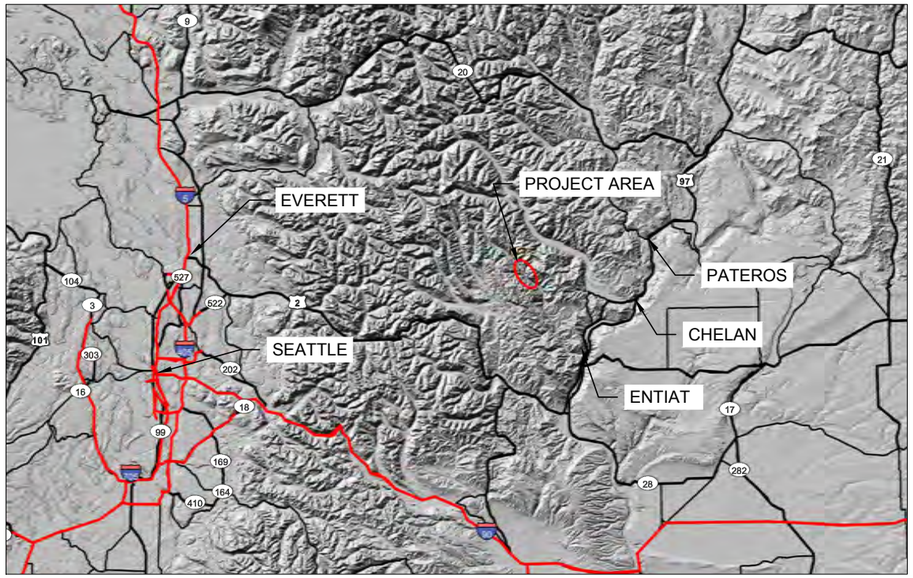
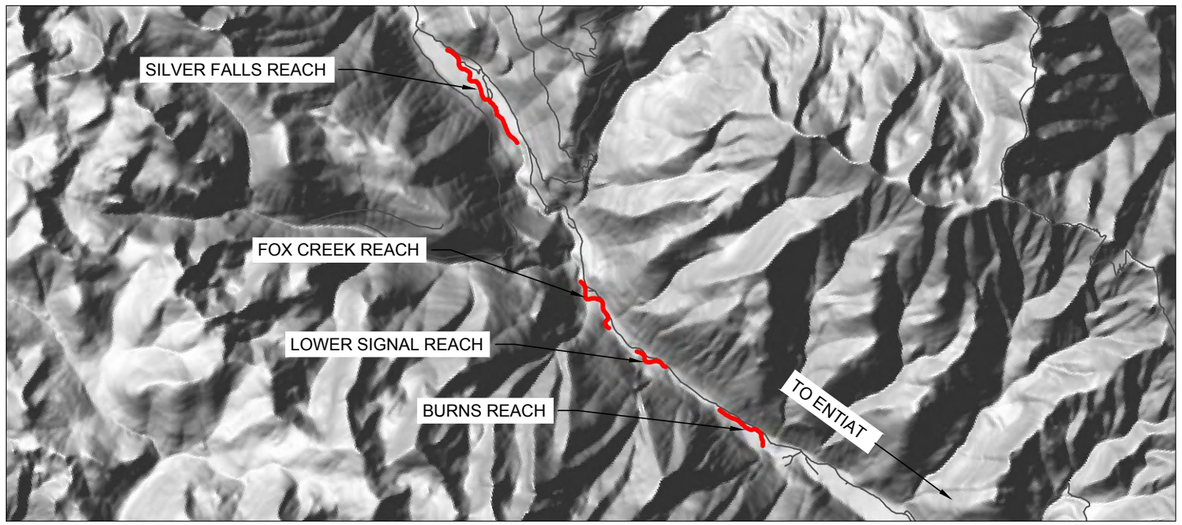
APPENDIX A

Project Plan Sheets

YAKAMA NATION FISHERIES
UPPER STILLWATERS REACH - ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN



LOCATION MAP
SCALE: NTS



VICINITY MAP
SCALE: 1" = 2 MILES

DRAWING INDEX	
DWG #	TITLE
GENERAL	
G-001	COVER SHEET
G-002	GENERAL NOTES
CIVIL	
E-001	EXISTING CONDITIONS OVERVIEW
E-002	BURNS REACH EXISTING CONDITIONS
E-003	LOWER SIGNAL REACH EXISTING CONDITIONS
E-004	FOX CREEK REACH EXISTING CONDITIONS
E-005	SILVER FALLS REACH EXISTING CONDITIONS
C-100 - C-102	BURNS REACH PROPOSED CONDITIONS
C-200	LOWER SIGNAL REACH PROPOSED CONDITIONS
C-300 - C-301	FOX CREEK REACH PROPOSED CONDITIONS
C-400 - C-404	SILVER FALLS REACH PROPOSED CONDITIONS
C-501 - C-503	DETAILS - LWD CONSTRUCTION
C-601	DETAILS - TESC
C-602	DEWATERING AND REWATERING DETAILS

TETRA TECH
www.tetratech.com
19803 North Creek Parkway
Bothell, Washington 98011
Phone: 425-482-7600 Fax: 425-482-7652

Yakama Nation Fisheries

NOT FOR CONSTRUCTION

PLOTTED AS ANSI B (11" X 17"), PLAN SHEET FULL SIZE ANSI D (22" X 34")

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	APP
A	5/14/18	CONCEPT LEVEL DESIGN	CM	CEB	JT

UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

COVER SHEET

DWG. NO.: G-001

CREATED: 4/26/2018

SHEET: 1 of 22

Z:\PROJECTS\194-6194.UPPER.STILLWATERS\10%.DESIGN\.SHEET FILES\01-COVER PAGE AND NOTES.DWG
PLOT DETAILS: REISTER, CAMERON May 11, 2018 9:48 AM

ABBREVIATIONS

1H:1V	HORIZONTAL TO VERTICAL EXAGGERATION
%	PERCENT
BPA	BONNEVILLE POWER ADMINISTRATION
DWG	DRAWING
EX.	EXISTING
FT, '	FOOT
IN, "	INCH
LT, (L)	LEFT
LWD	LARGE WOODY DEBRIS
NTS	NOT TO SCALE
OHW	ORDINARY HIGH WATER
RD	ROAD
RT, (R)	RIGHT
STA	STATION
TESC	TEMPORARY EROSION SEDIMENT CONTROL
TYP	TYPICAL
USFS	UNITIED STATES FOREST SERVICE
USFWS	UNITED STATES FISH AND WILDLIFE SERVICE
WDFW	WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
XS	CROSS SECTION
YR	YEAR

PROPOSED SEQUENCING:

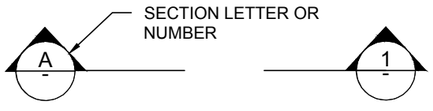
1. PLACE TESC, WORK AREA ISOLATION, AND FISH SALVAGE MEASURES.
2. COMPLETE CLEARING AND GRUBBING.
3. PERFORM EXCAVATION ACTIVITIES.
4. INSTALL LWD STRUCTURES IN SIDE CHANNELS AND MAIN CHANNEL.
5. RESTORE AND RE-VEGETATE WORK AREAS.
6. REMOVES TESC, WORK AREA ISOLATION, AND FISH SALVAGE MEASURES.

GENERAL NOTES:

1. HORIZONTAL PROJECTION: NAD83 WASHINGTON STATE PLANES, NORTH ZONE, US FOOT.
2. VERTICAL PROJECTION: NAVD88.
3. PROJECT TOPOGRAPHIC SURFACE IS BASED ON 2015 LiDAR TOPOGRAPHIC DATA AND FIELD SURVEYS COMPLETED BY TETRA TECH IN OCTOBER 2017 AND APRIL 2018.
4. PROJECT CHANNEL ALIGNMENT AND STATIONING FOR BURNS, LOWER SIGNAL AND FOX CREEK CAMPGROUND REACHES IS BASED ON FIELD SURVEYS COMPLETED BY TETRA TECH IN OCTOBER 2017 AND APRIL 2018.
5. PROPOSED PROJECT DESIGN, CONSTRUCTION ACTIVITIES, AND MATERIALS SUBJECT TO APPROVAL BY LANDOWNER.

SYMBOLS

SECTIONS ARE REFERENCED IN THE FOLLOWING MANNER:



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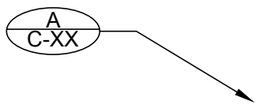

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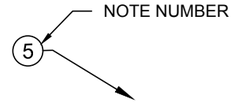

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REV.	DATE	REVISION DESCRIPTION	DRW	ENG	APP
A	5/14/18	CONCEPT LEVEL DESIGN	CM	CEB	JT

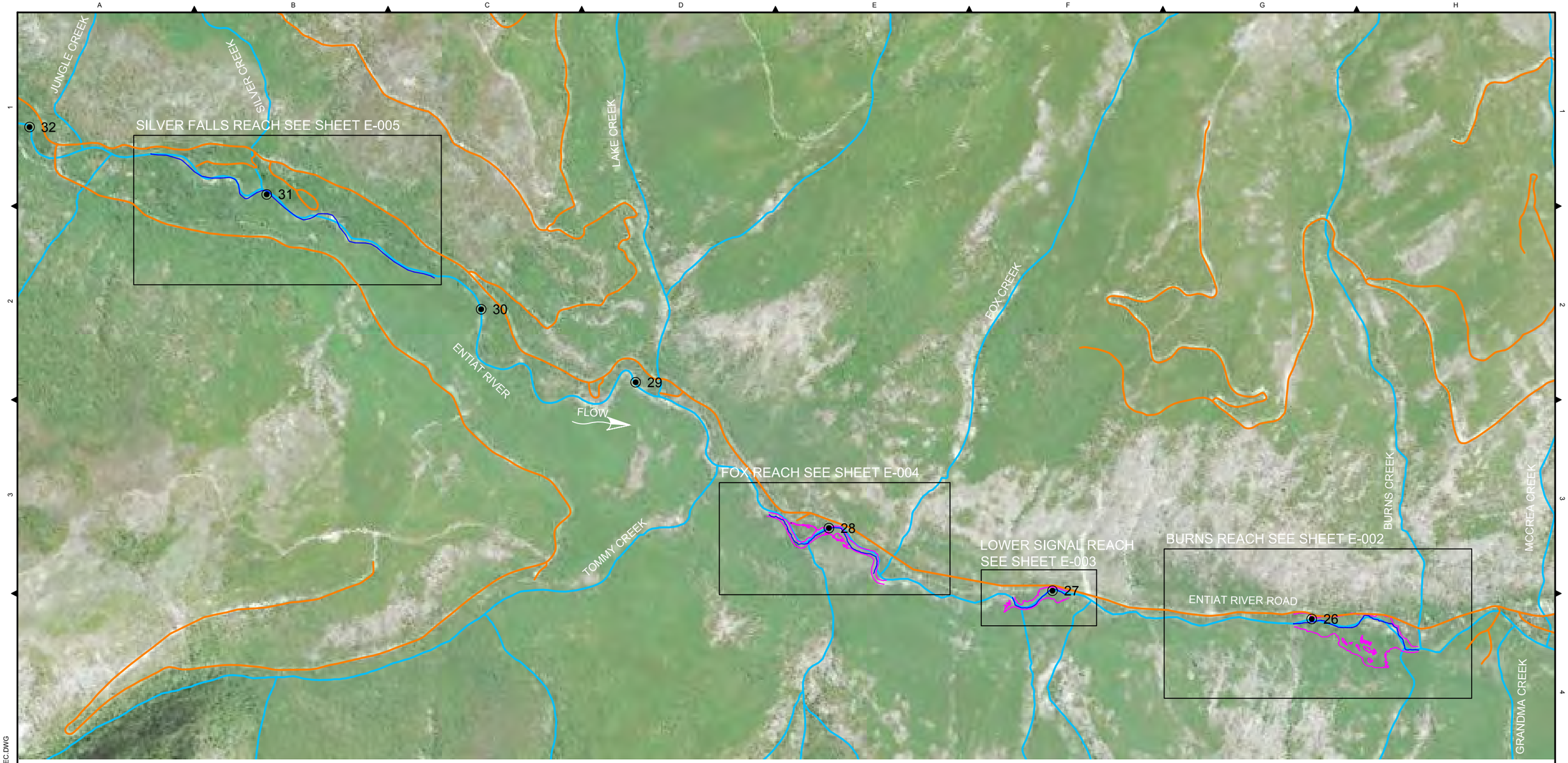
UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

GENERAL NOTES

DWG. NO.: G-002

CREATED: 4/26/2018

SHEET: 2 of 22



0 1000' 2000' 4000'

LEGEND:
- ENTIAT RIVER THALWEG REACH ALIGNMENTS
- USGS RIVER MILE
- EXISTING 100-YEAR INUNDATION
- EXISTING TRIBUTARIES
- EXISTING ROADS

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A	5/14/18	CONCEPT LEVEL DESIGN	CM	CEB	JT

UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

EXISTING CONDITIONS OVERVIEW

DWG. NO.: E-001
CREATED: 4/26/2018
SHEET: 3 of 22

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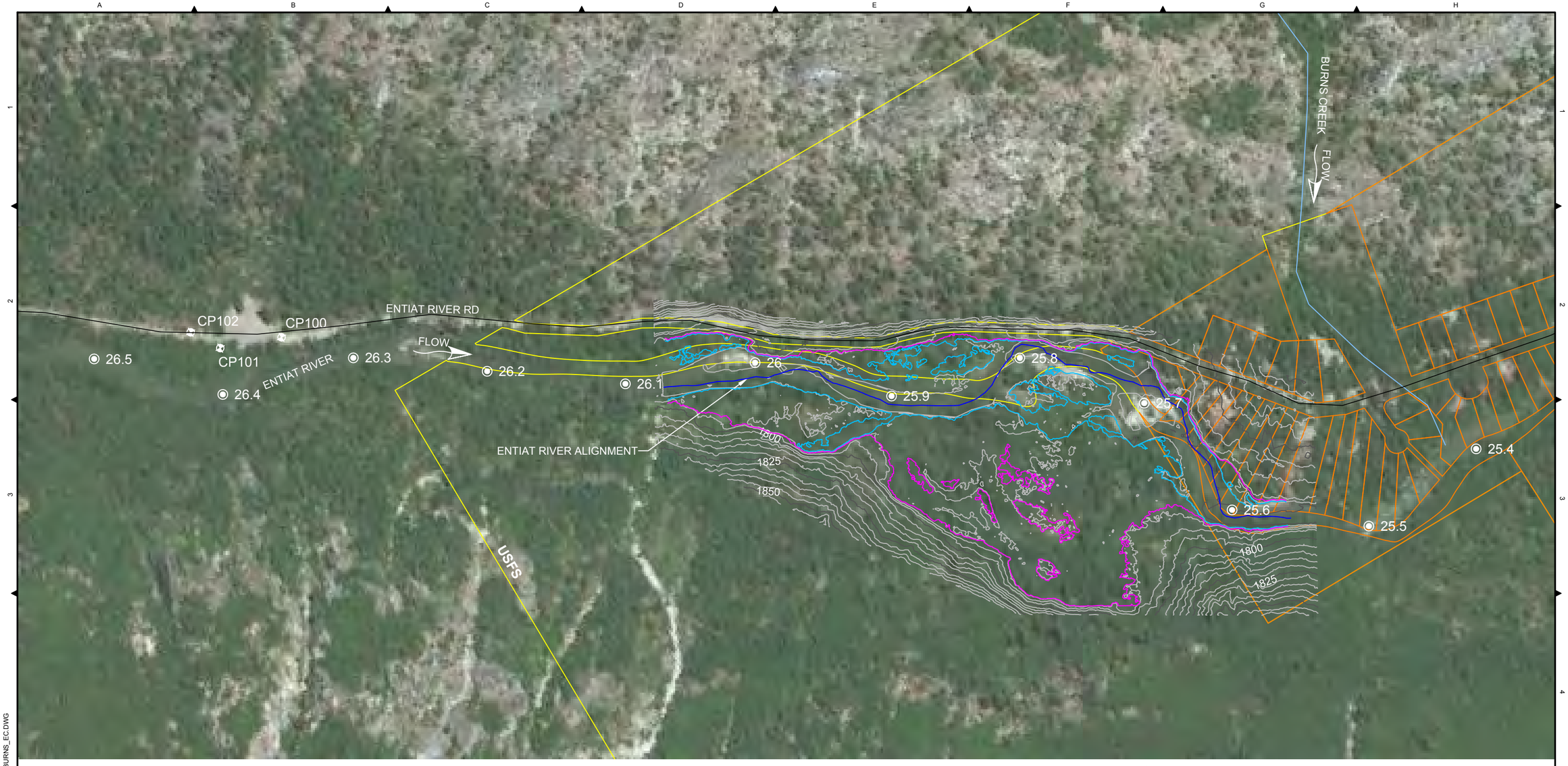

0 200' 400' 800'

BURNS REACH CONTROL POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
100	331901.65	1725721.09	1814.32	CP100
101	331989.78	1725479.54	1819.45	CP101
102	332107.27	1725406.65	1826.86	CP102

LEGEND:
- ENTIAT RIVER THALWEG ALIGNMENT
- USFS PROPERTY BOUNDARY
- PRIVATE PROPERTY BOUNDARY
- USGS RIVER MILE
- SURVEY CONTROL POINT
- EXISTING 2-YEAR INUNDATION (BANKFULL)
- EXISTING 100-YEAR INUNDATION
- EXISTING TRIBUTARY (BURNS CREEK)
- 25-FT MAJOR CONTOUR
- 5-FT MINOR CONTOUR

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UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

BURNS REACH EXISTING CONDITIONS

DWG. NO.: E-002
CREATED: 4/26/2018
SHEET: 4 of 22

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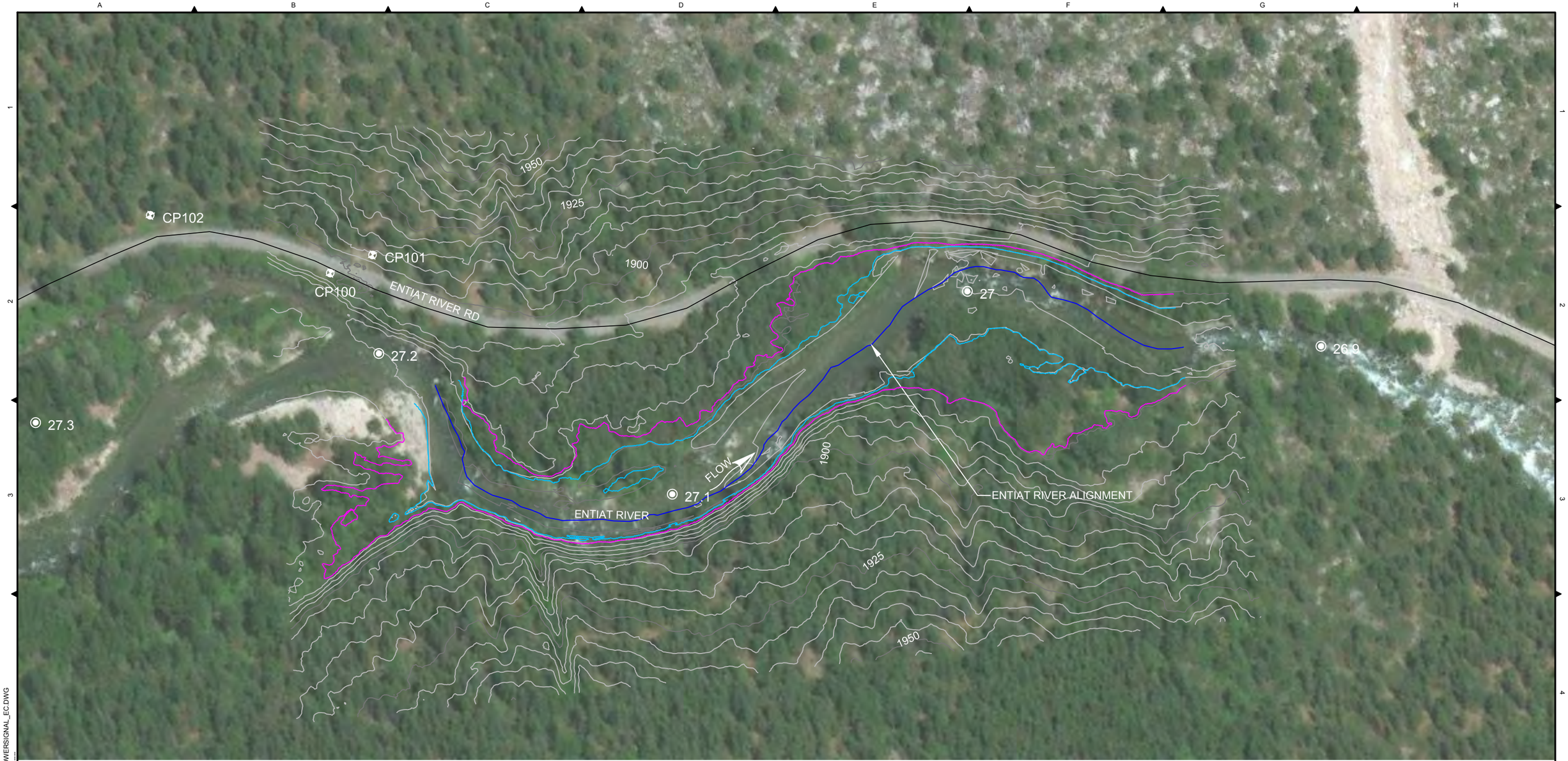

0' 75' 150 300'

LOWER SIGNAL & FOX REACHES CONTROL POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
100	334532.64	1722178.57	1898.99	CP100
101	334524.00	1722249.36	1907.05	CP101
102	334749.33	1721982.08	1902.49	CP102

LEGEND:
- ENTIAT RIVER THALWEG ALIGNMENT
- USGS RIVER MILE
- SURVEY CONTROL POINT
- EXISTING 2-YEAR INUNDATION (BANKFULL)
- EXISTING 100-YEAR INUNDATION
- EXISTING TRIBUTARY
- 25-FT MAJOR CONTOUR
- 5-FT MINOR CONTOUR

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UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

LOWER SIGNAL REACH EXISTING CONDITIONS

DWG. NO.: E-003
CREATED: 4/26/2018
SHEET: 5 of 22

Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\SHEET FILES\03-LOWERSIGNAL_EC.DWG
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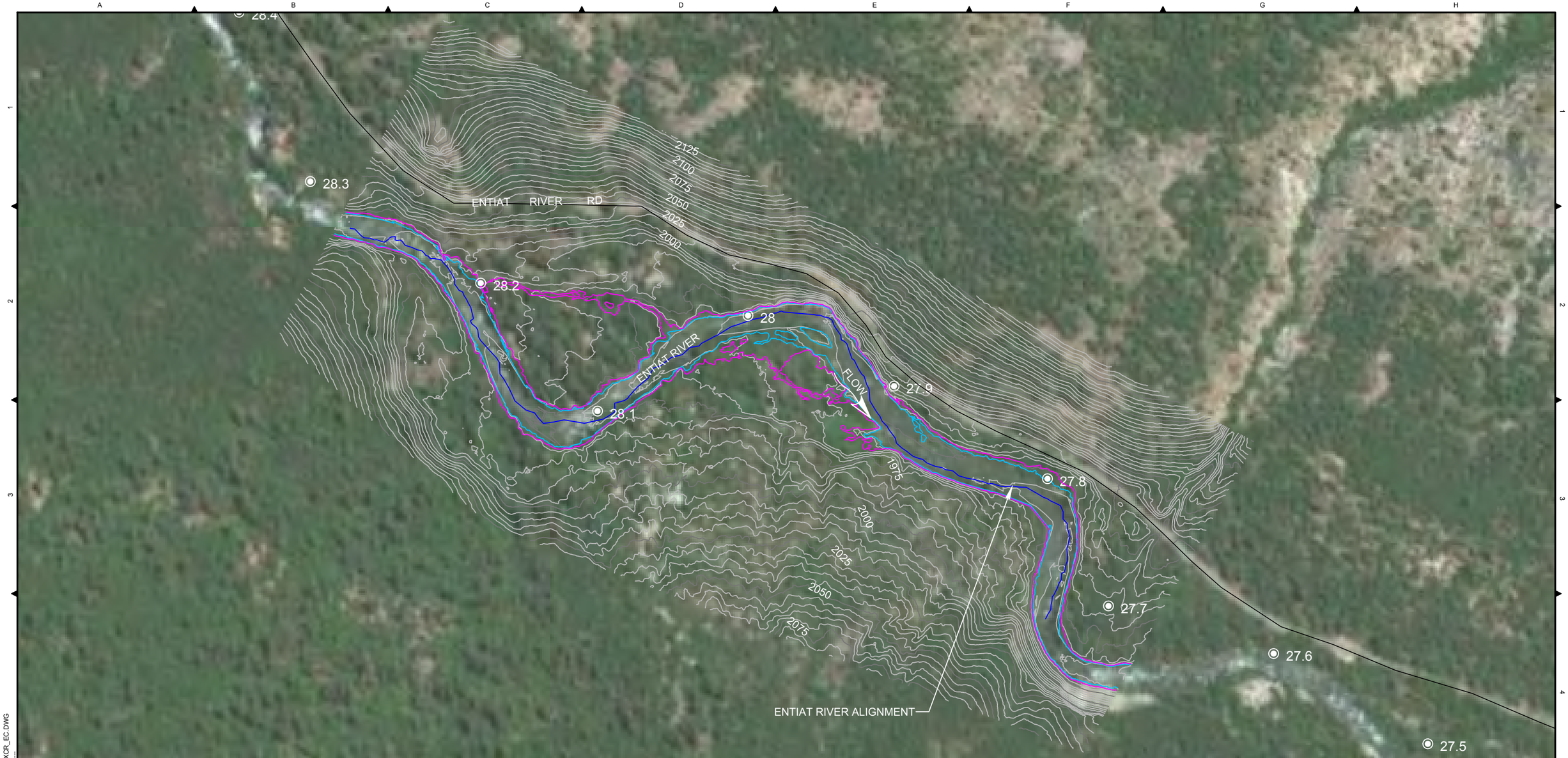

0 150' 300' 600'

NOTE: CONTROL POINTS FOR FOX REACH ARE THE SAME AS LOWER SIGNAL REACH.
SEE SHEET E-003 FOR TABLE.

LEGEND:
- ENTIAT RIVER THALWEG ALIGNMENT
- USGS RIVER MILE
- SURVEY CONTROL POINT
- EXISTING 2-YEAR INUNDATION (BANKFULL)
- EXISTING 100-YEAR INUNDATION
- EXISTING TRIBUTARY
- 25-FT MAJOR CONTOUR
- 5-FT MINOR CONTOUR

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UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

FOX CREEK REACH EXISTING CONDITIONS

DWG. NO.: E-004
CREATED: 4/26/2018
SHEET: 6 of 22

Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\SHEET FILES\04-FOXCR_EC.DWG
PLOT DETAILS: REISTER, CAMERON May 11, 2018 2:57 PM

LEGEND:
- ENTIAT RIVER THALWEG ALIGNMENT
- USGS RIVER MILE
- EXISTING TRIBUTARY

0 200' 400' 800'

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UPPER STILLWATERS REACH
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CONCEPT LEVEL DESIGN

SILVER FALLS REACH EXISTING CONDITIONS

DWG. NO.: E-005

CREATED: 4/26/2018

SHEET: 7 of 22

Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\SHEET FILES\05-SILVERFALLS_EC.DWG
PLOT DETAILS: REISTER, CAMERON May 11, 2018 2:58 PM

ENTIAT RIVER RD
ENTIAT RIVER FLOW
EXISTING ENTIAT RIVER ALIGNMENT
BEGIN SURVEY
SEE SHEET C-101
25.8
25.7
25.6
1780
1785
1790
1795
1800
0' 50' 100' 200'

NOTES:

1. SUPPLEMENT EXISTING LWD JAM AT THE HEAD OF THE HIGH FLOW SIDE CHANNEL. FINAL LWD JAM TO ACTIVATE THE SIDE CHANNEL AT LOWER FLOWS. PLACE ROOTWADS INTO LOW FLOW. FINAL LWD CONFIGURATION COORDINATION IN THE FIELD. SEE SHEET C-502 FOR TYPICAL DETAILS. STRUCTURES TO INCLUDE BALLAST AND BUMPER LOGS.
2. PLACE LWD FOR COVER AND INCREASED HABITAT COMPLEXITY ON SIDE CHANNEL AND DOWNSTREAM ALCOVE. FINAL LWD CONFIGURATION COORDINATION IN THE FIELD. SEE SHEET C-502 FOR TYPICAL DETAILS. STRUCTURES EXPOSED TO MAIN CHANNEL FLOW SHALL INCLUDE BALLAST AND BUMPER LOGS.
3. INSTALL LOG JAM TO PROMOTE ADDITIONAL SPLIT FLOW AND INCREASE CHANNEL COMPLEXITY. SEE SHEET C-501 FOR TYPICAL DETAILS.
4. POTENTIAL TEMPORARY STREAM CROSSING TO ACCESS EXPOSED GRAVEL BAR FOR WOOD PLACEMENT. FINAL ACCESS ROUTES AND CROSSINGS TO BE CONFIRMED IN THE FIELD.
5. PRESERVE AND PROTECT EXISTING ENGINEERED LOG JAM.
6. PRESERVE AND PROTECT EXISTING LARGE DOWN COTTONWOOD AND SCOUR HOLE IN EXISTING SIDE CHANNEL.
7. BOLT ADDITIONAL LWD TO EXISTING RIPRAP/LWD STRUCTURE TO INCREASE ROOTWAD INTERACTION AT LOW FLOW CONDITIONS. ADD ADDITIONAL BOULDER BALLAST AND BUMPER LOGS AS NEEDED.
8. EVALUATE ALCOVE FOR POTENTIAL GROUNDWATER/ALCOVE ENHANCEMENT.

