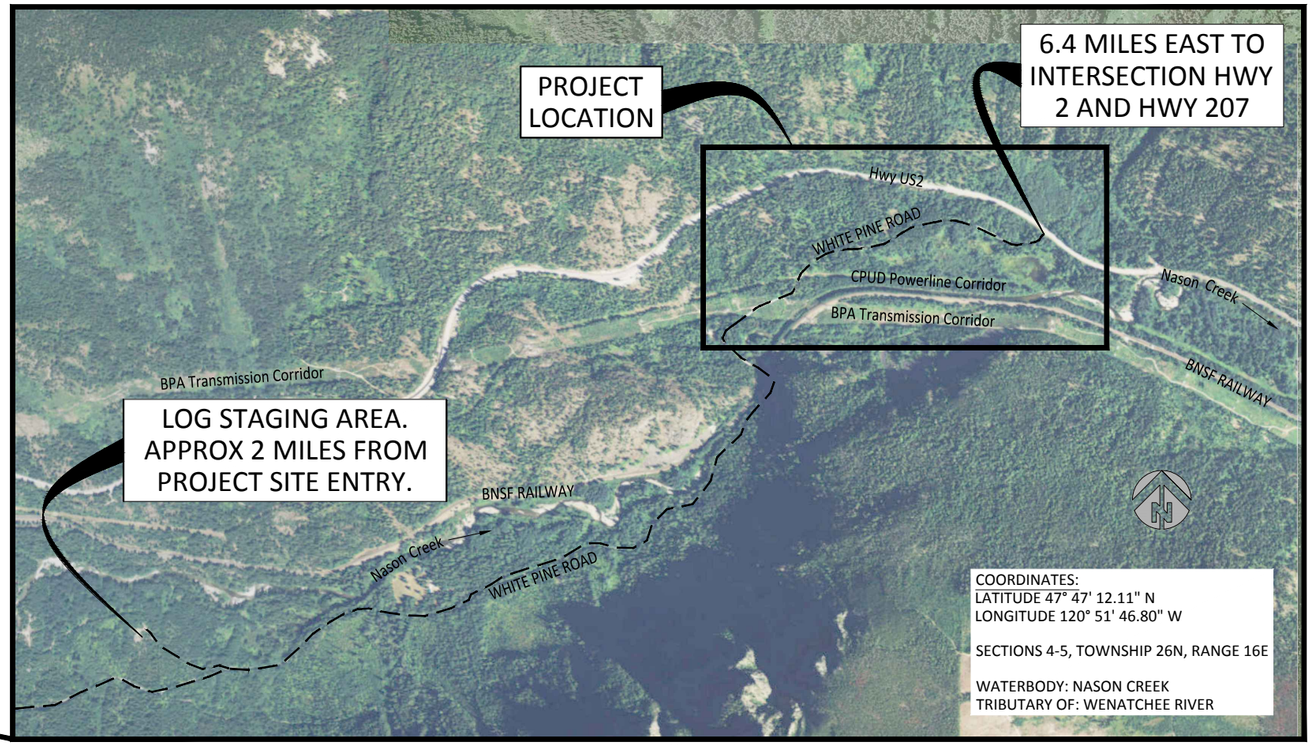
NASON CREEK – UPPER WHITE PINE REACH SUBREACH 2 STREAM HABITAT ENHANCEMENT CHELAN COUNTY, WASHINGTON 90% DESIGN – JUNE 7, 2016

LOCATION MAP

VICINITY MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE

SHEET LIST

Preliminary 90%

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COLUMBIA/SNAKE RIVER SALMON RECOVERY OFFICE
FCRPS HABITAT IMPROVEMENT PROGRAM – WASHINGTON

NASON CREEK – UWP SUBREACH 2
STREAM HABITAT ENHANCEMENT
COVER, SHEET LIST AND VICINITY MAP

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Hood River, OR 97031
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COVER, SHEET LIST AND VICINITY MAP

1
SHEET 1 OF 55

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GENERAL NOTES

THE CONTRACTOR SHALL ATTEND A MANDATORY PRE-BID SITE MEETING.

THE CONTRACTOR SHALL ATTEND A PRE-CONSTRUCTION MEETING WITH OWNER AND OWNER'S REPRESENTATIVE PRIOR TO BEGINNING CONSTRUCTION.

ALL WORK SHALL CONFORM TO THE CURRENT EDITIONS OF STANDARD PLANS AND SPECIFICATIONS OF THE WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT), AND LOCAL STANDARDS UNLESS INDICATED OTHERWISE BY THE CONTRACT DOCUMENTS. IN CASE OF A CONFLICT BETWEEN THE REGULATORY STANDARDS OR SPECIFICATIONS, THE MORE STRINGENT WILL PREVAIL.

WDFW IN-WATER WORK PERIODS

IN-WATER WORK SHALL OCCUR DURING THE PERMITTED IN-WATER WORK PERIOD STATED IN THE HYDRAULIC PROJECT APPROVAL.

EXISTING DATA

TOPOGRAPHIC DATA COLLECTED BY INTER-FLUVE USING RTK AND TOTAL STATION IN SEPTEMBER 2013; HYDROLOGY INFORMATION PROVIDED BY USBR AND WDOE; HYDRAULIC INFORMATION PROVIDED BY USBR; GIS DATA PROVIDED BY VARIOUS AGENCIES INCLUDING AERIAL PHOTOGRAPHY, LIDAR, FISH USE, SURFACE SOILS INFORMATION, LAND OWNERSHIP, AND TRANSPORTATION ROUTES. PROPERTY BOUNDARY SURVEY BY LANDLINE SURVEYORS, NOVEMBER 2013.

SOILS

SEVEN SOILS TEST PITS WERE EXCAVATED ON AUGUST 26-27, 2014. SOILS PROFILES AVAILABLE UPON REQUEST.

UTILITIES

THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR HAVING UTILITIES LOCATED PRIOR TO CONSTRUCTION ACTIVITIES.

THE CONTRACTOR SHALL CALL (800-424-5555) FOR UTILITY LOCATE PRIOR TO CONSTRUCTION

CALL 1-800-533-2891 TO ARRANGE FOR A BNSF UNDERGROUND CABLE LOCATE. BNSF FORM "UNDERGROUND CABLE LOCATION & ACKNOWLEDGE" WILL BE COMPLETED BY A BNSF REPRESENTATIVE AND COPY PROVIDED TO THE CONTRACTOR. THE CONTRACTOR MUST HAVE THIS COMPLETED FORM IN POSSESSION AT THE JOB SITE AT ALL TIMES.

THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE AFFECTED UTILITY SERVICE TO REPORT ANY DAMAGED OR DESTROYED UTILITIES.

THE CONTRACTOR SHALL PROVIDE EQUIPMENT OR LABOR TO AID THE AFFECTED UTILITY SERVICE IN REPAIRING DAMAGED OR DESTROYED UTILITIES AT NO ADDITIONAL COST.

CONSTRUCTION STAKING

OWNER'S REPRESENTATIVE WILL PROVIDE STAKING OF PROJECT LIMITS, GRADE STAKES, AND ELEVATION CONTROL POINTS. SOME FIELD ADJUSTMENTS TO THE LINES AND GRADES ARE TO BE EXPECTED.

CONTRACTOR SHALL MEET WITH THE OWNER AND OWNER'S REPRESENTATIVE TO DEFINE AND MARK LIMITS OF DISTURBANCE PRIOR TO MOBILIZATION OF EQUIPMENT OR MATERIALS ONTO THE SITE.

THE CONTRACTOR SHALL REPLACE DAMAGED OR DESTROYED CONSTRUCTION STAKES AT NO ADDITIONAL COST.

CONSTRUCTION MATERIALS

ESTIMATED MATERIAL VOLUMES ARE APPROXIMATE IN-PLACE QUANTITY AND NOT FACTORED FOR EXPANSION OF EXCAVATED MATERIAL OR COMPACTION OF PLACED MATERIAL. MEASUREMENT AND PAYMENT SHALL NOT BE BASED ON WEIGHT TICKETS OR TRUCK MEASURE WITHOUT PRIOR WRITTEN APPROVAL.

LOCATION, ALIGNMENT, AND ELEVATION OF LOGS AND LOGS WITH ROOT WADS ARE SUBJECT TO ADJUSTMENT BASED ON FIELD CONDITIONS, AND MATERIAL SIZE.

ANY EXCESS MATERIAL SHALL BE STOCKPILED NEATLY IN AN APPROVED LOCATION OF THE STOCKPILE AND STAGING AREA. AT COMPLETION OF WORK, THE MATERIAL SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY.

TREE SALVAGE

ALL SAPLINGS AND TREES TO BE TRANSPLANTED OR REMOVED SHALL BE CLEARLY MARKED AND APPROVED BY THE OWNER AND OWNER'S REPRESENTATIVE.

REMOVED VEGETATION SHALL BE INCORPORATED INTO LOG STRUCTURES AT NO ADDITIONAL COST. VEGETATION LARGER THAN 12" DIAMETER AND 15' LENGTH SHALL BE USED AS STRUCTURAL ELEMENTS. SMALLER MATERIAL SHALL BE USED AS SLASH.

SELECT TREES REMOVED WITHIN CLEARING LIMITS SHALL BE REMOVED WHOLE WITH ROOT WAD AND USED IN RESTORATION CONSTRUCTION. TREES WILL BE FLAGGED FOLLOWING STAKING AND PRIOR TO CONSTRUCTION.

LIVE TREES

ALL TREES NOT MARKED FOR REMOVAL SHALL BE LEFT STANDING UNDISTURBED. CONSTRUCTION ACTIVITY SHALL NOT DEBARK OR DAMAGE LIVE TREES. KEEP OUT OF DRIP LINE OF EXISTING TREES TO REMAIN.

AQUATIC CONSERVATION MEASURES TO MEET NOAA ESA CONSULTATION REQUIREMENTS THROUGH ARBO II

1 IN-WATER WORK PERIOD - ALL WORK BELOW THE ORDINARY HIGH WATER (GENERALLY BELOW THE ELEVATION OF SHRUBBY VEGETATION GROWTH) MUST BE CONDUCTED DURING THE WDFW APPROVED IN-WATER WORK WINDOW JULY 1 - AUGUST 15 (FINAL END DATE TO BE CONFIRMED IN CONSULTATION WITH WDFW).

1 FISH PASSAGE - FISH PASSAGE WILL BE PROVIDED FOR ANY ADULT OR JUVENILE FISH LIKELY TO BE PRESENT IN THE ACTION AREA DURING CONSTRUCTION AND STREAM ISOLATION AND DEWATERING IS REQUIRED DURING PROJECT IMPLEMENTATION.

15. POLLUTION AND EROSION CONTROL MEASURES - IMPLEMENT THE FOLLOWING POLLUTION AND EROSION CONTROL MEASURES:

a. PROJECT CONTACT: IDENTIFY A PROJECT CONTACT (NAME, PHONE NUMBER, AND ADDRESS) THAT WILL BE RESPONSIBLE FOR IMPLEMENTING POLLUTION AND EROSION CONTROL MEASURES.

b. LIST AND DESCRIBE ANY HAZARDOUS MATERIAL THAT WOULD BE USED AT THE PROJECT SITE, INCLUDING PROCEDURES FOR INVENTORY, STORAGE, HANDLING, AND MONITORING; NOTIFICATION PROCEDURES; SPECIFIC CLEAN-UP AND DISPOSAL INSTRUCTIONS FOR DIFFERENT PRODUCTS AVAILABLE ON THE SITE; PROPOSED METHODS FOR DISPOSAL OF SPILLED MATERIAL; AND EMPLOYEE TRAINING FOR SPILL CONTAINMENT.

c. TEMPORARILY STORE ANY WASTE LIQUIDS GENERATED AT THE STAGING AREAS UNDER COVER ON AN IMPERVIOUS SURFACE, SUCH AS TARPAULINS, UNTIL SUCH TIME THEY CAN BE PROPERLY TRANSPORTED TO AND TREATED AT AN APPROVED FACILITY FOR TREATMENT OF HAZARDOUS MATERIALS.

d. PROCEDURES BASED ON BEST MANAGEMENT PRACTICES TO CONFINE, REMOVE, AND DISPOSE OF CONSTRUCTION WASTE, INCLUDING EVERY TYPE OF DEBRIS, DISCHARGE WATER, CONCRETE, CEMENT, GROUT, WASHOUT FACILITY, WELDING SLAG, PETROLEUM PRODUCT, OR OTHER HAZARDOUS MATERIALS GENERATED, USED, OR STORED ON-SITE.

e. PROCEDURES TO CONTAIN AND CONTROL A SPILL OF ANY HAZARDOUS MATERIAL GENERATED, USED OR STORED ON-SITE, INCLUDING NOTIFICATION OF PROPER AUTHORITIES. ENSURE THAT MATERIALS FOR EMERGENCY EROSION AND HAZARDOUS MATERIALS CONTROL ARE ONSITE (*E.G.*, SILT FENCE, STRAW BALES, OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT).

f. BEST MANAGEMENT PRACTICES TO CONFINE VEGETATION AND SOIL DISTURBANCE TO THE MINIMUM AREA, AND MINIMUM LENGTH OF TIME, AS NECESSARY TO COMPLETE THE ACTION, AND OTHERWISE PREVENT OR MINIMIZE EROSION ASSOCIATED WITH THE ACTION AREA.

g. NO UNCURED CONCRETE OR FORM MATERIALS WILL BE ALLOWED TO ENTER THE ACTIVE STREAM CHANNEL.

h. STEPS TO CEASE WORK UNDER HIGH FLOWS, EXCEPT FOR EFFORTS TO AVOID OR MINIMIZE RESOURCE DAMAGE.

16. SITE PREPARATION

a. **FLAGGING SENSITIVE AREAS -** PRIOR TO CONSTRUCTION, VEGETATION TO REMAIN AND WETLANDS WILL BE FLAGGED TO MARK SENSITIVE AREAS THAT SHOULD NOT BE DISTURBED.

b. **STAGING AREA -** ESTABLISH STAGING AREAS FOR STORAGE OF VEHICLES, EQUIPMENT, AND FUELS TO MINIMIZE EROSION INTO OR CONTAMINATION OF STREAMS AND FLOODPLAINS. PLACE STAGING AREA 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND IN AREAS WHERE TOPOGRAPHY DOES NOT RESTRICT SUCH A DISTANCE.

c. **TEMPORARY EROSION CONTROLS -** PLACE SEDIMENT BARRIERS PRIOR TO CONSTRUCTION AROUND SITES WHERE SIGNIFICANT LEVELS OF EROSION MAY ENTER THE STREAM DIRECTLY OR THROUGH ROAD DITCHES. TEMPORARY EROSION CONTROLS WILL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE ACTION SITE AND WILL BE REMOVED ONCE THE SITE HAS BEEN STABILIZED FOLLOWING CONSTRUCTION ACTIVITIES.

d. **STOCKPILE MATERIALS -** MINIMIZE CLEARING AND GRUBBING ACTIVITIES WHEN PREPARING STAGING, PROJECT, AND OR STOCKPILE AREAS. ANY LW, TOPSOIL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION WILL BE STOCKPILED FOR USE DURING SITE RESTORATION. MATERIALS USED FOR IMPLEMENTATION OF AQUATIC RESTORATION CATEGORIES (*E.G.*, LW, BOULDERS, FENCING MATERIAL) MAY BE STAGED WITHIN THE 100-YEAR FLOODPLAIN.

17. HEAVY EQUIPMENT USE

a. **CHOICE OF EQUIPMENT -** SELECT HEAVY EQUIPMENT THAT MINIMIZES ADVERSE EFFECTS TO THE ENVIRONMENT (*E.G.*, MINIMALLY-SIZED, LOW PRESSURE TIRES, MINIMAL HARD TURN PATHS FOR TRACKED VEHICLES, TEMPORARY MATS OR PLATES WITHIN WET AREAS OR SENSITIVE SOILS).

b. **FUELING AND CLEANING AND INSPECTION FOR PETROLEUM PRODUCTS AND INVASIVE WEEDS**

i. ALL EQUIPMENT USED FOR INSTREAM WORK WILL BE CLEANED FOR PETROLEUM ACCUMULATIONS, DIRT, PLANT MATERIAL (TO PREVENT THE SPREAD OF NOXIOUS WEEDS), AND LEAKS REPAIRED PRIOR TO ENTERING THE PROJECT AREA. SUCH EQUIPMENT INCLUDES LARGE MACHINERY, STATIONARY POWER EQUIPMENT (*E.G.*, GENERATORS, CANES), AND GAS-POWERED EQUIPMENT WITH TANKS LARGER THAN FIVE GALLONS.

ii. STORE AND FUEL EQUIPMENT IN STAGING AREAS AFTER DAILY USE.

iii. INSPECT DAILY FOR FLUID LEAKS BEFORE LEAVING THE VEHICLE STAGING AREA FOR OPERATION.

iv. THOROUGHLY CLEAN EQUIPMENT BEFORE OPERATION BELOW ORDINARY HIGH WATER OR WITHIN 50 FEET OF ANY NATURAL WATER BODY OR AREAS THAT DRAIN DIRECTLY TO STREAMS OR WETLANDS AND AS OFTEN AS NECESSARY DURING OPERATION TO REMAIN GREASE FREE.

c. **TEMPORARY ACCESS ROADS -** ALL ACCESS WILL BE FROM THE NORTH. NO ACCESS WILL BE ALLOWED FROM THE BNSF RIGHT-OF-WAY; NO PERSONNEL OR EQUIPMENT WILL BE PERMITTED TO CROSS THE BNSF TRACKS. EXISTING ACCESS ROADS WILL BE USED WHENEVER POSSIBLE. MINIMIZE THE NUMBER OF TEMPORARY ACCESS ROADS AND TRAVEL PATHS TO LESSEN SOIL DISTURBANCE AND COMPACTION AND IMPACTS TO VEGETATION. TEMPORARY ACCESS ROADS WILL NOT BE BUILT ON SLOPES WHERE GRADE, SOIL, OR OTHER FEATURES SUGGEST A LIKELIHOOD OF EXCESSIVE EROSION OR FAILURE. ALL TEMPORARY ACCESS ROADS WILL BE OBLITERATED OR REVEGETATED.

d. **STREAM CROSSINGS -** THERE WILL ONLY BE ONE TEMPORARY CROSSING FOR EQUIPMENT TRAVEL OVER THE NEW CHANNEL. AFTER PROJECT COMPLETION, THE TEMPORARY STREAM CROSSING WILL BE ABANDONED AND THE STREAM CHANNEL AND BANKS RESTORED.

e. **WORK FROM TOP OF BANK -** TO THE EXTENT FEASIBLE, HEAVY EQUIPMENT WILL WORK FROM THE TOP OF THE BANK, UNLESS WORK INSTREAM WOULD RESULT IN LESS DAMAGE TO THE AQUATIC ECOSYSTEM.

f. **TIMELY COMPLETION -** MINIMIZE TIME IN WHICH HEAVY EQUIPMENT IS IN STREAM CHANNELS, RIPARIAN AREAS, AND WETLANDS. COMPLETE EARTHWORK (INCLUDING DRILLING, EXCAVATION, DREDGING, FILLING AND COMPACTING) AS QUICKLY AS POSSIBLE. DURING EXCAVATION, STOCKPILE NATIVE STREAMBED MATERIALS ABOVE THE BANKFULL ELEVATION, WHERE IT CANNOT REENTER THE STREAM, FOR LATER USE.

g. FOR WORK WITHIN THE LIMITS OF THE BNSF RIGHT-OF-WAY, THE CONTRACTOR WILL BE REQUIRED TO MEET ALL BNSF SAFETY AND INSURANCE REQUIREMENTS, AND WORK WITHIN 25 FEET OF THE TRACK CENTERLINE MAY ONLY BE ALLOWED WHEN A BNSF FLAGMAN IS PRESENT.

18. SITE RESTORATION

a. **INITIATE REHABILITATION -** UPON PROJECT COMPLETION, REHABILITATE ALL DISTURBED AREAS IN A MANNER THAT RESULTS IN SIMILAR OR BETTER THAN PRE-WORK CONDITIONS THROUGH REMOVAL OF PROJECT RELATED WASTE, SPREADING OF STOCKPILED MATERIALS (SOIL, LW, TREES, *ETC.*) SEEDING, OR PLANTING WITH LOCAL NATIVE SEED MIXES OR PLANTS.

b. **SHORT-TERM STABILIZATION -** MEASURES MAY INCLUDE THE USE OF NON-NATIVE STERILE SEED MIX (WHEN NATIVE SEEDS ARE NOT AVAILABLE), WEED-FREE CERTIFIED STRAW, JUTE MATTING, AND OTHER SIMILAR TECHNIQUES. SHORT-TERM STABILIZATION MEASURES WILL BE MAINTAINED UNTIL PERMANENT EROSION CONTROL MEASURES ARE EFFECTIVE. STABILIZATION MEASURES WILL BE IMPLEMENTED WITHIN THREE DAYS OF CONSTRUCTION COMPLETION.

c. **REVEGETATION -** REPLANT EACH AREA REQUIRING REVEGETATION PRIOR TO OR AT THE BEGINNING OF THE FIRST GROWING SEASON FOLLOWING CONSTRUCTION.

e. **DECOMPACT SOILS -** DECOMPACT SOIL BY SCARIFYING THE SOIL SURFACE OF ROADS AND PATHS, STREAM CROSSINGS, STAGING, AND STOCKPILE AREAS SO THAT SEEDS AND PLANTINGS CAN ROOT.

b. **401 CERTIFICATION -** TO MINIMIZE SHORT-TERM DEGRADATION TO WATER QUALITY DURING PROJECT IMPLEMENTATION, FOLLOW CURRENT 401 CERTIFICATION PROVISIONS OF THE FEDERAL CLEAN WATER ACT FOR MAINTENANCE OR WATER QUALITY STANDARDS DESCRIBED BY THE WASHINGTON DEPARTMENT OF ECOLOGY.

20. WORK AREA ISOLATION, SURFACE WATER WITHDRAWALS, AND FISH CAPTURE AND RELEASE - PRIOR TO EARTHWORK BELOW THE ORDINARY HIGH WATER, THE CONSTRUCTION AREA MUST BE ISOLATED AND FISH MUST BE REMOVED FROM THE WORK AREA. CONTRACTOR MUST COORDINATE THE TIMING OF IN-WATER WORK WITH THE CONSTRUCTION MANAGER TO ENSURE THAT WORK AREA ISOLATION AND DE-FISHING OCCUR IN THE CORRECT SEQUENCE.

a. **ISOLATE CAPTURE AREA -** CHELAN COUNTY STAFF WILL COORDINATE WORK AREA ISOLATION ACTIVITIES WITH ASSISTANCE FROM THE CONTRACTOR. IN GENERAL, WORK AREA ISOLATION WILL INCLUDE INSTALLATION OF BLOCK NETS AT UP AND DOWNSTREAM LOCATIONS OUTSIDE OF THE CONSTRUCTION ZONE TO EXCLUDE FISH FROM ENTERING THE PROJECT AREA. NETS WILL REMAIN IN PLACE SECURED TO THE STREAM CHANNEL BED AND BANKS UNTIL CONSTRUCTION ACTIVITIES WITHIN THE STREAM CHANNEL ARE COMPLETE. IF BLOCK NETS OR TRAPS REMAIN IN PLACE MORE THAN ONE DAY, CHELAN COUNTY WILL MONITOR THE NETS AND OR TRAPS AT LEAST ON A DAILY BASIS TO ENSURE THEY ARE SECURED TO THE BANKS AND FREE OF ORGANIC ACCUMULATION AND TO MINIMIZE FISH PREDATION IN THE TRAP.

b. **CAPTURE AND RELEASE -** CHELAN COUNTY WILL COORDINATE THE FISH CAPTURE AND RELEASE ACTIVITIES WHICH WILL PROCEED GENERALLY AS FOLLOWS: FISH TRAPPED WITHIN THE ISOLATED WORK AREA WILL BE CAPTURED AND RELEASED USING METHODS TO MINIMIZE THE RISK OF INJURY. FISH WILL BE RELEASED AT A SAFE RELEASE SITE, PREFERABLY UPSTREAM OF THE ISOLATED REACH IN A POOL OR OTHER AREA THAT PROVIDES COVER AND FLOW REFUGE. FISH WILL BE COLLECTED IN THE BEST MANNER TO MINIMIZE POTENTIAL STRANDING AND STRESS BY SEINE OR DIP NETS AS THE AREA IS SLOWLY DEWATERED, BAITED MINNOW TRAPS PLACED OVERNIGHT, OR ELECTROFISHING (IF ELECTROFISHING WILL BE USED TO CAPTURE FISH FOR SALVAGE, NMFS'S ELECTROFISHING GUIDELINES WILL BE FOLLOWED (NMFS 2000).). FISH WILL BE HANDLED WITH EXTREME CARE AND KEPT IN WATER THE MAXIMUM EXTENT POSSIBLE DURING TRANSFER PROCEDURES. A HEALTHY ENVIRONMENT FOR THE STRESSED FISH SHALL BE PROVIDED--LARGE BUCKETS (FIVE-GALLON MINIMUM TO PREVENT OVERCROWDING) AND MINIMAL HANDLING OF FISH. FISH WILL BE PLACED IN BUCKETS SEPARATE FROM SMALLER PREY-SIZED FISH. WATER TEMPERATURE IN BUCKETS WILL BE MONITORED TO ENSURE THE WELL-BEING OF CAPTURED FISH. IF BUCKETS ARE NOT BEING IMMEDIATELY TRANSPORTED, AERATORS WILL BE USED TO MAINTAIN WATER QUALITY. AS RAPIDLY AS POSSIBLE, BUT AFTER FISH HAVE RECOVERED, FISH WILL BE RELEASED. CAPTURE AND RELEASE WILL BE SUPERVISED BY A FISHERY BIOLOGIST EXPERIENCED WITH WORK AREA ISOLATION AND SAFE HANDLING OF ALL FISH.

DEWATER CONSTRUCTION SITE - THE FIRST PHASE OF CONSTRUCTION OF THE NEW CHANNEL MEANDERS (YEAR 2 WORK) WILL BE CONSTRUCTED IN ISOLATION FROM THE EXISTING CHANNEL TO AVOID ANY IMPACTS TO FISH PASSAGE OR WATER QUALITY. ISOLATION BERMS WILL BE LEFT AT THE UPSTREAM AND DOWNSTREAM CONNECTION POINTS TO PREVENT SURFACE WATER ENTRY BETWEEN YEARS 1 AND 2. IN YEAR 1, DEWATERING WILL OCCUR AS NEEDED WITHIN THE CONSTRUCTION SITE TO FACILITATE EARTHWORK. IN YEAR 2, COFFERDAMS WILL BE USED IN THE MAIN CHANNEL TO DIVERT ALL OF THE NASON CREEK FLOW INTO THE NEW CHANNEL. THIS WILL OCCUR IN STAGES. THE FIRST STAGE INCLUDES GRADUALLY DIVERTING THE FLOW INTO THE NEW CHANNEL WITH FISH SCREENS IN PLACE AT THE UPSTREAM AND DOWNSTREAM ENDS TO PREVENT FISH FROM INITIALLY ENTERING THE NEW CHANNEL. THE INITIAL TURBID "RINSING" FLOWS WILL BE PUMPED FROM THE DOWNSTREAM END OF THE NEW CHANNEL UNTIL THE FLOWS CLEAR. THEN THE PUMP AND FISH SCREENS WILL BE REMOVED AND FISH PASSAGE WILL BE ALLOWED IN THE NEW CHANNEL. THE GRADUAL DIVERSION OF FLOWS WILL ALSO FACILITATE FISH RESCUE IN THE OLD CHANNEL AS THOSE FLOWS RECEDE. CARE WILL BE TAKEN TO NOT DEWATER DOWNSTREAM AREAS BEFORE FISH RESCUE OCCURS. IN YEAR 2, FOLLOWING FISH RESCUE AND ISOLATED BEHIND COFFERDAMS, DEWATERING WILL OCCUR AS NEEDED WITHIN THE CONSTRUCTION SITE TO FACILITATE EARTHWORK. DIVERSION BULK BAGS CAN BE FILLED WITH MATERIAL MINED FROM THE FLOODPLAIN AS LONG AS SUCH MATERIAL IS REPLACED AT END OF PROJECT. PUMP INTAKES USED IN AREAS WITH FISH MUST HAVE A FISH SCREEN(S) AND BE OPERATED IN ACCORDANCE WITH NMFS FISH SCREEN CRITERIA DESCRIBED BELOW IN SECTION II OF **SURFACE WATER WITHDRAWALS**. SEEPAGE WATER WILL BE PUMPED TO AN UPLAND AREA JUST UPSTREAM AND NORTH OF THE CONSTRUCTION AREA AND WILL BE ALLOWED TO FILTER THROUGH VEGETATION AND SOILS PRIOR TO RE-ENTERING THE STREAM CHANNEL. IF NECESSARY TO AVOID EROSION OR RE-ENTRY OF TURBID WATER INTO THE RIVER OR WETLANDS, WATER WILL BE PUMPED FIRST INTO A SETTLING BASIN DESCRIBED IN THESE PLANS.

SURFACE WATER WITHDRAWALS

i. OTHER THAN THE DEWATERING PLAN DESCRIBED IN THESE PLANS, SURFACE WATER MAY NOT BE DIVERTED FROM NASON CREEK TO MEET CONSTRUCTION NEEDS.

ii. FOR DEWATERING WORK, IF ESA-LISTED FISH MAY BE PRESENT, A FISH SCREEN MUST BE USED ON THE PUMP INTAKE TO AVOID JUVENILE FISH ENTRAINMENT THAT MEETS CRITERIA SPECIFIED BY NMFS. NMFS APPROVED FISH SCREENS HAVE THE FOLLOWING SPECIFICATIONS: (A) AN AUTOMATED CLEANING DEVICE WITH A MINIMUM EFFECTIVE SURFACE AREA OF 2.5 SQUARE FEET PER CFS, AND A NOMINAL MAXIMUM APPROACH VELOCITY OF 0.4 FEET PER SECOND (FPS), OR NO AUTOMATED CLEANING DEVICE, A MINIMUM EFFECTIVE SURFACE AREA OF 1 SQUARE FOOT PER CFS, AND A NOMINAL MAXIMUM APPROACH RATE OF 0.2 FPS; AND (B) A ROUND OR SQUARE SCREEN MESH THAT IS NO LARGER THAN 2.38 MM (0.094") IN THE NARROW DIMENSION, OR ANY OTHER SHAPE THAT IS NO LARGER THAN 1.75 MM (0.069") IN THE NARROW DIMENSION.

Preliminary 90%

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NASON CREEK - UWP SUBREACH 2

STREAM HABITAT ENHANCEMENT
GENERAL NOTES

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GENERAL NOTES

2
SHEET 2 OF 55

SUMMARY OF ESTIMATED QUANTITIES

Year 1 - Meander Channel			
	Description	*Unit*	*Qty*
	Excavation, including on-site material management	CY	32,100
	Excavation, riprap salvage for re-use	CY	400
	Imported gravel and cobble material	CY	8,700
	Backfill, channel bed material (select native & imported)	CY	8,400
	Backfill, for large wood structures (native & import)	CY	6,900
	Fabric Encapsulated Soil Lifts (FESL)	LF	2,450
	Rootwad log, 10"-15" DBH, 40' long	EA	20
	Rootwad log, 16"-21" DBH, 40' long	EA	54
	Rootwad log, 22"-28" DBH, 40' long	EA	27
	Log pole, 10"-15" dia, 40' long	EA	44
	Log pole, 16"-21" dia, 40' long	EA	27
	Log pole, 22"-28" dia, 40' long	EA	6
	Pile (vertical snag), 10"-15" dia, 30' long	EA	12
	Pile (vertical snag), 15"-18" dia, 30' long	EA	129
	Whole tree, 9"-15" DBH	EA	9
	Whole tree, 16"-21" DBH	EA	23
	Upland Area Woody Vegetation Plantings	AC	0.37
	Upland Area Herbaceous Vegetation Seed Mix	AC	0.37
	Mesic Area Woody Vegetation Plantings	AC	3.10
	Mesic Area Herbaceous Vegetation Seed Mix	AC	3.10
	Streambank Woody Vegetation Plantings	AC	0.97
Year 2 - Levee Removal and Main Channel Fill			
	Description	*Unit*	*Qty*
	Excavation, levee, including on-site material management	CY	5,000
	Excavation, riprap salvage for re-use	CY	4,500
	Backfill, channel fill with native material and salvaged riprap	LF	29,300
	Fabric Encapsulated Soil Lifts (FESL)	EA	980
	Rootwad log, 10"-15" DBH, 40' long	EA	22
	Rootwad log, 16"-21" DBH, 40' long	EA	13
	Rootwad log, 22"-28" DBH, 40' long	EA	23
	Log pole, 10"-15" dia, 40' long	EA	2
	Log pole, 16"-21" dia, 40' long	EA	9
	Log pole, 22"-28" dia, 40' long	EA	4
	Pile (vertical snag), 12"-15" dia, 30' long	EA	28
	Pile (vertical snag), 15"-18" dia, 30' long	EA	7
	Whole tree, 9"-15" DBH	EA	-
	Whole tree, 16"-21" DBH	EA	29
	Upland Area Woody Vegetation Plantings	AC	3.33
	Upland Area Herbaceous Vegetation Seed Mix	AC	3.33
	Mesic Area Woody Vegetation Plantings	ACA	2.07
	Mesic Area Herbaceous Vegetation Seed Mix	AC	2.07
	Streambank Woody Vegetation Plantings	AC	0.05

NOTE: QUANTITIES ARE ESTIMATES, CONTRACTOR IS RESPONSIBLE FOR VERIFYING ITEMS AND QUANTITIES REQUIRED TO COMPLETE THE WORK AS SHOWN ON THE DRAWINGS AND REQUIRED IN THE SPECIFICATION.

ESTIMATED MATERIAL VOLUMES ARE APPROXIMATE IN-PLACE QUANTITY AND NOT FACTORED FOR EXPANSION OF EXCAVATED MATERIAL OR COMPACTION OF PLACED MATERIAL.

US SIEVE CLASS	PERCENT PASSING
14"	90 - 100
12"	84 -90
10"	50 - 84
9"	40 - 50
2-1/2"	15 - 28
1"	10 - 20
# 4	5 - 15
#40	3 - 10
#200	2 - 5

1/3 IMPORT MATERIAL - GRADATION A

US Sieve Class	Percent Passing
4"	93 - 100
2-1/2"	50 - 90
1"	30 - 55
# 4	10 - 30
#40	0 - 20

2/3 IMPORT MATERIAL - GRADATION B

Preliminary 90%

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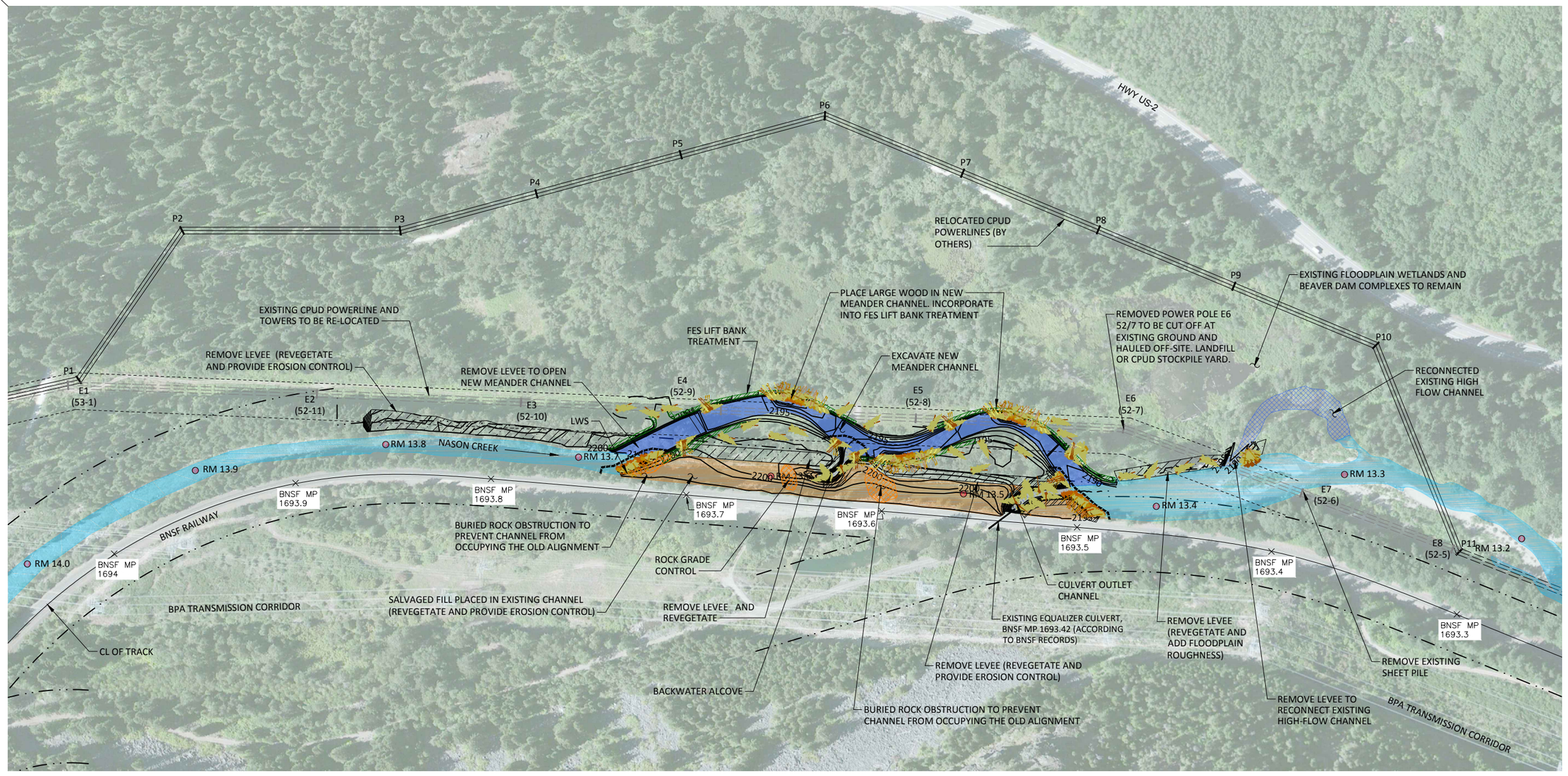

SITE PLAN

LEGEND

0 150 300
SCALE IN FEET

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- RM 13.4 — RIVER MILE
- E1 — EXISTING OVERHEAD POWERLINE AND TOWERS (TO BE RELOCATED BY OTHERS)
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- CENTER LINE OF BNSF TRACKS
- CPUD EASEMENT

PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- CONSTRUCTED BURIED MAINSTEM CHANNEL OBSTRUCTION
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
- NEW BACKWATER ALCOVE
- LEVEE REMOVAL
- FES LIFT BANK TREATMENT
- EXISTING HIGH-FLOW CHANNEL TO BE RE-CONNECTED
- P1 — PROPOSED OVERHEAD POWERLINE (RELOCATED BY OTHERS)
- LARGE WOODY MATERIAL

Preliminary 90%

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FCRPS HABITAT IMPROVEMENT PROGRAM - WASHINGTON

NASON CREEK – UWP SUBREACH 2

STREAM HABITAT ENHANCEMENT
SITE PLAN OVERVIEW

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REV NO

GJ DM JG — DESIGNED
RP — DRAWN
DM GJ JG — CHECKED

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SITE PLAN OVERVIEW

4

SHEET 4 OF 55

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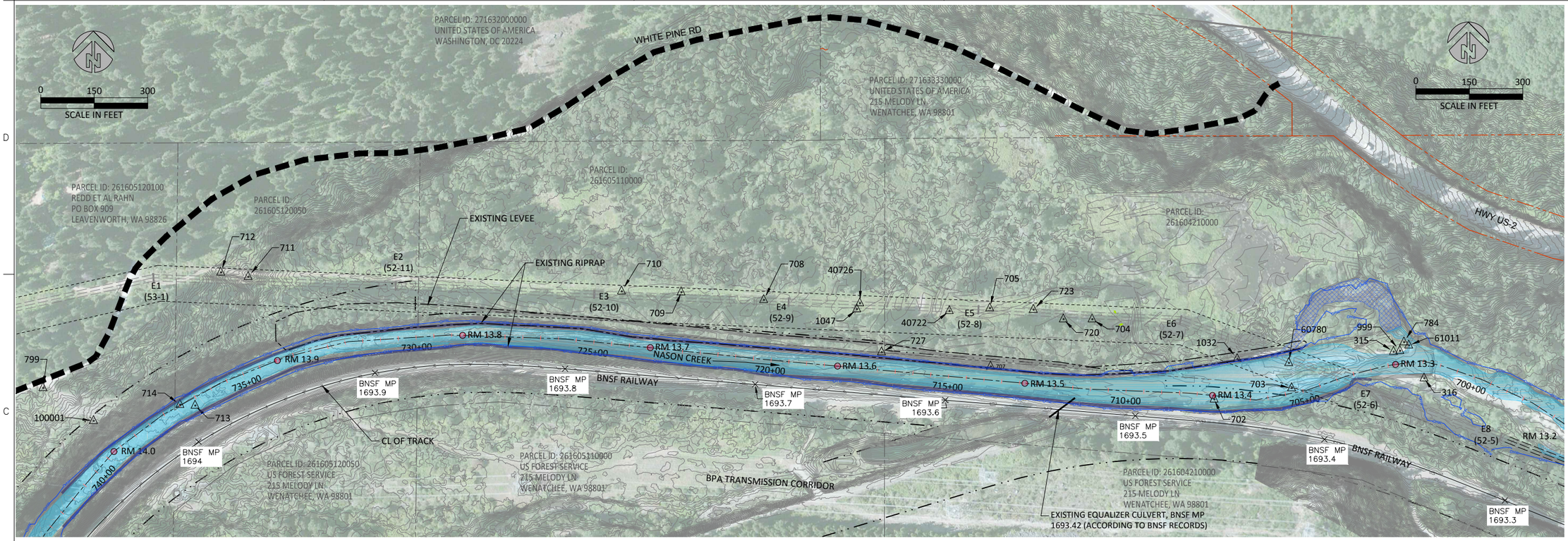
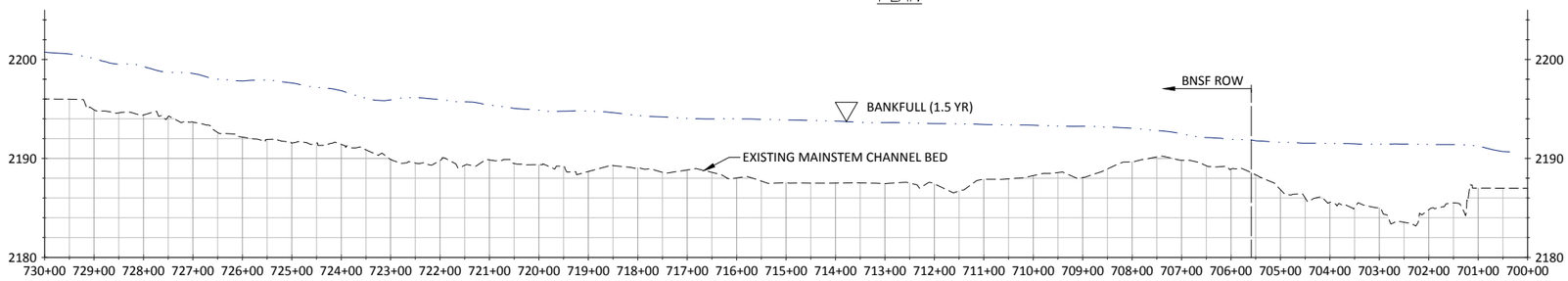


PLAN



PROFILE – EXISTING CHANNEL

20x VERTICAL EXAGGERATION
SCALE: 1" = 7.5'
SCALE: 1" = 150'

LEGEND

- EXISTING MAINSTEM CHANNEL
- RM 13.4 — RIVER MILE MARKER
- 100 — SURVEY CONTROL POINT
- EXISTING CONTOURS (5-FT INTERVAL)
- 711+00 — EXISTING ALIGNMENT, STATION
- PROPERTY LINES (PER CHELAN COUNTY GIS)
- PROPERTY LINES (PER SURVEY, SEE SHEET 6)
- EXISTING BNSF RIGHT-OF-WAY (PER SURVEY, SEE SHEET 6)
- EXISTING EASEMENT (PER SURVEY, SEE SHEET 6)
- OHW — ORDINARY HIGH WATER
- E5 — EXISTING OVERHEAD POWERLINE AND TOWERS (TO BE RELOCATED BY OTHERS)
- CENTERLINE OF BNSF TRACKS
- EXISTING LEVEE

SURVEY CONTROL POINTS

POINT NUMBER	EASTING	NORTHING	ELEVATION	DESCRIPTION
312	1634529.35	286852.14	2189.53	TBM312
315	1633941.28	287065.99	2191.14	TBM315
316	1634027.17	286991.50	2190.67	TBM316
702	1633437.95	286932.29	2191.44	TBM702
703	1633655.38	286964.05	2189.61	TBM703REBAR
704	1633095.47	287157.38	2195.64	TBM704
705	1632808.02	287188.17	2198.19	TBM705
707	1632810.41	287024.88	2198.96	TBM707
708	1632173.62	287211.62	2200.43	TBM708
709	1631941.92	287232.99	2200.68	TBM709
710	1631774.60	287235.64	2201.80	TBM710
711	1630726.54	287276.64	2234.06	TBM711
712	1630649.71	287288.68	2240.22	TBM712

POINT NUMBER	EASTING	NORTHING	ELEVATION	DESCRIPTION
713	1630577.53	286915.05	2201.98	TBM713
714	1630535.24	286917.37	2201.87	TBM714
720	1633014.68	287157.43	2196.18	TBM720
723	1632930.50	287184.12	2195.83	TBM723
727	1632504.39	287064.93	2204.69	TBM727
784	1633970.62	287092.86	2189.82	TBM784
799	1630150.51	286964.61	2267.34	BOR REBAR
999	1633959.14	287068.92	2190.80	REBAR
1032	1633502.73	287045.87	2196.73	REBAR
1047	1632434.86	287185.45	2199.57	REBAR1000EPOCH
40722	1632694.71	287180.54	2198.46	TBM722
40726	1632443.27	287202.37	2200.07	TBM726
60780	1633647.32	287034.49	2190.57	TBM780
61011	1633984.21	287084.06	2188.79	TBM784

NOTES:

HORIZONTAL SURVEY DATUM: NAD83 WA STATE PLANE NORTH, US FEET
VERTICAL SURVEY DATUM: NAVD88

TOPOGRAPHIC SURVEY AND CONTROL COLLECTED BY INTER-FLUVE IN SEPTEMBER 2013 USING RTK GPS AND TOTAL STATION.

PROPERTY BOUNDARY INFORMATION FROM CHELAN COUNTY AND SELECT PROPERTY BOUNDARY SURVEY BY LANDLINE SURVEYORS INCLUDED FOR REFERENCE (SEE SHEET 6) (OCTOBER-NOVEMBER 2013).

