



Smithsonian  
Institution

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COLE**

National Zoo & Conservation Biology Institute

# **Repair Stormwater Mitigation at Elephant Yards**

Washington, DC 20008

SF Project #2233104

EC Project #20230426

## **NCPC Preliminary and Final Review Submission**

August 29, 2025



## TABLE OF CONTENTS

2	TOC
3	Project Overview
4	Project Context
5	Existing Conditions
7	Proposed Development
8	Project Cost and Schedule
8	Environmental and Historical Considerations
9	Detailed Project Description
9	Proposed Work
15	Tree Preservation Plan
16	Landscape Plan



Photo of Elephant Yard 4, looking South

## TABLE OF CONTENTS



## PROJECT OVERVIEW

### Location

Smithsonian's National Zoo and Conservation Biology Institute (NZCBI)  
3001 Connecticut Avenue NW  
Washington, D.C. 20008

### Owner/Contact

Smithsonian Institution  
Office of Planning, Design, and Construction (OPDC)

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### Project Summary

The primary purpose of this project is to address stormwater runoff and erosion problems within the National Zoological Park's outdoor elephant exhibit yards (1, 2 and 4). Additional scope has been included to support ongoing animal care and maintenance needs within the yards.

### Compliance with NCPC Plans and Policies

This Site Improvements project has scope limited to existing animal yards within the National Zoological Park, and meets Principle 2 for Resilient and Sustainable Development Planning for the Comprehensive Plan for the National Capital: Federal Elements.