LEGEND:

- ENTIAT RIVER THALWEG ALIGNMENT
- USFS PROPERTY BOUNDARY
- PRIVATE PROPERTY BOUNDARY
- USGS RIVER MILE
- SURVEY CONTROL POINT
- EXISTING 2-YEAR INUNDATION (BANKFULL)
- EXISTING 100-YEAR INUNDATION
- EXISTING TRIBUTARY (BURNS CREEK)
- SHEET BOUNDARY
- SURVEYED EOW
- EXISTING 5-FT MAJOR CONTOUR
- PROPOSED LWD STRUCTURES
- PROPOSED SIDE CHANNEL
- PROPOSED ACCESS ROUTE
- PROPOSED STREAM CROSSING

KEYMAP
NTS

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UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN
BURNS REACH
PROPOSED CONDITIONS

DWG. NO.: C-100
CREATED: 4/26/2018
SHEET: 8 of 22

Z:\PROJECTS\194-6194_UPPER_STILLWATERS\10%_DESIGN\SHEET FILES\06-BURNS_PC.DWG
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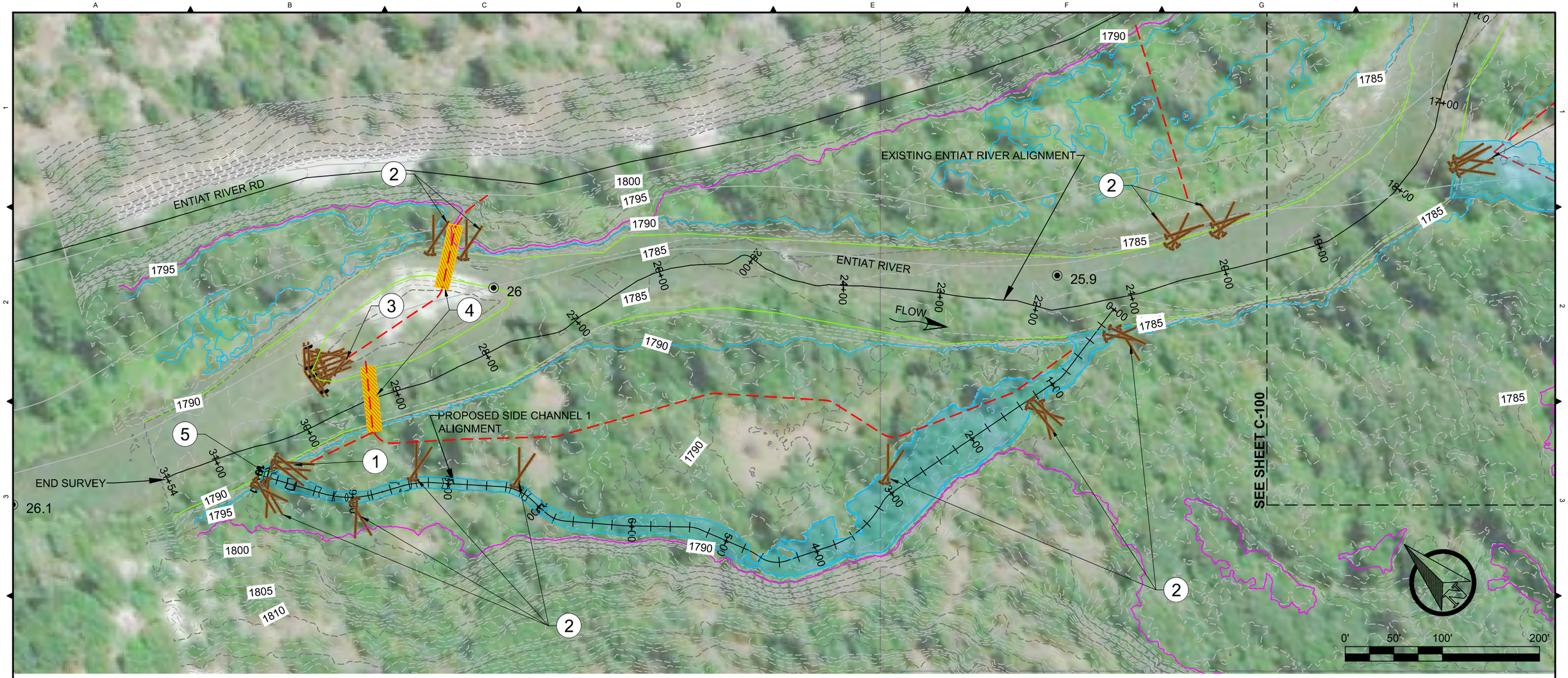
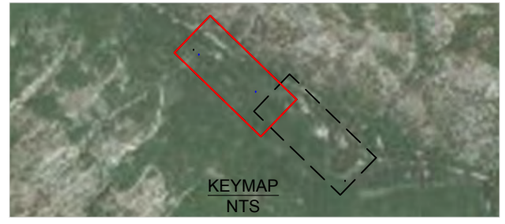


NOTES:

1. PLACE LWD JAM AT THE HEAD OF THE PROPOSED SIDE CHANNEL. FINAL LWD JAM TO ACTIVATE THE SIDE CHANNEL AT LOW FLOWS. PLACE ROOTWADS INTO LOW FLOW. FINAL LWD CONFIGURATION COORDINATION IN THE FIELD. SEE SHEET C-502 FOR TYPICAL DETAILS. STRUCTURES TO INCLUDE BALLAST AND BUMPER LOGS.
2. PLACE LWD FOR COVER AND INCREASED HABITAT COMPLEXITY. FINAL LWD CONFIGURATION COORDINATION IN THE FIELD. SEE SHEET C-502 FOR TYPICAL DETAILS. STRUCTURES EXPOSED TO MAIN CHANNEL FLOW SHALL HAVE BALLAST AND BUMPER LOGS INSTALLED.
3. INSTALL LOG JAM TO PROMOTE ADDITIONAL SPLIT FLOW AND INCREASE CHANNEL COMPLEXITY. SEE SHEET C-501 FOR TYPICAL DETAILS.
4. POTENTIAL TEMPORARY STREAM CROSSING TO ACCESS EXPOSED GRAVEL BAR AND SOUTH BANK FOR WOOD PLACEMENT. FINAL ACCESS ROUTES AND CROSSINGS TO BE CONFIRMED IN THE FIELD.
5. EXCAVATE APPROXIMATELY 20 CY OF FLOODPLAIN MATERIAL TO RECONNECT THE ENTIAT RIVER TO APPROXIMATELY 1,000 LINEAR FEET OF SIDE CHANNEL.

LEGEND:

- ENTIAT RIVER THALWEG ALIGNMENT
- USFS PROPERTY BOUNDARY
- PRIVATE PROPERTY BOUNDARY
- USGS RIVER MILE
- SURVEY CONTROL POINT
- EXISTING 2-YEAR INUNDATION (BANKFULL)
- EXISTING 100-YEAR INUNDATION
- EXISTING TRIBUTARY (BURNS CREEK)
- SHEET BOUNDARY
- SURVEYED EOW
- EXISTING 5-FT MAJOR CONTOUR
- PROPOSED LWD STRUCTURES
- PROPOSED SIDE CHANNEL
- PROPOSED ACCESS ROUTE
- PROPOSED STREAM CROSSING



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UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

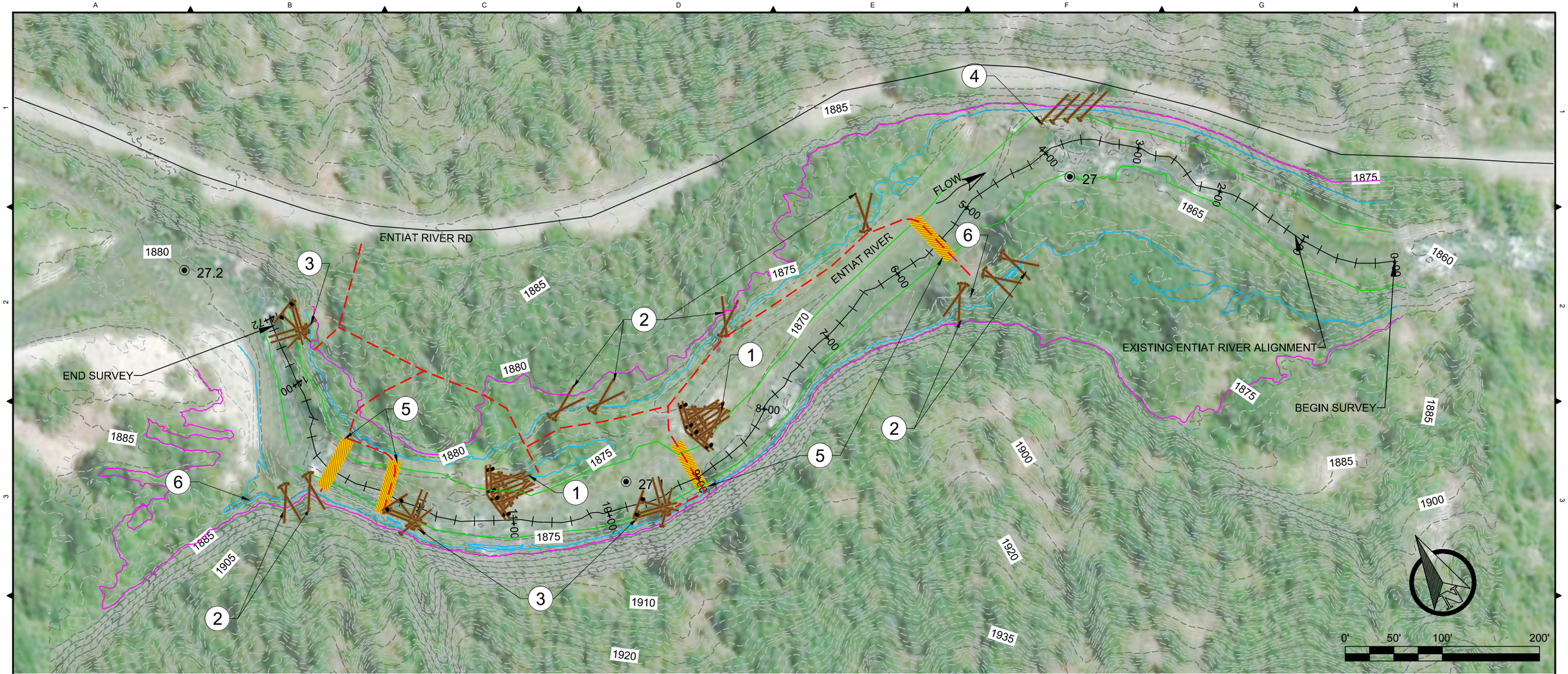
BURNS REACH
PROPOSED CONDITIONS

DWG. NO.: C-101

CREATED: 4/26/2018

SHEET: 9 of 22

Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\SHEET FILES\06-BURNS_PC.DWG
PLOT DETAILS: REISTER, CAMERON May 15, 2018 9:57 AM

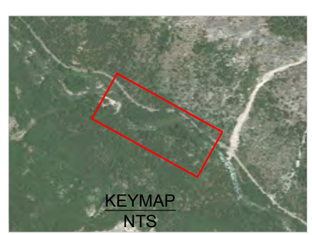


NOTES:

1. INSTALL LOG JAM TO PROMOTE ADDITIONAL SPLIT FLOW AND INCREASE CHANNEL COMPLEXITY. SEE SHEET C-501 FOR TYPICAL DETAILS.
2. PLACE LWD FOR COVER AND INCREASED HABITAT COMPLEXITY ON SIDE CHANNELS AND ALCOVE. FINAL LWD CONFIGURATION COORDINATION IN THE FIELD. SEE SHEET C-502 FOR TYPICAL DETAILS. STRUCTURES EXPOSED TO MAIN CHANNEL FLOW SHALL HAVE BOULDER BALLAST AND BUMPER LOGS INSTALLED.
3. INSTALL BANK JAMS TO INCREASE CHANNEL ROUGHNESS, PROMOTE SCOUR POOLS, AND INCREASE HABITAT DIVERSITY. SEE SHEET C-503 FOR DETAILS. STRUCTURES TO INCLUDE ROCK BALLAST AND BOLTED BUMPER LOGS.
4. BOLT ADDITIONAL LWD TO EXISTING ENGINEERED LOG JAM TO INCREASE ROOTWAD INTERACTION WITH LOW FLOW. LWD ADDITION TO INCLUDE ADDITIONAL ROCK BALLAST AND BOLTED BUMPER LOGS AS NEEDED.
5. POTENTIAL TEMPORARY STREAM CROSSING FOR WOOD PLACEMENT. FINAL ACCESS ROUTES AND CROSSINGS TO BE CONFIRMED IN THE FIELD.
6. EVALUATE ALCOVE FOR POTENTIAL GROUNDWATER/ALCOVE ENHANCEMENT.

