



*River Otter at Trillside (Pressley Associates 2007).*

## C. Zoological Appendices

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### 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  
Size  
Exhibit Concept

4250 sf  
50' x 85'  
*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

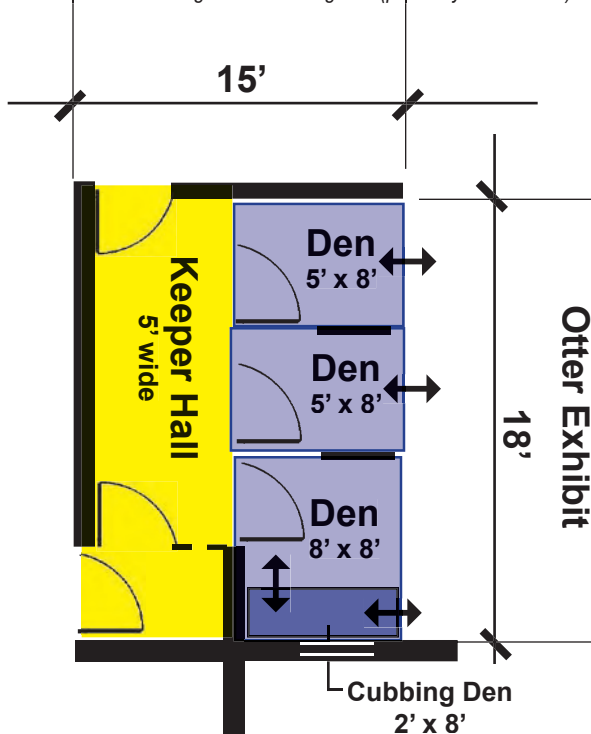
## EXHIBIT HABITAT

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

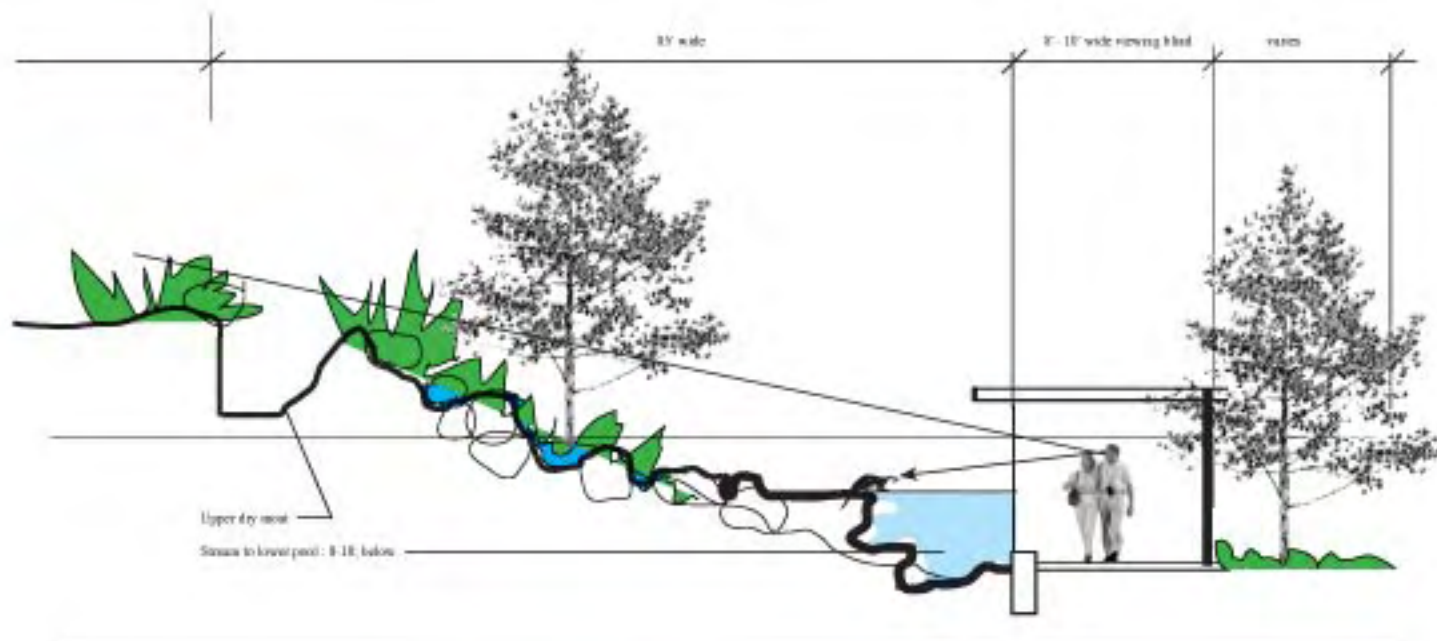
Pool cleaning: Filtration system/ozone  
Animal Water source: Drinker at cave  
Special Features: On-exhibit cave-type rock shelter (2'x2'x2' tall)  
Service Access: 4' solid door (open into exhibit)

