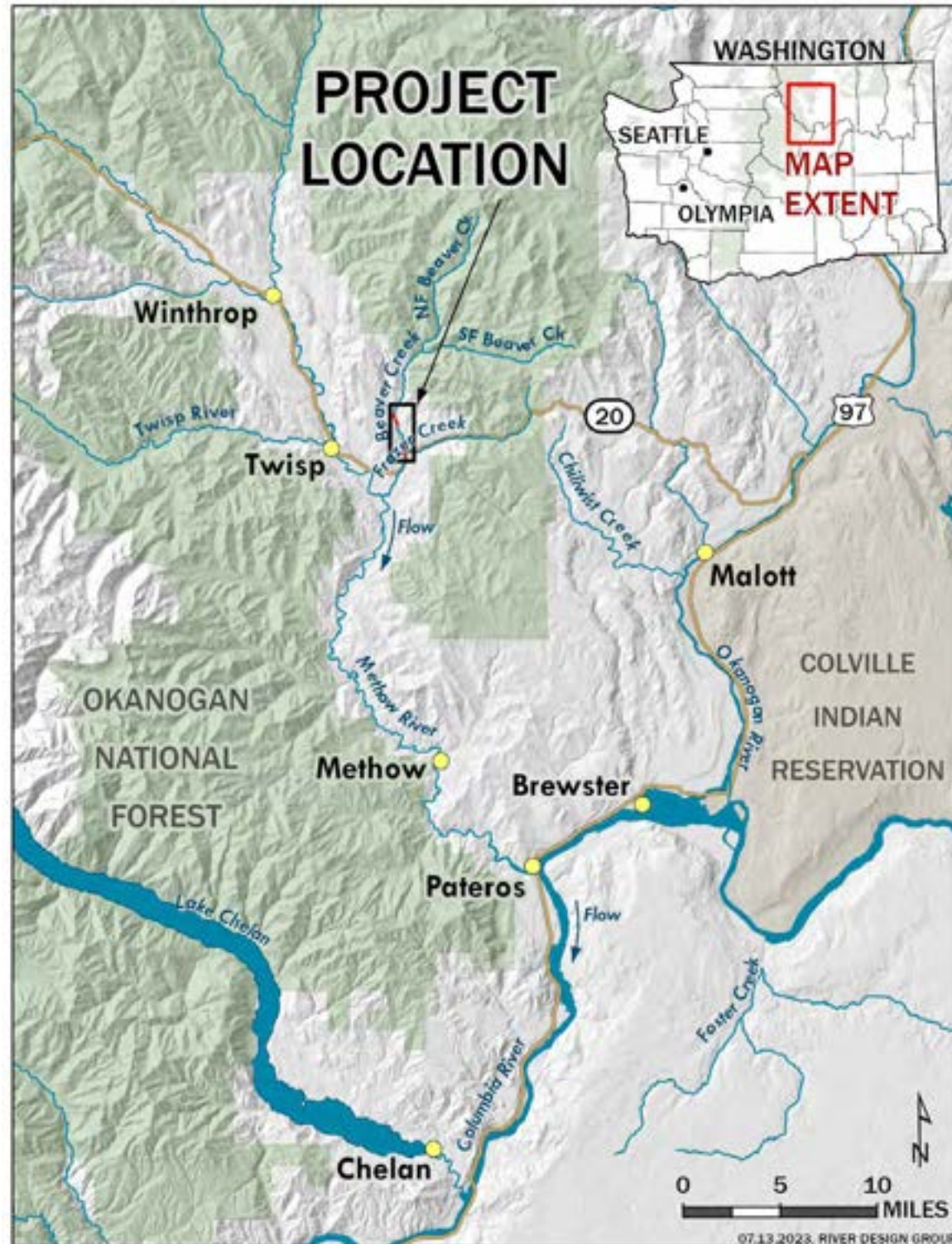


BEAVER CREEK WOOD ENHANCEMENT PROJECT

60% DESIGN PLAN SET

BEAVER CREEK VICINITY MAP



LEGAL DESCRIPTION: SECTIONS 2 AND 14, T33N R22E, WPM,
OKANOGAN COUNTY, WASHINGTON

PROJECT PARTNERS



CONFEDERATED TRIBES OF
THE COLVILLE RESERVATION
21 COLVILLE STREET
NESPELEM, WASHINGTON 99155



BONNEVILLE POWER ADMINISTRATION
P.O. BOX 3621
PORTLAND, OR 97208

PROJECT DESCRIPTION

BEAVER CREEK IS A TRIBUTARY TO THE METHOW RIVER IN OKANOGAN COUNTY, WASHINGTON. THE PROJECT AREA INCLUDES THREE SITES TOTALING APPROXIMATELY 1.5 MILES OF BEAVER CREEK LOCATED THREE MILES UPSTREAM OF THE CONFLUENCE WITH THE METHOW RIVER NEAR TWISP, WASHINGTON. LAND OWNERSHIP IS A MIX OF TRIBAL PROPERTY AND PRIVATE PROPERTY. THE BEAVER CREEK WATERSHED HAS BEEN IMPACTED BY AGRICULTURE, IRRIGATION DIVERSIONS, ROADS, WILDFIRES AND REDUCTIONS IN BEAVER ACTIVITY.

THE UPPER COLUMBIA RECOVERY PLAN (USBR 2008) IDENTIFIED BEAVER CREEK AS A SIGNIFICANT TRIBUTARY AND LISTS MAINTAINING CONNECTIVITY BETWEEN SALMONID POPULATIONS WITHIN THE MAINSTEM METHOW RIVER AND BEAVER CREEK AS A SHORT-TERM PRIORITY. RESTORATION STRATEGIES FOR BEAVER CREEK FOCUS ON IMPROVEMENT OF MIGRATION AND REARING HABITAT FOR FOCAL FISH SPECIES THROUGH IN-STREAM AND FLOODPLAIN HABITAT RESTORATION. THE PROPOSED STRATEGIES ADDRESS SITE-SPECIFIC LIMITING FACTORS AND LINK TO THE OVER-ARCHING BIOLOGICAL OBJECTIVES FOR THE UPPER COLUMBIA RIVER FOUND IN THE UPPER COLUMBIA SPRING CHINOOK SALMON AND STEELHEAD RECOVERY PLAN (UCSRB 2007) AND A BIOLOGICAL STRATEGY TO PROTECT AND RESTORE SALMONID HABITAT IN THE UPPER COLUMBIA REGION (UCSRB 2017).

THE PURPOSE OF THE BEAVER CREEK WOOD ENHANCEMENT PROJECT IS TO IMPROVE AQUATIC HABITAT USING A PROCESS-BASED RESTORATION APPROACH. PROJECT OBJECTIVES INCLUDE:

- INCREASE INSTREAM COVER AND COMPLEXITY BY SUPPLEMENTING LARGE AND SMALL WOOD;
- IMPROVE FLOODPLAIN CONNECTIVITY AND ALLOW FOR NATURAL PROCESSES TO OCCUR WHERE POSSIBLE;
- ENHANCE OFF CHANNEL HABITATS; AND
- INCREASE AVAILABLE POOL HABITAT DURING SUMMER BASEFLOW.

PROJECT ACTIONS ARE INTENDED TO ADDRESS THE EARLY LIFE STAGE HABITAT NEEDS OF ESA LISTED SPECIES INCLUDING STEELHEAD, SPRING CHINOOK AND BULL TROUT. RESTORATION EFFORTS ARE BEING FUNDED BY BONNEVILLE POWER ADMINISTRATION UNDER THE NORTHWEST POWER AND CONSERVATION COUNCIL'S COLUMBIA BASIN FISH AND WILDLIFE PROGRAM.

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NOT FOR CONSTRUCTION

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

PROJECT NUMBER
RDG-23-009

DRAWING NUMBER

1.0

Drawing 1 of 30

GENERAL NOTES

1. THE CONTRACTOR SHALL VERIFY EXISTING CONDITIONS IN THE FIELD PRIOR TO CONSTRUCTION. IF NECESSARY, ADJUSTMENTS TO THE DRAWINGS WILL BE MADE AS DIRECTED BY THE ENGINEER.
2. UTILITIES IDENTIFIED ON THE DRAWINGS ARE APPROXIMATE AND DO NOT REPRESENT ABSOLUTE HORIZONTAL AND VERTICAL LOCATIONS. THE CONTRACTOR SHALL COORDINATE WITH THE APPROPRIATE UTILITY LOCATE SERVICE PRIOR TO CONSTRUCTION TO IDENTIFY UTILITY LOCATIONS.
3. THE OWNER WILL PROVIDE COPIES OF APPLICABLE PERMITS REQUIRED TO PERFORM THE WORK PRIOR TO THE START OF CONSTRUCTION.
4. THE CONTRACTOR SHALL COMPLY WITH ALL SAFETY REQUIREMENTS DESCRIBED IN THE CONTRACT DOCUMENTS.
5. THE CONTRACTOR SHALL PROTECT ALL TREES AND LAND AREAS NOT LOCATED WITHIN THE PROJECT CONSTRUCTION, STAGING OR CONSTRUCTION LIMITS. EXERCISE CARE IN AREAS NOT MARKED TO AVOID DAMAGE TO EXISTING VEGETATION.
6. THE ENGINEER WILL PROVIDE SURVEY CONTROL AND GRADING SURFACES FOR EQUIPMENT WITH GPS MACHINE CONTROL CAPABILITY. THE CONTRACTOR SHALL PROVIDE SURVEY STAKING AND LAYOUT FOR CONSTRUCTION.
7. VERTICAL TOLERANCE FOR CONSTRUCTION COMPLIANCE WILL BE 0.3 FEET. HORIZONTAL TOLERANCE WILL BE 1.0 FEET.
8. THE CONTRACTOR SHALL CONFIRM QUANTITIES SHOWN ON THE DRAWINGS AND FOR OWNER-SUPPLIED MATERIALS.
9. EARTHWORK QUANTITIES REPORTED ON THE DRAWINGS ARE NEAT LINE QUANTITIES CALCULATED FROM THE DIFFERENCE BETWEEN THE FINISHED GROUND SURFACE AND EXISTING GROUND SURFACE.
10. THE VOLUME OF MATERIAL REQUIRED FOR FILL SURFACES MAY VARY DEPENDING ON COMPACTION AND MOISTURE CONTENT.
11. EARTHWORK QUANTITIES DO NOT INCLUDE SUBGRADE EXCAVATION QUANTITIES UNLESS NOTED OTHERWISE.
12. SLOPES DESIGNATED AS 2:1, 1.5:1, ETC., ARE THE RATIOS OF HORIZONTAL DISTANCE TO VERTICAL DISTANCE.
13. DIMENSIONS ARE GIVEN IN FEET AND TENTHS OF A FOOT.
14. EXCAVATION, TRENCHING, SHORING, AND SHIELDING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR PERFORMING THE WORK, THESE DRAWINGS ARE NOT INTENDED TO PROVIDE MEANS OR METHODS OF CONSTRUCTION.

ABBREVIATIONS	
APPROX	APPROXIMATE
CH	CHANNEL
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
DBH	DIAMETER AT BREAST HEIGHT
DEG	DEGREE
DIA	DIAMETER
E	EASTING
EL.	ELEVATION
ELEV.	ELEVATION
EXTG	EXISTING
H	HORIZONTAL
HORIZ.	HORIZONTAL
I.E.	INVERT ELEVATION
LBS	POUNDS
LF	LINEAL FEET
MHHW	MEAN HIGHER HIGH WATER
MLLW	MEAN LOWER LOW WATER
MIN	MINIMUM
N	NORTHING
NTS	NOT TO SCALE
O.C.	ON CENTER
OZ	OUNCE
PC	POINT OF CURVATURE
PT	POINT OF TANGENCY
PVC	POLY VINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
RD.	ROAD
STA	STATION
THRU	THROUGH
TYP.	TYPICAL
V	VERTICAL
VERT.	VERTICAL

STANDARD OF PRACTICE

PERFORMANCE EXPECTATIONS AND INDUSTRY STANDARDS FOR THE DESIGN OF RESTORATION PROJECTS VARY DEPENDING ON PROJECT GOALS AND THE CONSEQUENCES OF PROJECT FAILURE. BECAUSE RIVERS ARE NATURALLY DYNAMIC SYSTEMS, EXPECTATIONS FOR PROJECT STABILITY CAN BE EXPRESSED IN THE CONTEXT OF DYNAMIC EQUILIBRIUM, WHEREBY PROJECT ELEMENTS AND RESTORATION TREATMENTS ARE EXPECTED TO REMAIN QUASI-STABLE, BUT CHANGE IN AN ECOLOGICALLY BENEFICIAL MANNER AS A RESULT OF DESIRED DISTURBANCES FROM NATURAL RIVER PROCESSES. WHEN PROJECTS ARE BUILT PRIMARILY FOR HABITAT, STABILITY DESIGN CRITERIA ARE SELECTED TO MAXIMIZE DYNAMIC EQUILIBRIUM AND ALLOW FOR NATURAL RIVER PROCESSES TO OCCUR (TYPICALLY A 25-YEAR FLOW/4 PERCENT EXCEEDANCE EVENT OR LESS). WHEN PROJECTS HAVE THE POTENTIAL TO CAUSE DAMAGE OR JEOPARDIZE PUBLIC SAFETY DUE TO FAILURE, STABILITY DESIGN CRITERIA ARE SELECTED TO REDUCE THE RISK OF FAILURE (TYPICALLY A 100-YEAR FLOW/1 PERCENT EXCEEDANCE EVENT, OR GREATER). FOR THIS PROJECT, THE 25-YEAR FLOW HAS BEEN SELECTED FOR STABILITY DESIGN CRITERIA.

REUSE OF DRAWINGS

THESE DRAWINGS, THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, ARE THE PROPERTY OF RIVER DESIGN GROUP, INC. (RDG) AND ARE NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF RDG. LIKewise, THESE DRAWINGS MAY NOT BE ALTERED OR MODIFIED WITHOUT AUTHORIZATION OF RDG. DRAWING DUPLICATION IS ALLOWED IF THE ORIGINAL CONTENT IS NOT MODIFIED.

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GENERAL NOTES
 BEAVER CREEK WOOD ENHANCEMENT PROJECT
 OKANOHAN COUNTY, WASHINGTON

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HIP GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS

THE ACTIVITIES COVERED UNDER THE HIP ARE INTENDED TO PROTECT AND RESTORE FISH AND WILDLIFE HABITAT WITH LONG-TERM BENEFITS TO ESA-LISTED SPECIES. THE FOLLOWING GENERAL CONSERVATION MEASURES (DEVELOPED IN COORDINATION WITH USFWS AND NMFS) WILL BE APPLIED TO ALL ACTIONS OF THIS PROJECT.

PROJECT DESIGN AND SITE PREPARATION.

1. STATE AND FEDERAL PERMITS.

- A. ALL APPLICABLE REGULATORY PERMITS AND OFFICIAL PROJECT AUTHORIZATIONS WILL BE OBTAINED BEFORE PROJECT IMPLEMENTATION.
- B. THESE PERMITS AND AUTHORIZATIONS INCLUDE, BUT ARE NOT LIMITED TO, NATIONAL ENVIRONMENTAL POLICY ACT, NATIONAL HISTORIC PRESERVATION ACT, THE APPROPRIATE STATE AGENCY REMOVAL AND FILL PERMIT, USACE CLEAN WATER ACT (CWA) 404 PERMITS, CWA SECTION 401 WATER QUALITY CERTIFICATIONS, AND FEMA NO-RISE ANALYSES.

2. TIMING OF IN-WATER WORK.

- A. APPROPRIATE STATE (OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW), WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), AND MONTANA FISH WILDLIFE AND PARKS (MFWP)) GUIDELINES FOR TIMING OF IN-WATER WORK WINDOWS (IWW) WILL BE FOLLOWED.
- B. CHANGES TO ESTABLISHED WORK WINDOWS WILL BE APPROVED BY REGIONAL STATE BIOLOGISTS AND BPA'S EC LEAD.
- C. BULL TROUT. FOR AREAS WITH DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT OR AREAS KNOWN TO HAVE BULL TROUT, PROJECT PROPONENTS WILL CONTACT THE APPROPRIATE USFWS FIELD OFFICE TO INSURE THAT ALL REASONABLE IMPLEMENTATION MEASURES ARE CONSIDERED AND AN APPROPRIATE IN-WATER WORK WINDOW IS BEING USED TO MINIMIZE PROJECT EFFECTS.
- D. LAMPREY. WORKING IN STREAM OR RIVER CHANNELS THAT CONTAIN PACIFIC LAMPREY WILL BE AVOIDED FROM MARCH 1 TO JULY 1 FOR REACHES <5,000 FEET IN ELEVATION AND FROM MARCH 1 TO AUGUST 1 FOR REACHES >5,000 FEET. IF EITHER TIMEFRAME IS INCOMPATIBLE WITH OTHER OBJECTIVES, THE AREA WILL BE SURVEYED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF POSSIBLE. IF LAMPREYS ARE KNOWN TO EXIST, THE PROJECT SPONSOR WILL UTILIZE DEWATERING AND SALVAGE PROCEDURES (SEE FISH SALVAGE AND ELECTROFISHING SECTIONS) TO MINIMIZE ADVERSE EFFECTS.
- E. THE IN-WATER WORK WINDOW WILL BE PROVIDED IN THE CONSTRUCTION PLANS.

3. CONTAMINANTS.

- A. EXCAVATION OF MORE THAN 20 CUBIC YARDS WILL REQUIRE A SITE VISIT AND DOCUMENTED ASSESSMENT FOR POTENTIAL CONTAMINANT SOURCES. THE SITE ASSESSMENT WILL BE STORED WITH PROJECT FILES OR AS AN APPENDIX TO THE BASIS OF DESIGN REPORT.
- B. THE SITE ASSESSMENT WILL SUMMARIZE:
 - 1. THE SITE VISIT, CONDITION OF THE PROPERTY, AND IDENTIFICATION OF ANY AREAS USED FOR VARIOUS INDUSTRIAL PROCESSES;
 - 2. AVAILABLE RECORDS, SUCH AS FORMER SITE USE, BUILDING PLANS, AND RECORDS OF ANY PRIOR CONTAMINATION EVENTS;
 - 3. INTERVIEWS WITH KNOWLEDGEABLE PEOPLE, SUCH AS SITE OWNERS, OPERATORS, OCCUPANTS, NEIGHBORS, OR LOCAL GOVERNMENT OFFICIALS; AND
 - 4. THE TYPE, QUANTITY, AND EXTENT OF ANY POTENTIAL CONTAMINATION SOURCES.

4. SITE LAYOUT AND FLAGGING.

- A. CONSTRUCTION AREAS TO BE CLEARLY FLAGGED PRIOR TO CONSTRUCTION.
- B. AREAS TO BE FLAGGED WILL INCLUDE:
 - 1. SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER, SPAWNING AREAS, SPRINGS, AND WETLANDS;
 - 2. EQUIPMENT ENTRY AND EXIT POINTS;
 - 3. ROAD AND STREAM CROSSING ALIGNMENTS;
 - 4. STAGING, STORAGE, AND STOCKPILE AREAS; AND
 - 5. NO-SPRAY AREAS AND BUFFERS.

5. TEMPORARY ACCESS ROADS AND PATHS.

- A. EXISTING ACCESS ROADS AND PATHS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER AND LENGTH OF TEMPORARY ACCESS ROADS AND PATHS THROUGH RIPARIAN AREAS AND FLOODPLAINS WILL BE MINIMIZED.
- B. VEHICLE USE AND HUMAN ACTIVITIES, INCLUDING WALKING, IN AREAS OCCUPIED BY TERRESTRIAL ESA-LISTED SPECIES WILL BE MINIMIZED.
- C. TEMPORARY ACCESS ROADS AND PATHS WILL NOT BE BUILT ON SLOPES WHERE GRADE, SOIL, OR OTHER FEATURES SUGGEST A LIKELIHOOD OF EXCESSIVE EROSION OR FAILURE. IF SLOPES ARE STEEPER THAN 30%, THEN THE ROAD WILL BE DESIGNED BY A CIVIL ENGINEER WITH EXPERIENCE IN STEEP ROAD DESIGN.
- D. THE REMOVAL OF RIPARIAN VEGETATION DURING CONSTRUCTION OF TEMPORARY ACCESS ROADS WILL BE MINIMIZED. WHEN TEMPORARY VEGETATION REMOVAL IS REQUIRED, VEGETATION WILL BE CUT AT GROUND LEVEL (NOT GRUBBED).
- E. AT PROJECT COMPLETION, ALL TEMPORARY ACCESS ROADS AND PATHS WILL BE OBLITERATED, AND THE SOIL WILL BE STABILIZED AND REVEGETATED. ROAD AND PATH OBLITERATION REFERS TO THE MOST COMPREHENSIVE DEGREE OF DECOMMISSIONING AND INVOLVES DECOMPACTING THE SURFACE AND DITCH, PULLING THE FILL MATERIAL ONTO THE RUNNING SURFACE, AND RESHAPING TO MATCH THE ORIGINAL CONTOUR.
- F. HELICOPTER FLIGHT PATTERNS WILL BE ESTABLISHED IN ADVANCE AND LOCATED TO AVOID TERRESTRIAL ESA-LISTED SPECIES AND THEIR OCCUPIED HABITAT DURING SENSITIVE LIFE STAGES.

6. TEMPORARY STREAM CROSSINGS.

- A. EXISTING STREAM CROSSINGS OR BEDROCK WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER OF TEMPORARY STREAM CROSSINGS WILL BE MINIMIZED.
- B. TEMPORARY BRIDGES AND CULVERTS WILL BE INSTALLED TO ALLOW FOR EQUIPMENT AND VEHICLE CROSSING OVER PERENNIAL STREAMS DURING CONSTRUCTION. TREATED WOOD SHALL NOT BE USED ON TEMPORARY BRIDGE CROSSINGS OR IN LOCATIONS IN CONTACT WITH OR DIRECTLY OVER WATER.
- C. FOR PROJECTS THAT REQUIRE EQUIPMENT AND VEHICLES TO CROSS IN THE WET:
 - 1. THE LOCATION AND NUMBER OF ALL WET CROSSINGS SHALL BE APPROVED BY THE BPA EC LEAD AND DOCUMENTED IN THE CONSTRUCTION PLANS;
 - 2. VEHICLES AND MACHINERY SHALL CROSS STREAMS AT RIGHT ANGLES TO THE MAIN CHANNEL WHENEVER POSSIBLE;
 - 3. NO STREAM CROSSINGS WILL OCCUR 300 FEET UPSTREAM OR 100 FEET DOWNSTREAM OF AN EXISTING REDD OR SPAWNING FISH; AND
 - 4. AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED AND BANKS RESTORED.

7. STAGING, STORAGE, AND STOCKPILE AREAS.

- A. STAGING AREAS (USED FOR CONSTRUCTION EQUIPMENT STORAGE, VEHICLE STORAGE, FUELING, SERVICING, AND HAZARDOUS MATERIAL STORAGE) WILL BE 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND. STAGING AREAS CLOSER THAN 150 FEET WILL BE APPROVED BY THE EC LEAD.
- B. NATURAL MATERIALS USED FOR IMPLEMENTATION OF AQUATIC RESTORATION, SUCH AS LARGE WOOD, GRAVEL, AND BOULDERS, MAY BE STAGED WITHIN 150 FEET IF CLEARLY INDICATED IN THE PLANS THAT AREA IS FOR NATURAL MATERIALS ONLY.
- C. ANY LARGE WOOD, TOPSOIL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION WILL BE STOCKPILED FOR USE DURING SITE RESTORATION AT A SPECIFICALLY IDENTIFIED AND FLAGGED AREA.
- D. ANY MATERIAL NOT USED IN RESTORATION, AND NOT NATIVE TO THE FLOODPLAIN, WILL BE DISPOSED OF OUTSIDE THE 100-YEAR FLOODPLAIN.

8. EQUIPMENT.

- A. MECHANIZED EQUIPMENT AND VEHICLES WILL BE SELECTED, OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE EFFECTS ON THE ENVIRONMENT (E.G., MINIMALLY-SIZED, LOW PRESSURE TIRES; MINIMAL HARD-TURN PATHS FOR TRACKED VEHICLES; TEMPORARY MATS OR PLATES WITHIN WET AREAS OR ON SENSITIVE SOILS).
- B. EQUIPMENT WILL BE STORED, FUELED, AND MAINTAINED IN AN CLEARLY IDENTIFIED STAGING AREA THAT MEETS STAGING AREA CONSERVATION MEASURES.

- C. EQUIPMENT WILL BE REFUELED IN A VEHICLE STAGING AREA OR IN AN ISOLATED HARD ZONE, SUCH AS A PAVED PARKING LOT OR ADJACENT, ESTABLISHED ROAD (THIS MEASURE APPLIES ONLY TO GAS-POWERED EQUIPMENT WITH TANKS LARGER THAN 5 GALLONS).
- D. BIODEGRADABLE LUBRICANTS AND FLUIDS WILL BE USED ON EQUIPMENT OPERATING IN AND ADJACENT TO THE STREAM CHANNEL AND LIVE WATER.
- E. EQUIPMENT WILL BE INSPECTED DAILY FOR FLUID LEAKS BEFORE LEAVING THE VEHICLE STAGING AREA FOR OPERATION WITHIN 150 FEET OF ANY NATURAL WATER BODY OR WETLAND.
- F. EQUIPMENT WILL BE THOROUGHLY CLEANED BEFORE OPERATION BELOW ORDINARY HIGH WATER, AND AS OFTEN AS NECESSARY DURING OPERATION, TO REMAIN GREASE FREE.

9. EROSION CONTROL.

- A. TEMPORARY EROSION CONTROL MEASURES INCLUDE:
 - 1. TEMPORARY EROSION CONTROLS WILL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE ACTION SITE AND APPROPRIATELY INSTALLED DOWNSLOPE OF PROJECT ACTIVITY WITHIN THE RIPARIAN BUFFER AREA UNTIL SITE REHABILITATION IS COMPLETE;
 - 2. IF THERE IS A POTENTIAL FOR ERODED SEDIMENT TO ENTER THE STREAM, SEDIMENT BARRIERS WILL BE INSTALLED AND MAINTAINED FOR THE DURATION OF PROJECT IMPLEMENTATION;
 - 3. TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE SEDGE MATS, FIBER WATTLES, SILT FENCES, JUTE MATTING, WOOD FIBER MULCH AND SOIL BINDER, OR GEOTEXTILES AND GEOSYNTHETIC FABRIC;
 - 4. SOIL STABILIZATION UTILIZING WOOD FIBER MULCH AND TACKIFIER (HYDRO-APPLIED) MAY BE USED TO REDUCE EROSION OF BARE SOIL IF THE MATERIALS ARE NOXIOUS WEED FREE AND NONTOXIC TO AQUATIC AND TERRESTRIAL ANIMALS, SOIL MICROORGANISMS, AND VEGETATION;
 - 5. SEDIMENT WILL BE REMOVED FROM EROSION CONTROLS ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE CONTROL; AND
 - 6. ONCE THE SITE IS STABILIZED AFTER CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES WILL BE REMOVED.
- B. EMERGENCY EROSION CONTROLS. THE FOLLOWING MATERIALS FOR EMERGENCY EROSION CONTROL WILL BE AVAILABLE AT THE WORK SITE:
 - 1. A SUPPLY OF SEDIMENT CONTROL MATERIALS; AND
 - 2. AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.

10. DUST ABATEMENT.

- A. THE PROJECT SPONSOR WILL DETERMINE THE APPROPRIATE DUST CONTROL MEASURES BY CONSIDERING SOIL TYPE, EQUIPMENT USAGE, PREVAILING WIND DIRECTION, AND THE EFFECTS CAUSED BY OTHER EROSION AND SEDIMENT CONTROL MEASURES.
- B. WORK WILL BE SEQUENCED AND SCHEDULED TO REDUCE EXPOSED BARE SOIL SUBJECT TO WIND EROSION.
- C. DUST-ABATEMENT ADDITIVES AND STABILIZATION CHEMICALS (TYPICALLY MAGNESIUM CHLORIDE, CALCIUM CHLORIDE SALTS, OR LIGNINSULFONATE) WILL NOT BE APPLIED WITHIN 25 FEET OF WATER OR A STREAM CHANNEL AND WILL BE APPLIED SO AS TO MINIMIZE THE LIKELIHOOD THAT THEY WILL ENTER STREAMS. APPLICATIONS OF LIGNINSULFONATE WILL BE LIMITED TO A MAXIMUM RATE OF 0.5 GALLONS PER SQUARE YARD OF ROAD SURFACE, ASSUMING MIXED 50:50 WITH WATER.
- D. APPLICATION OF DUST ABATEMENT CHEMICALS WILL BE AVOIDED DURING OR JUST BEFORE WET WEATHER, AND AT STREAM CROSSINGS OR OTHER AREAS THAT COULD RESULT IN UNFILTERED DELIVERY OF THE DUST ABATEMENT MATERIALS TO A WATERBODY (TYPICALLY THESE WOULD BE AREAS WITHIN 25 FEET OF A WATERBODY OR STREAM CHANNEL; DISTANCES MAY BE GREATER WHERE VEGETATION IS SPARSE OR SLOPES ARE STEEP).
- E. SPILL CONTAINMENT EQUIPMENT WILL BE AVAILABLE DURING APPLICATION OF DUST ABATEMENT CHEMICALS.
- F. PETROLEUM-BASED PRODUCTS WILL NOT BE USED FOR DUST ABATEMENT.