LEGEND:

- ENTIAT RIVER THALWEG ALIGNMENT
- USGS RIVER MILE
- SURVEY CONTROL POINT
- EXISTING 2-YEAR INUNDATION (BANKFULL)
- EXISTING 100-YEAR INUNDATION
- SHEET BOUNDARY
- SURVEYED EOW
- EXISTING 5-FT MAJOR CONTOUR
- PROPOSED LWD STRUCTURES
- PROPOSED SIDE CHANNEL
- PROPOSED ACCESS ROUTE
- PROPOSED STREAM CROSSING



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ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

LOWER SIGNAL REACH
PROPOSED CONDITIONS

DWG. NO.: C-200

CREATED: 4/26/2018

SHEET: 10 of 22

Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\SHEET FILES\07-LOWERSIGNAL_PC.DWG
PLOT DETAILS: REISTER, CAMERON
May 15, 2018
11:10 AM

PROPOSED SIDE CHANNEL 2 ALIGNMENT

ENTIAT RIVER RD

PROPOSED SIDE CHANNEL 1 ALIGNMENT

EXISTING ENTIAT RIVER ALIGNMENT

ENTIAT RIVER 5,500 FLOW 1945.00

FOX CREEK

BEGIN SURVEY

SEE SHEET C-301

0' 50' 100' 200'

NOTES:

1. INSTALL LOG JAM TO PROMOTE ADDITIONAL SPLIT FLOW AND INCREASE CHANNEL COMPLEXITY. SEE SHEET C-501 FOR TYPICAL DETAILS.
2. PLACE LWD FOR COVER AND INCREASED HABITAT COMPLEXITY ON SIDE CHANNELS AND ALCOVE. FINAL LWD CONFIGURATION COORDINATION IN THE FIELD. SEE SHEET C-502 FOR TYPICAL DETAILS. STRUCTURES EXPOSED TO MAIN CHANNEL FLOW TO INCLUDE ROCK BALLAST AND BOLTED BUMPER LOGS.
3. EXCAVATE APPROXIMATELY 334 CY OF FLOODPLAIN MATERIAL TO PERENNIALLY RECONNECT THE ENTIAT RIVER TO APPROXIMATELY 350 LINEAR FEET OF SIDE CHANNEL.
4. EXCAVATE APPROXIMATELY 55 CY OF FLOODPLAIN MATERIAL TO RECONNECT THE ENTIAT RIVER TO APPROXIMATELY 200 LINEAR FEET OF SIDE CHANNEL.
5. INSTALL BANK JAMS TO INCREASE CHANNEL ROUGHNESS, PROMOTE SCOUR POOLS, AND INCREASE HABITAT DIVERSITY. SEE SHEET C-503 FOR DETAILS. STRUCTURES TO INCLUDE ROCK BALLAST AND BOLTED BUMPER LOGS.
6. POTENTIAL TEMPORARY STREAM CROSSING TO ACCESS EXPOSED GRAVEL BAR FOR WOOD PLACEMENT. FINAL ACCESS ROUTES AND CROSSINGS TO BE CONFIRMED IN THE FIELD.
7. EVALUATE ALCOVE FOR POTENTIAL GROUNDWATER/ALCOVE ENHANCEMENT.

LEGEND:

- ENTIAT RIVER THALWEG ALIGNMENT
- USGS RIVER MILE
- SURVEY CONTROL POINT
- EXISTING 2-YEAR INUNDATION (BANKFULL)
- EXISTING 100-YEAR INUNDATION
- EXISTING TRIBUTARY (FOX CREEK)
- SHEET BOUNDARY
- SURVEYED EOW
- EXISTING 5-FT MAJOR CONTOUR
- PROPOSED LWD STRUCTURES
- PROPOSED SIDE CHANNEL
- PROPOSED ACCESS ROUTE
- PROPOSED STREAM CROSSING
- FOX CREEK CAMPGROUND

KEYMAP NTS

TETRA TECH
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Phone: 425-482-7600 Fax: 425-482-7652

Yakama Nation Fisheries

NOT FOR CONSTRUCTION

PLOTTED AS ANSI B (11" X 17"), PLAN SHEET FULL SIZE ANSI D (22" X 34")

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	APP
A	5/14/18	CONCEPT LEVEL DESIGN	CM	CEB	JT

UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

FOX CREEK REACH
PROPOSED CONDITIONS

DWG. NO.: C-300

CREATED: 4/26/2018

SHEET: 11 of 22

Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\ SHEET FILES\08-FOXCR_PC.DWG
PLOT DETAILS: REISTER, CAMERON May 15, 2018 11:11 AM

PROPOSED SIDE CHANNEL 3 ALIGNMENT

ENTIAT RIVER RD

END SURVEY

EXISTING ENTIAT RIVER ALIGNMENT

ENTIAT RIVER FLOW

SEE SHEET C-300

28.3

28.2

28.1

0+00 1+00 2+00 3+00 4+00 5+00 6+00 6+79

17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00 27+00 28+00 29+00 32+00 33+00 34+00 38+00 39+74

1965 1970 1975 1980 1985 1990 1995 2000 2005 2010 2020 2030 2040

1 2 3 4 5 6

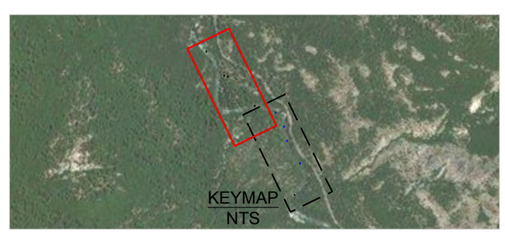
0' 50' 100' 200'

NOTES:

1. EXISTING HISTORIC MASONRY WALL. PRESERVE AND PROTECT IF NOT SELECTED FOR DEMOLITION, SEE NOTE 3.
2. PLACE LWD FOR COVER AND INCREASED HABITAT COMPLEXITY. FINAL LWD CONFIGURATION COORDINATION IN THE FIELD. SEE SHEET C-502 FOR TYPICAL DETAILS. STRUCTURES EXPOSED TO MAIN CHANNEL FLOW SHALL INCLUDE BALLAST AND BUMPER LOGS INSTALLED.
3. PROPOSED SIDE CHANNEL 3 INLET. PROPOSED SIDE CHANNEL ACTIVATION OPTIONS INCLUDE:
   - 3.A. PARTIALLY REMOVE MASONRY WALL AND EXCAVATE ANTHROPOGENIC FILL TO ALLOW FLOW ACCESS TO SIDE CHANNEL 3. INSTALL APPROPRIATE LWD STRUCTURES TO MAINTAIN SIDE CHANNEL 3 INLET DIMENSIONS AND METER FLOW INTO SIDE CHANNEL 3.
   - 3.B. RETAIN MASONRY WALL AND EXCAVATE NEW SIDE CHANNEL 3 INLET ALIGNMENT AND INLET UPSTREAM OF MASONRY WALL. INSTALL APPROPRIATE LWD STRUCTURES TO MAINTAIN SIDE CHANNEL 3 INLET DIMENSIONS AND METER FLOW INTO SIDE CHANNEL 3.
   - 3.C. INSTALL FISH-FRIENDLY CULVERT UNDER MASONRY WALL TO METER FLOW INTO SIDE CHANNEL 3.
   - 3.D. RETAIN MASONRY WALL AND INSTALL GROUNDWATER GALLERY AT THE HEAD OF SIDE CHANNEL 3 TO PROVIDE PERENNIAL FLOW TO SIDE CHANNEL 3.
4. REMOVE EXISTING 18" CULVER AND REPLACE WITH FISH-FRIENDLY ROAD CROSSING.
5. INSTALL BANK JAMS TO INCREASE CHANNEL ROUGHNESS, PROMOTE SCOUR POOLS, AND INCREASE HABITAT DIVERSITY. SEE SHEET C-503 FOR DETAILS.
6. POTENTIAL TEMPORARY STREAM CROSSING TO ACCESS EXPOSED GRAVEL BAR FOR WOOD PLACEMENT. FINAL ACCESS ROUTES AND CROSSINGS TO BE CONFIRMED IN THE FIELD.

LEGEND:

- ENTIAT RIVER THALWEG ALIGNMENT
- USGS RIVER MILE
- SURVEY CONTROL POINT
- EXISTING 2-YEAR INUNDATION (BANKFULL)
- EXISTING 100-YEAR INUNDATION
- EXISTING TRIBUTARY (FOX CREEK)
- SHEET BOUNDARY
- SURVEYED EOW
- EXISTING 5-FT MAJOR CONTOUR
- PROPOSED LWD STRUCTURES
- PROPOSED SIDE CHANNEL
- PROPOSED ACCESS ROUTE
- PROPOSED STREAM CROSSING
- FOX CREEK CAMPGROUND



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UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

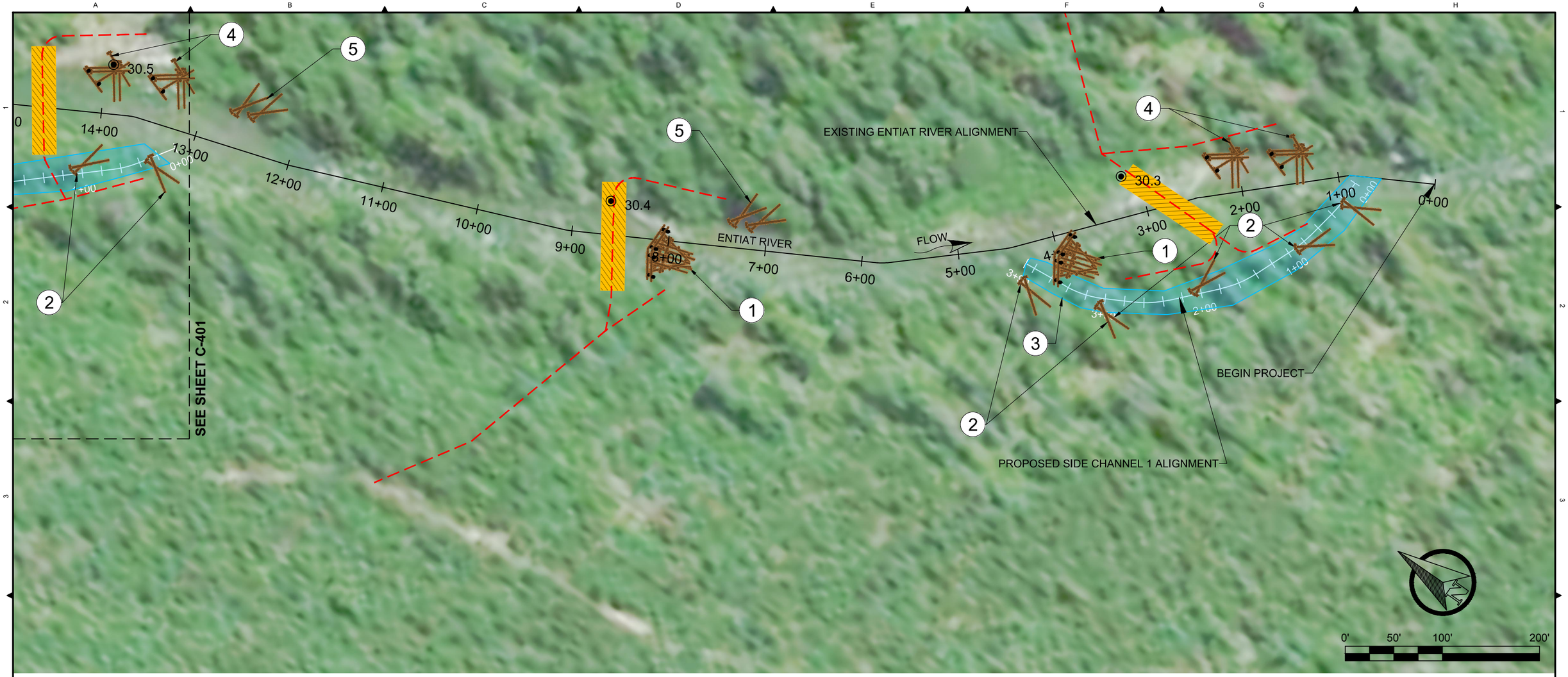
FOX CREEK REACH
PROPOSED CONDITIONS

DWG. NO.: C-301

CREATED: 4/26/2018

SHEET: 12 of 22

Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\SHEET FILES\08-FOXCR_PC.DWG
PLOT DETAILS: REISTER, CAMERON May 15, 2018 11:13 AM



NOTES:

1. INSTALL LOG JAM TO PROMOTE ADDITIONAL SPLIT FLOW AND INCREASE CHANNEL COMPLEXITY. SEE SHEET C-501 FOR TYPICAL DETAILS.
2. PLACE LWD FOR COVER AND INCREASED HABITAT COMPLEXITY ON SIDE CHANNELS AND ALCOVE. FINAL LWD CONFIGURATION COORDINATION IN THE FIELD. SEE SHEET C-502 FOR TYPICAL DETAILS. STRUCTURES EXPOSED TO MAIN CHANNEL FLOW SHALL HAVE BOULDER BALLAST AND BOLTED BUMPER LOGS INSTALLED.
3. EXCAVATE SIDE CHANNEL INLET AS NEEDED TO PERENNIALLY RECONNECT THE ENTIAT RIVER TO APPROXIMATELY 400 LINEAR FEET OF SIDE CHANNEL.
4. INSTALL BANK JAMS TO INCREASE CHANNEL ROUGHNESS, PROMOTE SCOUR POOLS, AND INCREASE HABITAT DIVERSITY. SEE SHEET C-503 FOR DETAILS. STRUCTURES TO INCLUDE ROCK BALLAST AND BOLTED BUMPER LOGS.
5. AUGMENT EXISTING LWD TO INCREASE EXISTING LWD JAM COVER AND HABITAT COMPLEXITY. FINAL LWD CONFIGURATION COORDINATION IN THE FIELD. SEE SHEET C-502 FOR TYPICAL DETIALS. STRUCTURES EXPOSED TO MAIN CHANNEL FLOW SHALL HAVE BOULDER BALLAST AND BOLTED BUMPER LOGS INSTALLED.
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LEGEND:

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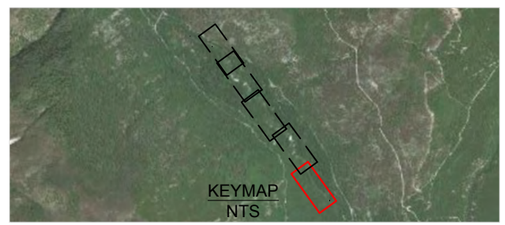
- USGS RIVER MILE
- EXISTING TRIBUTARY (NHD)
- SHEET BOUNDARY
- PROPOSED LWD STRUCTURES
- PROPOSED SIDE CHANNEL
- PROPOSED ALCOVE EXCAVATION
- PROPOSED ACCESS ROUTE
- PROPOSED STREAM CROSSING



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A	5/14/18	CONCEPT LEVEL DESIGN	CM	CEB	JT

UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

SILVER FALLS REACH
PROPOSED CONDITIONS

DWG. NO.: C-400

CREATED: 4/26/2018

SHEET: 13 of 22

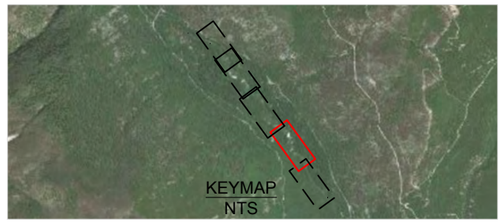
Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\SHEET FILES\09-SILVERFALLS_PC.DWG
PLOT DETAILS: REISTER, CAMERON May 15, 2018 12:16 PM

NOTES:

1. INSTALL LOG JAM TO PROMOTE ADDITIONAL SPLIT FLOW AND INCREASE CHANNEL COMPLEXITY. SEE SHEET C-501 FOR TYPICAL DETAILS.
2. PLACE LWD FOR COVER AND INCREASED HABITAT COMPLEXITY ON SIDE CHANNELS AND ALCOVE. FINAL LWD CONFIGURATION COORDINATION IN THE FIELD. SEE SHEET C-502 FOR TYPICAL DETAILS. STRUCTURES EXPOSED TO MAIN CHANNEL FLOW SHALL HAVE BOULDER BALLAST AND BOLTED BUMPER LOGS INSTALLED.
3. EXCAVATE SIDE CHANNEL INLET AS NEEDED TO PERENNIALLY RECONNECT THE ENTIAT RIVER TO APPROXIMATELY 300 LINEAR FEET OF SIDE CHANNEL.
4. EXCAVATE SIDE CHANNEL INLET AS NEEDED TO PERENNIALLY RECONNECT THE ENTIAT RIVER TO APPROXIMATELY 400 LINEAR FEET OF SIDE CHANNEL.
5. INSTALL BANK JAMS TO INCREASE CHANNEL ROUGHNESS, PROMOTE SCOUR POOLS, AND INCREASE HABITAT DIVERSITY. SEE SHEET C-503 FOR DETAILS. STRUCTURES TO INCLUDE ROCK BALLAST AND BOLTED BUMPER LOGS.
6. AUGMENT EXISTING LWD TO INCREASE EXISTING LWD JAM COVER AND HABITAT COMPLEXITY. FINAL LWD CONFIGURATION COORDINATION IN THE FIELD. SEE SHEET C-502 FOR TYPICAL DETIALS. STRUCTURES EXPOSED TO MAIN CHANNEL FLOW SHALL HAVE BOULDER BALLAST AND BOLTED BUMPER LOGS INSTALLED.
7. POTENTIAL TEMPORARY STREAM CROSSING TO ACCESS EXPOSED GRAVEL BAR FOR WOOD PLACEMENT. FINAL ACCESS ROUTES AND CROSSINGS TO BE CONFIRMED IN THE FIELD.

LEGEND:

- ENTIAT RIVER ALIGNMENT
- USGS RIVER MILE
- EXISTING TRIBUTARY (NHD)
- SHEET BOUNDARY
- PROPOSED LWD STRUCTURES
- PROPOSED SIDE CHANNEL
- PROPOSED ALCOVE EXCAVATION
- PROPOSED ACCESS ROUTE
- PROPOSED STREAM CROSSING



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Yakama Nation Fisheries

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A	5/14/18	CONCEPT LEVEL DESIGN	CM	CEB	JT

UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

SILVER FALLS REACH
PROPOSED CONDITIONS

DWG. NO.: C-401

CREATED: 4/26/2018

SHEET: 14 of 22

Z:\PROJECTS\194-6194-UPPER STILLWATERS\10% DESIGN\ SHEET FILES\09-SILVERFALLS_PC.DWG
PLOT DETAILS: REISTER, CAMERON May 15, 2018 12:14 PM

NOTES:

1. INSTALL LOG JAM TO PROMOTE ADDITIONAL SPLIT FLOW AND INCREASE CHANNEL COMPLEXITY. SEE SHEET C-501 FOR TYPICAL DETAILS.
2. PLACE LWD FOR COVER AND INCREASED HABITAT COMPLEXITY ON SIDE CHANNELS AND ALCOVE. FINAL LWD CONFIGURATION COORDINATION IN THE FIELD. SEE SHEET C-502 FOR TYPICAL DETAILS. STRUCTURES EXPOSED TO MAIN CHANNEL FLOW SHALL HAVE BOULDER BALLAST AND BOLTED BUMPER LOGS INSTALLED.
3. EXCAVATE SIDE CHANNEL INLET AS NEEDED TO PERENNIALLY RECONNECT THE ENTIAT RIVER TO APPROXIMATELY 450 LINEAR FEET OF SIDE CHANNEL.
4. EXCAVATE SIDE CHANNEL INLET AS NEEDED TO PERENNIALLY RECONNECT THE ENTIAT RIVER TO APPROXIMATELY 1,300 LINEAR FEET OF SIDE CHANNEL. AUGMENT EXISTING LWD TO PROMOTE SPLIT FLOW INTO SIDE CHANNEL.
5. INSTALL BANK JAMS TO INCREASE CHANNEL ROUGHNESS, PROMOTE SCOUR POOLS, AND INCREASE HABITAT DIVERSITY. SEE SHEET C-503 FOR DETAILS. STRUCTURES TO INCLUDE ROCK BALLAST AND BOLTED BUMPER LOGS.
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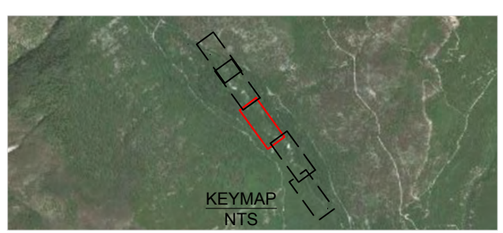
7. POTENTIAL TEMPORARY STREAM CROSSING TO ACCESS EXPOSED GRAVEL BAR FOR WOOD PLACEMENT. FINAL ACCESS ROUTES AND CROSSINGS TO BE CONFIRMED IN THE FIELD.

LEGEND:

- ENTIAT RIVER ALIGNMENT
- USGS RIVER MILE
- EXISTING TRIBUTARY (NHD)
- SHEET BOUNDARY
- PROPOSED LWD STRUCTURES
- PROPOSED SIDE CHANNEL
- PROPOSED ALCOVE EXCAVATION
- PROPOSED ACCESS ROUTE
- PROPOSED STREAM CROSSING



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Yakama Nation Fisheries

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A	5/14/18	CONCEPT LEVEL DESIGN	CM	CEB	JT

UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

SILVER FALLS REACH
PROPOSED CONDITIONS

DWG. NO.: C-402

CREATED: 4/26/2018

SHEET: 15 of 22

Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\SHEET FILES\09-SILVERFALLS_PC.DWG
PLOT DETAILS: REISTER, CAMERON May 15, 2018 11:41 AM

SEE SHEET C-404

SEE SHEET C-402

EXISTING ENTIAT RIVER ALIGNMENT

ENTIAT RIVER

FLOW

PROPOSED SIDE CHANNEL 6 ALIGNMENT

PROPOSED SIDE CHANNEL 7 ALIGNMENT

65+00 64+00 63+00 62+00 61+00 60+00 59+00 58+00 57+00 56+00 55+00 54+00 53+00 52+00 51+00 50+00 49+00 48+00

31.1 31.2 31.3

0' 50' 100' 200'

NOTES:

1. INSTALL LOG JAM TO PROMOTE ADDITIONAL SPLIT FLOW AND INCREASE CHANNEL COMPLEXITY. SEE SHEET C-501 FOR TYPICAL DETAILS.
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3. EXCAVATE SIDE CHANNEL INLET AS NEEDED TO PERENNIALLY RECONNECT THE ENTIAT RIVER TO APPROXIMATELY 400 LINEAR FEET OF SIDE CHANNEL.
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5. AUGMENT EXISTING LWD TO INCREASE EXISTING LWD JAM COVER AND HABITAT COMPLEXITY. FINAL LWD CONFIGURATION COORDINATION IN THE FIELD. SEE SHEET C-502 FOR TYPICAL DETIALS. STRUCTURES EXPOSED TO MAIN CHANNEL FLOW SHALL HAVE BOULDER BALLAST AND BOLTED BUMPER LOGS INSTALLED.
6. POTENTIAL TEMPORARY STREAM CROSSING TO ACCESS EXPOSED GRAVEL BAR FOR WOOD PLACEMENT. FINAL ACCESS ROUTES AND CROSSINGS TO BE CONFIRMED IN THE FIELD.

LEGEND:

- ENTIAT RIVER ALIGNMENT
- USGS RIVER MILE
- EXISTING TRIBUTARY (NHD)
- SHEET BOUNDARY
- PROPOSED LWD STRUCTURES
- PROPOSED SIDE CHANNEL
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KEYMAP
NTS

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UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

SILVER FALLS REACH
PROPOSED CONDITIONS

DWG. NO.: C-403

CREATED: 4/26/2018

SHEET: 16 of 22

Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\SHEET FILES\09-SILVERFALLS_PC.DWG
PLOT DETAILS: REISTER, CAMERON
May 15, 2018
12:13 PM

NOTES:

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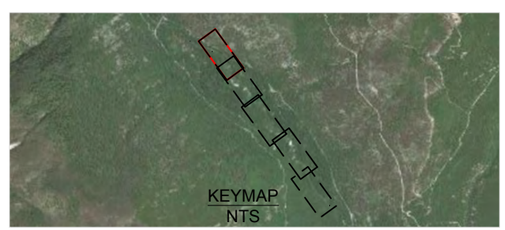

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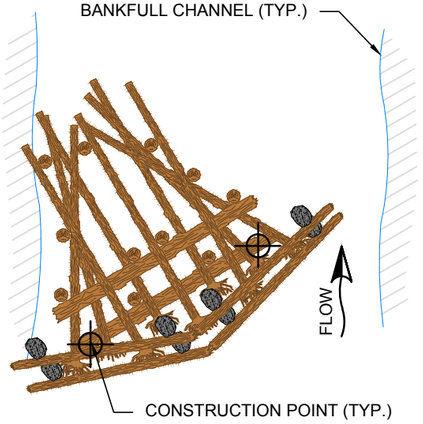
PROPOSED CONDITIONS

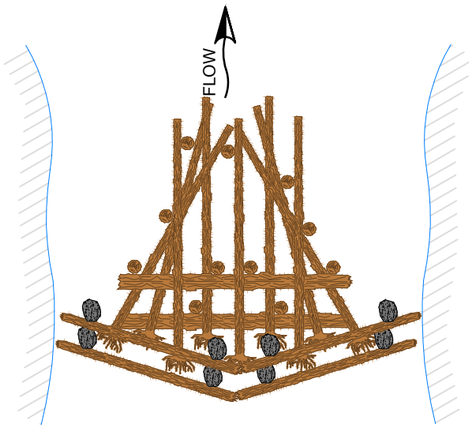
DWG. NO.: C-404

CREATED: 4/26/2018

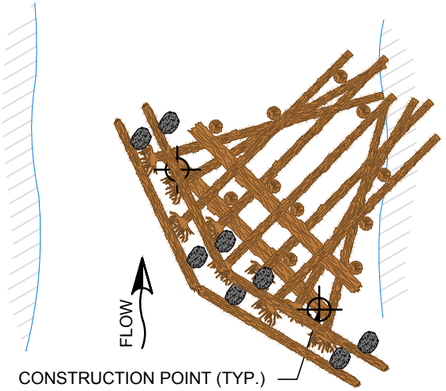
SHEET: 17 of 22

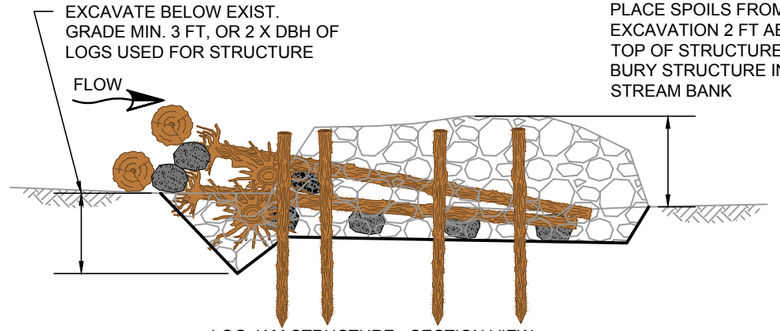
Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\SHEET FILES\09-SILVERFALLS_PC.DWG
PLOT DETAILS: REISTER, CAMERON May 15, 2018 12:10 PM





