WASLA Conference
April 21, 2017

Exploring Earthquakes, Springs, Dams, and a River Restored

Designing a New Wildlife Area on the Columbia River at Beebe Springs

j.a. brennan associates PLLC

Ecosystems N.W.

BHC CONSULTANTS

LENNOX INSITES
EXTRAORDINARY VISITOR EXPERIENCES

Jim Brennan

J.A. Brennan Associates

j.a. brennan associates PLLC

Dennis Beich

Ecosystems NW

Ecosystems N.W.

Carla Talich

BHC Consultants

BHC CONSULTANTS

Chuck Lennox

Lennox Insites

LENNOX INSITES

EXTRAORDINARY VISITOR EXPERIENCES

Learning Objectives

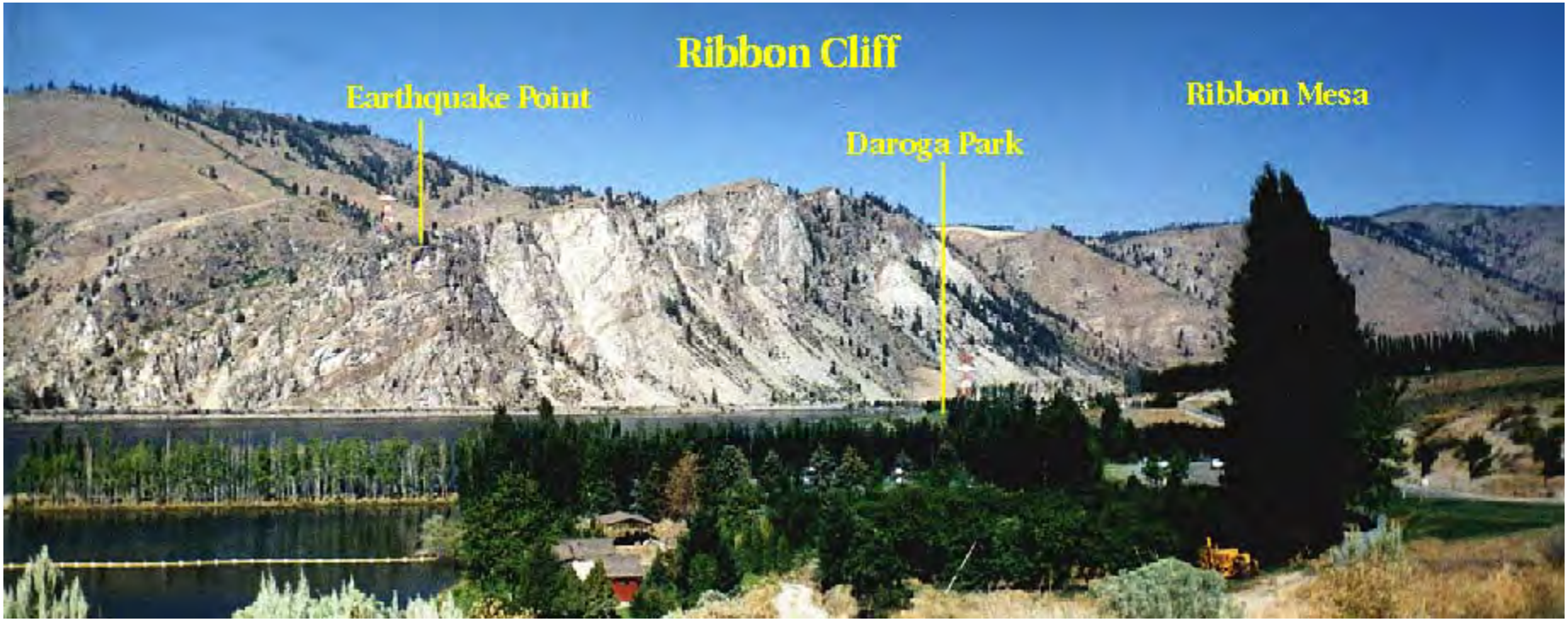
- Design of restoration projects
- Importance of public involvement
- Learn to design to lead a visitor on a path of discovery exploring place, history, ecological design, and preservation using creative interpretive design
- Explore ways to integrate a natural environment into the context of the local community
- Create balance of human use and preservation of the natural environment

Agenda

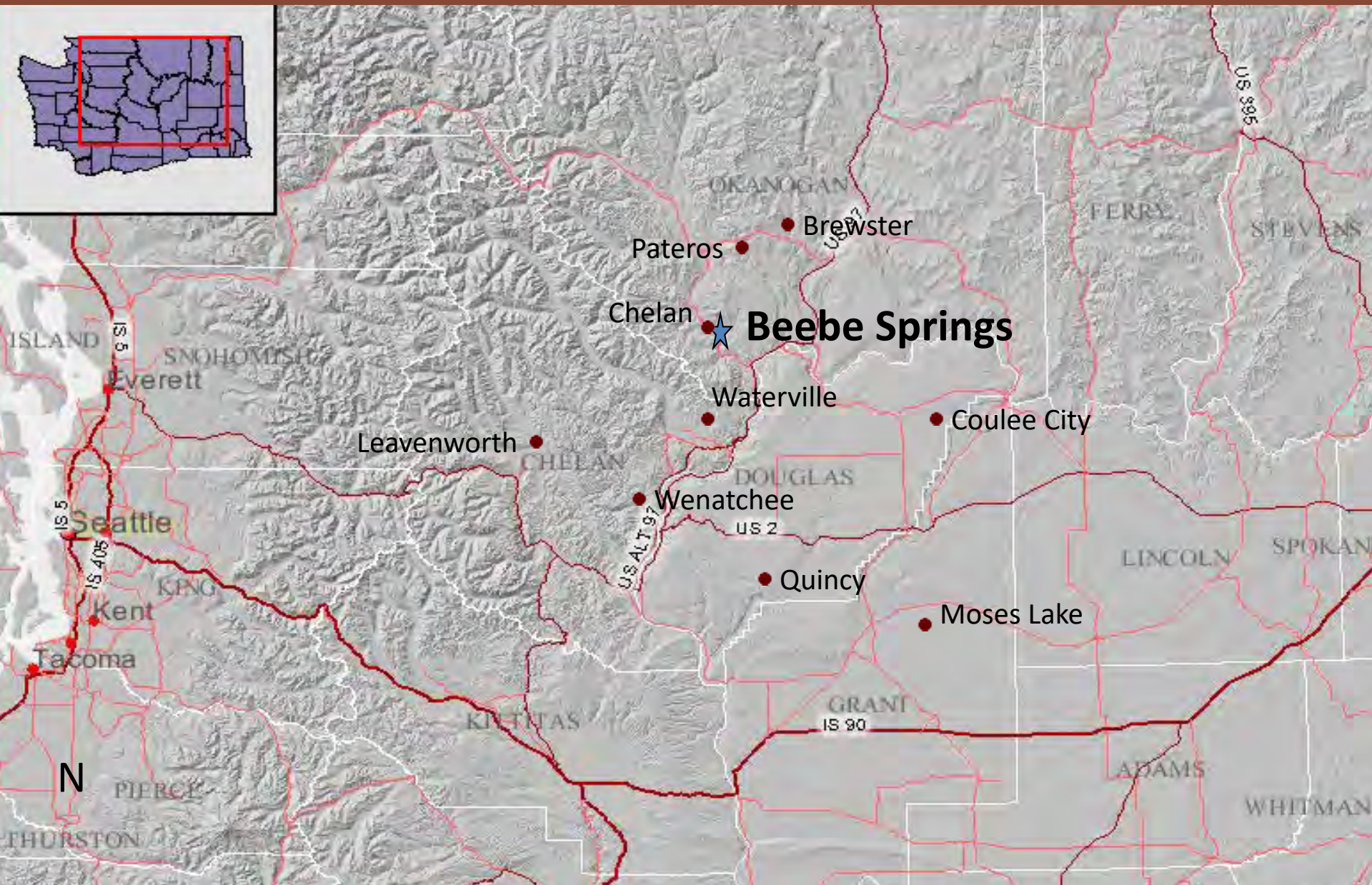
- Introduction
- Master Plan Design
- Stakeholder Group & Local Community
- Restoration Goals & Targeted Habitat
- Ecological Design
- Access Design
- Interpretive Goals & Themes
- Trails of Discovery
- Opportunities, Challenges, & Lessons Learned

Master Plan Design

Ribbon Cliffs Earthquake



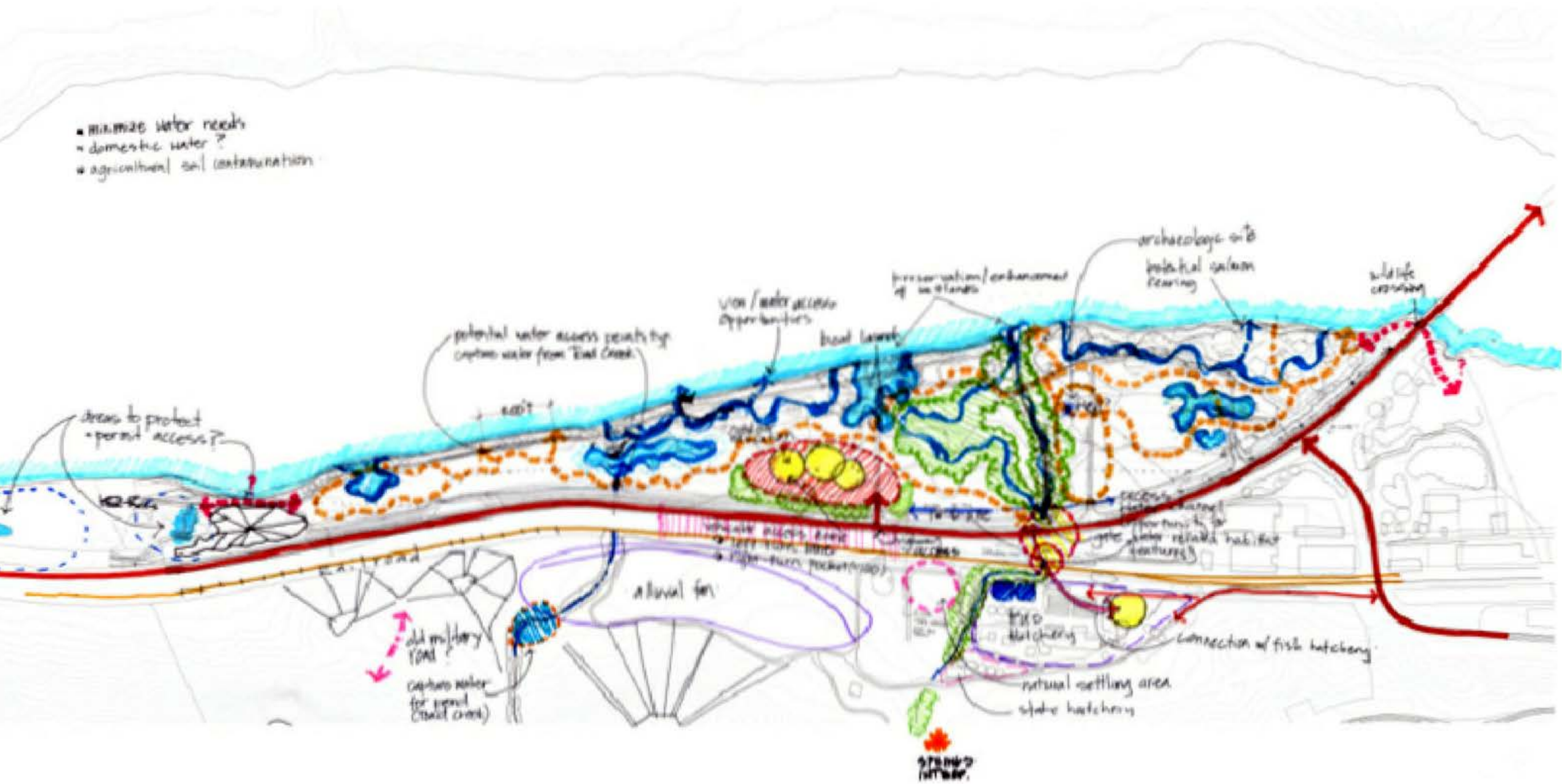
Regional Map



Site Location Map

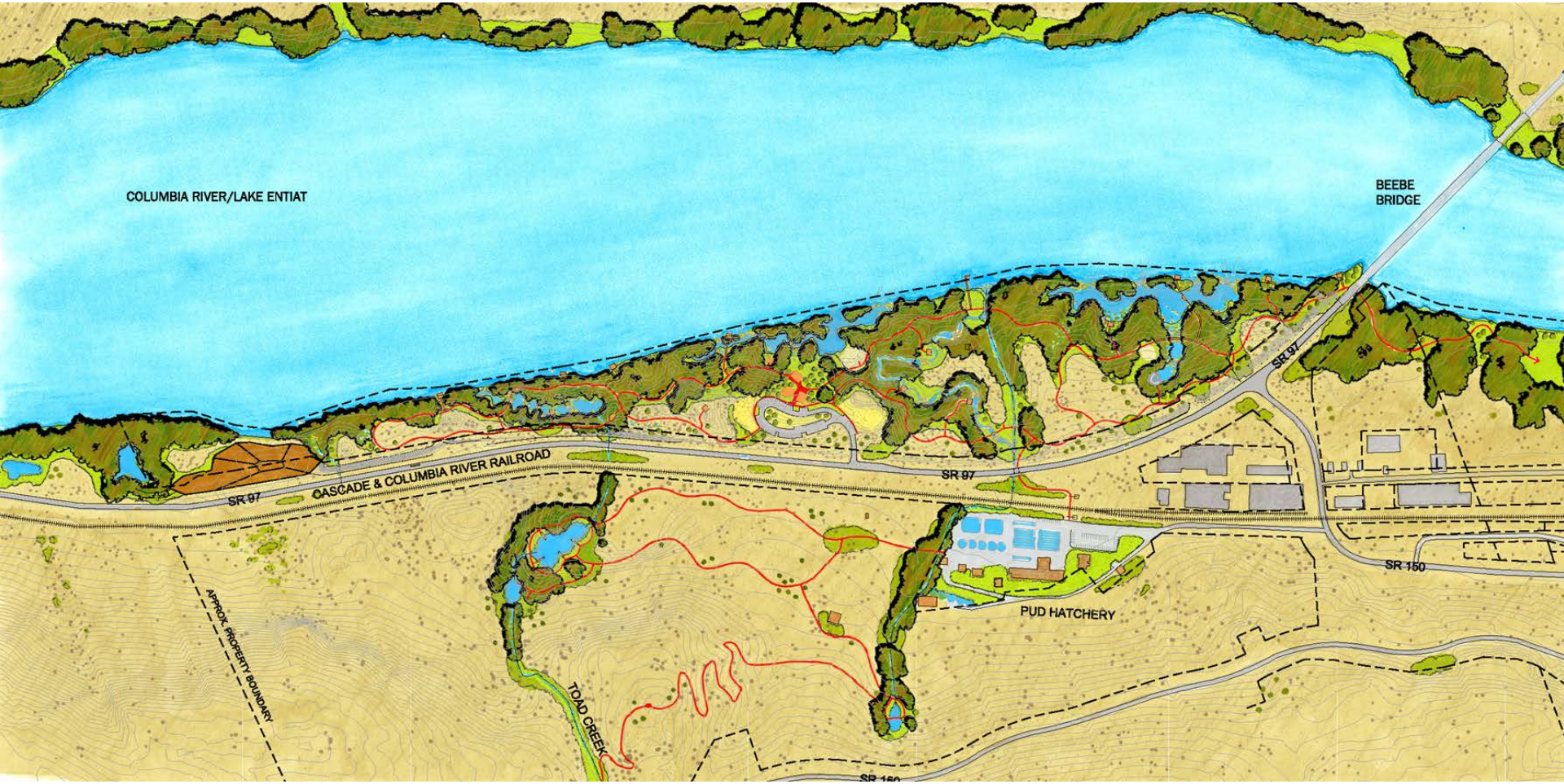
Area of Development: Beebe Springs Natural Area

