

SMITHSONIAN INSTITUTION

CONSTRUCT ARABIAN LEOPARD HABITAT
NCPC FINAL REPORT

SMITHSONIAN PROJECT CODE: 2533105

SEPTEMBER 3, 2026

SMITHGROUP



IMAGE BY MARK ADLINGTON

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1.0 PROJECT OVERVIEW



1.0 PROJECT OVERVIEW

1.1 PROJECT DATA

1.1.1 PROJECT NAME

Construct Arabian Leopard Habitat
National Zoo and Conservation Biology Institute (NZCBI)

1.1.2 AGENCY AND CONTACT

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1.1.3 PROJECT LOCATION AND SITE

Smithsonian Institution
National Zoo and Conservation Biology Institute (NZCBI)
Near the Panda Plaza Entrance at the former Bison Exhibit
3001 Connecticut Ave NW, Washington, D.C. 20008
The planned Arabian Leopard Habitat is located east of the Connecticut Avenue entrance to the National Zoo and Conservation Biology Institute site. This project addresses the replacement of the former Bison Habitat with a new animal habitat to exhibit Arabian Leopards. The project

area is situated along the historic Olmsted Walk, across from the Africa Trail Exhibit (currently under restoration), abuts the Panda Habitat and is just north of the Elephant House exhibit.

1.1.4 VICINITY MAP



Figure 1.1.3.1: National Zoological Park Historic District



Figure 1.1.3.2: Washington DC Aerial View

1.1.5 PROPOSED DEVELOPMENT AND ALTERNATIVES

The Smithsonian Institution’s NZCBI has entered a partnership to advance Arabian Leopard conservation efforts. The proposed new Arabian Leopard Habitat facility will provide year-round public viewing of adult and cub leopards that will support education around conservation of this unique species. The habitat is to be designed with the flexibility to accommodate future species such as the Amur Leopard or Jaguars. Public viewing areas are to be designed with the influence of the arid rocky mountains of the Arabian Peninsula while taking into consideration the historic environment of the National Zoological Park Historic District and Olmsted Walk.

1.1.6 PREVIOUS PLANNING DOCUMENTS

The following planning documents were provided to SmithGroup by the Smithsonian Institution to guide the project design.

- **Olmsted Walk Design Guidelines (2016)** - The Arabian Leopard Habitat project is subject to compliance with these internal design guidelines that call for an Olmsted Walk that celebrates its natural setting that is preserved to the greatest extent possible. The guiding principles of these guidelines are to enhance visitor experience, refine the design language, integrate informal learning, respect and preserve the cultural landscape, and promote sustainability.

- **Smithsonian National Zoological Park Facilities Master Plan & Environmental Assessment (2008)** - This document provides a physical framework for implementing the Zoo Strategic Plan for the next 20-25 years that ensures the Zoo’s leadership in animal care, science, education, and sustainability. The Construct Arabian Leopard Habitat was not a project included in this facilities plan.

1.1.7 NATIONAL ZOOLOGICAL PARK HISTORIC DISTRICT BOUNDARY

The Arabian Leopard Habitat is located within the National Zoological Park Historic District which was added to the DC Inventory of Historic Sites in 1964 and listed on the National Register of Historic Places in 1973. Nothing on the existing Project Site is considered a contributing element; however, the site is adjacent to the Elephant House, which is a contributing element.

1.1.8 PROJECT SCHEDULE

Design Start: April 2025
Design Completion: October 2026
Site Work and Utilities Construction Start: August 2026
Construction Completion: Winter 2028/2029

1.2 NATIONAL ZOO AND CONSERVATION BIOLOGY INSTITUTE MISSION

The Smithsonian’s National Zoo and Conservation Biology Institute (NZCBI) mission is as follows:

NZCBI saves species by using cutting-edge science, sharing knowledge, and providing inspirational experiences for our guests.

NZCBI leads the Smithsonian’s global efforts to save species, better understand ecosystems, and train future generations of conservationists. Founded in 1889, the Zoo is part of the Smithsonian Institution, the world’s largest museum and research complex. Its two campuses are home to more than 2,200 animals, including some of the planet’s most critically endangered species.

Always free of charge, the Zoo’s 163-acre park in the heart of Washington, D.C., is a popular tourist destination, welcoming nearly 2 million visitors from all over the world each year. The Zoo instills a lifelong commitment to conservation through engaging experiences with animals and the people working to save them. Today, the Zoo is home to animals representing almost 400 different species.

Smithsonian’s NZCBI researchers also work in field stations in more than 30 countries around the world. Alongside partners, they create and share knowledge to aid in the conservation and restoration of species and habitats. Findings from their studies provide critical data for the management of populations in human care, as well as valuable insights for the conservation and management of wild populations.

The Smithsonian’s NZCBI is a long-standing accredited member of the Association of Zoos & Aquariums (AZA), the organization that determines modern zoological standards for its 200-plus members. AZA accreditation certifies that the Zoo has met or exceeded AZA’s standards for animal care, veterinary programs, conservation, education and safety.



1.3 ARABIAN LEOPARD SPECIES PROGRAMMATIC AGREEMENT

The NZCBI has built a working relationship with the RCU (Royal Commission for AlUla) in a shared goal to conserve the Arabian Leopard species. The Zoo has proposed the site of the existing former Bison Habitat and existing Zoo in Your Backyard exhibit as the location for a new exhibit featuring habitats for Arabian Leopards, a care facility, and visitor viewing areas. The intent of this exhibit is to create a program similar to that of the NZCBI Panda program, with the goal of breeding the Arabian Leopards and sharing the story of their conservation and rewilding with Zoo visitors through an immersive habitat experience.

PROJECT GOALS

The goals developed by NZCBI for this project are as follows:

- **Large Leopard Habitat** – Provide exterior habitats for two Arabian Leopards with opportunities for the cats to display their natural climbing behaviors.
- **Day Room** – Provide a climate-controlled day room for animal viewing all year round.
- **Animal Care Facility** – Provide an animal care facility dedicated to animal care staff consisting of a day room, three Leopard dens, one cubbing den, and one quarantine stall.
- **VIP Viewing Space** – Provide a VIP viewing area behind the scenes that does not require the visitor to go through the animal care spaces.
- **Respond to Existing Site** – Proposed designs are to strike a balance between creating a

habitat reminiscent of the mountainous region of the Arabian Peninsula while also being compatible with the historic district and adjacencies to Olmsted Walk.

- **Accessibility** – The design is to provide fully ADA compliant paths for visitors.
- **Stormwater Management** – The site needs to address storm water management requirements.
- **Bison Habitat Structures** – Consider the reuse of Bison Habitat structures if possible.



1.4 PROGRAM REQUIREMENTS

1.4.1 ANIMAL HABITAT AND ENVIRONMENT

Arabian Leopards primarily inhabit rugged mountainous and arid regions of the Arabian Peninsula, particularly in areas with suitable hiding spots like caves and rocky terrain. While they can tolerate desert conditions, they are more commonly found in areas with water sources and cooler temperatures, especially in southern Arabia. The proposed habitat design will consider these characteristics in both the design of the ecosystem within the enclosure for the Arabian Leopards and in the surrounding referential landscape design to enrich the visitor experience.

The habitat needs to accommodate a minimum of two full-time animals with the capacity to support additional animals on a temporary basis.

1.4.2 HABITAT ENCLOSURE REQUIREMENTS

The proposed Arabian Leopard habitat will require fully enclosed habitat yards. A vertical volume within the enclosure enables critical behavioral opportunities such as climbing, elevated resting, and territorial observation. Arabian Leopards prefer to be elevated and visually above their territory.

European Association of Zoos and Aquaria (EAZA) Leopard Husbandry Guidelines recommend a minimum clear internal height of 16 to 20 feet for closed-top enclosures. For a usable volume of 20 feet clear height internal to the mesh, the maximum height of the enclosure must be taller for the supporting structure. A Mast Pole Tensile Structure type system for example, would need to be approximately 35 feet tall to achieve the 20

feet clear for the majority of the internal volume.

Concept designs explored a range of structural solutions for the enclosure ranging from Mast Pole Tensile structure to an Arch structure.

Total Animal Yard Space Requirements – 10,000 SF:

- 2 Public Viewing Yards (4,000 and 5,000 SF)
- 1 Off Exhibit Habitat (1000 SF)
- 1 Pool and waterfall
- Faux Trees (2 per habitat w/ 1 heated limb min.)
- Heated Dens (1 per habitat)

1.4.3 ANIMAL CARE BUILDING PROGRAM

The Animal Care Building needs to support staff requirements for animal care integral to the animal habitat. The interior of the building will need to have durable finishes throughout to accommodate care and cleaning activities. Sealed concrete is preferred with floors sloped to a drain. Maintaining and retrofitting the existing Bison Care Facility is to be considered.

Total Care Building Space Requirements – 3,750 SF

- Day Room (Public Viewing) (500SF)
- Animal Holding Areas (Off Public View):
 - 3 Animal Dens (150SF each)
 - 1 Quarantine Den (100SF)
 - 1 Cubbing Den (100SF)
 - Transfer Chutes

- Staff Areas:
 - Animal Care Staff Working Area (450SF)
 - Prep Kitchen, Restroom, Workspace (300SF)
 - Mechanical/Electrical/Security/IT Room/Smoke Evac (1,600SF)



Figure 1.4.3.1: Day Room Example

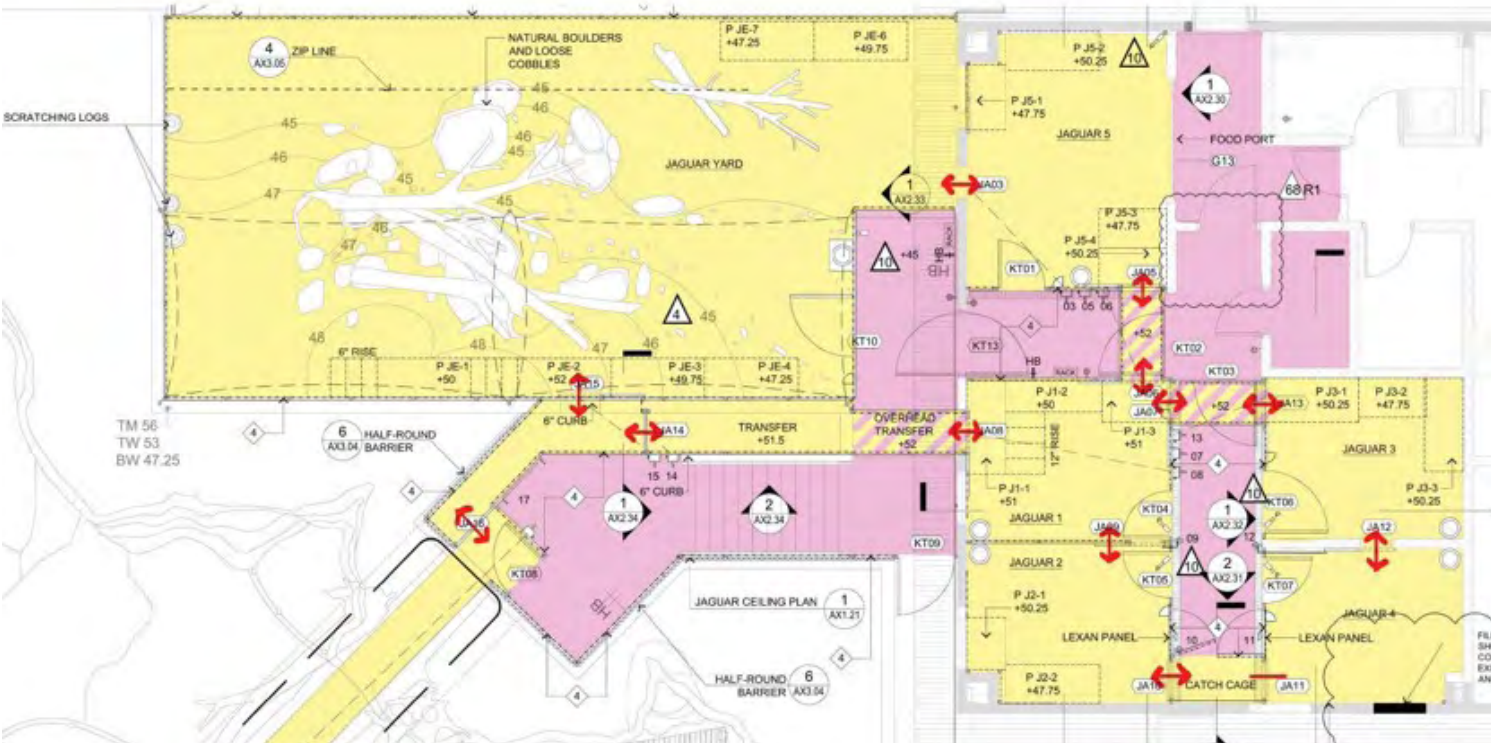


Figure 1.4.3.2: Animal Care Building Layout Example

1.5 PRIOR NCPC SUBMISSION REVIEW(S)

1.5.1 CONCEPT SUBMISSION REVIEW, JANUARY 8, 2026

On January 8, 2026, the Construct Arabian Leopard Habitat was reviewed by the NCPC. The Commission supported the following concepts:

- Site Concept: Oasis-Wadi Hybrid
- Building Mass Concept: “The Sweep”
- Habitat Enclosure Mass Concept: Arched Mesh Structure

The Commission recommended the project continue to refine the preferred design to:

- Extend the curvilinear language to other portions of the building and simplify or lower the building roofline where feasible. In response to this:
 - The building roofline has been refined to maintain an approximately 20 foot height along Olmsted Walk. The refinement of the roof profile is presented within 5.4.1 Roof Profile Studies.
- Further studies have been completed to analyze the landscape berm condition between the care building and Olmsted Walk to help minimize the amount of visible vertical building facade from Olmsted Walk. Reference 5.4.2 Bringing Enclosure and Building Together.
- Explore alternative profiles, such as thinner or rounded, for the main structural members of the mesh enclosure to reduce visual impacts. In response to this:
 - The arches within the arched mesh enclosure have been progressed to show the appropriate sizing for the built condition and limited to the outdoor animal habitats.

Reference 5.5.1 Arched Mesh Structure.

The following items were requested to be provided as a part of the Preliminary Design Submission:

- A landscape plan and further details on the screening approach along the Olmsted Walk.
 - Reference 5.6 Proposed Landscape Approach for a landscape plan, site sections, and section vignettes .
- Proposed signage and wayfinding that will help identify the exhibit and guide visitors.
 - Reference 5.7 Proposed Signage and Wayfinding for a site plan indicating signage and wayfinding locations.
- Updated site and building plans, along with renderings, that are aligned with the preferred concept.
 - Reference 5.0 Preliminary Design for update site and building plans as well as renderings.

1.5.2 PRELIMINARY SUBMISSION REVIEW, APRIL 2, 2026

On April 2, 2026, the Construct Arabian Leopard Habitat was reviewed by the NCPC for Preliminary Review. The Commission approved the preliminary site and building plans. The following recommendations were noted:

- Shade Structures: Further refinements to the design of the shade structures to maximize the benefits of the structures while also minimizing the visual impact on the design of the habitat.

- The shade structures have been refined throughout the Section 106 Consulting Parties process. Refinements have been made in response to requests to minimize the vertical structure to the greatest extent possible and consolidate with adjacent structure on the site. The enclosure support and mesh finish colors were selected through the Section 106 consultation process to complement the landscape and sky backdrops to minimize visual impacts. The horizontal canopy portion of the shade structure has been refined to be a metal slat system in a bronze color to match the enclosure color and typical metal color throughout the site. Reference 5.4 Proposed Shade Structure Materials for additional information.

- Screen Enclosure: Further refinement to the screen enclosure at the corner of Olmsted Walk and Asia Trail to minimize the visual impacts on the surrounding area.
 - The screen enclosure, referred to as Screen Fence within this submission, has been refined further through the Section 106 consultation process to continue to serve the function of screening the outdoor mechanical yard and service access while also maintaining the precedent of a vertical slat fence utilized consistently throughout the Zoo. The material for the fence shall be metal and painted bronze, the typical project metal color. Reference 5.8.10 Proposed Final Railing Type Locations for a complete railing/ fence analysis and associated visuals.

- Additional Trees and Plantings: Consider additional trees or other plantings at the west entry of the project site to help screen the enclosure from the approach at Olmsted Walk.
 - Documentation and visualization of the existing and proposed additional plantings at the west entry of the project site have been completed. The previous submission did not include an existing tree that is located on the adjacent Panda Overlook site. Additional low shrub and/or perennial plantings are proposed at the base of the existing tree on the adjacent Panda Overlook site. Reference Figure 5.7.3.2 for an updated rendering.
- Tree Preservation: Coordinate with staff on an alternative approach for compliance with the *Comprehensive Plan’s Tree Preservation and Replacement Policy*.
 - A Certified Arborist has completed a Tree Inventory, see 6.2 Tree Inventory, to support the project’s compliance with the *Tree Preservation and Replacement Policy*. An updated Tree Preservation and Replacement Table has been included in this submission shown in Figure 6.1.1.1 within 6.0 Appendix. A total of sixty-eight trees are needed for compliance. Fifty-six trees can be accommodated within the project site. The project is requesting NCPC approve an alternate approach to achieving the totals by allowing the project to plant the additional twelve trees needed for compliance off the project site.

2.0 PROJECT CONTEXT



2.0 PROJECT CONTEXT

2.1 PROJECT LOCATION AND AREA

The Smithsonian’s National Zoological Park is not just home to an impressive array of wildlife, but also hosts historic buildings and landscape features that reflect the evolution of zoological architecture and the Zoo’s commitment to conservation and education. Established in 1889, the National Zoo spans 163 acres within Rock Creek Park and features notable structures and exhibits that have both historic and architectural significance. It is located east of Connecticut Avenue and west of Rock Creek in Northwest Washington, D.C. The Rock Creek stream valley meanders through the eastern portion of the site, contributing to steep topography.

The original plan and layout for the Zoo is reflective of a growing consciousness for preservation of natural wilderness and wildlife. It was shaped by noted landscape architect Frederick Law Olmsted Sr., along with Smithsonian Director Samuel P. Langley. Central to the park design was the meandering promenade now known as Olmsted Walk.

The project site is currently an unoccupied animal exhibit, built in 1996 as the American Bison Exhibit and the Zoo in Your Backyard Exhibit.



2.2 RELATED PROJECTS AND PROJECT SCOPE

In an effort to continue to improve visitor experience at the National Zoological Park, the Smithsonian has recently embarked on two projects adjacent to the Arabian Leopard Habitat project that are both currently under construction.

2.2.1 CHEETAH HABITAT (AFRICA TRAIL) PROJECT

To the north of the proposed Arabian Leopard Habitat site is the Cheetah Conservation Station, now known as the Africa Trail, a series of mixed species exhibit yards with a central back-of-house area not visible to the public. Residents include cheetahs, ostriches, zebras and the endangered Addax. The Renew Cheetah Conservation Station – Africa Trail project addresses stormwater infrastructure, improves MEP systems, and upgrades the care facilities to improve animal safety and maximize animal enrichment. The majority of these improvements are underground and in back-of-house areas. This project is currently under construction.

2.2.2 BUS DROP-OFF PROJECT

Directly to the north of the proposed Arabian Leopard Habitat the Smithsonian is providing upgrades to the Bus Parking Lot and entrance to Olmsted Walk and the Panda Plaza. This scope of work includes regrading and repaving the Bus Parking Lot, providing a stormwater retention pond and introducing stationary and hydraulic traffic bollards. This project is recently completed.

2.2.3 PROJECT SCOPE

The Arabian Leopard Habitat project will provide a habitat and care building for supporting an Arabian Leopard exhibit to augment the range of species that are displayed at the National Zoo. The scope of work includes:

- Habitat enclosure that is open air
- Care building structure for animal care and all-weather viewing
- Pedestrian entry/exit from Olmsted Walk
- Service drive to access the Care Building
- Perimeter landscaping



Figure 2.2.1.1: Site Plan with future projects adjacent to the project site.

2.3 PROJECT SITE

The project site is approximately 32,000 square feet, or 0.73 acres and is prominently located at a north bend in Olmsted Walk, situated between the Panda Habitat and the Elephant House Exhibit. It is close to the Connecticut Avenue entrance and across from the Bus Group Entry, the restroom facility, and the Panda Plaza concessions area, all of which are heavily used by visitors. The existing Bison Habitat visitors' viewing entry is located at the northwest corner and the existing site service entry is located at the northeast corner. Two existing exhibits currently occupy the site: the former Bison Habitat, closed since 2024, and the currently open Zoo in Your Backyard exhibit, which features plants native to the Washington, D.C. area. The site is largely hidden from view from surrounding walks by a berm planted with a mix of shrubs and trees.

2.3.1 EXISTING SITE FEATURES

There are several existing site features within the project site. Some of these features will be removed to accommodate the Arabian Leopard Habitat design and some will potentially be incorporated into the design.

- 1. **Bison Care Building** – The Bison Care building is an existing concrete structure with a green roof. This structure will be removed.
- 2. **Bison Habitat Service Shed** – An existing service shed to the north of the Bison Care Building will be removed.
- 3. **Bison Shade Structure** – An existing wood Bison shade structure consisting of four posts and a trellis-like roof will be removed.

- 4. **Bison Overlook Structure** – A steel framed shade structure with wood and metal roof meant for viewing the Bison Habitat will be removed.
- 5. **Former Prairie Dog Exhibit and Concession Shade Structure** – A former exhibit enclosure with low concrete walls will be removed.
- 6. **Service Entry Drive** – An existing site service entrance drive off of the Panda Trail will remain and be incorporated into the design.
- 7. **Carderock Wall** – At the midpoint of the site is an existing Carderock wall that helps mitigate the 20 feet of change in topography within the site that will be removed.
- 8. **Zoo in Your Backyard Features** – There are three gazebos that are part of the Zoo In Your Backyard exhibit that will be removed along with all other exhibit features.
- 9. **Vending Shade Structure** – At the west end of the Zoo in Your Backyard exhibit is a steel vending structure with wood and metal roof that will be removed.
- 10. **Merchandise Stand** - An existing panda stand serves visitors from the panda habitat entry, which will be removed.

2.3.2 EXISTING SITE CIRCULATION

The previous habitat experience had a viewing location directly off of Olmsted Walk and a viewing pavilion on the west side of the site that allowed visitors to look down in the site (Item 4 in Figure 2.3.1.1). The design for the Arabian Leopard Habitat will adjust the grade to allow visitors to walk through the project site on an accessible path via Olmsted Walk.



Figure 2.3.1.1: Project Site and Existing Features

- SITE BOUNDARY
- OLMSTED WALK
- ZOO IN YOUR BACKYARD EXHIBIT
- BISON EXHIBIT AND HABITAT

EXISTING SITE FEATURES



Bison Care Building



Bison Shade Structure



Bison Overlook Structure



Former Prairie Dog Exhibit and Panda Concession Shade Structure



Service Entry Drive



Vending Shade Structure

Figure 2.3.1.2: Existing Structures Pictures

2.4 ENVIRONMENTAL CONSIDERATIONS

2.4.1 NEPA COORDINATION

The National Environmental Policy Act of 1969 (NEPA) is legislation that requires Federal Agencies to:

- Consider effect of their proposed action on the natural and human environment.
- Consider alternative ways of meeting objectives.
- Apply systematic planning analysis and decision-making process.
- Factor environmental consideration into decisions.
- Involve the public.

The Smithsonian Institution is consulting NCPC staff regarding the level of NEPA analysis required for this project. The Arabian Leopard Care Building is 3,750 square feet, and makes use of the existing facility footprint. Additionally, the ground has previously been disturbed and tree coverage and plantings will be installed consistent with the existing environmental character. Existing tree coverage will be maintained where possible. NCPC staff has indicated they anticipate applying a categorical exclusion to the project.

2.4.2 FLOODING AND STORMWATER MANAGEMENT

The proposed Arabian Leopard Habitat will disturb approximately 33,500 square feet and result in greater than 2,500 square feet of impervious surface in post-development. As a result, the site will be required to meet DOE's stormwater

detention and retention requirements. The National Zoological Park is within a Combined Sewer System (CSS) area and will need to detain the 2-year storm event. Retention requirements will be based on a 1.2 inches rainfall event because of the quantity of disturbance for the site.

The existing site drainage system consists of multiple perforated underdrains designed to collect infiltrated groundwater. The site is graded to direct surface runoff as sheet flow from the center of the habitat area toward the south, where it is captured by an area drain. Most perforated underdrains are connected to this area drain, and the collected flow is conveyed through a 6-inch PVC pipe that discharges into the contaminated storm network.

The included site plan, Figure 2.4.2.1, shows the general direction of surface flows and the location of the various stormwater lines on the existing site. Reference 5.8 Proposed Civil.

The DOE Stormwater Management (SWM) permit is currently under review and is expected complete at the end of August.



3.0 HISTORIC CONTEXT



3.0 HISTORIC CONTEXT

3.1 SITE HISTORY

The National Zoo was created by an Act of Congress in 1889 for “the advancement of science and instruction and recreation of the People.” Originally designed by Frederick Law Olmsted in collaboration with Smithsonian Director Samuel P. Langley, the 163 acre site was planned to reflect Olmsted’s interest in creating picturesque landscapes with native plants and careful manipulation of terrain to afford scenic views. Langley had a vision for that aesthetic appeal with a desire to use architecture to communicate the culture and landscape from which an animal originates. Through the following decades, the National Zoo began to lose the original naturalistic design and started to take on the appearance of a collection of habitat structures.

In the 1930s a series of buildings with a more classical design allowed visitors to experience the animals. These buildings incorporated details that were a literal reference to the collections housed within the building. More recent animal exhibits represent a conceptual change, organizing exhibits in groups based upon ecological relationships, such as the Asia Trail and the Africa Trail.

The 1972 Master Plan planned for placing buildings behind landscape, or providing underground structures to expand exhibit space without impacting the landscape, reemphasizing the naturalistic planning principles of the Zoo.

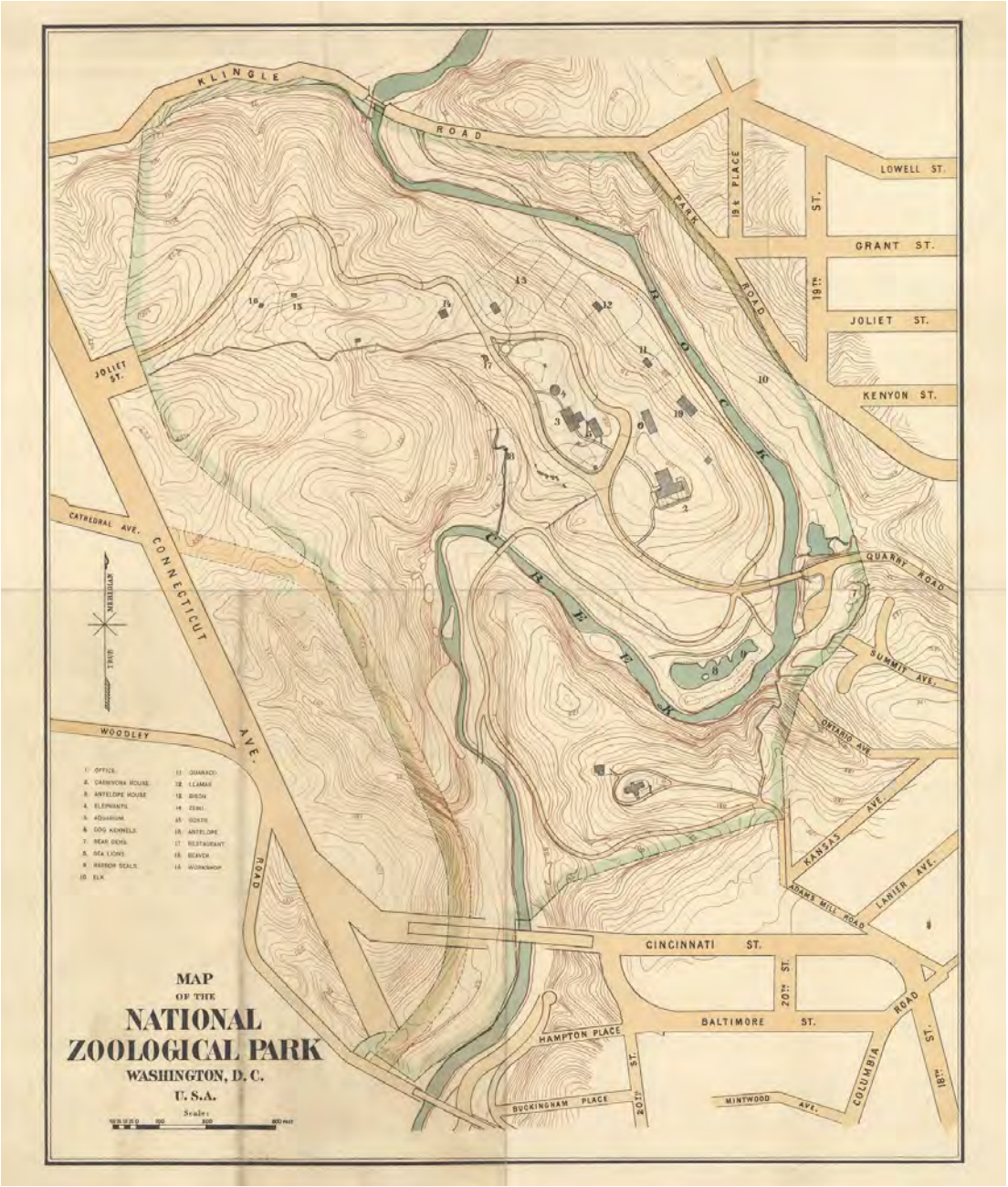


Figure 3.1.1: 1899 Map of the National Zoological Park, Smithsonian Institution Archives



Figure 3.1.2: National Zoo and Conservation Biology Institute , Smithsonian Institution Archives



Figure 3.1.3: Log Bridge Built in 1897 to carry Blue Road over Rock Creek. Smithsonian Institution Archives

3.2 NATIONAL ZOOLOGICAL PARK HISTORIC DISTRICT

The National Zoological Park Historic District was listed in the District of Columbia Inventory of Historic Sites in 1964 and then the National Register of Historic Places in 1973. It was recognized for its significant contributions in the fields of conservation, landscape architecture, science, and urban planning. The nomination highlighted the original conservation goals, the involvement of famed landscape architect Frederick Law Olmsted Sr. in the design and planning of the park and setting, and the role of the Smithsonian’s scientists in expanded zoological and ecological knowledge while defining the Period of Significance as the nineteenth century. The 2008 National Zoological Park Facilities Master Plan more clearly defined the Period of Significance for the historic district to be from 1889 to 1960 to include Zoo additions made prior to the 1972 Master Plan. Although the Great Flight Aviary (1965) postdates this period, its design merited individual evaluation as an exemplary example of a neo-expressionist design and is considered a contributing resource. The 2024 Cultural Resources Assessment, conducted by Ewing Cole in preparation of a Comprehensive Facilities Plan, recommended expanding the Zoo’s Period of Significance to 1976 to embrace cultural landscape features that reflected the evolution

of the Zoo’s mission and design philosophy that started to shift away from architecture back to exhibits displaying animals within more naturalistic landscape settings. This historic district retains high integrity of use, location, and setting, with its historic resources and landscape in continuous operation.

