Smithsonian National Zoological Park
Traffic Analysis and Central Parking Facility Massing Studies

Concept Submission to the National Capital Planning Commission
September 1, 2017
Central Parking Facility

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Consultants
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John d’Epagnier
Transportation Engineer
Jeff Parker
DDOT Case Manager
Jonathan Rogers
I. Introduction

The Smithsonian Institution is currently in the procurement phase to establish a Public Private Partnership (P3) to implement one of the key projects that will unlock the potential of the National Zoological Park (NZP) 2008 Master Plan – the Central Parking Facility and Midpoint Zoo Entrance. By consolidating visitor parking in a structure above the General Services Building (whose roof is the current Parking Lot C), the National Zoo will be able to reclaim Lots A and B to expand these areas as animal habitat. For an urban zoo in an historic park setting with little room to grow, this opportunity is essential to providing the best environments for our animal collection while expanding the Smithsonian’s ability to provide engaging visitor experiences and create and share knowledge to save wildlife and habitats – the primary focus of the NZP and the related Smithsonian Conservation Biology Institute which together operate at the Rock Creek site as well as at facilities in Front Royal, Virginia and at remote global research locations.

This Concept Design submission requests the Commission’s review and approval of an adjustment to the total amount of parking previously approved as part of the 2008 Master Plan (1285) that would allow an additional 166 spaces for visitor parking for a total of 1451 spaces for Visitors, SI Official Vehicles and Volunteers and Employees. These spaces would be located in the new garage as well as at Lot E in the Lower Zoo and at a staff research center on Science Hill. This request is based on what is needed to best serve the Zoo’s educational mission and visitors while encouraging use of mass transit solutions that are the best option for many. Amounts of parking for SI Vehicles, Official Visitors, Volunteers and Employees would remain as previously approved by NCPC.

The chart on page 5, summarizes the parking that currently exist at the zoo, the increases requested in the original master plan and the amount approved by NCPC, as well as what is proposed in this submission.

In its November 2008 action for the Master Plan, NCPC noted that it was not approving the requested total amount of parking (1620 spaces), because the Smithsonian had not demonstrated that the provision of those spaces conformed with the Transportation Element of the Comprehensive Plan and because potential adverse impacts on surrounded roads and intersections had not been analyzed and addressed in the Transportation Management Plan (TMP).
In anticipation of the current project and based on the above guidance, Smithsonian Facilities commissioned a traffic study in consultation with the District Department of Transportation in 2016-2017 to assess the impact on numerous intersections and roadways in the vicinity of the Zoo. These studies revealed that there was little difference between the impact of the approved amount of visitor parking versus the amount we are now proposing. This study and DDOT’s response to it are included in the Appendix. During this study, DDOT proposed extending its Circulator bus service to the Zoo’s Connecticut Avenue entrance, an option that would require a convenient turnaround within the Zoo. That option is being further explored in a current Bus Circulation Study that will address all bus traffic within the zoo as part of the overall preparation for changes to land use, parking and vehicle circulation that will come with the implementation of the Central Parking Garage project as well as new security screening at Zoo entrances.

We have provided an update on our progress in implementing the 2008 Transportation Management Plan also included in the Appendix. We have made good progress on many fronts, including success in promoting transit and in implementing a North Road shuttle for visitors. Some elements will be part of the implementation of the garage including further improvements to traffic management systems and the implementation of paid employee parking. It is expected that the P3 Team will have responsibility for operating surface parking as well as the garage. Visitor Survey Data by method of transportation for 2011-2016 is included on Page 13. Reasons for variations are not known and may include external factors such as Metro Safe Track Program or several major crimes on the Red Line as well as normal variations such as weather. Between 28% and 53% of survey respondents came by car. Of those, two thirds parked at the Zoo and others either parked in the neighborhood or were dropped off.

With respect to conformance with policies of the Transportation Element (2004), specifics were not cited and highlighted in the October 31, 2008 Executive Director’s Report. However, most of those policies appear to have been developed with individual federal employees and their daily commute and choices in mind and not with the occasional visits of family groups from a wider region to the National Zoo. Visitors to federal facilities, including visitors as the larger occupancy of a federal facility, are not specifically addressed and parking ratios for visitors are not established in the previous or current Transportation Element. Other factors are also not differentiated, including visitors who are not working age adults and who will not sit down at a desk following their commute, but rather begin a day of up and down climbing within the 163 acre site, sometimes with toddlers and picnic in hand.

I. Introduction

The Smithsonian is committed to conforming with relevant Transportation Element policies and requests interpretation of these for our multi-generational visitors and topographically challenging site, as well as the understanding that peak traveling times for visitors include the weekends and midday hours when transit options are generally more limited. The broader regional draw of a National Zoo also makes us different from a local government employer. When compared with other major zoos, our experience with visitor parking is more comparable, including the desire to reduce the land dedicated to parking in favor of improved animal habitats and visitor experience while accommodating those with less viable transit options. An article from the American Planning Association (APA), entitled “Lions, Tigers and...Cars?” by Peter Harnik and Alexandra Hiple, comparing parking and visitation at major zoos, showed the National Zoo to have less parking than many other zoos based on the ratio of spaces to annual visitors.

Using daily visitor data from the most recent historical peak visitation year prior to 2016, (2007), the proposed increased parking amount of 1285 visitor spaces (plus 166 spots reserved for employees, volunteers and official vehicles) would result in the Zoo being able to satisfy visitor parking demand on all but 39 days of the year, equivalent to the 89th-percentile visitation level. The previously approved amount of visitor parking (1119 spaces) would satisfy visitor parking demand on all but 54 days of the year, equivalent to the 85th-percentile visitation level. Based on visitor projections for 2027-32 of 3.5 million, the existing parking supply would accommodate visitor demand 64% of the year. The NCPC approved parking supply would accommodate demand 75% of the year and the current proposed total would accommodate demand 81% of the year. Peak visitation days tend to fall on weekends or holidays; therefore, the proposed increased parking amount would significantly reduce the likelihood of zoo visitors searching for off-site parking in the adjacent neighborhoods on approximately 15 additional Saturdays or Sundays compared to the previously approved parking total. The NZP Park Manager reports that the parking lots fill to capacity by mid-day on approximately 100 days per year.

Anticipating the advantages of concentrating visitor parking in the new garage, Smithsonian Facilities staff have undertaken massing and view-shed studies that address a larger garage than anticipated in the Master Plan, based on studies undertaken in 2011 as part of the GSB Retaining Wall project. These studies are included beginning on Page 18 and suggest that a somewhat larger garage would be acceptable. Actual designs would be prepared by the AE on the selected P3 team and these would be subject to NCPC and other agency review as for any other Smithsonian project. It is noted that the 2008 Master Plan included a small Office block at the north end of the Parking Garage. The Office block is not part of the current P3 plan. A future update of the Master Plan will consider whether this remains a desirable option. At this time, we do not anticipate the need. A small portion of the garage will likely house a modest amount of workspace for the P3 team staff on duty at the garage.
## I. Introduction

<table>
<thead>
<tr>
<th>NZP PARKING LOCATION</th>
<th>EXISTING PARKING #=#2008 Master Plan Count</th>
<th>CURRENT COUNT</th>
<th>REQUESTED IN THE MASTER PLAN</th>
<th>APPROVED BY NCPC</th>
<th>CURRENT PROPOSED CONCEPT</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>111 Employee 35 Service</td>
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<td>Not called out</td>
<td>20 No visitors</td>
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<td>888</td>
<td>844</td>
<td>1620</td>
<td>1285</td>
<td>1451</td>
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### NZP PARKING BY USER TYPE

<table>
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<tr>
<th>User Type</th>
<th>Visitor</th>
<th>Employee (1:4 for 520+) including volunteers</th>
<th>Official Veh/Voluteers</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>Visitor</td>
<td>678</td>
<td>1419</td>
<td>1119</td>
<td>1285</td>
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<tr>
<td>Employee (1:4 for 520+) including volunteers</td>
<td>210</td>
<td>131</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>Official Veh/Voluteers</td>
<td>Included with Employees</td>
<td>70</td>
<td>35</td>
<td>35</td>
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<tr>
<td>TOTAL</td>
<td>888</td>
<td>844</td>
<td>1620</td>
<td>1451</td>
</tr>
</tbody>
</table>

Parking Summary
I. Introduction

Existing Surface Parking Lots A, B, C, D, E, Research Hill

Proposed Parking in the 2008 Master Plan

Research Hill (Staff Only)
I. Introduction

Existing Visitor Pedestrian Circulation

Existing Surface Parking Lots + Vehicular Circulation
II. Project Overview

a. Description of Agency Mission

The Smithsonian National Zoological Park is part of the larger Smithsonian complex that includes 19 museums and galleries and nine research centers, established in 1846 with the purpose of “the increase and diffusion of knowledge”.

The Smithsonian’s mission is defined in its 2017-2022 Strategic Plan:

- The Smithsonian creates knowledge through high-impact research in science, art, history, and culture.
- It preserves our national and natural heritage, as well as aspects of other cultures, through art and its curation, by maintaining important historical artifacts, and by caring for and expanding the National Collection [which includes the living animal collection at the National Zoo].
- It shares knowledge with the public through compelling exhibitions, education programs, and media products, by telling the American story, and by showcasing American artistic, intellectual, and technological leadership.

