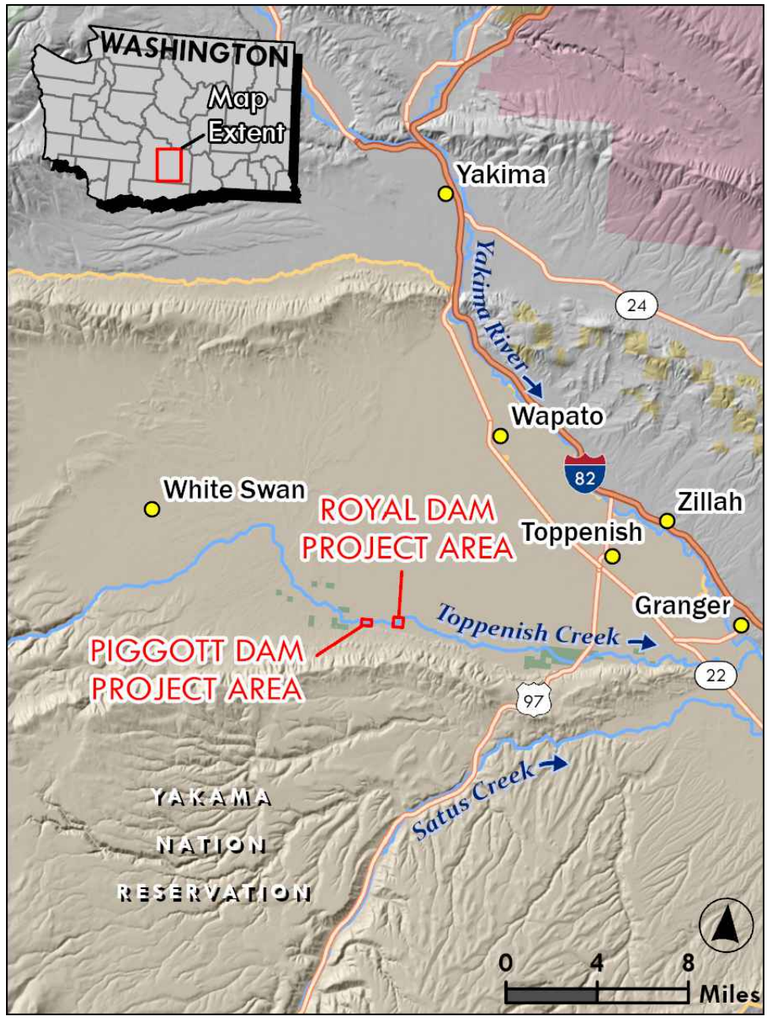
LOWER TOPPENISH CREEK DAM REMOVALS
PIGGOTT DAM AND ROYAL DAM
FINAL DESIGN PLAN SET

LOWER TOPPENISH CREEK VICINITY MAP



LEGAL DESCRIPTION: SEC. 25 AND 26, T 10 N, R 18 E, AND SEC. 29 AND 30, T 10 N, R 19 E, YAKIMA COUNTY

PROJECT PARTNERS

CONFEDERATED TRIBES AND BANDS OF THE YAKAMA NATION
P.O. BOX 151
TOPPENISH, WA 98948

PROJECT DESCRIPTION

YAKAMA NATION FISHERIES RETAINED SWCA TO PREPARE DAM REMOVAL DESIGNS FOR TWO PROJECT SITES ON LOWER TOPPENISH CREEK ON THE YAKAMA RESERVATION NEAR TOPPENISH, WASHINGTON. THE PROJECT AREAS ARE LOCATED ON PRIVATE LAND AND LAND OWNED BY THE CONFEDERATED TRIBES AND BANDS OF THE YAKAMA NATION. THE PROJECT IS BEING FUNDED BY A GRANT FROM THE U.S. FISH AND WILDLIFE SERVICE NATIONAL FISH PASSAGE PROGRAM.

THE PROJECTS ARE LOCATED IN A REACH OF EXTREMELY HIGH JUVENILE STEELHEAD OUTMIGRATION MORTALITY, TOTALING GREATER THAN 50%; THEREFORE, JUVENILE STEELHEAD MORTALITY DUE TO STRANDING OR OTHER FACTORS IS A MAJOR RESOURCE CONCERN. THE PROJECTS ENTAIL THE REMOVAL OF CHECK STRUCTURES, PIGGOTT DAM AND ROYAL DAM, THAT ARE CURRENTLY USED TO PROVIDE WATER TO WETLANDS FOR MIGRATORY WATERFOWL. WHEN THE CHECK STRUCTURES ARE IN OPERATION, THE DAMS ACTS AS UPSTREAM PASSAGE BARRIERS FOR AQUATIC ORGANISMS AS WELL AS A FLOODPLAIN STRANDING RISK FOR DOWNSTREAM PASSAGE. THE STRUCTURES ARE TO BE REPLACED BY ROUGHENED CHANNELS THAT RETAIN THE ABILITY TO MIMIC EXISTING WETLAND INUNDATION.

THE GOALS OF THE PROJECT ARE TO IMPROVE FISH PASSAGE AND FLOODPLAIN ECOSYSTEM FUNCTION FOR ESA LISTED STEELHEAD, LAMPREY, MIGRATORY WATERFOWL, WETLAND PLANTS, AND OTHER SPECIES ON TOPPENISH CREEK. THE PROJECT OBJECTIVES INCLUDE:

- RESTORE FULL FISH PASSAGE IN THE PROJECT REACH
- MAINTAIN AND ENHANCE WETLAND FUNCTION FOR MIGRATORY WATERFOWL AND OTHER FISH AND WILDLIFE, AND WETLAND PLANT SPECIES
- REDUCE STEELHEAD AND LAMPREY STRANDING RISK ON THE FLOODPLAIN
- ENHANCE SIDE CHANNEL AND FLOODPLAIN WINTER REARING HABITAT FOR STEELHEAD

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COVER PAGE

LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
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PROJECT NUMBER
00097854-000-CRB

DRAWING NUMBER
1.0

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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. TOPOGRAPHY SHOWN ON THE DRAWINGS IS BASED ON MERGED LIDAR AND BATHYMETRIC SURVEY DATA. BATHYMETRIC SURVEY WORK WAS PERFORMED IN OCTOBER 2025 BY SWCA USING SURVEY GRADE GPS. AERIAL LIDAR DATA WAS COLLECTED IN JUNE 2025 BY NV5 GEOSPATIAL.
3. 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.
4. THE OWNER WILL PROVIDE COPIES OF APPLICABLE PERMITS REQUIRED TO PERFORM THE WORK PRIOR TO THE START OF CONSTRUCTION.
5. THE CONTRACTOR SHALL COMPLY WITH ALL SAFETY REQUIREMENTS DESCRIBED IN THE CONTRACT DOCUMENTS.
6. 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.
7. 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.
8. VERTICAL TOLERANCE FOR CONSTRUCTION COMPLIANCE WILL BE 0.3 FEET. HORIZONTAL TOLERANCE WILL BE 1.0 FEET.
9. THE CONTRACTOR SHALL CONFIRM QUANTITIES SHOWN ON THE DRAWINGS AND FOR OWNER-SUPPLIED MATERIALS.
10. EARTHWORK QUANTITIES REPORTED ON THE DRAWINGS ARE NEAT LINE QUANTITIES CALCULATED FROM THE DIFFERENCE BETWEEN THE FINISHED GROUND SURFACE AND EXISTING GROUND SURFACE.
11. THE VOLUME OF MATERIAL REQUIRED FOR FILL SURFACES MAY VARY DEPENDING ON COMPACTION AND MOISTURE CONTENT.
12. EARTHWORK QUANTITIES DO NOT INCLUDE SUBGRADE EXCAVATION QUANTITIES UNLESS NOTED OTHERWISE.
13. SLOPES DESIGNATED AS 2:1, 1.5:1, ETC., ARE THE RATIOS OF HORIZONTAL DISTANCE TO VERTICAL DISTANCE.
14. DIMENSIONS ARE GIVEN IN FEET AND TENTHS OF A FOOT.
15. 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.

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 100-YEAR FLOW HAS BEEN SELECTED FOR STABILITY DESIGN CRITERIA.

GENERAL SYMBOLS

1	SITE ACCESS TAG
X	MATERIAL ITEM TAG
	WATER ELEVATION
	SURVEY CONTROL POINT
4:1	SLOPE
Flow	CHANNEL FLOW DIRECTION
1+00	PROPOSED ALIGNMENT
	GRADING EXTENTS
	APPROXIMATE PROPERTY LINE
	EXISTING UNIMPROVED ACCESS ROAD
	NEW CONSTRUCTION ACCESS ROAD
	STAGING AREA
	EXISTING MAIN CHANNEL ALIGNMENT
	EXISTING SIDE CHANNEL ALIGNMENT (WHEN CHECK BOARDS ARE IN PLACE)
	EXISTING BERM ALIGNMENT
	PILOT CHANNEL
	LARGE WOOD STRUCTURE
	ROUGHENED CHANNEL
	SPOILS/ROAD IMPROVEMENTS
	VEGETATED WOOD MATRIX
	TEMPORARY BULK BAG
	TEMPORARY BYPASS CHANNEL
P	TEMPORARY PUMP
	REPOSITORY
	CATTLE FENCE
	GATE

ABBREVIATIONS

APPROX	APPROXIMATE
BKF	BANKFULL
CFS	CUBIC FEET PER SECOND
CH	CHANNEL
CL	CENTERLINE
CMP	CORRUGATED METAL PIPE
CP	CONTROL POINT
CY	CUBIC YARDS
DBH	DIAMETER AT BREAST HEIGHT
DEG	DEGREE
DIA	DIAMETER
E	EASTING
EA	EACH
EL.	ELEVATION
ELEV.	ELEVATION
EXTG	EXISTING
GRAD.	GRADATION
H	HORIZONTAL
HOR	HORIZONTAL
HORIZ.	HORIZONTAL
I.E.	INVERT ELEVATION
INV.	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
OP	OPERATION
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
TW	THALWEG
TYP.	TYPICAL
V	VERTICAL
VER	VERTICAL
VERT.	VERTICAL

SWCA ENVIRONMENTAL CONSULTANTS
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GENERAL NOTES

LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	10/23/26	LS	FINAL DESIGN	NW

PROJECT NUMBER
00097854-000-CRB

DRAWING NUMBER
1.1

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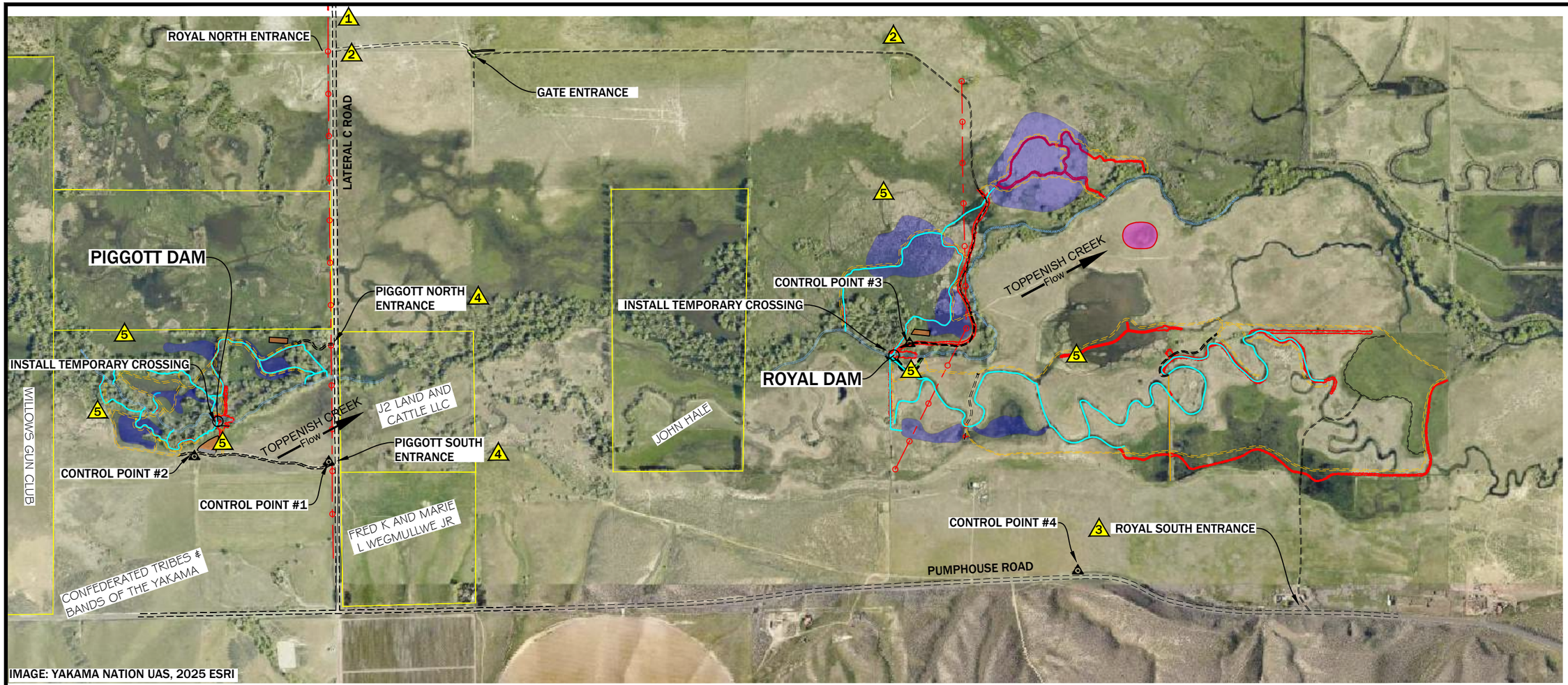


IMAGE: YAKAMA NATION UAS, 2025 ESRI

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 SOUTH
UNITS:	US SURVEY FEET
HORIZONTAL DATUM:	NAD83 (2011)
VERTICAL DATUM:	NAVD88 (GEOID 18)

CONTROL POINTS

POINT NUMBER	NORTHING	EASTING	POINT ELEVATION	RAW DESCRIPTION
1	360194.826'	1634588.433'	785.672'	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "SWCA"
2	360247.088'	1633317.597'	788.970'	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "SWCA"
3	361316.861'	1640082.837'	778.833'	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "SWCA"
4	359166.739'	1641675.101'	798.573'	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "SWCA"

SITE ACCESS NOTES

1. FROM TOPPENISH WA, HEAD WEST ON WEST 1ST AVE. AND THEN CONTINUE WEST ONTO FORT ROAD. HEAD WEST ON FORT ROAD FOR ~9.4 MILES THEN TURN LEFT (SOUTH) ONTO LATERAL C ROAD.
2. TO ACCESS THE ROYAL NORTH ENTRANCE FROM FORT ROAD, CONTINUE SOUTH ON LATERAL C ROAD FOR ~3.0 MILES THEN TURN LEFT (EAST) ON TO AN EXISTING ACCESS ROAD. CONTINUE ~1.8 MILES TO ARRIVE AT THE PROJECT SITE.
3. TO ACCESS THE ROYAL SOUTH ENTRANCE FROM FORT ROAD, CONTINUE SOUTH ON LATERAL C ROAD FOR 3.7 MILES THEN TURN LEFT (EAST) ON TO PUMP HOUSE ROAD . CONTINUE 1.7 MILES TO SOUTH ACCESS ROAD. TURN LEFT (NORTH) AND TRAVEL TO PROJECT SITE.
4. TO ACCESS THE PIGGOTT DAM SITE FROM FORT ROAD, CONTINUE SOUTH ON LATERAL C ROAD FOR ~3.5 MILES THEN TURN RIGHT (WEST) TO ACCESS THE NORTH ENTRANCE. FROM THE NORTH ENTRANCE, CONTINUE SOUTH ON LATERAL C ROAD FOR 0.2 MILES THEN TURN RIGHT (WEST) TO ACCESS THE SOUTH ENTRANCE.
5. USE VARIOUS TEMPORARY ACCESS ROADS OUTLINED IN THE PLANS ABOVE TO ACCESS AREAS AROUND THE PROJECT SITE.

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

DRAWING LEGEND

- SITE ACCESS TAG
- SURVEY CONTROL POINT
- APPROXIMATE PROPERTY LINE
- EXISTING OVERHEAD POWER
- EXISTING POWER POLE
- EXISTING UNIMPROVED ACCESS ROAD
- NEW CONSTRUCTION ACCESS ROAD
- STAGING AREA
- REPOSITORY
- GRADING EXTENTS

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ACCESS, STAGING, AND SURVEY CONTROL
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
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PROJECT NUMBER 00097854-000-CRB

DRAWING NUMBER 1.2

Drawing 3 of 46

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TOTAL WOOD QUANTITIES

ITEM	QUANTITY	DIAMETER	LENGTH	ROOTWAD
CATEGORY 1 WOOD	66 EA	18" - 24"	20	YES
CATEGORY 2 WOOD	52 EA	14"-16"	15	OPTIONAL
CATEGORY 3 WOOD	615 EA	3" - 10"	10-15	OPTIONAL
CATEGORY 4 WOOD	1,230 EA	1" - 3"	10-15	OPTIONAL
WILLOW CUTTINGS	4,545	0.25" - 1"	6-8	NO

TOTAL ROCK QUANTITIES

ITEM	QUANTITY	DIAMETER	
CATEGORY 1 ROCK	160 EA (~50 CY)	24-36 IN	
CATEGORY 2 ROCK	92 EA (~20 CY)	18-24 IN	
ITEM	QUANTITY	GRADATION	
RIFFLE MATERIAL	192 CY	SIZE	PERCENT PASSING
		16"	95
		14"	80-95
		10"	50-80
		6"	30-50
		4"	15-30
		FINES	15
STREAMBANK MATERIAL	128 CY	SIZE	PERCENT PASSING
		10"	95
		6"	80-95
		3"	50-80
		1.5"	30-50
		NO. 4 SIEVE	15-30
		NO. 200 SIEVE	15
PIT RUN	192 CY		

TOTAL EARTHWORK QUANTITIES

ITEM	QUANTITY (CY)
PILOT CHANNEL GRADING	547 CY (CUT)
SPOIL PLACEMENT	187 CY (FILL)
ROUGHENED CHANNELS GENERAL FILL	360 CY (FILL)
NET	0 CY

NOTES:
VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.

GENERAL FILL - EXCAVATED MATERIAL NO SPECIFIED GRADATION

MISCELLANEOUS

ITEM	QUANTITY
TEMPORARY ACCESS ROAD	7,715 LF
SHEET PILE	140 LF
ALL-THREAD ROD	210 LF

VEGETATED WOOD MATRIX QUANTITIES



ITEM	QUANTITY
VEGETATED WOOD MATRIX	535 LF
CATEGORY 3 WOOD	535 EA
CATEGORY 4 WOOD	1,070 EA
WILLOW CUTTINGS	3,745 EA
STREAMBANK MATERIAL	123 CY

LARGE WOOD STRUCTURE TYPE 1 QUANTITIES



ITEM	QUANTITY
LARGE WOOD STRUCTURES	5 EA
CATEGORY 1 WOOD	25 EA
CATEGORY 2 WOOD	10 EA
CATEGORY 3 WOOD	50 EA
CATEGORY 4 WOOD	100 EA
WILLOW CUTTINGS	500 EA
STREAMBANK MATERIAL	3 CY

LARGE WOOD STRUCTURE TYPE 2 QUANTITIES



ITEM	QUANTITY
LARGE WOOD STRUCTURES	3 EA
CATEGORY 1 WOOD	18 EA
CATEGORY 2 WOOD	42 EA
CATEGORY 3 WOOD	30 EA
CATEGORY 4 WOOD	60 EA
WILLOW CUTTINGS	300 EA
STREAMBANK MATERIAL	2 CY
ALL-THREAD BOLT (ROD)	210 LF

PRIMARY ROUGHENED CHANNEL QUANTITIES

ITEM	QUANTITY
CATEGORY 1 ROCK	120 EA
CATEGORY 2 ROCK	60 EA
RIFFLE MATERIAL	115 CY
SUBGRADE MATERIAL (PIT RUN)	115 CY
CATEGORY 1 WOOD	15 EA
GENERAL FILL	300 CY

SECONDARY ROUGHENED CHANNEL QUANTITIES

ITEM	QUANTITY
CATEGORY 1 ROCK	40 EA
CATEGORY 2 ROCK	32 EA
RIFFLE MATERIAL	77 CY
SUBGRADE MATERIAL	77 CY
CATEGORY 1 WOOD	8 EA
GENERAL FILL	60 CY

PLANTING SCHEDULE (CONTAINERS AND CUTTINGS)

VEGETATED WOOD MATRIX & LARGE WOOD STRUCTURES	TOTAL	6,350
RIPARIAN FLOODPLAIN 1.08 ACRES	TOTAL	777
UPLAND 1.40 ACRES	TOTAL	498
	TOTAL CUTTINGS	6,350
	TOTAL CONTAINERS	1,275

SEEDING SCHEDULE

LOCATION	TOTAL PLS LBS
FLOODPLAIN 2.49 ACRES	92.39
UPLAND RECLAMATION MIX 1.4 ACRES	64.15

SWCA ENVIRONMENTAL CONSULTANTS
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PIGGOTT MATERIALS AND QUANTITIES

LOWER TOPPENISH CREEK DAM REMOVALS

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TOTAL WOOD QUANTITIES

ITEM	QUANTITY	DIAMETER	LENGTH	ROOTWAD
CATEGORY 1 WOOD	69 EA	18" - 24"	20	YES
CATEGORY 2 WOOD	46 EA	14"-16"	15	OPTIONAL
CATEGORY 3 WOOD	560 EA	3" - 10"	10-15	OPTIONAL
CATEGORY 4 WOOD	1,120 EA	1" - 3"	10-15	OPTIONAL
WILLOW CUTTINGS	4,250	0.25" - 1"	6-8	NO

LARGE WOOD STRUCTURE TYPE 1 QUANTITIES



ITEM	QUANTITY
LARGE WOOD STRUCTURES	9 EA
CATEGORY 1 WOOD	45 EA
CATEGORY 2 WOOD	18 EA
CATEGORY 3 WOOD	90 EA
CATEGORY 4 WOOD	180 EA
WILLOW CUTTINGS	900 EA
STREAMBANK MATERIAL	5 CY

LARGE WOOD STRUCTURE TYPE 2 QUANTITIES



ITEM	QUANTITY
LARGE WOOD STRUCTURES	2 EA
CATEGORY 1 WOOD	12 EA
CATEGORY 2 WOOD	28 EA
CATEGORY 3 WOOD	20 EA
CATEGORY 4 WOOD	40 EA
WILLOW CUTTINGS	200 EA
STREAMBANK MATERIAL	2 CY
ALL-THREAD BOLT (ROD)	140 LF

VEGETATED WOOD MATRIX QUANTITIES



ITEM	QUANTITY
VEGETATED WOOD MATRIX	450 LF
CATEGORY 3 WOOD	450 EA
CATEGORY 4 WOOD	900 EA
WILLOW CUTTINGS	3,150 EA
STREAMBANK MATERIAL	104 CY

TOTAL ROCK QUANTITIES

ITEM	QUANTITY	DIAMETER
CATEGORY 1 ROCK	150 EA (~47 CY)	24-36 IN
CATEGORY 2 ROCK	80 EA (~14 CY)	18-24 IN

ITEM	QUANTITY	GRADATION	
		SIZE	PERCENT PASSING
RIFFLE MATERIAL	200 CY	16"	95
		14"	80-95
		10"	50-80
		6"	30-50
		4"	15-30
		FINES	15
STREAMBANK MATERIAL	115 CY	SIZE	PERCENT PASSING
		10"	95
		6"	80-95
		3"	50-80
		1.5"	30-50
		NO. 4 SIEVE	15-30
		NO. 200 SIEVE	15
PIT RUN	2860 CY		
¾" CRUSHED GRAVEL	670 CY	¾" MINUS	

ROUGHENED CHANNEL QUANTITIES

ITEM	QUANTITY
CATEGORY 1 ROCK	150 EA
CATEGORY 2 ROCK	80 CY
RIFFLE MATERIAL	200 CY
SUBGRADE MATERIAL (PIT RUN)	200 CY
CATEGORY 1 WOOD	12 EA
GENERAL FILL	400 CY

PLANTING SCHEDULE (CONTAINERS AND CUTTINGS)

VEGETATED WOOD MATRIX & LARGE WOOD STRUCTURES	TOTAL	3,130
RIPARIAN FLOODPLAIN 3 ACRES	TOTAL	2,157
	TOTAL CUTTINGS	3,130
	TOTAL CONTAINERS	2,157

SEEDING SCHEDULE

LOCATION	TOTAL PLS LBS
FLOODPLAIN 8.97 ACRES	332.82
UPLAND STAGING AREAS AND HAUL ROUTES: RECLAMATION MIX 4.79 ACRES	219.47

EARTHWORK VOLUMES

AREA	CUT (CY)	FILL (CY)	NET (CY)
TEMPORARY BYPASS	1,070	1,070	0
CONSTRUCTED RIFFLE	860	15	845
PILOT CHN 1	25	0	25 C
PILOT CHN 2	270	40	230 C
BULRUSH CHN 1	1,185	0	1,185 C
BULRUSH CHN 2	1,230	0	1,230 C
BULRUSH CONNECTOR	285	0	285 C
DITCH FILL MICRO	0	1,570	1,570 F
PILOT CHN 3	170	0	170 C
BREACH 1	40	0	40 C
BREACH 2	45	0	45 C
CORN FIELD	500	15	485 C
SOUTH CHANNEL	1,865	0	1,865 C
MEANDER 1	25	0	25 C
MEANDER 2	490	10	480 C
MEANDER 3	1,055	20	1,035 C
TOTAL	9,115	2,740	6,375 C

NOTE: VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.

NOTE: OVERBURDEN MATERIAL SHALL BE PLACED WITHIN THE CORN FIELDS WHICH IS DESIGNATED AS THE REPOSITORY.

GENERAL FILL - EXCAVATED MATERIAL
NO SPECIFIED GRADATION

ROAD IMPROVEMENT

ITEM	QUANTITY
ROAD IMPROVEMENT	2,265 LF
PITRUN	2660 CY
¾" CRUSHED GRAVEL	670 CY

MISCELLANEOUS

ITEM	QUANTITY
TEMPORARY ACCESS ROAD	19,948 LF
SHEET PILE	120 LF
ALL-THREAD ROD	140 LF
CATTLE FENCE (3 STRAND SMOOTH WITH 6" POSTS)	250 LF
12' CATTLE GATE	4

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ROYAL MATERIALS AND QUANTITIES

LOWER TOPPENISH CREEK DAM REMOVALS

YAKAMA RESERVATION, WASHINGTON

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PROJECT NUMBER
00097854-000-CRB

DRAWING NUMBER
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IMAGE: YAKAMA NATION UAS, 2025 ESRI

1 PIGGOTT DAM EXISTING CONDITIONS
PLAN VIEW

1" = 200'

EXISTING CONDITIONS

THE PIGGOTT DAM IS CURRENTLY MANAGED BY THE YAKAMA NATION WILDLIFE PROGRAM TO ENHANCE CULTURALLY SIGNIFICANT TRIBAL RESOURCES INCLUDING MIGRATORY WATERFOWL AND WETLAND PLANT SPECIES. THE EXISTING STRUCTURE CONSISTS OF A 21-FOOT-WIDE BY 12-FOOT-LONG CONCRETE SILL WITH AN INVERT ELEVATION OF 783.0-FEET. THE STRUCTURE HAS HEADWALLS THAT CONSIST OF CONCRETE BLOCKS AND WOOD PANELS. ABOVE THE STRUCTURE IS A STEEL CATWALK WITH HAND RAILINGS. THE FOOTINGS OF THE CATWALK CREATE THREE SEPARATE GATES THAT ARE SEASONALLY ADJUSTED WITH THE PLACEMENT OF CHECK BOARDS. THE STRUCTURE TOP ELEVATION IS 787.5-FEET WHICH ALLOWS FOR 4.5-FEET OF ADJUSTABILITY BEFORE OVER TOPPING. CHECK BOARDS ARE PLACED INTO THE STRUCTURE SEASONALLY TO AID THE WETLAND COMPLEX PONDING BETWEEN MID-NOVEMBER AND LATE JANUARY. A SECONDARY DAM STRUCTURE IS LOCATED APPROXIMATELY 60-FEET SOUTH OF THE PIGGOTT DAM. THE STRUCTURE IS LOCATED ON A SIDE CHANNEL THAT IS SEASONALLY ACTIVATED. THIS STRUCTURE CONSISTS OF CONCRETE BLOCK AND STEEL PLATE HEADWALLS. A CONCRETE BLOCK IS PLACED ON TOP OF THE SILL THAT CREATES A FIXED INVERT ELEVATION OF 785.8-FEET.

DRAWING LEGEND	
	APPROXIMATE PROPERTY LINE
	EXISTING OVERHEAD POWER
	EXISTING POWER POLE
	EXISTING MAIN CHANNEL ALIGNMENT
	CONNECTED SIDE CHANNEL WITH BOARDS PLACED IN STRUCTURE
	CONNECTED INUNDATION AREA WITH BOARDS PLACED IN STRUCTURE
	EXISTING BERM ALIGNMENT

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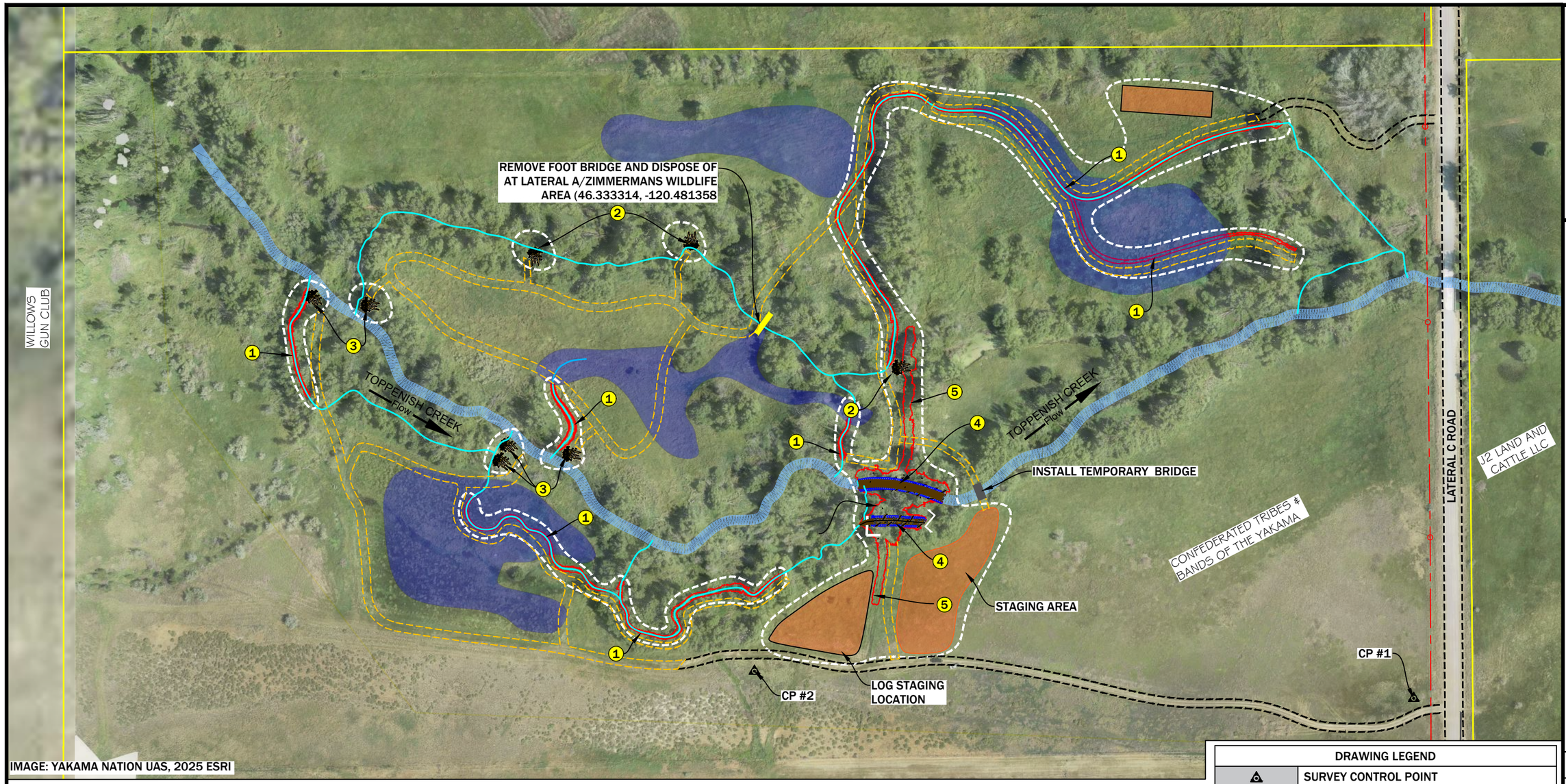
PIGGOTT EXISTING CONDITIONS
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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1 PIGGOTT DAM RESTORATION PLAN
PLAN VIEW

1" = 200'

RESTORATION PLAN OVERVIEW

1. PILOT CHANNEL MICROTOPOGRAPHY EXCAVATION TO DIRECT FLOW INTO FLOODPLAIN ~547 CY NET CUT
2. LWS STRUCTURE TYPE 1 LOCATION (SEE DETAIL 7.2) - 5 TOTAL STRUCTURES
3. LWS STRUCTURE TYPE 2 LOCATION (SEE DETAIL 7.3) - 3 TOTAL STRUCTURES
4. ROUGHENED CHANNEL - PRIMARY ~ 175 LF, SECONDARY ~125 LF (SEE DETAIL 7.0)
5. MICROTOPOGRAPHY FILL ~ GRADE TOP ELEV. TO ~789.5

DRAWING LEGEND	
	SURVEY CONTROL POINT
	APPROXIMATE PROPERTY LINE
	EXISTING OVERHEAD POWER
	EXISTING POWER POLE
	EXISTING UNIMPROVED ACCESS ROAD
	NEW CONSTRUCTION ACCESS ROAD
	STAGING AREA
	SEASONALLY CONNECTED SIDE CHANNEL
	SEASONALLY CONNECTED INUNDATION AREA
	LARGE WOOD STRUCTURE
	ROUGHENED CHANNEL
	VEGETATED WOOD MATRIX
	GRADING EXTENTS
	AREA OF DISTURBANCE

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PIGGOTT RESTORATION PLAN
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

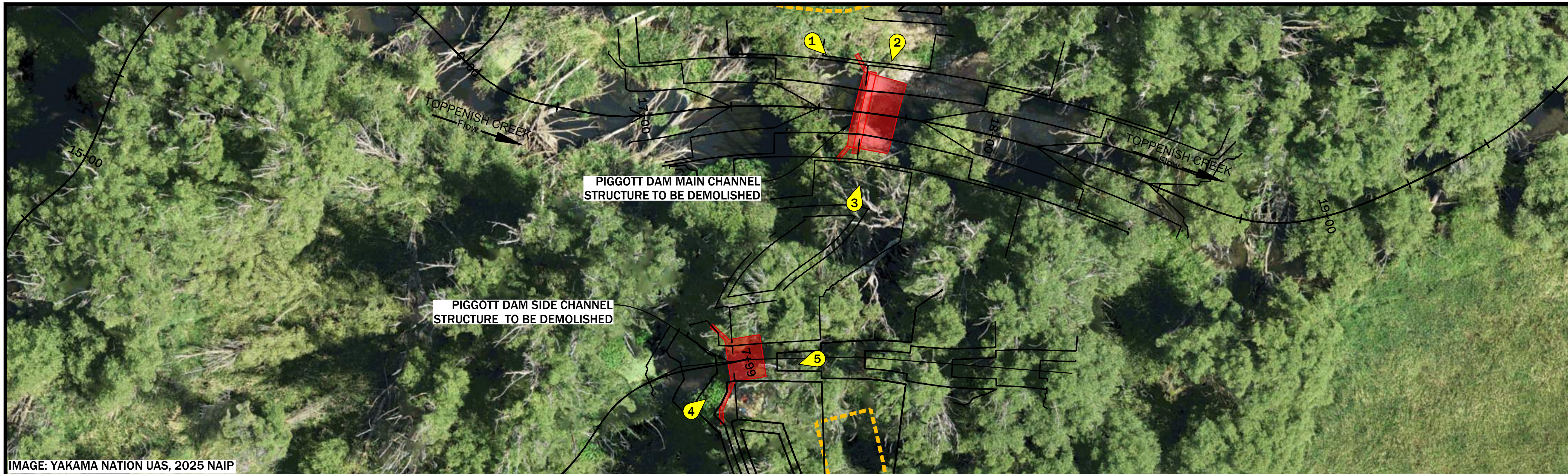
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Drawing 7 of 46

