

# FONSI ATTACHMENT E

## **FINAL EA Appendix G: Additional Coordination Errata**

1\_8538\_U.S.\_National\_Arboretum\_Elevated\_Canopy\_Trail\_Commission\_Action\_May2024.pdf

2\_8538\_U.S.\_National\_Arboretum\_Elevated\_Canopy\_Trail\_Project\_Narrative\_May2024.pdf

3\_8538\_U.S.\_National\_Arboretum\_Elevated\_Canopy\_Trail\_Project\_Plans\_May2024.pdf

4\_8538\_U.S.\_National\_Arboretum\_Elevated\_Canopy\_Trail\_Project\_Synopsis\_May2024.pdf

5\_8538\_U.S.\_National\_Arboretum\_Elevated\_Canopy\_Trail\_Staff\_Report\_May2024.pdf



## Commission Action

May 2, 2024

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<b>PROJECT</b> <b>United States National Arboretum Elevated Canopy Trail</b> 3501 New York Avenue, NE Washington, DC	<b>NCPC FILE NUMBER</b> 8538
<b>SUBMITTED BY</b> United States Department of Agriculture National Arboretum	<b>NCPC MAP FILE NUMBER</b> 43.20(70.00)45815
<b>REVIEW AUTHORITY</b> Federal Projects in the District per 40 U.S.C. § 8722(b)(1) and (d)	<b>APPLICANT'S REQUEST</b> Approval of preliminary site and building plans
	<b>ACTION TAKEN</b> Approved preliminary site and building plans with comments

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The Commission:


**Approves** the preliminary site and building plans for the new elevated canopy trail at the United States National Arboretum in northeast Washington, DC.

**Notes** the purpose of the canopy trail is to generate interest in and support for Arboretum programming through a different type of educational and recreational experience for visitors.

**Notes** the project will be installed in manner that does not harm existing trees or require tree removal.

**Recommends** the applicant continue to refine the entry building to help it further blend into the woodland setting, while meeting programmatic requirements.

**Requests** the applicant provide signage and lighting plans, if applicable, as part of the final project submission.

 05/06/2024

Julia A. Koster  
Secretary to the National Capital Planning Commission





## National Capital Planning Commission (NCPC)

*Preliminary Review Report: Building, Site, and Park Projects*

For

USDA Agricultural Research Service – U.S. National Arboretum

United States National Arboretum, Washington, D.C.

## CANOPY TRAIL PROJECT

Submittal Date: March 29, 2024

**Prepared for:**

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**Submitted by:**

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## 1. PROJECT OVERVIEW

The United States National Arboretum (USNA), located in northeast Washington, DC, was established in 1927 by an Act of Congress. It is operated by the United States Department of Agriculture's (USDA) Agricultural Research Service (ARS) and serves as a research and education facility, museum, and park. The USNA spans 451 acres and includes 9.5 miles of winding roadways connecting the campus's gardens and collections. The mission of the USNA is to enhance "the economic, environmental, and aesthetic value of ornamental and landscape plants through long-term, multi-disciplinary research, conservation of genetic resources, and interpretative gardens and exhibits" (USDA ARS 2013). The Arboretum welcomed more than 660,000 visitors in 2022 (FONA 2022). In addition to its federal budget, the USNA receives volunteer and financial support from nine non-profit organizations, one of which is the Friends of the National Arboretum (FONA).

The FONA has proposed construction of a Canopy Trail attraction at the USNA to expand educational and visitor opportunities at the Arboretum. Canopy trails—also called canopy walks, treetop walks, or treetop walkways—provide pedestrian access to a forest canopy. These types of attractions typically consist of a series of bridges between trees in the canopy of a forest that link to platforms around the trees. The Canopy Trail would be a paid attraction focusing on the benefits of trees, would complement existing USNA's programming, and would support the USNA's Strategic Plan to expand visitor services and programs.

A Draft Environmental Assessment (EA) was prepared for the proposed project and was made available for public review and comment on March 29, 2024. This date marks the beginning of the 30-day review period for the Draft EA. The EA documents the current site conditions of the proposed project and assesses the potential adverse and beneficial impacts to natural, socioeconomic, and cultural resources. The EA was prepared in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321 *et seq.*), CEQ regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1501 through 1508); 7 CFR Part 3407, USDA; and 1 CFR part 601, National Capital Planning Commission (NCPC).

The USDA is the lead agency for the preparation and coordination of the EA (40 CFR § 1501.7) and the NCPC is a cooperating agency (40 CFR § 1501.8). The NCPC is participating as a cooperating agency during the EA process to satisfy the NCPC Commission's NEPA obligation, at the time of its final review, for the project. NCPC is also a Consulting Party for the project's concurrent process under Section 106 of the National Historic Preservation Act.

### 1.1 NCPC Plans and Policies

The NCPC is the federal government's central planning agency for the National Capital Region, within which the USNA is located. The National Capital Planning Act gives approval authority to NCPC over all development on federal property within the District of Columbia.

The applicable NCPC project category for this project is *Building, Site, and Park Projects*.

### 1.2 Description of Project Area

The USNA is irregularly shaped with borders that run along natural features, roadways, and residential areas. Notable borders of the USNA include New York Avenue NE to the north, the Arboretum

Neighborhood to the northwest, Bladensburg Road NE to the west, M Street NE and the Carver Langston Neighborhood to the south, the Langston Golf Course to the southeast, and the Anacostia River to the east. The proposed project would be in the southeast portion of the Arboretum. It would be bounded to the north by Azalea Road NE and the Washington Youth Garden and bounded to the west by Ellipse Road NE and the National Grove of State Trees. To the south, the project would be bounded by M Street. To the south and east, the area is heavily wooded with steep terrain that slopes toward the Langston Golf Course and the Anacostia River.

The project area is in the southern corner of the Arboretum, adjacent to the existing Washington Youth Garden, and hidden by existing deciduous tree, shrub, and vine cover. Within the wooded area where the proposed Canopy Trail would be located, the terrain is steeply sloping with an intermittent stream at the bottom of the slope.

### **1.3 Description of the Proposed Development and Alternatives**

The proposed project is the creation of a Canopy Trail attraction (i.e., the Build Alternative or project) within the USNA. The USNA considered two alternatives: the Build Alternative and the No Build Alternative.

The Build Alternative would provide three self-guided, aboveground canopy trails weaving through the existing forested USNA project study area for a combined trail length of 1,294 feet. The trails would lead visitors over a ravine, up to 20 to 30 feet above ground, toward an unnamed tributary of the Anacostia River, offering an aerial perspective for visitors of all ages and abilities. Visitors would move freely throughout the trail system, observing, admiring, and learning about the forest in the Arboretum. FONAs teamed with Tree-Mendous Aerial Adventures and Proper & O’Leary Engineering to provide design and construction services for the Build Alternative. Tree-Mendous is one of the nation’s foremost authorities on this type of attraction, having designed and built similar canopy trails at the Bronx Zoo and in California’s Redwood Forest.

The Build Alternative includes three canopy trails (Phase 1, Phase 2, and Phase 3) with each trail consisting of a series of bridges and platforms attached to existing trees. Tree-Mendous Aerial Adventures has developed a construction approach that does not damage the trees used for this type of project and only uses sustainably and locally harvested lumber derived from rot-resistant species. Only trees and free-floating center poles would be used, if needed, to relieve weight from the trees. Proprietary hardware would be used to mount the decks to the trees. This hardware is specially designed to attach to and grow with the trees without impacting their health.

- The bridges would include ADA-compliant static bridges, as well as suspension bridges and a “squirrel’s nest” feature for the able-bodied to enjoy. (The squirrel’s nest would be a rope netting feature connecting the interior area of platforms and bridge decking.)
- The ADA bridges would be equipped with 4-foot-high side netting for safety.
- Decking boards would be rough-sawn eastern white cedar planks. The ADA Canopy Trail segments would have larger platform decks to allow for wheelchair turnaround and passing.
- Suspension bridges would connect to the ADA static bridges, offering a way for able-bodied visitors to observe and experience the landscape from a different aerial perspective. Suspension bridges

would offer dynamic movement and create a more adventurous trail experience for the able-bodied visitor.

The squirrel's nest portion of the canopy trail network would provide a fun feature, particularly for younger visitors to enjoy. The squirrel's nest would be "landscaped" with tension ship ropes to create valleys and peaks throughout the nest area, creating 3-dimensional contours. While in the squirrel's nest, visitors could relax, observe, and reflect on their surroundings or they could play, jump, and climb around freely. The squirrel's nest area would also serve as an outdoor classroom and learning space for groups.

A gated, public entrance to the Canopy Trail attraction would feature a treehouse building/ticket booth accessible from the ADA-compliant sidewalk. The 4-foot-tall gate and connected perimeter fence would be constructed as an eastern access point and locked when the facility is not in operation. The perimeter fence would be a cedar post and rail design, with the same type of rope netting as the squirrel's nest and would be attached along the railings. No taller security fencing is proposed as the terrain and height of overhead platforms and bridges would not be easily accessible.

The sidewalk would be constructed of pervious concrete and extend from Ellipse Road eastward, through the National Grove of State Trees, to the treehouse building/ticket booth. Additional project features would include a stonedust walkway extending from the end of the concrete sidewalk and gated public entrance eastward to non-ADA trail entrances. A mulched path would provide staff-only access to the trails and platforms.

A temporary, primary staging area would be used to store construction equipment and project materials. A temporary, secondary staging area would be used only if additional space is needed during the shipping and staging phase of installation, allowing multiple deliveries of materials to be unloaded and pre-staged at one time. Both staging areas are previously disturbed, mowed grass (primary staging area) and a gravel access road (secondary staging area) adjacent to Crabtree Road and the Washington Youth Garden. These two areas would be cleaned, smoothed, and returned to their original condition at the completion of the project.

The Project Study Area also serves as the project Limits of Disturbance (LOD) boundary; the maximum area within which temporary and permanent project activities would occur. All construction work, project staging, and potential physical impacts to land would be within the approximately 7.7-acre LOD area for the Build Alternative.

The Build Alternative would be designed and built to look as though it grew from the forest, using natural-colored materials and curved black locust logs. Materials used would be a combination of galvanized aircraft cable; 12mm zip line swaged cable; black locust and eastern white cedar; highly rated, long-lasting netting and lashing cord; high-tech rope; and custom, galvanized hardware. Equipment, material, and building standards would adhere to the quality standards approved by American National Standards Institute (ANSI), Association for Challenge Course Technology (ACCT), and/or ASTM International (formerly the American Society for Testing and Materials).

Project design and construction of the Build Alternative would be phased, as funds become available, with the first trail constructed in Phase 1, the second trail in Phase 2, and the third trail in Phase 3. The Draft EA provides additional design detail, illustrations, photographs, and conceptual plans of the



proposed Build Alternative. The Draft EA is incorporated by reference into this NCPC Preliminary Review Report.

#### **1.4 Master Plan Alignment**

The project is not included in the USNA's *Draft 2021 Core Framework Master Plan* or the current *USNA Strategic Plan 2013 – 2017*. However, it would complement existing USNA programming and would support the USNA's Strategic Plan to expand visitor services and programs.

#### **1.5 Schedule**

Following completion of the NEPA and Section 106 processes, the USNA will develop a schedule for the project's phased implementation.

#### **1.6 Project Cost Estimate**

The total project cost estimate will be determined following completion of the NEPA and Section 106 processes.

#### **1.7 Employment and Parking**

When in operation, the Canopy Trail attraction is not anticipated to require more than a few employees or volunteers for ticket sales, instruction, and oversight. It would not be a substantial employment generator.

The USNA's concept *2020 Master Plan Update* shows a new shuttle parking lot could take the place of the existing National Grove of State Trees parking lot. Additional visitor parking in the vicinity of the Build Alternative area is also proposed. These potential improvements would enhance parking and address the access needs of visitors to the Canopy Trail attraction. Potential changes in roadway direction and location would not substantially alter access to or from the Canopy Trail attraction. Neither the potential shuttle parking lot nor roadway improvements are part of the proposed project.

## **2. OUTREACH AND COORDINATION**

### **2.1 Public Engagement**

Under the requirements of NEPA, public engagement is not mandatory for environmental assessments. A formal public engagement program was not developed for the project: the project was not seen as controversial nor was it anticipated to have "significant" impacts. However, ANC5D, one of the local neighborhood groups that abuts the USNA, accepted the invitation to consult on the project with representatives attending the first Section 106 Consulting Party/Interested Party meeting in July 2022. Invitations to the neighborhood group continue to be sent but no representatives have attended the subsequent meetings.

### **2.2 Coordination with Federal, State, and Local Jurisdictions**

The USDA is the lead federal agency for this EA and the NCPC serves as a cooperating agency. Subject matter experts from multiple agencies and organizations provided input on the EA. The following federal, state, and local officials, as well as interested parties, contributed to the development of the EA and the proposed project.

- USDA Agricultural Research Service (ARS) National Arboretum (USNA)
- U.S. Commission of Fine Arts (CFA)
- National Capital Planning Commission (NCPC)
- District of Columbia Historic Preservation Office (DCHPO)
- District of Columbia Preservation League (DCPL)
- Friends of the National Arboretum (FONA)
- District of Columbia, Department of Energy & Environment (DOEE)
- U.S. Fish and Wildlife Service (USFWS)
- Tree-Mendous Aerial Adventures
- Proper & O’Leary Engineering, dpc
- Gray & Pape, Inc.

### **3. DETAILED PROJECT INFORMATION AND DRAWINGS**

The Draft EA and Appendices provide detailed information on the proposed project.

#### **3.1 Site Plan**

See Draft EA, Appendix A – Draft Planning Set & Reports, Canopy Trail DRAFT Set 3-19-24.

#### **3.2 Vicinity Map**

Multiple maps and photographs are included in the Draft EA. A Project Location Map is provided on the following page.

#### **3.3 Architectural Design Program**

As part of the Section 106 effort for this project, the U.S. Commission of Fine Arts (CFA), the District of Columbia Historic Preservation Office (DCHPO), the District of Columbia Preservation League, and the NCPC have provided input on the architectural merits and design consistency of the proposed treehouse ticket booth structure features of the Canopy Trail project.

#### **3.4 Existing Tree Survey and Inventory**

See Draft EA, Appendix A – Draft Planning Set & Reports, Canopy Trail DRAFT Set 3-19-24:

- Sheet T1.1, Construction Notes
- Sheet C1.3, Tree Canopy Overlay

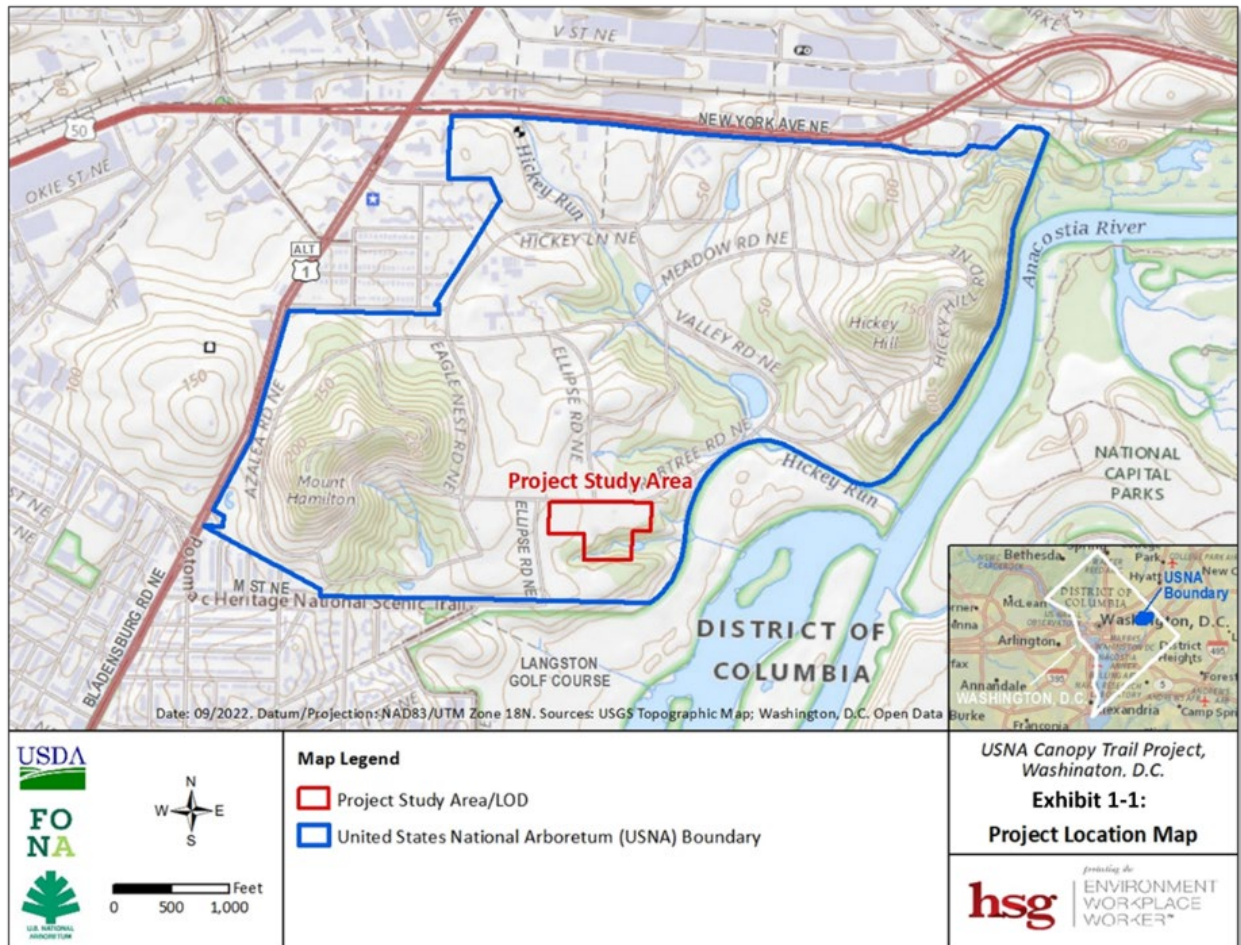
#### **3.5 Tree Preservation and Replacement Plan**

Except for the removal of one dead tree that poses a safety hazard, no trees would be cut or removed for the project.

See Draft EA, Appendix A – Draft Planning Set & Reports, Canopy Trail DRAFT Set 3-19-24:

- Sheet T1.1, Construction Notes
- Sheet C1.3, Tree Canopy Overlay
- Sheet C2.0, Site Details – Tree Preservation Notes

**U.S. National Arboretum Project Location Map**



**3.6 Transportation and Circulation**

The USNA’s concept *2020 Master Plan Update* illustrates the USNA’s plans for future transportation and circulation. See the Draft EA, Chapter 3.7 Traffic and Transportation, for additional details and figures.

**3.7 Signage**

Appropriate signage would be developed at a later stage of project development.

**3.8 Perimeter Security**

Perimeter security fencing and gates are proposed as part of the project.

See Draft EA, Appendix A – Draft Planning Set & Reports, Canopy Trail DRAFT Set 3-19-24:

- Sheet C1.1, Phase I Site Plan



- Sheet C2.0, Site Details – Perimeter Fence and Access Gate
- Sheet T1.1, Construction Notes

### 3.9 Photographs

See the Draft EA for multiple photographs throughout the document.

### 3.10 Project Construction Drawings

See Draft EA, Appendix A – Draft Planning Set & Reports, Canopy Trail DRAFT Set 3-19-24.

## 4. ENVIRONMENTAL AND HISTORICAL CONSIDERATIONS

The Draft EA documents the affected environment and environmental consequences of the proposed project. Resources evaluated in detail include topography, geology, and soils; rare, threatened, and endangered species; terrestrial resources; water resources; noise; air quality; traffic and transportation; socioeconomic resources; environmental justice; human health and safety; cultural and historic resources, visual resources, and cumulative impacts.

### 4.1 Historic Preservation

The U.S. National Arboretum is listed in the National Register of Historic Places. In accordance with Section 106 of the NHPA, multiple meetings were held to inform and receive input from consulting and interested parties. This includes coordination and consultation with these parties. In accordance with Section 106 of the NHPA and its implementing regulations (36 CFR § 800), the USDA has requested concurrence from the DCHPO on its determination of no adverse effect for the project.

Greater detail on historic preservation and cultural resources is provided in the following documents:

- Draft EA, Chapter 3.11 Cultural and Historic Resources
- Draft EA, Appendix E. Section 106 Coordination
- Draft EA, Appendix F. Phase I Cultural Resource Survey
- NCPC Preliminary Review Package – Section 106 Assessment of Effects Package

### 4.2 Natural Resources

The U.S. Fish and Wildlife Service (USFWS) provides an online web service for the Endangered Species Act (ESA) environmental review process through its Information for Planning and Consultation (IPaC) website. An Official Species List of threatened and endangered species and critical habitat that may occur in the project study area was obtained through IPaC. Two listed species were identified: the Northern Long-eared Bat (NLEB) *Myotis septentrionalis* (Endangered species) and the Monarch Butterfly *Danaus plexippus* (Candidate species). The IPaC review identified no critical habitats within the proposed project area. The IPaC review noted the likely occurrence of Bald Eagles *Haliaeetus leucocephalus*.

Acoustic surveys conducted at the Arboretum in Summer 2023 confirmed the vocalization signal of the NLEB. Informal consultation with the USFWS resulted in a determination of Not Likely to Adversely

Affect (NLAA) the NLEB. In addition, no time-of-year restrictions for construction activities will be required for the protection of this endangered species.

The nest of a breeding pair of bald eagles is to the east of the proposed project. The eastern third of the project's limits of disturbance (LOD) is outside of the protected 330-foot buffer around the nest but within the 330-foot to 660-foot buffer. Outside of the breeding season, no buffer around the nest is necessary. The existing Washington Youth Garden is within the project's LOD. Activities anticipated for the project would be similar in the degree of effect they have on the nesting pair of eagles. Because the eagles built their nest adjacent to the existing Washington Youth Garden, it is expected the project would not likely have an adverse effect on the nesting pair of eagles, given the combination of existing and proposed factors (steep terrain, tree cover, distance, existing human activity in the vicinity of the eagle nest, time-of-year construction restrictions during the eagle's breeding season, and compliance with USFWS's Activity category impact minimization measures). Neither temporary trail construction nor the permanent operation activities of the Canopy Trail project, individually or combined, are anticipated to agitate or bother the nesting pair of eagles to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits (i.e., nest abandonment). As such, the Build Alternative is not anticipated, with reasonable certainty, to cause incidental take of bald eagles, avoiding the need for a Bald Eagle Incidental Take Permit from the USFWS.

A wetland and stream delineation survey was conducted for the project in 2022. An unnamed intermittent stream and three forested wetland areas were identified. Construction of the first phase of the trail system (Phase 1) would not physically touch or cross these wetlands or stream. For Phase 1, silt fencing would be placed on the down slope side of all construction activities within the LOD. However, for Phase 2 and Phase 3, the trails would have elevated crossings over two of the wetland areas, as well as the stream. As currently envisioned, neither Phase 2 nor Phase 3 trails would require ground disturbing activity because of the elevated crossings. The heights above which Phase 2 and Phase 3 trails would cross these resources would not be determined until future funds are available for Phase 2 and/or Phase 3 design. At that time, the EA would be revisited by the USDA and NCPC for a detailed impact assessment.

Overall, the project would have minimal to no adverse effects on the wetlands and stream. Because Phase 1 of the Build Alternative avoids physical disturbance of or crossing over the wetlands and stream, neither Section 404 nor Section 401 permits are anticipated. Due to the phased design and construction of the Build Alternative, potential impacts from Phase 2 and Phase 3 would be revisited when more developed design details are available. Should construction permits for Phase 2 and/or Phase 3 require a Jurisdictional Determination to confirm delineated wetland and stream boundaries, the USACE and DOEE would be consulted, and all applicable permits would be obtained prior to any ground-disturbing activity related to Phase 2 or Phase 3.

Greater detail on natural resources in the project area is provided in the following chapters and appendices of the Draft EA:

- Chapter 3.2 Rare, Threatened, and Endangered Species
- Chapter 3.3 Terrestrial Resources
- Chapter 3.4 Water Resources – Surface Water and Wetlands, as well as Water Quality and Stormwater Management
- Appendix A, Sheet C1.0 Overall Site Plan
- Appendix A, Sheet C1.1 Phase 1 Site Plan
- Appendix A, Sheet C1.2 Erosion Control Plan & Details
- Appendix B, Supporting Information
- Appendix C, USFWS ESA Protection Review
- Appendix D, Wetland Delineation Report

#### **4.3 Energy and Sustainability**

Sustainably harvested black locust and cedar will be the primary building materials for the project.

#### **4.4 Public Realm and Viewsheds**

The LOD is a densely vegetated forest area with steep inclines down to a ravine with water collecting at the bottom. The Canopy Trail would be built using natural materials, such as Black Locust logs, which are designed to blend into the existing environment. While visibility of the trail will be greater in the winter months, it is still not likely that the Canopy Trail will adversely impact character defining USNA viewsheds. For additional information, see the Draft EA, Chapter 3.12 Visual Resources.

#### **4.5 Flooding**

The project is not within or near a floodplain.

## **APPENDIX A: USNA CANOPY TRAIL – DRAFT PLANNING SET**

- 1\_Canopy Trail DRAFT Set 3-19-24.pdf
- 2\_Tree-Mendous\_USNA\_CanopyWalkVisualOverview-rcvd 2022.3.31.pdf
- 3\_FONA Canopy Trail Concept Paper\_rcvd 2022.2.28.pdf

# NATIONAL ARBORETUM CANOPY TRAIL

PREPARED FOR:

**FRIENDS  
OF THE  
NATIONAL  
ARBORETUM**

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PREPARED BY:



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## DRAWING SUMMARY:

T1.0	TITLE PAGE	S2.4	PLATFORM #4 PLANS & ELEVATIONS	S5.6	CABLE BRIDGES #6 PLAN & ELEVATIONS
T1.1	CONSTRUCTION NOTES	S2.5	PLATFORM #5 PLANS & ELEVATIONS	S6.0	SQUIRRELS NEST DETAILS
C1.0	OVERALL SITE PLAN	S2.6	PLATFORM #6 PLANS & ELEVATIONS	S7.0	PLATFORM DETAILS
C1.1	PHASE I SITE PLAN	S2.7	PLATFORM #7 PLANS & ELEVATIONS	S8.0	TREE PLATFORM DETAILS
C1.2	EROSION CONTROL PLAN & DETAILS	S2.8	PLATFORM #8 PLANS & ELEVATIONS	S9.0	CABLE BRIDGE DETAILS
C1.3	TREE CANOPY OVERLAY	S3.9	TREE PLATFORM #9 PLANS & ELEVATIONS	S10.0	RIGID BRIDGE DETAILS
C2.0	SITE DETAILS	S3.9A	TREE PLATFORM #9 ELEVATION & SKETCH VIEWS		
A1.0	ADA TRAIL LAYOUT PLAN & PROFILE	S3.10	TREE PLATFORM #10 PLANS & ELEVATIONS		* GRAYED OUT DRAWINGS TO BE PROVIDED IN FUTURE DRAWING SETS
A1.1	CABLE BRIDGE TRAIL LAYOUT PLAN & PROFILE	S3.11	TREE PLATFORM #11 PLANS & ELEVATIONS		
A2.0	OVERALL ISOMETRIC VIEWS	S3.12	TREE PLATFORM #12 PLANS & ELEVATIONS		
B1.0	TREE HOUSE FLOOR & ROOF PLAN	S4.1	BRIDGE #1 PLANS & ELEVATION		
B2.0	TREE HOUSE ELEVATIONS & SKETCH VIEWS	S4.2	BRIDGE #2 & #4 PLANS & ELEVATION		
B3.0	TREE HOUSE SECTIONS & TIMBER FRAMES	S4.4	BRIDGE #4 PLANS & ELEVATION		
B4.0	TREE HOUSE FOUNDATION & DETAILS	S4.5	BRIDGE #5 PLANS & ELEVATION		
S1.0	OVERALL FOUNDATION PLAN	S4.6	BRIDGE #6 PLANS & ELEVATION		
S1.1	FOUNDATION DETAILS	S4.7	BRIDGE #7 PLANS & ELEVATION		
S2.0	SQUIRRELS NEST & PLATFORM #1,#2 AND #3 PLANS	S5.1	CABLE BRIDGE #1 PLAN & ELEVATIONS		
S2.1	SQUIRRELS NEST ELEVATIONS & SKETCH VIEWS	S5.2	CABLE BRIDGE #2 PLAN & ELEVATIONS		
		S5.3	CABLE BRIDGES #3 PLAN & ELEVATIONS		
		S5.4	CABLE BRIDGES #4 PLAN & ELEVATIONS		
		S5.5	CABLE BRIDGES #5 PLAN & ELEVATIONS		

Sheet B1.0 Replaced 3/19/2024 - sm  
Sheet G1.0 Replaced 3/02/2024 - sm

**DRAFT  
PLANNING SET**

NOT FOR CONSTRUCTION  
8-18-23

LOCATION  
NATIONAL ARBORETUM,  
WASHINGTON DC



Proper & O'Leary  
Engineering. dpc

STRUCTURAL • CIVIL CONSULTANTS  
1915 5th Avenue, PO Box 246  
Troy, NY 12180  
518.610.8331 www.po-eng.com

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P&O # : 20109.0

DATE : 7-11-23

SCALE: NTS

DRAWN BY: DBP CHECKED BY: -

DESIGNED BY: DBP APPROVED BY: -

REVISIONS:

DATE DESCRIPTION

NATIONAL ARBORETUM  
CANOPY TRAIL

DISTRICT OF COLUMBIA

C/O WASHINGTON

TITLE  
PAGE

**T1.0**



CONCRETE NOTES

- 1. ALL CONCRETE WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE AMERICAN CONCRETE INSTITUTE BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE: ACI 318-14 & THE NEW YORK STATE BUILDING CODE w/ EMPHASIS ON CH. 19 - CONCRETE.
2. CONCRETE SHALL CONSIST OF THE FOLLOWING:
- READY MIX CONCRETE (ASTM C94)
28 DAY COMPRESSIVE STRENGTH - ASTM C 39/C 39M (UNLESS NOTED)
FOOTING 3,500 PSI
WALL/PIER 4,000 PSI
INTERIOR SLAB 4,000 PSI
EXTERIOR SLAB 4,000 PSI
- MAX AGGREGATE CONTENT SIZE OF 3/4 INCH (ASTM C33)
- MAX SLUMP OF 5" + OR - AN INCH (ASTM C143)
- FIBERMESH OR APPROVED EQUAL: 1.5 LBS / CUBIC YARD ( WHEN INDICATED)
- PORTLAND CEMENT: ASTM-C 150, TYPE 1
- CLEAN POTABLE DRINKING WATER
- AIR CONTENT TO BE 6% +/- 1.5% (INTERIOR SLABS TO HAVE 0% AIR)
- FLY ASH ASTM C-618 | FOR INT. SLAB ONLY WHEN INDICATED
3. REINFORCING STEEL SHALL CONSIST OF THE FOLLOWING:
- REINFORCING BARS: ASTM - A 615 GRADE 60 KSI
- WELDED WIRE FABRIC: ASTM-A 185
4. PROVIDE CONTINUOUS REINFORCING WHEREVER POSSIBLE. PLACE ONLY AS SHOWN OR APPROVED. STAGGER SPICES WHERE POSSIBLE.
5. ALL REINFORCING STEEL AND EMBEDMENT TO BE HELD SECURELY IN PLACE PRIOR TO PLACING CONCRETE. PROVIDE SUFFICIENT SUPPORTS TO ALLOW WALKING ON REINFORCEMENT.
6. DETAIL ACCORDING TO ACI STANDARD 315. MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCING CONCRETE STRUCTURES.
7. CONCRETE MEMBERS SHALL NOT BE LOADED UNTIL SATISFACTORY CONCRETE STRENGTH HAS BEEN OBTAINED.
8. NO ADMIXTURES MAY BE USED UNLESS PRIOR APPROVAL BY THE OWNER/ENGINEER.
9. COLD WEATHER REQUIREMENT SHALL BE USED DURING FREEZING OR NEAR FREEZING WEATHER - ACI 306.1-90. COLD WEATHER IS DEFINED AS 3 DAYS WITH AVG. TEMP. BELOW 40F.
10. DURING HOT WEATHER CONCRETE SHALL BE PLACED AND CURED IN ACCORDANCE WITH ACI 305.
11. PROVIDE CORNERS BARS IN ALL WALLS AND FOOTINGS THE SAME SIZE AS ALL CONTINUOUS REINFORCEMENT. CORNERS BARS TO BE LAPPED Z'-2" WITH MAIN REINFORCING BARS FOR #3 THRU #6 BARS.
12. CONCRETE WALLS TO ATTAIN A MINIMUM STRENGTH OF 70% BEFORE BACKFILLING WITH GRAVEL MATERIAL.
13. CONCRETE COVER FOR PLACEMENT OF REINFORCEMENT SHALL BE IN ACCORDANCE WITH ACI 9, WHICH IS INDICATED BELOW, UNLESS NOTED ON DRAWINGS:
- CAST AGAINST AND PERMANENTLY IN CONTACT WITH GROUND : 3"
- EXPOSED TO WEATHER, OR IN CONTACT WITH GROUND #6 BARS AND LARGER 2"
#5 BARS AND SMALLER 1 1/2"
- NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND FOR BEAMS & COL: 1 1/2"
- NOT EXPOSED TO WEATHER FOR SLABS AND WALLS 1 1/2"

STEEL NOTES

- 1. ALL STRUCTURAL STEEL TO BE DETAILED, FABRICATED, AND ERECTED IN ACCORDANCE WITH CURRENT AISC SPECIFICATIONS.
2. ALL STRUCTURAL STEEL SHALL MEET THE FOLLOWING ASTM STANDARDS & MATERIAL PROPERTIES:
- W & WT SHAPES: ASTM A992 (50 KSI)
- HSS SHAPES: ASTM A500 (46 KSI)
- C & MC SHAPES: ASTM A36 (36 KSI)
- L SHAPES: ASTM A36 (36 KSI)
- PIPE: ASTM A53, TYPE E OR S, GRADE B (35 KSI)
- PLATE STOCK: ASTM A36 (36 KSI)
3. ALL STRUCTURAL STEEL TO HAVE ONE COAT OF STANDARD SHOP PRIMER. TOUCH UP ALL STRUCTURAL STEEL AFTER ERECTION W/ SAME PRIMER.
4. CONTRACTOR / FABRICATOR SHALL NOT DRILL HOLES, CUT NOTCHES, COPE FLANGES, OR OTHERWISE MODIFY STEEL MEMBERS UNLESS DETAILED ON THE STRUCTURAL DRAWING SET OR APPROVED BY THE ENGINEER.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ERECTION AIDS AND PREPARATIONS REQUIRED FOR INSTALLATION. CONTRACTOR SHALL ENSURE COMPLIANCE WITH ALL CURRENT OSHA STANDARDS.
6. ALL CONNECTION COMPONENTS (FASTENERS, PLATE STOCK, WASHERS, ETC.) USED IN GALVANIZED FRAMING CONNECTIONS TO BE HOT DIP GALVANIZED. ALL CONNECTION COMPONENTS USED IN STAINLESS STEEL FRAMING CONNECTIONS TO BE STAINLESS STEEL.
7. ALL BOLT HOLES TO BE DRILLED 1/16" LARGER THAN THE BOLT DIAMETER.
8. ALL BOLTS TO BE HIGH STRENGTH BOLTS A325X - 3/4" DIAMETER W/ WASHERS, UNLESS NOTED OTHERWISE.
9. ALL EXTERIOR BOLTS SHALL BE HOT DIP GALVANIZED, UNLESS NOTED OTHERWISE.
10. ALL WELDS SHALL CONSIST OF E70XX (70 KSI) ELECTRODE AND MEET AISC MIN AND MAX SIZE CRITERIA.
11. ALL WELDING SHALL CONFORM TO CURRENT AWS STANDARDS AND BE PERFORMED BY AN AWS CERTIFIED WELDER.
12. WHERE FILLET WELD SIZES ARE NOTED AS "AISC MIN" ON DRAWINGS, FABRICATOR TO PROVIDE MINIMUM SIZE WELD BASED ON MATERIAL THICKNESS AND FOLLOWING CHART. ACTUAL WELD SIZES TO BE SHOWN ON SHOP DRAWINGS.

Table with 3 columns: MATERIAL THICKNESS OF THINNER PART JOINED (IN), MINIMUM SIZE OF FILLET WELD (IN), MAXIMUM SIZE OF FILLET WELD (IN). Rows include thickness ranges like TO 1/4 INCLUSIVE, OVER 1/4 TO 1/2, OVER 1/2 TO 3/4, OVER 3/4.

WOOD NOTES

- 1. WOOD MEMBERS SHALL CONSIST OF THE FOLLOWING:
- POLES: BLACK LOCUST No. 2 (BL), 3RD PARTY CERTIFIED, PER BLDG CODE 2303.1.1
- ROUNDS: WHITE CEDAR (WC) No. 1 NDS
- DECKING: WHITE CEDAR (WC) No. 1 NDS
- ELEMENT LOG BEAMS: BLACK LOCUST No. 2 (BL), 3RD PARTY CERTIFIED, PER BLDG CODE 2303.1.1
- PT 2x: SOUTHERN YELLOW PINE (SYP) No. 1
- KNEE BENDS: BLACK LOCUST No. 2 (BL), 3RD PARTY CERTIFIED, PER BLDG CODE 2303.1.1
- GUARD POST: BLACK LOCUST No. 3 OR BETTER, 3RD PARTY CERTIFIED, PER BLDG CODE 2303.1.1
2. ALL PRESSURE TREATED LUMBER PLACED IN CONTACT WITH SOIL SHALL BE 0.60 ACQ. ALL OTHER PRESSURE TREATED LUMBER TO BE 0.40 ACQ. MOISTURE CONTENT OF P.T. LUMBER TO BE 19% MAX.
3. ALL DIMENSIONAL LUMBER SHALL BE KILN DRIED TO MAX. MOISTURE CONTENT OF 17%.
4. ALL WOOD MEMBERS TO BE REJECTED FOR EXCESSIVE AND / OR STRUCTURALLY UNSOUND KNOTS, OR OTHER FLAWS - INCLUDING BUT NOT LIMITED TO BARK, PITCHING, CHECKING, TWISTING, AND YARD DAMAGE.
5. ALL CARPENTRY WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL DESIGN STANDARDS FOR WOOD CONSTRUCTION AND THE NEW YORK STATE BUILDING CODE.
6. ALL METAL CONNECTORS FOR WOOD (SIMPSON STRONG TIE / UPS OR EQUAL) SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS. ALL CONNECTORS IN CONTACT WITH PRESSURE TREATED LUMBER SHALL HAVE G 185 HDG COATING PER ASTM A-65 3. SIMPSON "ZMAX" OR EQUAL.
7. NAILS, SPIKES AND STAPLES, FOR ROUGH CARPENTRY, TO BE DOUBLE HOT DIPPED GALVANIZED CONFORMING TO ASTM A-153. SPIRAL NAILS: SIZE AND TYPE TO SUIT APPLICATION AND MEET ASTM F 1667 SPECIFICATIONS - MAZE SHANK OR EQUAL.
8. ALL LAG BOLTS TO BE HOT DIPPED GALVANIZED CONFORMING TO ASTM A-153 WITH WASHERS UNLESS OTHERWISE SPECIFIED AND TO MEET ASTM A307 SPECIFICATIONS.
9. ALL THROUGH BOLTS TO BE HOT DIPPED GALVANIZED CONFORMING TO ASTM A-153 WITH WASHERS UNLESS OTHERWISE SPECIFIED AND TO MEET ASTM A325 SPECIFICATIONS.
10. ALL LAG BOLTS WITH DIAMETER GREATER THAN 3/8" TO HAVE PRE-DRILLED LEAD HOLES PRIOR TO INSTALLATION. LEAD HOLE DIAMETER SHALL BE 40% - 70% OF LAG BOLT DIAMETER. LEAD HOLE LENGTH SHALL BE NO LESS THAN THE LENGTH OF THE THREADED PORTION OF THE LAG BOLT.
11. ALL THROUGH BOLT HOLES TO BE DRILLED 1/16" LARGER THAN BOLT DIAMETER.
12. ALL WOOD & ENGINEERED WOOD PRODUCTS SHALL BE PLACED ABOVE GRADE AND COVERED WITH TARPS, OR EQUIVALENT MEANS, TO PREVENT DETERIORATION BY SUNLIGHT, WATER, AND WIND ONCE AT THE SITE. ALL DETERIORATED MEMBERS CAN BE REJECTED BASED ON THE DECISION OF THE ENGINEER.

WIRE ROPE NOTES

- 1. CABLE BRACING SHALL CONSIST OF WIRE ROPE INSTALL IN FABRICATED AND INSTALLED IN ACCORDANCE WITH ASCE 19 - STRUCTURAL APPLICATION OF STEEL CABLES FOR BUILDINGS.
2. ALL CABLES FOR TREETOP WALK TO CONSIST OF HIGH PERFORMANCE ROPE S355 BY PFEIFER, 12 mm (1/2"), UNLESS NOTED. ALL CABLES SHALL BE RATED FOR A MAXIMUM BREAKING FORCE OF 30,799 LBS. AND A MAXIMUM WORKING LOAD OF 5,800 LBS. ACCOUNTING FOR 5.0% REDUCTION DUE TO FERRULE TERMINATIONS.
3. ALL WIRE ROPES SHALL BE TERMINATED WITH GALV. HEAVY DUTY THIMBLE AND (1) ZINC COATED COPPER FERRULE COMPLYING WITH MILITARY SPEC., MS1844 D.
4. ALL TURNBUCKLES SHALL BE CONSIST OF GALV. OR ZINC PLATED, COMPLYING WITH ASTM F11 45-05 TYPE 1, GRADE 1, WITH WORKING LOAD LIMIT OF 3.0 KIPS.
5. ALL BRACING SHALL BE PRE-TENSION TO ENSURE ADEQUATE TRANSFER OF LATERAL LOADS.

FOUNDATION NOTES

- 1. FOUNDATION HAS BEEN DESIGNED BASED ON THE FOLLOWING SITE PARAMETERS, WITH THE UNDERSTANDING THAT THE SITE RESTS ON BEDROCK.
INSITU MATERIAL - SAND ABOVE ROCK: 115 PCF / 130 PCF / 68 PCF ( DAMP / SAT / BUOYANT)
ANGLE OF INTERNAL FRICTION: 33 DEG.
ACTIVE PRESSURE COEF: 0.29
PASSIVE PRESSURE COEF: 3.4
2. FOOTINGS HAVE BEEN DESIGNED TO REST ON BEDROCK, WITH AN ALLOWABLE BEARING CAPACITY OF 6,000 P.S.F. IF ACTUAL CONDITIONS DIFFER THAN WHAT ASSUMED, CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY, PRIOR TO PROCEEDING WITH WORK.
3. ALL SUB BASE MATERIAL SHALL BE COMPACTED TO 95% OF OPTIMUM MODIFIED PROCTOR DRY DENSITY ASTM-D1557, WITH A MOISTURE CONTENT OF ± 2% OF OPTIMUM.
4. ALL ORGANIC MATERIAL TO BE REMOVED PRIOR TO PLACEMENT OF SUB-BASE / FOUNDATION.
5. CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY IF ANY UNSUITABLE MATERIAL IS UNCOVERED DURING EXCAVATION.

ADHESIVE ANCHOR NOTES

- 1. ALL EPOXY TO BE USED IN ADHESIVE ANCHOR ASSEMBLIES SHALL CONSIST OF THE FOLLOWING UNLESS NOTED OTHERWISE:
BASE MATERIAL CONCRETE GROUDED CMU UNGROUDED CMU STONE / BRICK
EPOXY TYPE HILTI HIT HY 200 HILTI HIT HY 200 HILTI HIT HY 270 (MESH SLEEVE REQUIRED) HILTI HIT HY 270
2. ALL THREADED ROD TO BE USED IN ADHESIVE ANCHOR ASSEMBLIES SHALL CONSIST OF HILTI HAS-E THREADED ROD UNLESS NOTED OTHERWISE. IF DRAWING SET DESIGNATES REBAR TO BE USED WITH ADHESIVE ANCHORAGE, REBAR SHALL CONFORM TO ASTM A615.
3. ALL ADHESIVE ANCHORS SHALL BE SUPPLIED AS A COMPLETE SYSTEM INCLUDING A NEW ADHESIVE CARTRIDGE, CLEAN MIXING NOZZLE, EXTENSION TUBE, DISPENSING GUN, AND ALL EQUIPMENT REQUIRED TO INSTALL THE ADHESIVE ANCHOR IN A PROPERLY CLEANED HOLE INCLUDING, BUT NOT LIMITED TO, DRILLS, SETTING TOOLS, CLEAN OUT BRUSHES, BLOW OUT BRUSHES, OIL FREE COMPRESSED AIR, ETC.
4. NUTS, WASHERS, AND OTHER HARDWARE USED IN CONJUNCTION WITH THE ADHESIVE ANCHOR ASSEMBLY SHALL MATCH THE MATERIAL TYPE OF THE THREADED ROD.
5. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2,500 PSI, AND A TEMPERATURE OF AT LEAST 50 DEGREES AT TIME OF ADHESIVE ANCHOR INSTALLATION.
6. ADHESIVES SHALL BE STORED AND INSTALLED IN ACCORDANCE WITH THE SERVICE TEMPERATURE RANGES RECOMMENDED BY THE MANUFACTURER.
7. ADHESIVE ANCHORS SHALL BE INSTALLED ONLY BY QUALIFIED, TRAINED CONTRACTORS IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS.
8. ADHESIVE ANCHORS SHALL NOT BE USED IN OVERHEAD / VERTICALLY INCLINED APPLICATIONS OR UNDER SUSTAINED TENSION LOADING WITHOUT SPECIAL RECOMMENDATION FROM THE ENGINEER.
9. HOLES SHALL BE DRILLED WITH A ROTARY IMPACT DRILL OR ROCK DRILL. HOLES SHALL BE THOROUGHLY CLEANED (BLOW-BRUSH-BLOW METHOD) IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS PRIOR TO ADHESIVE INJECTION. HOLES SHALL BE PROTECTED AFTER CLEANING TO PREVENT CONTAMINATION PRIOR TO INJECTION AND RE-CLEANED IF NECESSARY.
10. UNLESS OTHERWISE INDICATED BY THE MANUFACTURER, ADHESIVE SHALL BE DISPENSED THROUGH A TUBE OR CARTRIDGE EXTENSION, BEGINNING AT THE MAXIMUM DEPTH OF THE HOLE AND WITHDRAWN AS ADHESIVE IS INJECTED, FOLLOWED BY INSERTION AND ROTATION OF THE ANCHOR ROD TO THE SPECIFIED DEPTH.
11. ANCHOR ROD SHALL BE CLEAN AND FREE OF OIL, RUST, PAINT OR OTHER COATINGS PRIOR TO INSTALLATION. ANCHORS SHALL BE SECURELY FIXED IN PLACE TO PREVENT DISPLACEMENT WHILE THE ADHESIVE CURES.

WOOD SHEATHING & SUB FLOOR NOTES

- 1. ALL ENGINEERED PLYWOOD AND ORIENTED STRAND BOARD SHALL MEET APA ENGINEERED WOOD PRODUCT ASSOCIATION STANDARDS. ALL EXTERIOR SHEATHING & SUB FLOORING SHALL MEET APA EXPOSURE I CLASSIFICATIONS.
2. ALL ROOF SHEATHING SHALL CONSIST OF THE FOLLOWING, UNLESS NOTED:
- 5/8" CDX PLYWOOD
- ATTACHED w/ 10d RING SHANK NAILS 6" O.C. EDGE, 12" O.C. FIELD, TYP.
3. ALL FLOOR SUB FLOORING SHALL CONSIST OF THE FOLLOWING, UNLESS NOTED:
- 3/4" BC PLYWOOD
- TONGUE & GROOVE
- ATTACHED w/ 10d RING SHANK NAILS, 4" O.C. EDGE, 12" O.C. FIELD, TYP.
- GLUED CONTINUOUSLY W/ DAP BEAT THE NAILS OR EQUAL
4. ALL WALL SHEATHING SHALL CONSIST OF THE FOLLOWING, UNLESS NOTED:
- 1/2" CDX PLYWOOD
- ATTACHED w/ 10d RING SHANK NAILS, 6" O.C. EDGE, 12" O.C. FIELD, TYP.
- NAILING PATTERNS TYP., UNLESS NOTED AT SHEARWALL
5. ACCEPTABLE SUBSTITUTIONS INCLUDE:
- ROOF SHEATHING: 5/8" ADVANTECH OSB OR ZIP SYSTEM ROOF SHEATHING
- FLOOR SUB FLOORING: 7/8" ADVANTECH OSB TONGUE & GROOVE FLOORING
- WALL SHEATHING: 1/2" ADVANTECH OSB OR ZIP SYSTEM WALL SHEATHING
6. HANDLING AND STORAGE IN ACCORDANCE W/ APA - THE ENGINEERED WOOD ASSOCIATION

LIST OF ABBREVIATIONS

Table with 3 columns: ABBREVIATION, DESCRIPTION, MEANING. Includes ARCH, BLK, BM, BRDG, BRG, BTWN, BTM, CLG, COL, CONC, CONN, CONSTR, CONT, CMU, CT, DBL, DIA, DIAG, DET, DWG, EA, ELEV, EMBED, ENG, EQ, EX, EXT, EXP, FDN, FF, FLR, FS, FTG, GALV, GA, HD, HDR, HORZ, INT, I-JST, JNT, JST, LDGR, LOC, LVL, MAX, MANUF., MIN, MISC, NTS, OC, OCEW, OCH, OCV, OWJ, PERF, PL, PNT, PRE-ENG, PT, PROP, R, RC, REBAR, REN, REQ, RFT, SBC, SIM, SP, SQ, SST, STRUCT, SW, TEMP, TBO, THK, T&G, TOF, TOS, TOSH, TOSL, TOW, TYP, UN, VERT, VLY, VIF, WCJ, VWA, W, WS, MINIMUM MISCELLANEOUS, NOT TO SCALE, ON CENTER, ON CENTER EACH WAY, ON CENTER HORIZONTALLY, ON CENTER VERTICALLY, OPEN WEB JOIST(S), PERFORATED, PLATE, POINT, PRE-ENGINEERED, PRESSURE TREATED, PROPOSED, RIPPED, ROUGH CUT, REINFORCING BAR, REINFORCEMENT, REQUIRED, RAFTER(S), SELECTED BY OWNER, SIMILAR, SPLICE, SQUARE, SIMPSON STRONG TIE, STRUCTURAL, SHEAR WALL, TEMPORARY, TO BE DETERMINED, THICKNESS, TONGUE & GROOVE, TOP OF FOOTING, TOP OF STEEL, TOP OF SHELF, TOP OF SLAB, TOP OF WALL, TYPICAL, UNLESS NOTED, VERTICAL, VALLEY, VERIFY IN FIELD, INTERIOR CONTROL JOINT, VERIFY WITH ARCHITECT, WITH, WALL STEP.

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P&O #: 20109.0 DATE: 7-11-23 SCALE: NTS DRAWN BY: DBP CHECKED BY: DESIGNED BY: DBP APPROVED BY:

REVISIONS:

Table with 2 columns: DATE, DESCRIPTION

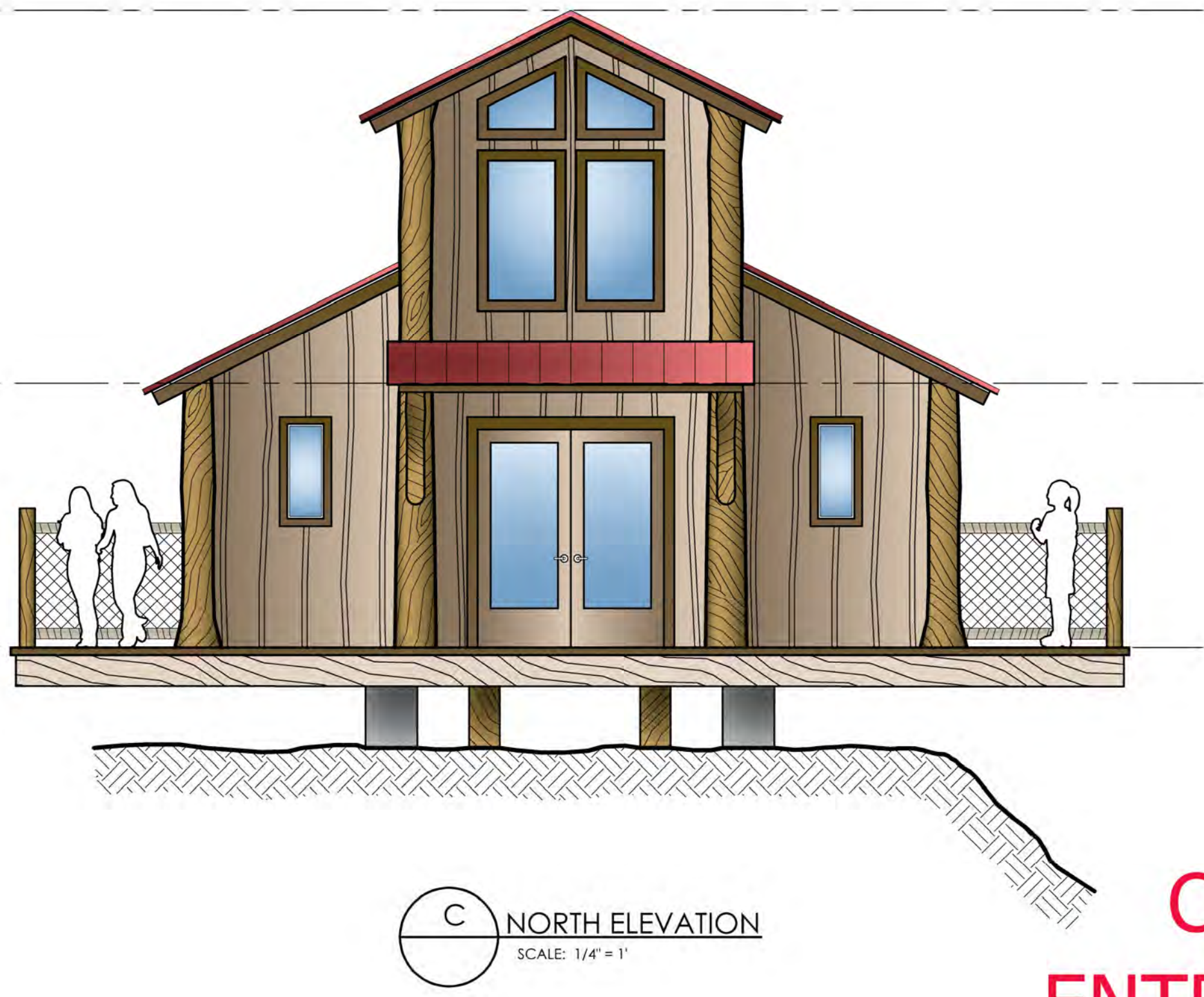
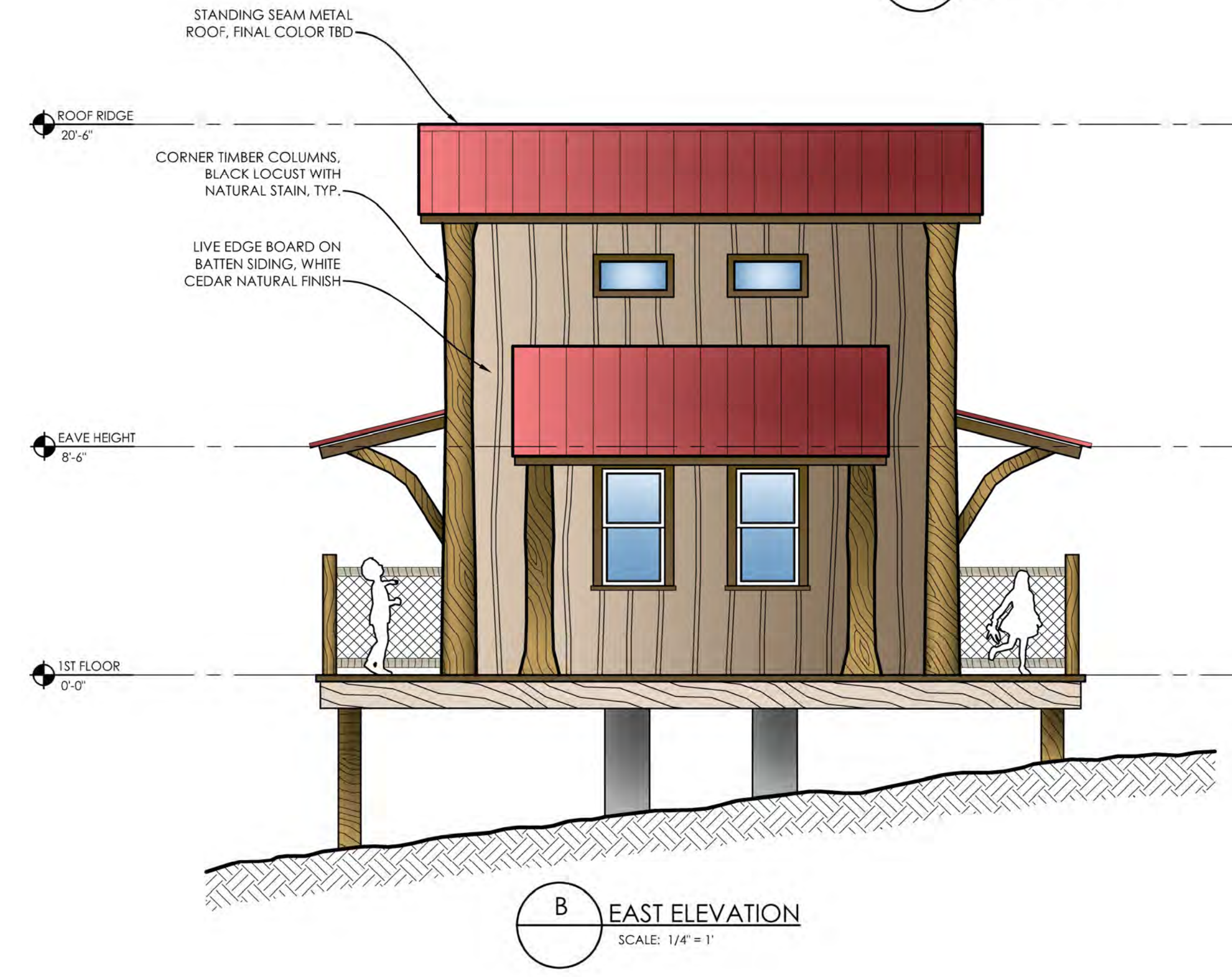
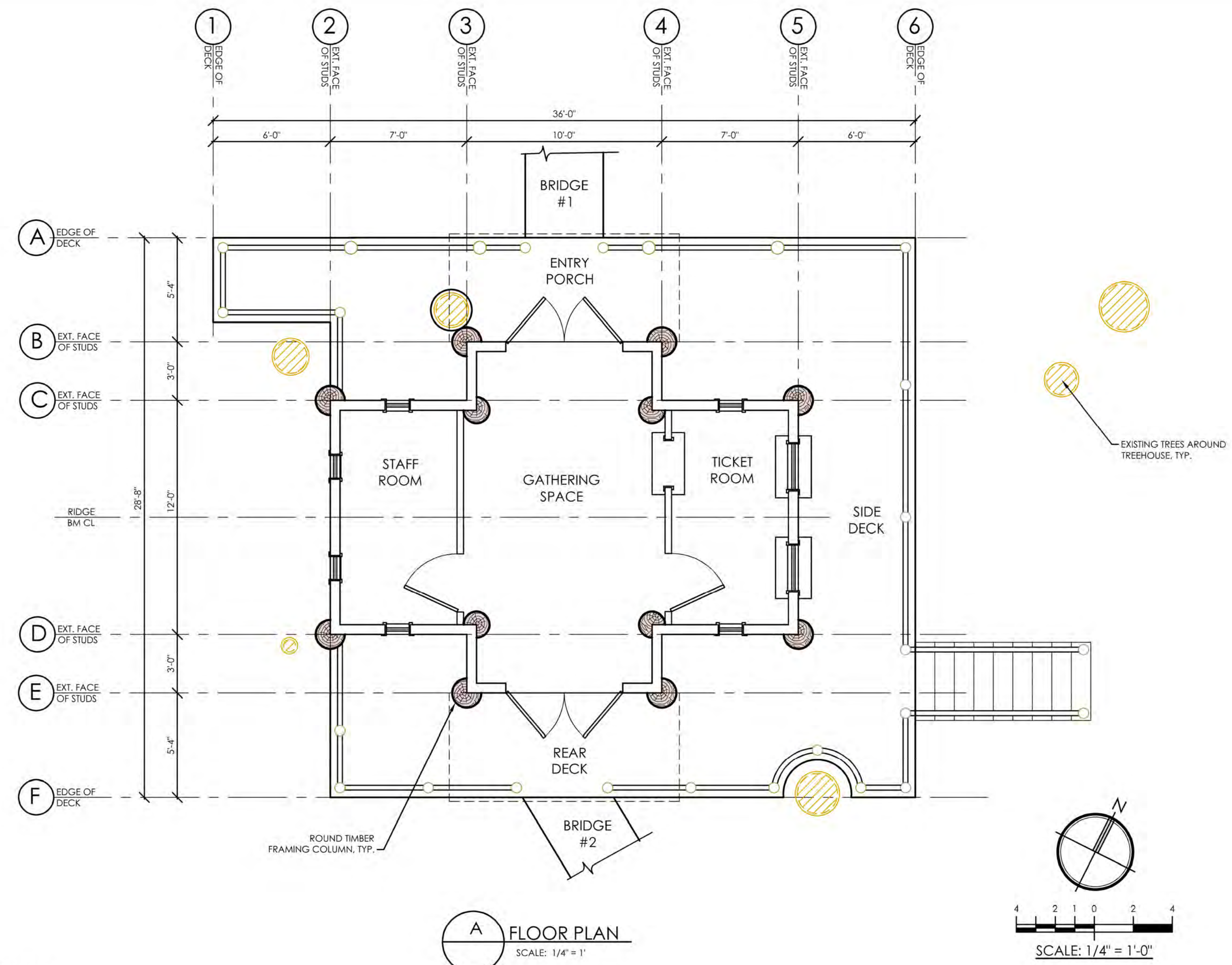
NATIONAL ARBORETUM CANOPY TRAIL

