



River Otter at Trailside (Pressley Associates 2007).

C. Zoological Appendices

1. Animal Enclosure Requirements/Fact Sheets

River Otter
Mixed Native Turtles
Virginia Opossum
White-tailed Deer
Barn Owl
Red Fox
Snowy Owl
Red-tailed Hawk
Eastern Wild Turkey
Turkey Vulture
Fisher
Striped Skunk
Eastern Timber Rattlesnake and Northern Copperhead

For AZA Accreditation Standards and Related Policies, Revisions to AZA Accreditation Standards, and Zoo Standards for Keeping Otters in Captivity see Appendices for Phase 1: Information Gathering.



River Otter at Woodland Park Zoo: Photo by Woodland Park Zoo



River Otter Viewing at Animal Kingdom (photo by Nevin Lash)

Program Space 4250 sf
Size 50' x 85'
Exhibit Concept *This Exhibit depicts a forested rocky stream with small pools with close up viewing through glass into the cubbing den, filtered pond and into upland areas.*

BIOLOGY

Head and body length: 2.5' average
Tail length: 15"
Weight: 10-35 lbs average
Population: 1 male/2 female

EXHIBIT HABITAT

Enclosure: 6' solid wooden fence, 6' deep moat, overhanging "rockwork" wall or glazing
Structure: 3" dia. posts set in concrete footing
Viewing Building: Glass underwater view at main building
Animal Fencing: Ext. grade plywood panels or concrete wall
Height: 6' min. smooth surface
Viewing Types: Underwater glass /dryland-side glass

Viewing Area: 30 lf water view and 30 lf dry view
Land Area: 2450 sf
Water Area: 1800 sf
Water Depth: 4' to 5' at building, 2'-4' at shallow pool
Substrate: Gunite pool/natural substrate/rocks
Vegetation: Grasses/shrubs protected with hotwire
Furnishings: Logs and Rocks

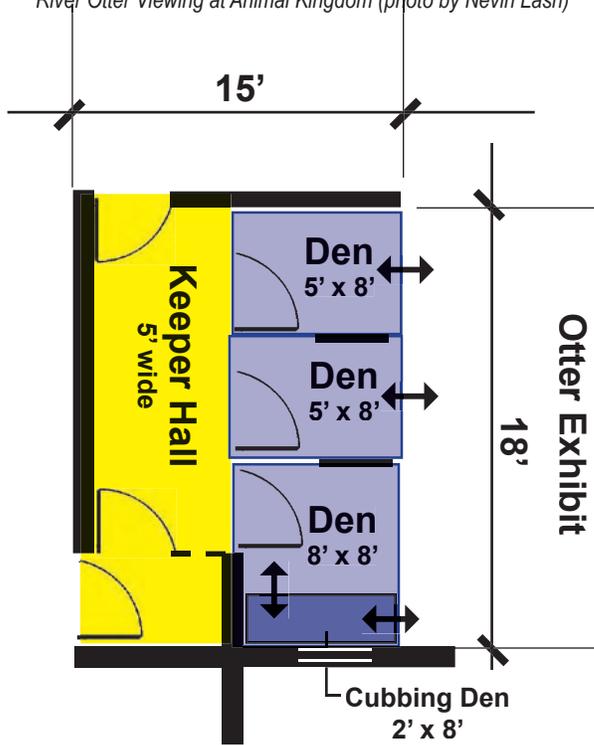
Pool cleaning: Filtration system/ozone
Animal Water source: Drinker at cave
Special Features: On-exhibit cave-type rock shelter (2'x2'x2' tall)
Service Access: 4' solid door (open into exhibit)

HOLDING AREA

Interior height: 7' min.
Interior stalls sizes/#: 5' x 8' (2) and (1) at 8' x 8' with cubbing den

Floors: Sloped, sealed concrete to drain
Walls: Sealed CMU
Ceiling: Concrete slab
Exterior Animal doors: Polypropylene slider (18"x18") or guillotine
Exterior Keeper doors: 7'x3' mesh panel gate
Hardware types: Two padlock tabs
Caging types: Mesh panel in a welded steel frame
Animal entry procedure: Catch cage attach to holding den door
Lighting: Outside of animal area

Electrical: Waterproof outlet outside animal area
Drains: 6" drain and skimmer with basket strainer
Keeper Water supply: Hosebib at keeper access (75' hose)



