provides access to Rock Creek and Pinehurst Parkway Parks. Visitor facilities accessible from Oregon Avenue include multi-use trails, an extensive network of hiking and horseback riding trails, scenic roads, Milkhouse Ford, Fort DeRussy, Miller Cabin, access from the northwest to the Rock Creek Park Horse Center, the Rock Creek Public Golf Course, the Rock Creek Park Nature Center, and the Planetarium.

3.3.10 Utilities and Infrastructure

The following inventory of existing utilities and infrastructure was compiled using data supplied by DDOT and supplemented with field observation and additional information gathered from the various utility owners/agencies.
**WATER AND SEWER AUTHORITY (DC WATER)**

Typically in the District of Columbia, waterlines and sewer lines are owned and maintained by DC Water, while the storm drain system is owned by DDOT and maintained by DC Water. The watermains and sewer lines within the project area are described further below.

Starting from the south end of the corridor at the Military Road/Oregon Avenue intersection, there is a 12-inch existing watermain that aligns approximately in the middle of the roadway up to/nearby Moreland Place, then shifts further west along the western edge of pavement, then off the pavement around the upstream side of Pinehurst Run culvert, back along the western edge of the pavement up to/near Beech Street, then shifts further west outside of the pavement, and stops 50 feet north of Dogwood Street.

There is no existing watermain within the portion of the roadway between Dogwood Street and Daniel Lane. Approximately 40 feet south of Daniel Lane, however, there is an 8-inch watermain that aligns outside of the pavement area along the western side of the roadway and runs all the way up to Western Avenue and turns westerly along the south edge of the Western Avenue pavement edge.

Houses within the neighborhoods adjacent to the project are served by water house service connection from the existing 12-inch and 8-inch watermains described above.

With respect to sewer service, Oregon Avenue does not have a continuously running sanitary sewer line; however, in the vicinity of residential properties, there is a sanitary line that serves the homes and ties to either crossing street sewer lines or discharges into a combined sewer system.

A 12-inch sanitary sewer line starts north of the St. John’s College High School property and runs beneath the southbound roadway up to Northampton Street, and then turns westerly on to Northampton Street.

A 10-inch sanitary sewer line starts at 5800 Oregon Avenue and runs parallel to the roadway outside of the pavement area and ties to a 10-inch sewer line along Rittenhouse Road. The latter continues from Rittenhouse Road on to Oregon Avenue within pavement, runs northerly up to Nebraska Avenue, and then turns westerly on to the south leg of the Nebraska Avenue intersection. There is no existing sewer line between the Nebraska Avenue intersection and Tennyson Street.

A 10-inch sanitary sewer line runs along Tennyson Street, turns northerly off the pavement on to Oregon Avenue, then runs underneath the pavement starting about 250 feet west of the Unicorn Lane intersection, connects to a 10-inch line along Beech Street and runs further north, off the pavement along the western edge of the right-of-way and ends near 7000 Oregon Avenue.

A 10-inch sanitary sewer line starts near 7010 Oregon Avenue off the western edge of pavement, runs through the Western Avenue intersection, and then continues further north.
WASHINGTON GAS

An 8-inch gas line starts around 200 feet south of Moreland Place, runs off the pavement along the western edge of the roadway, and stops near the Rittenhouse Road intersection. There is no existing gas line between Rittenhouse Road and Tennyson Street.

There is a 4-inch gas line that runs along the southbound roadway between Tennyson Street and Private Drive, north of Oregon Knolls Drive, and then further north, it runs off the pavement parallel to the western right-of-way line up to Chestnut Street/Wise Road. The line then aligns off the roadway, but closer to the southbound roadway, and stops near Dogwood Street.

There is no existing gas line between Dogwood Street and Daniel Lane.

A 4-inch gas line runs along Daniel Lane, turns on to Oregon Avenue in a northerly direction off the pavement, continues up to Western Avenue, and then turns further west.

POTOMAC ELECTRIC POWER COMPANY (PEPCO)

PEPCO owns and maintains overhead and underground facilities within the project limits.

Starting from Military Road, PEPCO runs their 13 kilovolt (KV) overhead lines on wood poles along the east side of the roadway up to the Northampton Avenue intersection, then along the west side of the roadway up to the Chestnut Street/Wise Road intersection, and then back along the east side of the roadway all the way up to Western Avenue. Overhead lines continue on to Western Avenue and across the DC/MD border.

VERIZON COMMUNICATION (VERIZON) AND COMCAST CABLE (COMCAST)

VERIZON and COMCAST maintain their overhead facilities on joint-use PEPCO poles.

STREET LIGHTS

Existing street lights are leased, and the arms and the fixtures are installed on PEPCO wood poles. The presence of street lights is sporadic and they are only provided at intersections and along the mainline where exiting PEPCO poles permit.

3.4 TRANSPORTATION

Each of the elements of the transportation system – pedestrian and bicycle facilities, the roadway network, and transit services – is described in the subsections below.

3.4.1 PEDESTRIAN AND BICYCLE NETWORK

With the exception of a sidewalk in front of a few homes on the west side of the roadway near Moreland Place, Oregon Avenue does not currently have continuous sidewalk facilities, which poses a safety concern for pedestrians and bus stop users (see Figure 3-13). Recent DC legislation (see Section 1.2.4) has prompted the need for pedestrian accommodations within the corridor. Furnishing sidewalks along Oregon Avenue would also conform to the District’s Complete Street Program, a policy document that encourages the provision of sidewalks along DC streets.

The 2010 DC Bike Map lists Oregon Avenue as having fair biking conditions, with no on-street bike lanes. Generally, the rating of biking conditions is based on factors such as vehicle speed,
traffic, volume and low width, and collector roadways like Oregon Avenue usually receive a fair rating. Wise Road, heading east away from Oregon Avenue, and Nebraska Avenue, heading west from Oregon Avenue, are both also listed as having fair biking conditions. Military Road is considered to have poor biking conditions.

The recreational trail to the east of Oregon Avenue in Rock Creek Park is listed as an off-street bike trail with access points at Wise Road, Bingham Drive, and Military Road.

Currently, between 10 and 20 bikes per hour use Oregon Avenue during the peak commuting periods.

3.4.2 ROAD NETWORK
Traffic volumes, function, and character of the roadway vary over the 1.7-mile length of Oregon Avenue.

From Military Road to Wise Road/Chestnut Street (a distance of 1.3 miles), Oregon Avenue is functionally classified as a collector carrying daily traffic volumes of 3,500 vehicles per day south of Nebraska Avenue and 8,400 vehicles per day north of Nebraska Avenue. The remaining 0.4 miles from Wise Road/Chestnut Street to Western Avenue is functionally classified as a local road and carries approximately 2,300 vehicles per day.

The topography and roadway cross-section also vary along the corridor, with the Southern Section exhibiting the steepest cross slope. Grades range from 6 to 10 percent along the corridor, well above the desirable grades for a collector and there are several “blind” crests, where sight distance is limited, that contribute to the roadway safety concerns. Travel lanes are generally 10 feet wide, with short sections that have been widened to provide on-street parking.

At its southernmost point, Oregon Avenue intersects with Military Road at a signalized intersection. South of Military Road, the roadway continues as Glover Road. North of Military Road, Moreland Place, Northampton Street, and Rittenhouse Street connect with Oregon Avenue in the Chevy Chase neighborhood, along with Nebraska Avenue, which continues into Rock Creek Park as Bingham Drive. The Nebraska Avenue/Bingham Drive/Oregon Avenue intersection was recently upgraded and features rain gardens for stormwater control.

In the Barnaby Woods neighborhood, Lindsay Drive, Tennyson Street, Unicorn Lane, and Oregon Knolls Drive intersect with Oregon Avenue. And in the Hawthorn neighborhood,
Beech, Birch, Chestnut, and Dogwood Streets and Daniel Lane tie into Oregon Avenue. The main east-west corridor in the Hawthorn neighborhood is Chestnut Street, which originates in Maryland as Winnett Road and continues through Rock Creek Park as Wise Road. The northern limit of the project and this neighborhood is Western Avenue.

Aside from the signalized intersection of Oregon Avenue with Military Road, traffic control along the roadway is stop-controlled, with a four way stop at Nebraska Avenue and Chestnut Street/Wise Road and a three-way stop where it terminates at Western Avenue and continues as Daniel Road into Maryland.

Traffic counts were collected as part of the study to verify traffic volumes and to provide input to operational and environmental analyses. Turning movement counts were conducted at the following intersections, as summarized in Table 3-5:

- Oregon Avenue and Military Road
- Oregon Avenue and Nebraska Avenue/Bingham Drive
- Oregon Avenue and Chestnut Street/Wise Road

Table 3-5. Intersection Turning Movement Counts

<table>
<thead>
<tr>
<th>INTERSECTION WITH OREGON AVENUE</th>
<th>PEAK HOUR*</th>
<th>NORTHBOUND</th>
<th>SOUTHBOUND</th>
<th>EASTBOUND</th>
<th>WESTBOUND</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LEFT</td>
<td>THRU</td>
<td>RIGHT</td>
<td>LEFT</td>
</tr>
<tr>
<td>Military Road</td>
<td>AM</td>
<td>5</td>
<td>25</td>
<td>40</td>
<td>165</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>5</td>
<td>120</td>
<td>120</td>
<td>110</td>
</tr>
<tr>
<td>Nebraska Avenue/Bingham Drive</td>
<td>AM</td>
<td>5</td>
<td>90</td>
<td>15</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>5</td>
<td>250</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>Chestnut Street/Wise Road</td>
<td>AM</td>
<td>20</td>
<td>45</td>
<td>140</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>25</td>
<td>135</td>
<td>280</td>
<td>5</td>
</tr>
</tbody>
</table>

* AM Peak Hour is between 7:30 - 8:30 AM and PM Peak Hour is between 5:30 - 6:30 PM.

Forty-eight hour counts were collected on Oregon Avenue north and south of Nebraska Avenue to determine typical hourly traffic flows. The typical existing peak hour and daily traffic volumes are shown in Figure 3-14.

A review of the traffic volumes suggests that there is adequate capacity; therefore, capacity improvements are not recommended on Oregon Avenue. As shown in Figure 3-14, existing traffic volumes are two to three times heavier between Nebraska Avenue and Chestnut Street/Wise Road because this section of Oregon Avenue is part of a commuter route for several adjacent neighborhoods to locations east of Rock Creek Park. The higher traffic volumes on this section, combined with the lack of space for pedestrians and cyclists, present a growing safety problem in the roadway corridor. The Wise Road intersection operates at level of service (LOS) E in the AM peak hour due to the left turns associated with commuter traffic.¹

¹ Level of Service (LOS) is a measure used by traffic engineers to characterize the operating conditions of a roadway or intersection. LOS is ranked from A to F, where A represents free flow or negligible delay and F represents extensive delay and congestion.
Figure 3-14. Traffic Volumes
3.4.3 TRANSIT

Currently within the project area, the Metrobus E-6 route utilizes Oregon Avenue north of Lindsey Drive. Route E-6, the Chevy Chase Line, originates at the Friendship Heights Metro Station and travels generally along Western Avenue to Oregon Avenue and then follows Oregon Avenue south to the Knollwood Retirement Home. The route travels along Oregon Avenue 34 times per day and serves seven bus stops, located at the end of the local streets that connect to Oregon Avenue:

1. South of Western Avenue
2. Daniel Lane
3. Dogwood Street
4. Chestnut Street
5. Birch Street
6. Beech Street
7. Unicorn Lane

The bus then returns north to Western Avenue, but it does not stop in the northbound direction. As illustrated in Figure 3-15, there are no pull-off areas or shelters at the bus stops.

3.5 AIR QUALITY

A project-level air quality analysis for the improvements to Oregon Avenue was considered in accordance with U.S. Environmental Protection Agency (EPA) and FHWA guidelines. The purpose of this project-level air quality analysis was to evaluate the potential effects of the proposed alternatives on the air quality, including the analysis of carbon monoxide (CO), ozone precursors (NOX and VOC), particulate matter (PM10 and PM2.5), and Mobile Source Air Toxics (MSATs).

3.5.1 REGIONAL CONFORMITY

The reconstruction of Oregon Avenue is included in the Transportation Improvement Program (TIP) for the Metropolitan Washington Region (Fiscal Years 2011 to 2016), and the scope of the project is consistent with the regional analysis included in the TIP. The National Capital Region 2010 Constrained Long-Range Transportation Plan (CLRP) and the 2011-2016 TIP have been determined by the Metropolitan Washington Council of Governments (MWCOG) to conform to the intent of the State Implementation Plan (SIP).
3.5.2 **PROJECT-LEVEL CO CONFORMITY**

The District is currently in maintenance for the CO air quality standard. However, under 40 CFR § 93.126, the Oregon Avenue project is exempt from air quality conformity determination because it will not add capacity and it conforms to some or all of the following features:

- Projects that correct, improve, or eliminate a hazardous location or feature.
- Shoulder improvements.
- Increasing sight distance.
- Pavement resurfacing and/or rehabilitation.
- Widening narrow pavements or reconstructing bridges (no additional travel lanes).

3.5.3 **PROJECT-LEVEL FINE PARTICULATE MATTER (PM2.5) CONFORMITY**

The Oregon Avenue project is located in the Washington, DC-MD-VA nonattainment area for the PM$_{2.5}$ annual standard. The area was designated as nonattainment for PM$_{2.5}$ on January 5, 2005 by the EPA, effective on April 5, 2005 and applied on April 5, 2006. On March 10, 2006, EPA issued amendments to the Transportation Conformity Rule to address localized impacts of particulate matter: *PM$_{2.5}$ and PM$_{10}$ Hot-Spot Analyses in Project-level Transportation Conformity Determinations for the New PM$_{2.5}$ and Existing PM$_{10}$ National Ambient Air Quality Standards (NAAQS)* (71 FR 12468). These rule amendments, listed below, require the assessment of localized air quality impacts of Federally-funded or approved transportation projects in PM$_{10}$ and PM$_{2.5}$ nonattainment and maintenance areas deemed to be *projects of air quality concern* as identified in 40 CFR 93.123(b)(1):

(i) **New highway projects that have a significant number of diesel vehicles, and expanded highway projects that have a significant increase in the number of diesel vehicles;**

(ii) **Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;**

(iii) **New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;**

(iv) **Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and**

(v) **Projects in or affecting locations, areas, or categories of sites which are identified in the PM10 or PM2.5 applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.**

Based on these definitions in 40 CFR 93.123(b)(1), the Oregon Avenue project is not a *project of air quality concern.*
3.5.4 MOBILE SOURCE AIR TOXICS
In addition to the criteria air pollutants for which there are NAAQS, EPA also regulates air toxics. Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries). MSATs are a subset of the 188 air toxics defined by the Clean Air Act (CAA). MSATs are compounds emitted from highway vehicles and non-road equipment. 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 or gasoline.

The FHWA Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA (FHWA, 2009) defines three levels of analysis based on a tiered approach for analyzing MSAT in environmental documents. The Oregon Avenue project falls into the first category of "Projects with No Meaningful Potential MSAT Effects or Exempt Projects" based on the fact that this project will have "no meaningful impacts on traffic volumes or vehicle mix." Therefore, no analysis or discussion of MSAT is needed for the project.

3.5.5 GREENHOUSE GAS (GHG) IMPACTS
Carbon dioxide is the principle man-made greenhouse gas, representing approximately 82 percent of all greenhouse gas emissions in the United States (EIA, 2010). Among other sources, approximately 34 percent of the total carbon dioxide is produced by the burning of fossil fuel (gasoline) in internal combustion engines in motor vehicles. The Oregon Avenue project would not increase roadway capacity and would not increase vehicle emissions or vehicle miles traveled. Therefore, the project would not contribute to an increase in greenhouse gases.

3.6 NOISE AND VIBRATION
Noise levels are important design parameters in the planning of road and highway improvements and are subject to federal regulations. Noise criteria applicable to the proposed project are set forth in 23 CFR 772 and Section 772 of the Federal-Aid Highway Policy Guide.

3.6.1 NOISE CRITERIA
As stated in the District Department of Transportation Noise Policy (January 10, 2011), a “sensitive receptor is a noise-sensitive location registering measurable sound levels as described in 23 CFR 722 – typically a residence or other use that would be negatively affected by noise.” Based on this definition, sensitive land uses located within the project corridor include a mix of residential, park, and education (institutional) land uses, which can be categorized as Activity Category B based on Noise Abatement Criteria (see Table 3-6).

3.6.2 EXISTING CONDITIONS
Existing noise measurements were conducted along Oregon Avenue in April of 2011. Noise measurements were collected at six representative locations during peak traffic periods to determine ambient noise levels within the corridor. Short-term measurements were collected in accordance with the guidelines contained in the FHWA Highway Traffic Noise: Analysis and
Abatement Guidance (June 2010) and DCMR Chapter 29, Noise Measuring Test Procedures, and as described in Section 6.2.2 of the District Department of Transportation Noise Policy (January 10, 2011).

Table 3-6. FHWA Noise Abatement Criteria

<table>
<thead>
<tr>
<th>ACTIVITY CATEGORY</th>
<th>$L_{eq}(H)$ (DBA)*</th>
<th>DESCRIPTION OF ACTIVITY CATEGORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>57 (Exterior)</td>
<td>Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.</td>
</tr>
<tr>
<td>B</td>
<td>67 (Exterior)</td>
<td>Residential</td>
</tr>
<tr>
<td>C</td>
<td>67 (Exterior)</td>
<td>Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.</td>
</tr>
<tr>
<td>D</td>
<td>52 (Interior)</td>
<td>Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.</td>
</tr>
<tr>
<td>E</td>
<td>72 (Exterior)</td>
<td>Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included A-D.</td>
</tr>
</tbody>
</table>

*Hourly Equivalent A-weighted Sound Level

With the exception of St. Johns College High School, Rock Creek Park, and Pinehurst Parkway Park, all land uses adjacent to Oregon Avenue are residential. Sensitive receptors were selected to cover the high school, the multi-family residential facility (Knollwood retirement community), and several typical single-family residences. The single family residences are representative of that land use type along the length of Oregon Avenue. The receptor locations are depicted on Figure 3-14.

The predominant noise sources in the project area are birds and insects, street activities normal to urban environment, airplanes, building HVAC units, landscaping tools, and traffic on nearby roadways. As shown in Table 3-7, existing measured noise levels in the project area range from 55 to 62 decibels (dBA), which does not approach or exceed the FHWA noise abatement criteria (NAC) of 67 dBA.

For comparative purposes, Table 3-8 provides a description of common noise levels. As noted above, the activity levels along Oregon Avenue are considered Activity Category B, which includes picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals. If traffic were to cause noise levels above 67 dBA in a Category B area, noise abatement would be required.
Figure 3-14. Noise Sensitive Receptor Locations
### Table 3-7. Noise Sensitive Receptor Measurement Levels

<table>
<thead>
<tr>
<th>SITE</th>
<th>LOCATIONS</th>
<th>15-MIN $L_{eq}$ (DBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>St. John’s College High School</td>
<td>55</td>
</tr>
<tr>
<td>2</td>
<td>Rock Creek Park Trail - northeast quadrant of Oregon Avenue/Military Road intersection</td>
<td>62</td>
</tr>
<tr>
<td>3</td>
<td>Single family residence - 5750 Oregon Avenue NW</td>
<td>62</td>
</tr>
<tr>
<td>4</td>
<td>Knollwood Retirement Community outdoor seating area - 6200 Oregon Avenue NW</td>
<td>58</td>
</tr>
<tr>
<td>5</td>
<td>Single family residence - 3001 Chestnut Street NW (corner of Oregon Avenue, Chestnut Street, and Wise Road)</td>
<td>62</td>
</tr>
<tr>
<td>6</td>
<td>Single family residence - 7034 Oregon Avenue NW</td>
<td>61</td>
</tr>
</tbody>
</table>

### Table 3-8. Common Noise Levels

<table>
<thead>
<tr>
<th>NOISE SOURCE</th>
<th>SOUND LEVEL (DBA)</th>
<th>SUBJECT IMPRESSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jet aircraft taking off</td>
<td>120</td>
<td>Uncomfortably Loud</td>
</tr>
<tr>
<td>Heavy truck / motorcycle</td>
<td>90</td>
<td>Very Loud</td>
</tr>
<tr>
<td>Food blender</td>
<td>90</td>
<td>Very Loud</td>
</tr>
<tr>
<td>Lawn mower / vacuum cleaner</td>
<td>70</td>
<td>Moderately Loud</td>
</tr>
<tr>
<td>Light auto traffic / dishwasher</td>
<td>50</td>
<td>Quiet</td>
</tr>
<tr>
<td>Quiet urban (night/library)</td>
<td>30</td>
<td>Very Quiet</td>
</tr>
<tr>
<td>Acoustic test chamber</td>
<td>10</td>
<td>Just Audible</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>Threshold of Hearing</td>
</tr>
</tbody>
</table>

### 3.7 HAZARDOUS WASTE/MATERIALS

A review of previous studies, the EPA online site, DDOE information, and a site visit indicate that there are no areas of concern within the project vicinity. According to the DDOE, a case was opened for a leak and subsequent contaminated soil at St. Johns College High School, which is located at the southern terminus of the project area. This case was closed in October of 1995 (DDOE, 2010a).

### 3.8 ENERGY CONSERVATION

There are currently no known energy conservation measures being taken in the project corridor.
This “Environmental Consequences” chapter addresses the potential impacts to each of the resource areas (i.e., impact topics) discussed under the “Affected Environment” chapter for the No Action and Candidate Build Alternatives.

Potential impacts of all alternatives are described in terms of type (beneficial or adverse); context (site-specific, local, or regional); duration (short-term or long-term), and intensity (negligible, minor, moderate, major). This is consistent with the regulations of the Council on Environmental Quality (CEQ) that implements the National Environmental Policy Act (NEPA). Definitions of these descriptors include:

**Beneficial:** A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

**Adverse:** A change that declines, degrades, and moves the resource away from a desired condition or detracts from its appearance or condition.

**Context:** Context is the affected environment within which an impact would occur, such as local, park-wide, regional, global, affected interests, society as a whole, or any combination of these. Context is variable and depends on the circumstances involved with each impact topic. As such, the impact analysis determines the context, not vice versa.

**Duration:** The duration of the effect is described as short-term or long-term. Duration is variable with each impact topic; therefore, definitions related to each impact topic are provided in the specific impact analysis narrative.

**Intensity:** Because definitions of impact intensity (negligible, minor, moderate, and major) vary by impact topic, intensity definitions are provided for each impact topic analyzed in the specific impact analysis narrative.

National Park Service policy also requires that direct and indirect impacts be discussed and analyzed during the impact analysis, but not specifically identified in the narrative.

In general, impacts were determined through the consultation and collaboration of a multidiscipline team of DDOT, FHWA, NPS, and consultant professional staff. In addition, regulatory agency consultation and other existing sources such as any existing literature and industry accepted methods were used to assess the potential impact associated with each alternative.
According to the CEQ guidelines (40 CFR Sections 1500-1508), the determination of a significant impact is a function of both context and intensity. Significance of an action is analyzed within the setting of the action, or context, including regional, local, and site-specific. Intensity refers to the severity of an impact which is analyzed in terms of type, quality, and sensitivity of a particular resource. The appropriate class of environmental documentation is determined by the level of significance, which is established through impact analysis of each resource. Following public and agency review of this EA, FHWA in coordination with DDOT would select a preferred alternative and determine if a Finding of No Significant Impact (FONSI) is warranted for the preferred alternative.

4.1 **NATURAL RESOURCES**

4.1.1 **Geology, Soils, and Topography**

**Alternative 1 - No Action Alternative**

Under the No Action Alternative, the improvements to Oregon Avenue would be limited to maintenance, such as the removal of fallen trees and other debris caused by the deterioration of the roadway, and the resurfacing of the roadway. This maintenance work would not impact the topography, geology, or soils, unless road bed stabilization is necessary to maintain the site conditions or provide access for construction vehicles. Under the No Action Alternative, the uncontrolled runoff from the roadway and adjacent parcels would continue to result in pavement deterioration and the topography in Rock Creek Park would continue to be altered through erosion. Therefore, the No Action Alternative would have an adverse, minor, long-term impact to geology, soils, and topography because the runoff would continue unabated and alter the natural environment.

**Candidate Build Alternatives**

In the District, land disturbing activities are regulated and require a construction permit from the District prior to engaging in any such activities. In accordance with the District of Columbia Municipal Regulations (DCMR) Title 21-Chapter 5 Water Quality and Pollution, an erosion and sediment control plan is required for 50 square feet of land disturbance and a stormwater management plan is required for 5,000 square feet of land disturbance. Construction activities will also be regulated for compliance.

Alternatives 2, 3, and 4 would have minor short-term and long-term site-specific impacts on the topography and soils in and around the Oregon Avenue project area. The differences in soil impacts among the Candidate Build Alternatives are minimal. The majority of land within the project area has been previously graded and paved over from the construction and maintenance of the existing Oregon Avenue, and much of the project area is currently experiencing moderate to severe erosion.