## PROJECT OVERVIEW

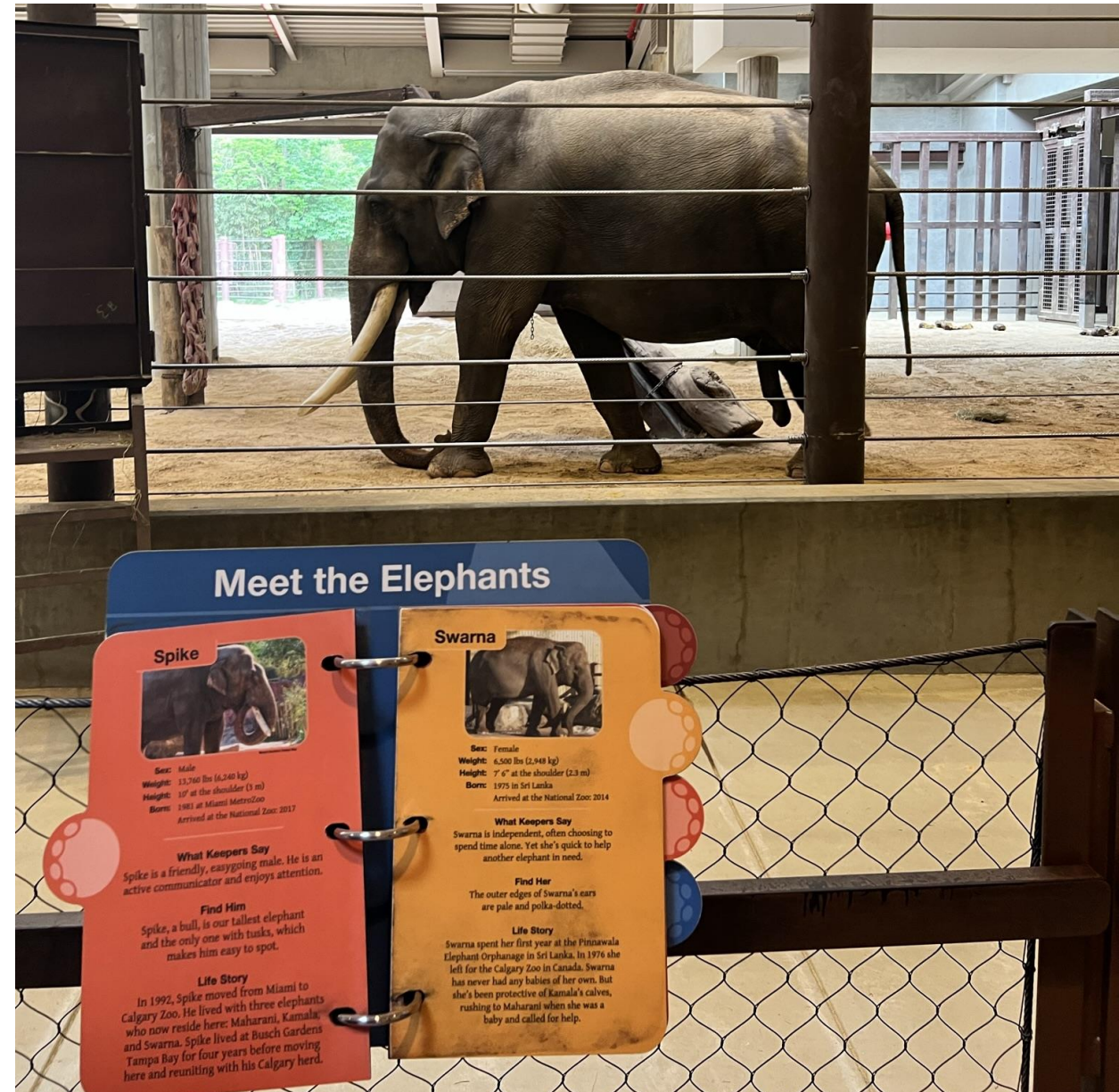


Photo of Elephant Yard 2, through the Elephant House interior



## PROJECT CONTEXT

### District Context and Zoning

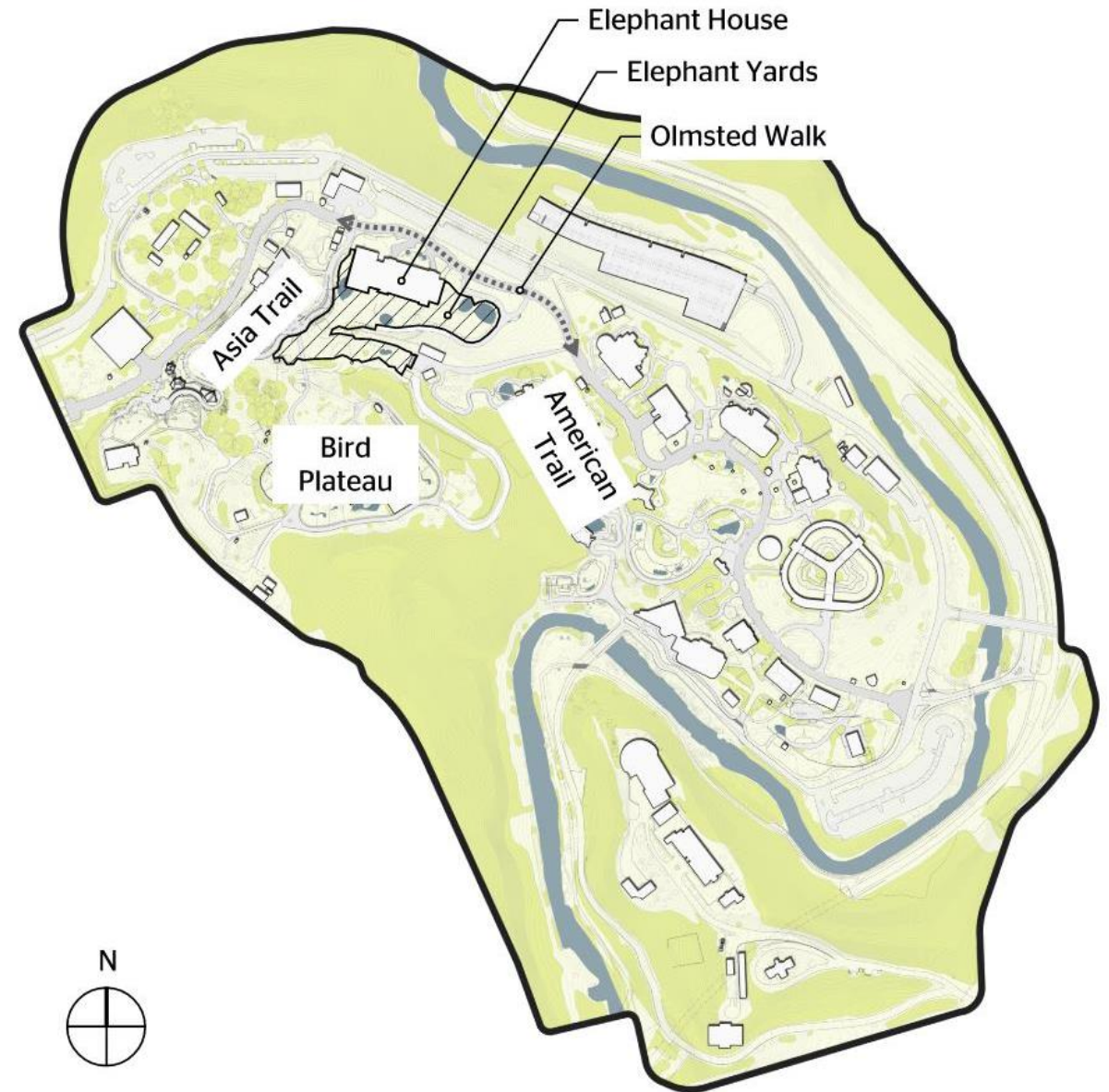
The Smithsonian National Zoological Park (NZP) is located on 163 acres between Connecticut Avenue and Rock Creek Parkway/Beach Drive in Washington, D.C. Surrounding areas are largely residential, with a commercial corridor along Connecticut Avenue. The Zoo site itself is unzoned.

### Campus Context

The entire Zoo is set on a steep slope, creating various challenges throughout the park for staff, visitors, and animals including but not limited to stormwater runoff.

The Elephant Trails Exhibit is one of the larger animal exhibits and is comprised of the Elephant House and four (4) large outdoor yards with pools. These four (4) outdoor yards span approximately 2 acres overlaid on a significantly sloped site (approx. 25% slope in some areas), and are located south, east, and west of the Elephant House.

Areas immediately adjacent to the Elephant Exhibit include public walkways and viewing areas such as Olmsted Walk, Asia Trail, and American Trail. Uphill from Yard 4 is the Bird House Plateau. All of these areas are part of the National Zoological Park property and have been previously developed, with the exception of the wooded slope between American Trail and the Bird Plateau.



## PROJECT OVERVIEW



## EXISTING CONDITIONS

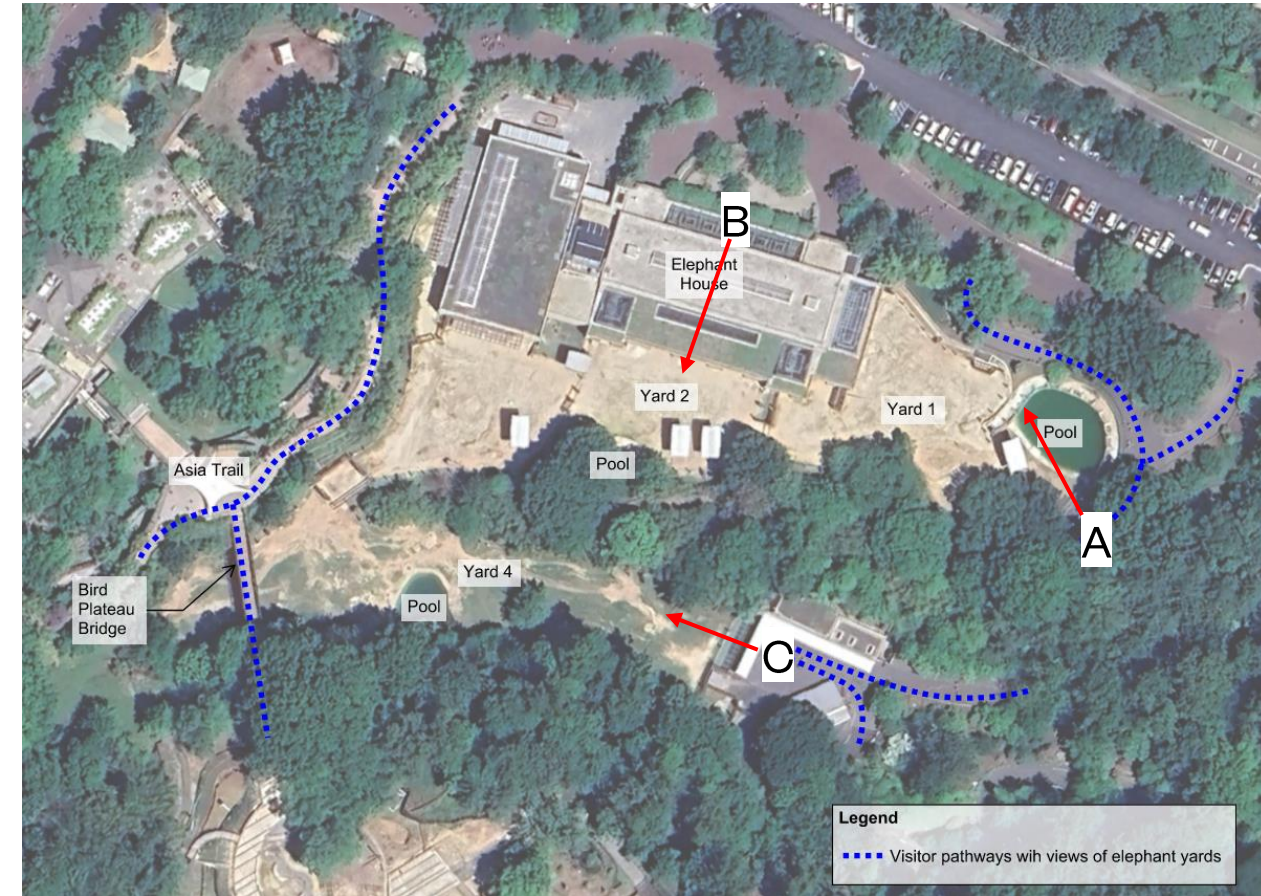
### Site and Yards

Exhibit spaces are enclosed with a steel bollard and high tensile wire barrier system and with artificial rock concrete wall systems topped with angled steel bollards and high tensile wire barrier systems. Most visitor viewing locations for exhibit spaces consist of asphalt paving, decorative low plantings and guardrail systems to prevent visitors from accessing the elephant barrier systems.

