BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

UPPER GRANDE RONDE RIVER - GRANDE RONDE SUBBASIN

FINAL DESIGN DRAWINGS

UPPER GRANDE RONDE RIVER WATERSHED - HYDROLOGICAL UNIT CODE (HUC) 1706010401

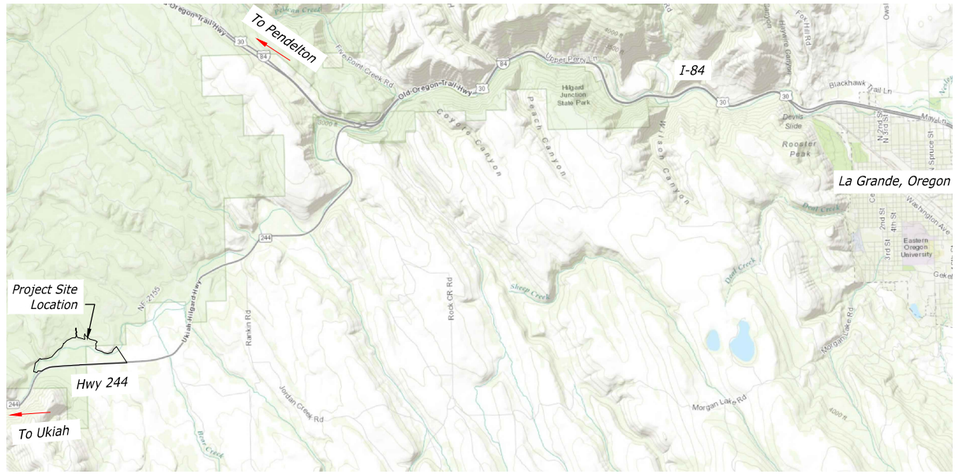


LOCATION MAP

PREPARED FOR:
CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION
ALLEN CHILDS
10507 N. MCALISTER RD.
LA GRANDE, OR 97850
EMAIL: ALLENCHILDS@CTUIR.ORG

PREPARED BY:
U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION,
PACIFIC NORTHWEST REGION
CONTACT: MIKE KNUTSON, P.E.
1150 N. CURTIS RD.
BOISE, ID 83706
EMAIL: MKNUTSON@USBR.GOV

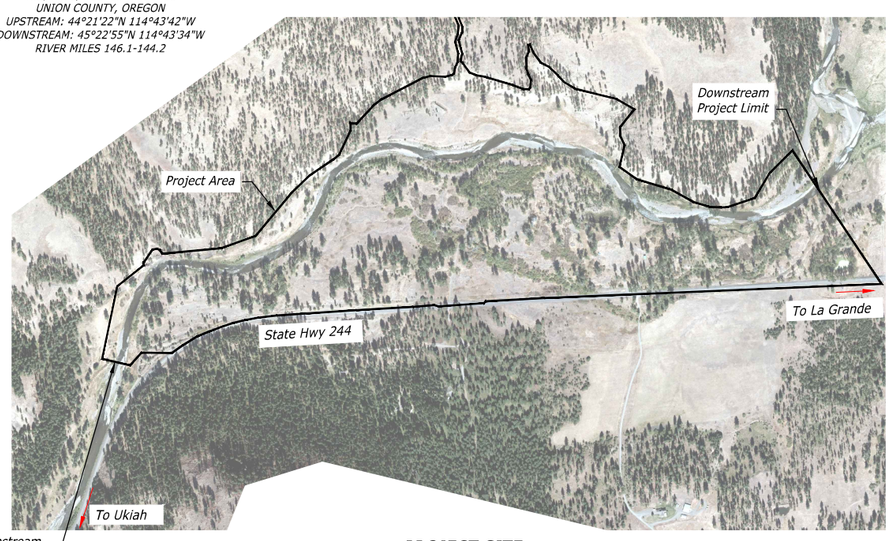
PARTNERS:
BONNEVILLE POWER ADMINISTRATION
GRANDE RONDE MODEL WATERSHED
WALLOWA–WHITMAN NATIONAL FOREST



VICINITY MAP

5000 0 5000 10000 15000
SCALE OF FEET

SITE SUMMARY
T3S, R36E, SEC. 15 & SEC. 16
UNION COUNTY, OREGON
UPSTREAM: 44°21'22"N 114°43'42"W
DOWNSTREAM: 45°22'55"N 114°43'34"W
RIVER MILES 146.1-144.2



PROJECT SITE

600 0 600 1200 1800
SCALE OF FEET

DATE AND TIME PLOTTED
MAY 11, 2018 08:29
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
01_BTS_99PCL_COVER SHEET.DWG

SHEET INDEX

#	DRAWING NO.	SHEET CONTENTS	#	DRAWING NO.	SHEET CONTENTS
1	1678-100-60689	COVER SHEET	76	1678-100-60764	SIDE CHANNEL 10 PLAN AND PROFILE - STA 27+00 to STA 31+50
2	1678-100-60690	GENERAL NOTES AND ABBREVIATIONS	77	1678-100-60765	SIDE CHANNEL 10 PLAN AND PROFILE - STA 31+50 to STA 35+90
3	1678-100-60691	HIP III GENERAL CONSERVATION MEASURES	78	1678-100-60766	VALLEY SECTIONS KEY MAP
4	1678-100-60692	HIP III GENERAL CONSERVATION MEASURES	79	1678-100-60767	VALLEY SECTIONS A-A thru C-C
5	1678-100-60693	EXISTING CONDITIONS AND SURVEY CONTROL	80	1678-100-60768	VALLEY SECTIONS D-D thru F-F
6	1678-100-60694	PROPOSED CONDITIONS	81	1678-100-60769	VALLEY SECTIONS G-G thru I-I
7	1678-100-60695	LARGE WOOD PLAN KEY MAP	82	1678-100-60770	VALLEY SECTIONS J-J thru L-L
8	1678-100-60696	LARGE WOOD PLAN 1	83	1678-100-60771	VALLEY SECTIONS M-M thru O-O
9	1678-100-60697	LARGE WOOD PLAN 2	84	1678-100-60772	VALLEY SECTIONS P-P thru R-R
10	1678-100-60698	LARGE WOOD PLAN 3	85	1678-100-60773	VALLEY SECTIONS S-S thru U-U
11	1678-100-60699	LARGE WOOD PLAN 4	86	1678-100-60774	VALLEY SECTIONS V-V thru X-X
12	1678-100-60700	LARGE WOOD PLAN 5	87	1678-100-60775	VALLEY SECTIONS Y-Y thru AA-AA
13	1678-100-60701	LARGE WOOD PLAN 6	88	1678-100-60776	EARTHWORK CUT AND FILL VOLUMES 1
14	1678-100-60702	LARGE WOOD PLAN 7	89	1678-100-60777	EARTHWORK CUT AND FILL VOLUMES 2
15	1678-100-60703	LARGE WOOD PLAN 8	90	1678-100-60778	TOPSOIL PLACEMENT PLAN
16	1678-100-60704	LARGE WOOD PLAN 9	91	1678-100-60779	FILL MATERIALS AND PLACEMENT DETAILS
17	1678-100-60705	LARGE WOOD PLAN 10	92	1678-100-60780	EXCESS MATERIAL DISPOSAL DETAILS
18	1678-100-60706	LARGE WOOD PLAN 11	93	1678-100-60781	CHANNEL MATERIALS OVERVIEW
19	1678-100-60707	LARGE WOOD PLAN 12	94	1678-100-60782	GLIDE MATERIALS OVERVIEW
20	1678-100-60708	LARGE WOOD PLAN 13	95	1678-100-60783	RIFFLE CONSTRUCTION
21	1678-100-60709	LARGE WOOD PLAN 14	96	1678-100-60784	RIFFLE MATERIALS
22	1678-100-60710	LARGE WOOD PLAN 15	97	1678-100-60785	POINT BAR MATERIALS
23	1678-100-60711	GRADING PLAN KEY MAP	98	1678-100-60786	TYPE A - APEX JAM
24	1678-100-60712	GRADING PLAN 1	99	1678-100-60787	TYPE B1 - MEANDER JAM - UPSTREAM COMPONENT
25	1678-100-60713	GRADING PLAN 2	100	1678-100-60788	TYPE B1 - MEANDER JAM - UPSTREAM COMPONENT SEQUENCING
26	1678-100-60714	GRADING PLAN 3	101	1678-100-60789	TYPE B2 - MEANDER JAM - MIDDLE BEND COMPONENT
27	1678-100-60715	GRADING PLAN 4	102	1678-100-60790	TYPE B2 - MEANDER JAM - MIDDLE BEND COMPONENT SEQUENCING
28	1678-100-60716	GRADING PLAN 5	103	1678-100-60791	TYPE B3 - MEANDER JAM - DOWNSTREAM COMPONENT
29	1678-100-60717	GRADING PLAN 6	104	1678-100-60792	TYPE B3 - MEANDER JAM - DOWNSTREAM COMPONENT SEQUENCING
30	1678-100-60718	MAIN CHANNEL PLAN AND PROFILE KEY MAP	105	1678-100-60793	TYPE B4 - MEANDER JAM - MALLET JAM
31	1678-100-60719	MAIN CHANNEL PLAN AND PROFILE - STA 15+50 to STA 19+50	106	1678-100-60794	TYPE B4 - MEANDER JAM - MALLET JAM SEQUENCING
32	1678-100-60720	MAIN CHANNEL PLAN AND PROFILE - STA 19+50 to STA 24+00	107	1678-100-60795	TYPE C1 - LONGITUDINAL CHANNEL MARGIN JAM
33	1678-100-60721	MAIN CHANNEL PLAN AND PROFILE - STA 24+00 to STA 28+50	108	1678-100-60796	TYPE C2 - ANGLED CHANNEL MARGIN JAM
34	1678-100-60722	MAIN CHANNEL PLAN AND PROFILE - STA 28+50 to STA 33+00	109	1678-100-60797	TYPE D1 - DEFLECTOR JAM (SMALL)
35	1678-100-60723	MAIN CHANNEL PLAN AND PROFILE - STA 33+00 to STA 37+50	110	1678-100-60798	TYPE D2 - DEFLECTOR JAM (LARGE)
36	1678-100-60724	MAIN CHANNEL PLAN AND PROFILE - STA 37+50 to STA 42+00	111	1678-100-60799	TYPE D2 - DEFLECTOR JAM (LARGE) SEQUENCING
37	1678-100-60725	MAIN CHANNEL PLAN AND PROFILE - STA 42+00 to STA 46+50	112	1678-100-60800	TYPE D3 - SPLIT DEFLECTOR JAM
38	1678-100-60726	MAIN CHANNEL PLAN AND PROFILE - STA 46+50 to STA 51+00	113	1678-100-60801	TYPE D3 - SPLIT DEFLECTOR JAM SEQUENCING
39	1678-100-60727	MAIN CHANNEL PLAN AND PROFILE - STA 51+00 to STA 55+50	114	1678-100-60802	TYPE E - SINGLE LOG SWEEPER JAM
40	1678-100-60728	MAIN CHANNEL PLAN AND PROFILE - STA 55+50 to STA 60+00	115	1678-100-60803	TYPE F - FLOODPLAIN ROUGHNESS
41	1678-100-60729	MAIN CHANNEL PLAN AND PROFILE - STA 60+00 to STA 64+50	116	1678-100-60804	TYPE G1 - SC HABITAT - SINGLE LOG
42	1678-100-60730	MAIN CHANNEL PLAN AND PROFILE - STA 64+50 to STA 69+00	117	1678-100-60805	TYPE G2 - SC HABITAT - DOUBLE LOG
43	1678-100-60731	MAIN CHANNEL PLAN AND PROFILE - STA 69+00 to STA 73+50	118	1678-100-60806	TYPE G3 - SC HABITAT - TRIPLE LOG
44	1678-100-60732	MAIN CHANNEL PLAN AND PROFILE - STA 73+50 to STA 78+00	119	1678-100-60807	TYPE H - COVER LOG
45	1678-100-60733	MAIN CHANNEL PLAN AND PROFILE - STA 78+00 to STA 82+50	120	1678-100-60808	TYPE I - ICE CRIB JAM (SMALL)
46	1678-100-60734	MAIN CHANNEL PLAN AND PROFILE - STA 82+50 to STA 87+00	121	1678-100-60809	TYPE I - ICE CRIB JAM (SMALL) SEQUENCING
47	1678-100-60735	MAIN CHANNEL PLAN AND PROFILE - STA 87+00 to STA 91+50	122	1678-100-60810	TYPE J - REINFORCED HABITAT STRUCTURE
48	1678-100-60736	SIDE CHANNEL PLAN AND PROFILE KEY MAP	123	1678-100-60811	BRUSH BANK TREATMENT
49	1678-100-60737	SIDE CHANNEL 1 PLAN AND PROFILE - STA 0+00 to STA 4+50	124	1678-100-60812	ROUGHENED EDGE BANK TREATMENT
50	1678-100-60738	SIDE CHANNEL 1 PLAN AND PROFILE - STA 4+50 to STA 8+53	125	1678-100-60813	BRUSH TRENCH AND LIVE STAKING
51	1678-100-60739	SIDE CHANNEL 2 PLAN AND PROFILE - STA 0+00 to STA 4+50	126	1678-100-60814	ACCESS AND STAGING PLAN KEY MAP
52	1678-100-60740	SIDE CHANNEL 2 PLAN AND PROFILE - STA 4+50 to STA 9+00	127	1678-100-60815	ACCESS AND STAGING PLAN 1
53	1678-100-60741	SIDE CHANNEL 2 PLAN AND PROFILE - STA 9+00 to STA 13+50	128	1678-100-60816	ACCESS AND STAGING PLAN 2
54	1678-100-60742	SIDE CHANNEL 2 PLAN AND PROFILE - STA 13+50 to STA 18+00	129	1678-100-60817	ACCESS AND STAGING PLAN 3
55	1678-100-60743	SIDE CHANNEL 2 PLAN AND PROFILE - STA 18+00 to STA 21+36	130	1678-100-60818	ACCESS AND STAGING - TESC DETAILS
56	1678-100-60744	SIDE CHANNEL MC1A AND 2A PLAN AND PROFILE	131	1678-100-60819	ACCESS AND STAGING - TEMPORARY CROSSINGS
57	1678-100-60745	SIDE CHANNEL 3 PLAN AND PROFILE - STA 0+00 to STA 4+50	132	1678-100-60820	CONSTRUCTION SEQUENCING OVERVIEW PLAN - PHASE 1
58	1678-100-60746	SIDE CHANNEL 3 PLAN AND PROFILE - STA 4+50 to STA 9+00	133	1678-100-60821	CONSTRUCTION SEQUENCING OVERVIEW PLAN - PHASE 2
59	1678-100-60747	SIDE CHANNEL 3 PLAN AND PROFILE - STA 9+00 to STA 13+50	134	1678-100-60822	CONSTRUCTION SEQUENCING PLAN 1
60	1678-100-60748	SIDE CHANNEL 3 PLAN AND PROFILE - STA 13+50 to STA 18+00	135	1678-100-60823	CONSTRUCTION SEQUENCING PLAN 2
61	1678-100-60749	SIDE CHANNEL 3 PLAN AND PROFILE - STA 18+00 to STA 22+43	136	1678-100-60824	CONSTRUCTION SEQUENCING PLAN 3
62	1678-100-60750	SIDE CHANNEL 3A PLAN AND PROFILE - STA 0+00 to STA 5+25	137	1678-100-60825	CONSTRUCTION SEQUENCING PLAN 4
63	1678-100-60751	SIDE CHANNEL 3A PLAN AND PROFILE - STA 5+25 to STA 10+27	138	1678-100-60826	CONSTRUCTION SEQUENCING PLAN 5
64	1678-100-60752	SIDE CHANNEL 3B PLAN AND PROFILE - STA 0+00 to STA 5+13	139	1678-100-60827	CONSTRUCTION SEQUENCING PLAN 6
65	1678-100-60753	SIDE CHANNEL 3C PLAN AND PROFILE - STA 0+00 to STA 2+25	140	1678-100-60828	CONSTRUCTION SEQUENCING PLAN 7
66	1678-100-60754	SIDE CHANNEL 4 PLAN AND PROFILE - STA 0+00 to STA 4+50	141	1678-100-60829	CONSTRUCTION SEQUENCING PLAN 8
67	1678-100-60755	SIDE CHANNEL 4 PLAN AND PROFILE - STA 4+50 to STA 9+95	142	1678-100-60830	CONSTRUCTION SEQUENCING PLAN 9
68	1678-100-60756	SIDE CHANNEL 5 PLAN AND PROFILE - STA 0+00 to STA 4+50	143	1678-100-60831	CONSTRUCTION SEQUENCING PLAN 10
69	1678-100-60757	SIDE CHANNEL 5 PLAN AND PROFILE - STA 4+50 to STA 9+95	144	1678-100-60832	CONSTRUCTION SEQUENCING PLAN 11
70	1678-100-60758	SIDE CHANNEL 10 PLAN AND PROFILE - STA 0+00 to STA 4+50	145	1678-100-60833	CONSTRUCTION SEQUENCING PLAN 12
71	1678-100-60759	SIDE CHANNEL 10 PLAN AND PROFILE - STA 4+50 to STA 9+00	146	1678-100-60834	CONSTRUCTION SEQUENCING PLAN 13
72	1678-100-60760	SIDE CHANNEL 10 PLAN AND PROFILE - STA 9+00 to STA 13+50	147	1678-100-60835	REMOVAL OF WATER PLAN
73	1678-100-60761	SIDE CHANNEL 10 PLAN AND PROFILE - STA 13+50 to STA 18+00	148	1678-100-60836	REMOVAL OF WATER PLAN
74	1678-100-60762	SIDE CHANNEL 10 PLAN AND PROFILE - STA 18+00 to STA 22+50	149	1678-100-60837	OVERALL RESTORATION AND SEEDING PLAN
75	1678-100-60763	SIDE CHANNEL 10 PLAN AND PROFILE - STA 22+50 to STA 27+00	150	1678-100-60838	SEEDING NOTES

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
M. Bergstrom
DRAWN
J. Bryant
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

COVER SHEET

TITLE, SHEET INDEX, & LOCATION MAP

1678-100-60689

SHEET 1 of 6

GENERAL NOTES

1. Work shown in these contract documents will be performed for the Confederated Tribes of the Umatillla Indian Reservation (CTUIR), herein referred to as "Contracting Agency". Contracting Agency's representative assigned by Contracting Agency is herein referred to as the "Contracting Officer".
2. The drawings contained within should not be applied to any project except the one specified.
3. For those portions of full-size drawings (22x34 inches) showing scale bars, the major scale unit equals 1 inch. On comparable portions of half-size drawings (11x17 inches), the major scale unit equals 1/2 inch.
4. Elevations and distances shown are in feet and decimals with contour intervals at 1-foot and 5-foot increments.
5. Horizontal datum is State Plane Coordinate System, Oregon North Zone, NAD83 (2011), International Feet. The vertical datum is NAVD88.
6. Topographic mapping within stream banks was performed by Anderson Perry (La Grande, Oregon) in 2015. Geometry of the stream bed and banks at the time of construction may be different than shown on the Drawings. Topographic mapping outside the stream banks is based on 2013 LIDAR performed by Watershed Sciences (Corvallis, Oregon).
7. Engineer will not be responsible for, or liable for, unauthorized changes to, or use of, the Drawings and Specifications. All changes to the Drawings and Specifications must be approved in writing by the Engineer prior to construction.
8. The design may be adjusted in the field by the Contracting Officer during construction in order to meet site conditions and intended function as approved by the responsible engineer.
9. Funding for this project comes from the Bonneville Power Administration (BPA) and Oregon Watershed Enhancement Board (OWEB). The Contractor shall comply with all BPA and OWEB contract clauses that flow down to it, and to its subcontractors, as noted in the individual clauses and comply with applicable BPA and OWEB Contract construction clauses.
10. Portions of the project site are on public land administered by the Wallowa-Whitman National Forest. The Contractor shall comply with all applicable USFS regulations (C.O. will provide) pertaining to the use and construction on forest roads, trails, and lands.

CONTRACTING AGENCY REQUIREMENTS

1. Contracting Agency will provide implementation monitoring to ensure compliance with the contract documents and the applicable biological opinion, including:
   a. General conservation measures are adequately followed; and
   b. Effects to ESA-listed species are not greater than predicted and incidental take limitations are not exceeded.
2. Contracting Agency will coordinate the receipt, and provide copies to the Contractor, of the Oregon DSL/COE Fill Permit, Oregon Department of Transportation Access Permit, and Cultural Resources Inadvertent Discovery Plan.
3. Contracting Agency will provide all large woody materials (LWM), live stakes, and seed required for use in construction.

CONTRACTOR REQUIREMENTS

1. Contractor shall be responsible for obtaining, at Contractor's expense, all other permits as required by local, state, and Federal agencies including the EPA NPDES permit (SWPPP for Construction Activities).
2. Contractor shall pursue work in a diligent manner and provide all material, labor, and equipment required to ensure timely completion of the project excluding materials provided by Contracting Agency .
3. Contractor shall furnish all material and workmanship necessary for compliance with permit conditions, approving agency (Contracting Agency) requirements, and contract documents.
4. Contractor shall post on-site in a location visible to the public the following documentation:
   a. Contractor's contact name, phone number, and address for the person responsible for oversight;
   b. A description of the hazardous materials that will be used, including inventory, storage, and handling procedures;
   c. Procedures to contain and control a spill of any hazardous material generated, used, or stored on-site, including notification of proper authorities; and
   d. A standing order to cease work in the event of high flows (as defined in specifications) except as necessary to minimize resource damage (above those addressed in the design and implementation plans) or exceedance of take or water quality limitations.
5. Contractor shall construct the project in accordance with the contract documents provided by Contracting Agency. Work shall not be done without the current set of approved construction plans.
6. Contractor shall be solely and completely responsible for the conditions of the Project Site, including safety of all persons and property during performance of the work. The contractor shall ensure that all work conforms to pertinent safety regulations and codes including OSHA.
7. All work within the existing Ordinary High Water and/or the diverted actively flowing channel shall occur within the allowable Oregon Department of Fish and Wildlife in-water work window of July 1st through October 15th.
8. Contractor is responsible for construction surveying. Contracting agency and Engineer will provide field checks of construction staking, layout, and products. All topographic surface files and alignments will be provided to the Contractor in Autodesk Civil3D format.
9. Contractor shall coordinate with Contracting Officer to ensure fish salvage within the Project Site has been accomplished prior to construction activities. Fish salvage will be the responsibility of Contracting Agency.
10. Contractor will complete turbidity monitoring following permit requirements and will furnish data to the Contracting Agency on a weekly basis.
11. Contractor shall avoid, preserve, and protect existing sensitive areas as marked in the field by Contracting Officer.
12. Construction shall minimize disturbance to existing riparian vegetated areas and maximize reuse of existing riparian vegetation.
13. All native materials not used on-site shall be disposed of on-site by Contractor as directed by the Contracting Officer and all non-native materials shall be hauled offsite by Contractor and properly disposed of.

UTILITY NOTES

1. The location of existing utilities shown on the drawings are approximate and have not been field verified. Utility location and protection is the responsibility of the contractor. The contractor shall be responsible for verifying the exact type, owner, location, and elevation of all buried and overhead utilities. It is the contractor's responsibility to perform the work in a safe manner and in accordance with any requirements set forth by the utility owner and applicable laws and regulations.
2. Contractor shall notify utility owners within the limits of construction a minimum of two weeks prior to excavation or other construction activity that may impact the utility. Contractor shall also contact the contracting officer prior to any construction activity in the area. Contractor shall provide access to utility owners for maintenance and work on their utilities during the course of the work.
3. Relocations and/or replacements of existing utilities shall be coordinated by the contractor with the utility owner. Contractor shall contact, schedule, and establish utility shut down times and determine the relocation and/or replacement requirements of existing utilities prior to the start of any work. The utility shall be relocated or replaced to the satisfaction of the utility owner.
4. The size, location and type of underground utilities exposed or modified by the contractor shall be accurately noted and placed on the contractor's as-built drawings.

CARE OF WATER

1. The Contractor is responsible for work area isolation and performing work in compliance with all permits and ESA stipulations which are detailed in BPA's HIP III conservation measures on sheets 60691 and 60692. The Contractor may only work within Ordinary High Water (OHW) during the stipulated in-water work period of July 1st thru October 15th. Typical flow rates by month, during the construction period, are shown below for guidance only, the Contractor is solely responsible for managing water and project site safety.

GRAND RONDE RIVER FLOW STATISTICS AT PROJECT SITE

MONTH	CHANCE OF EXCEEDANCE		
	95%	50%	5%
MAY	183 cfs	634 cfs	1645 cfs
JUNE	65	221 cfs	1083 cfs
JULY	16 cfs	54 cfs	204 cfs
AUGUST	9 cfs	20 cfs	49 cfs
SEPTEMBER	12 cfs	19 cfs	40 cfs
OCTOBER	18 cfs	28 cfs	62 cfs
NOVEMBER	19 cfs	37 cfs	168 cfs

PROJECT SCOPE

The general scope of the project consists of approximately 5,000 feet of main channel construction; approximately 9,500 feet of side channel construction; approximately 1,200 feet of alcove construction; approximately 2,000 feet of floodplain swale construction; and construction of approximately 300 large wood structures along with numerous additional wood placements. The project includes a large earthwork component with approximately 85,000 cubic yards of cut/fill material and sorting/screening of approximately 9,000 cubic yards of excavated material.

ABBREVIATIONS

AC	Acre
BMP	Best Management Practices
B.O.	Biological Opinion
BPA	Boneville Power Administration
CFS	Cubic Feet per Second
CO / C.O.	Contracting Officer
CP	Control Point
CSRO	Columbia-Snake Salmon Recovery Office
CTUIR	Confederated Tribe of the Umatillla Indian Reservation
CWA	Clean Water Act
CY	Cubic Yards
DBH	Diameter at Breast Height
DC	Direct Current
E.	East
E	Electrical
El	Elevation
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FCRPS	Federal Columbia River Power System
F.G.	Finished Grade
HIP III	Habitat Improvement Program III
Hwy	Highway
I	Interstate
IWW	In-Water Work Window
LWM	Large Woody Material
MC	Main Channel
MW	Monitoring Well
N.	North
NAD	North American Datum
NAVD	North American Vertical Datum
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
ODEQ	Oregon Department Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
ODSL	Oregon Department of State Lands
O.O.	Original Grade
OHW	Ordinary High Water
OR	Oregon
OSHA	Occupational Saftey and Health Administration
PDC	Pulsed Direct Current
PH	Phone
PLS/AC	Pure Live Seed per Acre
R	Range
S.	South
SC	Side Channel
Sec.	Section
SHPO	State Historic Preservation Office
STA	Station
SWPPP	Storm Water Pollution Prevention Plan
SY	Square Yards
T	Township
TESC	Temporary Erosion & Sediment Control
TOB	Top of Bank
Typ	Typical
U.S.	United States
USACE	United States Army Corps of Engineers
USBR	United State Bureau of Reclamation
USFS	United States Forest Service
USFWS	United States Fish & Wildlife Service
v	Volts
W.	West
WSE	Water Surface Elevation
YR	Year
µs	Micro-Siemens

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
M. Bergstrom — DRAWN
J. Bryant — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

BOISE, ID 2018-05-14

NOTES

GENERAL NOTES AND ABBREVIATIONS

1678-100-60690

SHEET 2 of 6

DATE AND TIME PLOTTED
MAY 8, 2018 15:18
PLOTTED BY
MBERGSTROM

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
I:\2_BTS_SSPCT_NOTES.DWG

HIP 3 GENERAL AQUATIC CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS

THE ACTIVITIES COVERED UNDER THE HIPIII ARE INTENDED TO PROTECT AND RESTORE FISH AND WILDLIFE HABITAT WITH LONG-TERM BENEFITS TO ESA-LISTED SPECIES. TO MINIMIZE THESE SHORT-TERM ADVERSE EFFECTS AND MAKE THEM PREDICTABLE FOR THE PURPOSES OF PROGRAMMATIC ANALYSIS, BPA WILL INCLUDE IN ALL PROJECTS IMPLEMENTED UNDER THIS HIP III PROPOSED ACTION THE FOLLOWING GENERAL CONSERVATION MEASURES (DEVELOPED IN COORDINATION WITH USFWS AND NMFS).

PROJECT DESIGN AND SITE PREPARATION.

1) STATE AND FEDERAL PERMITS. ALL APPLICABLE REGULATORY PERMITS AND OFFICIAL PROJECT AUTHORIZATIONS WILL BE OBTAINED BEFORE PROJECT IMPLEMENTATION. THESE PERMITS AND AUTHORIZATIONS INCLUDE, BUT ARE NOT LIMITED TO, NATIONAL ENVIRONMENTAL POLICY ACT, NATIONAL HISTORIC PRESERVATION ACT, AND THE APPROPRIATE STATE AGENCY REMOVAL AND FILL PERMIT, USACE CLEAN WATER ACT (CWA) 404 PERMITS, AND CWA SECTION 401 WATER QUALITY CERTIFICATIONS.

2) TIMING OF IN-WATER WORK. APPROPRIATE STATE (OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW), WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), AND MONTANA FISH WILDLIFE AND PARKS (MFWP)) GUIDELINES FOR TIMING OF IN-WATER WORK WINDOWS (IWW) WILL BE FOLLOWED.

A) BULL TROUT - WHILE UTILIZING THE APPROPRIATE STATE DESIGNATED IN-WATER WORK PERIOD WILL LESSEN THE RISK TO BULL TROUT, THIS ALONE MAY NOT BE SUFFICIENT TO ADEQUATELY PROTECT LOCAL BULL TROUT POPULATIONS. THIS IS ESPECIALLY TRUE IF WORK IS OCCURRING IN SPAWNING AND REARING AREAS BECAUSE EGGS, ALEVIN, AND FRY ARE IN THE SUBSTRATE OR CLOSELY ASSOCIATED HABITATS NEARLY YEAR ROUND. SOME AREAS MAY NOT HAVE DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT OR IF THEY DO, THEY MAY CONFLICT WITH WORK WINDOWS FOR SALMON AND STEELHEAD. IF THIS IS THE CASE, OR IF PROPOSED WORK IS TO OCCUR WITHIN BULL TROUT SPAWNING AND REARING HABITATS, PROJECT PROPONENTS WILL CONTACT THE APPROPRIATE USFWS FIELD OFFICE TO INSURE THAT ALL REASONABLE IMPLEMENTATION MEASURES ARE CONSIDERED AND AN APPROPRIATE IN-WATER WORK WINDOW IS BEING USED TO MINIMIZE PROJECT EFFECTS.

B) LAMPREY - THE PROJECT SPONSOR AND/OR THEIR CONTRACTORS WILL AVOID WORKING IN STREAM OR RIVER CHANNELS THAT CONTAIN PACIFIC LAMPREY FROM MARCH 1 TO JULY 1 IN LOW TO MID ELEVATION REACHES (<5,000 FEET). IN HIGH ELEVATION REACHES (>5,000 FEET), THE PROJECT SPONSOR WILL AVOID WORKING IN STREAM OR RIVER CHANNELS FROM MARCH 1 TO AUGUST 1. IF EITHER TIMEFRAME IS INCOMPATIBLE WITH OTHER OBJECTIVES, THE AREA WILL BE SURVEYED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF POSSIBLE. IF LAMPREYS ARE KNOWN TO EXIST, THE PROJECT SPONSOR WILL UTILIZE DEWATERING AND SALVAGE PROCEDURES OUTLINED IN US FISH AND WILDLIFE SERVICE BEST MANAGEMENT PRACTICES TO MINIMIZE ADVERSE EFFECTS TO PACIFIC LAMPREY (2010).

C) EXCEPTIONS TO ODFW, WDFW, MFWP, OR IDFG IN-WATER WORK WINDOWS WILL BE REQUESTED THROUGH THE VARIANCE PROCESS (PAGE 2).

3) CONTAMINANTS. THE PROJECT SPONSOR WILL COMPLETE A SITE ASSESSMENT WITH THE FOLLOWING ELEMENTS TO IDENTIFY THE TYPE, QUANTITY, AND EXTENT OF ANY POTENTIAL CONTAMINATION FOR ANY ACTION THAT INVOLVES EXCAVATION OF MORE THAN 20 CUBIC YARDS OF MATERIAL:

A) A REVIEW OF AVAILABLE RECORDS, SUCH AS FORMER SITE USE, BUILDING PLANS, AND RECORDS OF ANY PRIOR CONTAMINATION EVENTS;

B) A SITE VISIT TO INSPECT THE AREAS USED FOR VARIOUS INDUSTRIAL PROCESSES AND THE CONDITION OF THE PROPERTY;

C) INTERVIEWS WITH KNOWLEDGEABLE PEOPLE, SUCH AS SITE OWNERS, OPERATORS, AND OCCUPANTS, NEIGHBORS, OR LOCAL GOVERNMENT OFFICIALS; AND

D) A SUMMARY, STORED WITH THE PROJECT FILE THAT INCLUDES AN ASSESSMENT OF THE LIKELIHOOD THAT CONTAMINANTS ARE PRESENT AT THE SITE, BASED ON ITEMS 4(A) THROUGH 4(C).

4) SITE LAYOUT AND FLAGGING. PRIOR TO CONSTRUCTION. THE ACTION AREA WILL BE CLEARLY FLAGGED TO IDENTIFY THE FOLLOWING:

A) SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER, SPAWNING AREAS, SPRINGS, AND WETLANDS;

B) EQUIPMENT ENTRY AND EXIT POINTS;

C) ROAD AND STREAM CROSSING ALIGNMENTS;

D) STAGING, STORAGE, AND STOCKPILE AREAS; AND

E) NO-SPRAY AREAS AND BUFFERS.

5) TEMPORARY ACCESS ROADS AND PATHS.

A) EXISTING ACCESS ROADS AND PATHS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER AND LENGTH OF TEMPORARY ACCESS ROADS AND PATHS THROUGH RIPARIAN AREAS AND FLOODPLAINS WILL BE MINIMIZED TO LESSEN SOIL DISTURBANCE AND COMPACTION, AND IMPACTS TO VEGETATION.

B) TEMPORARY ACCESS ROADS AND PATHS WILL NOT BE BUILT ON SLOPES WHERE GRADE, SOIL, OR OTHER FEATURES SUGGEST A LIKELIHOOD OF EXCESSIVE EROSION OR FAILURE. IF SLOPES ARE STEEPER THAN 30%, THEN THE ROAD WILL BE DESIGNED BY A CIVIL ENGINEER WITH EXPERIENCE IN STEEP ROAD DESIGN.

C) THE REMOVAL OF RIPARIAN VEGETATION DURING CONSTRUCTION OF TEMPORARY ACCESS ROADS WILL BE MINIMIZED. WHEN TEMPORARY VEGETATION REMOVAL IS REQUIRED, VEGETATION WILL BE CUT AT GROUND LEVEL (NOT GRUBBED).

D) AT PROJECT COMPLETION, ALL TEMPORARY ACCESS ROADS AND PATHS WILL BE OBLITERATED, AND THE SOIL WILL BE STABILIZED AND REVEGETATED. ROAD AND PATH OBLITERATION REFERS TO THE MOST COMPREHENSIVE DEGREE OF DECOMMISSIONING AND INVOLVES DECOMPACTING THE SURFACE AND DITCH, PULLING THE FILL MATERIAL ONTO THE RUNNING SURFACE, AND RESHAPING TO MATCH THE ORIGINAL CONTOUR.

E) TEMPORARY ROADS AND PATHS IN WET AREAS OR AREAS PRONE TO FLOODING WILL BE OBLITERATED BY THE END OF THE IN-WATER WORK WINDOW.

6) TEMPORARY STREAM CROSSINGS.

A) EXISTING STREAM CROSSINGS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER OF TEMPORARY STREAM CROSSINGS WILL BE MINIMIZED.

B) TEMPORARY BRIDGES AND CULVERTS WILL BE INSTALLED TO ALLOW FOR EQUIPMENT AND VEHICLE CROSSING OVER PERENNIAL STREAMS DURING CONSTRUCTION. TREATED WOOD SHALL NOT BE USED ON TEMPORARY BRIDGE CROSSINGS OR IN LOCATIONS IN CONTACT WITH OR OVER WATER.

C) EQUIPMENT AND VEHICLES WILL CROSS THE STREAM IN THE WET ONLY WHERE:

I. THE STREAMBED IS BEDROCK; OR

II. MATS OR OFF-SITE LOGS ARE PLACED IN THE STREAM AND USED AS A CROSSING.

D) VEHICLES AND MACHINERY WILL CROSS STREAMS AT RIGHT ANGLES TO THE MAIN CHANNEL WHEREVER POSSIBLE.

E) THE LOCATION OF THE TEMPORARY CROSSING WILL AVOID AREAS THAT MAY INCREASE THE RISK OF CHANNEL RE-ROUTING OR AVULSION.

F) POTENTIAL SPAWNING HABITAT (I.E., POOL TAILOUTS) AND POOLS WILL BE AVOIDED TO THE MAXIMUM EXTENT POSSIBLE.

G) NO STREAM CROSSINGS WILL OCCUR AT ACTIVE SPAWNING SITES, WHEN HOLDING ADULT LISTED FISH ARE PRESENT, OR WHEN EGGS OR ALEVINS ARE IN THE GRAVEL. THE APPROPRIATE STATE FISH AND WILDLIFE AGENCY WILL BE CONTACTED FOR SPECIFIC TIMING INFORMATION.

H) AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED AND THE STREAM CHANNEL AND BANKS RESTORED.

7) STAGING, STORAGE, AND STOCKPILE AREAS.

A) STAGING AREAS (USED FOR CONSTRUCTION EQUIPMENT STORAGE, VEHICLE STORAGE, FUELING, SERVICING, AND HAZARDOUS MATERIAL STORAGE) WILL BE 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND, OR ON AN ADJACENT, ESTABLISHED ROAD AREA IN A LOCATION AND MANNER THAT WILL PRECLUDE EROSION INTO OR CONTAMINATION OF THE STREAM OR FLOODPLAIN.

B) NATURAL MATERIALS USED FOR IMPLEMENTATION OF AQUATIC RESTORATION, SUCH AS LARGE WOOD, GRAVEL, AND BOULDERS, MAY BE STAGED WITHIN THE 100-YEAR FLOODPLAIN.

C) ANY LARGE WOOD, TOPSOIL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION WILL BE STOCKPILED FOR USE DURING SITE RESTORATION AT A SPECIFICALLY IDENTIFIED AND FLAGGED AREA.

D) ANY MATERIAL NOT USED IN RESTORATION, AND NOT NATIVE TO THE FLOODPLAIN, WILL BE REMOVED TO A LOCATION OUTSIDE OF THE 100-YEAR FLOODPLAIN FOR DISPOSAL.

8) EQUIPMENT. MECHANIZED EQUIPMENT AND VEHICLES WILL BE SELECTED, OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE EFFECTS ON THE ENVIRONMENT (E.G., MINIMALLY-SIZED, LOW PRESSURE TIRES; MINIMAL HARD-TURN PATHS FOR TRACKED VEHICLES; TEMPORARY MATS OR PLATES WITHIN WET AREAS OR ON SENSITIVE SOILS). ALL VEHICLES AND OTHER MECHANIZED EQUIPMENT WILL BE:

A) STORED, FUELED, AND MAINTAINED IN A VEHICLE STAGING AREA PLACED 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND OR ON AN ADJACENT, ESTABLISHED ROAD AREA;

B) REFUELED IN A VEHICLE STAGING AREA PLACED 150 FEET OR MORE FROM A NATURAL WATERBODY OR WETLAND, OR IN AN ISOLATED HARD ZONE, SUCH AS A PAVED PARKING LOT OR ADJACENT, ESTABLISHED ROAD (THIS MEASURE APPLIES ONLY TO GAS-POWERED EQUIPMENT WITH TANKS LARGER THAN 5 GALLONS);

C) BIODEGRADABLE LUBRICANTS AND FLUIDS SHALL BE USED ON EQUIPMENT OPERATING IN AND ADJACENT TO THE STREAM CHANNEL AND LIVE WATER.

D) INSPECTED DAILY FOR FLUID LEAKS BEFORE LEAVING THE VEHICLE STAGING AREA FOR OPERATION WITHIN 150 FEET OF ANY NATURAL WATER BODY OR WETLAND; AND

E) THOROUGHLY CLEANED BEFORE OPERATION BELOW ORDINARY HIGH WATER, AND AS OFTEN AS NECESSARY DURING OPERATION, TO REMAIN GREASE FREE.

9) EROSION CONTROL. EROSION CONTROL MEASURES WILL BE PREPARED AND CARRIED OUT, COMMENSURATE IN SCOPE WITH THE ACTION, THAT MAY INCLUDE THE FOLLOWING:

A) TEMPORARY EROSION CONTROLS.

I. TEMPORARY EROSION CONTROLS WILL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE ACTION SITE AND APPROPRIATELY INSTALLED DOWNSLOPE OF PROJECT ACTIVITY WITHIN THE RIPARIAN BUFFER AREA UNTIL SITE REHABILITATION IS COMPLETE.

II. IF THERE IS A POTENTIAL FOR ERODED SEDIMENT TO ENTER THE STREAM, SEDIMENT BARRIERS WILL BE INSTALLED AND MAINTAINED FOR THE DURATION OF PROJECT IMPLEMENTATION.

III. TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE FIBER WATTLES, SILT FENCES, JUTE MATTING, WOOD FIBER MULCH AND SOIL BINDER, OR GEOTEXTILES AND GEOSYNTHETIC FABRIC.

IV. SOIL STABILIZATION UTILIZING WOOD FIBER MULCH AND TACKIFIER (HYDRO-APPLIED) MAY BE USED TO REDUCE EROSION OF BARE SOIL IF THE MATERIALS ARE NOXIOUS WEED FREE AND NONTOXIC TO AQUATIC AND TERRESTRIAL ANIMALS, SOIL MICROORGANISMS, AND VEGETATION.

V. SEDIMENT WILL BE REMOVED FROM EROSION CONTROLS ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE CONTROL.

VI. ONCE THE SITE IS STABILIZED AFTER CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES WILL BE REMOVED.

B) EMERGENCY EROSION CONTROLS. THE FOLLOWING MATERIALS FOR EMERGENCY EROSION CONTROL WILL BE AVAILABLE AT THE WORK SITE:

I. A SUPPLY OF SEDIMENT CONTROL MATERIALS; AND

II. AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.

10) DUST ABATEMENT. THE PROJECT SPONSOR WILL DETERMINE THE APPROPRIATE DUST CONTROL MEASURES BY CONSIDERING SOIL TYPE, EQUIPMENT USAGE, PREVAILING WIND DIRECTION, AND THE EFFECTS CAUSED BY OTHER EROSION AND SEDIMENT CONTROL MEASURES. IN ADDITION, THE FOLLOWING CRITERIA WILL BE FOLLOWED:

A) WORK WILL BE SEQUENCED AND SCHEDULED TO REDUCE EXPOSED BARE SOIL SUBJECT TO WIND EROSION.

B) DUST-ABATEMENT ADDITIVES AND STABILIZATION CHEMICALS (TYPICALLY MAGNESIUM CHLORIDE, CALCIUM CHLORIDE SALTS, OR LIGNINSULFONATE) WILL NOT BE APPLIED WITHIN 25 FEET OF WATER OR A STREAM CHANNEL AND WILL BE APPLIED SO AS TO MINIMIZE THE LIKELIHOOD THAT THEY WILL ENTER STREAMS. APPLICATIONS OF LIGNINSULFONATE WILL BE LIMITED TO A MAXIMUM RATE OF 0.5 GALLONS PER SQUARE YARD OF ROAD SURFACE, ASSUMING A 50:50 (LIGNINSULFONATE TO WATER) SOLUTION.

C) APPLICATION OF DUST ABATEMENT CHEMICALS WILL BE AVOIDED DURING OR JUST BEFORE WET WEATHER, AND AT STREAM CROSSINGS OR OTHER AREAS THAT COULD RESULT IN UNFILTERED DELIVERY OF THE DUST ABATEMENT MATERIALS TO A WATERBODY (TYPICALLY THESE WOULD BE AREAS WITHIN 25 FEET OF A WATERBODY OR STREAM CHANNEL; DISTANCES MAY BE GREATER WHERE VEGETATION IS SPARSE OR SLOPES ARE STEEP).

D) SPILL CONTAINMENT EQUIPMENT WILL BE AVAILABLE DURING APPLICATION OF DUST ABATEMENT CHEMICALS.

E) PETROLEUM-BASED PRODUCTS WILL NOT BE USED FOR DUST ABATEMENT.

11) SPILL PREVENTION, CONTROL, AND COUNTER MEASURES. THE USE OF MECHANIZED MACHINERY INCREASES THE RISK FOR ACCIDENTAL SPILLS OF FUEL, LUBRICANTS, HYDRAULIC FLUID, OR OTHER CONTAMINANTS INTO THE RIPARIAN ZONE OR DIRECTLY INTO THE WATER. ADDITIONALLY, UNCURED CONCRETE AND FORM MATERIALS ADJACENT TO THE ACTIVE STREAM CHANNEL MAY RESULT IN ACCIDENTAL DISCHARGE INTO THE WATER. THESE CONTAMINANTS CAN DEGRADE HABITAT, AND INJURE OR KILL AQUATIC FOOD ORGANISMS AND ESA-LISTED SPECIES. THE PROJECT SPONSOR WILL ADHERE TO THE FOLLOWING MEASURES:

A) A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES WILL BE AVAILABLE ON-SITE.

B) WRITTEN PROCEDURES FOR NOTIFYING ENVIRONMENTAL RESPONSE AGENCIES WILL BE POSTED AT THE WORK SITE.

C) SPILL CONTAINMENT KITS (INCLUDING INSTRUCTIONS FOR CLEANUP AND DISPOSAL) ADEQUATE FOR THE TYPES AND QUANTITY OF HAZARDOUS MATERIALS USED AT THE SITE WILL BE AVAILABLE AT THE WORK SITE.

D) WORKERS WILL BE TRAINED IN SPILL CONTAINMENT PROCEDURES AND WILL BE INFORMED OF THE LOCATION OF SPILL CONTAINMENT KITS.

E) ANY WASTE LIQUIDS GENERATED AT THE STAGING AREAS WILL BE TEMPORARILY STORED UNDER AN IMPERVIOUS COVER, SUCH AS A TARPAULIN, UNTIL THEY CAN BE PROPERLY TRANSPORTED TO AND DISPOSED OF AT A FACILITY THAT IS APPROVED FOR RECEIPT OF HAZARDOUS MATERIALS.

12) INVASIVE SPECIES CONTROL. THE FOLLOWING MEASURES WILL BE FOLLOWED TO AVOID INTRODUCTION OF INVASIVE PLANTS AND NOXIOUS WEEDS INTO PROJECT AREAS:

A) PRIOR TO ENTERING THE SITE, ALL VEHICLES AND EQUIPMENT WILL BE POWER WASHED, ALLOWED TO FULLY DRY, AND INSPECTED TO MAKE SURE NO PLANTS, SOIL, OR OTHER ORGANIC MATERIAL ADHERES TO THE SURFACE.

B) WATERCRAFT, WADERS, BOOTS, AND ANY OTHER GEAR TO BE USED IN OR NEAR WATER WILL BE INSPECTED FOR AQUATIC INVASIVE SPECIES.

C) WADING BOOTS WITH FELT SOLES ARE NOT TO BE USED DUE TO THEIR PROPENSITY FOR AIDING IN THE TRANSFER OF INVASIVE SPECIES.

DATE AND TIME PLOTTED
MAY 8, 2018 15:18
PLOTTED BY
MBERGSTROM

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
02_BTS_RPCT_NOTES.DWG

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT
BIRD

J. Nielsen P.E.
DESIGNED
M. Bergstrom
DRAWN
J. Bryant
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

BOISE, ID 2018-05-14

NOTES

HIP III GENERAL CONSERVATION MEASURES

1678-100-60691

SHEET 1

WORK AREA ISOLATION & FISH SALVAGE.

ANY WORK AREA WITHIN THE WETTED CHANNEL WILL BE ISOLATED FROM THE ACTIVE STREAM WHENEVER ESA-LISTED FISH ARE REASONABLY CERTAIN TO BE PRESENT, OR IF THE WORK AREA IS LESS THAN 300-FEET UPSTREAM FROM KNOWN SPAWNING HABITATS. WHEN WORK AREA ISOLATION IS REQUIRED, DESIGN PLANS WILL INCLUDE ALL ISOLATION ELEMENTS, FISH RELEASE AREAS, AND, WHEN A PUMP IS USED TO DEWATER THE ISOLATION AREA AND FISH ARE PRESENT, A FISH SCREEN THAT MEETS NMFS'S FISH SCREEN CRITERIA (NMFS 2011, OR MOST CURRENT). WORK AREA ISOLATION AND FISH CAPTURE ACTIVITIES WILL OCCUR DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS AND DEATH OF SPECIES PRESENT.

- NATIONAL MARINE FISHERIES SERVICE. 2011. ANADROMOUS SALMONID PASSAGE FACILITY DESIGN. NORTHWEST REGION. AVAILABLE ONLINE AT:
HTTP://WWW.NWR.NOAA.GOV/SALMON-HYDROPOWER/FERC/UPLOAD/FISH-PASSAGE-DESIGN.PDF

- U.S. FISH AND WILDLIFE SERVICE. 2010. BEST MANAGEMENT PRACTICES TO MINIMIZE ADVERSE EFFECTS TO PACIFIC LAMPREY.
HTTP://WWW.FWS.GOV/PACIFIC/FISHERIES/SPHABCON/LAMPREY/PDF/BEST%20MANAGEMENT%20PRACTICES%20FOR%20PACIFIC%20LAMPREY%20APRIL%202010%20VERSION.PDF

FOR SALVAGE OPERATIONS IN KNOWN BULL TROUT SPAWNING AND REARING HABITAT, ELECTROFISHING SHALL ONLY OCCUR FROM MAY 1 TO JULY 31. NO ELECTROFISHING WILL OCCUR IN ANY BULL TROUT OCCUPIED HABITAT AFTER AUGUST 15. BULL TROUT ARE VERY TEMPERATURE SENSITIVE AND GENERALLY SHOULD NOT BE ELECTROSHOCKED OR OTHERWISE HANDLED WHEN TEMPERATURES EXCEED 15 DEGREES CELSIUS. SALVAGE ACTIVITIES SHOULD TAKE PLACE DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS TO FISH SPECIES PRESENT.

SALVAGE OPERATIONS WILL FOLLOW THE ORDERING, METHODOLOGIES, AND CONSERVATION MEASURES SPECIFIED BELOW IN STEPS 1 THROUGH 6. STEPS 1 AND 2 WILL BE IMPLEMENTED FOR ALL PROJECTS WHERE WORK AREA ISOLATION IS NECESSARY ACCORDING TO CONDITIONS ABOVE. ELECTROFISHING (STEP 3) CAN BE IMPLEMENTED TO ENSURE ALL FISH HAVE BEEN REMOVED FOLLOWING STEPS 1 AND 2, OR WHEN OTHER MEANS OF FISH CAPTURE MAY NOT BE FEASIBLE OR EFFECTIVE. DEWATERING AND REWATERING (STEPS 4 AND 5) WILL BE IMPLEMENTED UNLESS WETTED IN-STREAM WORK IS DEEMED TO BE MINIMALLY HARMFUL TO FISH, AND IS BENEFICIAL TO OTHER AQUATIC SPECIES. DEWATERING WILL NOT BE CONDUCTED IN AREAS KNOWN TO BE OCCUPIED BY LAMPREY, UNLESS LAMPREYS ARE SALVAGED USING GUIDANCE SET FORTH IN US FISH AND WILDLIFE SERVICE (2010)3.

1) ISOLATE.

A) BLOCK NETS WILL BE INSTALLED AT UPSTREAM AND DOWNSTREAM LOCATIONS AND MAINTAINED IN A SECURED POSITION TO EXCLUDE FISH FROM ENTERING THE PROJECT AREA.

B) BLOCK NETS WILL BE SECURED TO THE STREAM CHANNEL BED AND BANKS UNTIL FISH CAPTURE AND TRANSPORT ACTIVITIES ARE COMPLETE. BLOCK NETS MAY BE LEFT IN PLACE FOR THE DURATION OF THE PROJECT TO EXCLUDE FISH.

C) IF BLOCK NETS REMAIN IN PLACE MORE THAN ONE DAY, THE NETS WILL BE MONITORED AT LEAST DAILY TO ENSURE THEY ARE SECURED TO THE BANKS AND FREE OF ORGANIC ACCUMULATION. IF THE PROJECT IS WITHIN BULL TROUT SPAWNING AND REARING HABITAT, THE BLOCK NETS MUST BE CHECKED EVERY FOUR HOURS FOR FISH IMPINGEMENT ON THE NET. LESS FREQUENT INTERVALS MUST BE APPROVED THROUGH A VARIANCE REQUEST.

D) NETS WILL BE MONITORED HOURLY ANYTIME THERE IS INSTREAM DISTURBANCE.

2) SALVAGE. AS DESCRIBED BELOW, FISH TRAPPED WITHIN THE ISOLATED WORK AREA WILL BE CAPTURED TO MINIMIZE THE RISK OF INJURY, THEN RELEASED AT A SAFE SITE:

A) REMOVE AS MANY FISH AS POSSIBLE PRIOR TO DEWATERING.

B) DURING DEWATERING, ANY REMAINING FISH WILL BE COLLECTED BY HAND OR DIP NETS.

C) SEINES WITH A MESH SIZE TO ENSURE CAPTURE OF THE RESIDING ESA-LISTED FISH WILL BE USED.

D) MINNOW TRAPS WILL BE LEFT IN PLACE OVERNIGHT AND USED IN CONJUNCTION WITH SEINING.

E) IF BUCKETS ARE USED TO TRANSPORT FISH:

I. THE TIME FISH ARE IN A TRANSPORT BUCKET WILL BE LIMITED, AND WILL BE RELEASED AS QUICKLY AS POSSIBLE;

II. THE NUMBER OF FISH WITHIN A BUCKET WILL BE LIMITED BASED ON SIZE, AND FISH WILL BE OF RELATIVELY COMPARABLE SIZE TO MINIMIZE PREDATION;

III. AERATORS FOR BUCKETS WILL BE USED OR THE BUCKET WATER WILL BE FREQUENTLY CHANGED WITH COLD CLEAR WATER AT 15 MINUTE OR MORE FREQUENT INTERVALS.

IV. BUCKETS WILL BE KEPT IN SHADED AREAS OR WILL BE COVERED BY A CANOPY IN EXPOSED AREAS.

V. DEAD FISH WILL NOT BE STORED IN TRANSPORT BUCKETS, BUT WILL BE LEFT ON THE STREAM BANK TO AVOID MORTALITY COUNTING ERRORS.

F) AS RAPIDLY AS POSSIBLE (ESPECIALLY FOR TEMPERATURE-SENSITIVE BULL TROUT), FISH WILL BE RELEASED IN AN AREA THAT PROVIDES ADEQUATE COVER AND FLOW REFUGE. UPSTREAM RELEASE IS GENERALLY PREFERRED, BUT FISH RELEASED DOWNSTREAM WILL BE SUFFICIENTLY OUTSIDE OF THE INFLUENCE OF CONSTRUCTION.

G) SALVAGE WILL BE SUPERVISED BY A QUALIFIED FISHERIES BIOLOGIST EXPERIENCED WITH WORK AREA ISOLATION AND COMPETENT TO ENSURE THE SAFE HANDLING OF ALL FISH.

3) ELECTROFISHING. ELECTROFISHING WILL BE USED ONLY AFTER OTHER SALVAGE METHODS HAVE BEEN EMPLOYED OR WHEN OTHER MEANS OF FISH CAPTURE ARE DETERMINED TO NOT BE FEASIBLE OR EFFECTIVE. IF ELECTROFISHING WILL BE USED TO CAPTURE FISH FOR SALVAGE, THE SALVAGE OPERATION WILL BE LED BY AN EXPERIENCED FISHERIES BIOLOGIST AND THE FOLLOWING GUIDELINES WILL BE FOLLOWED:

A) THE NMFS'S ELECTROFISHING GUIDELINES (NMFS 2000).

B) ONLY DIRECT CURRENT (DC) OR PULSED DIRECT CURRENT (PDC) WILL BE USED AND CONDUCTIVITY MUST BE TESTED.

I. IF CONDUCTIVITY IS LESS THAN 100 MS, VOLTAGE RANGES FROM 900 TO 1100 WILL BE USED.

II. FOR CONDUCTIVITY RANGES BETWEEN 100 TO 300 MS, VOLTAGE RANGES WILL BE 500 TO 800.

III. FOR CONDUCTIVITY GREATER THAN 300 MS, VOLTAGE WILL BE LESS THAN 400.

C) ELECTROFISHING WILL BEGIN WITH A MINIMUM PULSE WIDTH AND RECOMMENDED VOLTAGE AND THEN GRADUALLY INCREASE TO THE POINT WHERE FISH ARE IMMOBILIZED.

D) THE ANODE WILL NOT INTENTIONALLY CONTACT FISH.

E) ELECTROFISHING SHALL NOT BE CONDUCTED WHEN THE WATER CONDITIONS ARE TURBID AND VISIBILITY IS POOR. THIS CONDITION MAY BE EXPERIENCED WHEN THE SAMPLER CANNOT SEE THE STREAM BOTTOM IN ONE FOOT OF WATER.

F) IF MORTALITY OR OBVIOUS INJURY (DEFINED AS DARK BANDS ON THE BODY, SPINAL DEFORMATIONS, DE-SCALING OF 25% OR MORE OF BODY, AND TORPIDITY OR INABILITY TO MAINTAIN UPRIGHT ATTITUDE AFTER SUFFICIENT RECOVERY TIME) OCCURS DURING ELECTROFISHING, OPERATIONS WILL BE IMMEDIATELY DISCONTINUED, MACHINE SETTINGS, WATER TEMPERATURE AND CONDUCTIVITY CHECKED, AND PROCEDURES ADJUSTED OR ELECTROFISHING POSTPONED TO REDUCE MORTALITY.

4) DEWATER. DEWATERING, WHEN NECESSARY, WILL BE CONDUCTED OVER A SUFFICIENT PERIOD OF TIME TO ALLOW SPECIES TO NATURALLY MIGRATE OUT OF THE WORK AREA AND WILL BE LIMITED TO THE SHORTEST LINEAR EXTENT PRACTICABLE.

A) DIVERSION AROUND THE CONSTRUCTION SITE MAY BE ACCOMPLISHED WITH A COFFER DAM AND A BY-PASS CULVERT OR PIPE, OR A LINED, NON-ERODIBLE DIVERSION DITCH. WHERE GRAVITY FEED IS NOT POSSIBLE, A PUMP MAY BE USED, BUT MUST BE OPERATED IN SUCH A WAY AS TO AVOID REPETITIVE DEWATERING AND REWATERING OF THE SITE. IMPOUNDMENT BEHIND THE COFFERDAM MUST OCCUR SLOWLY THROUGH THE TRANSITION, WHILE CONSTANT FLOW IS DELIVERED TO THE DOWNSTREAM REACHES.

B) ALL PUMPS WILL HAVE FISH SCREENS TO AVOID JUVENILE FISH IMPINGEMENT OR ENTRAINMENT, AND WILL BE OPERATED IN ACCORDANCE WITH NMFS'S CURRENT FISH SCREEN CRITERIA (NMFS 20114, OR MOST RECENT VERSION). IF THE PUMPING RATE EXCEEDS 3 CUBIC FEET SECOND (CFS), A NMFS HYDRO FISH PASSAGE REVIEW WILL BE NECESSARY.

C) DISSIPATION OF FLOW ENERGY AT THE BYPASS OUTFLOW WILL BE PROVIDED TO PREVENT DAMAGE TO RIPARIAN VEGETATION OR STREAM CHANNEL.

D) SAFE REENTRY OF FISH INTO THE STREAM CHANNEL WILL BE PROVIDED, PREFERABLY INTO POOL HABITAT WITH COVER, IF THE DIVERSION ALLOWS FOR DOWNSTREAM FISH PASSAGE.

E) SEEPAGE WATER WILL BE PUMPED TO A TEMPORARY STORAGE AND TREATMENT SITE OR INTO UPLAND AREAS TO ALLOW WATER TO PERCOLATE THROUGH SOIL OR TO FILTER THROUGH VEGETATION PRIOR TO REENTERING THE STREAM CHANNEL.

4 NATIONAL MARINE FISHERIES SERVICE. 2011. ANADROMOUS SALMONID PASSAGE FACILITY DESIGN. NORTHWEST REGION. AVAILABLE ONLINE AT:
HTTP://WWW.NWR.NOAA.GOV/SALMON-HYDROPOWER/FERC/UPLOAD/FISH-PASSAGE-DESIGN.PDF

5) SALVAGE NOTICE. MONITORING AND RECORDING OF FISH PRESENCE, HANDLING, AND MORTALITY MUST OCCUR DURING THE DURATION OF THE ISOLATION, SALVAGE, ELECTROFISHING, DEWATERING, AND REWATERING OPERATIONS. ONCE OPERATIONS ARE COMPLETED, A SALVAGE REPORT WILL DOCUMENT PROCEDURES USED, ANY FISH INJURIES OR DEATHS (INCLUDING NUMBERS OF FISH AFFECTED), AND CAUSES OF ANY DEATHS.

CONSTRUCTION AND POST-CONSTRUCTION CONSERVATION MEASURES.

1) FISH PASSAGE. FISH PASSAGE WILL BE PROVIDED FOR ANY ADULT OR JUVENILE FISH LIKELY TO BE PRESENT IN THE ACTION AREA DURING CONSTRUCTION, UNLESS PASSAGE DID NOT EXIST BEFORE CONSTRUCTION OR THE STREAM IS NATURALLY IMPASSABLE AT THE TIME OF CONSTRUCTION. IF THE PROVISION OF TEMPORARY FISH PASSAGE DURING CONSTRUCTION WILL INCREASE NEGATIVE EFFECTS ON AQUATIC SPECIES OF INTEREST OR THEIR HABITAT, A VARIANCE CAN BE REQUESTED FROM THE NMFS BRANCH CHIEF AND THE FWS FIELD OFFICE SUPERVISOR. PERTINENT INFORMATION, SUCH AS THE SPECIES AFFECTED, LENGTH OF STREAM REACH AFFECTED, PROPOSED TIME FOR THE PASSAGE BARRIER, AND ALTERNATIVESCONSIDERED, WILL BE INCLUDED IN THE VARIANCE REQUEST.

2) CONSTRUCTION AND DISCHARGE WATER.

A) SURFACE WATER MAY BE DIVERTED TO MEET CONSTRUCTION NEEDS, BUT ONLY IF DEVELOPED SOURCES ARE UNAVAILABLE OR INADEQUATE.

B) DIVERSIONS WILL NOT EXCEED 10% OF THE AVAILABLE FLOW.

C) ALL CONSTRUCTION DISCHARGE WATER WILL BE COLLECTED AND TREATED USING THE BEST AVAILABLE TECHNOLOGY APPLICABLE TO SITE CONDITIONS.

D) TREATMENTS TO REMOVE DEBRIS, NUTRIENTS, SEDIMENT, PETROLEUM HYDROCARBONS, METALS AND OTHER POLLUTANTS LIKELY TO BE PRESENT WILL BE PROVIDED.

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
M. Bergstrom
DRAWN
J. Bryant
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

BOISE, ID *2018-05-14*

NOTES

HIP III GENERAL CONSERVATION MEASURES

1678-100-60692

SHEET 1

DATE AND TIME PLOTTED
MAY 8, 2018 15:18
PLOTTED BY
MBERGSTROM

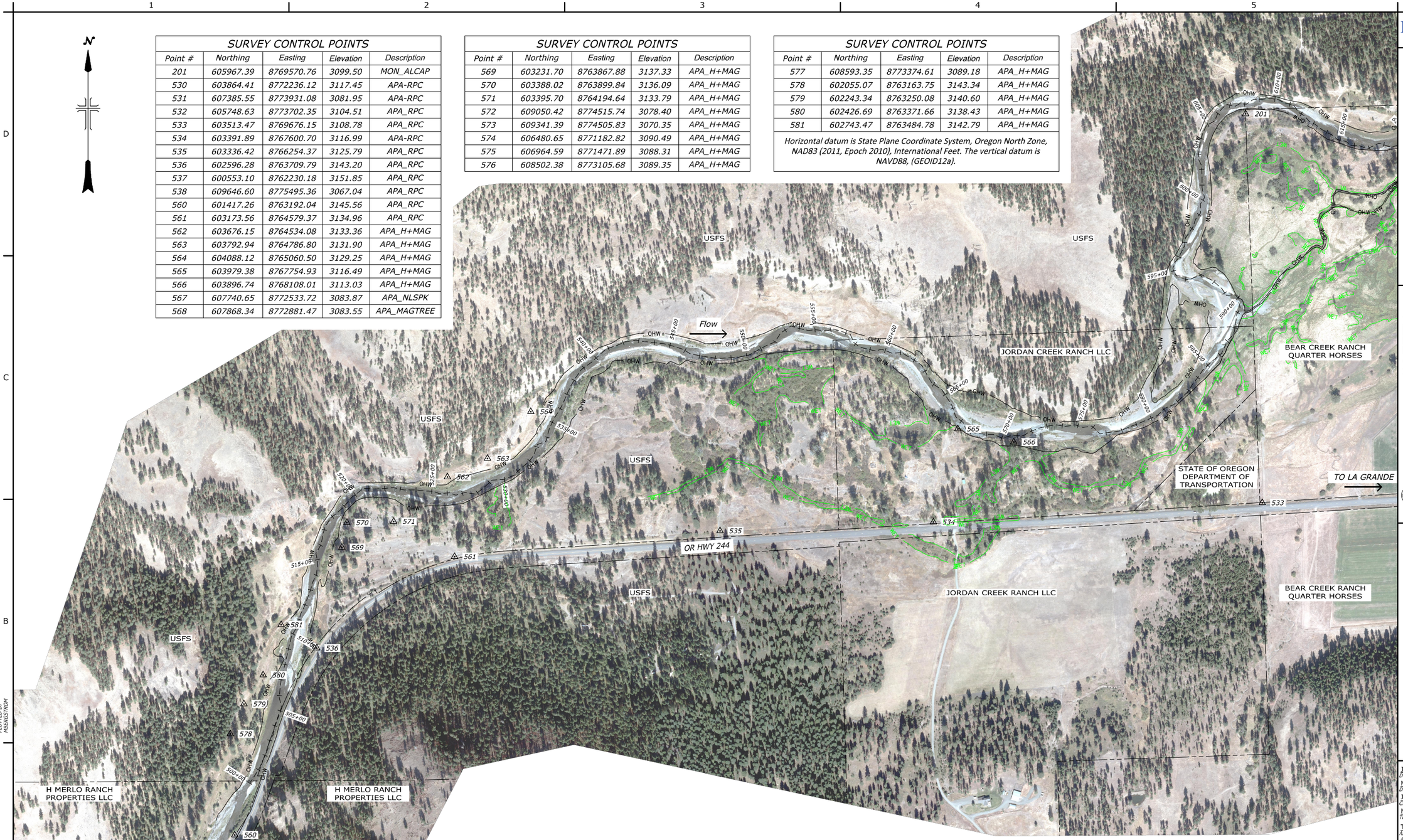
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
02_BTS_93PCT_NOTES.DWG

SURVEY CONTROL POINTS				
Point #	Northing	Easting	Elevation	Description
201	605967.39	8769570.76	3099.50	MON_ALCAP
530	603864.41	8772236.12	3117.45	APA-RPC
531	607385.55	8773931.08	3081.95	APA-RPC
532	605748.63	8773702.35	3104.51	APA_RPC
533	603513.47	8769676.15	3108.78	APA_RPC
534	603391.89	8767600.70	3116.99	APA-RPC
535	603336.42	8766254.37	3125.79	APA_RPC
536	602596.28	8763709.79	3143.20	APA_RPC
537	600553.10	8762230.18	3151.85	APA_RPC
538	609646.60	8775495.36	3067.04	APA_RPC
560	601417.26	8763192.04	3145.56	APA_RPC
561	603173.56	8764579.37	3134.96	APA_RPC
562	603676.15	8764534.08	3133.36	APA_H+MAG
563	603792.94	8764786.80	3131.90	APA_H+MAG
564	604088.12	8765060.50	3129.25	APA_H+MAG
565	603979.38	8767754.93	3116.49	APA_H+MAG
566	603896.74	8768108.01	3113.03	APA_H+MAG
567	607740.65	8772533.72	3083.87	APA_NLSPK
568	607868.34	8772881.47	3083.55	APA_MAGTREE

SURVEY CONTROL POINTS				
Point #	Northing	Easting	Elevation	Description
569	603231.70	8763867.88	3137.33	APA_H+MAG
570	603388.02	8763899.84	3136.09	APA_H+MAG
571	603395.70	8764194.64	3133.79	APA_H+MAG
572	609050.42	8774515.74	3078.40	APA_H+MAG
573	609341.39	8774505.83	3070.35	APA_H+MAG
574	606480.65	8771182.82	3090.49	APA_H+MAG
575	606964.59	8771471.89	3088.31	APA_H+MAG
576	608502.38	8773105.68	3089.35	APA_H+MAG

SURVEY CONTROL POINTS				
Point #	Northing	Easting	Elevation	Description
577	608593.35	8773374.61	3089.18	APA_H+MAG
578	602055.07	8763163.75	3143.34	APA_H+MAG
579	602243.34	8763250.08	3140.60	APA_H+MAG
580	602426.69	8763371.66	3138.43	APA_H+MAG
581	602743.47	8763484.78	3142.79	APA_H+MAG

Horizontal datum is State Plane Coordinate System, Oregon North Zone, NAD83 (2011, Epoch 2010), International Feet. The vertical datum is NAVD88, (GEOID12a).



EXISTING CONDITION PLAN AND SURVEY CONTROL

300 0 300 600 900
SCALE OF FEET

NOTES

1. *Property lines based on Union County Assessor's Office TaxlotParcels_UnionCounty GIS Shapefile published 05/31/2001. Property Ownership based on 2008 information from Union County Assessor's Office. This dataset was not prepared for or intended to be suitable for legal, engineering, or surveying purposes.*
2. *Survey control was established by Anderson Perry (La Grande, Oregon) in 2015. The Contractor shall check and verify primary control and resolve discrepancies with the C.O. prior to beginning work. Copies of the survey will be provided upon request.*

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
M. Bergstrom — DRAWN
J. Nielsen P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

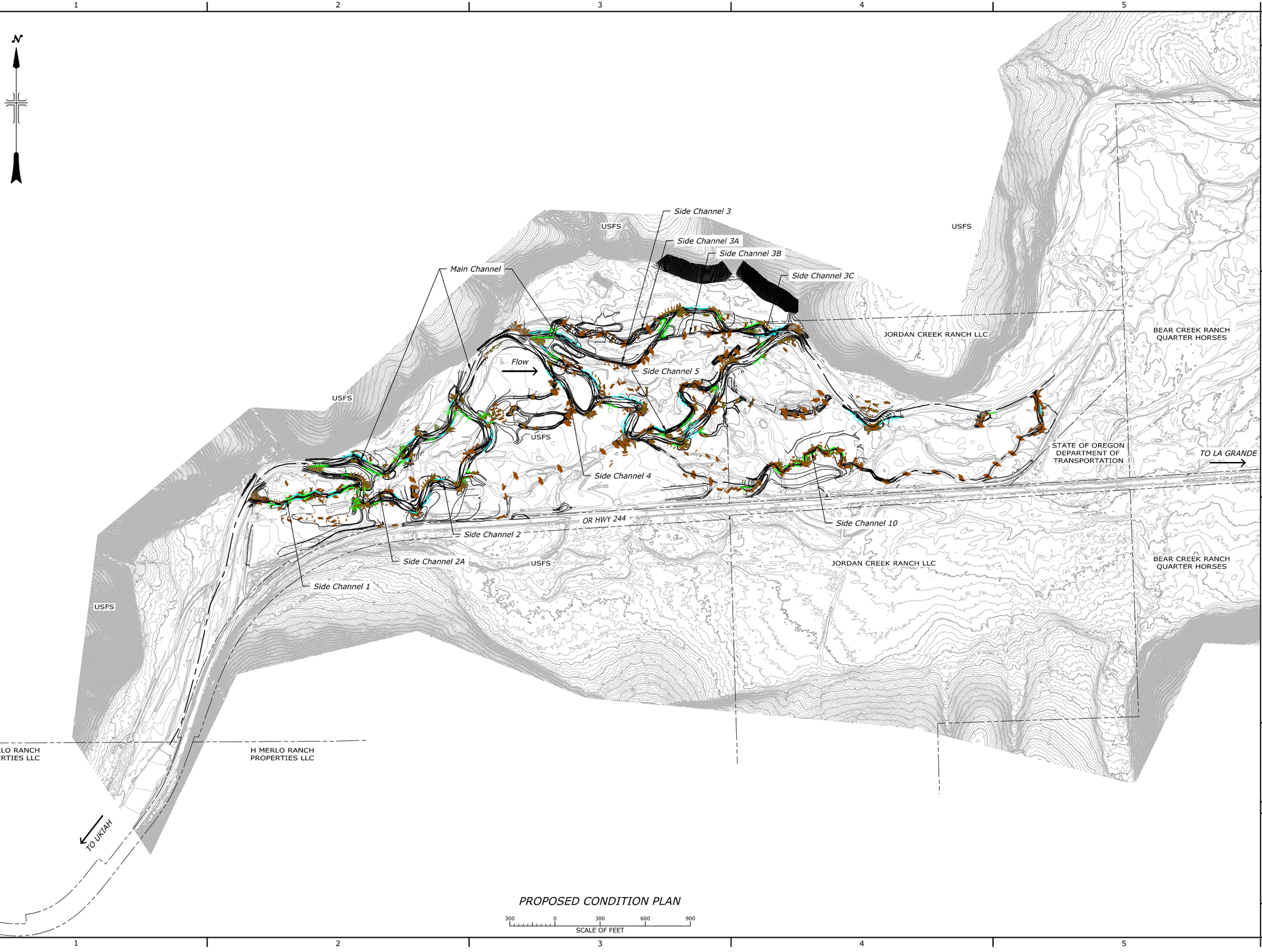
EXISTING CONDITION PLAN AND SURVEY CONTROL

1678-100-60693

SHEET 5 OF 6

DATE AND TIME PLOTTED
MAY 8, 2018 15:05
PLOTTED BY
MBERGSTROM

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_SSPCT_EXISTING.DWG



PROPOSED CONDITION PLAN

300 0 300 600 900
SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
M. Bergstrom
DRAWN
J. Bryant
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

PROPOSED CONDITION PLAN

1678-100-60694

SHEET 6 of 6

DATE AND TIME PLOTTED
MAY 8, 2018 15:02
PLOTTED BY
MBERGSTROM

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_9SPCT_PROPOSED.DWG

LEGEND

- Property Line
- Thalweg
- OHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench

N

USFS
Sheet 60703
Sheet 60707
Sheet 60702
SC 3A
SC 3C
JORDAN CREEK RANCH LLC
Sheet 60708
Sheet 60710
Sheet 60699
SC 3B
SC 3
SC 5
Sheet 60704
SC 4
Main Channel
Sheet 60698
Sheet 60701
Flow
Main Channel
OREGON DEPARTMENT OF TRANSPORTATION
TO LA GRANDE
Sheet 60705
SC 10
SC 1
SC 2
OR HWY 244
Sheet 60706
Sheet 60709
Sheet 60696
Sheet 60700
BEAR CREEK RANCH QUARTER HORSES
Sheet 60697
USFS
JORDAN CREEK RANCH LLC
Main Channel
H MERLO RANCH PROPERTIES LLC
H MERLO RANCH PROPERTIES LLC
TO UKIAH

LARGE WOOD KEY MAP

300 0 300 600 900
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
NICHOLAS T. DAVIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

LARGE WOOD KEY MAP

1678-100-60695
SHEET 1 of 16

DATE AND TIME PLOTTED
5/10/2018 8:17 AM
PLOTTED BY
NICK DAVIS

CAD SYSTEM
Autodesk Civil 3D 2016 22.0s (LMS Tech)
CAD FILENAME
BTS_HABITAT PLAN.DWG

Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Main Channel							
MC-1	17+45	Right	D3	Split Deflector	3137.00	3126.50	60800

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	0 EA	60803
G	Cover Logs	0 EA	60807
	Brush Bank Treatment	0 LF	60811
	Roughened Edge Bank Treatment	0 LF	60812
	Live Brush Trench	0 EA	60813

LEGEND

- Property Line
- Thalweg
- OHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench



LARGE WOOD PLAN 1

40 0 40 80 120
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DAVIS
10/17/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2019-05-14

LARGE WOOD PLAN 1

1678-100-60696

SHEET 2 of 16

DATE AND TIME PLOTTED
5/7/2019 9:18 AM
PLOTTED BY
NICK DAVIS

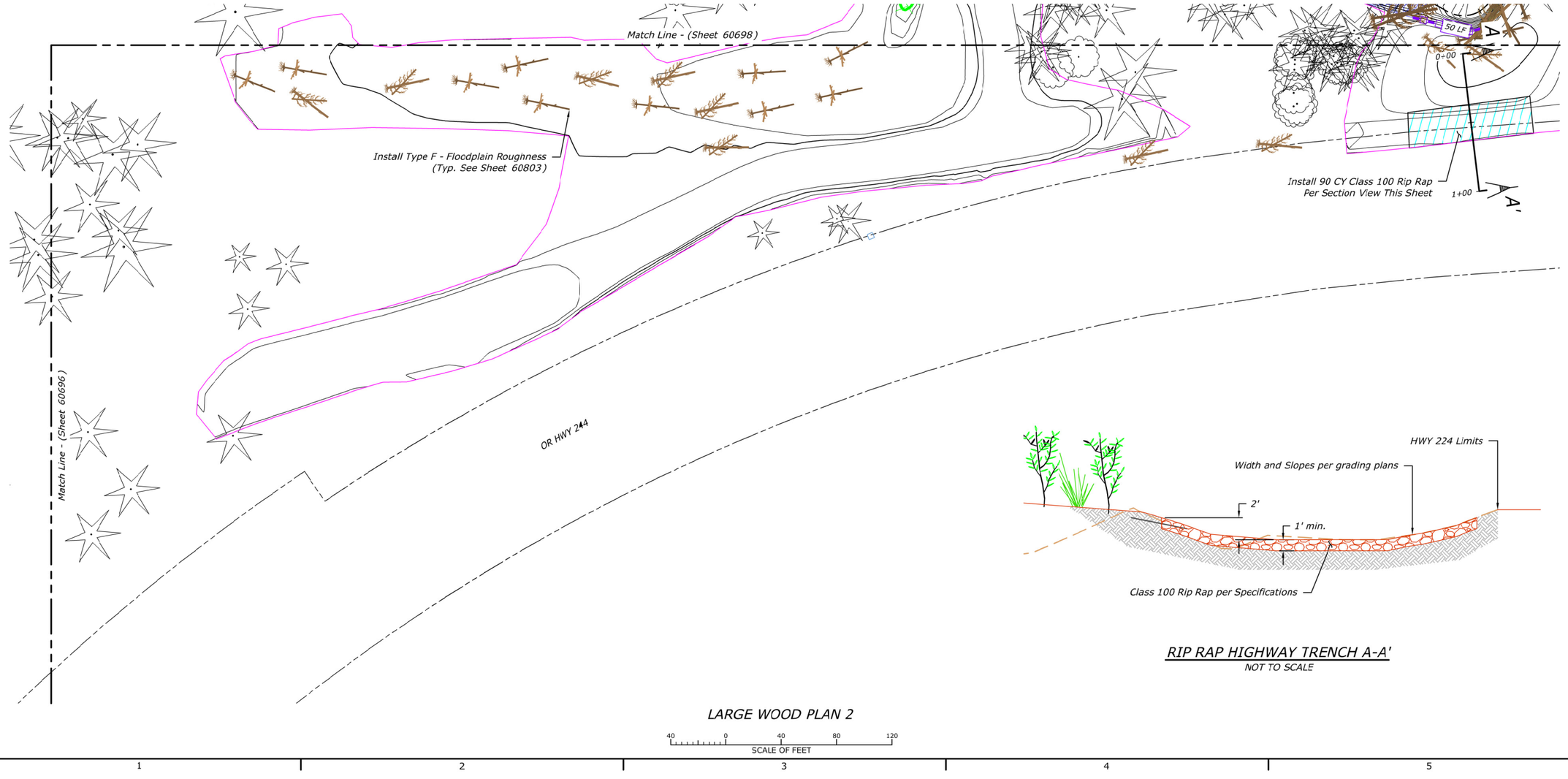
CAD SYSTEM
AutoCAD Civil 3D 2018 (LMS Tech)
CAD FILENAME
BTS_HABITAT PLAN.DWG

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	20 EA	60803
G	Cover Logs	0 EA	60807
	Brush Bank Treatment	0 LF	60811
	Roughened Edge Bank Treatment	0 LF	60812
	Live Brush Trench	0 EA	60813

N

LEGEND

- Property Line
- Thalweg
- CHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench



RIP RAP HIGHWAY TRENCH A-A'
NOT TO SCALE

LARGE WOOD PLAN 2

40 0 40 80 120
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

LARGE WOOD PLAN 2

1678-100-60697

SHEET 3 of 16

DATE AND TIME PLOTTED
5/10/2018 9:18 AM
PLOTTED BY
NICK DANIS

CAD SYSTEM
ARCGIS Desktop 10.2.2
CAD FILENAME
BTS_HABITAT PLAN.DWG

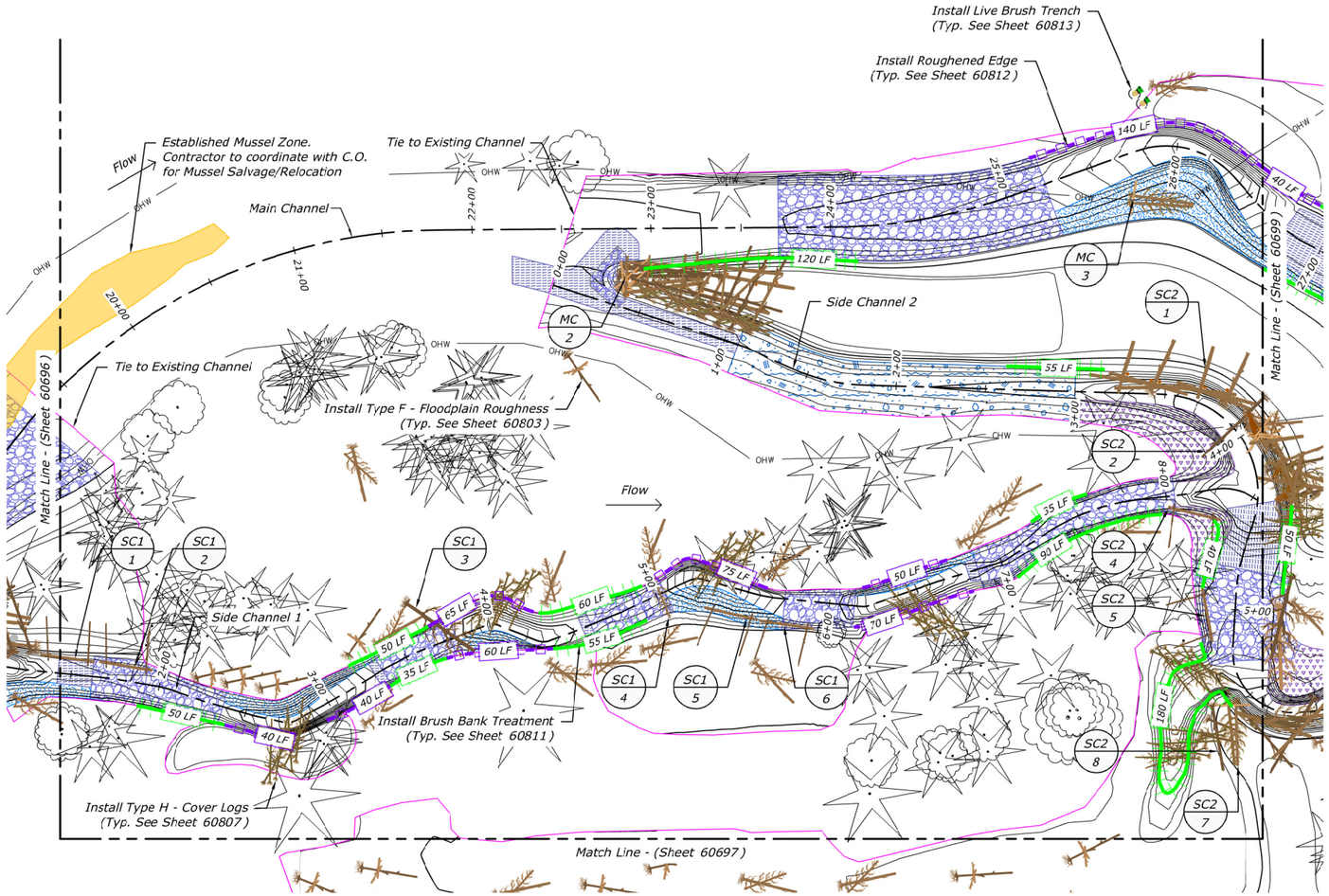
Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Main Channel							
MC-2	22+31	Right	I	Ice Crib Jam	3136.00	3129.00	60808
MC-3	25+13	Right	A	Apex	-	-	60786
Side Channel 1							
SC1-1	1+47	Left	C1	Longitudinal Channel Margin	-	-	60795
SC1-2	1+80	Left	C1	Longitudinal Channel Margin	-	-	60795
SC1-3	3+76	Left	E	Sweeper (Single)	-	-	60802
SC1-4	5+03	Sill Log	G1	SC Habitat - Single	-	-	60804
SC1-5	5+48	Right	C1	Longitudinal Channel Margin	-	-	60795
SC1-6	5+78	Right	C1	Longitudinal Channel Margin	-	-	60795
Side Channel 2							
SC2-1	3+62	Left	B1	Meander Upstream	3133.30	3126.30	60787
SC2-2	4+10	Left	B2	Meander Middle	3133.25	3124.50	60789
SC2-4	4+56	Right	C1	Longitudinal Channel Margin	-	-	60795
SC2-5	5+04	Right	C1	Longitudinal Channel Margin	-	-	60795
SC2-7	5+48	Right	A	Apex	-	-	60786
SC2-8	5+50	Right	C2	Angled Channel Margin	-	-	60796

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	20 EA	60803
G	Cover Logs	6 EA	60807
	Brush Bank Treatment	770 LF	60811
	Roughened Edge Bank Treatment	540 LF	60812
	Live Brush Trench	2 EA	60813

N

LEGEND

- Property Line
- Thalweg
- OHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench



LARGE WOOD PLAN 3

40 0 40 80 120
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
06/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2019-05-14

LARGE WOOD PLAN 3

1678-100-60698

SHEET 4 of 16

DATE AND TIME PLOTTED
5/10/2019 8:19 AM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 2018 (LMS Tech)
CAD FILENAME
BTS_HABITAT PLAN.DWG

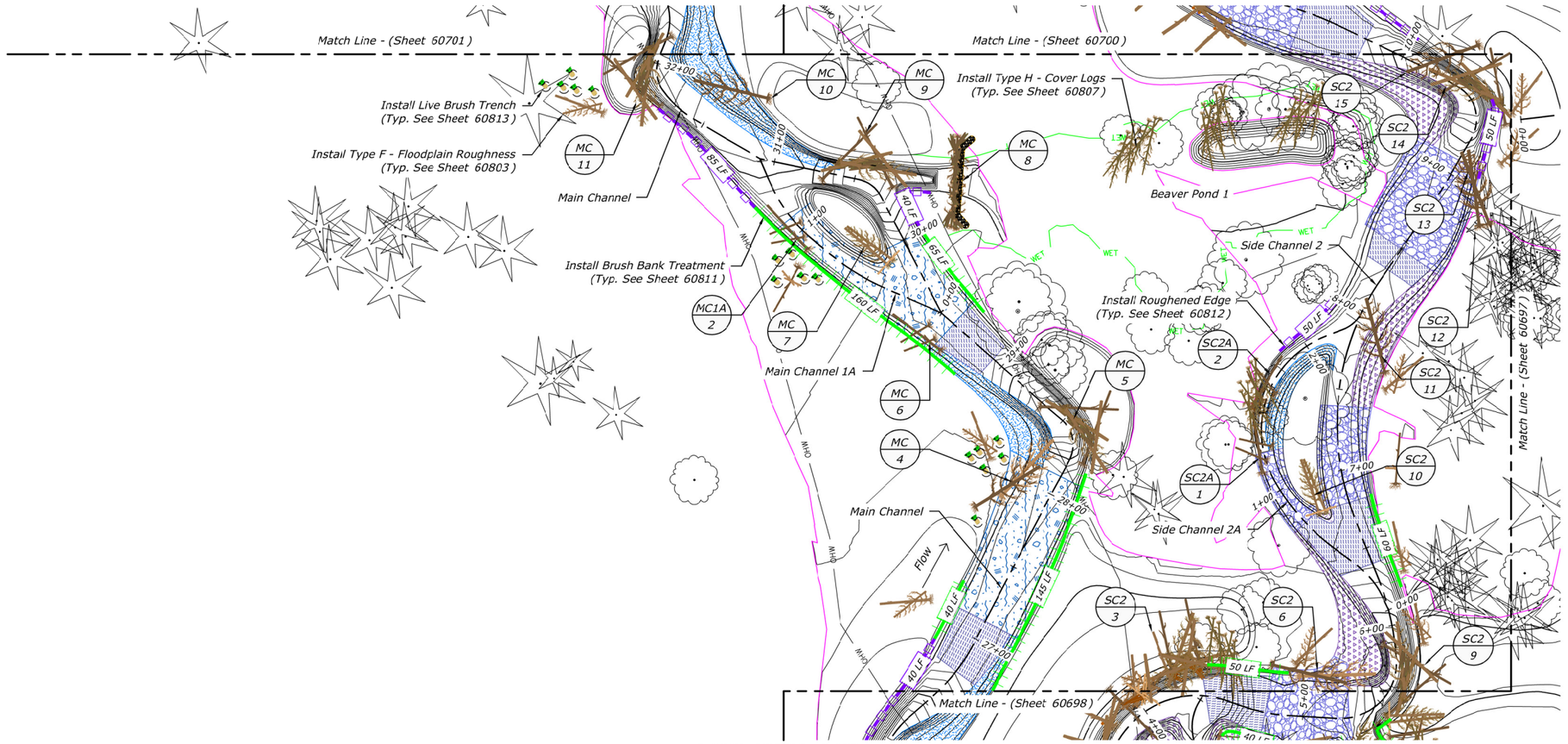
Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Main Channel							
MC-4	27+59	Left	E	Sweeper (Double)	-	-	60802
MC-5	27+89	Right	B4	Meander Mallet	3131.50	3126.00	60793
MC-6	28+95	Left	C2	Angled Channel Margin	-	-	60796
MC-7	29+39	Left	A	Apex	-	-	60786
MC-8	29+64	Right	J	Reinforced Habitat Structure	3130.00	-	60810
MC-9	29+94	Right	B4	Meander Mallet	3130.50	3125.00	60793
MC-10	30+95	Right	E	Sweeper (Single)	-	-	60802
MC-11	31+41	Left	B4	Meander Mallet	3130.00	3124.50	60793
Main Channel 1A							
MC1A-1	1+03	Left	C2	Angled Channel Margin	-	-	60796

Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Side Channel 2							
SC2-3	4+25	Left	B3	Meander Downstream	3133.70	3123.20	60791
SC2-6	5+34	Left	E	Sweeper (Double)	-	-	60802
SC2-9	5+70	Right	B4	Meander Mallet	3132.60	3127.10	60793
SC2-10	6+80	Left	A	Apex	-	-	60786
SC2-11	7+90	Right	E	Sweeper (Single)	-	-	60802
SC2-12	9+01	Right	E	Sweeper (Single)	-	-	60802
SC2-13	9+01	Right	E	Sweeper (Single)	-	-	60802
SC2-14	9+52	Right	B4	Meander Mallet	3131.20	3125.70	60793
SC2-15	9+79	Right	E	Sweeper (Single)	-	-	60802
Side Channel 2B							
SC2A-1	1+27	Left	C2	Angled Channel Margin	-	-	60796
SC2A-2	1+64	Left	C2	Angled Channel Margin	-	-	60796

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	9 EA	60803
G	Cover Logs	5 EA	60807
	Brush Bank Treatment	520 LF	60811
	Roughened Edge Bank Treatment	265 LF	60812
	Live Brush Trench	16 EA	60813

LEGEND

- Property Line
- Thalweg
- CHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench



LARGE WOOD PLAN 4

40 0 40 80 120
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
05/14/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

LARGE WOOD PLAN 4

1678-100-60699

SHEET 5 of 16

DATE AND TIME PLOTTED
5/10/2018 8:19 AM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_HABITAT PLAN.DWG

Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Side Channel 2							
SC2-16	11+27	Right	E	Sweeper (Double)	-	-	60802
SC2-17	11+46	Left	B1	Meander Upstream	3130.80	3123.80	60787
SC2-18	11+82	Left	B3	Meander Downstream	3131.20	3120.70	60791
SC2-19	13+22	Left	A	Apex	-	-	60786
SC2-20	13+65	Right	B2	Meander Middle	3130.00	3121.25	60789
SC2-21	13+79	Right	B3	Meander Downstream	3130.50	3120.00	60791
SC2-22	14+21	Right	C2	Angled Channel Margin	-	-	60796
SC2-23	15+34	Left	C1	Longitudinal Channel Margin	-	-	60795
SC2-24	15+64	Left	C1	Longitudinal Channel Margin	-	-	60795
SC2-25	15+91	Right	E	Sweeper (Double)	-	-	60802
SC2-26	15+97	Left	D1	Deflector (Small)	3127.50	3123.00	60797

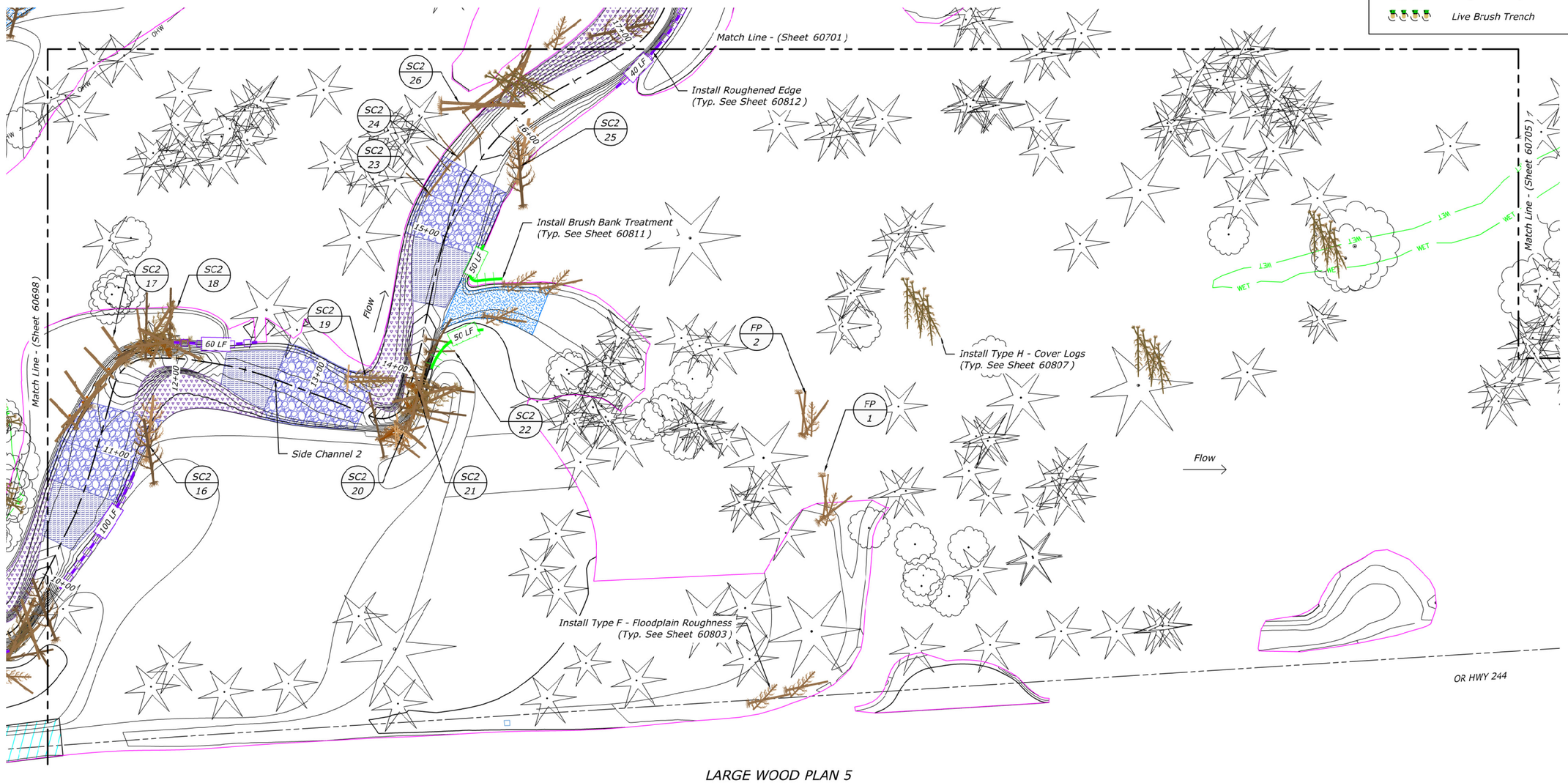
Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Floodplain							
FP-1	-	-	G2	SC Habitat - Double	-	-	60805
FP-2	-	-	G2	SC Habitat - Double	-	-	60805

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	7 EA	60803
G	Cover Logs	4 EA	60807
	Brush Bank Treatment	100 LF	60811
	Roughened Edge Bank Treatment	200 LF	60812
	Live Brush Trench	0 EA	60813

N

LEGEND

- Property Line
- Thalweg
- OHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench



LARGE WOOD PLAN 5

SCALE OF FEET: 40 0 40 80 120

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

LARGE WOOD PLAN 5

1678-100-60700

SHEET 6 of 16

DATE AND TIME PLOTTED
5/10/2018 8:20 AM
PLOTTED BY
NICK DANIS

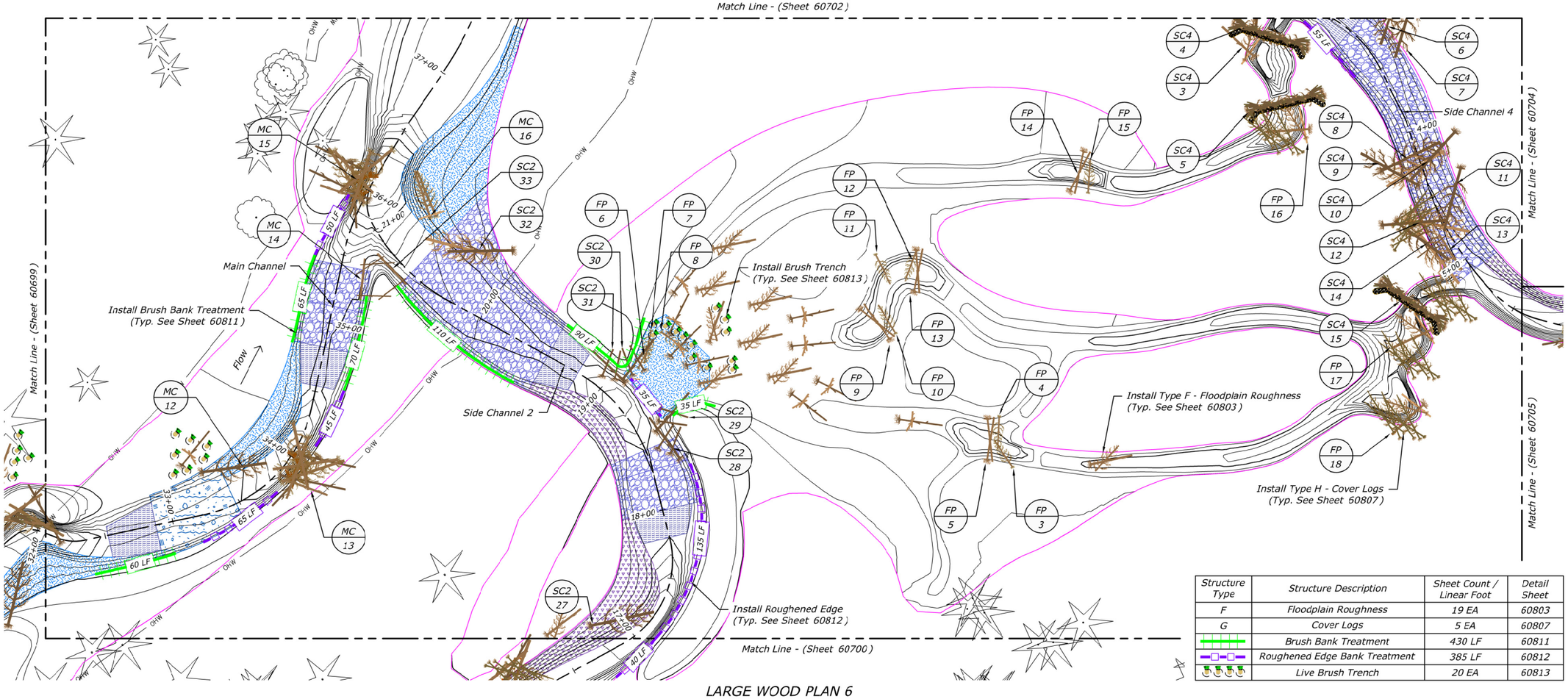
CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_HABITAT PLAN.DWG

Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Main Channel							
MC-12	33+10	Left	E	Sweeper (Single)	-	-	60802
MC-13	33+42	Right	B3	Meander Downstream	3130.00	3119.50	60791
MC-14	34+82	Right	C1	Longitudinal Channel Margin	-	-	60795
MC-15	35+46	Left	B3	Meander Downstream	3128.20	3117.70	60791
MC-16	35+55	Right	A	Apex	-	-	60786
Side Channel 2							
SC2-27	17+03	Left	E	Sweeper (Single)	-	-	60802
SC2-28	18+43	Right	C2	Angled Channel Margin	-	-	60796
SC2-29	18+58	Right	C2	Angled Channel Margin	-	-	60796
SC2-30	18+94	Right	C2	Angled Channel Margin	-	-	60796
SC2-31	19+03	Right	C2	Angled Channel Margin	-	-	60796
SC2-32	20+50	Right	E	Sweeper (Double)	-	-	60803
SC2-33	20+71	Left	C1	Longitudinal Channel Margin	-	-	60795
Side Channel 4							
SC4-3	2+59	Floodplain	G3	SC Habitat - Triple	-	-	60806
SC4-4	2+65	Right	J	Reinforced Habitat Structure	3123.50	-	60810
SC4-5	2+98	Right	J	Reinforced Habitat Structure	3124.25	-	60810
SC4-6	3+27	Left	E	Sweeper (Single)	-	-	60802
SC4-7	3+37	Left	E	Sweeper (Single)	-	-	60802
SC4-8	4+16	Right	E	Sweeper (Single)	-	-	60802
SC4-9	4+20	Right	E	Sweeper (Single)	-	-	60802
SC4-10	4+29	Right	E	Sweeper (Double)	-	-	60802

Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Side Channel 4							
SC4-11	4+59	Left	E	Sweeper (Single)	-	-	60802
SC4-12	4+71	Right	E	Sweeper (Double)	-	-	60802
SC4-13	4+90	Right	C1	Longitudinal Channel Margin	-	-	60795
SC4-14	4+94	Right	E	Sweeper (Double)	-	-	60802
SC4-15	5+03	Right	J	Reinforced Habitat Structure	3123.00	-	60810
Floodplain							
FP-3	-	-	G1	SC Habitat - Single	-	-	60804
FP-4	-	-	G1	SC Habitat - Single	-	-	60804
FP-5	-	-	G2	SC Habitat - Double	-	-	60805
FP-6	-	-	G1	SC Habitat - Single	-	-	60804
FP-7	-	-	G1	SC Habitat - Single	-	-	60804
FP-8	-	-	G1	SC Habitat - Single	-	-	60804
FP-9	-	-	G2	SC Habitat - Double	-	-	60805
FP-10	-	-	G1	SC Habitat - Single	-	-	60804
FP-11	-	-	G1	SC Habitat - Single	-	-	60804
FP-12	-	-	G1	SC Habitat - Single	-	-	60804
FP-13	-	-	G2	SC Habitat - Double	-	-	60805
FP-14	-	-	G2	SC Habitat - Double	-	-	60805
FP-15	-	-	G1	SC Habitat - Single	-	-	60804
FP-16	-	-	G3	SC Habitat - Triple	-	-	60806
FP-17	-	-	G3	SC Habitat - Triple	-	-	60806
FP-18	-	-	G3	SC Habitat - Triple	-	-	60806

LEGEND

- Property Line
- Thalweg
- OHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench



Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	19 EA	60803
G	Cover Logs	5 EA	60807
	Brush Bank Treatment	430 LF	60811
	Roughened Edge Bank Treatment	385 LF	60812
	Live Brush Trench	20 EA	60813

LARGE WOOD PLAN 6

SCALE OF FEET: 40 0 40 80 120

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
RENEWAL DATE
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN
M.KNUTSON P.E.
ACCEPTED
CSRO (BOISE, IDAHO) 2018-05-14

LARGE WOOD PLAN 6

1678-100-60701

SHEET 7 of 16

DATE AND TIME PLOTTED
5/10/2018 8:20 AM
PLOTTED BY
NICK DAVIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_HABITAT PLAN.DWG

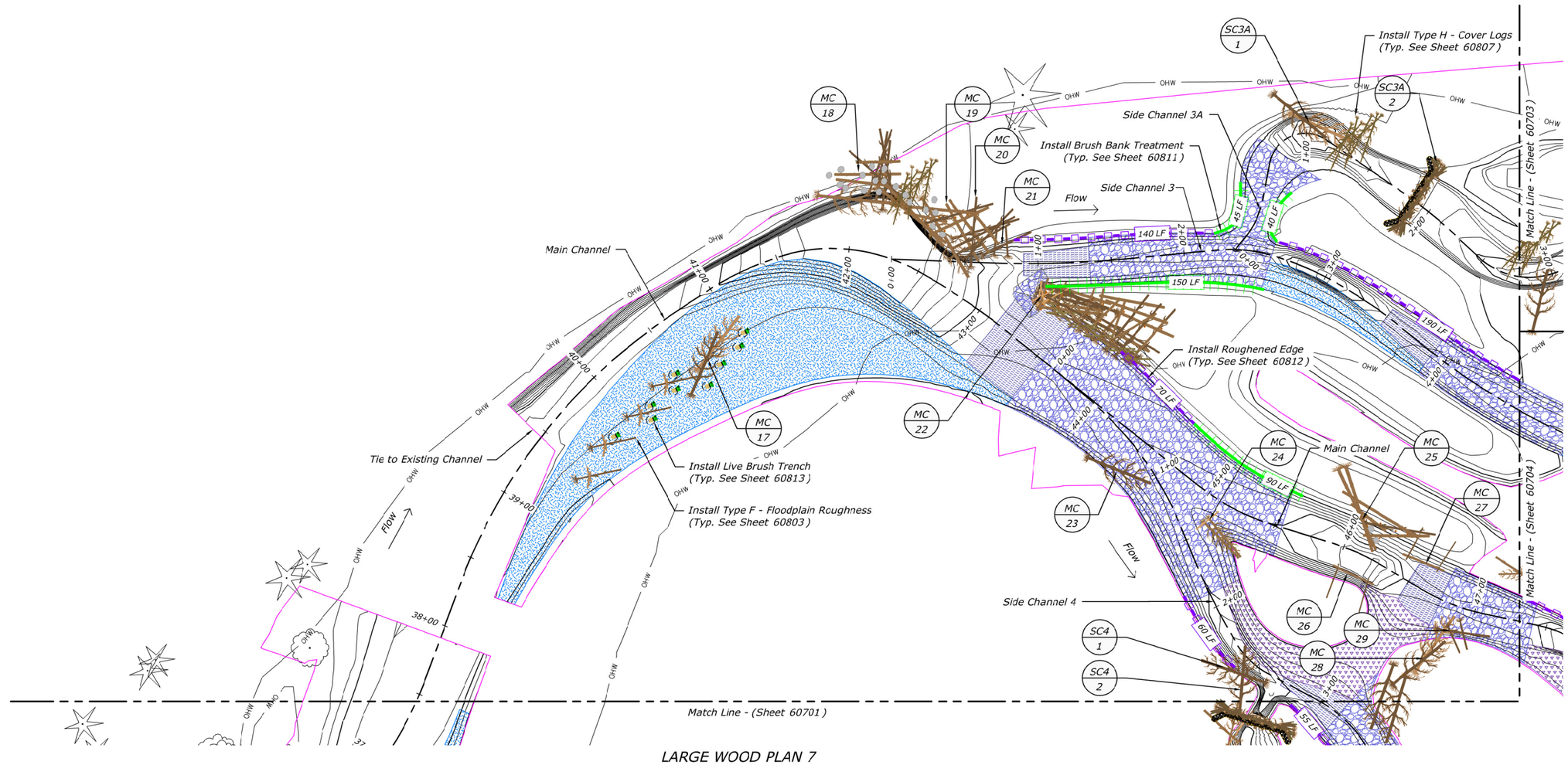
Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Main Channel							
MC-17	40+35	Right	E	Sweeper (Double)	-	-	60802
MC-18	41+57	Left	D2	Deflector (Large)	3127.00	3118.25	60798
MC-19	41+87	Left	D1	Deflector (Small)	3127.00	3122.50	60797
MC-20	42+16	Left	D2	Deflector (Large)	3127.00	3118.25	60798
MC-21	42+34	Left	C2	Angled Channel Margin	-	-	60796
MC-22	42+73	Left	I	Ice Crib Jam	3127.00	3120.00	60808
MC-23	43+91	Right	E	Sweeper (Single)	-	-	60802
MC-24	44+56	Right	A	Apex	-	-	60786
MC-25	45+54	Left	D1	Deflector (Small)	3124.30	3119.80	60797
MC-26	45+61	Right	C1	Longitudinal Channel Margin	-	-	60795
MC-27	45+99	Left	C1	Longitudinal Channel Margin	-	-	60795
MC-28	46+32	Right	E	Sweeper (Double)	-	-	60802
MC-29	46+39	Right	C2	Angled Channel Margin	-	-	60796
Side Channel 3A							
SC3A-1	1+13	Left	E	Sweeper (Double)	-	-	60802
SC3A-2	1+88	Spanning	J	Reinforced Habitat Structure	3124.00	-	60810

Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Side Channel 4							
SC4-1	2+40	Right	E	Sweeper (Single)	-	-	60802
SC4-2	2+46	Right	E	Sweeper (Single)	-	-	60802

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	4 EA	60803
G	Cover Logs	2 EA	60807
	Brush Bank Treatment	325 LF	60811
	Roughened Edge Bank Treatment	460 LF	60812
	Live Brush Trench	9 EA	60813

LEGEND

- Property Line
- Thalweg
- OHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench



LARGE WOOD PLAN 7

SCALE OF FEET 40 0 40 80 120

RECLAMATION Managing Water in the West

Cardno Shaping the Future

REGISTERED PROFESSIONAL ENGINEER 79319PE OREGON NICHOLAS T. DAVIS EXPIRES: 12/31/19 05/11/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

LARGE WOOD PLAN 7

1678-100-60702

SHEET 8 of 16

DATE AND TIME PLOTTED
5/10/2018 8:20 AM
PLOTTED BY
NICK DAVIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_HABITAT PLAN.DWG

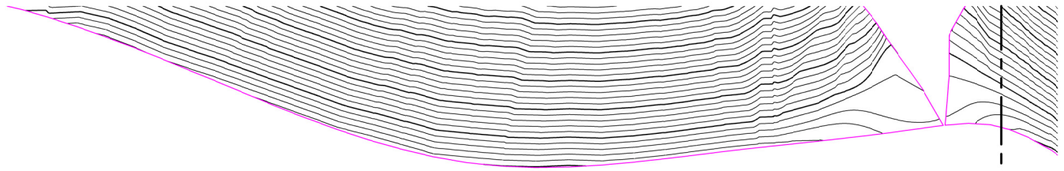
Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Side Channel 3							
SC3-5	12+56	Right	E	Sweeper (Single)	-	-	60802
SC3-6	12+65	Left	B1	Meander Upstream	3120.20	3113.20	60787
SC3-7	12+84	Right	A	Apex	-	-	60786
SC3-8	13+07	Left	B3	Meander Downstream	3122.00	3111.50	60791
SC3-9	13+07	Right	A	Apex	-	-	60786
SC3-10	14+77	Right	A	Apex	-	-	60786
SC3-11	14+90	Right	E	Sweeper (Single)	-	-	60802
SC3-12	15+16	Left	C1	Longitudinal Channel Margin	-	-	60795
SC3-13	15+52	Left	B4	Meander Mallet	3119.50	3114.00	60793
SC3-14	16+51	Right	C1	Longitudinal Channel Margin	-	-	60795
Side Channel 3A							
SC3A-3	2+90	Right	E	Sweeper (Single)	-	-	60802
SC3A-4	3+46	Spanning	J	Reinforced Habitat Structure	3123.00	-	60810
SC3A-5	4+45	Right	G3	SC Habitat - Triple	-	-	60806
SC3A-6	5+09	Spanning	J	Reinforced Habitat Structure	3122.00	-	60810
SC3A-7	6+04	Right	E	Sweeper (Single)	-	-	60802
SC3A-8	6+93	Spanning	J	Reinforced Habitat Structure	3121.50	-	60810
SC3A-9	8+02	Right	G3	SC Habitat - Triple	-	-	60806
SC3A-10	8+93	Spanning	J	Reinforced Habitat Structure	3120.50	-	60810