CONSTRUCTION NOTES

T1.1



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**Concept Plan**  
**ENTRY TREEHOUSE**  
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P&O #: 20109.0  
DATE: 03/19/2024  
SCALE: 1/4" = 1'-0"  
DRAWN BY: EGF CHECKED BY: DBP  
DESIGNED BY: DBP APPROVED BY: -

**REVISIONS:**

DATE	DESCRIPTION

NATIONAL ARBORETUM  
CANOPY TRAIL

DISTRICT OF COLUMBIA

C/O WASHINGTON

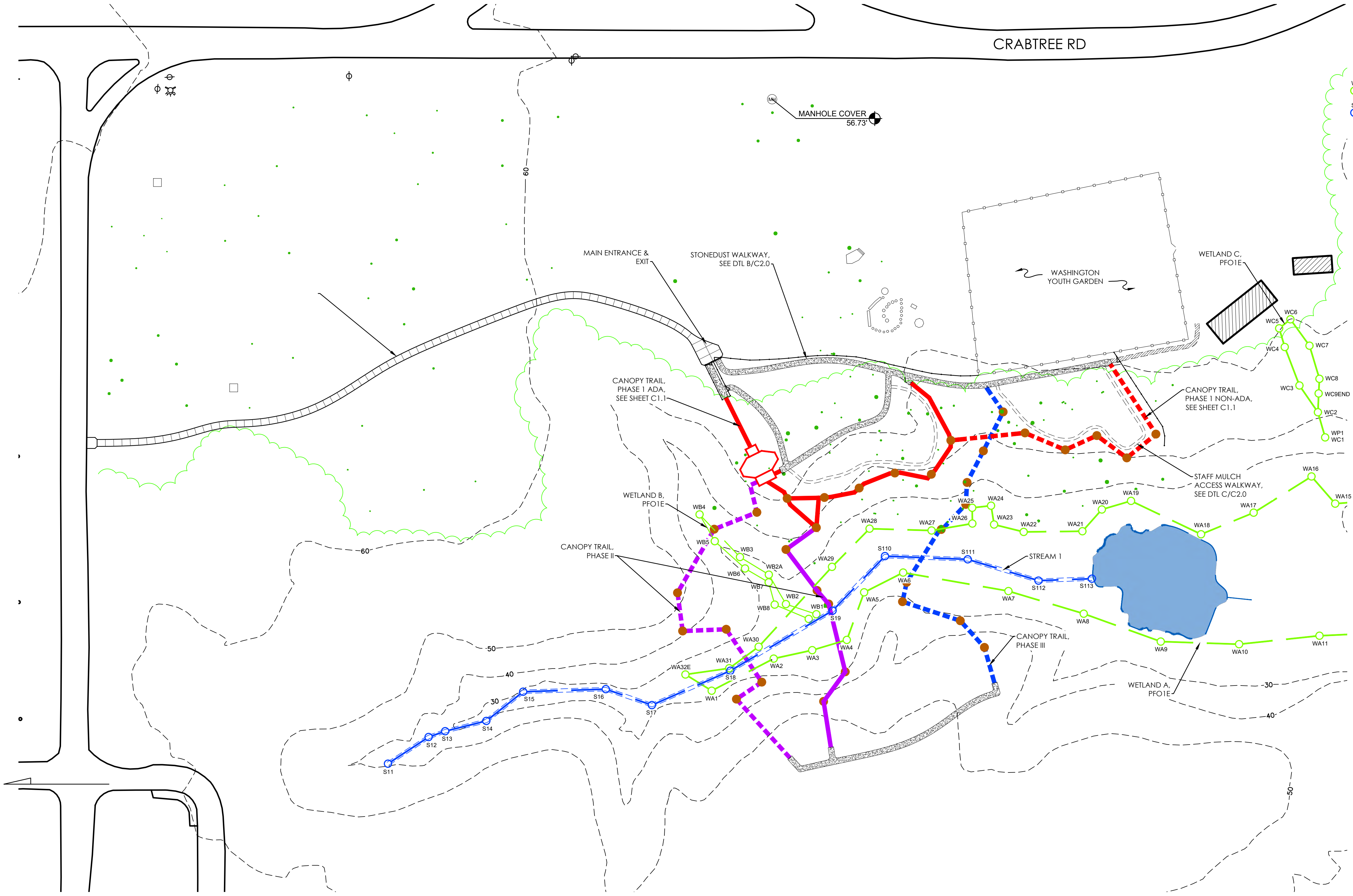
TREE HOUSE  
FLOOR PLAN &  
ELEVATIONS

**B1.0**

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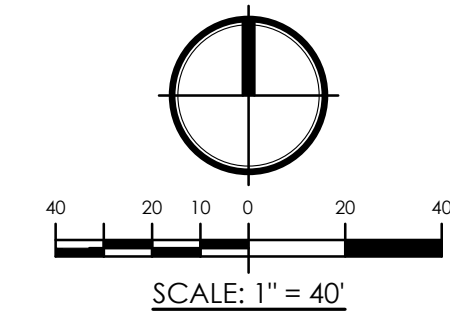


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 PLOT BY: jpalmer



### LEGEND

---	EXISTING CONTOUR 10' INTERVAL
---	APPROX. EDGE OF WATER
---	APPROX. EDGE OF USACE/DOEE WETLAND
---	APPROX. CL OF USACE/DOEE STREAM
●	EXISTING TREE
●	PROP. PLATFORM
---	PHASE I ADA TRAIL
---	PHASE I NON ADA TRAIL
---	PHASE II ADA TRAIL
---	PHASE II NON ADA TRAIL
---	PHASE III NON ADA TRAIL
---	EXISTING PATH
---	CONCRETE WALKWAY
---	STONEDUST WALKWAY
---	STAFF MULCH WALKWAY
●	SURVEY BENCHMARK (VERT. DATUM)
●	EXISTING HYDRANT / WATER VALVE
●	EXISTING MANHOLE / CATCH BASIN



**OVERALL SITE PLAN**  
SCALE: 1" = 40'

- SITE NOTES:**
1. SITE BASE MAP OBTAINED FROM A PLAN DEVELOPED BY KCI TECHNOLOGIES ENTITLED "TOPOGRAPHICAL SURVEY FOR UNITED STATES NATIONAL ARBORETUM", SHEETS 4 & 5, DATED 12-24-96. PROPER & O'LEARY ENGINEERING, DPC MAKES NO REPRESENTATION TO THE CORRECTNESS OF SAID MAP.
  2. TOPOGRAPHY DEVELOPED FROM A LIDAR SURVEY CONDUCTED BY PROPER & O'LEARY ENGINEERING, DPC DURING THE WEEK OF MARCH 13, 2023.
  3. TOPOGRAPHIC DATUM IS ASSUMED TO BE MATCHED TO AN ELEVATION OF A MANHOLE GIVEN PER THE BASE MAP REFERENCED IN NOTE #1. PROPER & O'LEARY ENGINEERING MAKES NO REPRESENTATION TO THE CORRECTNESS OF THE DATUM.
  4. POND BOUNDARY IS ESTIMATED FROM LIDAR SURVEY PER NOTE #2.
  5. WETLAND AND STREAM INFORMATION OBTAINED FROM A CAD PLAN AND REPORT DEVELOPED BY LRS FEDERAL LLC, ENTITLED "UNITED STATES NATIONAL ARBORETUM - CANOPY TRAIL WETLAND DELINEATION REPORT", DATED JULY 2022.
  6. NO COORDINATE SYSTEM IS ASSOCIATED WITH THE BASE MAP PER NOTE #1. LOCATIONS OF THE WETLAND AND STREAM DELINEATION FLAGS OBTAINED FROM THE PLAN PER NOTE #4 HAVE BEEN ADDED TO THIS PLAN BY OVERLAYING FROM SATELLITE IMAGERY. THE BASE POINT OF THE OVERLAY BEING THE RIGHT-HAND CORNER OF THE CONCRETE SIDEWALK WHERE IT ABUTS AZALEA ROAD NE NEAR THE INTERSECTION WITH ELLIPSE ROAD NE. IT IS ASSUMED THAT THIS METHOD OF LOCATING THE FLAGS CONTAINS HORIZONTAL ERROR OF 3' +/-.

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DATE: 7-11-23  
SCALE: 1" = 40'

DRAWN BY:	ARL	CHECKED BY:	DBP
DESIGNED BY:	DBP	APPROVED BY:	

**REVISIONS:**

DATE	DESCRIPTION

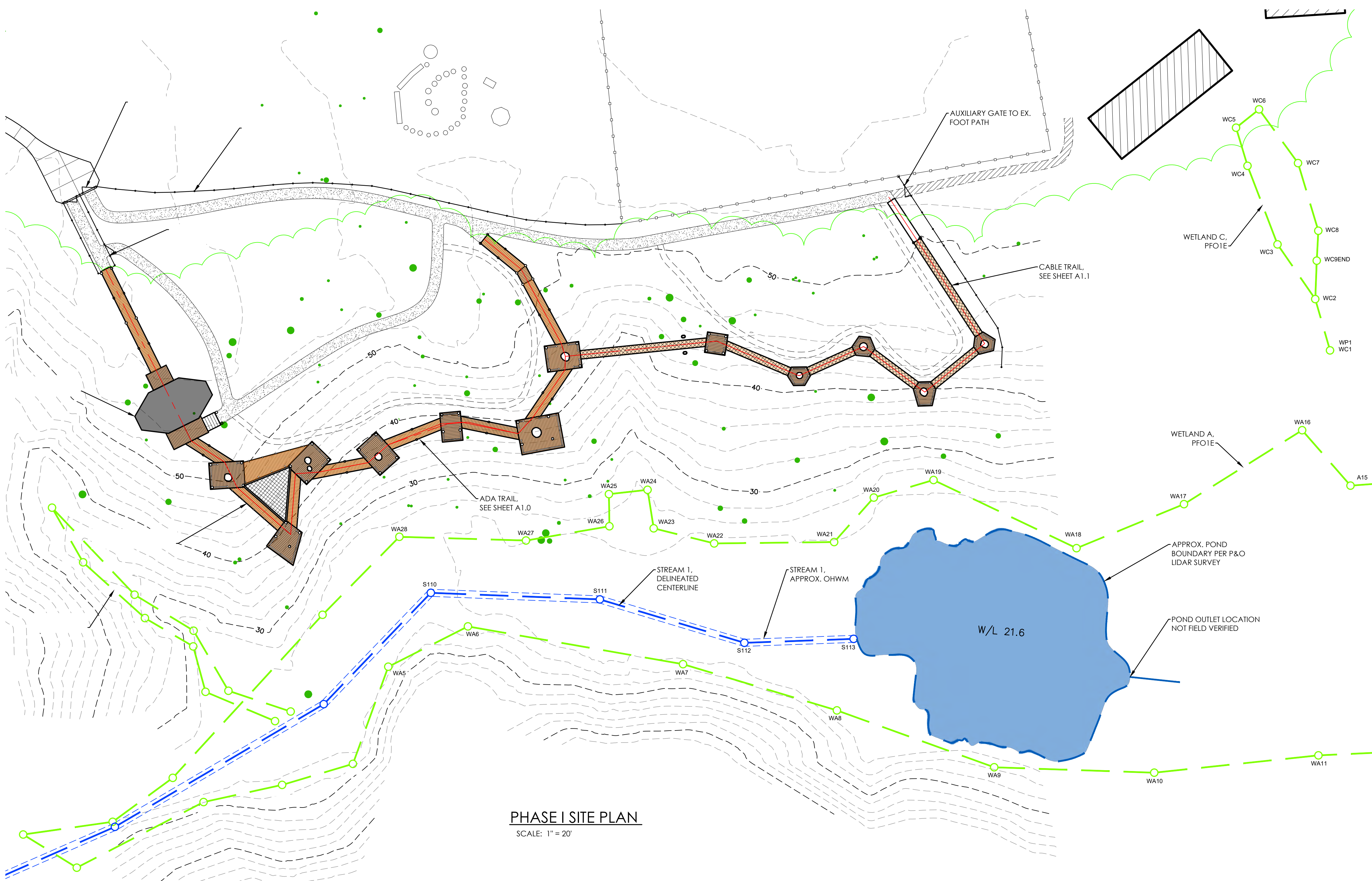
NATIONAL ARBORETUM  
CANOPY TRAIL  
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OVERALL SITE PLAN

**C1.0**



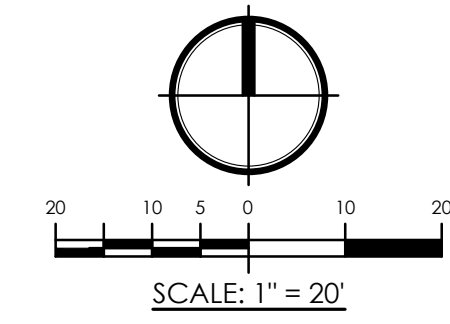
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 Plot Size: 36" x 48"



**PHASE I SITE PLAN**  
SCALE: 1" = 20'

**LEGEND**

- 52.73 EXISTING SPOT ELEVATION
- - - - - EXISTING CONTOUR 2' INTERVAL
- - - - - EXISTING CONTOUR 10' INTERVAL
- - - - - APPROX. EDGE OF WATER
- W# - - - - - APPROX. EDGE OF USACE/DOEE WETLAND
- S# - - - - - APPROX. CL. OF USACE/DOEE STREAM
- - - - - EXISTING FENCE
- - - - - PROPOSED FENCE
- - - - - PROPOSED GATE
- - - - - NON-ADA BRIDGE
- - - - - ADA BRIDGE
- - - - - PROPOSED PLATFORM
- - - - - EXISTING PATH
- - - - - CONCRETE WALKWAY
- - - - - STONEDUST WALKWAY
- - - - - STAFF MULCH WALKWAY
- EXISTING TREE



- SITE NOTES:**
- SITE BASE MAP OBTAINED FROM A PLAN DEVELOPED BY KCI TECHNOLOGIES ENTITLED "TOPOGRAPHICAL SURVEY FOR UNITED STATES NATIONAL ARBORETUM", SHEETS 4 & 5, DATED 12-24-96. PROPER & O'LEARY ENGINEERING, DPC MAKES NO REPRESENTATION TO THE CORRECTNESS OF SAID MAP.
  - TOPOGRAPHY DEVELOPED FROM A LIDAR SURVEY CONDUCTED BY PROPER & O'LEARY ENGINEERING, DPC DURING THE WEEK OF MARCH 13, 2023.
  - TOPOGRAPHIC DATUM IS ASSUMED TO BE MATCHED TO AN ELEVATION OF A MANHOLE GIVEN PER THE BASE MAP REFERENCED IN NOTE #1. PROPER & O'LEARY ENGINEERING MAKES NO REPRESENTATION TO THE CORRECTNESS OF THE DATUM.
  - POND BOUNDARY IS ESTIMATED FROM LIDAR SURVEY PER NOTE #2.
  - WETLAND AND STREAM INFORMATION OBTAINED FROM A CAD PLAN AND REPORT DEVELOPED BY LRS FEDERAL LLC, ENTITLED "UNITED STATES NATIONAL ARBORETUM - CANOPY TRAIL WETLAND DELINEATION REPORT", DATED JULY 2022.
  - NO COORDINATE SYSTEM IS ASSOCIATED WITH THE BASE MAP PER NOTE #1. LOCATIONS OF THE WETLAND AND STREAM DELINEATION FLAGS OBTAINED FROM THE PLAN PER NOTE #4 HAVE BEEN ADDED TO THIS PLAN BY OVERLAYING FROM SATELLITE IMAGERY. THE BASE POINT OF THE OVERLAY BEING THE RIGHTHAND CORNER OF THE CONCRETE SIDEWALK WHERE IT ABUTS AZALEA ROAD NE NEAR THE INTERSECTION WITH ELLIPSE ROAD NE. IT IS ASSUMED THAT THIS METHOD OF LOCATING THE FLAGS CONTAINS HORIZONTAL ERROR OF 3' +/-.

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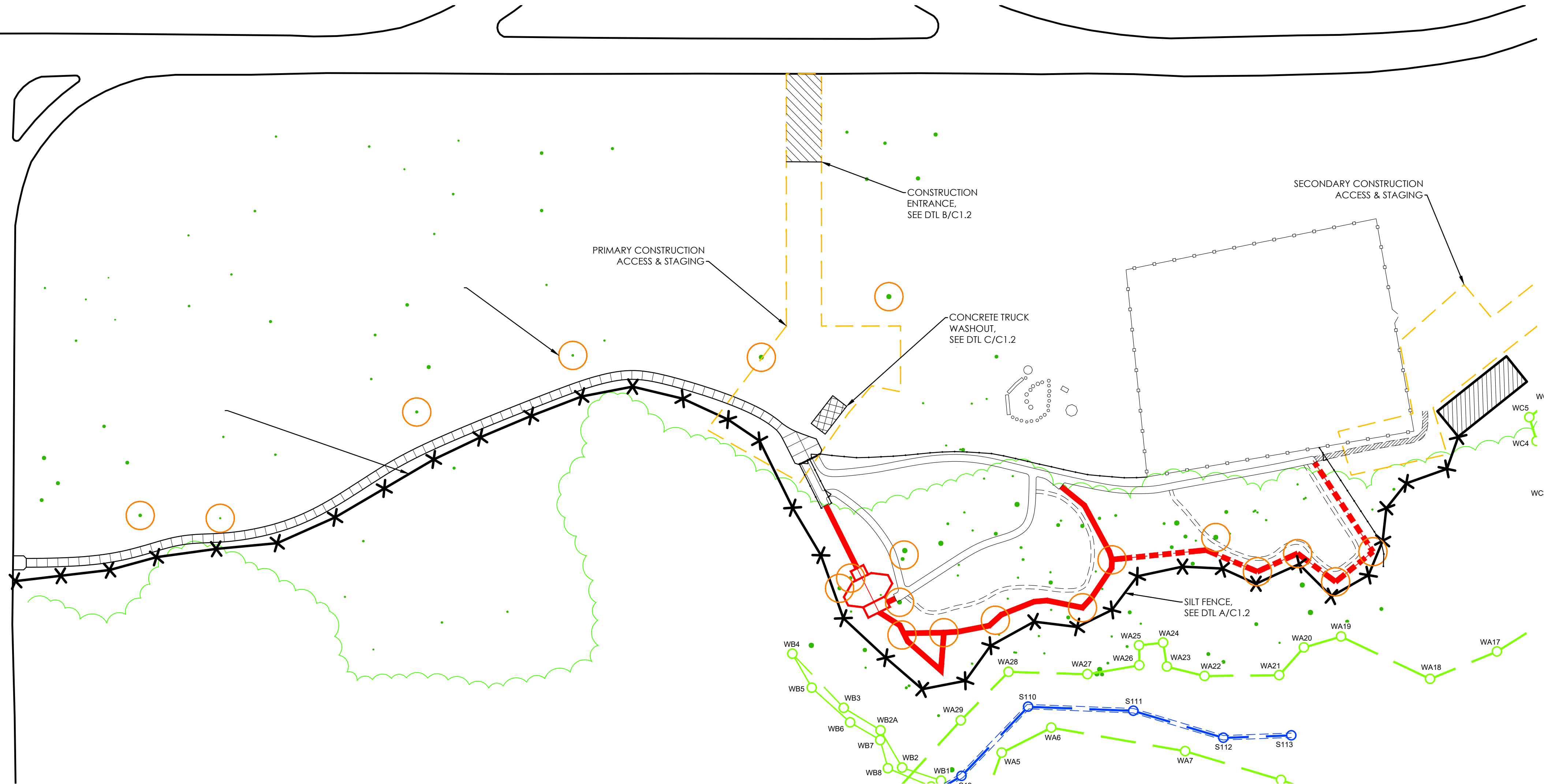
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PHASE I SITE PLAN

**C1.1**



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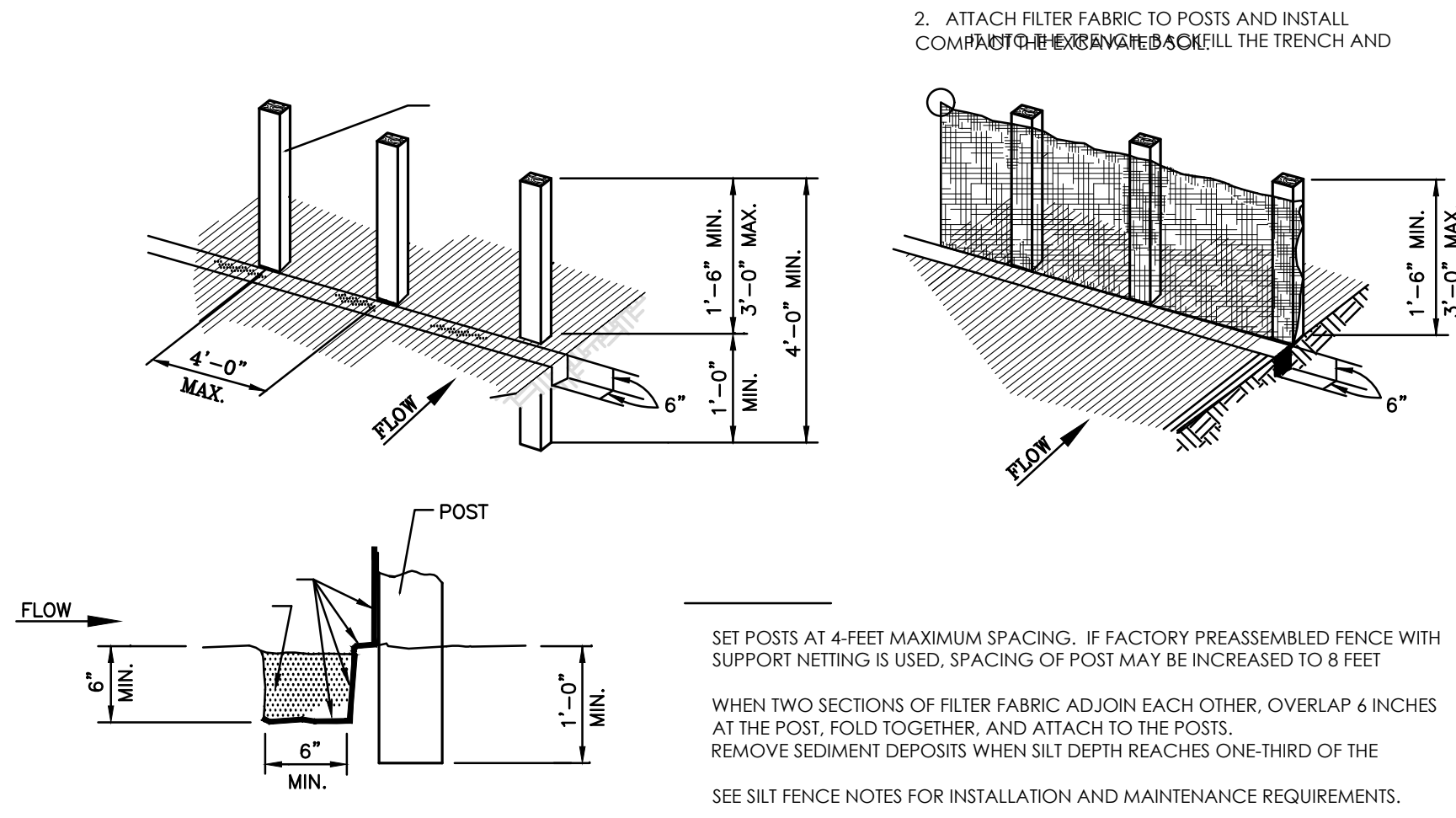
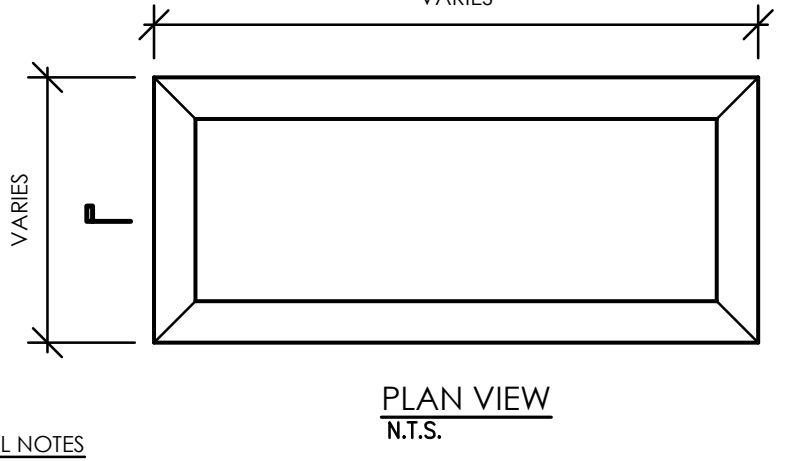
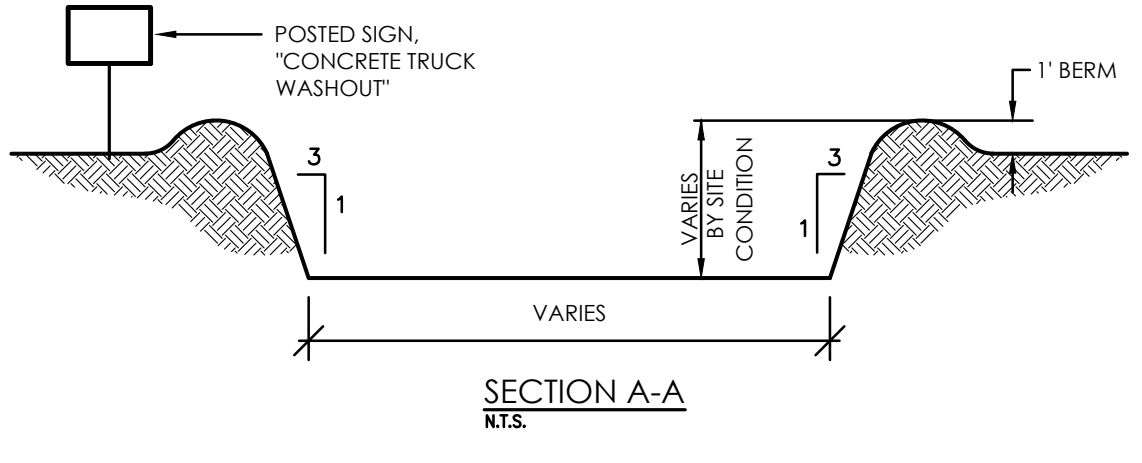
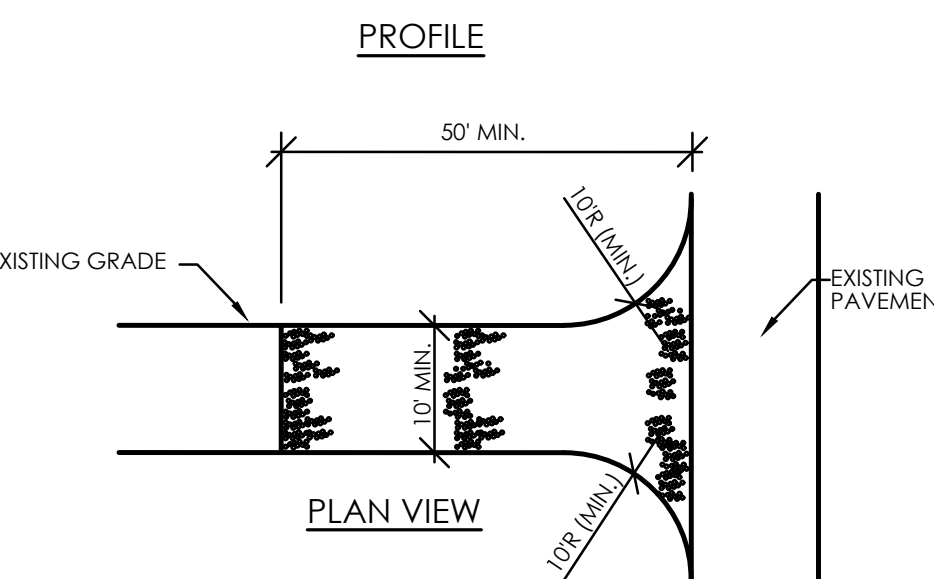
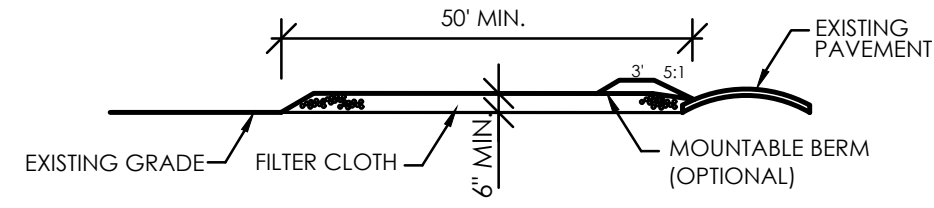
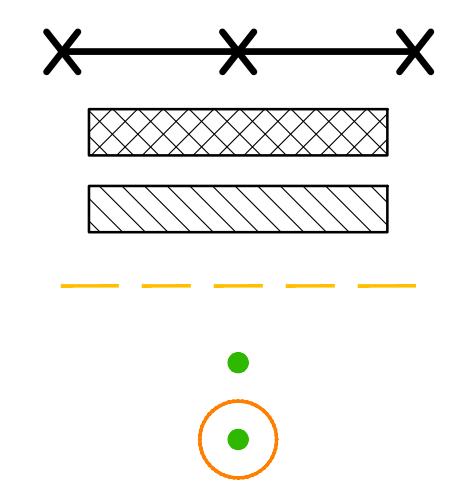
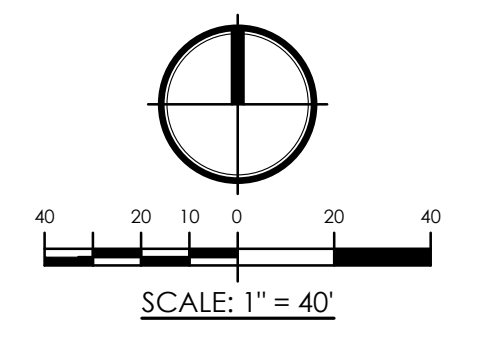
**EROSION CONTROL PLAN**  
SCALE: 1" = 40'

- STABILIZED CONSTRUCTION ENTRANCE NOTES:**
- WHERE NECESSARY, STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED TO PREVENT SOIL AND SEDIMENT FROM BEING TRACKED ON TO ROADWAYS.
  - PERMANENT TRAFFIC CORRIDORS SHALL BE ESTABLISHED AND "ROUTES OF CONVENIENCE" SHALL BE AVOIDED. CONSTRUCTION TRAFFIC SHALL NOT CROSS STREAMS OR DITCHES EXCEPT AT SUITABLE CROSSING FACILITIES, AND SHALL NOT OPERATE UNNECESSARILY WITHIN WATERWAYS OR DRAINAGE DITCHES.
  - IF INTERNAL CONSTRUCTION ROADS ARE A SOURCE OF SEDIMENT-LADEN RUNOFF TO SENSITIVE AREAS, MEASURES SHALL BE TAKEN TO STABILIZE THE INTERNAL ROADWAYS AS SOON AS PRACTICABLE.

- SILT FENCE NOTES:**
- SILT FENCE SHALL BE PLACED ON THE DOWN SLOPE SIDE OF EXCAVATED AREAS AND AROUND SOIL STOCKPILES. SILT FENCE SHALL ALSO BE PLACED AROUND THE BOUNDARY OF WETLANDS AND STREAMS ADJACENT TO THE WORK AREA AND AT THE EDGE OF THE WETLANDS AND STREAM AFTER CONSTRUCTION IS COMPLETE. WITHIN RESIDENTIAL AREAS THE SILT FENCE SHALL BE INSTALLED ALONG THE PERIMETER OF THE ENTIRE WORK AREA.
  - SILT FENCE MUST BE REPAIRED OR REPLACED WHEN THE ENDS ARE FRAYED OR WORN, AND THE FENCE IS NOT ANCHORED 6" INTO THE GROUND. WHEN ACCUMULATED SEDIMENT REACHES 33% OF THE SILT FENCE HEIGHT, THE SEDIMENT SHALL BE REMOVED AND DISPOSED OF IN AN APPROPRIATE UPLAND AREA.

- STOCKPILE NOTES:**
- TOPSOIL AND FILL THAT IS TO REMAIN STOCKPILED ON-SITE FOR PERIODS GREATER THAN 14 DAYS SHALL BE STABILIZED BY SEEDING. PRIOR TO SEEDING, THE STOCKPILE TOPSOIL MATERIAL SHALL BE GRADED AS NEEDED TO PERMIT THE USE OF CONVENTIONAL EQUIPMENT FOR SEED PREPARATION, SEEDING, MULCH APPLICATION, AND MULCH ANCHORING. IN NO CASE SHALL ERODIBLE MATERIALS BE STOCKPILED WITHIN 25 FEET OF ANY DITCH, STREAM, OR OTHER SURFACE WATER.
  - SILT FENCE OR HAY BALE BERMS SHALL BE CONSTRUCTED AROUND ALL STOCKPILE OF FILL, TOPSOIL, AND EXCAVATED OVERBURDEN THAT ARE TO REMAIN EXPOSED FOR PERIODS LESS THAN 30 DAYS. SILT FENCE OR HAY BALE BERMS ARE TO REMAIN IN PLACE UNTIL SUCH TIME AS SAID STOCKPILES ARE REMOVED AND STOCKPILE AREAS ARE BROUGHT BACK TO FINAL GRADE AND PERMANENTLY STABILIZED.

- MULCHING & SEEDING NOTES:**
- STABILIZING MEASURES SHALL BE INITIATED AS SOON AS PRACTICAL IN PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE TEMPORARILY OR PERMANENTLY CEASED, BUT NOT MORE THAN 14 DAYS SHALL ELAPSE WITHOUT STABILIZATION AFTER WORK HAS CEASED. ACCEPTABLE TEMPORARY STABILIZATION INCLUDES MULCH, STRAW, HAY, EROSION CONTROL FABRIC, OR OTHER FUNCTIONAL EQUIVALENT.
  - TEMPORARY EROSION CONTROL PROTECTION BY MULCHING SHALL BE CARRIED OUT WITHIN 14 DAYS OF FILL PLACEMENT TO FINAL FINISHED GRADE IN ORDER TO AVOID ALL POSSIBLE CONTAMINATION OF PONDS, STREAMS, OR OTHER WATERCOURSES. PLACEMENT OF JUTE MESH OVER THE MULCH IS RECOMMENDED TO PROVIDE POSITIVE "TRACKING" OF THE MULCH AND INCREASED PROTECTION AGAINST EROSION.
  - DISTURBED AREAS SHALL BE REVEGETATED IN ACCORDANCE WITH RECOMMENDATIONS CONTAINED IN THE FACILITY AND MUNICIPALITY GUIDELINES, LATEST EDITION.



- CONSTRUCTION SPECIFICATIONS**
- STONE SIZE - 1/2" TO 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
  - LENGTH - AS REQUIRED, BUT NOT LESS THAN 30' (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30' MINIMUM LENGTH WOULD APPLY).
  - THICKNESS - NOT LESS THAN 6".
  - WIDTH - 10' MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
  - FILTER CLOTH WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO THE PLACING OF STONE. FILTER WILL NOT BE REQUIRED ON A SINGLE FAMILY RESIDENCE LOT.
  - SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH S:1 SLOPES SHALL BE PERMITTED.
  - MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHT-OF-WAY MUST BE REMOVED IMMEDIATELY.
  - WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
  - STABILIZED CONSTRUCTION ENTRANCES SHALL BE MAINTAINED AND REPAIRED AFTER EACH RAIN.
  - STABILIZED CONSTRUCTION ENTRANCES SHALL BE MAINTAINED AND REPAIRED AFTER EACH RAIN.

- GENERAL NOTES**
- POST A SIGN READING "CONCRETE WASH OUT PIT" NEXT TO THE PIT.
  - VERBALLY INSTRUCT THE CONCRETE TRUCK DRIVERS WHERE THE PIT IS AND TO WASH OUT THEIR TRUCKS IN THE PIT AND NO WHERE ELSE.
  - UPON THE CONCRETE SETTING UP (CURING, DRYING OUT), THE CONCRETE WASTE SHALL BE REMOVED FROM THE PROJECT SITE AND DISPOSED OF PROPERLY BY THE CONTRACTOR. AFTER REMOVAL OF THE CONCRETE WASTE, THE WASH OUT PIT SHALL BE FILLED WITH CLEAN FILL MATERIAL AND COMPACTED TO IN-SITU CONDITIONS, OR AS DIRECTED BY THE PROJECT SPECIFICATIONS.
  - CONCRETE WASH OUT PITS SHALL NOT BE LOCATED DIRECTLY ADJACENT TO, NOR AT ANY TIME DRAIN INTO THE STORM SEWER SYSTEM OR ANY OTHER SWALE, DITCH, OR WATERWAY.
  - CONSTRUCT ENTRY ROAD AND BOTTOM OF WASHOUT AREA TO SUPPORT EXPECTED LOADINGS FROM TRUCKS EQUIPMENT.



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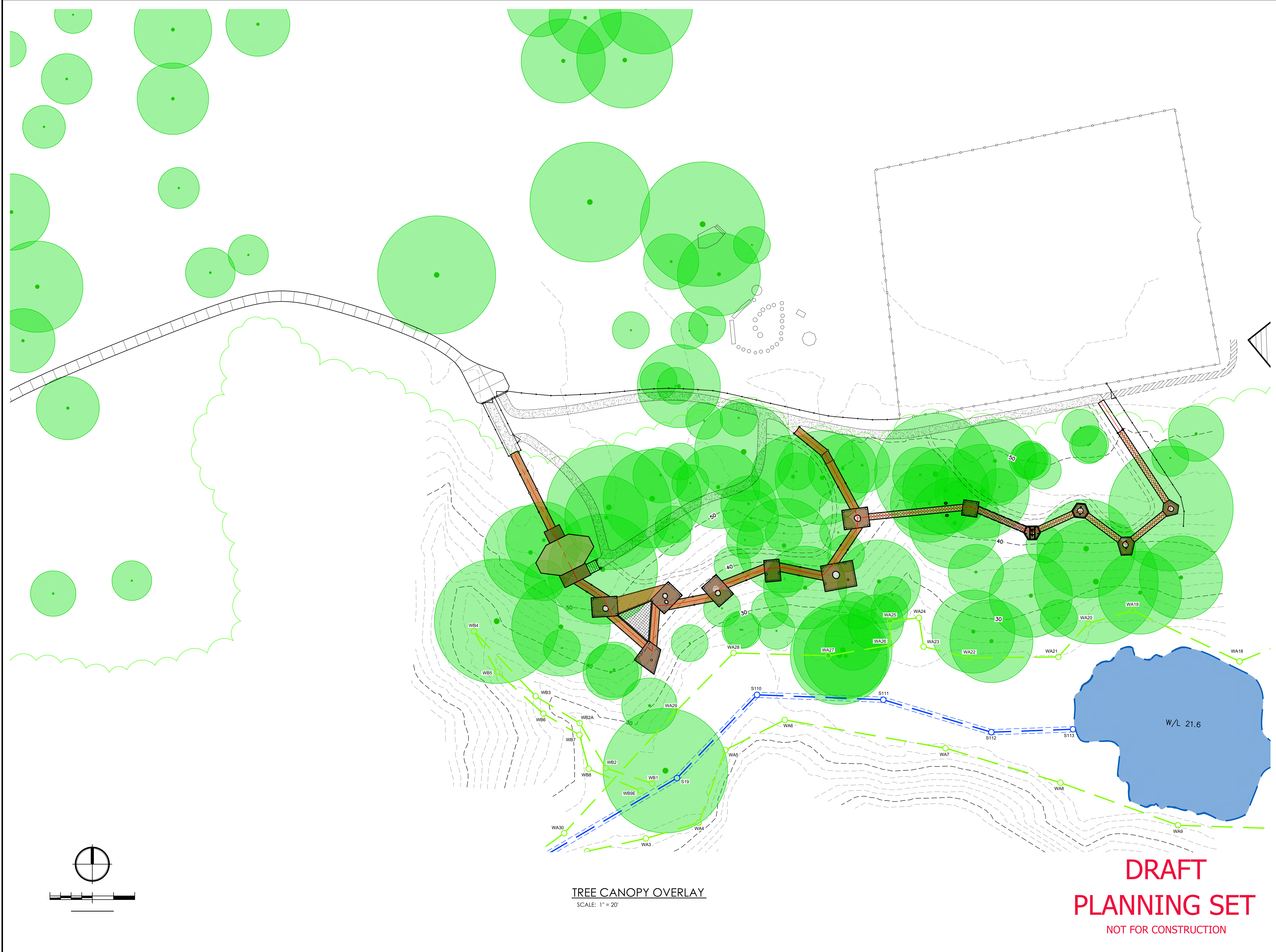
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**EROSION CONTROL  
PLAN & DETAILS**

**C1.2**



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TREE CANOPY OVERLAY  
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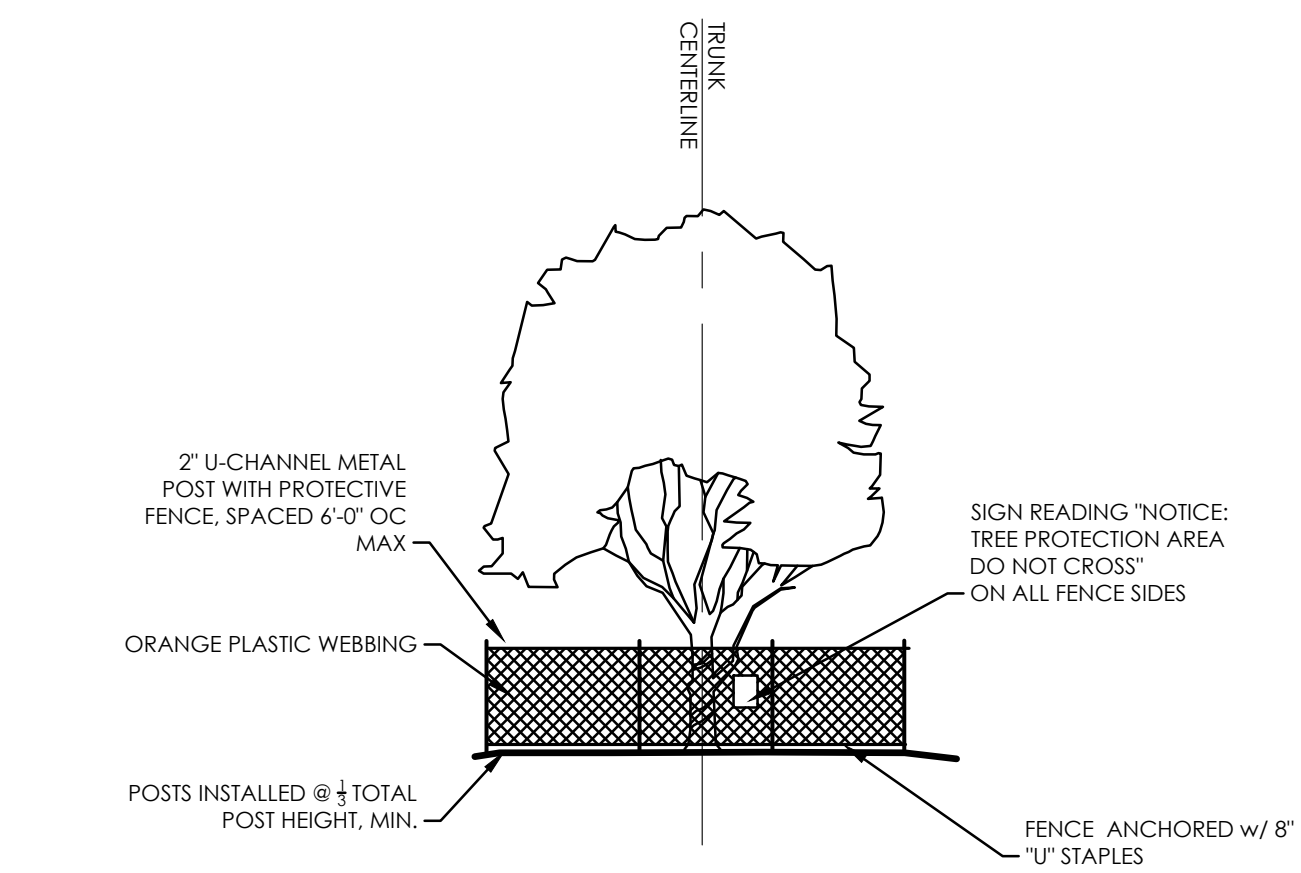
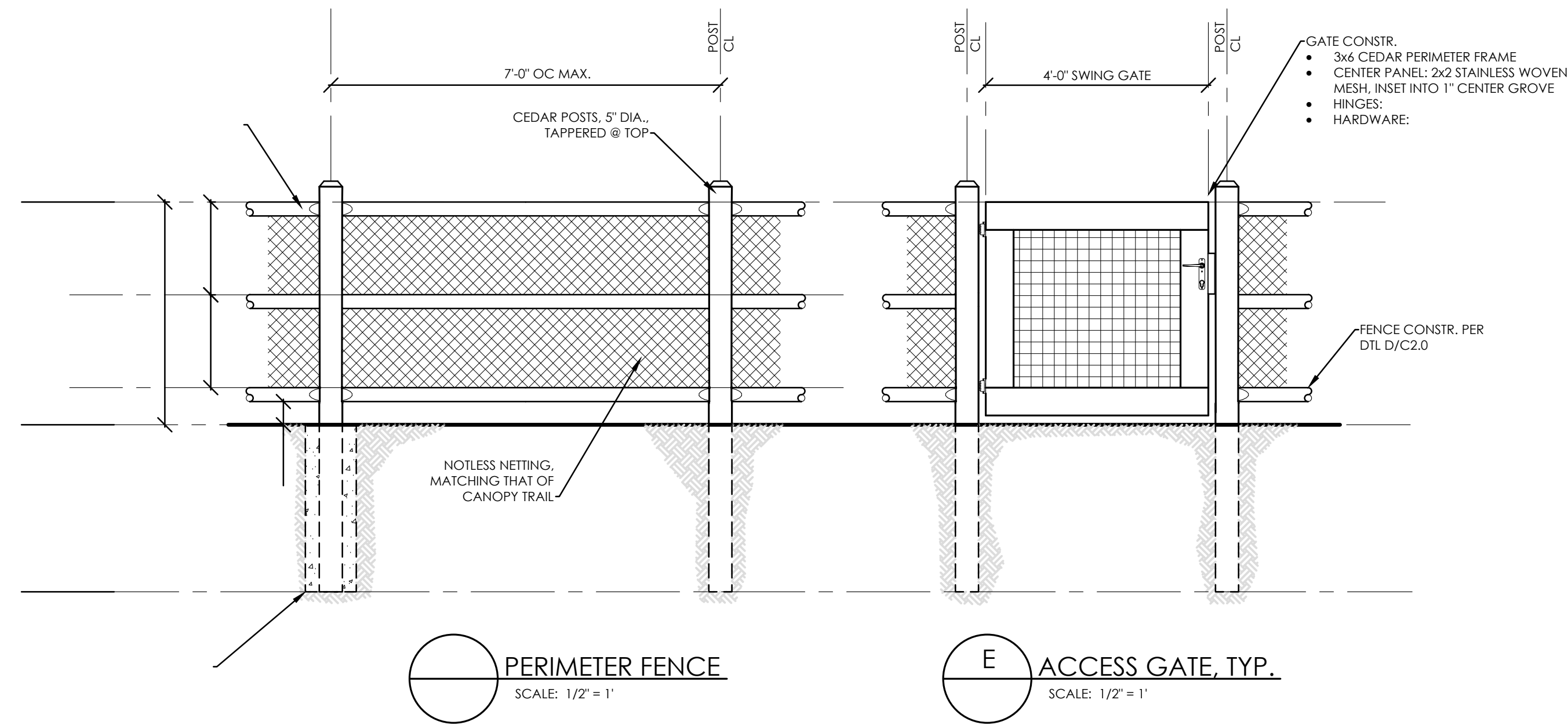
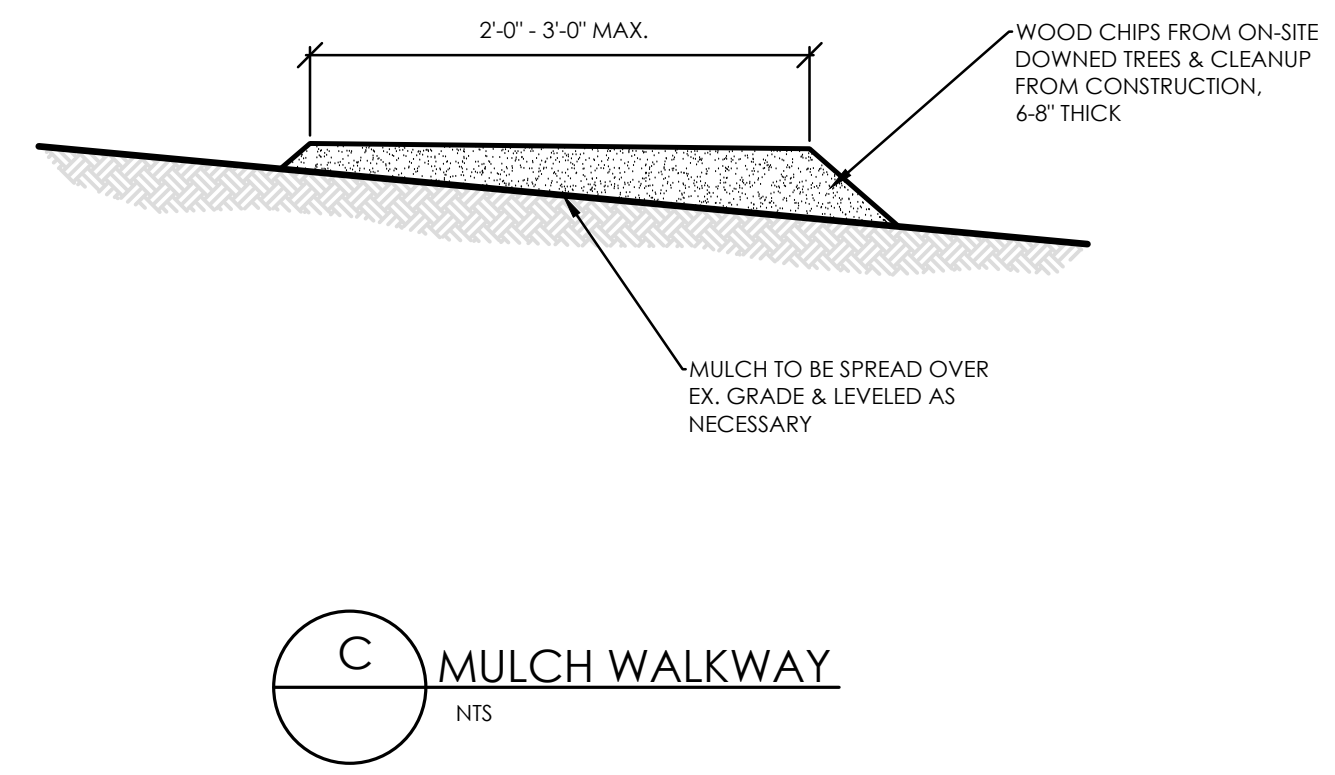
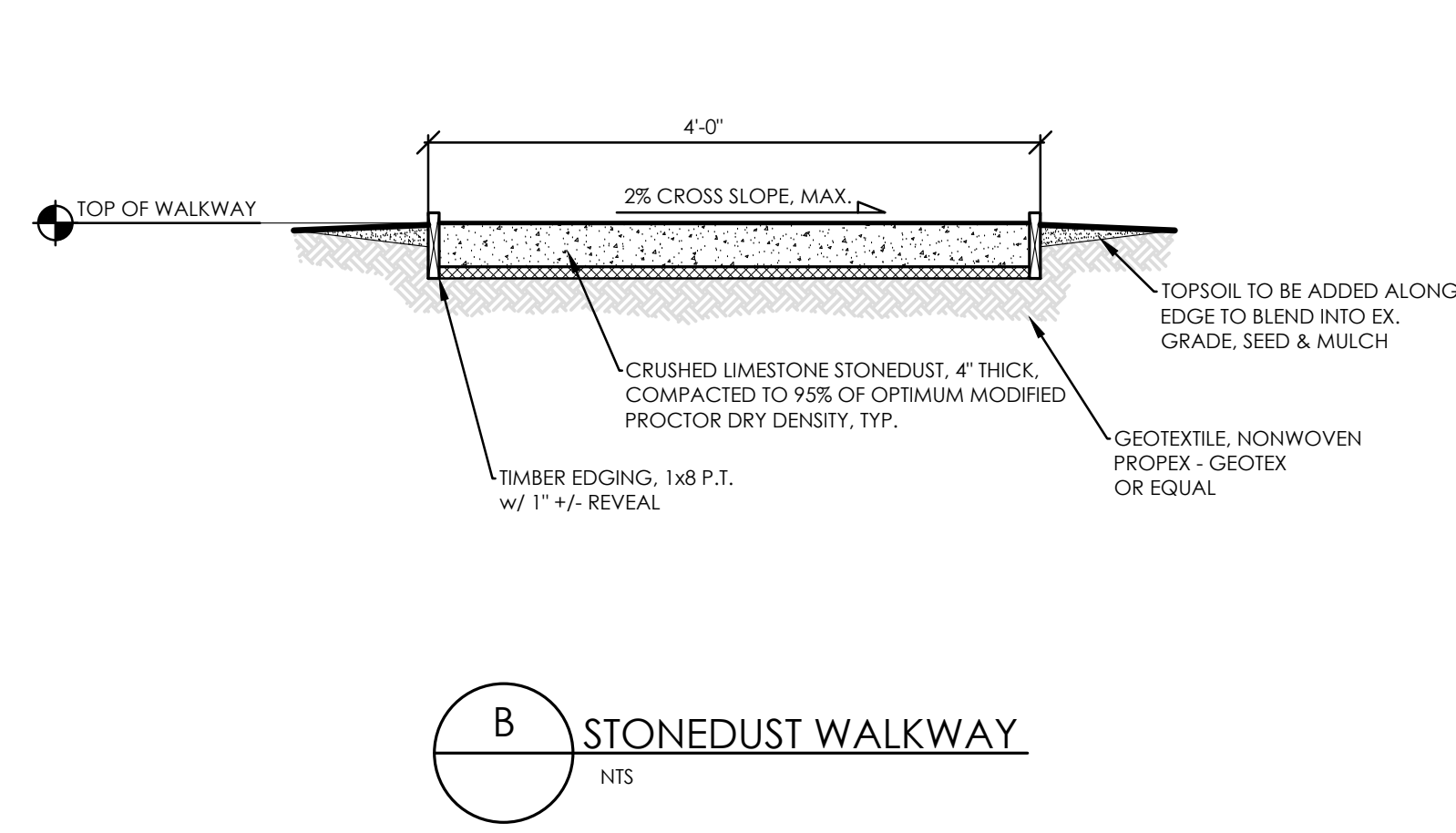
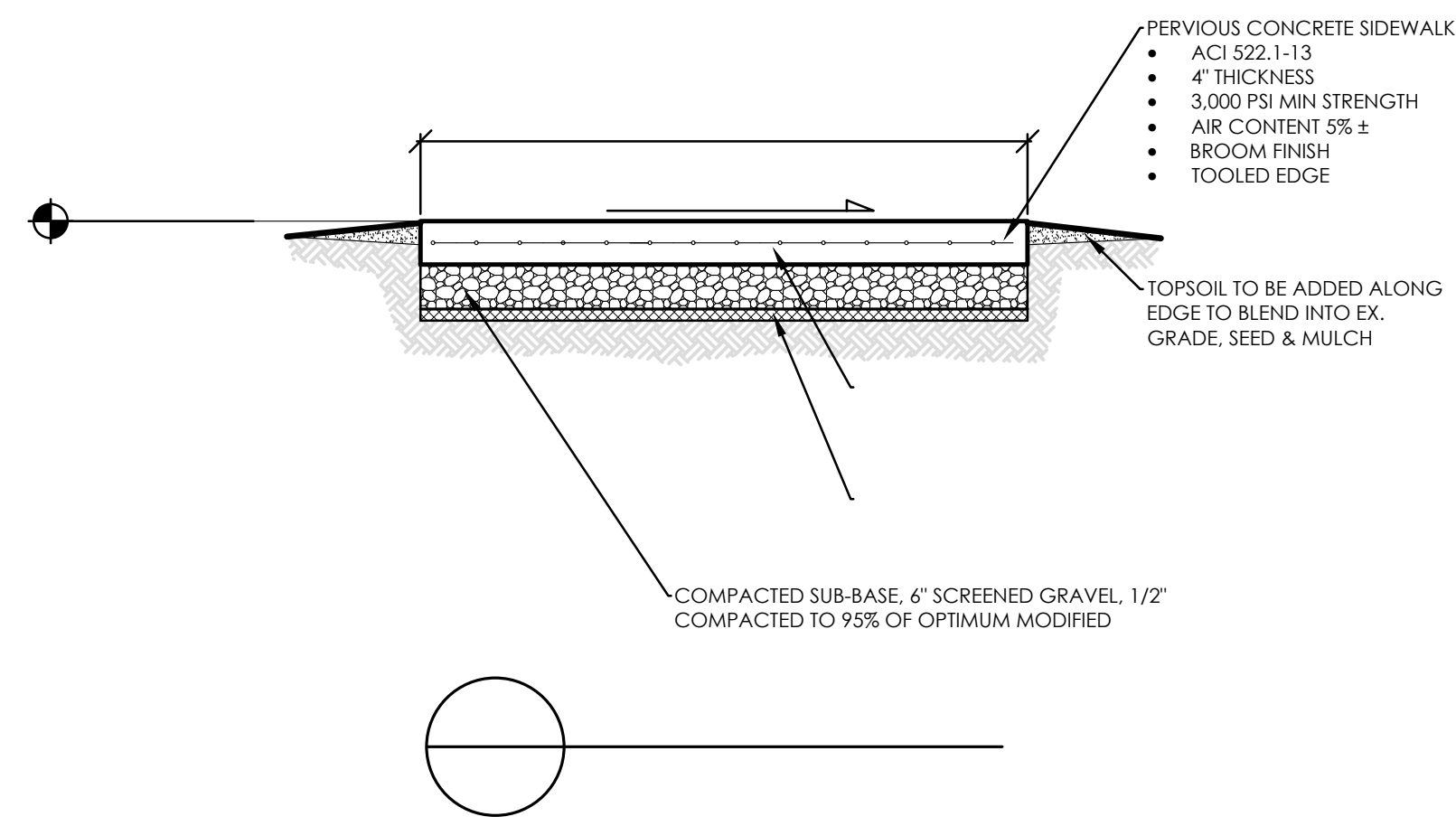
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TREE CANOPY  
OVERLAY

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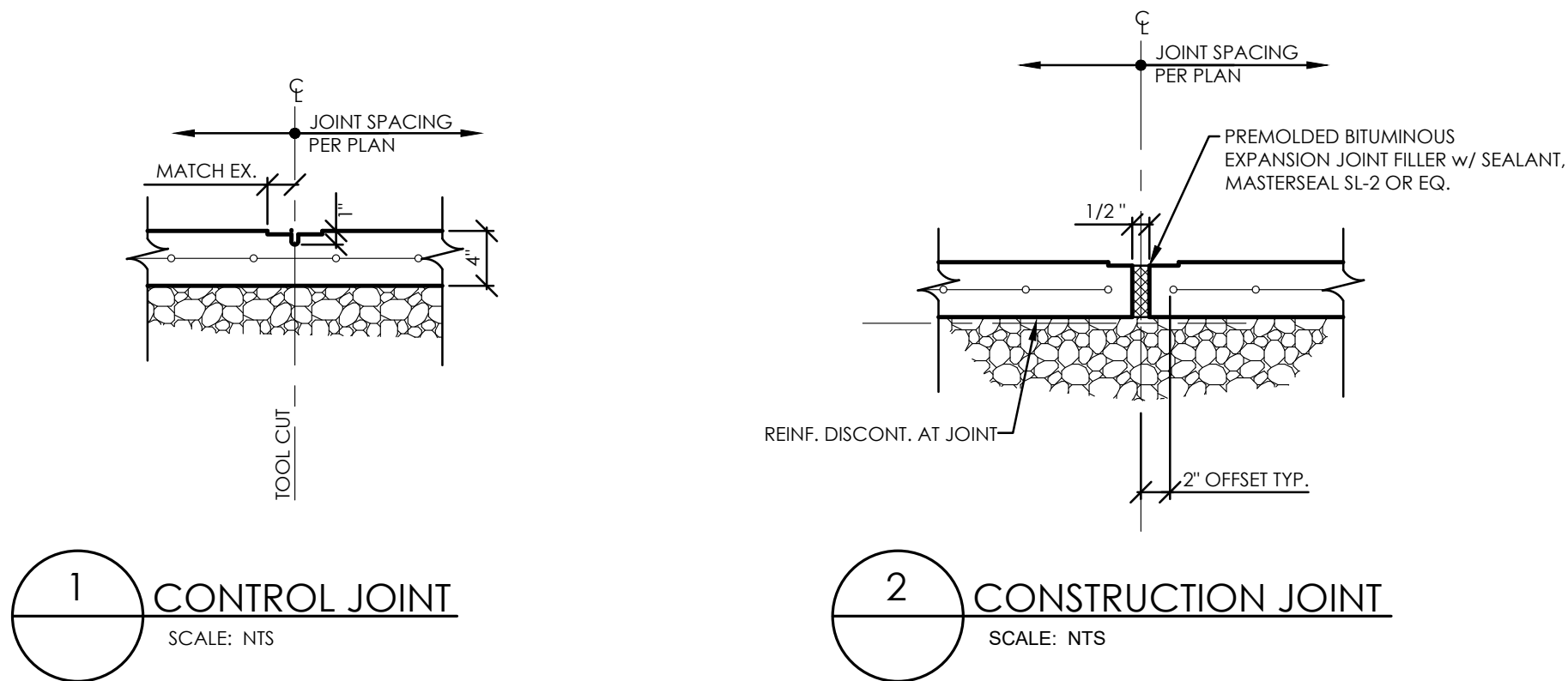


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**TREE PRESERVATION NOTES**

1. ALL TREES INDICATED PER SHEET C1.2 REQUIRE PROTECTIVE FENCING.
2. PROTECTIVE FENCING CONSISTS OF 4'-0" HIGH FENCE w/ SIGNAGE ON ALL SIDES.
3. FENCING SHALL BE PLACED AT THE DRIP LINE OF TREES TO BE PROTECTED DURING CONSTRUCTION, EXCEPT ON THE SIDE OF CONSTRUCTION WHERE FENCING SHALL NOT BE PLACED CLOSER TO THE TREE THAN 1/4 THE TOTAL DISTANCE FROM THE TREE TO THE LIMITS OF THE TREE DRIPLINE. THIS SPACE IS TO ACCOMMODATE GRADING ONLY AND NOT TO ALLOW ADDITIONAL WORKING SPACE.
4. GROUPS OF TREE MAY BE FENCED AS ONE SINGLE UNIT.
5. DURING CONSTRUCTION, NO EXCESS SOIL, FILL MATERIAL, EQUIPMENT, LIQUIDS OR CONSTRUCTION DEBRIS SHALL BE PLACED WITHIN THE PROTECTIVE FENCING, NOR SHALL ANY SOIL BE REMOVED FROM WITHIN THE FENCING.
6. ALL TREE PROTECTION MUST BE STAKED AND FLAGGED PRIOR TO INSTALLING AND CONSTRUCTION AND MAINTAINED THROUGHOUT CONSTRUCTION.
7. ROOT DAMAGE IS TO BE AVOIDED TO MAXIMUM EXTENT POSSIBLE.