LOG JAM STRUCTURE - PLAN VIEWS

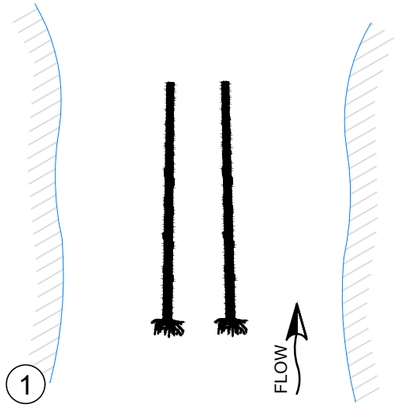


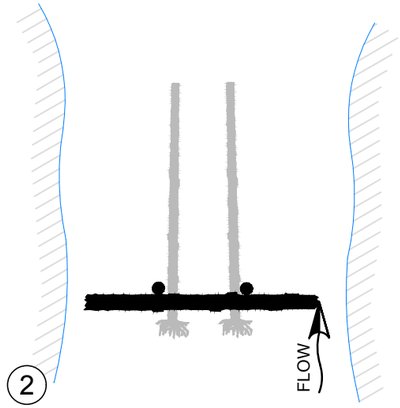


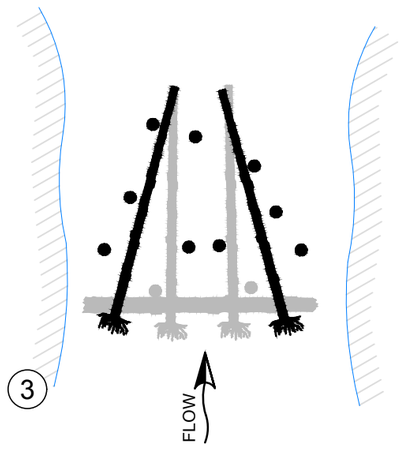
LOG JAM STRUCTURE - SECTION VIEW

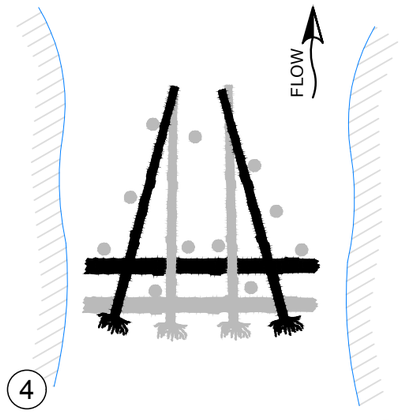
CONSTRUCTION QUANTITIES:

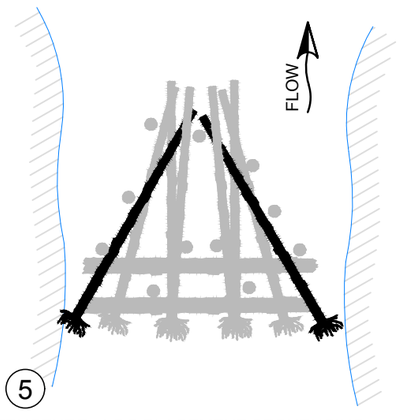
COMPONENT	DESCRIPTION	QUANTITY
LOG WITH ROOTWAD	18"+ DBH, 40 FT MIN	11
LOGS WITHOUT ROOTWAD	18"+ DBH, 40 FT MIN	6
VERTICAL PILING	12" - 18" DBH, 12 FT MIN	11
BOULDERS	3 FT MINIMUM	8
BALLAST	SPOILS/FLOODPLAIN ALLUVIUM	200 CY

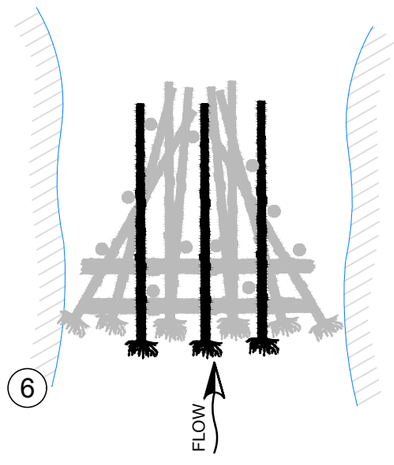


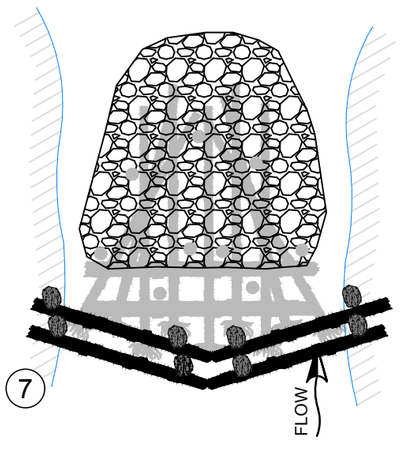












LOG JAM STRUCTURE - LOG PLACEMENT SEQUENCING

LOG JAM STRUCTURE NOTES:

1. INSTALL TEMPORARY COFFERDAM TO ISOLATE WORK AREA.
2. FISH SALVAGE TO BE SUPERVISED BY QUALIFIED FISH BIOLOGIST.
3. EXCAVATE TRENCH A MINIMUM OF 3 FT TO COMPLETELY BURY BOTTOM LAYER OF STRUCTURE. EXCAVATE UPSTREAM PORTION OF TRENCH TO PROVIDE ELEVATED TIPS OF TREES IN SEQUENCE #1 WHEN ROOTWADS ARE PLACED IN TRENCH.
4. PLACE MEDIUM TREES IN SEQUENCE #1. ROOTWADS PLACED IN DEEPEST PORTION OF TRENCH UPSTREAM.
5. LARGE BASE LOG PLACED IN SEQUENCE #2 DOES NOT REQUIRE ROOTWAD. PLACE LOG DOWNSTREAM OF SEQUENCE #1 ROOTWADS. PLACE VERTICAL PILINGS TO LOCK LARGE BASE LOG IN PLACE.
6. SMALL LOGS PLACED IN SEQUENCE #3 DO NOT HAVE BRANCHES. PLACE VERTICAL PILINGS AROUND PERIMETER OF SMALL LOGS TO LOCK IN PLACE.
7. LARGE RISER LOG PLACED IN SEQUENCE #4 SHALL BE PLACED AT BACK OF STRUCTURE AND PUSHED FORWARD INTO PLACE TIPS OF TREES IN SEQUENCE #1 SHALL BE LIFTED ON TOP OF LARGE RISER LOG.TIPS OF SEQUENCE #1 TREES WILL ELEVATE AS LARGE RISER LOG IS PUSHED INTO PLACE.
7. MEDIUM TREES PLACED IN SEQUENCE #5 SHALL BE PLACE SO TIPS OF TREES ARE UNDER ELEVATED SEQUENCE #1 TREE TIPS.
8. PLACE LARGE TREES IN SEQUENCE #6.
9. SPOILS FROM EXCAVATION SHALL BE USED TO BACKFILL STRUCTURE AS CONSTRUCTION PROGRESSES. MATERIAL SHALL BE COMPACTED WITH EXCAVATOR BUCKET. ADDITIONAL ALLUVIAL FLOODPLAIN MATERIAL MAY BE NEEDED TO BURY STRUCTURE AS SHOWN. BALLAST MATERIAL INCIDENTAL TO STRUCTURE COST.
10. PLACE BUMPER LOGS AND ROCK BALLAST IN SEQUENCE #7. BOLT BUMPER LOGS TO ROCK BALLAST. DETAIL TO BE PROVIDED AT PERMIT LEVEL DESIGN STAGE.
11. PLANT 15 TO 25 WILLOW STAKES IN STRUCTURE TO COMPLETE CONSTRUCTION. OWNER SHALL BE RESPONSIBLE FOR PLANTING WILLOW STAKES.
12. BANKFULL LOCATION WITH RESPECT TO STRUCTURE LOCATION IS A TYPICAL REPRESENTATION AND MAY VARY AT EACH STRUCTURE LOCATION. FINAL CONFIGURATION OF STRUCTURE SHALL BE AS DIRECTED IN FIELD.

TETRA TECH
www.tetratech.com
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Phone: 425-482-7600 Fax: 425-482-7652

Yakama Nation Fisheries

NOT FOR CONSTRUCTION

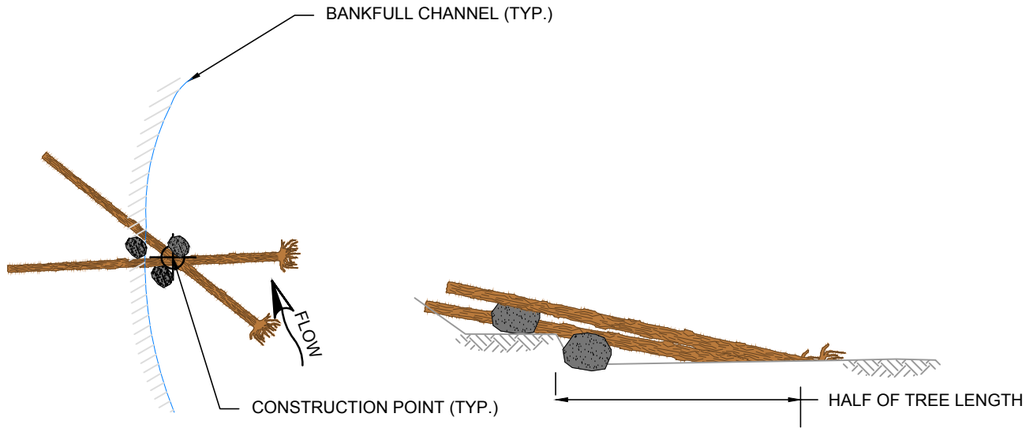
PLOTTED AS ANSI B (11" X 17"), PLAN SHEET FULL SIZE ANSI D (22" X 34")

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	APP
A	5/14/18	CONCEPT LEVEL DESIGN	CM	CEB	JT

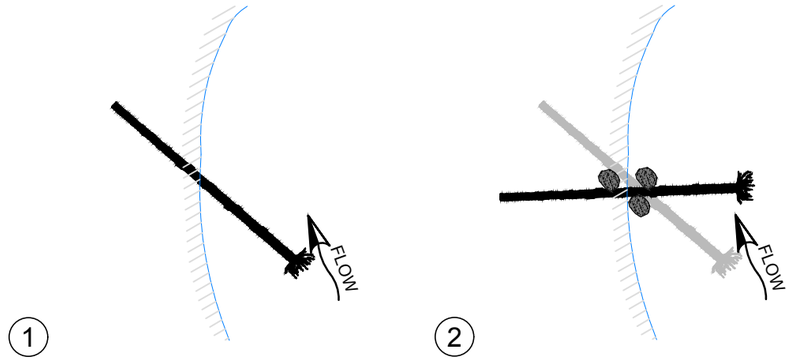
UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN
DETAILS
LWD CONSTRUCTION

DWG. NO.: C-501
CREATED: 4/26/2018
SHEET: 18 of 22

Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\SHEET FILES\10-DETAILS_LWD.DWG
PLOT DETAILS: REISTER, CAMERON May. 10, 2018 3:36 PM



2-LOG CROSS STRUCTURE WITH BOULDERS - LEFT BANK PLAN AND SECTION VIEWS



2-LOG CROSS STRUCTURE WITH BOULDERS - LEFT BANK LOG PLACEMENT SEQUENCING

2-LOG CROSS STRUCTURE - STRUCTURE NOTES:

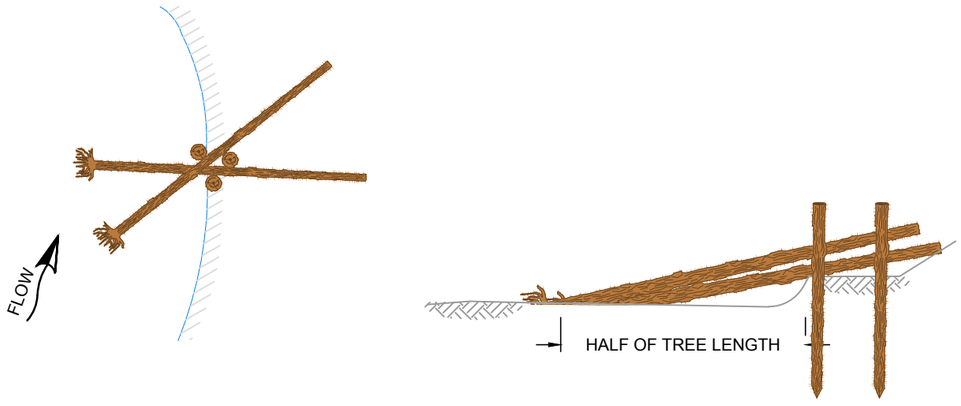
1. PLACE HALF OF THE LENGTH OF THE LARGE LOG IN SEQUENCE #1 WITHIN BANKFULL CHANNEL WITH TIP OF LOG DOWNSTREAM OF STANDING TREE OR EXISTING BOULDER/BEDROCK, IF PRESENT.
2. BURY BOTTOM HALF OF SEQUENCE #1 ROOTWAD IN CHANNEL.
3. PLACE QUARTER TO HALF OF THE LENGTH OF THE LARGE LOG IN SEQUENCE #2 WITHIN BANKFULL CHANNEL WITH TIP OF LOG UPSTREAM OF STANDING TREE OR EXISTING BOULDER/BEDRECOCK, IF PRESENT.
4. BURY BOTTOM HALF OF SEQUENCE #2 ROOTWAD IN CHANNEL.
5. PLACE BALLAST BOULDERS OR VERTICAL PILINGS ON EITHER SIDE OF LARGE LOGS TO LOCK IN PLACE. STRUCTURES WITH BALLAST BOULDERS, BOLT LARGE LOGS TO EXISTING OR PLACED BOULDERS.
6. STRUCTURES PLACED IN MAIN FLOW OF METHOW RIVER WITH POTENTIAL RECREATION RISK SHALL HAVE BOULDERS AND BUMPER LOGS PLACED IN FRONT OF EXPOSED ROOTWADS.
7. BANKFULL LOCATION WITH RESPECT TO STRUCTURE LOCATION IS A TYPICAL REPRESENTATION AND MAY VARY AT EACH STRUCTURE LOCATION. FINAL CONFIGURATION OF STRUCTURE SHALL BE AS DIRECTED IN FIELD.