Beebe Bridge Park
Lake Entiat/Columbia River
McNeil Canyon Rd
SR 97
Willmorth Dr
Beebe Springs Natural Area
Chelan Falls Park
ALT 97
SR 150
Chelan Falls Powerhouse Park
Chelan River
Chelan
N

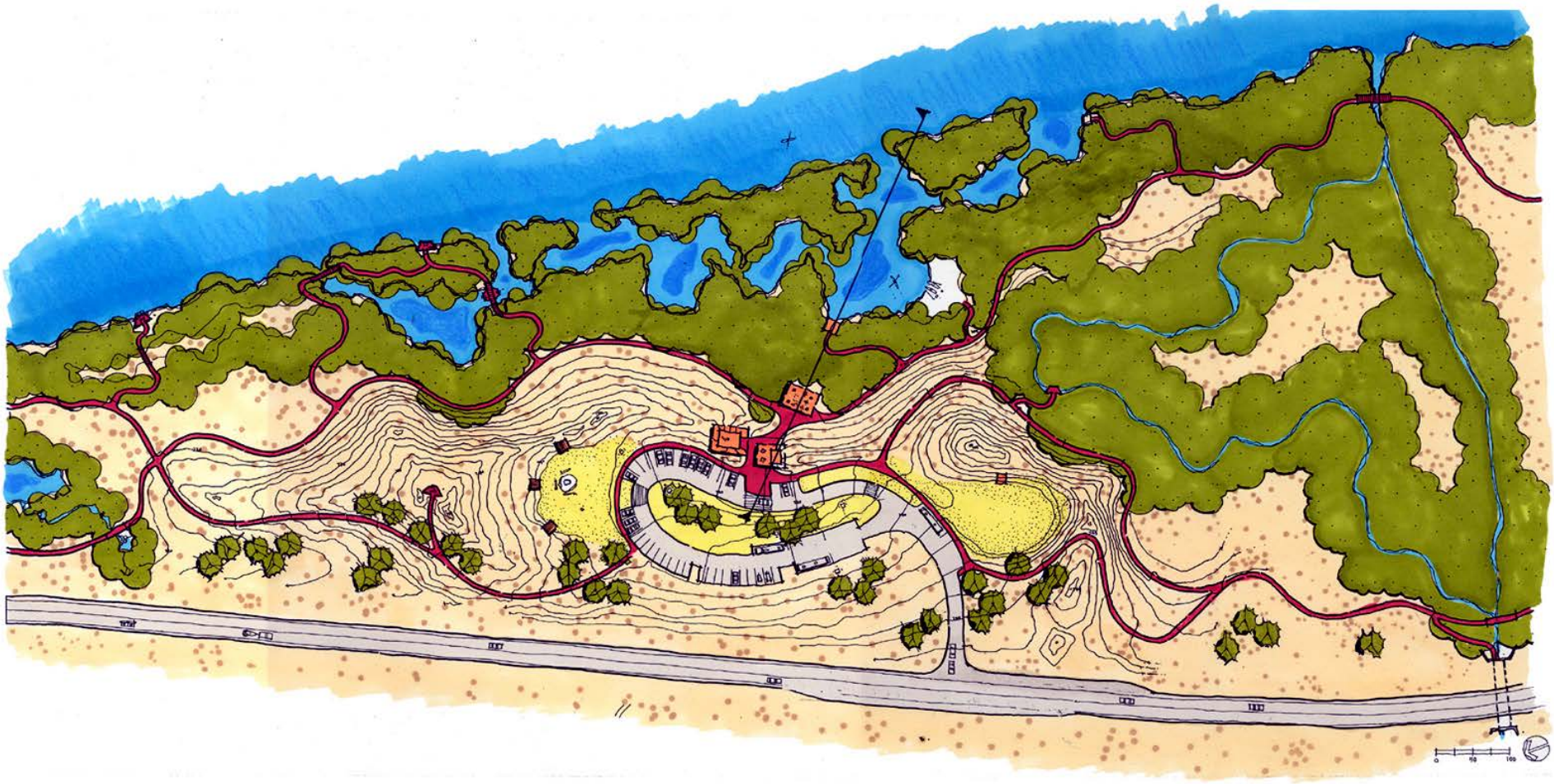


minimize water needs
domestic water ?
agricultural soil contamination
areas to protect
permit access?
potential water access points
view / water access opportunities
boat launch
archaeology site
potential salmon rearing
wildlife crossing
alluvial fan
old military road?
connection w/ fish hatchery
natural settling area
state hatchery

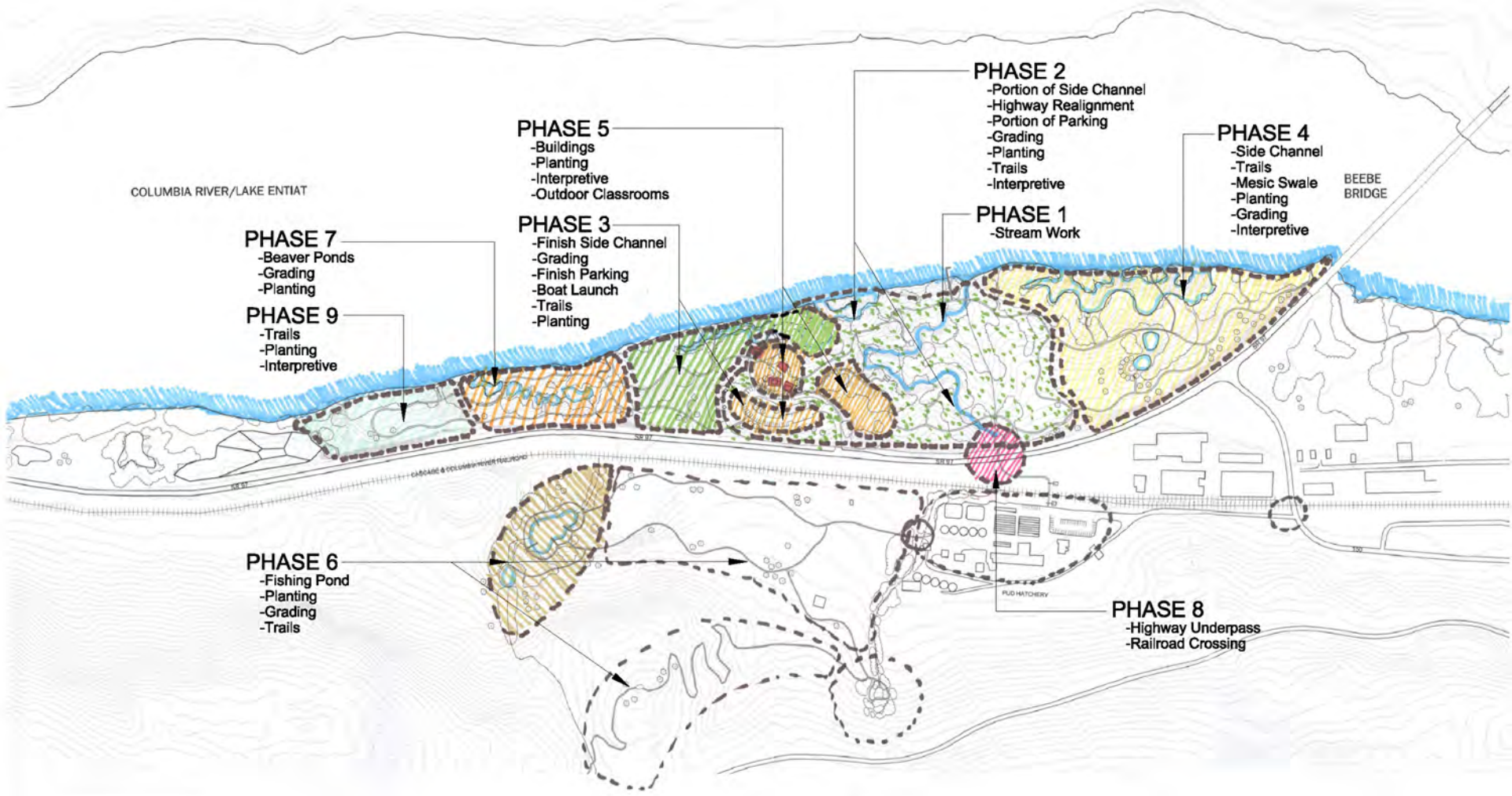
Master Plan


COLUMBIA RIVER/LAKE ENTIAT
BEEBE BRIDGE
SR 97
CASCADE & COLUMBIA RIVER RAILROAD
SR 97
SR 97
SR 150
PUD HATCHERY
APPROX. PROPERTY BOUNDARY
TOAD CREEK

Beebe Springs Natural Area Master Plan



Phasing


COLUMBIA RIVER/LAKE ENTIAT
PHASE 2
-Portion of Side Channel
-Highway Realignment
-Portion of Parking
-Grading
-Planting
-Trails
-Interpretive
PHASE 5
-Buildings
-Planting
-Interpretive
-Outdoor Classrooms
PHASE 4
-Side Channel
-Trails
-Mesic Swale
-Planting
-Grading
-Interpretive
BEEBE BRIDGE
PHASE 1
-Stream Work
PHASE 3
-Finish Side Channel
-Grading
-Finish Parking
-Boat Launch
-Trails
-Planting
PHASE 7
-Beaver Ponds
-Grading
-Planting
PHASE 9
-Trails
-Planting
-Interpretive
PHASE 6
-Fishing Pond
-Planting
-Grading
-Trails
PHASE 8
-Highway Underpass
-Railroad Crossing

