



May 5, 2023

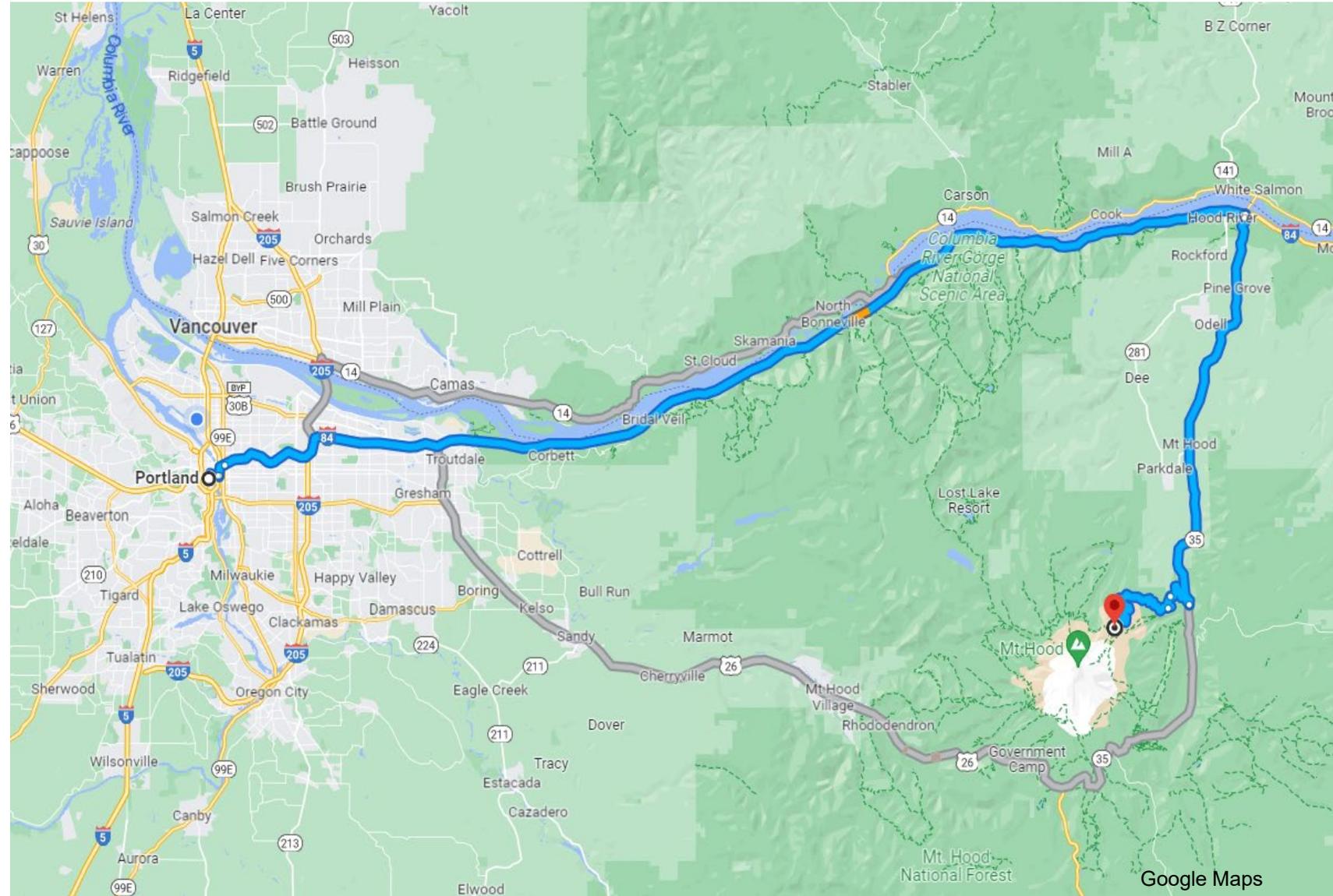
Evaluation and Improvements Design of the Cloud Cap Inn Water System Mt Hood, Oregon

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Agenda/Outline

- History – Mt Hood Area
- History – Water System
- Project Purpose
- Project Timeline
- Evaluation and Design