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FCRPS HABITAT IMPROVEMENT PROGRAM – WASHINGTON

NASON CREEK – UWP SUBREACH 2

STREAM HABITAT ENHANCEMENT

EXISTING CONDITIONS, OWNERSHIP, AND SURVEY CONTROL

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EXISTING CONDITIONS, OWNERSHIP, AND SURVEY CONTROL

5

SHEET 5 OF 55

NASON CREEK UPPER WHITE PINE

BASE MAP

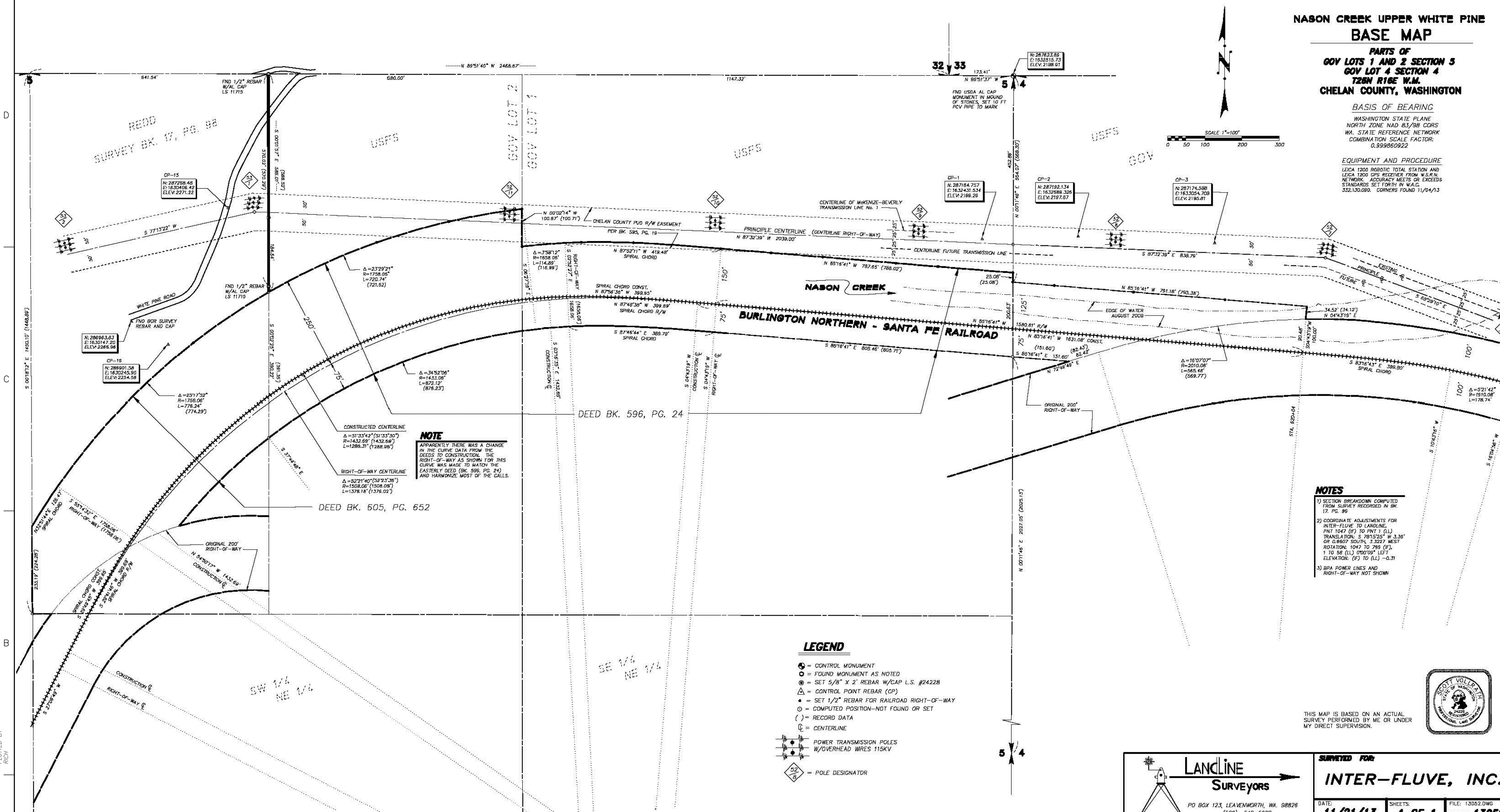
PARTS OF
GOV LOTS 1 AND 2 SECTION 5
GOV LOT 4 SECTION 4
T26N R16E W.M.
CHELAN COUNTY, WASHINGTON

BASIS OF BEARING

WASHINGTON STATE PLANE
NORTH ZONE NAD 83/98 CORS
WA. STATE REFERENCE NETWORK
COMBINATION SCALE FACTOR:
0.999860922

EQUIPMENT AND PROCEDURE

LEICA 1200 ROBOTIC TOTAL STATION AND LEICA 1200 GPS RECEIVER FROM W.S.R.N. NETWORK. ACCURACY MEETS OR EXCEEDS STANDARDS SET FORTH IN W.A.C. 332.130.090. CORNERS FOUND 11/04/13



NOTE

APPARENTLY THERE WAS A CHANGE IN THE CURVE DATA FROM THE DEEDS TO CONSTRUCTION. THE RIGHT-OF-WAY AS SHOWN FOR THIS CURVE WAS MADE TO MATCH THE EASTERLY DEED (BK. 596, PG. 24) AND HARMONIZE MOST OF THE CALLS.

NOTES

1) SECTION BREAKDOWN COMPUTED FROM SURVEY RECORDED IN BK. 17, PG. 96
2) COORDINATE ADJUSTMENTS FOR INTER-FLUVE TO LANDLINE. PNT 1047 (IF) TO PNT 1 (LL) TRANSLATION: S 78°15'25" W 3.39' OR 0.6907 SOUTH, 3.3227 WEST ROTATION: 1047 TO 799 (IF), 1 TO 58 (LL) 0°00'09" LEFT ELEVATION: (IF) TO (LL) −0.31
3) BPA POWER LINES AND RIGHT-OF-WAY NOT SHOWN

LEGEND

- = CONTROL MONUMENT
- = FOUND MONUMENT AS NOTED
- = SET 5/8" X 2' REBAR W/CAP L.S. #24228
- = CONTROL POINT REBAR (CP)
- = SET 1/2" REBAR FOR RAILROAD RIGHT-OF-WAY
- = COMPUTED POSITION—NOT FOUND OR SET
- ( ) = RECORD DATA
- ℄ = CENTERLINE
- POWER TRANSMISSION POLES W/OVERHEAD WIRES 115KV
- = POLE DESIGNATOR

THIS MAP IS BASED ON AN ACTUAL SURVEY PERFORMED BY ME OR UNDER MY DIRECT SUPERVISION.

SCOTT VOLLRATH
STATE OF WASHINGTON
24228
REGISTERED PROFESSIONAL LAND SURVEYOR

LANDLINE SURVEYORS
PO BOX 123, LEAVENWORTH, WA. 98826
(509) 548-5290

SURVEYED FOR:
INTER-FLUVE, INC.

DATE:	SHEETS:	FILE: 13052.DWG
11/21/13	1 OF 1	JOB NO: 13052

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FCRPS HABITAT IMPROVEMENT PROGRAM – WASHINGTON

NASON CREEK – UWP SUBREACH 2
STREAM HABITAT ENHANCEMENT
PROPERTY BOUNDARY SURVEY (LANDLINE)

REV NO

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DESIGNED
RP
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PROPERTY BOUNDARY SURVEY (LANDLINE)

6

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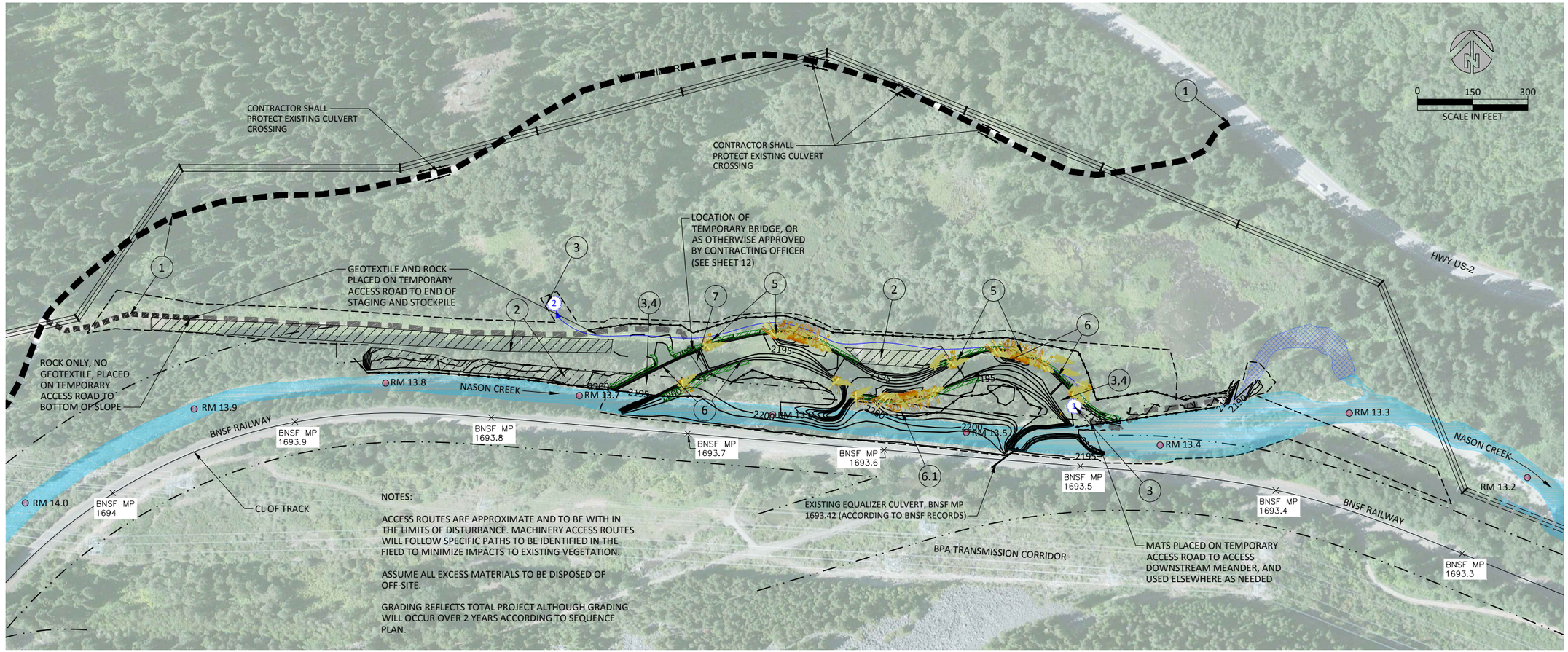

NOTES:

ACCESS ROUTES ARE APPROXIMATE AND TO BE WITH IN THE LIMITS OF DISTURBANCE. MACHINERY ACCESS ROUTES WILL FOLLOW SPECIFIC PATHS TO BE IDENTIFIED IN THE FIELD TO MINIMIZE IMPACTS TO EXISTING VEGETATION.

ASSUME ALL EXCESS MATERIALS TO BE DISPOSED OF OFF-SITE.

GRADING REFLECTS TOTAL PROJECT ALTHOUGH GRADING WILL OCCUR OVER 2 YEARS ACCORDING TO SEQUENCE PLAN.

PLAN

CONSTRUCTION SEQUENCE

ANTICIPATED OVERALL SCHEDULE

YEAR 1 (2017) - REMOVAL AND RELOCATION OF CPUD POWERLINES (DESIGNED BY OTHERS)

YEAR 1 (2017) - CONSTRUCTION OF PROPOSED MEANDER CHANNEL; MAINTAINING BERMS AT BOTH ENDS TO ISOLATE FROM MAINSTEM NASON CREEK. REMOVAL OF DOWNSTREAM PORTION OF LEVEE. (STEPS 1 TO 8 BELOW).

YEAR 2 (2018) - ACTIVATION OF PROPOSED CHANNEL AND COMPLETION OF ALL OTHER PROJECT ELEMENTS (STEPS 9 TO 22 BELOW).

YEAR 1 (NON IN-WATER WORK)

PROJECT ELEMENT - MOBILIZATION AND CLEARING

STEP 1 - MOBILIZE EQUIPMENT TO THE SITE AND CREATE AND IMPROVE ACCESS ROUTES AS REQUIRED.

STEP 2 - REMOVE VEGETATION AS NEEDED FROM LEVEE REMOVAL AREAS AND STOCKPILE ON SITE FOR INCORPORATION INTO LARGE WOOD STRUCTURES, CHIPPING, AND/OR LOP AND SCATTER THROUGHOUT THE SITE FOLLOWING COMPLETION OF EARTHWORK.

PROJECT ELEMENT - NEW CHANNEL

STEP 3 - EXCAVATION OF THE NEW CHANNEL WILL BE ISOLATED FROM THE MAIN CHANNEL BY LEAVING ISOLATION BERMS INTACT AT THE UPSTREAM AND DOWNSTREAM ENDS. THE CHANNEL WILL NEED TO BE DEWATERED DUE TO INFILTRATION BY GROUNDWATER FROM UPSLOPE. A PUMP DISCHARGE AREA WILL BE ESTABLISHED NORTH OF THE TEMPORARY ACCESS ROAD TO THE WEST OF THE MEANDER, AND A SHALLOW INFILTRATION BASIN MAY NEED TO BE EXCAVATED. MATERIAL WILL BE STOCKPILED IN THE STAGING AREA AS DEPICTED ON PLANS. SELECTIVELY STOCKPILE SEDIMENTS SEGREGATED BY MATERIAL TYPE AND SIZE CLASSIFICATION.

STEP 4 - OVER-EXCAVATE TO STREAMBED SUBGRADE AND HAUL IN AND PLACE STREAMBED MATERIAL (GRADATION A).

STEP 5 - CONSTRUCT LWS AND PLACE WOOD IN NEW CHANNEL ALIGNMENT.

STEP 6 - CONSTRUCT BANK TREATMENTS (BIODEGRADABLE EROSION CONTROL FABRICS, FES LIFTS, WOOD, ETC).

STEP 6.1 - *RECONFIGURE LEVEE BETWEEN RM 13.5 AND 13.6 TO PREVENT POTENTIAL ENTRY OF FLOODWATERS.*

STEP 7 - CONSTRUCT TEMPORARY BRIDGE CROSSING ABUTMENTS (DECK WILL BE PLACED IN 2018) OVER NEW CHANNEL ALIGNMENT TO PROVIDE ACCESS TO THE TEMPORARY STOCKPILE AREAS AND CHANNEL BACKFILL.

LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- RM 13.4 — RIVER MILE MARKER
- EXISTING OVERHEAD POWERLINE AND TOWERS REMOVED 2016 (BY OTHERS)
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- EXISTING EQUALIZATION CULVERT UNDER RAILROAD
- CENTERLINE OF BNSF TRACKS

PROPOSED FEATURES

- TEMPORARY STAGING / STOCKPILE AREAS
- TEMPORARY ACCESS ROAD
- LIMITS OF DISTURBANCE
- EXISTING HIGH FLOW CHANNEL TO BE RE-CONNECTED
- LEVEE REMOVAL
- FES LIFT BANK TREATMENT
- PROPOSED OVERHEAD POWERLINE 2016 (RELOCATED BY OTHERS)
- LARGE WOODY MATERIAL

Preliminary 90%

DEWATERING NOTES

1. PUMP LOCATION, SEE SHEET 13
2. DISCHARGE LOCATION

NOTE SEE SHEET 12 FOR SETTLING BASIN, IF NEEDED

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NASON CREEK – UWP SUBREACH 2
STREAM HABITAT ENHANCEMENT
CONSTRUCTION SEQUENCING – YEAR 1 NON IN–WATER WORK

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REV NO

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GP DRAWN
DM, GJ, JG CHECKED

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CONSTRUCTION SEQUENCING – YEAR 1 NON IN–WATER WORK

7

SHEET 7 OF 55

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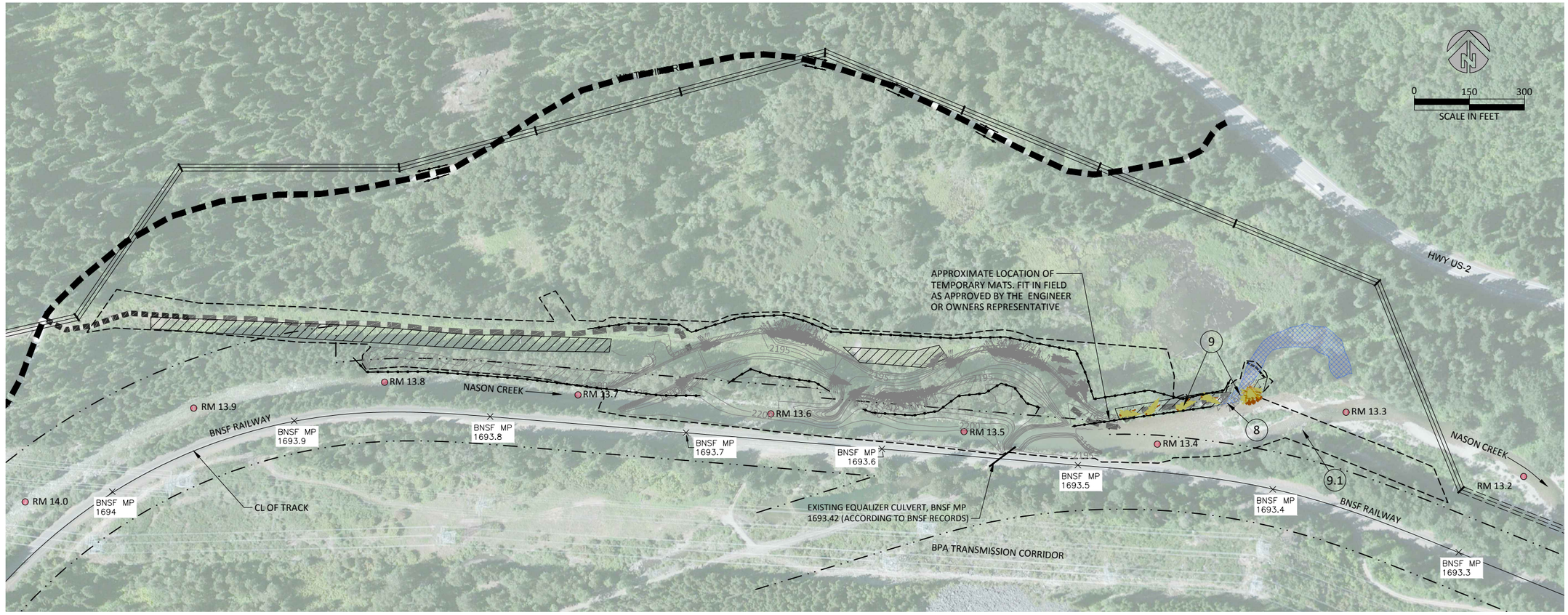

PLAN

CONSTRUCTION SEQUENCE

YEAR 1 (IN-WATER WORK PERIOD)

PROJECT ELEMENT: LEVEE REMOVAL AND RIPRAP REMOVAL

STEP 8 - REMOVE DOWNSTREAM LEVEE INCLUDING INLET OF HIGH FLOW CHANNEL (NEAR RM 13.35) TO RECONNECT WITH THE MAIN CHANNEL. INLET ELEVATION OF 2,191 FT WILL BE ~1 FT ABOVE ANTICIPATED AUGUST WATER LEVEL SO NO COFFERDAM REQUIRED.

STEP 9 - CONSTRUCT LWS AND INSTALL FLOODPLAIN ROUGHNESS LW AS SHOWN.

STEP 9.1 - REMOVE SHEETPILE AT CPUD POWERPOLE #52-6. ACCESS TO BE OBTAINED FROM SOUTH SIDE OF NASON CREEK. CHELAN COUNTY WILL COORDINATE ACCESS WITH BNSF

LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- RM 13.4 — RIVER MILE MARKER
- EXISTING OVERHEAD POWERLINE AND TOWERS
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- EXISTING EQUALIZATION CULVERT UNDER RAILROAD
- CENTERLINE OF BNSF TRACKS

PROPOSED FEATURES

- TEMPORARY STAGING / STOCKPILE AREAS
- TEMPORARY ACCESS ROAD
- COFFERDAM
- LIMITS OF DISTURBANCE
- SILT FENCE
- EXISTING HIGH FLOW CHANNEL TO BE RE-CONNECTED
- LEVEE REMOVAL
- FES LIFT BANK TREATMENT
- PROPOSED OVERHEAD POWERLINE 2016 (RELOCATED BY OTHERS)
- LARGE WOODY MATERIAL TO BE PLACED
- LARGE WOODY MATERIAL PREVIOUSLY PLACED

NOTES:

ACCESS ROUTES ARE APPROXIMATE. MACHINERY ACCESS ROUTES WILL FOLLOW SPECIFIC PATHS TO BE IDENTIFIED IN THE FIELD TO MINIMIZE IMPACTS TO EXISTING VEGETATION.

ASSUME ALL EXCESS MATERIALS TO BE DISPOSED OF OFF-SITE.

Preliminary 90%

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CONSTRUCTION SEQUENCING – YEAR 1 IN-WATER WORK

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CONSTRUCTION SEQUENCING – YEAR 1 IN–WATER WORK

8

SHEET 8 OF 55

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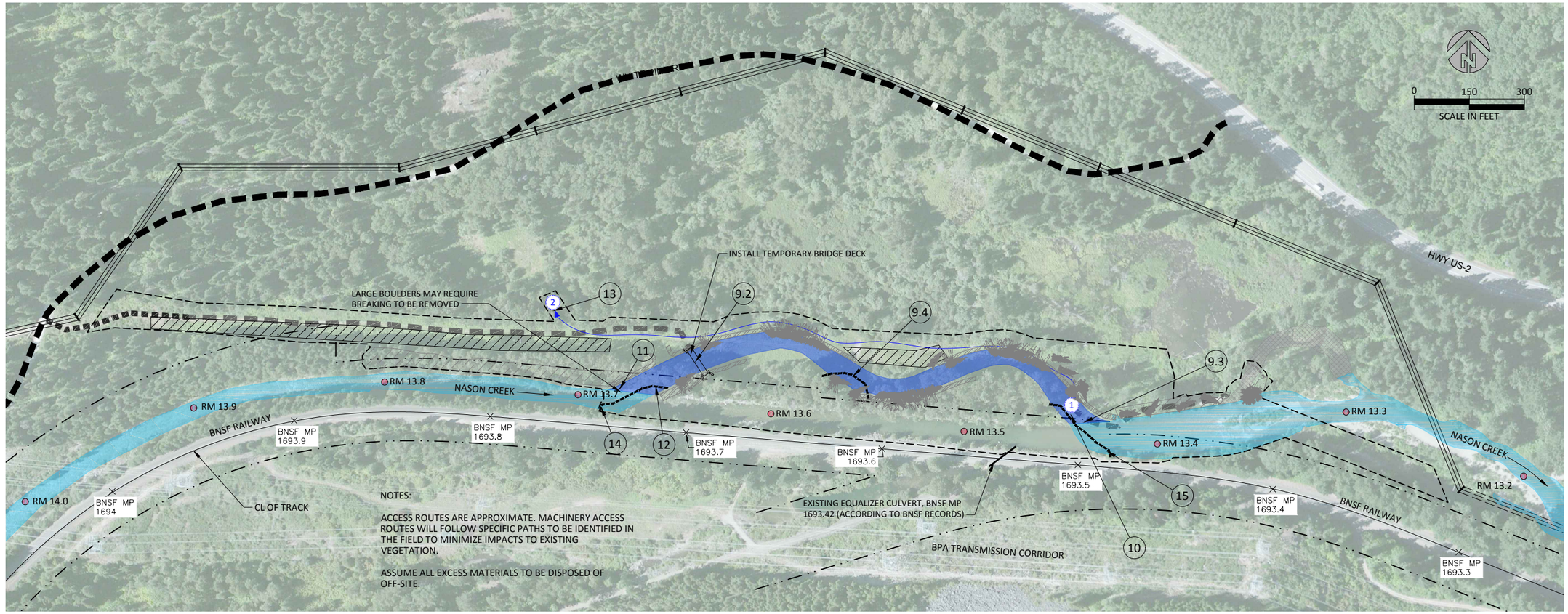

PLAN

CONSTRUCTION SEQUENCE

YEAR 2 (IN-WATER WORK PERIOD)

PROJECT ELEMENT - NEW CHANNEL ACTIVATION

STEP 9.2 - INSTALL TEMPORARY BRIDGE DECK.
STEP 9.3 - AT DOWNSTREAM END (OUTLET), CONFIGURE THE ISOLATION BERM AS AN UNCONSOLIDATED BERM OF ALLUVIAL MATERIAL, APPROXIMATELY 2 FT WIDE AND 1 FT ABOVE THE WATER SURFACE IN THE MAINSTEM AT THE OUTLET.
STEP 9.4 - ADD COFFERDAM AT INLET OF MIDWAY ALCOVE.
STEP 10 - PLACE PUMP AT DOWNSTREAM END TO PUMP RINSING FLOWS.
STEP 11 - INSTALL FISH SCREEN AND REMOVE INLET ISOLATION BERM. MODIFY BOULDERS AT CHANNEL ENTRANCE AS NEEDED
STEP 12 - INSTALL COFFERDAM ACROSS THE MAINSTEM TO GRADUALLY DIVERT FLOWS INTO THE MEANDER BEND.
STEP 13 - AS FLOWS ARE INTRODUCED INTO THE CHANNEL, PUMP UNTIL RINSING FLOWS RUN CLEAR. ONCE FLOWS RUN CLEAR, REMOVE SHORT OUTLET BERM TO ALLOW FOR FREE FLOW INTO THE MAIN CHANNEL ALIGNMENT. REMOVE FISH SCREEN AT INLET.
STEP 14 - CONTINUE THE INSTALLATION OF THE UPSTREAM COFFERDAM UNTIL IT SPANS THE ENTIRE CHANNEL AND DIVERTS ALL FLOW INTO THE NEW MEANDER.
STEP 15 - INSTALL DOWNSTREAM COFFERDAM ON MAINSTEM TO ISOLATE AREA TO BE FILLED FOR CHANNEL BACKFILL AND PERFORM FISH RESCUE.

LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- RM 13.4 — RIVER MILE MARKER
- EXISTING OVERHEAD POWERLINE AND TOWERS 2016 (BY OTHERS)
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- EXISTING EQUALIZATION CULVERT UNDER RAILROAD
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PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- TEMPORARY STAGING / STOCKPILE AREAS
- TEMPORARY ACCESS ROAD
- COFFERDAM
- LIMITS OF DISTURBANCE
- EXISTING HIGH FLOW CHANNEL TO BE RE-CONNECTED
- LEVEE REMOVAL
- FES LIFT BANK TREATMENT
- PROPOSED OVERHEAD POWERLINE 2016 (RELOCATED BY OTHERS)
- LARGE WOODY MATERIAL PREVIOUSLY PLACED

DEWATERING NOTES

(1) PUMP LOCATION, SEE SHEET 13
(2) DISCHARGE LOCATION

NOTE SEE SHEET 12 FOR SETTLING BASIN, IF NEEDED

Preliminary 90%

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DM, GJ, JG
CHECKED

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CONSTRUCTION SEQUENCING – YEAR 2 IN-WATER WORK

9

SHEET 9 OF 55

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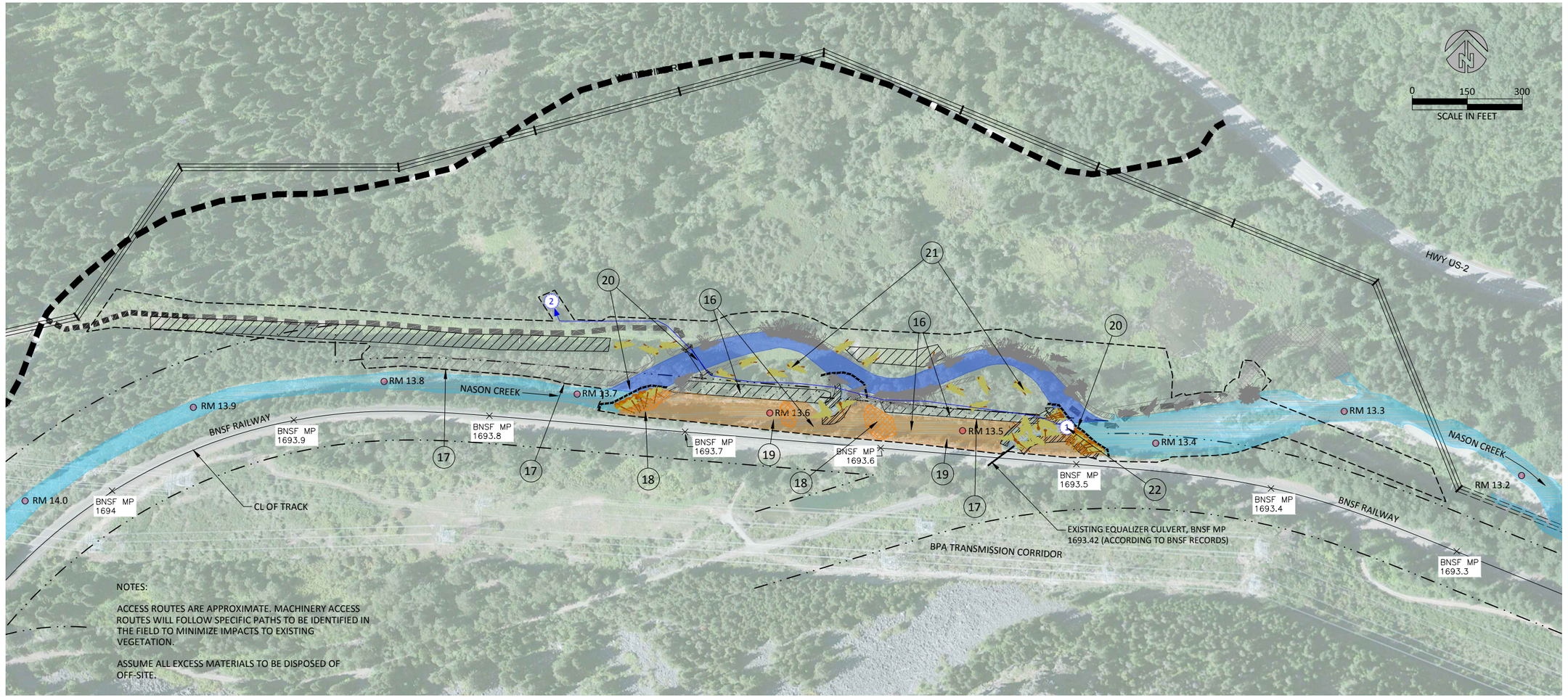

PLAN

CONSTRUCTION SEQUENCE

YEAR 2 (POST IN-WATER WORK PERIOD) - ALL WORK BEHIND COFFERDAMS

PROJECT ELEMENT: LEVEE REMOVAL AND RIPRAP REMOVAL

STEP 16 - REMOVE REMAINING LEVEES AND PLACE MATERIAL IN OLD CHANNEL. LEAVE AREAS OF BURIED OBSTRUCTIONS UNFILLED.
STEP 17 - REMOVE ALL RIPRAP FROM THE NORTH BANK OF THE CHANNEL TO BE FILLED, AND SELECTIVELY REMOVE RIPRAP (ABOVE 2-YR FLOOD WSE) FROM OTHER AREAS ON RIVER-LEFT BANK FROM RM 13.35 TO RM 13.8. MATERIAL TO BE USED FOR BURIED OBSTRUCTIONS.

PROJECT ELEMENT: EXISTING CHANNEL FILL

STEP 18 - CONSTRUCT BURIED OBSTRUCTIONS AND INLET LWM.
STEP 19 - PUMP WATER FROM ISOLATED AREA DURING CONSTRUCTION TO MINIMIZE RELEASE OF TURBID WATER TO MAINSTEM.BACKFILL THE EXISTING CHANNEL WITH MATERIAL STOCKPILED ON SITE.
STEP 20 - REMOVE UPSTREAM AND DOWNSTREAM COFFERDAMS AFTER OCTOBER 15TH, OR AT TIME TO BE DETERMINED IN CONSULTATION WITH RESOURCE AGENCIES.
STEP 21 - PLACE FLOODPLAIN ROUGHNESS AND COMMENCE RIPARIAN REVEGETATION. REMOVE TEMPORARY BRIDGE AFTER OCTOBER 15TH, OR AT TIME TO BE DETERMINED IN CONSULTATION WITH RESOURCE AGENCIES.
STEP 22 - PLACE PUMP TO MANAGE WATER FOR EXISTING CHANNEL FILL
STEP 23 - CLEAN SITE AND CONTINUE REVEGETATION EFFORTS. REVEGETATION WILL BE DONE BY OTHERS (NOT UNDER THE CONSTRUCTION CONTRACT)

LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- RM 13.4 — RIVER MILE MARKER
- EXISTING OVERHEAD POWERLINE AND TOWERS
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- EXISTING EQUALIZATION CULVERT UNDER RAILROAD
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PROPOSED FEATURES

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- TEMPORARY STAGING / STOCKPILE AREAS
- TEMPORARY ACCESS ROAD
- COFFERDAM
- LIMITS OF DISTURBANCE
- CONSTRUCTED BURIED MAINSTEM CHANNEL OBSTRUCTION
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
- NEW BACKWATER ALCOVE
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- LEVEE REMOVAL
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COLUMBIA/SNAKE RIVER SALMON RECOVERY OFFICE
FCRPS HABITAT IMPROVEMENT PROGRAM - WASHINGTON

NASON CREEK – UWP SUBREACH 2
STREAM HABITAT ENHANCEMENT
CONSTRUCTION SEQUENCING – YEAR 2 POST–IN WATER WORK

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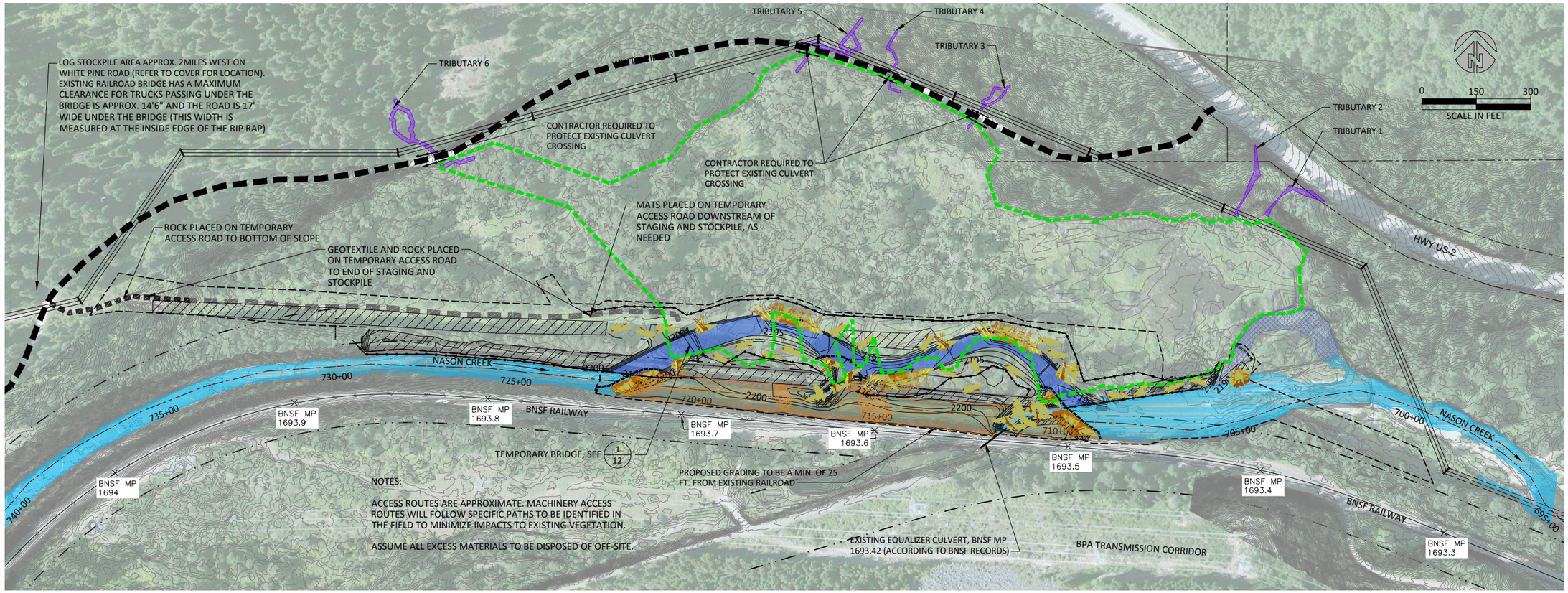
CONSTRUCTION SEQUENCING – YEAR 2 POST–IN WATER WORK

10

SHEET 10 OF 55



NOTES:

ACCESS ROUTES ARE APPROXIMATE. MACHINERY ACCESS ROUTES WILL FOLLOW SPECIFIC PATHS TO BE IDENTIFIED IN THE FIELD TO MINIMIZE IMPACTS TO EXISTING VEGETATION.

ASSUME ALL EXCESS MATERIALS TO BE DISPOSED OF OFF-SITE.

PLAN

LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- RM 13.4 — RIVER MILE MARKER
- 711+00 — EXISTING ALIGNMENT, STATION
- PROPERTY LINES (PER CHELAN COUNTY GIS)
- PROPERTY LINES (PER SURVEY, SEE SHEET 6)
- EXISTING BNSF RIGHT-OF-WAY (PER SURVEY, SEE SHEET 6)
- EXISTING EASEMENT (PER SURVEY, SEE SHEET 6)
- EXISTING OVERHEAD POWERLINE AND TOWERS
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- EXISTING EQUALIZATION CULVERT UNDER RAILROAD
- CENTERLINE OF BNSF TRACKS
- EXISTING TRIBUTARY
- EXISTING WETLAND BOUNDARY

PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- TEMPORARY STAGING / STOCKPILE AREAS
- TEMPORARY ACCESS ROAD
- LIMITS OF DISTURBANCE
- SILT FENCE, SEE SHEET 14
- TEMPORARY COFFERDAM, SEE SHEET 14
- CONSTRUCTED BURIED MAINSTEM CHANNEL OBSTRUCTION
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
- NEW BACKWATER ALCOVE
- LEVEE REMOVAL
- FES LIFT BANK TREATMENT
- EXISTING HIGH-FLOW CHANNEL TO BE RE-CONNECTED
- PROPOSED OVERHEAD POWERLINE (RELOCATED BY OTHERS)
- LARGE WOODY MATERIAL

Preliminary 90%

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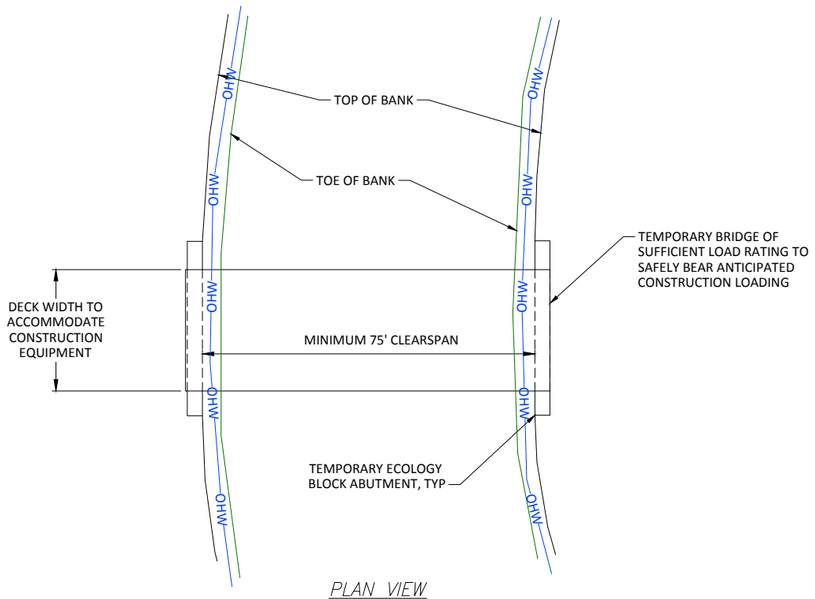
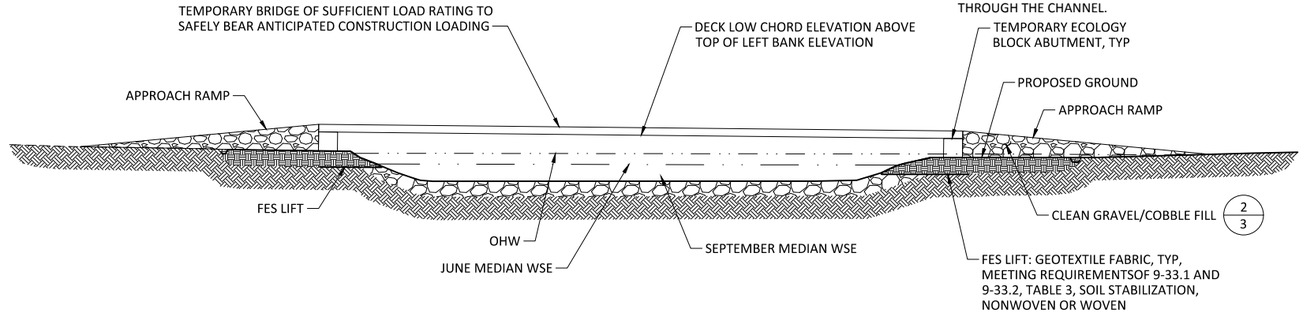
ACCESS, STAGING, DEWATERING AND EROSION CONTROL

11

SHEET 11 OF 55



PLAN VIEW

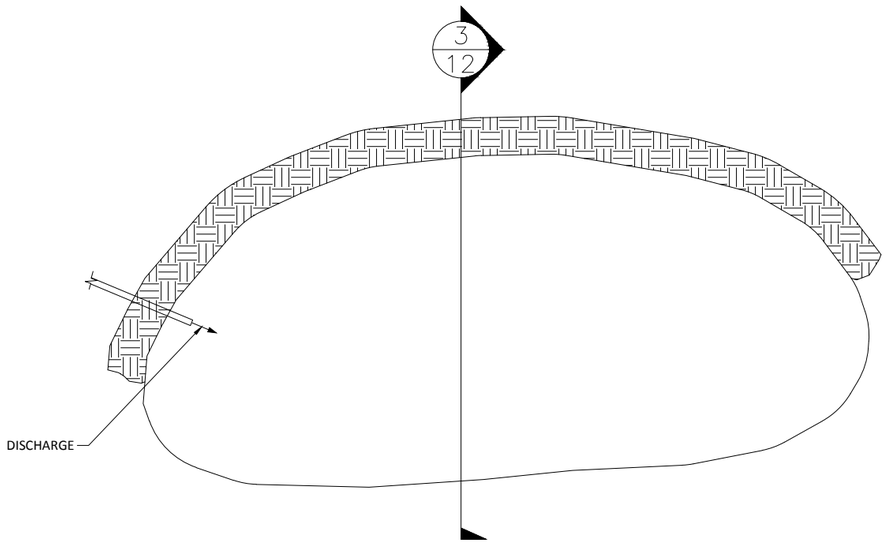


SECTION VIEW

NOTES:
TEMPORARY BRIDGE, ECOLOGY BLOCK ABUTMENTS, CLEAN GRAVEL/COBBLE FILL AND BULK BAGS SHALL BE REMOVED AT PROJECT COMPLETION AND SITE RESTORED TO DESIGN GRADE AND CONDITIONS.

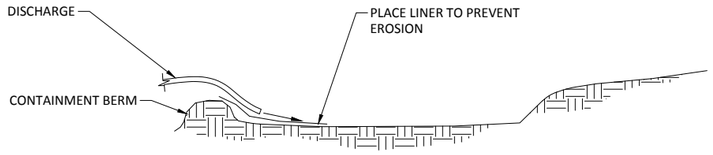
BRIDGE REMOVAL, INCLUDING ABUTMENTS, SHALL BE ACCOMPLISHED WITHOUT EQUIPMENT CROSSING THROUGH THE CHANNEL.

1/12 TEMPORARY BRIDGE CROSSING
NOT TO SCALE



NOTE: AREA AND SHAPE DEPENDENT OF INFLOW RATE, OBSERVED INFILTRATION RATE, AND LOCAL TOPOGRAPHY.

2/12 TYPICAL SETTLING BASIN DETAIL
NOT TO SCALE



NOTES:

1. PREFERENCE IS TO LAND APPLY WITHOUT DIGGING A SETTLING BASIN. IF LAND APPLICATION SITE IS INADEQUATE TO PREVENT ENTRY OF TURBID WATER INTO STREAM, SETTLING BASIN WILL BE CONSTRUCTED IN A PREVIOUSLY DISTURBED AREA.
2. SETTLING BASIN SHOULD BE MONITORED FOR SILTATION AND REDUCTION IN INFILTRATION RATES WHILE IN USE.

3/12 TYPICAL SETTLING BASIN DETAIL
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ACCESS AND EROSION CONTROL DETAILS

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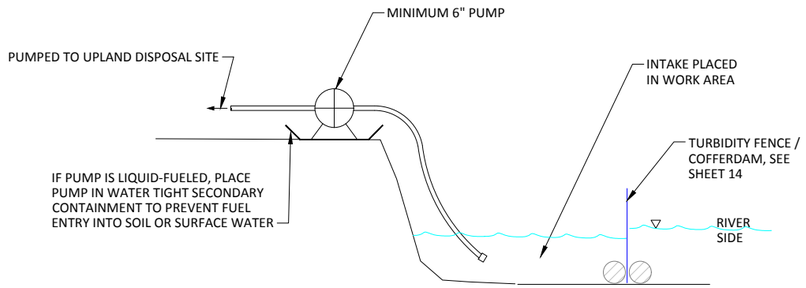
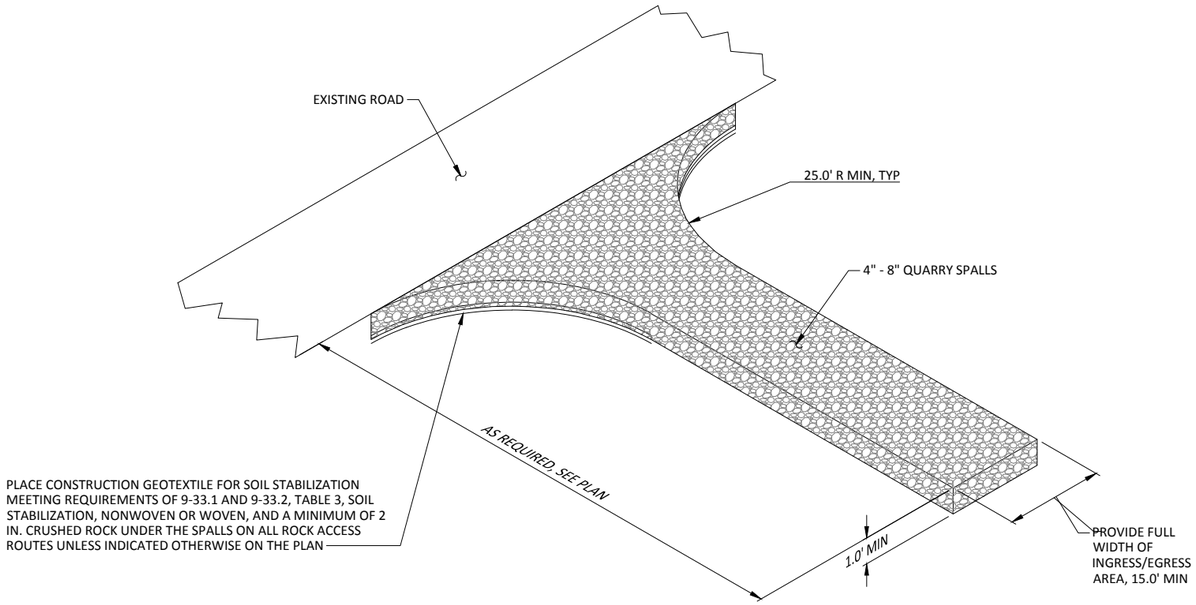


NOTES:

1. PREFERENCE IS TO LAND APPLY WITHOUT DIGGING A SETTLING BASIN. IF LAND APPLICATION SITE IS INADEQUATE TO PREVENT ENTRY OF TURBID WATER INTO STREAM, A 'DIRT-BAG' OR SEDIMENT RETENTION STRUCTURE MAY BE REQUIRED AS NECESSARY TO COMPLY WITH LAWS AND PERMIT REQUIREMENTS AT NO ADDITIONAL COST.
2. SETTLING BASIN SHALL BE MONITORED FOR SILTATION AND REDUCTION IN INFILTRATION RATES WHILE IN USE.
3. WHERE PUMPS MAY BE USED IN WATER WITH POTENTIAL TO HOLD FISH, FISH FRIENDLY SCREEN WILL BE REQUIRED ON INTAKES.
4. PUMPING WILL OCCUR BEHIND COFFERDAMS FOLLOWING DEFISHING.