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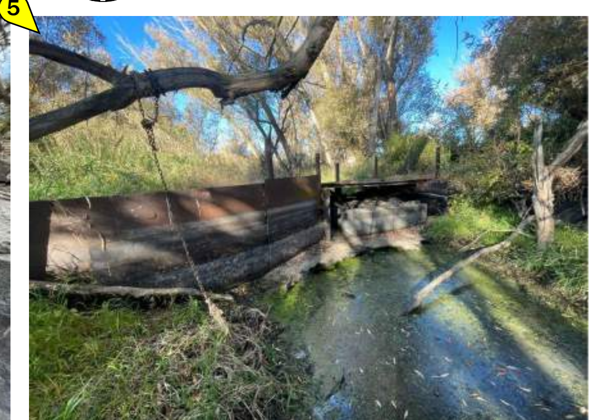
1 PIGGOTT DAM DEMOLITION PLAN
PLAN VIEW

1" = 30'









NOTE:
DISPOSAL OF STRUCTURES WILL BE AT DESIGNATED LOCATION, LATERAL A / ZIMMERMANS WILDLIFE AREA (46.333314, -120.481358)



MAIN CHANNEL STRUCTURE PHOTO POINTS

SIDE CHANNEL STRUCTURE PHOTO POINTS

MAIN CHANNEL STRUCTURE DEMOLITION SCHEDULE

ITEM	DESCRIPTION	DIMENSIONS
1	CATWALK WITH RAILING	~23.5 LF (2' WIDE WALK WAY WITH 3' TALL RAILING)
2	GATES	4 X (~15' LONG, 6" DIA. STEEL PIPES)
3	WING WALLS	10 X (2" X 10" X 10') WOOD BOARDS AND ~6.8 CY OF CONCRETE
4	SILL	17.9 CY: (242 SQ. FT X ~2' THICK)
	TOTAL CONCRETE = ~24.7 CY	

SIDE CHANNEL STRUCTURE DEMOLITION SCHEDULE

ITEM	DESCRIPTION	DIMENSIONS
1	WALKWAY	1 X (8' X 12' STEEL PLATE) WITH MISC. WOOD JOISTS
2	GATES	6 X (~8' LONG, 6" DIA. STEEL PIPES)
3	WING WALLS	5 X (8' X 12' STEEL PLATE)
4	SILL	5 X (2' X 2' X 4' CONCRETE BLOCKS) AND (91 SQ. FT X ~1' THICK SILL)
	TOTAL CONCRETE = ~6.3 CY	

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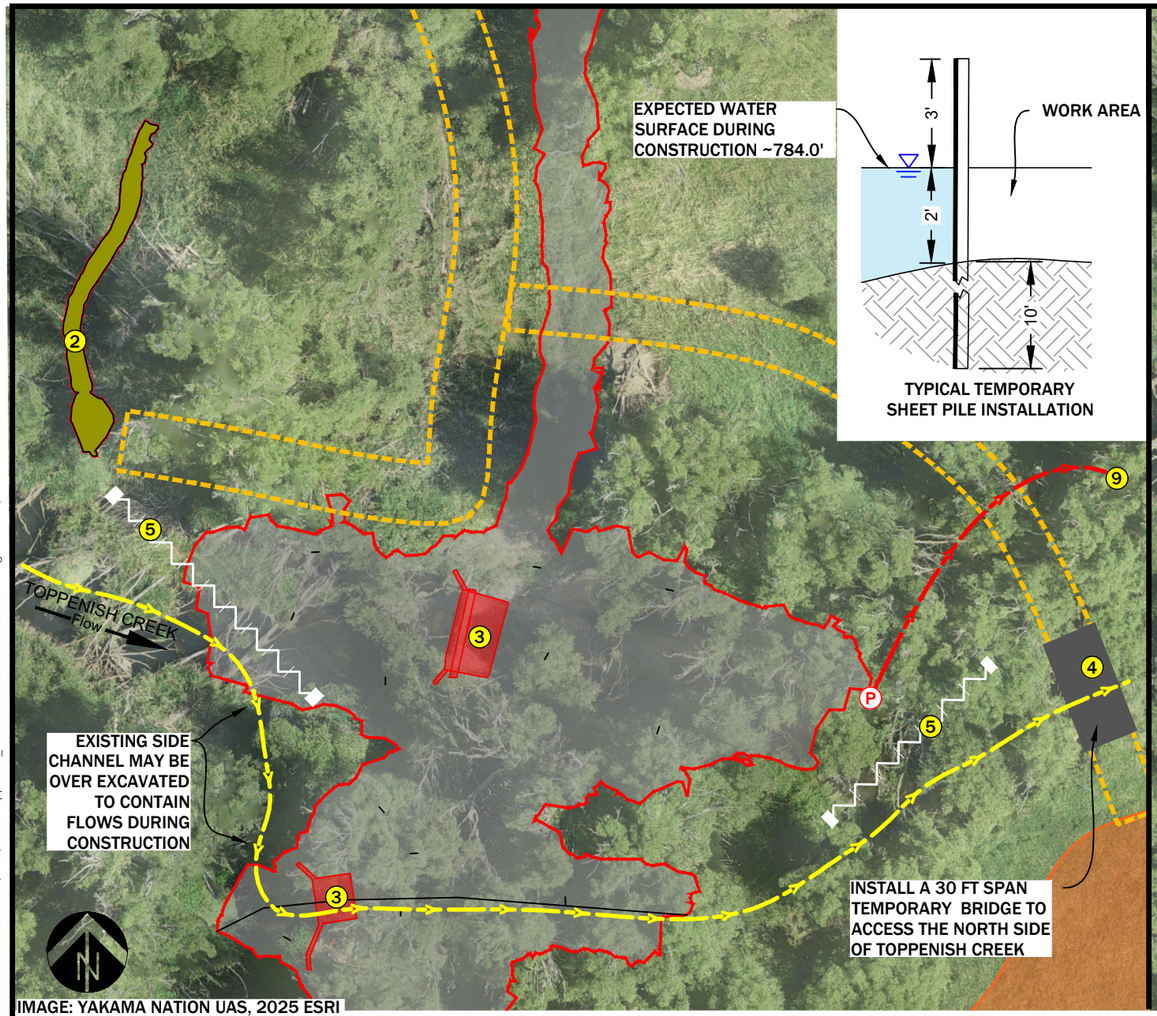
PIGGOTT DEMOLITION PLAN
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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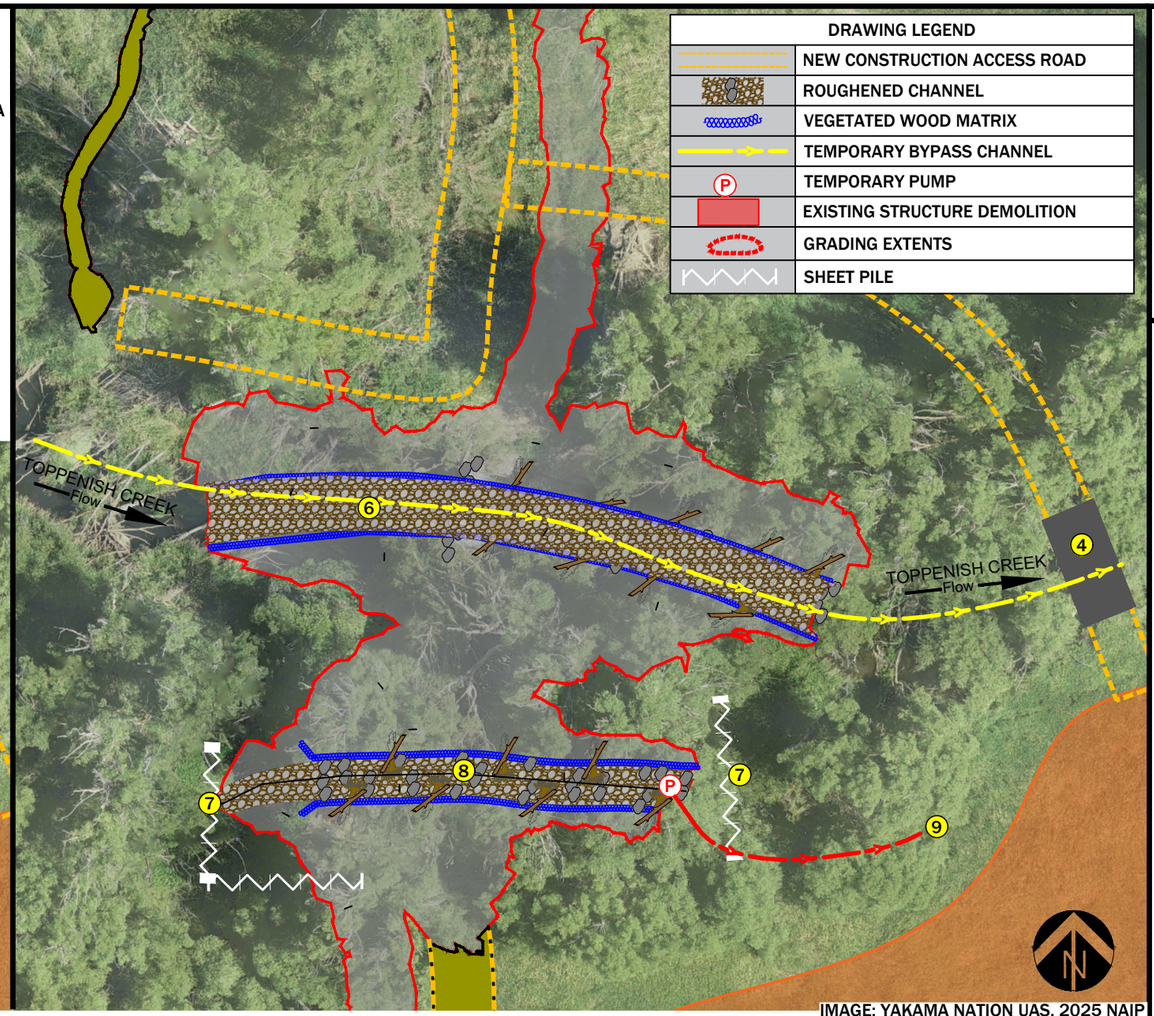
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1 TEMPORARY BYPASS CHANNEL 1 PLAN VIEW

1" = 40'



2 TEMPORARY BYPASS CHANNEL 2 PLAN VIEW

1" = 40'

CONSTRUCTION SEQUENCE AND WORK AREA ISOLATION

1. ISOLATE EACH LARGE WOOD STRUCTURE (LWS) LOCATION BY INSTALLING SHEET PILES WITH A VIBRATORY DRIVER AROUND THE WORK AREA AND ROUTE FLOW AWAY FROM THE SITE. CONSTRUCT EACH LARGE WOOD STRUCTURE AND THEN REMOVE SHEET PILE AND MOVE TO NEXT LWS INSTALLATION. REPEAT UNTIL ALL LWS ARE COMPLETED.
2. CONSTRUCT ALL PILOT CHANNELS AND PLACE PILOT CHANNEL SPOILS ON TOP OF EXISTING BERM.
3. ISOLATE AND REMOVE THE EXISTING STRUCTURE FROM THE SOUTH ACCESS.
4. INSTALL TEMPORARY BRIDGE JUST DOWNSTREAM OF PROPOSED STRUCTURE AS SHOWN.
5. ISOLATE THE PRIMARY ROUGHENED CHANNEL BY PLACING SHEET PILES WITH VIBRATORY DRIVER AROUND GRADING EXTENTS AND ROUTING FLOW THROUGH THE EXISTING SIDE CHANNEL (SEE DETAIL 1 ON THIS SHEET). THE EXISTING SIDE CHANNEL MAY NEED TO BE EXPANDED TO CONTAIN FLOWS DURING CONSTRUCTION. FISH SALVAGE SHALL BE PREFORMED IN THE ISOLATED MAIN CHANNEL.
6. REMOVE THE MAIN CHANNEL STRUCTURE AND CONSTRUCT THE PRIMARY ROUGHENED CHANNEL STRUCTURE. ACCESS THE PRIMARY ROUGHENED CHANNEL USING THE TEMPORARY ACCESS OVER TOPPENISH CREEK FROM THE SOUTH. PUMPING MAY BE NECESSARY TO DEWATER THE PRIMARY ROUGHENED CHANNEL WORK AREA.
7. AFTER CONSTRUCTION OF THE PRIMARY ROUGHENED CHANNEL, REMOVE THE MAIN CHANNEL SHEET PILE AND ALLOW FLOW TO ROUTE THROUGH THE COMPLETED PRIMARY ROUGHENED CHANNEL. ISOLATE THE SIDE CHANNEL BY PLACING SHEET PILE AT GRADING EXTENTS (SEE DETAIL 2 ON THIS SHEET). PUMPING MAY BE REQUIRED TO REMOVE SEEPING WATER. FISH SALVAGE SHALL BE PREFORMED IN THE ISOLATED SIDE CHANNEL.
8. CONSTRUCT THE SECONDARY ROUGHENED CHANNEL STRUCTURE. ACCESS THE SECONDARY ROUGHENED CHANNEL USING THE SOUTHERN ACCESS ROADS. PUMPING MAY BE NECESSARY TO DEWATER THE SECONDARY ROUGHENED CHANNEL WORK AREA.
9. PUMP CONSTRUCTION WATER INTO UPLAND AREA AND ALLOW FLOW TO DISPERSE AND INFILTRATE. TURBID CONSTRUCTION WATER SHALL NOT FLOW DIRECTLY BACK INTO TOPPENISH CREEK.

SHEET PILE INSTALLATION NOTEs

1. SHEET PILE SHALL BE INSTALLED IN AN INTERLOCKING CONFIGURATION THAT CREATES A SEAL AND MINIMIZES SEEPAGE INTO AND OUT OF THE ISOLATED WORK AREA.
2. SHEET PILE MATERIAL SHALL BE SUFFICIENT TO MAINTAIN STRUCTURAL INTEGRITY AND FUNCTION DURING INSTALLATION AND REMOVAL, AND DURING DEWATERING OPERATIONS. SELECTION OF SHEET PILE MATERIAL SHALL CONFORM WITH RECOMMENDED USE, AND BE CONSTRUCTED WITH THE RECOMMENDED FACTOR OF SAFETY TO SUPPORT STRUCTURAL STABILITY AS DETERMINED FROM MANUFACTURER SPECIFICATIONS.
3. VIBRATORY METHODS SHALL BE USED FOR SHEET PILE INSTALLATION.
4. SHEET PILE EMBEDMENT SHALL BE A MIN. OF 10 FEET.
5. SHEET PILE HEIGHT SHALL BE HIGHER THAN ADJACENT STREAMBANK ELEVATIONS.
6. SHEET PILE CONFIGURATION SHALL NOT INHIBIT CONSTRUCTION OF OTHER PROJECT ELEMENTS.
7. SHEET PILE SHALL BE REMOVED AFTER COMPLETION OF THE WORK. SHEET PILE SHALL NOT REMAIN BURIED IN THE STREAMBED.

NOTE: ALL FISH SALVAGE EFFORTS SHALL BE PERFORMED BY OWNER PRIOR TO CONSTRUCTION.

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PIGGOTT CONSTRUCTION SEQUENCE AND WORK AREA ISOLATION

LOWER TOPPENISH CREEK DAM REMOVALS
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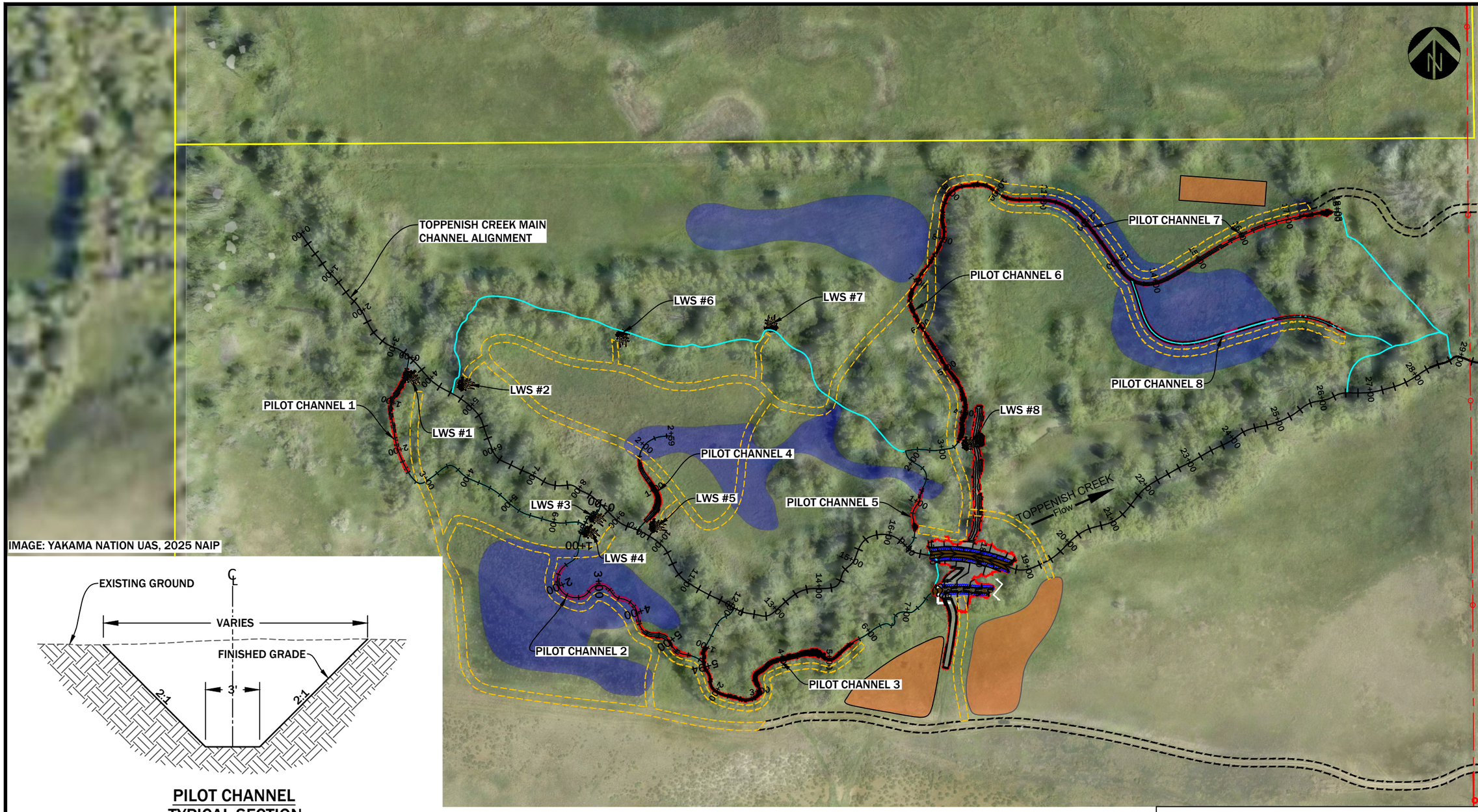
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PILOT CHANNEL TYPICAL SECTION

PILOT CHANNEL EARTH WORK TABLE		
PILOT CHANNEL	LENGTH (LF)	VOLUME (CY)
1	221	30 CUT
2	399	43 CUT
3	468	108 CUT
4	145	47 CUT
5	91	8 FILL
6	662	116 CUT
7	779	136 CUT
8	523	75 CUT
TOTAL	3288	547 CUT

1 PILOT CHANNELS AND LARGE WOOD STRUCTURES PLAN VIEW

1" = 100'

DRAWING LEGEND	
	SEASONALLY CONNECTED SIDE CHANNEL
	SEASONALLY CONNECTED INUNDATION AREA
	LARGE WOOD STRUCTURE
	ROUGHENED CHANNEL
	VEGETATED WOOD MATRIX
	STAGING AREA
	EXISTING UNIMPROVED ACCESS ROAD
	NEW CONSTRUCTION ACCESS ROAD
	GRADING EXTENTS

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PIGGOTT PILOT CHANNELS AND LARGE WOOD STRUCTURES LAYOUT

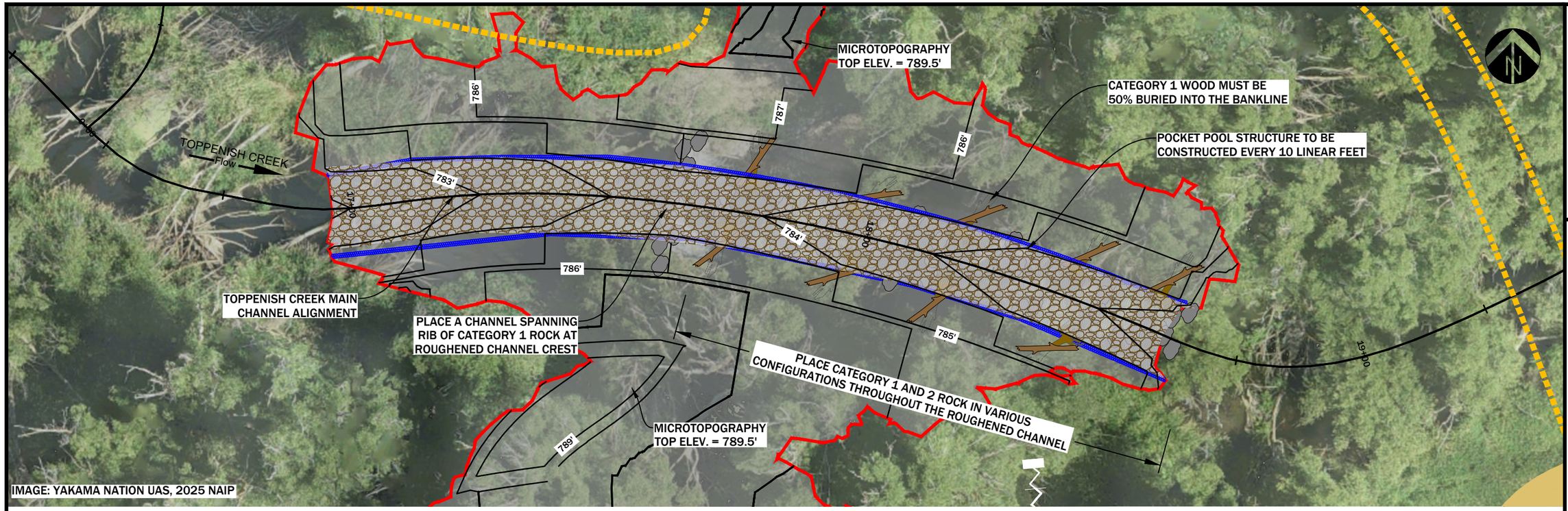
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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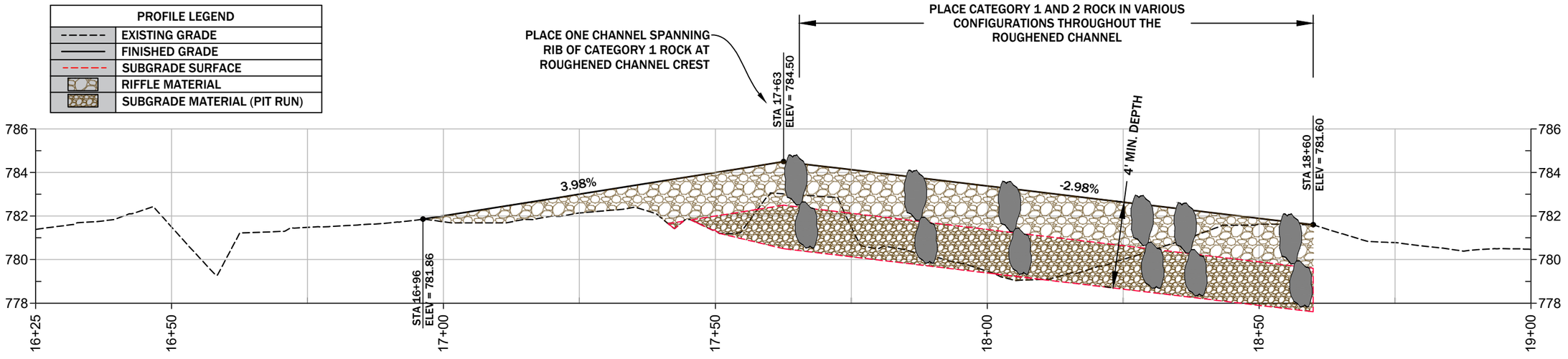


1 PRIMARY ROUGHENED CHANNEL PLAN VIEW

1" = 20'

DRAWING LEGEND	
	MICROTOPOGRAPHY EXTENT
	ROUGHENED CHANNEL
	VEGETATED WOOD MATRIX
	GRADING EXTENTS

PROFILE LEGEND	
	EXISTING GRADE
	FINISHED GRADE
	SUBGRADE SURFACE
	RIFFLE MATERIAL
	SUBGRADE MATERIAL (PIT RUN)



2 PRIMARY ROUGHENED CHANNEL PROFILE VIEW

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

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PIGGOTT PRIMARY ROUGHENED CHANNEL PLAN AND PROFILE

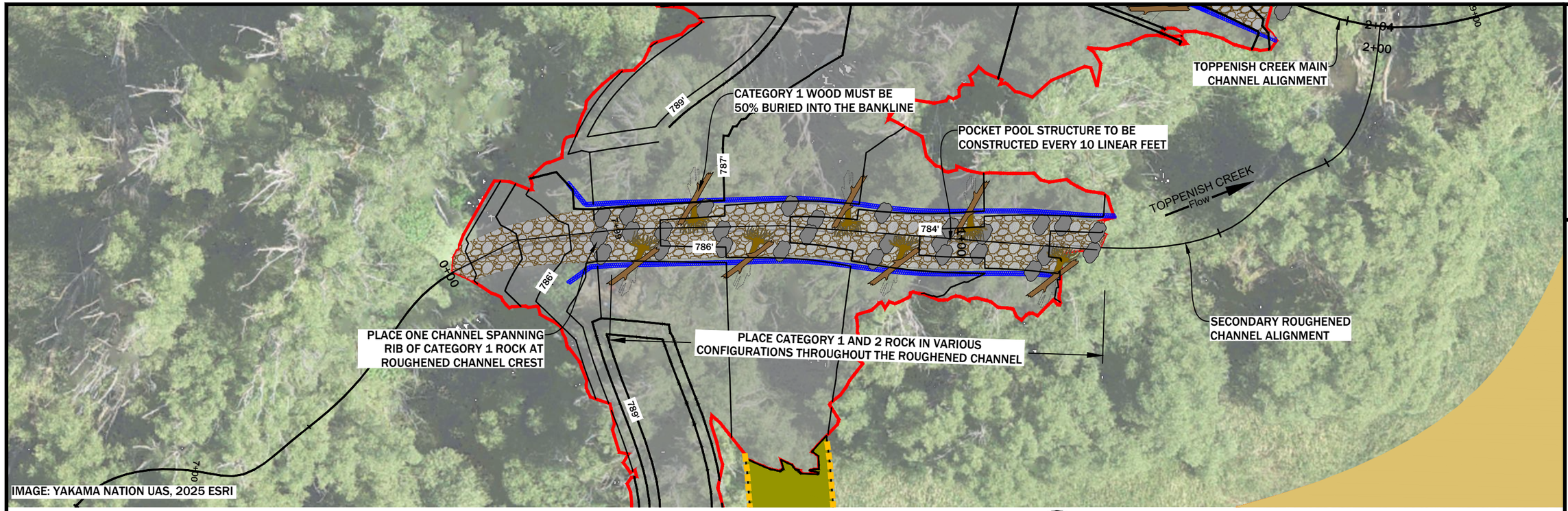
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YAKAMA RESERVATION, WASHINGTON

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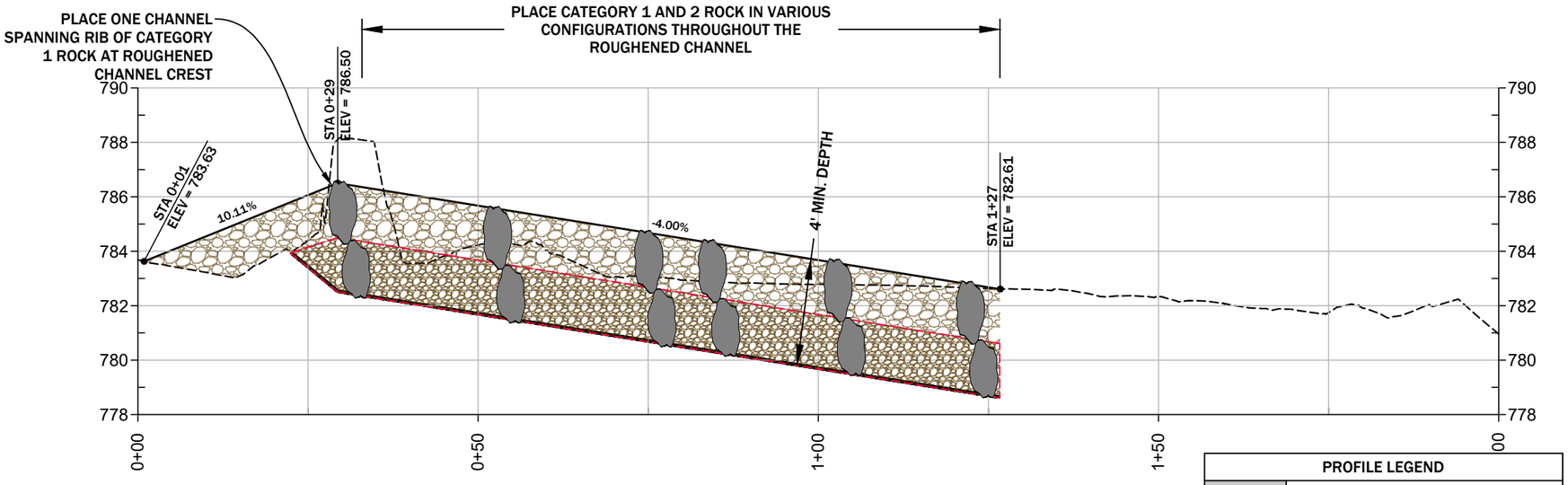
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1 SECONDARY ROUGHENED CHANNEL PLAN VIEW

1" = 10'

DRAWING LEGEND	
	ROUGHENED CHANNEL
	VEGETATED WOOD MATRIX
	GRADING EXTENTS



2 SECONDARY ROUGHENED CHANNEL PROFILE VIEW

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

PROFILE LEGEND	
	EXISTING GRADE
	FINISHED GRADE
	SUBGRADE SURFACE
	RIFFLE MATERIAL
	SUBGRADE MATERIAL (PIT RUN)

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PIGGOTT SECONDARY ROUGHENED CHANNEL PLAN AND PROFILE

LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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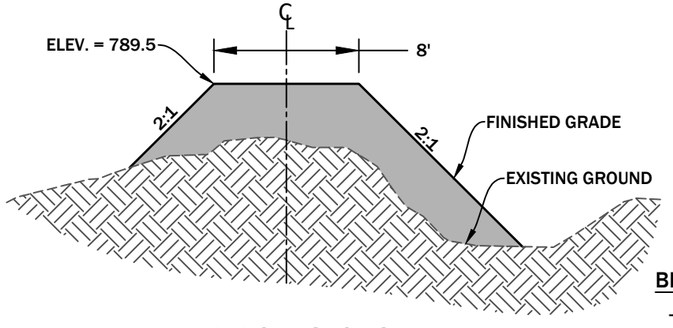
TOPPENISH CREEK MAIN CHANNEL ALIGNMENT

TOPPENISH CREEK SIDE CHANNEL ALIGNMENT

EXISTING LEVEE TO RECEIVE SPOILS
PRIORITIZE MICROTOPOGRAPHY NEAR THE ROUGHENED CHANNELS IF GENERATED MATERIAL IS NOT SUFFICIENT FOR FULL CONSTRUCTION

TOPPENISH CREEK Flow

IMAGE: YAKAMA NATION UAS, 2025 NAIP



TYPICAL SECTION

1 SPOIL PLACEMENT PLAN
PLAN VIEW

1" = 100'

DRAWING LEGEND	
	MICROTOPOGRAPHY EXTENT
	SEASONALLY CONNECTED SIDE CHANNEL
	SEASONALLY CONNECTED INUNDATION AREA
	LARGE WOOD STRUCTURE
	ROUGHENED CHANNEL
	VEGETATED WOOD MATRIX
	STAGING AREA
	NEW CONSTRUCTION ACCESS ROAD
	IMPROVED ACCESS ROAD
	GRADING EXTENTS

BERM IMPROVEMENT NOTES

- EXCESS MATERIAL GENERATED FROM PILOT CHANNEL GRADING SHALL BE SPOILED ON TOP OF THE EXISTING BERM.
- IF GENERATED MATERIAL IS NOT SUFFICIENT TO CONSTRUCT THE FULL LENGTH SHOWN ON PLANS, SPOIL PLACEMENT SHALL BE PRIORITIZED NEAR THE ROUGHENED CHANNEL STRUCTURES.
- THE SPOIL PLACEMENT MAY BE EXTENDED OR BUILT TO A HIGHER ELEVATION IF THE MATERIAL GENERATED FROM PILOT CHANNEL GRADING CREATES AN EXCESS OF MATERIAL.