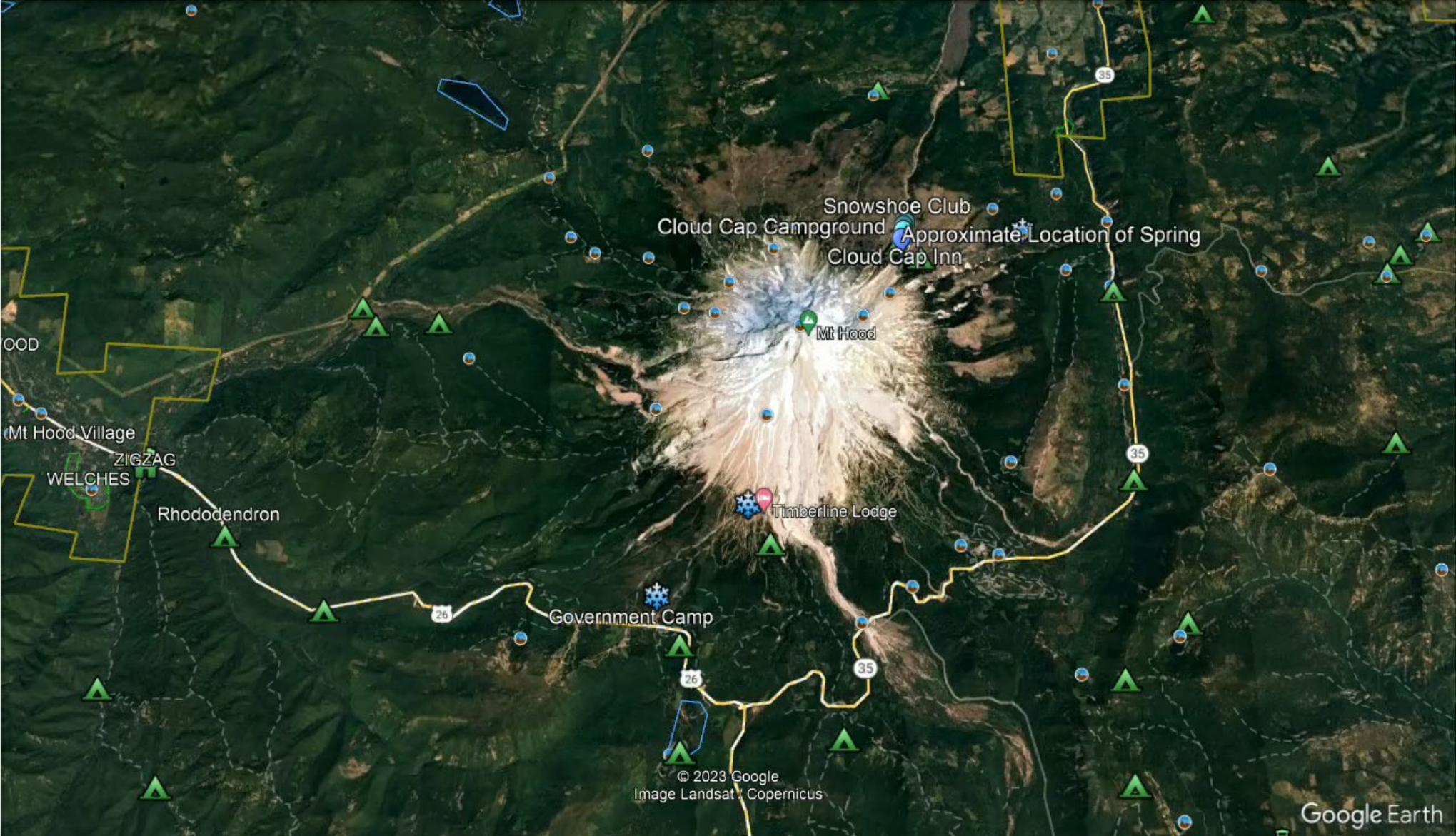


History – Water Service Customers

- Cloud Cap Inn
 - 1889 – Established
 - 1940 – Forest Service
- Crag Rats 1954 – Present
 - Oldest Search and Rescue organization in America
- Snowshoe Club Cabin
 - 1910 – Privately owned and operated
- Cloud Cap Saddle Campground
 - 3 single sites
 - Access to Tilly Jane North and Trail #600

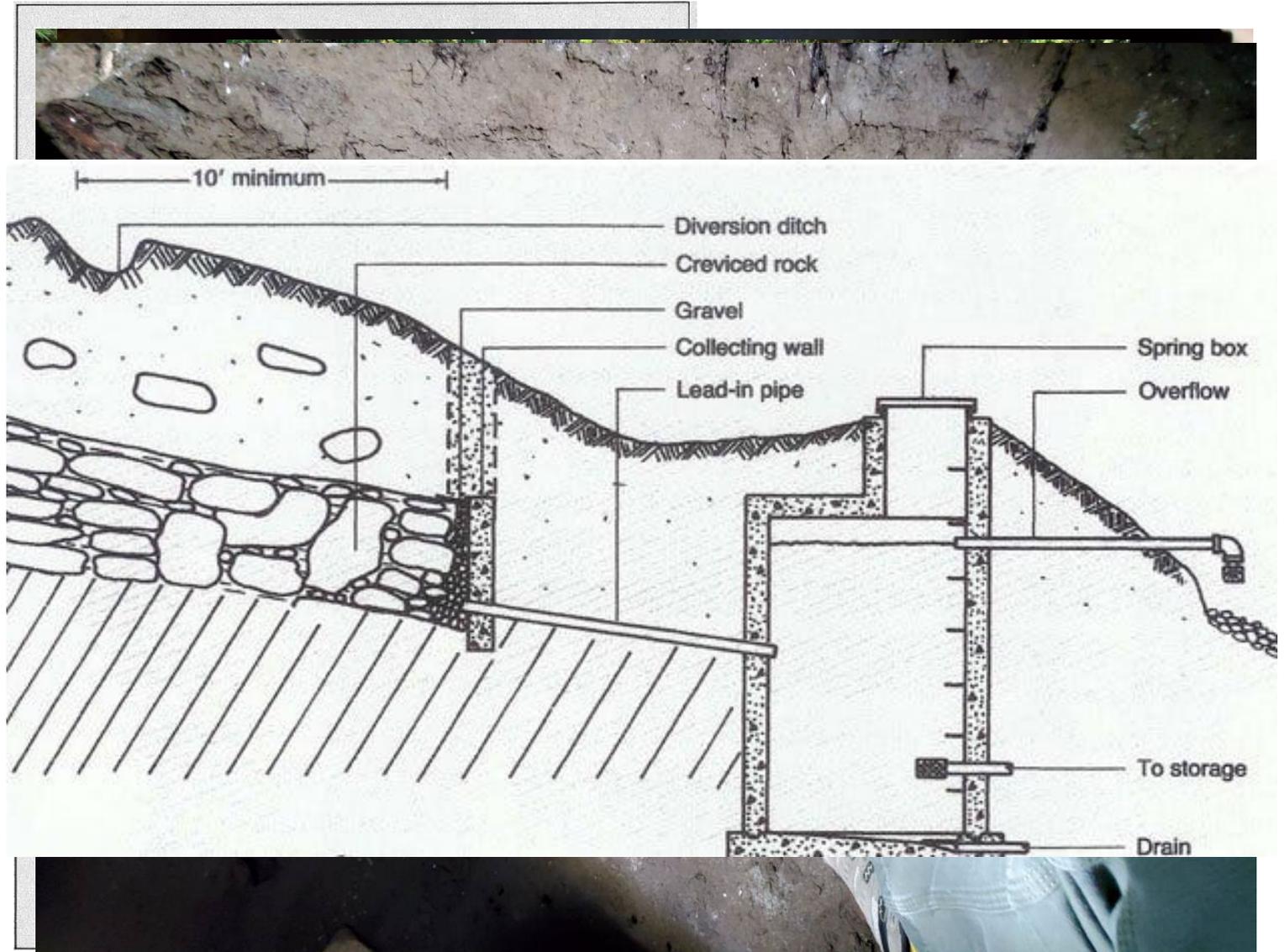


History – Water System



History – Water System

- Water right filed and developed in 1926
- Spring – Water emerges naturally
- Location, design and protection
- Transmission main