1/13 TYPICAL PUMP DETAIL
NOT TO SCALE



ISOMETRIC VIEW

2/13 STABILIZED TEMPORARY CONSTRUCTION ACCESS ROUTE
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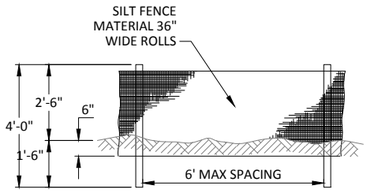
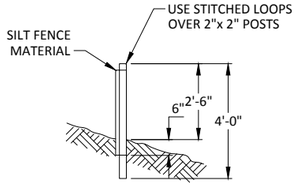
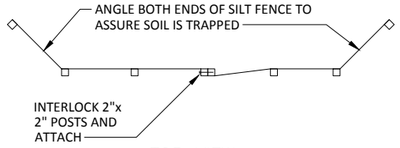


FRONT VIEW



SIDE VIEW

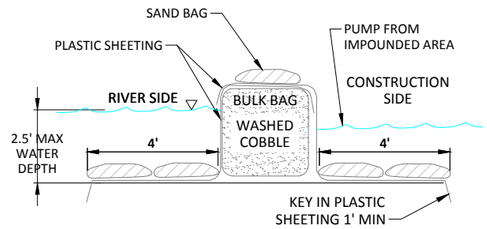


TOP VIEW

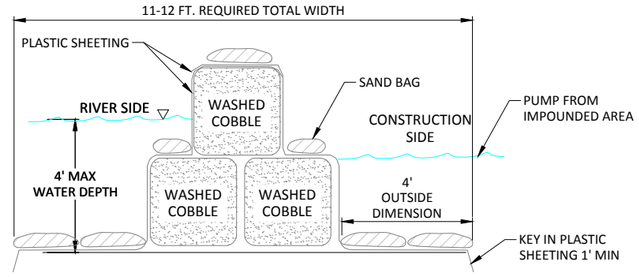
SILT FENCE NOTES:

1. THE SILT FENCE SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, SILT FENCE SHALL BE SPLICED TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6 INCH OVERLAP, AND BOTH ENDS SECURELY FASTENED TO THE POST. ALTERNATIVELY, OVERLAP AND INTERLOCK TWO POSTS WITH ATTACHED FABRIC AS REQUIRED TO MEET APPLICABLE REGULATIONS.
2. THE SILT FENCE IS TO BE INSTALLED AT LOCATIONS SHOWN ON THE PLAN ALONG THE DOWNHILL PERIMETER OF CONSTRUCTION AREAS. THE FENCE POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND A MINIMUM OF 24 INCHES.
3. THE SILT FENCE SHALL HAVE A MINIMUM VERTICAL BURIAL OF 6 INCHES. ALL EXCAVATED MATERIAL FROM SILT FENCE INSTALLATION SHALL BE BACK-FILLED AND COMPACTED ALONG THE ENTIRE DISTURBED AREA.
4. STANDARD OR HEAVY DUTY SILT FENCE SHALL HAVE MANUFACTURED STITCHED LOOPS FOR 2 INCHES X 2 INCHES POST INSTALLATION.
5. SILT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY PROTECTED AND STABILIZED, OR AS DIRECTED BY CONTRACTING OFFICER.

1/14 SILT FENCE
NOT TO SCALE



TEMPORARY COFFERDAM SECTION

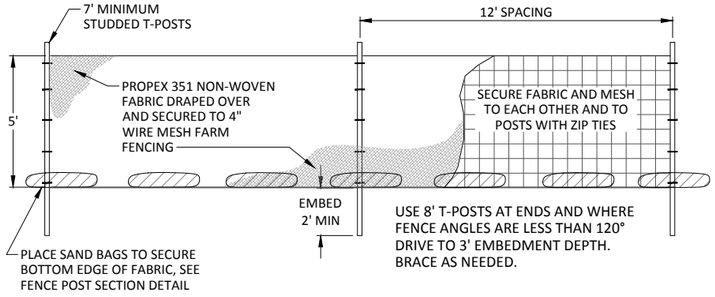


COFFERDAM SECTION IN WATER DEPTHS GREATER THAN 2.5'

BULK BAG COFFERDAM NOTES:

1. BULK BAG COFFERDAM SHALL BE CONSTRUCTED OF SEVERAL UNITS OF BULK BAGS FILLED WITH STREAMBED COBBLES [WSDOT 9-03.11(2)] NO LARGER THAN SPECIFIED FOR INCORPORATION INTO THE PROJECT, AND ABUTTED SIDE BY SIDE TO CREATE A ROW THAT ISOLATES THE CONSTRUCTION SITE.
2. IF WATER DEPTH EXCEEDS 85% OF THE BULK BAG HEIGHT, AN ADDITIONAL TOP ROW OF BULK BAGS SHALL BE INSTALLED, SUPPORTED BY TWO BOTTOM ROWS OF BULK BAGS. BULK BAG COFFERDAM SHALL BE SEALED BY COVERING THE COFFERDAM WITH PLASTIC SHEETING HELD IN PLACE BY STANDARD SANDBAGS PLACED IN ROWS ON TOP OF COFFERDAM, AND AT TOE OF COFFERDAM.
3. THE PLASTIC SHEETING SHALL BE DRAPED ALONG THE CHANNEL BOTTOM ON BOTH SIDES OF THE COFFERDAM WITH OUTWARD EDGE OF SHEETING MINIMUM 4-FEET FROM TOE OF COFFERDAM. THE DRAPED PORTION OF PLASTIC SHEETING SHALL BE PINNED TO THE CHANNEL BED BY MINIMUM TWO ROWS OF STANDARD SANDBAGS.
4. THE CONSTRUCTION SIDE EDGE OF PLASTIC SHEETING SHALL BE TOED INTO THE CHANNEL BED MINIMUM 1-FT. TOEING IN THE OUTWARD EDGE OF PLASTIC SHEETING SHALL OCCUR AFTER THE COFFERDAM IS CLOSED TO PREVENT TURBIDITY RELEASE TO THE WATERWAY.
5. IF POSSIBLE, THE COFFERDAM SHALL BE EXTENDED ONTO A GRAVEL BAR AND OUT OF THE WATER. IF THE END MUST BE TERMINATED AT THE RIVERBANK, THE COFFERDAM SHALL BE TIGHTLY SEALED TO THE GROUND BY PLASTIC SHEETING AND STANDARD SANDBAGS. MULTIPLE LAYERS OF SHEETING AND SANDBAGS MAY BE REQUIRED TO FORM A WATERTIGHT SEAL.
6. BULK BAGS SHALL BE CUBE-SHAPED POLYPROPYLENE WOVEN FABRIC BAGS WITH FULLY OPEN TOP, FLAT BOTTOM, FOUR LOOPS, MINIMUM 2-TON WEIGHT CAPACITY, MINIMUM 5:1 SAFETY FACTOR.
7. PLASTIC SHEETING SHALL BE MINIMUM 6-MIL THICKNESS. ROLL LENGTH SHALL COVER THE ENTIRE COFFERDAM WITHOUT SEAMS. MINIMUM 12-FT WIDE ROLL SHALL BE USED FOR SINGLE LAYER BULK BAG COFFERDAM. MINIMUM 16-FT WIDE ROLL SHALL BE USED FOR 2-LAYER STACKED BULK BAG COFFERDAM.
8. BULK BAG COFFERDAM SHALL BE COMPLETELY REMOVED AFTER CONSTRUCTION IS COMPLETED AND TURBIDITY HAS BEEN REMOVED. STONE IN BAGS AND ALL SYNTHETICS SHALL BE REMOVED FROM SITE AND LEGALLY DISPOSED OF BY CONTRACTOR.
9. MEASUREMENT AND PAYMENT FOR BULK BAG COFFERDAM, SAND BAGS, PLASTIC SHEETING, WASHED GRAVEL PLACEMENT, MAINTENANCE AND REMOVAL OF ALL MATERIALS SHALL BE INCIDENTAL TO THE LUMP SUM ALL INCLUSIVE COST FOR DIVERSION AND DEWATERING.
10. ALTERNATE COFFERDAM MATERIALS AND CONFIGURATIONS MAY BE ALLOWED BUT SHALL NOT BE IMPLEMENTED WITHOUT REVIEW AND APPROVAL BY THE OWNER'S REPRESENTATIVE. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS AND/OR VENDOR CUT SHEETS FOR SUBSTITUTIONS.

2/14 BULK BAG COFFERDAM
NOT TO SCALE



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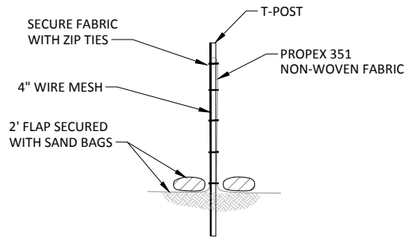

SECTION

3/14 TURBIDITY CONTAINMENT FENCE
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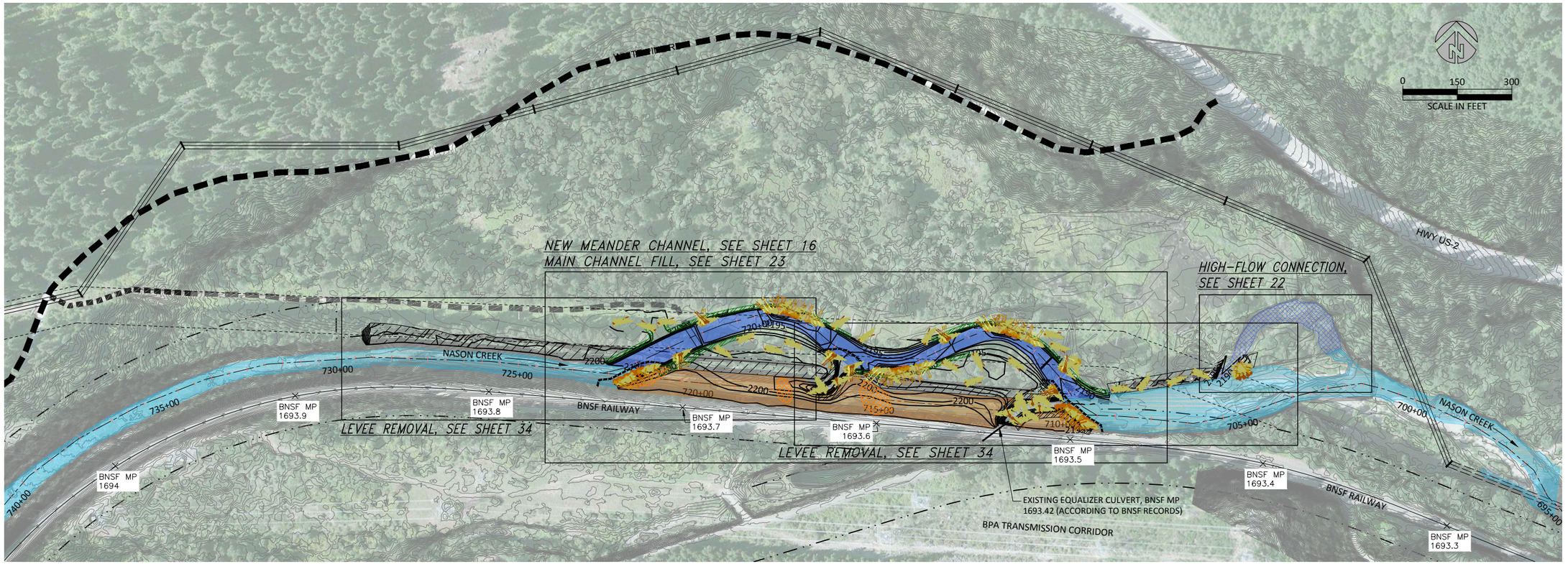

PLAN

LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- RM 13.4 — RIVER MILE MARKER
- 715+00 — EXISTING ALIGNMENT, STATION
- EXISTING CONTOURS (5-FT INTERVAL)
- EXISTING OVERHEAD POWERLINE AND TOWERS
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- EXISTING EQUALIZATION CULVERT UNDER RAILROAD
- CENTERLINE OF BNSF TRACKS

PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- 715+00 — PROPOSED ALIGNMENT, STATION
- TEMPORARY ACCESS ROAD
- CONSTRUCTED BURIED MAINSTEM CHANNEL OBSTRUCTION
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
- NEW BACKWATER ALCOVE
- LEVEE REMOVAL
- FES LIFT BANK TREATMENT
- EXISTING HIGH-FLOW CHANNEL TO BE RE-CONNECTED
- PROPOSED OVERHEAD POWERLINE (RELOCATED BY OTHERS)
- LARGE WOODY MATERIAL

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PROPOSED CONDITIONS AND SHEET LAYOUT

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PROPOSED CONDITIONS AND SHEET LAYOUT

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SHEET 15 OF 55

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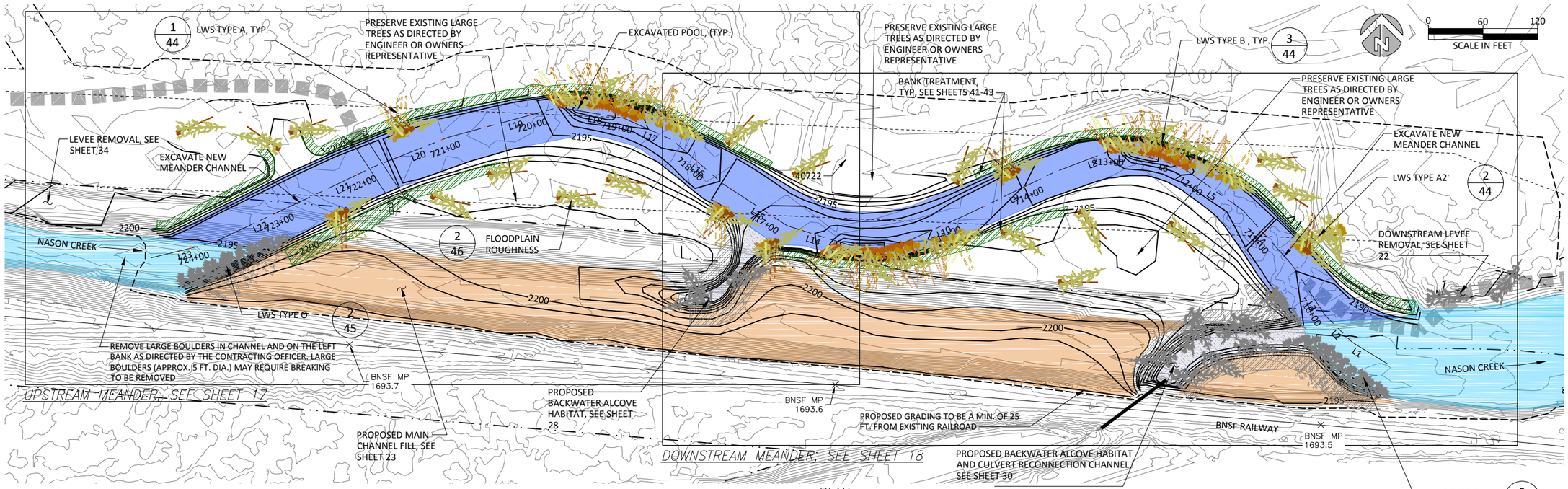


PLAN

LINE TABLE: NEW MEANDER CHANNEL

Line #	Start Point (N,E)	Length	Direction
L1	(286953.03,1633290.08)	46.17	N58° 38' 44.77"W
L2	(286977.06,1633250.65)	42.28	N45° 01' 07.46"W
L3	(287006.94,1633220.75)	66.68	N33° 22' 15.10"W
L4	(287062.63,1633184.07)	79.76	N42° 00' 55.91"W
L5	(287121.89,1633130.68)	84.53	N54° 46' 53.61"W
L6	(287170.64,1633061.62)	55.38	N74° 36' 50.56"W
L7	(287185.34,1633008.23)	26.32	N88° 18' 59.24"W
L8	(287186.11,1632981.92)	63.54	S68° 59' 34.60"W

LINE TABLE: NEW MEANDER CHANNEL

Line #	Start Point (N,E)	Length	Direction
L9	(287163.33,1632922.60)	106.02	S64° 10' 51.36"W
L10	(287117.16,1632827.16)	76.86	S65° 53' 05.41"W
L11	(287085.75,1632757.01)	20.55	S84° 09' 33.22"W
L12	(287083.66,1632736.56)	36.87	S89° 48' 59.58"W
L13	(287083.54,1632699.70)	23.48	N73° 47' 23.34"W
L14	(287090.10,1632677.15)	49.46	N72° 24' 58.62"W
L15	(287105.04,1632630.00)	84.67	N56° 55' 56.22"W
L16	(287151.24,1632559.04)	73.08	N49° 03' 15.14"W

LINE TABLE: NEW MEANDER CHANNEL

Line #	Start Point (N,E)	Length	Direction
L17	(287199.13,1632503.84)	58.34	N65° 48' 37.21"W
L18	(287223.04,1632450.63)	72.79	N80° 37' 47.71"W
L19	(287234.89,1632378.81)	125.60	S74° 51' 28.30"W
L20	(287202.08,1632257.57)	85.62	S68° 26' 48.14"W
L21	(287170.63,1632177.94)	92.51	S64° 42' 19.82"W
L22	(287131.10,1632094.30)	105.76	S64° 49' 29.69"W
L23	(287086.11,1631998.59)	69.57	S76° 18' 52.62"W

L23 ENDPOINT (N,E): 287069.65,1631930.99

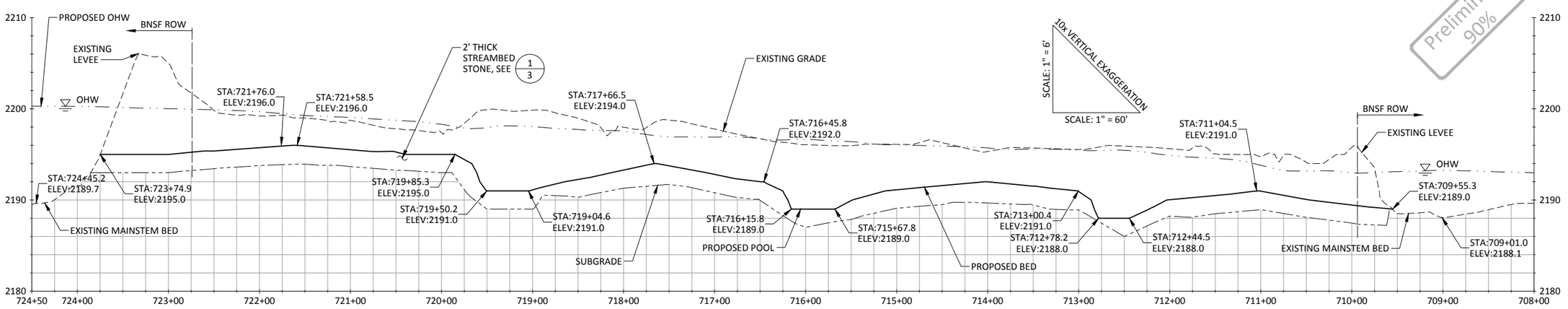
LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- EXISTING CONTOURS (1-FT INTERVAL)
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- EXISTING EQUALIZATION CULVERT UNDER RAILROAD
- CENTERLINE OF BNSF TRACKS

PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- PROPOSED ALIGNMENT, STATION (711+00)
- PROPOSED ALIGNMENT LINE SEGMENT (SEE TABLES THIS SHEET) (L15)
- PROPOSED CONTOURS (1-FT INTERVAL)
- TEMPORARY ACCESS ROAD
- LIMITS OF DISTURBANCE
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
- NEW BACKWATER ALCOVE
- FES LIFT BANK TREATMENT
- LARGE WOODY MATERIAL



PROFILE – PROPOSED MEANDERS

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PROPOSED MEANDER CHANNEL PLAN AND PROFILE

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GJ, DM, JG DESIGNED
GP DRAWN
DM, GJ, JG CHECKED

6/7/16

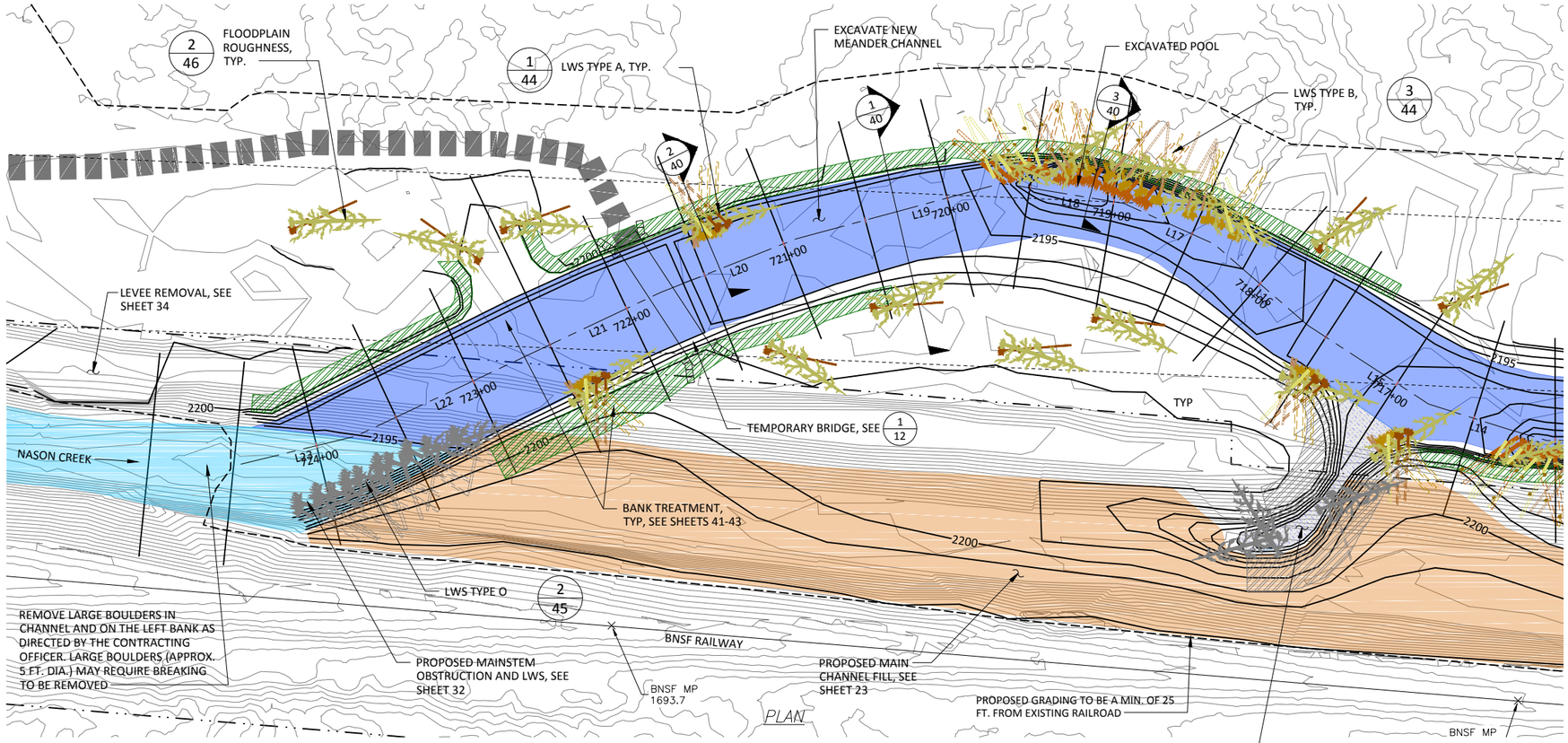
PROPOSED MEANDER CHANNEL PLAN AND PROFILE

16

SHEET 16 OF 55

DATE AND TIME PLOTTED 6/7/2016 12:33 PM
PLOTTED BY RICH

CAD SYSTEM AutoCAD Rel. 20.1S (LMS TECH)
CAD FILENAME USBR_Nason_UWP_D.dwg



PLAN

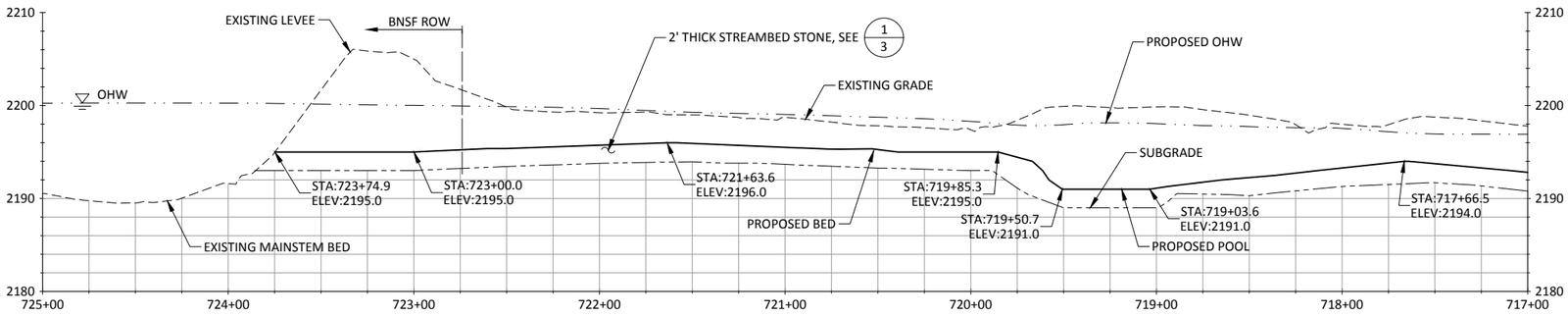
NOTE: SEE SHEETS 19-21 FOR GRADING CROSS SECTION VIEWS. ORIENTATION IS LEFT TO RIGHT LOOKING DOWNSTREAM.

GRADING CROSS SECTION COORDINATES

STATION	RIVER LEFT (N,E)	RIVER RIGHT (N,E)
717+00	287167.37,1632644.23	287066.81,1632578.76
717+50	287194.65,1632602.33	287094.09,1632536.85
718+00	287221.08,1632570.11	287130.44,1632491.46
718+50	287259.74,1632515.36	287150.27,1632466.18
719+00	287283.21,1632454.48	287159.63,1632434.09
719+50	287291.35,1632405.15	287172.95,1632385.61
720+00	287284.13,1632331.08	287168.30,1632362.43
720+50	287271.07,1632282.82	287155.24,1632314.17
721+00	287255.09,1632228.46	287143.48,1632272.54

GRADING CROSS SECTION COORDINATES

STATION	RIVER LEFT (N,E)	RIVER RIGHT (N,E)
721+50	287236.72,1632181.95	287125.11,1632226.04
722+00	287215.48,1632132.42	287106.99,1632183.70
722+50	287194.12,1632087.22	287085.62,1632138.49
723+00	287172.86,1632042.10	287064.26,1632093.14
723+50	287151.59,1631996.85	287042.99,1632047.89
724+00	287138.80,1631961.35	287022.20,1631989.74
724+50	287129.76,1631933.00	287010.39,1631920.73
725+00	287134.87,1631883.26	287015.50,1631870.99



PROFILE – UPSTREAM MEANDER

5X VERTICAL EXAGGERATION
SCALE: 1" = 8'
SCALE: 1" = 40'

Preliminary 90%

0 40 80
SCALE IN FEET

LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- EXISTING CONTOURS (1-FT INTERVAL)
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- CENTERLINE OF BNSF TRACKS

PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- PROPOSED ALIGNMENT, STATION (711+00)
- CROSS SECTION LINE AND LABEL (REFERENCES PROPOSED ALIGNMENT STATION), SEE SHEETS 19-21
- PROPOSED CONTOURS (1-FT INTERVAL)
- TEMPORARY STAGING / STOCKPILE AREAS
- TEMPORARY ACCESS ROAD
- LIMITS OF DISTURBANCE
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
- NEW BACKWATER ALCOVE
- FES LIFT BANK TREATMENT
- LARGE WOODY MATERIAL

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FCRPS HABITAT IMPROVEMENT PROGRAM – WASHINGTON

NASON CREEK – UWP SUBREACH 2
STREAM HABITAT ENHANCEMENT
PROPOSED MEANDER CHANNEL UPSTREAM PLAN AND PROFILE

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Hood River, OR 97031
541.386.9003
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REV. NO

GJ,DM,JG
DESIGNED
RD
DRAWN
DM,GJ,JG
CHECKED

6/7/16

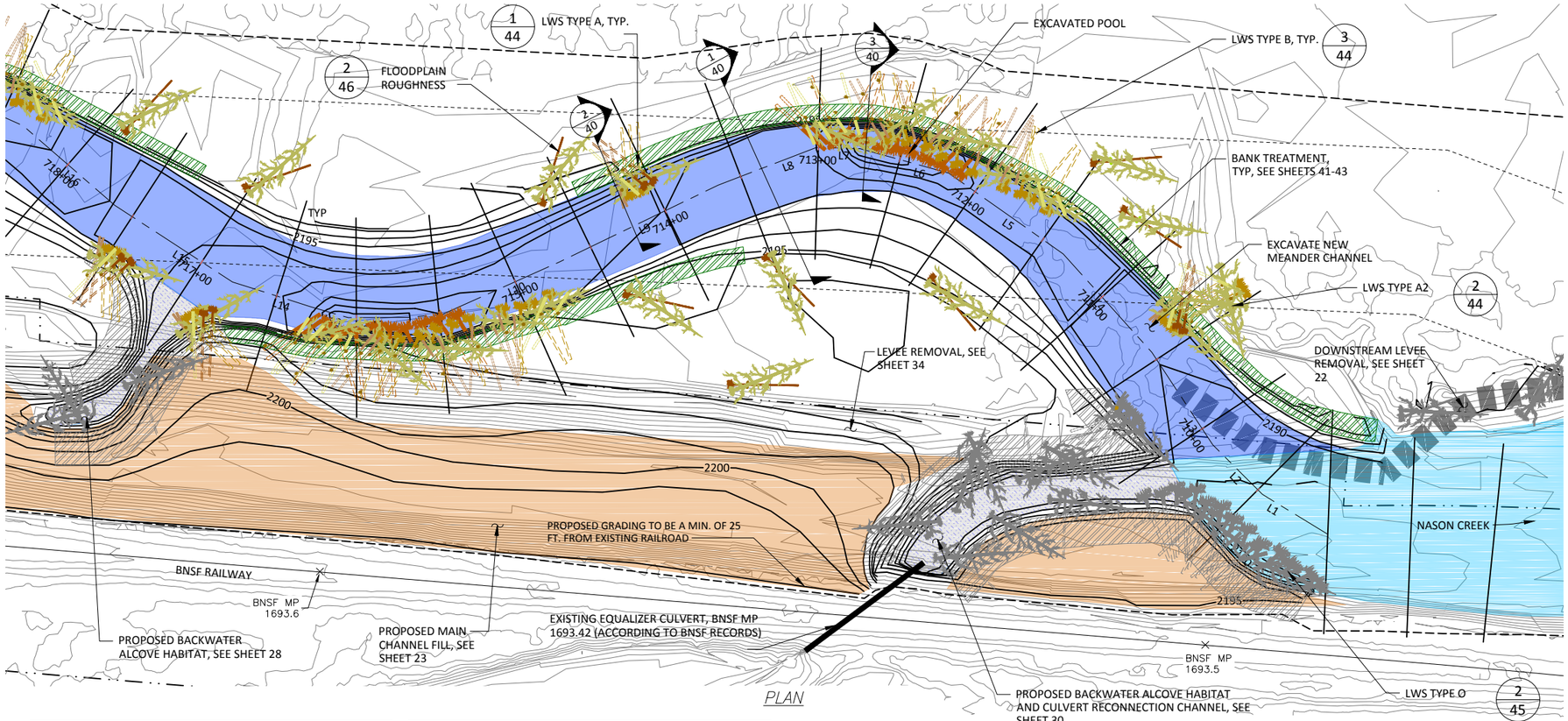
PROPOSED MEANDER CHANNEL UPSTREAM PLAN AND PROFILE

17

SHEET 17 OF 55

DATE AND TIME PLOTTED
6/7/2016 12:33 PM
PLOTTED BY
RICH

CAD SYSTEM
AutoCAD Rel. 20.1S (LMS TECH)
CAD FILENAME
USBR_Nason_UWP_D.dwg



PLAN

NOTE: SEE SHEETS 19-21 FOR GRADING CROSS SECTION VIEWS. ORIENTATION IS LEFT TO RIGHT LOOKING DOWNSTREAM.

GRADING CROSS SECTION COORDINATES

STATION	RIVER LEFT (N,E)	RIVER RIGHT (N,E)
708+00	287007.43,1633396.00	286888.05,1633383.82
708+50	287010.99,1633342.44	286891.08,1633337.65
709+00	287012.98,1633292.48	286893.08,1633287.69
709+50	287022.20,1633290.36	286937.32,1633205.54
710+00	287049.59,1633264.50	286983.58,1633164.29
710+50	287091.35,1633237.00	287025.34,1633136.79
711+00	287136.13,1633198.62	287051.81,1633105.02
711+50	287179.62,1633152.95	287076.47,1633080.13
712+00	287208.46,1633112.10	287102.94,1633037.62

GRADING CROSS SECTION COORDINATES

STATION	RIVER LEFT (N,E)	RIVER RIGHT (N,E)
712+50	287236.60,1633048.07	287113.41,1633014.17
713+00	287246.05,1632984.81	287118.76,1632981.07
713+50	287224.60,1632914.79	287112.58,1632957.81
714+00	287201.96,1632864.67	287093.93,1632916.93
714+50	287180.18,1632819.66	287072.16,1632871.92
715+00	287159.95,1632775.90	287050.42,1632824.93
715+50	287145.19,1632748.47	287025.81,1632760.68
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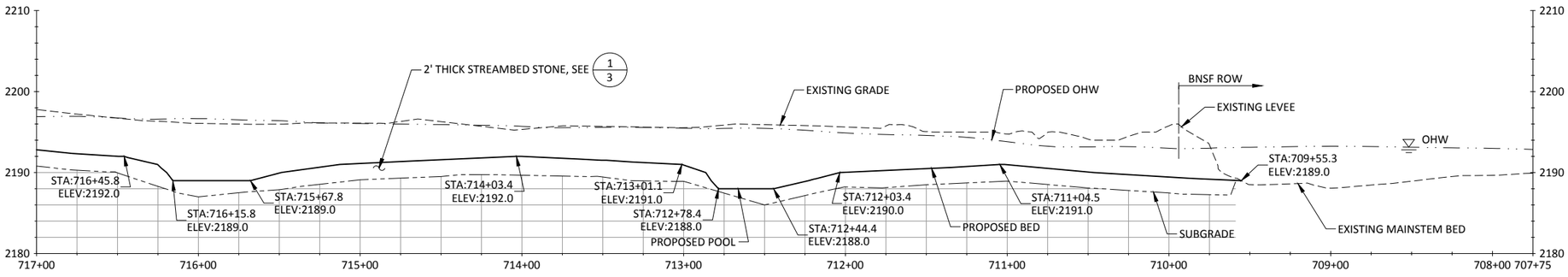
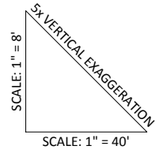
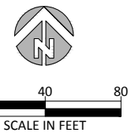
716+50	287153.80,1632674.74	287039.41,1632638.49



PROFILE – DOWNSTREAM MEANDER



Preliminary 90%



LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- EXISTING CONTOURS (1-FT INTERVAL)
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- CENTERLINE OF BNSF TRACKS

PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- 711+00 PROPOSED ALIGNMENT, STATION
- CROSS SECTION LINE AND LABEL (REFERENCES PROPOSED ALIGNMENT STATION), SEE SHEETS 19-21
- PROPOSED CONTOURS (1-FT INTERVAL)
- TEMPORARY STAGING / STOCKPILE AREAS
- TEMPORARY ACCESS ROAD
- LIMITS OF DISTURBANCE
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
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RP DRAWN
DM, GJ, JG CHECKED

6/7/16

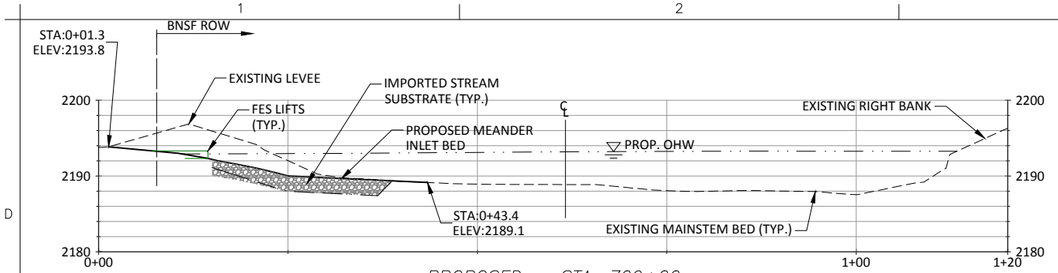
PROPOSED MEANDER CHANNEL DOWNSTREAM PLAN AND PROFILE

18

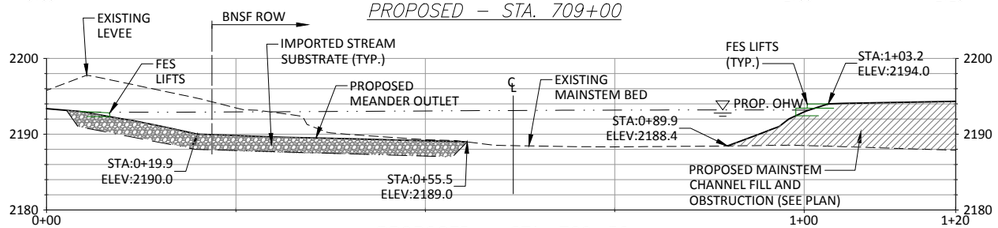
SHEET 18 OF 55

DATE AND TIME PLOTTED 6/7/2016 12:34 PM
PLOTTED BY RICH

CAD SYSTEM AutoCAD Rel. 20.1S (LMS TECH)
CAD FILENAME USBR_Nason_UWP_D.dwg



PROPOSED – STA. 709+00



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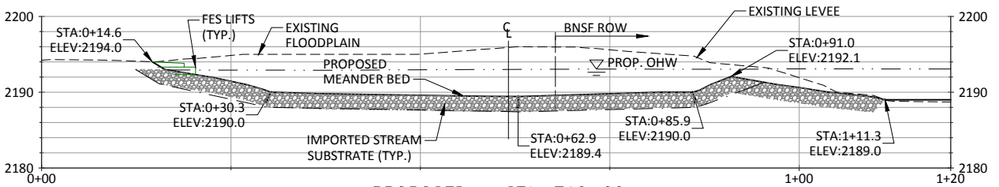

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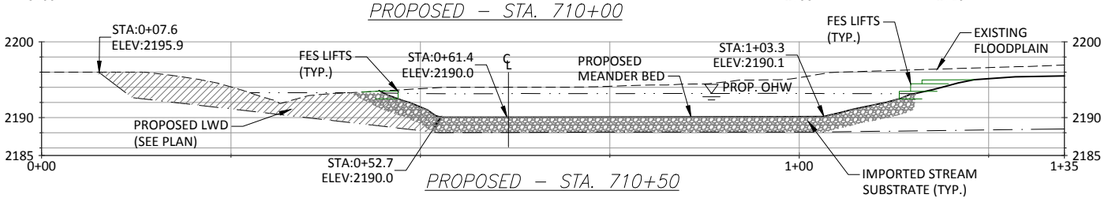
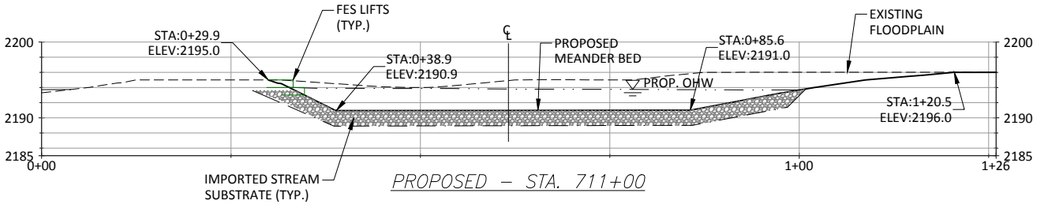


PROPOSED – STA. 710+50



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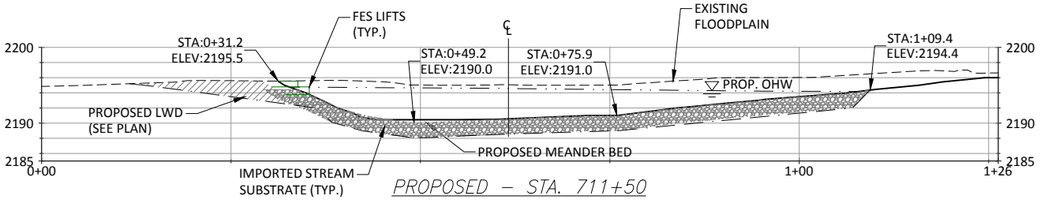

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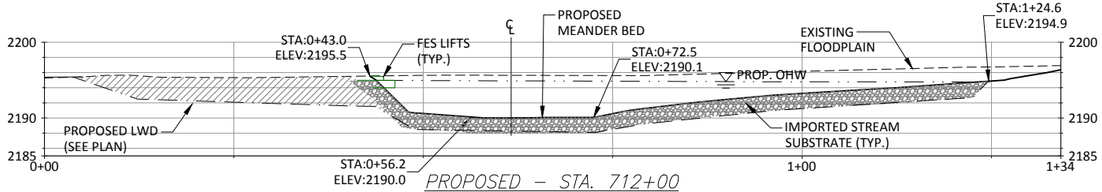

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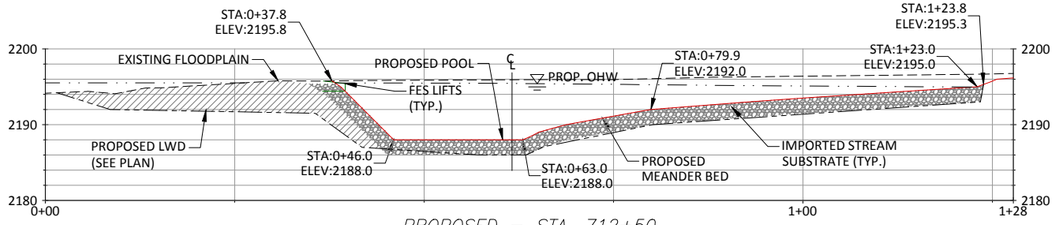
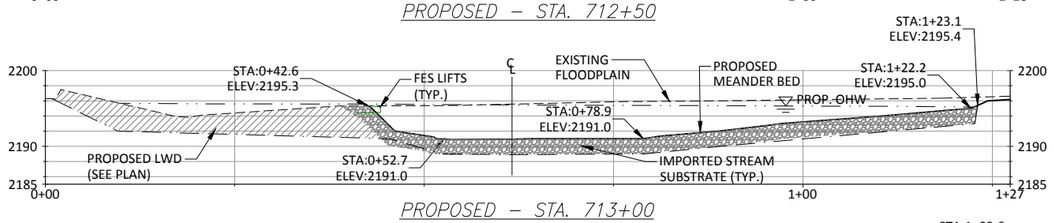
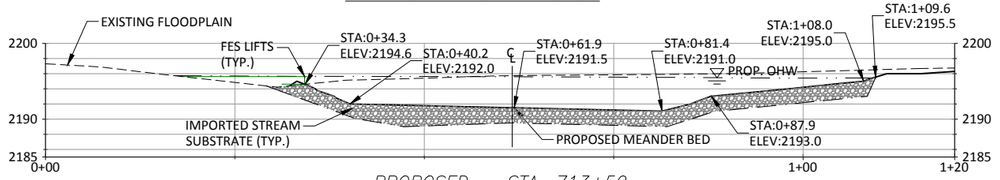


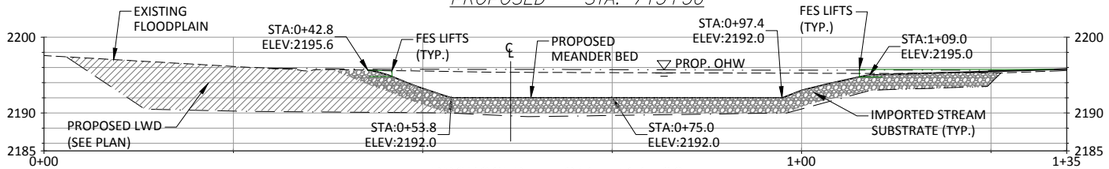
PROPOSED – STA. 712+50



PROPOSED – STA. 713+00



PROPOSED – STA. 713+50



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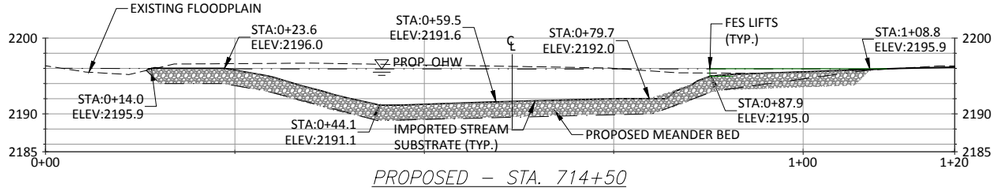
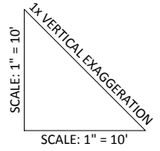


PROPOSED – STA. 714+50

LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- SUBGRADE LIMIT
- PROPOSED OHW
- STREAMBED MATERIAL (GRADATION A)
- FILL



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Preliminary 90%

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PROPOSED MEANDER CHANNEL GRADING CROSS SECTIONS

19

SHEET 19 OF 55

DATE AND TIME PLOTTED
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RICH

CAD SYSTEM
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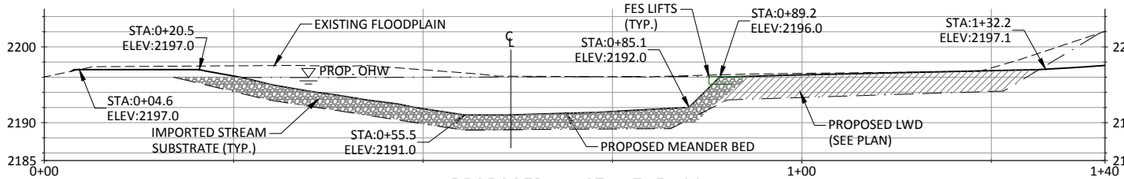

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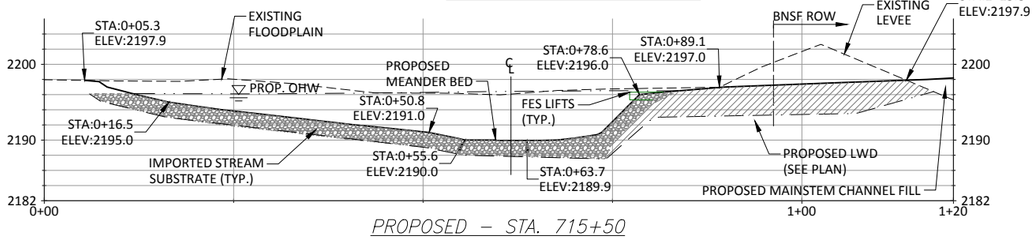
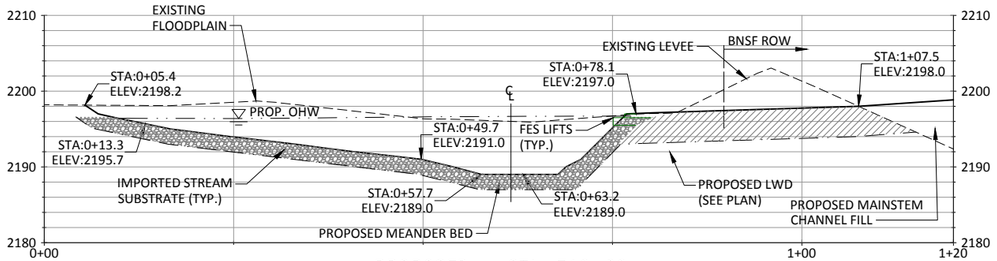


PROPOSED – STA. 715+50



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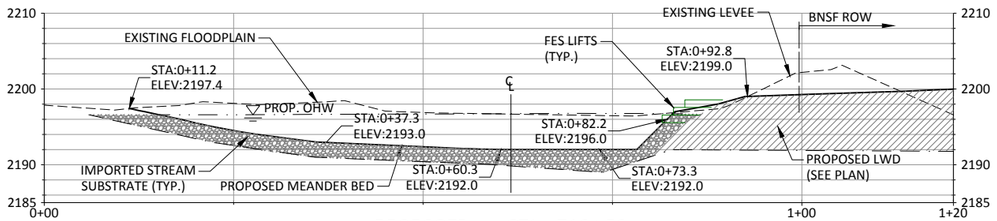

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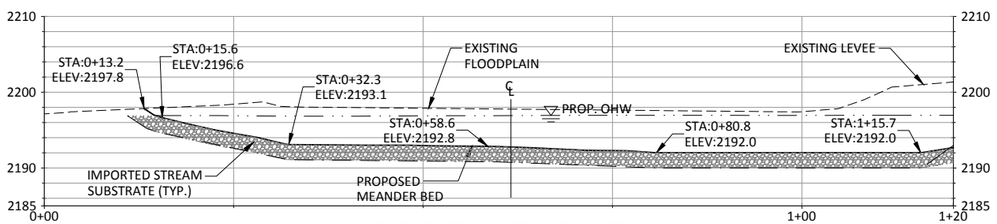