Depending on the alternative, construction may extend beyond the existing roadway footprint to the west of the corridor, an area which has been previously disturbed for residential lots. Roadway construction limitations such as moderate to high erosion potential, steep slopes, frost action, low strength, depth to bedrock, depth to saturation, and flooding will need to be taken into account for this project.
ALTERNATIVE 2
This alternative would result in adverse, minor, long-term impacts to geology, soils, and topography as it would disturb approximately 1.37 additional acres that have not been previously graded for facility construction.

ALTERNATIVE 3
This alternative would result in adverse, minor, long-term impacts to geology, soils, and topography as it would disturb approximately 3.36 additional acres that have not been previously graded for facility construction.

ALTERNATIVE 4
This alternative would result in adverse, minor, long-term impacts to geology, soils, and topography as it would disturb approximately 3.40 additional acres that have not been previously graded for facility construction.

Areas of disturbance associated with each alternative are presented in Table 4-1. Areas of disturbance associated with Options A, C, and D are included within the estimates for each of the Candidate Build Alternatives. The areas of disturbance for the two options at the Nebraska Avenue intersection, however, are included as separate line items in Table 4-1.

OPTIONS
Option A Traffic Calming with pavement markings would not disturb any additional area; therefore, this option would not have an additional effect on geology, soils, or topography.

Option B Nebraska Avenue built with a four-way stop or construction of a traffic circle would change the total area of additional disturbance for this project.

Option C Stormwater Management includes two systems, the closed system and open system with a swale. Addition of on-site and/or off-site bioretention areas would disturb a variable amount of additional area depending on the design.

Option D Pinehurst Run Crossing with a bridge, culvert, or open arch culvert would disturb the channel and overbanks upstream and downstream from the crossing to transition flows into and out of the wider opening. The traditional concrete-bottomed box culvert could cause floodwaters to pick up velocity, resulting in increased erosion on the downstream side of the culvert during a storm event – as is demonstrated in the system today. The bridge or an open bottom arch culvert would provide a continuous natural stream bottom that would reduce velocities and erosion potential.

AGRICULTURAL LANDS, PRIME, AND UNIQUE FARMLAND SOILS

ALTERNATIVES 1, 2, 3, AND 4 / OPTIONS
There are no prime farmlands within the project area; therefore, there would be no impact to farmland from the No Action Alternative, Candidate Build Alternatives, or project options.
### Table 4-1. Areas of Disturbance (in square feet)

<table>
<thead>
<tr>
<th>ALTERNATIVE &amp; OPTION</th>
<th>EXISTING FOOTPRINT</th>
<th>ALTERNATIVE FOOTPRINT</th>
<th>ADDITIONAL AREA OF DISTURBANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1</td>
<td>250,318 sf</td>
<td>250,318 sf</td>
<td>0 sf</td>
</tr>
<tr>
<td>Alternative 2</td>
<td>250,318 sf</td>
<td>309,867 sf</td>
<td>59,549 sf</td>
</tr>
<tr>
<td>Alternative 3</td>
<td>250,318 sf</td>
<td>396,465 sf</td>
<td>146,147 sf</td>
</tr>
<tr>
<td>Alternative 4</td>
<td>250,318 sf</td>
<td>398,596 sf</td>
<td>148,278 sf</td>
</tr>
<tr>
<td>Option B – 4-way</td>
<td>--</td>
<td>18,658 sf</td>
<td>18,658 sf</td>
</tr>
<tr>
<td>Option B - Circle</td>
<td>--</td>
<td>20,302 sf</td>
<td>20,302 sf</td>
</tr>
</tbody>
</table>

### 4.1.2 Water Resources

#### Drinking Water and Groundwater

**Alternative 1 – No Action Alternative**

No addition of impervious surfaces would occur under this alternative. No changes to groundwater volume or quality would be expected under the No Action Alternative. No drinking water resources occur in the project vicinity; therefore, this alternative would not have an effect.

**Alternatives 2, 3, and 4**

All of the Candidate Build Alternatives would result in minor, beneficial, local effects. All alternatives include a stormwater sewer with perforations that would allow for some of the stormwater to naturally infiltrate as it travels through the culverts. This type of system would compensate for some of the impervious surfaces in the area and allow for groundwater regeneration closer to historic volumes. Stormwater swales and rain gardens are also being considered for this project to compensate for impervious surfaces in this area. These facilities would allow for additional recharge and filtration of pollutants that currently drain directly into the local surface water system. These stormwater facilities are known to filter 60 to 80 percent of unwanted contaminants. Impacts to groundwater associated with recharge would not be expected under any of the Action Alternatives.

No drinking water resources occur in the project vicinity; therefore, the Candidate Build Alternatives are not expected to have any effect.

**Options**

Options A (Traffic Calming) and D (Pinehurst Run Crossing) would not have any additional effect on groundwaters.

**Option B Nebraska Avenue** built as a four-way intersection would allow for a larger bioretention facility to be built, permitting greater infiltration to groundwater during storm events. Existing paved areas that currently form additional turn lanes in the northwest quadrant of the intersection would be available for optional stormwater management systems (i.e., rain garden, bioretention areas). Additional area would also be available with the traffic
circle; however, the amount would be less and this option would have more impervious surface.

Option C Stormwater Management will provide beneficial effects to ground waters. The addition of stormwater swales and rain gardens would allow for additional recharge and filtration of pollutants that currently drain directly into the local surface water system. These stormwater facilities are known to filter 60 to 80 percent of unwanted contaminants.

**Surface Water**

**Alternative 1 – No Action Alternative**

Surface waters in the area are currently receiving increased sediment, nutrients, and chemicals that are washed from Oregon Avenue and the upstream neighborhoods to the west directly. In addition, the lack of stormwater infiltration and increased water volume and velocity have caused scouring of slopes and channels and degradation of water quality and roadway infrastructure. Under the No Action Alternative, these impacts would not be corrected and would continue to effect local streams and surface waters.

**Alternatives 2, 3, and 4**

Actions potentially affecting surface waters are regulated at the federal and state (including the District) levels in accordance with Section 404 of the Clean Water Act. All of the Candidate Build Alternatives would result in minor, beneficial, long-term effects to surface waters. General impacts to water resources from roadway construction would be similar among the Candidate Build Alternatives, the primary difference being the amount of impervious surface that would occupy the project area and the length of stream disturbance over Pinehurst Run (see Table 4-2). In-stream work for this project will require permits.

**Table 4-2. Pinehurst Run Limits of Disturbance (in linear feet)**

<table>
<thead>
<tr>
<th></th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Pinehurst Run within Limits of Disturbance</td>
<td>57</td>
<td>73</td>
<td>74</td>
</tr>
<tr>
<td>Total Stream Length within Limits of Disturbance</td>
<td>350</td>
<td>350</td>
<td>350</td>
</tr>
</tbody>
</table>

Although they would result in an increase of impervious surfaces, the proposed reconstruction of Oregon Avenue incorporates stormwater systems that will accommodate the infiltration of the first 1.2 inches of stormwater from the project area (provided that studies during design confirm that soils are adequately pervious and the water table is low). Stormwater treatment measures will allow for infiltration of stormwater to more closely match historic values for the area and reduce the amount of additional sediment, chemicals, nutrients, and heat in run-off that comes from impervious surfaces. As a part of this project, an erosion and sediment control plan, stormwater management plan, and a “treatment train” of BMP techniques will be developed. Work in this area is not expected to have an effect past the confluence with Rock Creek, a tributary to the Potomac River.
Options

Option A Traffic Calming would have only temporary effects during construction. These options would not have any additional long-term effects on surface waters.

Option B Nebraska Avenue built as a four-way intersection would allow for a larger bioretention facility to be built, permitting greater infiltration to groundwater during storm events. Existing paved areas that currently form additional turn lanes in the northwest quadrant of the intersection would be available for optional stormwater management systems (i.e., rain garden, bioretention areas). Additional area would also be available with the traffic circle; however, the amount would be less and this option would have more impervious surface.

Option C Stormwater Management includes two systems. The closed system will reduce the volume of stormwater flowing directly into local surface waters by providing debris removal and infiltration, which would alleviate erosion and bring stormwater volumes closer to historic levels. Use of an open system with swales would allow for additional stormwater treatment, including the ability to further reduce sediment and dissolved pollutants. The addition of stormwater swales and rain gardens would allow for additional recharge and filtration of pollutants that currently drain directly into the local surface water system. These stormwater facilities are known to filter 60 to 80 percent of unwanted contaminants.

Option D Pinehurst Run Crossing includes a traditional culvert, an open bottom arch culvert, and a bridge. Each would have varying effects on the floodplain downstream of the current crossing. The traditional concrete-bottomed box culvert could cause floodwaters to pick up velocity, resulting in increased erosion on the downstream side of the culvert during a storm event – as is demonstrated in the system today. The bridge or an open bottom arch culvert would provide a continuous natural stream bottom that would reduce velocities and erosion potential. The natural stream bottom of these two options would also be beneficial to aquatic organisms within the stream and floodplain by allowing for easier access upstream and downstream of the crossing.

Floodplains

Alternative 1 – No Action Alternative

A portion of the existing Oregon Avenue lies within the 100-year floodplain for Pinehurst Run. The No Action Alternative would not introduce new development within the floodplain; however, scouring of stream beds, sedimentation in the floodplain, and greater stormwater volumes and velocities than historically accommodated in this area due to impervious surfaces and lack of stormwater infrastructure would continue. Floodplain values and functions would continue to be effected and local erosion would continue due to lack of stormwater management structures. The 100-year flood overtops the culvert at Oregon Avenue and has potential to create significant erosion damage to the roadway. This No Action Alternative would result in long-term, local adverse effects to functional values of the floodplain as well as continued structural degradation to the existing culvert.
ALTERNATIVES 2, 3, AND 4

In accordance with Executive Order 11988, Floodplain Management, and corresponding NPS Floodplain Management Director’s Order (DO) 77-2, Floodplain Management, floodplain encroachments should be avoided or minimized to the maximum extent practicable. Federal agencies are required to reduce the risk of flood loss, minimize flood impacts to human safety, health, and welfare and to restore and preserve beneficial floodplain values and functions.

The Candidate Build Alternatives would have minor, short-term, adverse effects to the Pinehurst Run floodplain and long-term, beneficial effects to local floodplains upstream and downstream of Oregon Avenue. Each of the Candidate Build Alternatives would require temporary work within the floodplain for the replacement of the existing deteriorating culvert over Pinehurst Run and reconfiguration of the overbanks and channel. However, the new culvert or bridge will be sized so as to pass episodic flood events and will therefore eliminate previous problems associated with flood waters overtopping the roadway. The effective sizing of the box culverts (and/or the bridge structure) will prevent any increase in backwater elevations, which are commonly experienced today due to the inadequate size of the existing culvert. The width of the roadway crossing will increase due to the addition of sidewalk and/or bike lanes in the Candidate Build Alternatives (see Table 4-3); however, this minor increase in width will have no short-term or long-term effects on the functional values of the associated floodplain. In addition, improved geomorphology, reestablishment of riparian buffer, and improved floodplain functions will result in long-term benefits to the Pinehurst Run floodplain as well as downstream systems of this tributary.

Table 4-3. Floodplain Encroachments (in square feet)

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>EXISTING AREA WITHIN FLOODPLAIN</th>
<th>ALTERNATIVE AREA WITHIN FLOODPLAIN</th>
<th>ADDITIONAL FLOODPLAIN ENCROACHMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5,616 sf</td>
<td>5,616 sf</td>
<td>0 sf</td>
</tr>
<tr>
<td>2</td>
<td>5,616 sf</td>
<td>8,124 sf</td>
<td>2,508 sf</td>
</tr>
<tr>
<td>3</td>
<td>5,616 sf</td>
<td>11,869 sf</td>
<td>6,253 sf</td>
</tr>
<tr>
<td>4</td>
<td>5,616 sf</td>
<td>12,376 sf</td>
<td>6,760 sf</td>
</tr>
</tbody>
</table>

OPTIONS

Option A Traffic Calming would not have any additional effect on the local floodplain.

Option B Nebraska Avenue built as a four-way intersection would allow for a larger bioretention facility to be built, permitting greater infiltration to groundwater during storm events. Existing paved areas that currently form additional turn lanes in the northwest quadrant of the intersection would be available for optional stormwater management systems (i.e., rain garden, bioretention areas). Additional area would also be available with the traffic circle; however, the amount would be less and this option would have more impervious surface.

Option C Stormwater Management options would result in floodplain values and functions receiving local, minor, beneficial effects. The greatest benefit would occur from the use of an
open system with ditches and the addition of on-site and off-site bioretention facilities; however, the differences between them would be negligible.

Option D Pinehurst Run Crossing includes a traditional culvert, an open bottom arch culvert, and a bridge. Each would have varying effects on the floodplain downstream of the current crossing. The traditional concrete-bottomed box culvert could cause floodwaters to pick up velocity, resulting in increased erosion on the downstream side of the culvert during a storm event – as is demonstrated in the system today. The bridge or an open bottom arch culvert would provide a continuous natural stream bottom that would reduce velocities and erosion potential. The natural stream bottom of these two options would also be beneficial to aquatic organisms within the stream and floodplain by allowing for easier access upstream and downstream of the crossing.

**WATER QUALITY**

**ALTERNATIVE 1 – NO ACTION ALTERNATIVE**

Under this alternative, Oregon Avenue would not be reconstructed to include any additional stormwater management systems and as a result, erosion and chemical and nutrient loading would continue. Although roadbed erosion would continue to occur, there would be no discernable change in the existing impervious surface within the study area (approximately 1.92 acres). The stormwater volumes and channel velocities would continue unabated, resulting in continued erosion of the stream channel, sedimentation from overland erosion, and loss of riparian vegetation. Therefore, the No Action Alternative would continue to have minor, long-term, adverse impacts to water resources due to continued erosion, sedimentation, and degraded water quality.

**ALTERNATIVES 2, 3, AND 4**

All Candidate Build Alternatives would result in moderate, beneficial, long-term effects to local water quality and minor to negligible benefits downstream. Although it would result in an increase of impervious surfaces, the reconstruction of Oregon Avenue would incorporate Low Impact Development techniques that include infiltration of up to the first 1.2 inches of stormwater from the project area, approximately 25,060 cubic feet of water.

One of the goals of the proposed project is to improve water quality and stormwater management in this area to alleviate drainage issues and prevent further damage from uncontrolled runoff. As such, temporary (during construction) and permanent stormwater management and erosion and sediment controls and upgraded stormwater conveyance and outfalls will be implemented as part of the project. Best management practices will be used and any work completed as part of this project will improve stormwater management and is anticipated to improve water quality downstream of the project area. Work in this area is not expected to have an effect past the confluence with Rock Creek, a tributary to the Potomac River.

**OPTIONS**

Option A Traffic Calming would not have any additional effect on water quality.
Option B Nebraska Avenue built as a four-way intersection would allow for a larger bioretention facility to be built, permitting greater infiltration to groundwater during storm events. Existing paved areas that currently form additional turn lanes in the northwest quadrant of the intersection would be available for optional stormwater management systems (i.e., rain garden, bioretention areas). Additional area would also be available with the traffic circle; however, the amount would be less and this option would have more impervious surface.

Option C Stormwater Management includes two systems. The closed system will reduce the volume of stormwater flowing directly into local surface waters by providing infiltration, which would alleviate erosion and bring stormwater volumes closer to historic levels. Use of an open system with swales would allow for additional stormwater treatment including the ability to reduce sediment and dissolved pollutants. The addition of stormwater swales and rain gardens would allow for additional recharge and filtration of pollutants that currently drain directly into the local surface water system, as shown in Table 4-4. These stormwater facilities are known to filter 60 to 80 percent of unwanted contaminants.

Table 4-4. Comparison of Water Treatment System Capabilities (Infiltration Volumes in cubic feet)

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>CLOSED SYSTEM</th>
<th>CLOSED SYSTEM WITH BIORETENTION</th>
<th>OPEN SYSTEM WITH DITCHES</th>
<th>OPEN SYSTEM WITH DITCHES AND BIORETENTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – No Action</td>
<td>No Treatment</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2, 3, and 4</td>
<td>25,060 cf</td>
<td>27,360 cf</td>
<td>27,710 cf</td>
<td>30,010 cf</td>
</tr>
</tbody>
</table>

Option D Pinehurst Run Crossing includes a traditional culvert, an open bottom arch culvert, and a bridge. Each would have varying effects on the floodplain downstream of the current crossing. The traditional concrete-bottomed box culvert could cause floodwaters to pick up velocity, resulting in increased erosion on the downstream side of the culvert during a storm event – as is demonstrated in the system today. The bridge or an open bottom arch culvert would provide a continuous natural stream bottom that would reduce velocities and erosion potential. The natural stream bottom of these two options would also be beneficial to aquatic organisms within the stream and floodplain by allowing for easier access upstream and downstream of the crossing.

Wetlands

Alternatives 1, 2, 3, and 4 / Options

In accordance with survey methods presented in the 1987 US Army Corps of Engineers Wetlands Delineation Manual, no wetlands were identified within the project area; therefore, there would be no impact to wetlands from the No Action Alternative, the Candidate Build Alternatives, or any project options.
Navigable Waters

Alternative 1 - No Action Alternative
Under this alternative, inadequate stormwater management for this area would result in continued erosion of the roadbed and stream channels, sedimentation from overland erosion, chemical and nutrient loading from untreated stormwater, and loss of riparian vegetation. Therefore, the No Action Alternative would have negligible, adverse, long-term effects to downstream water resources including Navigable Waters due to continued degraded water quality.

Alternatives 2, 3, and 4
There are no Navigable Waters located within the project vicinity. This project would support preservation of downstream waters and their resources by implementing stormwater management practices that will reduce pollutants and alleviate damage from water during rain events, which would improve downstream water quality. Therefore, the Candidate Build Alternatives would have negligible, beneficial, long-term effects to downstream water resources, including Navigable Waters.

Options
Due to the significant distance to the Potomac River (the nearest navigable water), the four options for this project would have no measurable effect on Navigable Waters.

Wild and Scenic Rivers

Alternative S1, 2, 3 and 4 / Options
There are currently no Wild or Scenic Rivers in the immediate or extant project area. Therefore, none of the described alternatives or options would have an impact to such resources.

Coastal Zone

Alternative S1, 2, 3 and 4 / Options
There are no Coastal Zones within the District of Columbia; therefore, the proposed project will have no effect on the management of Coastal Zone resources.

Chesapeake Bay Protection

Alternative 1 - No Action Alternative
Under this alternative, inadequate stormwater management for this area would continue resulting in continued erosion of the roadbed and stream channels, sedimentation from overland erosion, chemical and nutrient loading from untreated stormwater, and loss of riparian vegetation. Therefore, the No Action Alternative would have minor, long-term effects to downstream water resources, including the Chesapeake Bay, due to continued degraded water quality.
By implementing stormwater management practices that will reduce pollutants and alleviate damage from water during rain events, each of the Candidate Build Alternatives would support preservation of local tributaries that eventually reach the Chesapeake Bay and its resources.

Options

Options for this project would either not effect or will support preservation of downstream resources by implementing additional stormwater management practices that will improve downstream water quality. Minor beneficial effects from project options are anticipated.

Marine and Estuarine Resources

Alternative 1 – No Action Alternative

Under this alternative, inadequate stormwater management for this area would continue resulting in continued erosion of the roadbed and stream channels, sedimentation from overland erosion, chemical and nutrient loading from untreated stormwater, and loss of riparian vegetation. Therefore, the No Action Alternative would have minor long-term effects to downstream water resources, including the marine and estuarine resources, due to continued degraded water quality.

Alternatives 2, 3, and 4

No marine or estuarine resources are located in the immediate vicinity of this project; however, the Candidate Build Alternatives would support preservation of downstream resources by implementing stormwater management practices that will reduce pollutants and alleviate damage from water during rain events.

Options

Options for this project would either not effect or will support preservation of downstream resources by implementing additional stormwater management practices that will improve downstream water quality.

4.1.3 Wildlife Including Threatened and Endangered Species

As discussed in Chapter 3, the US Fish and Wildlife Service (USFWS) have indicated that no other proposed or federally listed endangered or threatened species are known to exist within the project area. Therefore, it is not expected that this project will have any effect on protected species and no further coordination under Section 7 is required (Miranda, 2011).

Alternative 1 – No Action Alternative

Although no threatened or endangered species are known to exist in the project vicinity, other terrestrial and aquatic wildlife would be affected by the No Action Alternative. Under this alternative, inadequate stormwater management for this area would continue the erosion of the roadbed and stream channels, sedimentation from overland erosion, chemical and nutrient loading from untreated stormwater, and loss of riparian vegetation.
Degradation of the riparian habitats through erosion and sedimentation could result in potential displacement of terrestrial populations. Sensitive habitats located downstream of the project would continue to receive contaminated stormwater degrading the quality of that habitat. Therefore, the No Action Alternative would have minor, long-term, adverse effects to local riparian habitat and downstream water resources, including aquatic habitat, due to continued degraded water quality.

**Alternatives 2, 3, and 4**

A search of databases and communication with park officials indicate no federal or state-listed threatened or endangered species are known to occur in the project vicinity.

Minor, short-term, adverse effects to terrestrial and aquatic organisms and their habitat would occur during construction, and minor, long-term, beneficial effects upon completion of the project. Species likely to be found in the area are adapted to urban habitats and the more protected wooded park habitats. Construction associated with the Candidate Build Alternatives will be primarily in previously disturbed areas that are predominantly grassed lawns, which provides very little habitat for terrestrial animals. Reconstruction activities and operation of machinery would be disruptive to wildlife, which would likely retreat to deeper parts of the forest, and repopulate the site when construction is complete.

Although there are no aquatic species of concern near the project area, sensitive habitats downstream would benefit from increased stormwater management. Erosion and sediment control plans, stormwater management plans, and BMPs will be used during construction to protect water quality and habitat integrity. Build alternatives would support preservation of downstream resources, including aquatic habitat, by implementing stormwater management practices that will reduce pollutants and alleviate damage from water during rain event, improving the water quality. Stormwater management would alleviate erosion and allow for riparian habitat to reestablish. Disturbed areas will be replanted with a native mix recommended by DDOT and NPS officials.

**Options**

**Option A Traffic Calming** would have no additional effect on wildlife.

**Option B Nebraska Avenue** built with either option would reduce impervious surface and allow for native revegetation, resulting in a minor, beneficial, local effect from slightly increased habitat. The four-way stop option would allow for a greater area to remain vegetated.

**Option C Stormwater Management** that includes bioretention facilities would increase the area of native vegetation and habitat, resulting in a minor, beneficial, local effect from slightly increased habitat.

**Option D Pinehurst Run Crossing** includes a traditional culvert, an open bottom arch culvert, and a bridge. The bridge or an open bottom arch culvert would provide a continuous natural stream bottom that would reduce velocities and erosion potential. The natural stream bottom of these two options would also be beneficial to aquatic organisms within the stream and floodplain by allowing for easier access upstream and downstream of the crossing.
**WILDLIFE AND WATERFOWL REFUGES**

**ALTERNATIVES 1, 2, 3, AND 4 / OPTIONS**

No wildlife or waterfowl refuges are located in the vicinity of this project; however, the Candidate Build Alternatives would support preservation of downstream resources by implementing stormwater management practices that will reduce pollutants and alleviate damage from water during rain events, which would improve downstream water quality. No adverse effects from this project are anticipated.

**ANADROMOUS FISH, TROUT WATERS, AND SHELLFISH**

**ALTERNATIVES 1, 2, 3, AND 4 / OPTIONS**

None of the waters in the project area or immediately downstream support populations of trout and shellfish – nor do they provide spawning areas for anadromous fish species. Therefore, neither the No Action nor the Candidate Build Alternatives are anticipated to have any effect on these fishery resources.

### 4.1.4 Vegetation

**ALTERNATIVE 1 - NO ACTION ALTERNATIVE**

Although no reconstruction would take place, this alternative would have minor, local, long-term, adverse effects to vegetation due to continued erosion. Excess stormwater from the upland areas surrounding Oregon Avenue currently flows unchecked into Rock Creek Park, causing erosion, damaging vegetation, and making it difficult for new vegetation to take hold.

**ALTERNATIVES 2, 3, AND 4**

This project would expand the width of the existing Oregon Avenue footprint, decrease vegetated areas, and result in a minor, long-term, local, adverse effect. The footprint will be expanded in areas that are primarily urban and planted as lawn, which provides very little habitat for terrestrial animals. Although no work will be conducted on park land, construction may damage the root systems of large trees located in the park resulting in their ultimate loss.

Limits of disturbance will remain the same for all alternatives on the east/park side of Oregon Avenue. All vegetation occurring within the limits of disturbance is considered to be impacted. Trees surveyed in which 30% or greater of the critical root zone is located within the limits of disturbance are also considered to be impacted. According to the tree survey, 62 trees in Alternative 2 and 85 trees in both Alternatives 3 and 4 have a diameter of six inches or greater and have the potential of being impacted.