HIP CONSERVATION MEASURES
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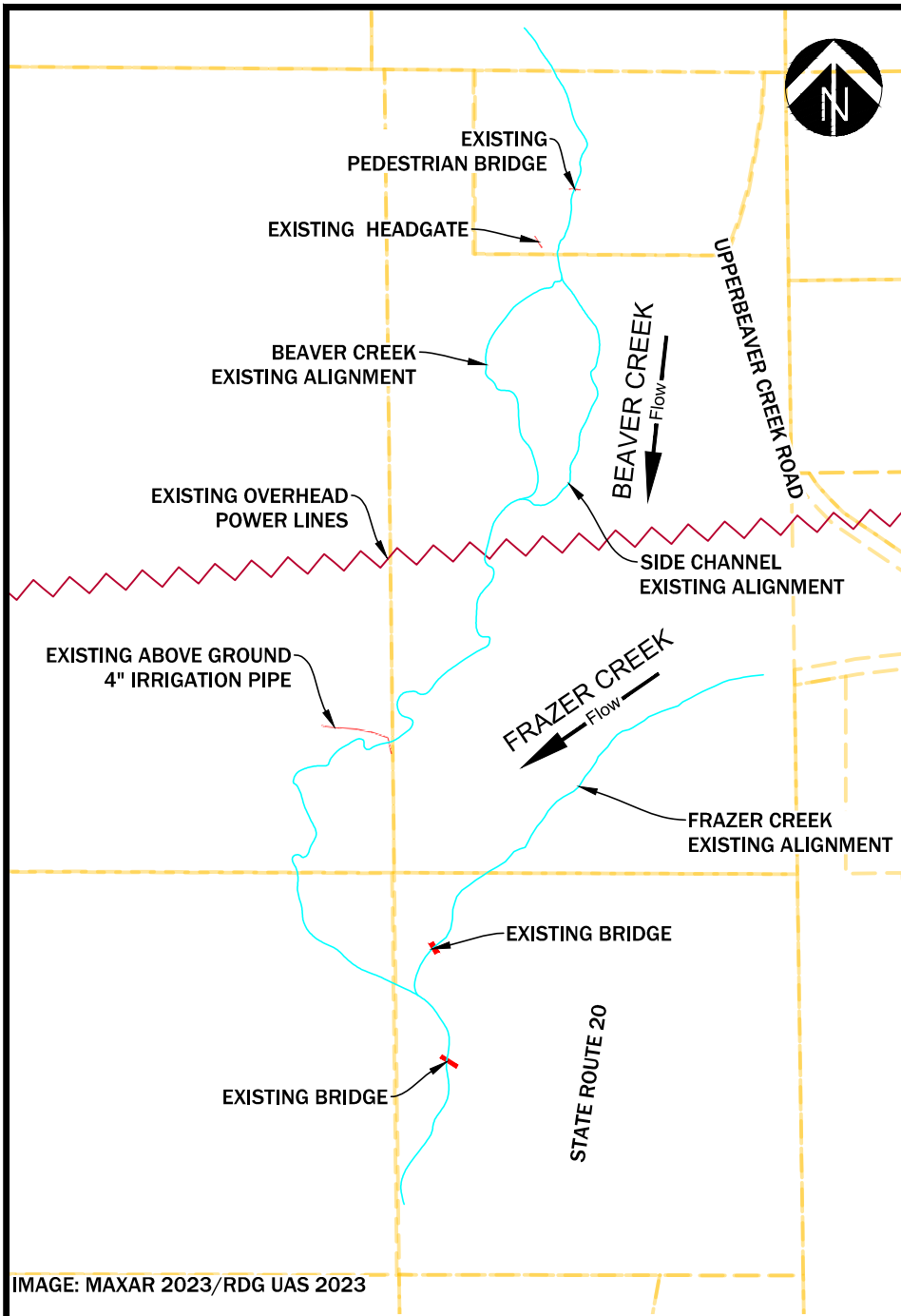


IMAGE: MAXAR 2023/RDG UAS 2023

1 SITE 1 EXISTING CONDITIONS PLAN VIEW
1" = 600'

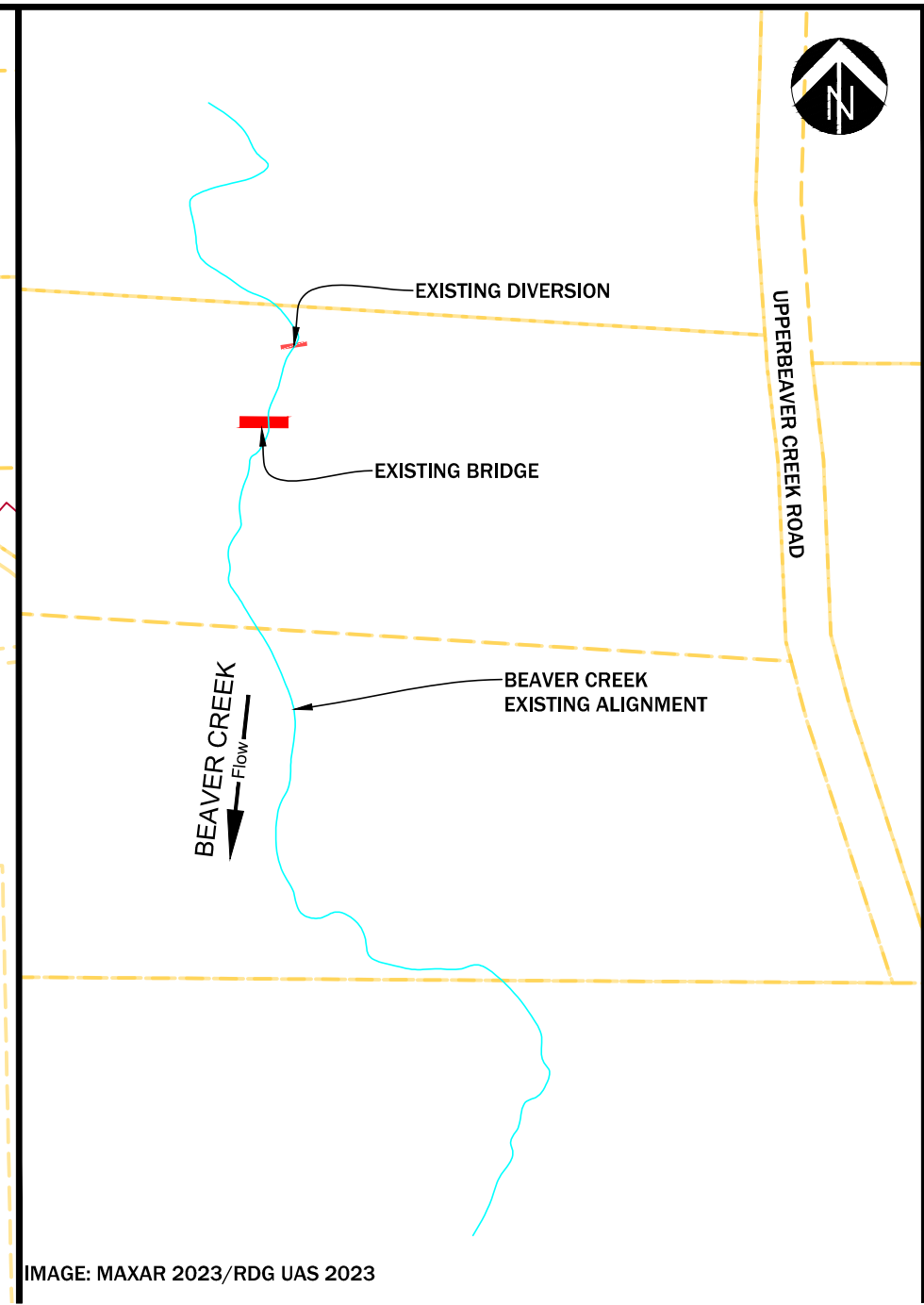


IMAGE: MAXAR 2023/RDG UAS 2023

2 SITE 2 EXISTING CONDITIONS PLAN VIEW
1" = 200'

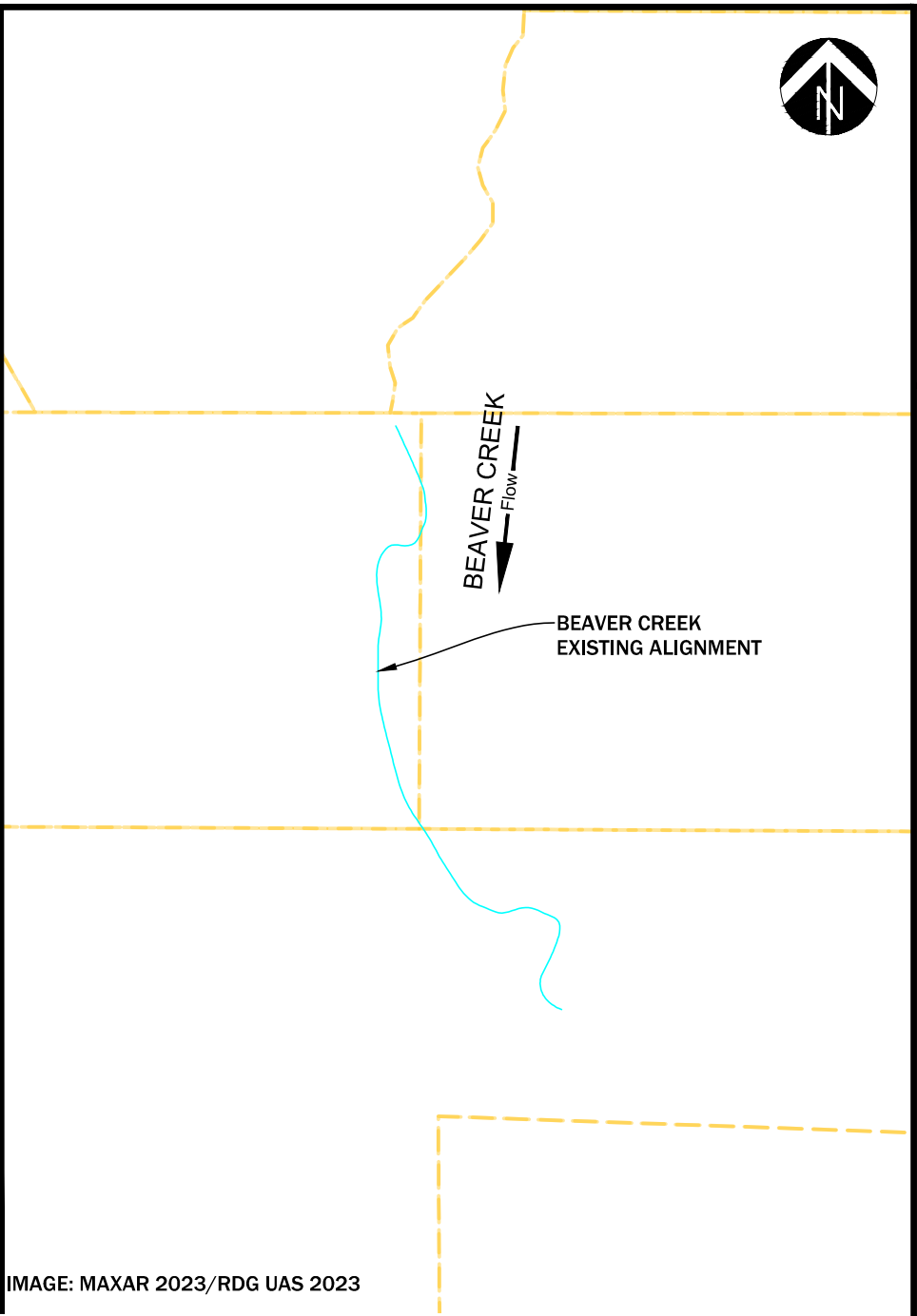


IMAGE: MAXAR 2023/RDG UAS 2023

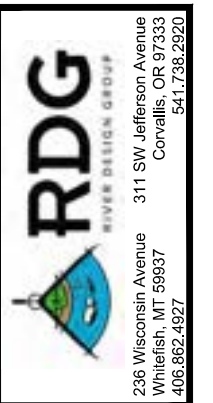
3 SITE 3 EXISTING CONDITIONS PLAN VIEW
1" = 300'

EXISTING CONDITIONS

BEAVER CREEK FLOWS THROUGH A CONFINED VALLEY WITH ABANDONED TERRACES AND GRANITIC GEOLOGY. THROUGH THE PROJECT AREA, BEAVER CREEK IS AN ENTRENCHED GRAVEL-BED STREAM. IT IS CLASSIFIED AS A RIFFLE-POOL STREAM (ROSGEN TYPE F4). HYDROLOGY IS FLASHY AND INFLUENCED BY IRRIGATION WITHDRAWALS DURING THE GROWING SEASON. VEGETATION IS DOMINATED BY PASTURE GRASSES INTERMIXED WITH REMNANT PATCHES OF WILLOWS AND COTTONWOODS. BANK EROSION RATES VARY WITH THE MOST SEVERE EROSION OCCURRING ALONG TERRACES AND ON STREAMBANKS LACKING WOODY VEGETATION. STREAMBED SUBSTRATE IS COARSE WITH MODERATE ARMORING AND EMBEDDEDNESS. FISH HABITAT IS AFFECTED BY INFREQUENT POOLS, LACK OF OFF-CHANNEL REARING HABITAT AND LACK OF COMPLEXITY. THE SITE WAS PARTIALLY BURNED IN 2014 BY THE CARLTON COMPLEX FIRE WHICH BURNED 38% OF WATERSHED UPSTREAM OF FRAZER CREEK.

RIVER CHARACTERISTICS	
DRAINAGE AREA	80 SQUARE MILES
MEAN ANNUAL PRECIPITATION	23 INCHES
FOREST COVER	60% FORESTED
BASEFLOW DISCHARGE	< 10 CFS
2-YEAR DISCHARGE	100 - 150 CFS
25-YEAR DISCHARGE (4% EXCEEDANCE)	1,200 - 1,400 CFS
STREAM GRADIENT	1.9%
STREAMBED D50	2-INCH GRAVEL
STREAMBED D84	4-INCH COBBLE

DRAWING LEGEND	
SYMBOL	
	APPROX. PROPERTY LINE



EXISTING CONDITIONS
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

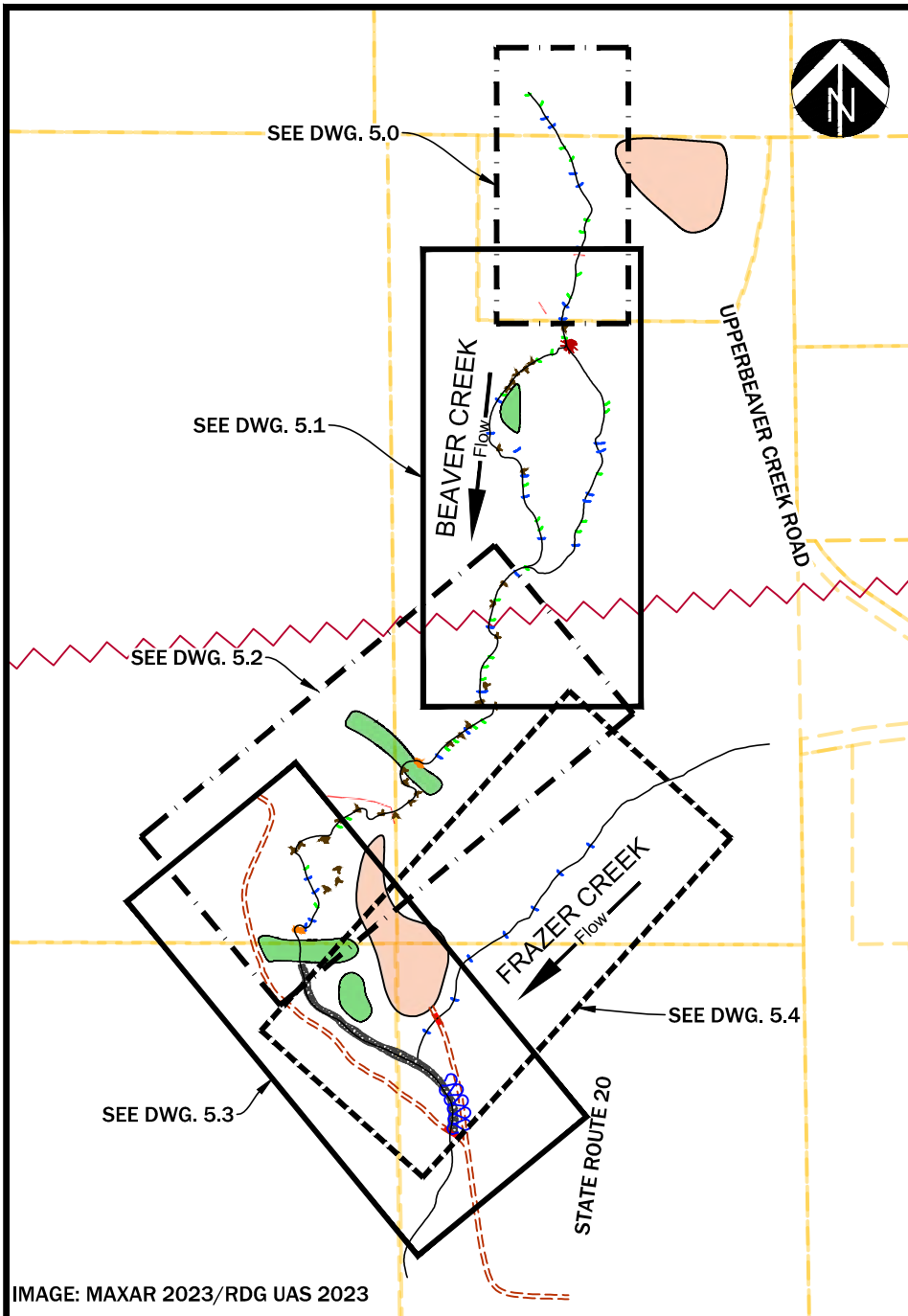
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PROJECT NUMBER
RDG-23-009

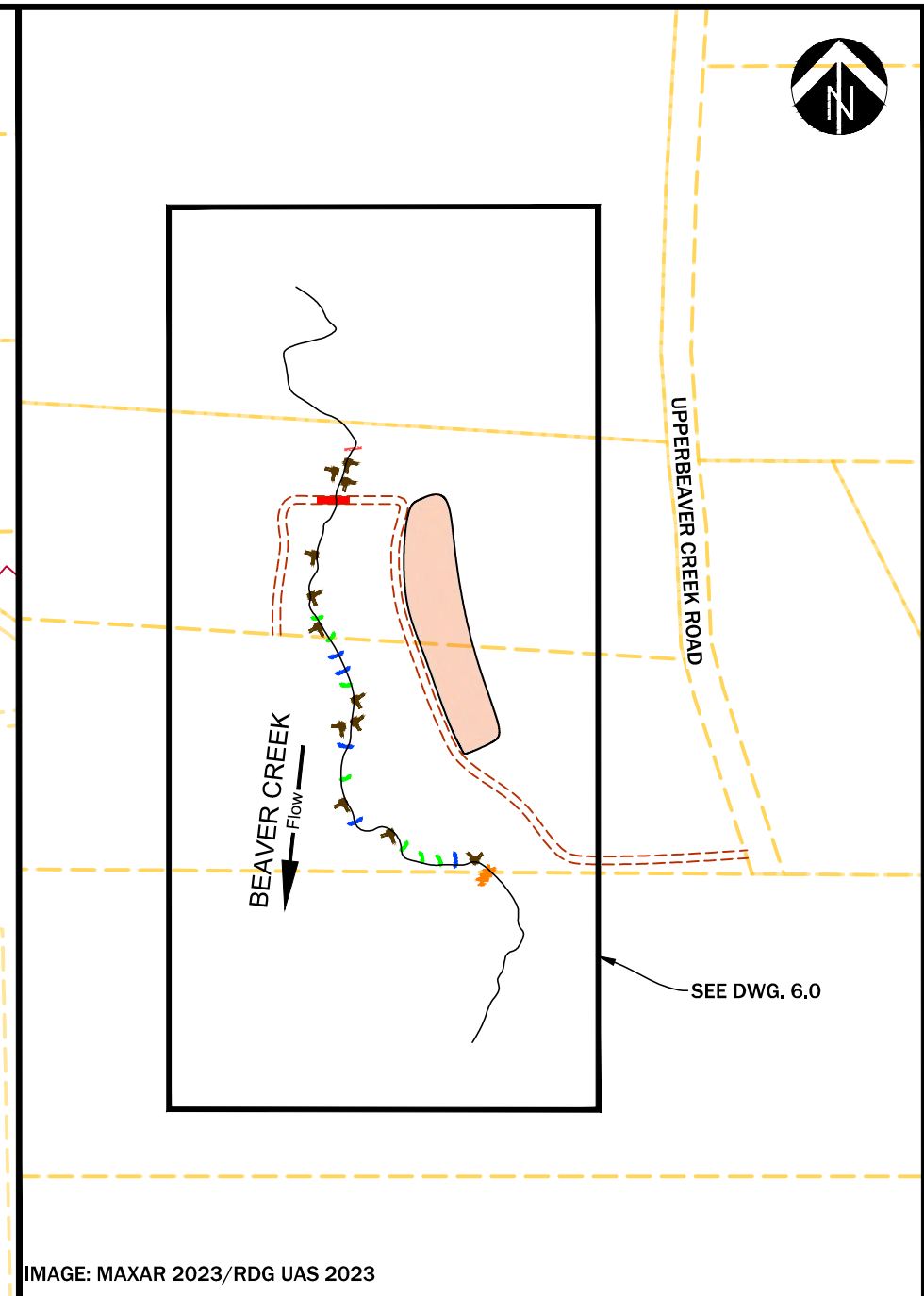
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Drawing 4 of 30

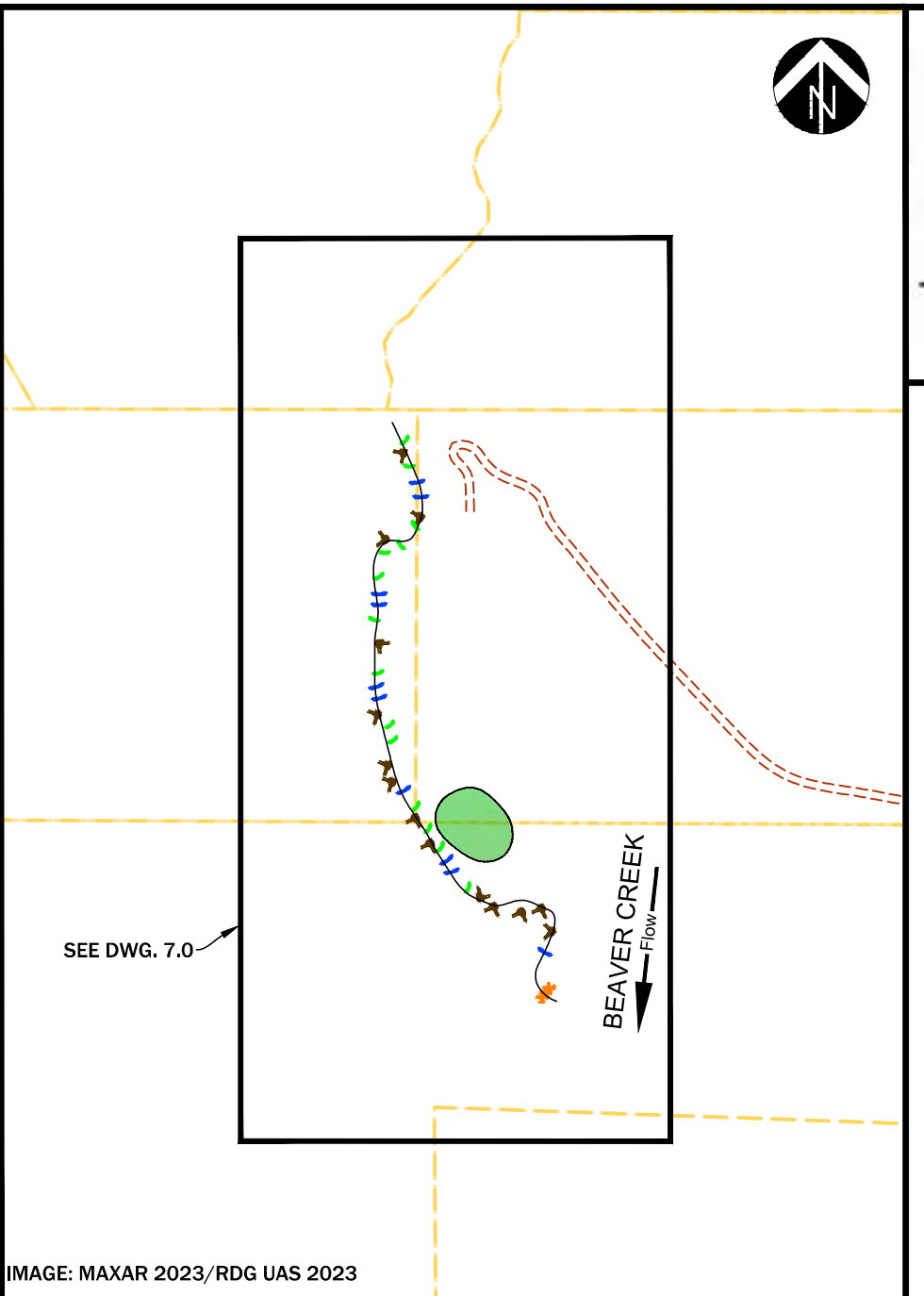
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1 SITE 1 EXISTING CONDITIONS PLAN VIEW
1" = 600'



2 SITE 2 EXISTING CONDITIONS PLAN VIEW
1" = 300'



3 SITE 3 EXISTING CONDITIONS PLAN VIEW
1" = 300'

RESTORATION STRATEGIES AND ACTIONS

THE PROPOSED RESTORATION PLAN INCLUDES INSTALLATION OF WOOD-BASED STRUCTURES TO IMPROVE STREAM CHANNEL DYNAMICS.

PROPOSED ACTIONS INCLUDE:

- PRESERVATION OF EXISTING HIGH-QUALITY VEGETATION AND HABITAT FEATURES.
- INSTALLATION OF POST-ASSISTED LOG STRUCTURES (PALS) TO INCREASE LATERAL MIGRATION AND PROVIDE GRAVEL AUGMENTATION;
- INSTALLATION OF LARGE WOOD COMPLEXES TO PROVIDE STABILITY ON SELECTED BANK MARGINS AND PROMOTE POOL DEVELOPMENT;
- INSTALLATION OF LARGE WOOD APEX STRUCTURES TO PROMOTE FLOW PARTITIONING INTO SIDE CHANNELS AND FLOODPLAINS;
- HELICOPTER WOOD PLACEMENT TO PROMOTE HYDRAULIC COMPLEXITY AND GRAVEL SORTING;

- INSTALLATION OF BOULDERS IN CHANNEL TO INCREASE STREAMBED COMPLEXITY, RAISE WATER SURFACE ELEVATION TO RESTORE FLOODPLAIN CONNECTIVITY AND IMPROVE DIVERSITY OF FISH HABITAT;
- INSTALLATION OF FLOODPLAIN ROUGHNESS CONSISTING OF LOGS, BOULDERS, AND DRIVEN POSTS DESIGNED TO COLLECT AND RETAIN MOBILE WOODY DEBRIS UPSTREAM OF INFRASTRUCTURE;
- PLANTING OF CONTAINERIZED PLANTS AND WILLOW CUTTINGS TO IMPROVE RIPARIAN CONDITIONS; AND

THESE ACTIONS ARE INTENDED TO CREATE REARING HABITAT FOR FOCAL AQUATIC SPECIES BY INCREASING THE DENSITY OF LARGE WOOD IN THE CHANNEL TO PROMOTE GRAVEL SORTING AND POOL FORMATION; IMPROVE HABITAT COMPLEXITY AND FLOODPLAIN FUNCTION; ESTABLISH SIDE CHANNEL CONNECTIONS AND RAISE THE CHANNEL BED OVER TIME TO INCREASE CONNECTIVITY WITH ADJACENT FLOODPLAIN SURFACES; AND PROVIDE FORAGE FOR FOCAL AQUATIC SPECIES BY INCREASING CONNECTION TO ALCOVE WETLAND HABITATS AND ESTABLISHING WOODY VEGETATION ON THE FLOODPLAIN.

DRAWING LEGEND	
SYMBOL	DETAIL SHEET
	STAGING AREA
	TEMPORARY ACCESS ROAD
	EXISTING INFRASTRUCTURE
	BANK ATTACHED JAM (BAJ) 8.0
	LARGE WOOD APEX (LWA) 8.1
	LARGE WOOD (LW) 8.2
	CHANNEL-SPANNING JAM (CSJ) 8.3
	POST ASSISTED LOG STRUCTURE (PALS) 8.4
	CHANNEL SPANNING POST ASSISTED LOG STRUCTURE (PALS-CS) 8.4
	HABITAT BOULDERS (HB) 8.5
	FLOODPLAIN ROUGHNESS (FR) 8.6

RESTORATION PLAN
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

PROJECT NUMBER
RDG-23-009

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3.0

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TOTAL WOOD QUANTITIES

ITEM	QUANTITY	DIAMETER	LENGTH	ROOTWAD
LARGE ROOT WAD LOG	339	18"-24"	30'-40'	YES
LARGE LOG	125	18"-24"	30'-40'	NO
HEAVY SLASH-WHOLE	923	5"-10"	20'-40'	OPTIONAL


NOTE:
WOOD LENGTHS SHOWN WILL PRODUCE THE PROPER AMOUNT MATERIAL FOR STRUCTURES WHEN SPLIT INTO APPROPRIATE SIZES DURING CONSTRUCTION. IT IS CONTRACTOR'S RESPONSIBILITY TO CUT WOOD INTO APPROPRIATE SIZE LENGTHS TO FIT STRUCTURE DIMENSIONS.