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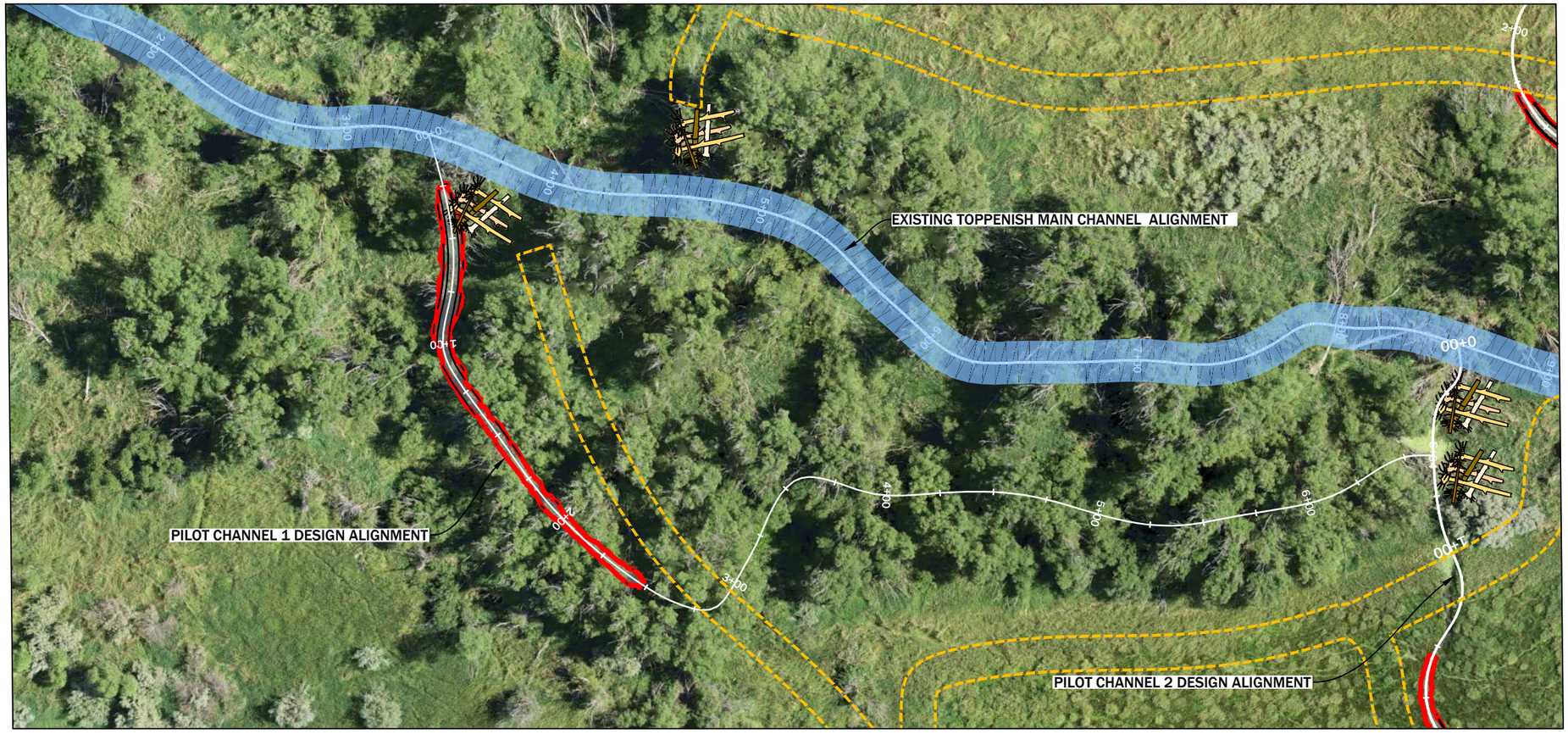
PIGGOTT SPOIL PLACEMENT PLAN
LOWER TOPPENISH CREEK DAM REMOVALS
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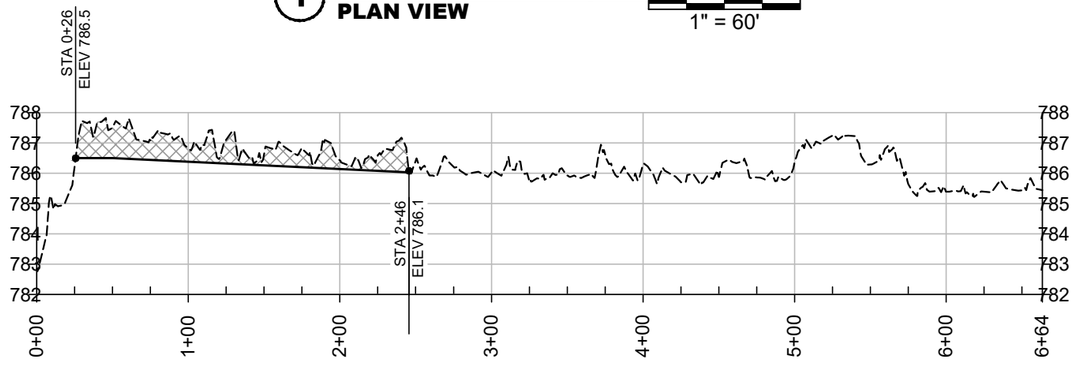
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1 PIGGOTT PILOT CHANNEL 1 PLAN
PLAN VIEW 1" = 60'



2 PIGGOTT PILOT CHANNEL 1 PROFILE
PROFILE VIEW H: 1" = 100' V: 1" =5'

PROFILE LEGEND	
SYMBOL	FEATURE
– – – – –	EXISTING GRADE
———	FINISHED GRADE
	CUT
	FILL

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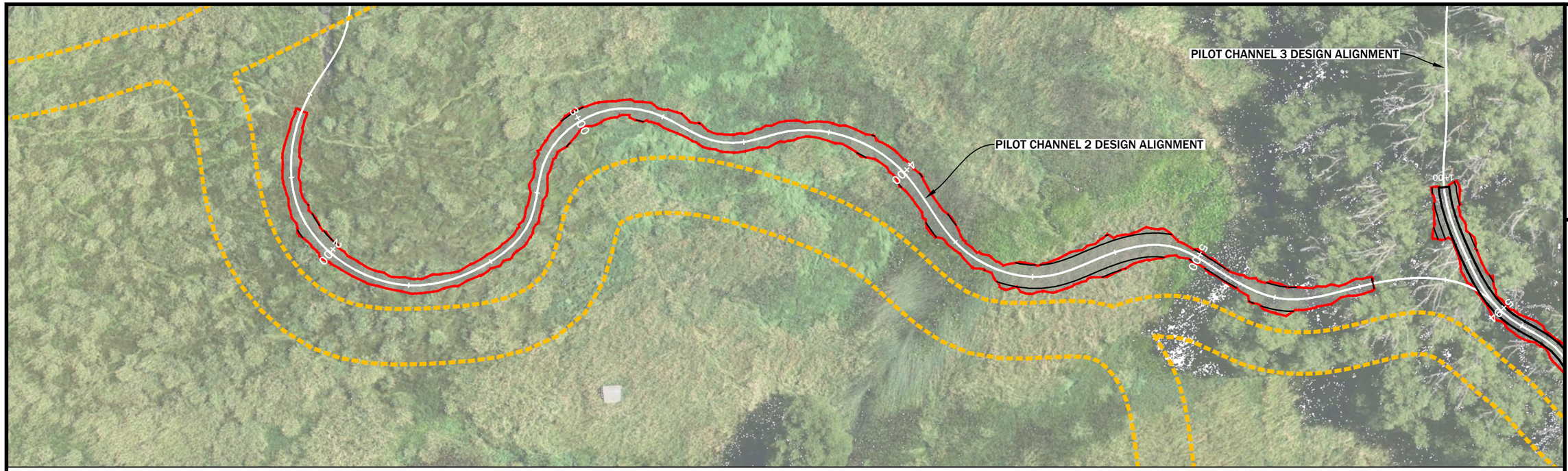
PIGGOT PILOT CHANNEL 1 PLAN AND PROFILE
LOWER TOPPENISH CREEK DAM REMOVALS
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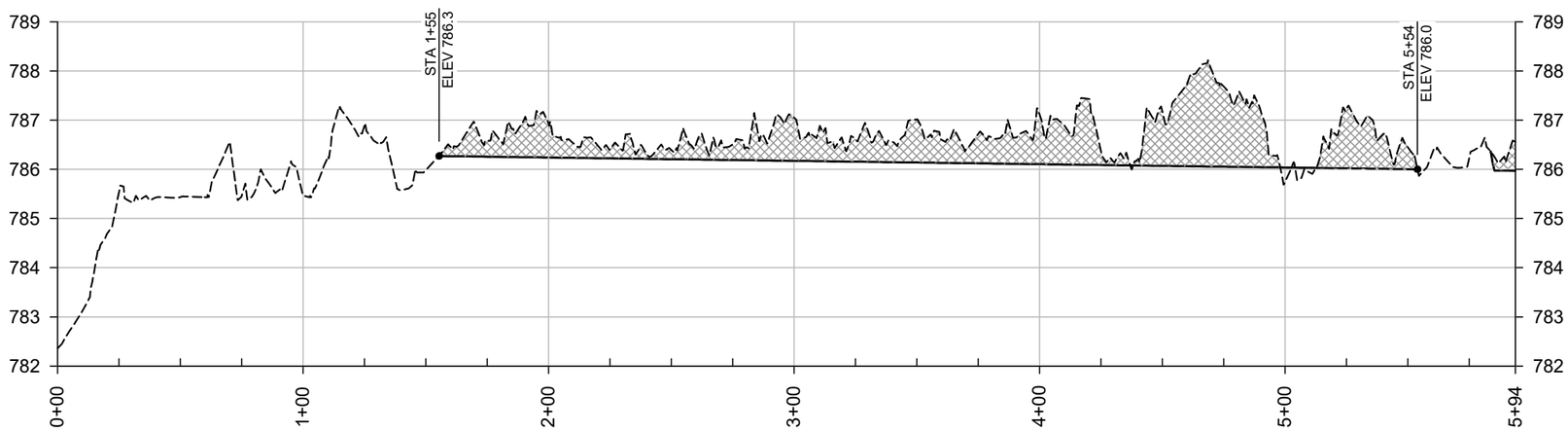
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1 PIGGOTT PILOT CHANNEL 2 PLAN
PLAN VIEW
1" = 30'

DRAWING LEGEND	
	MICROTOPOGRAPHY EXTENTS
	UNIMPROVED ACCESS ROAD
	GRADING EXTENTS



2 PIGGOTT PILOT CHANNEL 2 PROFILE
PROFILE VIEW
H: 1" = 60' V: 1" =3'

PROFILE LEGEND	
SYMBOL	FEATURE
	EXISTING GRADE
	FINISHED GRADE
	CUT
	FILL

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PIGGOT PILOT CHANNEL 2 PLAN AND PROFILE

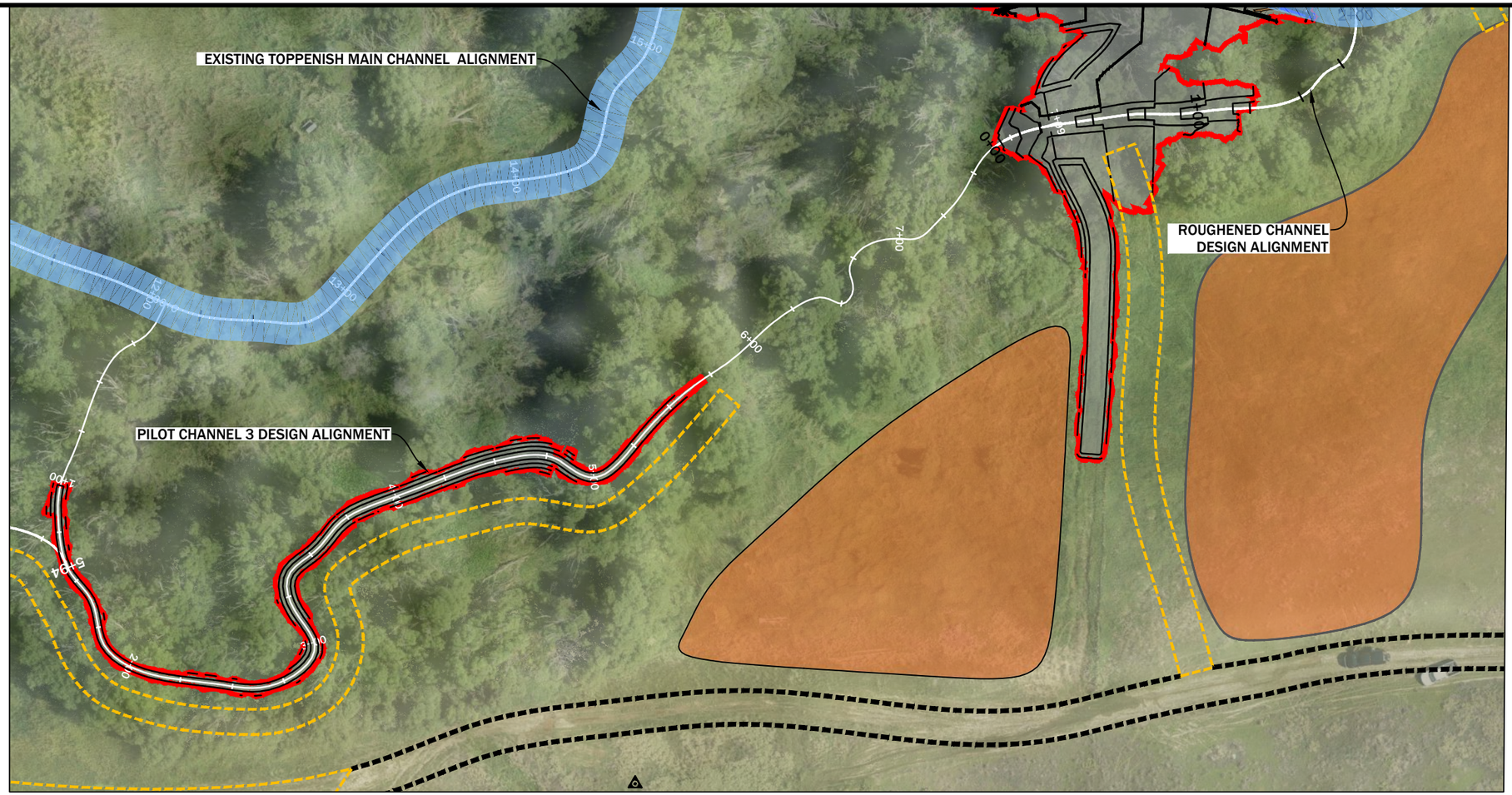
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	10/23/26	LS	FINAL DESIGN	NW

PROJECT NUMBER
00097854-000-CRB

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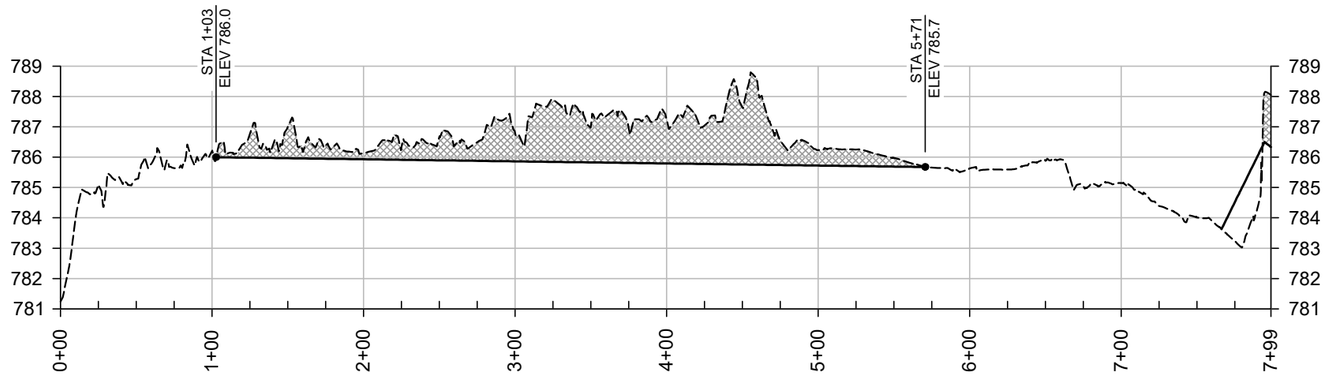
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1 PIGGOTT PILOT CHANNEL 3 PLAN
PLAN VIEW

1" = 100'

DRAWING LEGEND	
	UNIMPROVED ACCESS ROAD
	GRADING EXTENTS



2 PIGGOTT PILOT CHANNEL 3 PROFILE
PROFILE VIEW

H: 1" = 100' V: 1" =5'

PROFILE LEGEND	
SYMBOL	FEATURE
	EXISTING GRADE
	FINISHED GRADE
	CUT
	FILL

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PIGGOTT DAM PILOT CHANNEL 3 PLAN AND PROFILE

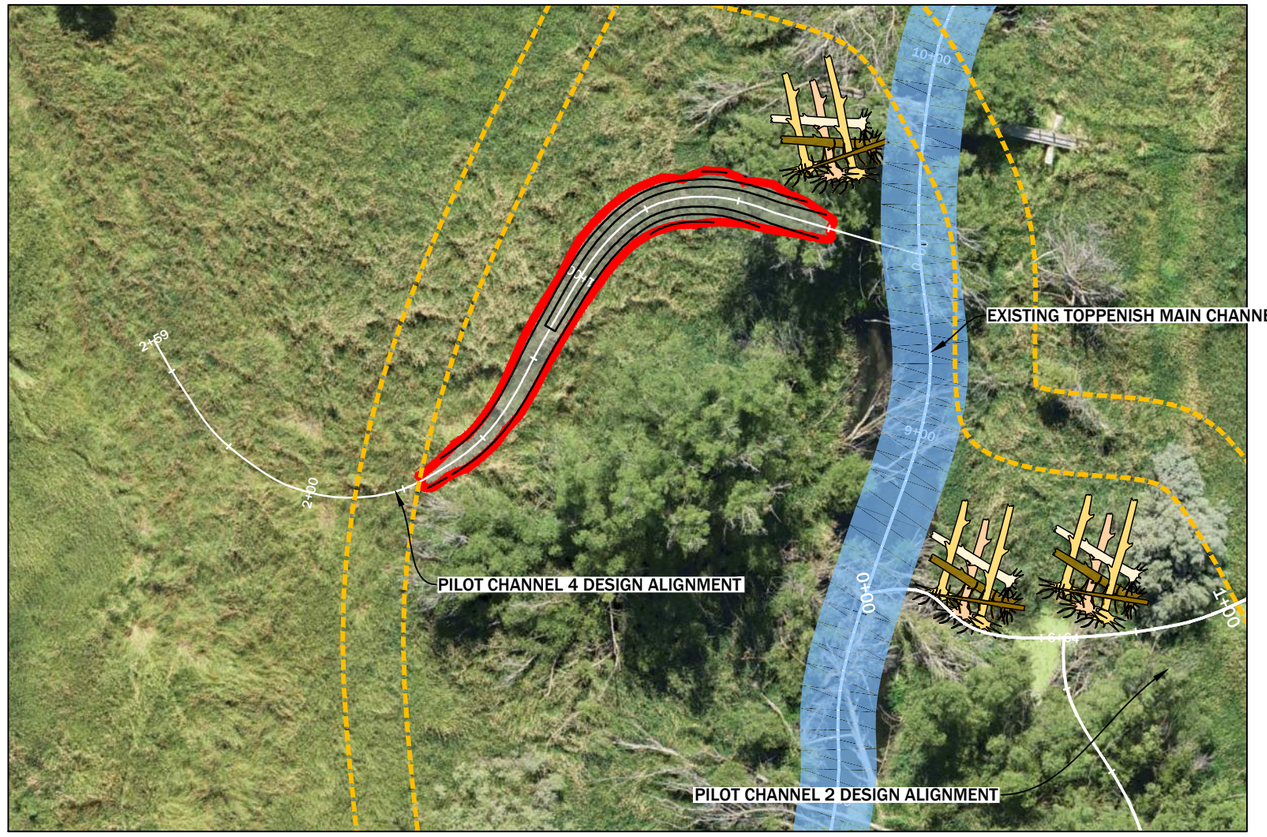
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
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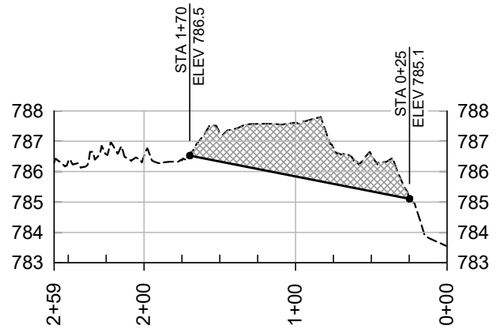
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1 PIGGOTT PILOT CHANNEL 4 PLAN
PLAN VIEW 1" = 100'



2 PIGGOTT PILOT CHANNEL 4 ROFILE
PROFILE VIEW H: 1" = 100' V: 1" =5'

PROFILE LEGEND	
SYMBOL	FEATURE
	EXISTING GRADE
	FINISHED GRADE
	CUT
	FILL

PIGGOTT DAM CHANNEL 4 PLAN AND PROFILE

LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

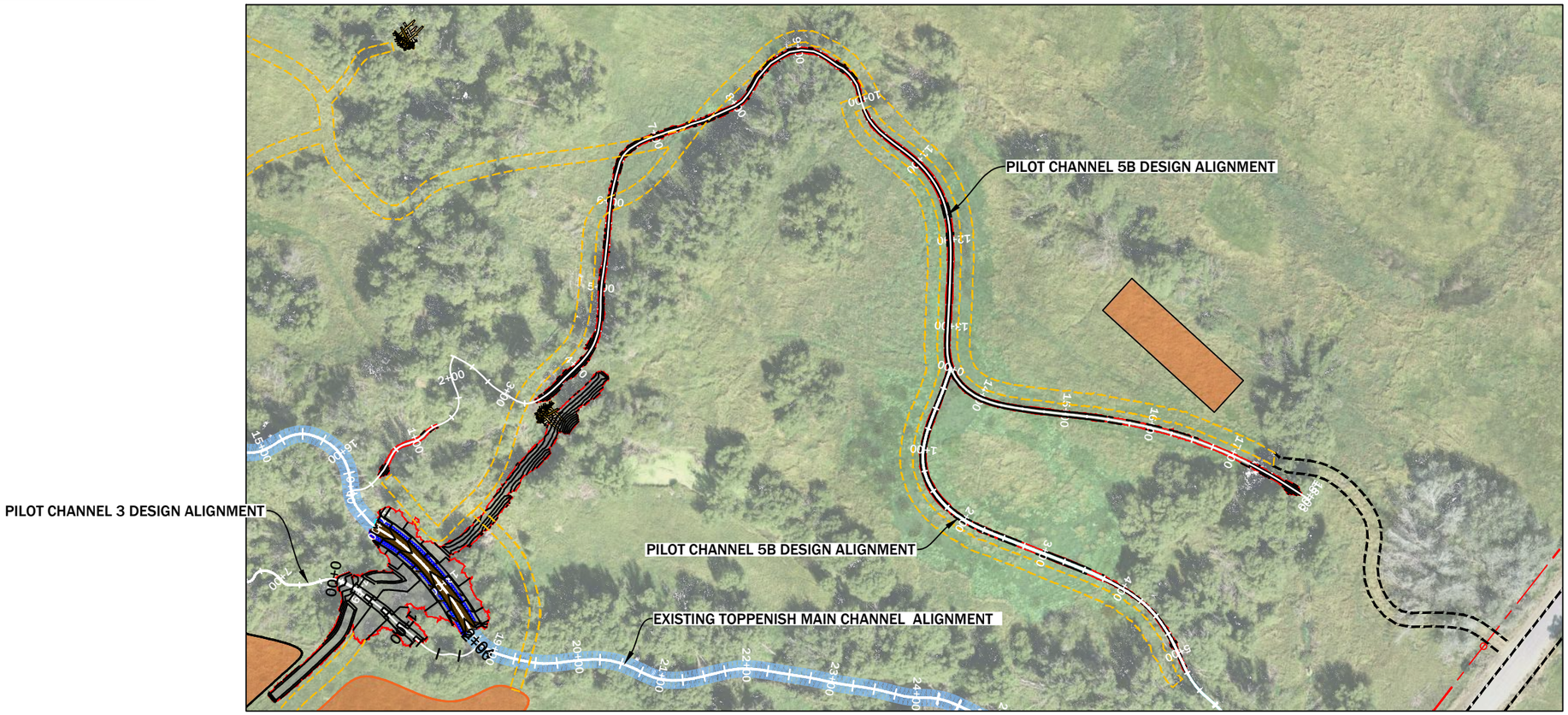
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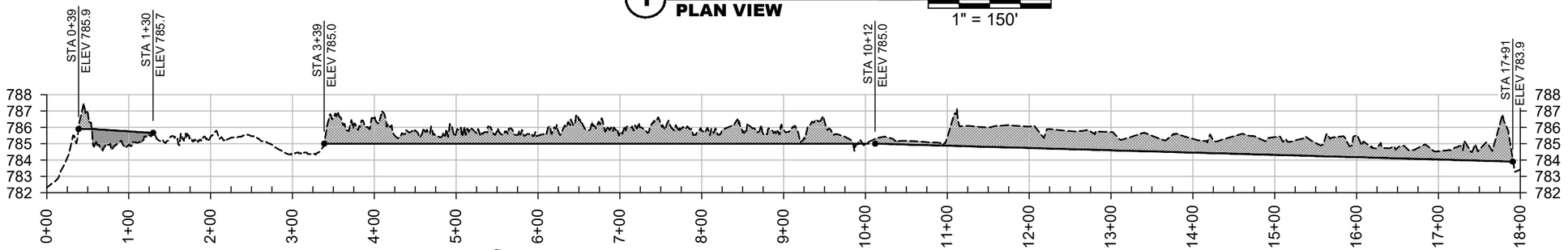
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DRAWING LEGEND	
	UNIMPROVED ACCESS ROAD
	GRADING EXTENTS

1 PIGGOTT PILOT CHANNEL 5 PLAN
PLAN VIEW

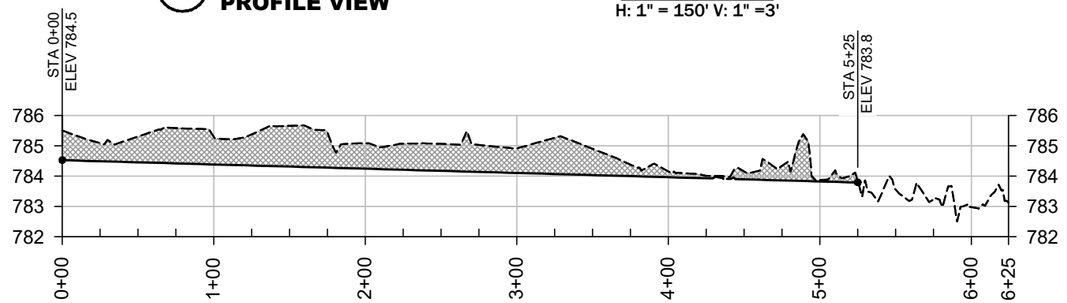
1" = 150'



2 PIGGOTT PILOT CHANNEL 5A PROFILE
PROFILE VIEW

H: 1" = 150' V: 1" =3'

PROFILE LEGEND	
SYMBOL	FEATURE
	EXISTING GRADE
	FINISHED GRADE
	CUT
	FILL



3 PIGGOTT PILOT CHANNEL 5B PROFILE
PROFILE VIEW

H: 1" = 100' V: 1" =5'

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PIGGOTT DAM PILOT CHANNEL 5 PLAN AND PROFILE

LOWER TOPPENISH CREEK DAM REMOVALS
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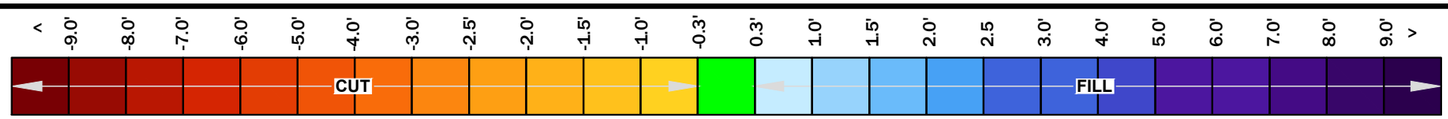
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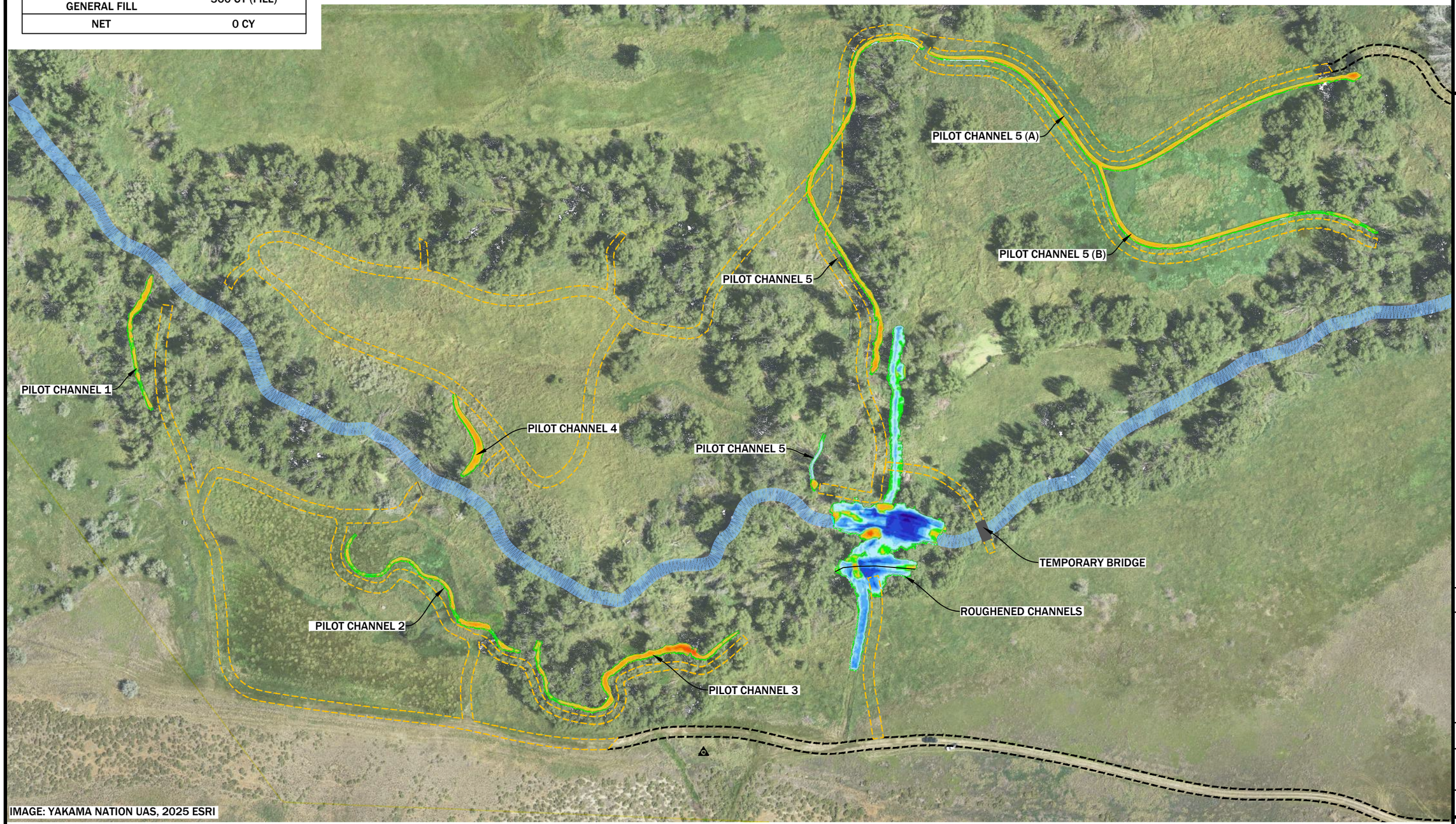
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TOTAL EARTHWORK QUANTITIES	
ITEM	QUANTITY (CY)
PILOT CHANNEL GRADING	547 CY (CUT)
SPOIL PLACEMENT	187 CY (FILL)
ROUGHENED CHANNELS GENERAL FILL	360 CY (FILL)
NET	0 CY



EXISTING GROUND COMPARED TO SWCA DESIGN SURFACE



1 PIGGOTT DAM PILOT CHANNEL MICROTOPOGRAPHY
PLAN VIEW

1" = 150'

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PIGGOTT DAM PILOT CHANNEL MICROTOPOGRAPHY

LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

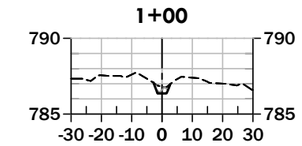
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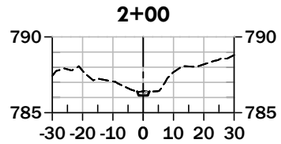
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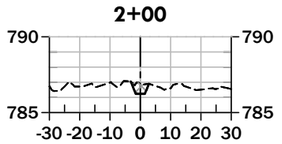
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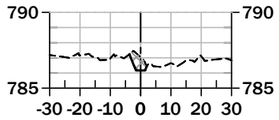
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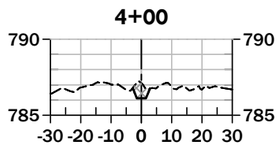


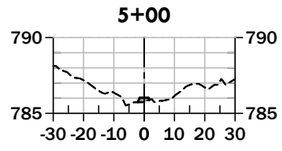


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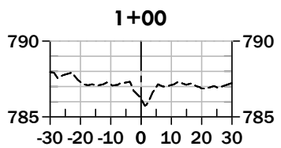


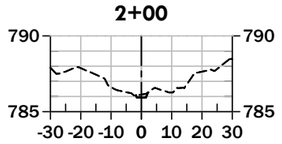


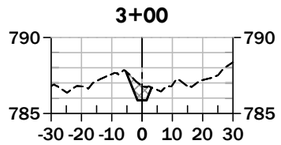


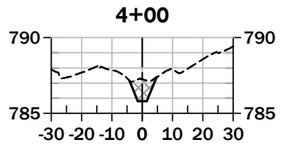


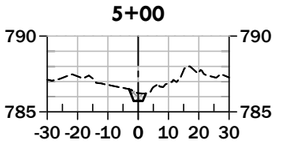
2 **PILOT CHANNEL 2**

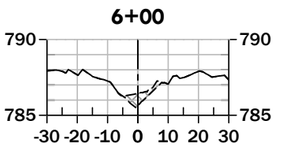




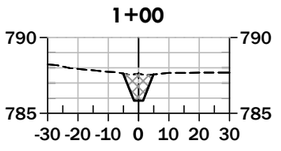




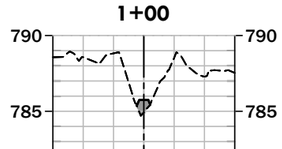


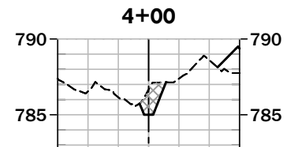


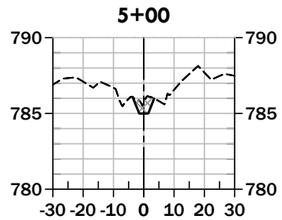
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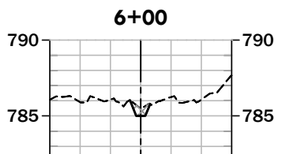


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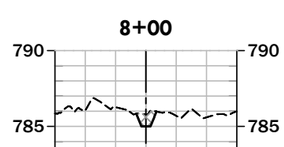


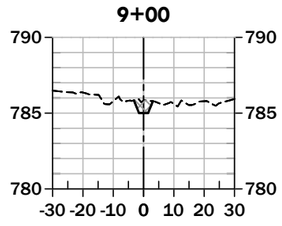


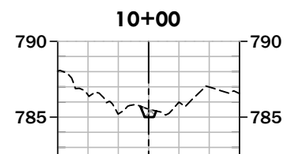




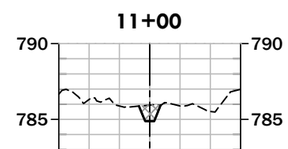


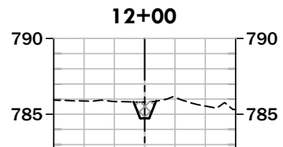


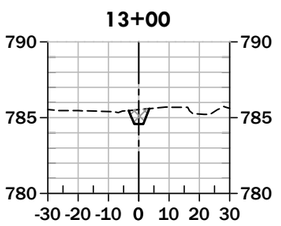


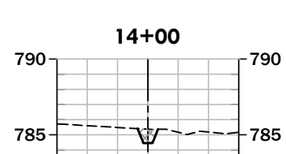


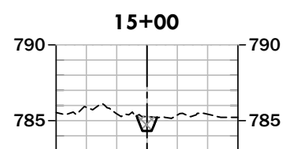
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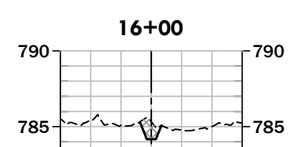


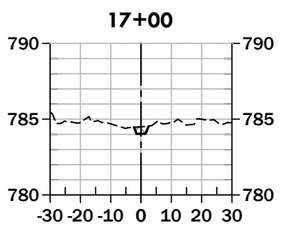












DRAWING LEGEND	
SYMBOL	FEATURE
-----	EXISTING GRADE
———	FINISHED GRADE
▨	CUT
▩	FILL

1 **PIGGOT DAM PILOT CHANNEL CROSS SECTIONS**
SECTION VIEWS
H: 1" = 50' V: 1" = 10'

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PIGGOT DAM PILOT CHANNEL CROSS SECTIONS

