Renew Cheetah Conservation Station Infrastructure (Africa Trail)

Smithsonian's National Zoo and Conservation Biology Institute, Washington DC

SI Project Number: 2033108

PRELIMINARY AND FINAL PROJECT SUBMISSION
National Capital Planning Commission

Estimated Construction Contract award September 2024

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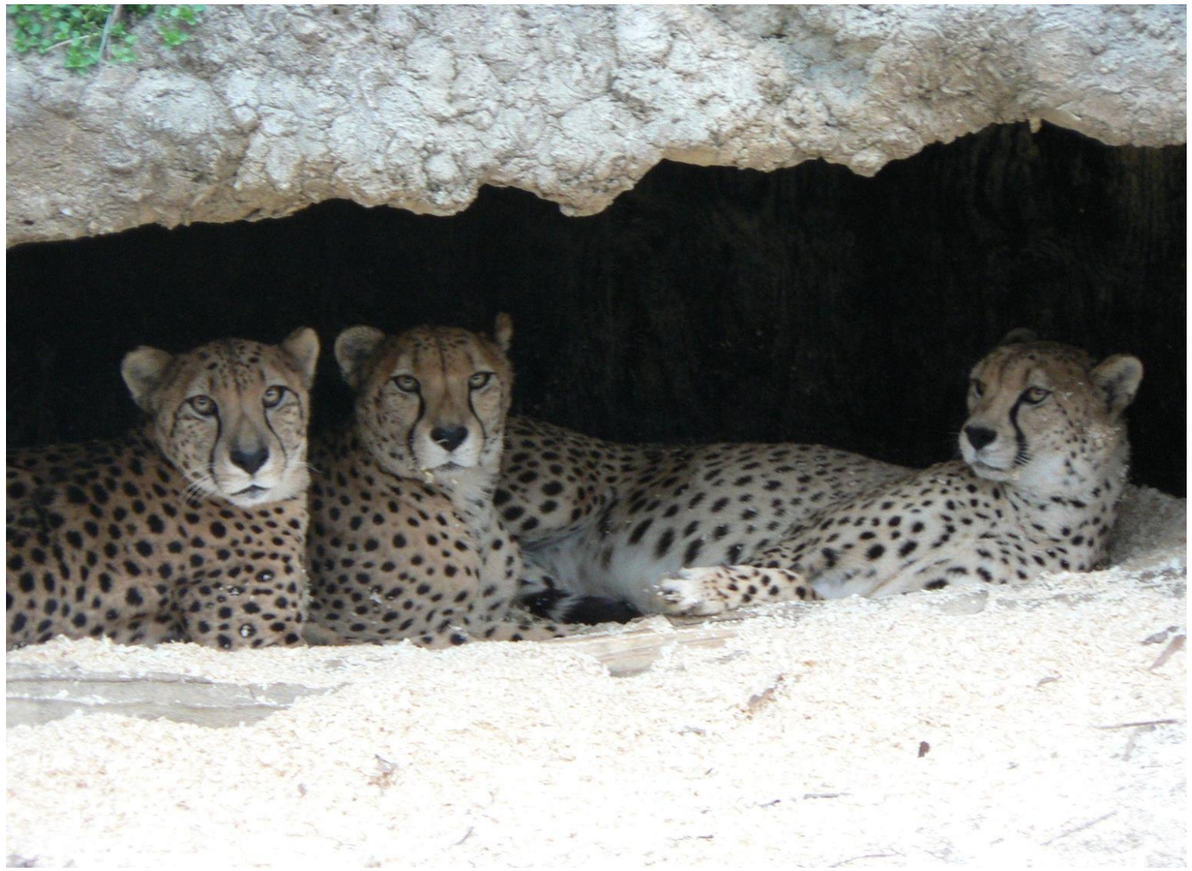

LOCATION

Smithsonian's National Zoo and
Conservation Biology Institute (NZCBI)
3001 Connecticut Ave NW
Washington DC

OWNER/CONTACT

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

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PROJECT SUMMARY

The Cheetah Conservation Station (CCS), now known as the Africa Trail (AT), is a series of mixed-species exhibit yards with a central back-of-house area that is not visible to visitors. Residents include cheetahs, ostriches, zebras, and the endangered addax, among others. The goal of the Africa Trail is to provide animal enrichment: enclosures, socialization, objects, smells and sounds that enhance animal well-being and provide physical and mental stimulation. The activities and mixed species habitats allow animals to demonstrate their species-typical behaviors as they would in the wild. The CCS facility was constructed in 1965, and is not a contributing resource to the National Zoological Park Historic District. The site abuts Olmsted Walk to the south, a contributing resource to the NZP Historic District. There are no other contributing structures and no archeological sites in the project area.

The **Renew Cheetah Conservation Station-Africa Trail (CCS-AT) project** proposes new stormwater infrastructure needed to resolve critical drainage issues in the exhibit yards and central animal management area of the CCS facility. The project also improves inefficient and degraded MEP, animal shifting & management, and barn building envelope systems. The upgraded systems are essential for staff and animal safety and to maximize animal enrichment and well-being. The majority of these improvements are underground and in back of house areas that are not visible to visitors.

National Zoological Park Map

PROPOSED SITE PLAN

The project proposal maintains the core structure of the facility with proposed improvements to the interconnected exhibit yards and the central animal shifting & management yard. Additionally, improvements to the back of house barns will be visible as rooflines and siding are currently visible from visitor paths.

The **greatest visual impacts of the proposed redesign** include:

1) New perimeter stormwater infrastructure with infill of existing moat.
2) New Olmsted Walk softened edge condition.
3) New planting design with shade structures to replace removed trees.
4) Improvements to existing barns.

Existing view looking west from visitor path, example of typical exhibit yard and barn view (see site plan **View A**).

SITE KEY PLAN

LEGEND

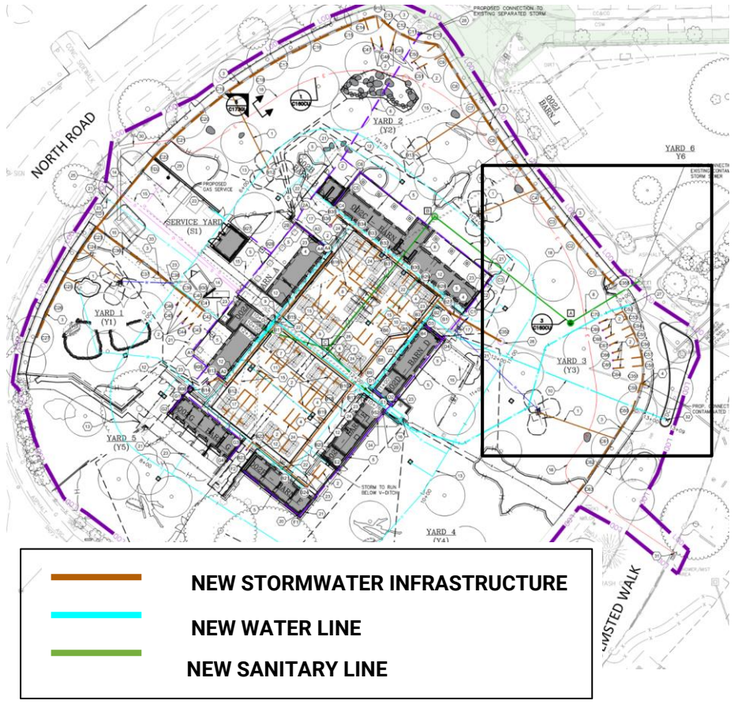
- NEW PERIMETER STORMWATER INFRASTRUCTURE & INFILL OF EXISTING MOAT
- NEW OLMSTED WALK SOFTENED CORNER
- NEW SHADE STRUCTURES
- IMPROVEMENTS TO BARNS