## HOLDING AREA

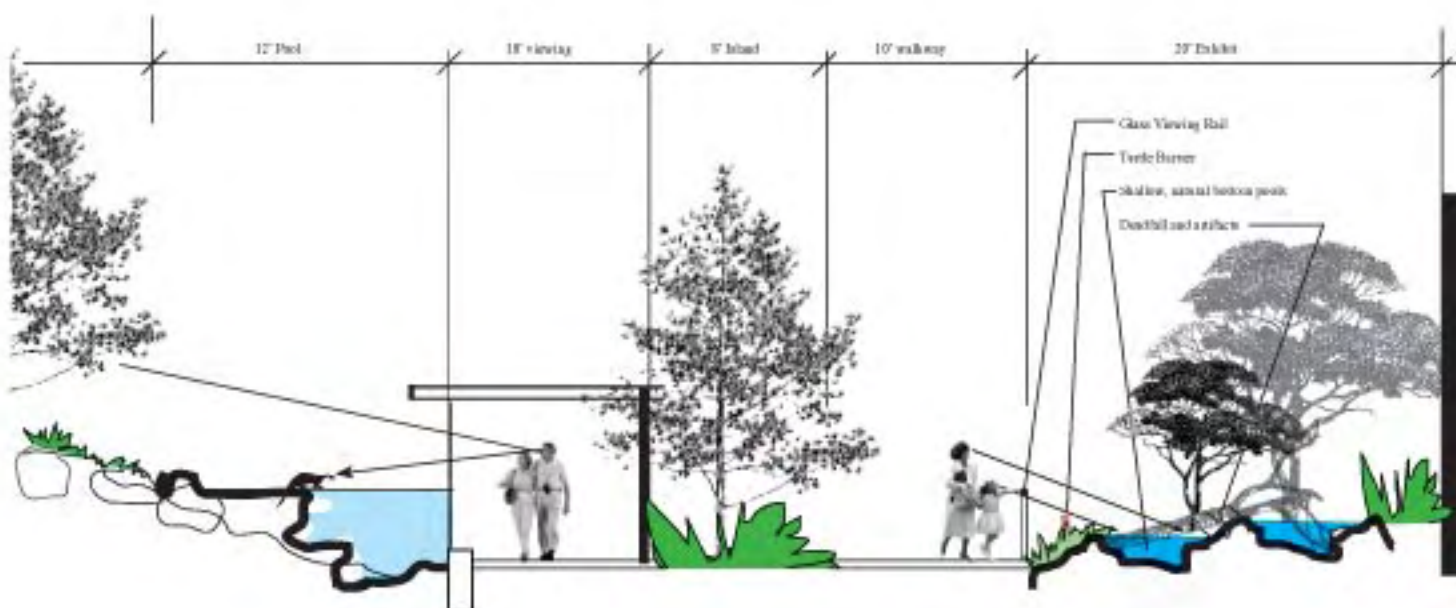
Interior height: 7' min.  
Interior stalls sizes/#: 5' x 8' (2) and (1) at 8' x 8' with cubbing den  
  
Floors: Sloped, sealed concrete to drain  
Walls: Sealed CMU  
Ceiling: Concrete slab  
Exterior Animal doors: Polypropylene slider (18"x18") or guillotine  
Exterior Keeper doors: 7'x3' mesh panel 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***

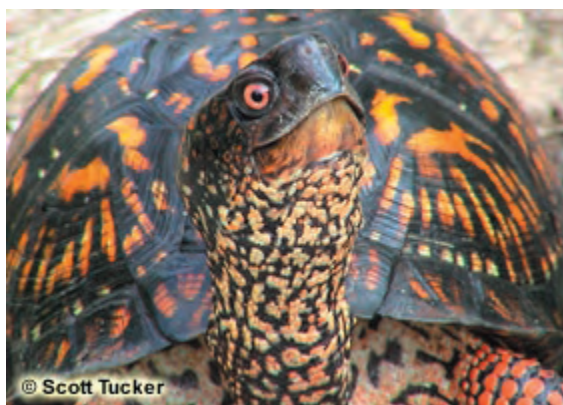


***Exhibit Section: from Otter to Turtle Pond***





Blandings Turtle



Eastern Box Turtle



Musk Turtle



Snapping Turtles

Assorted Turtles, from [www.turtleconservationproject.org](http://www.turtleconservationproject.org)

Program Space  
Size  
Exhibit Concept

700 sf  
20' x 35'  
*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

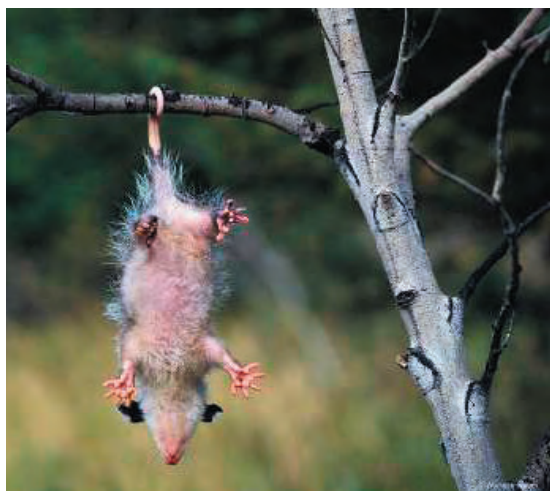
Enclosure:	Open exhibit with small log wooden fence to contain turtles
Structure:	8" dia. posts set in concrete footing
Viewing:	Over or through 42" glass handrail
Animal Fencing:	Log rails and main building
Height:	1' min. smooth surface
Viewing Area:	40 lf pond edge and stream view
Land Area:	200 sf
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