A prominent feature of the historic district from Olmsted’s original vision for the park is the primary circulation path known as the Olmsted Walk. This pedestrian path connects the Connecticut Avenue Zoo Pedestrian Entrance to the South Pedestrian Entrance with a meandering, park-like promenade. Designed in the early 20th century as part of Olmsted’s broader vision for Rock Creek Park, the walk reflects principles of naturalistic landscape design, emphasizing harmony with the surrounding environment. It connects various Zoo exhibits and historic buildings, providing visitors with scenic views and a sense of continuity and passive recreation. Those connections points vary from being direct connections to historic buildings like the Elephant House, to sequentially revealed connections from Olmsted Walk, like the Asia Trail Exhibit.

Reference Chapter 4.0 for additional features of Olmsted Walk.



Figure 3.2.1: Frederick Law Olmsted National Historic Site. Courtesy of the District of Columbia, Office of Planning

3.2.1 HISTORIC ENCLOSURE PRECEDENT

Within the historic district, there has been long-standing precedent for a variety of enclosures and structures in support of unique animal care requirements. Over time, enclosures within the Zoo have evolved to accommodate changes in exhibits and growing knowledge in conservation science and animal welfare. This history of change is consistent throughout the historic district and supports the high integrity of use and setting within the National Zoological Park.



Figure 3.2.1.1: Great Flying Cage, c. 1920-22
Note: Mesh screen with tall, arched truss superstructure, as seen through dense foliage in winter (demolished)



Figure 3.2.1.2: Bird Enclosure, c. 1912
Note: Mesh screen with tall, pointed-arch superstructure to accommodate animals' natural habitat and behavior (demolished)



Figure 3.2.1.3: Animal (Lion) House, 1891
Note: Carnivore exhibit with outdoor enclosure connected and adjacent to animal care building (demolished)

3.2.2 CONTRIBUTING BUILDING RESOURCES

- 1. Holt House (1820)
- 2. Think Tank (1906)
- 3. Guard House (1910)
- 4. Boiler Plant (1912)
- 5. Bird House (1928)
- 6. Reptile Discovery Center (1931)
- 7. Propagation Building (1937)
- 8. Elephant House (1937)
- 9. Small Mammal House (1937)
- 10. Mongolian Horses (1937)
- 11. Wallabies (1939)
- 12. Mane Restaurant (1940)
- 13. NZP Police Station (1956)
- 14. Great Flight Aviary (1965)

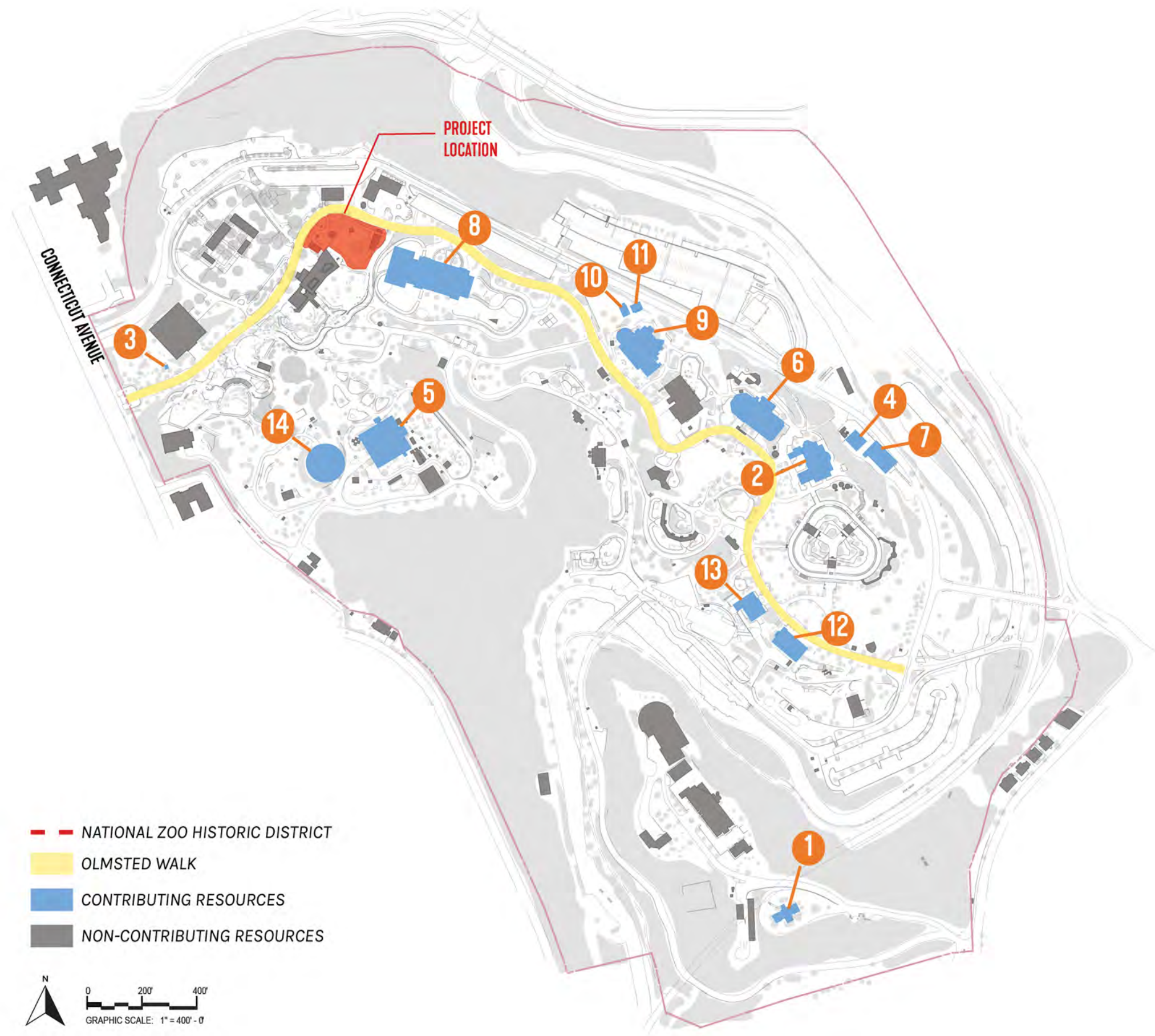


Figure 3.2.2.1: Character Defining Building Diagram

3.2.2 CHARACTER DEFINING LANDSCAPE FEATURES

- Olmsted Walk
 - Primary unifying circulation artery
 - Curved pathways
 - Mature Tree Canopy
 - Connection of city with nature
 - Connection of visitors with exhibits
- Integration of natural topography
- Changing views and vistas that prioritize landscape over architecture
- Native flora and fauna

See section 4.6 for photographs highlighting these character-defining landscape features.

3.2.3 NON-CHARACTER DEFINING FEATURES

The Arabian Leopard Habitat project site shares adjacency with a range of existing building resources that are non-character defining. These resources include the Panda House, the Panda Plaza Restrooms, Panda Plaza, and the Panda Overlook and Food Pavilion. While these are not historic structures, they are among the most popular buildings in the Zoo complex. The new exhibit will seek to enhance these connections and expand upon the visitors' experience throughout the site.



Panda Overlook



Restrooms



Panda Plaza



Panda Overlook

Figure 3.2.3.1: Existing Conditions - Non-Character Defining Key Map and Features

The design philosophy for how to experience animal exhibits has evolved over time at the National Zoo. Buildings built in the 1920s and 30s had distinctive formal designs with details that referenced the animals held within. In the 1960s zoo design philosophy shifted away from architecture to more naturalistic exhibits that closely resemble the habitat of origin of the animal species. The 1970s exhibit structures became more integral with the landscape, such as the Lion Exhibit and the Visitor Center. The habitats of the 1980s and 1990s such as the Asia Trail Exhibit have been designed to be visible from walking paths off of Olmsted Walk and enhance the visitor experience by allowing for easier observation of animals from various vantage points as they interact within a natural landscape. This accessibility fosters a stronger connection to animals and their natural behaviors, supporting educational and conservation messages. The Orangutan exhibit's O-Line actually has animals crossing Olmsted Walk.



Figure 3.3.1: Olmsted Walk Exhibit Evolution Timeline

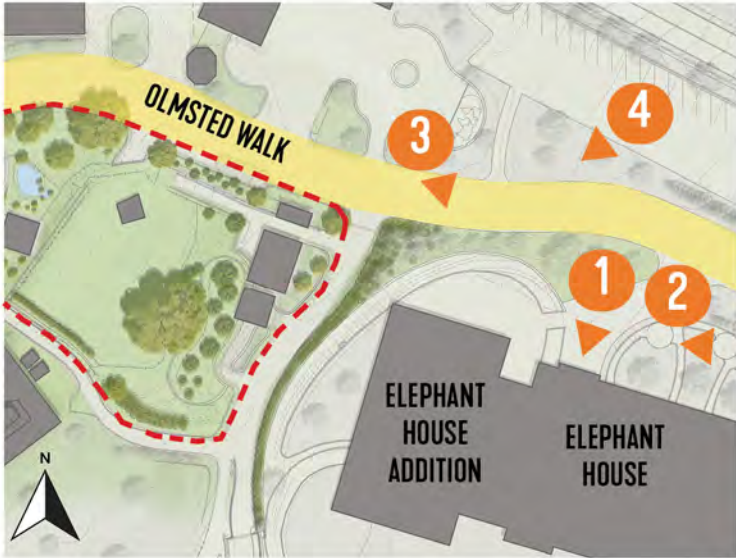
3.4 HISTORIC RESOURCES IMPACTED BY PROJECT

Given the prominent location of the site for the Arabian Leopard Habitat project along Olmsted Walk, there are adjacent historic resources within the National Zoological Park Historic District.

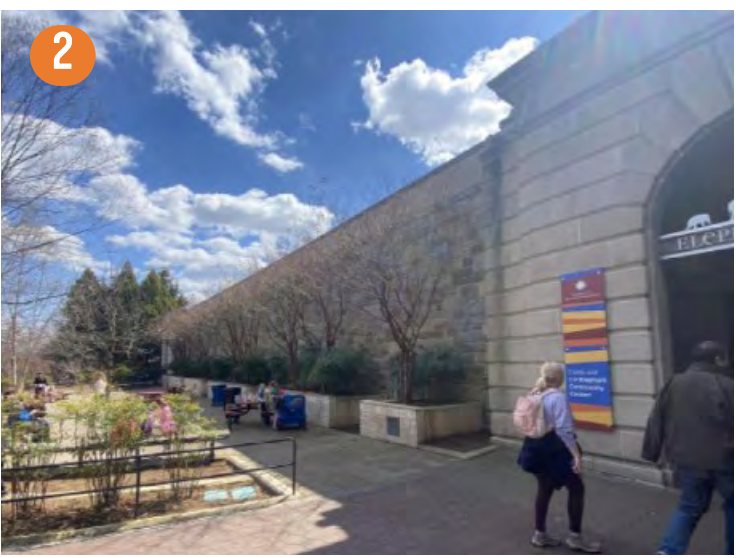
3.4.1 ELEPHANT HOUSE

The only contributing building resource within the National Zoological Park Historic District in direct proximity to the project site is the Elephant House. Designed by Edwin Clark and originally constructed in 1930, the Elephant House showcases Beaux-Arts architectural influences, characterized by its grand arched windows and classical detailing. It has been modernized over the years to support the Zoo’s Asian Elephant Conservation Program. In 2013, a large animal care facility addition was added to the west side of the building. The visibility of this addition from Olmsted Walk is screened by dense vegetation and therefore cannot be seen from the southeast corner of the project site.

It was determined through the Section 106 process that this project will have no adverse effect on the Elephant House.



Elephant House - Entrance



Olmsted Walk - Elephant House



Olmsted Walk - Elephant House Addition



Olmsted Walk Vegetation

Figure 3.4.1.1: Existing Conditions - Historic Resources Potentially Impacted by Project - Key Map and Images

3.4.2 OLMSTED WALK

The Project Site is located on the first third of Olmsted Walk, a character-defining landscape resource within the National Zoological Park Historic District, where the path bends significantly south and east. The visitor entry into and exit from the proposed habitat will be directly off of Olmsted Walk. Views and vistas looking both east and west along Olmsted Walk will be impacted by this new habitat. Similarly, in order to accommodate the habitat and associated animal enclosure, some of the sheltering shade trees will need to be replaced.

There are a series of guiding principles rooted in Frederick Law Olmsted Sr.’s original planning for the Zoo that help to define Olmsted Walk and how a visitor experiences the landscape and the animal exhibits. These include

- Providing unique, appropriate habitats for each animal;
- Careful use of natural topography to allow strategic views and access;
- Overall orchestration of visitor experience in a picturesque urban park setting.

It was determined through the Section 106 consultation process that this project will have an adverse effect on Olmsted Walk

3.5 HISTORIC PRESERVATION AND PUBLIC OUTREACH

3.5.1 SECTION 106 CONSULTATION

In accordance with Section 106 of the National Historic Preservation Act of 1966, the Arabian Leopard Habitat Project is subject to review due to the project location within the National Zoological Park Historic District.

Section 106 of the National Historic Preservation act requires federal agencies to consider the effects of their projects on historic properties and seek ways to avoid, minimize or mitigate averse effects. It requires consultation to seek input from the public who are invited to participate in the process.

The Section 106 consultation process for the Arabian Leopard Habitat Project was initiated with the District of Columbia State Historic Preservation Office on October 10, 2025.

3.5.2 PUBLIC OUTREACH

The initial Consulting Parties meeting was held on February 18, 2026.

Smithsonian has developed a project webpage to facilitate the public’s participation in the Section 106 process.

<https://nationalzoo.si.edu/animals/exhibits/saudi-arabia-arabian-leopard>

Following the initial Consulting Parties meeting, three additional Consulting Parties meetings were held to engage the public with the design of the project. The following were key topics of discussion for each of the respective meetings:

■ Consulting Parties Meeting #1 February 18,2026

- Topics: Project Purpose and Need, Proposed Project Location and Site Organizational Concepts, Character Defining Features and Historic Significance, Design Alternatives, Schedule and Next Steps. Preliminary Assessment of Effects report issued for review.

■ Consulting Parties Meeting #2 March 24, 2026

- Topics: Care Building and Enclosure Refinements, Animal Care Building Materials, Service Access, Site and Landscape Refinements, Shade Concept Refinements

■ Consulting Parties Meeting #3 April 28, 2026

- Topics: Animal Care Building Roof Studies, Animal Care Building Materials, Site Perimeter, Signage, Shade Concept Refinements, Assessment of Effects report updates.

■ Consulting Parties Meeting #4 May 26, 2026

- Topics: Animal Care Building Roof Profile, Animal Care Building Materials, Assessment of Effects Recap, Minimization and Mitigation Measures.

The final Assessment of Effects on Historic Resources has been provided to Consulting Parties within which adverse effects have been identified. See 6.0 Appendix for the final Assessment of Effects on Historic Resources. Consultation has concluded.

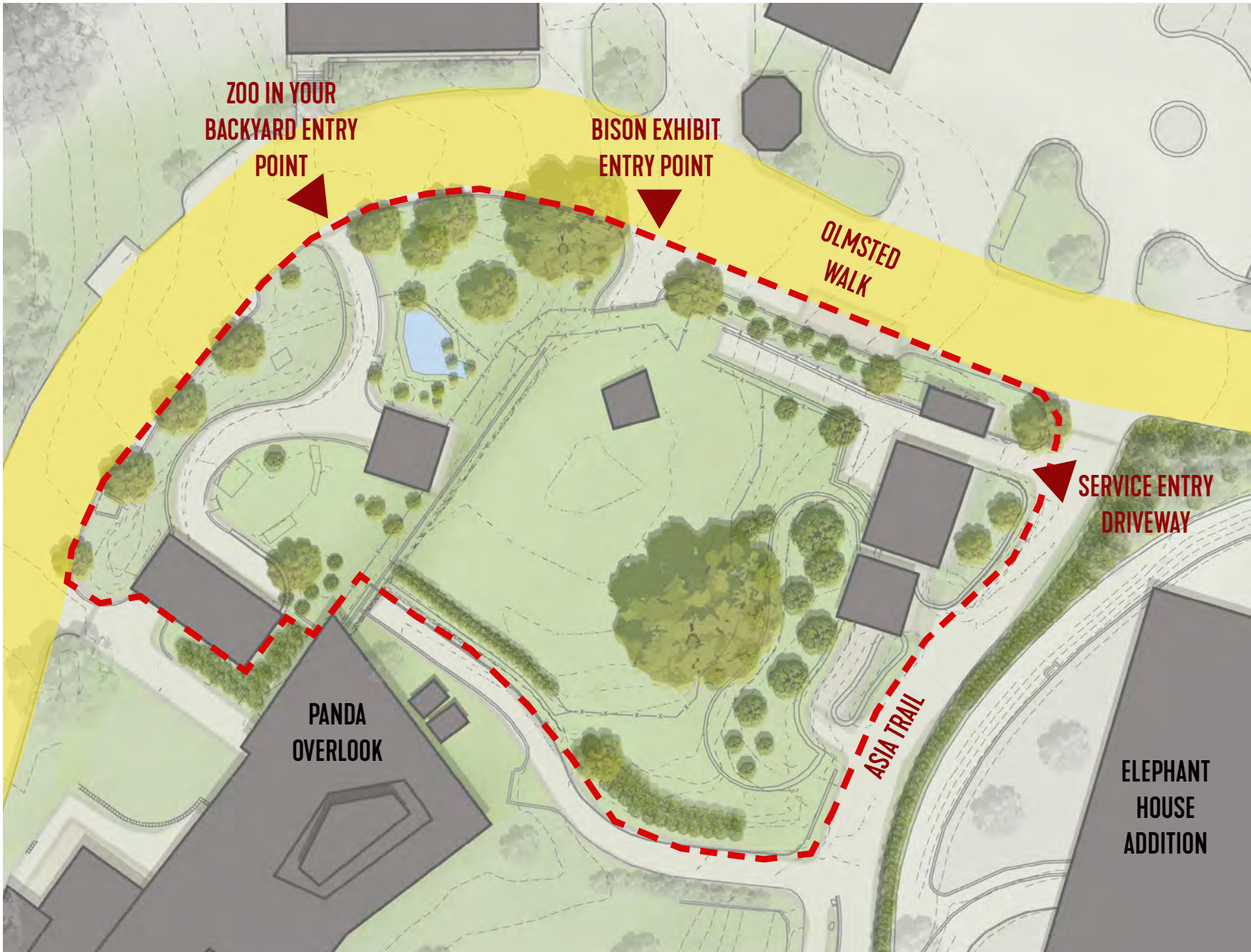
To resolve adverse effects, the SI, NCPC, and DC SHPO have drafted a Memorandum of Agreement (MOA). The MOA was issued to Consulting Parties for review on July 6, 2026, for a 30-day comment period that runs through August 4, 2026. SI will provide the fully executed MOA to NCPC under separate cover.

4.0 EXISTING CONDITIONS



4.0 EXISTING CONDITIONS

4.1 EXISTING SITE PLAN



PROJECT LOCATION

OLMSTED WALK

4.2 EXISTING SITE SECTIONS

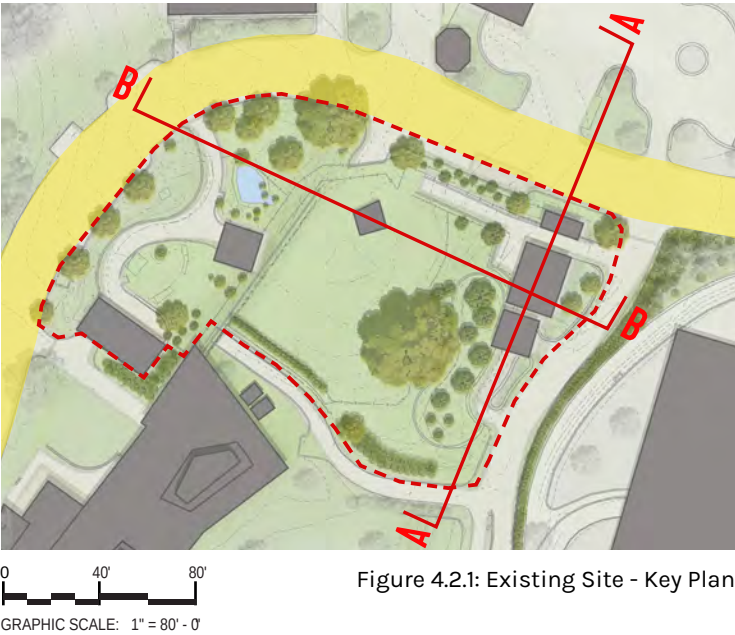


Figure 4.2.1: Existing Site - Key Plan

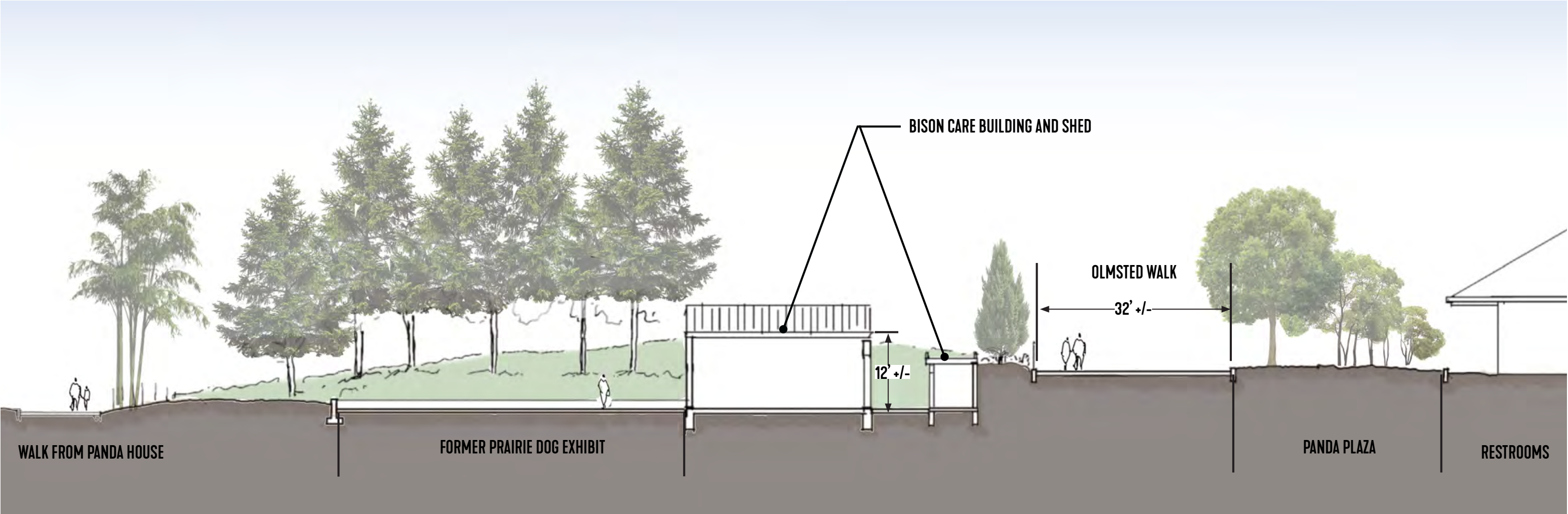


Figure 4.2.2: Existing Site - Section "A-A"



4.3 EXISTING TOPOGRAPHY

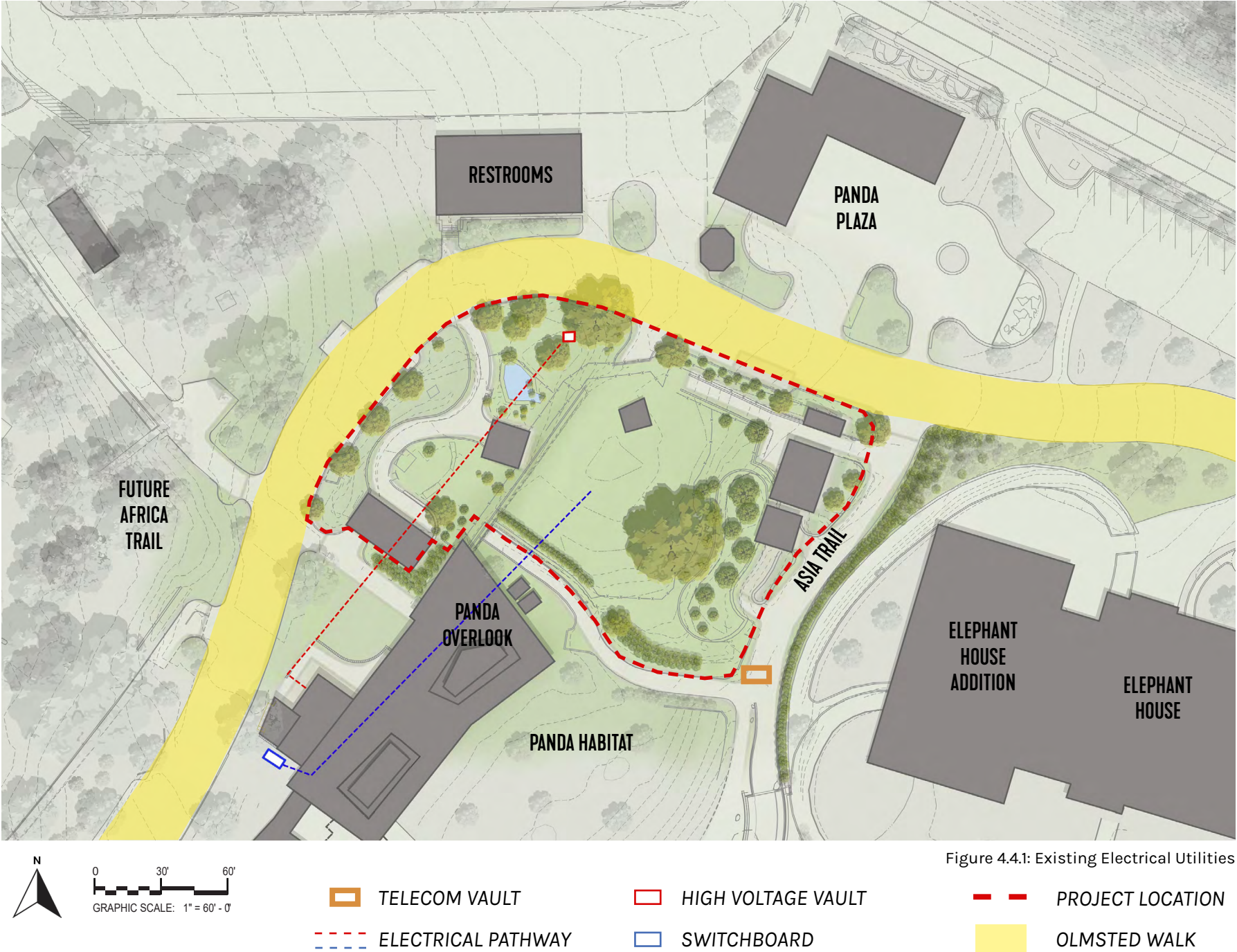
The service entrance to the former Bison Habitat is located at the northeast corner, adjacent to an existing one-story, concrete Bison Care Building, and a separate cement block shed. A ramp near the entrance provides access to the main habitat area. Site elevations range from approximately 180 feet at the southeast corner to 200 feet at the northwest corner, with the highest elevation within the Bison exhibit in the center of the site reaching 191.3 feet. Surface water generally drains southeast toward an abandoned, concrete encased pond which served as a past exhibit. A retaining wall along the southern edge of the site creates an elevated zone within the habitat, enhancing spatial definition and site containment, and contains bamboo screening from the Asia Trail. A Carderock retaining wall bisects the site to allow for an upper viewing platform to the west.



4.4 EXISTING SITE UTILITIES

There are a range of existing utilities that cross the project site. All of these utilities will be removed and replaced with the exception of two existing vaults.

- **Electric Transfer Station** – There is a primary electrical vault that serves as a high voltage electric transfer station located on the northern edge of the project site that cannot be relocated. This vault feeds power to other adjacent structures.
- **Existing Telecommunications Vault** – An existing telecommunications vault is found at the SE corner of the site and provides service to adjacent buildings. There is no existing connection from this vault to the existing Bison building, but the block shed does support a controller with a line heading north into the Olmsted Walk. The vault is located outside of the limit of disturbance and will be protected in place during construction.



4.5 EXISTING LANDSCAPE

Bison Habitat - The primary landscape features of the existing site are the care building, associated shed, and shade structure. A prominent Carderock stone retaining wall separates the upper Zoo in Your Backyard exhibit from the Bison Habitat and ties into the wall of the adjacent Panda Habitat day room building to the southwest. A low, curvilinear concrete retaining wall forms a filled-basin at the east end of the site that was formerly the Prairie Dog exhibit. This area is currently filled with pine trees and scattered groundcover.

Zoo in Your Backyard Exhibit - The Zoo in Your Backyard exhibit features concrete sidewalks, black painted steel tube railing, and concrete seat walls. There is a small ornamental pond, edged with irregular flagstones and featuring a small waterfall with recirculating water. Signage explains the value of native plants and how to incorporate them into visitors' yards and everyday experience. There is a small pergola and several pavilions with metal roofs for shade, providing comfortable resting areas.

Olmsted Walk - Olmsted Walk features a standard set of furniture, including a water fountain, trash receptacles, wood and steel benches, and signage. These features are inset in several 'niches' of 3 to 5 feet horizontal distance that allow comfortable spacing from the main thoroughfare. The paving material is hexagonal asphalt unit pavers bound by low concrete curbs. Black steel tube forms the primary railing along this portion of Olmsted Walk. Existing furnishings along the Walk will be protected or removed and replaced.