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SITE DETAILS

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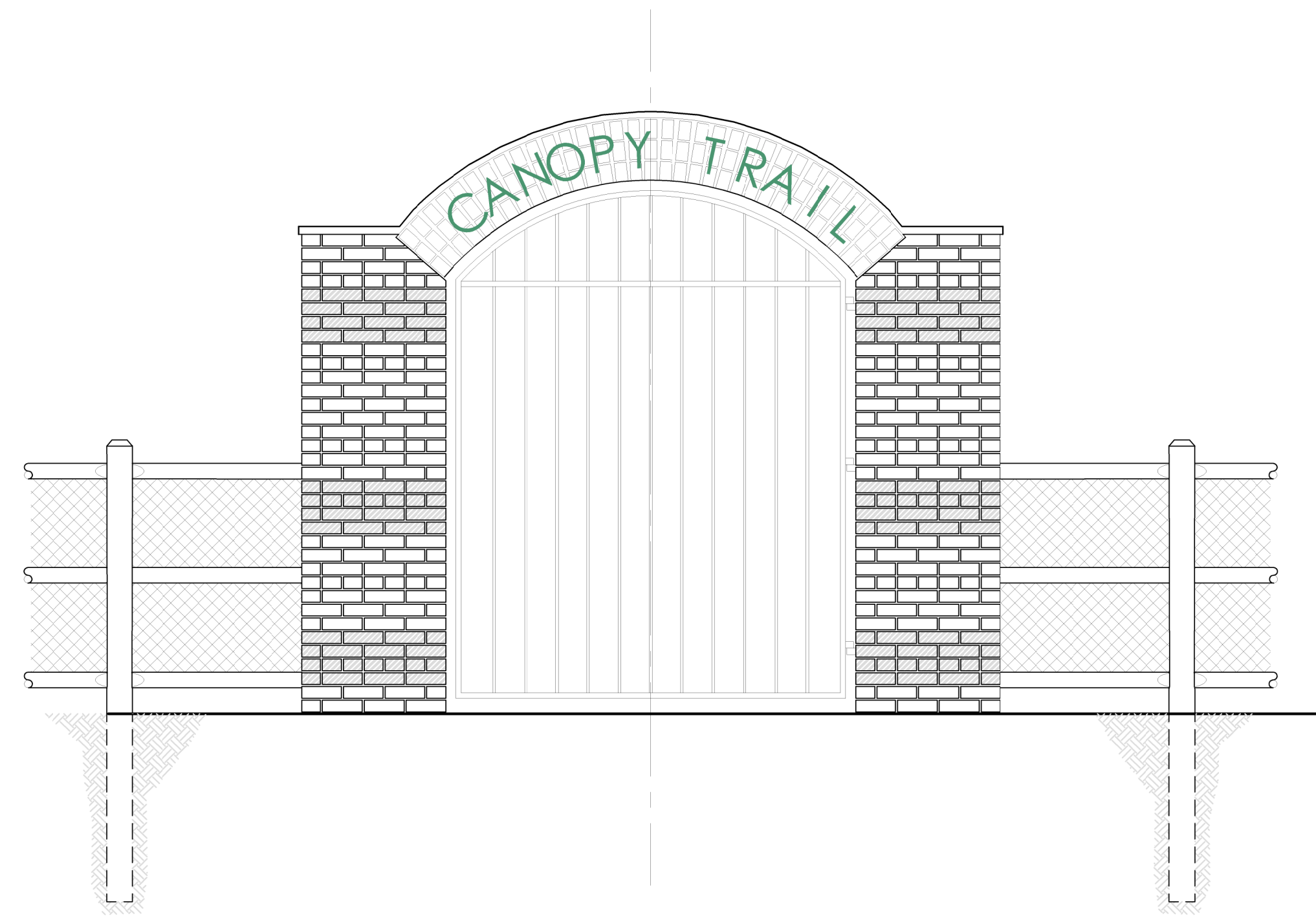




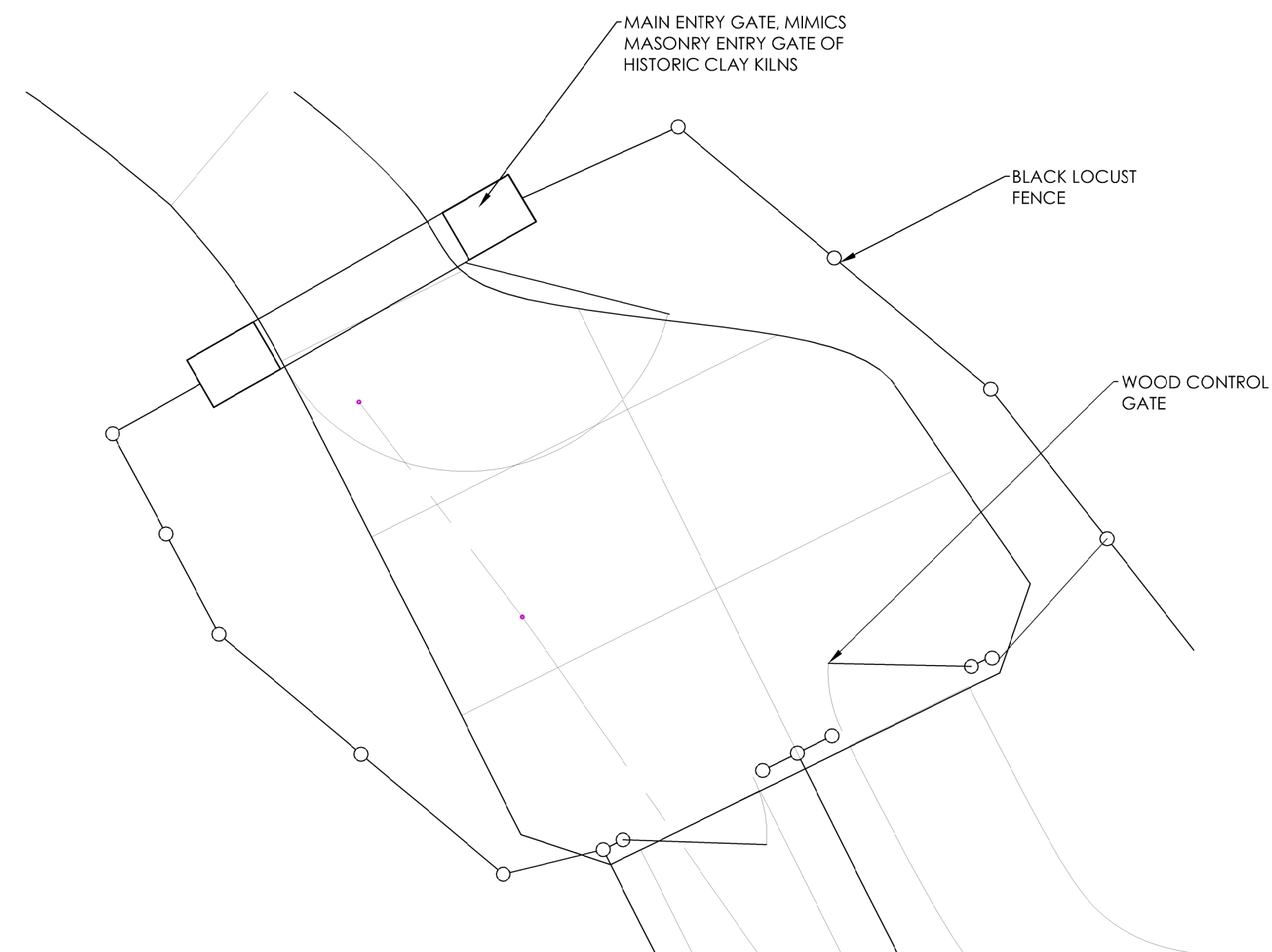




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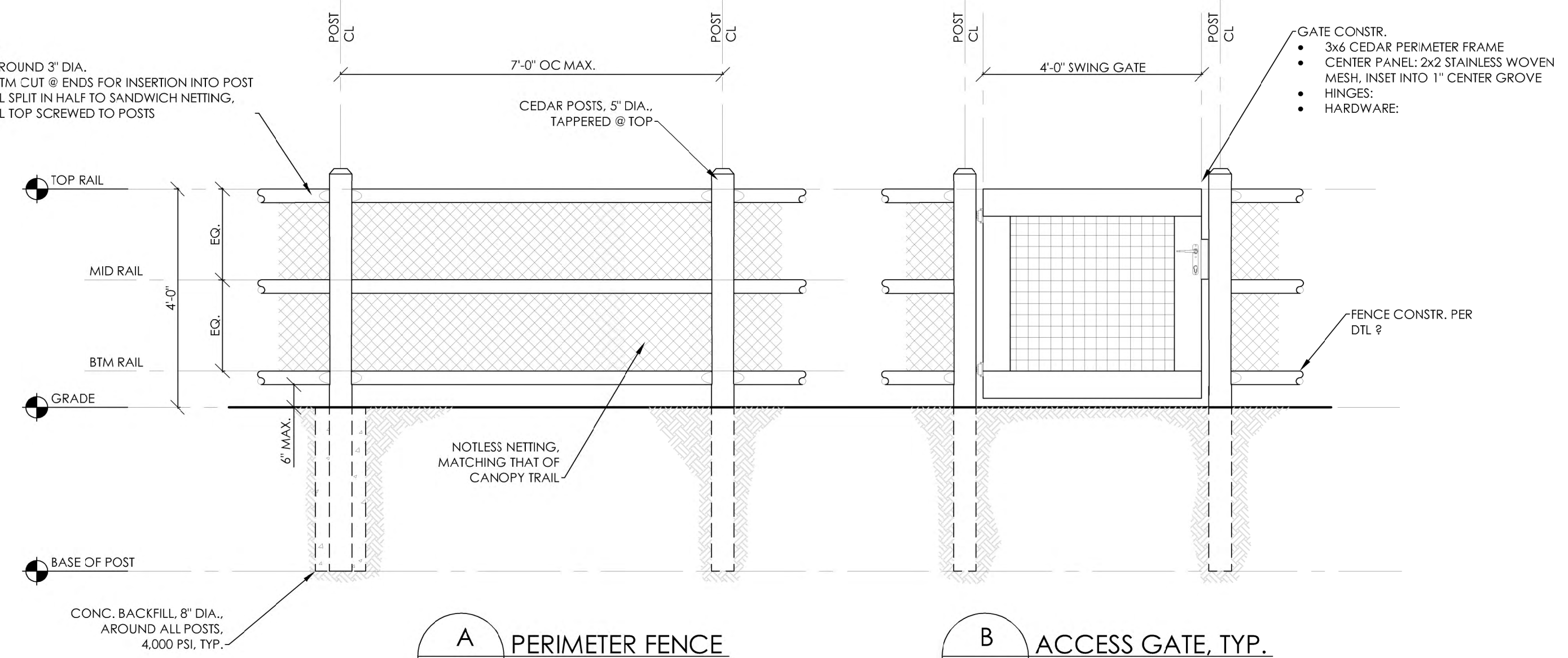


**B** MAIN ENTRY GATE  
SCALE: 1/2" = 1'



**1** MAIN ENTRY GATE - SITE PLAN  
SCALE: 1/4" = 1'

FENCE RAILS  
• CEDAR ROUND 3" DIA.  
• TOP & BTM CUT @ ENDS FOR INSERTION INTO POST  
• MID-RAIL SPLIT IN HALF TO SANDWICH NETTING,  
• MID-RAIL TOP SCREWED TO POSTS



**A** PERIMETER FENCE  
SCALE: 1/2" = 1'

**B** ACCESS GATE, TYP.  
SCALE: 1/2" = 1'



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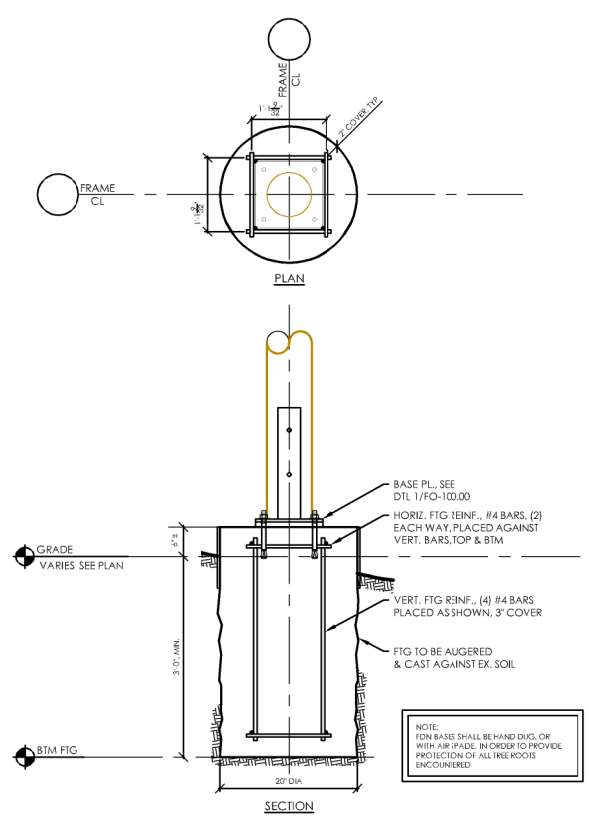
MAIN ENTRY GATE AND FENCE DETAILS

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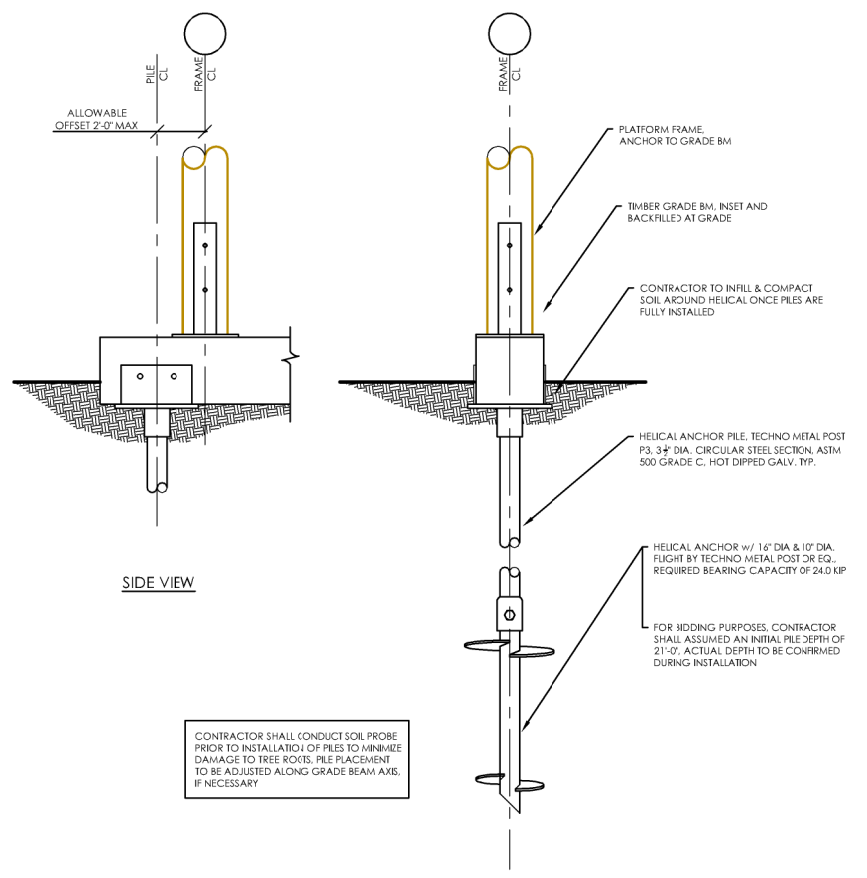
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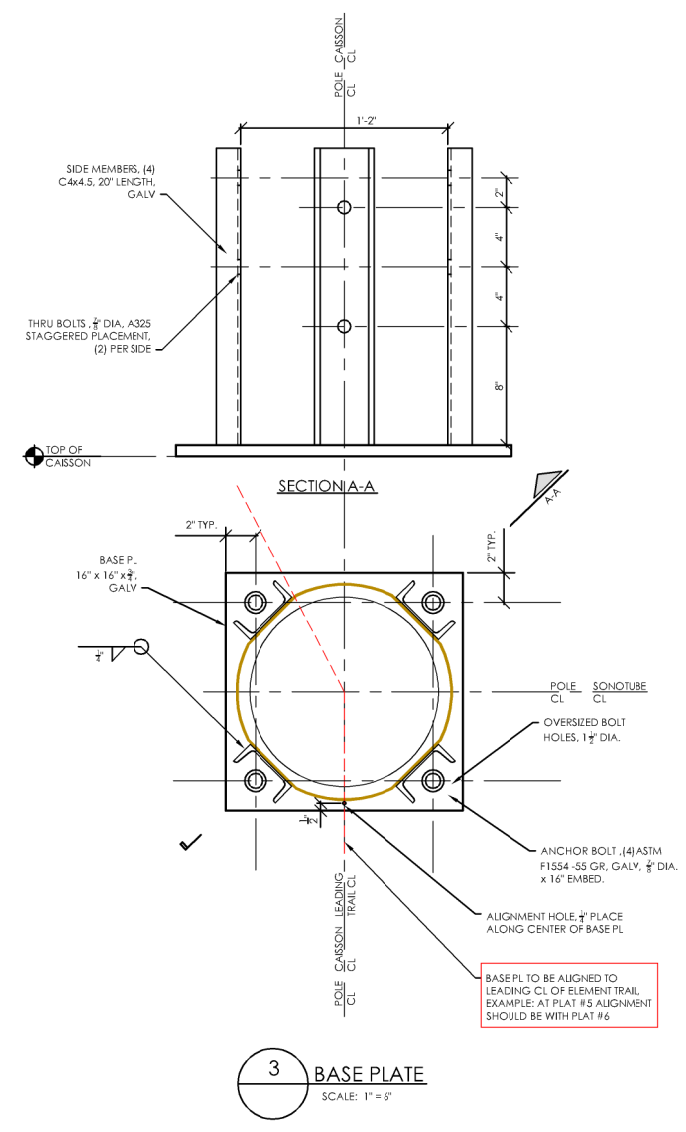
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**1 SONOTUBE-FTG**  
SCALE: 3/4" = 1"



**2 ALT. HELICAL PILE FDN**  
SCALE: 3/4" = 1"



**3 BASE PLATE**  
SCALE: 1" = 5"

NOTE:  
1. ALL STEEL MEMBERS AND CONNECTION COMPONENTS TO BE HOT-DIPPED GALVANIZED PER ASTM A123 AND A153.  
2. SIZE OF ALL CONNECTION CONDITION TO BE FABRICATED TO TAKE INTO ACCOUNT INCREASE IN PLATE THICKNESS DUE TO GALVANIZATION.

CONTRACTOR SHALL CONDUCT SOIL PROBE PRIOR TO INSTALLATION OF PILES TO MINIMIZE DAMAGE TO TREE ROOTS. PILE PLACEMENT TO BE ADJUSTED ALONG GRADE BEAM AXIS, IF NECESSARY.

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FOUNDATION  
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S1.1

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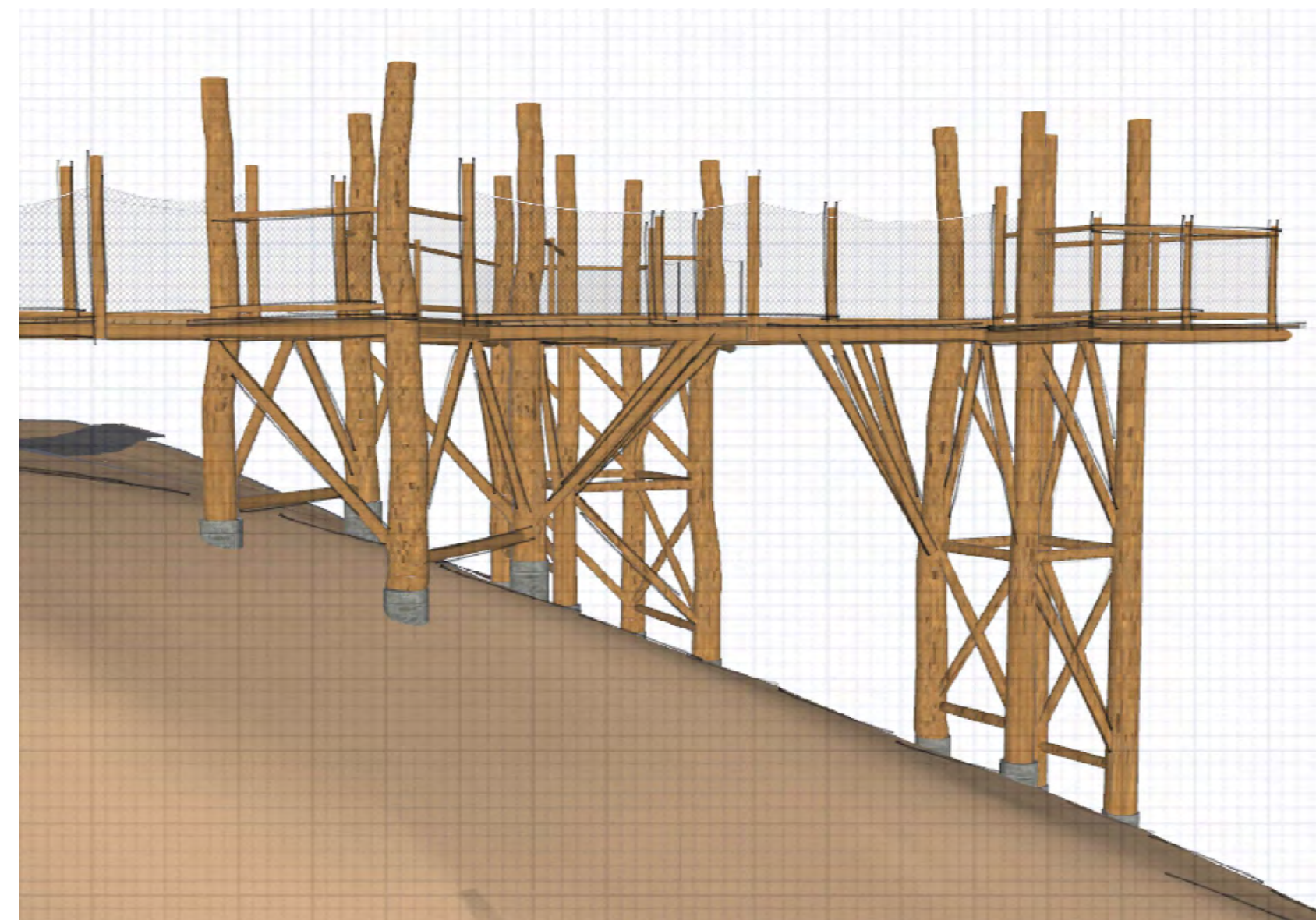
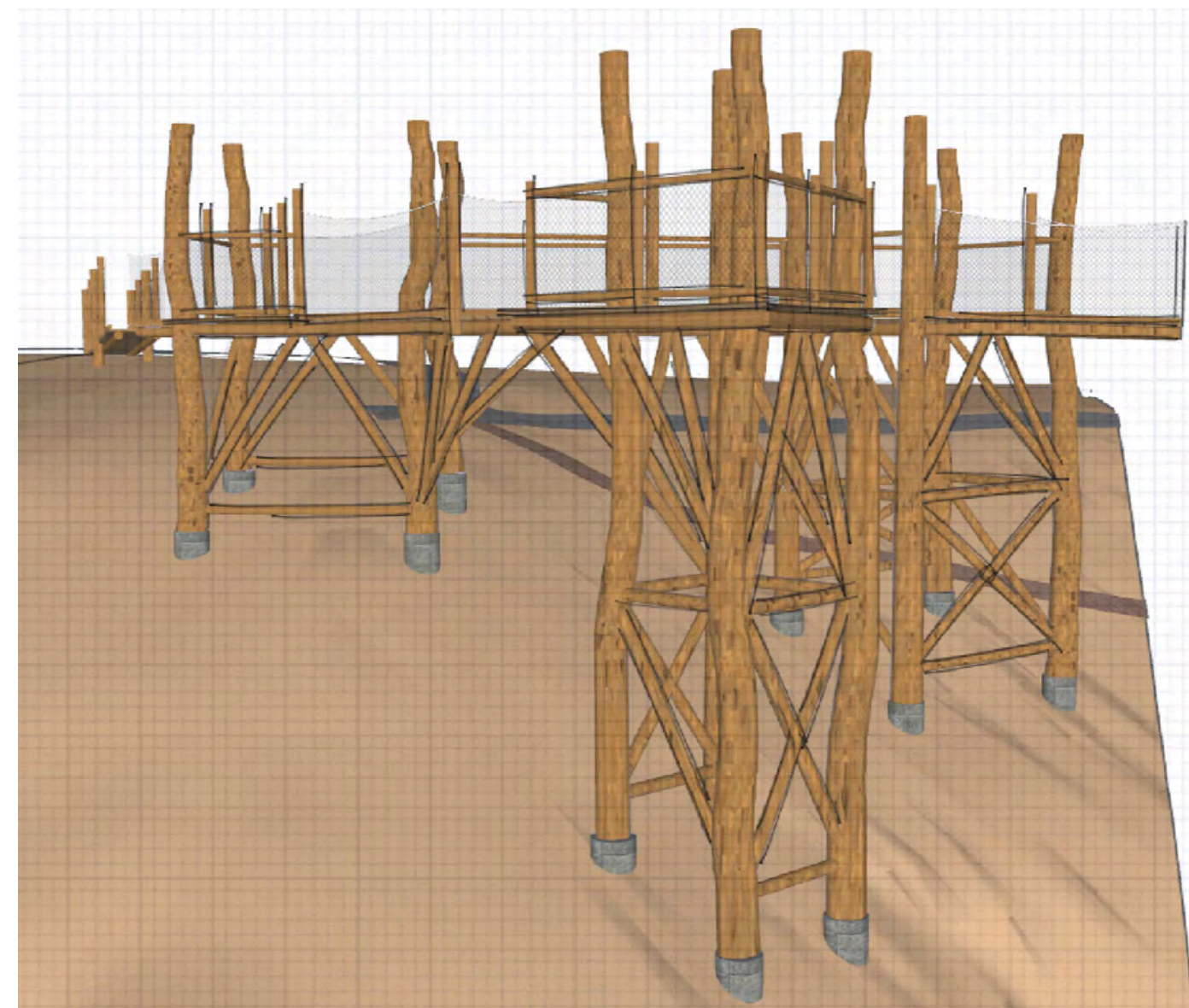
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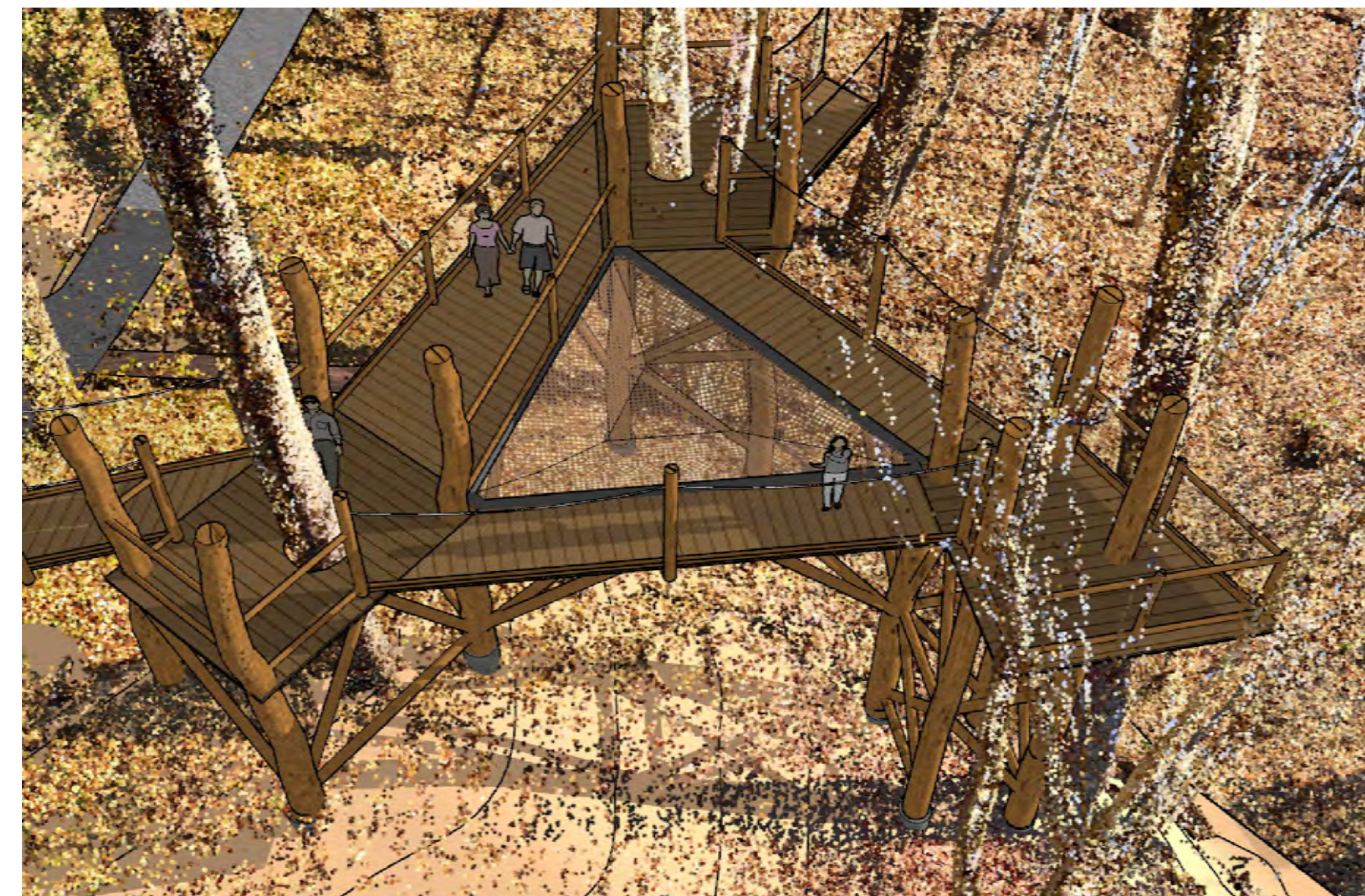
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**SQUIRRELS NEST  
ELEVATIONS &  
SKETCH VIEWS**

**S2.1**



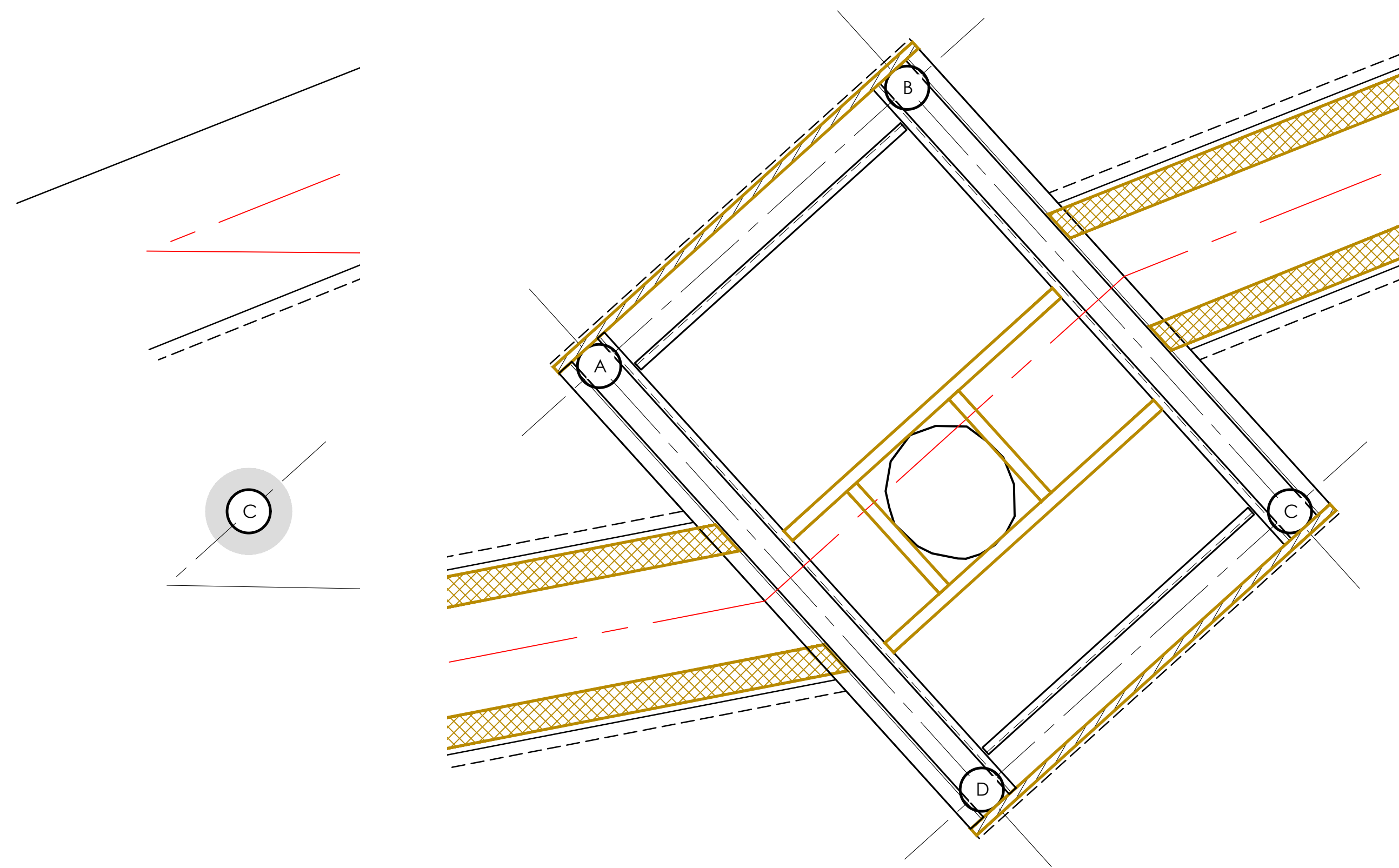
2 ELEVATION 2  
SCALE: NTS



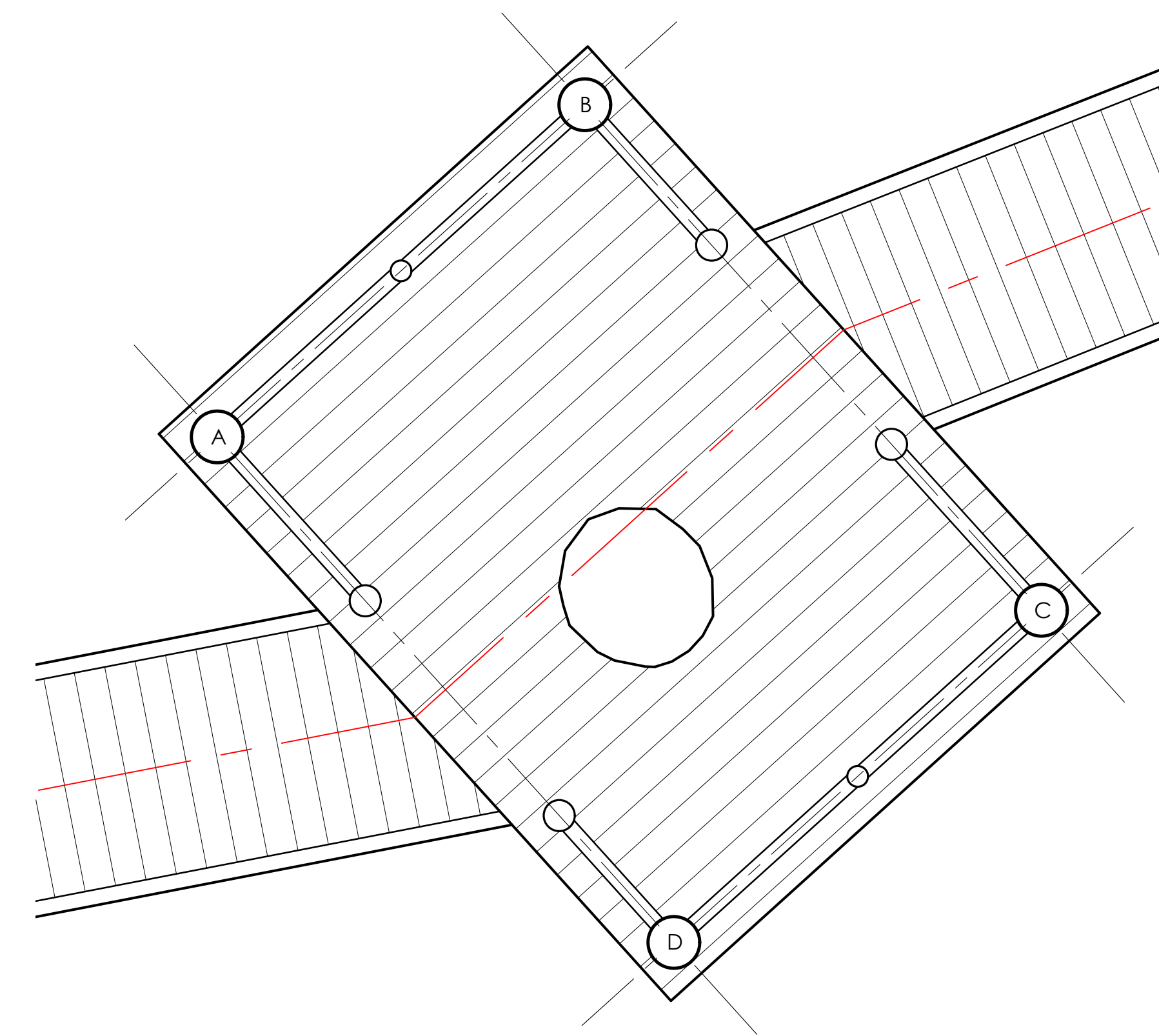
3 ISOMETRIC  
SCALE: NTS

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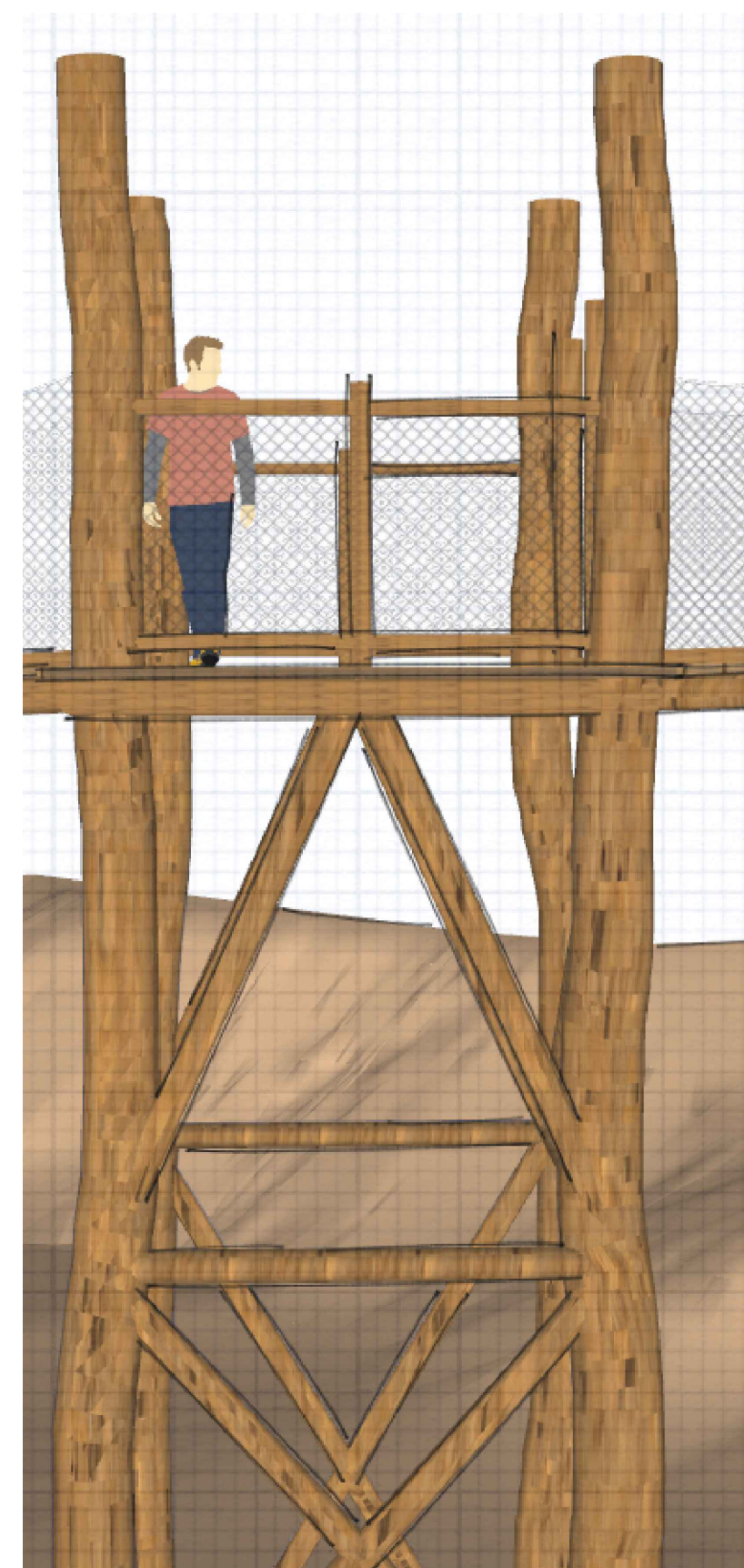
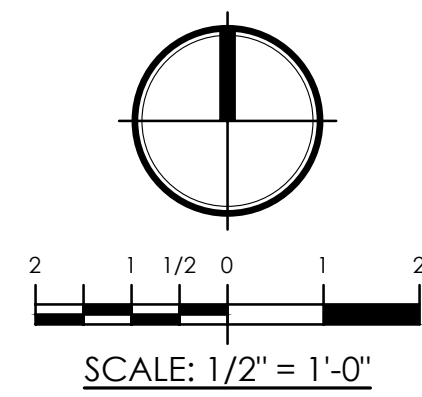




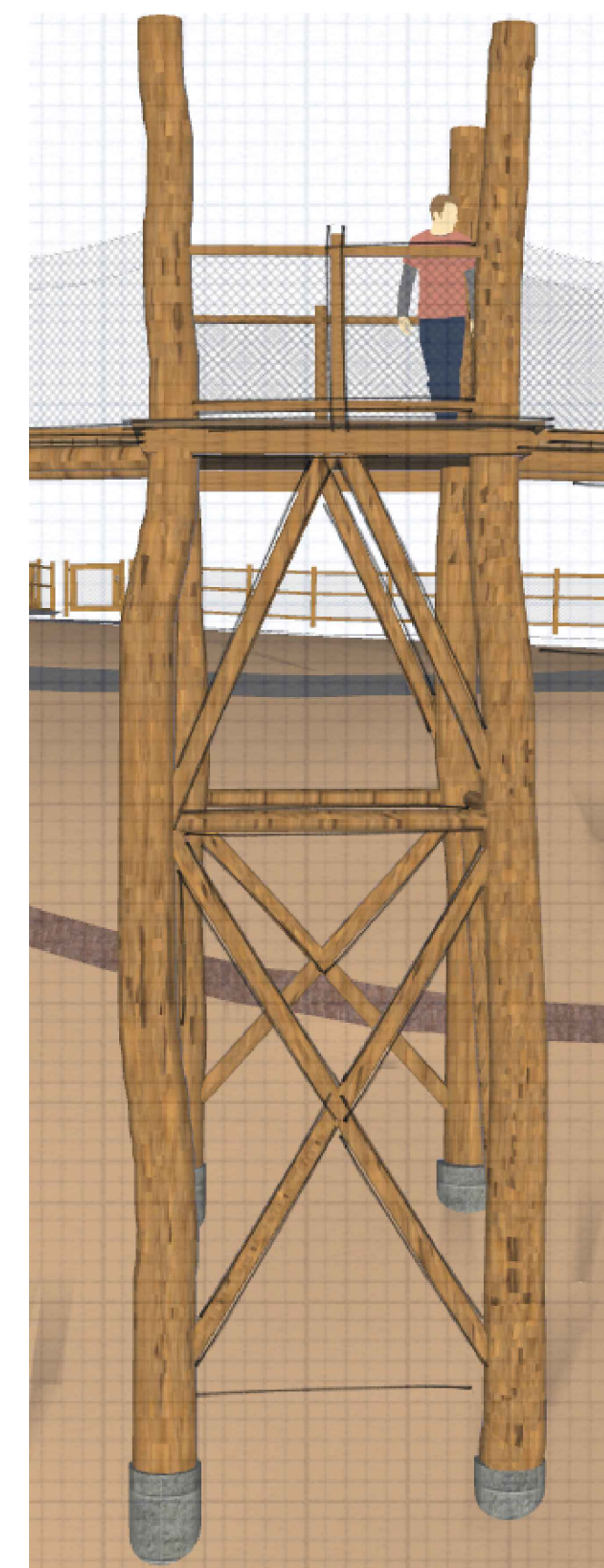
**B** DECK FRAMING PLAN  
SCALE: 1/2" = 1'



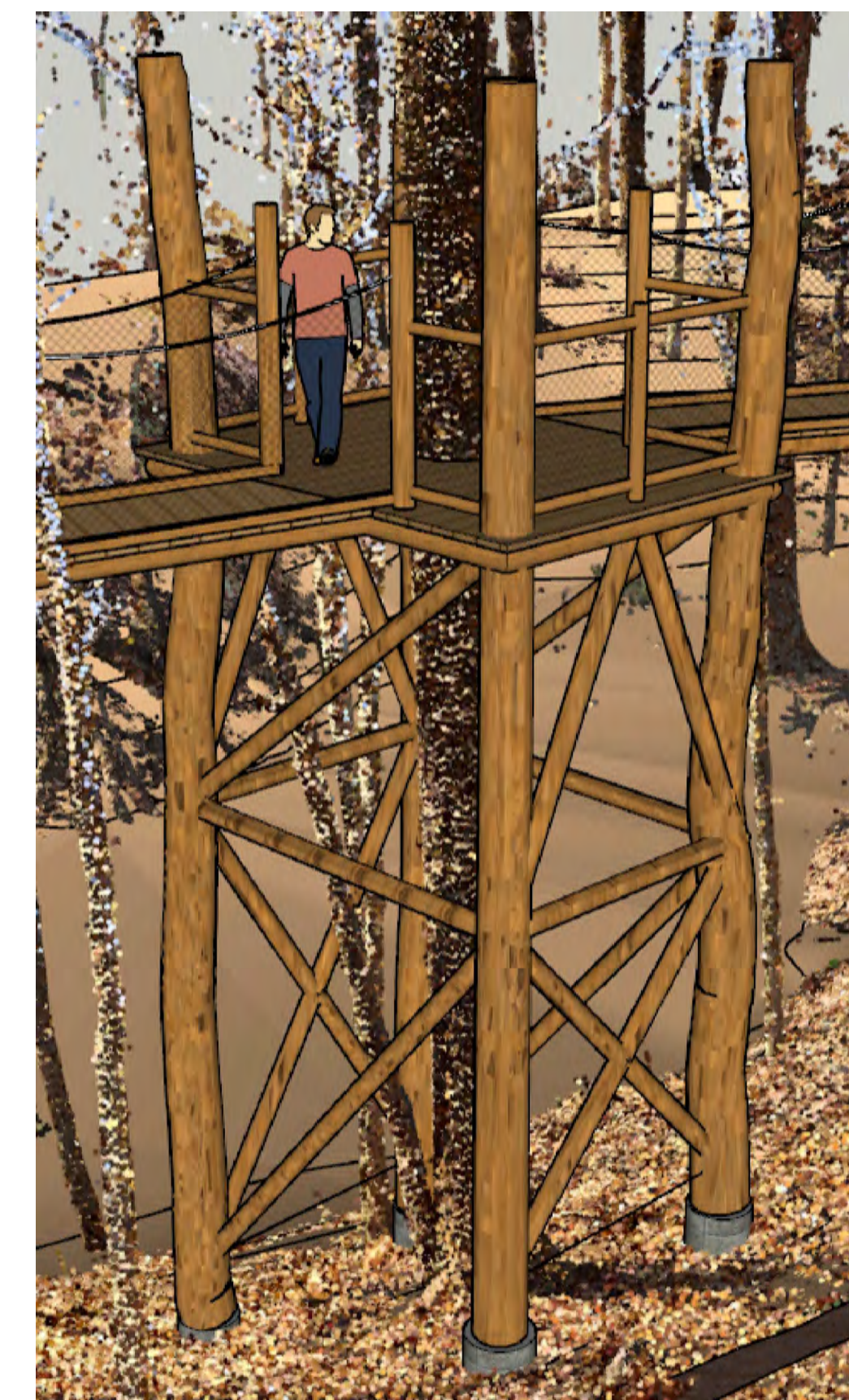
**C** DECK PLAN  
SCALE: 1/2" = 1'



**1** ELEVATION 1  
SCALE: NTS



**2** ELEVATION 2  
SCALE: NTS



**3** ISOMETRIC  
SCALE: NTS

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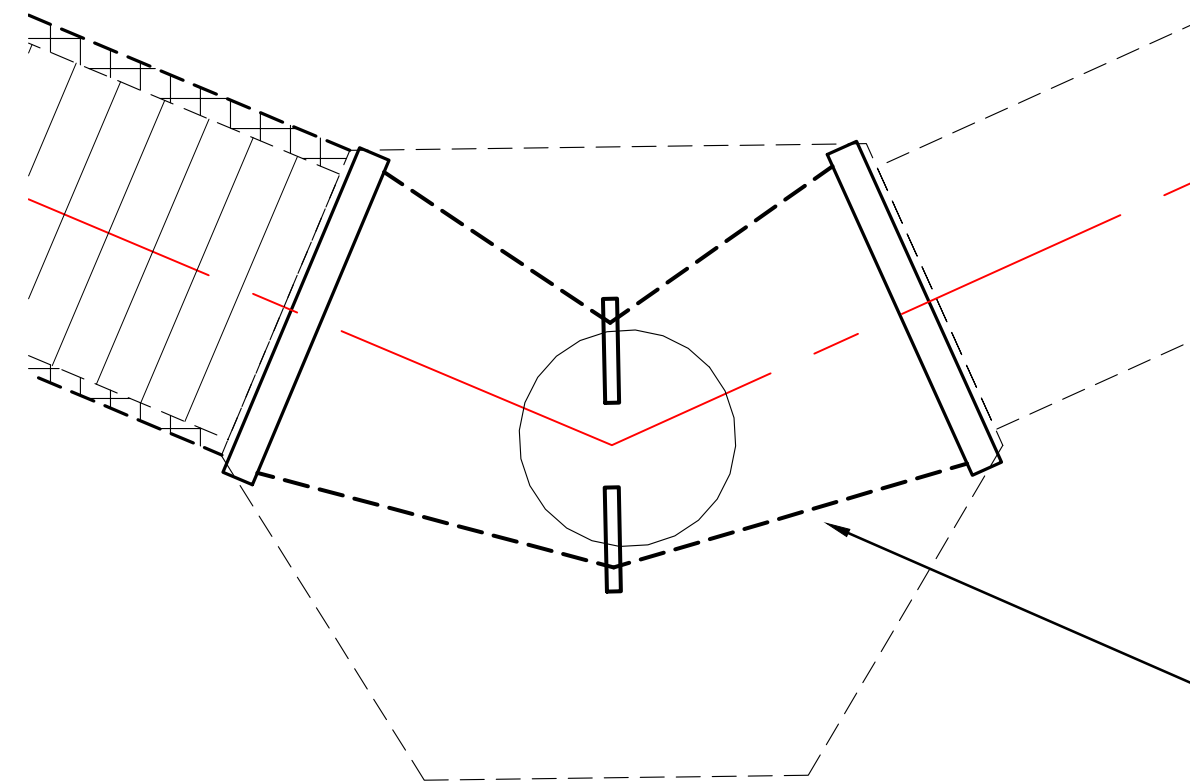
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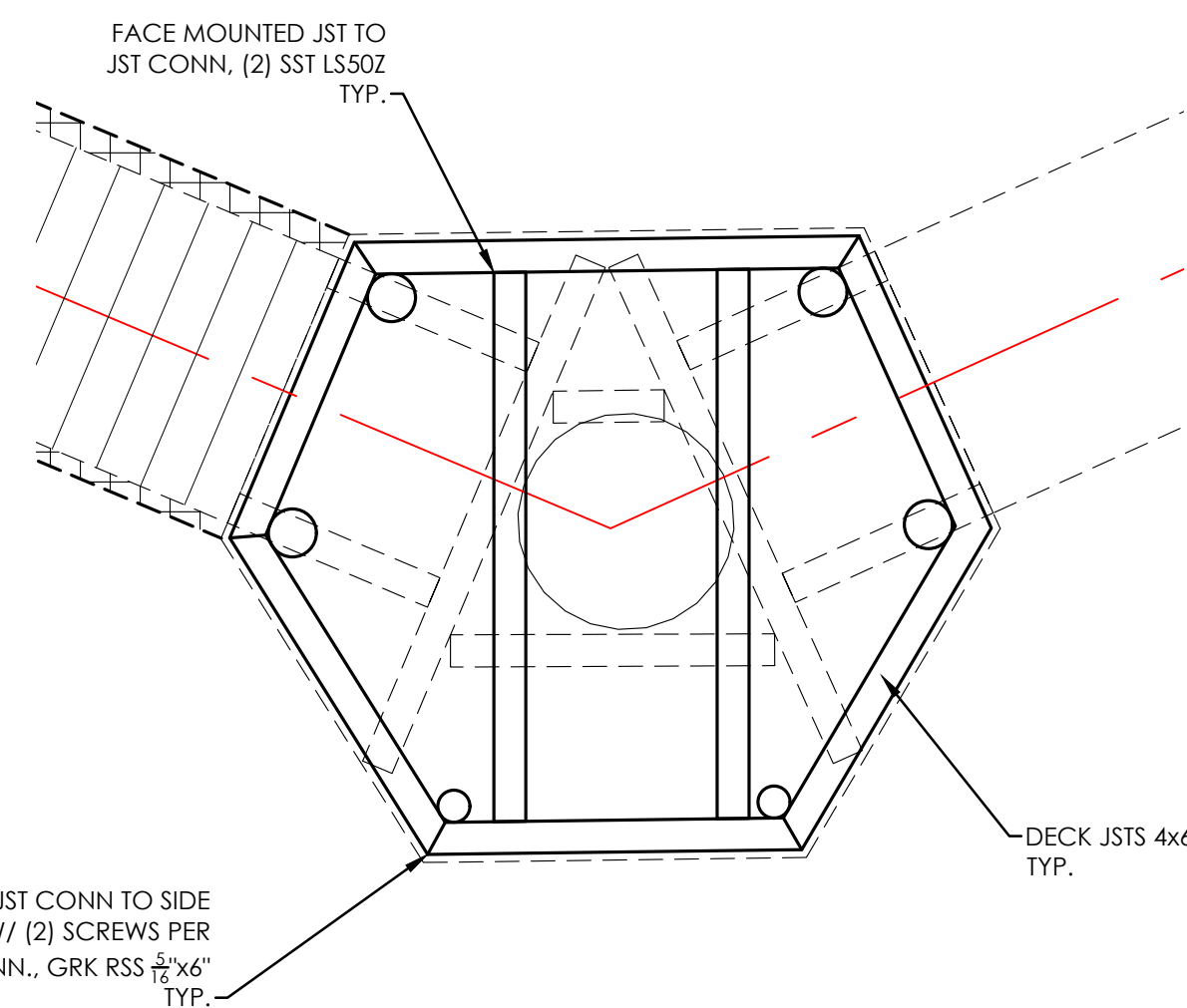
DATE	DESCRIPTION





WIRE ROPE BRACE, 12 mm, TERMINATED @ TAB PER DTL S/S3.0, & WRAPPED AROUND POLE, TYP.