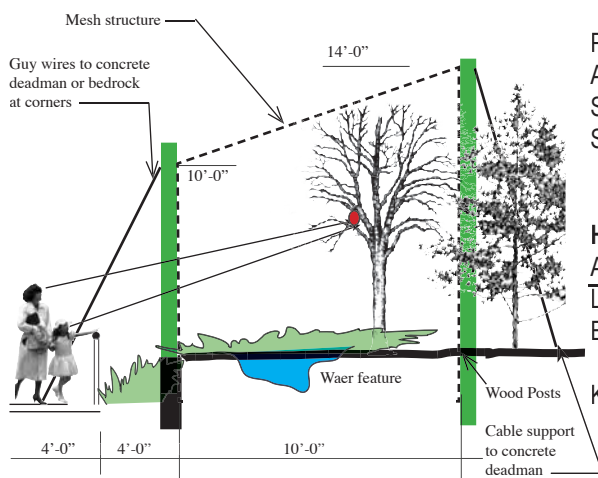
Animal Fencing: 2'x2"x 1/16" steel mesh (top and sides)  
Height: 10' min.  
Viewing Types: Through Mesh  
Viewing Area: One (8') along visitor walkway/3' min. setback  
Land Area: 125 sf

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

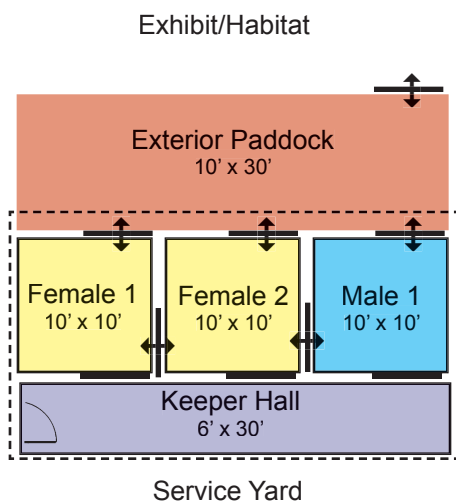
Animal entry procedure: Den Box placed in Exhibit/door open  
Lighting: Outside of animal area  
Electrical: Waterproof outlet outside animal area/  
Heat Lamp  
Keeper Water supply: Hosebib at keeper access (25' hose)