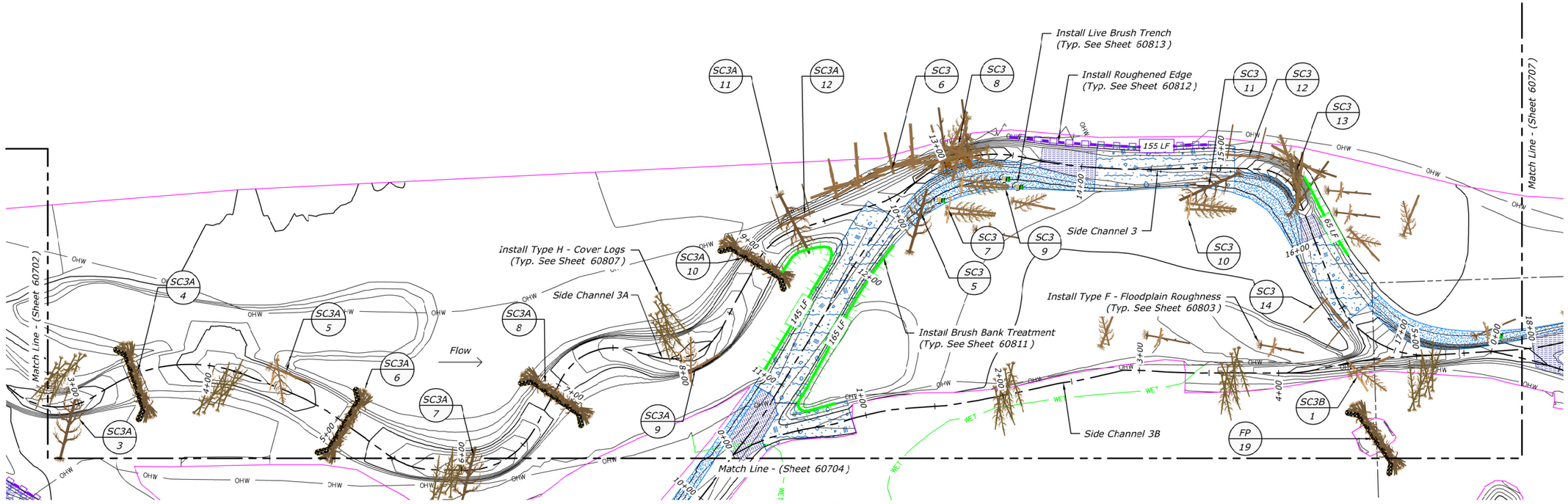
Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Side Channel 3A (cont.)							
SC3A-11	9+30	Left	E	Sweeper (Single)	-	-	60802
SC3A-12	9+31	Left	C1	Longitudinal Channel Margin	-	-	60795
Side Channel 3B							
SC3B-1	4+55	Right	G3	SC Habitat - Triple	-	-	60806
Floodplain							
FP-19	-	-	J	Reinforced Habitat Structure	3118.00	-	60810

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	10 EA	60803
G	Cover Logs	6 EA	60807
	Brush Bank Treatment	375 LF	60811
	Roughened Edge Bank Treatment	155 LF	60812
	Live Brush Trench	4 EA	60813

LEGEND

- Property Line
- Thalweg
- OHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench





LARGE WOOD PLAN 8

40 0 40 80 120
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DAMIS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2019-05-14

LARGE WOOD PLAN 8

1678-100-60703

SHEET 9 of 16

DATE AND TIME PLOTTED
5/10/2018 8:21 AM
PLOTTED BY
NICK DAMIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_HABITAT PLAN.DWG

Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Main Channel							
MC-30	48+94	Right	E	Sweeper (Single)	-	-	60802
MC-31	49+29	Right	B4	Meander Mallet	3123.50	3118.50	60793
MC-32	52+22	Left	B2	Meander Middle	3123.75	3115.00	60789
MC-33	52+29	Left	B3	Meander Downstream	3124.00	3113.50	60791
MC-51	62+30	Right	C2	Angled Channel Margin	-	-	60796
MC-52	63+63	Left	E	Sweeper (Single)	-	-	60802
MC-53	64+17	Left	C2	Angled Channel Margin	-	-	60796
MC-54	64+53	Right	E	Sweeper (Double)	-	-	60802
MC-55	64+62	Left	B1	Meander Upstream	3119.00	3112.00	60787
MC-56	64+98	Left	B3	Meander Downstream	3119.50	3109.00	60791
MC-57	65+34	Left	C1	Longitudinal Channel Margin	-	-	60795
Side Channel 3							
SC3-1	6+51	Right	C1	Longitudinal Channel Margin	-	-	60795
SC3-2	7+13	Right	C1	Longitudinal Channel Margin	-	-	60795
SC3-3	7+23	Left	E	Sweeper (Single)	-	-	60802
SC3-4	8+18	Left	E	Sweeper (Double)	-	-	60802
Side Channel 4							
SC4-17	6+93	Right	E	Sweeper (Double)	-	-	60802

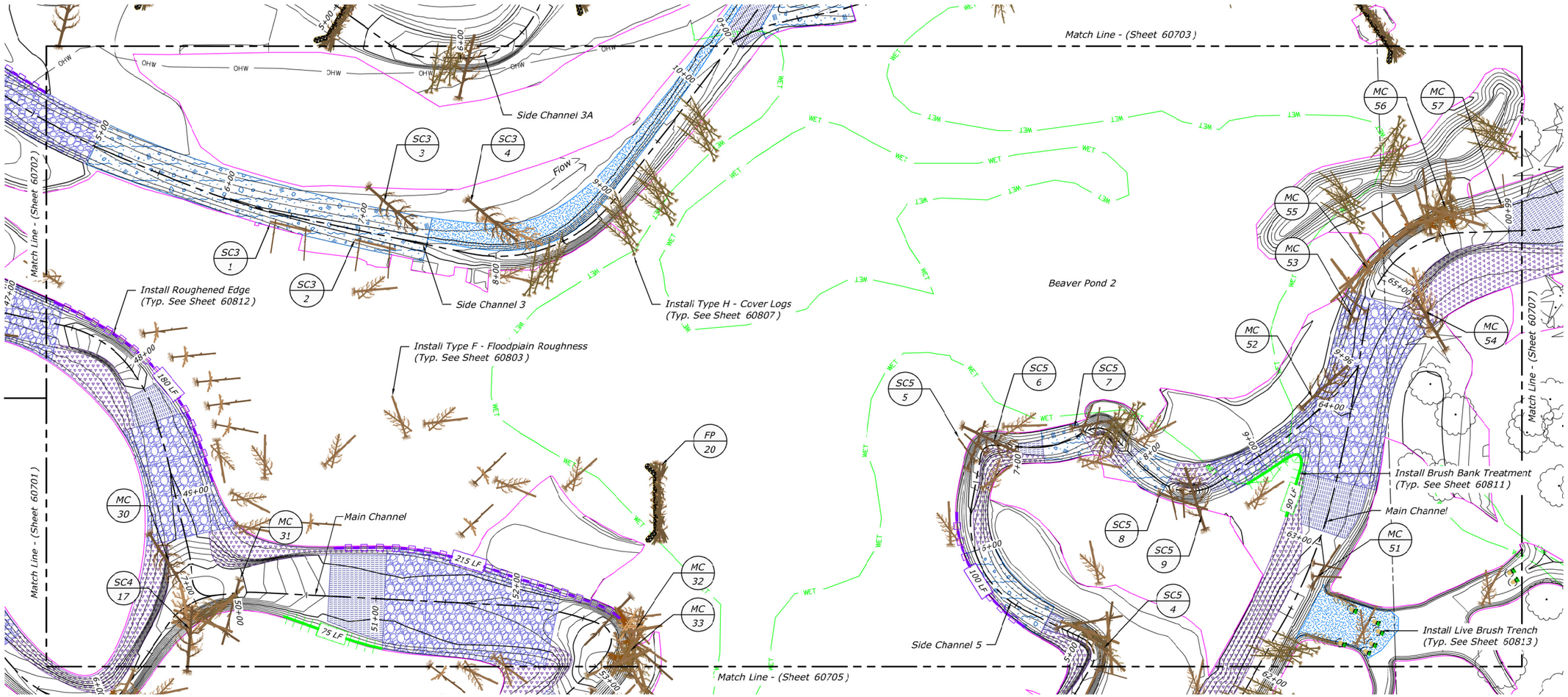
Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Side Channel 5							
SC5-4	4+91	Right	B4	Meander Mallet	3120.50	3115.00	60793
SC5-5	6+71	Left	C2	Angled Channel Margin	-	-	60796
SC5-6	6+83	Left	E	Sweeper (Single)	-	-	60802
SC5-7	7+56	Left	C2	Angled Channel Margin	-	-	60796
SC5-8	8+35	Right	C2	Angled Channel Margin	-	-	60796
SC5-9	8+45	Right	E	Sweeper (Single)	-	-	60802
Floodplain							
FP-20	-	-	J	Reinforced Habitat Structure	3121.50	-	60810

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	29 EA	60803
G	Cover Logs	10 EA	60807
	Brush Bank Treatment	165 LF	60811
	Roughened Edge Bank Treatment	495 LF	60812
	Live Brush Trench	8 EA	60813

N

LEGEND

- Property Line
- Thalweg
- OHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench



LARGE WOOD PLAN 9

40 0 40 80 120
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
NICHOLAS T. DAVIS
79319PE
STATE OF IDAHO
05/17/2019
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2019-05-14

LARGE WOOD PLAN 9

1678-100-60704

SHEET 10 of 16

DATE AND TIME PLOTTED
5/20/2019 8:21 AM
PLOTTED BY
NICK DAVIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_HABITAT PLAN.DWG

Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Main Channel							
MC-34	52+73	Left	C2	Angled Channel Margin	-	-	60796
MC-35	54+48	Right	D1	Deflector (Small)	3122.20	3117.70	60797
MC-36	54+57	Floodplain	G1	SC Habitat - Single	-	-	60804
MC-37	54+58	Floodplain	G1	SC Habitat - Single	-	-	60804
MC-38	54+71	Floodplain	A	Apex	-	-	60786
MC-39	55+03	Right	D1	Deflector (Small)	3122.00	3117.50	60797
MC-40	55+51	Right	E	Sweeper (Single)	-	-	60802
MC-41	56+09	Left	A	Apex	-	-	60786
MC-42	56+09	Right	A	Apex	-	-	60786
MC-43	57+21	Left	A	Apex	-	-	60786
MC-44	57+43	Left	C1	Longitudinal Channel Margin	-	-	60795
MC-45	57+59	Right	C1	Longitudinal Channel Margin	-	-	60795
MC-46	57+99	Left	A	Apex	-	-	60786
MC-47	58+38	Right	B2	Meander Middle	3121.50	3112.75	60789
MC-48	58+49	Right	B3	Meander Downstream	3122.00	3111.50	60791
MC-49	58+76	Right	C2	Angled Channel Margin	-	-	60796
MC-50	60+10	Right	C2	Angled Channel Margin	-	-	60796

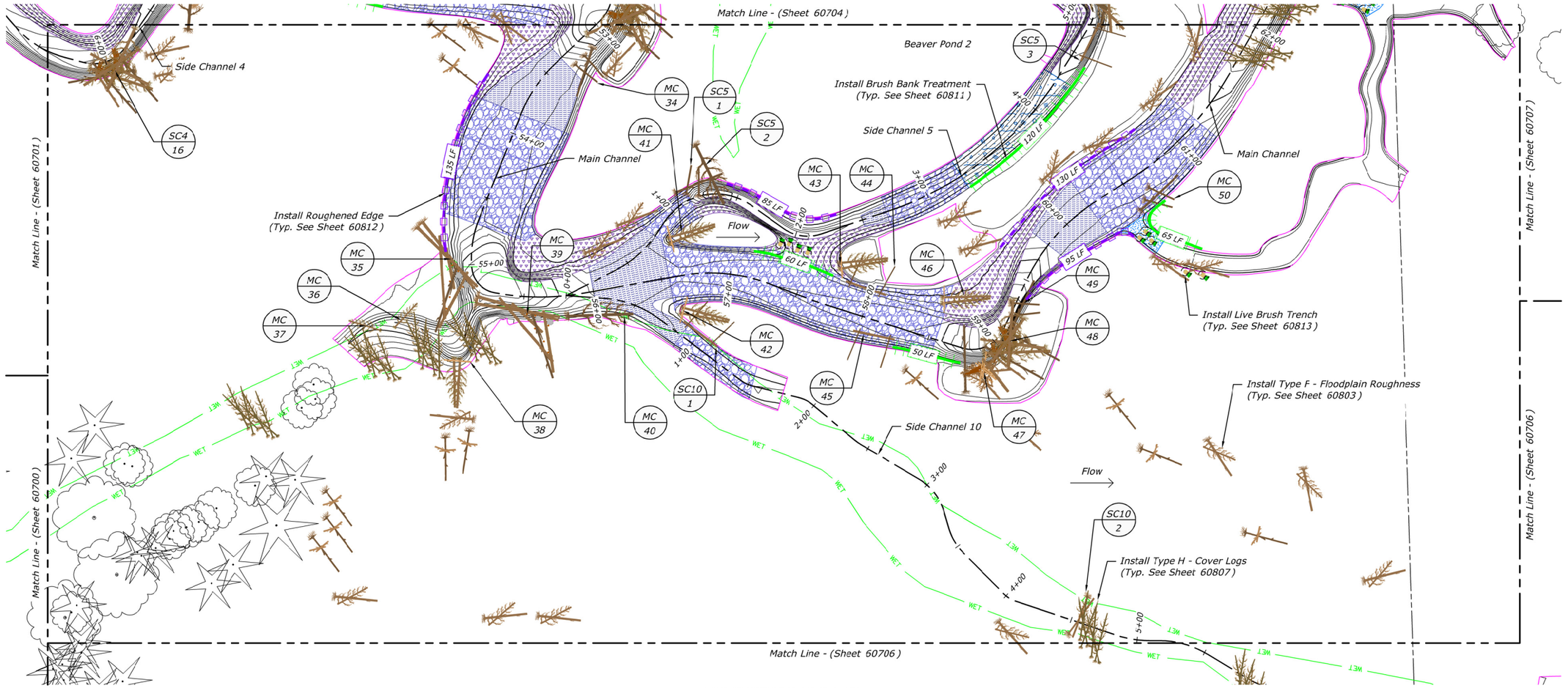
Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Side Channel 4							
SC4-16	6+01	Right	B3	Meander Downstream	3124.50	3114.00	60791
Side Channel 5							
SC5-1	1+20	Left	C2	Angled Channel Margin	-	-	60796
SC5-2	1+32	Left	E	Sweeper (Single)	-	-	60802
SC5-3	4+62	Right	C1	Longitudinal Channel Margin	-	-	60795
Side Channel 10							
SC10-1	1+00	Left	C1	Longitudinal Channel Margin	-	-	60795
SC10-2	1+63	Spanning	G2	SC Habitat - Double	-	-	60805

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	35 EA	60803
G	Cover Logs	5 EA	60807
	Brush Bank Treatment	295 LF	60811
	Roughened Edge Bank Treatment	445 LF	60812
	Live Brush Trench	9 EA	60813

N

LEGEND

- Property Line
- Thalweg
- CHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench



LARGE WOOD PLAN 10

40 0 40 80 120
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
NICHOLAS T. DAMIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

LARGE WOOD PLAN 10

1678-100-60705

SHEET 11 of 16

DATE AND TIME PLOTTED
5/10/2018 8:22 AM
PLOTTED BY
NICK DAMIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_HABITAT PLAN.DWG

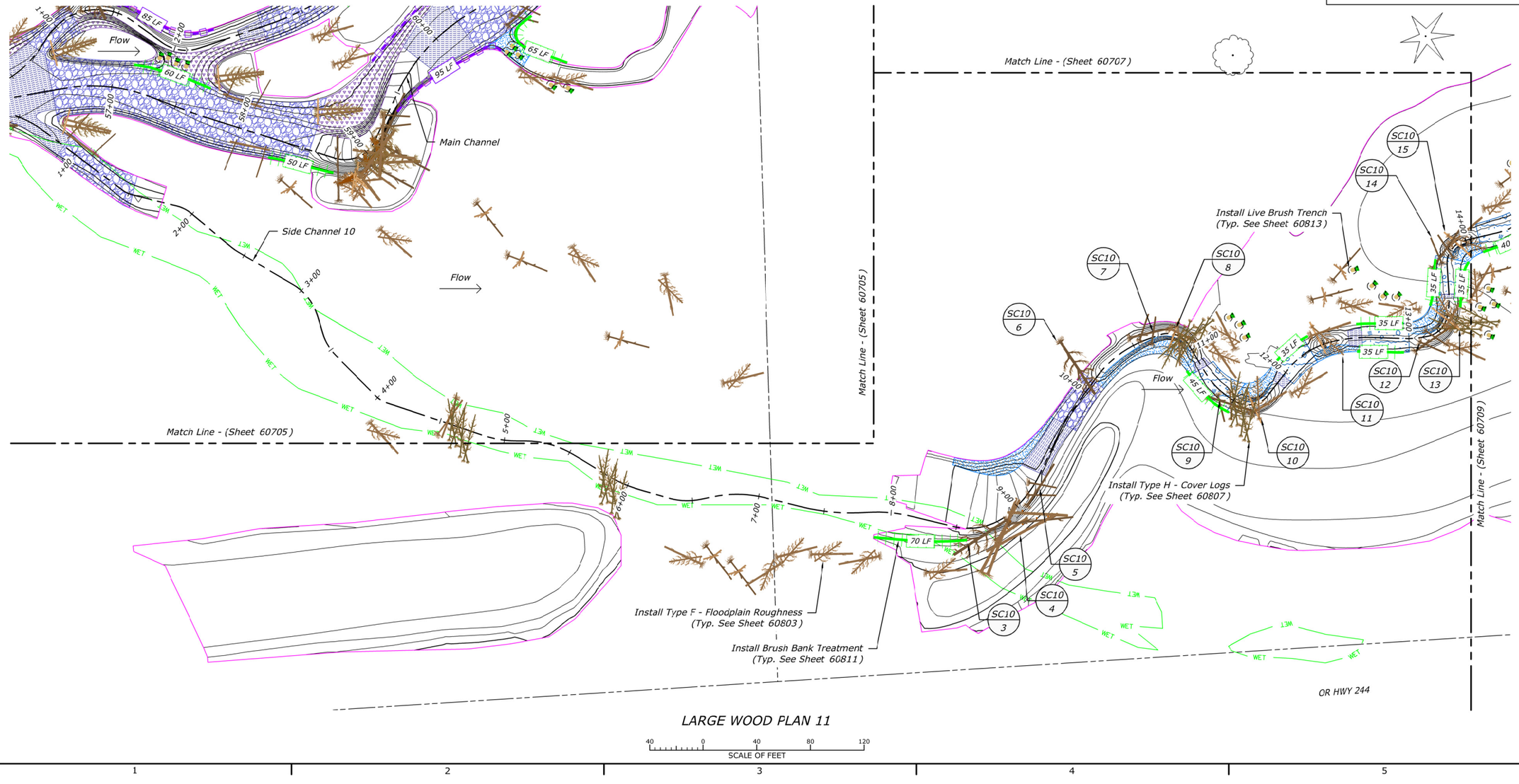
Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Side Channel 10							
SC10-3	8+65	Right	E	Sweeper (Single)	-	-	60802
SC10-4	8+87	Right	D1	Deflector (Small)	3117.50	3113.00	60797
SC10-5	9+18	Right	C2	Angled Channel Margin	-	-	60796
SC10-6	10+11	Left	E	Sweeper (Single)	-	-	60802
SC10-7	10+63	Left	C2	Angled Channel Margin	-	-	60796
SC10-8	10+82	Left	G3	SC Habitat - Triple	-	-	60806
SC10-9	11+45	Right	C2	Angled Channel Margin	-	-	60796
SC10-10	11+66	Right	G3	SC Habitat - Triple	-	-	60806
SC10-11	12+33	Left	G3	SC Habitat - Triple	-	-	60806
SC10-12	13+15	Right	C2	Angled Channel Margin	-	-	60796
SC10-13	13+33	Right	G3	SC Habitat - Triple	-	-	60806
SC10-14	13+82	Left	C2	Angled Channel Margin	-	-	60796
SC10-15	13+93	Left	G3	SC Habitat - Triple	-	-	60806

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	16 EA	60803
G	Cover Logs	4 EA	60807
	Brush Bank Treatment	290 LF	60811
	Roughened Edge Bank Treatment	0 LF	60812
	Live Brush Trench	8 EA	60813

N

LEGEND

- Property Line
- Thalweg
- CHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench



LARGE WOOD PLAN 11

40 0 40 80 120
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
NICHOLAS T. DAVIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

LARGE WOOD PLAN 11

1678-100-60706

SHEET 12 of 16

DATE AND TIME PLOTTED
5/10/2018 10:22 AM
PLOTTED BY
NICK DAVIS

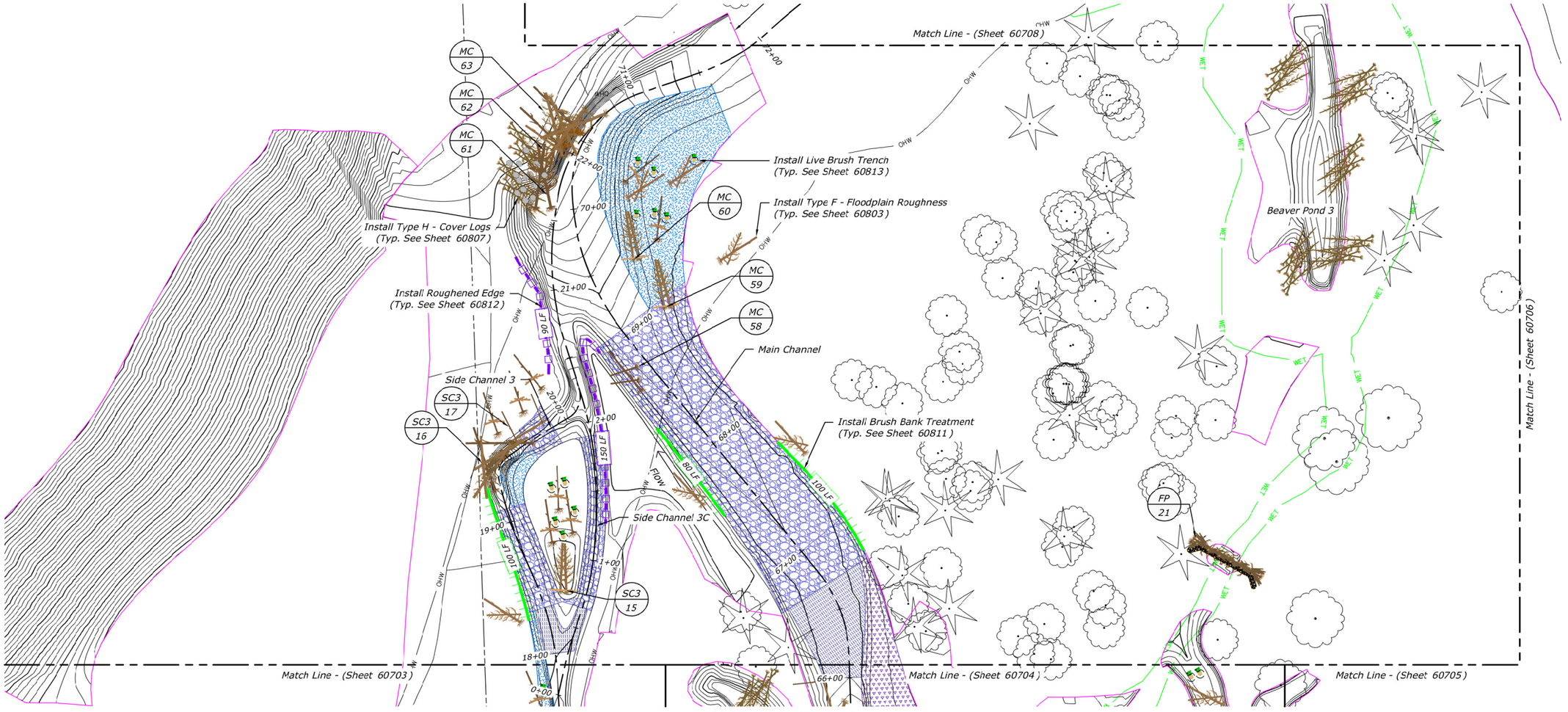
CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
C&D FILENAME
BTS_HABITAT PLAN.DWG

Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Main Channel							
MC-58	68+23	Left	C2	Angled Channel Margin	-	-	60796
MC-59	68+46	Right	A	Apex	-	-	60786
MC-60	68+97	Right	A	Apex	-	-	60786
MC-61	69+70	Left	E	Sweeper (Single)	-	-	60802
MC-62	69+70	Left	E	Sweeper (Single)	-	-	60802
MC-63	69+94	Left	B3	Meander Downstream	3117.50	3107.00	60791
Side Channel 3							
SC3-15	18+41	Right	A	Apex	-	-	60786
SC3-16	19+45	Left	B4	Meander Mallet	3118.00	3112.50	60793
SC3-17	19+74	Left	C1	Longitudinal Channel Margin	-	-	60795
Floodplain							
FP-21	-	-	J	Reinforced Habitat Structure	3117.00	-	60810

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	14 EA	60803
G	Cover Logs	7 EA	60807
	Brush Bank Treatment	280 LF	60811
	Roughened Edge Bank Treatment	240 LF	60812
	Live Brush Trench	11 EA	60813

LEGEND

- Property Line
- Thalweg
- CHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench



LARGE WOOD PLAN 12

40 0 40 80 120
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
10/1/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

LARGE WOOD PLAN 12

1678-100-60707

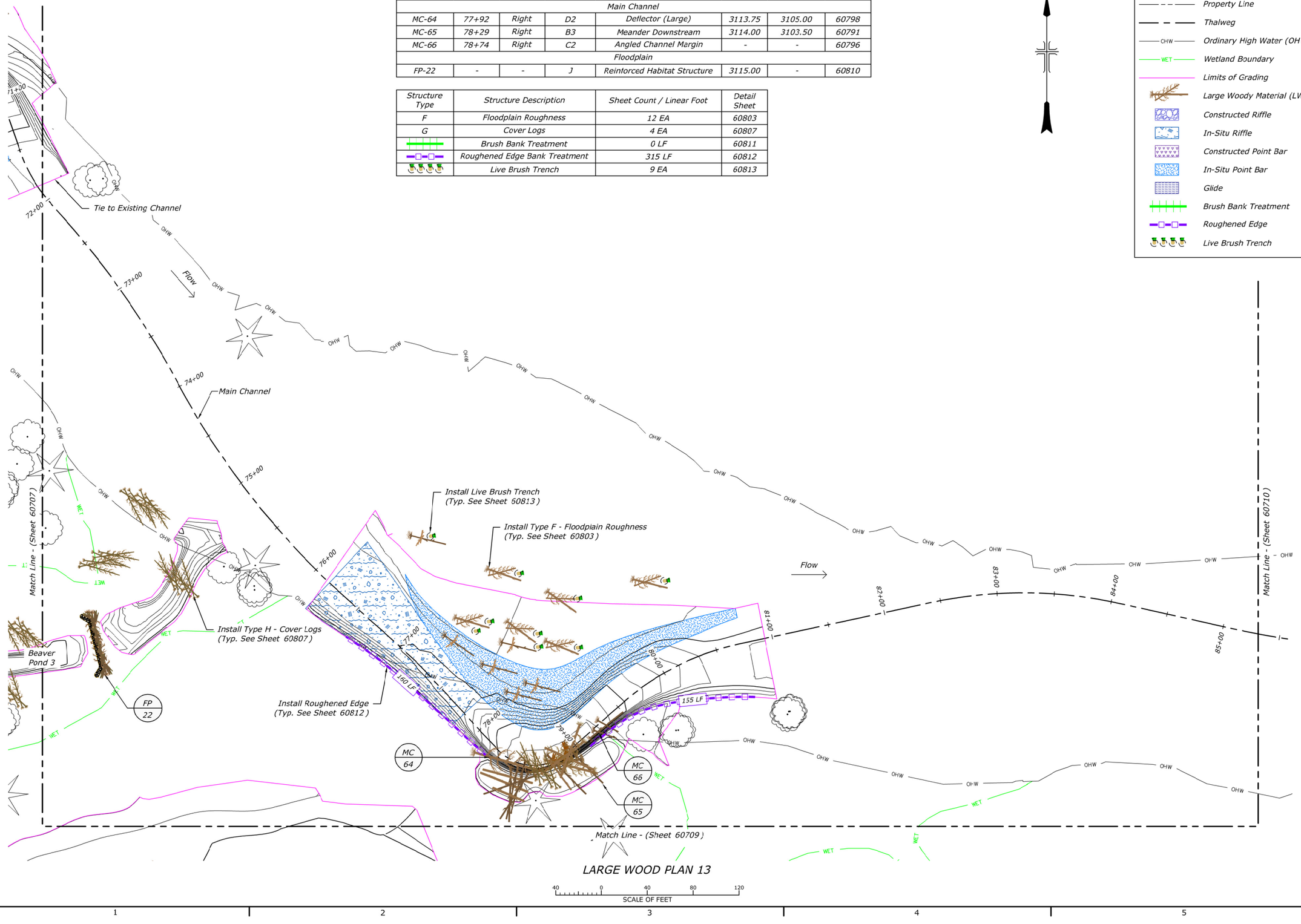
SHEET 13 of 16

DATE AND TIME PLOTTED
10/1/2018 9:12 AM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_HABITAT PLAN.DWG

Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Main Channel							
MC-64	77+92	Right	D2	Deflector (Large)	3113.75	3105.00	60798
MC-65	78+29	Right	B3	Meander Downstream	3114.00	3103.50	60791
MC-66	78+74	Right	C2	Angled Channel Margin	-	-	60796
Floodplain							
FP-22	-	-	J	Reinforced Habitat Structure	3115.00	-	60810

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	12 EA	60803
G	Cover Logs	4 EA	60807
	Brush Bank Treatment	0 LF	60811
	Roughened Edge Bank Treatment	315 LF	60812
	Live Brush Trench	9 EA	60813



LARGE WOOD PLAN 13

SCALE OF FEET: 40 0 40 80 120

N

LEGEND

- Property Line
- Thalweg
- Ordinary High Water (OHW)
- Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
NICHOLAS T. DAVIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

LARGE WOOD PLAN 13

1678-100-60708

SHEET 14 of 16

DATE AND TIME PLOTTED
5/10/2018 8:23 AM
PLOTTED BY
NICK DAVIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_HABITAT PLAN.DWG

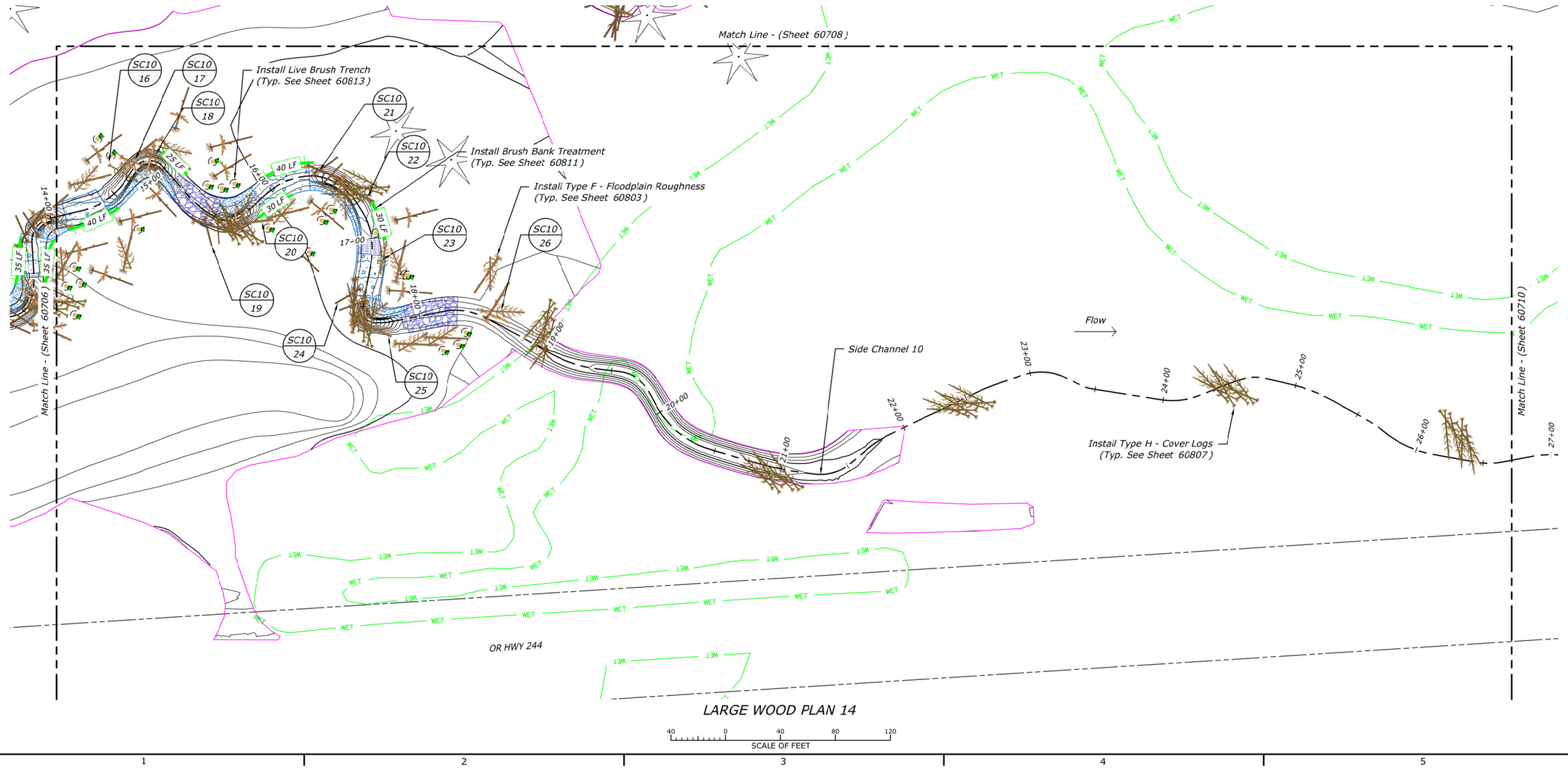
Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Side Channel 10							
SC10-16	14+65	Left	G1	SC Habitat - Single	-	-	60804
SC10-17	14+73	Left	G3	SC Habitat - Triple	-	-	60806
SC10-18	14+88	Left	G3	SC Habitat - Triple	-	-	60806
SC10-19	15+52	Right	C2	Angled Channel Margin	-	-	60796
SC10-20	15+65	Right	G3	SC Habitat - Triple	-	-	60806
SC10-21	16+41	Left	C2	Angled Channel Margin	-	-	60796
SC10-22	16+54	Left	G3	SC Habitat - Triple	-	-	60806
SC10-23	17+23	Left	G1	SC Habitat - Single	-	-	60804
SC10-24	17+45	Right	C2	Angled Channel Margin	-	-	60796
SC10-25	17+58	Right	G3	SC Habitat - Triple	-	-	60806
SC10-26	18+51	Left	G3	SC Habitat - Triple	-	-	60806

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	21 EA	60803
G	Cover Logs	9 EA	60807
	Brush Bank Treatment	165 LF	60811
	Roughened Edge Bank Treatment	0 LF	60812
	Live Brush Trench	21 EA	60813

N

LEGEND

- Property Line
- Thalweg
- CHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench



LARGE WOOD PLAN 14

40 0 40 80 120
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/17/2018
NICHOLAS T. DAVIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

LARGE WOOD PLAN 14

1678-100-60709

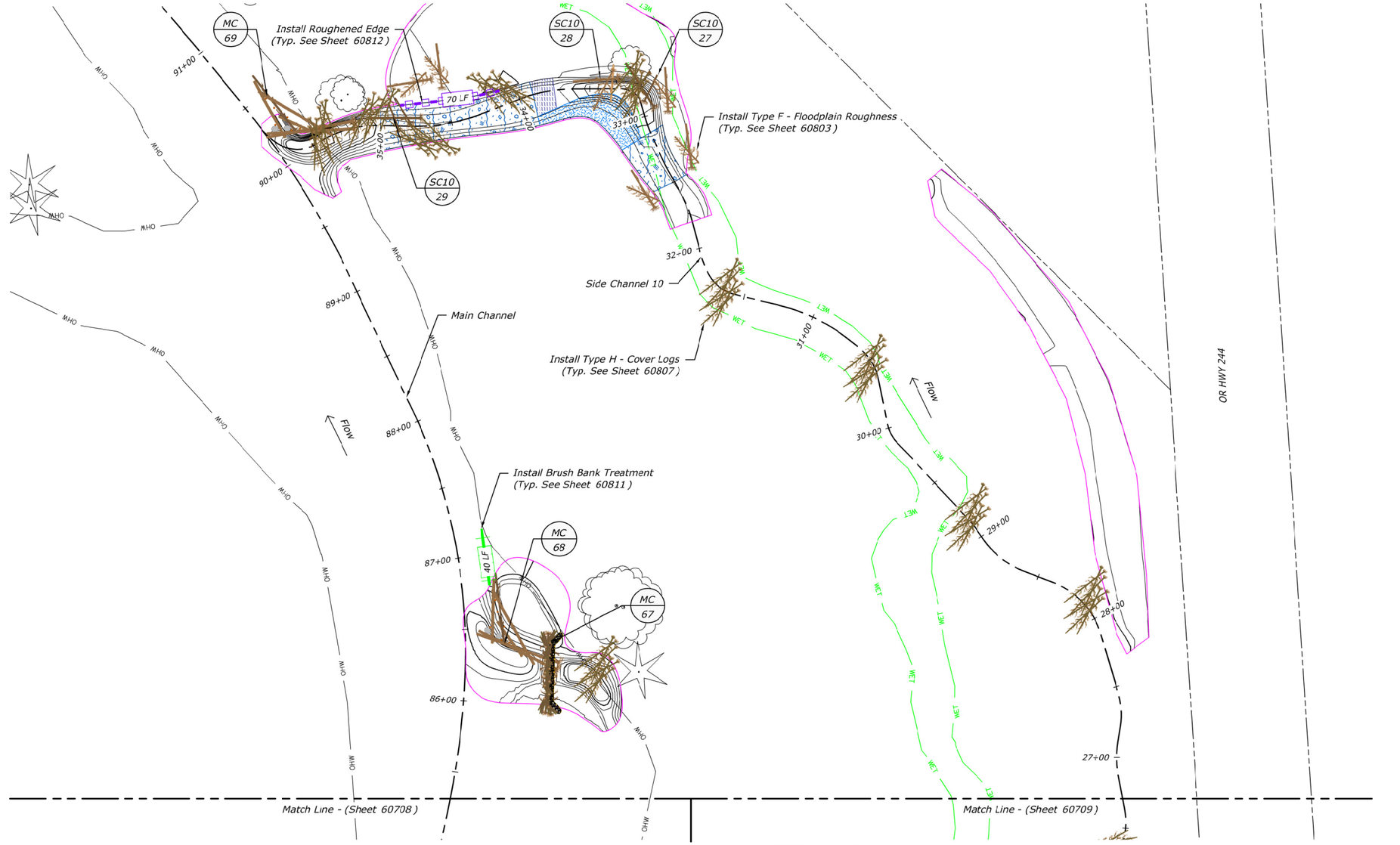
SHEET 15 of 16

DATE AND TIME PLOTTED
5/16/2018 8:23 AM
PLOTTED BY
NICK DAVIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_HABITAT PLAN.DWG

Structure ID	Station	Bank	Structure Type	Structure Description	Top Elevation	Foundation Elevation	Detail Sheet
Main Channel							
MC-67	85+69	Right	J	Reinforced Habitat Structure	3109.00	-	60810
MC-68	85+87	Right	D1	Deflector (Small)	3110.50	3106.00	60797
MC-69	89+64	Right	D1	Deflector (Small)	3109.00	3104.50	60797
Side Channel 10							
SC10-27	33+15	Right	C2	Angled Channel Margin	-	-	60796
SC10-28	33+34	Right	G3	SC Habitat - Triple	-	-	60806
SC10-29	34+86	Right	C2	Angled Channel Margin	-	-	60796

Structure Type	Structure Description	Sheet Count / Linear Foot	Detail Sheet
F	Floodplain Roughness	5 EA	60803
G	Cover Logs	10 EA	60807
	Brush Bank Treatment	40 LF	60811
	Roughened Edge Bank Treatment	70 LF	60812
	Live Brush Trench	0 EA	60813



LARGE WOOD PLAN 15

SCALE OF FEET: 40 0 40 80 120

LEGEND

- Property Line
- Thalweg
- Ordinary High Water (OHW)
- Wetland Boundary
- Limits of Grading
- Large Woody Material (LWM)
- Constructed Riffle
- In-Situ Riffle
- Constructed Point Bar
- In-Situ Point Bar
- Glide
- Brush Bank Treatment
- Roughened Edge
- Live Brush Trench

RECLAMATION Managing Water in the West

Cardno Shaping the Future

REGISTERED PROFESSIONAL ENGINEER 79319PE OREGON 10/31/2018 NICHOLAS T. DANIS EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2019-05-14

LARGE WOOD PLAN 15

1678-100-60710

SHEET 16 of 16

DATE AND TIME PLOTTED 5/7/2019 8:23 AM
PLOTTED BY NICK DANIS

CAD SYSTEM AutoCAD Civil 3D 2018 (LMS Tech)
CAD FILENAME BTS_HABITAT PLAN.DWG

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Disturbance Limit
- Grading Zone Boundary
- Existing Wetlands
- Ordinary High Water (OWH)
- Property Line
- Buried Power Line
- Overhead Power Line
- Compacted Fill
- Monitoring Well

N

USFS

Sheet 60714

Sheet 60715

EXCESS MATERIAL DISPOSAL AREA

Sheet 60717

JORDAN CREEK RANCH LLC

Flow

USFS

Sheet 60712

UPPER GRADING ZONE

MIDDLE GRADING ZONE

JORDAN CREEK RANCH GRADING ZONE

LOWER GRADING ZONE

STATE OF OREGON
DEPARTMENT OF
TRANSPORTATION

OR HWY 244

Sheet 60713

Sheet 60716

USFS

JORDAN CREEK RANCH LLC

H MERLO RANCH
PROPERTIES LLC

TO UKIAH

GRADING PLAN KEY MAP

250 0 250 500 750
SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Nielsen P.E.	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED
ADRIAN ARMOUR - PROGRAM MANAGER	
CSRO (BOISE, IDAHO)	2018-05-14

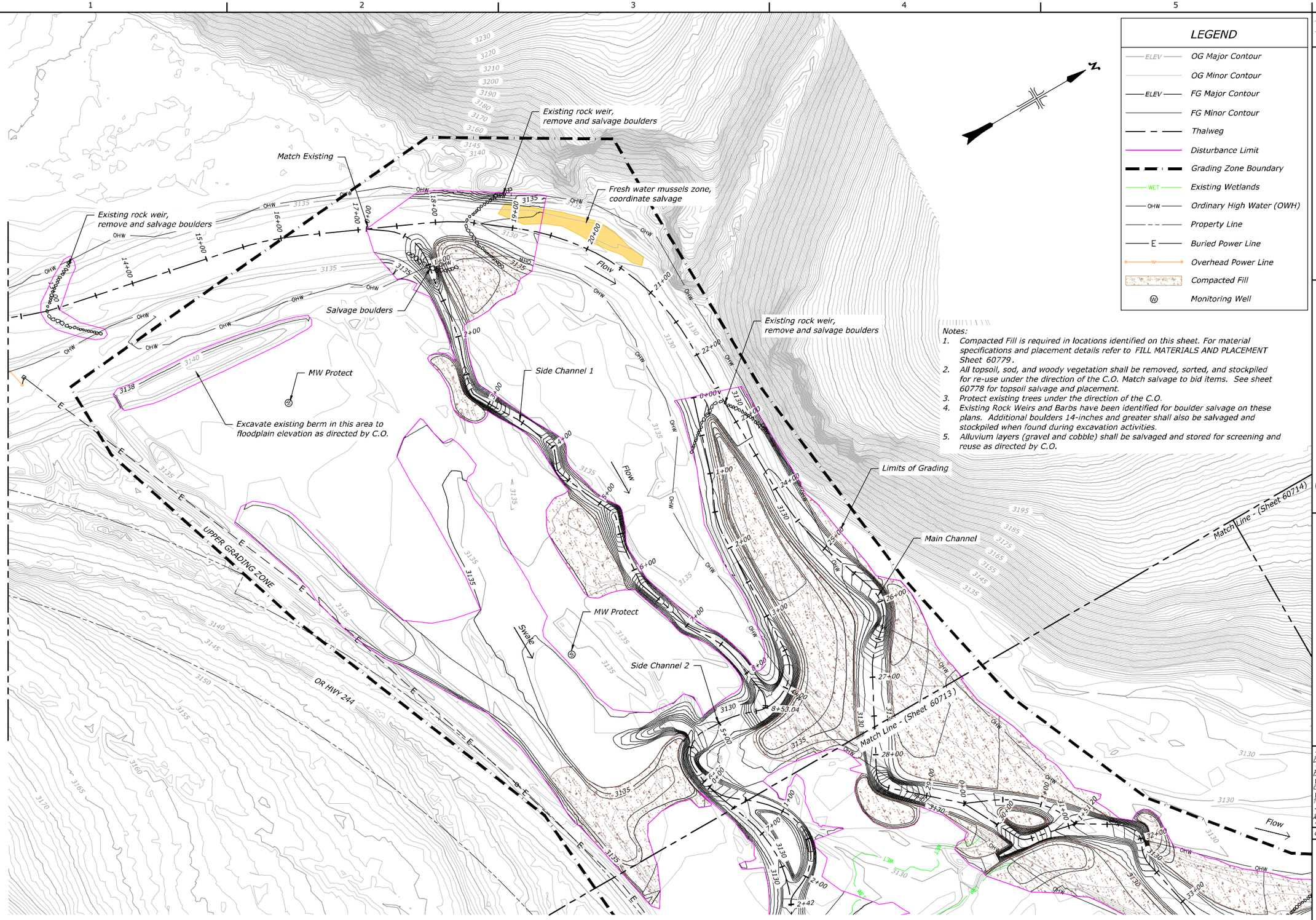
GRADING PLAN KEY MAP

1678-100-60711

SHEET 1 of 7

DATE AND TIME PLOTTED
MAY 9, 2018 13:05
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_GRADING PLAN_60SCALE.DWG



LEGEND

- ELEV — OG Major Contour
- OG Minor Contour
- ELEV — FG Major Contour
- FG Minor Contour
- Thalweg
- Disturbance Limit
- Grading Zone Boundary
- WET — Existing Wetlands
- OHW — Ordinary High Water (OWH)
- Property Line
- E — Buried Power Line
- Overhead Power Line
- Compacted Fill
- (W) Monitoring Well

Notes:

1. Compacted Fill is required in locations identified on this sheet. For material specifications and placement details refer to FILL MATERIALS AND PLACEMENT Sheet 60779.
2. All topsoil, sod, and woody vegetation shall be removed, sorted, and stockpiled for re-use under the direction of the C.O. Match salvage to bid items. See sheet 60778 for topsoil salvage and placement.
3. Protect existing trees under the direction of the C.O.
4. Existing Rock Weirs and Barbs have been identified for boulder salvage on these plans. Additional boulders 14-inches and greater shall also be salvaged and stockpiled when found during excavation activities.
5. Alluvium layers (gravel and cobble) shall be salvaged and stored for screening and reuse as directed by C.O.

GRADING PLAN 1

60 0 60 120 180
SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Nielsen P.E.	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED (DRAIN APPROVAL · PROGRAM MANAGER)
CSRO (BOISE, IDAHO)	2018-05-14

GRADING PLAN 1

1678-100-60712

SHEET 2 of 7

DATE AND TIME PLOTTED
MAY 9, 2018 13:05
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
RTS_SSPCT_GRADING PLAN_60SCALE.DWG

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Disturbance Limit
- Grading Zone Boundary
- Existing Wetlands
- Ordinary High Water (OWH)
- Property Line
- Buried Power Line
- Overhead Power Line
- Compacted Fill
- Monitoring Well

Match Line - (Sheet 60714)

Match Line - (Sheet 60712)

Match Line - (Sheet 60716)

Flow

Main Channel

Existing rock weir, remove and salvage boulders

Side Channel 2

Excavate Pond to lines and grades shown

MW Protect

Side Channel 2A

Side Channel 4

MIDDLE GRADING ZONE

Limits of Grading

UPPER GRADING ZONE

OR HWY 244

Install Class 100 Rip Rap, see Sheet 60697 Rip Rap Highway Trench Detail.

GRADING PLAN 2

SCALE OF FEET 60 0 60 120 180

Notes:

1. Compacted Fill is required in locations identified on this sheet. For material specifications and placement details refer to FILL MATERIALS AND PLACEMENT Sheet 60779.
2. All topsoil, sod, and woody vegetation shall be removed, sorted, and stockpiled for re-use under the direction of the C.O. Match salvage to bid items. See sheet 60778 for topsoil salvage and placement.
3. Protect existing trees under the direction of the C.O.
4. Existing Rock Weirs and Barbs have been identified for boulder salvage on these plans. Additional boulders 14-inches and greater shall also be salvaged and stockpiled when found during excavation activities.
5. Alluvium layers (gravel and cobble) shall be salvaged and stored for screening and reuse as directed by C.O.

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Nielsen P.E. — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

GRADING PLAN 2

1678-100-60713

SHEET 3 of 7

DATE AND TIME PLOTTED
MAY 9, 2018 13:05
PLOTTED BY
JNIELSEN

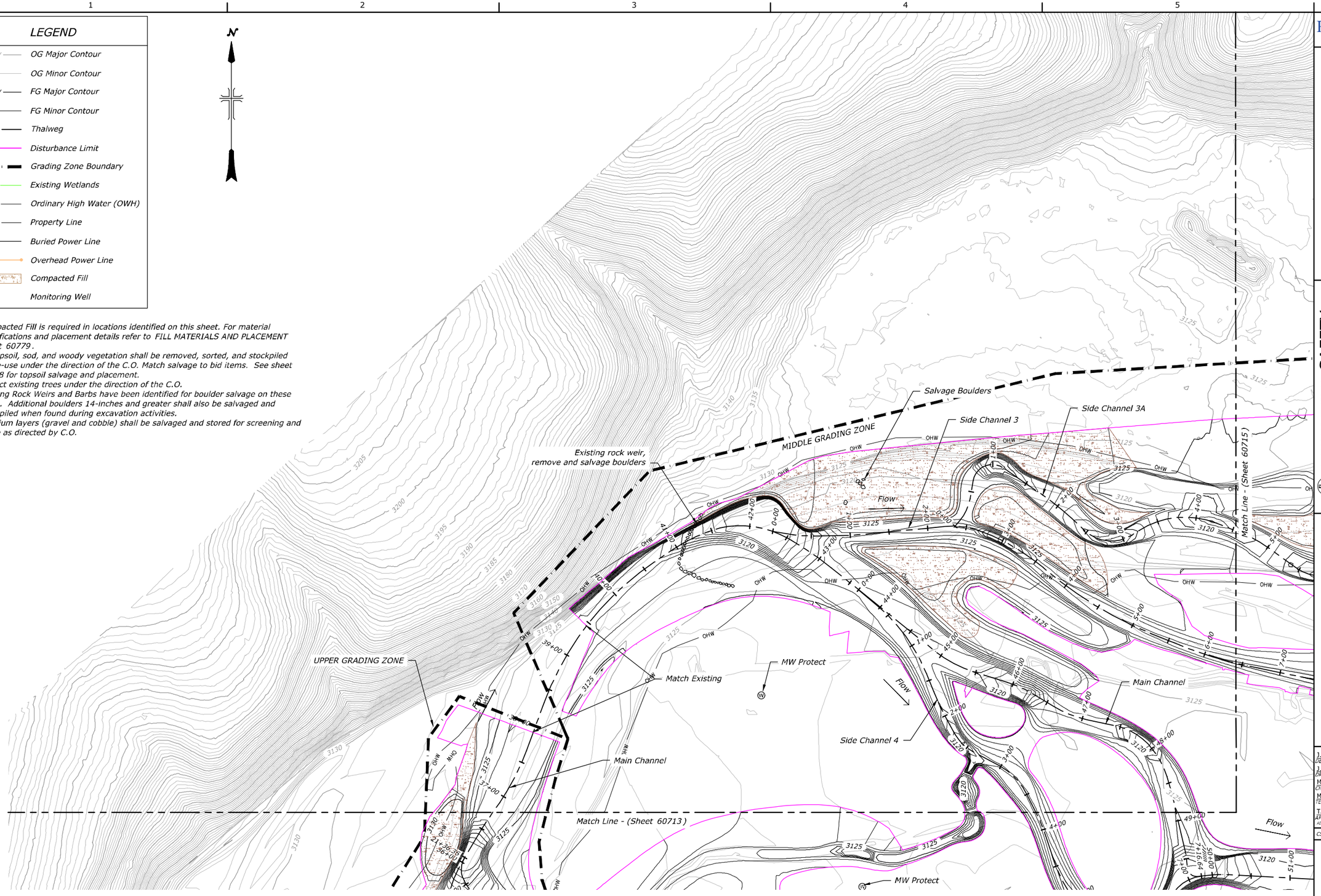
C4D SYSTEM
AutoCAD Rel. 22.0s
C4D FILENAME
BTS_SPVCT_GRADING PLAN_60SCALE.DWG

LEGEND

- ELEV — OG Major Contour
- OG Minor Contour
- ELEV — FG Major Contour
- FG Minor Contour
- Thalweg
- Disturbance Limit
- Grading Zone Boundary
- WET — Existing Wetlands
- OHW — Ordinary High Water (OWH)
- Property Line
- E — Buried Power Line
- Overhead Power Line
- Compacted Fill
- (W) Monitoring Well

Notes:

1. *Compacted Fill is required in locations identified on this sheet. For material specifications and placement details refer to FILL MATERIALS AND PLACEMENT Sheet 60779 .*
2. *All topsoil, sod, and woody vegetation shall be removed, sorted, and stockpiled for re-use under the direction of the C.O. Match salvage to bid items. See sheet 60778 for topsoil salvage and placement.*
3. *Protect existing trees under the direction of the C.O.*
4. *Existing Rock Weirs and Barbs have been identified for boulder salvage on these plans. Additional boulders 14-inches and greater shall also be salvaged and stockpiled when found during excavation activities.*
5. *Alluvium layers (gravel and cobble) shall be salvaged and stored for screening and reuse as directed by C.O.*



GRADING PLAN 3

60 0 60 120 180
SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Nielsen P.E.	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED
	ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO)	2018-05-14

GRADING PLAN 3

1678-100-60714

SHEET 4 of 7

DATE AND TIME PLOTTED
MAY 9, 2018 13:05
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_GRADING PLAN_60SCALE.DWG

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Disturbance Limit
- Grading Zone Boundary
- Existing Wetlands
- Ordinary High Water (OWH)
- Property Line
- Buried Power Line
- Overhead Power Line
- Compacted Fill
- Monitoring Well

N

Notes:
1. Compacted Fill is required in locations identified on this sheet. For material specifications and placement details refer to FILL MATERIALS AND PLACEMENT Sheet 60779.
2. All topsoil, sod, and woody vegetation shall be removed, sorted, and stockpiled for re-use under the direction of the C.O. Match salvage to bid items. See sheet 60778 for topsoil salvage and placement.
3. Protect existing trees under the direction of the C.O.
4. Existing Rock Weirs and Barbs have been identified for boulder salvage on these plans. Additional boulders 14-inches and greater shall also be salvaged and stockpiled when found during excavation activities.
5. Alluvium layers (gravel and cobble) shall be salvaged and stored for screening and reuse as directed by C.O.

Excess Material disposal Areas, see EXCESS MATERIAL DISPOSAL sheet 60780

MIDDLE GRADING ZONE

Side Channel 3

Salvage Boulders

Side Channel 3A

Match Line - (Sheet 60714)

Side Channel 3B

Match Existing

Excavate pond to lines and grades shown

Add Fill

Side Channel 3C

Salvage Bolders

Flow

Main Channel

Side Channel 5

Remove Fill

Match Line - (Sheet 60716)

MW Protect

JORDAN CREEK RANCH GRADING ZONE

Match Line - (Sheet 60717)

GRADING PLAN 4

60 0 60 120 180
SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Nielsen P.E.	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED (DRAIN APPROVAL - PROGRAM MANAGER)
CSRO (BOISE, IDAHO)	2018-05-14

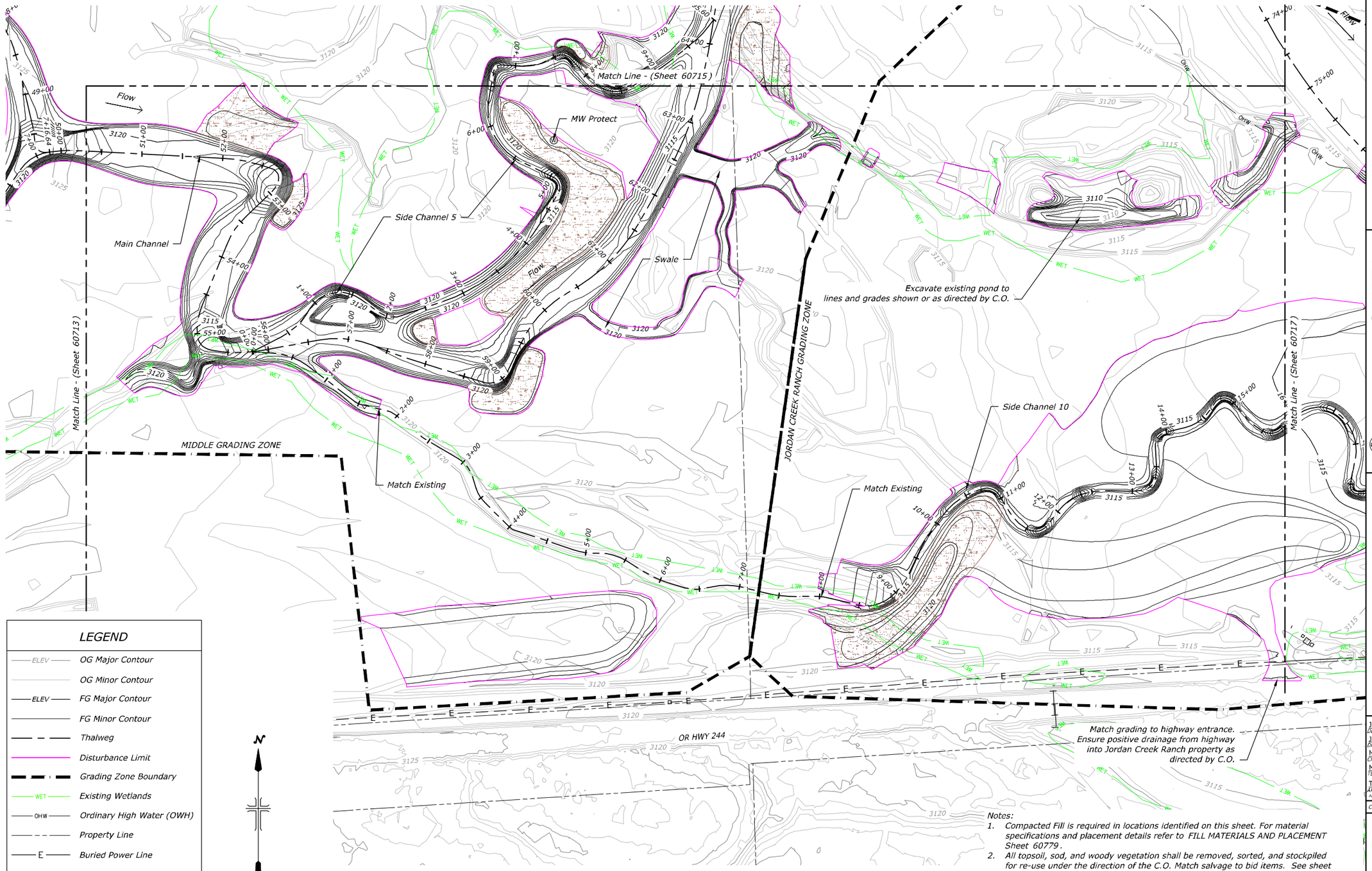
GRADING PLAN 4

1678-100-60715

SHEET 5 of 7

DATE AND TIME PLOTTED
MAY 9, 2018 13:05
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
RTS_SSPCT_GRADING PLAN_60SCALE.DWG



LEGEND

- ELEV — OG Major Contour
- OG Minor Contour
- ELEV — FG Major Contour
- FG Minor Contour
- Thalweg
- Disturbance Limit
- Grading Zone Boundary
- WET — Existing Wetlands
- OHW — Ordinary High Water (OWH)
- Property Line
- E — Buried Power Line
- W — Overhead Power Line
- Compacted Fill
- Ⓦ Monitoring Well

GRADING PLAN 5

60 0 60 120 180
SCALE OF FEET

Notes:

1. *Compacted Fill is required in locations identified on this sheet. For material specifications and placement details refer to FILL MATERIALS AND PLACEMENT Sheet 60779 .*
2. *All topsoil, sod, and woody vegetation shall be removed, sorted, and stockpiled for re-use under the direction of the C.O. Match salvage to bid items. See sheet 60778 for topsoil salvage and placement.*
3. *Protect existing trees under the direction of the C.O.*
4. *Existing Rock Weirs and Barbs have been identified for boulder salvage on these plans. Additional boulders 14-inches and greater shall also be salvaged and stockpiled when found during excavation activities.*
5. *Alluvium layers (gravel and cobble) shall be salvaged and stored for screening and reuse as directed by C.O.*

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Nielsen P.E. — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED — ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

GRADING PLAN 5

1678-100-60716
SHEET 6 of 7

DATE AND TIME PLOTTED
MAY 9, 2018 13:05
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PC_GRADING PLAN_60SCALE.DWG

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

LEGEND

- ELEV — OG Major Contour
- OG Minor Contour
- ELEV — FG Major Contour
- FG Minor Contour
- Thalweg
- Disturbance Limit
- Grading Zone Boundary
- WET — Existing Wetlands
- OHW — Ordinary High Water (OWH)
- Property Line
- E — Buried Power Line
- Overhead Power Line
- Compacted Fill
- (M) Monitoring Well

Match Line - (Sheet 60715)

Match Line - (Sheet 60716)

Match Existing

Flow

Main Channel

Salvage boulders from existing bankline

JORDAN CREEK RANCH GRADING ZONE

LOWER GRADING ZONE

Side Channel 10

Fill

Notes:

1. Compacted Fill is required in locations identified on this sheet. For material specifications and placement details refer to FILL MATERIALS AND PLACEMENT Sheet 60779.
2. All topsoil, sod, and woody vegetation shall be removed, sorted, and stockpiled for re-use under the direction of the C.O. Match salvage to bid items. See sheet 60778 for topsoil salvage and placement.
3. Protect existing trees under the direction of the C.O.
4. Existing Rock Weirs and Barbs have been identified for boulder salvage on these plans. Additional boulders 14-inches and greater shall also be salvaged and stockpiled when found during excavation activities.
5. Alluvium layers (gravel and cobble) shall be salvaged and stored for screening and reuse as directed by C.O.

GRADING PLAN 6

60 0 60 120 180
SCALE OF FEET

J. Nielsen P.E.	DESIGNED
J. Nielsen P.E.	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED
ADMIN APPROVAL - PROGRAM MANAGER	
CSRO (BOISE, IDAHO)	2018-05-14

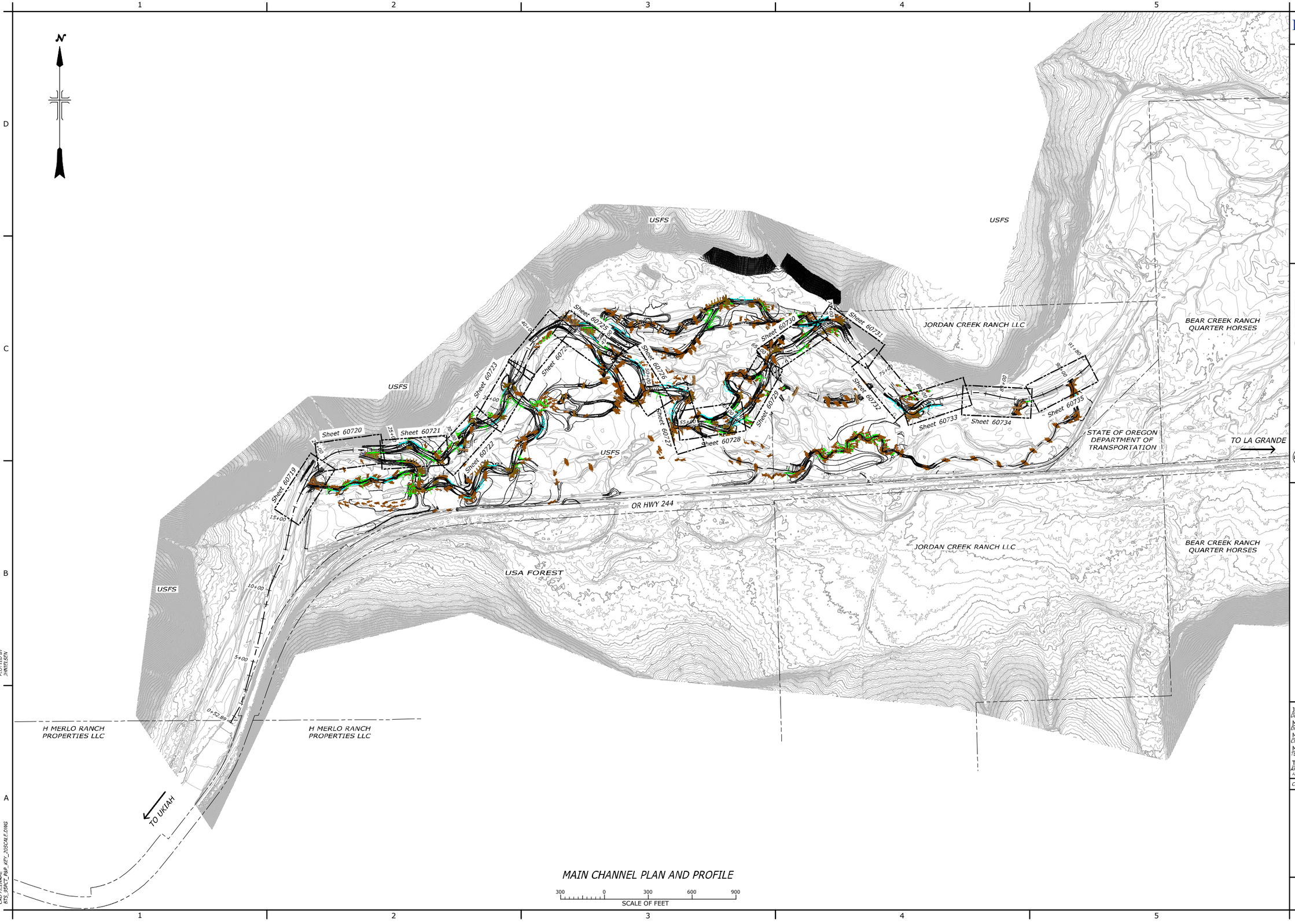
GRADING PLAN 6

1678-100-60717

SHEET 7 of 7

DATE AND TIME PLOTTED
MAY 9, 2018 13:05
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_SSPCT_GRADING PLAN_60SCALE.DWG



MAIN CHANNEL PLAN AND PROFILE

300 0 300 600 900
SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
M. Bergstrom
DRAWN
M. Knutson P.E.
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) *2018-05-14*

MAIN CHANNEL PLAN AND PROFILE

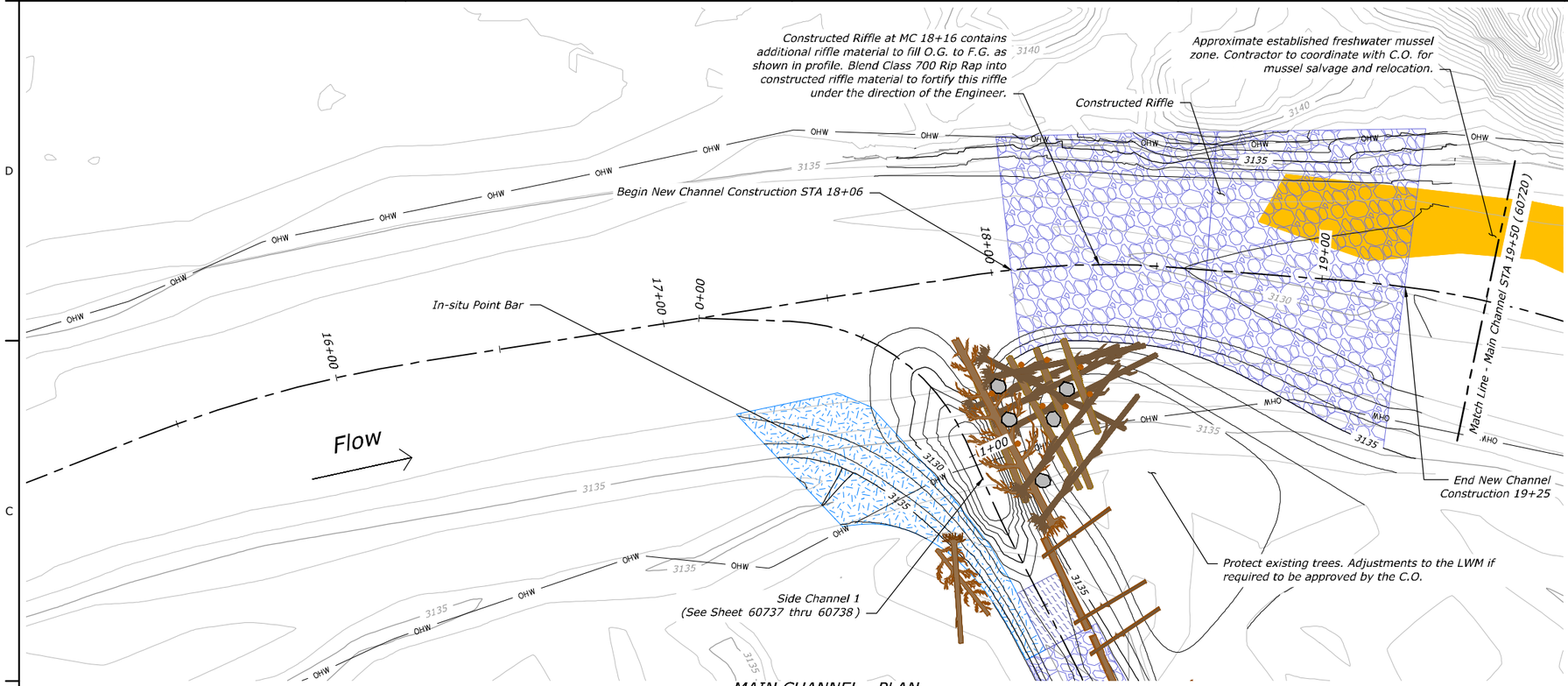
KEY MAP

1678-100-60718

SHEET 1 of 18

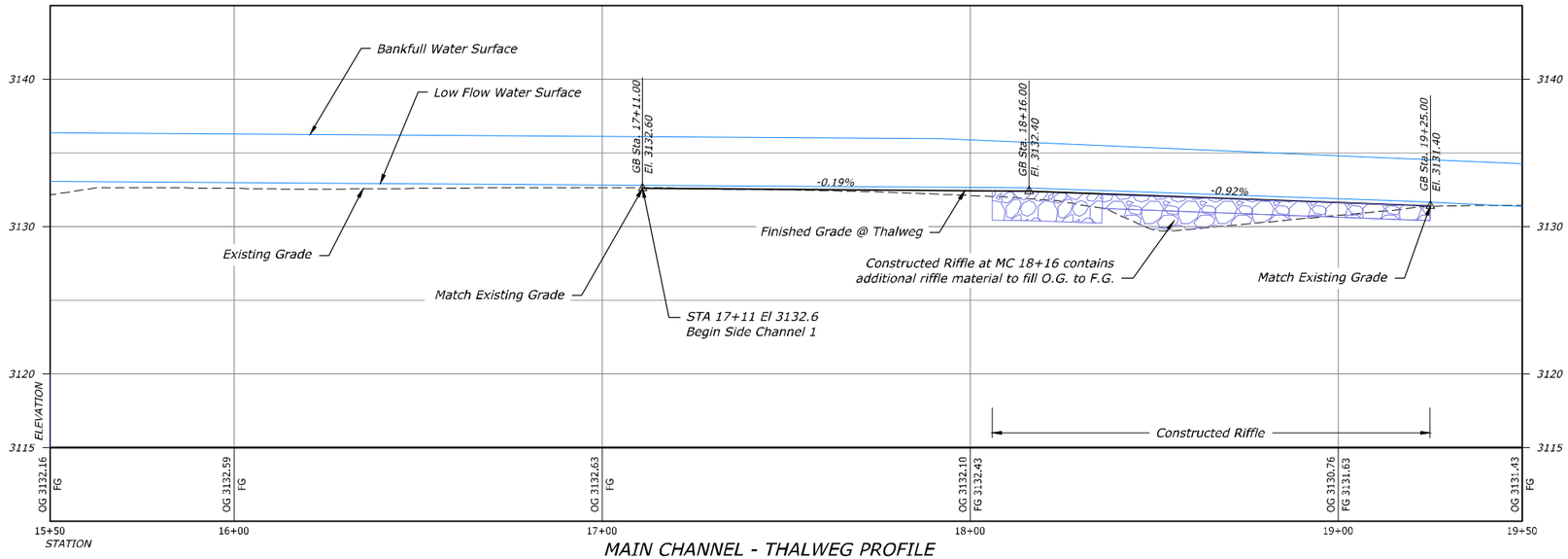
DATE AND TIME PLOTTED
MAY 11, 2018 15:33
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
R7S_95PCT_P&P_KEY_30SCALE.DWG



MAIN CHANNEL - PLAN
STA 15+50 To STA 19+50

SCALE OF FEET: 20 0 20 40 60



MAIN CHANNEL - THALWEG PROFILE
STA 15+50 To STA 19+50

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Gilker — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. SVSR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

MAIN CHANNEL PLAN AND PROFILE

STA 15+50 TO STA 19+50

1678-100-60719

SHEET 1 of 18

DATE AND TIME PLOTTED
MAY 11, 2018 14:07
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_MAINCHANNEL_P&P_20SCALE.DWG

Approximate established freshwater mussel zone. Contractor to coordinate with C.O. for mussel salvage and relocation.

Match Line - Main Channel STA 19+50 (60719)

Side Channel 2 (See Sheet 60739 thru 60743)

Flow

Glide

Begin New Channel Construction STA 23+71

Constructed Riffle

120 LF

Match Line - Main Channel STA 24+00 (60721)

20+00 21+00 22+00 23+00 24+00 0+00 1+00

OHW MHW 3130 3135 3140 3145 3150 3155 3160 3165 3170 3175

LEGEND

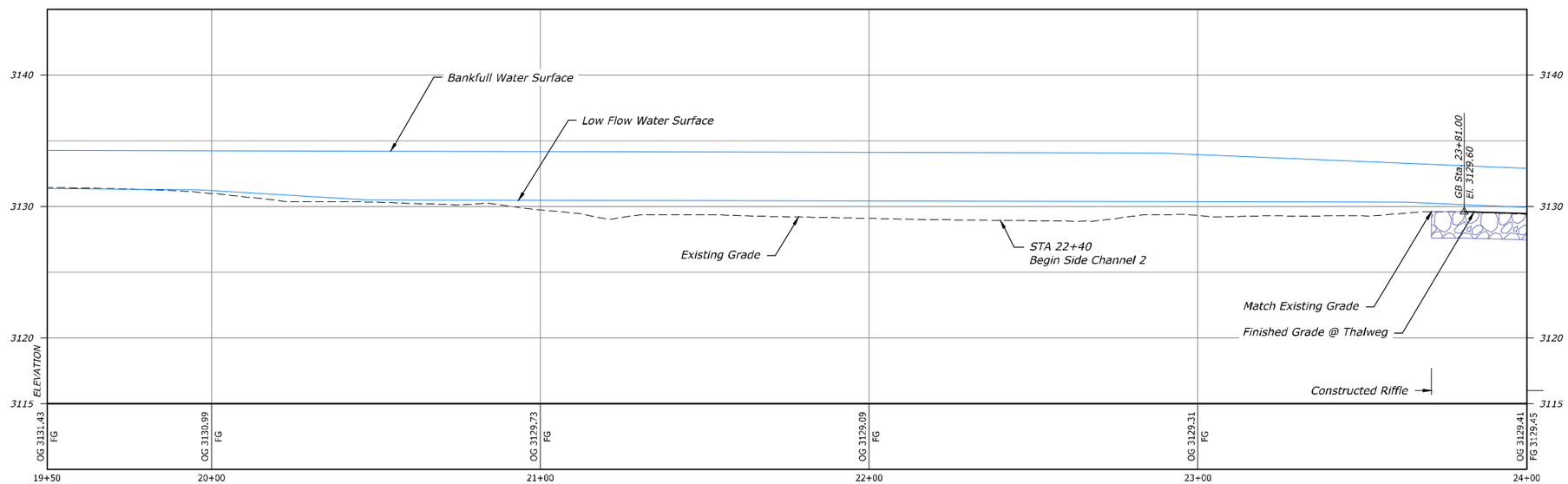
- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

N

MAIN CHANNEL - PLAN

STA 19+50 TO STA 24+00

20 0 20 40 60
SCALE OF FEET



MAIN CHANNEL - THALWEG PROFILE

STA 19+50 TO STA 24+00

HORIZONTAL SCALE
20 0 20 40 60
SCALE OF FEET

VERTICAL SCALE
5 0 5 10 15
SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Gilder — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED (CRSO APPROVAL - PROGRAM MANAGER)

CSRO (BOISE, IDAHO) 2018-05-14

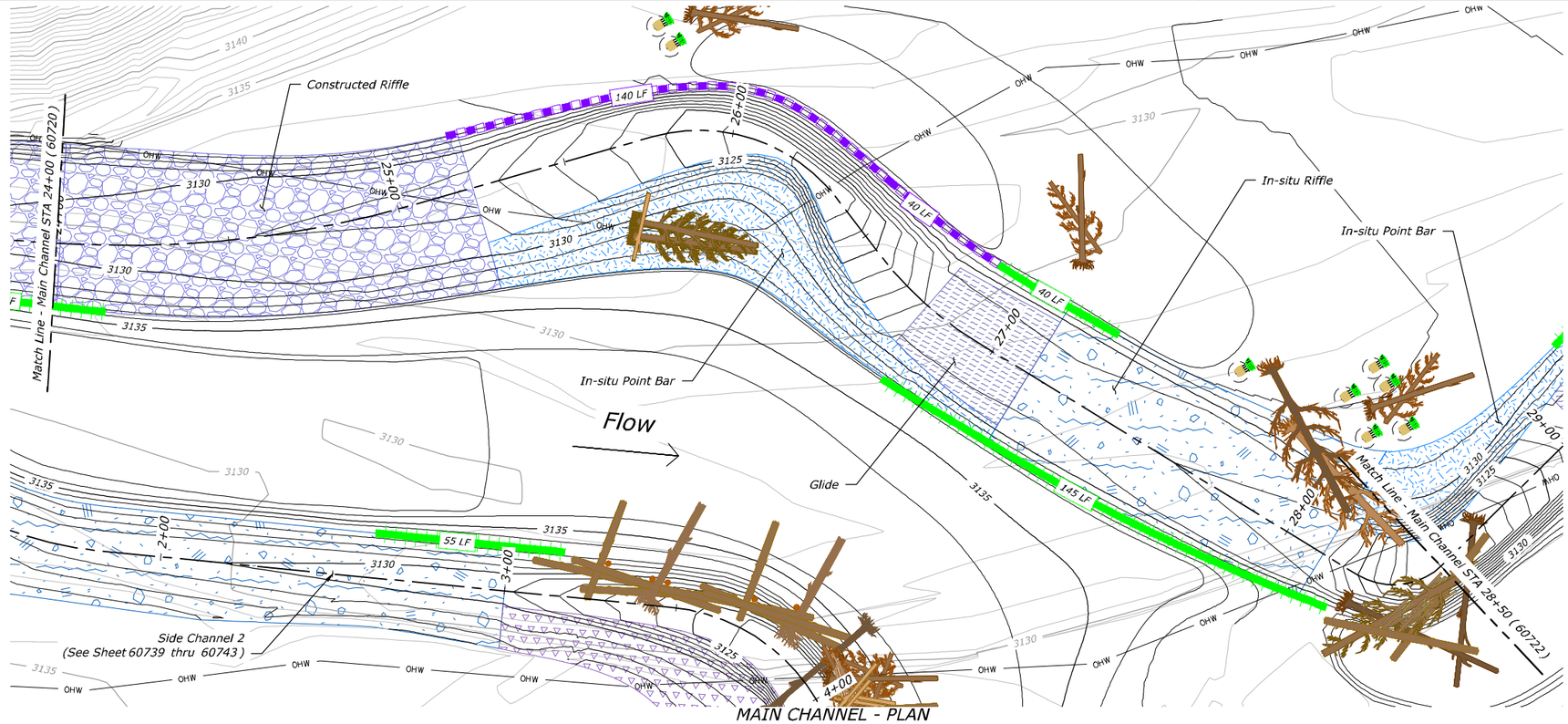
MAIN CHANNEL PLAN AND PROFILE

STA 19+50 TO STA 24+00

1678-100-60720

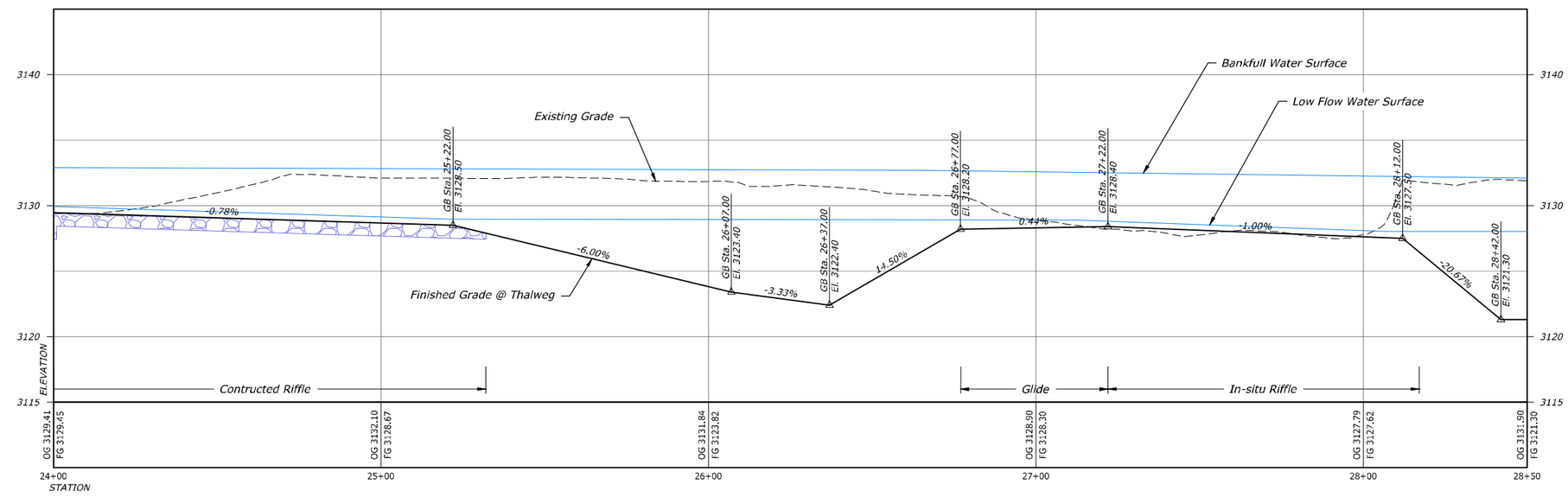
SHEET 3 of 18

DATE AND TIME PLOTTED: MAY 11, 2018 14:10
PLOTTED BY: JNIELSEN
CAD SYSTEM: AutoCAD Rel. 22.0s
CAD FILENAME: R7S_SPKT_MAINCHANNEL_PAP_20SCALE.DWG



MAIN CHANNEL - PLAN
STA 24+00 TO 28+50

SCALE OF FEET: 20 0 20 40 60



MAIN CHANNEL - THALWEG PROFILE
STA 24+00 TO 28+50

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Gilder — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED — ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

MAIN CHANNEL PLAN AND PROFILE

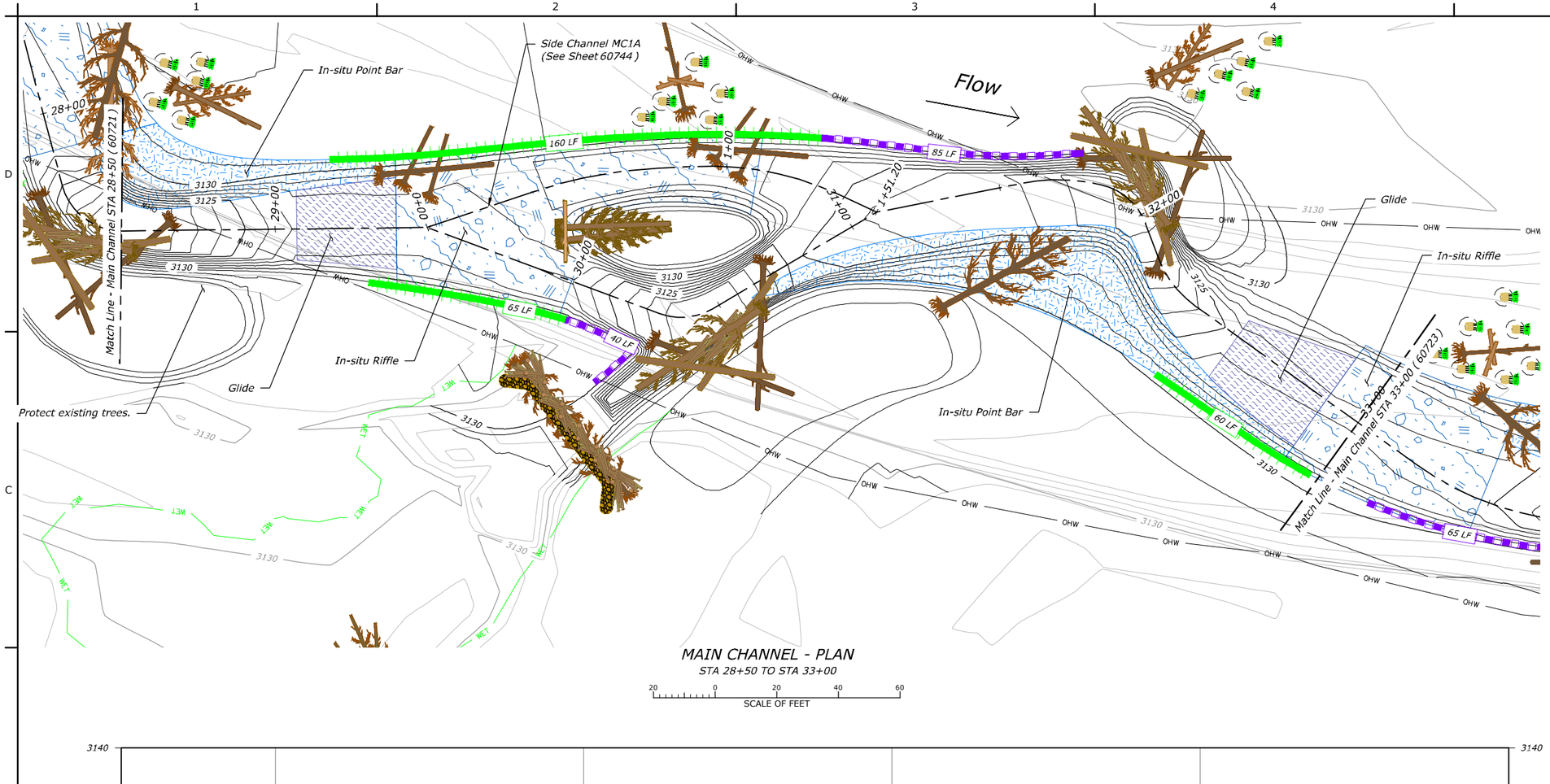
STA 24+00 TO 28+50

1678-100-60721

SHEET 4 of 18

DATE AND TIME PLOTTED
MAY 11, 2018 14:13
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_MAINCHANNEL_P&P_20SCALE.DWG



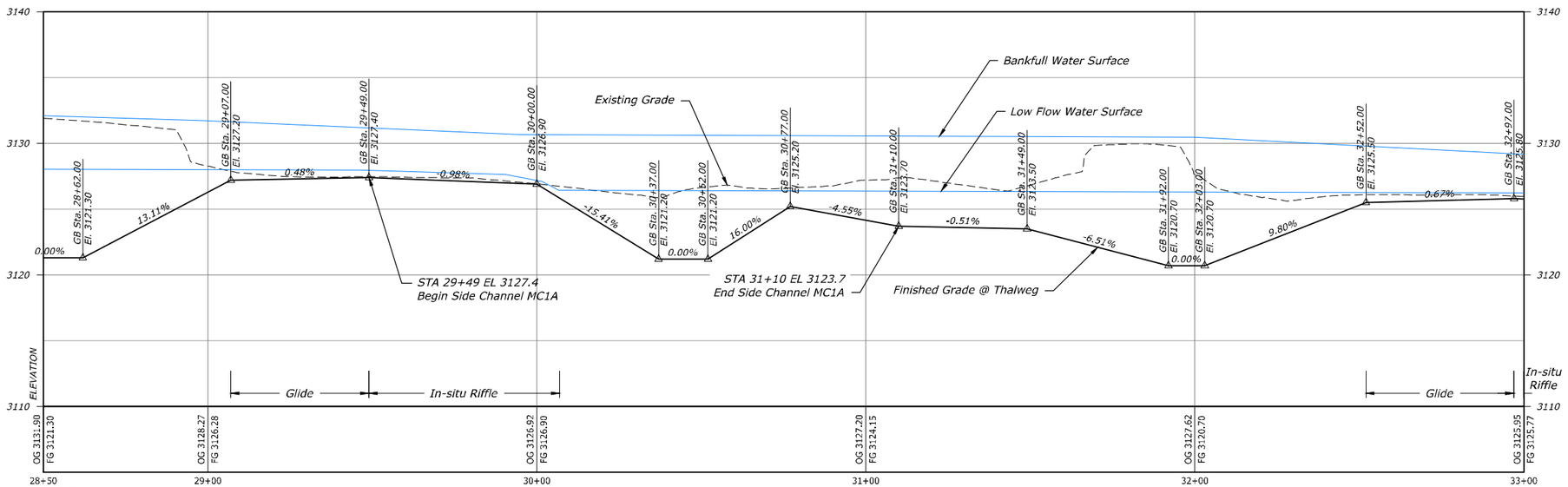
LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

MAIN CHANNEL - PLAN

STA 28+50 TO STA 33+00

20 0 20 40 60
SCALE OF FEET



MAIN CHANNEL - THALWEG PROFILE

STA 28+50 TO STA 33+00

HORIZONTAL SCALE
20 0 20 40 60
SCALE OF FEET

VERTICAL SCALE
5 0 5 10 15
SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Gilder — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

MAIN CHANNEL PLAN AND PROFILE

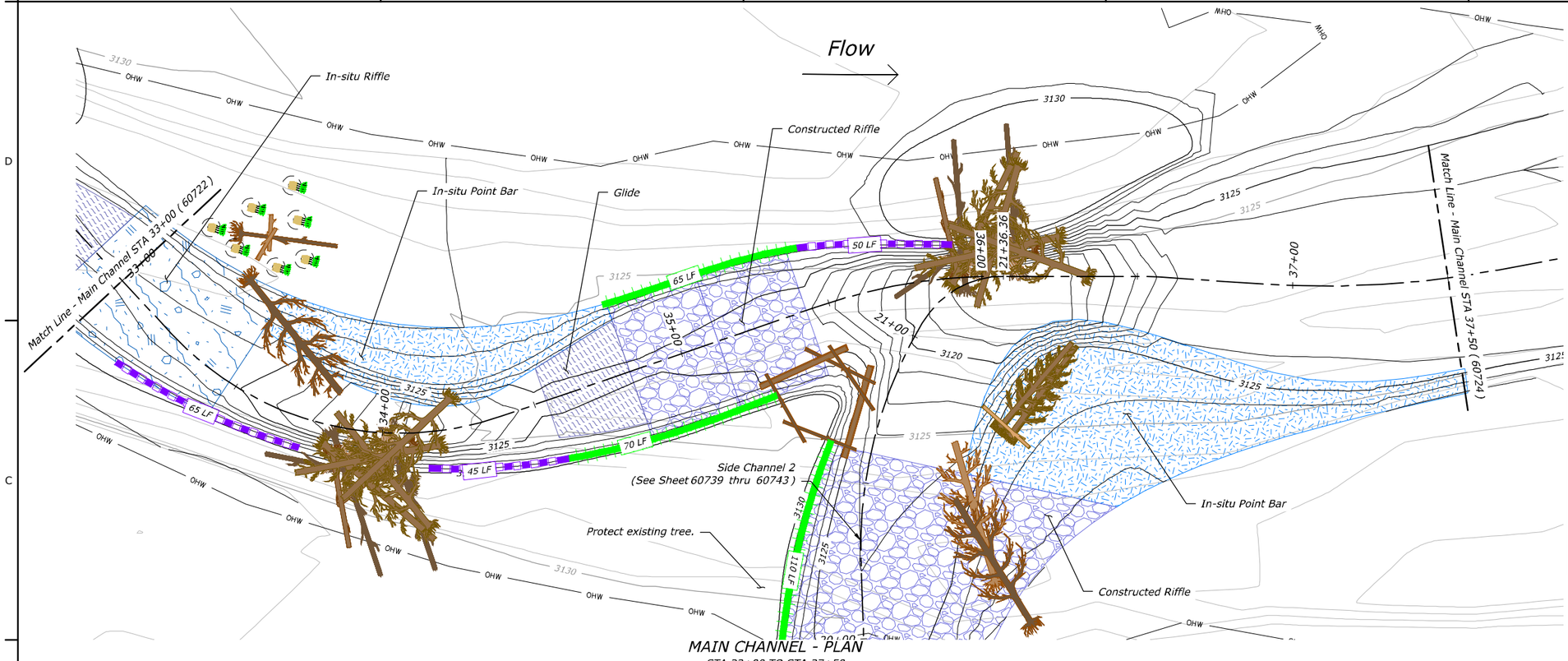
STA 28+50 TO STA 33+00

1678-100-60722

SHEET 5 of 18

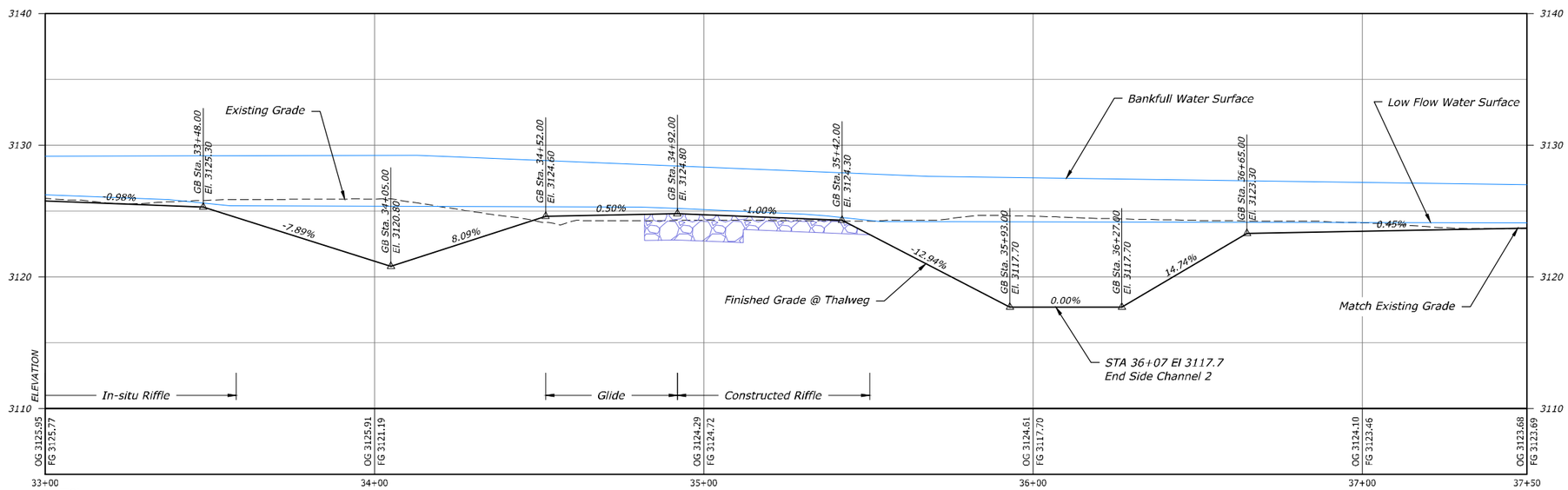
DATE AND TIME PLOTTED
MAY 11, 2018 14:14
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_MAINCHANNEL_P&P_20SCALE.DWG



MAIN CHANNEL - PLAN
STA 33+00 TO STA 37+50

20 0 20 40 60
SCALE OF FEET



MAIN CHANNEL - THALWEG PROFILE
STA 33+00 TO STA 37+50

HORIZONTAL SCALE
20 0 20 40 60
SCALE OF FEET

VERTICAL SCALE
5 0 5 10 15
SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
J. Gilder
DRAWN
M. Knutson P.E.
CHECKED
M. Knutson P.E.
TECH. SVSR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

MAIN CHANNEL
PLAN AND PROFILE

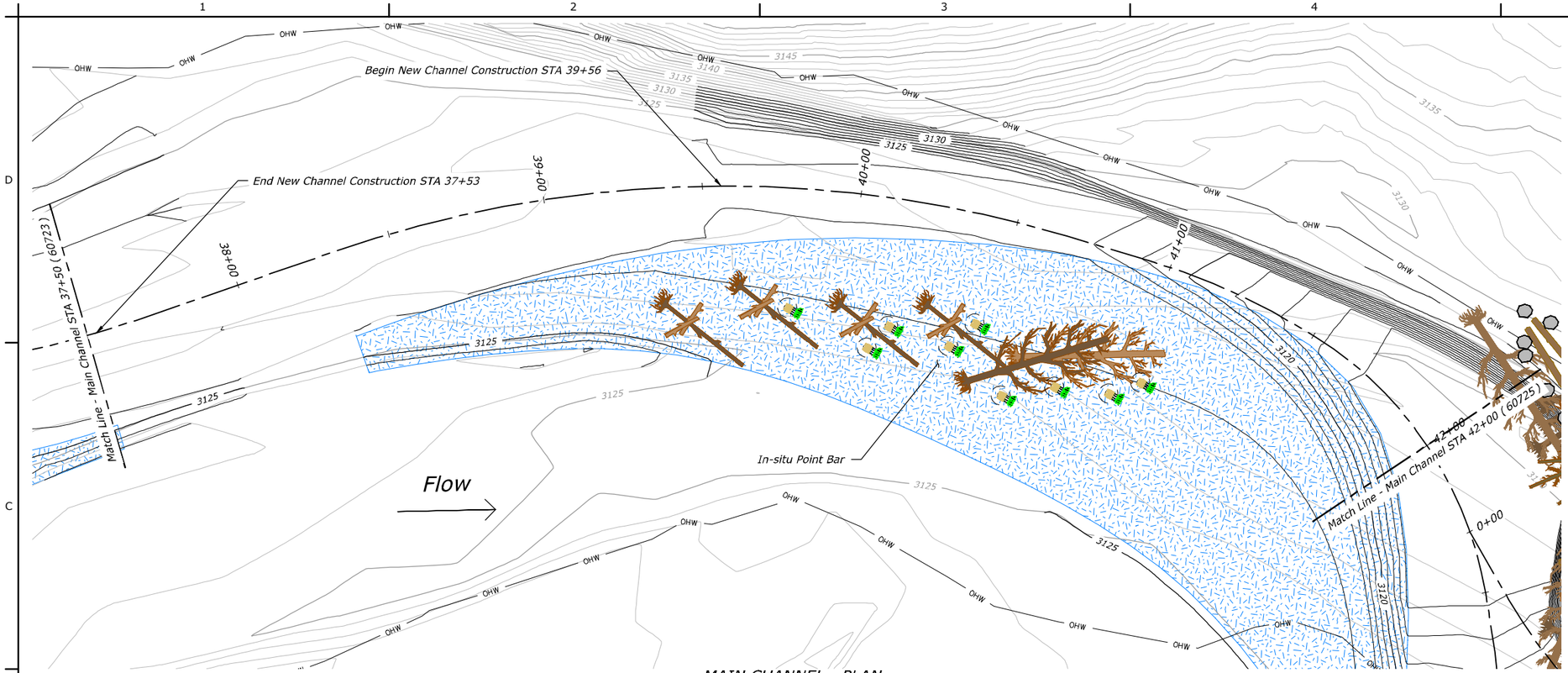
STA 33+00 TO
STA 37+50

1678-100-60723

SHEET 6 of 18

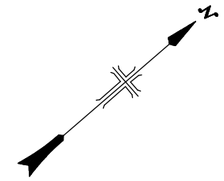
DATE AND TIME PLOTTED
MAY 11, 2018 14:15
PLOTTED BY
JHNIELSEN

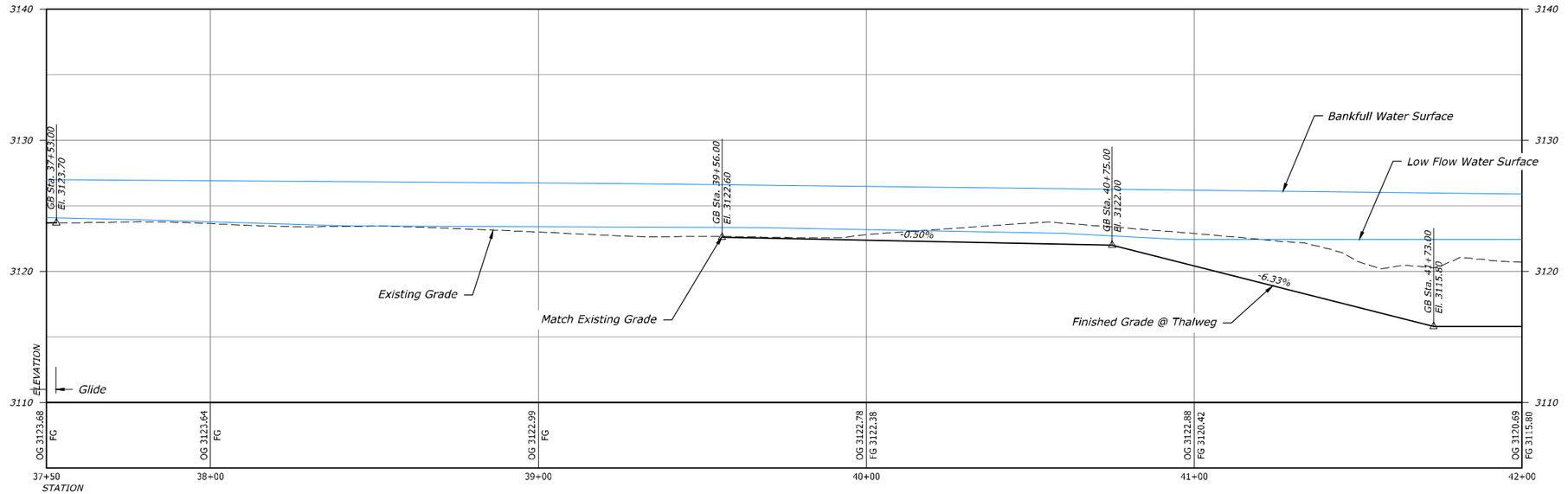
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_MAINCHANNEL_P&P_20SCALE.DWG



MAIN CHANNEL - PLAN
STA 37+50 TO 42+00

SCALE OF FEET: 20 0 20 40 60





MAIN CHANNEL - THALWEG PROFILE
STA 37+50 TO 42+00

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Gilder — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

MAIN CHANNEL PLAN AND PROFILE

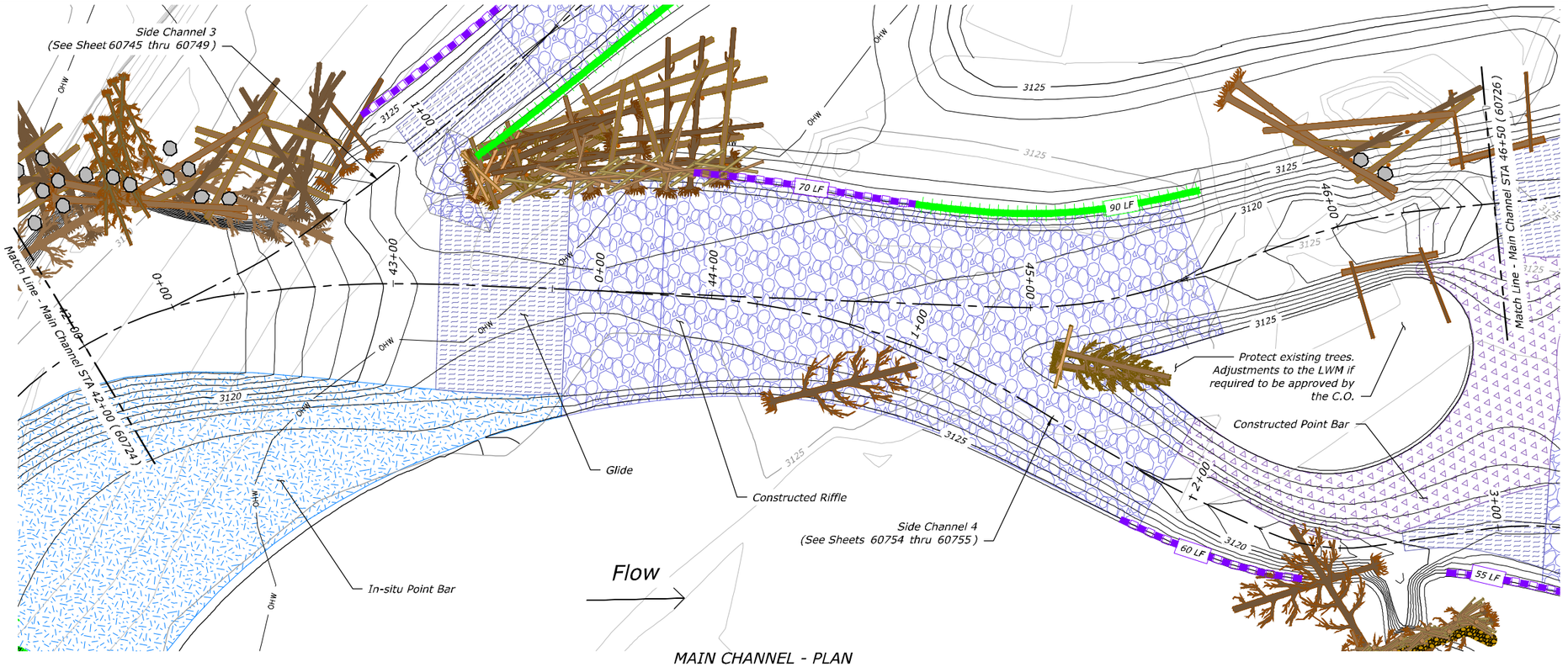
STA 37+50 TO 42+00

1678-100-60724

SHEET 7 of 18

DATE AND TIME PLOTTED
MAY 11, 2018 14:19
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_MAINCHANNEL_P&P_20SCALE.DWG

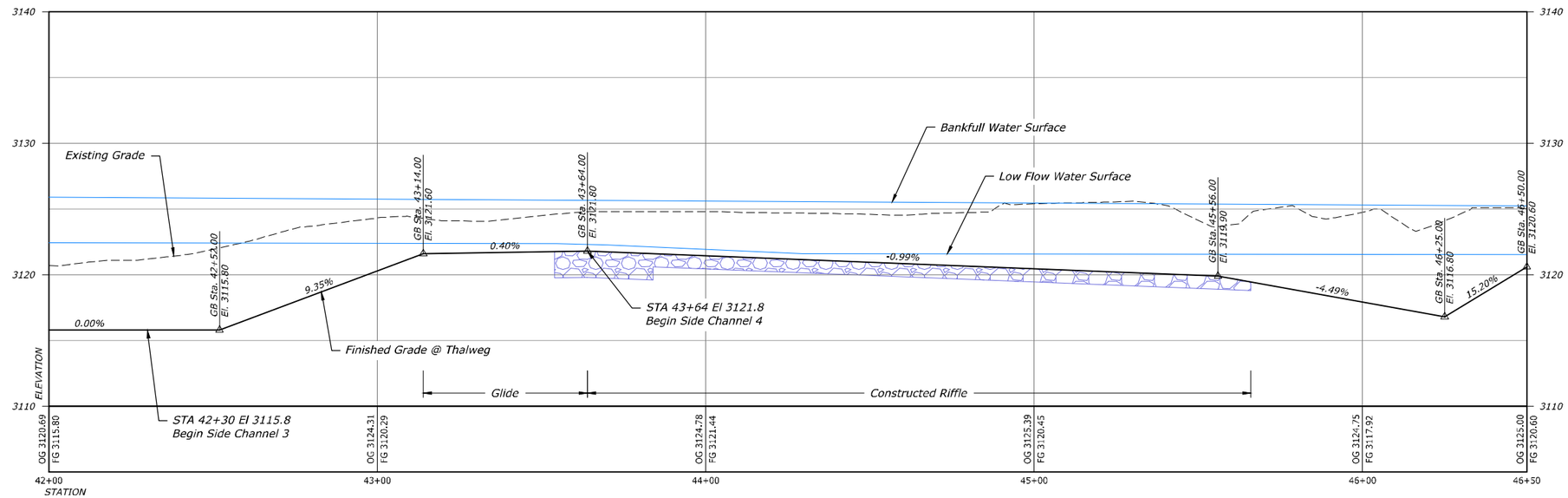


MAIN CHANNEL - PLAN
STA 42+00 TO STA 46+50

SCALE OF FEET: 20 0 20 40 60

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810



MAIN CHANNEL - THALWEG PROFILE
STA 42+00 TO STA 46+50

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Gilder	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED (CROM APPROVAL - PROGRAM MANAGER)
CSRO (BOISE, IDAHO)	2018-05-14

MAIN CHANNEL PLAN AND PROFILE

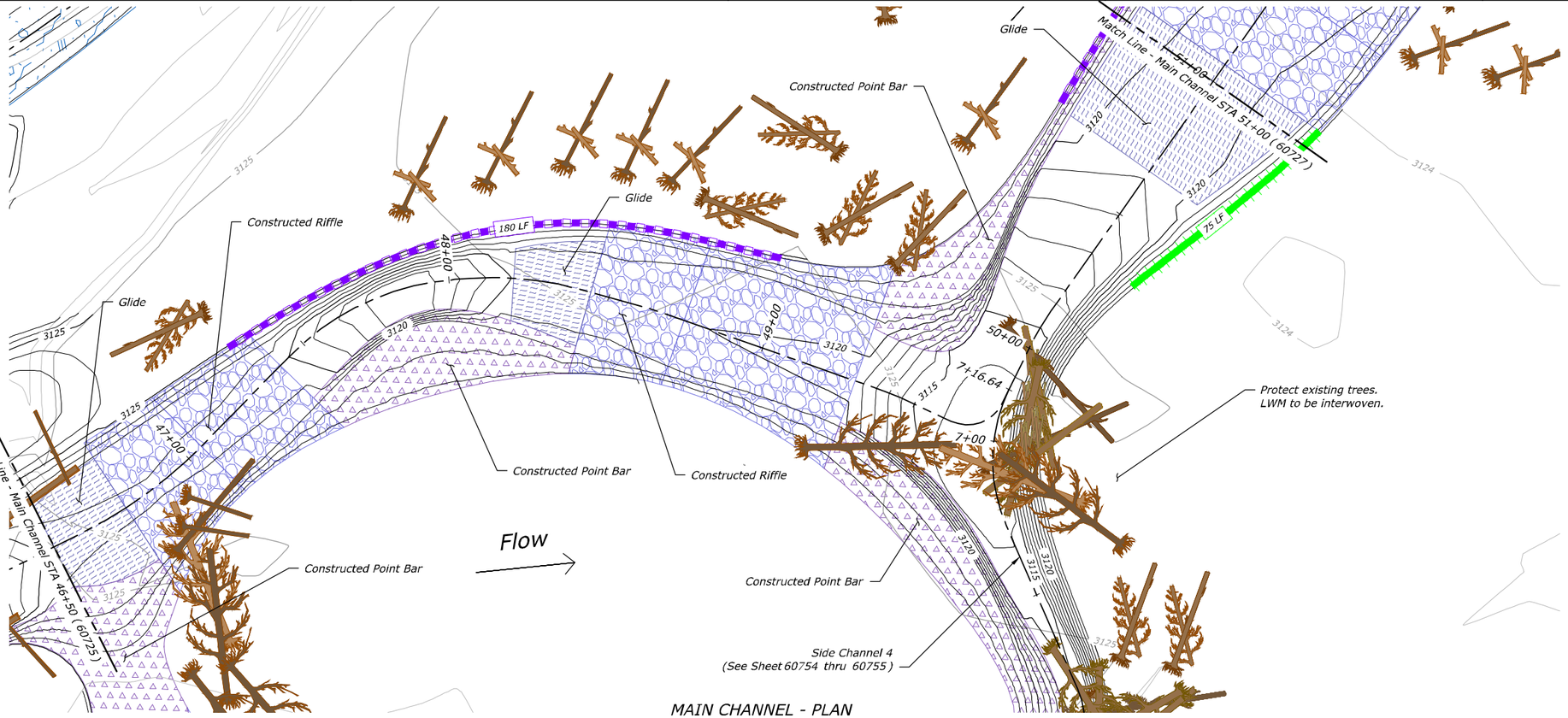
STA 42+00 TO STA 46+50

1678-100-60725

SHEET 8 of 18

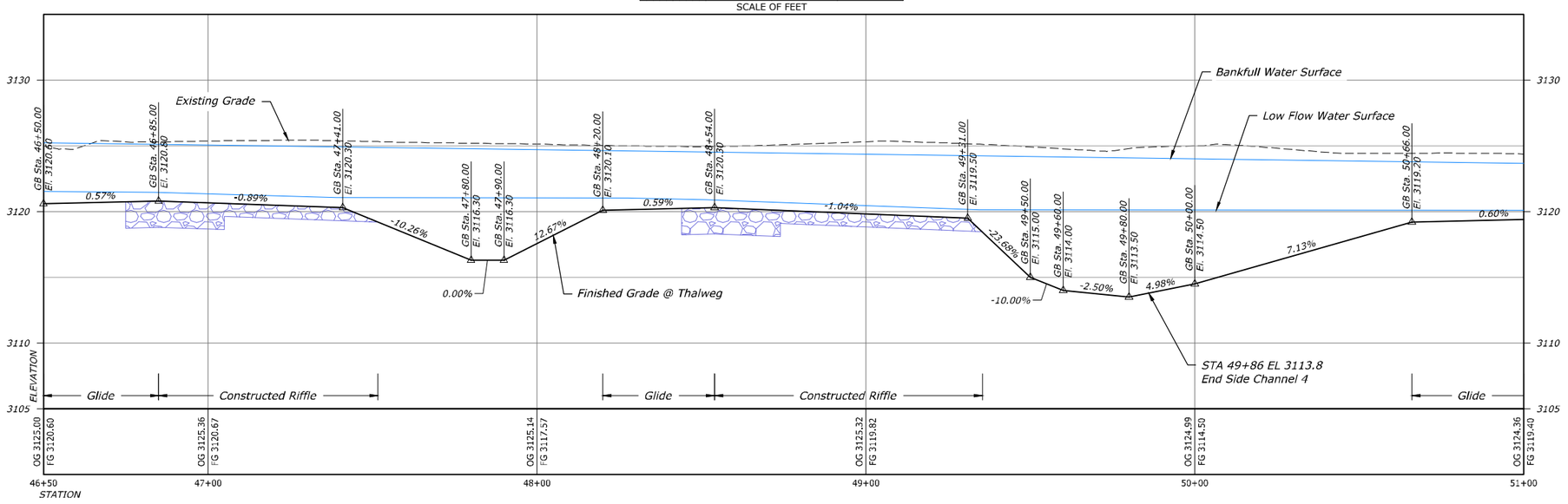
DATE AND TIME PLOTTED
MAY 11, 2018 14:20
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_SPCT_MAINCHANNEL_PAP_20SCALE.DWG