The National Zoological Park and the related Smithsonian Conservation Biology Institute further define their mission in their 2013-2018 Strategic Plan: “We provide engaging experiences with animals and create and share knowledge to save wildlife and habitats” with the overarching goal of saving species from extinction.
Current and (projected 2027-2032) National Zoological Park employment includes:

Daily Employment (FTE) for Smithsonian Facilities, Office of Protection Services/NZP Police, and NZP/SCBI Federal and Trust employees: 334 (384)

Daily Employment (permanent) for Friends of the National Zoo (FONZ): 91 (111)


FONZ Seasonal Employees: 300 (400)

FONZ Volunteers (highest on any given day): 135 (150)

National Zoological Park Annual Visitation is currently approximately 2.7 million (2016) and was projected to be 3,500,000 by 2027-2032 in the 2008 Master Plan. We believe that number continues to be our best estimate given the proposed expansions and upgrades to animal exhibits and visitor amenities expected. We are also having very good results in Giant Panda breeding which is a significant draw for visitors. Our visitation is also affected by broader patterns including the increasing population of DC that has occurred since hitting its low point around the time of the 2008 master plan. Smithsonian visitation declined after the events of 9/11 and the setbacks from the Great Recession but has now recovered.
II. Project Overview

b. Project Area

The location of the proposed Parking Garage along North Road and above Rock Creek is shown on this page. The garage will be built on the roof of the General Services Building (GSB), completed in 1976 and always intended to have a garage built above. For that reason, the shoring of the hillside on the northeast side of North Road was constructed in a more temporary fashion. Its subsequent failing condition led to the separate construction of the North Road GSB Retaining Wall (approved by NCPC in June 2012). The GSB houses the NZP commissary that prepares animal food, the fleet fuel depot, operations and maintenance shops, NZP Exhibits offices, and NZP Park Management as well as general administrative offices and engineering (design and construction) support offices, locker rooms and employee restrooms.
II. Project Overview

1. Looking toward retaining wall from North Road
2. Looking NW at retaining wall and the General Services Building
3. Looking south along retaining wall
The National Zoo is located within Rock Creek Park and is itself a National Historic District.

The Zoo is characterized by a rugged landscape with significant grade changes within the park -- 166 feet (50.9m) between the Lower Zoo Entry and Connecticut Avenue. The Zoo borders Connecticut Avenue and other city streets with dense residential and commercial development.

The General Services Building (GSB) is adjacent to the 100-year flood plain for Rock Creek and its eastern edge is within the 500-year flood plain. (See maps on this page.)
The Parking Garage will be located on top of the GSB roof and on land immediately to the east that is currently occupied by additional surface parking, equipment and trailers. The Garage will be connected to the main pedestrian paths of the Zoo by a bridge across North Road to a new entrance plaza (see page 18).

The Garage is proposed to contain a total of 1285 visitor parking spaces, an increase of approximately 157 spaces over what was approved for the garage by NCPC for the master plan (which focused on the maximum total on site rather than their precise distribution to various lots). An additional 166 spaces (131 for employees and 35 for Official Vehicles, Volunteers and Official Visitors as previously approved) will be allocated to surface lots at the Lower Zoo and Research Hill. This results in a total increase in parking on site of 166 spaces (from 1285 to 1451) over the amounts approved in the master plan. This amount remains well below the total of 1620 requested in the 2008 Master Plan. To provide an understanding of the impact of an additional 166 parking spaces on nearby roadways, the Smithsonian undertook analysis of 21 intersections on the roadways surrounding the Zoo to determine if the added spaces would make a significant difference to traffic flow at peak times (typically Saturday mornings). The traffic counts and analyses were undertaken by RKK with direction on which intersections to evaluate and the methods of analysis approved by DDOT. There were only two intersections where the new trips generated by the 166 additional requested parking spaces would exceed DDOT’s threshold for changes in intersection delay and those changes are proposed to be mitigated. A copy of the CTR and DDOT’s review letter dated June 21, 2017 are included in the Appendix.
Because the Smithsonian has not yet selected its P3 team, and therefore a proposed architectural team and design, descriptions of the project and the massing studies included on pages 17-48 reflect internal SI studies and past master planning and feasibility studies only. The design proposed by the successful team will be presented as a Revised Concept Design following award of the contract. The Garage, Bridge and Landing Area will be built to meet Smithsonian design standards and will be compatible with the Zoo’s Olmsted Walk Design Guidelines. The Smithsonian expects to require the Garage to meet the standards for certification as a Green Garage under the Parksmart program administered by Green Business Certification, Inc.

The project will include landscape work to screen the garage as well as to integrate its Landing Area with the Zoo’s pedestrian walks. The landing area will occur in front of a new entrance security screening pavilion, a separate project that includes screening for multiple entrances whose NCPC approval process will likely overlap that for the Parking Garage.
d. MASTER PLAN ALIGNMENT

The project aligns with the 2008 Master Plan with the exception of the following:

- The increase in overall site parking from 1285 to 1451 spaces.
- An increase in the garage capacity from 1128 to 1285 spaces.
- The construction of the North Road GSB Retaining Wall as a separate project rather than as part of the garage itself.
- The small office block addition included in the master plan at the upper end of the Garage is not a part of the project. The need for this and its location would be re-evaluated as part of our next master plan update.
- The addition of security screening pavilions to all zoo entrances was not anticipated in the master plan. While not a part of this project, the screen pavilion and garage designs at the Landing Area will be coordinated.

The Master Plan has served the Smithsonian well, with many projects completed or in progress, including the recently approved projects for the Bird House, Retail Building and Police Station and the completed Elephant Trails and Seals and Sea Lions facilities. Most relevant to this project is progress in implementing the Transportation Management Plan. A summary of our project on each element of this is included in the Appendix. The Garage project is key to that plan and its completion will include the introduction of smart technologies to minimize idling and congestion as well as the implementation of paid parking for employees. A few of the mitigation measures involving offsite parking that were included in the TMP did not prove feasible. The neighborhood continues to have few commercial parking options and a scarcity of street parking.

In a related project, we are also currently re-evaluating the location for bus circulation and parking as a separate traffic study. The master plan left the bus lot in its current location. There is the potential to consider relocating the bus lot to the Lower Zoo area as well as to construct a turnaround on Zoo property in the vicinity of Connecticut Avenue sized for use by the Circulator. While the Master Plan provided a turnaround in this general area, its purpose then was related to an underground garage that was not part of the final approval. Such a turnaround would be separate from the Garage Project and would be constructed after the garage is completed and Lot A is taken out of service.

e. PROJECT SCHEDULE

The Smithsonian has identified a short list of proposing teams for the garage project and is preparing an RFP for issue to those teams (expected by October 2017). The RFP process will take approximately 6 months (CONFIRM) and will include 15% concept design for the garage, along with a complete financial and operating proposal for the project. Once selected, the project’s design would be submitted by the Smithsonian for review and approval in accordance with NCPC’s requirements in a similar manner to our typical capital projects. Construction of the project is expected to begin in 2018 and complete in 2020.

f. PROJECT COST ESTIMATE

A construction cost for the project is not yet available but is expected to be roughly $50 million. The P3 Team will be proposing a complete package that includes finance, design, construction, maintenance and operations over a 30 year period, with a portion of annual receipts to be returned to the Smithsonian.
OUTREACH AND COORDINATION

a. PUBLIC ENGAGEMENT

The Zoo frequently meets with neighboring agencies and ANCs and expects to keep them informed about the parking garage project and any expected temporary and permanent expected changes to parking and vehicle circulation at the NZP once the P3 Team and its design are under agreement and the Bus Circulation Study is complete.

The public was provided with the opportunity to comment during the Environmental Assessments for the Master Plan and the North Road Retaining Wall. Public comment during the 2008 EA was generally favorable for providing additional parking including the preferred Alternative C that included a mid-point garage and a smaller underground lot nearer Connecticut Avenue and a total of 1620 spaces. Concerns were raised to avoid polluting Rock Creek and to there was support to expand and improve habitats for animals. Accommodating more of the Zoo’s visitors with on-site parking is expected to reduce competition with residents and businesses in the neighborhood for a limited supply of both street parking and commercial parking while making additional land available for animal habitat and improved stormwater facilities.

COORDINATION WITH FEDERAL, STATE AND LOCAL JURISDICTIONS

In developing this Concept focused on the impact of additional parking spaces on roadways and garage massing, the Smithsonian has coordinated with DDOT and NCPC as the agencies with jurisdiction over these issues. Smithsonian and Zoo staff have met with DDOT traffic engineers to refine the traffic analyses required as well as with their manager for the Circulator Bus system to discuss the requirements for a bus turnaround. DDOT has been invited to bring a Circulator bus up to the Zoo to test whether utilizing the current Bus Lot might be feasible as a long term or temporary solution. The Smithsonian expects the Central Parking Garage project will follow a typical agency staff review process with involvement of NCPC, NPS, CFA and DC HPO, including a full Concept Review following the selection of a P3 team and design. The Smithsonian has reached out to relevant oversight committees of Congress as well.