Yard 1: Yard 1 is steeply sloped at around 10% grade and is fully enclosed by a bollard and wire barrier system. A concrete exhibit pool with a curbed edge is located at the bottom of the sloped exhibit space. Rain events result in migration of the sandy substrate downslope and into the pool. Multiple shade trees line the southern edge of the exhibit space. Visitor viewing areas wrap around the exhibit space on the north and east edges of the exhibit space.

Yard 2: Yard 2 is gently sloped at around 7% grade and is fully enclosed by a bollard and wire barrier system. A concrete exhibit pool is located on the southern edge of the exhibit. The exhibit is viewed from the Elephant House, through the indoor exhibit space.

Yard 4: Yard 4 is steeply sloped at around 10% to 15% grade. Barrier systems include a bollard and wire system, and a shotcrete system. Rain events cause sand migration and creates erosion gullies, primarily along the northern edge of the exhibit space. Yard 4 is viewed by visitors from the eastern edge from an asphalt and view rail system. The exhibit is also viewed from the Bird Plateau Bridge spanning over the habitat near the west side of the habitat, and distantly from a viewing area on Asia Trail, an adjacent visitor pathway that is out of the project area.



**A**  
Photo of Yard 1 visitor viewing location and exhibit pool and barrier system.



**B**  
Photo of visitor viewing location of Yard 2 from Elephant House interior.



**C**  
Photo of visitor viewing location on the east side of Yard 4.

## PROJECT OVERVIEW



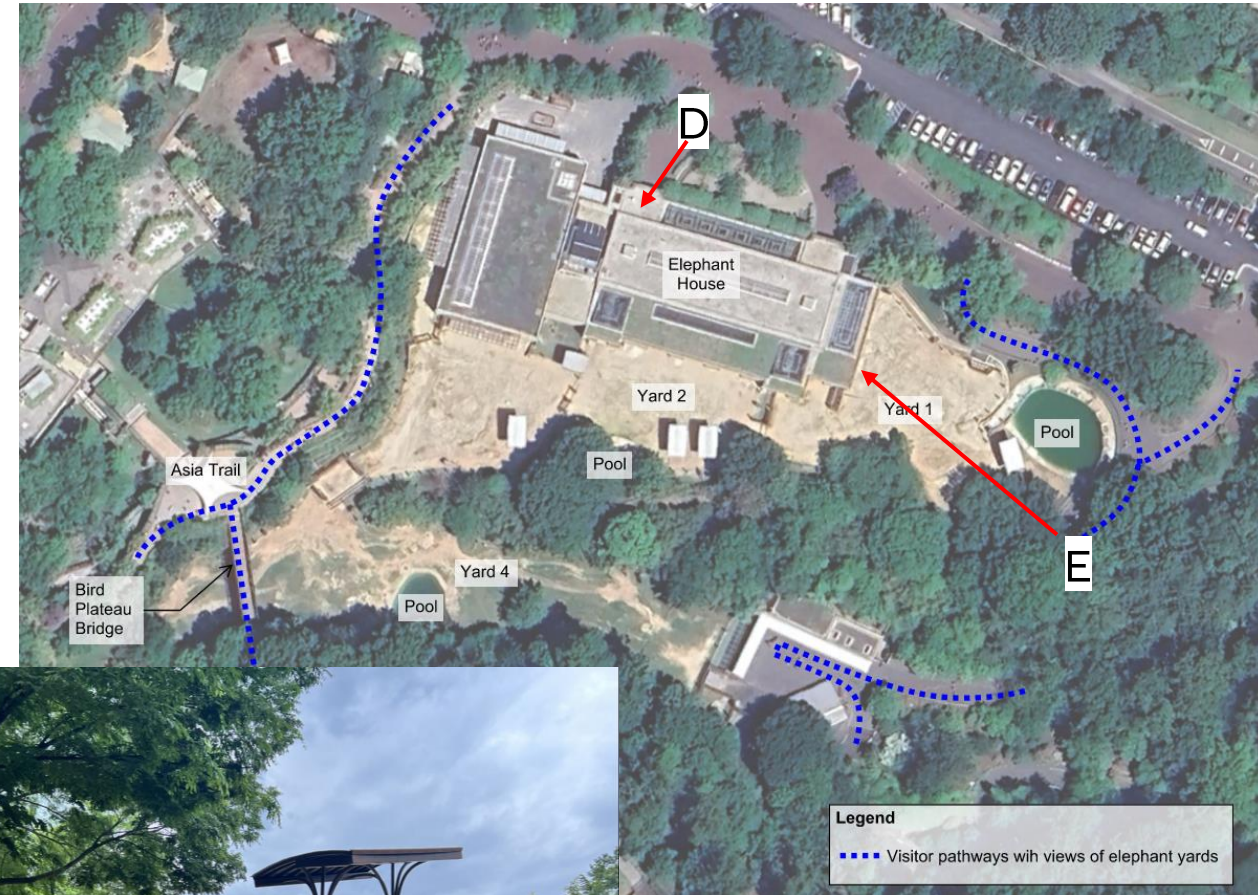
## EXISTING CONDITIONS

### Buildings

The existing 62,500 gsf Elephant House is a contributing structure within the National Zoological Park Historic District. Built in 1937, the two-story building exhibits a Carderock stone rubble exterior, accented with limestone quoins and entrance loggia. Interior program includes holding and a dayroom for the elephants, and office space for keepers and curators. Multiple renovations and a large addition completed over the years have reconfigured and improved areas for animal and staff, but key historic elements of the original design have been preserved.



D  
Exterior Photo of the Elephant House entrance.



E  
Exterior Photo of the Elephant House as seen from visitor viewing outside of Yard 1.

## PROJECT OVERVIEW



## PROPOSED DEVELOPMENT

### Project Area

The total area of the site being impacted is 65,466 SF (1.5 acres), divided between the yards as follows:

- Yard 1: 25,334 SF (0.58 acres)
- Yard 2: 11,178 SF (0.26 acres)
- Yard 4: 28,954 SF (0.66 acres)

No proposed work will increase or decrease the current extents of the elephant yards. All land use will remain unchanged, dedicated to animal holding and associated maintenance and access uses.