STONE RETAINING WALL



ORNAMENTAL POND



OLMSTED FURNITURE



Figure 4.5.1: Existing Landscape - Aerial Plan



0 30' 60'
GRAPHIC SCALE: 1" = 60' - 0"

- ZOO IN YOUR BACKYARD EXHIBIT
- BISON EXHIBIT AND HABITAT
- PROJECT LOCATION
- OLMSTED WALK

4.5.1 EXISTING SHADE TREES

Shade trees on the site have been surveyed by a Certified Arborist and NZCBI Horticulture. NZCBI Horticulture has noted seven which are most significant and important for preservation. All of the seven noted were deemed to be in good condition per the Tree Inventory provided by the Arborist. While not all can be saved due to the disruption necessary for constructing the new habitat, the design will make every effort to protect and preserve as many as possible. The project has identified existing trees, 4 of which were deemed significant to NZCBI Horticulture, for preservation.

Due to the project being a federal project, the National Capital Planning Commission (NCP) Tree Replacement Guidelines will be followed to ensure the project is in compliance. See 6.1 Tree Preservation, Removals, and Replacement for additional information including the Tree Inventory completed by the Certified Arborist.



Figure 4.5.1.1: Project Site with Existing Trees

[CONT.] 4.5.1 EXISTING SHADE TREES



Figure 4.5.1.2,3: Mature Hickory trees along northwestern edge of site

Figure 4.5.1.4: 46" Oak Tree within the Bison Habitat

Figure 4.5.1.5: 36" Oak Tree at northern edge of site

4.5.2 EXISTING LANDSCAPE CONDITIONS

Mature shade trees line the outer edges of the site along Olmsted Walk. These include Oak and Hickory, and range from 12 inches in diameter to a significant anchoring oak at 36 inches in diameter at the north corner of the site. See figures 4.5.1.2 to 4.5.1.5 for tree images. Within the upper Zoo in Your Backyard site, there are several smaller to mid-sized understory trees, including Sweetbay Magnolia, Redbud, Amelanchier, and Holly. Within the Bison Yard site, there is one very large 49 inch Oak tree, and a cluster of medium sized White Pine trees at the eastern low end of the site. Thick bamboo forms a dense wall around the east and south ends of the site, which is a characteristic component of the Asia Trail running along these edges.

A variety of shrubs are found along Olmsted Walk and within the Zoo in Your Backyard exhibit, including Hydrangea, Boxwood, Spirea, and a tall group of Bottlebrush Buckeye along the northern edge of the site.



Figure 4.5.2.1: View from Olmsted Walk into the Bison Habitat exhibit



Figure 4.5.2.2: View from within Bison Habitat exhibit looking north to Zoo in Your Backyard exhibit, showing stone retaining wall, metal-roofed pavilion, deactivated electrical fence, tall bamboo, and typical sandy ground surface with sparse grass.

(CONT.) 4.5.2 EXISTING LANDSCAPE CONDITIONS

Groundcover is likewise varied and in good condition in the Zoo in Your Backyard area, including Hellebore, Nepeta, Yucca, and other native ornamental perennials. Well-kept mulch beds and small patches of turfgrass are also present in this area. The Bison Habitat exhibit, by contrast, displays an unkempt assortment of opportunistic grasses and weeds, such as mugwort, sprouting from the sandy soil.

NZCBI Horticulture has required that many of the shrub and groundcover plant selections are governed by deer resistance, which are rampant within the Zoo and browse heavily on most plants within their reach.



Figure 4.5.2.3: View from back of the Bison Care building looking south. The concrete retaining wall of the former prairie dog exhibit is filled with weeds and white pine trees. A metal-roofed pavilion covers a temporary panda-related vendor in the left background.



Figure 4.5.2.4: View from east boundary of site looking back to the West. Panda sculpture marks the exit/secondary entrance to the Asia Trail. The service entry to the existing Bison Yard care building can be seen to the left. The transition from Olmsted Walk hexagonal asphalt pavers to concrete paving of the Asia Trail is visible, as are the steel-and bamboo landscape railings.

4.6 OLMSTED WALK FEATURES

4.6.1 BUFFERS AND BERMS

Berms with low plantings are utilized along the edge of the upper portion of Olmsted Walk to provide buffer to the animal exhibits and to allow for window views into habitats.



Zoo in Your Backyard



Africa Trail

4.6.2 PORTALS AND ENTRIES

There is a precedent for utilizing strong portals as entries to exhibits or buildings along Olmsted Walk. Portals are formed by the landscape or building architecture.



Small Mammal House



Asia Trail

Figure 4.6.1.1: Existing Portals along Olmsted,

(CONT.) 4.6 OLMSTED WALK FEATURES

4.6.3 TREE CANOPY

The canopy of mature trees along Olmsted Walk are a character defining feature of the walk.



Upper Olmsted Walk



Upper Olmsted Walk

4.6.4 UPPER VERSUS LOWER OLMSTED WALK

There is a strong difference between the more defined edges of upper Olmsted Walk and the dense tree canopy where the project site is versus the more blurred edges and less dense planting of the lower portion of Olmsted Walk.



Upper Olmsted Walk



Lower Olmsted Walk

Figure 4.6.3.1: Existing Tree Canopies along Olmsted Walk

(CONT.) 4.6 OLMSTED WALK FEATURES

4.6.5 USE OF STONE

The use of Carderock throughout the park either in the architecture or in landscape features gives a sense of continuity.



4.6.6 ROOF FEATURES

Many of the service buildings along Olmsted Walk are low in profile with significant wood shingled or slate shingled roof features. Similarly, the roofs of the more formal 1920s and 1930s exhibit buildings prominently feature red or green terracotta tiles. The more contemporary exhibit structures have green planted roofs.



Figure 4.6.5.1: Existing Use of Stone and Roof Features

(CONT.) 4.6 OLMSTED WALK FEATURES

4.6.7 PATHS AND PAVING

A change in paving along Olmsted Walk is utilized to signify transition to exhibit and vendor zones. The paving material is hexagonal asphalt unit, bound by low concrete curbs.



4.6.8 FEATURES AND FURNISHINGS

Olmsted Walk features a standard set of site furnishings including a water fountain, trash receptacles, wood and steel benches, and signage. Black steel tube forms the primary railing along this portion of Olmsted Walk.



Figure 4.6.7.1: Existing Features and Furnishings along Olmsted Walk

4.6.9 EXISTING VIEWSHED PHOTOGRAPHS

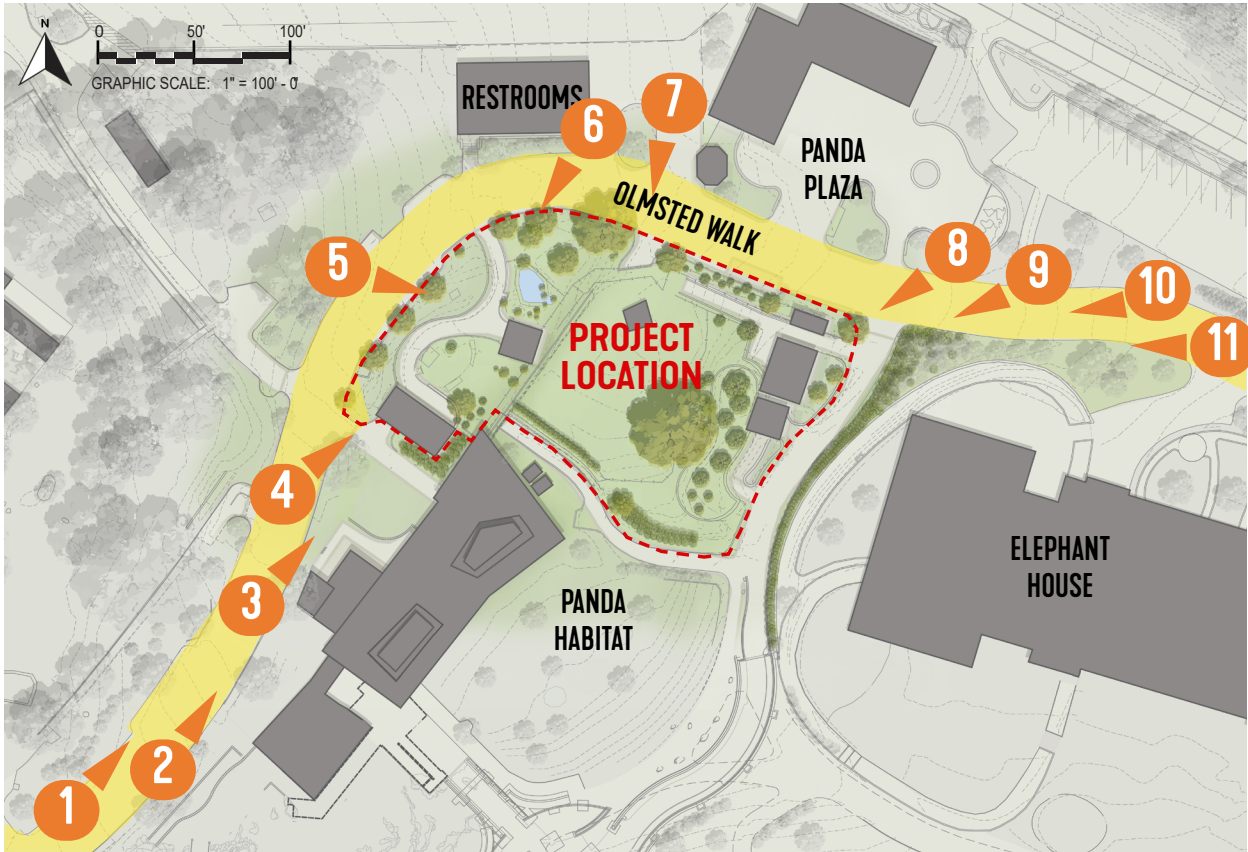


Figure 4.6.9.1: Existing Viewshed along Upper Olmsted Walk



Figure 4.6.9.2: Existing Viewshed along Upper Olmsted Walk Approaching Africa Trail



Figure 4.6.9.3: Existing Viewshed along Upper Olmsted Walk Approaching Africa Trail and Panda Overlook

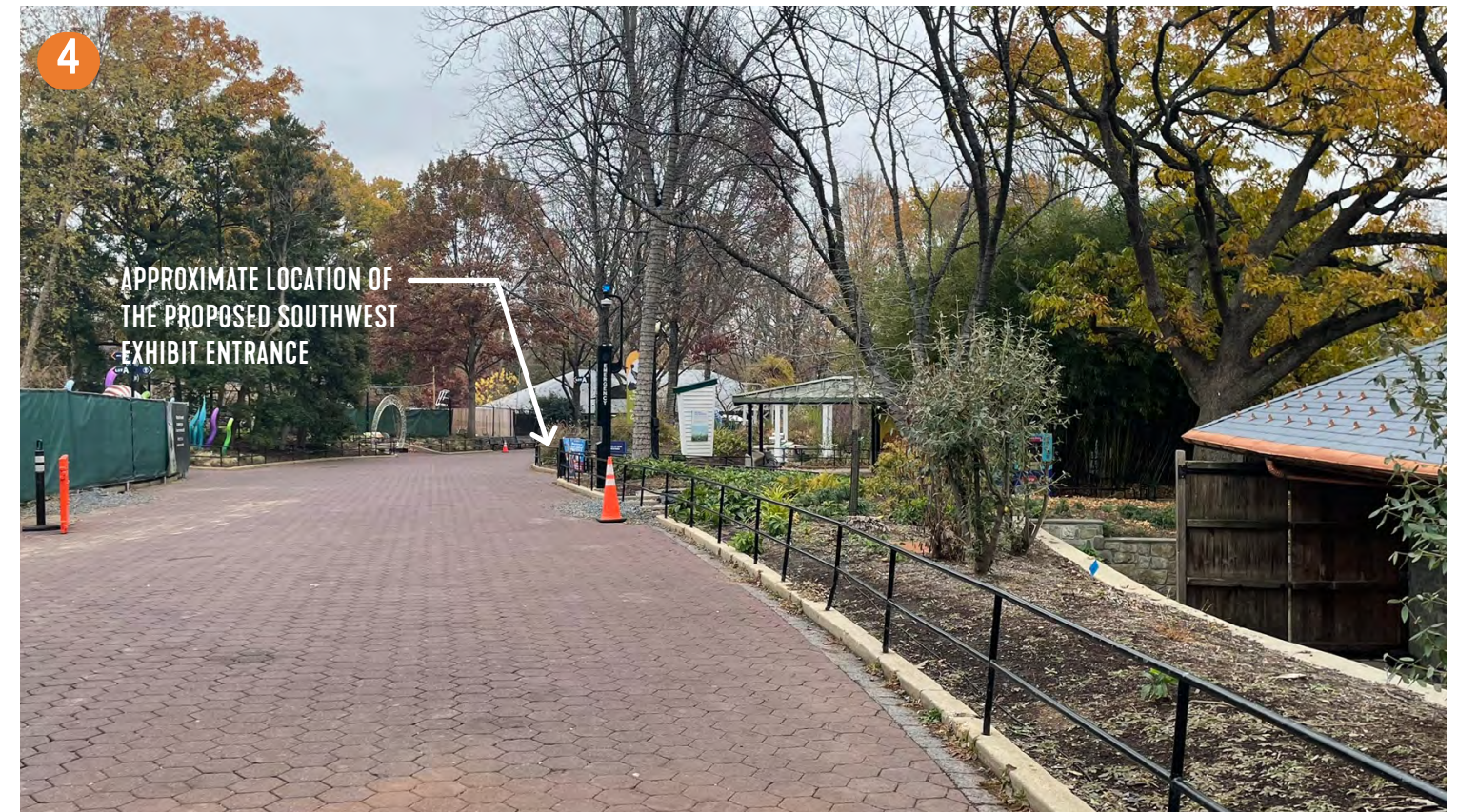


Figure 4.6.9.4: Existing Viewshed along Upper Olmsted Walk at Panda Overlook Entry



Figure 4.6.9.5: Existing Viewshed along Upper Olmsted Walk at Panda Overlook and Zoo in Your Backyard Entry

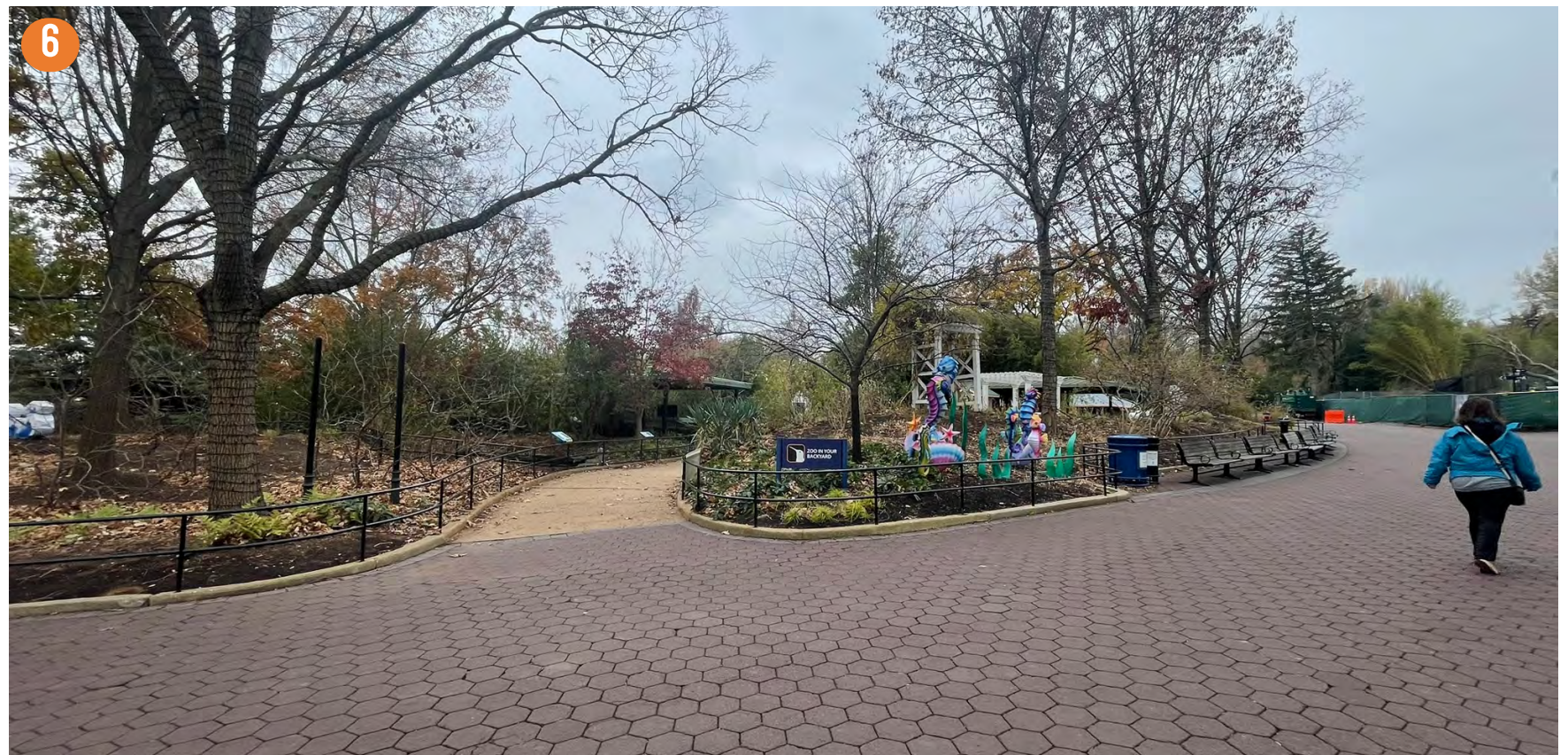
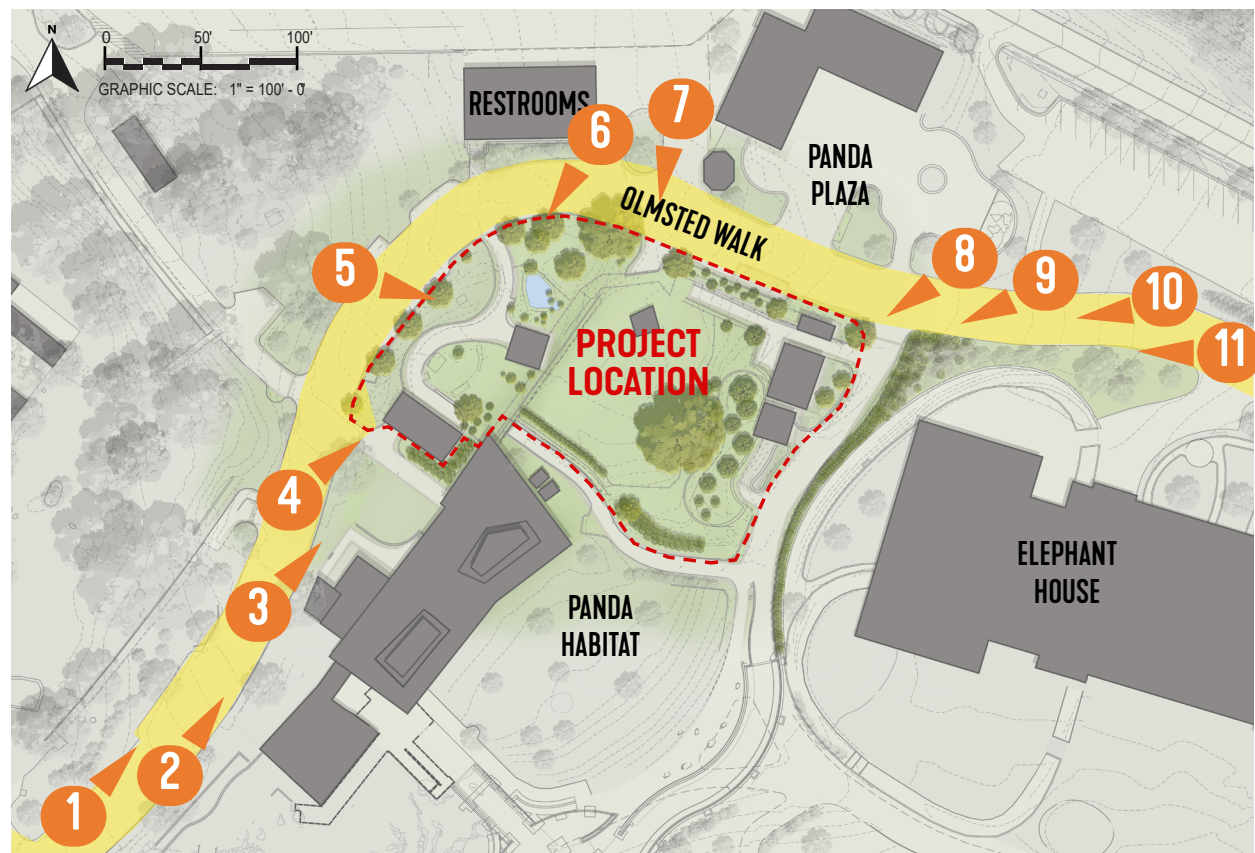


Figure 4.6.9.6: Existing Viewshed along Upper Olmsted Walk at Zoo in Your Backyard Entry



Figure 4.6.9.7: Existing Viewshed along Upper Olmsted Walk at American Bison Overlook



Figure 4.6.9.8: Existing Viewshed along Lower Olmsted Walk at Asia Trail Entry



Figure 4.6.9.9: Existing Viewshed along Lower Olmsted Walk at Asia Trail Entry



Figure 4.6.9.10: Existing Viewshed along Lower Olmsted Walk at Elephant House Loading Dock



Figure 4.6.9.11: Existing Viewshed along Lower Olmsted Walk at Elephant House

4.7 EXISTING HABITAT ENCLOSURE STRUCTURES

Arabian Leopards are excellent climbers and use trees to escape predators and scan their hunting territory, so there is a requirement for a tall habitat enclosure to accommodate their activity. There are precedents for such enclosures at the National Zoo.

The Great Flight Aviary is an example of a masted tensile structure with the addition of an arched frame with a mesh suspended structure. This system allows for open space within the structure with a single point of structure touching down in the middle of the habitat while also maximizing the amount of clear vertical volume.

The Gibbon Habitat Enclosure directly off Olmsted Walk is an example of a masted tensile mesh structure. There are multiple masts within the enclosure that are highly visible; however, they serve a purpose for supporting other features of the Gibbon Habitat as well as being utilized by the Gibbons.

The Orangutan O-Line exhibit that crosses Olmsted Walk includes a series of vertical support towers with cables in between. The O-Line exhibit has visibility from significant distances while ascending or descending Olmsted Walk due to crossing the Walk several times.

THE GREAT FLIGHT AVIARY - MASTED TENSILE STRUCTURE WITH MESH AND ARCHED STRUCTURAL SUPPORTS

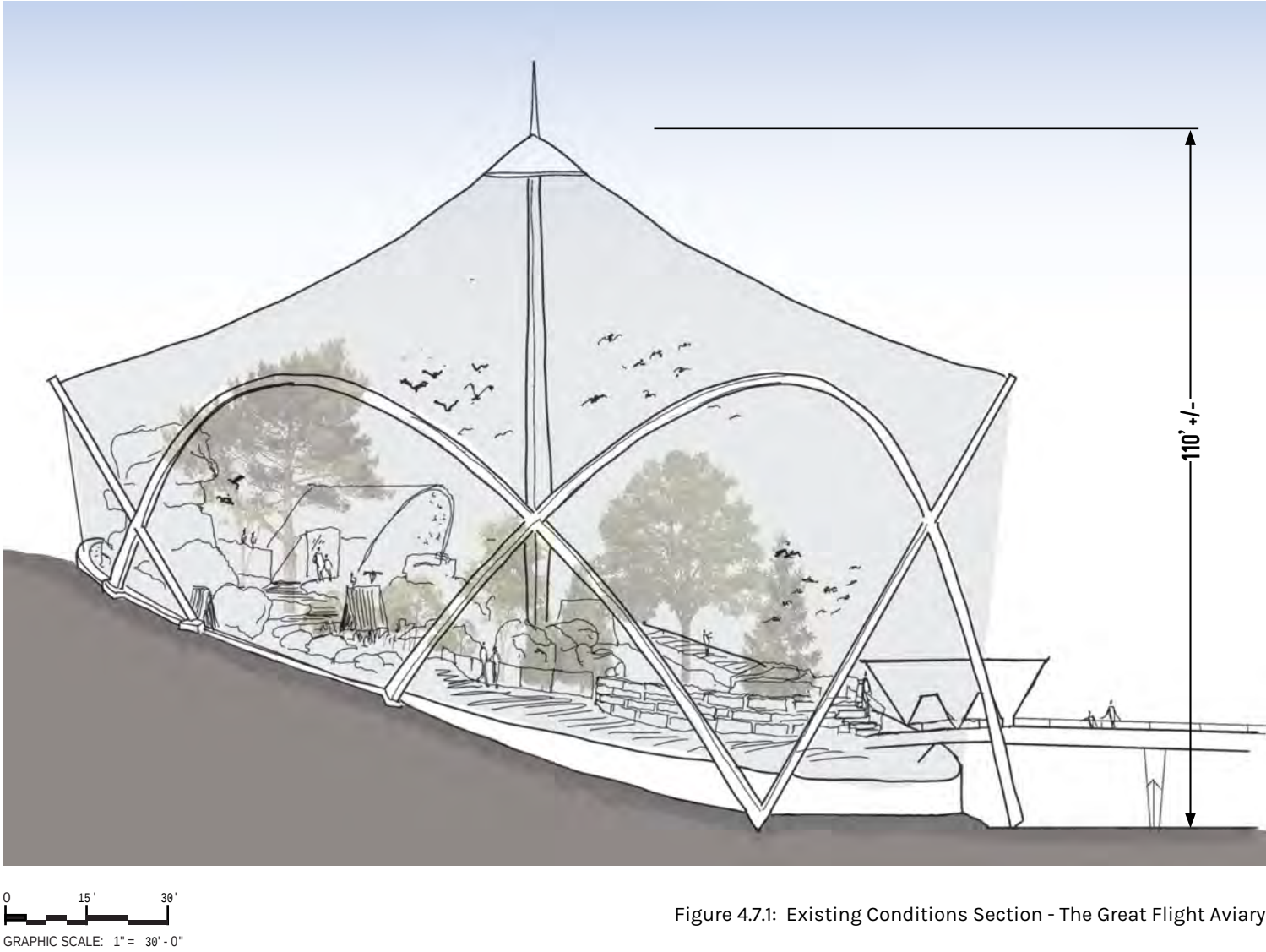


Figure 4.7.1: Existing Conditions Section - The Great Flight Aviary

GIBBON HABITAT ENCLOSURE - MASTED TENSILE MESH STRUCTURE



0 10' 20'
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Figure 4.7.2: Existing Conditions Section - Gibbon Habitat Enclosure

ORANGUTAN O-LINE EXHIBIT

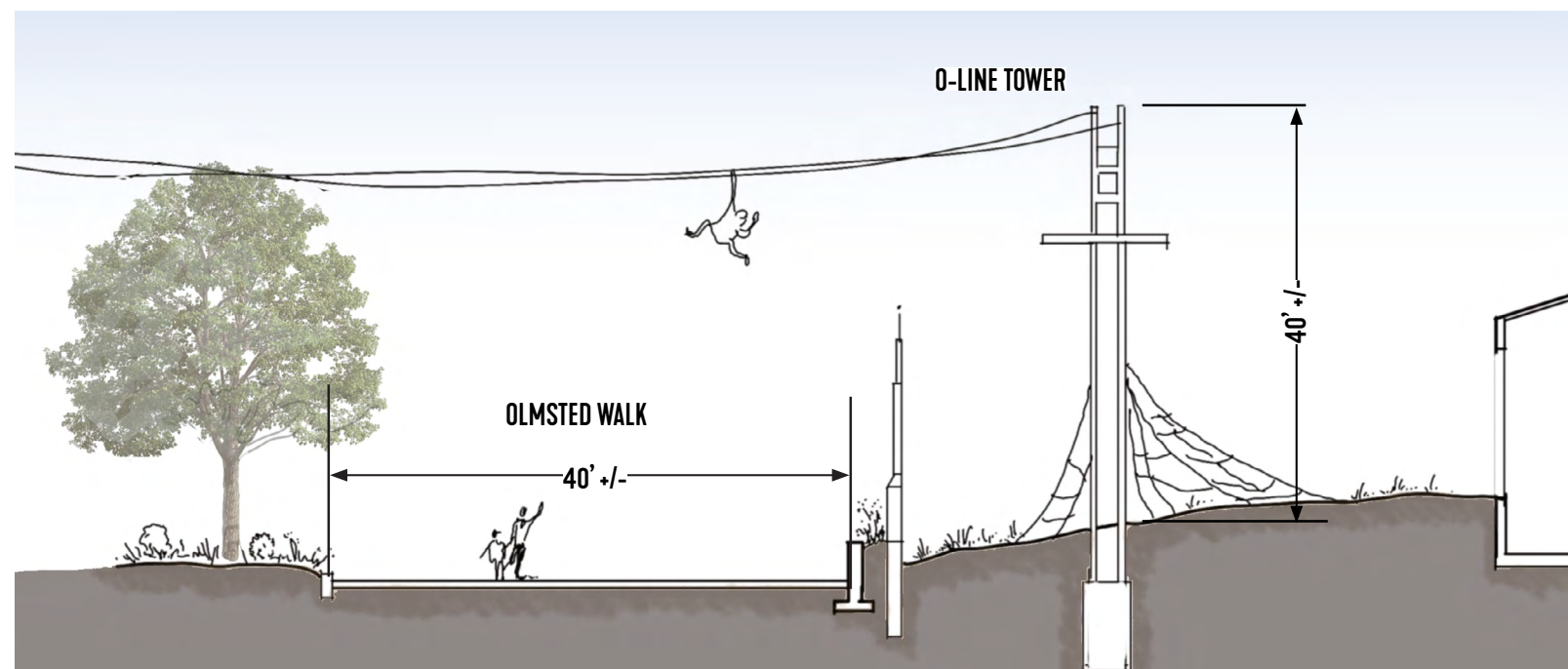


Figure 4.7.3: Existing Conditions Section - Orangutan O-Line Exhibit

5.0 FINAL DESIGN



5.0 FINAL DESIGN

5.1 DESIGN INSPIRATION

5.1.1 ARCHITECTURE IN SERVICE TO LANDSCAPE

The architectural language of the National Zoo along Olmsted Walk has always reflected a reverence for the natural landscape. From its inception under Frederick Law Olmsted Sr., the guiding principle was that architecture should give power to the landscape, quietly supporting the visitor’s encounter with nature rather than asserting dominance over it. Buildings are conceived as part of the topography: nestled into slopes, framed by tree canopies, and woven into the contours of Rock Creek Park.