PERIMETER STORMWATER INFRASTRUCTURE

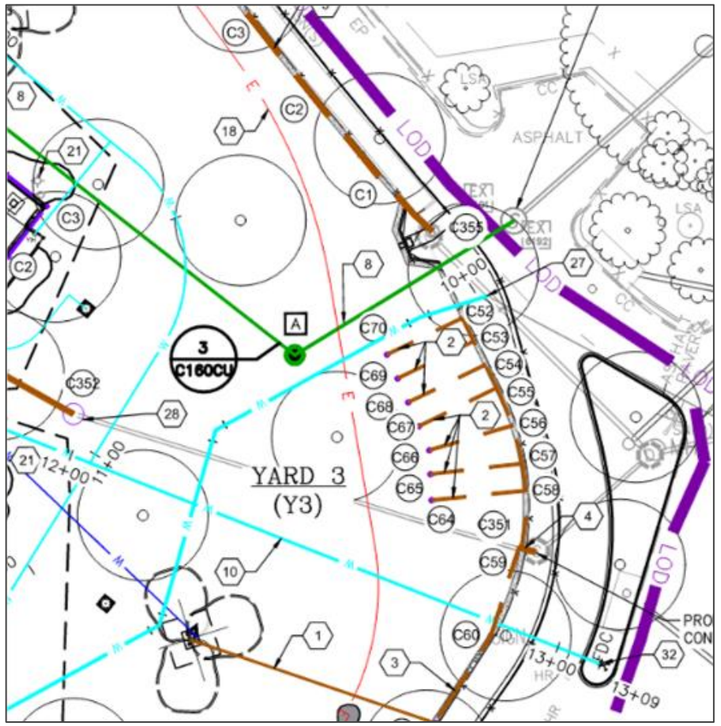
There are existing moats along the perimeter of the site that were constructed in the mid-1960s as a naturalistic animal containment. However, today they are the site of heavy water pooling. The insufficient stormwater capacity underground is causing the exhibit yards to get flooded and muddy. This flooding problem extends all the way back into the central management yard area.

The key plan shows the new utilities sitework, including new contaminated stormwater, separated stormwater, sanitary, and water infrastructure necessary to slow down water and deliver stormwater underground. **Most of these systems are underground or at ground level, with the highest visual impacts at the perimeter of the site.** The new stormline and red river gravel percolation strip is proposed along the perimeter of the site to replace the existing moat structures. The moat is being infilled to create a level grade, improving visitor visibility, with a new railing to match the existing railing at the existing cheetah yards. To prevent erosion a new substrate composition is also proposed. The plan enlargement and perimeter section show the sitewide typology of this new design.

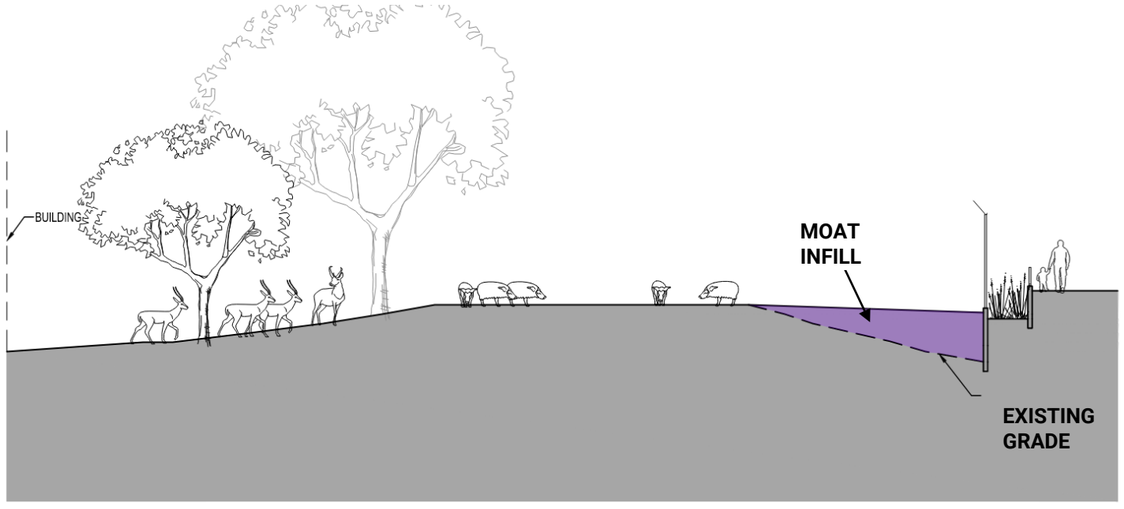
KEY PLAN: NEW UTILITIES

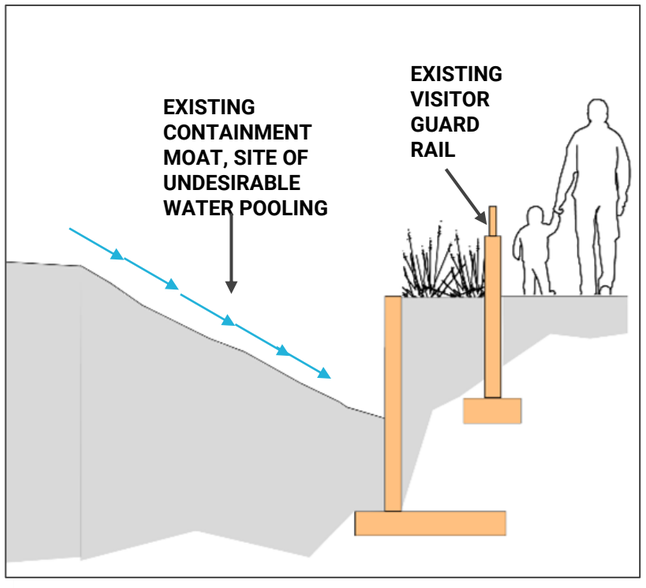


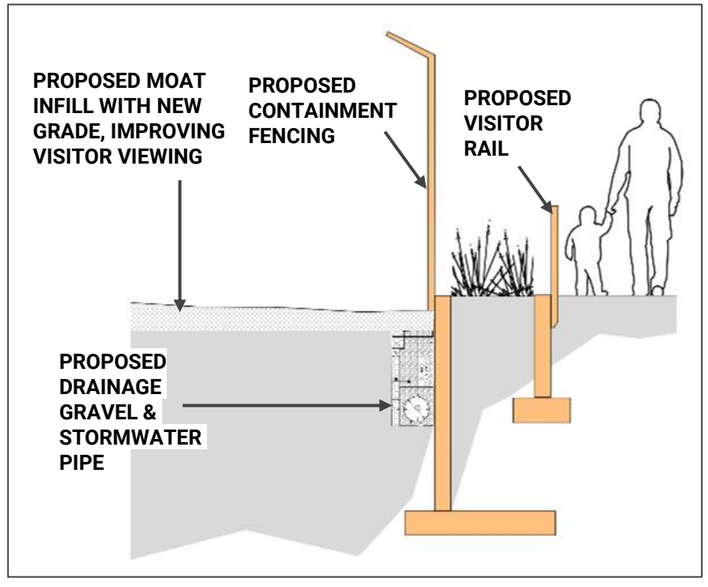
PLAN ENLARGEMENT



Proposed section cut showing moat infill, with improved visitor visibility of animals.