MAIN CHANNEL - PLAN
STA 46+50 TO STA 51+00

SCALE OF FEET (20 0 20 40 60)



MAIN CHANNEL - THALWEG PROFILE
STA 46+50 TO STA 51+00

HORIZONTAL SCALE (20 0 20 40 60) SCALE OF FEET

VERTICAL SCALE (5 0 5 10 15) SCALE OF FEET

LEGEND

- OG Major Contour (ELEV)
- OG Minor Contour
- FG Major Contour (ELEV)
- FG Minor Contour
- Thalweg
- Existing Wetlands (WET)
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Gilder — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

MAIN CHANNEL PLAN AND PROFILE

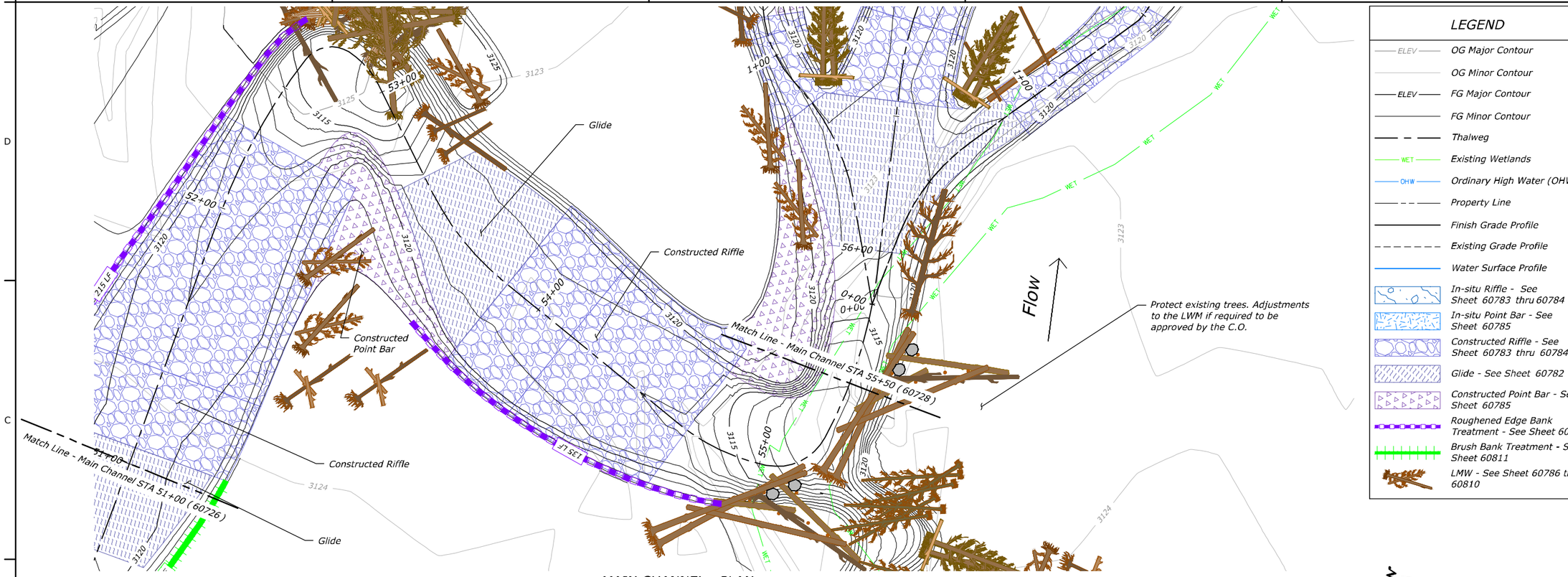
STA 46+50 TO STA 51+00

1678-100-60726

SHEET 9 of 18

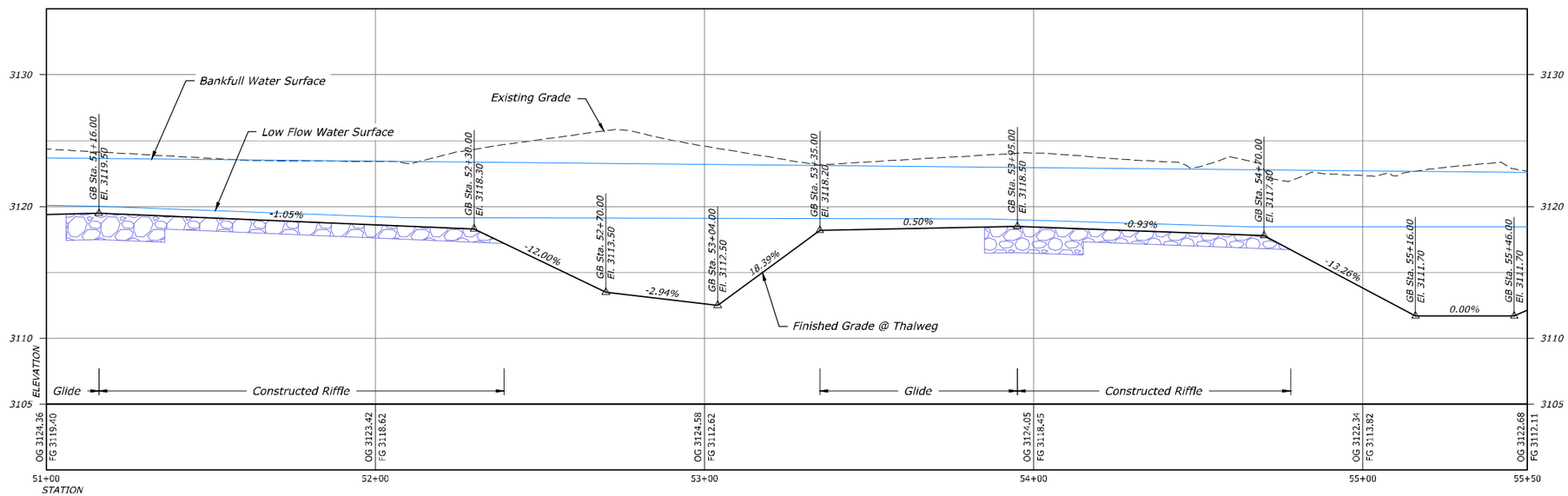
DATE AND TIME PLOTTED: MAY 11, 2018 14:22
PLOTTED BY: JNIELSEN

CAD SYSTEM: AutoCAD Rel. 22.0s
CAD FILENAME: BTS_35PCT_MAINCHANNEL_P&P_20SCALE.DWG



MAIN CHANNEL - PLAN
STA 51+00 TO STA 55+50

SCALE OF FEET: 20 0 20 40 60



MAIN CHANNEL - THALWEG PROFILE
STA 51+00 TO STA 55+50

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Gilder — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED (ADMIN APPROVAL - PROGRAM MANAGER)
CSRO (BOISE, IDAHO) 2018-05-14

MAIN CHANNEL PLAN AND PROFILE

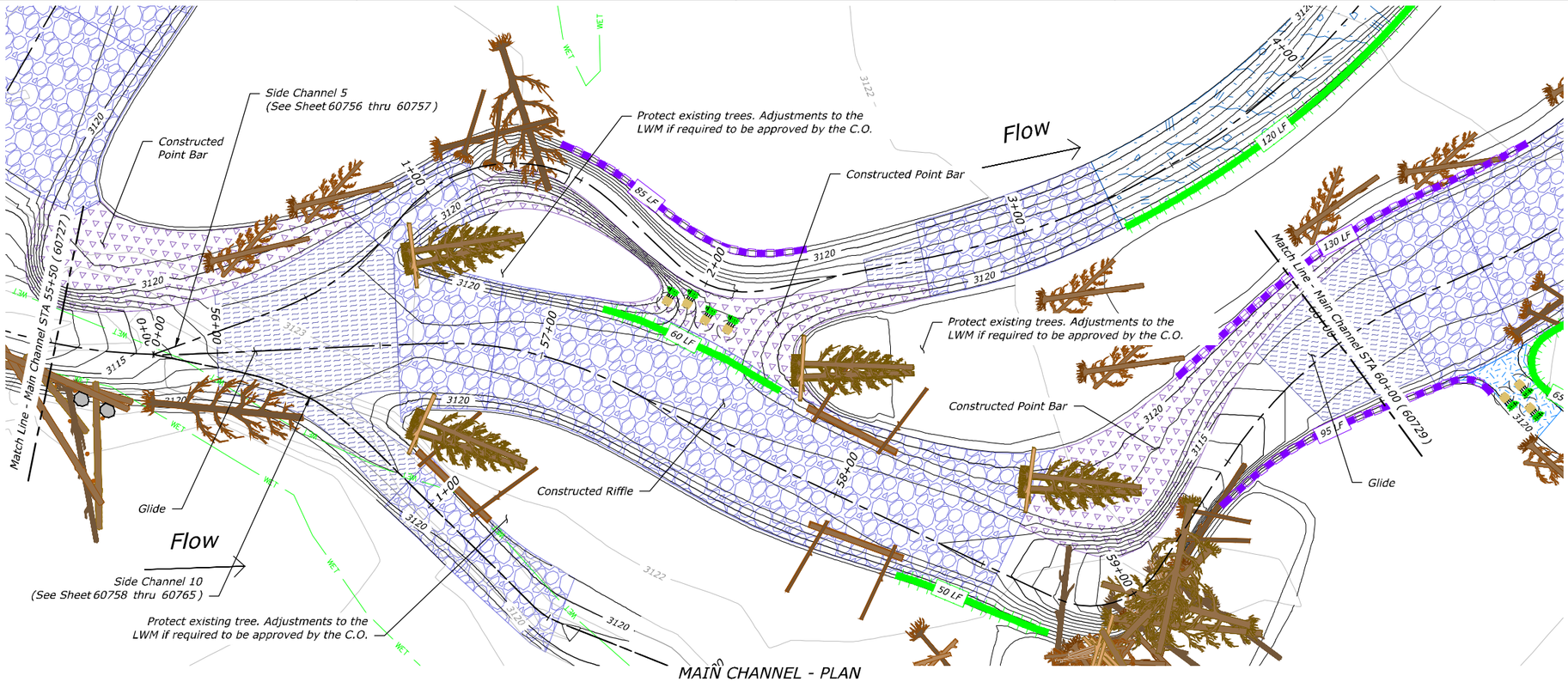
STA 51+00 TO STA 55+50

1678-100-60727

SHEET 10 of 18

DATE AND TIME PLOTTED
MAY 11, 2018 14:23
PLOTTED BY
JNIELSEN

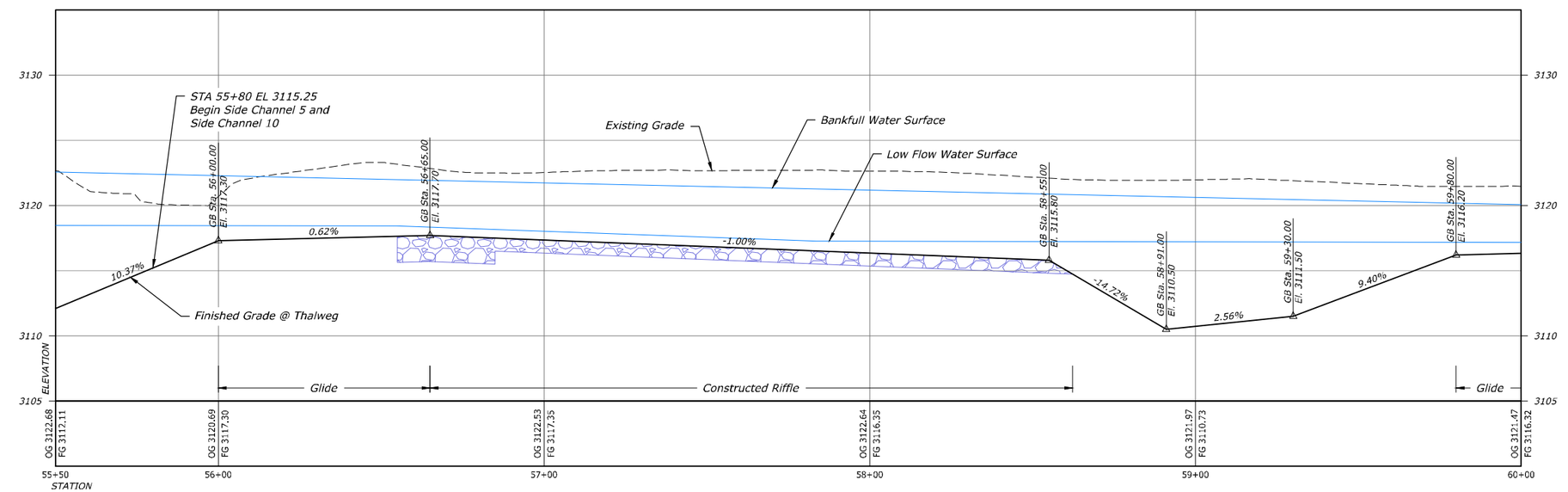
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
RTS_SPACT_MAINCHANNEL_P&P_10SCALE.DWG



MAIN CHANNEL - PLAN

STA 55+50 TO STA 60+00

SCALE OF FEET: 20 0 20 40 60



MAIN CHANNEL - THALWEG PROFILE

STA 55+50 TO STA 60+00

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Gilder — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

MAIN CHANNEL
PLAN AND PROFILE

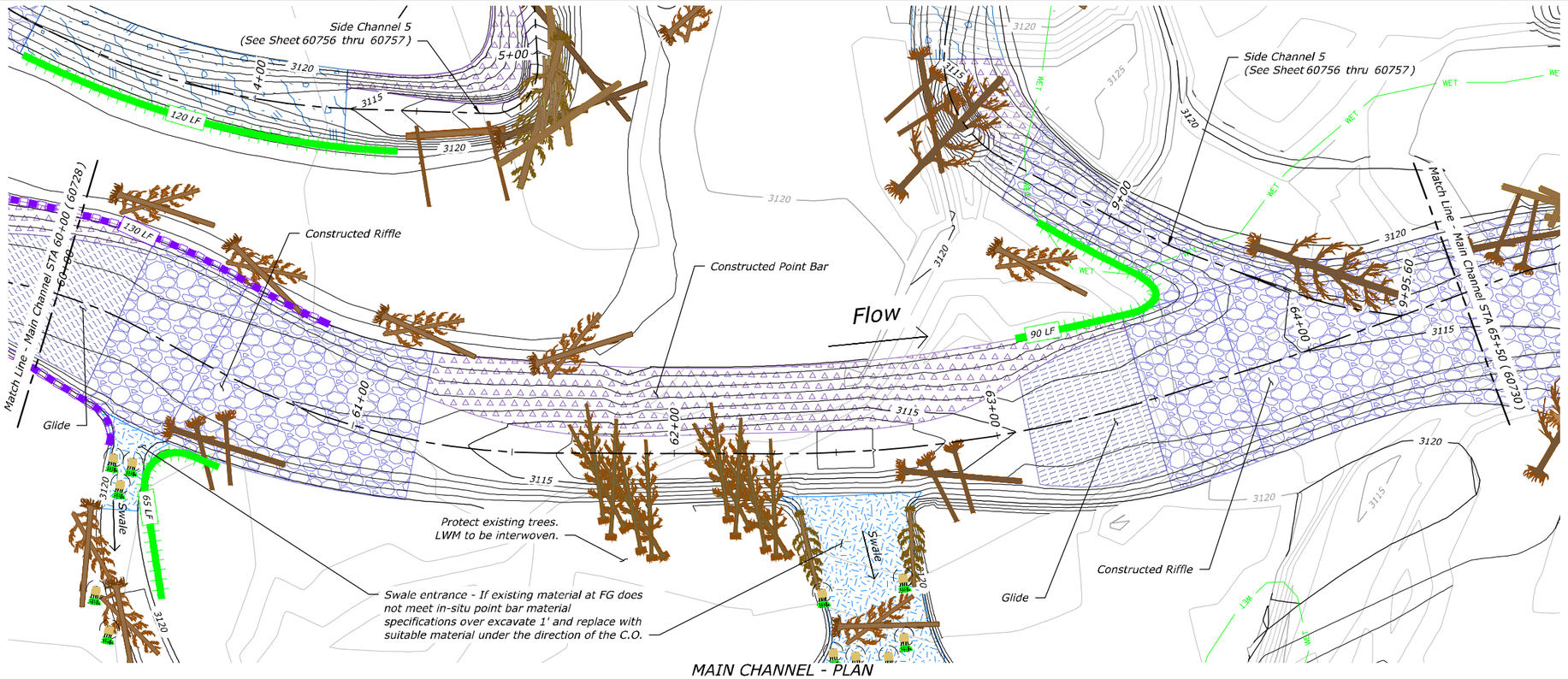
STA 55+50 TO
STA 60+00

1678-100-60728

SHEET 11 of 18

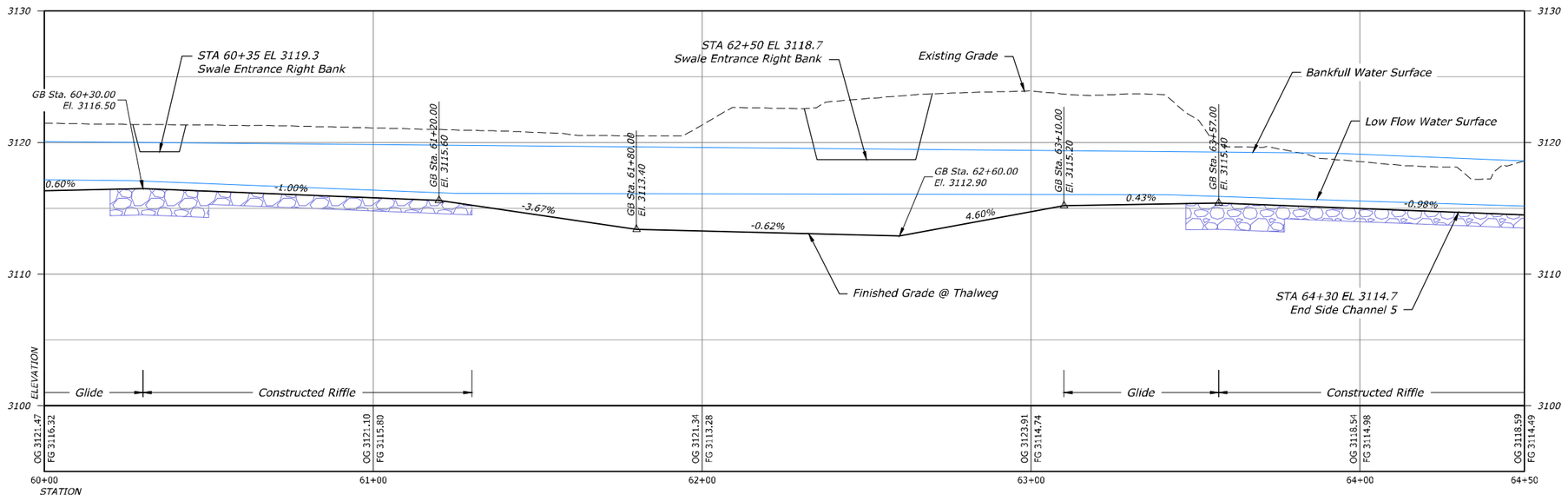
DATE AND TIME PLOTTED
MAY 11, 2018 14:25
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_MAINCHANNEL_P&P_20SCALE.DWG



MAIN CHANNEL - PLAN
STA 60+00 TO STA 64+50

SCALE OF FEET: 20 0 20 40 60



MAIN CHANNEL - THALWEG PROFILE
STA 60+00 TO STA 64+50

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Gilder — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

MAIN CHANNEL
PLAN AND PROFILE

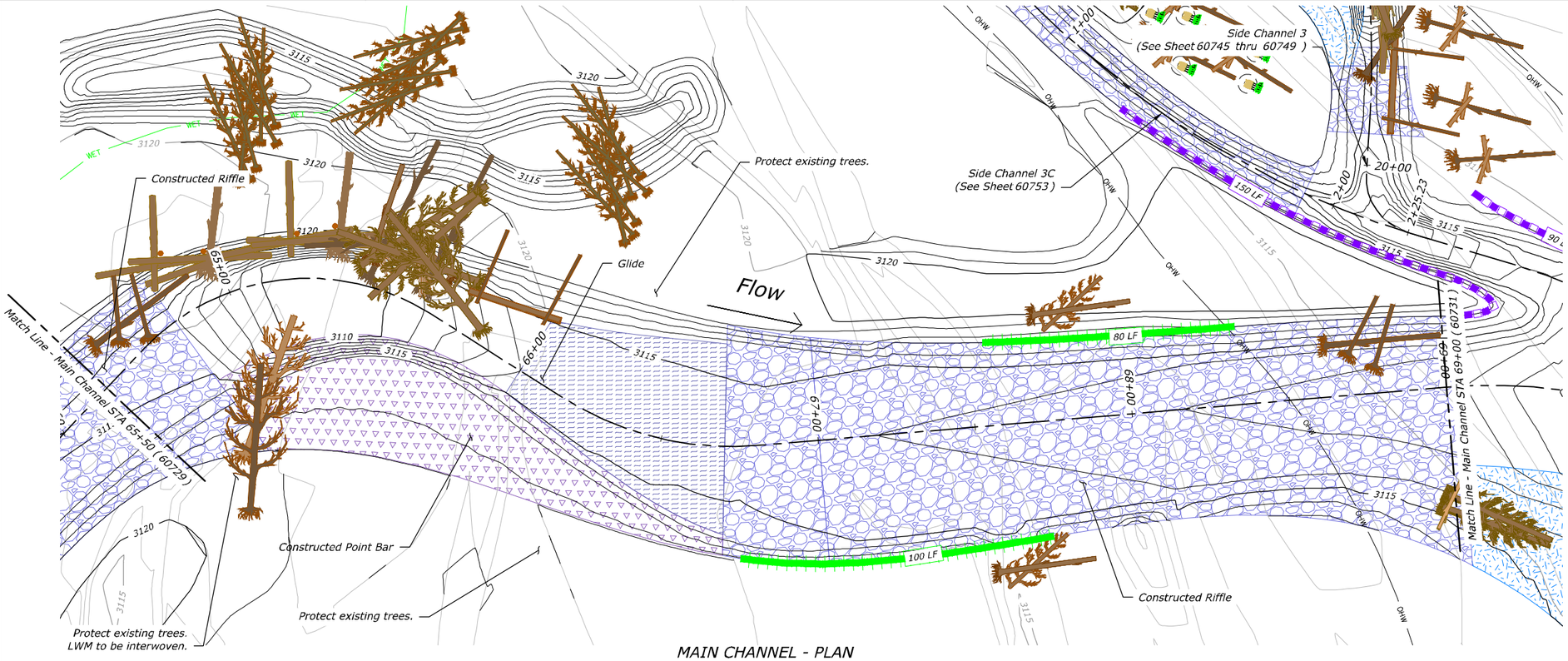
STA 60+00 TO
STA 64+50

1678-100-60729

SHEET 12 of 18

DATE AND TIME PLOTTED
MAY 11, 2018 14:26
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_MAINCHANNEL_P&P_20SCALE.DWG

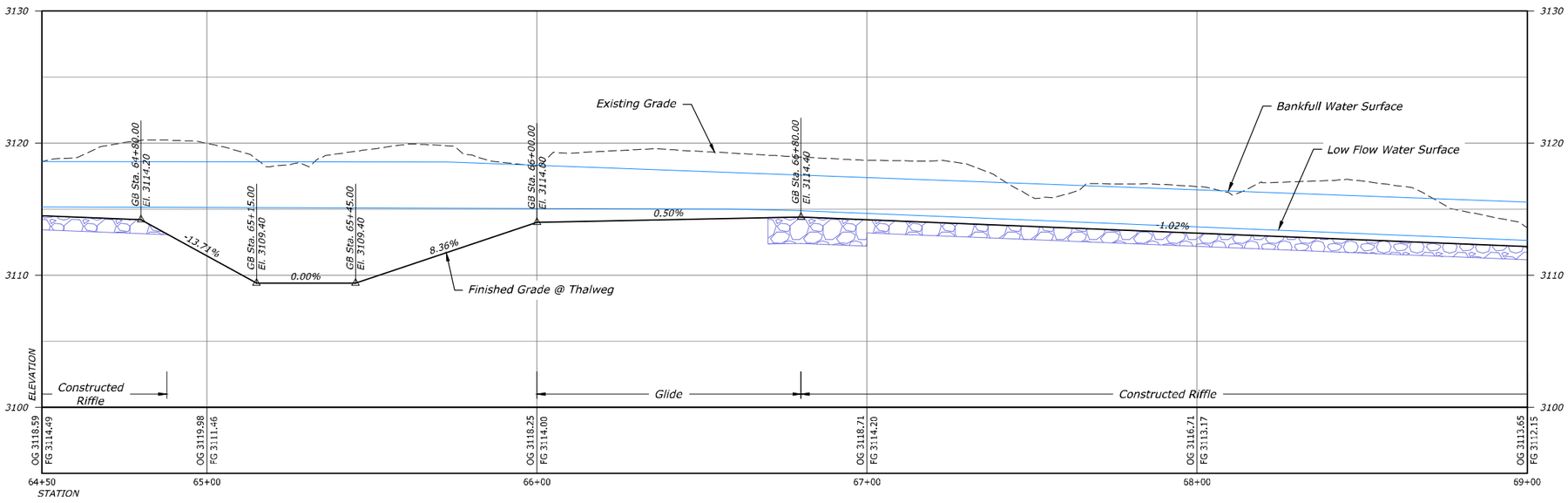


MAIN CHANNEL - PLAN
STA 64+50 TO STA 69+00

SCALE OF FEET: 20 0 20 40 60

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810



MAIN CHANNEL - THALWEG PROFILE
STA 64+50 TO STA 69+00

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Gilder — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

MAIN CHANNEL PLAN AND PROFILE

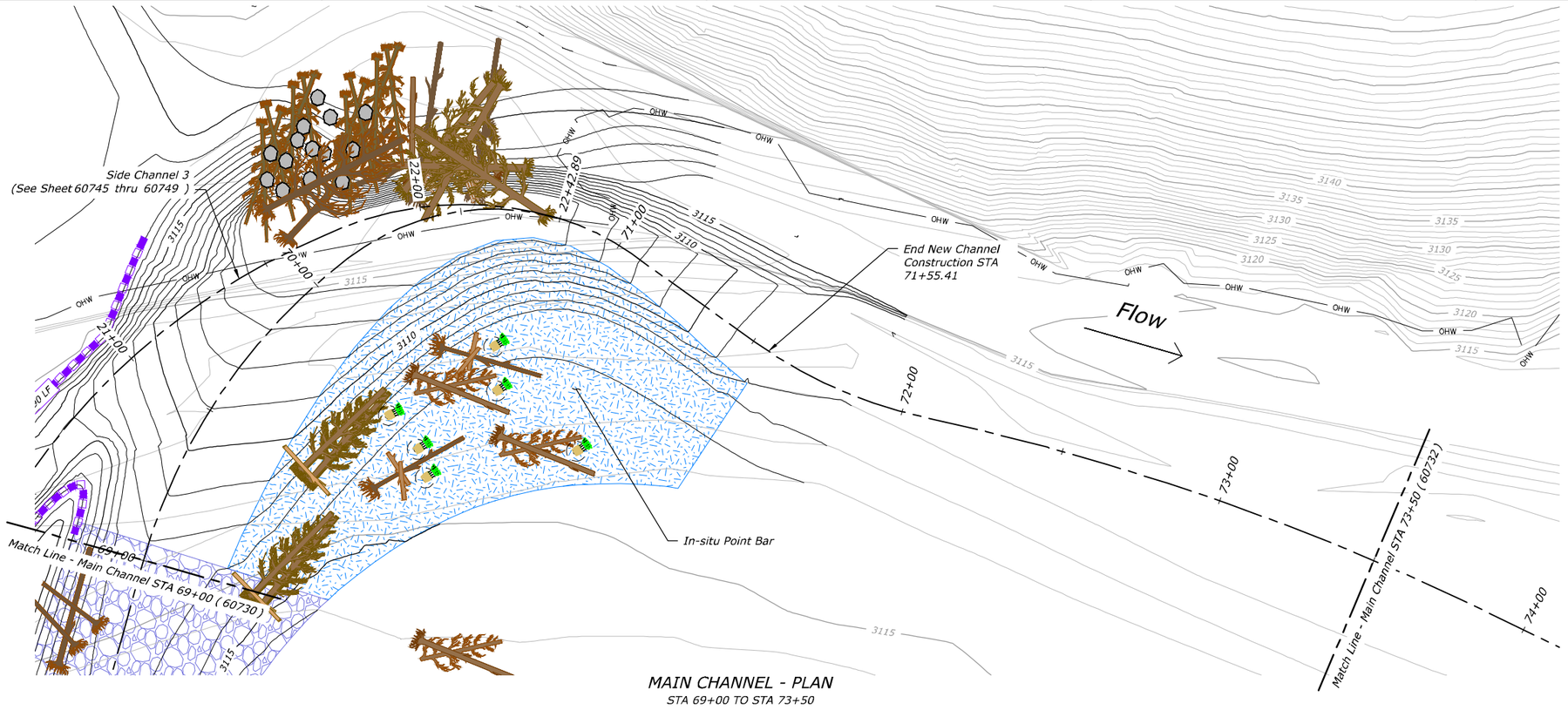
STA 64+50 TO STA 69+00

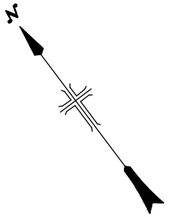
1678-100-60730

SHEET 13 of 18

DATE AND TIME PLOTTED
MAY 11, 2018 14:32
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_MAINCHANNEL_P&P_20SCALE.DWG





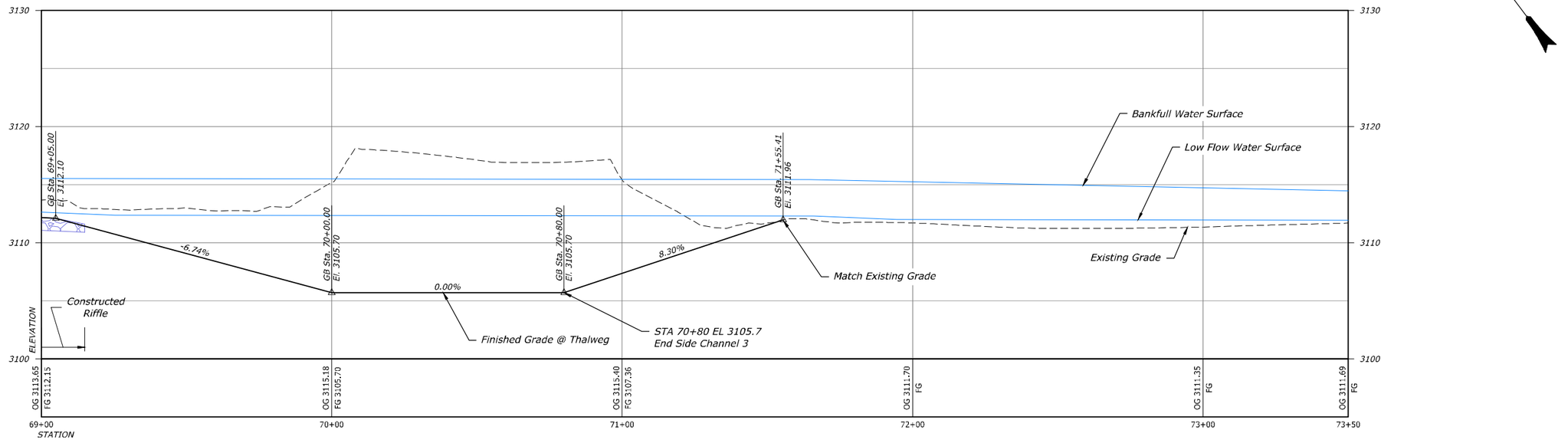
LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

MAIN CHANNEL - PLAN

STA 69+00 TO STA 73+50

20 0 20 40 60
SCALE OF FEET



MAIN CHANNEL - THALWEG PROFILE

STA 69+00 TO STA 73+50

HORIZONTAL SCALE
20 0 20 40 60
SCALE OF FEET

VERTICAL SCALE
5 0 5 10 15
SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Gilder	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED
ADMIN APPROVAL - PROGRAM MANAGER	
CSRO (BOISE, IDAHO)	2018-05-14

MAIN CHANNEL
PLAN AND PROFILE

STA 69+00 TO
STA 73+50

1678-100-60731

SHEET 14 of 18

DATE AND TIME PLOTTED
MAY 11, 2018 14:35
PLOTTED BY
JWELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_MAINCHANNEL_P&P_20SCALE.DWG

Flow

In-situ Point Bar

Begin New Channel Construction
STA 76+26.36

Match Line - Main Channel STA 73+50 (60731)

Match Line - Main Channel STA 78+00 (60733)

74+00

75+00

76+00

77+00

160 LF

In-situ Riffle

3135 3130 3125 3120 3115 3110 OHW WET

MAIN CHANNEL - PLAN
STA 73+50 TO STA 78+00

SCALE OF FEET 20 0 20 40 60

LEGEND

- OG Major Contour (ELEV)
- OG Minor Contour
- FG Major Contour (ELEV)
- FG Minor Contour
- Thalweg
- Existing Wetlands (WET)
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

N

Bankfull Water Surface

Low Flow Water Surface

Existing Grade

Match Existing Grade

GB Sta. 76+26.36
El. 3110.88

GB Sta. 77+80.32
El. 3109.00

1.22%

Finished Grade @ Thalweg

In-situ Riffle

ELEVATION 3120 3110 3100 3095

STATION	73+50	74+00	75+00	76+00	77+00	78+00
OG	3111.69	3111.81	3111.66	3110.86	3110.35	3114.28
FG					3109.98	3107.17

MAIN CHANNEL - THALWEG PROFILE
STA 73+50 TO STA 78+00

HORIZONTAL SCALE 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE 5 0 5 10 15 SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Gilker — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. SVSR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

MAIN CHANNEL
PLAN AND PROFILE

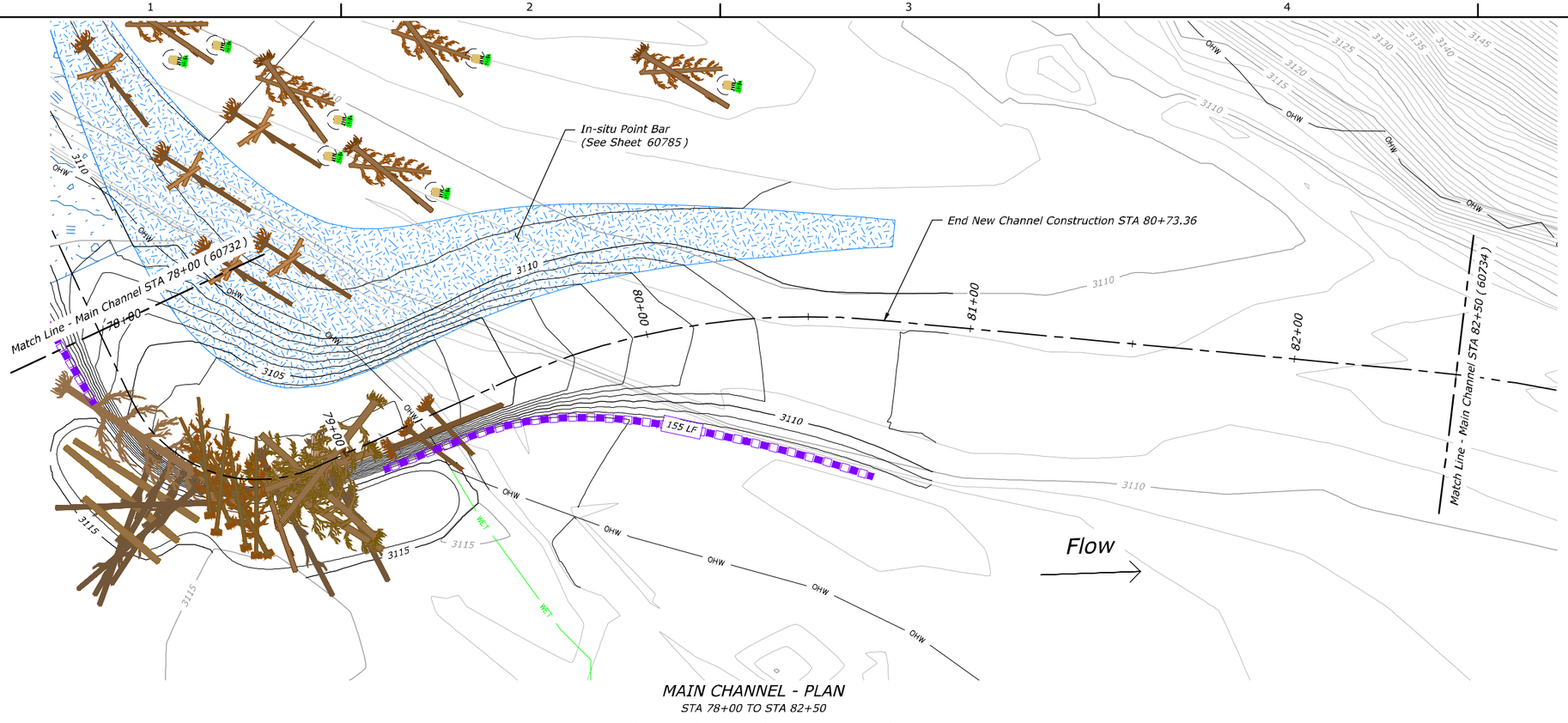
STA 73+50 TO
STA 78+00

1678-100-60732

SHEET 15 of 18

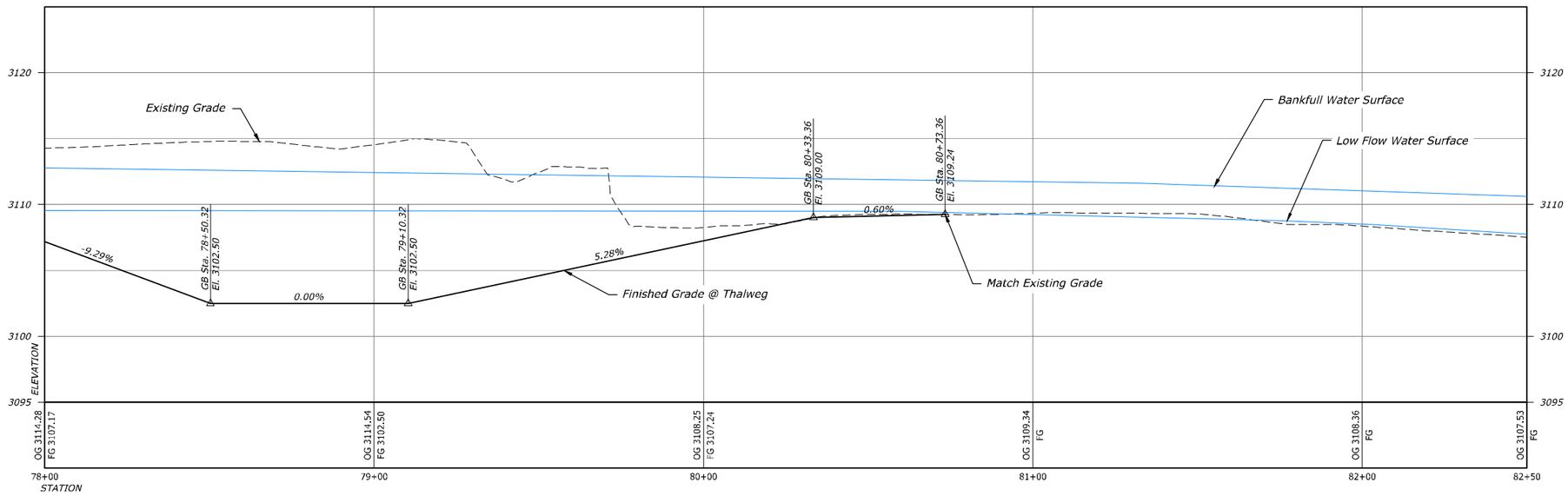
DATE AND TIME PLOTTED
MAY 11, 2018 14:37
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PC_MAINCHANNEL_P&P_20SCALE.DWG



MAIN CHANNEL - PLAN
STA 78+00 TO STA 82+50

SCALE OF FEET: 20 0 20 40 60



MAIN CHANNEL - THALWEG PROFILE
STA 78+00 TO STA 82+50

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Gilder — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

MAIN CHANNEL PLAN AND PROFILE

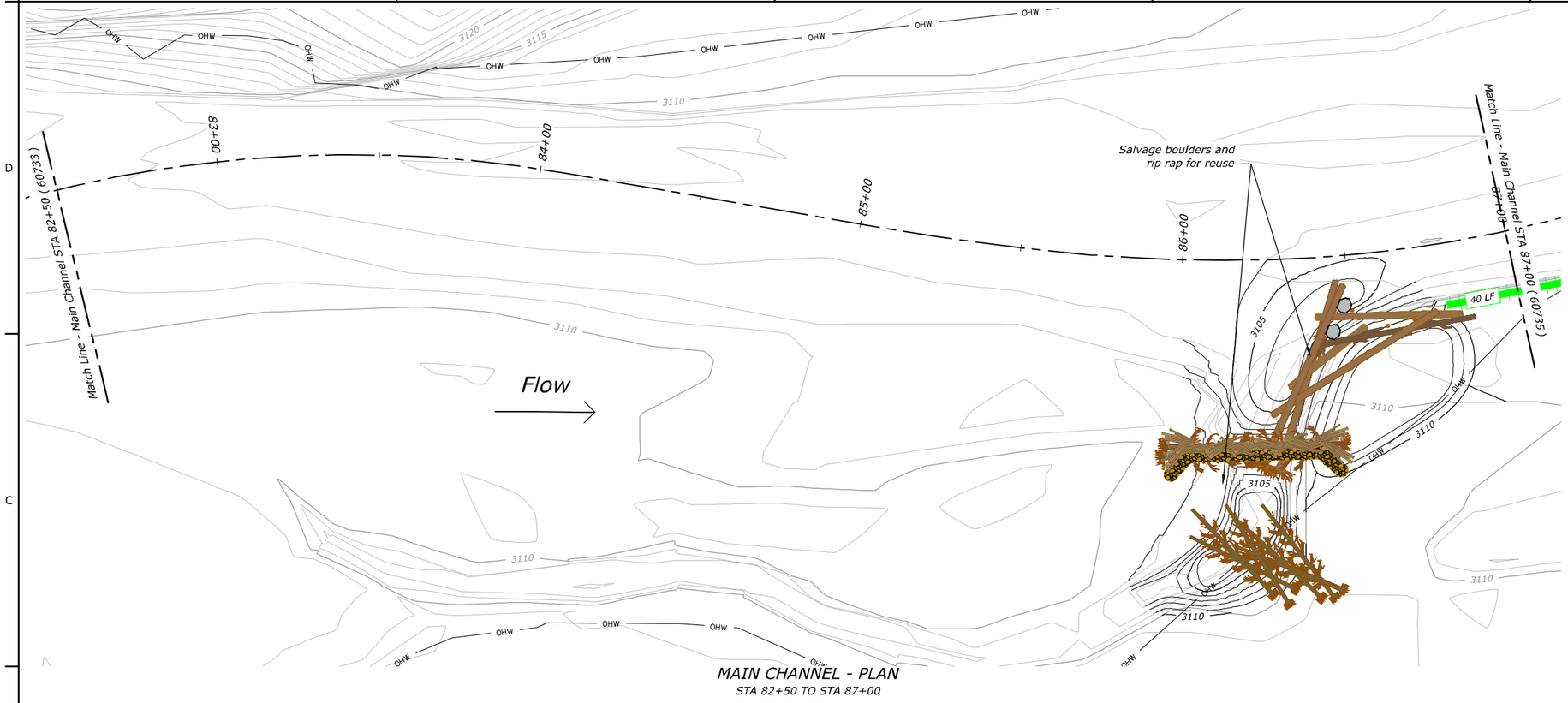
STA 78+00 TO STA 82+50

1678-100-60733

SHEET 16 of 18

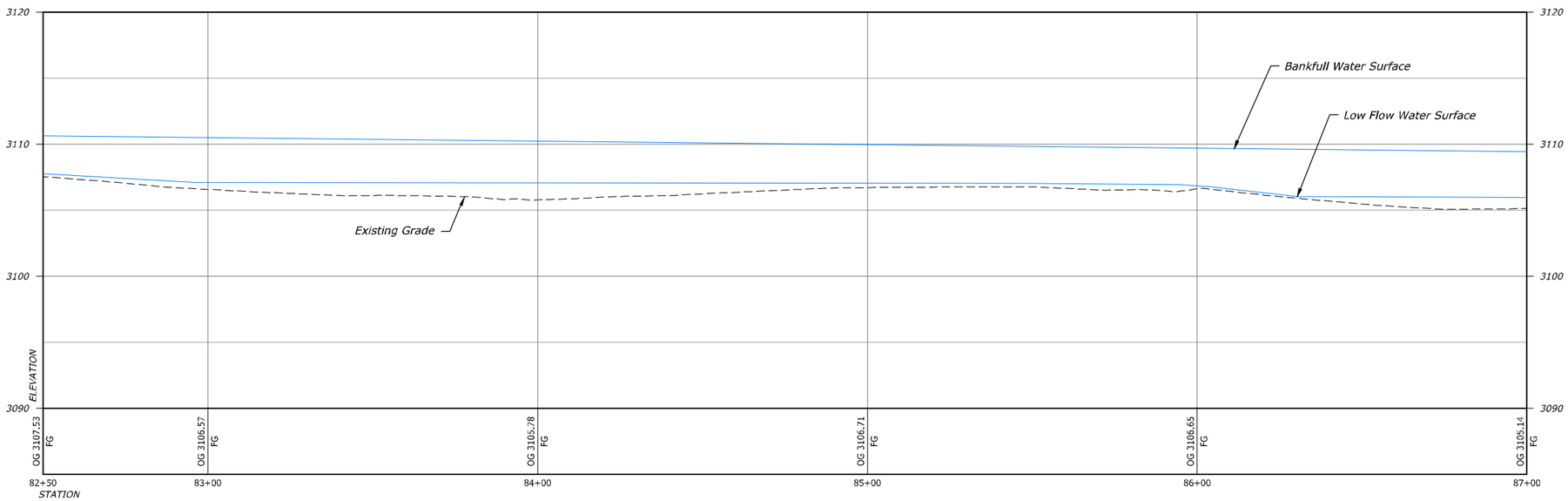
DATE AND TIME PLOTTED
MAY 11, 2018 14:39
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_MAINCHANNEL_P&P_20SCALE.DWG



MAIN CHANNEL - PLAN
STA 82+50 TO STA 87+00

SCALE OF FEET: 20 0 20 40 60



MAIN CHANNEL - THALWEG PROFILE
STA 82+50 TO STA 87+00

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

N

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Gilder — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

MAIN CHANNEL
PLAN AND PROFILE

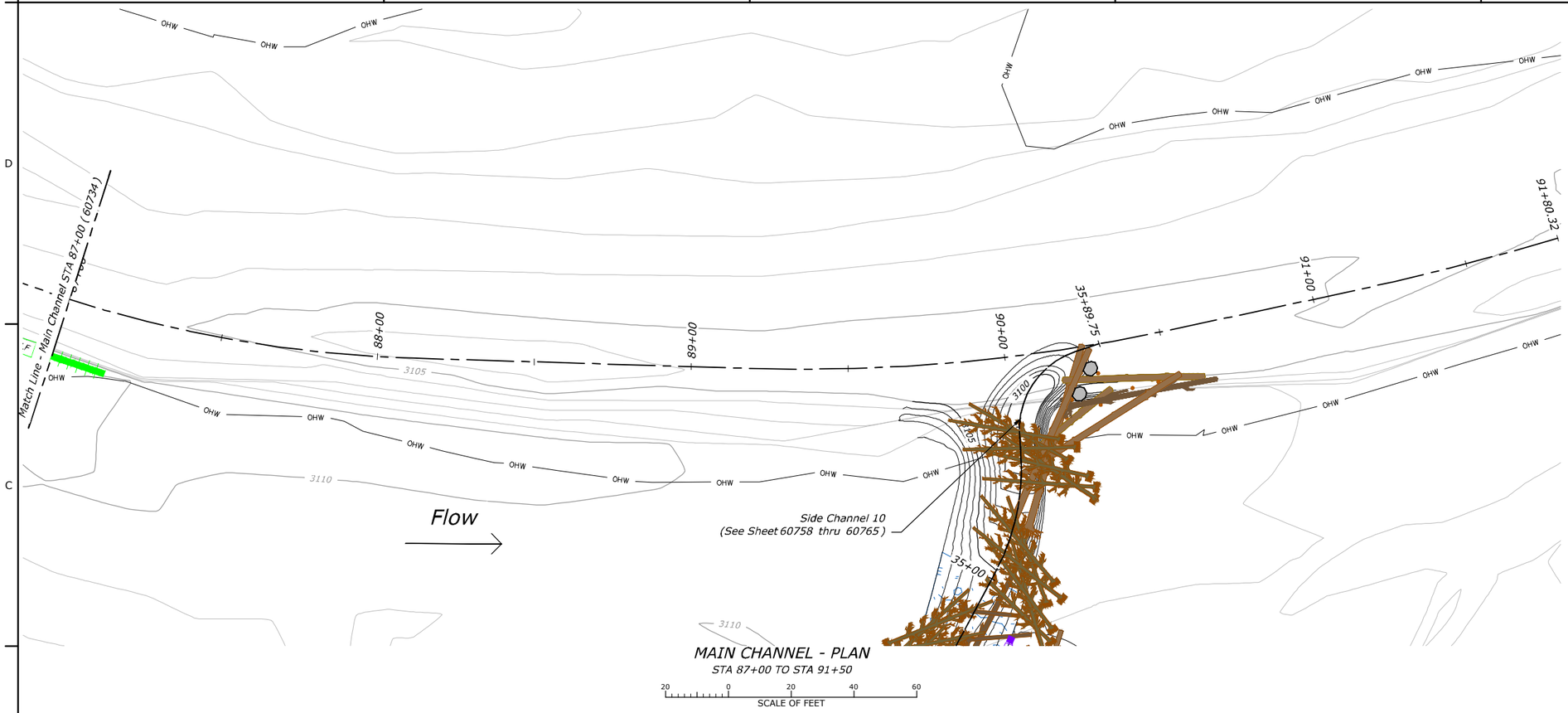
STA 82+50 TO
STA 87+00

1678-100-60734

SHEET 17 of 18

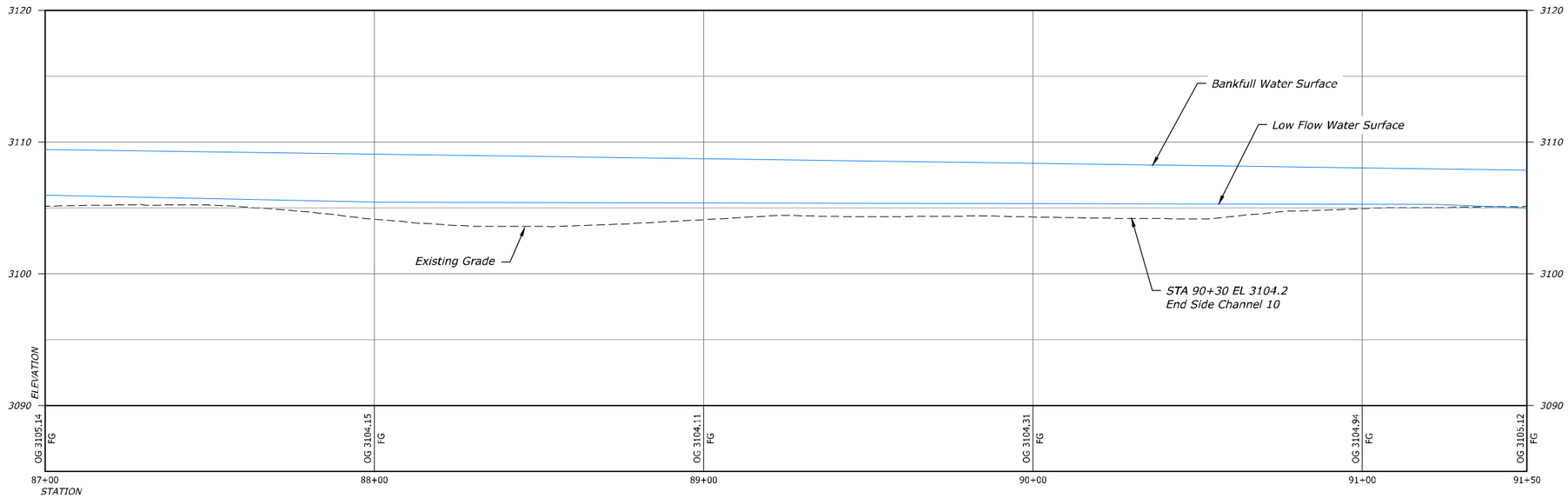
DATE AND TIME PLOTTED
MAY 11, 2018 14:40
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_MAINCHANNEL_P&P_20SCALE.DWG



MAIN CHANNEL - PLAN
STA 87+00 TO STA 91+50

SCALE OF FEET: 20 0 20 40 60



MAIN CHANNEL - THALWEG PROFILE
STA 87+00 TO STA 91+50

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Gilder	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED
ADMIN APPROVAL -	PROGRAM MANAGER
CSRO (BOISE, IDAHO)	2018-05-14

MAIN CHANNEL PLAN AND PROFILE

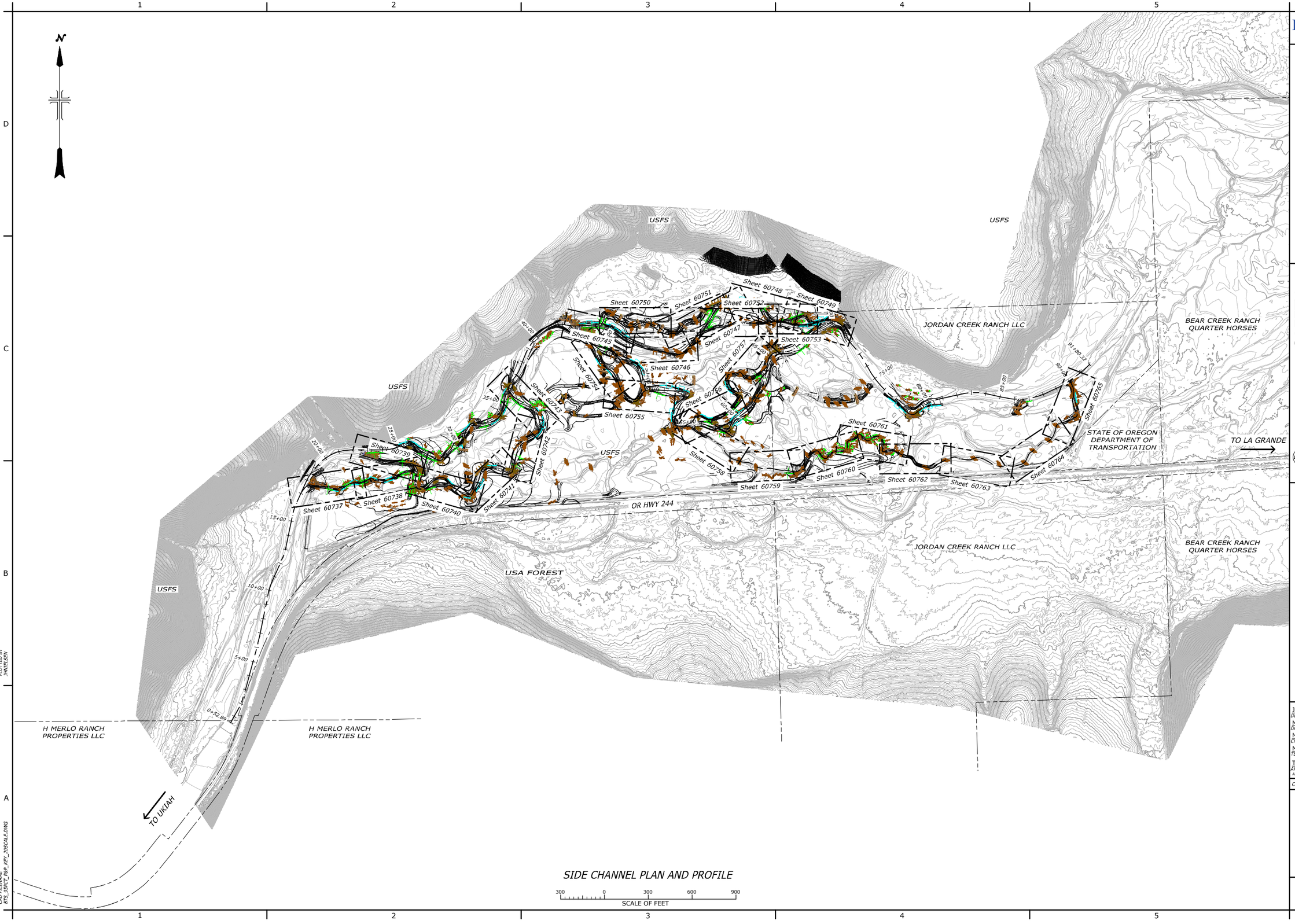
STA 87+00 TO STA 91+50

1678-100-60735

SHEET 18 of 18

DATE AND TIME PLOTTED
MAY 11, 2018 14:41
PLOTTED BY
JWHITESEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
RTS_95PCT_MAINCHANNEL_PAP_20SCALE.DWG



SIDE CHANNEL PLAN AND PROFILE

300 0 300 600 900
SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
M. Bergstrom
DRAWN
M. Knutson P.E.
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) *2018-05-14*

SIDE CHANNEL PLAN AND PROFILE

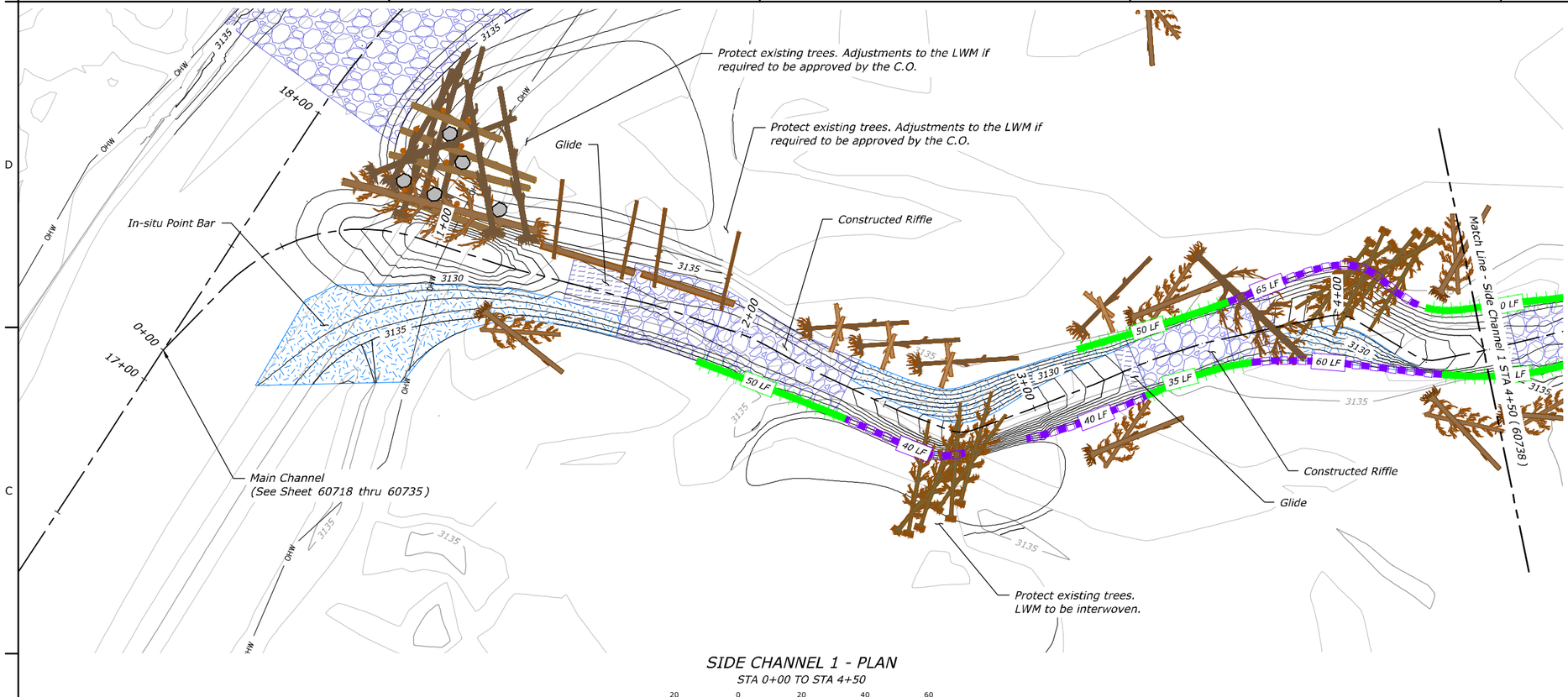
KEY MAP

1678-100-60736

SHEET 1 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:32
PLOTTED BY
JNIELSEN

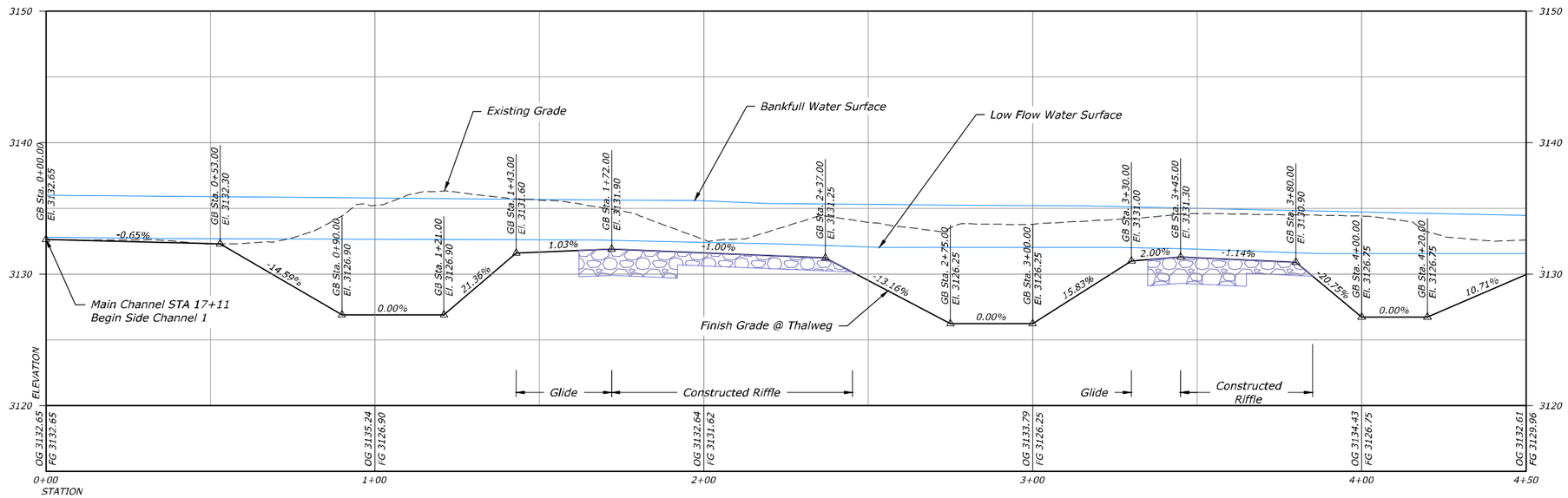
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_P&P_KEY_30SCALE.DWG



SIDE CHANNEL 1 - PLAN

STA 0+00 TO STA 4+50

20 0 20 40 60
SCALE OF FEET



SIDE CHANNEL 1 - THALWEG PROFILE

HORIZONTAL SCALE
20 0 20 40 60
SCALE OF FEET

STA 0+00 TO STA 4+50

VERTICAL SCALE
5 0 5 10 15
SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
J. Bryant
DRAWN
M. Knutson P.E.
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 1 PLAN AND PROFILE

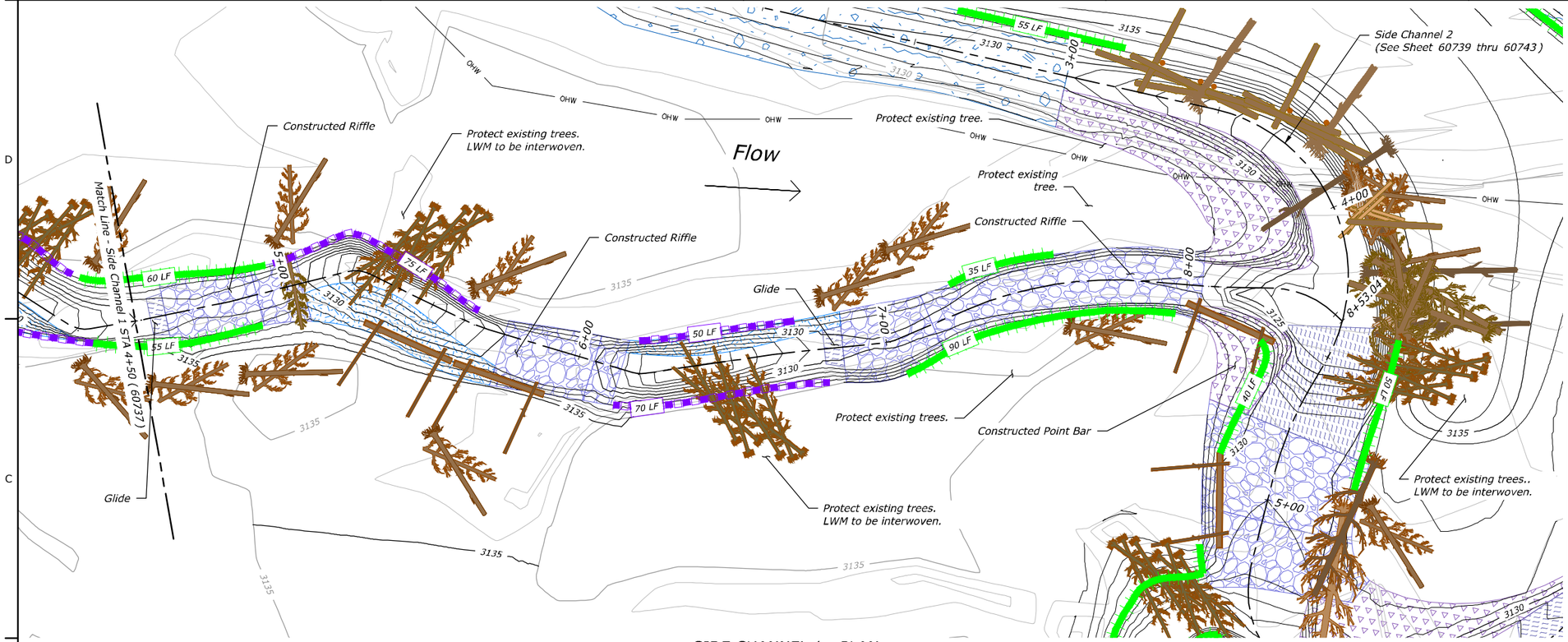
STA 0+00 TO STA 4+50

1678-100-60737

SHEET 2 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 14:50
PLOTTED BY
JWHITESEN

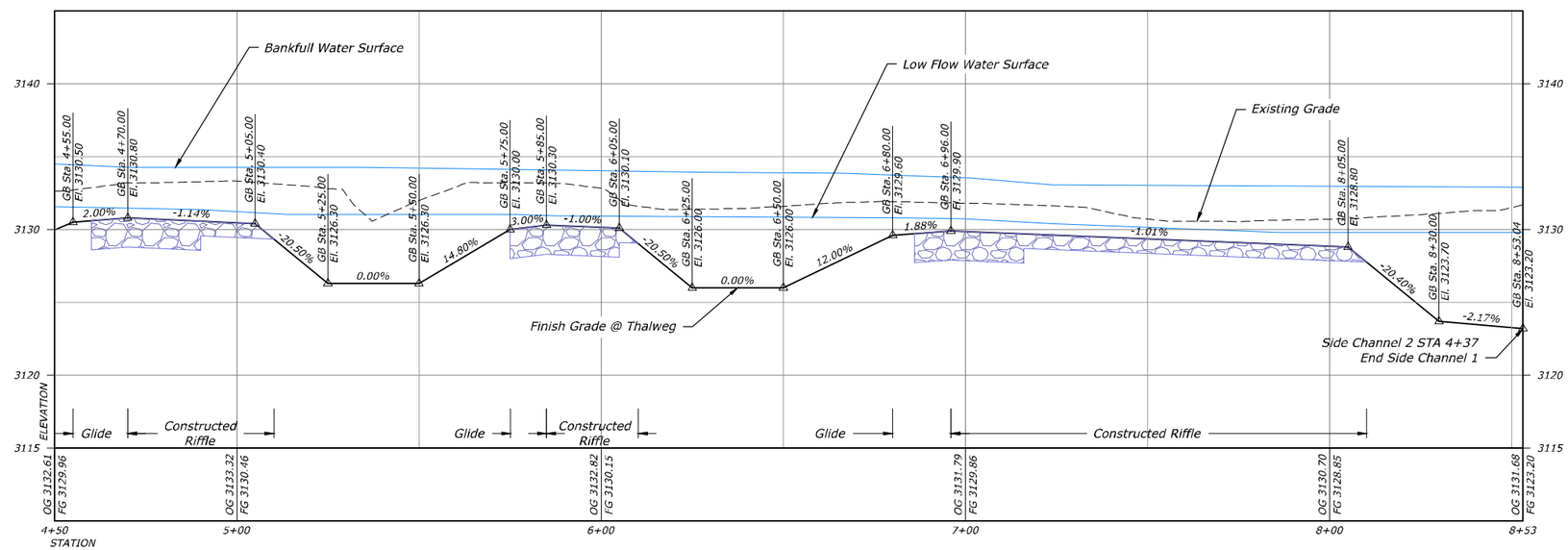
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_SSPCT_SIDECHANNEL_1&2_P&P_20SCALE.DWG



SIDE CHANNEL 1 - PLAN

STA 4+50 TO 8+53

SCALE OF FEET (20 0 20 40 60)



SIDE CHANNEL 1 - THALWEG PROFILE

STA 4+50 TO 8+53

HORIZONTAL SCALE (20 0 20 40 60) SCALE OF FEET

VERTICAL SCALE (5 0 5 10 15) SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
J. Bryant
DRAWN
M. Knutson P.E.
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 1 PLAN AND PROFILE

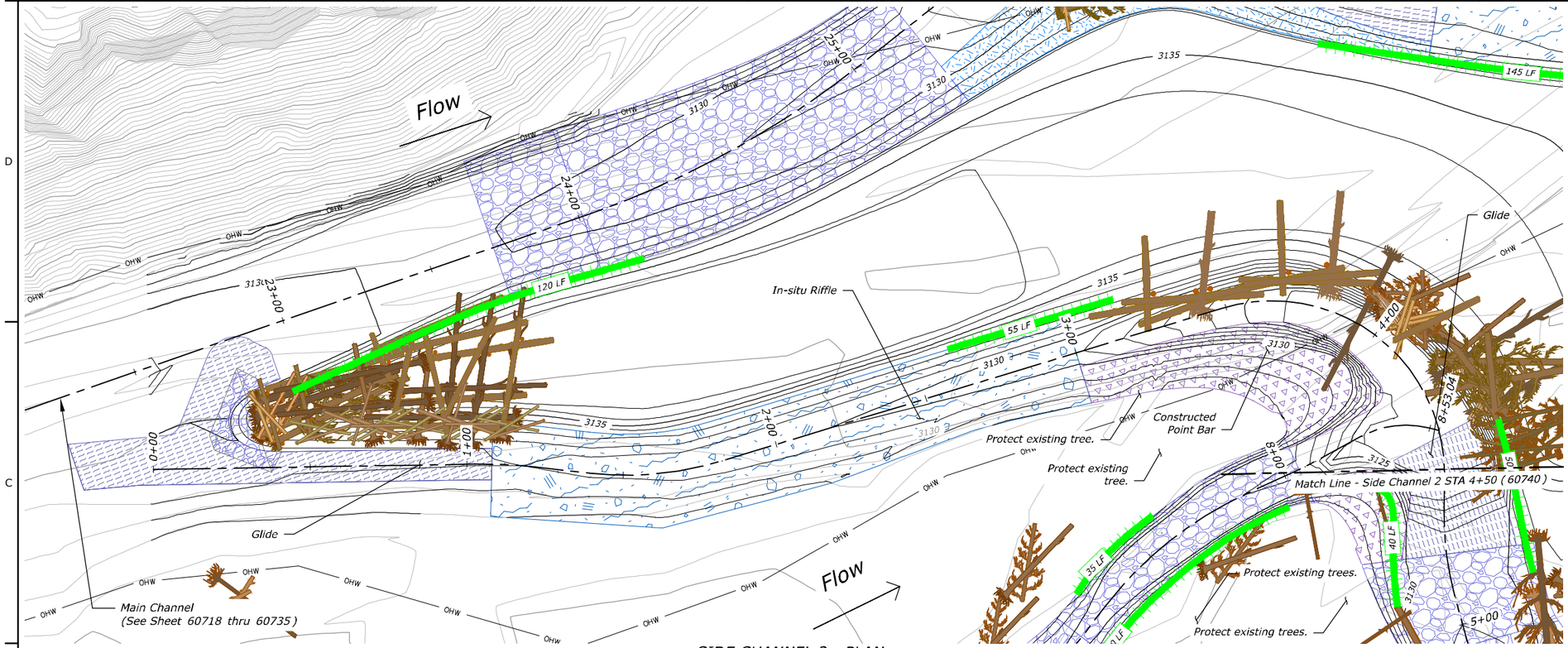
STA 4+50 TO 8+53

1678-100-60738

SHEET 3 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 14:53
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rlk. 22.0s
CAD FILENAME
BTS_35PC_SIDECHANNEL_1&2_PNP_705CAL.DWG



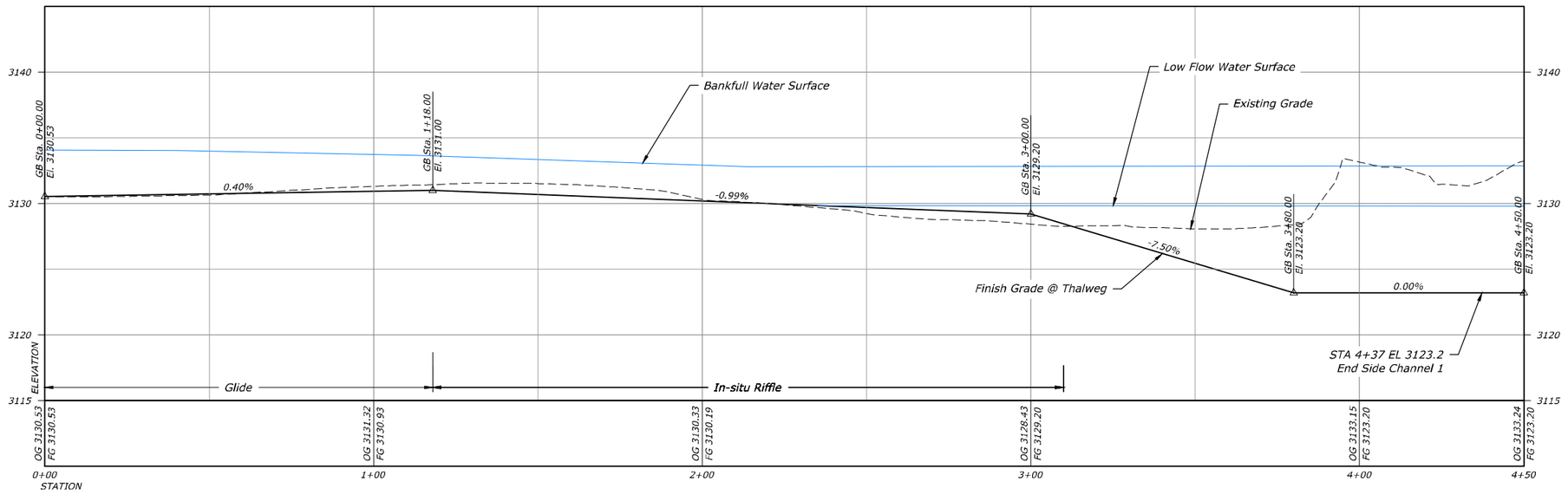
LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

SIDE CHANNEL 2 - PLAN

STA 0+00 TO 4+50

SCALE OF FEET: 20 0 20 40 60



SIDE CHANNEL 2 - THALWEG PROFILE

STA 0+00 TO 4+50

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Bryant	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED (CROM APPROVAL - PROGRAM MANAGER)
CSRO (BOISE, IDAHO)	2018-05-14

SIDE CHANNEL 2 PLAN AND PROFILE

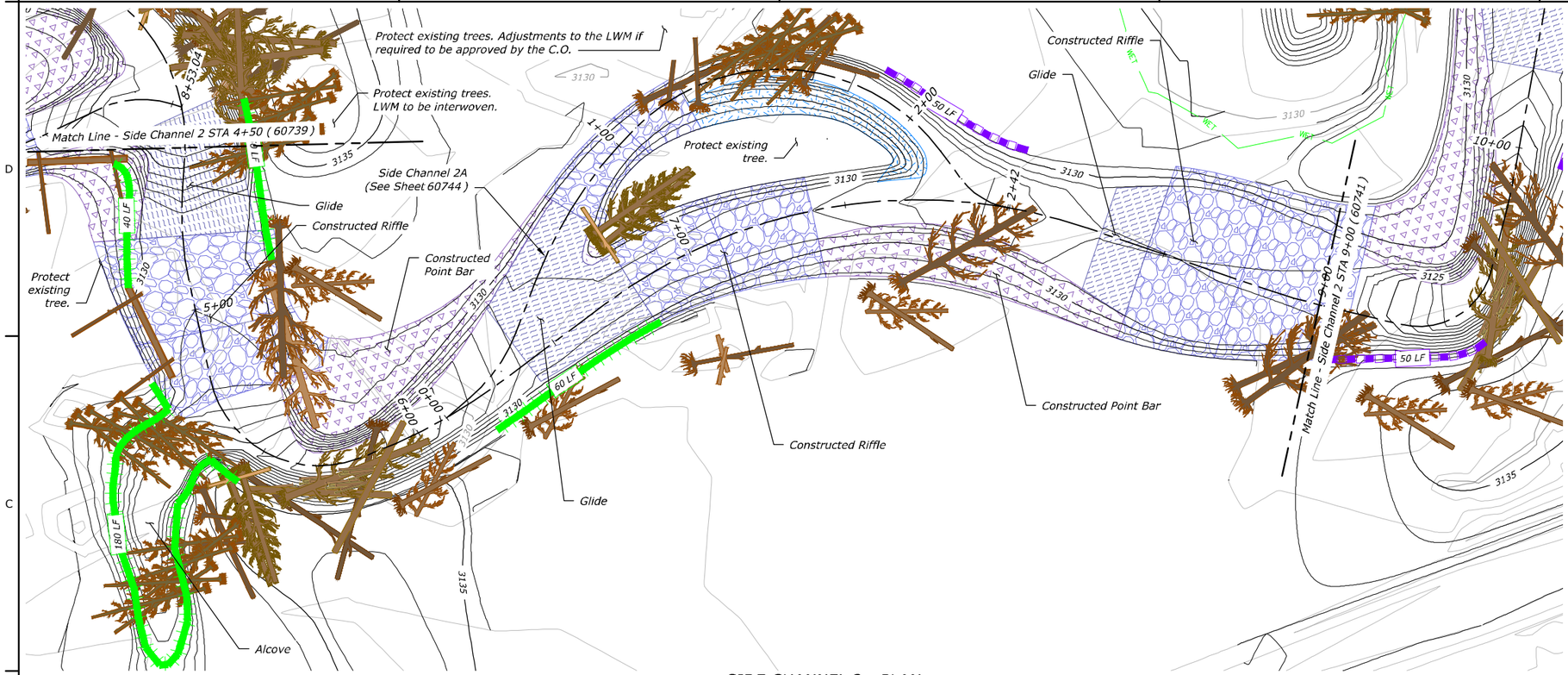
STA 0+00 TO 4+50

1678-100-60739

SHEET 4 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 14:58
PLOTTED BY
JWNIELSEN

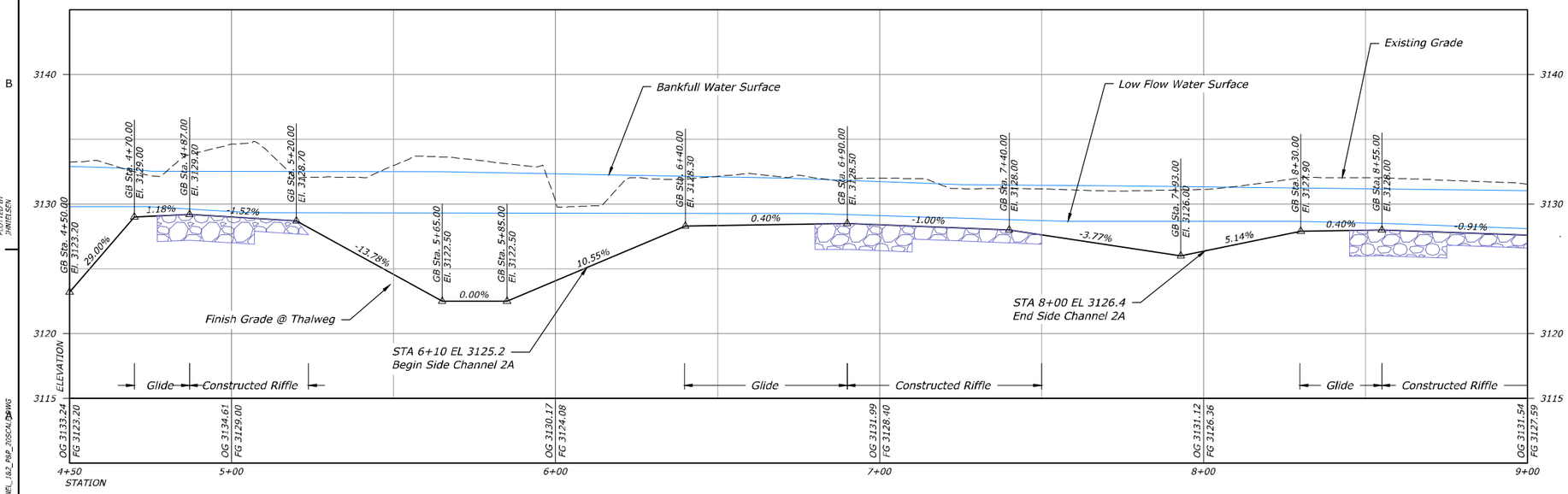
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME:
RTS_SPCT_SIDECHANNEL_1&2_P&P_20SCALE.DWG



SIDE CHANNEL 2 - PLAN

STA 4+50 TO 9+00

SCALE OF FEET: 20 0 20 40 60



SIDE CHANNEL 2 - THALWEG PROFILE

STA 4+50 TO 9+00

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

N

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Bryant	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED
ADRON APPROVAL - PROGRAM MANAGER	
CSRO (BOISE, IDAHO)	2018-05-14

SIDE CHANNEL 2 PLAN AND PROFILE

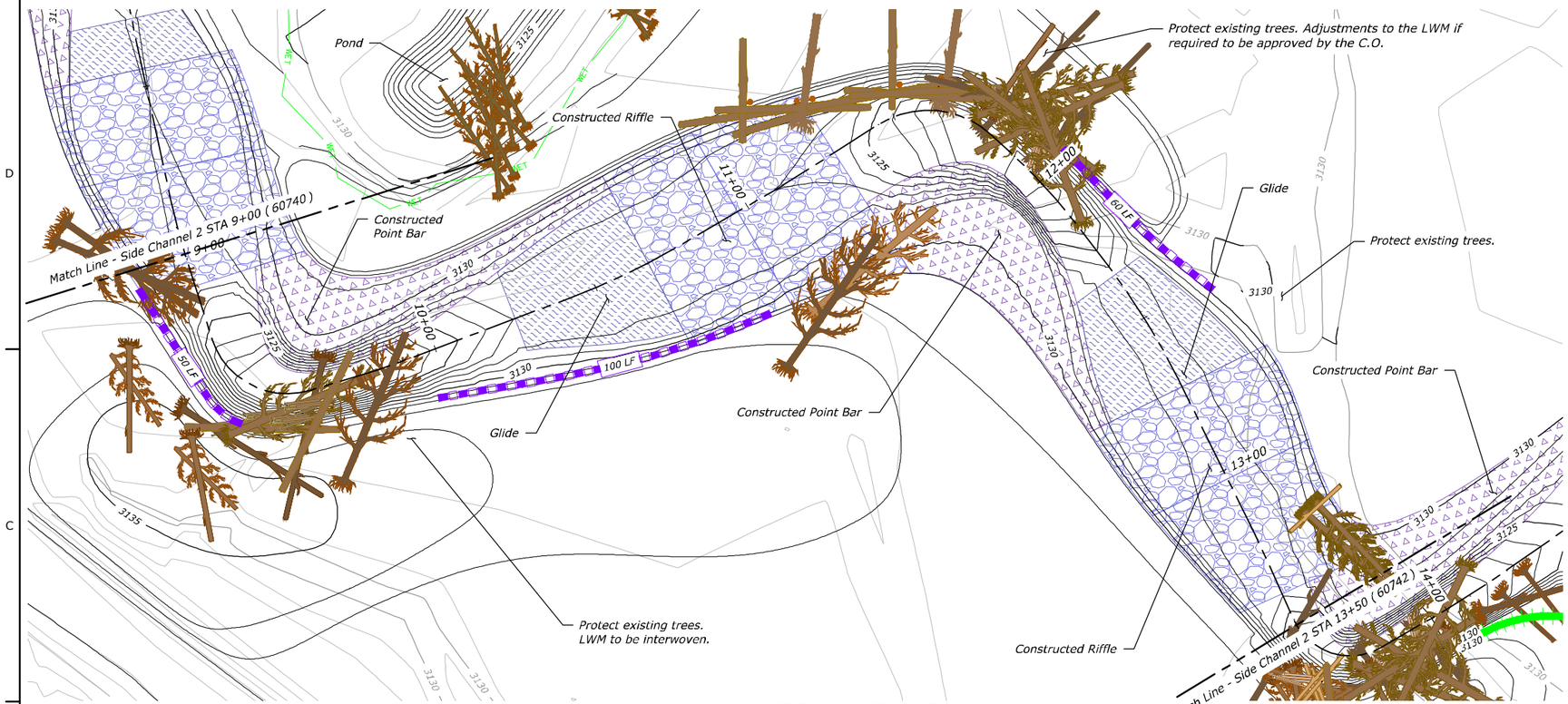
STA 4+50 TO 9+00

1678-100-60740

SHEET 5 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:00
PLOTTED BY
JWILSEN

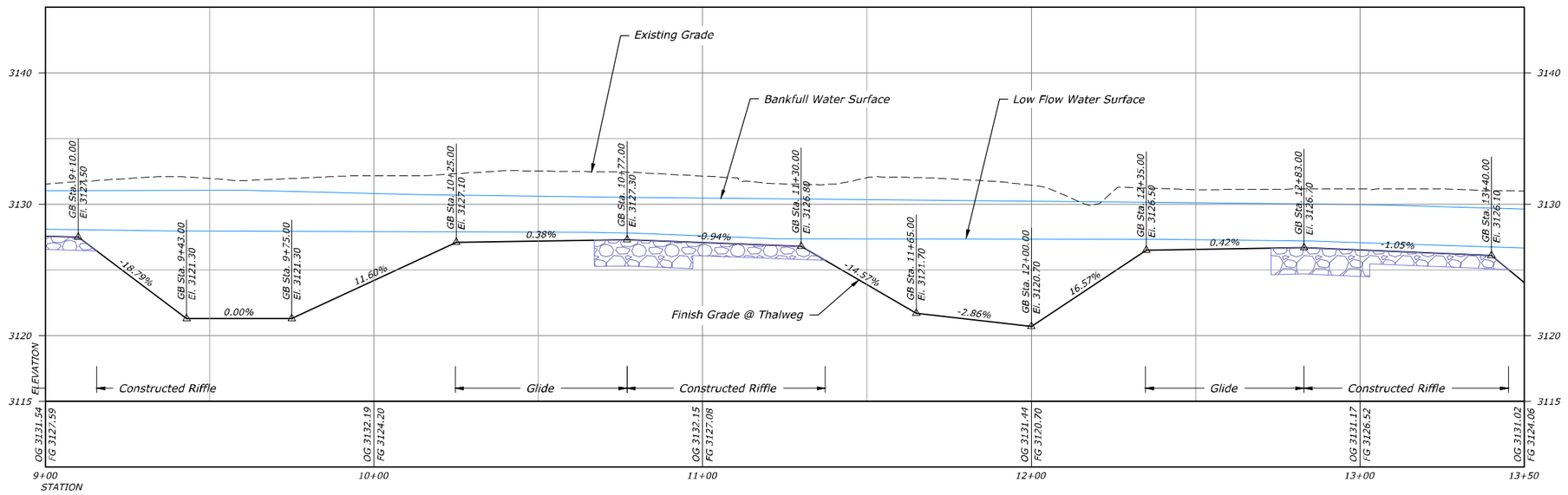
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_SIDECHANNEL_1&2_P&P_20SCALE.DWG



SIDE CHANNEL 2 - PLAN

STA 9+00 TO 13+50

SCALE OF FEET (20 0 20 40 60)



SIDE CHANNEL 2 - THALWEG PROFILE

STA 9+00 TO 13+50

HORIZONTAL SCALE (20 0 20 40 60) SCALE OF FEET

VERTICAL SCALE (5 0 5 10 15) SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Bryant — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED — ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 2 PLAN AND PROFILE

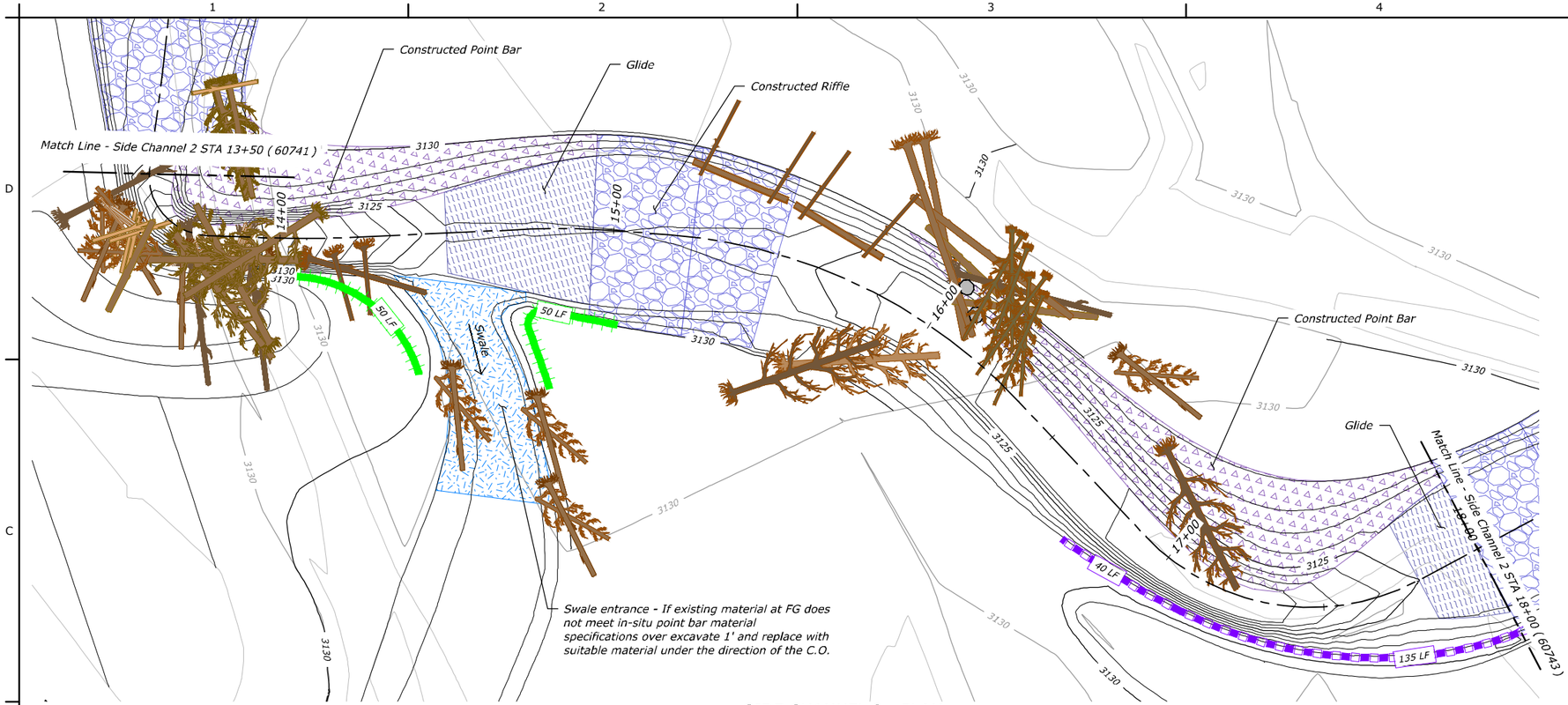
STA 9+00 TO 13+50

1678-100-60741

SHEET 6 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:01
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_SIDECHANNEL_1&2_PNP_20SCALE.DWG

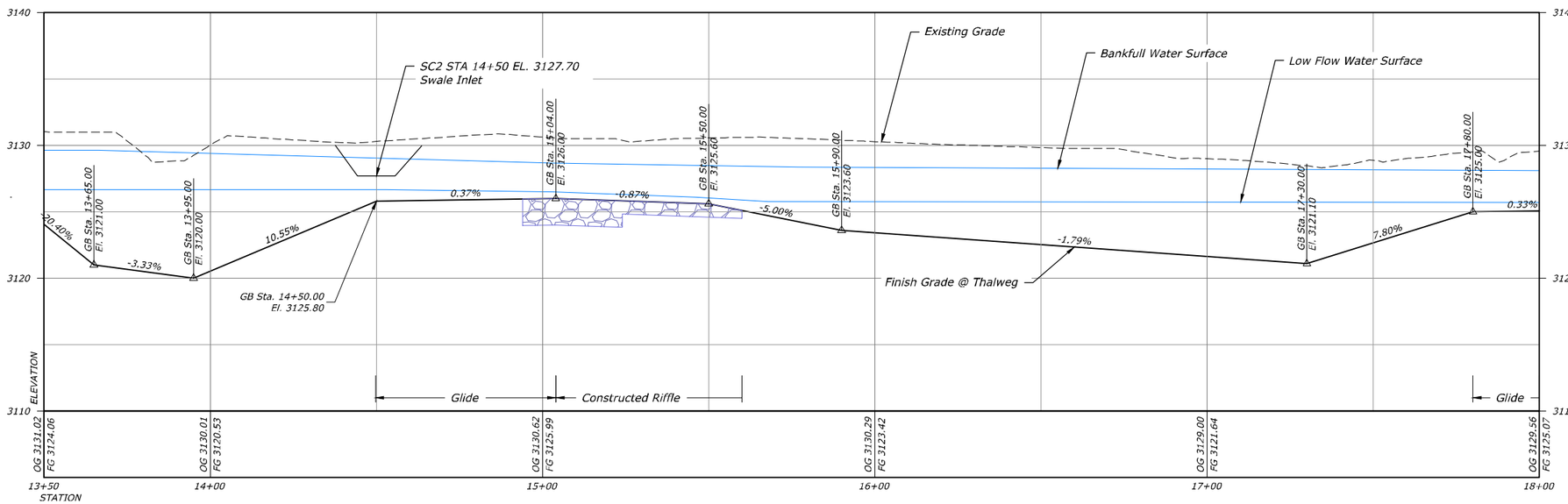


SIDE CHANNEL 2 - PLAN

STA 13+50 TO 18+00

SCALE OF FEET (20 0 20 40 60)

N



SIDE CHANNEL 2 - THALWEG PROFILE

STA 13+50 TO 18+00

HORIZONTAL SCALE (20 0 20 40 60) SCALE OF FEET

VERTICAL SCALE (5 0 5 10 15) SCALE OF FEET

LEGEND

- OG Major Contour (ELEV)
- OG Minor Contour
- FG Major Contour (ELEV)
- FG Minor Contour
- Thalweg
- Existing Wetlands (WET)
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Bryant	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED (ADMIN APPROVAL - PROGRAM MANAGER)
CSRO (BOISE, IDAHO)	2018-05-14

SIDE CHANNEL 2 PLAN AND PROFILE

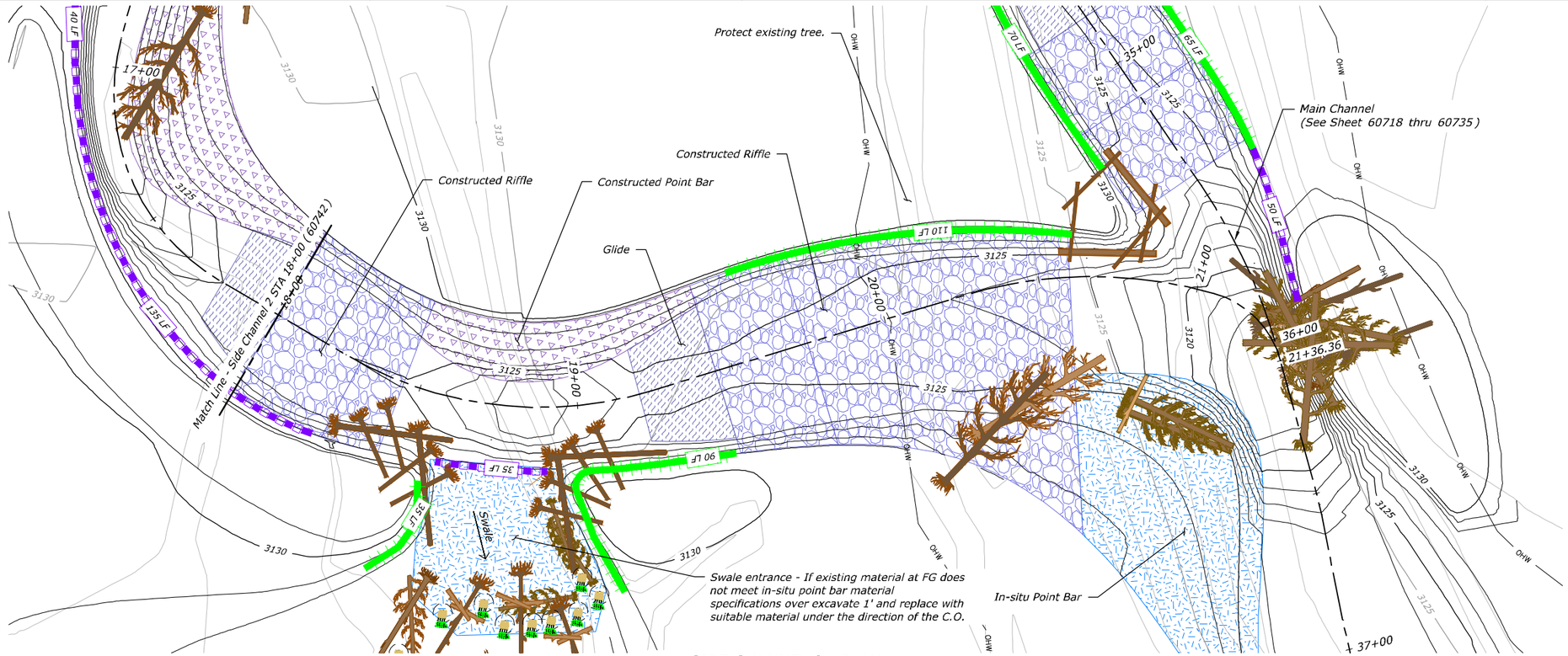
STA 13+50 TO 18+00

1678-100-60742

SHEET 7 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:03
PLOTTED BY
JWNIELSEN

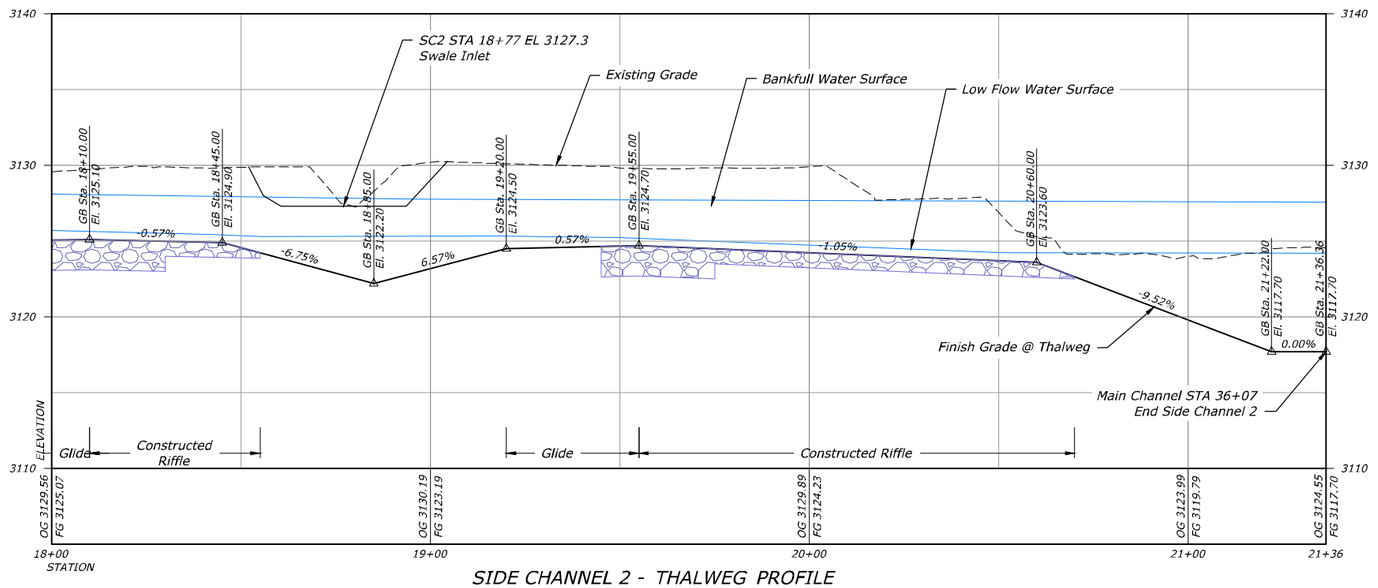
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME:
RTS_SSPCT_SIDECHANNEL_1&2_P&P_20SCALE.DWG



SIDE CHANNEL 2 - PLAN

STA 18+00 TO 21+36

SCALE OF FEET: 20 0 20 40 60



SIDE CHANNEL 2 - THALWEG PROFILE

STA 18+00 TO 21+36

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Bryant — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED — ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 2 PLAN AND PROFILE

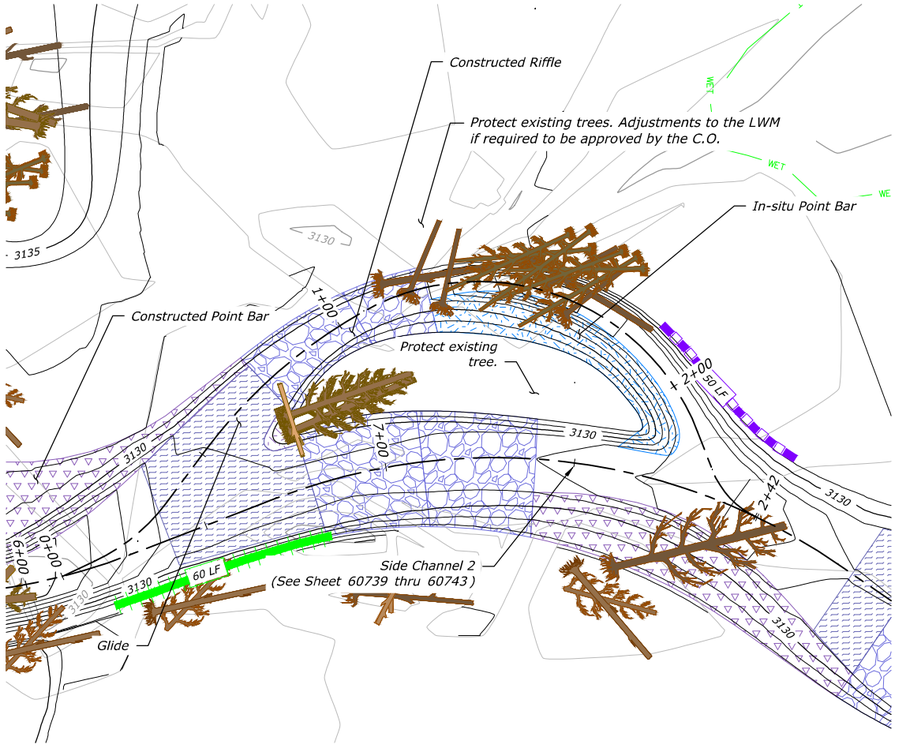
STA 18+00 TO 21+36

1678-100-60743

SHEET 8 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:16
PLOTTED BY
JNIELSEN

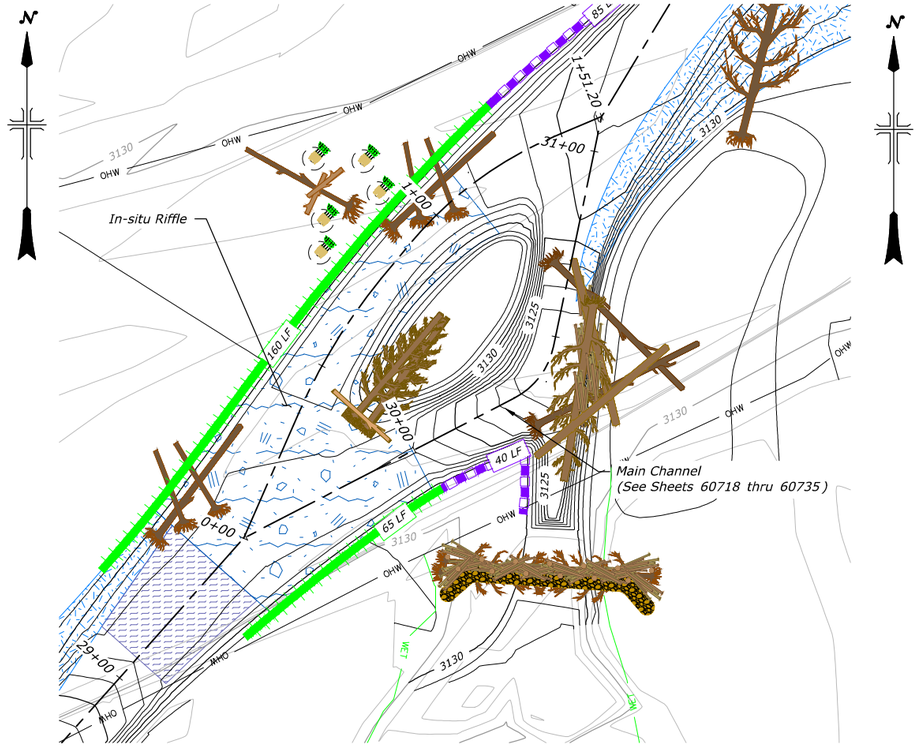
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_SSPCT_SIDECHANNEL_1&2_PAP_20SCALE.DWG



SIDE CHANNEL 2A - PLAN

STA 0+00 TO STA 2+42

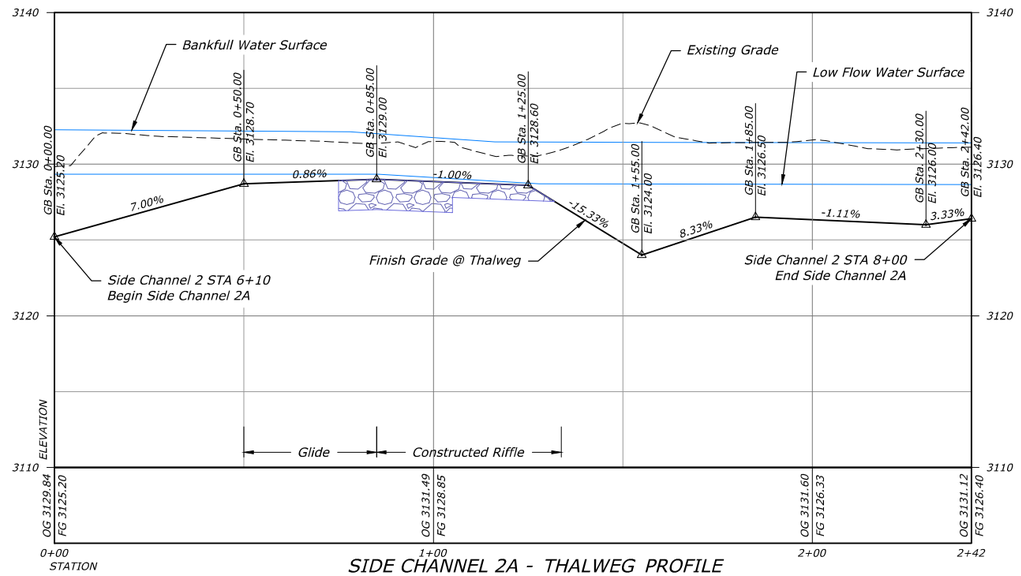
SCALE OF FEET: 40 0 40 80 120



SIDE CHANNEL MC1A - PLAN

STA 0+00 TO STA 1+51

SCALE OF FEET: 40 0 40 80 120

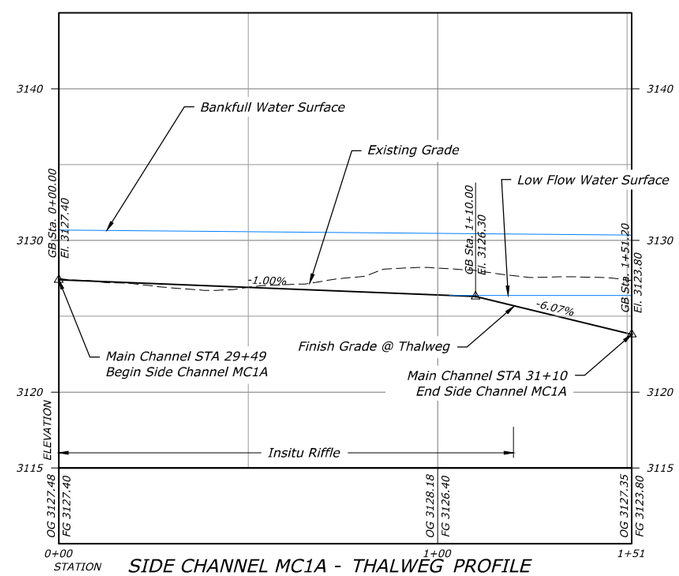


SIDE CHANNEL 2A - THALWEG PROFILE

STA 0+00 TO 2+42

HORIZONTAL SCALE: 40 0 40 80 120 SCALE OF FEET

VERTICAL SCALE: 8 0 8 16 24 SCALE OF FEET



SIDE CHANNEL MC1A - THALWEG PROFILE

STA 0+00 TO 1+51

HORIZONTAL SCALE: 40 0 40 80 120 SCALE OF FEET

VERTICAL SCALE: 8 0 8 16 24 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Bryant	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED
	ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO)	2018-05-14

SIDE CHANNEL MC1A AND 2A

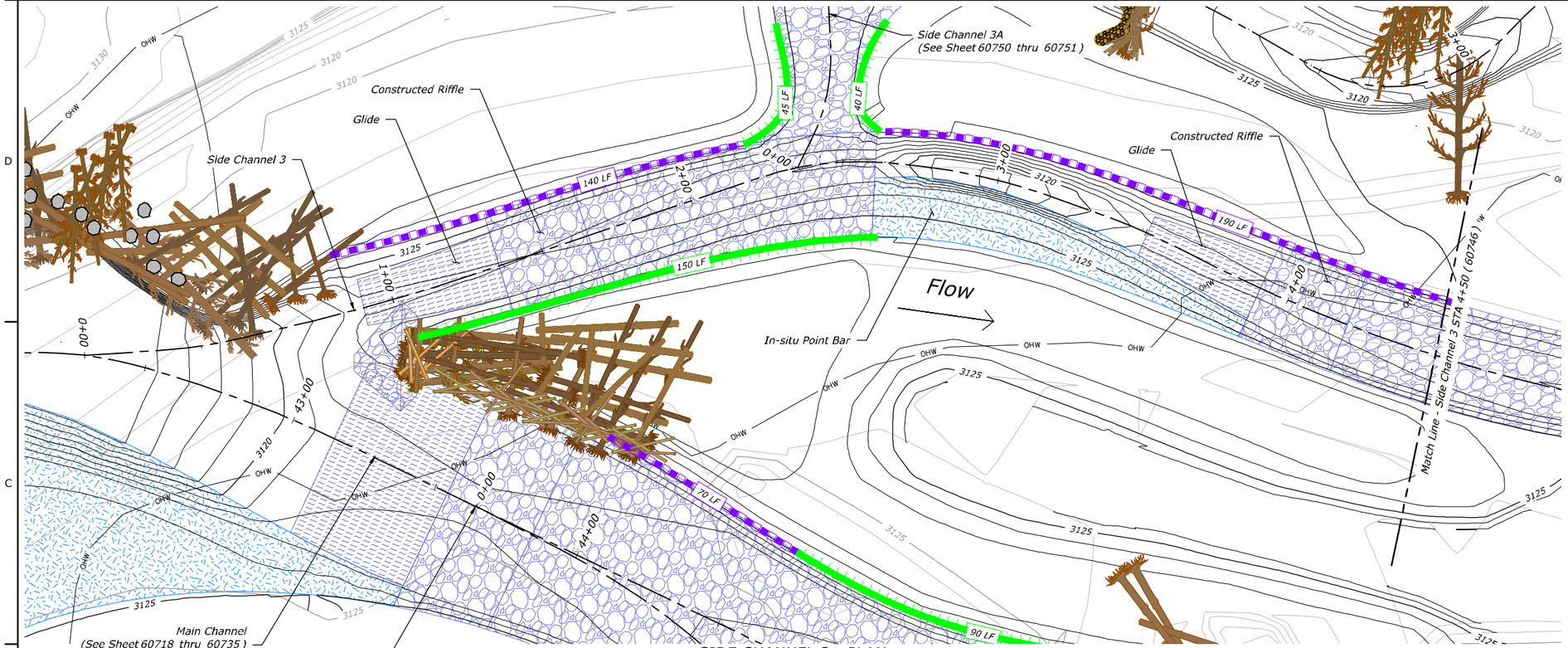
PLAN AND PROFILE

1678-100-60744

SHEET 9 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:18
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_SSPCT_SIDECHANNEL_1&2_P&P_20SCALE.DWG