5.1.2 CONTEXTUAL FABRIC

Olmsted Walk presents a rich tapestry of historic materials and forms that collectively define its character. Architecture serves as a companion to the landscape rather than its centerpiece.

The following are key contextual principles found throughout the Zoo:

Materiality

Natural stone, brick, wood, and terracotta tile are found throughout creating consistency within the material landscape. Carderock, a local stone that presents in a wide range of gray, brown, and beige colors, is the most predominant natural stone and complementary to the landscape.

Form

Building masses are simple and articulated to reduce visual bulk, often setback or screened by vegetation to maintain the continuity of the pedestrian experience and landscape setting. Architectural forms avoid monumentality, favoring proportions and detailing that reinforce the park-like character of the Zoo.

Roofscape

The roof is often the most visually prominent element when viewed from the winding grades of Olmsted Walk. Historic roof lines are typically pitched or hipped, clad in clay tile or slate, creating a rhythmic continuity across the Zoo’s campus. Their color and texture complement the surrounding landscape, ensuring that architecture remains a quiet companion to the park environment.

Building Hierarchy

Supporting structures—restrooms, concessions, maintenance—can be utilitarian and recessive while exhibition buildings are more expressive, reflecting the spirit of the species or ecosystems they represent supporting the visitor along their path at the Zoo.



Figure 5.1.2.1: Existing Contextual Fabric

5.2 PROPOSED ANIMAL CARE BUILDING MATERIALS

5.2.1 NATURAL STONE FACADE

Natural stone is deeply rooted in the architectural language of the National Zoo and serves as a character-defining material across its historic campus. Many of the Zoo’s original structures—such as retaining walls, gateways, and exhibit buildings—feature stone in foundations, facades, and site elements, reinforcing a handcrafted, enduring aesthetic that harmonizes with Rock Creek Park’s geology.

A Carderock stone facade is proposed as the preferred material for the project.

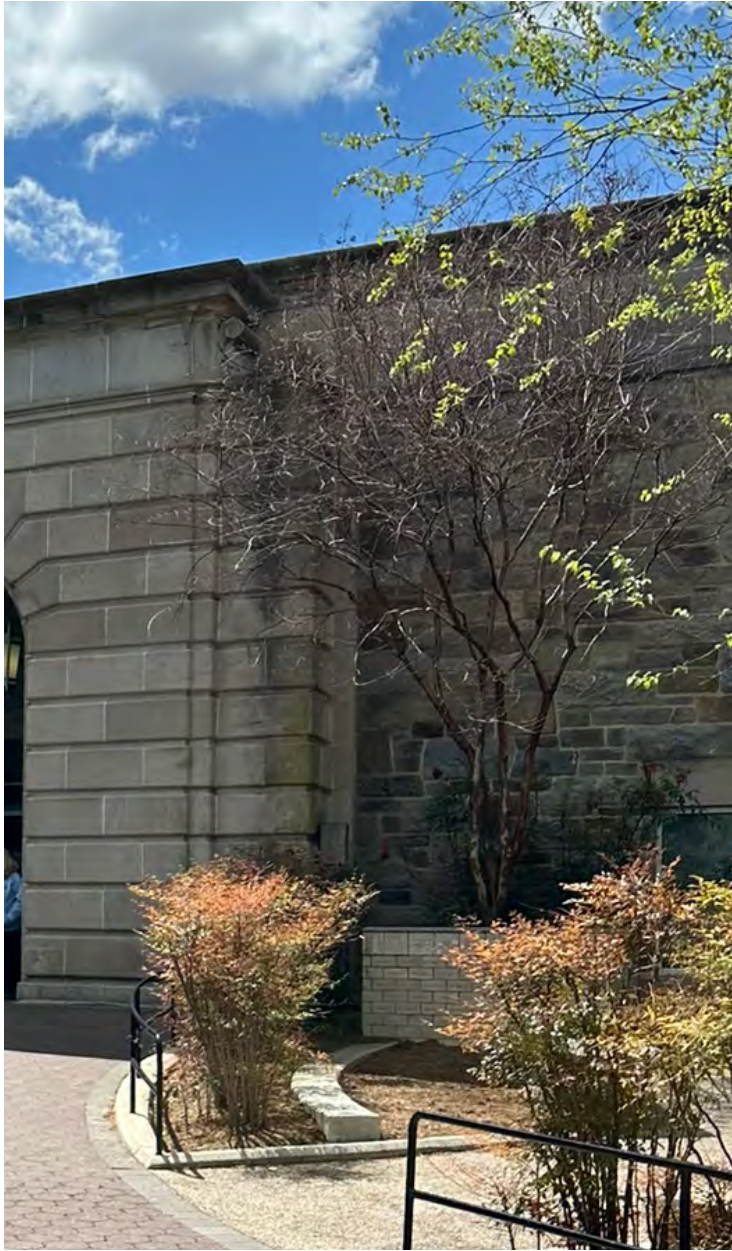
- Carderock is the most prevalent material throughout the Zoo. The natural range of Carderock installations throughout the historic district feature a wide range in tonality. For this project, a subtle warm beige tone in addition to the typical blue-grey tones more common in Carderock will be utilized to complement the natural habitat aesthetic throughout the exhibit.
- A common ashlar coursing pattern of stone is proposed, inspired by the typical coursing pattern of Carderock found throughout the historic district.
- Basis of Design: Tri-State Stone, Carderock, Ashlar Veneer - 3-1/2", 7-1/2", and 11-1/2"H by Random Lengths



Figure 5.2.1.1: Proposed Facade Material
Carderock, Ashlar Coursing



Conservation Pavilion featuring Carderock, ashlar coursing



Elephant House featuring carved Indiana Limestone and
Carderock, ashlar coursing

Figure 5.2.1.2: Natural Stone - Precedent Imagery

5.2.2 GREEN-COLORED ROOF

Green-colored, non-vegetated, roofing establishes a strong visual and material connection between the Arabian Leopard Habitat and its surrounding landscape, reinforcing the architectural character of Olmsted Walk and the historic district.

Pre-formed, interlocking, metal roofing is proposed as the preferred material for the project. Specifically, pre-patinated copper shingles in a diamond shape are proposed.

- Its weathered green tones harmonize with the tree canopy, stone, and vegetated roofs in the historic district, allowing the structure to recede into the landscape while maintaining a crafted, expressive presence.
- Diamond pattern geometries introduce a subtle rhythm that unifies the building’s silhouette along Olmsted Walk. The roof’s geometric language transforms a functional surface into an architectural field of light and shadow, echoing terracotta roofs on early Zoo structures such as the Think Tank, Bird House, and Reptile House.
- Basis of Design: Spengler Industries, Pre-Patinated Copper Diamond Shape Shingles, Approximately 12"W by 17"L



Figure 5.2.2.1: Proposed Roof Material - Pre-Patinated Copper Diamond Shape Shingles



Figure 5.2.2.2: Roof Precedent Imagery - Green-Colored Roof Think Tank Featuring Green Terracotta and Glass Tile Roof

5.3 PROPOSED HABITAT ENCLOSURE MATERIALS

5.3.1 ARCHED STRUCTURE AND MESH DIMENSIONS

The design team has explored alternative ways to make the profiles of the ribs smaller to lessen the visual impact of the structural members. To minimize the superstructure of the enclosure, the members vary in size from 6" diameter for the shorter steel arches to 12" diameter for the taller steel arches. The diameter is consistent throughout each arch and does not taper. This approach maintains overall proportionality of the superstructure arches compared to utilizing a uniform dimension that would create disproportionate forms.

The enclosure mesh will be hand woven A316 stainless steel mesh. Mesh size is driven by the animal care program requirements and will be 2"x2"x1/8" to ensure the safety of both animal and human.

5.3.2 ARCHED STRUCTURE AND MESH COLOR PALETTE

The design team recommends the enclosure arches be colored bronze to allow the arches to disappear into the landscape of the Zoo. This recommendation differs from the prior submission. Upon further study, the bronze color blends into the landscape more to minimize visual clutter from Olmsted Walk. The mesh color proposed is black oxidized as it also falls into the landscape and allows for clear viewing from visitor to animal. Reference 6.3.2 Arched Structure and Color Palette for design studies.



Figure 5.3.2.1: Stainless Steel Black Oxidized Finish Mesh



Figure 5.3.2.2: Proposed Enclosure Color Palette: Bronze Arches and Stainless Steel Black Oxidized Finish Mesh

5.4 PROPOSED SHADE STRUCTURE MATERIALS

5.4.1 SHADE STRUCTURE DIMENSIONS

Throughout the site, there are two locations identified for permanent shade structures for visitors. See 5.5.3 Proposed Site Plan for locations within the project site. Alternative ways to lessen the visual impact of the structural members at the shade structures has been explored further. The vertical structure has been consolidated to both lessen the visual impact and also enhance the visitor experience.

In the previous submission, there was a shroud shown encompassing the structural support for both the shade and the enclosure structure as shown in Figure 5.4.1.1. The Commission recommended the project minimize the visual impact of the structures.

In an effort to minimize the visual impact of the shade structures, the supports have been separated from the enclosure and shade structure, creating two separate vertical supports. This helps break-up the mass that was apparent previously, while also ensuring the sight lines for the visitor into the habitat are not obstructed, which is achieved by having the supports adjacent to each other. Where possible, the supports for the shade structure are consolidated within the faux rockwork. The vertical structural supports of the shade structure range between 10" to 11" in diameter.

5.4.2 SHADE STRUCTURE MATERIAL AND COLOR PALETTE

The canopy of the shade structure was previously shown as perforated metal panel as the preferred material approach; however, during the Section

106 Consulting Parties process, it was determined that the alternate slat canopy design proposed was more appropriate to blend within the historic district of the Zoo.

The use of painted metal slats with painted metal vertical supports is proposed for the materiality of the shade structures. Painted metal is currently found within the material palette of the project via painted metal railings that serve as visitor barriers/railings and painted metal arches supporting the enclosure; thus, creating less of a visual impact on the project site by limiting the number of materials within the project material palette.



Figure 5.4.1.1: Preliminary Report Submission Shade Structure Preferred Option



Figure 5.4.1.2: Revised Shade Structure at Central Plaza - Painted Steel Supports Separated from Painted Steel Arch Supports at Enclosure

5.5 SITE DESIGN

5.5.1 SITE ORGANIZATION PROPOSED CONCEPT

The Oasis Wadi Hybrid Combo provides multiple points of entry off of Olmsted Walk at a very busy section. Visitors can view the exhibit from multiple points throughout creating a variety of viewing experiences. The following areas are viewpoints for visitors:

- Walking through the exhibit and on Olmsted Walk
- Under tunnel within exhibit
- Within Oasis area at the central plaza of exhibit

Throughout the site, there are two locations to offer shading for visitors that coincide with viewing and respite opportunities.

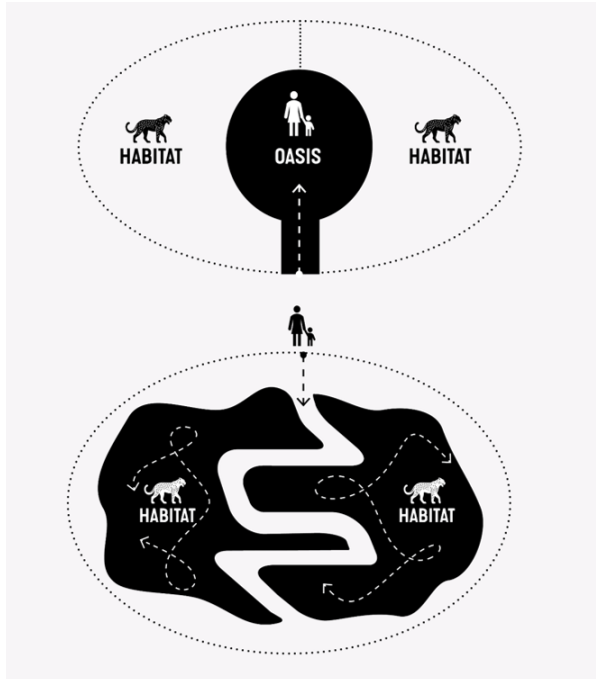


Figure 5.5.1.1: Oasis Wadi Combo Diagram.



Figure 5.5.1.2: Proposed Site Plan - Visitor and Service Circulation

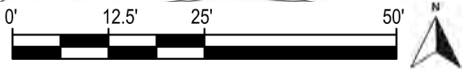
5.5.2 EXISTING SITE PLAN

Features List:

- 1. West Entrance to Zoo in Your Backyard
- 2. Northwest entrance to Zoo in Your Backyard
- 3. Zoo in Your Backyard Exhibit
- 4. Viewing area for American Bison Exhibit
- 5. Service Access for American Bison Exhibit
- 6. Exit from Panda House
- 7. American Bison Yard
- 8. Olmsted Walk Bench Niche with Drinking Fountain
- 9. Vendor Area and Niche
- 10. Vending Shade Structure
- 11. Gazebo
- 12. Bison Overlook Structure
- 13. Bison Habitat Shade Structure
- 14. Bison Care Shed
- 15. Bison Care Building
- 16. Panda Concession Shade Structure and Vending Area
- 17. Pond
- 18. Olmsted Rail & Curb
- 19. Carderock Wall
- 20. Bamboo Arch
- 21. Bamboo Landscape Rail and Curb
- 22. Retaining Wall



Figure 5.5.2.1: Existing Site Plan



5.5.3 PROPOSED SITE PLAN

Features List:

- 1. West Entrance to Arabian Leopard Exhibit
- 2. North Entrance to Arabian Leopard Exhibit
- 3. New Arabian Leopard Care Building (one-story plus basement)
- 4. New Arabian Leopard Habitat with Custom Faux Rockwork
- 5. New Off-view Arabian Leopard Habitat
- 6. New Pedestrian Tunnel through Exhibit, with Poured-in-place Rubber Surfacing
- 7. New Pedestrian Pathway with Exposed Aggregate Concrete Pavement
- 8. New Retaining Wall
- 9. New Habitat Enclosure
- 10. New guardrail
- 11. Existing Benches and Niche to Remain
- 12. New Urban Planter
- 13. New Service Access, Existing Curb Cut and Service Access
- 14. New Screen Fence
- 15. New Service Access, Existing Curb Cut
- 16. New Bioretention
- 17. Existing Retaining Wall
- 18. Shade Structure



Figure 5.5.3.1: Proposed Site Plan - Features

5.6 ANIMAL CARE BUILDING AND HABITAT ENCLOSURE

5.6.1 MASSING

The strategy deployed in the design for both the building and enclosure responds to the topography of Olmsted Walk and the rhythm of existing buildings throughout the historic district. The following are guiding principles taken for each of the massing concepts:

- **Scale** - The existing building maintains a low, elongated profile, visually anchored into the slope to minimize its presence.
- **Integration** - Existing terraced retaining walls and planted edges merge the structure with the terrain.
- **Roofscape** - The roofline references the traditional gable and hipped geometries throughout the historic district but are simplified into a crisp, contemporary plane that references the traditional gable roofs in the historic district.
- **Fenestration** - A careful balance between solid and transparent zones for both visitors and animals ensures visual porosity throughout. Allowing glimpses of animal care functions without compromising privacy or habitat serenity.

Through the Section 106 Consulting Parties process, the mitigation of the visual impact of the care building and roof profile from Olmsted Walk was discussed and further developed. The previous roof profile shown within the Preliminary Report was a traditional gable form that transitioned to an inverted gable. The request was made during the Section 106 process to simplify

the geometry of the roof to mitigate visual impact. See 6.2 Animal Care Building and Animal Habitat Refinement for additional information on proposed options during the Section 106 process.

The contiguous shed roof was the preferred option as it appeared too flattened when viewed from Olmsted Walk, referencing the low slope roofs prevalent in the historic district. See Figure 5.6.1.2 for reference.



Figure 5.6.1.1: Preliminary Roof Profile



Figure 5.6.1.2: Final Roof Profile

5.7 PROPOSED FINAL DESIGN

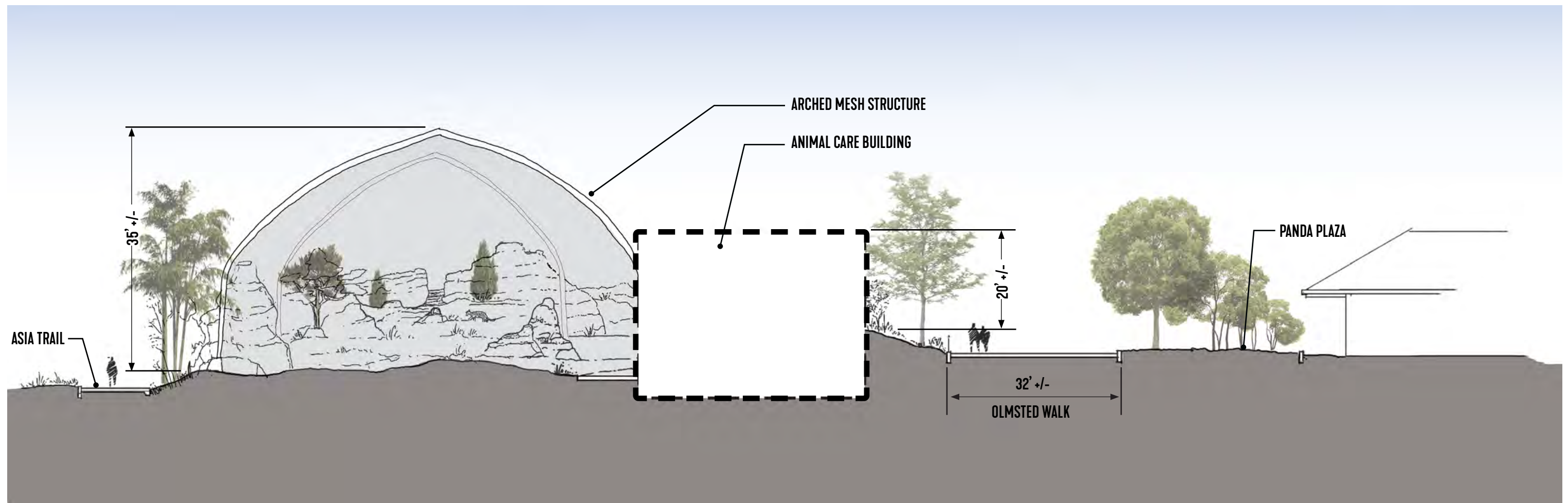
5.7.1 ARCHED MESH STRUCTURE

The Arched Mesh Structure consolidates both the Leopard habitats and the visitor pathway, via a tunnel under the habitat, within a single, continuous enclosure. A series of long-span steel arches form an arched superstructure, spanning across the full habitat zone to create a unified architectural volume along the perimeter of the animal habitat. A tensioned steel mesh is draped and secured at the centerline of this frame to define the enclosure.

In this configuration, the primary structure is located entirely at the perimeter, eliminating internal supports and maintaining clear sight-lines through the habitat. Placing the primary structure at the perimeter provides the greatest flexibility for future adjustments to climbing structures and the habitats to support changing animal care requirements. The superstructure presents a sculptural profile along Olmsted Walk maintaining no more than 35 feet above grade at any given point to reduce visual impacts. The arch shape can be found within the historic district used as an entry gateway into contributing historic buildings.



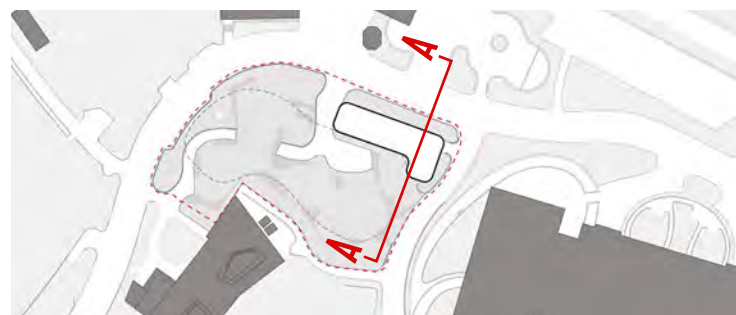
Figure 5.7.1.1: Final Enclosure Design



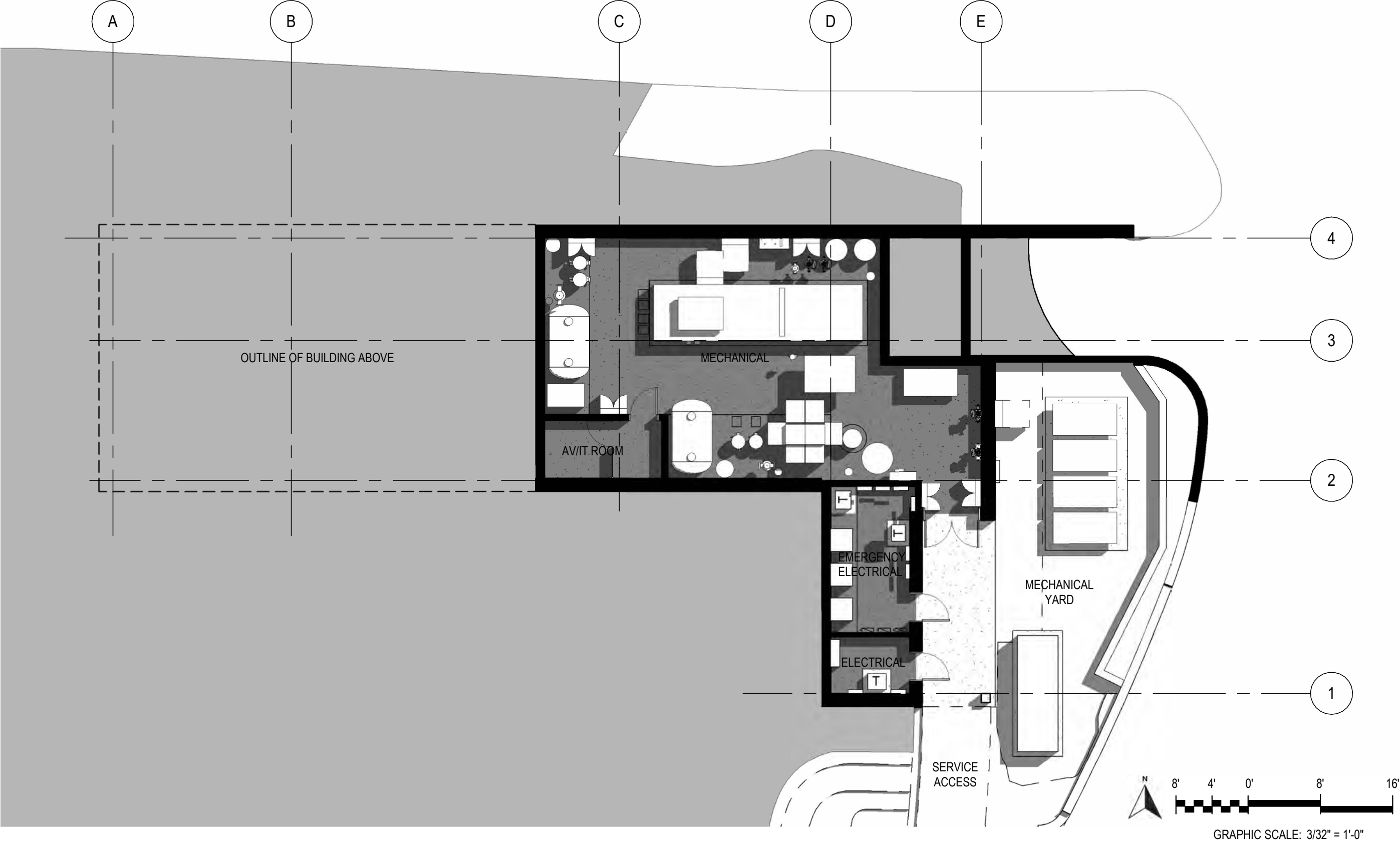
0 10' 20'

GRAPHIC SCALE: 1" = 20' - 0"

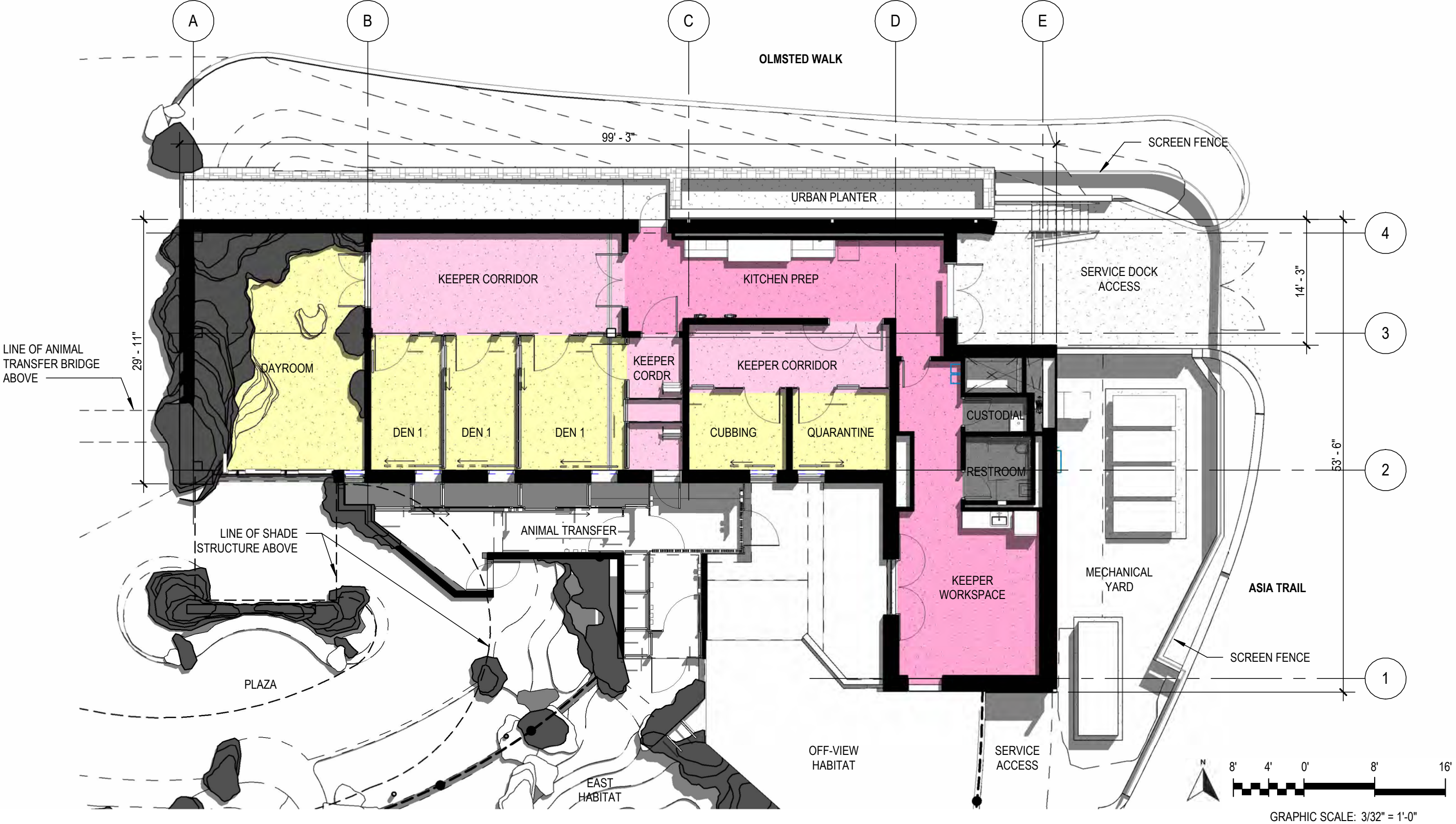
Figure 5.7.1.2: Arched Mesh Structure - Massing Site Section