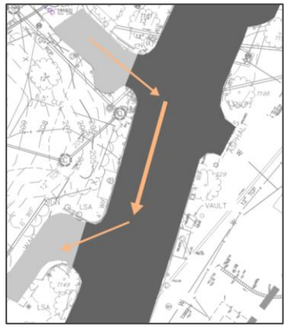


OLMSTED WALK SOFTENED CORNER

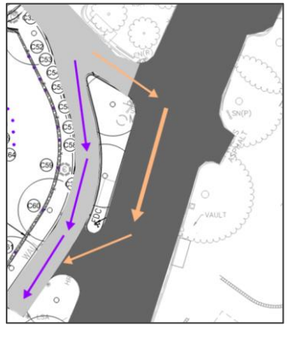
The proposed project requires demolition of existing stormwater infrastructure, tree removal, and new installation of stormwater infrastructure with increased capacity at the east corner of the site. **The redesign includes a newly softened edge condition that provides a secondary viewing path to the Yard 3 exhibit, preventing clogging on Olmsted Walk.** The redesign improves visitor flow and creates visual unity with other areas along Olmsted. The new secondary path will be asphalt and tie into the red hexagonal pavers of Olmsted Walk with a paver border course to match existing.

Existing photo looking southwest along Olmstead Walk.

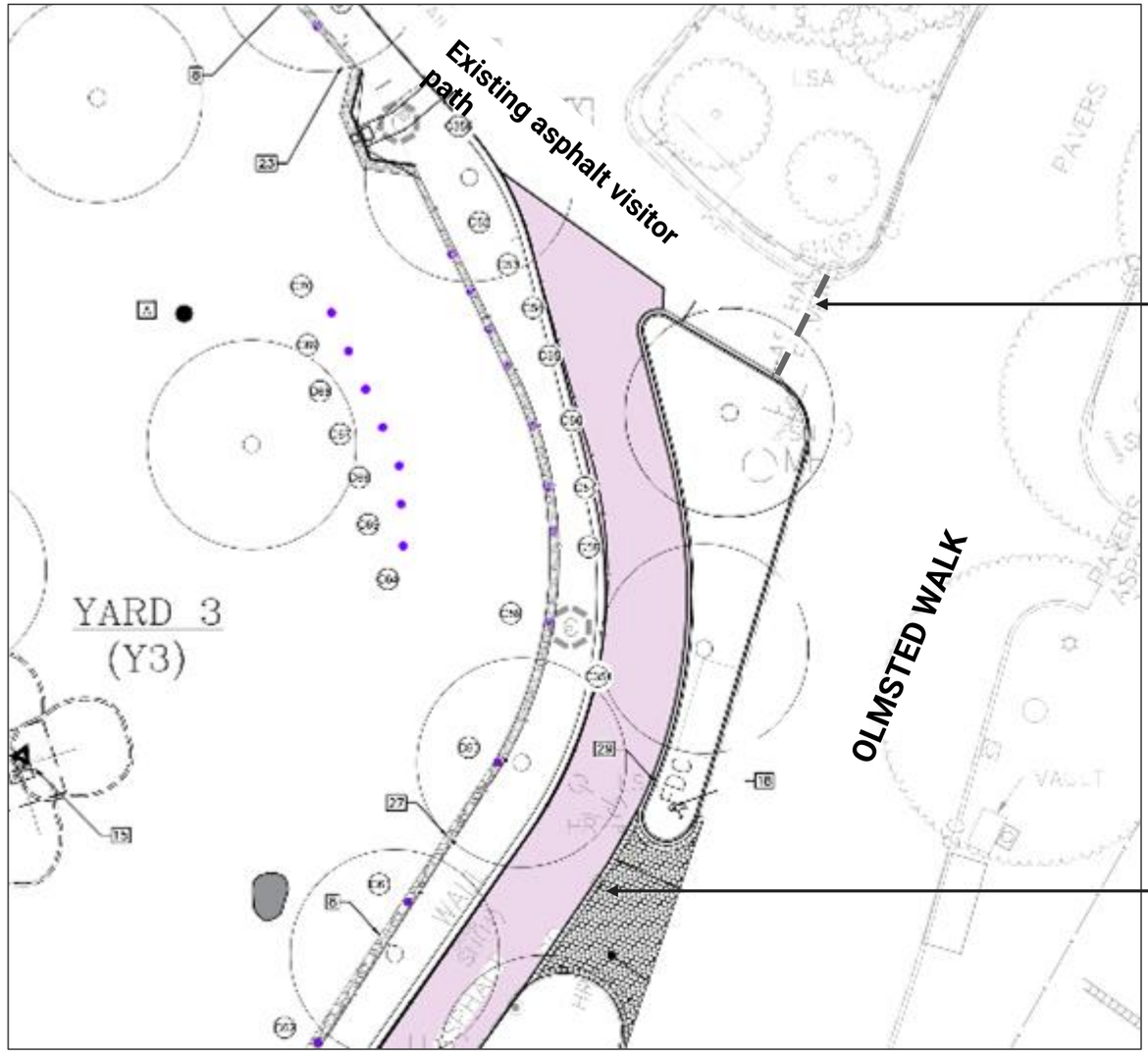
Existing corner with Yard 3 viewing from Olmsted Walk.



Proposed softened corner with secondary path to Yard 3 viewing.

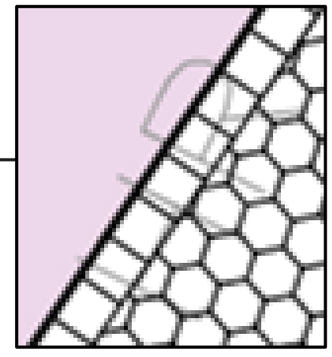


PLAN ENLARGEMENT



Existing asphalt tie-in to hexagonal pavers with border course.

Proposed asphalt tie-in to hexagonal pavers with border course matches existing condition.