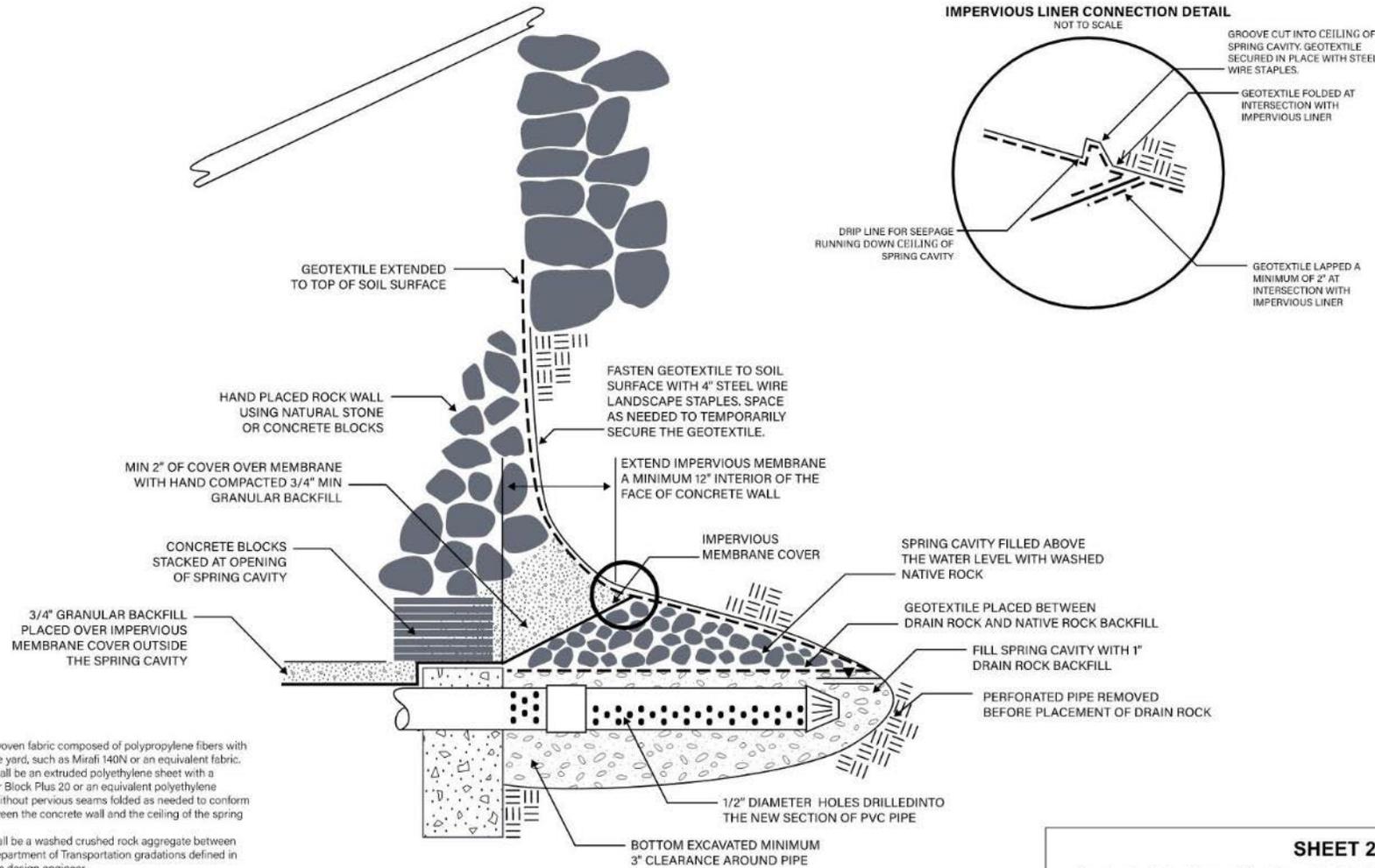


Project Purpose and Timeline

- Aging infrastructure
- Positive coliform sample in 2017
- Loss of water 2017 – Dry Summer
- Low water pressure at Cloud Cap Inn
- Bratslavsky Consulting Engineers, BCE - Consor (Murraysmith) 2019

- Groundwater Solutions Inc., GSI - Repairs to Spring October 2019
- Engineering Report – January 2020
- Conceptual Design – December 2020
- Final Design – March 2022

Evaluation and Design



NOTES:

1. The GEOTEXTILE FABRIC shall be non-woven fabric composed of polypropylene fibers with a minimum weight of 4.5 ounces per square yard, such as Mirafit 140N or an equivalent fabric.
2. The IMPERVIOUS MEMBRANE cover shall be an extruded polyethylene sheet with a nominal thickness of 20 mils, such as Vapor Block Plus 20 or an equivalent polyethylene sheeting. The cover will be a single sheet without previous seams folded as needed to conform to the spring cavity and cover the gap between the concrete wall and the ceiling of the spring cavity as shown on Sheet 3.
3. The 1-INCH DRAIN ROCK BACKFILL shall be a washed crushed rock aggregate between 3/4" and 1 1/2" in size conforming to Oregon Department of Transportation gradations defined in Specification 0043011 or as approved by the design engineer.
4. The 3/4-INCH MINUS GRANULAR BACKFILL shall be crushed angular rock aggregate conforming with Oregon Department of Transportation gradations defined in Specification 02630 or as approved by the design engineer.
5. Prior to placement of the geotextile, drain rock backfill, and impervious membrane in the spring cavity, implement disinfection of these materials in accordance with Oregon Health Authority Drinking Water Services disinfection details. Take care to prevent disinfection water from running into established surface water drainages. The spring water distribution system will need disinfection after completion of the work in accordance with Oregon Health Authority Drinking Water Services disinfection details.

SHEET 2

Spring Intake Cross Section, As-Built
Cloud Cap Spring Intake

0 10
1-INCH = 10 INCHES



Evaluation and Design

Alternatives Analysis - Source

1. Rebuild spring source (do nothing)
 - Repairs by Crag Rats and Snow Shoe Club in October 2019
2. Redevelop spring source
3. Construct a new well

Alternatives Analysis - Distribution

1. Apply for OHA pressure variance at Cloud Cap Inn
2. Construct pump house to boost pressure
3. Reconstruct distribution system