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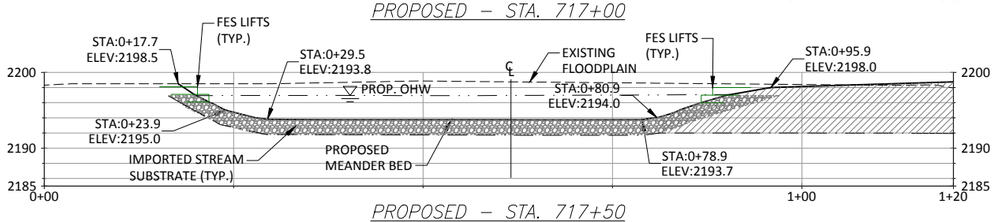


PROPOSED – STA. 717+50

LEGEND

EXISTING GRADE

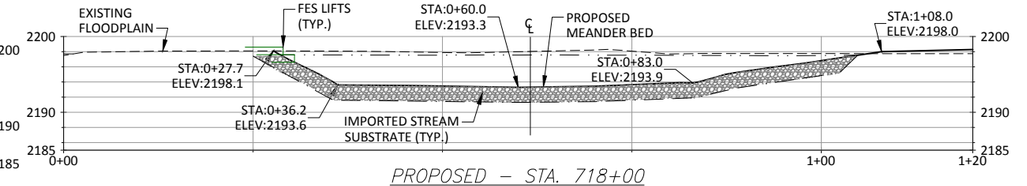
PROPOSED GRADE

SUBGRADE LIMIT

PROPOSED OHW

STREAMBED MATERIAL (GRADATION A)

FILL



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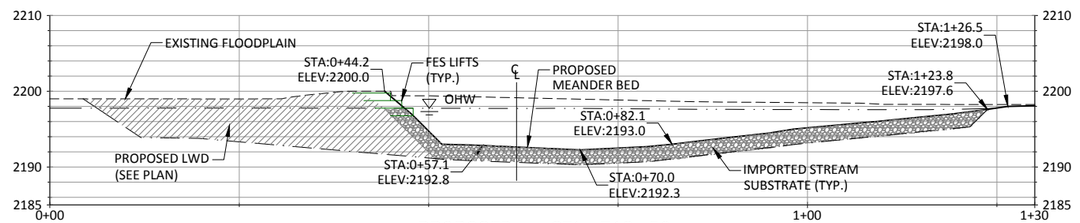

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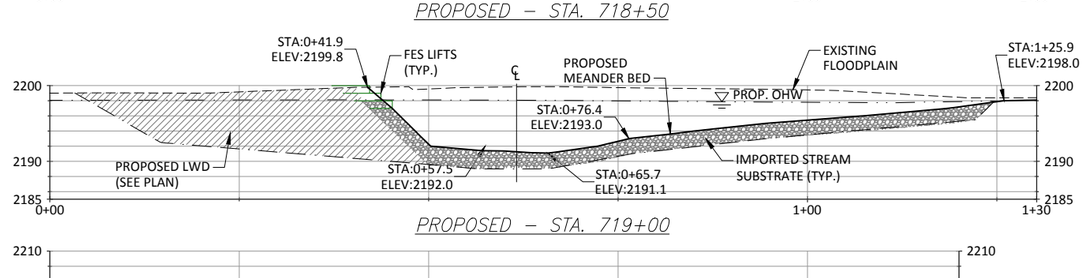

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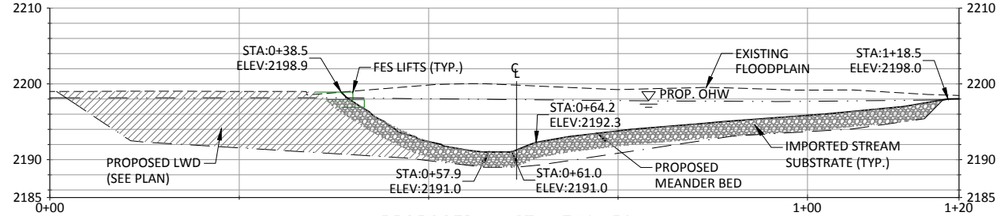
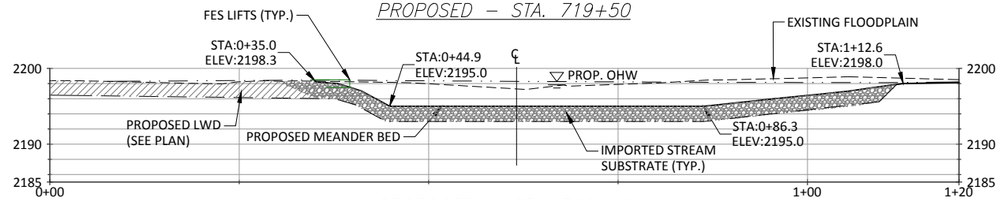


PROPOSED – STA. 719+50



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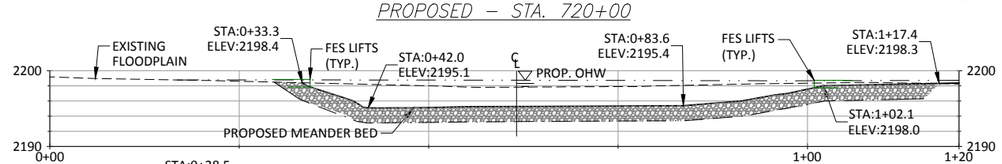

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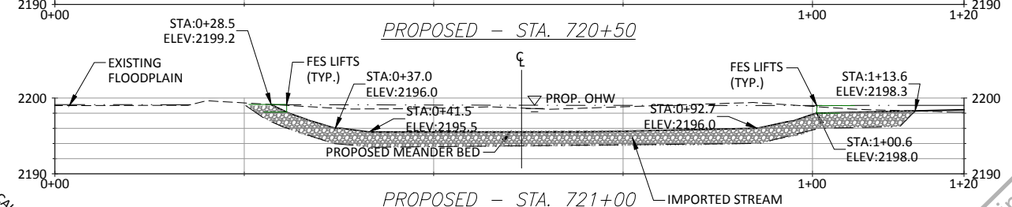
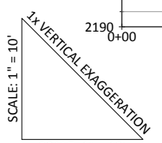


PROPOSED – STA. 721+00



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Preliminary 90%

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REV NO

GJ, DM, JG
DESIGNED
RP
DRAWN
DM, GJ, JG
CHECKED

6/7/16

PROPOSED MEANDER CHANNEL GRADING CROSS SECTIONS

20

SHEET 20 OF 55

DATE AND TIME PLOTTED
6/7/2016 12:34 PM
PLOTTED BY
RICH

CAD SYSTEM
AutoCAD Rel. 20.1S (LMS TECH)
CAD FILENAME
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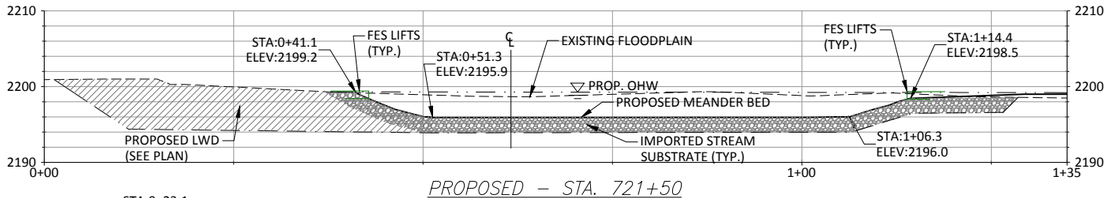
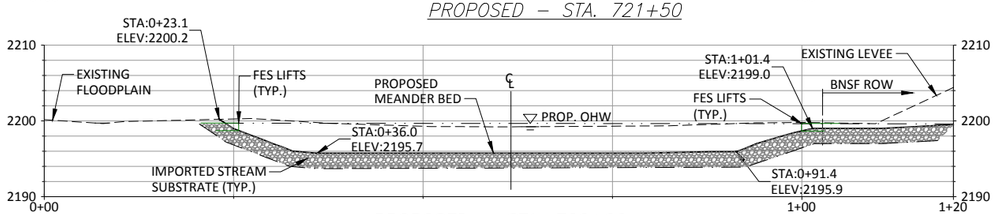
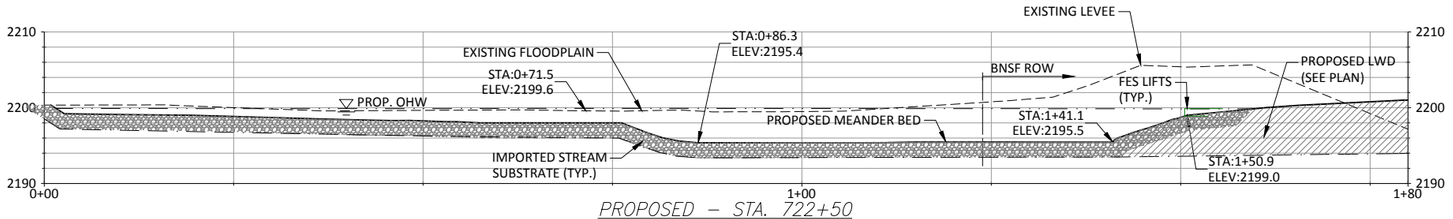


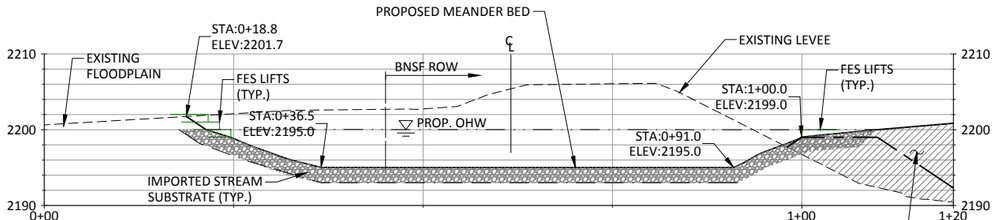
PROPOSED – STA. 721+50



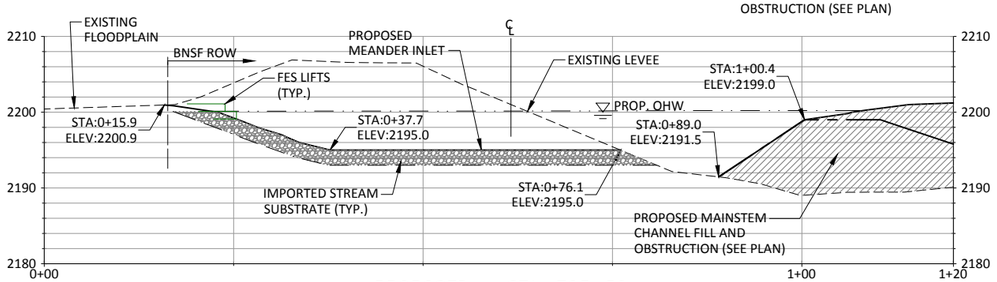
PROPOSED – STA. 722+00



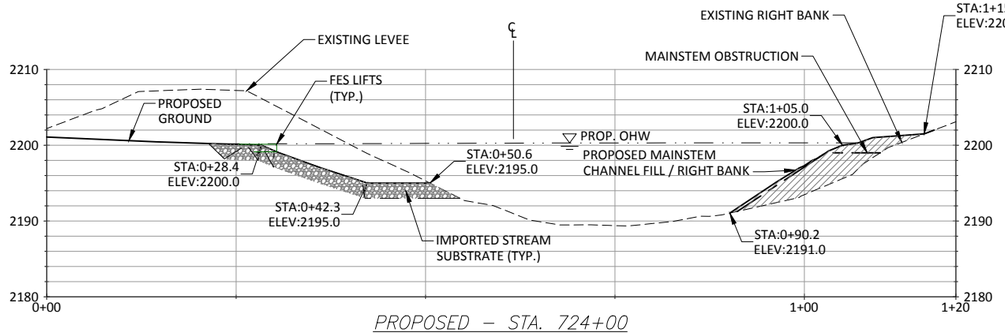
PROPOSED – STA. 722+50



PROPOSED – STA. 723+00

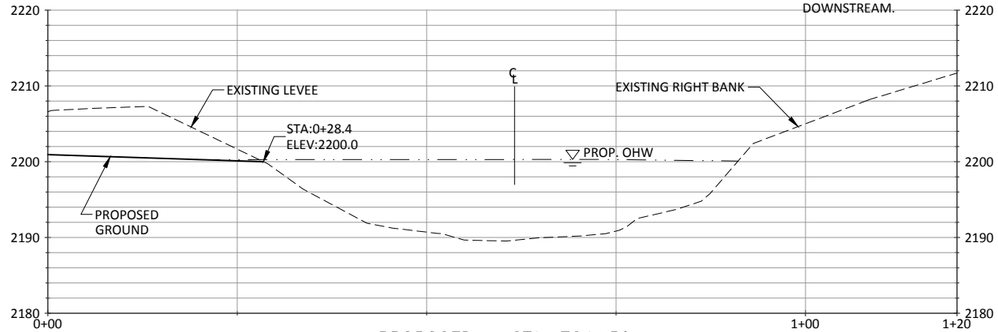


PROPOSED – STA. 723+50

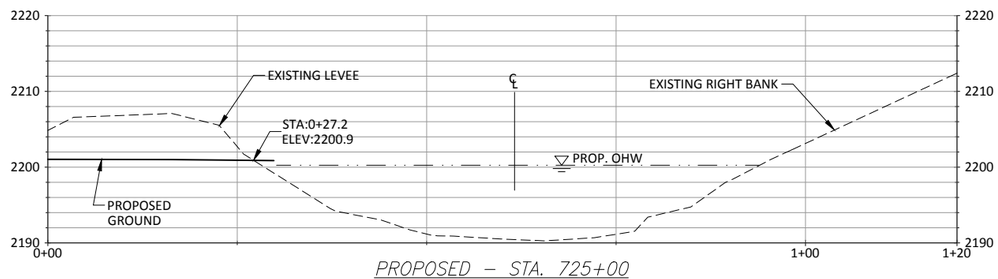


PROPOSED – STA. 724+00

NOTE: VIEW ORIENTATION IS LEFT TO RIGHT, LOOKING DOWNSTREAM.



PROPOSED – STA. 724+50



PROPOSED – STA. 725+00

LEGEND

EXISTING GRADE
PROPOSED GRADE
SUBGRADE LIMIT
PROPOSED OHW
STREAMBED MATERIAL (GRADATION A)
FILL

SCALE: 1" = 10'
1x VERTICAL EXAGGERATION
SCALE: 1" = 10'

Preliminary 90%

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NASON CREEK – UWP SUBREACH 2

STREAM HABITAT ENHANCEMENT
PROPOSED MEANDER CHANNEL GRADING CROSS SECTIONS

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REV. NO

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PROPOSED MEANDER CHANNEL GRADING CROSS SECTIONS

21

SHEET 21 OF 55

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6/7/2016 12:34 PM
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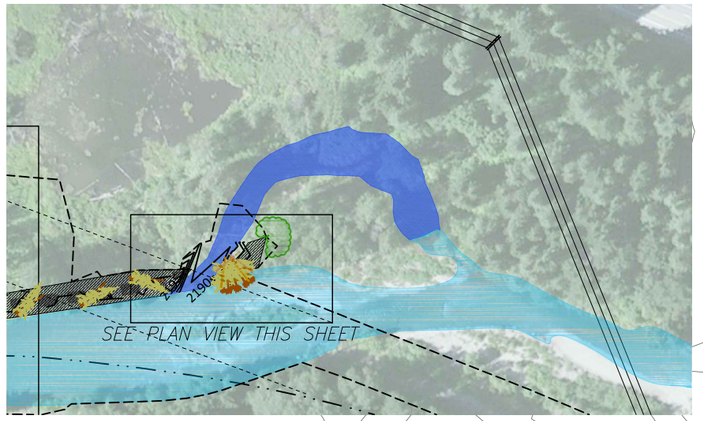
RICH

CAD SYSTEM
AutoCAD Rel. 20.1S (LMS TECH)
CAD FILENAME
USBR_Nason_UWP_D.dwg



PROTECT EXISTING COTTONWOOD TREES, TO BE FLAGGED BY THE CONTRACTING OFFICER.

EXISTING THALWEG HIGH-FLOW CHANNEL

1/22 STA:5+50.0

STA:6+00.0

2195

2190

NASON CREEK

REMOVE INLET BERM TO RECONNECT HIGH FLOW CHANNEL

LWS, KEY MEMBER BOLES BURIED 3' MINIMUM, ALONG 3/4 OF LOG LENGTH. WHOLE TREES BRACED AGAINST VERTICAL SNAGS.

0 10 20
SCALE IN FEET

LEGEND

EXISTING FEATURES

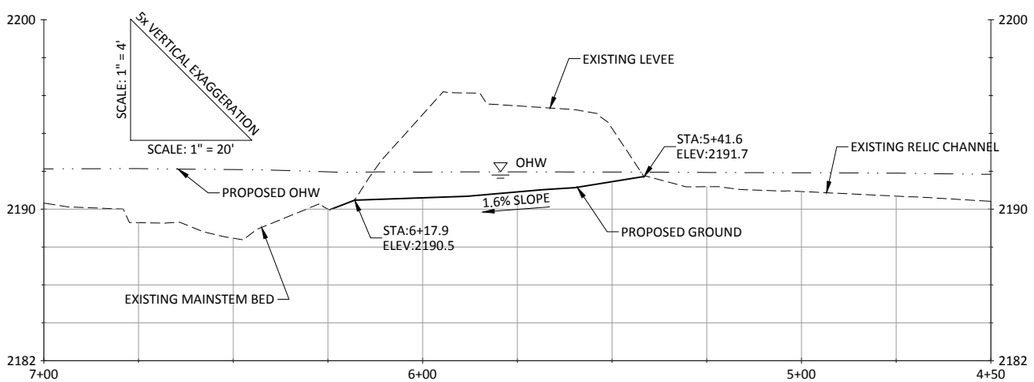
- EXISTING MAINSTEM CHANNEL
- EXISTING HIGH-FLOW CHANNEL
- EXISTING CONTOURS (1-FT INTERVAL)
- ORDINARY HIGH WATER

PROPOSED FEATURES

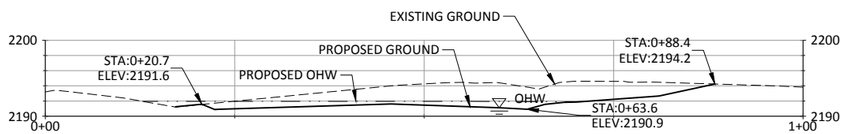
- 711+00 — PROPOSED ALIGNMENT, STATION
- STA:5+80.0 — CROSS SECTION LINE AND LABEL (REFERENCES EXISTING ALIGNMENT STATION), SEE THIS SHEET
- PROPOSED CONTOURS (1-FT INTERVAL)
- TEMPORARY ACCESS
- LIMITS OF DISTURBANCE
- LARGE WOODY MATERIAL
- LEVEE TO BE REMOVED

Preliminary 90%

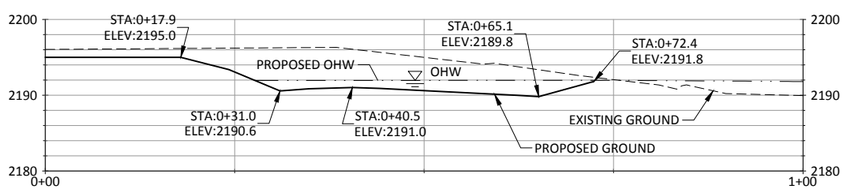
PLAN



PROFILE – HIGH-FLOW CHANNEL



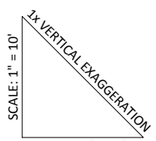
1/22 SECTION - STA. 5+50
NOT TO SCALE



2/22 SECTION - STA. 6+00
NOT TO SCALE

CROSS SECTION LEGEND

- EXCAVATION



NOTE: VIEW ORIENTATION IS LEFT TO RIGHT, LOOKING DOWNSTREAM.

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STREAM HABITAT ENHANCEMENT

DOWNSTREAM LEVEE REMOVAL GRADING PLAN AND PROFILE

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Hood River, OR 97031
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RP
DRAWN
DM, GJ, JG
PROJECT CHECKED

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DOWNSTREAM LEVEE REMOVAL GRADING PLAN AND PROFILE

22

SHEET 22 OF 55

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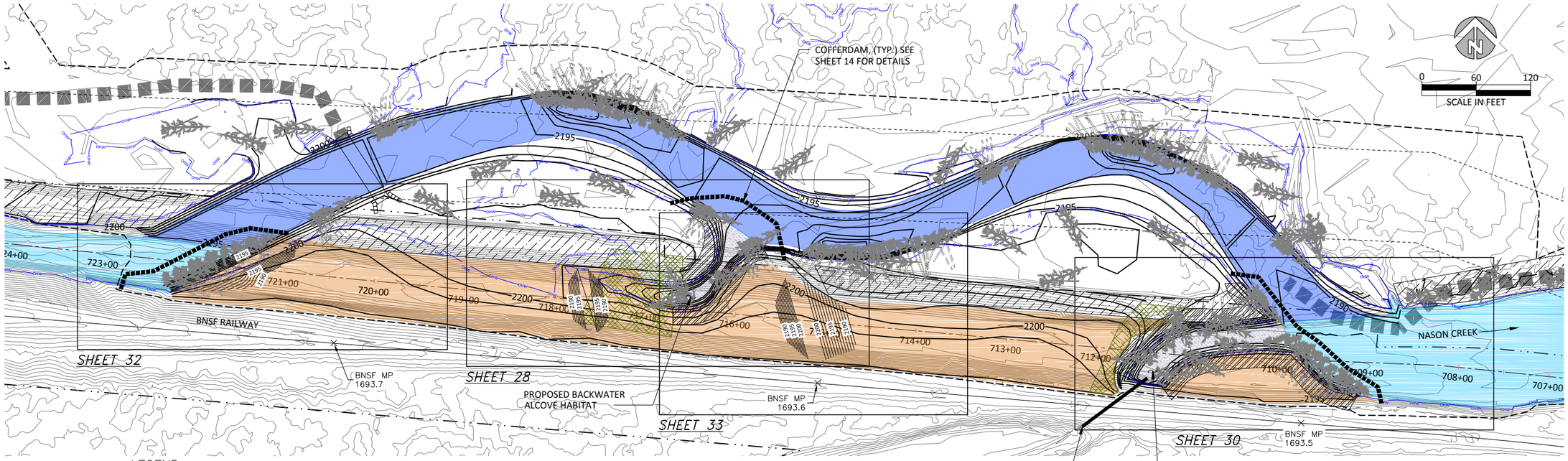
CAD FILENAME USBR_Nason_UWP_D.dwg



PLAN

LEGEND

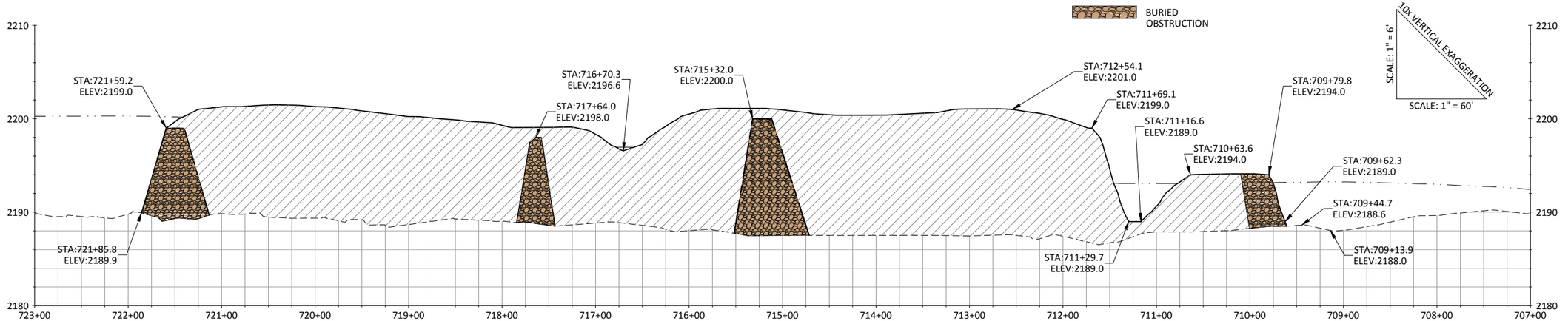
EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- 711+00 EXISTING ALIGNMENT, STATION
- EXISTING CONTOURS (5-FT INTERVAL)
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- EXISTING EQUALIZATION CULVERT UNDER RAILROAD
- CENTERLINE OF BNSF TRACKS

PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- PROPOSED CONTOURS (1-FT INTERVAL)
- TEMPORARY ACCESS ROAD
- TEMPORARY COFFERDAM, SEE SHEET 14
- LIMITS OF DISTURBANCE
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
- NEW BACKWATER ALCOVE
- AREA OF ENHANCED FLOODPLAIN ROUGHNESS AND SLASH
- COIR FABRIC OVERLAY
- FABRIC ENCAPSULATED SOIL LIFTS
- LARGE WOODY MATERIAL
- LEVEE TO BE REMOVED

Preliminary 90%



PROFILE – PROPOSED FILL IN EXISTING CHANNEL

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STREAM HABITAT ENHANCEMENT
PROPOSED CHANNEL FILL OVERVIEW AND PROFILE

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PROPOSED CHANNEL FILL OVERVIEW AND PROFILE

23

SHEET 23 OF 55

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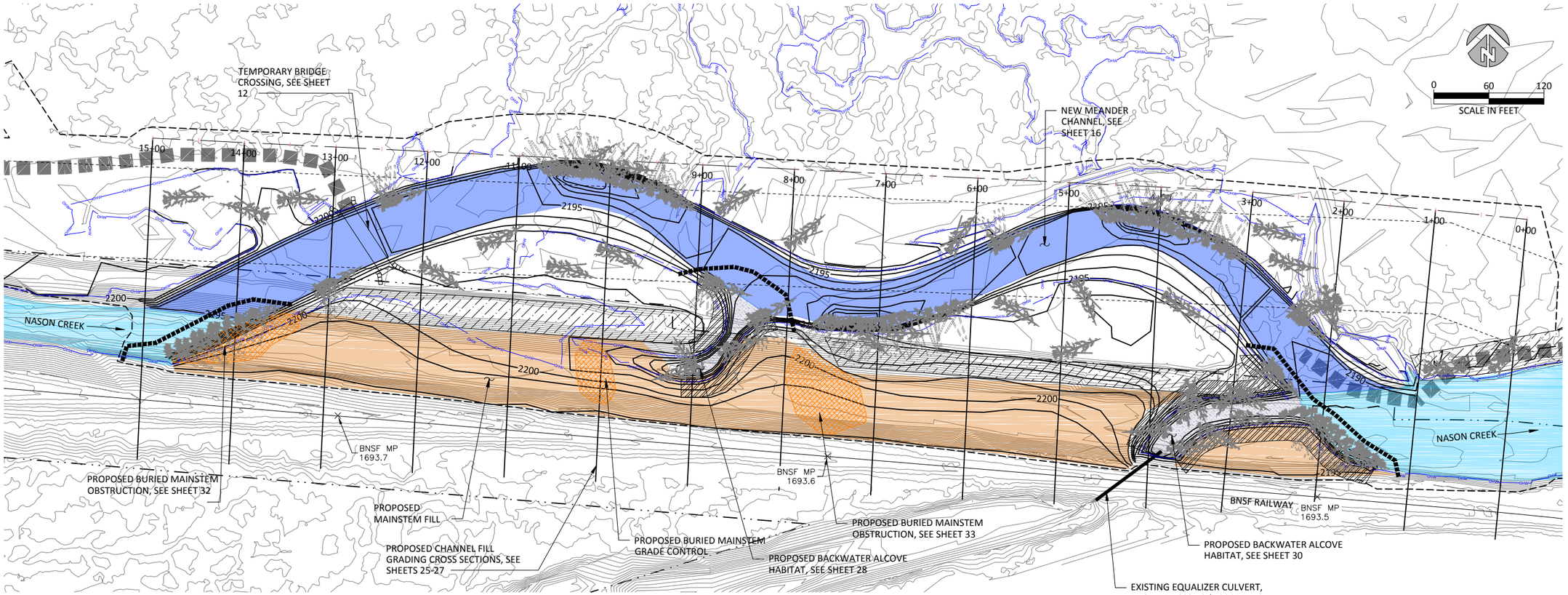
CAD FILENAME USBR_Nason_UWP_D.dwg



PLAN

LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- RM 13.4 — RIVER MILE MARKER
- 100 — SURVEY CONTROL POINT
- EXISTING CONTOURS (5-FT INTERVAL)
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- EXISTING EQUALIZATION CULVERT UNDER RAILROAD
- CENTERLINE OF BNSF TRACKS

PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- 711+00 — BASELINE ALIGNMENT, STATION
- TEMPORARY ACCESS ROAD
- COFFERDAM
- LIMITS OF DISTURBANCE
- CONSTRUCTED BURIED MAINSTEM CHANNEL OBSTRUCTION
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
- NEW BACKWATER ALCOVE
- FABRIC ENCAPSULATED SOIL LIFTS
- LARGE WOODY MATERIAL
- LEVEE TO BE REMOVED

NOTE: SEE SHEETS 25-27 FOR PROPOSED CHANNEL FILL GRADING CROSS SECTIONS.

PROPOSED MAINSTEM CHANNEL FILL:

FILL MATERIAL SHALL BE PLACED ±3% OF OPTIMUM MOISTURE CONTENT IN 12 IN. LIFTS AND COMPACTED TO 90% STANDARD PROCTOR.

TOP 6 IN. OF FILL NOT COMPACTED TO ENCOURAGE PLANT GROWTH.

SURFACE OF MAINSTEM FILL SHALL BE SEEDED AND MULCHED AND PLANTED PER SHEET 52.

FILL MATERIAL WILL BE PLACED NO CLOSER THAN 13 FEET TO TRACK CENTERLINE

Preliminary 90%

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PROPOSED CHANNEL FILL GRADING PLAN

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PROPOSED CHANNEL FILL GRADING PLAN

24

SHEET 24 OF 55

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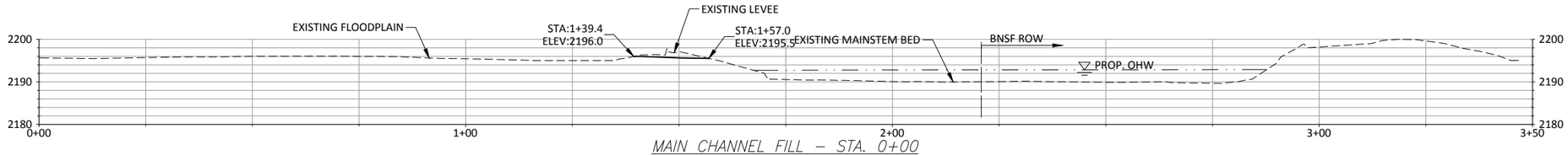
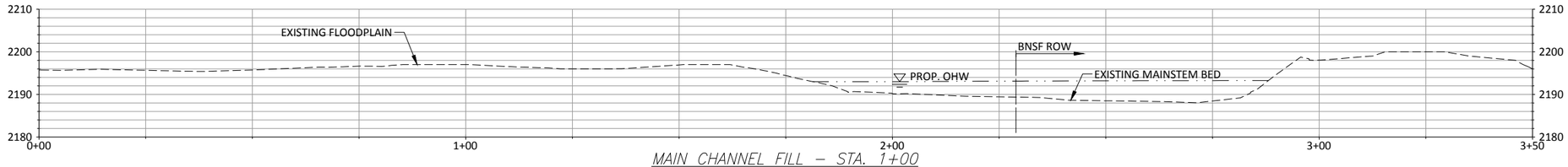
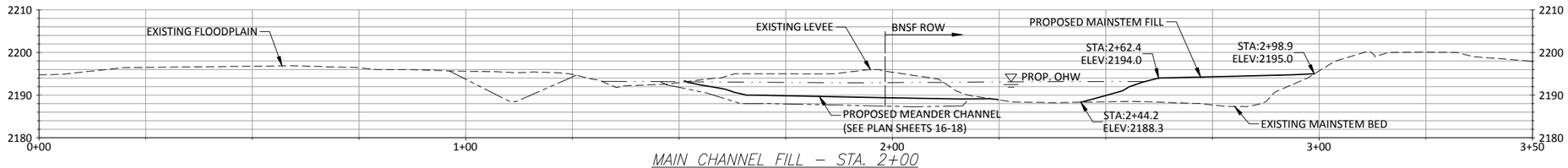
CAD FILENAME USBR_Nason_UWP_D.dwg



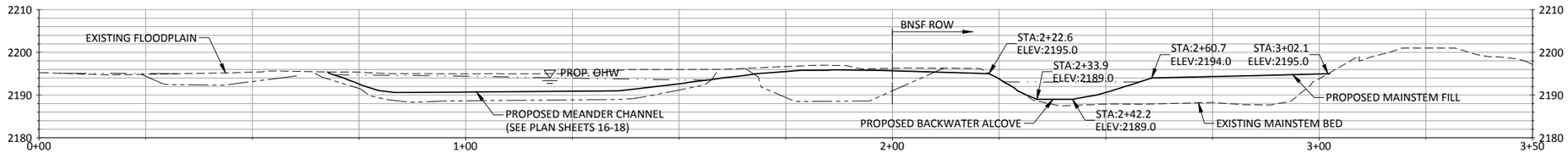
MAIN CHANNEL FILL – STA. 0+00



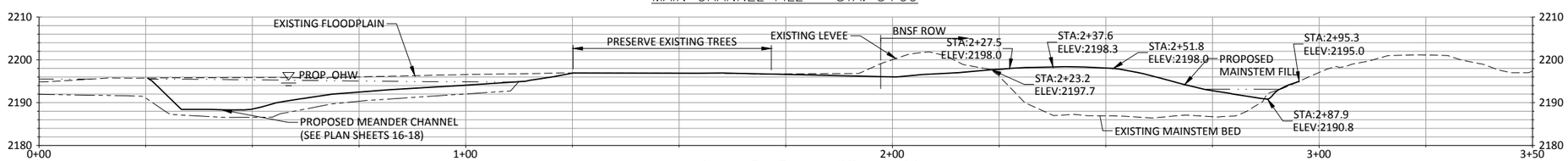
MAIN CHANNEL FILL – STA. 1+00



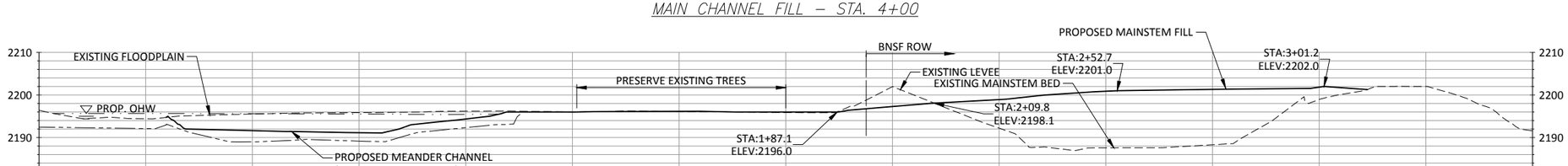
MAIN CHANNEL FILL – STA. 2+00



MAIN CHANNEL FILL – STA. 3+00



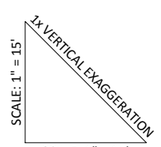
MAIN CHANNEL FILL – STA. 4+00



MAIN CHANNEL FILL – STA. 5+00

LEGEND

EXISTING GRADE
PROPOSED GRADE
SUBGRADE LIMIT
PROPOSED OHW



NOTE: VIEW ORIENTATION IS LEFT TO RIGHT, LOOKING DOWNSTREAM.

Preliminary 90%

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PROPOSED CHANNEL FILL GRADING CROSS SECTIONS

25

SHEET 25 OF 55

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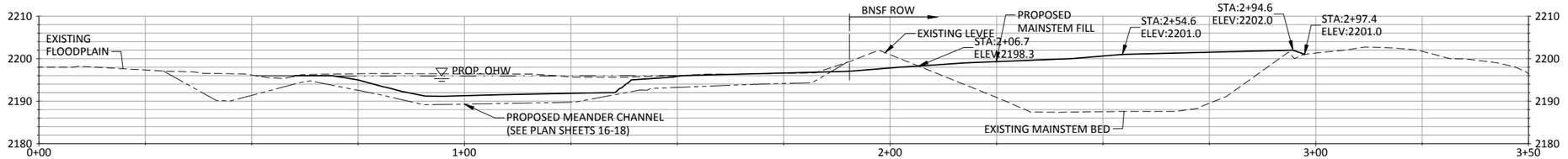
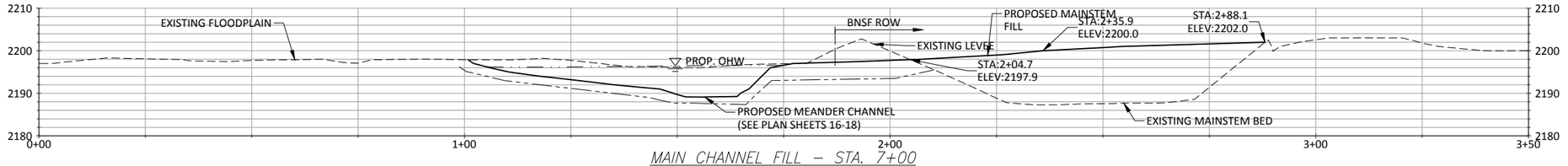
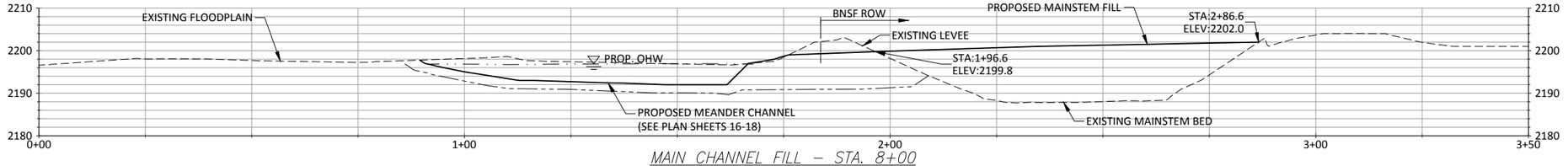
CAD FILENAME
USBR_Nason_UWP_1b.dwg



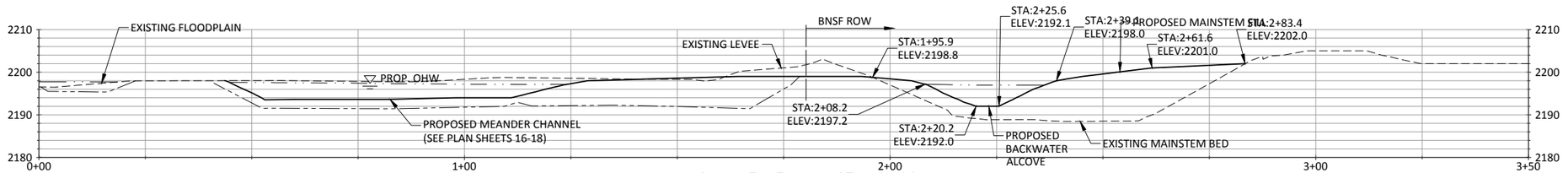
MAIN CHANNEL FILL – STA. 6+00



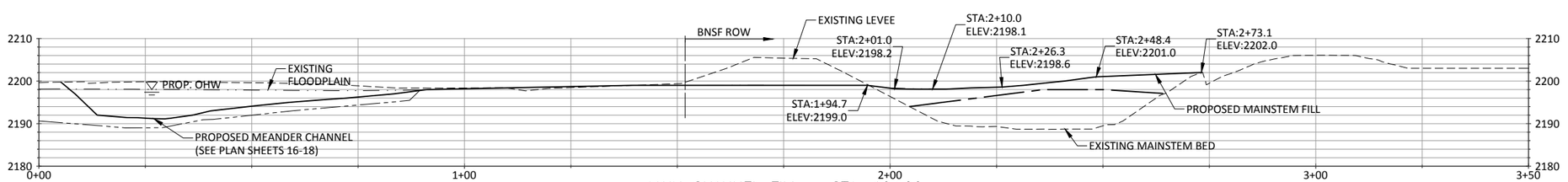
MAIN CHANNEL FILL – STA. 7+00



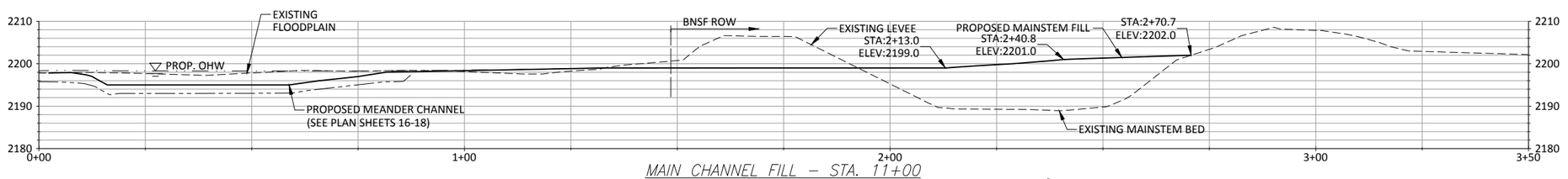
MAIN CHANNEL FILL – STA. 8+00



MAIN CHANNEL FILL – STA. 9+00



MAIN CHANNEL FILL – STA. 10+00



MAIN CHANNEL FILL – STA. 11+00

LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- SUBGRADE LIMIT PROPOSED OHW

SCALE: 1" = 15'
1x VERTICAL EXAGGERATION
SCALE: 1" = 15'

NOTE: VIEW ORIENTATION IS LEFT TO RIGHT, LOOKING DOWNSTREAM.

Preliminary 90%

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NASON CREEK – UWP SUBREACH 2

STREAM HABITAT ENHANCEMENT

PROPOSED CHANNEL FILL GRADING CROSS SECTIONS

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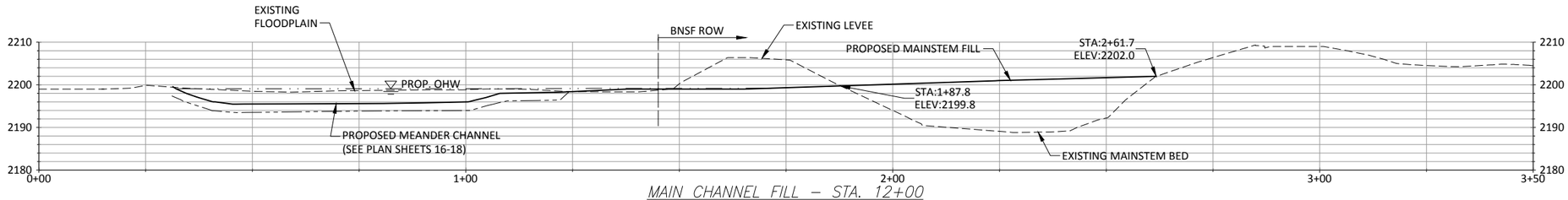
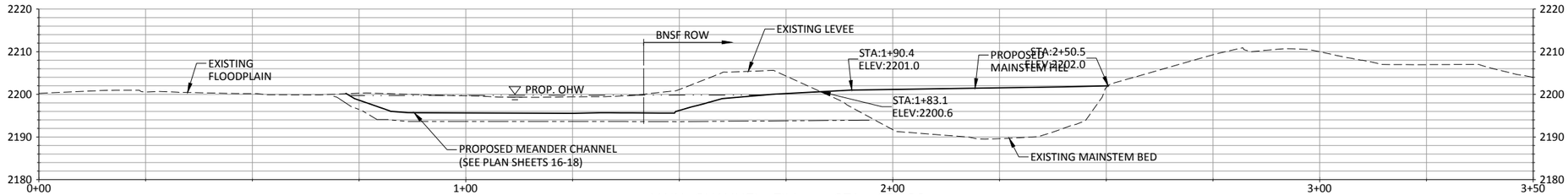
PROPOSED CHANNEL FILL GRADING CROSS SECTIONS

26

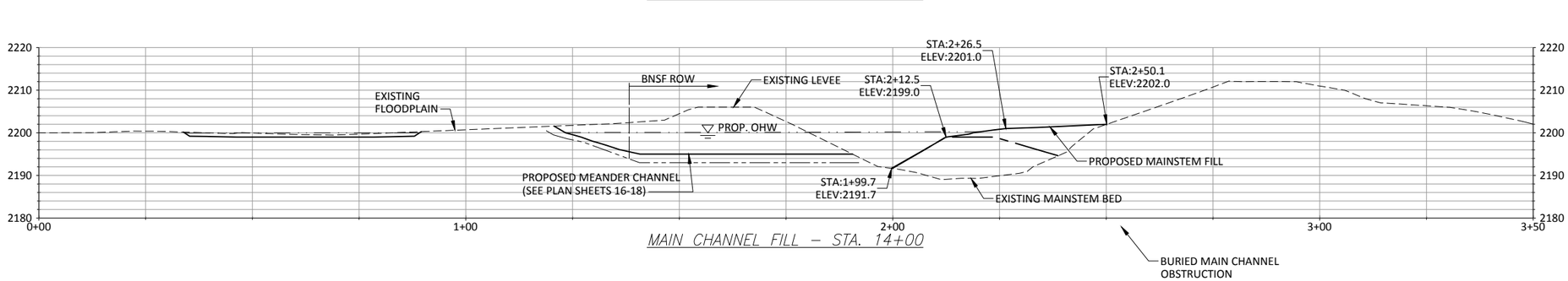
SHEET 26 OF 55



MAIN CHANNEL FILL – STA. 12+00

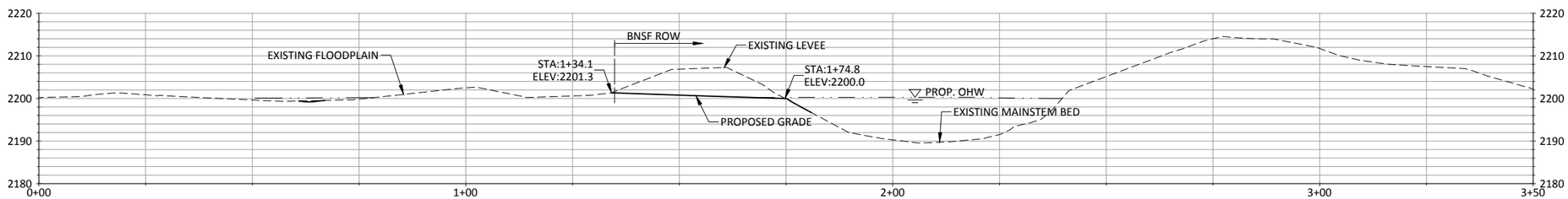


MAIN CHANNEL FILL – STA. 13+00



MAIN CHANNEL FILL – STA. 14+00

BURIED MAIN CHANNEL OBSTRUCTION



MAIN CHANNEL FILL – STA. 15+00

LEGEND

- EXISTING GRADE
- PROPOSED GRADE
- SUBGRADE LIMIT
- PROPOSED OHW
- STREAMBED MATERIAL (GRADATION A)
- FILL

SCALE: 1" = 15'
1x VERTICAL EXAGGERATION
SCALE: 1" = 15'

NOTE: VIEW ORIENTATION IS LEFT TO RIGHT, LOOKING DOWNSTREAM.