### Project Scope

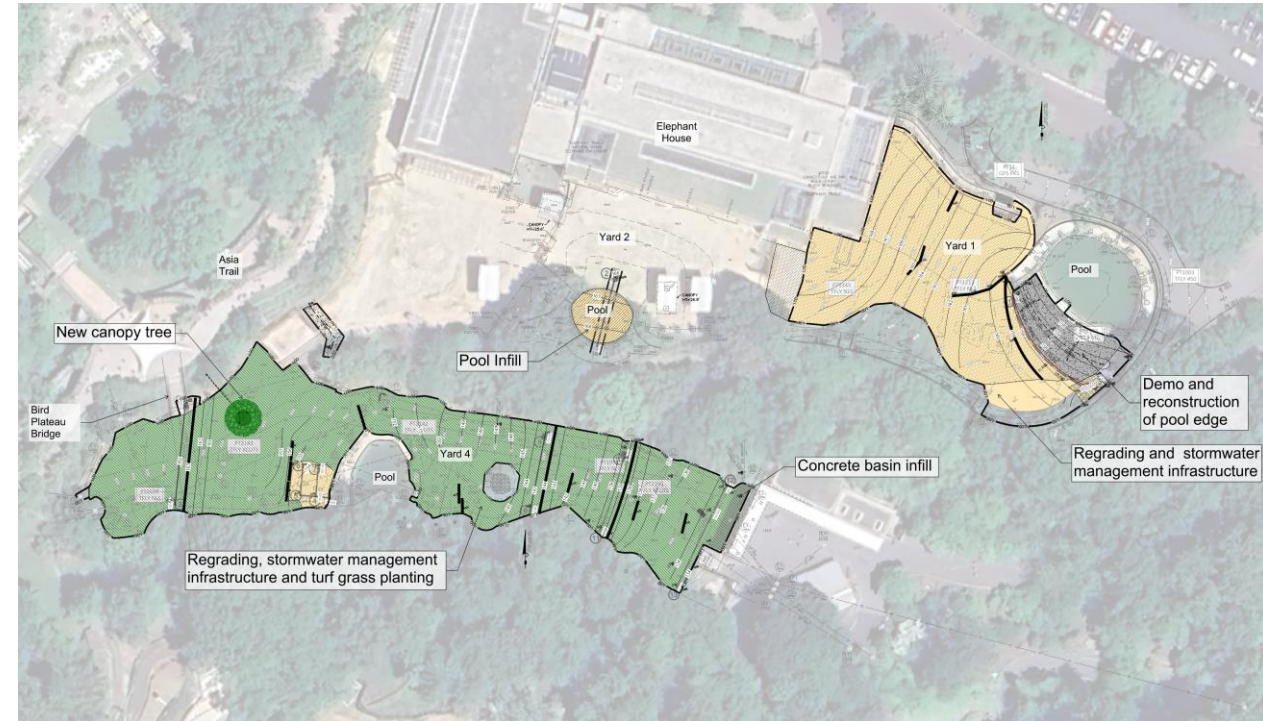
The base scope of the project includes the following work:

- Re-grading of Yard 1 and Yard 4, to reduce observed runoff and erosion issues and direct water more efficiently into improved stormwater management infrastructure.
- Planting of new turf grasses and a new canopy tree within Yard 4.
- Demolition and reconstruction of the Pool 1 perimeter within Yard 1, to reduce stormwater runoff into the pool and to make the pool more accessible for both animals and staff.
- Infill of Pool 2 in Yard 2 to create a clay bath for the elephants, including associated drainage and stormwater improvements to prevent ponding of water.
- Infill of an existing and unused concrete basin at the bottom of Yard 4, including associated drainage modifications and landscaping to improve maintenance access and visitor viewing experience.

An Add/Alternate was included in the construction documents for potential selection dependent on funding availability. That Alternate includes the following work:

- Correction of Pool 1 leaks by demolition and replacement of failed concrete, drain line, and waterproofing materials.

No new buildings or structures are proposed as part of this project.



Site Plan

## PROJECT OVERVIEW

## PROJECT COST AND SCHEDULE

### Project Cost

The project is funded for construction as part of the NZCBI Capital Plan for FY 2027.

The total estimated construction cost of the base project scope is \$1,753,130.

The total estimated construction cost of the project if Add/Alternate 3 is selected is \$2,093,363.

### Project Schedule

The project is expected to begin construction in FY 2027. Based on current phasing and scope projections, construction will take approximately 21 weeks (+/- 5 months) once procurement is completed. A full construction and occupancy schedule is not available at this time.

### Public Engagement and Outreach

As the project is limited to exhibit infrastructure improvements, public consultation is being completed through Section 106 and external review agency processes. The Smithsonian has coordinated internally to ensure the project aligns with its operational goals and visitor experience standards.

## ENVIRONMENTAL AND HISTORICAL CONSIDERATIONS

### DOEE Coordination

A meeting was held with the District Department of Energy and the Environment on September 18<sup>th</sup>, 2024, to discuss the project scope and confirm stormwater management requirements. Per DOEE guidelines, this project will not include more than 2,500 square feet of new impervious land cover. There are also no building renovations or additions proposed with this project. As a result, no additional post construction stormwater management measures are required. DOEE confirmed that the project will be only be reviewed for Erosion and Sediment Control permitting.

### Flooding

The project site is not located within a floodplain.

### Historical Considerations

Although the Elephant House is a contributing element, its surrounding exhibit yards are non-contributing to the National Zoological Park Historic District. This project will not result in visual impacts or changes to the character and uses of the exhibit yards. Work is contained within existing construction, and there is no potential to encounter undiscovered archaeological resources. A determination of No Adverse Effect on historic resources was submitted to the DC State Historic Preservation Office.