Evaluation and Design

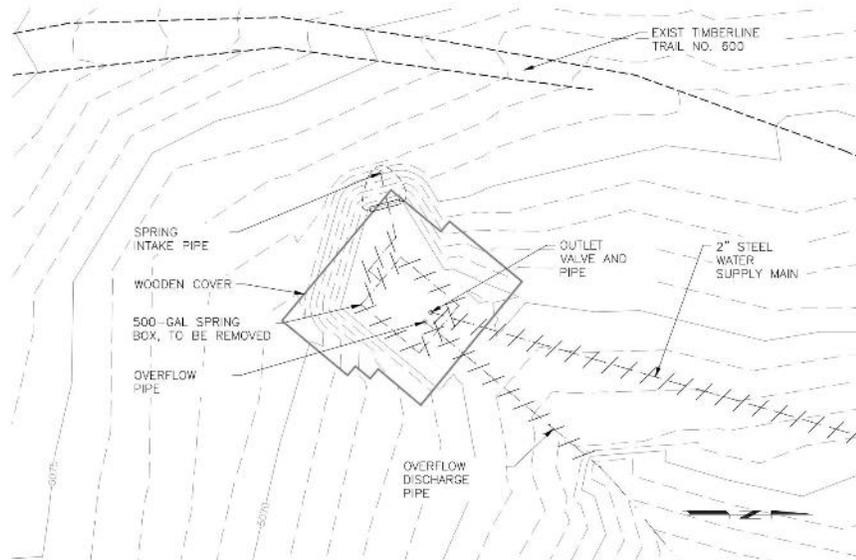
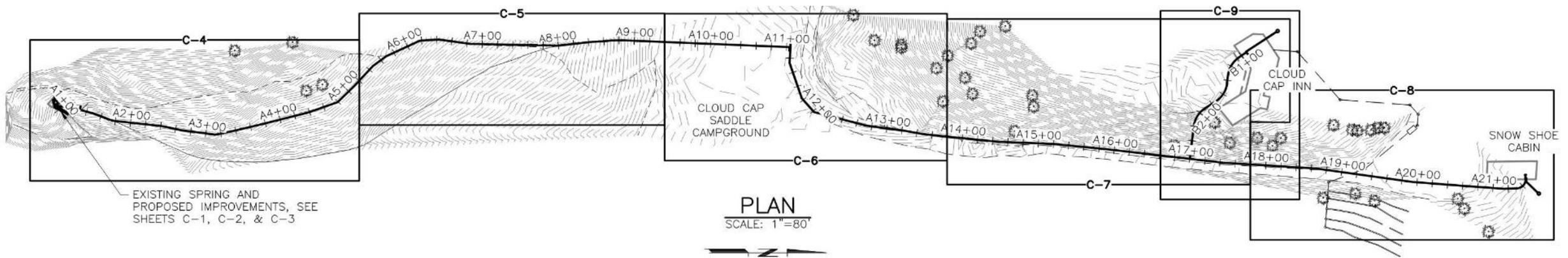
Comparative Cost Analysis*

| Alternative | Initial Capital Cost | 30-Year Life Cycle Cost | Present Worth Cost |
|---|----------------------|-------------------------|--------------------|
| Alternative 1 – Rebuild Spring Source | \$0.00 | \$101,958.66 | \$27,222.96 |
| Alternative 2 – Redevelop Spring System | \$75,000.00 | \$176,958.66 | \$47,247.96 |
| Alternative 3 – Construct a Well | \$422,000.00 | \$599,147.30 | \$159,972.34 |
| Alternative D1 – Apply for Variance** | \$1,500.00 | \$103,458.66 | \$27,623.46 |
| Alternative D2 – Construct a Pumpouse | \$60,000.00 | \$236,063.18 | \$63,028.87 |
| Alternative D3 – Reconstruct Distribution | \$110,000.00 | \$198,061.76 | \$52,882.49 |

* 30-year life cycle cost and present worth analysis calculation based upon an average construction cost index of 4.5%

** Design variance requires annual updates and reporting

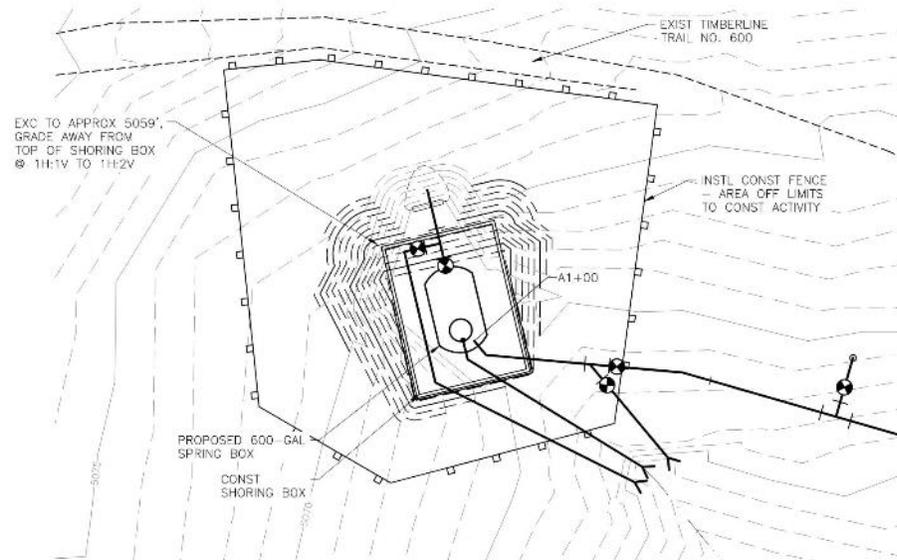
Final Design



EXISTING CONDITIONS AND DEMOLITION PLAN

SCALE: 3/16"=1'-0"