DETAILED PROJECT INFORMATION AND DRAWINGS

A massing study with diagrammatic plans, sections and view-shed illustrates the potential additional garage massing required to accommodate approximately 160 additional cars. These diagrammatic studies prepared by Smithsonian Facilities staff are included in the following section. NCPC’s comments on the massing would be provided to the four P3 teams competing for the project from which a proposal will be selected next year. The selected project will be submitted as a Revised Concept Design.

PROJECT EFFECTS AND ENVIRONMENTAL CONSIDERATIONS

a. HISTORIC PRESERVATION

The project will be subject to a Section 106 review which will be initiated upon selection of a P3 team. The DC HPO will be involved in agency consultations during the development of a Revised Concept Design by the P3 team. Efforts to avoid adverse effects on the National Zoo and Rock Creek historic resources will be made as with all projects at the National Zoo.

b. NATURAL RESOURCES

The majority of the project’s construction will be on top of an existing structure and previously developed site. The Environmental Assessment for the NZP Master Plan and the Supplementary EA for the North Road Retaining Wall project address the environmental issues for this project.

FLOODING

The GSB building is adjacent to the 100 year flood plain and a small portion of the site extends into the 500 year flood plain. See page 12.

STORMWATER

The future Revised Concept Design submission prepared by the P3 team will include a storm water management plan in conformance with the DC regulation and taking account of particular issues for a parking garage at the Zoo and adjacent to Rock Creek.
PARKING LOT C
EXISTING CONDITIONS

IV. Massing Study

* APPROXIMATE AREA

~ 90,700 SF
~ 27,600 SF
LEVEL 1 – PARKING LOT C
PARKING LOT EXPANSION – TOP VIEW - CONCEPT

LEGEND:
- OFFICE TOWER INCLUDED IN THE MASTER PLAN IS NOT PART OF THIS PROJECT.
- PROPOSED DECK – CONCEPT STUDY 11.03.11
- VERTICAL CIRCULATION – CONCEPT STUDY 11.03.11
- NEW DECK MODIFICATION
- ADDITIONAL LANDSCAPE SCREENING AREA (TREES, SHRUBS)
PARKING LOT C - MASSING MODEL
SITE CONTEXT & MASSING
MASSING DIAGRAM
PARKING LOT EXPANSION -VIEW FROM ROCK CREEK, LOOKING SOUTH

LEGEND:
- PROPOSED DECK – CONCEPT STUDY 11.03.11
- VERTICAL CIRCULATION – CONCEPT STUDY 11.03.11
- NEW DECK MODIFICATION

LEVEL 1 -EXISTING PARKING LOT C
LEVEL 1 - NEW EXTENSION
LEVEL 2
LEVEL 3
LEVEL 4
LEVEL 5
LEVEL 6
LEVEL 6 - NEW DECK
LEVEL 5 - NEW DECK
LEVEL 4 - NEW DECK
MASSING DIAGRAM
PARKING LOT EXPANSION - ELEVATION

LEGEND:

- PROPOSED DECK – CONCEPT STUDY 11.03.11
- VERTICAL CIRCULATION – CONCEPT STUDY 11.03.11
- NEW DECK MODIFICATION

ELEVATION - VIEW FROM NORTH ROAD, LOOKING NORTH
LEVEL 1- PARKING (EXISTING LOT C)
CONCEPT DIAGRAM

CONCEPT STUDY: 298 PARKING SPACES – 250 EXISTING, 48 NEW IN THE EAST EXTENSION
DECK EXTENSION: 18 ADDITIONAL PARKING SPACES

LEVEL 1 TOTAL: 316 PARKING SPACES
LEVEL 2 - PARKING
CONCEPT DIAGRAM

CONCEPT STUDY: 174 PARKING SPACES
DECK EXTENSION: 0 ADDITIONAL PARKING SPACES
LEVEL 2 TOTAL: 174 PARKING SPACES
LEVEL 3 - PARKING
CONCEPT DIAGRAM

LEGEND:
- PROPOSED DECK – CONCEPT STUDY (11.03.11)
- VERTICAL CIRCULATION – CONCEPT STUDY (11.03.11)
- NEW DECK MODIFICATION
- NEW PARKING SPACES

CONCEPT STUDY: 244 PARKING SPACES
DECK EXTENSION : 0 ADDITIONAL PARKING SPACES

LEVEL 3 TOTAL: 244 PARKING SPACES
LEVEL 4 - PARKING
CONCEPT DIAGRAM

CONCEPT STUDY: 208 PARKING SPACES
DECK EXTENSION: 17 ADDITIONAL PARKING SPACES
LEVEL 4 TOTAL: 225 PARKING SPACES

LEGEND:
- PROPOSED DECK – CONCEPT STUDY (11.03.11)
- VERTICAL CIRCULATION – CONCEPT STUDY (11.03.11)
- NEW DECK MODIFICATION
- NEW PARKING SPACES
LEVEL 5 - PARKING

CONCEPT DIAGRAM

LEGEND:
- PROPOSED DECK – CONCEPT STUDY (11.03.11)
- VERTICAL CIRCULATION – CONCEPT STUDY (11.03.11)
- NEW DECK MODIFICATION
- NEW PARKING SPACES

CONCEPT STUDY: 164 PARKING SPACES
DECK EXTENSION: 28 ADDITIONAL PARKING SPACES

LEVEL 5 TOTAL: 192 PARKING SPACES
CONCEPT DIAGRAM

LEVEL 6 - PARKING

CONCEPT STUDY: 109 PARKING SPACES
DECK EXTENSION: 25 ADDITIONAL PARKING SPACES

LEVEL 6 TOTAL: 134 PARKING SPACES

LEGEND:
- PROPOSED DECK – CONCEPT STUDY (11.03.11)
- VERTICAL CIRCULATION – CONCEPT STUDY (11.03.11)
- NEW DECK MODIFICATION
- NEW PARKING SPACES

09-01-2017 Concept Submission
National Zoological Park-Central Parking Facility
Note: Due to the high density of trees surrounding the neighborhoods and parking area, the retaining wall and new parking deck would be nearly impossible to see.
PATH BEHIND SMALL MAMMAL HOUSE – POINT E : VIEW 1 - 2
OLMSTEAD WALK – POINT G : VIEW 1 - 3
PATH BEHIND REPTILE DISCOVERY CENTER TO PARKING LOT C – POINT 1: VIEW 1-3
OLMSTEAD WALK – CONSERVATION CAROUSEL - POINT K : VIEW 1 - 3
NORTH ROAD – BEHIND PARKING LOT B – POINT L : VIEW 1 - 3
NORTH ROAD – PARKING LOT C – POINT M : VIEW 1 - 2
Note: Due to the high density of trees surrounding the neighborhoods and parking area, the retaining wall and new parking deck would be nearly impossible to see.
V. Appendix

Introduction

The purpose of this document is to describe the anticipated impacts of proposed development at the National Zoological Park (NZP) to satisfy the requirements of the District Department of Transportation's (DDOT) Comprehensive Transportation Review (CTR) process.

The 2008 Transportation Management Program (TMP), a component of the Facilities Master Plan for the National Zoo, concluded that a total of 1,620 parking spaces would be required for the Zoo to accommodate the future visitor demand during all but 58 days of the year, assuming daily parking demand that is commensurate with a projected annual visitation of 3.1 million people. There are currently 888 existing parking spaces at the Zoo, occupying 4.5 acres. Existing parking lots A, B, and D (marked with red K's on the zoo map shown as Figure 1 on the following page) would be eliminated under the TMP proposal and their land areas repurposed for animal exhibits and visitor services. The TMP proposal amounted to a net increase of 732 spaces. One goal of the additional parking capacity is to reduce the frequency of adverse effects on traffic operations on roads abutting the zoo (such as Connecticut Avenue, Beach Drive, and Adams Mill Road) when the lots are full and vehicles must be turned away. A secondary goal is to reduce the need for zoo visitors to park on streets in the neighborhood adjacent to the zoo by providing more capacity for them within the zoo property.

In 2008, NCP approved all but 335 of the additional 732 spaces proposed in the TMP, which would result in a total of 1,285 spaces instead of the proposed 1,451 spaces. The approved total of 1,285 spaces represents an increase of 397 spaces compared to existing conditions. The 1,285 spaces were assumed to be allocated as shown in Table 1.

Table 1 - NCP-Approved Parking (2008)

<table>
<thead>
<tr>
<th>Lot</th>
<th>Existing (2008 &amp; 2017) Parking Spaces</th>
<th>NCP-Approved Changes</th>
<th>Total Spaces with NCP-Approved Changes</th>
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<tr>
<td>A</td>
<td>200</td>
<td>-100</td>
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<td>B</td>
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<td>E</td>
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<td>TOTAL</td>
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</tbody>
</table>

The Applicant now desires to construct 106 of the 335 parking spaces that were disapproved by NCP in 2008. This would bring the total number of spaces to 1,451. Figure 1 shows how the desired additional spaces would be allocated, assuming the NCP-approved changes in 2008 as the baseline condition.
The rezoned changes shown above would result in a total of 1,285 spaces at Lot C, with 1,166 of the existing 1,172 spaces in Lot E and the 20 existing spaces on Research Hill also being used, for a total of 1,451 spaces (i.e., 166 more spaces than were approved by NOCP in 2008). The specific users of the spaces in Lot E and on Research Hill have not yet been finalized by ASP; however, the net increase in spaces would be in the proposed LOT C parking structure, which will be primarily used for visitor parking.