6 UPPER BRACE FRAMING PLAN  
SCALE: 1/2" = 1'

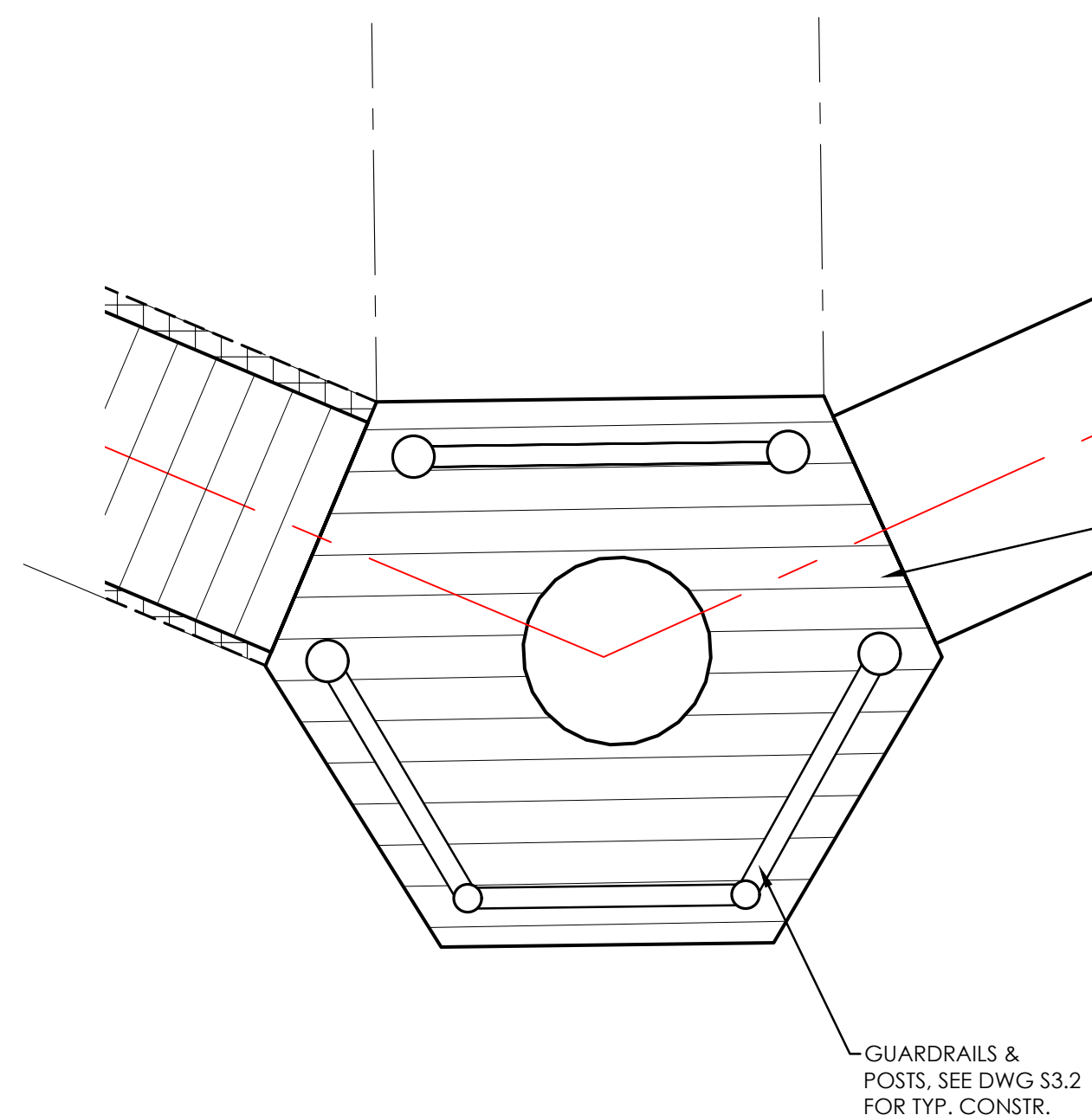


STANDARD BRIDGE STRUT, HSS 5x3x1/4 SEE DTL

EDGE JST CONN TO SIDE JSTS W/ (2) SCREWS PER CONN., GRK RSS 1/2"x6" TYP.

DECK JSTS 4x6, TYP.

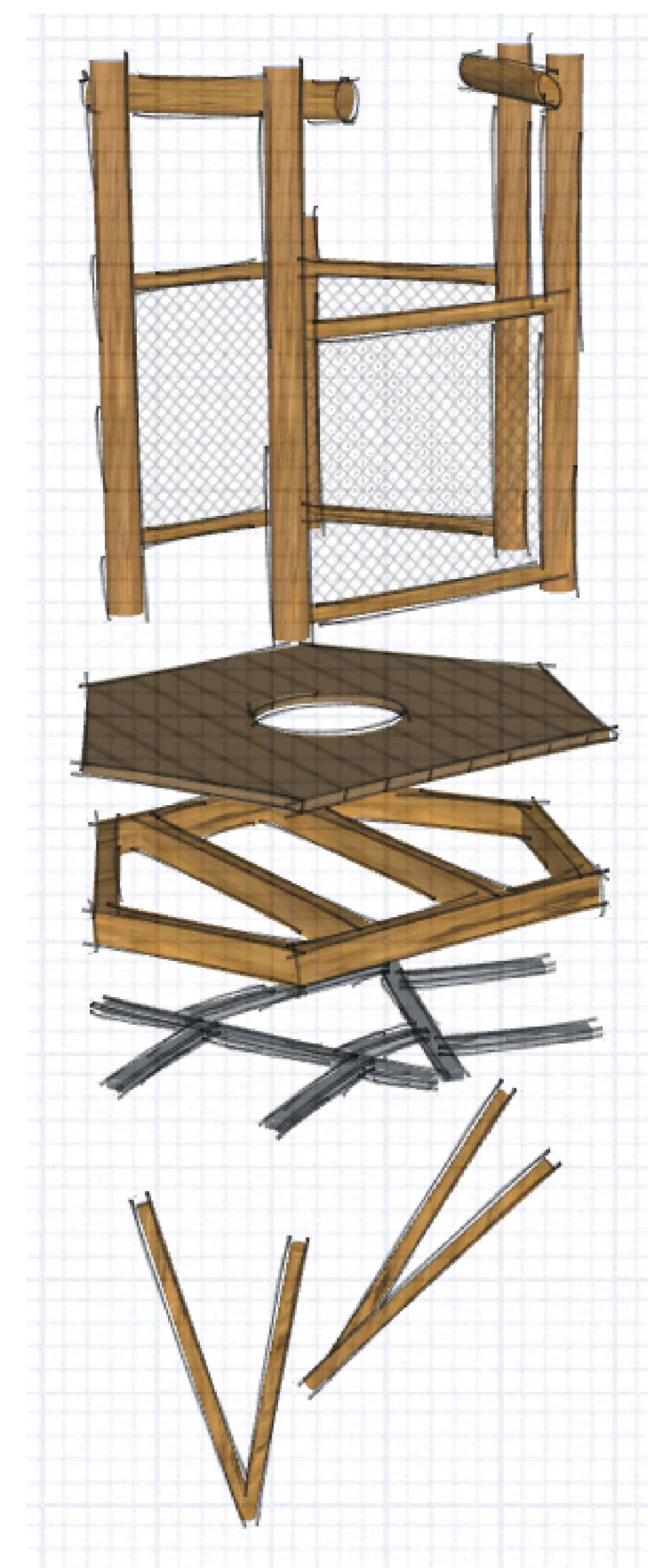
3 PLATFORM TIMBER FRAMING PLAN  
SCALE: 1/2" = 1'



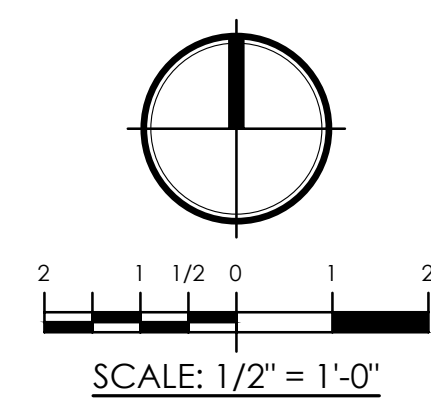
DECKING, RC WESTERN RED CEDAR SEE DTL D/S3.0

GUARDRAILS & POSTS, SEE DWG S3.2 FOR TYP. CONSTR.

4 PLATFORM PLAN  
SCALE: 1/2" = 1'



7 ASSEMBLY VIEW  
SCALE: NTS



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NATIONAL ARBORETUM  
CANOPY TRAIL

DISTRICT OF COLUMBIA

C/O WASHINGTON

TREE PLATFORM #9  
PLANS & ELEVATIONS

S3.9

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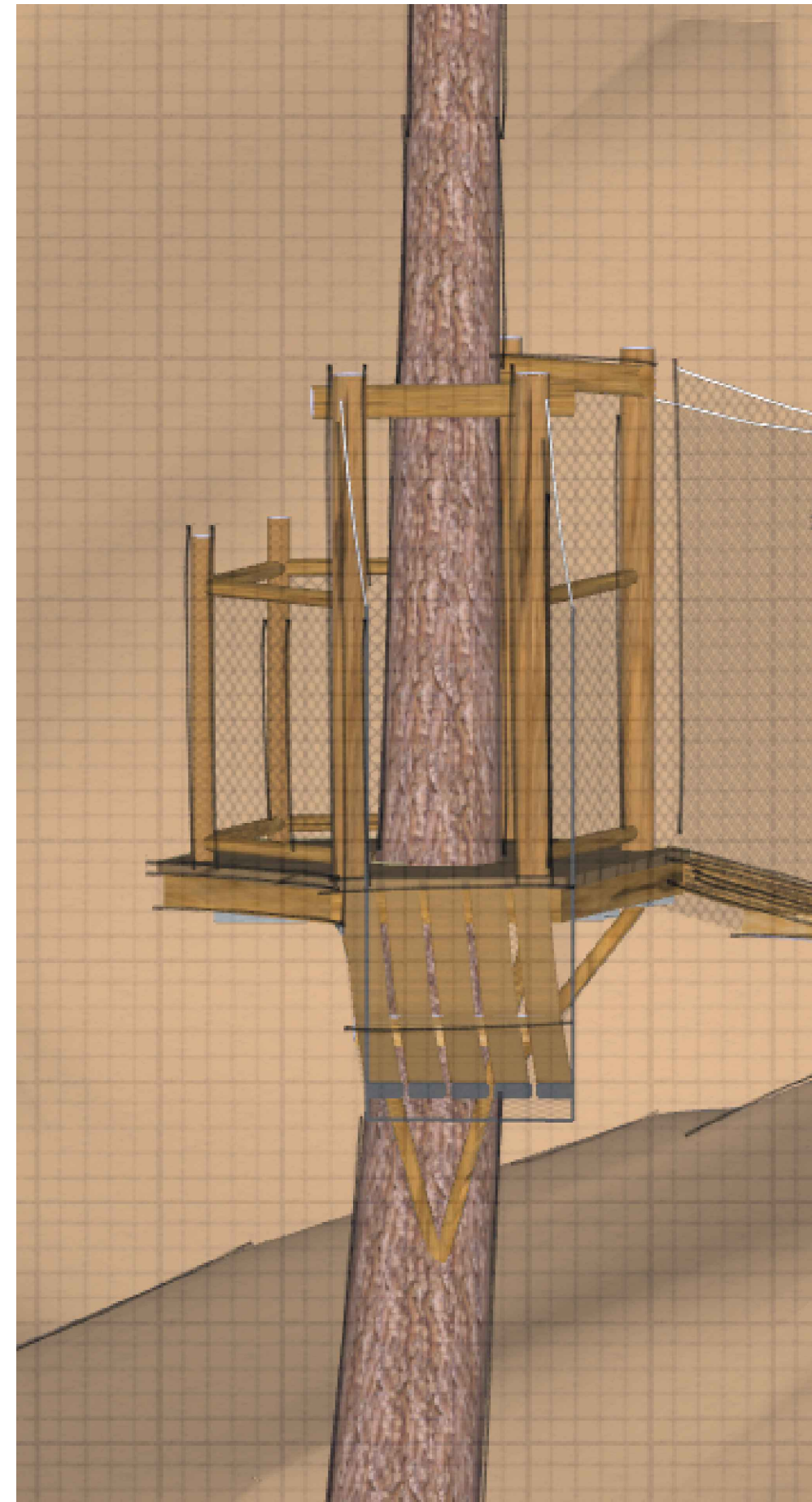
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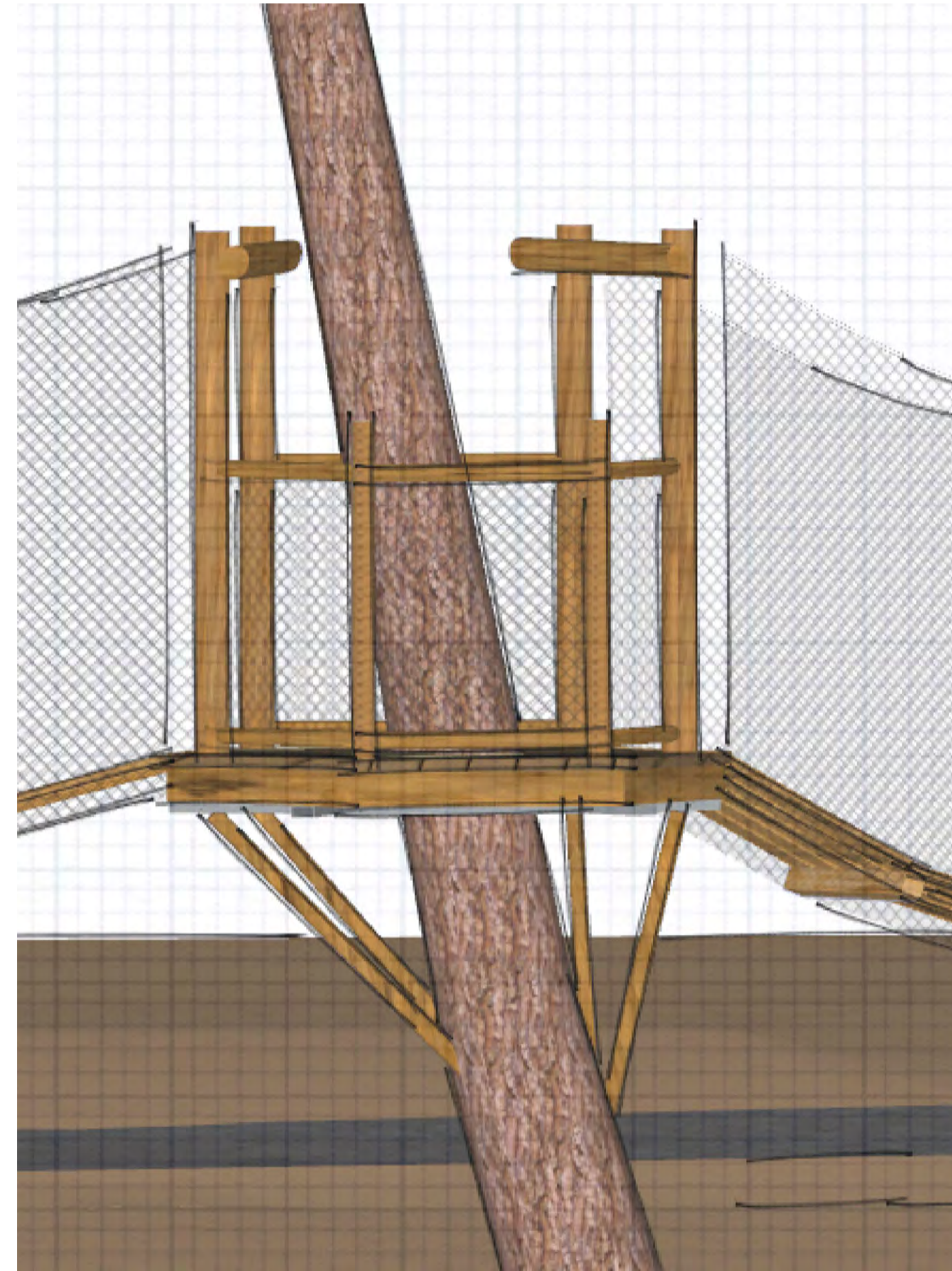
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DATE	DESCRIPTION



2 ELEVATION VIEW 1  
SCALE: NTS



1 ELEVATION VIEW  
SCALE: NTS

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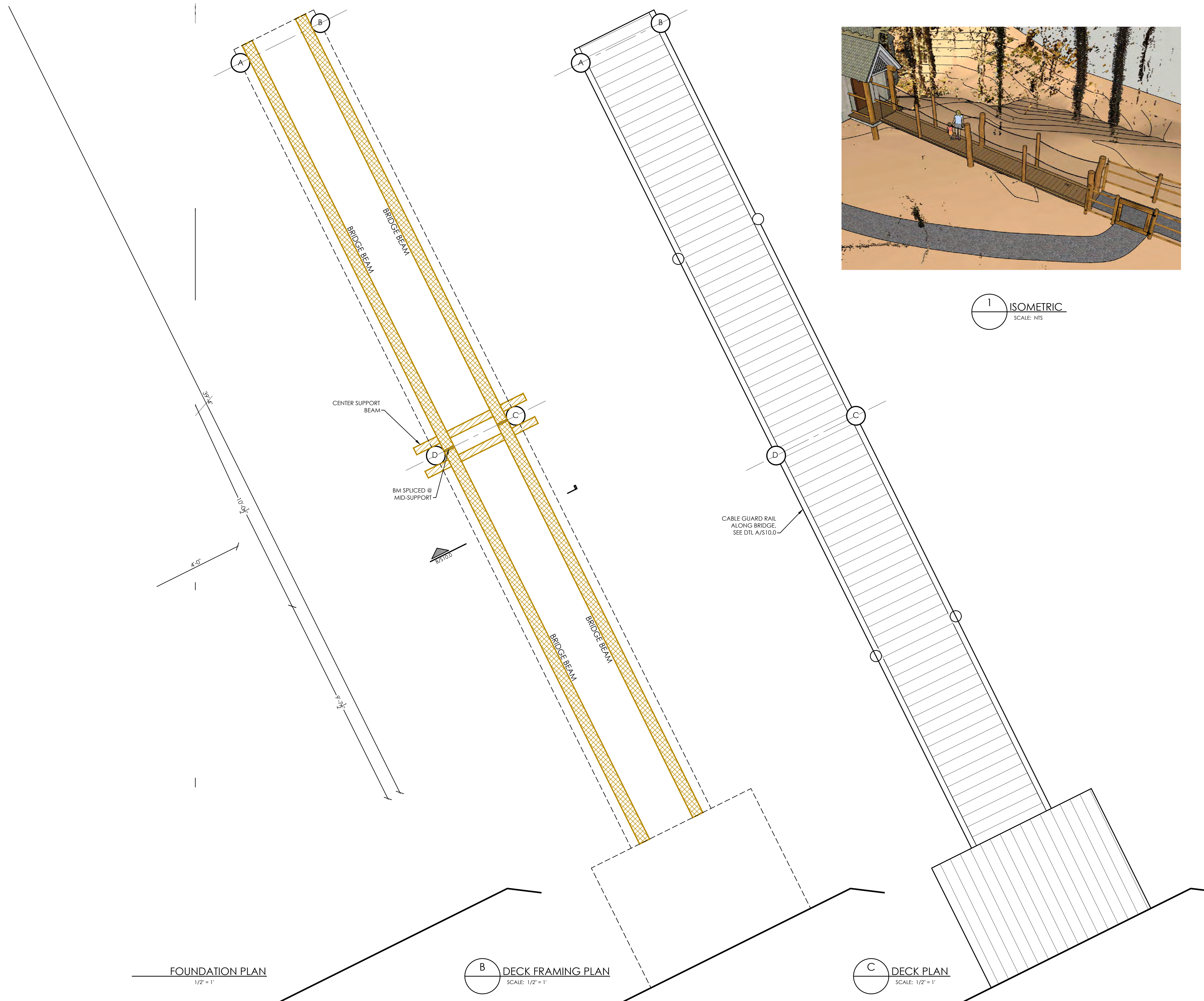
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**NATIONAL ARBORETUM  
CANOPY TRAIL**

TREE PLATFORM #9  
SKETCH VIEWS

**S3.9A**





1 ISOMETRIC  
SCALE: NTS

A FOUNDATION PLAN  
SCALE: 1/2" = 1'

B DECK FRAMING PLAN  
SCALE: 1/2" = 1'

C DECK PLAN  
SCALE: 1/2" = 1'

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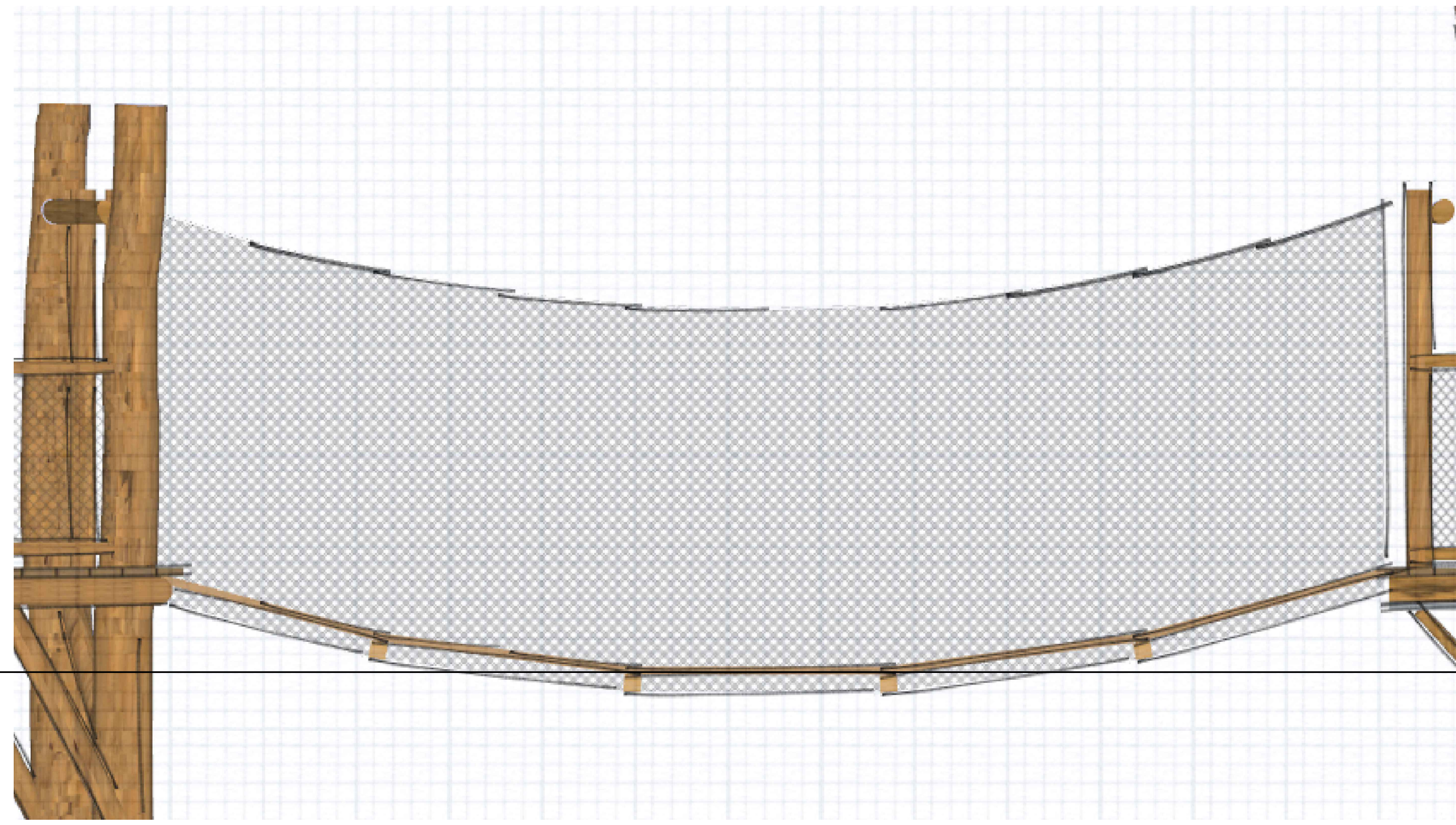
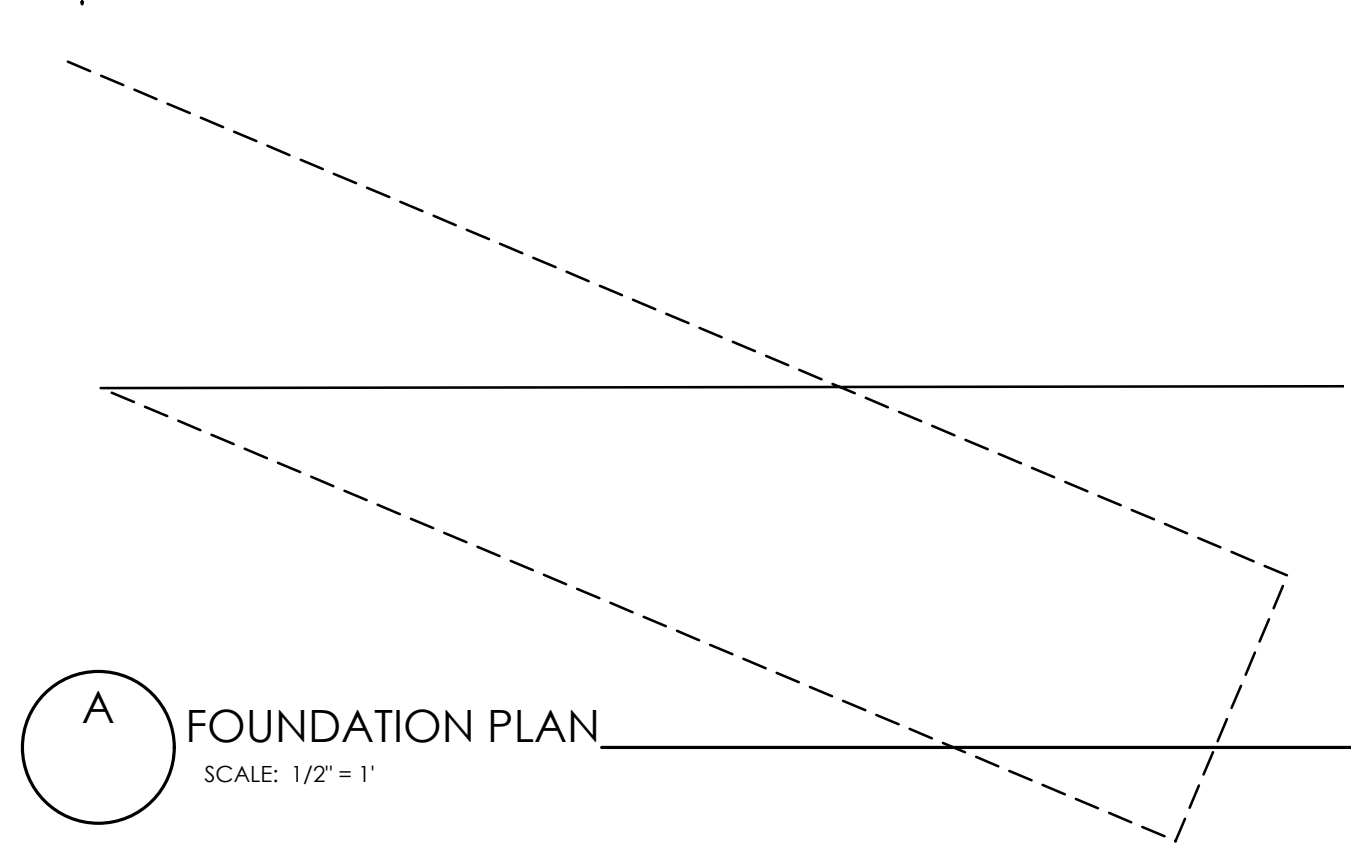
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CANOPY TRAIL  
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BRIDGE #1 PLANS & ELEVATION

**S4.1**

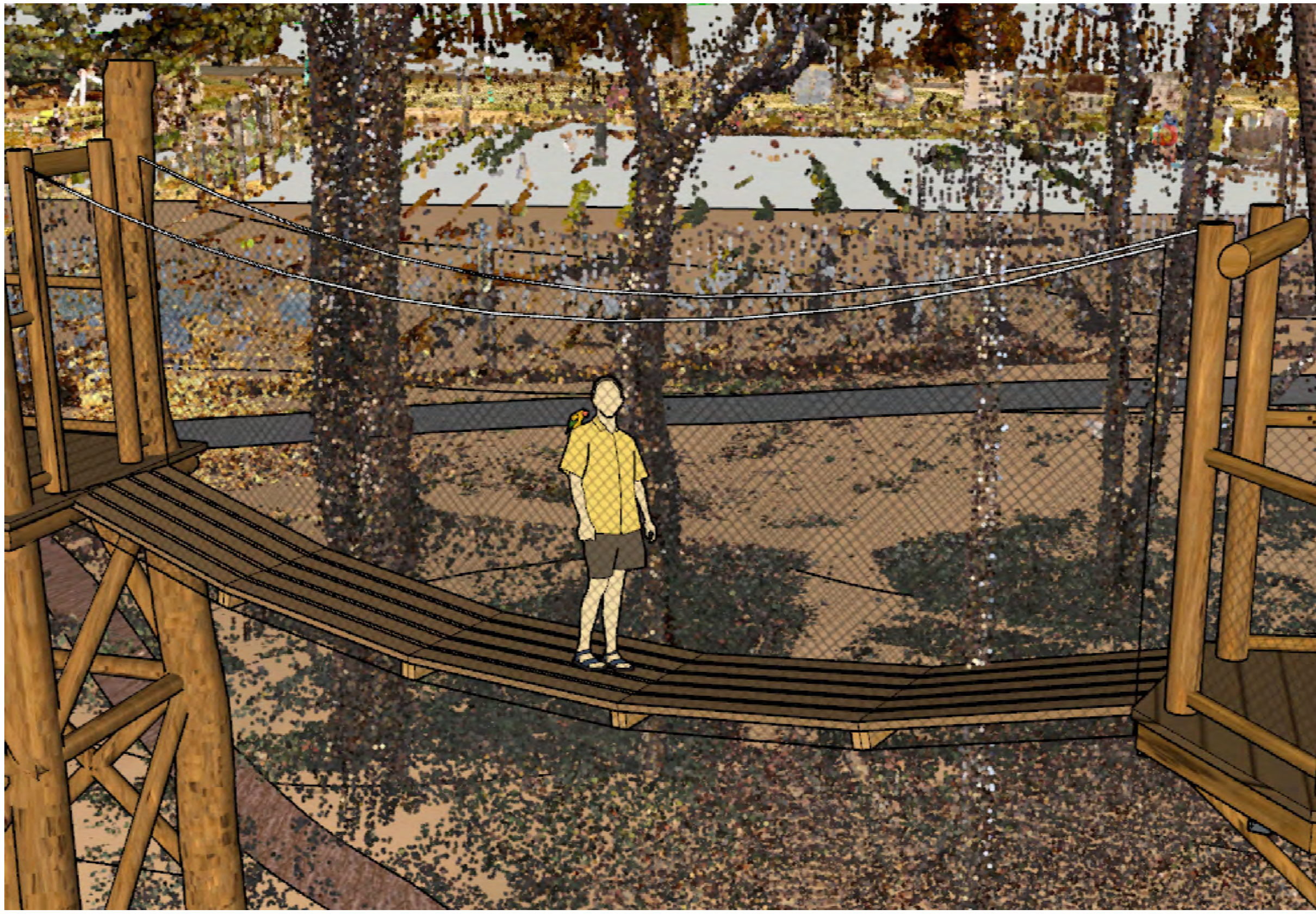
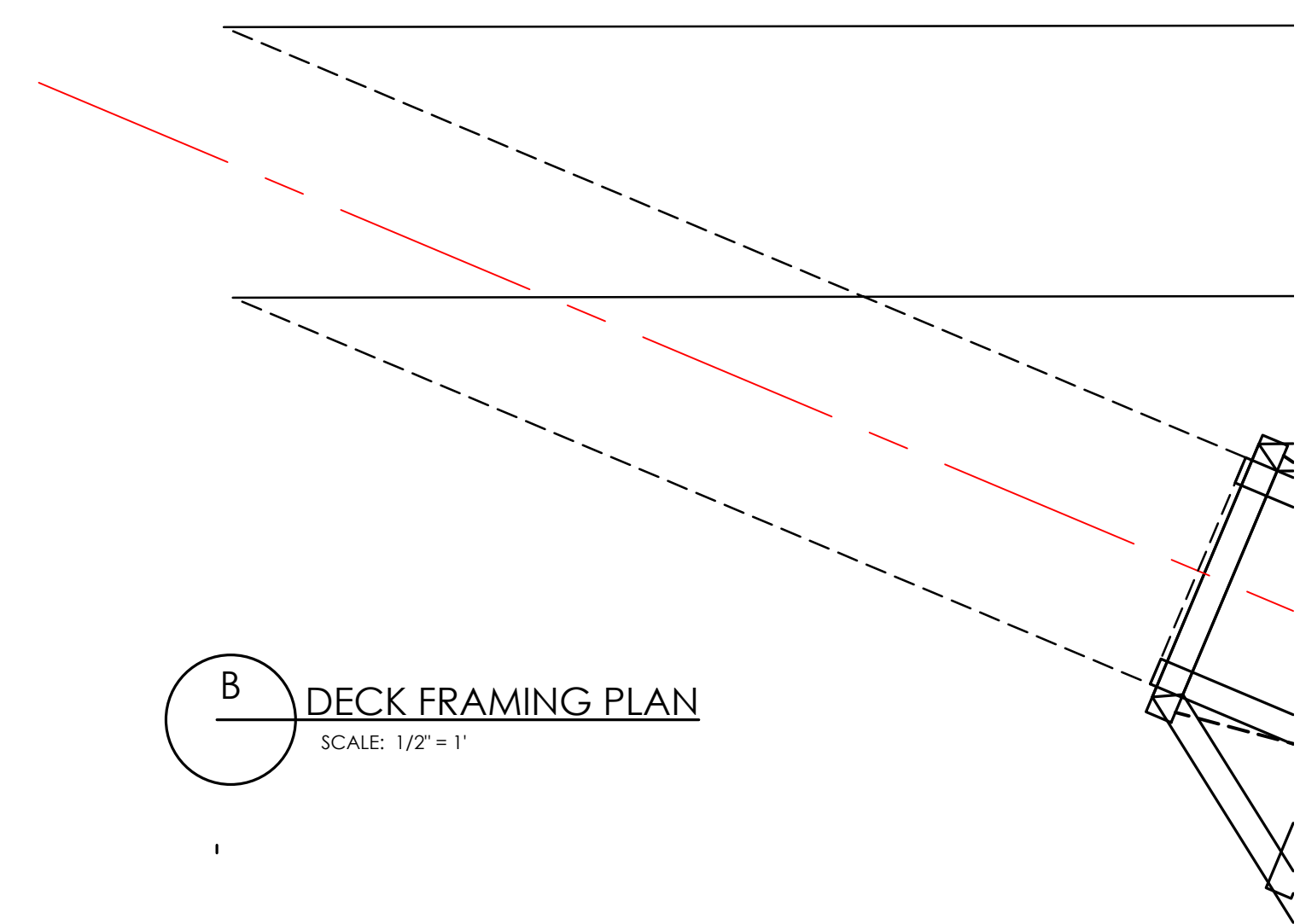


**A** FOUNDATION PLAN  
SCALE: 1/2" = 1'



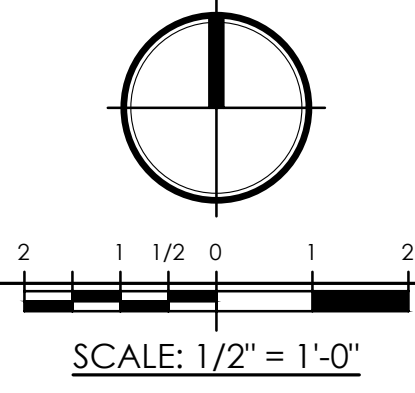
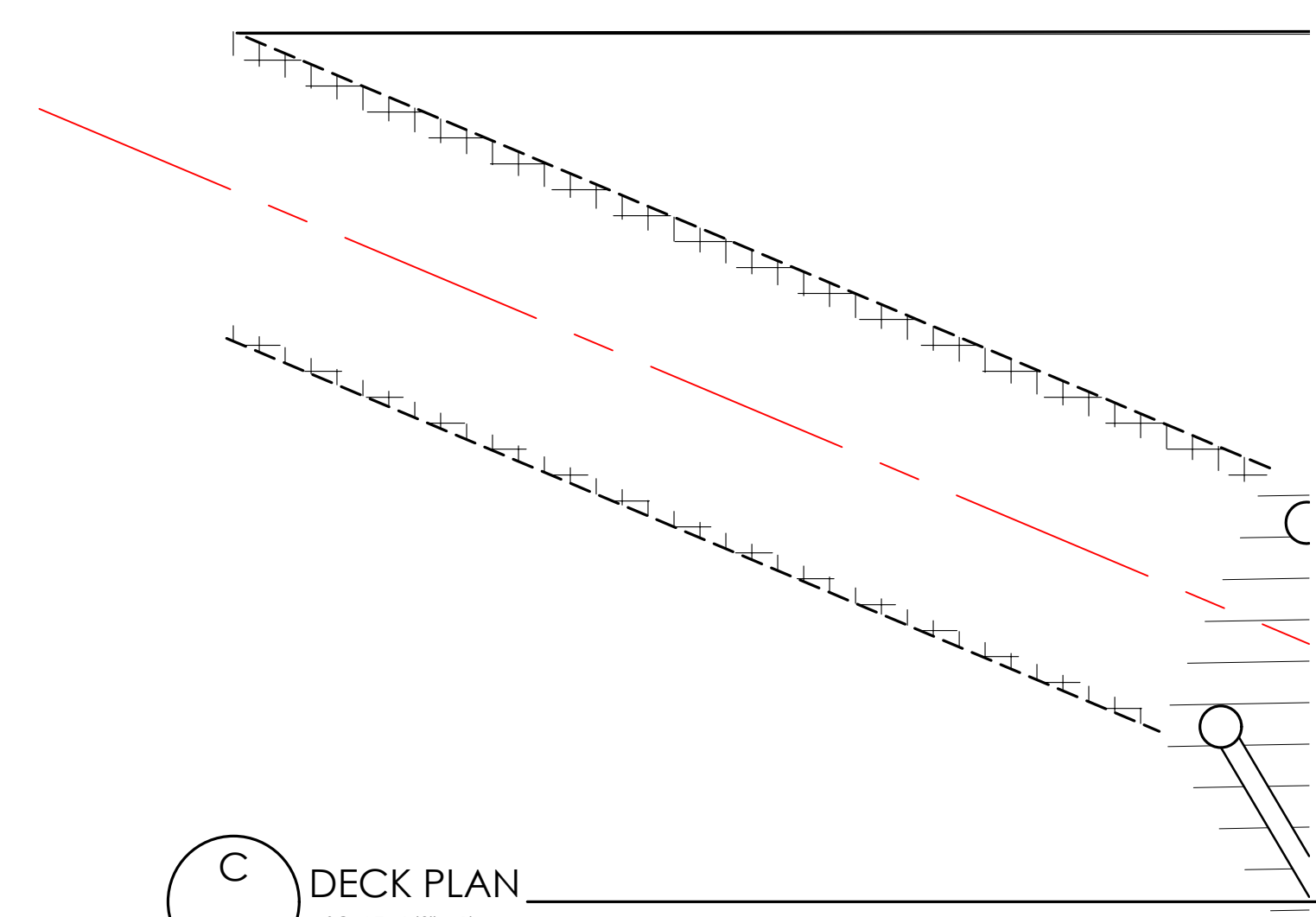
**1** ELEVATION 1  
SCALE: NTS

**B** DECK FRAMING PLAN  
SCALE: 1/2" = 1'



**2** ISOMETRIC  
SCALE: NTS

**C** DECK PLAN  
SCALE: 1/2" = 1'



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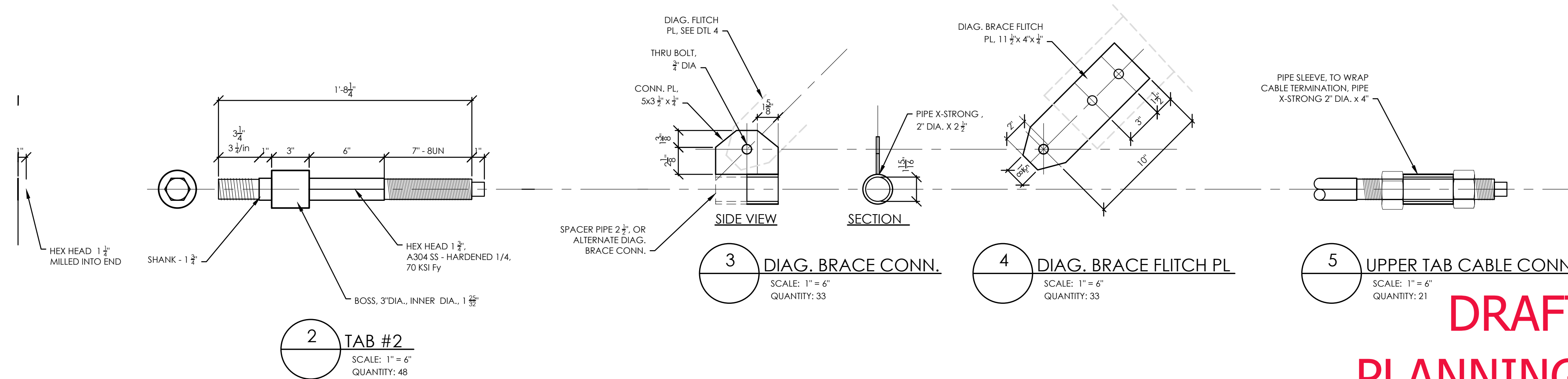
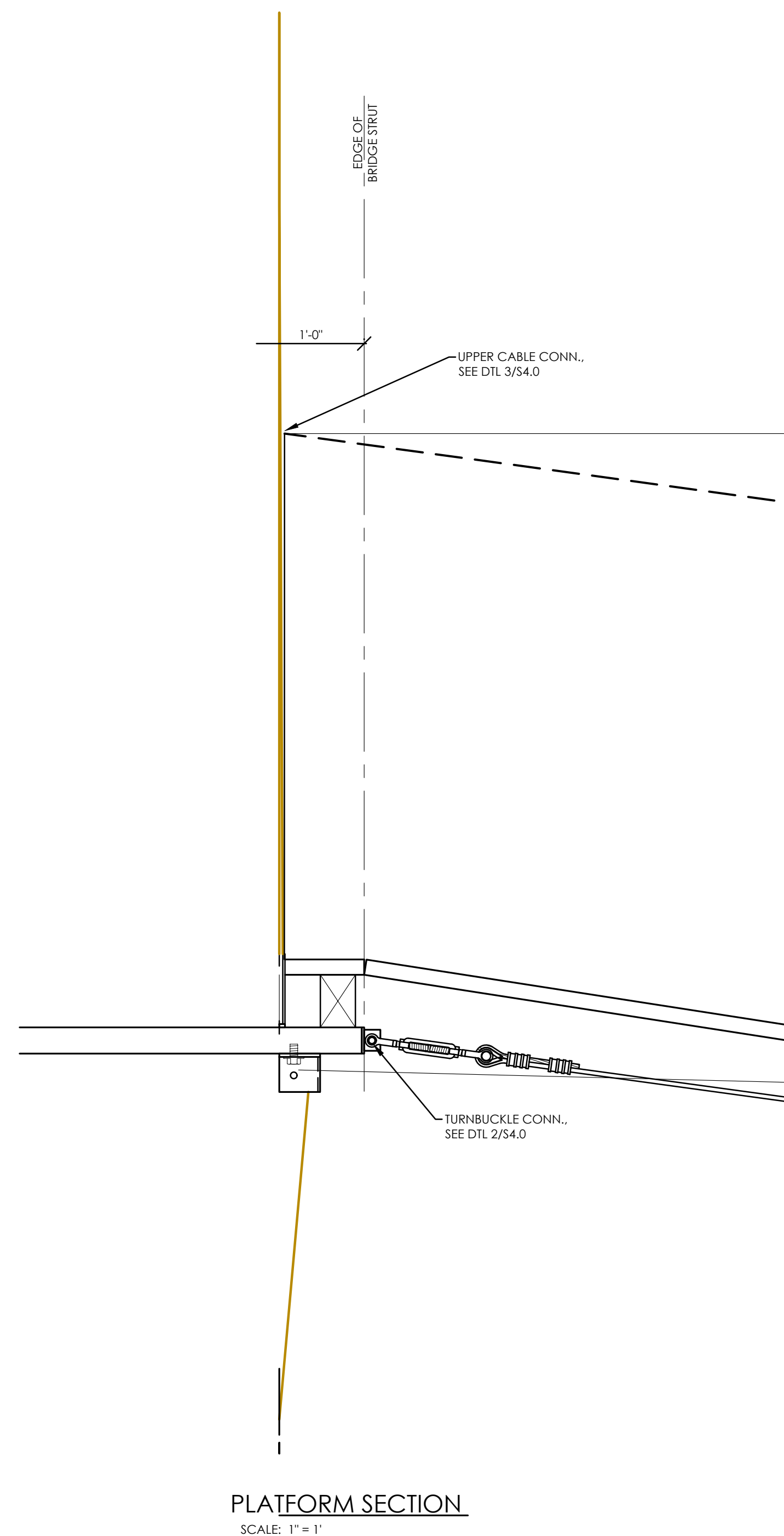
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CABLE BRIDGE #2  
PLAN & ELEVATIONS

**S5.1**







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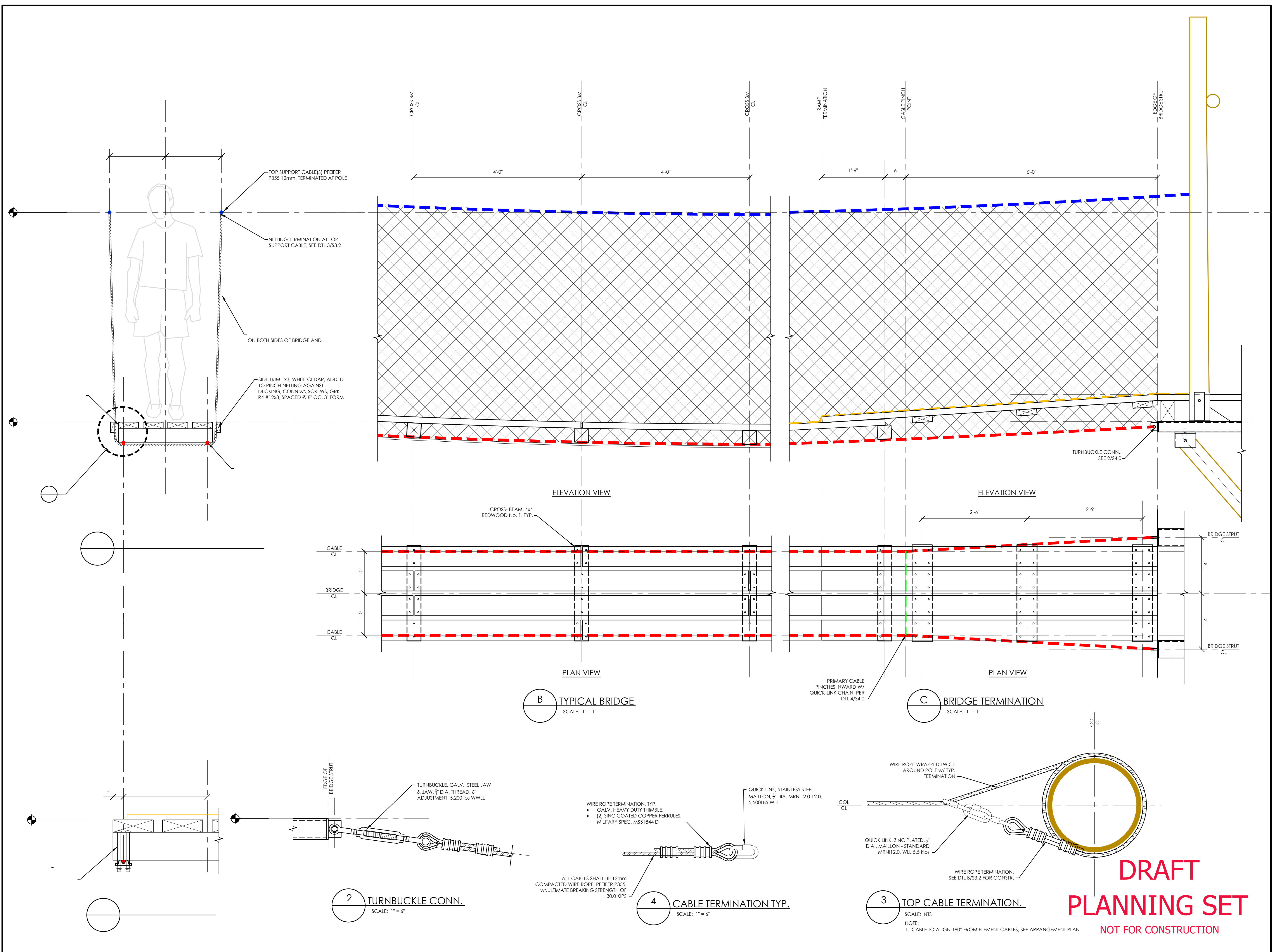
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TREE PLATFORM  
DETAILS

**S8.0**





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**CANOPY TRAIL**

DISTRICT OF COLUMBIA  
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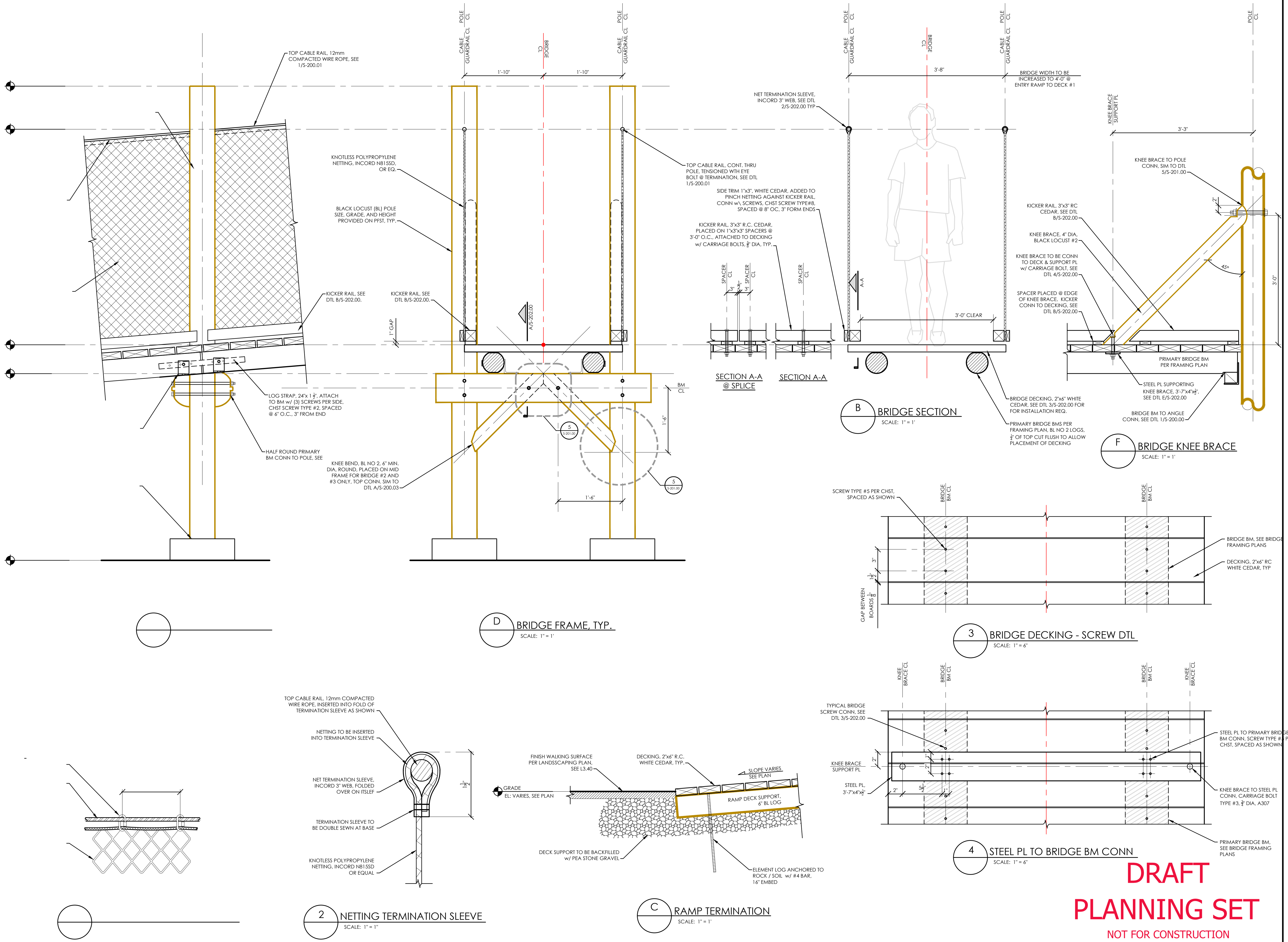
**CABLE BRIDGE**  
**DETAILS**

**S9.0**



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7/14/2023 11:08 AM



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**RIGID BRIDGE  
DETAILS**

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**S10.0**





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## National Arboretum Canopy Walk Visual Overview

ADA & Static Bridges

Suspension Bridges

Custom Net-Scape







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# COVER LETTER



April 26, 2021

Friends of the National Arboretum  
Mr. Craven Rand, CEO  
3501 New York Ave NE,  
Washington, D.C., DC 20002

Re: NATIONAL ARBORETUM CANOPY WALK

Dear Mr. Rand,

We are excited and honored to submit the enclosed proposal in response to your request for preliminary design services for the future Nature Play and Canopy Tour.

The concept of the Canopy tour is simple, yet the design solution will be complex. TM Park Inc., DBA Tree-Mendous Aerial Adventures is a multi-disciplinary design and build firm that thrives in the complex and creative. As the leading company in our field of work, we share FONAs commitment to design that is educational, accessible, and uplifting for all. Deeply rooted in "green" and inclusive building methods and designs since our inception over a decade ago, our award winning attractions span across the country.

Our current projects include Botanical Gardens, Zoo's, Parks, Private sector attractions, Kids Camps, Inner City Urban Attractions and Ski Resorts.

Tree-Mendous is honored to partner with Proper & O'Leary Engineering to offer complete design services for the NA Canopy Walk. The principals of both companies have a focus on creating educational and integrative play opportunities. Tree-Mendous is an expert in the design, construction, and operation of aerial and nature-based adventure attractions.

As a team we will bring decades of local experience, global expertise, and creative innovation to the design of the Canopy Walk. Our collective experience will serve your mission well as we work together to make a ground breaking project that will engage children in conservation, while getting their dose of Vitamin N(ature). We invite you to review our credentials, experience, and project approach in the following pages and look forward to the opportunity to work with you.

Sincerely,

Gerhard Komenda  
-CEO-  
TM Park Inc.  
Canaan, NY 12060





An aerial photograph of a wooden structure, possibly a tower or observation deck, situated in a dense forest. The structure has a hexagonal top section with a central circular opening. It is surrounded by lush green trees and foliage. The word "CONCEPT" is overlaid in large, bold, black letters on the left side of the image.

# CONCEPT

Our concept for the National Arboretum is to provide an attraction for *everyone* to enjoy. By combining ADA & Static Bridges with Aerial Suspension Bridges and a custom Net-Scape feature, we are confident that this attraction will provide a wonderful experience for new and existing guests of the Arboretum.

The ADA Bridges, meandering through the forest towards the water, will offer an aerial perspective for guests of all ages and abilities. Along these accessible bridges, guests will move freely throughout the course, observing, admiring and learning about the beautiful forests in the Arboretum.

Stemming off of the ADA Bridge trail, the Suspension Bridges offer a way for able bodied guests to observe and experience the breathtaking landscape from an entirely new aerial perspective. These bridges offer dynamic movement, and create a more adventurous trail route.

The Net-Scape portion of the attraction will provide a fun feature, particularly for younger guests to enjoy. The net will be “landscaped” with tension ship ropes to create valleys and peaks throughout the area, creating a 3 dimensional contour. While in the net, guests can relax, observe and reflect their surroundings, or can play, jump and climb around freely if they choose. The Net-Scape can also serve as an outdoor classroom and learning space for groups.







# PROJECT VISION

We are taking a multiphase approach to the project to allow for future expansion without having to start from scratch or undo previous elements. The emphasis in the design is not only to offer an amazing experience in nature, but to provide a new and unique space for educational programming at the Arboretum.

Our plan considers the least invasive methods of installation, using only trees and free floating center poles, if needed to relieve weight from the trees. We will use proprietary hardware to mount the decks to the trees. This hardware is specially designed to attach to, and grow with the trees without impacting their health.

Phase 1 will consist of 8 ADA accessible bridges and 7 platforms. The entry path starts on the lawn east of the Children's Garden and leads straight onto the first ADA ramp. We also propose a smaller side trail that leads directly to the Net-Scape to provide a separate access route and opportunity for special programs.

The ADA bridges are static and equipped with a 4' high side net. The decking boards are rough sawn Eastern White Cedar planks. The trail will have larger decks in-between to allow for wheelchair turnaround/passing.







At platform 7, participants can leave the attraction via the ADA exit ramp, or continue onto the non-ADA suspension bridge portion of the course. This portion consists of 4 cable bridges and 3 decks. The style of these suspension bridges offer subtle movement and increased elevation changes for a bit more of an “Adventurous” segment. This trail has its own exit and will be connected via ground trail with the other exits. For special programming, the cable bridges can be entered via the “exit” from platform 7. We believe a ticket price for Phase 1 could be \$6-9.

For Phase 2 we propose one more ADA trail and one non-ADA trail.

Phase 3 offers another non-ADA trail. Ground trails would be added on the other side of the stream that will serve as access to a new Nature Play/Educational area (flat). Potential future phases could include zip lines, adventure park trails, a true Native American longhouse as an outdoor classroom, a forest STEAM area, a mushroom/mycelia garden, tree house building classes and more.

Our current scope of work entails all aerial trails, decks and net-scape. Ground trails, fencing and any other infrastructure elements (ticket booth, queue line, etc.) are assumed to be completed by other, and are not included in this project scope. We would gladly provide a separate scope of work to include these elements, upon request.