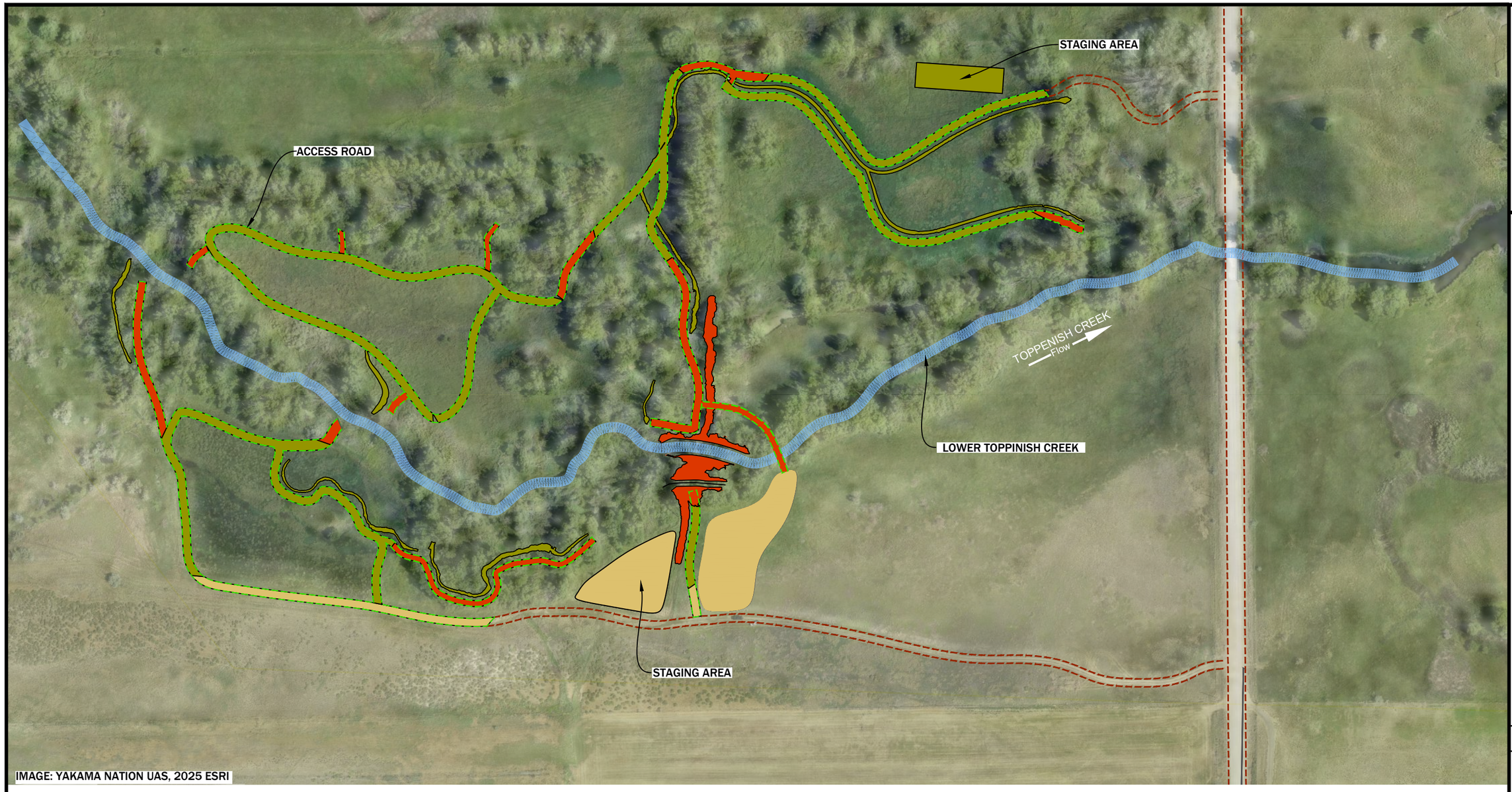
LOWER TOPPENISH CREEK DAM REMOVALS
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1 PIGGOTT DAM PLANTING AND SEEDING PLAN
PLAN VIEW

1" = 200'

PLANTING AND SEEDING LEGEND	
SYMBOL	
	FLOODPLAIN PLANTING AND SEEDING
	UPLAND SEEDING
	FLOODPLAIN SEEDING
	NEW CONSTRUCTION ACCESS ROAD
	IMPROVED ACCESS ROAD

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PIGGOTT PLANTING AND SEEDING PLAN
LOWER TOPPENISH CREEK DAM REMOVALS
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PIGGOT DAM PLANTING SCHEDULE						
LOCATION	**SPECIES (TALL 1-GALLON CONTAINERS)**		**SIZE**	**PERCENT COMPOSITION**	**SPACING (FT)**	**NUMBER**
VEGETATED WOOD MATRIX & LARGE WOOD STRUCTURES	COYOTE WILLOW	*SALIX EXIGUA*	8-FT TALL CUTTINGS	85.0000	0.2	5,400
	PACIFIC WILLOW	*SALIX LUCIDA SPP. LASIANDRA*		15.0000	0.2	950
					TOTAL	6,350
RIPARIAN FLOODPLAIN 1.08 ACRES	BLACK COTTONWOOD	*POPULUS TREMULOIDES*	4"x4"x14" tall	20.0000	10	94
	WATER BIRCH	*BETULA OCCIDENTALIS*	4"x4"x14" tall	10.0000	8	74
	BLACK HAWTHORN	*CRATAEGUS DOUGLASII*	4"x4"x14" tall	25.0000	10	118
	RED OSIER DOGWOOD	*CORNUS SERICEA*	4"x4"x14" tall	35.0000	10	165
	PACIFIC WILLOW	*SALIX LUCIDA SPP. LASIANDRA*	4"x4"x14" tall	25	6	327
					TOTAL	777
UPLAND 1.40 ACRES	SERVICEBERRY	*AMELANCHIER ALNIFOLIA*	4"x4"x14" tall	15	15	41
	QUAKING ASPEN	POPULUS TREMULOIDES	4"x4"x14" tall	25	15	68
	CHOKECHERRY	*PRUNUS VIRGINIANA*	4"x4"x14" tall	25	15	68
	WOODS' ROSE	*ROSA WOODSII*	4"x4"x14" tall	10	6	169
	LEWIS' MOCK ORANGE	*PHILADELPHUS LEWISII*	4"x4"x14" tall	25	10	152
					TOTAL	498
					TOTAL CUTTINGS	6,350
					TOTAL CONTAINERIZED PLANTS	1,275

PIGGOT DAM SEEDING SCHEDULE				
LOCATION	**SPECIES**		***PLS/ACRE***	**TOTAL PLS LBS**
FLOODPLAIN 2.49 ACRES	BLUE WILDRYE	*ELYMUS GLAUCUS*	*13.79*	34.34
	THICKSPIKE WHEATGRASS	*ELYMUS MACROURUS*	*19.86*	49.46
	BLUEJOINT REEDGRASS	*CALAMAGROSTIS CANADENSIS*	*1.24*	3.09
	ANALOGUE SEDGE	*CAREX SIMULATA*	*2.21*	5.50
			TOTAL	92.39
UPLAND RECLAMATION MIX 1.40 ACRES	IDAHO FESCUE	*FESTUCA IDAHOENSIS*	*1.24*	8.15
	BLUEBUNCH WHEATGRASS	*PSEUDOROEGNERIA SPICATA*	*13.09*	18.33
	INDIAN RICEGRASS	*ACHNATHERUM HYMENOIDES*	*9.09*	12.73
	BLUE WILDRYE	*ELYMUS GLAUCUS*	*17.82*	24.95
			TOTAL	64.16

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PIGGOTT DAM PLANTING AND SEEDING SCHEDULES

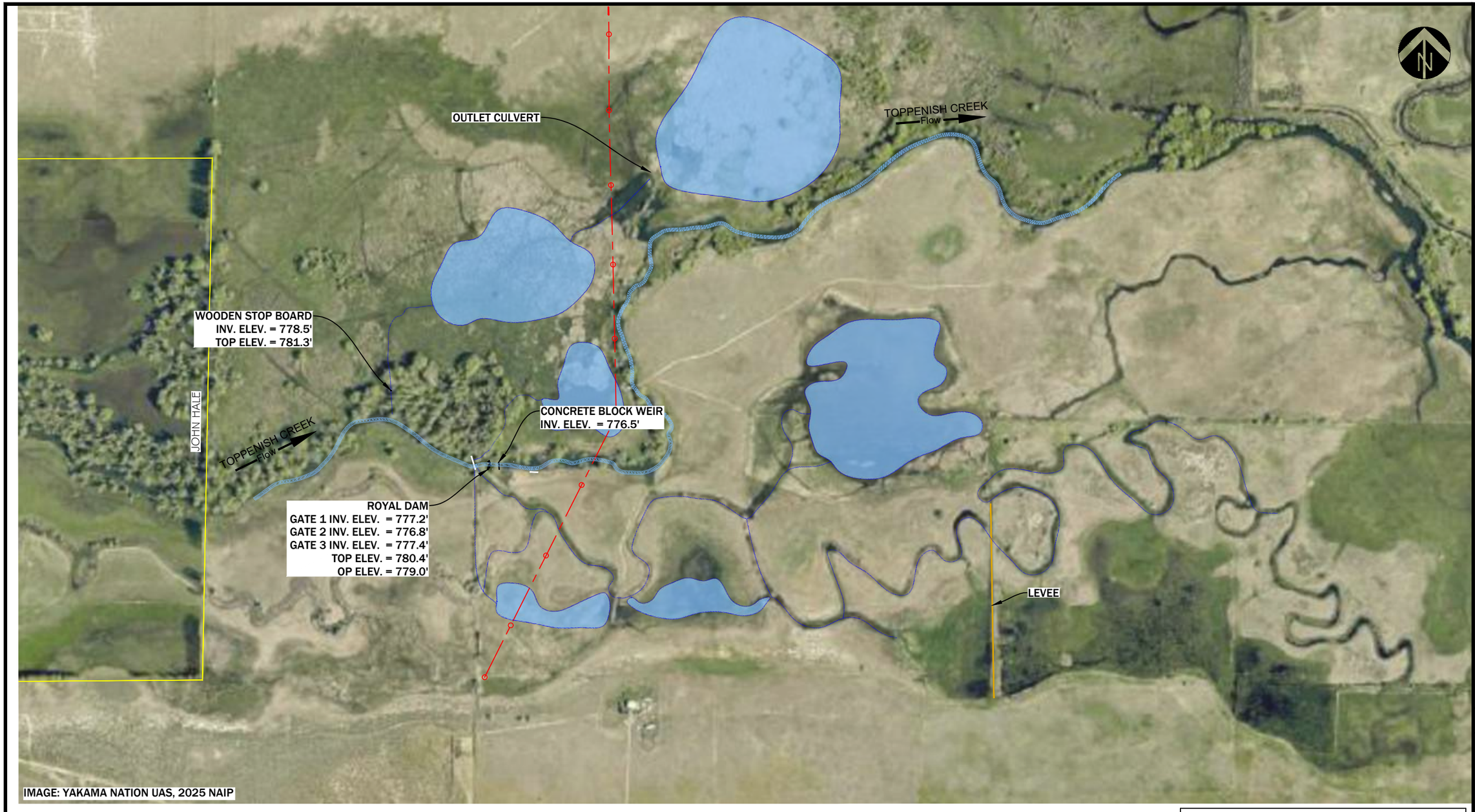
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	10/23/26	LS	FINAL DESIGN	NW

PROJECT NUMBER
00097854-000-CRB

DRAWING NUMBER
4.1

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1 ROYAL DAM EXISTING CONDITIONS
PLAN VIEW

1" = 500'

DRAWING LEGEND	
	APPROXIMATE PROPERTY LINE
	EXISTING OVERHEAD POWER
	EXISTING POWER POLE
	EXISTING MAIN CHANNEL ALIGNMENT
	CONNECTED SIDE CHANNEL WITH BOARDS PLACED IN STRUCTURE
	CONNECTED INUNDATION AREA WITH BOARDS PLACED IN STRUCTURE

EXISTING CONDITIONS

ROYAL DAM IS CURRENTLY MANAGED BY A PRIVATE ORGANIZATION THAT HAS AGREED TO PARTNER WITH YAKAMA NATION TO ADDRESS PASSAGE AND STRANDING CONCERNS. THE STRUCTURE CONSISTS OF VARIOUS STEEL PIPE PILLARS WITH WOOD PANEL AND TIN PANEL HEAD WALLS THAT CREATE THREE SEPARATE GATES. CHECK BOARDS CAN BE INSTALLED AT EACH GATE TO INCREASE UPSTREAM WATER SURFACE ELEVATIONS. THE THREE GATES HAVE INVERT ELEVATIONS THAT RANGE FROM 776.8 FEET TO 777.5 FEET AND A TOP ELEVATION OF 780.0 FEET. THIS ALLOWS FOR 3.2 FEET OF WATER LEVEL MANAGEMENT BEFORE THE STRUCTURE OVERTOPS. CHECK BOARDS ARE PLACED INTO THE STRUCTURE SEASONALLY TO INUNDATE WATERFOWL HABITAT FOR HUNTING PURPOSES FROM MID-NOVEMBER TO LATE JANUARY. APPROXIMATELY 40 FEET DOWNSTREAM OF THE ROYAL DAM STRUCTURE IS A GRADE-CONTROL STRUCTURE THAT CONSISTS OF CONCRETE BLOCKS. THE HYDRAULICS FROM THE ROYAL DAM CREATE A DOWNSTREAM SCOUR HOLE, AND THE GRADE-CONTROL STRUCTURE APPEARS TO HELP STABILIZE THIS THE SCOUR HOLE. THE GRADE- CONTROL STRUCTURE INVERT IS 776.5 FEET AND TIES INTO THE EXISTING BANK LINES.

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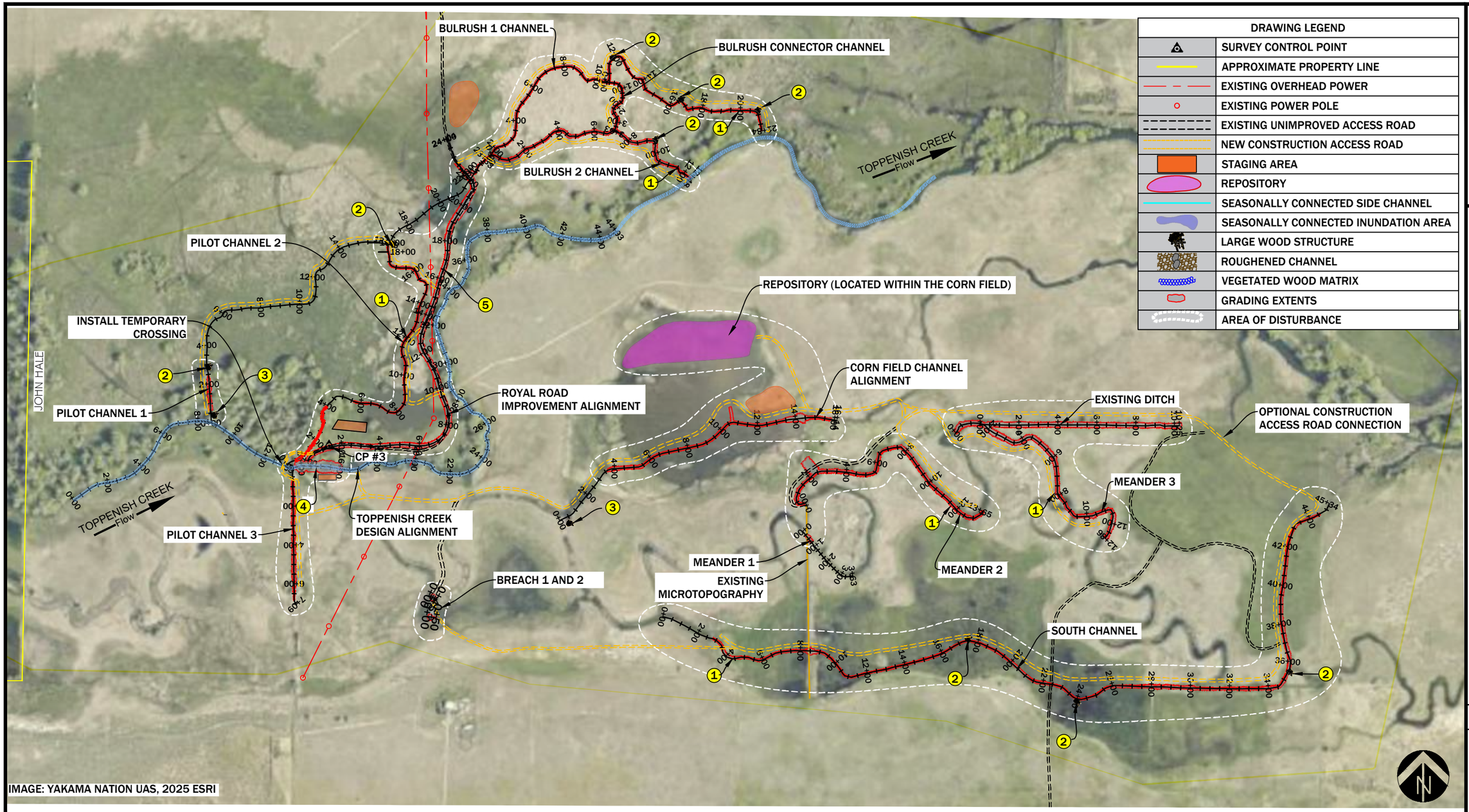
ROYAL DAM EXISTING CONDITIONS
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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DRAWING LEGEND	
	SURVEY CONTROL POINT
	APPROXIMATE PROPERTY LINE
	EXISTING OVERHEAD POWER
	EXISTING POWER POLE
	EXISTING UNIMPROVED ACCESS ROAD
	NEW CONSTRUCTION ACCESS ROAD
	STAGING AREA
	REPOSITORY
	SEASONALLY CONNECTED SIDE CHANNEL
	SEASONALLY CONNECTED INUNDATION AREA
	LARGE WOOD STRUCTURE
	ROUGHENED CHANNEL
	VEGETATED WOOD MATRIX
	GRADING EXTENTS
	AREA OF DISTURBANCE

1 ROYAL DAM RESTORATION PLAN
PLAN VIEW

1" = 500'

RESTORATION PLAN OVERVIEW

1. GRADING ELEMENTS
2. LWS STRUCTURE TYPE 1 LOCATION (SEE DETAIL 7.2)
3. LWS STRUCTURE TYPE 2 LOCATION (SEE DETAIL 7.3)
4. ROUGHENED CHANNEL ~217 LF (SEE DETAIL 7.0)
5. INCREASE EXISTING ACCESS ROAD ELEVATION TO 781.0'

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ROYAL DAM RESTORATION PLAN
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

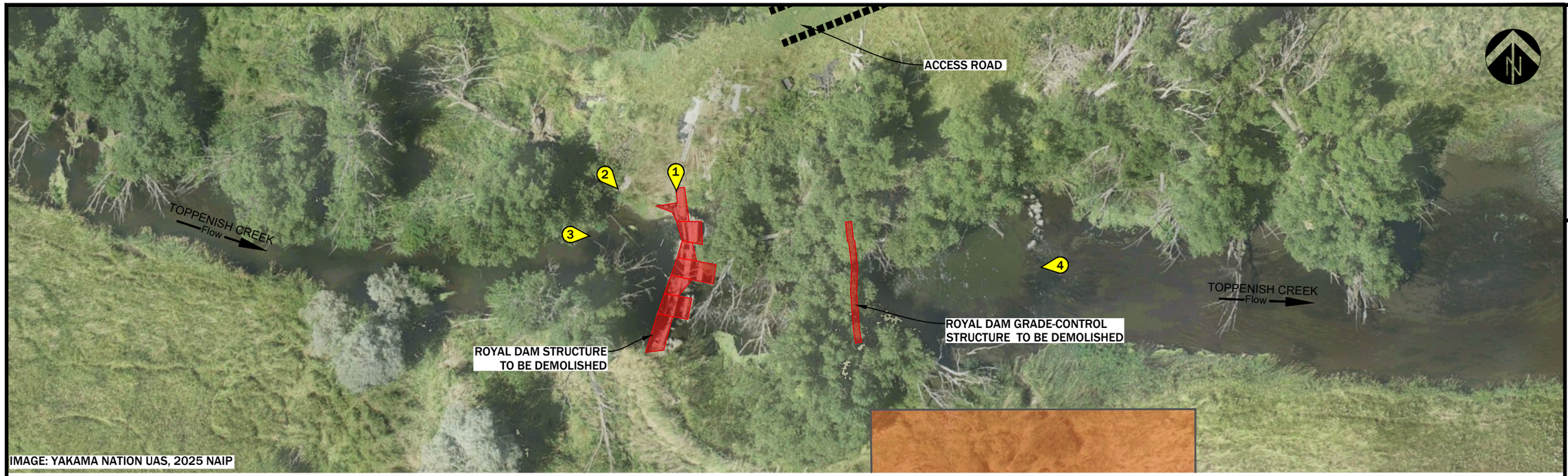
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Drawing 24 of 46

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1 ROYAL DAM DEMOLITION PLAN
PLAN VIEW

1" = 30'









ROYAL DAM STRUCTURE PHOTO POINTS

GRADE-CONTROL STRUCTURE PHOTO POINT

NOTE:
DISPOSAL OF STRUCTURES WILL BE AT DESIGNATED LOCATION, LATERAL A / ZIMMERMANS WILDLIFE AREA (46.333314, -120.481358)

ROYAL DAM STRUCTURE DEMOLITION SCHEDULE

ITEM	DESCRIPTION	DIMENSIONS
1	WOOD PLANKS	~450 LF (VARIOUS SIZES)
2	STEEL TUBING	~225 LF (VARIOUS SIZES)
3	TIN PANELS	~100 SF (VARIOUS SIZES)

GRADE-CONTROL STRUCTURE DEMOLITION SCHEDULE

ITEM	DESCRIPTION	DIMENSIONS
1	CONCRETE BLOCKS	~16 EA 2' X 2' X 4' CONCRETE BLOCKS
TOTAL CONCRETE = ~9.5 CY		

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ROYAL DAM DEMOLITION PLAN
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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DRAWING LEGEND	
	NEW CONSTRUCTION ACCESS ROAD
	ROUGHENED CHANNEL
	VEGETATED WOOD MATRIX
	TEMPORARY BYPASS CHANNEL
P	TEMPORARY PUMP
	GRADING EXTENTS
	SHEET PILE

TOPPENISH CREEK
Flow

779'
778'
777'

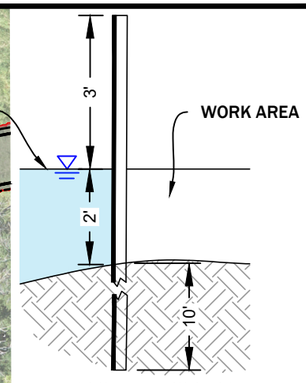
4 STAGE AREA FOR VOLUME OF MATERIAL TO BE REMOVED AND REPLACED FOR TEMPORARY BYPASS CHANNEL ~ 1,070 CY

IMAGE: YAKAMA NATION UAS, 2025 NAIP

1 TEMPORARY BYPASS CHANNEL PLAN VIEW

1" = 50'

EXPECTED WATER SURFACE DURING CONSTRUCTION ~788.5'



TYPICAL TEMPORARY SHEET PILE INSTALLATION

TOPPENISH CREEK
Flow

779'
778'
777'

9

IMAGE: YAKAMA NATION UAS, 2025 NAIP

2 TEMPORARY BYPASS CHANNEL PLAN VIEW

1" = 50'

CONSTRUCTION SEQUENCE AND WORK AREA ISOLATION

1. ISOLATE EACH LARGE WOOD STRUCTURE (LWS) LOCATION BY INSTALLING SHEET PILES WITH A VIBRATORY DRIVER AROUND THE WORK AREA AND ROUTE FLOW AWAY FROM THE SITE. CONSTRUCT EACH LARGE WOOD STRUCTURE AND THEN REMOVE SHEET PILE AND MOVE TO NEXT LWS INSTALLATION. REPEAT UNTIL ALL LWS ARE COMPLETED.
2. CONSTRUCT ALL PILOT CHANNELS AND PLACE PILOT CHANNEL SPOILS IN THE DESIGNATED REPOSITORY.
3. INSTALL TEMPORARY BRIDGE JUST UPSTREAM OF PROPOSED STRUCTURE.
4. EXCAVATE CLEAR WATER BYPASS CHANNEL AND PLACE SPOILS ADJACENT TO THE SITE AS SHOWN.
5. ISOLATE THE PRIMARY ROUGHENED CHANNEL LOCATION BY INSTALLING SHEET PILES WITH A VIBRATORY DRIVER AROUND GRADING EXTENTS AND ROUTING FLOW THROUGH THE TEMPORARY BYPASS CHANNEL. FISH SALVAGE SHALL BE PERFORMED IN THE ISOLATED MAIN CHANNEL.
6. REMOVE THE EXISTING DAM STRUCTURE FROM THE SOUTH ACCESS.
7. CONSTRUCT THE ROUGHENED CHANNEL STRUCTURE. ACCESS THE PRIMARY ROUGHENED CHANNEL USING THE SOUTHERN ACCESS ROADS. PUMPING MAY BE NECESSARY TO DEWATER THE PRIMARY ROUGHENED CHANNEL WORK AREA.
8. AFTER CONSTRUCTION OF THE PRIMARY ROUGHENED CHANNEL, REMOVE THE MAIN CHANNEL SHEET PILE AND ALLOW FLOW TO ROUTE THROUGH THE COMPLETED PRIMARY ROUGHENED CHANNEL. ISOLATE THE TEMPORARY BYPASS CHANNEL BY PLACING SHEET PILE AT GRADING EXTENTS (SEE DETAIL 2 ON THIS SHEET). PUMPING MAY BE REQUIRED TO REMOVE SEEPING WATER.
9. FILL THE TEMPORARY BYPASS CHANNEL WITH STAGED MATERIAL AND INSTALL RECLAMATION COMPONENTS.

SHEET PILE INSTALLATION NOTES

1. SHEET PILE SHALL BE INSTALLED IN AN INTERLOCKING CONFIGURATION THAT CREATES A SEAL AND MINIMIZES SEEPAGE INTO AND OUT OF THE ISOLATED WORK AREA.
2. SHEET PILE MATERIAL SHALL BE SUFFICIENT TO MAINTAIN STRUCTURAL INTEGRITY AND FUNCTION DURING INSTALLATION AND REMOVAL, AND DURING DEWATERING OPERATIONS. SELECTION OF SHEET PILE MATERIAL SHALL CONFORM WITH RECOMMENDED USE, AND BE CONSTRUCTED WITH THE RECOMMENDED FACTOR OF SAFETY TO SUPPORT STRUCTURAL STABILITY AS DETERMINED FROM MANUFACTURER SPECIFICATIONS.
3. VIBRATORY METHODS SHALL BE USED FOR SHEET PILE INSTALLATION.
4. SHEET PILE EMBEDMENT SHALL BE EQUAL TO OR GREATER THAN THE LENGTH OF EXPOSED SHEET PILE ABOVE THE STREAMBED.
5. SHEET PILE HEIGHT SHALL BE HIGHER THAN ADJACENT STREAMBANK ELEVATIONS.
6. SHEET PILE CONFIGURATION SHALL NOT INHIBIT CONSTRUCTION OF OTHER PROJECT ELEMENTS.
7. SHEET PILE SHALL BE REMOVED AFTER COMPLETION OF THE WORK. SHEET PILE SHALL NOT REMAIN BURIED IN THE STREAMBED.

NOTE

ALL FISH SALVAGE EFFORTS SHALL BE PERFORMED BY OWNER PRIOR TO CONSTRUCTION.

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ROYAL DAM DEWATERING PLAN

LOWER TOPPENISH CREEK DAM REMOVALS

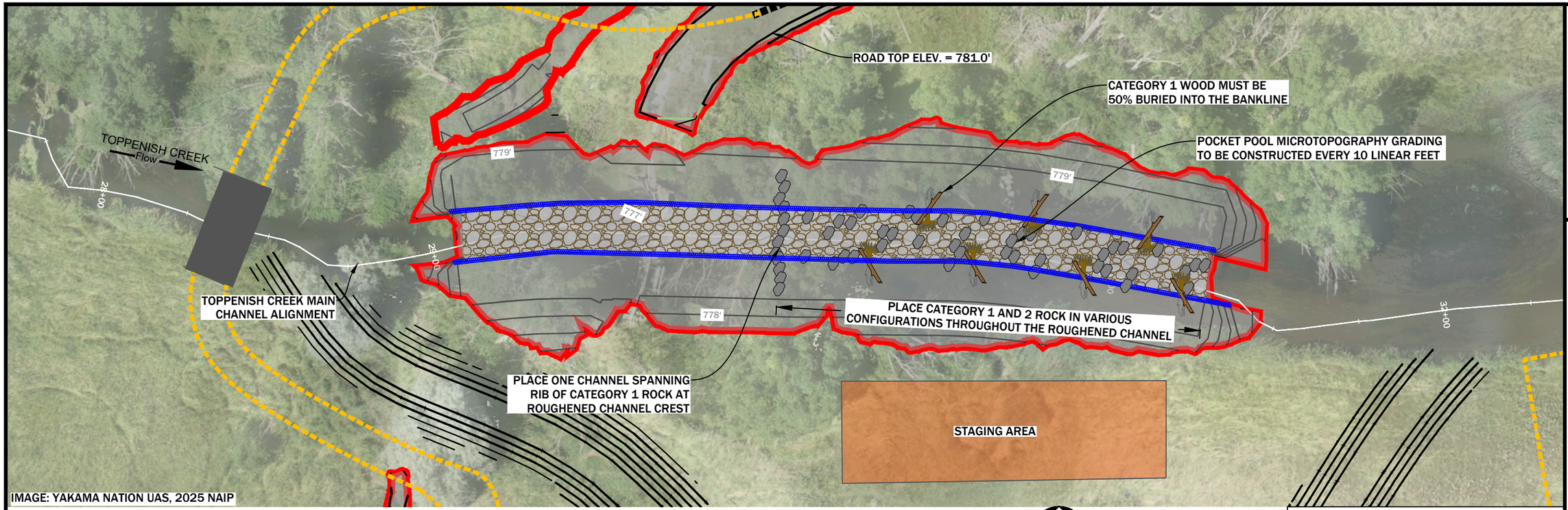
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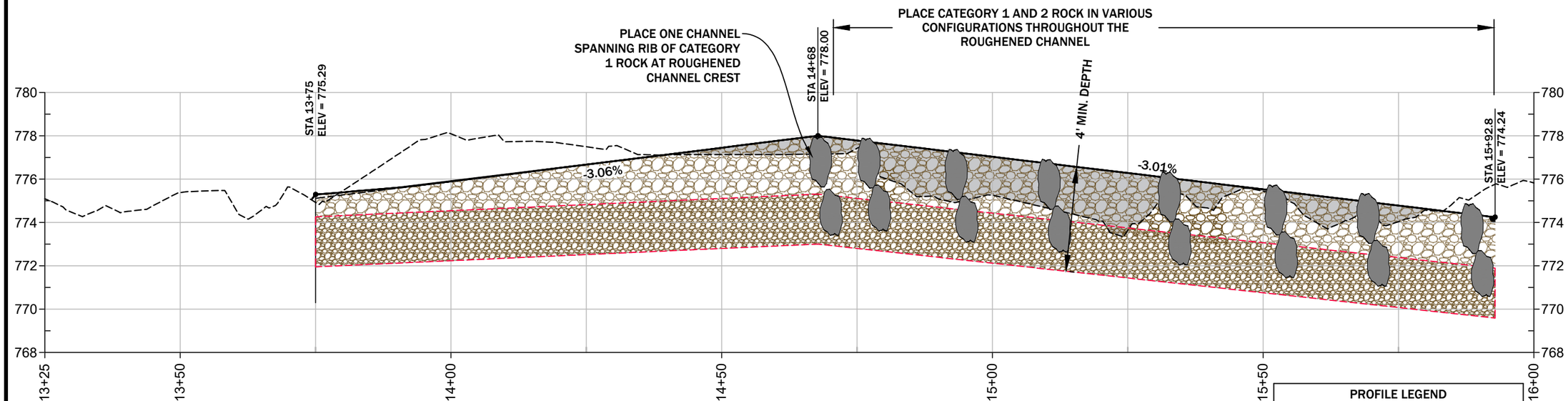
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1 ROYAL ROUGHENED CHANNEL
PLAN VIEW
1" = 30'

DRAWING LEGEND
ROUGHENED CHANNEL
VEGETATED WOOD MATRIX
GRADING EXTENTS



2 ROYAL ROUGHENED CHANNEL
PROFILE VIEW
HOR: 1" = 20'
VER: 1: = 5'

PROFILE LEGEND
EXISTING GRADE
FINISHED GRADE
SUBGRADE SURFACE
RIFFLE MATERIAL
SUBGRADE MATERIAL (PIT RUN)
FILL

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ROYAL DAM ROUGHENED CHANNEL PLAN AND PROFILE

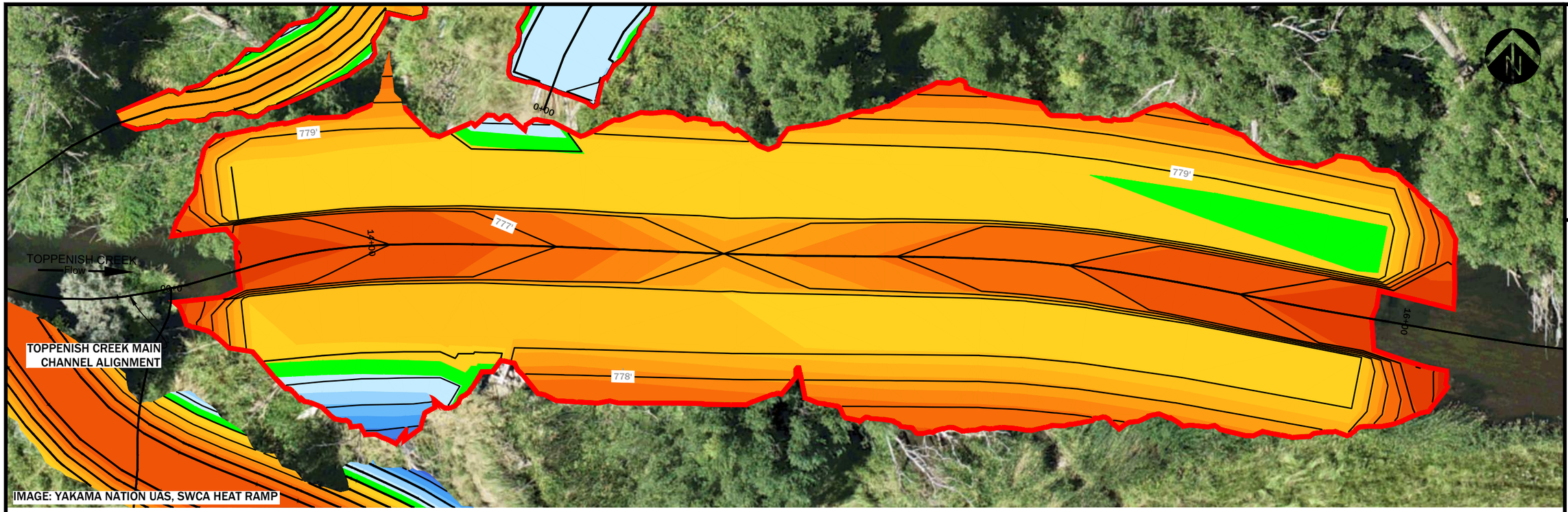
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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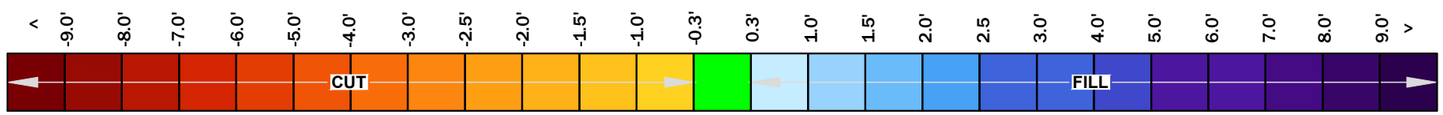
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5.4

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1 ROYAL ROUGHENED CHANNEL
PLAN VIEW
1" = 20'



EXISTING GROUND COMPARED TO SWCA DESIGN SURFACE

EARTHWORK VOLUMES	
ITEM	QUANTITY (CY)
CUT	860
BACKFILL	15
NET CUT	845

NOTE:
VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.