## PROJECT OVERVIEW



## PROPOSED WORK

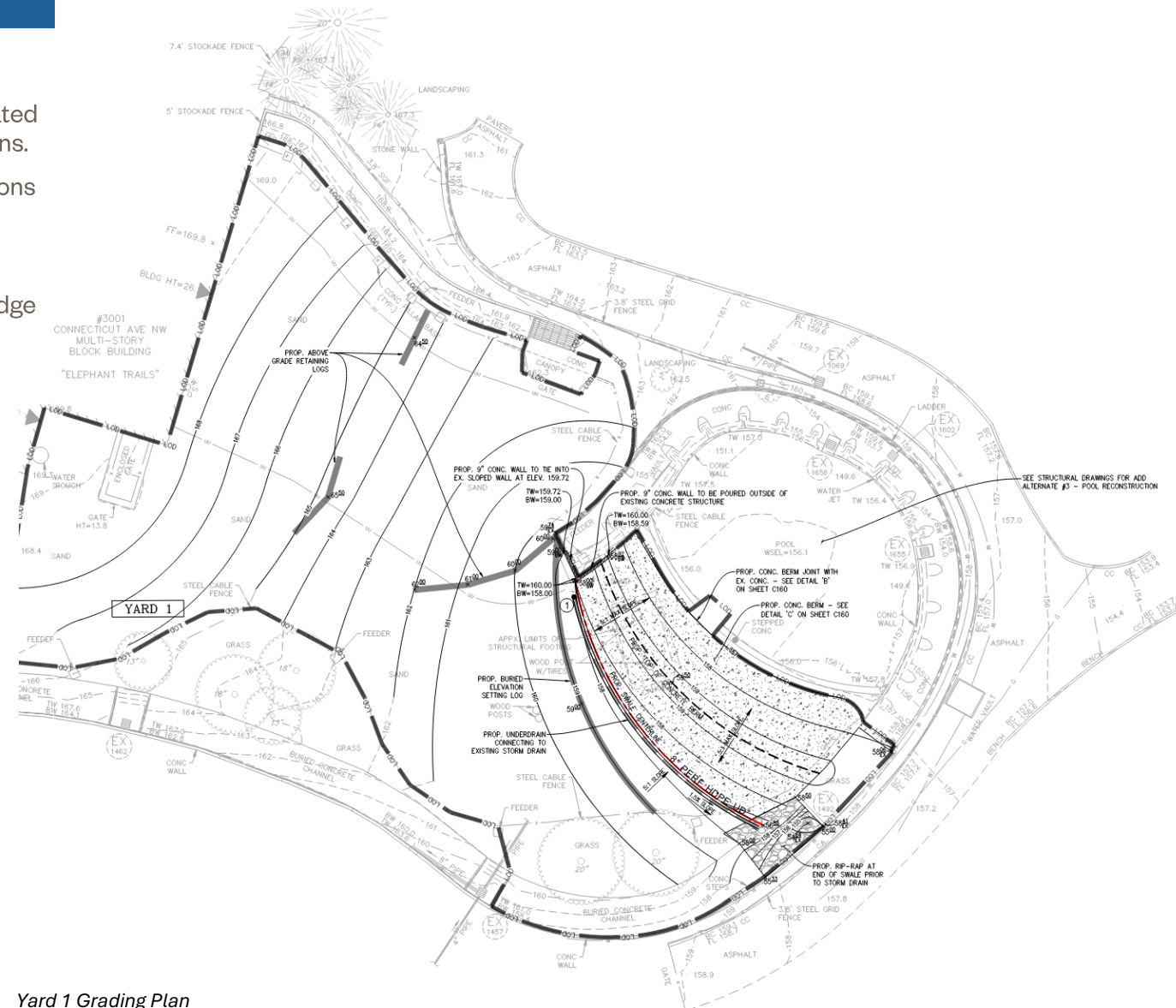
### Re-grading and stormwater management

Yards 1 and 4 each undergo grading adjustments to correct existing channels created by erosion and animal movement, and re-direct stormwater flow to new underdrains.

Yard 1: Topographic setlines in Yard 1 are drawn to start and end in the same locations as the existing grade but in between are smoothed and adjusted to help properly direct water flow down the yard. Semi-buried retaining logs are placed in key locations where sediment runoff has been observed, particularly around sandier areas to prevent sand transfer into Pool 1. Where the slope of the yard meets the edge of Pool 1, a swale has been created with an underdrain below, capturing any runoff and directing it to a nearby existing drain.



Photo of Yard 1 displaying ponding and runoff after a rain event.



Yard 1 Grading Plan

## DETAILED PROJECT DESCRIPTION



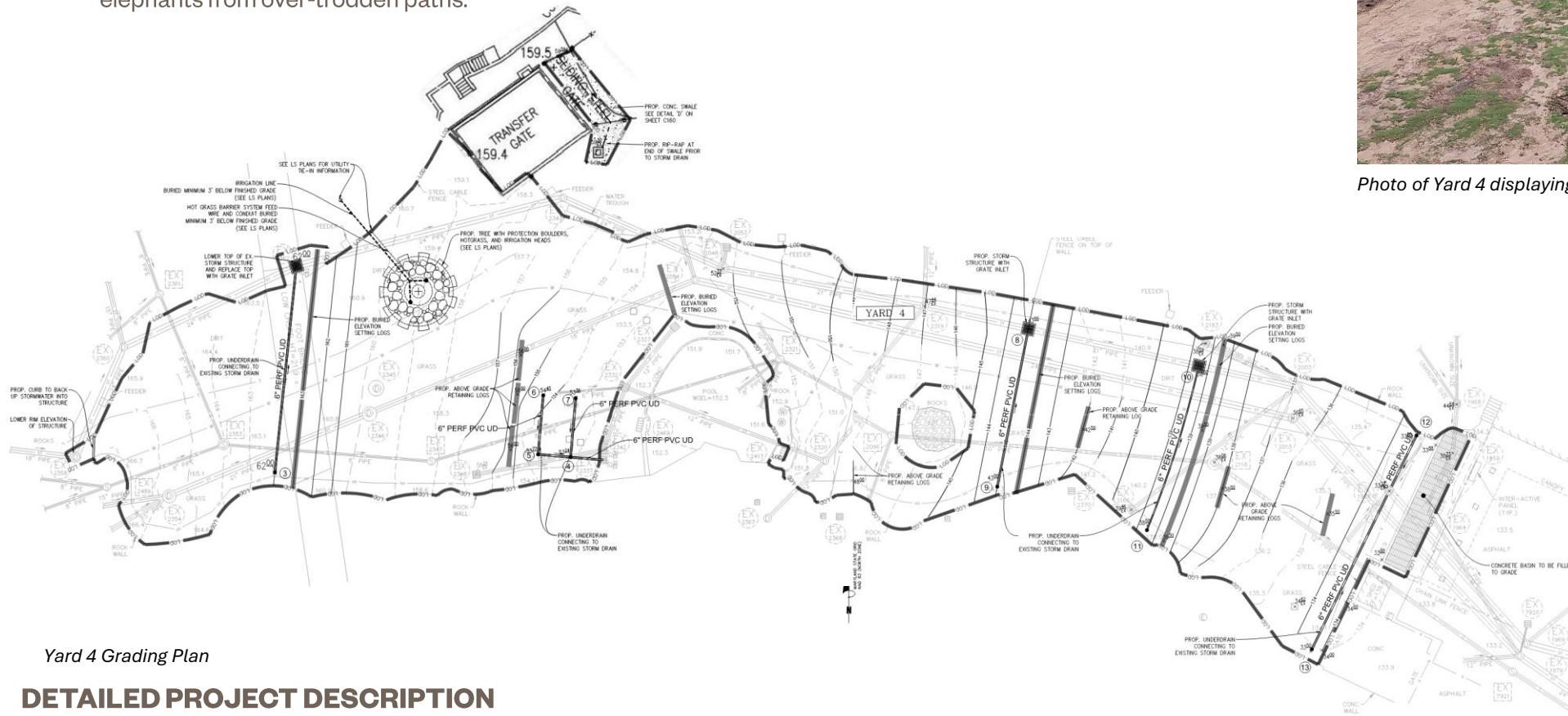
## PROPOSED WORK

### Re-grading and stormwater management

Yard 4: Re-grading in Yard 4 is limited to areas where animal movement and erosion has created channels in the substrate, and where new swales and berms are created to direct water flow. These new swales, paired with underdrains and elevation-setting logs, occur at intervals along the downward slope of the yard, capturing overland flow of water and directing it toward nearby existing drainage structures. Additional above-grade retaining logs and underdrains are distributed throughout the yard, helping hold back areas prone to erosion, reduce ponding of water, and re-direct elephants from over-trodden paths.