TOTAL MISCELLANEOUS QUANTITIES


ITEM	QUANTITY	DIAMETER	LENGTH
UNTREATED TIMBER POST	2,902	2"-4"	4'
BOULDERS	275	2'-3'	NA

BANK ATTACHED JAM QUANTITIES 


ITEM	QUANTITY (EA)
BANK ATTACHED JAM LENGTH	162 FT
LARGE ROOT WAD LOGS	65
LARGE LOGS	113
HEAVY SLASH-BRUSH	81

LARGE WOOD APEX QUANTITIES 


ITEM	QUANTITY (EA)
LARGE WOOD APEX STRUCTURES	1
LARGE ROOT WAD LOGS	10
LARGE LOGS	4
HEAVY SLASH-WHOLE	10
UNTREATED TIMBER POSTS	20

LARGE WOOD QUANTITIES 


ITEM	QUANTITY (EA)
LARGE WOOD STRUCTURES	58
LARGE ROOT WAD LOGS	232
BOULDERS	116

CHANNEL-SPANNING JAM QUANTITIES 

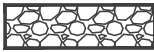
ITEM	QUANTITY (EA)
CHANNEL-SPANNING JAM STRUCTURES	4
LARGE ROOT WAD LOGS	32
LARGE LOGS	8

POST ASSISTED LOG STRUCTURE QUANTITIES 


ITEM	QUANTITY (EA)
POST ASSISTED LOG STRUCTURES	55
UNTREATED TIMBER POSTS	990
HEAVY SLASH-LOG	165
HEAVY SLASH-BRUSH	1100

CHANNEL-SPANNING POST ASSISTED LOG STRUCTURE QUANTITIES 

ITEM	QUANTITY (EA)
CHANNEL-SPANNING POST ASSISTED LOG STRUCTURES	49
UNTREATED TIMBER POSTS	980
HEAVY SLASH-LOG	98
HEAVY SLASH-BRUSH	980

HABITAT BOULDERS QUANTITIES 

ITEM	QUANTITY
HABITAT BOULDER REACH LENGTH	794 FT
BOULDERS	159

FLOODPLAIN ROUGHNESS QUANTITIES 

ITEM	QUANTITY
FLOODPLAIN ROUGHNESS AREA	1.73 AC.
UNTREATED TIMBER POSTS	980
HEAVY SLASH-WHOLE	147

MATERIALS AND QUANTITIES
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

PROJECT NUMBER
RDG-23-009

DRAWING NUMBER

3.1

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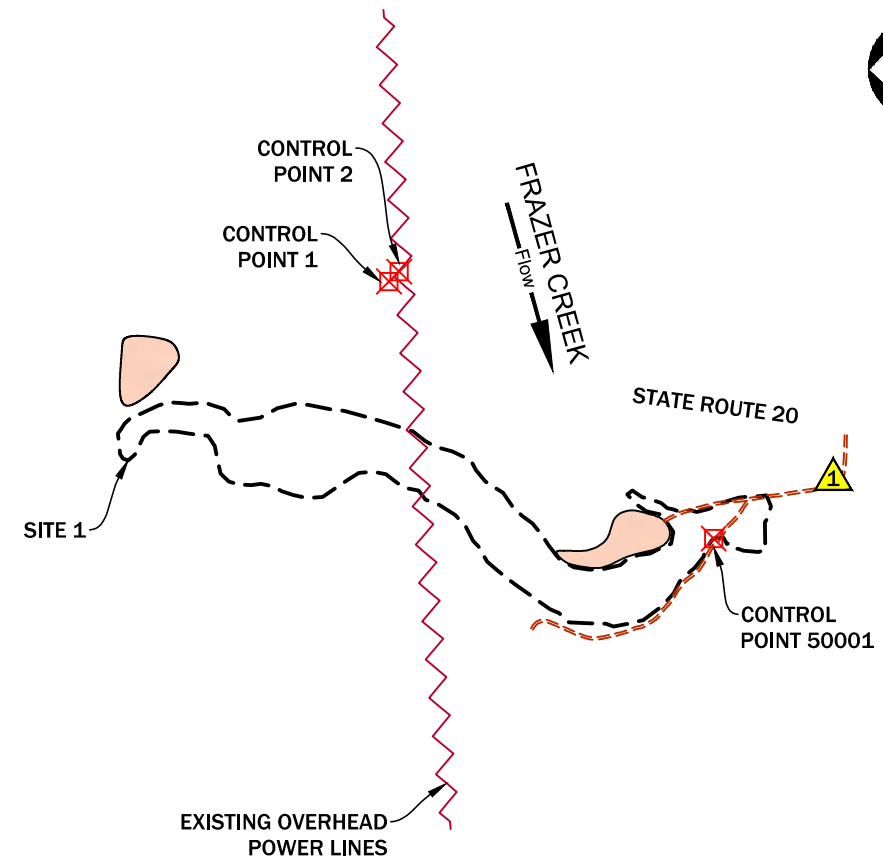
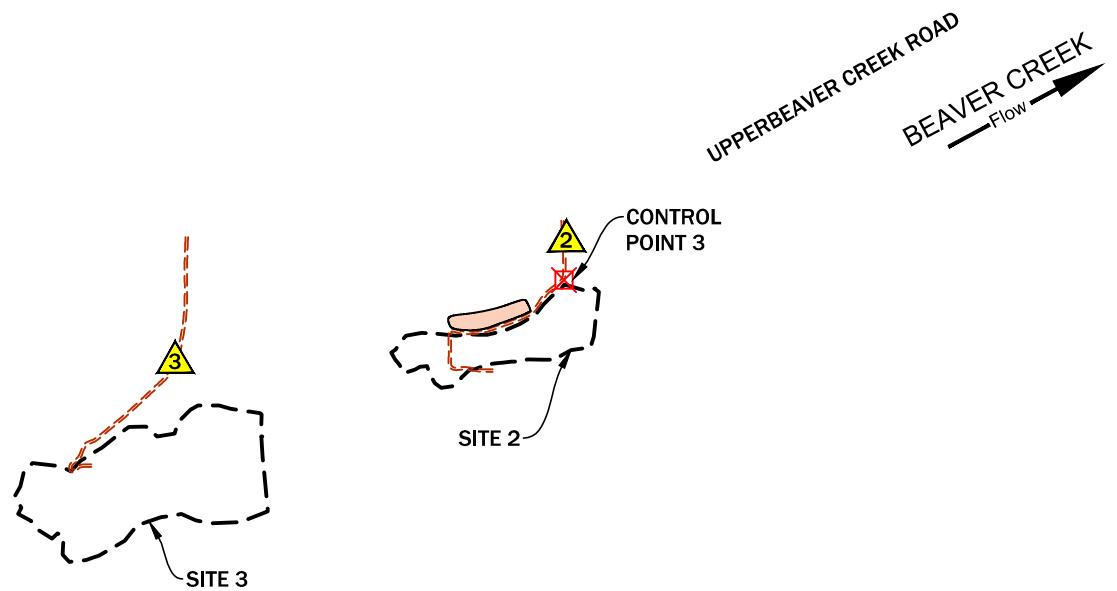
IMAGE: MAXAR 2023/RDG UAS 2023

DRAWING LEGEND	
SYMBOL	
	SITE ACCESS TAG
	SURVEY CONTROL POINT
	STAGING AREA
	TEMPORARY ACCESS ROAD

ACCESS AND STAGING

- SITE 1 - FROM STATE ROUTE 20 TURN WEST ON TO EXISTING ACCESS ROAD LOCATED AT 20647A STATE ROUTE 20. VARIOUS EXISTING ACCESS ROADS ARE LOCATED AT THE PROPERTY FOR PROJECT ACCESS.
- SITE 2 - FROM STATE ROUTE 20 TURN NORTH ON TO UPPER BEAVER CREEK ROAD. CONTINUE FOR 1.6 MILES THEN TURN LEFT ON TO AN EXISTING ACCESS ROAD. FOLLOW THE EXISTING ACCESS ROAD FOR PROJECT ACCESS
- SITE 3 - FROM STATE ROUTE 20 TURN NORTH ON TO UPPER BEAVER CREEK ROAD. CONTINUE FOR 2 MILES THEN TURN LEFT AT 205 UPPER BEAVER CREEK ROAD. CONTINUE ALONG DRIVEWAY THEN DEVELOP TEMPORARY ACCESS ROAD TO THE NORTH END OF THE HOUSE DOWN TO PROJECT.

NOTE: CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ACCESS ROADS AND TEMPORARY HAUL ROADS. EQUIPMENT, MAINTENANCE AND MATERIALS TO BE STAGED MINIMUM 150' FROM RIVER.



1 ACCESS, STAGING AND SURVEY CONTROL PLAN VIEW
1" = 1000'

PROJECT DATUM	
THE PROJECT COORDINATES ARE BASED ON THE FOLLOWING:	
HORIZONTAL PROJECTION:	WASHINGTON STATE PLANE, NORTH ZONE
HORIZONTAL DATUM:	NAD83 (CORS96 2002.00)
UNITS:	US SURVEY FEET
VERTICAL DATUM:	NAVD88 (GEOID 12A)
CROSS SECTIONS WERE SURVEYED BY RDG IN JUNE 2023. LIDAR DATA WAS ACQUIRED BY ATLANTIC GROUP LLC IN 2018.	

CONTROL POINTS					
POINT NUMBER	EASTING	NORTHING	POINT ELEVATION	RAW DESCRIPTION	
	1	1834431.811	498022.823	1955.228	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "RDG"
	2	1834482.929	497969.578	1954.148	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "RDG"
	3	1831360.56	504794.217	2064.521	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "RDG"
	50001	1833092.45	496332.027	1833.969	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "RDG"

ACCESS, STAGING AND SURVEY CONTROL
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

PROJECT NUMBER
RDG-23-009

DRAWING NUMBER
4.0

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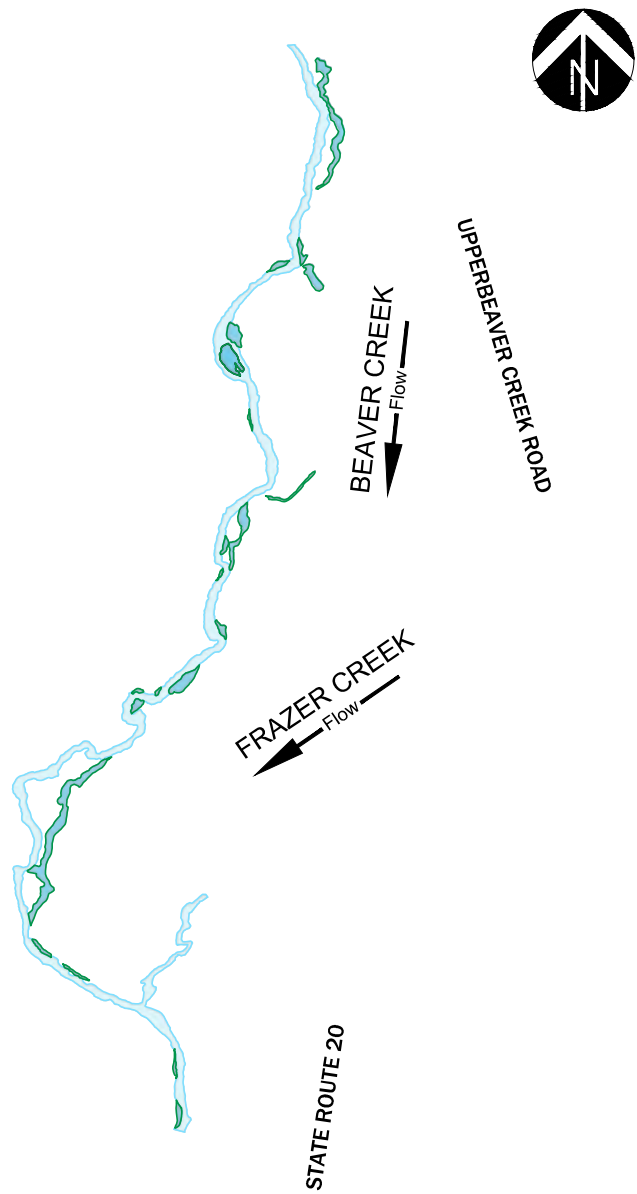


IMAGE: MAXAR 2023/RDG UAS 2023

**1 SITE 1 WETLANDS
PLAN VIEW**

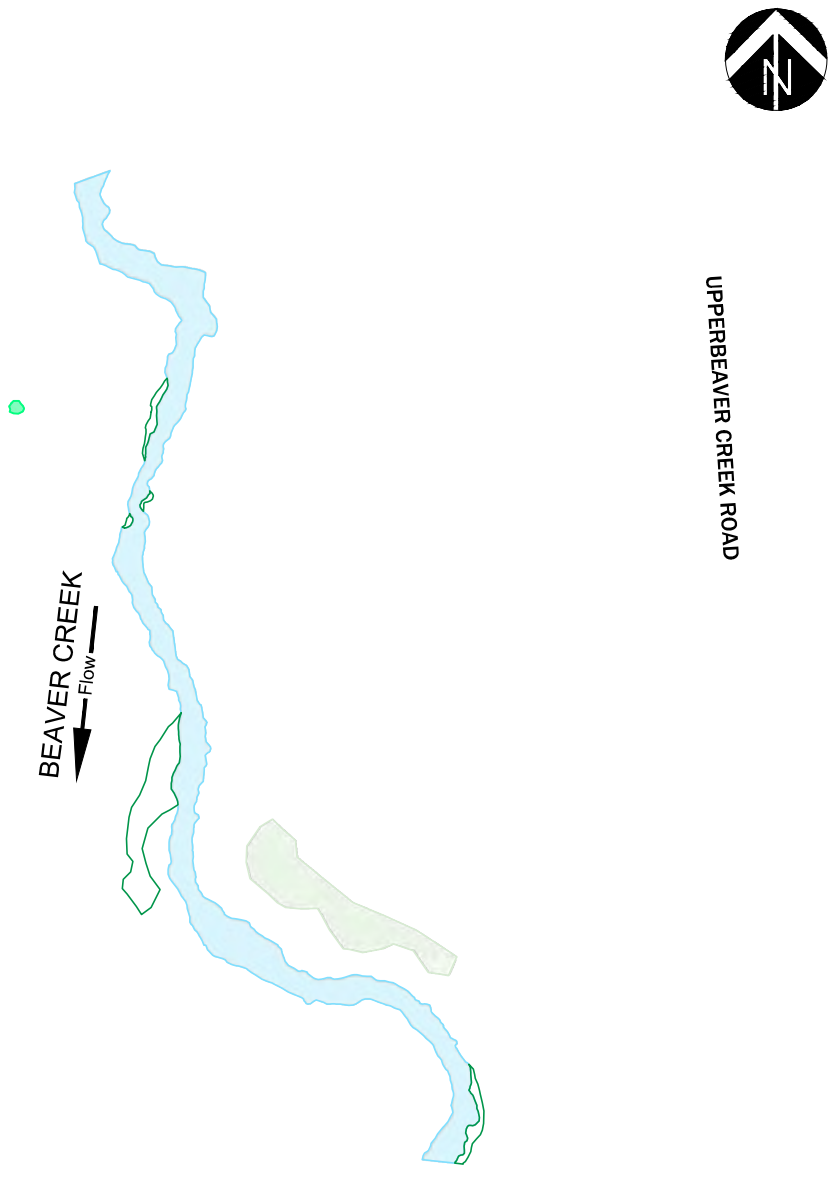
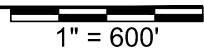


IMAGE: MAXAR 2023/RDG UAS 2023

**2 SITE 2 WETLANDS
PLAN VIEW**

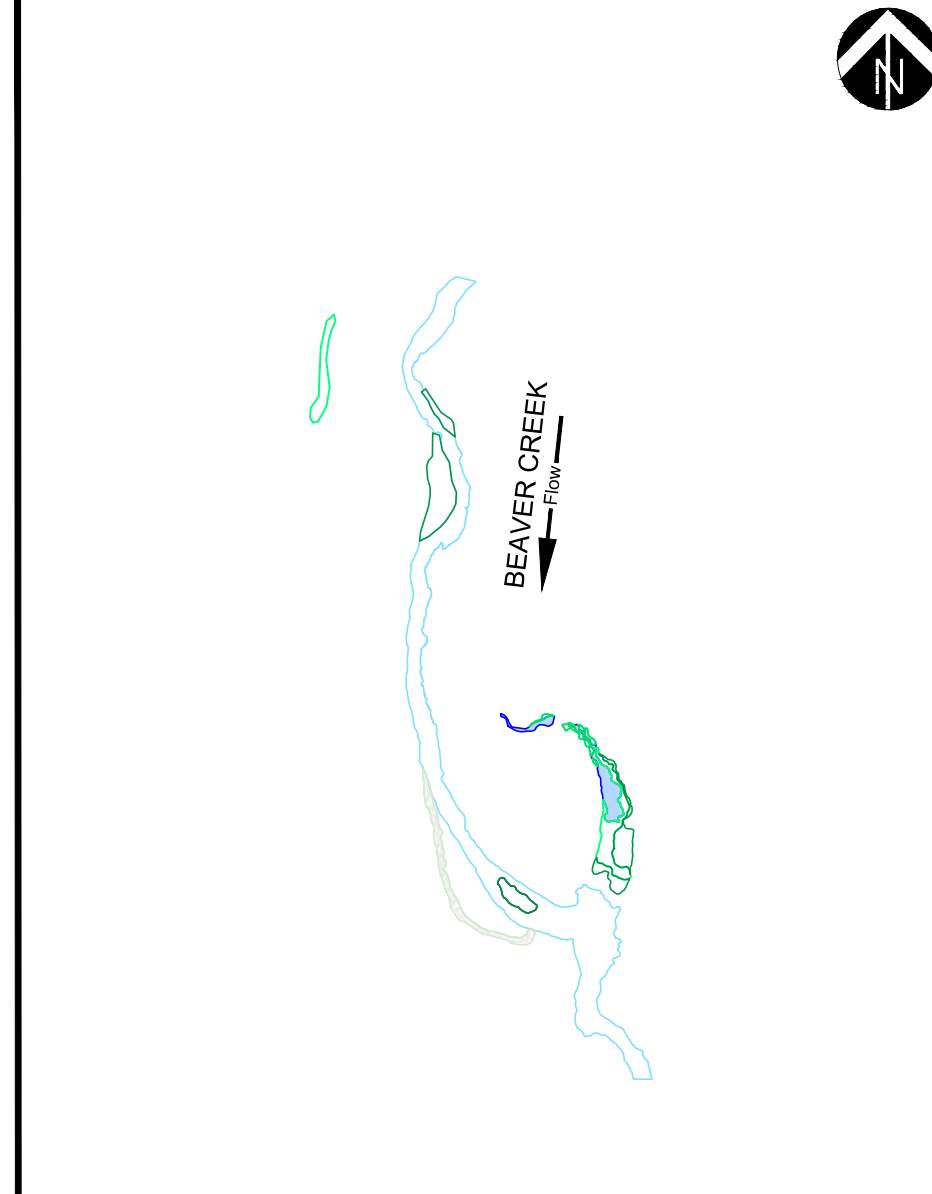
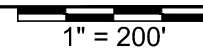
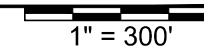







IMAGE: MAXAR 2023/RDG UAS 2023

**3 SITE 3 WETLANDS
PLAN VIEW**



FEATURE LEGEND	
SYMBOL	
	EMERGENT WETLANDS
	SCRUB-SHRUB WETLANDS
	FORESTED WETLANDS
	RIVERINE
	OPEN WATER

WETLANDS AND VEGETATION PRESERVATION
BEAVER CREEK WOOD ENHANCEMENT PROJECT
 OKANOHAN COUNTY, WASHINGTON



NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

PROJECT NUMBER
RDG-23-009

DRAWING NUMBER
4.1

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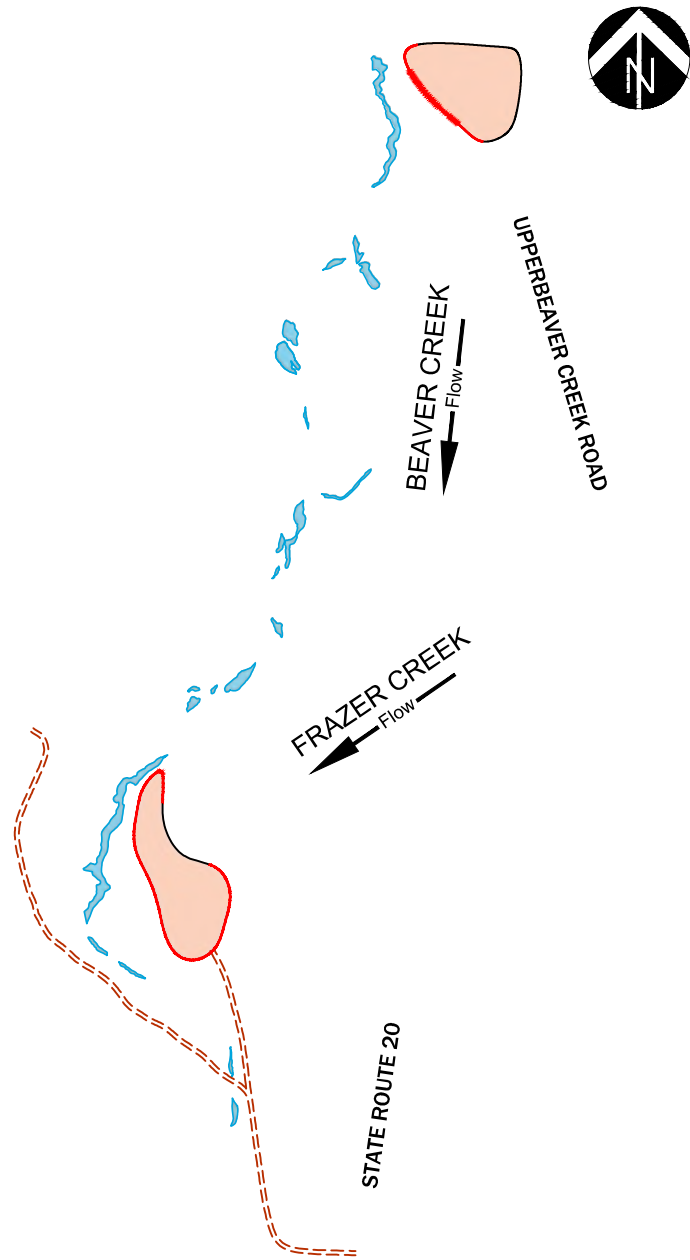


IMAGE: MAXAR 2023/RDG UAS 2023

1 SITE 1 STORMWATER MANAGEMENT PLAN VIEW
1" = 600'

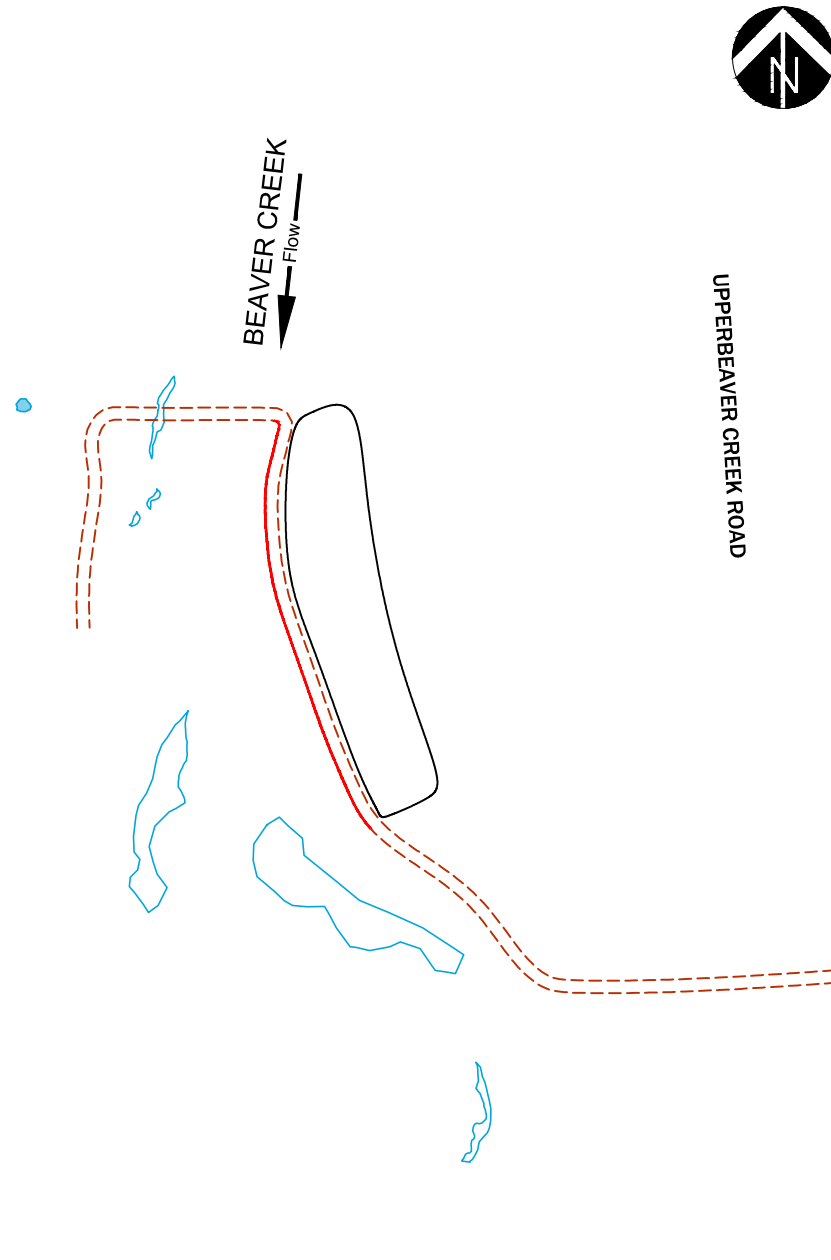


IMAGE: MAXAR 2023/RDG UAS 2023

2 SITE 2 STORMWATER MANAGEMENT PLAN VIEW
1" = 200'

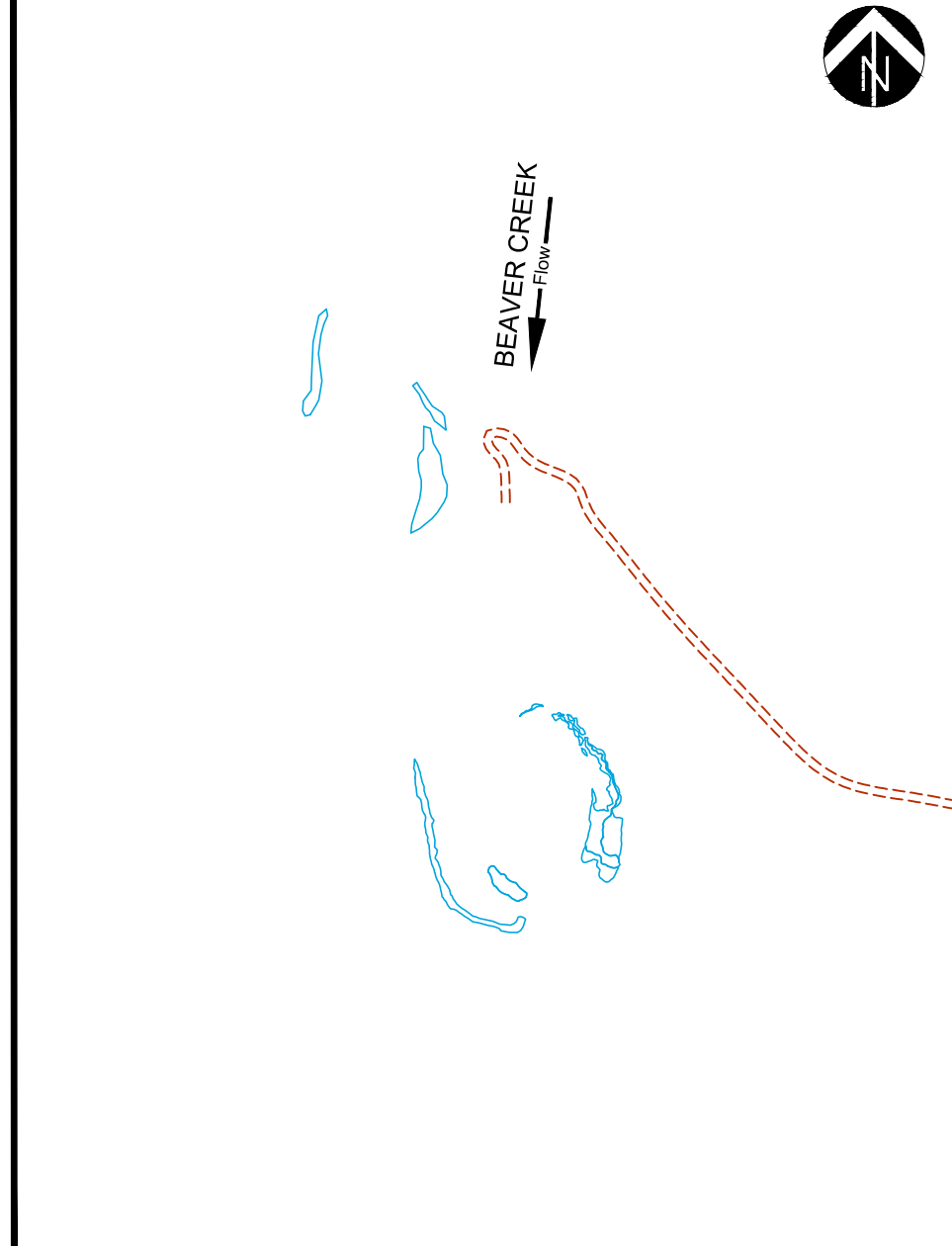


IMAGE: MAXAR 2023/RDG UAS 2023

3 SITE 3 STORMWATER MANAGEMENT PLAN VIEW
1" = 300'

FEATURE LEGEND	
SYMBOL	
	EXISTING WETLAND
	TEMPORARY ACCESS ROAD
	STAGING AREA
	SILT FENCE

STORMWATER MANAGEMENT PLAN
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

PROJECT NUMBER
RDG-23-009

DRAWING NUMBER

4.2



WORK AREA ISOLATION
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

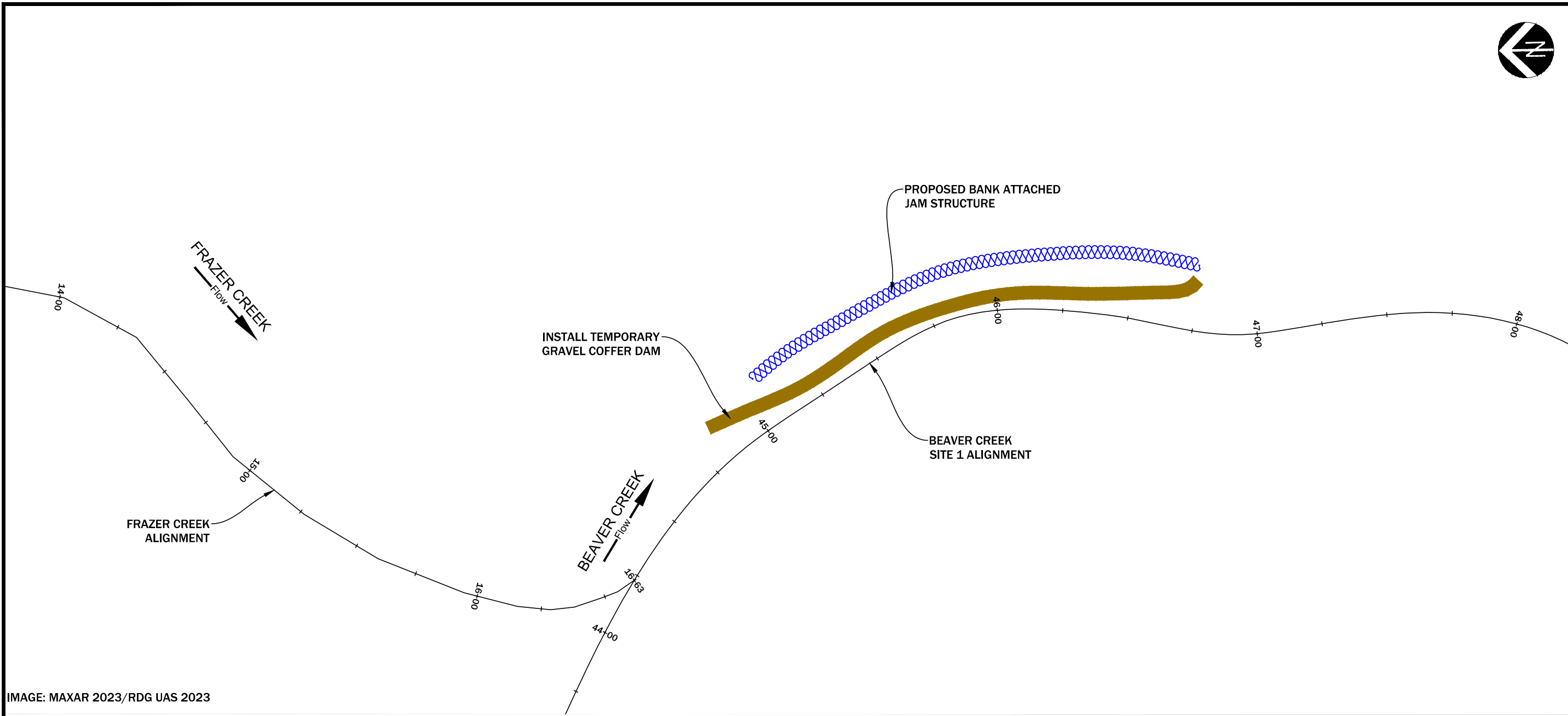
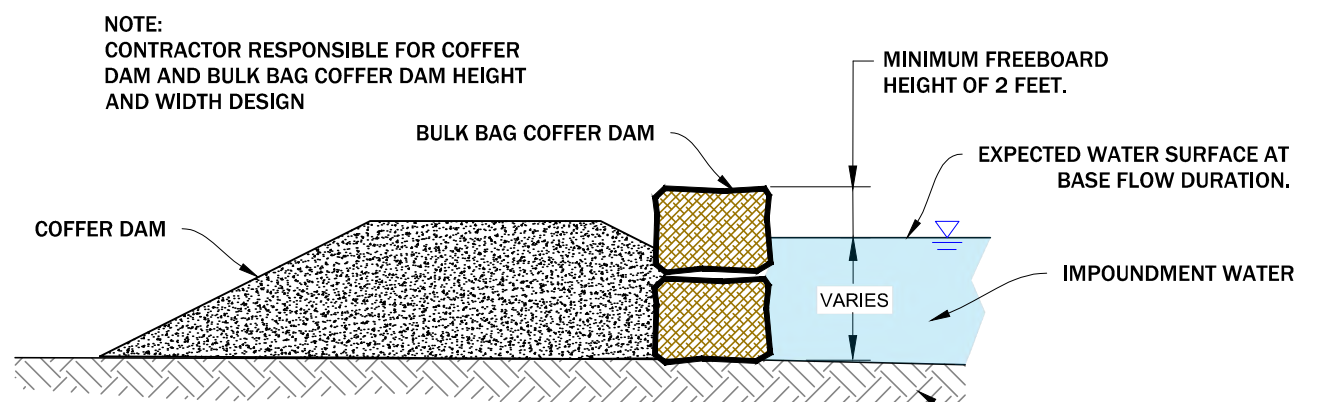


IMAGE: MAXAR 2023/RDG UAS 2023

1 WORK AREA ISOLATION PLAN
PLAN VIEW
1" = 40'

GENERAL NOTES:

1. WORK AREA TO BE ISOLATED USING COFFERDAMS CONSTRUCTED WITH BULK BAGS, SAND BAGS, OR APPROVED ALTERNATIVE. BULK BAGS ARE ALSO CALLED FLEXIBLE INTERMEDIATE BULK CONTAINERS (FIBC) THAT CAN BE CUSTOM MADE FROM VARIOUS FABRIC. THE FOLLOWING REQUIREMENTS ARE NECESSARY FOR THE RIVER ENVIRONMENT:
2. LARGE BULK BAGS SHALL BE CONSTRUCTED OF 8 oz WOVEN FABRIC, 1200 HOUR UV RESISTANT WITH SEWN LIFTING LOOPS. FILL MATERIAL SHALL BE COMPRISED OF SPAWNING GRAVEL AND MEET THE GRADATION SHOWN IN FILL GRADATION TABLE. THE BAGS ARE APPROXIMATELY 6' WIDE x 6' LONG x 4' HIGH WHEN FILLED.
3. SMALL BULK BAGS SHALL BE CONSTRUCTED OF 8 oz WOVEN FABRIC, 1200 HOUR UV RESISTANT WITH SEWN LIFTING LOOPS. FILL MATERIAL SHALL BE COMPRISED OF SPAWNING GRAVEL AND MEET THE GRADATION GIVEN BY THE CITY OF BOISE SPECIFICATIONS (SHOWN BELOW). THE BAGS ARE APPROXIMATELY 3' WIDE x 3' LONG x 2.5' HIGH WHEN FILLED.
4. BULK BAGS SHALL BE CAREFULLY PLACED TO ENSURE NO TEARING OR CUTTING OF THE BAGS OCCURS.
5. BULK BAGS SHALL BE PLACED USING A HYDRAULIC CRANE OR TRACKHOE USING LIFTING BARS AND STEEL CABLES TO EQUALIZE LOAD ON LIFTING LOOPS.