Legend

PROPOSED ASPHALT

PROPOSED PAVERS

Smithsonian

Renew Cheetah Conservation Station Infrastructure (Africa Trail)

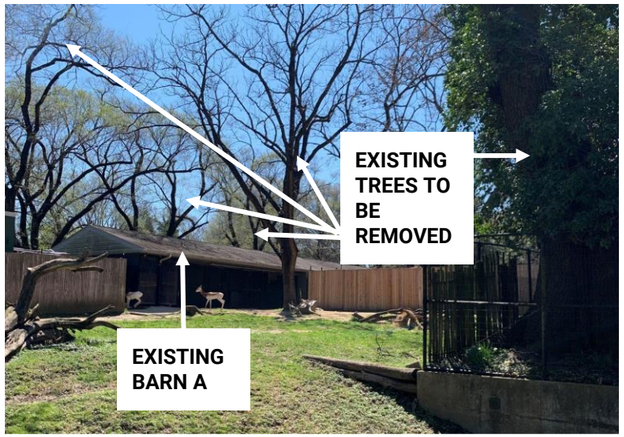
Proposed Improvements: Olmsted Walk Softened Corner

TREE REMOVAL AND REPLACEMENT

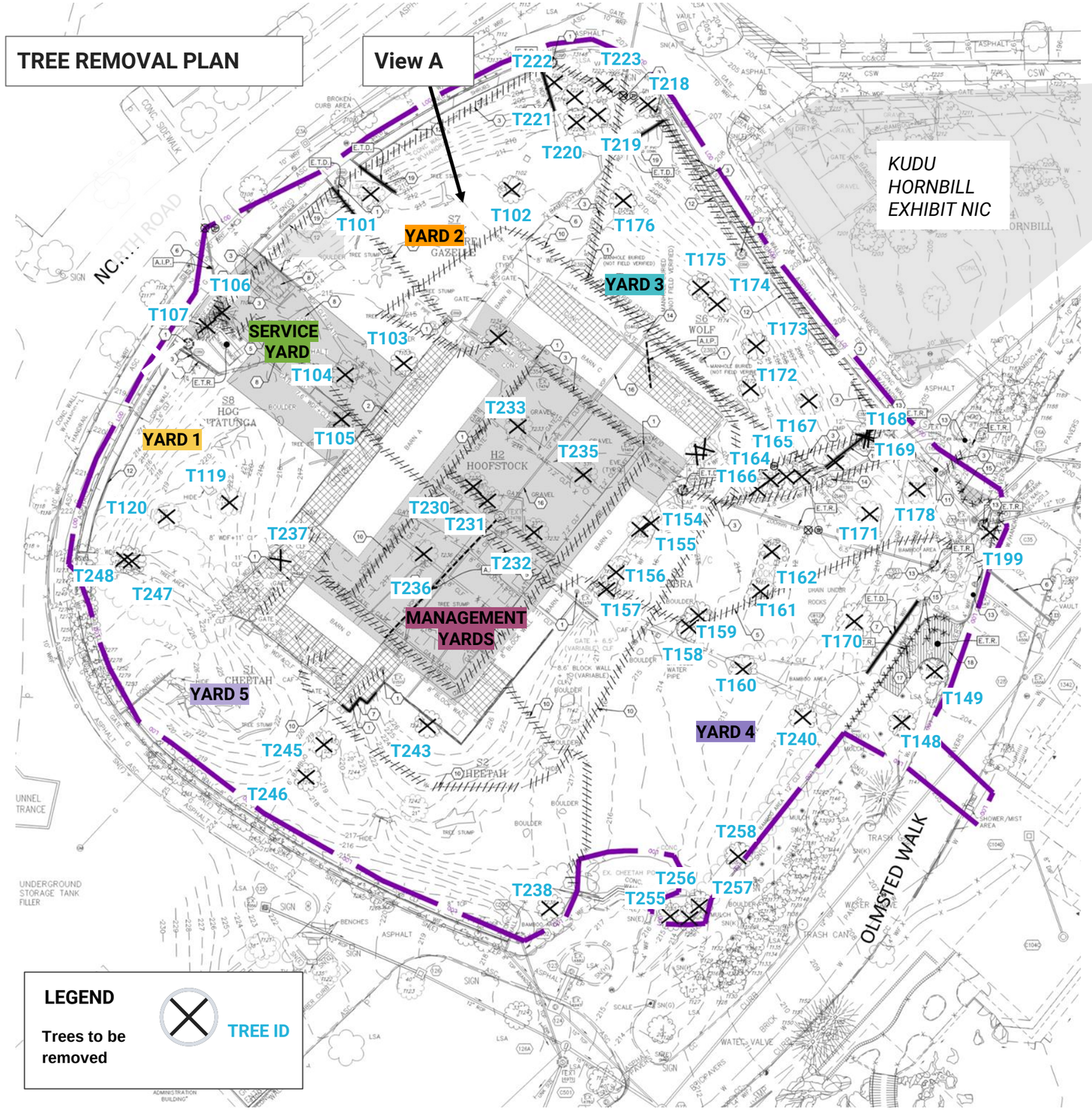
There are a total of (61) trees to be removed as a part of the CCS-AT project. These trees are assessed by the project arborist and zoo horticulture staff to be in poor condition, invasive, and/or not able to survive critical subgrade infrastructure work. Certain trees need to be removed to accomplish a raised grade for the moat infill along the perimeter of the site.

The full species list and replacement calculations by tree follows on the Tree Removal and Replacement schedule. Some of these replacement trees will be planted in other areas of the zoo, including as a part of the KUDU Hornbill Yard which is adjacent to Conservation Station-Africa Trail (CCS-AT) Project. The tree replacement formula shown with the schedule follows NCPC guidelines for tree replacement.

For the replacement of these trees, the project uses a combination strategy of shade structures and new tree plantings to provide reliable and species-appropriate shaded areas in animal habitats. The savannah habitat of cheetahs, kudu, addax, zebra and other Africa Trail animals has sparse trees, and the proposed trees emulate the animals' natural habitat. The strategy also reduces the risk of fallen limbs from weak, unhealthy trees that could create a potential escape route for animals from exhibit yards. A third consideration is providing consistent shade as trees on site mature and change.



Existing example of tree removal, looking southwest along visitor path and towards back holding area (see plan **View A**).