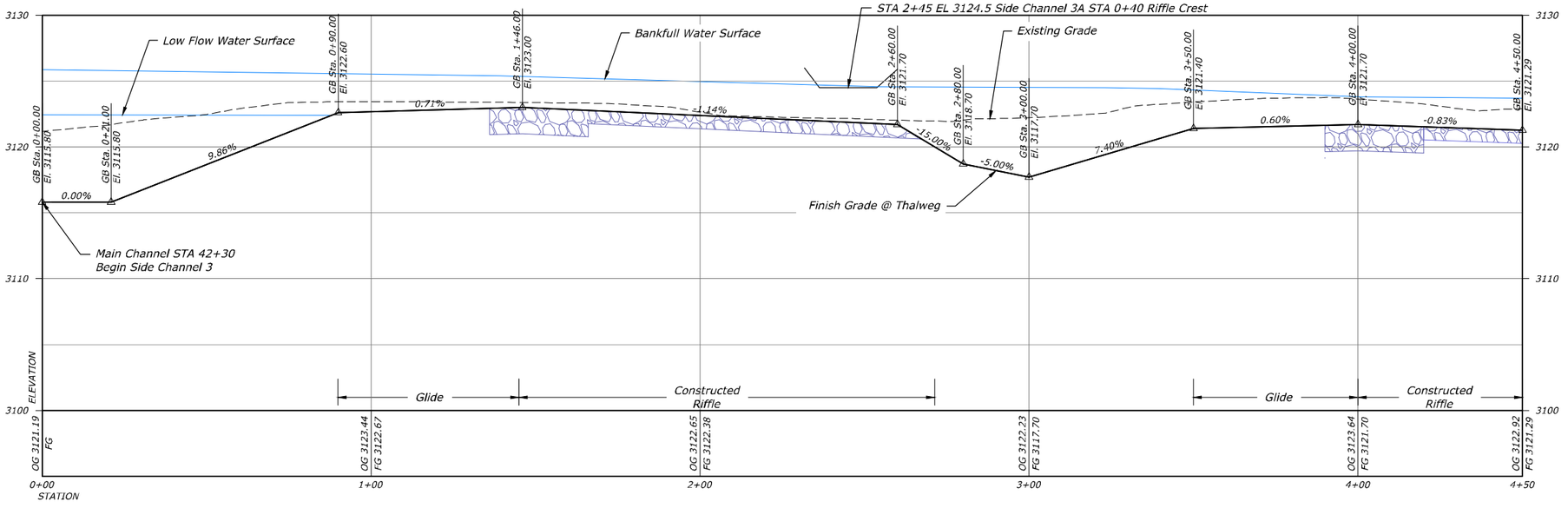
SIDE CHANNEL 3 - PLAN

STA 0+00 TO STA 4+50

SCALE OF FEET: 20 0 20 40 60

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810



SIDE CHANNEL 3 - THALWEG PROFILE

HORIZONTAL SCALE: STA 0+00 TO STA 4+50

SCALE OF FEET: 20 0 20 40 60

VERTICAL SCALE

SCALE OF FEET: 5 0 5 10 15

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
G. Beck — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED — ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 3 PLAN AND PROFILE

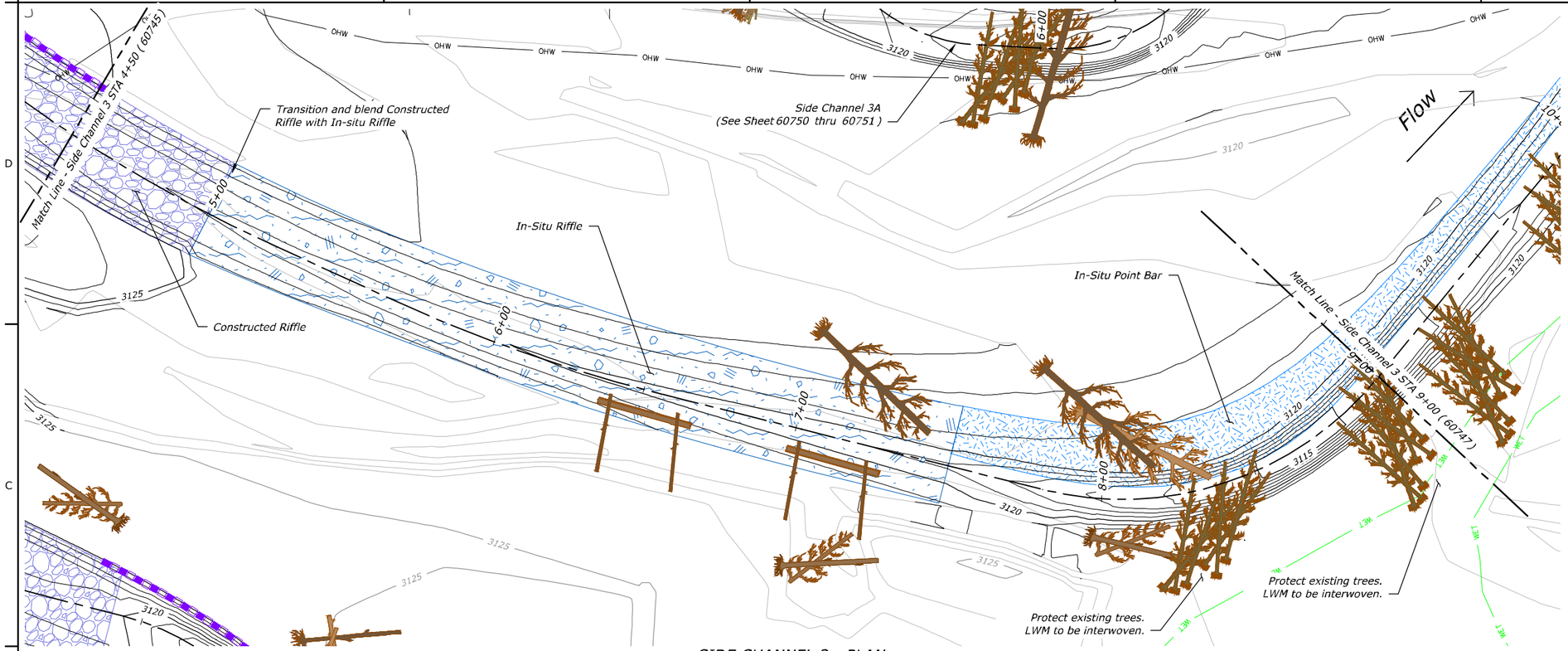
STA 0+00 TO STA 4+50

1678-100-60745

SHEET 10 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:22
PLOTTED BY
JNIELSEN

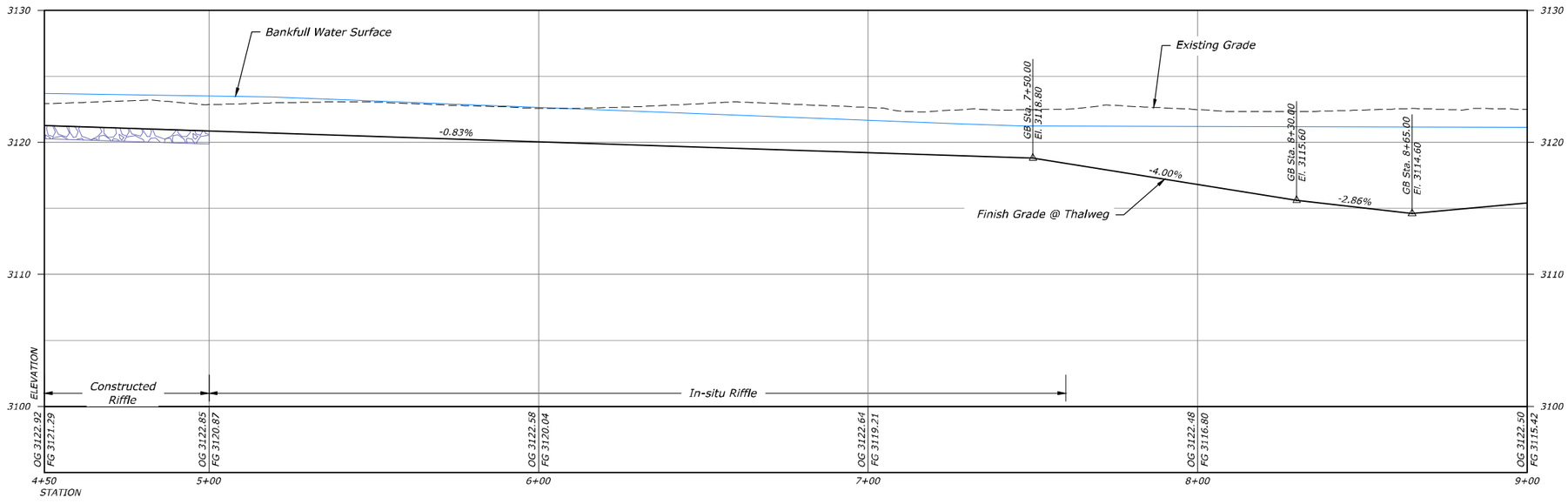
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_SIDECHANNEL_3_P&P_20SCALE.DWG



SIDE CHANNEL 3 - PLAN

STA 4+50 TO STA 9+00

SCALE OF FEET: 20 0 20 40 60



SIDE CHANNEL 3 - THALWEG PROFILE

STA 4+50 TO STA 9+00

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour (ELEV)
- OG Minor Contour
- FG Major Contour (ELEV)
- FG Minor Contour
- Thalweg
- Existing Wetlands (WET)
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
G. Beck — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. SVSR.
T. Day — APPROVED (ADMIN APPROVAL - PROGRAM MANAGER)
CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 3 PLAN AND PROFILE

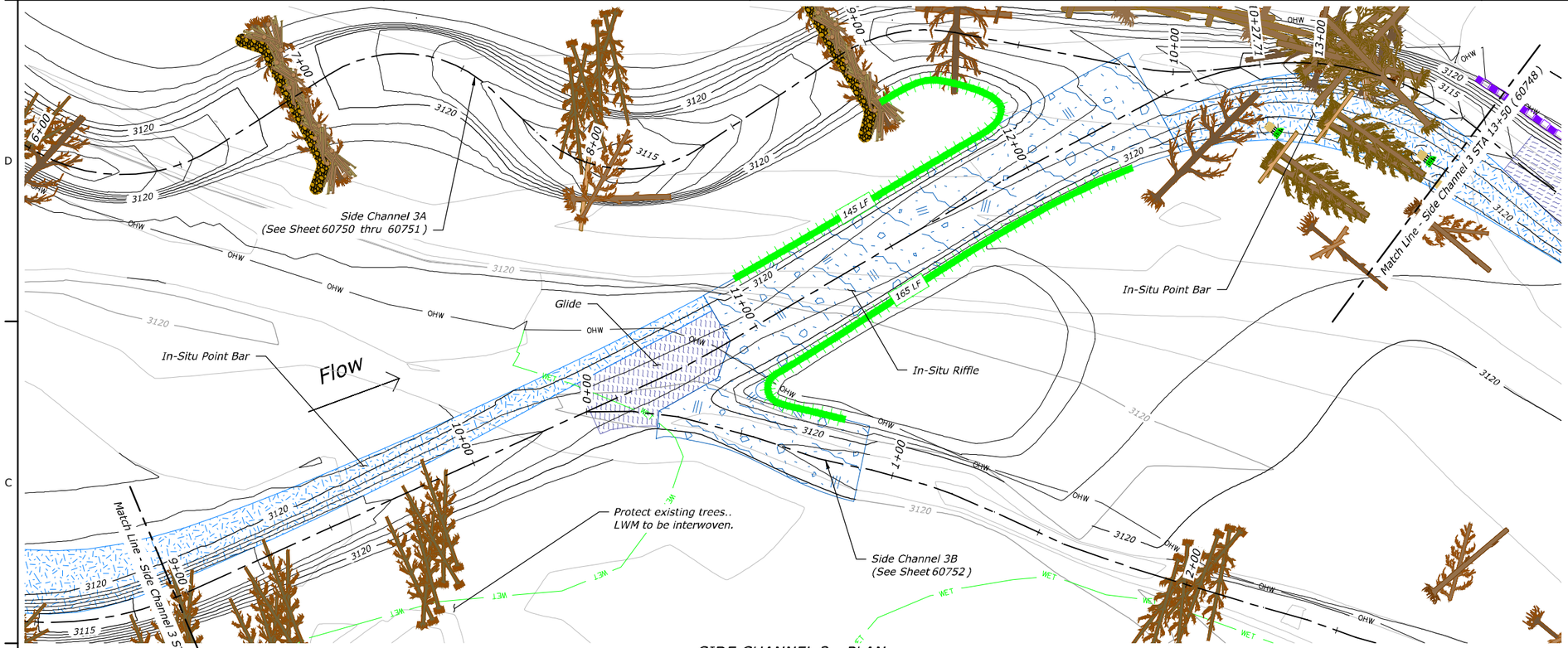
STA 4+50 TO STA 9+00

1678-100-60746

SHEET 11 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:23
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_SSPA_T_SIDECHANNEL_3_P&P_20SCALE.DWG



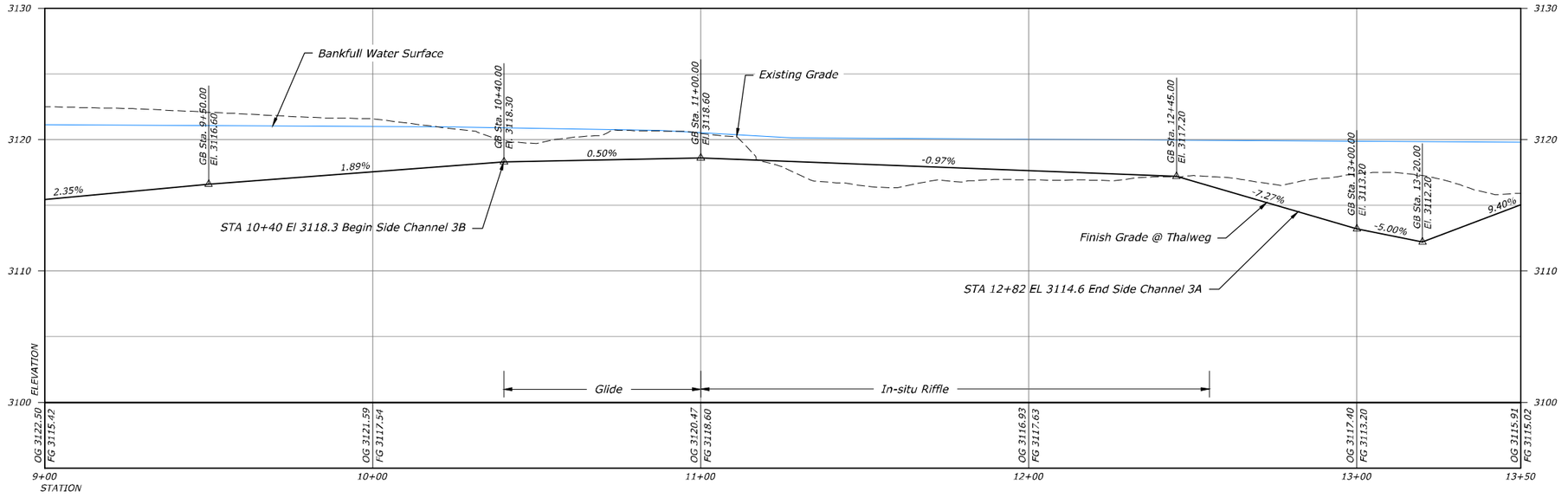
SIDE CHANNEL 3 - PLAN

STA 9+00 TO STA 13+50

SCALE OF FEET: 20 0 20 40 60

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810



SIDE CHANNEL 3 - THALWEG PROFILE

HORIZONTAL SCALE: STA 9+00 TO STA 13+50

SCALE OF FEET: 20 0 20 40 60

VERTICAL SCALE

SCALE OF FEET: 5 0 5 10 15

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
G. Beck	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED
	ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO)	2018-05-14

SIDE CHANNEL 3 PLAN AND PROFILE

STA 9+00 TO STA 13+50

1678-100-60747

SHEET 12 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:24
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_39ACT_SIDECHANNEL_3_PAP_20SCALE.DWG

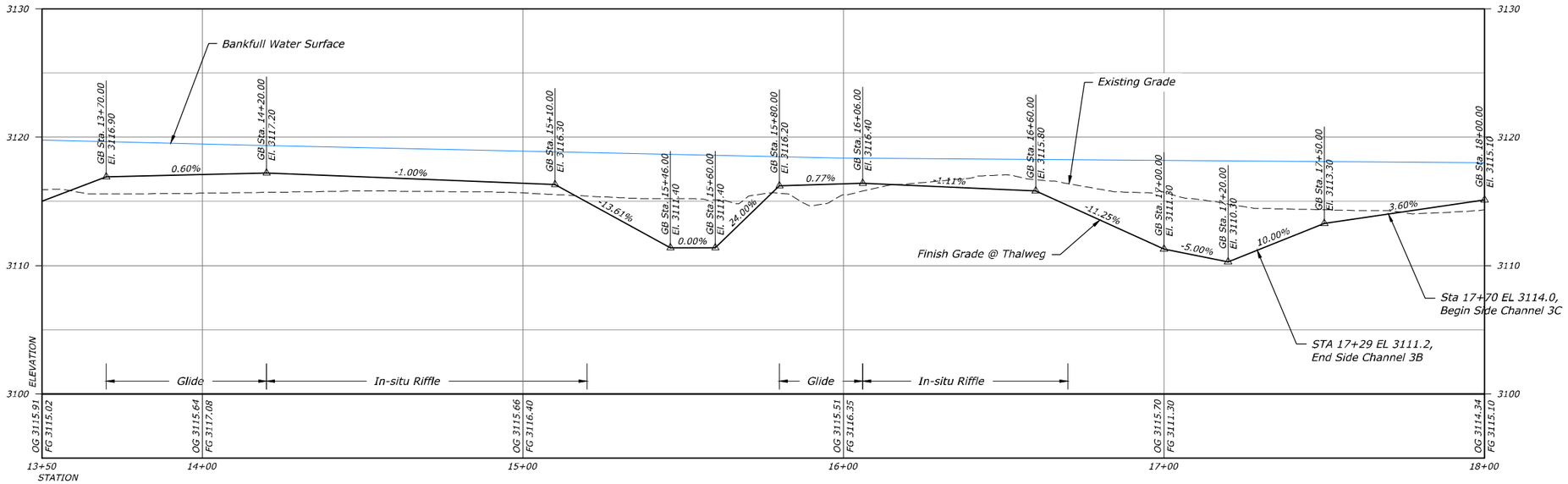
Flow
Glide
155 LF
Match Line - Side Channel 3 STA 13+50 (60747)
13+50
14+00
15+00
In-situ Point Bar
In-situ Riffle
Glide
65 LF
16+00
In-situ Point Bar
In-situ Riffle
Side Channel 3B
(See Sheet 60752)
17+00
5+12.67
5+00
Flow
Match Line - Side Channel 3 STA 18+00 (60749)
6+00
100 LF
Side Channel 3C
(See Sheet 60753)
Protect existing trees.
LWM to be interwoven.
4+00
OHW
3120
3115

SIDE CHANNEL 3 - PLAN
STA 13+50 TO STA 18+00

SCALE OF FEET: 20 0 20 40 60

N

LEGEND
- ELEV — OG Major Contour
- OG Minor Contour
- ELEV — FG Major Contour
- FG Minor Contour
- Thalweg
- WET — Existing Wetlands
- OHW — Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810



SIDE CHANNEL 3 - THALWEG PROFILE
STA 13+50 TO STA 18+00

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER 19223PE OREGON JULY 15, 1997 MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
G. Beck — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED — ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 3 PLAN AND PROFILE

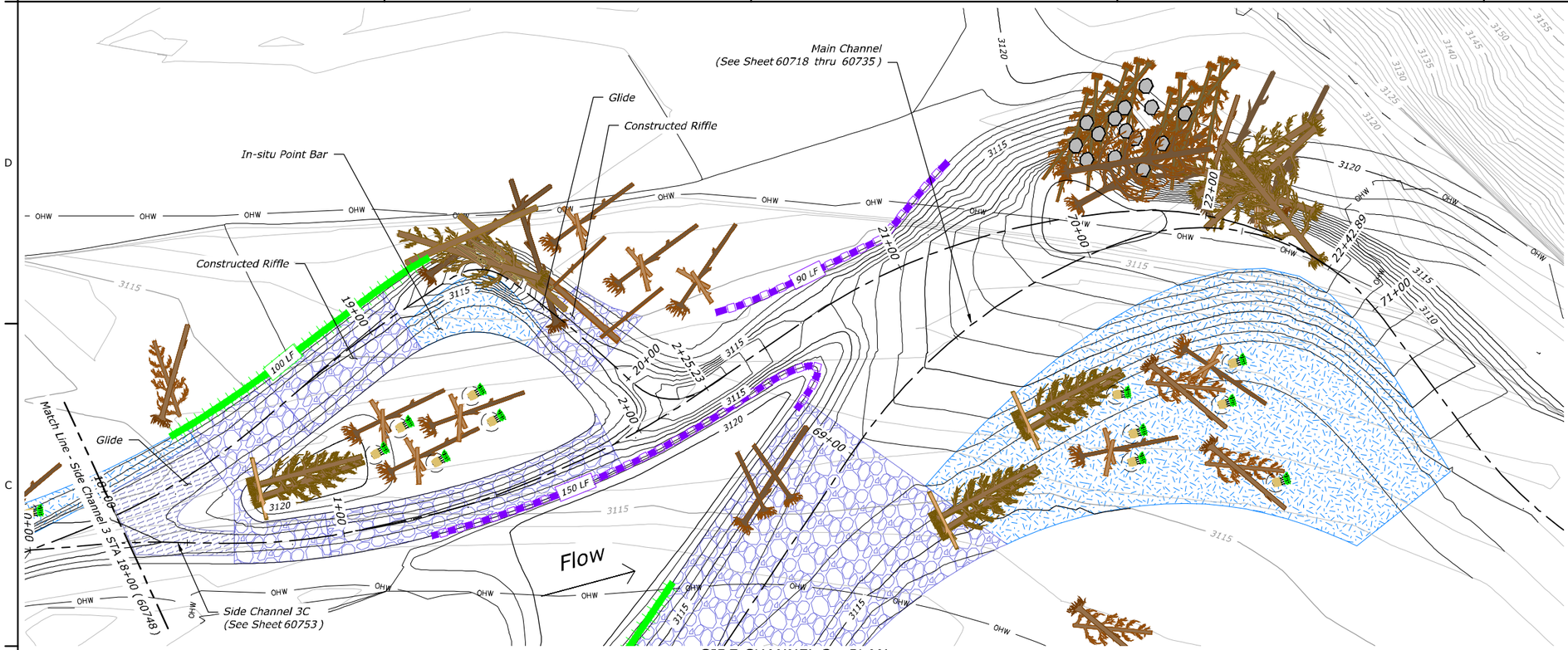
STA 13+50 TO STA 18+00

1678-100-60748

SHEET 13 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:25
PLOTTED BY
JHNTELSEN

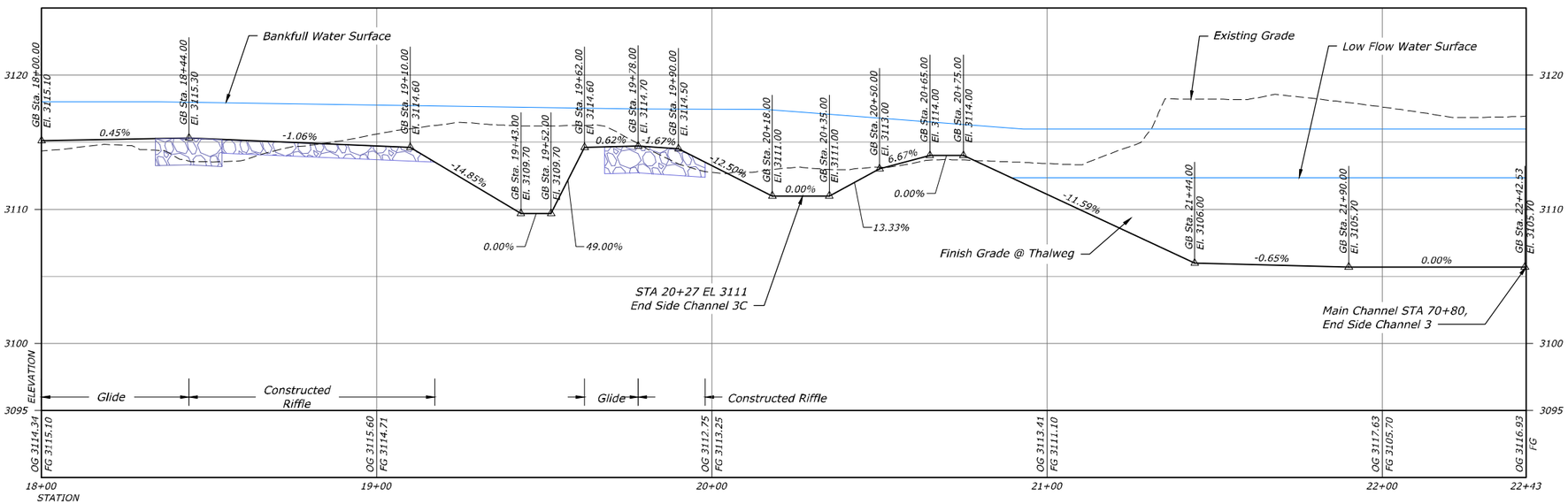
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_SIDECHANNEL_3_PAP_20SCALE.DWG



SIDE CHANNEL 3 - PLAN

STA 18+00 TO STA 22+43

SCALE OF FEET (20 0 20 40 60)



SIDE CHANNEL 3 - THALWEG PROFILE

STA 18+00 TO STA 22+43

HORIZONTAL SCALE (20 0 20 40 60 SCALE OF FEET)

VERTICAL SCALE (5 0 5 10 15 SCALE OF FEET)

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
G. Beck — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 3 PLAN AND PROFILE

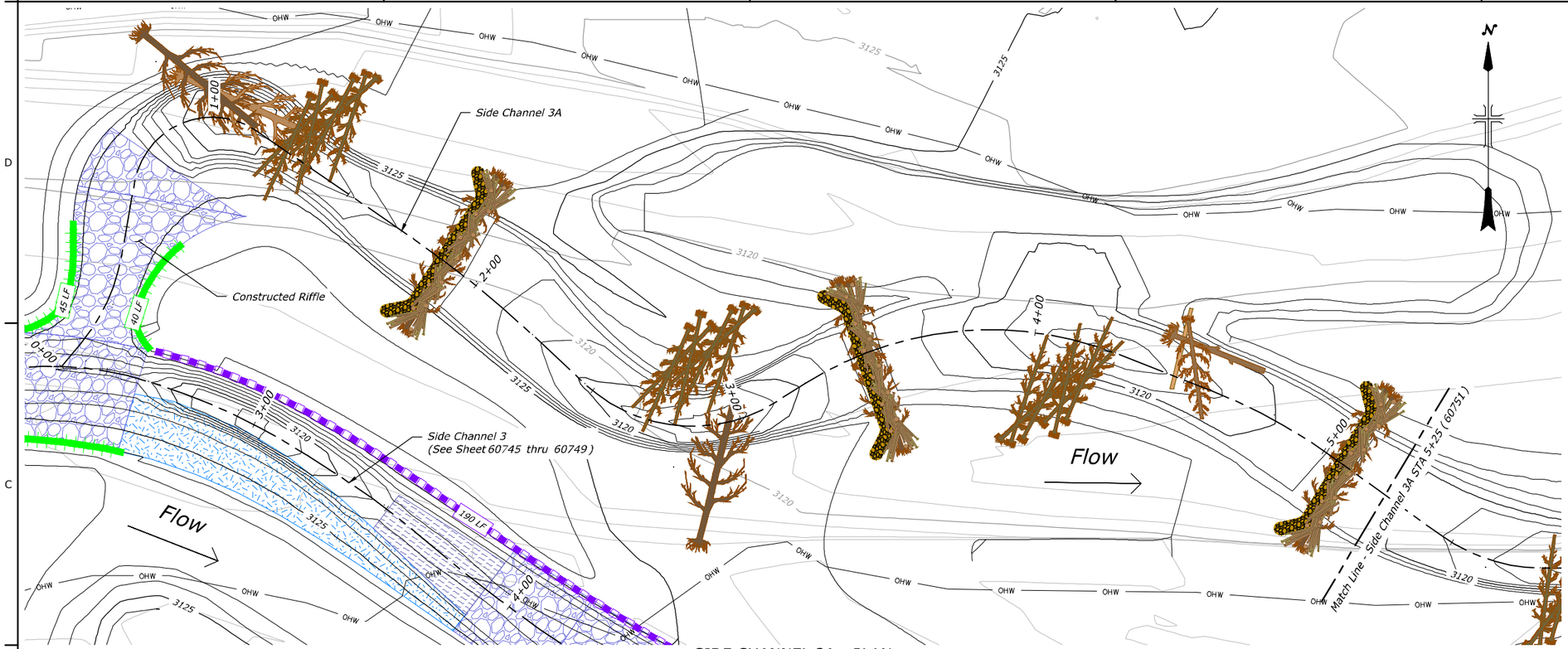
STA 18+00 TO STA 22+43

1678-100-60749

SHEET 14 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:26
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_99PCT_SIDECHANNEL_3_P&P_30SCALE.DWG



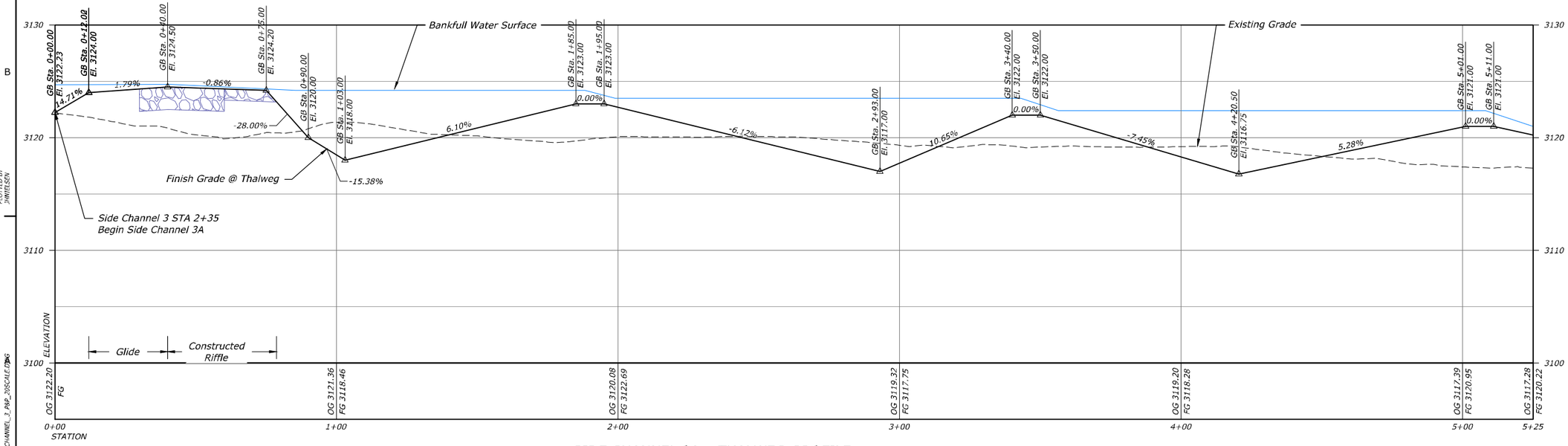
LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

SIDE CHANNEL 3A - PLAN

STA 0+00 TO 5+25

SCALE OF FEET: 20 0 20 40 60



SIDE CHANNEL 3A - THALWEG PROFILE

STA 0+00 TO 5+25

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
G. Beck — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 3A PLAN AND PROFILE

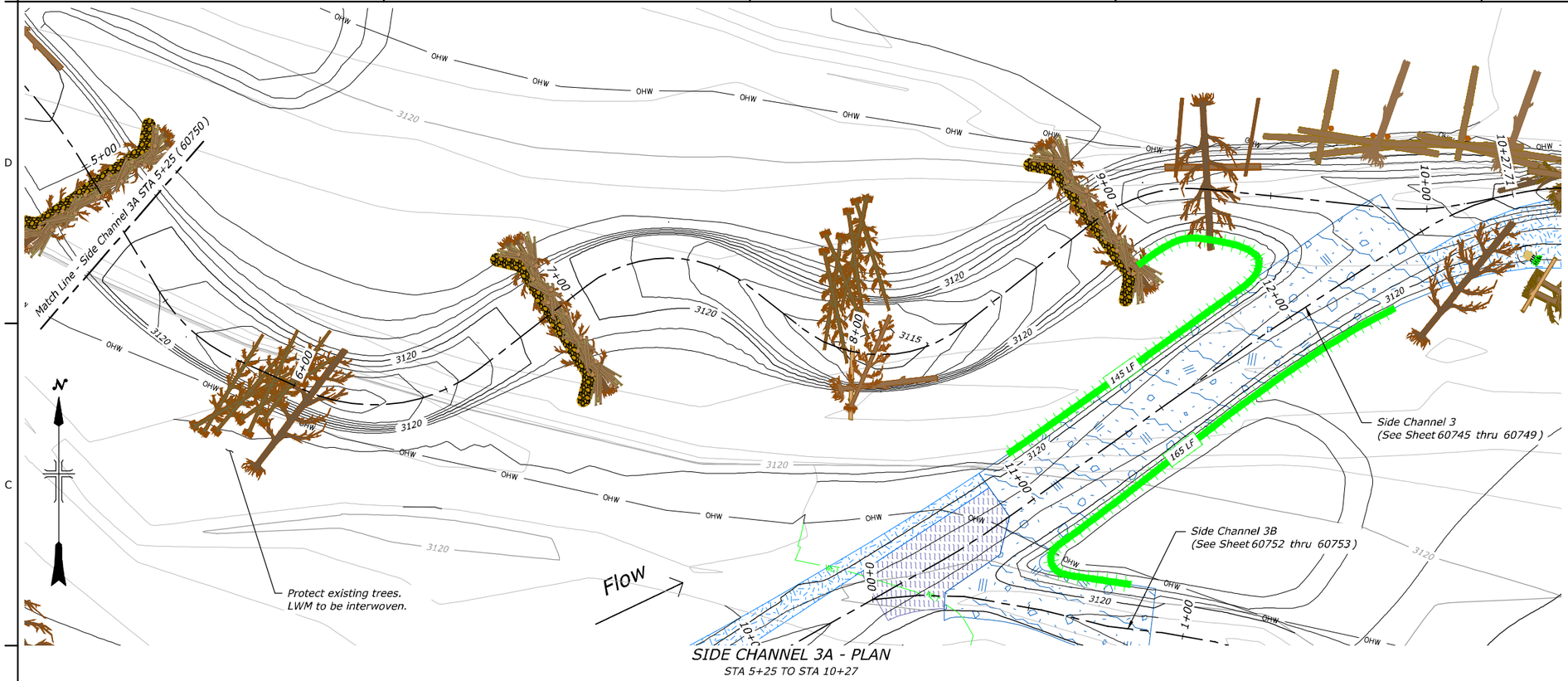
STA 0+00 TO 5+25

1678-100-60750

SHEET 15 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:27
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_SIDECHANNEL_3_P&P_20SCALE.DWG



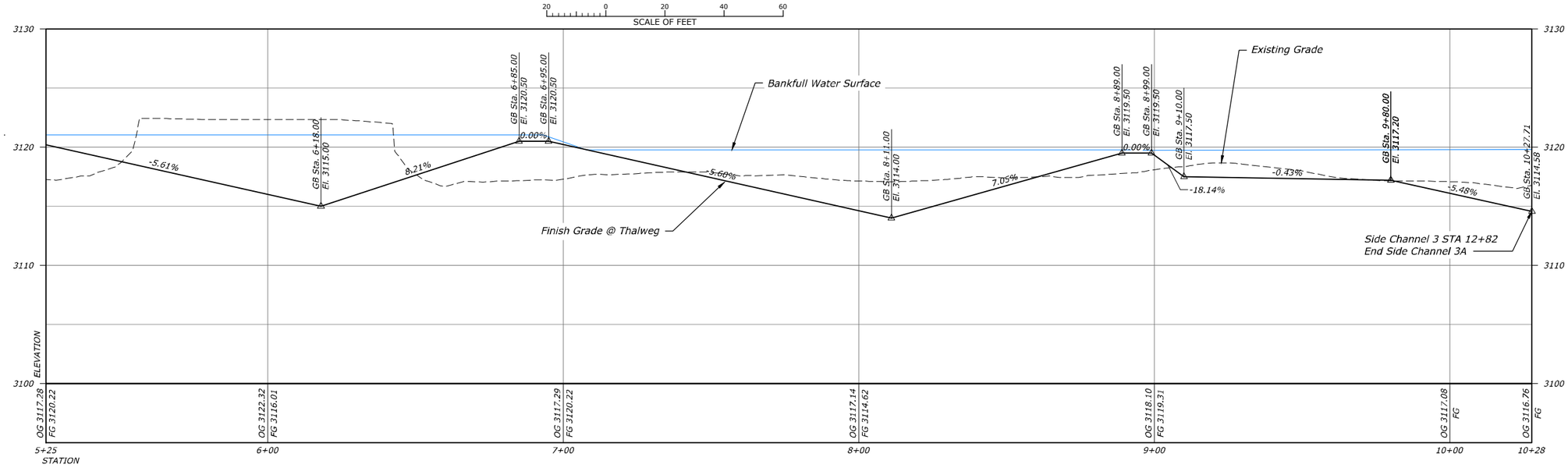
SIDE CHANNEL 3A - PLAN

STA 5+25 TO STA 10+27

SCALE OF FEET: 20 0 20 40 60

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810



SIDE CHANNEL 3A - THALWEG PROFILE

STA 5+25 TO STA 10+27

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
G. Beck
DRAWN
M. Knutson P.E.
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 3A PLAN AND PROFILE

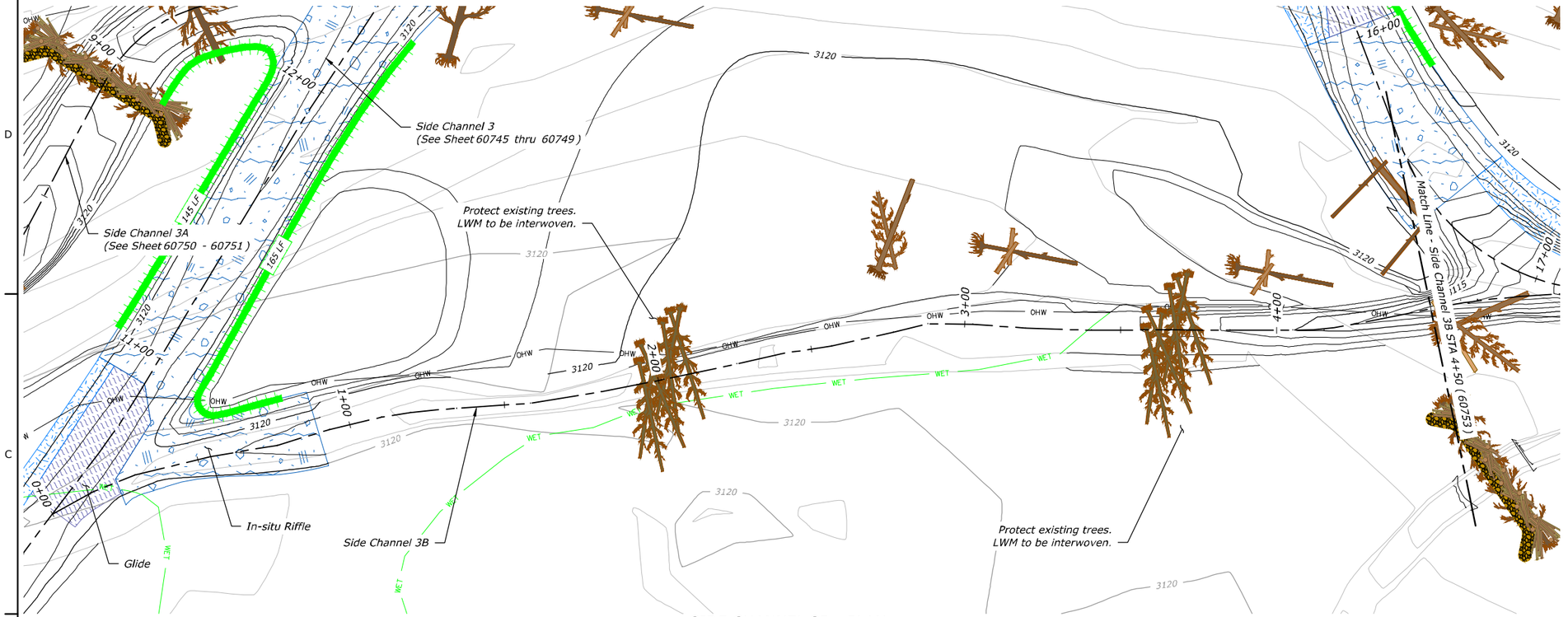
STA 5+25 TO STA 10+27

1678-100-60751

SHEET 16 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:28
PLOTTED BY
JNIELSEN

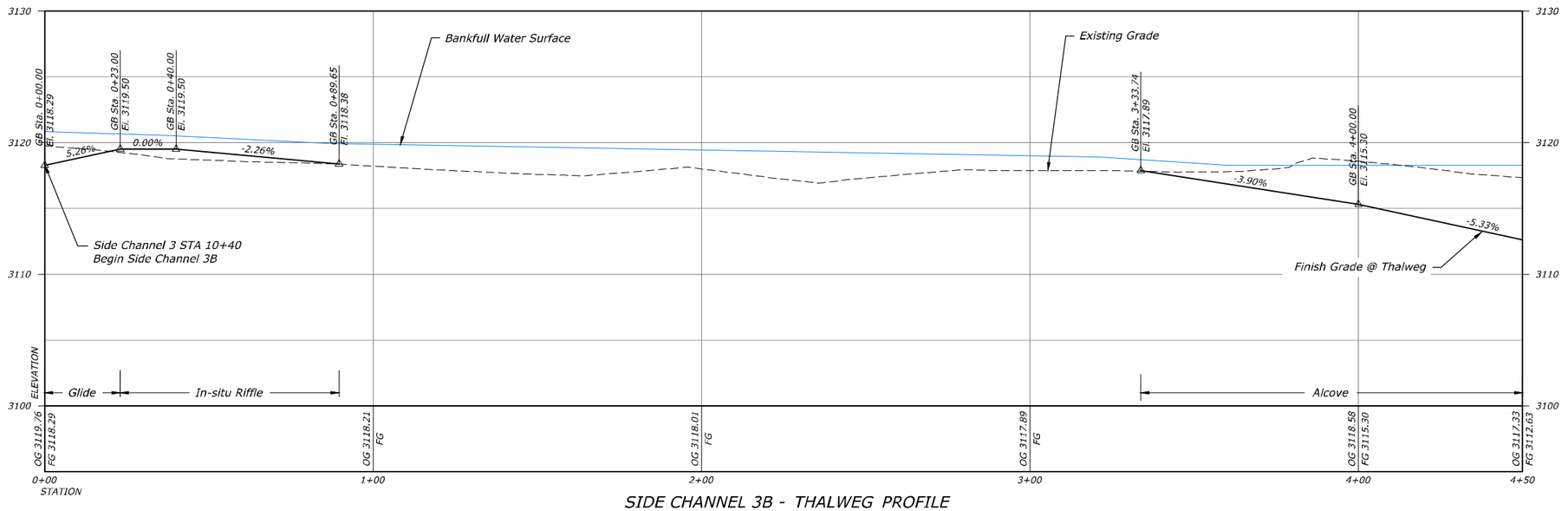
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_SIDECHANNEL_3_P&P_20SCALE.DWG



SIDE CHANNEL 3B - PLAN

STA 0+00 TO STA 4+50

SCALE OF FEET



SIDE CHANNEL 3B - THALWEG PROFILE

STA 0+00 TO STA 4+50

HORIZONTAL SCALE — SCALE OF FEET

VERTICAL SCALE — SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
G. Beck
DRAWN
M. Knutson P.E.
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 3B PLAN AND PROFILE

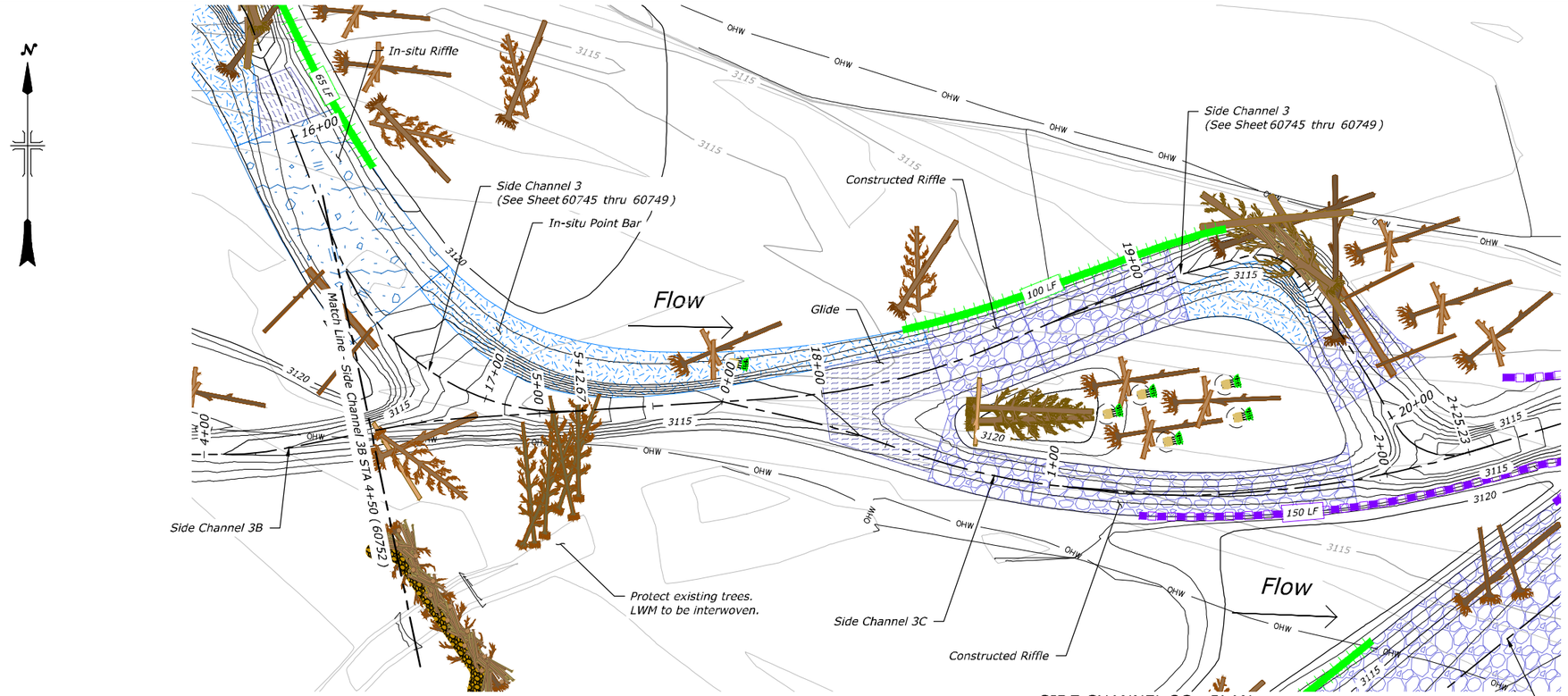
STA 0+00 TO STA 4+50

1678-100-60752

SHEET 17 of 30

DATE AND TIME PLOTTED MAY 11, 2018 15:29
PLOTTED BY JNIELSEN

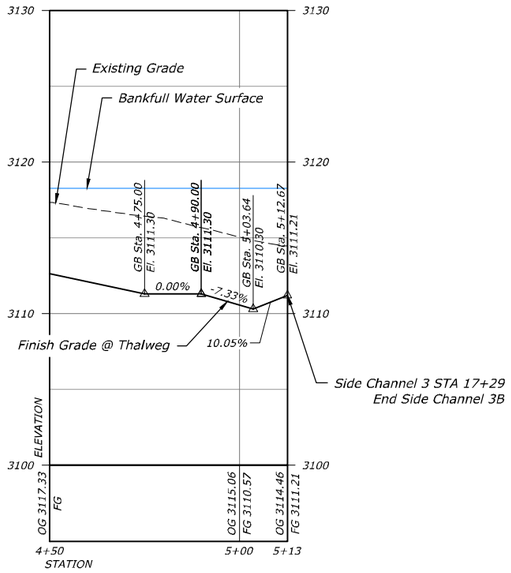
CAD SYSTEM AutoCAD Rel. 22.0s
CAD FILENAME BTS_95PCT_SIDECHANNEL_3_P&P_20SCALE.DWG



SIDE CHANNEL 3B - PLAN
STA 4+50 TO 5+13

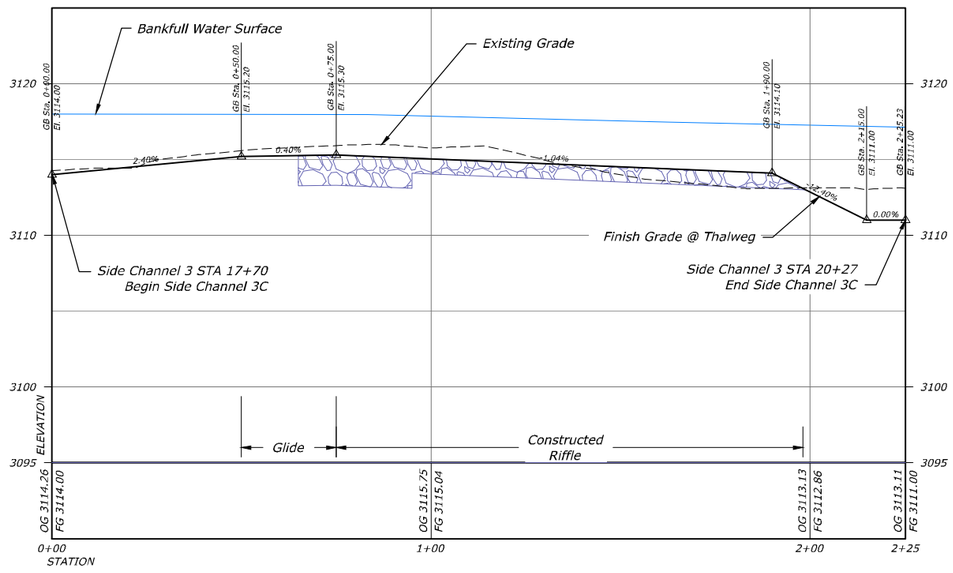
SIDE CHANNEL 3C - PLAN
STA 0+00 TO STA 2+25

SCALE OF FEET: 20 0 20 40 60



SIDE CHANNEL 3B - THALWEG PROFILE
STA 4+50 TO STA 5+13

VERTICAL SCALE: 20 0 20 40 60 SCALE OF FEET
HORIZONTAL SCALE: 5 0 5 10 15 SCALE OF FEET



SIDE CHANNEL 3C - THALWEG PROFILE
STA 0+00 TO STA 2+25

VERTICAL SCALE: 20 0 20 40 60 SCALE OF FEET
HORIZONTAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
G. Beck — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

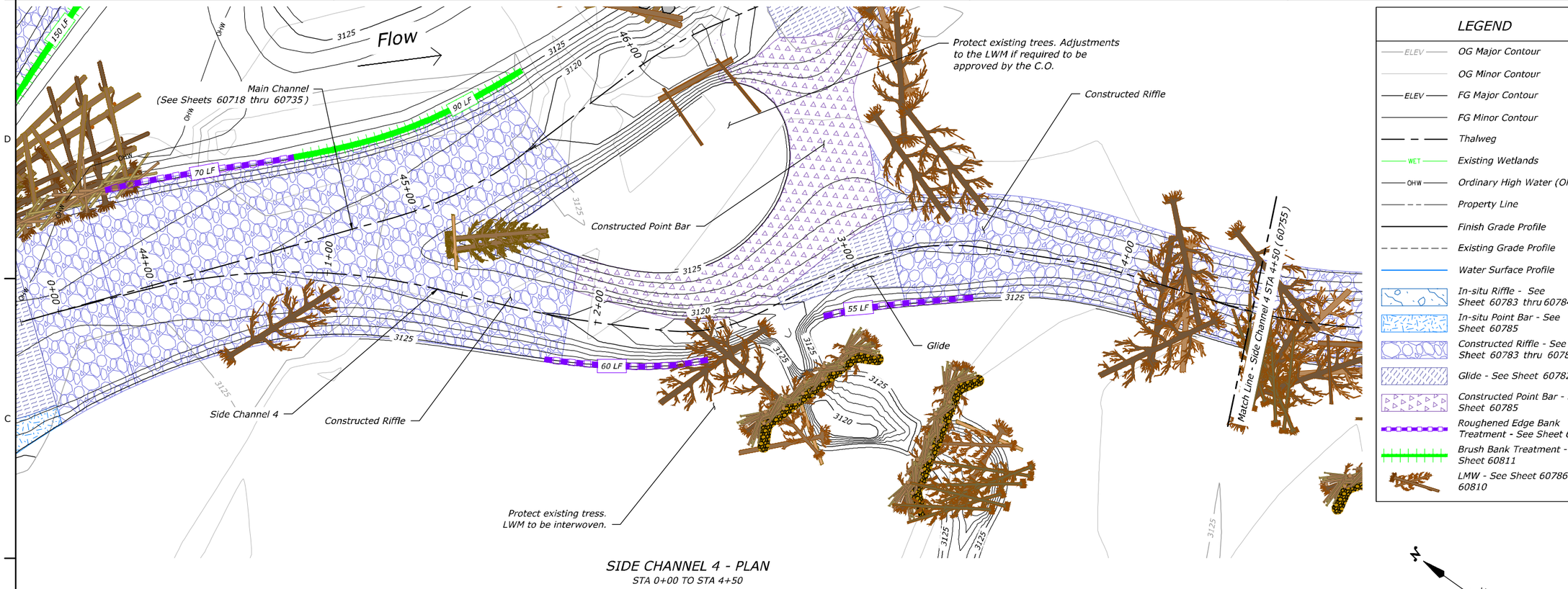
SIDE CHANNEL 3B & 3C PLAN AND PROFILE

1678-100-60753

SHEET 18 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:30
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_3SPCT_SIDECHANNEL_3_P&P_20SCALE.dwg



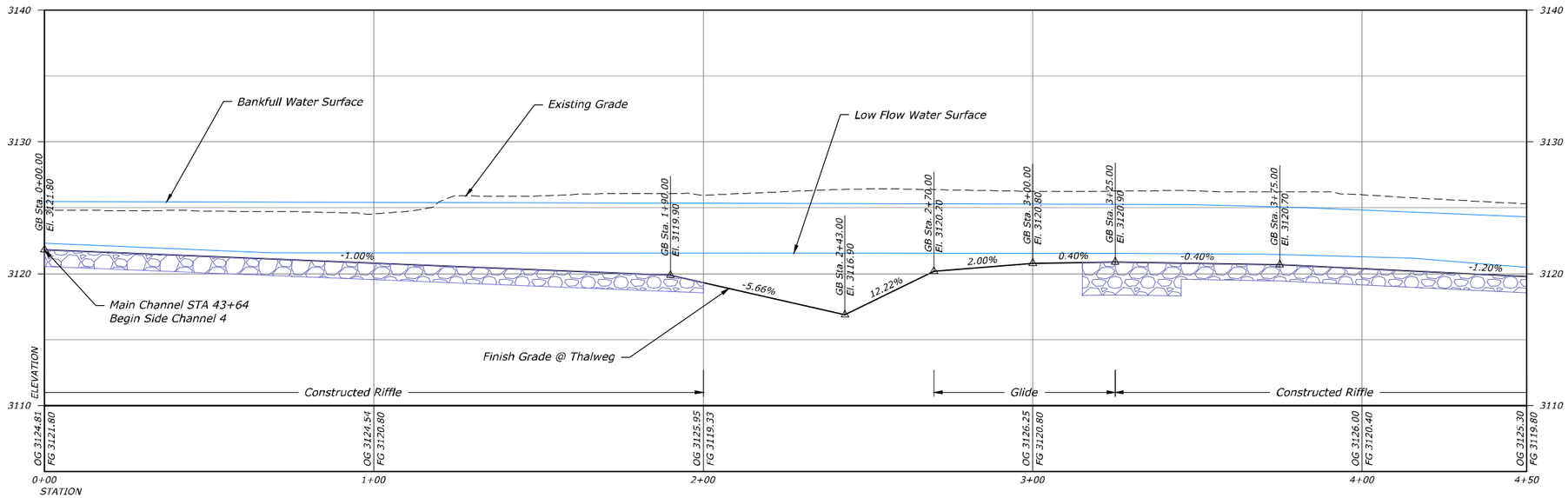
SIDE CHANNEL 4 - PLAN

STA 0+00 TO STA 4+50

SCALE OF FEET: 20 0 20 40 60

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810



SIDE CHANNEL 4 - THALWEG PROFILE

STA 0+00 TO STA 4+50

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Bryant — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED — ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 4 PLAN AND PROFILE

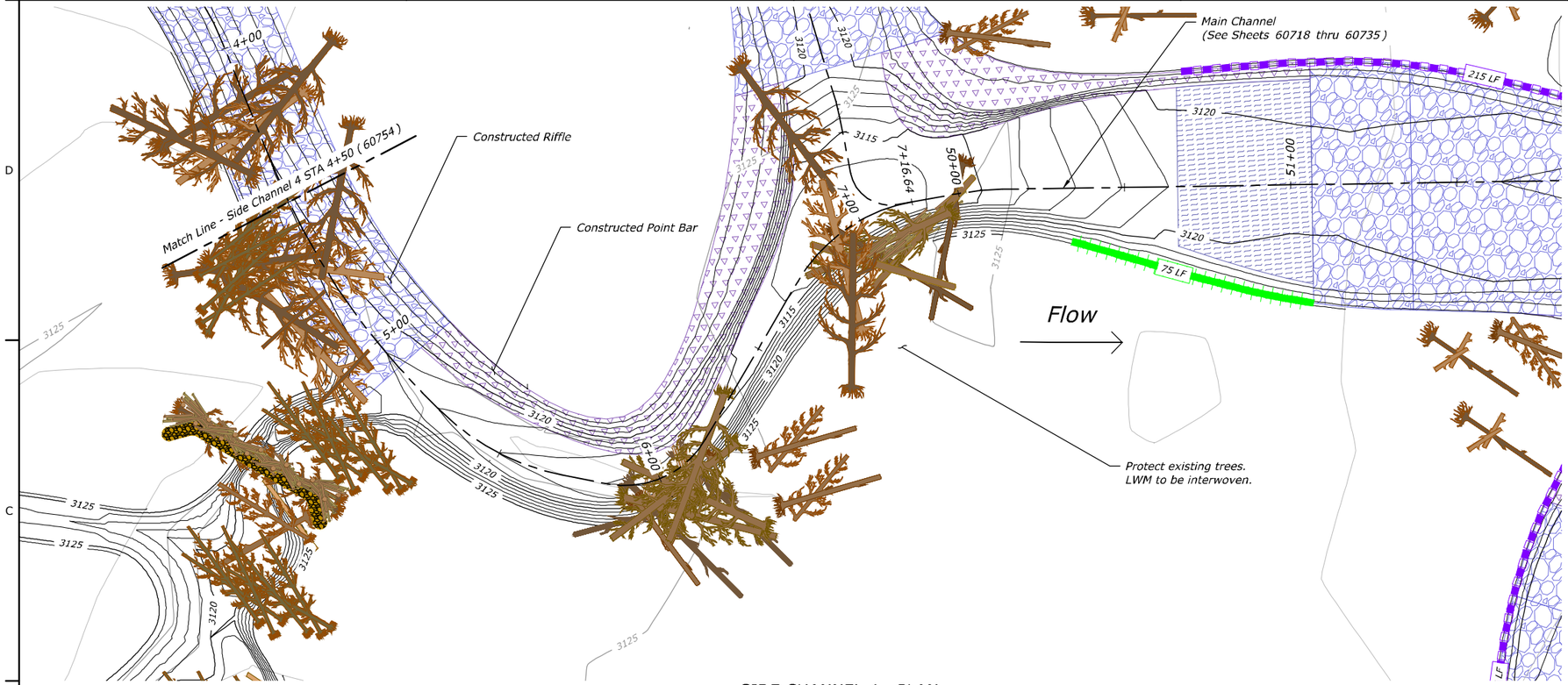
STA 0+00 TO STA 4+50

1678-100-60754

SHEET 19 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:46
PLOTTED BY
JWITELSEN

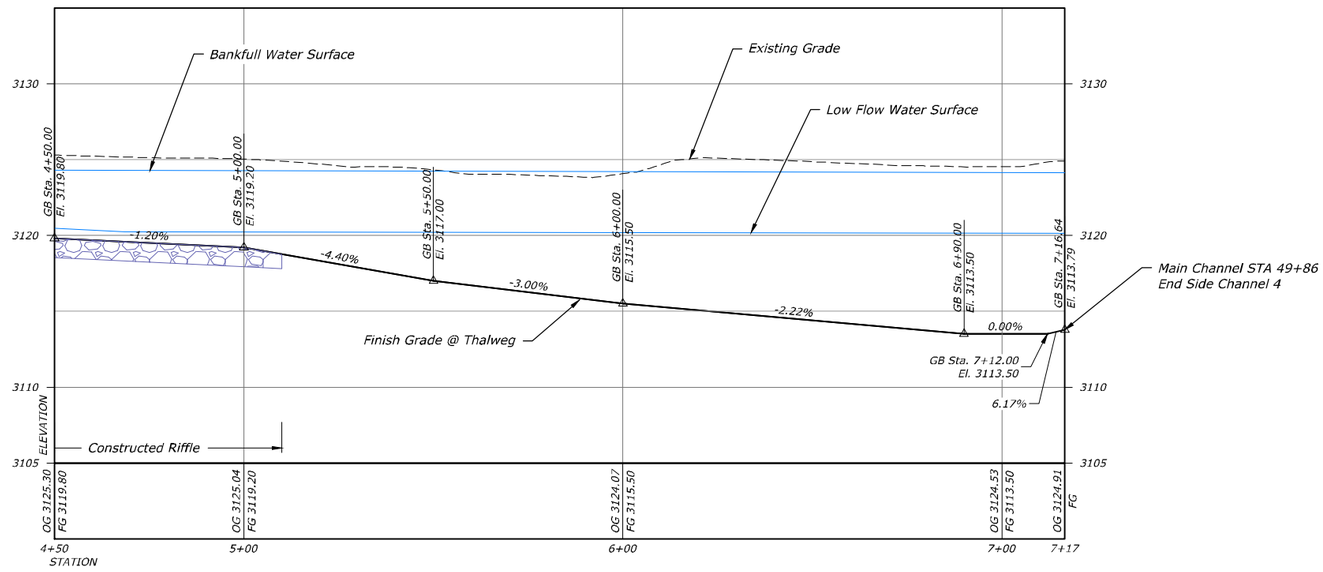
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_SSPCT_SIDECHANNEL_465_PAP_20SCALE.DWG



SIDE CHANNEL 4 - PLAN

STA 4+50 TO STA 7+17

SCALE OF FEET



SIDE CHANNEL 4 - THALWEG PROFILE

STA 4+50 TO STA 7+17

HORIZONTAL SCALE — SCALE OF FEET

VERTICAL SCALE — SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER 19223PE OREGON JULY 15, 1997 MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
J. Bryant
DRAWN
M. Knutson P.E.
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 4 PLAN AND PROFILE

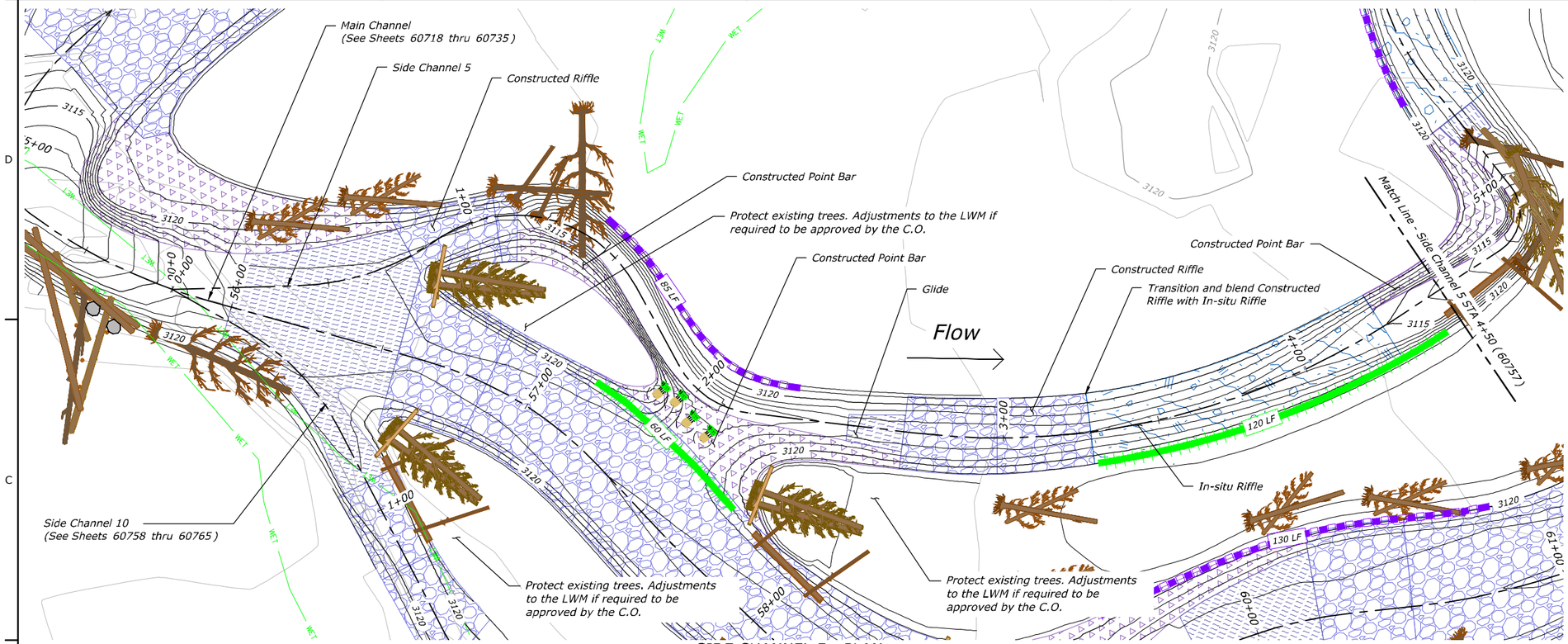
STA 4+50 TO STA 7+17

1678-100-60755

SHEET 20 of 30

DATE AND TIME PLOTTED MAY 11, 2018 15:55
PLOTTED BY JNNIELSEN

CAD SYSTEM AutoCAD Rel. 22.0s
CAD FILENAME BTS_95PCT_SIDECHANNEL_4&5_P&P_20SCALE.DWG



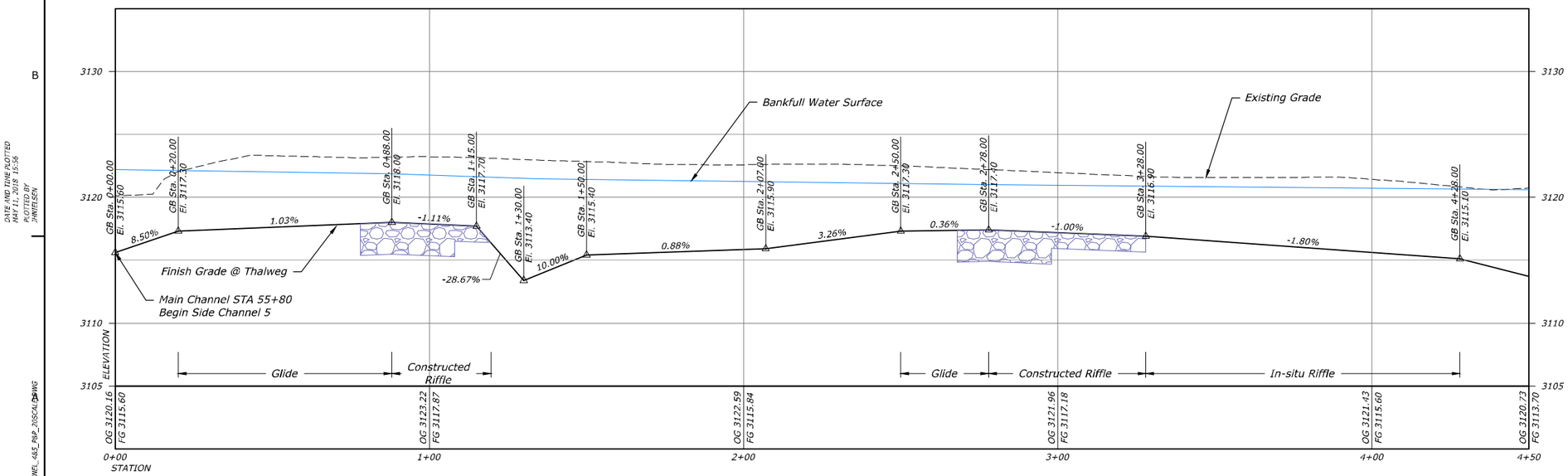
SIDE CHANNEL 5 - PLAN

STA 0+00 TO STA 4+50

SCALE OF FEET (20 0 20 40 60)

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810



SIDE CHANNEL 5 - THALWEG PROFILE

STA 0+00 TO STA 4+50

HORIZONTAL SCALE (20 0 20 40 60) SCALE OF FEET

VERTICAL SCALE (5 0 5 10 15) SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Bryant — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 5 PLAN AND PROFILE

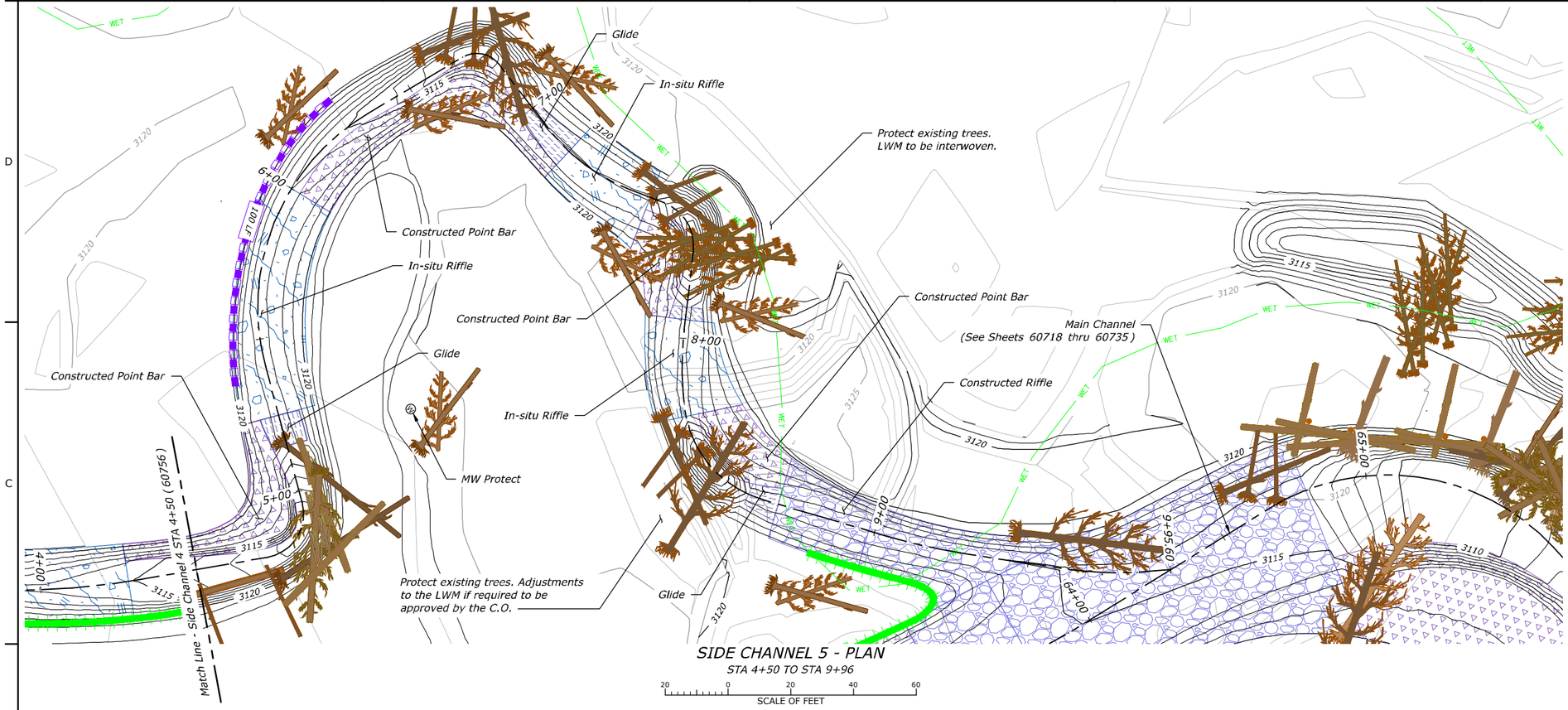
STA 0+00 TO STA 4+50

1678-100-60756

SHEET 21 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 15:56
PLOTTED BY
JNIELSEN

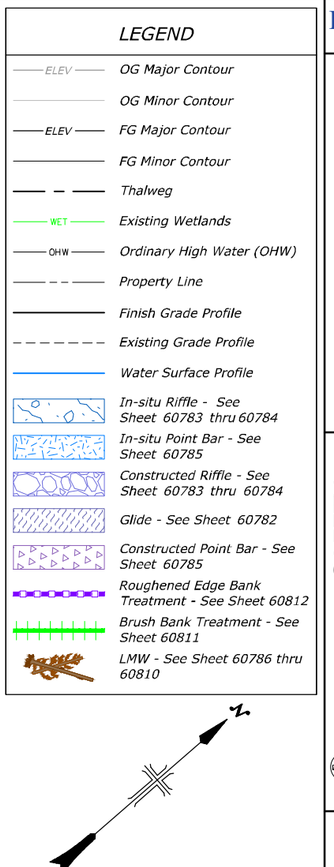
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_SIDECHANNEL_485_PAP_20SCALE.DWG



SIDE CHANNEL 5 - PLAN

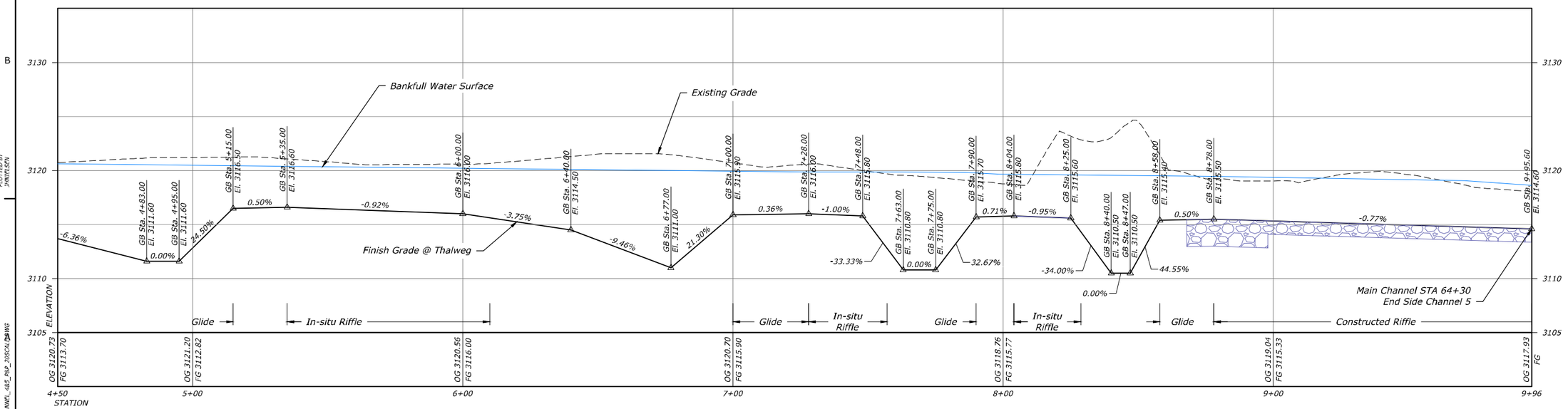
STA 4+50 TO STA 9+96

SCALE OF FEET: 20 0 20 40 60



LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810



SIDE CHANNEL 5 - THALWEG PROFILE

STA 4+50 TO STA 9+96

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Bryant	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED (CROM APPROVAL - PROGRAM MANAGER)
CSRO (BOISE, IDAHO)	2018-05-14

SIDE CHANNEL 5 PLAN AND PROFILE

STA 4+50 TO STA 9+96

1678-100-60757

SHEET 22 of 30

DATE AND TIME PLOTTED: MAY 11, 2018 15:57
PLOTTED BY: JWATELSEN
CAD SYSTEM: AutoCAD Rel. 22.0s
CAD FILENAME: RTS_SPICT_SIDECHANNEL_4&5_P&P_20SCALE.DWG

Side Channel 5
(See Sheets 60756 thru 60757)

60 LF

50 LF

Protect existing tree. Adjustments to the LWM if required to be approved by the C.O.

Flow

Match Line - Side Channel 10 STA 4+50 (60759)

Constructed Riffle

Glide

Side Channel 10

Main Channel
(See Sheets 60718 thru 60735)

SIDE CHANNEL 10 - PLAN

STA 0+00 TO 4+50

SCALE OF FEET: 20 0 20 40 60

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

Low Flow Water Surface

Bankfull Water Surface

Existing Grade

Finish Grade @ Thalweg

Match Existing Grade

Main Channel STA 55+80 Begin Side Channel 10

GB Sta. 0+00.00 El. 3115.60

GB Sta. 0+25.00 El. 3117.30

GB Sta. 1+00.00 El. 3119.40

GB Sta. 1+53.00 El. 3119.10

6.80%

2.80%

-0.57%

Glide

Constructed Riffle

ELEVATION

OG 3120.16 FG 3115.60

OG 3118.55 FG 3119.40

OG 3119.19 FG

OG 3117.95 FG

OG 3118.07 FG

OG 3117.72 FG

STATION: 0+00 1+00 2+00 3+00 4+00 4+50

SIDE CHANNEL 10 - THALWEG PROFILE

STA 0+00 TO 4+50

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Bryant — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 10 PLAN AND PROFILE

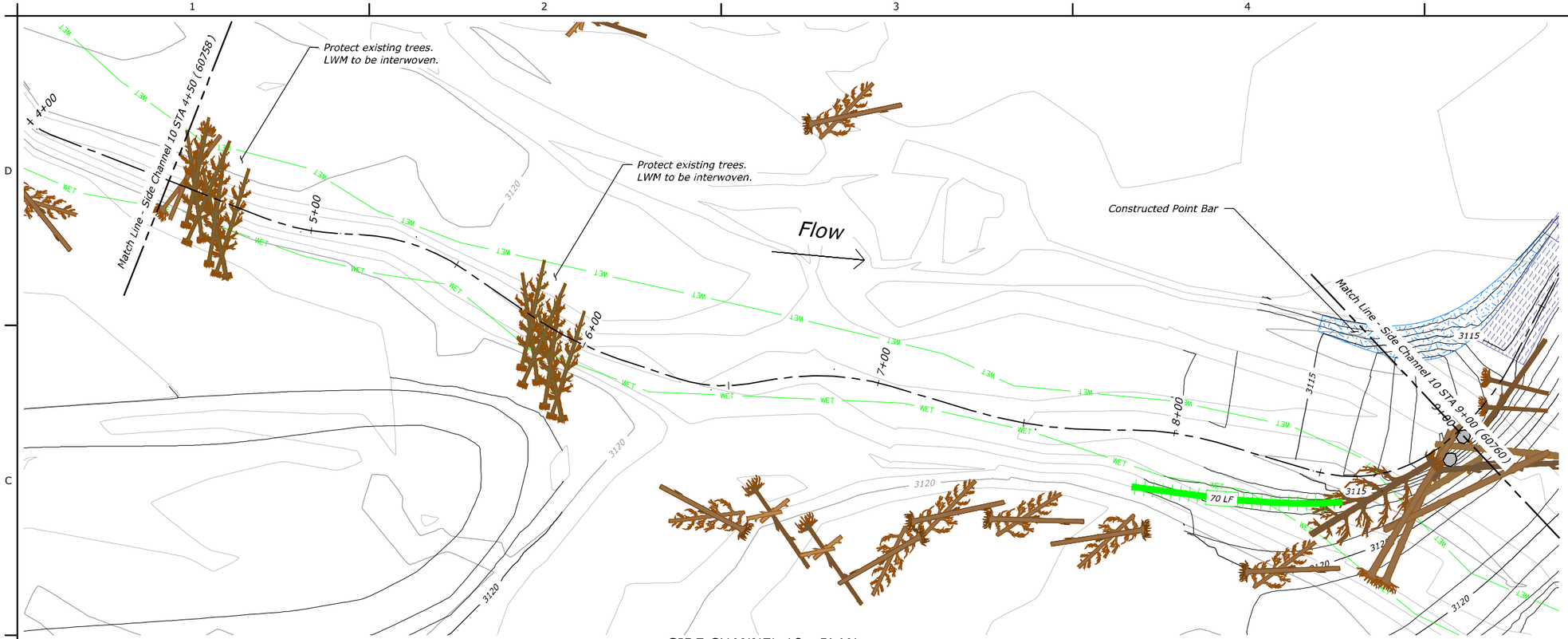
STA 0+00 TO 4+50

1678-100-60758

SHEET 23 of 30

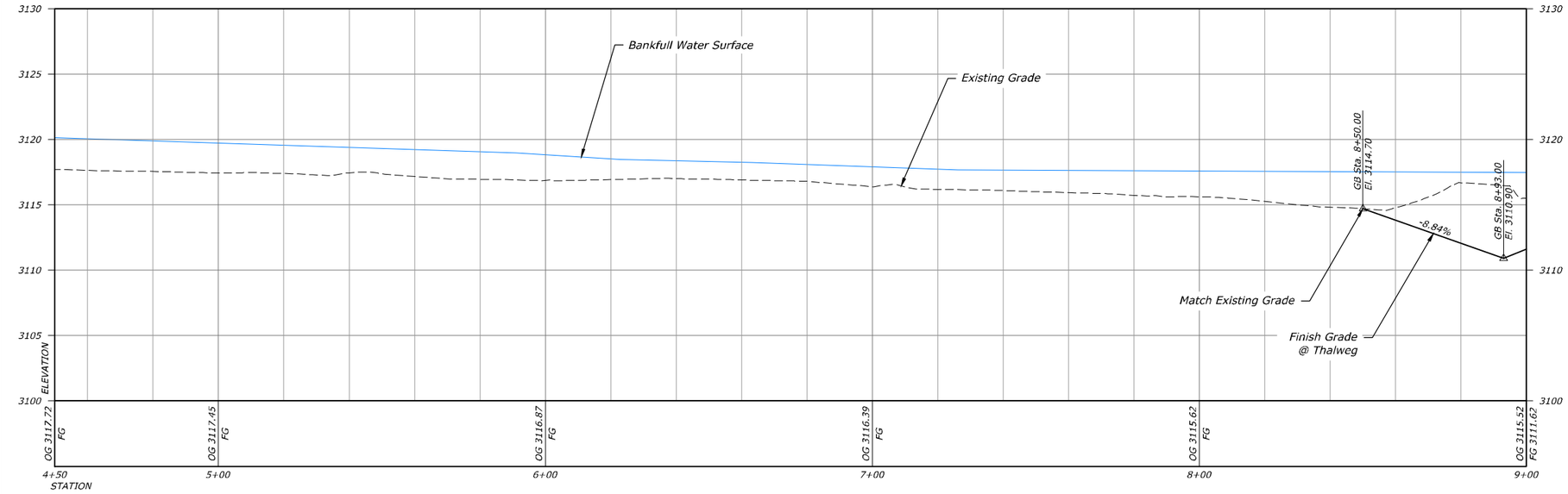
DATE AND TIME PLOTTED
MAY 11, 2018 16:01
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PC_SIDECHANNEL_10_P&P_20SCALE.DWG



SIDE CHANNEL 10 - PLAN
STA 4+50 TO STA 9+00

SCALE OF FEET: 20 0 20 40 60



SIDE CHANNEL 10 - THALWEG PROFILE
STA 4+50 TO STA 9+00

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Bryant	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED
	ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO)	2018-05-14

SIDE CHANNEL 10 PLAN AND PROFILE

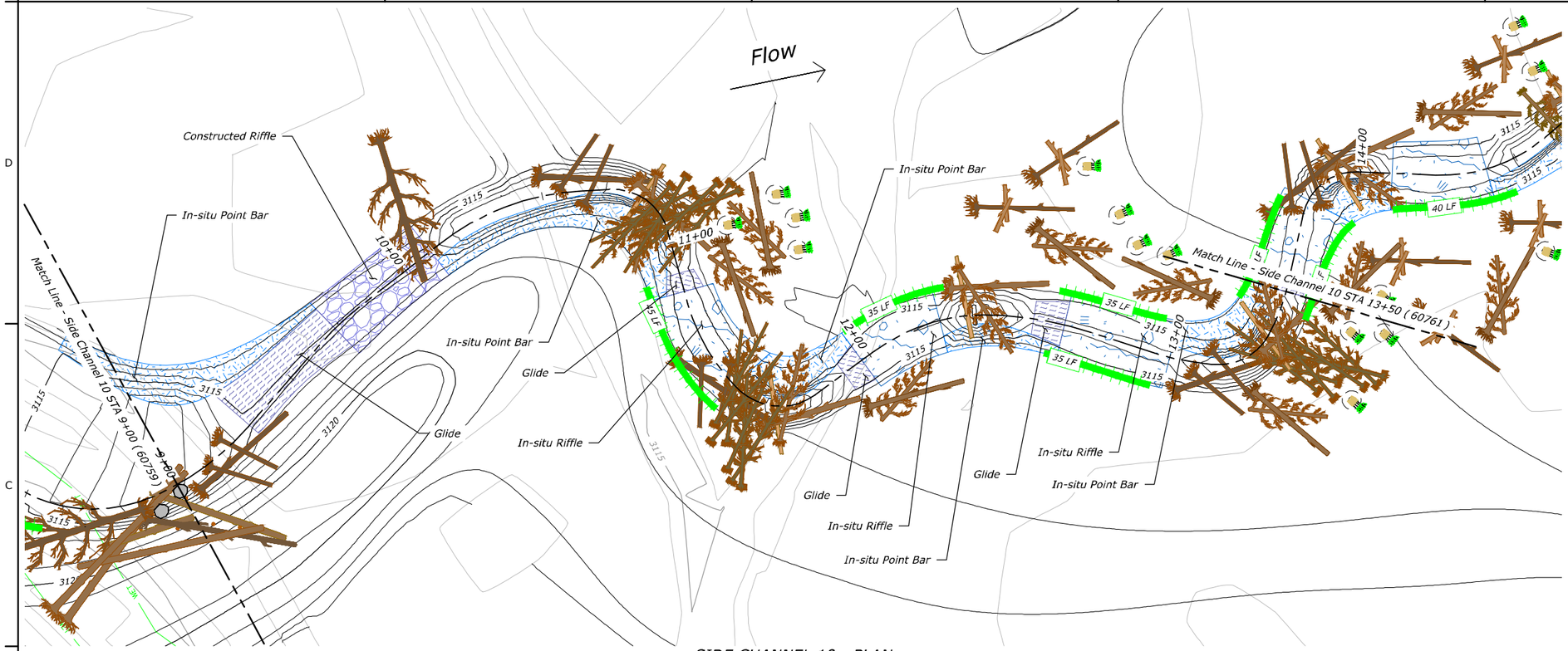
STA 4+50 TO STA 9+00

1678-100-60759

SHEET 24 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 16:02
PLOTTED BY
JNIELSEN

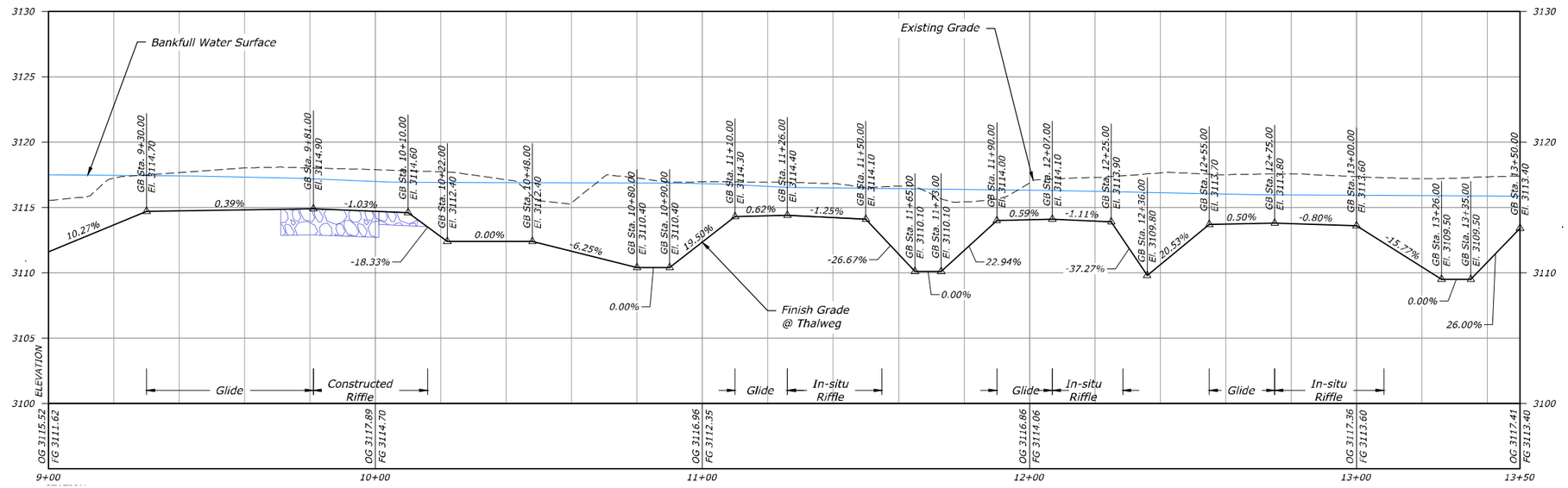
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_SIDECHANNEL_10_P&P_20SCALE.DWG



SIDE CHANNEL 10 - PLAN

STA 9+00 TO STA 13+50

SCALE OF FEET



SIDE CHANNEL 10 - THALWEG PROFILE

STA 9+00 TO STA 13+50

HORIZONTAL SCALE — SCALE OF FEET

VERTICAL SCALE — SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Bryant	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED
	ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO)	2018-05-14

SIDE CHANNEL 10 PLAN AND PROFILE

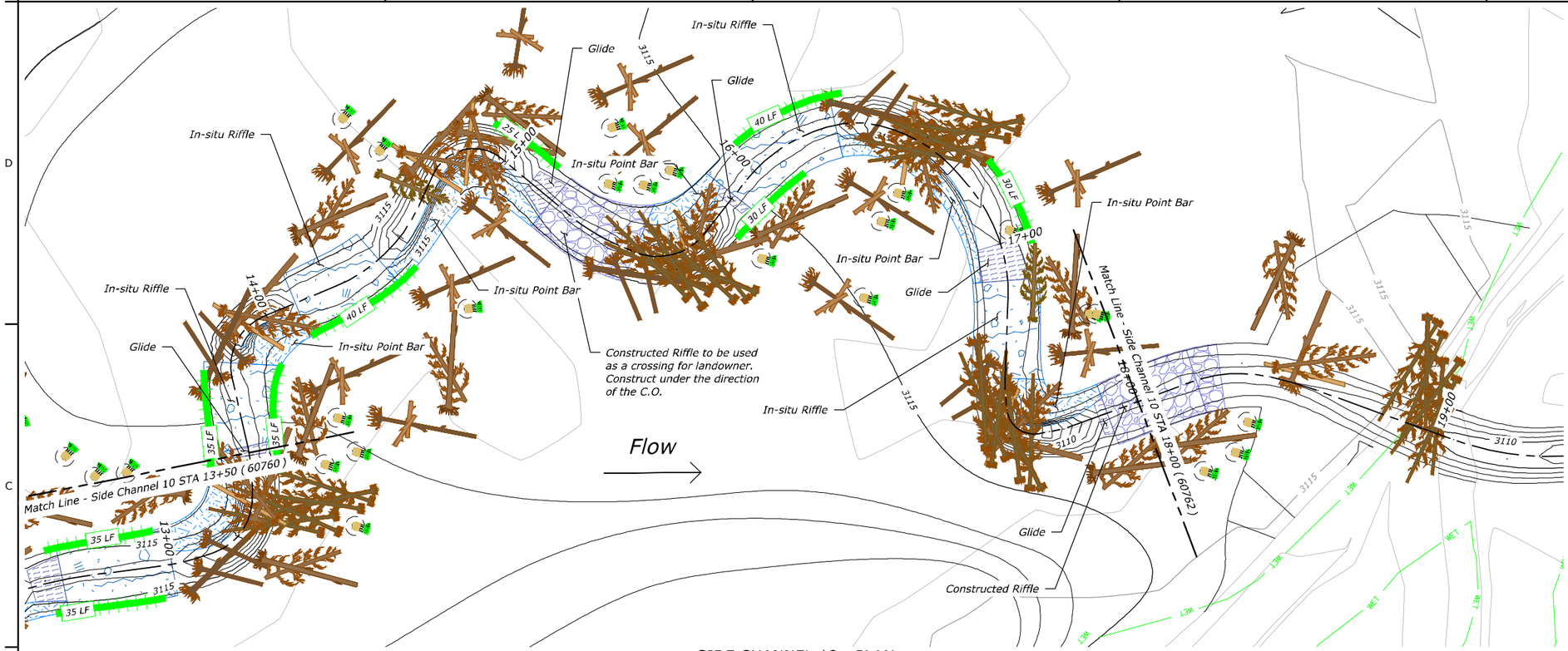
STA 9+00 TO STA 13+50

1678-100-60760

SHEET 25 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 16:04
PLOTTED BY
JNIELSEN

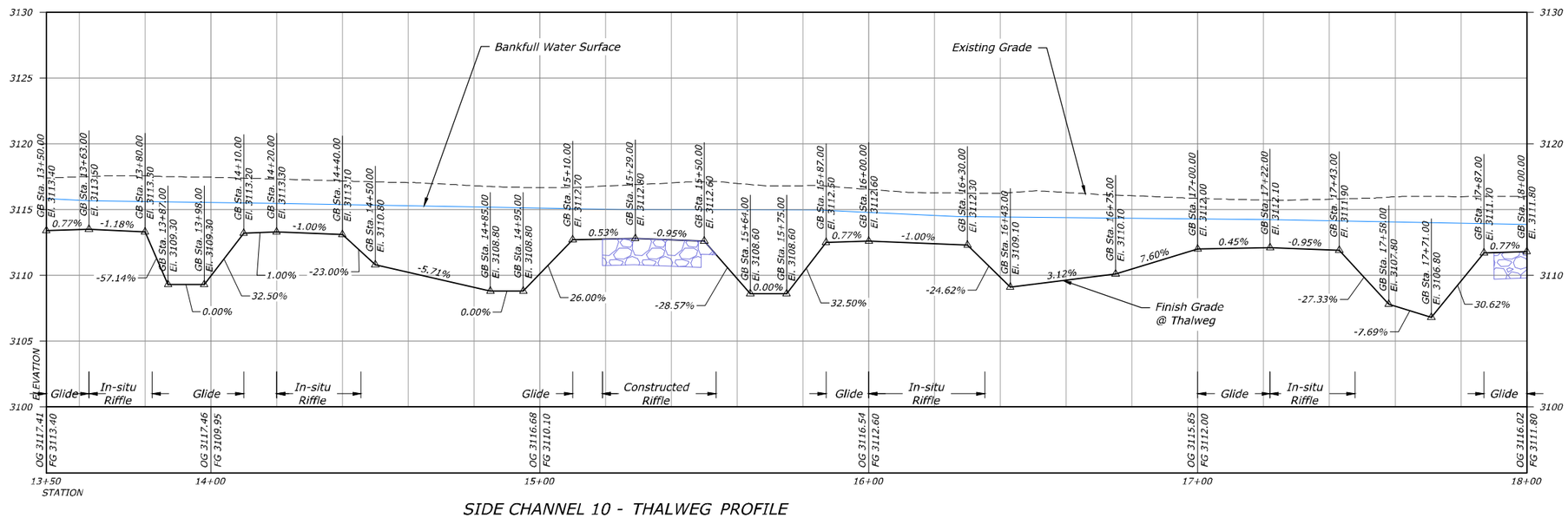
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_SSPCT_SIDECHANNEL_10_P&P_20SCALE.DWG



SIDE CHANNEL 10 - PLAN

STA 13+50 TO STA 18+00

SCALE OF FEET: 20 0 20 40 60



SIDE CHANNEL 10 - THALWEG PROFILE

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

STA 13+50 TO STA 18+00

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Bryant — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED — ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 10 PLAN AND PROFILE

STA 13+50 TO STA 18+00

1678-100-60761

SHEET 26 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 16:05
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_SIDECHANNEL_10_P&P_20SCALE.DWG



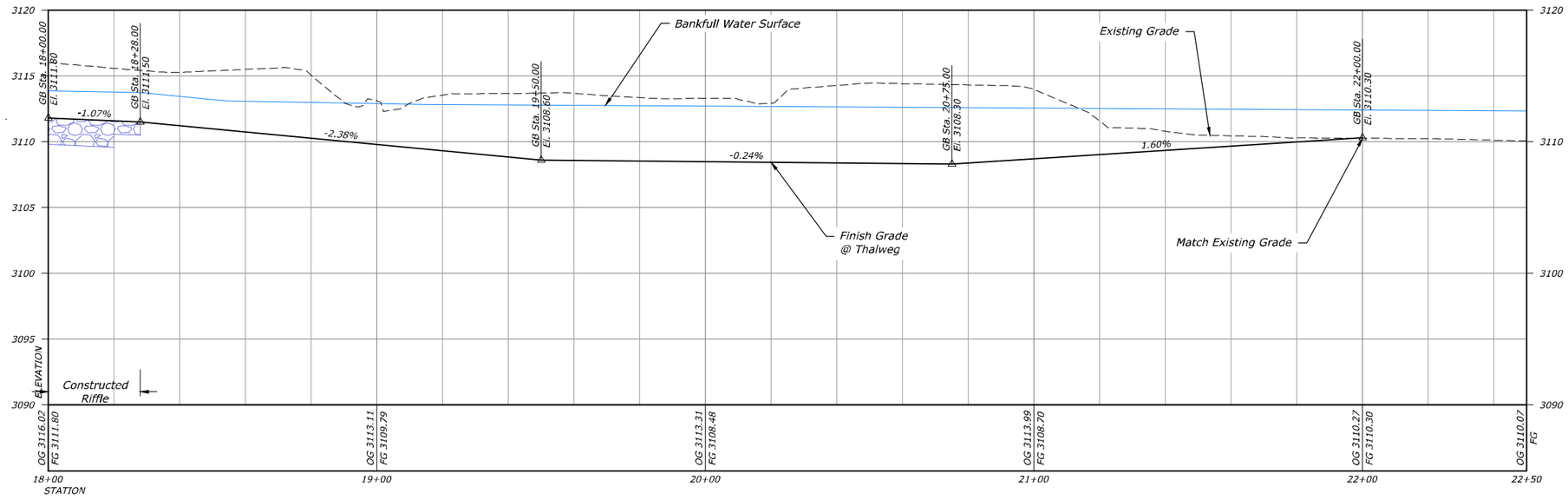
SIDE CHANNEL 10 - PLAN

STA 18+00 TO STA 22+50

SCALE OF FEET: 20 0 20 40 60

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810



SIDE CHANNEL 10 - THALWEG PROFILE

STA 18+00 TO STA 22+50

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Bryant — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED — ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 10 PLAN AND PROFILE

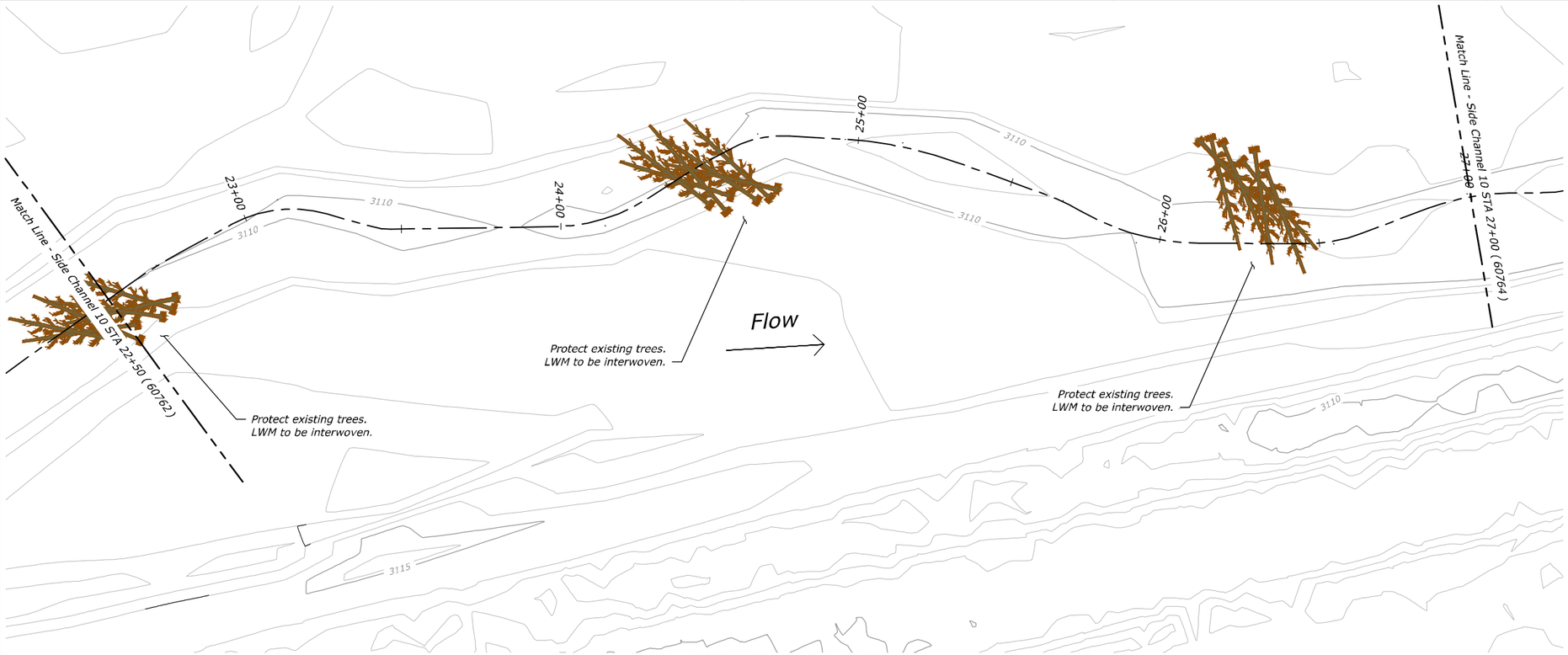
STA 18+00 TO STA 22+50

1678-100-60762

SHEET 27 of 30

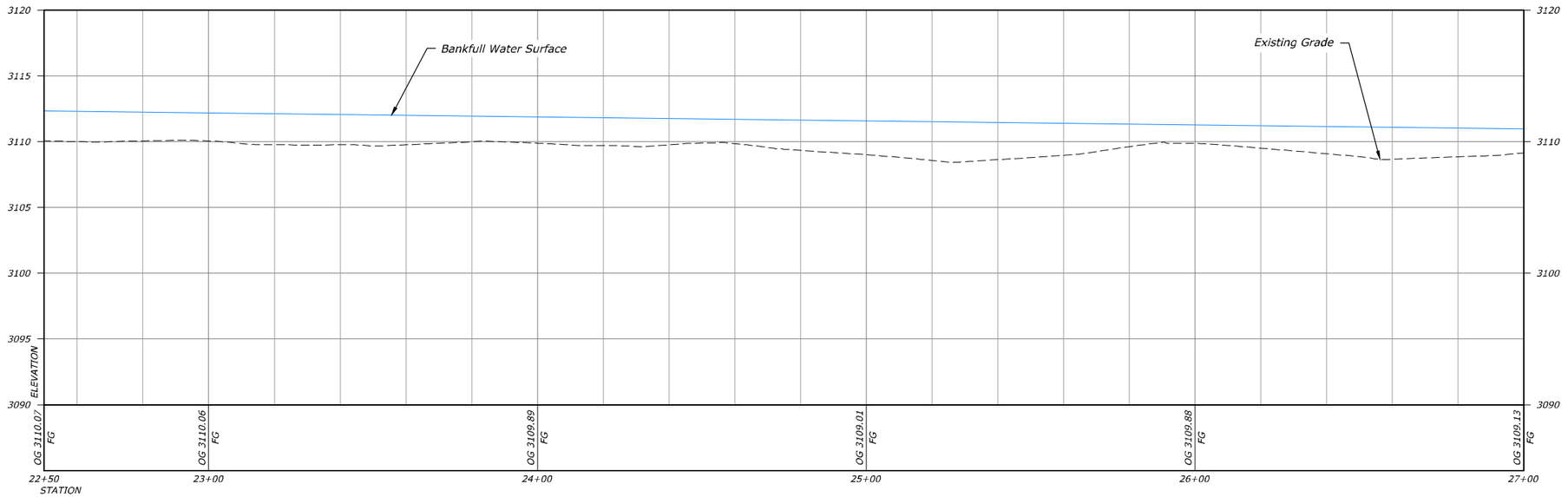
DATE AND TIME PLOTTED
MAY 11, 2018 16:06
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_SIDECHANNEL_10_P&P_20SCALE.DWG



SIDE CHANNEL 10 - PLAN
STA 22+50 TO 27+00

SCALE OF FEET: 20 0 20 40 60



SIDE CHANNEL 10 - THALWEG PROFILE
STA 22+50 TO 27+00

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET

VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

N

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Bryant	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED
ADMIN APPROVAL -	PROGRAM MANAGER
CSRO (BOISE, IDAHO)	2018-05-14

SIDE CHANNEL 10 PLAN AND PROFILE

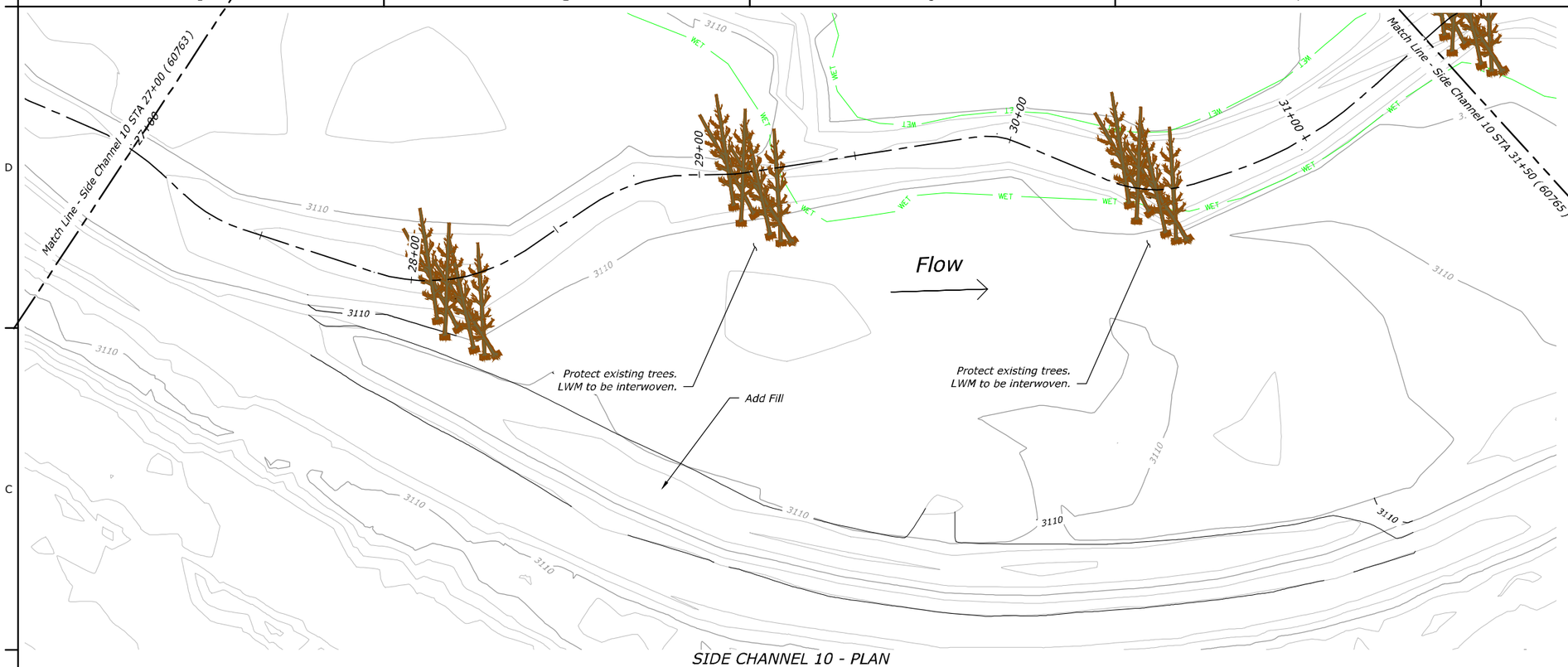
STA 22+50 TO 27+00

1678-100-60763

SHEET 28 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 16:08
PLOTTED BY
JNIELSEN

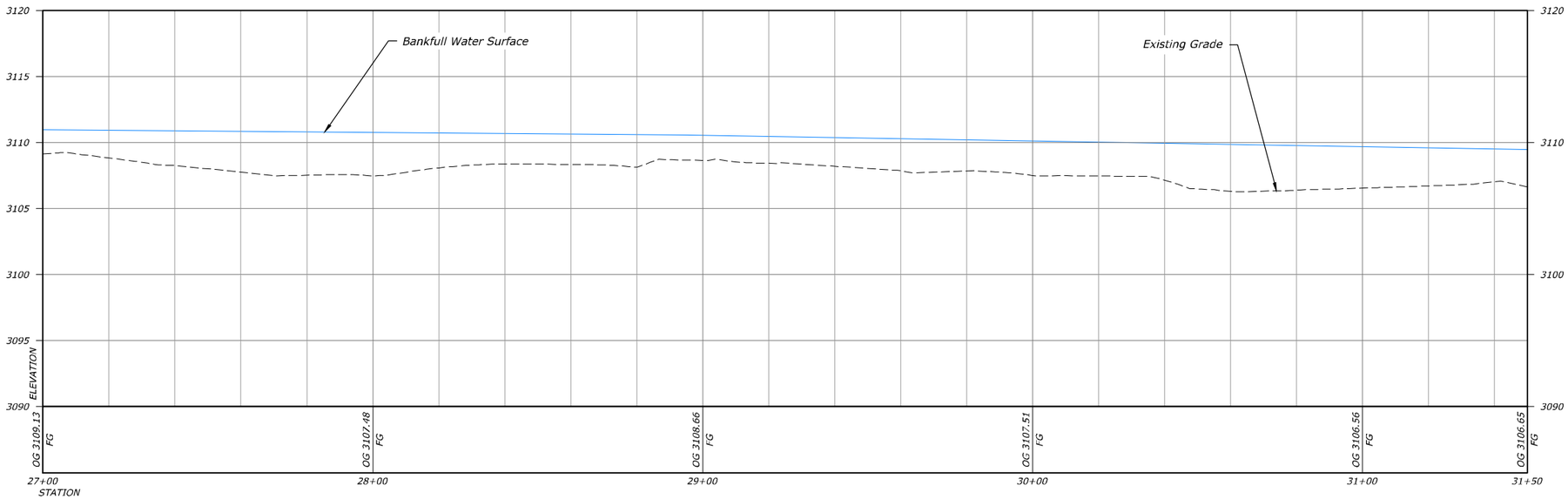
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_SIDECHANNEL_10_P&P_20SCALE.DWG



SIDE CHANNEL 10 - PLAN

STA 27+00 TO 31+50

SCALE OF FEET (20 0 20 40 60)



SIDE CHANNEL 10 - THALWEG PROFILE

STA 27+00 TO 31+50

HORIZONTAL SCALE (20 0 20 40 60) SCALE OF FEET

VERTICAL SCALE (5 0 5 10 15) SCALE OF FEET

LEGEND

- OG Major Contour (ELEV)
- OG Minor Contour
- FG Major Contour (ELEV)
- FG Minor Contour
- Thalweg
- Existing Wetlands (WET)
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
J. Bryant	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED (ADMIN APPROVAL - PROGRAM MANAGER)
CSRO (BOISE, IDAHO)	2018-05-14

SIDE CHANNEL 10 PLAN AND PROFILE

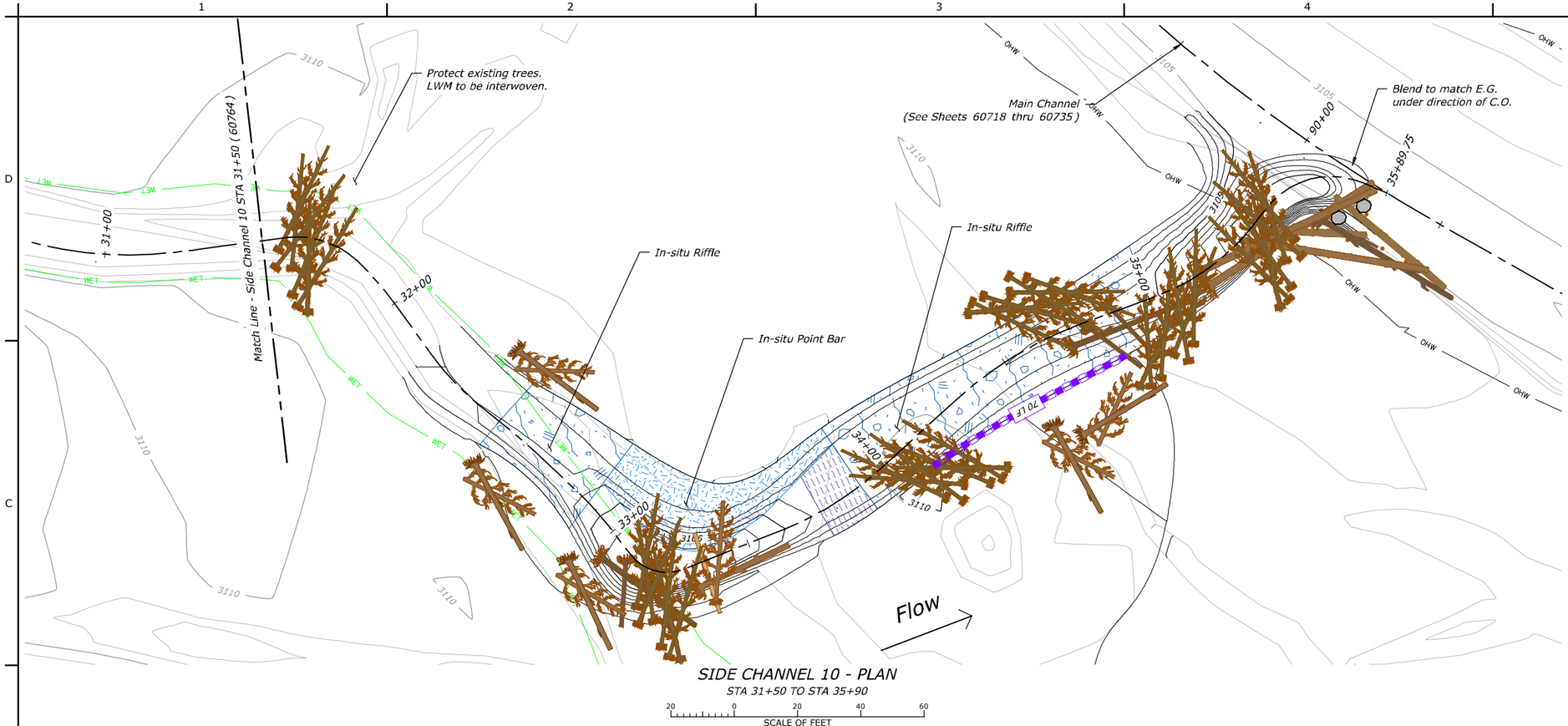
STA 27+00 TO 31+50

1678-100-60764

SHEET 29 of 30

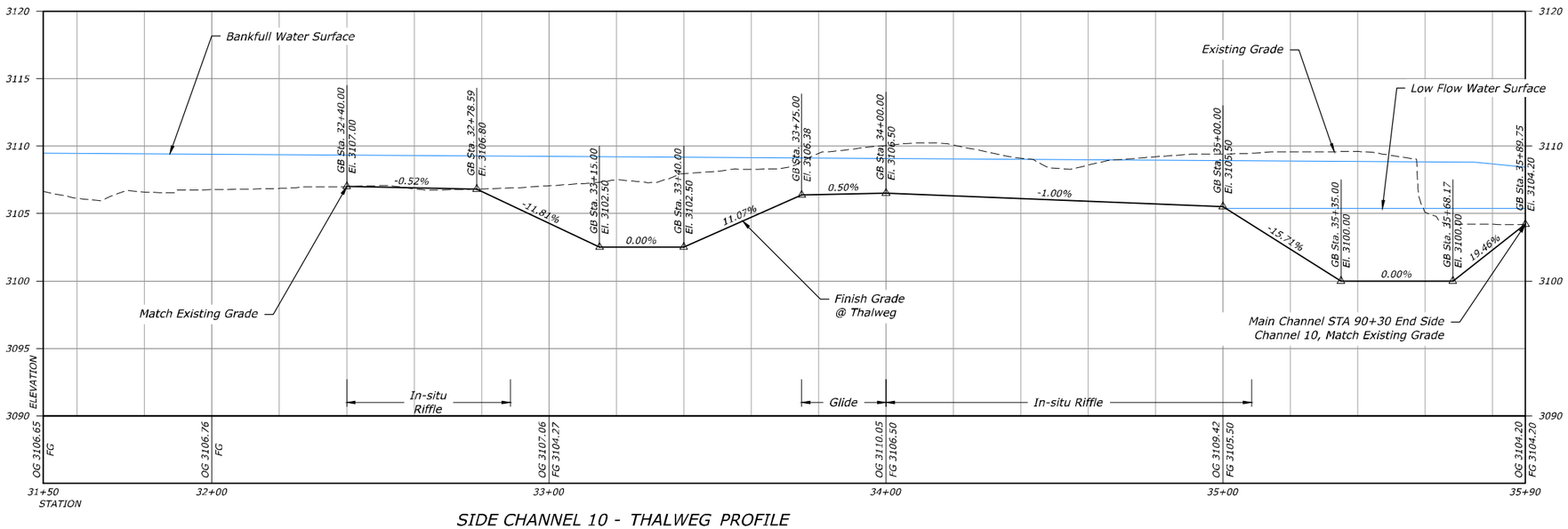
DATE AND TIME PLOTTED
MAY 11, 2018 16:09
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME:
RTS_SSPCT_SIDECHANNEL_10_P&P_20SCALE.DWG



SIDE CHANNEL 10 - PLAN
STA 31+50 TO STA 35+90

SCALE OF FEET: 20 0 20 40 60



SIDE CHANNEL 10 - THALWEG PROFILE
STA 31+50 TO STA 35+90

HORIZONTAL SCALE: 20 0 20 40 60 SCALE OF FEET
VERTICAL SCALE: 5 0 5 10 15 SCALE OF FEET

LEGEND

- OG Major Contour
- OG Minor Contour
- FG Major Contour
- FG Minor Contour
- Thalweg
- Existing Wetlands
- Ordinary High Water (OHW)
- Property Line
- Finish Grade Profile
- Existing Grade Profile
- Water Surface Profile
- In-situ Riffle - See Sheet 60783 thru 60784
- In-situ Point Bar - See Sheet 60785
- Constructed Riffle - See Sheet 60783 thru 60784
- Glide - See Sheet 60782
- Constructed Point Bar - See Sheet 60785
- Roughened Edge Bank Treatment - See Sheet 60812
- Brush Bank Treatment - See Sheet 60811
- LMW - See Sheet 60786 thru 60810

N

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
J. Bryant — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. SVSR.
T. Day — APPROVED (ADMIN APPROVAL - PROGRAM MANAGER)
CSRO (BOISE, IDAHO) 2018-05-14

SIDE CHANNEL 10 PLAN AND PROFILE

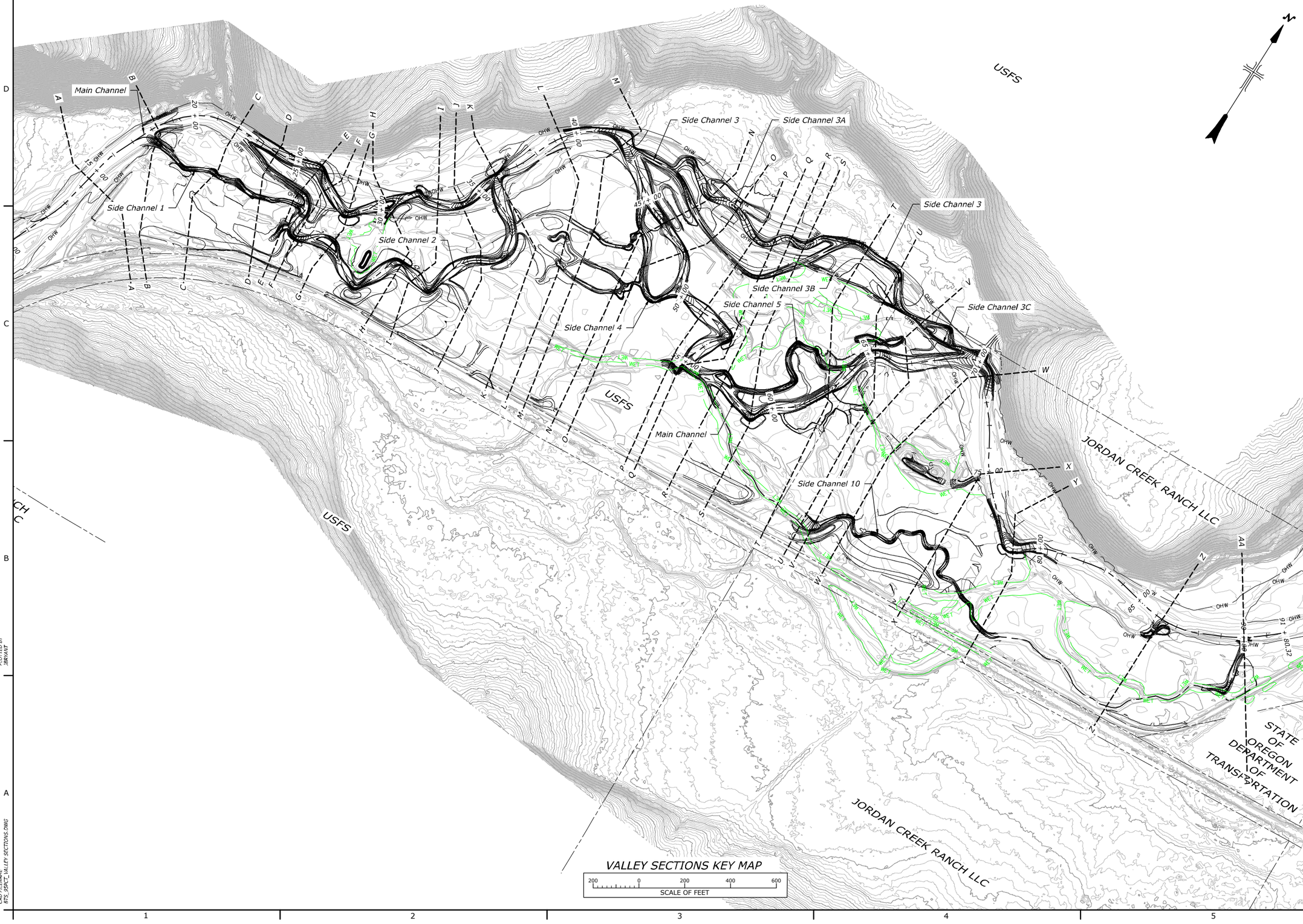
STA 31+50 TO STA 35+90

1678-100-60765

SHEET 30 of 30

DATE AND TIME PLOTTED
MAY 11, 2018 16:10
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_SSPA_T_SIDECHANNEL_10_P&P_20SCALE.DWG



RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
G. Beck
DRAWN
M. Knutson P.E.
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) *2018-05-14*

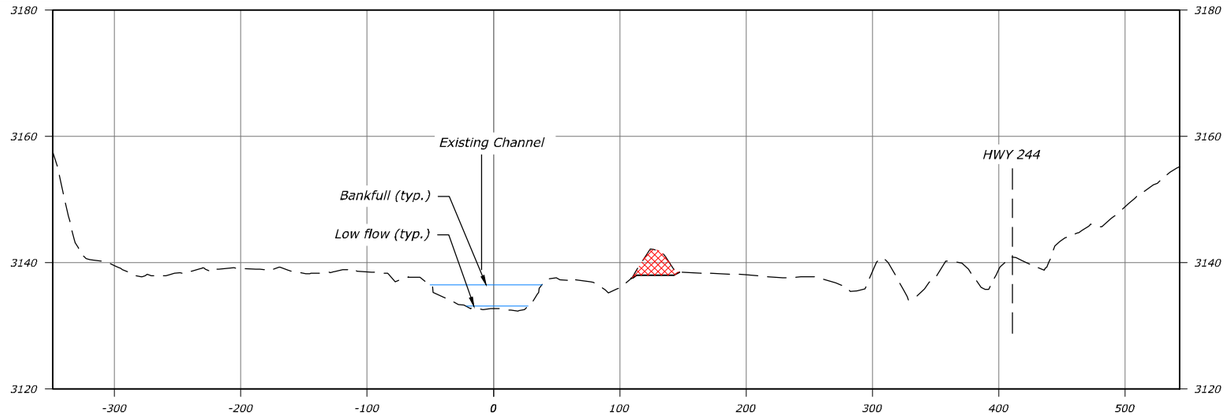
VALLEY SECTIONS

KEY MAP

1678-100-60766
SHEET 1 of 10

DATE AND TIME PLOTTED
MAY 11, 2018 15:55
PLOTTED BY
JBRYANT

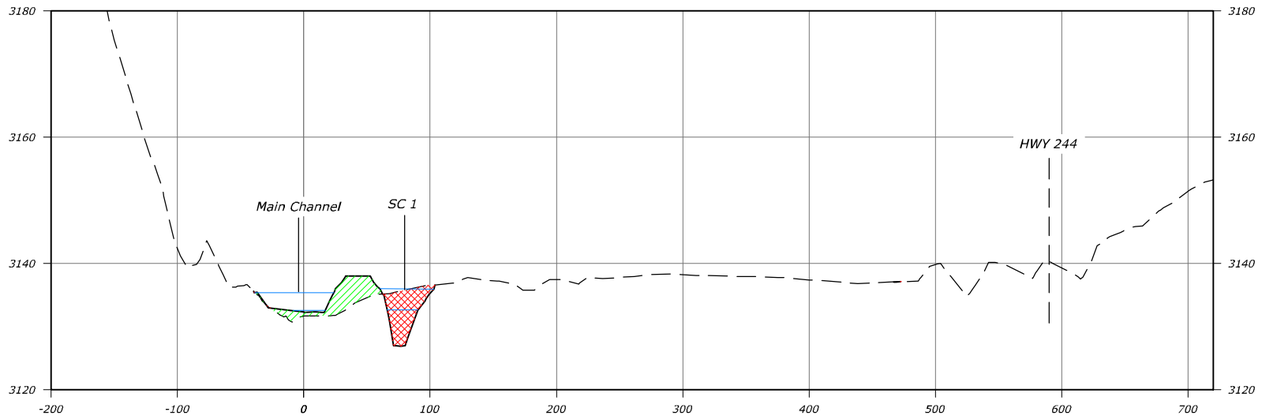
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_VALLEY SECTIONS.DWG



VALLEY SECTION A-A (STA 14+50)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

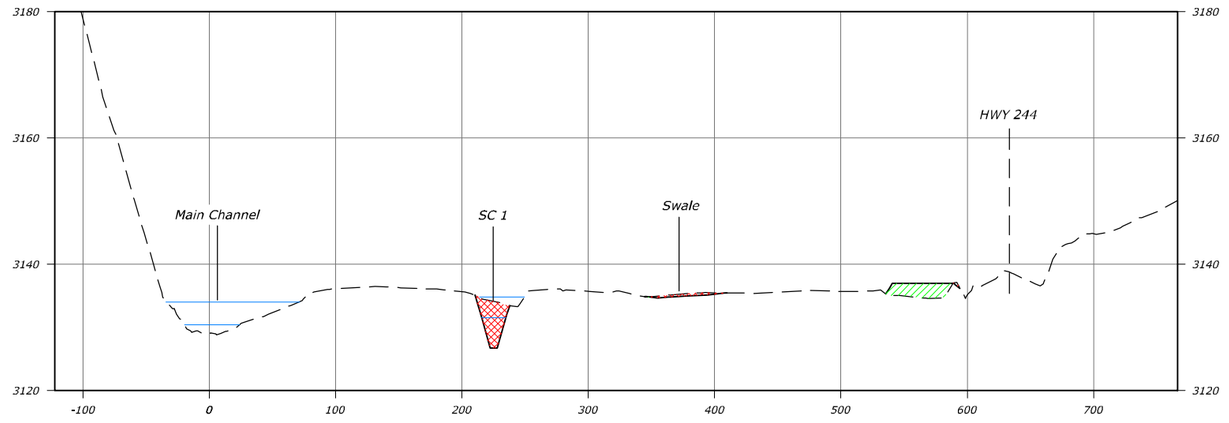
VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION B-B (STA 18+25)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION C-C (STA 22+00)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET

Notes:
1. All fill areas to be constructed of suitable material as detailed in Sheet 60779.
2. All fill areas to be compacted with equipment as directed by the C.O. and to the minimum specifications in Sheet 60779.
3. Cross sections shown on this sheet that do not catch are to be carried through horizontally until intersection with existing ground.