## Exhibit Section: Typical Opossum structure



Photo by Joe Kosack/PGC Photo



Holding Concept Diagram

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

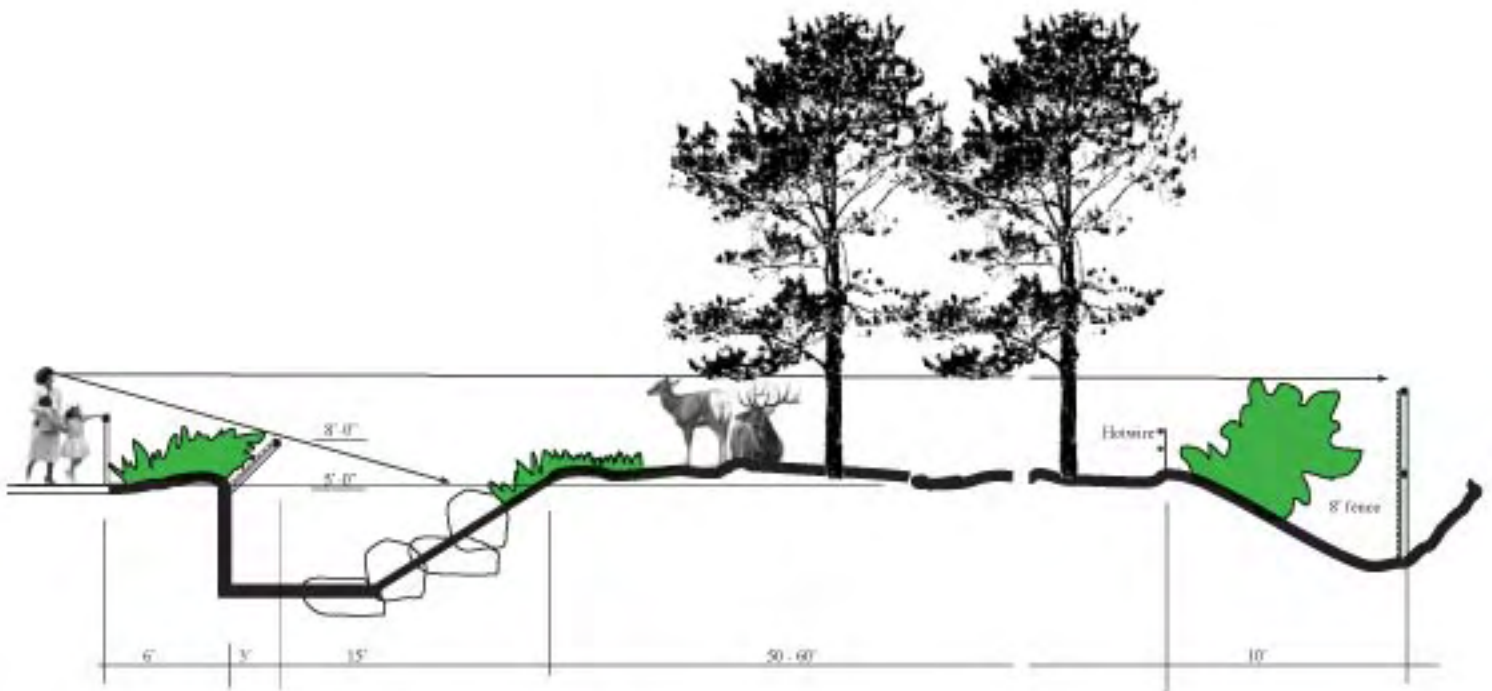
#### **EXHIBIT HABITAT**

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)

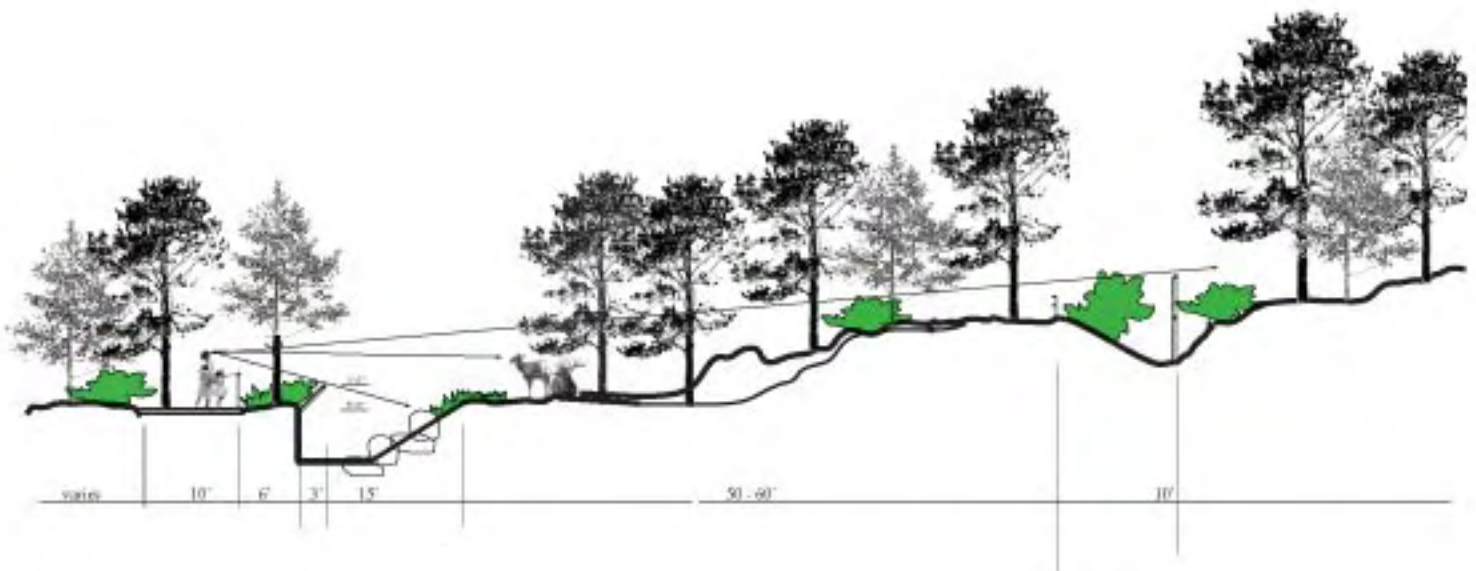
#### **HOLDING AREA**

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)





***Exhibit Section: Option with dry moat***



***Exhibit Section: Overall Context***





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



Barn Owl in Barn setting ([www.elizabethfarnum.com](http://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:

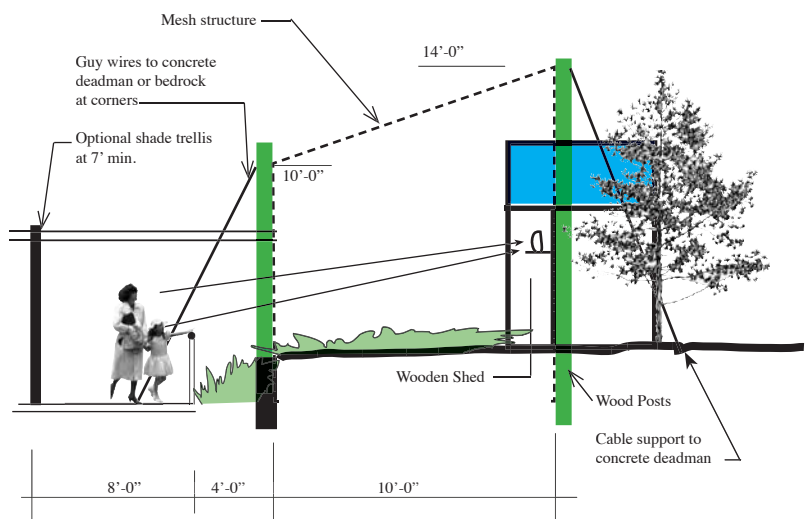
Waterproof outlet outside animal area

Drains:

As needed

Keeper Water supply:

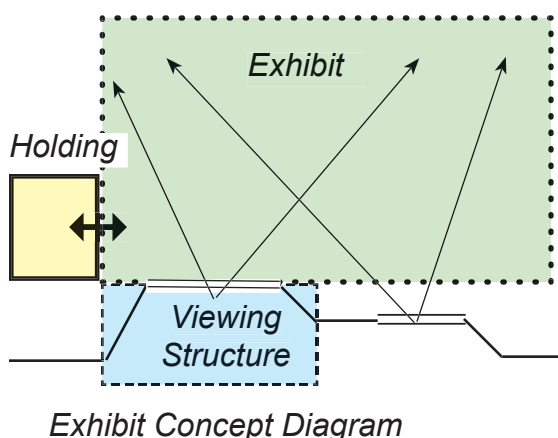
Hosebib at keeper access (25' hose)



**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

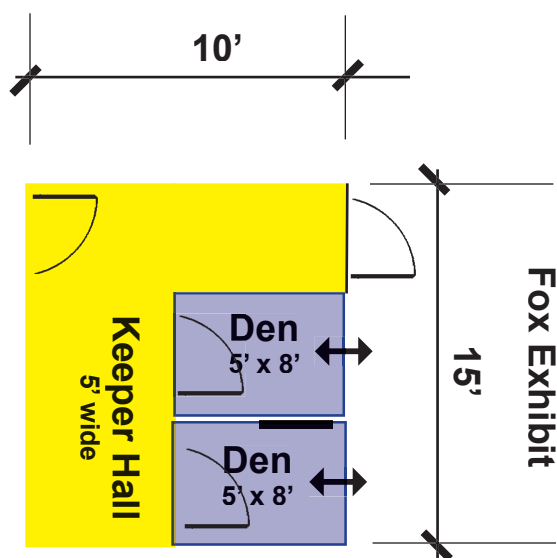
Head and body length:	39-41"
Tail length:	10"
Weight: Male	15 lb. Max.
Weight: Female	10 lb. Min.
Population:	1 male/1 female/ kits (option)

## 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:	10' min.
Height:	Through Mesh and glass panel viewing
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:	

## 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](http://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

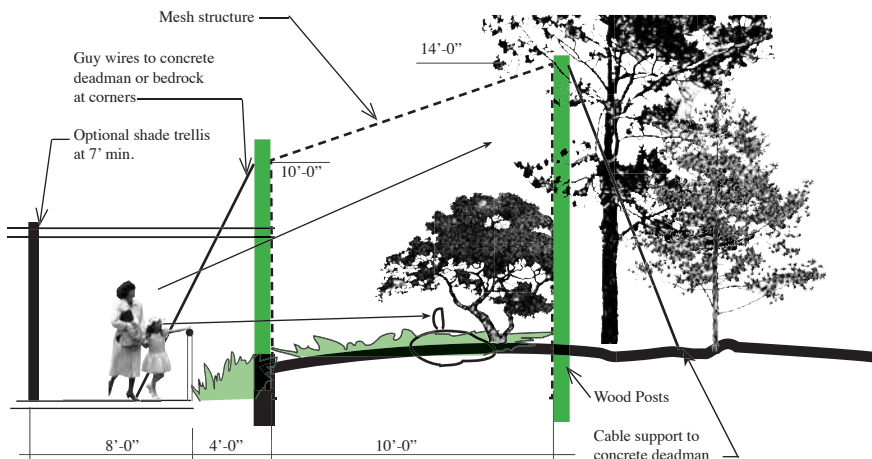
Water Depth:	N/A
Substrate:	Natural substrate/planting
Vegetation:	Grasses/shrubs
Furnishings:	Logs, rocks and low perches
Animal Water source:	Drinker

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)
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**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