2 COFFER DAM INSTALLATION
DETAIL
NTS

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

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RDG-23-009

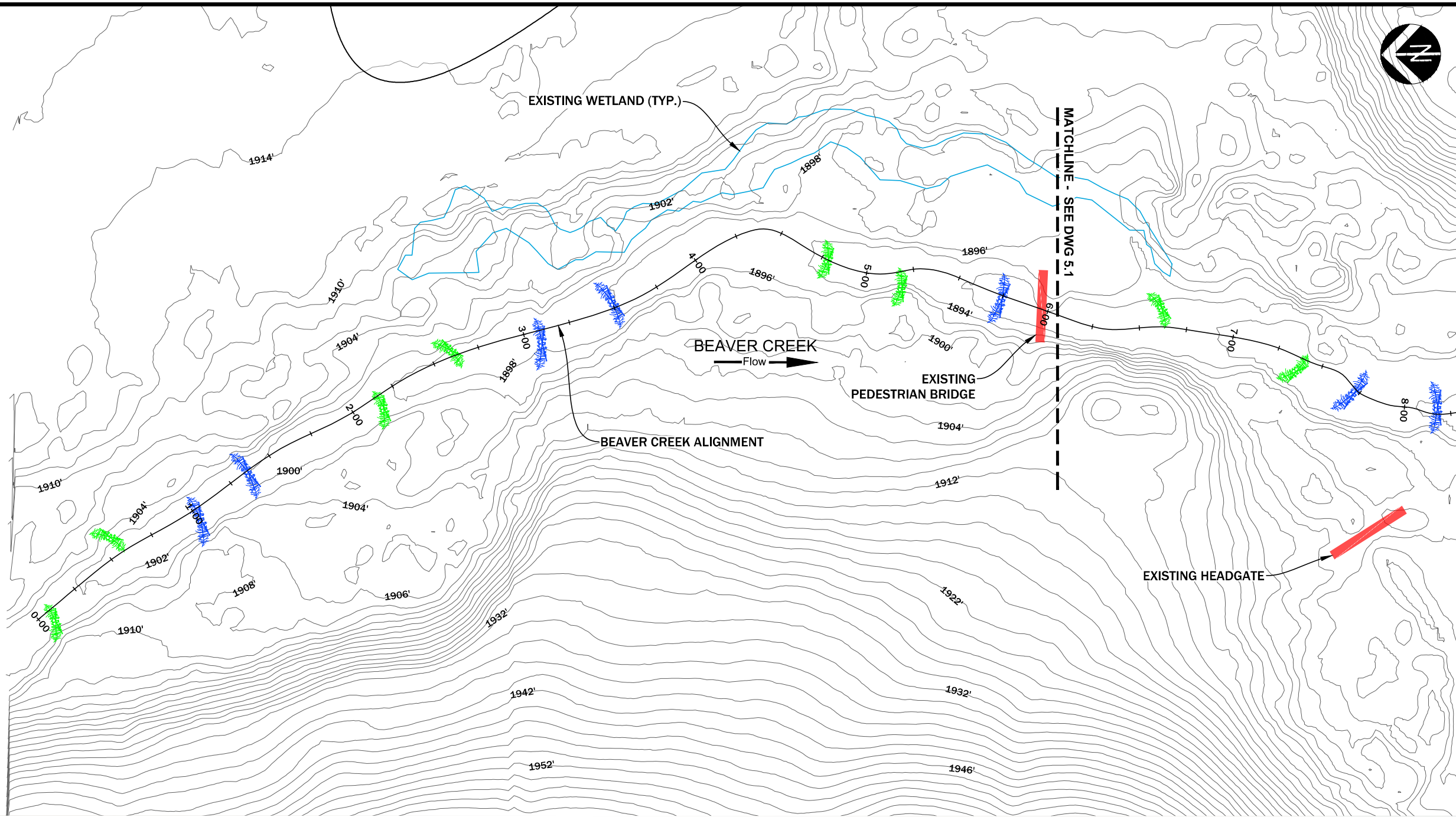
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IMAGE: MAXAR 2023/RDG UAS 2023



SITE 1 STRUCTURE LAYOUT STA 0+00 TO 6+00
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

1 SITE 1 STRUCTURE LAYOUT STA 0+00 - 6+00
PLAN VIEW
1" = 60'

DRAWING LEGEND		DETAIL SHEET
SYMBOL		
	STAGING AREA	
	POST ASSISTED LOG STRUCTURE (PALS)	8.4
	CHANNEL SPANNING POST ASSISTED LOG STRUCTURE (PALS-CS)	8.4

BEAVER CREEK STRUCTURE SCHEDULE		
STATION START	BANK	STRUCTURE
0+05	R	PALS
0+56	L	PALS
1+00	C	PALS-CS
1+36	C	PALS-CS
2+14	R	PALS
2+61	L	PALS
3+08	C	PALS-CS
3+50	C	PALS-CS
4+78	L	PALS
5+18	R	PALS
5+75	C	PALS-CS

NO.	DATE	BY	DESCRIPTION	CHK
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PROJECT NUMBER
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DRAWING NUMBER
5.0

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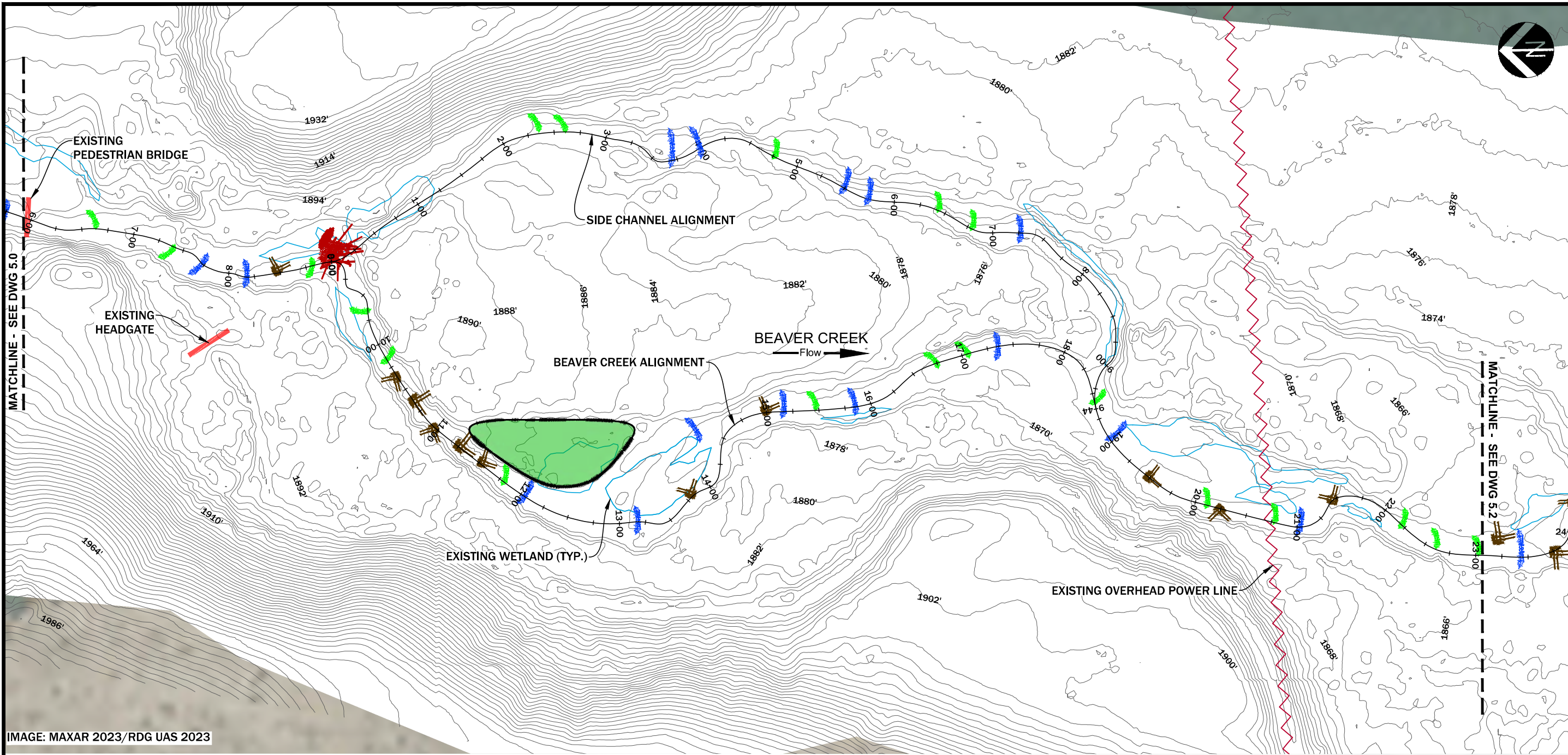


IMAGE: MAXAR 2023/RDG UAS 2023

1 SITE 1 STRUCTURE LAYOUT STA 6+00 - 23+00
PLAN VIEW
 1" = 100'

DRAWING LEGEND	
SYMBOL	DETAIL SHEET
	LARGE WOOD APEX (LWA) 8.1
	LARGE WOOD (LW) 8.2
	POST ASSISTED LOG STRUCTURE (PALS) 8.4
	CHANNEL SPANNING POST ASSISTED LOG STRUCTURE (PALS-CS) 8.4
	FLOODPLAIN ROUGHNESS (FR) 8.6

BEAVER CREEK STRUCTURE SCHEDULE								
STATION START	BANK	STRUCTURE	STATION START	BANK	STRUCTURE	STATION START	BANK	STRUCTURE
6+62	L	PALS	11+26	L	START FR	17+02	L	PALS
7+38	R	PALS	11+50	L	LW	17+37	C	PALS-CS
7+72	C	PALS-CS	11+80	L	PALS	18+58	L	PALS
8+16	C	PALS-CS	12+04	C	PALS-CS	18+96	C	PALS-CS
8+46	L	LW	13+18	C	PALS-CS	19+50	L	LW
8+79	R	PALS	13+18	L	END FR	20+10	L	PALS
9+00	C	LWA	13+82	L	LW	20+25	R	LW
9+68	R	PALS	14+48	C	PALS-CS	20+74	L	PALS
10+14	L	PALS	15+00	L	LW	21+02	C	PALS-CS
10+34	R	LW	15+16	C	PALS-CS	21+47	L	LW
10+65	L	LW	15+43	L	PALS	22+19	L	PALS
10+96	R	LW	15+85	C	PALS-CS	22+58	L	PALS
11+26	L	LW	16+71	L	PALS	23+00	L	PALS

SIDE CHANNEL STRUCTURE SCHEDULE		
STATION START	BANK	STRUCTURE
2+25	L	PALS
2+55	L	PALS
3+60	C	PALS-CS
3+90	C	PALS-CS
4+75	L	PALS
5+45	C	PALS-CS
5+75	C	PALS-CS
6+35	L	PALS
6+80	L	PALS
7+20	C	PALS-CS

SITE 1 STRUCTURE LAYOUT STA 6+00-23+00
 BEAVER CREEK WOOD ENHANCEMENT PROJECT
 OKANOHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
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PROJECT NUMBER
RDG-23-009

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5.1

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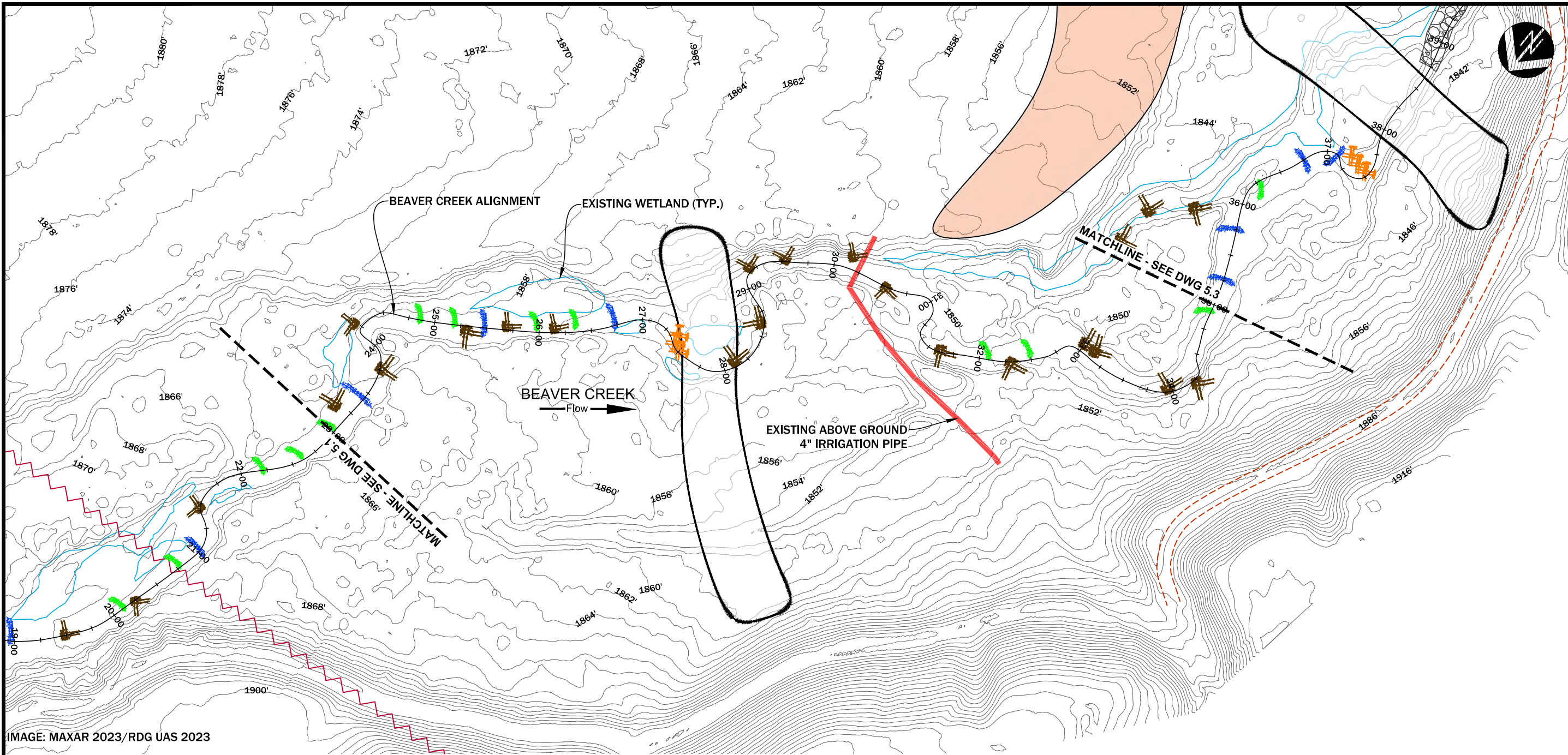


IMAGE: MAXAR 2023/RDG UAS 2023

1 SITE 1 STRUCTURE LAYOUT STA 23+00 - 35+00
PLAN VIEW

1" = 100'

DRAWING LEGEND	
SYMBOL	DETAIL SHEET
	STAGING AREA
	TEMPORARY ACCESS ROAD
	LARGE WOOD (LW) 8.2
	CHANNEL-SPANNING JAM (CSJ) 8.3
	POST ASSISTED LOG STRUCTURE (PALS) 8.4
	CHANNEL SPANNING POST ASSISTED LOG STRUCTURE (PALS-CS) 8.4
	FLOODPLAIN ROUGHNESS (FR) 8.6

BEAVER CREEK STRUCTURE SCHEDULE					
STATION START	BANK	STRUCTURE	STATION START	BANK	STRUCTURE
23+21	L	LW	28+13	L	LW
23+43	C	PALS-CS	28+61	L	LW
23+75	R	LW	29+20	L	LW
24+24	L	LW	29+53	L	LW
24+86	L	PALS	30+14	L	LW
25+17	L	PALS	35+56	R	LW
25+30	R	LW	31+63	R	LW
25+47	C	PALS-CS	32+04	L	PALS
25+68	L	LW	32+30	R	LW
25+97	L	PALS	32+48	L	PALS
26+15	L	LW	33+00	L	LW
26+35	L	PALS	33+10	L	LW
26+74	C	PALS-CS	33+95	L	LW
27+53	C	CSJ	34+22	R	LW
27+53		START FR	34+91	L	PALS
28+13		END FR			

SITE 1 STRUCTURE LAYOUT STA 23+00-35+00
 BEAVER CREEK WOOD ENHANCEMENT PROJECT
 OKANOHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

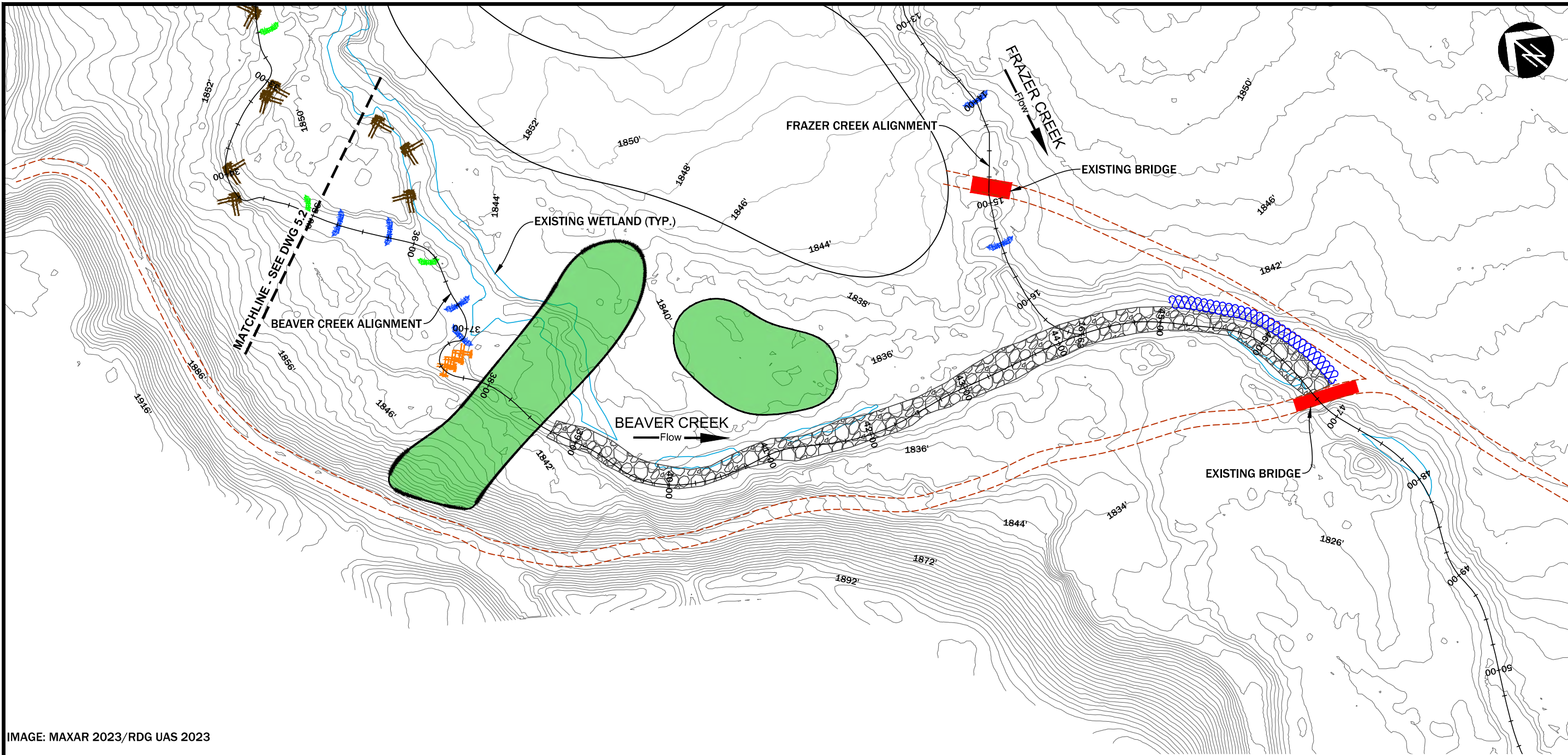
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RDG-23-009

DRAWING NUMBER

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IMAGE: MAXAR 2023/RDG UAS 2023



1 SITE 1 STRUCTURE LAYOUT STA 35+00 - 47+00
PLAN VIEW

1" = 100'

DRAWING LEGEND		DETAIL SHEET
SYMBOL		
	STAGING AREA	
	TEMPORARY ACCESS ROAD	
	BANK ATTACHED JAM (BAJ)	8.0
	LARGE WOOD (LW)	8.2
	CHANNEL-SPANNING JAM (CSJ)	8.3
	POST ASSISTED LOG STRUCTURE (PALS)	8.4
	CHANNEL SPANNING POST ASSISTED LOG STRUCTURE (PALS-CS)	8.4
	HABITAT BOULDERS (HR)	8.5
	FLOODPLAIN ROUGHNESS (FR)	8.6

BEAVER CREEK STRUCTURE SCHEDULE					
STATION START	BANK	STRUCTURE	STATION START	BANK	STRUCTURE
35+25	C	BDA	37+85		START FR
35+36	L	LW	38+66		END FR
35+75	C	PALS-CS	38+75		START HR
35+75	L	LW	40+38	L	START FR
35+89	L	LW	41+82	L	END FR
36+24	C	PALS-CS	45+07	L	START BAJ
36+24	R	PALS	46+69		END HR
37+10	C	PALS-CS	46+69	L	END BAJ
37+50	C	CSJ			

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

PROJECT NUMBER
RDG-23-009

DRAWING NUMBER
5.3

Drawing 14 of 30

M:\Projects\2023\RDG-23-009 Beaver Creek Wood Enhancement\CAD\RDG-23-009_Beaver_Crk_Planset.dwg

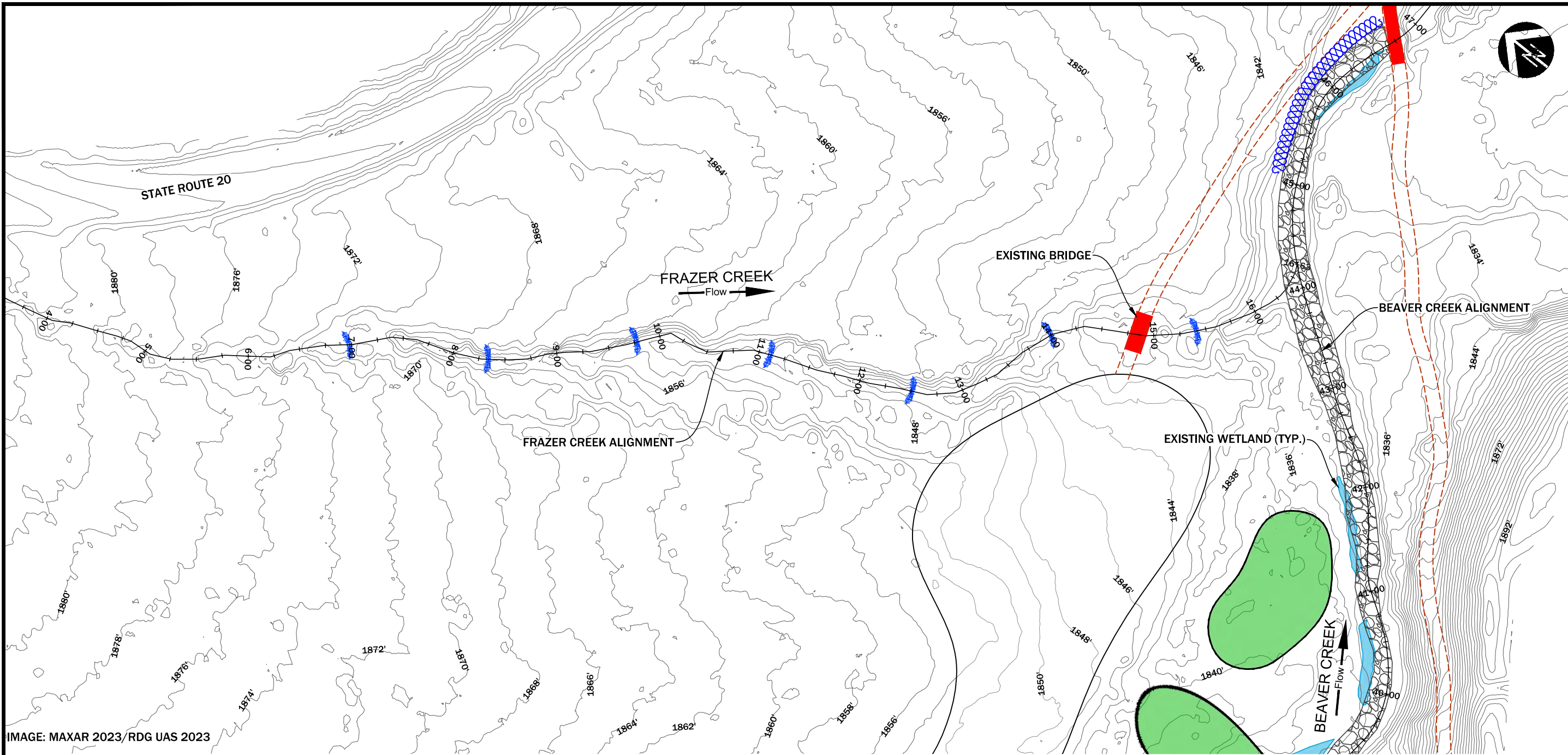


IMAGE: MAXAR 2023/RDG UAS 2023

1 SITE 1 STRUCTURE LAYOUT FRAZER CREEK
PLAN VIEW

1" = 100'

DRAWING LEGEND	
SYMBOL	DETAIL SHEET
	STAGING AREA
	TEMPORARY ACCESS ROAD
	CHANNEL SPANNING POST ASSISTED LOG STRUCTURE (PALS-CS)
	8.4

FRAZER CREEK STRUCTURE SCHEDULE		
STATION START	BANK	STRUCTURE
7+00	C	PAL-CS
8+40	C	PAL-CS
9+80	C	PAL-CS
11+20	C	PAL-CS
12+60	C	PAL-CS
14+00	C	PAL-CS
15+40	C	PAL-CS

SITE 1 STRUCTURE LAYOUT FRAZER CREEK
BEAVER CREEK WOOD ENHANCEMENT PROJECT
 OKANOHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