1

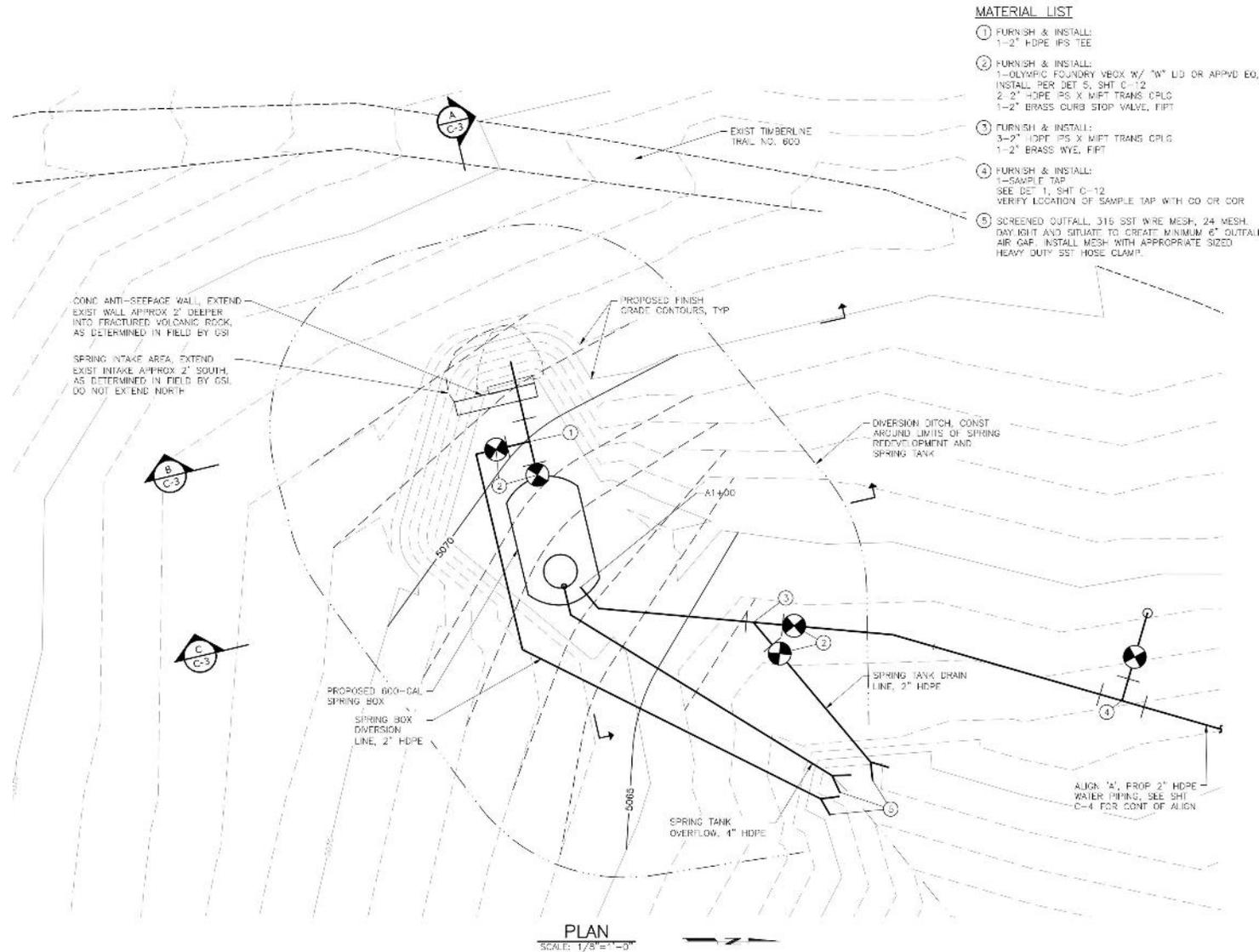


TEMPORARY EXCAVATION PLAN

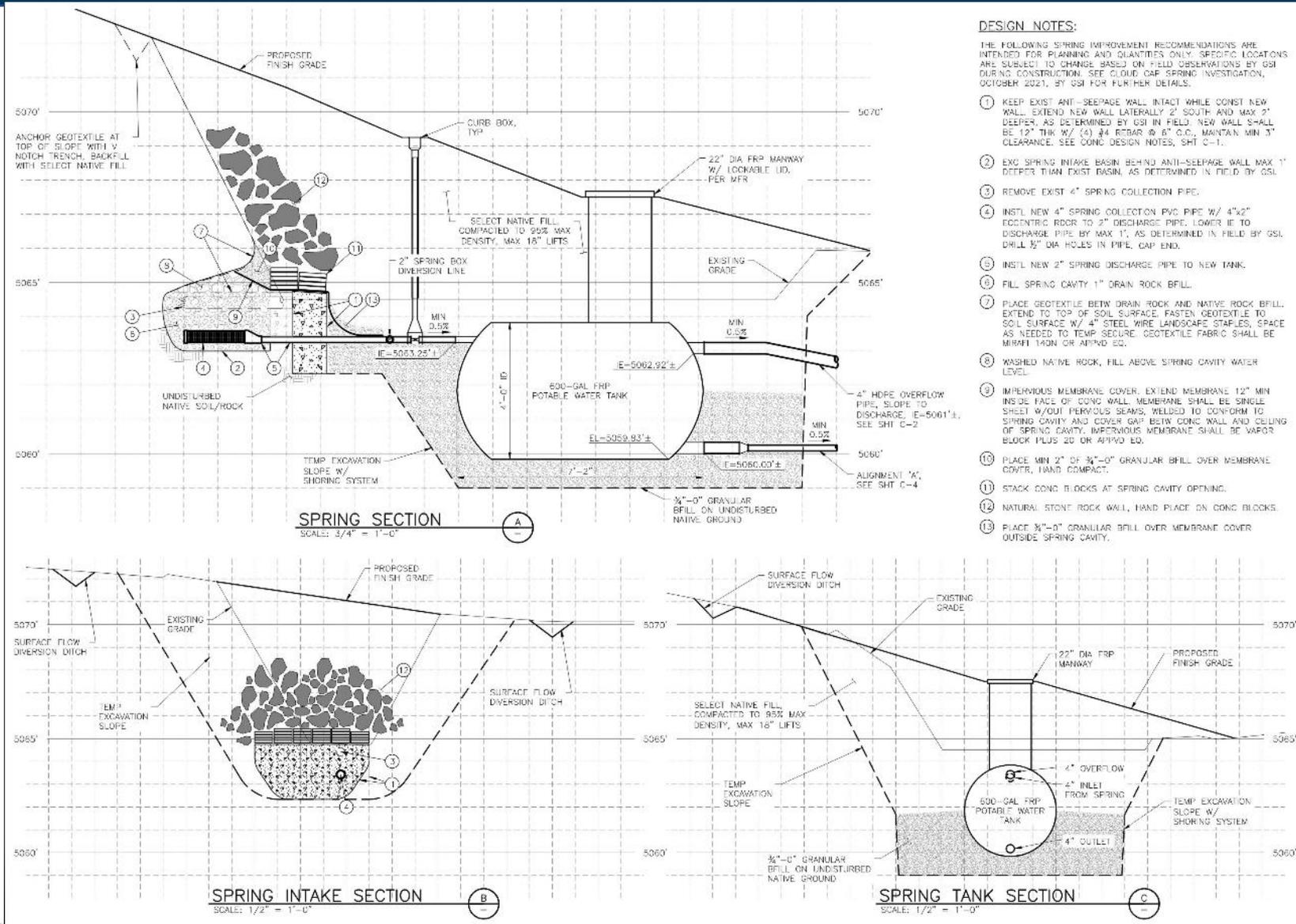
SCALE: 3/16"=1'-0"