Holding Concept Diagram

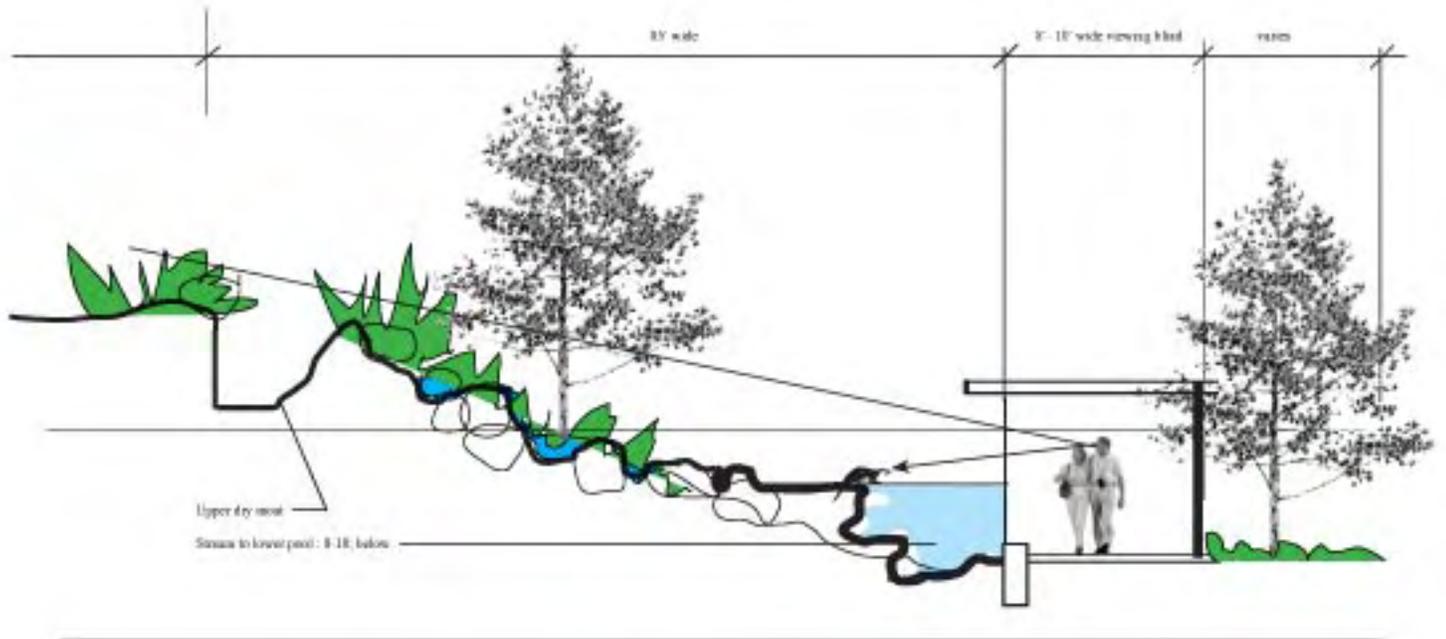


Exhibit Section: Otter from main visitor path

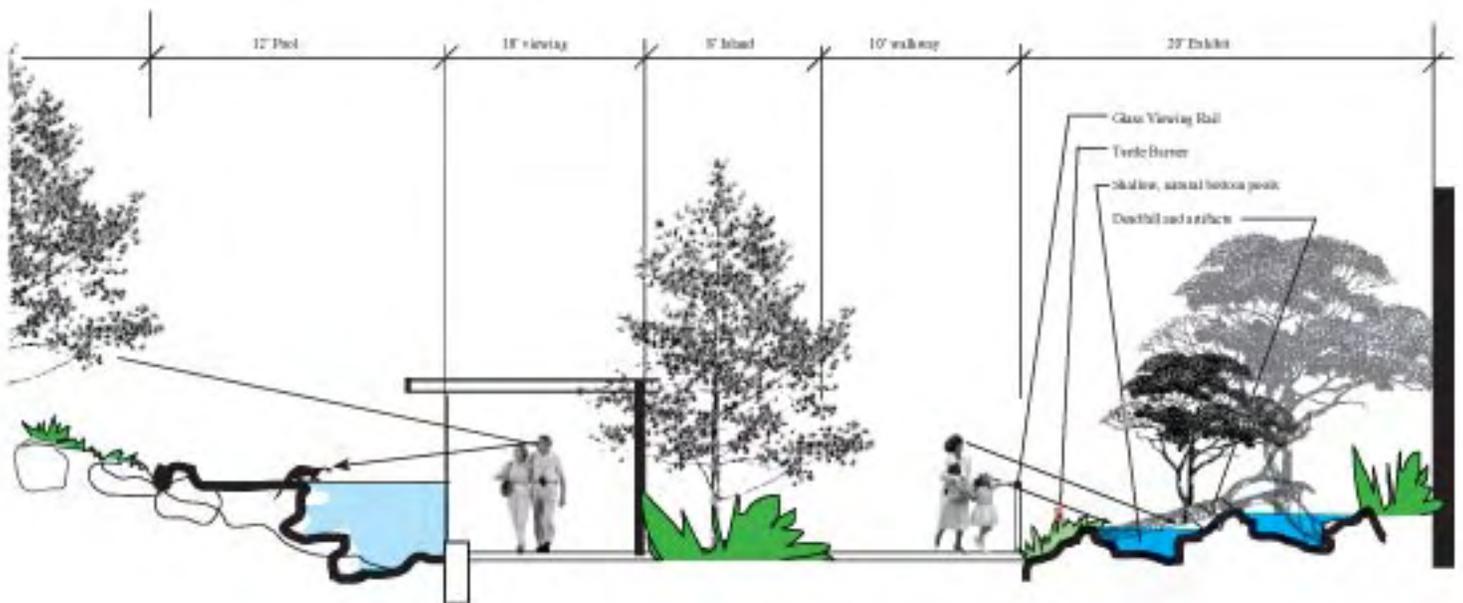


Exhibit Section: from Otter to Turtle Pond



Blandings Turtle



Eastern Box Turtle



Musk Turtle



Snapping Turtles

Assorted Turtles, from www.turtleconservationproject.org

Program Space 700 sf
 Size 20' x 35'
 Exhibit Concept *This Exhibit depicts a forested stream and pond with close up viewing over glass viewrail into the filtered natural pond and into upland areas.*

SPECIES

Musk turtle	<i>Sternotherus odoratus</i>
Spotted turtles	<i>Clemmys guttata</i>
Eastern box turtles	<i>Terrepene carolina carolina</i>
Wood Turtle	<i>Glyptemys insculpta</i>
Blanding turtle	<i>Emydoidea blandingii</i>
Snapping turtle	<i>Chelydra serpentina</i>
Painted turtles	<i>Chrysemys picta</i>

EXHIBIT HABITAT

Enclosure:	Open exhibit with small log wooden fence to contain turtles
Structure:	8" dia. posts set in concrete footing
Viewing:	Over or through 42" glass handrail
Animal Fencing:	Log rails and main building
Height:	1' min. smooth surface
Viewing Area:	40 lf pond edge and stream view
Land Area:	200 sf
Water Area:	500 sf
Water Depth:	1'-3' shallow pool
Substrate:	Clay pool/natural substrate/rocks
Vegetation:	Grasses/shrubs
Furnishings:	Logs and Rocks
Pool cleaning:	Filtration system/recirculation
Animal Water source:	Pond with small waterfall
Service Access:	42" glass door (open into exhibit)

HOLDING AREA

Interior height:	7' min.
Keeper hall:	4' x 10' accessway
Interior stalls sizes/#:	5' x 5' (2)
Floors:	Sloped, sealed concrete to drain
Walls:	Sealed CMU
Ceiling:	Concrete slab
Exterior Animal doors:	Not used
Exterior Keeper doors:	7'x3' solid panel gate
Hardware types:	Two padlock tabs
Caging types:	3' poly wall panel and frames
Animal entry procedure:	Catch cage release into Iso stall
Lighting:	Outside of animal area
Electrical:	Waterproof outlet outside animal area
Drains:	6" drain and skimmer with basket strainer
Keeper Water supply:	Hosebib at keeper access (75' hose)



Opossum (Photo: Public domain image from English Wikipedia)



Opossum showing their prehensile tail, (Photo: www.paleodirect.net)

Program Space
Size 150 sf
10' x 15'

Exhibit Concept

This is a small indoor/outdoor enclosure that replicates an Opossum Den with a foraging outdoor area with live vegetation and dead perches for climbing. The intention is to show the adaptation of this small marsupial mammal to the local environment.