SIDE CHANNEL CONSTRUCTION QUANTITIES:

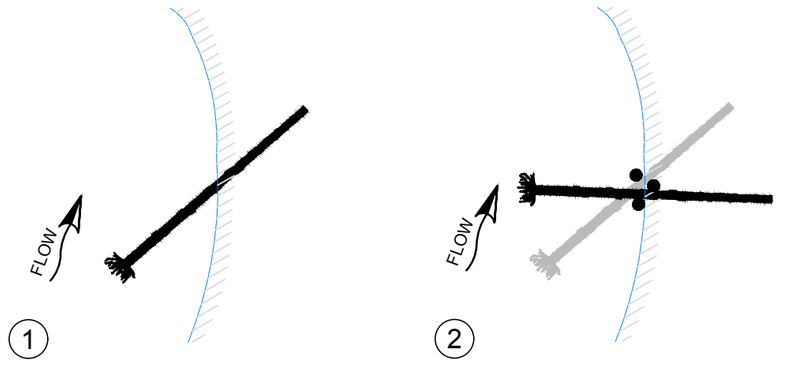
COMPONENT	DESCRIPTION	QUANTITY
LOG WITH ROOTWAD	18"+ DBH, 40 FT MIN	2
BOULDER	3 FT MIN	3

SIDE CHANNEL CONSTRUCTION QUANTITIES:

COMPONENT	DESCRIPTION	QUANTITY
LOG WITH ROOTWAD	18"+ DBH, 40 FT MIN	2
VERTICAL PILING	12" - 18" DBH, 12 FT MIN	3



2-LOG CROSS STRUCTURE WITH PILINGS - RIGHT BANK PLAN AND SECTION VIEWS



2-LOG CROSS STRUCTURE WITH PILINGS - RIGHT BANK LOG PLACEMENT SEQUENCING

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19803 North Creek Parkway
Bothell, Washington 98011
Phone: 425-482-7600 Fax: 425-482-7652

Yakama Nation Fisheries

NOT FOR CONSTRUCTION

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REV.	DATE	REVISION DESCRIPTION	DRW	ENG	APP
A	5/14/18	CONCEPT LEVEL DESIGN	CM	CEB	JT

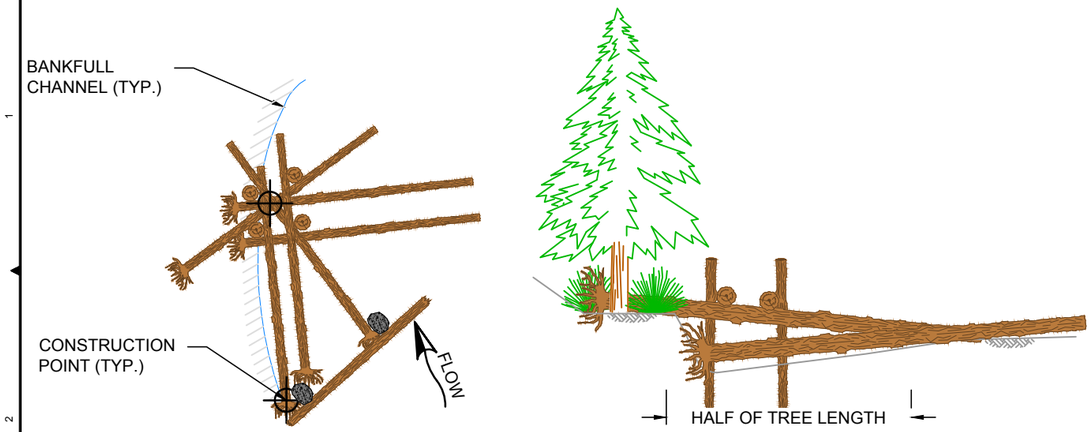
UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

DETAILS
LWD CONSTRUCTION

DWG. NO.: C-502

CREATED: 4/26/2018

SHEET: 19 of 22



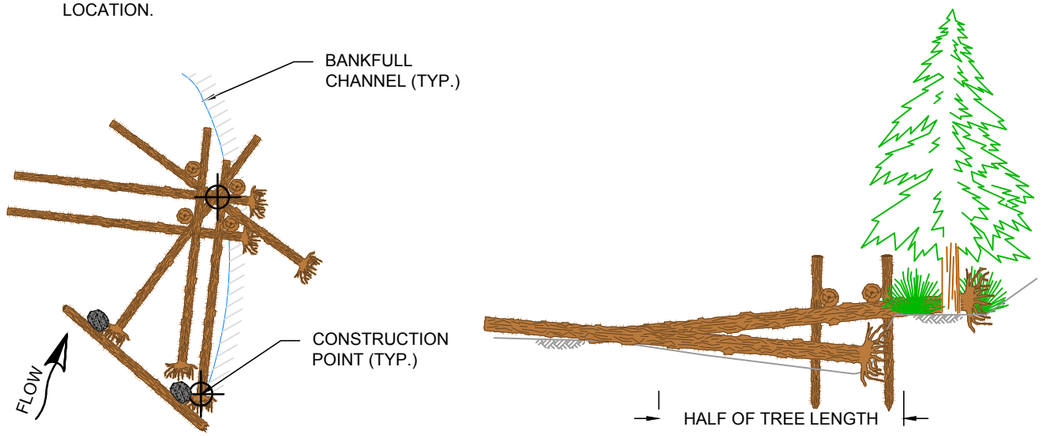
BANK JAM STRUCTURE - LEFT BANK PLAN AND SECTION VIEWS

CONSTRUCTION QUANTITIES:

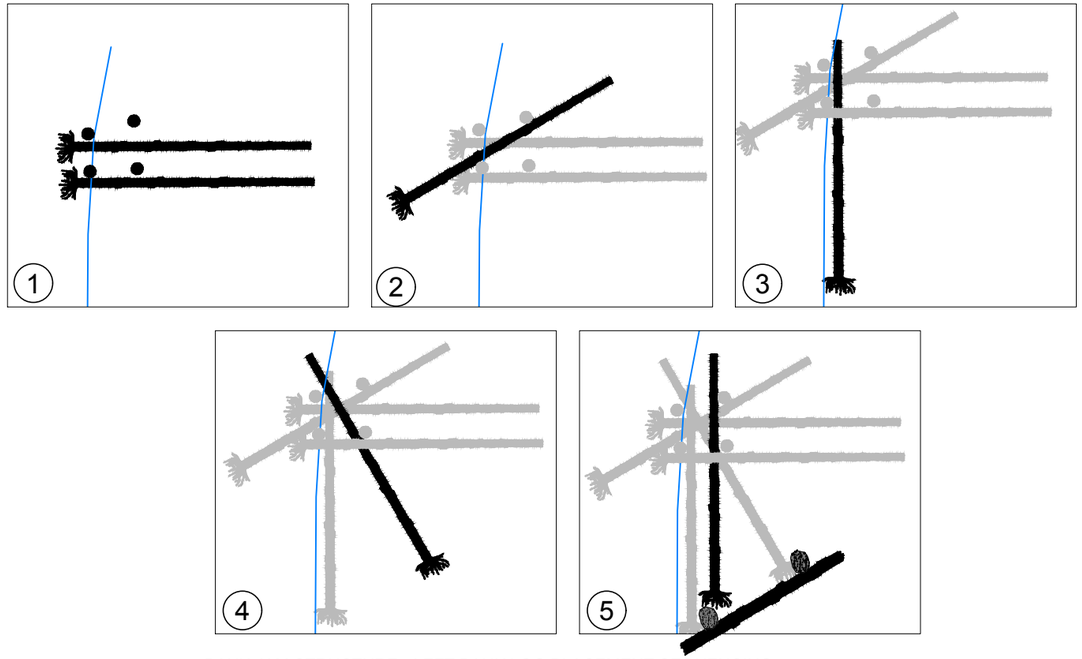
COMPONENT	DESCRIPTION	QUANTITY
LOGS WITH ROOTWAD	24"+ DBH, 40 FT MIN	6
VERTICAL PILING	12" - 18" DBH, 12 FT MIN	4
LOGS WITHOUT ROOTWAD	18"+ DBH, 40 FT MIN	1
BOULDERS	3 FT MINIMUM	2

BANK JAM STRUCTURE NOTES:

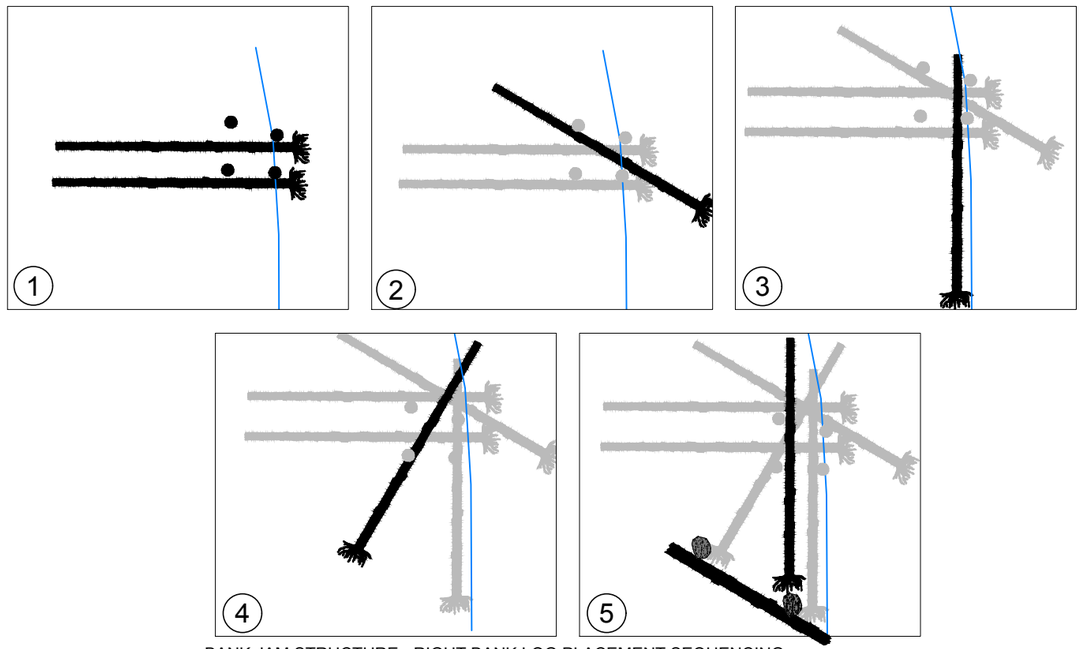
1. FIRST TWO LOGS PLACED SHALL BE LARGEST OF SIX LOGS USED TO CONSTRUCT STRUCTURES.
2. PLACE ROOTWAD OF LOGS PLACED IN SEQUENCE #1 1 TO 2 FEET FROM BANK FACE. PLACE VERTICAL PILINGS TO LOCK LOGS IN PLACE.
3. PLACE ROOTWAD OF THIRD LOG ON TOP OF BANK. PLACE UPSTREAM OF ANY EXISTING VEGETATION.
4. PLACE ROOTWAD OF FOURTH LOG IN CHANNEL THALWEG.
5. PLACE ROOTWAD OF FIFTH LOG ON OPPOSITE EDGE OF WATER.
6. PLACE ROOTWAD OF SIXTH LOG IN CHANNEL THALWEG.
7. ADD BOULDER BALLAST AND BOLT BUMPER LOGS TO BOULDERS.
8. BANKFULL LOCATION WITH RESPECT TO STRUCTURE ORIENTATION IS A TYPICAL REPRESENTATION AND WILL VARY AT EACH STRUCTURE LOCATION.



BANK JAM STRUCTURE - RIGHT BANK PLAN AND SECTION VIEWS



BANK JAM STRUCTURE - LEFT BANK LOG PLACEMENT SEQUENCING



BANK JAM STRUCTURE - RIGHT BANK LOG PLACEMENT SEQUENCING

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Yakama Nation Fisheries

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REV.	DATE	REVISION DESCRIPTION	DRW	ENG	APP
A	5/14/18	CONCEPT LEVEL DESIGN	CM	CEB	JT

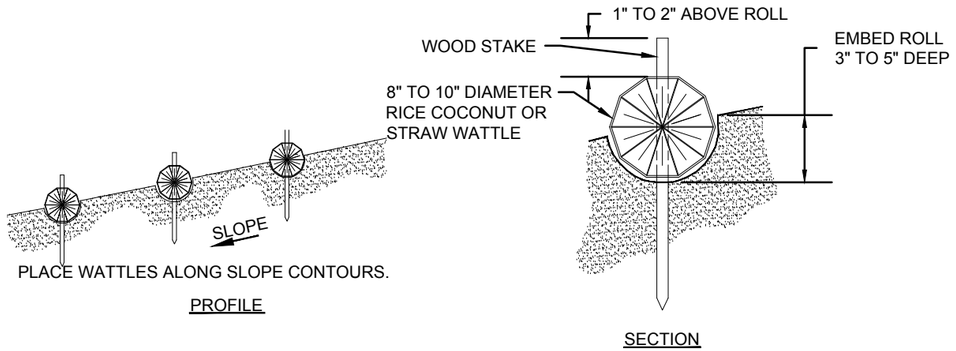
UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

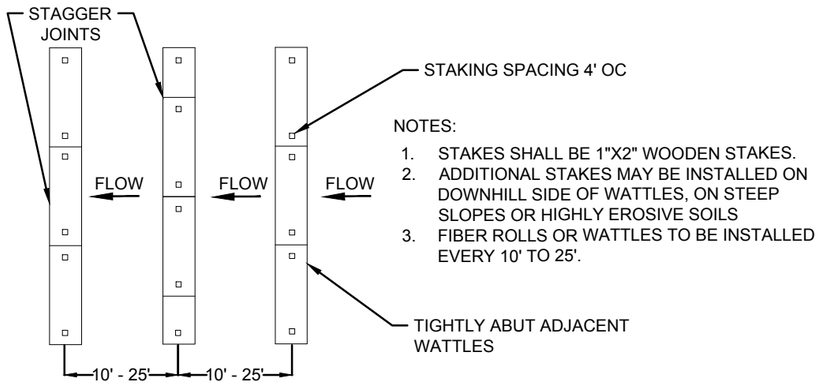
DETAILS
LWD CONSTRUCTION

DWG. NO.: C-503

CREATED: 4/26/2018

SHEET: 20 of 22



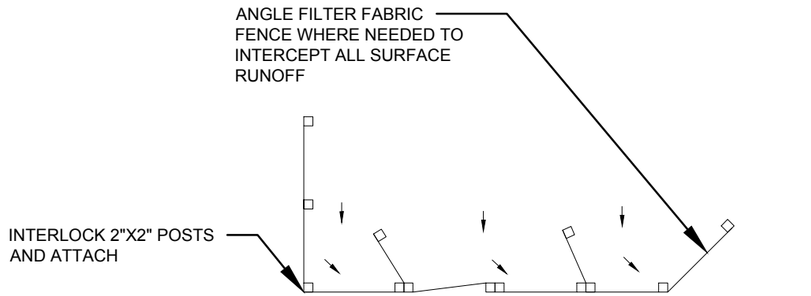


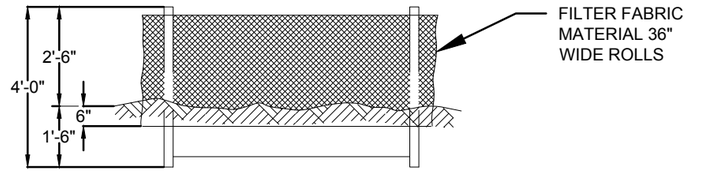
NOTES:

1. STAKES SHALL BE 1"X2" WOODEN STAKES.
2. ADDITIONAL STAKES MAY BE INSTALLED ON DOWNHILL SIDE OF WATTLES, ON STEEP SLOPES OR HIGHLY EROSIVE SOILS
3. FIBER ROLLS OR WATTLES TO BE INSTALLED EVERY 10' TO 25'.