# PHASE 1

CONTROLLED  
ENTRANCE

53.5

ACCESS BARRIER  
OR FENCE

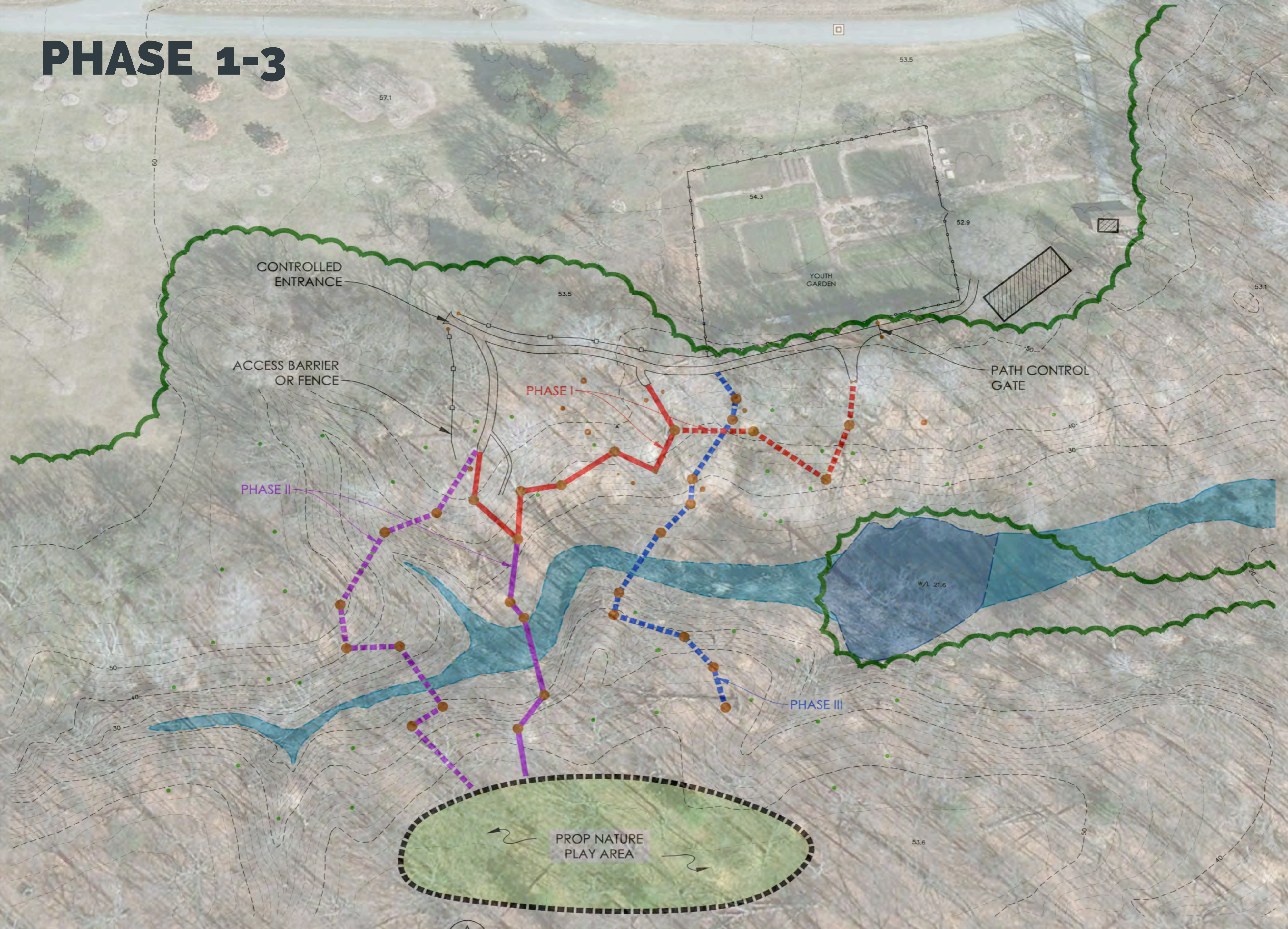
PATH CONTROL  
GATE

YOUTH  
GARDEN





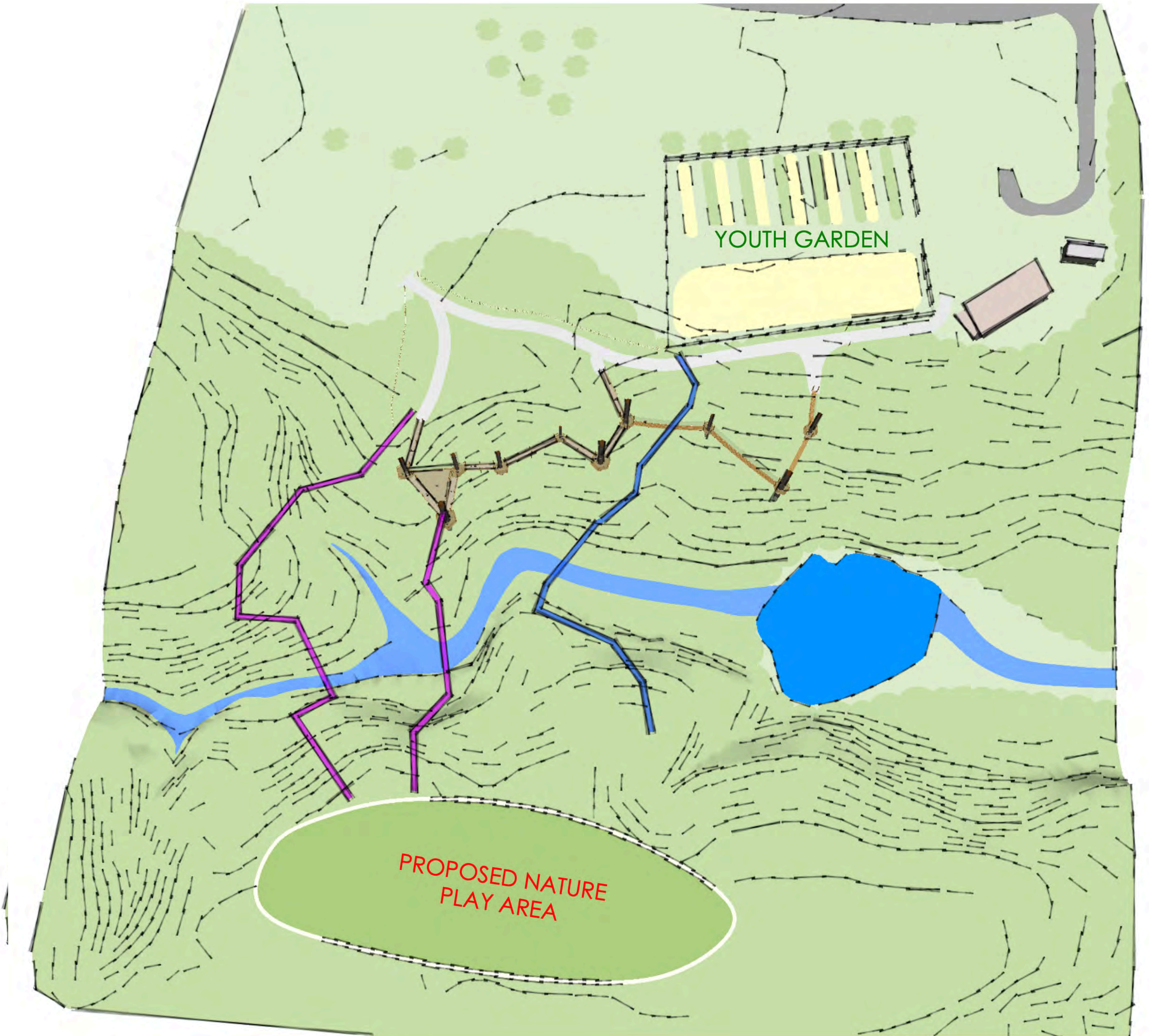
# PHASE 1-3



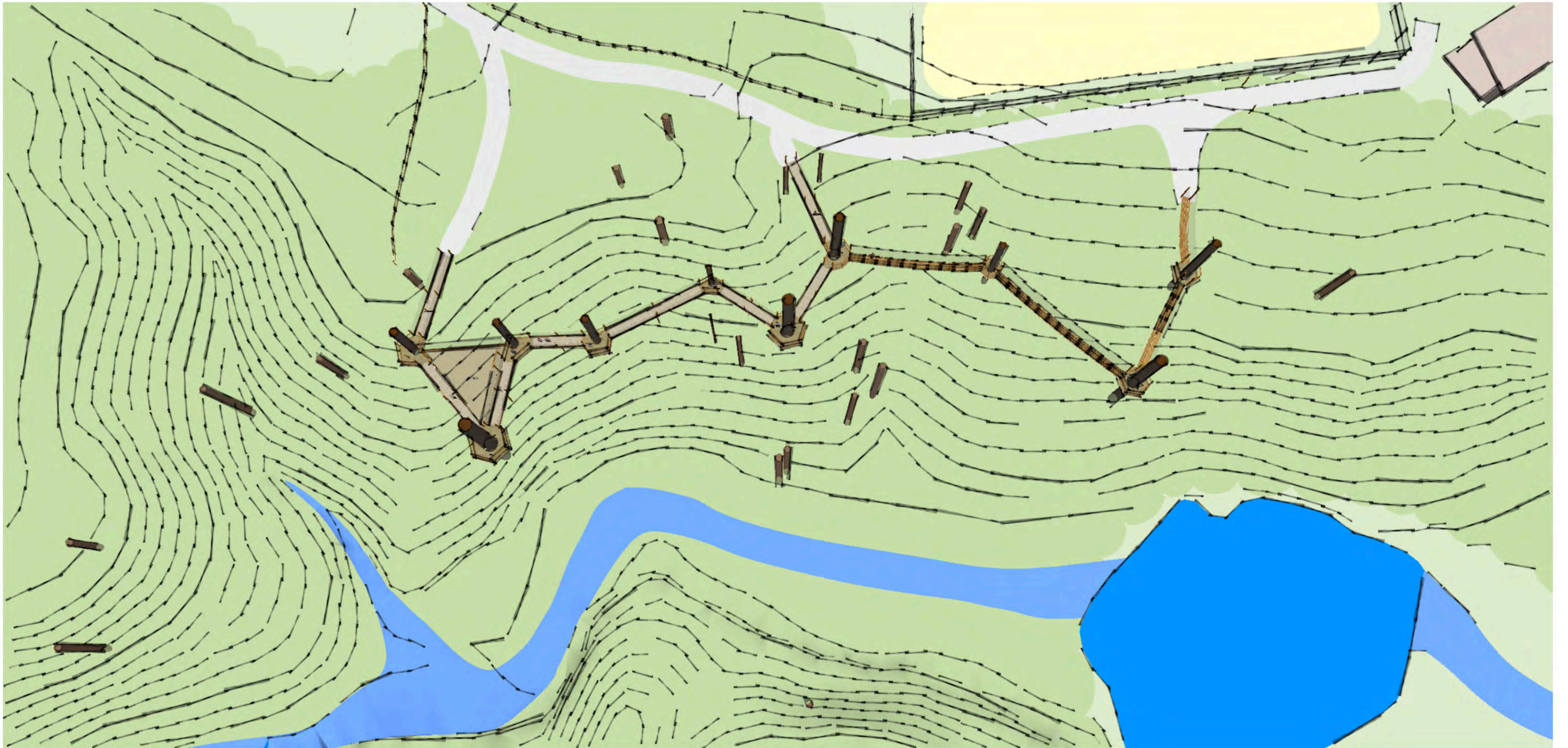
LEGEND	
52.73	EXISTING SPOT ELEVATION
- - - - -	EXISTING CONTOUR 2.0' INTERVAL
- - - - - 140 - - - - -	EXISTING CONTOUR 10.0' INTERVAL
- - - - -	CREEK EDGE 50' SETBACK APPROX.
- - - - -	CREEK, TOP OF BANK APPROX.
● ● ● ● ●	EXISTING TREE
● ● ● ● ●	PROP. PLATFORM
- - - - -	PHASE I ADA TRAIL
- - - - -	PHASE I NON ADA TRAIL
- - - - -	PHASE II ADA TRAIL
- - - - -	PHASE II NON ADA TRAIL
- - - - -	PHASE III NON ADA TRAIL



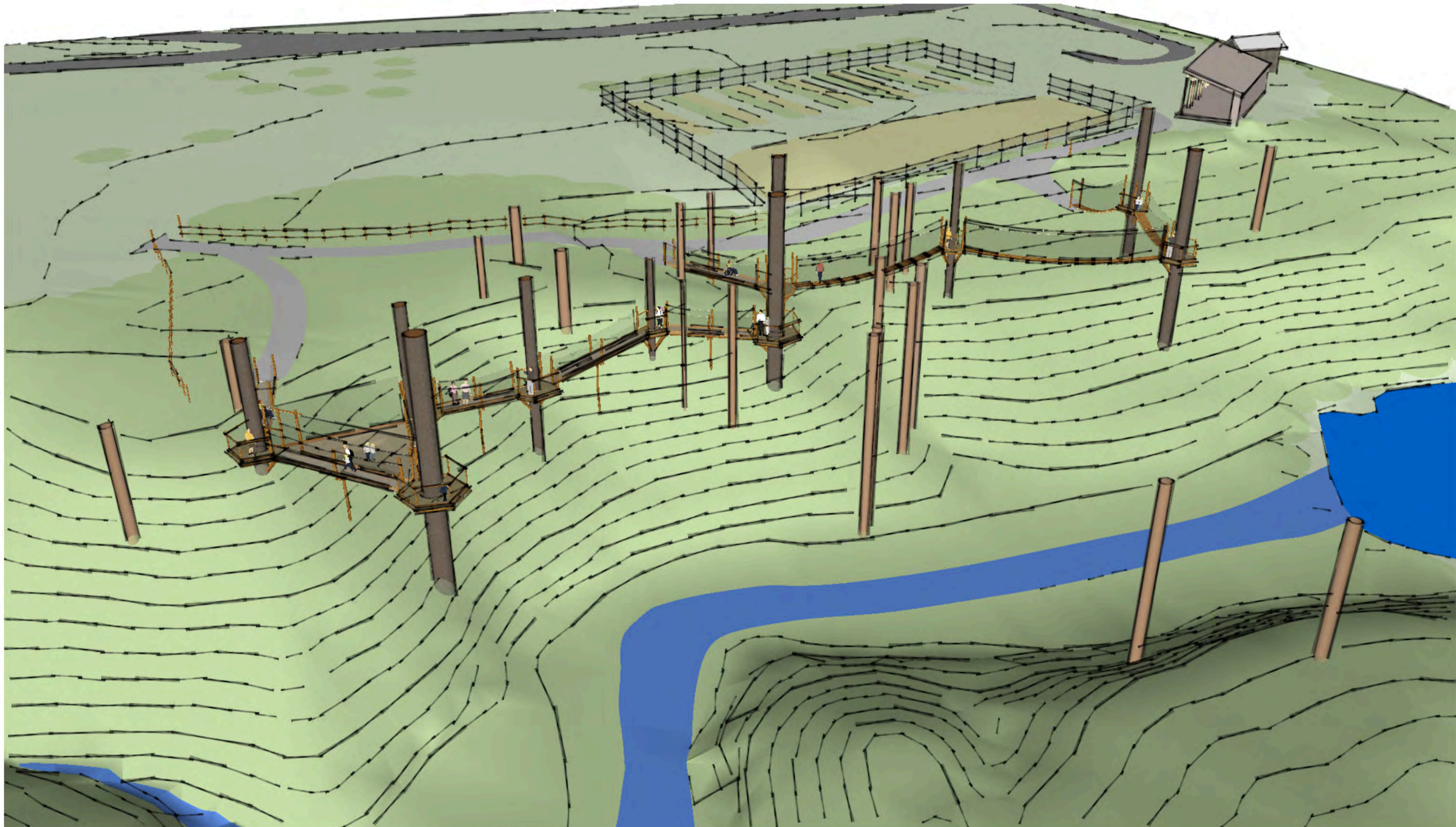




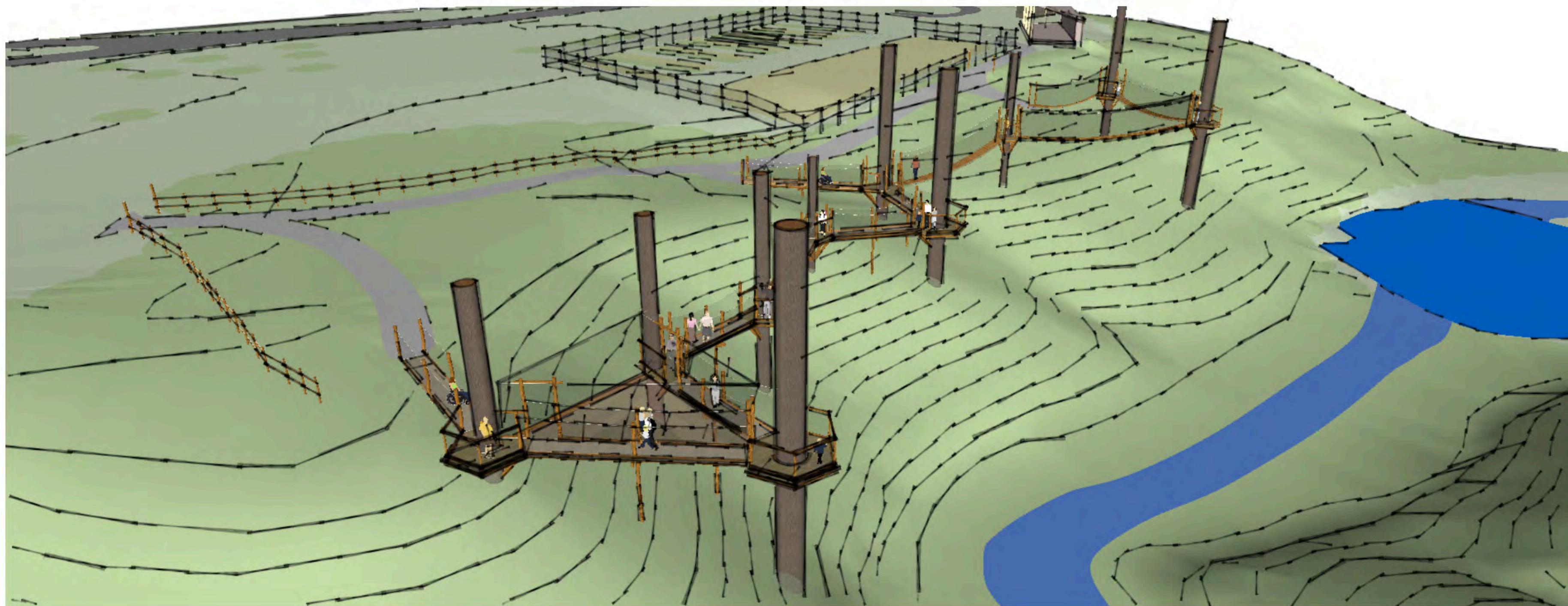
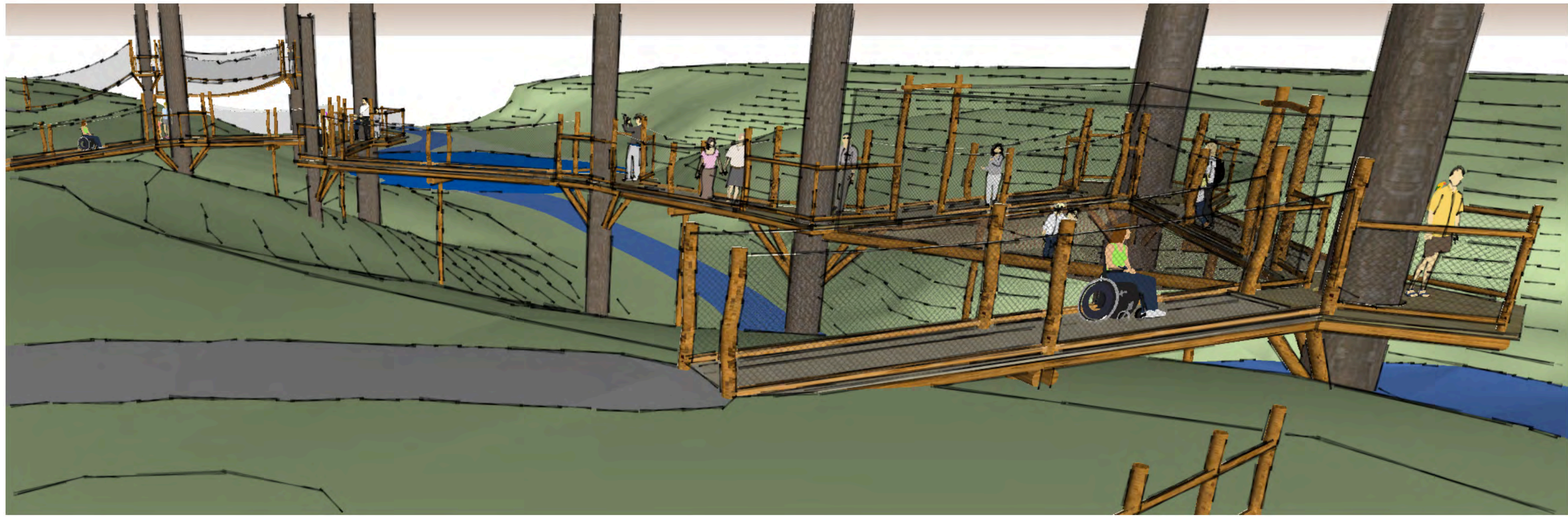




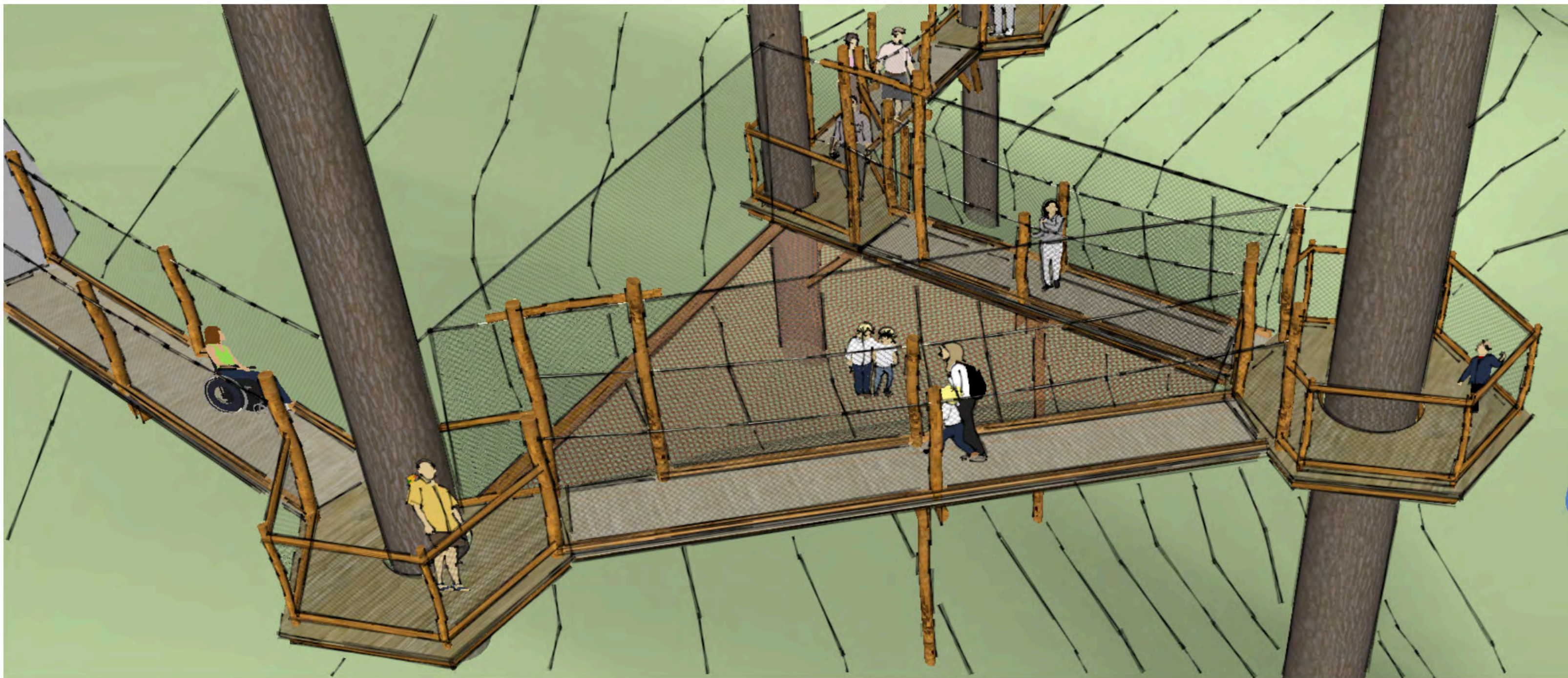
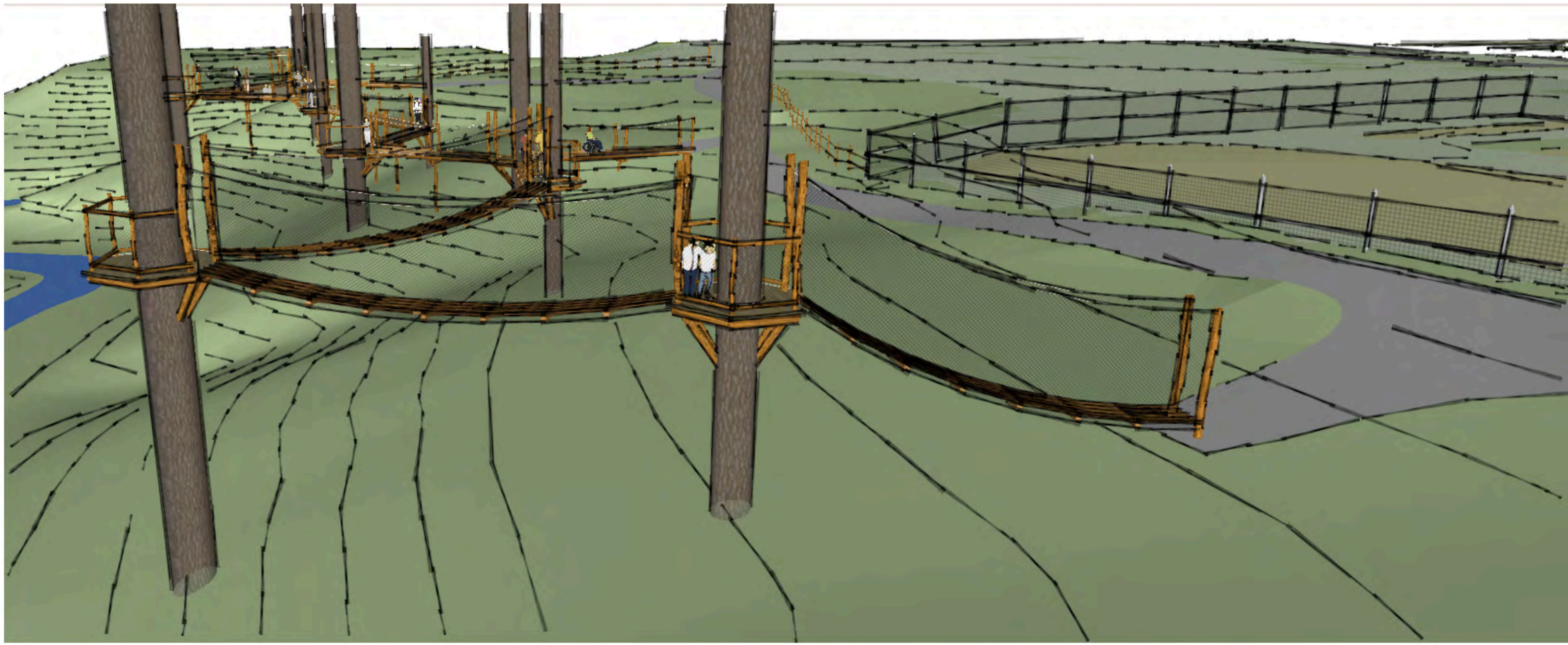




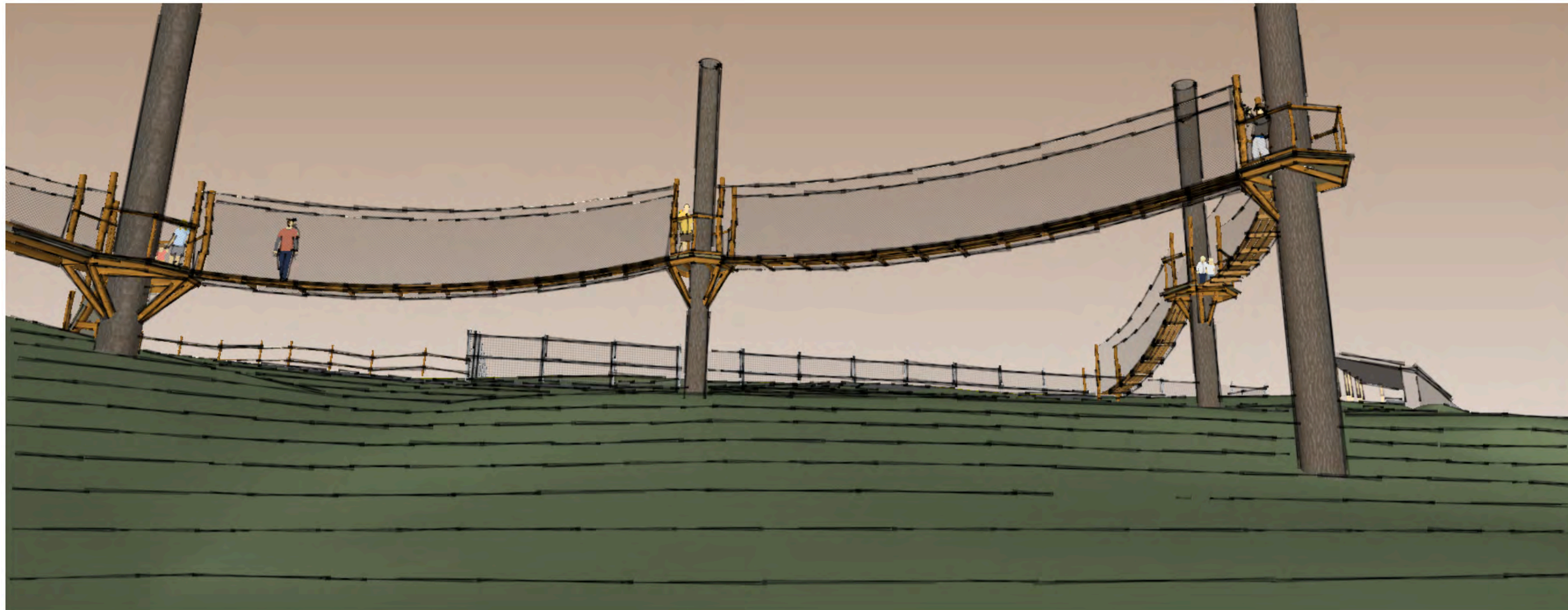
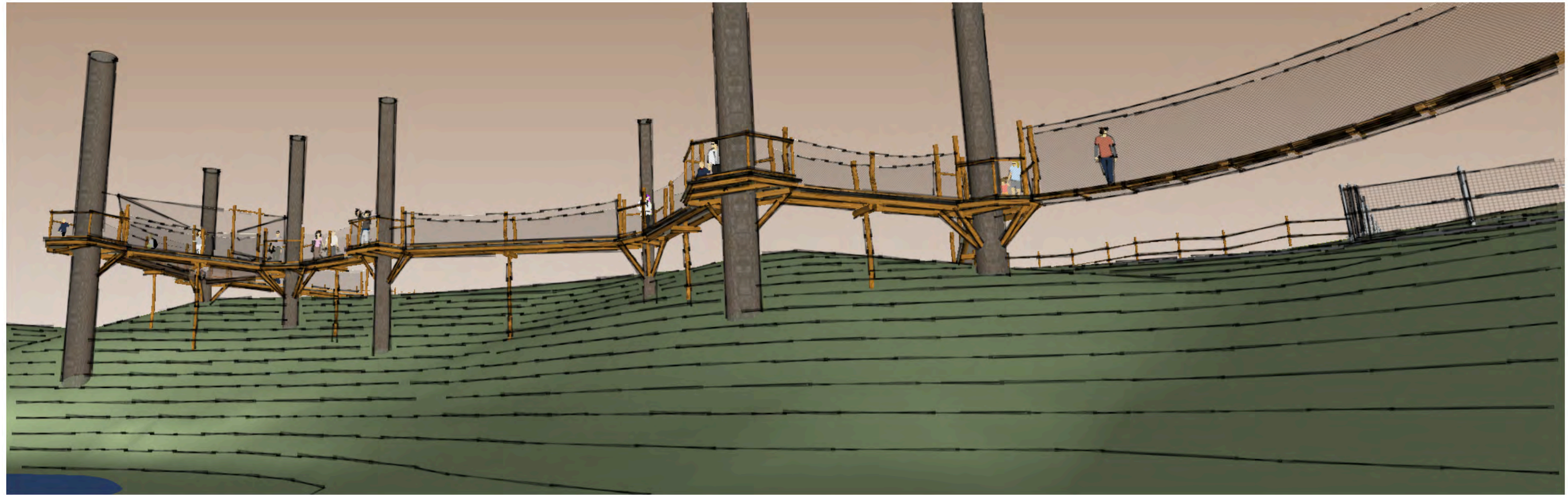




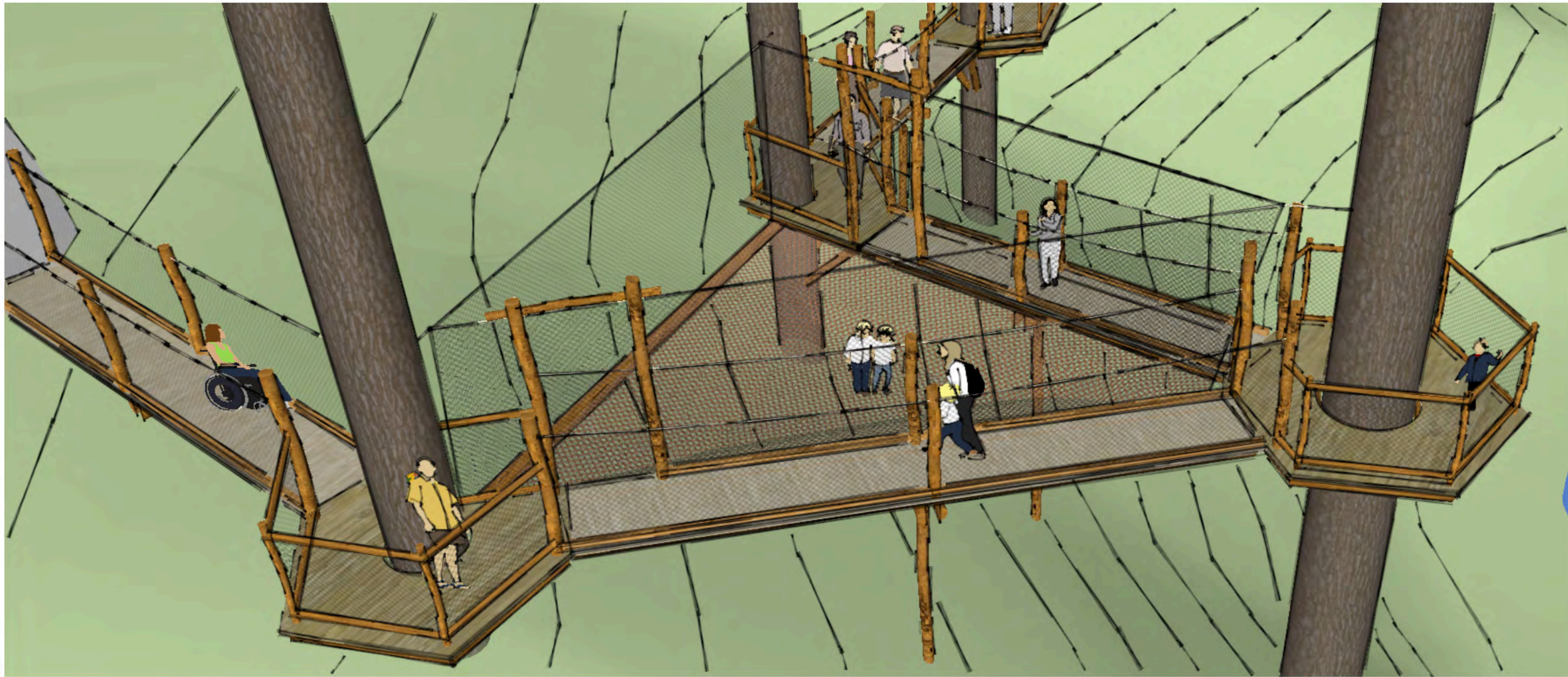
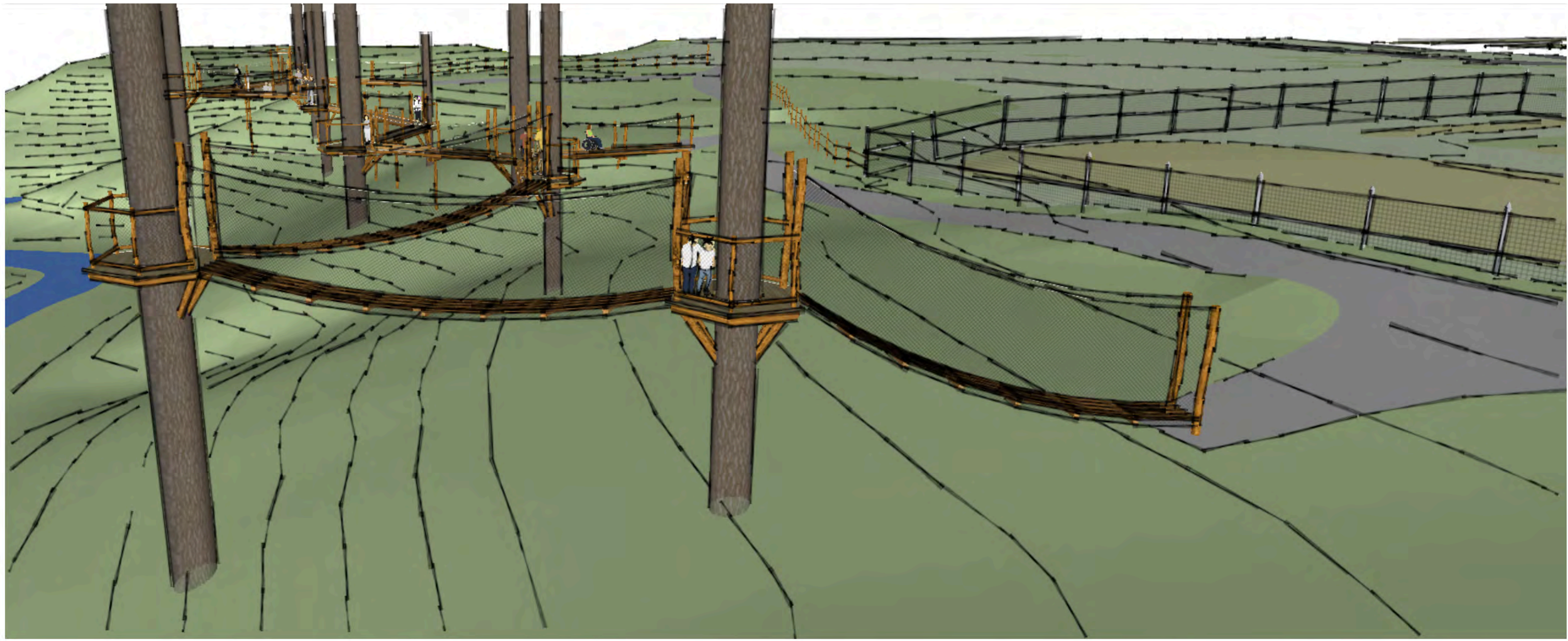




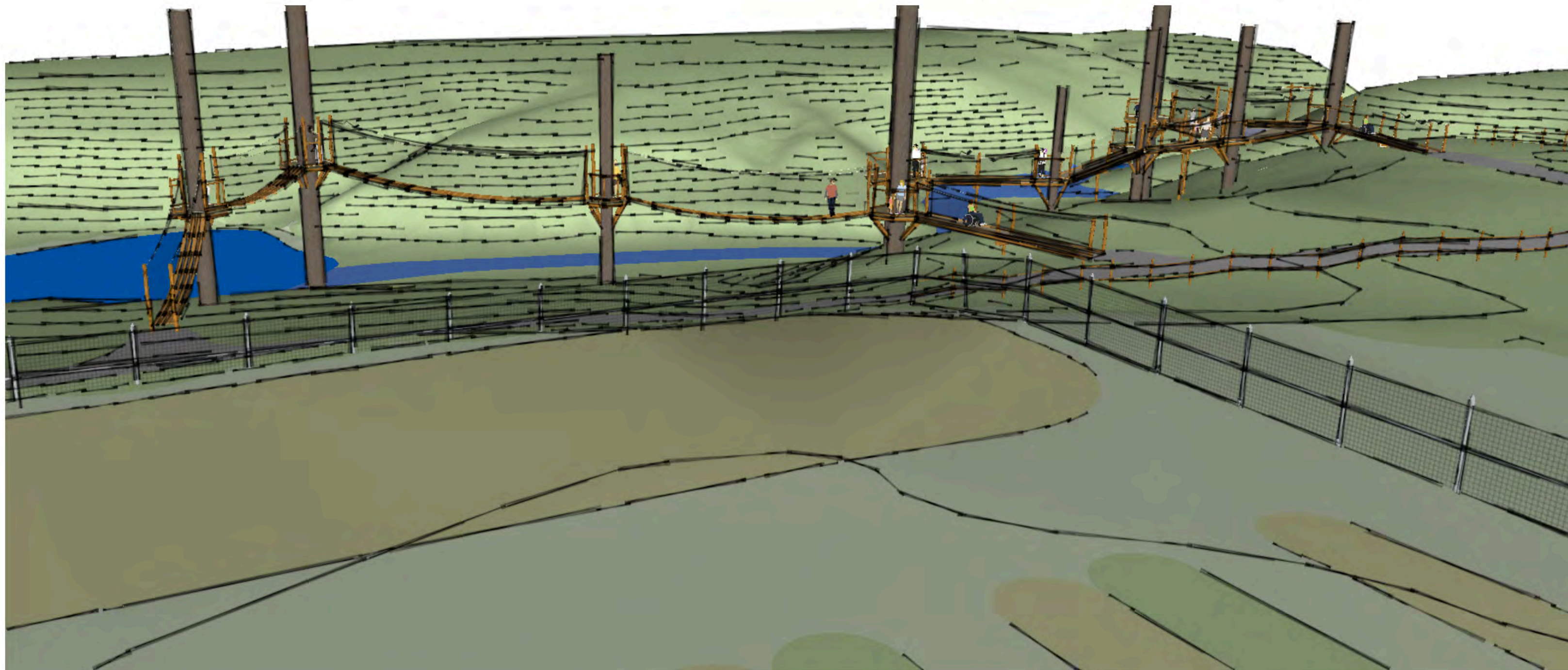
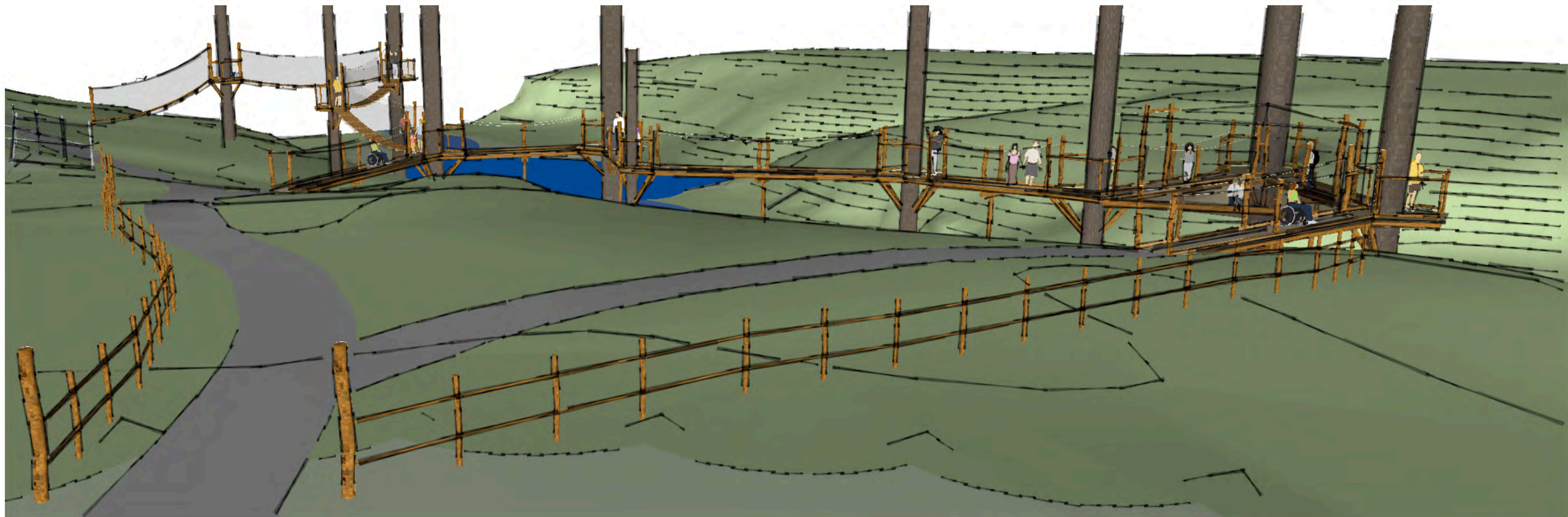








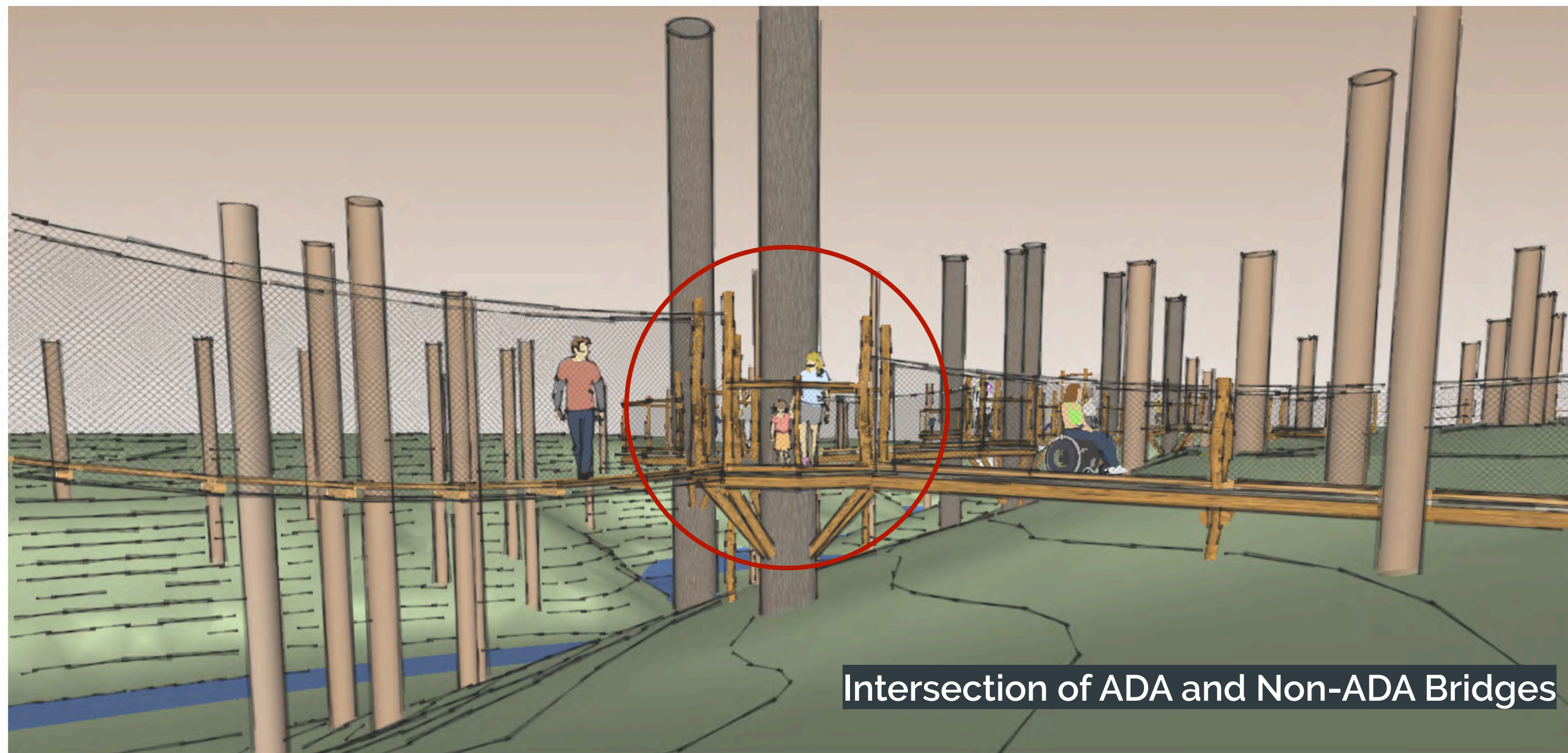








Intersection of ADA and Non-ADA Bridges



Intersection of ADA and Non-ADA Bridges







KENNETH LINKHAM  
PHOTOS

# PROJECT EXAMPLES



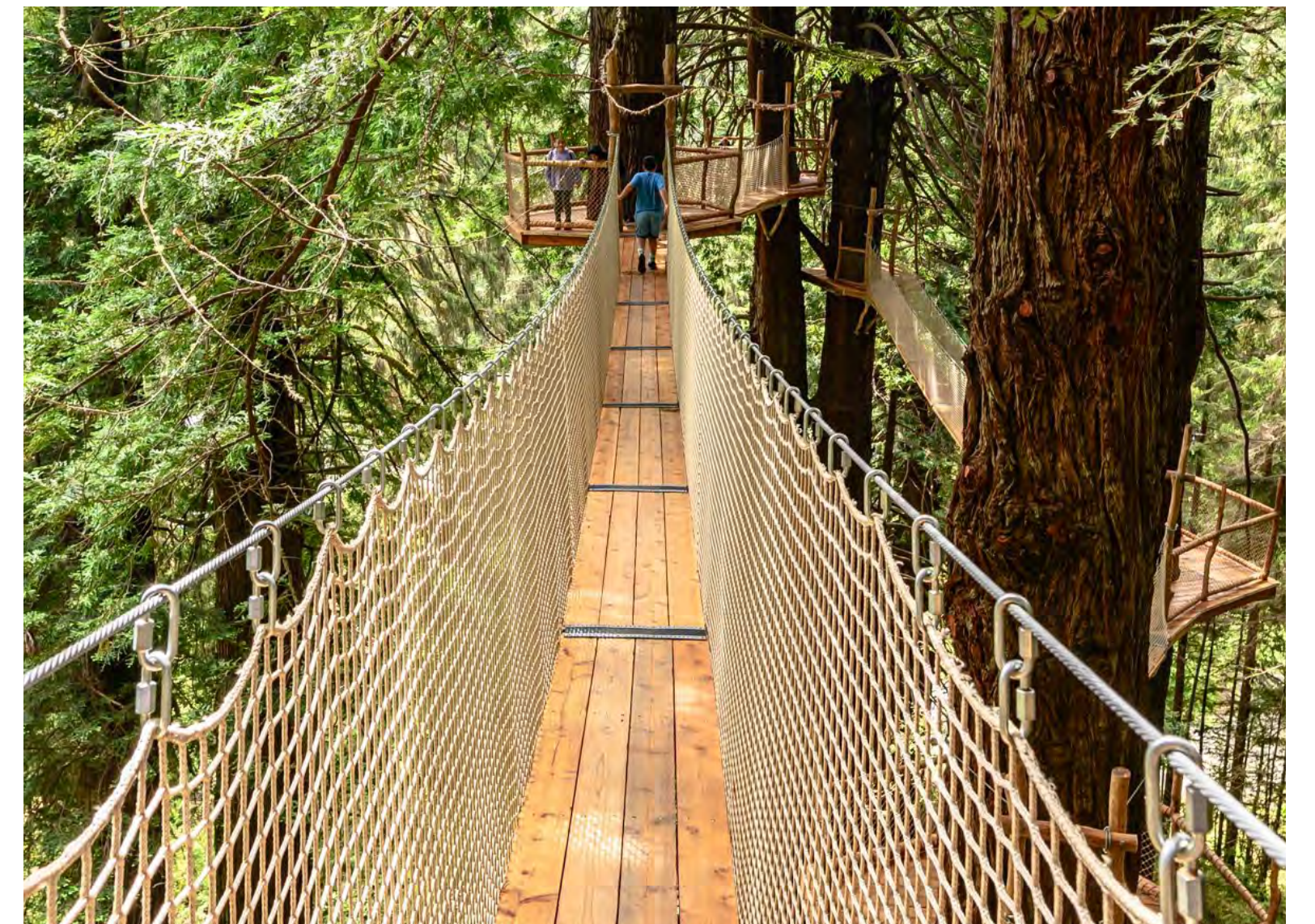


# ADA & STATIC BRIDGES





# SUSPENSION BRIDGES





# CUSTOM NET-SCAPE







# MATERIALS

Tree-Mendous Attractions are built to look as though they grew from the forest, like they've always belonged there. We opt for natural colored materials and curved Locust logs that mimic the true characteristics of nature.

As a Certified B-Corporation, we choose to use sustainably sourced lumber and acquire our materials from as many local vendors as possible. The lumber we use is not commercially readily available, but harvested and milled for us. All Black Locust logs are felled per our specifications, hand-peeled by our crew, sanded and finished with a natural sealant. All critical rigging hardware is imported from Europe due to the superior quality and safety specifications.

Materials used in this project will be a combination of European galvanized aircraft cable, German high tech 12mm Zip Line swaged cable, Black Locust, Eastern White Cedar, high quality life rated netting and lashing cord, high tech rope, and custom galvanized hardware like turnbuckles, threaded rod, nuts, washers, lag bolts, lag screws, screws, timber locks, etc.

Our equipment, material, and building standards adhere to the quality standards approved by ANSI, ACCT and/or ASTM.





# TREE HEALTH

Our goal has always been to not impact tree health and tree growth with our installs. After many years of experimenting with different methods we decided to improve on a tried and proven Tree Tab, or Artificial Tree Limb, concept that has been used for over 30 years without causing problems in trees.

Exactly one year ago we used this method for the installation of a Canopy Trail in an old growth forest of costal Redwoods in northern CA. The results where amazing, with minimal wounds that are already sealed by the tree, we managed to support 100' long suspension bridges at about 100' height, encountering up to 18" of bark and a diameter of 6-8' at height. Made with surgical stainless steel, all tools and Tabs are disinfected before use and installers apply stringent sanitary measures to avoid contamination.

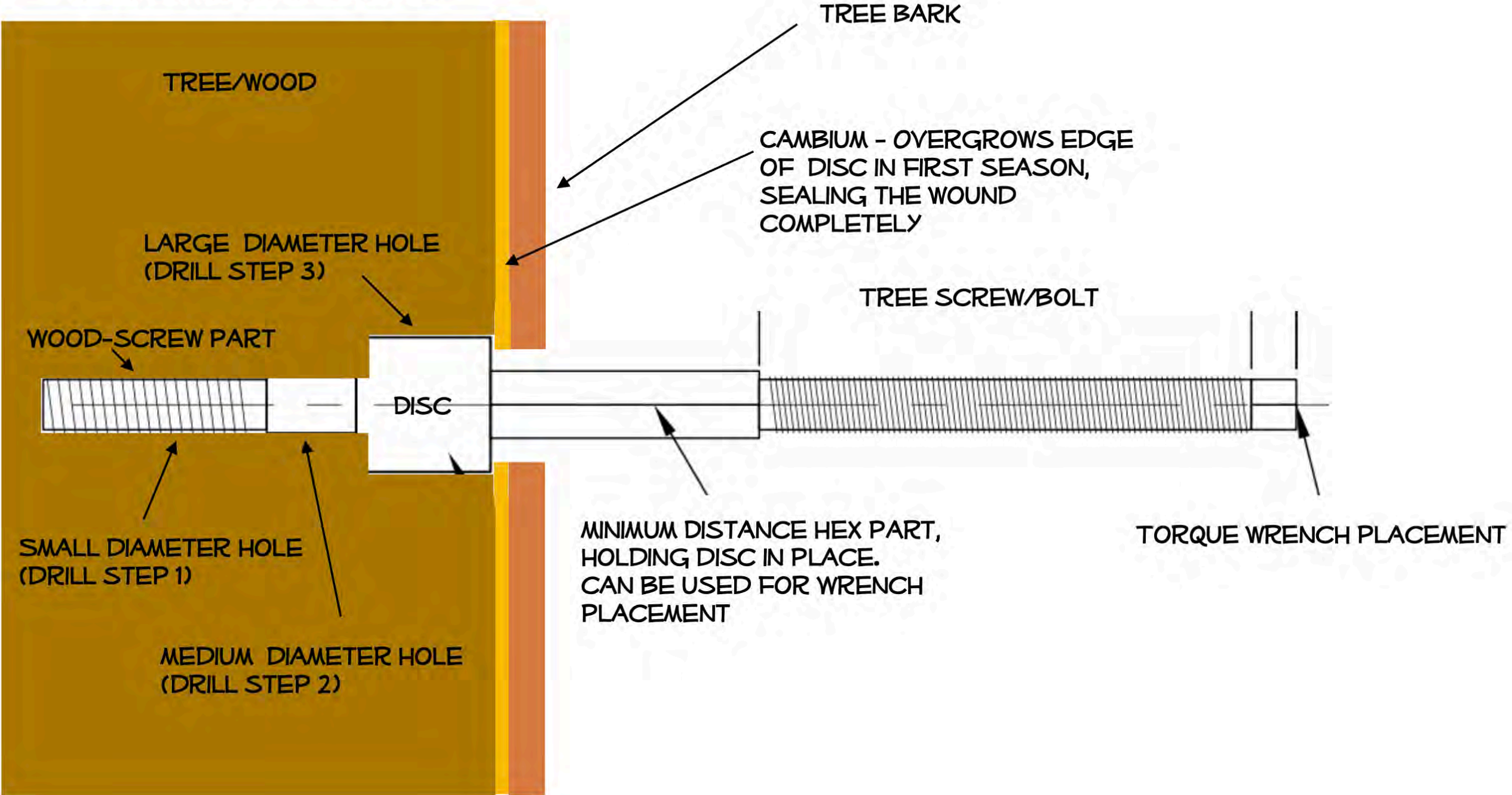
Given the complexity and size of the Canopy Trail at the National Arboretum, as well as the importance to respect and preserve the integrity of the trees, we feel that this method is the safest and most applicable one. The tree tabs are extendable, allowing them to grow with the tree and create a seamless elongation of the "limb".

We can provide a detailed, in depth description for your tree experts.