ORIGINATION OF THE IDEA

Proximity to People: Tourism

EXPERIENCE MORE...
Via 97

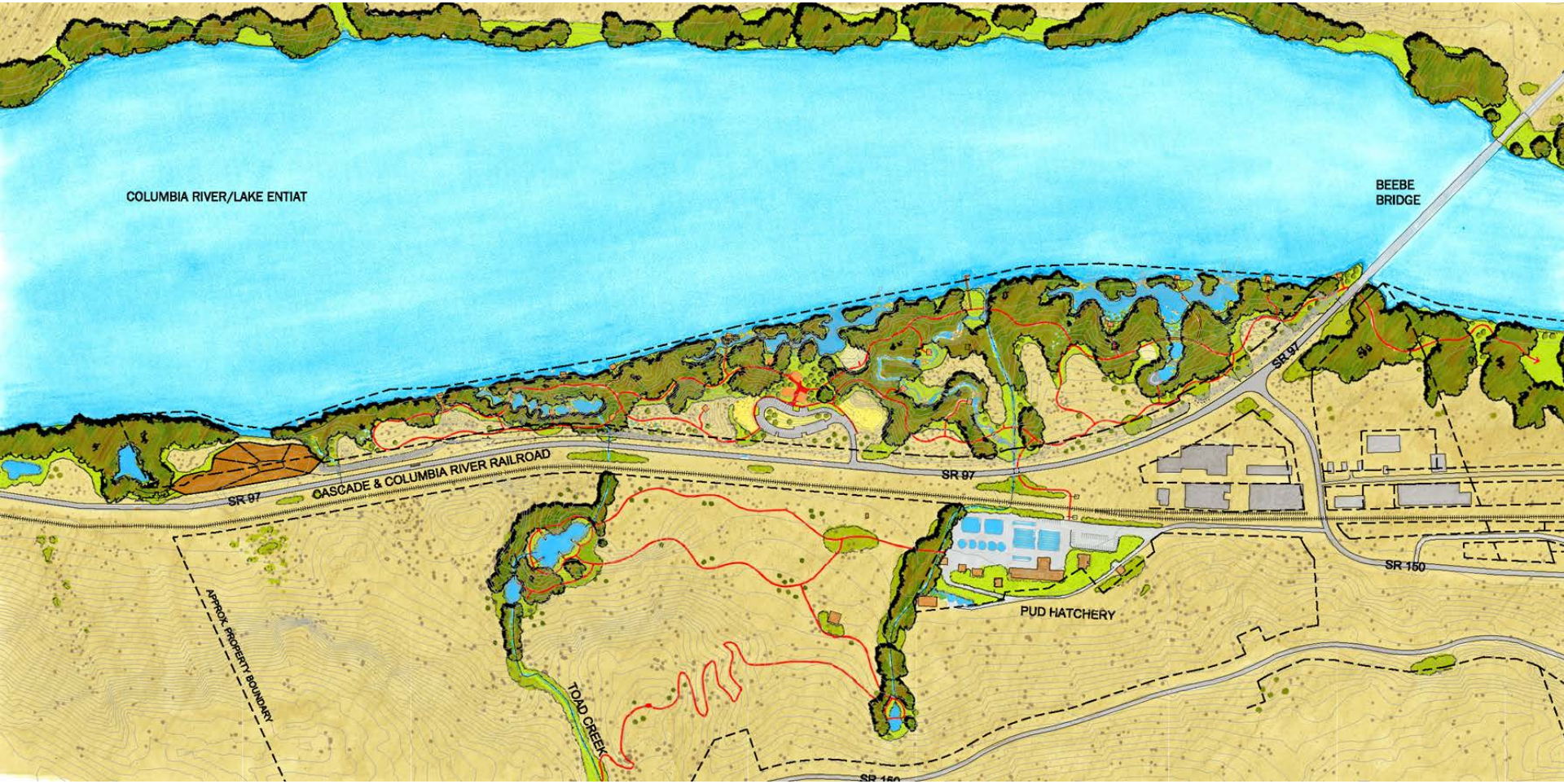
Hatchery Public Access

Hatchery Public Access

Ribbon Cutting/Opening Day

STAKEHOLDERS & COMMUNITY

Master Plan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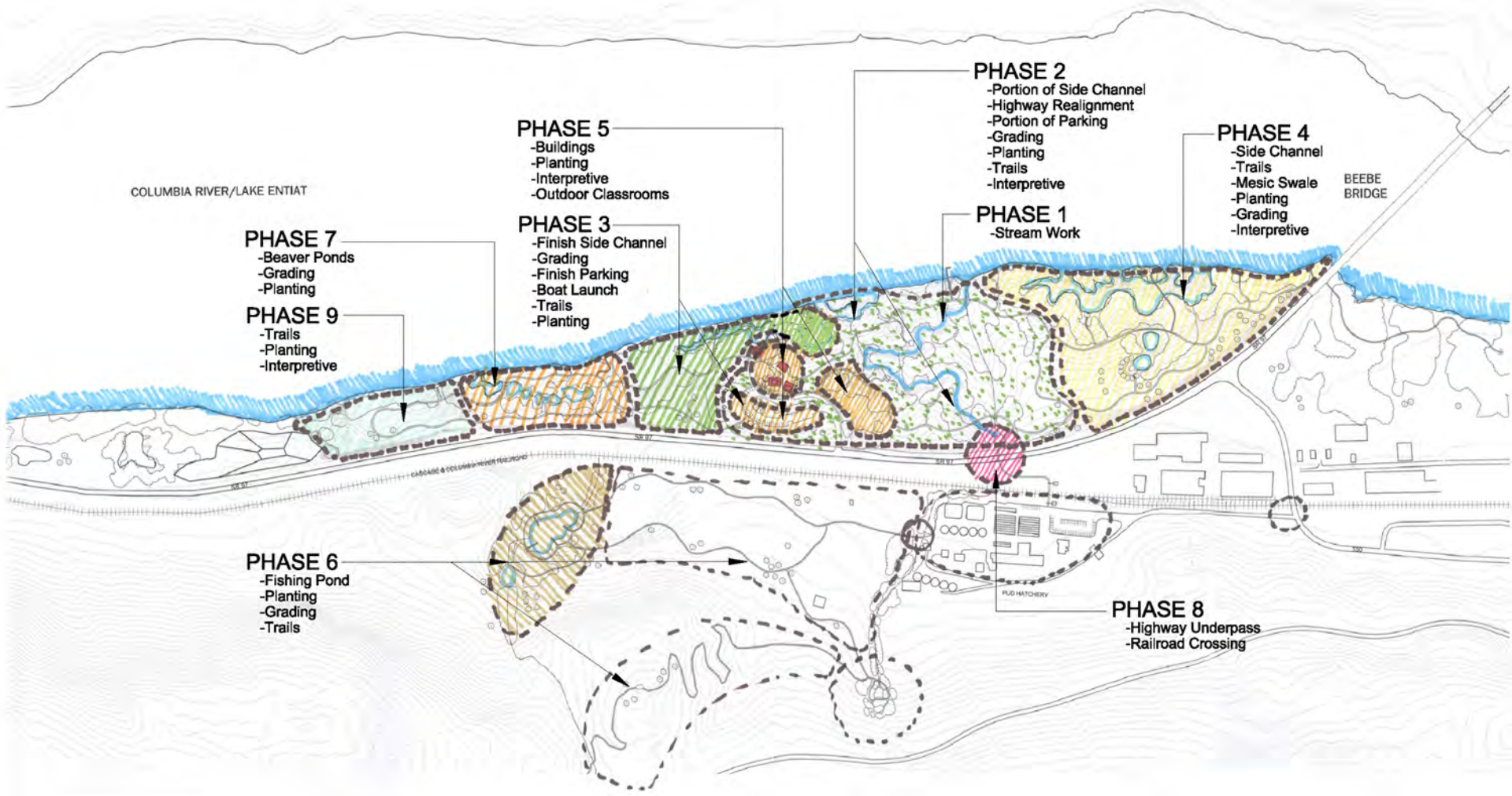
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Ribbon Cutting/Opening Day

Chelan sportsmen lend a hand to help expand fish habitat

Chelan, WA
(Chelan Co.)
Lake Chelan Mirror
(Cir. W. 3,400)

MAR 28 2007

Allen's P. C. B. Est. 1888

Beebe Springs project linked with PUD plans

(2) 2219

By Ed Merriman
Staff Writer

Things are getting better everyday for salmon, steelhead, and resident rainbow, cutthroat and bull trout in Lake Chelan and its tributaries, as well as the Chelan and Columbia rivers, according to reports presented Wednesday at the Lake Chelan Sportsmen's Association.

Fish habitat improvement projects supported by the sportsmen's association include building acclamation ponds by

participated in negotiations on fish habitat and water allocations for fish included in the PUD's licensing agreement for the hydroelectric dam on the Chelan River.

Clark said he and other members of the Sportsmen's Association help the Washington Department of Fish and Wildlife feed salmon and other fish reared in Chelan River net pens below the dam.

"We are interested in sportsfishing and conservation. For those reasons we are supporting fish habitat enhancement in this area," Clark said.

Toward those goals, the association has invested funds, including member dues and grant funds, in fish production and conservation programs, and in public edu-

ney to the ocean and adulthood, depending on ocean conditions, ocean harvests, predation by seals, sea lions, whales and other prey, and other factors.

When the net pens have been replaced with acclamation ponds to be constructed in the Chelan River, the plan calls for increasing the number of Chinook salmon reared at the site from 100,000 to 600,000, Osborn said.

Improvements are also planned at the Chelan Falls hatchery, which produces cutthroat and rainbow trout for harvesting by sports fishermen.

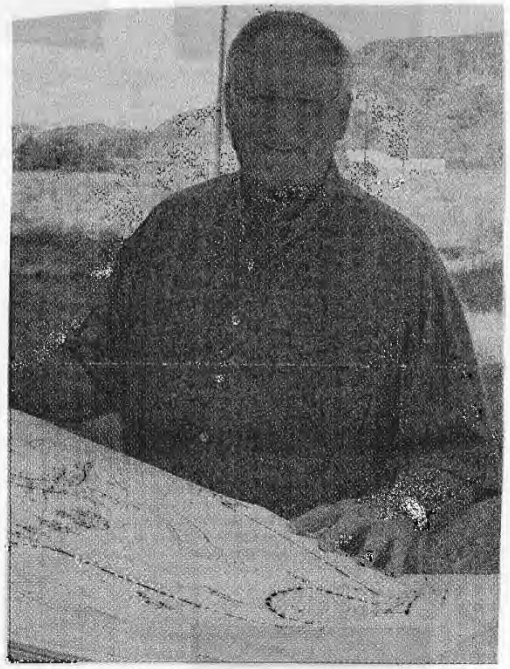
Under a 50-year relicensing agreement with the Federal Energy Regulatory Commission, the PUD has two years to

Clark honored as volunteer force behind Beebe Springs fish project

Chelan, WA
(Chelan Co.)
Lake Chelan Mirror
(Cir. W. 3,400)

JUN 20 2007

Allen's P.C.B. Est. 1888



Multi-million dollar project, Phase II underway

By Ed Merriman
Editor

The $1 million Phase II of the Beebe Springs fish-enhancement and wildlife-viewing project is moving forward with new state funding and volunteer efforts recently recognized by the Washington Department of Fish and Wildlife.

Frank Clark, president of the Lake Chelan Sportsman's Association, said the longterm cost of work planned at Beebe Springs, the nearby Chelan Fish hatchery and the in the Chelan River are expected to cost more than $8 million over eight to 10 phases.

Clark was recently presented with a WDFW Outstanding Volunteer award for his work on the Beebe Springs project.

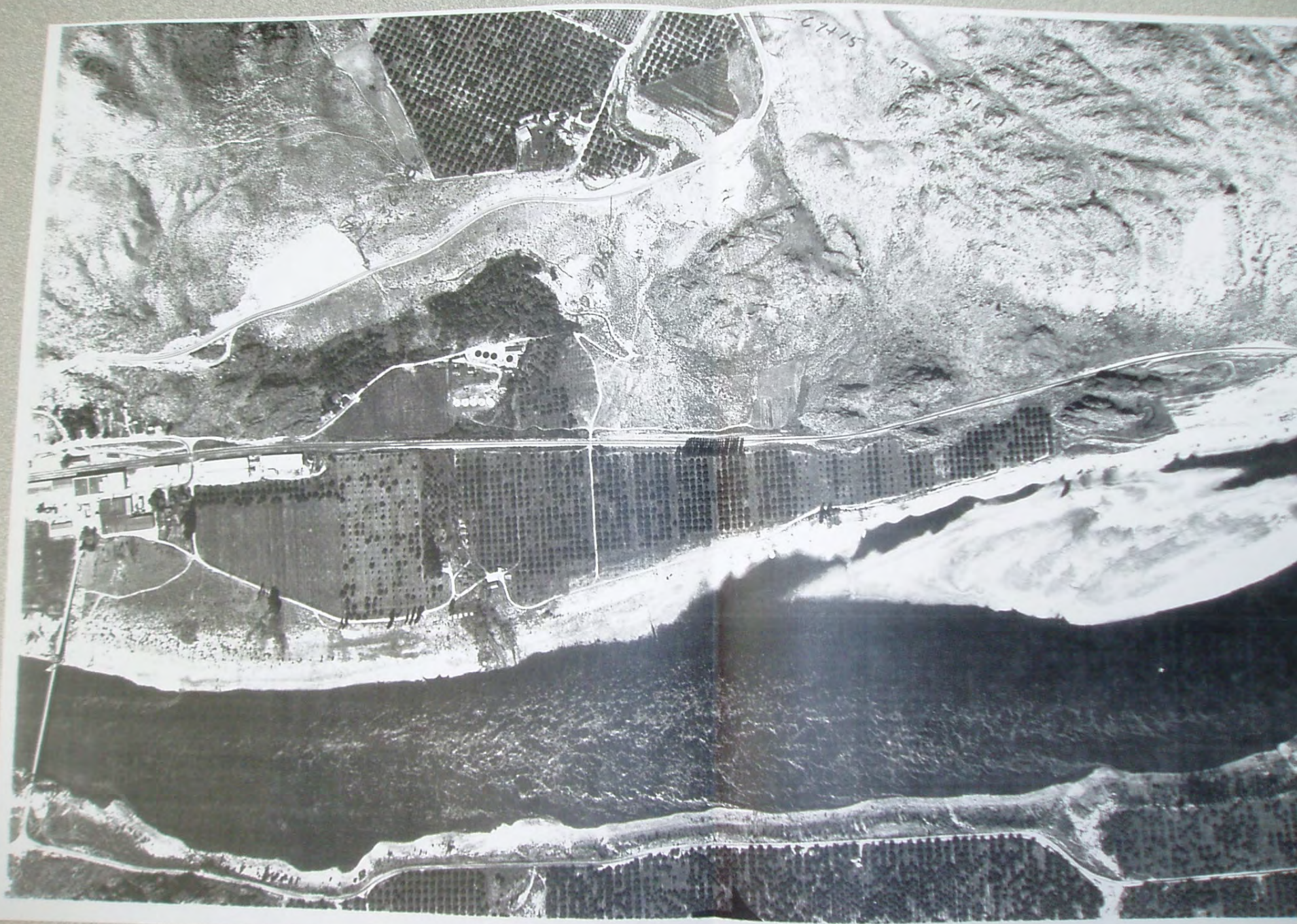
For four years, Clark and fellow members of the sportsman's association, along with other stakeholders have been working with state and county elected officials, the Chelan County Public Utility District, the Chelan Chamber of Commerce, the U.S. Forest Service, Audubon Society, Colville Confederated Tribes, and