Preliminary 90%

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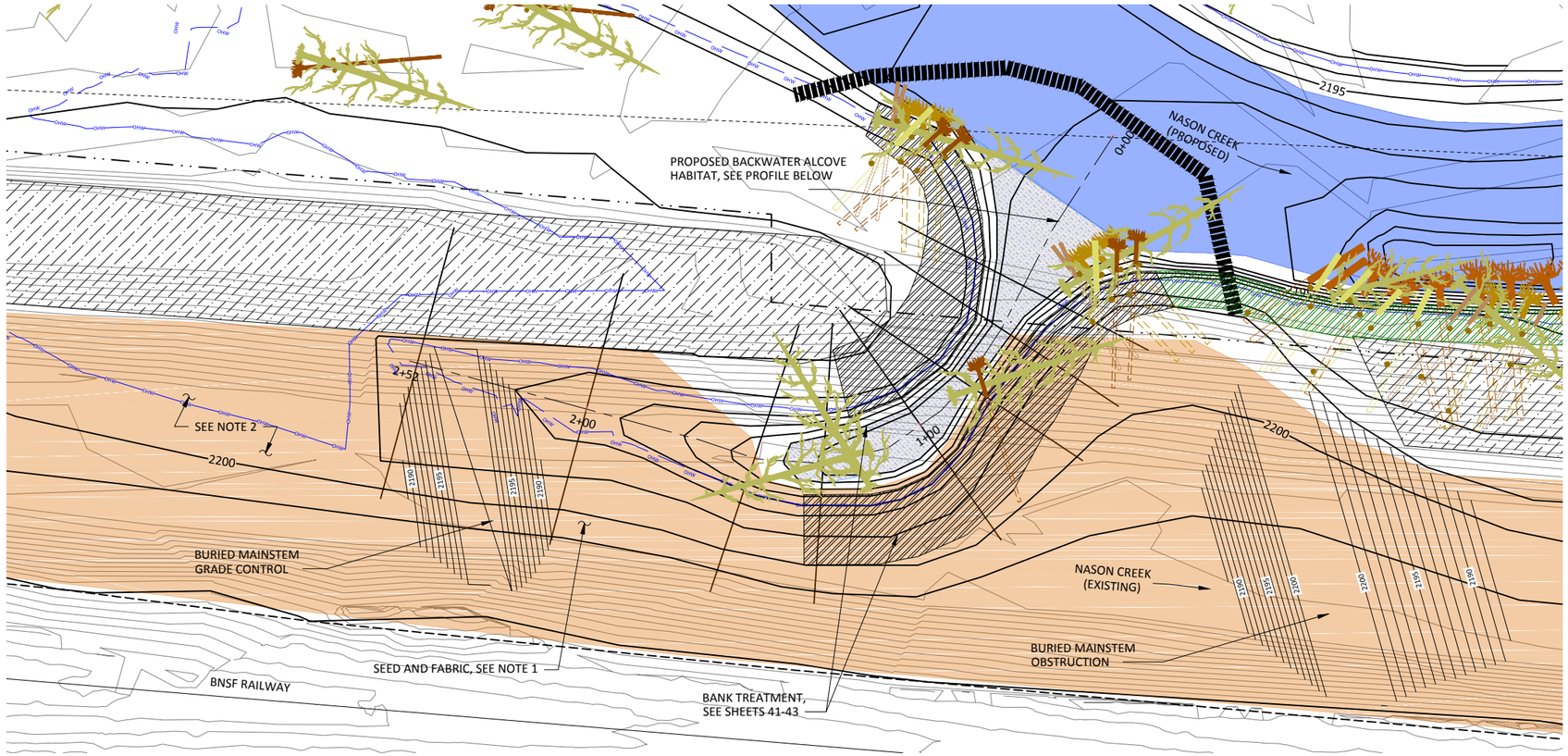
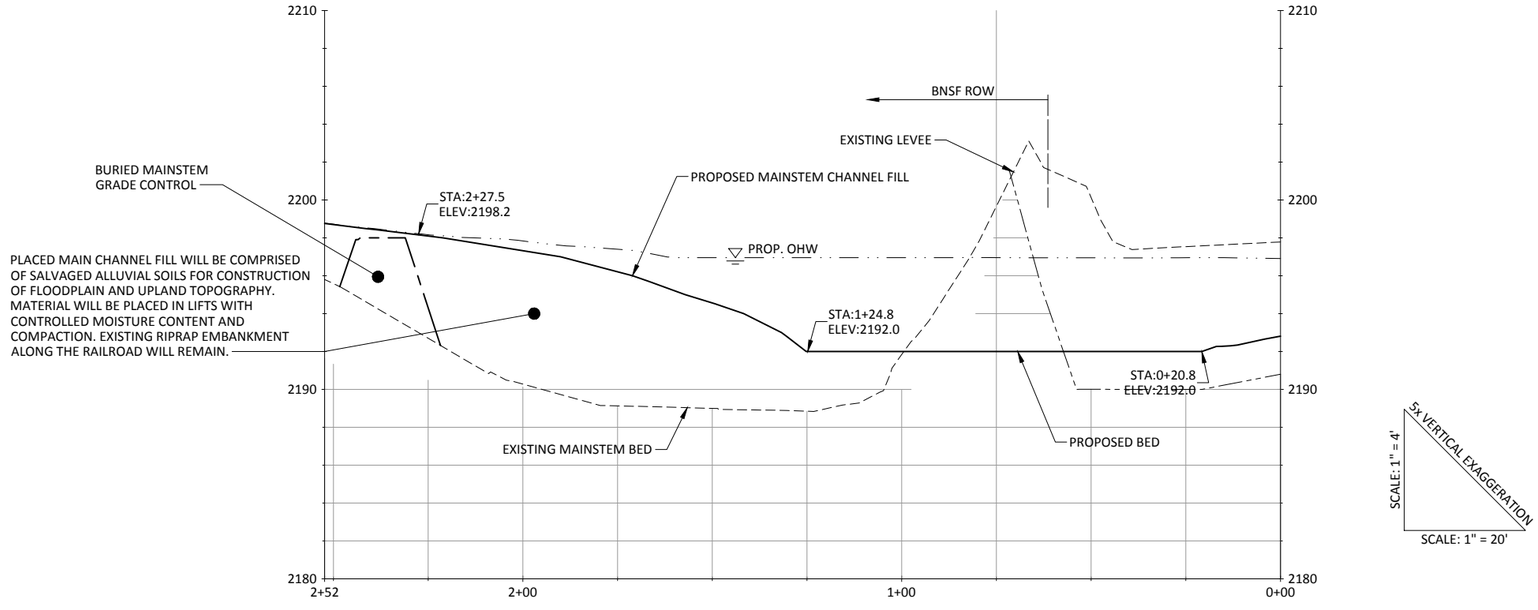
PROPOSED CHANNEL FILL GRADING CROSS SECTIONS

27

SHEET 27 OF 55



PLAN



PROFILE – PROPOSED BACKWATER ALCOVE HABITAT

5x VERTICAL EXAGGERATION
SCALE: 1" = 4'
SCALE: 1" = 20'

0 20 40
SCALE IN FEET

LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- EXISTING CONTOURS (1-FT INTERVAL)
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- CENTERLINE OF EXISTING TRACKS

PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- PROPOSED ALIGNMENT, STATION (711+00)
- CROSS SECTION LINE AND LABEL (REFERENCES PROPOSED ALIGNMENT STATION), STA:711+00.0, SEE SHEET 29
- PROPOSED CONTOURS (1-FT INTERVAL)
- TEMPORARY ACCESS ROAD
- LIMITS OF DISTURBANCE
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
- NEW BACKWATER ALCOVE
- FES LIFT BANK TREATMENT
- LARGE WOODY MATERIAL
- COFFERDAM
- LEVEE TO BE REMOVED

NOTES:

1. SEED AND FABRIC ON FINISH GRADE. NORTH AMERICAN GREEN C125BN OR APPROVED EQUAL ON SOIL, OVERLAID WITH 900 WEIGHT G/SQ. M WOVEN COIR OR APPROVED EQUAL, STAKE PER MANUFACTURER RECOMMENDATIONS.
2. ALL SURFACES OF MAINSTEM FILL SHALL BE SEEDED AND MULCHED.
3. SEE SHEET 29 FOR GRADING CROSS SECTIONS.

Preliminary 90%

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NASON CREEK – UWP SUBREACH 2

STREAM HABITAT ENHANCEMENT

PROPOSED BACKWATER ALCOVE PLAN AND PROFILE

501 Portway Avenue
Hood River, OR 97031
541.386.9003
www.interfluve.com

REV NO

GJ,DM,JG
DESIGNED
RP
DRAWN
DM,GJ,JG
CHECKED

6/7/16

PROPOSED BACKWATER ALCOVE PLAN AND PROFILE

28

SHEET 28 OF 55

DATE AND TIME PLOTTED
6/7/2016 12:38 PM
PLOTTED BY
RICH

CAD SYSTEM
AutoCAD Rel. 20.1S (LMS TECH)
CAD FILENAME
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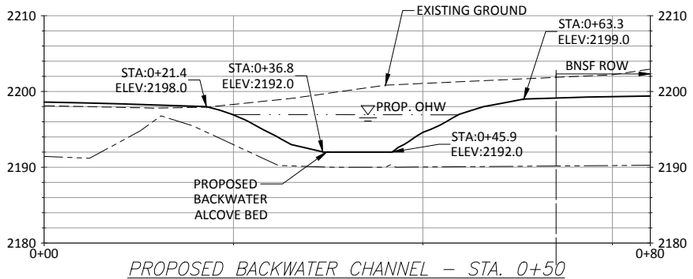
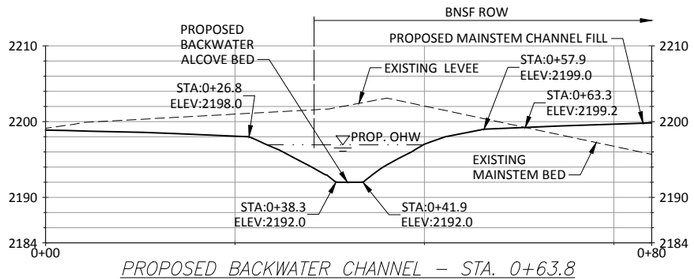
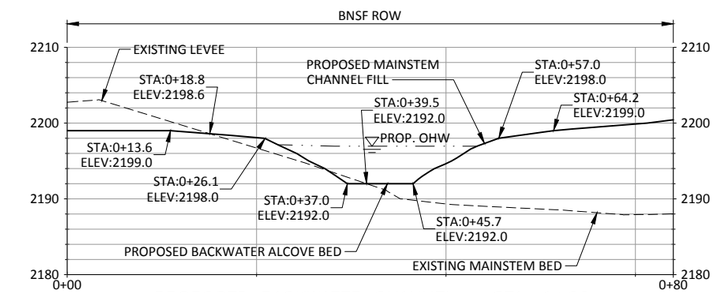


PROPOSED BACKWATER CHANNEL – STA. 0+50



PROPOSED BACKWATER CHANNEL – STA. 0+63.8

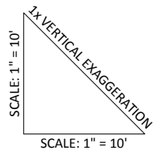
PROPOSED BACKWATER CHANNEL – STA. 0+82.4

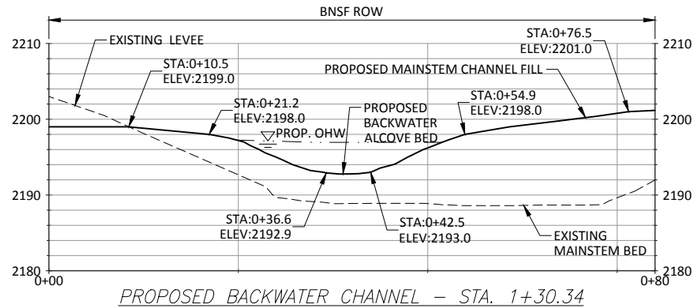


PROPOSED BACKWATER CHANNEL – STA. 1+00

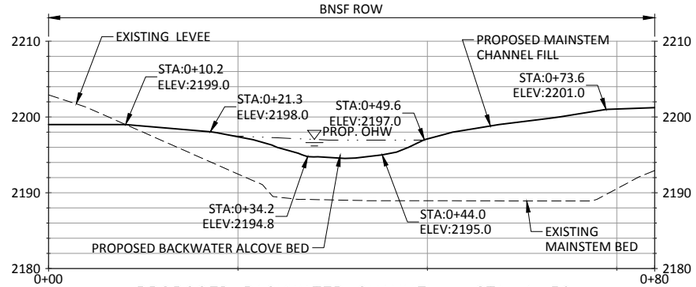
NOTES

1. VIEW ORIENTATION IS LEFT TO RIGHT, LOOKING DOWNSTREAM.
2. PLACED MAIN CHANNEL FILL WILL BE COMPRISED OF SALVAGED ALLUVIAL SOILS FOR CONSTRUCTION OF FLOODPLAIN AND UPLAND TOPOGRAPHY. MATERIAL WILL BE PLACED IN LIFTS WITH CONTROLLED MOISTURE CONTENT AND COMPACTION. EXISTING RIPRAP EMBANKMENT ALONG THE RAILROAD WILL REMAIN.



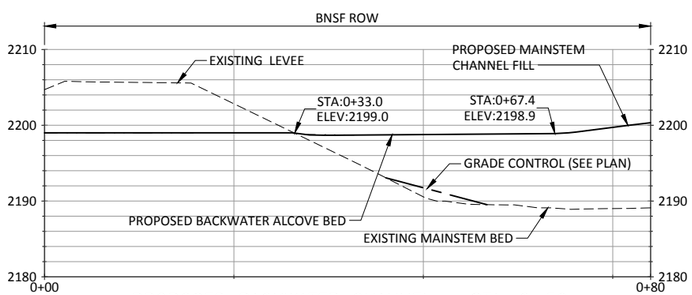


PROPOSED BACKWATER CHANNEL – STA. 1+30.34



PROPOSED BACKWATER CHANNEL – STA. 1+50

PROPOSED BACKWATER CHANNEL – STA. 2+00



PROPOSED BACKWATER CHANNEL – STA. 2+50

LEGEND

EXISTING GRADE — PROPOSED GRADE — SUBGRADE LIMIT — PROPOSED OHW

Preliminary 90%

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PROPOSED BACKWATER ALCOVE GRADING CROSS SECTIONS

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RP
DRAWN
DM GL JG
CHECKED

6/7/16

PROPOSED BACKWATER ALCOVE GRADING CROSS SECTIONS

29

SHEET 29 OF 55

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AutoCAD Rel. 20.1S (LMS TECH)
CAD FILENAME
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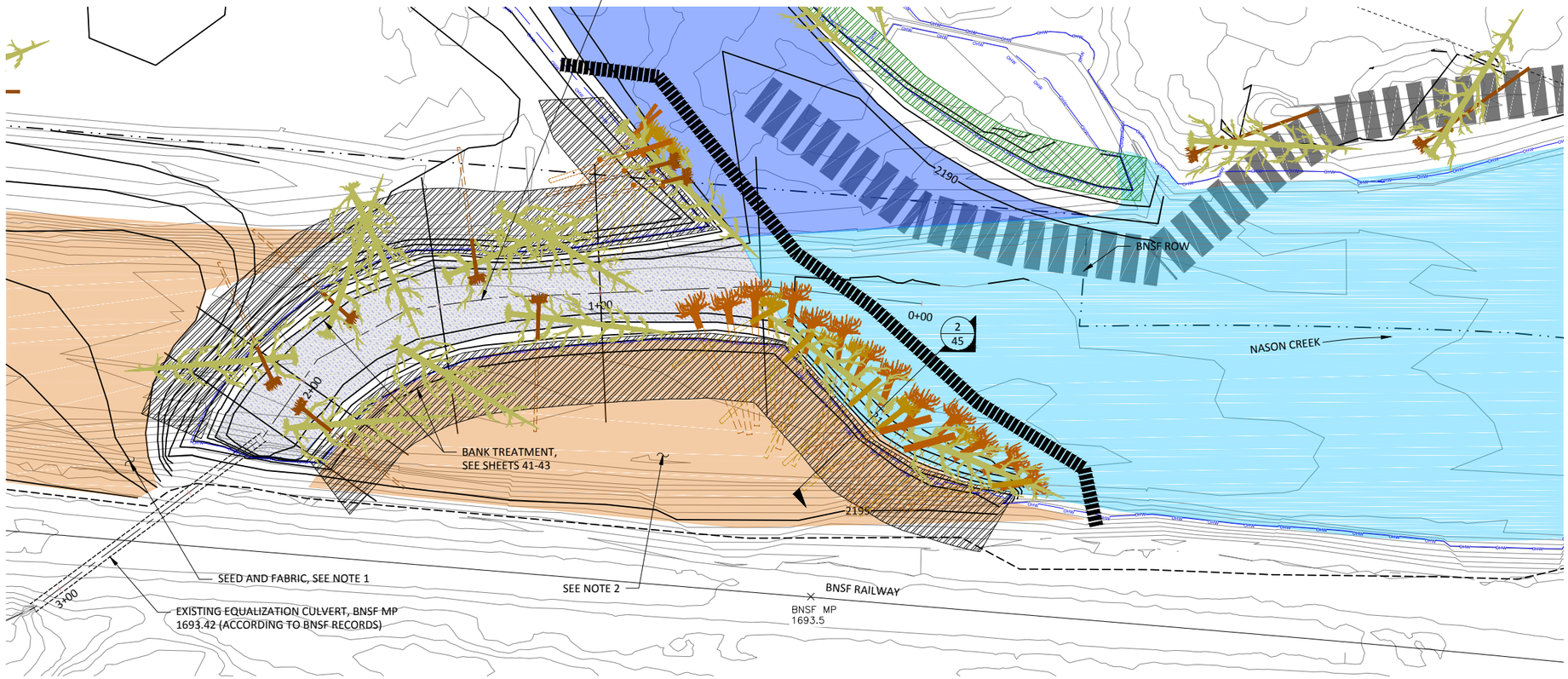
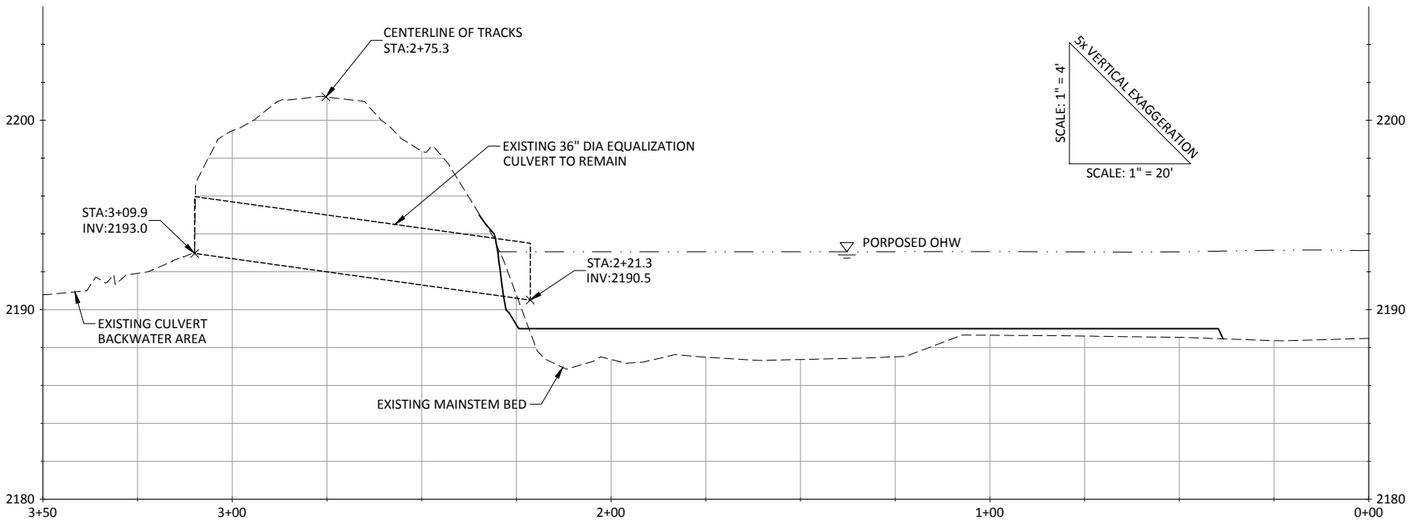


PLAN

SEE SHEET 31 FOR GRADING CROSS SECTIONS.



PROFILE – PROPOSED CULVERT RECONNECTION

0 20 40
SCALE IN FEET

LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- EXISTING CONTOURS (1-FT INTERVAL)
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- CENTERLINE OF BNSF TRACKS

PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- 711+00 PROPOSED ALIGNMENT, STATION
- STA:711+00.0 CROSS SECTION LINE AND LABEL (REFERENCES PROPOSED ALIGNMENT STATION), SEE SHEET 31
- PROPOSED CONTOURS (1-FT INTERVAL)
- TEMPORARY ACCESS ROAD
- LIMITS OF DISTURBANCE
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
- NEW BACKWATER ALCOVE
- FES LIFT BANK TREATMENT
- LARGE WOODY MATERIAL
- COFFERDAM

NOTES:

1. SEED AND FABRIC ON FINISH GRADE. NORTH AMERICAN GREEN C125BN OR APPROVED EQUAL ON SOIL, OVERLAID WITH 900 WEIGHT G/SQ. M WOVEN COIR OR APPROVED EQUAL, STAKE PER MANUFACTURER RECOMMENDATIONS.
2. ALL SURFACES OF MAINSTEM FILL SHALL BE SEEDED AND MULCHED.

Preliminary 90%

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STREAM HABITAT ENHANCEMENT

PROPOSED CULVERT RECONNECTION PLAN AND PROFILE

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REV NO

DESIGNED	GJ DM JG
DRAWN	RP
CHECKED	DM GJ JG

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PROPOSED CULVERT RECONNECTION PLAN AND PROFILE

30

SHEET 30 OF 55

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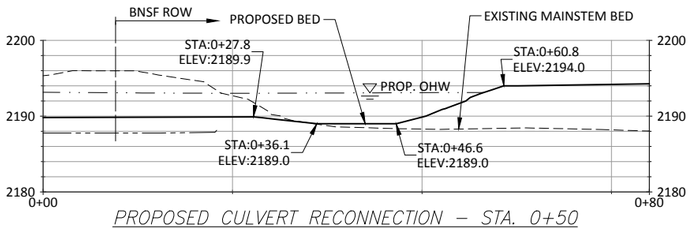
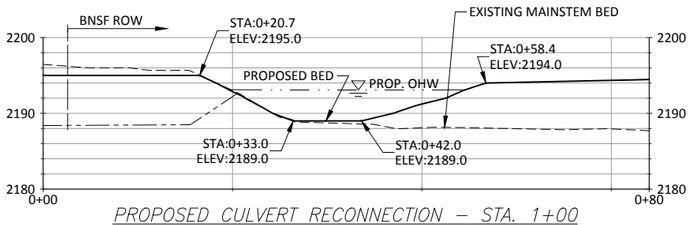
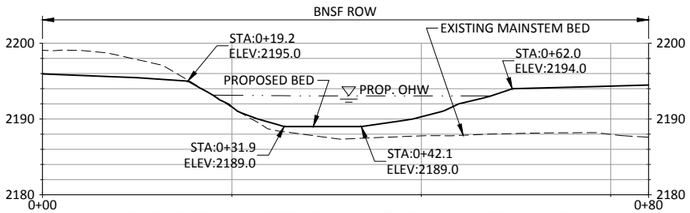


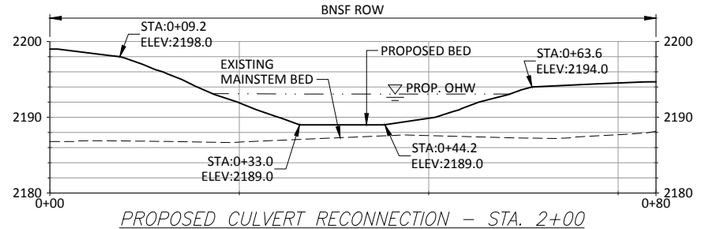
PROPOSED CULVERT RECONNECTION – STA. 0+50



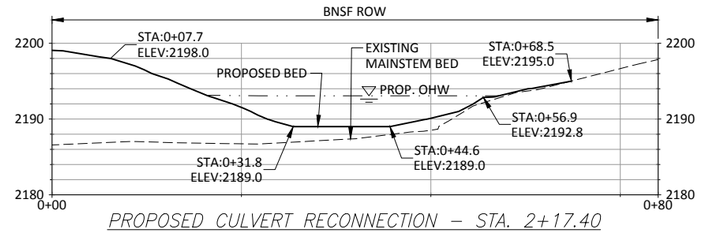
PROPOSED CULVERT RECONNECTION – STA. 1+00



PROPOSED CULVERT RECONNECTION – STA. 1+50



PROPOSED CULVERT RECONNECTION – STA. 2+00



PROPOSED CULVERT RECONNECTION – STA. 2+17.40

LEGEND

EXISTING GRADE

PROPOSED GRADE

SUBGRADE LIMIT

PROPOSED OHW

SCALE: 1" = 10'

1X VERTICAL EXAGGERATION

SCALE: 1" = 10'

NOTE: VIEW ORIENTATION IS LEFT TO RIGHT, LOOKING DOWNSTREAM.

Preliminary 90%

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PROPOSED CULVERT RECONNECTION GRADING CROSS SECTIONS

31

SHEET 31 OF 55

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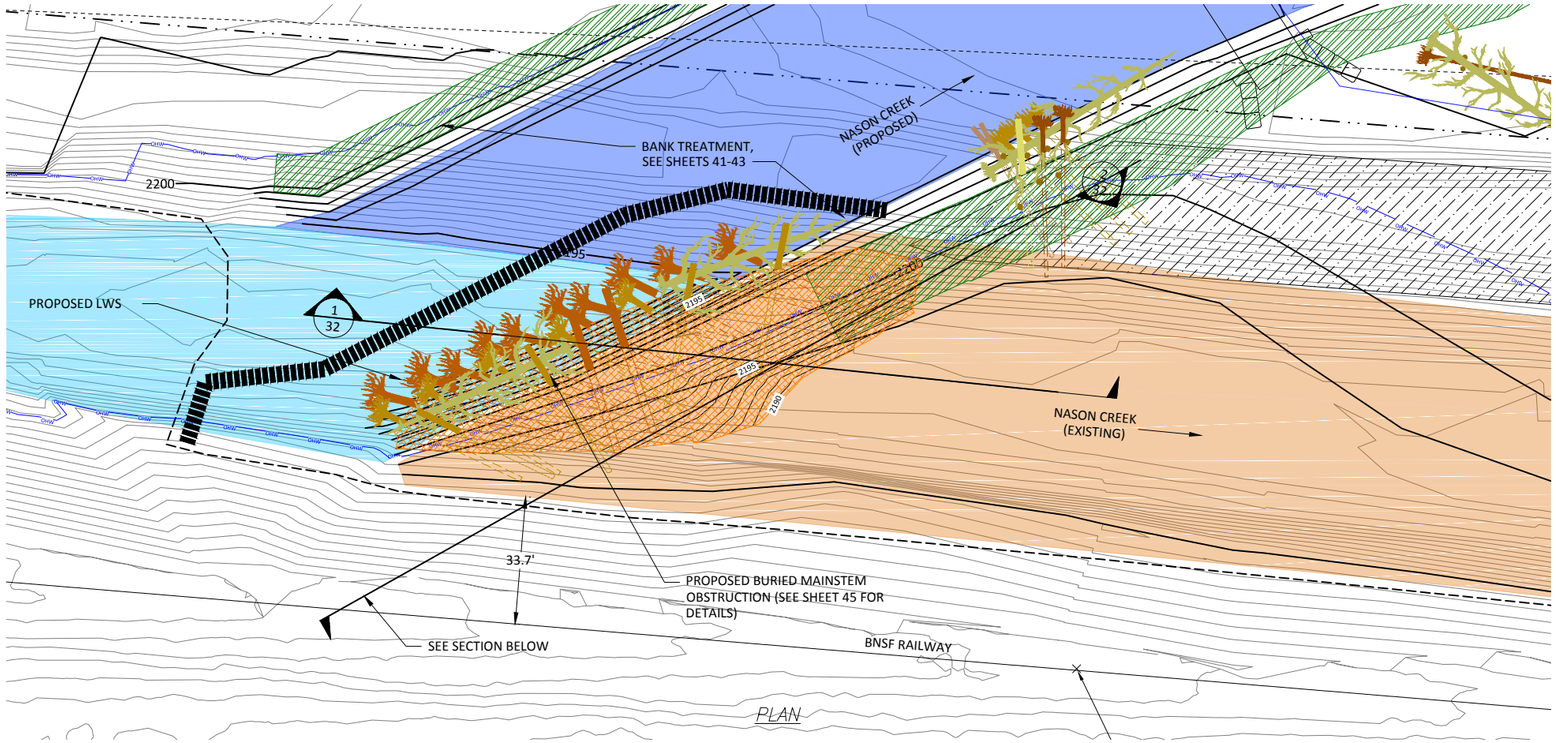
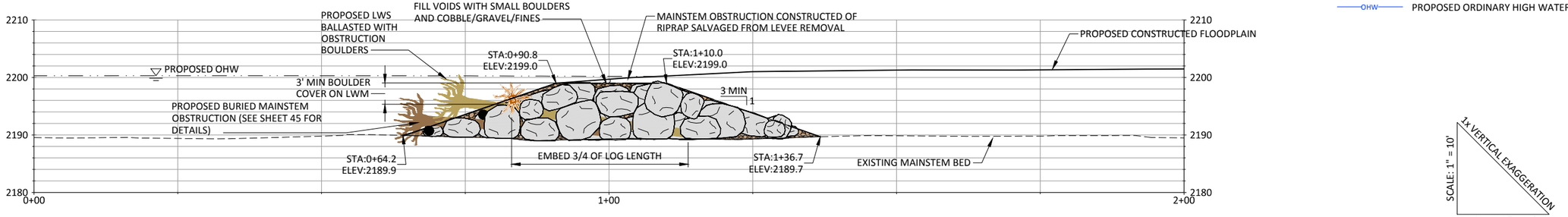
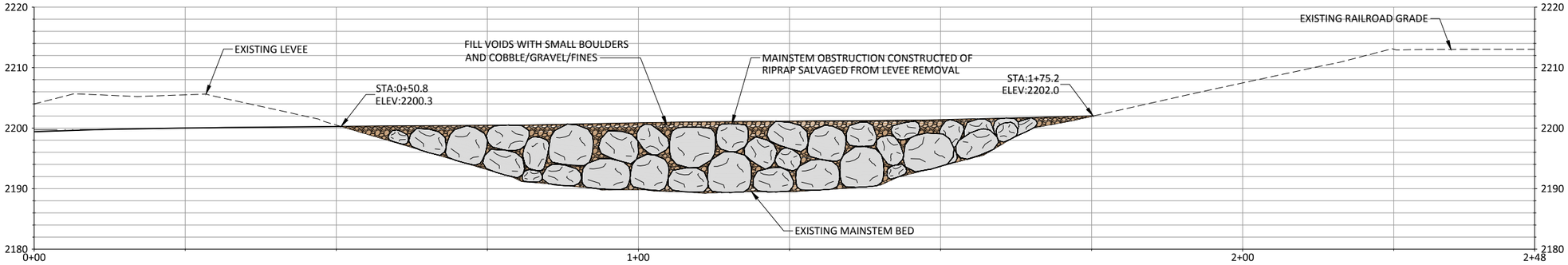


PLAN



1 / 32 PROFILE - UPSTREAM MAIN CHANNEL OBSTRUCTION



2 / 32 SECTION - UPSTREAM MAIN CHANNEL OBSTRUCTION

0 20 40
SCALE IN FEET

LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- EXISTING CONTOURS (1-FT INTERVAL)
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- CENTERLINE OF BNSF TRACKS

PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- PROPOSED ALIGNMENT, STATION (711+00)
- PROPOSED CONTOURS (1-FT INTERVAL)
- TEMPORARY ACCESS ROAD
- LIMITS OF DISTURBANCE
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
- FES LIFT BANK TREATMENT
- CONSTRUCTED MAINSTEM CHANNEL OBSTRUCTION
- LARGE WOODY MATERIAL
- PROPOSED ORDINARY HIGH WATER (OHW)

1x VERTICAL EXAGGERATION
SCALE: 1" = 10'
SCALE: 1" = 10'

Preliminary 90%

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PROPOSED UPSTREAM MAINSTEM OBSTRUCTION PLAN AND PROFILE

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PROPOSED UPSTREAM MAINSTEM OBSTRUCTION PLAN AND PROFILE

32

SHEET 32 OF 55

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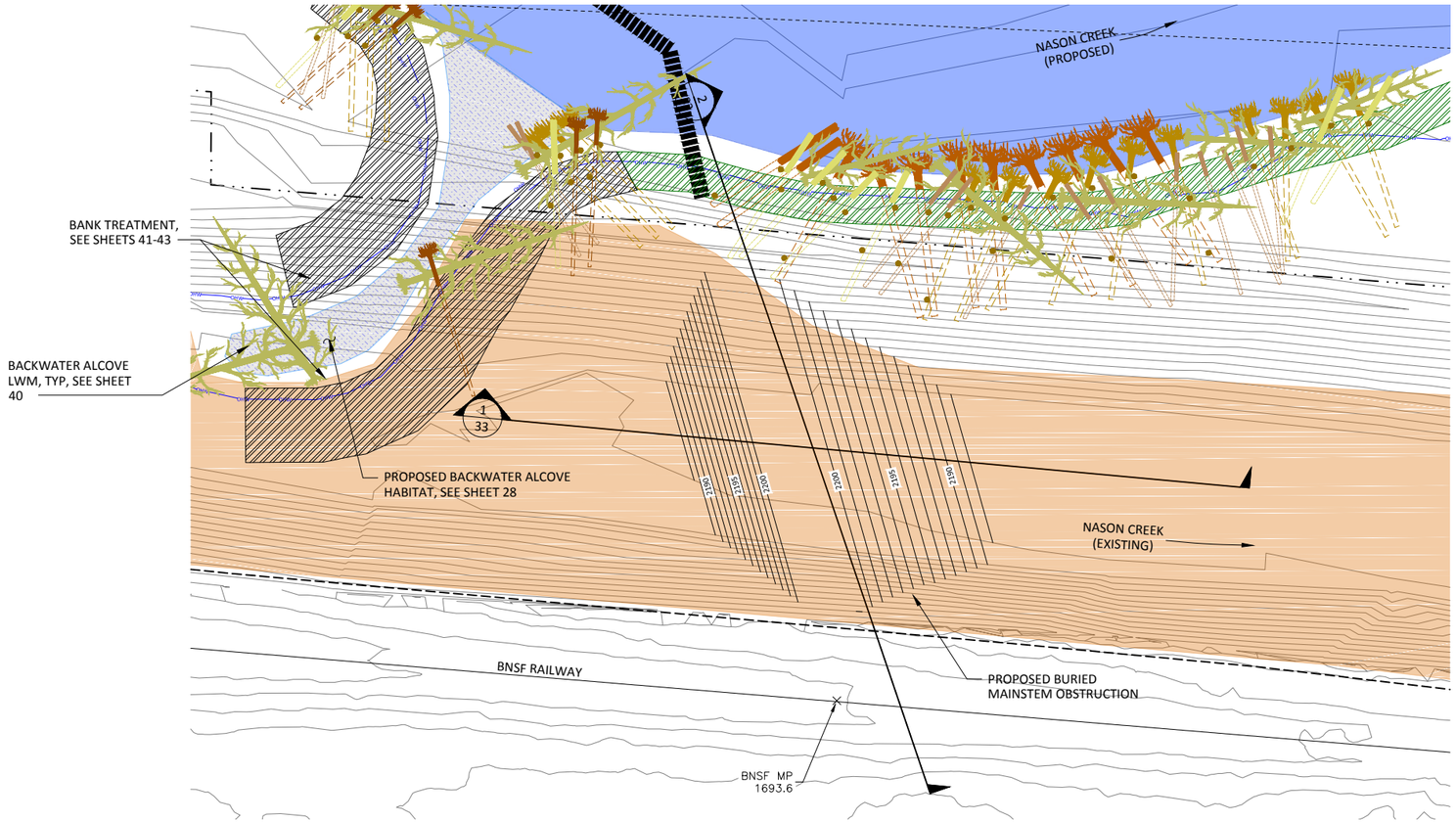
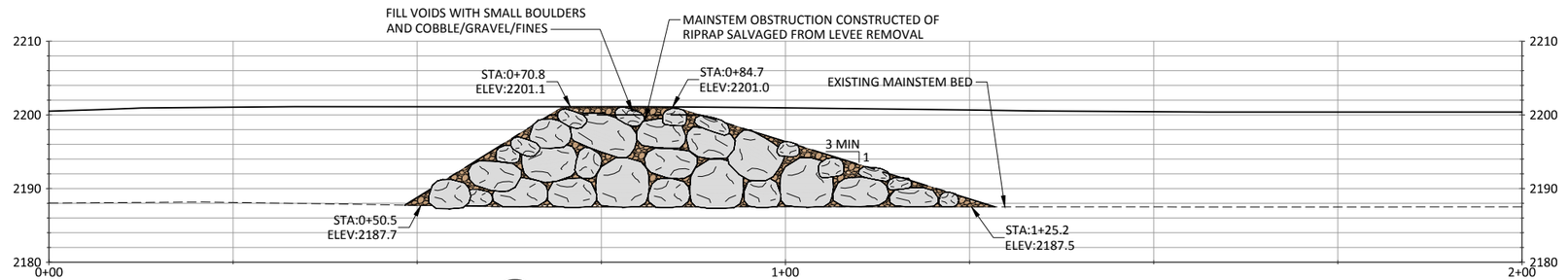
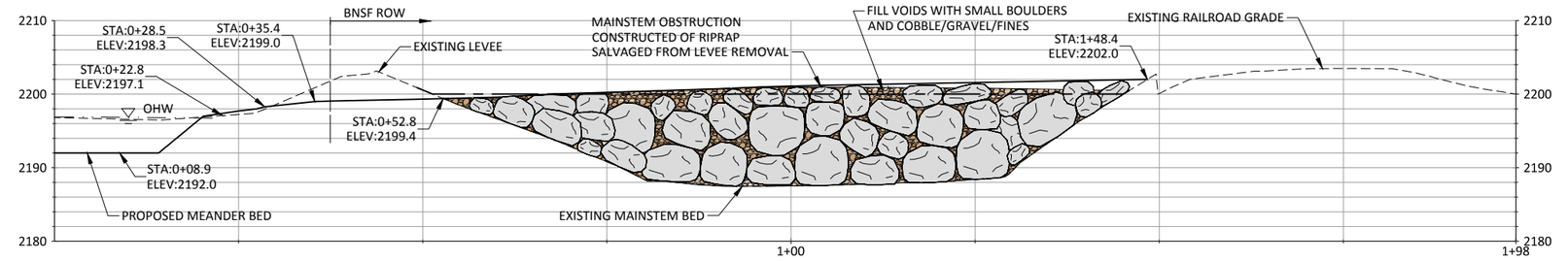


PLAN



1/33 PROFILE - DOWNSTREAM MAIN CHANNEL OBSTRUCTION



2/33 SECTION - DOWNSTREAM MAIN CHANNEL OBSTRUCTION

0 20 40
SCALE IN FEET

LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- EXISTING CONTOURS (1-FT INTERVAL)
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- CENTERLINE OF BNSF TRACKS

PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- 711+00 PROPOSED ALIGNMENT, STATION
- PROPOSED CONTOURS (1-FT INTERVAL)
- TEMPORARY ACCESS ROAD
- LIMITS OF DISTURBANCE
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
- NEW BACKWATER ALCOVE
- FES LIFT BANK TREATMENT
- CONSTRUCTED MAINSTEM CHANNEL OBSTRUCTION
- LARGE WOODY MATERIAL
- OHW PROPOSED ORDINARY HIGH WATER

PROFILE LEGEND

- EXCAVATION
- FILL

SCALE: 1" = 10'
1x VERTICAL EXAGGERATION
SCALE: 1" = 10'

Preliminary 90%

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DM,GJ,JG
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PROPOSED DOWNSTREAM MAINSTEM OBSTRUCTION PLAN AND PROFILE

33

SHEET 33 OF 55

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CAD SYSTEM
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CAD FILENAME
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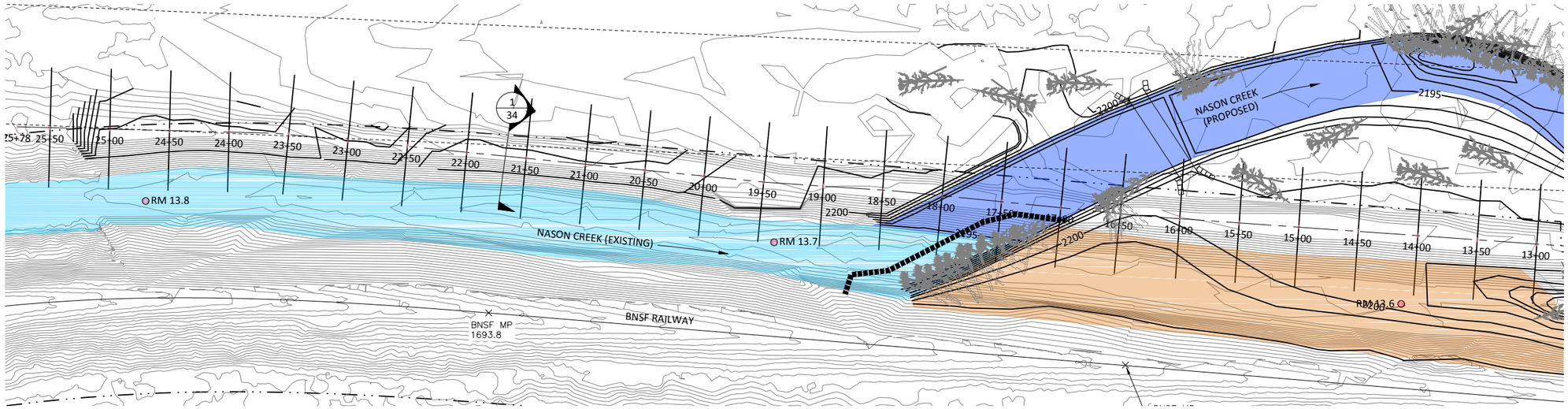
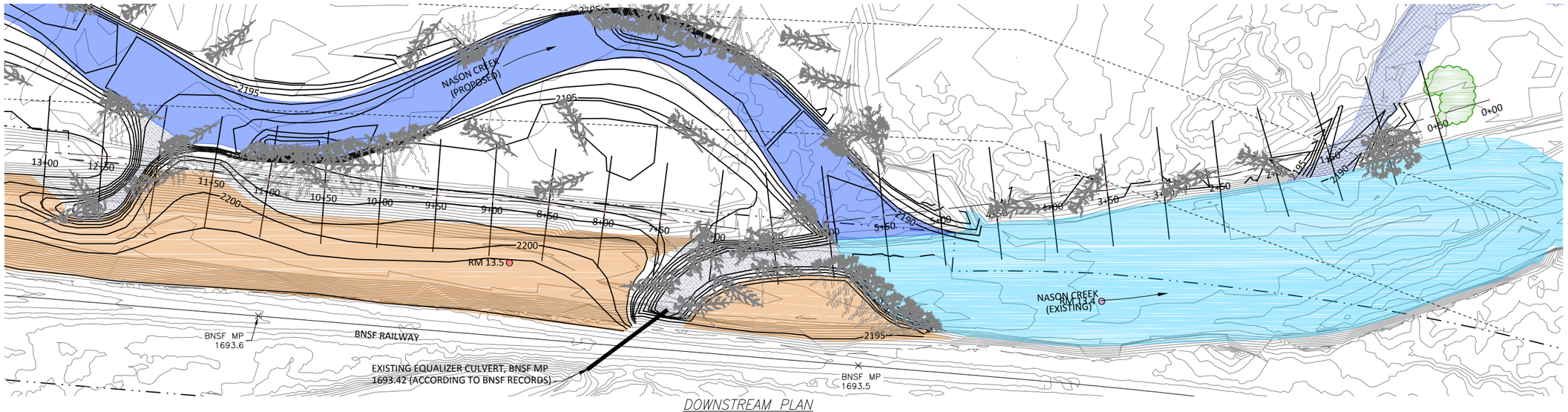


UPSTREAM PLAN



DOWNSTREAM PLAN

LEGEND

EXISTING FEATURES

- EXISTING MAINSTEM CHANNEL
- EXISTING CONTOURS (1-FT INTERVAL)
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- EXISTING EQUALIZATION CULVERT UNDER RAILROAD
- CENTERLINE OF BNSF TRACKS

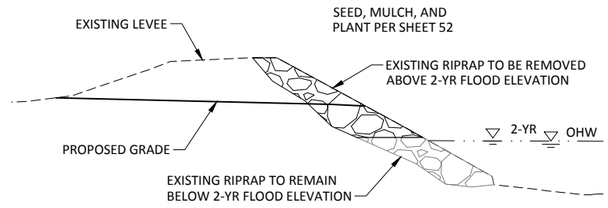
PROPOSED FEATURES

- CONSTRUCTED MAINSTEM CHANNEL MEANDER BEND
- WETLAND CREATION
- LEVEE CENTERLINE ALIGNMENT, STATION (19+00)
- CROSS SECTION LINE AND LABEL (REFERENCES PROPOSED ALIGNMENT STATION), SEE SHEETS 35-39 (STA:19+00.0)
- PROPOSED CONTOURS (1-FT INTERVAL)
- CONSTRUCTED FLOODPLAIN (FILLED EXISTING CHANNEL)
- NEW BACKWATER ALCOVE
- LARGE WOODY MATERIAL

NOTES:

SEE SHEETS 35-39 FOR GRADING CROSS SECTIONS.

LEVEE REMOVAL SURFACES SHALL BE SEEDED, MULCHED, AND REVEGETATED PER SHEET 52.