TREE REMOVAL AND REPLACEMENT SCHEDULE

Tree ID	Scientific Name	Common Name	Diam (inch)	Species Rating (%)	Condition Rating	Score	Replace. Trees	Location
T247	Ulmus pumila	Siberian Elm	18	0.40	50	3.6	1	Yard 1
T248	Ulmus pumila	Siberian Elm	14	0.40	64	3.6	1	Yard 1
T119	Gleditsia triacanthos	Thornless Honey Locust	13	0.60	78	6.1	2	Yard 1
T120	Gleditsia triacanthos	Thornless Honey Locust	10	0.60	77	4.6	1	Yard 1
T237	Acer saccharum	Sugar Maple	17	0.70	50	6.0	2	Yard 1
T104	Castanea dentata	American Chestnut	33.7	0.50	68	11.5	3	Service
T105	Juglans nigra	Black Walnut	20.1	0.50	70	7.0	2	Service
T106	Pinus strobus	White Pine	16.7	0.70	79	9.2	2	Service
T107	Pinus strobus	White Pine	14.7	0.70	79	8.1	2	Service
T101	Paulowania tomentosa	Paulownia	51.3	0.40	61.00	12.5	4	Yard 2
T102	Ulmus pumila	Siberian Elm	24.8	0.50	72	8.9	2	Yard 2
T103	Juglans nigra	Black Walnut	24.7	0.50	72	8.9	2	Yard 2
T218	Ilex 'Nellie Stevens'	Nellie Stevens Holly	17.3	0.70	73	8.8	2	Yard 2
T219	Ilex 'Nellie Stevens'	Nellie Stevens Holly	7.5	0.70	60	3.2	1	Yard 2
T220	Fraxinus pennsylvanica	Green Ash	34	0.60	71	14.5	3	Yard 2
T221	Ilex 'Nellie Stevens'	Nellie Stevens Holly	5.8	0.70	71	2.9	1	Yard 2
T222	Acer saccharum	Sugar Maple	17	0.70	56	6.7	2	Yard 2
T223	Morus alba 'Pendula'	Weeping Mulberry	5.1	0.40	66	1.3	1	Yard 2
T172	Fraxinus pennsylvanica	Green Ash	14.6	0.50	45	3.3	1	Yard 3
T173	Ulmus pumila	Siberian Elm	16.4	0.50	65	5.3	2	Yard 3
T174	Ulmus pumila	Siberian Elm	19.8	0.50	64	6.3	2	Yard 3
T175	Ulmus pumila	Siberian Elm	30.8	0.50	65	10.0	3	Yard 3
T176	Ulmus pumila	Siberian Elm	11.3	0.50	65	3.7	1	Yard 3
T164	Morus alba	White Mulberry	8.5	0.40	68	2.3	1	Yard 3
T165	Morus alba	White Mulberry	9.2	0.40	68	2.5	1	Yard 3
T166	Morus alba	White Mulberry	7.4	0.40	66	2.0	1	Yard 3
T167	Morus alba	White Mulberry	13.3	0.40	68	3.6	1	Yard 3
T168	Ulmus americana	American Elm	6.3	0.50	69	2.2	1	Yard 3
T169	Platanus acerifolia	London Planetree	31	0.70	73	15.8	4	Yard 3
T154	Gleditsia triacanthos	Thornless Honey Locust	10.6	0.60	70	4.5	2	Yard 3
T155	Gleditsia triacanthos	Thornless Honey Locust	5.2	0.60	74	2.3	2	Yard 3
T156	Gleditsia triacanthos	Thornless Honey Locust	17.8	0.60	74	7.9	2	Yard 3
T157	Morus alba	White Mulberry	9.7	0.40	74	2.9	1	Yard 3
T158	Paulowania tomentosa	Paulownia	6.2	0.40	74	1.8	1	Yard 3
T159	Paulowania tomentosa	Paulownia	5	0.40	75	1.5	1	Yard 3
T160	Morus alba	White Mulberry	16.8	0.40	75	5.0	2	Yard 3
T161	Quercus rubra	Red Oak	14.1	0.70	78	7.7	2	Yard 3
T162	Gleditsia triacanthos	Thornless Honey Locust	19	0.60	69	7.9	2	Yard 3
T170	Rhus typhina	Sumac	4	0.70	40	1.1	1	Yard 3
T178	Carpinus caroliniana	American Hornbeam	10.2	0.80	73	6.0	2	Yard 3
T199	Nyssa sylvatica	Blackgum	12.5	0.80	78	7.8	2	Yard 3
T163	Gleditsia triacanthos	Thornless Honey Locust	22	0.70	74	11.4	3	Yard 3
T240	Quercus Palustria	Pin Oak	32.9	0.70	62	14.3	3	Yard 4
T245	Ulmus Pumila	Siberian Elm	22.5	0.50	50	5.6	2	Yard 4
T246	Ulmus Pumila	Siberian Elm	25.5	0.50	54	6.9	2	Yard 4
T243	Ulmus Pumila	Siberian Elm	13.3	0.50	75	5.0	2	Yard 4
T238	Ulmus Pumila	Siberian Elm	47	0.50	60	14.1	3	Yard 4
T255	Juglans nigra	Black Walnut	11.3	0.60	75	5.1	2	Yard 4
T256	Sophora Japonica	Japanese Pagodatree	18.9	0.60	69	7.8	2	Yard 4
T257	Sophora Japonica	Japanese Pagodatree	11	0.60	66	4.4	1	Yard 4
T258	Ulmus Americana	American Elm	12	0.50	70	4.2	1	Yard 4
T171	Indistinguishable	Indistinguishable	21	0.70	70	10.3	3	Dense Bamboo
T148	Betula nigra	River Birch	22.3	0.70	80	12.5	3	Predator Prey
T149	Platanus acerifolia	London Planetree	16.2	0.70	80	9.1	2	Predator Prey
T230	Ulmus Pumila	Siberian Elm	25	0.50	62	7.8	2	Management
T231	Ulmus Pumila	Siberian Elm	19.4	0.50	55	5.3	2	Management
T232	Ulmus Pumila	Siberian Elm	25.7	0.50	57	7.3	2	Management
T233	Ulmus Pumila	Siberian Elm	28	0.50	53	7.4	2	Management
T234	Ulmus Pumila	Siberian Elm	24	0.50	62	7.4	3	Management
T235	Ulmus Americana	American Elm	35	0.50	59	10.3	3	Management
T236	Ulmus Pumila	Siberian Elm	23.9	0.50	51	6.1	2	Management
					TOTAL REPLACEMENT TREES NEEDED:		**117**	

TREE REPLACEMENT FORMULA:

Tree Diameter (in inches) x Species Rating (as percentage) x Condition Rating (as percentage) = **Score**.

1-4.9 = one tree
5-9.9 = two trees
10-14.9 = three trees
15-19.9 = four trees
20-24.5 = five tree
25+ = six trees