2

Final Design



Final Design

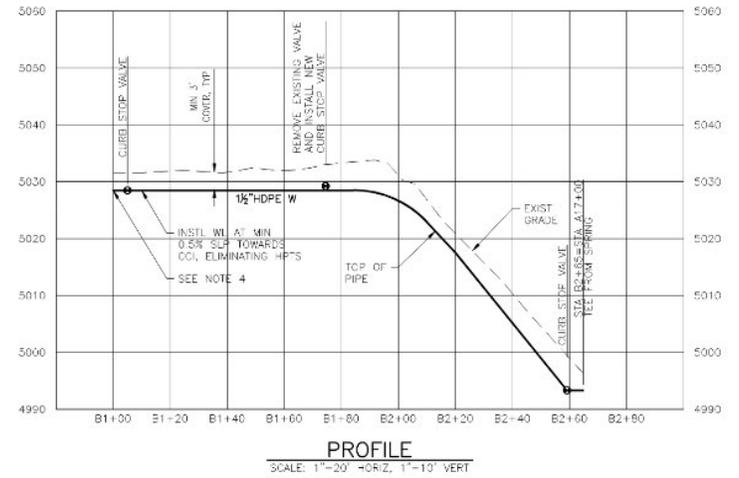
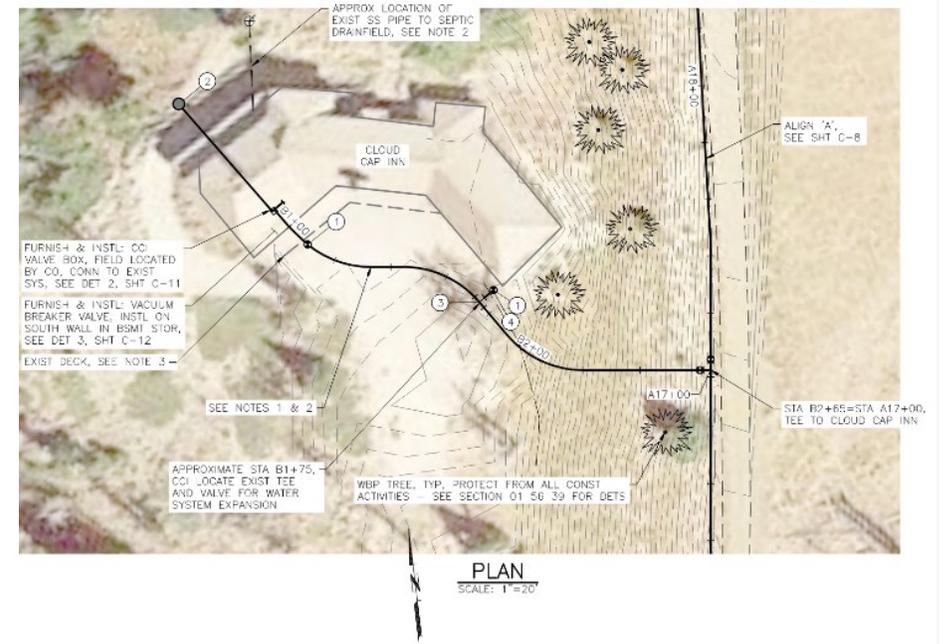
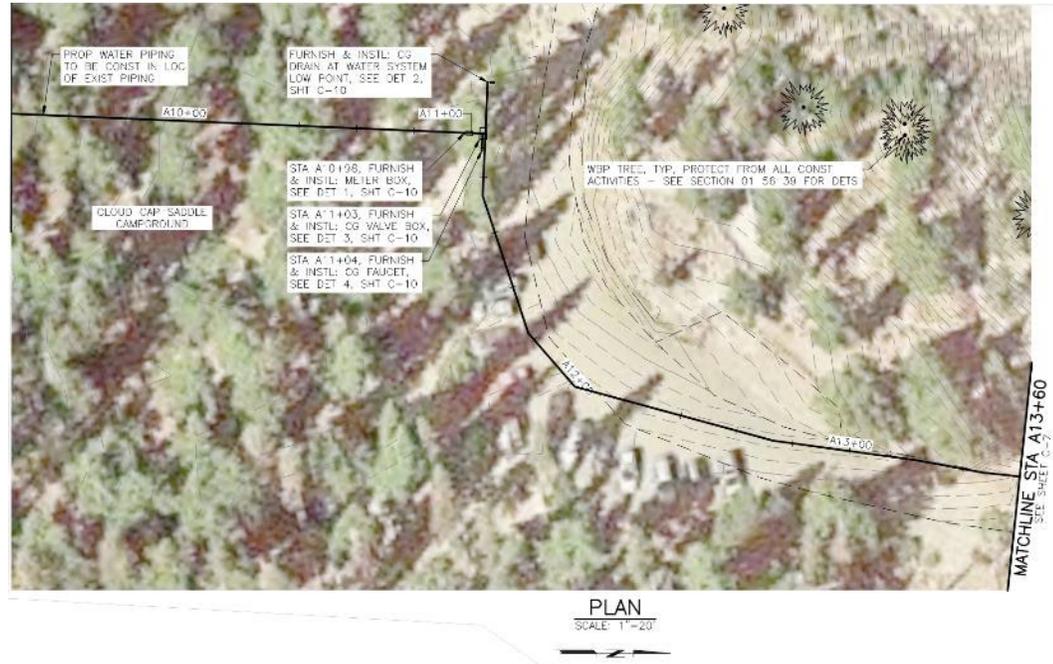


DESIGN NOTES:

THE FOLLOWING SPRING IMPROVEMENT RECOMMENDATIONS ARE INTENDED FOR PLANNING AND QUANTITIES ONLY. SPECIFIC LOCATIONS ARE SUBJECT TO CHANGE BASED ON FIELD OBSERVATIONS BY GSI DURING CONSTRUCTION. SEE CLOUD CAP SPRING INVESTIGATION, OCTOBER 2021, BY GSI FOR FURTHER DETAILS.