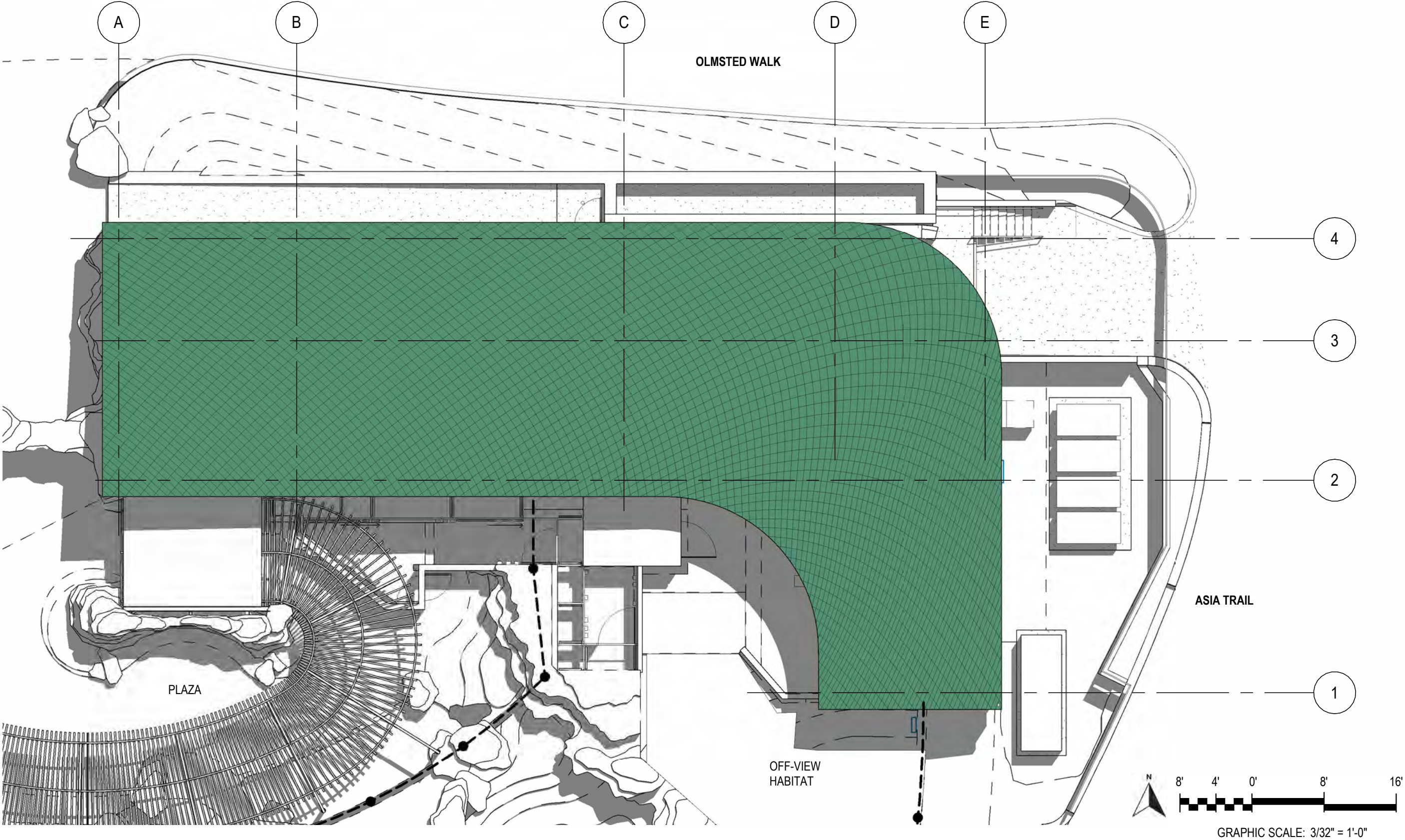


5.7.2 ANIMAL CARE BUILDING DRAWINGS
Floor Plan - Basement

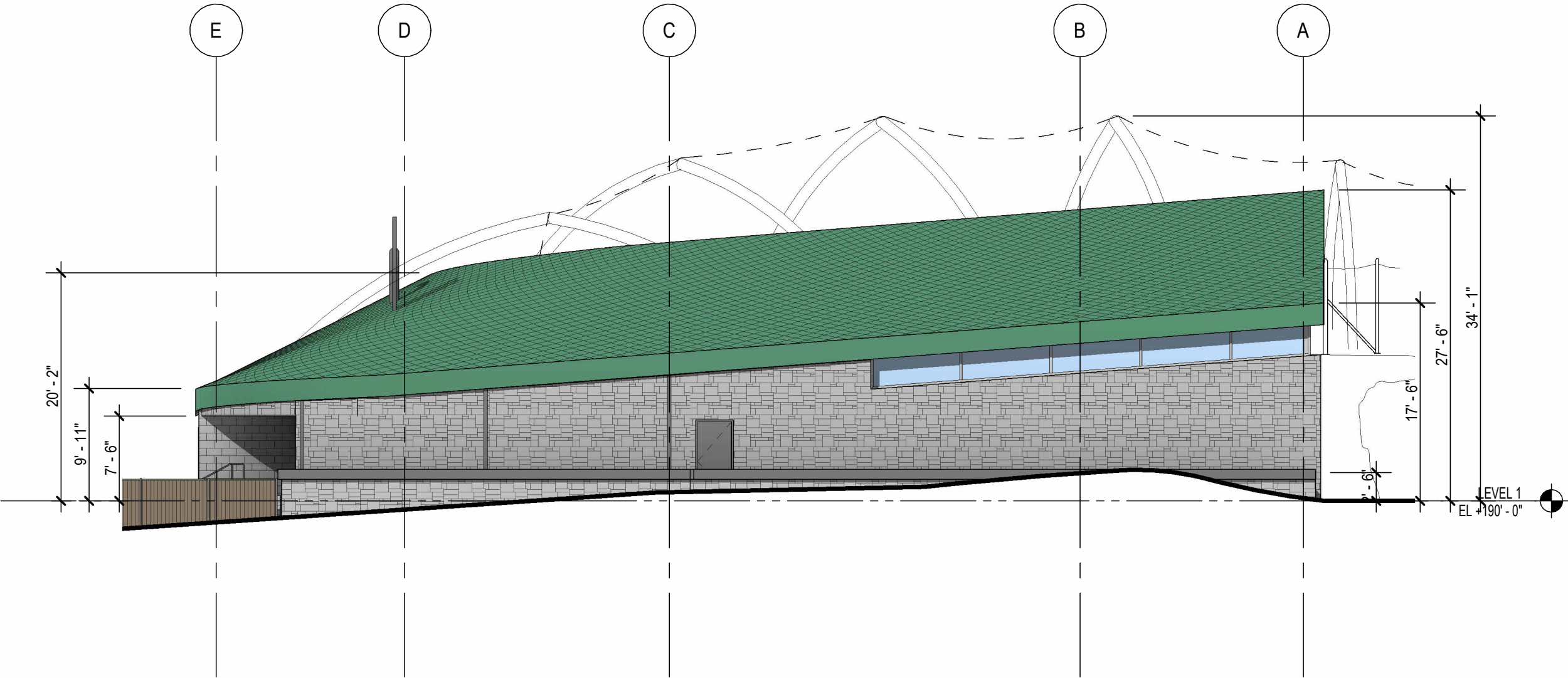


Floor Plan - Level 1





Elevation - North

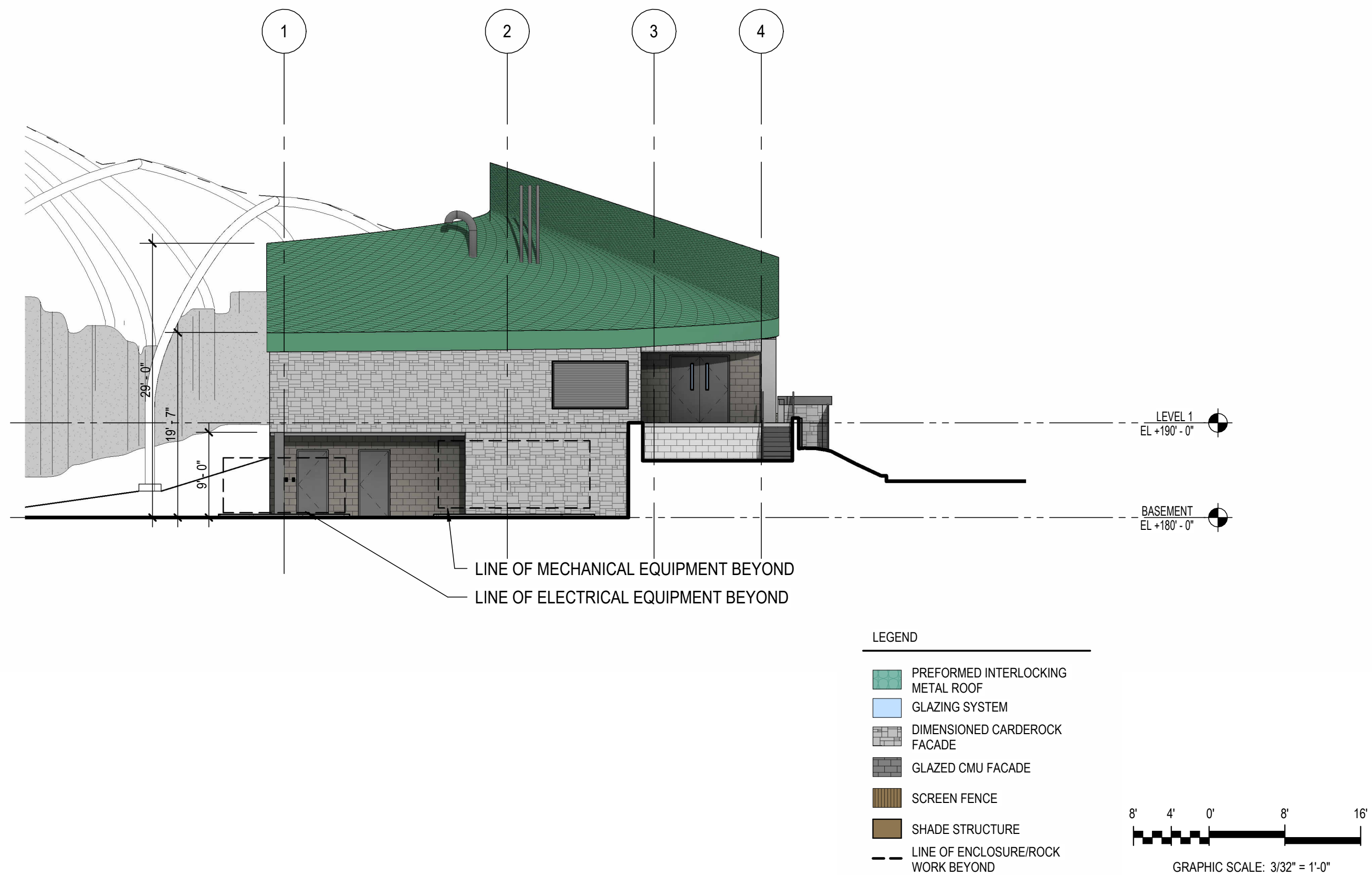


LEGEND

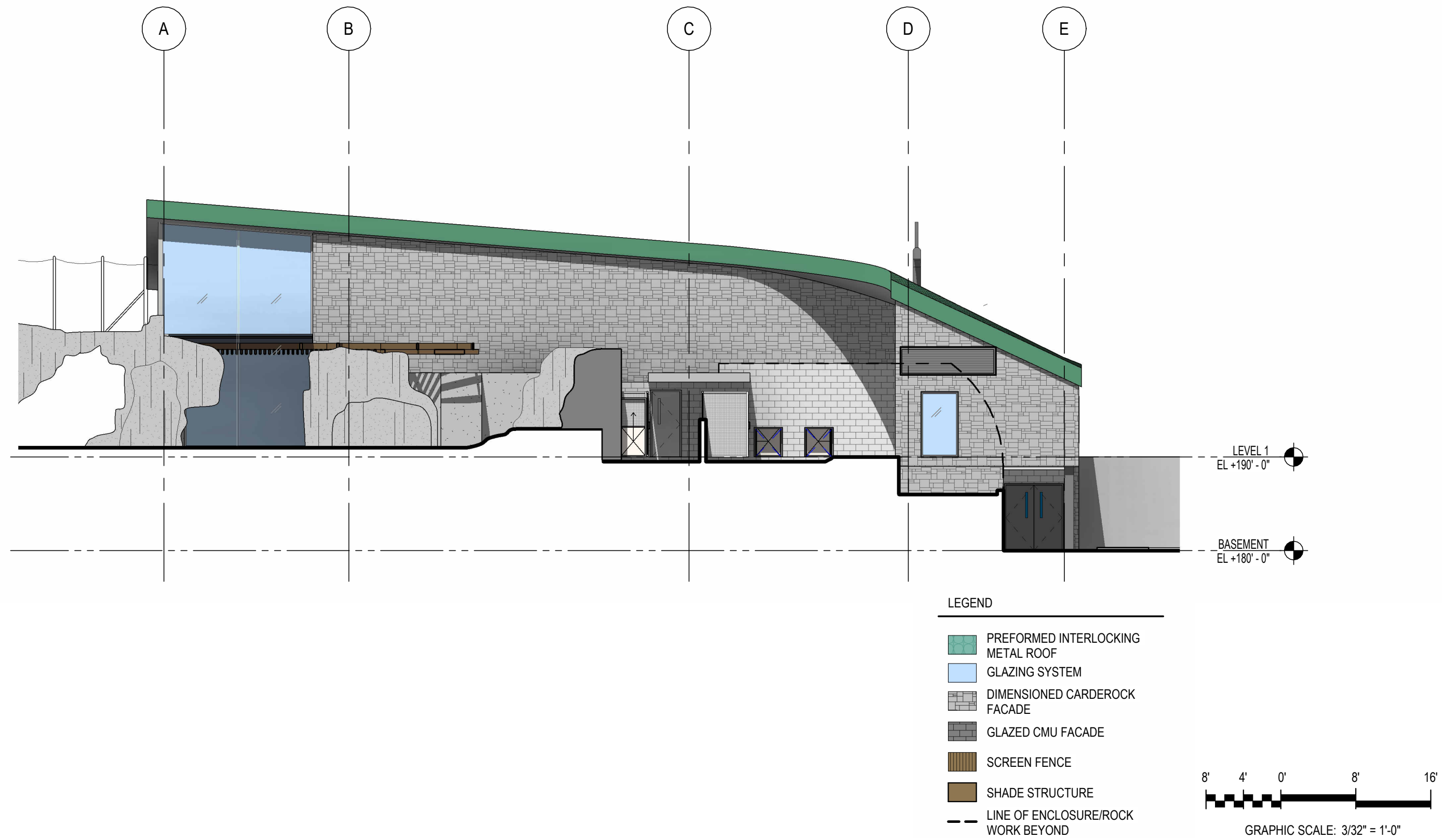
- PREFORMED INTERLOCKING METAL ROOF
- GLAZING SYSTEM
- DIMENSIONED CARDEROCK FACADE
- GLAZED CMU FACADE
- SCREEN FENCE
- SHADE STRUCTURE
- LINE OF ENCLOSURE/ROCK WORK BEYOND



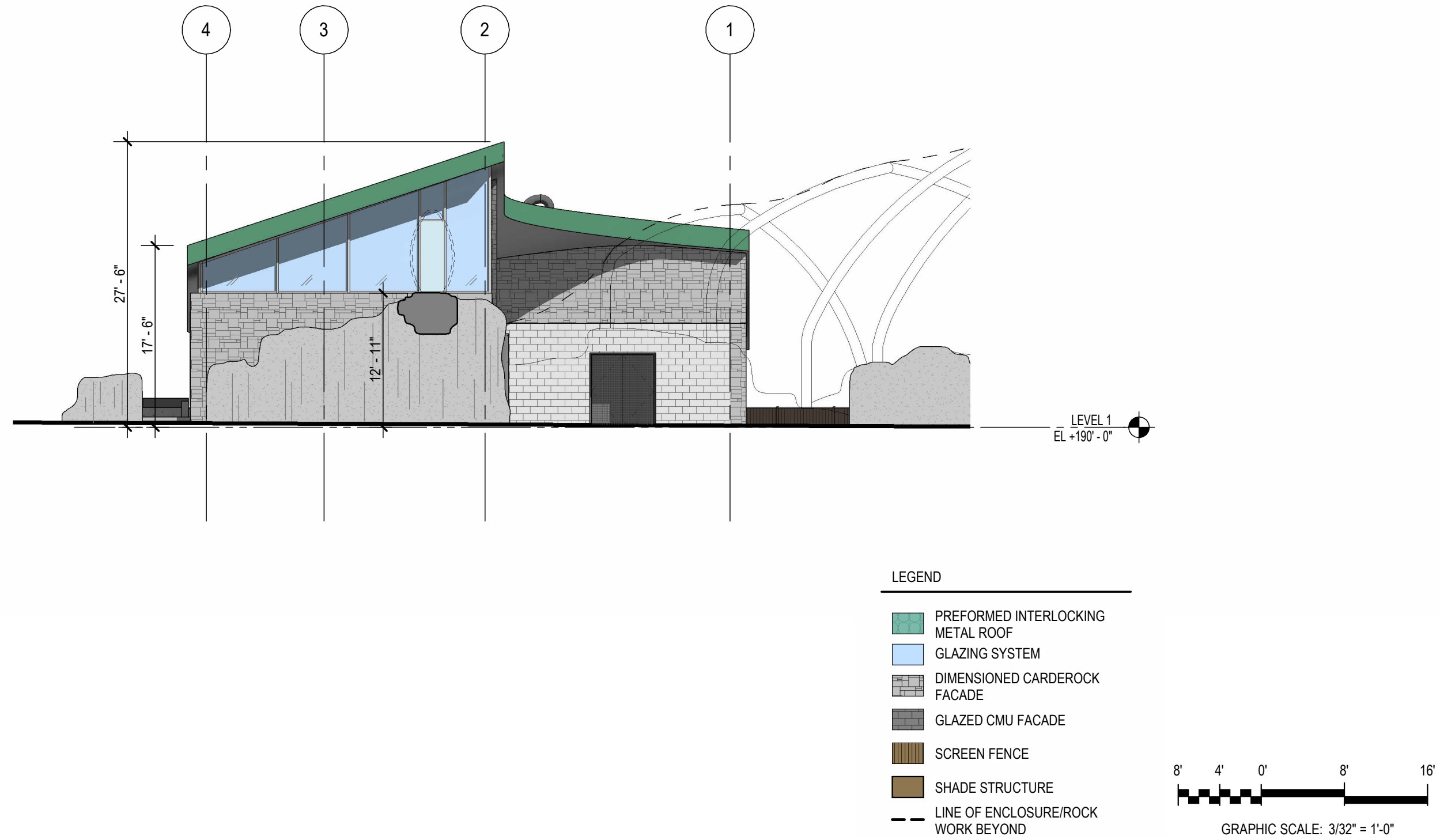
Elevation - East



Elevation - South



Elevation - West



5.7.3 ANIMAL CARE BUILDING RENDERINGS

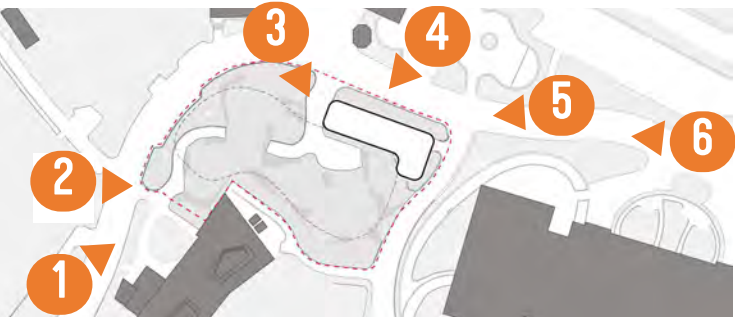


Figure 5.7.3.1: Rendering 1 - Perspective View - Upper Olmsted Walk Looking East
Note: Exhibit structure to viewer's left is the existing Cheetah Conservation Station.



Figure 5.7.3.2: Rendering 2 - Perspective View - Upper Olmsted Walk Looking East, Site Entry - Additional Shrubs and Existing Tree Added per Recommendation from Preliminary Review



Figure 5.7.3.3: Preliminary Report Rendering 2



Figure 5.7.3.4: Rendering 3 - Perspective View - Olmsted Walk Looking South at Care Building/Day Room, Site Entry





Figure 5.7.3.5: Rendering 4 - Perspective View - Olmsted Walk Looking South at Care Building/Day Room, Site Entry from Kiosk

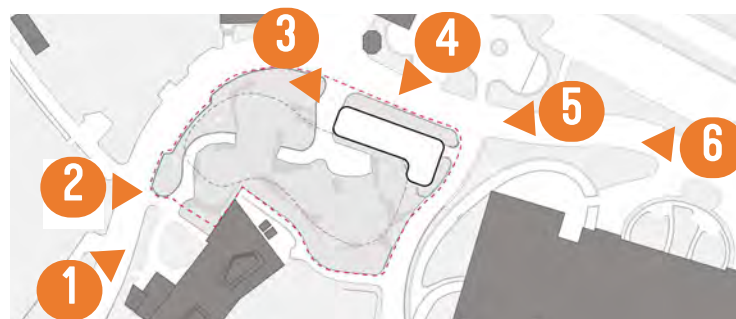


Figure 5.7.3.6: Rendering 5 - Perspective View - Lower Olmsted Walk Looking West, Asia Trail and Panda Plaza to Service Access

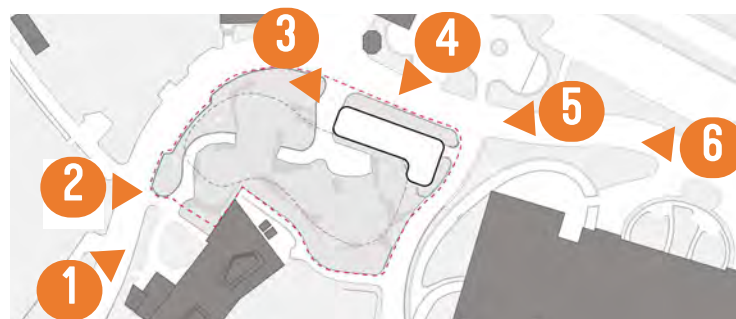


Figure 5.7.3.7: Rendering 6 - Perspective View - Lower Olmsted Walk Looking West, Elephant House

5.7.4 SHADE STRUCTURE RENDERINGS

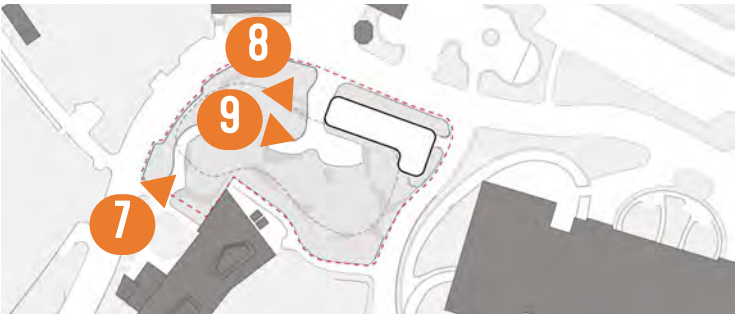


Figure 5.7.4.1: Rendering 7 - Shade Structure Perspective View - West Site Visitor Entry Looking at West Habitat



Figure 5.7.4.2: Rendering 8 - Shade Structure Perspective View - Plaza Looking at East Habitat





Figure 5.7.4.3: Rendering 9 - Shade Structure Perspective View - Plaza Looking at Day Room and Animal Transfer

5.8 PROPOSED FINAL LANDSCAPE DESIGN

5.8.1 INTEGRATION INTO THE LANDSCAPE

The landscape design will support the Arabian Leopard Habitat and the architecture of the associated Day Room and Care Building. It will help situate the new building, with its expressive and unique presence, within the historic context of Olmsted Walk and the Zoo.

Protection of existing trees along Olmsted Walk will form an important scope for landscape design. Several of these trees have already achieved the height and stature that lends character to Olmsted Walk. Identifying and protecting these throughout construction will be critical to help blend new architecture and exhibit with existing Zoo landscape.

For tree protection measures, a Certified Project Arborist will be retained for the duration of construction to supervise all tree-sensitive activities and enforce tree protection measures. Key protective measures include protection fencing, specialized excavation techniques to avoid damaging root systems, hand digging, directional boring around utility conflicts, and supplemental watering during summer months. All tree protection areas shall remain closed off and maintained until the Project Arborist and Smithsonian determine it is safe to remove them.

The addition of new trees will be concentrated to areas within the new habitat structures. Trees will serve as accents to support the feel of a mountainous and dry Arabian Peninsula

landscape with the use of trees that can survive in the humid summers and cool winters of Washington, D.C.

Likewise, shrubs and ground covers within the habitat have been strategically placed to encourage the thematic expression of the Arabian Peninsula, and may be used to help shape views or soften edges of built forms. Shrubs and ground covers outside the Habitat, along Olmsted Walk and the Asia Trail, will continue to support the function and aesthetics of these pathways and will be largely native and reliable for typical Zoo plantings and maintenance, with some special plantings to announce and evoke the Arabian theme at strategic views or entry points.

Existing soils will be evaluated to see if stockpiling and reuse is possible, in order to contribute to the mix of new soils and surfacing for the habitats.

If existing topsoil depth is sufficient, then amendments can be tilled into existing soil to create the top horizon of the amended soil layer.

Imported horticultural soils will be used to form new plant beds as needed for areas along the site perimeter walks.



Figure 5.8.1.1: Proposed Planting Plan

5.8.2 PROPOSED FINAL PLANTING PLAN

Features List:

- 1. Existing Tree to Remain
- 2. New Canopy Tree
- 3. New Understory Tree
- 4. New Habitat Tree
- 5. Olmsted Walk Planting Palette
- 6. Wadi and Oasis Planting Palettes
- 7. Bioretention Planting Palette
- 8. Asia Trail Planting Palette
- 9. Bamboo



Figure 5.8.2.1: Proposed Concept Site Plan - Planting

5.8.3 OLMSTED WALK PLANTING PALETTE

The Olmsted Plant Palette consists of selected trees, shrubs, and perennials designed to reflect the natural plant communities of Rock Creek Park. To preserve the existing canopy trees along Olmsted Walk, the planting strategy emphasizes a layered understory of shade-tolerant species, primarily utilizing sedges and ferns.

Along the building facade, shrubs will be incorporated to ground and soften the building. At locations where Olmsted Walk approaches exhibit entrances, the plant palette will transition gradually into an Arabian-themed landscape, ensuring a cohesive visual connection between areas.

Plant selections have been made based on overall character, deer resistance, native status, pollinator benefits, and alignment with both the NCPC Pollinator Guidelines and the Olmsted Walk Guidelines

ECOSYSTEM ANALOGUE



PLANT PALETTE



GLEDITSIA
TRIACANTHOS



CARPINUS
CAROLINIANA



ILEX GLABRA
'DENSE'



RHUS
AROMATICA
'GRO-LOW'



CAREX
LEAVENWORTHII



CAREX
PLANTAGINEA



FESTUCA MAIREI



ATHYRIUM FILIX-
FEMINA 'LADY IN
RED'

	SCIENTIFIC NAME	COMMON NAME	DEER RESISTANT	POLLINATOR	NATIVE
TREES	<i>Gleditsia triacanthos</i> var. <i>inermis</i>	Honey Locust	X	X	X
	<i>Carpinus caroliniana</i>	American Hornbeam	X	X	X
SHRUBS	<i>Carcococca hookeriana</i> var. <i>humilis</i>	Dwarf Sweetbox			
	<i>Ilex glabra</i> 'Densa'	Inkberry Holly	X	X	X
	<i>Rhus aromatica</i> 'Gro-Low'	Gro-low Sumac	X	X	X
PERENNIALS	<i>Athyrium filix-femina</i> 'Lady in Red'	Lady in Red Lady Fern	X		X
	<i>Deschampsia flexuosa</i>	Crinkled Hairgrass	X		X
	<i>Dryopteris erythrosora</i> 'Brilliance'	Brilliance Autumn Fern	X		
	<i>Carex leavenworthii</i>	Leavenworth's Sedge	X	X	X
	<i>Carex muskingumensis</i> 'Oehme'	Oehme' Palm Sedge	X		X
	<i>Carex plantaginea</i>	Plantain-leaf Sedge	X	X	X
	<i>Festuca mairei</i>	Atlas Fescue	X		X
	<i>Metteuccia struthiopteris</i>	Ostrict Fern	X		X
	<i>Sesleria autumnalis</i>	Autumn Moor Grass	X		X

5.8.4 WADI PLANTING PALETTE

Wadi landscapes are arid riverbeds and valleys found within the natural habitat of the Arabian Leopard. They are defined by their ephemeral hydrology—remaining dry for most of the year and becoming active only during rare rainfall events.

The Wadi Plant Palette emphasizes the visual character of this dry terrain through a curated selection of ornamental grasses and thistle-like perennials. Light-canopied, structurally expressive ornamental trees are strategically placed to reinforce the sparse and open qualities typical of Wadi environments.

The Wadi plant palette has been incorporated throughout the Arabian Leopard exhibit and at its main entry points to reinforce the exhibit's overall theme.

All plant selections were made to reflect these defining characteristics while also ensuring suitability for growth in the Washington, DC region and compatibility with the Smithsonian’s National Zoo site conditions.

ECOSYSTEM ANALOGUE



PLANT PALETTE



PYCNANTHEMUM
MUTICUM



ARTEMISIA
FRIGIDA



DESCHAMPSIA
FLEXOUSA



SOLIDAGO X
'DANSOLITEM'



ARTEMISIA
FILIFOLIA



CHILOPSIS
LINEARIS



AGAVE
MONTANA



MORELLA
CERIFERA

	SCIENTIFIC NAME	COMMON NAME	DEER RESISTANT	POLLINATOR	NATIVE
TREES	Chilopsis linearis	Desert Willow	X	X	
SHRUBS	Artemisia filifolia	Sand Sagebush	X		
	Dasiphora fruticosa	Bush Cinquefoil	X	X	
	Morella cerifera	Wax Myrtle	X	X	X
	Artemisia frigida	Prairie Sagebush	X		
PERENNIALS	Calamintha nepeta 'Montrose White'	Catmint	X	X	
	Deschampsia flexuosa	Wavy Hairgrass	X	X	
	Festuca mairei	Atlas Fescue	X		X
	Hesperaloe parviflora	Red Yucca	X	X	
	Pycnanthemum muticum	Mountain Mint	X	X	X
	Schizachyrium scoparium 'Standing Ovation'	Little Bluestem	X	X	X
	Sesleria autumnalis	Autumn Moor Grass	X		X
	Solidago x 'Dansolitem'	Little Lemon Solidago	X	X	
	Sporobolus heterolepis 'Tara'	Tara Prairie Dropseed	X	X	X

5.8.5 OASIS PLANTING PALETTE

The Oasis Plant Palette represents the lush vegetation typically found surrounding a reliable water source, providing a distinct visual and ecological contrast to the surrounding Wadi terrain. The Oasis landscape is strategically placed around exhibit pools and is intended to convey a sense of relief and refuge within the broader composition of adjacent rockwork and arid features.

Planting within the Oasis is organized through layered masses of dense shrubs and robust grasses, creating a rich, verdant counterpoint to the surrounding golden rock formations. Ornamental trees with full, shaded canopies further frame and define the space.

All plant species were selected to reflect these defining characteristics while ensuring their suitability for the Washington, DC climate and their ability to thrive within the specific conditions of the National Zoo.

ECOSYSTEM ANALOGUE



PLANT PALETTE



CAREX
LEAVENWORTHII



CAREX
PLANTAGINEA



DESCHAMPSIA
CAESPITOSA



FESTUCA MAIREI



CRATAEGUS
VIRIDIS 'WINTER
KING'



HALESIA
CAROLINA



SESLERIA
AUTUMNALIS



SARCOCOCCA
HOOKERIANA
VAR. HUMILIS

	SCIENTIFIC NAME	COMMON NAME	DEER RESISTANT	POLLINATOR	NATIVE
TREES	<i>Halesia carolina</i>	Carolina Silverbell	X	X	X
	<i>Crataegus viridis</i> 'Winter King'	Winter King Hawthorne		X	X
SHRUBS	<i>Sarcococca hookeriana</i> var. <i>humilis</i>	Dwarf Sweet Box	X		
PERENNIALS	<i>Carex leavenworthii</i>	Leavenworth's Sedge	X	X	X
	<i>Carex plantaginea</i>	Plantain-leaf Sedge	X	X	X
	<i>Deschampsia caespitosa</i>	Tufted Hairgrass	X	X	X
	<i>Festuca mairei</i>	Atlas Fescue	X		X
	<i>Sesleria autumnalis</i>	Autumn Moor Grass	X		X

5.8.6 BIORETENTION AND ASIA TRAIL PLANTING PALETTE

Bioretention areas will be planted primarily with herbaceous groundcover, supplemented by strategically placed shrubs and perennials. Plant selections are based on proven tolerance to both wet and dry conditions, as well as prioritization of native species to support ecological function. All proposed plant materials will fully comply with DOEE standards, requirements, and proposed species lists.