Impacts to trees will be avoided to the maximum extent possible by minimizing cut/fill/pavement within the root zone. In order to prevent the introduction of new invasive species and to prevent the spread of existing populations, best management practices should be followed, including washing machinery before it enters the area, minimizing ground disturbance, and reseeding of disturbed areas. Rock Creek Park staff will be providing a preferred seed mix for use in disturbed areas after construction.
OPTIONS

Options A (Traffic Calming) and D (Pinehurst Run Crossing) would not have an effect on local vegetation.

Option B Nebraska Avenue built with either option would reduce impervious surface and allow for native revegetation. The four-way stop option would allow for a greater area to remain vegetated.

Option C Stormwater Management bioretention facility and swale options would allow for a greater area of native vegetation to replace lawn areas, which would result in a more rural character.

4.2 CULTURAL AND PALEONTOLOGICAL RESOURCES

In this EA, impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the Council on Environmental Quality (CEQ) that implement NEPA. These impact analyses are intended, however, to comply with the requirements of both NEPA and Section 106 of the National Historic Preservation Act (NHPA). In accordance with the Advisory Council on Historic Preservation’s (ACHP) regulations implementing Section 106 (36 CFR Part 800, Protection of Historic Properties), impacts to cultural resources were identified and evaluated by (1) determining the area of potential effects (APE); (2) identifying cultural resources present in the APE that are either listed in or eligible to be listed in the National Register of Historic Places (NRHP); (3) applying the criteria of adverse effect to affected cultural resources either listed in or eligible to be listed in the NRHP; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the ACHP’s regulations, a determination of either adverse effect or no adverse effect must be made for affected NRHP listed or eligible cultural resources. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the NRHP (e.g., diminishing the integrity of the resource’s location, design, setting, materials, workmanship, feeling, or association). Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5, Assessment of Adverse Effects). Adverse effects on historic properties would include, but not be limited to:

1. Physical destruction, damage, or alteration of all or part of the property;
2. Isolation of the property from or alteration of the character of the property’s setting when that character contributes to the property’s qualification for the NRHP;
3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
4. Neglect of a property resulting in its deterioration or destruction; and
5. Transfer, lease, or sale of the property (36 CFR 800.9[b]).

A determination of no adverse effect means historic properties are present, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the NRHP.
CEQ regulations and the National Park Service’s Conservation Planning, Environmental Impact Analysis and Decision Making (NPS Director’s Order #12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Cultural resources are non-renewable resources and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under Section 106 may be mitigated, the effect remains adverse.

For the purposes of this EA, a significant impact under NEPA is defined as an “unresolvable” adverse effect under Section 106 of the NHPA. “Unresolvable” adverse effects may occur when the terms of mitigation cannot be agreed upon, or if the NHPA Section 106 process is foreclosed due to an inability to reach agreement.

A separate Cultural Resources Assessment has been prepared for the Oregon Avenue project area and this EA summarizes the findings. The Cultural Resources Assessment is intended to meet the requirements of Section 106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based upon the criteria of adverse effect found in the ACHP’s regulations.

**4.2.1 ARCHEOLOGICAL RESOURCES**

**Impact Thresholds.** The following thresholds were used to determine the magnitude of impacts on archeological resources under NEPA:

- **Negligible** – The impact would be at the lowest level of detection or barely perceptible and not measurable. For purposes of Section 106, the determination of effect would be no adverse effect.

- **Minor** –
  
  *Adverse impact* – Disturbance of a site(s) results in little, if any, loss of integrity. The determination of effect for Section 106 would be no adverse effect.

  *Beneficial impact* – Maintenance and preservation of a site(s). The determination of effect for Section 106 would be no adverse effect.

- **Moderate** –
  
  *Adverse impact* – Disturbance of a site(s) results in loss of integrity. For purposes of Section 106, the determination of effect would be adverse effect. A memorandum of agreement is executed among the National Park Service and applicable state or tribal historic preservation officer and, if necessary, the ACHP, in accordance with 36 CFR 800.6(b). The mitigation measures identified in the MOA reduce the intensity of impact from major to moderate. Measures...
identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.

*Beneficial impact* – Stabilization of a site(s). The determination of effect for Section 106 would be no adverse effect.

*Major –*

*Adverse impact* – Disturbance of a site(s) results in loss of integrity. For purposes of Section 106, the determination of effect would be adverse effect. The National Park Service and applicable state or tribal historic preservation officer and/or ACHP are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b) resulting in an ‘unresolvable’ adverse effect.

*Beneficial impact* – Active intervention to preserve a site(s). The determination of effect for Section 106 would be no adverse effect.

**Duration.** Because archeological resources are non-renewable, any impact on either prehistoric or historic archeological resources would be considered long term.

**ALTERNATIVE 1- NO ACTION ALTERNATIVE**

Continued erosion and natural degradation of areas within Rock Creek Park which contain archeological resources will continue to occur as a result of uncontrolled stormwater runoff. Archeological resources would continue to be managed in accordance with Sections 106 and 110 of the National Historic Preservation Act and the National Park Service’s Conservation Planning, Environmental Impact Analysis and Decision Making (Director’s Order #12). Implementation of the No Action Alternative (repaving and general maintenance) would result in negligible impacts to archeological resources.

**ALTERNATIVE 2**

The proposed modifications to the existing roadway would include removal of existing asphalt paving, cut and fill construction with excavation to depths of 3 to 4 feet within the existing Oregon Avenue alignment, and addition of fill to create the east to west slope for drainage. The addition of a curb along the east side of the road and a curb and sidewalk on the west side of the road would require minimal excavation to a depth of 8 inches (6 inches for the base and 2 inches for the surface treatment) in areas that are currently unpaved, but within the DDOT right-of-way. The installation of a subsurface gutter will require excavation of up to 3 additional feet in a narrow (2 feet wide) linear path parallel to the roadway, also within the DDOT right-of-way. The construction of a retaining wall in the Southern Section of the project area, defined as Military Road to Nebraska Avenue, would require excavation of up to 4 feet below surface for wall footings on the east side of the DDOT right-of-way. The use of heavy equipment during construction in any unpaved staging areas (including equipment yards and materials storage areas) may cause soil disturbance several inches deep.

The area of proposed road reconstruction under Alternative 2 has likely been previously disturbed by road construction and maintenance, installation of underground infrastructure
and utilities, and residential development on the west side of the road and is unlikely to contain intact archeological resources.

Reconstruction of Pinehurst Run Crossing will most likely require the demolition of existing abutments and construction or installation of new supports on the terrace ledges above the waterway. Previous excavation into these landforms likely occurred with the construction of the current crossing; however, additional excavation beyond the previous limits will occur with Alternative 2 (from 27 feet existing to 32 feet) and may result in disturbance to unidentified intact archeological resources. Although no prehistoric artifacts were identified in the floodplain along Pinehurst Run just inside the park, there is a potential for prehistoric archeological resources to occur on these terraces.

Implementation of Alternative 2 (reconstruction with sidewalk) could result in moderate impacts to archeological resources if present.

**ALTERNATIVE 3**

Impacts to archeological resources in the Southern Section of the alignment between Military Road and Nebraska Avenue as part of Alternative 3 would be similar to those described under Alternative 2. In the Northern Section, defined as Nebraska Avenue to Western Avenue, the construction of a wider alignment to include a 10-foot wide shared-use path will require minimal excavation to a depth of 8 inches (6 inches for the base and 2 inches for the surface treatment) in areas that are currently unpaved, but within the DDOT right-of-way. The installation of a vegetated swale will require excavation of up to 3 additional feet in a 10-foot wide linear path on the west side of the roadway, within the DDOT right-of-way. Taller retaining walls (up to 8 feet) in the Northern Section along the western edge of the roadway would require excavation up to 4 feet for footings.

The area of proposed road reconstruction under Alternative 3 has likely been previously disturbed by road construction and maintenance, installation of underground infrastructure and utilities, and residential development on the west side of the road and is unlikely to contain intact archeological resources.

Reconstruction of Pinehurst Run Crossing will most likely require the demolition of existing abutments and construction or installation of new supports on the terrace ledges above the waterway. Previous excavation into these landforms likely occurred with the construction of the current crossing; however, additional excavation beyond the previous limits will occur with Alternative 3 (from 27 feet existing to 37 feet) and may result in disturbance to unidentified intact archeological resources. Although no prehistoric artifacts were identified in the floodplain along Pinehurst Run just inside the park, there is a potential for prehistoric archeological resources to occur on these terraces.

Implementation of Alternative 3 (reconstruction with shared-use trail) could result in moderate impacts to archeological resources if present.
ALTERNATIVE 4

Impacts to archeological resources in the Southern Section of the alignment between Military Road and Nebraska Avenue as part of Alternative 4 would be similar to those described under Alternative 2. In the Northern Section, the construction of a wider alignment to include a sidewalk and a bike lane will require minimal excavation to a depth of 8 inches (6 inches for the base and 2 inches for the surface treatment) in areas that are currently unpaved, but within the DDOT right-of-way. The installation of a vegetated swale will require excavation of up to 3 additional feet in a 10-foot wide linear path on the west side of the roadway, within the DDOT right-of-way. Taller retaining walls (up to 8 feet) in the Northern Section along the western edge of the roadway would require excavation up to 4 feet for footings.

The area of proposed road reconstruction under Alternative 4 has likely been previously disturbed by road construction and maintenance, installation of underground infrastructure and utilities, and residential development on the west side of the road and is unlikely to contain intact archeological resources.

Reconstruction of Pinehurst Run Crossing will most likely require the demolition of existing abutments and construction or installation of new supports on the terrace ledges above the waterway. Previous excavation into these landforms likely occurred with the construction of the current crossing; however, additional excavation beyond the previous limits will occur with Alternative 4 (from 27 feet existing to 40 feet) and may result in disturbance to unidentified intact archeological resources. Although no prehistoric artifacts were identified in the floodplain along Pinehurst Run just inside the park, there is a potential for prehistoric archeological resources to occur on these terraces.

Implementation of Alternative 4 (reconstruction with bike lanes) could result in moderate impacts to archeological resources if present.

OPTIONS

Option A Traffic Calming. No additional subsurface disturbance would occur under Option A; therefore, implementation of Option A would result in negligible impacts to archeological resources.

Option B Nebraska Avenue. Subsurface disturbance outside of the Oregon Avenue alignment may occur under Option B with reconfiguration of the intersection at Nebraska Avenue; however, this area has been previously disturbed from prior reconstruction of this intersection in 2008 and with the original construction of this roadway. There is limited potential for undisturbed archeological resources to occur in this area. Implementation of Option B would result in negligible impacts to archeological resources.

Option C Stormwater Management. No new outfalls or culverts are being proposed for any of the alternatives. The stormwater management options are all variations that require the excavation of up to 3 feet below ground surface within DDOT right-of-way. Previous disturbance associated with the original construction of Oregon Avenue and underground utilities and residential development on the west side of the roadway has likely resulted in
limited potential for unidentified intact archeological resources. Implementation of Option C would result in negligible impacts to archeological resources.

Option D Pinehurst Run Crossing. Three replacement options for the existing box culvert at the Pinehurst Run Crossing have been proposed: an enlarged box culvert, a short bridge, or a precast, concrete bottomless culvert. Selection of any of these options would not affect archeological resources. Implementation of Option D would result in negligible impacts to archeological resources if present.

4.2.2 Historic Structures
Impact Thresholds. The following thresholds were used to determine the magnitude of impacts on architectural resources under NEPA:

Negligible – The impact would be at the lowest level of detection or barely perceptible and not measurable. For purposes of Section 106, the determination of effect would be no adverse effect.

Minor –

Adverse impact – Alteration of a character-defining feature(s) would not diminish the overall integrity of the resource. The determination of effect for Section 106 would be no adverse effect.

Beneficial impact – The character-defining feature(s) would be stabilized/preserved in accordance with the Secretary of the Interior’s Standards for the Treatment of Historic Properties (NPS 1995b), and maintain the existing integrity of the cultural resource. The determination of effect for Section 106 would be no adverse effect.

Moderate –

Adverse impact – Alteration of a character-defining feature(s) would diminish the overall integrity of the resource. The determination of effect for Section 106 would be adverse effect. A memorandum of agreement (MOA) is executed among the National Park Service and applicable state or tribal historic preservation officer and, if necessary, the ACHP, in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.

Beneficial impact – The resource would be rehabilitated in accordance with the Secretary of the Interior’s Standards for the Treatment of Historic Properties. The determination of effect for Section 106 would be no adverse effect.

Major –

Adverse impact – Alternation of a character-defining feature(s) would diminish the overall integrity of the resource. The determination of effect for Section 106 would be adverse effect. Measures to minimize or mitigate adverse impacts
cannot be agreed upon and the National Park Service and applicable state or tribal historic preservation officer and/or ACHRHP are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b) resulting in an ‘unresolvable’ adverse effect.

Beneficial impact – The resource would be restored in accordance with the Secretary of the Interior’s Standards for the Treatment of Historic Properties. The determination of effect for Section 106 would be no adverse effect.

Duration. Short-term impacts may include visual, audio or vibration effects related to construction activities and occur only for the duration of construction. Because historic structures are non-renewable, any impacts related to physical disturbance would be considered long term.

ALTERNATIVE 1 – NO ACTION ALTERNATIVE

Deterioration of historic structures will continue to occur as a result of uncontrolled stormwater runoff. Historic resources in Rock Creek Park would continue to be managed in accordance with Sections 106 and 110 of the National Historic Preservation Act and the National Park Service’s Conservation Planning, Environmental Impact Analysis and Decision Making (Director’s Order #12).

One historic concrete and stone culvert (Outfall 4) may be a contributing element to the Rock Creek Park Historic District (RCPHD). Debris including downed branches and trash will continue to obstruct the flow of water through the structure, resulting in potential failure. Vegetation will continue to grow between the cracks, crevices, and openings in the concrete and stone structure, further destabilizing it. Continuation of the existing conditions would result in negligible impacts to the RCPHD.

ALTERNATIVE 2

Proposed reconstruction of the roadway under Alternative 2 would include the removal of existing asphalt paving, cut and fill construction, and installation of new surface treatments consisting of new roadway paving; a context-sensitive designed sidewalk and a gutter along the full western side of the roadway corridor; curbing on both sides; and a retaining wall in the Southern Section, within the existing Oregon Avenue alignment.

The RCPHD and contributing elements to the District, including intersecting roads of the park circulation network (Wise and Bingham Roads) and historic park boundary monuments occur in the project area. Minimal repaving of portions of the historic roads that intersect Oregon Avenue may occur; the location of historic boundary monuments will not be altered because reconstruction of Oregon Avenue will occur in the existing right-of-way and no staging areas will occur on the park side of the road or near boundary monuments. No impacts to these resources are anticipated as a result of implementing roadway reconstruction under Alternative 2.

No new outfalls will be installed in the project area; however, improvements to existing outfalls may occur to better handle the flow of stormwater into the park. One of these culverts (Outfall 4) may be a contributing resource to the RCPHD.
Environmental Consequences

Temporary visual and audible intrusions to historic structures, including residences and Knollwood, on the west side of the roadway will likely occur during the period of construction, including the presence of large machinery, excavated roadway and earth, spoil and fill piles, stockpiling of new construction material, and road blocks and detours. Temporary audible intrusions may include increased noise from construction activity such as jack-hammering; large vehicle movement, braking, and back-up signals; and construction crews. Long-term audible intrusions are not anticipated because reconstruction of Oregon Avenue is not a capacity-building project; no increased noise from additional traffic is expected to occur.

The addition of low (three to five foot) retaining walls in the Southern Section will not disrupt the view from structures on the west side of the roadway into the RCPHD. Structures in this area are elevated on the slope and the view into the park from these structures would occur above the grade of the top of the retaining wall. The outward view from the historic district to the residential area on the west side of Oregon Avenue is not a contributing element to the NRHP-eligibility of the park and will not result in an impact to this historic property.

Alterations to a historic outfall may result in minor, long-term impacts to the RCPHD if this resource is determined to be a contributing element to an NRHP district.

Minor, short-term visual and audible impacts may occur to historic structures, including residences and Knollwood, on the west side of the roadway during construction.

**Alternative 3**

Impacts to historic structures in the Southern Section of the alignment between Military Road and Nebraska Avenue as part of Alternative 3 would be similar to those described under Alternative 2. In the Northern Section, the construction of a wider alignment to include a 10-foot wide shared-use path will require additional surface treatments in areas that are currently unpaved, but within the DDOT right-of-way. The installation of a vegetated swale instead of a gutter will reduce alterations to the surface and preserve some grass cover on the west side of the roadway in the Northern Section.

Taller retaining walls (up to 8 feet) in the Northern Section will be constructed along the western edge of Oregon Avenue. Structures in this area are elevated on the slope and the view into the park from these structures would occur above the grade of the top of the retaining wall. The outward view from the historic district to the residential area on the west side of Oregon Avenue is not a contributing element to the NRHP-eligibility of the park and will not result in an impact to this historic resource.

Alterations to a historic outfall may result in minor, long-term impacts to the RCPHD if this resource is determined to be a contributing element to an NRHP district.

Minor, short-term visual and audible impacts may occur to historic structures, including residences and Knollwood, on the west side of the roadway during construction.
**Alternative 4**

Impacts to historic structures in the Southern Section of the alignment between Military Road and Nebraska Avenue as part of Alternative 4 would be similar to those described under Alternative 2. In the Northern Section, the construction of the widest alignment of the three candidate build alternatives to include a sidewalk and a bike lane will require additional surface treatments in areas that are currently unpaved, but within the DDOT right-of-way. The installation of a vegetated swale instead of a gutter will reduce alterations to the surface and preserve some grass cover on the west side of the roadway in the Northern Section.

Taller retaining walls (up to 8 feet) in the Northern Section will be constructed along the western edge of Oregon Avenue. Structures in this area are elevated on the slope and the view into the park from these structures would occur above the grade of the top of the retaining wall. The outward view from the historic district to the residential area on the west side of Oregon Avenue is not a contributing element to the NRHP-eligibility of the park and will not result in an impact to this historic resource.

Alterations to a historic outfall may result in minor, long-term impacts to the RCPHD if this resource is determined to be a contributing element to an NRHP district.

Minor, short-term visual and audible impacts may occur to historic structures, including residences and Knollwood, on the west side of the roadway during construction.

**Options**

**Option A Traffic Calming.** The addition of markings to the surface of the roadway will not alter any NRHP-eligible historic structures. Implementation of Option A would result in negligible impacts to historic structures.

**Option B Nebraska Avenue.** Reconfiguration of the intersection at Nebraska Avenue will result in no impacts to historic structures. Nebraska Avenue was constructed after the construction of Oregon Avenue and this intersection was a previous modification to the original design of Oregon Avenue. The intersection has also previously been redesigned. Implementation of Option B would result in negligible to no impacts to historic structures.

**Option C Stormwater Management.** Improvement of the stormwater management system may require modifications to an existing historic structure where the new system links to this existing outfall, which may be a contributing resource to the RCPHD. Depending on the type of modifications required, impacts may range from minor to moderate, long-term impacts.

**Option D Pinehurst Run Crossing.** Three replacement options for the existing box culvert at the Pinehurst Run Crossing have been proposed: an enlarged box culvert, a short bridge, or a precast, concrete bottomless culvert. Selection of any of these options would not affect historic structures. Implementation of Option D would result in negligible impacts to historic structures.

**4.2.3 Cultural Landscapes**

Implementation of any of the alternatives or options will not alter the NRHP-eligible cultural landscapes of Rock Creek Park because these resources do not occur in or near the project area.
Alternatives 1, 2, 3, and 4 / Options

Implementation of the No Action, Candidate Build Alternatives, or project options would result in negligible to no impacts to cultural landscapes.

4.2.4 Ethnographic Resources

Ethnographic resources are not known to exist in the proposed project area. No impacts to ethnographic resources are anticipated as a result of implementing the No Action or Candidate Build Alternatives.

Alternatives 1, 2, 3, and 4 / Options

No known ethnographic resources exist within the Oregon Avenue project area. No impacts are anticipated.

4.2.5 Museum Collections

Although artifacts from previous archeological surveys conducted in Rock Creek Park have been collected, none are housed in the Oregon Avenue project area. No impacts to museum collections are anticipated as a result of implementing the No Action or Candidate Build Alternatives.

Alternatives 1, 2, 3, and 4 / Options

No known museum collections occur within the Oregon Avenue project area. No impacts are anticipated.

4.2.6 Indian Trust Resources and Native American Sacred Sites

No Indian Trust Resources are known to exist within the proposed project area and the lands are not held in trust by the Secretary of Interior for the benefit of American Indians or Alaska Native Tribes. No sites sacred to Native Americans are known to exist in the project area. No impacts to Indian Trust Resources and Native American sacred sites are anticipated from the No Action or Candidate Build Alternatives.

Alternatives 1, 2, 3, and 4 / Options

No known Indian Trust Resources or Native American sacred sites exist within the Oregon Avenue project area. No impacts are anticipated.

4.2.7 Paleontological Resources

Although surface outcrops of the fossiliferous Potomac Formation occur in the project area, no localities have been identified. Because no known resources exist within the project area, no impact to paleontological resources would occur from the No Action or the Candidate Build Alternatives.

Alternatives 1, 2, 3, and 4 / Options

No known paleontological resources exist within the Oregon Avenue project area. No impacts are anticipated.
4.2.8 **Cultural and Paleontological Resources Summary**

The No Action Alternative would result in negligible to no impacts to archeological resources. Candidate Build Alternatives 2, 3, and 4 may result in moderate, long-term impacts to archeological resources if they are identified along the terraces of Pinehurst Run. Options A, B, C, and D would result in negligible to no impacts to archeological resources.

Implementation of the No Action Alternative will result in negligible impacts to historic structures. Implementation of Alternatives 2, 3, and 4 may result in minor, long-term impacts to one historic structure if this resource is determined to be a contributing resource to an NRHP district. In addition, Alternatives 2, 3, and 4 may result in minor, short-term visual and audible impacts to historic structures during construction.

Options A, B, and D would result in negligible to no impacts to historic structures. Option C may result in minor to moderate long-term impacts to one historic structure.

Implementation of the No Action and all three Candidate Build Alternatives as well as all Options would result in negligible to no impacts to cultural landscapes, ethnographic resources, museum collections, Indian Trust Resources and Native American Sacred Sites, and paleontological resources.

4.3 **Socioeconomic Resources**

4.3.1 **Land Use**

According to DC Policy UD-1.2.1: *Respecting Natural Features in Development*, it is an important goal of the District to maintain and protect Washington’s unique landscape and natural features. The District’s comprehensive plan states that natural features should be preserved in low-density, wooded, or hilly areas and new construction should accommodate these resources rather than altering them. Designs for this project should take into consideration the bucolic setting of the project area and strive to maintain the existing neighborhood setting (DC Government 2007a, 2007b, 2007c).

The methodology used to determine the environmental consequences to land use was derived from the potential for changes to land use as a result of the implementation of any of the Candidate Build Alternatives.

**Alternatives 1, 2, 3, and 4 / Options**

Land use within the project area is not anticipated to change from either the maintenance or improvement of this road. The land is zoned as single family residential and is currently at capacity. Zoning will not be changed in this area and is not expected to change in the near future.

**Zoning**

**Alternatives 1, 2, 3, and 4 / Options**

The No Action Alternative, Candidate Build Alternatives, and project options would not change zoning within or surrounding the project area; therefore there would be no impact to zoning.
4.3.2 DEMOGRAPHICS

ALTERNATIVE 1 – NO ACTION ALTERNATIVE
Under the No Action Alternative, Oregon Avenue would not be reconstructed, but only repaved within the DDOT right-of-way, and existing conditions would remain unchanged. There would be no impact to demographics under the No Action Alternative.

ALTERNATIVES 2, 3, AND 4
Oregon Avenue would be reconstructed within existing DDOT right-of-way and would not result in any residential relocations, nor would it directly affect populations in the project area. The Candidate Build Alternatives would have no impact on population distribution within the project area.

OPTIONS
The Oregon Avenue options would not result in any residential relocations and would have no impact on demographics.

4.3.3 ENVIRONMENTAL JUSTICE

ALTERNATIVE 1 – NO ACTION ALTERNATIVE
Under the No Action Alternative, Oregon Avenue would not be reconstructed, only repaved within DDOT right-of-way, and maintenance activities would occur as with existing conditions. No impacts to low-income or minority populations would occur under the No Action Alternative.

ALTERNATIVES 2, 3, AND 4
The Candidate Build Alternatives would not result in impacts to low-income or minority populations. To ensure minority populations were afforded the opportunity to participate during the public scoping and alternatives development period, advertisements were placed in several area newspapers, including The Current Newspaper and El Tiempo Latino Spanish newspaper, and postings were made to the surrounding communities’ and ANC listservs, as well as the project website. A contact was provided with each advertisement for individuals to request special assistance or translation services during the meetings, and English and Spanish versions of meeting handouts were available at each public meeting or upon request (please see the Public Involvement section of this EA).