PROJECT NUMBER
RDG-23-009

DRAWING NUMBER
5.4

Drawing 15 of 30

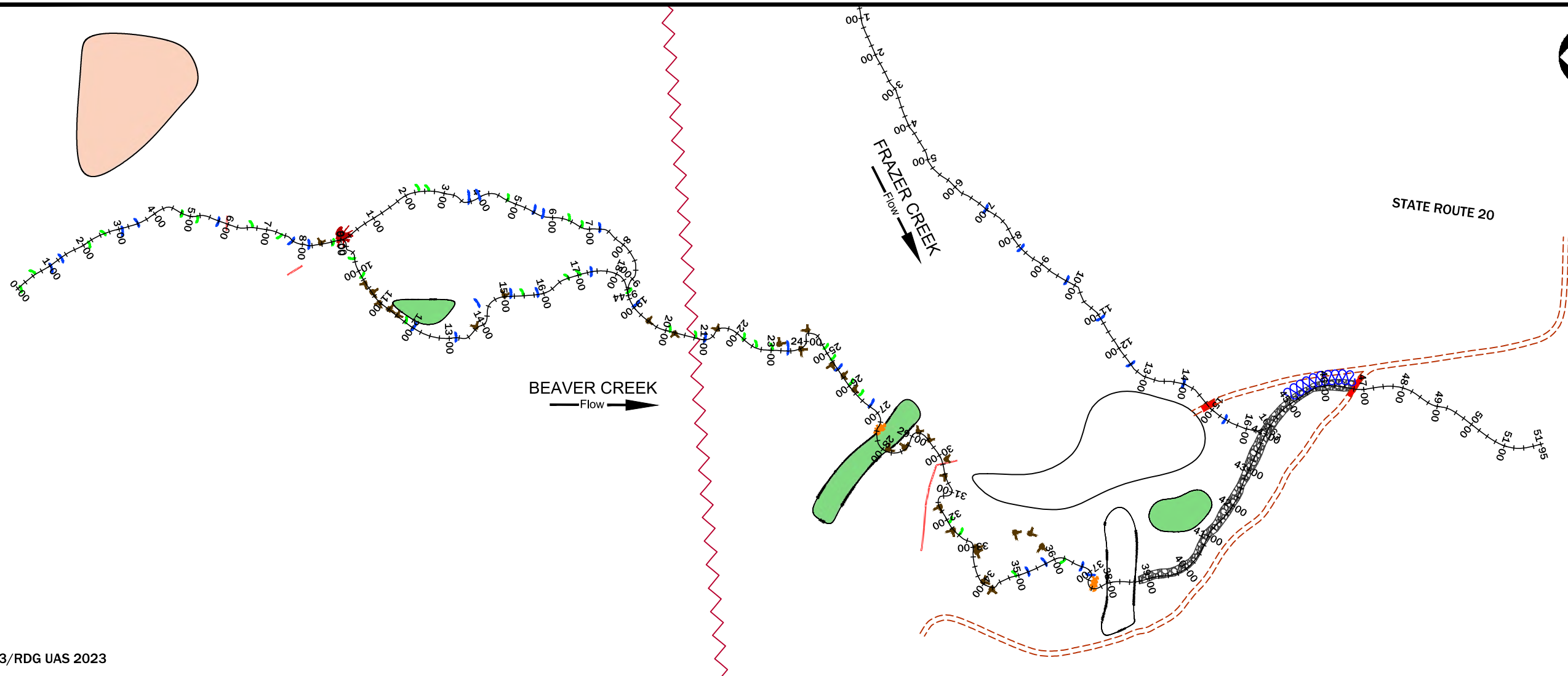
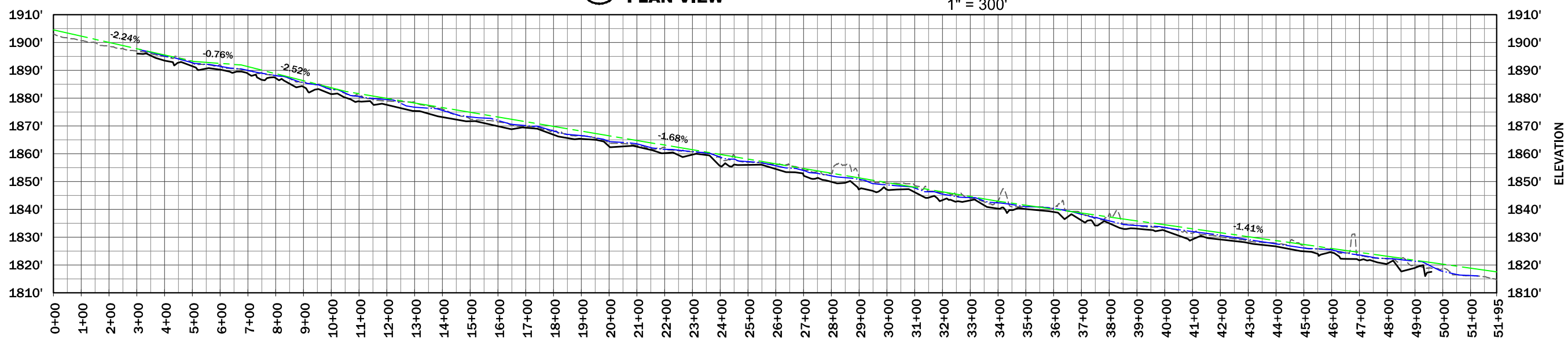


IMAGE: MAXAR 2023/RDG UAS 2023

1 SITE 1 PLAN VIEW
PLAN VIEW
1" = 300'



2 SITE 1 PROFILE
PROFILE VIEW
HOR: 1" = 400'
VER: 1" = 40'

LEGEND	
SYMBOL	
---	EXISTING GRADE (2018 LIDAR)
---	BANKFULL (SURVEYED)
---	WATER SURFACE (SURVEYED)
---	THALWEG (SURVEYED)

SITE 1 PLAN AND PROFILE
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

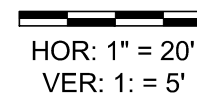
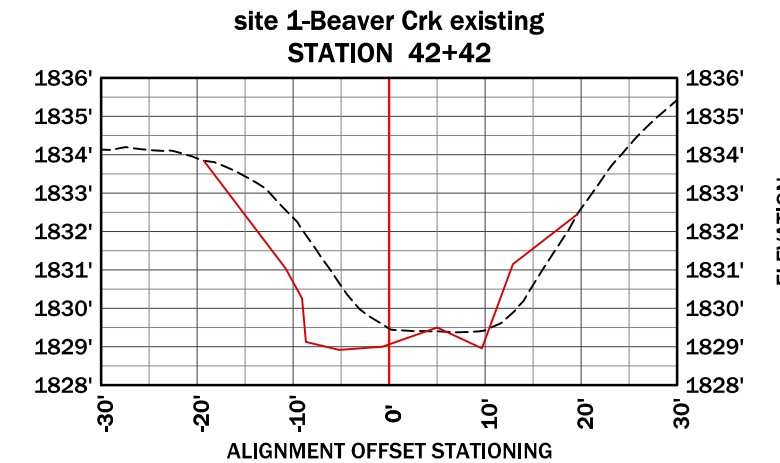
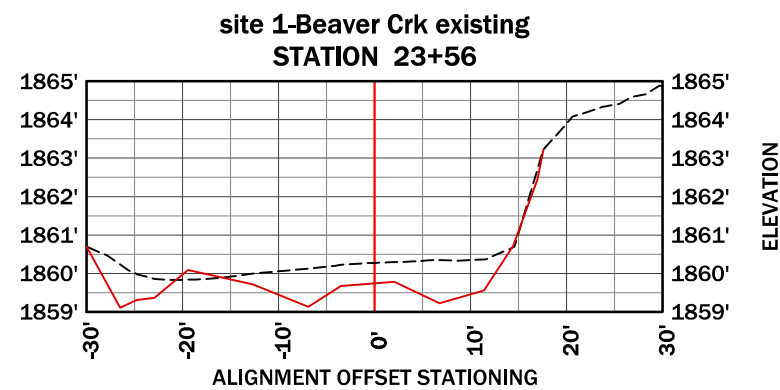
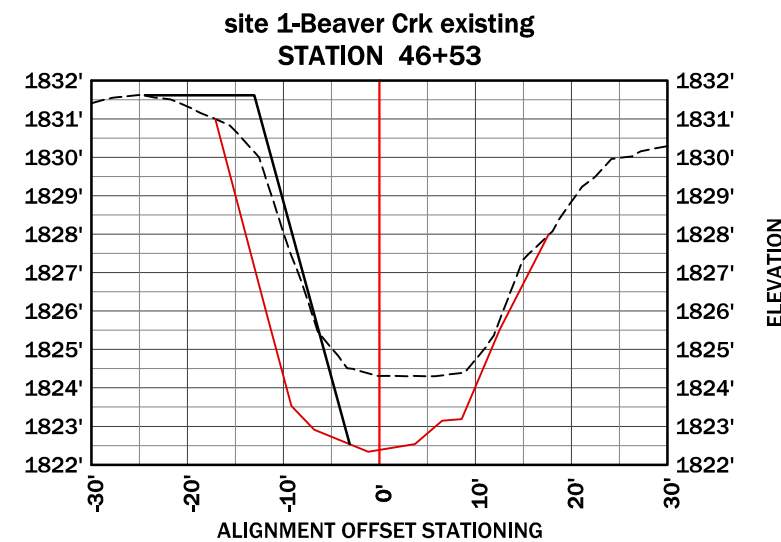
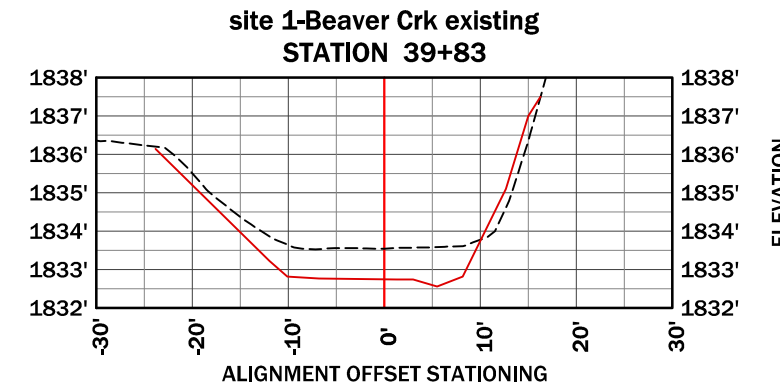
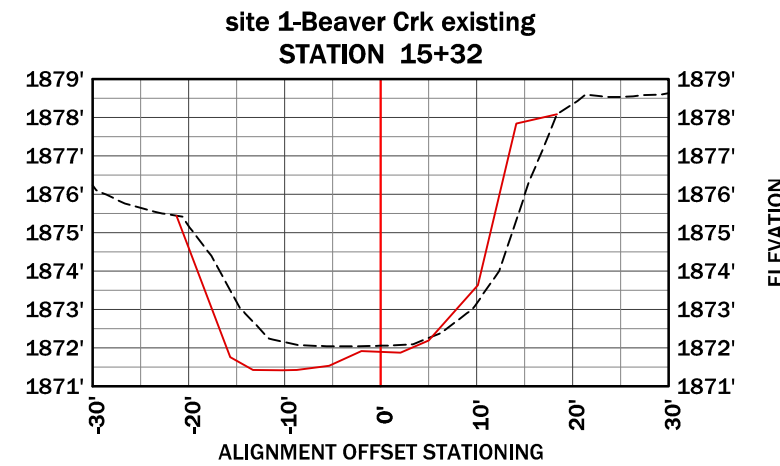
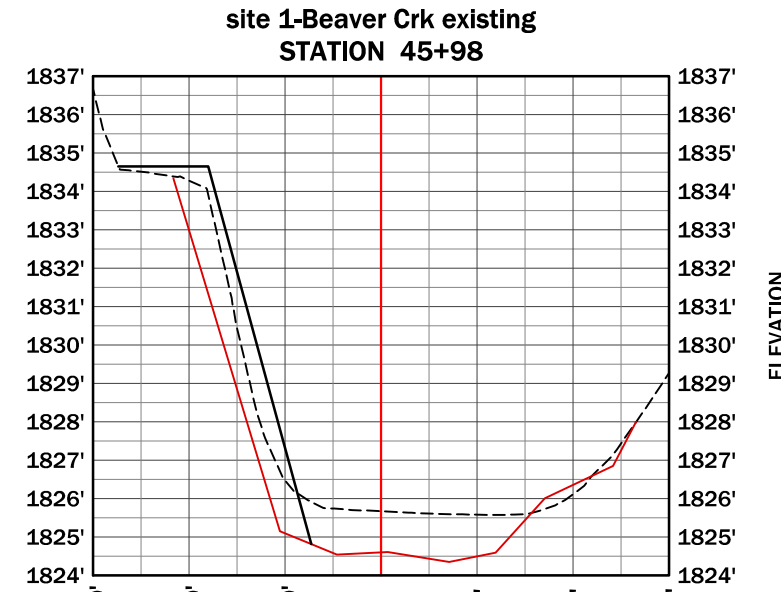
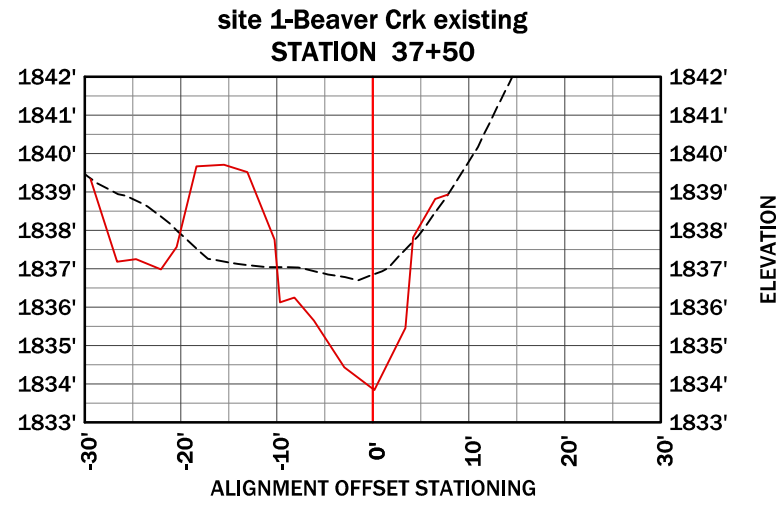
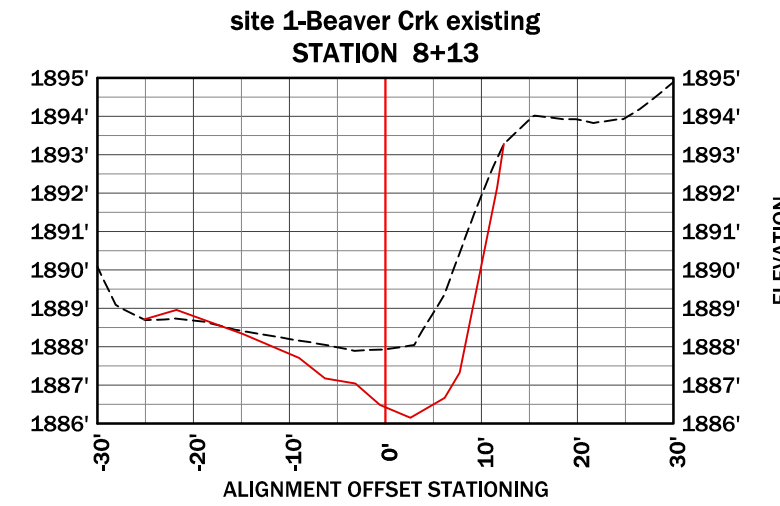
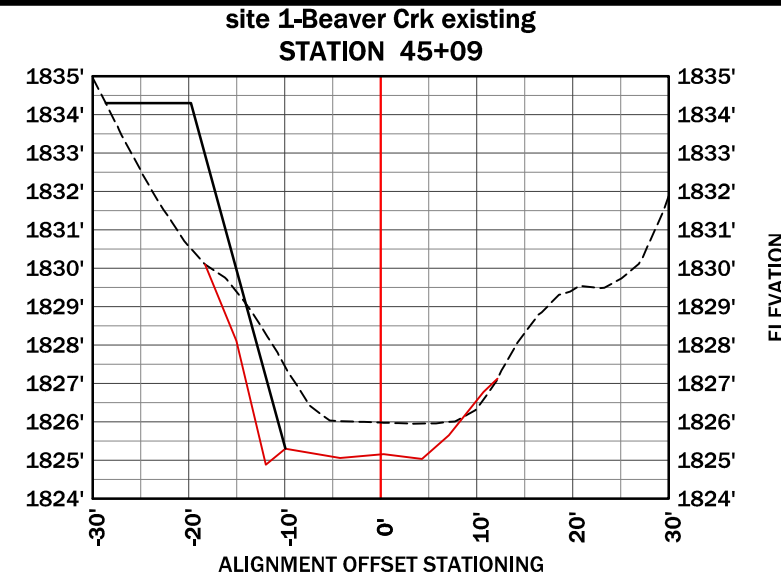
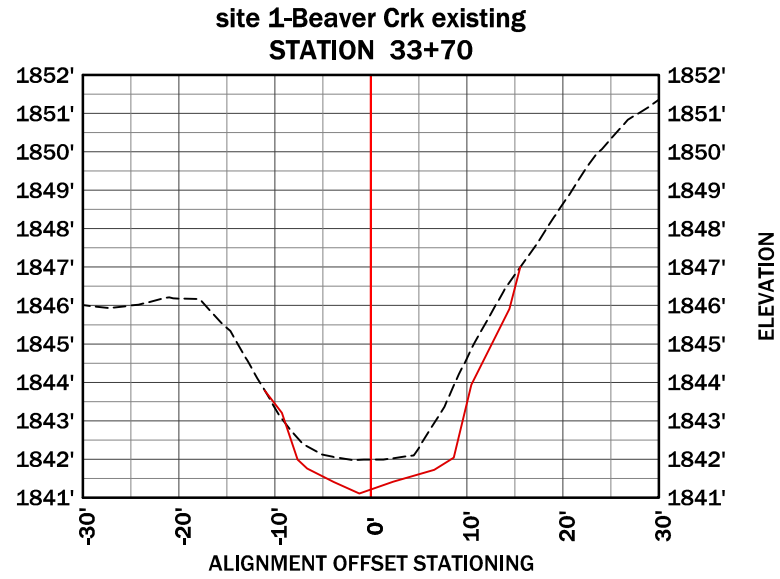
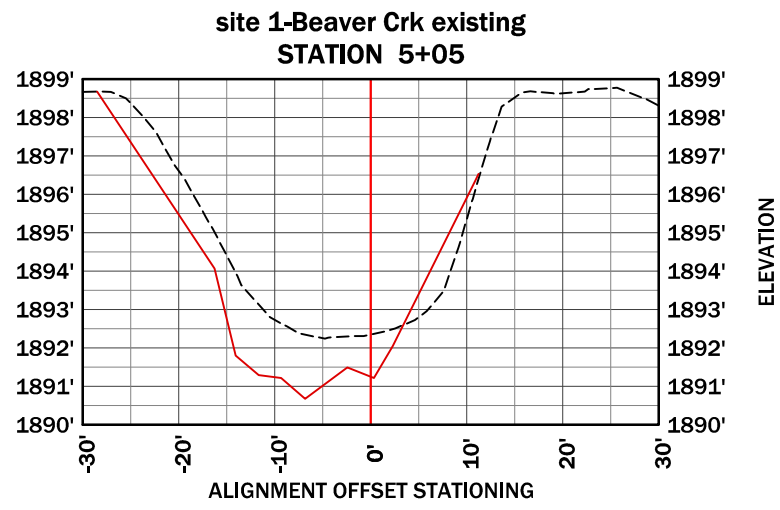
PROJECT NUMBER
RDG-23-009

DRAWING NUMBER
5.5

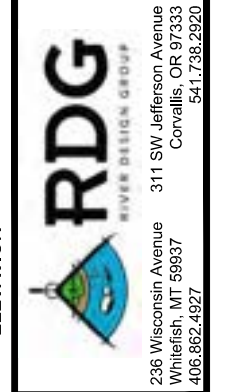
Drawing 16 of 30

M:\Projects\2023\RDG-23-009 Beaver Creek Wood Enhancement\CAD\RDG-23-009_Beaver_Crk_Planset.dwg

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LEGEND	
SYMBOL	
---	EXISTING GRADE (LiDAR)
---	EXISTING GRADE (SURVEYED)
---	FINISHED GRADE (FG)



SITE 1 CROSS SECTIONS

BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN
PROJECT NUMBER RDG-23-009				
DRAWING NUMBER 5.6				
Drawing 17 of 30				

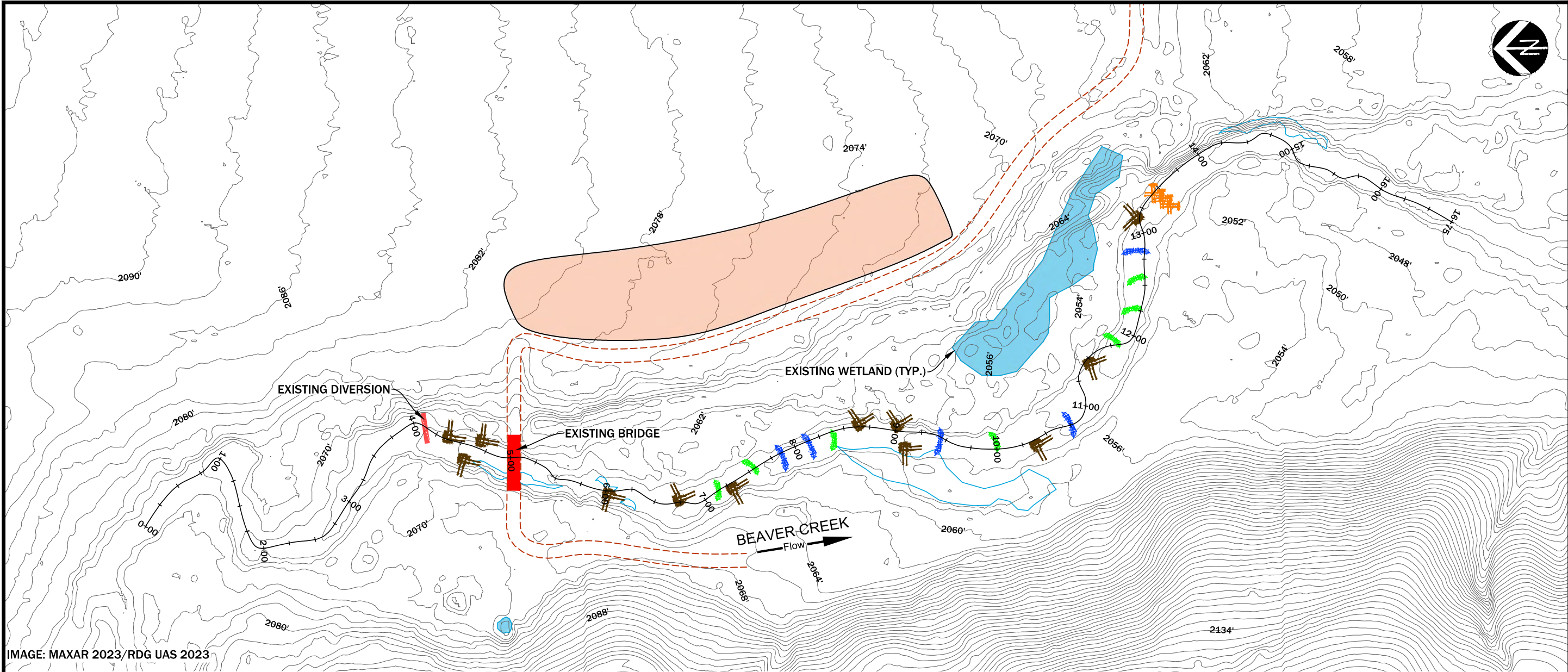


IMAGE: MAXAR 2023/RDG UAS 2023

**1 SITE 2 STRUCTURE LAYOUT
PLAN VIEW**

1" = 100'

DRAWING LEGEND		DETAIL SHEET
SYMBOL		
	STAGING AREA	
	TEMPORARY ACCESS ROAD	
	LARGE WOOD (LW)	8.2
	CHANNEL-SPANNING JAM (CSJ)	8.3
	POST ASSISTED LOG STRUCTURE (PALS)	8.4
	CHANNEL SPANNING POST ASSISTED LOG STRUCTURE (PALS-CS)	8.4

BEAVER CREEK STRUCTURE SCHEDULE					
STATION START	BANK	STRUCTURE	STATION START	BANK	STRUCTURE
4+35	R	LW	9+09	R	LW
4+56	L	LW	9+44	C	PALS-CS
4+68	R	LW	10+00	L	PALS
6+05	R	LW	10+37	R	LW
6+73	L	LW	10+75	C	PALS-CS
7+15	L	PALS	11+45	R	LW
7+28	R	LW	11+80	L	PALS
7+55	L	PALS	12+24	L	PALS
7+85	C	PALS-CS	12+55	L	PALS
8+13	C	PALS-CS	12+81	C	PALS-CS
8+37	R	PALS	13+14	L	LW
8+65	L	LW	13+45	C	CSJ
9+00	L	LW			

SITE 2 STRUCTURE LAYOUT
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

PROJECT NUMBER
RDG-23-009

DRAWING NUMBER
6.0

Drawing 18 of 30

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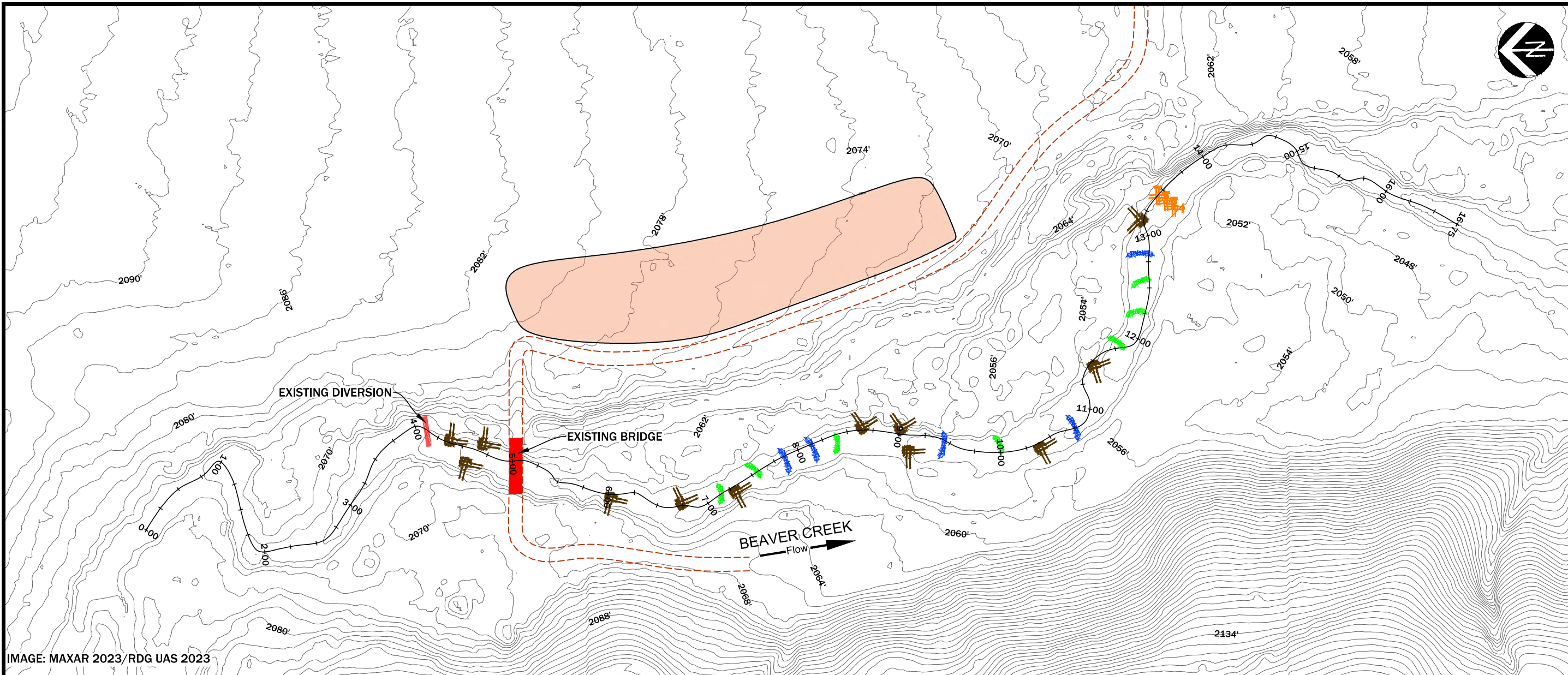
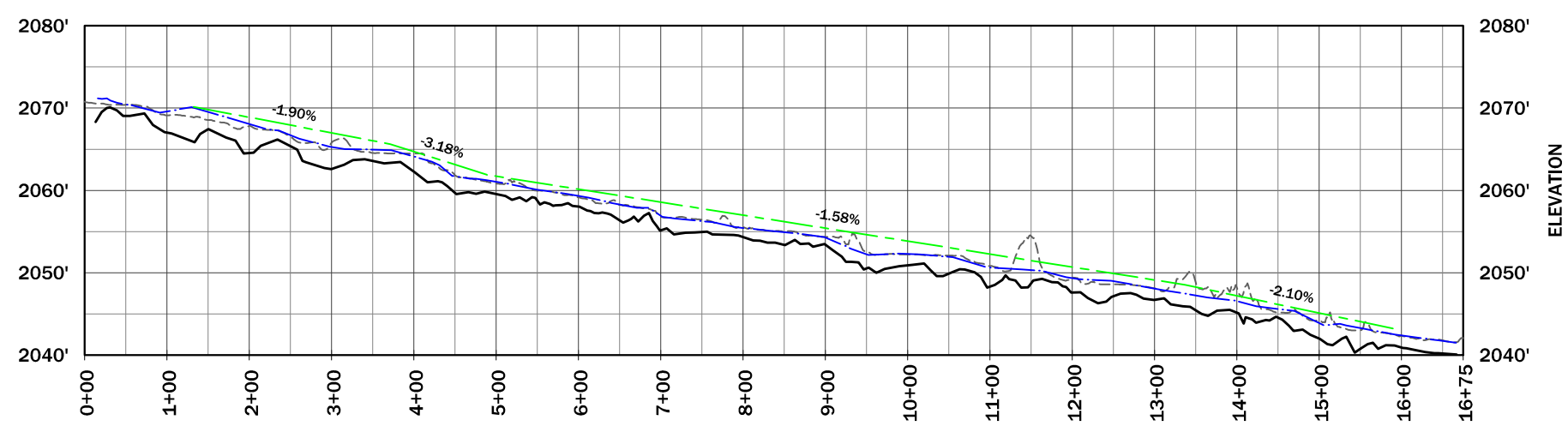


IMAGE: MAXAR 2023/RDG UAS 2023

**1 SITE 2 STRUCTURE LAYOUT
PLAN VIEW**
1" = 100'



**2 SITE 2 PROFILE
PROFILE VIEW**
HOR: 1" = 200'
VER: 1" = 20'

SYMBOL	
---	EXISTING GRADE (2018 LIDAR)
---	BANKFULL (SURVEYED)
---	WATER SURFACE (SURVEYED)
---	THALWEG (SURVEYED)