Planting within the Asia Trail will maintain the established design character of the existing landscape. Where feasible, existing bamboo will be retained and used to provide visual screening for nearby mechanical equipment. Additional accent plantings—such as Japanese forest grass—will be incorporated to reinforce the corridor’s design intent and ensure visual continuity.

ECOSYSTEM ANALOGUE



PLANT PALETTE



TAXODIUM
DISTICHUM
'JIM'S LITTLE GUY'



JUNCUS
EFFUSUS



CAREX BICKNELLII



IRIS
VIRGINICA



LINDERA BENZOIN



FARGESIA



HAKONECHLOA
MACRA



METTEUCCIA
STRUTHIOPTERIS

SCIENTIFIC NAME		COMMON NAME	DEER RESISTANT	POLLINATOR	NATIVE
BIORETENTION					
TREES	<i>Taxodium distichum 'Jim's Little Guy'</i>	Jim's Little Guy Bald Cypress	X		X
PERENNIALS	<i>Juncus effusus</i>	Soft Rush	X		X
	<i>Carex bicknellii</i>	Prairie sedge	X		X
	<i>Iris virginica</i>	Virginia blueflag	X	X	X
	<i>Pllox maculata</i>	Meadow phlox	X	X	X
	<i>Panicum virgatum</i>	Switchgrass	X	X	X
	<i>Rudbeckia subtomentosa</i>	Black eyed susan	X	X	X
ASIA TRAIL					
SHRUBS	<i>Lindera benzoin</i>	Spicebush	X	X	X
PERENNIALS	<i>Fargesia</i>	Bamboo	X		
	<i>Carex flaccosperma</i>	Blue Wood Sedge	X		X
	<i>Carex plantaginea</i>	Plantain-leaf Sedge	X	X	X
	<i>Hakonechloa macra</i>	Japanese Forest Grass	X		
	<i>Metteuccia struthiopteris</i>	Ostrict Fern	X		X
	<i>Sesleria autumnalis</i>	Autumn Moor Grass	X		X

5.8.7 PROPOSED FINAL TREE PLANTING PLAN

The project aims to protect and preserve existing healthy trees wherever possible. New proposed trees will enhance visitor experience while improving ecological function throughout the site. Along Olmsted Walk, a mix of native canopy and understory trees provides shade and reinforces the historic character of the corridor. Within the visitor space, specimen trees evoke the character of desert wadis and oases while framing key views of the Arabian leopards.

PLANT SCHEDULE WHOLE SITE	
SYMBOL	BOTANICAL / COMMON NAME
TREES	
	CARPINUS CAROLINIANA / AMERICAN HORNBEAM MULTI-TRUNK
	CHILOPSIS LINEARIS / DESERT WILLOW
	GLEDITSIA TRIACANTHOS VAR. INERMIS / HONEY LOCUST
	HALESIA CAROLINA / SILVERBELL
	TAXODIUM DISTICHUM 'JIM'S LITTLE GUY' / JIM'S LITTLE GUY BALD CYPRESS



Figure 5.8.7.1: Proposed Tree Planting Plan

5.8.8 PROPOSED FINAL SHRUB AND PERENNIAL PLANTING PLAN

Planting design throughout the site serves to interpret the exhibit, ground the building and super structure in a natural setting, and relate to the local ecosystem of Olmsted Walk. The planting plan applies plant palettes (Olmsted, Wadi, Oasis, Bioretention, and Asia Trail) based on context, sun exposure, and proximity to exhibit habitat. Shrubs and perennials are placed within each bed based on height, texture, form, and color, ensuring four-season interest from all viewing angles.

PLANT SCHEDULE WHOLE SITE	
SYMBOL	BOTANICAL / COMMON NAME
SHRUBS	
	DASIPHORA FRUTICOSA / BUSH CINQUEFOIL
	ILEX GLABRA 'DENSE' / INKBERRY HOLLY
	LINDERA BENZOIN / SPICEBUSH
	MORELLA CERIFERA / WAX MYRTLE
	RHUS AROMATICA 'GRO-LOW' / GRO-LOW FRAGRANT SUMAC
	SARCOCOCCA HOOKERIANA HUMILIS / TRAILING SWEETBOX
BIORETENTION	
	CAREX BICKNELLII / PRAIRIE SEDGE
	JUNCUS EFFUSUS / SOFT RUSH
	PANICUM VIRGATUM 'CLOUD NINE' / CLOUD NINE SWITCH GRASS
PERENNIALS	
	AGAVE NEOMEXICANA / NEW MEXICO AGAVE
	ARTEMISIA FILIFOLIA / SAND SAGEBRUSH
	ARTEMISIA FRIGIDA / FRINGED WORMWOOD
	ATHYRIUM FILIX-FEMINA 'LADY IN RED' / LADY IN RED FERN
	CAREX LEAVENWORTHII / LEAVENWORTH'S SEDGE
	CAREX MUSKINGUMENSIS 'OEHME' / OEHME PALM SEDGE
	CAREX PLANTAGINEA / PLANTAIN-LEAVED SEDGE
	DESCHAMPSIA FLEXUOSA / CRINKLED HAIR GRASS
	DRYOPTERIS ERYTHROSORA 'BRILLIANCE' / BRILLIANCE AUTUMN FERN
	FESTUCA MAIREI / ATLAS FESCUE
	HAKONECHLOA MACRA / JAPANESE FOREST GRASS
	HESPERALOE PARVIFLORA / RED YUCCA
	MATTEUCCIA STRUTHIOPTERIS / OSTRICH FERN
	PYCNANTHEMUM MUTICUM / BLUNT MOUNTAINMINT
	SCHIZACHYRIUM SCOPARIUM 'STANDING OVATION' / STANDING OVATION LITTLE BLUESTEM
	SESLERIA AUTUMNALIS / AUTUMN MOOR GRASS
	SOLIDAGO X 'DANSOLITLEM' / LITTLE LEMON GOLDENROD
	SPOROBOLUS HETEROLEPIS 'TARA' / TARA PRAIRIE DROPSEED



Figure 5.8.8.1: Proposed Shrub and Perennial Planting Plan

5.8.9 PROPOSED FINAL RAILING DESIGN

The proposed railing design has been developed to preserve and reinforce the existing character and design language established along Olmsted Walk and the Asia Trail. A new Olmsted Rail is proposed for installation along the entirety of the walk.

The Secondary Pedestrian Rail is in isolated locations and setback from the Olmsted Rail. It will incorporate infill panels of 2-inch by 2-inch mesh to ensure visitor safety creating a secure physical barrier adjacent to the animal enclosure. Per Zoo standards and safety protocols, a human can never get closer than 6 feet to a leopard where there is perforated barrier. Use of the Secondary Pedestrian Barrier ensures a continuous barrier is provided and maintains the Olmsted Barrier currently utilized throughout Olmsted Walk.

Along Asia Trail, the established design vocabulary will be maintained or restored through the continued use of Carderock walls, bamboo landscape railings, and bamboo arch elements. Ornamental screening fencing constructed of vertical metal panels is proposed at the loading dock, mechanical enclosure, and the east exhibit access point to provide appropriate visual screening while remaining consistent with the broader design context.



Secondary Pedestrian Rail (42”H)



Olmsted Rail (36”H)



Bamboo Landscape Rail



Screen Fence



Bamboo Arch



Carderock Wall

Figure 5.8.9.1: Proposed Railing Types

5.8.10 PROPOSED FINAL RAILING TYPE LOCATIONS

Railings along Olmsted Walk will follow the Olmsted Design Guidelines and match existing design language as closely as possible. This will be achieved by using the standard Olmsted Rail along Olmsted Walk. An additional secondary pedestrian barrier will be provided at targeted areas to serve as a safety barrier to keep animals and humans separated.

Existing railing types along the Asia Trail will be retained or replaced in kind to preserve the established character. Additionally, a metal panel screen fence will be used at the service access, around the mechanical enclosure, and along the east habitat access.

- SECONDARY PEDESTRIAN BARRIER (42" H)
- OLMSTED RAIL (36" H)
- BAMBOO LANDSCAPE RAIL
- BAMBOO ARCH
- SCREEN FENCE
- CARDEROCK WALL



Figure 5.8.10.1: Site Plan - Railing Type Location Diagram



Figure 5.8.10.2: Rendering 5 - Perspective View - Lower Olmsted Walk Looking West, Asia Trail and Panda Plaza to Service Access



5.8.11 PROPOSED FINAL VISITOR PAVING

The pavement within the visitor area will unify elements of the building and exhibit, helping to ground the overall design and complying with the Olmsted Guidelines. The proposal includes tan, integrally colored concrete with an exposed aggregate finish to create cohesive thematic connections. Along Asia Trail, the pavement will also feature integrally colored concrete matched to the existing adjacent conditions. Poured-in-place rubber surface will be used within the exhibit tunnel area.

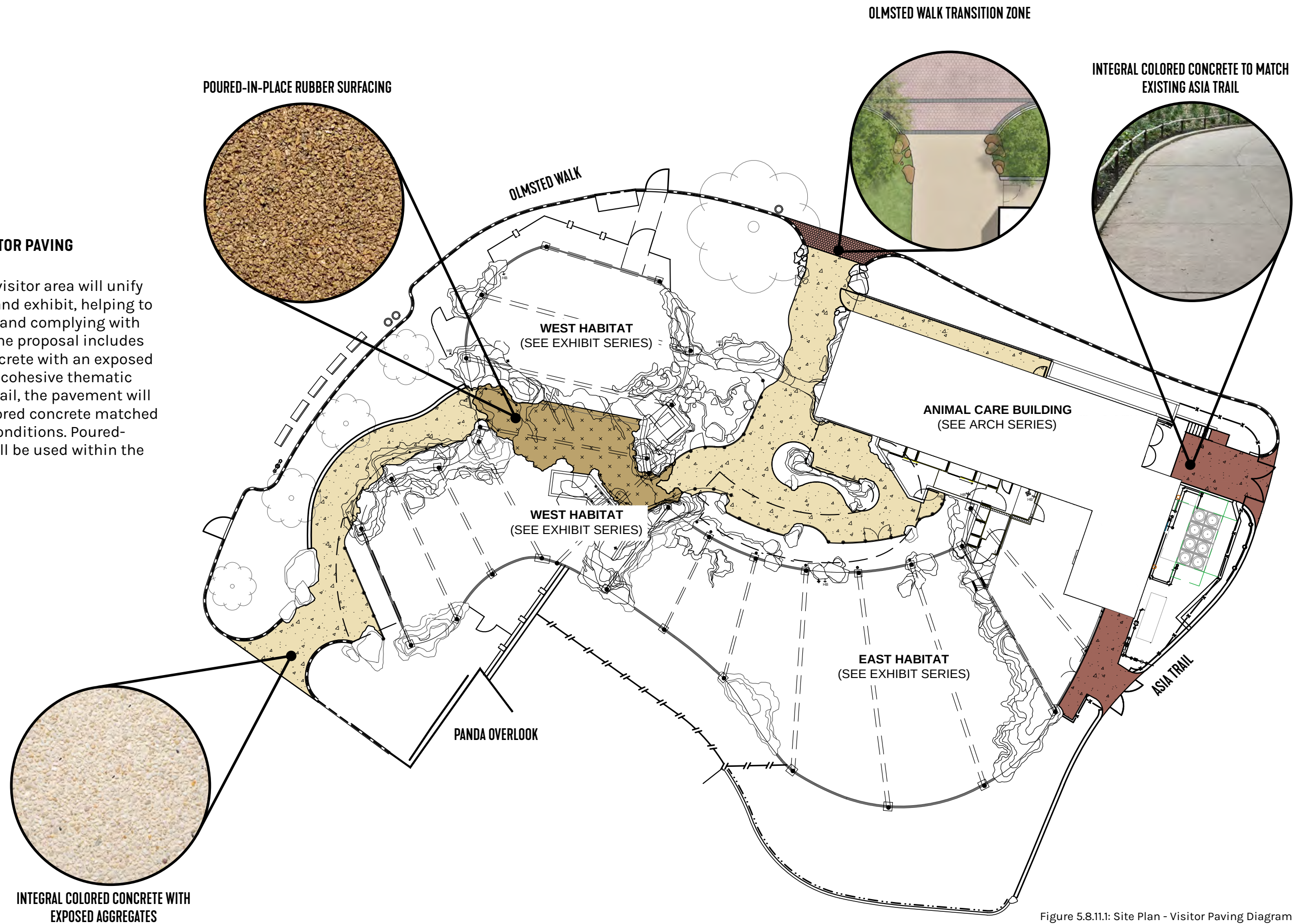


Figure 5.8.11.1: Site Plan - Visitor Paving Diagram

5.8.12 PROPOSED BERM CONDITIONS

To integrate the exhibit and building design with the landscape along Olmsted Walk, strategic berms - up to 4 feet tall - and careful plant selection will ground the building in the landscape and soften background views of the exhibition. This will ensure that visitors have a consistent experience as they travel along Olmsted Walk from nearby exhibits.



Figure 5.8.12.1: Planting Plan Key Plan - Berm Locations

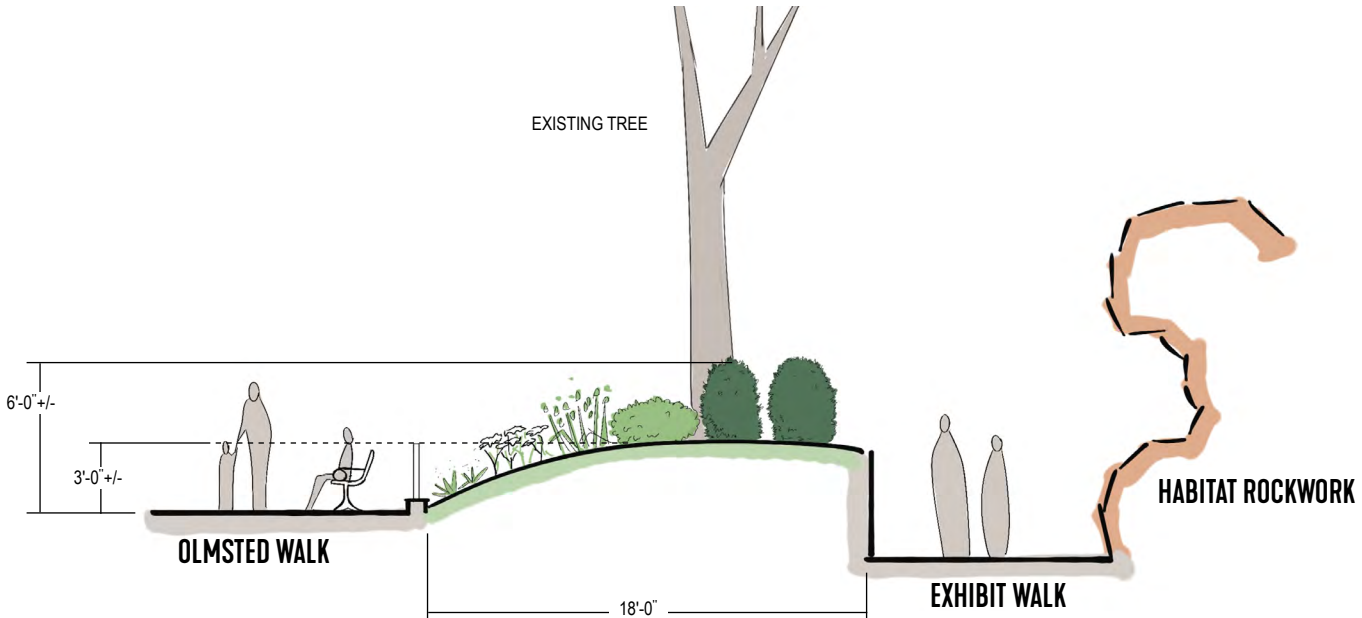


Figure 5.8.12.2: Site Section A - Through Olmsted and Habitat

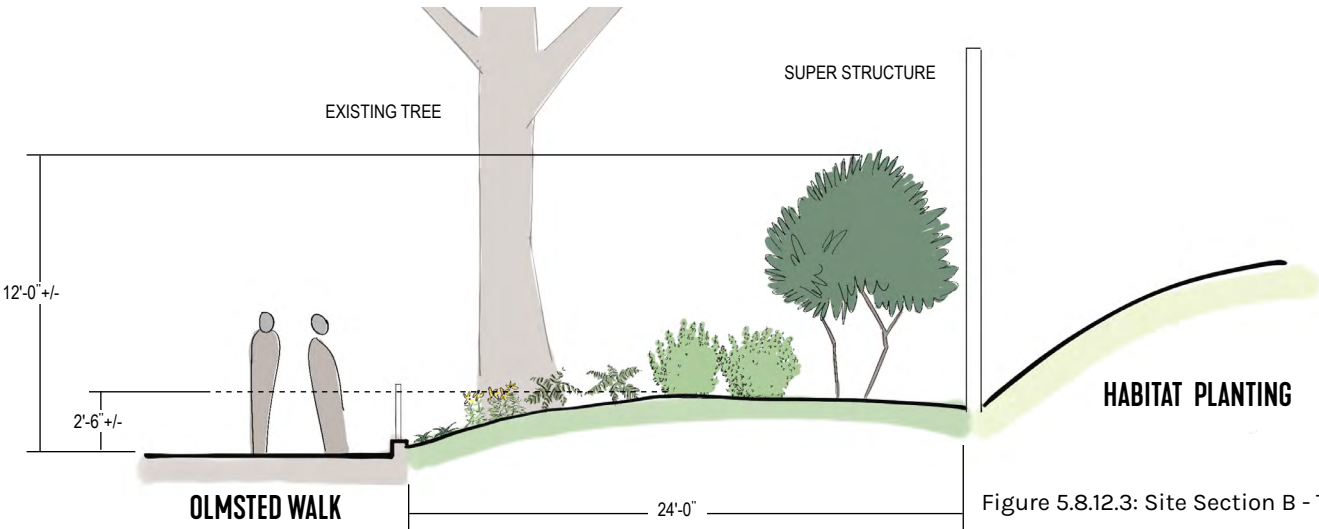


Figure 5.8.12.3: Site Section B - Through Olmsted and Habitat

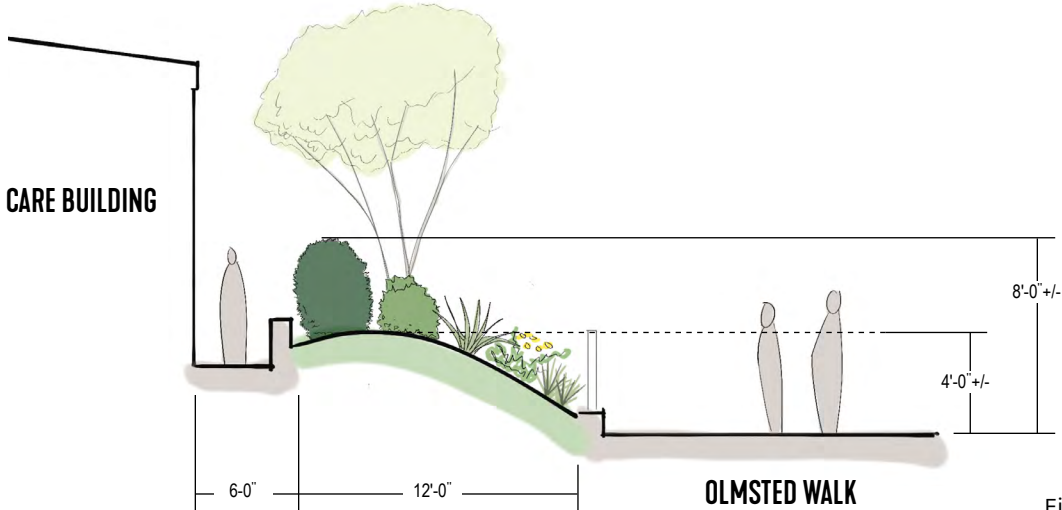


Figure 5.8.12.4: Site Section C - North Berm

5.9 PROPOSED FINAL SIGNAGE AND WAYFINDING

The Zoo has a well established standard for wayfinding and signage throughout as described within the Olmsted Walk Design Guidelines. The existing location of the Olmsted Directional Blade Sign will remain. There are two proposed locations for the exhibit entry signage indicated on Figure 5.9.3.



Figure 5.9.1: Existing Olmsted Exhibit Entry Point Signage



Figure 5.9.2: Existing Olmsted Directional Blade Sign to Remain



Figure 5.9.3: Site Plan - Signage and Wayfinding Locations

- PROPOSED EXHIBIT ENTRY SIGNAGE
- EXISTING OLMSTED DIRECTIONAL BLADE SIGN

5.10 PROPOSED SITE ENGINEERING

5.10.1 PROPOSED STORMWATER MANAGEMENT

Stormwater Best Management Practices (BMPs) were evaluated based on the limits of disturbance and site and building design development. The calculated Stormwater Retention Volume (SWRv) requirement is approximately 1,552 cubic feet (11,609 gallons). To meet both retention and detention requirements, a single enhanced bioretention and a single stormwater planter box at the building have been designed. This approach would require approximately 916 square feet of enhanced bioretention and 149 square feet of stormwater planter box.

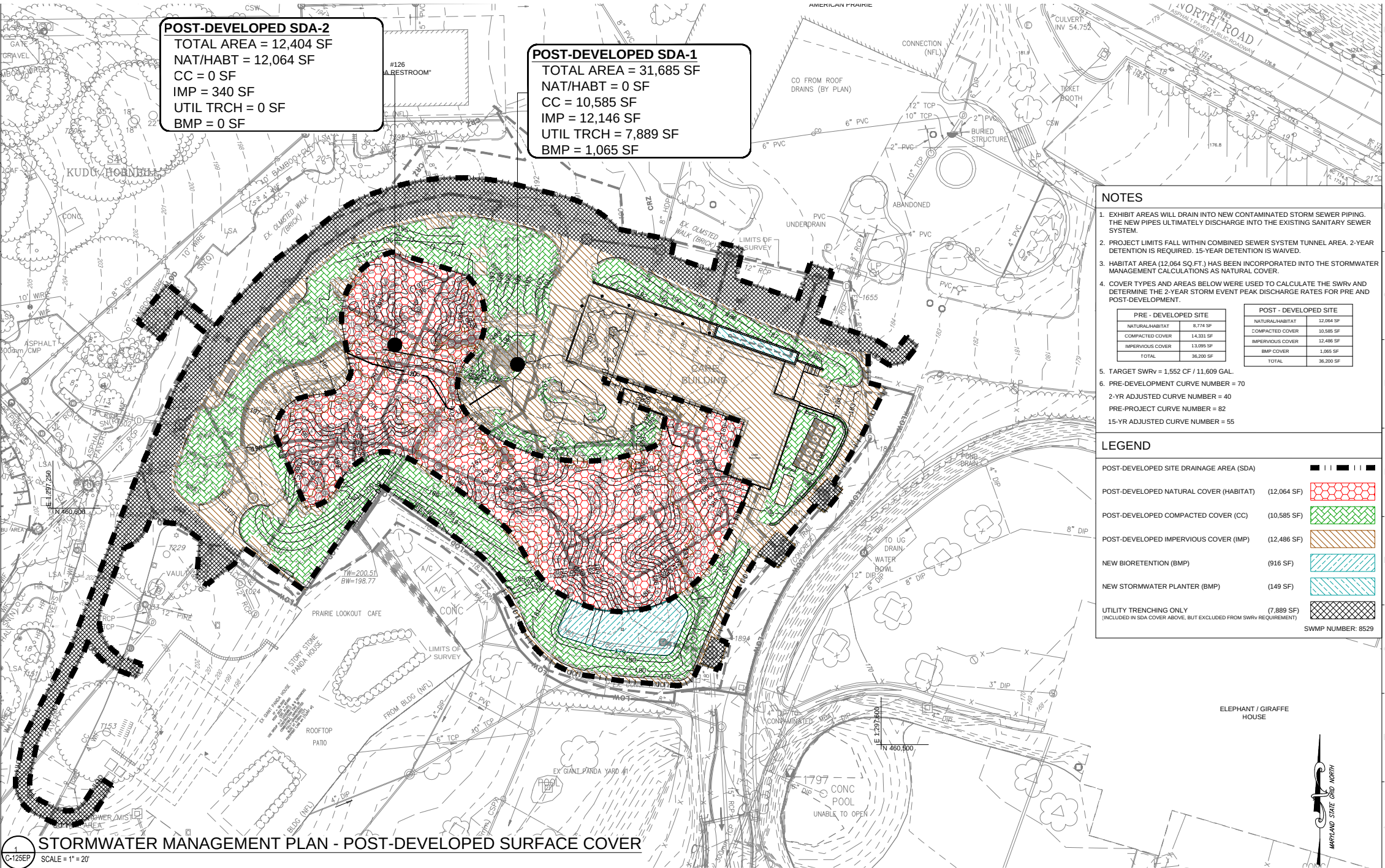


Figure 5.10.1.1: Civil Drawings C-125EP - Stormwater Management Plan - Post-Developed Surface Cover

5.10.2 PROPOSED TOPOGRAPHY

Along the perimeter of the site, the topography has been maintained to the greatest extent possible to support the sustained growth of the existing trees along Olmsted Walk. The topography within the site has been modified to support the inclusion of the animal habitat as well as accessible visitor paths. The care building is positioned to minimize the amount of disturbance to the existing grade.



Figure 5.10.2.1: Grading Plan - New Work

6.0 APPENDIX



6.0 APPENDIX

6.1 TREE PRESERVATION, REMOVALS, AND REPLACEMENT

6.1.1 TREE APPROACH

Significant and important trees within project limits have been identified by both NZCBI Horticulture and a Certified Arborist to be preserved. See 6.2 Tree Inventory for the full report. Preservation effort has been focused on the significant shade trees along Olmsted Walk with most removals occurring within new habitat and care building limits. An assessment of existing trees on site was completed by a Certified Arborist and is shown in Figure 6.1.1.1.

Where feasible, replacement trees will be planted along Olmsted Walk, within visitor areas, and inside the habitat enclosure. However, due to the specialized nature of the exhibit and the need to ensure compatibility between tree species and the Arabian Leopard habitat, full tree-replacement requirements cannot be met.

Accordingly, this project requests a deviation from standard tree-replacement requirements. The proposed approach prioritizes preservation of existing trees and provides for new tree plantings to the maximum extent practicable. All tree preservation will follow Olmsted Guidelines and ANSI A300 standards. There are 5 trees that are to be preserved, 68 replacement trees required, and 56 trees are to be planted within project limits. The 12 additional trees will be placed off the project site within the boundary

of the Zoo. See 6.1.3 Off-Site Tree Location Plan for the proposed off-site tree locations.

In coordination with the Certified Arborist, the Project Team has taken extra precautions in both design and detailing to provide preservation details and protocol to ensure preservation of the trees throughout construction to project completion.

#	SPECIES	TREE DBH	SPECIES RATING (average)	CONDITION RATING	REPLACEMENT REQUIREMENT	REPLACEMENT SCORE	REQUIRED REPLACEMENT QTY. (RATE)
1	Quercus palustris	45.5	65	75	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	22	5
2	Gleditsia triacanthos	13	60	31.3	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	2	1
3	Pinus strobus	5	55	50	<10" Dia. (1:1)	1	1
4	Pinus strobus	6.5	55	62.5	<10" Dia. (1:1)	1	1
5	Pinus strobus	7	55	62.5	<10" Dia. (1:1)	1	1
6	Pinus strobus	10.5	55	64.1	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	4	1
7	Pinus strobus	15	55	75	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	6	2
8	Pinus strobus	15.5	55	75	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	6	2
9	Pinus strobus	12	55	78.1	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	5	2
10	Pinus strobus	14	55	81.3	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	6	2
11	Pinus strobus	7	55	65.6	<10" Dia. (1:1)	1	1
12	Pinus strobus	9	55	65.6	<10" Dia. (1:1)	1	1
13	Pinus strobus	19	55	84.4	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	9	2
14	Pinus strobus	9	55	65.6	<10" Dia. (1:1)	1	1
15	Pinus strobus	10	55	81.3	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	4	1
16	Pinus strobus	7	55	68.8	<10" Dia. (1:1)	1	1
17	Pinus strobus	18	55	81.3	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	8	2
18	Quercus phellos	17.5	75	78.1	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	10	3
19	Ginkgo biloba	9	70	75	<10" Dia. (1:1)	1	1
20	Ginkgo biloba	10	70	81.3	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	6	2
21	Carya ovata	10.5	75	87.5	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	7	2
22	Thuja species	5	60	75	<10" Dia. (1:1)	1	1
23	Thuja species	5	60	75	<10" Dia. (1:1)	1	1
24	Thuja species	5	60	75	<10" Dia. (1:1)	1	1
25	Thuja species	5	60	75	<10" Dia. (1:1)	1	1
26	Thuja species	5	60	75	<10" Dia. (1:1)	1	1
27	Thuja species	5	60	75	<10" Dia. (1:1)	1	1
28	Thuja species	5	60	75	<10" Dia. (1:1)	1	1
29	Thuja species	5	60	75	<10" Dia. (1:1)	1	1
30	Thuja species	5	60	75	<10" Dia. (1:1)	1	1
31	Quercus phellos	16	75	87.5	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	11	3
32	Quercus macrocarpa	36	75	87.5	TO BE PRESERVED	-	-
33	Quercus phellos	20	75	81.3	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	12	3
34	Quercus phellos	15.5	75	65.6	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	8	2
35	Quercus phellos	13.5	75	81.3	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	8	2
36	Quercus bicolor	16	87.5	84.4	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	12	3
37	Cercis canadensis	5	72.5	81.3	<10" Dia. (1:1)	1	1
38	Cornus kousa	5	87.5	84.4	<10" Dia. (1:1)	1	1
39	Rhus spp	5	50	81.3	<10" Dia. (1:1)	1	1
40	Rhus spp	3	50	71.9	<10" Dia. (1:1)	1	1
41	Magnolia virginiana	6	75	87.5	<10" Dia. (1:1)	1	1
42	Quercus bicolor	15.5	87.5	68.8	> 10" Dia. (Tree DIA. x Species Rating x Condition Rating)	9	2
43	Ilex cornuta	4	72.5	81.3	<10" Dia. (1:1)	1	1
44	Ilex cornuta	5	72.5	81.3	<10" Dia. (1:1)	1	1
45	Ilex cornuta	4.5	72.5	81.3	<10" Dia. (1:1)	1	1
46	Ilex cornuta	4	72.5	81.3	<10" Dia. (1:1)	1	1
47	Carya glabra	13.5	75	84.4	TO BE PRESERVED	-	-
48	Carya ovata	15	75	84.4	TO BE PRESERVED	-	-
49	Carya glabra	17	75	84.4	TO BE PRESERVED	-	-
50	Carya ovata	13	75	84.4	TO BE PRESERVED	-	-
TOTAL REPLACEMENT TREES REQUIRED							68
TREES PLANTED OUTSIDE HABITAT							16
TREES PLANTED INSIDE HABITAT							40
TOTAL TREES PLANTED ON-SITE							56
TOTAL TREE REPLACEMENT REQUIRED OFF SITE							12

Figure 6.1.1.1: Tree Preservation and Replacement Table

6.1.2 TREE PRESERVATION & REMOVALS DIAGRAM



Figure 6.1.2.1: Tree Preservation and Replacement Plan

6.1.3 OFF-SITE TREE LOCATION PLAN

The 12 additional trees that are required to meet the total tree replacement needed for the project are proposed to be planted off the project site, throughout the Zoo along Olmsted Walk.