Photo of Yard 4 displaying erosion after a rain event.



Yard 4 Grading Plan

## DETAILED PROJECT DESCRIPTION



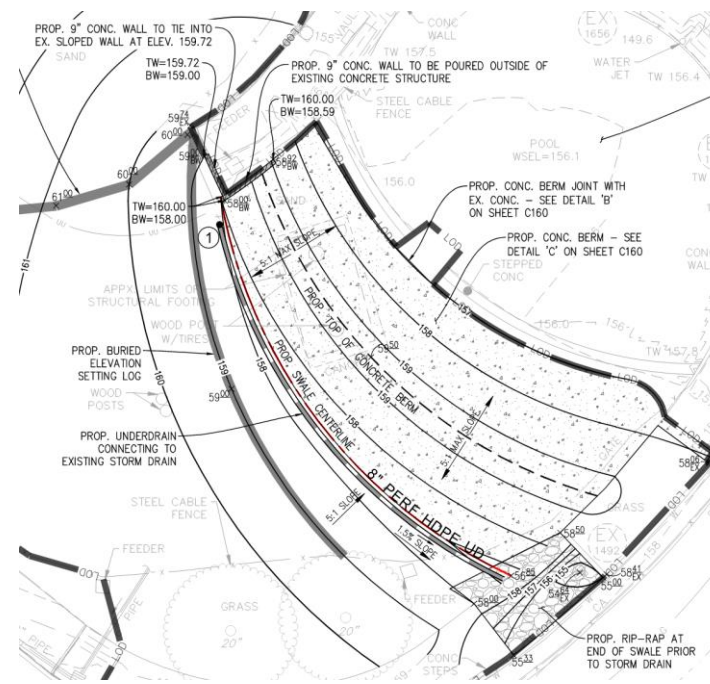
## PROPOSED WORK

### Animal care and visitor experience improvements

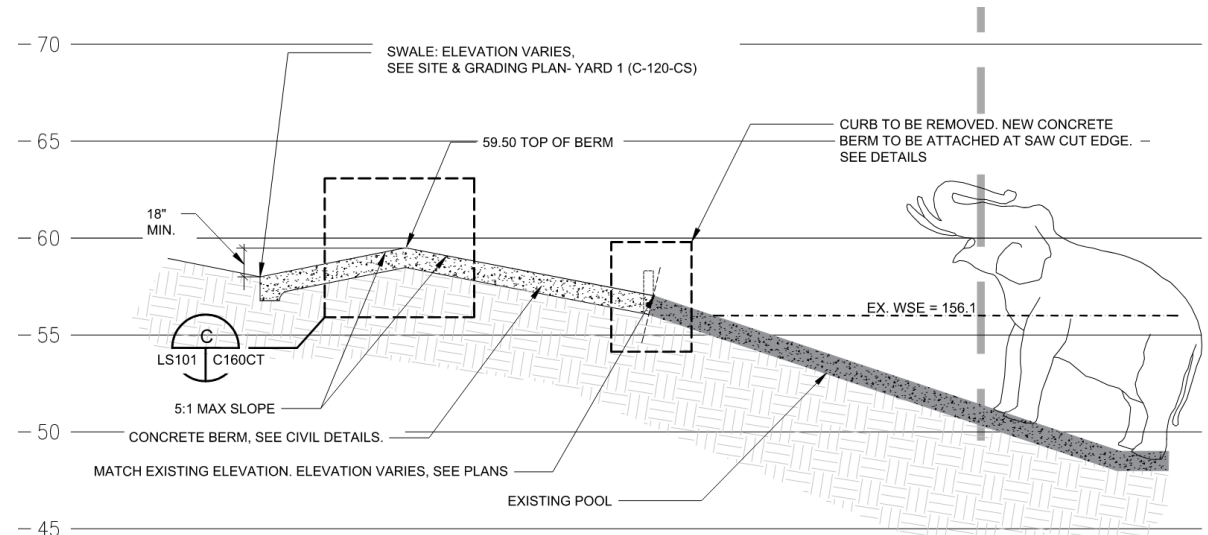
Yard 1: The Pool 1 perimeter will be partially demolished, removing a concrete curb and a steep skid-steer ramp. The perimeter is then reconstructed as a rolled-edge apron, terminating at the bottom of the new swale. This modification makes the pool more accessible for both animals and staff by creating a more gradual slope into the water, and helps the proposed swale divert stormwater runoff away from the pool.



Photo of existing Pool 1 edge.



Pool 1 proposed plan.



Pool 1 proposed section.