LEGEND
Cut
Fill

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
G. Beck — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

VALLEY SECTIONS

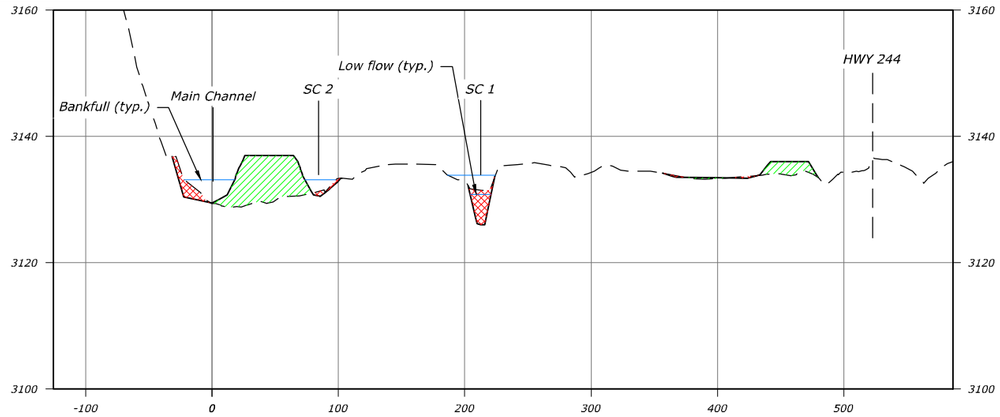
A-A thru C-C

1678-100-60767

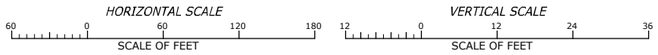
SHEET 2 of 10

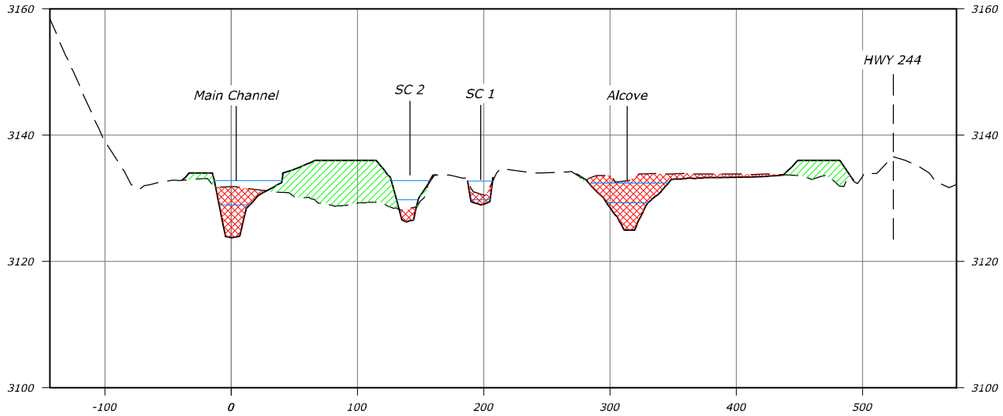
DATE AND TIME PLOTTED
MAY 10, 2018 15:07
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_SSPCT_VALLEY SECTIONS.DWG

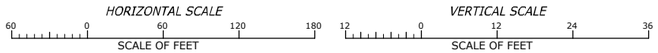


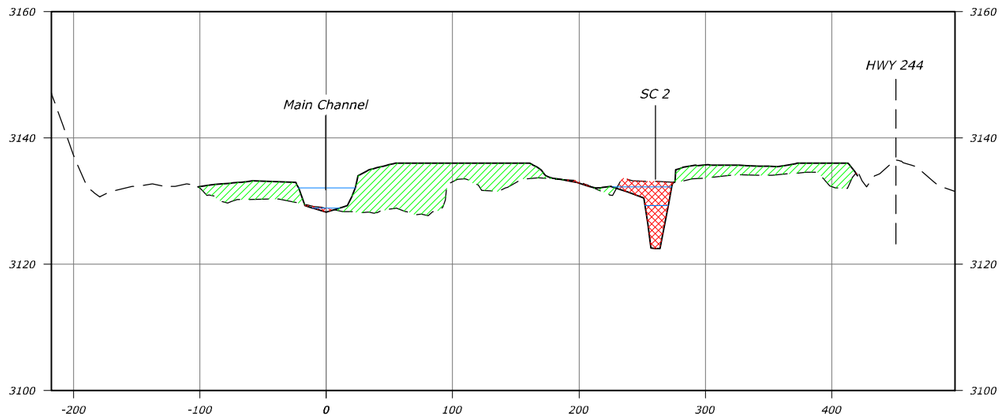
VALLEY SECTION D-D (STA 24+00)



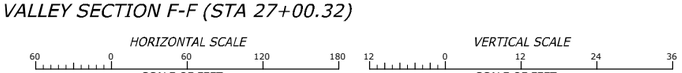


VALLEY SECTION E-E (STA 26+00)





VALLEY SECTION F-F (STA 27+00.32)



Notes:

1. *All fill areas to be constructed of suitable material as detailed in Sheet 60779.*
2. *All fill areas to be compacted with equipment as directed by the C.O. and to the minimum specifications in Sheet 60779.*
3. *Cross sections shown on this sheet that do not catch are to be carried through horizontally until intersection with existing ground.*

LEGEND

Cut

Fill

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.	DESIGNED
G. Beck	DRAWN
M. Knutson P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED
ADMIN APPROVAL - PROGRAM MANAGER	
CSRO (BOISE, IDAHO)	2018-05-14

VALLEY SECTIONS

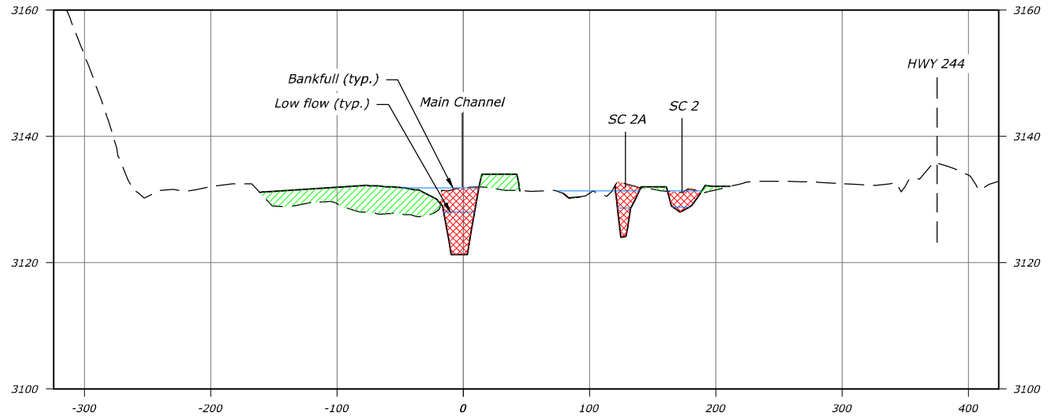
D-D thru F-F

1678-100-60768

SHEET 3 of 10

DATE AND TIME PLOTTED
MAY 10, 2018 15:07
PLOTTED BY
JNIELSEN

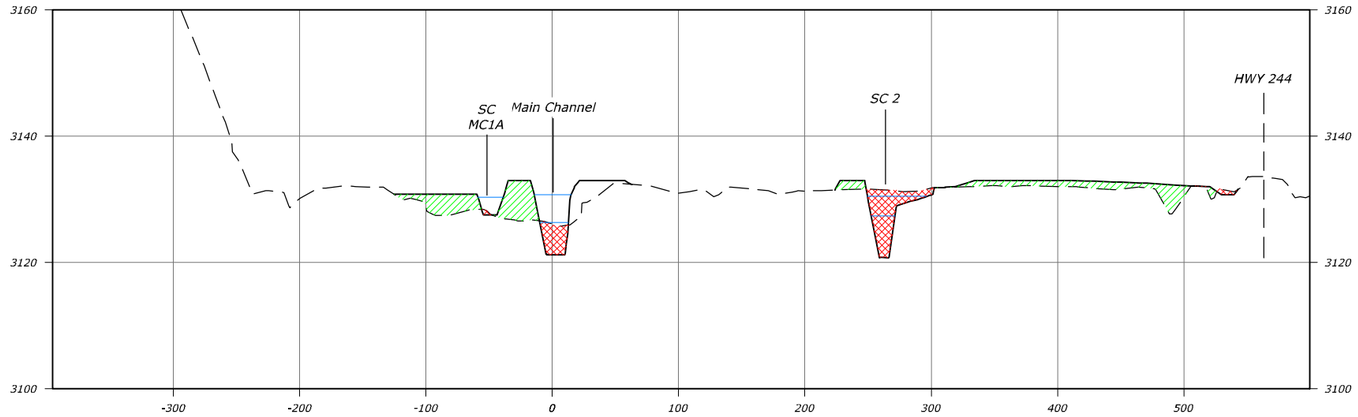
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_VALLEY SECTIONS.DWG



VALLEY SECTION G-G (STA 28+50)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

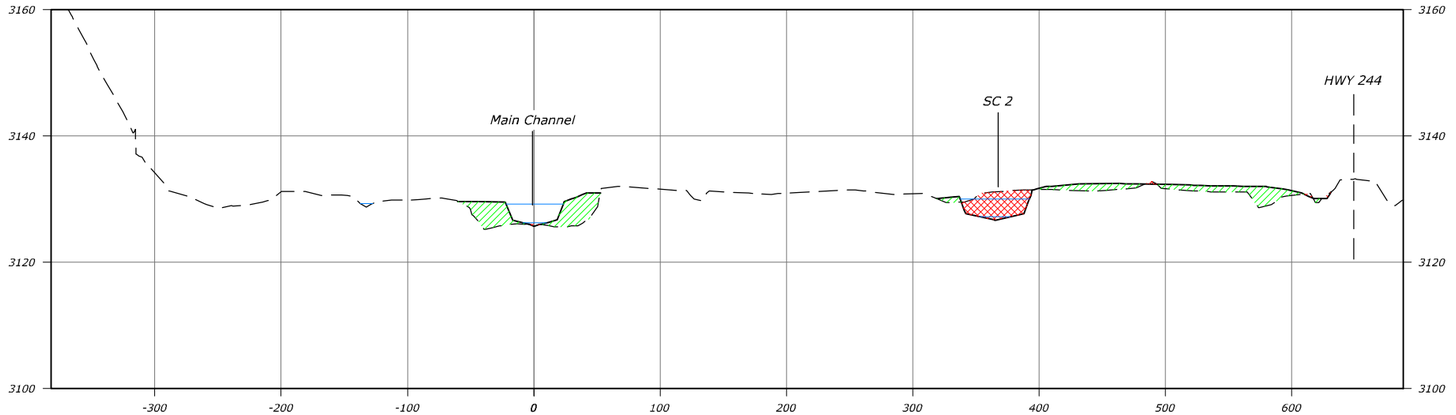
VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION H-H (STA 30+40)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION I-I (STA 32+90)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET

Notes:

1. *All fill areas to be constructed of suitable material as detailed in Sheet 60779.*
2. *All fill areas to be compacted with equipment as directed by the C.O. and to the minimum specifications in Sheet 60779.*
3. *Cross sections shown on this sheet that do not catch are to be carried through horizontally until intersection with existing ground.*

LEGEND

Cut

Fill

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
G. Beck — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED — ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

VALLEY SECTIONS

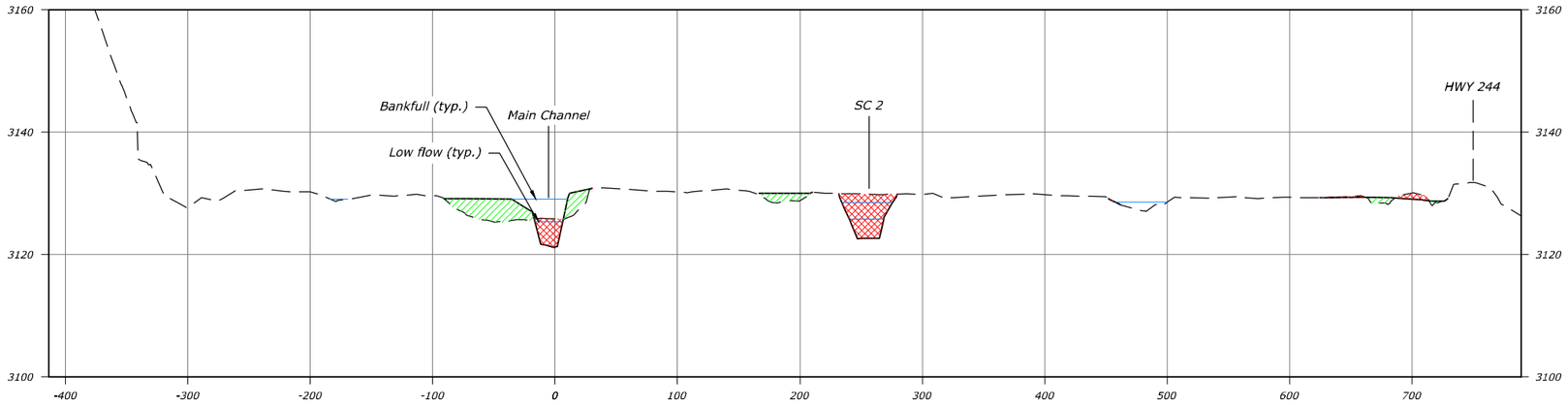
G-G thru I-I

1678-100-60769

SHEET 4 of 10

DATE AND TIME PLOTTED
MAY 10, 2018 15:07
PLOTTED BY
JNIELSEN

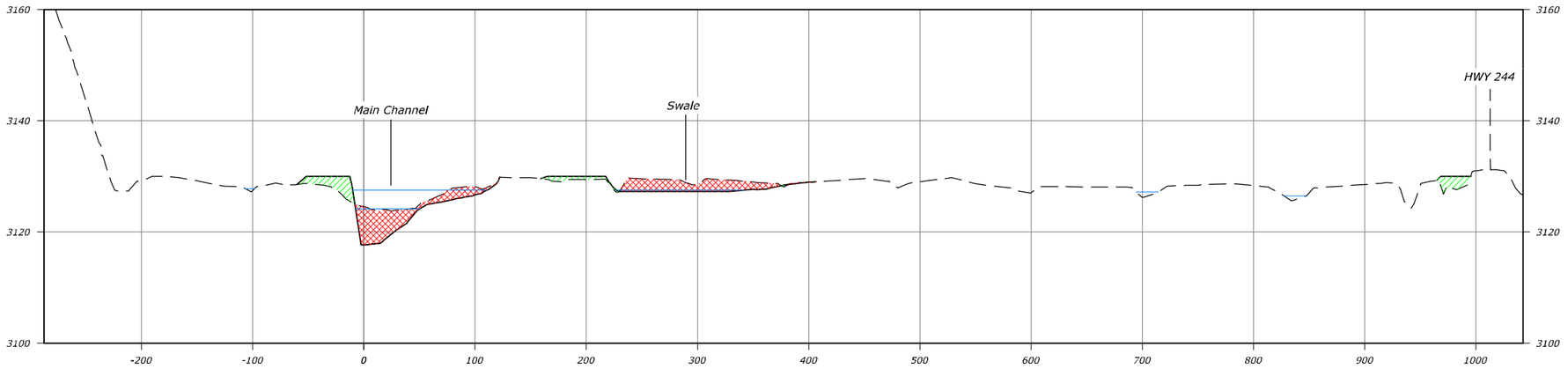
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PCT_VALLEY SECTIONS.DWG



VALLEY SECTION J-J (STA 34+00)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

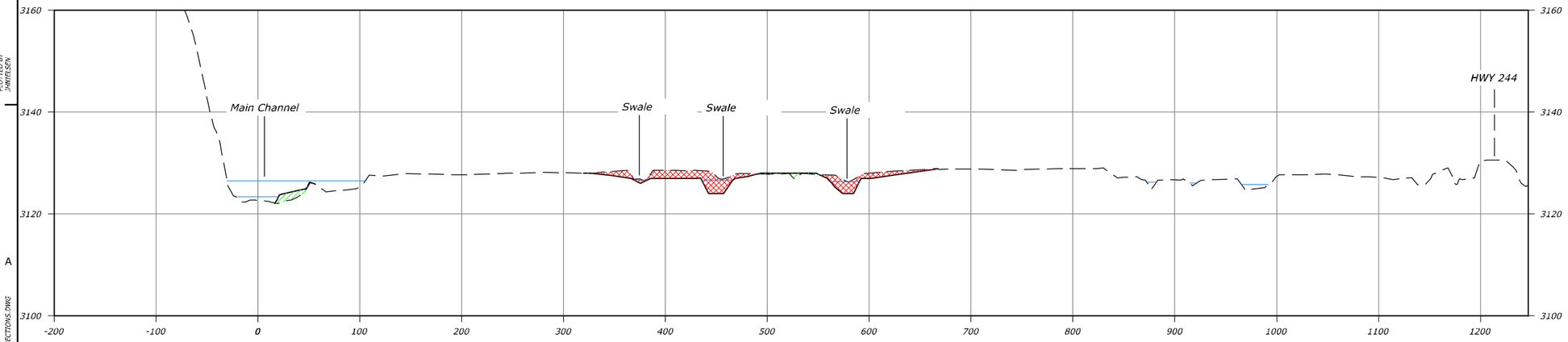
VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION K-K (STA 36+00)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION L-L (STA 39+30)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET

Notes:

1. *All fill areas to be constructed of suitable material as detailed in Sheet 60779.*
2. *All fill areas to be compacted with equipment as directed by the C.O. and to the minimum specifications in Sheet 60779.*
3. *Cross sections shown on this sheet that do not catch are to be carried through horizontally until intersection with existing ground.*

LEGEND

Cut

Fill

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
G. Beck
DRAWN
M. Knutson P.E.
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

VALLEY SECTIONS

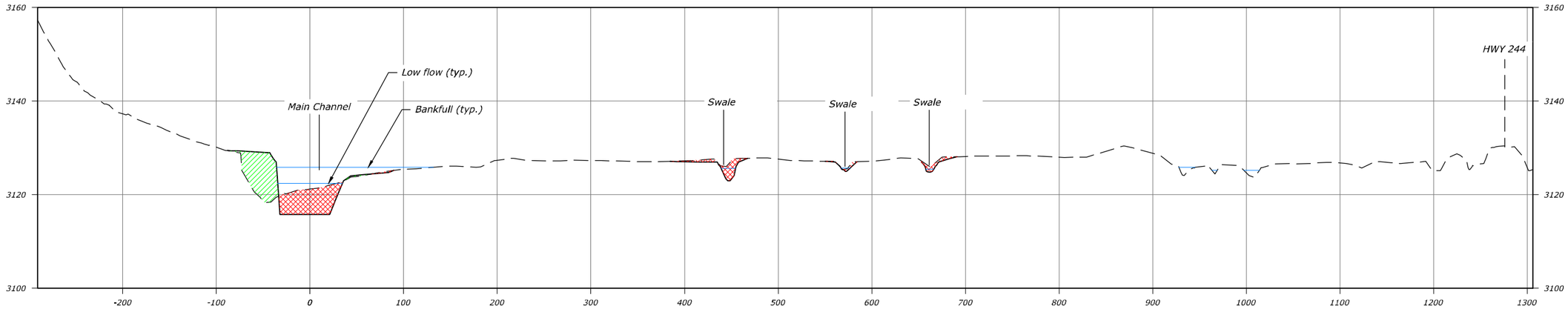
J-J thru L-L

1678-100-60770

SHEET 5 of 10

DATE AND TIME PLOTTED
MAY 10, 2018 15:07
PLOTTED BY
JNIELSEN

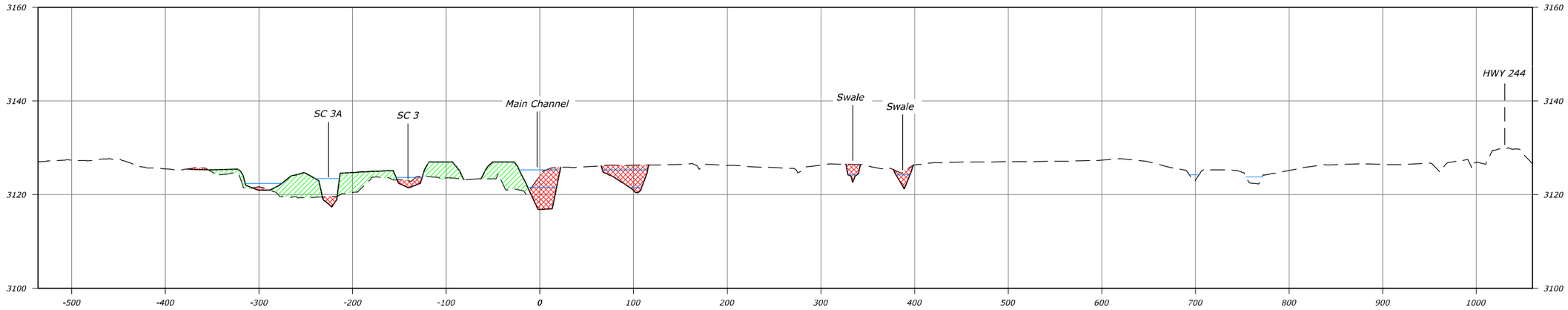
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_VALLEY SECTIONS.DWG



VALLEY SECTION M -M (STA 42+31)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

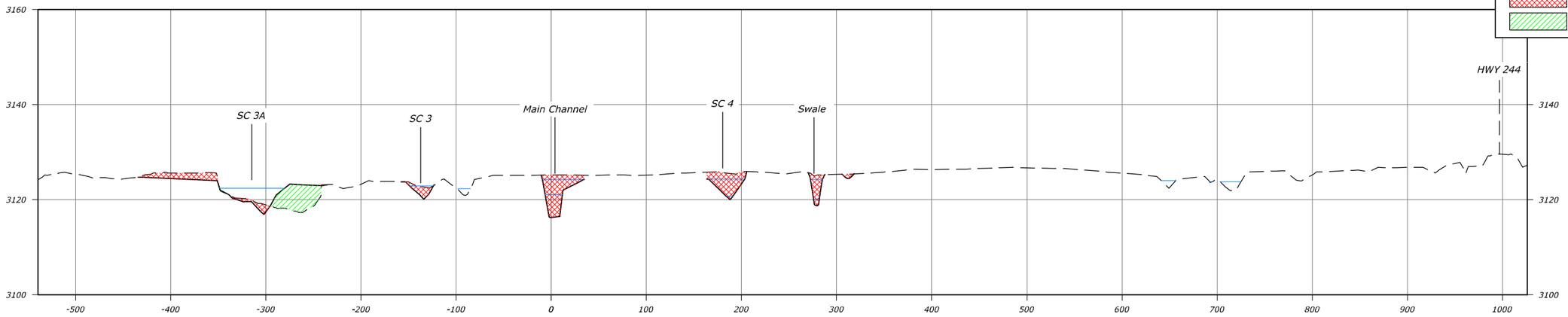
VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION N-N (STA 46+25.28)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION O-O (STA 47+80)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET

LEGEND
- Cut
- Fill

Notes:
1. All fill areas to be constructed of suitable material as detailed in Sheet 60779.
2. All fill areas to be compacted with equipment as directed by the C.O. and to the minimum specifications in Sheet 60779.
3. Cross sections shown on this sheet that do not catch are to be carried through horizontally until intersection with existing ground.

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
G. Beck — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. APPR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

VALLEY SECTIONS

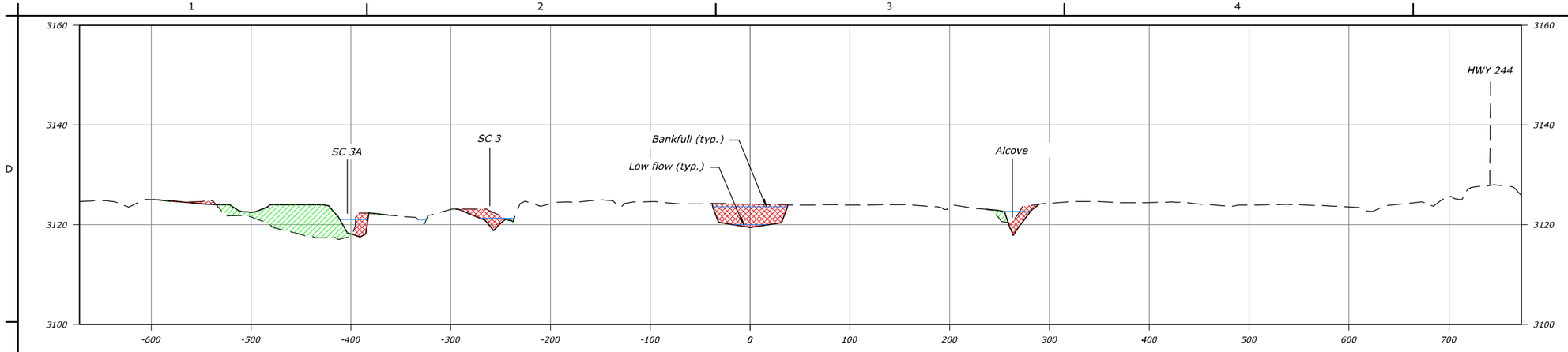
M-M thru O-O

1678-100-60771

SHEET 6 of 10

DATE AND TIME PLOTTED
MAY 10, 2018 15:07
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_VALLEY SECTIONS.DWG



VALLEY SECTION P-P (STA 51+16)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET

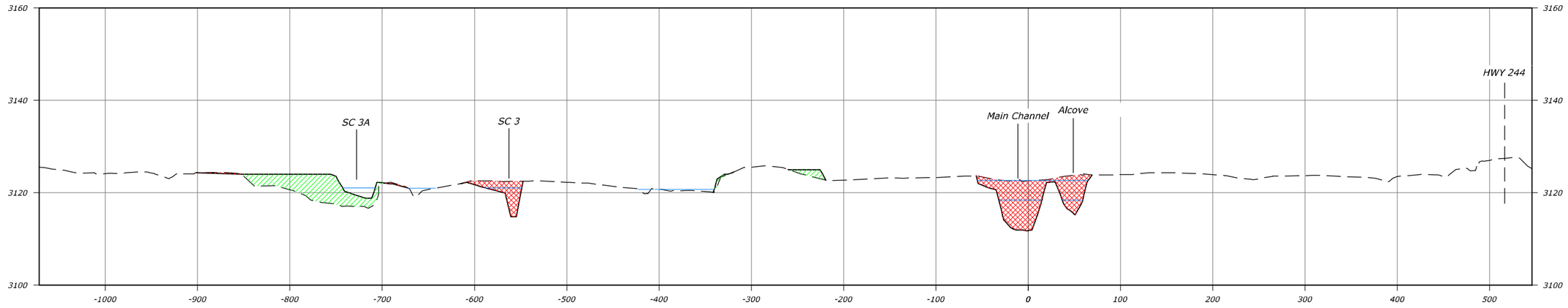
Notes:

1. *All fill areas to be constructed of suitable material as detailed in Sheet 60779.*
2. *All fill areas to be compacted with equipment as directed by the C.O. and to the minimum specifications in Sheet 60779.*
3. *Cross sections shown on this sheet that do not catch are to be carried through horizontally until intersection with existing ground.*

LEGEND

Cut

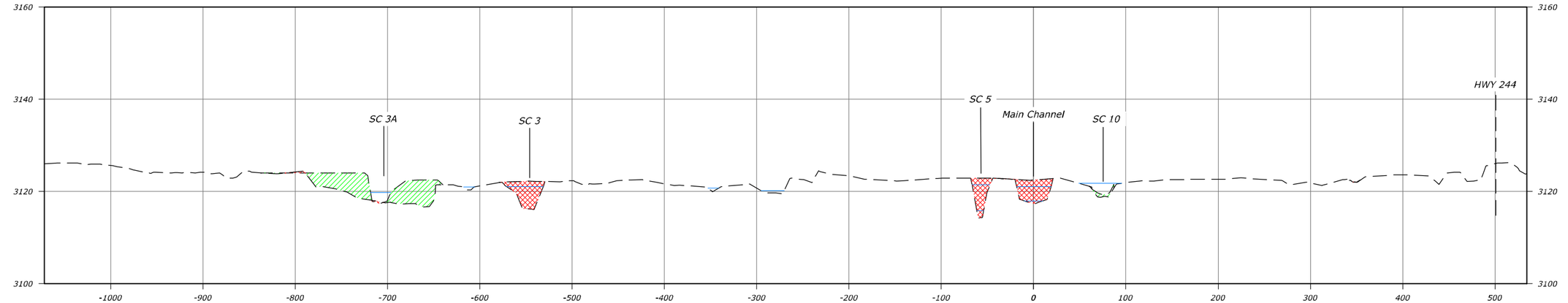
Fill



VALLEY SECTION Q-Q (STA 55+15)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION R-R (STA 57+00)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
G. Beck
DRAWN
M. Knutson P.E.
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

VALLEY SECTIONS

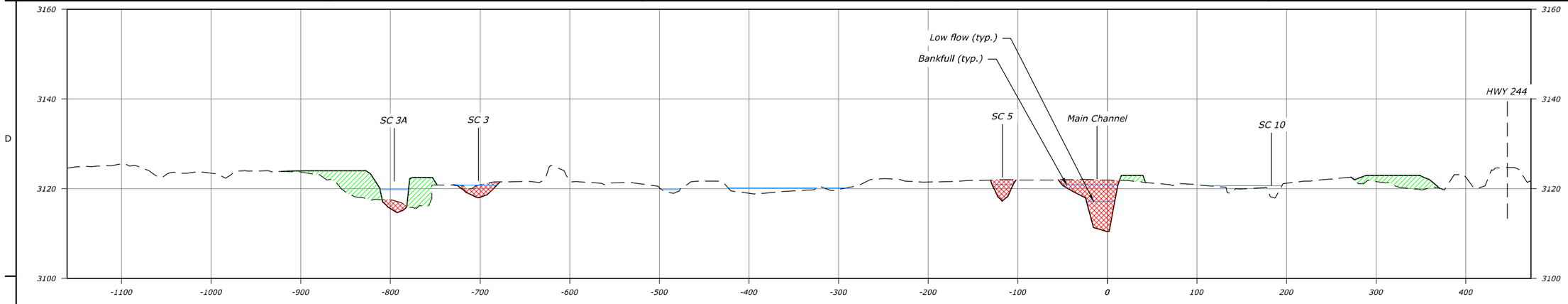
P-P thru R-R

1678-100-60772

SHEET 7 of 10

DATE AND TIME PLOTTED
MAY 10, 2018 15:07
PLOTTED BY
JNIELSEN

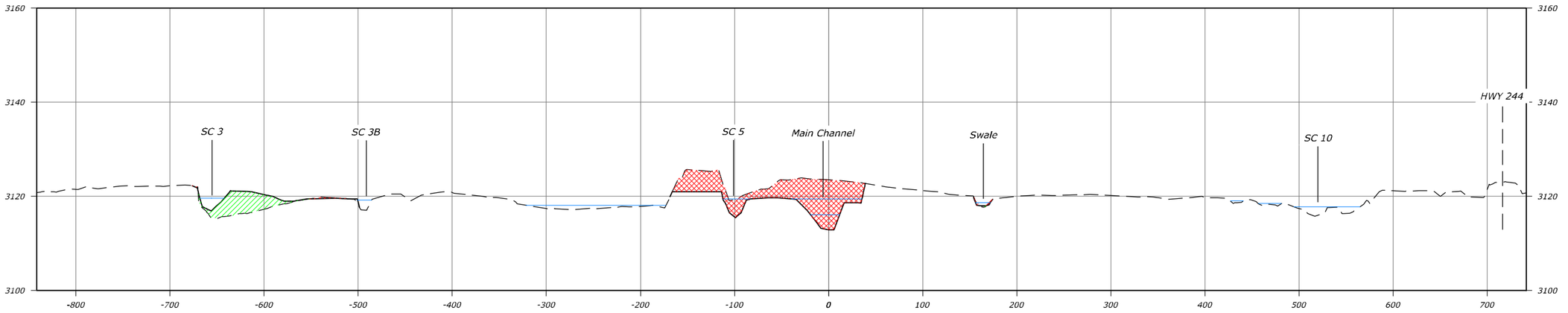
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME:
RTS_SSPCT_VALLEY SECTIONS.DWG



VALLEY SECTION S-S (STA 58+91.32)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

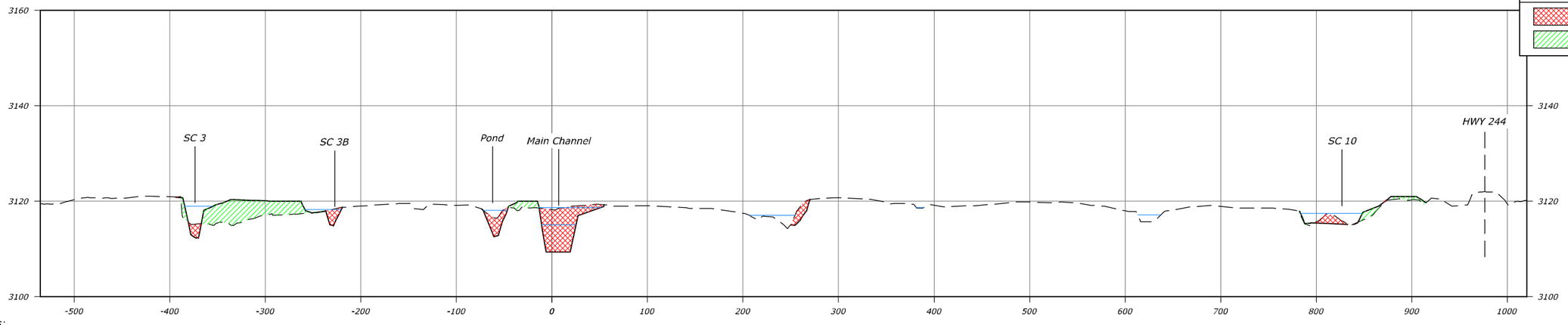
VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION T-T (STA 62+60)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION U-U (STA 65+30)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET

LEGEND

- Cut
- Fill

Notes:

1. *All fill areas to be constructed of suitable material as detailed in Sheet 60779.*
2. *All fill areas to be compacted with equipment as directed by the C.O. and to the minimum specifications in Sheet 60779.*
3. *Cross sections shown on this sheet that do not catch are to be carried through horizontally until intersection with existing ground.*

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. — DESIGNED
G. Beck — DRAWN
M. Knutson P.E. — CHECKED
M. Knutson P.E. — TECH. SVSR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

VALLEY SECTIONS

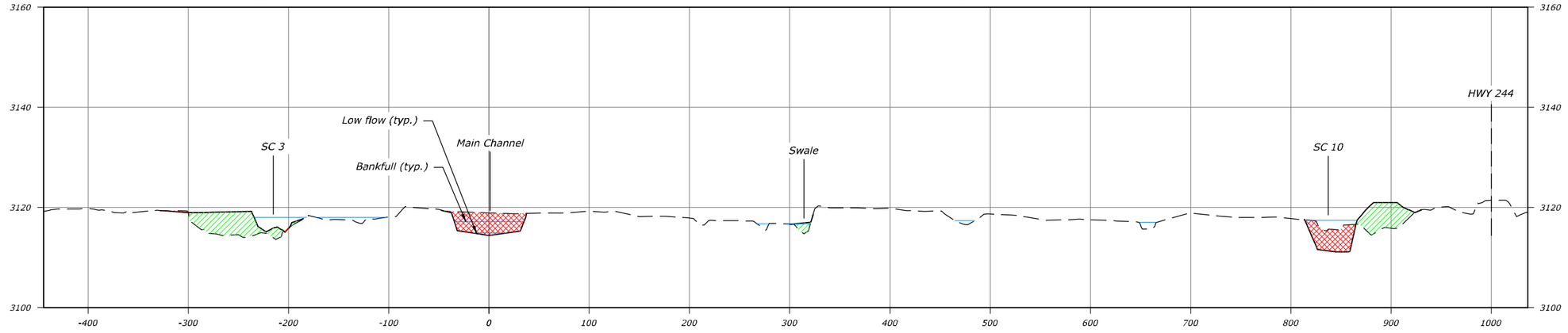
S-S thru U-U

1678-100-60773

SHEET 8 of 10

DATE AND TIME PLOTTED
MAY 10, 2018 15:07
PLOTTED BY
JNIELSEN

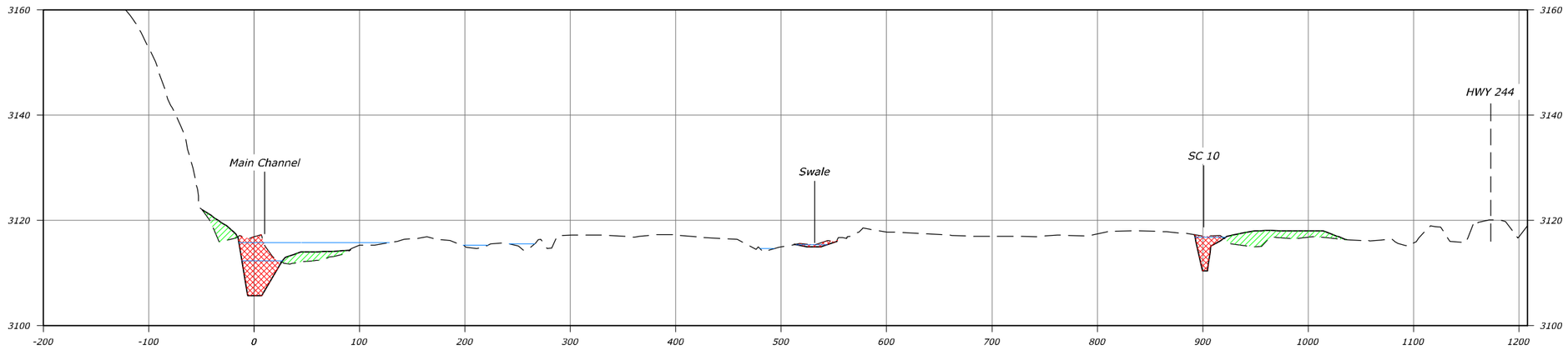
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_35PA_T_VALLEY SECTIONS.DWG



VALLEY SECTION V-V (STA 66+80)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

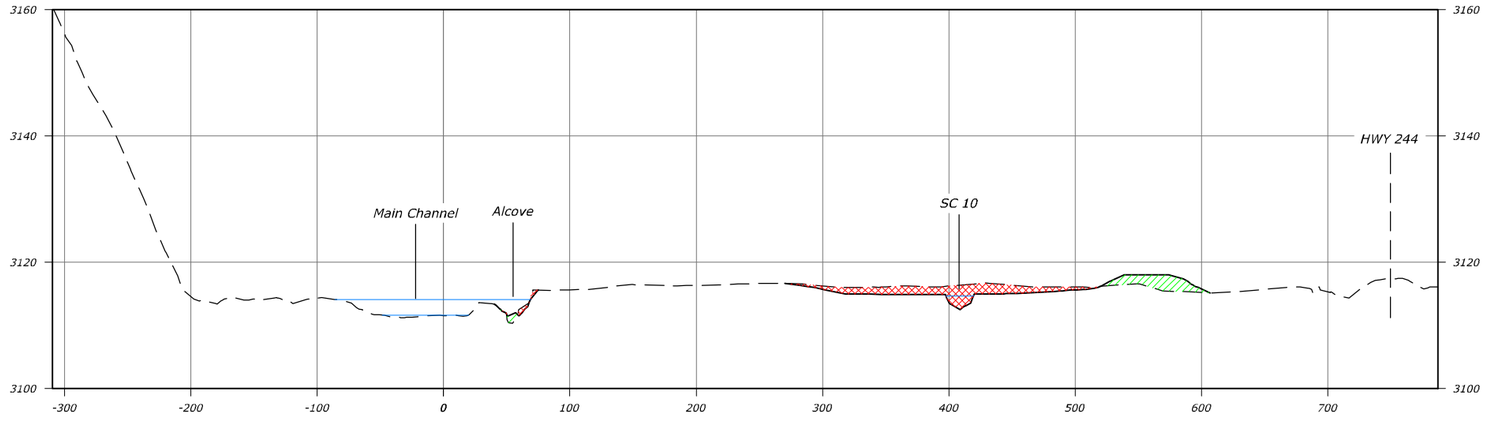
VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION W-W (STA 70+80)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION X-X (STA 75+09)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET

Notes:

1. *All fill areas to be constructed of suitable material as detailed in Sheet 60779 .*
2. *All fill areas to be compacted with equipment as directed by the C.O. and to the minimum specifications in Sheet 60779 .*
3. *Cross sections shown on this sheet that do not catch are to be carried through horizontally until intersection with existing ground.*

LEGEND

Cut

Fill

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
G. Beck
DRAWN
M. Knutson P.E.
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

VALLEY SECTIONS

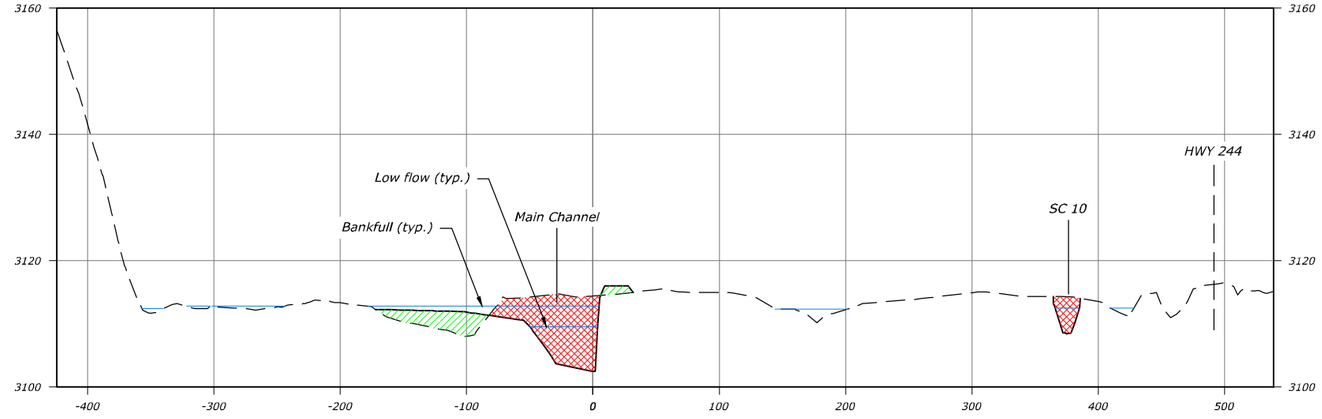
V-V thru X-X

1678-100-60774

SHEET 9 of 10

DATE AND TIME PLOTTED
MAY 10, 2018 15:07
PLOTTED BY
JNIELSEN

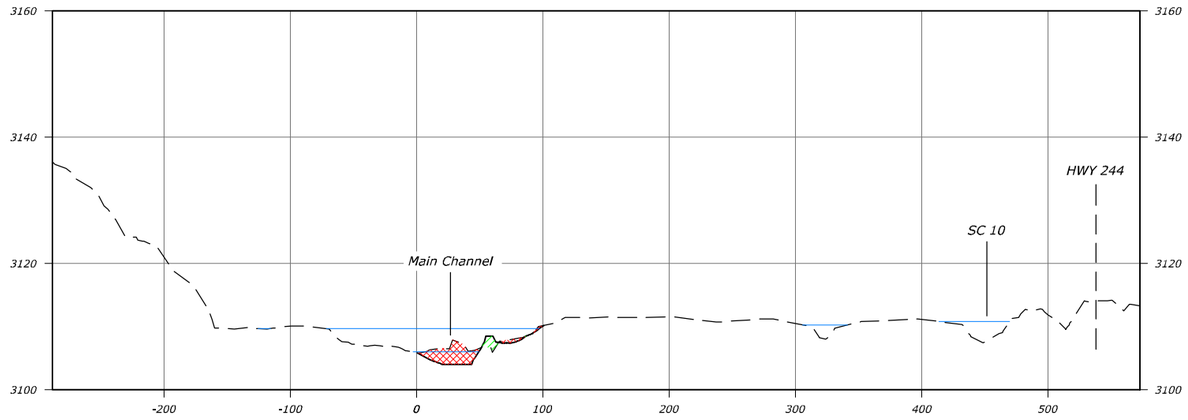
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_SPVCT_VALLEY SECTIONS.DWG



VALLEY SECTION Y-Y (STA 78+80)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

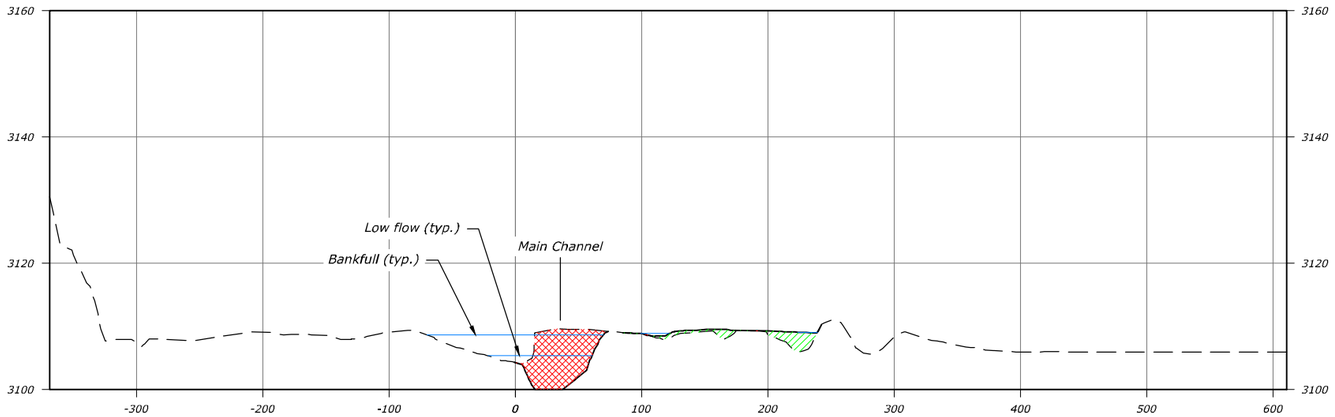
VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION Z-Z (STA 86+30)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET



VALLEY SECTION AA-AA (STA 90+00)

HORIZONTAL SCALE
60 0 60 120 180
SCALE OF FEET

VERTICAL SCALE
12 0 12 24 36
SCALE OF FEET

Notes:

1. *All fill areas to be constructed of suitable material as detailed in Sheet 60779.*
2. *All fill areas to be compacted with equipment as directed by the C.O. and to the minimum specifications in Sheet 60779.*
3. *Cross sections shown on this sheet that do not catch are to be carried through horizontally until intersection with existing ground.*

LEGEND

Cut

Fill

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
G. Beck
DRAWN
M. Knutson P.E.
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

VALLEY SECTIONS

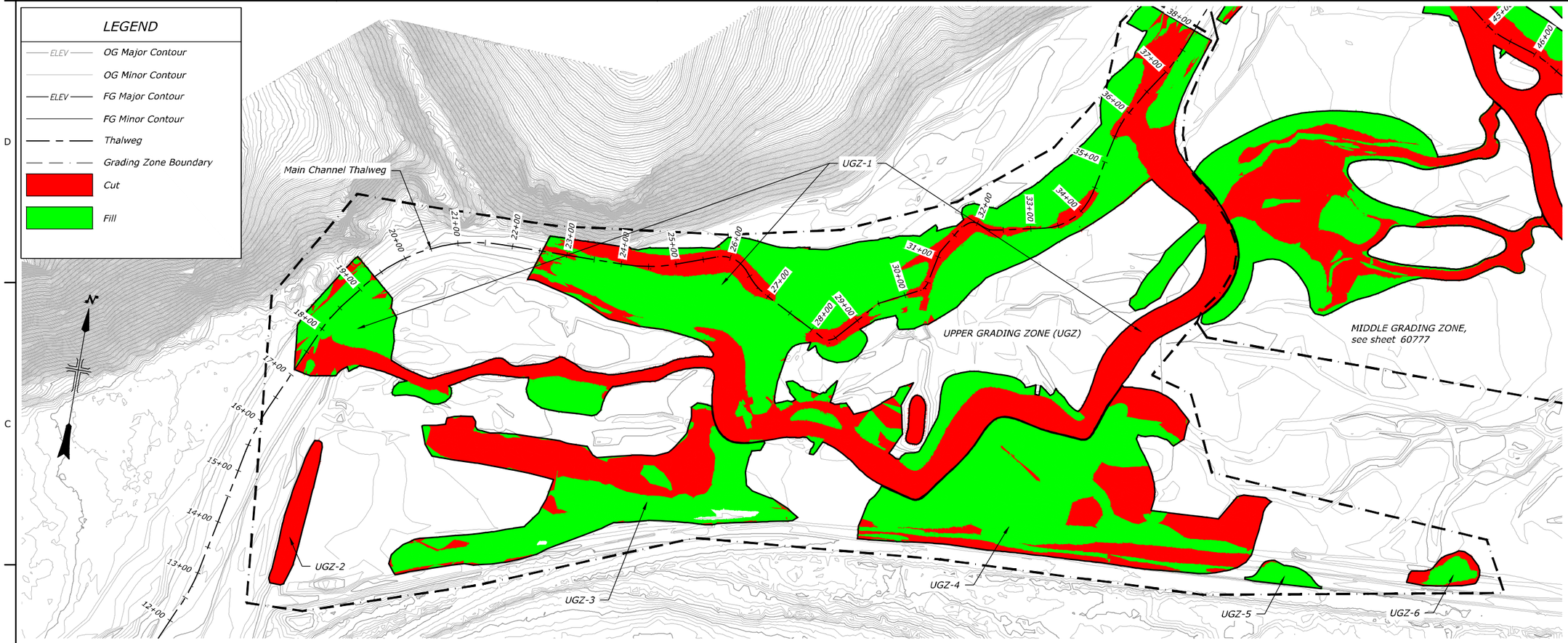
Y-Y thru AA-AA

1678-100-60775

SHEET 10 of 10

DATE AND TIME PLOTTED
MAY 11, 2018 15:54
PLOTTED BY
BRYANT

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_VALLEY SECTIONS.DWG



EARTHWORK CUT AND FILL VOLUMES 1

100 0 100 200 300
SCALE OF FEET

UPPER GRADING ZONE (UGZ)				
NAME	AREA (Acres)	CUT (CY)	FILL (CY)	NET (CY)
UGZ-1	8.5	17439	18197	755<Fill>
UGZ-2	0.2	633	0	633<Cut>
UGZ-3	2.1	744	2423	1679<Fill>
UGZ-4	2.9	1041	3331	2290<Fill>
UGZ-5	0.1	0	174	174<Fill>
UGZ-6	0.1	3	228	225<Fill>
TOTAL	13.9	19860	24353	4493<Fill>

Table Notes:

1. Volumes are approximate and represent F.G. minus O.G. only.
2. Volumes do not include additional over excavation required for placement of riffle, point bar, and glide materials or installation of LWM structures.
3. The cut and fill volumes of each feature were calculated using a comparison of the proposed surface of each feature surface to the existing ground surface. Volumes of the overall composite surface of the entire project shown at the bottom of the table.
4. The Contractor shall place excess material in the areas shown on Sheet 60777 according to details in Sheet 60780 under the direction of the C.O. to blend the excess material in the footprint shown with the existing hill slope.

GENERAL FILL NOTE:
All fill within this project must meet material specifications and placement requirements detailed in Sheet 60779.

GENERAL EXCAVATION NOTES:

1. Excavation shall be completed to the lines and grades shown on the Drawings unless otherwise directed by the Engineer.
2. The quantity of material to be excavated or placed has been measured by surface subtraction in AutoCAD and is therefore assumed to be compacted in-place and not factored for any potential expansion.
3. Shape, trim, and finish cut slopes to conform with lines, grades, and cross-sections shown on the Drawings unless otherwise directed by the Engineer.
4. Stockpile excavated material and sort for use as fill or channel material until material is needed.
5. Dry excavated material may be stockpiled near each work site. Wet excavated material shall be hauled to a stockpile area where turbid water draining from the material cannot enter the waterway.
6. As boulders larger than 14 inches in diameter are discovered during excavation, remove and stock pile at locations to be used in riffle construction.

FINISH GRADING NOTES:

1. Finish grading shall be within ±0.50 feet Horizontal and ±0.10 feet Vertical of the locations and elevations shown on the Drawings and construction stakes.
2. Where 6 to 12 inches of topsoil is applied, the topsoil shall be compacted by a single pass with a tracked excavator or similar equipment to provide a uniform firm compaction, prior to measurement of finish grade, see Sheet 60778.
3. Finish grade shall be flush with adjacent surfaces unless otherwise indicated.
4. Finish Grade shall be inspected and approved by the Contracting Officer prior to seeding or other activity that would hinder adjustments to the finish grading.
5. Compaction of finished surface is not required where the finished surface is achieved through only excavation, except in main channel excavation areas through riffles, glides, and point bars where specific construction is required, see detail sheets 60781 thru 60785.

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E.
DESIGNED
J. Nielsen P.E.
DRAWN
J. Bryant
CHECKED
M. Knutson P.E.
TECH. APPR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

EARTHWORK CUT AND FILL

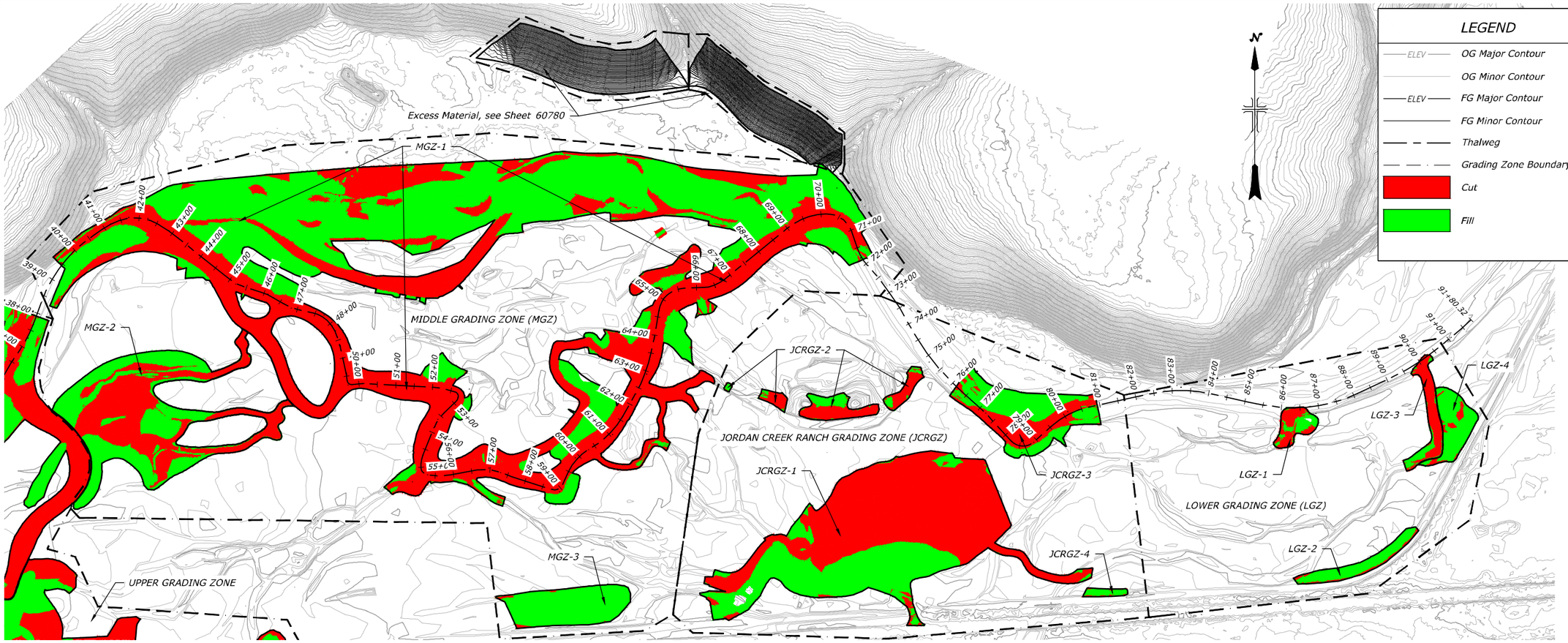
VOLUMES 1

1678-100-60776

SHEET 1 of 5

DATE AND TIME PLOTTED
MAY 10, 2018 15:43
PLOTTED BY
JWNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_3PRC_CUT_FILL_VOLUMES.DWG



EARTHWORK CUT AND FILL VOLUMES 2

150 0 150 300 450
SCALE OF FEET

MIDDLE GRADING ZONE (MGZ)				
NAME	AREA (Acres)	CUT (CY)	FILL (CY)	NET (CY)
MGZ-1	16.2	39201	34360	5041<Cut>
MGZ-2	2.6	4225	460	3765<Cut>
MGZ-3	0.7	4	1666	1662<Fill>
Total	19.5	43430	36486	7144<Cut>
JORDAN CREEK RANCH GRADING ZONE (JCRGZ)				
NAME	AREA (Acres)	CUT (CY)	FILL (CY)	NET (CY)
JCRGZ-1	4.8	7186	3330	3856<Cut>
JCRGZ-2	0.4	796	118	678<Cut>
JCRGZ-3	1.1	3030	1156	1874<Cut>
JCRGZ-4	0.1	1	47	46<Fill>
Total	6.4	11013	4651	6362<Cut>
LOWER GRADING ZONE (LGZ)				
NAME	AREA (Acres)	CUT (CY)	FILL (CY)	NET (CY)
LGZ-1	0.2	210	137	73<Cut>
LGZ-2	0.3	11	476	465<Fill>
LGZ-3	0.3	860	43	817<Cut>
LGZ-4	0.3	5	450	445<Fill>
Total	1.1	1086	1106	20<Fill>
DESIGN SURFACE OVERALL VOLUME *				
NAME	AREA (Acres)	CUT (CY)	FILL (CY)	NET (CY)
Design Composite	40.9	75389	66396	8993<Cut>

*DESIGN SURFACE OVERALL VOLUME (Design Composite) does not include the excess material.

GENERAL FILL NOTE:
All fill within this project must meet material specifications and placement requirements detailed in Sheet 60779 .

GENERAL EXCAVATION NOTES:
1. *Excavation shall be completed to the lines and grades shown on the Drawings unless otherwise directed by the Engineer.*
2. *The quantity of material to be excavated or placed has been measured by surface subtraction in AutoCAD and is therefore assumed to be compacted in-place and not factored for any potential expansion.*
3. *Shape, trim, and finish cut slopes to conform with lines, grades, and cross-sections shown on the Drawings unless otherwise directed by the Engineer.*
4. *Stockpile excavated material and sort for use as fill or channel material until material is needed.*
5. *Dry excavated material may be stockpiled near each work site. Wet excavated material shall be hauled to a stockpile area where turbid water draining from the material cannot enter the waterway.*
6. *As boulders larger than 14 inches in diameter are discovered during excavation, remove and stock pile at locations to be used in riffle construction.*

FINISH GRADING NOTES:
1. *Finish grading shall be within ±0.50 feet Horizontal and ±0.10 feet Vertical of the locations and elevations shown on the Drawings and construction stakes.*
2. *Where 6 to 12 inches of topsoil is applied, the topsoil shall be compacted by a single pass with a tracked excavator or similar equipment to provide a uniform firm compaction, prior to measurement of finish grade, see Sheet 60778.*
3. *Finish grade shall be flush with adjacent surfaces unless otherwise indicated.*
4. *Finish Grade shall be inspected and approved by the Contracting Officer prior to seeding or other activity that would hinder adjustments to the finish grading.*
5. *Compaction of finished surface is not required where the finished surface is achieved through only excavation, except in main channel excavation areas through riffles, glides, and point bars where specific construction is required, see detail sheets 60781 thru 60785 .*

Table Notes:
1. *Volumes are approximate and represent F.G. minus O.G. only.*
2. *Volumes do not include additional over excavation required for placement of riffle, point bar, and glide materials or installation of LWM structures.*
3. *The cut and fill volumes of each feature were calculated using a comparison of the proposed surface of each feature surface to the existing ground surface. Volumes of the overall composite surface of the entire project shown at the bottom of the table.*
4. *The Contractor shall place excess material in the areas shown according to details in Sheet 60780 under the direction of the C.O. to blend the excess material in the footprint shown with the existing hill slope.*

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

J. Nielsen P.E. DESIGNED
J. Nielsen P.E. DRAWN
J. Bryant CHECKED
M. Knutson P.E. TECH. APPR.
T. Day APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

EARTHWORK CUT AND FILL

VOLUMES 2

1678-100-60777

SHEET 2 of 5

DATE AND TIME PLOTTED
MAY 10, 2018 15:43
PLOTTED BY
JNIELSEN

C4D SYSTEM
AutoCAD Rlse. 22.0s
C4D FILENAME
BTS_SPKT_CUT_FILL_VOLUMES.DWG

LEGEND

- Topsoil Salvage Zone
- Topsoil Placement Zone

Notes:
- Assumed Topsoil Placement depth of 6" for all zones.
- Assumed Topsoil Salvage depth of 9" for all zones.

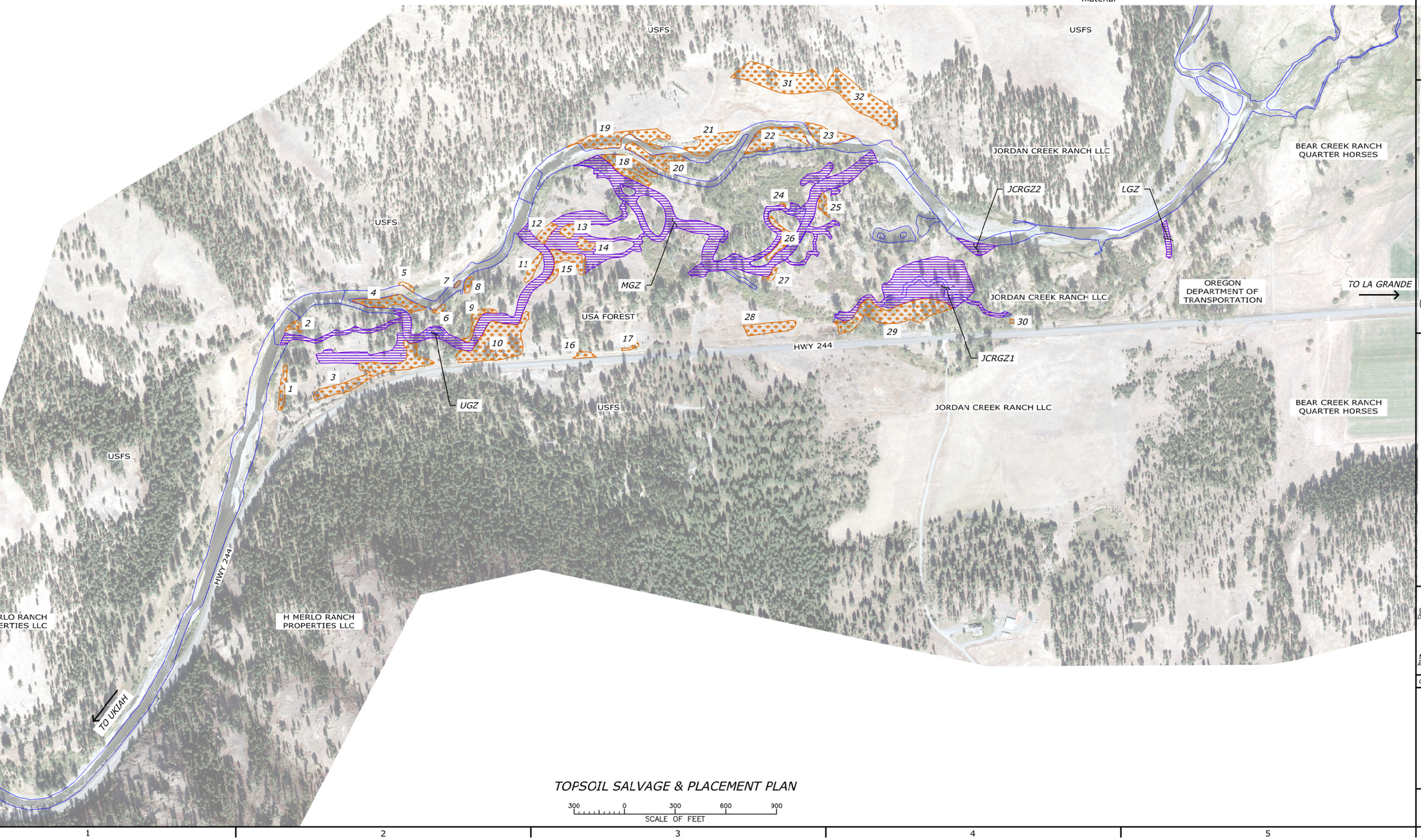
Topsoil Salvage Zone	Topsoil Slavage Volume (CY)	Topsoil Salvage Area (SF)
UGZ	3928	141407
MGZ	8836	318090
JCRGZ1	3707	133454
JCRGZ2	283	10195
LGZ	180	6462
TOTAL	16934	

Topsoil Placement Zone (TZ)	Topsoil Placement Volume (CY)	Topsoil Placement Area (SF)
TZ-1	151	8136
TZ-2	56	3043
TZ-3	867	46828
TZ-4	360	19441
TZ-5	40	2176
TZ-6	58	3134
TZ-7	13	722
TZ-8	56	3025
TZ-9	148	7999
TZ-10	1163	62795
TZ-11	119	6431

Topsoil Placement Zone (TZ)	Topsoil Placement Volume (CY)	Topsoil Placement Area (SF)
TZ-12	129	3959
TZ-13	104	5598
TZ-14	94	5060
TZ-15	309	16702
TZ-16	66	3588
TZ-17	33	1767
TZ-18	427	23032
TZ-19	622	33587
TZ-20	357	19282
TZ-21	418	22598
TZ-22	504	27209

Topsoil Placement Zone (TZ)	Topsoil Placement Volume (CY)	Topsoil Placement Area (SF)
TZ-23	329	17751
TZ-24	7	374
TZ-25	92	4974
TZ-26	207	11151
TZ-27	55	2949
TZ-28	325	17527
TZ-29	1113	60110
TZ-30	40	2134
TZ-31	1095*	59104
TZ-32	1000*	54024
TOTAL	10356	

* Volume dependent upon footprint of excess material



TOPSOIL SALVAGE & PLACEMENT PLAN

300 0 300 600 900
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
EXPIRES: 12/31/19
05/17/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2019-05-14

TOPSOIL SALVAGE & PLACEMENT PLAN

1678-100-60778

SHEET 3 of 5

DATE AND TIME PLOTTED
5/14/2019 10:23 AM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
AutoCAD Civil 3D 2018 (LMS Tech)
CAD FILENAME
BTS_TOPSOIL SALVAGE.DWG

FILL MATERIAL OVERVIEW

Fill material and placement requirements for this project, with the exception of channel materials, are detailed on this sheet. For this project, fill has been delineated into three types: compacted fill, general fill, and channel materials with specific material and compaction requirements for each type. This sheet provides material and placement details for general and compacted fill types, details for channel materials can be found on sheets 60781 thru 60785.

COMPACTED FILL MATERIAL

Critical locations within the project require compacted fill as detailed on the Grading plans (see sheets 60711 thru 60717). Excavated materials that are uniform in size and type will require mixing to create a well-graded and compactable fill that meets the following requirements:

COMPACTED FILL PLACEMENT NOTES:

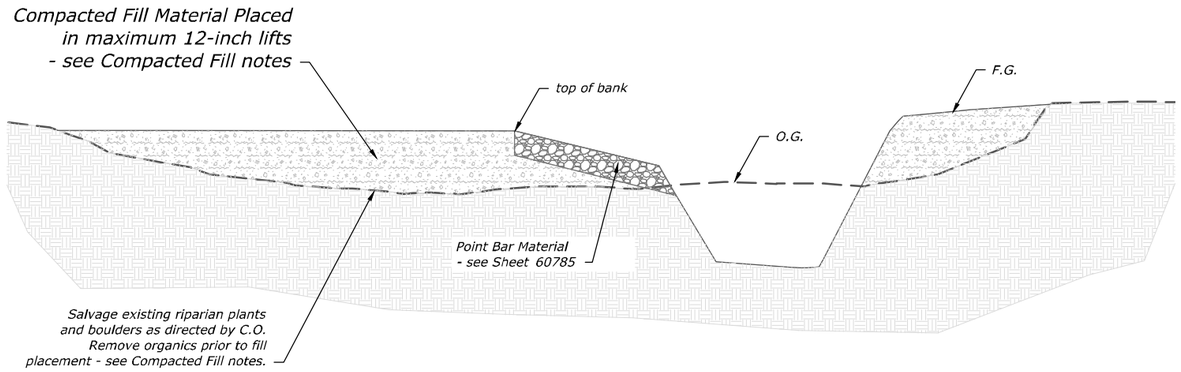
1. *Treat fill area prior to fill placement as follows:*
   - *Salvage existing vegetation at direction of C.O.*
   - *Salvage exposed boulders greater than 14-inches for re-use*
   - *Remove organics as necessary and at direction of C.O.*
   - *Salvage sod and soil as directed by C.O.*
2. *Prepare Compacted Fill Material:*
   - *Compacted Fill material shall be a well graded mix and be near optimum moisture content for compaction. Fill material shall be approved by the C.O. before placement at each compacted fill area. Working with the Engineer or C.O., develop well-graded compacted fill material per table herein or as directed.*
3. *Place compacted fill material in maximum of 12-inch lifts, and compact thoroughly. No testing of compacted density will be performed; acceptance will be by the C.O.or Engineer observing fill placement and compaction effort. The intent of compaction will be to achieve approximately 85% relative density.*
4. *Place additional lifts and repeat until finish grade is met.*
5. *Where indicated on plans, place topsoil to finished grade per topsoil specifications, elsewhere, scarify top 3-inches of fill at direction of C.O.*

COMPACTED FILL MATERIAL

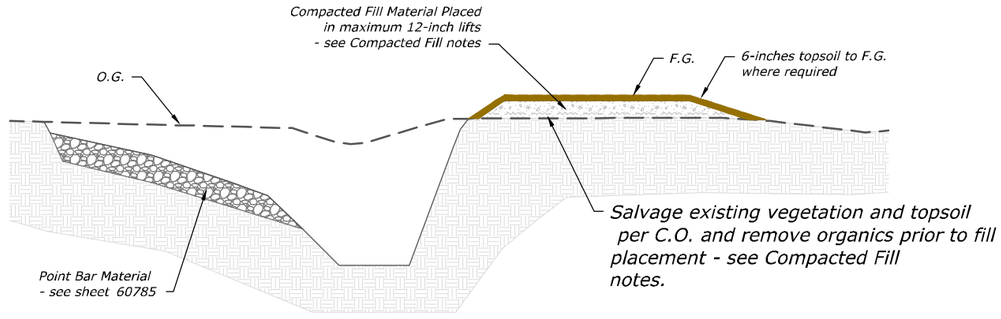
Material Class (approximate size range)	"Idealized" Percent Passing*	Range of Acceptable Compacted Fill as Class Percentage**
Boulders (10-inches to 12-inches)	100%	0% to 20%
Cobble (3-inches to 10-inches)	80%	0% to 60%
Gravel (0.08-inches to 3-inches)	50%	20% to 80%
Sands (0.0025 to 0.08 inches)	30%	10% to 30%
Fines (<No. 200 Sieve)	10%	5% to 40%
Moisture Content	10%	5% to 10%

**Note - Idealized Percent Passing is intended to show a well-graded alluvial mix that contains all size classes along with optimum fine material and water content for compaction and support of vegetative plants. This example is for illustration only.*

***Note -The C.O. will utilize this range for approval of acceptable materials for Compacted Fill. The C.O. and Engineer will work with the Contractor to develop a fill mixture that will meet requirements given materials readily found and accessible on site.*



EXISTING CHANNEL FILL TYPICAL SECTION VIEW
NOT TO SCALE



FLOODPLAIN FILL TYPICAL SECTION VIEW
NOT TO SCALE

GENERAL FILL MATERIAL

General Fill can be placed in all required floodplain or upland fill areas outside of constructed channel features that are not identified as requiring Compacted Fill. All General Fill shall be approved by the Engineer or C.O. for use as fill material prior to placement. General Fill has a broad range of acceptable material properties, but shall be well-graded, shall be compactable and not contain greater than 10% water content.

GENERAL FILL NOTES:

1. *Treat fill area prior to fill placement as follows:*
   - *Salvage existing vegetation at direction of C.O.*
   - *Salvage exposed boulders greater than 14-inches for re-use*
   - *Remove organics as necessary and at direction of C.O.*
   - *Salvage sod and soil as directed by C.O.*
2. *Place general fill material in maximum of 12-inch lifts, and compact with tracks of machine unless otherwise directed by C.O. to meet finish grade. No testing of compacted density will be performed; acceptance will be by the C.O. observing fill placement and compaction effort. Place additional lifts and repeat until finish grade is met.*
3. *Where indicated on plans, place topsoil to finished grade per topsoil specifications, elsewhere, scarify top 3-inches of fill at direction of C.O.*

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

M. Knutson P.E. — DESIGNED
M. Knutson P.E. — DRAWN
J. Nielsen P.E. — CHECKED
M. Knutson P.E. — TECH. SVVR.
T. Day — APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
CSRO (BOISE, IDAHO) 2018-05-14

FILL MATERIALS AND PLACEMENT

DETAILS

1678-100-60779
SHEET 4 of 5

DATE AND TIME PLOTTED
MAY 11, 2018 08:29
PLOTTED BY
JNIELSEN

C4D SYSTEM
AutoCAD Rel. 22.0s
C4D FILENAME
BTS_SPAC_FILL MATERIALS.DWG

EXCESS FILL OVERVIEW

Excavation from this project results in a net cut of material as detailed on sheets 60776 and 60777. The area described on this sheet details the identified location and methods for placement of this excess material. The Contractor shall work with the C.O. in determining finished appearance while meeting specifications for placement described herein.

EXCESS FILL LOCATION GENERAL NOTES:

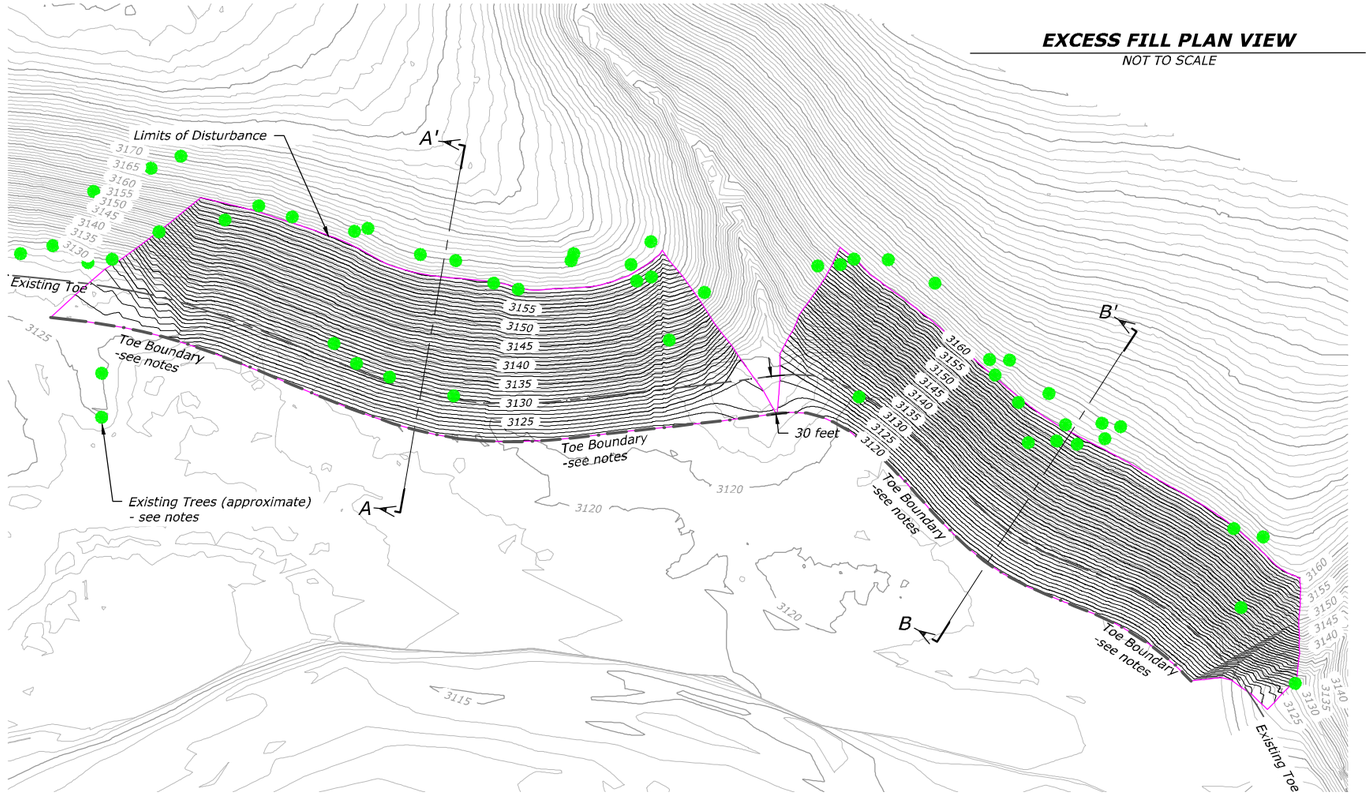
1. *Location for excess fill has been identified and shaped with contours as shown for placement of approximately 20,000 cubic yards of excess fill material, which is greater than anticipated excess fill requirements. For details of cut and fill volumes, refer to sheets 60776 and 60777.*
2. *The Contractor shall work with the C.O. to determine finish grade appearance within the defined limits of disturbance.*
3. *The Contractor shall attempt to preserve existing trees by placing fill around them as able and as directed by the C.O.*

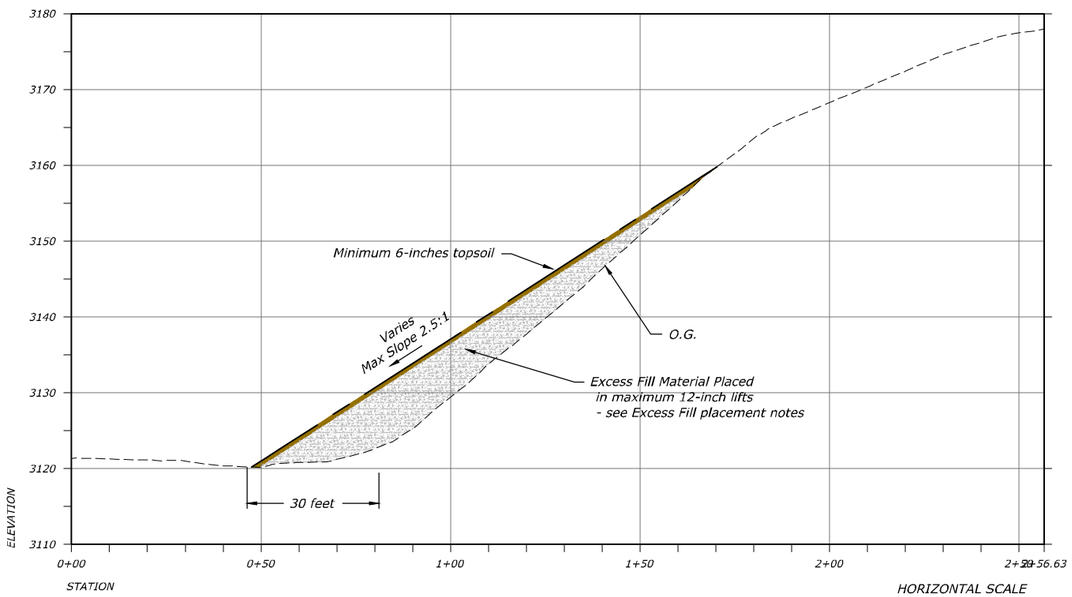
EXCESS FILL PLACEMENT NOTES:

1. *Working with the Engineer and C.O., locate toe boundary along area for placement of excess fill as shown.*
2. *Treat fill area prior to fill placement as follows:*
   - *Salvage existing vegetation at direction of C.O.*
   - *Salvage exposed boulders greater than 14-inches for re-use*
   - *Salvage sod and soil as directed by C.O.*
2. *Beginning at the Toe of slope, place excess fill material in maximum of 12-inch lifts, and compact thoroughly. No testing of compacted density will be performed; acceptance will be by the C.O.or Engineer observing fill placement and compaction effort. The intent of compaction will be to achieve approximately 85% relative density.*
3. *Place additional lifts and repeat until all excess fill requirements are met.*
4. *Shape fill slope to blend naturally with surrounding hillslope by feathering fill into natural slope at all edges and as directed by C.O.*
5. *Place a minimum of 6-inches topsoil to finished grade per topsoil specifications and as directed by C.O.*

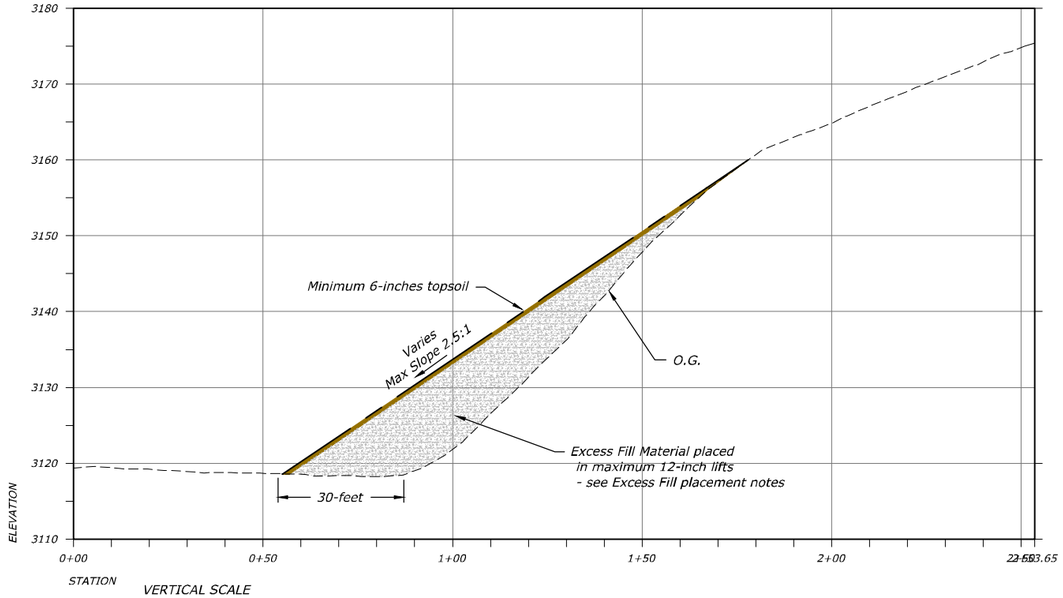
EXCESS FILL PLAN VIEW

NOT TO SCALE





EXCESS MATERIAL DISPOSAL A-A' PROFILE



EXCESS MATERIAL DISPOSAL B-B' PROFILE

HORIZONTAL SCALE
20 0 20 40 60
SCALE OF FEET

VERTICAL SCALE
10 0 10 20 30
SCALE OF FEET

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

M. Knutson P.E. DESIGNED
M. Knutson P.E. DRAWN
J. Nielsen P.E. CHECKED
M. Knutson P.E. TECH. APPR.
T. Day APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

CSRO (BOISE, IDAHO) 2018-05-14

EXCESS MATERIAL DISPOSAL

DETAILS

1678-100-60780

SHEET 5 of 5

DATE AND TIME PLOTTED
MAY 11, 2018 08:29
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
RTS_SSPCT_FILL MATERIALS.DWG

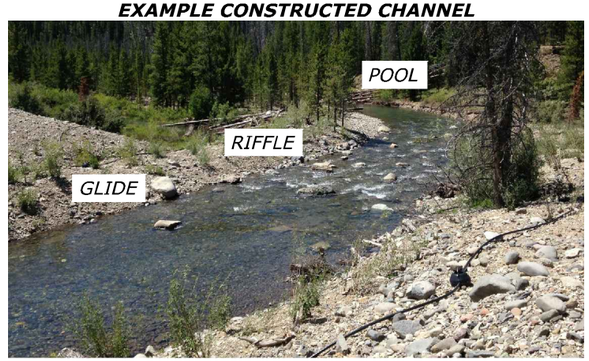
CHANNEL MATERIALS OVERVIEW

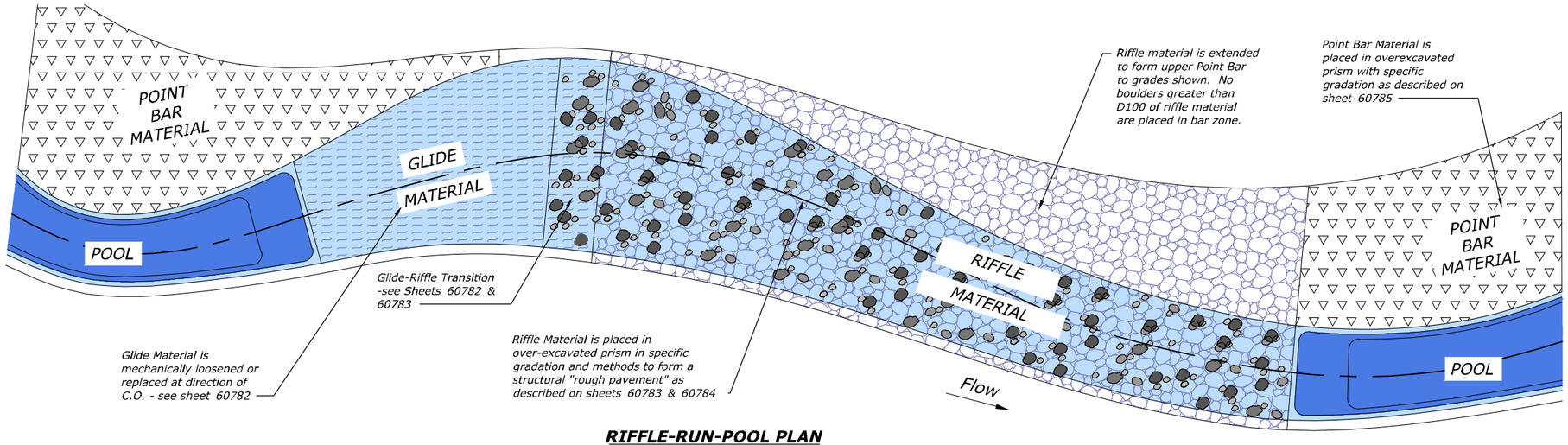
Constructed channel features are intended to mimic a natural stream channel. Riffles are critical to project success and are to be constructed to be stable and to provide hydraulic roughness and fish resting areas through small pocket pool development. Riffles are to be constructed such that low flows remain on the surface. Glide features are located between pools and riffles and are formed by mobile bed material. Glide features are used for spawning by salmon and steelhead, which require clean, sub-rounded to rounded alluvium of specific size. Glides will not be overly compacted and will contain minimum fines. Bar features are located on the inside of meander bends and along longitudinal margins. Bar features are a mixture of alluvial materials with gradations that replenish glide and riffle features during high flow events.

Channel Material Notes:

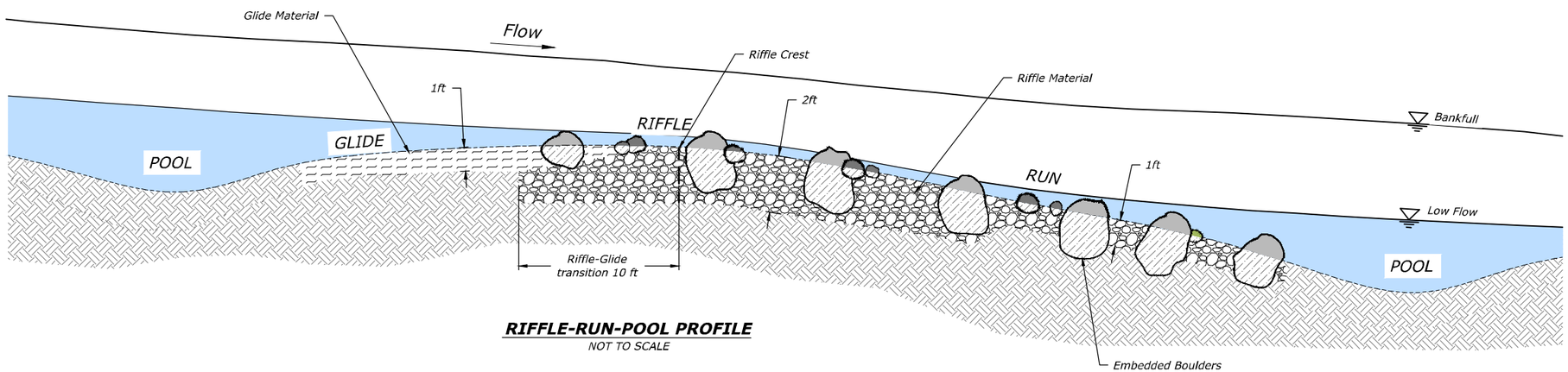
1. *This project has been designed to have specific channel materials for both stability and habitat objectives. It is important for the Contractor to pay particular attention to channel materials and specifications as shown in these plans. Channels shall be graded as shown in grading plans with some finish grading required to blend to existing features as directed by the contracting officer (C.O.)*
2. *Pools are designed to be self-maintaining within native materials and additional large wood for stability and habitat cover as shown in Large Wood plans.*
3. *Glides are designed to provide lightly packed gravel-cobble of specific size with minimal fines for spawning substrate. Additionally, glides are to provide a transition from pool to riffle crest with boulders placed near riffle crest transition as directed by C.O.*
4. *Riffles are designed to provide a hardened and rough surface made of specific-well-graded material. Riffles are designed to provide vertical channel stability and withstand hydraulic forces. Riffles also provide fish habitat through boulder habitat and margin roughness elements.*
5. *Runs are designed as riffle transitions to pools and are formed by both riffle and point bar grading. Grading of these transitions is essential and the Contractor must refer to grading plans and additional direction by the C.O.*

EXAMPLE CONSTRUCTED CHANNEL





RIFFLE-RUN-POOL PLAN
NOT TO SCALE



RIFFLE-RUN-POOL PROFILE
NOT TO SCALE

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

M. Knutson P.E.	DESIGNED
M. Knutson P.E.	DRAWN
J. Nielsen P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED (ADMIN APPROVAL - PROGRAM MANAGER)
BOISE, ID	2018-05-14

CHANNEL MATERIALS OVERVIEW

DETAILS

1678-100-60781

SHEET 1 of 5

DATE AND TIME PLOTTED
MAY 10, 2018 16:05
PLOTTED BY
JWNIELSEN

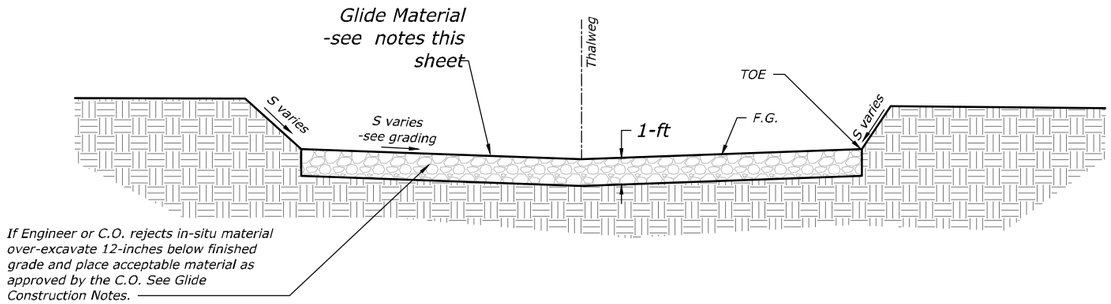
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_ASPCT_CHANNEL DETAILS.DWG

GLIDE OVERVIEW

Glide features are located between pools and riffles and are formed by mobile bed material. Glide features are used for spawning by salmon and steelhead, which require clean, sub-rounded alluvium of specific size. Glide features will not be overly compacted and will contain minimal fines.

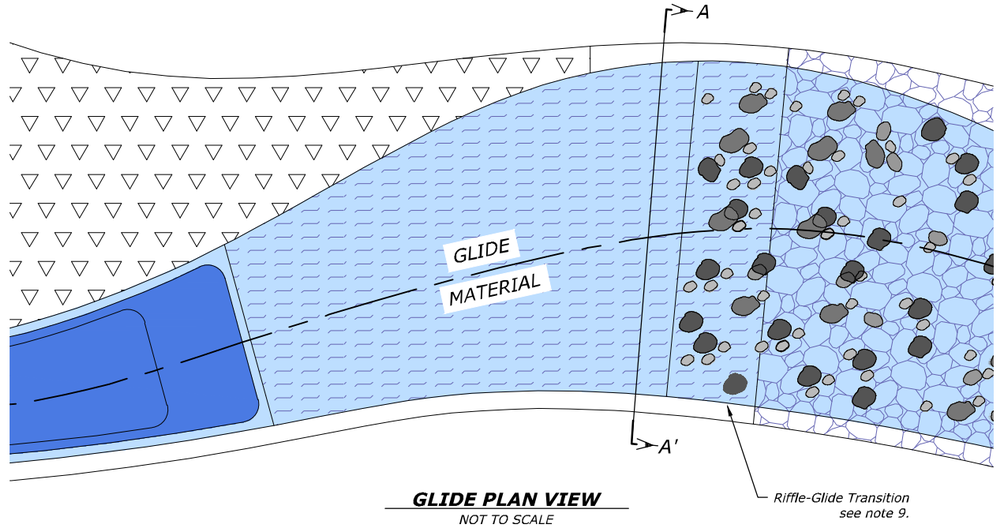
GENERAL NOTES - GLIDE FEATURES

1. For this project, glides will consist of in-situ material graded to lines and grades within glide areas as shown on grading plans and un-compacted as necessary. However, in locations where in-situ materials are not within prescribed specifications, glide material will be replaced to a depth of 1-foot as shown and described herein.
2. Locations for in-situ glide material replacement will be made by inspection in the field by the C.O. or Engineer. If the in-situ material is not acceptable, the C.O. and Engineer will work with the Contractor to develop a glide mixture that meets these specifications with materials found onsite.
3. Potential replacement quantities of glide material have been calculated and are tabulated on this sheet. Quantities are based upon identified glide areas assuming a 1-foot replacement depth.



SECTION A - A' TYPICAL GLIDE MATERIAL SECTION - FOR AREAS WITH UNSUITABLE IN-SITU MATERIAL

NOT TO SCALE



GLIDE PLAN VIEW

NOT TO SCALE

GLIDE CONSTRUCTION NOTES:

1. Excavate native material to design grade. Rip and uncompact in-situ material so it is unconsolidated for a depth of 12-inches below the finished grade.
2. C.O. or Engineer shall accept or reject glide material after it has been uncompacted.
3. If in-situ material is accepted by C.O. or Engineer leave material in its unconsolidated condition.
4. Replace unsuitable glide material with material that meets placed glide material gradation as shown on this sheet.
5. For unsuitable material overexcavate glide areas shown on Drawings to 1-foot below finish grade.
6. Place glide material meeting the specifications below for placed glide material directly upstream of riffles and feather into pool for a natural appearance, as shown in plans and as directed by the C.O.
7. Glide material will be clean and sub-rounded to rounded native gravel and cobble with minimal fines as approved by C.O.
8. Spread glide material with minimal compaction.
9. Feather glide material over riffle at riffle-glide transition to appear natural per C.O.

ACCEPTABLE IN-SITU GLIDE MATERIAL	
Percent Passing	Size Class
100%	6 inches
84%	3 inches - 5 inches
50%	1 inch - 3 inches
16%	0.5 inch - 1 inch

PLACED GLIDE MATERIAL	
Percent Passing	Size Class
100%	6 inches
84%	3 inches
50%	2 inches
16%	1 inch
10%	< 0.5 inches

GRADATION NOTES:

1. Percent passing size class is based on the nominal diameter of rock.
2. Nominal diameter shall be measured as the intermediate axis where the small and large axis shall not be more than 3 times less than or greater than the nominal diameter.
3. Acceptable placed glide material may be created from stockpiles of various sized screened materials. One example that creates an acceptable placed glide material is shown below. The C.O. and Engineer shall work with the Contractor to develop an acceptable mixture to meet the requirements above.