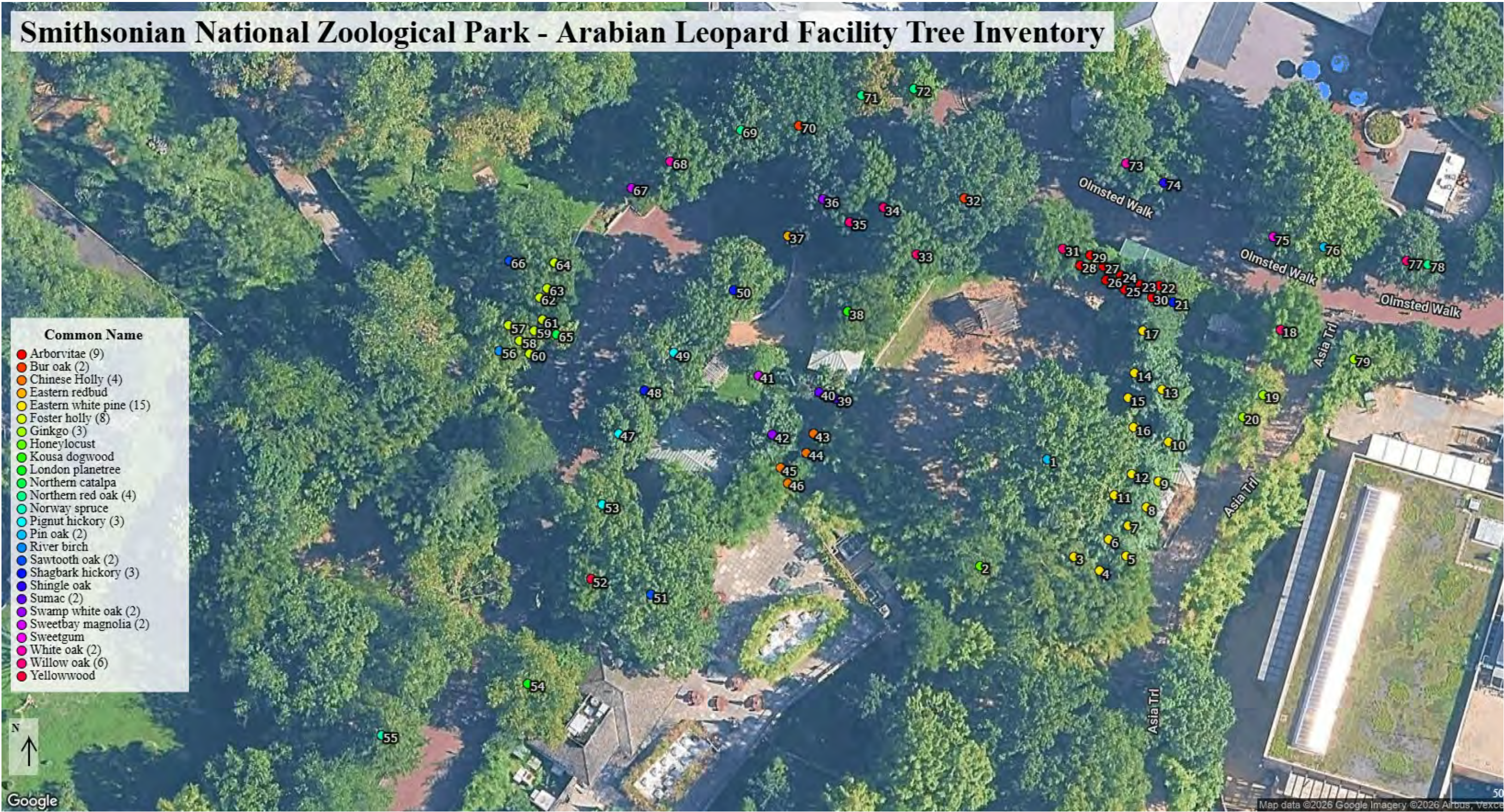
The upper part of the Zoo, from Connecticut Avenue to approximately Small Mammal House will receive 6 replacement trees. The lower part of the Zoo, from Great Ape House to the Animal Hospital will receive 6 replacement trees. The exact locations will be determined when the planting period nears.

The trees will be purchased and planted concurrently with the trees that will be planted within the project site limits. NZCBI commits to documenting the species and locations of these off-site trees and will communicate this information to NCPC once planted.



6.2 TREE INVENTORY

6.2.1 TREE INVENTORY - SITE PLAN



6.2.2 TREE INVENTORY - CONDITIONS

PLANT CONDITION RATINGS			Factor 1			Factor 2			Factor 3			Factor 4		Factor 5			
Smithsonian National Zoological Park Arabian Leopard Facility Scoring System: No apparent problems4 Minor problems3 Major problems2 Extreme problems1			(A root collar inspection may be warranted.) Root anchorage Collar/flare soundness Mechanical injury Girdling/kinked roots Compaction/waterlogged roots Toxic gases/chemical symptoms Presence of insects or disease Mushrooms (May need to interview owner)			(Core sampling or climbing may be needed.) Sound bark and wood Cavities Mechanical or fire injury Cracks (frost or other) Swollen or sunken areas Presence of insects or disease Conks			(Climbing the tree may be warranted to inspect branches.) Strong attachments Vertical branch distribution Free of included bark Free of decay and cavities Well pruned Wound closure Deadwood or fire injury Smaller diameter than trunk where attached Well-proportioned/proper taper insects or disease			Well distributed through canopy Presence of disease or insects Presence of weak or dead twigs Vigor of current shoots (compare previous growth) Appearance of buds (color, shape, size for the species)		Size of foliage/buds Coloration of foliage Nutrient status Herbicide, chemical, pollution injury Wilted or dead leaves Dry buds Presence of insects or disease			
Tree			Factor 1: Roots			Factor 2: Trunk			Factor 3: Scaffold Branches			Factor 4: Small Branches & Twigs		Factor 5: Foliage and/or Buds		Total	Condition Rating
#	Size	Species	Structure	Health	Subtotal	Structure	Health	Subtotal	Structure	Health	Subtotal	Health	Subtotal	Health	Subtotal		
1.0	45.5	Quercus palustris	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
2.0	13.0	Gleditsia triacanthos	1	1	2.0	2	1	3.0	2	1	3.0	1	1.0	1	1.0	10.0	31.3
3.0	5.0	Pinus strobus	2	2	4.0	3	2	5.0	2	2	4.0	2	2.0	1	1.0	16.0	50.0
4.0	6.5	Pinus strobus	2	2	4.0	3	3	6.0	3	3	6.0	2	2.0	2	2.0	20.0	62.5
5.0	7.0	Pinus strobus	2	2	4.0	3	3	6.0	3	3	6.0	2	2.0	2	2.0	20.0	62.5
6.0	10.5	Pinus strobus	2	2	4.0	3	3	6.0	3	3	6.0	2	2.0	2.5	2.5	20.5	64.1
7.0	15.0	Pinus strobus	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
8.0	15.5	Pinus strobus	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
9.0	12.0	Pinus strobus	3	4	7.0	3.0	3.0	6.0	3.0	3.0	6.0	3	3.0	3	3.0	25.0	78.1
10.0	14.0	Pinus strobus	3	4	7.0	4	3	7.0	3	3	6.0	3	3.0	3	3.0	26.0	81.3
11.0	7.0	Pinus strobus	2	2	4.0	3	3	6.0	3	3	6.0	2	2.0	3	3.0	21.0	65.6
12.0	9.0	Pinus strobus	2	2	4.0	3	3	6.0	3	3	6.0	2	2.0	3	3.0	21.0	65.6
13.0	19.0	Pinus strobus	3	4	7.0	3	4	7.0	4	3	7.0	3	3.0	3	3.0	27.0	84.4
14.0	9.0	Pinus strobus	2	2	4.0	3	3	6.0	3	3	6.0	3	3.0	2	2.0	21.0	65.6
15.0	10.0	Pinus strobus	4	3	7.0	3	3	6.0	3	3	6.0	4	4.0	3	3.0	26.0	81.3
16.0	7.0	Pinus strobus	2	2	4.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	22.0	68.8
17.0	18.0	Pinus strobus	2	3	5.0	3	4	7.0	4	4	8.0	3	3.0	3	3.0	26.0	81.3
18.0	17.5	Quercus phellos	2	3	5.0	3	3	6.0	3	4	7.0	4	4.0	3	3.0	25.0	78.1
19.0	9.0	Ginkgo biloba	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
20.0	10.0	Ginkgo biloba	3	3	6.0	3	4	7.0	3	3	6.0	3	3.0	4	4.0	26.0	81.3
21.0	10.5	Carya ovata	3	3	6.0	4	3	7.0	4	3	7.0	4	4.0	3.5	4.0	28.0	87.5
22.0	5.0	Thuja occidentalis	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0

PLANT CONDITION RATINGS			Factor 1			Factor 2			Factor 3			Factor 4		Factor 5			
Smithsonian National Zoological Park Arabian Leopard Facility Scoring System: No apparent problems4 Minor problems3 Major problems2 Extreme problems1			(A root collar inspection may be warranted.) Root anchorage Collar/flare soundness Mechanical injury Girdling/kinked roots Compaction/waterlogged roots Toxic gases/chemical symptoms Presence of insects or disease Mushrooms (May need to interview owner)			(Core sampling or climbing may be needed.) Sound bark and wood Cavities Mechanical or fire injury Cracks (frost or other) Swollen or sunken areas Presence of insects or disease Conks			(Climbing the tree may be warranted to inspect branches.) Strong attachments Vertical branch distribution Free of included bark Free of decay and cavities Well pruned Wound closure Deadwood or fire injury Smaller diamter than trunk where attached Well-proportioned/proper taper insects or disease			Well distributed through canopy Presence of disease or insects Presence of weak or dead twigs Vigor of current shoots (compare previous growth) Apperance of buds (color, shape, size for the species)		Size of foliage/buds Coloration of foliage Nutrient status Herbicide, chemical, pollution injury Wilted or dead leaves Dry buds Presence of insects or disease			
Tree			Factor 1: Roots			Factor 2: Trunk			Factor 3: Scaffold Branches			Factor 4: Small Branches & Twigs		Factor 5: Foliage and/or Buds		Total	Condition Rating
#	Size	Species	Structure	Health	Subtotal	Structure	Health	Subtotal	Structure	Health	Subtotal	Health	Subtotal	Health	Subtotal		
23.0	5.0	Thuja occidentalis	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
24.0	5.0	Thuja occidentalis	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
25.0	5.0	Thuja occidentalis	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
26.0	5.0	Thuja occidentalis	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
27.0	5.0	Thuja occidentalis	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
28.0	5.0	Thuja occidentalis	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
29.0	5.0	Thuja occidentalis	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
30.0	5.0	Thuja occidentalis	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
31.0	16.0	Quercus phellos	3	3	6.0	4	4	8.0	4	3	7.0	4	4.0	3	3.0	28.0	87.5
32.0	36.0	Quercus macrocarpa	3	4	7.0	4	3	7.0	3	4	7.0	3	3.0	4	4.0	28.0	87.5
33.0	20.0	Quercus phellos	3	3	6.0	3	4	7.0	3	3	6.0	3	3.0	4	4.0	26.0	81.3
34.0	15.5	Quercus phellos	3	3	6.0	3	3	6.0	2	2	4.0	2	2.0	3	3.0	21.0	65.6
35.0	13.5	Quercus phellos	3	3	6.0	4	3	7.0	3	4	7.0	3	3.0	3	3.0	26.0	81.3
36.0	16.0	Quercus bicolor	3	3	6.0	3	4	7.0	3	4	7.0	3	3.0	4	4.0	27.0	84.4
37.0	5.0	Cercis canadensis	3	3	6.0	3	3	6.0	3	3	6.0	4	4.0	4	4.0	26.0	81.3
38.0	5.0	Cornus kousa	4	3	7.0	3	4	7.0	4	3	7.0	3	3.0	3	3.0	27.0	84.4
39.0	5.0	Rhus vernix	4	4	8.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	26.0	81.3
40.0	3.0	Rhus vernix	4	3	7.0	3	3	6.0	2	2	4.0	3	3.0	3	3.0	23.0	71.9
41.0	6.0	Magnolia virginiana	3	4	7.0	3	3	6.0	4	4	8.0	4	4.0	3	3.0	28.0	87.5
42.0	15.5	Quercus bicolor	3	3	6.0	3	3	6.0	2	2	4.0	3	3.0	3	3.0	22.0	68.8
43.0	4.0	Ilex cornuta	4	3	7.0	3	3	6.0	4	3	7.0	3	3.0	3	3.0	26.0	81.3
44.0	5.0	Ilex cornuta	4	3	7.0	3	3	6.0	4	3	7.0	3	3.0	3	3.0	26.0	81.3
45.0	4.5	Ilex cornuta	4	3	7.0	3	3	6.0	4	3	7.0	3	3.0	3	3.0	26.0	81.3
46.0	4.0	Ilex cornuta	4	3	7.0	3	3	6.0	4	3	7.0	3	3.0	3	3.0	26.0	81.3

PLANT CONDITION RATINGS			Factor 1			Factor 2			Factor 3			Factor 4		Factor 5			
Smithsonian National Zoological Park Arabian Leopard Facility Scoring System: No apparent problems 4 Minor problems 3 Major problems 2 Extreme problems 1			(A root collar inspection may be warranted.) Root anchorage Collar/flare soundness Mechanical injury Girdling/kinked roots Compaction/waterlogged roots Toxic gases/chemical symptoms Presence of insects or disease Mushrooms (May need to interview owner)			(Core sampling or climbing may be needed.) Sound bark and wood Cavities Mechanical or fire injury Cracks (frost or other) Swollen or sunken areas Presence of insects or disease Conks			(Climbing the tree may be warranted to inspect branches.) Strong attachments Vertical branch distribution Free of included bark Free of decay and cavities Well pruned Wound closure Deadwood or fire injury Smaller diamter than trunk where attached Well-proportioned/proper taper insects or disease			Well distributed through canopy Presence of disease or insects Presence of weak or dead twigs Vigor of current shoots (compare previous growth) Apperance of buds (color, shape, size for the species)		Size of foliage/buds Coloration of foliage Nutrient status Herbicide, chemical, pollution injury Wilted or dead leaves Dry buds Presence of insects or disease			
Tree			Factor 1: Roots			Factor 2: Trunk			Factor 3: Scaffold Branches			Factor 4: Small Branches & Twigs		Factor 5: Foliage and/or Buds		Total	Condition Rating
#	Size	Species	Structure	Health	Subtotal	Structure	Health	Subtotal	Structure	Health	Subtotal	Health	Subtotal	Health	Subtotal		
47.0	13.5	<i>Carya glabra</i>	3	3	6.0	4	3	7.0	4	3	7.0	4	4.0	3	3.0	27.0	84.4
48.0	15.0	<i>Carya ovata</i>	3	3	6.0	4	3	7.0	4	3	7.0	4	4.0	3	3.0	27.0	84.4
49.0	17.0	<i>Carya glabra</i>	3	3	6.0	4	3	7.0	4	3	7.0	4	4.0	3	3.0	27.0	84.4
50.0	13.0	<i>Carya ovata</i>	3	3	6.0	4	3	7.0	4	3	7.0	4	4.0	3	3.0	27.0	84.4
51.0	34.0	<i>Quercus acutissima</i>	3	3	6.0	3	3	6.0	2	2	4.0	3	3.0	3	3.0	22.0	68.8
52.0	22.5	<i>Cladrastis lutea</i>	3	3	6.0	2	3	5.0	3	3	6.0	4	4.0	3	3.0	24.0	75.0
53.0	16.0	<i>Carya glabra</i>	3	3	6.0	3	4	7.0	4	3	7.0	4	4.0	3	3.0	27.0	84.4
54.0	18.0	<i>Platanus x acerifolia</i>	2	3	5.0	4	4	8.0	3	3	6.0	3	3.0	3	3.0	25.0	78.1
55.0	25.0	<i>Picea abies</i>	2	3	5.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	23.0	71.9
56.0	18.0	<i>Betula nigra</i>	3	3	6.0	3	4	7.0	3	4	7.0	4	4.0	3	3.0	27.0	84.4
57.0	8.0	<i>Ilex attenuata</i>	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
58.0	8.0	<i>Ilex attenuata</i>	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
59.0	8.0	<i>Ilex attenuata</i>	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
60.0	8.0	<i>Ilex attenuata</i>	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
61.0	7.0	<i>Ilex attenuata</i>	3	3	6.0	3	3	6.0	3	2	5.0	3	3.0	3	3.0	23.0	71.9
62.0	8.0	<i>Ilex attenuata</i>	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
63.0	9.0	<i>Ilex attenuata</i>	3	3	6.0	3	3	6.0	3	3	6.0	4	4.0	3	3.0	25.0	78.1
64.0	7.5	<i>Ilex attenuata</i>	3	3	6.0	3	3	6.0	3	2	5.0	3	3.0	3	3.0	23.0	71.9
65.0	13.0	<i>Catalpa ovata</i>	3	3	6.0	3	2	5.0	2	2	4.0	2	2.0	3	3.0	20.0	62.5
66.0	21.0	<i>Quercus acutissima</i>	4	3	7.0	3	4	7.0	4	3	7.0	3	3.0	3	3.0	27.0	84.4
67.0	2.0	<i>Magnolia virginiana</i>	4	3	7.0	4	3	7.0	3	4	7.0	3	3.0	3	3.0	27.0	84.4
68.0	17.0	<i>Quercus alba</i>	3	3	6.0	3	4	7.0	4	3	7.0	4	4.0	3	3.0	27.0	84.4
69.0	20.0	<i>Quercus rubra</i>	2	2	4.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	22.0	68.8
70.0	26.0	<i>Quercus macrocarpa</i>	3	3	6.0	3	2	5.0	3	2	5.0	3	3.0	3	3.0	22.0	68.8

PLANT CONDITION RATINGS			Factor 1			Factor 2			Factor 3			Factor 4		Factor 5			
Smithsonian National Zoological Park Arabian Leopard Facility Scoring System: No apparent problems 4 Minor problems 3 Major problems 2 Extreme problems 1			(A root collar inspection may be warranted.) Root anchorage Collar/flare soundness Mechanical injury Girdling/kinked roots Compaction/waterlogged roots Toxic gases/chemical symptoms Presence of insects or disease Mushrooms (May need to interview owner)			(Core sampling or climbing may be needed.) Sound bark and wood Cavities Mechanical or fire injury Cracks (frost or other) Swollen or sunken areas Presence of insects or disease Conks			(Climbing the tree may be warranted to inspect branches.) Strong attachments Vertical branch distribution Free of included bark Free of decay and cavities Well pruned Wound closure Deadwood or fire injury Smaller diamter than trunk where attached Well-proportioned/proper taper insects or disease			Well distributed through canopy Presence of disease or insects Presence of weak or dead twigs Vigor of current shoots (compare previous growth) Apperance of buds (color, shape, size for the species)		Size of foliage/buds Coloration of foliage Nutrient status Herbicide, chemical, pollution injury Wilted or dead leaves Dry buds Presence of insects or disease			
Tree			Factor 1: Roots			Factor 2: Trunk			Factor 3: Scaffold Branches			Factor 4: Small Branches & Twigs		Factor 5: Foliage and/or Buds		Total	Condition Rating
#	Size	Species	Structure	Health	Subtotal	Structure	Health	Subtotal	Structure	Health	Subtotal	Health	Subtotal	Health	Subtotal		
71.0	18.0	<i>Quercus rubra</i>	3	2	5.0	3	3	6.0	2	2	4.0	2	2.0	2	2.0	19.0	59.4
72.0	9.5	<i>Quercus rubra</i>	3	3	6.0	3	3	6.0	3	2	5.0	3	3.0	3	3.0	23.0	71.9
73.0	17.5	<i>Quercus alba</i>	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
74.0	18.0	<i>Quercus imbricaria</i>	3	3	6.0	3	3	6.0	3	4	7.0	4	4.0	3	3.0	26.0	81.3
75.0	12.5	<i>Liquidambar styraciflua</i>	2	2	4.0	3	2	5.0	3	3	6.0	2	2.0	3	3.0	20.0	62.5
76.0	31.0	<i>Quercus palustris</i>	4	3	7.0	4	3	7.0	3	4	7.0	4	4.0	3	3.0	28.0	87.5
77.0	11.0	<i>Quercus phellos</i>	3	3	6.0	3	4	7.0	4	3	7.0	3	3.0	3	3.0	26.0	81.3
78.0	10.0	<i>Quercus rubra</i>	3	3	6.0	3	3	6.0	3	3	6.0	3	3.0	3	3.0	24.0	75.0
79.0	8.0	<i>Ginkgo biloba</i>	3	3	6.0	3	3	6.0	2	2	4.0	3	3.0	3	3.0	22.0	68.8

6.3 ANIMAL CARE BUILDING AND ANIMAL HABITAT REFINEMENT

6.3.1 ROOF PROFILE STUDIES

Since the Concept Design submission, the mitigation of the visual impact of the care building and roof profile from Olmsted Walk was discussed and further developed through the Section 106 consultation process. The previous roof profile shown within the Preliminary Report was a traditional gable form that transitioned to an inverted gable. The request was made during the Section 106 process to simplify the geometry of the roof to minimize visual impact.

To do so, the design team explored options to minimize and simplify the roof. Two options were provided:

- Option #1 - Half Gable: A gable roof that transitioned to a shed roof above the Day Room.
- Option #2 - Shed: A contiguous shed roof swept along the outline of the building.

The contiguous shed roof, Option #2, was preferred as it appeared to flatten when viewed from Olmsted Walk, referencing the low slope roofs prevalent in the historic district. See Figure 6.3.1.2 for reference. The one con for this option is that the roof line no longer hides utility flues and piping that are required for the systems of the building. The flues and pipes cannot be relocated to a different location due to the programmatic layout needed to meet animal care needs and the only potential revised location, would push them closer to Olmsted Walk. This has prompted the utilities to remain and the Consulting Parties agreed the piping shall remain exposed as it is less visually intrusive then an additional enclosure.



Figure 6.3.1.1: Option #1 - Half Gable Roof



Figure 6.3.1.2: Option #2 - Shed Roof

6.3.2 ARCHED STRUCTURE AND COLOR PALETTE

The design team has explored alternative ways to make the profiles of the ribs smaller so that the visual impact of the structural members of the arched structure are reduced. To minimize the superstructure of the enclosure, the members vary in size from 6" diameter for the shorter arches to 12" diameter for the taller arches. The diameter is consistent throughout each arch and does not taper. This approach maintains overall proportionality of the superstructure arches compared to utilizing a uniform dimension that would create disproportionate forms.

The enclosure mesh will be hand woven A316 stainless steel mesh. Mesh size is driven by the animal care program requirements and will be 2"x2"x1/8" to ensure the safety of both animal and human.

The color palette of the arched mesh enclosure has also been studied to ensure the structure complements the adjacent landscape and historic district. The adjacent images show a series of studies with the following variants:

- Arch Color: Charcoal Grey and Bronze
- Mesh Color: Black Oxidized Stainless Steel

The design team recommends the enclosure arches be colored bronze to allow it to integrate with both the landscape and sky, the two backdrops the enclosure is visible against. The mesh color recommended is black oxidized as it disappears against landscape plantings and allows for clear viewing from visitor to animal.



Enclosure Color Study #1: Charcoal Grey Structure and Black Oxidized Mesh



Enclosure Color Study #2: Bronze Structure and Black Oxidized Mesh

Figure 6.3.2.2: Enclosure Color Palette Refinement Studies



Figure 6.3.2.1: Stainless Steel Black Oxidized Finish Mesh

Exhibit D – Assessment of Effects on Historic Resources Report

Criteria of Adverse Effect

This report provides an assessment of effects on historic resources associated with the Construct Arabian Leopard Habitat (CALH) project. Effect assessments are based on the criteria of adverse effect as defined in the implementing regulations of Section 106 of the National Historic Preservation Act (36 CFR Part 800). The criteria of adverse effect are defined as follows:

An adverse effect is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register of Historic Places in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property’s eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative (36 CFR § 800.5(a)(1)).

Project Background and Section 106 Compliance

The Smithsonian Institution’s (SI) National Zoo and Conservation Biology Institute (NZCBI) has entered a partnership to advance Arabian Leopard conservation efforts, including the construction of a new Arabian Leopard habitat facility. The new habitat will include an outdoor enclosure and animal care building, located on the site of the former Bison Habitat, along the historic Olmsted Walk.

This Assessment of Effects on Historic Resources report describes the project actions and features and their effects on character defining features at the National Zoological Park Historic District. This report has been updated in consultation with the Consulting Parties, following the Preliminary Assessment of Effects report issued in February 2026.

Project Description

The Construct Arabian Leopard Habitat project includes the construction of a new habitat enclosure and animal care building with the capacity to accommodate a minimum of two full-time animals and the ability to support additional animals on a temporary basis. The animal care building will provide three leopard dens, an all-weather “day room” for public viewing, and private animal care spaces; there is no public access to the building interior. Two opportunities for entrance and exit from the habitat are proposed at the northeast and northwest corners, directly from Olmsted Walk. A separate service entrance and loading dock will link from the care building to the Asia Trail path.

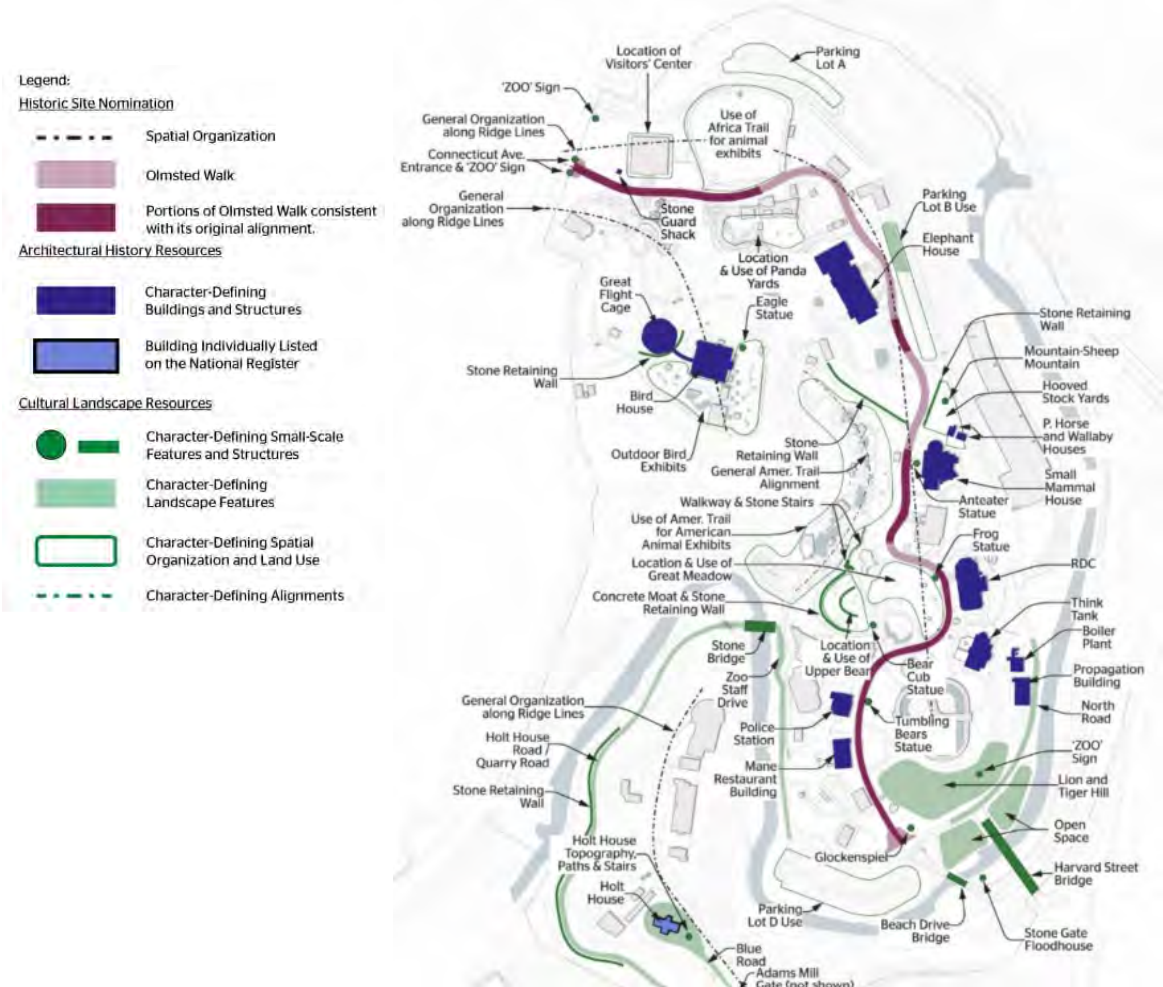
National Zoological Park Historic District – Character Defining Features *

The National Zoological Park Historic District, located between Rock Creek and Connecticut Avenue in the District of Columbia, is listed in the National Register of Historic Places and the DC Inventory of Historic Sites. The Zoo was established in 1889 to protect endangered native animals, particularly the American bison. Although the Zoo’s landscape and habitats have evolved

considerably since 1889, as animal care requirements have modernized, the Zoo maintains a high integrity of use as a site prioritizing animal care, conservation research, recreation, and education.