PLAN VIEW

FIBER ROLLS/WATTLES - TYPICAL DETAIL
NTS





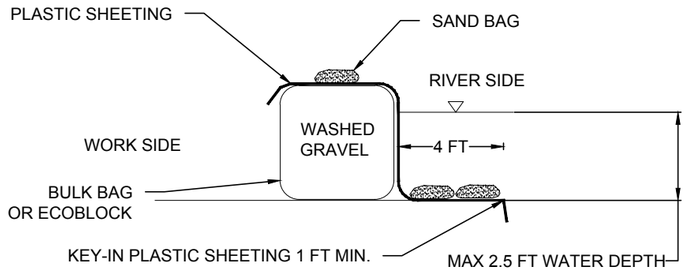
TEMPORARY SILT FENCE TYPICAL DETAIL
NTS

SEDIMENT FENCE NOTES:

1. SEDIMENT FENCE SHALL BE INSTALLED ON A LINE OF EQUAL ELEVATION.
2. BOTTOM EDGE OF SEDIMENT FENCE SHALL BE BURIED MIN 6".
3. POSTS MAY BE 2"X2" FIR, PINE OR STEEL.
4. POSTS TO BE INSTALLED ON UPHILL SIDE OF SLOPE.
5. COMPACT BOTH SIDES OF FILTER FABRIC TRENCH.
6. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATION REACHES 1/3 OF THE MEASURE HEIGHT. SEDIMENT SHALL BE DISPOSED OF TO AN AREA THAT CAN BE PERMANENTLY STABILIZED.

COFFERDAM NOTES:

1. ALL WORK IN CHANNEL SHALL ONLY OCCUR BETWEEN JULY 1 AND AUGUST 15.
2. IN-WATER WORK AREAS SHALL BE ISOLATED BY COFFERDAMS.
3. ISOLATED AREAS REQUIRE FISH SALVAGE ACTIVITIES PRIOR TO THE INITIATION OF CONSTRUCTION.
4. FISH SALVAGE TO BE PERFORMED BY QUALIFIED FISH BIOLOGIST.
5. FILL BULK BAG WITH WASHED GRAVEL.
6. SAND BAGS, ECO-BLOCKS, OR SIMILAR MAY BE SUBSTITUTED FOR WASHED GRAVEL BULK BAG.



TEMPORARY COFFERDAM SECTION TYPICAL DETAIL
NTS

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UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

DETAILS
TESC

DWG. NO.: C-601

CREATED: 4/26/2018

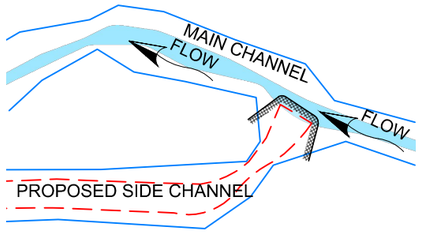
SHEET: 21 of 22

Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\SHEET FILES\10-DETAILS_LWD.DWG
PLOT DETAILS: REISTER, CAMERON May 10, 2018 3:38 PM

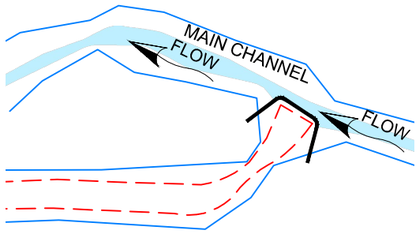
RECOMMENDED DEWATERING AND REWATERING STEPS

CONSTRUCTION SHALL OCCUR IN THE FOLLOWING GENERAL STEPS, WHICH CORRESPOND TO THE STEPS SHOWN ON THIS PLAN SHEET. ALL WORK WITHIN THE ACTIVE CHANNEL SHALL OCCUR WITHIN THE ALLOWABLE FISH WINDOW (TBD).

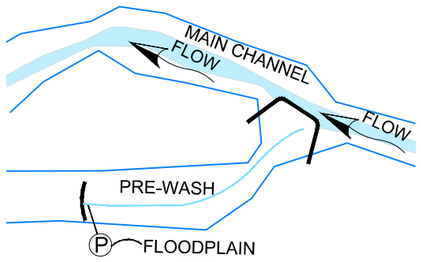
1. INSTALL AND MAINTAIN TESC MEASURES. ESTABLISH WORK AREA ISOLATION AS SHOWN ON THIS SHEET.
2. DEWATERING AND INSTALLATION: INSTALL COFFERDAM AND DEWATER ISOLATED WORK AREA. EXCAVATE SIDE CHANNEL AND INSTALL INSTREAM HABITAT FEATURES AS SHOWN ON THE CONSTRUCTION PLAN SHEETS.
3. REWATERING: PERFORM STAGED REWATERING PROCESS WITH THE RECENTLY EXCAVATED CHANNEL. PREWASH EXCAVATED CHANNEL AND DETAIN AND RELEASE TURBID WATER TO THE FLOODPLAIN RATHER THAN FISH BEARING WATER. PREWASH CONSTRUCTED CHANNEL AND DETAIN AND RELEASE TURBID WATER TO THE FLOODPLAIN RATHER THAN FISH BEARING WATER. INSTALL SEINE AT UPSTREAM END OF CHANNEL TO PREVENT DOWNSTREAM FISH MOVEMENT UNTIL 2/3 OF TOTAL STREAMFLOW IS AVAILABLE IN THE CHANNEL. IN EARLY MORNING, INTRODUCE 1/3 OF FLOW INTO NEW CHANNEL OVER A 1-2 HOUR PERIOD. PERFORM TURBIDITY MONITORING PROTOCOL. INTRODUCE SECOND 1/3 OF THE FLOW OVER THE NEXT 1-2 HOURS. AFTER SECOND 1/3 IS INTRODUCED AND TURBIDITY IS WITHIN 10% OF THE BACKGROUND LEVEL, REMOVE SEINE NETS FROM THE NEW CHANNEL, AND ALLOW DOWNSTREAM FISH MOVEMENT.
4. SITE RESTORATION: STREAM BANKS AND DISTURBED AREA SHALL BE PERMANENTLY STABILIZED AS NECESSARY USING ONSITE NATIVE MATERIAL AND ALL PROJECT WASTE MATERIAL REMOVED.



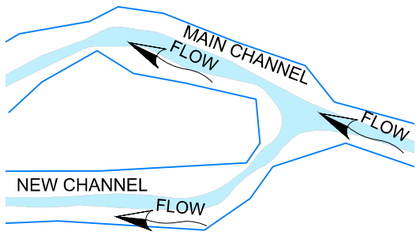
STEP 1



STEP 2



STEP 3



STEP 4

SIDE CHANNEL EXCAVATION WITH LOCAL ISOLATION (TYP.)

(NTS)

LEGEND:
- TOP OF BANK
- LOW FLOW LINE
- FISH BLOCK NET
- EXCAVATION LIMITS
- COFFER DAM
- (P) PUMP

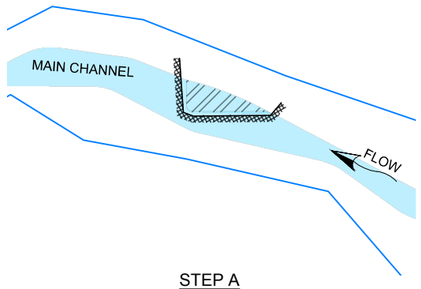
GENERAL FISH SALVAGE AND DEWATERING STEPS

CONSTRUCTION SHALL OCCUR IN THE FOLLOWING GENERAL STEPS, WHICH CORRESPOND TO THE STEPS SHOWN ON THIS PLAN SHEET.

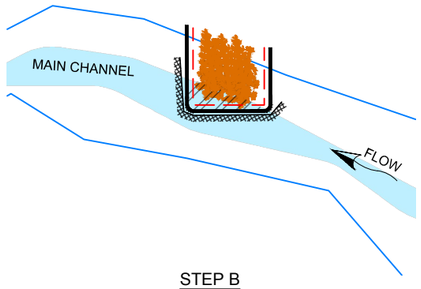
A) ISOLATION AND SALVAGE: ESTABLISH LIMITS OF EXCAVATION, STAGING AREAS AND ACCESS ROADS. INSTALL AND MAINTAIN EROSION AND SEDIMENT CONTROL MEASURES. INSTALL BLOCKNETS AND ESTABLISH WORK AREA ISOLATION AS SHOWN ON THIS SHEET. FISH SALVAGE METHODS SHALL BE IN ACCORDANCE WITH HIP III GUIDELINES.
B) DEWATERING AND INSTALLATION: INSTALL COFFERDAM AND DEWATER ISOLATED WORK AREA. ALL ISOLATION WORK AND DEWATERING ACTIVITIES SHALL BE IN ACCORDANCE WITH HIP III GUIDELINES. EXCAVATE AND INSTALL LARGE WOODY DEBRIS (LWD) STRUCTURES AS SHOWN ON THE THE CONSTRUCTION PLAN SHEETS AND IN ACCORDANCE WITH PROJECT SPECIFICATIONS.
C) REWATERING: WHEN NECESSARY PERFORM STAGED REWATERING PROCESS WITH THE RECENTLY INSTALLED STRUCTURE. PREWASH CHANNEL AND DETAIN AND RELEASE TURBID WATER TO THE FLOODPLAIN RATHER THAN FISH BEARING WATER IN ACCORDANCE WITH STAGED REWATERING PLAN. PERFORM TURBIDITY MONITORING PROTOCOL.
D) SITE RESTORATION: STREAMBANKS AND DISTURB AREA SHALL BE RESTORED AS NECESSARY USING ONSITE NATIVE MATERIAL AND ALL PROJECT WASTE MATERIAL REMOVED. ALL REWATERING ACTIVITIES, CONSTRUCTION, AND POST-CONSTRUCTION CONSERVATION MEASURES SHALL BE IN ACCORDANCE WITH THE PROJECT PLANS AND SPECIFICATIONS.

GENERAL FISH SALVAGE NOTES:

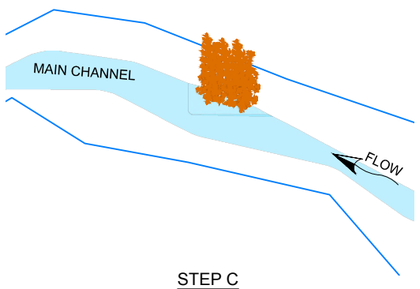
1. PROPOSED PROJECT DESIGN, CONSTRUCTION ACTIVITIES, AND MATERIALS SUBJECT TO APPROVAL BY OWNER.
2. CONTRACTOR TO PROVIDE EROSION AND SEDIMENT CONTROL PLAN PER PROJECT PLAN AND SPECIFICATIONS.
3. CONTRACTOR TO PROVIDE DEWATERING PLAN PER PROJECT PLANS AND SPECIFICATIONS.
4. THE CONTRACTOR SHALL CONSTRUCT THE RESTORATION DESIGN ELEMENTS IN ACCORDANCE WITH THE PLANS STAMPED "ISSUED FOR CONSTRUCTION" AS PROVIDED TO THE CONTRACTOR BY THE OWNER PRIOR TO CONSTRUCTION.
5. ALL WORK WITHIN THE ACTIVE CHANNEL SHALL OCCUR WITHIN THE ALLOWABLE FISH WINDOW (TBD). ALL CONSTRUCTION ACTIVITIES SHALL MINIMIZE DISTURBANCE TO AND MAXIMIZE RE-USE OF EXISTING RIPARIAN VEGETATION.
6. ALL TEMPORARY ACCESS ROUTES SHALL BE LAID OUT TO MINIMIZE DISTURBANCE TO EXISTING VEGETATION AND FINAL LOCATION WILL BE VERIFIED BY OWNER.
7. ALL EROSION CONTROL MEASURES ARE TO INDICATE WHAT IS EXPECTED IN SIMILAR GEOMORPHIC CONDITIONS. CHANNEL CONDITIONS MAY DIFFER DURING CONSTRUCTION AND FIELD ADJUSTMENT SHALL BE COORDINATED WITH PROJECT OWNER.
8. OWNER SHALL BE RESPONSIBLE FOR FISH SALVAGE EFFORTS.
9. CONSTRUCTION WORK IN THE IMMEDIATE VICINITY OF FISH SALVAGE EFFORTS SHALL BE DELAYED (TYPICALLY 2 TO 24 HOURS) DURING SALVAGE. DELAYS MAY BE LONGER IN SOME CASES.



STEP A



STEP B



STEP C

LWD INSTALLATION WITH LOCAL ISOLATION (TYP.)

(NOT TO SCALE)

TETRA TECH
www.tetratech.com
19803 North Creek Parkway
Bothell, Washington 98011
Phone: 425-482-7600 Fax: 425-482-7652

Yakama Nation Fisheries

NOT FOR CONSTRUCTION

PLOTTED AS ANSI B (11" X 17"), PLAN SHEET FULL SIZE ANSI D (22" X 34")

REV.	DATE	REVISION DESCRIPTION	DRW	ENG	APP
A	5/14/18	CONCEPT LEVEL DESIGN	CM	CEB	JT

UPPER STILLWATERS REACH
ENTIAT RIVER RESTORATION DESIGN
CONCEPT LEVEL DESIGN

DEWATERING
AND REWATERING DETAILS

DWG. NO.: C-602

CREATED: 4/26/2018

SHEET: 22 of 22

Z:\PROJECTS\194-6194 UPPER STILLWATERS\10% DESIGN\SHEET FILES\11-DEWATER AND REWATERING.DWG
PLOT DETAILS: REISTER, CAMERON May 10, 2018 3:38 PM