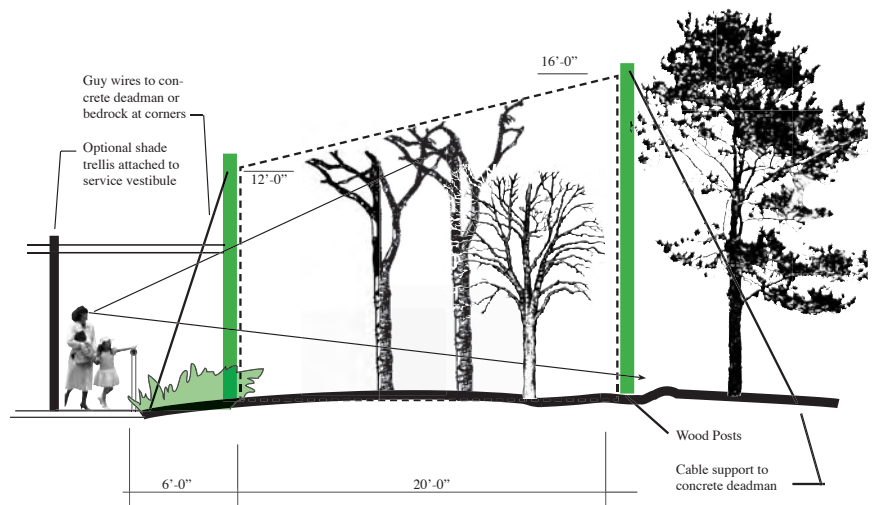
Enclosure: Mesh structure w/perimeter concrete curb  
Structure: Post and cable tension structure with guys  
Animal Fencing: 2"x2"x 14 gauge steel mesh (top and sides)

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

*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.*

## 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

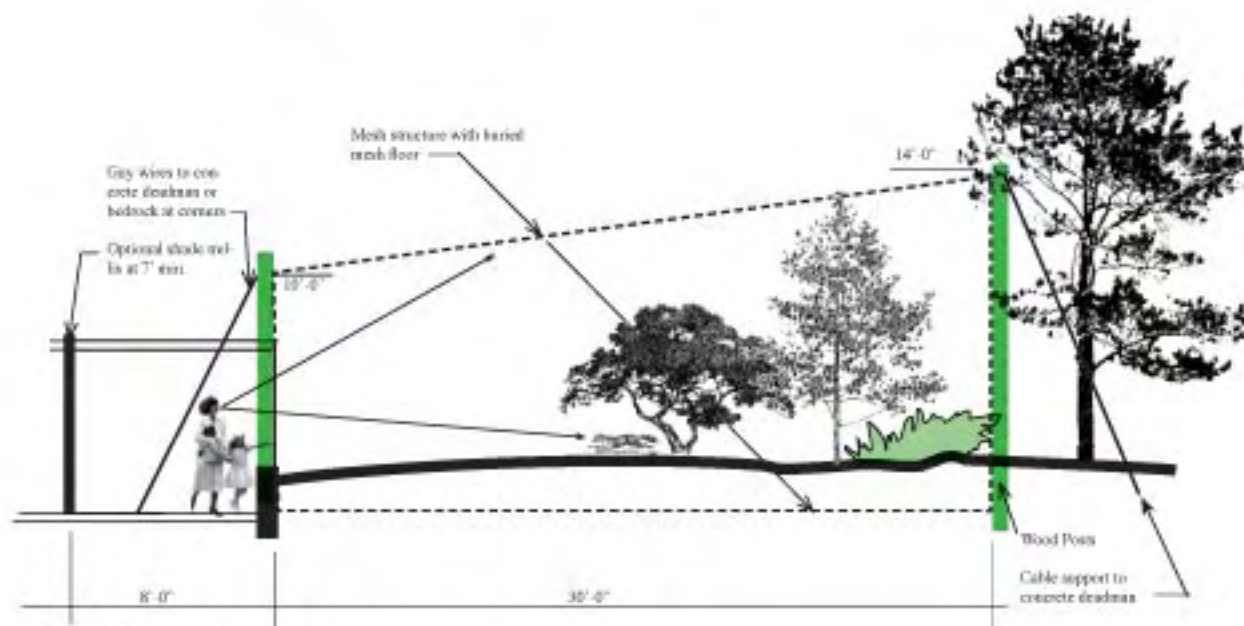
Viewing Area: (4) 12 lf along visitor walkway/6' min. setback  
Land Area: 1720 sf  
Water Area: 8' x 8' clay-lined pond  
Water Depth: 2' with sloping sides  
Substrate: Natural substrate

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)