EXAMPLE STOCKPILE MIX RATIOS FOR PLACED GLIDE MATERIAL		
Stock Pile Size Class	Mix Percentage (By Volume)	Mix Ratios (By Parts)
3 - 6 inches	20%	1
1 - 3 inches	60%	3
0 - 1 inches	20%	1

POTENTIAL REPLACEMENT QUANTITIES OF GLIDE MATERIALS BY VOLUME *(see General Note 3.)*

VOLUMES OF PLACED GLIDE MATERIAL (IF REQUIRED)	
Approximate Channel Thalweg Alignment Station	Placed Glide Material (CY)
MC 26+77	42
MC 29+07	31
MC 32+52	38
MC 34+52	31
MC 43+14	93
MC 46+50	32
MC 48+20	25
MC 50+66	83
MC 53+35	85
MC 56+00	86
MC 59+80	55
MC 63+10	58
MC 66+00	109
SC-1 1+43	10
SC-1 3+30	3
SC-1 4+55	2
SC-1 6+80	3
SC-2 0+00	81
SC-2 4+70	42
SC-2 6+40	30

VOLUMES OF PLACED GLIDE MATERIAL (IF REQUIRED)	
Approximate Channel Thalweg Alignment Station	Placed Glide Material (CY)
SC-2 8+30	21
SC-2 10+25	56
SC-2 12+35	49
SC-2 14+50	57
SC-2 17+80	29
SC-2 19+20	34
SC-2A 0+50	24
SC-3 0+90	30
SC-3 3+50	25
SC-3 10+40	31
SC-3 13+70	27
SC-3 15+80	9
SC-3 18+00	20
SC-3 19+62	2
SC-3B 0+00	5
SC-3C 0+50	10
SC-4 2+70	24
SC-5 2+50	7
SC-5 5+15	4
SC-5 7+00	6

VOLUMES OF PLACED GLIDE MATERIAL (IF REQUIRED)	
Approximate Channel Thalweg Alignment Station	Placed Glide Material (CY)
SC-5 7+90	1
SC-5 8+58	3
SC-10 0+25	20
SC-10 9+30	24
SC-10 11+10	2
SC-10 11+90	3
SC-10 12+55	5
SC-10 13+50	1
SC-10 14+10	-
SC-10 15+10	3
SC-10 15+87	1
SC-10 17+00	6
SC-10 17+87	1
SC-10 33+75	13

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

M. Knutson P.E. DESIGNED
M. Knutson P.E. DRAWN
J. Nielsen P.E. CHECKED
M. Knutson P.E. TECH. APPR.
T. Day APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
BOISE, ID 2018-05-14

GLIDE MATERIALS AND CONSTRUCTION

DETAILS

1678-100-60782

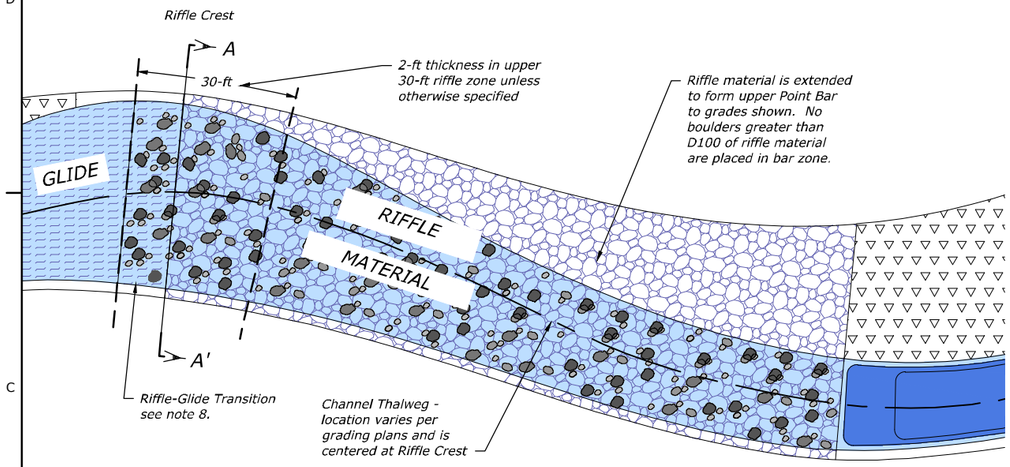
SHEET 2 of 5

DATE AND TIME PLOTTED
MAY 10, 2018 16:05
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_SSPCT_CHANNELDETAILS.DWG

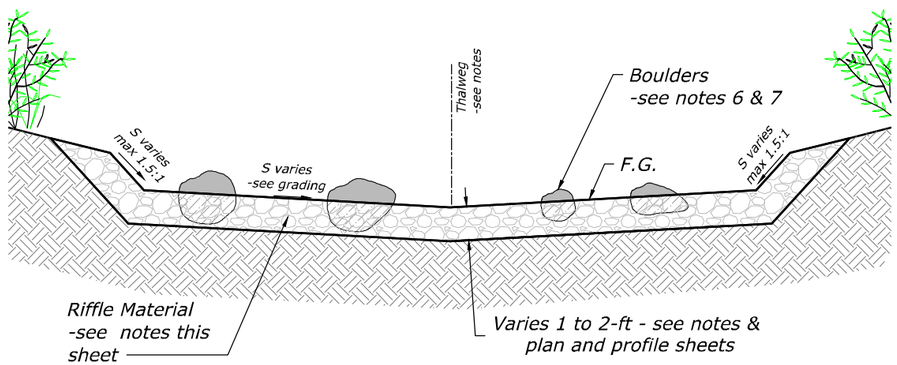
RIFFLE OVERVIEW

Riffle features are intended to mimic a natural stream channel. Riffles are to be constructed to be stable and to provide hydraulic roughness and fish resting areas through small pocket pool development. Riffles are to be constructed such that low flows remain on the surface.



TYPICAL RIFFLE PLAN VIEW
NOT TO SCALE

Note - typical riffle section view shown at Riffle Crest. Thalweg and side slopes vary - see grading plans.

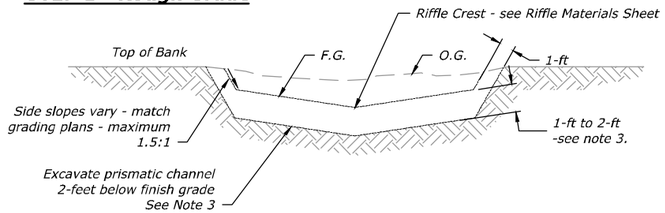


TYPICAL RIFFLE MATERIAL SECTION A - A' - FOR CONSTRUCTED RIFFLES
NOT TO SCALE

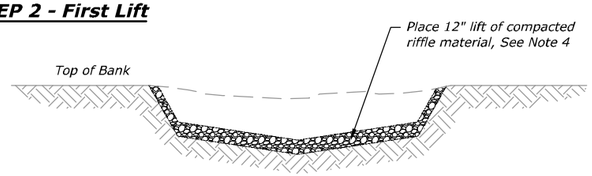
RIFFLE CONSTRUCTION STEPS

Not to Scale

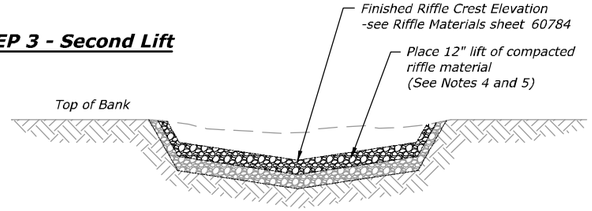
STEP 1 - Rough Grade



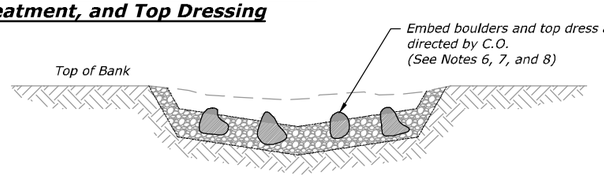
STEP 2 - First Lift



STEP 3 - Second Lift



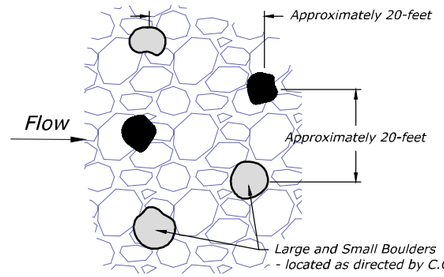
STEP 4 - Boulder Placement, Bank Treatment, and Top Dressing



RIFFLE CONSTRUCTION NOTES:

1. *Stockpile channel materials per design specifications. Materials are to be stockpiled in the immediate project area or transported from the sorting area as needed.*
2. *Three placements are required as follows:*
   1. *Constructed Riffle Material (See Riffle Materials - 60784)*
   2. *Fines (Silty-Sand to wash-in)*
   3. *Large and Small Boulders (For Embeddment)*
3. *Treat existing channel bed by removing organics and creating a prismatic working surface following channel thalweg and design contours on grading sheets. Rough grade from finish grade 1-ft to 2-ft in channel bed as shown on plan and profile sheets. Rough grade banks by 1-ft to slopes shown on grading plans and not exceeding 1.5:1.*
4. *Import well-mixed Constructed Riffle Material (see next sheet.) Compact riffle material in 12-inch lifts using tracked 300 Series Excavator, or similar equipment as approved by C.O. Track on matrix material sufficiently to compact material. Add a layer of additional fines on the surface. Wash fines into matrix material using a trash pump and 2-inch fire hose with a nozzle until water ponds on the surface and approved by the C.O. -see photo this sheet.*
5. *Repeat riffle construction in another 12-inch lift to design channel thalweg F.G. and shape.*
6. *Boulders of various sizes (Large and Small - See Table on next sheet) are to be added to the riffle to create diverse flow paths and habitat. Each boulder is to be embedded to 50% of the boulder diameter and re-compacted per note 7.*
7. *Excavate pockets into riffle material and set boulders to 50% embedment. Wash additional fines into matrix surrounding boulders and compact with excavator bucket as directed by C.O.*
8. *Top Dress with riffle material as needed and directed by C.O. Feather surrounding channel materials to include glide material at riffle-glide transition and point bar material at riffle-bar transition to form a natural appearance.*

BOULDER PLACEMENT
NOT TO SCALE





WASHING-IN FINES

FInes are washed in until water ponds on surface for each lift - see note 4.



COMPLETED RIFFLE

Note - Finished appearance to include boulders, bank treatment, and water ponded on surface.

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

M. Knutson P.E.	DESIGNED
M. Knutson P.E.	DRAWN
J. Nielsen P.E.	CHECKED
M. Knutson P.E.	TECH. APPR.
T. Day	APPROVED
	ADMIN APPROVAL - PROGRAM MANAGER
BOISE, ID	2018-05-14

RIFFLE CONSTRUCTION DETAILS

1678-100-60783

SHEET 3 of 5

DATE AND TIME PLOTTED
MAY 10, 2018 16:05
PLOTTED BY
JWHITESEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_CHANNELDETAILS.DWG

RIFFLE MATERIALS OVERVIEW

These plans contain both "Constructed" and "In-situ" Riffles. Constructed riffles are critical features to project success and shall be built from materials that are formed by excavation, sorting, and mixing specific sized alluvium to achieve a well graded mixture that is placed as shown in riffle construction details. In-situ riffles are located in non-critical locations that are known to have alluvial materials in and near the existing channel that may meet acceptable gradation as determined through inspection.

CONSTRUCTED RIFFLE MATERIAL

Percent Passing	Size Class
100%	12 inches
84%	7 inches
50%	4 inches
30%	1.5 inches
16%	0.5 inch
10%	<0.08 inch

ACCEPTABLE IN-SITU RIFFLE MATERIAL

Percent Passing	Size Class
100%	10 inches to 12 inches
84%	5 inches to 7 inches
50%	2 inches to 4 inches
30%	1 inch to 2 inches
16%	0.5 inch to 1 inch
10%	<0.08 inch

BOULDERS

Description	Size Class
Large Boulders	Greater than 24 inches
Small Boulders	14 inch - 24 inch

Constructed Riffle Material Notes:

1. "Constructed Riffle Material" shall be developed by Contractor onsite by screening and mixing to form a well graded and uniformly mixed substrate for placement in locations identified as "Constructed Riffle" features.
2. Riffle Materials to be sourced from excavated and screened alluvial materiels found onsite unless otherwise approved by Engineer.

In-Situ Riffle Material Notes:

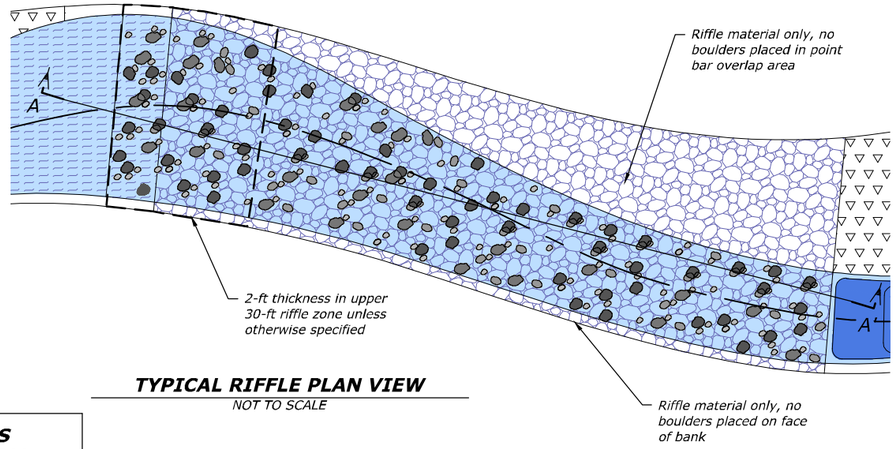
1. In-situ riffle material to be inspected and utilized or replaced in locations identified as "in-situ riffle" within these plans unless otherwise directed by C.O. or Engineer.
2. The C.O. or Engineer shall inspect suitability of in-situ material and accept or reject based upon the in-situ riffle material gradation shown on this sheet.
3. If in-situ material does not meet the specified in-situ riffle gradation, the Contractor shall over-excavate unsuitable material per "constructed riffle" dimensions and replace with suitable materials that meet in-situ riffle material requirements per "constructed riffle" placement methods (see previous sheet).
4. Where placement of additional in-situ riffle material is required to meet finish grade the Contractor shall follow riffle construction details, refer to previous sheet.

Boulder Notes:

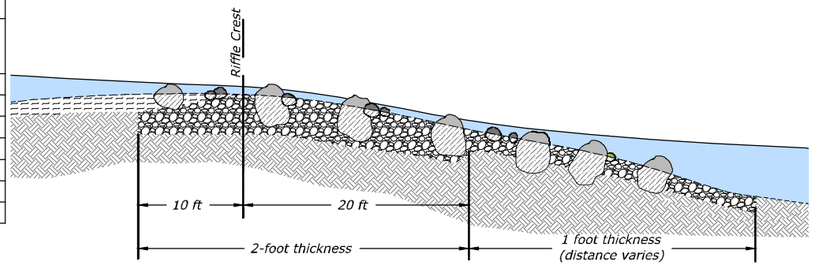
1. Large and Small Boulders to be stockpiled from known locations as identified on plans and from general excavation on site for use in Riffles as directed by C.O.

EXAMPLE STOCKPILE MIX RATIOS FOR CONSTRUCTED RIFFLE MATERIAL

Stock Pile Size Class	Mix Percentage (By Volume)	Mix Ratios (By Parts)
9 - 12 inches	10%	1
7 - 9 inches	10%	1
5 - 7 inches	10%	1
3 - 5 inches	30%	3
1.5 - 3 inches	10%	1
0.08 - 1.5 inches	20%	2
< 0.08 inches	10%	1



TYPICAL RIFFLE PLAN VIEW
NOT TO SCALE



TYPICAL RIFFLE MATERIAL SECTION A - A' - FOR CONSTRUCTED RIFFLES
NOT TO SCALE

GRADATION NOTES:

1. Percent passing size class is based on the nominal diameter of rock.
2. Nominal diameter shall be measured as the intermediate axis where the small and large axis shall not be more than 3 times less than or greater than the nominal diameter.
3. Size Class is unique to these drawings and is not the Unified Soil Classification.
4. Acceptable riffle material may be created from stockpiles of various sized screened materials. One example that creates an acceptable riffle matrix material is shown to the right. The C.O. and Engineer shall work with the Contractor to develop an acceptable mixture to meet the requirements above.

RIFFLE REQUIREMENTS BY CHANNEL STATION

RIFFLE REQUIREMENTS BY CHANNEL STATION

Channel Station	Riffle Crest Elevation	In-Situ or Constructed	Volume Required (CY)
MC 18+16	3132.40	Constructed	470
MC 23+81	3129.60	Constructed	313
MC 27+22	3128.40	In-situ	+ 179
MC 29+49	3127.40	In-situ	+ 145
MC 32+97	3125.80	In-situ	+ 79
MC 34+92	3124.80	Constructed	152
MC 43+64	3121.80	Constructed	527
MC 46+85	3120.80	Constructed	153
MC 48+54	3120.30	Constructed	214
MC 51+16	3119.50	Constructed	387
MC 53+95	3118.50	Constructed	301
MC 56+65	3117.70	Constructed	368
MC 60+30	3116.50	Constructed	253
MC 63+57	3115.40	Constructed	330
MC 66+80	3114.40	Constructed	654
MC 76+26	3110.88	In-situ	+ 48
SC-1 1+72	3131.90	Constructed	87
SC-1 3+45	3131.30	Constructed	54
SC-1 4+70	3130.80	Constructed	57
SC-1 5+85	3130.30	Constructed	56
SC-1 6+96	3129.90	Constructed	118
SC-2 1+18	3131.00	In-situ	+ 131

RIFFLE REQUIREMENTS BY CHANNEL STATION

Channel Station	Riffle Crest Elevation	In-Situ or Constructed	Volume Required (CY)
SC-2 4+87	3129.20	Constructed	155
SC-2 6+90	3128.50	Constructed	100
SC-2 8+55	3128.00	Constructed	191
SC-2 10+77	3127.30	Constructed	199
SC-2 12+83	3126.70	Constructed	185
SC-2 15+04	3126.00	Constructed	178
SC-2 18+10	3125.10	Constructed	153
SC-2 19+55	3124.70	Constructed	352
SC-2A 0+85	3129.00	Constructed	50
SC-3 1+46	3123.00	Constructed	189
SC-3 4+00	3121.70	Constructed	172
SC-3 5+00	3120.87	In-situ	+4
SC-3 11+00	3118.60	In-situ	+ 279
SC-3 14+20	3117.20	In-situ	+ 245
SC-3 16+06	3116.40	In-situ	+ 77
SC-3 18+44	3115.30	Constructed	95
SC-3 19+78	3114.70	Constructed	42
SC-3A 0+40	3124.50	Constructed	132
SC-3B 0+33	3119.50	In-situ	+26
SC-3C 0+75	3115.30	Constructed	81
SC-4 0+00	3121.80	Constructed	103
SC-4 3+25	3120.90	Constructed	300

RIFFLE REQUIREMENTS BY CHANNEL STATION

Channel Station	Riffle Crest Elevation	In-Situ or Constructed	Volume Required (CY)
SC-5 0+88	3118.00	Constructed	54
SC-5 2+78	3117.40	Constructed	80
SC-5 3+28	3116.90	In-situ	-
SC-5 5+35	3116.60	In-situ	-
SC-5 7+28	3116.00	In-situ	-
SC-5 8+04	3115.80	In-situ	-
SC-5 8+78	3115.50	Constructed	90
SC-10 1+00	3119.40	Constructed	70
SC-10 9+81	3114.90	Constructed	53
SC-10 11+26	3114.40	In-situ	-
SC-10 12+07	3114.10	In-situ	-
SC-10 12+75	3113.80	In-situ	-
SC-10 13+63	3113.50	In-situ	-
SC-10 14+20	3113.30	In-situ	-
SC-10 15+29	3112.80	Constructed	51
SC-10 16+00	3112.60	In-situ	-
SC-10 17+22	3112.10	In-situ	-
SC-10 18+00	3111.80	Constructed	53
SC-10 32+40	3107.00	In-situ	-
SC-10 34+00	3106.50	In-situ	-

Table Notes:

1. Quantities for "constructed riffle" features based on area identified for constructed riffle by the depth requirements shown on riffle construction details.
2. Quantities for "in-situ riffle" features are shown for locations where additional fill is required to meet finished grade. Where finish grade is below the existing surface, a "-" is shown.

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

M. Knutson P.E.
DESIGNED
M. Knutson P.E.
DRAWN
J. Nielsen P.E.
CHECKED
M. Knutson P.E.
TECH. SVVR.
T. Day
APPROVED
ADMIN APPROVAL - PROGRAM MANAGER

BOISE, ID 2018-05-14

RIFFLE MATERIALS

DETAILS

1678-100-60784

SHEET 4 of 5

DATE AND TIME PLOTTED
MAY 10, 2018 16:05
PLOTTED BY
JNIELSEN

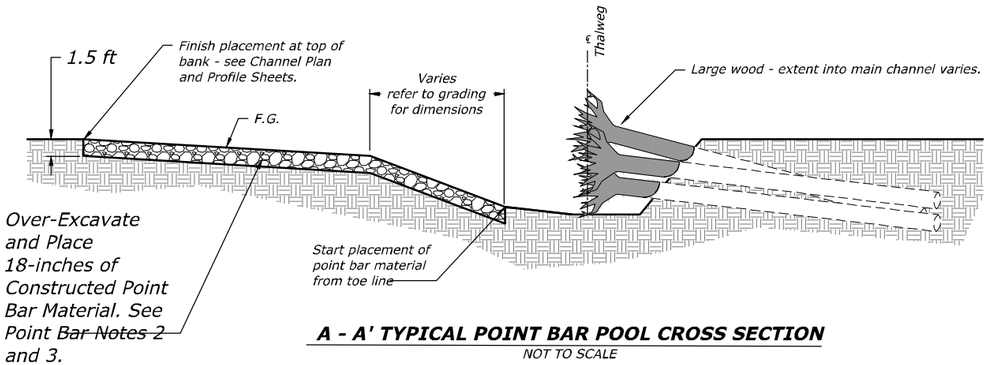
CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_CHANNELDETAILS.DWG

POINT BAR OVERVIEW

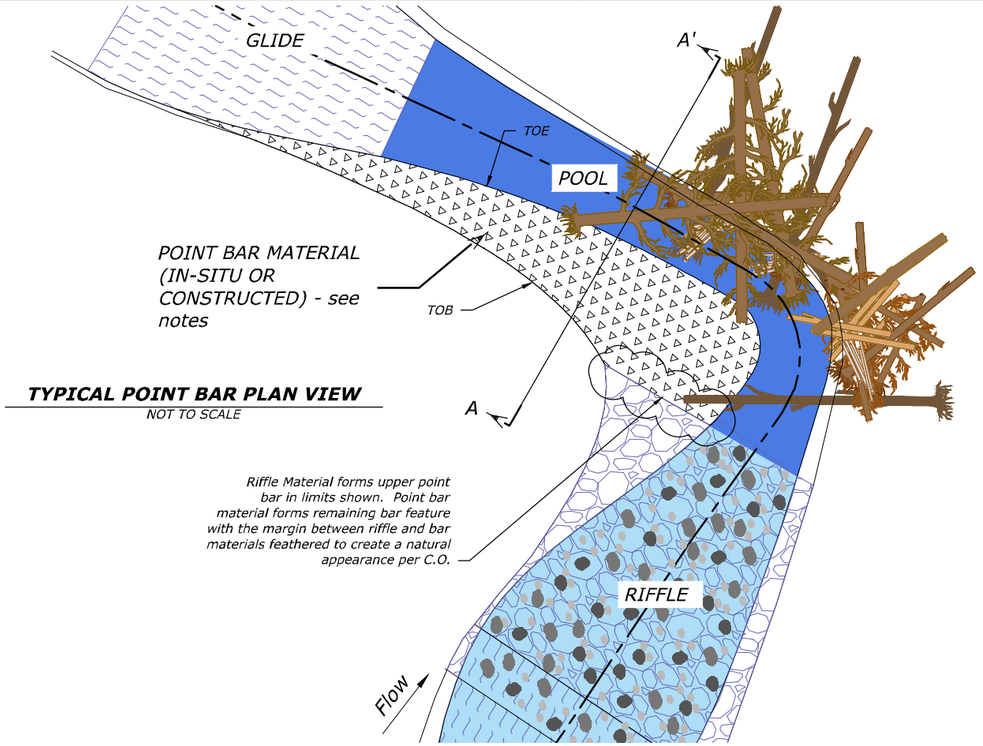
Point bars are located at inside of meander bends and consist of well-graded alluvium that is stored by the stream and mobilized in large storm events. This material replenishes glide and riffle material.

GENERAL NOTES - POINT BAR FEATURES

1. For this project, point bars will consist of either 18-inches of constructed point bar material placed to finish grade or in-situ material graded to lines and grades within point bar areas as shown on grading plans and compacted as detailed herein. Constructed point bars have been prescribed within newly constructed channels. In-situ point bars have been prescribed in existing channel areas. However, in locations where in-situ materials are not within prescribed specifications, point bar material meeting specifications herein will be constructed to a depth of 18-inches as shown and described.
2. Locations where in-situ materials are unknown and anticipated to not conform to point bar specifications have been identified as "constructed point bars" within these plans. However, locations for point bar re-construction may vary from these plans with determinations made in the field by the C.O. or Engineer. The C.O. and Engineer will work with the Contractor to develop a point bar construction mixture that meets these specifications with materials found onsite.
3. Point bar extents are shown on channel plan and profile sheets and shall generally extend from top of bank to toe of bank and feather into adjacent riffle and glide features.



A - A' TYPICAL POINT BAR POOL CROSS SECTION
NOT TO SCALE



TYPICAL POINT BAR PLAN VIEW
NOT TO SCALE

POINT BAR CONSTRUCTION NOTES:

1. Refer to Channel Plan and Profile sheets for Point Bar extents, design elevations, and offsets of pool sections.
2. Engineer or C.O. shall inspect suitability of in-situ material and accept or reject in-situ material based on the acceptable in-situ point bar material gradation shown on this sheet.
3. If in-situ material does not meet the specified gradation, the Contractor shall over-excavate unsuitable material to 18-inches depth and replace with specified point bar material (See constructed point bar material gradation this sheet) to design finish grade.
4. Point Bar material shall meet the gradations (in-situ or constructed) on this sheet and shall be well-mixed.
5. Point Bar material is to be placed in maximum of 1-foot lifts with machine compaction utilizing tracked excavator or dozer as accepted by Engineer.

QUANTITIES OF REQUIRED POINT BAR MATERIALS BY TYPE AND VOLUME

POINT BAR REQUIREMENTS BY CHANNEL STATION

Channel Station	In-Situ or Constructed	Volume Required (CY)
MC 26+00	In-situ	-
MC 28+75	In-situ	+ 56
MC 31+75	In-situ	+ 128
MC 34+10	In-situ	+ 144
MC 36+50	In-situ	+ 93
MC 41+00	In-situ	+ 327
MC 46+50	Constructed	79
MC 47+90	Constructed	87
MC 50+15	Constructed	86
MC 53+25	Constructed	91
MC 55+75	Constructed	119
MC 59+50	Constructed	140
MC 62+30	Constructed	215
MC 65+75	Constructed	231
MC 70+50	In-situ	-
MC 78+50	In-situ	-
SC-1 0+95	In-situ	-
SC-1 2+75	In-situ	-
SC-1 4+00	In-situ	-
SC-1 5+40	In-situ	-

POINT BAR REQUIREMENTS BY CHANNEL STATION

Channel Station	In-Situ or Constructed	Volume Required (CY)
SC-1 6+50	In-situ	-
SC-2 3+80	Constructed	110
SC-2 4+60	Constructed	35
SC-2 5+90	Constructed	94
SC-2 7+80	Constructed	76
SC-2 9+70	Constructed	102
SC-2 11+95	Constructed	119
SC-2 14+00	Constructed	123
SC-2 17+25	Constructed	195
SC-2 18+75	Constructed	71
SC-2A 0+70	Constructed	4
SC-2A 1+70	In-situ	-
SC-3 3+10	In-situ	+ 76
SC-3 9+25	In-situ	-
SC-3 13+25	In-situ	+ 276
SC-3 15+50	In-situ	+ 136
SC-3 17+50	In-situ	+ 128
SC-3 19+40	In-situ	+ 5
SC-4 2+75	Constructed	157
SC-4 6+50	Constructed	144

POINT BAR REQUIREMENTS BY CHANNEL STATION

Channel Station	In-Situ or Constructed	Volume Required (CY)
SC-5 2+00	Constructed	93
SC-5 4+80	Constructed	42
SC-5 6+75	Constructed	58
SC-5 7+75	Constructed	23
SC-5 8+45	Constructed	26
SC-10 9+20	In-situ	-
SC-10 10+75	In-situ	-
SC-10 11+70	In-situ	-
SC-10 12+45	In-situ	-
SC-10 13+25	In-situ	-
SC-10 13+95	In-situ	-
SC-10 14+85	In-situ	-
SC-10 15+70	In-situ	-
SC-10 16+65	In-situ	-
SC-10 17+60	In-situ	-
SC-10 33+40	In-situ	-

Table Notes:

1. Quantities for "constructed point bar" features based on area identified for constructed point bars by 18-inches depth.
2. Quantities for "in-situ point bar" features are shown for locations where additional fill is required to meet finished grade. Where finish grade is below the existing surface, a "-" is shown.

ACCEPTABLE IN-SITU POINT BAR MATERIAL

Percent Passing	Size Class
100%	6 inches
84%	3 inches - 5 inches
50%	1 inch - 3 inches
16%	0.5 inch - 1 inch

CONSTRUCTED POINT BAR MATERIAL

Percent Passing	Size Class
100%	6 inches
84%	3 inches
50%	2 inches
16%	1 inches
10%	< 0.5 inches

GRADATION NOTES:

1. Percent passing size class is based on the nominal diameter of rock.
2. Nominal diameter shall be measured as the intermediate axis where the small and large axis shall not be more than 3 times less than or greater than the nominal diameter.
3. Acceptable placed point bar material may be created from stockpiles of various sized screened materials. One example that creates an acceptable placed point bar material is shown below. The C.O. and Engineer shall work with the Contractor to develop an acceptable mixture to meet the requirements above.

EXAMPLE STOCKPILE MIX RATIOS FOR CONSTRUCTED POINT BAR MATERIAL

Stock Pile Size Class	Mix Percentage (By Volume)	Mix Ratios (By Parts)
3 - 6 inches	20%	1
1 - 3 inches	60%	3
0 - 1 inches	20%	1

RECLAMATION
Managing Water in the West

REGISTERED PROFESSIONAL ENGINEER
19223PE
OREGON
JULY 15, 1997
MICHAEL TODD KNUTSON

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

M. Knutson P.E. DESIGNED
M. Knutson P.E. DRAWN
J. Nielsen P.E. CHECKED
M. Knutson P.E. TECH. SVVR.
T. Day APPROVED
ADMIN APPROVAL - PROGRAM MANAGER
BOISE, ID 2018-05-14

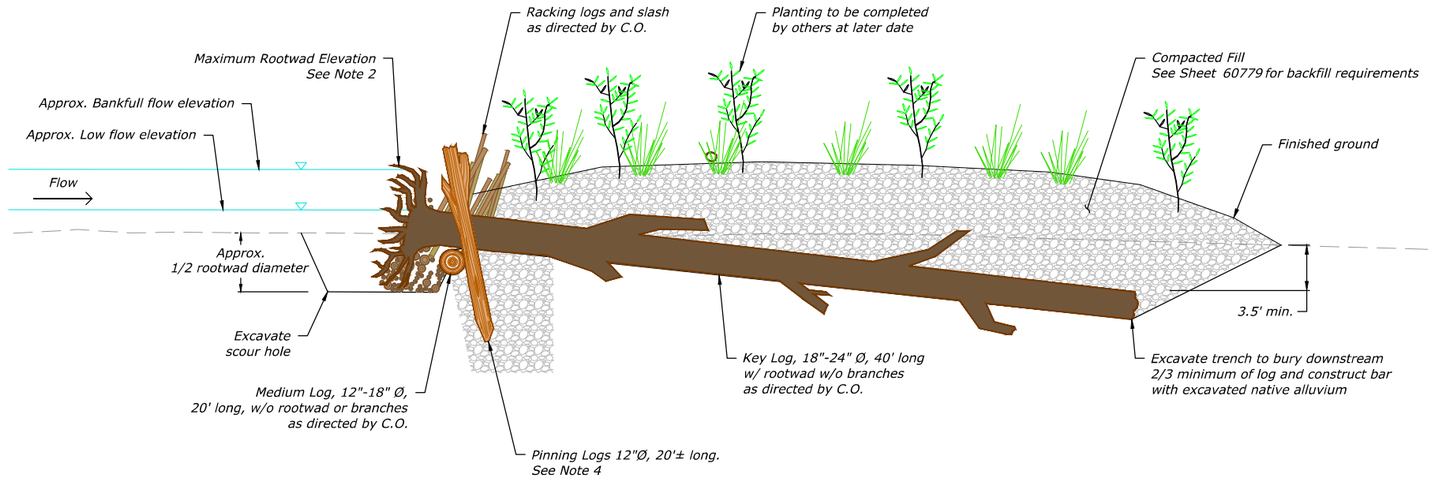
POINT BAR MATERIALS AND CONSTRUCTION

DETAILS

1678-100-60785
SHEET 5 of 5

DATE AND TIME PLOTTED
MAY 10, 2018 16:05
PLOTTED BY
JNIELSEN

CAD SYSTEM
AutoCAD Rel. 22.0s
CAD FILENAME
BTS_95PCT_CHANNELDETAILS.DWG

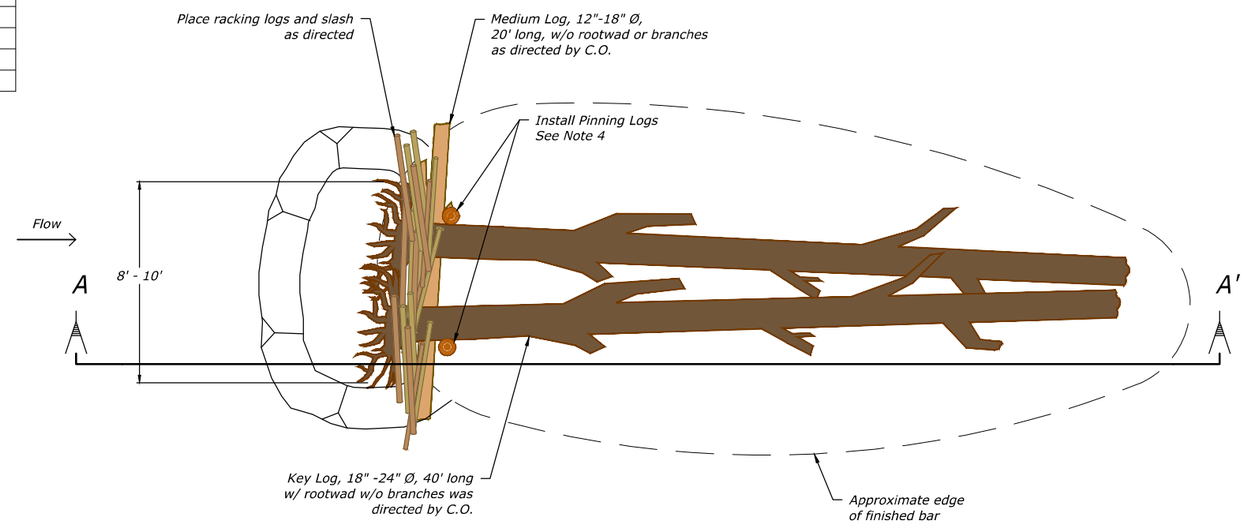


SECTION A-A'
NOT TO SCALE

Hydraulic Purpose:
* Create split flow, and protect or create vegetated island or gravel bar.
* Create scour pool and sort sediment.

Habitat Purpose:
* Accumulate debris over time.
* Enhance fish habitat complexity and diversity.

TYPE A - APEX JAM						
Log Type	Size (DBH)	Min Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Key	18" - 24"	40'	Yes	6'	No	2
Medium	12" - 18"	20'	No	-	No	1
Racking	6" - 12"	20'	Optional	-	Optional	5
Pinning	12"	20'	Yes	-	No	2
Slash (CY)	1" - 6"	-	-	-	Yes	5
Live Cuttings	-	-	-	-	-	9



PLAN VIEW

TYPE A - APEX JAM
NOT TO SCALE

Construction Notes:
1. Racking logs and slash wedged between key members. Racking logs and slash shall have irregular and natural appearance and not stacked.
2. Top of rootwad should not exceed more than 1/2 foot above top of bank.
3. Backfill structure with Compacted Fill per Sht. 60779 .
4. Pinning logs to be driven. If pinning logs cannot be driven, then pinning logs with rootwads shall be used and installed by excavation per Sheet 60802 .
5. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
6. If located in Side Channels, structure may be constructed with smaller logs as directed By C.O.
7. Structure location may be field adjusted By C.O.

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/10/2018
NICHOLAS T. DANIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

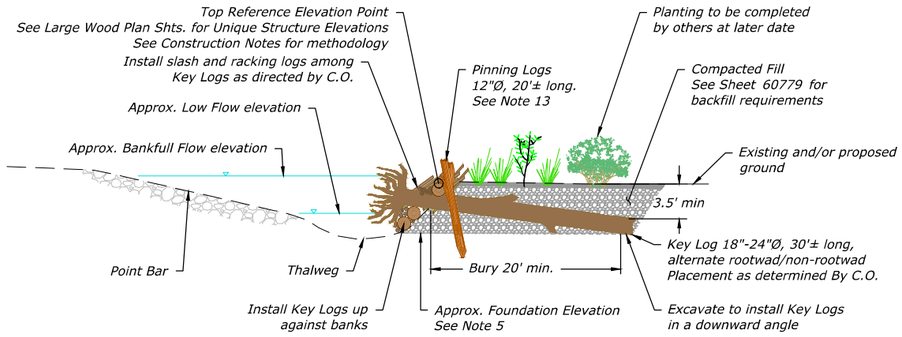
TYPE A - APEX JAM

1678-100-60786

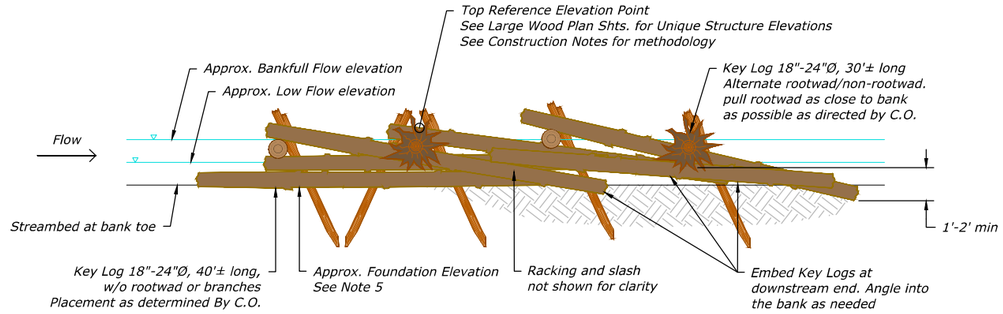
SHEET 1 of 25

DATE AND TIME PLOTTED 5/10/2018 1:53 PM
PLOTTED BY NICK DANIS

CAD SYSTEM AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME BTS_APEX_JAM.DWG



SECTION A-A'
NOT TO SCALE



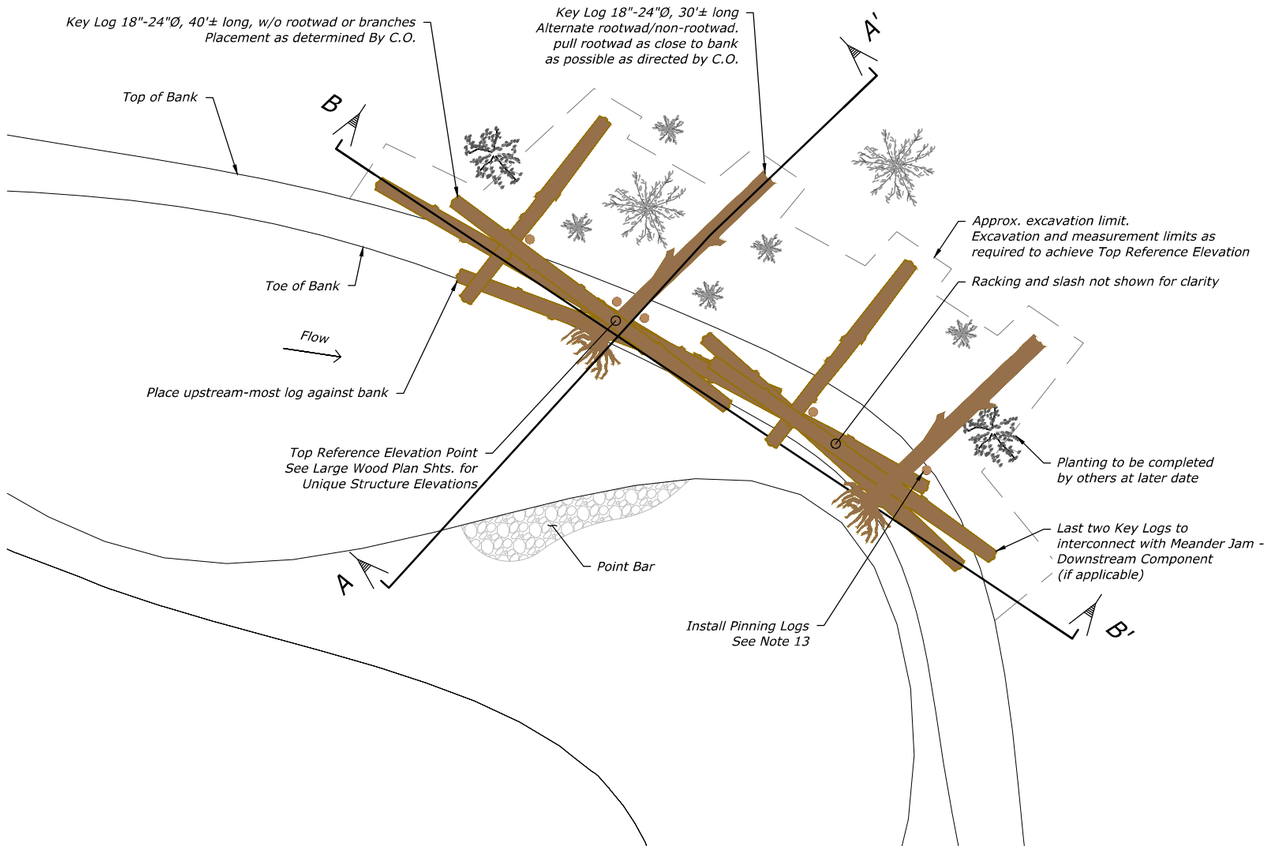
SECTION B-B'
NOT TO SCALE

Hydraulic Purpose:
* Limits channel migration in the short term to restore aquatic and riparian habitat.
* Increases velocities along outside of bend leading to downstream component of meander jam to force larger scour hole.

Habitat Purpose:
* Enhances fish habitat by creating large bank side pools for fish holding and sediment sorting.

TYPE B1 - MEANDER JAM UPSTREAM COMPONENT						
Log Type	Size (DBH)	Min Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Key	18" - 24"	40'	No	5'	No	6
Key	18" - 24"	30'	Yes	6'	No	2
Key	18" - 24"	30'	No	-	No	2
Racking	6" - 12"	20'	Optional	-	Optional	10
Pinning	12"	20'	Optional	3'	No	5
Slash (CY)	1" - 6"	-	-	-	-	20
Live Cuttings	-	-	-	-	-	30

Construction Notes:
1. Contractor to select Key and Medium logs, per table above with the approval of the C.O. or Engineer.
2. Contractor shall measure the Diameter at Breast Height (DBH)
3. Contractor shall excavate to Foundation Elevation, by subtracting diameters of stacked logs from Top Reference Elevation.
4. Approximate Foundation Elevation shown assumes a structure height of 7.0 feet.
5. Foundation Elevation will vary based on materials and field conditions and is being provided for contractor reference only. Top Reference Elevation Point shall be held for finish grade by Contractor.
6. Racking logs and slash wedged between key members. Racking logs and slash shall have irregular and natural appearance and not stacked.
7. Top of rootwad should not exceed more than 1/2 foot above top of bank.
8. Backfill structure with Compacted Fill per Sht. 60779 .
9. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
10. If located in Side Channels, structure may be constructed with smaller logs as directed By C.O.
11. Length of structure will vary by locations. Structures may have variable number of logs. Limits of structure and number of logs to be determined By C.O.
12. Structure location may be field adjusted By C.O.
13. Pinning logs to be driven. If pinning logs cannot be driven, then pinning logs with rootwads shall be used and installed by excavation per Sheet 60802 .
14. All visible ends of logs shall be cut or broken off to create natural appearance. No flat cuts allowed.



PLAN VIEW

TYPE B1 - MEANDER JAM UPSTREAM COMPONENT
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
05/01/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

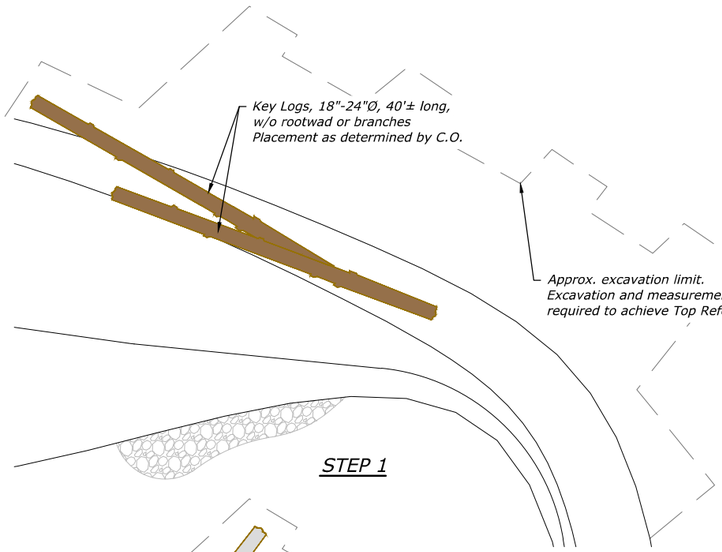
TYPE B1 - MEANDER JAM
UPSTREAM COMPONENT

1678-100-60787

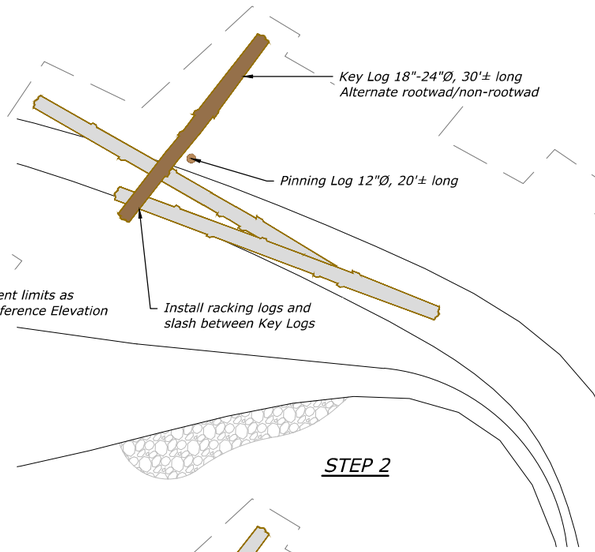
SHEET 2 of 25

DATE AND TIME PLOTTED
5/1/2018 1:50 PM
PLOTTED BY
NICK DANIS

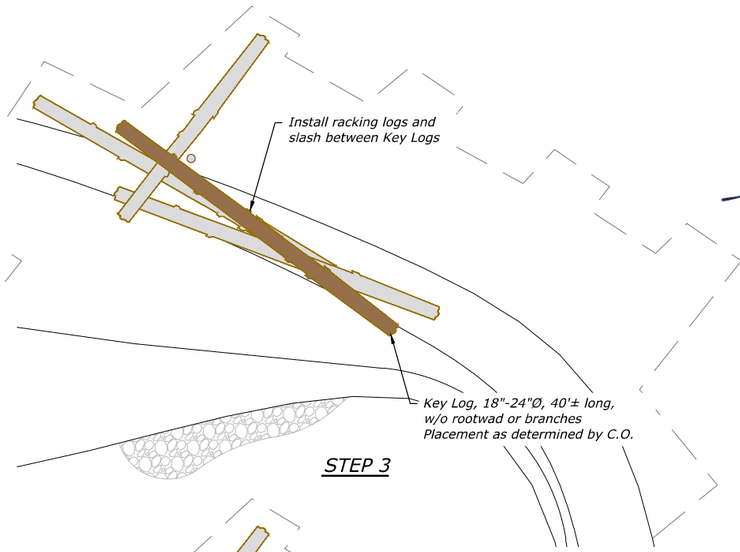
CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_MEANDER JAM.DWG



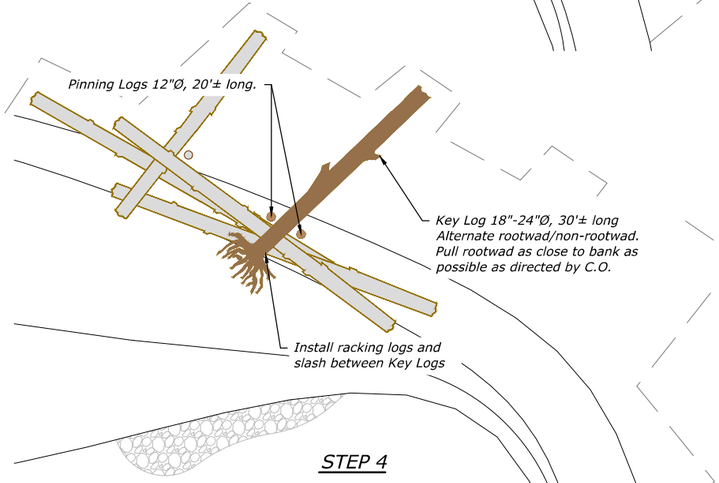
STEP 1



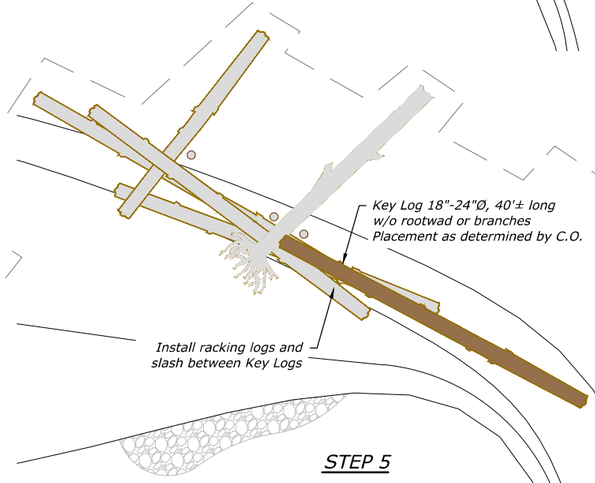
STEP 2



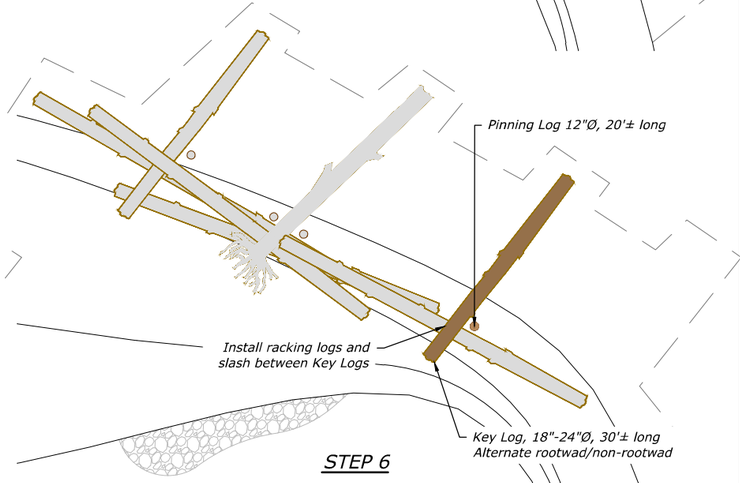
STEP 3



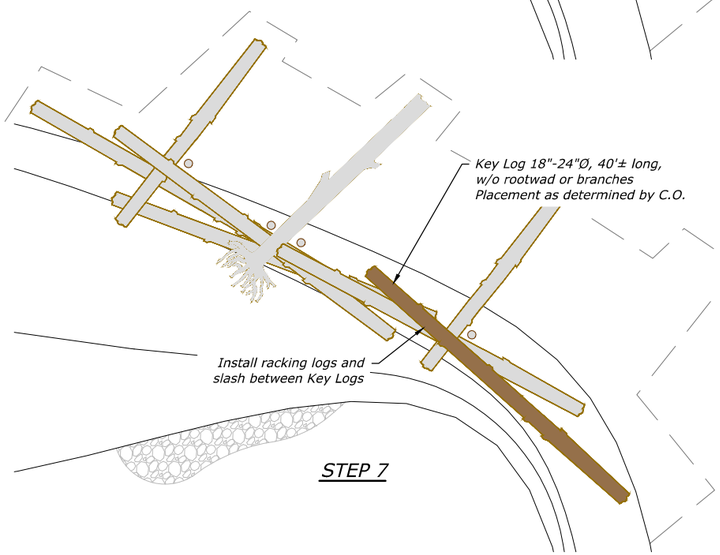
STEP 4



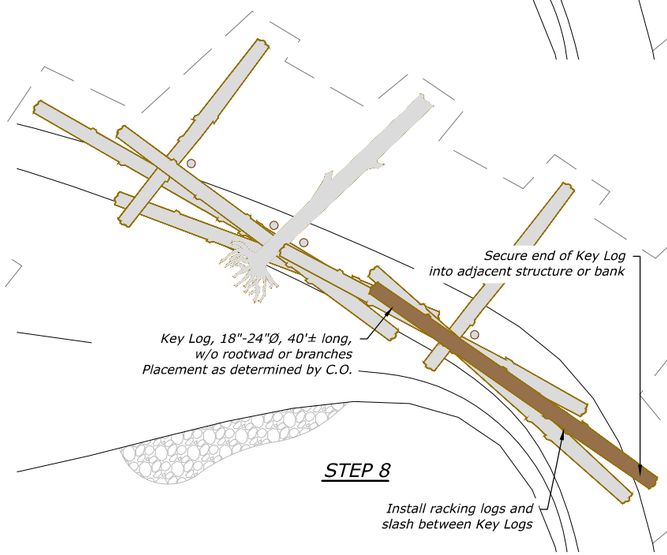
STEP 5



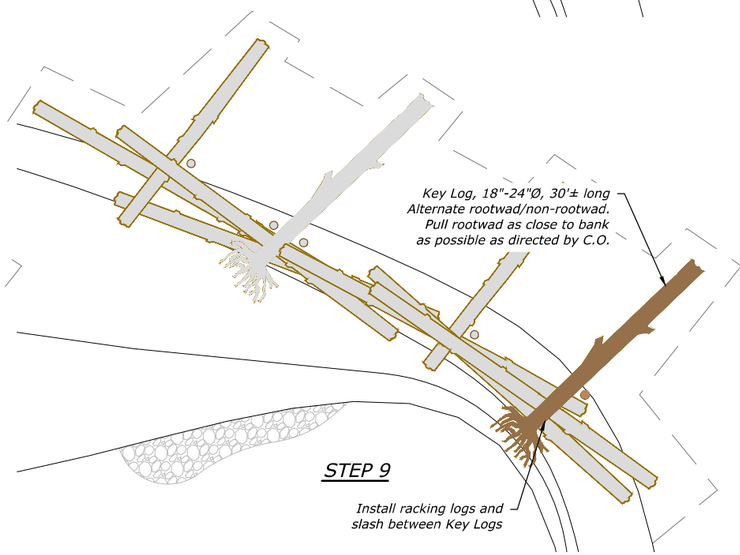
STEP 6



STEP 7



STEP 8



STEP 9

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
EXPIRES: 12/31/19
05/11/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

TYPE B1 - MEANDER JAM
UPSTREAM COMPONENT

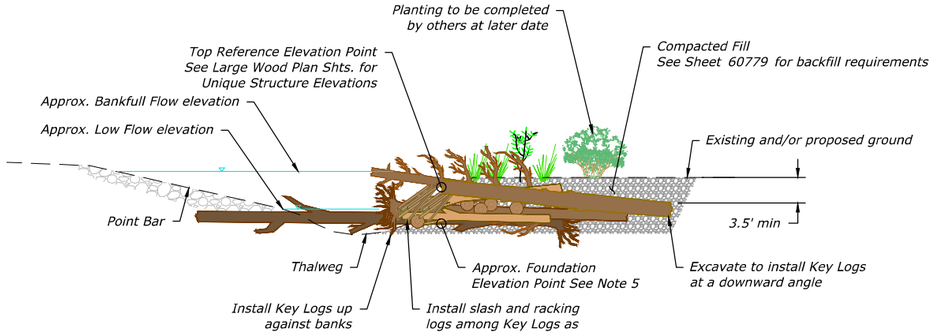
SEQUENCING

1678-100-60788

SHEET 3 of 25

DATE AND TIME PLOTTED
5/10/2018 1:50 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 2016 (LMS Tech)
CAD FILENAME
BTS_MEANDER JAM.DWG



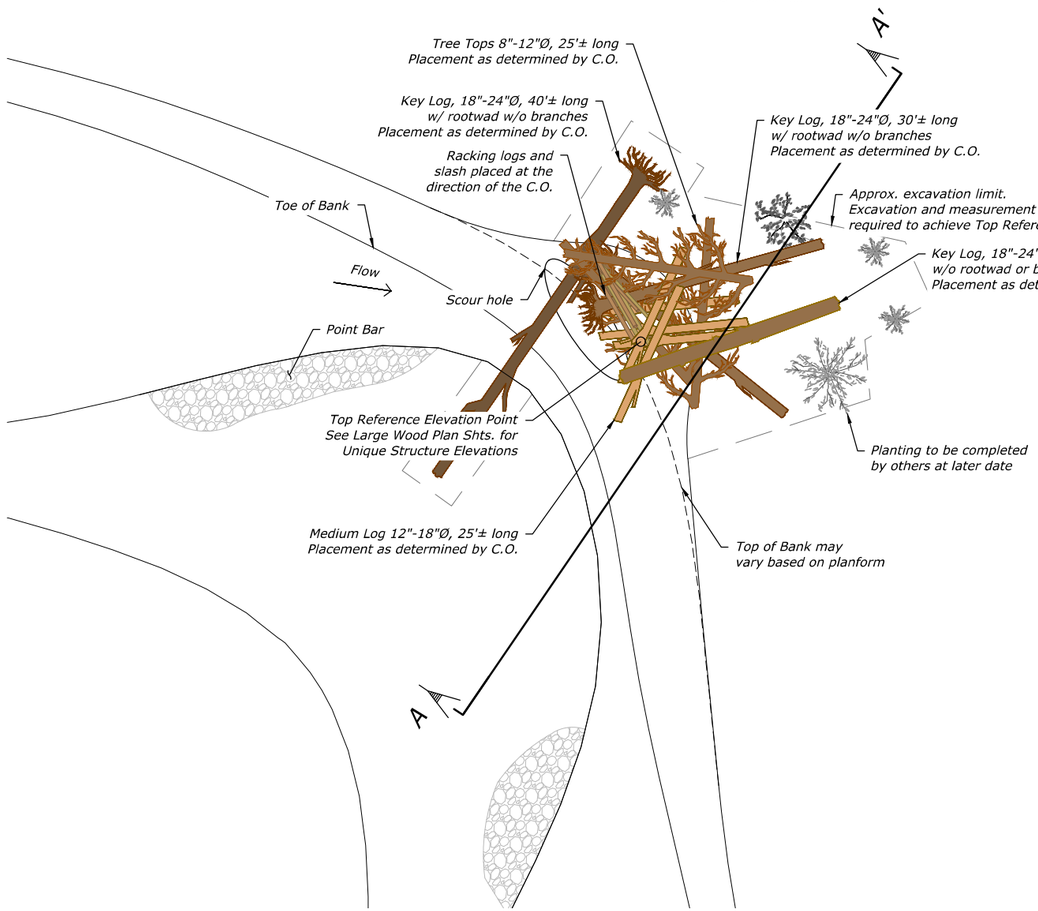
SECTION A-A'
NOT TO SCALE

Hydraulic Purpose:
- Limits channel migration in the short term to restore aquatic and riparian habitat.
- Forces stream power into bed creating sustainable scour hole.

Habitat Purpose:
- Enhances fish habitat by creating large bank side pools for fish holding and sediment sorting.
- Accumulates debris over time.
- Provides cover.

TYPE B2 - MEANDER JAM MIDDLE COMPONENT						
Log Type	Size (DBH)	Min Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Key	18" - 24"	40	Yes	6'	No	1
Key	18" - 24"	30'	Yes	6'	No	2
Key	18" - 24"	30'	No	-	No	1
Medium	12" - 18"	25'	No	-	Yes	5
Racking	6" - 12"	20'	Optional	-	Optional	15
Slash (CY)	1" - 6"	-	-	-	-	30
Tree Tops	8" - 12"	25'	No	-	Yes	3
Live Cuttings	-	-	-	-	-	27

Construction Notes:
1. Contractor to select Key and Medium logs, per table above with the approval of the C.O. or Engineer.
2. Contractor shall measure the Diameter at Breast Height (DBH)
3. Contractor shall excavate to Foundation Elevation, by subtracting diameters of stacked logs from Top Reference Elevation.
4. Approximate Foundation Elevation shown assumes a structure height of 8.75 feet.
5. Foundation Elevation will vary based on materials and field conditions and is being provided for contractor reference only. Top Reference Elevation Point shall be held for finish grade by Contractor.
6. Racking logs and slash wedged between key members. Racking logs and slash shall have irregular and natural appearance and not stacked.
7. Top of rootwad should not exceed more than 1/2 foot above top of bank.
8. Backfill structure with Compacted Fill per Sht. 60779 .
9. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
10. If located in Side Channels, structure may be constructed with smaller logs as directed By C.O.
11. Structure location may be field adjusted By C.O.
12. All visible ends of logs shall be cut or broken off to create natural appearance. No flat cuts allowed.



PLAN VIEW

TYPE B2 - MEANDER JAM MIDDLE COMPONENT
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
EXPIRES: 12/31/19
05/22/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

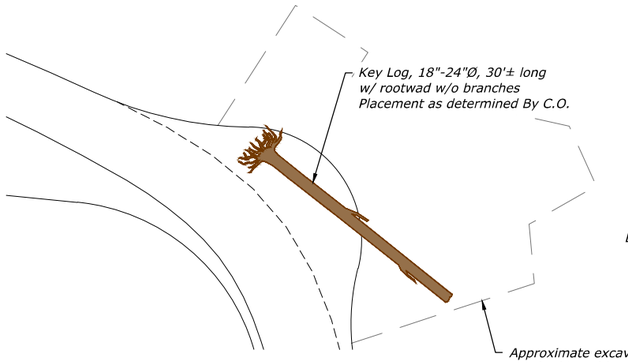
TYPE B2 - MEANDER JAM MIDDLE COMPONENT

1678-100-60789

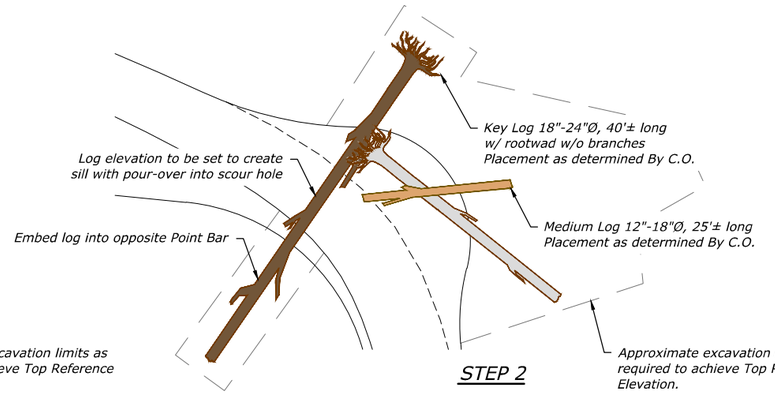
SHEET 4 of 25

DATE AND TIME PLOTTED
5/22/2018 1:58 PM
PLOTTED BY
NICK DANIS

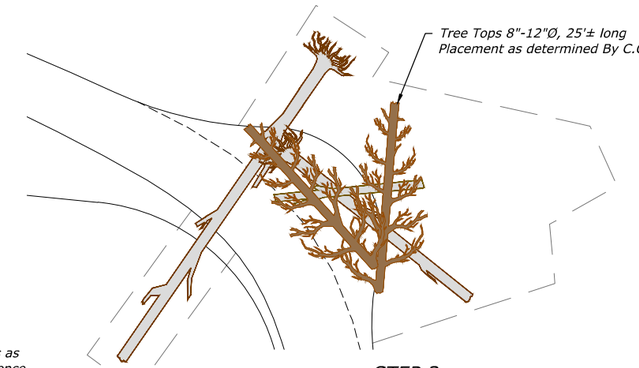
CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_MEANDER JAM.DWG



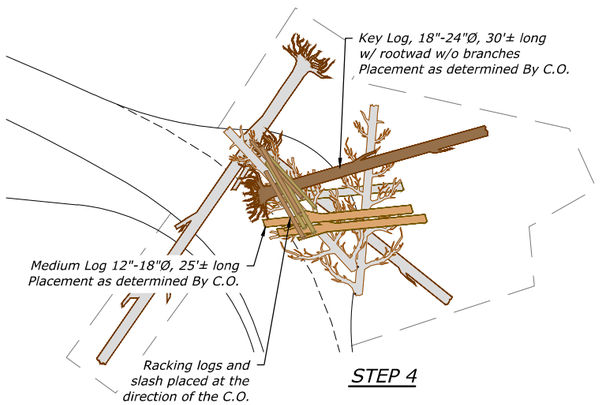
STEP 1



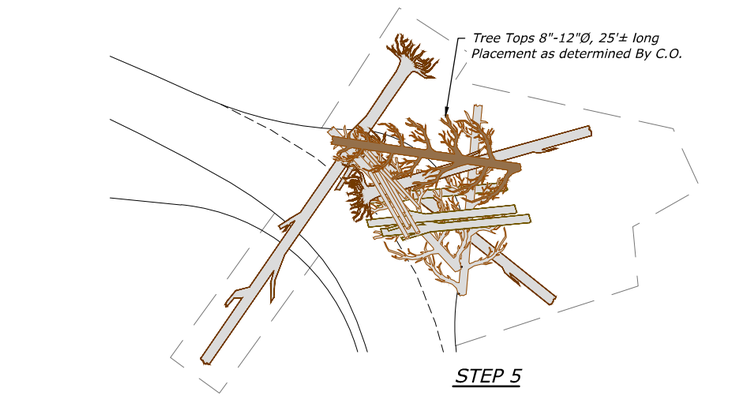
STEP 2



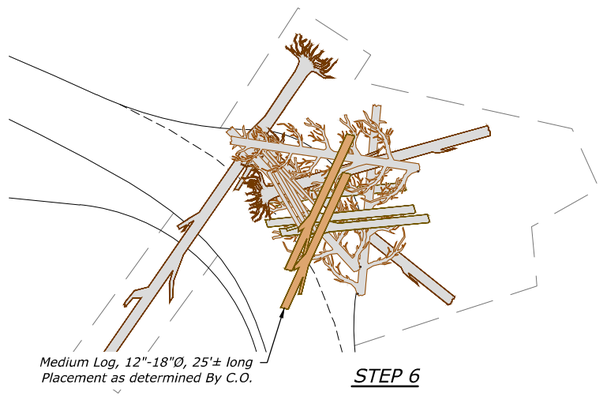
STEP 3



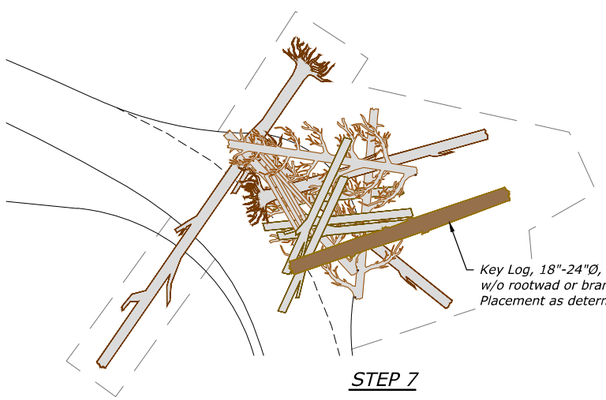
STEP 4



STEP 5



STEP 6



STEP 7

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

TYPE B2 - MEANDER JAM
MIDDLE COMPONENT

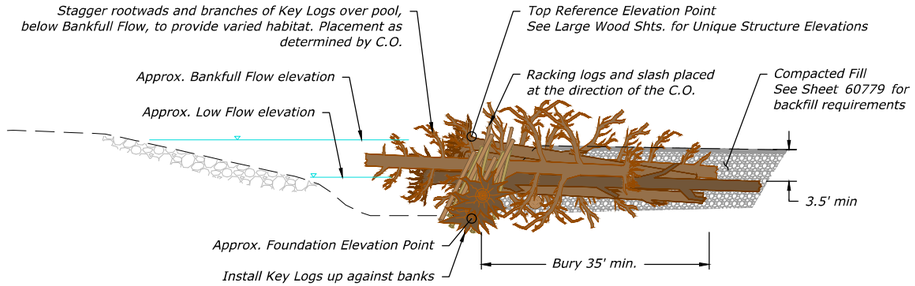
SEQUENCING

1678-100-60790

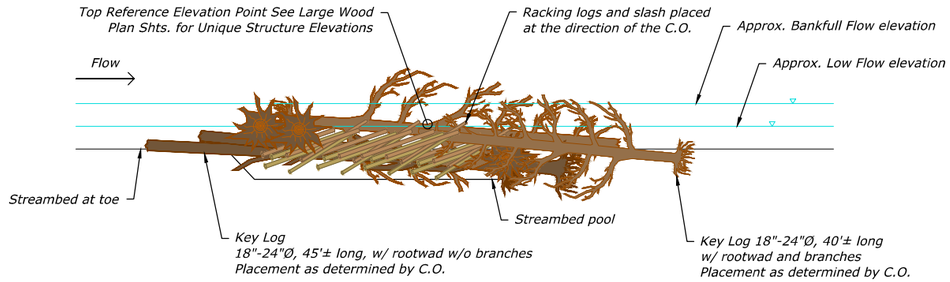
SHEET 5 of 25

DATE AND TIME PLOTTED
5/11/2018 1:58 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_MEANDER JAMLDWG



SECTION A-A'
NOT TO SCALE



SECTION B-B'
NOT TO SCALE

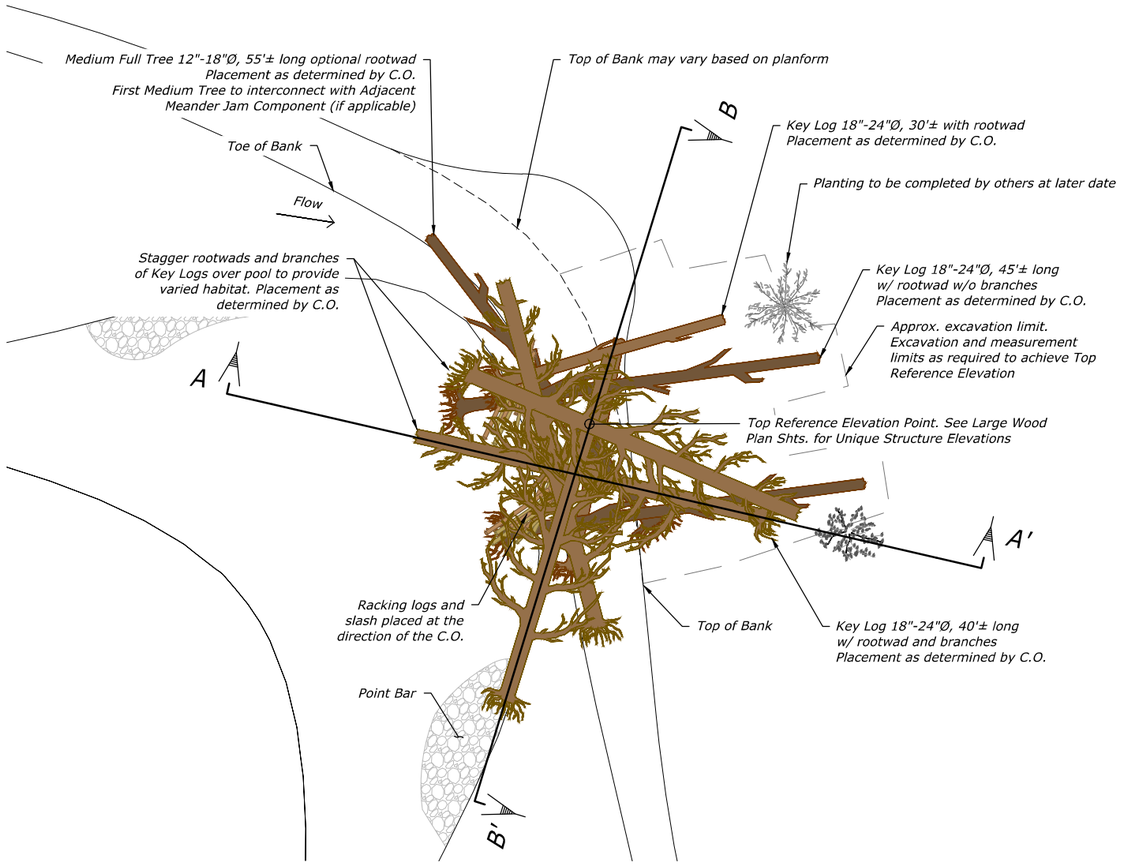
Hydraulic Purpose:
- Limits channel migration in the short term to restore aquatic and riparian habitat.
- Angles stream power into bed creating sustainable scour hole.

Habitat Purpose:
- Enhances fish habitat by creating large bank side pools for fish holding and sediment sorting.
- Accumulates debris over time.
- Provides cover.

TYPE B3 - MEANDER JAM DOWNSTREAM COMPONENT

Log Type	Size (DBH)	Min Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Key	18" - 24"	40'	Yes	6'	Yes	4
Key	18" - 24"	45'	Yes	6'	No	3
Key	18" - 24"	30'	Yes	6'	No	2
Medium	12" - 18"	55'	Optional	-	No	1
Racking	6" - 12"	20'	Optional	-	Optional	20
Slash (CY)	1" - 6"	-	-	-	-	40
Live Cuttings	-	-	-	-	-	30

Construction Notes:
1. Contractor to select Key and Medium logs, per table above with the approval of the C.O. or Engineer.
2. Contractor shall measure the Diameter at Breast Height (DBH)
3. Contractor shall excavate to Foundation Elevation, by subtracting diameters of stacked logs from Top Reference Elevation.
4. Approximate Foundation Elevation shown assumes a structure height of 10.5 feet.
5. Foundation Elevation will vary based on materials and field conditions and is being provided for contractor reference only. Top Reference Elevation Point shall be held for finish grade by Contractor.
6. Racking logs and slash wedged between key members. Racking logs and slash shall have irregular and natural appearance and not stacked.
7. Top of rootwad should not exceed more than 1/2 foot above top of bank.
8. Backfill structure with Compacted Fill per Sht. 60779 .
9. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
10. If located in Side Channels, structure may be constructed with smaller logs as directed By C.O.
11. Structure location may be field adjusted By C.O.
12. All visible ends of logs shall be cut or broken off to create natural appearance. No flat cuts allowed.



PLAN VIEW

TYPE B3 - MEANDER JAM DOWNSTREAM COMPONENT
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
MICHAEL T. KNUTSON
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

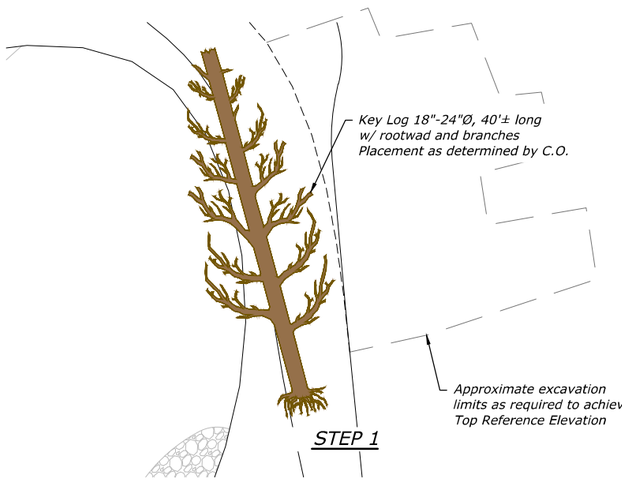
TYPE B3 - MEANDER JAM DOWNSTREAM COMPONENT

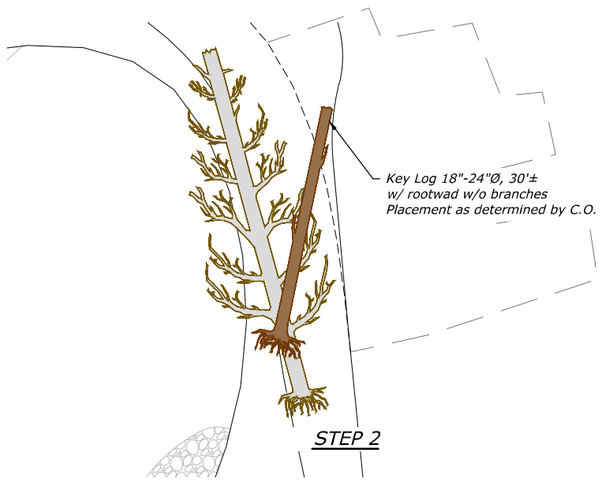
1678-100-60791

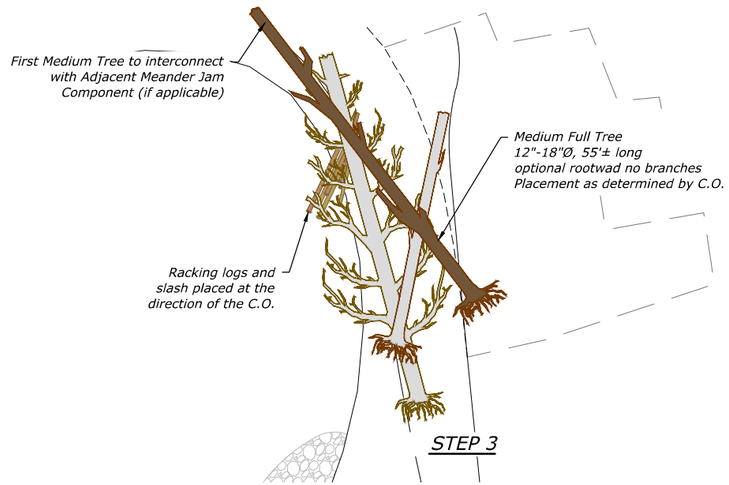
SHEET 6 of 25

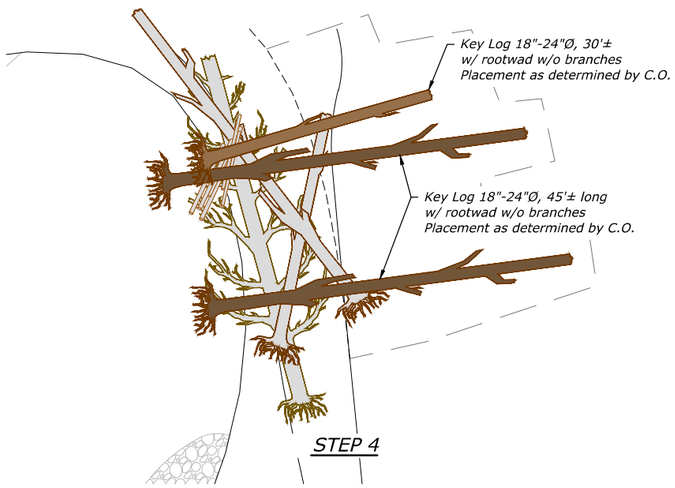
DATE AND TIME PLOTTED
5/10/2018 1:50 PM
PLOTTED BY
NICK DAVIS

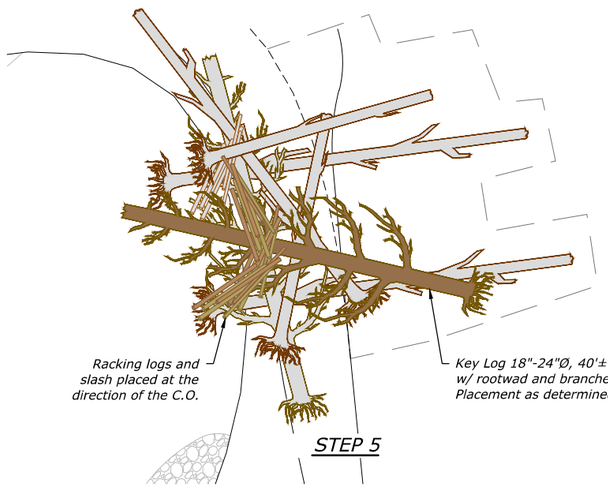
CAD SYSTEM
AutoCAD Civil 3D 2016 22.0s (LMS Tech)
CAD FILENAME
BTS_MEANDER JAM.DWG

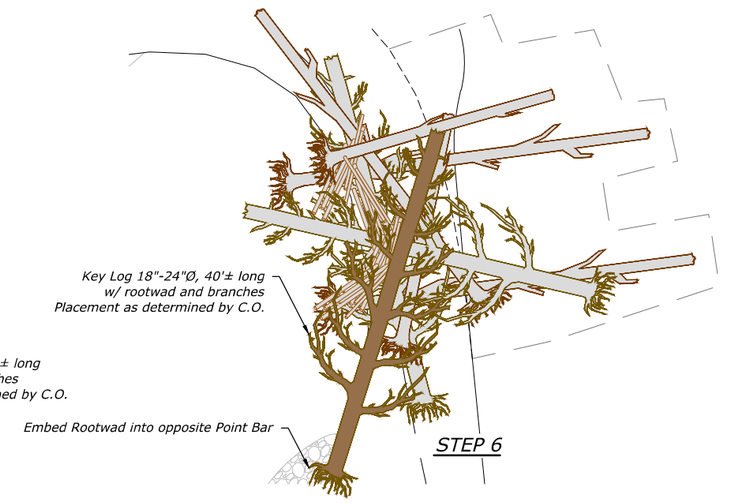


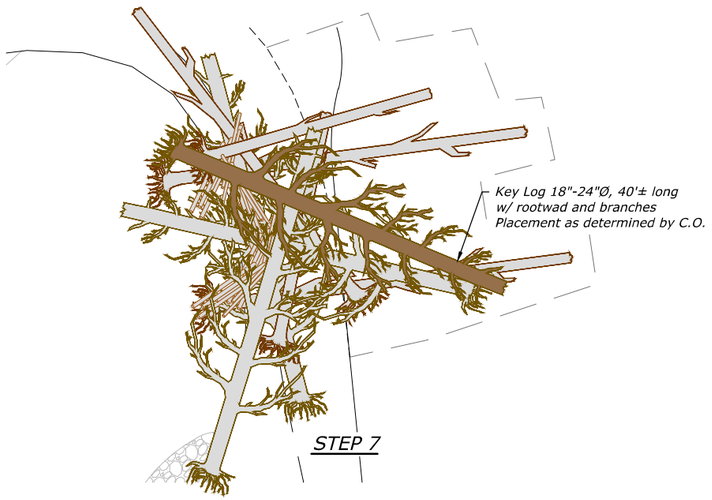












RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
7931PE
OREGON
NICHOLAS T. DANIS
EXPIRES: 12/31/19
10/31/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

TYPE B3 - MEANDER JAM
DOWNSTREAM COMPONENT

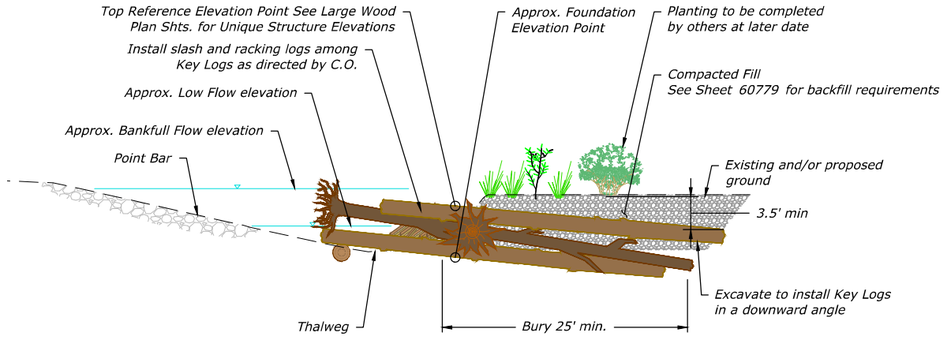
SEQUENCING

1678-100-60792

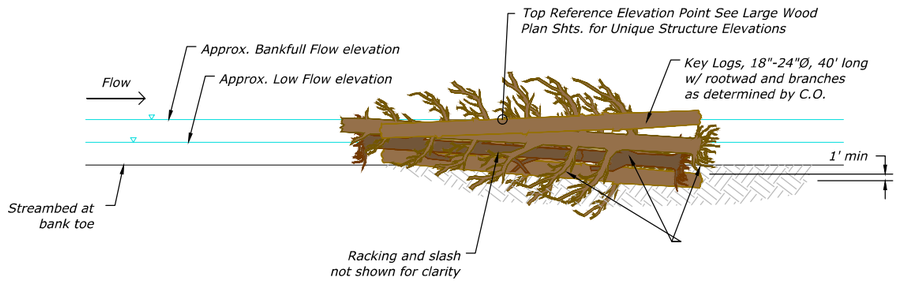
SHEET 7 of 25

DATE AND TIME PLOTTED
5/10/2018 1:09 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_MEANDER JAM.DWG



SECTION A-A'
NOT TO SCALE



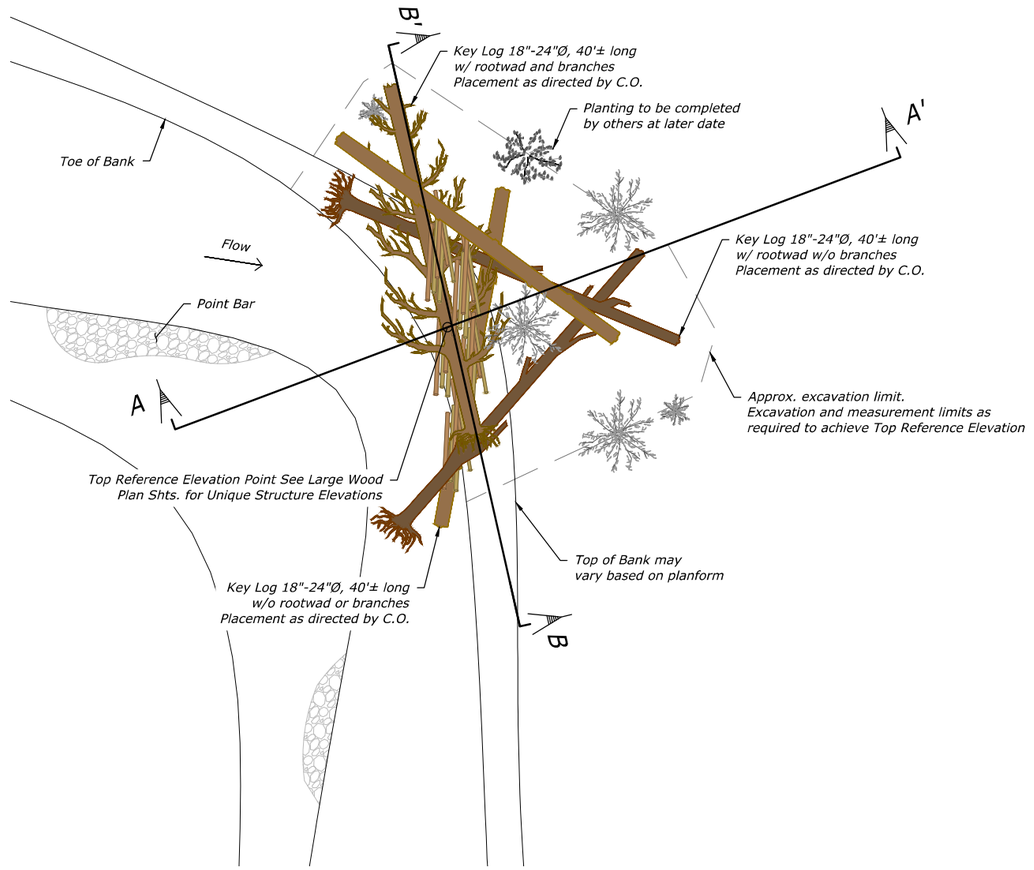
SECTION B-B'
NOT TO SCALE

Hydraulic Purpose:
- Limits channel migration in the short term to restore aquatic and riparian habitat.
- Angles stream power into bed creating sustainable scour hole.

Habitat Purpose:
- Enhances fish habitat by creating large bank side pools for fish holding and sediment sorting.
- Accumulates debris over time.
- Provides cover.

TYPE B4 - MEANDER JAM MALLET JAM						
Log Type	Size (DBH)	Min Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Key	18" - 24"	40'	Yes	6'	Yes	1
Key	18" - 24"	40'	Yes	6'	No	2
Key	18" - 24"	40'	No	-	No	2
Racking	6" - 12"	20'	Optional	-	Optional	20
Slash (CY)	1" - 6"	-	-	-	-	20
Live Cuttings	-	-	-	-	-	15

Construction Notes:
1. Contractor to select Key and Medium logs, per table above with the approval of the C.O. or Engineer.
2. Contractor shall measure the Diameter at Breast Height (DBH)
3. Contractor shall excavate to Foundation Elevation, by subtracting diameters of stacked logs from Top Reference Elevation.
4. Approximate Foundation Elevation shown assumes a structure height of 5.5 feet.
5. Foundation Elevation will vary based on materials and field conditions and is being provided for contractor reference only. Top Reference Elevation Point shall be held for finish grade by Contractor.
6. Racking logs and slash wedged between key members. Racking logs and slash shall have irregular and natural appearance and not stacked.
7. Top of rootwad should not exceed more than 1/2 foot above top of bank.
8. Backfill structure with Compacted Fill per Sht. 60779 .
9. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
10. If located in Side Channels, structure may be constructed with smaller logs as directed By C.O.
11. Structure location may be field adjusted By C.O.
12. All visible ends of logs shall be cut or broken off to create natural appearance. No flat cuts allowed.



PLAN VIEW

TYPE B4 - MEANDER JAM MALLET JAM
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/14/2018
RENEWAL DATE
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

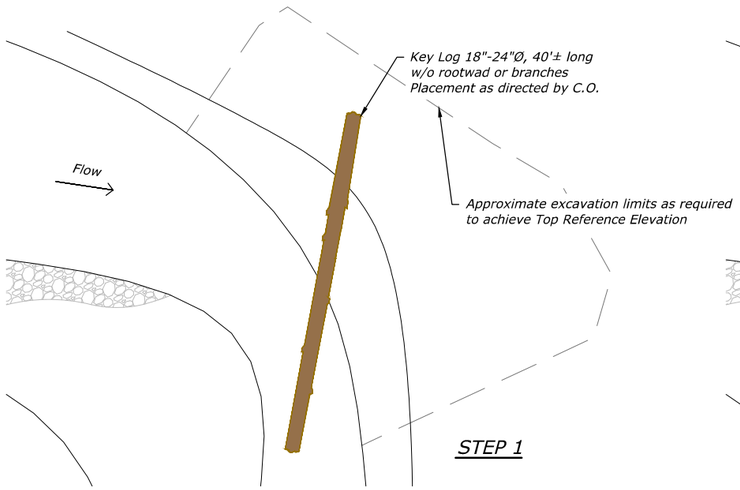
TYPE B4 - MEANDER JAM MALLET JAM

1678-100-60793

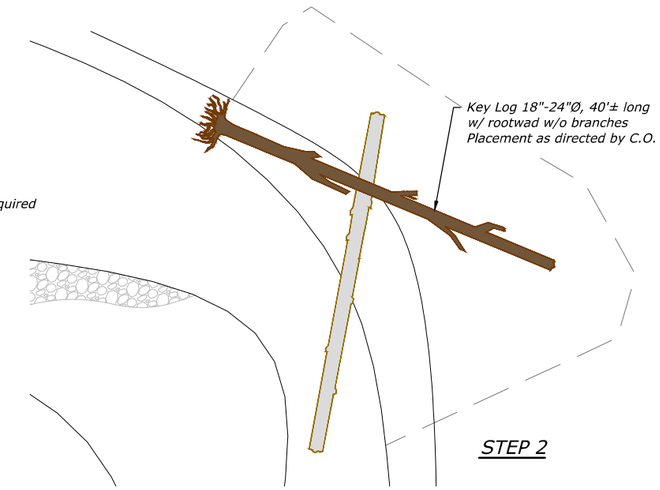
SHEET 8 of 25

DATE AND TIME PLOTTED
5/10/2018 2:50 PM
PLOTTED BY
NICK DANIS

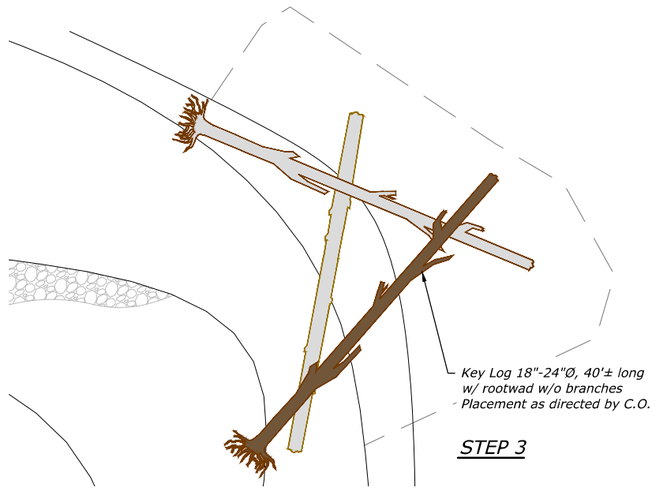
CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_MEANDER JAM.DWG



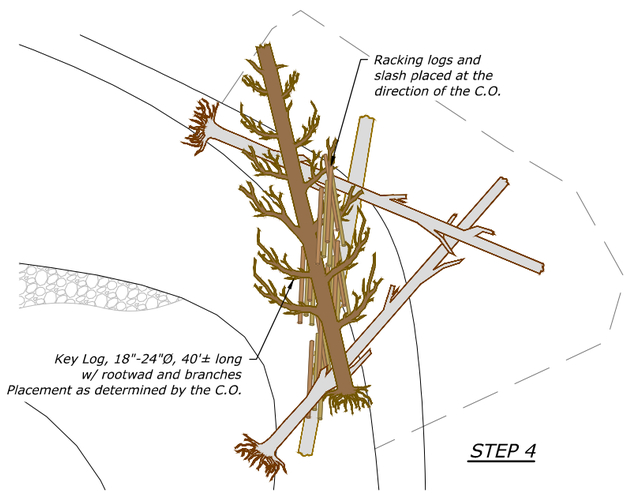
STEP 1



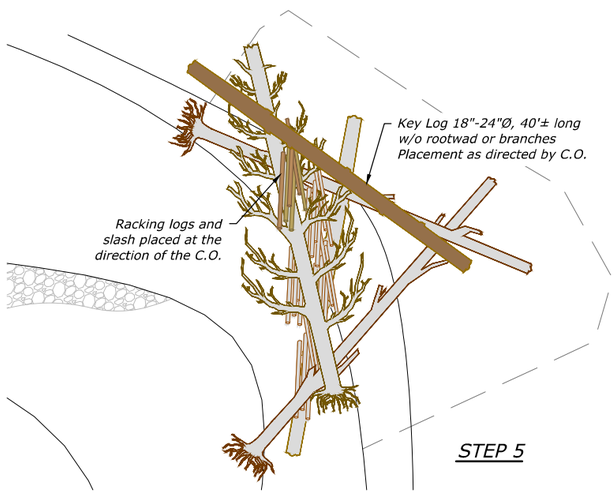
STEP 2



STEP 3



STEP 4



STEP 5

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

TYPE B4 - MEANDER JAM
MALLET JAM

SEQUENCING

1678-100-60794

SHEET 9 of 25

DATE AND TIME PLOTTED
5/10/2018 1:58 PM
PLOTTED BY
NICK DANTS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_MEANDER JAMLOWG

Hydraulic Purpose:

* Temporarily stabilize new banks in the short term to restore aquatic and riparian habitats.
* Divert high flows into side channels and floodplain.
* Sort and retain gravel.

Habitat Purpose:

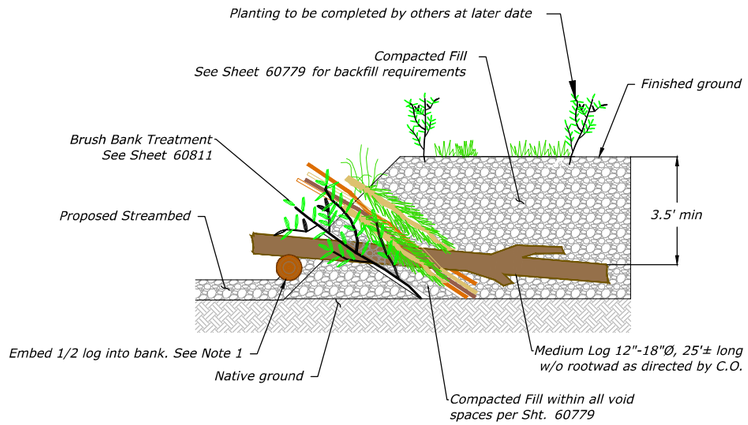
* Create diverse fish habitat on river margin.
* Provide cover.

TYPE C1 - LONGITUDINAL CHANNEL MARGIN JAM						
Log Type	Size (DBH)	Min Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Key	18" - 24"	40'	No	-	No	1
Medium	12" - 18"	25'	No	-	No	2

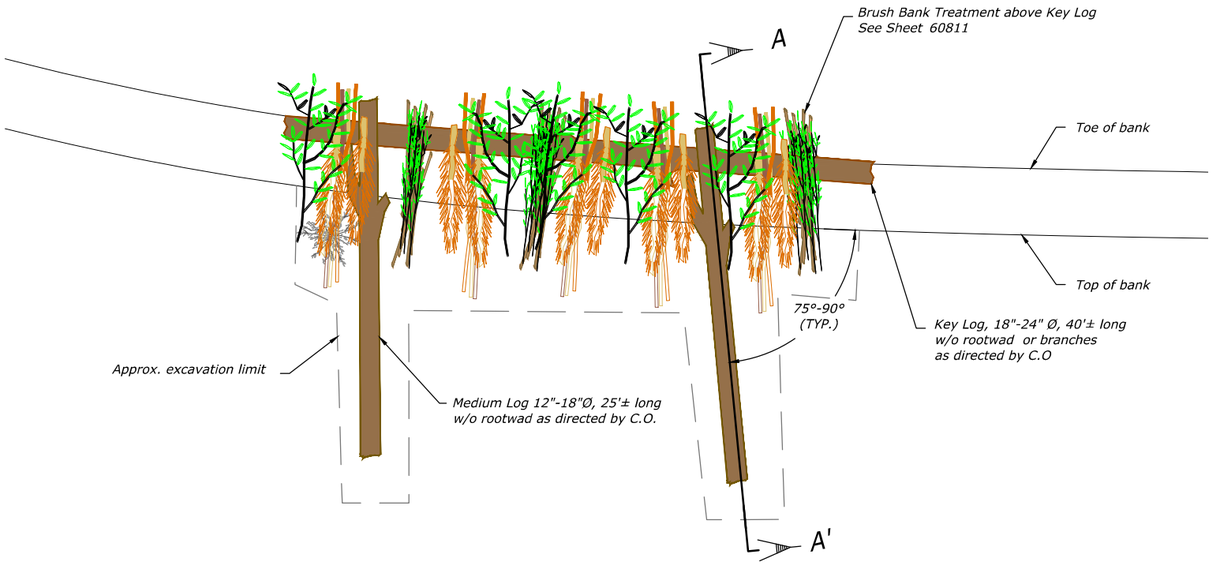
* For quantities associated with Brush Bank Treatment see Sht. 60811 .

Construction Notes:

1. Key log shall be placed so its upstream end rests on stream bed, and its downstream end is embedded up to 6". Backfill and compact around key log with Constructed Riffle Material per Sheet 60784 .
2. Medium logs shall be installed on top of key log.
3. All visible ends of logs shall be cut or broken off to create natural appearance. No flat cuts allowed.
3. Construct Brush Bank above Key Log and within void spaces per Sht. 60811 as directed by the C.O.
4. Backfill structure and void spaces with Compacted Fill per Sht. 60779 .
5. If located in Side Channels, structure may be constructed with smaller logs as directed By C.O.
6. Structure location may be field adjusted By C.O.



SECTION A-A'
NOT TO SCALE



PLAN VIEW

TYPE C1 - LONGITUDINAL CHANNEL MARGIN JAM
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/14/2018
NICHOLAS T. DANIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

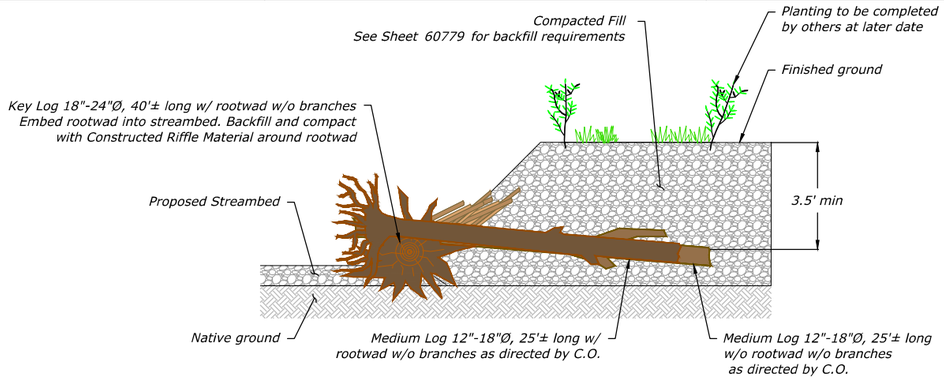
TYPE C1 -
LONGITUDINAL
CHANNEL MARGIN JAM

1678-100-60795

SHEET 10 of 25

DATE AND TIME PLOTTED
5/10/2018 1:55 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 12.0s (LMS Tech)
CAD FILENAME
BTS_LONGITUDINAL JAM.DWG



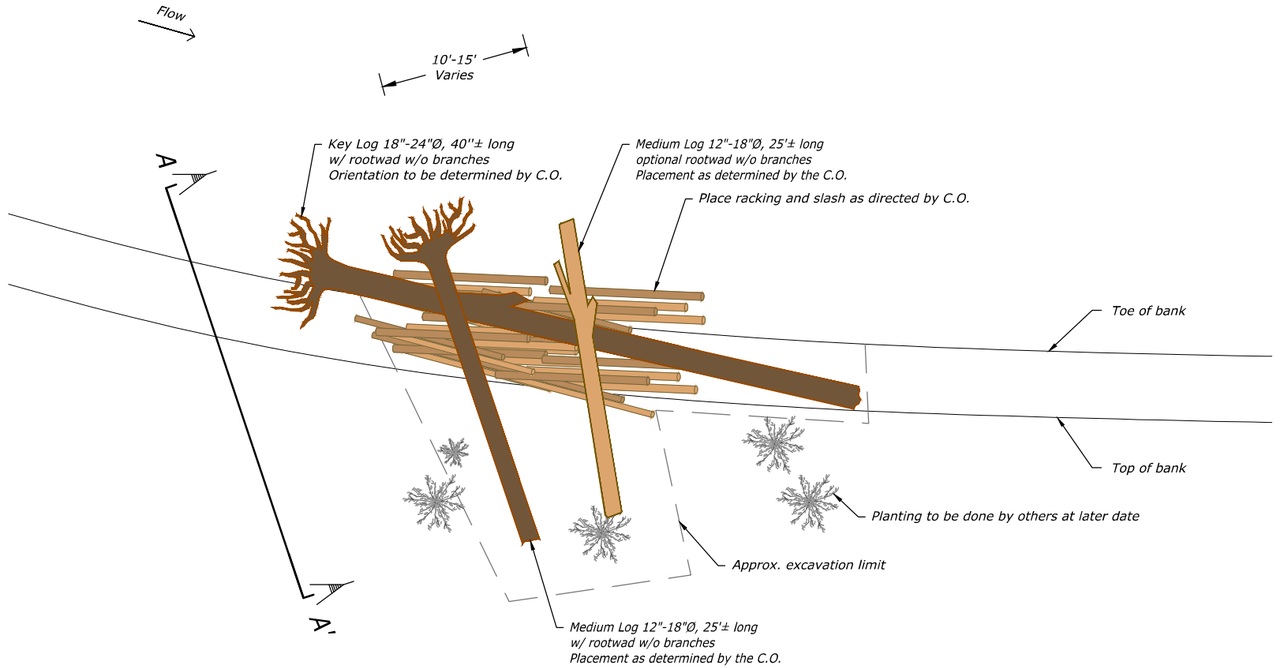
SECTION A-A'
NOT TO SCALE

Hydraulic Purpose:
* Temporarily stabilize new banks in the short term to restore aquatic and riparian habitats.
* Maintain scour holes by flow convergence.
* Divert high flows into side channels and floodplain.
* Sort and retain gravel.

Habitat Purpose:
* Create diverse fish habitat along channel margin.
* Provide cover.

TYPE C2 - ANGLED CHANNEL MARGIN JAM						
Log Type	Size (DBH)	Min Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Key	18" - 24"	40'	Yes	6'	No	1
Medium	12" - 18"	25'	Yes	4'	No	1
Medium	12" - 18"	25'	Optional	-	No	1
Racking	6" - 12"	25'	Optional	-	Optional	5
Slash (CY)	1" - 6"	5'	-	-	Yes	20
Live Cuttings	-	-	-	-	-	9

Construction Notes:
1. Key log shall be placed so its upstream end rests on stream bed, and its downstream end is embedded up to 6". Backfill and compact around key log with Constructed Riffle Material per Sht. 60784 .
2. Medium logs shall be installed on top of key log.
3. All visible ends of logs shall be cut or broken off to create natural appearance. No flat cuts allowed.
4. Backfill structure with Compacted Fill per Sht. 60779 .
5. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
6. If located in Side Channels, structure may be constructed with smaller logs as directed By C.O.
7. Structure location may be field adjusted By C.O.



PLAN VIEW

TYPE C2 - ANGLED CHANNEL MARGIN JAM
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER 79319PE OREGON NICHOLAS T. DANIS EXPIRES: 12/31/19
05/11/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

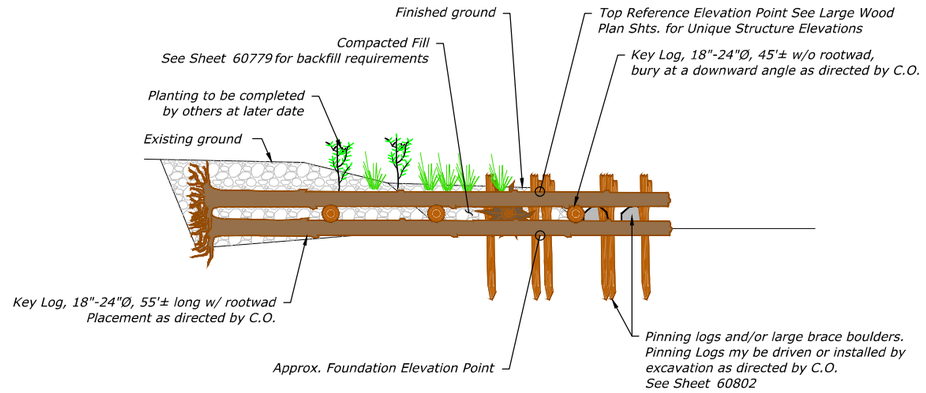
TYPE C2 - ANGLED CHANNEL MARGIN JAM

1678-100-60796

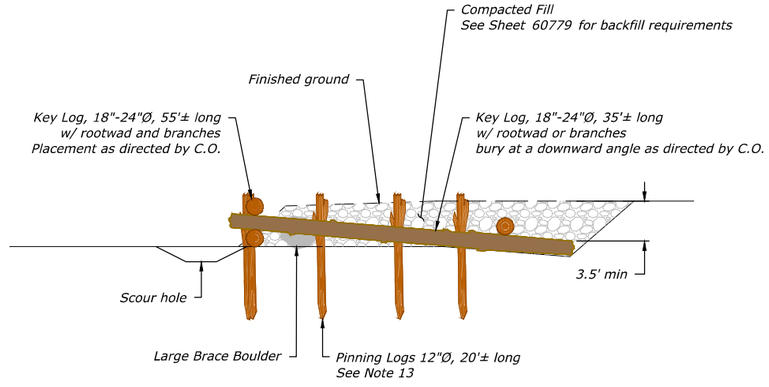
SHEET 11 of 25

DATE AND TIME PLOTTED
5/11/2018 1:59 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_LONGITUDINAL JAM.DWG



SECTION A-A'
NOT TO SCALE



SECTION B-B'
NOT TO SCALE

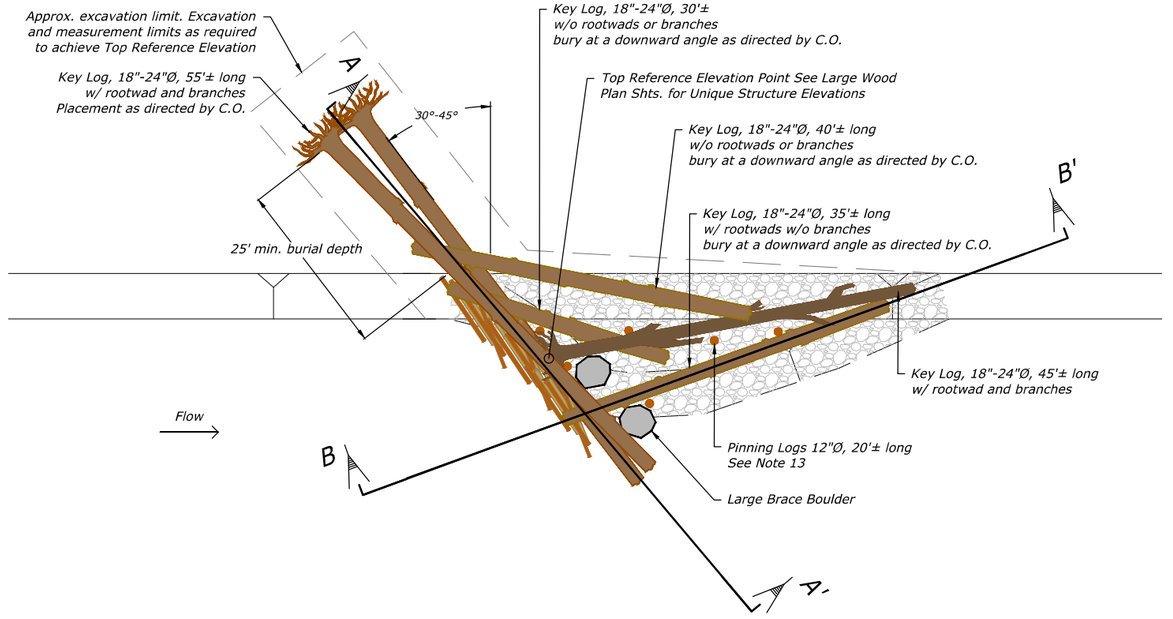
Hydraulic Purpose:
* Redirect high flows.
* Create scour pools.

Habitat Purpose:
* Provide cover and shade.

TYPE D1 - DEFLECTOR JAM (SMALL)						
Log Type	Size (DBH)	Min Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Key	18" - 24"	55'	Yes	6'	No	2
Key	18" - 24"	45'	Yes	6'	Yes	1
Key	18" - 24"	40'	No	-	No	2
Key	18" - 24"	30'	No	-	No	1
Racking	6" - 12"	20'	Optional	-	Optional	10
Pinning	12"	20'	Optional	3'	No	6
Large Boulders	>24"	-	-	-	-	2
Slash (CY)	1" - 6"	-	-	-	-	20
Live Cuttings	-	-	-	-	-	30

Construction Notes:

1. Contractor to select Key and Medium logs, per table above with the approval of the C.O. or Engineer.
2. Contractor shall measure the Diameter at Breast Height (DBH).
3. Contractor shall excavate to Foundation Elevation, by subtracting diameters of stacked logs from Top Reference Elevation.
4. Approximate Foundation Elevation shown assumes a structure height of 4.5 feet.
5. Foundation Elevation will vary based on materials and field conditions and is being provided for contractor reference only. Top Reference Elevation Point shall be held for finish grade by Contractor.
6. Trees with branches or multiple trunks preferred.
7. Racking logs and slash wedged between key members. Racking logs and slash shall have irregular and natural appearance and not stacked.
8. Top of rootwad should not exceed more than 1/2 foot above top of bank.
9. Backfill structure with Compacted Fill per Sht. 60779.
10. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
11. If located in Side Channels, structure may be constructed with smaller logs as directed By C.O.
12. Structure location may be field adjusted By C.O.
13. Pinning logs to be driven. If pinning logs cannot be driven, then pinning logs with rootwads shall be used and installed by excavation per Sheet 60802.
14. All visible ends of logs shall be cut or broken off to create natural appearance. No flat cuts allowed.



PLAN VIEW

TYPE D1 - DEFLECTOR JAM (SMALL)
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
NICHOLAS T. DANIS
79319PE
OREGON
05/14/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

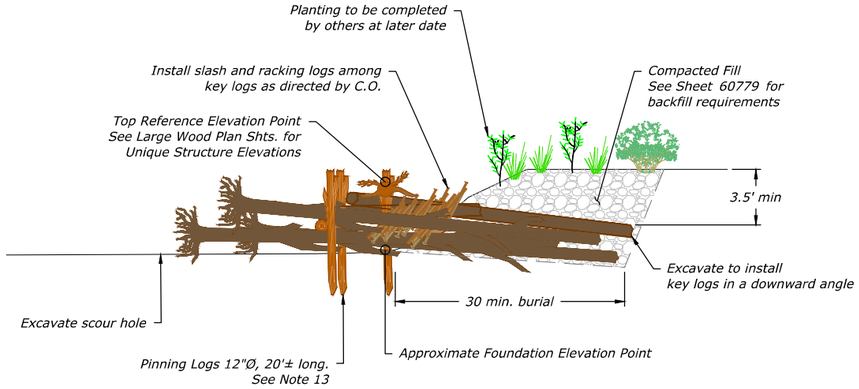
TYPE D1 - DEFLECTOR JAM (SMALL)

1678-100-60797

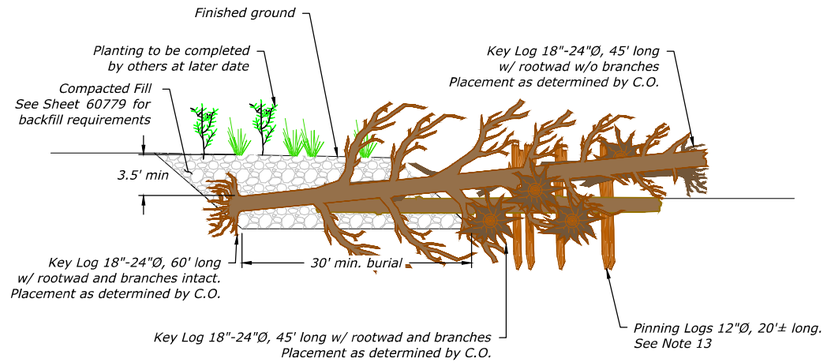
SHEET 12 of 25

DATE AND TIME PLOTTED
5/14/2018 1:58 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_DEFLECTOR JAM.DWG



SECTION A-A'
NOT TO SCALE



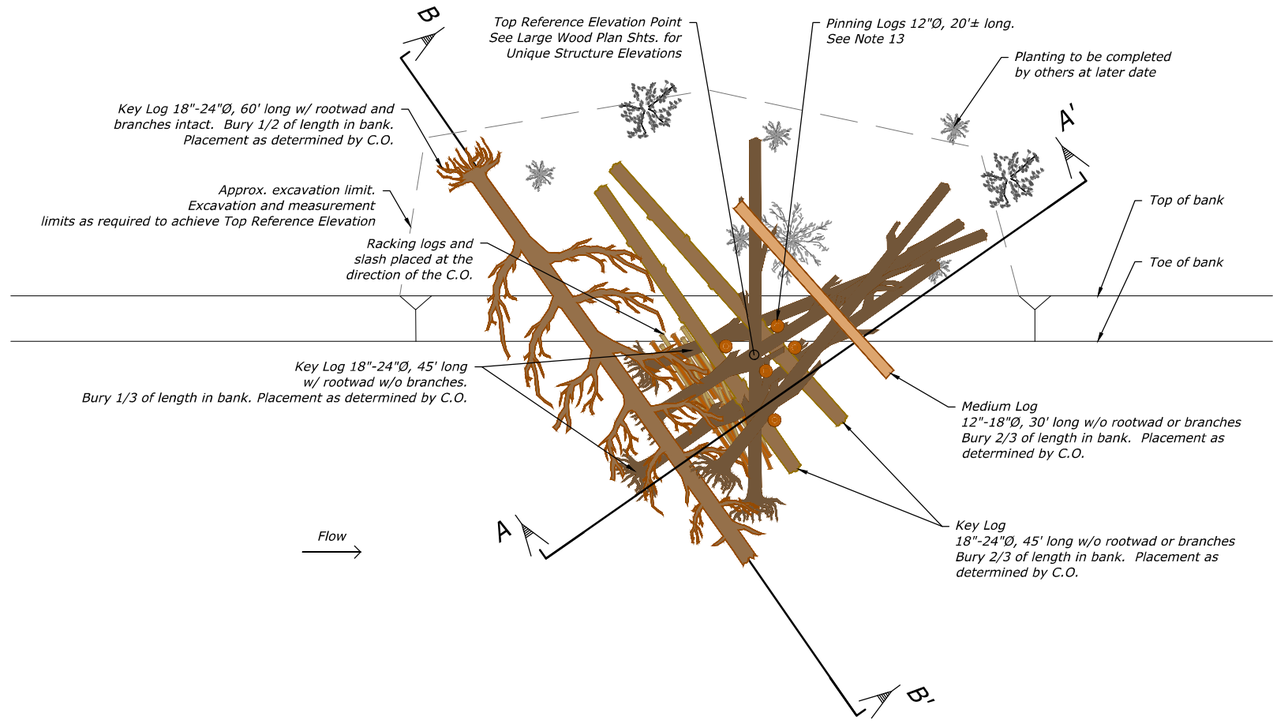
SECTION B-B'
NOT TO SCALE

Hydraulic Purpose:
* Redirect high flows.
* Create scour pools.