OPTIONS
The Oregon Avenue options would have no impact to low-income or minority populations.

4.3.4 ECONOMICS AND DEVELOPMENT

ALTERNATIVE 1 – NO ACTION ALTERNATIVE
Under the No Action Alternative, Oregon Avenue would not be reconstructed, only repaved. No impact would occur to existing economics and development.
**Alternatives 2, 3, and 4**

The Candidate Build Alternatives would not change employment or development in the project area. Minimal employment opportunities and some related revenues would result from the construction of the proposed project. While construction activities have the potential to be beneficial, the relatively small scope of the project makes economic impacts negligible and short-term in nature.

**Options**

The Oregon Avenue options would have negligible benefits to economics and development during construction due to the relatively small scope and short duration of the project.

**4.3.5 Joint Development**

**Alternatives 1, 2, 3, and 4 / Options**

The No Action Alternative, Candidate Build Alternatives, and project options would have no impact on joint development, since there are no proposed or existing joint developments within or surrounding the project area.

**4.3.6 Aesthetics and Visual Quality**

NEPA requires the examination of environmental impacts of a Federal project including those associated with the visual and aesthetic quality of a project area.

**Alternative 1 – No Action Alternative**

Oregon Avenue has been damaged by the forces of uncontrolled stormwater, which has resulted in significant pavement damage and erosion. Under the No Action Alternative, there would be no major changes to the existing visual quality of the project area; however, unchecked stormwater would continue to cause erosion, affecting the existing roadbed, slopes, and vegetation, resulting in a minor, long-term impact on visual quality due to stormwater damage.

**Alternatives 2, 3, and 4**

Although preservation of the area would be a benefit of reconstruction, the new design would have moderate, adverse effects to the local aesthetics and visual quality of the Oregon Avenue corridor. All alternatives would alter the setting of the corridor by the addition of a sidewalk, curbs and gutters, and a retaining wall in some places, creating a more urban atmosphere.

The rural atmosphere in the neighborhoods bordering the park will be preserved through context-sensitive design, the stabilization of the adjacent streams, and improvement of stormwater management. Stormwater management facilities would protect the scenic quality of this area from further erosion and degradation due to unchecked stormwater, allow for riparian vegetation to reestablish, and increase vegetated elements. Designs for this project will take into consideration the bucolic setting of the project area and strive to maintain the existing neighborhood atmosphere and may include: graded curbs, stone facing, and stamped concrete, native tree, and vegetation plantings.
OPTIONS

Option A Traffic Calming measures would detract from the bucolic setting of the corridor by incorporating urban elements resulting in minor, long-term, adverse effects to the local area.

Option B Nebraska Avenue built as a four-way intersection would preserve the rural setting of the corridor. Circular elements are generally more associated with urban settings.

Option C Stormwater Management systems incorporating vegetative areas such as swales or bioretention facilities would maintain the rural setting of the corridor by adding natural vegetative elements and habitat more indicative of rural settings. Infiltration systems would be underground and have no visual impact other than for access covers.

Option D Pinehurst Run Crossing options could all be planned to preserve the rural setting of the corridor by using context sensitive designs and material choices. DDOT would apply context sensitive design elements to blend in with the natural setting of Rock Creek Park. In addition, restoration of Pinehurst Run in locations where there is visible vegetation damage, erosion, and/or debris would increase the visual quality of the project area.

SCENIC EASEMENTS

ALTERNATIVES 1, 2, 3, AND 4 / OPTIONS

Oregon Avenue is not located within viewing distance of the nearby NPS scenic easements due to separation by the forested area within Pinehurst Parkway Park; therefore, none of the alternatives or options are anticipated to have any effect on scenic easements.

4.3.7 HEALTH AND SAFETY

ALTERNATIVE 1 – NO ACTION ALTERNATIVE

Under this alternative, no improvements would be made, and Oregon Avenue would continue to have inadequate facilities for pedestrian and non-motorized vehicle use. Lack of appropriate lighting, sidewalks, bus stop facilities, marked crossings, speeding vehicles, and a narrow winding roadway with poor sight distances would remain, generating unsafe passage for pedestrians and bicyclists. Drainage issues would remain, causing ice slicks at crossings in the winter, unsafe footing for pedestrians, and ponding on the roadway in warmer weather, which makes it difficult for cars to stop.

Under the No Action Alternative, the project area facilities would remain inadequate, posing a continued risk to public safety and resulting in moderate, adverse, local, long-term effects.

CANDIDATE BUILD ALTERNATIVES

Under all the build alternatives this project would have moderate, beneficial, local, long-term effects as public safety would improve over existing conditions with the addition of designated non-motorized infrastructure, repair of degraded facilities, improved lighting, stormwater facilities, and marked pedestrian crossings.
ALTERNATIVE 2
Construction of a sidewalk will create safer conditions for pedestrians who currently share the narrow roadway with motorized traffic. With this option, bicyclists would continue to share the narrow roadway with motorized vehicles without a dedicated bike lane.

ALTERNATIVE 3
Under this alternative bicyclists and pedestrians would share a wide trail, which would allow for both to remain separate from motorized traffic.

ALTERNATIVE 4
Construction of a sidewalk will create safer conditions to pedestrians who currently share the avenue with motorized traffic. With this option, bicyclists would continue to share the roadway with motorized vehicles; however, the pavement would be extended and bike lanes would be added in either direction.

OPTIONS
Option A Traffic Calming would provide for safer interaction between motorized and non-motorized users and would encourage motorized users to follow the posted speed limits.

Option B Nebraska Avenue built as a circle would provide the added benefit of traffic calming and reduction in accident severity.

Option C Stormwater Management options will provide stormwater management, which will eliminate the current ponding and icing conditions on the roadway. This element will also reduce erosion, which causes the deterioration of infrastructure. Continued periodic maintenance will prevent impacts from the infiltration systems.

Option D Pinehurst Run Crossing options will upgrade the existing facility by replacing broken guard rails and cracked pavement and will provide additional facilities for non-motorized users.

4.3.8 COMMUNITY RESOURCES

ALTERNATIVE 1 – NO ACTION ALTERNATIVE

EMERGENCY SERVICES
The No Action Alternative would have no impact on emergency services in the general project vicinity.

SCHOOLS
The No Action Alternative would have moderate, long-term, adverse effects to schools in the study area, including St. John’s College High School, from the lack of pedestrian and bicycle facilities providing access.

PARKS AND RECREATION AREAS
The No Action Alternative would have no direct impact on NPS land. However, continued lack of maintenance of the project area would induce indirect impacts on the natural and biological
resources of NPS lands. Erosion and sedimentation would gradually worsen as the road structure deteriorates, causing continued sedimentation and debris. The No Action Alternative would result in moderate long-term indirect impacts to NPS land, natural and biological resources, and the water quality of waterways if the roadway is left in its current state and maintenance/clean-up is not performed.

**Alternatives 2, 3, and 4**

During construction, all alternatives would result in minor, short-term, local, adverse effects to community resources including schools, emergency service, and local parks and recreation areas. Although there are many alternative routes that could be used, access via Oregon Avenue during construction would be limited.

Access for motorized vehicles would improve with the upgrade of facilities and improved safety resulting from stormwater management and improved roadway engineering. Maintenance and operational activities would remain essentially unchanged. Project work should be planned and scheduled to allow for the least disruption of road and park use and coordinated with park staff to identify any concerns.

**Emergency Services**

Access for motorized vehicles would improve with the upgrade of facilities and improved safety resulting from stormwater management.

**Schools**

Build Alternatives would have moderate, long-term, beneficial effects to schools in the study area, including St. John’s College High School. In accordance with the Districts “Safe Routes to Schools” program, this project would improve safety for students who walk or bike to school with the addition of a sidewalk or shared-use trail.

**Parks and Recreation Areas**

This project would have moderate, long-term, beneficial effects to NPS land. All alternatives would provide for safer access to community resources by the addition of non-motorized facilities. Alternatives will include the consideration of a sidewalk and crosswalks that would allow for safer access to trail and park facilities.

**Options**

None of the options would alter access to community resources.

**4.3.9 Utilities and Infrastructure**

Impacts to utilities and other infrastructure were assessed through coordination with various utilities companies to determine existing infrastructure and utility demands. Utility coordination would continue into the design phase of the project.

**Alternative 1 – No Action Alternative**

Under the No Action Alternative, existing utilities, including water and sewer lines, Washington Gas lines, PEPCO overhead and underground electric lines, DC Street lighting,
Verizon overhead and underground communication lines, Comcast overhead and underground cable lines, and their house service connections, would not be impacted as the roadway work would be limited to routine maintenance. This work would include milling and resurfacing of pavement areas with minor base repair depending upon the subsurface condition encountered.

**ALTERNATIVES 2, 3, AND 4 / OPTIONS**

During construction of the Candidate Build Alternatives, existing utilities on Oregon Avenue such as those that run under Oregon Avenue pavement and parallel to or across Oregon Avenue would have to be considered. Continuous coordination with utility companies during design and construction would be required to avoid utilities conflict as much as possible, and the contractor would be required to contact Miss Utility to identify and mark all utilities prior to earth disturbance activities. The estimated extent of utility relocations for each of the Candidate Build Alternatives is presented in Table 4-5.

**Table 4-5. Utility Relocations**

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>WATERMAIN (LINEAR FEET)</th>
<th>SANITARY SEWER (LINEAR FEET)</th>
<th>ELECTRICITY AND COMMUNICATIONS (LINEAR FEET)</th>
<th>GAS (LINEAR FEET)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1,100</td>
<td>1,250</td>
<td>5,500</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>4,900</td>
<td>2,750</td>
<td>7,500</td>
<td>500</td>
</tr>
<tr>
<td>4</td>
<td>4,900</td>
<td>2,750</td>
<td>7,500</td>
<td>3,000</td>
</tr>
</tbody>
</table>

**4.4 TRANSPORTATION**

Potential impacts on the transportation system elements – bicycle and pedestrian facilities, the roadway network, and transit services – are discussed in the subsections below.

**4.4.1 BICYCLE AND PEDESTRIAN NETWORK**

**ALTERNATIVE 1 – NO ACTION ALTERNATIVE**

Under the No Action Alternative, DDOT would not reconstruct Oregon Avenue. The roadway would be repaved but infrastructure would remain deteriorated and damage from stormwater runoff would continue unabated. The No Action Alternative would have minor long-term regional impacts to the pedestrian and bicycle network because of the lack of facilities to serve those users of the roadway.

**ALTERNATIVES 2, 3, AND 4**

Under Alternatives 2, 3, and 4, DDOT would reconstruct the existing roadway with appropriate stormwater management systems; provide facilities for motorists, pedestrians, and bicyclists; and improve linkages with respect to serving pedestrian and bicycle travel.

During construction, temporary disruption could occur to pedestrians and cyclists using Oregon Avenue; however, in general, alternative routes, including the Pinehurst Trail in Rock Creek Park, are available and would minimize travel impacts.
Options

Option A Traffic Calming would provide for safer interaction between motorized and non-motorized users and would encourage motorized users to follow the posted speed limits.

Option B Nebraska Avenue built as a circle reduces vehicle speeds on the approaches to the intersection, thereby creating a safer environment for cyclists and pedestrians.

Options C (Stormwater Management) and D (Pinehurst Run Crossing) will have no additional impact on pedestrian and cyclist facilities.

4.4.2 Road Network

Alternative 1 – No Action Alternative

Under the No Action Alternative, DDOT would not reconstruct Oregon Avenue. The roadway would be resurfaced, resulting in minor improvements to the driving surface, and the potential to hydroplane due to surface water in tire ruts would be eliminated in the short term. Improvements from a resurfacing project would be expected to last about two years. Without reconstruction of the sub-grade, it is anticipated that the driving surface would deteriorate again within a short time frame.

Alternatives 2, 3, and 4

Under Alternatives 2, 3, and 4, DDOT would reconstruct the roadway within the existing transportation right-of-way. The roadway would be excavated to a depth of approximately three feet and then reconstructed with appropriate material. Minor changes to the alignment and profile would be made to improve sight distances. It is anticipated that an alignment that meets the requirements of a 25 mph design speed can be achieved throughout the full length of the corridor with minor grading changes to adjacent properties. During reconstruction of the road and stormwater management infrastructure, short-term, temporary impacts would occur on the local streets due to truck traffic generated by construction activities. Specifically, the contractor would have to remove and haul the existing concrete, asphalt, and other materials by dump truck and would be required to deliver clean fill, asphalt or concrete, and other construction materials. It is anticipated that construction access could be provided via either Western Avenue or Military Road. DDOT would prepare a maintenance of traffic plan that would identify routes to be used by the contractor to minimize traffic impacts and disruption to residential areas and parkland.

Due to the limited right of way and narrow roadway, portions of Oregon Avenue would be closed to all but local and emergency vehicle traffic during construction. Therefore, in order to minimize impacts, it is recommended that reconstruction occur in three phases, as presented in Table 4-6. Potential detour plans during each phase of construction are described in Appendix D.

Table 4-6. Construction Phasing / Maintenance of Traffic

<table>
<thead>
<tr>
<th>PHASE</th>
<th>LOCATION</th>
<th>CONSTRUCTION DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nebraska Avenue/Bingham Drive to Chestnut Street/Wise Road</td>
<td>6 – 9 months</td>
</tr>
<tr>
<td>2</td>
<td>Chestnut Street/Wise Road to Western Avenue</td>
<td>3 – 6 months</td>
</tr>
<tr>
<td>3</td>
<td>Military Road to Nebraska Avenue/Bingham Drive</td>
<td>3 – 6 months</td>
</tr>
</tbody>
</table>
Although Alternatives 2, 3, and 4 would have minor short-term impacts because of temporary traffic delays and congestion during the transport and delivery of construction materials, no long-term impacts are expected on the roadway network with the reconstruction of Oregon Avenue. Once reconstructed, Oregon Avenue will have a superior travel surface and will function as it has in the past.

Year 2030 forecasts show that traffic volumes are expected to remain at current levels with the exception of increased commuter traffic during the peak periods. Projected traffic volumes for 2030 are shown in Figure 4-1. With this increase in traffic, the level of service at the Wise Road intersection will drop to F in the AM peak hour (see Table 4-7). The addition of a dedicated left-turn lane would raise the level of service to acceptable levels; however, its construction is not recommended as it may encourage additional “cut through” traffic. Instead, the use of traffic calming techniques is recommended to control speeds and minimize commuter and through traffic.

**Options**

**Option A Traffic Calming** controls travel speeds of motorists, thereby providing for safer interaction between motorized and non-motorized users.

**Option B Nebraska Avenue** built as a circle would provide the added benefit of traffic calming and reduction in accident severity by minimizing “T” collisions.

**Options C (Stormwater Management) and D (Pinehurst Run Crossing) will have no additional impact on the roadway network.**

### 4.4.3 Transit

**Alternative 1 – No Action Alternative**

The No Action Alternative would have no impact on transit operations or the public’s ability to use transit in the study area. WMATA’s Metrobus E-6 route would continue to service the project area.

**Alternatives 2, 3, and 4**

Improved pedestrian facilities will result in a long-term benefit to bus service along Oregon Avenue.

During construction of Alternatives 2, 3, and 4, bus service would be disrupted during Phases 1 and 2. DDOT will work with WMATA during design of the selected alternative to develop service plans for each phase of construction. During Phase 1, service could be maintained in the

<table>
<thead>
<tr>
<th>INTERSECTION WITH OREGON AVENUE</th>
<th>PEAK HOUR*</th>
<th>EXISTING</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Military Road</td>
<td>AM</td>
<td>E</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>D</td>
<td>D</td>
</tr>
<tr>
<td>Nebraska Avenue/ Bingham Drive</td>
<td>AM</td>
<td>C</td>
<td>D</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Chestnut Street/Wise Road</td>
<td>AM</td>
<td>E</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>PM</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>

* AM Peak Hour between 7:30 and 8:30 AM; PM Peak Hour between 5:30 and 6:30 PM.
Figure 4-1. 2030 Traffic Volumes
north end of the corridor by rerouting the bus along Chestnut Street to return to Western Avenue without traveling south along Oregon Avenue to Knollwood. Service to Knollwood may be possible from Western Avenue via Tennyson Street to Oregon Avenue. Provision to allow the buses to traverse the short section of Oregon Avenue between Tennyson Street and Knollwood would be required. Use of shuttle bus to provide service to Knollwood to and from the Friendship Heights Metro Station will also be explored.

During Phase 2, Route E-6 service could be provided by rerouting the line to Chestnut Street for the inbound trip.

**OPTIONS**

**Option A Traffic Calming** controls vehicle speeds and improves safety for boarding and alighting passengers.

**Option B Nebraska Avenue** built as a four-way stop or traffic circle does not impact transit as transit services do not travel along Nebraska Avenue.

**Options C (Stormwater Management) and D (Pinehurst Run Crossing)** will have no additional impacts on transit service.

### 4.5 AIR QUALITY

Impacts to air quality can generally occur in three ways: 1) by raising the vehicle emission levels near a project site through an increase in vehicular traffic; 2) by introducing new stationary sources, such as the case with development; and 3) through the generation of airborne dust from construction activities. The Oregon Avenue project is not anticipated to impact air quality with respect to either of the first two ways. As explained below, air quality impacts due to construction will be temporary.

**ALTERNATIVE 1 – NO ACTION ALTERNATIVE**

Under the No Action Alternative, Oregon Avenue would remain in its current state. Therefore, this alternative would have no impact to air quality.

**ALTERNATIVES 2, 3, AND 4 / OPTIONS**

**Project-Level CO Conformity**

The District is currently in maintenance for the CO air quality standard. However, under 40 CFR § 93.126 and as noted in Section 3.5.2, the Oregon Avenue project is exempt from air quality conformity determination because it is a rehabilitation project.

**Project-level Fine Particulate Matter (PM<sub>2.5</sub>) Conformity**

While the Oregon Avenue project is located within the Washington DC-MD-VA PM<sub>2.5</sub> nonattainment area, the project does not meet the definition of a project of air quality concern according to 40 CFR 93.123(b)(1).
Mobile Source Air Toxics (MSATs)

As noted in Section 3.5.4, the Oregon Avenue project falls into the first category of "Projects with No Meaningful Potential MSATs Effects or Exempt Projects" based on the fact that this project will have “no meaningful impacts on traffic volumes or vehicle mix.” Therefore, no analysis or discussion of MSATs is needed for the project.

Greenhouse Gas (GHG) Impacts

The Oregon Avenue project would not increase roadway capacity and would not increase vehicle emissions or vehicle miles traveled. Therefore, the project would not contribute to an increase in greenhouse gases.

In terms of all of the pollutant categories noted above, it is important to note that implementation of any of the Candidate Build Alternatives would not contribute additional air emissions when compared to the No Action Alternative. This is because traffic volumes, vehicle mix, speeds, and traffic controls would be the same between the No Action Alternative and the Candidate Build Alternatives. There would, therefore, be no impact to air quality for any of the Candidate Build Alternatives or Options.

Construction Impacts

Construction impacts from any of the Candidate Build Alternatives and options would be similar across alternatives and options, would be temporary, and there would be no long-term air quality impacts.

4.6 Noise and Vibration

As described in the District Department of Transportation Noise Policy (January 10, 2011), “the FHWA Noise Standard requires that noise abatement measures be considered when traffic noise impacts are identified for Type I Federal projects.” The definitions of project types for purposes of noise analysis and abatement, as indicated by Highway Traffic Noise: Analysis and Abatement Guidance, Federal Highway Administration, June 2010 (Revised January 2011), is provided below.

Type I Project: The following projects are considered Type 1 projects:

1. The construction of a highway on new location; or,
2. The physical alteration of an existing highway where there is either:
   i. Substantial Horizontal Alteration. A project that halves the distance between the traffic noise source and the closest receptor between the existing condition to the future build condition; or,
   ii. Substantial Vertical Alteration. A project that removes shielding, therefore exposing the line-of-sight between the receptor and the traffic noise source. This is done by either altering the vertical alignment of the highway or by altering the topography between the highway traffic noise source and the receptor; or,
3. The addition of a through-traffic lane(s). This includes the addition of a through-traffic lane that functions as a HOV lane, High-Occupancy Toll (HOT) lane, bus lane, or truck climbing lane; or,
4. The addition of an auxiliary lane, except for when the auxiliary lane is a turn lane; or,
5. The addition or relocation of interchange lanes or ramps added to a quadrant to complete an existing partial interchange; or,
6. Restripping existing pavement for the purpose of adding a through-traffic lane or an auxiliary lane; or,
7. The addition of a new or substantial alteration of a weigh station, rest stop, ride-share lot, or toll plaza.

**Type II Project:** A Federal or Federal-aid highway project for noise abatement on an existing highway. For a Type II project to be eligible for Federal-aid funding, the highway agency must develop and implement a Type II program in accordance with section 772.7(e). [Note: DDOT does not currently have a Type II program.]

**Type III Project:** A Federal or Federal-aid highway project that does not meet the classifications of a Type I or Type II project. Type III projects do not require a noise analysis.

The proposed improvements to Oregon Avenue will take place along the existing alignment of the road and will not add lanes or increase capacity. Alterations to the horizontal and vertical alignment of the roadway will not be substantial based on the definitions included for a Type I project. Therefore, the Oregon Avenue project is classified as a Type III project that does not require a noise analysis (note that, at this time, DDOT does not have a Type II program).

As noted in Chapter 3, the Oregon Avenue project is located in an area with sensitive land uses, including a mix of residential, park, and education (institutional) land uses, which can be categorized as Activity Category B based on Noise Abatement Criteria. Current noise levels in the project area range from 55 to 62 decibels (dBA), which do not approach or exceed the FHWA noise abatement criteria (NAC) of 67 dBA. None of the Candidate Build Alternatives are anticipated to change traffic volumes, speeds, or vehicle mix as compared to the No Action Alternative.

**ALTERNATIVE 1 – NO ACTION ALTERNATIVE**

No new noise sources would be created in the Oregon Avenue project area as a result of the No Action Alternative; therefore, impacts to the existing noise and vibration levels are not expected to occur.

**ALTERNATIVES 2, 3, AND 4 / OPTIONS**

All of the Candidate Build Alternatives and options would have a short-term impact to noise and vibration levels in the study area during the construction phase. The length and degree of noise impacts associated with construction activities would vary and would be caused by activities associated with removal of the existing infrastructure and reconstruction of the roadway and stormwater management facilities. However, these noise impacts would be
Environmental Consequences

temporary and could be minimized by implementing Best Management Practices (BMPs), such as time restrictions, during construction.

No appreciable impacts to noise and vibration would occur from implementation of the Candidate Build Alternatives and options because, as noted above, they would not increase traffic or change the vehicle mix, speeds, or traffic controls.

4.7 HAZARDOUS WASTE AND MATERIALS

ALTERNATIVE 1 – NO ACTION ALTERNATIVE

Based on a review of available data and site inspection, no evidence of recognized environmental concerns was identified within the project area. Therefore, there would be no impact from Hazardous Wastes/Materials under the No Action Alternative.

ALTERNATIVES 2, 3, AND 4

Based on a review of available data and site inspection, no evidence of recognized environmental concerns was identified within the project area. Although it is unlikely, undocumented hazardous materials could be uncovered during construction. If contaminated soils, water, or other hazardous materials are discovered, construction should stop and the situation assessed by the contract officer. The notification of appropriate authorities, including coordination with the DDOE, and proper removal, disposal, treatment, and/or remediation of the material should be evaluated and suitable measures taken, as necessary.

In order to address any potential risk to public safety, the contractor for the proposed construction will prepare and implement a plan for management and disposal of controlled hazardous materials and contaminated soil and groundwater that may be encountered during construction activities, as defined in DC Department of Transportation Design and Engineering Manual, Chapter 4.11 (Hazardous Waste and Materials/Contaminated Soils).

No adverse effects due to hazardous materials are anticipated and no additional coordination will be required.

OPTIONS

Impacts from hazardous materials/wastes under all options would be the same as under Alternatives 2, 3, and 4.

4.8 ENERGY CONSERVATION

ALTERNATIVE 1 – NO ACTION ALTERNATIVE

Currently there are no energy conservation measures being conducted along the alignment. Under this alternative no changes would be made to the project area; however, routine pavement maintenance would continue. Therefore, there would be no effect on energy conservation.

ALTERNATIVES 2, 3, AND 4

One of the largest energy consumers for urbanized areas is water treatment. Utilizing natural stormwater management in the form of bioswales and rain gardens to reduce the load on
natural infiltration storm sewer systems will reduce the load to water treatment facilities. Adding stormwater facilities to an area that previously lacked these resources will reduce the need for maintenance and therefore energy consumption.

Lighting options to improve the safety of this corridor are being considered. Using energy efficient lighting would reduce energy consumption in the corridor while improving safety.

**OPTIONS**

**Options A (Traffic Calming) and D (Pinehurst Run Crossing)** would have no effect on energy conservation in this project.

**Option B Nebraska Avenue** built as a four-way intersection instead of a circle would allow for a greater area that could be used for bioretention and would decrease the need for lighting as a smaller area would be in use.