STA 18+50 TO STA 25+00

1/34 TYPICAL SECTION - UPSTREAM LEVEE RIPRAP REMOVAL

NOT TO SCALE

Preliminary 90%

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PROPOSED LEVEE REMOVAL PLAN

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RP
DRAWN
DM, GJ, JG
CHECKED

6/7/16

PROPOSED LEVEE REMOVAL PLAN

34

SHEET 34 OF 55

DATE AND TIME PLOTTED
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RICH

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CAD FILENAME
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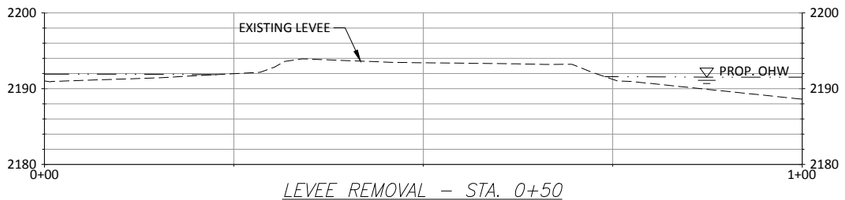
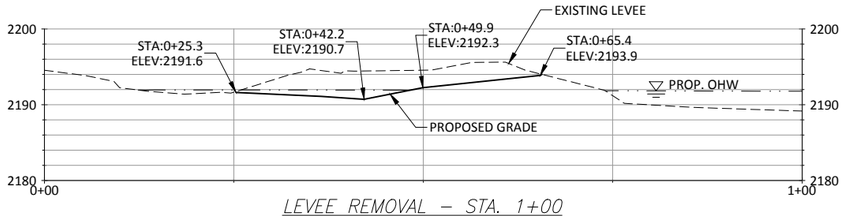
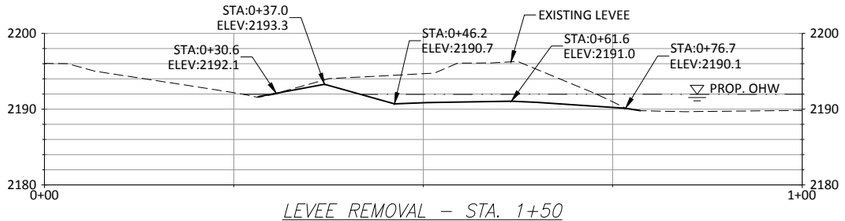


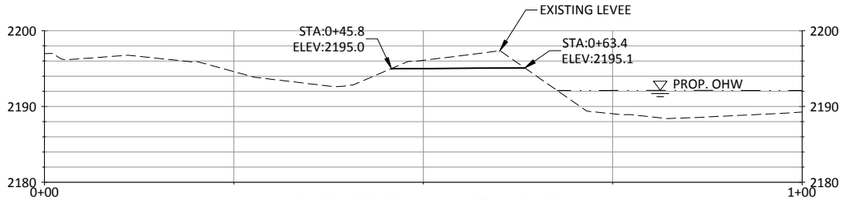
LEVEE REMOVAL – STA. 0+50



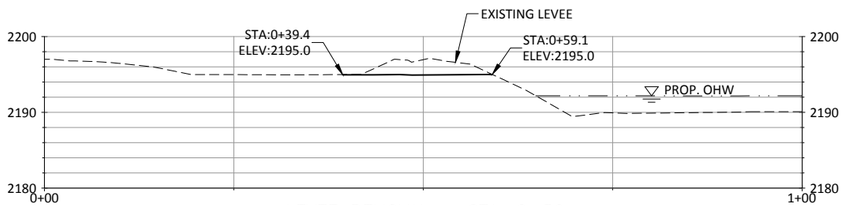
LEVEE REMOVAL – STA. 1+00



LEVEE REMOVAL – STA. 1+50



LEVEE REMOVAL – STA. 2+00



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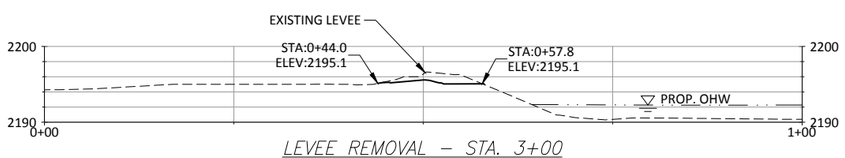
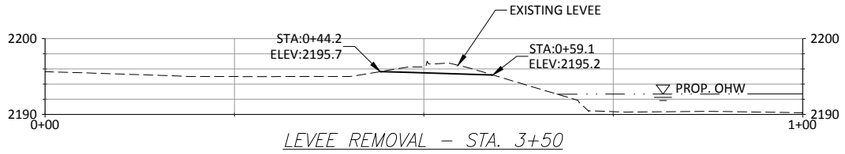
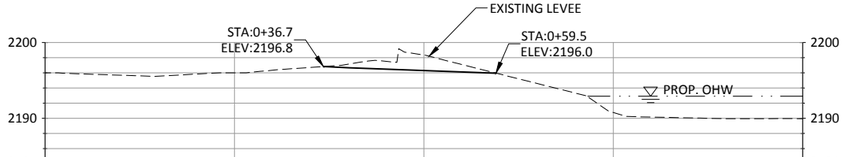


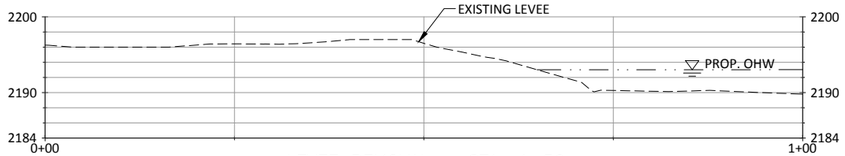
LEVEE REMOVAL – STA. 3+00



LEVEE REMOVAL – STA. 3+50



LEVEE REMOVAL – STA. 4+00



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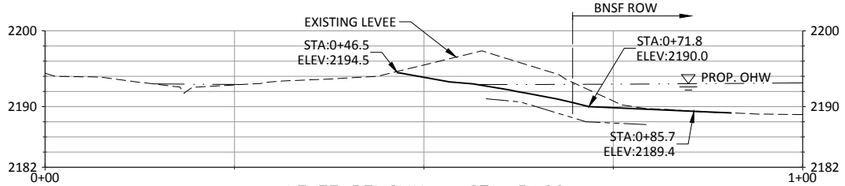
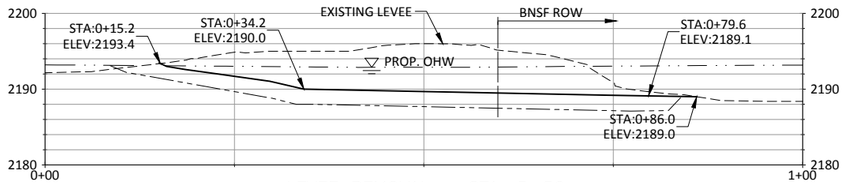
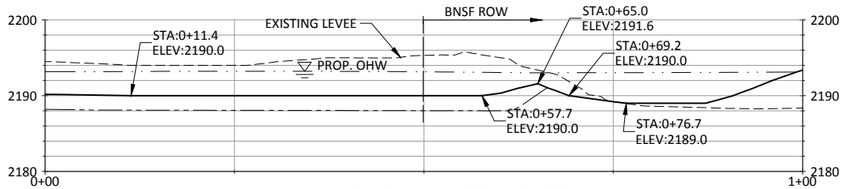


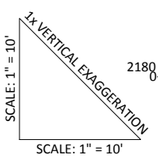
LEVEE REMOVAL – STA. 5+00



LEVEE REMOVAL – STA. 5+50



LEVEE REMOVAL – STA. 6+00



LEGEND

EXISTING GRADE

PROPOSED GRADE

SUBGRADE LIMIT

PROPOSED OHW

Preliminary 90%

NOTES:

VIEW ORIENTATION IS LEFT TO RIGHT, LOOKING DOWNSTREAM.

LEVEE BASELINE ALIGNMENT IS AT STA 0+50, TYP EACH SECTION.

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PROPOSED LEVEE REMOVAL GRADING CROSS SECTIONS

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SHEET 35 OF 55

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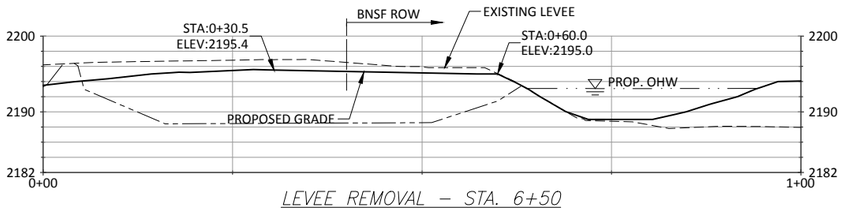

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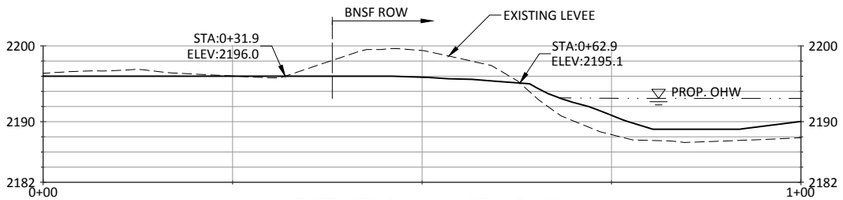
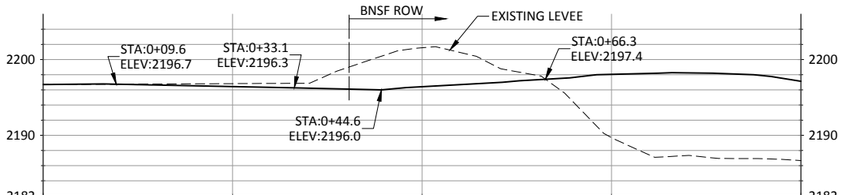
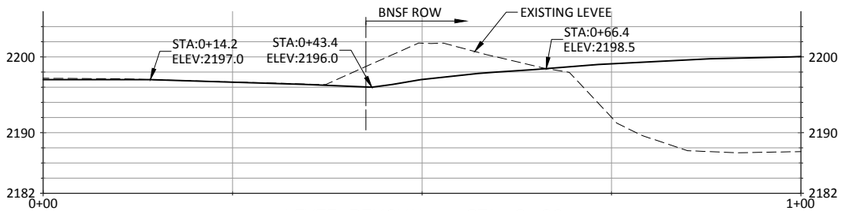


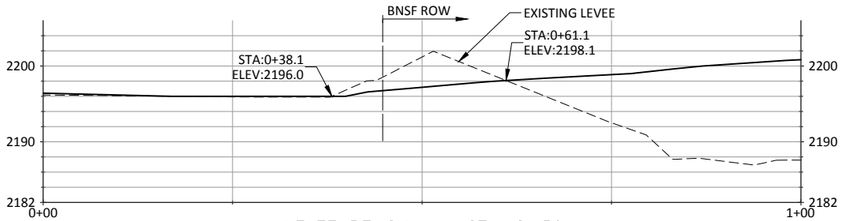
LEVEE REMOVAL – STA. 7+00



LEVEE REMOVAL – STA. 7+50



LEVEE REMOVAL – STA. 8+00



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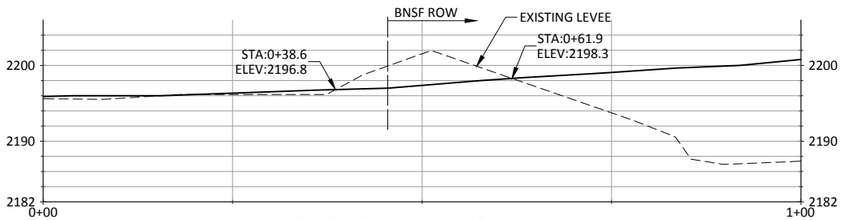
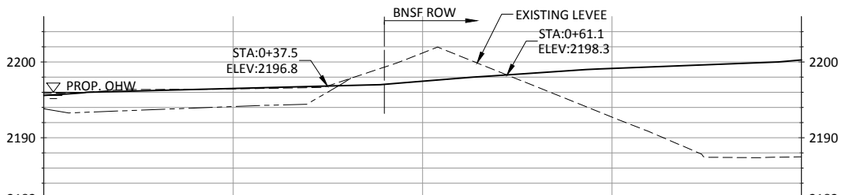
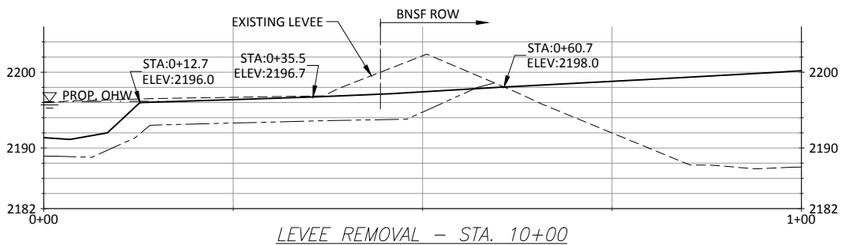


LEVEE REMOVAL – STA. 9+00



LEVEE REMOVAL – STA. 9+50



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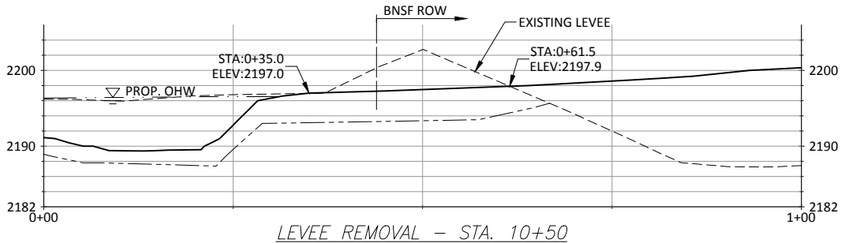
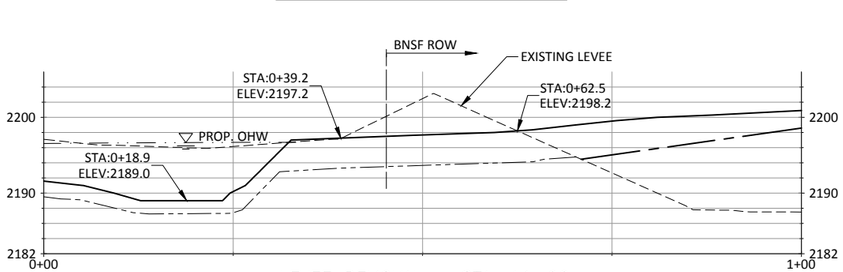


LEVEE REMOVAL – STA. 10+50



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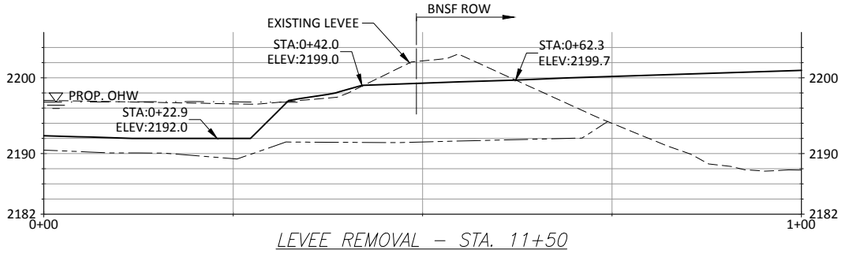


LEVEE REMOVAL – STA. 11+50

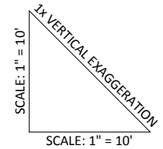
LEGEND

EXISTING GRADE

PROPOSED GRADE

SUBGRADE LIMIT

PROPOSED OHW



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PROPOSED LEVEE REMOVAL GRADING CROSS SECTIONS

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SHEET 36 OF 55

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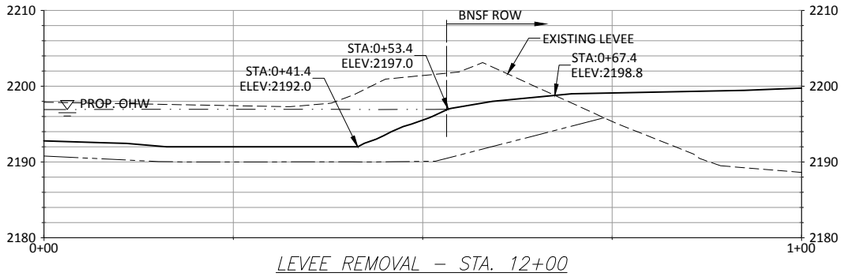

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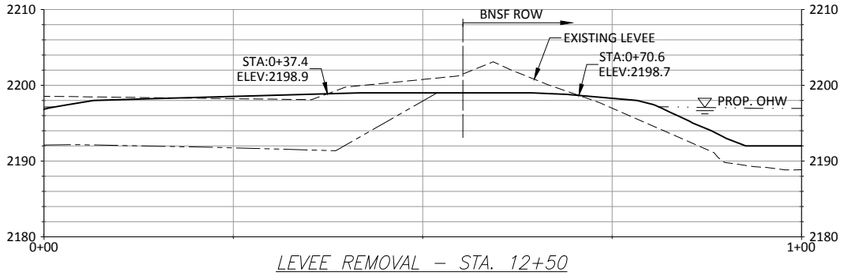
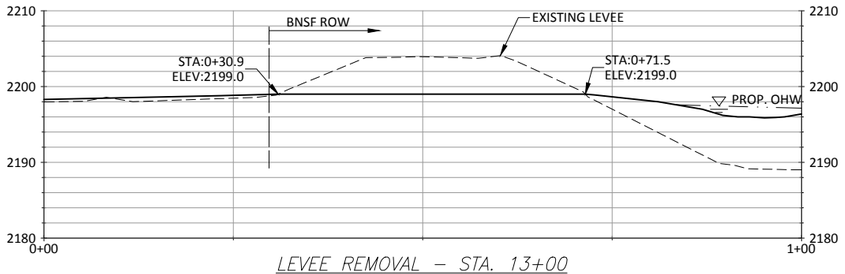


LEVEE REMOVAL – STA. 12+50



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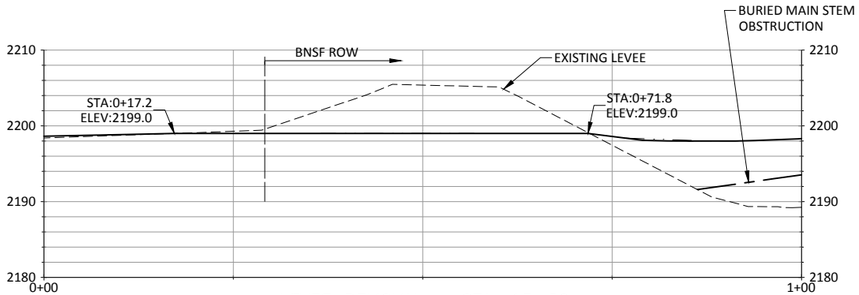
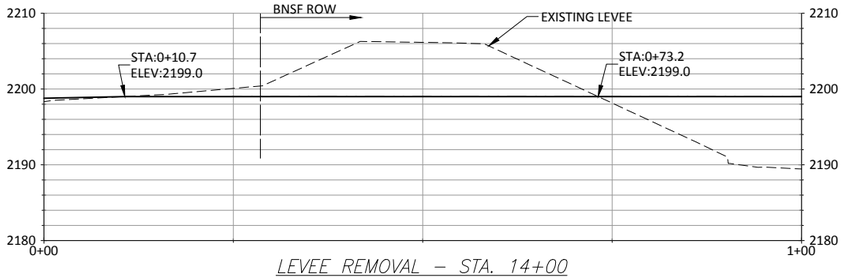


LEVEE REMOVAL – STA. 13+50



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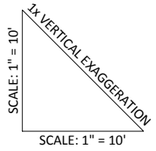

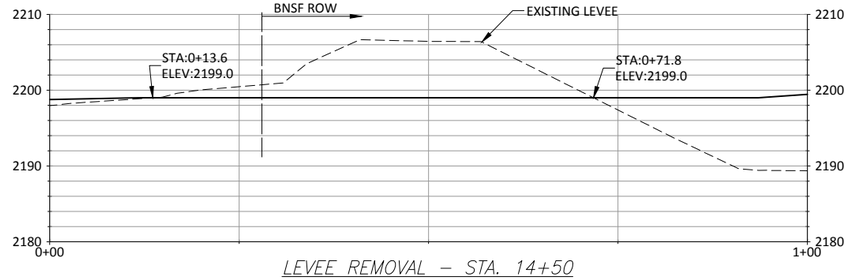

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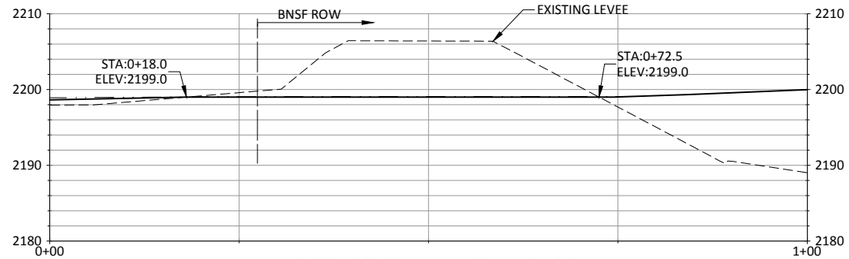

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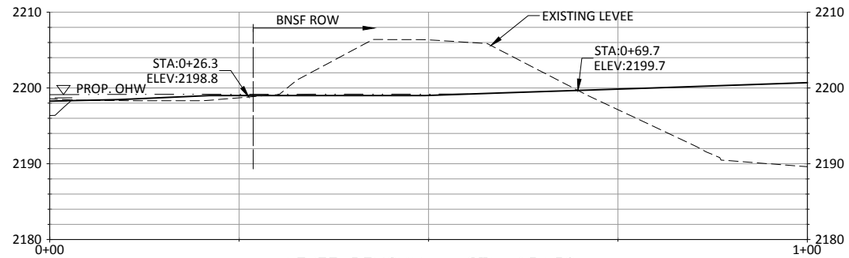

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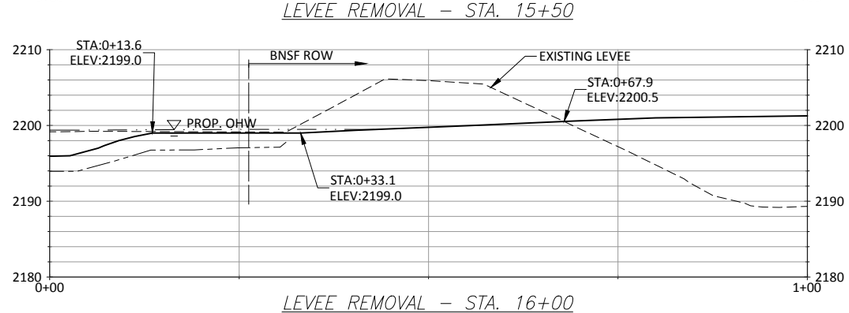

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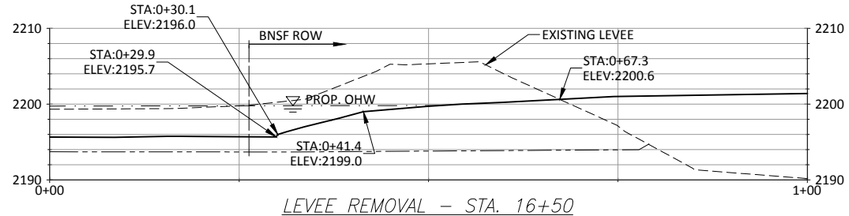

LEVEE REMOVAL – STA. 16+50

LEGEND

EXISTING GRADE

PROPOSED GRADE

SUBGRADE LIMIT

PROPOSED OHW

NOTES:

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PROPOSED LEVEE REMOVAL GRADING CROSS SECTIONS

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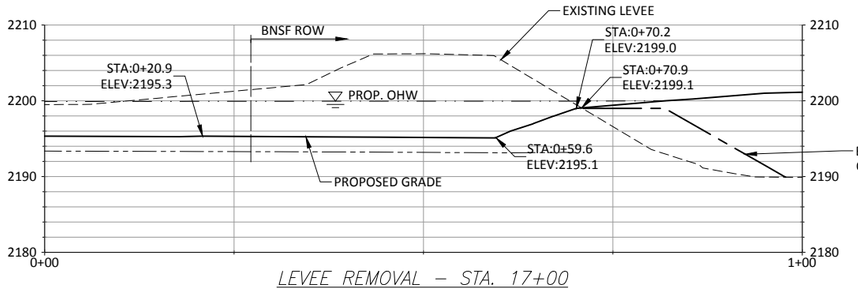
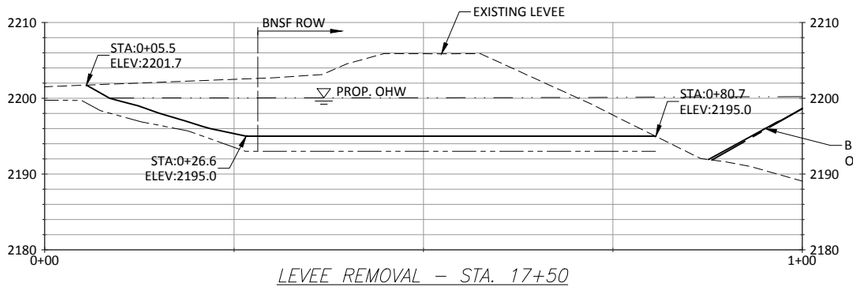


LEVEE REMOVAL – STA. 17+00



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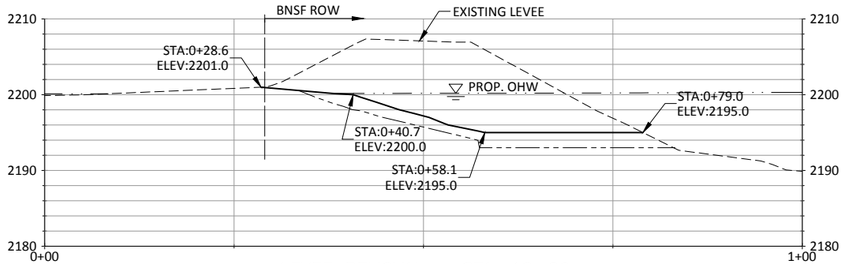

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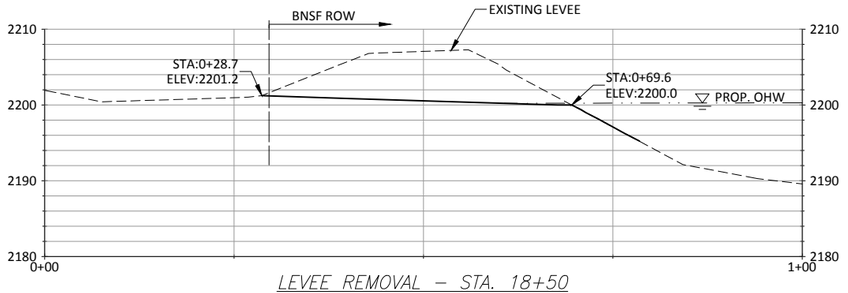

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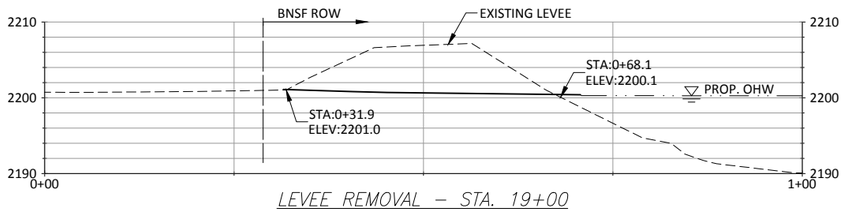

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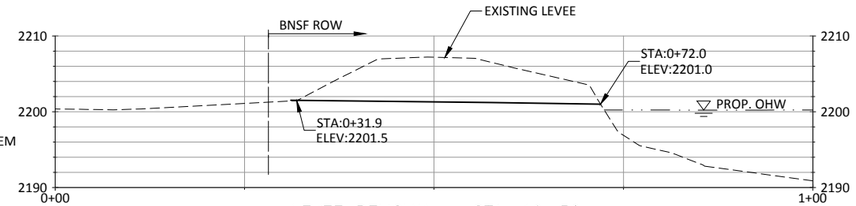

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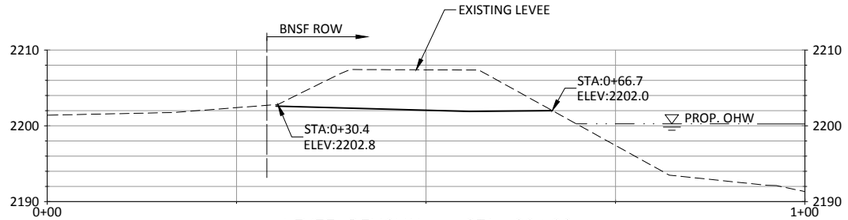
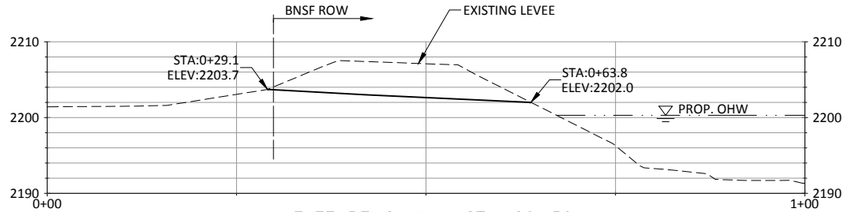


LEVEE REMOVAL – STA. 20+00



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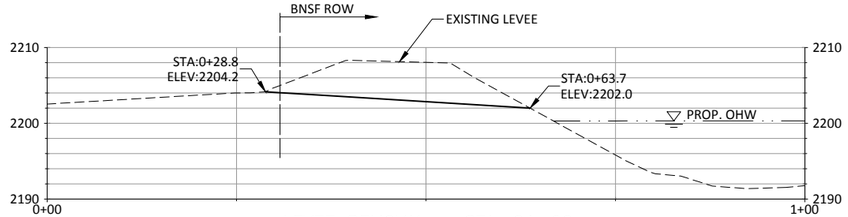
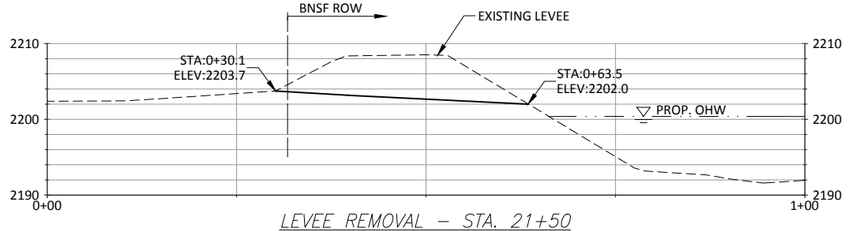


LEVEE REMOVAL – STA. 21+00



LEVEE REMOVAL – STA. 21+50

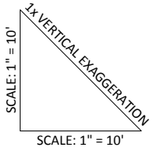
LEGEND

EXISTING GRADE

PROPOSED GRADE

SUBGRADE LIMIT

PROPOSED OHW



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PROPOSED LEVEE REMOVAL GRADING CROSS SECTIONS

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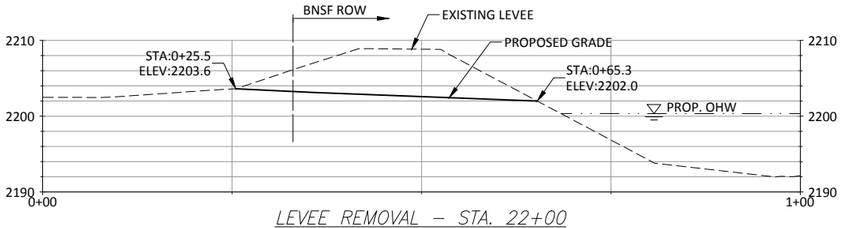
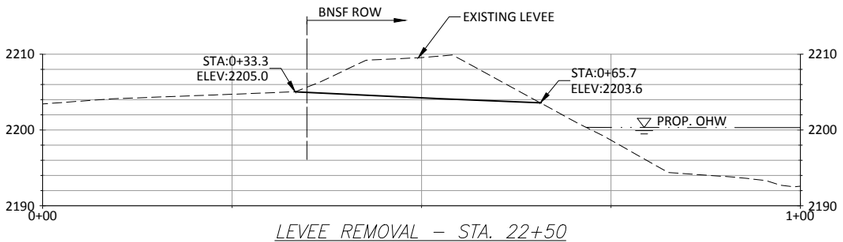
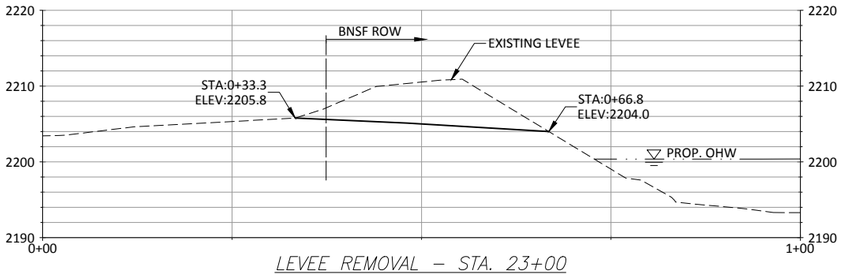


LEVEE REMOVAL – STA. 22+00



LEVEE REMOVAL – STA. 22+50



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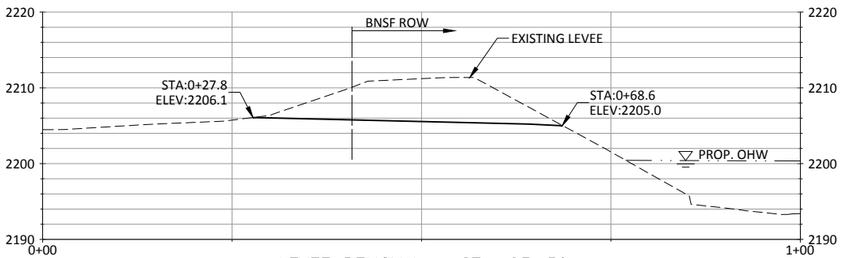
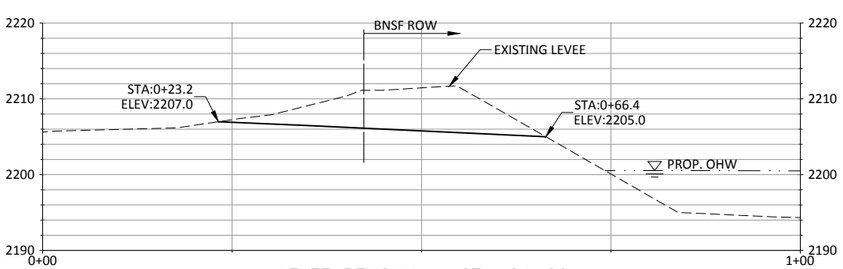
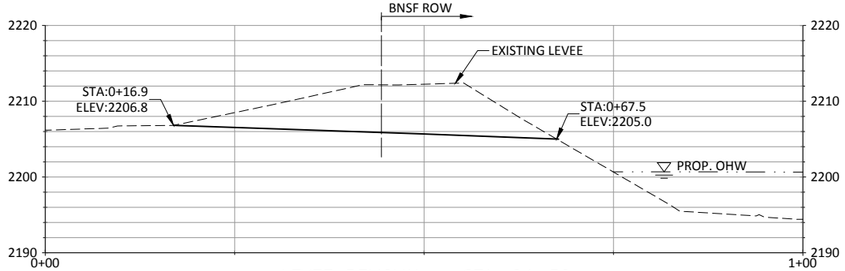


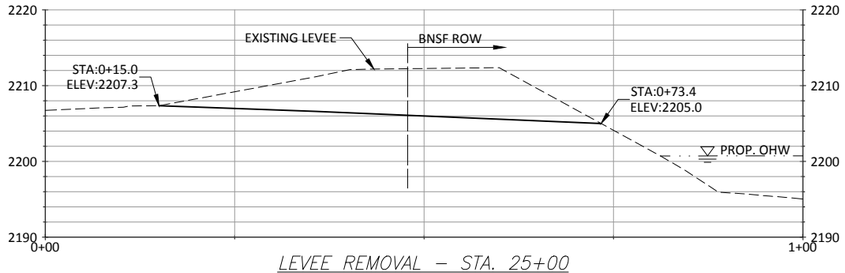
LEVEE REMOVAL – STA. 23+50



LEVEE REMOVAL – STA. 24+00



LEVEE REMOVAL – STA. 24+50



LEVEE REMOVAL – STA. 25+00

LEVEE REMOVAL – STA. 25+50

LEGEND

EXISTING GRADE

PROPOSED GRADE

SUBGRADE LIMIT

PROPOSED OHW

SCALE: 1" = 10'

1x VERTICAL EXAGGERATION

SCALE: 1" = 10'

NOTES:

VIEW ORIENTATION IS LEFT TO RIGHT, LOOKING DOWNSTREAM.

LEVEE BASELINE ALIGNMENT IS AT STA 0+50, TYP EACH SECTION.

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PROPOSED LEVEE REMOVAL GRADING CROSS SECTIONS

39

SHEET 39 OF 55

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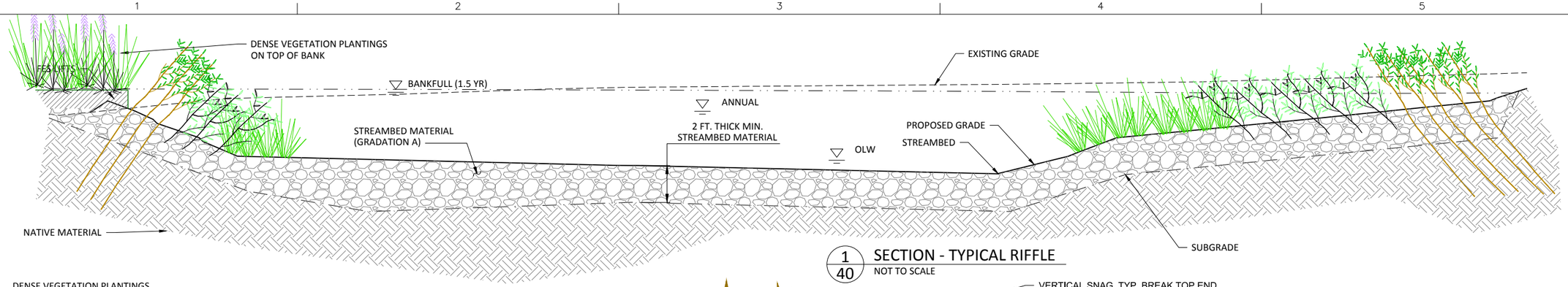
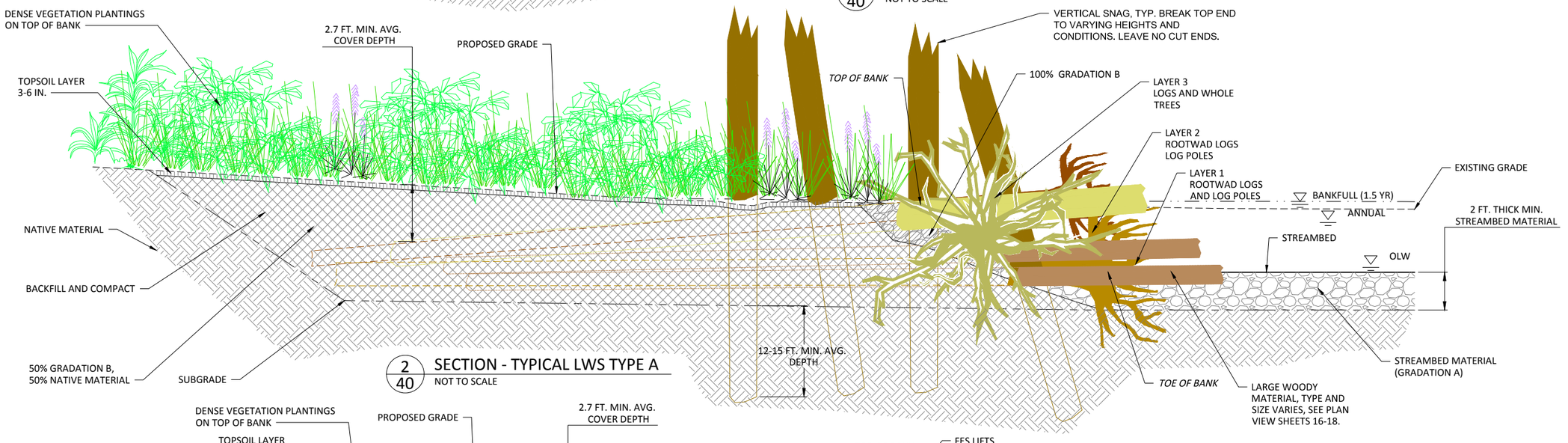
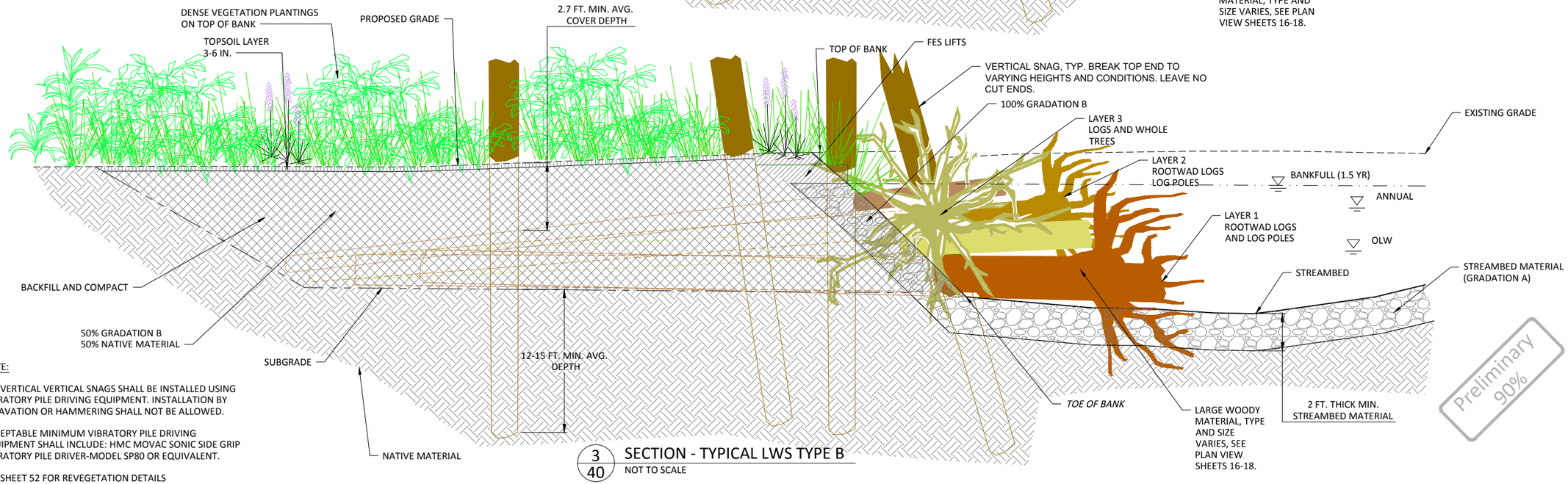


1/40 SECTION - TYPICAL RIFFLE
NOT TO SCALE



2/40 SECTION - TYPICAL LWS TYPE A
NOT TO SCALE



3/40 SECTION - TYPICAL LWS TYPE B
NOT TO SCALE

NOTE:

ALL VERTICAL VERTICAL SNAGS SHALL BE INSTALLED USING VIBRATORY PILE DRIVING EQUIPMENT. INSTALLATION BY EXCAVATION OR HAMMERING SHALL NOT BE ALLOWED.

ACCEPTABLE MINIMUM VIBRATORY PILE DRIVING EQUIPMENT SHALL INCLUDE: HMC MOVAC SONIC SIDE GRIP VIBRATORY PILE DRIVER-MODEL SP80 OR EQUIVALENT.

SEE SHEET 52 FOR REVEGETATION DETAILS

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TYPICAL SECTIONS - RIFLLE AND LWS A-B

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SHEET 40 OF 55

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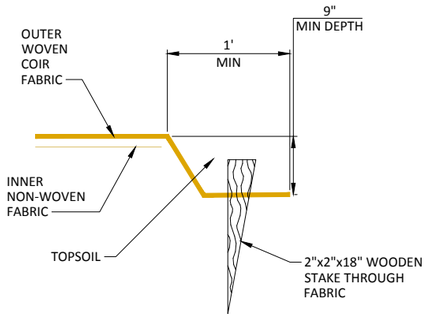
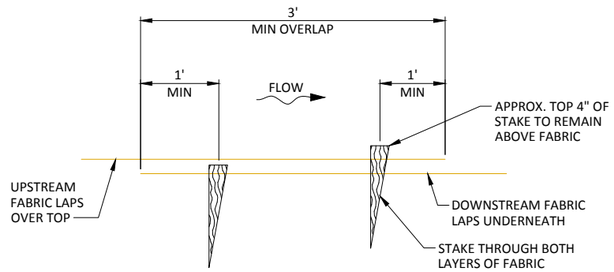
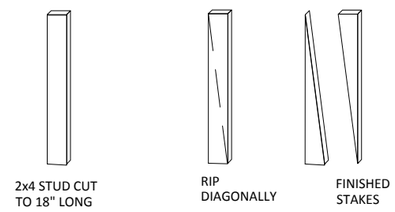


A 41 FABRIC EDGE
NOT TO SCALE

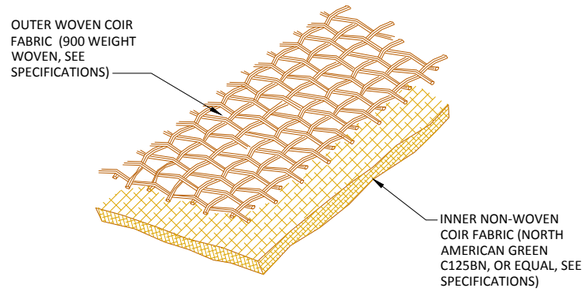


B 41 FABRIC OVERLAP
NOT TO SCALE

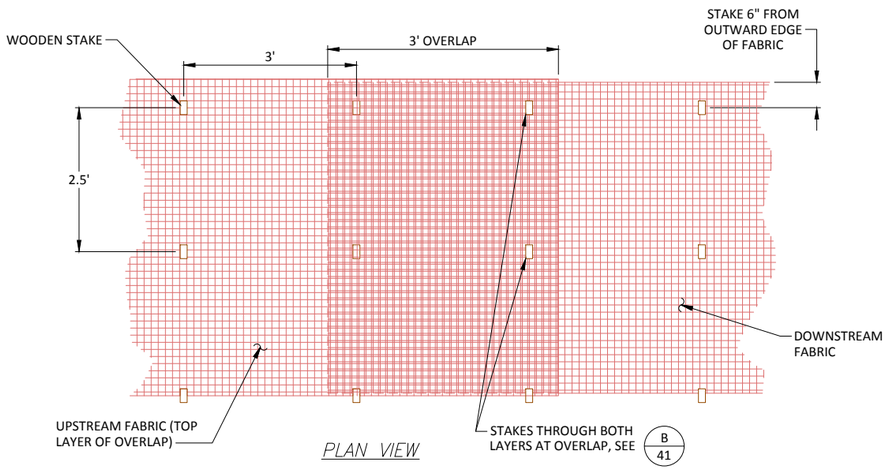


NOTE: WOOD SHALL BE UNTREATED.

D 41 WOODEN STAKE CONSTRUCTION
NOT TO SCALE

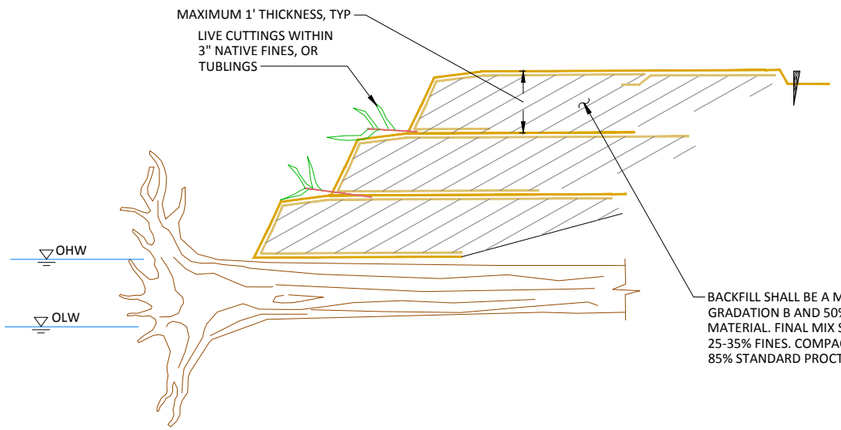


C 41 FABRIC LAYERING
-

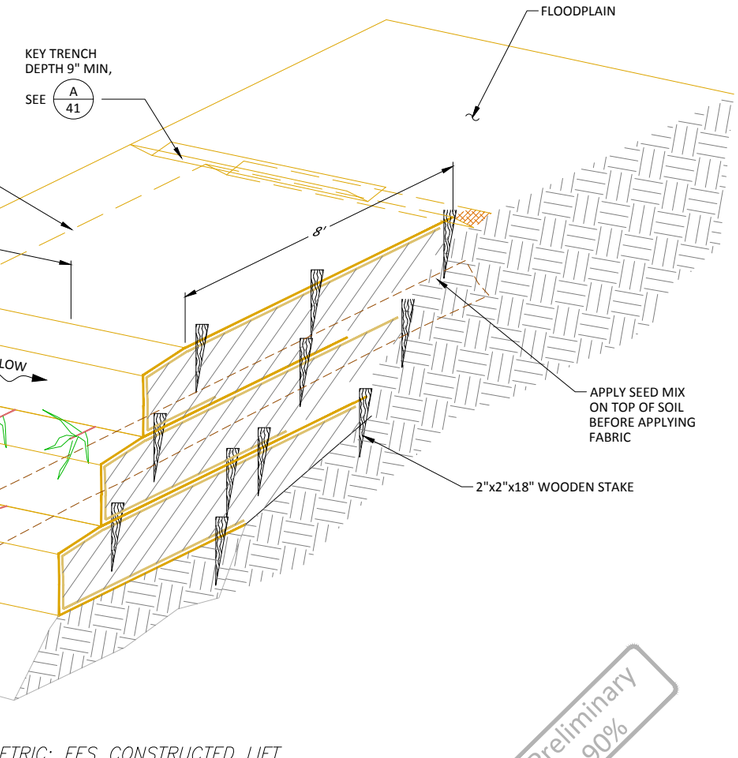


PLAN VIEW

E 41 STREAMBANK CONSTRUCTION FABRIC
NOT TO SCALE



SECTION: FES CONSTRUCTED LIFT



ISOMETRIC: FES CONSTRUCTED LIFT

1 41 FABRIC ENCAPSULATED SOIL (FES) CONSTRUCTED LIFT
NOT TO SCALE

Preliminary 90%

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TYPICAL DETAILS - FES LIFTS

41
SHEET 41 OF 55

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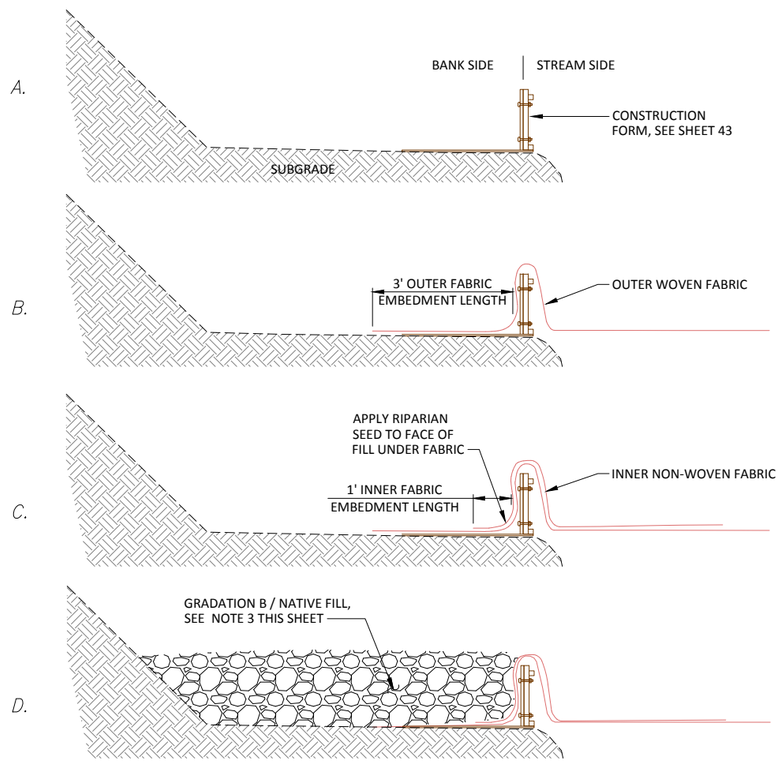
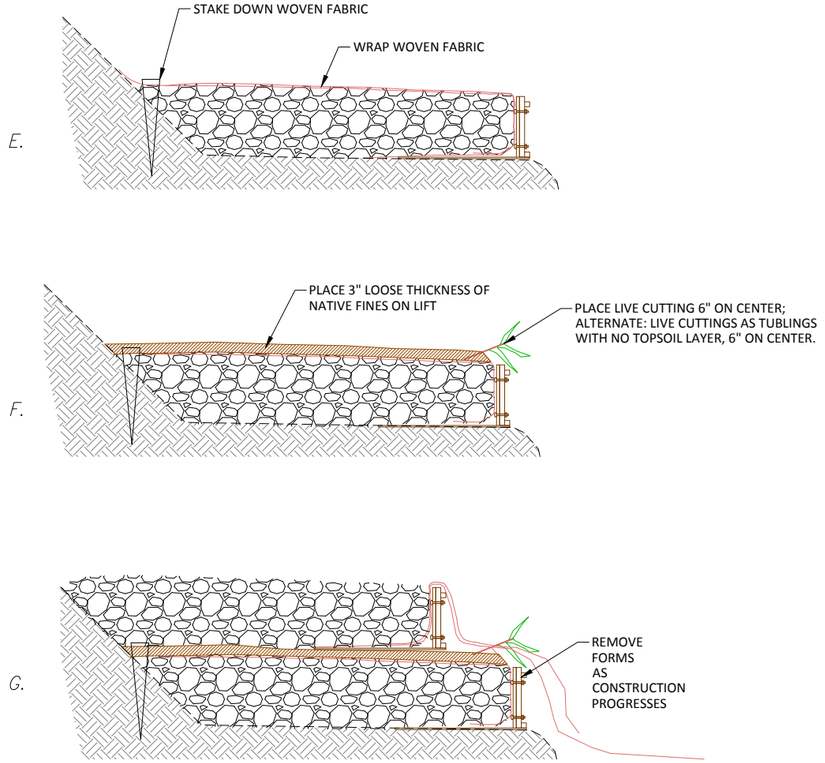


NOTE:
ORDINARY HIGH WATER (OHW) ELEVATION IS BELOW FES LIFTS.