## DETAILED PROJECT DESCRIPTION



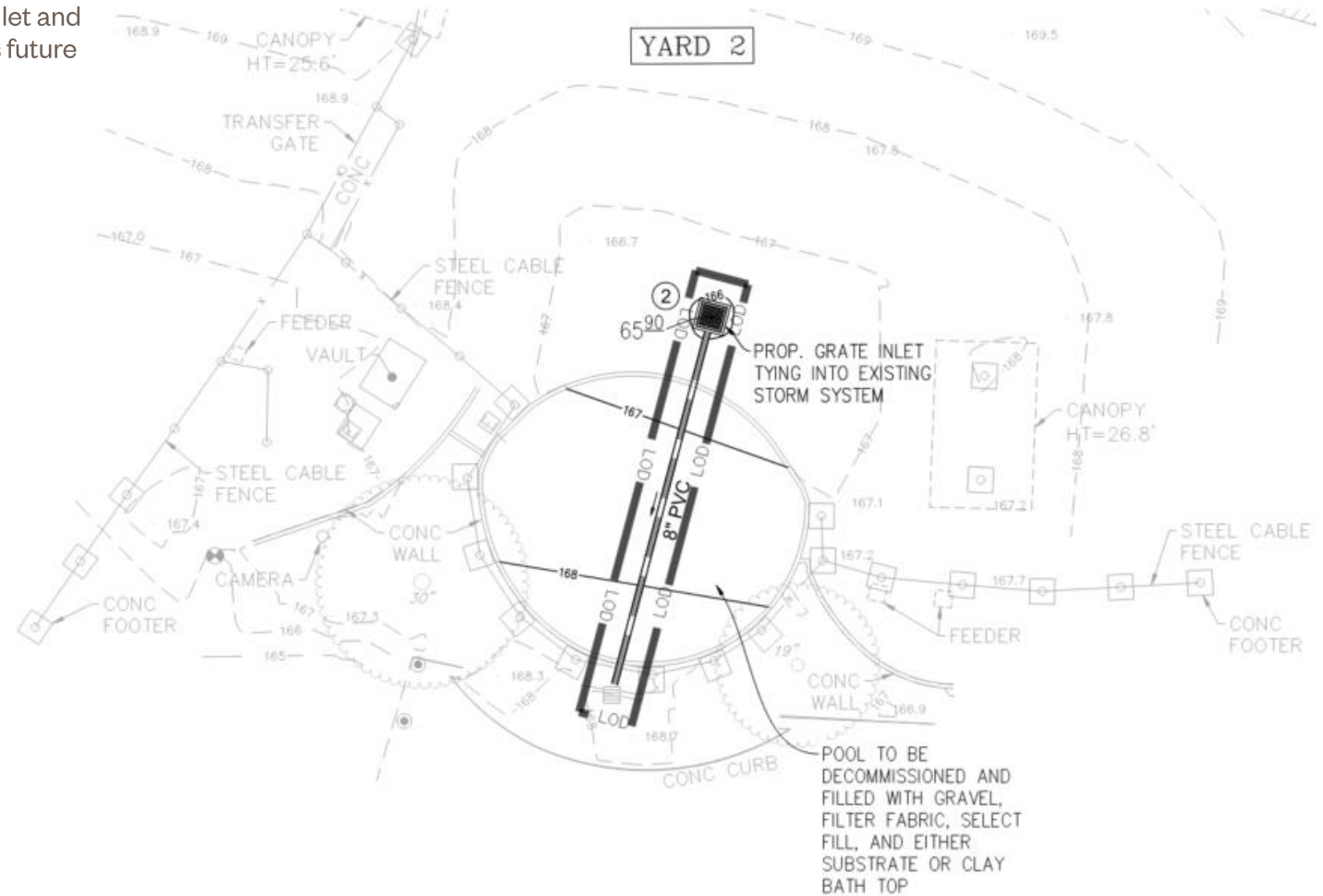
## PROPOSED WORK

### Animal care and visitor experience improvements

Yard 2: Pool 2 will be decommissioned and filled with gravel, filter fabric, and substrate to allow more walkable space for the elephants. A new grate inlet and drainage line connecting into a nearby existing storm structure prevents future ponding of water around the infilled pool.



Photo of existing Pool 2.



Pool 2 proposed plan.

## DETAILED PROJECT DESCRIPTION



## PROPOSED WORK

### Animal care and visitor experience improvements

Yard 4: Worn-down areas of Yard 4 will be re-seeded with a turf grass seed mix. A new canopy tree will be planted within Yard 4, creating a new shade element for the elephants. At the lower end of the yard, outside of the containment fence, an existing unused concrete basin is infilled with permeable fill and substrate materials, bringing the surface to grade and allowing stormwater to drain through to an existing storm structure below.



Yard 4 Landscape Plan

## DETAILED PROJECT DESCRIPTION



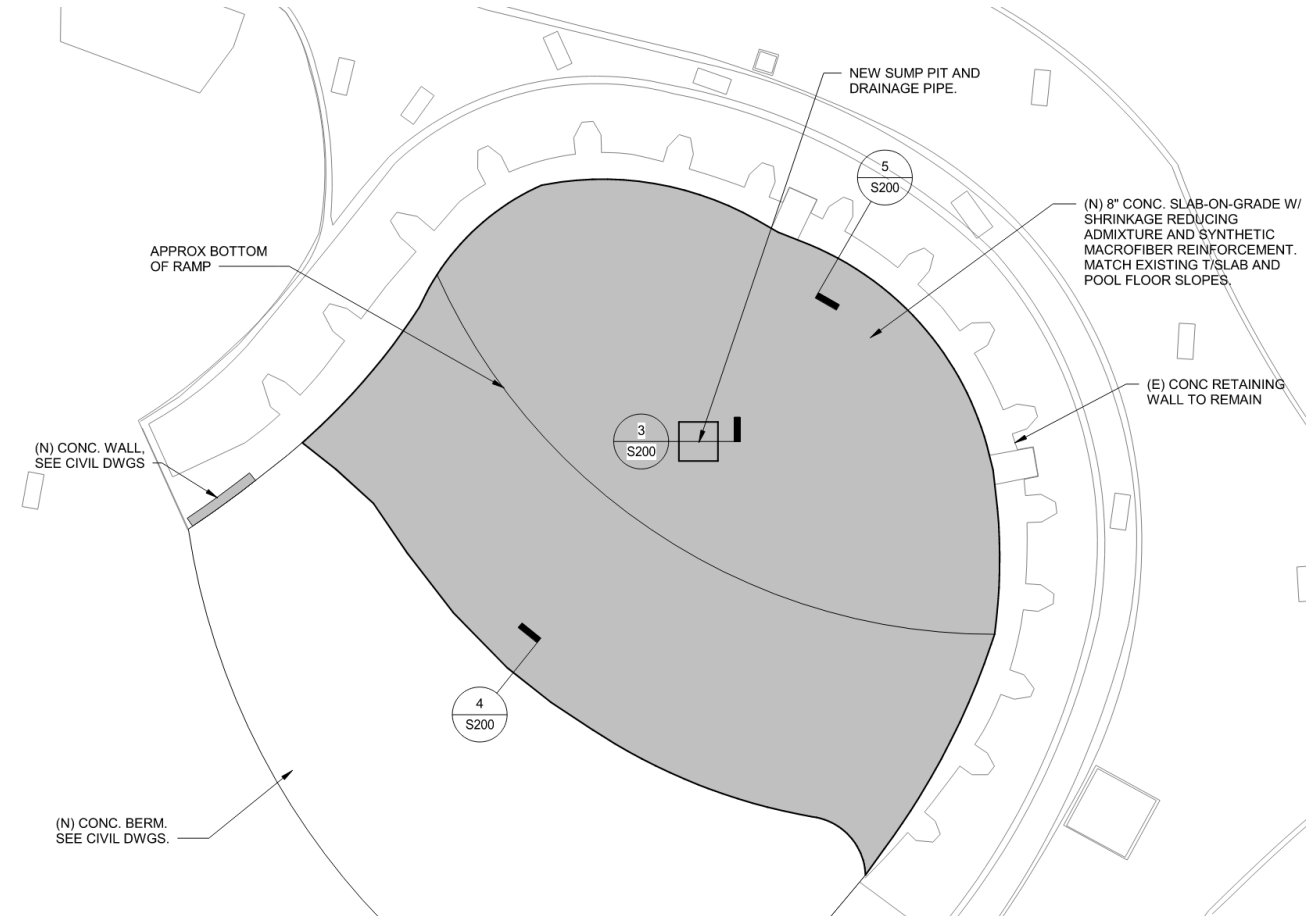
## PROPOSED WORK – ALTERNATE 3

Add/Alternate 3 scope as designed includes the following work, budget dependent.

