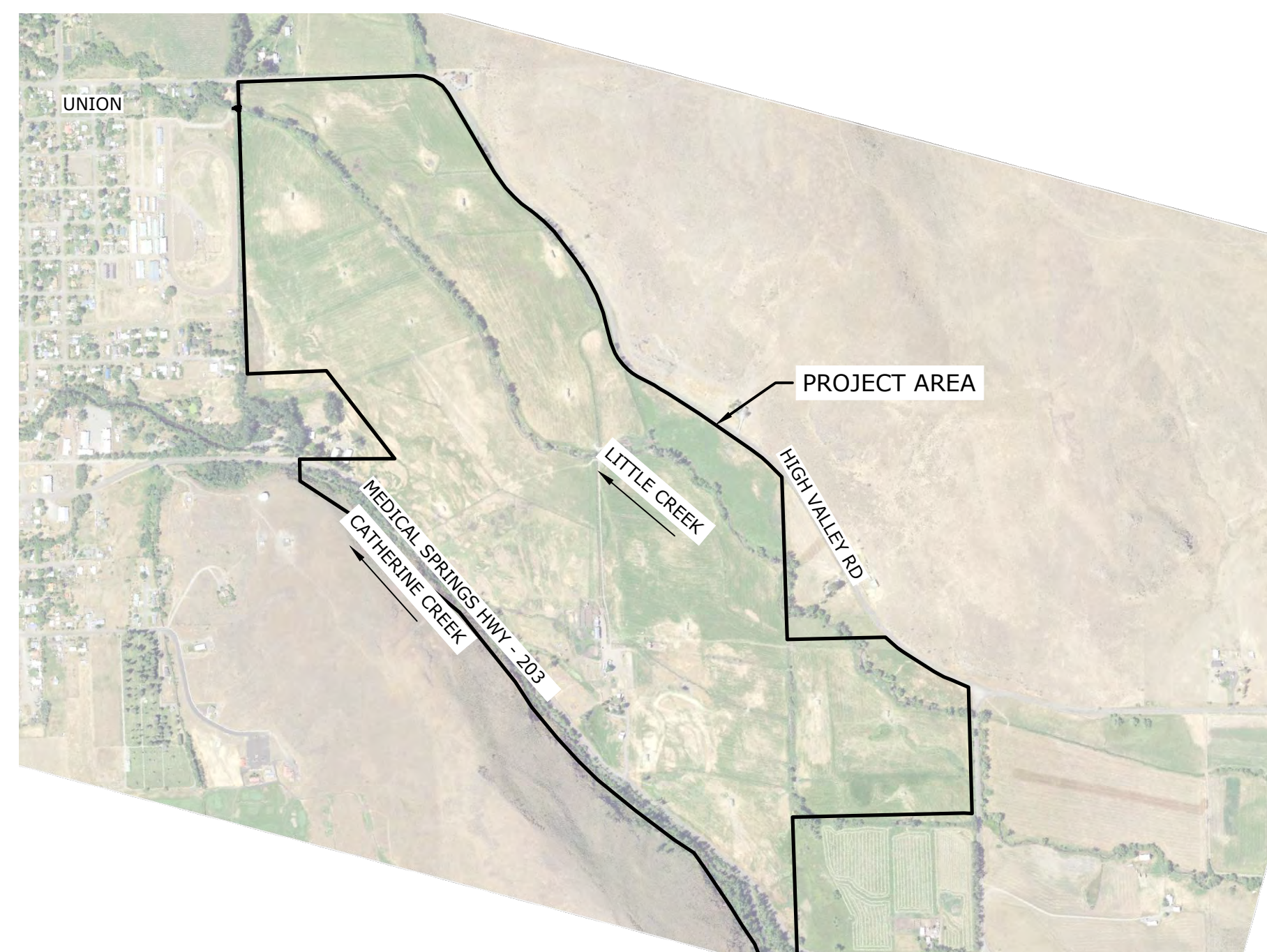