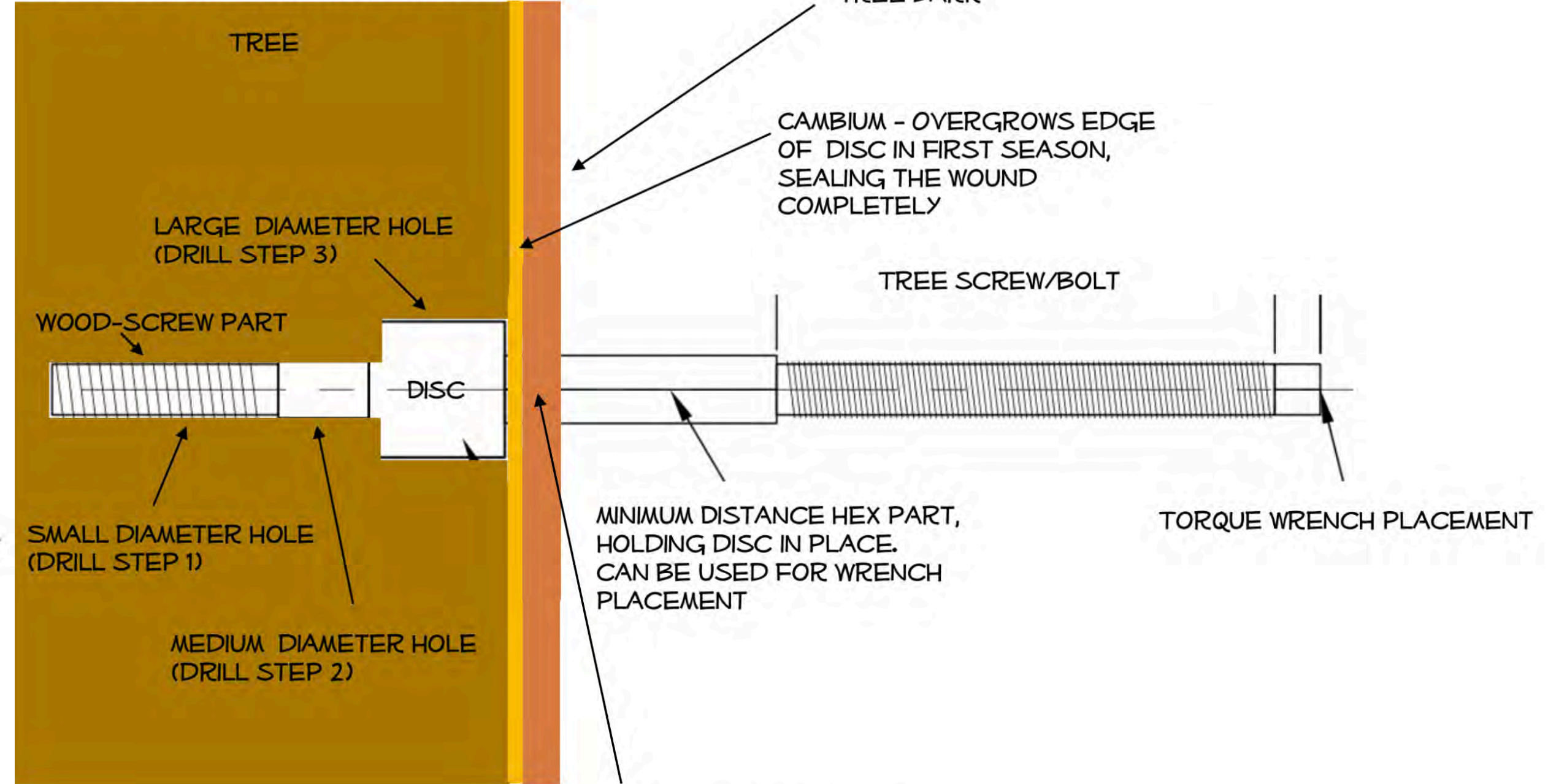




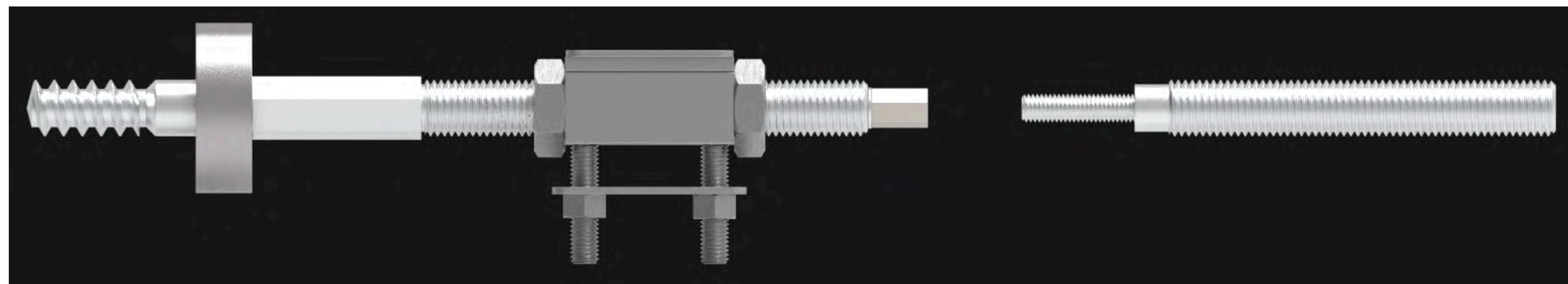
AFTER FIRST GROWTH SEASON



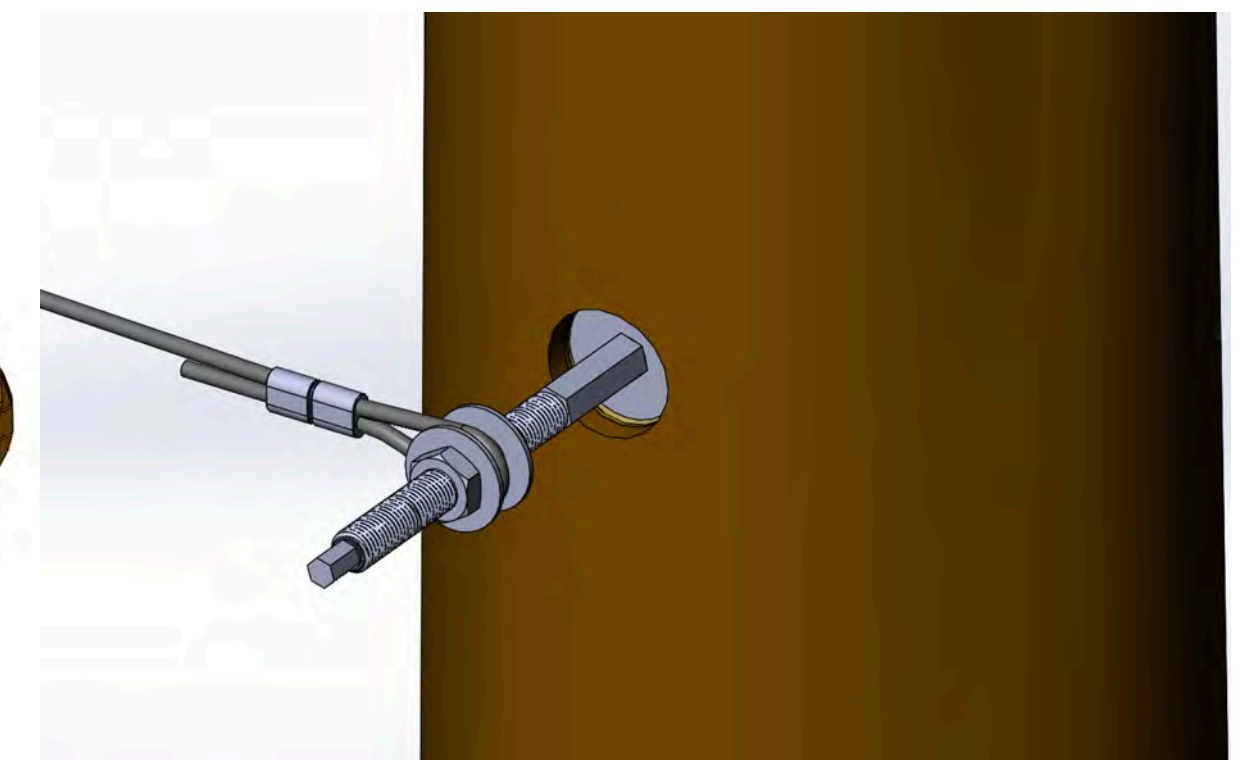
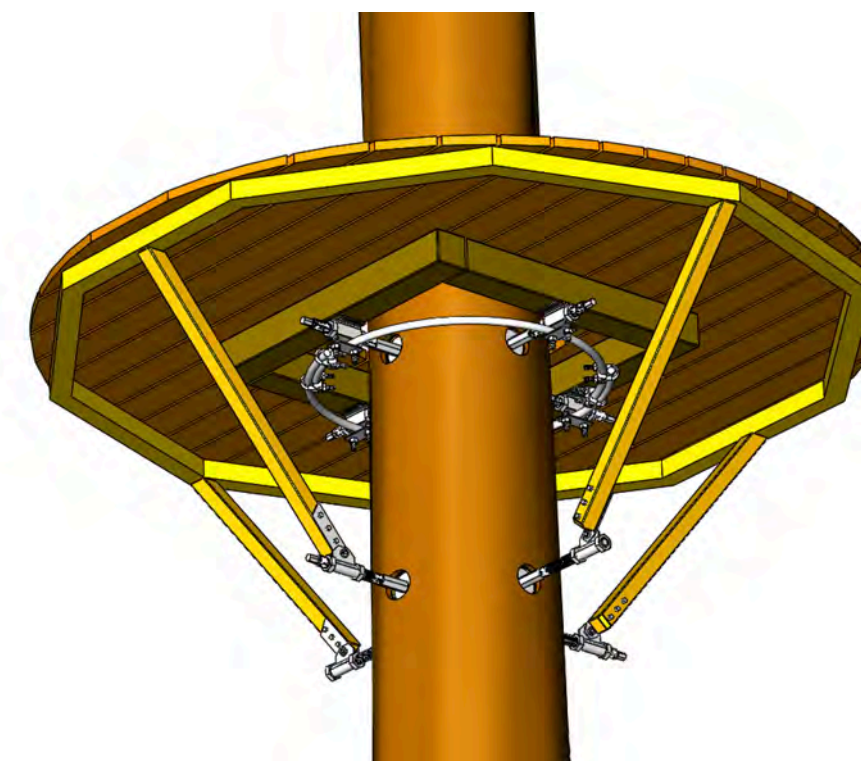
AFTER SEVERAL GROWTH SEASONS



FULLY ENCAPSULATED DISC WITH RESTORED SAP FLOW.



ACTUAL TREERIFIC TREE TAB WITH EXTENDER ROD



CABLE ATTACHEMENT

PLATFORM SAMPLE, THERE ARE MANY VARIATIONS.





# REFERENCES



## TREE-MENDOUS REFERENCES

### **Niko Radjenovic**

Vice President, Business Services, WCS/Bronx Zoo  
(718) 741-8170  
nradjenovic@wcs.org  
Services: Design, Construction, Installation, Staff Training, Inspection, Maintenance  
Terms of Service: 2016-2017

### **Joy Wolf**

Director of Operations, San Diego Zoo Safari Park  
(760) 497-4184  
jwolf@sandiegozoo.org  
Services: Design, Construction, Installation, Staff Training, Inspection, Maintenance  
Terms of Service: 2012-2017

### **Ursula Hoskins**

VP for Capital Projects, NYC Botanical Garden  
(718) 817-8866  
uhoskins@nybg.org  
Services: Re-Design of the Children's Garden  
Terms of Service: 2018-present

### **Sean McAllister**

Vice-President/General Manager of Attractions Development, SimexIwerks  
(443)-318-7602  
SMcAllister@iwerks.com  
Services Provided: Worked as partners with Simex on Zoo & Aquarium  
partnerships and revenue share agreements  
Terms of Service: 2013-current

More references upon request.









# GERHARD KOMENDA

518-567-7832

gerhard@tree-mendous.com

12913 State Route 22  
Canaan, NY  
12029

## CERTIFICATIONS

Inspector of Amusement  
Devices

Challenge Course & Climbing  
Wall Inspector for the  
Commonwealth of  
Massachusetts

Licensed Private Pilot,

Licensed Ski Instructor.

## PROFILE

Gerhard Komenda is a forester and Social Therapist by trade and has decades of experience and knowledge working with trees and forests all over the world. His determination to find a new way of responsible and sensible forest management led him to start a Sustainable Holistic BioDynamic Forestry company called Green Forestry in 2008. After several years of managing Green Forestry, Gerhard chose to refine his work, incorporating his sustainable efforts into the Attractions Industry, forming a design and build company, Tree-Mendous Aerial Adventures.

Gerhard is a well recognized, design award winning and well respected name in the Aerial Attractions Industry. For over a decade he has provided a wide variety of designs, services and innovations for new businesses and internationally recognized companies across the world.

## EXPERIENCE

### CEO-Founder, Tree-Mendous Aerial Adventures; Canaan, NY

A Certified B Corp that designs and builds Aerial Adventure Parks, Tree Houses, Zip Lines & Canopy Tours, Netted "Nature Trek" Attractions, Playground Structures, Suspension Bridges, Climbing Walls, Jump Towers and Urban Installations.

Tree-Mendous has been awarded the Annual Award for Excellence in Design for the "Treetop Adventure Park & Zip Line" and "Nature Trek" at the Bronx Zoo. This prestigious award comes from the Public Design Commission of New York City. Tree-Mendous was also honored by the International Association of Amusement Parks and Attractions (IAAPA) with the Award for Best New Children Attraction in 2017.

Tree-Mendous Designs and Attractions have been featured in the NY Times, NY Post, Boston Globe, Boston Magazine, Yankee Magazine, Vogue, Vanity Fair, Animal Planets "Tree-House Masters" and the A+E documentary series "Employable Me" in addition to dozens of local papers and TV stations and industry magazines.

### CEO-Founder, Adventure Park Gear Inc; Canaan, NY

Adventure Park Gear (APG) is also a Certified B Corp, supplying customers with the most innovative, industry leading climbing gear and equipment from leading brands around the world. APG is the head distributor and service center for German EDELRID Adventure products in North America.

### CEO-Founder, Green Forestry Inc; East Chatham, NY

Green Forestry is a certified B Corp founded in 2008 with the mission of recreating old growth forests through various tree services and carefully developed forest management plans that span a minimum of 150 years. In addition to forest management, Green Forestry produced handcrafted wooden goods and immersive attractions to encourage people to spend time in the forest.

## EDUCATION

- Baukhof Landbau-Forschungsgesellschaft
- Amerlinghausen, Germany, CBDF, Bio-Dynamic Forestry
- Cornell University, Ithaca, NY, MFO, Forestry
- Camphill Academy, Copake, NY, CST, Social Therapist

# Daniel B. Proper, PE

## Structural Engineer

## AREAS OF EXPERTISE

*Structural Assessment of  
Existing Buildings*

*Commercial Renovation/ Reuse  
& New Construction*

*Historic Preservation*

*Dam Renovation / Permitting*

*Specialty Structures, Aerial  
Parks, Collapsed Building  
Simulators*

## LICENSURE PE:

*NY, MA, CT, FL, OR,  
MI (pending)*

## SKILLS

*Excel, Word  
AutoCad / Revit  
Visual Analysis- FEM  
Sketch-up 3D Modelling  
Building Code Review*

## AFFILIATIONS

*Past / Current  
American Concrete Inst.  
American Inst. Steel Constr.  
American Wood Council  
Structural Eng. Inst.  
Structural Eng. Cert. Board  
Leadership Col. County NY*

## CONTACT INFO.

*P&O Engineering, dpc  
1915 5<sup>th</sup> Ave / PO Box 246  
Troy, NY 12180*

*Office: 518-610-8331  
Mobile: 518-821-0329  
dproper@po-eng.com*

## CAREER HISTORY

**Proper & O'Leary Engineering, dpc** – Valatie, NY

Principal / Project Engineer – December 2013 to present

- *Responsible for working with associates to provide thorough and quality based structural engineering services to our clients.*
- *Primary structural engineer for a full array of both private / public and residential / commercial projects.*
- *Provided structural assessments for both renovation and pre-purchase analysis of buildings.*
- *Provided construction management and construction support services for both public and private clients.*

**Crawford & Associates Engineering, PC** – Hudson, NY

VP: Structural Group Manager – May 1993 to November 2013

- *Responsible for management and development 8 persons structural engineering design team.*
- *Acted as project manager for primary assignments overseeing all aspect of the work from design thru construction.*
- *Expanded group services from high-end residential to historic preservation, commercial and specialty structures.*

## EDUCATION

**Rensselaer Polytechnic Institute** – Troy NY - 2001

*Master of Professional Engineering – Structural*

**Rensselaer Polytechnic Institute** – Troy NY - 1991

*BS Civil Engineering – Structural Geotechnical, Cum Laude*

## HIGHLIGHTED PROJECTS

**Bronx Zoo Ziplines** – New York, NY

*Was responsible for full design of the dual zipline system along with aided significantly in obtaining local and state approval.*

**Bronx Zoo Nature Trek** – New York, NY

*Works with zoo staff and Tree-Mendous Adventure Park Inc from conceptual design thru completion. Project was awarded NYC coveted Design Commission award for 2017.*

**NY Botanical Garden Children's Adventures**- NY, NY

*Worked with Landscape Architect and TMA in developing Treetop Walk which consisted of interactive elevated Black Locust walkway integrated into white pine tree grove.*

**Camp Elmwood**, Westchester NY

*Work with Tree-Mendous Adventure Park Inc in developing construction plans for elevated Black Locust play venue for day-camp, ranging in age from 4 to 12 years old.*

**Ramblewild**, Lansborough MA

*Work with Tree-Mendous Adventure Park Inc in the design and construction of 200 ft cable suspension bridge for access by patron and emergency response to west side aerial trails.*







# TREE-MENDOUS™

## AERIAL ADVENTURES

Tree-Mendous Aerial Adventures is a Premier Builder & Designer of custom Aerial Attractions. Tree-Mendous has proudly provided unique Design Concepts and Attractions for Zoos, Aquariums, Botanical Gardens & Arboretums, Orchards, Vacation & Ski Resorts, Camps, Schools and Private Property owners across the United States. Some of our most fulfilling projects include "Nature Trek & Play" and "Treetop Adventure" Zip & Climb at the Bronx Zoo, the San Diego Zoo Safari Park Aerial Adventure Course, and custom Design Concepts for the New Orleans Aquarium and the National Arboretum in DC.

### DOING WELL, WHILE DOING GOOD

Tree-Mendous is driven by a core mission of reconnecting children and families with nature. Our Attractions provide the opportunity to foster an appreciation for the environment through outdoor play and experiential learning.

### Tree-Mendous is the only Certified B Corporation in our industry.

Our years of experience in the adventure and attractions industry, paired with our dedication to sustainability has led to receive Awards including the "2017 NYC Design Award" and the "2017 IAAPA Brass Ring Award" for our works at the Bronx Zoo, and a 2021 Top 150 Impact Company Award from Real Leaders.

Tree-Mendous focuses on safety, organic design, low environmental impact, sustainable and locally sourced materials, educational elements, inclusion and of course, adventure.

Our teams combined knowledge of forestry, social therapy, carpentry, unique design, climbing and work at height, industry safety standards, operations and guest experience has set us apart from competition.

Tree-Mendous services include design, construction and installation, consultation and peer review, annual maintenance and inspections, staff training for owners & operators, and gear & equipment sourcing through our subsidiary Adventure Park Gear.

### LOCATION

12913 State Route 22  
Canaan, NY 12029  
518-288-2920  
[www.tree-mendous.com](http://www.tree-mendous.com)

### CERTIFIED B CORPORATION

### COMPANY SIZE

1 Owner/Lead Designer  
1 Project Manager  
2 Project Foreman  
4-8 Build Crew Members  
3 Administrative Staff

### YEARS IN BUSINESS

Since 2012 (Previously Green Forestry, Inc.)





## PROPER & O'LEARY ENGINEERING, dpc

**Proper & O'Leary Engineering dpc** specializes in structural and auxiliary civil engineering services. The firm was established in 2013 by Dan Proper & Melissa O'Leary, who combined have over 40 years of consulting experience. P&O provides comprehensive structural engineering services from conceptual planning through completion. We pride ourselves on being able to listen to our clients, work collaboratively within a design team and develop smart integrated solutions that best fit each project scenario. We are currently licensed in nine states, and continue to expand our reach to maintain our strong client relationships.

*Our goal is to provide thorough, high-quality design that help our clientele exceed their project objectives*

Located in the Hudson Valley Region, our employees have experience in assessing and designing structural steel, concrete, masonry, nominal wood and timber projects. Our current, but ever expanding resume of projects includes custom residential, commercial, industrial, performance spaces, religious, civil, Aerial Park Facilities, and military search & rescue structures.

General Structural Engineering Services offered by P&O consist of the following.

- Pre-Design Services to aid in layout of venues, and initial feasibility studies
- Structural analysis and design
- Full drawing development from design through construction
- Development of Operation and Maintenance Manuals and supporting regulatory documents for custom amusements attractions
- Construction Support Services

LOCATION  
1915 5th AVE  
Troy, NY  
(518) 610-8331  
[www.Po-eng.com](http://www.Po-eng.com)

WOMEN OWNED BUSINESS

LIC: NY, MA, CA, FL, OR, VT, RI,  
PA, CT, MI (Pending)

COMPANY SIZE  
(2) Professional Engineers  
(8) Structural Engineers

YEARS IN BUSINESS  
Since 2014





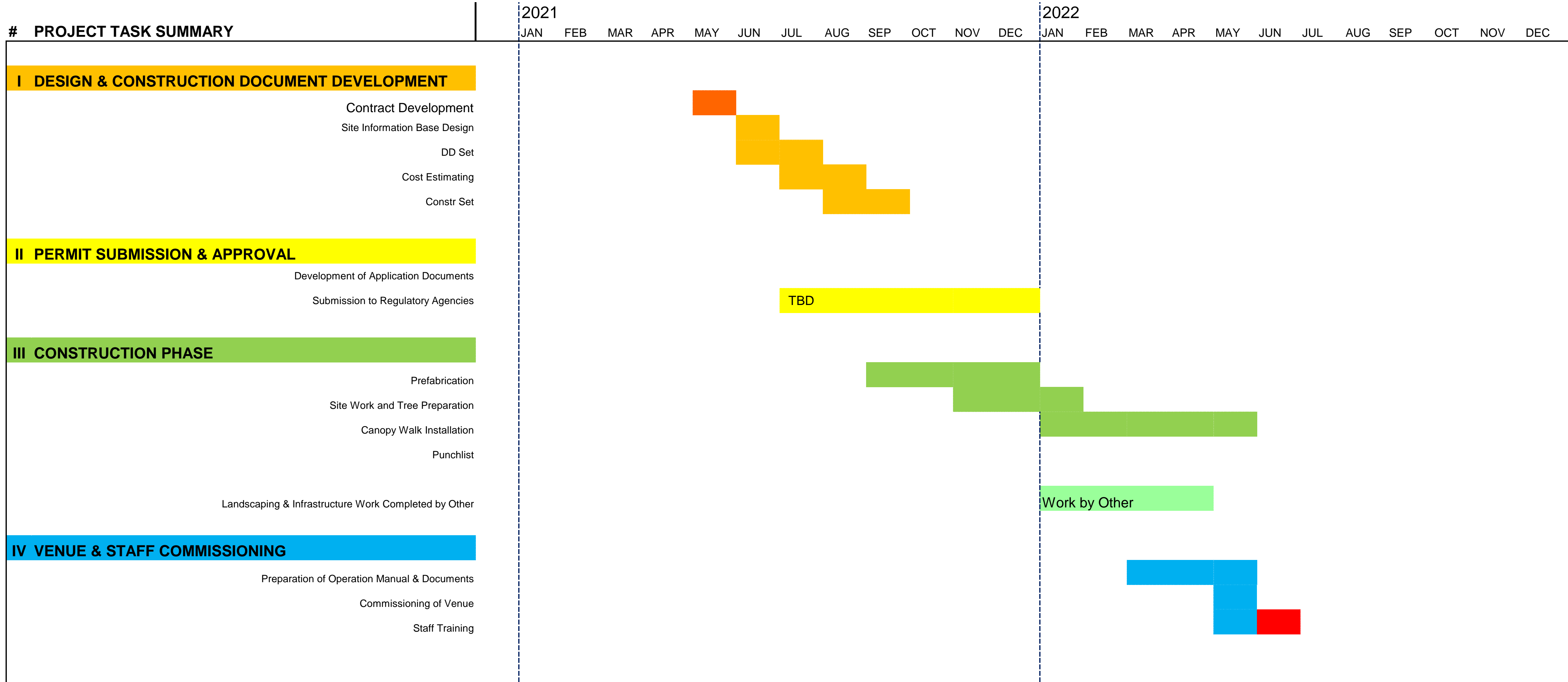
# SCHEDULE





# NATIONAL ARBORETUM - CANOPY WALK - PRELIMINARY PROJECT SCHEDULE

APRIL 2021







**BUDGET**





<b>NATIONAL ARBORETUM - CANOPY WALK - ROM COST ESTIMATE</b>				
<b>#</b>	<b>PROJECT TASK SUMMARY</b>	<b>SUB-TOTAL</b>		
<b>I</b>	<b>DESIGN &amp; CONSTRUCTION DOCUMENT DEVELOPMENT</b>	\$	140,000.00	BUDGET
<b>II</b>	<b>PERMIT SUBMISSION &amp; APPROVAL</b>	\$	50,000.00	ALLOWANCE
<b>III</b>	<b>CONSTRUCTION PHASE</b>			
	<b>ADA &amp; CABLE TRAILS</b>	\$	964,500.00	ESTIMATE
	<b>NET-SCAPE</b>	\$	150,000.00	ESTIMATE
<b>IV</b>	<b>VENUE &amp; STAFF COMMISSIONING</b>	\$	20,000.00	ALLOWANCE
	<b>PHASE I TOTAL</b>	<b>\$</b>	<b>1,324,500.00</b>	<b>ROM - ESTIMATE</b>
	<b>PHASE II TOTAL</b>	<b>\$</b>	<b>1,300,000.00</b>	<b>ROM-ESTIMATE</b>
	<b>PHASE III TOTAL</b>	<b>\$</b>	<b>900,000.00</b>	<b>ROM-ESTIMATE</b>
Notes: all cost area ROM (Rough order of Magnitude) +/- 30% all prices are subjected to change due to current rapid increases in construction materials.				







**TREE-MENDOUS**™

AERIAL ADVENTURES

TREE-MENDOUS.COM  
INFO@TREE-MENDOUS.COM  
12913 STATE ROUTE 22  
CANAAN, NY 12029  
518-288-2920

In every walk with nature one receives far more than he seeks.  
- John Muir





## Canopy Trail Concept Paper

### **Summary**

Friends of the National Arboretum (FONA) is interested in pursuing the construction of a canopy trail at the National Arboretum (USNA). The canopy trail would be a paid educational attraction that focuses on the benefits of trees and would complement existing FONA programming. FONA would raise the funds to pay for the construction, enter into a revenue share agreement with USNA, and would be fully responsible for the operations and maintenance of the attraction.

### **What is it?**

Canopy trails - also called canopy walks, treetop walks or treetop walkways - provide pedestrian access to a forest canopy. They consisted of a series of bridges between trees in the canopy of a forest, linked up with platforms around the trees.

### **Rationale**

Over the past year, FONA and USNA have been evaluating the possibility of a capital campaign to supplement the financial support of USDA to make restorations and enhancements and usher in the next 100 years of this national institution. Through this process, we identified various projects that could benefit significantly from capital investments through the FONA public-private partnership. After much discussion, we decided that rather than attempting a full scale capital campaign to fund these projects, we would pursue the viability of a canopy trail project that would provide ongoing education and recreation as well as an income stream for other projects. We recommended this approach for the following reasons:

- In today's changing world, there will be a greater demand for outdoor, educational activities – particularly in urban environments.
- The canopy trail will generate revenue to provide funding for other FONA investments and needs at the Arboretum.
- Similar institutions that have built canopy trails have seen a significant increase in attendance and revenue (e.g. Morris Arboretum saw a sustained 30% increase in attendance and membership).
- It will provide needed programming to teach youth (and others) about the importance of trees and the research ARS conducts in an interactive format compatible with environmental education curriculum requirements.
- It enhances the visitor experience for our guests, which could extend the average stay.
- It will strengthen FONA's programming portfolio and therefore the relationships we have with our institutional funders and partner schools.

### **Objectives**

When looking at this opportunity, we would aim to achieve the following objectives:



- Provide a safe, educational, and ADA accessible attraction for visitors and partner schools that is of zero cost to the Arboretum.
- Drive increased Arboretum visitation through membership communications, social marketing, and word of mouth.
- Share USNA's purpose and research through the attraction programming.
- Complement FONA's current Washington Youth Garden programming.
- Attract corporate/grant funding to pay for the attraction and interpretive programming.
- Create a business model with revenue to support USNA priorities.

### **Proposed Concept Location & Partner**

We have identified a potential location for the canopy trail between the current location of the Washington Youth Garden and the Arboretum's M Street entrance. The location is a ravine that would allow entrance on ground level and then take participants 20-30 feet over the ground through a series of bridges and treehouses. Since the entry is ground level, we would plan to make the attraction ADA accessible by keeping the bridges stable and treehouses on the same level. We would also enclose the bridges in netting to ensure the safety of visitors as they enjoy the attraction.

We have also identified a partner to work with on the project. Tree-Mendous is one of the nation's foremost authorities on these type of attractions, having built them at the Bronx Zoo and in California's Redwood Forest. They are a Certified B Corp, which are for-profit companies certified to meet rigorous standards of social and environmental performance, accountability, and transparency. They have developed a construction approach that does not damage the trees used for this type of project and they only use sustainably and locally harvested lumber derived from rot resistant species.

### **Next Steps**

FONA has engaged with Tree-Mendous to create a concept design development plan that will take place over the next 2-3 months. We plan to solicit input from relevant stakeholders as part of the plan development to ensure its alignment with USNA and FONA priorities. Once this process is complete, we will present the plan to USNA/FONA/ARS leadership for feedback and possible approval.



# United States National Arboretum New Canopy Trail

3501 New York Ave NE, Washington, DC 20002

Approval of Preliminary Site and Building Plans

United States Department of Agriculture



# Project Summary



## Project Summary:

The U.S. Department of Agriculture (USDA) has submitted preliminary plans to construct a new elevated canopy trail at the US National Arboretum in northeast Washington, DC. The project would consist of a new entry building (where visitors would purchase tickets); a network of bridges and platforms (within the tree canopy) that are attached to existing trees; perimeter fencing (to limit access when the trail is closed); and a new permeable access walkway. The project would be constructed in three separate phases, with the Phase 1 section consisting of 533 linear feet of elevated walkways, and the additional phases could be constructed in the future depending upon the success of the first phase. The trail would be constructed and operated by an aerial adventure company, which has developed similar trails elsewhere. Their construction approach would not damage any trees and the new elevated walkway would only use sustainable and locally harvested lumber derived from rot-resistant tree species. Only trees and free-floating center poles would be used, if needed, to relieve potential weight loads from the trees, and proprietary mounting hardware would be used that grows with the trees without impacting their health.

**Commission Meeting Date:** May 2, 2024

**NCPC Review Authority:** Federal Projects in the District - 40 U.S.C. § 8722(b)(1) and (d)

**Applicant Request:** Approval of Preliminary Site and Building Plans

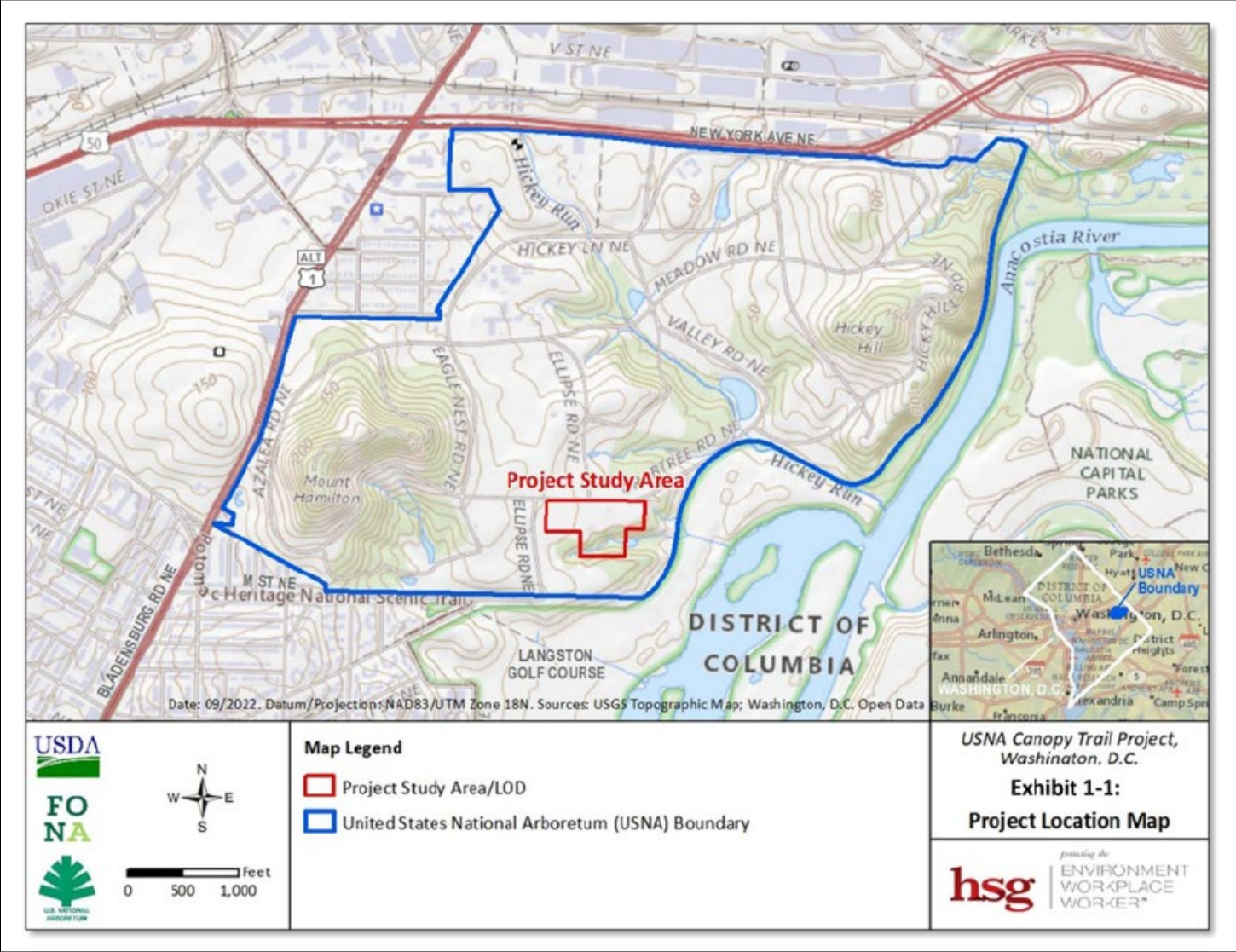
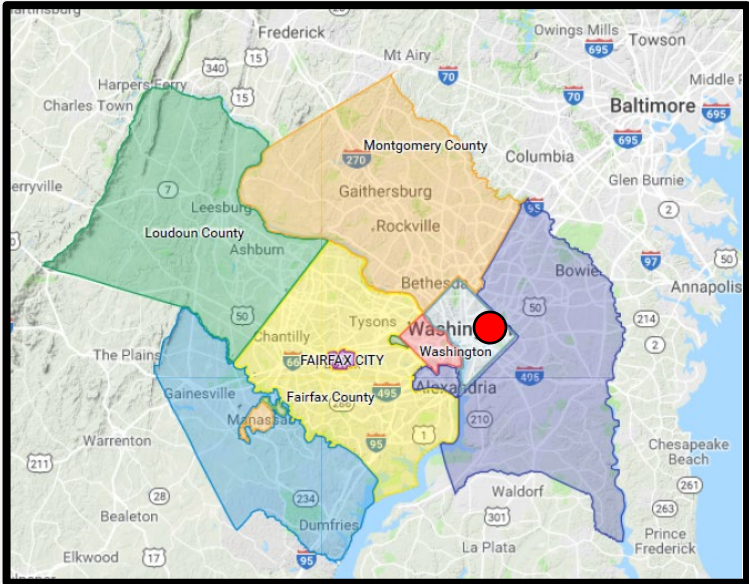
**Session:** Consent Calendar

**NCPC Review Officer:** Michael Weil

**NCPC File Number:** 8538



# Site Location



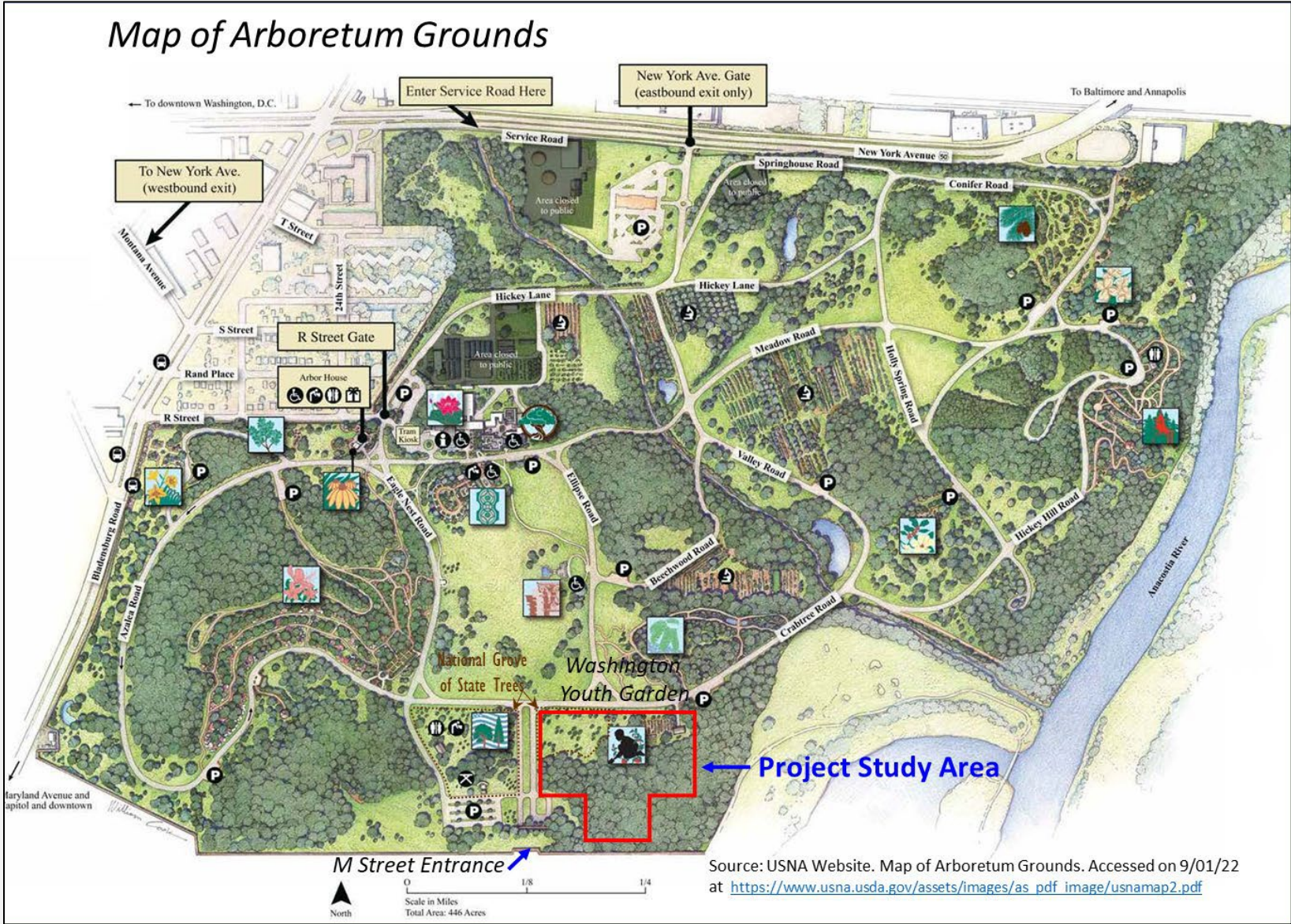


# Site Context





# Site Context



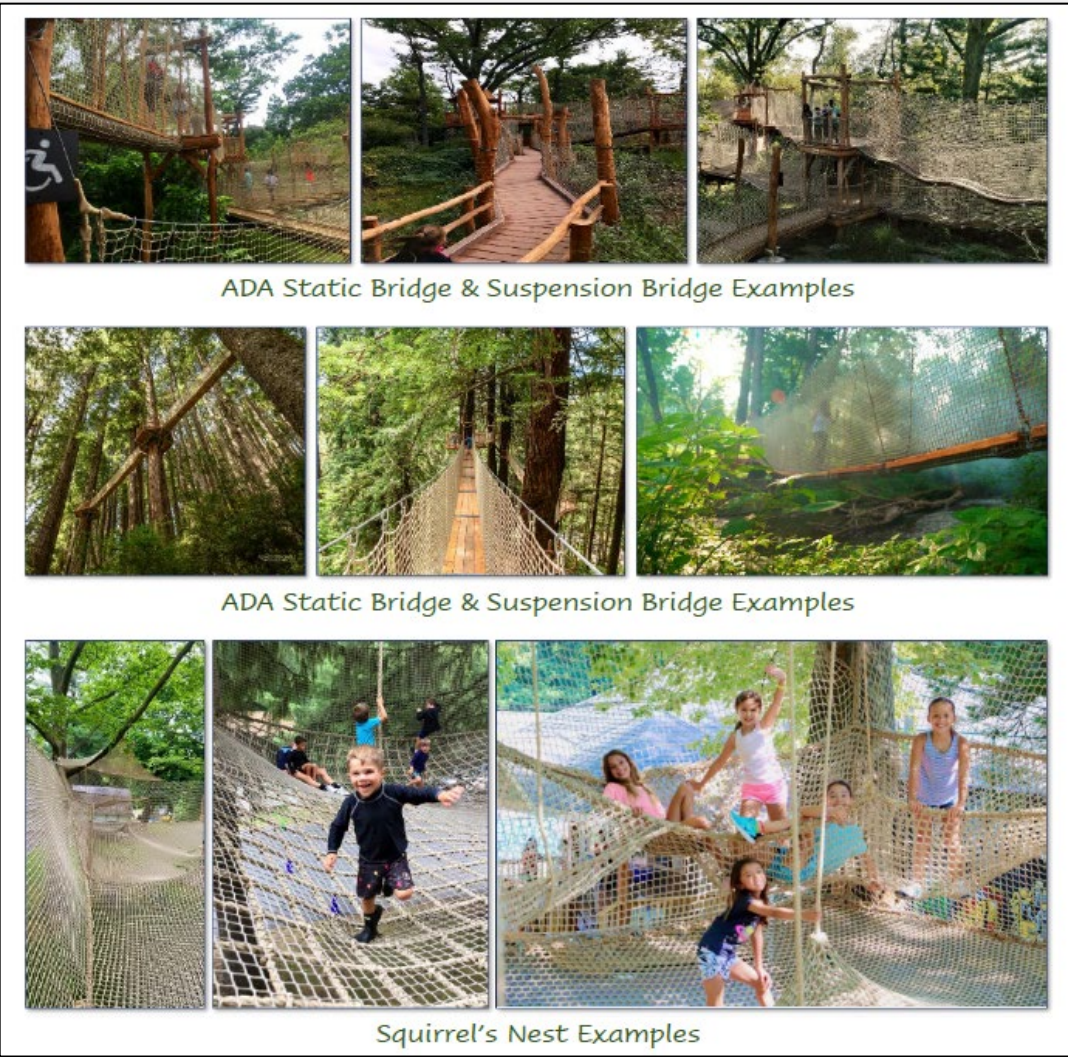


# Project Site



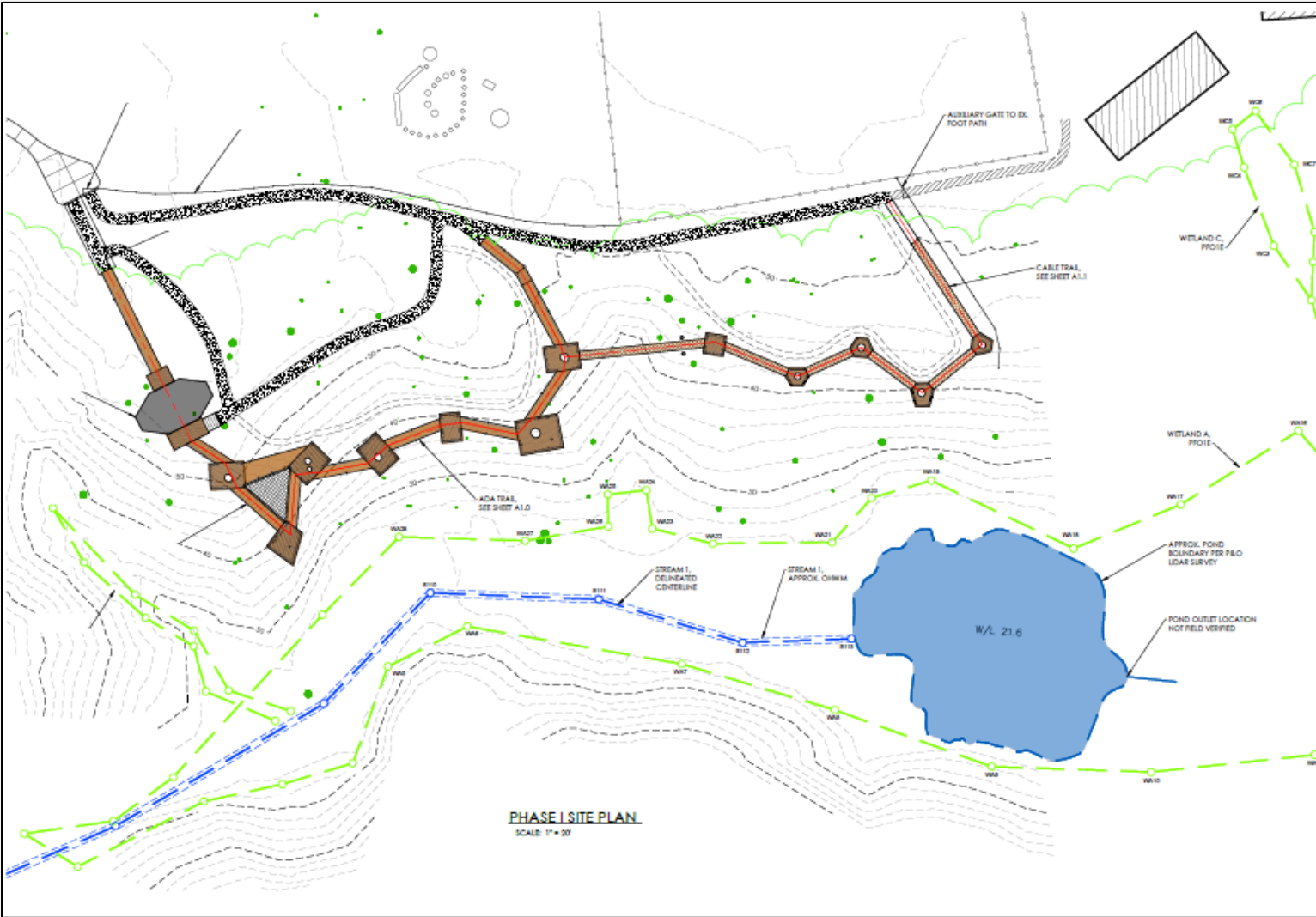


# Example / Existing Site Photos





# Phase 1 Canopy Trail Layout

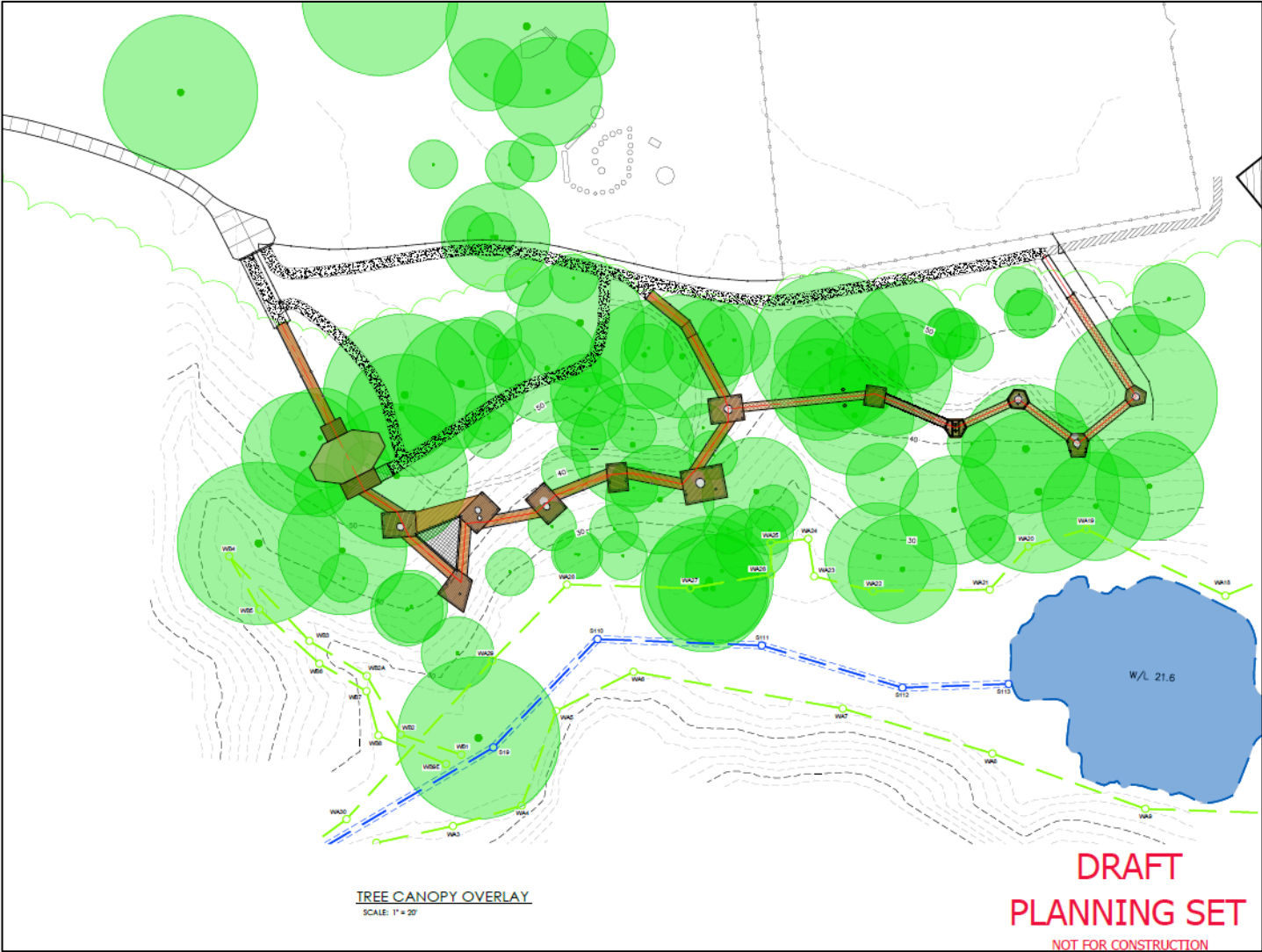


LEGEND	
52.73	EXISTING SPOT ELEVATION
- - - - -	EXISTING CONTOUR 2' INTERVAL
- - - - -	EXISTING CONTOUR 10' INTERVAL
— — — — —	APPROX. EDGE OF WATER
W/L	APPROX. EDGE OF USACE/DOEE WETLAND
S/L	APPROX. CL OF USACE/DOEE STREAM
— — — — —	EXISTING FENCE
— — — — —	PROPOSED FENCE
▲	PROPOSED GATE
— — — — —	NON-ADA BRIDGE
— — — — —	ADA BRIDGE
■	PROPOSED PLATFORM
— — — — —	EXISTING PATH
— — — — —	CONCRETE WALKWAY
— — — — —	STONEDUST WALKWAY
— — — — —	STAFF MULCH WALKWAY
●	EXISTING TREE

PHASE 1 SITE PLAN  
SCALE: 1" = 30'

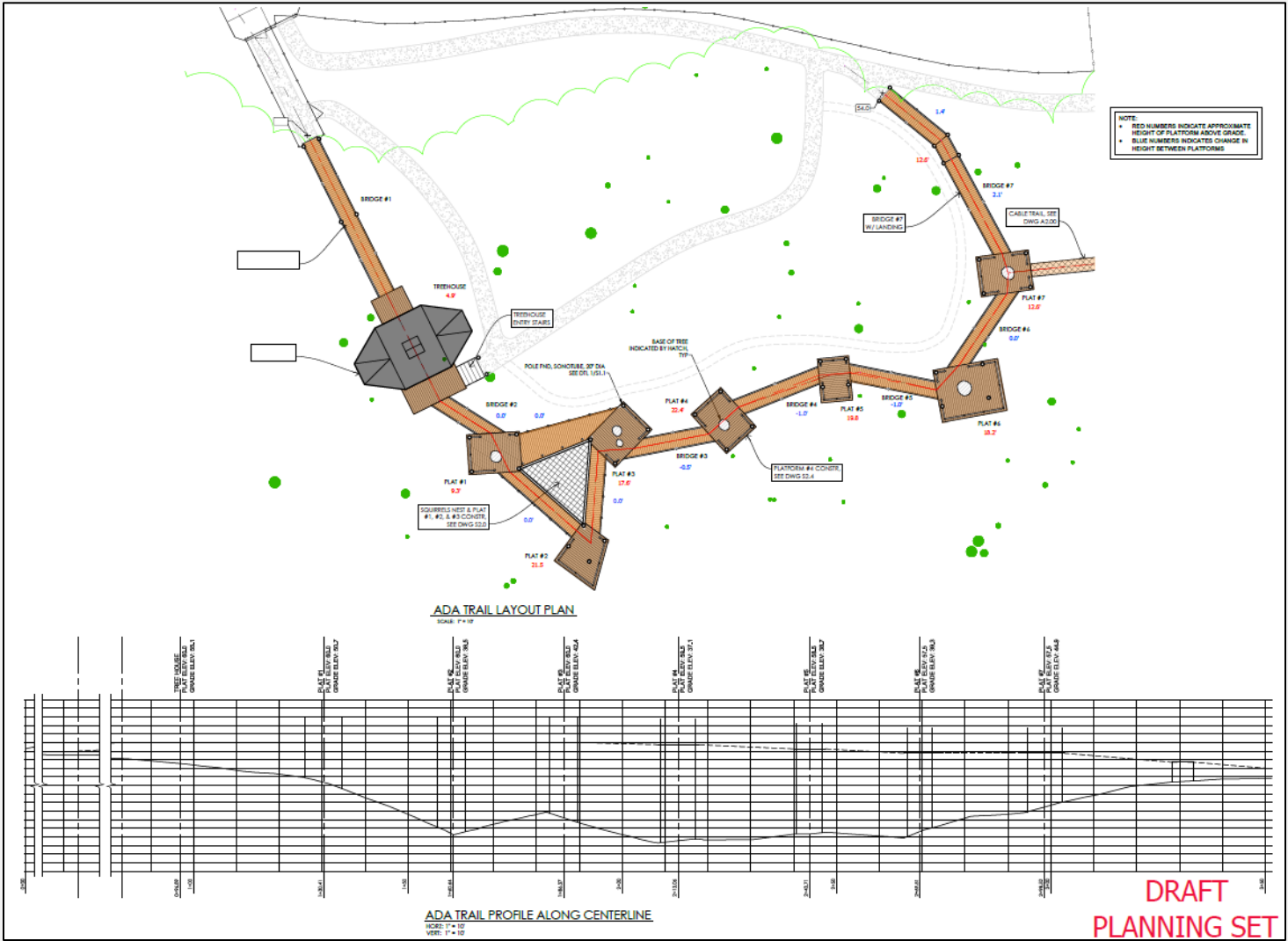


# Phase 1 Canopy Trail Layout



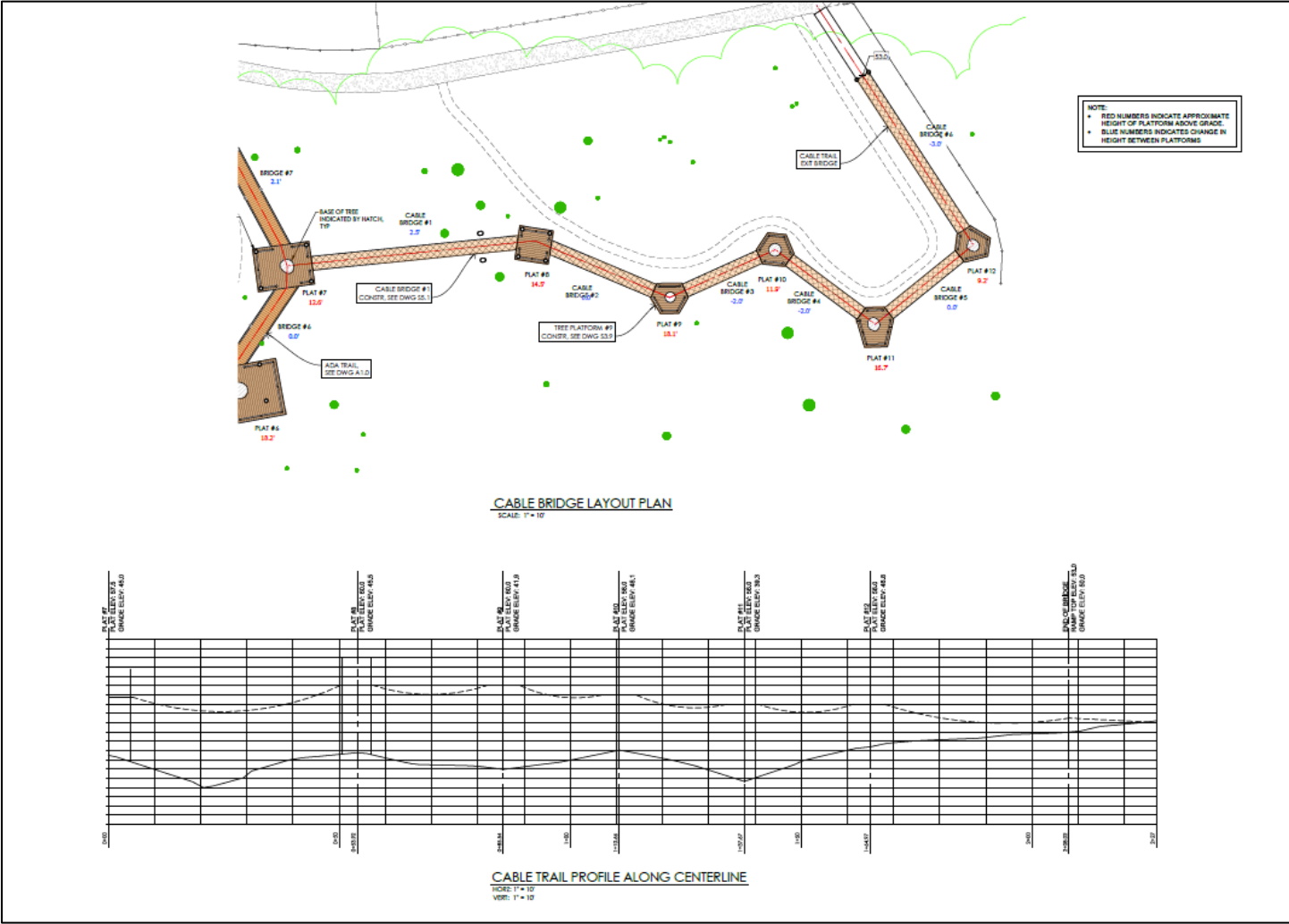


# Phase 1 Canopy Trail Layout & Profile





# Phase 1 Canopy Trail Layout & Profile





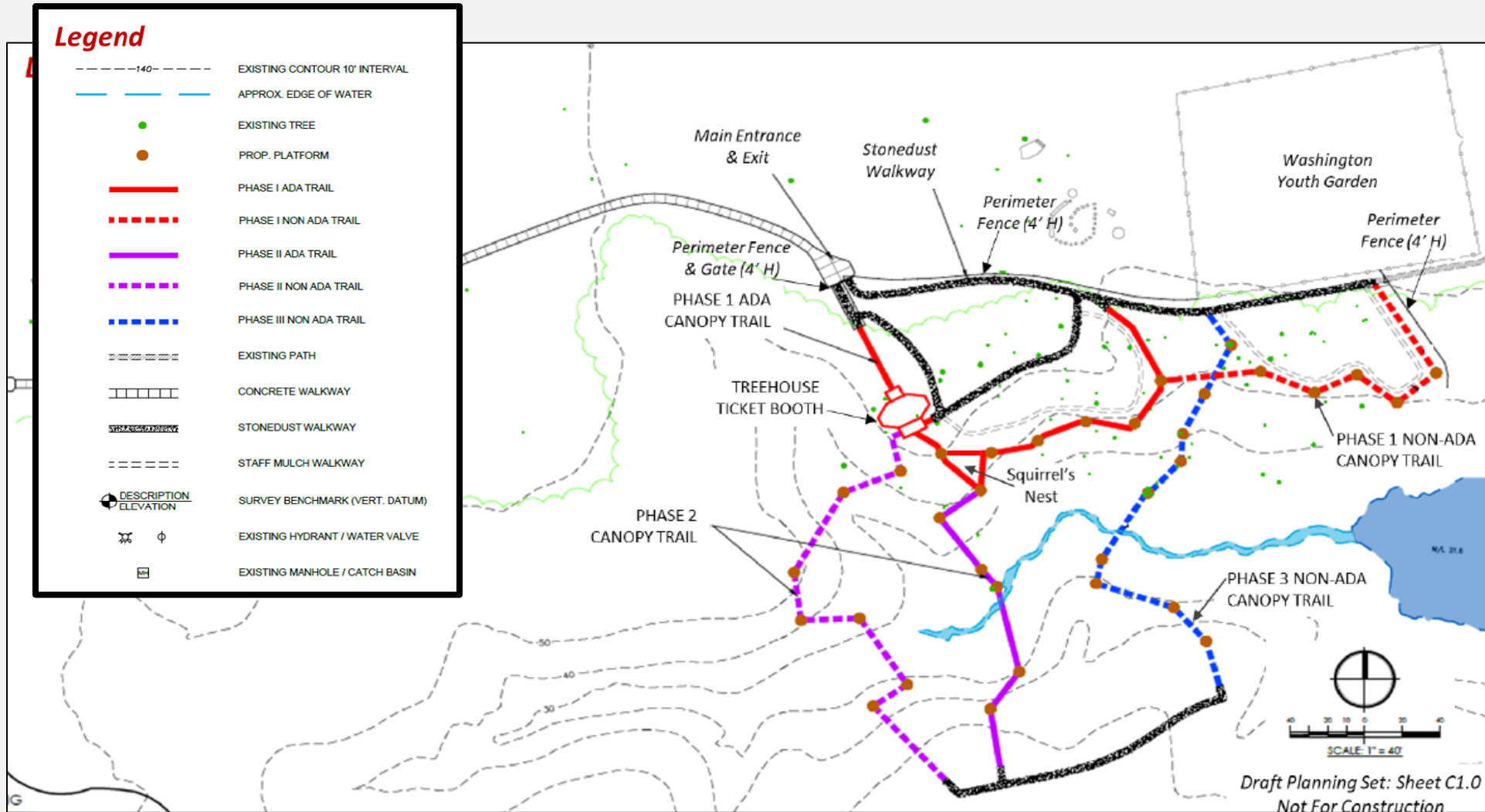






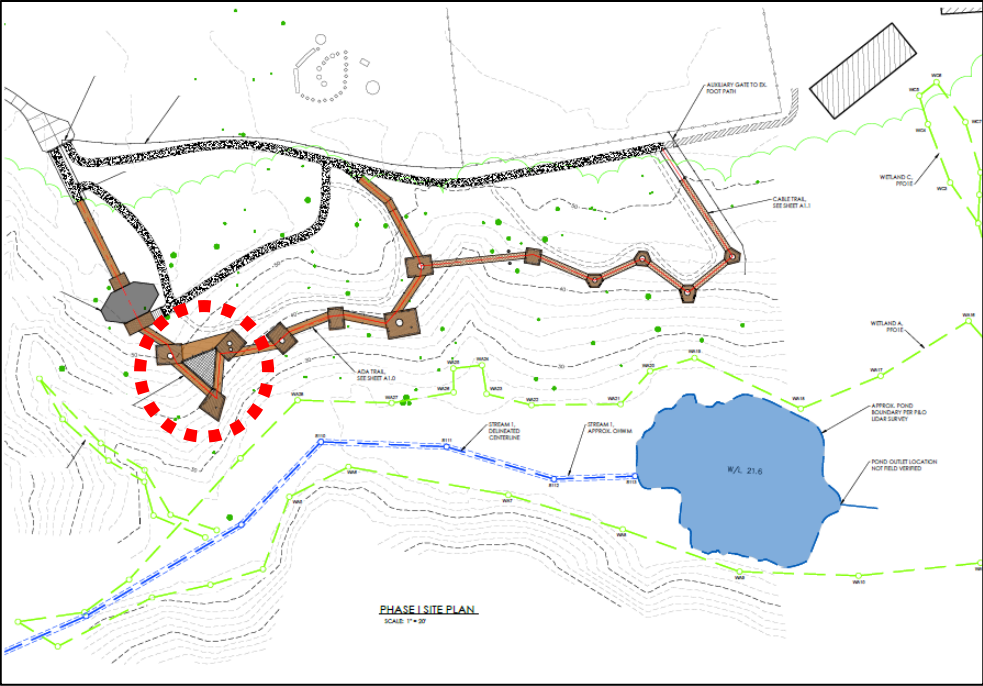


# Total Canopy Trail Map (Phases 1, 2, 3)





# Squirrel's Nest Renderings



Note: Post-looking objects represent existing trees

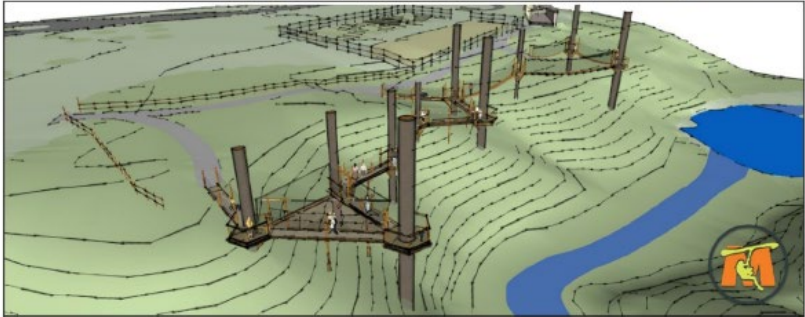
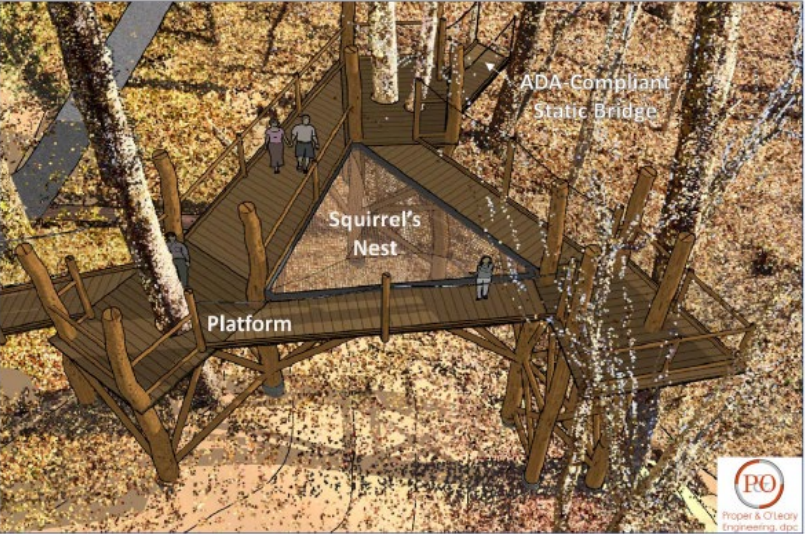
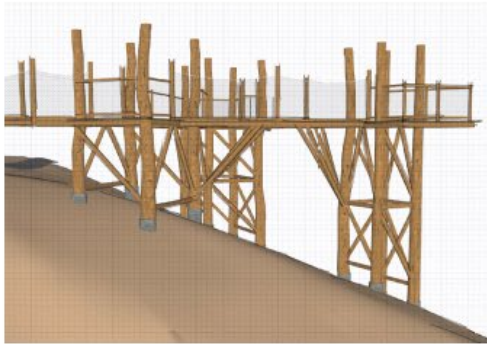
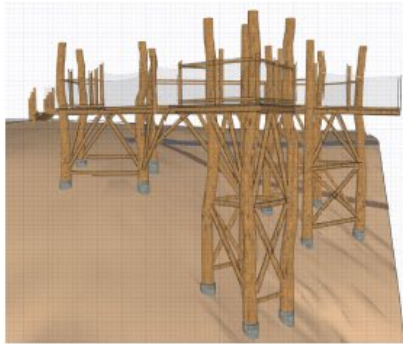
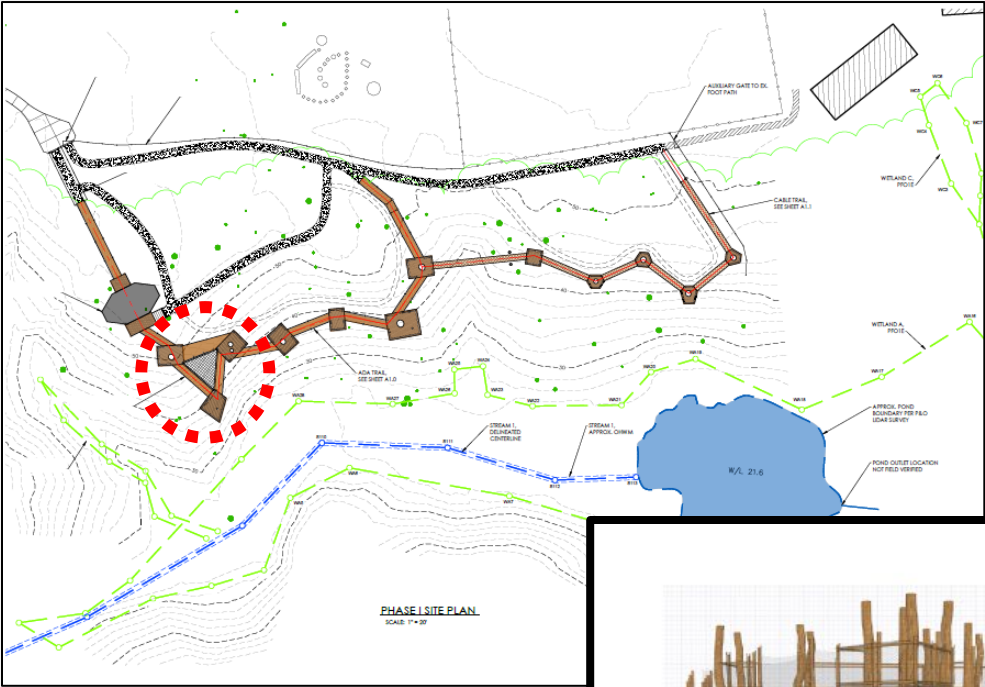