BIOLOGY

Head and body length: 2.5'
Tail length: 1' long
Weight: Male 10 lbs
Weight: Female 5 lbs

Population: 1 male/2 female

EXHIBIT HABITAT

Enclosure: Post and cable mesh structure (no guys).
Structure: 3" dia. posts set in concrete footing

Animal Fencing: 2'x2"x 1/16" steel mesh (top and sides)
Height: 10' min.
Viewing Types: Through Mesh
Viewing Area: One (8') along visitor walkway/3' min. setback
Land Area: 125 sf

Water Area: 4'x6' gunite pond
Water Depth: 9" max.
Substrate: Natural substrate/rocks/planting
Vegetation: Grasses/shrubs
Furnishings: Logs and Perches

Pool cleaning: Filtered
Animal Water source: Running water into pool
Special Features: Interior den exhibit
Service Access: 3'x7' mesh door (open into exhibit)

HOLDING AREA

Animal entry procedure: Den Box placed in Exhibit/door open
Lighting: Outside of animal area
Electrical: Waterproof outlet outside animal area/
Heat Lamp
Keeper Water supply: Hosebib at keeper access (25' hose)

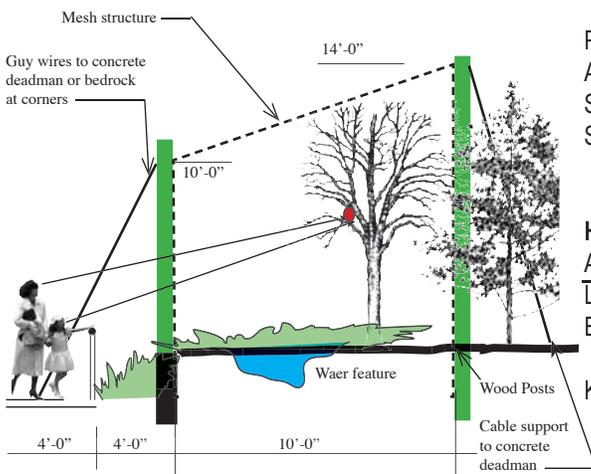


Exhibit Section: Typical Opossum structure



Photo by Joe Kosack/PGC Photo



Program Space
Size

6300 sf min. 12400 sf total area with buffer
155 x 80'

Exhibit Concept:

This open Exhibit depicts a Oak/Pine woodland with meadow clearing and dense understory plantings

BIOLOGY

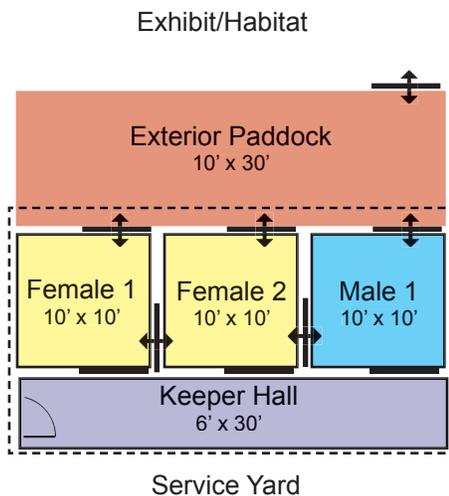
Length and height: 5.5 - 6.5' / 3'-3.5' at shoulder
Weight: Male 100-250 lbs max
Weight: Female 70-150 lbs max.
Population: 1 male/2 female

EXHIBIT HABITAT

Enclosure: 8' mesh fence (with optional dry moats)
Structure: 3" dia. posts set in concrete footing
Animal Fencing: 4"x 4" x 11 gauge "stock fencing"
Height: 8' min. (with optional angled top)
Viewing Types: Through Mesh (or over moat)
Viewing Area: (4)@ 12' ea. along visitor walkway/ 6' planting setback
Land Area: 6250 sf min.
Water Area: 8'x 8' clay-lined pond
Water Depth: 2' with sloping sides
Substrate: Natural substrate/planting
Vegetation: Grasses/shrubs/trees, hotwire to protect perimeter buffer
Furnishings: Logs, bedding area
Pool cleaning: Dump and Fill
Animal Water source: (2) Drinkers outside of holding pen
Special Features: Rough textured feeder slab for hoofs
Service Access: 8'x8' double door (open into exhibit)

HOLDING AREA

Interior height: 7' min.
Interior stalls sizes/#: 10'x10' (3)
Exterior stalls sizes/#: 10'x30' (1)
Floors: Sloped, sealed concrete to drain
Walls: Wooden slat walls
Ceiling: Wood framing/Metal Roof
Exterior Animal doors: Wood slat sliding gate (5'x7' opening)
Exterior Keeper doors: 7'x3' mesh panel gate
Hardware types: Two padlock tabs
Caging types: Wood slat panels in welded steel frame
Animal entry procedure: Trailer to connect to service door
Lighting: Outside of animal area
Electrical: Waterproof outlet outside animal area
Drains: 6" drain with basket strainer
Keeper Water supply: Hosebib at keeper access (75' hose)



Holding Concept Diagram



Barn Owl (Photo: Public domain image from English Wikipedia)



Barn Owl in Barn setting (www.elizabethfarnum.com)

Program Space	160 sf
Size	10' x 16'
Exhibit Concept	Exhibit depicts an open field in front of a small shed with open gates to allow the birds to roost

BIOLOGY

Head and body length:	Male:16-18" / Female:18-20"
Wing spread:	Male: 32-35" / Female: 34 - 36"
Weight:	Male: 13-15 oz / Female up to 18 oz.
Population:	1 male/1 female

EXHIBIT HABITAT

Enclosure:	Total mesh structure w/perimeter concrete curb
Structure:	Post and cable mesh structure with guy wires
Animal Fencing:	2" x 2"x 3/32" steel mesh (top and sides)
Height:	10' min.
Viewing Types:	Through mesh
Viewing Area:	(1) 8 lf along visitor walkway/4' min. setback
Land Area:	160 sf
Water Area:	None
Water Depth:	N/A
Substrate:	Natural substrate/planting
Vegetation:	Grasses/shrubs
Furnishings:	Logs, rocks and low perches
Animal Water source:	Drinker
Special Features:	none
Service Access:	3'x7' mesh door (open into exhibit)

HOLDING AREA

Animal entry procedure:	Wire Cage attach to 10'x10' Service access
Lighting:	In service area only
Electrical:	Waterproof outlet outside animal area
Drains:	As needed
Keeper Water supply:	Hosebib at keeper access (25' hose)