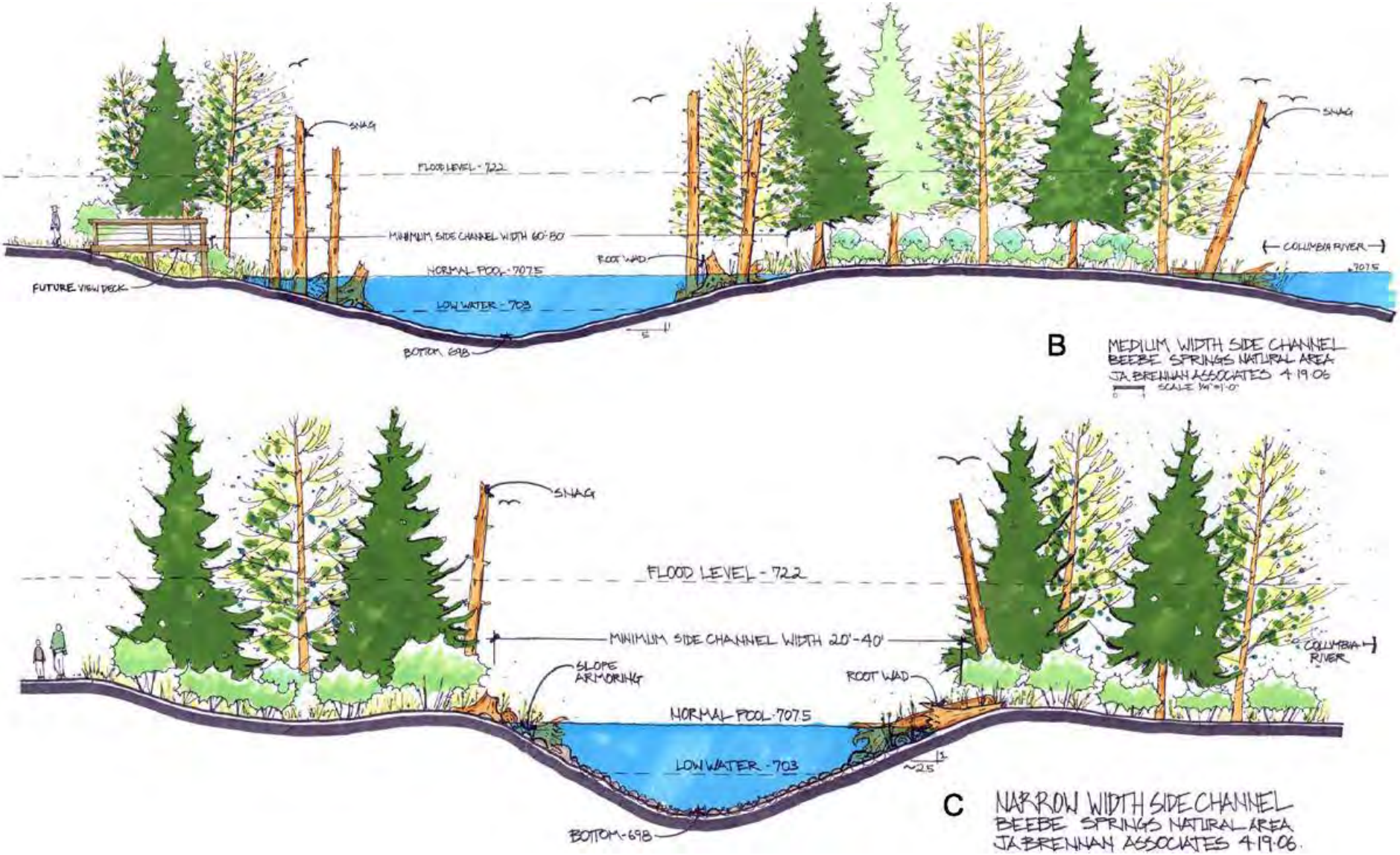
Article continued

Planting Party Phase 1

RESTORATION GOALS & TARGETED HABITATS

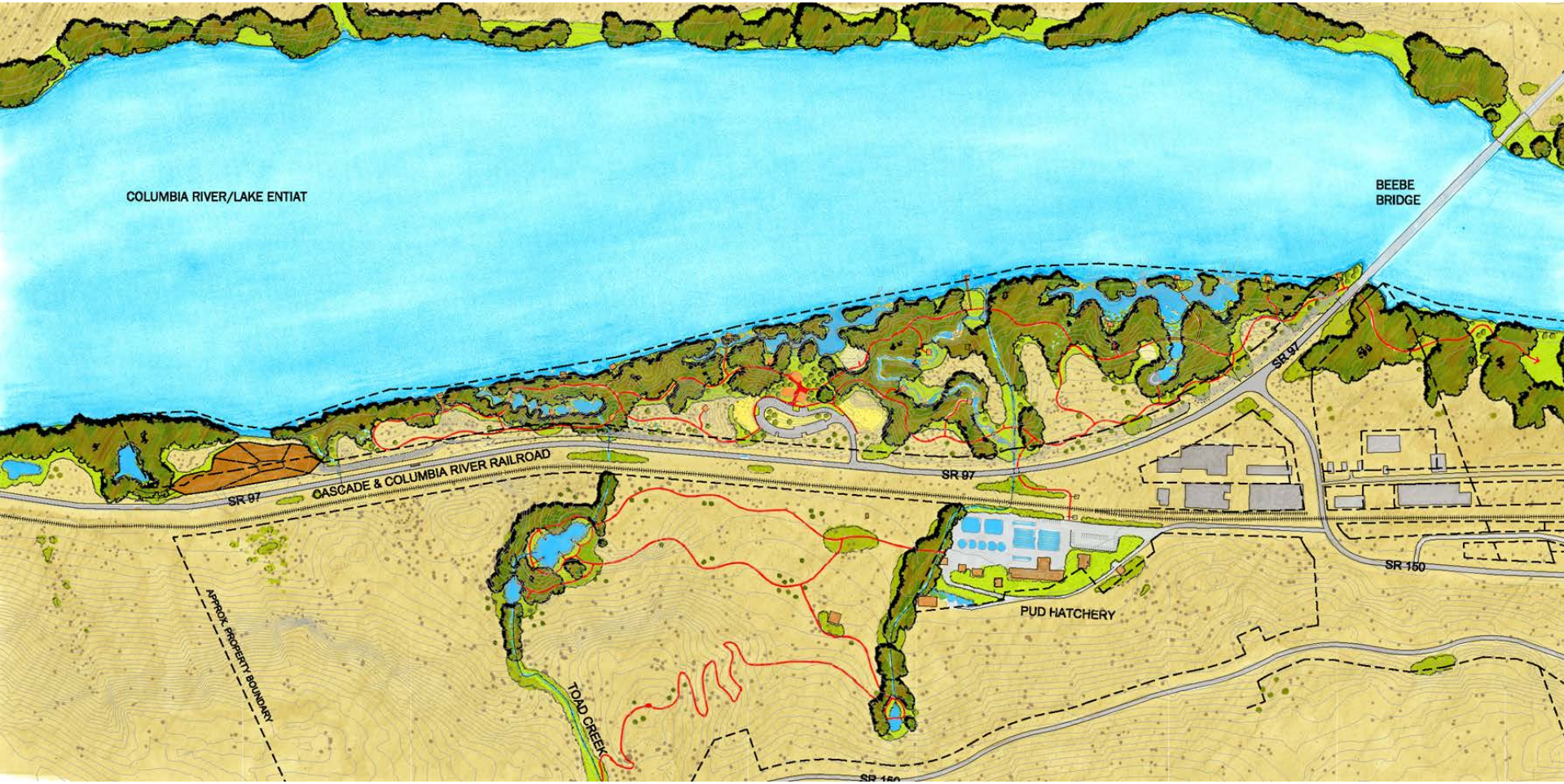
ECOLOGICAL DESIGN




SNAG
FLOOD LEVEL - 722
MINIMUM SIDE CHANNEL WIDTH 60'-80'
NORMAL POOL - 707.5
LOW WATER - 703
BOTTOM 698
FUTURE VIEW DECK
ROOT WAD
COLUMBIA RIVER
707.5
B
MEDIUM WIDTH SIDE CHANNEL
BEEBE SPRINGS NATURAL AREA
JA BRENNAN ASSOCIATES 4.19.06
SCALE 1/4"=1'-0"
SNAG
FLOOD LEVEL - 722
MINIMUM SIDE CHANNEL WIDTH 20'-40'
SLOPE ARMORING
NORMAL POOL 707.5
LOW WATER - 703
BOTTOM - 698
ROOT WAD
COLUMBIA RIVER
~25'
C
NARROW WIDTH SIDE CHANNEL
BEEBE SPRINGS NATURAL AREA
JA BRENNAN ASSOCIATES 4.19.06

ACCESS & PASSIVE RECREATION DESIGN

Master Plan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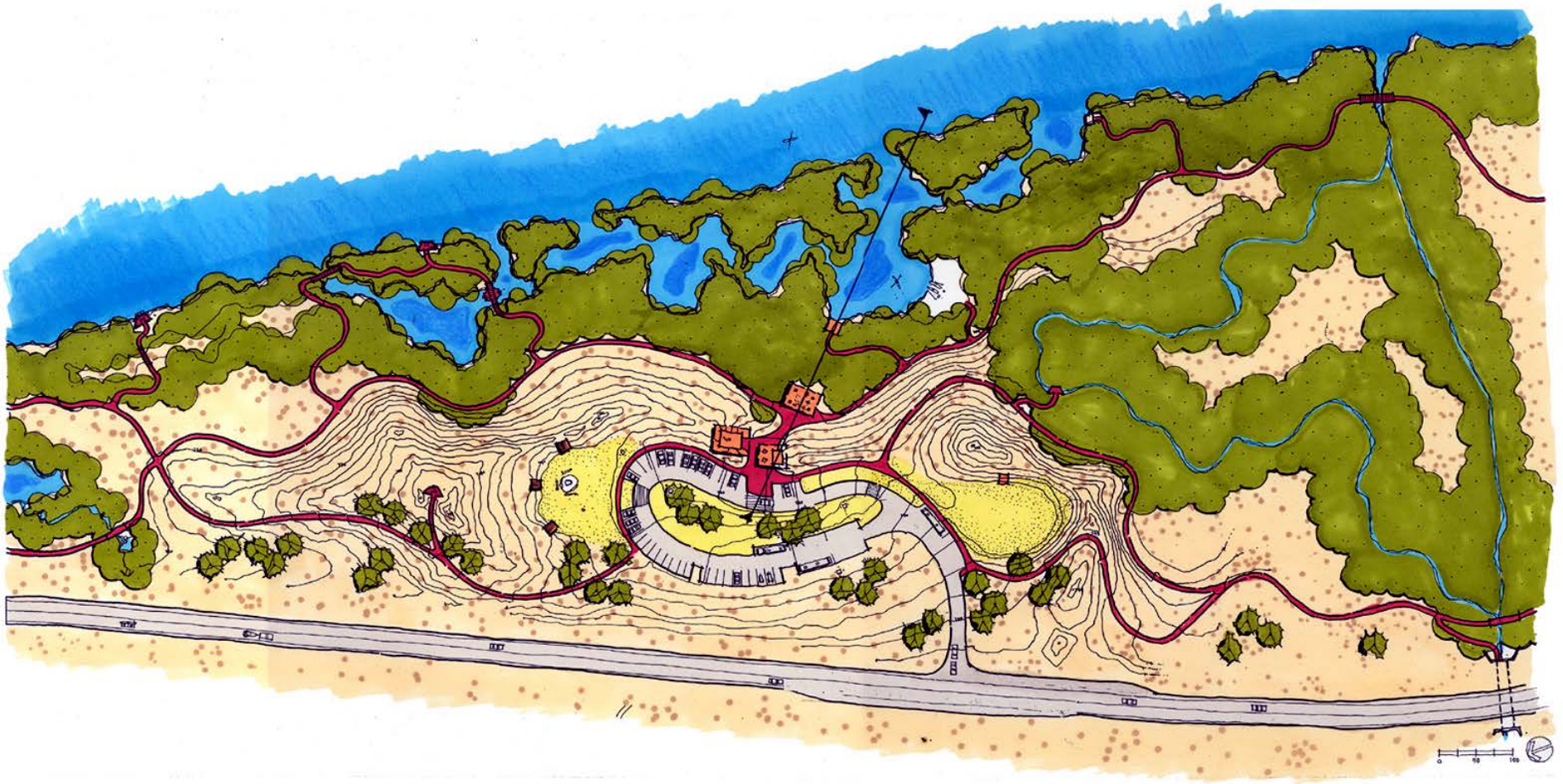
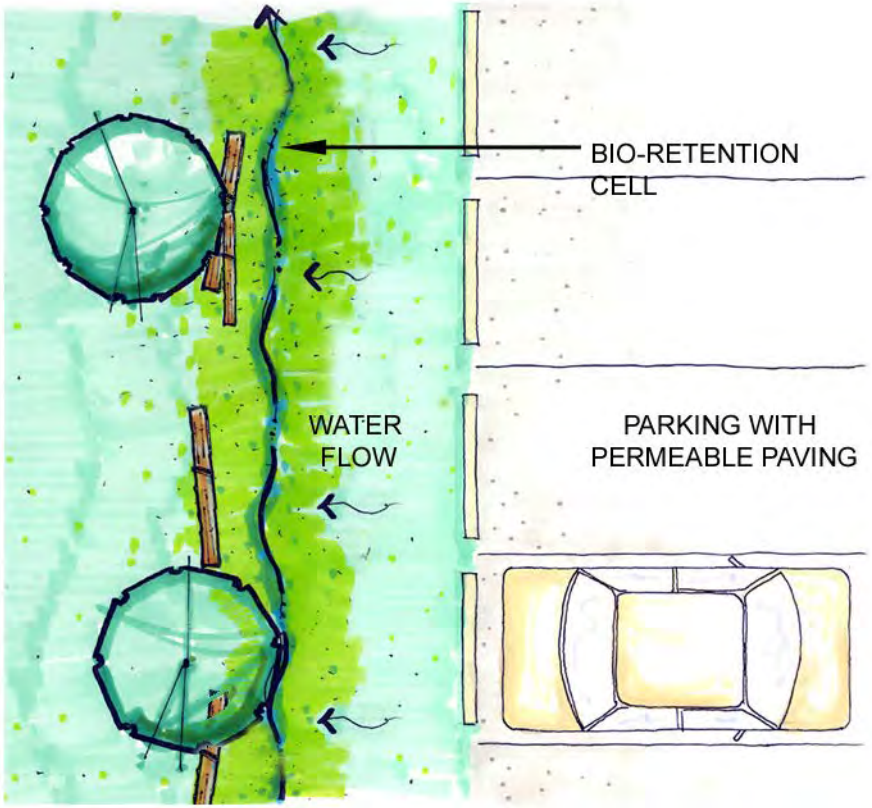
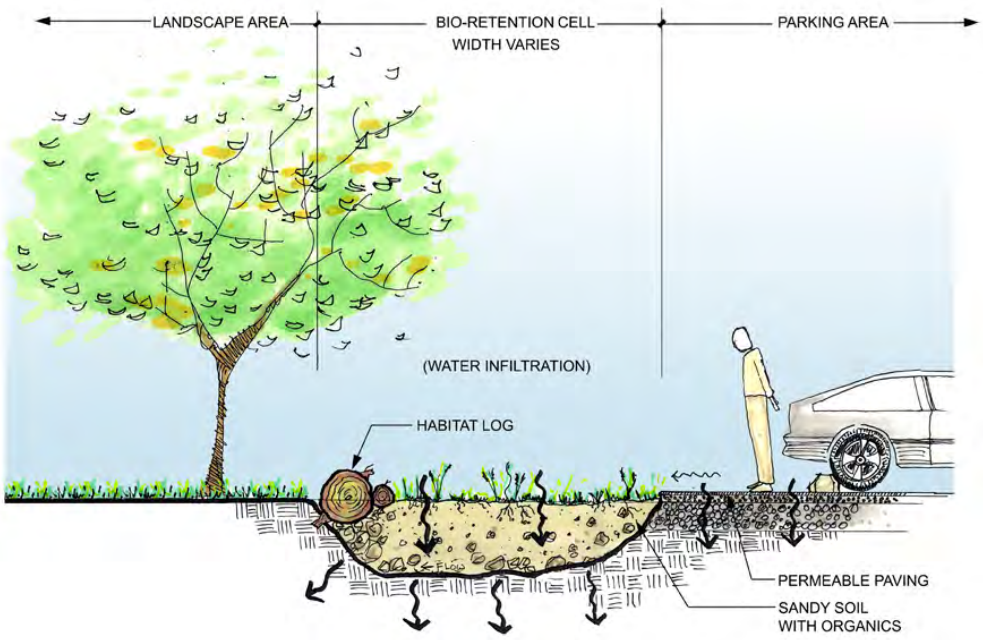
Beebe Springs Natural Area Master Plan



Project Design and Viability: Sustainable Design



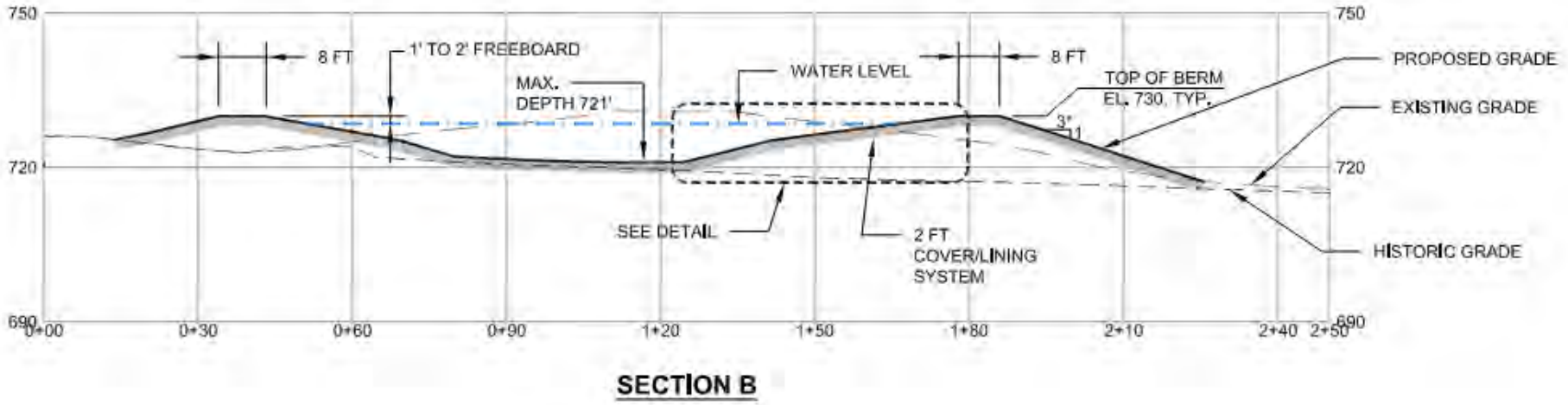


Fishing Pond Design

Fishing Pond Design: 30% Design Alternative 1 - One Pond Outlet Channel

Fishing Pond Design

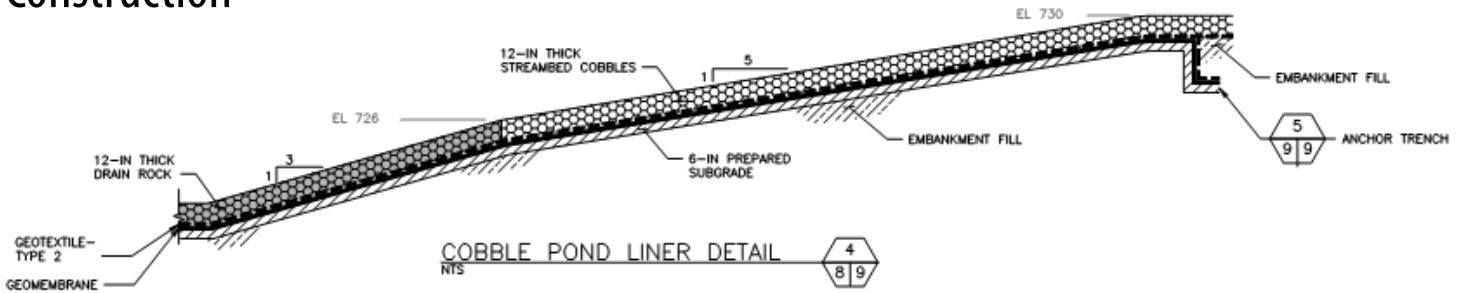
- Conceptual Design Challenges with Cultural Resources