SITE 2 PLAN AND PROFILE
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

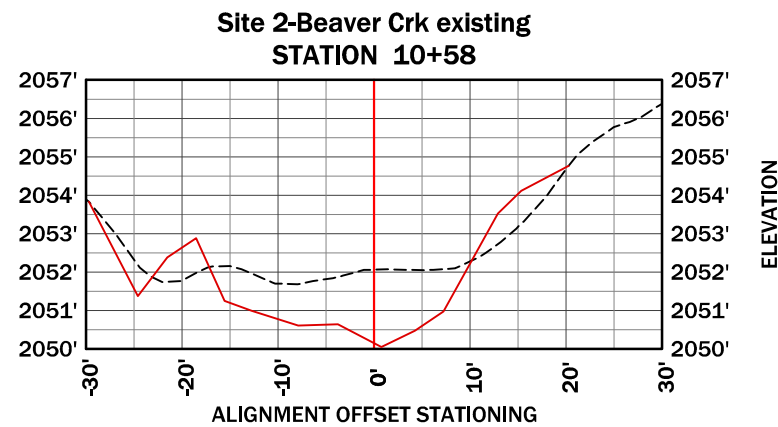
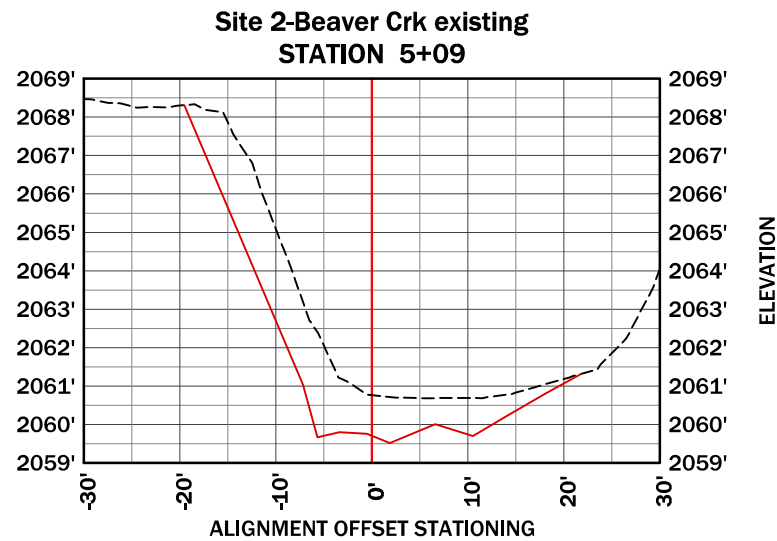
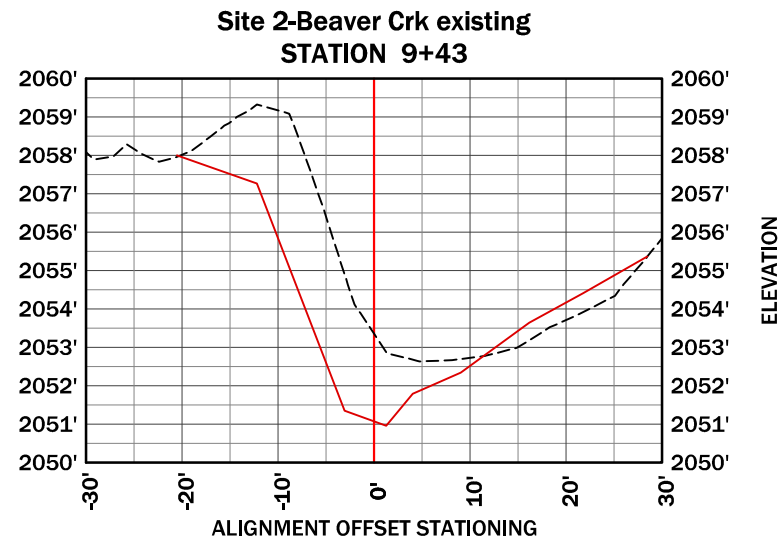
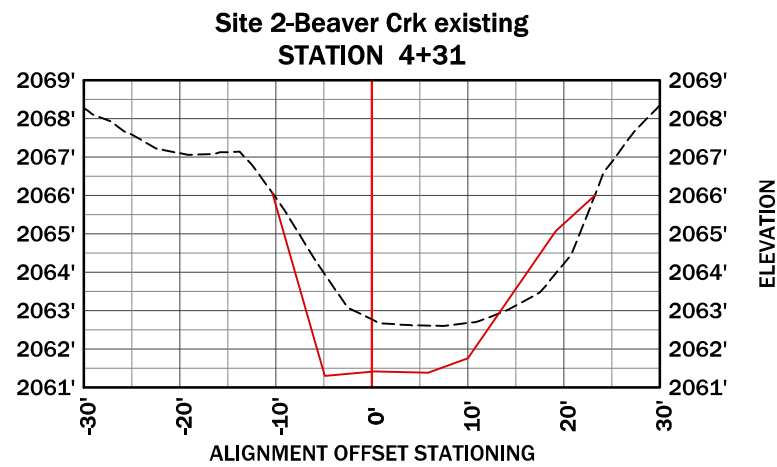
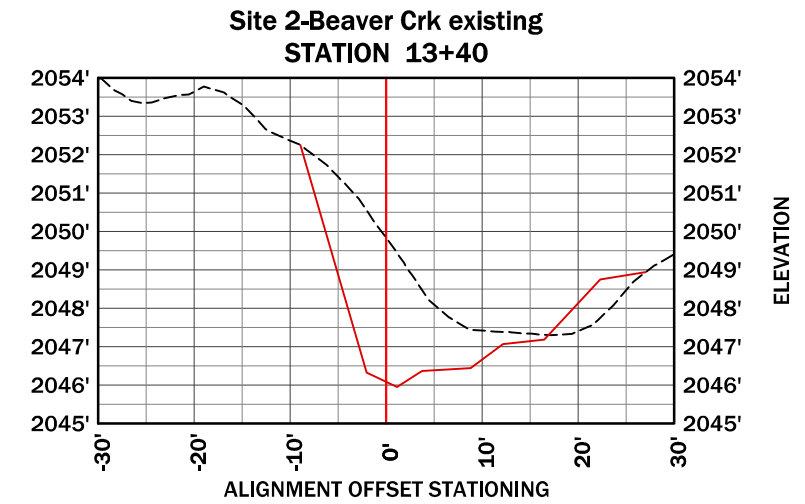
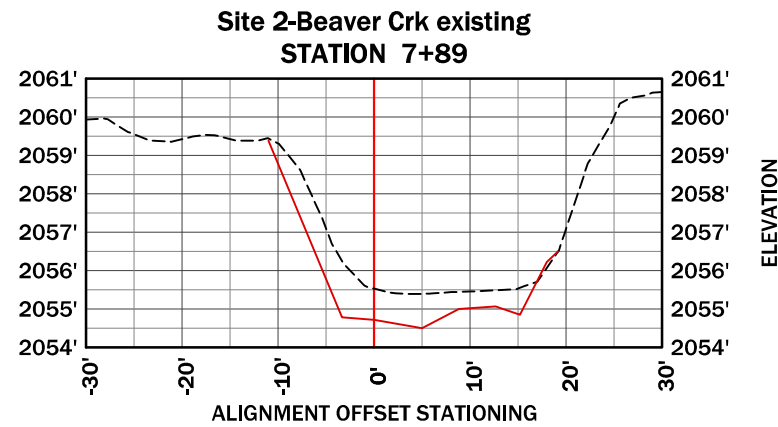
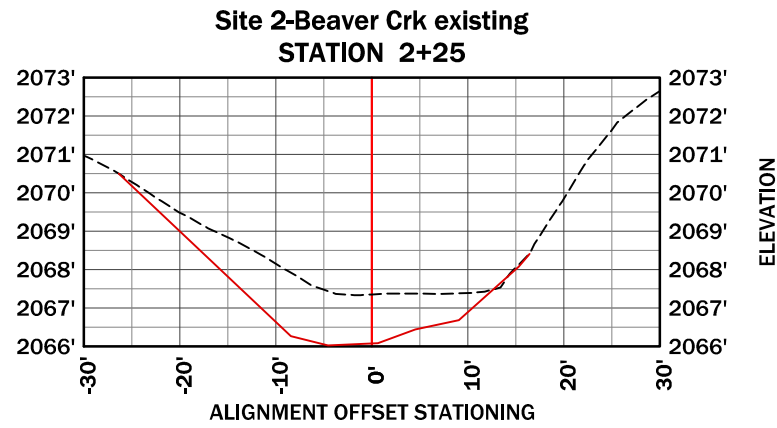
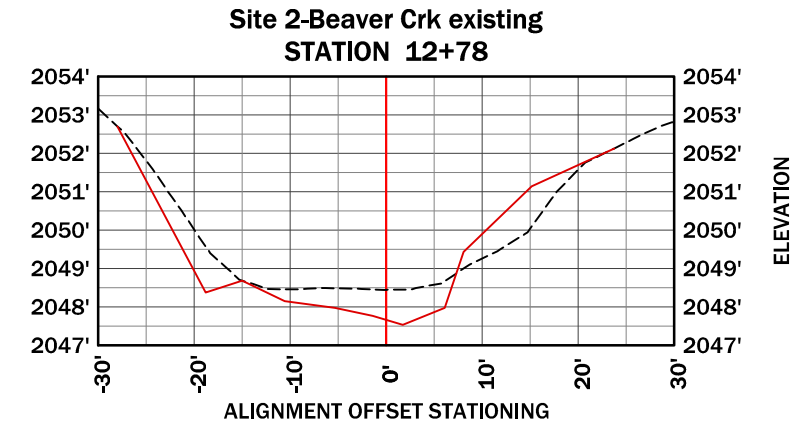
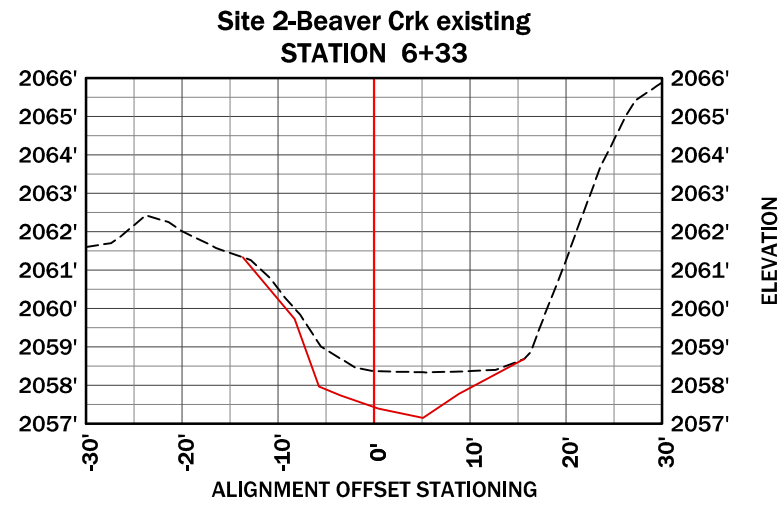
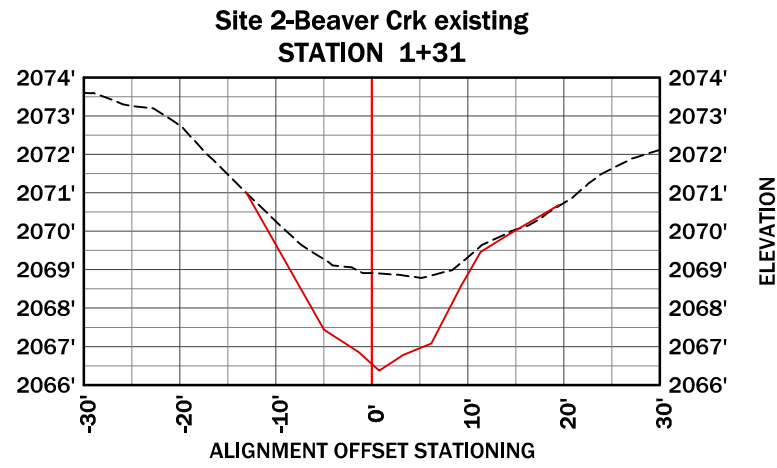
PROJECT NUMBER
RDG-23-009

DRAWING NUMBER
6.1

Drawing 19 of 30

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HOR: 1" = 20'
VER: 1" = 5'

LEGEND	
SYMBOL	
---	EXISTING GRADE (LiDAR)
---	EXISTING GRADE (SURVEYED)



SITE 2 CROSS SECTIONS
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

PROJECT NUMBER
RDG-23-009

DRAWING NUMBER

6.2

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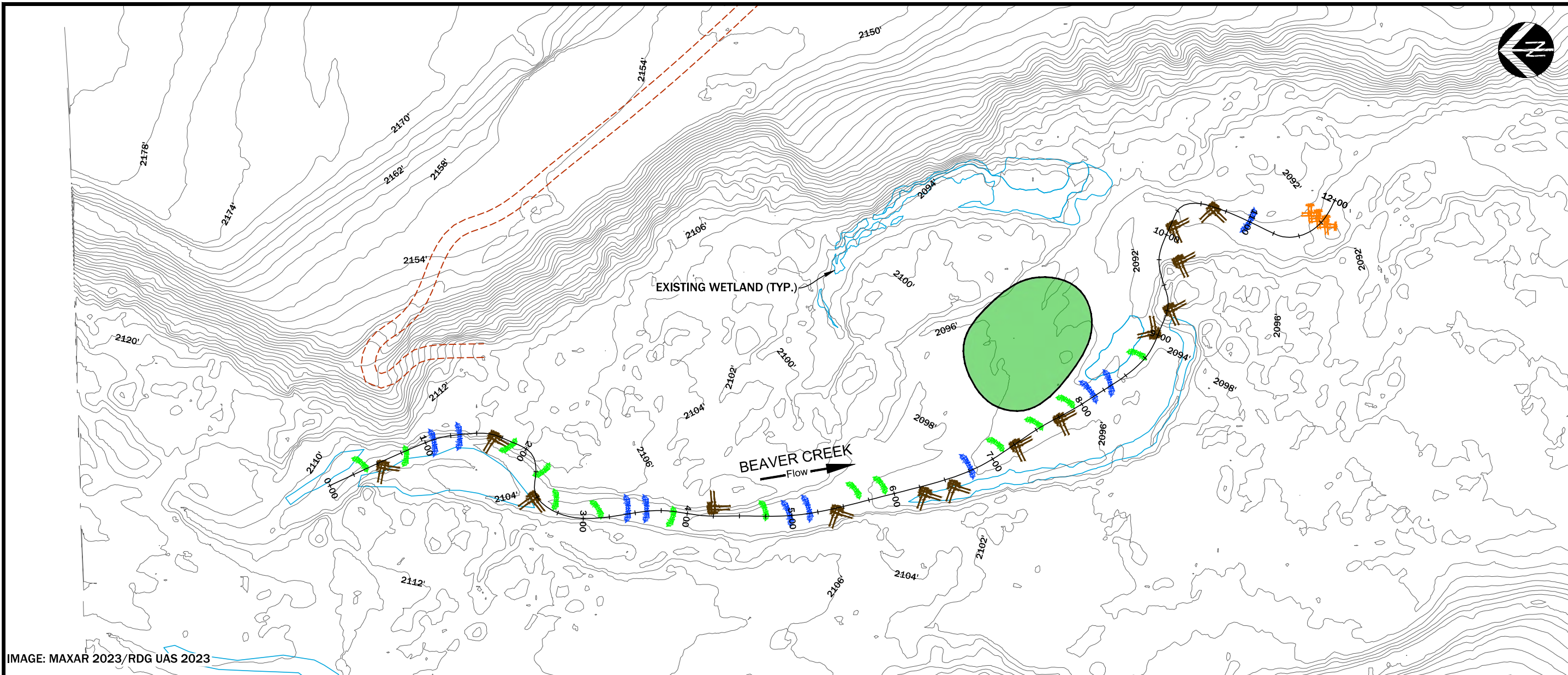


IMAGE: MAXAR 2023/RDG UAS 2023

1 SITE 3 STRUCTURE LAYOUT
PLAN VIEW
 1" = 100'

DRAWING LEGEND		
SYMBOL		DETAIL SHEET
	TEMPORARY ACCESS ROAD	
	LARGE WOOD (LW)	8.2
	CHANNEL-SPANNING JAM (CSJ)	8.3
	POST ASSISTED LOG STRUCTURE (PALS)	8.4
	CHANNEL SPANNING POST ASSISTED LOG STRUCTURE (PALS-CS)	8.4
	FLOODPLAIN ROUGHNESS (FR)	8.6

BEAVER CREEK STRUCTURE SCHEDULE								
STATION START	BANK	STRUCTURE	STATION START	BANK	STRUCTURE	STATION START	BANK	STRUCTURE
0+36	L	PALS	4+25	L	LW	7+75	R	LW
0+53	R	LW	4+74	L	PALS	7+89	L	PALS
0+78	R	PALS	4+97	C	PALS-CS	8+15	C	PALS-CS
1+07	C	PALS-CS	5+17	C	PALS-CS	8+34	C	PALS-CS
1+32	C	PALS-CS	5+42	R	LW	8+72	L	PALS
1+66	R	LW	5+66	L	PALS	9+02	L	LW
1+85	R	PALS	5+91	L	PALS	9+09	L	END FR
2+25	L	PALS	6+27	R	LW	9+27	R	LW
2+50	R	LW	5+57	R	LW	9+73	R	LW
2+67	L	PALS	6+76	C	PALS-CS	10+10	R	LW
3+15	L	PALS	7+11	L	PALS	10+64	R	LW
3+44	C	PALS-CS	7+25	R	LW	11+00	C	PALS-CS
3+61	C	PALS-CS	7+25	L	START FR	11+75	C	CSJ
3+85	R	PALS	7+52	L	PALS			

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ		CN

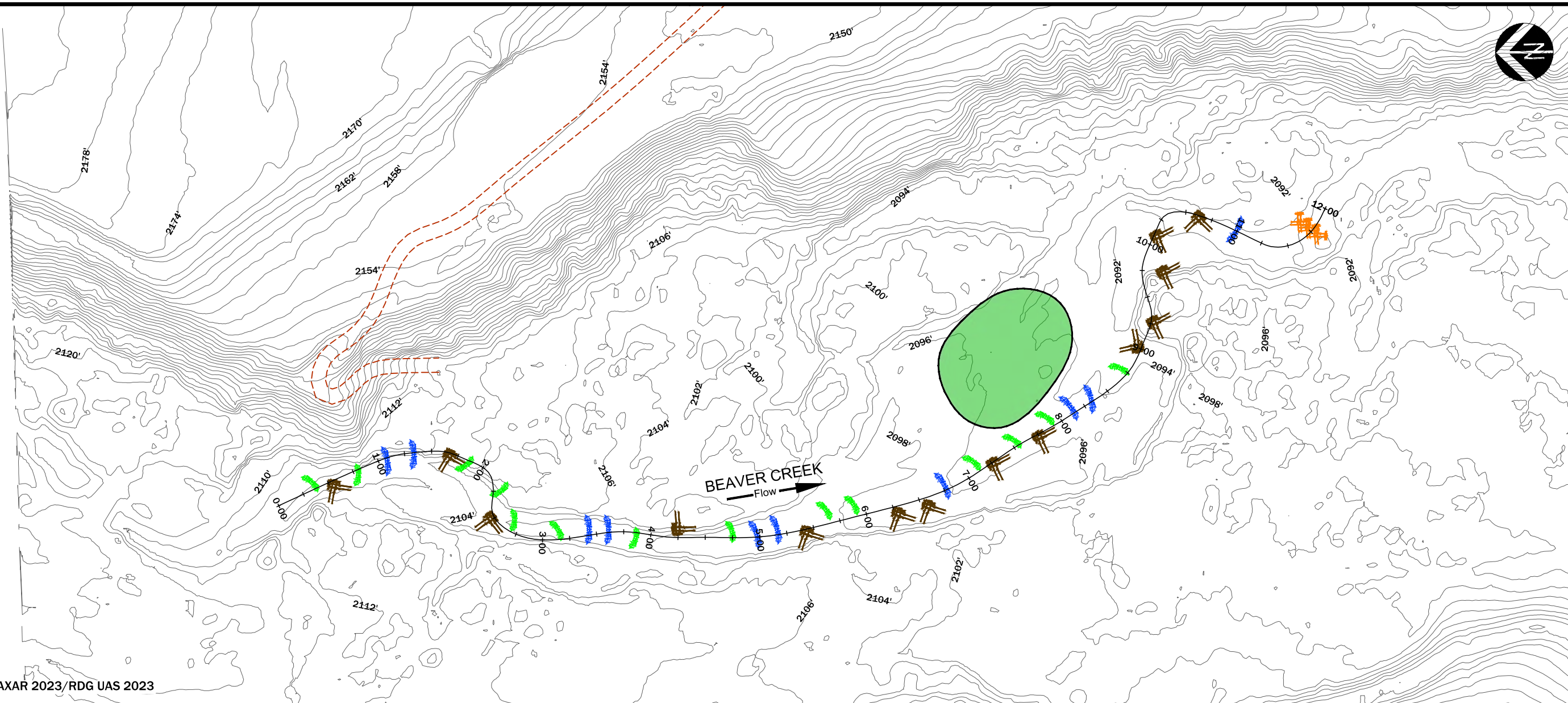
PROJECT NUMBER
RDG-23-009

DRAWING NUMBER
7.0

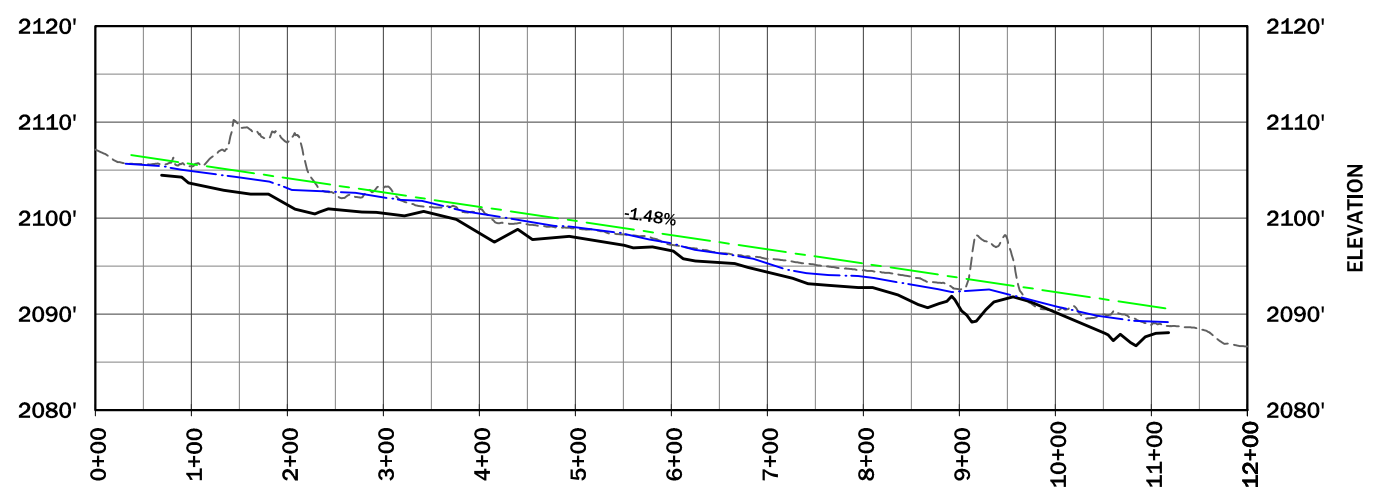
Drawing 21 of 30

M:\Projects\2023\RDG-23-009 Beaver Creek Wood Enhancement\CAD\RDG-23-009_Beaver_Crk_Planset.dwg

IMAGE: MAXAR 2023/RDG UAS 2023



1 SITE 3 STRUCTURE LAYOUT PLAN VIEW
 1" = 100'



2 SITE 3 PROFILE PROFILE VIEW
 HOR: 1" = 200'
 VER: 1" = 20'

LEGEND	
SYMBOL	
---	EXISTING GRADE (2018 LiDAR)
- - -	BANKFULL (SURVEYED)
- - -	WATER SURFACE (SURVEYED)
—	THALWEG (SURVEYED)

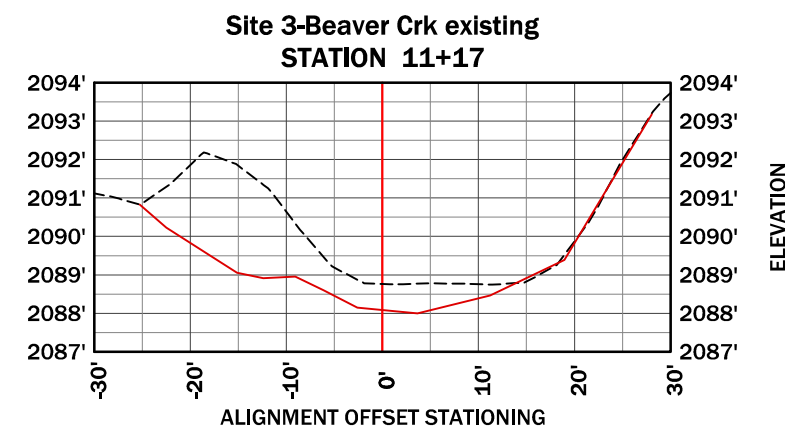
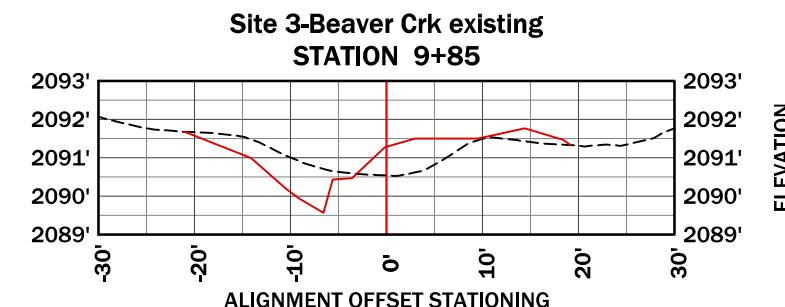
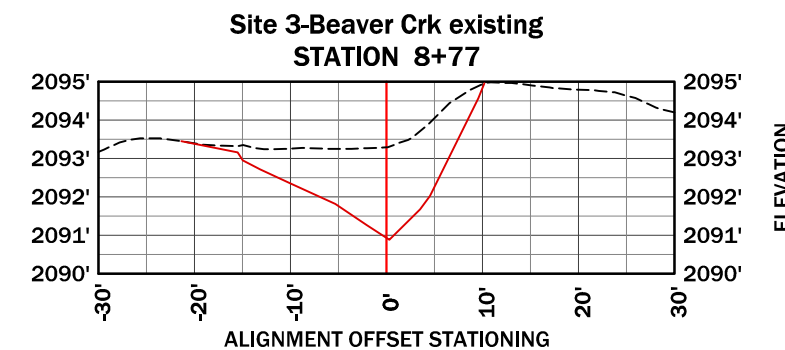
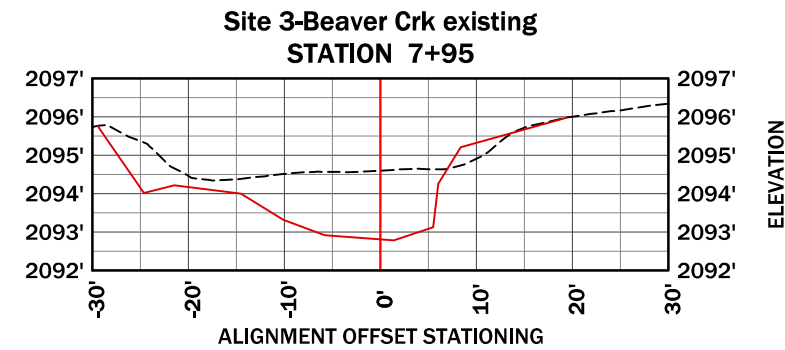
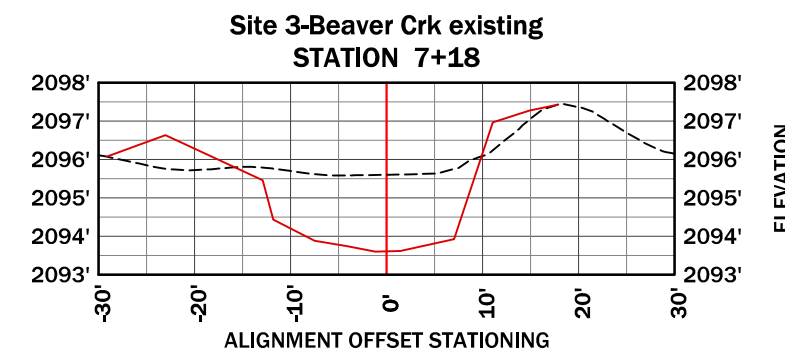
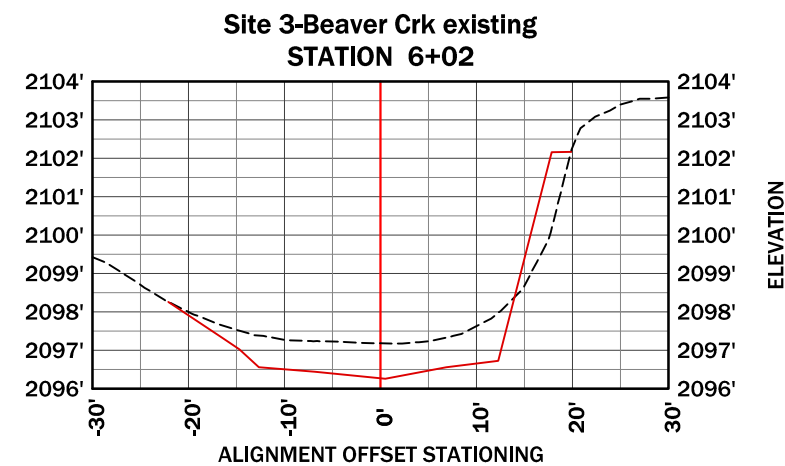
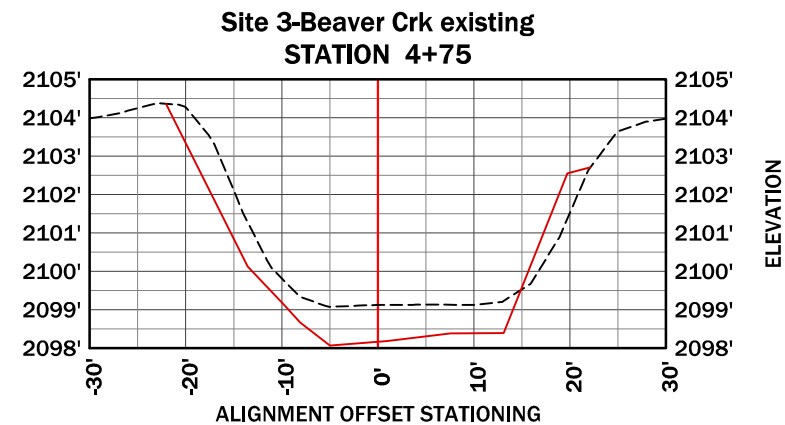
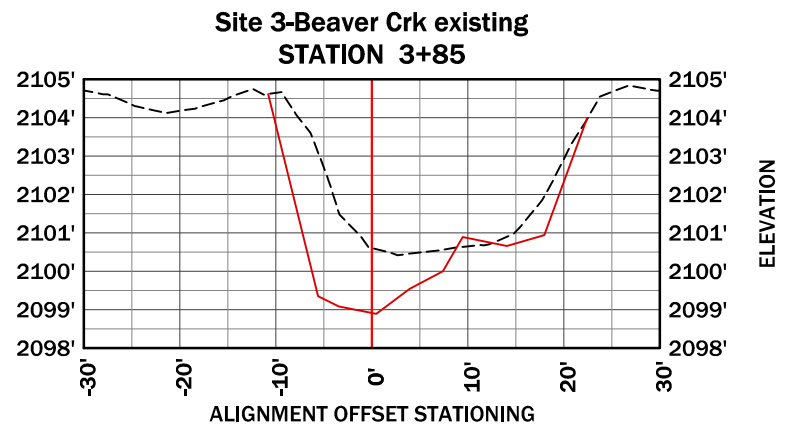
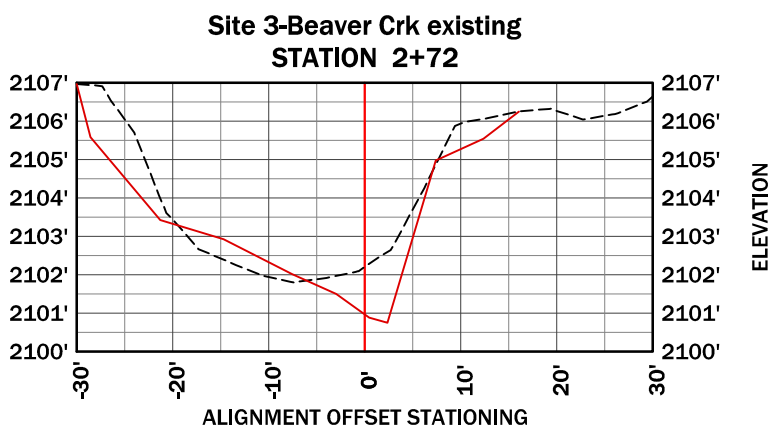
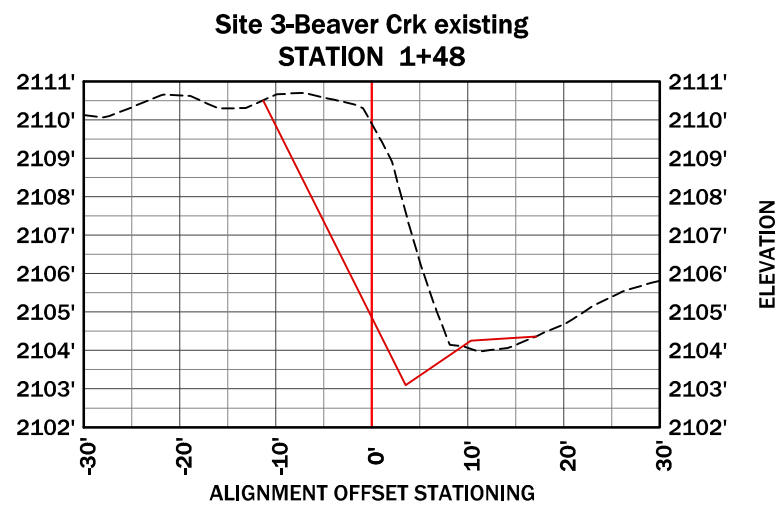
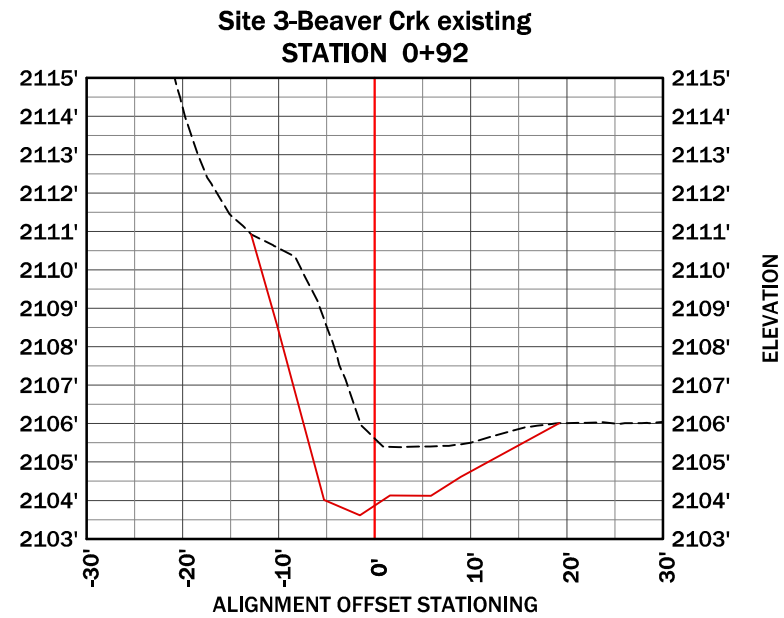
NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