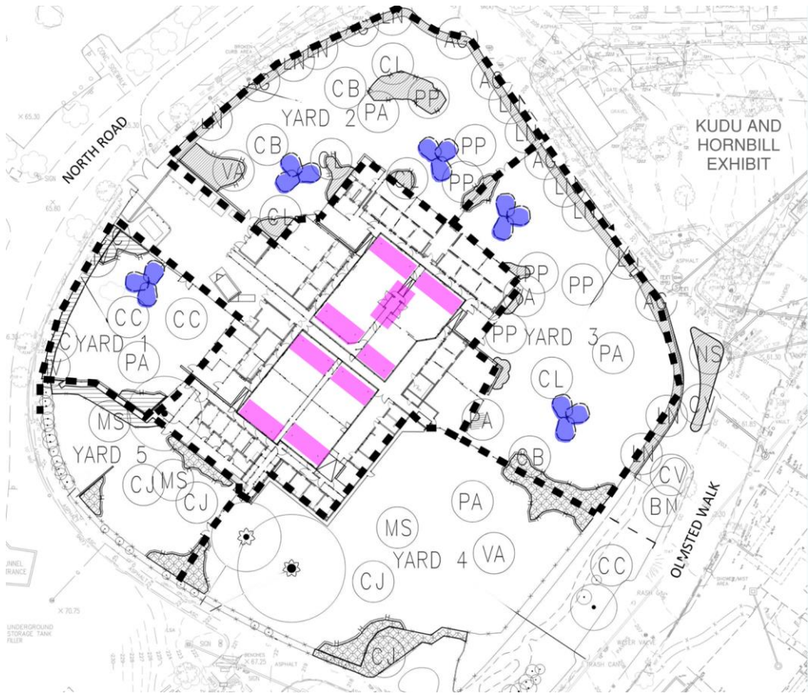
PROPOSED SHADE STRUCTURES

There are two types of new shade structures in the project, the Management Yard shade structures and the Habitat Yard shade structures. The management yards shade coverage is particularly degrading due to continental thinning of the existing shade trees. These trees (mostly Siberian Elm trees) are being removed as a part of the sitewide infrastructure improvements. **The Management Yard structures are a utilitarian design** proposed as reliable and consistent coverage, with no risk of thinning canopies or root damage to the critical subgrade infrastructure. These steel structures are back of house and will not be visible to visitors. **The Habitat Yard structures 3-leaf design** provides visual interest for visitors and enrichment for animals. These shade structures will provide reliable shade as newly planted trees mature. Each leaf-shaped panel has a steel decking with a wood-slat cladding on the underside for a natural look. The posts, panels, brackets and other components are steel with a high-performance metal coatings finish in the color black (BOD: Tnemec). Additionally, each structure has a mister component for animal comfort during hot summers months. A range of minimum to maximum heights for each structure accounts for different species needs. Both structures capitalize on capturing stormwater on site with underground downspout connections.

KEY PLAN

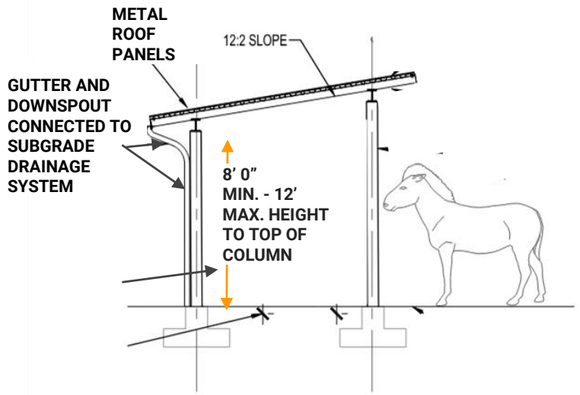
HABITAT SHADE STRUCTURES

MANAGEMENT YARD SHADE STRUCTURES

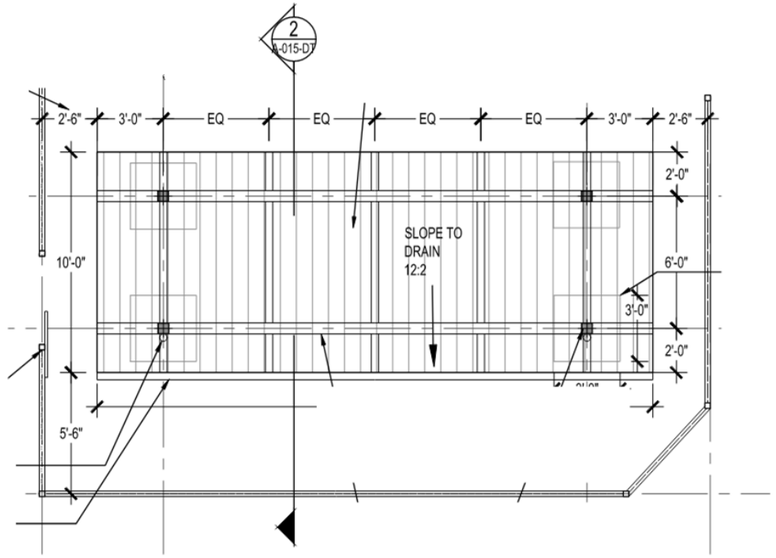


MANAGEMENT YARD: SECTION

*(Back-of-house structures, **not** visible to visitors)*

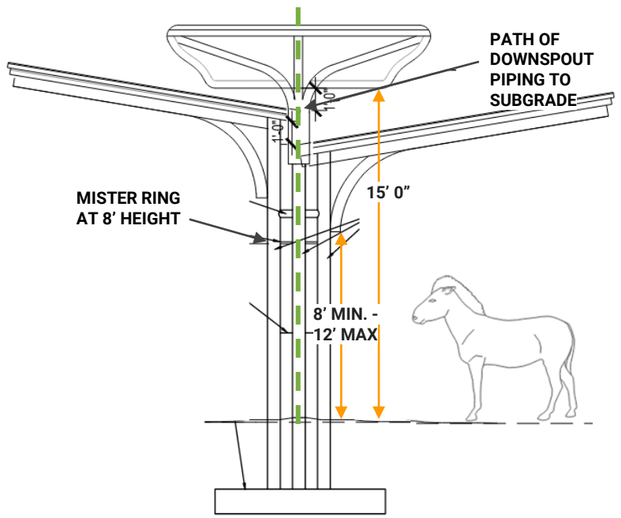


MANAGEMENT YARD: PLAN

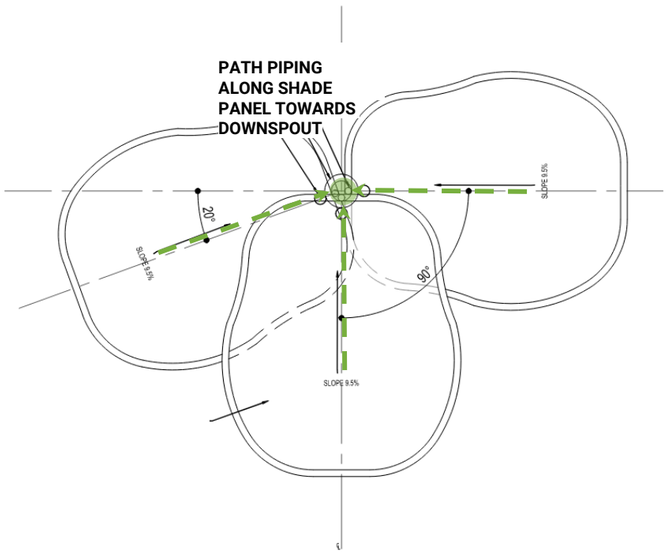


HABITAT YARD: ELEVATION

(Exhibit structures, visible to visitors)



HABITAT YARD: PLAN



PLANTING DESIGN & NEW TREES

The proposed exhibit yard improvements help to mitigate the existing erosion and drainage problems in the holding and exhibit yards. In addition to **(56) proposed trees** within the exhibit yard, there is proposed landscaping along the perimeter of the exhibit for visitor viewing and within the exhibit habitat. The species selection and placement is driven by emulating African savannah landscape, considerations of toxicity for animals, and safety concerns with tree limb failure. The proposal includes hot-wiring around the planting beds as protection from curious hoofs and horns and a new substrate composition. These modifications will ensure safety of staff, visitors and living collections, and will reduce contamination and erosion.

Proposed planting along Olmstead Softened Corner.