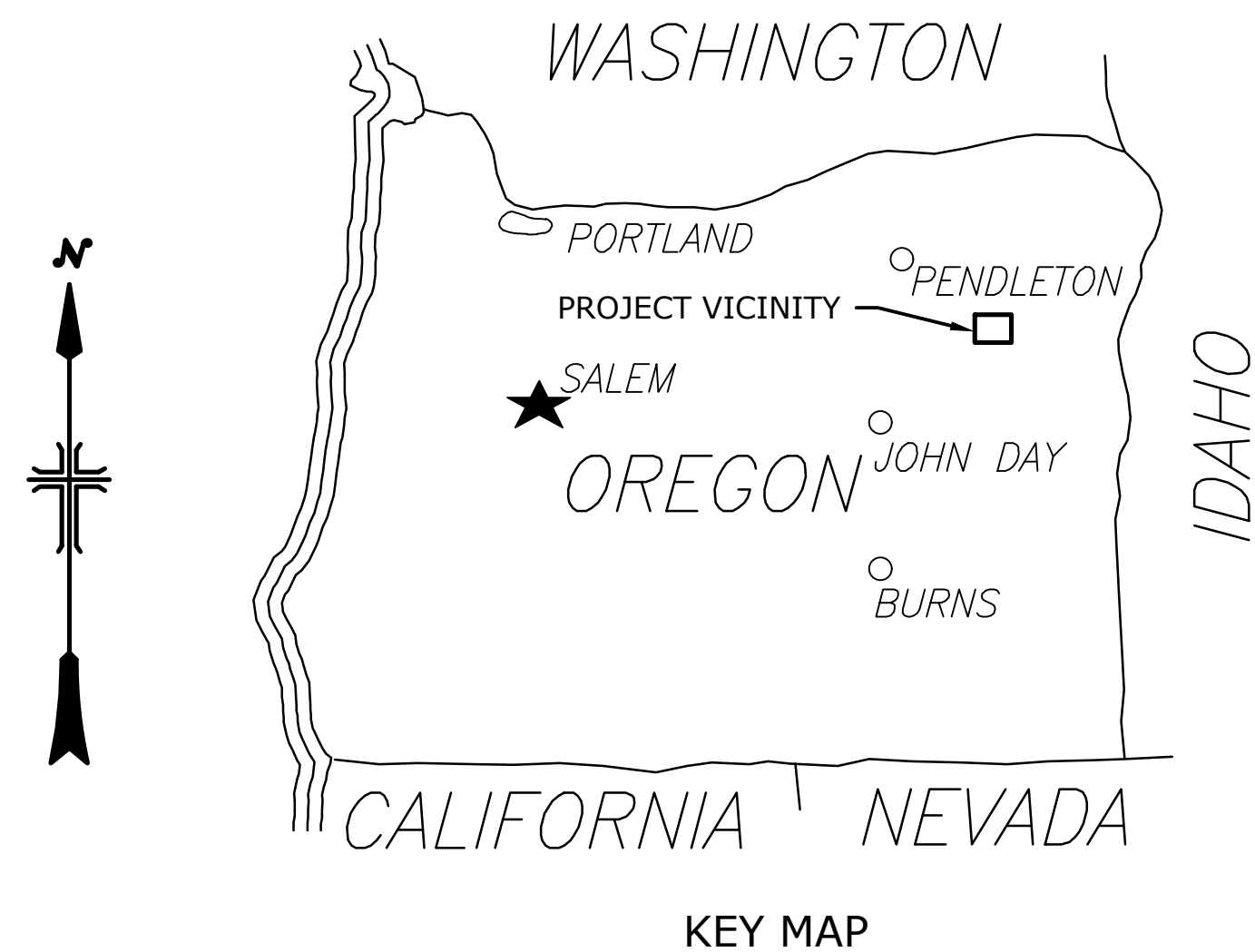