Exhibit 2-5. Rendering of Squirrel's Nest

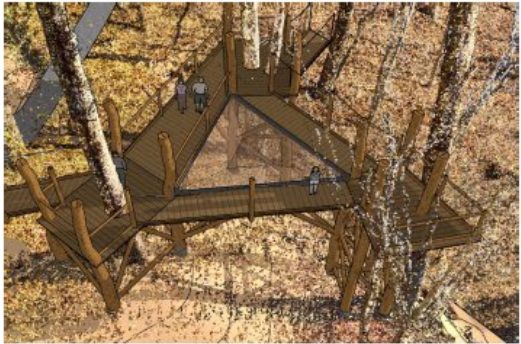




# Squirrel's Nest Elevations



2 ELEVATION 2  
SCALE: 1/8"

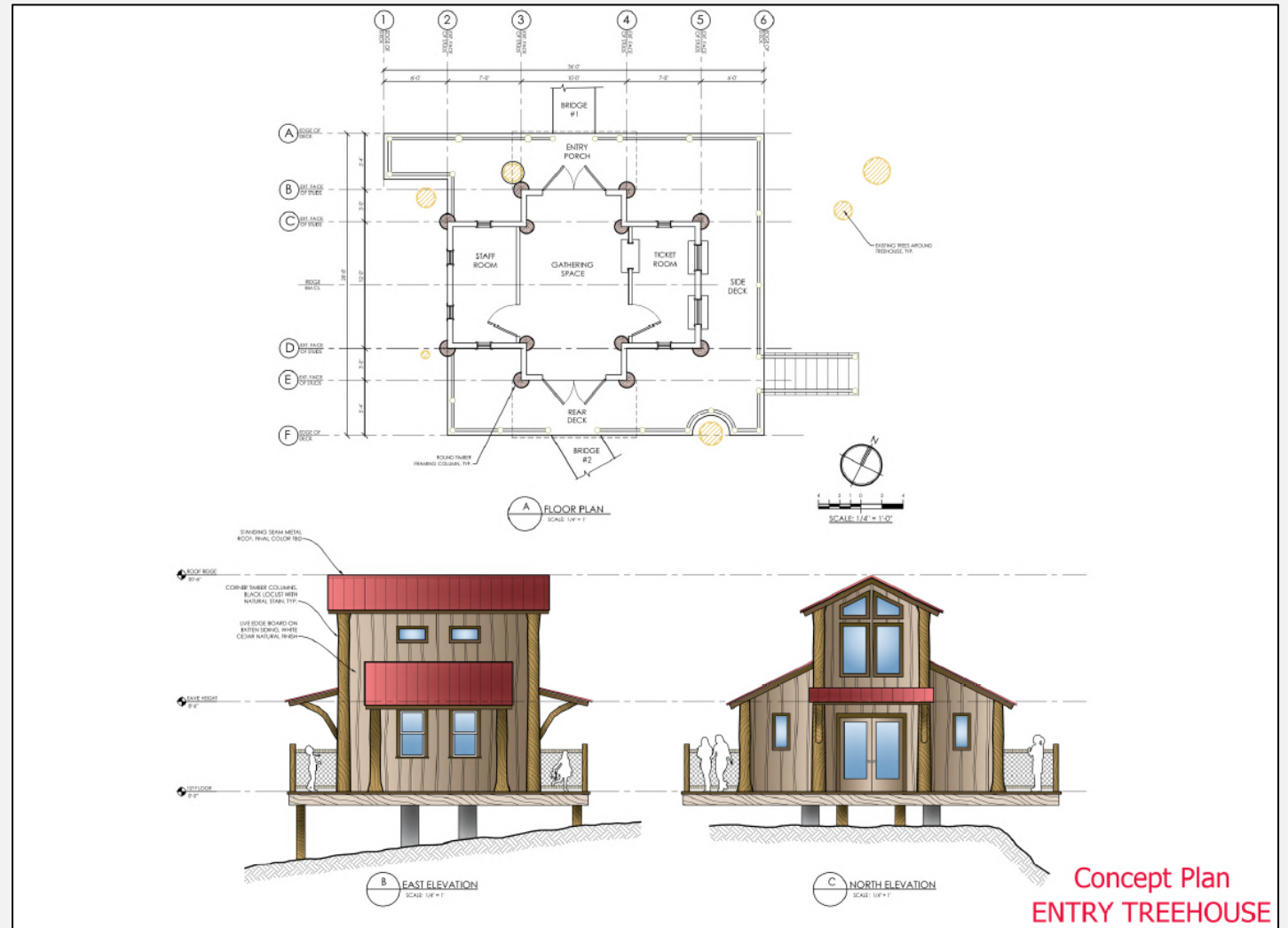
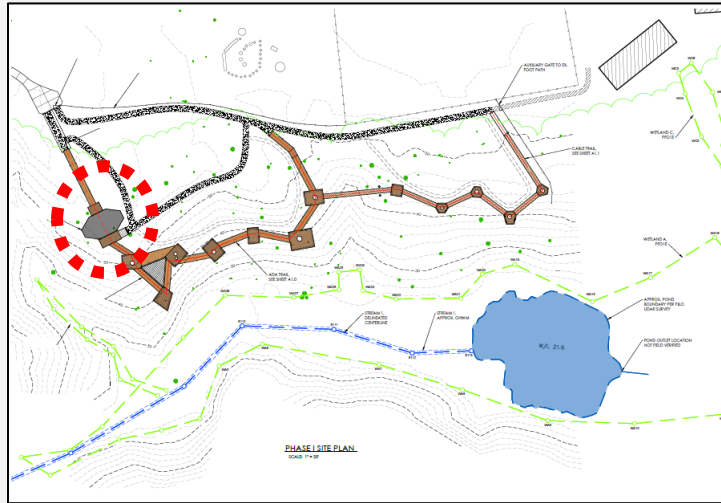


3 ISOMETRIC  
SCALE: 1/8"

DRAFT  
PLANNING SET  
NOT FOR CONSTRUCTION



# Ticket House Plans / Renderings

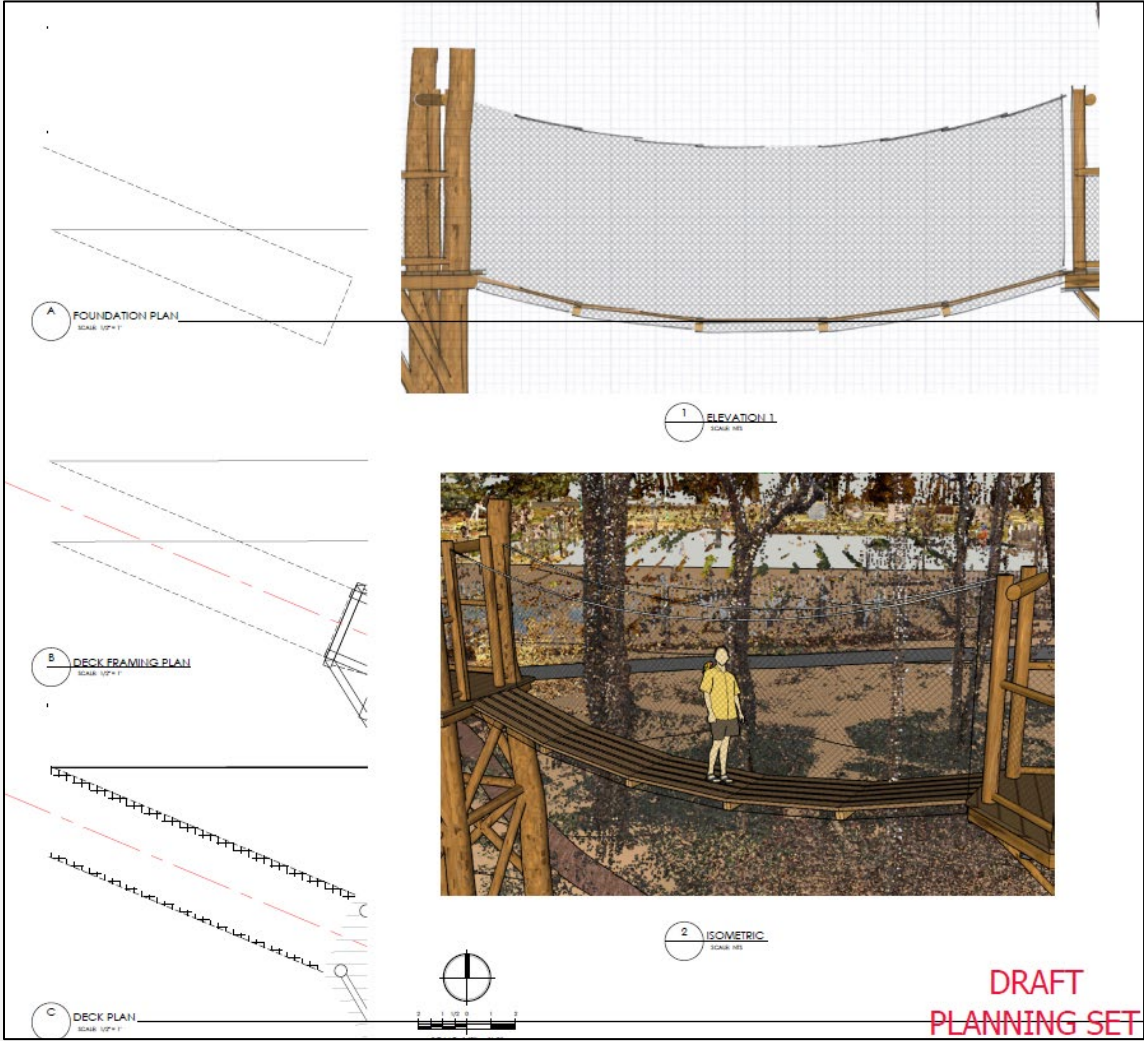
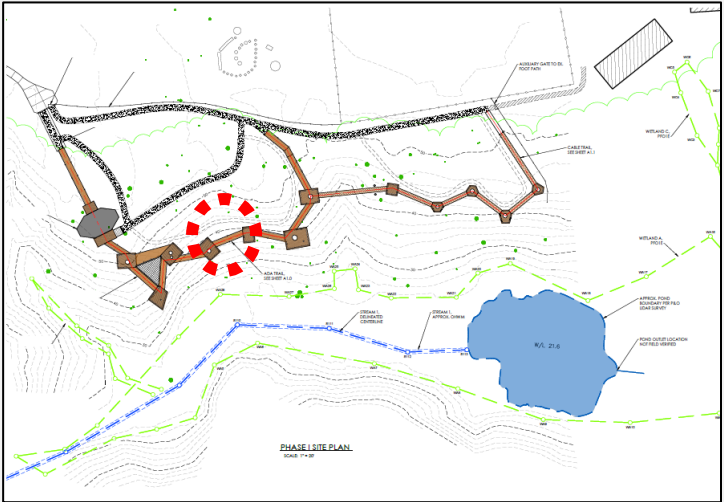








# Cable Bridge Plans / Elevations









# Project Metrics

Phase	ADA Canopy Trail Length (ft)	Non-ADA Canopy Trail Length (ft)	Total Canopy Trail Length (ft)
Phase 1	307	226	533
Phase 2	187	297	484
Phase 3	N/A	277	277
<b>Totals</b>	<b>494</b>	<b>800</b>	<b>1,294</b>

**Exhibit 2-8. Number of Canopy Trail Platforms by Trail Phase and Type**

Phase	ADA Canopy Trail # of Platforms	Non-ADA Canopy Trail # of Platforms	Total Canopy Trail # of Platforms
Phase 1	7	5	12
Phase 2	5	7	12
Phase 3	N/A	9	9
<b>Totals</b>	<b>12</b>	<b>21</b>	<b>33</b>

Phase 1 Trail Features	Dimensions			Area ft <sup>2</sup>
	Elevation (ft)	Width (ft)	Length (ft)	
<b>PERMANENT FEATURES (Appendix A, Sheets A1.0 &amp; A1.1)</b>				
Treehouse Building/Ticket Booth		16	28	448
Squirrel's Nest		9	18	162
ADA Bridge #1		4	40	160
ADA Bridge #2		4	18	72
ADA Bridge #3		4	22	88
ADA Bridge #4		4	22	88
ADA Bridge #5		4	22	88
ADA Bridge #6		4	24	96
ADA Bridge #7		4	49	196
Cable Bridge #1		3	45	135
Cable Bridge #2		3	25	75
Cable Bridge #3		3	18	54
Cable Bridge #4		3	19	57
Cable Bridge #5		3	20	60
Cable Bridge #6		3	40	120
ADA Platform #1		9	12	108
ADA Platform #2		11	12	132
ADA Platform #3		9	12	108
ADA Platform #4		9	12	108
ADA Platform #5		7	10	70
ADA Platform #6		12	15	180
ADA Platform #7		9	12	108
Platform #8		7	7	49
Platform #9		7	8	56
Platform #10		7	8	56
Platform #11		8	9	72
Platform #12		7	8	56
Pervious Concrete Sidewalk	---	5	481	2,405
Stonedust Walkway	---	4	658	2,632
Staff Mulch Walkway	---	2	378	756
<b>Permanent Total Area</b>				<b>879,145</b>
<b>TEMPORARY FEATURES (Appendix A, Sheet C1.2)</b>				
Primary Construction Access and Staging Area				8,513
Secondary Construction Access and Staging Area				5,727
<b>Temporary Total Area</b>				<b>14,240</b>
<b>Combined Total Area</b>				<b>893,385</b>



# Project Metrics

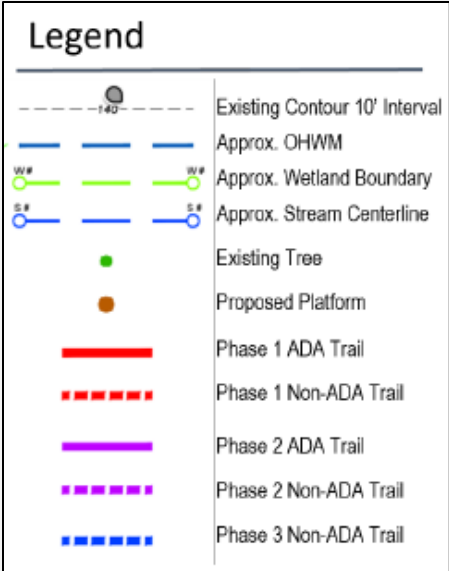
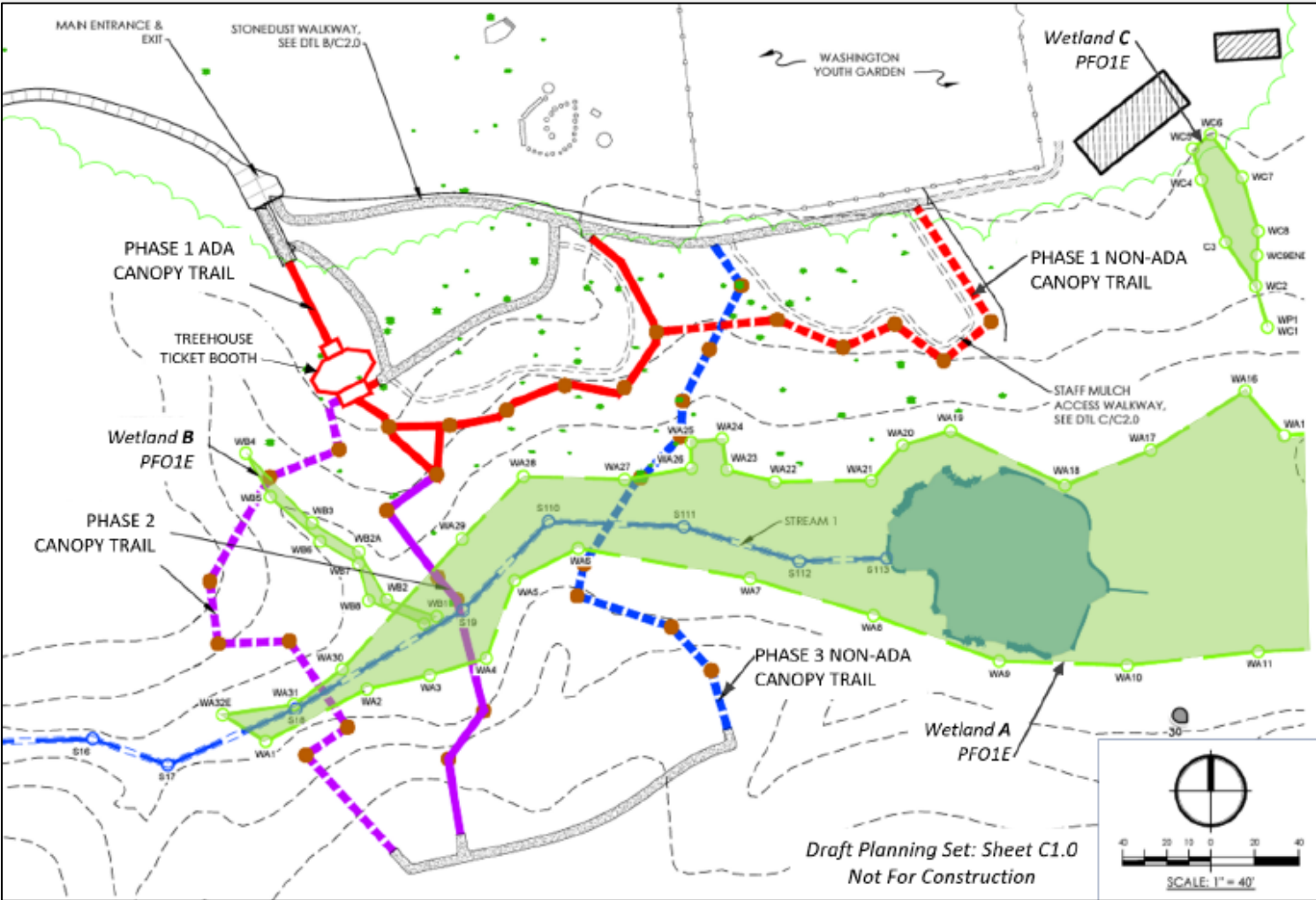
Phase 1 Trail Features	Approximate Ground Elevation (ft)		Approximate Structure Elevation (ft)		Approximate Average Height Above Ground (ft)	
	Begin*	End*	Begin*	End*	Begin*	End*
ADA Bridge #1 (Ramp)	58	58	58	60	0	2
Treehouse Building /Ticket Booth	56	54	60	60	4	6
ADA Bridge #2	54	52	60	60	6	8
ADA Platform #1	52	49	60	60	8	11
Squirrel's Nest	49	39	60	60	11	21
ADA Platform #2	39	38	60	60	21	22
ADA Platform #3	43	41	60	60	17	19
ADA Bridge #3	41	36	60	59	19	23
ADA Platform #4	36	38	59	59	23	21
ADA Bridge #4	37	38	59	58	22	20
ADA Platform #5	38	39	58	58	20	19
ADA Bridge #5	39	38	58	57	19	19
ADA Platform #6	38	40	57	57	19	17
ADA Bridge #6	40	44	57	57	17	13
ADA Platform #7	44	46	57	57	13	11
ADA Bridge #7	46	54	57	54	11	0
Cable Bridge #1	46	45	57	60	11	15
Platform #8	45	45	60	60	15	15
Cable Bridge #2	45	42	60	60	15	18
Platform #9	42	42	60	60	18	18
Cable Bridge #3	43	46	60	58	17	12
Platform #10	46	46	58	58	12	12
Cable Bridge #4	46	39	58	56	12	17
Platform #11	39	39	56	56	17	17
Cable Bridge #5	39	47	56	56	17	9
Platform #12	47	47	56	56	9	9
Cable Bridge #6	48	50	56	53	8	3

Elevations are approximate and rounded to nearest foot.

\*Note: The "Begin" and "End" elevation points are based on the Phase 1 trail profile elevations on Sheets A1.0 and A1.1 of the Draft Planning Set (**Appendix A**). The "Begin" elevation is the beginning point of the ground or structure, at the lower station number. The "End" elevation is the end point of the ground or structure, at the higher station number.

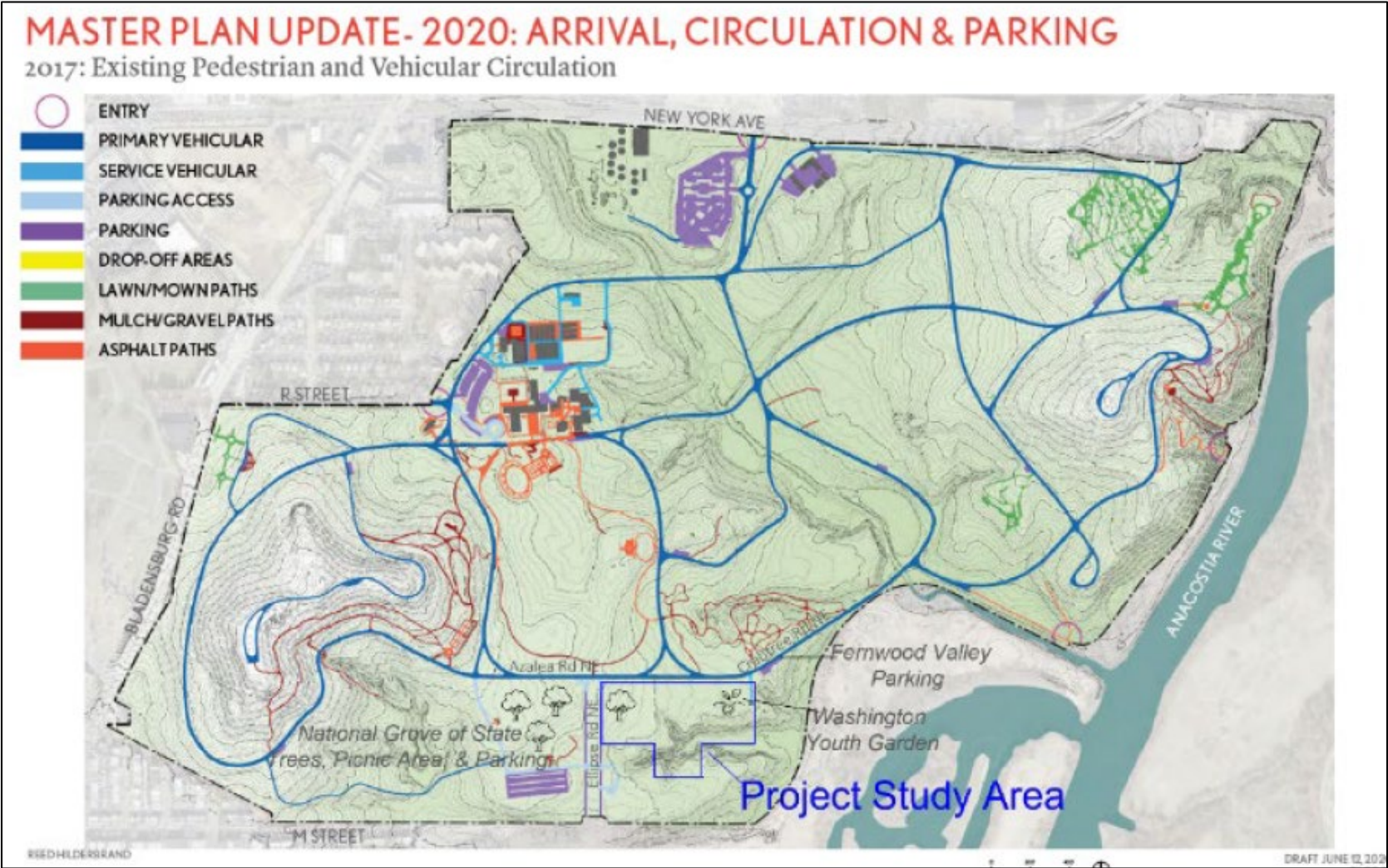


# Surface Water / Wetlands



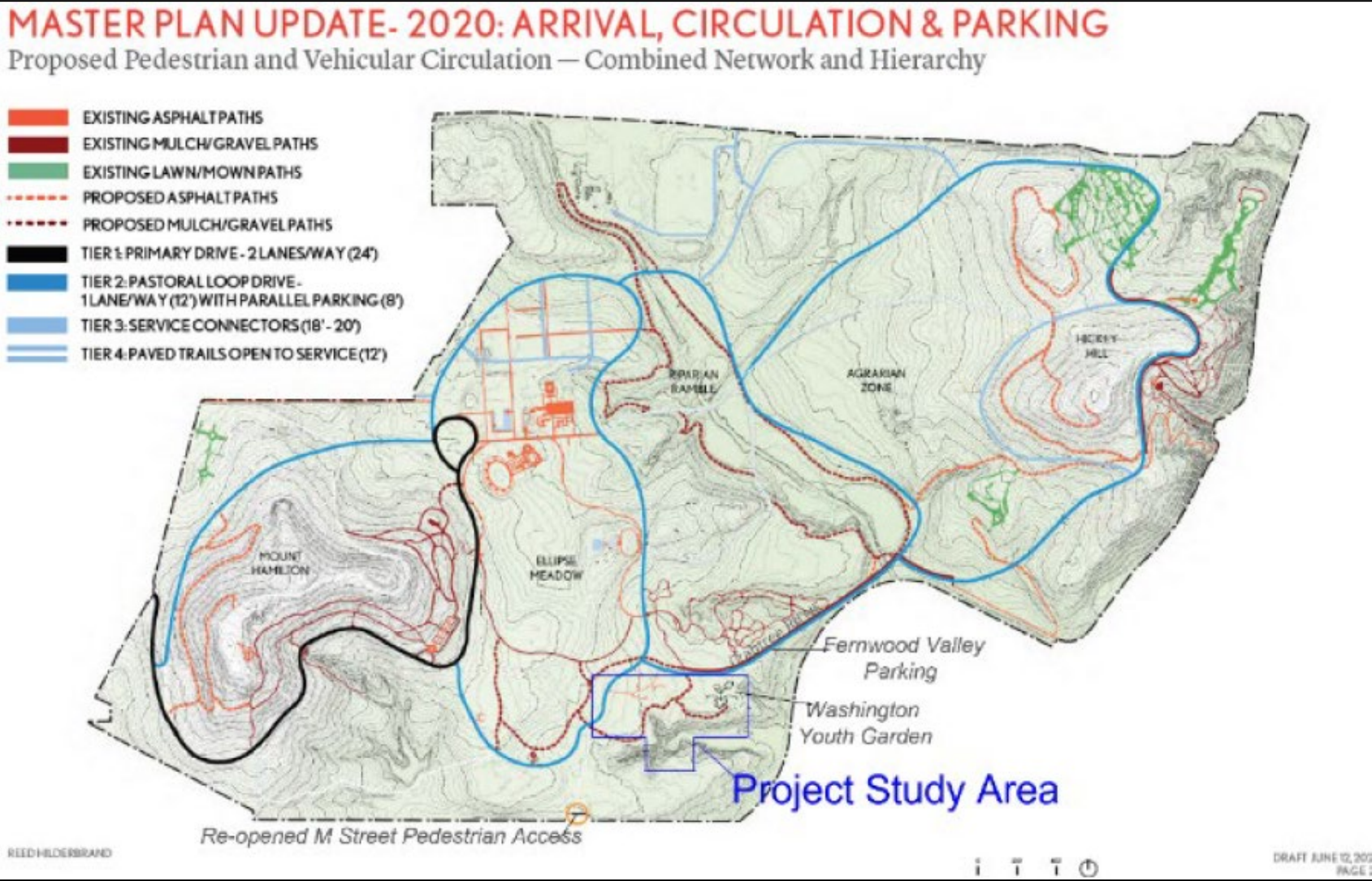


# Existing Circulation





# Future Planned Circulation





# Future Trail Connections (outside of the Arboretum)







# Executive Director's Recommendation

Commission Meeting: May 4, 2024

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<b>PROJECT</b> <b>United States National Arboretum Elevated Canopy Trail</b> 3501 New York Avenue, NE Washington, DC	<b>NCPC FILE NUMBER</b> 8538
<b>SUBMITTED BY</b> United States Department of Agriculture National Arboretum	<b>NCPC MAP FILE NUMBER</b> 43.20(70.00)45815
<b>REVIEW AUTHORITY</b> Federal Projects in the District per 40 U.S.C. § 8722(b)(1) and (d)	<b>APPLICANT'S REQUEST</b> Approval of preliminary site and building plans
	<b>PROPOSED ACTION</b> Approve preliminary site and building plans with comments
	<b>ACTION ITEM TYPE</b> Consent Calendar

---

## PROJECT SUMMARY

The United States Department of Agriculture (USDA) has submitted preliminary plans to construct a new elevated canopy trail at the United States National Arboretum (USNA) in northeast Washington, DC. The project consists of a new entry building where visitors would purchase tickets; a network of elevated bridges and platforms within the tree canopy; new fencing; and new permeable concrete, stone-dust, and mulch access pathways. The project will be constructed in three separate phases, with a Phase 1 section that is approximately 530 linear feet, and two potential additional phases added in the future depending upon the success of the first phase. The project will be constructed and operated by an experienced aerial adventure company that has developed similar trails elsewhere. Their construction approach will not damage any trees and the new elevated trail components (bridges, platforms, structural support posts) will be sustainable, locally harvested lumber that is derived from rot-resistant tree species. The project is located near the existing Washington Youth Garden.

## KEY INFORMATION

- The 446-acre United States National Arboretum (USNA) is the premier horticulture research facility of the United States Department of Agriculture. Established by Congress in 1927 and opened to the public in 1959, the Arboretum is known for its extensive research and exquisite plant exhibits.
- As part of the USDA Agricultural Research Service, the Arboretum employs scientists who maintain a large and invaluable inventory of plant specimens to support research for the nation and around the world. The mission of the United States National Arboretum is to “enhance the economic, environmental, and aesthetic value of ornamental and landscape plants through long-term, multi-disciplinary research, conservation of genetic resources, and interpretative gardens and exhibits.”



- 
- The purpose of the project is to generate interest in and support for Arboretum programming through a different type of educational and recreational experience for visitors.
  - The project was developed through a public-private partnership between the USDA/USNA and Friends of the National Arboretum (FONA) for educational purposes and a source of supplemental revenue for USNA to use to implement existing and long-term goals that might not otherwise be financially feasible. While admission to the Arboretum will continue to be free, the trail operators would charge a fee for entry into the attraction, with special arrangements made for school groups and children from Title 1 (low-income) schools, which may include free entry.
  - Project construction (Phase 1) will require approximately 6-7 months for off-site prefabrication of trail components and 5-6 months of on-site construction. Total construction time will be 10-12 months as pre-fabrication and on-site construction would overlap slightly.
- 

## RECOMMENDATION

The Commission:

**Approves** the preliminary site and building plans for the new elevated canopy trail at the United States National Arboretum in northeast Washington, DC.

**Notes** the purpose of the canopy trail is to generate interest in and support for Arboretum programming through a different type of educational and recreational experience for visitors.

**Notes** the project will be installed in manner that does not harm existing trees or require tree removal.

**Recommends** the applicant continue to refine the entry building to help it further blend into the woodland setting, while meeting programmatic requirements.

**Requests** the applicant provide signage and lighting plans, if applicable, as part of the final project submission.

## PROJECT REVIEW TIMELINE

<b>Previous actions</b>	None.
<b>Remaining actions</b> (anticipated)	<b>Fall/Winter 2024</b> – Approval of final site and building plans.

## PROJECT ANALYSIS

### Executive Summary



The applicant worked closely with NCPC staff and the other review agencies in the development of the project plans. The canopy trail closely aligns with the mission of the Arboretum and will help generate interest in and support for Arboretum programming through a different type of educational and recreational experience for visitors. Further, the project will have minimal impact on existing trees or the landscape. Therefore, staff recommends that the **Commission approve the preliminary site and building plans for the new elevated canopy trail at the United States National Arboretum in northeast Washington, DC.**

### Project Description

The project site is shaped like a “T” in the southern part of the Arboretum, bounded by Azalea Road, NE, and the Washington Youth Garden (to the north) and by Ellipse Road, NE, and the eastern portion of the National Grove of State Trees to the west. Ellipse Road, NE divides the National Grove of State Trees into two parts with the eastern half situated within the project’s limit of disturbance (LOD). The site is near the Arboretum’s southern perimeter. Approximately half the site is heavily wooded and slopes down toward an unnamed east-west Anacostia River tributary.

The primary project component is an elevated network of bridges and platforms that will extend out over the downward-sloping forest land. The network takes advantage of the sloping terrain to bring visitors into the forest canopy. The new trail will range from 1-23 feet above the ground, with a total length of approximately 530 linear feet. Approximately 58% (307 linear feet) of the trail will consist of rigid wooden bridges and platforms to accommodate users of all abilities. Around 42% (226 linear feet) of the trail will consist of a series of dynamic (moving) cable suspension bridges between static platforms. Protective side netting would prevent users from falling off the trail. The platforms will be affixed to existing trees or supported by posts. The entire network will be constructed from locally sourced wood (Eastern White Cedar, Black Locust) in the region and the platform attachments will not harm the trees in any way. Proprietary fasteners that secure the platforms to the trees accommodate the natural growth, expanding as the trunks expand.

The project will construct a new entry “tree house” building that is intended to resemble a rustic-looking cabin with a “monitor” (raised structure, often rectangular or square in shape, positioned along the ridge line of the roof) to provide a sense of entry and wayfinding. Access to the trail and new treehouse area will be controlled through a gated entrance and access barriers or fencing on the northern and western sides of the project area. The new house will encompass an interior ground-floor area of approximately 450 feet with space dedicated to a ticket room, gathering area, and staff room. The tree house will have a wrap-around covered deck area (on three sides) and a standing seam metal roof, with a top elevation of approximately 25 feet above ground level. A 4-foot-high cedar post fence (with netting) and a brick and metal entry gate (reminiscent of a historic brick kiln) limits access to the tree house and trail area (behind the tree house) when the attraction is closed.



Pedestrian access to the new attraction will be provided through a 480 linear foot permeable concrete sidewalk from Ellipse Road, with a 660 linear foot stone dust pathway providing access between the new "tree house" entry area and trail exit points to the east, closer to the Washington Youth Garden. Finally, the project includes a separate 380 linear foot mulch trail to allow staff access on the ground beneath portions of the elevated canopy trail structure. Participants will be able to leave the attraction via an ADA-compliant exit ramp or continue onto the non-ADA-compliant suspension bridge portion of the course with a separate exit point.

In the future, the current proposed trail network could be expanded in two additional phases. As currently envisioned, a second phase would include construction of one additional ADA-compliant trail with a length of approximately 190 feet and one non-ADA-compliant trail with a 300-foot length (totaling 490 feet.) At its southernmost extent, a new 50-foot-long stone dust trail would connect both ADA and non-ADA trail sections. And then the trail may be extended again as part of a third phase that would include one additional non-ADA-compliant trail section (approximately 280 feet in length) with a 190-foot-long stone dust ground trail section to connect to the southernmost portion of the Phase 2 and Phase 3 sections. The exact location and length of these future trail sections will be determined during their more detailed future design. However, all future trail components and construction activities would remain within the established LOD for this project.

#### Staff Analysis

According to the submission materials, the project has relatively minor to negligible site impacts. The project does not include any additional parking as there is an existing visitor lot to the west (0.10-mile) with adequate capacity, as well as parking approximately 0.50-miles away in the Arboretum's main development cluster area. The project will only remove one tree that is in poor health and could pose a safety hazard to trail users. All other trees will be preserved and unharmed with the planned installation methods. Construction of the trail would consist of non-invasive, generally smaller scale work to construct the platforms and bridges. Finally, permanent development will consist of a permeable concrete sidewalk, stone dust and mulch pathways, new fencing/gate, and the new tree house building, which would occupy a ground area of approximately 450 feet near the edge of the forested area. These impacts are reflected in the project's Environmental Assessment (EA.)

As part of previous consultation meetings, NCPC, CFA, and DC SHPO staff encouraged the applicant to develop an entry building that resembles a tree house or traditional-looking cabin. Potential suggestions included eliminating the piers beneath the building (by moving the house to the north of its current location and/or using a stacked-stone façade to give the appearance of a foundation); simplifying the building design (possibly reducing the size of the monitor or eliminating the feature all together); and better relating the building to the canopy trail behind it (as a tree house.) In addition to these considerations, the applicant could consider a more natural looking color for the roof such as dark brown (rather than the current red color of the roof.) Additional staff consultation is necessary to help the applicant develop a more defined building design prior to the project's next submission to NCPC. Therefore, staff suggests the **Commission recommends the applicant continue to refine the entry building to help it further blend into**



**the woodland setting, while meeting programmatic requirements.** The applicant should also continue to coordinate with NCPC staff, the Commission of Fine Arts, and the District of Columbia State Historic Preservation Officer.

The current preliminary submission includes detailed information related to trail layout, project elements, example photos (of similar projects), and renderings. Staff look forward to additional information as part of the project's final submission to include a signage plan, lighting plan (if applicable), and more detailed plans for the new treehouse entry building. The applicant should continue to refine the design with NCPC, DC SHPO, and CFA staff in preparation for the final submission.

## **CONFORMANCE TO EXISTING PLANS, POLICIES AND RELATED GUIDANCE**

### **Comprehensive Plan for the National Capital**

As noted in the analysis above, NCPC staff has reviewed this proposal for compliance with relevant guidance and has determined that it is not inconsistent with the policies established in the Federal Elements of the Comprehensive Plan for the National Capital.

### **National Arboretum Core Framework Master Plan**

The Commission reviewed the current National Arboretum Master Plan in 2000, with a modification in 2007 to reflect the China Garden project, an Anacostia waterfront access path, and decorative security entrances from the Anacostia River. Most recently, NCPC commented favorably on a concept master plan update (in April 2021) with internal Arboretum vehicular and pedestrian circulation changes and construction of new research buildings within the core administrative development area. The concept master plan does not include the proposed new canopy trail project; however, the project is relatively small in scale and will be included in the next master plan update. Further, the proposed canopy trail does not impact any other projects contemplated in the master plan.

### **National Environmental Policy Act**

NCPC has a formal review responsibility under the National Environmental Policy Act (NEPA) given the project's location on federal property within the District of Columbia. NCPC is participating in the National Arboretum's Environmental Assessment (EA) as a Cooperating Agency in order to satisfy the Commission's NEPA responsibility. The USNA posted the project's draft EA on its website for public comment between March 29 – April 28<sup>th</sup>. The EA includes a No Build Alternative and Build Alternative to assess potential future impacts to the natural and human environment, with the following impact topic areas: Topography, Geology, and Soils; Rare, Threatened, and Endangered Species; Terrestrial Resources; Water Resources; Noise; Air Quality; Traffic and Transportation; Socioeconomic Resources; Environmental Justice; Human Health and Safety; Cultural and Historic Resources; and Visual Resources. Based on an initial review, staff anticipates issuing a Finding of No Significant Impact (FONSI) to conclude the NEPA process.



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## **National Historic Preservation Act**

NCPC has a formal review responsibility under the National Historic Preservation Act (Section 106) given the project's location on federal property within the District of Columbia. The USNA has initiated project consultation with the District of Columbia State Historic Preservation Office (DC SHPO) as part of its Section 106 responsibility. NCPC has designed USDA as the lead federal agency for Section 106 purposes. The consultation process will be completed prior to NCPC's final review.

## **CONSULTATION**

### **Coordinating Committee**

The Coordinating Committee forwarded the proposed preliminary site and building plans to the Commission with the statement that the proposal has been coordinated with the following participating agencies: the U.S. Commission of Fine Arts (CFA), DC SHPO, General Services Administration, National Park Service, District of Columbia Office of Planning, and Washington Metropolitan Area Transit Authority. The District Department of Energy & Environment (DOEE) commented that additional coordination with DOEE would be necessary so that they can understand the scope of the land disturbing work for the ticketing house, and that the project will likely need an erosion and sediment control plan.

## **ONLINE REFERENCE**

The following supporting documents for this project are available online at [www.ncpc.gov](http://www.ncpc.gov):

- Project Narrative
- Project Plans / Renderings
- Project Details

Prepared by Michael Weil  
04/24/2024

## **POWERPOINT (ATTACHED)**



# United States National Arboretum New Canopy Trail

3501 New York Ave NE, Washington, DC 20002

Approval of Preliminary Site and Building Plans

United States Department of Agriculture



# Project Summary



## Project Summary:

The U.S. Department of Agriculture (USDA) has submitted preliminary plans to construct a new elevated canopy trail at the US National Arboretum in northeast Washington, DC. The project would consist of a new entry building (where visitors would purchase tickets); a network of bridges and platforms (within the tree canopy) that are attached to existing trees; perimeter fencing (to limit access when the trail is closed); and a new permeable access walkway. The project would be constructed in three separate phases, with the Phase 1 section consisting of 533 linear feet of elevated walkways, and the additional phases could be constructed in the future depending upon the success of the first phase. The trail would be constructed and operated by an aerial adventure company, which has developed similar trails elsewhere. Their construction approach would not damage any trees and the new elevated walkway would only use sustainable and locally harvested lumber derived from rot-resistant tree species. Only trees and free-floating center poles would be used, if needed, to relieve potential weight loads from the trees, and proprietary mounting hardware would be used that grows with the trees without impacting their health.

**Commission Meeting Date:** May 2, 2024

**NCPC Review Authority:** Federal Projects in the District - 40 U.S.C. § 8722(b)(1) and (d)

**Applicant Request:** Approval of Preliminary Site and Building Plans

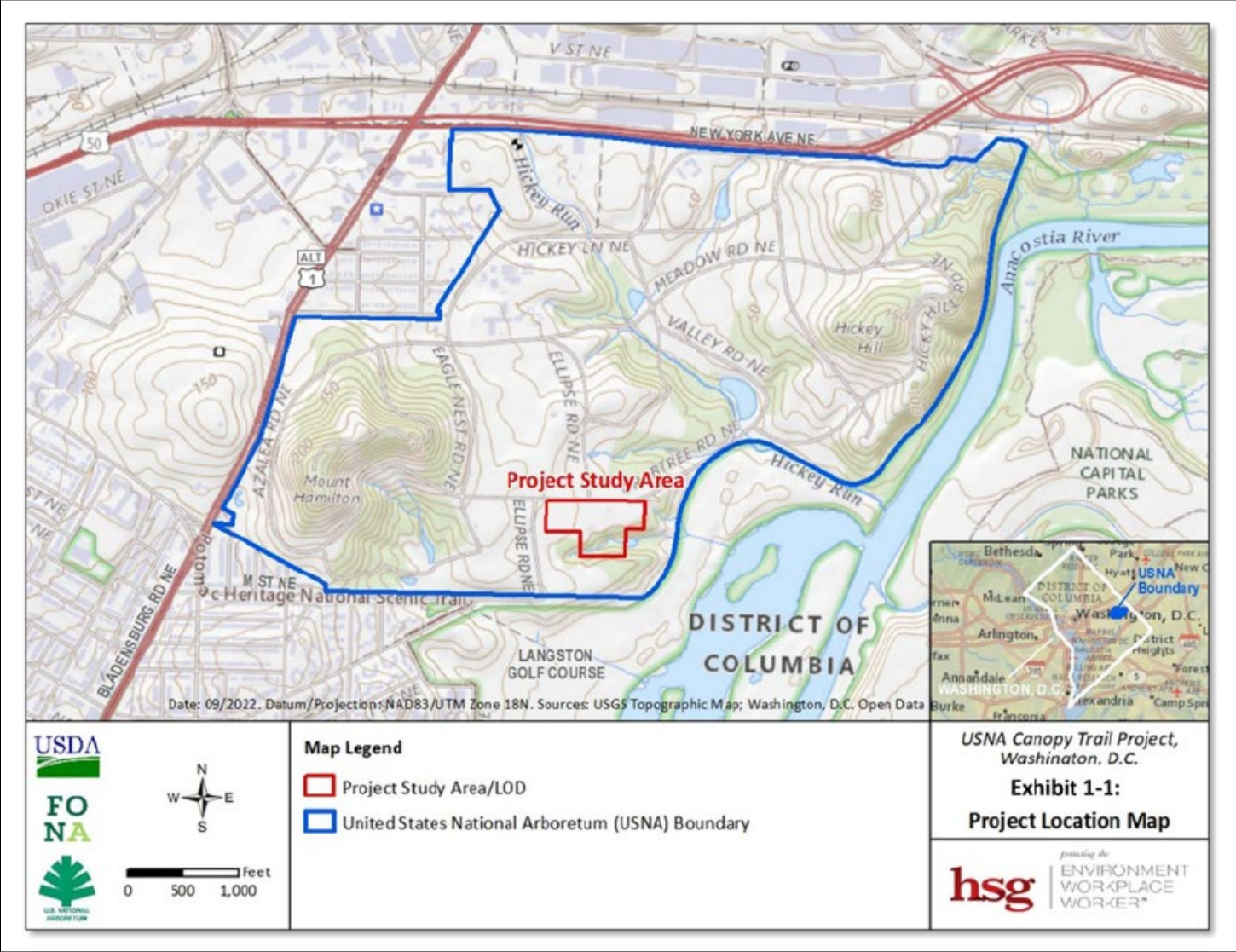
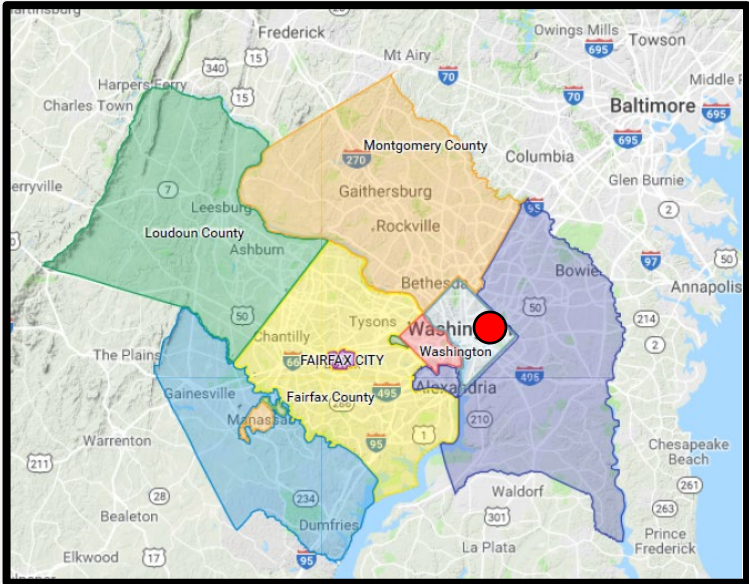
**Session:** Consent Calendar