Hypericum prolificum
(St. John's Wort)

Achillea millefolium
'Moonshine' (Yarrow)

Nassella tenuissima
(Feather Grass)

TOTAL REPLACEMENT TREES NEEDED	117
NEW TREES IN CCS-AT PROJECT LIMITS	56
TREES TO BE PLANTED IN OTHER AREAS OF THE ZOO	57 (19 OF THESE ARE AT KUDU)

LEGEND

- PROPOSED PERIMETER LANDSCAPE
- PROPOSED EXHIBIT LANDSCAPE
- XX — PROPOSED TREE
- EXISTING TREE

PROPOSED PLANTING PLAN

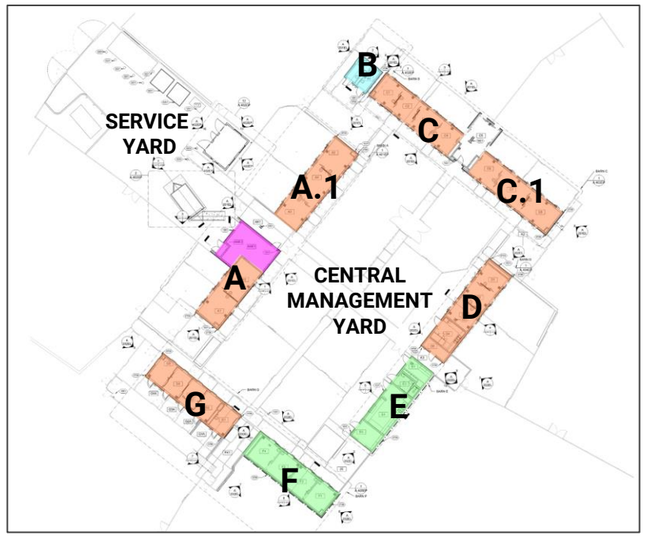
IMPROVEMENTS TO BARNS: EXTERIOR

The current deteriorated barn siding and outdated layouts are causing health issues for animals, safety concerns for staff, and a dangerous overlap of facilities maintenance and animal care work. Some issues include dryness and cracking hog hooves due to lack of insulation, insufficient barriers from cheetahs causing certain species high anxiety, and restraint systems for various species being difficult to maneuver. **The following improvements are critical for animal welfare and safe animal management practices. All barn modifications to align with the zoo's goal of minimizing visibility of back-of-house structures.**

Program improvements: The project proposal includes an improved program that increases square footage for animal holding by reconfiguring interior program layout across the existing buildings. There are two existing barn foundations without roofs that are currently used for miscellaneous storage (Barns F & E). These structures will be re-roofed to provide much needed space for animal holding and animal care staff offices. The layout also consolidates MEP systems into a single room accessible directly from the service yard so maintenance staff do not have to cross animal spaces.

Exterior improvements: The existing barn buildings have asphalt shingle roofs, wood framing, and painted CMU exterior walls. The proposed envelope improvements include a new insulated, corrugated metal paneling on the exterior faces of all barns A - G and the replacement of existing degraded asphalt roof shingles at barns A, B, C, D, and G for energy efficiency. The envelope will be treated with a high performance coating (epoxy, semi-gloss) as a part of this project. The asphalt shingles will match the existing gray color (Slate) and the metal paneling will match the current building of standard NZP green (Evergreen). Both the existing foundations for Animal Care Office Building E & Barn F will receive new insulated steel deck roofing with asphalt shingles to match existing roof structures on site. All structures have new gutters and downspouts to ensure sufficient stormwater management. The rooflines and exterior barn walls are visible from the perimeter visitor paths.

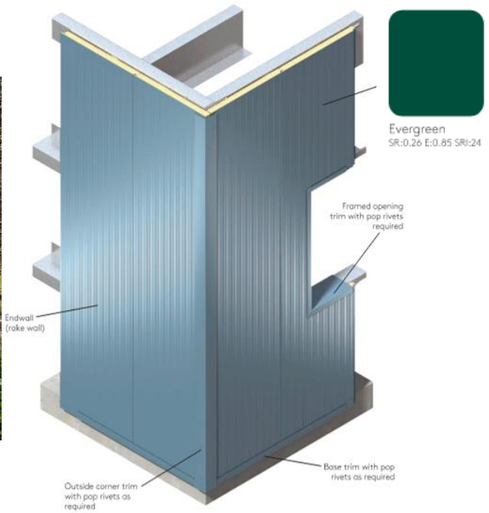
KEY PLAN



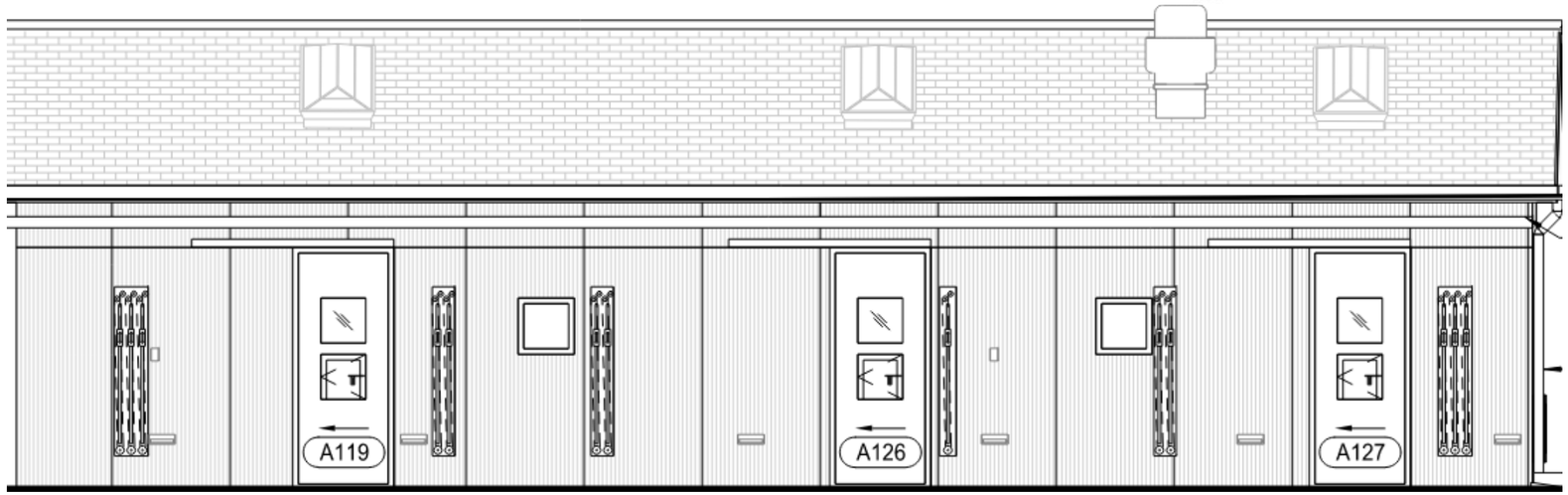
- EXISTING BARNS WITH IMPROVED STALLS
- NEW BARN F AND STAFF BUILDING E (RE-ROOFED STRUCTURES)
- NEW BARN B (EXISTING MEP SPACE)
- NEW MECHANICAL SPACE IN BARN A (CONSOLIDATED AND EASILY ACCESSIBLE)

Existing asphalt shingles and barn exterior siding. Roof lines and one side of each barn are visible from visitor paths.