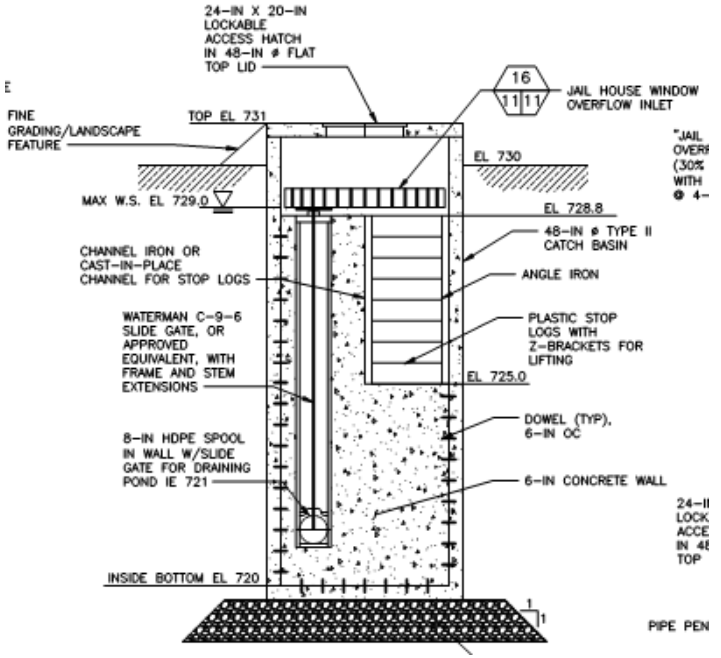
SECTION B

Fishing Pond Design

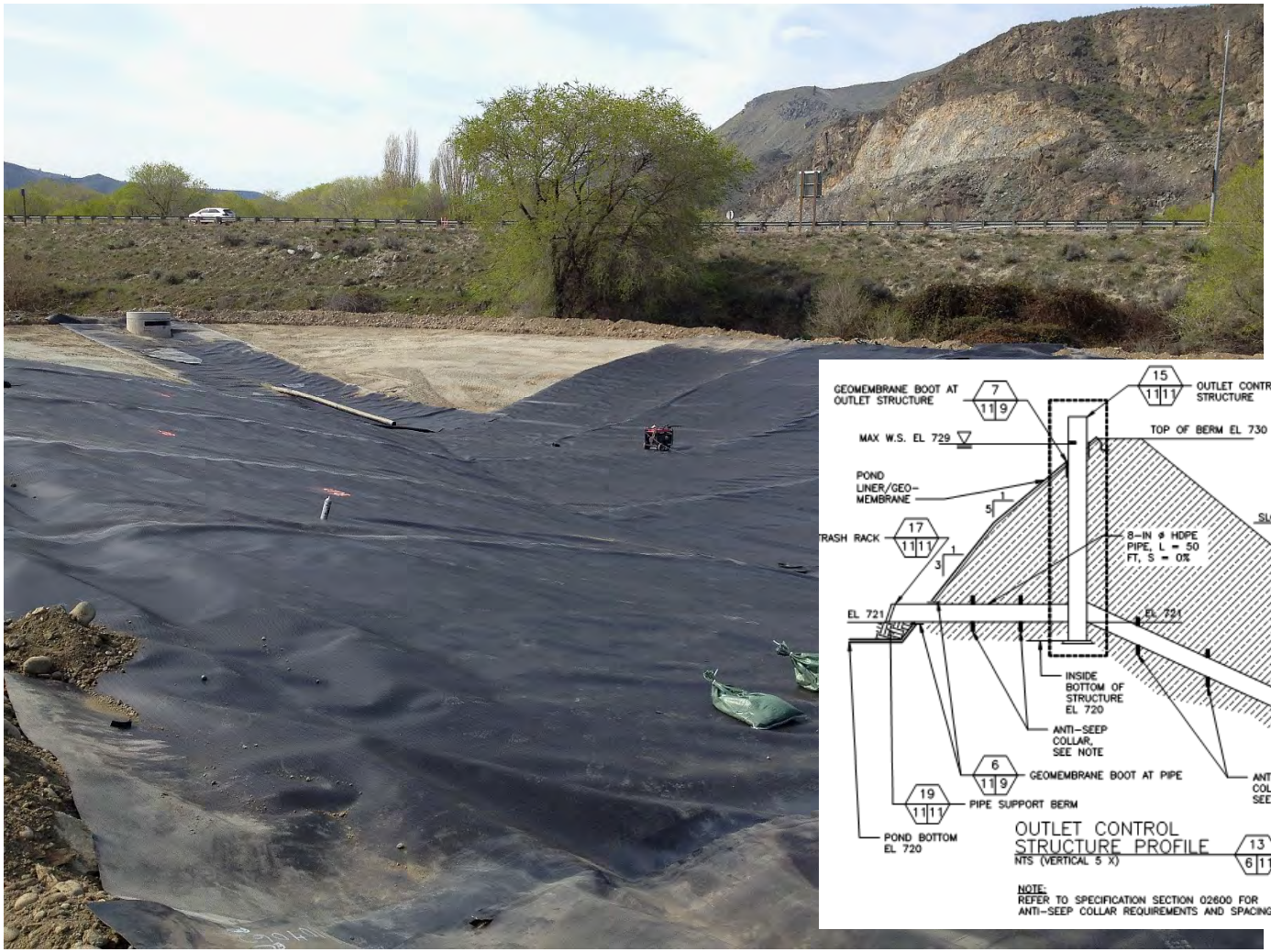
- Final Design and Construction

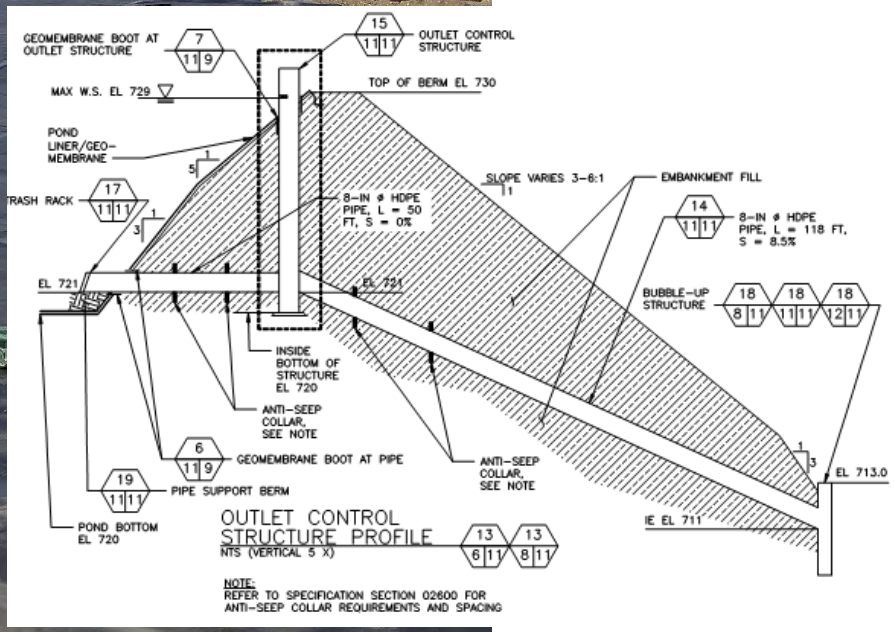


Fishing Pond Design: Construction – Outlet Structure



Fishing Pond Design: Construction – Outlet Structure

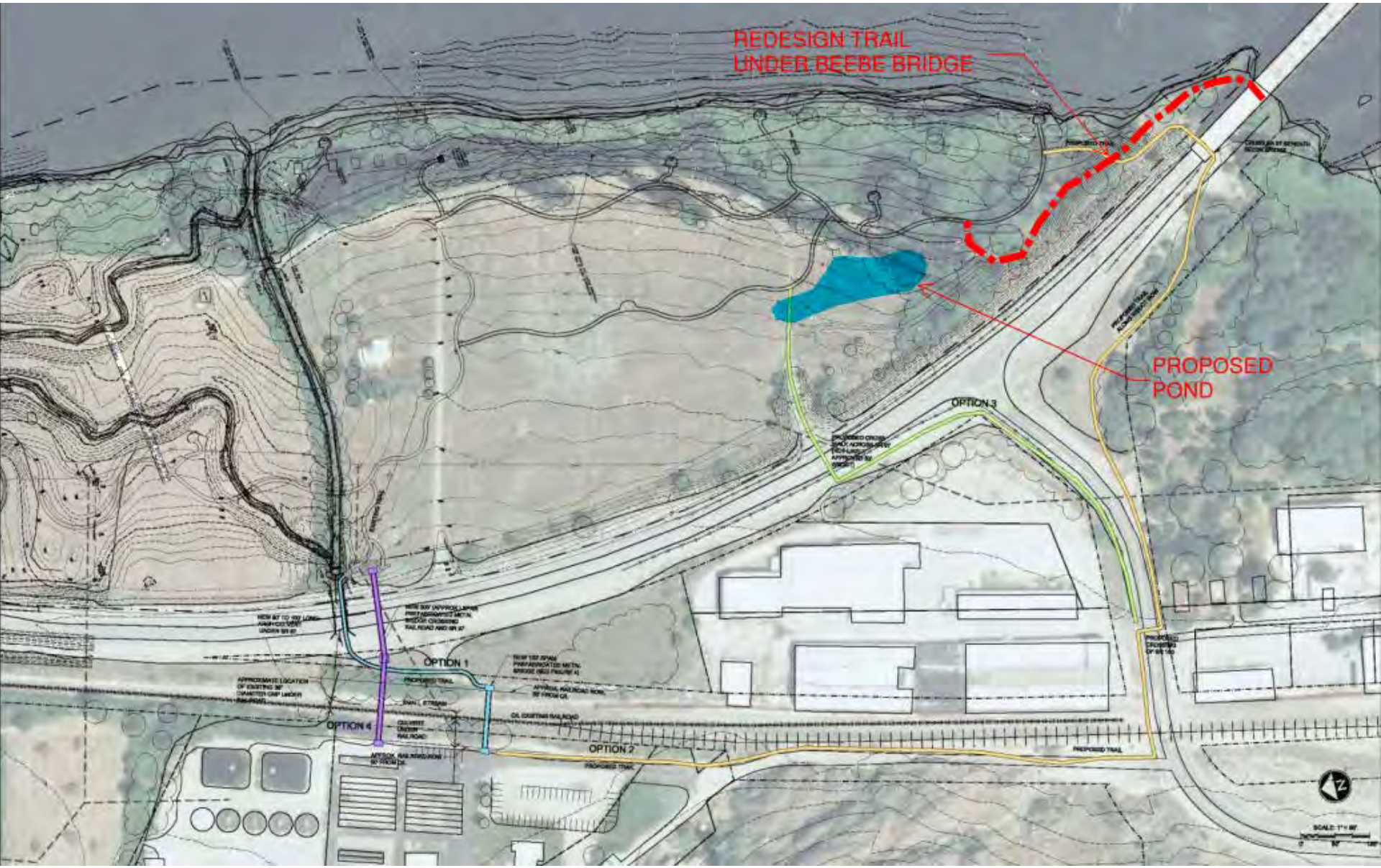




Fishing Pond Design: Ribbon Cutting/Opening Day

Fishing Pond Design: Ribbon Cutting/Opening Day

Fishing Pond Design



Access – Crossing SR97

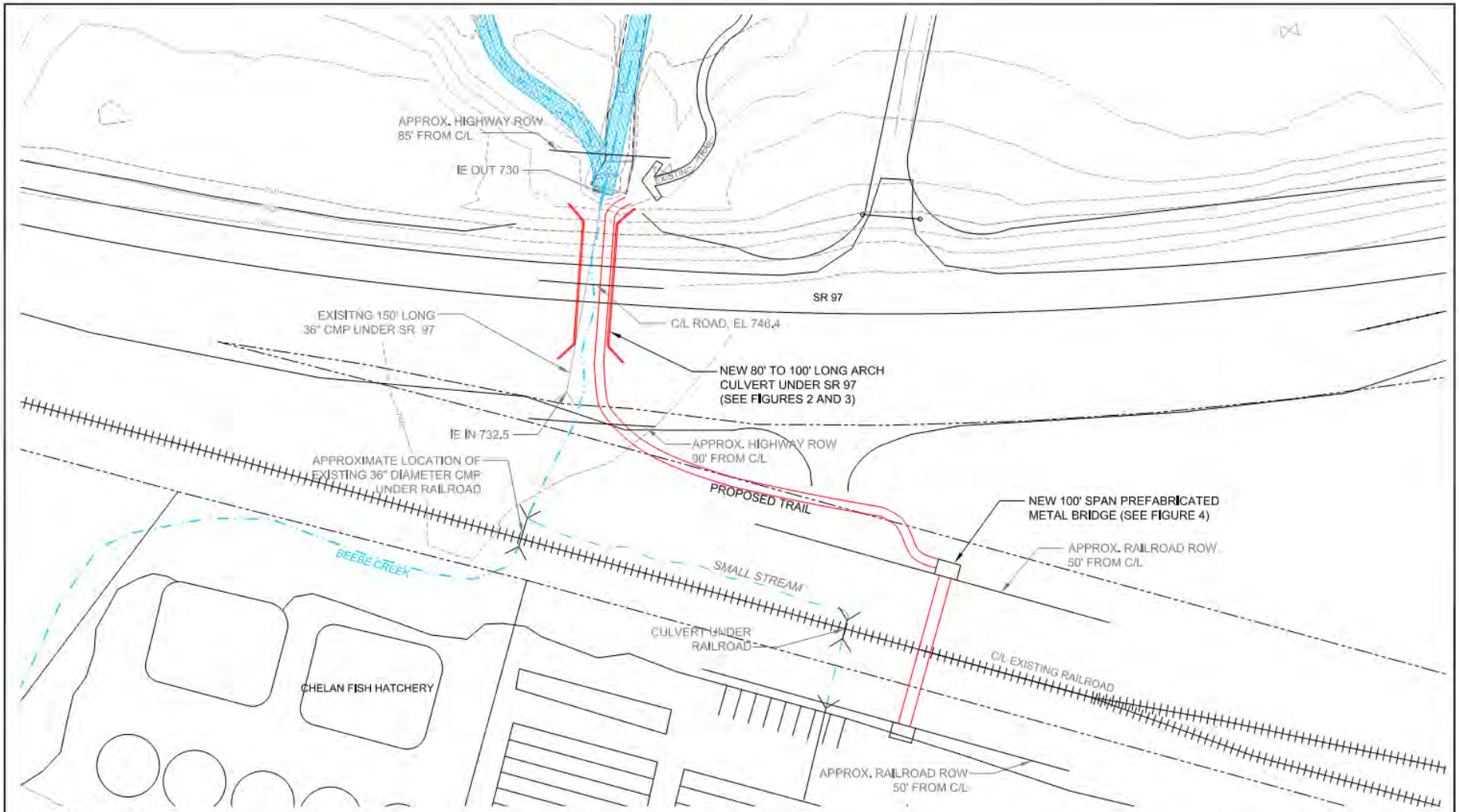


FIGURE 1
HIGHWAY AND RAILROAD CROSSING PLAN VIEW

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE JUNE 2011

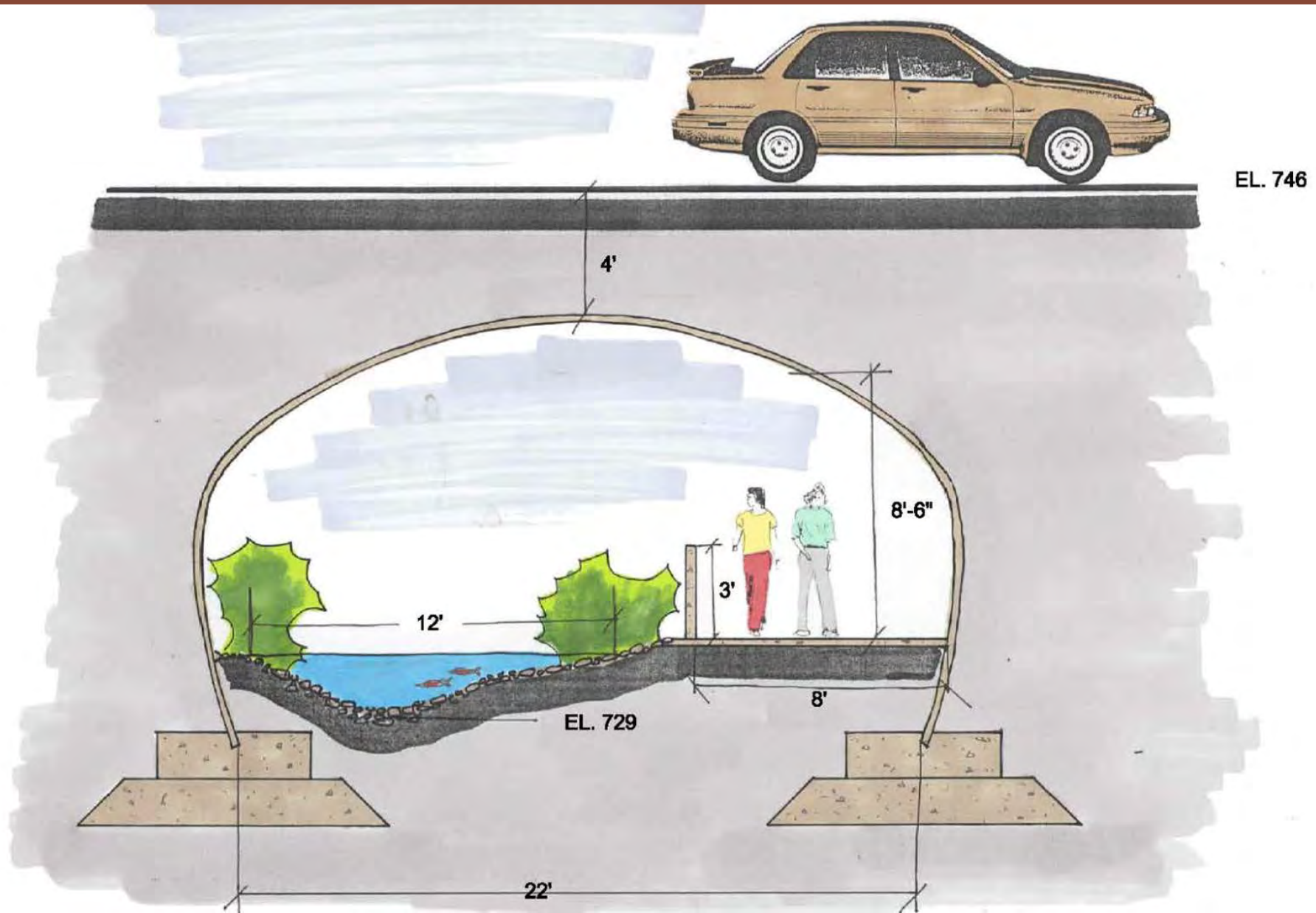
BEEBE SPRINGS NATURAL AREA

j.a. brennan associates, PLLC
In association with
URS Corporation
MAKERS Architecture and Urban Design
CASCADE Interpretive Consulting

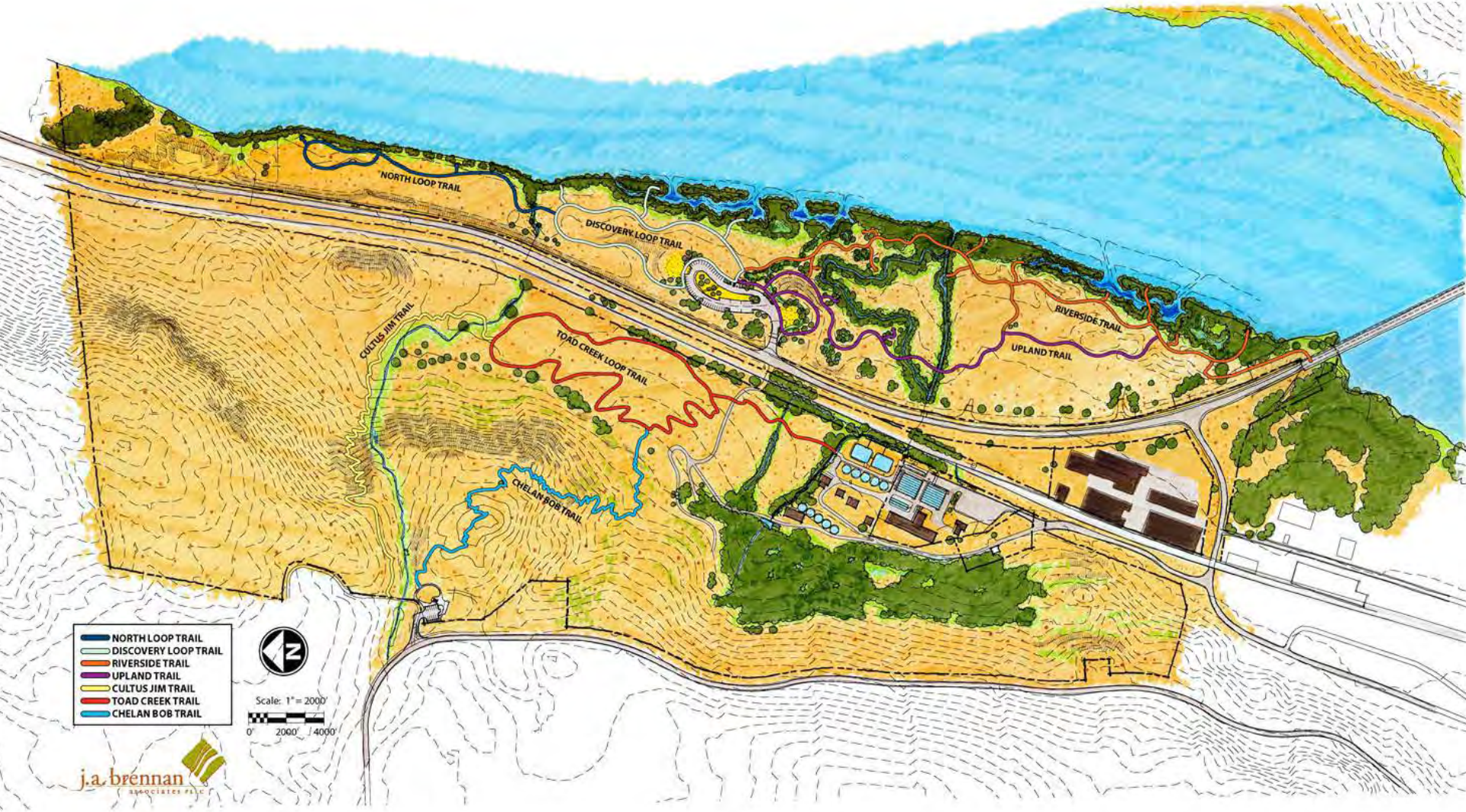
0 30 60
SCALE IN FEET

P:\ACAD\PROJECT\Beebe Springs\Phase4\Tech Memo\Figure 1 Culvert - Plan View.dwg

Hwy 97 Crossing



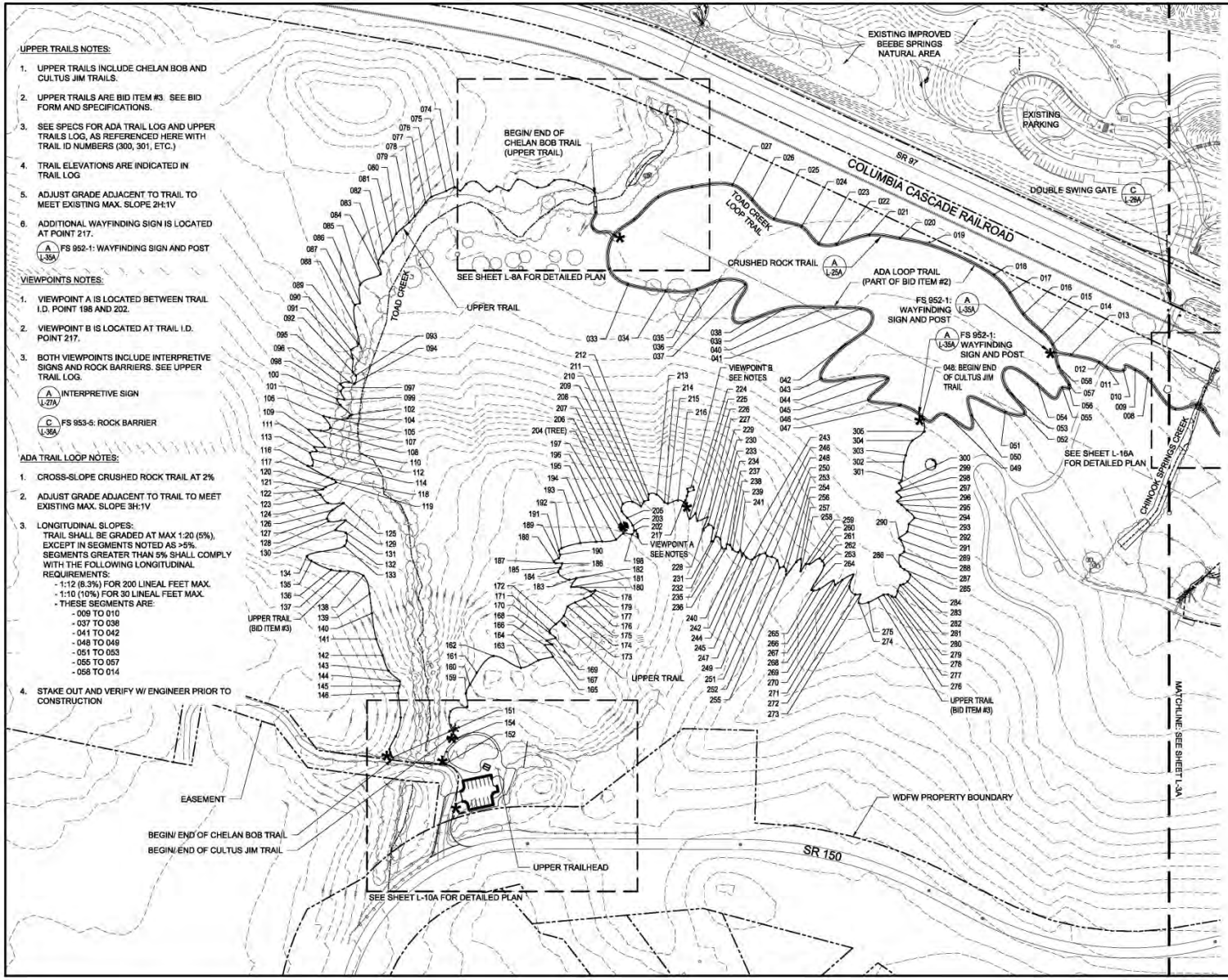
TRAILS OF DISCOVERY


NORTH LOOP TRAIL
DISCOVERY LOOP TRAIL
CULTUS JIM TRAIL
TOAD CREEK LOOP TRAIL
CHELAN BOB TRAIL
RIVERSIDE TRAIL
UPLAND TRAIL
NORTH LOOP TRAIL
DISCOVERY LOOP TRAIL
RIVERSIDE TRAIL
UPLAND TRAIL
CULTUS JIM TRAIL
TOAD CREEK TRAIL
CHELAN BOB TRAIL