The 2008 TMP traffic analysis was limited to the intersections providing direct access to the zoo (i.e., Connecticut Avenue at North Road, Harvard Street at Adams Mill Road, and Beach Drive at Zoo Drive Road) and two intersections within zoo property, all shown as yellow dots on Figure 1. NOCP indicated in their 2008 CDP approval that an additional evaluation of the traffic impacts along surrounding roadways and intersections is required by the Applicant for NOCP to reconsider their previous decision regarding the proposed additional parking spaces.

This study required the collection of new traffic volume data by the Applicant’s consultant during two Saturday mid-day peak periods, when DC public schools were in session and prior to the long-term closure of Beach Drive by NPS for a major reconstruction project. This traffic data was collected at 21 locations along Connecticut Avenue, Calvert Street, Beach Drive, and Adams Mill Road, as shown in Figure 2. This data was used to establish the existing conditions as well as the future baseline traffic operating conditions for the study, which include the traffic impacts of the additional parking spaces approved by NOCP in 2008.
3.1. Strategic Planning Elements (Planning Documents)

A primary purpose of the project being proposed by the Smithsonian/National Zoo is to help alleviate problems on zoo property and in the surrounding neighborhoods resulting from insufficient parking supply for zoo visitors and employees. A review of planning documents yielded Chapter 23, Section 2301.3.g of the DC Comprehensive Plan, which identifies the lack of adequate parking supply in the Rock Creek West Area (which includes the National Zoo) as an issue that needs to be addressed.

3.2. Roadway Network, Capacity & Operations

3.2.1. Vehicle Trip Generation Assumptions

Table 2 on the following page summarizes the NPP visitor count data from the 2008 TMP, which was used to perform the trip generation for the current study. This table shows how the number of vehicles entering and exiting the zoo during each hour corresponds to the number of vehicles parked at the zoo, and identifies the peak hour of zoo-generated trips. On peak visitation days, the zoo parking lots typically reach capacity by 11 AM and the vehicle entrance gates are closed to prevent any additional traffic from turning into the zoo. Therefore, the NCTCP-approved spaces and the additional requested spaces would only generate trips in and out of the zoo between these times [11 AM] and the time at which more vehicles exit than enter the zoo [i.e., 3 PM]. The trip generation projections for the additional requested spaces are based on typical parking space turnover rates (i.e., how often different vehicles enter and exit a single parking space) observed at the zoo during times when the entrance gates are open.

Daily visitation data provided by NPP for several annual periods indicated that the zoo handles significantly greater numbers of visitors on Saturdays than on weekdays or Sundays. Furthermore, the peak visitation period on weekdays does not coincide with the AM and PM peak travel periods along Connecticut Avenue, and traffic counts (verified by Year 2016 counts) show the midday Saturday peak hour volumes on Connecticut Avenue near the zoo are slightly higher than the weekday midday peak hour volumes on Connecticut Avenue near the zoo. Therefore, a midday Saturday analysis period was selected in the 2008 TMP to encompass both the highest weekend visitation and the highest traffic volumes on streets that provide access to the zoo, and the weekday AM and PM peak hours for Connecticut Avenue traffic were not evaluated. The number of daily trips that would be generated by the additional requested 166 parking spaces and the number of trips the spaces would generate during the peak hour for zoo-generated traffic on a Saturday with high zoo attendance are shown in the table. Recent (2016) traffic counts indicate the peak hour of weekday street traffic (i.e., Connecticut Avenue) traffic on Saturdays is 1 PM-2 PM. Since the peak hour for zoo-generated traffic (11 AM-12 PM) does not coincide with the peak hour of adjacent street traffic (1 PM-2 PM), the operational analysis for this traffic impact assessment uses the zoo trips that would be generated by the additional requested parking spaces during the peak hour of traffic on Connecticut Avenue (1 PM-2 PM) if the entrance gates were open to traffic during this period. This amounts to 66 additional trips entering the zoo from all access points, and 42 additional trips exiting the zoo via all access.
### Table 2 - Trip Generation and Distribution Summary

<table>
<thead>
<tr>
<th>Hour</th>
<th>Walkers to</th>
<th>Visitors Day</th>
<th>Total Visitors Day</th>
<th>Percentage of Daily Trips</th>
<th>Walkers to 0.5 Mile</th>
<th>Car to 0.5 Mile</th>
<th>Car to 0.5 Mile Capacity</th>
<th>Car Parked at Site</th>
<th>New Add'l Trips</th>
<th>New Add'l Trips Out</th>
<th>New Add'l Trips In</th>
<th>New Add'l Trips Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 - 9 AM</td>
<td>851</td>
<td>91</td>
<td>1,082</td>
<td>84%</td>
<td>298</td>
<td>2.7</td>
<td>85</td>
<td>12</td>
<td>12</td>
<td>7%</td>
<td>9</td>
<td>48</td>
</tr>
<tr>
<td>9 - 12 PM</td>
<td>1,123</td>
<td>224</td>
<td>1,347</td>
<td>84%</td>
<td>360</td>
<td>2.7</td>
<td>124</td>
<td>45</td>
<td>61</td>
<td>14%</td>
<td>49</td>
<td>45</td>
</tr>
<tr>
<td>12 - 3 PM</td>
<td>1,579</td>
<td>279</td>
<td>1,858</td>
<td>84%</td>
<td>748</td>
<td>2.3</td>
<td>201</td>
<td>58</td>
<td>279</td>
<td>15%</td>
<td>51</td>
<td>10</td>
</tr>
<tr>
<td>3 - 6 PM</td>
<td>1,198</td>
<td>106</td>
<td>1,304</td>
<td>84%</td>
<td>669</td>
<td>2.3</td>
<td>181</td>
<td>60</td>
<td>669</td>
<td>15%</td>
<td>59</td>
<td>10</td>
</tr>
<tr>
<td>6 - 9 PM</td>
<td>426</td>
<td>412</td>
<td>838</td>
<td>84%</td>
<td>821</td>
<td>2.3</td>
<td>103</td>
<td>56</td>
<td>230</td>
<td>17%</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>3,591</td>
<td>504</td>
<td>4,095</td>
<td>84%</td>
<td>1,919</td>
<td>2.3</td>
<td>247</td>
<td>95</td>
<td>1,709</td>
<td>15%</td>
<td>114</td>
<td>32</td>
</tr>
</tbody>
</table>

**Note:** Round numbers for the total trips for the Conceptual Area at 0.5 Mile. Total number of daily trips is the sum of all trips for the area.

### Projected Trip Distributions

<table>
<thead>
<tr>
<th>Hour</th>
<th>Walkers to 0.5 Mile</th>
<th>Visitors Day</th>
<th>Total Visitors Day</th>
<th>Percentage of Daily Trips</th>
<th>Walkers to 0.5 Mile</th>
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</table>

**Note:** Round numbers for the total trips for the Conceptual Area at 0.5 Mile. Total number of daily trips is the sum of all trips for the area.
3.2.2. Vehicle Site Access

- Access Location(s): The proposed development consists of a parking structure and additional surface spaces that will be located on S/NZP property and will not require direct access to any DDOT-maintained streets.
- Access Control: N/A
- Exiting Curb cut utilized: N/A
- Existing curb cuts abandoned: N/A
- Proposed curb cuts: N/A
- Curb cut width and radii: N/A

3.2.3. CTR Triggers for Further Vehicle Analysis

Further analyses of vehicular impact were conducted, and the results of these analyses are summarized in Section 3.2.13. The 417 additional parking spaces approved by NJCP in 2008 are expected to generate 375 Saturday peak hour trips (367 entering and 394 exiting), and the additional 366 spaces being requested by S/NZP are expected to generate 108 Saturday peak hour trips (61 entering and 42 exiting).

For capacity analysis, this report identifies each intersection where the overall average or an individual approach operates under LOS "E" in existing, background, and total future scenario. Vehicular trip mitigation measures are proposed in Section 3.2.12 for any site generated impacts, defined as:

- Degradation of LOS to "E" or worse in a future scenario
- Increase in delay at intersection operating under LOS "E" or "F" of greater than 5 seconds, when compared to the background scenario
- Increase in 90th percentile queue length of greater than 150 feet, when compared to the background scenario

For this analysis, the background scenario is the NJCP approved 417 additional parking spaces, and the future scenario is the additional requested 366 parking spaces.

3.2.4. Development Scenarios

The existing condition year is assumed to be 2016. Background traffic growth was assumed at 0.5% per year through 2024, based on MWCCS model volumes, historical traffic count data, and DDOT staff guidance. Site-generated traffic was based on visit data, vehicle occupancy, and parking turnover observed for preparation of the 2008 TMP (see Section 3.2.2). The build year for this project is assumed to be 2020. There are no known external developments/approved projects that will generate significant trips within the study area.

The development scenarios included in this current analysis are:
- Existing 2016 based on 2016 counts
- No-build 2020 includes existing spaces with Year 2020 background traffic growth
- Build 2020 Approved: Includes existing spaces, minus spaces to be repurposed as exhibit area, plus the currently NJCP approved number of additional parking spaces (i.e., 417 add'l spaces), with Year 2020 background traffic.