**Option C Stormwater Management** using the option of an open system with ditches and on-site and off-site bioretention areas would increase stormwater treatment capacity, allowing for less strain on stormwater infrastructure and increased energy conservation due to lower maintenance.

### 4.9 Indirect and Cumulative Effects

**Indirect effects** are those that may be caused by the proposed action but occur later in time or farther in distance than the direct impacts discussed elsewhere in this document. The most common indirect effects associated with road and highway projects have to do with induced development, that is, development and the impacts of such development that would not otherwise occur if the project were not constructed. Lands surrounding the proposed project corridor currently can be accessed by the existing road network. As such, they could be subject to development or redevelopment even in the absence of implementation of this project. Much of the land along the west side of the road already is in residential uses and substantial additional development is not expected in the foreseeable future. Land along the east side of the road consists entirely of federal lands owned by the National Park Service as part of Rock Creek Park. As such, it is very unlikely that this land will be developed in the future. Rather, the land will be managed by the National Park Service in accordance with the Park’s General Management Plan to preserve and enhance the recreational and natural and cultural resource protection functions of the Park. The proposed project would not provide any new direct access to adjacent undeveloped lands where access does not currently exist. Furthermore, the proposed improvements will not increase roadway vehicular capacity. Accordingly, no indirect impacts are anticipated. In summary, the proposed project would serve traffic generated by development on adjoining lands and beyond the limits of the project, but would not cause any further such development. Moreover, the project is consistent with local comprehensive planning regarding land use goals in the surrounding area and transportation in the project corridor.

**Cumulative effects** are the incremental effects of an action when added to other past, present, and reasonably foreseeable future actions, regardless of the sponsor of those actions. The assessment of cumulative effects requires an assessment of the impact that past and present
actions have had on the environmental resources in the project area that would also be impacted by the proposed project. The current affected environment is a reflection of the impacts of those past and present actions over time. Additionally, a review of cumulative effects requires an assessment of how reasonably foreseeable future actions may affect the same environmental resources that would be directly affected by the project. Reasonably foreseeable future actions include the following:

- Implementation of the Rock Creek Park General Management Plan by the National Park Service.
- Improvements to Broad Branch Road between Linnean Avenue and Beach Drive (length approximately 1.75 miles) along the western perimeter of Rock Creek Park south of the Oregon Avenue improvements project.

Table 4-8 summarizes the more prominent environmental resources in the project area that would be impacted by the proposed project, the impact that these resources have experienced from past and present actions, the incremental impact expected from the proposed project, identification of potential reasonably foreseeable future actions, and the potential impact that may occur from other reasonably foreseeable future actions in or near the project area.

Despite the dramatic changes in the landscape that have occurred over time due to human settlement in the surrounding area, the intensity of the incremental impacts of the project are considered small, when viewed in the context of impacts from other past, present, and reasonably foreseeable future actions and would not rise to a level that would cause significant cumulative impacts.

**Table 4-8. Summary of Cumulative Effects**

<table>
<thead>
<tr>
<th>ENVIRONMENTAL RESOURCES</th>
<th>IMPACTS FROM PAST AND PRESENT ACTIONS</th>
<th>IMPACT FROM PROPOSED PROJECT</th>
<th>POTENTIAL FUTURE ACTION</th>
<th>POTENTIAL IMPACT ON RESOURCES FROM POTENTIAL FUTURE ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Quality</td>
<td>Decrease in regional air quality as population, industry, and traffic increases, offset by improvements to air quality resulting from increasingly stringent emissions and fuel standards.</td>
<td>No violations of NAAQS; because traffic volumes are low, localized pollutant emissions also are low and contributions to regional pollutant burdens are low.</td>
<td>Continuing development in region, accompanied by increasing regional traffic volumes; construction of other roadway improvements as programmed in the Constrained Long Range Plan.</td>
<td>Continuing improvements in vehicle and fuel technology, and resulting cleaner emissions, anticipated to offset increases in volumes of vehicles on regional travel network and potential impacts from other road improvements.</td>
</tr>
<tr>
<td>Noise</td>
<td>Increase in noise levels as urbanization and traffic increase.</td>
<td>Not a Type 1 project, no noise analysis required. No highway capacity increases and no significant changes in horizontal or vertical alignment.</td>
<td>Continued urbanization with accompanying increases in traffic volumes.</td>
<td>Cumulative effect not significant.</td>
</tr>
<tr>
<td>ENVIRONMENTAL RESOURCES</td>
<td>IMPACTS FROM PAST AND PRESENT ACTIONS</td>
<td>IMPACT FROM PROPOSED PROJECT</td>
<td>POTENTIAL FUTURE ACTION</td>
<td>POTENTIAL IMPACT ON RESOURCES FROM POTENTIAL FUTURE ACTIONS</td>
</tr>
<tr>
<td>-------------------------</td>
<td>---------------------------------------</td>
<td>------------------------------</td>
<td>------------------------</td>
<td>-----------------------------------------------------------</td>
</tr>
<tr>
<td>Waters of the U.S., Including Wetlands</td>
<td>Conversion or culverting of water resources to make way for development; degradation of water quality from urban runoff, impervious surfaces, increased runoff and sediment volumes.</td>
<td>Repair/replacement of drainage structures and other construction would cause temporary siltation during construction, which would be minimized through implementation of best management practices and stormwater management measures. Long-term improvements to receiving waters are expected as a result of the proposed stormwater management elements included.</td>
<td>Additional impervious surfaces and conversion of resources for growing urban area; long-term water quality effects could occur as a result of increased impervious surface; spills from vehicles; an increase in non-point source pollutants from asphalt, grease, oil, metals, nutrients, nitrogen, deicing salts, roadside vegetation management chemicals, and suspended solids and other elements associated with roadways. Implementation of Rock Creek Park General Management Plan by National Park Service will include elements to improve water quality in Rock Creek and tributaries.</td>
<td>Adverse effects offset by enforcement of stormwater management, erosion and sediment controls, and water quality permitting requirements under local and federal laws, including compensation requirements; cumulative effect not substantial.</td>
</tr>
<tr>
<td>Terrestrial and Aquatic Habitat and Wildlife</td>
<td>Conversion of wildlife habitat to other uses, and degradation of remaining habitat from urban impacts and fragmentation. Preservation of wildlife habitat in Rock Creek Park.</td>
<td>Minor impacts to vegetated areas that border the roadway as part of construction activities.</td>
<td>Continued urbanization and population growth. Implementation of Rock Creek Park General Management Plan by National Park Service will include elements to preserve and enhance wildlife habitat in Rock Creek Park.</td>
<td>Potential further degradation of remaining habitat due to urban influences, offset by preservation/enhancement activities in Rock Creek Park; cumulative effect not substantial.</td>
</tr>
<tr>
<td>Rock Creek Park</td>
<td>Minor impacts from in-park infrastructure (roads, trails, recreational and maintenance facilities. Minor impacts from other nearby projects, such as Broad Branch Road Improvements.</td>
<td>No direct use of Park lands for project right-of-way; minor visual impacts, particularly during the construction period. Stormwater management elements will reduce severe erosion and sedimentation occurring in streams within the park.</td>
<td>Implementation of Rock Creek Park General Management Plan by National Park Service will continue to preserve and protect Park resources.</td>
<td>Implementation of Rock Creek Park General Management Plan by National Park Service will continue to preserve and protect Park resources.</td>
</tr>
</tbody>
</table>
4.10 PERMITS AND AUTHORIZATIONS

The following resources may require coordination with regulatory agencies and/or permits if they will be affected by the proposed project.

4.10.1 HAZARDOUS MATERIALS SITES

Coordination with the regional Department of Environmental Quality (DEQ) and the District Department of the Environment (DDOE) office is recommended if hazardous substances occur in the construction area to determine permit requirements and appropriate management procedures.

4.10.2 WATER QUALITY

Section 402 of the Clean Water Act (33 U.S.C. 1344) regulates the discharge from any point source into the waters of the US and requires a permit from the US EPA. Activities that would require a permit include construction dewatering operations associated with activities such as utility excavation, culvert or bridge pier installation, trench digging, or other subsurface activities.

The placement of dredge or fill materials into waters of the US, including wetlands, is regulated under Section 404 of the Clean Water Act and requires a permit from the US Army Corps of Engineers. Construction activities that could require a permit include extended roadway embankments, stream crossings, and culvert rehabilitations. The District Department of the Environment (DDOE) provides the Water Quality Certificate for Section 402 and 404 permits.

In accordance with the District of Columbia Municipal Regulations (DCMR) Title 21-Chapter 5 Water Quality and Pollution, an erosion and sediment control plan is required for 50 square feet of land disturbance and a stormwater management plan is required for 5,000 square feet of land disturbance.

In accordance with the Clean Water Act, work resulting in alteration of, or work within a floodplain, waterway, or tidal or nontidal wetland within the District of Columbia will require a Jurisdictional Determination and Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland from the Maryland Army Corps of Engineers.

4.10.3 TREE REMOVAL

According to DCMR Title 24 – Chapter 37, removal of any tree with a circumference greater than 55 inches, except for tree of heaven (Ailanthus altissima), mulberry (Morus species), and Norway maple (Acer platanoides), requires a Special Tree Removal Permit from the District Department of Transportation Urban Forestry Administration.

Coordination with NPS and a tree survey should be conducted for any work that may have an effect on trees and shrubs with a diameter greater than half an inch within park property. This includes work done outside park property that may cause damage to species within park property (root damage).
4.10.4 Floodplains

In accordance with DCMR Title 20 – Chapter 31 Flood Hazard Rules, a building permit shall be required for all construction and development occurring in an identified floodplain area and a floodplain development plan and study are required.

In accordance with NPS DO 77-2 Floodplain Management, construction within floodplains on NPS land requires authorization from the NPS Water Resources Division.

4.10.5 Park

In accordance with NPS DO 53 Special Park Uses, restoration and stabilization of streams within park property would require a Special Use Permit from the National Park Service.

Coordination with NPS and a tree survey should be conducted for any work that may have an effect on trees and shrubs with a diameter greater than half an inch within park property. This includes work done outside park property that may cause damage to species within park property (root damage).

4.11 Section 4(f) Evaluation

The majority of work for this area will be conducted within the existing right-of-way; however, damage due to erosion from unchecked stormwater has occurred on park land. In an effort to mitigate existing damage and prevent future structural and environmental degradation, DDOT has requested that NPS serve as a cooperating agency. Designs and construction will be coordinated with NPS to develop stormwater management strategies, including the possibility for local stormwater retention and treatment and possible mitigation of eroded stream channels on the eastern (Park) side of Oregon Avenue.

Although work on Park property will be conducted solely for the purpose of mitigating existing damage and preventing future stormwater issues, any permanent use of Park property for right-of-way or easements would invoke Section 4(f) of the U.S. Department of Transportation Act of 1966, as amended. However, if certain criteria are met, the impacts may qualify for a de minimis impact determination. The de minimis criteria include the following:

1. The transportation use of the Section 4(f) resource, together with any impact avoidance, minimization, and mitigation or enhancement measures incorporated into the project, does not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f);

2. The official(s) with jurisdiction over the property are informed of FHWA’s intent to make the de minimis impact finding based on their written concurrence that the project will not adversely affect the activities, features, and attributes that qualify the property for protection under Section 4(f); and

3. The public has been afforded an opportunity to review and comment on the effects of the project on the protected activities, features, and attributes of the Section 4(f) resource.

If no permanent use of Park property is involved, the temporary occupancy of Park land during the construction period would be exempt from the requirements of Section 4(f).
The Land and Water Conservation Fund (LWCF) Program was established in 1965 by the federal government to expand public, outdoor recreation space. Section 6(f) provides matching funds in the form of grants to states or municipalities for acquisition, planning, or improvements to public outdoor recreation space. Any property in which LWCF money was used is considered a 6(f) resource. In the District of Columbia, the District Department of Parks and Recreation (DPR) is the recipient of such funds. A list from NPS of LWCF grants in the DC area does not indicate that any funds were used in the project area.

4.12 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The implementation of the improvements to Oregon Avenue involves a commitment of natural, physical, human, and fiscal resources. Land used in the construction of the improvements is considered an irreversible commitment during the time that the land is used for transportation facilities. Land use within this project area is already used for the roadway and is not anticipated to change from either the maintenance or improvement of this road. If a greater need arises for use of the land or if Oregon Avenue is no longer needed, the land can be converted to another use. At present, there is no reason to believe that such a conversion will ever be necessary or desirable.

Considerable amounts of fossil fuels, labor, and highway construction materials, such as cement, aggregate, asphalt, and steel would be expended for the improvements. Additionally, large amounts of labor and natural resources would be used in the fabrication and preparation of construction materials. These materials are generally not retrievable; however, they are not in short supply and their use would not have an adverse effect on the continued availability of these resources. Any construction would also require a substantial one-time expenditure of local, state, and federal funds that are not retrievable.

The commitment of these resources is based on the concept that residents in the immediate area and the region would benefit from the improved quality of the transportation system. These benefits would consist of improved infrastructure, including roadway pavement and geometrics, stormwater management, and upgraded structures, and separate facilities for pedestrians and bicycles to improve system linkage for pedestrians and bicyclists to parks, schools, and residential areas adjacent to Oregon Avenue and to the Rock Creek Park multi-use trail system.
5 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

5.1 AGENCY COORDINATION

As part of the planning process for the Oregon Avenue EA, DDOT conducted an agency coordination program. This coordination included project scoping, consultation with resource agencies in accordance with Section 7 of the Endangered Species Act (ESA), consultation with the DC Historic Preservation Office (DCHPO) and NPS in accordance with Section 106 of the National Historic Preservation Act (NHPA), and individual meetings.

AGENCY SCOPING

DDOT and FHWA held an Agency Scoping Meeting on October 21, 2010. Agencies in attendance included NPS, DC Water, District Department of the Environment (DDOE), DC Office of Planning (DCOP), and the National Capital Planning Commission (NCPC). The purpose of the meeting was to provide federal and local agencies with an overview of the proposed project as well as solicit their initial thoughts on issues, concerns, and resources within the study area.

AGENCY ALTERNATIVES MEETING

DDOT and FHWA held an Agency Alternatives Meeting on December 1, 2010 to update federal and local agencies on the study’s process and to solicit their input for concept improvements / preliminary alternatives. Agencies in attendance included NPS, DC Water, DDOE, DCOP, NCPC, and the DCHPO. Agency representatives helped construct preliminary alternatives (concepts) by incorporating various improvement elements including roadway segments, bike lanes, sidewalks, and stormwater management facilities (e.g., curb, swales and rain gardens). Concepts developed by agency representatives are illustrated in Appendix A. See Section 2.1 for further details on the concept development process.

DC HISTORIC PRESERVATION OFFICE

The Section 106 process of the NHPA was initiated with the DCHPO on August 11, 2010. DDOT met with the DCHPO on December 8, 2010 to define the Area of Potential Effects (APE). During the meeting, DCHPO was provided an overview of the Oregon Avenue project and informed that DDOT’s objective was to stay within the existing right-of-way.

DCHPO helped identify cultural resources in the project area including: a culvert at Pinehurst Run (DDOT-owned, however, it may have been originally owned/constructed by the US Army Corp of Engineers); NPS Rock Creek Park boundary markers (both modern and historic); concrete post and metal cable guard rails; a brick manhole; concrete wing walls (a water channeling feature); and several archaeological sites in the adjacent Rock Creek Park.
In delineating the APE, factors taken into account included the elements of the proposed action; the existence of buildings, vegetation, and terrain; possible visual concerns in terms of changes to viewshed caused by roadway modifications; audible impacts; and construction activities necessary for the proposed action.

The APE for archeological resources for the Oregon Avenue improvements is basically defined as 50 feet east of the existing right-of-way line on the east side of the road, with the exception of six areas, and the existing right-of-way line on the west side of Oregon Avenue, with the exception of two areas. On the east side, the APE was extended an additional 50 feet by 100 feet (approximately) at each of the six outfall locations. On the west side, at the Pinehurst Run area, the APE was extended an additional 50 feet west of the existing right-of-way and at the intersection with Nebraska Avenue, the APE was expanded to include the recently reconfigured traffic island. The 50-foot wide corridor along the length of the project area east of the existing right-of-way line is NPS land in Rock Creek Park. This APE is considered sufficient to include all proposed repairs or modifications to the seven existing outfalls (six on the east side and one on the west), to incorporate any possible construction staging areas on the east side of the road, and to accommodate any modifications and/or replacement of the box culvert carrying Oregon Avenue over Pinehurst Run that may involve ground disturbing activities. A letter requesting formal concurrence with the APE was sent to the DCHPO on December 21, 2010.

A teleconference was held with DCHPO on February 22, 2011 to follow-up on project activities. DCHPO recommended expanding the APE to the west to include residences facing Oregon Avenue as well as Knollwood. This expanded APE was intended to account for potential visual and audible intrusions to these properties. Revised APE mapping was prepared and submitted to the DCHPO for concurrence on March 9, 2011. DCHPO expanded a portion of this revised APE and DDOT concurred with the revision on March 17, 2011. Surveys and impact assessments included in this EA were based on the revised APE.

**Joint Agency Progress Meetings**

During the course of project planning and NEPA evaluations, DDOT and FHWA conducted a series of regularly scheduled meetings with the NPS and DDOE to ensure continuous input from these two agencies. Each agency provided extensive information on existing conditions within the project area and helped coordinate the roadway improvement with on-going improvements in Rock Creek Park – most notably stormwater management and stream restoration activities.

**5.2 Public Involvement**

DDOT held two public meetings to help inform as well as solicit input from the general public on the proposed project. Numerous methods were employed to publicize the public meetings, including newspaper advertisements in The Current Newspapers and El Tiempo Latino and announcements on the project website at www.OregonAve.com. Postings were also made to the surrounding communities’ and Advisory Neighborhood Commission’s (ANC) listservs and announcements were mailed to adjacent property owners.
DDOT held a Public Scoping Meeting at the Chevy Chase Community Center, 5601 Connecticut Avenue, NW in Washington, DC on October 28, 2010 from 6:30 to 8:30 p.m. The purpose of the open house meeting was to introduce the project and to provide all interested persons the opportunity to provide comments regarding the project. Maps, displays, and background information were available for review at the meeting. Forty-four citizens signed-in at the meeting. Written comments were submitted by nine (9) individuals who attended the meeting and a court reporter documented verbal comments from thirteen (13) citizens.

DDOT held a Public Meeting at the same location on December 2, 2010 from 6:30 to 8:30 p.m. The purpose of this second public meeting was to provide an update on study activities and to afford interested persons an opportunity to provide input towards the development of improvements being considered for the project. Various engineering concepts for reconstruction of the roadway, stormwater management systems, sidewalks, and bikeways were reviewed and discussed at the meeting. Meeting participants were encouraged to provide comments on the design concepts and to work with study team members in creating improvement concepts (employing the same concept building tools used at the Agency Alternatives meeting). Concepts developed by the meeting participants are illustrated in Appendix A). Of the citizens who attended the meeting, 33 signed-in. Written comments were submitted by four (4) individuals at the meeting and a court reporter documented verbal comments from three (3) meeting attendees.

No requests for special assistance or translations were received prior to the meetings. Meeting handouts were available in English and Spanish at both meetings.

Throughout the study, DDOT provided a project website that detailed the project history and current activities associated with the proposed Oregon Avenue EA study. The website provided the public with continuous opportunity to provide comments via e-mail to OregonEA@parsons.com.

**SUMMARY OF COMMENTS RECEIVED**

The following is a summary of the comments received prior to the Public Scoping Meeting via e-mail (6 e-mails); at the meeting by way of written (9) and oral (13) comments; and in e-mails immediately following the meeting (4 e-mails):

<table>
<thead>
<tr>
<th>COMMENT</th>
<th>NUMBER OF COMMENTS (IF MORE THAN 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construct storm drains or implement other means to collect stormwater runoff</td>
<td>20</td>
</tr>
<tr>
<td>Provide sidewalks along Oregon Avenue</td>
<td>20</td>
</tr>
<tr>
<td>Make the roadway safer for pedestrians</td>
<td>7</td>
</tr>
<tr>
<td>Repave and rehabilitate roadway</td>
<td>4</td>
</tr>
<tr>
<td>Remove debris and garbage along Rock Creek Park side of roadway</td>
<td>3</td>
</tr>
<tr>
<td>Do not provide sidewalks along Oregon Avenue</td>
<td>3</td>
</tr>
<tr>
<td>Reduce speed of traffic</td>
<td>3</td>
</tr>
<tr>
<td>Install curb and gutter along the roadway</td>
<td>2</td>
</tr>
<tr>
<td>Repair both the roadway and bridge at Beech Street</td>
<td>2</td>
</tr>
<tr>
<td>COMMENT</td>
<td>NUMBER OF COMMENTS (IF MORE THAN 1)</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------------------------------</td>
</tr>
<tr>
<td>Bury all utility lines</td>
<td>2</td>
</tr>
<tr>
<td>Concerned about high volume of traffic on roadway</td>
<td>2</td>
</tr>
<tr>
<td>Evaluate impact of runoff on historic properties within Rock Creek Park.</td>
<td></td>
</tr>
<tr>
<td>Improve lighting</td>
<td></td>
</tr>
<tr>
<td>Repair Pinehurst Creek Bridge</td>
<td></td>
</tr>
<tr>
<td>Provide more stop signs along the roadway</td>
<td></td>
</tr>
<tr>
<td>Remove stop signs along the roadway</td>
<td></td>
</tr>
<tr>
<td>Remove emergency snow route designation</td>
<td></td>
</tr>
<tr>
<td>Provide parking along roadway</td>
<td></td>
</tr>
<tr>
<td>Speeding is not a concern – no speed bumps</td>
<td></td>
</tr>
<tr>
<td>Improve signage at Nebraska Avenue/Bingham Drive intersection</td>
<td></td>
</tr>
<tr>
<td>Provide bike lanes</td>
<td></td>
</tr>
</tbody>
</table>

The following is a summary of the written (4) and oral (3) comments received at the December 2, 2010 Alternatives Public Meeting and the e-mails received following the meeting (6 e-mails):

<table>
<thead>
<tr>
<th>COMMENT</th>
<th>NUMBER OF COMMENTS (IF MORE THAN 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correct drainage problems</td>
<td>7</td>
</tr>
<tr>
<td>Make the roadway safer for bicyclists and pedestrians</td>
<td>4</td>
</tr>
<tr>
<td>Opposed to sidewalks on either side of Oregon Avenue</td>
<td>4</td>
</tr>
<tr>
<td>Provide sidewalks along Oregon Avenue</td>
<td>3</td>
</tr>
<tr>
<td>Repave and rehabilitate roadway</td>
<td>3</td>
</tr>
<tr>
<td>Opposed to taking lands to widen traffic lanes</td>
<td></td>
</tr>
<tr>
<td>Opposed to bike lanes</td>
<td></td>
</tr>
<tr>
<td>Concern over lengthy construction period and impacts associated with</td>
<td></td>
</tr>
<tr>
<td>noise and construction vehicle traffic</td>
<td></td>
</tr>
<tr>
<td>Provide aesthetically-pleasing curbs</td>
<td></td>
</tr>
<tr>
<td>Implement traffic calming methods to control speeding</td>
<td></td>
</tr>
<tr>
<td>Improve bicycle and pedestrian safety – including dedicated bikeways</td>
<td></td>
</tr>
<tr>
<td>and sidewalks</td>
<td></td>
</tr>
<tr>
<td>Add a crosswalk at Nebraska Avenue and Bingham Drive</td>
<td></td>
</tr>
<tr>
<td>Convert some of the trails to bike paths</td>
<td></td>
</tr>
<tr>
<td>Consider long-term solutions</td>
<td></td>
</tr>
<tr>
<td>Eliminate stop signs and widen roadway at congested locations, i.e.,</td>
<td></td>
</tr>
<tr>
<td>Oregon Avenue/Military Road</td>
<td></td>
</tr>
<tr>
<td>Mixed opinions on the study schedule – some indicated it is moving too</td>
<td></td>
</tr>
<tr>
<td>fast while others suggest it is too slow</td>
<td></td>
</tr>
</tbody>
</table>
# LIST OF PREPARERS

## District Department of Transportation
### Planning Policy and Sustainability Administration
55 M Street, SE
Washington, DC 20003

- Faisal Hameed, Environmental Manager
- Saadat Khan, Environmental Policy Analyst
- Anna Chamberlain, Project Planner
- Jim Sebastian, Bicycle Planner