Scale: 1" = 2000'
0' 2000' 4000'
j.a. brennan
associates PLLC


Beebe Springs Natural Area
Beebe Bridge
potential connection across Highway 97
Chelan Falls
97
R.R.
Fish Hatchery
potential loop and viewpoint
Alternative 1: Toad Creek route
Alternative 2: Mountainside Traverse Segment
1200
150
Alternative 1: Ridge Route
potential trail head
Alternative Route: Powerline Corridor
to Chelan
to Deer Mountain and


Layered Approach
tall trees
mid level
tall and low shrubs
meadow
Time + Growth
= Successional change
Soil development
Weed control
views / aesthetics
food, water, shelter
Rock
Path Alignment
Marsh
Maximize Watchable wildlife opportunities
Transition through Edges
Meadow habitat
Maximize ecotone layered edge
Brush piles, logs
snags
edge mowing
Edge Viewpoint


Alternative 2:
Mountainside Traverse
Segment



>>>>CAUTION<<<<
CALL BEFORE YOU DIG!
NOT LESS THAN TWO OR MORE THAN TEN BUSINESS DAYS PRIOR TO COMMENCING EXCAVATION OR DEMOLITION, SECURE THE SERVICES OF A COMMERCIAL UNDERGROUND UTILITIES LOCATOR SERVICE TO IDENTIFY BELOW-GROUND IMPROVEMENTS THAT MAY NOT BE INDICATED ON THE DRAWINGS.
>>800 424 5555<<

PROJECT: BEEBE SPRINGS NATURAL AREA

TITLE: PHASE 4A LAYOUT PLAN: NORTH

j.a. brennan
GEOTECHNICS PLLC
100 S King Street, Suite 200
Seattle, WA 98104
t. 206.583.0620 f.206.583.0623
www.jabrennan.com