PROJECT NUMBER
RDG-23-009

DRAWING NUMBER
7.1

Drawing 22 of 30

M:\Projects\2023\RDG-23-009 Beaver Creek Wood Enhancement\CAD\RDG-23-009_Beaver_Crk_Planset.dwg



HOR: 1" = 20'
VER: 1" = 5'

LEGEND	
SYMBOL	
---	EXISTING GRADE (LiDAR)
---	EXISTING GRADE (SURVEYED)



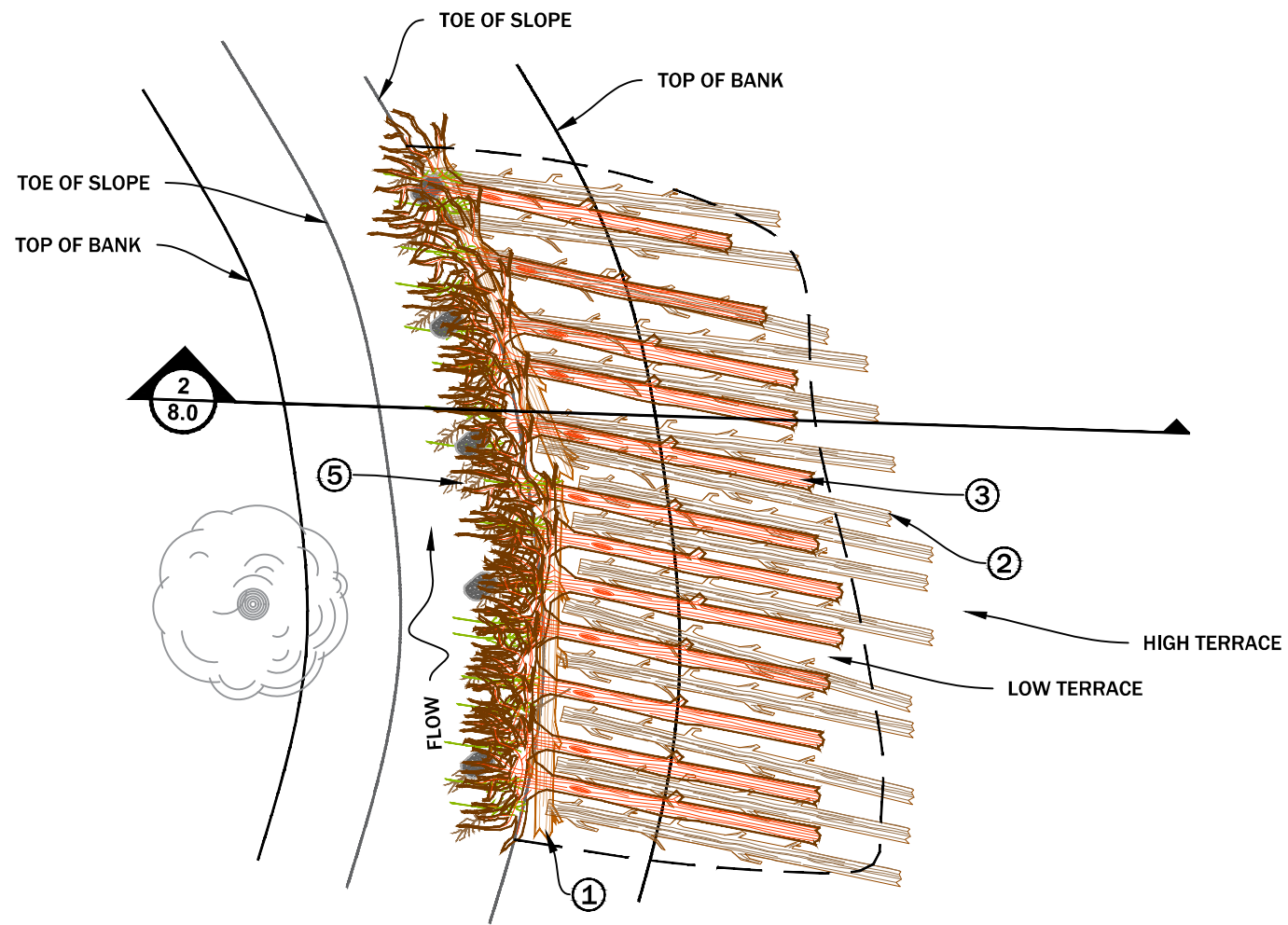
311 SW Jefferson Avenue
Whitefish, MT 59937
406.862.4927
541.738.2920

SITE 3 CROSS SECTIONS
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANAHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

PROJECT NUMBER
RDG-23-009
DRAWING NUMBER
7.2
Drawing 23 of 30

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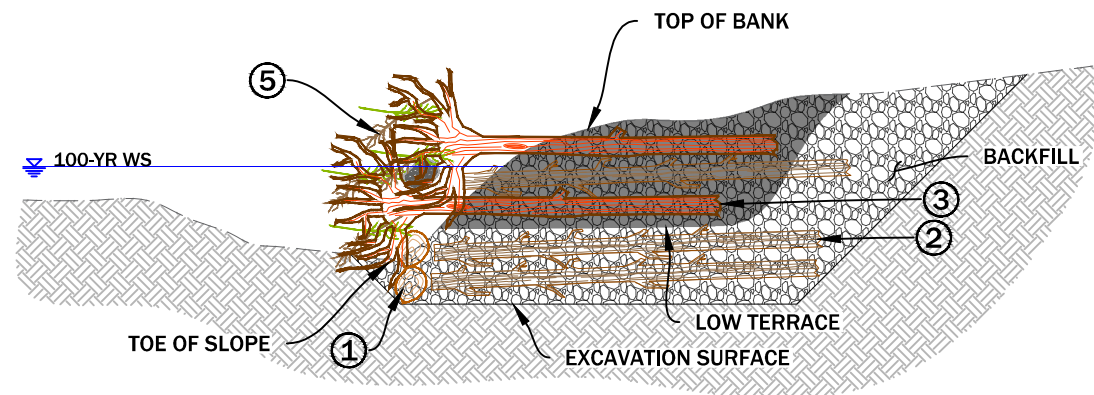


**1 BANK ATTACHED JAM DETAIL
PLAN VIEW**

1" = 20'

CONSTRUCTION NOTES

- ① PLACE TOE LOGS AT SCOUR DEPTH.
- ② PLACE TORSION LOG ON TOP OF TOE LOG OUT INTO STREAM CHANNEL, ANGLED 15°-20° TO FLOW.
- ③ PLACE TREE WITH ROOTWAD ON TOP OF TORSION LOG.
- ④ CONTINUE ALTERNATING TOE AND TORSION LOG PLACEMENT, TAPERING THE STRUCTURE ELEVATION UP AND INWARD TOWARD BANK/TERRACE. FINAL LOG PLACEMENTS SHOULD EXCEED THE Q100 ELEVATION.
- ⑤ PLACE/ WEAVE ADDITIONAL TREES, LOGS, LARGE BOULDERS, SLASH OR ROOT-WADS IN APEX OF STRUCTURE.
- ⑥ PLACE SLASH AND SMALL WOODY DEBRIS ON THE UP-STREAM BANK INTERFACE OF THE STRUCTURE.
- ⑦ BACKFILL TO MINIMUM DEPTH OF 1-FOOT.

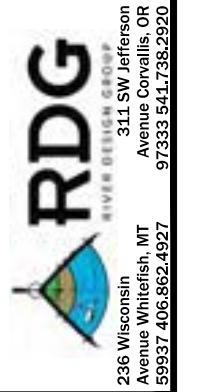


**2 BANK ATTACHED JAM DETAIL
PROFILE VIEW**

1" = 20'

MATERIAL SCHEDULE (PER 10 LINEAR FEET)

ITEM	DIA. (IN)	LENGTH (FT)	QUANTITY (EA)
TOE LOGS	18-24	30-40	1
TORSION LOGS	18-24	30-40	6
TREE WITH ROOTWAD	18-24	30-40	4
HEAVY SLASH-BRUSH	1-3	5-8	5



BANK ATTACHED JAM DETAIL
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

PROJECT NUMBER
RDG-23-009

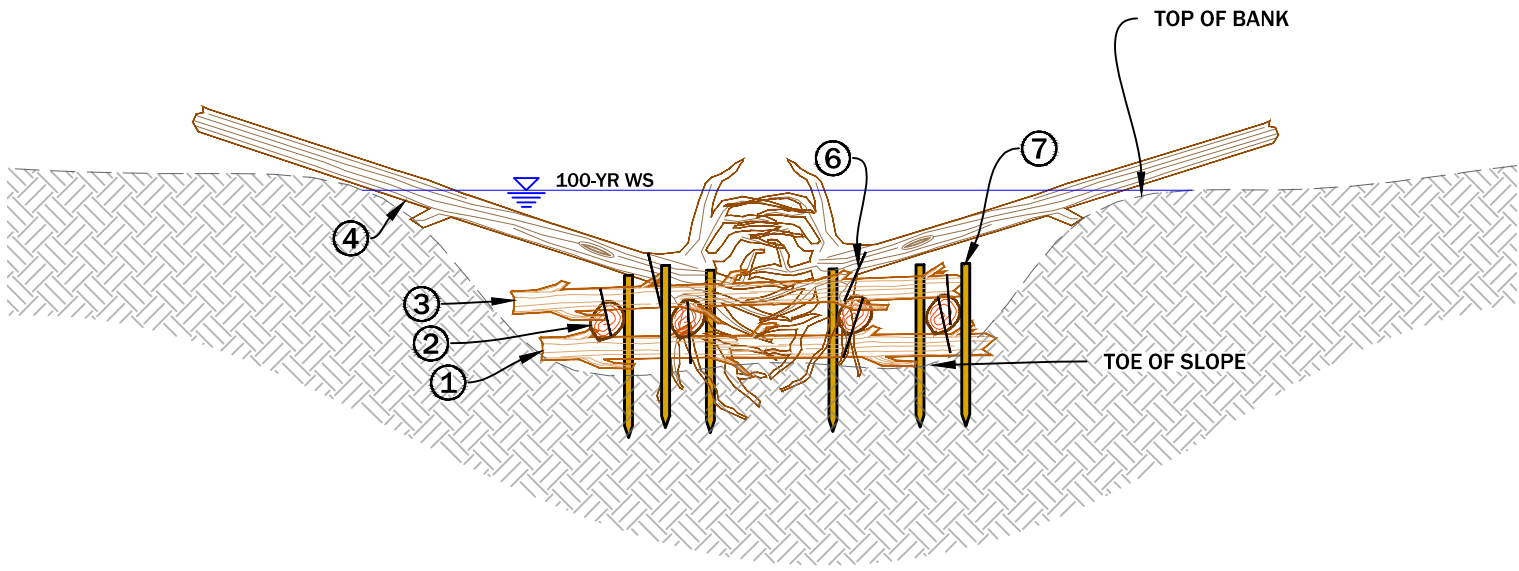
DRAWING NUMBER

8.0

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1 HELICOPTER PLACED LARGE WOOD APEX PLAN VIEW
1" = 12'



2 HELICOPTER PLACED LARGE WOOD APEX PROFILE VIEW
1" = 12'

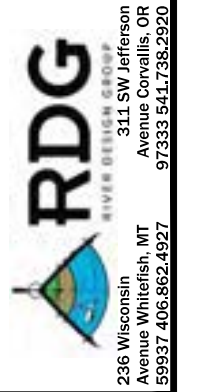
CONSTRUCTION NOTES

- ① PLACE FOOTER LOGS IN CHANNEL PERPENDICULAR TO FLOW.
- ② PLACE ROOT WAD LOGS PARALLEL TO MAIN CHANNEL FLOW WITH ROOT WADS FACING UPSTREAM.
- ③ PLACE HEADER LOGS PERPENDICULAR TO FLOW WITH OPTIONAL ROOT WADS IN THE STREAM CHANNEL.
- ④ PLACE BALLAST LOGS EXTENDING FROM BANK WITH ROOT WADS IN THE STREAM CHANNEL.
- ⑤ PLACE PILE OF HEAVY SLASH UPSTREAM OF STRUCTURE PERPENDICULAR TO FLOW.
- ⑥ PIN LARGE MEMBERS TOGETHER WITH BOLTS/REBAR.
- ⑦ DRIVE POSTS TO INTERLOCK ROOT WAD AND BALLAST LOGS.

MATERIAL SCHEDULE			
ITEM	DIA. (IN)	LENGTH (FT)	QUANTITY (EA)
FOOTER LOGS	18-24	30-40	2
ROOTWAD LOGS	18-24	30-40	6
HEADER LOGS	18-24	30-40	2
BALLAST LOGS	18-24	30-40	4
HEAVY SLASH-WHOLE	5-10	30-40	10
UNTREATED TIMBER POST	2-4	4	20



TYPICAL LARGE WOOD APEX STRUCTURE



HELICOPTER PLACED LARGE WOOD APEX DETAIL
BEAVER CREEK WOOD ENHANCEMENT PROJECT
OKANOHAN COUNTY, WASHINGTON

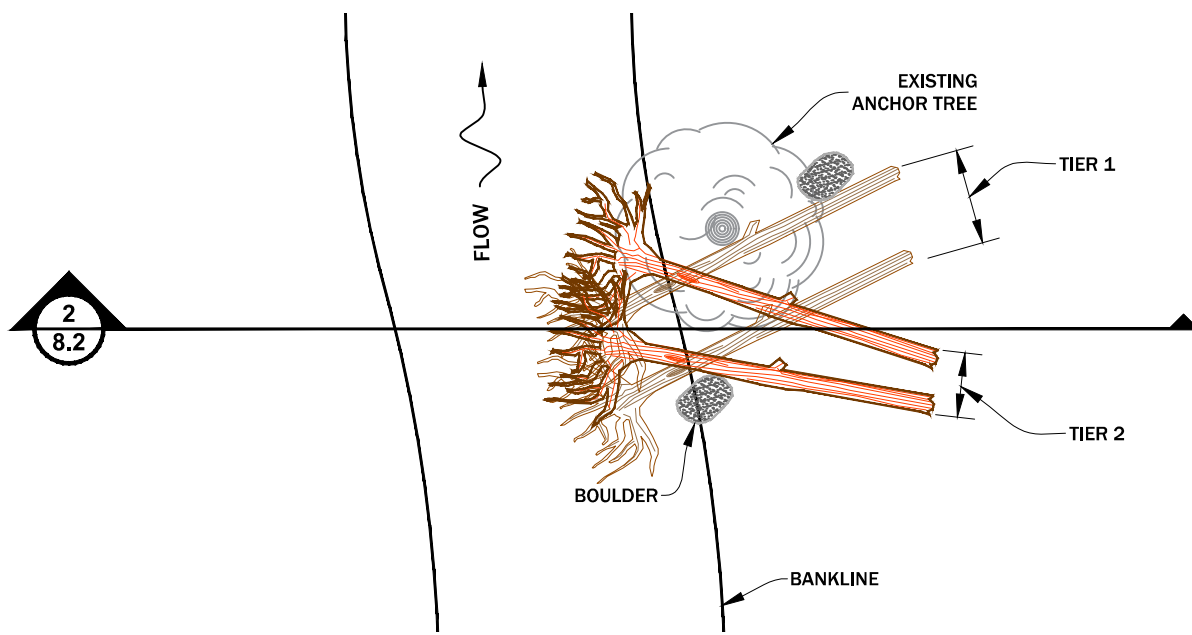
NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

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RDG-23-009

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8.1

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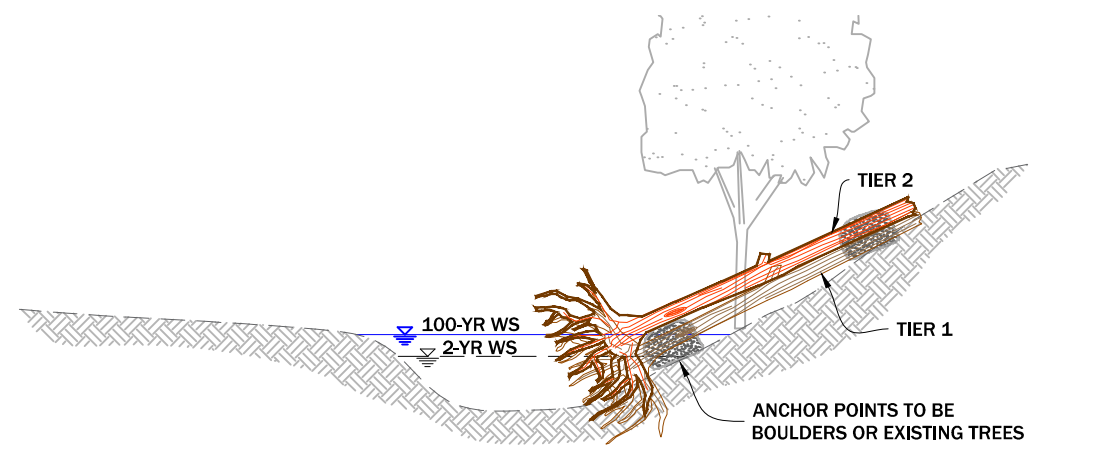


1 HELICOPTER PLACED LARGE WOOD - BANK ATTACHED
PLAN VIEW 1" = 20'

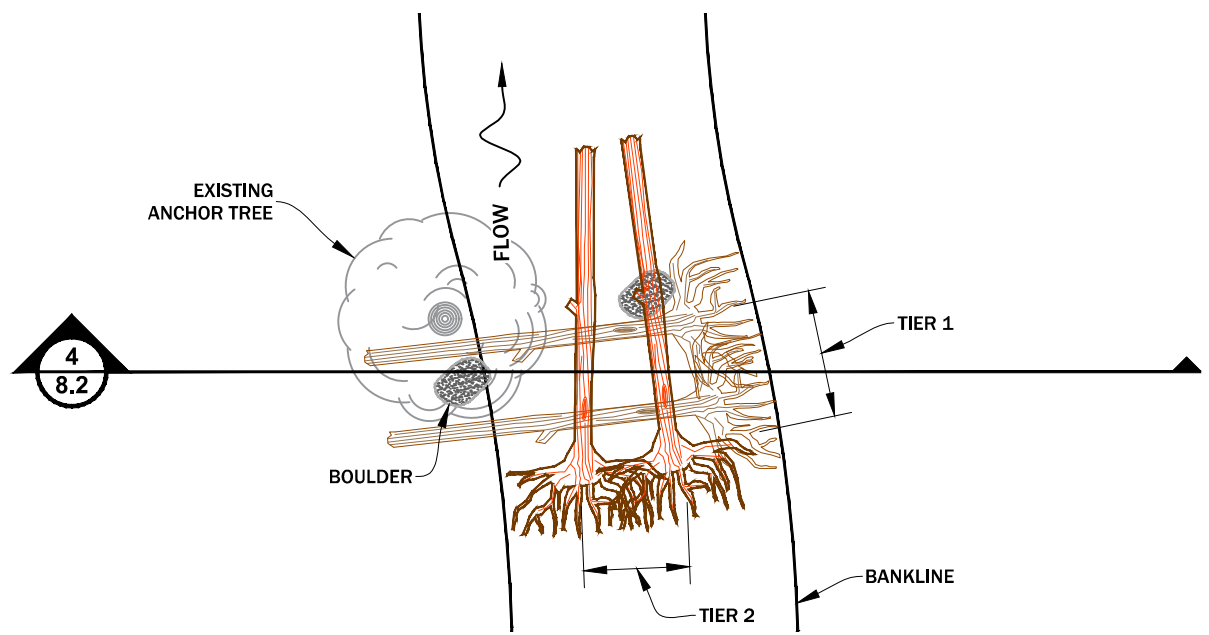
CONSTRUCTION NOTES

- ① TWO-TIERED LARGE WOOD STRUCTURE TO CONFORM TO MATERIAL SCHEDULE SPECIFICATIONS. A SUFFICIENT PORTION OF THE TOP TIER MEMBERS WILL BE PLACED ABOVE THE 100-YR WATER SURFACE TO PROVIDE SUFFICIENT BALLAST TO HOLD DOWN BOTH THEMSELVES AND BOTTOM TIER MEMBERS. NO ADDITIONAL BALLASTING PROPOSED.
- ② LOGS ARE TO BE PLACED ADJACENT TO ONE ANCHOR POINT ON THE UPSTREAM SIDE OF THE ANCHOR POINT. ANCHOR POINT TO BE STABLE TREE OR BOULDER.
- ③ FINAL LOCATION OF LOGS TO BE DETERMINED IN THE FIELD BY OWNER'S REPRESENTATIVE.

MATERIAL SCHEDULE				
TIER	BOULDERS	LARGE WOOD W/ ROOT WAD	DIA. (IN)	LENGTH (FT)
TIER 1	2	2 PIECES	18-24	30-40
TIER 2	0	2 PIECES	18-24	30-40



2 HELICOPTER PLACED LARGE WOOD - BANK ATTACHED
PROFILE VIEW 1" = 20'

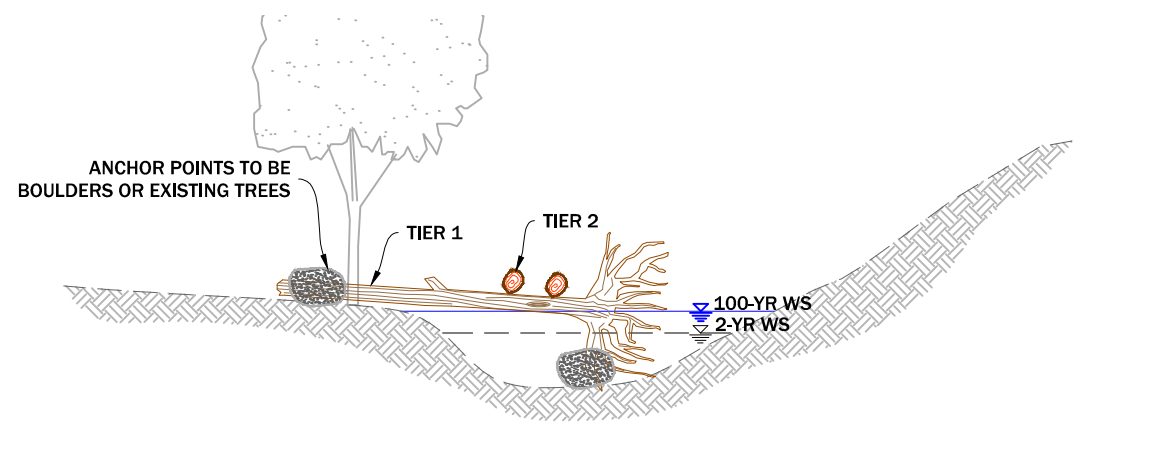


3 HELICOPTER PLACED LARGE WOOD - IN CHANNEL
PLAN VIEW 1" = 20'

CONSTRUCTION NOTES

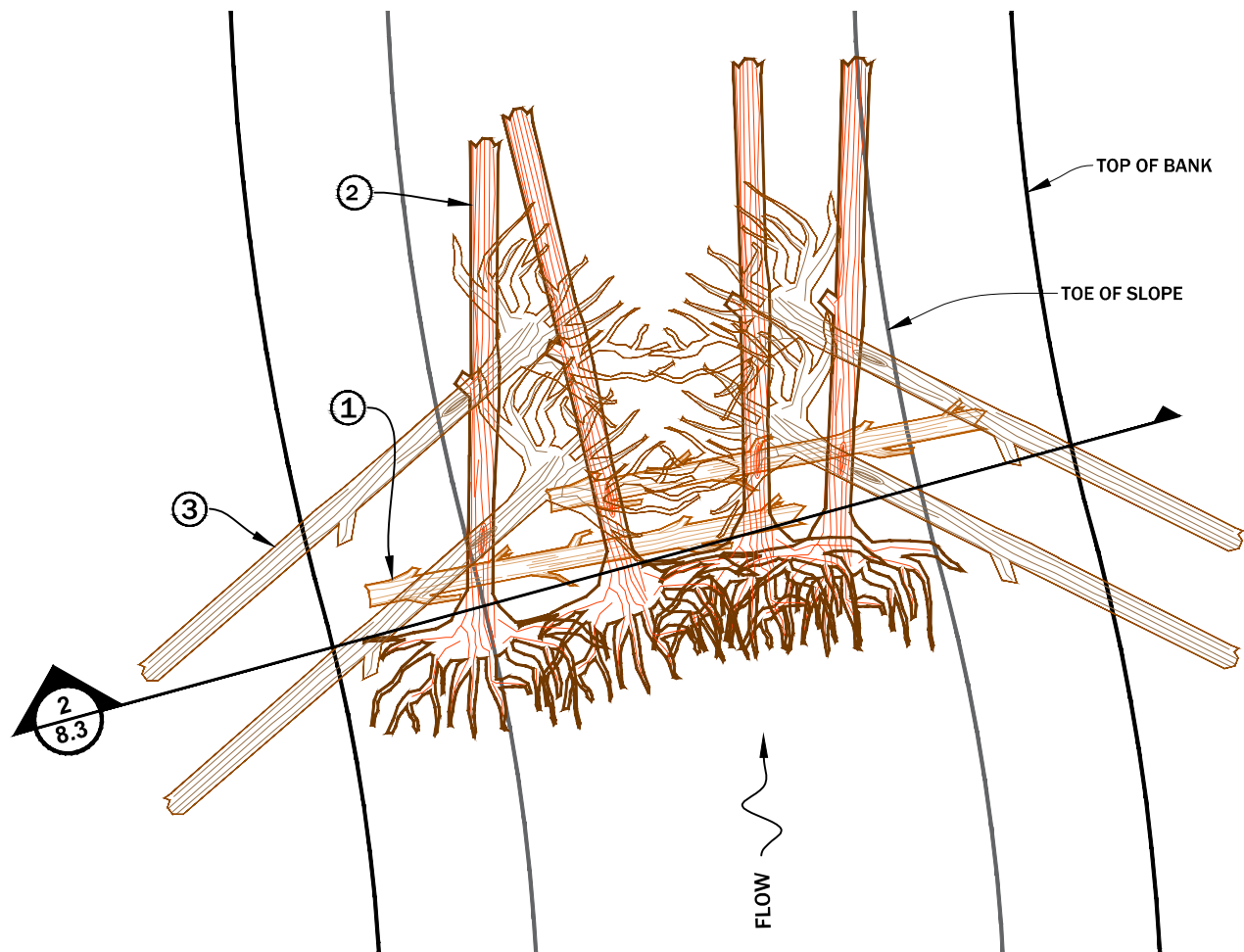
- ① PLACE TIER 1 LOGS PERPENDICULAR TO FLOW WITH ROOTWAD FACING TOWARDS BANKLINE.
- ② PLACE TIER 2 LOGS ON TOP OF TIER 1 LOG PARALLEL TO FLOW WITH ROOTWAD FACING UPSTREAM.
- ③ FINAL LOCATION OF LOGS TO BE DETERMINED IN THE FIELD BY OWNER'S REPRESENTATIVE.