- 1 KEEP EXIST ANTI-SEEPAGE WALL INTACT WHILE CONST NEW WALL. EXTEND NEW WALL LATERALLY 2' SOUTH AND MAX 2' DEEPER, AS DETERMINED BY GSI IN FIELD. NEW WALL SHALL BE 12" THK W/ (4) #4 REBAR @ 6" O.C., MAINTAIN MIN 3" CLEARANCE. SEE CONC DESIGN NOTES, SHT C-1.
- 2 EXC SPRING INTAKE BASIN BEHIND ANTI-SEEPAGE WALL MAX 1' DEEPER THAN EXIST BASIN, AS DETERMINED IN FIELD BY GSI.
- 3 REMOVE EXIST 4" SPRING COLLECTION PIPE.
- 4 INSTL NEW 4" SPRING COLLECTION PVC PIPE W/ 4"x2" ECCENTRIC RDR TO 2" DISCHARGE PIPE. LOWER IE TO DISCHARGE PIPE BY MAX 1', AS DETERMINED IN FIELD BY GSI. DRILL 1/2" DIA HOLES IN PIPE, GAP END.
- 5 INSTL NEW 2" SPRING DISCHARGE PIPE TO NEW TANK.
- 6 FILL SPRING CAVITY 1" DRAIN ROCK BFILL.
- 7 PLACE GEOTEXTILE BETW DRAIN ROCK AND NATIVE ROCK BFILL. EXTEND TO TOP OF SOIL SURFACE. FASTEN GEOTEXTILE TO SOIL SURFACE W/ 4" STEEL WIRE LANDSCAPE STAPLES, SPACE AS NEEDED TO TEMP SECURE. GEOTEXTILE FABRIC SHALL BE MIRAFIX 140N OR APPROV EQ.
- 8 WASHED NATIVE ROCK, FILL ABOVE SPRING CAVITY WATER LEVEL.
- 9 IMPERVIOUS MEMBRANE COVER. EXTEND MEMBRANE 12" MIN INSIDE FACE OF CONC WALL. MEMBRANE SHALL BE SINGLE SHEET W/OUT PERVIOUS SEAMS, WELDED TO CONFORM TO SPRING CAVITY AND COVER GAP BETW CONC WALL AND CEILING OF SPRING CAVITY. IMPERVIOUS MEMBRANE SHALL BE WAFOR BLOCK PLUS 20 OR APPROV EQ.
- 10 PLACE MIN 2" OF 3/4"-0" GRANULAR BFILL OVER MEMBRANE COVER, HAND COMPACT.
- 11 STACK CONC BLOCKS AT SPRING CAVITY OPENING.
- 12 NATURAL STONE ROCK WALL, HAND PLACE ON CONC BLOCKS.
- 13 PLACE 3/4"-0" GRANULAR BFILL OVER MEMBRANE COVER OUTSIDE SPRING CAVITY.

Final Design



Final Design

NOTES:

1. PROPOSED WATER PIPING SHALL BE INSTALLED WITH A MINIMUM COVER OF 3'. THE ACTUAL DEPTH SHOULD BE ADJUSTED IN THE FIELD AND APPROVED BY THE CO TO PROVIDE FOR SMOOTH GRADIENTS THROUGHOUT THE PIPELINE AND SUCH THAT NO LOCALIZED LOW POINTS OR HIGH POINTS ARE CREATED.

2. THE CONTRACTOR SHALL POT-HOLE AND VERIFY LOCATIONS, ELEVATIONS, TYPES, AND SIZES OF ALL EXISTING UTILITIES PRIOR TO CONSTRUCTING NEW WATER LINE TIE IN/OUT IN ADVANCE TO ALLOW NECESSARY ADJUSTMENTS IN GRADE AND SHALL NOTIFY CO IF NEEDED TO ADJUST PIPING INSTALLATION ACCORDINGLY.

3. WHERE THE PROPOSED WATER LINE CROSSES A SEWER LINE, THE CONTRACTOR SHALL INSTALL THE WATER LINE IN ACCORDANCE WITH OAR 333-061-0000(9)(c)(C), CROSSINGS - SANITARY SEWERS AND WATER LINES.

MATERIAL LIST

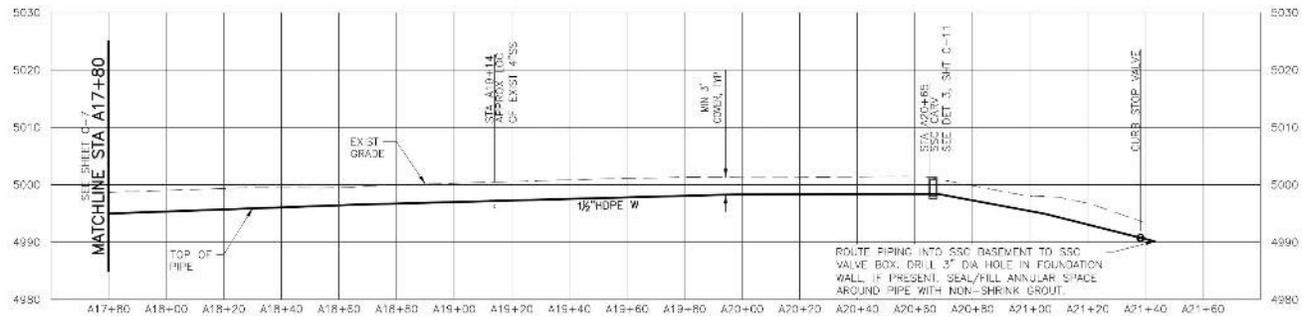
① FURNISH & INSTALL:

- 1-CURB BOX INSIDE ANSI TIER 22 LOAD RATED OLDCASTLE 910 VBOX W/ "WATER" LID OR APPROV EQ. INSTALL PER DET 5, SHT C-12
- 1-1/2" HDPE IPS X WPT TRANS CPLG
- 1-1/2" BRASS CURB SIG¹ VALVE, HM
- TRANS FROM 1/2" HDPE PIPE TO 1/2" GALV STL PIPE



PLAN

SCALE: 1"=20'