# BUFFALO FLATS HABITAT IMPROVEMENT PROJECT

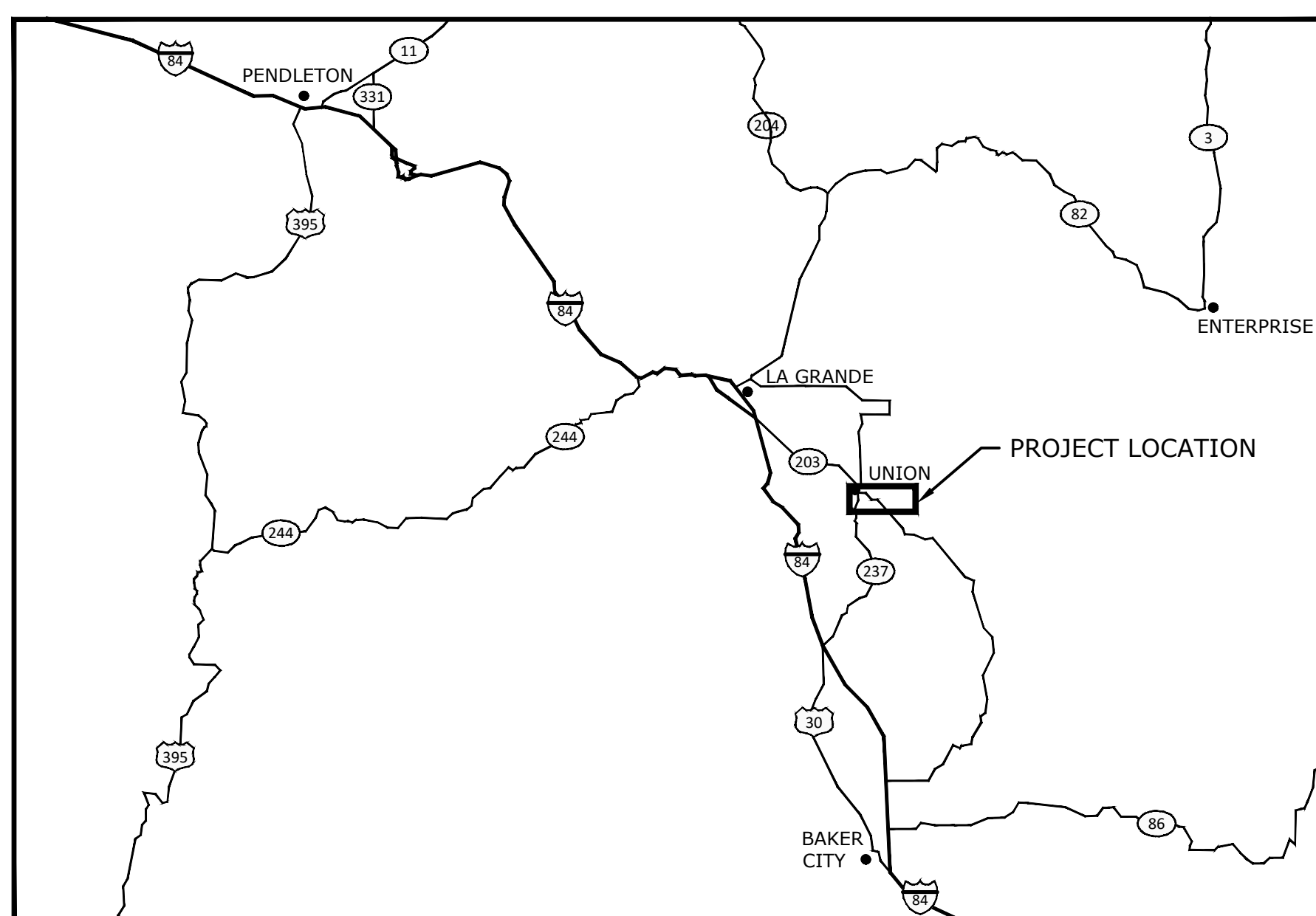
## LITTLE CREEK - GRANDE RONDE RIVER SUBBASIN