## Infrastructure Project Management Administration
55 M Street, SE
Washington, DC 20003

- Wayne Wilson, Project Manager

## Federal Highway Administration
### District of Columbia Division
1990 K Street, N.W. Suite 510
Washington, DC 20006

- Michael Hicks, Environmental Engineer

## Parsons Transportation Group
100 M Street, SE
Washington, DC 20003

<table>
<thead>
<tr>
<th>NAME</th>
<th>Education and Experience</th>
<th>Project Role</th>
</tr>
</thead>
</table>
| Stephen Walter | M.S. Environmental Studies  
                  University of New Haven, 1985  
                  B.S. Environmental Conservation  
                  Virginia Polytechnic Institute & State University 1976  
                  34 years of experience in environmental/transportation planning and NEPA documentation. | Project Manager    |
<table>
<thead>
<tr>
<th>NAME</th>
<th>EDUCATION AND EXPERIENCE</th>
<th>PROJECT ROLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jim Curren</td>
<td>M. Eng. Project Management University of Calgary, 1990</td>
<td>Task Manager - Traffic and Transportation</td>
</tr>
<tr>
<td></td>
<td>B. Eng. Civil Engineering Technical University of Nova Scotia, 1979</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. Sc. Engineering, Dalhousie University, 1976</td>
<td></td>
</tr>
<tr>
<td></td>
<td>35 years of experience in engineering and transportation.</td>
<td></td>
</tr>
<tr>
<td>Joseph Springer</td>
<td>Masters Degree Program in Urban Planning University of Virginia, 1985-1986</td>
<td>Transportation Analysis; Air and Noise Analysis</td>
</tr>
<tr>
<td></td>
<td>Bachelor of Arts English and Art History College of William and Mary, 1984</td>
<td></td>
</tr>
<tr>
<td></td>
<td>26 years of experience in environmental/transportation planning and air/noise analysis.</td>
<td></td>
</tr>
<tr>
<td>Prakash Patel</td>
<td>B.S. Civil Engineering BVM (Birla Vishvakarma Mahavidyalaya), India, 1977</td>
<td>Task Manager – Alternatives Development and</td>
</tr>
<tr>
<td></td>
<td>33 years of experience in roadway, utilities, grading, and drainage design.</td>
<td>Preliminary Engineering</td>
</tr>
<tr>
<td>Robert Reed</td>
<td>M.E. Engineering Rensselaer Polytechnic Institute, 1973</td>
<td>Alternatives Development and Preliminary</td>
</tr>
<tr>
<td></td>
<td>B.S. Civil Engineering Rensselaer Polytechnic Institute, 1972</td>
<td>Engineering</td>
</tr>
<tr>
<td></td>
<td>39 years of experience in civil engineering and design.</td>
<td></td>
</tr>
<tr>
<td>Oscar Garcia</td>
<td>M.S. Engineering University of Florida, 2002</td>
<td>Alternatives Development and Preliminary</td>
</tr>
<tr>
<td></td>
<td>B.S. Civil Engineering Universidad Javeriana, Bogota-Colombia, 1999</td>
<td>Engineering</td>
</tr>
<tr>
<td></td>
<td>8 years of experience in roadway design.</td>
<td></td>
</tr>
<tr>
<td>Surbhi Ashton</td>
<td>M.S. Civil Engineering University of Virginia, 1994</td>
<td>Task Manager – NEPA Document</td>
</tr>
<tr>
<td></td>
<td>B.S. Civil Engineering University of Virginia, 1992</td>
<td></td>
</tr>
<tr>
<td></td>
<td>19 years of experience in environmental/transportation planning and NEPA documentation.</td>
<td></td>
</tr>
<tr>
<td>Stuart Tyler</td>
<td>M.S. Civil Engineering University of Virginia, 1981</td>
<td>Section 4(f); Indirect and Cumulative Impact</td>
</tr>
<tr>
<td></td>
<td>B.A. Environmental Science University of Virginia, 1976</td>
<td>Analysis</td>
</tr>
<tr>
<td></td>
<td>33 years of experience in environmental/transportation planning and NEPA documentation.</td>
<td></td>
</tr>
<tr>
<td>NAME</td>
<td>EDUCATION AND EXPERIENCE</td>
<td>PROJECT ROLE</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Jeremy Watson</td>
<td>M.S. Urban &amp; Regional Planning Virginia Polytechnic Institute &amp; State University, 2011 B.S. Civil Engineering University of Florida, 2008 3 years of experience in transportation engineering and planning.</td>
<td>Air, Noise and Energy Analysis</td>
</tr>
<tr>
<td>Rebecca Chojnacki</td>
<td>B.S. Biotechnology and Biology University of Wisconsin, 2004 5 years of experience as an environmental scientist/natural resources field biologist.</td>
<td>Natural Resource Analysis</td>
</tr>
<tr>
<td>Rachael Mangum</td>
<td>M.A. Anthropology George Washington University, 2008 B.A. Anthropology Wake Forest University, 1997 11 years of experience in cultural resource analysis and historic preservation.</td>
<td>Task Manager – Cultural Resources</td>
</tr>
<tr>
<td>Susan Bupp</td>
<td>M.A. Anthropology University of Wyoming, 1981 B.A. Anthropology Wichita State University, 1977 35 years of experience in cultural resource analysis and management.</td>
<td>Cultural Resource Surveys and Analysis</td>
</tr>
</tbody>
</table>
ENVIROMENTAL ASSESSMENT DISTRIBUTION

FEDERAL/REGIONAL AGENCIES

Mr. Joseph C. Lawson
Division Administrator
Federal Highway Administration, District of Columbia Division
1990 K St. NW, Suite 510
Washington, DC 20006

Mr. Michael Hicks
Urban/Environmental Engineer
Federal Highway Administration, District of Columbia Division
1990 K St. NW, Suite 510
Washington, DC 20006

Ms. Tara Morrison
Superintendent, Rock Creek Park
National Park Service
3545 Williamsburg Lane, NW
Washington, DC 20008

Ms. Cynthia Cox
Deputy Superintendent, Rock Creek Park
National Park Service
3545 Williamsburg Lane, NW
Washington, DC 20008

Mr. Joel Gorder
Regional Planning and Environmental Coordinator
National Park Service
National Capital Region
1100 Ohio Drive, SW
Washington, DC 20242

Mr. Leopoldo Miranda
Supervisor
Chesapeake Bay Field Office
U.S. Fish and Wildlife Service
177 Admiral Cochrane Drive
Annapolis, MD 21404

Mr. David Hayes
Regional Planner and Transportation Liaison
US Department of the Interior
National Park Service (NCR)
1100 Ohio Drive, SW
Washington, DC 20242

Ms. Maria Teresi
Project Manager
U.S. Army Corps of Engineers
PO Box 1715
Baltimore, MD 21203

Ms. Barbara Rudnick
NEPA Team Leader
U.S. Environmental Protection Agency
Region 3
1650 Arch Street
Philadelphia, PA 19103

Mr. Tom Luebeke
Secretary
Commission of Fine Arts
401 F Street, NW, Suite 312
Washington, DC 20001
Mr. David Levy
Director, Urban Design and Plan Review
National Capital Planning Commission
401 9th Street NW
North Lobby, Suite 500
Washington, DC 20004

Mr. George S. Hawkins
General Manager
DC Water
5000 Overlook Drive
Washington, DC 20032

Mr. Richard Sarles
General Manager
Washington Metro Area Transit Authority
600 5th Street, NW
Washington, DC 20001

Mr. Steve Saari
Watershed Protection Specialist
District Department of the Environment
1200 First Street, NE
6th Floor
Washington, DC 20002

Mr. Bryan King
District Department of the Environment
Fisheries and Wildlife Division
51 N Street, NE
Washington, DC 20002

Mr. Jesús Aguirre
Director
District Department of the Environment
Department of Parks and Recreation
3149 16th Street, NW
Washington, DC 20010

Mr. Tim Karikari
Branch Chief
District Department of the Environment
Watershed Protection Division
1200 First Street, NE
Washington, DC 20002

Mr. Adion Chinkuyu
District Department of the Environment
Water Quality Division
1200 First Street, NE
5th Floor
Washington, DC 20002

Mr. Andrew Lewis
Senior Historic Preservation Specialist
DC Office of State Historic Preservation
1100 4th Street, SW, Suite E650
Washington, DC 20024

The Honorable Muriel Bowser
Ward 4 Councilmember
1350 Pennsylvania Avenue, NW, Suite 110
Washington, DC 20004

The Honorable Mary M. Cheh
Ward 3 Councilmember
1350 Pennsylvania Avenue, NW, Suite 108
Washington, DC 20004

Commissioner Angelina D. Scott
ANC-1D
1845 Harvard Street NW, #606
Washington, DC 20009

Commissioner Jack McKay
ANC-1D
3200 - 19th Street, NW
Washington, DC 20010

DISTRICT AGENCIES

DISTRICT ELECTED OFFICIALS

ADVISORY NEIGHBORHOOD COMMISSIONS
Commissioner Chair Gregg Edwards  
ANC-1D  
1647 Lamont Street, NW, #201  
Washington, DC 20010

Commissioner Chair Anne-Marie Baistow  
ANC-3C  
2802 27th Street NW  
Washington, DC 20008

Commissioner Gale Black  
ANC-4A  
1761 Crestwood Drive NW  
Washington, DC 20011

Commissioner Chair Stephen Whatley  
ANC-4A  
1315 Fern Street, NW  
Washington, DC 20012

Commissioner Chair Jane Solomon  
ANC-3F  
2935 Albemarle Street, NW  
Washington, DC 20008

Mr. Gary Thompson  
ANC-3/4G  
2840 Northampton Street, NW  
Washington, DC 20015

Mr. Asi Jacob Mbah  
DC Water  
Planning and Design Branch  
5000 Overlook Avenue, SW  
Washington, DC 20032

Mr. Tim Outsa  
Verizon Communication  
13101 Columbia Pike FDC1  
Silver Spring, MD 20904

**INTEREST GROUPS**

Mr. Rick Morgan  
The People’s Alliance for Rock Creek (PARC)  
733 15th Street, NW  
Suite 1030  
Washington, DC 20005

Mr. Tom Downs  
Friends of Rock Creek’s Environment  
3035 Oliver Street, NW  
Washington, DC 20015

**PUBLIC REVIEW COPIES**

Chevy Chase Branch Library  
5625 Connecticut Avenue, NW  
Washington, DC 20015

**UTILITIES**

Mr. Allan Melliza  
Washington Gas Co.  
6801 Industrial Road  
Springfield, VA 22151
Baedke, Steve J., Lynn S. Fichter.

Bartolomeo, Nick
2010 Personal communication. E-mail to Rachael Mangum, cc Rebecca Chojnacki, regarding NPS tree replacement policy. Chief Ranger, Rock Creek Park. Dated September, 24.

Birnbaum, Charles A.

Birnbaum, Charles A.

Bushong, William

Bushong, William

CH2M Hill
1979 Rock Creek Watershed Conservation Study. Prepared for the National Park Service. Washington, DC
Cowardin et al.  

Davis, Timothy  

DC Government  

DC Government  

DC Government  

DC Government  

DCOZ (District of Columbia Office of Planning)  

DCOZ (District of Columbia Office of Zoning)  
DCOZ (District of Columbia Office of Zoning)

DDOE (District Department of the Environment)
2010a Closed Leaking Underground Storage Tank (LUST) Cases.
   http://ddoe.dc.gov/ddoe/cwp/view,a,1209,q,494854,ddoeNav_GID,1486,ddoeNav,%7C31

DDOE (District Department of the Environment)
2010b List of District Regulated Open LUST Cases (Heating Oil Contaminated Sites).
   http://ddoe.dc.gov/ddoe/cwp/view,a,1209,q,494854,ddoeNav_GID,1486,ddoeNav,%7C31

DDOE (District Department of the Environment)
2010c List of Federally Regulated Open LUST Cases (Petroleum Contaminated Sites-Not
   Heating Oil).
   http://ddoe.dc.gov/ddoe/cwp/view,a,1209,q,494854,ddoeNav_GID,1486,ddoeNav,%7C31

DDOE (District Department of the Environment)
2010d List of Know Facilities with Active Underground Storage Tanks in DC.
   http://ddoe.dc.gov/ddoe/cwp/view,a,1209,q,494854,ddoeNav_GID,1486,ddoeNav,%7C31

DDOE (District Department of the Environment)
2010  Rock Creek Watershed Implementation Plan (WIP). DDOE Watershed Protection Division.
   Washington, DC.

DDOE (District Department of the Environment)
2011  District of Columbia Chesapeake Bay Program.

DDOT (District Department of Transportation)
2005  District of Columbia Bicycle Master Plan. Washington, DC.
   http://www.dc.gov/DC/DDOT/On+Your+Street/Bicycles+and+Pedestrians/Bicycles/Bicyc
DDOT (District Department of Transportation)

EDR (Environmental Data Resources, Inc.)
2005 Database search for Klingle Road DEIS. DDOT 2005.

EPA (Environmental Protection Agency)

EPA (Environmental Protection Agency)

EPA (Environmental Protection Agency)

Fiedel, Stuart J., John Bedell, and Charles LeeDecker

Fiedel, Stuart J., John Bedell, and Charles LeeDecker

Fiedel, Stuart J., John Bedell, and Charles LeeDecker
Fiedel, Stuart J., John Bedell, Charles LeeDecker, Jason Shellenhamer and Eric Griffitts

Fleming, A.H., Drake, A.A. and McCartan, Lucy

Gibb, James G. and Sarah Michailof

Greenhorne and O’Mara
2010  DRAFT Environmental Assessment for Klingle Valley Trail, Washington, DC. Prepared for US Department of Transportation, Federal Highway Administration and District Department of Transportation in cooperation with the National Park Service.

Highshoe, Gary

Inashima, Paul Y.
Environmental Assessment of Oregon Avenue NW

The Louis Berger Group, Inc.
2005 Culvert Architectural Feature Assessment, Reconstruction and Rehabilitation of Rock Creek and Potomac Parkway, From P Street through Beach Drive, PMIS# 44965, 82798, 45197, Rock Creek Park, District of Columbia. Prepared for HNTB Urban Design + Planning, Washington, DC and National Park Service, Denver Service Center, Transportation Division, Denver, Colorado.

Miranda, Leopoldo

Monteleone, Simone
2011 Personal Communication between Simone Monteleone, Cultural Resource Program Manager, Rock Creek Park and Susan L. Bupp, Parsons Cultural Resources Specialist regarding cultural resources and landscapes issues. April 8, 2011.

Moran, Jennifer

NPS (National Park Service)

NPS (National Park Service)

NPS (National Park Service)
NPS  (National Park Service)

NPS  (National Park Service)

NPS  (National Park Service)

NPS  (National Park Service)

NPS  (National Park Service)

NPS  (National Park Service)

NPS  (National Park Service)

NPS  (National Park Service)
Environmental Assessment of Oregon Avenue NW

NPS (National Park Service)

Parsons

Parsons

Pfaffko, Mary

Robert Peccia & Associates

Rock Creek Park. (Rock Creek National Park)

Southworth, S., and D. Denenny

UNESCO. (United Nations Educational, Scientific, and Cultural Organization)

US Census Bureau.
References

US Census Bureau.

US Census Bureau.

US Census Bureau.

US Census Bureau.

USGS (United States Geological Survey)

USDA (United States Department of Agriculture)

Weeks, Kay D., and Anne E. Grimmer

Wilbur Smith Associates.
William and Mary Department of Education.

2009 Piedmont Geology of Virginia.

2003 Level III and IV Ecoregions of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia. US Environmental Protection Agency, National Health and Environmental Effects Research Laboratory. Corvallis, OR, USA.

Yeaman, Bill
2010 Personal communication e-mail to Rebecca Chojnacki with Parsons. Re: Oregon Avenue EA: NPS ROCR Data Collection. Dated 8/30/2010.
INDEX

AASHTO ........................................... S-3, 1-9, 2-5

Advisory Neighborhood Commissions (ANC) ........................................ 5-3

Aesthetics ........ S-3, S-6, 2-5, 2-17, 3-27, 4-26

Agency Coordination ............... 2-1, 5-1, C-1

Air Quality .... S-8, S-10, S-11, 3-34, 3-35, 4-34, ............................ 4-35, 4-39

Anadromous Fish......................... 3-8, 4-13

Archeological Resources ......... S-9, 3-11, 3-12, 3-13, 3-14, 3-15, 3-16, 4-15, 4-16, 4-17, 4-18, 4-19, 4-24, 5-2, E-1

Area of Potential Effects (APE) ..... 3-12, 3-13, 3-15, 3-16, 3-17, 3-21, 3-23, 4-14, 5-1, 5-2, E-1

Bicycle(s).................. S-1, S-8, 1-5, 1-6, 4-43, C-2

Bicyclist(s) ...... S-1, S-2, S-4, S-111-1, 1-5, 1-6, 1-9, 1-10, 1-11, 2-1, 2-4, 4-27, 4-27, 4-28, 4-30, 4-43, A-1

Boundary Monuments .......... 3-16, 3-17, 3-19, 4-20, 4-21

Candidate Build Alternatives..... S-2, S-3, S-4, S-5, S-8, S-9, S-10, S-11, 2-1, 2-2, 2-4, 2-5, 2-12, 2-15, 2-16, 4-1, 4-2, 4-3, 4-4, 4-5, 4-7, 4-8, 4-9, 4-10, 4-11, 4-12, 4-13, 4-23, 4-24, 4-25, 4-26, 4-27, 4-30, 4-35, 4-36, 4-37, B-1, C-1

Chesapeake Bay Protection......... 3-8, 4-10

CO Conformity ............................... 3-35, 4-34

Coastal Zone ......................... 3-7, 3-8, 4-10

Community Resources .......... S-10, 3-28, 4-28, 4-29

Comprehensive Plan of the National Capital ............................... 1-12

Construction Phasing .............. 4-31, D-1

Costs ............. S-5, S-6, S-11, 2-12, 2-13, 2-16, 2-17, C-1

Council on Environmental Quality (CEQ) ...................................... S-1, 1-1, 4-1, 4-2, 4-14, 4-15

Cultural Landscapes.......... S-3, S-10, 2-5, 3-11, 3-23, 4-22, 4-23, 4-24

Cultural Resources .......... 4-14, 4-15, 4-19, 4-22, 4-24, 4-38, E-1

Culverts .... S-3, S-5, S-8, 2-5, 2-14, 2-15, 2-16, 3-16, 3-17, 3-18, 3-19, 3-21, 4-4, 4-7, 4-18, 4-20, C-3, C-4, C-6, C-8

Cumulative Effects .......... S-10, 4-38, 4-39

Cyclist(s) .................. 2-8, 3-32, 4-30, 4-31

DC Bicycle Master Plan ............... 1-6

DC Historic Preservation Office (DCHPO) .... 3-12, 3-15, 3-17, 3-22, 3-23, 5-1, 5-2, E-1

DC Water .......... 3-4, 3-16, 3-21, 3-29, 5-1, C-2

Demographics ......................... 3-25, 4-25

District Department of the Environment (DDOE) .... S-5, 1-7, 1-11, 2-15, 3-8, 3-15, 3-39, 4-37, 4-41, 5-1, 5-3
Environmental Assessment of Oregon Avenue NW

District Department of Transportation (DDOT).................S-1, S-2, S-3, S-10, 1-1, 1-7, 1-9, 1-10, 1-11, 2-2, 2-4, 2-5, 2-6, 3-28, 3-29, 4-1, 4-2, 4-12, 4-16, 4-17, 4-18, 4-21, 4-22, 4-25, 4-27, 4-30, 4-31, 4-32, 4-35, 4-36, 4-41, 4-42, 5-1, 5-2, 5-3, C-1

District of Columbia Pedestrian Master Plan.................1-9, 1-11

Drinking Water........................................3-4, 3-6, 4-4

Emergency Services.................................3-28, 4-28, 4-29

Energy..............................................S-6, 3-39, 4-37, 4-38

Environmental Justice.........................S-11, 3-26, 4-25

Ethnographic Resources.........S-10, 3-11, 3-23, ........................................4-23, 4-24

Farmlands.........................................3-4, 4-3

Federal Emergency Management Agency (FEMA).............S-6, 2-16, 3-6

Federal Highway Administration (FHWA) .............S-1, 1-1, 1-6, 1-9, 3-1, 3-12, 3-34, 3-36, 3-37, 4-1, 4-2, 4-35, 4-36, 4-42, 5-1, 5-3

Floodplain(s)........S-6, S-9, S-11, 3-6, 3-13, 3-15, 4-6, 4-7, 4-8, 4-9, 4-12, 4-17, 4-18, 4-41, 4-42

Fort DeRussy.............3-14, 3-15, 3-16, 3-28

Geology............................................3-1, 3-2, 4-3

Greenhouse Gas.................................3-36, 4-35

Groundwater .................3-4, 3-8, 4-4, 4-6, 4-7, 4-9, .........................................4-37

Hazardous Materials ..........S-11, 4-37, 4-41

Health and Safety...............3-28, 4-27

Historic Resources.............1-12, 3-14, 4-20

Historic Structures..........S-9, S-10, 3-11, 3-16, 3-17, 4-15, 4-19, 4-20, 4-21, 4-22, 4-24

Impervious Surface........1-11, 3-6, 4-4, 4-5, 4-6, 4-7, 4-8, 4-9, 4-12, 4-14, 4-40

Indian Trust Resources ......S-10, 3-11, 3-24, .........................................4-23, 4-24

Infrastructure Deficiencies......S-1, 1-3

Invasive Species.........................3-9, 3-11, 4-13

Joint Development...............3-27, 4-26

Knollwood.........S-8, S-9, 1-8, 3-13, 3-17, 3-22, 3-28, 3-34, 3-37, 3-39, 4-21, 4-22, .........................................4-34, 5-2

Land Use..................S-1, S-8, S-10, S-11, 1-1, 1-12, 3-13, 3-14, 3-25, 3-36, 3-37, 4-24, 4-36, 4-38, 4-43

Landscapes.........................3-10, 3-16, 3-23

Legislation.....................S-1, 1-6, 2-1, 3-9, 3-25, 3-30

Level of Service.........................4-32

Lighting........S-1, S-3, 1-5, 1-7, 2-5, 3-22, 3-28, 4-27, 4-29, 4-38, 5-4

Maintenance of Traffic........S-10, 4-31, C-5, C-7, C-9, D-1

Mitigation.........................1-8, 3-6, 4-15, 4-42

Mobile Source Air Toxics (MSATs)..........3-34, 3-36, 4-35

Museum Collections........S-10, 3-11, 3-24, 4-23, 4-24

National Environmental Policy Act (NEPA) .S-1, 1-1, 3-36, 4-1, 4-14, 4-15, 4-16, 4-19, 4-26, 5-3

National Historic Preservation Act (NHPA) .1-1, 3-11, 3-12, 4-14, 4-15, 4-16, 4-20, 5-1, E-1
Index

National Park Service (NPS)...........S-1, S-2, S-9,
...........1-1, 1-7, 1-8, 1-9, 1-11, 2-18, 3-1, 3-6,
...........3-7, 3-9, 3-12, 3-13, 3-15, 3-16, 3-17,
...........3-18, 3-23, 3-24, 4-1, 4-7, 4-12, 4-15,
...........4-16, 4-19, 4-20, 4-27, 4-28, 4-29,
...........4-38, 4-39, 4-40, 4-41, 4-42, 4-43,
...........5-1, 5-2, 5-3, C-1

National Register of Historic Places (NRHP)
...........S-8, 3-12, 3-15, 3-16, 3-17, 3-18, 3-20,
...........3-21, 3-22, 3-23, 4-14, 4-21, 4-22, 4-24

Native American Sacred Sites ...........S-10, 3-11,
..................................................3-24, 4-23, 4-24

Navigable Waters....................S-9, 3-4, 3-7, 4-10

No Action Alternative ...........S-2, 2-1, 2-4, 4-1,
...........4-2, 4-3, 4-4, 4-5, 4-6, 4-8, 4-9, 4-10,
...........4-11, 4-12, 4-13, 4-16, 4-20, 4-23, 4-24,
...........4-25, 4-26, 4-27, 4-28, 4-29, 4-30, 4-31,
...........4-32, 4-34, 4-35, 4-36, 4-37

Noise ...........S-6, S-8, S-10, S-11, 1-7, 3-36, 3-37,
.....................3-38, 3-39, 4-21, 4-35, 4-36, 4-37,
.....................4-39, 5-5

Noise Abatement Criteria ...........3-36, 3-37, 4-36

Paleontological Resources ...........S-9, S-10, 3-11,
.....................3-24, 3-25, 4-14, 4-23, 4-24

Pedestrian(s) ...........S-1, S-4, S-8, 1-1, 1-5, 1-6,
...........1-9, 1-11, 2-4, 2-8, 3-9, 3-28, 3-30, 3-32,
...........4-27, 4-28, 4-30, 4-31, 4-43, 5-4, A-1

Permits......................................4-5, 4-41

Pinehurst Run ...........S-1, S-3, S-6, S-8, S-9, S-11,
...........1-5, 1-7, 2-5, 2-16, 3-6, 3-7, 3-12, 3-13,
...........3-15, 3-17, 3-20, 3-21, 3-22, 3-29, 4-3,
...........4-4, 4-5, 4-6, 4-7, 4-8, 4-9, 4-12, 4-14,
...........4-17, 4-18, 4-19, 4-22, 4-24, 4-27, 4-28,
...........4-31, 4-32, 4-34, 4-38, 5-2, C-4, C-6, C-8