3.2.5. Vehicle Study Area

Limits of the proposed study include the 10 (10) signalized intersections along Connecticut Avenue NW between Canal St and C Street, plus 11 additional intersections as follows:

- Porter Street NW at Quebec Street NW
- Calvert Street NW at 24th Street NW
- Beach Drive NW at High Branch Parkway NW
- Beach Drive NW at Porter Street NW
- Beach Drive NW at National Zoo Entrance (esignated)
- Harvard Street NW at Adams Mill Road NW/OFF Ramp from NB Beach Drive
- Harvard Street NW at North Road NW
- National Zoo Drive NW at North Road NW
- Irving Street/Adams Mill Road/Kenyon Street, NW
- Calvert Street/Adams Mill Road/North Drive, NW
- Rock Creek Parkway/Beach Drive/Shenandoah Drive, NW

Each of the intersections being evaluated are shown on the map in Figure 2.

3.2.6. Vehicular Data Collection and Hours of Analysis

Turning movement volumes and tube counts were collected on Saturday, August 27, 2016 and on Saturday, September 30, 2016 for 4 hours between 11:00 AM and 3:00 PM. The highest traffic volumes at the count locations were generally observed between 12:15 PM and 1:45 PM; however, the peak hour along Connecticut Avenue at North Road occurred between 1:00 PM and 2:00 PM. Beach Drive was open to traffic on both days on which counts were performed.

3.2.7. Roadway Improvements

Beach Drive NW is currently under rehabilitation. The project began on September 22, 2016, and it is expected to conclude in 2017. Beach Drive NW will be closed in 4 segments for staged construction with full detour plans between the DC/MDS border and Rock Creek and Potomac Parkway. Beach Drive will be rehabilitated prior to the proposal's horizon year, but no additional capacity will be added.

3.2.8. Background Developments

There are no approved/entitled developments in the study area that would have a significant number of trips with origins/destinations within the study area. No significant changes in vehicle trips were identified. However, the growth rate for background traffic was assumed to be 0.5% per year based on MWCCS model outputs, historical traffic counts data, and DDOT staff guidance.
### 3.2.9 Background Growth

The study assumed a 0.5% per year background traffic growth rate through 2030, as agreed upon by DDOT staff, and based on Metropolitan Washington Council of Governments (MWCOG) modeling and historical traffic count data. The build-out year for this project is assumed to be 2030.

### 3.2.10 Site Trip Distribution and Assignment

The proposed project is expected to generate a total of 3.79 Saturday peak hour trips (273 trips from 417 NCCP-approved parking spaces, and 108 trips from the additional 166 LADP-requested parking spaces). The distribution of these additional trips was determined based on the existing trip distribution of trips entering and exiting the zoo at each of the three access points. These three intersections are:

- Connecticut Avenue NW and North Drive NW
- Beach Drive NW and National Zoo Drive NW
- Adams Mill Road NW and Harvard Street NW

These distribution percentages were shown previously in Table 1 along with how the percentages were applied to the trips generated at each access point (i.e., proportionally, based on existing vehicle volumes and directional splits). The trips were then distributed along Connecticut Avenue, Beach Drive, and Adams Mill Road to the edges of the study area. The total increase in traffic volumes throughout the study area because of the 166 additional requested parking spaces, compared to the study area traffic volumes with only the additional 417 NCCP-approved parking spaces, will not exceed 3 percent. Study area maps showing how these trips were distributed throughout the study area network for the additional 417 NCCP-approved spaces and for the 166 additional requested spaces are provided in Appendix A. This trip distribution methodology was previously approved by DDOT.

### 3.2.11 Analysis Methodology

Capacity analysts were conducted using Synchro to determine level of service (LOS), delay and 95th percentile queues, based on the HCM methodology. LOS thresholds follow the current HCM methodology for signalized and unsignalized intersections. Analyses were conducted for the Existing Conditions (2016), No-Build 2020 Conditions, 2020 Build Approved Conditions (the baseline condition, with 417 additional NCCP-approved spaces vs. Existing Conditions), and 2020 Build Requested Conditions (same as 2020 Build Approved plus the additional 166 spaces being requested by 5N/2P). Appendix B contains spreadsheet output showing the Saturday peak hour volumes that were used to analyze traffic operations at the 21 study area intersections. For all of these scenarios above, Appendix C contains tables summarizing the Saturday peak hour delays and levels of service at each of the 21 study area intersections.

The following is a summary of the key results of the Saturday peak hour traffic operations analyses:

- **Under Existing Conditions,** none of the study area intersections operate at LOS F overall.
  - However, the stop-controlled approach on Beach Dr at Shohreh Dr does operate at LOS F, as does the stop-controlled left turn from Shohreh Dr onto Beach Dr.
  - Also, the stop-controlled approach (unprotected) on Porter St at Beach Dr operates at LOS F.
  - Kenyon St westbound at Adams Mill Rd & Irving St operates at LOS F.
  - The northbound Connecticut Ave approach at Calvert St operates at LOS F.

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### 3.2.12 Vehicle Trip Mitigation

The two intersections found to require traffic impact mitigation per the traffic analysis results and the mitigation criteria described in Section 3.2.3 are:

- **Connecticut Avenue NW and Calvert Street NW**
- **Rock Creek and Potomac River Drive NW & Shohreh Drive NW**

These locations are both located south of the zoo. A potential mitigation option for Connecticut Avenue NW and Calvert Street NW (also discussed in Section 3.4.4—Transit Trip Mitigation) would be a proposed northeast extension of the Woodley Parkway—Adams Morgan—McPherson Square Metro DC Circulator route to the zoo. This extension would require an ability for Circulator buses to easily turn-around on the Zoo campus. DDOT should consider accommodating a bus turn-around loop as a strong mitigation for the subject action to increase the parking supply at the Zoo by 266 spaces above the NCCP-approved 417 additional spaces. The DC Circulator route extension would likely reduce passenger car trips to/from the south, including those traveling through the Connecticut Ave/Calvert St intersections.

A potential mitigation option for Rock Creek and Potomac River Drive NW & Shohreh Drive NW would be specific outreach from DDOT. DDOT should advise visitors parking by car to avoid exiting the zoo toward the south via Beach Drive during peak periods, and encourage visitors to utilize the other two express lines instead. Although this could increase the number of auto trips along southbound Connecticut Avenue, the traffic analysis indicated the critical approach at the intersection of Connecticut Ave at Calvert St is the northbound approach; therefore, the trip diversion should have a negligible effect on Connecticut Ave while allowing southbound Beach Drive at Shohreh Dr to operate below the delay threshold that would require mitigation.
Currently, there is a $22 flat fee charged per vehicle for visitors who park at the zoo. Friends of the National Zoo (FCNZ) members may park for free. Zoo staff are not currently charged a fee to park at the zoo. However, NPS is expected to implement a parking fee for staff upon completion of the proposed lot C parking structure, and NPS is amenable to implementing paid employee parking as early as the commencement of construction of the garages.

The total increase in traffic volumes throughout the study area because of the 166 additional requested parking spaces, compared to the study area traffic volumes with only the additional 417 NPS-approved parking spaces, will not exceed 3 percent. Therefore, the options proposed above should be sufficient to mitigate the impact of the additional spaces being requested by NPS.

### 3.3. Bicycle & Pedestrian Facilities

#### 3.3.2 CTR Triggers for Comprehensive Review of Bike and Pedestrian Impacts

The following subsections of this report identify the locations where most pedestrians and bicyclists currently access the zoo or have potential conflicts with vehicular traffic entering and exiting the zoo. The need for potential mitigation measures is also discussed.

#### 3.3.2 CTR Bike and Pedestrian Study Area

This study focuses on key existing locations where vehicles potentially conflict with pedestrians and bicyclists, including the following:

- Connecticut Ave NW at Main Zoo Entrance and at North Road
- National Zoo Drive at Beach Drive NW
- Harvard Street NW at Adams M & I Road
- Adams M & I Road at Sherman St NW
- North Rd at National Zoo Dr NW (internal NPS intersection)
- North Rd at Harvard St NW (internal NPS intersection)

#### 3.3.3 Data Collection and Analysis of Bike Network and Pedestrian Facilities

The proposed parking spaces will not generate new external pedestrian or bike trips. Therefore, no increase in pedestrian or bicycle volumes are anticipated at the six potential pedestrian/bike vehicle conflict points listed in Section 3.2. The 166 additional requested parking spaces will increase vehicular volumes at these points; however, the increase in total traffic volumes at each of the six external intersections will not exceed 3% due to these new trips. At the two internal intersections, the total volume increase would not exceed 8%, but the total volume at each of these intersections would be less than 300 vehicles during the peak hour. These low projected volume increase percentages are insignificant in terms of potential to increase the crash exposure of pedestrians and bicyclists.

#### 3.3.4 Mitigation for Impacts to the Pedestrian and Bike Network

The low projected increase in total traffic volumes at the zoo access intersections most often used by pedestrians and bicyclists does not support a need for mitigation measures. However, an assessment of existing bicycle facilities at the zoo in 2013 indicated that current bicycle storage options are inadequate for the demand. NPS has considered designating an improved bike route through the areas of the zoo where bicycles are permitted, as well as incorporating improved bicycle facilities in the expanded parking garage.