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ROYAL DAM ROUGHENED CHANNEL MICROTOPOGRAPHY PLAN
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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1	10/23/26	LS	FINAL DESIGN	NW

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5.5

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DRAWING LEGEND	
	IMPROVED ACCESS ROAD
	UNIMPROVED ACCESS ROAD
	STAGING AREA
	EXISTING OVERHEAD POWER
	EXISTING POWER POLE
	GRADING EXTENTS

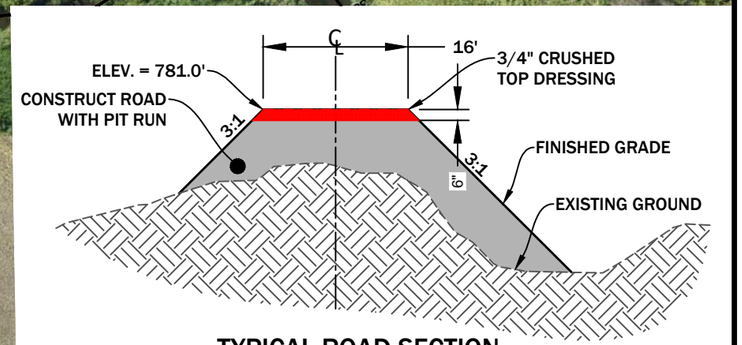
ROUGHENED CHANNEL
(SEE SHEET 5.4 & 5.5)

ROAD IMPROVEMENT
ALIGNMENT

TOPPENISH CREEK
Flow

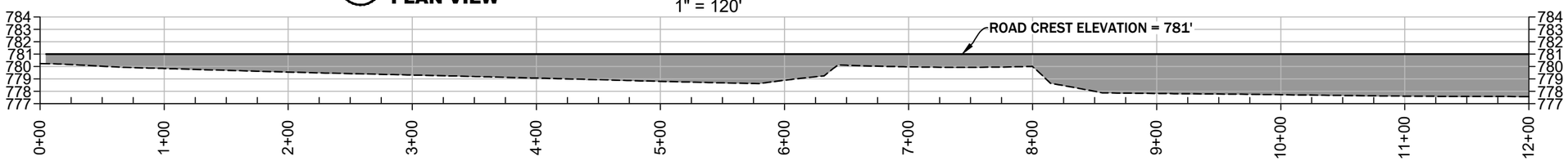
TOPPENISH CREEK MAIN
CHANNEL ALIGNMENT

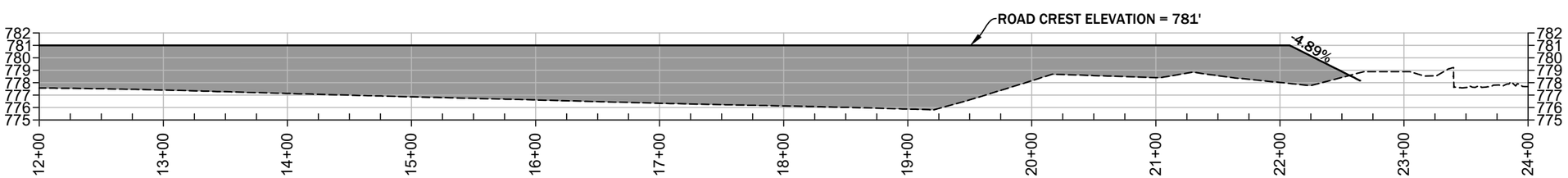
IMAGE: YAKAMA NATION UAS, 2025 NAIP



TYPICAL ROAD SECTION
NTS

1 ROAD IMPROVEMENTS PLAN
PLAN VIEW
1" = 120'





2 ROAD IMPROVEMENTS PLAN
PROFILE VIEW
H: 1" = 100' V: 1" = 10'

PROFILE LEGEND
EXISTING GRADE
FINISHED GRADE
SUBGRADE SURFACE
RIFFLE MATERIAL
SUBGRADE MATERIAL (PIT RUN)
FILL

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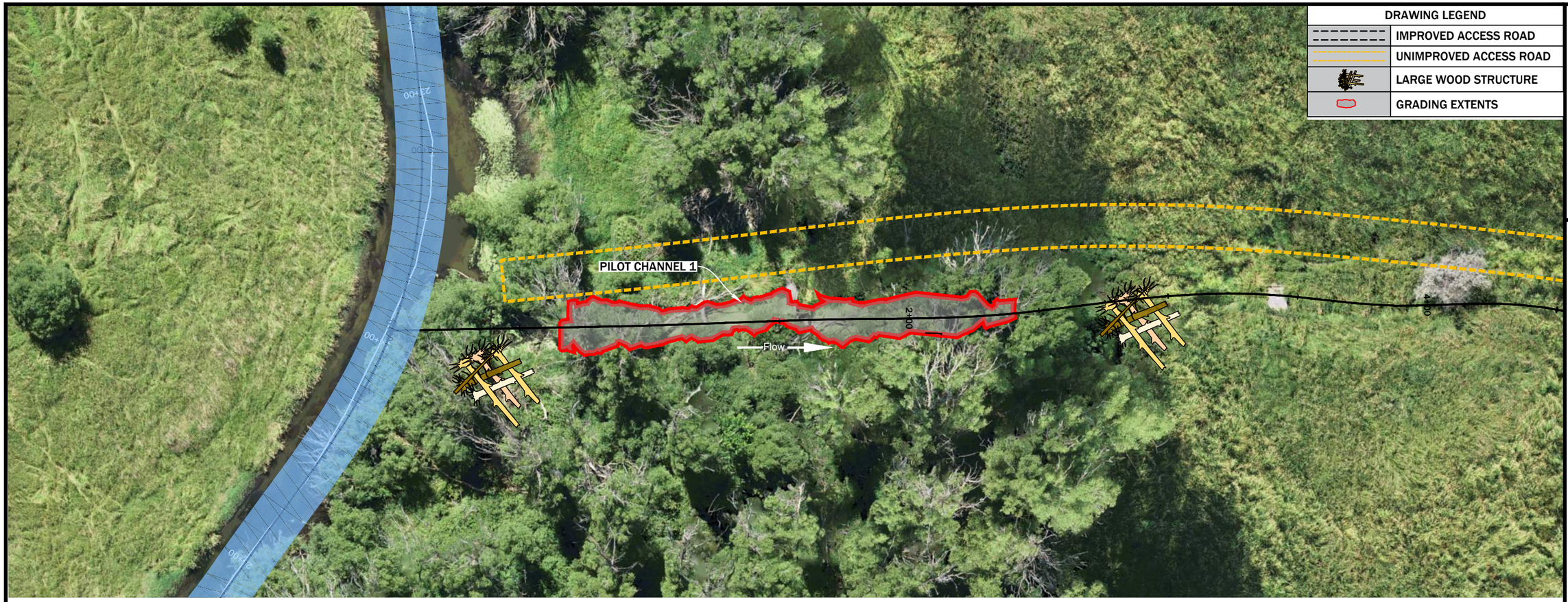
ROYAL DAM ROAD IMPROVEMENT PLAN AND PROFILE
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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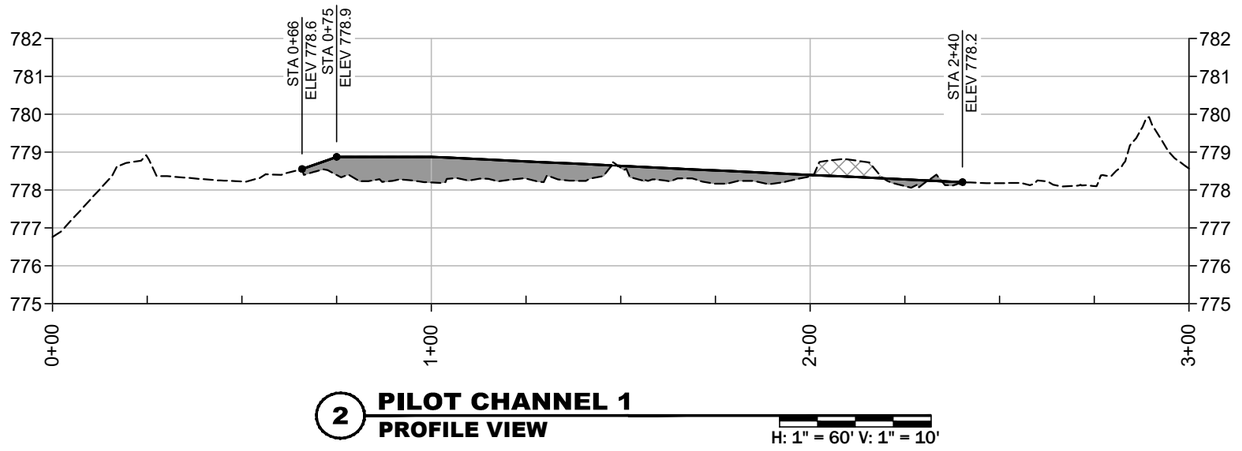
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DRAWING LEGEND	
	IMPROVED ACCESS ROAD
	UNIMPROVED ACCESS ROAD
	LARGE WOOD STRUCTURE
	GRADING EXTENTS

1 PILOT CHANNEL 1 PLAN VIEW

1" = 100'



2 PILOT CHANNEL 1 PROFILE VIEW

H: 1" = 60' V: 1" = 10'

PROFILE LEGEND	
SYMBOL	FEATURE
	EXISTING GRADE
	FINISHED GRADE
	CUT
	FILL

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ROYAL DAM PILOT CHANNEL 1 PLAN AND PROFILE

LOWER TOPPENISH CREEK DAM REMOVALS

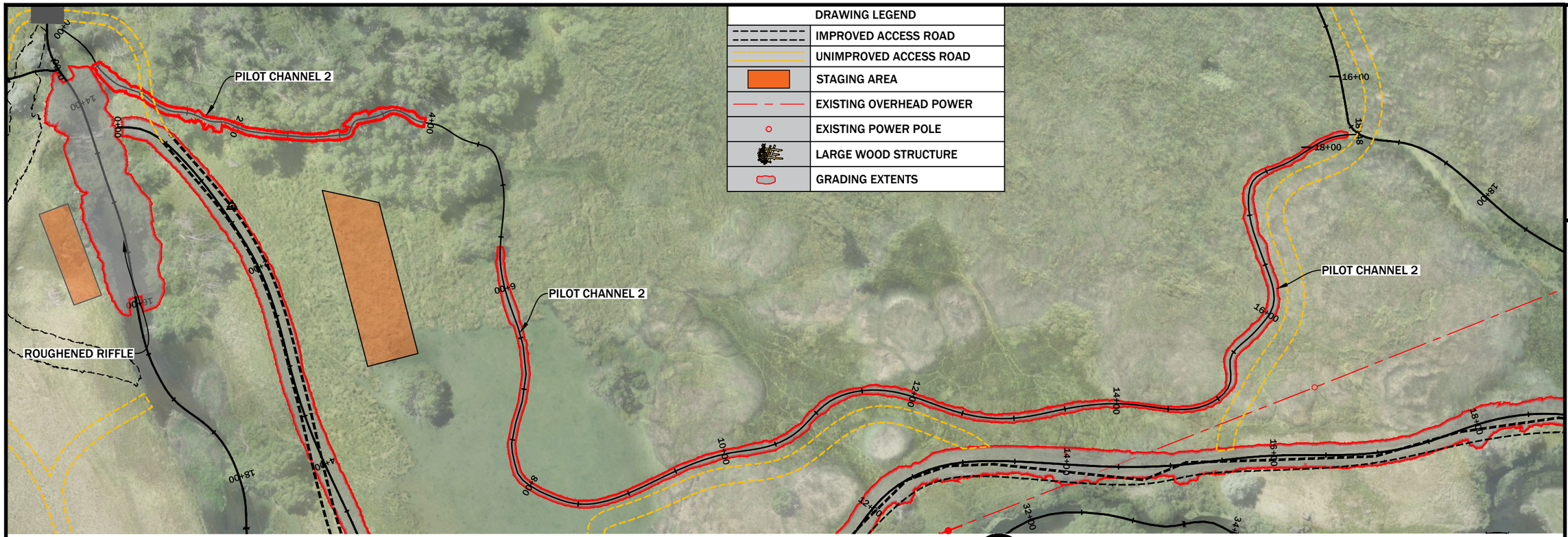
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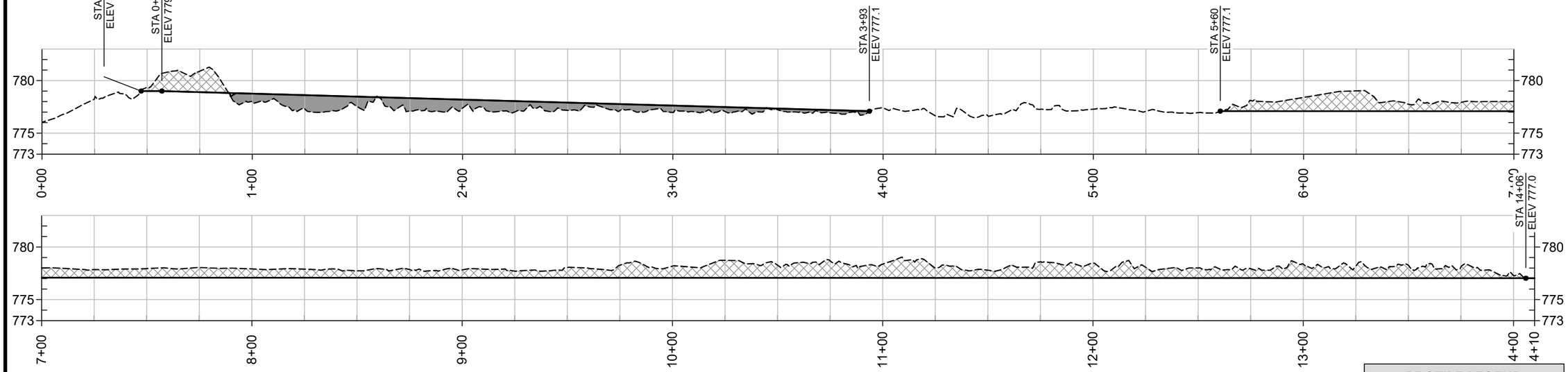
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DRAWING LEGEND	
	IMPROVED ACCESS ROAD
	UNIMPROVED ACCESS ROAD
	STAGING AREA
	EXISTING OVERHEAD POWER
	EXISTING POWER POLE
	LARGE WOOD STRUCTURE
	GRADING EXTENTS

1 PILOT CHANNEL 2 PLAN VIEW

1" = 100'



2 PILOT CHANNEL 2 PROFILE VIEW

H: 1" = 60' V: 1" = 10'

PROFILE LEGEND	
SYMBOL	FEATURE
	EXISTING GRADE
	FINISHED GRADE
	CUT
	FILL

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ROYAL DAM PILOT CHANNEL 2 PLAN AND PROFILE

LOWER TOPPENISH CREEK DAM REMOVALS

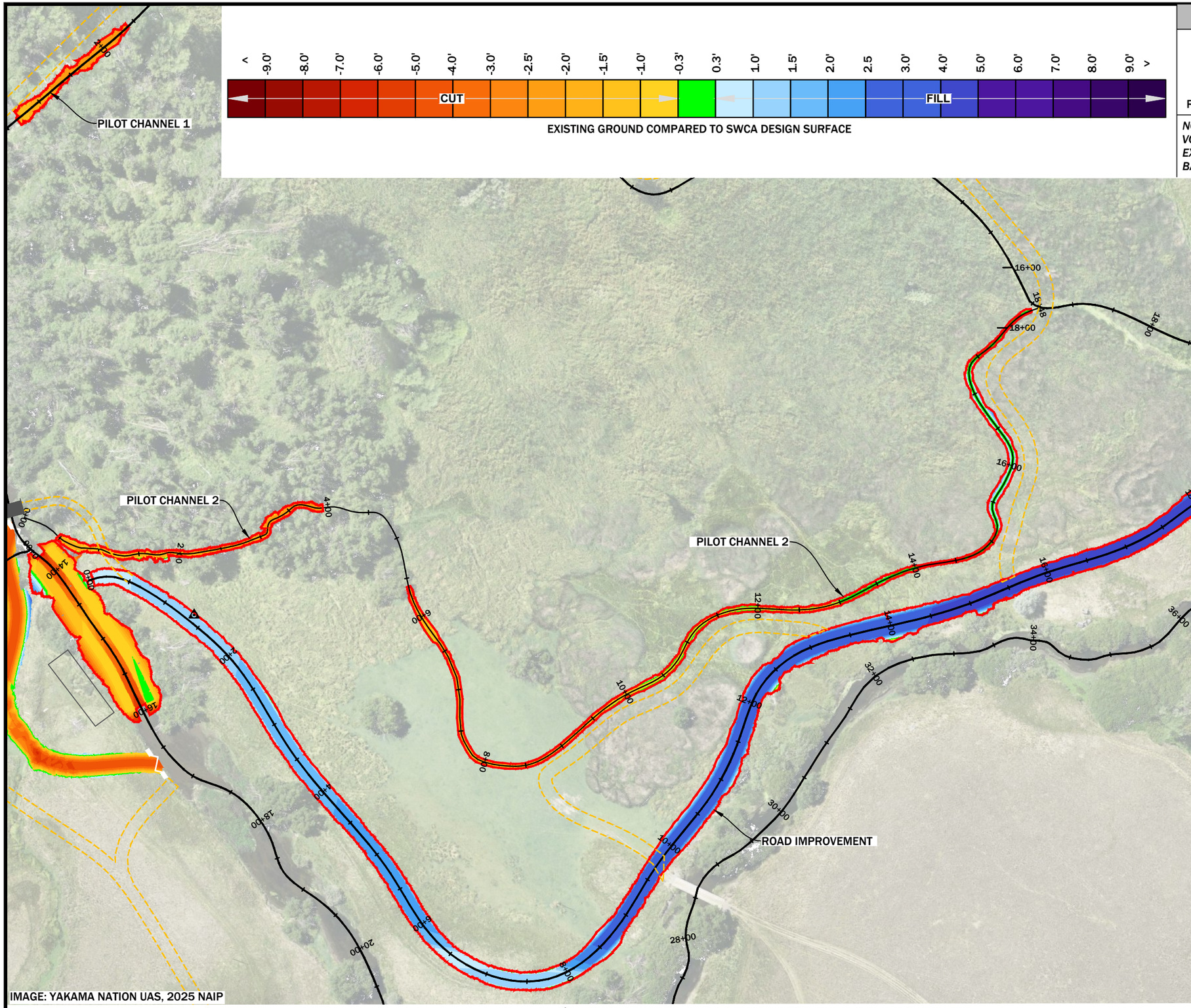
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< -9.0' -8.0' -7.0' -6.0' -5.0' -4.0' -3.0' -2.5' -2.0' -1.5' -1.0' -0.3' 0.3' 1.0' 1.5' 2.0' 2.5 3.0' 4.0' 5.0' 6.0' 7.0' 8.0' 9.0' >

CUT — FILL

EXISTING GROUND COMPARED TO SWCA DESIGN SURFACE

EARTHWORK VOLUMES

AREA	CUT (CY)	FILL (CY)	NET (CY)
PILOT CHN 1	25	0	25 C
PILOT CHN 2	270	0	270 C
ROAD IMPROVEMENT	0	3,330	3,330 F

NOTE:
VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.

1 **ROYAL DAM NORTH MICROTOPOGRAPHY**
PLAN VIEW
1" = 120'

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NORTH ROYAL DAM SITE MICROTOPOGRAPHY PLAN

LOWER TOPPENISH CREEK DAM REMOVALS

YAKAMA RESERVATION, WASHINGTON

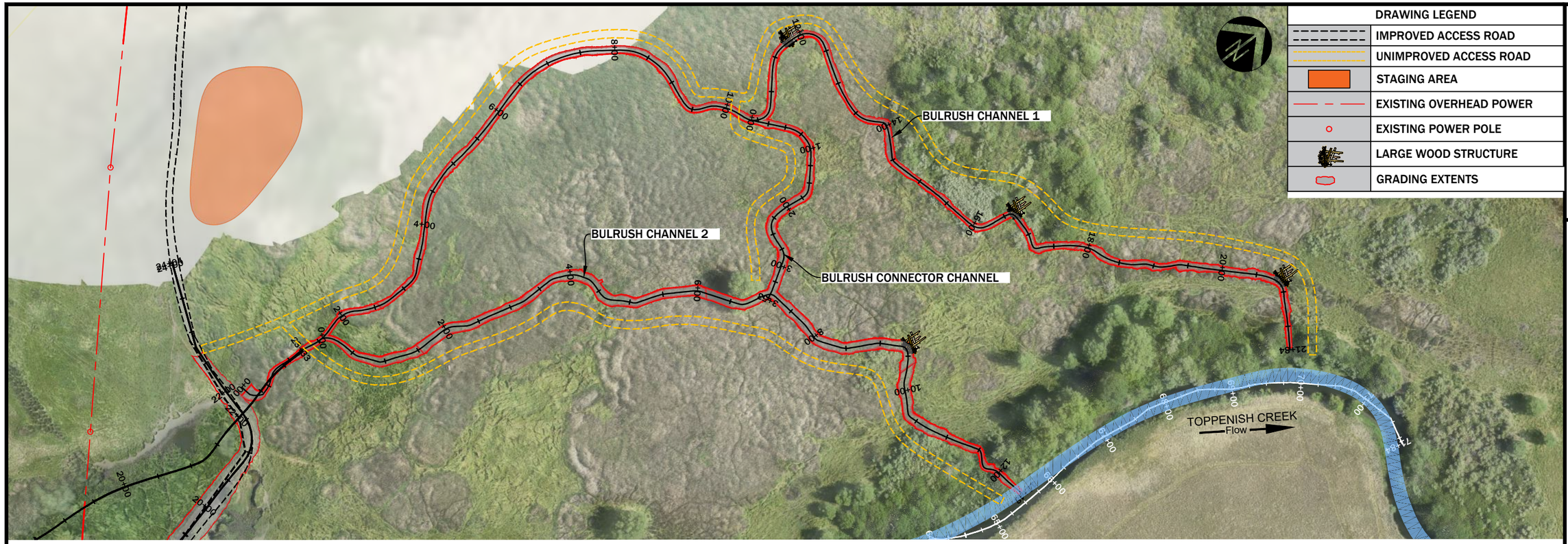
NO.	DATE	BY	DESCRIPTION	CHK
1	10/23/26	LS	FINAL DESIGN	NW

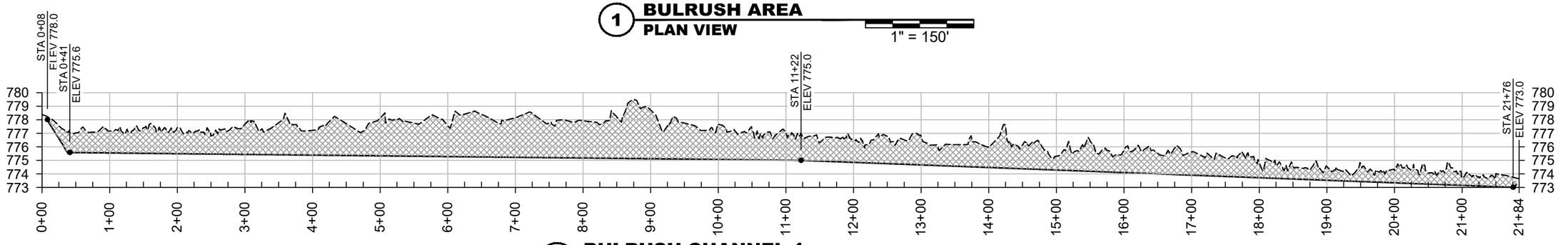
PROJECT NUMBER
00097854-000-CRB

DRAWING NUMBER
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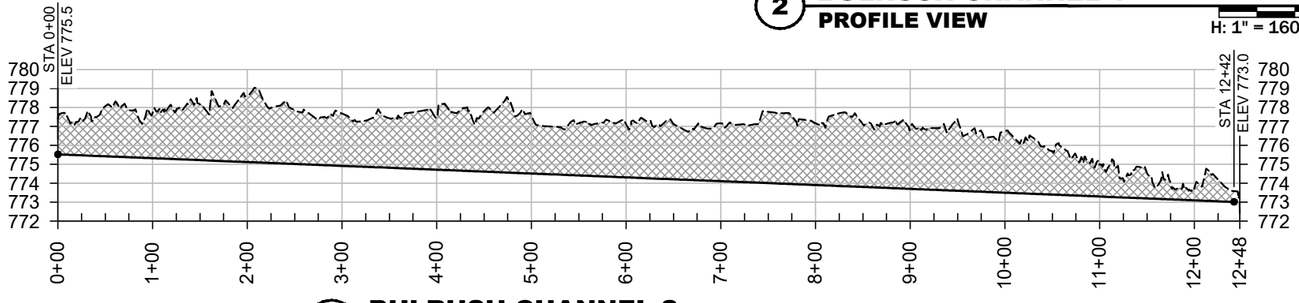
Drawing 24 of 46

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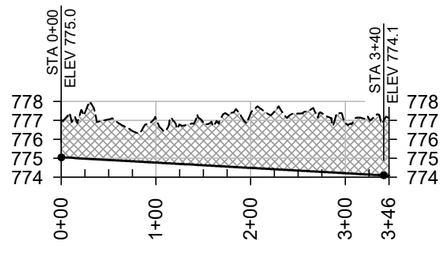




1 **BULRUSH AREA**
PLAN VIEW
1" = 150'



2 **BULRUSH CHANNEL 1**
PROFILE VIEW
H: 1" = 160' V: 1" = 8'



4 **BULRUSH CONNECTOR CHANNEL**
PROFILE VIEW
H: 1" = 160' V: 1" = 8'

3 **BULRUSH CHANNEL 2**
PROFILE VIEW
H: 1" = 160' V: 1" = 8'

PROFILE LEGEND	
SYMBOL	FEATURE
	EXISTING GRADE
	FINISHED GRADE
	CUT
	FILL

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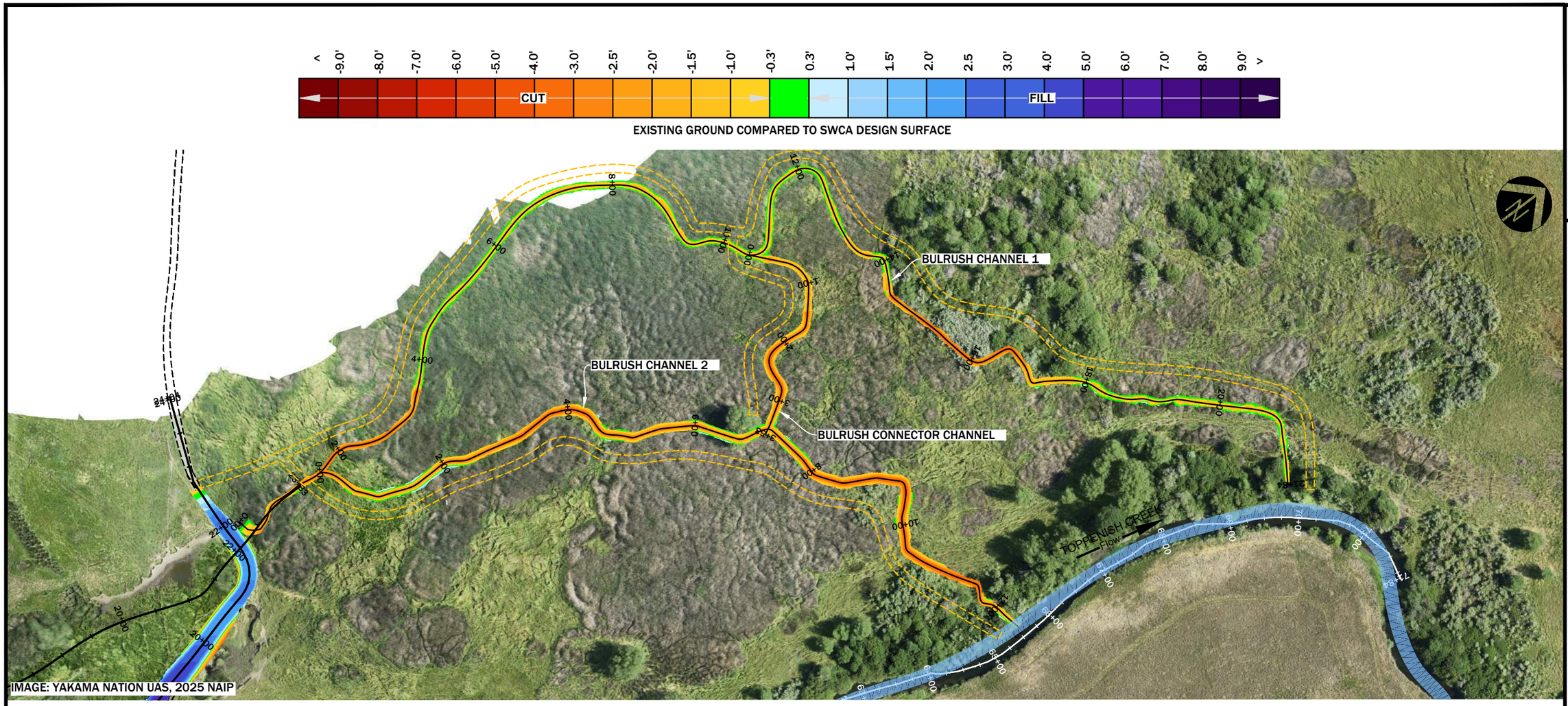
ROYAL DAM BULRUSH AREA PLAN AND PROFILE
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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1	10/23/26	LS	FINAL DESIGN	NW

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1 BULRUSH AREA
PLAN VIEW
1" = 150'

EARTHWORK VOLUMES	
AREA	CUT (CY)
BULRUSH CHN 1	1,185
BULRUSH CHN 2	1,230
BULRUSH CONNECTOR	285

NOTE:
VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.

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ROYAL DAM BULRUSH AREA MICROTOPOGRAPHY PLAN

LOWER TOPPENISH CREEK DAM REMOVALS

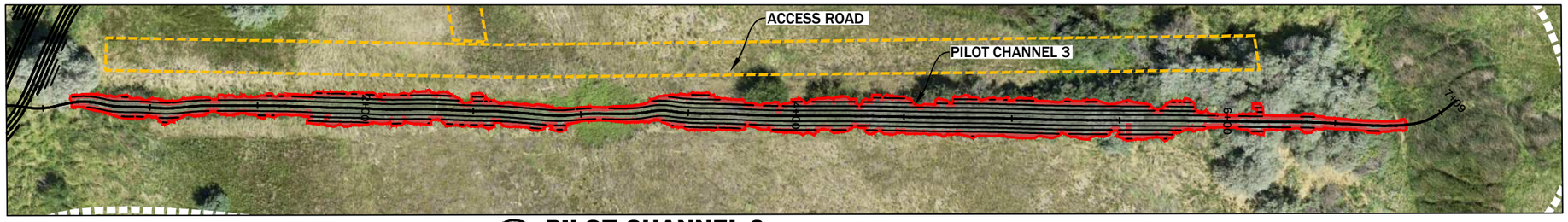
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NO.	DATE	BY	DESCRIPTION	CHK
1	10/23/26	LS	FINAL DESIGN	NW

PROJECT NUMBER
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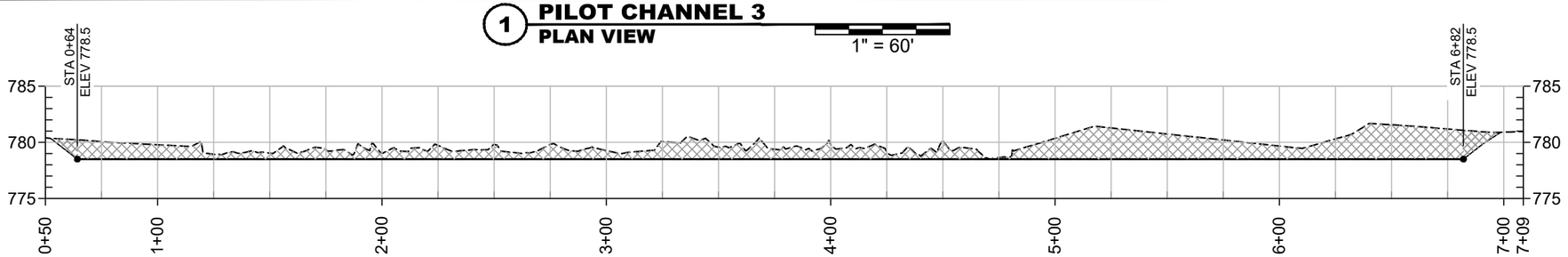
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1 PILOT CHANNEL 3 PLAN VIEW

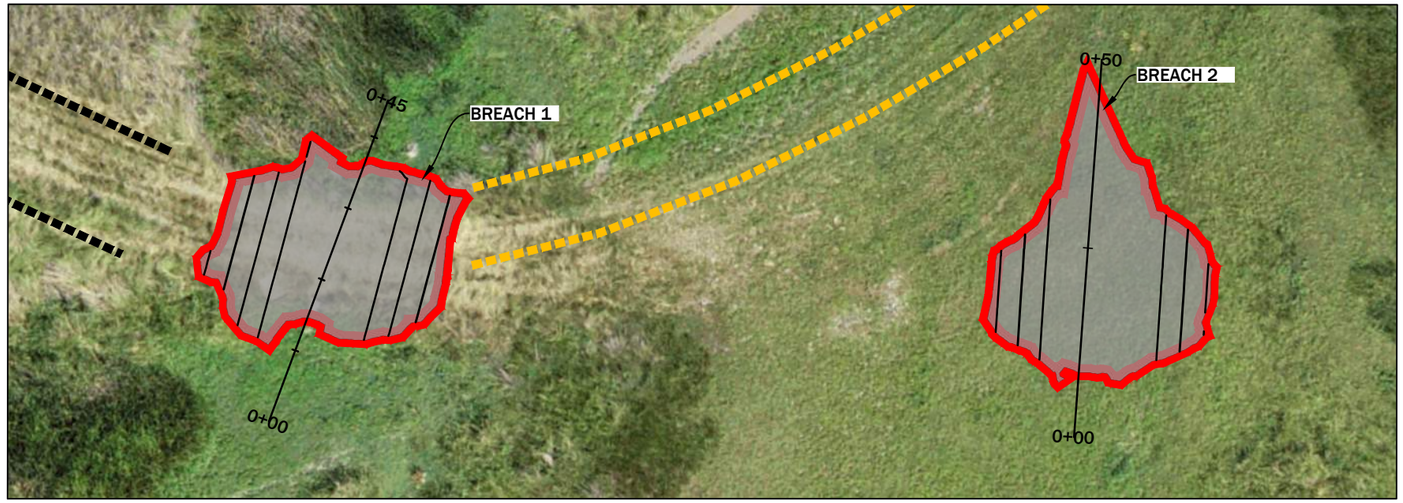
1" = 60'



2 PILOT CHANNEL 3 SECTION VIEW

H: 1" = 60' V: 1" = 10'

DRAWING LEGEND	
	MICROTOPOGRAPHY EXTENTS
	IMPROVED ACCESS ROAD
	UNIMPROVED ACCESS ROAD
	GRADING EXTENTS



PROFILE LEGEND	
SYMBOL	FEATURE
	EXISTING GRADE
	FINISHED GRADE
	CUT
	FILL

3 BREACH 1 & 2 PLAN VIEW

1" = 20'



4 BREACH 1 & 2 SECTION VIEW

H: 1" = 20' V: 1" = 10'

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PILOT CHANNEL AND MICROTOPOGRAPHY PLAN AND PROFILE

LOWER TOPPENISH CREEK DAM REMOVALS

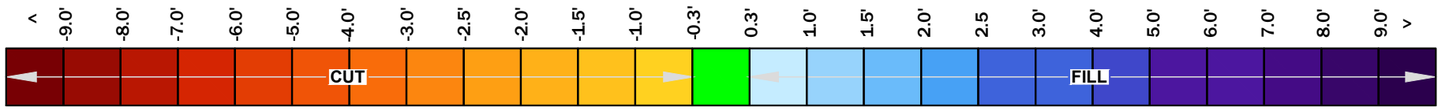
YAKAMA RESERVATION, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
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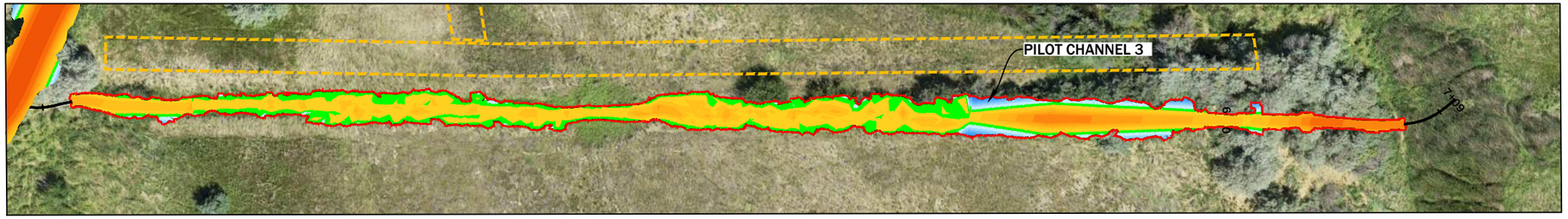
PROJECT NUMBER
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DRAWING NUMBER
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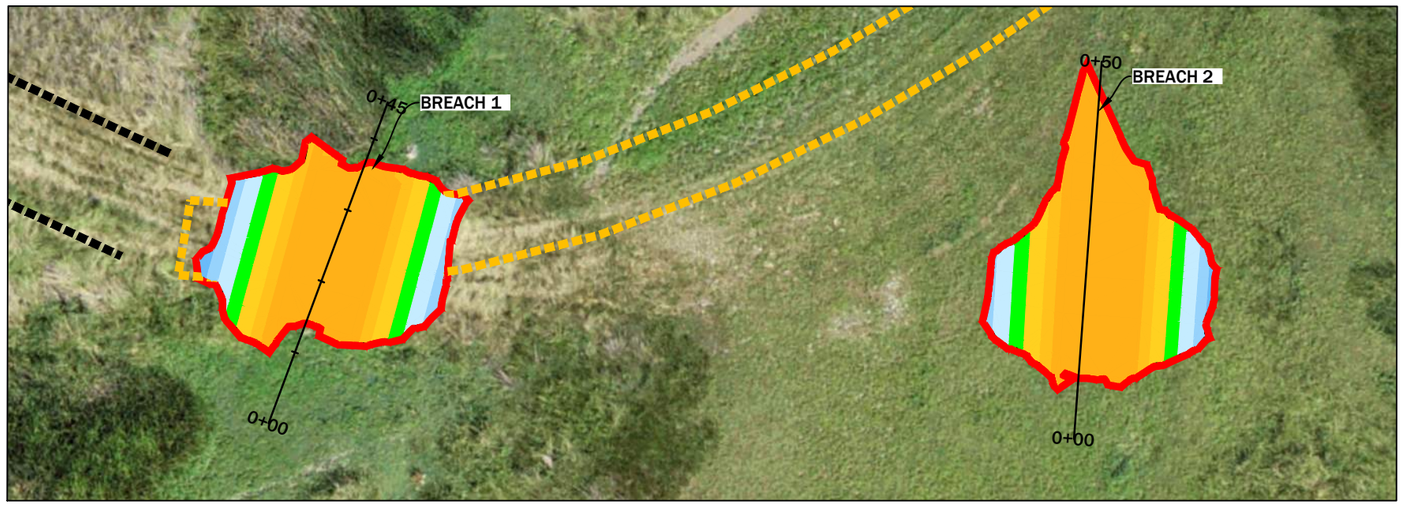
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EXISTING GROUND COMPARED TO SWCA DESIGN SURFACE