Pool 1 in Yard 1 will be partially demolished, including the removal of the concrete ramp and floor, sump pit, drain line, and waterproofing materials. A new drain line is run to the nearby vault, and the ramp, sump pit and floor will be re-poured with appropriate detailing and waterproofing to prevent future water loss.



Photo of existing Pool 1 exhibiting concrete spalling.



Proposed plan of Pool 1 Add/Alternate 3 scope, showing extents of ramp and floor reconstruction.

## DETAILED PROJECT DESCRIPTION



## TREE PRESERVATION PLAN

Project scope does not include removal of any existing trees – all existing trees within the limit of disturbance will be protected during construction.

DOEE standard Tree Protection details are specified in the plans. The fencing must be 6-foot tall chain link or 4-foot high wooden snow fencing constructed on all sides of the tree protection zone. The fencing will be installed prior to and maintained through construction and will only be removed at the end of the project. The fencing must be located such that it includes the entirety of the Critical Root Zone, which is defined as 1.5 feet in radius per 1 inch of tree diameter.



Existing Tree Plan for all three yards.

## DETAILED PROJECT DESCRIPTION

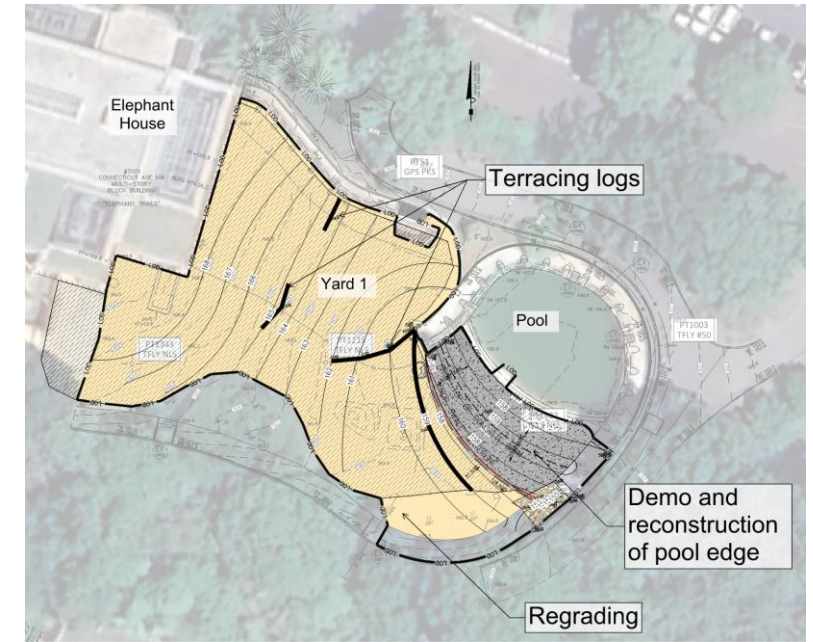


## LANDSCAPE PLAN

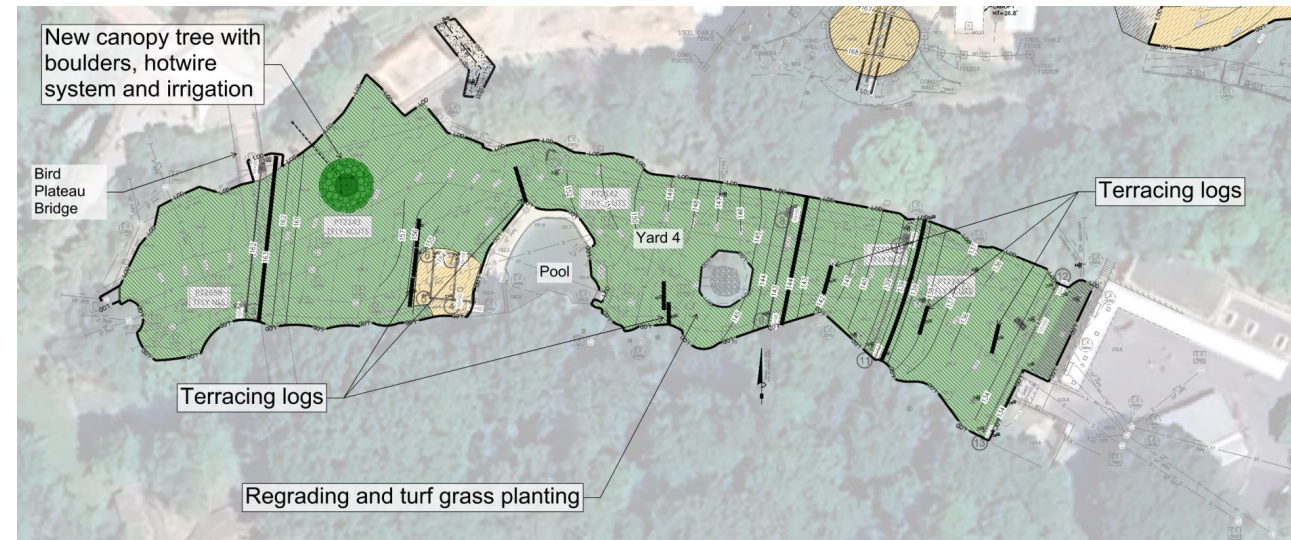
Proposed improvements within the exhibit spaces (Yards 1 and 4) include grading improvements and the addition of logs inset at grade to reduce impacts of erosion and create a terraced landscape in the exhibit spaces. No improvements are proposed to any of the visitor viewing areas, however, exhibit improvements will be visible from viewing areas.

**Yard 1:** Yard improvements include the grading and retaining strategies previously mentioned and improvements to the exhibit pool edge. Pool edge improvement includes the removal of the curb edge and replacement with a gently sloping cast in place concrete pool edge to improve elephant pool access and to reduce sand migration into the pool. The proposed pool edge will increase concrete coverage in the exhibit space and will aesthetically blend the pool edge with the sandy substrate.

**Yard 4:** Yard improvements include the grading and retaining strategies previously described, replanting of the yard with turf grass, and the addition of a new canopy tree on the west side of the exhibit. Turf grass plantings in Yard 4 aim to restore all greenspace lost to construction and past erosion and stabilize substrates on the steeply sloped site. The canopy tree will include a boulder and hotwire system, to prevent elephants from accessing the tree, and irrigation heads. The tree's location in the exhibit minimizes impacts on animal care staff access to the yard and on visitor views from the pedestrian bridge to the Bird Plateau.



Yard 1 Landscape Plan



Yard 4 Landscape Plan

## DETAILED PROJECT DESCRIPTION





**END**

*Photo of Yard 1 and Pool 1, looking towards the Elephant House from the visitor viewing area.*