Pinehurst Trail .......................1-6, 3-28, 4-30

Potomac Electric Power Company (PEPCO)
........................................3-30, 4-29, C-2, C-5, C-7, C-9

Proposed Action ...........S-1, S-10, 1-1, 1-6, 1-10,
........................................3-26, 4-38, 5-2

Public Comments.......................1-9

Public Involvement...................4-25, 5-1, 5-3

Purpose and Need ...........S-1, S-2, S-3, S-5, 1-1,
........................................1-9, 2-1, 2-2, 2-4, 2-5, 2-12

Retaining Walls ...........S-3, S-4, 2-5, 2-6, 2-8,
...........2-10, 2-17, 3-16, 3-17, 4-17, 4-18, 4-21,
...........4-22, B-1, C-4, C-6, C-8

Rock Creek ...........1-11, 3-6, 3-7, 3-8, 3-9, 3-13,
...........3-14, 3-15, 3-18, 3-28, 4-5, 4-8, 4-40

Rock Creek Park ...........S-1, S-3, S-5, S-6, S-8,
...........1-1, 1-4, 1-5, 1-6, 1-7, 1-8, 1-9, 1-11,
...........1-12, 2-4, 2-5, 2-13, 2-18, 3-3, 3-8, 3-9,
...........3-11, 3-12, 3-13, 3-14, 3-15, 3-16, 3-17,
...........3-18, 3-19, 3-20, 3-21, 3-23, 3-24, 3-25,
...........3-27, 3-28, 3-31, 3-32, 3-37, 4-2, 4-13,
...........4-16, 4-20, 4-22, 4-23, 4-27, 4-30, 4-38,
...........4-39, 4-40, 4-43, 5-2, 5-3, 5-4, D-1

Rock Creek Park Historic District (RCPHD)
...................S-8, S-9, 3-16, 3-17, 3-18, 3-19, 4-20,
........................................4-21, 4-22

Rock Creek Park Trail ...........1-11, 3-39

Rock Creek Watershed Implementation
Plan........................................1-11

Scenic Easements ......................3-27, 4-27

Scoping ......................1-9, 2-1, 4-25, 5-1, 5-3, 5-4

Section 106 ...........1-1, 1-7, 3-12, 4-14, 4-15, 4-16,
........................................4-19, 4-20, 5-1, E-1

Section 4(f) ...........S-1, S-11, 1-1, 1-7, 3-1, 3-37, 4-42

Section 7 ......................3-8, 4-11, 5-1
Environmental Assessment of Oregon Avenue NW

Shared-Use Path...........S-4, 1-10, 2-6, 2-18, 4-17, 4-21, C-2
Shellfish.........................3-8, 3-9, 4-13
Socioeconomic Resources.....S-6, S-10, 3-25, 4-24
Soils........2-15, 3-1, 3-2, 3-3, 3-4, 4-2, 4-3, 4-5, 4-37
St. Johns College High School.....3-22, 3-37, 3-39
Stormwater........S-1, S-2, S-3, S-5, S-9, S-11, 1-1, 1-3, 1-4, 1-6, 1-7, 1-8, 1-9, 1-10, 1-11, 2-1, 2-4, 2-5, 2-6, 2-8, 2-10, 2-12, 2-13, 2-14, 2-15, 2-16, 3-3, 3-6, 3-15, 3-16, 3-21, 3-22, 3-31, 4-2, 4-3, 4-4, 4-5, 4-6-9, 4-10, 4-11, 4-12, 4-13, 4-14, 4-16, 4-18, 4-20, 4-22, 4-26, 4-27, 4-28, 4-29, 4-30, 4-31, 4-32, 4-34, 4-36, 4-37, 4-38, 4-40, 4-41, 4-42, 4-43, 5-1, 5-3, 5-4, A-1, C-2, C-4, C-6, C-8
Surface Waters........S-9, 4-4, 4-5, 4-6, 4-9, 4-31
System Linkage..................S-1, 1-6, 4-43
Threatened and Endangered Species.....S-11, 3-8, 4-11
Topography........S-2, 1-4, 1-5, 1-6, 2-2, 2-4, 2-17, 3-1, 3-3, 3-28, 3-31, 4-2, 4-3, 4-35, C-3
Traffic........S-10, 1-9, 1-12, 2-12, 2-17, 3-32, 3-36, 3-37, 3-39, 4-21, 4-28, 4-31, 4-32, 4-34, 4-35, 4-36, 4-37, 4-38, 4-39, 5-2, 5-4, 5-5, 5-5, D-1
Traffic Calming........S-5, 2-5, 2-6, 2-10, 2-12, 2-17, 4-3, 4-4, 4-6, 4-7, 4-8, 4-12, 4-14, 4-18, 4-22, 4-27, 4-28, 4-31, 4-32, 4-34, 4-38, 5-5
Traffic Volumes........S-2, S-8, 2-2, 2-4, 2-12, 2-17, 3-31, 3-32, 3-33, 3-35, 3-36, 4-32, 4-35, 4-36, 4-39
Trails........1-10, 3-14, 3-16, 3-17, 3-23, 3-28, 3-37, 4-40, 5-5
Transit........1-6, 1-12, 2-17, 3-27, 3-30, 3-34, 4-30, 4-32, 4-34
Trees........S-3, S-6, S-9, S-11, 2-5, 3-8, 3-9, 3-11, 3-27, 4-2, 4-13, 4-41, 4-42
US Army Corps of Engineers.....3-7, 4-9, 4-41
US Environmental Protection Agency.....3-1
US Fish and Wildlife Service (USFWS)......S-9, 3-8, 4-11
Utilities...............3-28, 4-17, 4-18, 4-19, 4-29, 4-30, C-2, C-3, C-4, C-6, C-8
Vegetation.............S-3, 2-5, 3-7, 3-9, 3-23, 3-27, 4-8, 4-10, 4-11, 4-12, 4-13, 4-14, 4-20, 4-26, 4-27, 4-28, 4-29, 4-30, 4-31, 4-32, 4-34, 4-36, 4-37, 4-38, 4-40, 4-41, 4-42, 4-43, 5-1, 5-3, 5-4, A-1, C-2, C-4, C-6, C-8
Vibration........S-10, 3-36, 4-20, 4-35, 4-36, 4-37
Washington Area Metropolitan Transit Agency (WMATA)........4-32
Washington Gas............3-30, 4-29, C-2
Water Quality........1-7, 1-11, 2-13, 2-14, 2-15, 2-16, 3-4, 3-6, 3-7, 4-2, 4-5, 4-8, 4-10, 4-11, 4-12, 4-13, 4-29, 4-40, 4-41, 4-42
Water Resources........1-11, 3-4, 3-5, 4-4, 4-5, 4-8, 4-10, 4-11, 4-12, 4-14, 4-20, 4-26, 4-27, 4-40, 4-42
Waters of the United States (WOUS).......3-4
Wetlands........S-9, S-11, 3-4, 3-7, 4-9, 4-40, 4-41
Wild or Scenic Rivers........S-9, 3-7, 4-10
Wildlife................1-7, 3-7, 3-8, 3-9, 3-23, 4-11, 4-12, 4-40
Wildlife and Waterfowl Refuges...... 3-8, 4-13
Zoning............................. S-10, S-11, 3-25, 4-24
IMPROVEMENT CONCEPTS

As part of the project planning process, members of the general public as well as representatives from government agencies were asked to participate in developing improvement concepts for Oregon Avenue. Participants were provided with a series of “building blocks” that included roadway, stormwater management, and pedestrian and bicyclist elements and asked to construct the optimal configuration for the improvement. See Figure A-1 below.

Figure A-1. “Building Blocks” to Roadway Concepts

The width of each individual element was provided and the ultimate width of the concept was then compared to the existing right-of-way width (as shown on an accompanying aerial map of the corridor).

Participants at the Public Alternatives Meeting created eight concepts that varied in composition and width. These concepts are shown in Figure A-2.

As part of an Agency Alternatives Meeting, representatives from federal and local government agencies created five concepts. These concepts are presented in Figure A-3.
Figure A-2. Concepts Developed by General Public
(Sheet 1)
Figure A-2. Concepts Developed by General Public
Figure A-2. Concepts Developed by General Public
(Sheet 3)
Figure A-3. Concepts Developed by Agency Representatives

(Sheet 1)
Figure A-3. Concepts Developed by Agency Representatives
(Sheet 2)
The following exhibits present the conceptual alignment plans for each of the three Candidate Build Alternatives. These plans depict the general extent of roadway, sidewalks and multi-purpose lanes, as well as general locations of coping and retaining walls. Areas of cut and/or fill required for roadway construction are presented to indicate the area of potential disturbance. Typical sections are included at several locations to illustrate the relationship to existing right-of-way lines.

The 1.7-mile project is depicted on eleven separate sheets as noted in the key map below. Baseline stations are shown at 100-foot intervals starting with Station 100 at the Military Road intersection. These station points are presented to reference specific locations described in the document.

Figure B-1.Key Map
Figure B-2. Alternative 2
(Sheet 4)
Figure B-2. Alternative 2
(Sheet 7)
Figure B-2. Alternative 2
(Sheet 9)
Figure B-3. Alternative 3
Figure B-3. Alternative 3
(Sheet 2)
Figure B-3. Alternative 3
Figure B-3. Alternative 3
(Rock Creek Park)
Figure B-3. Alternative 3

(Sheet B)
Figure B-3. Alternative 3
(Sheet 10)
Figure B-3. Alternative 3
(Sheet 11)
Figure B-4. Alternative 4
(Sheet 1)
Figure B-4. Alternative 4
(Sheet 2)
Figure B-4. Alternative 4

(Sheet 3)
Figure B-4. Alternative 4
(Sheet 4)
Figure B-4. Alternative 4
(Sheet 7)
Figure B-4. Alternative 4
(Sheet 8)
Figure B-4. Alternative 4
(Sheet 10)
Figure B-4. Alternative 4
(Sheet 11)
In support of the alternatives development process, preliminary cost estimates were prepared for each of the three Candidate Build Alternatives. The cost estimates were based upon the conceptual level designs developed for the preliminary alignments and associated typical sections.

The project limits have been identified as Military Road at the south end to Western Avenue at the north end — a length of approximately 9,000 feet or 1.7 miles. The proposed improvements do not seek to increase capacity; therefore, each of the alternatives retains the existing two-lane configuration. All roadway improvements will be restricted to the DDOT-owned right-of-way and additional acquisition will be required. Construction easements would be necessary for the installation of erosion and sediment control measures, and in and around the areas near existing outfalls within NPS property to minimize erosion and to create safe access points for future maintenance.

Costs have been developed at this conceptual level for both “TOTAL CONSTRUCTION COST” for the construction effort under a traditional Design-Bid-Build approach, and “TOTAL PROJECT COST”, which includes funding for design, construction management, construction claims, change orders, and owner’s reserve of 10% of the total construction cost.

The following table summarizes these cost estimates.

**Table C-1. Conceptual Level Cost Estimate**

<table>
<thead>
<tr>
<th>ALTERNATIVE</th>
<th>TOTAL CONSTRUCTION COST</th>
<th>DDOT PROGRAM MANAGEMENT COST*</th>
<th>TOTAL PROJECT COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 2</td>
<td>$15,600,000</td>
<td>$7,800,000</td>
<td>$23,400,000</td>
</tr>
<tr>
<td>Alternative 3</td>
<td>$20,300,000</td>
<td>$10,150,000</td>
<td>$30,450,000</td>
</tr>
<tr>
<td>Alternative 4</td>
<td>$23,500,000</td>
<td>$11,750,000</td>
<td>$35,250,000</td>
</tr>
</tbody>
</table>

*DDOT Program Management Cost estimated to be 50% of the Total Construction Cost, broken down as follows: 1% for Public Relations/Agency Coordination/Misc.; 6% for Construction Escalation (2 years at 3% per year); 12% Final Design Fee; 8% Construction Management; 5% Construction Claims; 8% Change Orders; and 10% Owner’s Reserve.

**ASSUMPTIONS**

The following assumptions were made in support of the construction cost estimates:

**ROADWAY**

1. Complete reconstruction of the roadway with the following:
   a. Travel Lanes and Bike Lanes – 2” Superpave AC Surface Course, 5” Superpave AC Base Course, 6” Graded Aggregate Base Course (GAB)
   b. Bus Pads – 12” Reinforced PCC, 6” GAB
c. Curb and Curb & Gutter – 8” wide mountable PCC curb, Combined 8” wide mountable PCC curb and 12” wide PCC gutter

d. Driveways – Concrete Driveway - 7” PCC; Asphalt Driveway 4” AC, 4” GAB

2. Sidewalk, Shared Use Path, Bike Lanes with the following:
a. Shared Use Path – 1-1/2” Superpave AC Surface Course, 2-1/2” Superpave AC Base Course, 4” GAB
b. Bike Lanes - 2” Superpave AC Surface Course, 5” Superpave AC Base Course, 6” Graded Aggregate Base Course (GAB)
c. Sidewalk – 4” PCC, 4” GAB

Utilities

1. DC Water – Water and Sewer Relocations: Based on communications with DC Water design staff, the water and sewer lines are considered for relocation if the existing line falls within 1 foot of the curb/curb & gutter line; if the line falls within swale/ditch alignment; if the depth of cover is reduced to less than 3 feet; if the line falls underneath the wheelchair/bicycle ramp; or if the line falls within the footprint of other utilities.

2. PEPCO, VERIZON, and COMCAST – It is assumed that all overhead lines are on joint-use PEPCO poles and if PEPCO lines are impacted then they all need to be relocated. PEPCO lines are considered for relocation if the existing poles fall within the footprint of the roadway or excavation takes place within 1 foot. Some of the existing poles are outside of the right-of-way and they will remain as they are.

3. WASHINGTON GAS – Gas lines are considered for relocation if the existing line falls within 1 foot of the curb/curb & gutter line; if the line falls within swale/ditch alignment; if the depth of cover is reduced to less than 3 feet; the line falls underneath the wheelchair/bicycle ramp; or within the foot print of other utilities.

4. DC STREETLIGHT - Existing street lights are assumed to be DC-owned, leased lights on PEPCO poles. All existing old type light fixtures and arms will be replaced with new 250 Watt High Pressure Sodium Luminaries cut-off type fixtures with 8-, 12- or 14-foot arms.

Stormwater / Drainage

1. In general, the roadway will have a cross slope toward the west and runoff will be directed toward the drainage system to be installed on the west side of the roadway. Water collected in the system will be directed to existing outfall locations along the east side of the roadway.

2. The underground drainage system will include Low Impact Development techniques. These include a “treatment train” concept which incorporates:
   a. inlets along the edge of the roadway to collect surface runoff (spaced at about 300 feet); these inlets would include dynamic separator components to filter debris and particles prior to entering downstream parts of the system,
b. infiltration trenches under the sidewalk or vegetated swale area; these consist of a large diameter (48 inch), perforated pipe surrounded by aggregate and geotextile filter material which would occur for about 25% of the project length, the downstream outlet end of this pipe would include a weir to enable retention of 1.2 inches of runoff from the roadway,
c. the infiltration trench would be connected to culverts under Oregon Avenue which also collect upstream storm sewers from the neighborhoods to the west,
d. headwalls would be replaced or repaired at the outfalls on the east side of the roadway,
e. channels downstream of the new headwalls would be stabilized using sand seepage berms.

3. For Alternatives 3 and 4, a vegetated swale would be added to the above system.
4. Infiltration trenches would not be combined to the combined sewer systems.
5. It was assumed that the existing soil layers adjacent to the roadway are sufficiently pervious to accommodate the planned infiltration.
6. Given the rolling topography, it was assumed that sufficient grades were available to enable new systems to outfall at the existing outfall inverts.
7. The northernmost outfall near Western Avenue would incorporate an outlet which includes a level-spreader system to eliminate concentrated flow and transition the flows to non-erosive sheet flow conditions.
8. An optional rain garden can be provided near Nebraska Avenue.

EXCLUSIONS

The following items were not included in the construction cost estimates:

1. Unforeseen subsurface condition
2. Stream stabilization
3. Right-of-way acquisition including temporary construction easements
4. Accuracy of the survey
5. Location of existing utilities
### Table C-2. Conceptual Construction Cost Estimate - Alternative 2

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>ITEM DESCRIPTION</th>
<th>UNITS</th>
<th>QUANTITY</th>
<th>UNIT</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMMON EXCAVATION</td>
<td>CY</td>
<td>9,930</td>
<td>$30</td>
<td>$297,900</td>
</tr>
<tr>
<td></td>
<td>BORROW EMBANKMENT</td>
<td>CY</td>
<td>720</td>
<td>$35</td>
<td>$25,200</td>
</tr>
<tr>
<td></td>
<td>STRUCTURAL EXCAVATION</td>
<td>CY</td>
<td>445</td>
<td>$50</td>
<td>$22,250</td>
</tr>
<tr>
<td></td>
<td>UNDERCUT</td>
<td>CY</td>
<td>13,387</td>
<td>$50</td>
<td>$669,330</td>
</tr>
<tr>
<td></td>
<td>SUBGRADE STABILIZATION</td>
<td>CY</td>
<td>13,387</td>
<td>$40</td>
<td>$535,464</td>
</tr>
<tr>
<td>RDWY</td>
<td>ROADWAY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FULL-DEPT ASPHALT PAVEMENT (2&quot; HMA SURFACE COURSE+5&quot; HMA BASE COURSE+6&quot; GAB)</td>
<td>SY</td>
<td>22,311</td>
<td>$58</td>
<td>$1,294,038</td>
</tr>
<tr>
<td></td>
<td>ASPHALT DRIVEWAY (4&quot; HMA + 4&quot; GAB)</td>
<td>SY</td>
<td>522</td>
<td>$47</td>
<td>$24,534</td>
</tr>
<tr>
<td></td>
<td>7&quot; PCC DRIVEWAY</td>
<td>SY</td>
<td>316</td>
<td>$90</td>
<td>$28,440</td>
</tr>
<tr>
<td></td>
<td>PCC SIDEWALK (4&quot; PCC +4&quot; GAB)</td>
<td>SY</td>
<td>4,320</td>
<td>$75</td>
<td>$324,000</td>
</tr>
<tr>
<td></td>
<td>PCC WHEELCHAIR RAMPS 7&quot; PCC)</td>
<td>EA</td>
<td>33</td>
<td>$400</td>
<td>$13,200</td>
</tr>
<tr>
<td></td>
<td>SHARED PATH (4&quot; HMA + 4&quot; GAB)</td>
<td>SY</td>
<td>0</td>
<td>$47</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>MOUNTABLE CURB</td>
<td>CY</td>
<td>312</td>
<td>$270</td>
<td>$84,240</td>
</tr>
<tr>
<td></td>
<td>MOUNTABLE CURB AND GUTTER</td>
<td>CY</td>
<td>405</td>
<td>$350</td>
<td>$141,750</td>
</tr>
<tr>
<td></td>
<td>PCC BUS STOP PADS</td>
<td>CY</td>
<td>133</td>
<td>$350</td>
<td>$46,667</td>
</tr>
<tr>
<td>STWM</td>
<td>STORMWATER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CDS (INLET, CONTINUOUS DEFLECTIVE SEPARATOR)</td>
<td>EA</td>
<td>30</td>
<td>$10,500</td>
<td>$315,000</td>
</tr>
<tr>
<td></td>
<td>CLOSED STORM DRAIN SYSTEM</td>
<td>LF</td>
<td>6,720</td>
<td>$150</td>
<td>$1,008,000</td>
</tr>
<tr>
<td></td>
<td>OPEN STORM DRAIN SYSTEM</td>
<td>LF</td>
<td>895</td>
<td>$95</td>
<td>$85,025</td>
</tr>
<tr>
<td></td>
<td>48&quot; PERFORATED CMP W/PERVIOUS FILL</td>
<td>LF</td>
<td>2,300</td>
<td>$140</td>
<td>$322,000</td>
</tr>
<tr>
<td></td>
<td>OUTFALL IMPROVEMENTS</td>
<td>EA</td>
<td>8</td>
<td>$750</td>
<td>$6,000</td>
</tr>
<tr>
<td></td>
<td>MANHOLE</td>
<td>EA</td>
<td>15</td>
<td>$6,000</td>
<td>$90,000</td>
</tr>
<tr>
<td></td>
<td>CULVERT (OREGON AVENUE CROSSING)</td>
<td>EA</td>
<td>8</td>
<td>$12,000</td>
<td>$96,000</td>
</tr>
<tr>
<td></td>
<td>CULVERT (DRIVEWAY CROSSING)</td>
<td>EA</td>
<td>12</td>
<td>$5,500</td>
<td>$66,000</td>
</tr>
<tr>
<td></td>
<td>PCC HEADWALL</td>
<td>EA</td>
<td>6</td>
<td>$3,000</td>
<td>$18,000</td>
</tr>
<tr>
<td></td>
<td>RAIN GARDEN</td>
<td>SY</td>
<td>750</td>
<td>$160</td>
<td>$120,000</td>
</tr>
<tr>
<td></td>
<td>LEVEL SPREADER</td>
<td>EA</td>
<td>3</td>
<td>$25,000</td>
<td>$75,000</td>
</tr>
<tr>
<td>STRU</td>
<td>STRUCTURES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COPING WALL 8&quot; to 18&quot; HEIGHT</td>
<td>LF</td>
<td>396</td>
<td>$35</td>
<td>$13,860</td>
</tr>
<tr>
<td></td>
<td>RETAINING WALL 1-6&quot; to 5' HEIGHT W/ SAFETY RAILING</td>
<td>LF</td>
<td>672</td>
<td>$300</td>
<td>$201,600</td>
</tr>
<tr>
<td></td>
<td>RETAINING WALL 5' to 10' HEIGHT W/ SAFETY RAILING</td>
<td>LF</td>
<td>0</td>
<td>$465</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>PINEHURST RUN CULVERT REPLACEMENT (BRIDGE STRUCTURE)</td>
<td>LS</td>
<td>1</td>
<td>$275,000</td>
<td>$275,000</td>
</tr>
<tr>
<td>UTIL</td>
<td>UTILITIES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8&quot; WATERMAIN REPLACEMENT</td>
<td>LF</td>
<td>0</td>
<td>$300</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>12&quot; WATERMAIN REPLACEMENT</td>
<td>LF</td>
<td>1,100</td>
<td>$400</td>
<td>$440,000</td>
</tr>
<tr>
<td></td>
<td>10&quot; SANITARY SEWER REPLACEMENT</td>
<td>LF</td>
<td>500</td>
<td>$350</td>
<td>$175,000</td>
</tr>
<tr>
<td></td>
<td>12&quot; SANITARY SEWER REPLACEMENT</td>
<td>LF</td>
<td>750</td>
<td>$450</td>
<td>$337,500</td>
</tr>
<tr>
<td></td>
<td>2&quot; GASLINE REPLACEMENT</td>
<td>LF</td>
<td>0</td>
<td>$160</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>4&quot; GASLINE REPLACEMENT</td>
<td>LF</td>
<td>300</td>
<td>$170</td>
<td>$51,000</td>
</tr>
<tr>
<td></td>
<td>STREET LIGHT UPGRADEING</td>
<td>LF</td>
<td>9,000</td>
<td>$10</td>
<td>$90,000</td>
</tr>
</tbody>
</table>
## Project Cost Estimate Assumptions and Exclusions

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>ITEM DESCRIPTION</th>
<th>UNITS</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>PEPCO RELOCATIONS</strong></td>
<td>LF</td>
<td>5,500</td>
<td>$50</td>
<td>$275,000</td>
</tr>
<tr>
<td></td>
<td><strong>VERIZON RELOCATIONS</strong></td>
<td>LF</td>
<td>5,500</td>
<td>$40</td>
<td>$220,000</td>
</tr>
<tr>
<td></td>
<td><strong>COMCAST RELOCATION</strong></td>
<td>LF</td>
<td>5,500</td>
<td>$20</td>
<td>$110,000</td>
</tr>
<tr>
<td></td>
<td><strong>LASP LANDSCAPING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TREE REMOVAL</td>
<td>EA</td>
<td>62</td>
<td>$300</td>
<td>$18,500</td>
</tr>
<tr>
<td></td>
<td>NEW TREE - 2&quot; DBH</td>
<td>EA</td>
<td>190</td>
<td>$400</td>
<td>$76,000</td>
</tr>
<tr>
<td></td>
<td>TREE PRUNING</td>
<td>EA</td>
<td>50</td>
<td>$100</td>
<td>$5,000</td>
</tr>
<tr>
<td></td>
<td>SEEDING/SODDING</td>
<td>SY</td>
<td>15,000</td>
<td>$6</td>
<td>$90,000</td>
</tr>
<tr>
<td></td>
<td><strong>PMSG PAVEMENT MARKINGS AND SIGNING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ROADWAY PAVEMENT MARKINGS</td>
<td>LF</td>
<td>31,102</td>
<td>$4</td>
<td>$124,408</td>
</tr>
<tr>
<td></td>
<td>TRAFFIC SIGNS</td>
<td>SF</td>
<td>900</td>
<td>$50</td>
<td>$45,000</td>
</tr>
<tr>
<td></td>
<td>TRAFFIC SIGN SUPPORTS</td>
<td>LF</td>
<td>1,064</td>
<td>$5</td>
<td>$5,320</td>
</tr>
<tr>
<td></td>
<td><strong>SUBTOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$8,261,326</strong></td>
</tr>
<tr>
<td></td>
<td>MAINTENANCE OF TRAFFIC (25% of Subtotal)</td>
<td></td>
<td></td>
<td></td>
<td>$2,065,331</td>
</tr>
<tr>
<td></td>
<td>MOBILIZATION (10% of Subtotal)</td>
<td></td>
<td></td>
<td></td>
<td>$826,133</td>
</tr>
<tr>
<td></td>
<td>EROSION AND SEDIMENT CONTROL (10% of Subtotal)</td>
<td></td>
<td></td>
<td></td>
<td>$826,133</td>
</tr>
<tr>
<td></td>
<td><strong>NEW SUBTOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$11,978,922</strong></td>
</tr>
<tr>
<td></td>
<td>CONTINGENCY (30% of New Subtotal)</td>
<td></td>
<td></td>
<td></td>
<td>$3,593,677</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$15,572,599</strong></td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL CONSTRUCTION COST</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$15,600,000</strong></td>
</tr>
</tbody>
</table>
### Table C-3. Conceptual Construction Cost Estimate – Alternative 3