1 **PILOT CHANNEL MICROTOPOGRAPHY 3**
PLAN VIEW
1" = 60'



1 **MICROTOPOGRAPHY BREACH 1 & 2**
PLAN VIEW
1" = 20'

EARTHWORK VOLUMES	
AREA	CUT (CY)
PILOT CHANNEL MICROTOPOGRAPHY 3	170
MICROTOPOGRAPHY BREACH 1	40
MICROTOPOGRAPHY BREACH 2	45

NOTE:
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PILOT CHANNEL AND MICROTOPOGRAPHY PLAN

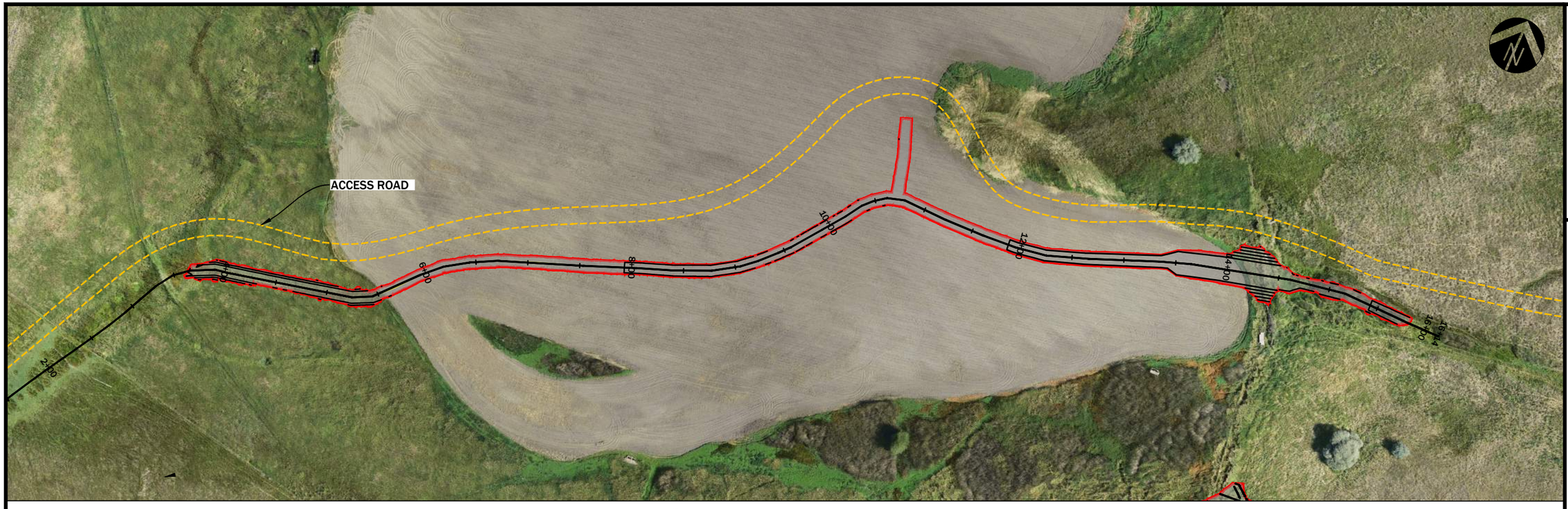
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
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PROJECT NUMBER
00097854-000-CRB

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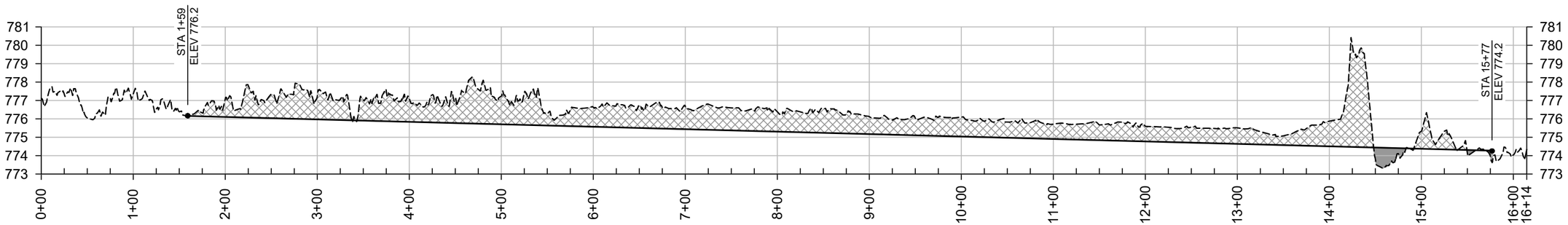
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1 CORN FIELD PLAN VIEW

1" = 100'

DRAWING LEGEND	
	MICROTOPOGRAPHY EXTENTS
	UNIMPROVED ACCESS ROAD
	GRADING EXTENTS



2 CORN FIELD PROFILE VIEW

H: 1" = 120' V: 1" = 6'

PROFILE LEGEND	
SYMBOL	FEATURE
	EXISTING GRADE
	FINISHED GRADE
	CUT
	FILL

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ROYAL DAM CORN FIELD PLAN AND PROFILE

LOWER TOPPENISH CREEK DAM REMOVALS

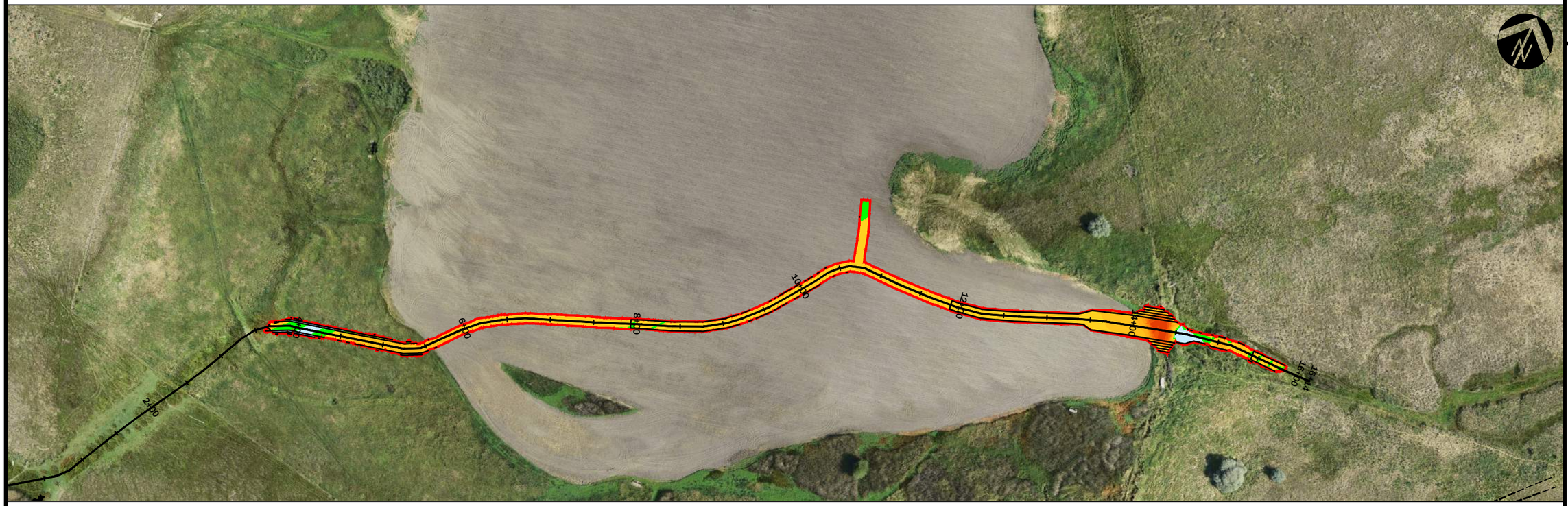
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1 CORN FIELD MICOTOPOGRAPHY
PLAN VIEW

1" = 120'

EARTHWORK VOLUMES			
AREA	CUT (CY)	FILL (CY)	NET (CY)
CORN FIELD MICROTOPOGRAPHY	500	15	485 C

NOTE:
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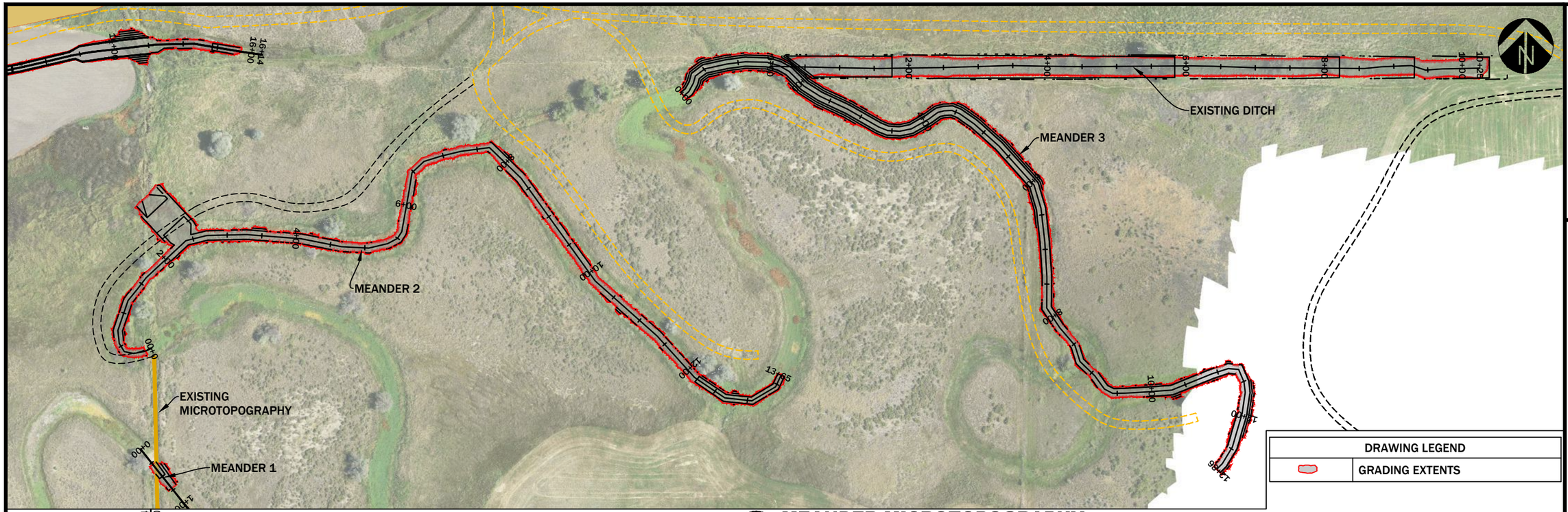
ROYAL DAM CORN FIELD MICROTOPOGRAPHY PLAN
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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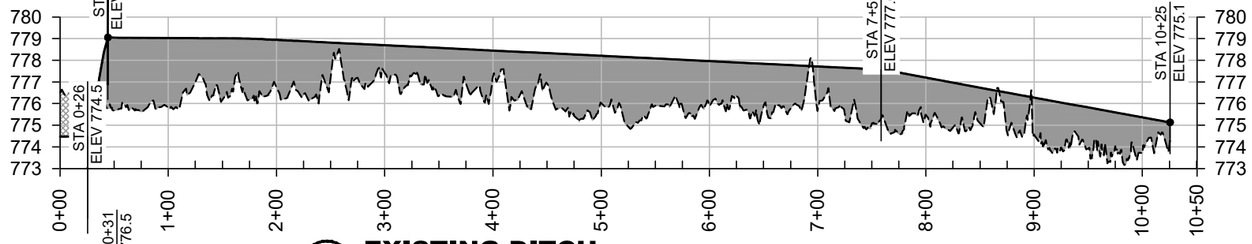
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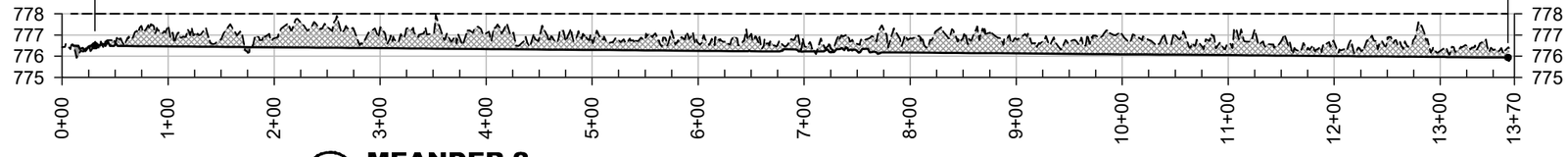
1 MEANDER MICROTOPOGRAPHY PLAN VIEW

1" = 150'



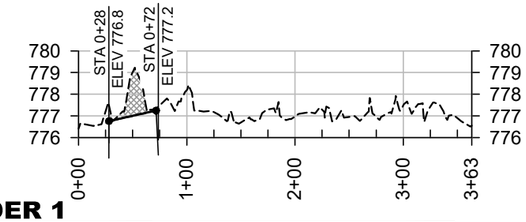
2 EXISTING DITCH PROFILE VIEW

H: 1" = 140' V: 1" = 10'



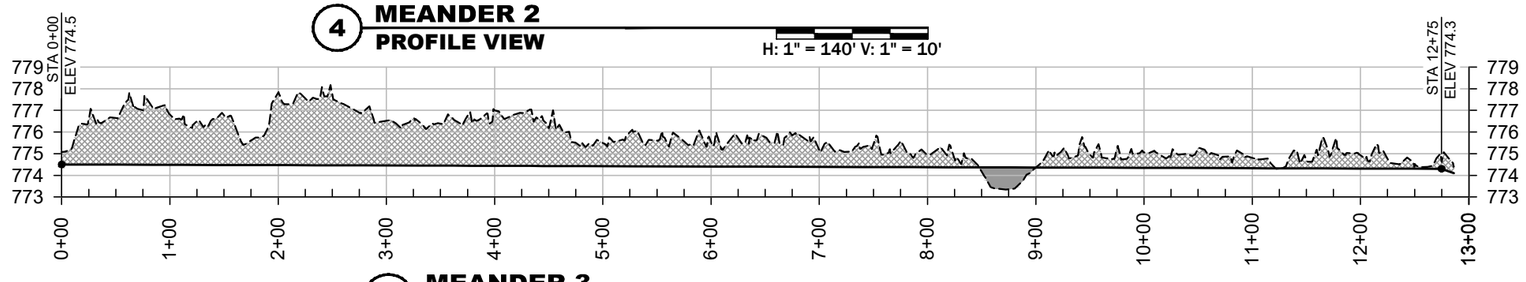
3 MEANDER 1 PROFILE VIEW

H: 1" = 140' V: 1" = 10'



4 MEANDER 2 PROFILE VIEW

H: 1" = 140' V: 1" = 10'



5 MEANDER 3 PROFILE VIEW

H: 1" = 140' V: 1" = 10'

PROFILE LEGEND	
SYMBOL	FEATURE
------	EXISTING GRADE
———	FINISHED GRADE
	CUT
	FILL

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ROYAL DAM MEANDER MICROTOPOGRAPHY PLAN AND PROFILE

LOWER TOPPENISH CREEK DAM REMOVALS

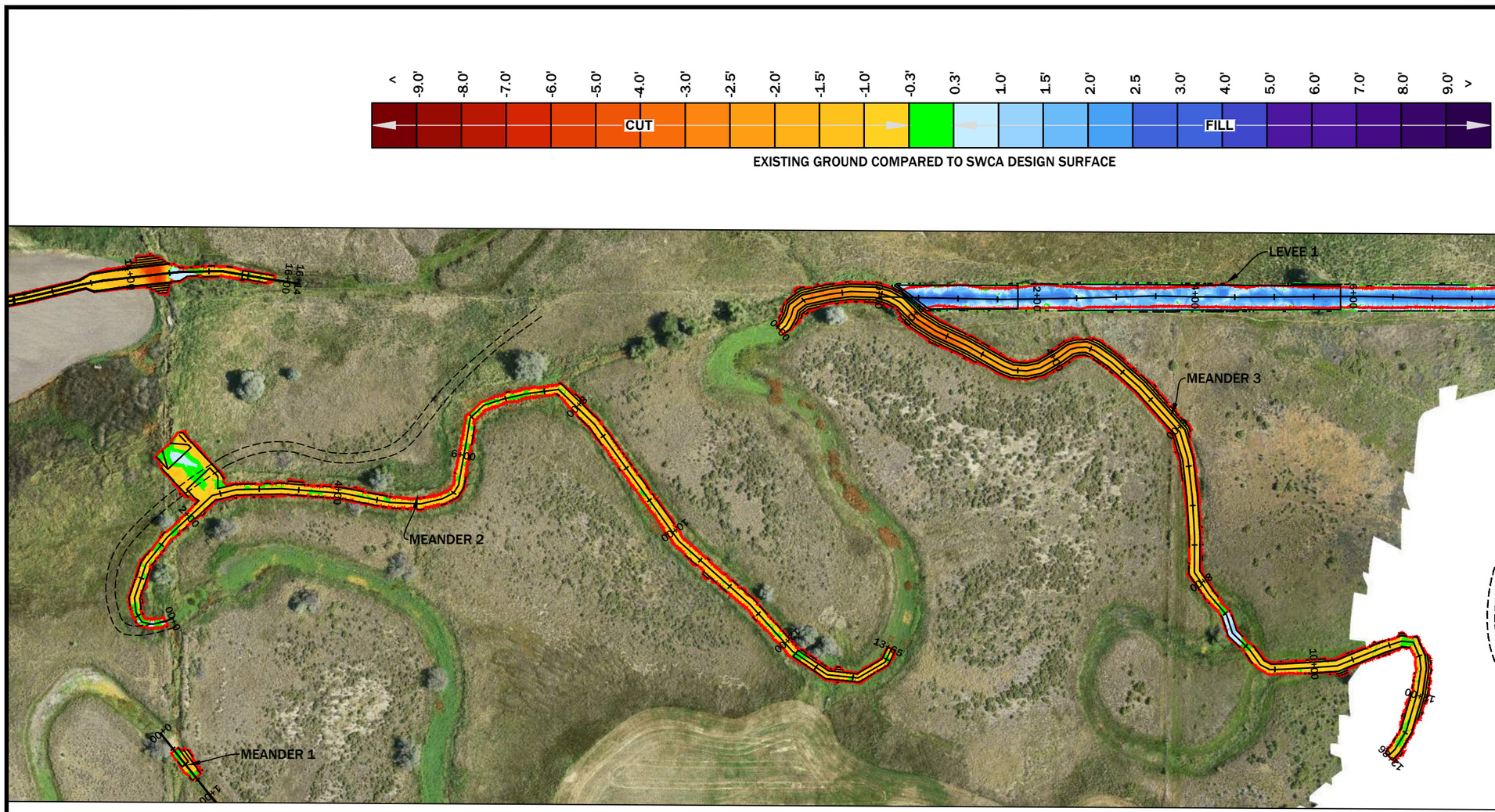
YAKAMA RESERVATION, WASHINGTON

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PROJECT NUMBER 00097854-000-CRB

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1 MEANDER MICROTOPOGRAPHY PLAN VIEW

1" = 150'

EARTHWORK VOLUMES			
AREA	CUT (CY)	FILL (CY)	NET (CY)
LEVEE 1 MICROTOPOGRAPHY	0	1,570	1,570 F
MEANDER 1 MICROTOPOGRAPHY	25	0	25 C
MEANDER 2 MICROTOPOGRAPHY	490	0	490 C
MEANDER 3 MICROTOPOGRAPHY	1,055	0	1,055 C

NOTE:
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ROYAL DAM MEANDER MICROTOPOGRAPHY PLAN

LOWER TOPPENISH CREEK DAM REMOVALS

YAKAMA RESERVATION, WASHINGTON

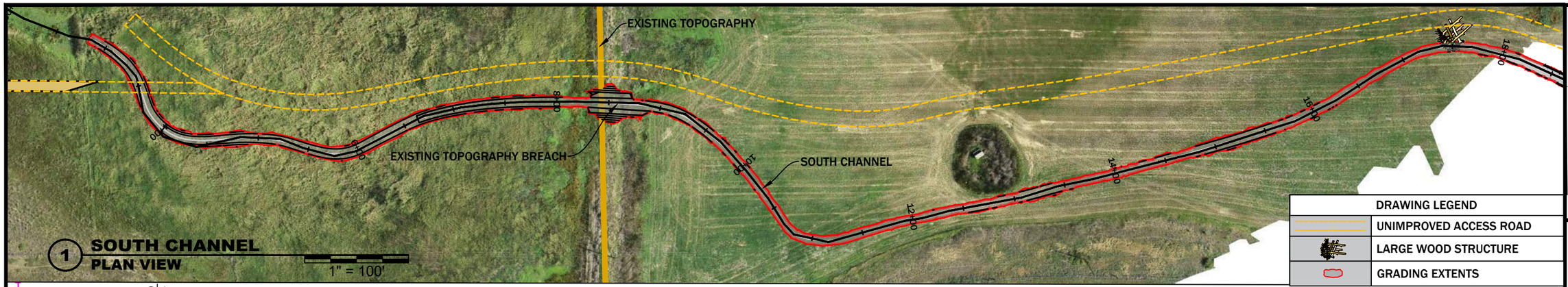
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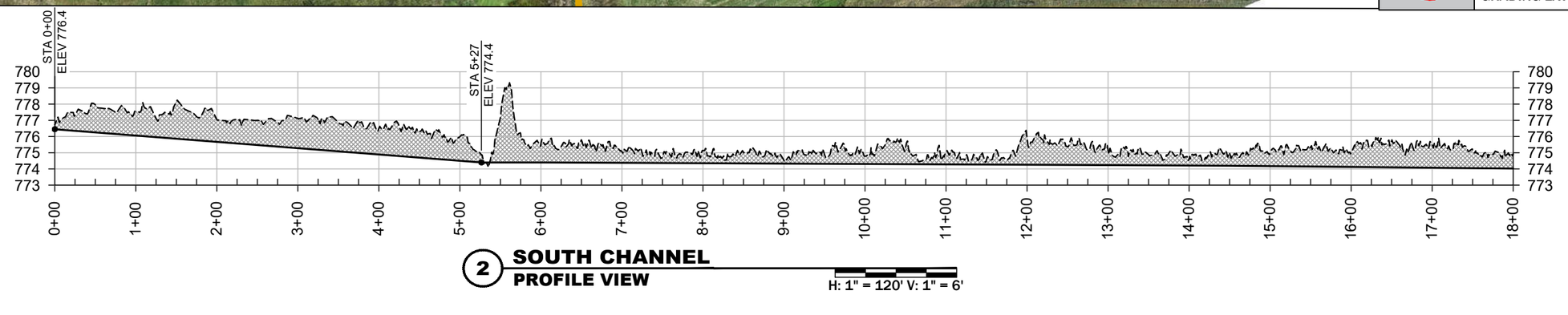
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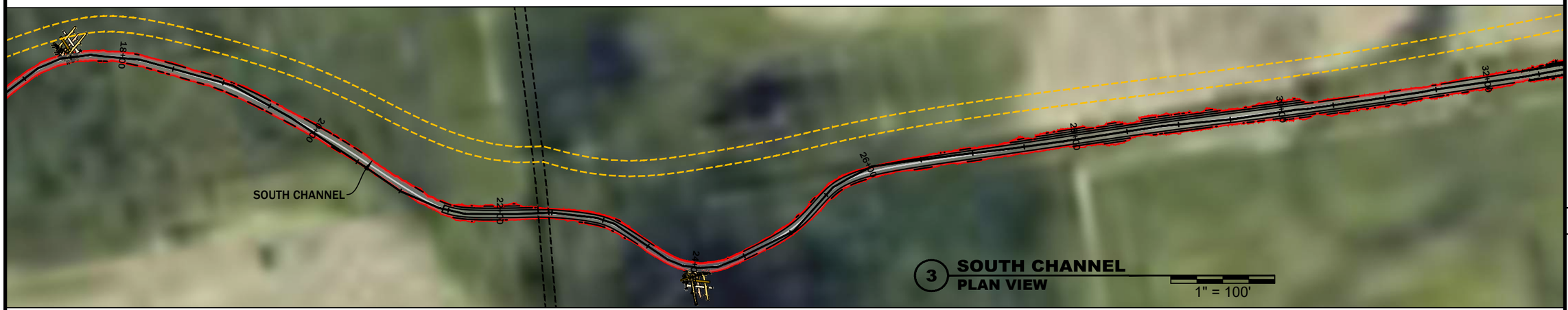
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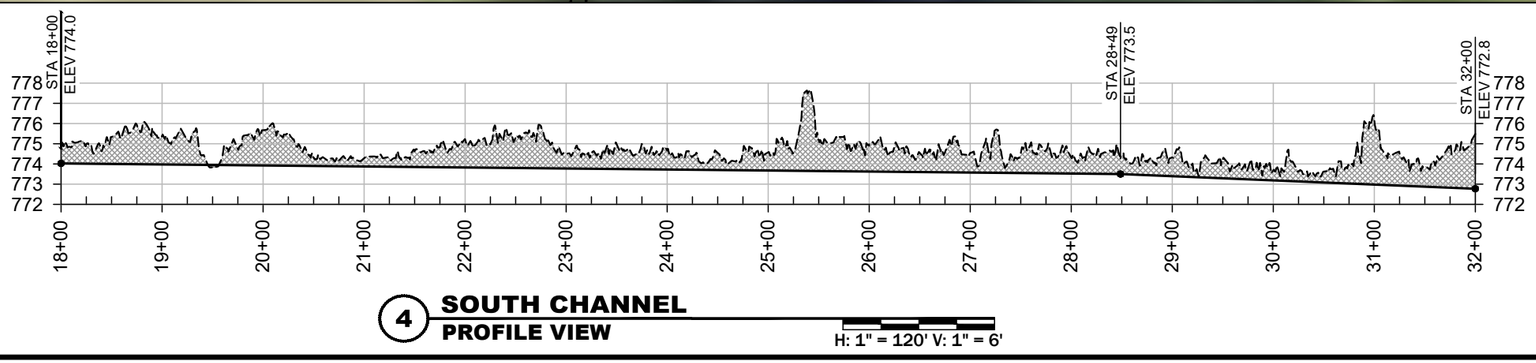
Drawing 32 of 46

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PROFILE LEGEND	
SYMBOL	FEATURE
	EXISTING GRADE
	FINISHED GRADE
	CUT
	FILL

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ROYAL DAM SOUTH CHANNEL PLAN AND PROFILE 1

LOWER TOPPENISH CREEK DAM REMOVALS

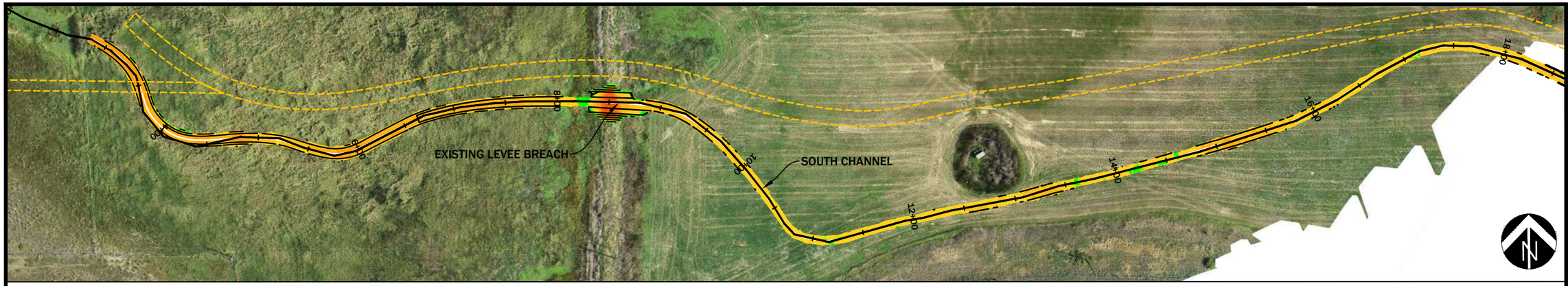
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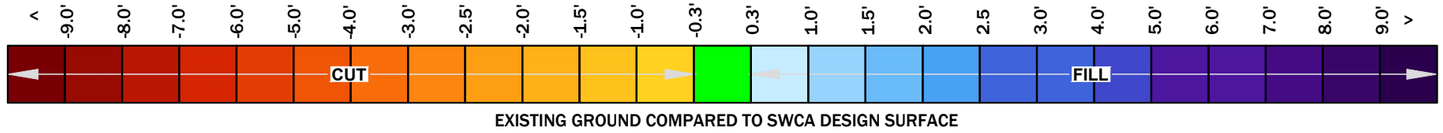
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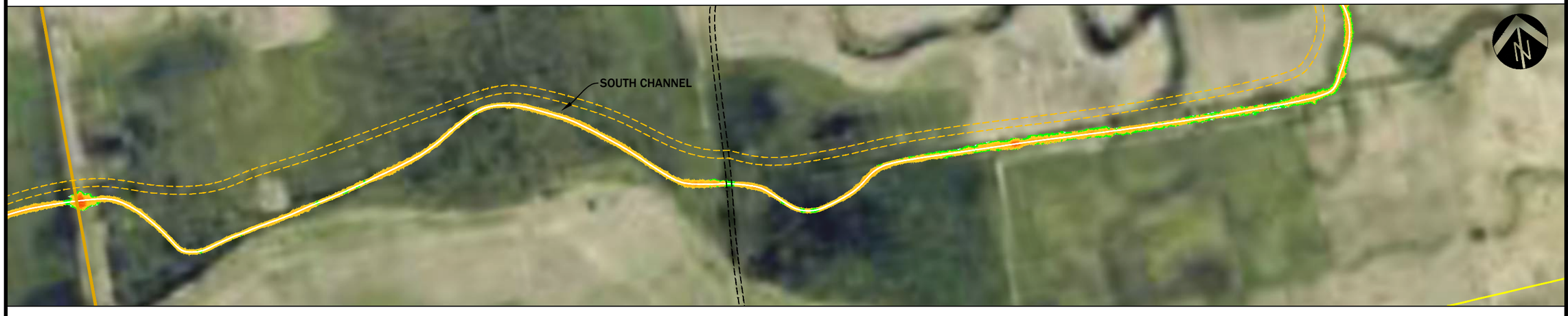
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1 SOUTH CHANNEL MICROTOPOGRAPHY
PLAN VIEW

1" = 100'





2 SOUTH CHANNEL MICROTOPOGRAPHY
PLAN VIEW

1" = 200'

EARTHWORK VOLUMES	
AREA	CUT (CY)
SOUTH CHANNEL MICROTOPOGRAPHY (STA 0+00 TO 18+00)	645
SOUTH CHANNEL MICROTOPOGRAPHY (STA 18+00 TO 32+00)	600

NOTE:
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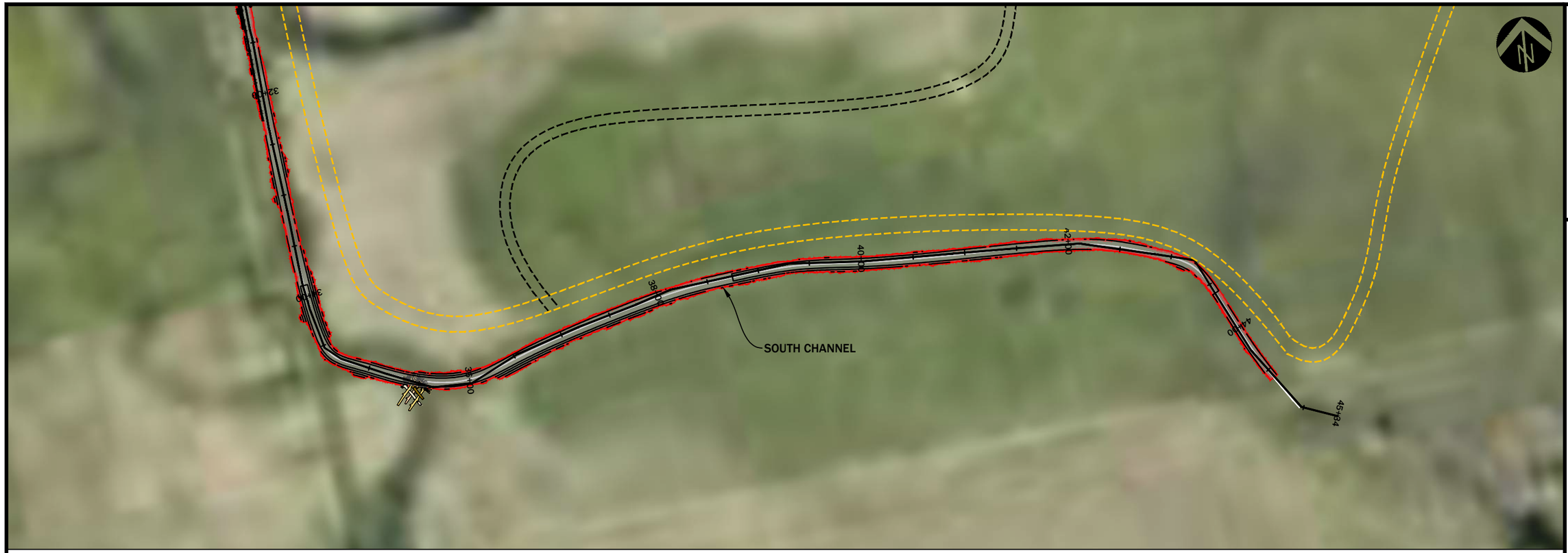
ROYAL DAM SOUTH CHANNEL GRADING PLAN 1
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	10/23/26	LS	FINAL DESIGN	NW

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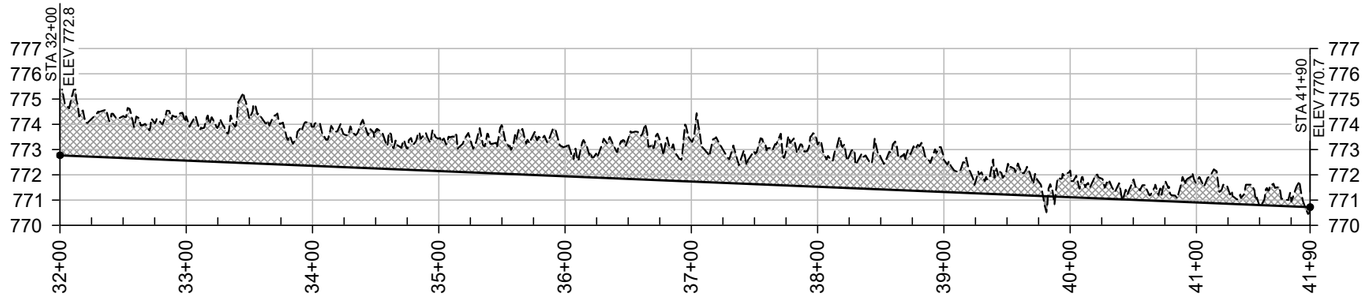
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DRAWING LEGEND	
	IMPROVED ACCESS ROAD
	UNIMPROVED ACCESS ROAD
	LARGE WOOD STRUCTURE
	GRADING EXTENTS

1 SOUTH CHANNEL PLAN VIEW

1" = 100'



2 SOUTH CHANNEL PROFILE VIEW

H: 1" = 120' V: 1" = 6'

PROFILE LEGEND	
SYMBOL	FEATURE
	EXISTING GRADE
	FINISHED GRADE
	CUT
	FILL

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ROYAL DAM SOUTH CHANNEL PLAN AND PROFILE 2

LOWER TOPPENISH CREEK DAM REMOVALS

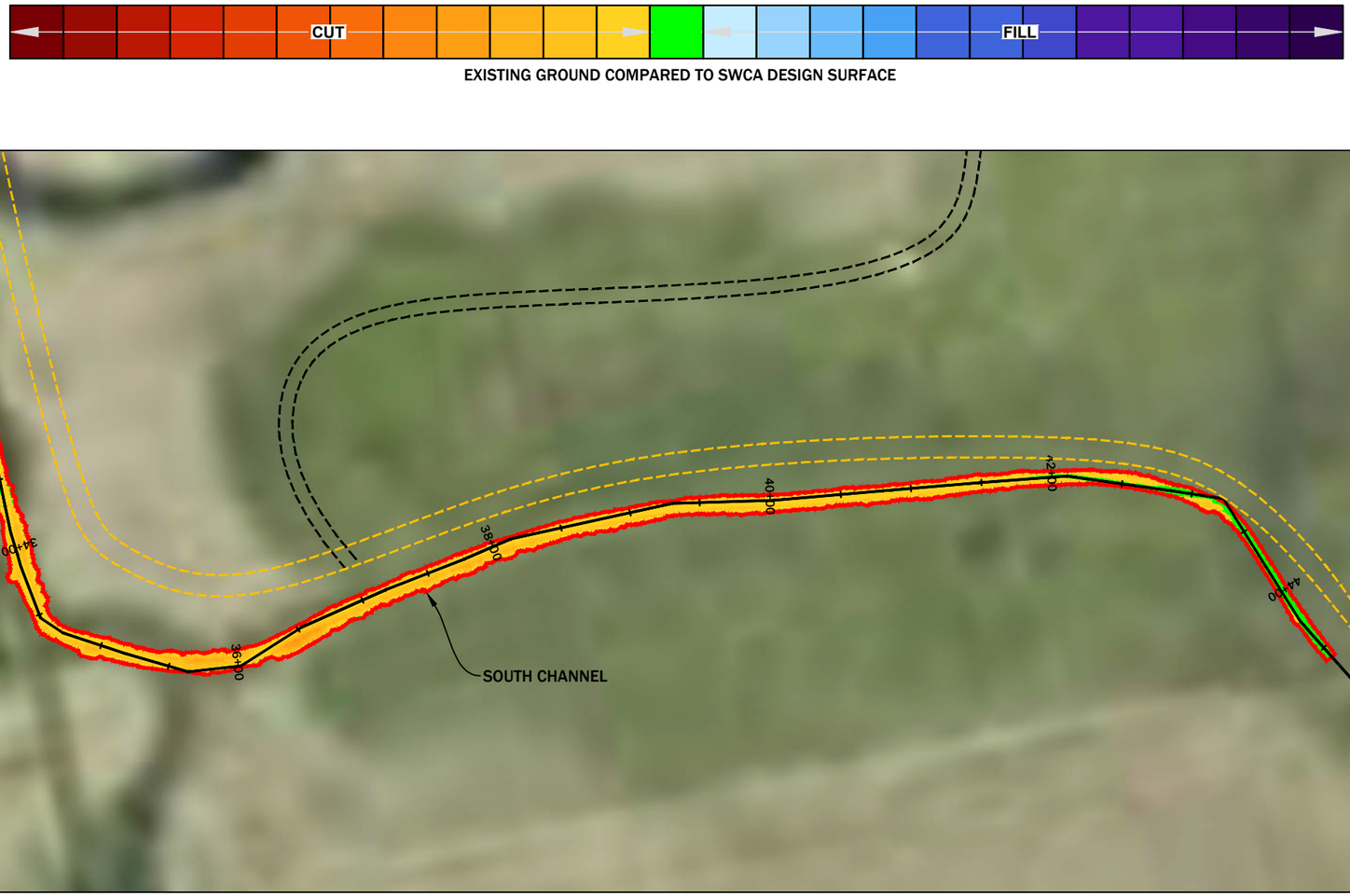
YAKAMA RESERVATION, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	10/23/26	LS	FINAL DESIGN	NW

PROJECT NUMBER
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1 SOUTH CHANNEL MICROTOPOGRAPHY
PLAN VIEW
1" = 100'

EARTHWORK VOLUMES	
AREA	CUT (CY)
SOUTH CHANNEL MICROTOPOGRAPHY (STA 32+00 TO 44+20)	620
NOTE: VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.	