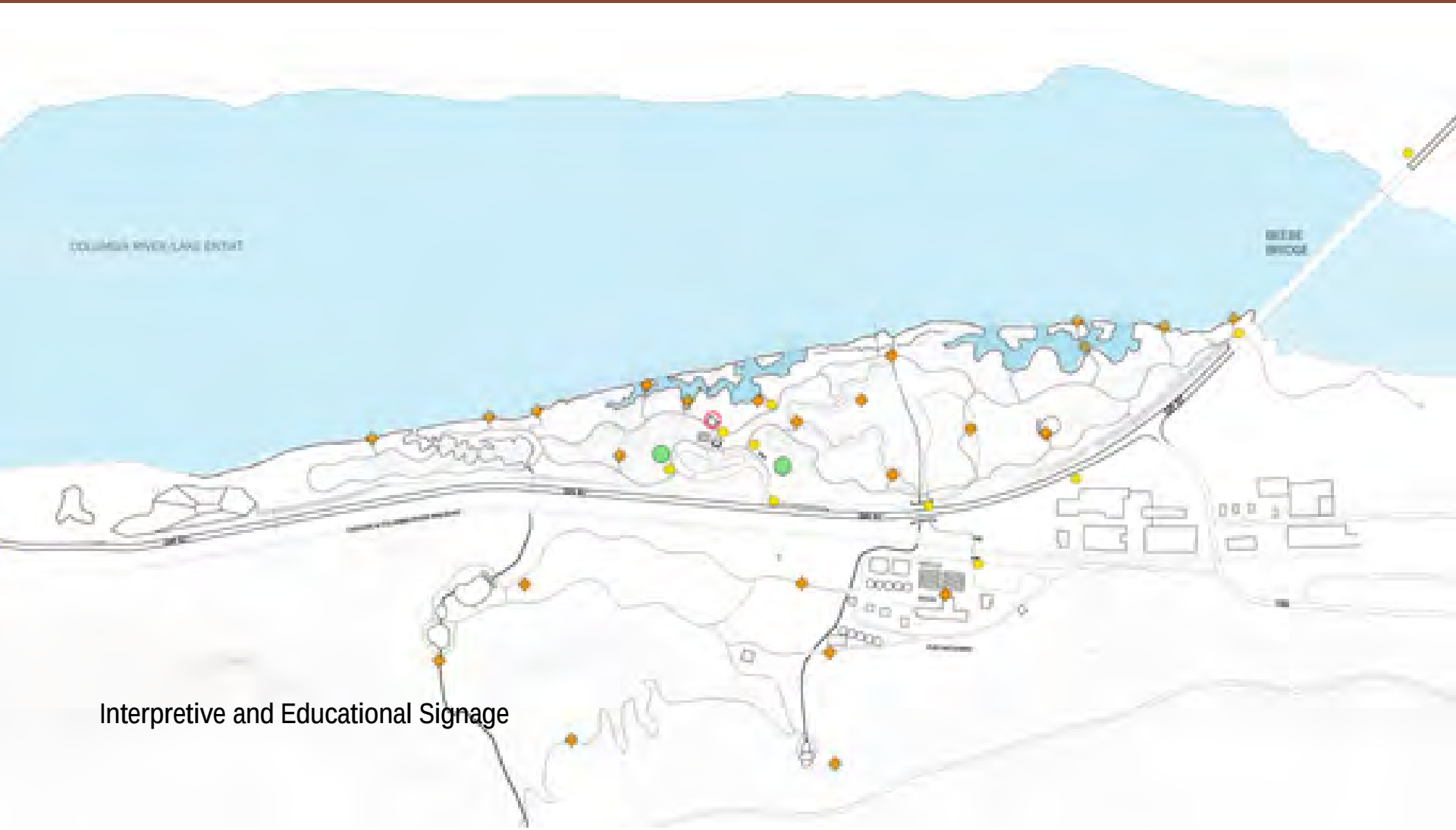
REVISION:

DATE:	DESCRIPTION:

SCALE: 1" = 100'
DATE: JUNE 19, 2012
DRAWN BY: MJ, KM
DESIGNED BY: JB, TW, MP
APPROVED BY:
CAD FILE NO.

SHEET NO. L-4A
4 OF 40 SHEETS

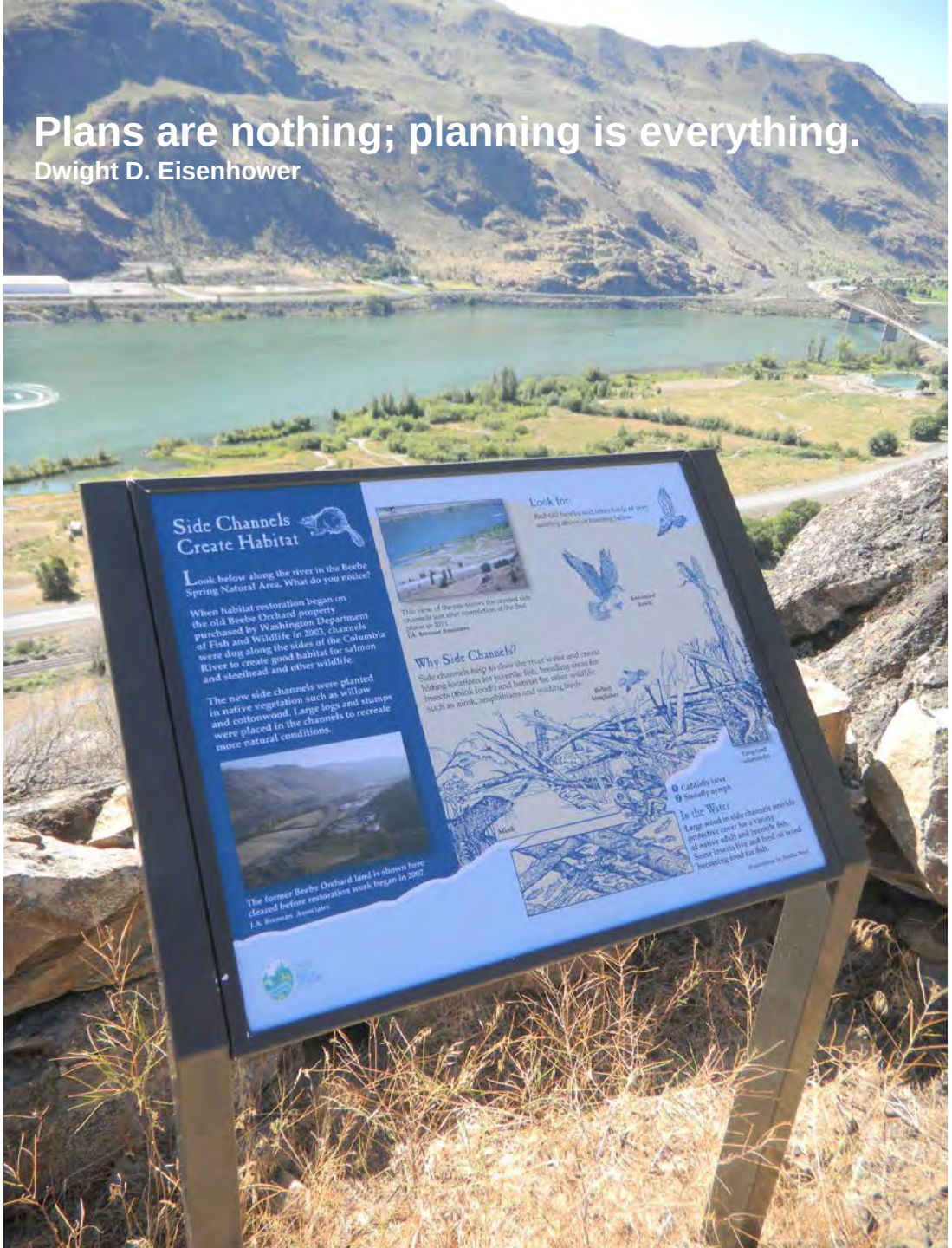
Site Design: Interpretation



Interpretive and Educational Signage

Visitor Experience

Site Design: Interpretation



Plans are nothing; planning is everything.

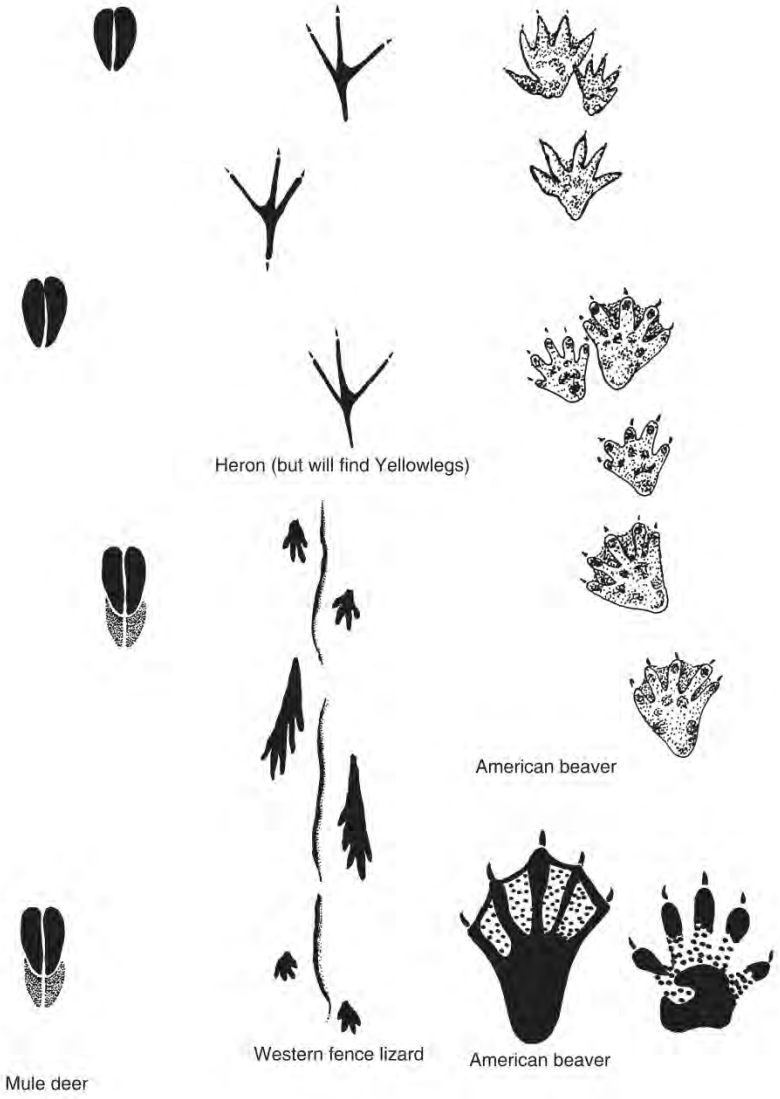
Dwight D. Eisenhower


The Origins of Beebe Springs
On Saturday December 14, 1872, the earth rumbled and rolled in this area when a magnitude 7.4 earthquake centered nearby caused large landslides, fissures (open holes) and a huge geyser.
"At what is now Chelan Station a great hole opened in the earth and a geyser was blown into the air 20 or 30 feet high. For weeks Indians came from all over the country to watch this geyser. It continued all winter, but got weaker and weaker until by summer it was just a spring now used to irrigate Beebe orchard."
Source: Wenatchee World
One massive landslide, at Ribbon Cliff (between Entiat and Winesap), blocked the Columbia River for several hours. Landslides were reported throughout the Cascades. The earthquake was reported throughout the U.S. Pacific Northwest and Canada.
The quake is credited to bringing underground springs to the surface and forming Beebe Springs that brought life to the land, nourished apple orchards and is now providing water for fish and other wildlife.
The "geyser" referred to in the quote to the left was actually artesian groundwater forced to the surface by the earthquake. It became an important source of water for locals and the future Beebe Orchard.
Illustration by Sandra Noel
Winter Waterfalls
Water from Beebe Springs seeps over the cliffs here in winter and freezes when temperatures drop creating a beautiful curtain of ice.
In summer – using this image, can you find the cliffs that form this ice curtain?
Waterfall of ice
J.A. Brennan Associates
Ribbon Cliffs
J.A. Brennan Associates
Erratics on Ridge
J.A. Brennan Associates
Rocks on the Ridge
Look directly across the Columbia River from this viewpoint and you will see several large boulders. Known as erratics, these rocks were carried by glacial ice to the Waterville Plateau and deposited. Erratics provide a place for birds of prey to perch and hunt.
Those Ice Age Floods
When large Northwest continental ice sheets shrunk 15,000 years ago, massive melt waters originating from ice-damned Glacial Lake Missoula (350 miles east) moved rapidly along the Columbia River gouging and scouring rock in its pathway. For more information about the Ice Age Floods, visit:
Ice Dam
Glacial Lake Missoula
Areas swept by floods
Glacial Lake Missoula floods
Illustration by Sandra Noel


Living a Seasonal Life

Tracks

- Yellowlegs
- Mule deer
- Western fence lizard
- American beaver

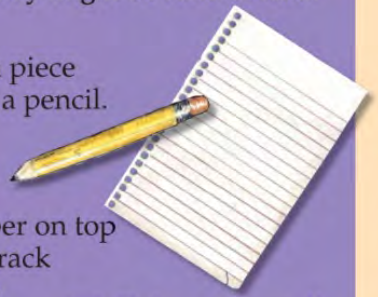


Can You Find These Tracks?

Be a nature detective and look for these replica tracks along the trail.

Look carefully — they might be hard to find!

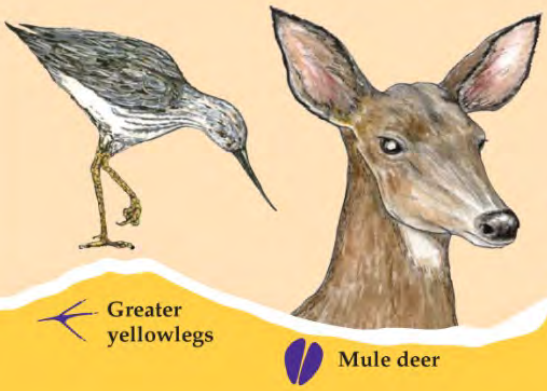
1. Bring along a piece of paper and a pencil.



2. Place the paper on top of the stone track

3. Rub your pencil over the paper.

4. Look what you've created!



Greater yellowlegs

Mule deer

American Beaver

Western fence lizard

Tools for Nature Detectives

Sketchbook or notebook – make a drawing of what you find

Camera – take a picture of what you see

Field Guide – look up what you find

While looking for stone tracks, keep your eyes open for real tracks that other animals have created.

Washington Watchable Wildlife

Washington Department of Fish and Wildlife

Stories in the Landscape

Before you lies a mighty river – the great Columbia River, draining over half of Oregon and Washington, nearly all of Idaho and much of southern British Columbia. But what did it look like here millions of years ago?

For 11 million years, volcanoes spewed great flows of lava over these lands stressed by uplifting and sinking. Our last Ice Age followed for 2 million years with a large continental ice sheet advancing and retreating across the northern United States and Canada.

At times, ice dams formed and blocked water flow creating Glacial Lake Missoula to the east. Over thousands of years, the ice dam would break and flood waters swept all the way to the Pacific Ocean altering the river course while carving, gouging and depositing soil and rock. The landscape you see today across eastern Washington and the Chelan Wildlife Area - Beebe Springs Unit is a result of these massive floods.

Locate metal sculptures on-site of Native women with digging sticks shown here.

Camas in bloom
Photo courtesy of www.paulnoll.com

Camas bulbs are dug in spring, peeled, cleaned, and eaten fresh or dried and ground into a flour. Illustration by S. Noel

Living on the Land

Native Americans lived along the river, including here at the Beebe Springs Unit, for more than 10,000 years establishing trails that connected to routes over the Cascade Mountains. Other travelers (fur traders, miners, prospectors, missionaries and settlers) used these trails. By 1860, pioneer settlement had begun on the shores of nearby Lake Chelan.