### 3.4. Transit Service

#### 3.4.1 CTR Triggers for Transit Mode Share

The proposed parking spaces will not generate new transit trips. However, NPS desires to increase the transit mode share above current levels.

#### 3.4.2 CTR Transit Study Area

Since the proposed parking spaces will not generate new transit trips, no transit study area boundaries were defined. However, NPS is considering a potential option which would affect the Woodley Park – Adams Morgan – McPherson Square Metro DC Circulator route.

#### 3.4.3 Data Collection and Analysis of Transit Network

The proposed development consists of additional parking spaces for personal vehicles, and therefore would not affect transit operations in the area, except along northbound Connecticut Avenue where the increase in approach delay would exceed ODOT's threshold for requiring traffic impact mitigation.

#### 3.4.4 Transit Trip Mitigation

A potential mitigation option for Connecticut Avenue NW and Calvert Street NW would be a proposed northward extension of the Woodley Park – Adams Morgan – McPherson Square Metro DC Circulator route to the Zoo. This extension would provide an ability for Circulator buses to easily turn-around on the Zoo campus. NPS should continue to accommodate a bus turn-around loop as a very strong mitigation for the subject action to increase the parking supply at the zoo above the current NPS-approved spaces. The DC Circulator route extension would likely reduce passenger car trips to/from the south, which could improve transit operations along Connecticut Avenue.

### 3.5. Site Access Loading

#### 3.5.1 Freight/Delivery

Not applicable. The proposed development consists of a parking structure and surface spaces on NPS property that will not require direct access from a ODOT-maintained street.

#### 3.5.2 Motorcoach

Not applicable. The proposed development consists of a parking structure and surface spaces on NPS property that will not require direct access from a ODOT-maintained street.
3.6. Parking

The need for the number of additional parking spaces being requested by S/NZP was previously determined in the 2008 TMP. This current study’s purpose is to evaluate the anticipated impact of these additional parking spaces in greater detail than was conducted in the 2008 TMP, not to restate the need for the additional spaces.

3.7. Transportation Demand Management (TDM)

3.7.1. Triggers for a TDM Plan

The proposed additional parking spaces are estimated to generate more than 50 Saturday peak hour trips; therefore, a TDM plan is required.

3.7.2. TDM Plan

S/NZP currently has a TDM plan and has implemented/implemented various TDM strategies to reduce employee and visitor dependence on automobiles, such as:

- Eliminating free parking for NPS staff on-site
- Providing a bus turn-around on-site to facilitate the extension of the Woodley Park – Adams Morgan – McPhearson Square Metro DC Circulator route to the Zoo.
- Information on the Zoo website explicitly stating that “the best way to get to the Zoo is by public transportation” and warning of the challenges of finding parking on-site during busy periods.

However, TDM measures will not reduce automobile demand to a level that renders the DCPC-approved parking spaces to be sufficient to prevent overflow during peak visitation periods. Therefore, the additional parking supplied requested by S/NZP is still necessary to further reduce the frequency of parking overflow occurrences that have adverse impacts on the surrounding neighborhoods.

3.8. Performance Monitoring & Measurement

The following steps described in the 2008 TMP may be taken by S/NZP to determine if actions outlined in the TMP are achieving the goals of the Comprehensive Facilities Master Plan:

- Perform visitor exit surveys on one average attendance day and one high-attendance day per year to estimate the percentage of visitors using each available mode of transportation. Ask visitors if they feel their experience getting into and out of the Zoo has improved.
- Perform a vehicle turning movement count at the intersection of Connecticut Avenue and North Road on one average attendance day and one high-attendance day per year, and use the counts to determine the intersection level of service (LOS).
- Measure the maximum queue length along condenser Connecticut Avenue approaching the North Road intersection on one high-attendance day and one peak-school/day/weekday bus day per year.
- Perform a delay study along southbound Connecticut Avenue for vehicles waiting to turn left into the Zoo on a high-attendance day and peak bus day each year. The measured delay will help verify the accuracy of the LOS determination.
During the three-year study period, 17 crashes were reported at the intersection of Adams Mill Road and Calvert Street NW. The crash data at the intersection showed patterns of side-impact (6 crashes), or 30% rear-end (10 crashes, or 30%), left-turn (3 crashes, or 9%), fixed-object (1 crash, or 3%), parked-vehicle (1 crash, or 3%), and right-angle (1 crash, or 3%) crashes. Majority of the crashes occurred during clear weather conditions with a dry roadway surface and with headlights on (for dusk/d inhite/dawn crashes).

Two bicycles were involved in the 17 crashes. Seventy percent (77%) of the crashes that occurred at the intersection were P00 crashes.

Table 2 summarizes crashes by severity, and crash type for the crash data locations provided. The crash data showed a prevalence of side-impact and rear-end crashes. Side-impact and rear-end crashes make up more than 50% of the total crashes. The crashes include 146 side-impact (31%), 97 rear-end (20%), 53 left-turn (11%), 24 backing (5%), 23 pedestrian-involved (5%), 21 right-angle (4%), 21 parked-vehicle (4%), 18 right-turn (4%), 8 head-on (2%), and 8 fixed-object (2%) crashes, with 58 crashes whose types were not specified (13%). There were no fatal crashes reported. There were 105 crashes that resulted in injuries during the 3-year study period. However, most of the crashes (377), or 78% of the total were P00 crashes.

Figure 4 presents information regarding the frequency of crashes by year and day of week. Based on the figure below, Wednesday, Friday, and Saturday each have similar crash totals of 17% to 18% of all reported crashes. Sunday has the lowest crash percentage compared to the rest of the week. Also from the figure below, over 344 crashes occurred in 2013 (39%), 171 crashes occurred in 2014 (36%), and 163 crashes occurred in 2015 (34%).

For the provided crash data, 250 crashes occurred during the daytime hours, 137 crashes occurred when it was dark with headlights on, 15 crashes occurred during dusk or dawn, and 30 crashes occurred when it was dark without headlights on, as shown in Figure 5.

In summary, Saturdays are one of three days on which the most number of crashes typically occur, and are also the days when the Zoo experiences the highest visitation levels. However, the increase in total traffic volume on the key streets in the vicinity of the Zoo resulting from the S/NP’s request to add 156 parking spaces would not exceed 3%. This small increase in total traffic volume is not likely to cause any noticeable effect on crash frequency in the area.
3.10. Streetscape/Public Realm

The proposed additional parking spaces will not encroach on any public realm, since it will not require any changes in access or geometry along any public streets.
Appendix A

Trip Distribution Percentage Maps
Appendix C:
Saturday Peak Hour Synchro Delay/COS Summary Tables
### Concept Submission

**National Zoological Park-Central Parking Facility**

#### Conceptual Design:

<table>
<thead>
<tr>
<th><strong>Section</strong></th>
<th><strong>Dimension (L x W x H)</strong></th>
<th><strong>Material</strong></th>
<th><strong>Color</strong></th>
<th><strong>Notes</strong></th>
</tr>
</thead>
</table>
| Entrance | 20 x 15 x 10 | Concrete | Gray | Existing building.
| Lobby | 15 x 12 x 8 | Glass | Clear | New construction.
| Restrooms | 5 x 5 x 4 | Steel | Stainless | ADA compliant.
| Ticket Office | 8 x 6 x 4 | Wood | Natural | Custom design.
| Gift Shop | 6 x 4 x 3 | Plastic | Transparent | Lighting feature.
| Cafe | 10 x 8 x 6 | Fabric | White | Self-service.
| Exhibition | 12 x 10 x 8 | Glass | Clear | Interactive displays.
| Administrative Offices | 15 x 12 x 9 | Glass | Frosted | Sunlight filters.

#### Parking Structure:

<table>
<thead>
<tr>
<th><strong>Section</strong></th>
<th><strong>Dimension (L x W x H)</strong></th>
<th><strong>Material</strong></th>
<th><strong>Color</strong></th>
<th><strong>Notes</strong></th>
</tr>
</thead>
</table>
| Entrance | 40 x 30 x 15 | Steel | Gray | Tilt-up panels.
| Canopy | 50 x 35 x 10 | Aluminum | Silver | Corrugated.
| Support Beams | 30 x 30 x 12 | Steel | Black | Steel I-beams.
| Driveway | 40 x 30 x 3 | Concrete | Gray | ADA compliant.
| Parking | 40 x 30 x 10 | Asphalt | Black | Lane markings.

#### Landscape Design:

<table>
<thead>
<tr>
<th><strong>Section</strong></th>
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<th><strong>Material</strong></th>
<th><strong>Color</strong></th>
<th><strong>Notes</strong></th>
</tr>
</thead>
</table>
| Entrance | 10 x 10 x 1 | Stone | Gray | Natural stone.
| Pathways | 10 x 10 x 1 | Brick | Red | Curved.
| Parking | 10 x 10 x 1 | Grass | Green | Rain gardens.
| Trees | 10 x 10 x 1 | Oak | Brown | Native species.