**NCPC Review Officer:** Michael Weil

**NCPC File Number:** 8538



# Site Location



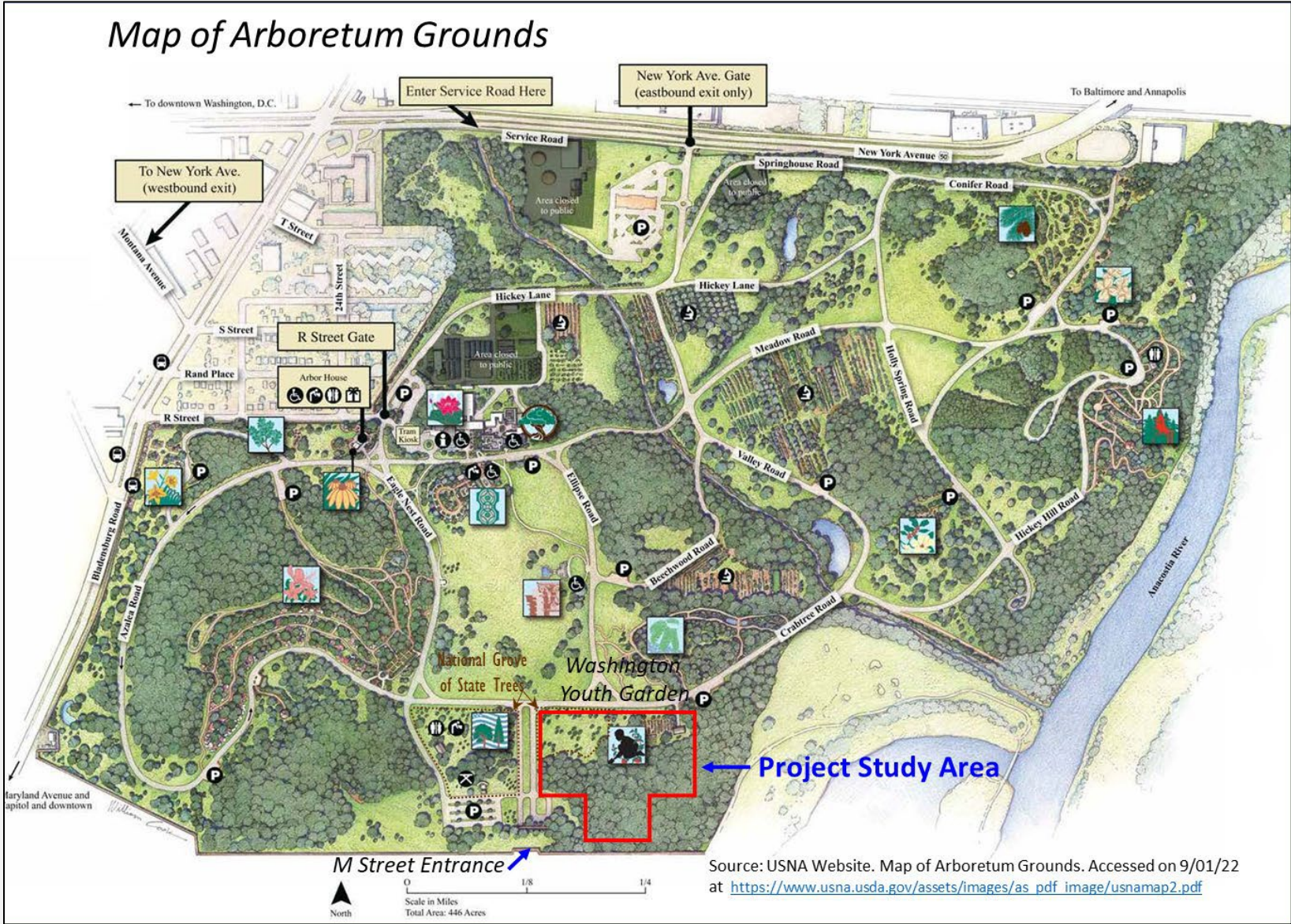


# Site Context





# Site Context



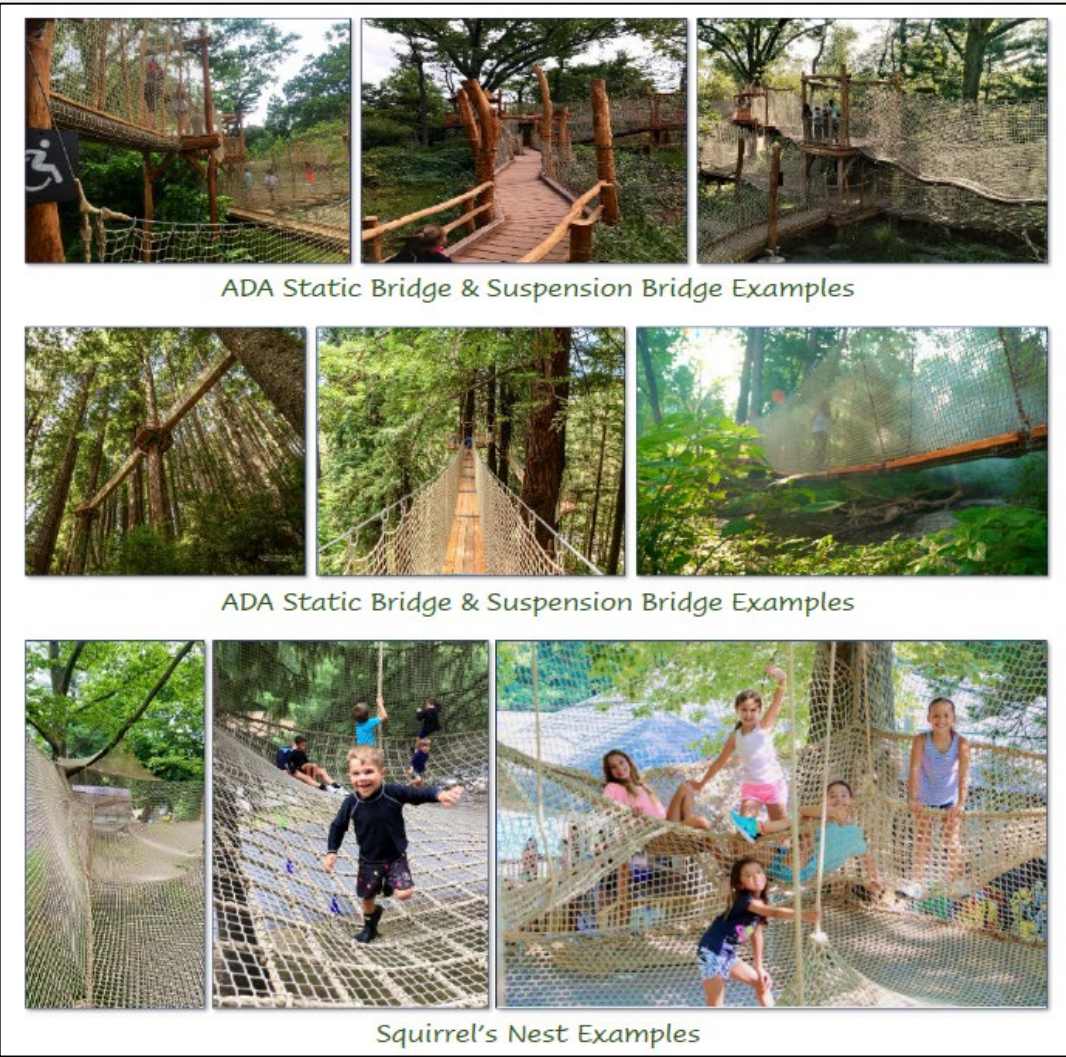


# Project Site



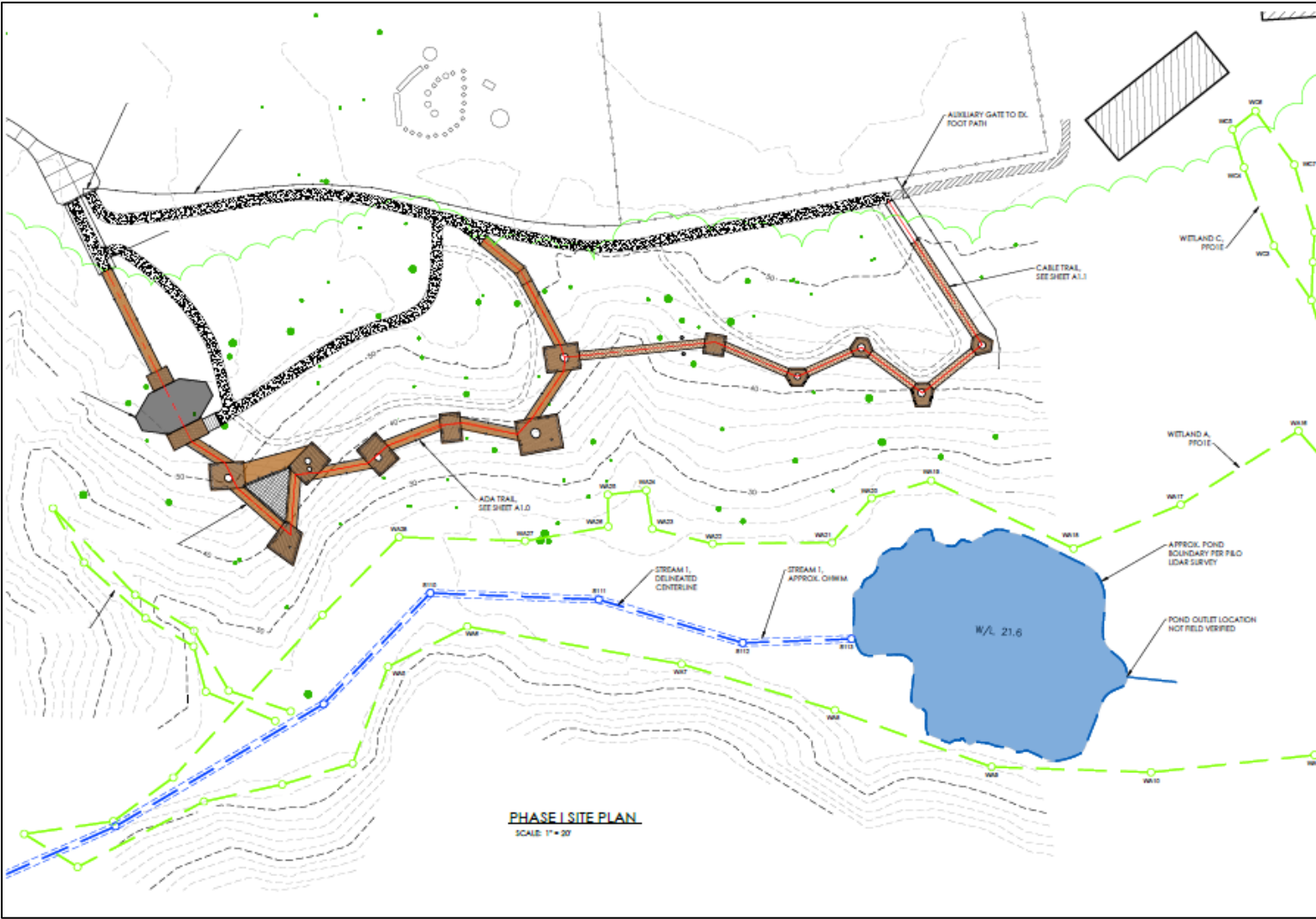


# Example / Existing Site Photos





# Phase 1 Canopy Trail Layout

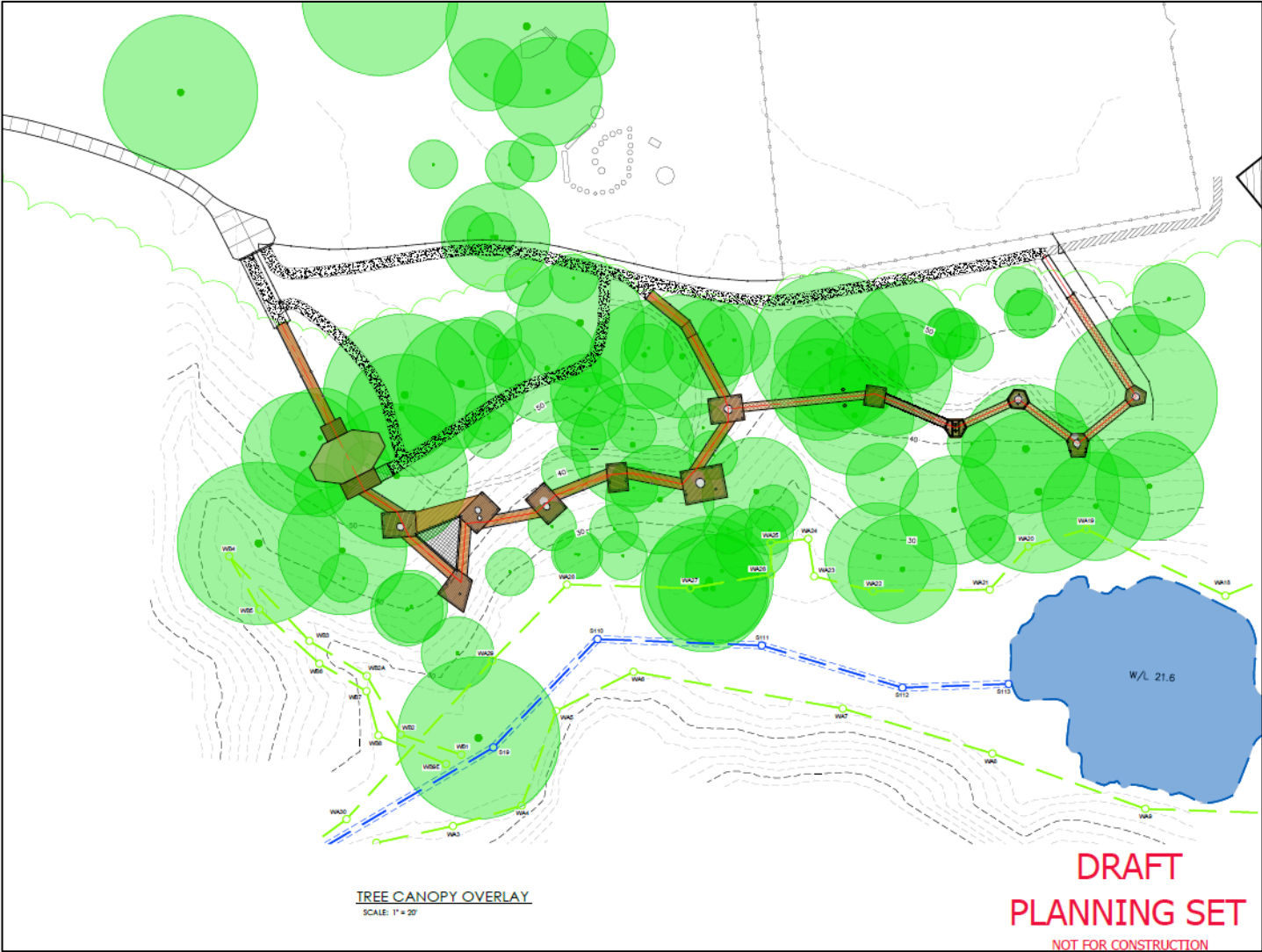


LEGEND	
52.73	EXISTING SPOT ELEVATION
- - - - -	EXISTING CONTOUR 2' INTERVAL
- - - - -	EXISTING CONTOUR 10' INTERVAL
— — — — —	APPROX. EDGE OF WATER
W/L	APPROX. EDGE OF USACE/DOEE WETLAND
S/L	APPROX. CL OF USACE/DOEE STREAM
— — — — —	EXISTING FENCE
— — — — —	PROPOSED FENCE
▲	PROPOSED GATE
— — — — —	NON-ADA BRIDGE
— — — — —	ADA BRIDGE
■	PROPOSED PLATFORM
— — — — —	EXISTING PATH
— — — — —	CONCRETE WALKWAY
— — — — —	STONEDUST WALKWAY
— — — — —	STAFF MULCH WALKWAY
●	EXISTING TREE

PHASE 1 SITE PLAN  
SCALE: 1" = 30'

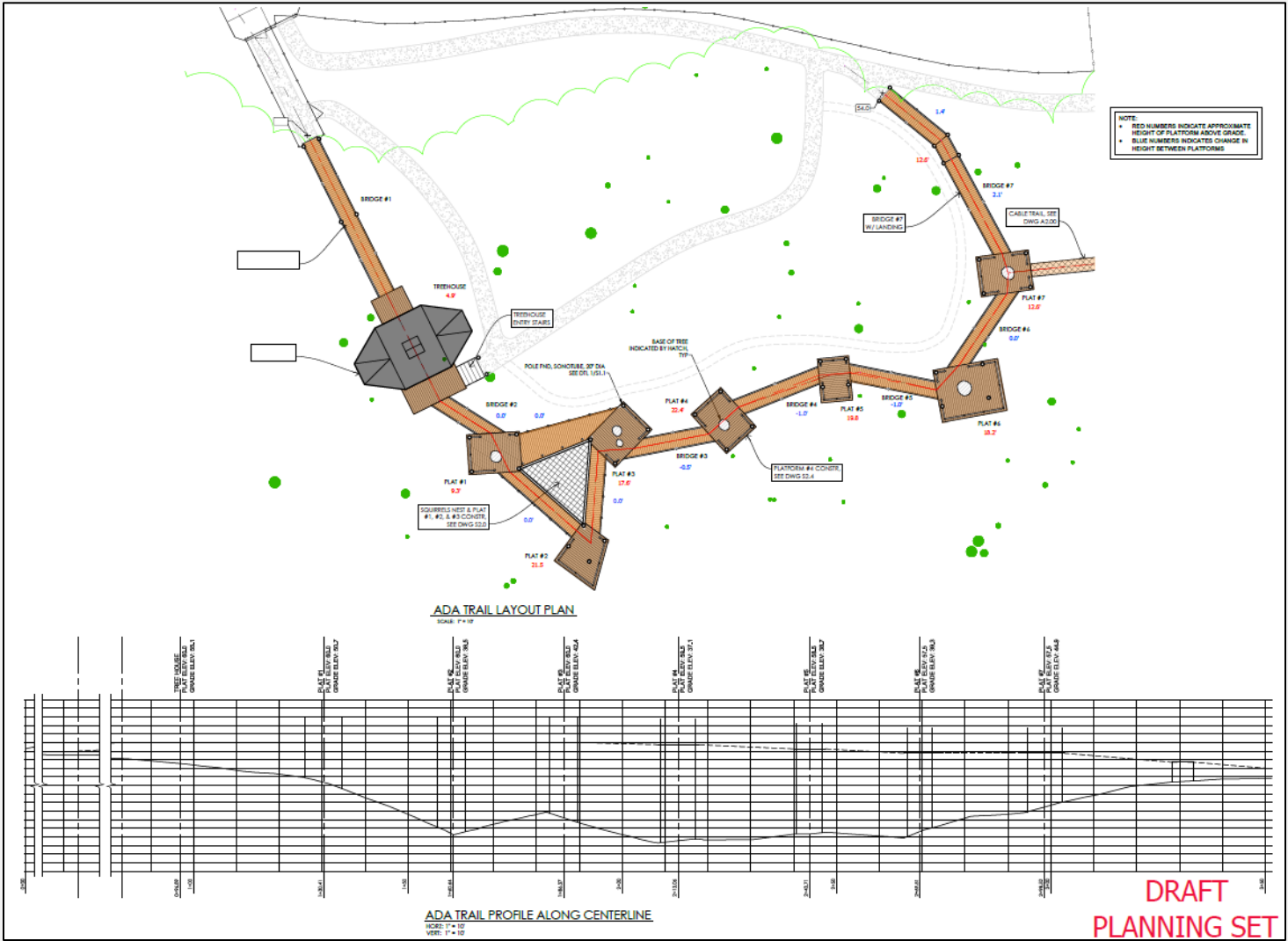


# Phase 1 Canopy Trail Layout



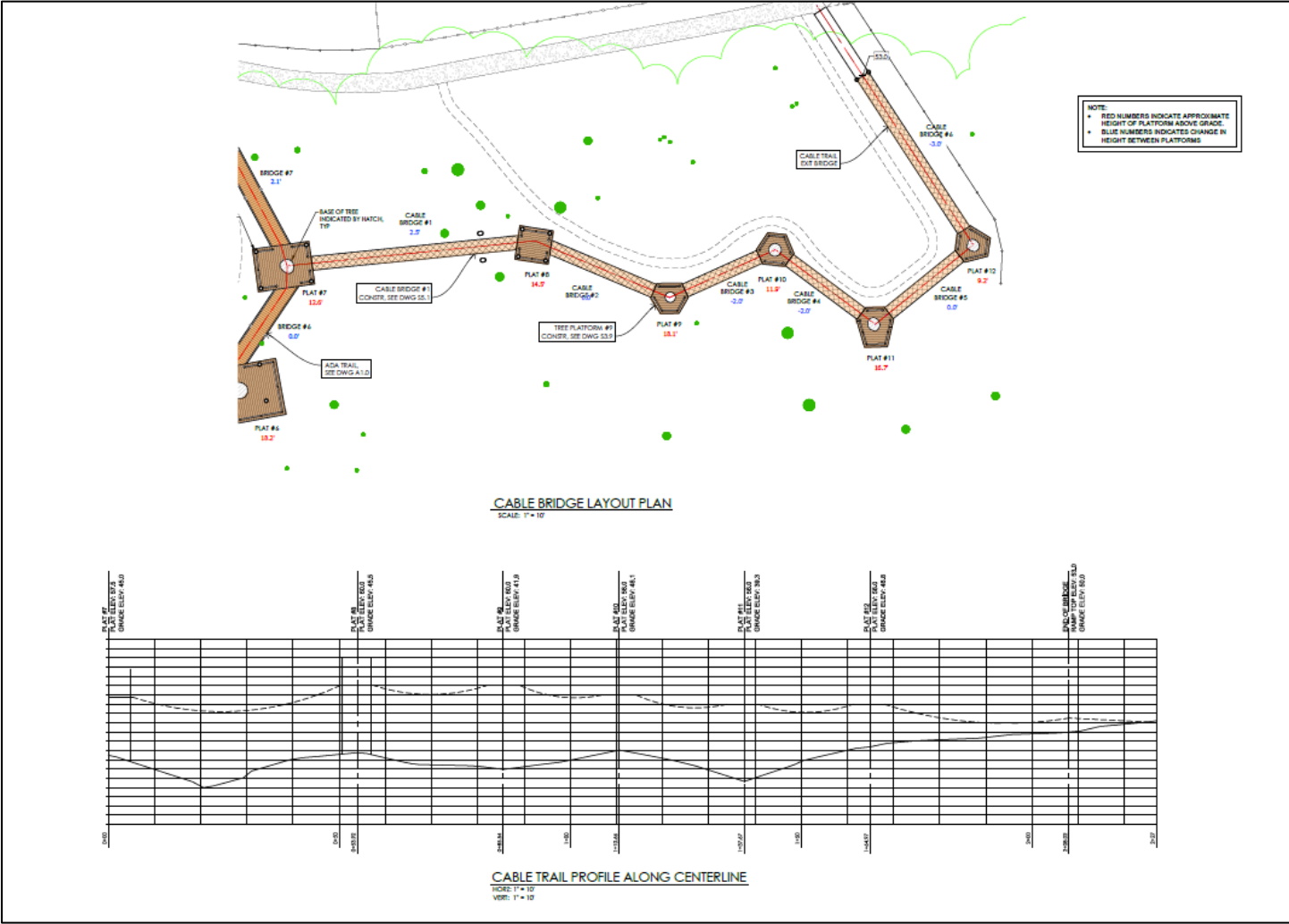


# Phase 1 Canopy Trail Layout & Profile





# Phase 1 Canopy Trail Layout & Profile





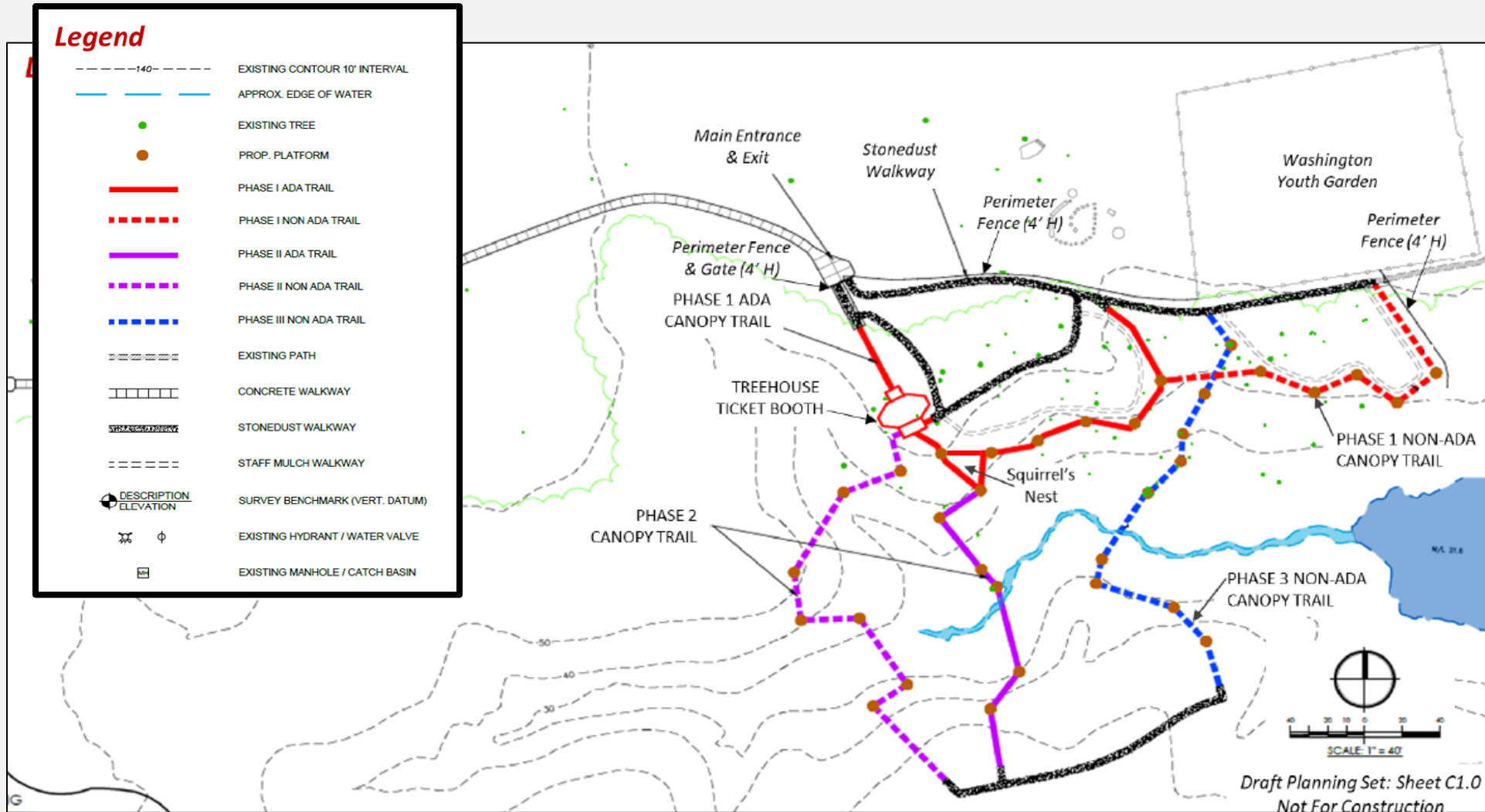






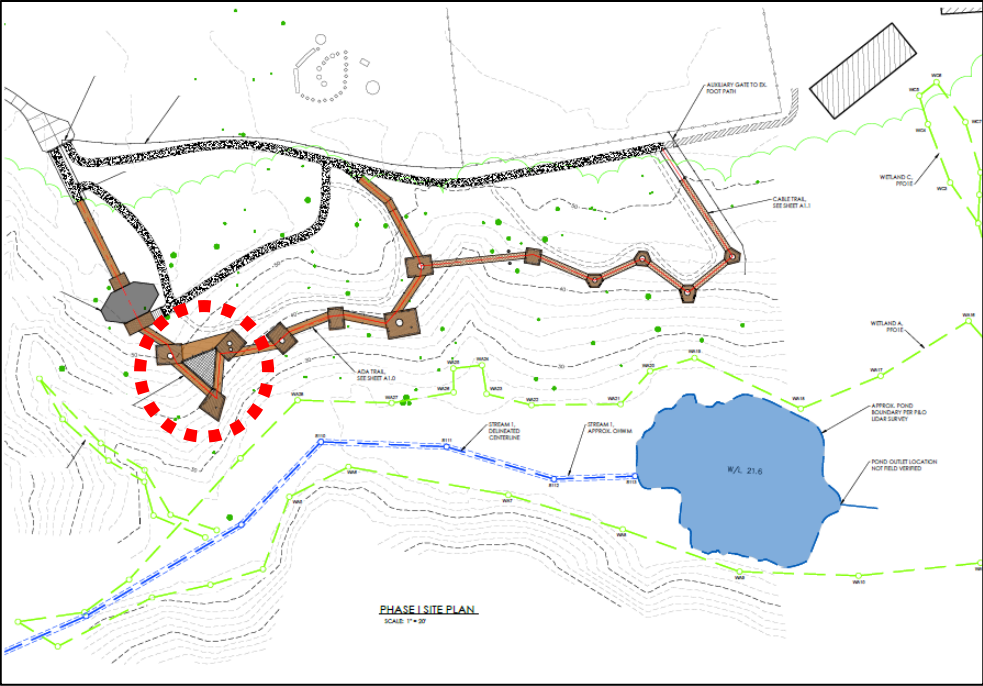


# Total Canopy Trail Map (Phases 1, 2, 3)





# Squirrel's Nest Renderings



Note: Post-looking objects represent existing trees

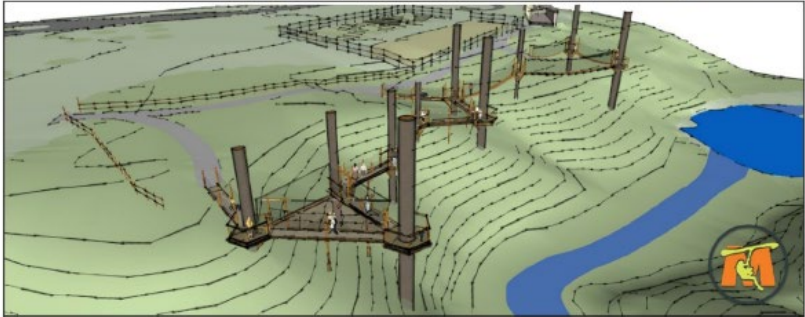
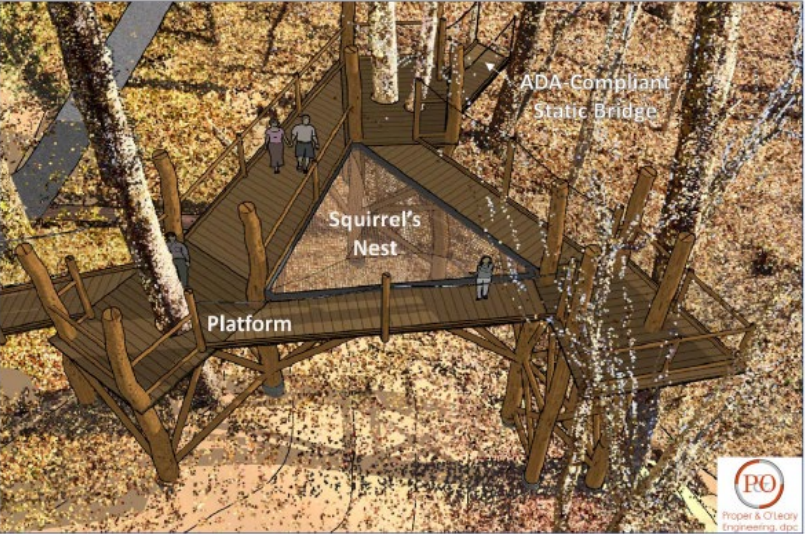
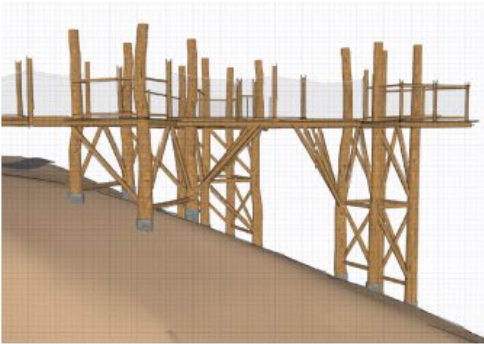
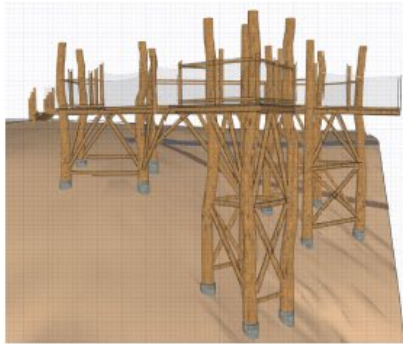
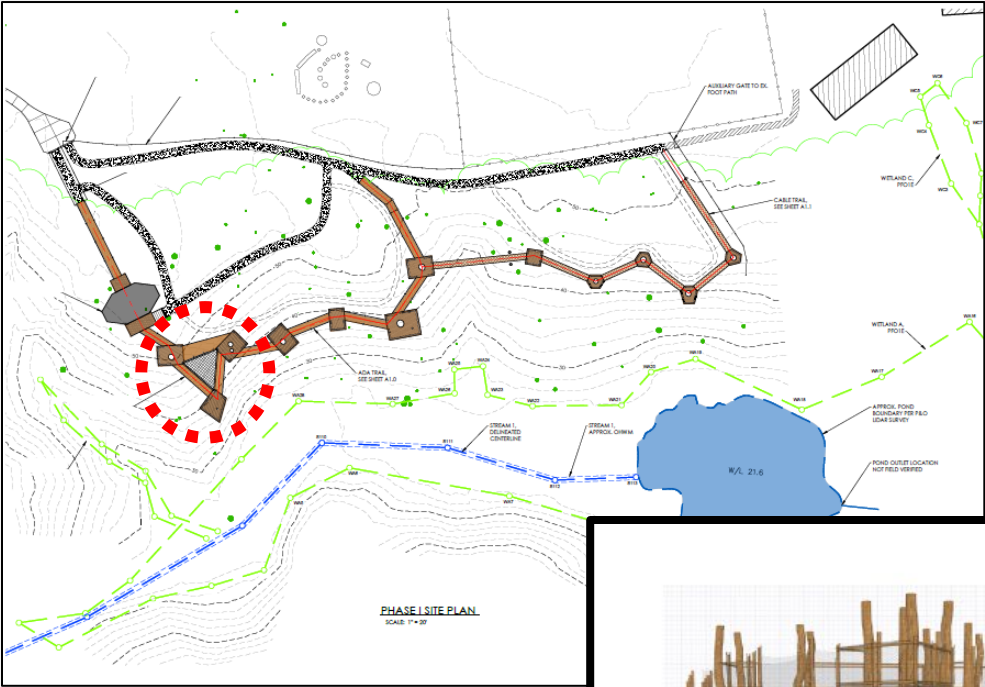


Exhibit 2-5. Rendering of Squirrel's Nest

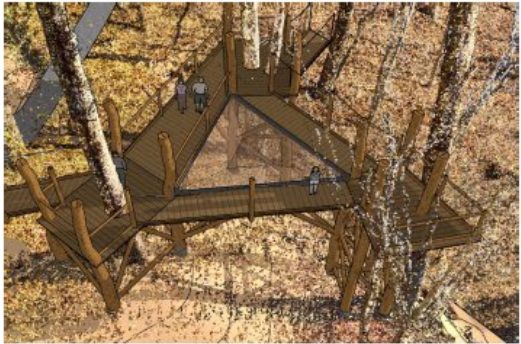




# Squirrel's Nest Elevations



2 ELEVATION 2  
SCALE: 1/8"

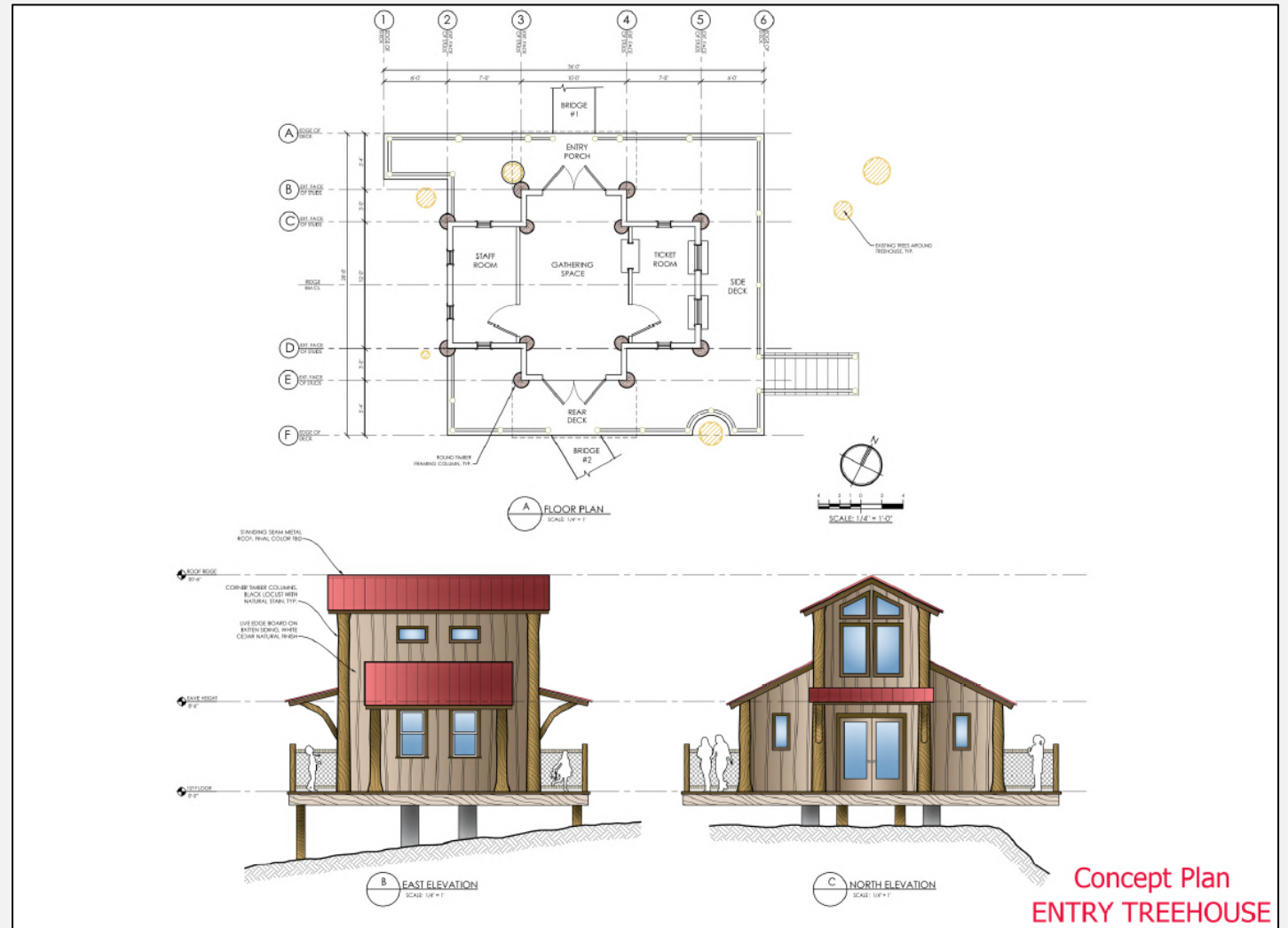
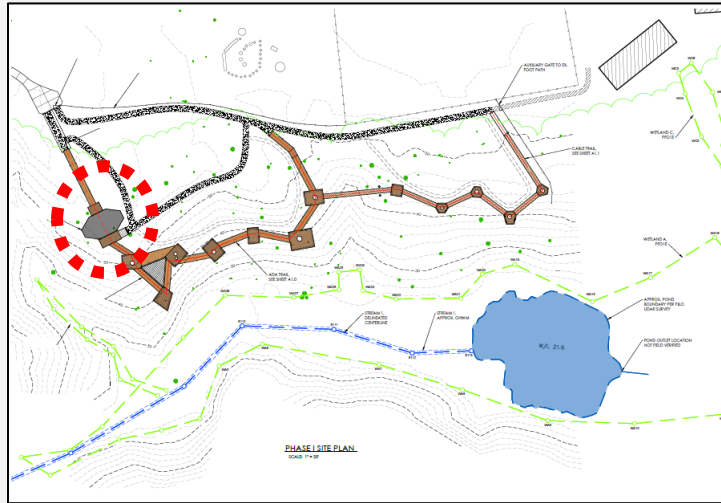


3 ISOMETRIC  
SCALE: 1/8"

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PLANNING SET  
NOT FOR CONSTRUCTION

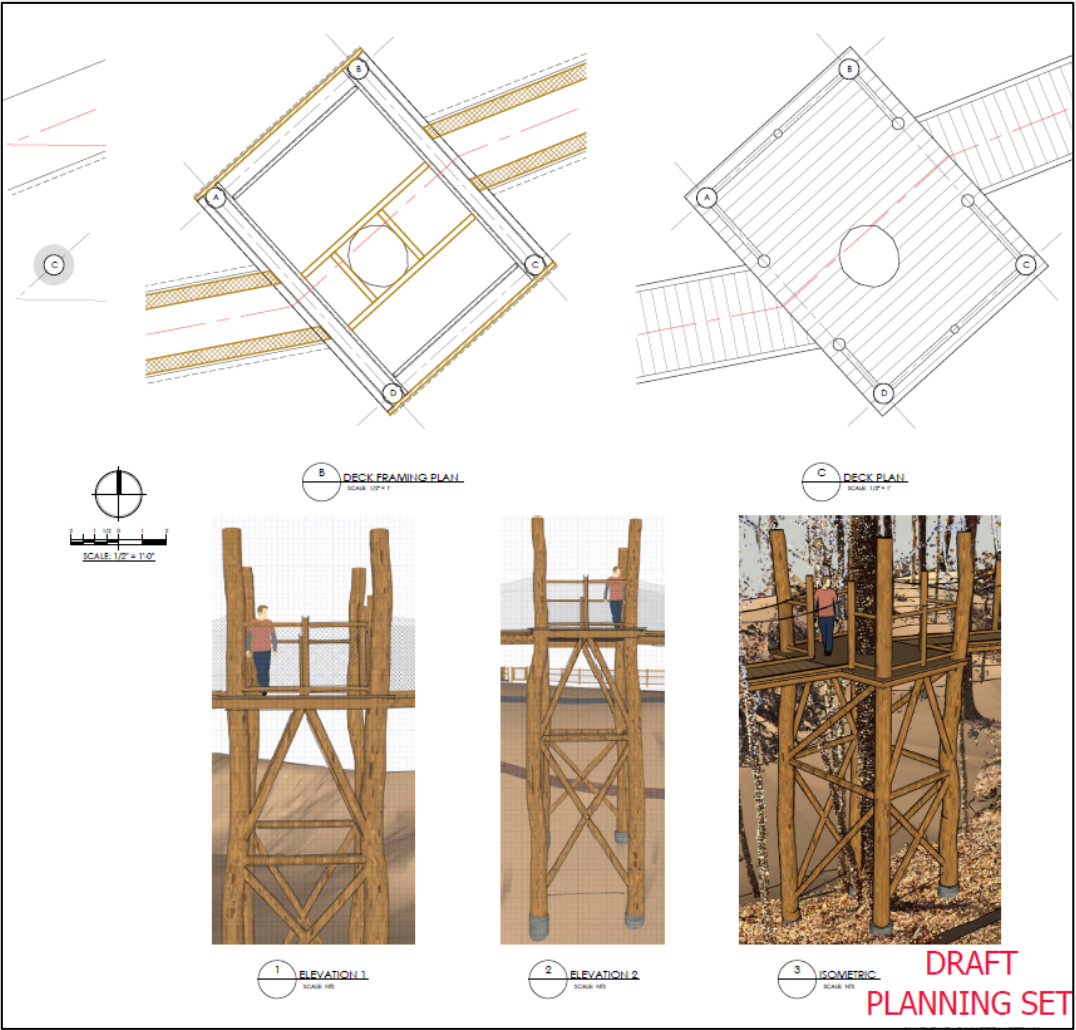
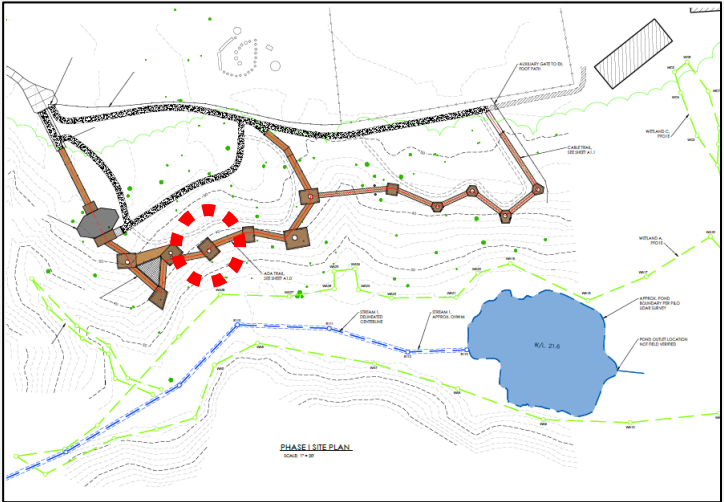


# Ticket House Plans / Renderings



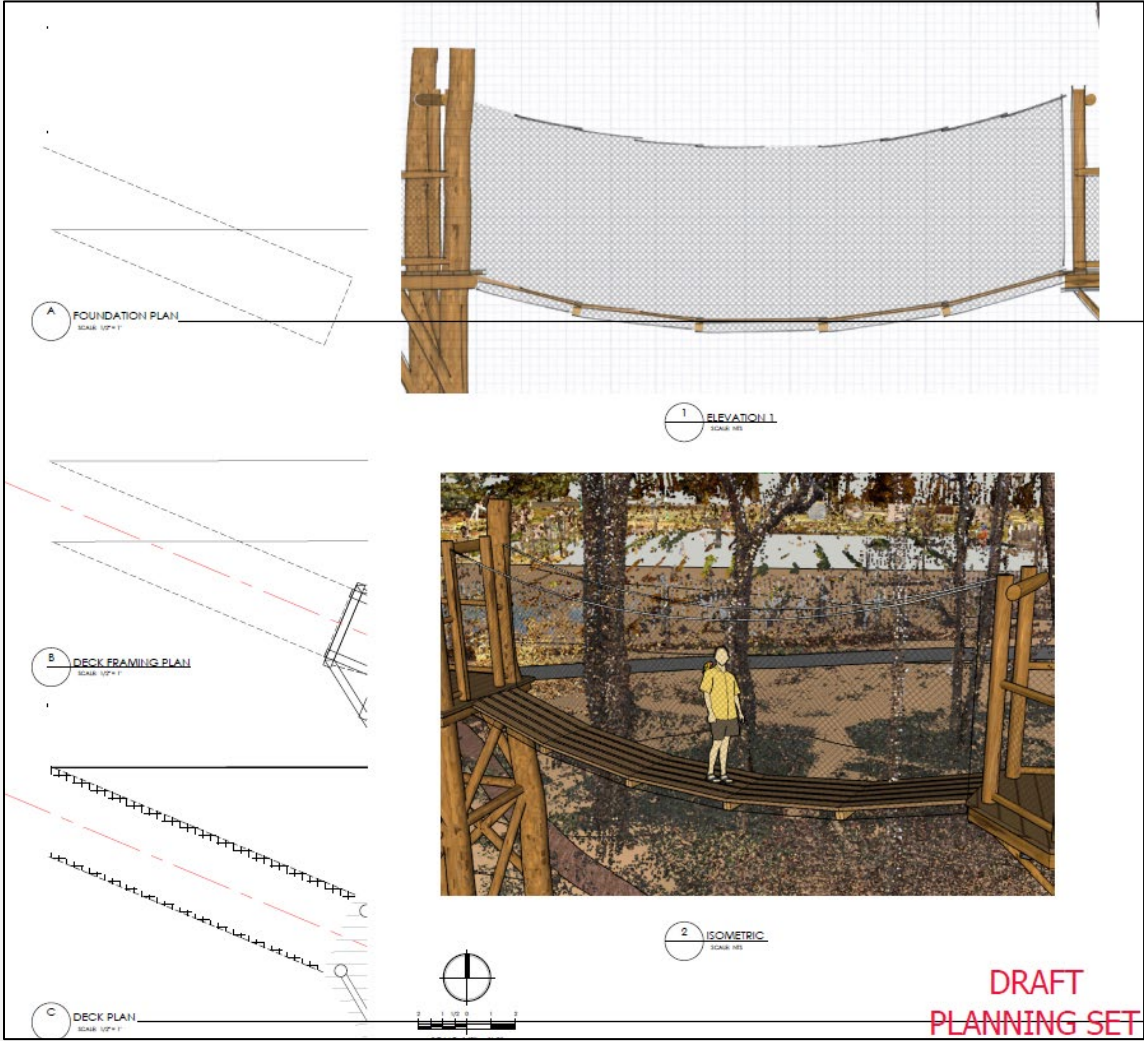
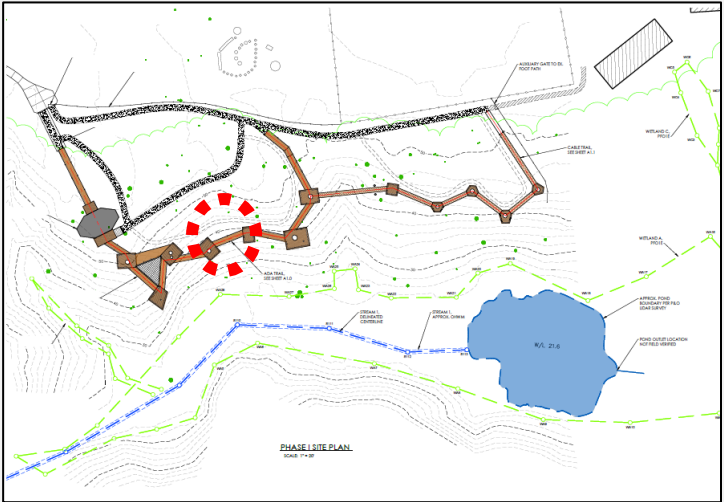


# Platform # 4 Plans / Elevations





# Cable Bridge Plans / Elevations









# Project Metrics

Phase	ADA Canopy Trail Length (ft)	Non-ADA Canopy Trail Length (ft)	Total Canopy Trail Length (ft)
Phase 1	307	226	533
Phase 2	187	297	484
Phase 3	N/A	277	277
<b>Totals</b>	<b>494</b>	<b>800</b>	<b>1,294</b>

**Exhibit 2-8. Number of Canopy Trail Platforms by Trail Phase and Type**

Phase	ADA Canopy Trail # of Platforms	Non-ADA Canopy Trail # of Platforms	Total Canopy Trail # of Platforms
Phase 1	7	5	12
Phase 2	5	7	12
Phase 3	N/A	9	9
<b>Totals</b>	<b>12</b>	<b>21</b>	<b>33</b>

Phase 1 Trail Features	Dimensions			Area
	Elevation (ft)	Width (ft)	Length (ft)	ft <sup>2</sup>
<b>PERMANENT FEATURES (Appendix A, Sheets A1.0 &amp; A1.1)</b>				
Treehouse Building/Ticket Booth		16	28	448
Squirrel's Nest		9	18	162
ADA Bridge #1		4	40	160
ADA Bridge #2		4	18	72
ADA Bridge #3		4	22	88
ADA Bridge #4		4	22	88
ADA Bridge #5		4	22	88
ADA Bridge #6		4	24	96
ADA Bridge #7		4	49	196
Cable Bridge #1		3	45	135
Cable Bridge #2		3	25	75
Cable Bridge #3		3	18	54
Cable Bridge #4		3	19	57
Cable Bridge #5		3	20	60
Cable Bridge #6		3	40	120
ADA Platform #1		9	12	108
ADA Platform #2		11	12	132
ADA Platform #3		9	12	108
ADA Platform #4		9	12	108
ADA Platform #5		7	10	70
ADA Platform #6		12	15	180
ADA Platform #7		9	12	108
Platform #8		7	7	49
Platform #9		7	8	56
Platform #10		7	8	56
Platform #11		8	9	72
Platform #12		7	8	56
Pervious Concrete Sidewalk	---	5	481	2,405
Stonedust Walkway	---	4	658	2,632
Staff Mulch Walkway	---	2	378	756
<b>Permanent Total Area</b>				<b>879,145</b>
<b>TEMPORARY FEATURES (Appendix A, Sheet C1.2)</b>				
Primary Construction Access and Staging Area				8,513
Secondary Construction Access and Staging Area				5,727
<b>Temporary Total Area</b>				<b>14,240</b>
<b>Combined Total Area</b>				<b>893,385</b>



# Project Metrics

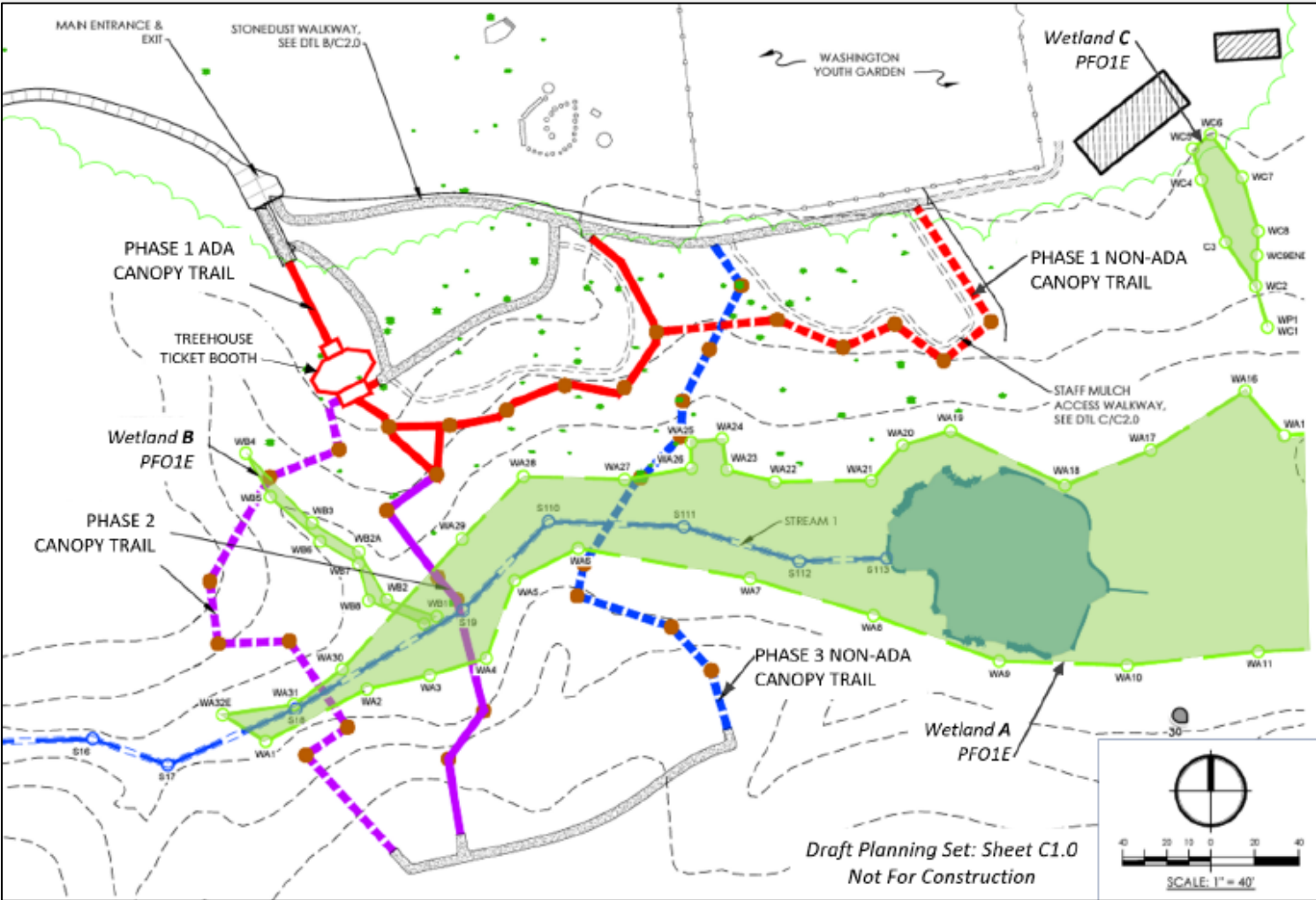
Phase 1 Trail Features	Approximate Ground Elevation (ft)		Approximate Structure Elevation (ft)		Approximate Average Height Above Ground (ft)	
	Begin*	End*	Begin*	End*	Begin*	End*
ADA Bridge #1 (Ramp)	58	58	58	60	0	2
Treehouse Building /Ticket Booth	56	54	60	60	4	6
ADA Bridge #2	54	52	60	60	6	8
ADA Platform #1	52	49	60	60	8	11
Squirrel's Nest	49	39	60	60	11	21
ADA Platform #2	39	38	60	60	21	22
ADA Platform #3	43	41	60	60	17	19
ADA Bridge #3	41	36	60	59	19	23
ADA Platform #4	36	38	59	59	23	21
ADA Bridge #4	37	38	59	58	22	20
ADA Platform #5	38	39	58	58	20	19
ADA Bridge #5	39	38	58	57	19	19
ADA Platform #6	38	40	57	57	19	17
ADA Bridge #6	40	44	57	57	17	13
ADA Platform #7	44	46	57	57	13	11
ADA Bridge #7	46	54	57	54	11	0
Cable Bridge #1	46	45	57	60	11	15
Platform #8	45	45	60	60	15	15
Cable Bridge #2	45	42	60	60	15	18
Platform #9	42	42	60	60	18	18
Cable Bridge #3	43	46	60	58	17	12
Platform #10	46	46	58	58	12	12
Cable Bridge #4	46	39	58	56	12	17
Platform #11	39	39	56	56	17	17
Cable Bridge #5	39	47	56	56	17	9
Platform #12	47	47	56	56	9	9
Cable Bridge #6	48	50	56	53	8	3

Elevations are approximate and rounded to nearest foot.

\*Note: The "Begin" and "End" elevation points are based on the Phase 1 trail profile elevations on Sheets A1.0 and A1.1 of the Draft Planning Set (**Appendix A**). The "Begin" elevation is the beginning point of the ground or structure, at the lower station number. The "End" elevation is the end point of the ground or structure, at the higher station number.

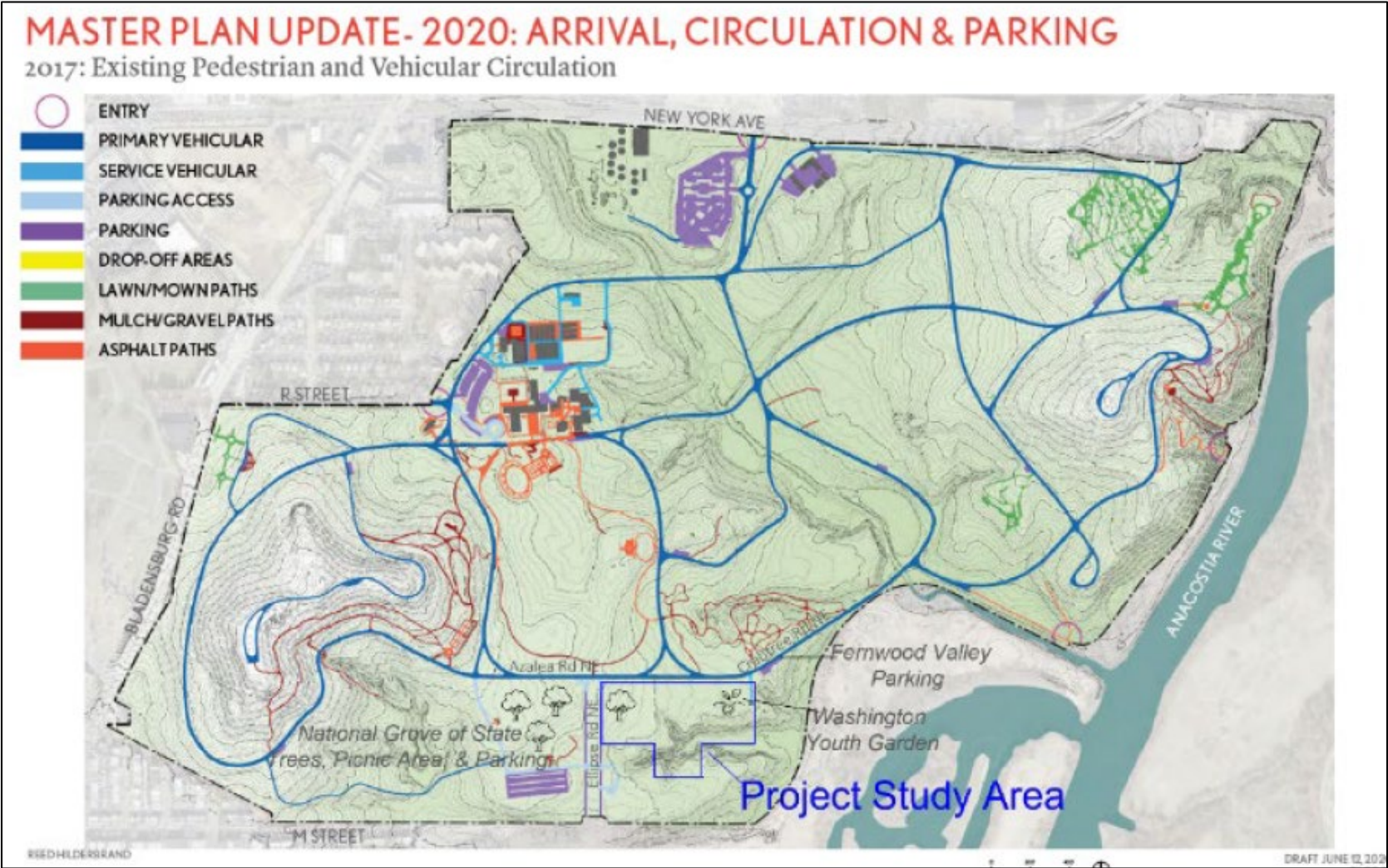


# Surface Water / Wetlands



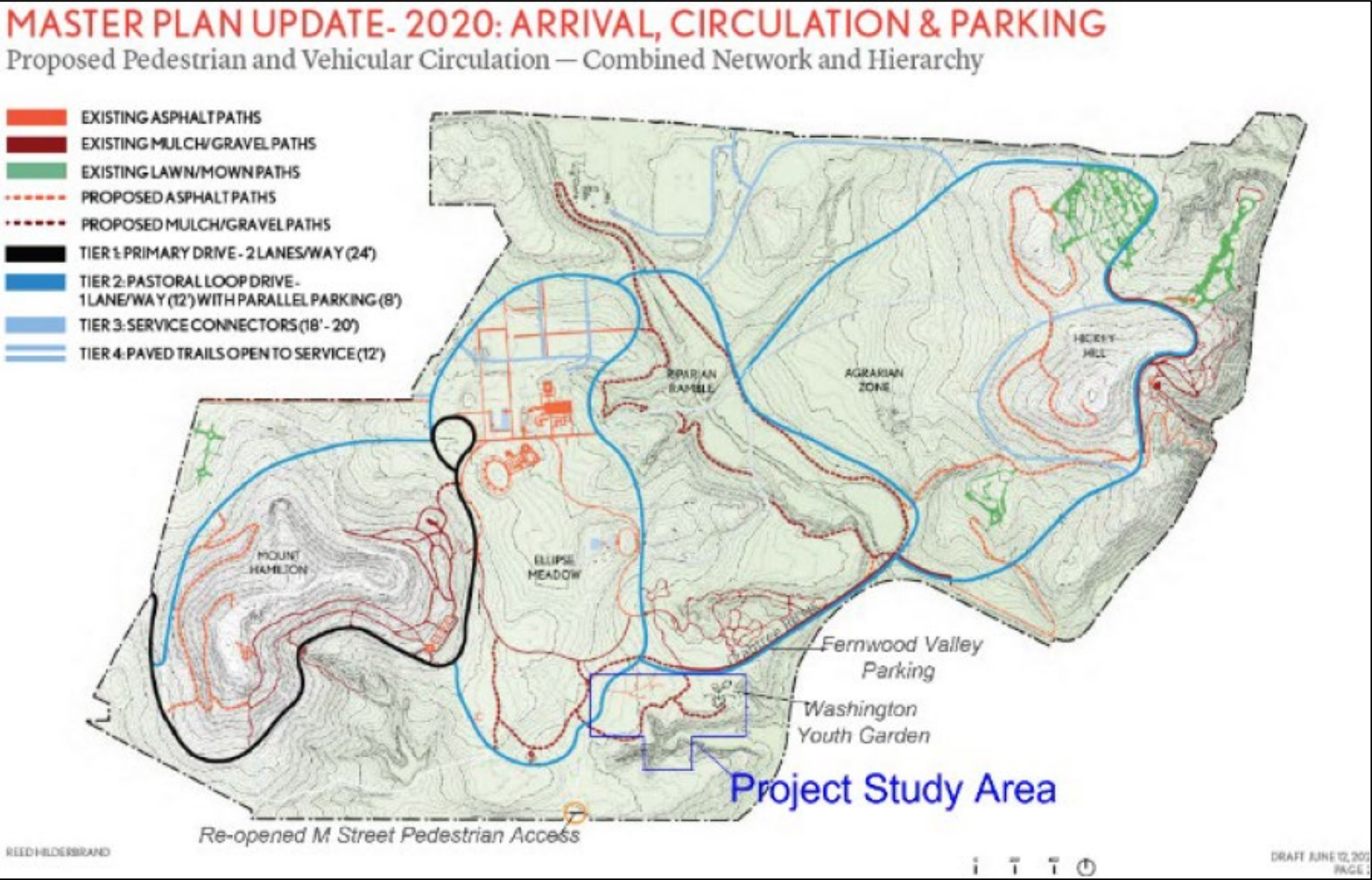


# Existing Circulation





# Future Planned Circulation





# Future Trail Connections (outside of the Arboretum)