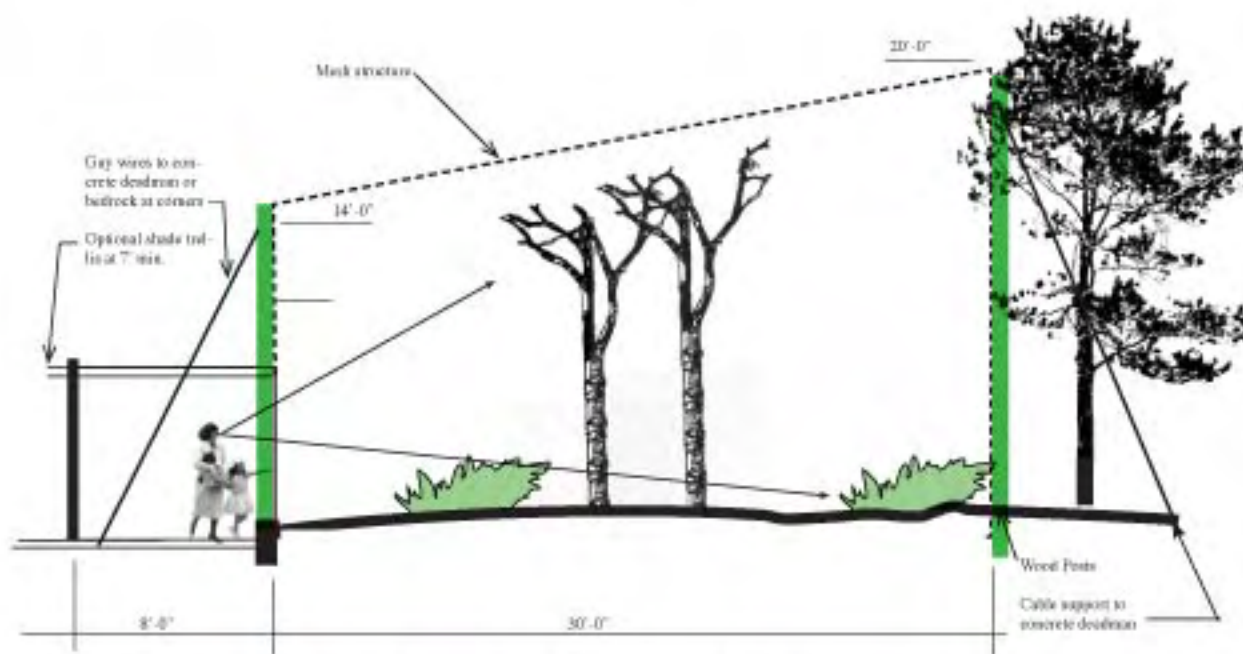
## HOLDING AREA

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.borallforest.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)

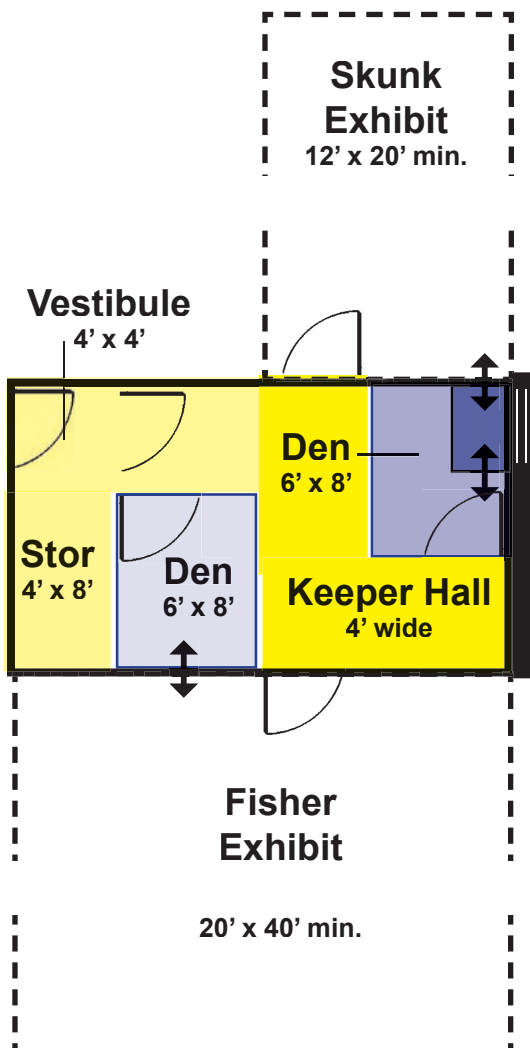
#### HOLDING AREA

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

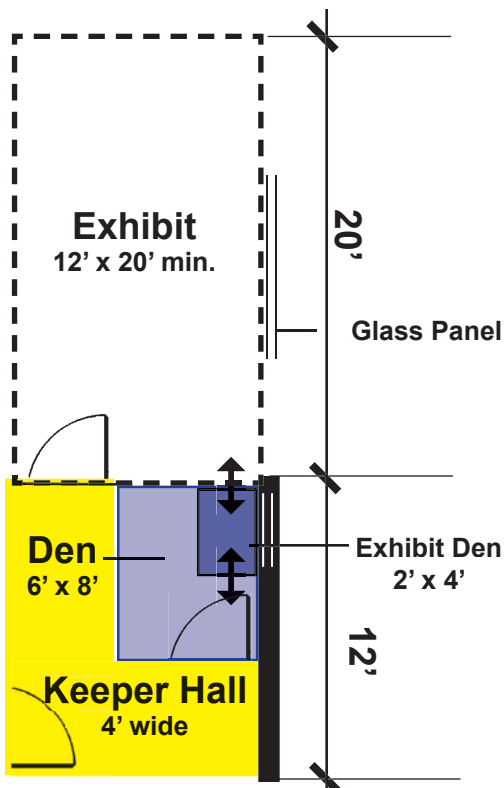
Caging types: Mesh panel in a welded steel frame