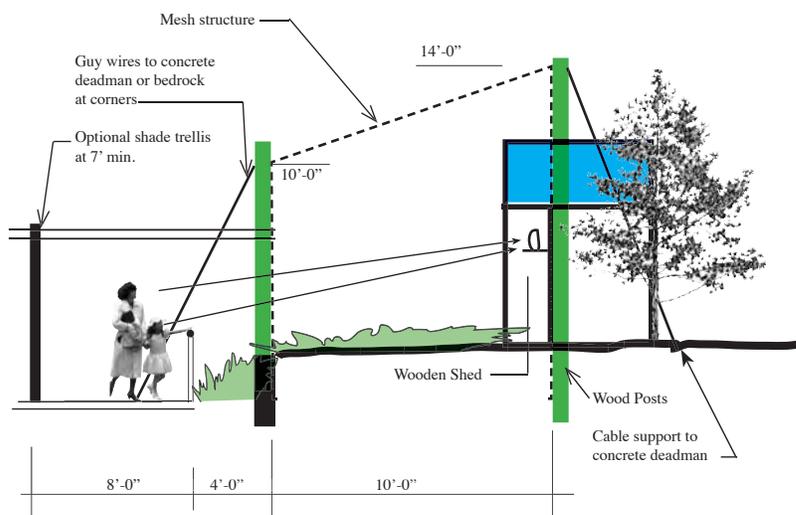


Exhibit Section: Typical mesh structure



Photo by Dan Walters (www.photo.net)

Program Space 1800 sf
Size 30' x 60'
Exhibit Concept This exhibit depicts a grassy meadow and provides a close-up view of Fox and their lifestyle.

BIOLOGY

Head and body length: 39-41"
Tail length: 10"

Weight: Male 15 lb. Max.
Weight: Female 10 lb. Min.
Population: 1 male/1 female/ kits (option)

EXHIBIT HABITAT

Enclosure: Post and cable mesh structure with guys
Structure: 3" dia. posts set in concrete footing
2' x 2" x 3/32" steel mesh (top, sides and WWM buried bottom)
Animal Fencing: Through Mesh and glass panel viewing
Height: 10' min.
Viewing Types: Two (12') along visitor walkway/6' min. setback at mesh view
Viewing Area: 1800 sf
Land Area: None
Water Area: Natural substrate/planting
Substrate: Grassland & Meadow, some shrubs (non-forest)
Vegetation: Hollow logs and rocks
Furnishings: N/A
Pool cleaning: Drinker at Nestbox
Animal Water source: Den with on-exhibit view
Special Features: 3'x7' mesh door (open into exhibit)
Service Access:

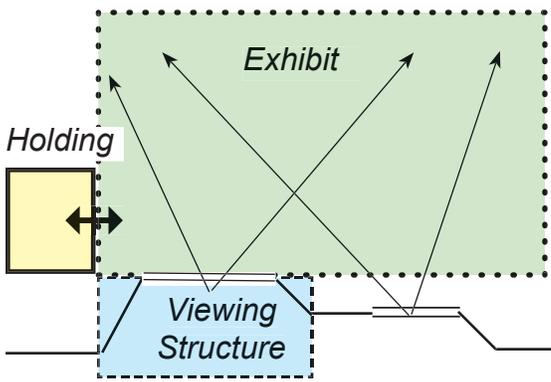


Exhibit Concept Diagram

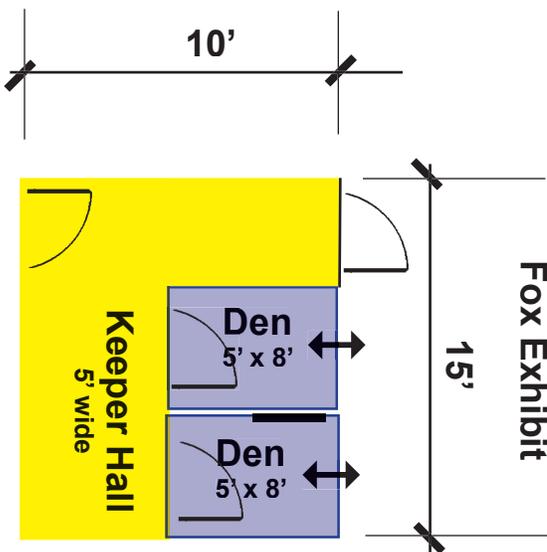
HOLDING AREA

Interior height: 7' min.
Interior stalls sizes/#: 5' x 8' (2)

Floors: Sloped, sealed concrete to drain
Walls: Sealed CMU
Ceiling: Mesh with wood roof above
Exterior Animal doors: Polypropylene slider (18"x18") or guillotine

Exterior Keeper doors: 7'x3' mesh panel gate
Hardware types: Two padlock tabs
Caging types: Mesh panel in a welded steel frame
Animal entry procedure: Catch cage attach to Service Gate

Lighting: Outside of animal area
Electrical: Waterproof outlet outside animal area
Keeper Water supply: Hosebib at keeper access (50' hose)

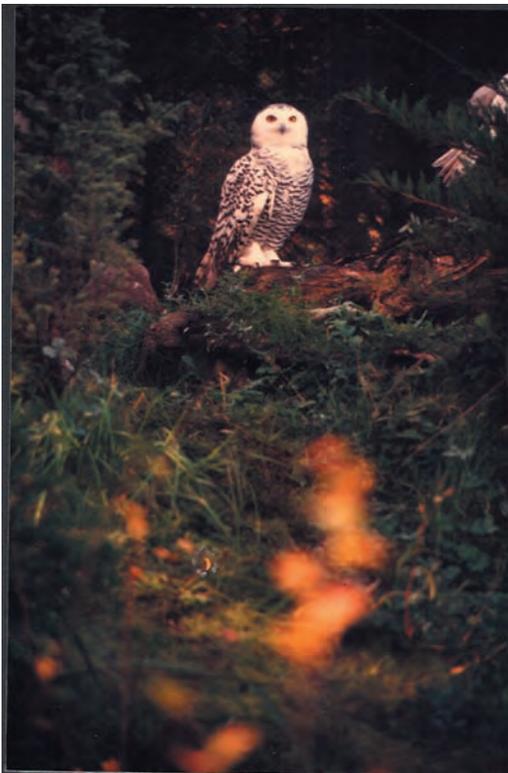


Holding Concept Diagram

See Vulture Exhibit sheet for Fox Exhibit Section drawing.



Snowy Owl, www.birdsource.org (Photo by Kim L. Graham)



Snowy Owl at Woodland Park Zoo: Photo by Woodland Park Zoo

Program Space 400 sf
Size 10' x 40'
Exhibit Concept This exhibit depicts a protected spruce nest site for the Owls. There are rocks for nesting and dense conifer above.