The development of the Zoo grounds was heavily influenced by plans prepared by the firm of the landscape architect, Frederick Law Olmsted. Olmsted’s design for individual spatial allotments and appropriate indigenous habitats for each type of animal was deeply influential to zoo design in the United States, and simultaneously advanced animal conservation and landscape architecture theory. The resources that are considered contributing retain integrity of location, setting, and association. The Zoo subsequently experienced two waves of development; the first in the 1930s and the second in the 1970s pursuant to a comprehensive facilities plan developed in 1972. Throughout these developments, high integrity of use, location, and setting is consistent with buildings complementary to the naturalistic environment. Buildings with large additions or alterations, and buildings generally constructed within the last 50 years are considered non-contributing.

The period of significance for the National Zoological Park per the National Register nomination is 19th century. Recent analysis suggests a period of significance of 1890-1973, to reflect the period that best demonstrates the Zoo’s development and adherence to historic associations.



National Zoological Park - Historic Resources

Character Defining Feature*	Notes
Setting/Landscape	• Olmsted’s plan sought to respect and complement the existing landscape and its natural features, including Rock Creek, woodlands of native trees and plants, and a rolling topography of ridges and valleys. • Consideration for both “pastoral” and “picturesque” scenes generated by landscape design.
Spatial Organization and Land Use	• Primary circulation route, Olmsted Walk, follows the natural contours of the land. • Core of buildings and exhibits located on the level knoll near the center of the Zoo. • Passive recreational use of Olmsted Walk and Long Meadow. • Each species has distinct habitat settings reminiscent of native natural environments, set in areas of existing topography that relate to the animals’ habitat of origin. • Architecture and campus planning complements and utilizes natural landscape features while functionally serving the program.
Circulation Patterns	Significant contributors to circulation patterns include: • Existing Olmsted Walk alignments with historic masterplan (est. 1890, alt. 1893-94; 1914; 1923) between Harvard Street entrance and Reptile House, between Small Mammal House and Elephant House, and curve between the Elephant House and the Africa Trail. • Valley trails (now American Trail) (1867, 1894, 1923) general alignment of paths through valley for access to exhibits. • North Road (1895-1900) general alignment from Propagation Building to Stone Bridge. • Blue Road (before 1890) from Stone Bridge to Adams Mill Road. • Harvard Street (1914). • North portion of Parking Lot B in front of Elephant House (1923).
Buildings and Building Materials	• Early buildings including the Guard Booth, Boiler House, Mongolian Horses, Think Tank (Small Mammal), Wallabies, Police Station, Mane Restaurant, and Propagation Building, share the naturalistic appearances of a “rustic” style. • Contributing buildings generally retain their historic appearance on the exterior and are typically concentrated along Olmsted Walk. • Early 20th century buildings including the Bird House, Elephant House, Small Mammal House, and Reptile Discovery Center incorporate ornate architectural detailing with animal references in stone or brick facades. • Great Flight Aviary of 1965 is an example of Neo-Expressionist design. • Many of the service buildings along Olmsted Walk are low in profile with significant shingled wood or slate roofs. • Roofs of the early 20th century exhibit buildings prominently feature red or green terracotta tiles. • More contemporary exhibit structures have green planted roofs or are partially embedded into the landscape.

Small Scale Features and Materials	• Use of local Carderock throughout the park either in the architecture or in landscape features gives a sense of continuity. • Olmsted Walk utilizes a paving pattern of hexagonal concrete unit pavers bound by low concrete curbs on either side. • Olmsted Walk features a standard set of site furnishings including water fountains, trash receptacles, wood and steel benches, and signage. These features are inset in several ‘niches’ of 3 to 5 feet horizontal distance that allow comfortable spacing from the main thoroughfare. • Black steel tube forms the primary railing along Olmsted Walk.
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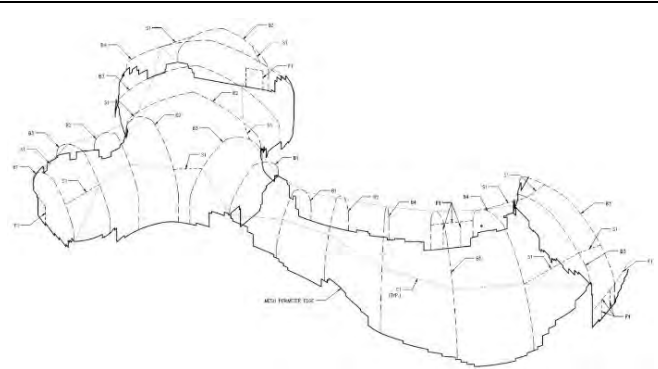
*Character defining features are referenced from “National Zoo & Conservation Biology Institute (NZCBI) Comprehensive Facilities Development Plan and Cultural Resources Assessment, Ewing Cole, 2023” and “National Zoological Park National Register of Historic Places Inventory - Nomination Form, 1973.”

Feature/Action	
1. Demolition of Existing Exhibits in the Project Site	
	
Description	Effect Analysis
The project site occupies two exhibits: the unoccupied American Bison Exhibit, built in 1996 and vacant since 2024, and the Zoo in Your Backyard Exhibit, which features pollinator-friendly plantings native to the Washington, DC area. The following features associated with previous exhibits will be removed from the project site: 1. Bison Care Building – The Bison Care building is an existing concrete structure with a green roof. 2. Bison Habitat Service Shed – An existing service shed to the north of the Bison Care Building. 3. Bison Shade Structure – An existing wood Bison shade structure consisting of four posts and a trellis-like roof. 4. Bison Overlook Structure – A steel framed shade structure with wood and metal roof meant for viewing the Bison Habitat. 5. Former Prairie Dog Exhibit and Concession Shade Structure – A former exhibit enclosure with low concrete walls. 6. Zoo in Your Backyard Features – Three gazebos, exhibit signage, and steel vending structure with wood and metal roof. 7. Merchandise Stand - An existing ‘panda stand’ serves visitors from the panda habitat entry, which will be removed. 8. Former Prairie Dog Exhibit: A concession shade structure with low concrete walls will be removed.	All existing exhibit structures and furnishings on the project site were constructed in 1996 or later and are non-contributing elements of the Historic District.
Effect Determination: No Adverse Effect	

Feature/Action	
2. Habitat Site Organization	
	
Site Plan - Dashed black line frames extents of project site, white “L” shape shows footprint of Animal Care Building, and central figure outlined by solid black line illustrates the perimeter of the outdoor animal habitat.	
Description	Effect Analysis
The site is organized around two primary structures: the Animal Care Building and the outdoor habitats with an enclosure. Two points of accessible entry from Olmsted Walk are connected to a visitor path weaves through the site, moving under an animal transfer bridge, through a central “oasis” viewing plaza, and under the exhibit rockwork and habitat enclosure. The design for the Arabian Leopard Habitat will minimally adjust the grade for accessible visitor circulation. The animal care building massing curves with the corner where the Asia Trail meets Olmsted Walk, at the location of the existing Bison Care Building and service entry. The outdoor habitat enclosure appears as a single volume enclosed with a mesh superstructure but includes three animal habitats separated by a mesh screen and landscape features. Service functions are proposed at the southeast end of the animal care building. Mechanical equipment will be placed in the small yard between the two curb cuts with fenced screening, including a bamboo planter, to restrict visibility from Asia Trail and Olmsted Walk.	Following original principles of Olmsted’s design, the habitat site organization seeks to promote integration with the existing landscape, topography, Olmsted Walk, and the historic district. The proposed site organization is consistent with contemporary animal exhibits within the historic district that promote natural activity among the animals and multiple vantage points where visitors can engage with the experience of the animals and the habitat. The site organization does not demolish any existing historic fabric on the project site and maintains the majority of the existing topography. The service entrance and mechanical equipment yard, a requirement of the Animal Care Building, is located to the side of the exhibit away from visitor circulation. This is consistent with other habitats in the historic district that have visible service and animal care operations. To avoid adverse effects from these service functions, landscape features and fences act as visual screening. See “Section 6: Relationship to Olmsted Walk” and “Section 9: Proposed Site Railing Plan” for further information about the service entrance.
Effect Determination: No Adverse Effect	

Feature/Action	
3. Animal Care Building Massing and Footprint	
 <i>Animal Care Building viewed from Olmsted Walk</i>  <i>Rendered Massing with Site Design and Context</i>	
Description	Effect Analysis
The proposed Animal Care Building has an L-shaped footprint on the northeast quadrant of the project site, and has no public access. The height of the care building's shed	The new animal care building will be highly visible from Olmsted Walk and is located closer to the Walk than other historic resources and exhibits in the District.

roof profile was determined by programmatic requirements, which require a clear interior vertical height of 20' in the dayroom to accommodate animal climbing behaviors. To both the north and east, the roof progressively slopes downward over keeper and animal care utility areas. The following building elements characterize its visibility along Olmsted: <u>Building Height:</u> The proposed building massing height is programmatically limited, raising to required animal care height of 27' - 6" only at the northeast "dayroom" location. The roof slopes downward with the topography of Olmsted Walk from the dayroom to a height of 20'-2" <u>Materials:</u> The Care Building features a patinated copper roof in a diamond shingle pattern and Carderock cladding in an ashlar coursing. <u>Planting and Site Features:</u> The building curves at the corner where Olmsted Walk intersects Asia Trail, corresponding to the path. Along Olmsted, a 4' berm with an additional 4' of planting is proposed as a buffer between the historic path and the new building. The berm varies in width and height; from 12' to 24' wide and between 2.5' and 4' tall (plantings will add additional visual screening height).	Although the proposed animal care building occupies the site of an existing building, the proposed building footprint is larger and out of context within the District, calling attention to the building massing and habitat. The design of the building and landscape minimize adverse effects, including: <u>Building Height:</u> To minimize the adverse affect of the roofline, the roof progressively slopes downward with the slope of Olmsted Walk. To minimize visible impact at the approach to the exhibit along Olmsted Walk from the north and south, the maximum roof height is limited only to the location where it is programmatically required for animal welfare. <u>Materials:</u> Both the copper shingle roof and Carderock cladding are materials consistent with the historic material palette of the District. Carderock cladding is found on contributing buildings like the Elephant House and Think Tank, and on site walls throughout the campus. <u>Planting and Site Features:</u> Curving the building at the intersection of Olmsted Walk and Asia Trail complements the existing curve of the paths and promotes consistent geometry between the District and the new building. The berming along Olmsted Walk further minimizes the vertical presence and perceived massing of the building.
Effect Determination: Adverse Effect	

Feature/Action	
4. Enclosure Design and Footprint	
	
Enclosure Structural Diagram: Dashed lines represent individual arch structures	
	
Habitat Enclosure viewed northwest of the project site from Olmsted Walk	

Description	Effect Analysis
The proposed habitat enclosure is an arched mesh structure that forms a continuous volume limited to the extents of the habitats. A series of single-span, two-point steel arches form the primary structure, with footings lining the perimeter of the enclosure. A tensioned steel mesh is draped and secured over this frame. The enclosure maintains the required maximum height of 35' from the ground at the tallest point (peak of tallest arch), and the required 20' of clear height above required habitat structures. The openings of the wire mesh must be 2"x2"x1/8" to maintain animal welfare and safety standards. The structural arches of the enclosure are proposed with a bronze finish. The proposed mesh is stainless steel with a black oxidized finish. The arched structural members of the enclosure are individually sized to accommodate the span and structural needs of their unique locations along the project site. Diameters of individual structural members are sized to structural requirements and vary based on the height and span of individual arches. A 3' tall berm with an additional 3' of planting consistent with the Olmsted Walk plant palette is proposed at the west side of the habitat where the enclosure interacts with Olmsted Walk. The berm is proposed at 12' in width in this location.	Although the Zoo has historic precedents for arched mesh enclosures, the proposed enclosure will be highly visible from Olmsted Walk. The enclosure will cover much of the project site and will be immediately visible from both exhibit entrances and along Olmsted Walk. The enclosure, though highly visible from Olmsted Walk, places structure at the habitat perimeter only, enabling potential adjustments to the habitat sizes and organization once the conservation program is established. To minimize adverse effect, each structural member will be sized to accommodate individual loads, minimizing the size and visual impact of structural members to a range of diameters between 6" and 12". The enclosure places the maximum height required only at the peak of the arch, allowing the enclosure to decrease in height where it approaches Olmsted Walk. The adverse effect is further minimized by the finishes of both the structural members and proposed mesh. The proposed bronze-colored structure and black oxidized mesh provide the greatest visibility into and through the habitat. The dark colors of both the structure and mesh blend with both the sky and plantings backdrops, minimizing the visual presence of the enclosure from Olmsted Walk. Berming and plantings along Olmsted Walk preserve the existing visual characteristics of Olmsted and maintain a visual boundary between the historic Walk and the new exhibit, to minimize adverse effect.
Effect Determination: Adverse Effect	

Feature/Action	
5. Building Envelope Materials	
 Pre-Patinated Copper Diamond-Shaped Shingle Carderock – Varied Ashlar Coursing en-Colored Roof Precedent within Historic District: Think Tank	
Description	Effect Analysis
The project complements the Zoo’s existing contributing buildings by utilizing consistent and/or compatible materials on the Care Building envelope. The envelope materials for the care building include Carderock cladding and a patinated copper roof in a diamond shingle pattern. Carderock is found throughout many of the contributing buildings, support buildings, and landscape features within the Historic District. At the nearby Elephant House, warm-toned, ashlar Carderock clads most of the building. Roof surfaces at the Zoo are composed of tiled or shingled roofs made of terracotta, slate, or wood. The Think Tank, a nearby contributing building, features green-colored terracotta tile. Several modern structures feature the use of vegetated green roofs to allow the structures to integrate into the topography. Many of the service buildings along Olmsted Walk are low in profile with prominent wood or slate shingled roof features, referencing natural colors and materials.	The vertical surface area of the animal care building will have a clear and close presence on Olmsted Walk. Carderock cladding in a varied ashlar pattern is proposed along the elevation fronting Olmsted Walk and Asia Trail for its consistency with other contributing buildings and historic materials within the District. Use of Carderock has precedent elsewhere in the Zoo and minimizes adverse effects from the Care Building. A pre-patinated, diamond-shaped copper shingle roof at the care building provides a visual connection to similarly colored roofs such as the Think Tank for consistency within the District. The incorporation of historically consistent materials at the care building minimizes the visual presence of the building as discussed in “Section 3: Animal Care Building Footprint and Massing.”
Effect Determination: No Adverse Effect	

Feature/Action	
6. Relationship to Olmsted Walk	
 View of upper corner of project site from Olmsted Walk. Current Zoo in Your Backyard exhibit.  Project location and planting plan in context. Figure 5.4.4.1: Proposed Concept Site Plan - Features Features List: 1. Existing Tree to Remain 2. New Canopy Tree 3. New Understory Tree 4. New Habitat Tree 5. Olmsted Walk Planting Palette 6. Wadi and Oasis Planting Palettes 7. Bioretention Planting Palette 8. Asia Trail Planting Palette	
Description	Effect Analysis
The Arabian Leopard Habitat is proposed in the upper portion of Olmsted Walk, accessible via the path on two	The Arabian Leopard Habitat has visible proximity to only two contributing resources within the Historic District,

of the site’s four sides. In this area, Olmsted Walk is characterized by a canopy of mature trees which create dense foliage and line the edges of the path. Dense tree coverage and berms with low plantings maintain the naturalistic park setting. Breaks in the trees create portals that frame views of exhibit entrances in this portion of the Walk.

The site currently has planted edges where it interacts with Olmsted Walk. NZCBI Horticulture surveyed the trees on the project site and identified seven for preservation. The project will comply with the National Capital Planning Commission (NCPD) Tree Replacement Guidelines.

The project’s planting plan and introduction of berms seeks to maintain existing characteristics of Olmsted Walk, including the canopy of mature trees, dense foliage, and clear path edges distinguishing Olmsted from this exhibit. The planting plan (above) illustrates mature canopy trees to be preserved in addition to new trees to be planted.

The proposed berms will range in width from 12’ – 24’ and in height 2.5’ – 4’ and will include plantings, providing additional screening and height between Olmsted Walk and the new exhibit. The existing viewing alcove off Olmsted Walk at the northwest corner of the project site will be removed and replaced with a berm, Olmsted walk plantings, and new canopy trees.

Three different planting palettes, including Olmsted Palette, Wadi/Oasis Palette, and Asia Trail Palette will characterize the plantings throughout the exhibit. The Olmsted Palette maintains consistency within the Historic District and will primarily be featured where the site borders Olmsted Walk, while the Wadi/Oasis Palette utilizes plantings characteristic of the Arabian Peninsula and will be introduced within the exhibit for thematic cohesion with the Leopards. The Asia Trail palette will be used where the site borders Asia Trail, and includes plantings consistent with the nearby Panda and Elephant exhibits.

Effect Determination: Adverse Effect

Olmsted Walk and the Elephant House. The project’s built elements, including the care building and habitat enclosure, are sited closer to Olmsted Walk than most other existing habitats and buildings. To minimize visual imposition of the new built elements, the projects uses landscape to maintain the visual characteristics of Olmsted Walk.

To minimize adverse effect, the density of the tree canopy is maintained through protection of existing trees where possible and introduction of new canopy trees. Plantings consistent with the Olmsted Planting Palette are proposed where the project site borders Olmsted Walk. The berms, to be planted with Olmsted plantings, are intended to buffer the project site from Olmsted Walk, maintaining the character of the Walk and minimizing visual intrusion from the new exhibit.

The service entrance to the loading dock at the northeast corner of the site will be adjacent to the intersection of Olmsted Walk and Asia Trail, and visible from lower Olmsted Walk. Landscape features, including berming and plantings will be strategically located to minimize visibility of the loading dock. For continuity with the existing condition, plantings in this location follow the Asia Trail plant palette, which intersects with Olmsted Walk. A screen fence with bamboo planting will buffer between the service yard and Asia Trail, also minimizing views of the service area from Olmsted Walk. Specific information about the railing/screening strategy is discussed in “Section 8: Proposed Site Railing Plan.”

Architectural considerations demonstrating sensitivity to Olmsted Walk include project height, roof profile, and materiality and are discussed in further detail in “Section 3: Animal Care Building Massing and Footprint.”

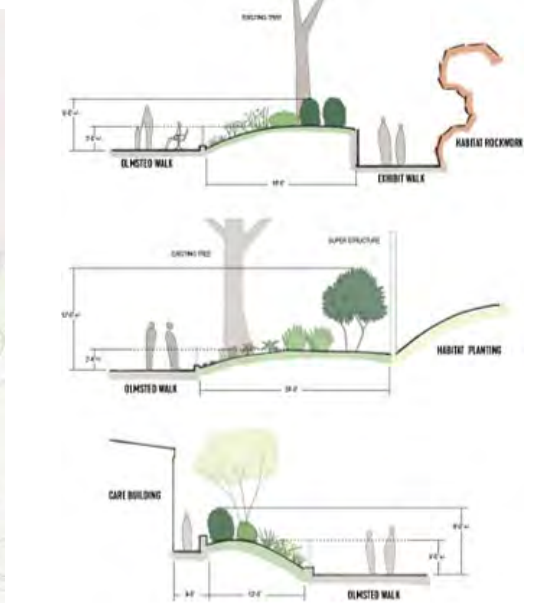
Feature/Action

7. Relationship to Elephant House



Description	Effect Analysis
The Arabian Leopard Habitat has visible proximity to only two contributing resources within the Historic District, Olmsted Walk and the Elephant House.	The closest portion of the Elephant House to the Arabian Leopard Habitat is a non-historic addition, service yard, and fence enclosure. There is no visibility of the Elephant House from within the Arabian Leopard Habitat site.
The Elephant House was designed by architect Edwin Clark in a symmetrical, Beaux-Arts style, constructed in 1937. The exterior is characterized by an ashlar Carderock exterior, limestone quoins and entrance loggias, grand arched windows, classical detailing and metal animal sculptures. It has been modernized over the years to support the Zoo’s Asian Elephant Conservation Program. In 2008-2013, a large animal care facility addition was added to the west side of the building; these non-historic additions are closest to the Arabian Leopard Habitat project site. The visibility of this addition and the service yard from Olmsted Walk is screened by dense vegetation and a gate, with visibility from Olmsted Walk. Elephant House (including addition and service yard) cannot be seen from within the project site.	There will be limited visibility of the eastern end of the Arabian Leopard Habitat when visitors are standing at the entrance to the Elephant House along Olmsted Walk. Proposed plantings in this location of the project site conform to the plant palette along the Asia Trail to maintain the existing setting. This visibility has no impact on the setting and character of the Elephant House.

Effect Determination: No Adverse Effect

Feature/Action				
8. Proposed Landscape Plan				
 Existing Conditions Figure 4.3.3: Site Topography Upper Terrace - 200' to 195' Middle Terrace - 191' to 185' Lower Terrace - 184' to 180' Project Location Olmsted Walk  Proposed Landscape Plan 1. Existing Tree to Remain 2. New Canopy Tree 3. New Understory Tree 4. New Habitat Tree 5. Olmsted Walk Planting Palette 6. Wadi and Oasis Planting Palettes 7. Bioretention Planting Palette 8. Asia Trail Planting Palette  Berm Locations  Berm Types <table><tr><th>Description</th><th>Effect Analysis</th></tr><tr><td>The existing topography of the site can be understood as three terraces gradually dropping in elevation from the top of the site down toward the Asia Trail and Elephant House. Site elevations range from approximately 180 feet</td><td>Adjustments to the non-historic existing exhibit topography have no effect on historic resources, avoiding adverse effect. Portions of the current exhibit are on grade with Olmsted Walk.</td></tr></table>	Description	Effect Analysis	The existing topography of the site can be understood as three terraces gradually dropping in elevation from the top of the site down toward the Asia Trail and Elephant House. Site elevations range from approximately 180 feet	Adjustments to the non-historic existing exhibit topography have no effect on historic resources, avoiding adverse effect. Portions of the current exhibit are on grade with Olmsted Walk.
Description	Effect Analysis			
The existing topography of the site can be understood as three terraces gradually dropping in elevation from the top of the site down toward the Asia Trail and Elephant House. Site elevations range from approximately 180 feet	Adjustments to the non-historic existing exhibit topography have no effect on historic resources, avoiding adverse effect. Portions of the current exhibit are on grade with Olmsted Walk.			

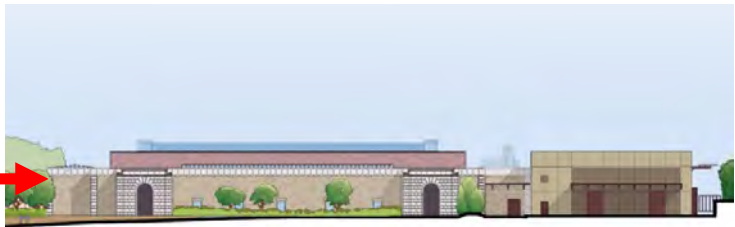
at the southeast corner to 200 feet at the northwest corner, with the highest elevation in center of the site reaching 191.3 feet. This project will have minimal impact on the existing topography, adjusting only for visitor access along the proposed path through site.	Design of the landscape planting palette specific to the animals' native habitat is consistent with Olmsted's founding design principles for the Zoo and current practices.
The landscape plan for the new habitat will prioritize the following: • Protection of existing trees along Olmsted Walk • Addition of new trees, primarily along the edges and corners • Introduction of berms along site edges adjacent to Olmsted Walk. The proposed berms will range in width from 12' – 24' and in height 2.5' – 4' and will include plantings, providing additional screening and height between Olmsted Walk and the new exhibit. • Olmsted Planting Palette – Maintains conformance to existing plantings found along Olmsted Walk throughout the Historic District. • Wadi/Oasis Planting Palette – Introduces plants thematically complementary of the Arabian Peninsula • Asia Trail Planting Palette – Utilizes plantings found along Asia Trail to ensure the southeastern edge of the project site is consistent with other path edges and plantings along Asia Trail	The berming strategy seeks to integrate the exhibit and building design with the landscape to maintain the landscape character along Olmsted Walk. Landscape design maintains the existing character of Olmsted Walk and Asia Trail, avoiding adverse effect.
Effect Determination: No Adverse Effect	

Feature/Action	
9. Proposed Shading Structures	
	
Proposed Shading Areas: Shade structures shown as white shaded forms Shade Structure with Metal Slats	
	
Proposed shade structure with metal slats at central "Oasis" viewing plaza	
Description	Effect Analysis
The exhibit has two primary habitat viewing areas located within the central "Oasis" portion of the exhibit and at the exhibit's west entrance. To provide shading for better viewing and visitor experience, permanent shade structures are proposed. The proposed shade structures utilize independent metal columns to support a canopy of metal slats with a bronze finish, the same as the proposed finish color for the enclosure structure. At the Oasis, the shade structure	Both the shade structure at the west habitat entrance and at the central Oasis area will be visible from Olmsted Walk. To avoid adverse effect, the design proposes a low-profile canopy in matching material (metal) and finish (bronze color) to the habitat enclosure. The use of a metal slat does not call undue attention to the shade structures. In addition, the shade structures will be finished to match the enclosure arch color to create a cohesive effect throughout the site.

follows the perimeter of the viewing area, providing shade for visitors at both the enclosure and day room. At the west entrance, the shade structure is immediately adjacent to the habitat enclosure.	Keeping the shade structures independent of the habitat and maintaining the same finish color as the enclosure does not result in the intensification of adverse effects from the habitat enclosure.
Effect Determination: No Adverse Effect	

Feature/Action	
10. Proposed Railings and Fences	
Proposed Site Railing Plan	
Description	Effect Analysis
The Arabian Leopard Habitat requires a variety of railings and edge treatments for programmatic requirements, including protection of plantings, retainage of berms and earth, and visual screening. There are six types of edge elements proposed for the site, including the original Olmsted Rail, a secondary visitor barrier rail, a bamboo landscape rail, bamboo arch screen, metal slatted screen fence, and low Carderock wall. Along Asia Trail and where Asia Trail intersects with Olmsted Walk, a variety of edge treatments are proposed to minimize visibility of the service entrance and mechanical yard. A screen fence, similar to the Elephant House service yard and gate on Olmsted, is proposed to both gate the service entrance and screen the mechanical equipment to the immediate south. Railing elements consistent with Asia Trail, are proposed as further screening measures near the loading dock and mechanical equipment. A low Carderock wall is proposed at the immediate edge where Asia Trail meets the project site.	To remain consistent and complementary of characteristic features of the District, the proposed railing plan incorporates the Olmsted railing standard along all edges where Olmsted Walk borders the project site. Zoo safety standards require a secondary barrier between Olmsted Walk and the mesh enclosure, which is depicted in orange above. The secondary barrier provides an additional protection between the Olmsted Rail and the enclosure, using continuous black mesh and black posts. The edge treatments along Asia Trail utilize existing Asia Trail elements to maintain a thematically and characteristically consistent edge with other areas of Asia Trail. The proposed railing and screening plan avoids adverse effect by using different railing and screening types reflecting the existing character of Olmsted Walk and Asia Trail. The railing plan provides an Olmsted Rail at all locations where the project site borders Olmsted Walk, maintaining the historic edge treatment of the path.
Effect Determination: No Adverse Effect	

Feature/Action	
11. Signage	
Proposed signage locations	
Proposed exhibit entry sign: Upper Olmsted	
Proposed exhibit entry sign: Lower Olmsted	
Description	Effect Analysis
Signage locations follow approved existing Zoo signage program and types, including pictographic wayfinding signage as well as thematic signs located at both entrances to the new exhibit. Two new entrance signs are proposed at both exhibit entrances, in addition to maintaining the existing directional blade sign. The new exhibit signs are proposed to be 4'x8'.	The proposed signage is consistent with existing signage throughout the Zoo, including thematic exhibit signage.

Effect Determination: No Adverse Effect	
Feature/Action	
12. New Construction in the Historic District	
 <i>Bird House c. 1928</i>  <i>Bird House c. 2023</i>  <i>Historic North Elevation (pre-2008): Elephant House</i>  <i>Elevation Including Addition (2013): Elephant House and new barn</i>	
Description	Effect Analysis
The Arabian Leopard Habitat is located within the National Zoological Park Historic District, which has experienced significant waves of development in the early 20th century and in the 1970s. Changes to this historic district reflect both evolution of animal care standards and expansion of NZCBI’s conservation efforts. In the last 20 years, contributing buildings have received modifications to improve animal care and visitor engagement (Elephant House – Adverse Effect with an accompanying Section 106 Memorandum of Agreement; Bird House – No Adverse Effect). Other recent new construction (Conservation Pavilion – No Adverse Effect) has been successfully designed to complement the historic district.	This Historic District retains high integrity of use and setting with continuous operation of its purpose built facilities and campus. Although the design and construction of the Arabian Leopard Habitat is consistent with recent changes in this Historic District, reflecting the evolution of animal care and conservation of species, the project cumulatively results in an adverse effect. Due to the project’s site constraints, which do not permit generous setbacks from Olmsted Walk consistent with older buildings and exhibits, the Care Building’s height and proximity to Olmsted Walk impacts the characteristic experience of the path. In addition, the habitat enclosure is highly visible from Olmsted Walk. The effects to Olmsted Walk by the close proximity of the Care Building and visibility of the habitat enclosure are minimized through several architectural and landscape strategies discussed in previous sections, including the introduction of berms and historically-consistent planting palettes, cladding and roofing materials consistent within the Historic District, color selections for roofing material and enclosure structure, and minimization of height at both the care building and habitat enclosure to minimum programmatic requirements.
Effect Determination: Adverse Effect	

Feature/Action	
13. Other Historic Resources Within the Area of Potential Effect (APE)	
 <i>Area of Potential Effect (National Zoological Park Historic District)</i>	
Description	Effect Analysis
Aside from impacts to Olmsted Walk, this project has no direct effects on other historic within the APE.	See “Relationship to Olmsted Walk” and “Relationship to Elephant House” for further information.
Effect Determination: No Adverse Effect	

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