GENERAL INSTRUCTIONS FOR CONSTRUCTING FABRIC WRAPPED LIFTS

1. UNROLL THE OUTER FABRIC (WOVEN COIR) PARALLEL TO THE LONG AXIS OF THE CHANNEL AND POSITION IT SO THAT 3 FEET EXTENDS FOR EMBEDMENT ON THE BANK SIDE OF THE FORMS (FIG B), AND A MINIMUM 3 FEET EXTENDS LENGTHWISE BEYOND THE LAST FORM FOR OVERLAP. DRAPE THE REMAINDER OF THE FABRIC OVER THE TOP OF THE FORMS ON THE STREAM SIDE (FIG B).
2. UNROLL THE INNER FABRIC (NON-WOVEN COIR) OVER THE TOP OF THE OUTER FABRIC AND POSITION IT SO THAT AT LEAST 1 FOOT OF THE INNER FABRIC EXTENDS AS AN EMBEDMENT LENGTH ON THE BANK SIDE OF THE FORMS (FIG C). DRAPE THE REMAINDER OF THE FABRIC OVER THE TOP OF THE FORMS ON THE STREAM SIDE AND ALIGN THE LONG EDGES OF THE INNER AND OUTER FABRICS. STRETCH AND PULL THE FABRIC LAYERS TO REMOVE WRINKLES.
3. PLACE GRADATION B / NATIVE FILL OVER THE FABRIC ON THE BANK SIDE OF THE FORMS TO A MAXIMUM COMPACTED DEPTH OF 12 INCHES. BACKFILL SHALL BE A MIX OF 50% IMPORTED GRADATION B AND 50% NATIVE MATERIAL. FINAL MIX SHALL HAVE 25-35% FINES. COMPACTED TO 86% STANDARD PROCTOR.
4. RIPARIAN SEED SHALL BE PLACED ON SOIL AND BENEATH FABRIC ON ALL EXPOSED SURFACES.
5. FOLD THE LOOSE ENDS OF THE TWO FABRIC LAYERS BACK OVER THE COMPACTED FILL MATERIAL AND STRETCH TIGHTLY TO REMOVE WRINKLES (FIG E). SECURE WITH WOODEN STAKES.
6. PLACE 3" OF NATIVE FINES ON LIFT. PLACE LIVE CUTTINGS, AT 6" ON CENTER. ALTERNATE: LIVE CUTTINGS AS TUBLINGS WITH NO NATIVE FINES LAYER, 6" ON CENTER. REPEAT 2-6 TO FULL BANK HEIGHT.
8. ON THE TOP LIFT, EXCAVATE A KEY TRENCH 1' WIDE AND 0.75' DEEP ALONG THE EDGE OF THE OUTER FABRIC LAYER, PARALLEL TO THE FORMS. SECURE FABRIC IN THE KEY TRENCH WITH WOODEN STAKES.
9. BACKFILL & COMPACT THE KEY TRENCH WITH NATIVE FINES AND CONTINUE TO APPLY NATIVE FINES TO SMOOTHLY MERGE WITH EXISTING CONTOURS.

1/42 SUGGESTED CONSTRUCTION SEQUENCE FOR FABRIC WRAPPED LIFTS (END VIEW)
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TYPICAL DETAILS - FES LIFTS

42

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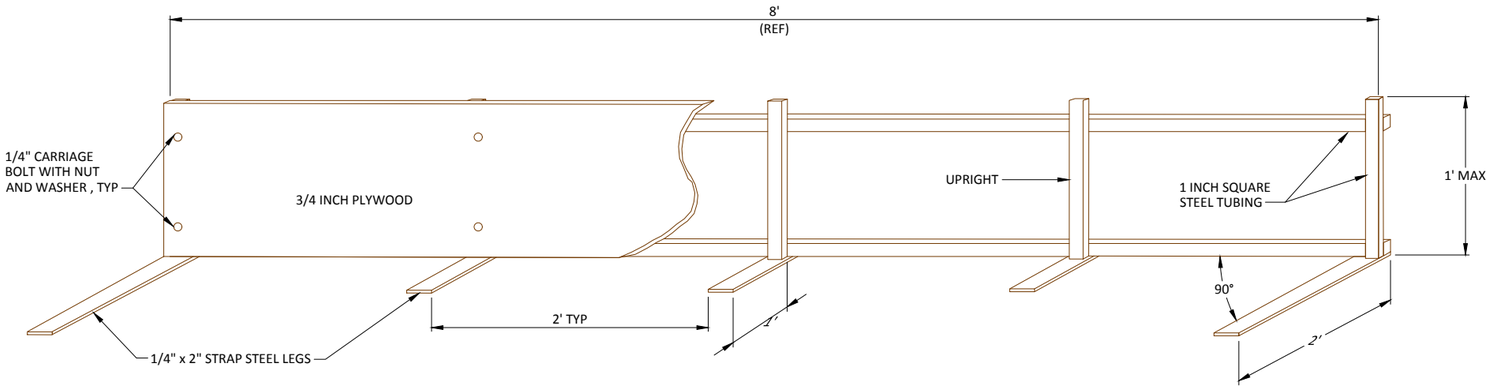
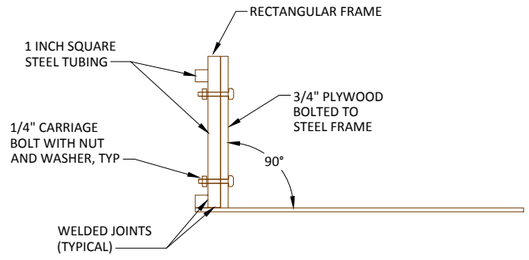
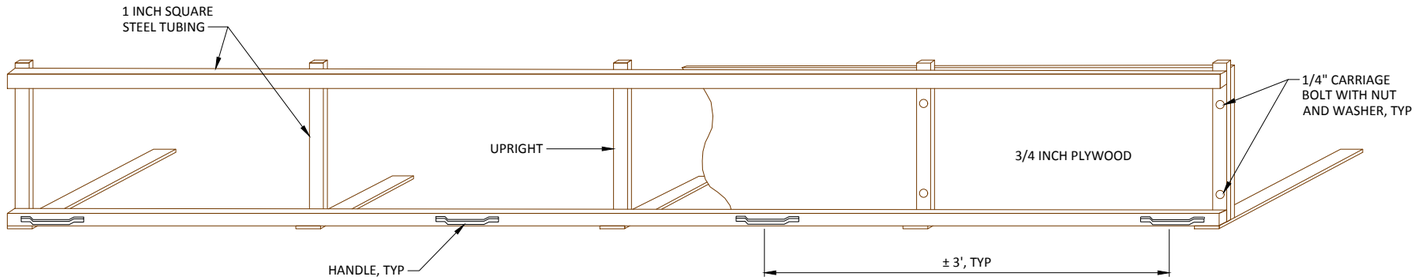


ISOMETRIC VIEW FROM REAR



END VIEW



ISOMETRIC VIEW FROM FRONT

GENERAL NOTES ON FABRICATION OF FORMS FOR FABRIC WRAPPED SOIL CONSTRUCTION

1. FABRICATE FORMS BY WELDING 1 INCH TUBULAR STEEL TOGETHER TO CREATE A 1x8 FOOT RECTANGULAR FRAMEWORK.
2. WELD LENGTHS OF 1/4x2 INCH STEEL STRAP AT 90 DEGREES TO THE FRAME EVERY 2 FEET.
3. ATTACH A PIECE OF 3/4 INCH PLYWOOD TO THE FRAME USING 1/4 INCH DIAMETER CARRIAGE BOLTS OR EQUIVALENT.
4. REMOVAL AND TRANSPORT OF THE FORMS IS FACILITATED IF HEAVY DUTY HANDLES ARE ATTACHED TO THE FRAME AS SHOWN.

1/43 FABRIC WRAPPED SOIL CONSTRUCTION FORM
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TYPICAL DETAILS - FES LIFTS

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TYPICAL DETAILS
- FES LIFTS

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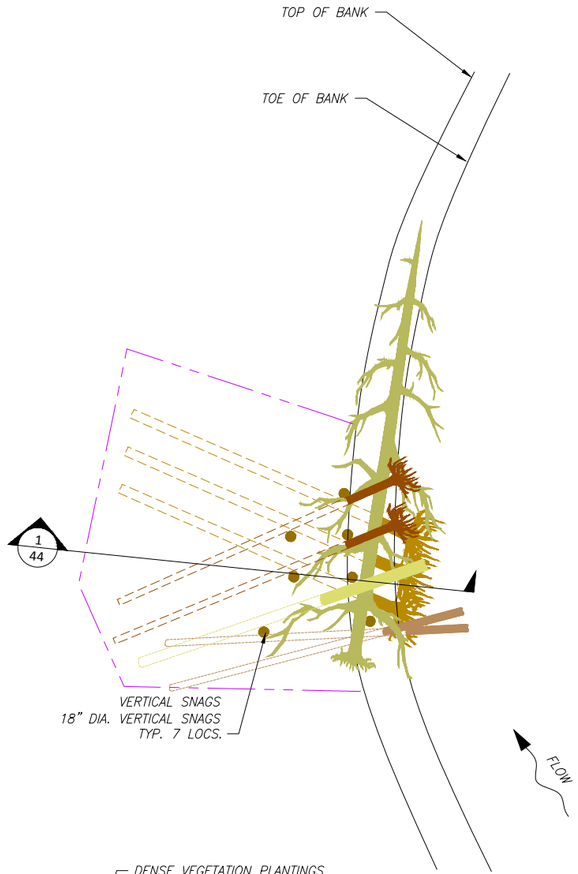
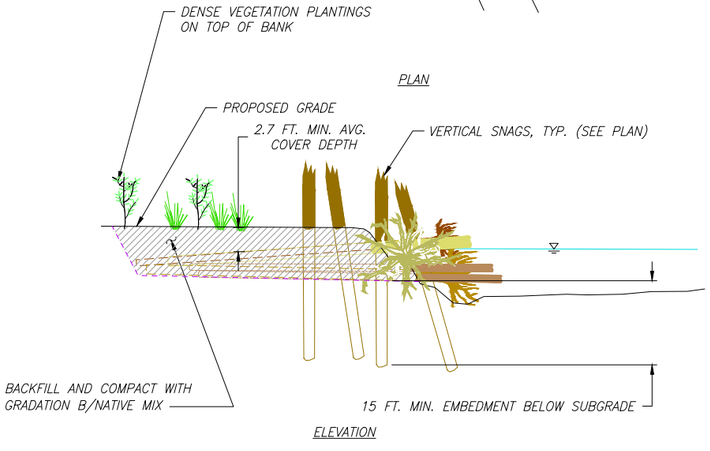
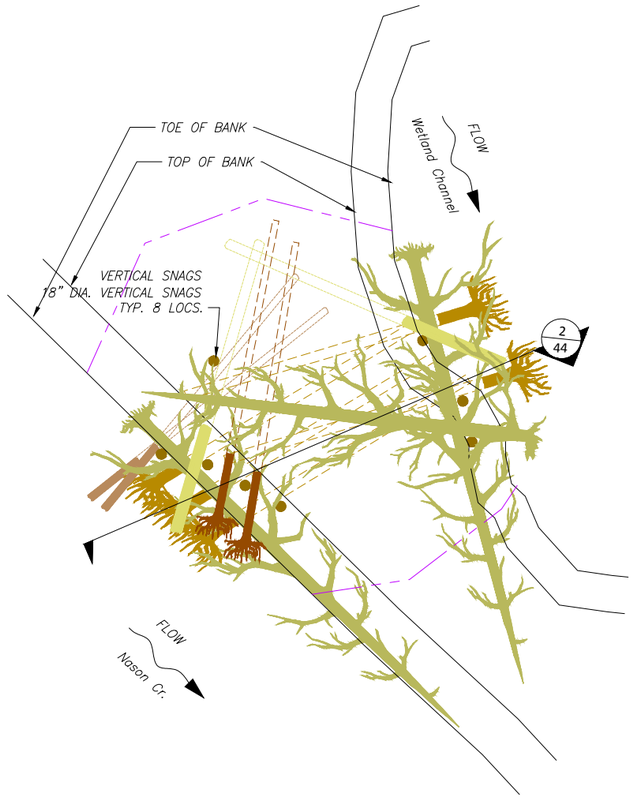
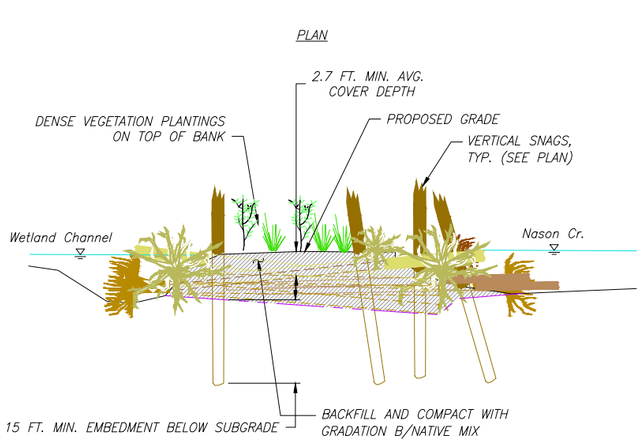


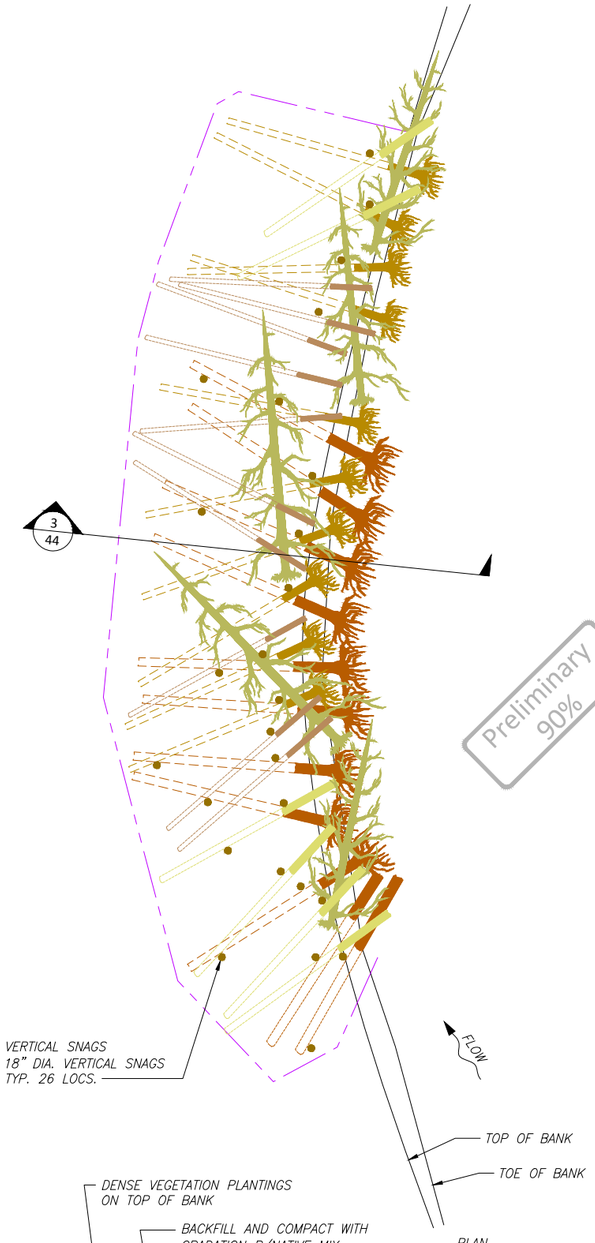


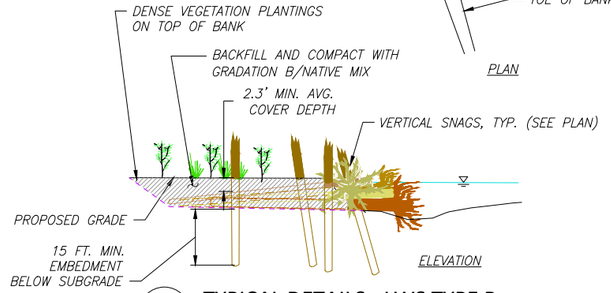
1
44
TYPICAL DETAILS - LWS TYPE A





2
44
TYPICAL DETAILS - LWS TYPE A-2





3
44
TYPICAL DETAILS - LWS TYPE B

Preliminary
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TYPICAL DETAILS – LWM

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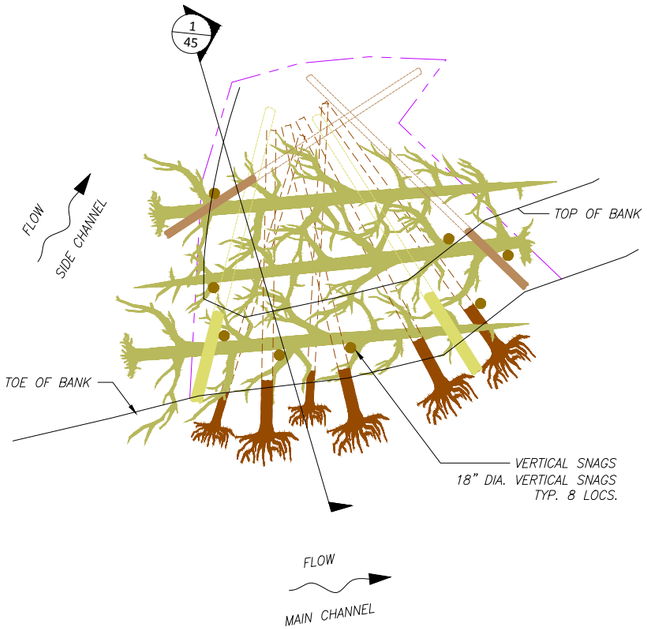
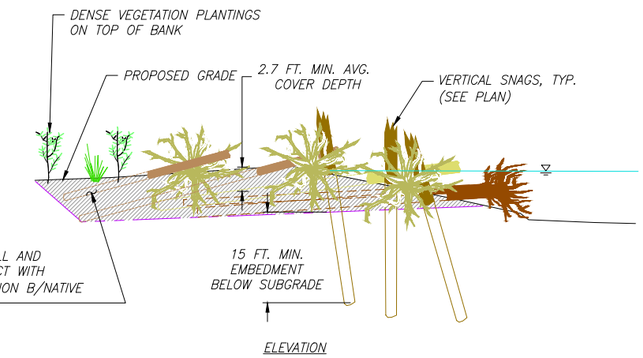
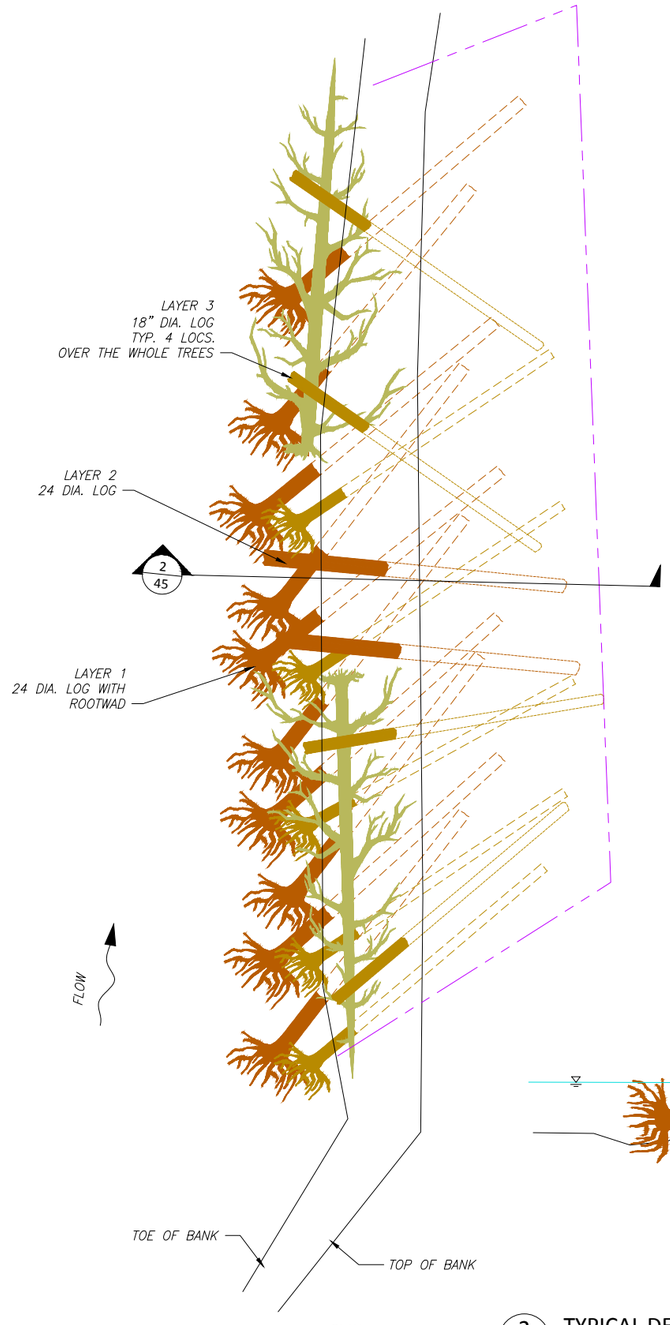


PLAN

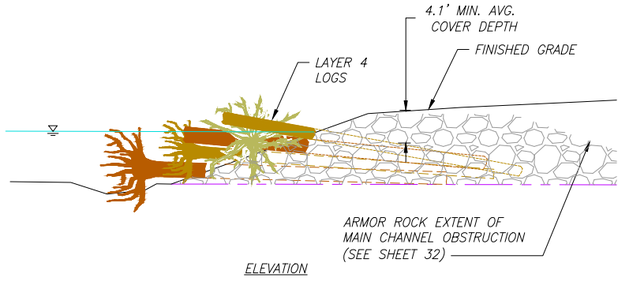


ELEVATION

1/45 TYPICAL DETAILS - LWS TYPE D



PLAN



ELEVATION

2/45 TYPICAL DETAILS - LWS TYPE O

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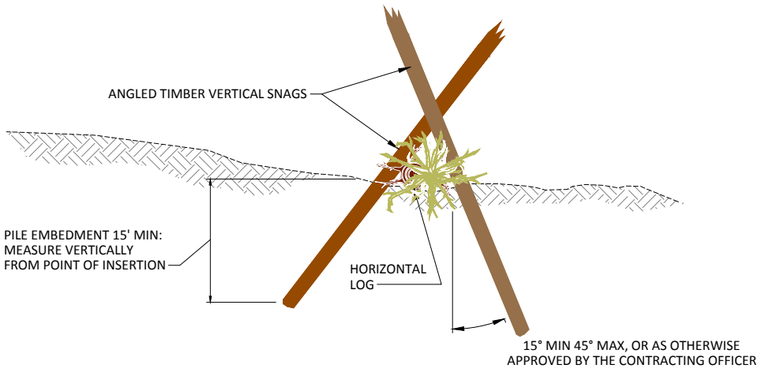


1/46 TYPICAL DETAIL - ANGLED VERTICAL SNAG ANCHORING
NOT TO SCALE

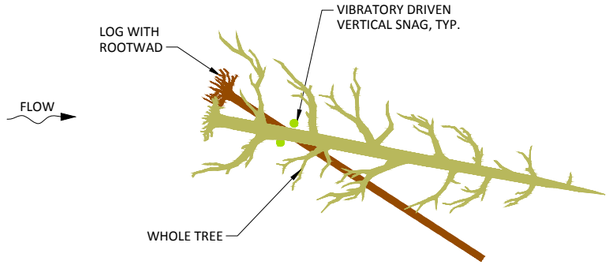
NOTES

FLOODPLAIN ROUGHNESS WOOD SHALL BE COMPRISED OF 1 WHOLE TREE WITH A DBH OF 18" (-2"/+3") AND LENGTH OF 60' (-15'/+10'), 1 ROOTWAD LOG WITH A DBH OF 12" (-2"/+3") AND A LENGTH OF 40' (-5'/+5'), 2 VERTICAL SNAGS WITH A DBH OF 14" (-2"/+1") AND A LENGTH NO LESS THAN 30', AND SLASH AS APPROVED BY THE CONTRACTING OFFICER. THE WHOLE TREE MAY BE DECIDUOUS OR CONIFEROUS. SEE SPECIFICATIONS FOR ADDITIONAL MATERIAL REQUIREMENTS.

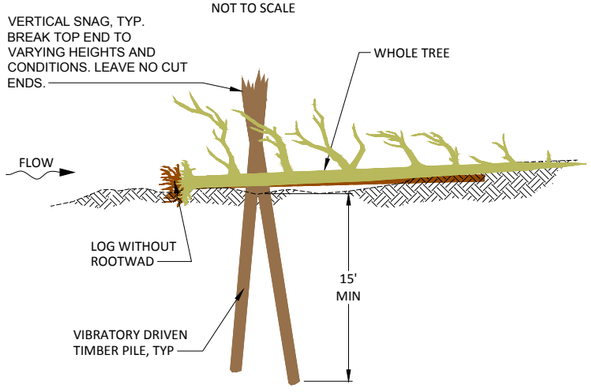
SPECIFIC ORIENTATION OF LOGS AND VERTICAL SNAGS MAY VARY FROM TYPICAL DRAWINGS DEPENDING ON SIZE AND SHAPE OF MATERIAL DELIVERED OR SALVAGED.

BRACING TO EXISTING TREES OR INSTALLED VERTICAL LOGS WILL OCCUR AT LOCATIONS IDENTIFIED IN THE FIELD TO PROVIDE HORIZONTAL STABILITY.

ACCEPTABLE VIBRATORY PILE DRIVING EQUIPMENT SHALL INCLUDE: HMC MOVAX SONIC SIDE GRIP VIBRATORY PILE DRIVER – MODEL SP80 OR EQUIVALENT. INSTALLATION BY EXCAVATION, HAMMERING OR VIBRATORY PLATE COMPACTOR SHALL NOT BE ALLOWED.



PLAN VIEW
NOT TO SCALE



SECTION VIEW
NOT TO SCALE

2/46 TYPICAL DETAIL - FLOODPLAIN ROUGHNESS
NOT TO SCALE

Preliminary
90%

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NASON CREEK – UWP SUBREACH 2
STREAM HABITAT ENHANCEMENT
TYPICAL DETAILS – LWM

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TYPICAL DETAILS – LWM

46
SHEET 46 OF 55

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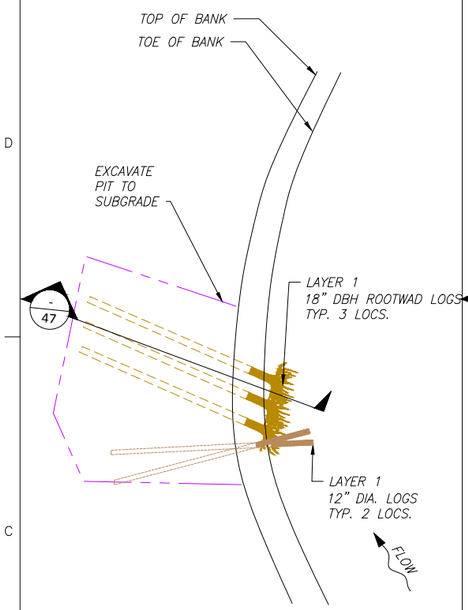
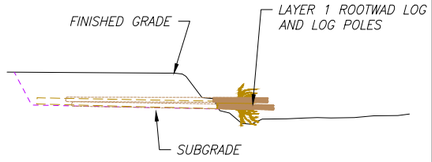
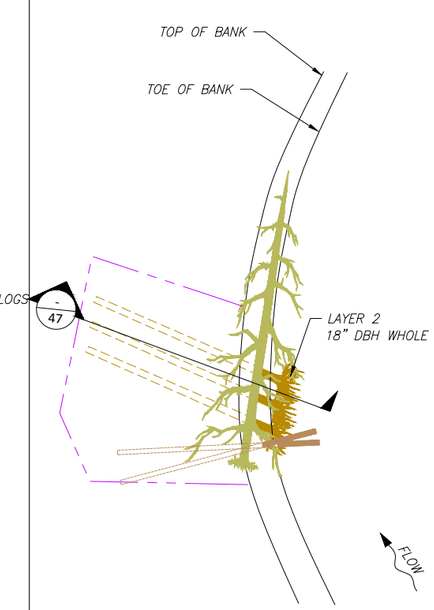


PLAN



ELEVATION

LARGE WOOD STRUCTURE TYPE 'A' LAYER 1 PLAN AND ELEVATION



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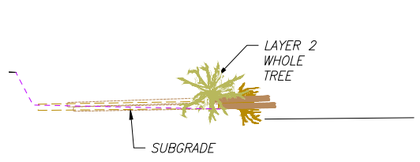
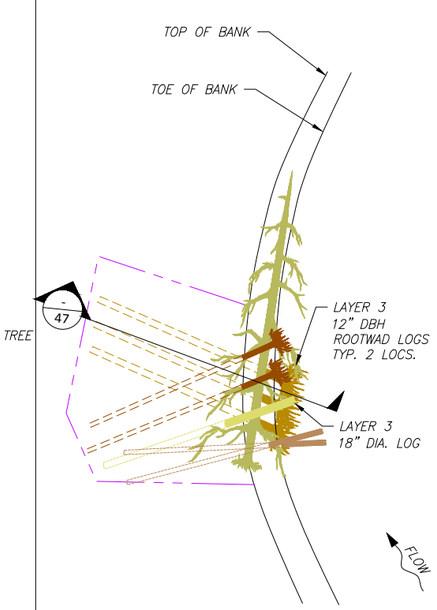


ELEVATION

LARGE WOOD STRUCTURE TYPE 'A' LAYER 2 PLAN AND ELEVATION



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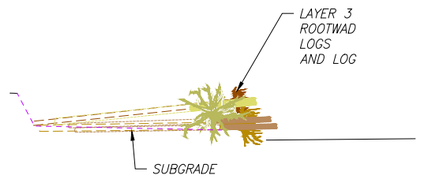
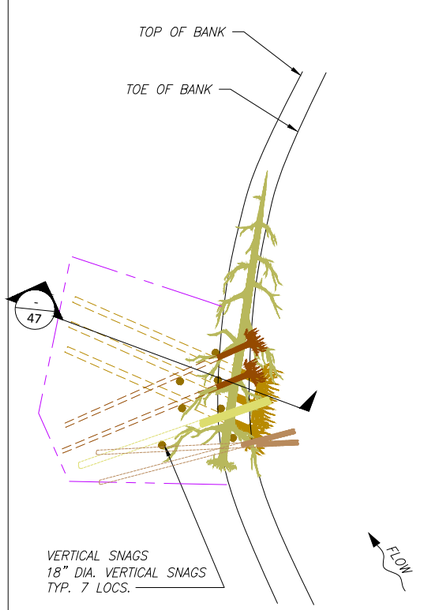


ELEVATION

LARGE WOOD STRUCTURE TYPE 'A' LAYER 3 PLAN AND ELEVATION



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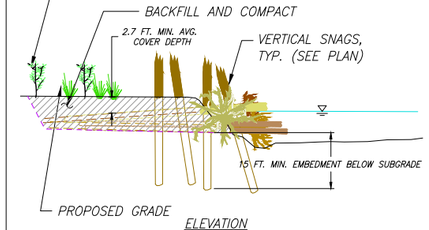


ELEVATION

LARGE WOOD STRUCTURE TYPE 'A' VERTICAL SNAGS INSTALLED PLAN AND ELEVATION

GENERAL NOTES:

1. PLACEMENT OF LOGS AT THE SUBGRADE ELEVATION MAY BE ACCOMPLISHED BY TRENCHING EACH LOG PLACEMENT WHERE POSSIBLE.
2. ALL ROOTWAD LOGS AND LOGS ARE 40' LONG. VERTICAL SNAGS ARE 30' LONG.
3. SLASH SHALL BE PLACED BETWEEN EACH LAYER AS THE STRUCTURE IS CONSTRUCTED, OR AS OTHERWISE APPROVED BY THE CONTRACTING OFFICER.
4. SPECIFIC POSITION, ORIENTATION, INCLINATION, AND NUMBER OF LOGS MAY BE ADJUSTED FROM THE TYPICAL DRAWINGS AS APPROVED BY THE CONTRACTING OFFICER BASED ON THE SIZE AND SHAPE OF MATERIALS AND THE CONDITIONS AT INDIVIDUAL LOCATIONS.
5. BACKFILL SHALL BE 50% GRADATION B, 50% FINES. FINAL MIX SHALL BE 25–30% FINES OR TOPSOILS. COMPACT TO 90% STANDARD PROCTOR. TOP 6IN SHALL BE TOPSOIL AT 85% COMPACTION.

LWM QUANTITIES		
TYPE	SIZE	NUMBER
ROOTWAD LOG	12" DBH, 40' LONG	2
ROOTWAD LOG	18" DBH, 40' LONG	3
LOG POLE	12" DIA., 40' LONG	2
LOG POLE	18" DIA., 40' LONG	1
WHOLE TREE	18" BDH, 60' LONG	1
VERTICAL SNAG	16" DIA., 30' LONG	7

Log (12" Dia. x 40'L)

Log (18" Dia. x 40'L)

Log (24" Dia. x 40'L)

Rootwad (12" DBH x 40'L)

Rootwad (18" DBH x 40'L)

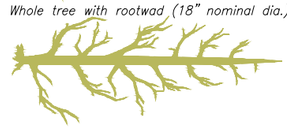
Rootwad (24" DBH x 40'L)

vertical snag (16" nominal dia.)

vertical snag (14" nominal dia.)

Whole tree with rootwad (12" nominal dia.)

Whole tree with rootwad (18" nominal dia.)



Preliminary 90%

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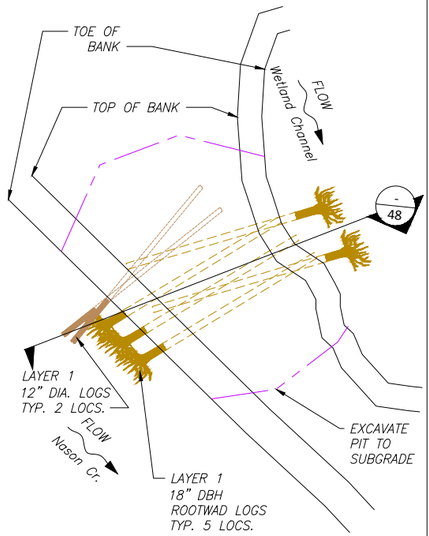

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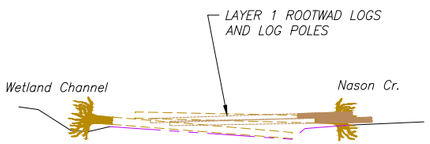
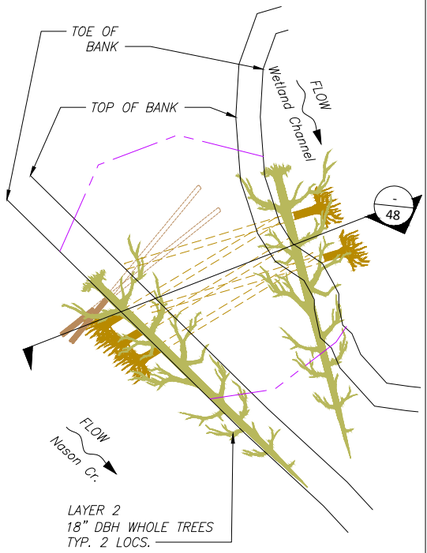


ELEVATION

LARGE WOOD
STRUCTURE A-2
LAYER 1
PLAN AND ELEVATION



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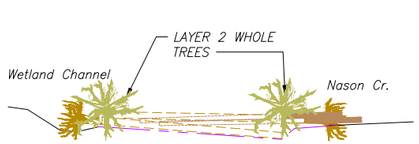
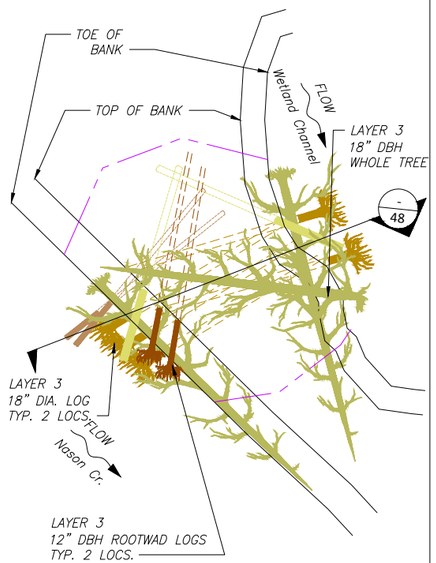


ELEVATION

LARGE WOOD
STRUCTURE A-2
LAYER 2
PLAN AND ELEVATION



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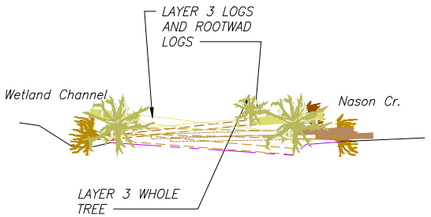
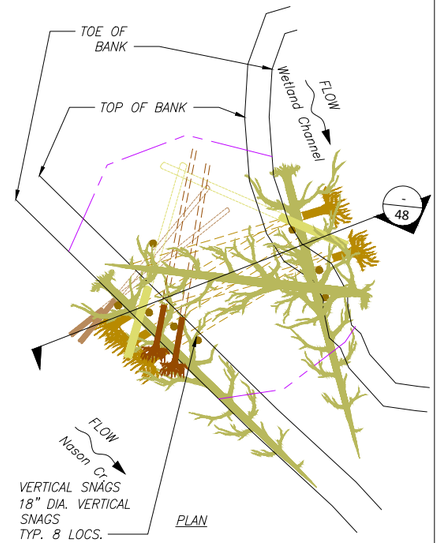


ELEVATION

LARGE WOOD
STRUCTURE A-2
LAYER 3
PLAN AND ELEVATION



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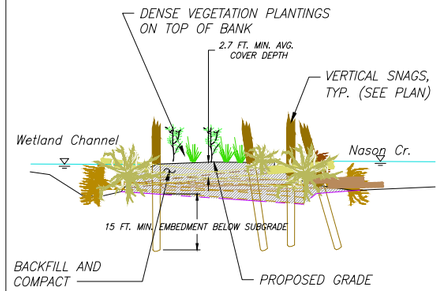


ELEVATION

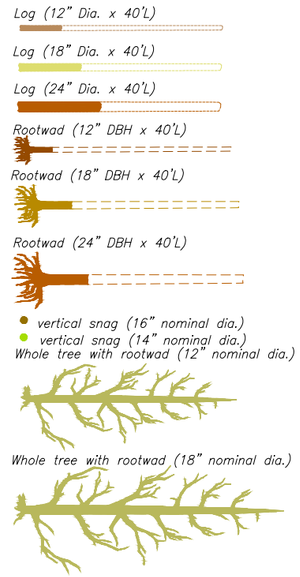
LARGE WOOD STRUCTURE
A-2
VERTICAL SNAGS INSTALLED
PLAN AND ELEVATION

GENERAL NOTES:

1. PLACEMENT OF LOGS AT THE SUBGRADE ELEVATION SHALL OCCUR PRIOR TO PLACEMENT OF BACKFILL.
2. PLACEMENT OF BACKFILL SHALL OCCUR THROUGHOUT THE LAYER PLACEMENT PROCESS TO LIMIT GAPS BETWEEN ROCKS.
3. ALL ROOTWAD LOGS AND LOGS ARE 40' LONG.
4. SLASH SHALL BE PLACED BETWEEN EACH LAYER AS THE STRUCTURE IS CONSTRUCTED, OR AS OTHERWISE APPROVED BY THE CONTRACTING OFFICER.
4. SPECIFIC POSITION, ORIENTATION, INCLINATION, AND NUMBER OF LOGS MAY BE ADJUSTED FROM THE TYPICAL DRAWINGS AS APPROVED BY THE CONTRACTING OFFICER BASED ON THE SIZE AND SHAPE OF MATERIALS AND THE CONDITIONS AT INDIVIDUAL LOCATIONS.
5. BACKFILL SHALL BE 50% GRADATION B, 50% FINES. FINAL MIX SHALL BE 25-30% FINES OR TOPSOILS. COMPACT TO 90% STANDARD PROCTOR. TOP 6IN SHALL BE TOPSOIL AT 85% COMPACTION.

LWM QUANTITIES

TYPE	SIZE	NUMBER
ROOTWAD LOG	12" DBH, 40' LONG	2
ROOTWAD LOG	18" DBH, 40' LONG	5
LOG POLE	12" DIA., 40' LONG	2
LOG POLE	18" DIA., 40' LONG	2
WHOLE TREE	18" BDH, 60' LONG	3
VERTICAL SNAG	16" DIA., 30' LONG	8



Preliminary
90%

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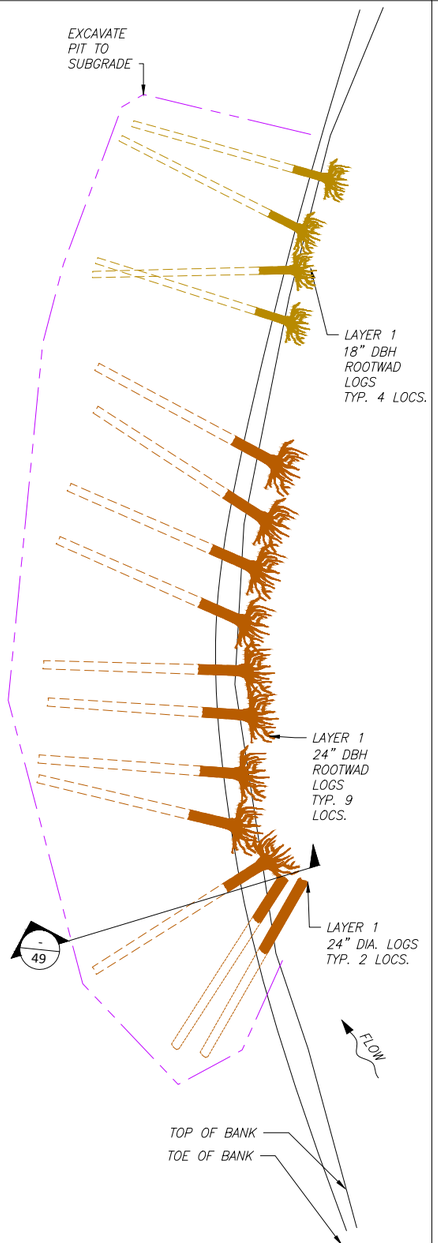
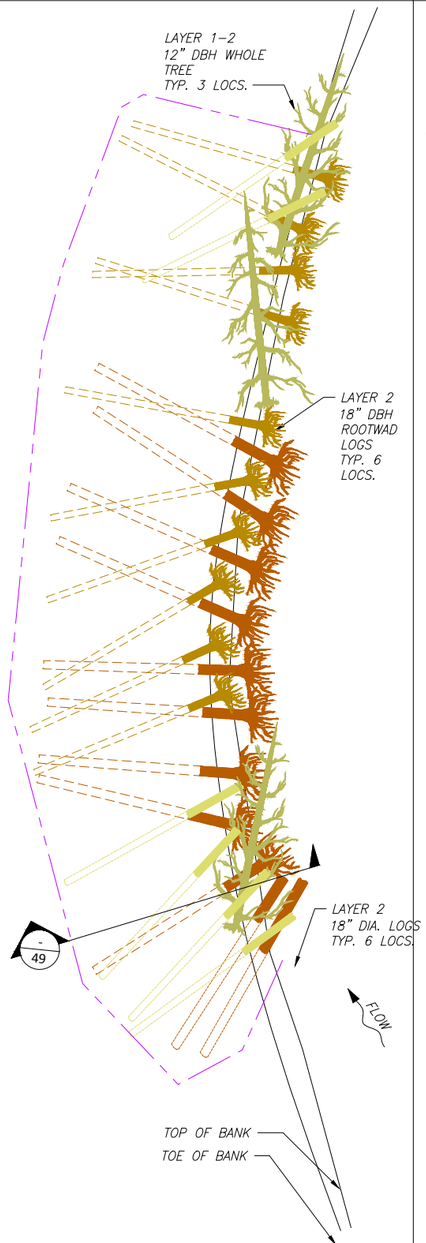


LARGE WOOD STRUCTURE TYPE 'B' LAYER 1



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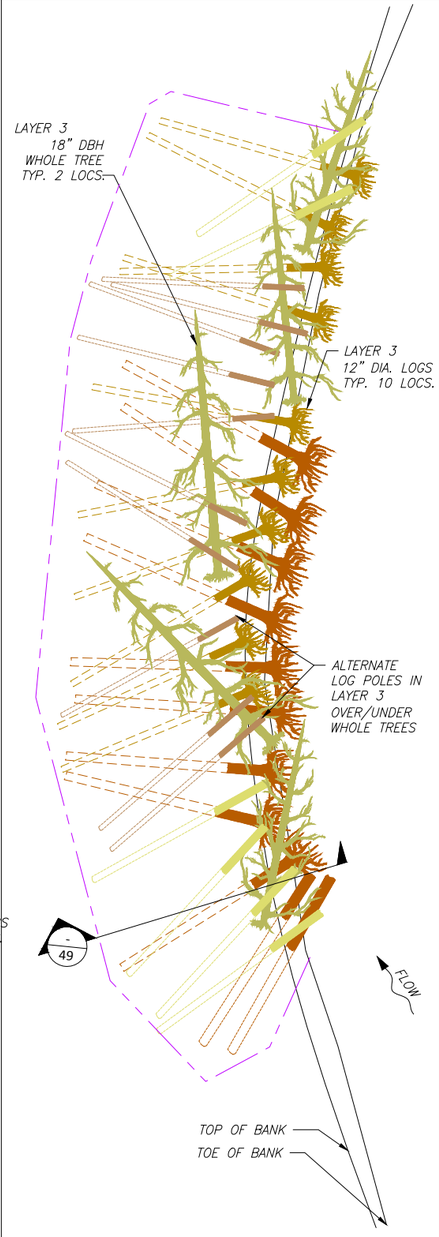
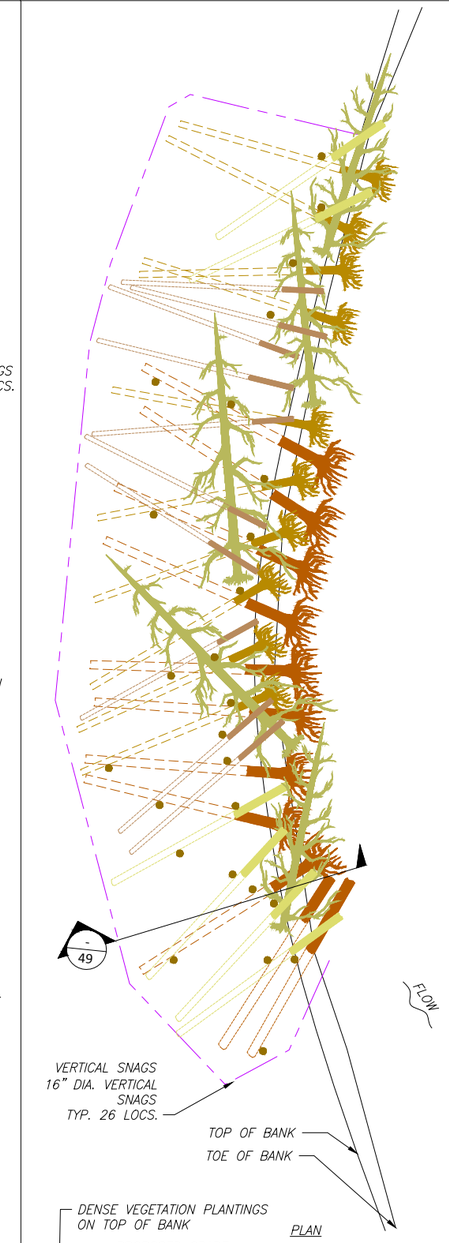


LARGE WOOD STRUCTURE TYPE 'B' LAYER 3



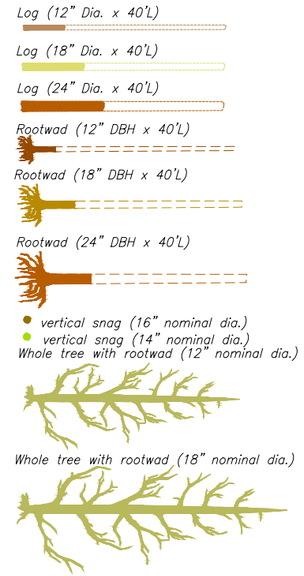
LARGE WOOD STRUCTURE TYPE 'B' VERTICAL SNAGS INSTALLED

GENERAL NOTES:

1. PLACEMENT OF LOGS AT THE SUBGRADE ELEVATION MAY BE ACCOMPLISHED BY TRENCHING EACH LOG PLACEMENT WHERE POSSIBLE.
2. ALL ROOTWAD LOGS AND LOGS ARE 40' LONG. VERTICAL SNAGS ARE 30' LONG.
3. SLASH SHALL BE PLACED BETWEEN EACH LAYER AS THE STRUCTURE IS CONSTRUCTED, OR AS OTHERWISE APPROVED BY THE CONTRACTING OFFICER.
4. SPECIFIC POSITION, ORIENTATION, INCLINATION, AND NUMBER OF LOGS MAY BE ADJUSTED FROM THE TYPICAL DRAWINGS AS APPROVED BY THE CONTRACTING OFFICER BASED ON THE SIZE AND SHAPE OF MATERIALS AND THE CONDITIONS AT INDIVIDUAL LOCATIONS.
5. BACKFILL SHALL BE 50% GRADATION B, 50% FINES. FINAL MIX SHALL BE 25–30% FINES OR TOPSOILS. COMPACT TO 90% STANDARD PROCTOR. TOP 6IN SHALL BE TOPSOIL AT 85% COMPACTION.