BIOLOGY

Head and body length: 20-26 inches
Wing spread: 50-60 in
Weight: 5 to 6.5 lbs
Population: 1 male/1 female

EXHIBIT HABITAT

Enclosure: Total mesh structure w/perimeter concrete curb
Structure: Post and cable mesh structure with guy wires
Animal Fencing: 2" x 2"x 3/64" steel mesh (top and sides)

Height: 10' min.
Viewing Types: Through mesh
Viewing Area: (1) 8 lf along visitor walkway/4' min. setback
Land Area: 400 sf
Water Area: None

Water Depth: N/A
Substrate: Natural substrate/planting
Vegetation: Grasses/shrubs
Furnishings: Logs, rocks and low perches
Animal Water source: Drinker

Special Features: none
Service Access: 3'x7' mesh door (open into exhibit)

HOLDING AREA

Animal entry procedure: Wire Cage attach to Service access
Lighting: For service area only
Electrical: Waterproof outlet outside animal area
Drains: As needed

Keeper Water supply: Hosebib at keeper access (25' hose)

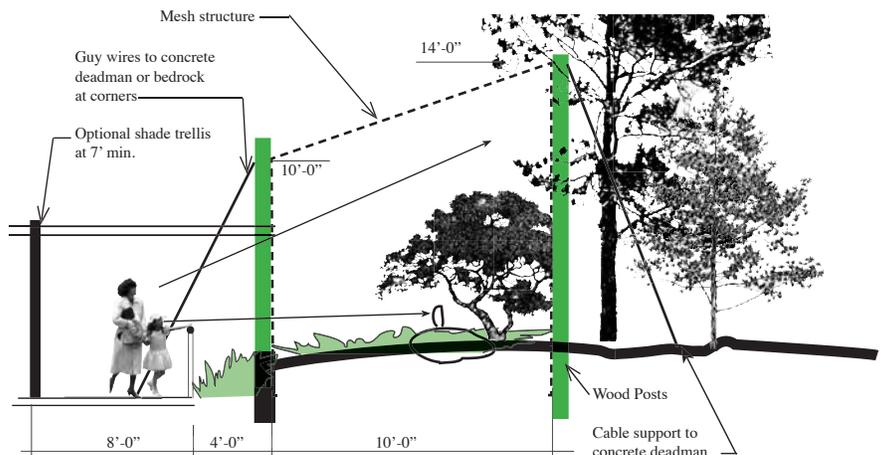


Exhibit Section: Typical mesh structure



Red tailed Hawk (www.FWS.gov - photo: Bill Garland)

Program Space 800 sf
Size 20' x 40'

Exhibit Concept *This is a tall aviary with large perch trees and opportunities for short flight and nesting.*

BIOLOGY

Head and body length: 22"
Wing spread: 56"
Weight: 2-4 lbs.
Population: 1 male/1 female

EXHIBIT HABITAT

Enclosure: Mesh structure w/perimeter concrete curb
Structure: Post and cable tension structure with guys
Animal Fencing: 2"x2"x 14 gauge steel mesh (top and sides)

Viewing Types: Through mesh
Viewing Area: (2) 8 lf along visitor walkway/6' min. setback
Land Area: 800 sf
Substrate: Natural substrate/planting
Vegetation: Grasses/shrubs

Furnishings: Logs and Perches
Animal Water source: Drinker
Special Features: Visible nest boxes
Service Access: 3'x7' mesh door (open into exhibit)

HOLDING AREA

Animal entry procedure: Wire Cage attach to 10'x10' Service area
Lighting: None
Electrical: Waterproof outlet outside animal area
Keeper Water supply: Hosebib at keeper access (25' hose)

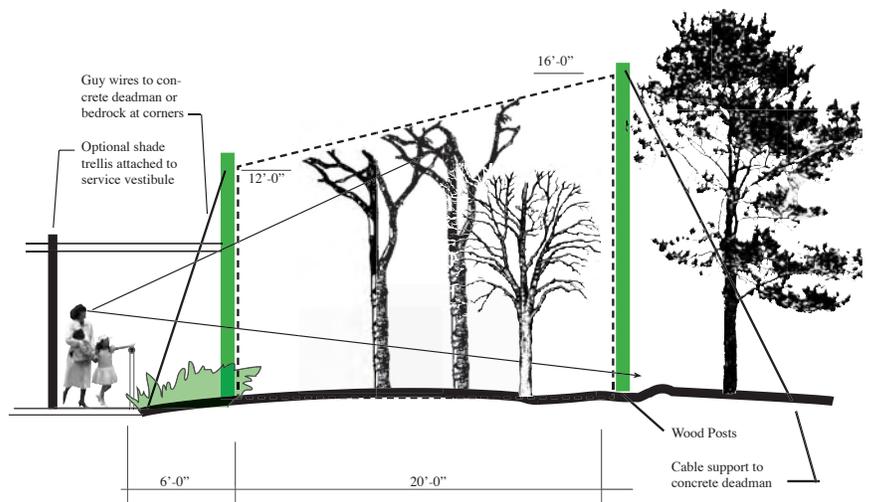


Exhibit Section: Typical mesh structure



Wild Turkey (Photo: Public domain image from English Wikipedia)

Program Space Size	1800 sf 30' x 60'
Exhibit Concept	<i>This is a large outdoor enclosure that replicates a Oak/pine woodland with heavy understory and some open grassland. This species is exhibited in a large aviary structure and allowed to fly. This will be an impressive display that will give people a chance to see these large birds, up close.</i>

BIOLOGY

Head/body length:	42"
Wing spread:	56"
Weight:	16-24 lbs. males/ 9-12 lbs. female
Population:	1 male/3 female

EXHIBIT HABITAT

Enclosure:	A total mesh enclosure, attached to Vulture.
Structure:	Post and cable mesh structure
Animal Fencing:	2"x2"x 14 gauge steel mesh (top and sides)
Height:	12' min. or wing clipped in Deer enclosure
Viewing Types:	Through mesh or over dry moat
Viewing Area:	(4) 12 lf along visitor walkway/6' min. setback
Land Area:	1720 sf
Water Area:	8' x 8' clay-lined pond
Water Depth:	2' with sloping sides
Substrate:	Natural substrate
Vegetation:	Grasses/shrubs/existing trees
Furnishings:	Logs and Perches
Animal Water source:	Drinker
Special Features:	feeding slab (cleanable)
Service Access:	6' x 8' mesh door (open into exhibit)

HOLDING AREA

Animal entry procedure:	Wire Cage attach to 10'x10' Service access
Lighting:	In service area
Electrical:	Waterproof outlet outside animal area
Drains:	As needed
Keeper Water supply:	Hosebib at keeper access (25' hose)