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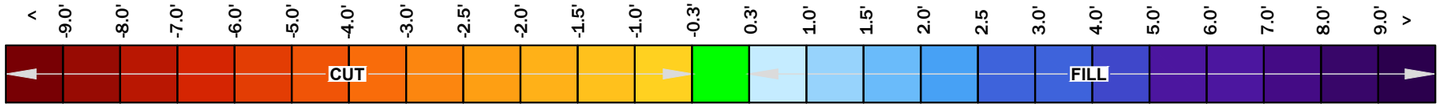
ROYAL DAM SOUTH CHANNEL MICROTOPOGRAPHY PLAN 2
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
1	10/23/26	LS	FINAL DESIGN	NW

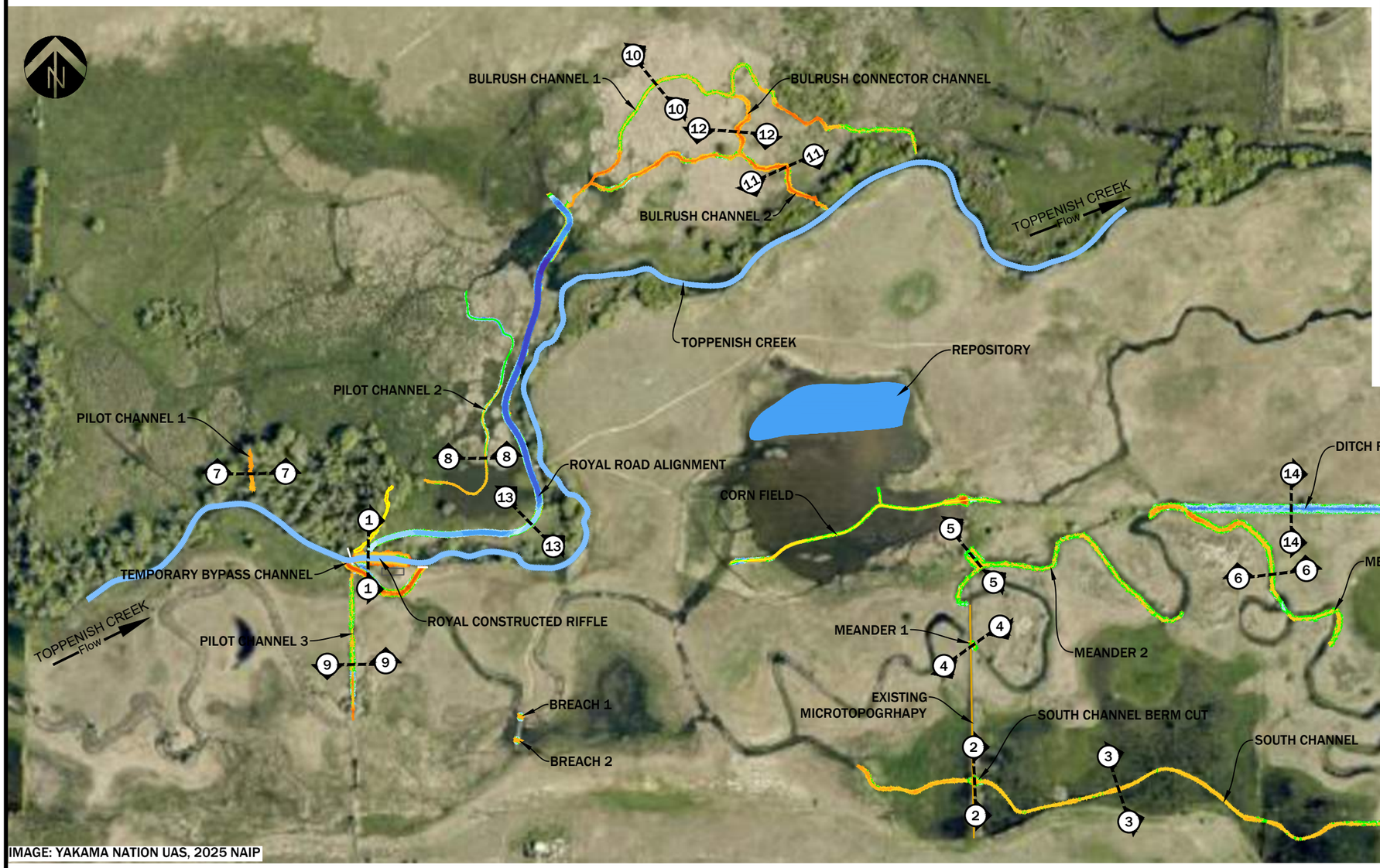
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EXISTING GROUND COMPARED TO SWCA DESIGN SURFACE



EARTHWORK VOLUMES

AREA	CUT (CY)	FILL (CY)	NET (CY)
TEMPORARY BYPASS	1,070	1,070	0
CONSTRUCTED RIFFLE	860	15	845
PILOT CHN 1	25	0	25 C
PILOT CHN 2	270	40	230 C
BULRUSH CHN 1	1,185	0	1,185 C
BULRUSH CHN 2	1,230	0	1,230 C
BULRUSH CONNECTOR	285	0	285 C
DITCH FILL MICRO	0	1,570	1,570 F
PILOT CHN 3	170	0	170 C
BREACH 1	40	0	40 C
BREACH 2	45	0	45 C
CORN FIELD	500	15	485 C
SOUTH CHANNEL	1,865	0	1,865 C
MEANDER 1	25	0	25 C
MEANDER 2	490	10	480 C
MEANDER 3	1,055	20	1,035 C
TOTAL	9,115	2,740	6,375 C

NOTE:
VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.

NOTE: OVERBURDEN MATERIAL SHALL BE PLACED WITHIN THE CORN FIELDS WHICH IS DESIGNATED AS THE REPOSITORY.

1 ROYAL DAM FLOODPLAIN MICROTOPOGRAPHY PLAN
PLAN VIEW
1" = 500'

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ROYAL DAM - OVERALL EARTHWORK QUANTITES

LOWER TOPPENISH CREEK DAM REMOVALS

YAKAMA RESERVATION, WASHINGTON

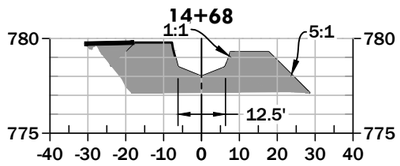
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1	10/23/26	LS	FINAL DESIGN	NW

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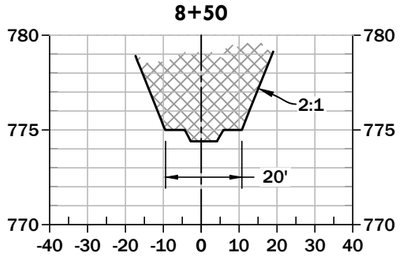
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Drawing 37 of 46

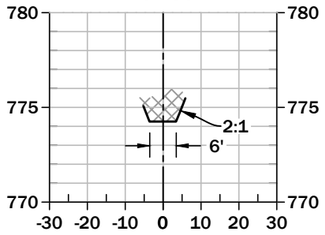
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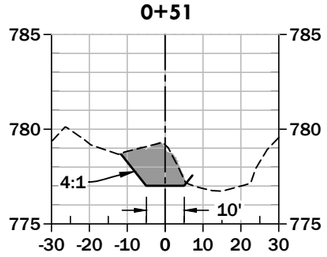
1 **TOPPENISH CREEK ROUGHENED CHANNEL**



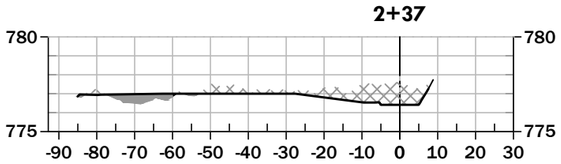
2 **SOUTH CHANNEL BERM BREACH**



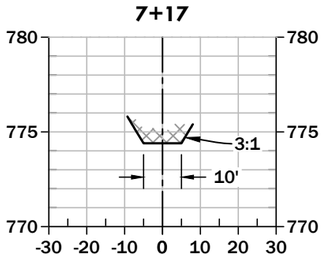
3 **SOUTH CHANNEL**



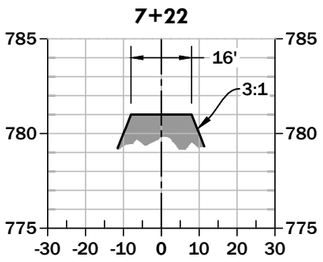
4 **SMALL MEANDER DITCH 1**



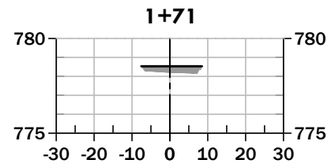
5 **SMALL MEANDER DITCH 2**



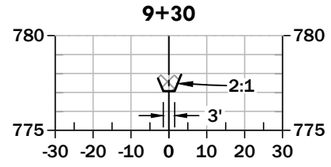
6 **SMALL MEANDER DITCH 3**



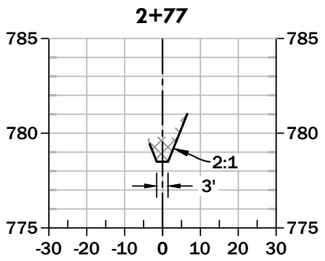
13 **ROYAL ROAD**



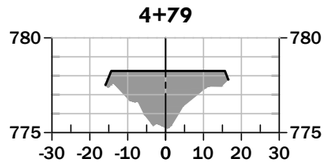
7 **PILOT CHANNEL 1**



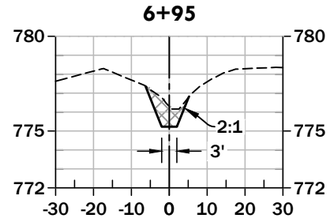
8 **PILOT CHANNEL 2**



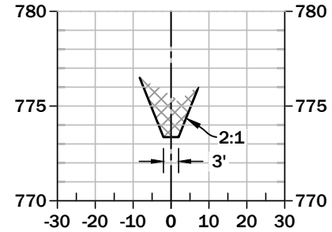
9 **PILOT CHANNEL 3**



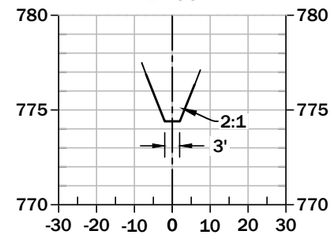
14 **MEANDER DITCH FILL**



10 **BULRUSH MAIN**



11 **BULRUSH 2**



12 **BULRUSH CONNECTOR**

DRAWING LEGEND	
SYMBOL	FEATURE
– – – – –	EXISTING GRADE
———	FINISHED GRADE
	CUT
	FILL

1 **CROSS SECTIONS**
SECTION VIEWS

H: 1" = 30' V: 1" = 10'

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ROYAL DAM CHANNEL CROSS SECTIONS

LOWER TOPPENISH CREEK DAM REMOVALS

YAKAMA RESERVATION, WASHINGTON

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PROJECT NUMBER
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Drawing 38 of 46

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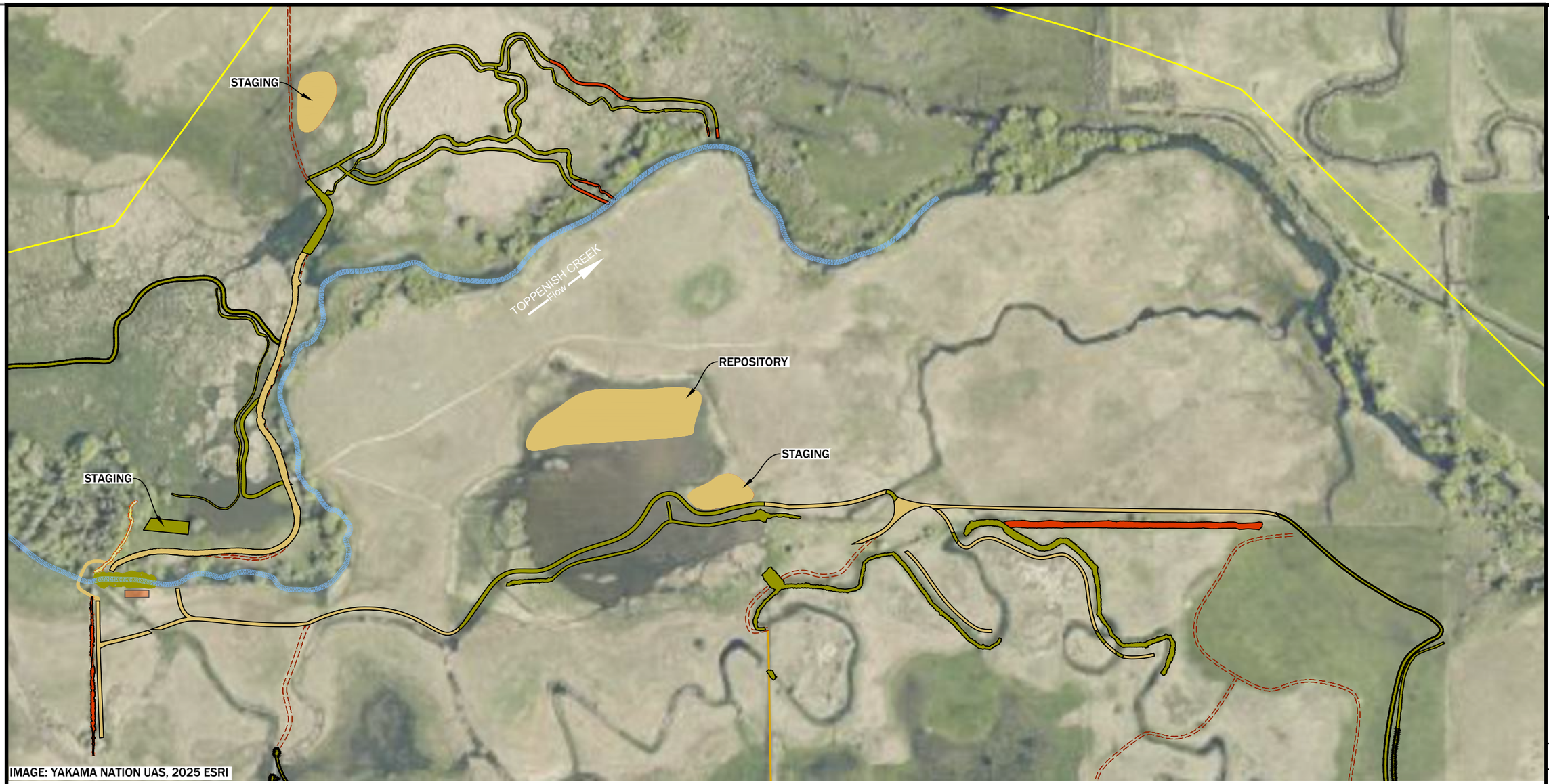


IMAGE: YAKAMA NATION UAS, 2025 ESRI

1 ROYAL DAM PLANTING AND SEEDING PLAN
PLAN VIEW

1" = 400'

PLANTING AND SEEDING LEGEND	
SYMBOL	
	FLOODPLAIN PLANTING
	UPLAND SEEDING
	FLOODPLAIN SEEDING
	NEW CONSTRUCTION ACCESS ROAD
	IMPROVED ACCESS ROAD
	STAGING AREA
	GRADING EXTENTS

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ROYAL DAM PLANTING AND SEEDING PLAN
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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ROYAL DAM PLANTING SCHEDULE						
LOCATION	SPECIES (TALL 1-GALLON CONTAINERS)		SIZE	% CANOPY COMPOSITION	SPACING (FT)	NUMBER
VEGETATED WOOD MATRIX & LARGE WOOD STRUCTURES	COYOTE WILLOW	*SALIX EXIGUA*	8-FT TALL CUTTINGS	85.0000	0.2	2,660
	PACIFIC WILLOW	*SALIX LUCIDA SPP. LASIANDRA*		15.0000	0.2	470
					TOTAL	3,130
RIPARIAN FLOODPLAIN 3.0 ACRES PLANTED WITHIN BROWSE EXCLOSURES	BLACK COTTONWOOD	*POPULUS TREMULOIDES*	4"x4"x14" tall	20.0000	10	261
	WATER BIRCH	*BETULA OCCIDENTALIS*	4"x4"x14" tall	10.0000	8	204
	BLACK HAWTHORN	*CRATAEGUS DOUGLASII*	4"x4"x14" tall	25.0000	10	327
	RED OSIER DOGWOOD	*CORNUS SERICEA*	4"x4"x14" tall	35.0000	10	457
	PACIFIC WILLOW	*SALIX LUCIDA SPP. LASIANDRA*	4"x4"x14" tall	25	6	908
					TOTAL	2,157
					TOTAL CUTTINGS	3,130
					TOTAL CONTAINERIZED PLANTS	2,157

ROYAL DAM SEEDING SCHEDULE				
LOCATION	SPECIES		*PLS/ACRE*	TOTAL PLS LBS
FLOODPLAIN 8.97 ACRES	BLUE WILDRYE	*ELYMUS GLAUCUS*	*13.79*	123.72
	THICKSPIKE WHEATGRASS	*ELYMUS MACROURUS*	*19.86*	178.16
	BLUEJOINT REEDGRASS	*CALAMAGROSTIS CANADENSIS*	*1.24*	11.14
	ANALOGUE SEDGE	*CAREX SIMULATA*	*2.21*	19.80
			TOTAL	332.82
UPLAND STAGING AREAS AND HAUL ROUTES: RECLAMATION MIX 4.79 ACRES	IDAHO FESCUE	*FESTUCA IDAHOENSIS*	*1.24*	27.87
	BLUEBUNCH WHEATGRASS	*PSEUDOROEGNERIA SPICATA*	*13.09*	62.71
	INDIAN RICEGRASS	*ACHNATHERUM HYMENOIDES*	*9.09*	43.55
	BLUE WILDRYE	*ELYMUS GLAUCUS*	*17.82*	85.35
			TOTAL	219.47

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ROYAL DAM PLANTING AND SEEDING SCHEDULE

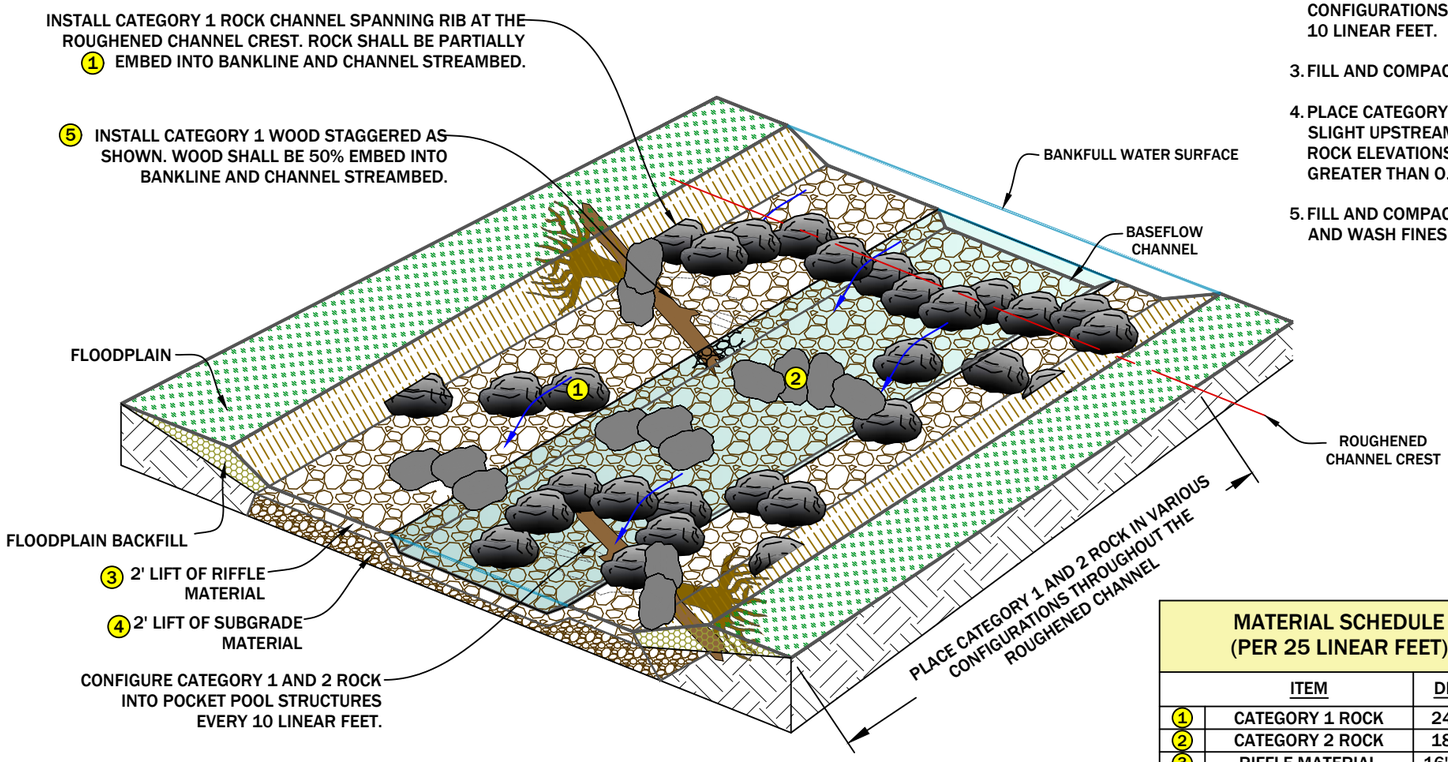
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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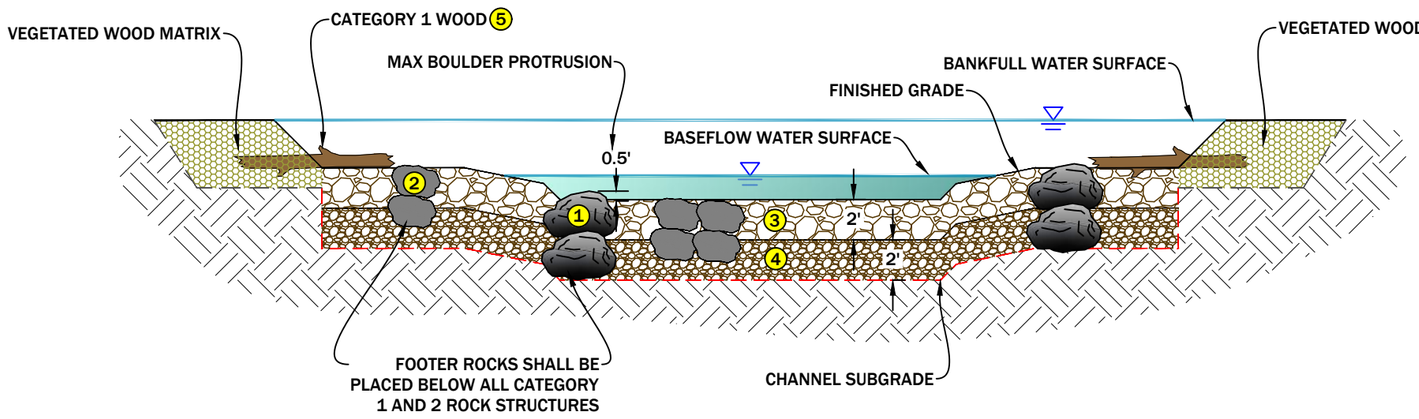
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1 TYPICAL ROUGHENED CHANNEL DETAIL
3D VIEW
NTS



2 TYPICAL ROUGHENED CHANNEL DETAIL
SECTION VIEW
NTS

NOTES ON ROUGHENED CHANNEL INSTALLATION

1. PRIOR TO CONSTRUCTION OF THE ROUGHENED CHANNEL, THE ENGINEER SHALL VERIFY CHANNEL SUBGRADE ELEVATIONS. CHANNEL SUBGRADE ELEVATIONS WILL BE SET AT A MINIMUM OF 4' BELOW FINISHED GRADE TO ALLOW FOR A 2-FOOT LIFT OF SUBGRADE MATERIAL AND A 2-FOOT LIFT OF RIFFLE MATERIAL.
2. PREPARE THE FRAMEWORK. A CHANNEL SPANNING RIB OF CATEGORY 1 ROCK FOOTERS SHALL BE PLACED AT THE ROUGHENED CHANNEL CREST LOCATION ON THE SUBGRADE SURFACE. CONTRACTOR SHALL PLACE CATEGORY 1 AND 2 FOOTER ROCKS ON THE SURFACE OF THE CHANNEL SUBGRADE IN VARIOUS CONFIGURATIONS THROUGHOUT THE ROUGHENED CHANNEL WITH A POCKET POOL STRUCTURE PLACED EVERY 10 LINEAR FEET.
3. FILL AND COMPACT A 2-FOOT LIFT OF SUBGRADE MATERIAL AND WASH FINES INTO MATERIAL.
4. PLACE CATEGORY 1 AND 2 CAP ROCKS ABOVE THE FOOTER ROCKS. CAP ROCK SHALL BE PLACED WITH A SLIGHT UPSTREAM OFFSET FROM THE FOOTER ROCKS. DUE TO THE INHERENT VARIABILITY IN MATERIALS, CAP ROCK ELEVATIONS SHALL BE ADJUSTED TO ASSURE BOULDER PROTRUSION ABOVE FINISH GRADE WILL BE NO GREATER THAN 0.5-FT.
5. FILL AND COMPACT A 2-FOOT LIFT OF RIFFLE MATERIAL TO THE HEIGHT OF THE FINISHED GRADE ELEVATION AND WASH FINES INTO STREAMBED.

RIFFLE MATERIAL GRADATION	
SIZE	PERCENT PASSING
16"	95
14"	80-95
10"	50-80
6"	30-50
4"	15-30
FINES	15

MATERIAL SCHEDULE (PER 25 LINEAR FEET)			PRIMARY ROUGHENED CHANNEL	SECONDARY ROUGHENED CHANNEL
	ITEM	DIA. (IN)	QUANTITY	QUANTITY
1	CATEGORY 1 ROCK	24" - 36"	32 EA	8 EA
2	CATEGORY 2 ROCK	18" - 24"	32 EA	8 EA
3	RIFFLE MATERIAL	16" MINUS	40 CY	16.5 CY
4	SUBGRADE MATERIAL	PIT RUN	40 CY	16.5 CY
5	CATEGORY 1 WOOD	18" - 24"	2 EA	2 EA

PIT RUN GRADATION	
SIZE	PERCENT PASSING
4"	95
3"	80-95
2"	50-80
1"	30-50
NO. 4 SIEVE	15-30
NO. 200 SIEVE	15



EXAMPLE PHOTO OF ROUGHENED CHANNEL AFTER CONSTRUCTION

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ROUGHENED CHANNEL DETAIL

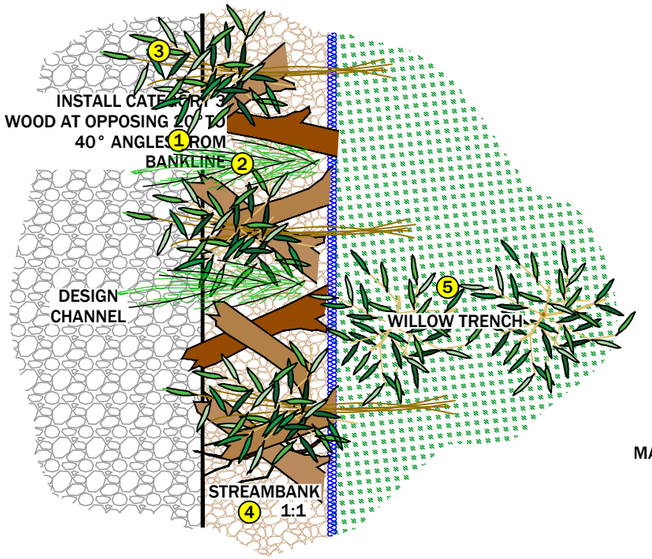
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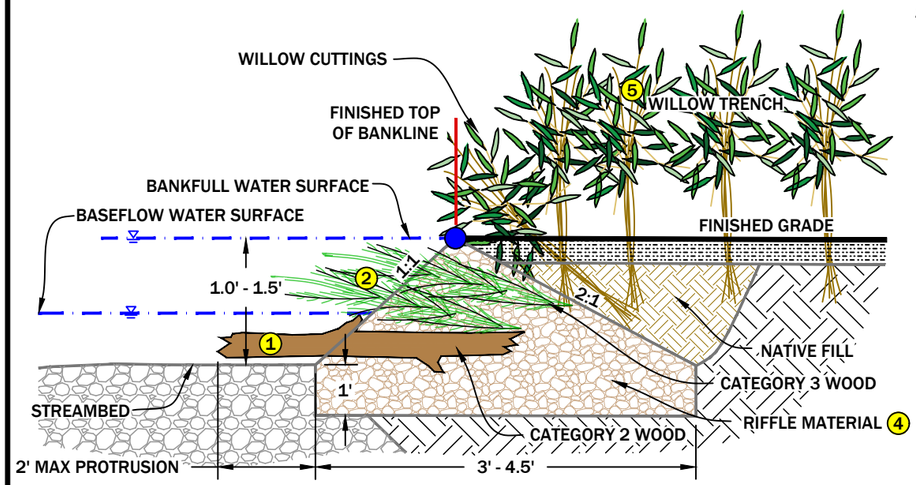
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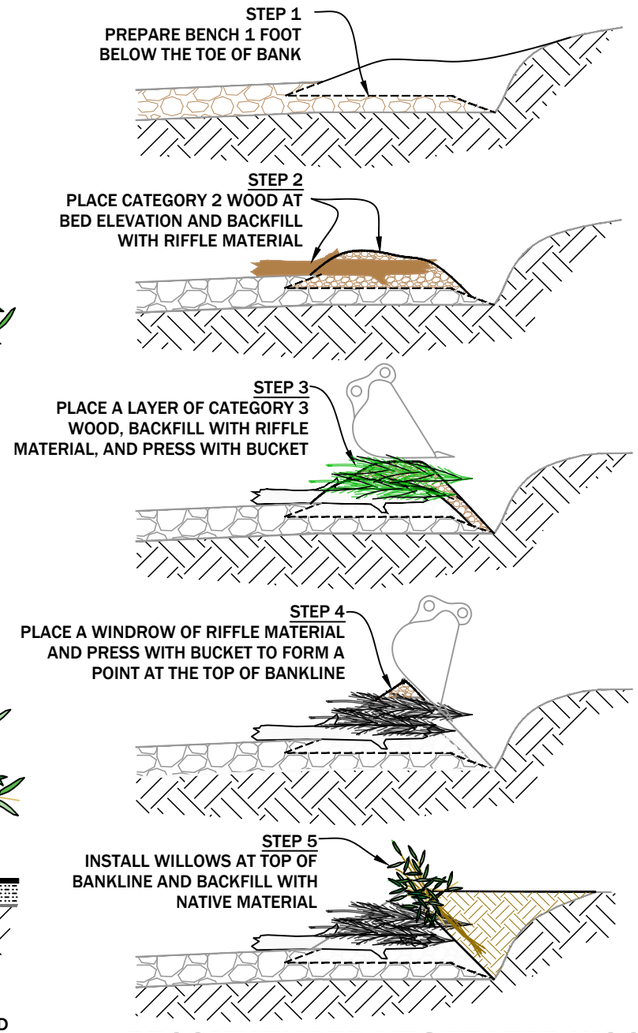
1 VEGETATED WOOD MATRIX PLAN VIEW

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2 VEGETATED WOOD MATRIX SECTION VIEW

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3 RECOMMENDED VEGETATED WOOD MATRIX INSTALLATION SEQUENCE SECTION VIEW

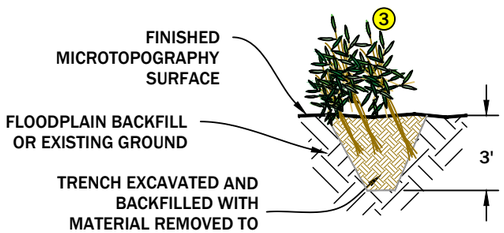
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GENERAL NOTES

1. CONSTRUCTION OF THE VEGETATED WOOD MATRIX WILL OCCUR AFTER INSTALLATION OF THE ROUGHENED CHANNEL.
2. IF VEGETATED WOOD MATRIX STRUCTURES ARE INSTALLED PRIOR TO OCTOBER 1, LEAVE BACK TRENCH UNFILLED AND COMPLETE STRUCTURE WHEN DORMANT WILLOWS ARE AVAILABLE.
3. IT IS CONTRACTOR'S RESPONSIBILITY TO CUT WOOD INTO APPROPRIATE SIZE LENGTHS TO FIT STRUCTURE DIMENSIONS.
4. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED BY THE ENGINEER.
5. CONTRACTOR SHALL MARK AND ENGINEER SHALL APPROVE THE GENERAL LOCATION FOR EACH VEGETATED WOOD MATRIX STRUCTURE PRIOR TO CONSTRUCTION.