LWM QUANTITIES

TYPE	SIZE	NUMBER
ROOTWAD LOG	18" DBH, 40' LONG	10
ROOTWAD LOG	24" DBH., 40' LONG	9
LOG POLE	12" DIA., 40' LONG	10
LOG POLE	18" DIA., 40' LONG	6
LOG POLE	24" DIA., 40' LONG	2
WHOLE TREE	12" DBH, 40' LONG	3
WHOLE TREE	18" BDH, 60' LONG	2
VERTICAL SNAG	16" DIA., 30' LONG	26



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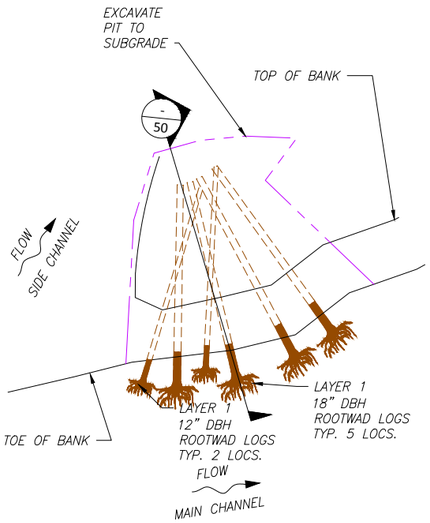

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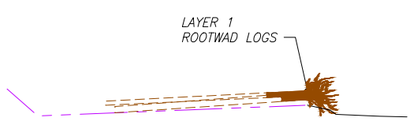
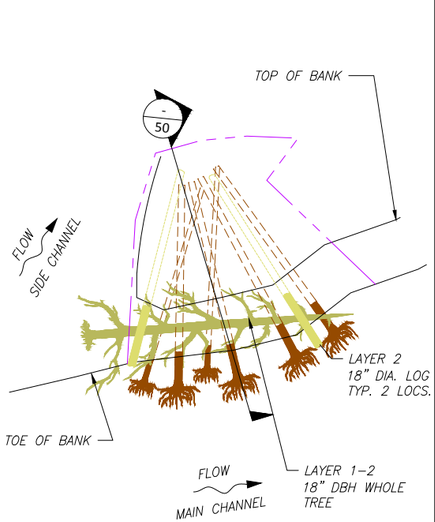


ELEVATION

LARGE WOOD STRUCTURE TYPE 'D' LAYER 1 PLAN AND ELEVATION



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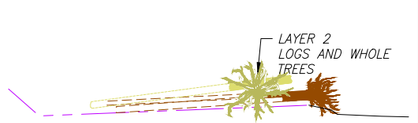
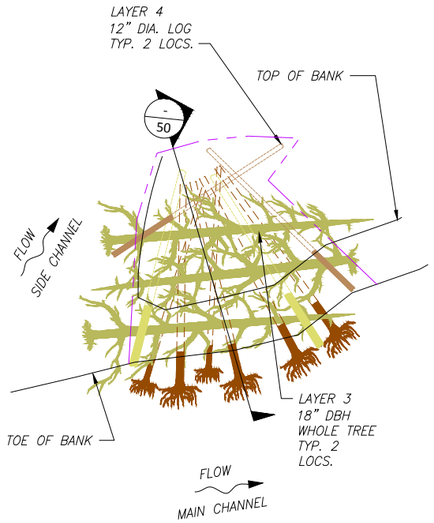


ELEVATION

LARGE WOOD STRUCTURE TYPE 'D' LAYER 2 PLAN AND ELEVATION



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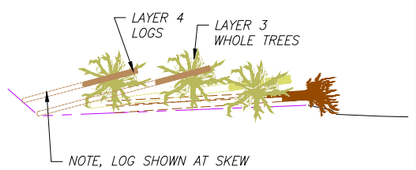
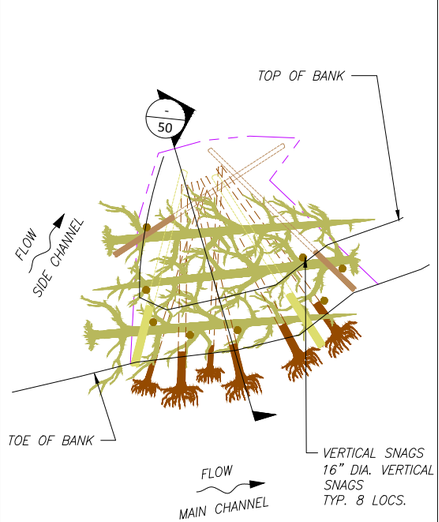


ELEVATION

LARGE WOOD STRUCTURE TYPE 'D' LAYER 3 PLAN AND ELEVATION



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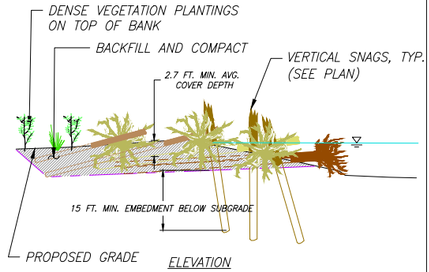


ELEVATION

LARGE WOOD STRUCTURE TYPE 'D' LAYER 4 PLAN AND ELEVATION

GENERAL NOTES:

1. PLACEMENT OF LOGS AT THE SUBGRADE ELEVATION SHALL OCCUR PRIOR TO PLACEMENT OF ARMOR STONE BACKFILL.
2. PLACEMENT OF ARMOR STONE SHALL OCCUR THROUGHOUT THE LAYER PLACEMENT PROCESS TO LIMIT GAPS BETWEEN ROCKS.
3. ALL ROOTWAD LOGS AND LOGS ARE 40' LONG.
4. SLASH SHALL BE PLACED BETWEEN EACH LAYER AS THE STRUCTURE IS CONSTRUCTED, OR AS OTHERWISE APPROVED BY THE CONTRACTING OFFICER.
4. SPECIFIC POSITION, ORIENTATION, INCLINATION, AND NUMBER OF LOGS MAY BE ADJUSTED FROM THE TYPICAL DRAWINGS AS APPROVED BY THE CONTRACTING OFFICER BASED ON THE SIZE AND SHAPE OF MATERIALS AND THE CONDITIONS AT INDIVIDUAL LOCATIONS.
5. BACKFILL SHALL BE 50% GRADATION B, 50% FINES. FINAL MIX SHALL BE 25–30% FINES OR TOPSOILS. COMPACT TO 90% STANDARD PROCTOR. TOP 6IN SHALL BE TOPSOIL AT 85% COMPACTION.

LWM QUANTITIES

TYPE	SIZE	NUMBER
ROOTWAD LOG	12" DBH, 40' LONG	2
ROOTWAD LOG	18" DBH., 40' LONG	4
LOG POLE	12" DIA., 40' LONG	2
LOG POLE	18" DIA., 40' LONG	2
WHOLE TREE	18" BDH, 60' LONG	3
VERTICAL SNAG	16" DIA., 30' LONG	8

Log (12" Dia. x 40'L)

Log (18" Dia. x 40'L)

Log (24" Dia. x 40'L)

Rootwad (12" DBH x 40'L)

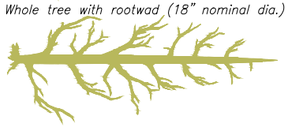
Rootwad (18" DBH x 40'L)

Rootwad (24" DBH x 40'L)

vertical snag (16" nominal dia.)
vertical snag (14" nominal dia.)

Whole tree with rootwad (12" nominal dia.)

Whole tree with rootwad (18" nominal dia.)



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NASON CREEK – UWP SUBREACH 2

STREAM HABITAT ENHANCEMENT
LWD CONSTRUCTION SEQUENCE

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SHEET 50 OF 55

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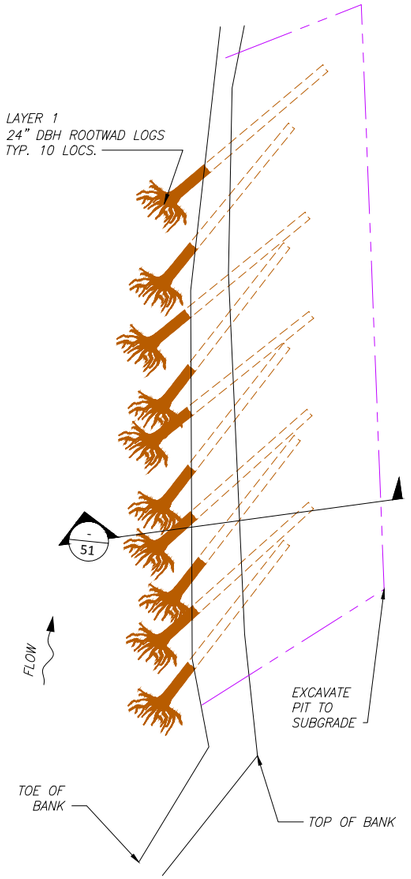
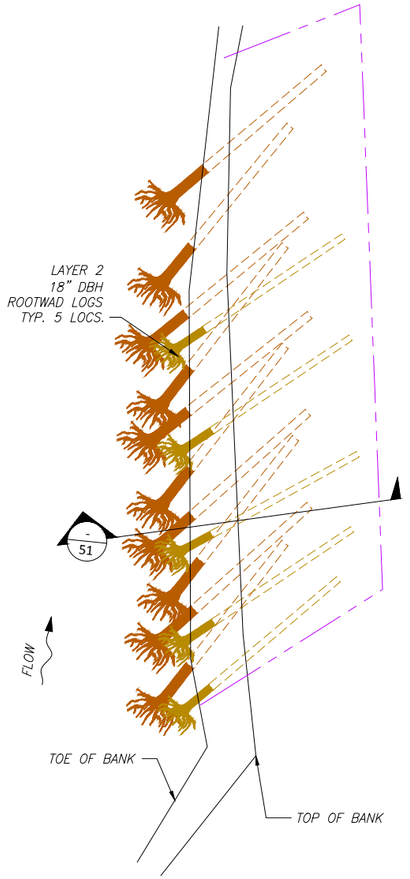


PLAN

ELEVATION

LARGE WOOD STRUCTURE TYPE 'O'
LAYER 1
PLAN AND ELEVATION



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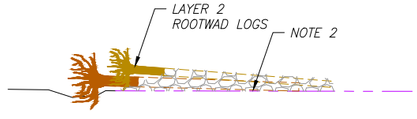
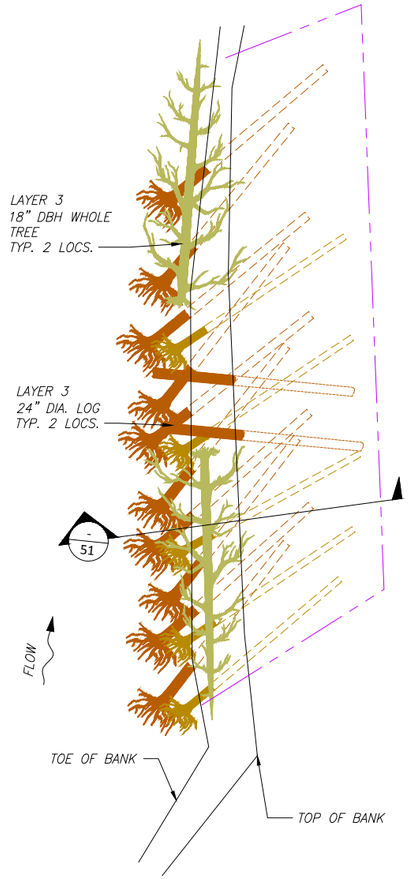


ELEVATION

LARGE WOOD STRUCTURE TYPE 'O'
LAYER 2
PLAN AND ELEVATION



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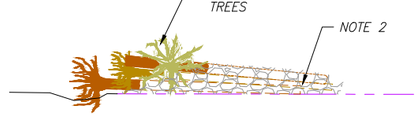
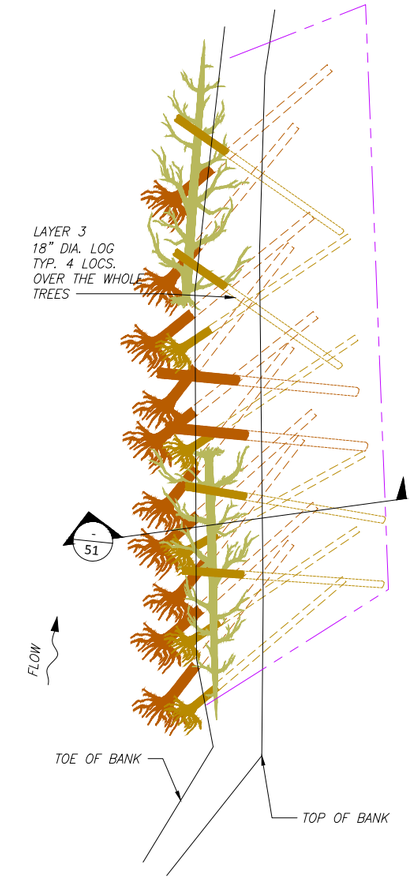


ELEVATION

LARGE WOOD STRUCTURE TYPE 'O'
LAYER 3
PLAN AND ELEVATION



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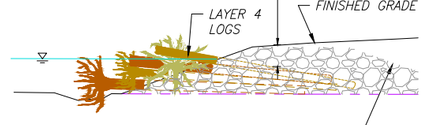


ELEVATION

LARGE WOOD STRUCTURE TYPE 'O'
LAYER 4
PLAN AND ELEVATION

GENERAL NOTES:

1. PLACEMENT OF LOGS AT THE SUBGRADE ELEVATION SHALL OCCUR PRIOR TO PLACEMENT OF BACKFILL.
2. PLACEMENT OF BACKFILL SHALL OCCUR THROUGHOUT THE LAYER PLACEMENT PROCESS TO LIMIT GAPS BETWEEN ROCKS.
3. ALL ROOTWAD LOGS AND LOGS ARE 40' LONG.
4. SLASH SHALL BE PLACED BETWEEN EACH LAYER AS THE STRUCTURE IS CONSTRUCTED, OR AS OTHERWISE APPROVED BY THE CONTRACTING OFFICER.
4. SPECIFIC POSITION, ORIENTATION, INCLINATION, AND NUMBER OF LOGS MAY BE ADJUSTED FROM THE TYPICAL DRAWINGS AS APPROVED BY THE CONTRACTING OFFICER BASED ON THE SIZE AND SHAPE OF MATERIALS AND THE CONDITIONS AT INDIVIDUAL LOCATIONS.
5. UPSTREAM STRUCTURE SHOWN, DOWNSTREAM STRUCTURE (0-2) IS SIMILAR, SEE PLAN FOR ORIENTATION AND CONFIGURATION.
6. BACKFILL SHALL BE ARMOR ROCK SOURCED FROM ON-SITE SALVAGE OF LEVEE AND BANK RIPRAP. TOP 6IN SHALL BE TOPSOIL AT 85% COMPACTION.

LWM QUANTITIES

TYPE	SIZE	NUMBER
ROOTWAD LOG	18" DBH, 40' LONG	5
ROOTWAD LOG	24" DBH., 40' LONG	10 (0-2 13)
LOG POLE	18" DIA., 40' LONG	4
LOG POLE	24" DIA., 40' LONG	2
WHOLE TREE	18" BDH, 60' LONG	2

Log (12" Dia. x 40'L)

Log (18" Dia. x 40'L)

Log (24" Dia. x 40'L)

Rootwad (12" DBH x 40'L)

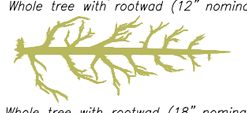
Rootwad (18" DBH x 40'L)

Rootwad (24" DBH x 40'L)

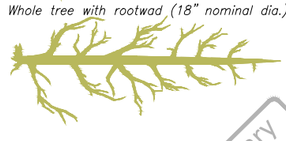
vertical snag (16" nominal dia.)

vertical snag (14" nominal dia.)

Whole tree with rootwad (12" nominal dia.)



Whole tree with rootwad (18" nominal dia.)



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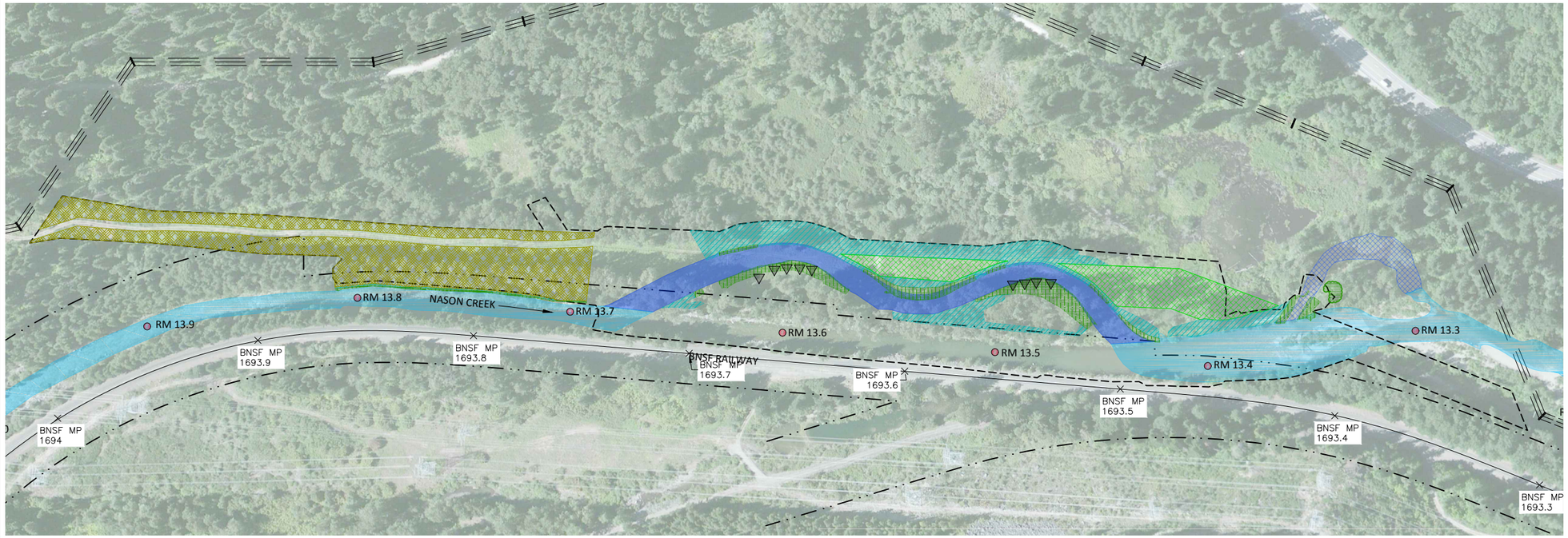
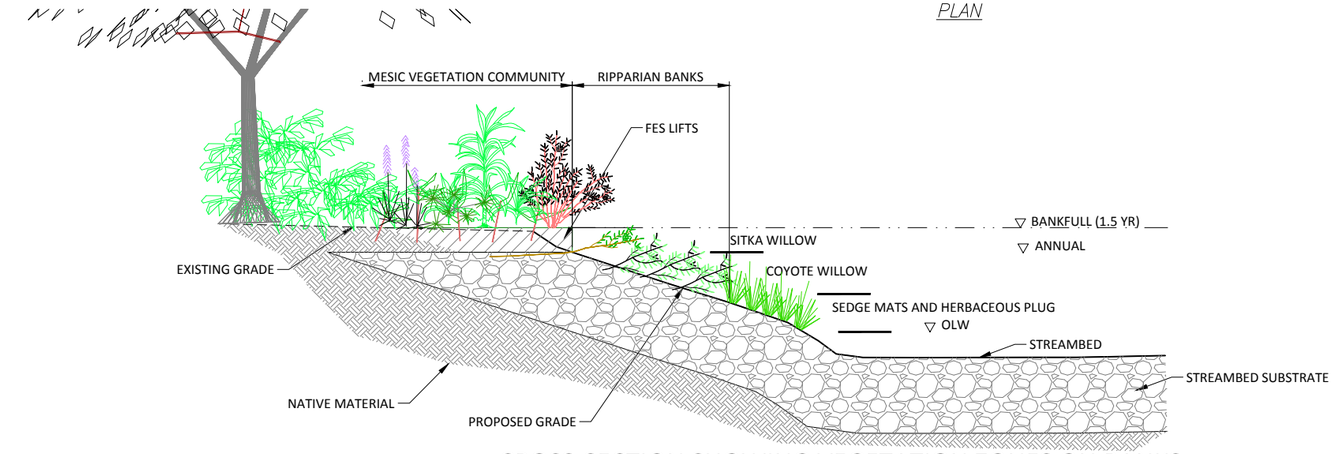
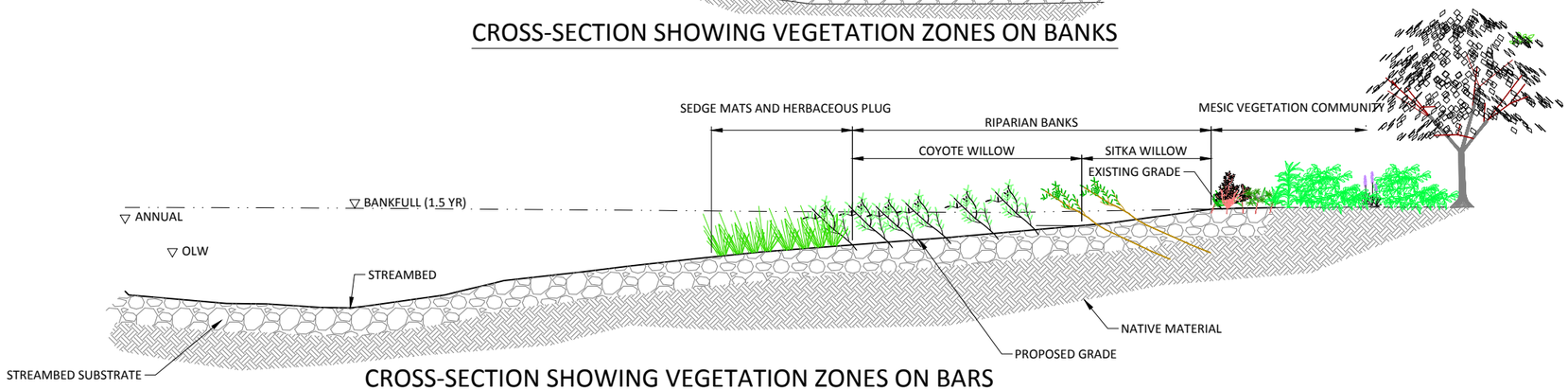


PLAN

0 150 300
SCALE IN FEET



CROSS-SECTION SHOWING VEGETATION ZONES ON BANKS



CROSS-SECTION SHOWING VEGETATION ZONES ON BARS

LEGEND

- RM 13.5 — RIVER MILE MARKER
- LIMITS OF DISTURBANCE
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- CENTERLINE OF BNSF TRACKS
- WETLAND AREAS 1.75 ACRES
- STREAMBANK SEED MIX AND WOODY VEGETATION 0.74 ACRES
- MESIC SEED MIX AND VEGETATION 1.88 ACRES
- UPLAND SEED MIX AND WOODY VEGETATION 3.12 ACRES
- SEDGE MATS ON BENCH

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REVEGETATION PLAN (2017)

52

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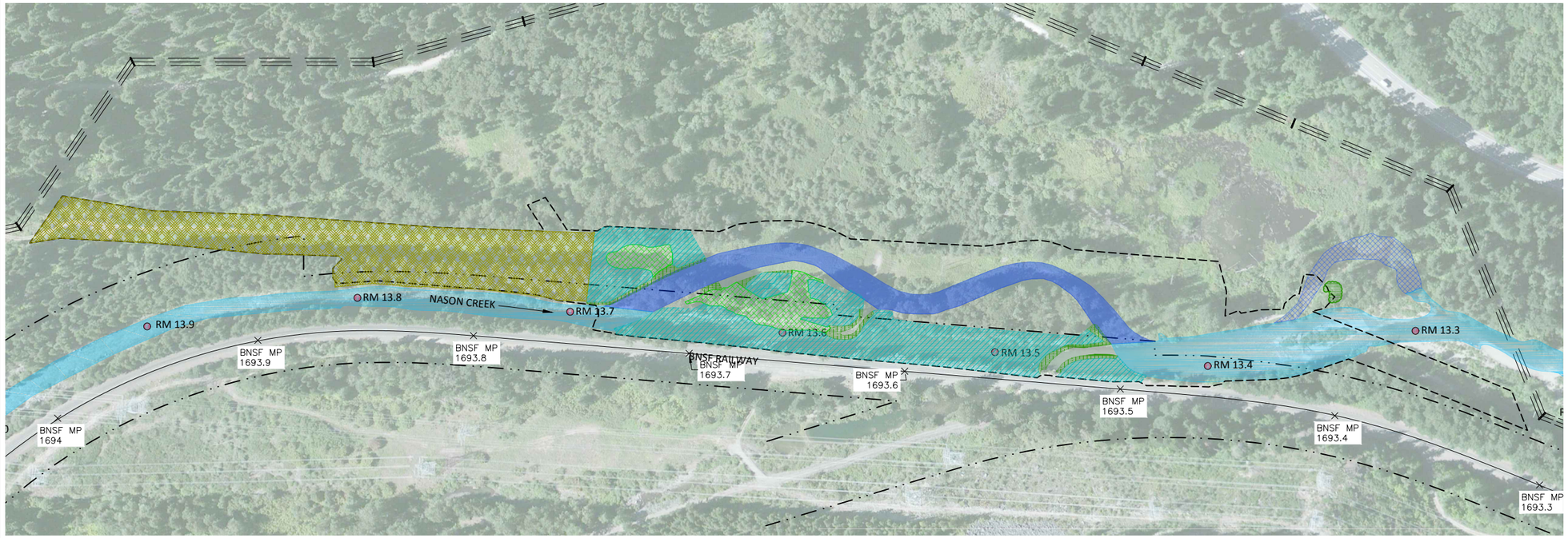

PLAN

0 150 300
SCALE IN FEET

LEGEND

- RM 13.5 — RIVER MILE MARKER
- LIMITS OF DISTURBANCE
- EXISTING BNSF ROW (FOR REFERENCE ONLY)
- CENTERLINE OF BNSF TRACKS
- WETLAND AREAS 0.76 ACRES
- STREAMBANK SEED MIX AND WOODY VEGETATION 0.28 ACRES
- MESIC SEED MIX AND VEGETATION 3.26 ACRES
- UPLAND SEED MIX AND WOODY VEGETATION 3.76 ACRES

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REVEGETATION PLAN (2018)

53
SHEET 53 OF 55

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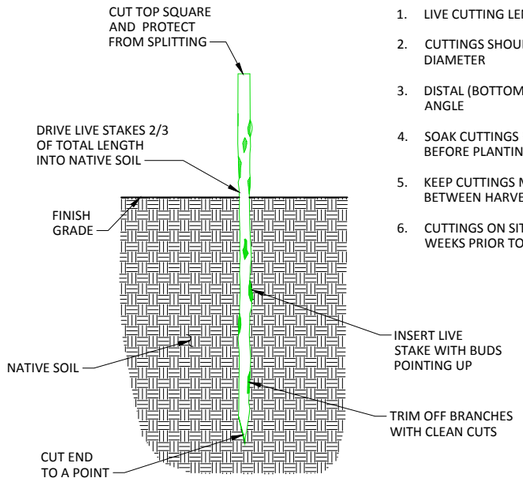
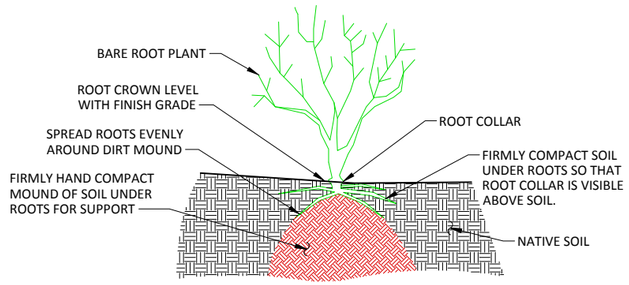


LIVE CUTTING PLANTING NOTES:

1. LIVE CUTTING LENGTH AT LEAST 48 INCHES
2. CUTTINGS SHOULD BE AT LEAST HALF INCH DIAMETER
3. DISTAL (BOTTOM) END CUT AT ~45 DEG ANGLE
4. SOAK CUTTINGS FOR 24 HOURS TO 10 DAYS BEFORE PLANTING
5. KEEP CUTTINGS MOIST, COOL, AND SHADED BETWEEN HARVEST AND PLANTING
6. CUTTINGS ON SITE FOR MAXIMUM OF 2 WEEKS PRIOR TO PLANTING

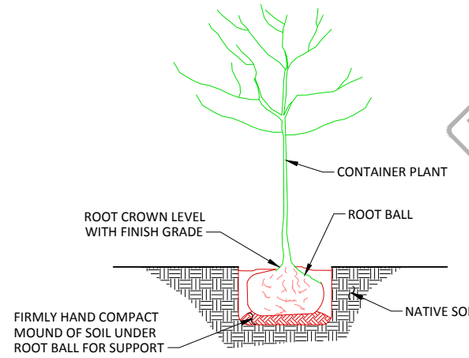
LIVE CUTTING DETAIL
NOT TO SCALE



BARE ROOT PLANTING NOTES:

1. PLANTING HOLE SHOULD BE DUG 2' WIDER THAN THE DIAMETER OF THE ROOT WAD.
2. PLANT SHOULD BE PLACED SO THAT THE ROOT COLLAR IS VISIBLE ABOVE THE SOIL SURFACE. TO REACH THE DESIRED PLANTING HEIGHT MOUND FIRMLY COMPACTED SOIL IN THE BOTTOM OF THE PLANTING PIT.
3. BACKFILL THE HOLE UNTIL IT IS HALF FULL. LIGHTLY TAMP SOIL WITH YOUR FOOT TO REMOVE LARGE AIR POCKETS. WATER ROOTS UNTIL SOIL IS COMPLETELY SATURATED, WHILE GENTLY SHAKING THE PLANT'S TRUNK SO THAT ANY REMAINING AIR POCKETS ARE REMOVED.
4. FILL HOLE THE REMAINDER OF THE WAY. USE ANY REMAINING SOIL TO BUILD A TEMPORARY SOIL BERM ABOVE THE PERIMETER OF THE ROOTS. DEEP WATER THE PLANT AGAIN.

BARE ROOT DETAIL
NOT TO SCALE



CONTAINER PLANTING NOTES:

1. DIG PLANTING HOLE 3" LARGER THAN ROOT BALL ON ALL SIDES, AND TO 3" DEEPER THAN THE HEIGHT OF THE ROOT BALL FROM BOTTOM OF CONTAINER TO ROOT COLLAR.
2. REMOVE CONTAINER AND MAKE THREE VERTICAL CUTS EQUALLY SPACED AROUND THE PERIMETER OF THE ROOT WAD TO A DEPTH OF 1/2 INCH.
3. PLANT SHOULD BE PLACED SO THAT THE ROOT COLLAR IS VISIBLE ABOVE THE SOIL SURFACE. TO REACH THE DESIRED PLANTING HEIGHT MOUND SOIL IN THE BOTTOM OF THE PLANTING HOLE AND FIRMLY COMPACT BY HAND UNTIL CORRECT HEIGHT IS REACHED.
4. BACKFILL AROUND ROOT BALL, FIRMLY COMPACTING SOIL BY HAND, TO A LEVEL 3/4" BELOW FINISH GRADE.

CONTAINER PLANT DETAIL
NOT TO SCALE

Preliminary 90%

NOTES:

1. APPLY SEED MIX USING A SEED DRILLER OR IMPRINTER.
2. APPLY 1" WOOD CHIP MULCH TO ALL AREAS WITHOUT FABRIC.
3. SEED AND MULCH SWALE ALONG ACCESS ROAD ALIGNMENT PER PLANS AS THE LAST STEP OF CONSTRUCTION.
4. PLANT RIPARIAN AND UPLAND AREAS PER SPECIES LISTS ON SHEET 55.
5. IRRIGATE ALL SEEDED AND PLANTED AREAS ONCE PER WEEK WITH 1" OF WATER FROM DATE OF PLANTING /SEEDING TO THE END OF OCTOBER.

SEED/GROUNDCOVER

GENERAL

ALL SEED SHALL COMPLY WITH REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS. WORK SHALL INCLUDE, BUT NOT BE LIMITED TO PURCHASE, STORAGE, INSTALLATION AND MAINTENANCE OF SEED THROUGHOUT THE PROJECT.

SEED TO BE APPLIED BY CONTRACTOR. IF GROUND DISTURBANCE OCCURS OUTSIDE THE DEPICTED OR STAKED LIMITS, CONTRACTOR SHALL SEED AREA WITH APPROPRIATE MIX AT NO COST TO OWNER.

SEEDING AREAS OVERLAP.

QUALITY

SEED MIXES SHALL BE FREE OF NOXIOUS WEED SEEDS. SEEDS THAT HAVE BECOME WET, MOLDY, OR OTHERWISE DAMAGED, OR DO NOT MEET THE SPECIFICATIONS WILL BE REJECTED BY THE ENGINEER AT NO COST TO THE OWNER.

LABELS

THE CONTENTS OF EACH BAG OF SEED DELIVERED SHALL BE CLEARLY LABELED AND THE FOLLOWING INFORMATION SHALL BE SUPPLIED UPON DELIVERY OF SEED:

A) COMMON NAME, GENUS, SPECIES, AND SUBSPECIES (WHEN APPLICABLE);
B) AMOUNT OF PURE LIVE SEED (PLS) POUNDS OF EACH SPECIES IN EACH SEED MIX;
C) PERCENT VIABILITY OF EACH SPECIES IN EACH SEED MIX;
D) TOTAL DELIVERED WEIGHT, IN POUNDS, OF EACH SEED MIX;
E) STATE AND COUNTY OF ORIGIN OF EACH SPECIES OF SEED USED IN MIXES; AND
F) NAME AND ADDRESS OF THE SEED SUPPLIER.

DELIVERY

THE DELIVERY DATE FOR SEED MIXES SHALL BE ARRANGED WITH THE CONTRACTOR, AND SUBJECT TO THE APPROVAL OF THE ENGINEER.

STORAGE

SEED SHALL BE STORED IN A COOL, DRY ENVIRONMENT UNTIL APPLICATION.

SOIL PREPARATION

RESTORE DISTURBED AREAS TO PRE-PROJECT GRADE.

PROPER SOIL PREPARATION PRIOR TO INSTALLATION OF SEED MIXES IS ESSENTIAL. ALL AREAS TO BE SEEDED SHALL HAVE A LOOSE, FRIABLE SEEDBED, FREE OF ANY WEED SEED, AND SHALL BE CONSTRUCTED TO MEET THE FINISH GRADE.

MULCHING AND CARE OF SEEDED AREAS

MULCH TO BE OBTAINED ON-SITE TO AVOID IMPORTING WEEDS.

APPLY 1" OF WOOD CHIP MULCH OVER ALL SEEDED AREAS. SEEDING AND MULCHING WILL TAKE PLACE AS THE LAST STEP OF CONSTRUCTION WHEN THE SITE IS DEMOBILIZED.

ANY AREAS SEEDED DURING CONSTRUCTION SHALL BE PROTECTED AND MAINTAINED THROUGHOUT THE CONSTRUCTION OF THE PROJECT AND UNTIL THE WORK IS ACCEPTED. NO CONSTRUCTION TRAFFIC WILL BE ALLOWED OVER A SEEDED OR PLANTED AREA ONCE THE SEED AND EROSION CONTROL MEASURES HAVE BEEN COMPLETED. FOOT TRAFFIC SHALL BE MINIMIZED ON SEEDED AREAS.

PLANTINGS

INDIVIDUAL PLANT LOCATIONS WILL BE DETERMINED IN THE FIELD BASED ON CONDITIONS. PLANTS SHALL BE OBTAINED FROM A LOCAL NURSERY WITHIN 150 MILES THAT SPECIALIZES IN THE PROPAGATION AND SALE OF NATIVE VEGETATION. ALL PLANTS SHALL BE WATERED UNTIL THE SOIL IS THOROUGHLY SATURATED IMMEDIATELY AFTER INSTALLATION. TO AVOID STEM ROT, MULCH MATERIAL SHALL BE PULLED BACK FROM THE PLANTS SO THAT MULCH DOES NOT CONTACT PLANT STEMS. ALL PLANTS SHALL BE SUBJECT TO INSPECTION BY THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.

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REVEGETATION DETAILS AND NOTES

54

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Upland Area Woody Vegetation Plantings - 2017 0.0 acres, 2018 3.7 acres, Total 3.7 acres							
Trees							
Species	**Common Name**	**% of Mix**	**Density**	**Form**	**2017 No.**	**2018 No.**	**Total No.**
Pinus ponderosa	Ponderosa pine	10	10' OC	tall 1 gal	-	164	164
Pseudotsuga menziesii	Douglas Fir	5	10' OC	tall 1 gal	-	82	82
				Sub-total	-	246	246
Shrubs							
Species	**Common Name**	**% of Mix**	**Density**	**Form**	**2017 No.**	**2018 No.**	**Total No.**
Amelanchier alnifolia	Pacific serviceberry	10	5' OC	tall 1 gal	-	656	656
Arctostaphylos uva-ursi	Bearberry	1	5' OC	tall 1 gal	-	66	66
Berberis aquilifolium	Tall Oregon grape	1	5' OC	3" x 18" tube	-	66	66
Berberis nervosa	Cascade Oregon grape	1	5' OC	3" x 18" tube	-	66	66
Ceanothus sanguineus	Redstem ceanothus	1	5' OC	3" x 18" tube	-	66	66
Ceanothus velutinus	Snowbrush ceanothus	1	5' OC	3" x 18" tube	-	66	66
Crataegus douglassii	Black hawthorn	10	5' OC	3" x 18" tube	-	656	656
Holodiscus discolor	Ocean spray	5	5' OC	3" x 18" tube	-	328	328
Pachistima myrsites	Oregon boxleaf	1	5' OC	tall 1 gal	-	66	66
Prunus emarginata	Oregon cherry	20	5' OC	tall 1 gal	-	1311	1311
Prunus virginiana	Chokecherry	5	5' OC	tall 1 gal	-	328	328
Rosa gymnocarpa	Dwarf rose	1	5' OC	tall 1 gal	-	66	66
Rosa woodsii	Woods' rose	10	5' OC	tall 1 gal	-	656	656
Symphoricarpos albus	Common snowberry	20	5' OC	3" x 18" tube	-	1311	1311
Note: 1% species mix item percent's are +/-0.5% of total mix. No woody plantings are required in 2017 for areas re-accessed in 2018.				**Sub-total**	-	5708	5708
				Total	-	5954	5954

Upland Area Herbaceous Vegetation Seed Mix - 2017 3.12 acres (Temp.), 2018 3.76 acres, Total 6.88 acres					
Seeding Rate: 15 lbs/acre			**Seed Weight (lbs)**		
Species	**Common Name**	**% of Mix**	**2017**	**2018**	**Total**
Elymus glaucus	Blue wild rye	33.3	15.6	18.8	34.4
Festuca idahoensis	Idaho fescue	33.3	15.6	18.8	34.4
Festuca ovina	Sheep's fescue	33.3	15.6	18.8	34.4
		Total Mix	46.8	56.3	103.1
Incorporate the following forbs or have a separate upland forb mix: Antennaria microphylla, Anaphalis margaratacea, Aster subspicatum, Achillea millefolium, Epilobium angustifolium, Lupine sp., Solidago canadensis					

Mesic Area Woody Vegetation Plantings -2017 1.88 acres, 2018 3.26 acres, Total 5.14 acres							
Trees							
Species	**Common Name**	**% of Mix**	**Density**	**Form**	**2017 No.**	**2018 No.**	**Total No.**
Pinus ponderosa	Ponderosa pine	5	10' OC	Tall 1 gal	41	72	113
Populus trichocarpa	Black cottonwood	10	10' OC	3" x 18" tube	82	143	225
				Sub-total	123	215	338
Shrubs							
Species	**Common Name**	**% of Mix**	**Density**	**Form**	**2017 No.**	**2018 No.**	**Total No.**
Amelanchier alnifolia	Pacific serviceberry	7.5	5' OC	Tall 1 gal	246	427	673
Crataegus douglassii	Black hawthorn	10	5' OC	3" x 18" tube	328	569	897
Holodiscus discolor	Ocean spray	5	5' OC	3" x 18" tube	164	285	449
Prunus emarginata	Oregon cherry	10	5' OC	Tall 1 gal	328	569	897
Rosa gymnocarpa	Dwarf rose	7.5	5' OC	Tall 1 gal	246	427	673
Rosa nutkana	Nootka rose	5	5' OC	Tall 1 gal	164	285	449
Salix lucida v. lasiandra	Pacific willow	5	5' OC	3" x 18" tube	164	285	449
Salix scouleriana	Scouler's willow	10	5' OC	3" x 18" tube	328	569	897
Spirea douglassi	Hardhack	15	5' OC	3" x 18" tube	492	853	1345
Symphoricarpos albus	Common snowberry	10	5' OC	3" x 18" tube	328	569	897
				Sub-total	2788	4838	7626
				Total	2911	5053	7964

Mesic Area Herbaceous Vegetation Seed Mix - 2017 1.88 acres, 2018 3.26 acres, Total 5.14 acres					
Seeding Rate: 15 lbs/acre (77.5 lbs total)			**Seed Weight (lbs)**		
Species	**Common Name**	**% of Mix**	**2017**	**2018**	**Total**
Carex obnupta	Slough sedge	17	4.7	8.2	12.9
Carex stipata	Awlfruit sedge	17	4.7	8.2	12.9
Deschampsia cespitosa	Tufted hairgrass	17	4.7	8.2	12.9
Festuca idahoensis	Idaho fescue	17	4.7	8.2	12.9
Glyceria grandis	American mannagrass	17	4.7	8.2	12.9
Juncus effusus	Common rush	17	4.7	8.2	12.9
		Total Mix	28.2	48.9	77.1

Streambank Woody Vegetation Plantings - 2017 0.74 acres, 2018 0.28 acres, Total 1.02 acres								
Trees								
Species	**Common Name**	**% of Mix**	**Density**	**Form**	**2017 No.**	**2018 No.**	**Total No.**	**Planting Notes**
Populus trichocarpa	Black cottonwood	7.5	3' OC	3" x 18" tube	269	102	371	Middle of bank between OLW and OHW
				Sub-total	269	102	371	
Shrubs								
Species	**Common Name**	**% of Mix**	**Density**	**Form**	**2017 No.**	**2018 No.**	**Total No.**	**Planting Notes**
Cornus sericea sp.	Red-osier dogwood	10	3' OC	3" x 18" tube	359	136	495	Near and above OHW
Rosa nutkana	Nootka rose	10	3' OC	tall 1 gal	359	136	495	Near and above OHW
Salix exigua*	Coyote willow	10	3' OC	3" x 18" tube	359	136	495	Between OLW and OHW
Salix lucida lasiandra*	Pacific willow	10	3' OC	3" x 18" tube	359	136	495	High on bank above OHW
Salix sitchensis*	Sitka willow	10	3' OC	3" x 18" tube	359	136	495	On banks near OHW
Spirea douglassi	Hardhack	10	3' OC	3" x 18" tube	359	136	495	At and above OHW
**Herbaceous sedge mats will comprise the remaining 32.5% of the mix and will include "*" marked willows*				**Sub-total**	2154	816	2970	
				Total	2423	918	3341	

Streambank Herbaceous Vegetation Seed Mix - 2017 0.74 acres, 2018 0.28 acres, Total 1.02 acres					
Seeding Rate: 15 lbs/acre (15.3 lbs total)			**Seed Weight (lbs)**		
Species	**Common name**	**% of mix**	**2017**	**2018**	**Total**
Carex obnupta	Slough sedge	20	2.2	0.8	3.1
Eleocharis palustris	Spike rush	25	2.8	1.1	3.8
Elymus lanceolatus lanceolatus	Thickspike wheatgra	10	1.1	0.4	1.5
Festuca idahoensis	Idaho fescue	15	1.7	0.6	2.3
Juncus balticus	Baltic rush	20	2.2	0.8	3.1
Leymus cinereus	Basin wildrye	10	1.1	0.4	1.5
		Total Mix	11.1	4.2	15.3

Preliminary 90%

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STREAM HABITAT ENHANCEMENT
REVEGETATION TABLES

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