Habitat Purpose:
* Provide cover and shade.
* Enhance fish habitat complexity and diversity.

TYPE D2 - DEFLECTOR JAM (LARGE)						
Log Type	Size (DBH)	Min. Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Key	18" - 24"	60'	Yes	6'	Yes	1
Key	18" - 24"	45'	Yes	6'	Optional	5
Key	18" - 24"	45'	No	-	No	2
Medium	12" - 18"	30'	No	-	No	1
Racking	6" - 12"	20'	Optional	-	Optional	30
Pinning	12"	20'	Optional	-	No	5
Slash (CY)	1" - 6"	5'	-	-	Yes	30
Live Cuttings	-	-	-	-	-	36

Construction Notes:
1. Contractor to select Key and Medium logs, per table above with the approval of the C.O. or Engineer.
2. Contractor shall measure the Diameter at Breast Height (DBH).
3. Contractor shall excavate to Foundation Elevation, by subtracting diameters of stacked logs from Top Reference Elevation.
4. Approximate Foundation Elevation shown assumes a structure height of 8.75 feet.
5. Foundation Elevation will vary based on materials and field conditions and is being provided for contractor reference only. Top Reference Elevation Point shall be held for finish grade by Contractor.
6. Trees with branches or multiple trunks preferred.
7. Racking logs and slash wedged between key members. Racking logs and slash shall have irregular and natural appearance and not stacked.
8. Top of rootwad should not exceed more than 1/2 foot above top of bank.
9. Backfill structure with Compacted Fill per Sht. 60779 .
10. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
11. If located in Side Channels, structure may be constructed with smaller logs as directed By C.O.
12. Structure location may be field adjusted By C.O.
13. Pinning logs to be driven. If pinning logs cannot be driven, then pinning logs with rootwads shall be used and installed by excavation per Sheet 60802 .
14. All visible ends of logs shall be cut or broken off to create natural appearance. No flat cuts allowed.



PLAN VIEW

TYPE D2 - DEFLECTOR JAM (LARGE)
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIELS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

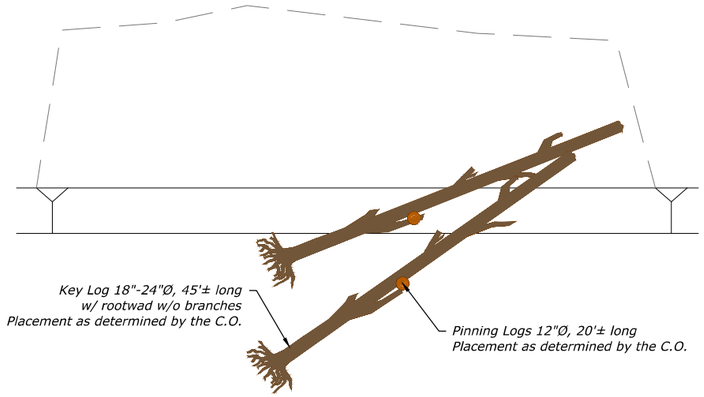
TYPE D2 - DEFLECTOR JAM (LARGE)

1678-100-60798

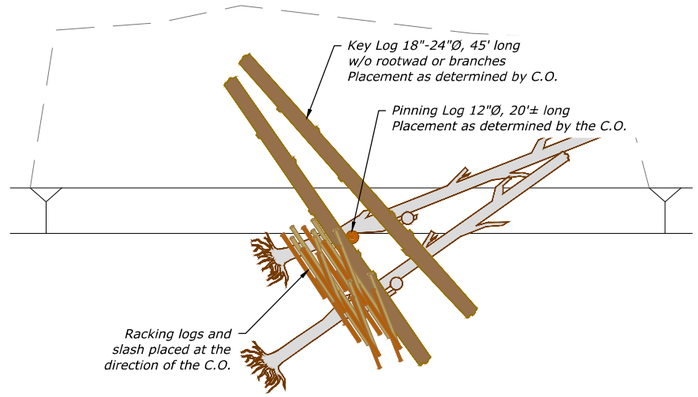
SHEET 13 of 25

DATE AND TIME PLOTTED
5/10/2018 1:50 PM
PLOTTED BY
NICK DANIS

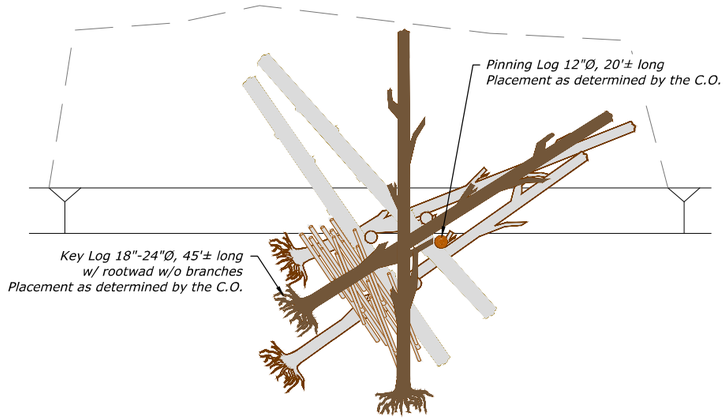
CAD SYSTEM
AutoCAD Rel. 22.0s (LMS Tech)
CAD FILENAME
BTS_DEFLECTOR JAM.DWG



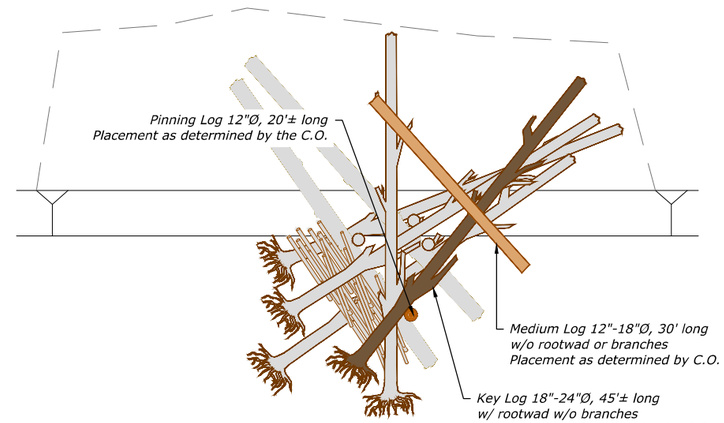
STEP 1



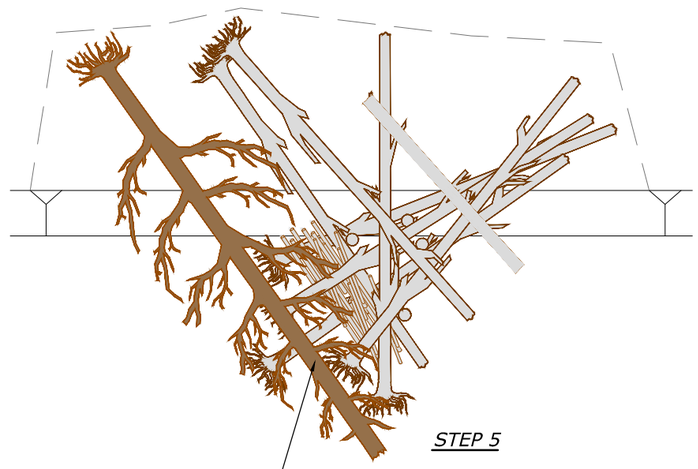
STEP 2



STEP 3



STEP 4



STEP 5

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

TYPE D2 - DEFLECTOR
JAM (LARGE)

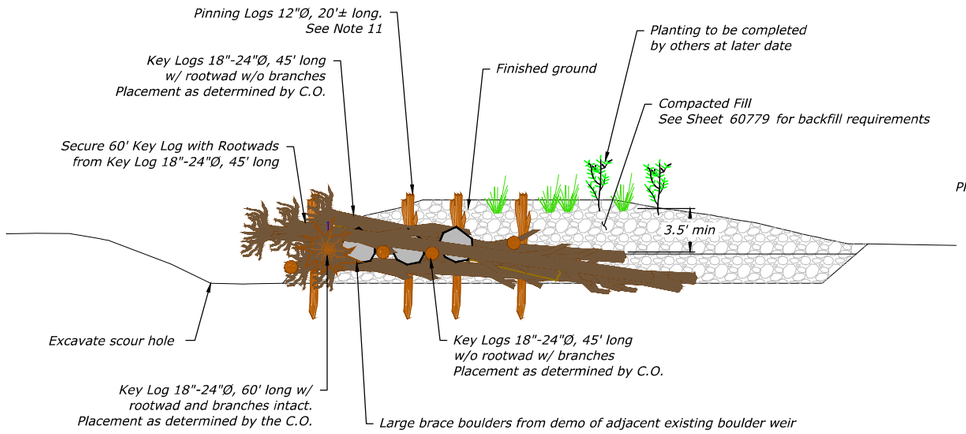
SEQUENCING

1678-100-60799

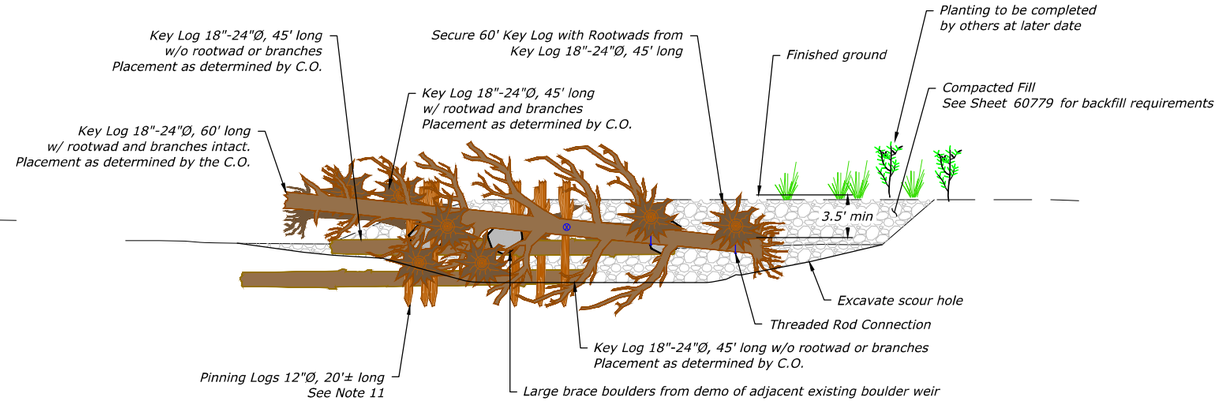
SHEET 14 of 25

DATE AND TIME PLOTTED
5/10/2018 1:30 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Rel. 22.0s (LMS Tech)
CAD FILENAME
BTS_DEFLECTOR JAM.DWG



SECTION A-A'
NOT TO SCALE



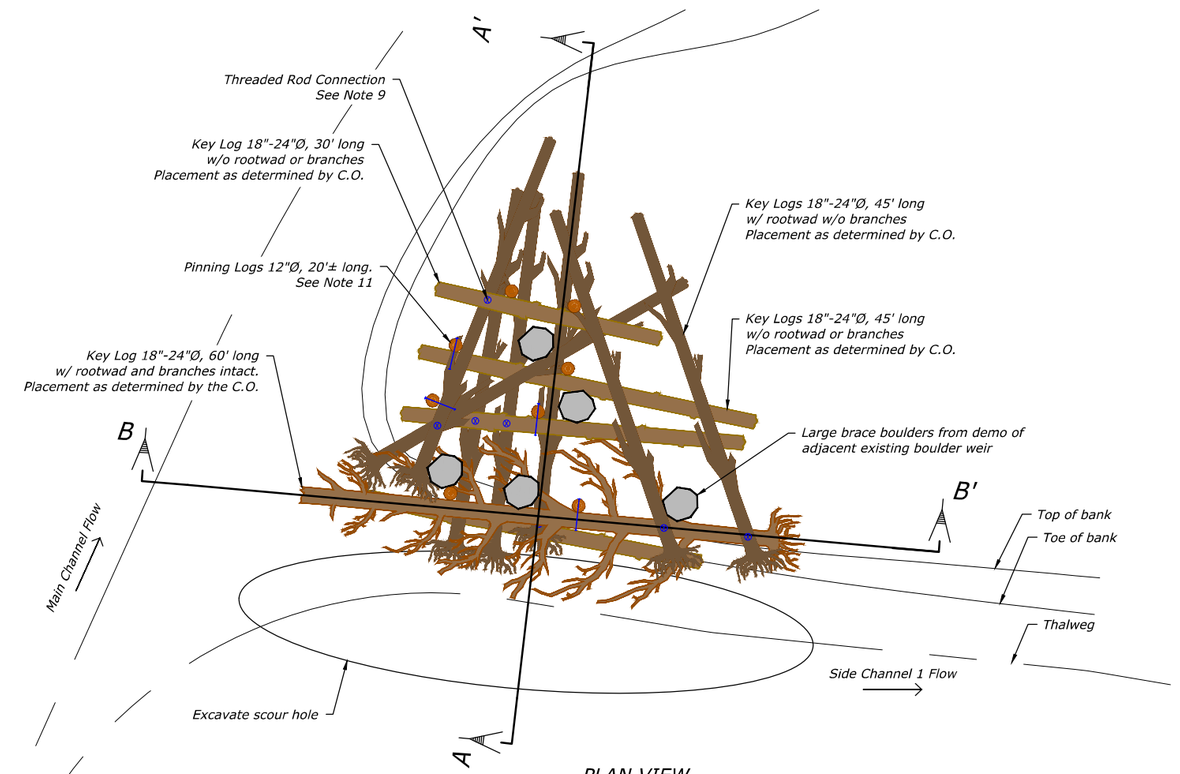
SECTION B-B'
NOT TO SCALE

Hydraulic Purpose:
- Redirect high flows.
- Create scour pools.
- Break-up and deflect ice.
- Withstand impact from heavy ice flow.

Habitat Purpose:
- Provide cover and shade.
- Enhance fish habitat complexity and diversity.

TYPE D3 - SPLIT DEFLECTOR JAM						
Log Type	Size (DBH)	Min. Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Key	18" - 24"	60'	Yes	6'	Yes	1
Key	18" - 24"	45'	Yes	6'	No	8
Key	18" - 24"	45'	No	-	No	2
Medium	12" - 18"	30'	No	-	No	1
Racking	6" - 12"	20'	Optional	-	Optional	30
Pinning	12"	20'	Optional	3'	No	8
Large Boulders	>24"	-	-	-	-	5
Slash (CY)	1" - 6"	-	-	-	Yes	30
Threaded Rod	-	-	-	-	-	13
Live Cuttings	-	-	-	-	-	36

Construction Notes:
1. Contractor to select Key and Medium logs, per table above with the approval of the C.O. or Engineer.
2. Contractor shall measure the Diameter at Breast Height (DBH)
3. Contractor shall excavate to Foundation Elevation, by subtracting diameters of stacked logs from Top Reference Elevation.
4. Approximate Foundation Elevation shown assumes a structure height of 10.5 feet.
5. Foundation Elevation will vary based on materials and field conditions and is being provided for contractor reference only. Top Reference Elevation Point shall be held for finish grade by Contractor.
6. Trees with branches or multiple trunks preferred.
7. Racking logs and slash wedged between key members.
8. Top of rootwad should not exceed more than 1/2 foot above top of bank.
9. Rods shall be 1-inch diameter minimum fully threaded steel rods (ASTM A193, grade B7) with steel nuts (ASTM A194, grade 2h) and 4-inch washers (ASTM F436) on each end. Visible portions of hardware shall be grey or other approved neutral color. Rods shall be flush cut at the nuts and sharp edges ground flush.
8. Backfill structure with Compacted Fill per Sht. 60779.
9. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
10. Structure location may be field adjusted By C.O.
11. Pinning logs to be driven. If pinning logs cannot be driven, then pinning logs with rootwads shall be used and installed by excavation per Sheet 60802. Pinning logs shall be cut such that they do not exceed top of bank.
12. All visible ends of logs shall be cut or broken off to create natural appearance. No flat cuts allowed.



PLAN VIEW

TYPE D3 - SPLIT DEFLECTOR JAM
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79819PE
OREGON
NICHOLAS T. DAVIS
EXPIRES: 12/31/19

05/11/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

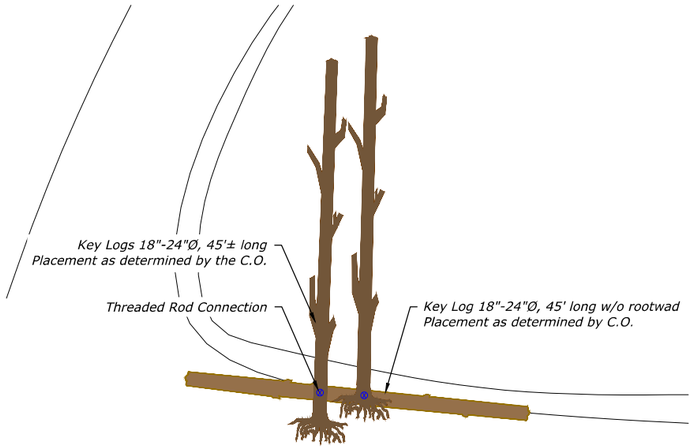
CONTRACTOR
DRAWN
M.KNUTSON P.E.
ACCEPTED
CSRO (BOISE, IDAHO) 2018-05-14

TYPE D3 - SPLIT
DEFLECTOR JAM

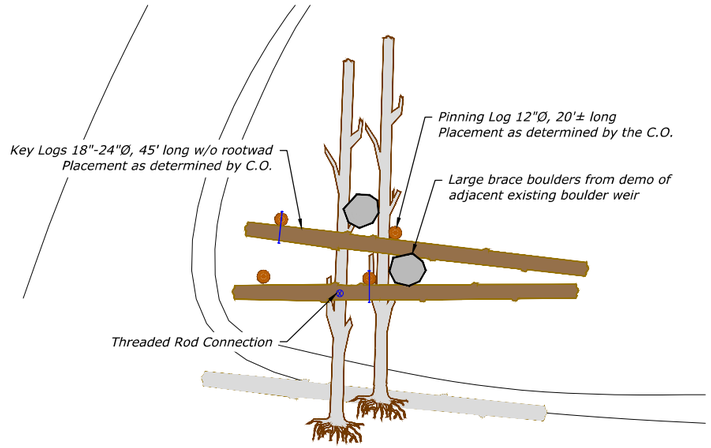
1678-100-60800
SHEET 15 of 25

DATE AND TIME PLOTTED
5/10/2018 1:51 PM
PLOTTED BY
NICK DAVIS

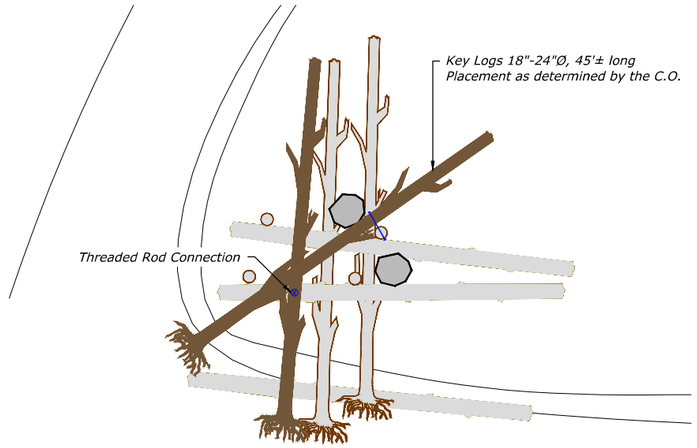
CAD SYSTEM
AutoCAD Rel. 22.0s (LMS Tech)
CAD FILENAME
BTS_DEFLECTOR JAM.DWG



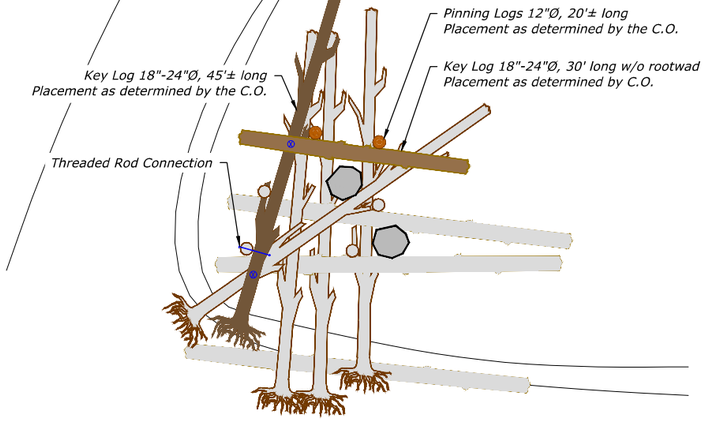
STEP 1



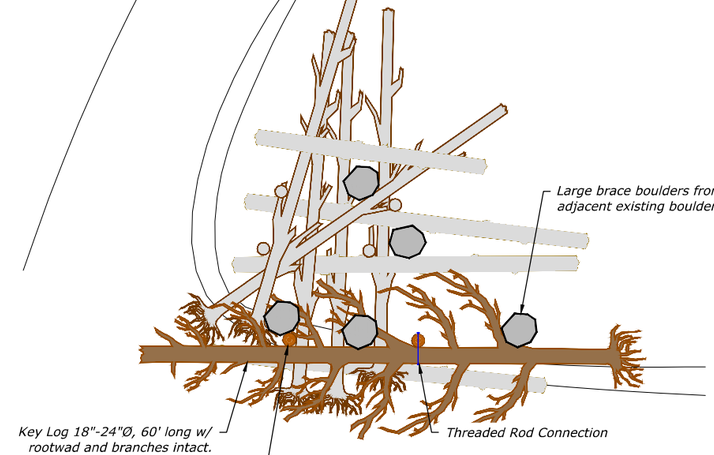
STEP 2



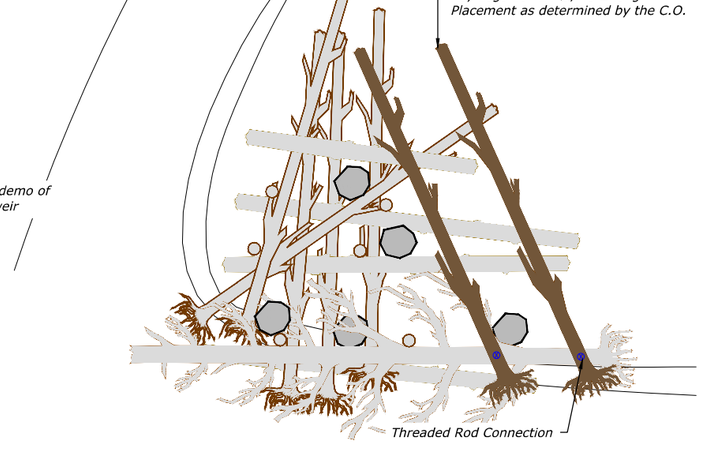
STEP 3



STEP 4



STEP 5



STEP 6

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
NICHOLAS T. DAVIS
79319PE
OREGON
05/17/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

TYPE D3 - SPLIT
DEFLECTOR JAM

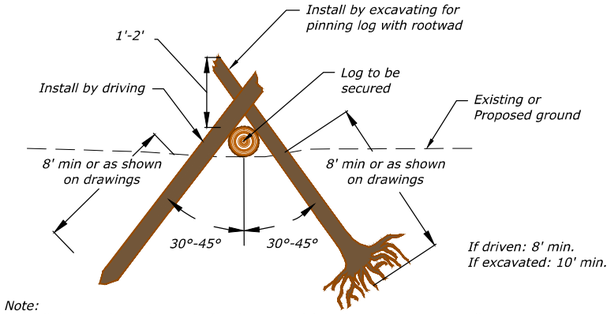
SEQUENCING

1678-100-60801

SHEET 16 of 25

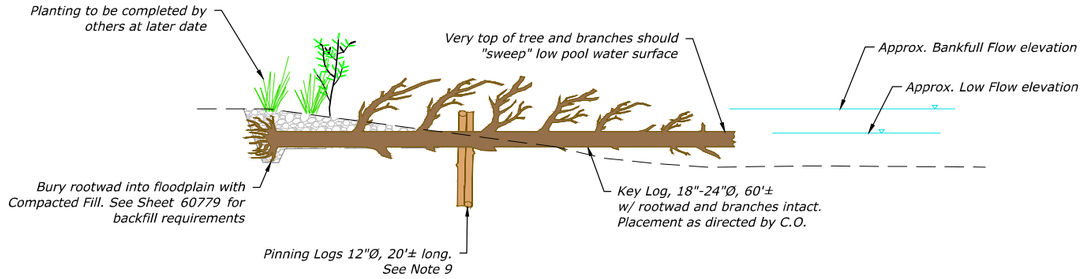
DATE AND TIME PLOTTED
5/10/2018 1:51 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Rel. 22.0s (LMS Tech)
CAD FILENAME
BTS_DEFLECTOR JAM.DWG



Note:
1. All driven piles to be marked with paint 12' from bottom prior to installation to ensure proper embedment as directed by C.O.
2. Pinning logs to be driven. If pinning logs cannot be driven to minimum burial, then pinning logs with rootwads shall be used and installed by excavation.
3. Min. rootwad diameter for excavated pinning logs shall be 3'.
4. If bedrock is encountered and minimum burial is not achievable by means of excavation, Contractor shall immediately contact the Engineer. Number and location of piles may be field adjusted by C.O. at the direction of the Engineer.

PINNING LOGS
NOT TO SCALE



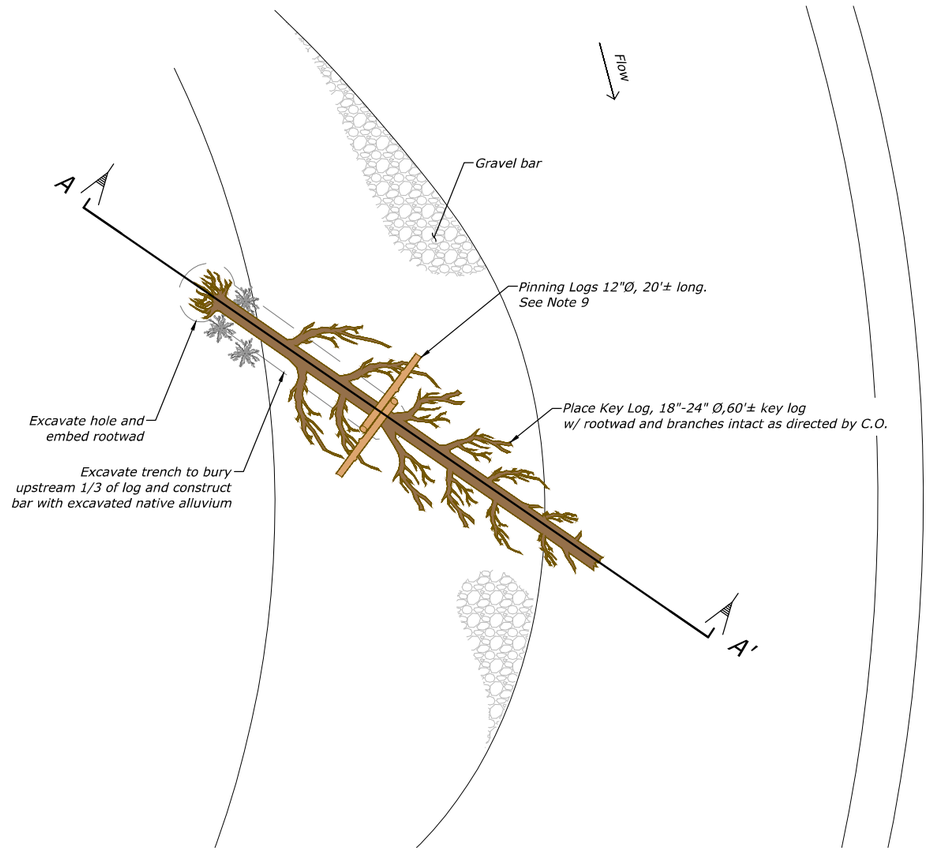
SECTION A-A'
NOT TO SCALE

Hydraulic Purpose:
* Redirect flow.

Habitat Purpose:
* Encourage gravel deposition.

TYPE E - SINGLE LOG SWEEPER JAM						
Log Type	Size (DBH)	Min Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Key	18" - 24"	60'	Yes	6'	Yes	1
Pinning	12"	20'	Optional	-	No	2
Live Cuttings	-	-	-	-	-	3

Construction Notes:
1. Place sweeper at upstream or downstream end of bend or on the inside of bend.
2. Place sweeper in areas of low shear stress or low scouring risk.
3. Trees with branches or multiple trunks preferred.
4. All visible ends of logs shall be cut or broken off to create natural appearance. No flat cuts allowed.
5. Backfill structure with Compacted Fill per Sht. 60779 .
6. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
7. Structures indicated as Type E - Sweeper (Double) in the Large Wood Plans shall consist of two (2) Type E - Sweeper (Single) detailed on this sheet or as directed by C.O.
8. Structure location may be field adjusted by the C.O.
9. Pinning logs to be driven. If pinning logs cannot be driven to minimum burial, then pinning logs with rootwads shall be used and installed by excavation per detail this sheet.



PLAN VIEW

TYPE E - SINGLE LOG SWEEPER JAM
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
NICHOLAS T. DANIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

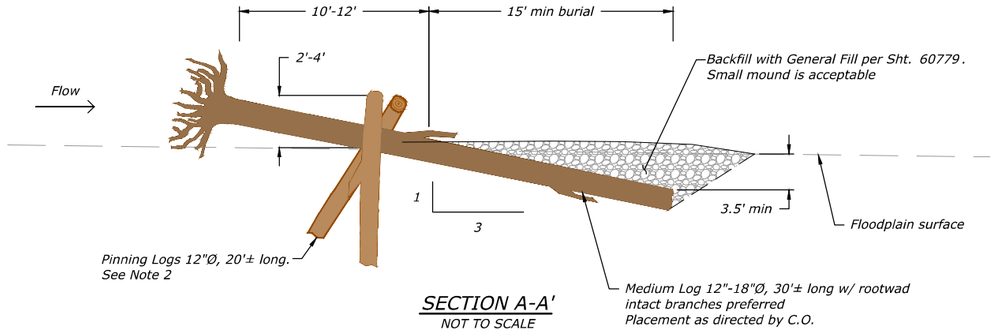
TYPE E - SINGLE LOG SWEEPER JAM

1678-100-60802

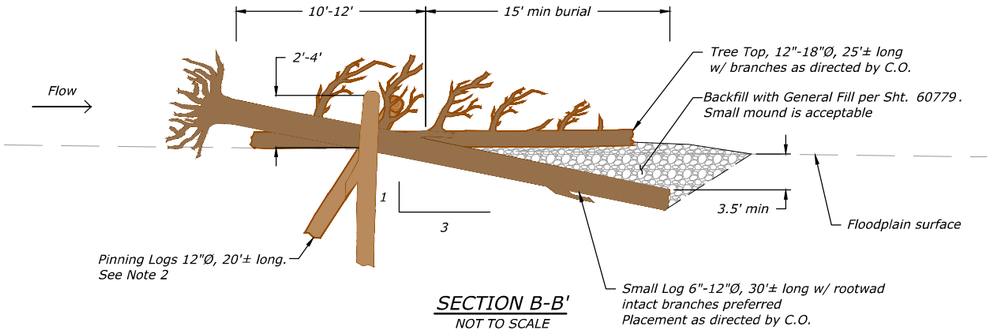
SHEET 17 of 25

DATE AND TIME PLOTTED
5/10/2018 7:51 PM
PLOTTED BY
NICK DANIS

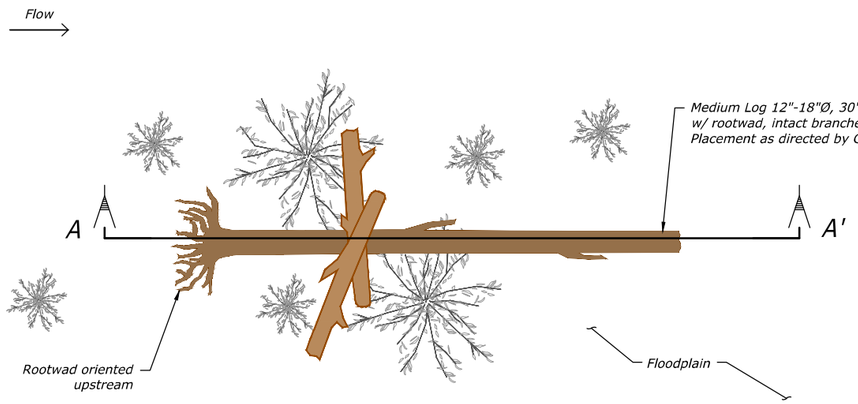
CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_SWEEPER JAM.DWG



SECTION A-A'
NOT TO SCALE

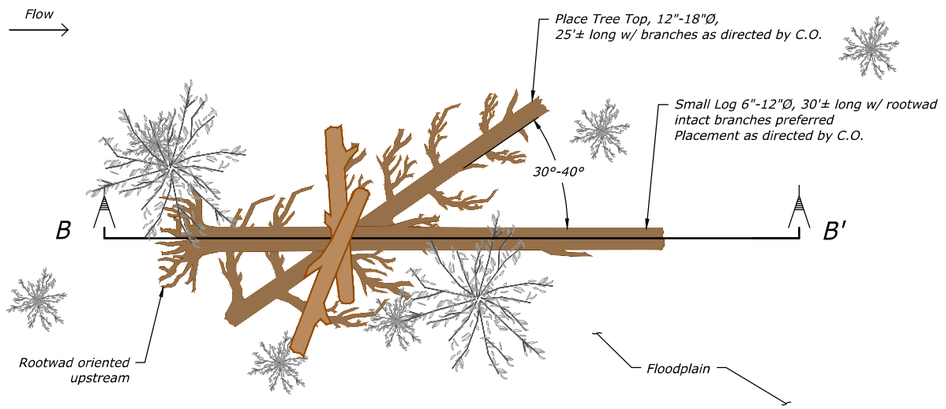


SECTION B-B'
NOT TO SCALE



PLAN VIEW

TYPE F - FLOODPLAIN ROUGHNESS (ONE LOG)
NOT TO SCALE



PLAN VIEW

TYPE F - FLOODPLAIN ROUGHNESS (TWO LOG)
NOT TO SCALE

TYPE F - FLOODPLAIN ROUGHNESS (ONE LOG)						
Log Type	Size (DBH)	Min Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Medium	12" - 18"	30'	Yes	3'	Optional	1
Pinning	12"	20'	Optional	-	No	2
Live Cuttings	-	-	-	-	-	3

TYPE F - FLOODPLAIN ROUGHNESS (TWO LOG)						
Log Type	Size (DBH)	Min Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Small	6" - 12"	30'	Yes	2'	Optional	1
Pinning	12"	20'	Optional	-	No	2
Tree Tops	8" - 12"	25'	No	-	Yes	1
Live Cuttings	-	-	-	-	-	6

Notes:

Hydraulic Purpose:
- * Increase hydraulic roughness of floodplain.

Habitat Purpose:
- * Encourage sediment deposition.

Design Specifics:
1. Install on floodplains with low shear stress.
2. Pinning logs to be driven. If pinning logs cannot be driven, then pinning logs with rootwads shall be used and installed by excavation per Sheet 60802.
3. All visible ends of logs shall be cut or broken off to create natural appearance. No flat cuts allowed.
4. Floodplain Roughness shall be an equal split of Type F - Floodplain Roughness (One Log) and Type F - Floodplain Roughness (Two Log) structures and shall be well distributed throughout the project area.
5. Orientation to vary as to not encourage preferential flow paths between structures.
6. Structure location may be field adjusted by the C.O.
7. Backfill with General Fill per Sht. 60779. Small mound is acceptable.

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
NICHOLAS T. DAVIS
79319PE
OREGON
05/01/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

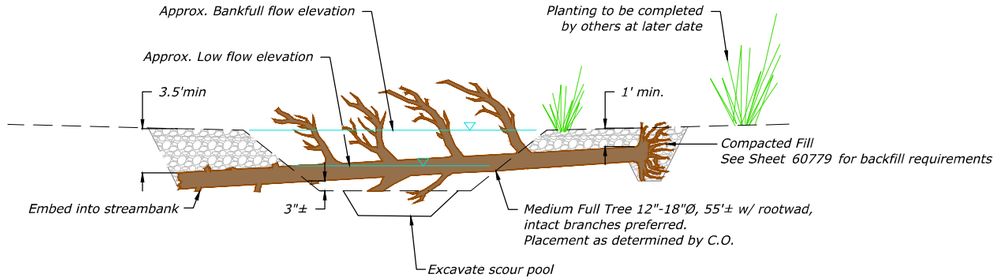
TYPE F - FLOODPLAIN ROUGHNESS

1678-100-60803

SHEET 18 of 25

DATE AND TIME PLOTTED
5/1/2018 1:21 PM
PLOTTED BY
NICK DAVIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_FLOODPLAIN ROUGHNESS.DWG



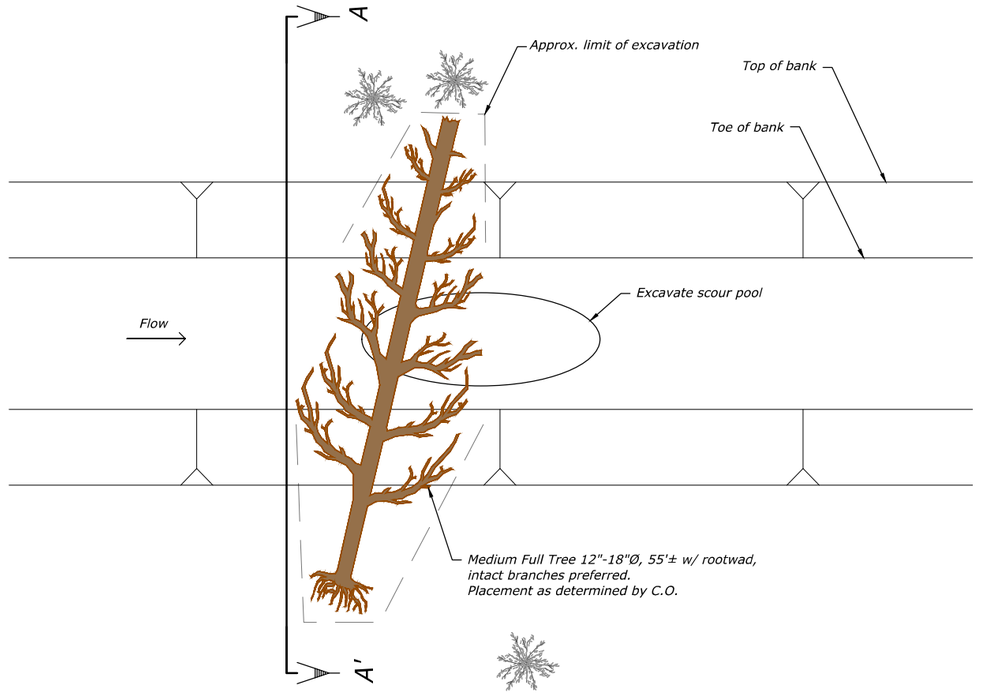
SECTION A-A'
NOT TO SCALE

Hydraulic Purpose:
* Create scour holes.

Habitat Purpose:
* Mimic trees falling into the channel.
* Provide cover.

TYPE G1 - SC HABITAT - SINGLE LOG						
Log Type	Size (DBH)	Min. Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Medium	12" - 18"	55'	Optional	4'	Yes	1
Live Cuttings	-	-	-	-	-	3

Construction Notes:
1. Structure located in Side Channels Only
2. Crossing logs shall be in contact with water at low flow to create scour pool.
3. Trees with branches or multiple trunks preferred.
4. Backfill structure with Compacted Fill per Sht. 60779 .
5. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
6. Structure location may be field adjusted By C.O.



PLAN VIEW

TYPE G1 - SC HABITAT - SINGLE LOG
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79919PE
OREGON
05/11/2018
NICHOLAS T. DANIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

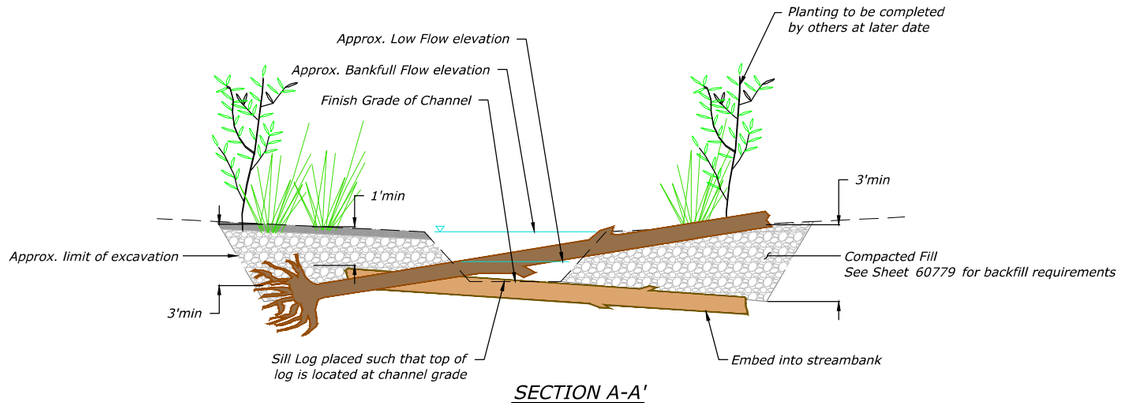
TYPE G1 - SC HABITAT - SINGLE LOG

1678-100-60804

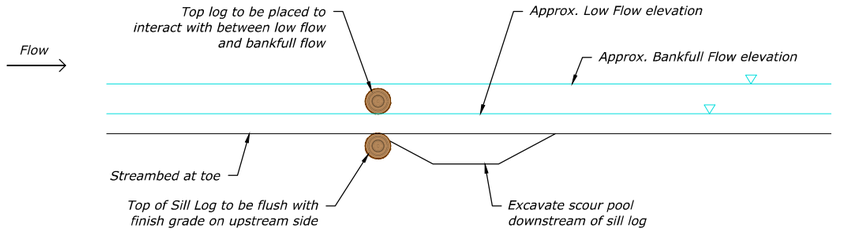
SHEET 19 of 25

DATE AND TIME PLOTTED
5/11/2018 1:51 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_CHANNEL SPANNING JAMS.DWG



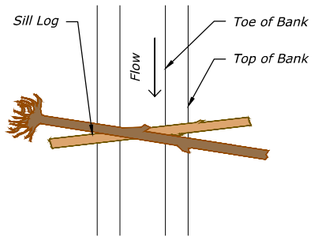
SECTION A-A'
NOT TO SCALE



SECTION B-B'
NOT TO SCALE

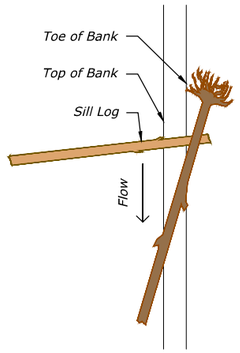
Hydraulic Purpose:
* Create scour holes.

Habitat Purpose:
* Mimic trees falling into the channel.
* Provide cover.

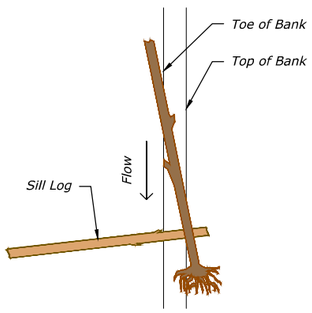


CHANNEL SPANNING OPTION

TYPE G2 - SC HABITAT - DOUBLE LOG						
Log Type	Size (DBH)	Min. Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Medium	12" - 18"	30'	Yes	3'	No	1
Small	6" - 12"	30'	No	-	No	1
Live Cuttings	-	-	-	-	-	6

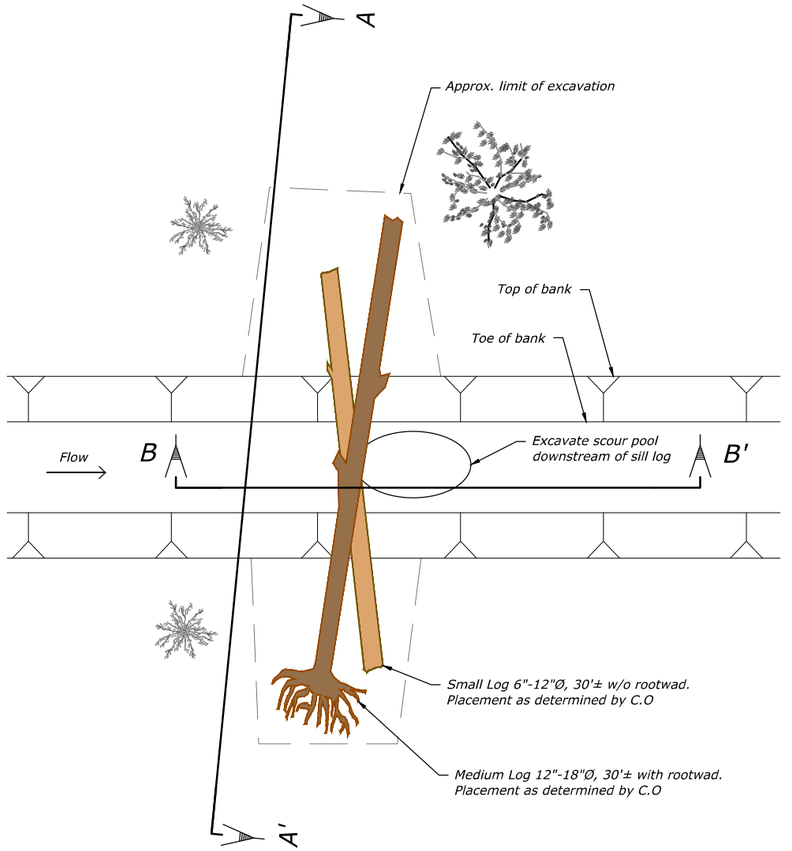


NON SPANNING OPTION 1



NON SPANNING OPTION 2

SC HABITAT DOUBLE LOG CONFIGURATIONS



PLAN VIEW

TYPE G2 - SC HABITAT - DOUBLE LOG
NOT TO SCALE

Construction Notes:

1. Structure located in Side Channels Only
2. Crossing logs shall be in contact with water at low flow to create scour pool.
3. Trees with branches or multiple trunks preferred.
4. Backfill structure with Compacted Fill per Sht. 60779 .
5. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
6. Structure configuration to be determined by C.O. in field to best meet intent of design.
7. Structure location may be field adjusted By C.O.

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/14/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

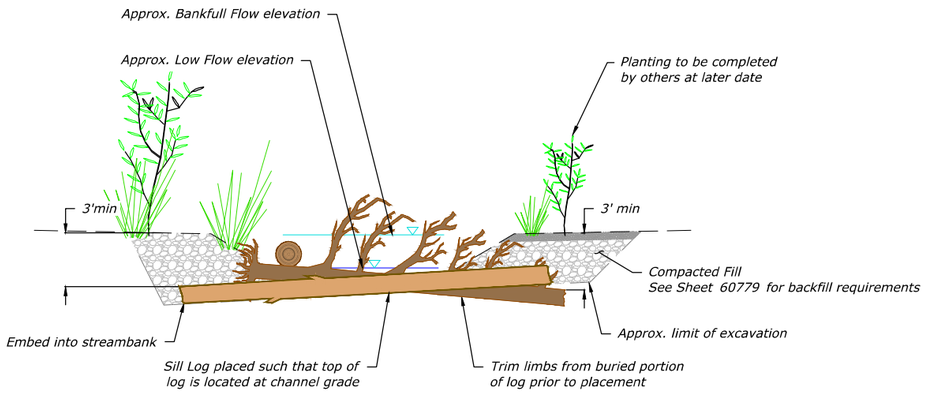
TYPE G2 - SC HABITAT - DOUBLE LOG

1678-100-60805

SHEET 20 of 25

DATE AND TIME PLOTTED
5/10/2018 12:15 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_CHANNEL SPANNING JAMS.DWG



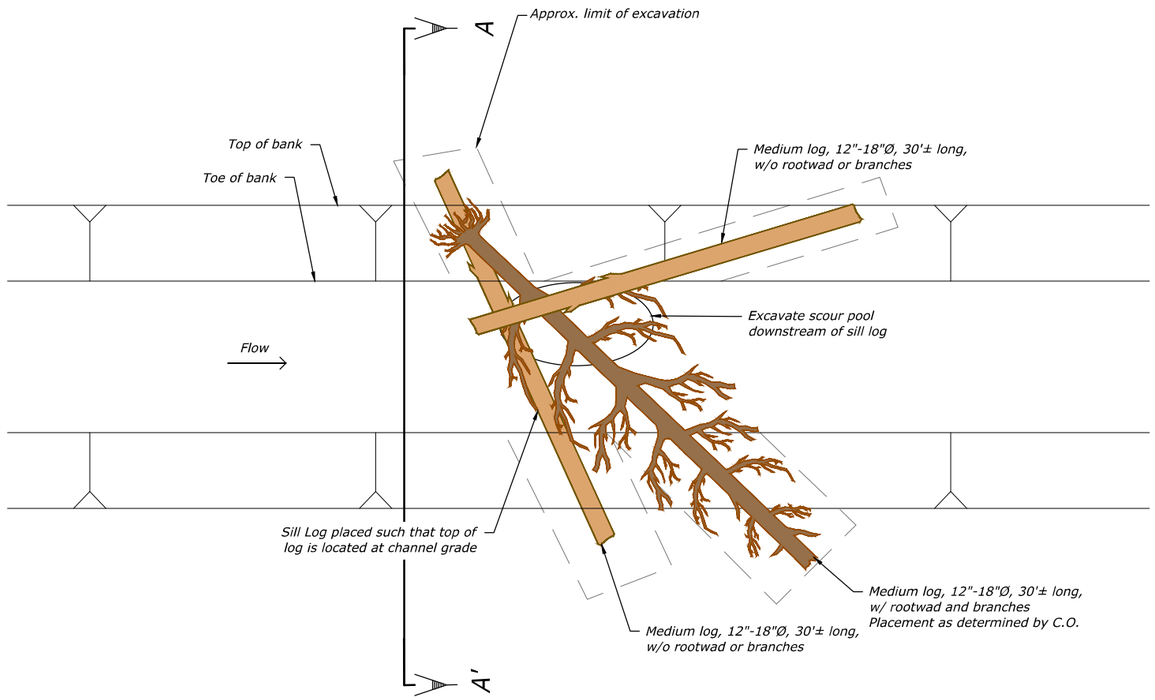
SECTION A-A'
NOT TO SCALE

Hydraulic Purpose:
* Create scour holes.

Habitat Purpose:
* Mimic trees falling into the channel.
* Provide cover.

TYPE G3 - SC HABITAT - TRIPLE LOG						
Log Type	Size (DBH)	Min. Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Medium	12" - 18"	30'	Yes	3'	Yes	1
Medium	12" - 18"	30'	No	-	No	2
Live Cuttings	-	-	-	-	-	9

Construction Notes:
1. Structure located in Side Channels Only
2. Crossing logs shall be in contact with water at low flow to create scour pool.
3. Trees with branches or multiple trunks preferred.
4. Members secured into banks and backfilled with Compacted Fill per Sht. 60779 .
5. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
6. Structure location may be field adjusted By C.O.



PLAN VIEW

TYPE G3 - SC HABITAT - TRIPLE LOG
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
NICHOLAS T. DANIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

TYPE G3 - SC HABITAT - TRIPLE LOG

1678-100-60806

SHEET 21 of 25

DATE AND TIME PLOTTED
5/10/2018 1:41 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 2016 (LMS Tech)
CAD FILENAME
BTS_CHANNEL SPANNING JAMS.DWG

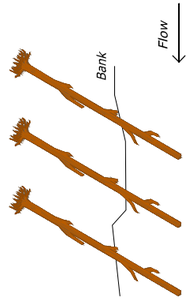
Habitat Purpose:
* Increase hydraulic roughness of floodplain.

Habitat Purpose:
* Encourage sediment deposition.
* Provide cover.

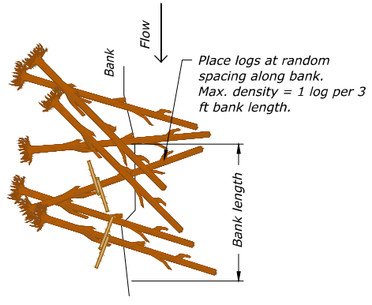
TYPE H - COVER LOG						
Log Type	Size (DBH)	Min. Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Racking	6" - 12"	20'	Optional	-	Optional	3-6
Pinning	12"	20'	Optional	-	No	6-12

* DBH = Diameter at Breast Height

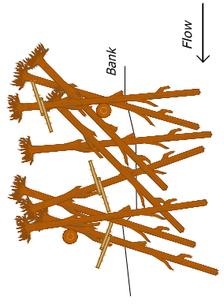
Construction Notes:
1. Whole coniferous trees with rootwads and limbs intact are preferred. Limbs not shown for clarity.
2. Bottom of cover logs shall be in contact with water at low flow.
3. Number of cover logs will vary by location and will be determined in the field by the C.O.
4. Cover logs will be field located by the C.O.
5. Protect existing trees. Remove only trees as marked or directed by C.O.



NOT ACCEPTABLE
Uniform spacing
Parallel angles

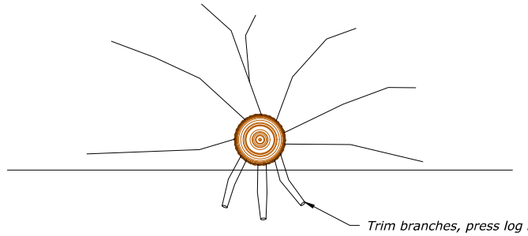


ACCEPTABLE
Random spacing
Predominantly angled downstream
Varied angles

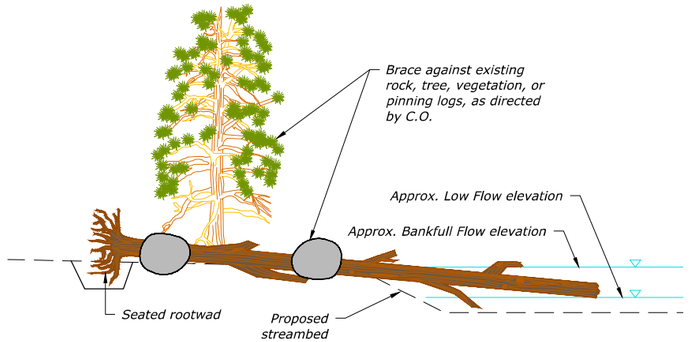


WHERE EXISTING FEATURES PERMIT
Bunch and cluster cover logs around existing vegetation, trees, or rock features.
Hook branches on existing features.
Lace logs through existing features.

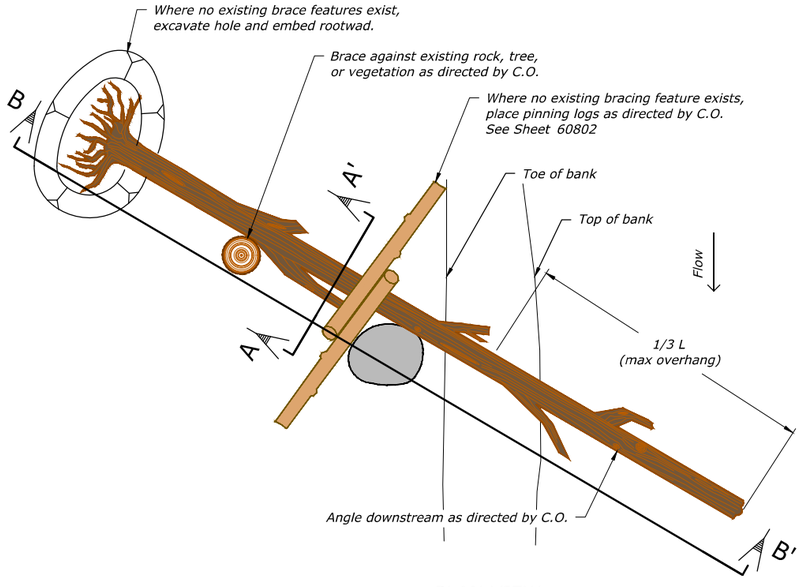
COVER LOG CONFIGURATIONS



SECTION A-A'
NOT TO SCALE



SECTION B-B'
NOT TO SCALE



PLAN VIEW

TYPE H - COVER LOG
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
NICHOLAS T. DANIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN
M.KNUTSON P.E.
ACCEPTED
CSRO (BOISE, IDAHO) 2018-05-14

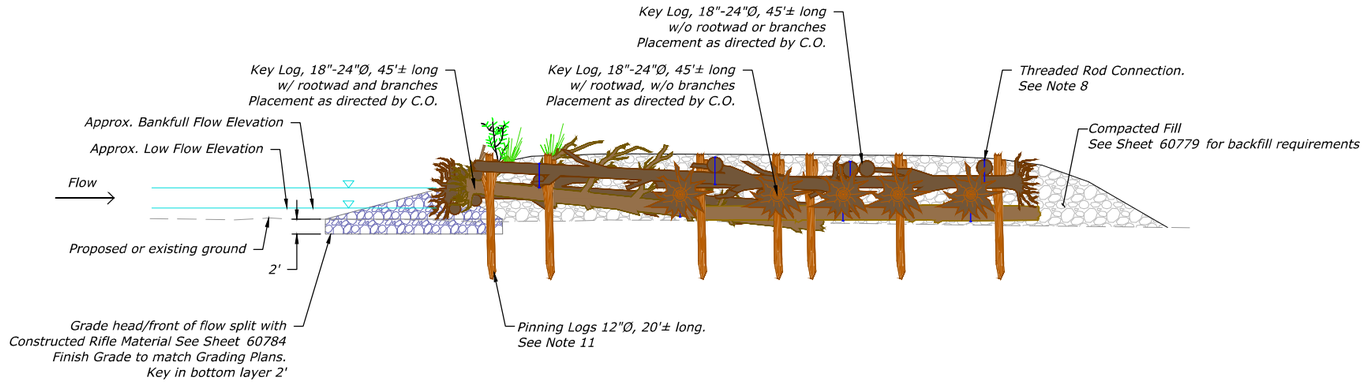
TYPE H - COVER LOG

1678-100-60807

SHEET 22 of 25

DATE AND TIME PLOTTED
5/10/2018 1:51 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Rel. 22.0s (LMS Tech)
CAD FILENAME
BTS_COVER LOGS DETAIL.DWG



SECTION A-A'
NOT TO SCALE

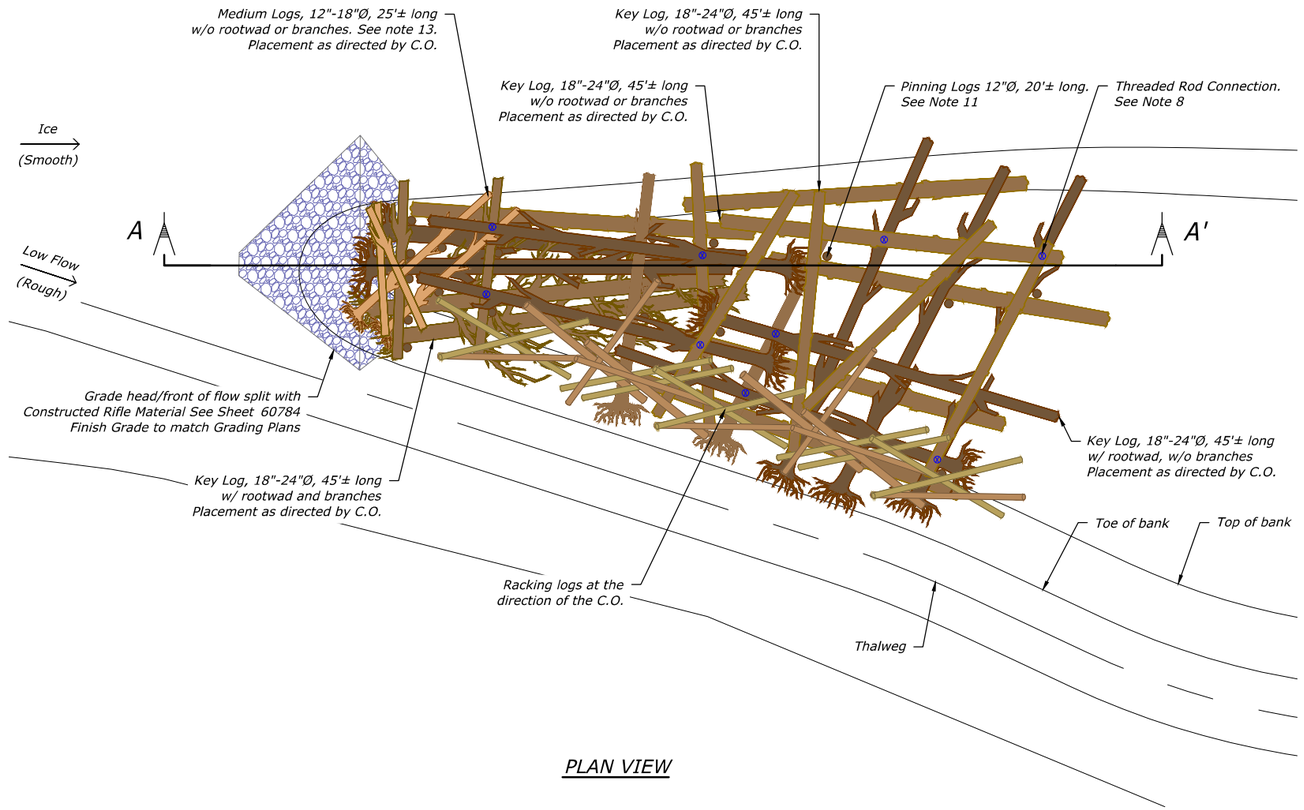
Hydraulic Purpose:

- Break-up and deflect ice.
- Withstand impact from heavy ice flow.
- Create split flow, and protect or create vegetated island or gravel bar.
- Create scour pool and sort sediment.

TYPE I - ICE CRIB JAM						
Log Type	Size (DBH)	Min. Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Key	18" - 24"	45'	Yes	4'	Yes	2
Key	18" - 24"	45"	Yes	4'	No	24
Key	18" - 24"	45"	No	-	No	9
Key	18" - 24"	35'	No	-	No	1
Key	18" - 24"	30'	Yes	4'	No	2
Medium	12" - 18"	30'	Optional	-	No	7
Racking	6" - 12"	20'	Optional	-	Optional	25
Pinning	12"	20'	Yes	3'	No	19
Constructed Riffle Material	-	-	-	-	-	50 CY
Threaded Rod	-	-	-	-	-	26
Live Cuttings	-	-	-	-	-	80

Construction Notes:

1. Contractor to select Key and Medium logs, per table above with the approval of the C.O. or Engineer.
2. Contractor shall measure the Diameter at Breast Height (DBH) of Key and Medium logs.
3. Contractor shall excavate to Foundation Elevation, by subtracting diameters of stacked logs from Top Reference Elevation.
4. Approximate Foundation Elevation shown assumes a structure height of 7.0 feet.
5. Foundation Elevation will vary based on materials and field conditions and is being provided for contractor reference only. Top Reference Elevation Point shall be held for finish grade by Contractor.
6. Racking logs and slash wedged between key members.
7. Top of rootwad should not exceed more than 1/2 foot above top of bank.
8. Rods shall be 1-inch diameter minimum fully threaded steel rods (ASTM A193, grade B7) with steel nuts (ASTM A194, grade 2h) and 4-inch washers (ASTM F436) on each end. Visible portions of hardware shall be grey or other approved neutral color. Rods shall be flush cut at the nuts and sharp edges ground flush.
9. Backfill structure with Compacted Fill per Sht. 60779.
10. Install live cuttings at a rate of 80 cuttings per structure while installing logs. Live cuttings shall be provided by Contracting Agency. Coordinate cutting placement with adjacent bank treatments if applicable.
11. Pinning logs to be driven. If pinning logs cannot be driven, then pinning logs with rootwads shall be used and installed by excavation per Sheet 60802. Pinning logs shall be cut such that they do not exceed top of bank. If bedrock is encountered and minimum burial for pinning logs is not achievable by means of excavation, Contractor shall immediately contact the Engineer. Number and location of piles may be field adjusted by C.O. at the direction of the Engineer.Top of pinning logs shall be cut prior to backfill such that top of logs does not protrude above finish grade.
12. North side of structure (river left) shall be hydraulically smooth to reduce potential ice snag and debris accumulation. Trees shall be limbed and logs shall not protrude out from structure.
13. All visible ends of logs shall be cut or broken off to create natural appearance. No flat cuts allowed.
14. Hydraulically smooth side of structure may flip sides as directed by C.O.
15. Structure location may be field adjusted By C.O.



PLAN VIEW

TYPE I - ICE CRIB JAM
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
EXPIRES: 12/31/19
05/11/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

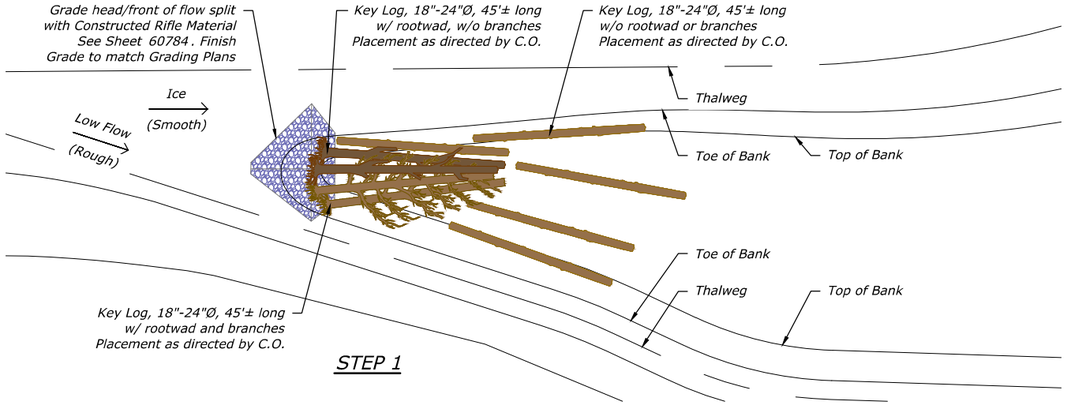
TYPE I - ICE CRIB JAM

1678-100-60808

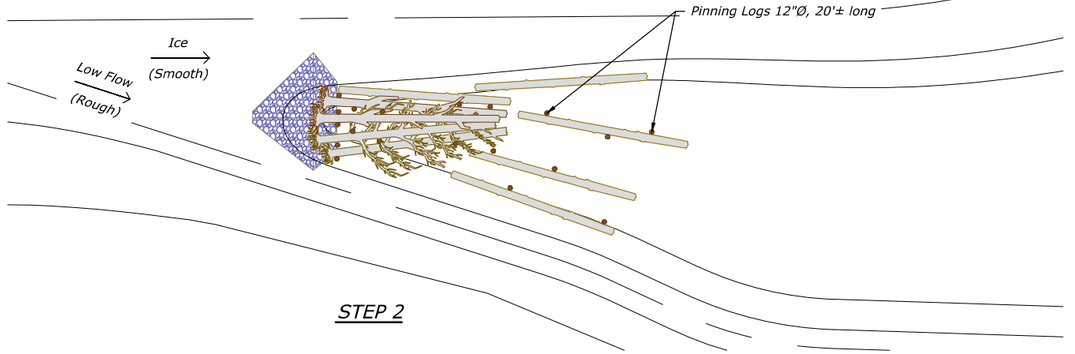
SHEET 23 of 25

DATE AND TIME PLOTTED
5/10/2018 1:51 PM
PLOTTED BY
NICK DANIS

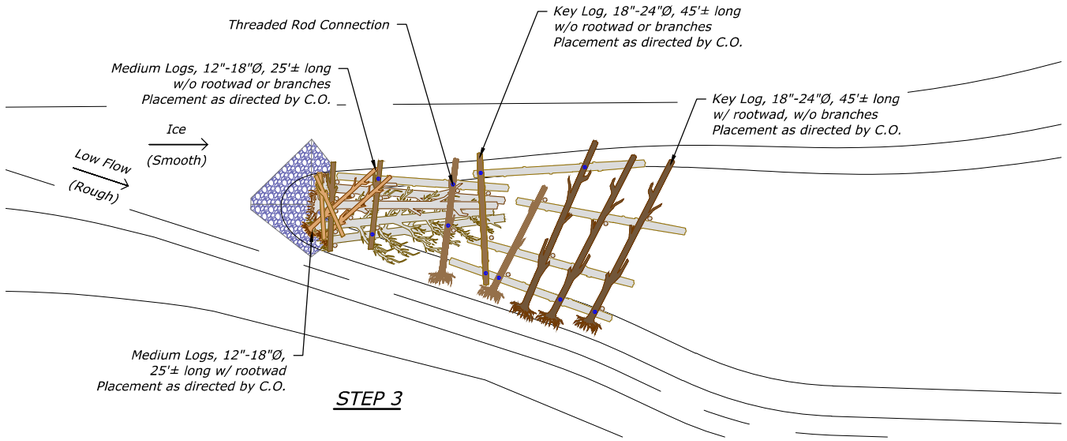
CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_ICE JAM SMALL CRIB.DWG



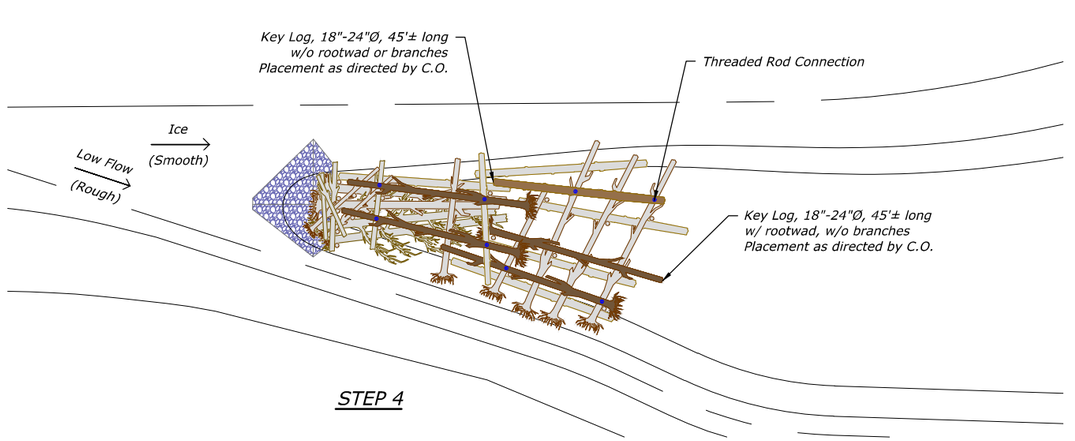
STEP 1



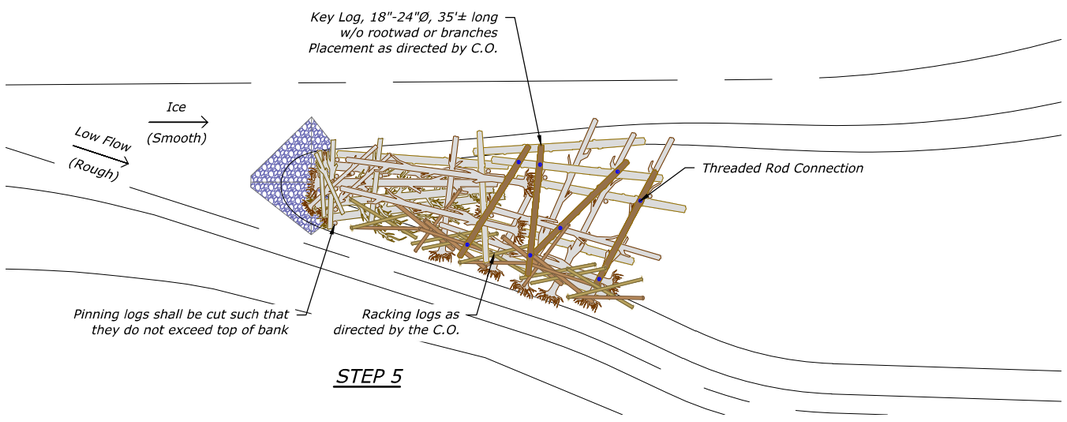
STEP 2



STEP 3



STEP 4



STEP 5

TYPE I - ICE CRIB JAM SEQUENCING

Step Number	Log Type	Size (DBH)	Min Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Step 1	Key	18" - 24"	45'	Yes	4'	Yes	2
Step 1	Key	18" - 24"	45'	Yes	4'	No	2
Step 1	Key	18" - 24"	45'	No	-	No	5
Step 1	Constructed Riffle Material	-	-	-	-	-	50 CY
Step 2	Pinning	12"	20'	Yes	3'	No	19
Step 3	Key	18" - 24"	45'	Yes	4'	No	3
Step 3	Key	18" - 24"	35'	No	-	No	1
Step 3	Key	18" - 24"	30'	Yes	4'	No	2
Step 3	Medium	12" - 18"	25'	Optional	-	No	7
Step 3	Threaded Rod	-	-	-	-	-	10
Step 4	Key	18" - 24"	45'	Yes	4'	No	18
Step 4	Threaded Rod	-	-	-	-	-	8
Step 5	Key	18" - 24"	45'	No	-	No	4
Step 5	Racking	6" - 12"	20'	Optional	-	Optional	25
Step 5	Threaded Rod	-	-	-	-	-	8

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
EXPIRES: 12/31/19
05/17/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM
FCRPS HABITAT IMPROVEMENT PROGRAM - IDAHO

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

TYPE I1 - ICE CRIB JAM

SEQUENCING

1678-100-60809

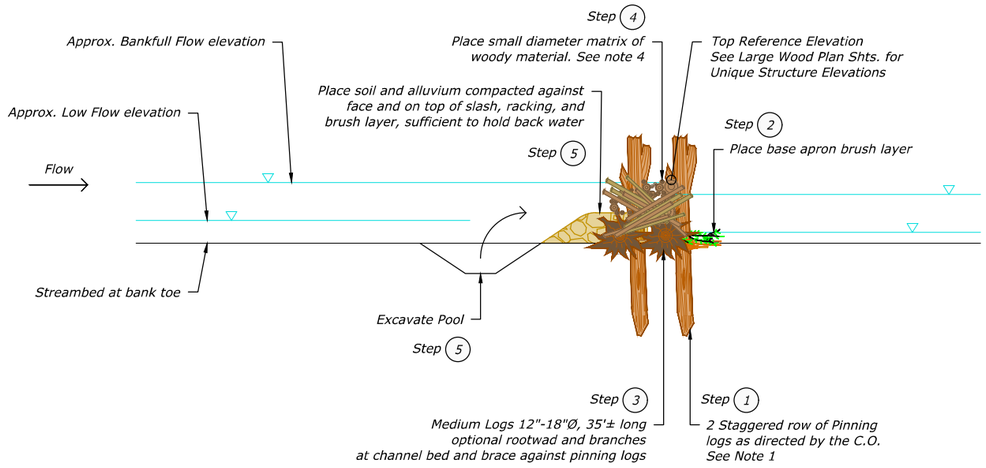
SHEET 24 of 25

DATE AND TIME PLOTTED
5/14/2018 11:52 PM
PLOTTED BY
NICK.DANIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_ICE JAM SMALL CRIB.DWG



EXAMPLE: INSTALLED REINFORCED HABITAT STRUCTURE



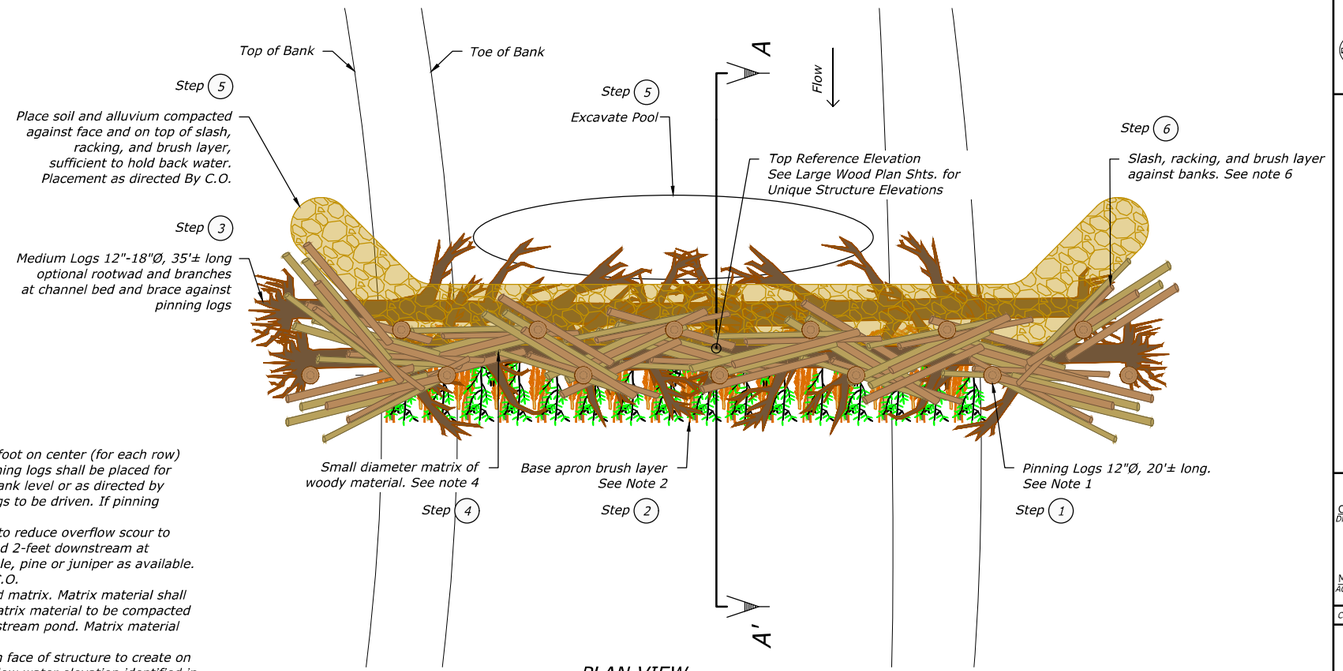
SECTION A-A'
NOT TO SCALE

Hydraulic Purpose:
* Raise water table and bed elevation upstream of structure.
* Reduce flow velocities in side channels and floodplain.
* Retain sediment in side channels and floodplain.

Habitat Purpose:
* Create habitat complexity.
* Create off channel rearing habitat.

TYPE J - REINFORCED HABITAT STRUCTURE						
Log Type	Size (DBH)	Min. Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity*
Medium	12" - 18"	35'	Optional	4'	Yes	4
Pinning	12"	20'	Optional	-	No	13
Dead Brush Layer and Slash	1" - 6"	-	-	-	Yes	± 10 CY
Soil and Native Alluvium	-	-	-	-	-	± 20 CY
Live Cuttings	-	-	-	-	-	12

* Width of structure may vary based on width of channel to be spanned. Quantities will vary as directed by the C.O.



PLAN VIEW

TYPE J - REINFORCED HABITAT STRUCTURE
NOT TO SCALE

Construction Notes:

1. Drive 2 staggered rows of pinning logs for structural reinforcement at locations shown. Pinning logs to be driven 9-foot on center (for each row) and 3-foot spacing between rows. Stagger pinning logs between rows to result in 4.5-feet on center. At banks, pinning logs shall be placed for both rows as shown. Pinning logs to be embedded to a minimum depth of 8-feet and shall be cut to 1-foot above bank level or as directed by C.O. All visible ends of logs shall be cut or broken off to create natural appearance. No flat cuts allowed. Pinning logs to be driven. If pinning logs cannot be driven, then pinning logs with rootwads shall be used and installed by excavation per Sheet 60802.
2. Place Base Apron brush layer extending a minimum of 2-feet beyond the downstream medium log of the structure to reduce overflow scour to streambed. Base apron material shall be a minimum of 5-feet in length to cover base area between pinning logs and 2-feet downstream at direction of Engineer. Base apron material to consist of limbs and branches with and without needles of fir, lodgepole, pine or juniper as available.
3. Place medium logs or whole small trees between and against upstream side of pinning logs at the direction of the C.O.
4. Place small diameter matrix of woody material woven within and through pinning logs to develop a stable interlaced matrix. Matrix material shall be woven into pinning logs at various angles and positions to add complexity and minimize preferred flow paths. Matrix material to be compacted to increase structural density and reduce permeability with the intent of capturing fine material and creating an upstream pond. Matrix material can be an assortment of slash and small racking material - see material schedule.
5. Excavate pool upstream of structure at direction of Engineer and place excavated material up and against upstream face of structure to create on apron and reduce flow seepage. Compact material against structure and banks to form a watertight seal up to the low water elevation identified in plans or directed by Engineer.
6. Backfill structure with Compacted Fill per Sht. 60779.
7. Install live cuttings at a rate of 3 cuttings per Key and/or Medium Log while installing logs. Live cuttings shall be provided by Contracting Agency.
8. Place extra slash and racking material along each bank at structure. Weave into bank pinning logs and cover with excavated material to form a roughened bank.
9. Planting to be completed by others at later date.

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER 7931SPE OREGON NICHOLAS T. DANIS EXPIRES: 12/31/19
05/11/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

TYPE J - REINFORCED HABITAT STRUCTURE

1678-100-60810

SHEET 25 of 25

DATE AND TIME PLOTTED 5/10/2018 1:52 PM
PLOTTED BY NICK DANIS

CAD SYSTEM AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME BTS_BEAVER_DAM_ANALOG.DWG



EXAMPLE: INSTALLED BRUSH BANK AND C1 WITH BRUSH BANK

Note: Brush bank only shown on left and C1 structures with brush bank shown on right.

Brush Bank Treatment

The purpose of the brush bank treatment is to establish a healthy riparian bank condition on a newly constructed channel that is supported by live roots. The brush bank treatment provides near-channel bank stability and channel boundary roughness with live and dead native materials. In the near term, edge roughness is provided by dead material that in-turn provides bank stability through slowing of near-bank flow velocities. In the long-term, live vegetation re-establishes bank strength through root structure and replaces roughness through growth.

Brush Bank Material Schedule (Per 10 ft Length)		
Item	Description	Quantity
Live Cuttings	4' to 5' live willow cutting	10
Slash (CY)	6" thick layer of live and dead brush when compressed	±2

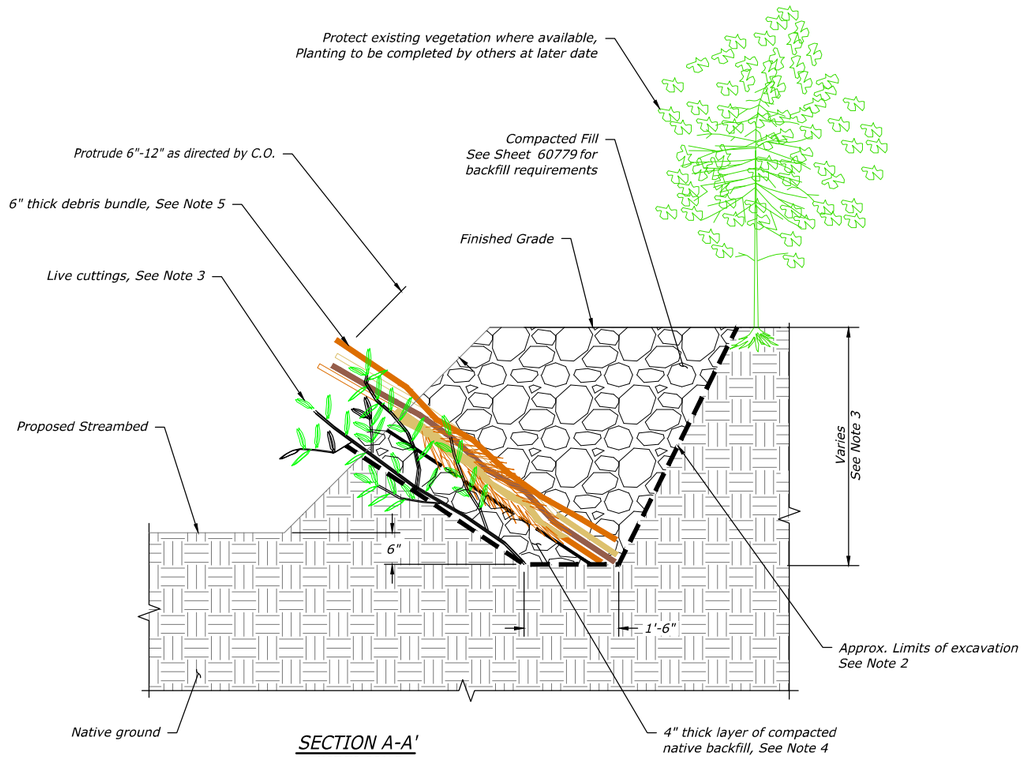
Construction Notes:

1. Brush Bank treatment shall be constructed at locations as shown on the plans.
2. Excavate material as shown on Section A-A' and stockpile. Excavated materials are to be used as backfill if meeting requirements of Compacted Fill per Sht. 60779. Excavation shall tie into proposed streambed at edge as shown in section view.
3. Live Cuttings shall be placed at 12 inches on center along the base of the excavation. The cuttings shall be 1/4 inch to 3 inches in trunk diameter and from 4 to 5 feet in length. Live cuttings shall be provided by Contracting Agency. Live Cuttings shall retain all side branches but will have the top foot of the previous year's growth removed. Cuttings shall be cut and installed as detailed herein. Bottom of live Cuttings need to be 6-inches below channel thalweg in Riffles, Glides and Runs and 6-inches below the top of pool low flow water surface at pools as directed by C.O.
4. A 4-inch layer of Compacted Fill per Sht. 60779, shall be placed over live willow cuttings to support establishment.
5. Install debris and slash including tree branches, stems, live cuttings, and general brush to form a compacted 6 inch thick debris layer. Material should be between 4 and 7 feet in length and consist of a range of stem diameters between 1/2 inch to 4 inches. Material can be a mixture of live and dead material.
6. Compacted Fill per Sht. 60779 shall be placed in incremental lifts with material previously excavated unless otherwise specified by C.O. Fill layer thickness prior to compaction shall not exceed 6 inches. Fill shall be compacted to a density equivalent to that of the surrounding in-situ material by means of machine compaction. Final fill elevations to match design grade as identified in the plans.

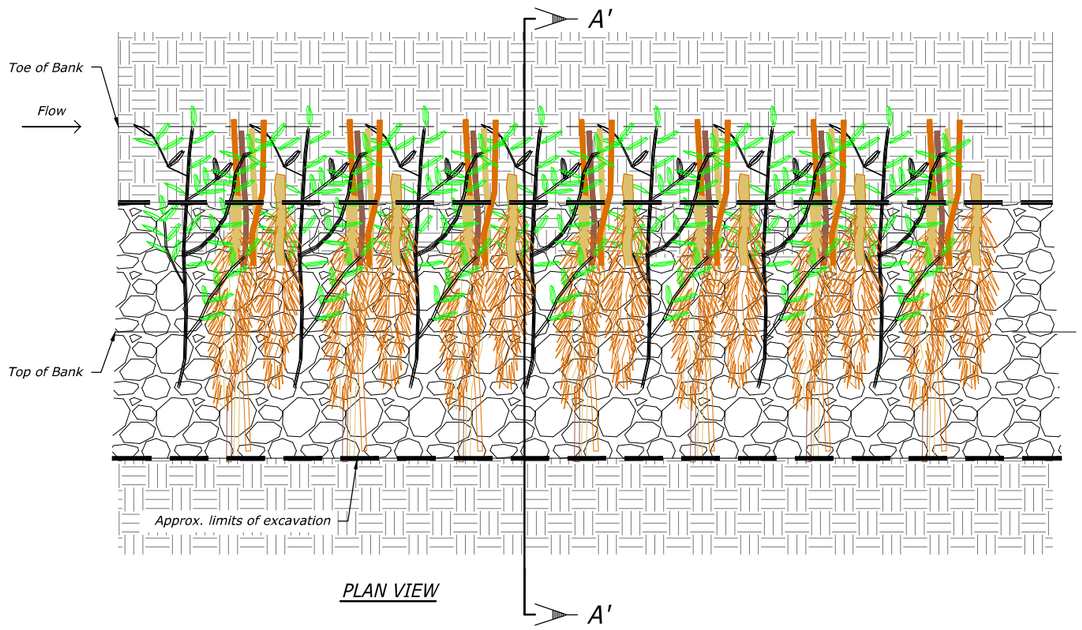
Live Cuttings*

Live Cuttings consist of locally harvested willow, cottonwood, or red-osier dogwood cuttings. Live Cuttings are between approximately 1/4-inch to 3-inches in diameter depending upon species and source. Live Cuttings harvested with care and cut to lengths of 4 feet to 5 feet. Live Cuttings shall be bundled and submerged in standing water for 5 to 7 days prior to planting. Care should be taken to mark upward or downward ends of cuttings (i.e. dipped in latex paint or other) when harvesting such that they are re-planted in the appropriate direction. Harvested live-cuttings shall not be allowed to dry-out and must be planted after removal from soaking location. Cuttings should be buried by a minimum of 75% of their length and must have some small portion of their top exposed to air.

**Note - Live Cuttings provided by Contracting Agency unless otherwise directed.*



SECTION A-A'
NOT TO SCALE



PLAN VIEW

BRUSH BANK TREATMENT
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANOS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

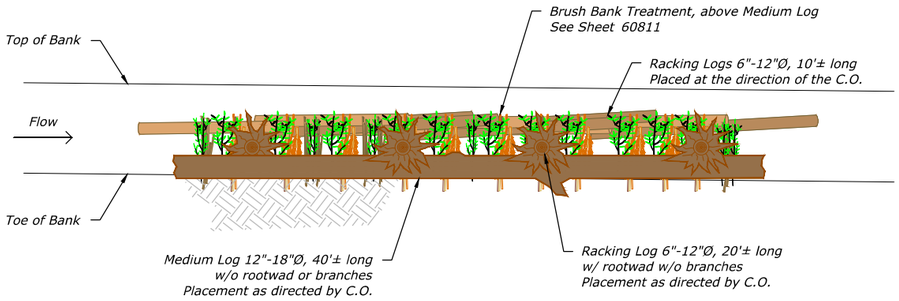
BRUSH BANK TREATMENT

1678-100-60811

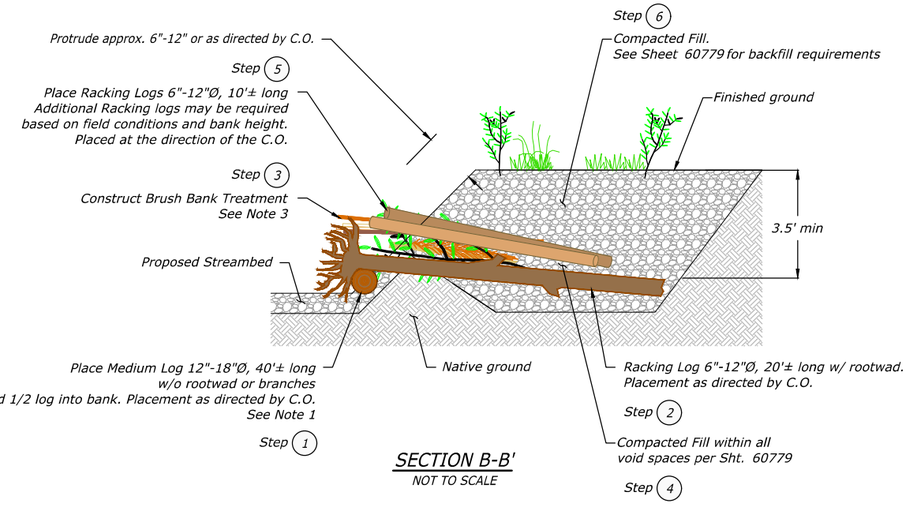
SHEET 1 of 3

DATE AND TIME PLOTTED
5/30/2018 7:01 PM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_BANK STABILITY FEATURES.DWG



SECTION A-A'
NOT TO SCALE



SECTION B-B'
NOT TO SCALE

Hydraulic Purposes:

* Provide structural stability for moderate height banks comprised dominantly of fill.
* Countersunk toe logs provide hydraulic resistance and a framework to support bank face plantings.
* Racking logs with rootwads pinning the toe log and buried within the bank create a framework for live staked plantings and racking log members.
* The wood elements, brush and alluvium backfill provide initial bank strength and hydraulic resistance.
* The wood elements and living woody riparian plantings will provide rooted bank strength and riparian cover over the long-term.

Habitat Purposes:

* Provide diverse edge hydraulics, cover and shade.

Roughened Edge Material Schedule (Per 40 ft Length)

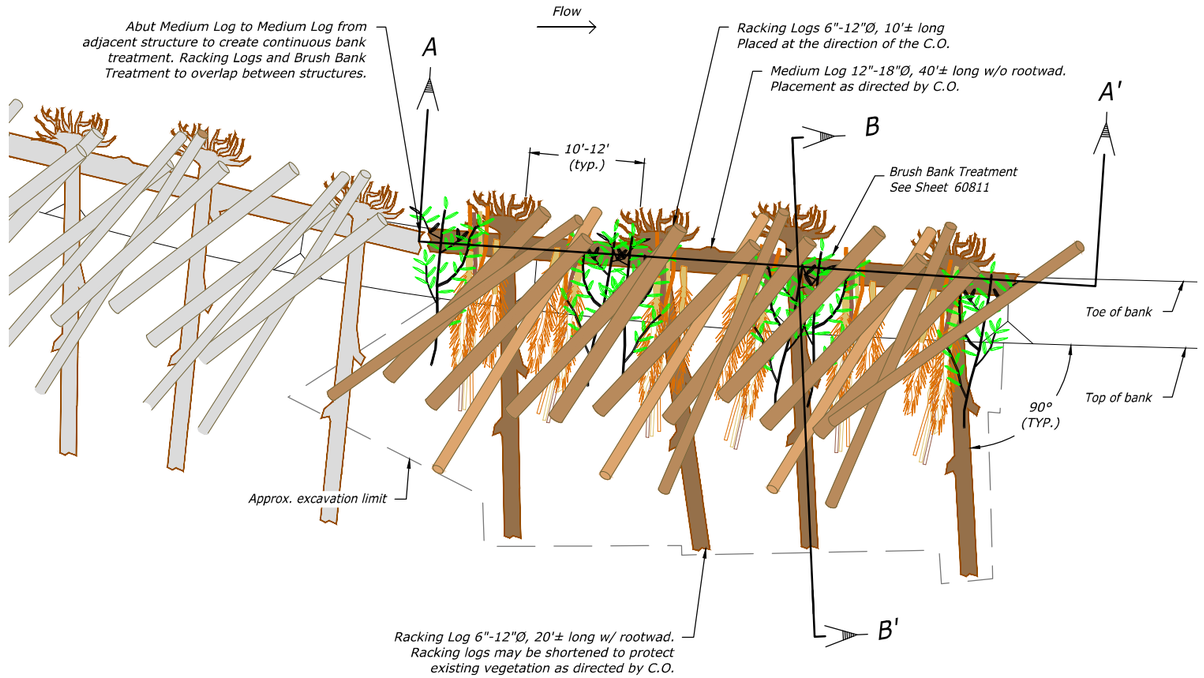
Log Type	Size (DBH)	Min Length (ft)	Rootwad	Min. Rootwad Diameter (ft)	Branches	Quantity
Medium	12" - 18"	40'	No	-	-	1
Racking	6" - 12"	20'	Yes	3'		4
Racking	6" - 12"	10'	Optional	-	-	40*

* Additional racking logs may be required based on field conditions and bank height. Placed at the direction of the C.O.

** For quantities associated with Brush Bank Treatment see Sht. 60811 .

Construction Notes:

1. Medium log shall be placed so its upstream end rests on stream bed, with1/2 log embedded into bank. Backfill and compact around key log with riffle material.
2. Racking logs with rootwads shall be installed on top of key log. Pull rootwad as close to bank as possible as directed by C.O
3. Construct Brush Bank within void spaces per Sht. 60811 as directed by the C.O.
4. Place compacted Fill per Sht. 60779 from excavation on Brush Bank Treatment and within void spaces as directed by the C.O.
5. Racking material shall be incorporated into the trench as it is backfilled. Racking material shall be placed at a downstream angle to avoid ice plucking.
6. Backfill shall be placed in 6" lifts, with the first lift to be washed into the brush bank treatment with water to eliminate voids. Supplemental lifts shall be compacted per Compacted Fill Sht. 60779 .
7. The exact location of each occurrence of bank roughness shall be staked by the Contractor and approved by the C.O. prior to constructing a particular occurrence.
8. Rough grading of the channel shall be completed prior to constructing in channel LWM structures.



PLAN VIEW

ROUGHENED EDGE BANK TREATMENT
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANKO
EXPIRES: 12/31/19
05/14/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

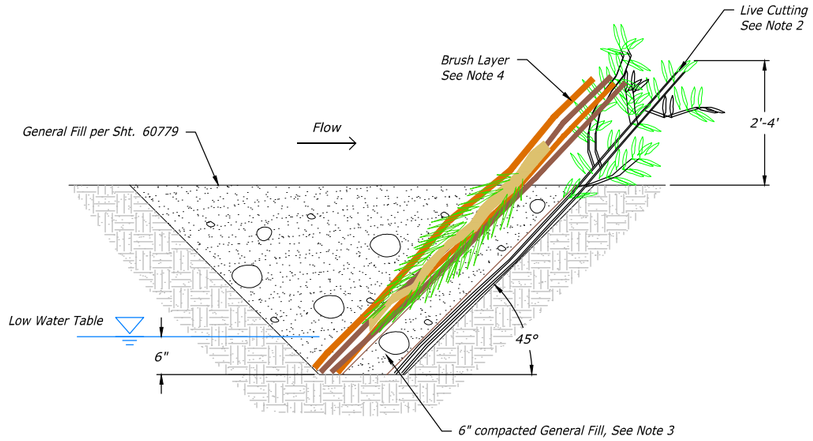
ROUGHENED EDGE BANK TREATMENT

1678-100-60812

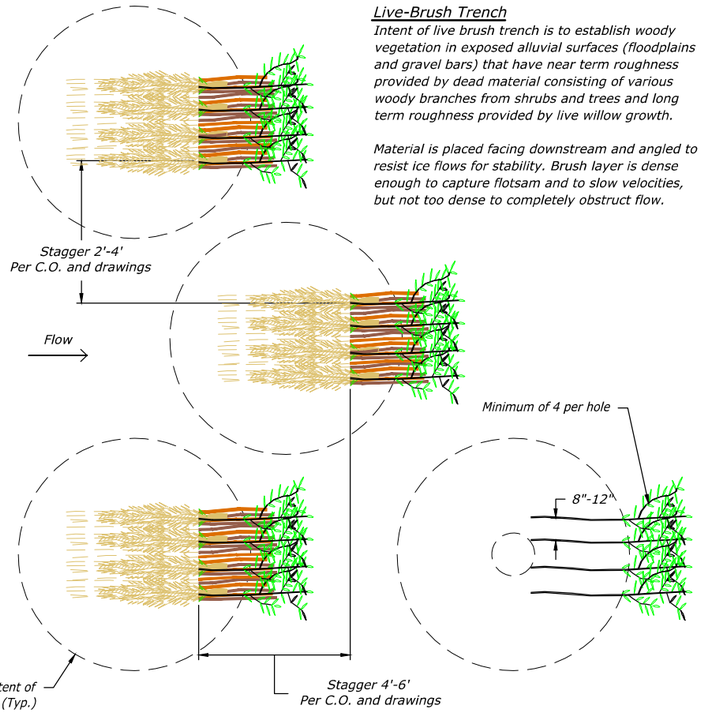
SHEET 2 of 3

DATE AND TIME PLOTTED
5/14/2018 2:01 PM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_BANK STABILITY FEATURES.DWG



SECTION VIEW



Live-Brush Trench

Intent of live brush trench is to establish woody vegetation in exposed alluvial surfaces (floodplains and gravel bars) that have near term roughness provided by dead material consisting of various woody branches from shrubs and trees and long term roughness provided by live willow growth.

Material is placed facing downstream and angled to resist ice flows for stability. Brush layer is dense enough to capture flotsam and to slow velocities, but not too dense to completely obstruct flow.

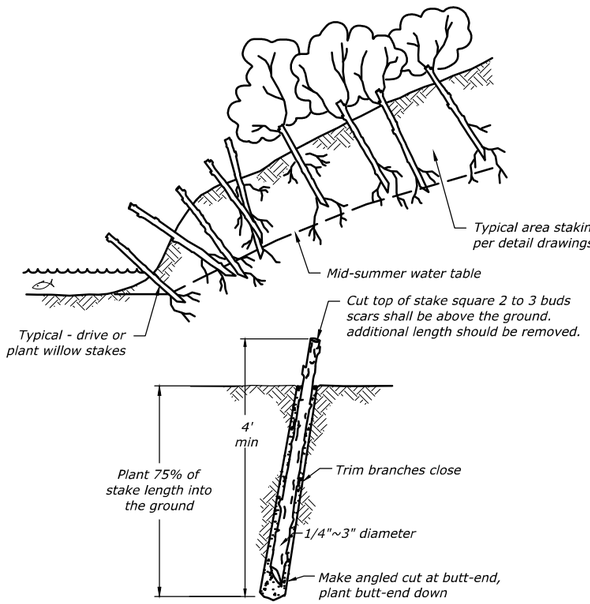
Construction Notes:

1. Excavate hole to 6" below low water table with approximate 45° side slopes.
2. Place layer 1 - Live willow cuttings 6" below low water table in manner as specified by "Live Willow Staking". Place along outside of hole on downstream face at 8"-12" spacing with a minimum of 4 per excavated hole and as directed by C.O.
3. Place 6" layer of material excavated from hole on layer 1 (live cuttings) and compact against layer 1 with bucket.
4. Place 6" layer of brush consisting of live and dead stems and branches of mixed diameter between 1/4" to 3" and sufficient length to protrude 2'-4' above surface as shown and per C.O.
5. Backfill structure with General Fill per Sht. 60779 .
6. Blend over any remaining excavated material into floodplain at the direction of C.O.

PLAN VIEW

LIVE BRUSH TRENCH PLAN

NOT TO SCALE



Construction Notes:

1. Live Willow Cuttings will be provided by C.O.
2. Make clean cuts and do not damage stakes or split ends during installation, use a pilot bar in firm soils.
3. Soak cuttings for 24 hours (min.) prior to installation.
4. When backfilling "Rod" or Mud" by filling the hole with water and then soil to make a mud slurry followed by rod tamping can remove air pockets.
5. Tamp the soil around the stake.

LIVE WILLOW STAKING

NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANOS
EXPIRES: 12/31/19
05/11/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

BRUSH TRENCH AND
LIVE STAKING

1678-100-60813

SHEET 3 of 3

DATE AND TIME PLOTTED
5/10/2018 7:41 PM
PLOTTED BY
JAC08 ZINSLI

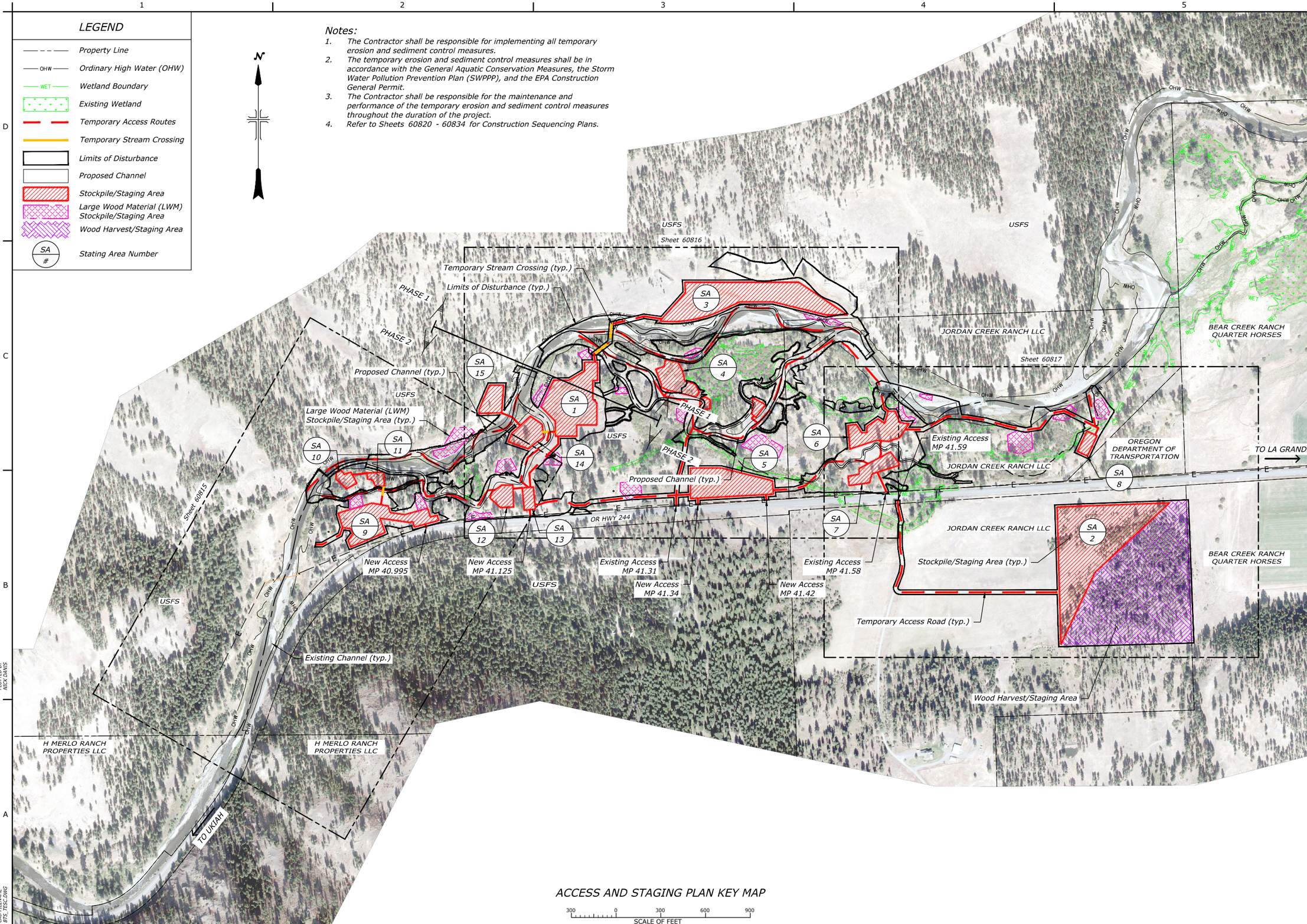
CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_BANK STABILITY FEATURES.DWG

LEGEND

- Property Line
- Ordinary High Water (OHW)
- Wetland Boundary
- Existing Wetland
- Temporary Access Routes
- Temporary Stream Crossing
- Limits of Disturbance
- Proposed Channel
- Stockpile/Staging Area
- Large Wood Material (LWM) Stockpile/Staging Area
- Wood Harvest/Staging Area
- SA # Stating Area Number

Notes:

1. The Contractor shall be responsible for implementing all temporary erosion and sediment control measures.
2. The temporary erosion and sediment control measures shall be in accordance with the General Aquatic Conservation Measures, the Storm Water Pollution Prevention Plan (SWPPP), and the EPA Construction General Permit.
3. The Contractor shall be responsible for the maintenance and performance of the temporary erosion and sediment control measures throughout the duration of the project.
4. Refer to Sheets 60820 - 60834 for Construction Sequencing Plans.



ACCESS AND STAGING PLAN KEY MAP

300 0 300 600 900
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER 79319PE OREGON NICHOLAS T. DANIS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

ACCESS AND STAGING PLAN KEY MAP

1678-100-60814

SHEET 1 of 6

DATE AND TIME PLOTTED 5/9/2018 2:21 PM
PLOTTED BY NICK DANIS

CAD SYSTEM AutoCAD Rel. 22.0s (LMS Tech)
CAD FILENAME BTS_TESC.DWG

LEGEND

- Property Line
- OHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Existing Wetland
- Temporary Access Routes
- Temporary Stream Crossing
- Limits of Disturbance
- Proposed Channel
- Stockpile/Staging Area
- Large Wood Material (LWM) Stockpile/Staging Area
- Wood Harvest/Staging Area
- SA # — Stating Area Number

N

USA FOREST

Limits of Disturbance (typ.)

OHW

E

SA 10

SA 11

SA 9

Proposed Channel (typ.)

Temporary Access Road (typ.)

OR HWY 244

Stockpile/Staging Area (typ.)

Stabilized Construction Entrance
See Sht. 60818

USA FOREST

WET

Match Line - (Sheet 60816)

Large Wood Material (LWM)
Stockpile/Staging Area (typ.)

ACCESS AND STAGING PLAN 1

100 0 100 200 300
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

ACCESS AND STAGING PLAN 1

1678-100-60815

SHEET 2 of 6

DATE AND TIME PLOTTED
5/10/2018 2:22 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
Microstation V8i 22.06 (LMS Tech)
CAD FILENAME
BTS_TESC.DWG

LEGEND

- Property Line
- OHW — Ordinary High Water (OHW)
- WET — Wetland Boundary
- Existing Wetland
- Temporary Access Routes
- Temporary Stream Crossing
- Limits of Disturbance
- Proposed Channel
- Stockpile/Staging Area
- Large Wood Material (LWM) Stockpile/Staging Area
- Wood Harvest/Staging Area
- SA # — Stating Area Number

N

USA FOREST

Limits of Disturbance (typ.)

Existing Channel (typ.)

Temporary Stream Crossing (typ.)

SA 3

SA 4

SA 15

SA 1

SA 14

SA 12

SA 13

SA 5

PHASE 1

PHASE 2

JORDAN CREEK RANCH LLC

Match Line - (Sheet 60815)

Match Line - (Sheet 60817)

Proposed Channel (typ.)

Temporary Access Road (typ.)

Large Wood Material (LWM) Stockpile/Staging Area (typ.)

Stockpile/Staging Area (typ.)