MATERIAL SCHEDULE				
TIER	BOULDERS	LARGE WOOD W/ ROOT WAD	DIA. (IN)	LENGTH (FT)
TIER 1	2	2 PIECES	18-24	30-40
TIER 2	0	2 PIECES	18-24	30-40



4 HELICOPTER PLACED LARGE WOOD - IN CHANNEL
PROFILE VIEW 1" = 20'

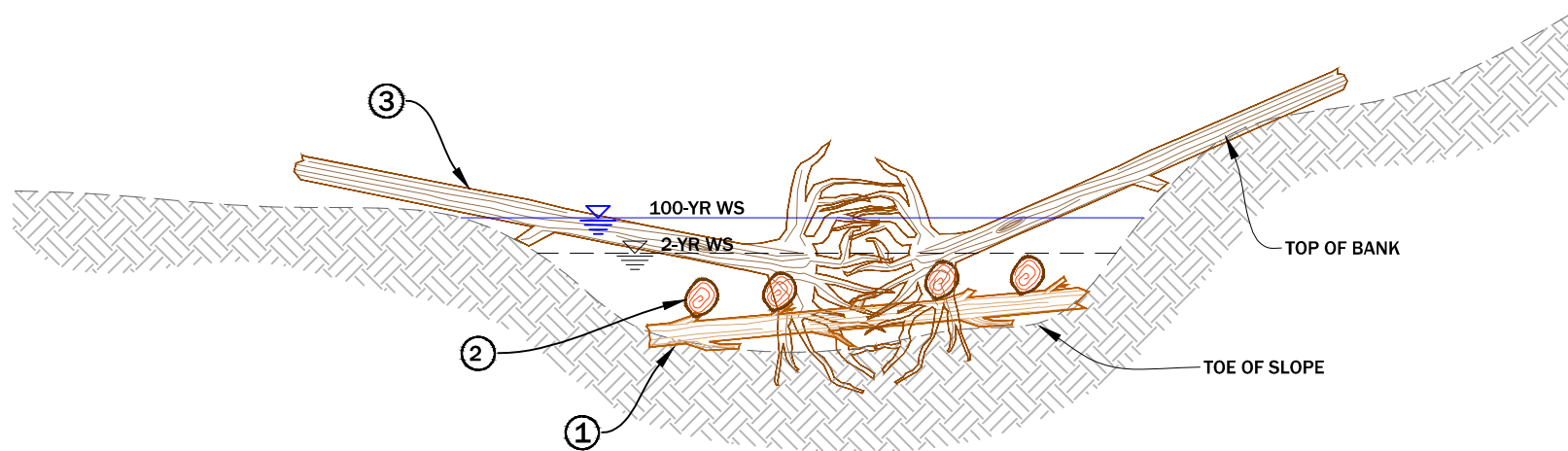
NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN



**1 HELICOPTER PLACED CHANNEL SPANNING JAM
PLAN VIEW**

1" = 12'

- CONSTRUCTION NOTES**
- ① PLACE FOOTER LOGS IN CHANNEL PERPENDICULAR TO FLOW.
 - ② PLACE ROOT WAD LOGS PARALLEL TO FLOW WITH ROOT WADS FACING UPSTREAM.
 - ③ PLACE BALLAST LOGS EXTENDING FROM BANK WITH ROOT WADS IN THE STREAM CHANNEL. ANGLE BALLAST LOGS DOWN STREAM.



**2 HELICOPTER PLACED CHANNEL SPANNING JAM
SECTION VIEW**

1" = 12'

MATERIAL SCHEDULE			
ITEM	DIA. (IN)	LENGTH (FT)	QUANTITY (EA)
FOOTER LOGS	18-24	30-40	2
ROOTWAD LOGS	18-24	30-40	4
BALLAST LOGS	18-24	30-40	4

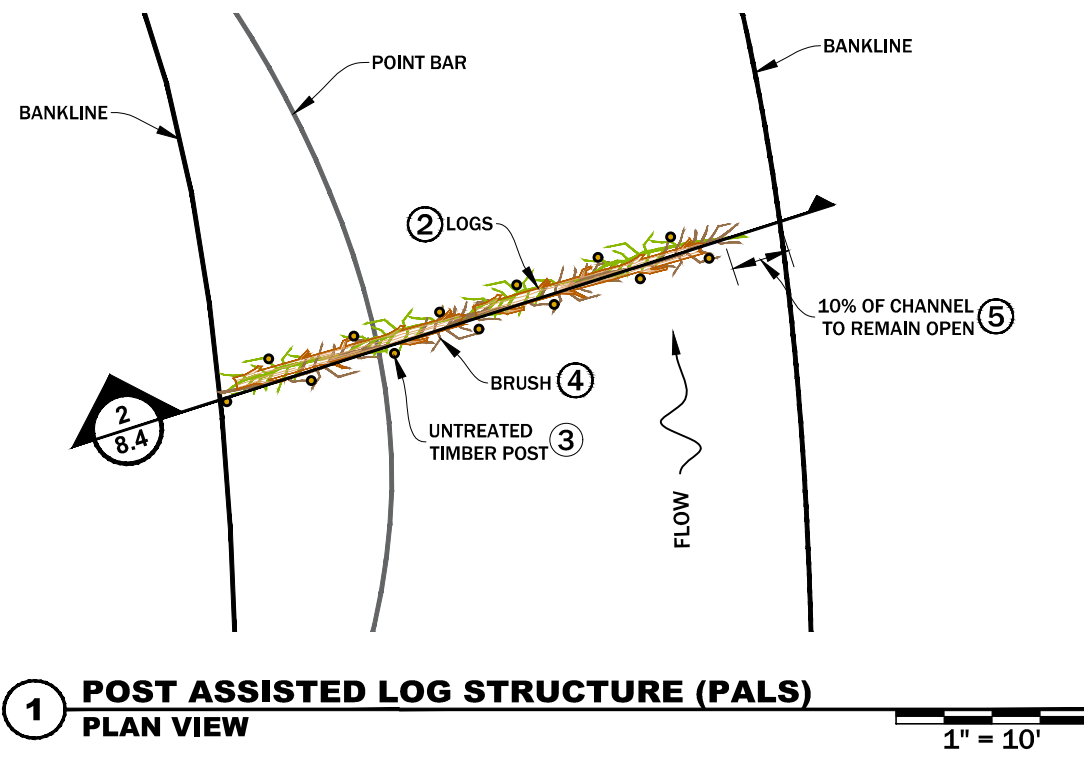
NO.	DATE	BY	DESCRIPTION	CHK
1	01/29/24	LJ	60% DESIGN	CN

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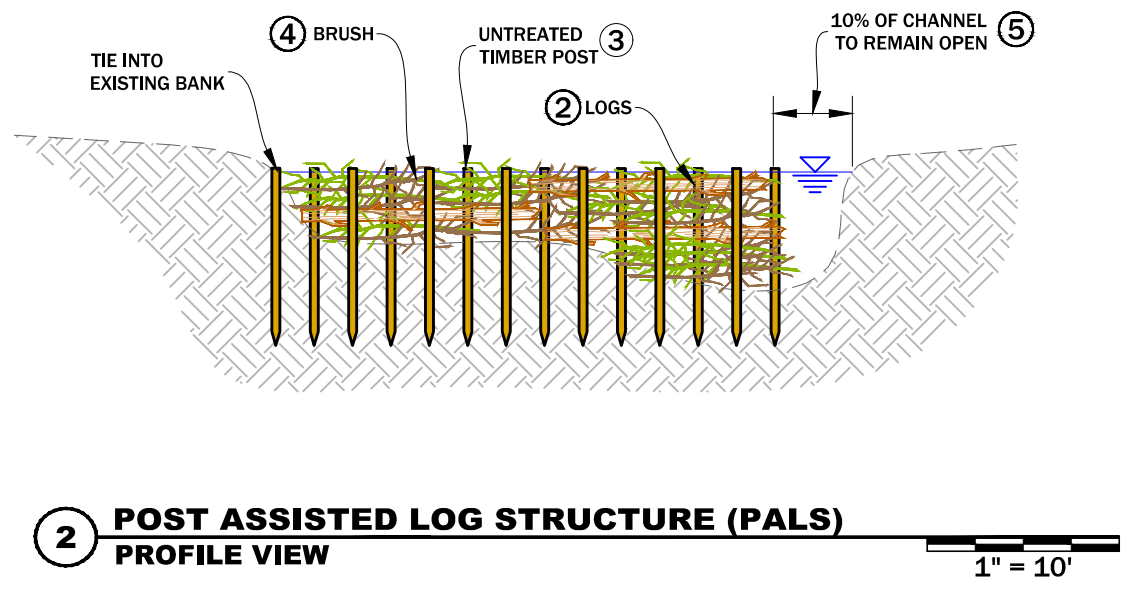


**1 POST ASSISTED LOG STRUCTURE (PALS)
PLAN VIEW** 1" = 10'

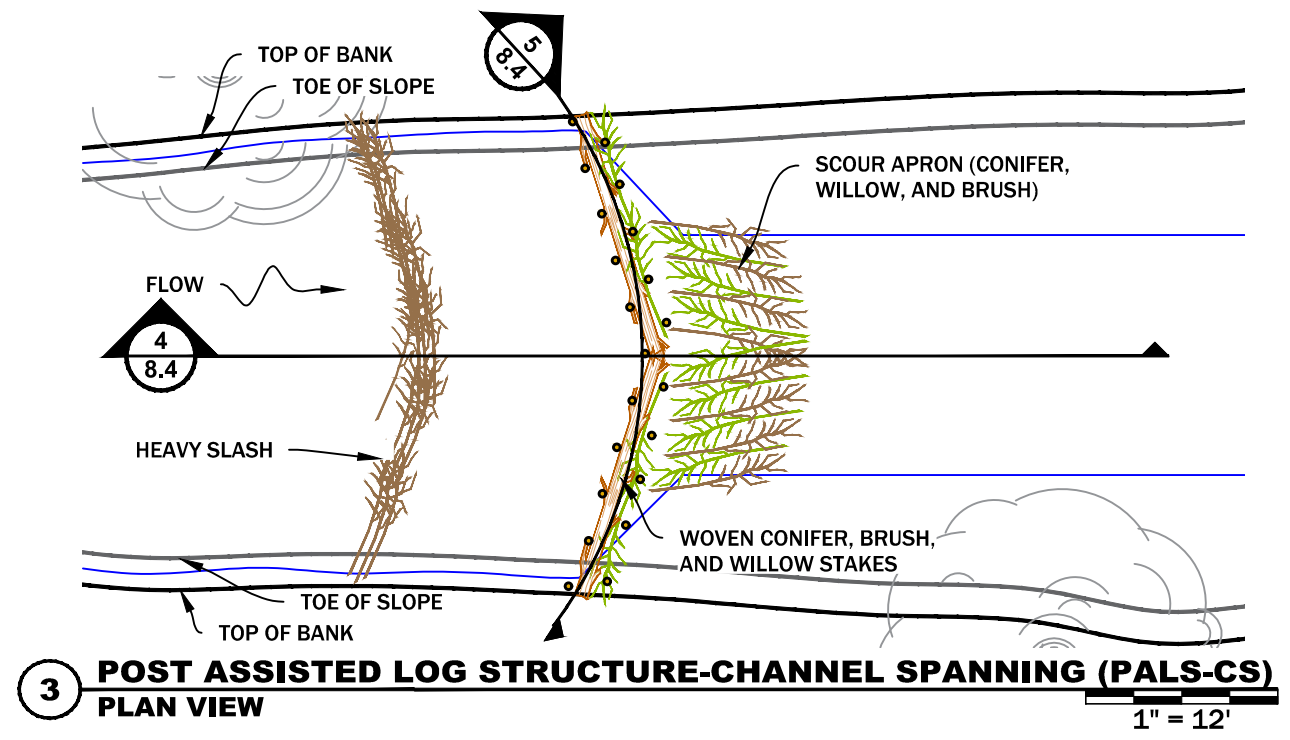
CONSTRUCTION NOTES

- 1 CONSTRUCT POST ASSISTED LOG STRUCTURES AT LOCATIONS STAKED BY ENGINEER.
- 2 PLACE LOGS AT 10°-15° ANGLE TO FLOW.
- 3 DRIVE POSTS ON ALTERNATE SIDE OF LOGS, ANGLING POSTS SLIGHTLY TO SECURE LOGS.
- 4 WEAVE AND STACK BRUSH OF VARYING LENGTHS BETWEEN THE VERTICAL POSTS, PERPENDICULAR TO THE FLOW TO CREATE A THICK MAT.
- 5 10% OF CHANNEL WIDTH TO REMAIN OPEN ON OUTSIDE OF STRUCTURE.

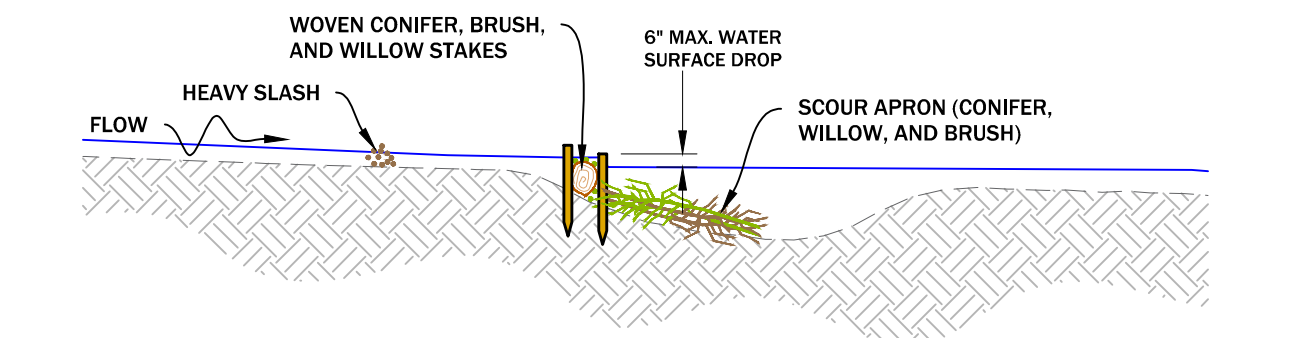
MATERIAL SCHEDULE (PER STRUCTURE)			
ITEM	DIA. (IN)	LENGTH (FT)	QUANTITY (EA)
UNTREATED TIMBER POSTS	3	6	18
HEAVY SLASH-LOGS	1-3	8-10	3
HEAVY SLASH-BRUSH	1-3	5-8	20



**2 POST ASSISTED LOG STRUCTURE (PALS)
PROFILE VIEW** 1" = 10'

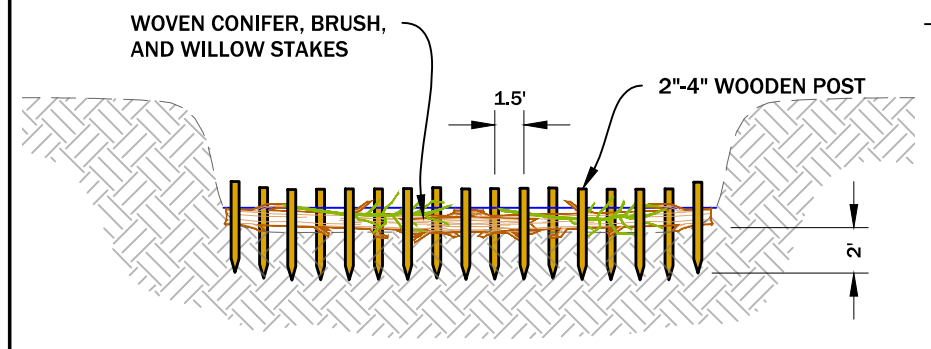


**3 POST ASSISTED LOG STRUCTURE-CHANNEL SPANNING (PALS-CS)
PLAN VIEW** 1" = 12'



**4 POST ASSISTED LOG STRUCTURE-CHANNEL SPANNING (PALS-CS)
PROFILE VIEW** 1" = 10'

CONSTRUCTION NOTES



**5 POST ASSISTED LOG STRUCTURE-CHANNEL SPANNING (PALS-CS)
SECTION VIEW** 1" = 10'

MATERIAL SCHEDULE (PER STRUCTURE)			
ITEM	DIA. (IN)	LENGTH (FT)	QUANTITY (EA)
UNTREATED TIMBER POSTS	3	6	20
HEAVY SLASH-LOGS	1-3	8-10	2
HEAVY SLASH-BRUSH	1-3	5-8	20

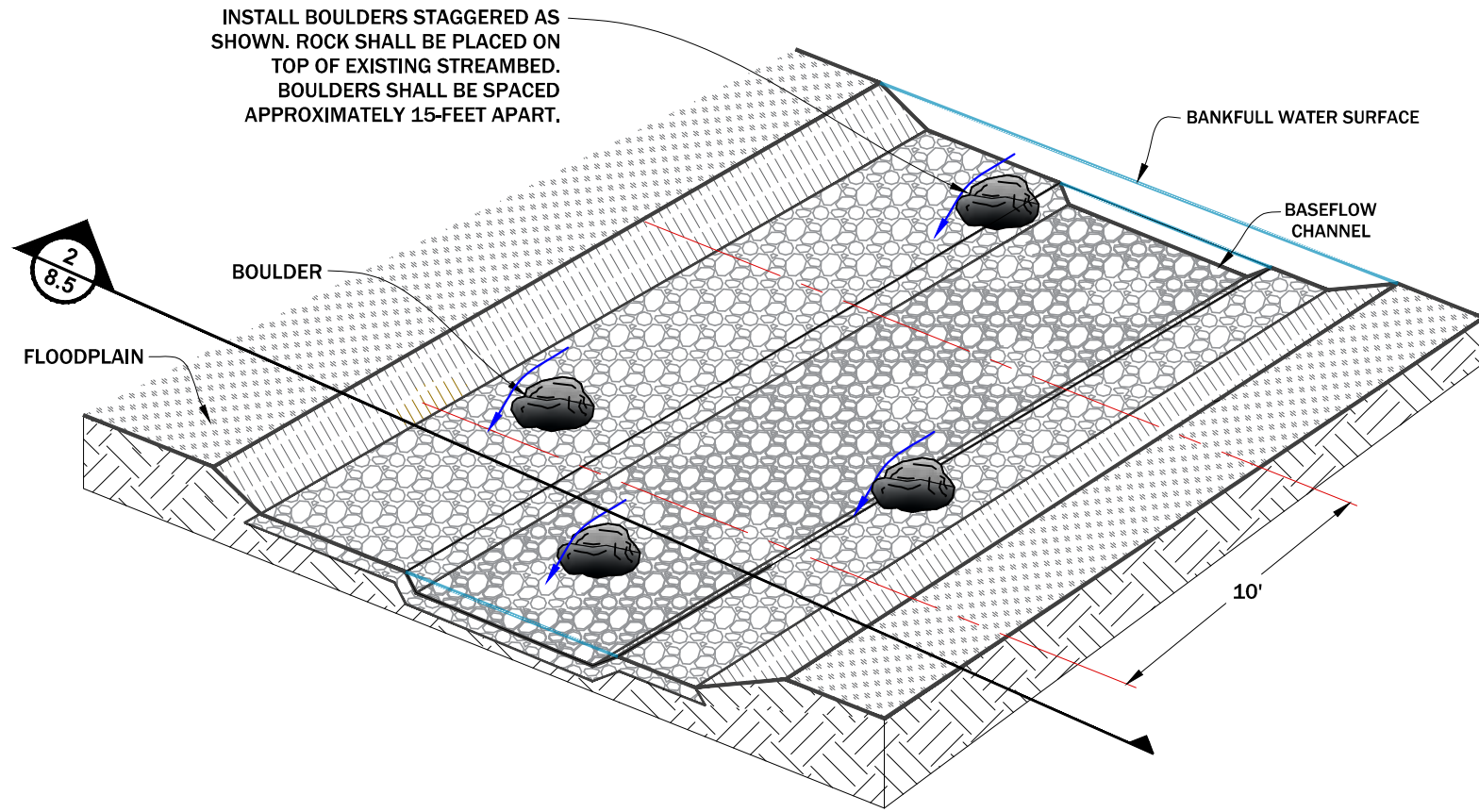
NO.	DATE	BY	DESCRIPTION	CHK
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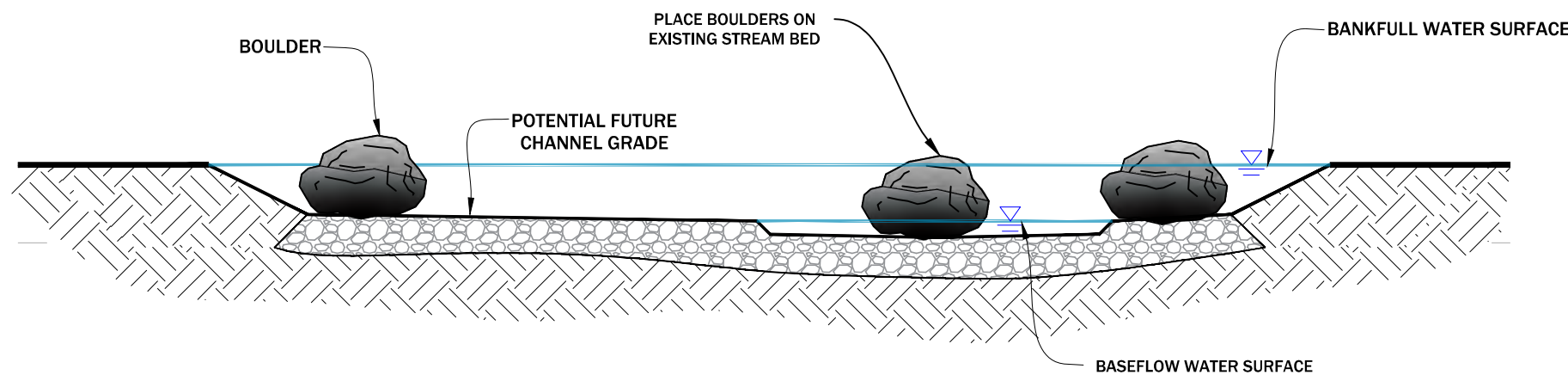
INSTALL BOULDERS STAGGERED AS SHOWN. ROCK SHALL BE PLACED ON TOP OF EXISTING STREAMBED. BOULDERS SHALL BE SPACED APPROXIMATELY 15-FEET APART.

1 HABITAT BOULDER DETAIL
3D VIEW
NTS

CONSTRUCTION NOTES

- ① PRIOR TO PLACEMENT OF HABITAT BOULDERS, CONSTRUCTION MANAGER SHALL MARK THE UPSTREAM AND DOWNSTREAM LIMITS FOR BOULDER PLACEMENT.
- ② CONTRACTOR SHALL STOCKPILE HABITAT BOULDER IN STAGING AREA DESIGNATED ON THE DRAWING.

MATERIAL SCHEDULE (PER 10 FEET OF STREAM CHANNEL)		
ITEM	DIA. (FT)	QUANTITY (EA)
BOULDERS	2-3	2



2 HABITAT BOULDER DETAIL
SECTION VIEW
NTS



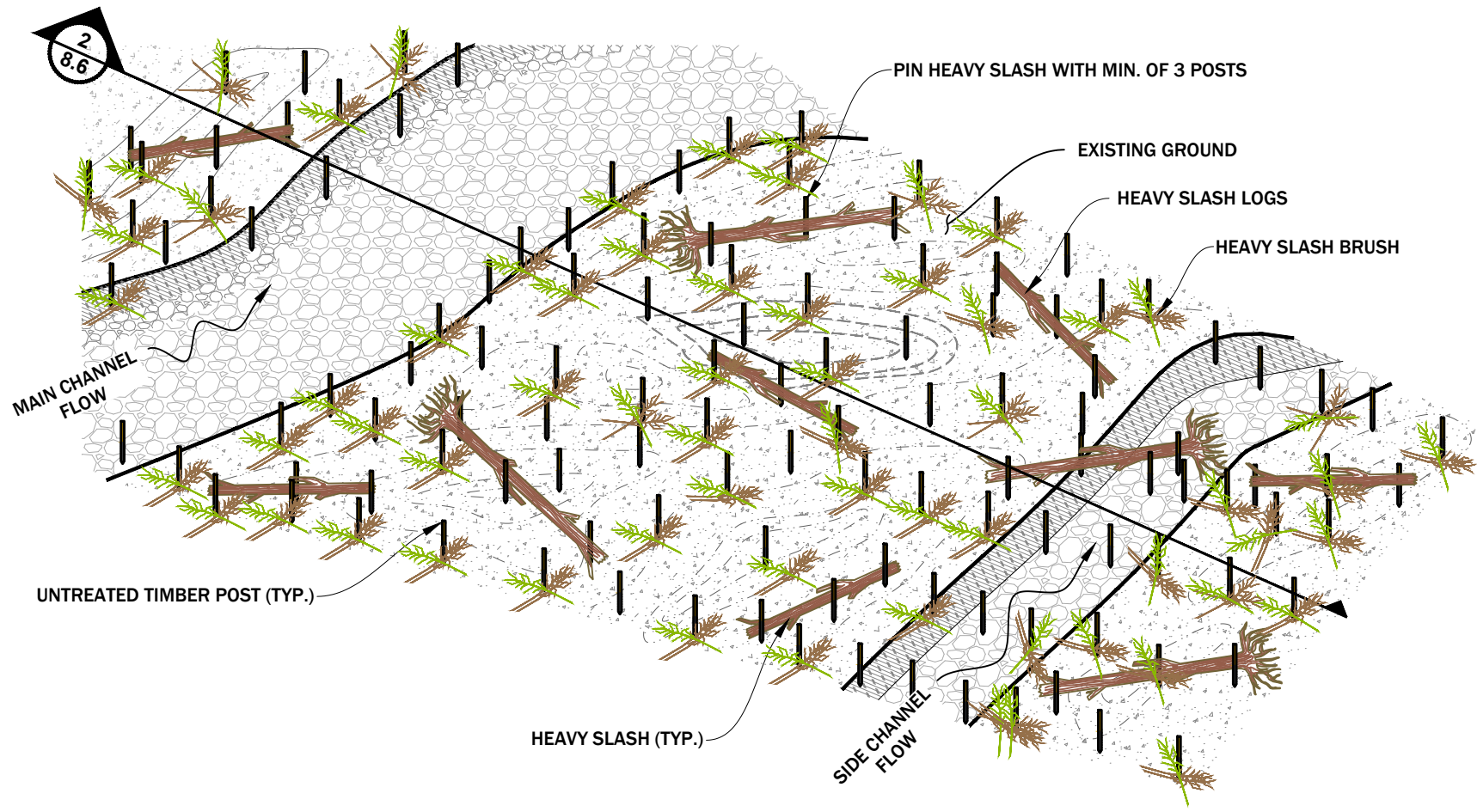
TYPICAL CONSTRUCTED STREAMBED THROUGH A RIFFLE FEATURE

NO.	DATE	BY	DESCRIPTION	CHK
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**1 FLOODPLAIN ROUGHNESS DETAIL
3D VIEW**

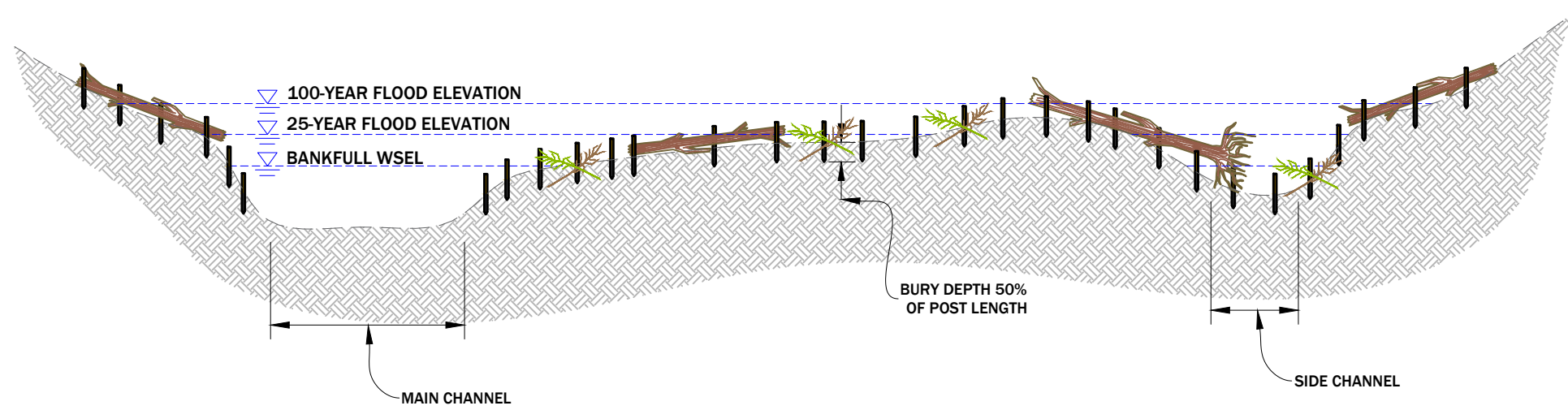
NTS

CONSTRUCTION NOTES

- ① CONTRACTOR SHALL TRANSPORT HEAVY SLASH LOGS AND HEAVY SLASH BRUSH FROM THE DESIGNATED STOCKPILE AREAS AND PLACE IN BUNDLES DISTRIBUTED EVENLY ACROSS THE FLOODPLAIN TREATMENT AREA TO FACILITATE HAND PLACEMENT OF LOGS AND SLASH.
- ② PLACE HEAVY SLASH LOGS AT A RATE OF 35 PIECES PER ACRE AND SPACED AT AN AVERAGE DISTANCE OF 20 FEET FROM HEAVY SLASH LOGS.
- ③ PLACE HEAVY SLASH BRUSH ON THE FLOODPLAIN SO IT COVERS 25 PERCENT OF THE FLOODPLAIN SURFACE (APPROXIMATELY 250 PIECES PER ACRE).
- ④ INSTALL POSTS ACROSS THE FLOODPLAIN SURFACE IN STAGGERED ROWS WITH AN AVERAGE SPACING OF 10', WITH ONE HALF OF THE POST BURIED TO A DEPTH OF 2-FT., AND ONE HALF EXPOSED A MAXIMUM OF 2-FT ABOVE FLOODPLAIN SURFACE. USE MINIMUM OF 3 POSTS TO ANCHOR EACH PIECE OF HEAVY SLASH LOGS.

MATERIAL SCHEDULE (PER ACRE)

ITEM	DIA. (IN)	LENGTH (FT)	QUANTITY (EA)
UNTREATED TIMBER POSTS	2-4	4	980
HEAVY SLASH-LOGS	5-10	20-40	61
HEAVY SLASH-BRUSH	1-3	5-8	433



**2 FLOODPLAIN ROUGHNESS DETAIL
SECTION VIEW**

NTS

NO.	DATE	BY	DESCRIPTION	CHK
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