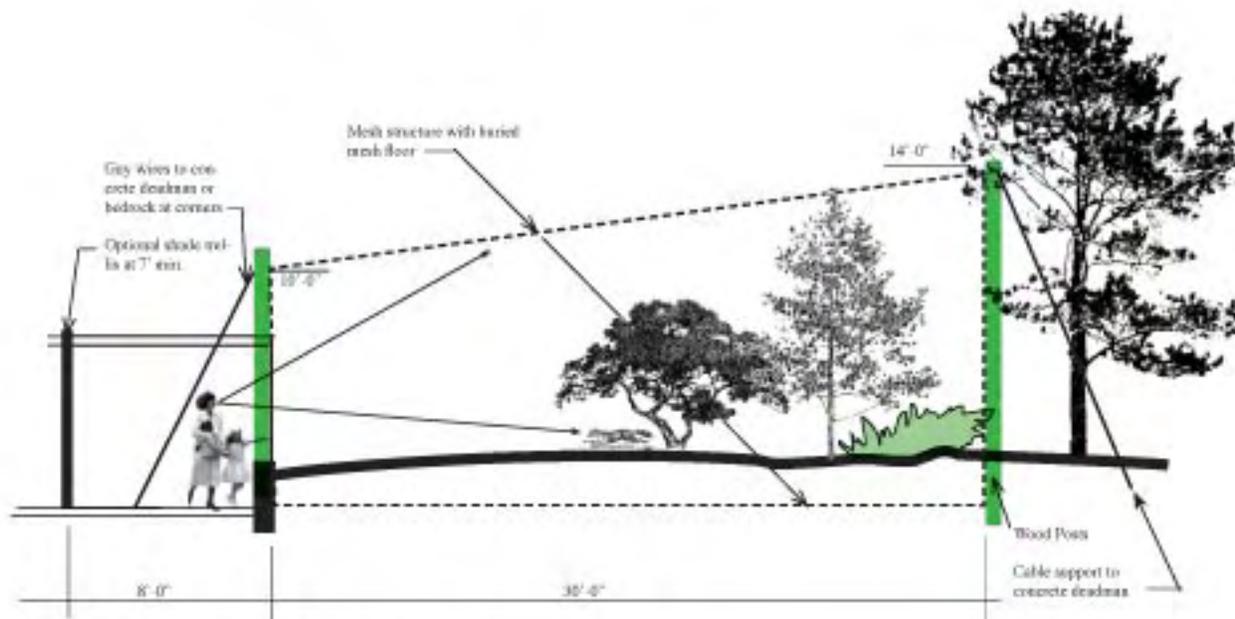


Exhibit Section: Typical Red Fox mesh structure

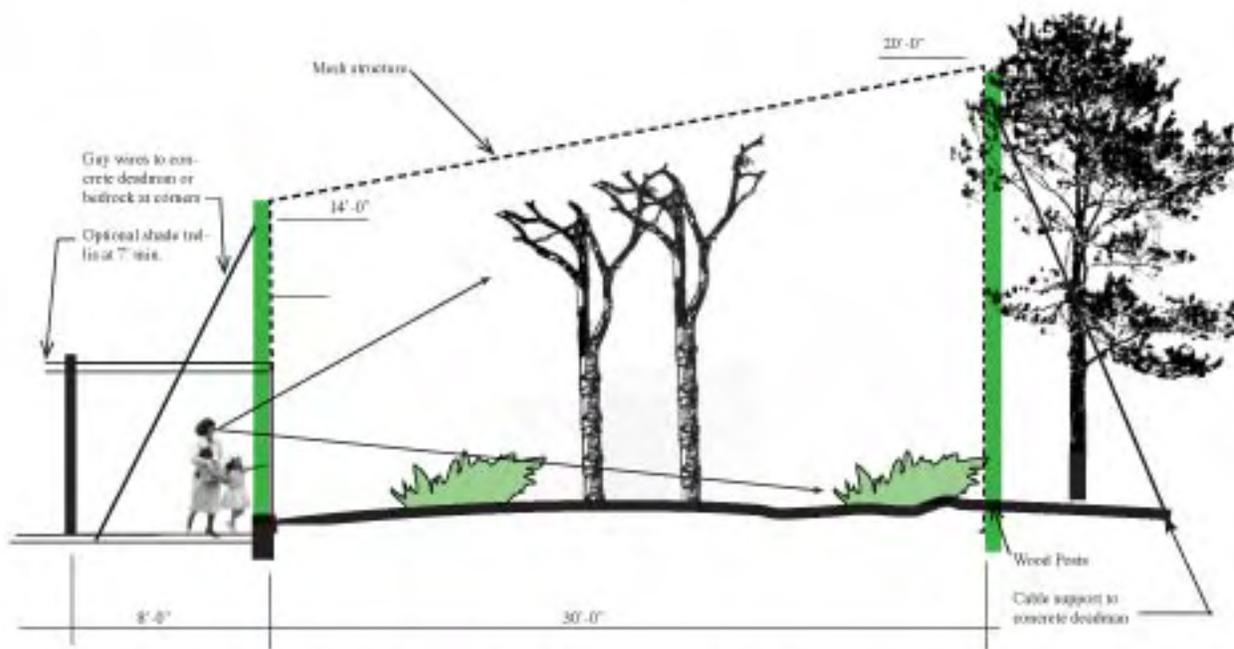


Exhibit Section: Typical Turkey and Vulture mesh structure



Turkey Vulture (Photo: Public domain image from English Wikipedia)

Program Space 1800 sf
Size 30' x 60'

Exhibit Concept: *This is a large outdoor enclosure that replicates a Oak/pine woodland with some open grassland. There should be dead perch trees that they can use to build nests in and a feeding area that they can show off their eating talents.*

BIOLOGY

Head and body length: 29-32 inches (female slightly smaller)
Wing spread: 68-72 inches (female slightly smaller)
Weight: 2-3 pounds (female slightly smaller)
Population: 1 male and 1 female

EXHIBIT HABITAT

Enclosure: Total mesh structure w/perimeter concrete curb
Structure: Post and Cable mesh structure
Animal Fencing: 2"x2"x 3/32" steel mesh (top and sides)
Height: 16' min.
Viewing Types: Through mesh/under 16' wide trellis

Viewing Area: (2) 8 lf along visitor walkway/6' min. setback
Land Area: 1800 sf
Water Area: None
Water Depth: N/A
Substrate: Natural substrate/planting

Vegetation: Grasses/shrubs
Furnishings: Logs and Perches
Animal Water source: Drinker
Special Features: Cleanable feeding slab up front
Service Access: 3'x7' mesh door (open into exhibit)