Proposed asphalt shingles to match existing slate gray (BOD: Timberline in Slate) and new insulated paneling to match standard NZP green (BOD: Kingspan Vertical Panels)



TYPICAL BARN EXTERIOR ELEVATION (A.1)



STORMWATER MANAGEMENT

The proposed civil work in the exhibit yards will reduce erosion potential in the yard. The stormwater strategy is to maintain existing conditions that include separated discharge of clean water and contaminated water. Water from roof runoff will be collected by storm pipes treated by an existing hydrodynamic separator. The remainder of the site runoff is collected in the contaminated storm system. The preservation of select trees and new trees provide further erosion treatment on site. **The project team is in the process of coordinating with the DOEE on requirements based on proposed utility improvements and impervious areas.**

The project area is a previously developed site within the limits of the National Zoo and there are no wetlands, forest, sensitive or critical environmental resources within the project limits. The site is not located within the FEMA designated floodplain or any tidal or non-tidal critical areas.

LEGEND

- EXISTING BUILDING TO REMAIN
- PROJECT IMPERVIOUS AREA ATTRIBUTED TO UTILITY IMPROVEMENTS
- PROJECT IMPERVIOUS AREA ATTRIBUTED TO MAINTENANCE / REPLACE IN KIND
- PROJECT IMPERVIOUS AREA NOT ATTRIBUTED TO UTILITY IMPROVEMENTS, MAINTENANCE / REPLACE IN KIND
- NEW STORMWATER INFRASTRUCTURE
- NEW WATER LINE
- NEW SANITARY LINE

SITE PLAN

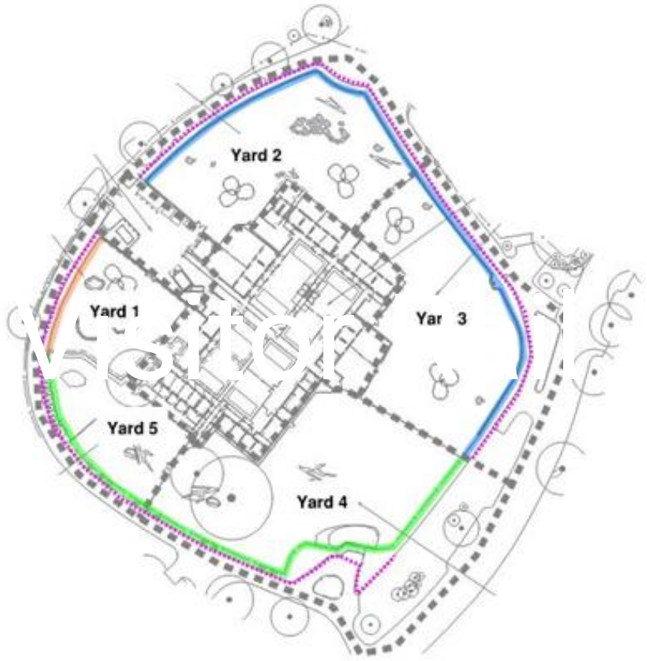
PERIMETER EXHIBIT FENCING AND VISITORS RAIL:

In 2016 the perimeter fence and visitors rail were upgraded at yards 4 and 5 as shown in the photos below. The perimeter fence material used in 2016 and for this project is the NZP standard, which is black oxidized braided cable.

This project will install either perimeter fence type H3a, or H2 and visitors rail around yards 1, 2 and 3. Fence type H3a and the visitors rail from 2016 are the same detail being used in this project. Fence type H2 is the only new detail added as part of this project, which is a slight deviation from fence type H3a.

The perimeter fence types are engineered based on the animals that will be part of the collection on exhibit in each yard. For example yards, 1, 4 and 5 can house Cheetahs which require 12'-0" tall fence. Yards 2 and 3 can house various types of African Hoof Stock animals like Zebras and Addax, which only require an 8'-0" tall fence.

One of the design goals of this project is to unify the aesthetic around the perimeter exhibit loop.



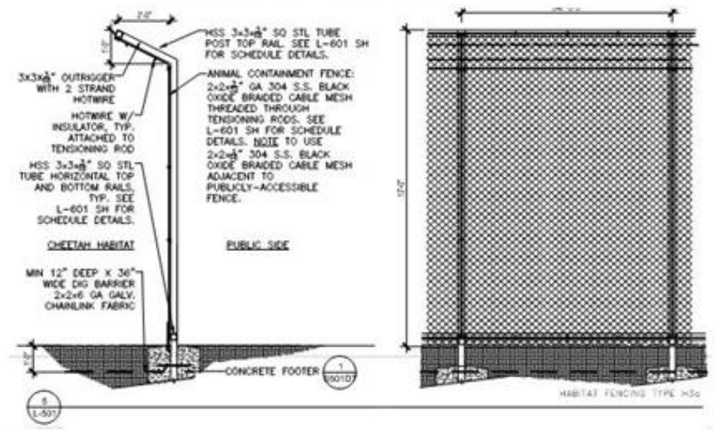
Fencing and visitors rail locations key plan

fence Type H3

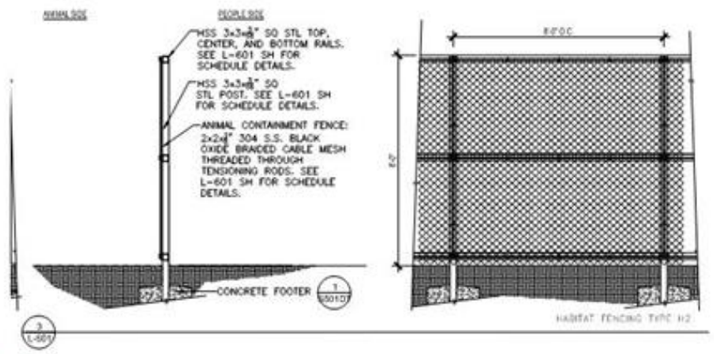
visitors rail

Pictures show renovation complete in 2016 that installed **fence Type H3a** and **visitors rail** at yards 4 and 5. Location shown on site plan in green.

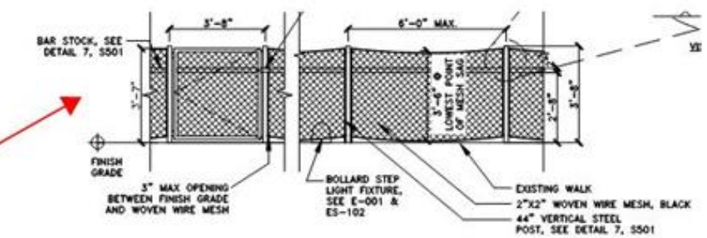
Fencing types and visitors rail elevations / details



Location for exhibit **fence Type H3a** shown on site plan in orange. In 2016 a portion was installed at yards 4 and 5. This project will install the same detail at yard 1



Location for exhibit **fence Type H2** shown on site plan in blue. This is the same detail as Type H3a, with the exception that it is only 8'-0" tall, has an intermediate horizontal steel rail and does not have a canted outrigger at the top. This project will install Type H2 at yards 2 and 3



Location of **visitors rail** shown on site plan in pink. In 2016 a portion was installed at yards 4 and 5. This project will install the same detail at yards 2, 3 and 4