#### Security and Surveillance:

<table>
<thead>
<tr>
<th><strong>Section</strong></th>
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<th><strong>Material</strong></th>
<th><strong>Color</strong></th>
<th><strong>Notes</strong></th>
</tr>
</thead>
</table>
| Surveillance Cameras | 3 x 3 x 0.5 | Glass | Clear | Infrared.
| Security Gates | 6 x 6 x 2 | Steel | Black | Motorized.
| Access Control | 3 x 3 x 0.5 | Plastic | Transparent | Biometric.

#### Lighting and Electrical:

<table>
<thead>
<tr>
<th><strong>Section</strong></th>
<th><strong>Dimension (L x W x H)</strong></th>
<th><strong>Material</strong></th>
<th><strong>Color</strong></th>
<th><strong>Notes</strong></th>
</tr>
</thead>
</table>
| Entrance | 10 x 10 x 1 | LED | White | Weatherproof.
| Pathways | 10 x 10 x 1 | Solar | Blue | Photovoltaic.
| Parking | 10 x 10 x 1 | Fluorescent | White | Motion sensors.
| Trees | 10 x 10 x 1 | Halogen | Yellow | Photocells.

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**Conclusion:**

The proposed design for the National Zoological Park-Central Parking Facility integrates functional and aesthetic elements to create a welcoming and efficient environment for visitors and employees alike. The use of sustainable materials and technologies ensures energy efficiency and environmental responsibility. The conceptual design is scalable and adaptable to future growth needs.
<table>
<thead>
<tr>
<th>Scenario Name</th>
<th>Scenario Description</th>
<th>Condition 1</th>
<th>Condition 2</th>
<th>Condition 3</th>
<th>Condition 4</th>
<th>Condition 5</th>
<th>Condition 6</th>
<th>Condition 7</th>
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</thead>
<tbody>
<tr>
<td>Scenario 1</td>
<td>Description 1</td>
<td>Condition A</td>
<td>Condition B</td>
<td>Condition C</td>
<td>Condition D</td>
<td>Condition E</td>
<td>Condition F</td>
<td>Condition G</td>
</tr>
<tr>
<td>Scenario 2</td>
<td>Description 2</td>
<td>Condition A</td>
<td>Condition B</td>
<td>Condition C</td>
<td>Condition D</td>
<td>Condition E</td>
<td>Condition F</td>
<td>Condition G</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>Description 3</td>
<td>Condition A</td>
<td>Condition B</td>
<td>Condition C</td>
<td>Condition D</td>
<td>Condition E</td>
<td>Condition F</td>
<td>Condition G</td>
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</table>

09-01-2017 Concept Submission

National Zoological Park-Central Parking Facility
### National Zoological Park-Central Parking Facility

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<th>Date</th>
<th>Time</th>
<th>Event Type</th>
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<td>Concept Submission</td>
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### Smithsoniod Institution SGP Oct 2020 Request Conditions

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<th>Date</th>
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<th>Location</th>
<th>Duration</th>
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</table>
GOVERNMENT OF THE DISTRICT OF COLUMBIA
DEPARTMENT OF TRANSPORTATION

June 21, 2017

Jeff Parker, Project Manager
RJK&L LLP
300 M Street SE, Suite 560
Washington, DC 20003

RE: Comprehensive Transportation Review for the Parking Expansion Amendment to the Smithsonian National Zoological Park Facilities Master Plan

Dear Mr. Parker:

The District Department of Transportation (DDOT) appreciates the opportunity to submit a letter detailing DDOT’s review of the Comprehensive Transportation Review (CTR) for an additional 166 vehicle parking spaces on-site. DDOT is committed to achieving an exceptional quality of life in the nation’s capital by encouraging sustainable travel practices, constructing safer streets, and providing outstanding access to goods and services. As one means to achieve this vision, DDOT works with federal projects to ensure that impacts from new developments take advantage of the District’s multimodal transportation network and minimize impacts on neighborhood streets and the broader transportation network. To accomplish this, all federal projects are expected to develop a CTR to appropriately document and mitigate their impacts on the District’s transportation network.

It is DDOT’s understanding that there are currently 888 vehicle parking spaces at the National Zoological Park (NZP) and that total will increase to 1,285 spaces under the already approved 2008 facilities Master Plan, as Lots A (100 spaces), B (132 spaces), and D (221 spaces) are proposed to be closed and consolidated with 397 additional new spaces on Lot C (1,093 spaces after consolidation). The 2008 plan does not anticipate any changes to Lot E (172 spaces) or Research Hill Lot (92 spaces).

Per the CTR provided for the 2017 amendment currently under consideration, Lot C is anticipated to be expanded by 192 spaces, bringing Lot C to 1,285 spaces, which is a reduction of 26 spaces to 146 spaces, and there will be no changes to the Research Hill Lot (20 spaces). These proposed changes would result in a net increase, beyond the 2008 approval, of 166 vehicle parking spaces on-site for a total of 1,451 spaces.

After an extensive review of the CTR dated April 2017, DDOT finds:

Site Design

- Primary vehicular access to the site is proposed to continue to be provided from Connecticut Avenue NW, Beach Drive NW, and Maryland Street NW;
- The closing of Lots A, B, and D, in conjunction with the reduction of 26 spaces in Lot E and addition of 152 vehicle spaces at Lot C will have a significant impact on the balance of traffic distributed to each of the three access points; and
- This amendment to the facilities Master Plan will result in a net increase of 166 vehicle parking spaces provided on-site.

Travel Assumptions

- The CTR estimated Saturday hourly traffic based on hourly visitor counts that were collected in 2006, which is the most current available dataset. NPS estimates that daily visitor totals have not changed much over the last 11 years.
- The CTR only studied the Saturday afternoon peak hour because that is the day of the week with the highest number of visitors.
- The additional 166 parking spaces are anticipated to generate approximately 1018 vehicle trips (86 in, 42 out) during the 1-2 PM Saturday hour. All 166 spaces will be filled over the course of several hours, not just in this one hour.
- The 1-2 PM study hour was determined to be the busiest hour for the overall transportation network and thus the period studied in the CTR. The busiest hour for the Zoo is 11 AM-12 PM, generating 150 vehicle trips and based on NPS survey results, approximately 65% of visitors arrive by automobile.

Analysis

- The addition of 166 vehicle spaces will not directly lead to an increase in walking, biking, or transit ridership;
- According to the CTR, the additional traffic generated by the increase of 166 vehicle parking spaces would result in two intersection approaches, currently at Lot F, worsening by more than 5 seconds of delay:
  - Rock Creek Parkway and Potomac Parkway/Beach Drive NW & Shady Grove Drive NW (6.3 seconds)
  - Connecticut Avenue NW and Calvert Street NW (9.3 seconds);
- There is an existing Transportation Management Program (TMP) as part of the facilities Master Plan that was released in December 2008, and the proposed mitigation measures, in conjunction with the existing TMP, sufficiently address impacts to the transportation network from the addition of 166 parking spaces.

Mitigations

As part of all major development review cases, DDOT requires the Applicant to mitigate the impacts of the development in order to positively contribute to the District's transportation network. The mitigations must sufficiently diminish the action's vehicle impact and promote non-auto travel modes.

District Department of Transportation | 300 M Street SE, Suite 560, Washington, DC 20003 | 202-671-8811 | ddot.dc.gov
Comprehensive Facilities Master Plan (2008-9)
Transportation Management Plan Progress Report
May 23, 2016, Updated June 24, 2017

**Action C.1a — Build additional parking levels atop existing Parking Lot C**

**Transportation Issues Addressed:**
- Add 865 new parking spaces to existing Lot C, for a total of 3,128 spaces at this location
- Reduces the need for visitors to cruise the surrounding residential neighborhoods in search of parking spaces
- Consolidates most of the visitor parking in one centralized location, allowing visitors to find available spaces without being required to drive up and down the full length of North Road to check the status of separate, dispersed parking lots
- Provides a pedestrian bridge connecting the garage to the exhibit areas, eliminating the need for the existing at-grade pedestrian crossing on North Road

**Implementation:** 2016 – 2018

Coordination with National Park Service (NPS), Commission of Fine Arts (CFA), National Capital Planning Commission (NCPC), DC HPO (DC Historical Preservation Office), and other DC agencies as needed.

**Smithsonian Update:** This project was separated into the Reawakening Wall Project (substantially completed Nov. 2016/2017) and the Central Parking Facility Project (pre-project planning underway). Implementation, including design and construction, is tentatively focused on FY18—FY20. The Smithsonian is currently exploring real estate options including competitive selection of a third party to build and operate the garage. An RFP was posted on FedBiz-DCs in January, 2017.

---

**Action C.1b — Build an underground parking structure beneath the existing cheetah exhibit, adjacent to the Visitor Center/Administrative Building, to replace existing Parking Lot A**

**Transportation Issues Addressed:**
- Replaces the 300 parking spaces lost due to the elimination of Lot A, and supplements those with 700 new parking spaces, for a total of 1000 spaces at this location
- Reduces the need for visitors to cruise the surrounding residential neighborhoods in search of parking spaces
- Provides parking at the Visitor Center building, which will be one of the stops for the proposed aerial tram
- Provides parking on the exhibit side of North Road, eliminating the need for at-grade pedestrian crossings of the road

**Implementation:** 2023 – 2026

Coordination with CFA, NCPC, DC HPO, and other DC agencies as needed.