Animal entry procedure: Catch cage attach to Service Gate

Lighting: Outside of animal area

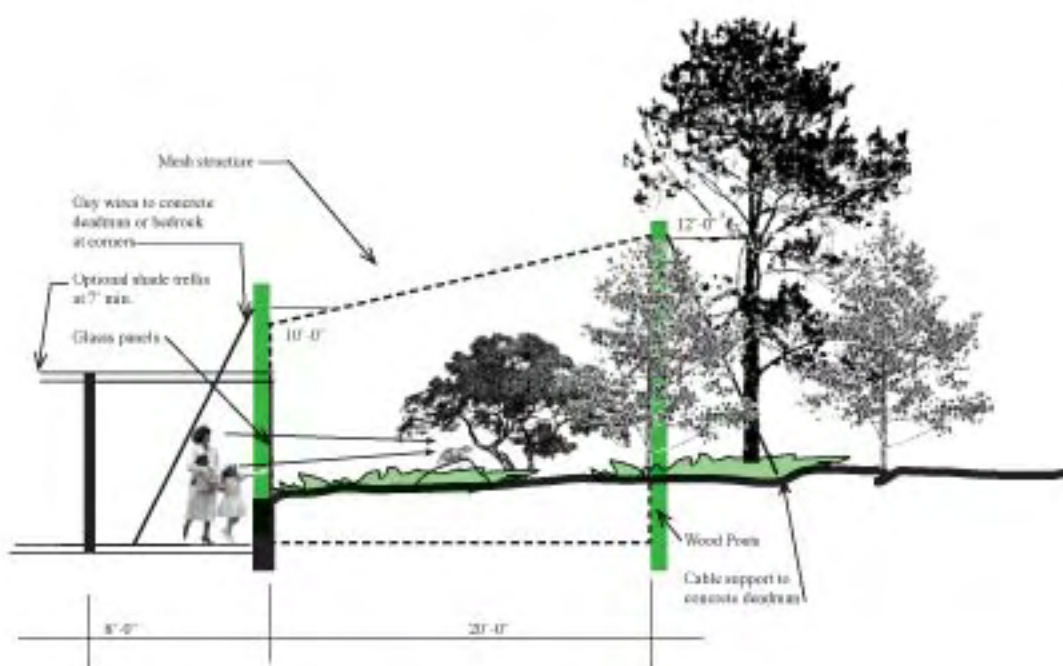
Electrical: Waterproof outlet outside animal area

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

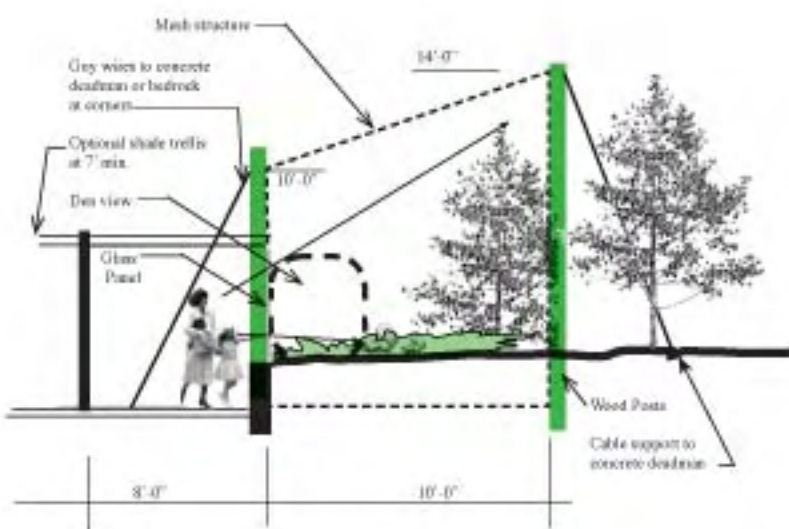


*Holding Concept Diagram  
part plan of Service Building*





**Exhibit Section: Typical Fisher mesh structure**



**Exhibit Section: Typical Skunk mesh structure**

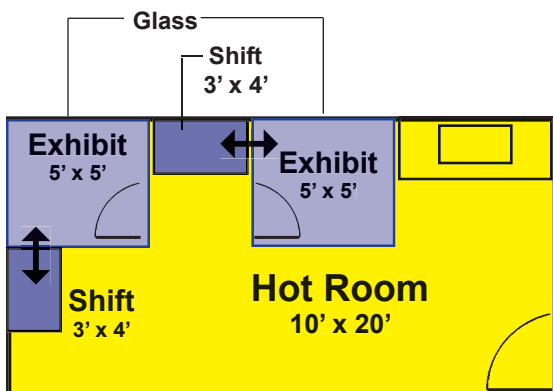


Timber Rattle Snake (photo by www.thewatersnake.com)



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