PROFILE

SCALE: 1"=50' HORIZ, 1"=10' VERT

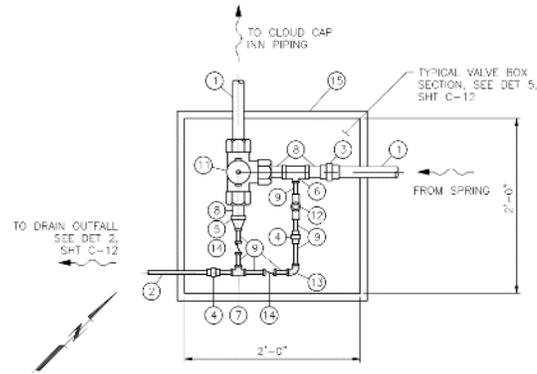
Final Design

MATERIAL LIST

- ① 1/2" GALV STL PIPE
- ② 3/4" GALV STL PIPE
- ③ 1/2" BRASS UNION, FIPT
- ④ 3/4" BRASS UNION, FIPT
- ⑤ 1/2" x 3/4" BRASS ROCR, FIPT
- ⑥ 1/2" x 3/4" BRASS TEE, FIPT
- ⑦ 3/4" BRASS TEE, FIPT
- ⑧ 1/2" BRASS NIPPLE
- ⑨ 3/4" BRASS NIPPLE
- ⑩ 1/2" BRASS 3-WAY BALL VALVE W/ MANUAL HANDLE LEVER, FIPT, SEE NOTE 1, ASSURED AUTOMATION 31D SERIES (FLOW PLAN 'F') OR APPVD EQ
- ⑪ 1/2" BRASS 3-WAY BALL VALVE W/ MANUAL HANDLE LEVER, FIPT, SEE NOTE 2, ASSURED AUTOMATION 31D SERIES (FLOW PLAN 'F') OR APPVD EQ
- ⑫ 3/4" BRASS NEEDLE VALVE, FIPT
- ⑬ 3/4" BRASS 90° ELBOW, FIPT
- ⑭ 3/4" BRASS CHECK VALVE, FIPT
- ⑮ VALVE VAULT, OLDCASTLE POLYMER 2424, 48" HT, RECTANGULAR POLYMER ENCL

INSTALLATION NOTES:

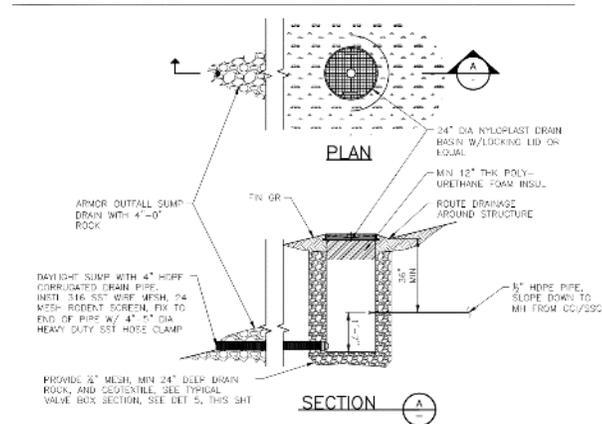
1. SNOW SHOE CABIN 3-WAY BALL VALVE:
 - 1.1. POSITION 1 - BLDG FLUWIND DRAIN
 - 1.2. POSITION 2 - SYSTEM OPERATION
2. CLOUD CAP INN 3-WAY BALL VALVE:
 - 2.1. POSITION 1 - SYSTEM OPERATION
 - 2.2. POSITION 2 - BLDG FLUMBING DRAIN



CLOUD CAP INN VALVE BOX DETAIL

SCALE: 1/8" = 1'-0"

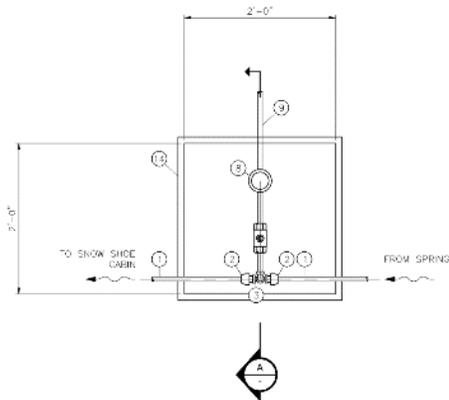
2
C-9



TYPICAL DRAIN/BYPASS OUTFALL STRUCTURE DETAIL

SCALE: NTS

2
C-10



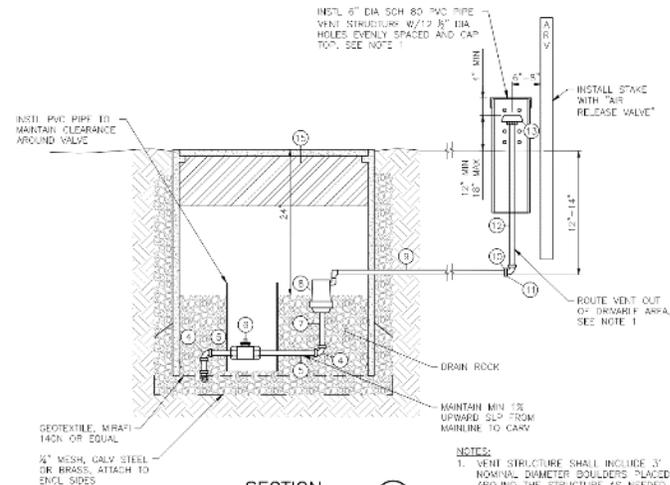
TYPICAL COMBINATION AIR RELEASE VALVE DETAIL

SCALE: 1/8" = 1'-0"

3
C-8

MATERIAL LIST

- ① 1/2" HOFF PIPE
- ② 1/2" HOPE IPS X MPT TRANS CPLG
- ③ 1/2" BRASS TEE, FIPT, ROTATE UP
- ④ 1/2" BRASS 90° ELBOW, FIPT
- ⑤ 1/2" BRASS NIPPLE
- ⑥ 1/2" BRASS CLRG STOP VALVE, FIPT
- ⑦ 1/2" BRASS NIPPLE W/ BRASS COUPLER
- ⑧ 2" COME AIR/VACUUM RELEASE VALVE
- ⑨ 3/4" HOPE PIPE
- ⑩ 3/4" HOPE X MPT ADAPTOR
- ⑪ 3/4" GALV 90° ELBOW, FIPT
- ⑫ 3/4" GALV PIPE
- ⑬ 3" SCREENED TANK VENT
- ⑭ TOR SSC DADV - VALVE VAULT, OLDCASTLE POLYMER 2424, 36" HT, TRAFFIC-SAFETY, RECTANGULAR POLYMER ENCL
- ⑮ MIN 12" THK POLYURETHANE FOAM INSUL.



SECTION

SCALE: 1/4" = 1'-0"

NOTES:

1. VENT STRUCTURE SHALL INCLUDE 3" NOMINAL DIAMETER BOULDERS PLACED AROUND THE STRUCTURE AS NEEDED TO PROTECT THE VENT FROM DAMAGE BY VEHICLES, FIELD LOCATED AND APPROVED BY CO.

Takeaways

- ✔ Location – Design and construction challenges
- ✔ Collaboration – USFS, Consultants, Tenants and Hood River County
- ✔ Cost – Limited funding for construction to effect repairs
- ✔ Risks – Possible loss of water from spring

Thank you!



Bratslavsky
CONSULTING ENGINEERS INC