**Smithsonian Update:** This action was not approved at the NCPC master plan approval hearing. It has since focused its efforts on what was approved to date and the most impactful near steps to unlock the NCPC master plan, which is the consolidation of the majority of visitor parking in a central parking facility. As a result over 5 acres of land will be reclaimed for green space increasing our ability to expand animal exhibits.

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**Action C.2 — Coordinate with the District of Columbia Housing Authority (DOHA) to allow the use of excess parking at their Howard Towers property by Zoo visitors on high-attendance days**

**Smithsonian Update:** This action was removed from further consideration due to lack of feasibility.

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**Action C.3a — Construct a turn-around area (similar to a roundabout) at the lower end of North Road**

**Transportation Issues Addressed:**
- Provides a passenger drop-off area for vehicles and turn-around point for on-site zoo shuttles
- Serves as a turn-around for visitor vehicles when all on-site parking facilities are full on high-attendance days

**Implementation:** 2015

Coordination with NCPC, CFA, DOOT, DCCUP, WMATA and/or other potential shuttle operators

**Smithsonian Update:** The Smithsonian is currently rethinking the design of the Lower Zoo Entry pedestrian and traffic circulation to introduce a newly required Security Screening Pavilion at the Lower Zoo Entrance. While this design is not yet complete and has not been reviewed with external authorities, it is anticipated that the solution will provide an improved drop-off but might not incorporate a Traffic Circle.

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**Action C.3b — Construct a modern roundabout at the upper end of North Road at the proposed entrance to the underground Lot A parking garage**

**Transportation Issues Addressed:**
- Provides a passenger drop-off area for vehicles and turn-around point for on-site zoo shuttles
- Provides access from North Road to the proposed underground Lot A garage
- Serves as a turn-around for visitor vehicles when all on-site parking facilities are full on high-attendance days

**Implementation:** 2019

Coordination with NCPC, CFA, DOOT, DCCUP, WMATA and/or other potential shuttle operators

**Smithsonian Update:** NHP conducted a feasibility study and based on these findings, the proposed underground garage at Lot A will not be part of our five-year plans. The need for a modern roundabout at the Upper Zoo is still reasonable in order to eliminate congestion and ease traffic flow and drop-off in this area of the Zoo. Expected implementation would be approximately FY2022. To be coordinated with...
completion of the Parking Garage Project.

The Smithsonian is currently in the process of contracting for a new Bus Circulation Study whose goal is to identify the best option for accommodating buses in the context of the new Parking Garage and the new security screening at the Zoo entrances. This will also consider the possible expansion of DDOT’s Circulator to serve the Connecticut Avenue entry that would require a turnarounds within the 616 site.

**Action C.4 – Implement a parking management system for the existing and proposed parking facilities**

Transportation Issues Addressed:

- Provides notification of parking space availability to visitors at the North Road entrances to the Zoo and potentially at the entrances to each parking lot
- System would be expanded to the new parking facilities as they are built
- Network of message boards may eventually be expanded beyond the limits of the Zoo (e.g., along Connecticut Avenue and Rock Creek Park’s Potomac Parkway) with coordination with DDOT, the National Park Service, and the Federal Highway Administration
- Parking structures will utilize the “Pay-on-Foot” payment system to reduce congestion and siting when exiting the garages
- Provide information on the Zoo website to strongly encourage the use of public transportation, to specify which days of the year are typically “parking overflow” days to help visitors choose the most appropriate mode of transportation for their trip, and to identify alternate parking resources in the area.
- Reduces the need for visitors to cruise the surrounding residential neighborhoods in search of parking spaces.

Implementation: pilot programs beginning 2010 (for existing parking lots)

Coordination with DDOT, FHA, NPS

**Smithsonian Update:** Upgrades are completed for parking booth systems, security and management. NPP encourages Metro use and provides public transportation information on the Zoo website (https://nationzoo.org/Zoo/GettingThere) as well as opportunities to reserve parking at the Zoo or locate alternative parking through third-party company Panda Parking. The proposed Central Parking Facility will engage modernized technology for state-of-the-art parking management as described above.

**Action C.5 – Operate a shuttle bus along North Road between the upper and lower turnaround areas.**

Transportation Issues Addressed:

- Allows visitors and employees to travel more quickly between upper and lower ends of the Zoo
- Provides a connection to external bus/shuttle routes at the turn-around areas
- Improves access to the Metro stations along Connecticut Avenue by allowing visitors to ride from the lower end of the Zoo to the upper end and (vice versa)
- The Zoo already operates a shuttle for visitors along North Road during the months of high visitation.

Implementation: estimated construction timetable for roundabouts is 2013 – 2015

Coordination: No coordination necessary.

**Smithsonian Update:** NCP runs an in-house year-round shuttle system for guests that operates in winter, 11-5 and in summer 11-7. This ground shuttle system runs on a 20-minute continuous loop with two stops at the Upper Zoo and Lower Zoo. NCP is currently looking into a shuttle run that would loop through the Zoo and include Cleveland Park metro. An employee shuttle runs 6am – 7pm during spring and summer hours when employee parking is restricted to Lot C. The Bus Circulation Study’s recommendations will include any associated requirements for the shuttle system which can be used to serve visitors who come by bus back to their buses.

**Action C.6 – Seek support from third-party bus operators to include the proposed upper turn-around area on their bus routes**

Transportation Issues Addressed:

- Provides direct links to other tourist destinations such as the National Mall and Arlington National Cemetery
- Reduces the need for visitors to other D.C. attractions to drive to the Zoo.

Implementation: discussions and coordination to take place during planning and design phases for roundabouts (2013-2012)

Coordination with third-party bus operators

**Smithsonian Update:** Tour Buses, such as Big Bus have added National Zoo as a stop. In 2015, NPP had informal discussions with WMATA regarding a bus drop-off in the Park and plans to continue this discussion. The Smithsonian and DDOT have initiated discussions regarding the feasibility of extending Circulator service from the Adams Morgan Metro station to the Connecticut Avenue NCP entrance. This would require a turnaround, either via the current bus lot or via a future traffic circle on land that would become available once existing parking and access to it is replaced by the new garage.

**Action C.7 – Eliminate free parking for zoo employees (parking for volunteers, official SI vehicles and official guests would remain free; volunteer parking spaces will not be reserved.**

Transportation Issues Addressed:
Promotes increased usage of alternative transportation modes for zoo employees (if feasible based on their individual work schedules)
- Helps the zoo meet parking demand for its employees while complying with NTPC's recommended ratio of one parking space for every four employees
- Helps the National Zoo comply with internal Smithsonian staff parking policies

Implementation: Policy changes phased in beginning in 2016/17 (updated as of May 2016)

Coordination: No coordination necessary

Smithsonian Update: The Smithsonian is working on developing a parking policy slated for implementation in conjunction with the new Parking Garage project. An NTP Employee parking committee was formed and is working towards a policy and implementation. When the charges are implemented, there will be a points system for eligibility based on seniority, vehicle type, and carpooling, combined with consideration of special needs.

Action C.8 – Seek agreements with the owners/operators of nearby hotels and other businesses with significant parking resources to allow the use of their lots (at regular parking rates) during their off-peak periods during special events at the Zoo.

Transportation Issues Addressed:
- Reduces the need for visitors to cruise the surrounding residential neighborhoods in search of parking spaces.

Implementation: Currently negotiated on a case-by-case basis

Coordination with private parties

Smithsonian Update: NTP together with its contractors continues to have ongoing dialogues with businesses in the neighborhood. Occasionally, when parking is full, visitors are informed of alternative parking options such as the Marriott Wardman Park and the Omni Shoreham. The cost of these ($45-$50) combines with sometimes minimal availability to non-guests make this a limited alternative. A developer's recent proposal to convert the Marriott site to an expanded residential property would likely eliminate public parking should it go forward in the future. There are no other major publicly accessible parking facilities in proximity of the NTP site. Sometimes the Marriott and Omni request help from NTP to accommodate their overflow parking for special events after 6:00 PM and this could continue in the future.

Action C.9 – Improve safety for at-grade pathway/multi-use trail crossings where there are potential conflicts between vehicles, pedestrians and bicyclists.

Transportation Issues Addressed:
- Upgrades pedestrian crossing warning signs and pavement markings to meet the latest federal MUTCD and DDOT standards (i.e., dimensions, colors, & placement)
- Positively modifies traffic patterns near the Beach Drive entrance to the Zoo to improve lines of sight for the Rock Creek Trail crossing

Implementation: Upgrades will be incorporated through walkway improvements projects scheduled for 2012-2015.

Coordination with DDOT, DDOT and NPS

Smithsonian Update: NTP has upgraded its pedestrian warning signs and pavement markings and added stop signs at key locations of vehicle/pedestrian conflict. NTP continues to participate in ongoing project meetings with DDOT and DDOT on proposed projects to rehabilitate Rock Creek Park trail systems (portions outside the Zoo are under construction) and intersections adjacent to NTP's entrance now underway. As part of the Beach Drive project, a crosswalk at Beach Drive has recently been completed and allows safe crossing when the Zoo's Marvin St. gate is closed. With the reopening of Beach Drive, traffic can only make a right turn to exit the Zoo (no turning across traffic). The sidewalk in the tunnel has been widened for cyclists and pedestrians.