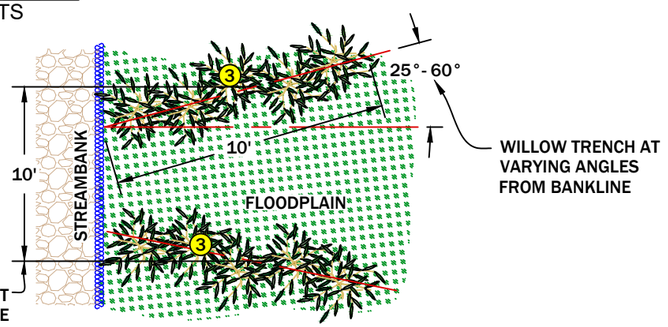
NOTES ON VEGETATED WOOD MATRIX INSTALLATION

1. EXCAVATE TO THE EXCAVATION LIMITS AS SHOWN. EXCAVATED MATERIAL SHALL BE STOCKPILED ON THE FLOODPLAIN OUTSIDE OF THE IMMEDIATE WORK AREA.
2. PREPARE THE BENCH OF THE STRUCTURE BY PLACING RIFFLE MATERIAL MINIMUM 1 FOOT BELOW THE TOE OF BANK.
3. CATEGORY 3 AND CATEGORY 4 WOOD, AND RIFFLE MATERIAL SHALL BE PLACED IN ALTERNATING LIFTS AND BUCKET COMPACTED UP TO THE TOP OF BANK ELEVATION AS SHOWN IN THE INSTALLATION SEQUENCE. PLACE 6 FT TO 8 FT. DORMANT WILLOW CUTTINGS AT A DENSITY OF 5 PER LINEAR FT ALONG THE TOP OF BANK LINE ELEVATION. WILLOW CUTTINGS SHALL SLOPE AT AN APPROXIMATE 2:1 SLOPE AS SHOWN IN SECTION VIEW. STEMS MAY OVERLAP. THE CUT ENDS SHALL BE PLACED AT THE BASE OF THE SLOPES WITH THE UN-CUT ENDS EXTENDING BEYOND THE EDGE OF THE TRENCH SO NO GREATER THAN ONE-THIRD OF THE TOTAL CUTTING LENGTH IS EXPOSED BEYOND THE TOP OF BANKLINE. WILLOW CUTTINGS SHOULD INTERCEPT THE DESIGN TOP OF BANKLINE AS SHOWN IN STEP 5 OF THE INSTALLATION SEQUENCE.
4. THE UPSTREAM AND DOWNSTREAM ENDS OF THE STRUCTURE SHALL TRANSITION SMOOTHLY INTO ADJACENT STREAMBANK STRUCTURES TO MINIMIZE EROSION, FLANKING, AND BANK FAILURE.
5. AFTER INSTALLATION OF THE VEGETATED WOOD MATRIX, BACKFILL THE STRUCTURE WITH STOCKPILED MATERIAL TO FINISHED GRADE, AND BUCKET COMPACT. INSTALL WILLOW TRENCHES AT A RATE OF 5 PER LINEAR FOOT (OR 50 PER TRENCH) AS SHOWN. NO AREAS BEHIND THE FINISHED BANKLINE ARE TO BE LEFT BELOW FINISHED GRADE.



4 WILLOW TRENCH SECTION VIEW

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5 WILLOW TRENCH PLAN VIEW

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STREAM BANK MATERIAL GRADATION	
SIZE	PERCENT PASSING
10"	95
6"	80-95
3"	50-80
1.5"	30-50
NO. 4 SIEVE	15-30
NO. 200 SIEVE	15

VEGETATED WOOD MATRIX MATERIAL SCHEDULE (PER LINEAR FOOT)			
	ITEM	DIA. (IN)	QTY.
1	CATEGORY 3 WOOD	3" - 10"	1 EA
2	CATEGORY 4 WOOD	1" - 3"	2 EA
3	WILLOW CUTTINGS	0.25"-1.0"	5 EA
4	STREAMBANK MATERIAL	10" MINUS	0.23 CY

WILLOW TRENCH MATERIAL SCHEDULE (PER LINEAL FOOT)			
	ITEM	DIA.	QUANTITY (EA)
5	WILLOW CUTTINGS	0.25" - 1.0"	2

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VEGETATED WOOD MATRIX DETAIL

LOWER TOPPENISH CREEK DAM REMOVALS

YAKAMA RESERVATION, WASHINGTON

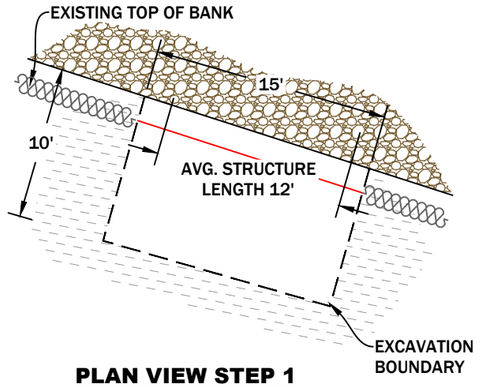
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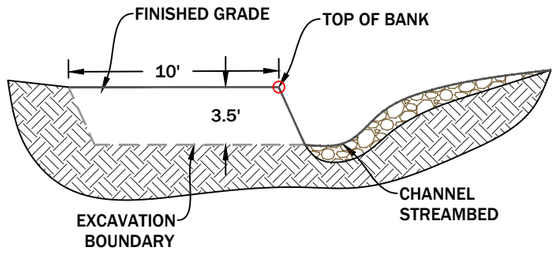
DRAWING NUMBER 7.1

Drawing 42 of 46

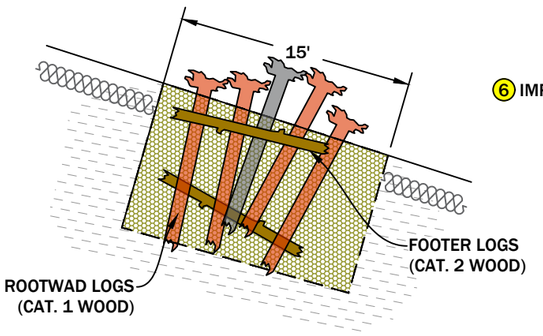
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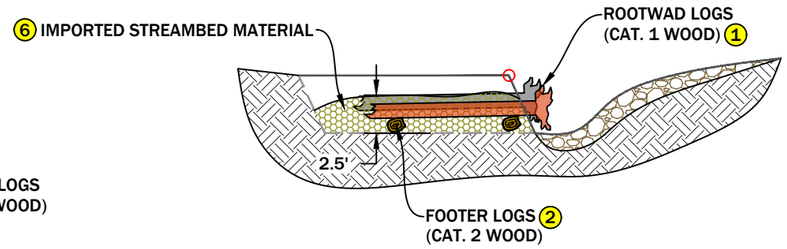
PLAN VIEW STEP 1



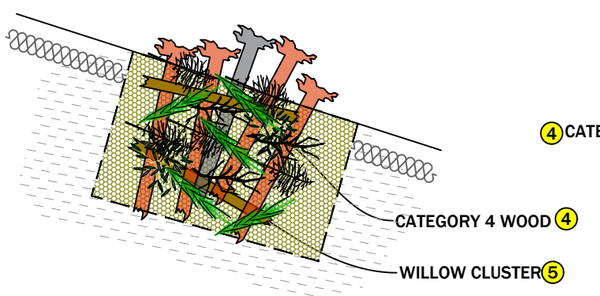
SECTION VIEW STEP 1



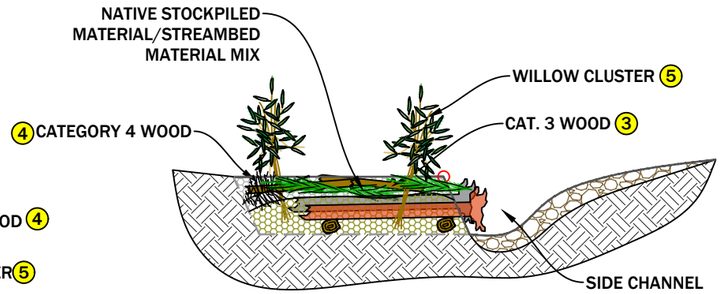
PLAN VIEW STEP 2-4



SECTION VIEW STEP 2-4



PLAN VIEW STEP 5-6



SECTION VIEW STEP 5-6

GENERAL NOTES

1. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED THE ENGINEER.
2. FIELD ENGINEER SHALL MARK THE GENERAL CONSTRUCTION LOCATION FOR EACH TYPE 1 LARGE WOOD STRUCTURE PRIOR TO CONSTRUCTION.

CONSTRUCTION NOTES

1. ISOLATE AND DEWATER
   CONTRACTOR SHALL ISOLATE AND DEWATER THE WORK AREA AS NECESSARY TO INSTALL EACH TYPE 2 LARGE WOOD STRUCTURE USING TEMPORARY SHEET PILES. DEWATERING METHODS AND REQUIREMENTS ARE PROVIDED ON SHEETS 3.3 AND 5.3.
2. EXCAVATE TRENCH
   EXCAVATE TO THE SPECIFIED SUBGRADE. STOCKPILE EXCAVATED MATERIAL ON THE FLOODPLAIN OUTSIDE THE IMMEDIATE WORK AREA FOR REUSE DURING BACKFILLING.
3. INSTALL LOWER FOOTER LOGS
   INSTALL TWO CATEGORY 2 FOOTER LOGS AT THE BASE OF THE EXCAVATED TRENCH, ORIENTED AS SHOWN IN PLAN VIEW. FOOTER LOGS SHALL NOT EXTEND BEYOND THE FINISHED BANK LINE. BREAK OR ROUGHEN EXPOSED LOG ENDS TO CREATE A NATURAL APPEARANCE. SAW-CUT ENDS SHALL NOT REMAIN EXPOSED.
4. INSTALL ROOTWAD LOGS
   INSTALL FIVE CATEGORY 1 ROOTWAD LOGS, INTERSECTING THE FOOTER LOGS AND ORIENTED AS SHOWN IN PLAN VIEW. THE UPSTREAM ROOTWAD SHALL TERMINATE FLUSH WITH THE FINISHED BANK LINE AND SHALL NOT PROJECT INTO THE CHANNEL. THE DOWNSTREAM ROOTWAD SHALL EXTEND NO MORE THAN 1 FOOT BEYOND THE FINISHED BANK LINE.
5. INSTALL SMALL WOOD, BRUSH, AND WILLOW CUTTINGS
   INTERWEAVE CATEGORY 2, CATEGORY 3, AND CATEGORY 4 WOOD, THROUGHOUT THE WOOD MATRIX. INSTALL TWO WILLOW BUNDLES IN BETWEEN WOOD WITH THE TIPS OF THE WILLOWS A MINIMUM OF 2 FT BELOW TOP OF BANK. CONTINUE LAYERING WOOD UNTIL YOU REACH TOP OF BANK ELEVATION. SMALL WOOD SHALL EXTEND NO MORE THAN 2 FEET BEYOND THE FINISHED BANK LINE.
6. COMPLETE BACKFILL AND FINAL GRADING
   BACKFILL THE REMAINING WOOD MATRIX WITH STREAMBED FILL AND STOCKPILED NATIVE MATERIAL TO ACHIEVE FINISHED GRADE.

TYPE 1 LARGE WOOD STRUCTURE MATERIAL SCHEDULE (PER STRUCTURE)

	ITEM	DIA. (IN)	LENGTH (FT)	ROOTWAD (Y/N)	QTY.
1	CATEGORY 1 WOOD	18" - 24"	20	YES - 24 IN DIA. MIN	5 EA
2	CATEGORY 2 WOOD	14" - 16"	15	NO	2 EA
3	CATEGORY 3 WOOD	3" - 10"	10-15	NO	10 EA
4	CATEGORY 4 WOOD	1" - 3"	10-15	NO	20 EA
5	WILLOW CUTTINGS	0.25" - 1"	6-8	NO	100 EA
6	STREAMBANK MATERIAL	10" MINUS	-	-	0.5 CY

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TYPE 1 LARGE WOOD STRUCTURE DETAIL

LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

NO.	DATE	BY	DESCRIPTION	CHK
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PROJECT NUMBER
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7.2

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CONSTRUCTION NOTES

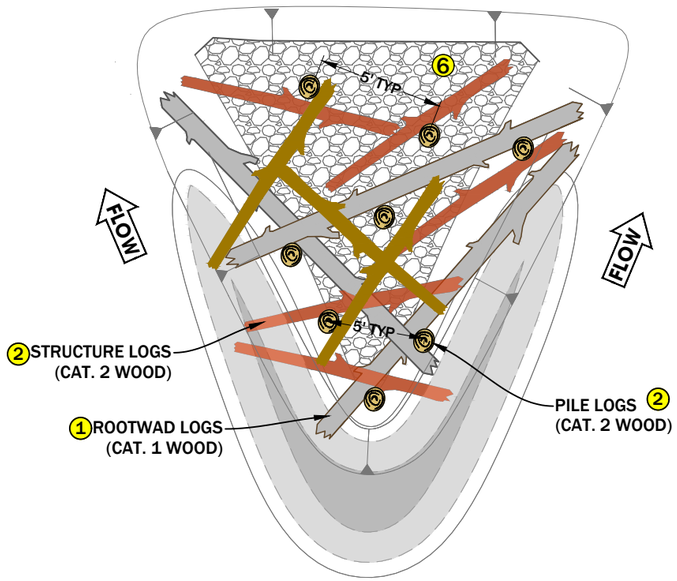
1. ISOLATE AND DEWATER
   CONTRACTOR SHALL ISOLATE AND DEWATER THE WORK AREA AS NECESSARY TO INSTALL EACH TYPE 2 LARGE WOOD STRUCTURE USING TEMPORARY SHEET PILES. DEWATERING METHODS AND REQUIREMENTS ARE PROVIDED ON SHEETS 3.3 AND 5.3.
2. EXCAVATE TO SUBGRADE
   EXCAVATE DOWN TO ONE FOOT ABOVE EXISTING WATER SURFACE, APPROXIMATELY THREE FEET BELOW EXISTING GROUND ELEVATION.
3. INSTALL VERTICAL PILES
   INSTALL TEN CATEGORY 2 WOOD PILES VERTICALLY USING A VIBRATORY PILE DRIVING EQUIPMENT, FOLLOWING THE PILE LAYOUT SHOWN IN PLAN VIEW. PILES SHALL EXTEND A MINIMUM OF 5 FOOT ABOVE SUBGRADE AND PENETRATE A MINIMUM OF 10 FEET BELOW EXISTING GROUND. SEE SHEET 7.5 FOR PILE INSTALLATION DETAILS.
4. INSTALL TIER OF HORIZONTAL LOGS
   PLACE CATEGORY 1 AND CATEGORY 2 LOGS HORIZONTALLY AGAINST THE VERTICAL PILES, FOLLOWING THE LAYOUT SHOWN IN PLAN VIEW. ROUGHEN EXPOSED LOG ENDS TO PROVIDE A NATURAL APPEARANCE. SAW-CUT ENDS SHALL NOT REMAIN EXPOSED.
5. FASTEN HORIZONTAL LOGS, INSTALL WILLOWS, AND PARTIALLY BACKFILL
   SECURE THE HORIZONTAL LOGS TO THE VERTICAL PILES USING 1-INCH-DIAMETER ALL-THREAD RODS (REFER TO SHEET 7.5). INSTALL TWO BUNDLES OF WILLOWS (50/BUNDLE) INBETWEEN RACKED WOOD REACHING A DEPTH OF 3 FEET. PARTIALLY BACKFILL TO APPROXIMATELY ONE-HALF OF THE FINISHED GROUND ELEVATION. WASH FINES AND WATER INTO THE FILL TO SEAL VOIDS WITHIN THE WOOD STRUCTURE.
6. INSTALL SMALL WOOD AND BRUSH
   RACK SMALL LOGS, BRUSH, AND WILLOW BUNCHES BETWEEN THE LARGE HORIZONTAL LOGS TO FILL VOIDS WITHIN THE WOOD STRUCTURE. RACKED WOOD AND LOGS MAY EXTEND UP TO 2 FEET ABOVE THE BANKFULL ELEVATION.
7. EXCAVATE UPSTREAM POOL
   EXCAVATE A SMALL POOL AT THE UPSTREAM END OF THE STRUCTURE AS SHOWN IN THE DETAIL.
8. COMPLETE BACKFILL AND COMPACTION
   PLACE THE NATIVE BACKFILL TO ACHIEVE THE FINISHED GROUND ELEVATION. WASH FINES AND WATER INTO THE FILL TO SEAL VOIDS WITHIN THE WOOD STRUCTURE. COMPACT THE BACKFILL USING THE EQUIPMENT BUCKET.

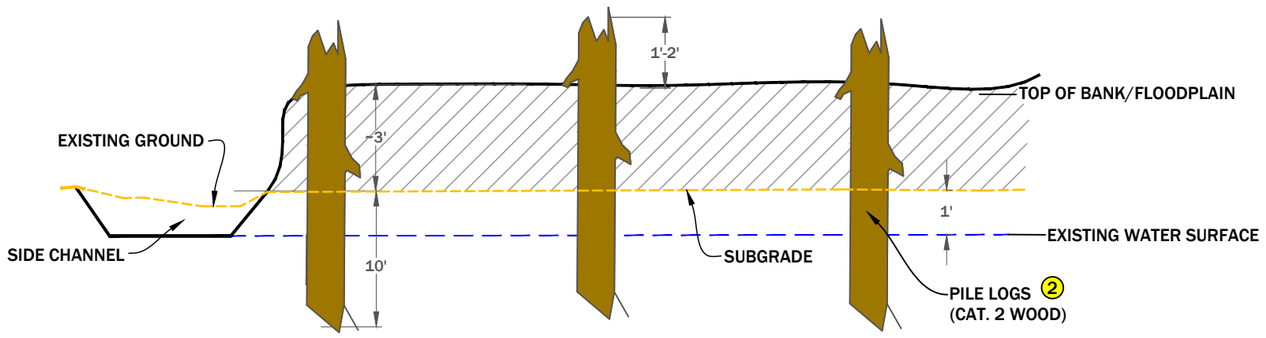
TYPE 2 LARGE WOOD STRUCTURE MATERIAL SCHEDULE (PER STRUCTURE)

	ITEM	DIA. (IN)	LENGTH (FT)	ROOTWAD (Y/N)	QTY.
1	CATEGORY 1 WOOD	18" - 24"	20	YES - 24 IN DIA. MIN	6 EA
2	CATEGORY 2 WOOD	14"-16"	15	NO	14 EA
3	CATEGORY 3 WOOD	3" - 10"	10-15	NO	10 EA
4	CATEGORY 4 WOOD	1" - 3"	10-15	NO	20 EA
5	WILLOW CUTTINGS	0.25" - 1"	6-8	NO	100 EA
6	STREAMBANK MATERIAL	10" MINUS	-	-	0.75 CY
7	ALL THREAD ROD	1"	VARIES	-	70 LF

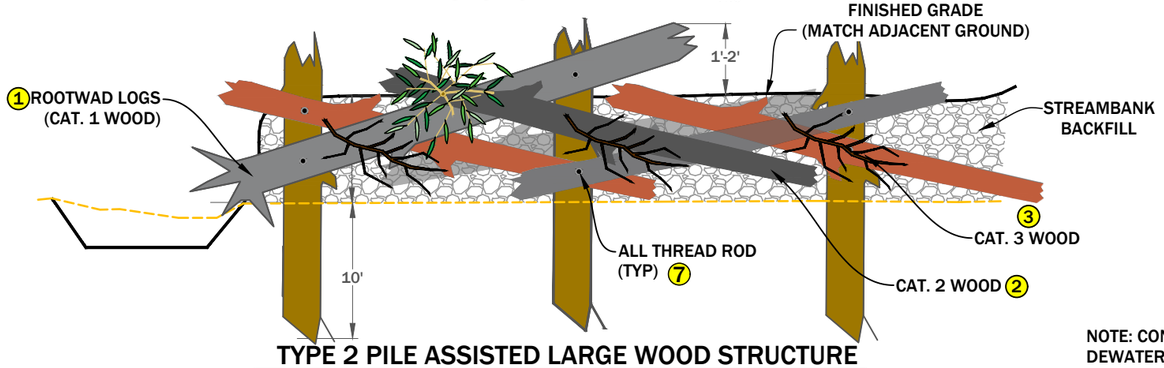
STREAM BANK MATERIAL GRADATION

SIZE	PERCENT PASSING
10"	95
6"	80-95
3"	50-80
1.5"	30-50
NO. 4 SIEVE	15-30
NO. 200 SIEVE	15



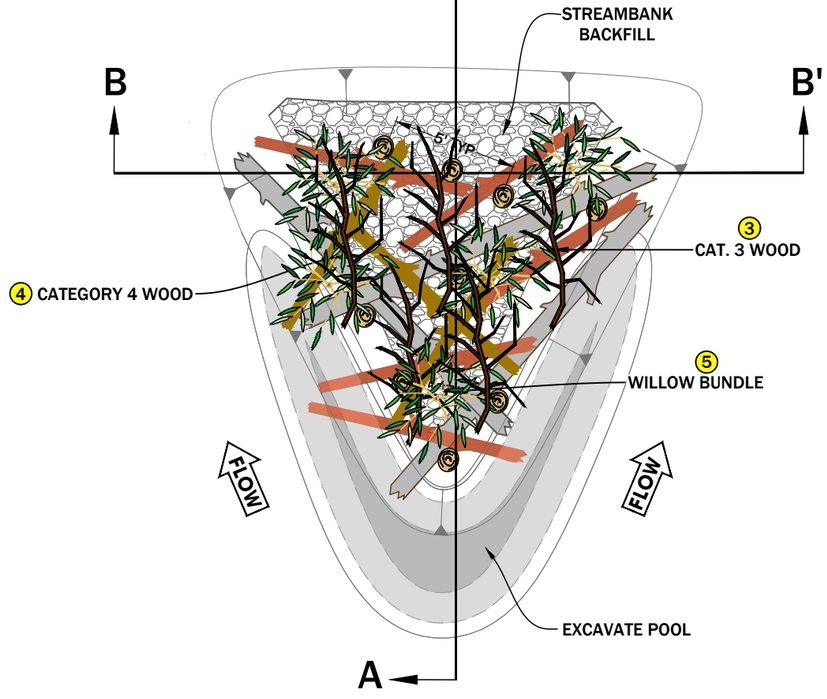


TYPE 2 PILE ASSISTED LARGE WOOD STRUCTURE
A - A' SECTION VIEW NTS



TYPE 2 PILE ASSISTED LARGE WOOD STRUCTURE
B - B' SECTION VIEW NTS

NOTE: CONTRACTOR SHALL ISOLATE AND DEWATER WORK AREA PRIOR TO EACH LARGE WOOD STRUCTURE INSTALLATION.



TYPE 2 LARGE WOOD RACKING
PLAN VIEW NTS

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TYPE 2 LARGE WOOD STRUCTURE DETAIL

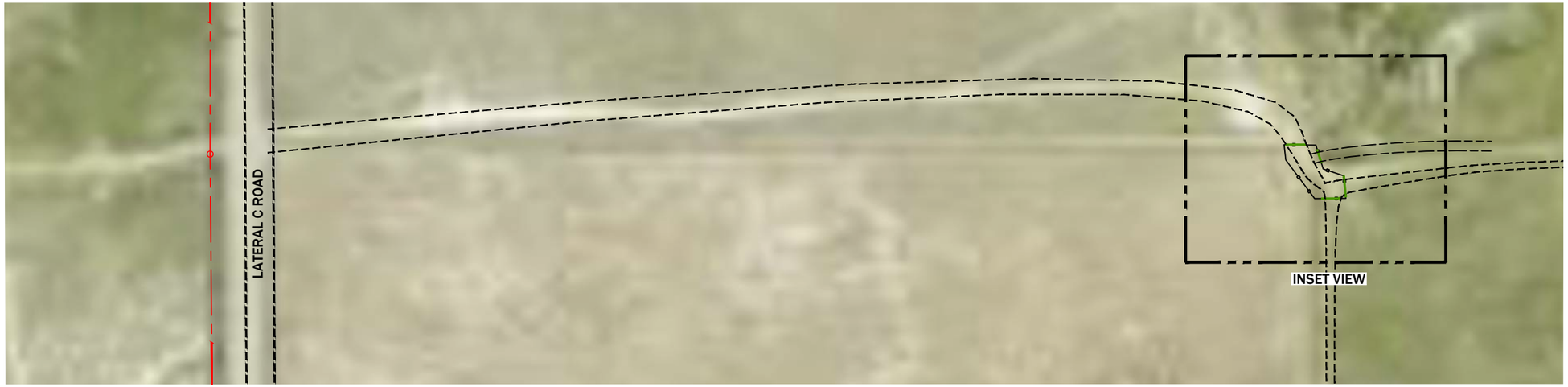
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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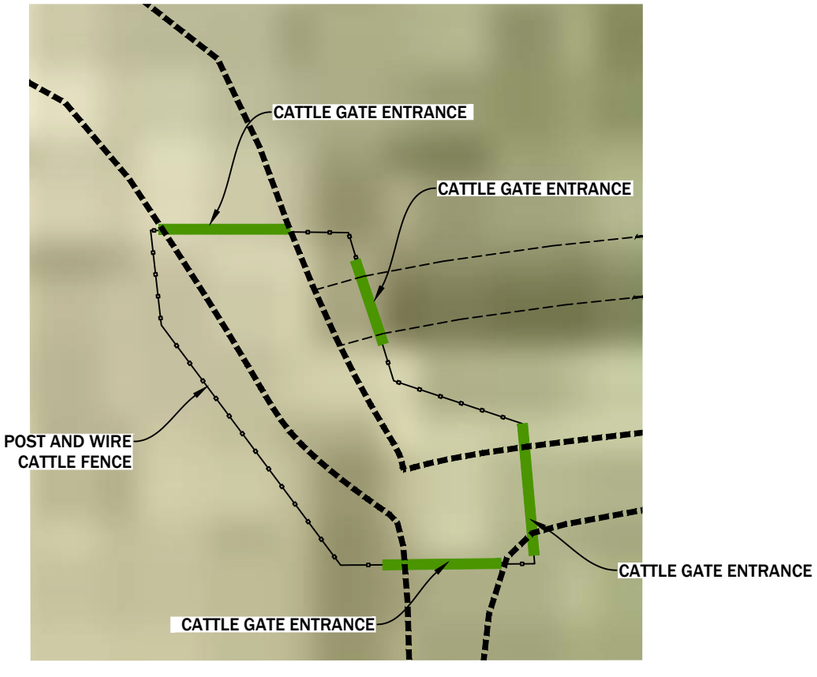
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1 **CATTLE FENCE PLAN**
SITE PLAN
1"=150'



2 **CATTLE FENCE AND GATE PLAN**
INSET VIEW
1"=30'



EXAMPLE POST AND WIRE FENCE WITH CATTLE GATE

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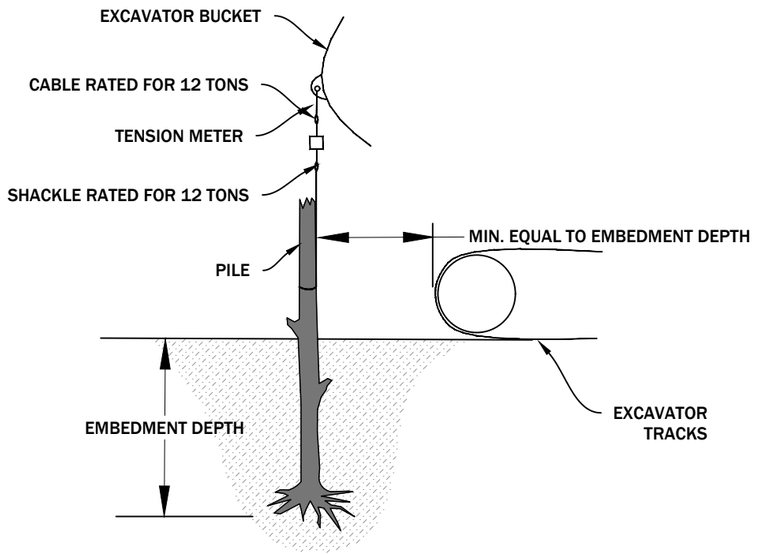
CATTLE FENCE AND GATE PLAN
LOWER TOPPENISH CREEK DAM REMOVALS
YAKAMA RESERVATION, WASHINGTON

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1 VERTICAL LOG (PILE) TESTING
SECTION VIEW

NTS

NOTES:

VERTICAL LOGS

ALL VERTICAL LOGS SHALL BE INSTALLED USING VIBRATORY PILE DRIVING EQUIPMENT. INSTALLATION BY EXCAVATION, HAMMERING, OR VIBRATORY PLATE COMPACTOR SHALL NOT BE ALLOWED.

RIGGING

RIGGING FOR VERTICAL LOG TESTING SHALL CONFORM TO THE TENSION SCALE MANUFACTURER'S RECOMMENDATIONS.

CHOKERS, CABLES AND SHACKLES SHALL HAVE MINIMUM WORKING LOAD RATING OF 12 TONS. FITTINGS SHALL BE SIZED ACCORDINGLY.

TESTING

TESTING OF VERTICAL LOGS SHALL BE PERFORMED IN THE PRESENCE OF THE OWNER'S REPRESENTATIVE.

EACH VERTICAL LOG TEST SHALL HAVE UPWARD LOAD GRADUALLY INCREASED AND AS CLOSELY ALIGNED TO AXIS OF VERTICAL LOG AS POSSIBLE. RECORD THE VERTICAL LOG DIAMETER, EMBEDMENT DEPTH AND MAXIMUM FORCE REQUIRED TO MOVE THE VERTICAL LOG. UP TO A TOTAL OF THREE LOADINGS MAY BE REQUIRED AT EACH EMBEDMENT DEPTH.

EXCAVATOR CONDUCTING PULL OUT LOADING SHALL BE POSITIONED NO CLOSER THAN EMBEDMENT DEPTH OF VERTICAL LOG IF POSSIBLE. IF A CLOSER POSITIONING IS REQUIRED, EXCAVATOR SHALL BE NO CLOSER THAN THAT REQUIRED TO GENERATE DESIRED LOADING WITH DISTANCE FROM VERTICAL LOG NOTED IN THE TEST RECORD. EQUIPMENT GROUND PRESSURE MAY BE REDUCED BY POSITIONING THE EXCAVATOR ACROSS HORIZONTAL LOGS, WITH DISTANCE FROM VERTICAL LOG, LOG NUMBERS AND LENGTH NOTED IN THE TEST RECORD.

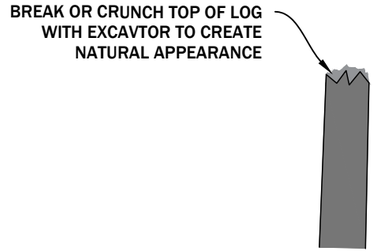
PULL OUT RESISTANCE READING SHALL BE COMPARED AGAINST EXCAVATOR MAX LIFT OFFSET TABLE.

10% OF PRODUCTION VERTICAL LOGS SHALL BE PROOF TESTED TO REQUIRED LOAD. IF RESULTS VARY MORE THAN 50% THEN IT SHOULD BE ANTICIPATED THAT UP TO 25% OF THE PRODUCTION VERTICAL LOGS SHALL BE PROOF TESTED. IF THE VERTICAL LOG EMBEDMENT DEPTH DOES NOT MEET MINIMUM, OWNER'S REPRESENTATIVE MAY REQUEST ADDITIONAL PULLOUT TESTING.

CONSTRUCTED DRIVEN VERTICAL LOG EMBEDMENT DEPTH SPECIFIED IN THE DRAWINGS MAY BE REDUCED OR INCREASED, PENDING PULL OUT TEST RESULTS, AT NO ADDITIONAL COST.

VIBRATORY DRIVEN VERTICAL LOGS SHALL INCLUDE REPOSITIONING AND MODIFICATIONS OF LOG TIP AS NEEDED FOR DRIVING AS INCIDENTAL TO THE LARGE WOOD STRUCTURE.

IN THE EVENT THAT 20 MINUTES OF FULL FORCE VIBRATORY DRIVING EFFORT FAILS TO EMBED LOGS TO A SUFFICIENT DEPTH TO PROVIDE 10,000 LB OF RESISTANCE TO PULLOUT, ENGINEER SHALL DETERMINE IF VERTICAL LOGS SHALL BE REPLACED OR ADDITIONAL PILES SHALL BE DRIVEN TO COMPENSATE FOR LACK OF PILE STABILITY.

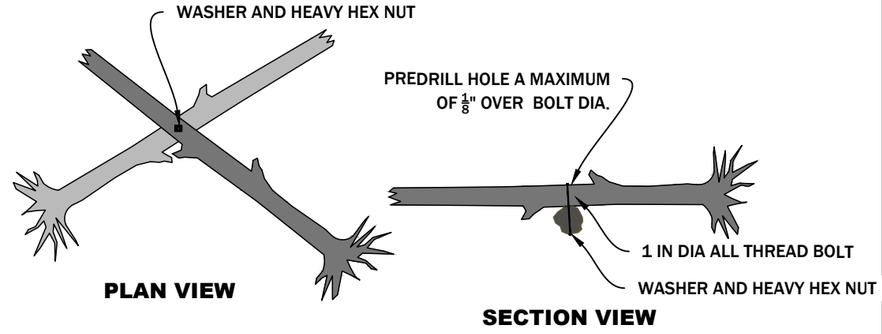


2 PILE END ROUGHENING
SECTION VIEW

NTS

NOTES:

1. VISIBLE ENDS OF VERTICAL LOGS SHALL BE ROUGHENED WITH A CHAINSAW, STUMP-GRINDER, OR OTHER SIMILAR METHOD PROVIDED THAT THE ROUGHENING DOES NOT COMPROMISE THE STRUCTURAL INTEGRITY OF THE LOG.
2. UNDER NO CIRCUMSTANCES MAY THE CONTRACTOR ATTEMPT TO BREAK THE TOPS OFF OF INSTALLED VERTICAL LOGS.
3. ANY VERTICAL LOGS DAMAGED OR BROKEN AT DURING ROUGHENING SHALL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.



3 ALL THREAD BOLTED CONNECTION
SECTION VIEW

NTS

NOTES:

1. BOLTS, WASHERS, AND NUTS SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS. 2. DRILL 1-1/4" HOLE THROUGH LOGS.
3. INSERT 1" DIAMETER THREADBAR.
4. INSTALL WASHERS OVER EACH END OF THE BOLT. THREAD NUTS ONTO EACH END OF THE BOLT AND TIGHTEN THE NUT UNTIL UNDERLYING WOOD BEGINS TO CRUSH.
5. IF END OF BOLT EXTENDS MORE THAN 2 INCHES BEYOND THE TIGHTENED NUT, CUT OFF EXCESS BOLT NO CLOSER THAN 1 INCH FROM THE NUT.
6. PEEN END OF BOLT OR CHISEL THREADS SO NUT CANNOT BE BACKED OFF.
7. FILE OR GRIND OFF SHARP EDGES ON BOLT END.

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PILE DETAIL
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