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>ITEM DESCRIPTION</th>
<th>UNITS</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GRAD</strong></td>
<td><strong>GRADING</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMMON EXCAVATION</td>
<td>CY</td>
<td>16,943</td>
<td>$30</td>
<td>$508,281</td>
</tr>
<tr>
<td></td>
<td>BORROW EMBANKMENT</td>
<td>CY</td>
<td>779</td>
<td>$35</td>
<td>$27,258</td>
</tr>
<tr>
<td></td>
<td>STRUCTURAL EXCAVATION</td>
<td>CY</td>
<td>445</td>
<td>$50</td>
<td>$22,250</td>
</tr>
<tr>
<td></td>
<td>UNDERCUT</td>
<td>CY</td>
<td>13,822</td>
<td>$50</td>
<td>$691,080</td>
</tr>
<tr>
<td></td>
<td>SUBGRADE STABILIZATION</td>
<td>CY</td>
<td>13,822</td>
<td>$40</td>
<td>$552,864</td>
</tr>
<tr>
<td><strong>RDWY</strong></td>
<td><strong>ROADWAY</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FULL-DEPT ASPHALT PAVEMENT (2” HMA SURFACE COURSE+5” HMA BASE COURSE+6” GAB)</td>
<td>SY</td>
<td>23,036</td>
<td>$58</td>
<td>$1,336,088</td>
</tr>
<tr>
<td></td>
<td>ASPHALT DRIVEWAY</td>
<td>SY</td>
<td>725</td>
<td>$47</td>
<td>$34,075</td>
</tr>
<tr>
<td></td>
<td>7” PCC DRIVEWAY</td>
<td>SY</td>
<td>415</td>
<td>$90</td>
<td>$37,350</td>
</tr>
<tr>
<td></td>
<td>PCC SIDEWALK (4” PCC +4” GAB)</td>
<td>SY</td>
<td>0</td>
<td>$75</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>PCC WHEELCHAIR RAMPS 7” PCC)</td>
<td>EA</td>
<td>33</td>
<td>$400</td>
<td>$13,200</td>
</tr>
<tr>
<td></td>
<td>SHARED PATH (4” HMA + 4” GAB)</td>
<td>SY</td>
<td>5,121</td>
<td>$47</td>
<td>$240,687</td>
</tr>
<tr>
<td></td>
<td>MOUNTABLE CURB</td>
<td>CY</td>
<td>312</td>
<td>$270</td>
<td>$84,240</td>
</tr>
<tr>
<td></td>
<td>MOUNTABLE CURB AND GUTTER</td>
<td>CY</td>
<td>154</td>
<td>$350</td>
<td>$53,900</td>
</tr>
<tr>
<td></td>
<td>PCC BUS STOP PADS</td>
<td>CY</td>
<td>133</td>
<td>$350</td>
<td>$46,667</td>
</tr>
<tr>
<td><strong>STWM</strong></td>
<td><strong>STORMWATER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CDS (INLET, CONTINUOUS DEFLECTIVE SEPARATOR)</td>
<td>EA</td>
<td>30</td>
<td>$10,500</td>
<td>$315,000</td>
</tr>
<tr>
<td></td>
<td>CLOSED STORM DRAIN SYSTEM</td>
<td>LF</td>
<td>5,400</td>
<td>$150</td>
<td>$810,000</td>
</tr>
<tr>
<td></td>
<td>OPEN STORM DRAIN SYSTEM</td>
<td>LF</td>
<td>5,300</td>
<td>$95</td>
<td>$503,500</td>
</tr>
<tr>
<td></td>
<td>48” PERFORATED CMP W/ PERVIOUS FILL</td>
<td>LF</td>
<td>2,300</td>
<td>$140</td>
<td>$322,000</td>
</tr>
<tr>
<td></td>
<td>OUTFALL IMPROVEMENTS</td>
<td>EA</td>
<td>8</td>
<td>$75</td>
<td>$6,000</td>
</tr>
<tr>
<td></td>
<td>MANHOLE</td>
<td>EA</td>
<td>15</td>
<td>$6,000</td>
<td>$90,000</td>
</tr>
<tr>
<td></td>
<td>CULVERT (OREGON AVENUE CROSSING)</td>
<td>EA</td>
<td>8</td>
<td>$12,000</td>
<td>$96,000</td>
</tr>
<tr>
<td></td>
<td>CULVERT (DRIVEWAY CROSSING)</td>
<td>EA</td>
<td>42</td>
<td>$5,500</td>
<td>$231,000</td>
</tr>
<tr>
<td></td>
<td>PCC HEADWALL</td>
<td>EA</td>
<td>6</td>
<td>$3,000</td>
<td>$18,000</td>
</tr>
<tr>
<td></td>
<td>RAIN GARDEN</td>
<td>SY</td>
<td>750</td>
<td>$160</td>
<td>$120,000</td>
</tr>
<tr>
<td></td>
<td>LEVEL SPREADER</td>
<td>EA</td>
<td>3</td>
<td>$25,000</td>
<td>$75,000</td>
</tr>
<tr>
<td><strong>STRU</strong></td>
<td><strong>STRUCTURES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COPING WALL 8” to 18” HEIGHT</td>
<td>LF</td>
<td>396</td>
<td>$35</td>
<td>$13,860</td>
</tr>
<tr>
<td></td>
<td>RETAINING WALL 1-6” to 5’ HEIGHT W/ SAFETY RAILING</td>
<td>LF</td>
<td>1,007</td>
<td>$300</td>
<td>$302,100</td>
</tr>
<tr>
<td></td>
<td>RETAINING WALL 5’ to 10’ HEIGHT W/ SAFETY RAILING</td>
<td>LF</td>
<td>155</td>
<td>$465</td>
<td>$72,075</td>
</tr>
<tr>
<td></td>
<td>PINEHURST RUN CULVERT REPLACEMENT (BRIDGE STRUCTURE)</td>
<td>LS</td>
<td>1</td>
<td>$300,000</td>
<td>$300,000</td>
</tr>
<tr>
<td><strong>UTIL</strong></td>
<td><strong>UTILITIES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8” WATERMAIN REPLACEMENT</td>
<td>LF</td>
<td>1,900</td>
<td>$300</td>
<td>$570,000</td>
</tr>
<tr>
<td></td>
<td>12” WATERMAIN REPLACEMENT</td>
<td>LF</td>
<td>3,000</td>
<td>$400</td>
<td>$1,200,000</td>
</tr>
<tr>
<td></td>
<td>10” SANITARY SEWER REPLACEMENT</td>
<td>LF</td>
<td>2,500</td>
<td>$350</td>
<td>$875,000</td>
</tr>
<tr>
<td></td>
<td>12” SANITARY SEWER REPLACEMENT</td>
<td>LF</td>
<td>750</td>
<td>$450</td>
<td>$337,500</td>
</tr>
<tr>
<td></td>
<td>2” GASLINE REPLACEMENT</td>
<td>LF</td>
<td>500</td>
<td>$160</td>
<td>$80,000</td>
</tr>
<tr>
<td></td>
<td>4” GASLINE REPLACEMENT</td>
<td>LF</td>
<td>2,300</td>
<td>$170</td>
<td>$391,000</td>
</tr>
<tr>
<td></td>
<td>STREET LIGHT UPGRADING</td>
<td>LF</td>
<td>9,000</td>
<td>$10</td>
<td>$90,000</td>
</tr>
</tbody>
</table>
## Project Cost Estimate Assumptions and Exclusions

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>ITEM DESCRIPTION</th>
<th>UNITS</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PEPCO RELOCATIONS</td>
<td>LF</td>
<td>7,500</td>
<td>$50</td>
<td>$375,000</td>
</tr>
<tr>
<td></td>
<td>VERIZON RELOCATIONS</td>
<td>LF</td>
<td>7,500</td>
<td>$40</td>
<td>$300,000</td>
</tr>
<tr>
<td></td>
<td>COMCAST RELOCATION</td>
<td>LF</td>
<td>7,500</td>
<td>$20</td>
<td>$150,000</td>
</tr>
</tbody>
</table>

### LASP - LANDSCAPING

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>ITEM DESCRIPTION</th>
<th>UNITS</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TREE REMOVAL</td>
<td>EA</td>
<td>85</td>
<td>$300</td>
<td>$25,500</td>
</tr>
<tr>
<td></td>
<td>NEW TREE - 2&quot; DBH</td>
<td>EA</td>
<td>260</td>
<td>$400</td>
<td>$104,000</td>
</tr>
<tr>
<td></td>
<td>TREE PRUNING</td>
<td>EA</td>
<td>50</td>
<td>$100</td>
<td>$5,000</td>
</tr>
<tr>
<td></td>
<td>SEEDING/SODDING</td>
<td>SY</td>
<td>20,000</td>
<td>$6</td>
<td>$120,000</td>
</tr>
</tbody>
</table>

### PMSG - PAVEMENT MARKINGS AND SIGNING

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>ITEM DESCRIPTION</th>
<th>UNITS</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ROADWAY PAVEMENT MARKINGS</td>
<td>LF</td>
<td>31,184</td>
<td>$4</td>
<td>$124,736</td>
</tr>
<tr>
<td></td>
<td>TRAFFIC SIGNS</td>
<td>SF</td>
<td>900</td>
<td>$50</td>
<td>$45,000</td>
</tr>
<tr>
<td></td>
<td>TRAFFIC SIGN SUPPORTS</td>
<td>LF</td>
<td>1,064</td>
<td>$5</td>
<td>$5,320</td>
</tr>
</tbody>
</table>

**SUBTOTAL** $10,765,531

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>ITEM DESCRIPTION</th>
<th>UNITS</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MAINTENANCE OF TRAFFIC</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MOBILIZATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EROSION AND SEDIMENT CONTROL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>NEW SUBTOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CONTINGENCY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL** $20,293,025

**TOTAL CONSTRUCTION COST** $20,300,000
### Table C-4. Conceptual Construction Cost Estimate - Alternative 4

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>ITEM DESCRIPTION</th>
<th>UNITS</th>
<th>QUANTITY</th>
<th>UNIT COST</th>
<th>AMOUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COMMON EXCAVATION</td>
<td>CY</td>
<td>18,830</td>
<td>$30</td>
<td>$564,912</td>
</tr>
<tr>
<td></td>
<td>BORROW EMBANKMENT</td>
<td>CY</td>
<td>742</td>
<td>$35</td>
<td>$25,956</td>
</tr>
<tr>
<td></td>
<td>STRUCTURAL EXCAVATION</td>
<td>CY</td>
<td>445</td>
<td>$50</td>
<td>$22,250</td>
</tr>
<tr>
<td></td>
<td>UNDERCUT</td>
<td>CY</td>
<td>15,934</td>
<td>$50</td>
<td>$796,710</td>
</tr>
<tr>
<td></td>
<td>SUBGRADE STABILIZATION</td>
<td>CY</td>
<td>15,934</td>
<td>$40</td>
<td>$637,368</td>
</tr>
<tr>
<td>RDWY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ROADWAY</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FULL-DEPTH ASPHALT PAVEMENT (2&quot; HMA SURFACE Course+5&quot; HMA BASE Course+6&quot; GAB)</td>
<td>SY</td>
<td>26,557</td>
<td>$58</td>
<td>$1,540,306</td>
</tr>
<tr>
<td></td>
<td>ASPHALT DRIVEWAY (4&quot; HMA + 4&quot; GAB)</td>
<td>SY</td>
<td>587</td>
<td>$47</td>
<td>$27,589</td>
</tr>
<tr>
<td></td>
<td>7&quot; PCC DRIVEWAY</td>
<td>SY</td>
<td>351</td>
<td>$90</td>
<td>$31,590</td>
</tr>
<tr>
<td></td>
<td>PCC SIDEWALK (4&quot; PCC +4&quot; GAB)</td>
<td>SY</td>
<td>4,229</td>
<td>$75</td>
<td>$317,175</td>
</tr>
<tr>
<td></td>
<td>PCC WHEELCHAIR RAMPS 7&quot; PCC)</td>
<td>EA</td>
<td>33</td>
<td>$400</td>
<td>$13,200</td>
</tr>
<tr>
<td></td>
<td>SHARED PATH (4&quot; HMA + 4&quot; PCC)</td>
<td>SY</td>
<td>0</td>
<td>$47</td>
<td>$0</td>
</tr>
<tr>
<td></td>
<td>MOUNTABLE CURB</td>
<td>CY</td>
<td>312</td>
<td>$270</td>
<td>$84,240</td>
</tr>
<tr>
<td></td>
<td>MOUNTABLE CURB AND GUTTER</td>
<td>CY</td>
<td>154</td>
<td>$350</td>
<td>$53,900</td>
</tr>
<tr>
<td></td>
<td>PCC BUS STOP PADS</td>
<td>CY</td>
<td>133</td>
<td>$350</td>
<td>$46,667</td>
</tr>
<tr>
<td>STWM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>STORMWATER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CDS (INLET, CONTINUOUS DEFLECTIVE SEPARATOR)</td>
<td>EA</td>
<td>30</td>
<td>$10,500</td>
<td>$315,000</td>
</tr>
<tr>
<td></td>
<td>CLOSED STORM DRAIN SYSTEM</td>
<td>LF</td>
<td>5,400</td>
<td>$150</td>
<td>$810,000</td>
</tr>
<tr>
<td></td>
<td>OPEN STORM DRAIN SYSTEM</td>
<td>LF</td>
<td>5,300</td>
<td>$95</td>
<td>$503,500</td>
</tr>
<tr>
<td></td>
<td>48&quot; PERFORATED CMP W/ PERVERIOUS FILL</td>
<td>LF</td>
<td>2,300</td>
<td>$140</td>
<td>$322,000</td>
</tr>
<tr>
<td></td>
<td>OUTFALL IMPROVEMENTS</td>
<td>EA</td>
<td>8</td>
<td>$750</td>
<td>$6,000</td>
</tr>
<tr>
<td></td>
<td>MANHOLE</td>
<td>EA</td>
<td>15</td>
<td>$6,000</td>
<td>$90,000</td>
</tr>
<tr>
<td></td>
<td>CULVERT (OREGON AVENUE CROSSING)</td>
<td>EA</td>
<td>8</td>
<td>$12,000</td>
<td>$96,000</td>
</tr>
<tr>
<td></td>
<td>CULVERT (DRIVEWAY CROSSING)</td>
<td>EA</td>
<td>42</td>
<td>$5,500</td>
<td>$231,000</td>
</tr>
<tr>
<td></td>
<td>PCC HEADWALL</td>
<td>EA</td>
<td>6</td>
<td>$3,000</td>
<td>$18,000</td>
</tr>
<tr>
<td></td>
<td>RAIN GARDEN</td>
<td>SY</td>
<td>750</td>
<td>$160</td>
<td>$120,000</td>
</tr>
<tr>
<td></td>
<td>LEVEL SPREADER</td>
<td>EA</td>
<td>3</td>
<td>$25,000</td>
<td>$75,000</td>
</tr>
<tr>
<td>STRU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>STRUCTURES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>COPING WALL 8&quot; to 18&quot; HEIGHT</td>
<td>LF</td>
<td>396</td>
<td>$35</td>
<td>$13,860</td>
</tr>
<tr>
<td></td>
<td>RETAINING WALL 1-6&quot; to 5' HEIGHT W/ SAFETY RAILING</td>
<td>LF</td>
<td>1,375</td>
<td>$300</td>
<td>$412,500</td>
</tr>
<tr>
<td></td>
<td>RETAINING WALL 5&quot; to 10' HEIGHT W/ SAFETY RAILING</td>
<td>LF</td>
<td>323</td>
<td>$465</td>
<td>$150,195</td>
</tr>
<tr>
<td></td>
<td>PINEHURST RUN CULVERT REPLACEMENT (BRIDGE STRUCTURE)</td>
<td>LS</td>
<td>1</td>
<td>$325,000</td>
<td>$325,000</td>
</tr>
<tr>
<td>UTIL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>UTILITIES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8&quot; WATERMAIN REPLACEMENT</td>
<td>LF</td>
<td>1,900</td>
<td>$300</td>
<td>$570,000</td>
</tr>
<tr>
<td></td>
<td>12&quot; WATERMAIN REPLACEMENT</td>
<td>LF</td>
<td>3,000</td>
<td>$400</td>
<td>$1,200,000</td>
</tr>
<tr>
<td></td>
<td>10&quot; SANITARY SEWER REPLACEMENT</td>
<td>LF</td>
<td>2,500</td>
<td>$350</td>
<td>$875,000</td>
</tr>
<tr>
<td></td>
<td>12&quot; SANITARY SEWER REPLACEMENT</td>
<td>LF</td>
<td>750</td>
<td>$450</td>
<td>$337,500</td>
</tr>
<tr>
<td></td>
<td>2&quot; GASLINE REPLACEMENT</td>
<td>LF</td>
<td>500</td>
<td>$160</td>
<td>$80,000</td>
</tr>
<tr>
<td></td>
<td>4&quot; GASLINE REPLACEMENT</td>
<td>LF</td>
<td>2,300</td>
<td>$170</td>
<td>$391,000</td>
</tr>
<tr>
<td></td>
<td>STREET LIGHT UPGRADING</td>
<td>LF</td>
<td>9,000</td>
<td>$10</td>
<td>$90,000</td>
</tr>
<tr>
<td>ITEM NO.</td>
<td>ITEM DESCRIPTION</td>
<td>UNITS</td>
<td>QUANTITY</td>
<td>UNIT COST</td>
<td>AMOUNT</td>
</tr>
<tr>
<td>---------</td>
<td>------------------------</td>
<td>-------</td>
<td>----------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td></td>
<td>PEPCO RELOCATIONS</td>
<td>LF</td>
<td>7,500</td>
<td>$50</td>
<td>$375,000</td>
</tr>
<tr>
<td></td>
<td>VERIZON RELOCATIONS</td>
<td>LF</td>
<td>7,500</td>
<td>$40</td>
<td>$300,000</td>
</tr>
<tr>
<td></td>
<td>COMCAST RELOCATION</td>
<td>LF</td>
<td>7,500</td>
<td>$20</td>
<td>$150,000</td>
</tr>
<tr>
<td>LASP</td>
<td>LANDSCAPING</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>TREE REMOVAL</td>
<td>EA</td>
<td>85</td>
<td>$300</td>
<td>$25,500</td>
</tr>
<tr>
<td></td>
<td>NEW TREE - 2” DBH</td>
<td>EA</td>
<td>260</td>
<td>$400</td>
<td>$104,000</td>
</tr>
<tr>
<td></td>
<td>TREE PRUNING</td>
<td>EA</td>
<td>50</td>
<td>$100</td>
<td>$5,000</td>
</tr>
<tr>
<td></td>
<td>SEEDING/SODDING</td>
<td>SY</td>
<td>20,000</td>
<td>$6</td>
<td>$120,000</td>
</tr>
<tr>
<td>PMSG</td>
<td>PAVEMENT MARKINGS AND SIGNING</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ROADWAY PAVEMENT MARKINGS</td>
<td>LF</td>
<td>31,511</td>
<td>$4</td>
<td>$126,044</td>
</tr>
<tr>
<td></td>
<td>TRAFFIC SIGNS</td>
<td>SF</td>
<td>900</td>
<td>$50</td>
<td>$45,000</td>
</tr>
<tr>
<td></td>
<td>TRAFFIC SIGN SUPPORTS</td>
<td>LF</td>
<td>1,064</td>
<td>$5</td>
<td>$5,320</td>
</tr>
<tr>
<td></td>
<td>SUBTOTAL</td>
<td></td>
<td></td>
<td></td>
<td>$12,449,282</td>
</tr>
<tr>
<td></td>
<td>MAINTENANCE OF TRAFFIC (25% of Subtotal)</td>
<td></td>
<td></td>
<td></td>
<td>$3,112,320</td>
</tr>
<tr>
<td></td>
<td>MOBILIZATION (10% of Subtotal)</td>
<td></td>
<td></td>
<td></td>
<td>$1,244,928</td>
</tr>
<tr>
<td></td>
<td>EROSION AND SEDIMENT CONTROL (10% of Subtotal)</td>
<td></td>
<td></td>
<td></td>
<td>$1,244,928</td>
</tr>
<tr>
<td></td>
<td>NEW SUBTOTAL</td>
<td></td>
<td></td>
<td></td>
<td>$18,051,458</td>
</tr>
<tr>
<td></td>
<td>CONTINGENCY (30% of New Subtotal)</td>
<td></td>
<td></td>
<td></td>
<td>$5,415,438</td>
</tr>
<tr>
<td></td>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td>$23,466,896</td>
</tr>
<tr>
<td></td>
<td>TOTAL CONSTRUCTION COST</td>
<td></td>
<td></td>
<td></td>
<td>$23,500,000</td>
</tr>
</tbody>
</table>
POTENTIAL DETOUR PLANS

During the reconstruction of Oregon Avenue, portions of the roadway would be closed to all but local and emergency vehicle traffic due to the limited right of way and narrow roadway. Therefore, in order to minimize impacts, it is recommended that reconstruction occur in three phases, as presented in Table D-1. Potential detour plans are described below for illustrative purposes; actual maintenance of traffic and detour plans will be developed during final design.

Table D-1. Construction Phasing / Maintenance of Traffic

<table>
<thead>
<tr>
<th>PHASE</th>
<th>LOCATION</th>
<th>CONSTRUCTION DURATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nebraska Avenue/Bingham Drive to Chestnut Street/Wise Road</td>
<td>6 – 9 months</td>
</tr>
<tr>
<td>2</td>
<td>Chestnut Street/Wise Road to Western Avenue</td>
<td>3 – 6 months</td>
</tr>
<tr>
<td>3</td>
<td>Military Road to Nebraska Avenue/Bingham Drive</td>
<td>3 – 6 months</td>
</tr>
</tbody>
</table>

During Phase 1, traffic to and from the south destined to the section of Oregon Avenue north of Wise Road could detour via Utah Avenue to either Chestnut Street or Western Avenue to access the northern portion of Oregon Avenue (see Figure D-1). Traffic traveling along Nebraska Avenue to Oregon Avenue, including the traffic traveling through Rock Creek Park via Wise Road, could travel along Utah Avenue and Chestnut Street. As a result of these detours, there would be an increase in traffic along Utah Avenue and Chestnut Street of approximately 4,000 to 6,000 vehicles per day.

During Phase 2, the impacts from detouring traffic would be relatively minor as the northern portion of Oregon Avenue is used almost exclusively for local access. Thus, there would be minimal traffic detouring due to construction. Vehicles traveling on Oregon Avenue destined to Daniel Road, NW could detour via Chestnut Street and 32nd Street (see Figure D-2).

During Phase 3, traffic to and from the south destined to Oregon Avenue north of Nebraska Avenue could use Utah Avenue and Nebraska Avenue (see Figure D-3).
Figure D-1. Potential Detour - Phase 1
Potential Detour Plans

Figure D-2. Potential Detour – Phase 2
Figure D-3. Potential Detour - Phase 3
In accordance with Section 106 of the National Historic Preservation Act, the Area of Potential Effects (APE) for cultural resources was determined in consultation with the DC Historic Preservation Office. The APE represents the geographic area or areas within which an undertaking could cause changes in the character or use of historic properties, if any such exists.

The APE for archeological and architectural resources is shown on the following sheets.
Figure E-1. Area of Potential Effects (Sheet 2)
Wayne Wilson
Infrastructure Project Management Administration

Saadat Khan
Planning Policy and Sustainability Administration
District Department of Transportation
55 M Street, SE
Washington, DC 20003
www.ddot.dc.gov