HOLDING AREA

Animal entry procedure: Wire Cage attach to 10'x10' Service access
Lighting: None
Electrical: Waterproof outlet outside animal area

Drains: N/A
Keeper Water supply: Hosebib at keeper access (25' hose)

Martes pennanti



Fisher, (photo by www.boralforest.org)

Program Space Size: 800 sf
20' x 40' min. plus den

Exhibit Concept *This Exhibit depicts a wooded habitat with a tangle of perches and burrows .*

BIOLOGY

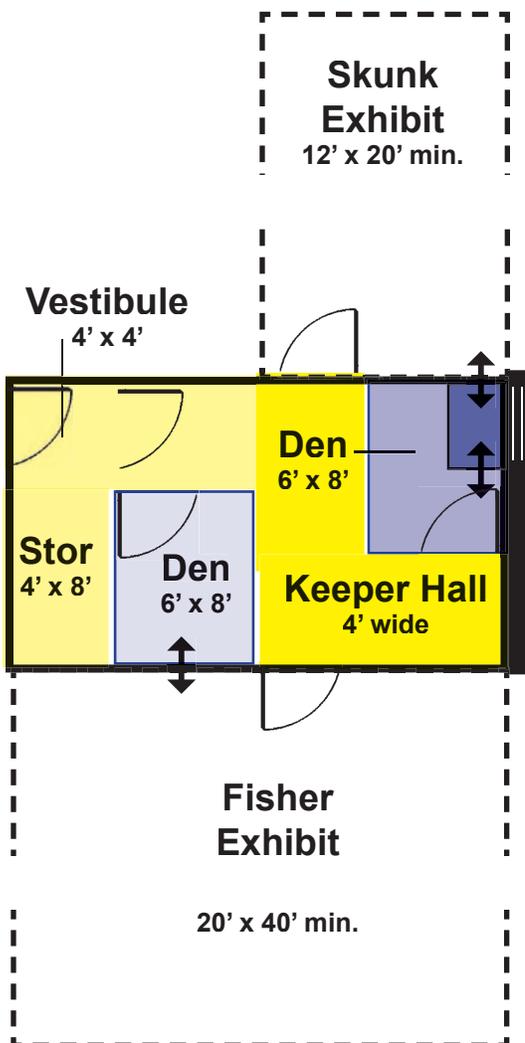
Head and body length: 3.5' long including tail (females somewhat smaller)
Tail length: 15"
Weight: 4-11 lbs.
Population: 1 male or female

EXHIBIT HABITAT

Enclosure: Total mesh enclosure attached to Fisher
Structure: 3" dia. posts set in concrete footing
Animal Fencing: 2'x2"x14 gauge steel mesh (top and sides)
Height: 10' min.
Viewing Types: Through Mesh or glass viewing
Viewing Area: One (16') along visitor walkway/3' min. setback
Land Area: 800 sf
Water Area: None
Substrate: Natural substrate on top of mesh floor, some planting
Vegetation: Grasses/shrubs
Furnishings: Logs and Perches
Pool cleaning: N/A
Animal Water source: Drinker at building
Special Features: Interior gunite den with glass view
Service Access: 3'x7' mesh door vestibule or through building (open into exhibit)

HOLDING AREA

Interior height: 7' min.
Interior stalls sizes/#: 6' x 8' (1)
Floors: Sloped, sealed concrete to drain
Walls: Sealed CMU
Ceiling: Concrete slab
Exterior Animal doors: Polypropylene slider (12"x12") or guillotine
Exterior Keeper doors: 7'x3' mesh panel gate
Hardware types: Two padlock tabs
Caging types: Mesh panel in a welded steel frame
Animal entry procedure: Catch cage attach to Service Gate
Lighting: Outside of animal area
Electrical: Waterproof outlet outside animal area
Keeper Water supply: Hosebib at keeper access (50' hose)



Holding Concept Diagram



Skunk, (photo by www.24houranimalcontrol.com)

Program Space Size: 240 sf
12' x 20' min. plus den

Exhibit Concept: *This Exhibit depicts a small interior rocky den space with an exterior natural woodland for foraging.*

BIOLOGY

Head and body length: 24-30" long including 8" tail (females somewhat smaller)

Tail length: 8"

Weight: 6-14 lbs.

Population: 1 male or female

EXHIBIT HABITAT

Enclosure: Total mesh enclosure attached to Fisher

Structure: 3" dia. posts set in concrete footing

Animal Fencing: 2'x2"x14 gauge steel mesh (top and sides)

Height: 10' min.

Viewing Types: Through Mesh or glass viewing

Viewing Area: One (8') along visitor walkway/3' min. setback and one interior den view

Land Area: 200 sf

Water Area: None

Substrate: Natural substrate on top of mesh floor, some planting

Vegetation: Grasses/shrubs

Furnishings: Logs and Perches

Pool cleaning: N/A

Animal Water source: Drinker at building

Special Features: Interior gunite den with glass view

Service Access: 3'x7' mesh door vestibule or through building (open into exhibit)

HOLDING AREA

Interior height: 7' min.

Interior stalls sizes/#: 6' x 8' (1)

Floors: Sloped, sealed concrete to drain

Walls: Sealed CMU

Ceiling: Concrete slab

Exterior Animal doors: Polypropylene slider (12"x12") or guillotine

Exterior Keeper doors: 7'x3' mesh panel gate

Hardware types: Two padlock tabs

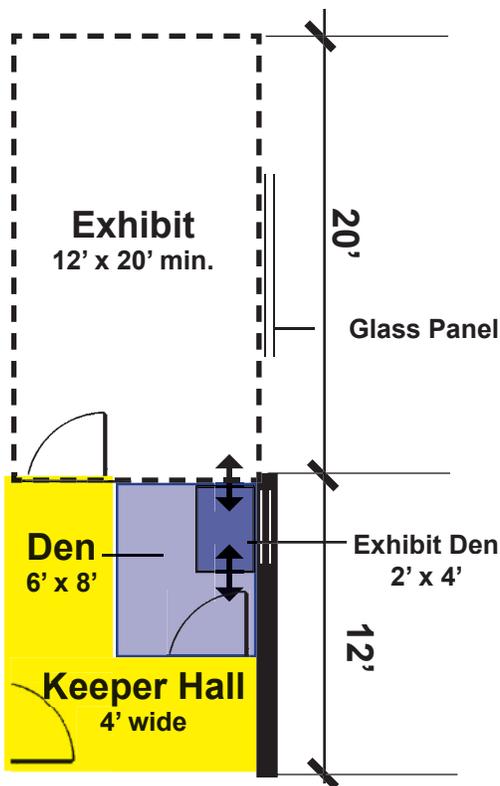
Caging types: Mesh panel in a welded steel frame