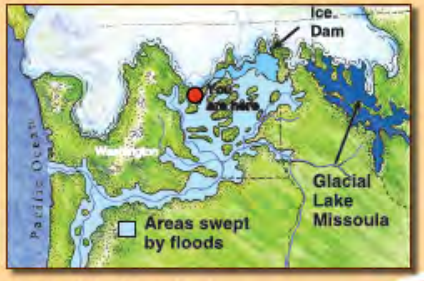
Spend Some Time

Explore beyond the parking lot – take a short stroll on a trail. Come back later and hike along the river here on the lowlands. Or hike the steeper trails across the road to the west which rewards you with spectacular views of the Columbia River and a flood-carved landscape.

Discover carved track replicas along the trail.
Photo courtesy of jabrennan.com

Look for more sculptures on site by Colville Artist, Smoker Marchand.

Area covered by layers of basalt over geologic time.



Extent of the Glacial Lake Missouula floods.

Want to Learn More?

Check out these Resources:

- Ice Age Floods Institute www.iafi.org
- The Confederated Tribes of the Colville Reservation www.colvilletribes.com
- Chelan Museum www.chelanmuseum.com

Timeline

Volcanic Activity
11 million years BP (before Present)

Look for exposed basalt rock formations called, 'Colonnades' formed as the basalt lava slowly cooled.

Ice Age
2 million years BP

Glacial Lake Missoula's floods scoured the landscape, creating the Channeled Scablands.

Last Glaciation Period ends 16,600 BP

Melting glacial ice and water polished this bedrock on site.

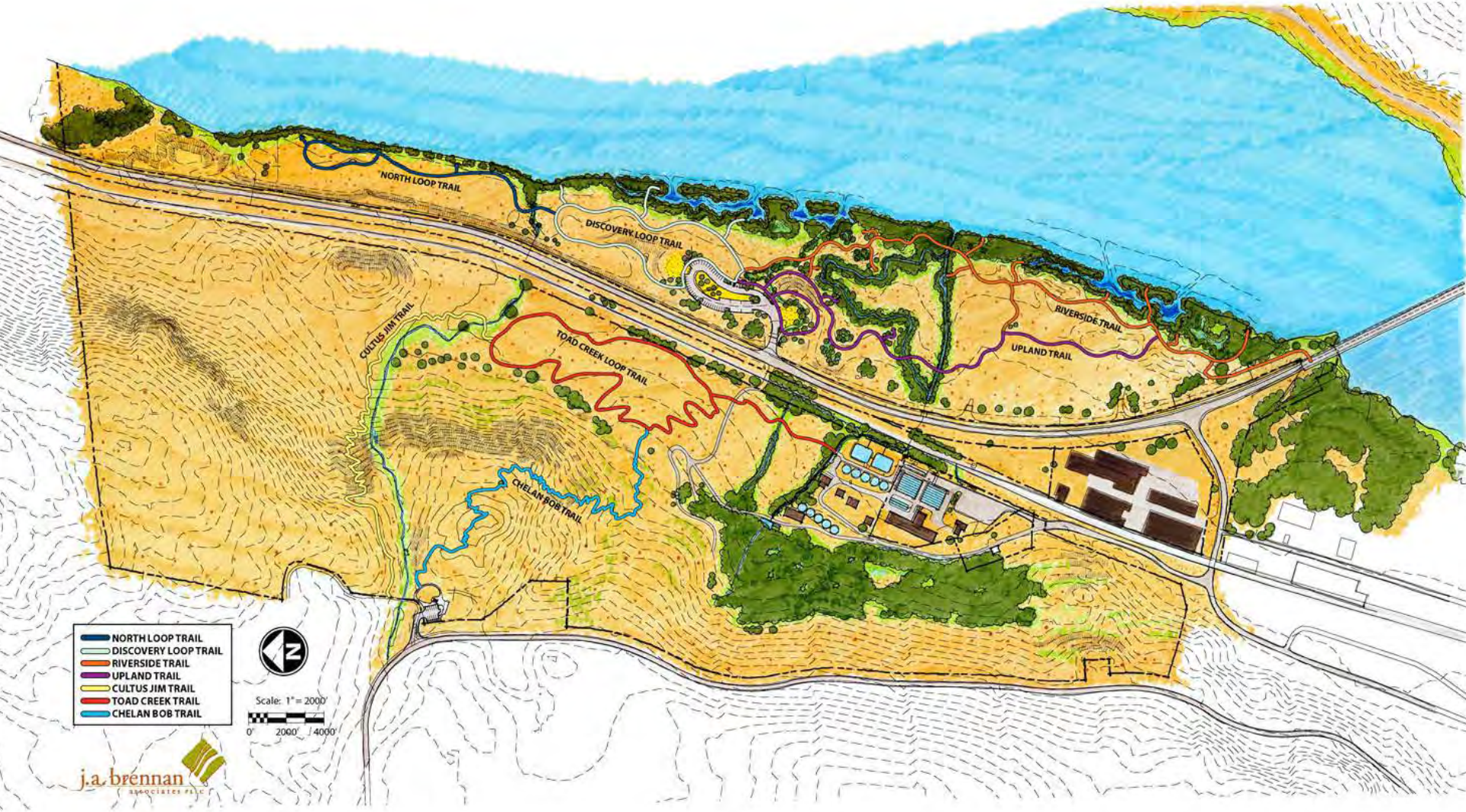
The First Humans arrive in the area 10-12,000 BP

Illustrations of early stone tools: scraper and pestle.
Illustrations by S. Noel

Euro-American 1860 settlements near lake Chelan

11 million years to present day

OPPORTUNITIES, CHALLENGES, & LESSONS LEARNED

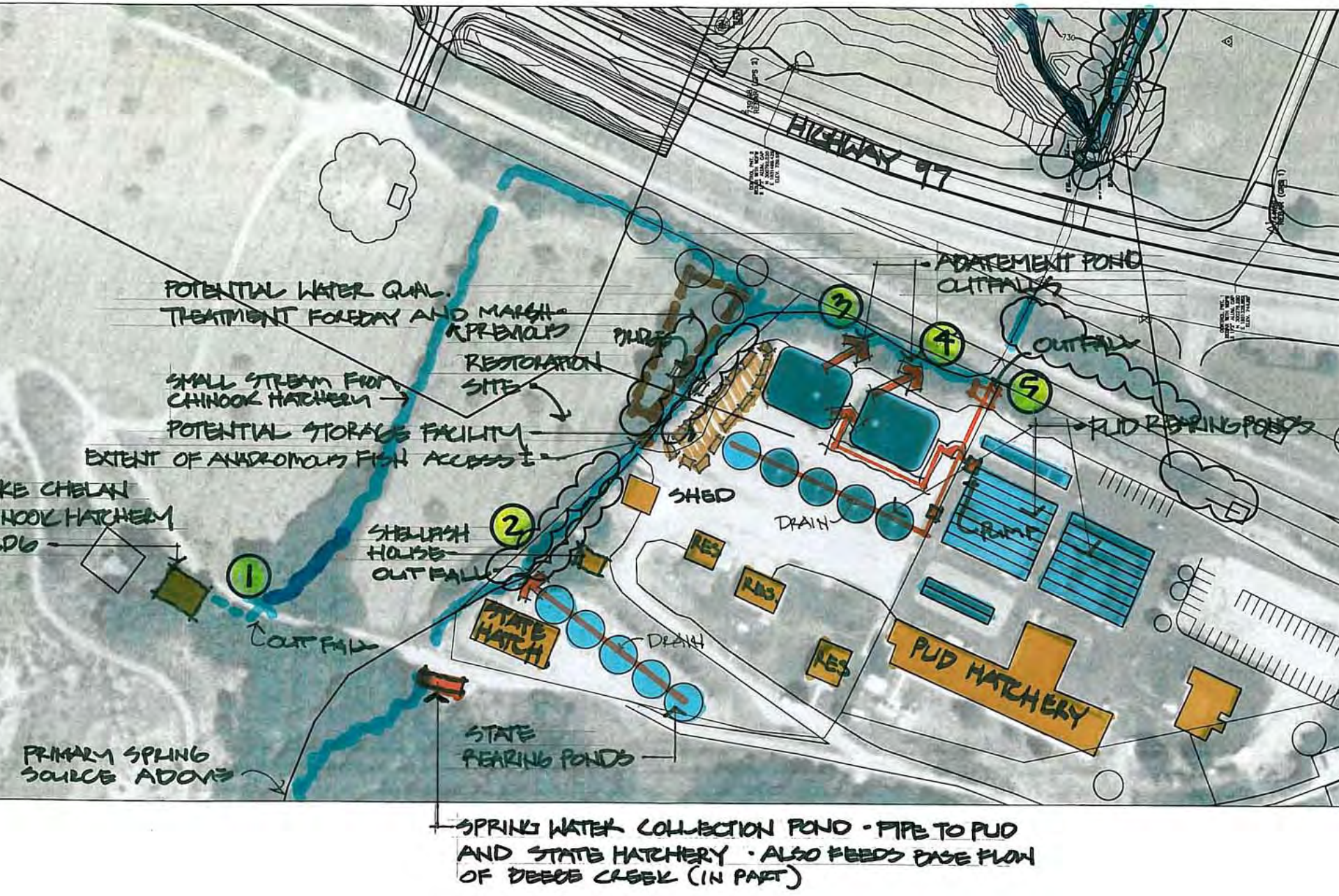

NORTH LOOP TRAIL
DISCOVERY LOOP TRAIL
CULTUS JIM TRAIL
TOAD CREEK LOOP TRAIL
CHELAN BOB TRAIL
RIVERSIDE TRAIL
UPLAND TRAIL
NORTH LOOP TRAIL
DISCOVERY LOOP TRAIL
RIVERSIDE TRAIL
UPLAND TRAIL
CULTUS JIM TRAIL
TOAD CREEK TRAIL
CHELAN BOB TRAIL
Scale: 1" = 2000'
0' 2000' 4000'
j.a. brennan
associates PLLC

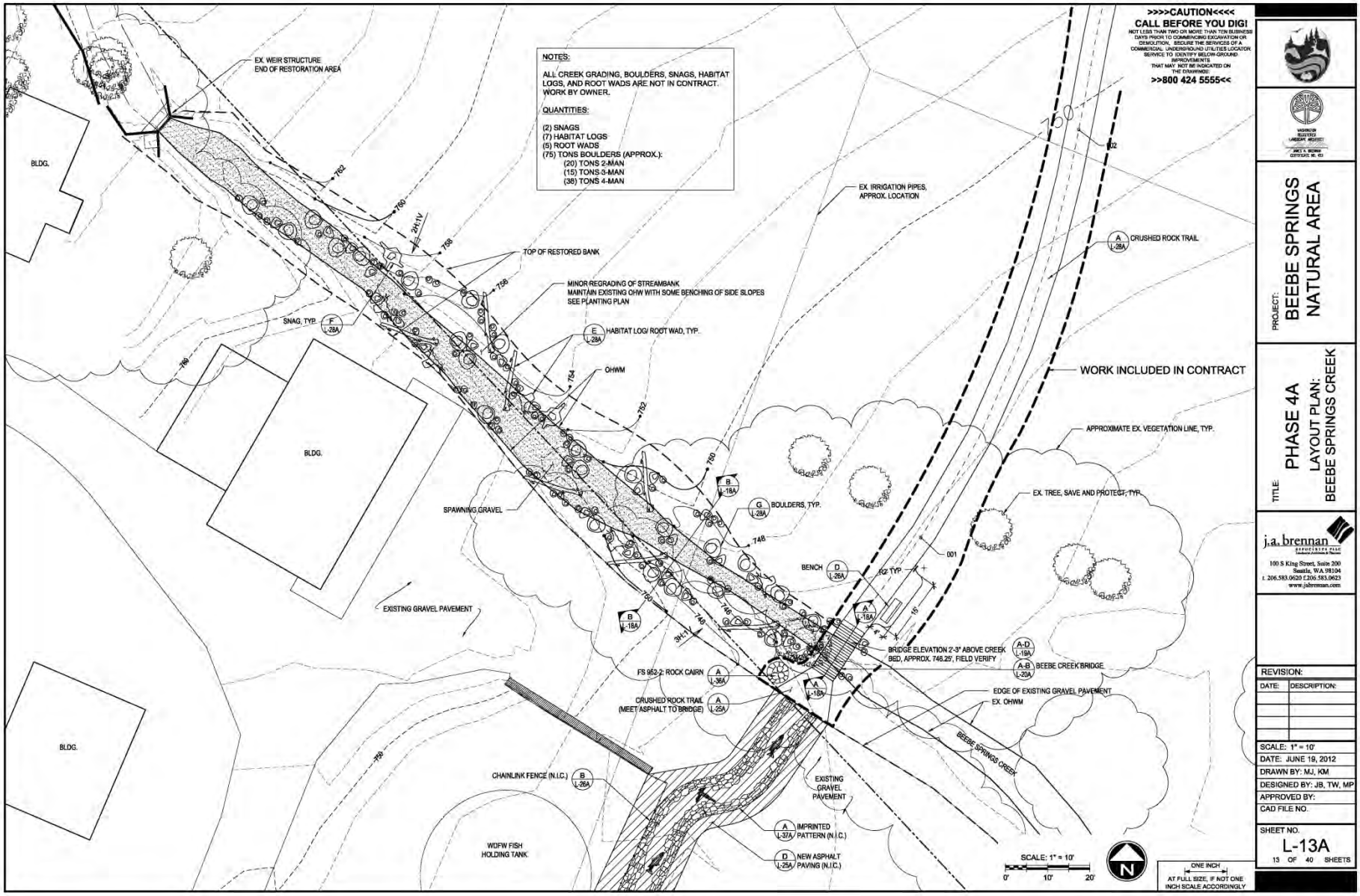
Phase 5 – Trail Connections

Hwy 97 Crossing

Flood Damage Repair

Flood Damage Repair


HIGHWAY 97
POTENTIAL WATER QUAL. TREATMENT FOREBAY AND MARSH
RIPARIAN RESTORATION SITE
SMALL STREAM FROM CHINOOK HATCHERY
POTENTIAL STORAGE FACILITY
EXTENT OF ANADROMOUS FISH ACCESS
ABATEMENT POND OUTFALLS
OUTFALL
PUD REARING PONDS
SHED
DRAIN
PUMP
SHELLFISH HOUSE OUTFALL
OUTFALL
STATE HATCH
DRAIN
PUD HATCHERY
STATE REARING PONDS
PRIMARY SPRING SOURCE ABOVE
SPRING WATER COLLECTION POND - PIPE TO PUD AND STATE HATCHERY - ALSO FEEDS BASE FLOW OF DEEP CREEK (IN PART)



PROJECT: BEEBE SPRINGS NATURAL AREA

TITLE: PHASE 4A LAYOUT PLAN: BEEBE SPRINGS CREEK

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REVISION:

DATE:	DESCRIPTION:

SCALE: 1" = 10'
DATE: JUNE 19, 2012
DRAWN BY: MJ, KM
DESIGNED BY: JB, TW, MP
APPROVED BY:
CAD FILE NO.

SHEET NO. L-13A
13 OF 40 SHEETS