Stabilized Construction Entrance See Sht. 60818

Temporary Access at Railroad Grade See Sht. 60818

OR HWY 244

ACCESS AND STAGING PLAN 2

SCALE OF FEET 100 0 100 200 300

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

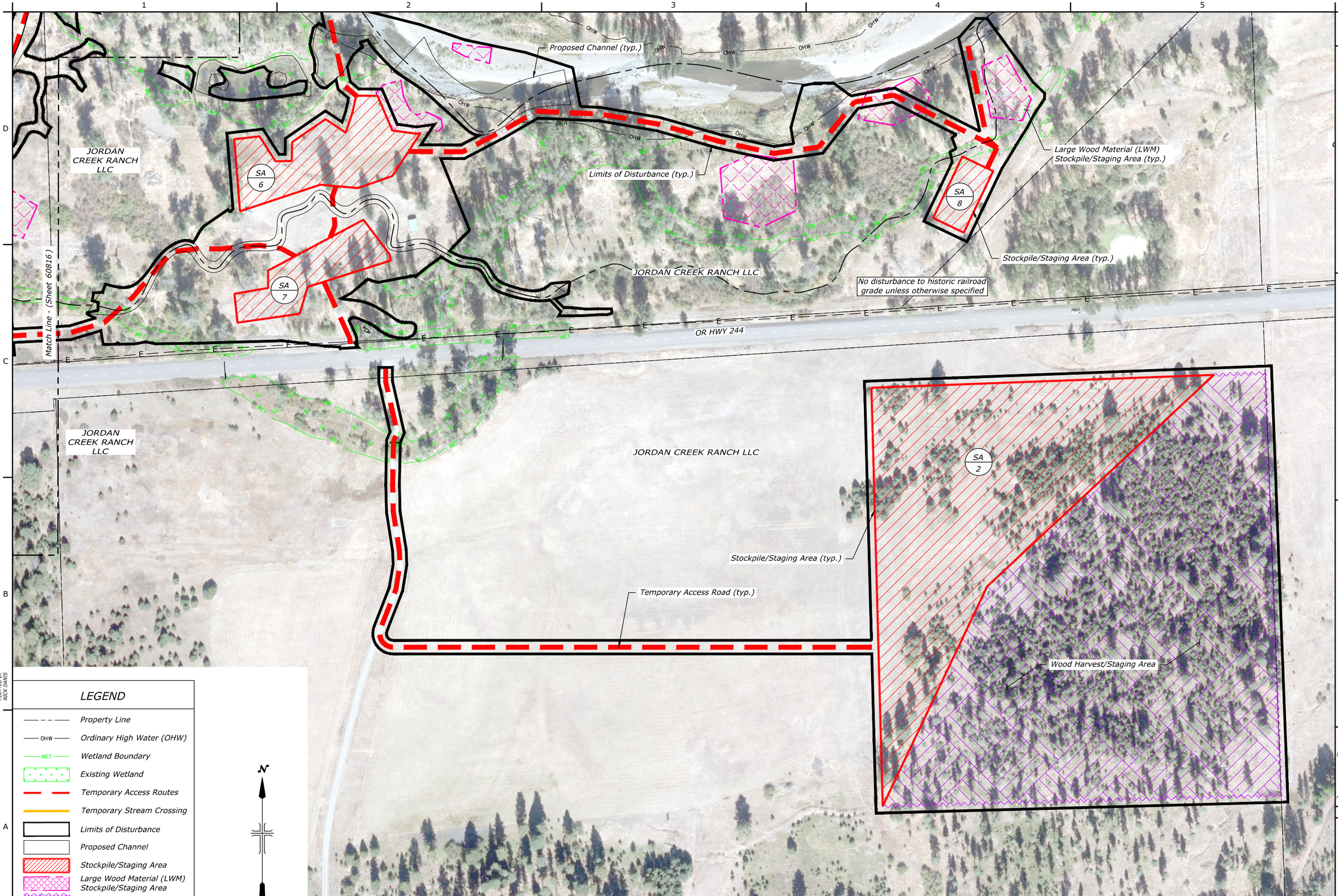
ACCESS AND STAGING PLAN 2

1678-100-60816

SHEET 3 of 6

DATE AND TIME PLOTTED
5/11/2018 7:22 AM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_TESC.DWG



LEGEND

- Property Line
- Ordinary High Water (OHW)
- Wetland Boundary
- Existing Wetland
- Temporary Access Routes
- Temporary Stream Crossing
- Limits of Disturbance
- Proposed Channel
- Stockpile/Staging Area
- Large Wood Material (LWM) Stockpile/Staging Area
- Wood Harvest/Staging Area
- SA # — Stating Area Number

N

ACCESS AND STAGING PLAN 3

100 0 100 200 300
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

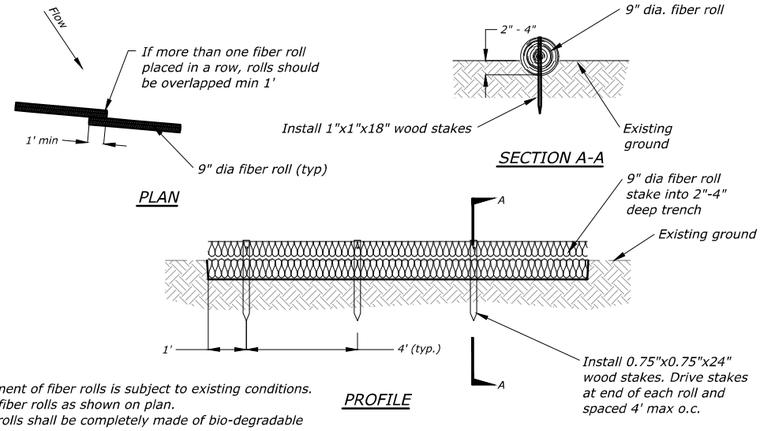
ACCESS AND STAGING PLAN 3

1678-100-60817

SHEET 4 of 6

DATE AND TIME PLOTTED 5/11/2018 1:23 PM
PLOTTED BY NICK DANIS

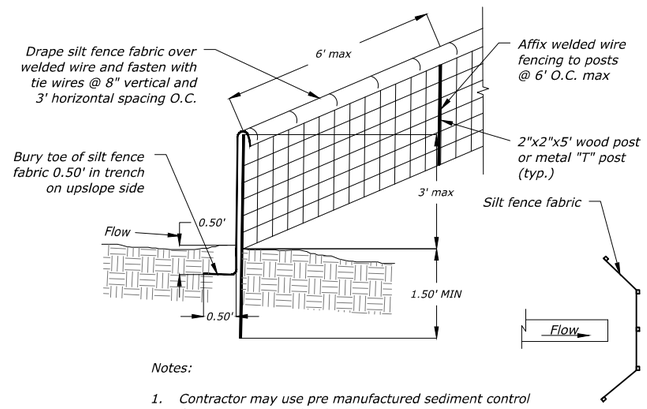
CAD SYSTEM AutoCAD Civil 3D 2016 (LMS Tech)
CAD FILENAME BTS_TESC.DWG



Notes:

1. Placement of fiber rolls is subject to existing conditions.
2. Place fiber rolls as shown on plan.
3. Fiber rolls shall be completely made of bio-degradable material.
4. Place gravel bags over fiber roll when stakes cannot be used due to bedrock.

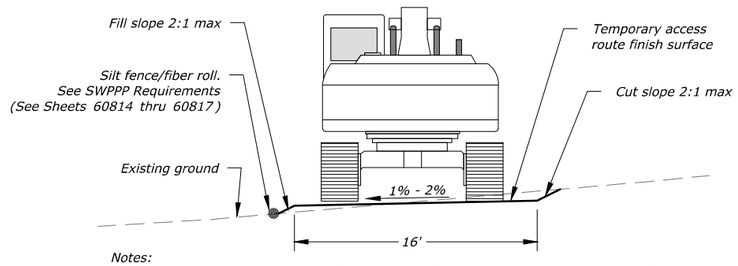
FIBER ROLL
NOT TO SCALE



Notes:

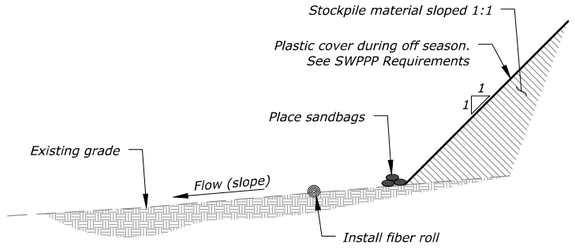
1. Contractor may use pre manufactured sediment control fence as approved by the C.O.
2. Place fencing such that storm runoff cannot pass around or under fence.

SILT FENCE
NOT TO SCALE



Notes:
1. Temporary access routes shall follow previously established routes where available.
2. Place temporary access routes as far as possible away from streams, surface waters and wetlands.

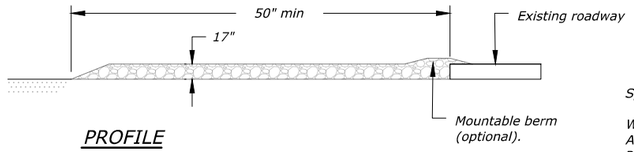
TEMPORARY ACCESS ROUTE
NOT TO SCALE



Notes:

1. All stockpiles shall be covered and protected with a temporary perimeter sediment barrier prior to the onset of precipitation.
2. Repair and/or replace perimeter controls and covers as needed, or as directed by engineer, to keep them functioning properly.
3. Locate stockpiles away from concentrated flows of storm water, drainage courses, and inlets.
4. Protect all stockpiles from storm water run-on using a temporary perimeter sediment barrier such as berm, dikes, fiber rolls, silt fences, sandbag or gravel bag barriers.
5. Implement wind erosion control practices as appropriate on all stockpiled material.

STAGING AND STOCKPILE AREA
NOT TO SCALE



Specifications:

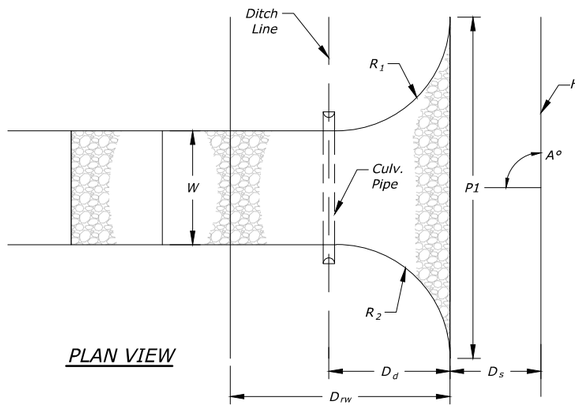
Width (W):	15 ft
Angle (A):	90 deg
Radius 1 (R_1):	15 ft
Radius 2 (R_2):	15 ft
Paving Limit 1 (P_1)	45 ft
Surface (D_s)	11 ft
Ditch (D_d)	16 ft
R/W	29 ft

Culvert Pipe Material:	Corrugated Metal (CMP)
Culvert Pipe Diameter:	18 in
Culvert Pipe Length:	20 ft
Pipe End Slopes:	1:6

Sub Base Course: 75mm - 0 Aggregate Base (3" - 0)
Thickness: 12 in

Course Base: 25mm - 0 Aggregate Base (1" - 0)
Thickness: 3 in

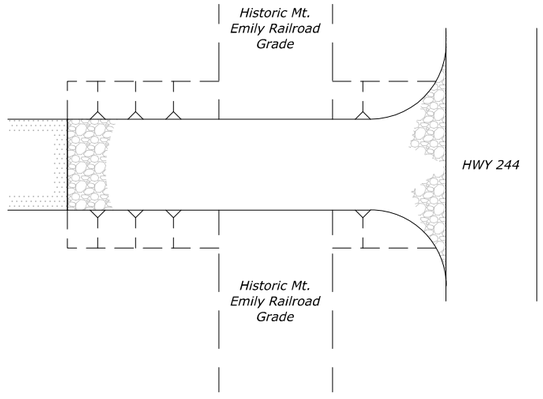
Wear Course: Gravel
Thickness: 2 in

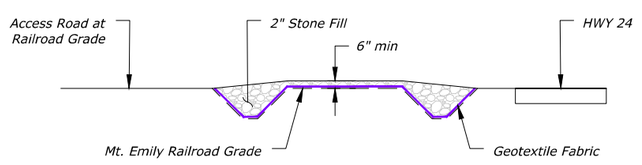


Notes:

1. Maintenance - The entrance shall be maintained in a condition which will prevent tracking or flowing of sediment onto public right-of-way. This may require periodic top dressing with additional stone as conditions demand and repair and/or cleanout of any measures used to trap sediment. All sediment spilled, dropped, washed or tracked onto public rights-of-way must be removed immediately.
2. Periodic inspection and needed maintenance shall be provided after each rain.
3. When necessary, wheels shall be cleaned prior to entrance onto public right-of-way.
4. When washing is required, it shall be done on an area stabilized with crushed stone or native tailings that drains into an approved sediment trap or sediment basin.
5. Use sandbags or other approved methods to channelize runoff to basin as required.
6. Culvert Safety End Sections not required (pipe diameter < 600mm).
7. Contractor shall remove any material used to construct temporary roadways, parking areas, construction entrances, and access roads prior to contract completion that are requested by the Contracting Officer to be removed. All materials removed shall become property of the Contractor and shall be disposed of at an approved disposal location.

STABILIZED CONSTRUCTION ENTRANCE
NOT TO SCALE





Notes:

1. Temporary Access will be consistent with Temporary Access Road Detail this sheet.
2. Culvert locations shall be outside of Historic Railroad Grade to create no impact.
3. There are 6 locations with varied levels of interaction with historic railroad grade. Work with C.O. to determine requirements at each location.
4. Lay Geotextile Fabric underneath the 2 inch stone.
5. Post construction stone and geotextile fabric to be removed leaving historic railroad grade intact.

TEMPORARY ACCESS AT RAILROAD GRADE
NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
EXPIRES: 12/31/19
05/11/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

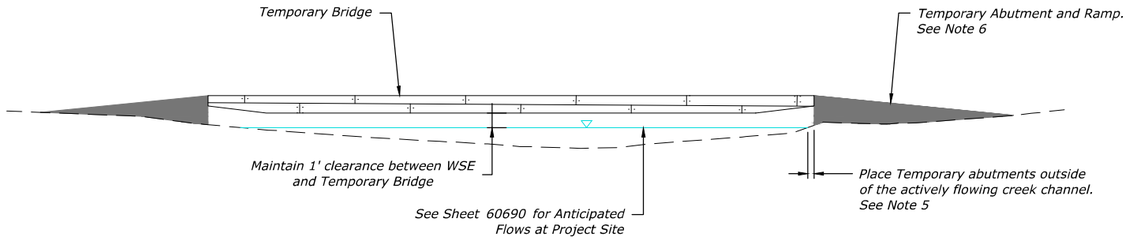
ACCESS AND STAGING TESC DETAILS

1678-100-60818

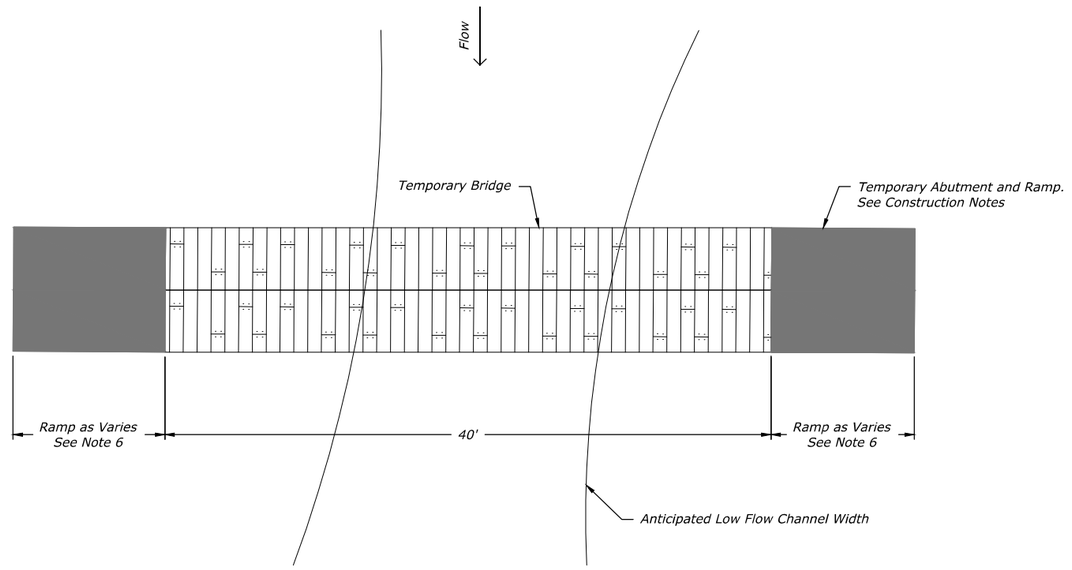
SHEET 5 of 6

DATE AND TIME PLOTTED
5/9/2018 7:32 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_TESC.DWG



PROFILE VIEW



PLAN VIEW

Construction Notes:

1. The Contractor shall submit a Temporary Bridge Crossing Plan, including Shop drawings of bridges to be installed for temporary channel crossings. Shop drawings shall include all pertinent details of the bridge and bridge superstructure deck including manufacture date, structural makeup, current condition, weight, load rating, etc.
2. The Contractor is solely responsible for supplying a structurally sound bridge including temporary abutments, structural support members, and bridge deck capable of supporting all equipment, machinery, and material deliveries that will cross the actively flowing river. The bridge shall be a single span with a minimum span of 40 feet supported by temporary abutments at each end.
3. The Contractor shall inspect and maintain the bridge and all associated components daily from the time of installation to the time of removal. The Contractor shall remove and replace any bridge components that become unfit or unsafe for use at no additional cost to the Contracting Agency.
4. Place temporary abutments outside of the actively flowing creek channel. Abutments shall be placed at an elevation such that the low chord of the bridge used for the temporary crossing sits a minimum of 1 foot above the water surface elevation at the time of installation.
5. 40' bridge may not be adequate to span the entire wetted surface. At the discretion of the C.O., limited encroachment with the approaches and abutment may be allowed.
6. Temporary ramps shall be constructed as deemed necessary by the Contractor to safely access and utilize the bridge deck.
7. The Contractor may cross the Grande Ronde River with tracked equipment prior to bridge installation to place abutments and to position the bridge on the abutments. Once the bridge is in place the Contractor shall use the temporary channel crossing for all channel crossings.
8. Removal of the temporary channel crossings shall be accomplished by first removing the bridge deck and structural members, isolating abutments within the wetted channel if necessary, and removing abutments. Material placed for temporary ramps shall be removed by the Contractor and disposed of as directed by the Contracting Officer.
9. The Contractor shall minimize the number of trips across the Grande Ronde River without the crossing in place during installation and removal of the crossing.
10. The exact location, elevation of the bridge deck, and configuration of approach ramps, will be determined in the field with the aid of the C.O. The work show on this sheet is an example of an acceptable method. Detailed method shall be included in Temporary Bridge Crossing Plan submitted by the Contractor.
11. Bridge Installation and Removal shall occur within the in-water work window between July 1 and October 15, and shall not remain in place between Phase 1 and Phase 2 of the project.

TEMPORARY BRIDGE CROSSING

NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT
ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

ACCESS AND STAGING -
TEMPORARY CROSSINGS

1678-100-60819

SHEET 6 of 6

DATE AND TIME PLOTTED
5/10/2018 2:21 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_TESC.DWG

LEGEND

- Property Line
- Thalweg
- Temporary Access Routes
- Stockpile/Staging Area
- Proposed Floodplain Grading
- LWM Staging Area
- LWM Harvest Area

Phase 1 Construction Timeline

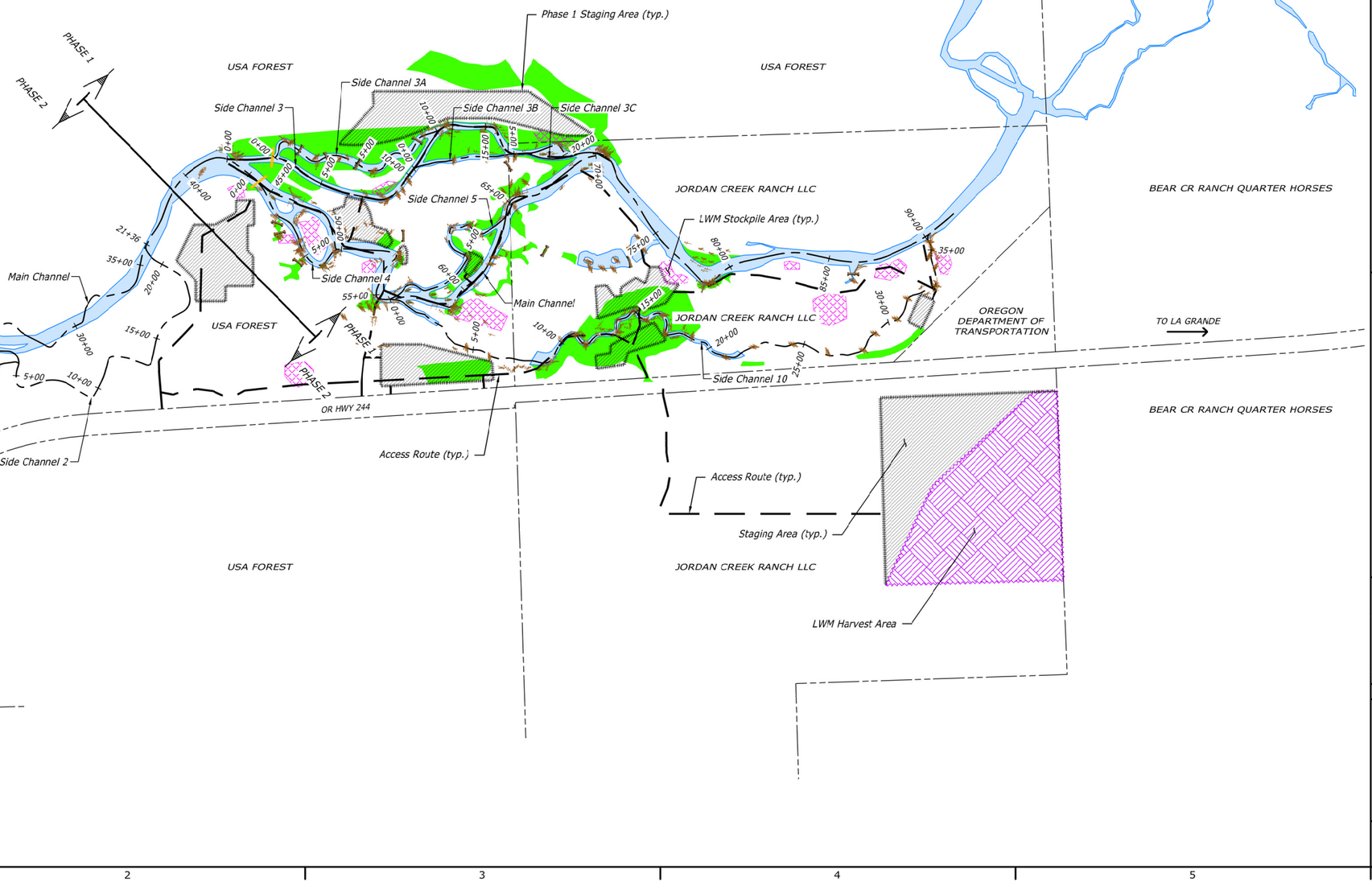
- Notice to Proceed
- Mobilize, implement SWPPP, establish Phase 1 temp. access routes, staging and stockpile areas
- Construct Phase 1 channels, habitat features and LWD in floodplain and outside active river ("in the dry")
- In-Water Work Window July 1 - October 15
- Fill/enhance existing channel and construct habitat features and LWD in active river
- Perform final work in the "Dry", clean-up, decommission and demobilize

Notes:

1. Plan Set meets permit requirements for project construction. The contractor may propose alternate plans that complete project objectives and meet all permit requirements to C.O. for approval.
2. Project construction is expected begin on July 16, 2018.
   - If a one year construction option is chosen by the Contractor, final project completion will occur on or before November 30, 2018.
   - If the two-year option is chosen, the Contractor is expected to complete Phase 1 on or before November 30, 2018 and complete Phase 2 on or before November 30, 2019.
3. This Plan is based on 2-year construction, beginning July 106, 2018, which may require modification based on date of receipt of permits.

N

300 0 300 600 900
SCALE OF FEET



DATE AND TIME PLOTTED
5/11/2018 3:59 PM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_SEQUENCING.DWG

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
05/11/2018
NICHOLAS T. DANIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

CONSTRUCTION SEQUENCING OVERVIEW PLAN - PHASE 1

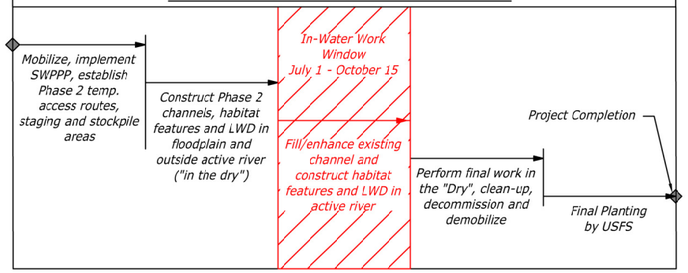
1678-100-60820

SHEET 1 of 15

LEGEND

- Property Line
- Thalweg
- Temporary Access Routes
- Stockpile/Staging Area
- Proposed Floodplain Grading
- Completed Floodplain Grading
- LWM Staging Area
- LWM Harvest Area

Phase 2 Construction Timeline



Notes:

1. Plan Set meets permit requirements for project construction. The contractor may propose alternate plans that complete project objectives and meet all permit requirements to C.O. for approval.
2. Project construction is expected begin on July 16, 2018.
   - If a one year construction option is chosen by the Contractor, final project completion will occur on or before November 30, 2018.
   - If the two-year option is chosen, the Contractor is expected to complete Phase 1 on or before November 30, 2018 and complete Phase 2 on or before November 30, 2019.
3. This Plan is based on 2-year construction, beginning July 106, 2018, which may require modification based on date of receipt of permits.

DATE AND TIME PLOTTED
5/1/2018 3:00 PM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_SEQUENCING.DWG

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DAINS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

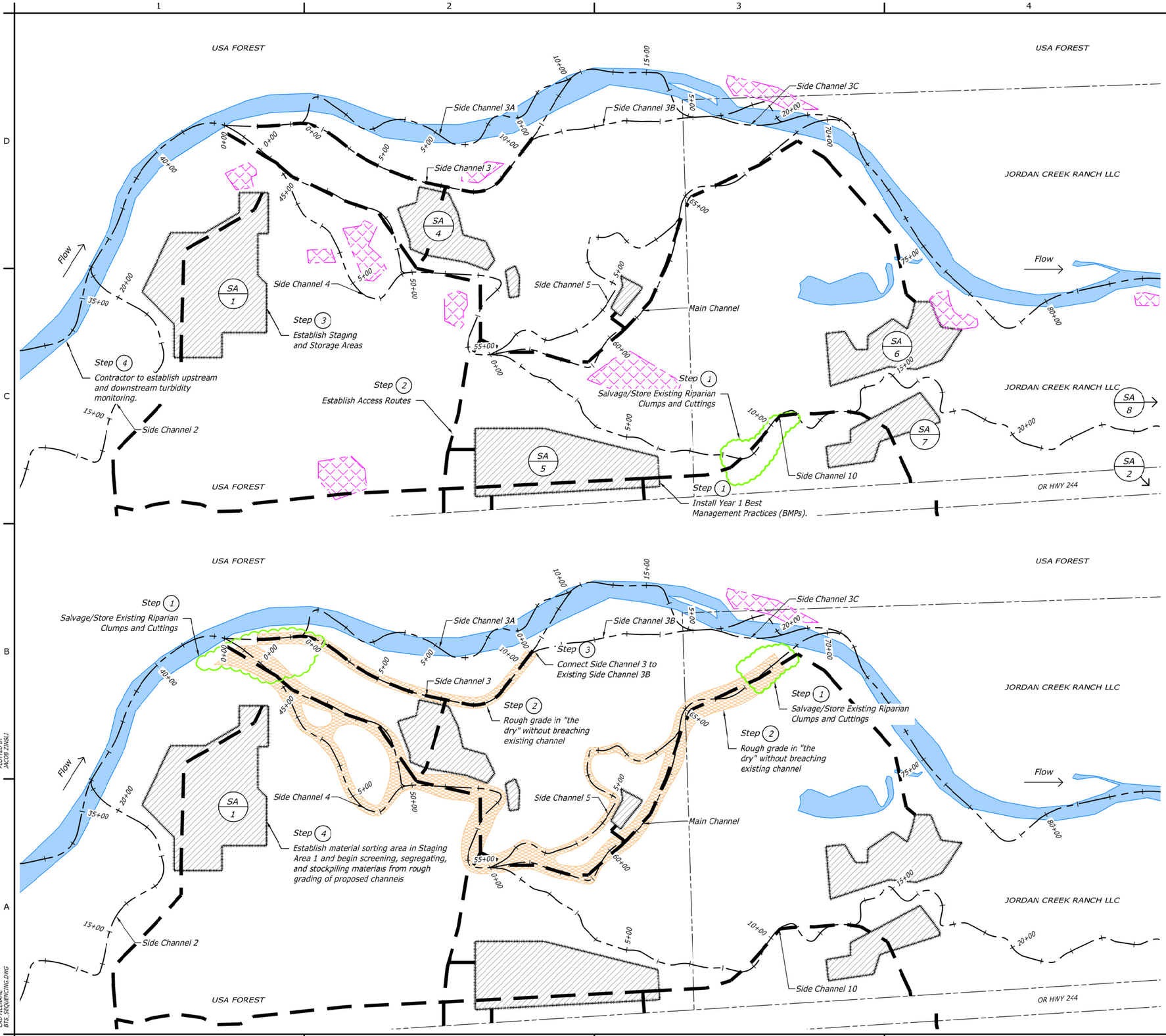
M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

CONSTRUCTION SEQUENCING OVERVIEW PLAN - PHASE 2

1678-100-60821

SHEET 2 of 15

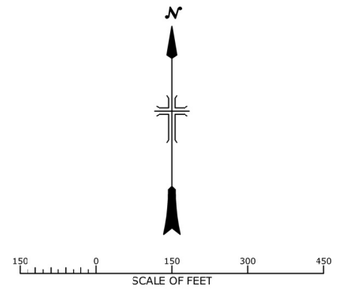


PHASE 1 - STEP 1

Before "In-Water" work window (July 1st).

- Install Best Management Practices (BMPs).
- Salvage/Store Existing Riparian Clumps and Cuttings (Alder, Cottonwood, Willow)
- All vegetation within project limits shall be protected unless flagged for removal by C.O.
- Establish temporary staging areas and access routes
- Clear and grub the site as necessary and within identified topsoil salvage zones.
- Contractor to establish upstream and downstream turbidity monitoring

This work is to be done prior to July 1st maximize the "in-water" work window (July 1 - October 15).



PHASE 1 - STEP 2

Before "In-Water" work window (July 1st).

- Salvage/Store Existing Riparian Clumps and Cuttings (Alder, Cottonwood, Willow)
- Rough grade MC Sta 44+50 - Sta 69+00, SC3 Sta 1+00 - Sta 10+50, SC4, and SC5 in "the dry" without breaching existing channel

This work is to be done prior to July 1st maximize the "in-water" work window (July 1 - October 15).

LEGEND

- Proposed Channel Alignment
- Temporary Access Routes
- Staging Area
- LWM Staging Area
- Proposed Channel Rough Grade
- Inundated Area
- Existing Vegetation - Salvage

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIELS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

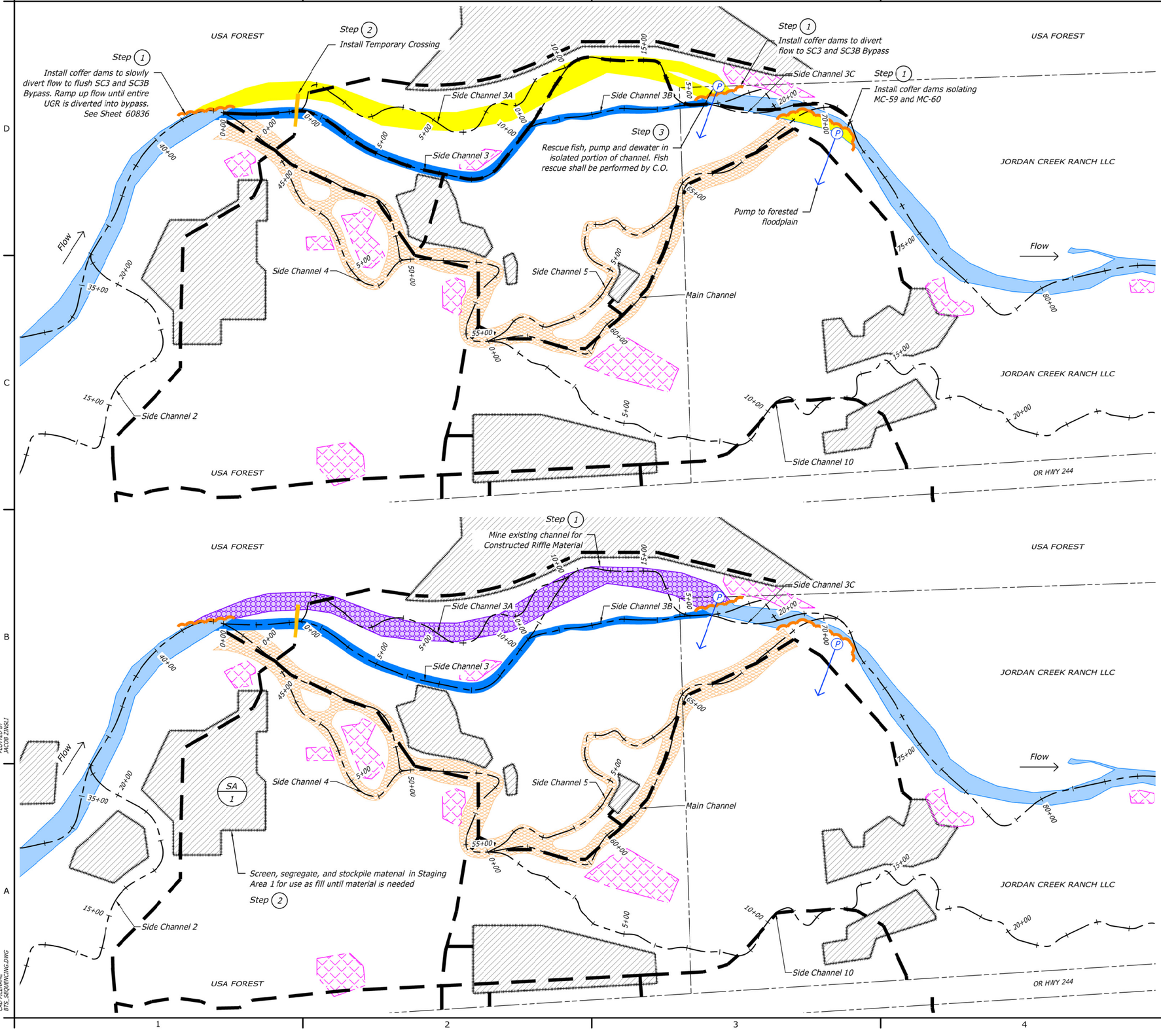
CONSTRUCTION SEQUENCING PLAN 1

1678-100-60822

SHEET 3 of 15

DATE AND TIME PLOTTED 5/11/2018 3:01 PM
PLOTTED BY JACOB ZINSLI

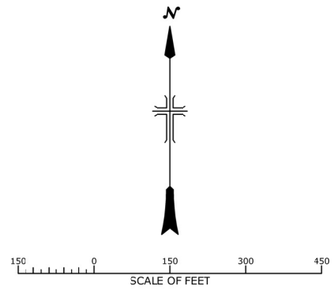
CAD SYSTEM AutoCAD Rel. 22.0s (LMS Tech)
CAD FILENAME BTS_SEQUENCING.DWG



PHASE 1 - STEP 3

Begin "In-Water" work (July 1st).

- *Install coffer dams to slowly divert flow to flush SC3 and SC3B Bypass. Ramp up flow until entire UGR is diverted into bypass per Shts. 60835 and 60836 as directed by C.O.*
- *Install coffer dams isolating MC-59 and MC-60*
- *Install temporary crossing*
- *Rescue fish (by others), pump and dewater in isolated portion of channel*



PHASE 2 - STEP 4

- *Salvage Existing Vegetation per C.O. in SC3 and SC-3A*
- *Rough grade and mine existing channel for riffle material throughout bypass*
- *Screen, segregate, and stockpile material in Staging Area 1 for use as fill until material is needed*

LEGEND

- Proposed Channel Alignment
- Temporary Access Routes
- Coffer Dam
- Temporary Crossing
- Staging Area
- LWM Staging Area
- Proposed Channel Rough Grade
- Mine Existing Channel for Constructed Riffle Material Dewatering and Fish Rescue Area
- Inundated Bypass Area
- Inundated Area

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
NICHOLAS T. DAINS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2019-05-14

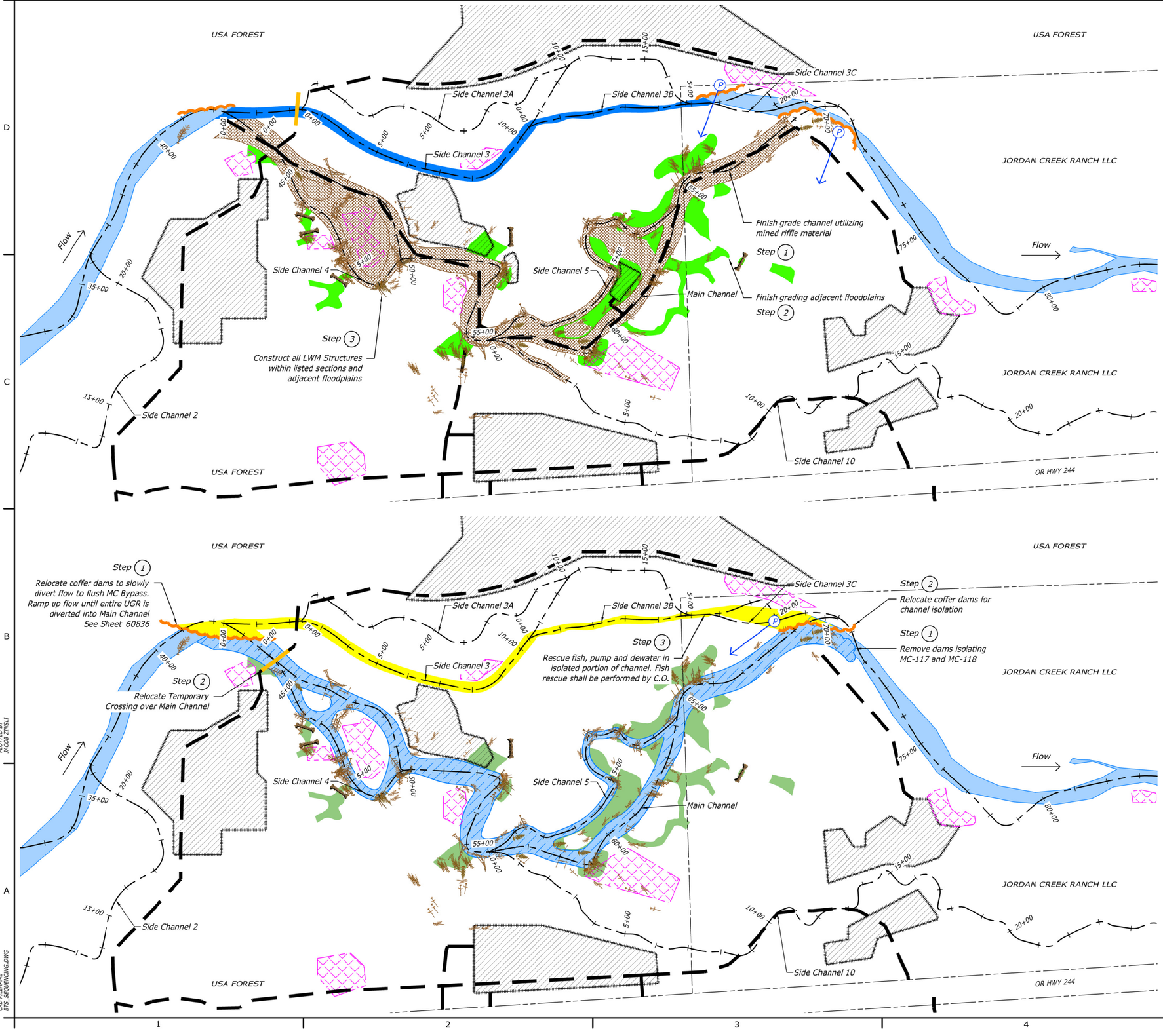
CONSTRUCTION SEQUENCING PLAN 2

1678-100-60823

SHEET 4 of 15

DATE AND TIME PLOTTED
5/11/2018 10:02 PM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
AutoCAD Civil 3D 2018
CAD FILENAME
BTS_SEQUENCING.DWG



PHASE 1 - STEP 5

- *Finish grading MC Sta 44+50 - Sta 69+00, SC4, SC5, and SC10 Inlet*
- *Finish grading adjacent floodplains*
- *Construct all Riffles and LWM Structures within listed sections and adjacent floodplains*

PHASE 1 - STEP 6

- *Install Temporary crossing at MC 44+00. Contractor to note FG grade prior to placing bridge abutment fill to ensure proper grading of fill banks.*
- *Breach existing channel at MC Sta 44+50 and MC Sta 69+00*
- *Flush newly constructed channels and minimize turbidity per Shts. 60835 and 60836 as directed by the C.O.*
- *Relocate coffer dams to divert existing flow to MC*
- *Rescue fish, pump and dewater in isolated portion of channel*

N

150 0 150 300 450
SCALE OF FEET

LEGEND

- Proposed Channel Alignment
- Temporary Access Routes
- Coffer Dam
- Temporary Crossing
- Staging Area
- LWM Staging Area
- Proposed Channel Grading
- Flush Completed Channel
- Proposed Floodplain Grading
- Completed Floodplain Grading
- Dewatering and Fish Rescue Area
- Inundated Bypass Area
- Inundated Area

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
NICHOLAS T. DANKO
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

CONSTRUCTION SEQUENCING PLAN 3

1678-100-60824

SHEET 5 of 15

DATE AND TIME PLOTTED
5/11/2018 10:03 PM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_SEQUENCING.DWG

Step 4
Construct all LWM Structures within listed sections and adjacent floodplains

Step 3
Complete adjacent floodplain grading

Step 1
Construct listed channel sections

Step 2
Finish grade SC3 with sorted riffle materials

Side Channel 3C
Side Channel 3A
Side Channel 3B
Side Channel 3
Side Channel 4
Side Channel 5
Main Channel
Side Channel 2
Side Channel 10

Flow

0+00 5+00 10+00 15+00 20+00 35+00 40+00 45+00 55+00 60+00 65+00 75+00 80+00

PHASE 1- STEP 7

- Construct SC3 Sta 10+50 - Sta 21+00, SC3A, and SC3C
- Finish Grading SC3 Sta 0+00- Sta 10+50 and SC3B
- Complete adjacent floodplain grading
- Construct all Riffles and LWM Structures within listed sections

N

150 0 150 300 450
SCALE OF FEET

Step 2
Decommission Staging Areas as shown prior to activating side channel 3 complex and removing temporary crossings

SA 2

Step 1
Remove coffer dams to slowly allow flow to flush SC 3 complex. Ramp up flow until entire UGR is undiverted. See Sheet 60836

Step 3
Remove Temporary Crossing over Main Channel

SA 4

Step 1
Remove coffer dams

PHASE 1 - STEP 8

- Remove coffer dams allowing water to flow to both MC and SC3 complexes
- Flush newly constructed channels and minimize turbidity per Shts. 60835 and 60836 as directed by the C.O.
- Decommission Staging Area 2 and 4 and associated access routes
- Remove Temporary Crossing

Coffer dams shall be removed by the end of the "in-water" work window

LEGEND

- Proposed Channel Alignment
- Temporary Access Routes
- Coffer Dam
- Temporary Crossing
- Staging Area
- LWM Staging Area
- Proposed Channel Grading
- Flush Completed Channel
- Proposed Floodplain Grading
- Completed Floodplain Grading
- Inundated Area

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
EXPIRES: 12/31/19
05/17/2018

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

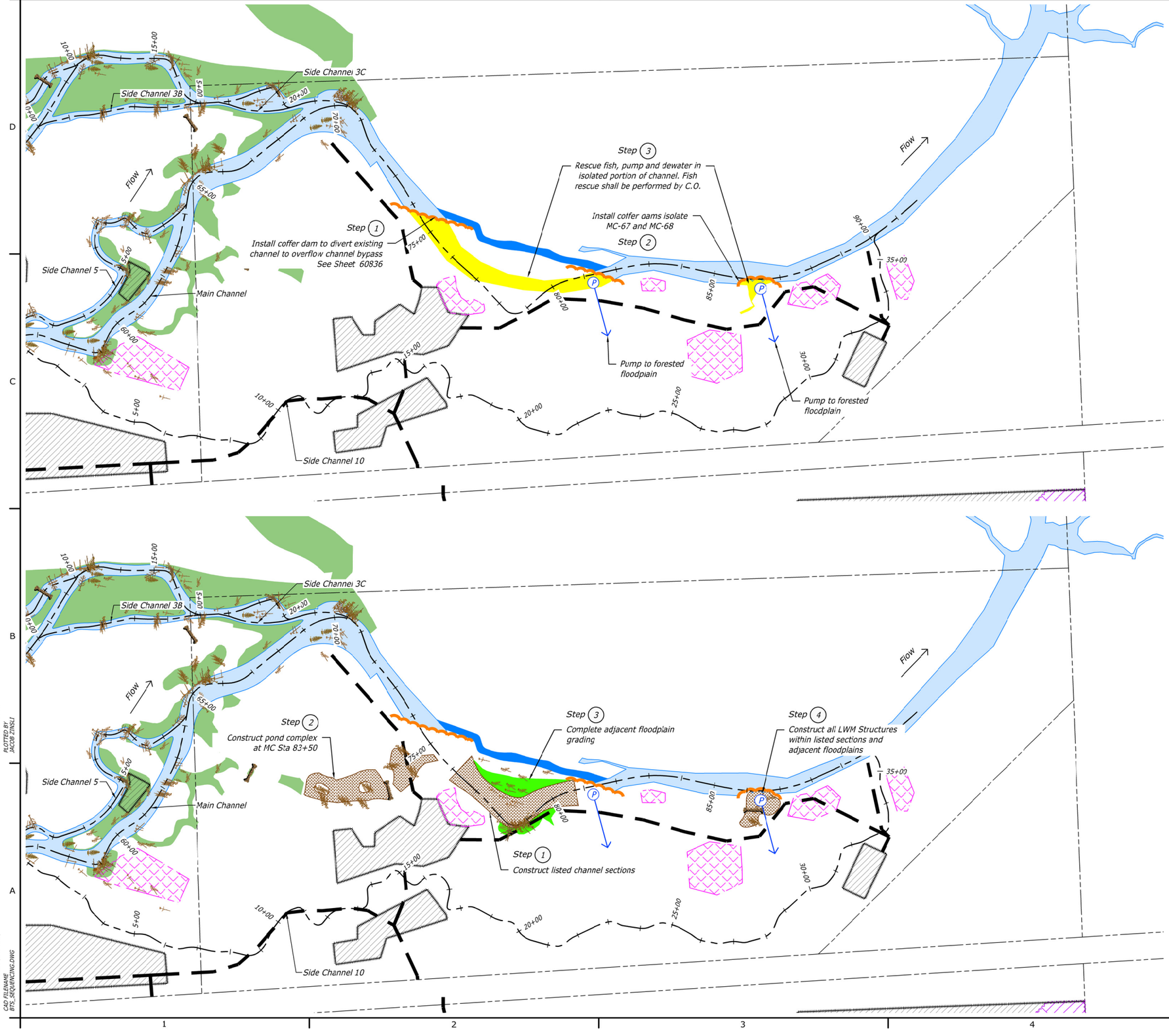
CONSTRUCTION SEQUENCING PLAN 4

1678-100-60825

SHEET 6 of 15

DATE AND TIME PLOTTED
5/17/2018 7:08 PM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_SEQUENCING.DWG



PHASE 1 - STEP 9

- *Install coffer dams MC Sta 74+50, MC Sta 81+50 and MC Sta 86+50 to divert flow to overflow bypass channel*
- *Rescue fish, pump and dewater in isolated portion of channel*

PHASE 1 - STEP 10

- *Construct MC Sta 76+26 - Sta 80+33*
- *Construct pond complex and outlet channels at MC Sta 75+25*
- *Complete adjacent floodplain grading*
- *Construct all LWM features within listed sections and adjacent floodplains*

N

150 0 150 300 450
SCALE OF FEET

LEGEND

- Proposed Channel Alignment
- Temporary Access Routes
- Coffer Dam
- Temporary Crossing
- Staging Area
- LWM Staging Area
- Proposed Floodplain Grading
- Proposed Channel Grading
- Completed Floodplain Grading
- Dewatering and Fish Rescue Area
- Inundated Bypass Area
- Inundated Area

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANKO
05/17/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

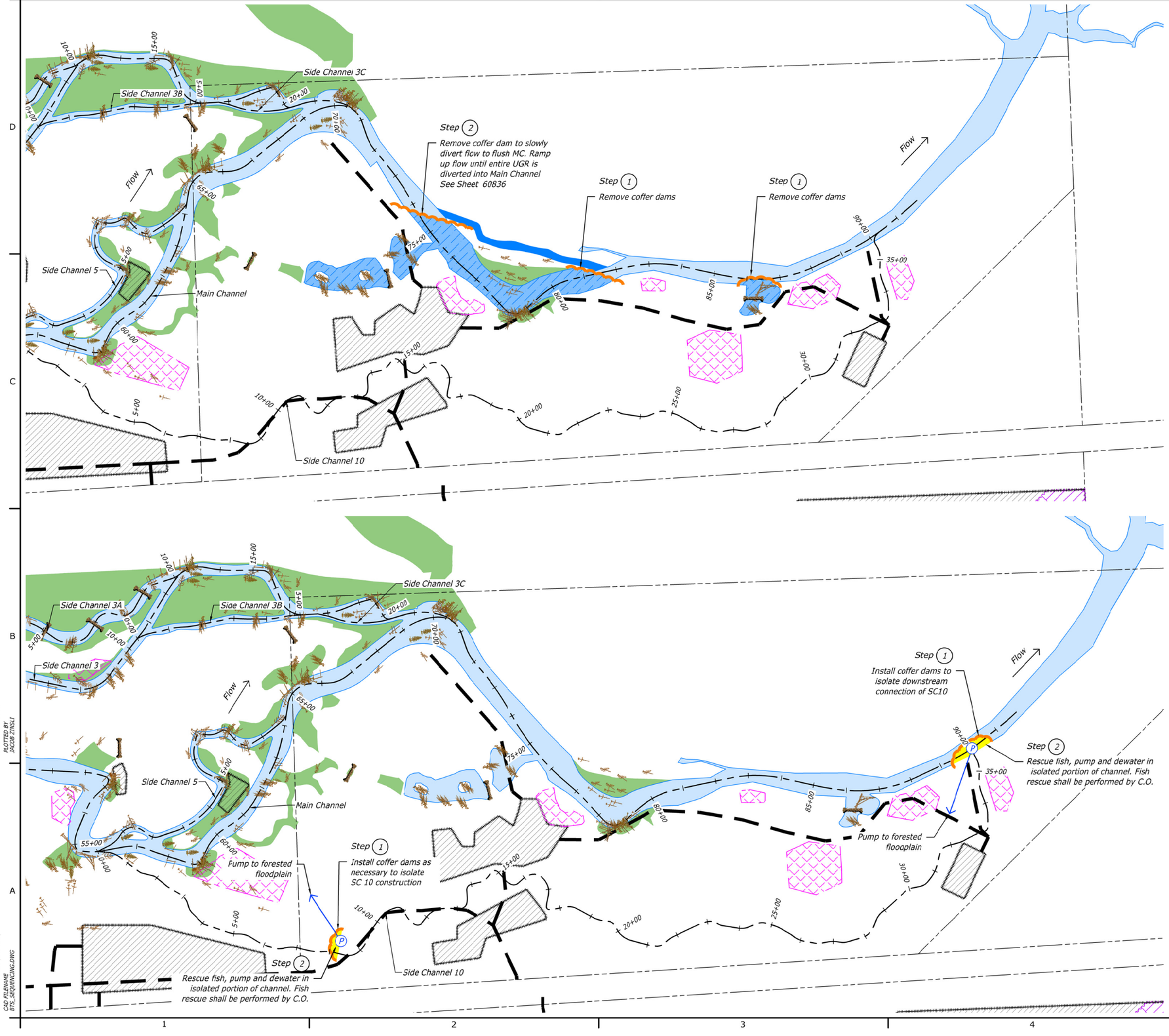
CONSTRUCTION SEQUENCING PLAN 5

1678-100-60826

SHEET 7 of 15

DATE AND TIME PLOTTED
5/17/2018 9:16 AM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_SEQUENCING.DWG



PHASE 1 - STEP 11

- *Remove downstream coffer dams*
- *Remove coffer dam at MC 74+00 to slowly divert flow to flush Main Channel. Ramp up flow until entire UGR is diverted into Main Channel per Shts. 60835 and 60836 as directed by the C.O.*

N

150 0 150 300 450
SCALE OF FEET

PHASE 1 - STEP 12

- *Install coffer dams to isolate upstream and downstream connections of SC10*
- *Rescue fish, pump and dewater in isolated portion of channel. Fish rescue shall be performed by C.O*

LEGEND

- Proposed Channel Alignment
- Temporary Access Routes
- Coffer Dam
- Temporary Crossing
- Staging Area
- LWM Staging Area
- Flush Completed Channel
- Completed Floodplain Grading
- Dewatering and Fish Rescue Area
- Inundated Bypass Area
- Inundated Area

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
IDAHO
NICHOLAS T. DANIS
05/17/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

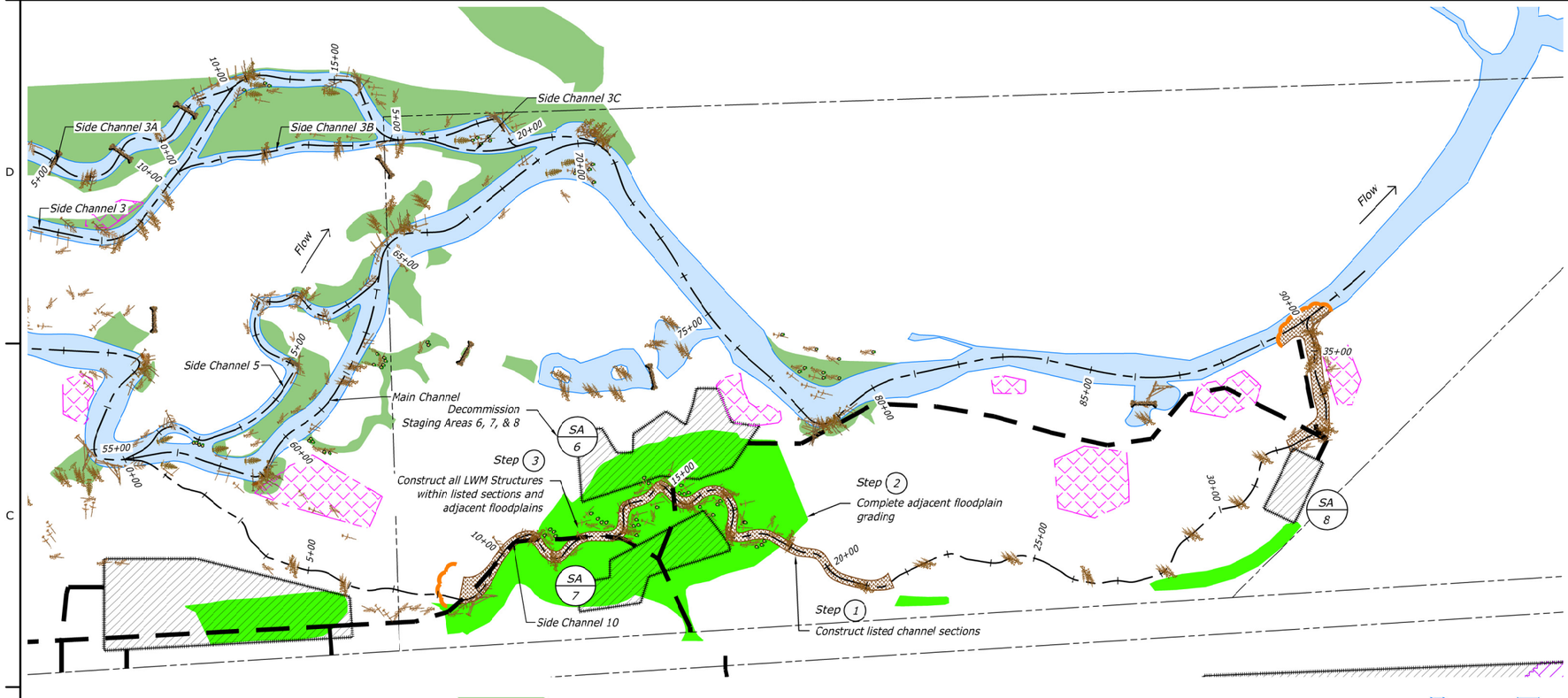
CONSTRUCTION SEQUENCING PLAN 6

1678-100-60827

SHEET 8 of 15

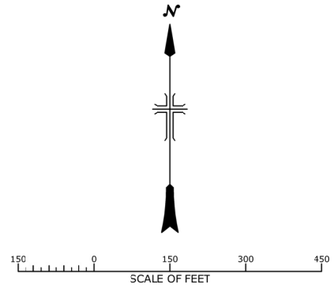
DATE AND TIME PLOTTED
5/17/2018 7:06 PM
PLOTTED BY
JACOB ZINSLI

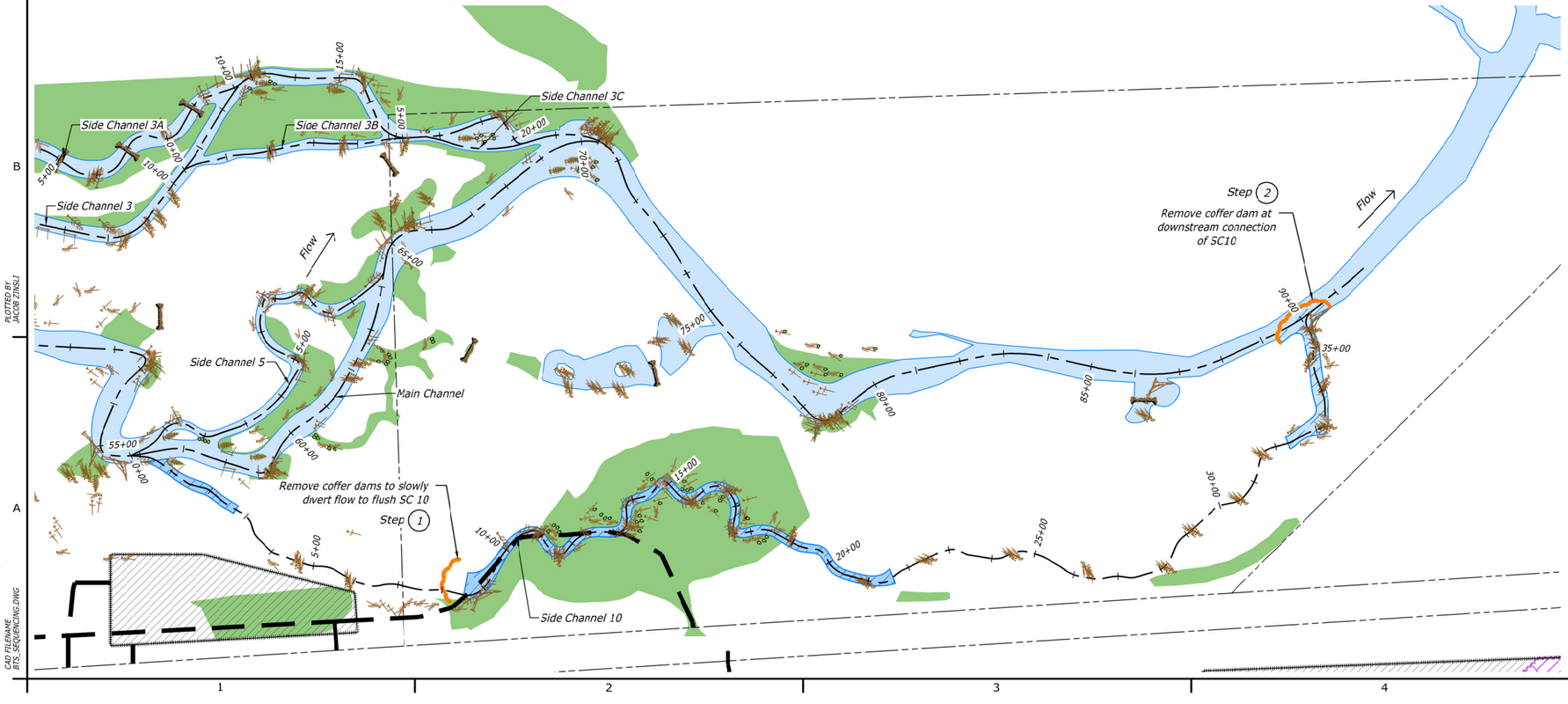
CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_SEQUENCING.DWG



PHASE 1 - STEP 13

- *Construct middle and downstream sections of SC10*
- *Complete adjacent floodplain grading*
- *Construct all LWM features within listed sections and adjacent floodplains*
- *Breach levee and connect MC and SC10*
- *Decommission Staging Areas 6, 7, 8, and associated access roads*





PHASE 1 - STEP 14

- *Remove coffer dams*
- *Flush newly constructed channels and minimize turbidity per Shts. 60835 and 60836 as directed by the C.O.*

LEGEND

- Proposed Channel Alignment
- Temporary Access Routes
- Coffer Dam
- Temporary Crossing
- Staging Area
- LWM Staging Area
- Proposed Channel Grading
- Flush Completed Channel
- Proposed Floodplain Grading
- Completed Floodplain Grading
- Inundated Area

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANKO
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

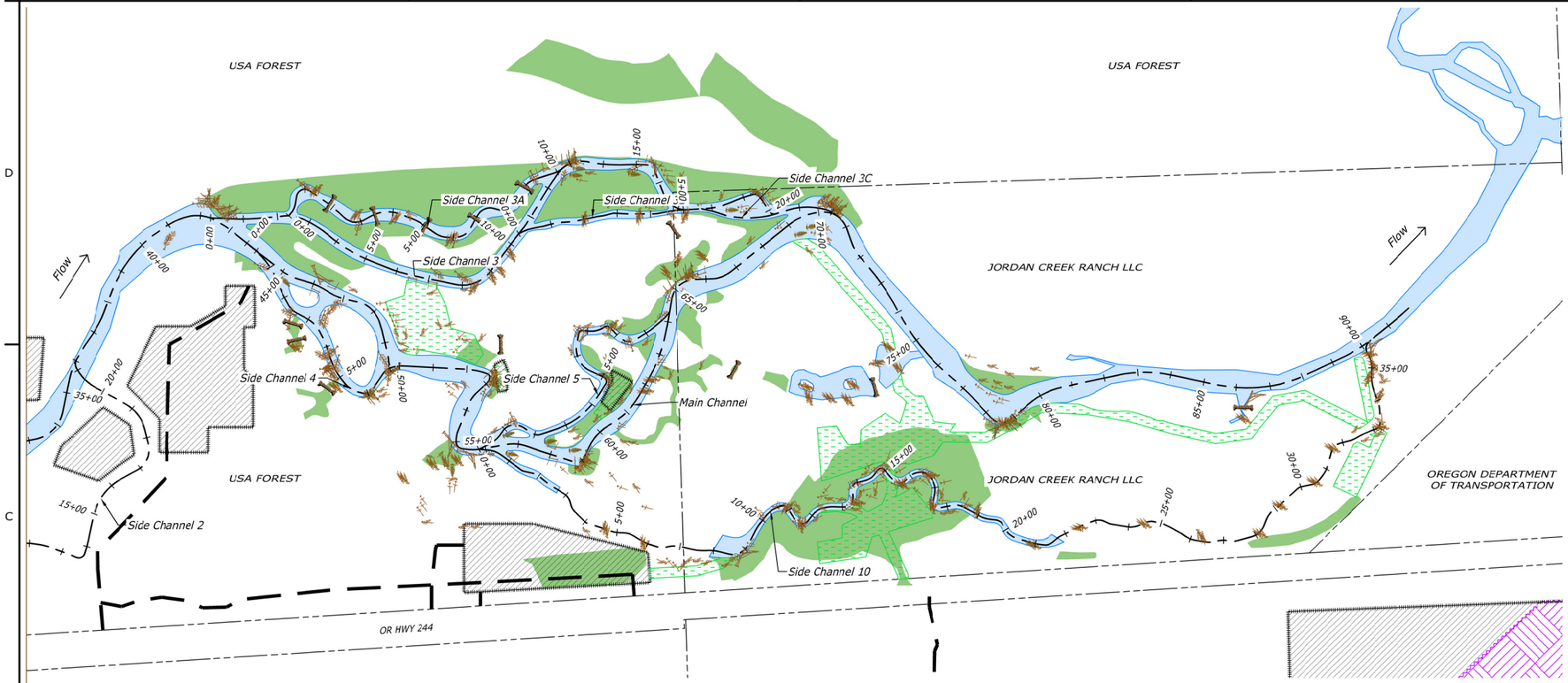
CONSTRUCTION SEQUENCING PLAN 7

1678-100-60828

SHEET 9 of 15

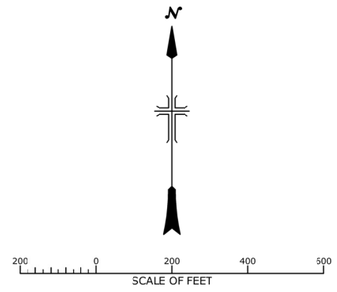
DATE AND TIME PLOTTED
5/11/2018 7:08 PM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_SEQUENCING.DWG



PHASE 1 - STEP 15
DOWNSTREAM CLOSEOUT

- *Decommission Phase 1 Downstream Access Roads*
- *Decommission Phase 1 Downstream Staging Areas*
- *Prior to leaving the site following Phase 1 construction activities the Contractor shall treat temporary stockpiles with Wood Fiber Hydraulic Mulch or other approved Temporary Erosion and Sediment Control (TESC) items as approved by the Contracting Officer to prevent erosion from the stockpile prior to reuse of the soil during Phase 2 construction activities.*



LEGEND

- Proposed Channel Alignment
- Temporary Access Routes
- Staging Area
- LWM Staging Area
- LWM Harvest Area
- Completed Floodplain Grading
- Inundated Area
- Restored Access and Staging

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DAINS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

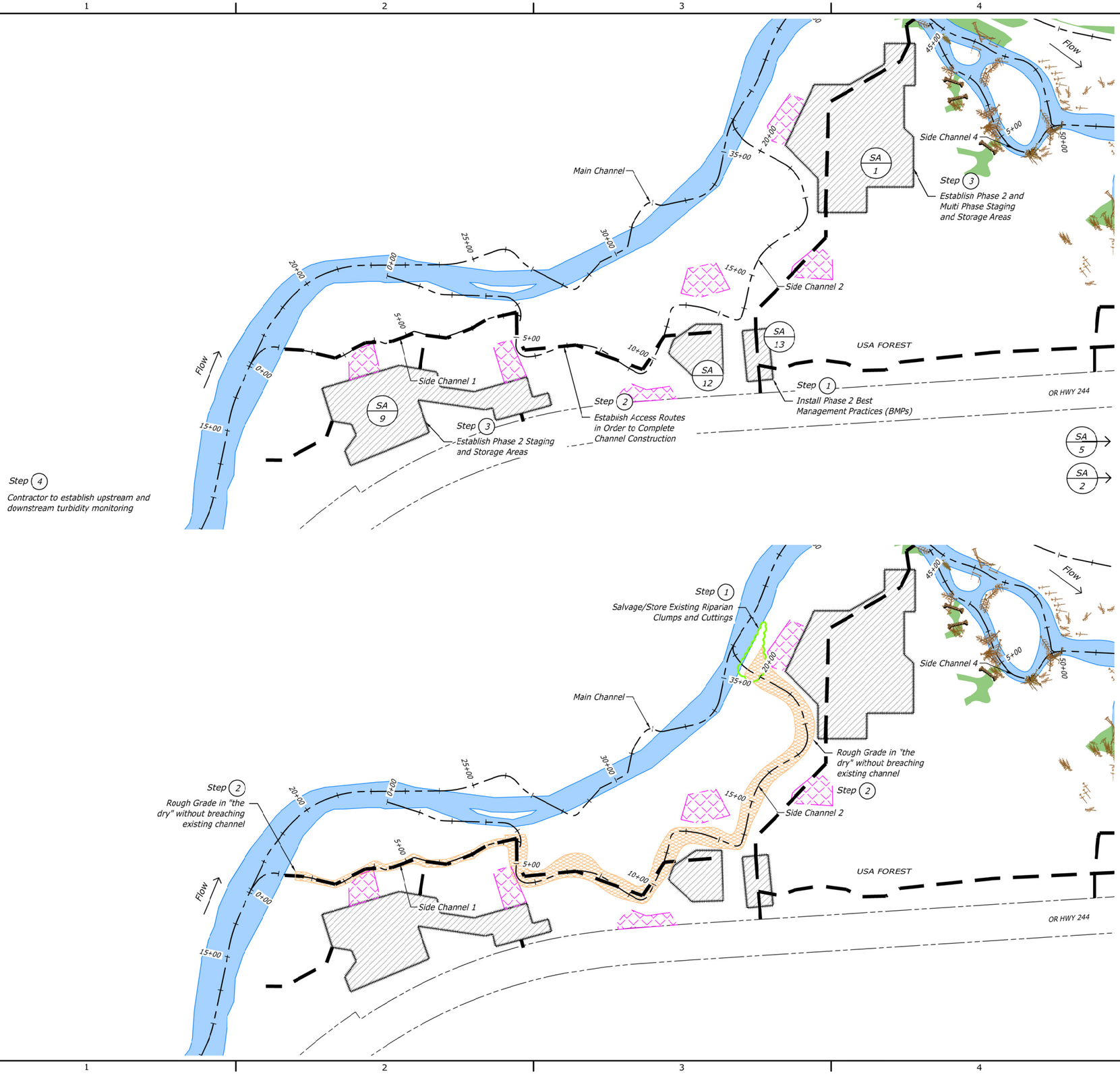
CONSTRUCTION SEQUENCING PLAN 8

1678-100-60829

SHEET 10 of 15

DATE AND TIME PLOTTED
5/11/2018 1:09 PM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_SEQUENCING.DWG



PHASE 2 - STEP 1

Before "In-Water" work window (July 1st).

- *Install Phase 2 Upstream Best Management Practices (BMPs)*
- *Establish Phase 2 Upstream staging areas and access routes, salvage selected vegetation within construction limits, and clear and grub the site as necessary*
- *Staging Area 1, 2, and 5 to remain in place*
- *Staging Areas 9, 10, 11, 12, 13, 14, & 15 to be Phase 2 only*
- *Contractor to establish upstream and downstream turbidity monitoring*

This work may be done prior to July 1st maximize the "in-water" work window (July 1 - October 15)

PHASE 2 - STEP 2

Before "In-Water" work window (July 1st).

- *Salvage/Store Existing Riparian Clumps and Cuttings*
- *Rough grade Side Channel 1 and Side Channel 2 Sta 4+50 - Sta 20+20 in "the dry" without breaching existing channel*

This work may be done prior to July 1st maximize the "in-water" work window (July 1 - October 15)

LEGEND

- Proposed Channel Alignment
- Temporary Access Routes
- Coffer Dam
- Temporary Crossing
- Staging Area
- LWM Staging Area
- Proposed Channel Rough Grade
- Completed Floodplain Grading
- Inundated Area
- Existing Vegetation - Salvage

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIELS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

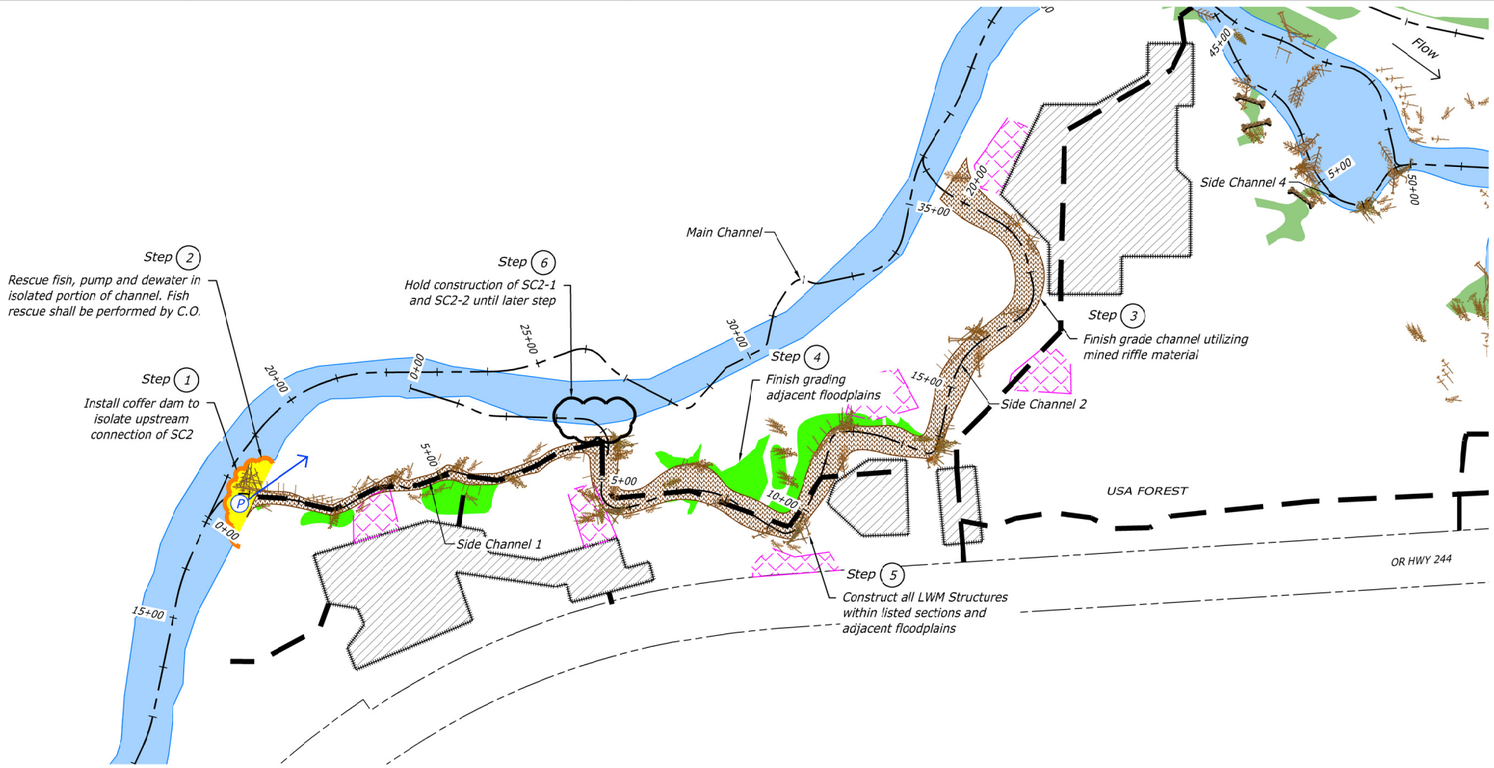
CONSTRUCTION SEQUENCING PLAN 9

1678-100-60830

SHEET 11 of 15

DATE AND TIME PLOTTED
5/11/2018 2:10 PM
PLOTTED BY
JACOB ZINSLI

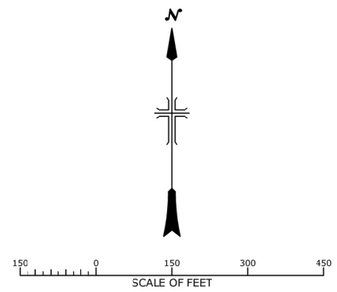
CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_SEQUENCING.DWG

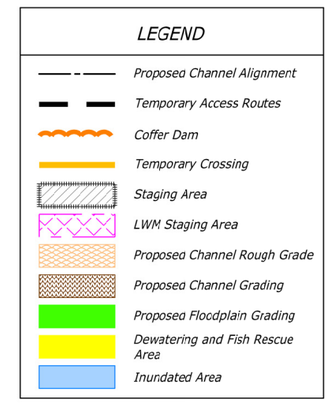


PHASE 2 - STEP 3

Begin "In-Water" work (July 1st).

- *Construct Side Channel 1 and Side Channel 2 Sta 4+50 - Sta 20+20*
- *Construct all Riffles and LWM Structures within listed section*
- *Hold construction of SC1-1 and SC1-2 until later step*
- *Hold construction of floodplain grading along highway until later step*
- *Install coffer dams to isolate upstream of connection to SC1*
- *Rescue fish, pump, and dewater in isolated portion of channel. Fish rescue shall be performed by C.O.*





RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIELS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

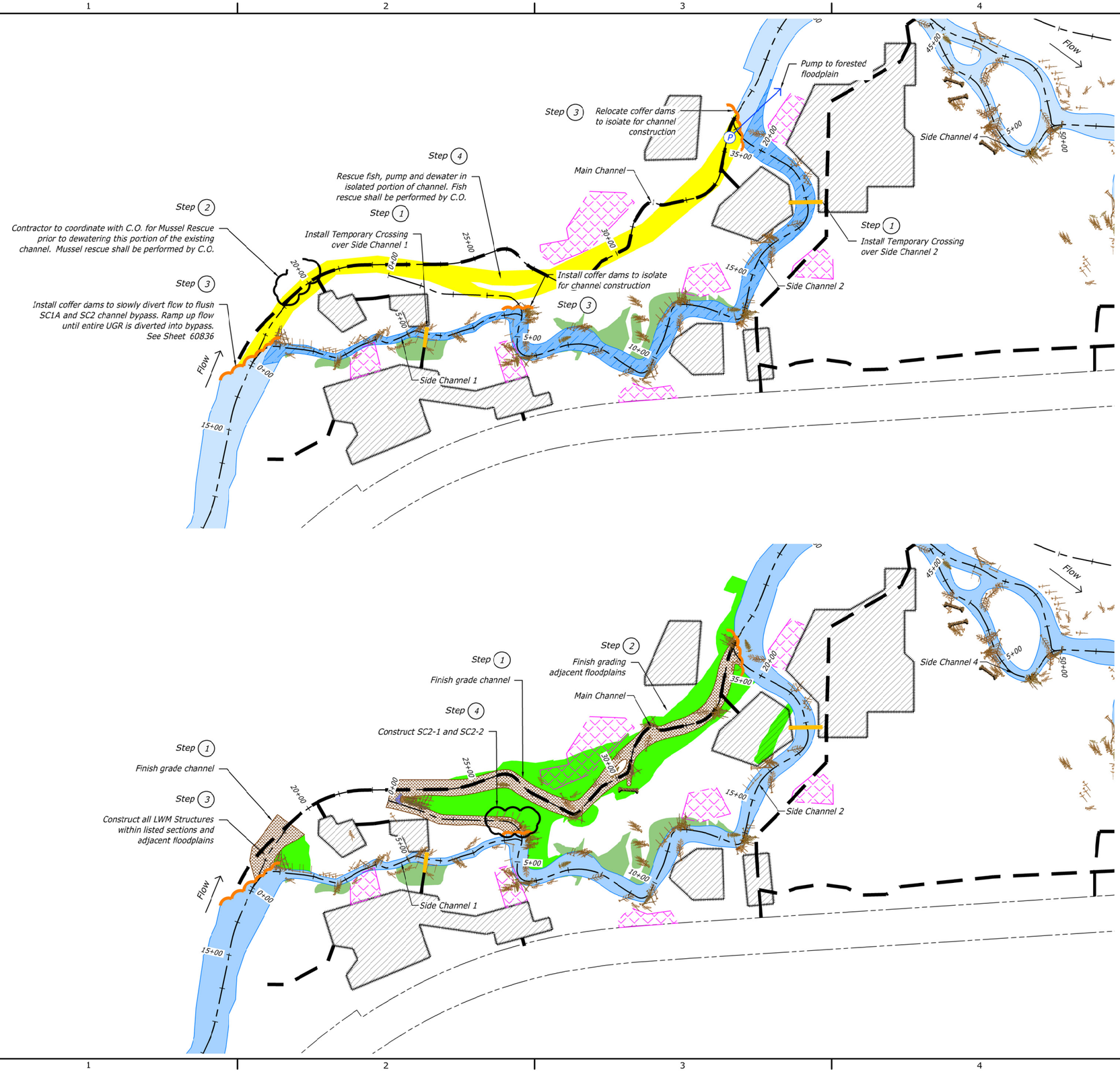
CONSTRUCTION SEQUENCING PLAN 10

1678-100-60831

SHEET 12 of 15

DATE AND TIME PLOTTED
5/11/2018 1:1 PM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_SEQUENCING.DWG



PHASE 2- STEP 4

- *Install Temporary Crossings over Side Channel 1 and Side Channel 2*
- *Install coffer dams to divert existing flow to Side Channel 1 and Side Channel 2 Bypass. Ramp up flow until entire UGR is diverted into bypass per Shts. 60835 and 60836 as directed by C.O.*
- *Rescue fish, pump and dewater in isoiated portion of channel*
- *Established Mussel Zone. Contractor to coordinate with C.O. for Mussel Salvage/Relocation. Mussel rescue to be performed by C.O.*

N

150 0 150 300 450
SCALE OF FEET

PHASE 2 - STEP 5

- *Finish grading Main Channel Sta 18+00 - Sta 36+00*
- *Finish grading SC2 Sta 0+00 - 4+00*
- *Finish grading adjacent floodplains*
- *Construct all Riffles and LWM Structures within listed sections and adjacent floodplains*
- *Construct SC2-1 & SC2-2*

LEGEND

- Proposed Channel Alignment
- Temporary Access Routes
- Coffer Dam
- Temporary Crossing
- Staging Area
- LWM Staging Area
- Proposed Channel Grading
- Flush Completed Channel
- Proposed Floodplain Grading
- Completed Floodplain Grading
- Dewatering and Fish Rescue Area
- Inundated Area

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIELS
EXPIRES: 12/31/19
05/22/18

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

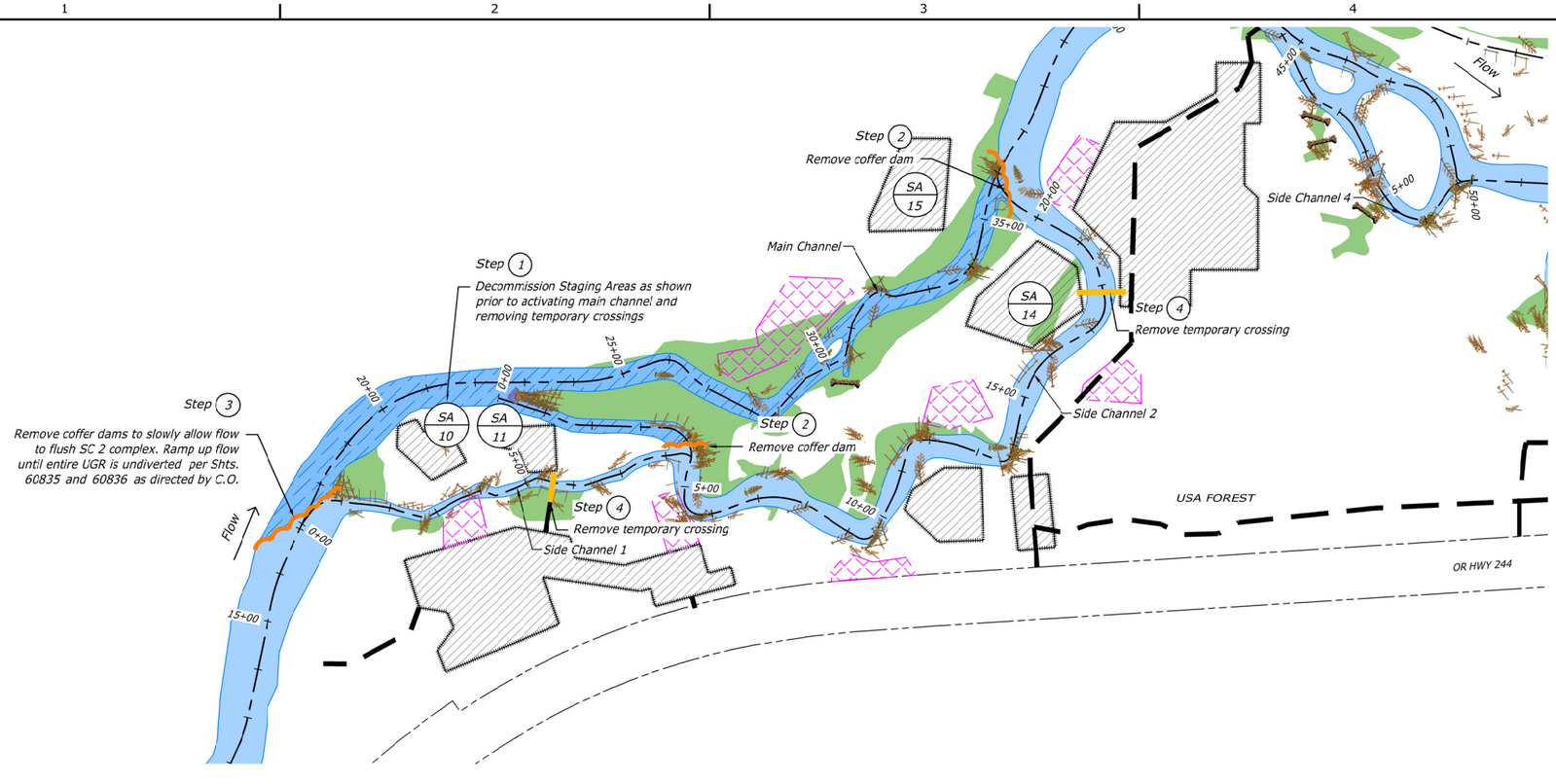
CONSTRUCTION SEQUENCING PLAN 11

1678-100-60832

SHEET 13 of 15

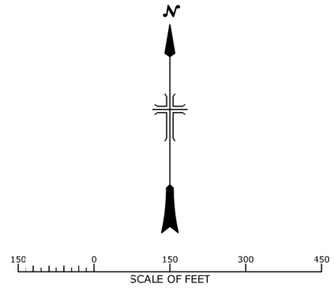
DATE AND TIME PLOTTED
5/11/2018 2:12 PM
PLOTTED BY
JACOB ZINSLI

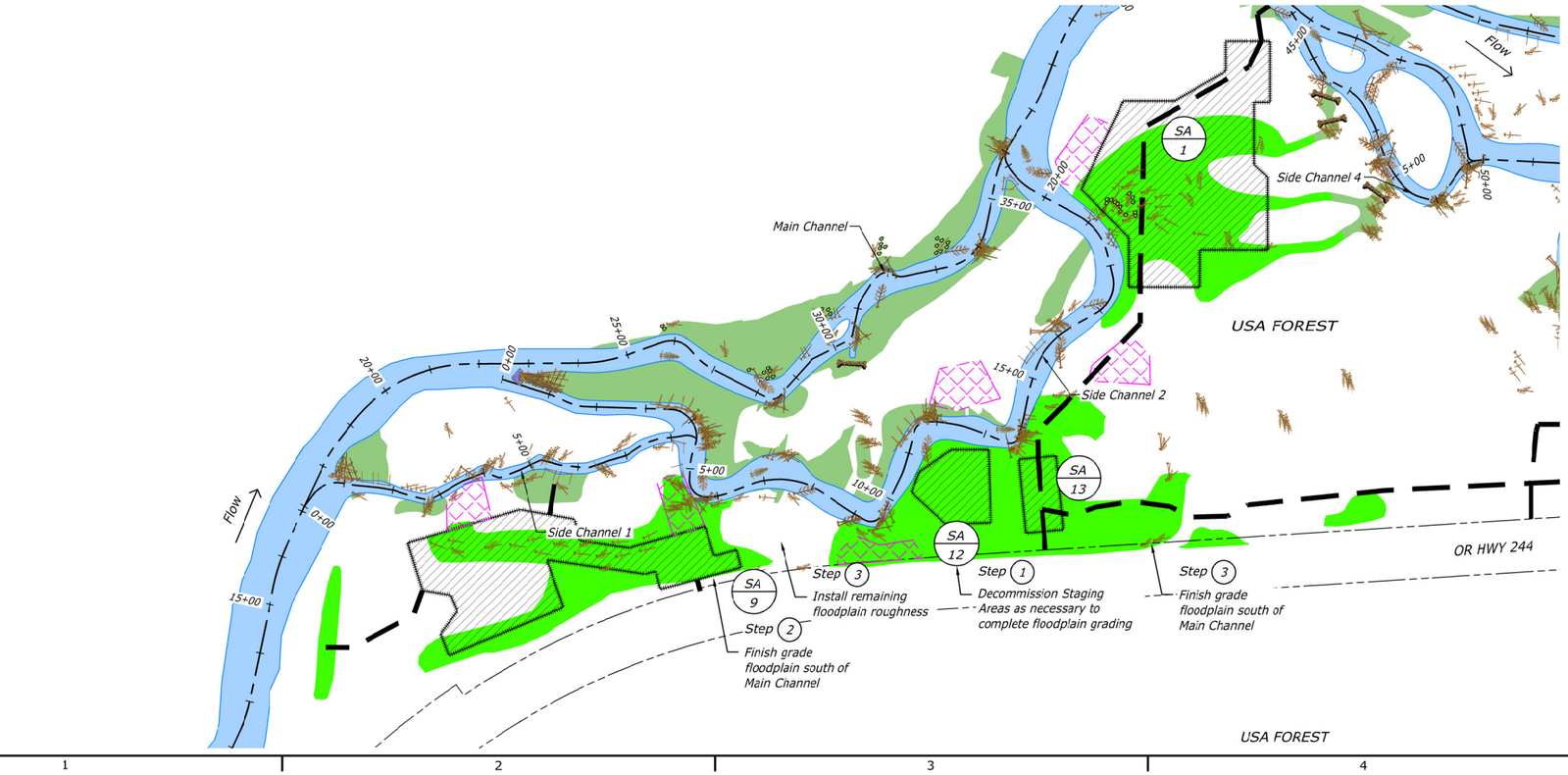
CAD SYSTEM
MicroStation V8i 22.06 (MS Tech)
CAD FILENAME
BTS_SEQUENCING.DWG



PHASE 2 - STEP 6

- *Decommission Staging Areas 10, 11, 14, and 15 and associated access routes*
- *Remove coffer dams to slowly allow flow to flush Main Channel complex. Ramp up flow until entire UGR is undiverted per Shts. 60835 and 60836 as directed by C.O.*
- *Remove temporary crossings*





PHASE 2 - STEP 7

Post "In-Water" work window

- *Decommission Staging Areas 1, 9, 12, & 13 as necessary to complete floodplain grading*
- *Grade floodplain teatures south of Main Channel*
- *Install floodplain roughness*

LEGEND

- Proposed Channel Alignment
- Temporary Access Routes
- Coffer Dam
- Temporary Crossing
- Staging Area
- LWM Staging Area
- Flush Completed Channel
- Completed Floodplain Grading
- Inundated Area

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
07/12/2018
NICHOLAS T. DANOS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

CONSTRUCTION SEQUENCING PLAN 12

1678-100-60833

SHEET 14 of 15

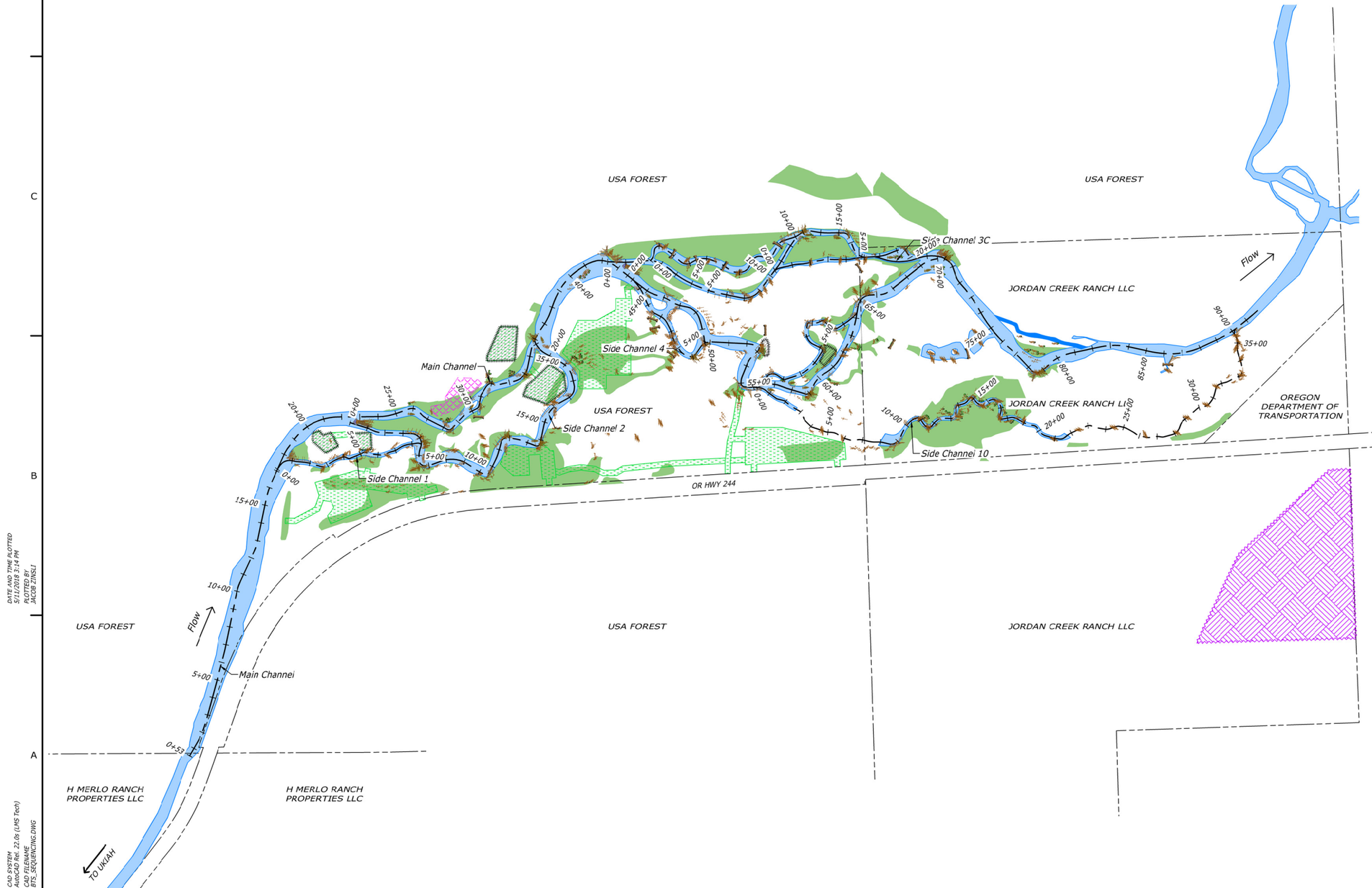
DATE AND TIME PLOTTED
5/11/2018 2:13 PM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
ARCGIS 10.4 22.0s (LMS Tech)
CAD FILENAME
BTS_SEQUENCING.DWG

PHASE 2 - STEP 8
CLOSEOUT

Post "In-Water" work window

- Remove all temporary crossings
- Obliterate all remaining access routes and staging areas
- Remove all temporary BMPs
- Restoration and Planting plan



RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANKO
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

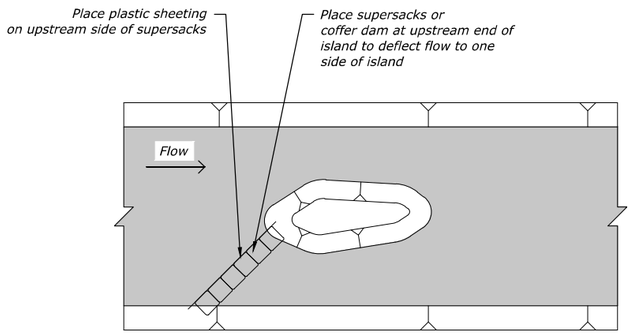
CONSTRUCTION SEQUENCING PLAN 13

1678-100-60834

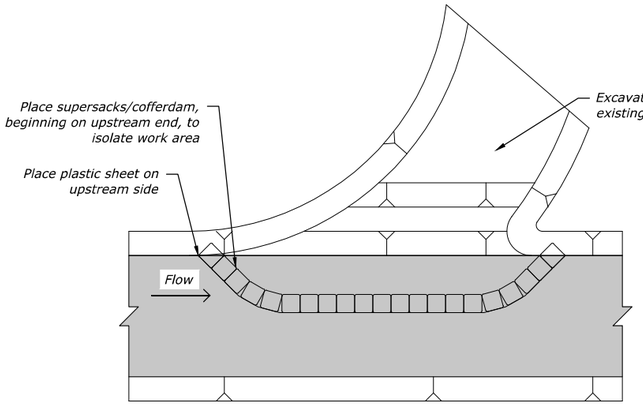
SHEET 15 of 15

DATE AND TIME PLOTTED
5/11/2018 7:14 PM
PLOTTED BY
JACOB ZINSLI

CAD SYSTEM
Microstation SE 22.06 (MS Tech)
CAD FILENAME
BTS_SEQUENCING.DWG



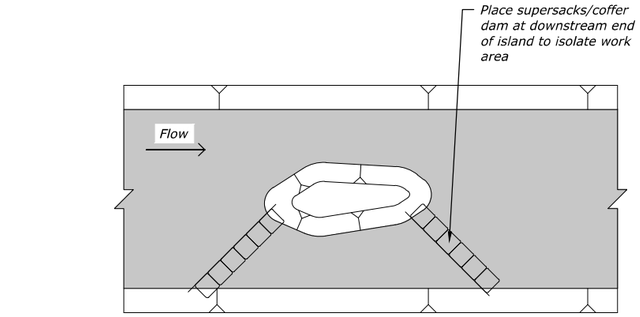
STEP 1



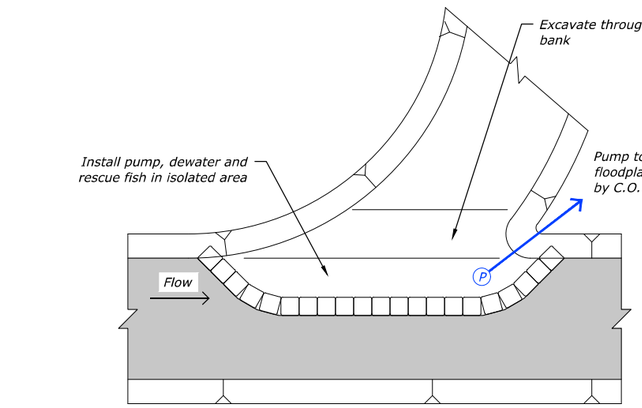
STEP 1

Notes for Removal of Water:

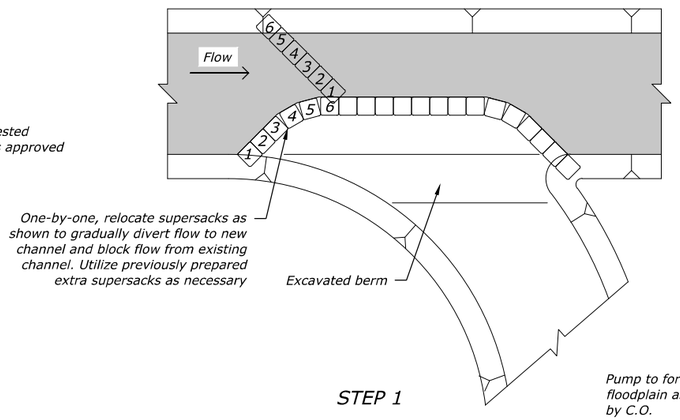
1. The contractor is solely responsible for designing and implementing measures to perform in-water work in compliance with work requirements and permit conditions.
2. A Cofferdam and Flow Diversion Plan and Dewatering Plan shall be submitted by the Contractor within ten (10) days of receiving notice-to-proceed in accordance with the Specifications.
3. See General Notes and Abbreviations Sheet 60690 for Grande Ronde Flow Statistics at this site.
4. Maintain fish passage during project construction.
5. Material used for temporary access shall be removed from the channel upon completion of the project, and deposited in an upland location where it will not re-enter the river.
6. If bulk bags or smaller gravel bags are used to construct cofferdams or flow diversion dams, material used to fill the bags shall not contain fines and shall be of similar gradation to the existing channel substrate. Material must be approved by the Contracting Officer and clearly defined in the Cofferdam and Flow Diversion Plan submittal
7. Notify C.O. minimum 5 days prior to performing in-water work.
8. The Contractor will monitor turbidity during construction. Turbidity sampling will be performed using a calibrated turbidimeter or by visual observation, every four hours while work is being implemented, or more often if turbidity disturbances vary greatly. Background samples or observations will be taken at a relatively undisturbed area approximately 100 feet upstream from the project area. The second turbidity sample or observation will take place immediately after the upstream observation 50 feet downstream from the project area in streams that are 30 feet wide or less, and 100 feet downstream from the project area in streams that are between 30 and 100 feet wide, every two hours. If the observed/measured turbidity downstream is more than background measurement (>10%), the activity must be modified to reduce turbidity. If the exceedance continues after the second monitoring interval, the activity must stop until the turbidity levels return to background.
9. The Contractor shall coordinate with the Contracting Agency for fish removal and shall notify the Contracting Officer a minimum of 5 working days prior to requiring fish removal services.



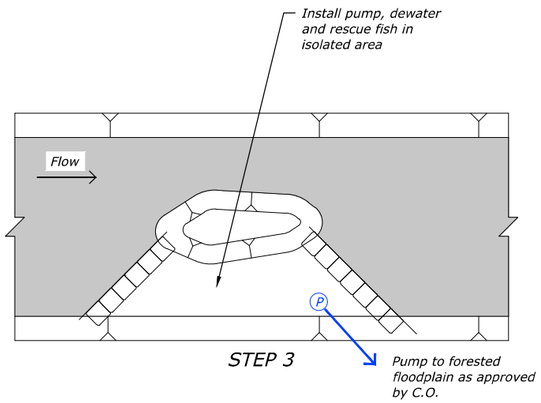
STEP 2



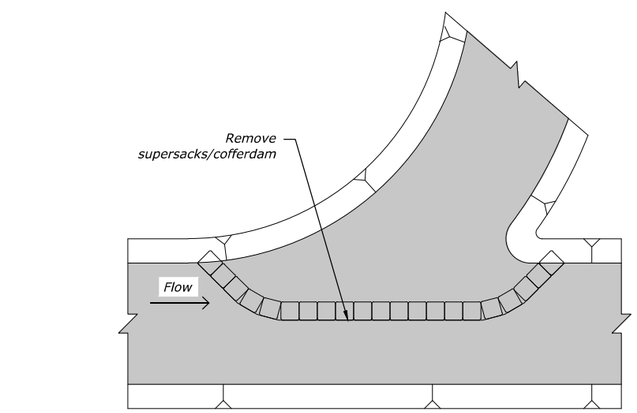
STEP 2



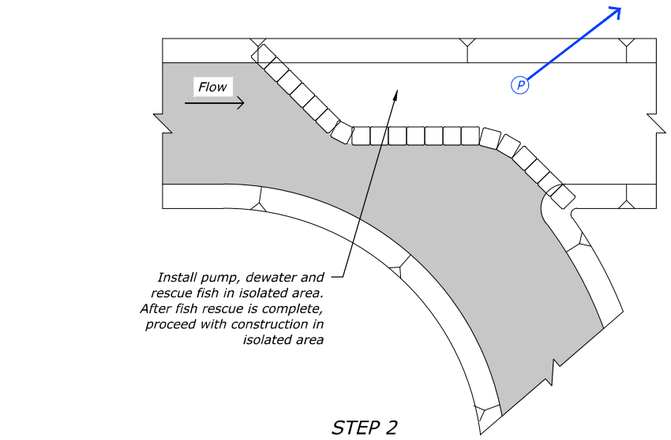
STEP 1



STEP 3



STEP 3



STEP 2

WATER REMOVAL AROUND ISLAND/SIDE CHANNEL

NOT TO SCALE

WATER REMOVAL AT CONFLUENCE

NOT TO SCALE

ADJUST COFFER DAMS

NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
NICHOLAS T. DANIS
05/11/2018
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN

BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

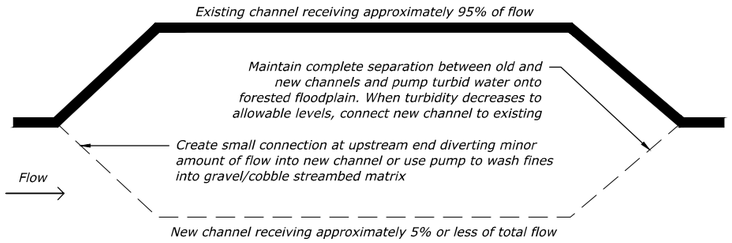
REMOVAL OF WATER PLAN

1678-100-60835

SHEET 1 of 2

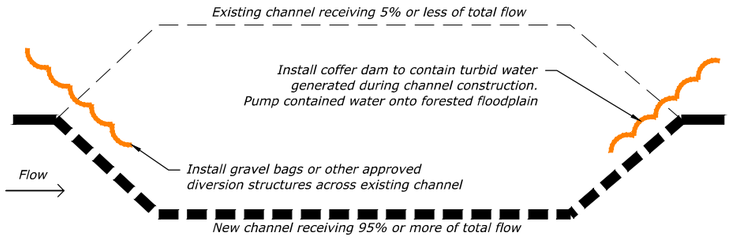
DATE AND TIME PLOTTED 5/10/2018 10:04 AM
PLOTTED BY NICK DANIS

CAD SYSTEM AutoCAD Civil 3D 2016 (LMS Tech)
CAD FILENAME BTS_WATER REMOVAL DETAILS.DWG



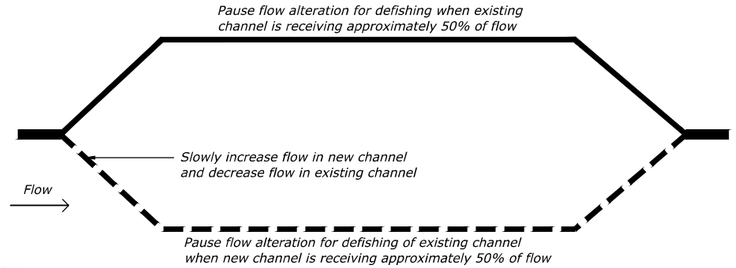
Notes:
1. Use pumped water applied to new channel to wash fines into the gravel/cobble bed material. Alternatively, a small opening can be made in the upstream diversion to allow a minor amount of flow from the river to enter the new channel. During either process, place a pump at the downstream end of the new channel that will pump turbid water onto an upland area. The capacity of the downstream pump shall exceed the amount of flow applied upstream.
2. When water pumped from the downstream end is no longer significantly turbid, the pump can be removed and the downstream end of the new channel can be opened up to the existing channel. Amount of allowable turbidity of the flow in the new channel varies depending on the flow rate in the new channel vs. flow rate in the existing channel. After mixing at the downstream connection, flow in the river channel shall meet water quality standards for maximum turbidity as required by multiple state and federal permits.
3. Following open connection, monitor turbidity of water in the creek 300 feet downstream of where new channel and existing channel meet. Incrementally increase upstream connection to 50% of total flow as turbidity of water at monitoring station decreases to allowable levels.

STEP 1



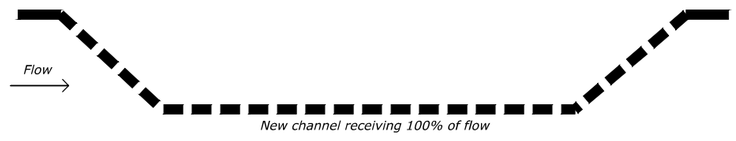
Notes:
1. After defishing of existing channel is complete as determined by the Contracting Officer. resume work to slowly increase amount of total flow entering the new channel.
2. Install temporary diversion dam across upstream end of existing channel to complete diversion. Install temporary coffer dam at downstream end of existing channel to contain turbid water generated during fill placement in existing channel.

STEP 3



Notes:
1. Slowly increase the amount of flow entering the new channel. The Contracting Officer (C.O.) will determine the rate to increase flow into the new channel. It is critical that the flow increase is done slowly to minimize turbidity generated in the new channel, and to prevent stranding of fish in the existing channel where flow rate is decreasing.
2. When approximately half of the flow is in the new channel, pause work that increases flow rate in the new channel allow the Contracting Agency to perform defishing of the old channel.

STEP 2

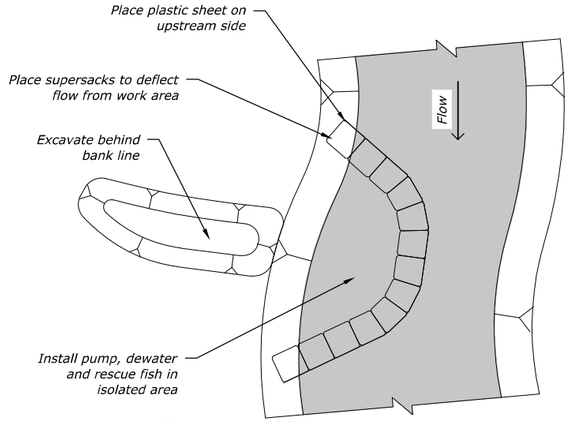


Notes:
1. Fill existing channel as shown in Grading Plan sheets in these Drawings.
2. Remove temporary diversion dam and coffer dam from abandoned channel.

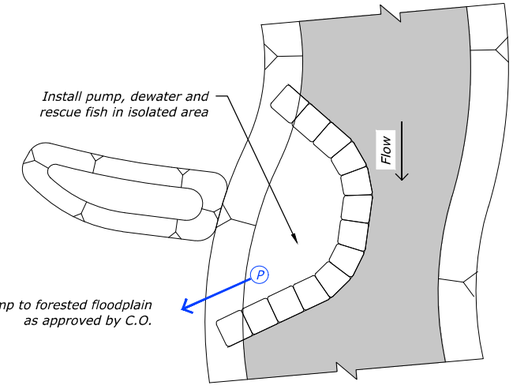
STEP 4

CHANNEL DIVERSION PROCEDURE

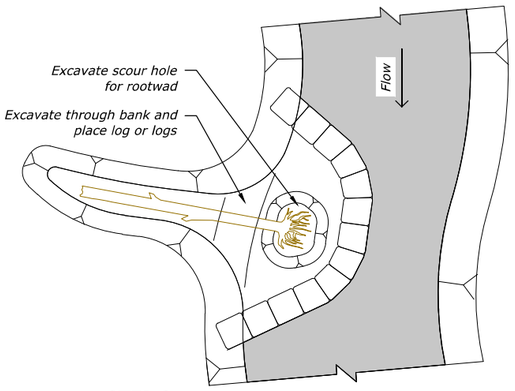
NOT TO SCALE



STEP 1



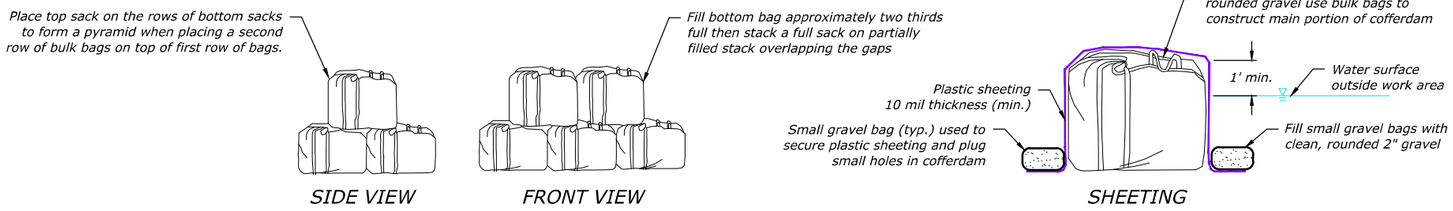
STEP 2



STEP 3

WOOD STRUCTURE PLACEMENT

NOT TO SCALE



SUPERSACK INSTALLATION DETAIL

NOT TO SCALE

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
NICHOLAS T. DANIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

REMOVAL OF WATER PLAN

1678-100-60836

SHEET 2 of 2

DATE AND TIME PLOTTED
5/10/2018 10:12 AM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME:
BTS_WATER REMOVAL DETAILS.DWG

LEGEND

- Seed Mix A
- Seed Mix B
- Seed Mix C

N

USFS
USFS
USFS
USA FOREST
USFS
LOWE FAMILY RANCH LLC
LOWE FAMILY RANCH LLC
LOWE FAMILY RANCH LLC
BEAR CREEK RANCH QUARTER HORSES
BEAR CREEK RANCH QUARTER HORSES
STATE OF OREGON PARKS & REC
OR HWY 244
TO LA GRANDE
H MERLO RANCH PROPERTIES LLC
H MERLO RANCH PROPERTIES LLC
TO UKIAH

OVERALL RESTORATION AND SEEDING PLAN

300 0 300 600 900
SCALE OF FEET

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
NICHOLAS T. DAINES
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

OVERALL RESTORATION AND SEEDING PLAN

1678-100-60837

SHEET 1 of 2

DATE AND TIME PLOTTED
5/10/2018 7:11 PM
PLOTTED BY
NICK DAVIS

CAD SYSTEM
AutoCAD Civil 3D 22.0s (LMS Tech)
CAD FILENAME
BTS_PLANTING.DWG

Seed Mix A		
Common Name	Botanical Name	Proportion of Mix
Blue wildrye	Elymus glaucus	33%
Tufted Hairgrass	Deschampsia cespitosa	20%
Slender hairgrass	Deschampsia elongata	13%
Nebraska Sedge	Carex nebrascensis	10%
Beaked sedge	Cyperaceae utriculata	5%
Creeping spikerush	Eleocharis palustris	5%
Small fruited bulrush	Scirpus microcarpus	5%
Soft stem bulrush	Schoenoplectus tabernaemontani	5%
Lewis Flax	Linum lewisii	1%
Missouri goldenrod	Solidago missouriensis	1%
Seep monkeyflower	Mimulus guttatus	1%
Western Yarrow	Achillea millefolium	1%
Mix Total		100%

Seed Mix B		
Common Name	Botanical Name	Proportion of Mix
Blue wildrye	Elymus glaucus	25%
Nebraska Sedge	Carex nebrascensis	20%
Baltic rush	Juncus balticus	10%
Creeping spikerush	Eleocharis palustris	10%
Idaho Fescue	Festuca idahoensis	10%
Tufted Hairgrass	Deschampsia cespitosa	10%
Small fruited bulrush	Scirpus microcarpus	5%
Lewis Flax	Linum lewisii	2%
Western yarrow	Achillea millefolium	2%
Missouri goldenrod	Solidago missouriensis	2%
Nettleleaf giant hyssop	Agastache urticifolia	2%
Sticky purple geranium	Geranium viscosissimum	1%
Seep monkeyflower	Mimulus guttatus	1%
Silverleaf phacelia	Phacelia hastata	1%
Mix Total		100%

Seed Mix C		
Common Name	Botanical Name	Proportion of Mix
Bluebunch wheatgrass	Pseudoroegneria spicata	30%
Blue wildrye	Elymus glaucus	19%
Idaho fescue	Festuca idahoensis	18%
Great Basin wildrye	Leymus cinereus	8%
Sandberg bluegrass	Poa secunda	8%
Prairie junegrass	Koeleria macrantha	6%
Mountain Brome	Bromus carinatus	3%
Mountain monardella	Monardella odortissima	2%
Nettleleaf giant hyssop	Agastache urticifolia	2%
Lewis flax	Linum lewisii	1%
Silverleaf phacelia	Phacelia hastata	1%
Sticky purple geranium	Geranium viscosissimum	1%
Western yarrow	Achillea millefolium	1%
White sagebrush	Artemisia ludoviciana	1%
Mix Total		100%

Seeding Notes:

1. *All seed shall will be provided to the Contractor at no cost by the Contracting Officer.*
2. *Seed shall be evenly distributed over shown areas at a rate of 15 lbs/acre Pure Live Seed (PLS). Actual weight per acre will be determined by C.O. based on purity and germination.*
3. *All seed will be specified as free of all Oregon-listed noxious weeds.*

RECLAMATION
Managing Water in the West

Cardno
Shaping the Future

REGISTERED PROFESSIONAL ENGINEER
79319PE
OREGON
05/11/2018
NICHOLAS T. DANIS
EXPIRES: 12/31/19

ALWAYS THINK SAFETY

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM

GRANDE RONDE RIVER SUBBASIN
BIRD TRACK SPRINGS FISH HABITAT ENHANCEMENT PROJECT

CONTRACTOR
DRAWN

M.KNUTSON P.E.
ACCEPTED

CSRO (BOISE, IDAHO) 2018-05-14

SEEDING NOTES

1678-100-60838

SHEET 2 of 2

DATE AND TIME PLOTTED
5/10/2018 12:11 PM
PLOTTED BY
NICK DANIS

CAD SYSTEM
AutoCAD Civil 3D 12.0s (LMS Tech)
CAD FILENAME
BTS_PLANTING.DWG