Animal entry procedure: Catch cage attach to Service Gate

Lighting: Outside of animal area

Electrical: Waterproof outlet outside animal area

Keeper Water supply: Hosebib at keeper access (50' hose)



Holding Concept Diagram
part plan of Service Building

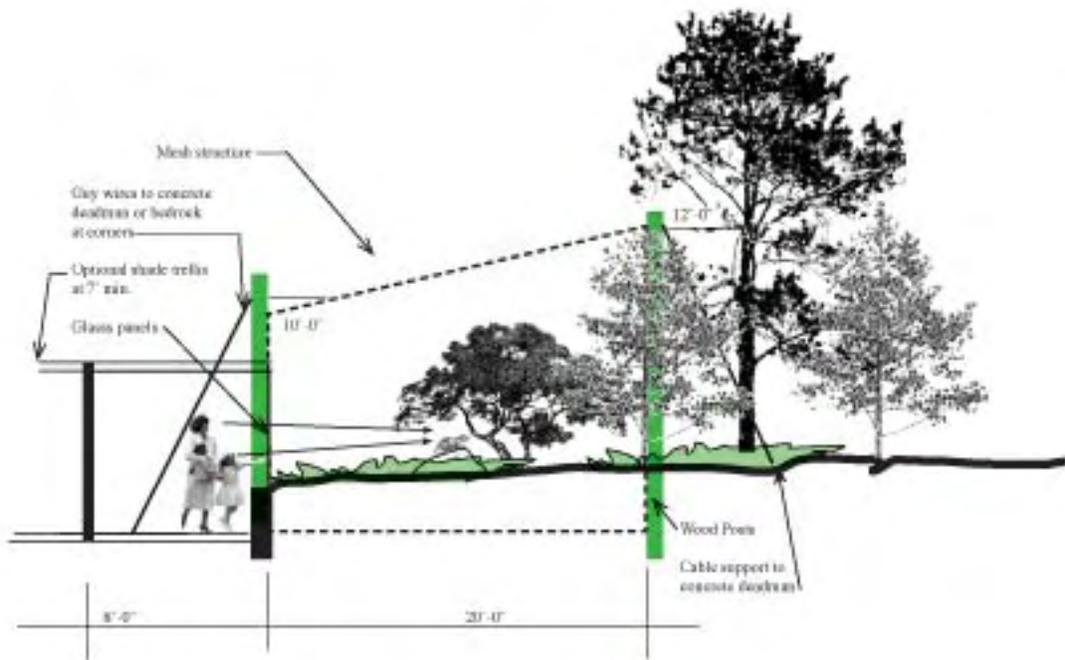


Exhibit Section: Typical Fisher mesh structure

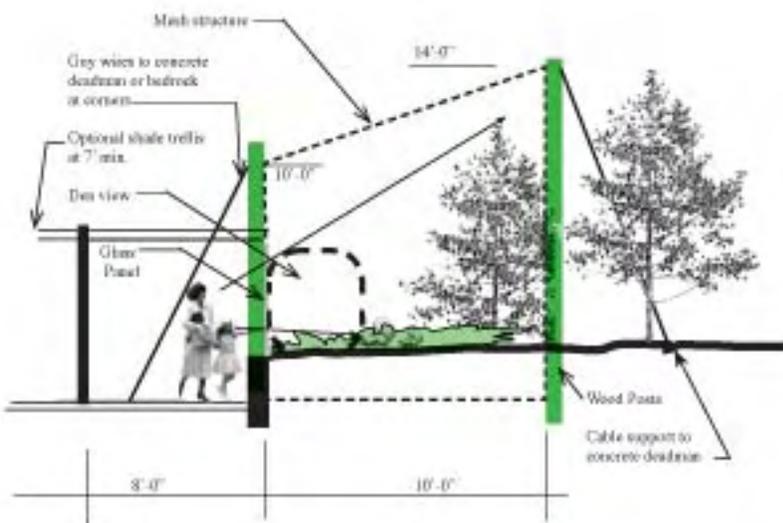


Exhibit Section: Typical Skunk mesh structure

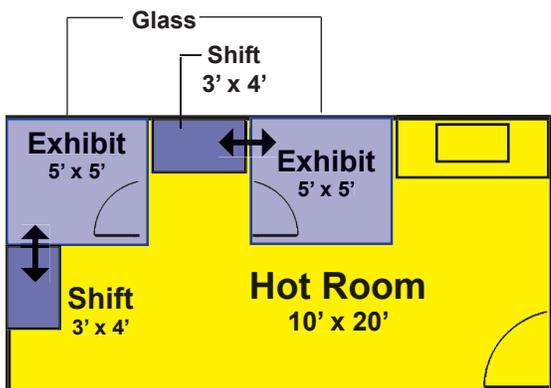


Timber Rattle Snake (photo by www.thewatersnake.com)



Copperhead (photo by S. Gibson)

Main Building Visitor hallway



Holding Concept Diagram

Exhibit L13

Northern Copperhead

Agkistrodon contortrix

Program Space 25 sf
Size 5' x 5' x 6' tall

Exhibit Concept *This Exhibit is viewed from the lobby of the Main Building and served through the Animal Care Center. This interior exhibit depicts a rocky outcrop den site for a Timber Rattlesnake and Northern Copperhead with natural substrates, exhibit elements and a painted diorama showing background natural elements of the Blue Hill.*

BIOLOGY

Head and body length: 3'-3" length
Weight: 4.5 lbs.
Population: 1 male or female/enclosure/species

EXHIBIT HABITAT

Enclosure: Non-glare glass front and mesh top, solid sides
Structure: Fiberglass structure - themed/textured
Height: 6' min.
Viewing Types: Through glass
Viewing Area: (1) 5 lf along visitor walkway
Land Area: 25 sf
Water Area: not necessary
Water Depth: N/A
Substrate: Sand and Gravel mix
Vegetation: some small plants
Furnishings: Branches, rocks and exhibit elements
Animal Water source: Drinker
Special Features: Den space
Service Access: 2' x 4' solid door (open into exhibit) with view port

HOLDING AREA

Hot Room Secondary secure room (10' x 20') required as a rear service access with sealed doors, alarms, and other safety precautions. Room contains back -up shift cages for each poisonous snake

Animal entry procedure: Transfer/transport case attach to Exhibit access

Lighting: UV fluorescent lighting, plant grow lights
Electrical: Waterproof outlet outside animal area
Drains: N/A
Keeper Water supply: Sink in Hot Room