### 30% DESIGN DRAWINGS

### DECEMBER 31, 2022



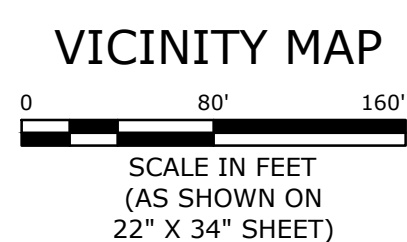
SHEET INDEX	
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2	GENERAL NOTES, QUANTITIES & ABBREVIATIONS
3	HIP IV NOTES
4	OBJECTIVES NARRATIVE
5	EXISTING CONDITIONS & SURVEY CONTROL
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**ON BEHALF OF:**  
 U.S. DEPARTMENT OF THE INTERIOR  
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**PARTNERS:**  
 BONNEVILLE POWER ADMINISTRATION  
 UNION SOIL AND WATER CONSERVATION DISTRICT  
 CTUIR  
 TROUT UNLIMITED  
 LANDOWNERS



**Site Summary**  
 T4S, R40E  
 Union County, Oregon

LAST SAVED DATE  
 2022-12-30  
 DRAWN BY  
 MSMT/TH

CAD SYSTEM  
 AutoCAD 2015 (LMS TECH)  
 AutoCAD 2015 (LMS TECH)  
 IFL BUFFALOFLATS.D.DWG

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 BUREAU OF RECLAMATION  
 COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM  
 FCRRS HABITAT ENHANCEMENT PROGRAM - OREGON  
**GRANDE RONDE RIVER SUBBASIN**  
**BUFFALO FLATS HABITAT IMPROVEMENT PROJECT**

CONTRACTOR  
 DRAWN  
 ACCEPTED  
 UNION, OR 2022-12-31

COVER, SHEET INDEX & VICINITY MAPS

GENERAL NOTES

- 1. Work shown in these contract documents will be performed for the Union County Soil and Water Conservation District, herein referred to as "Contracting Agency". Contracting Agency's representative assigned by Contracting Agency is herein referred to as the "Contracting Officer".
2. The drawings contained within should not be applied to any project except the one specified.
3. For those portions of full-size drawings (22x34 inches) showing scale bars, the major scale unit equals 1 inch. On comparable portions of half-size drawings (11x17 inches), the major scale unit equals 1/2 inch.
4. Elevations and distances shown are in feet and decimals with contour intervals at 1-foot and 5-foot increments.
5. Horizontal datum is State Plane Coordinate System, Oregon North Zone, NAD83 (2011), International Feet. The vertical datum is NAVD88.
6. Topographic mapping within stream banks was performed by TWI (Fall 2005) and supplemented in 2019 (USBR and Inter-Fluve) and 2020 (USBR). Geometry of the stream bed and banks at the time of construction may be different than shown on the Drawings. Topographic mapping outside the stream banks is based on 2008 LIDAR performed by Watershed Sciences (Corvallis, Oregon), and supplemental survey performed by USBR (2017, 2018, 2019 and 2020) and Inter-Fluve (2019 and 2022).

CONTRACTOR REQUIREMENTS

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

UTILITY NOTES

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

CARE OF WATER

- 1. The Contractor is responsible for work area isolation and performing work in compliance with all permits and ESA stipulations which are detailed in BPA's HIP IV conservation measures on sheet 3. The Contractor may only work within ordinary high water (OHW) during the stipulated in-water work period.

WETLANDS AND WATERS OF THE US

- 1. The ordinary high water (OHW) and wetland lines displayed in this design package were delineated by inter-Fluve staff in 2019 and are based upon analysis, modeling, field reconnaissance and best professional judgement.

These do not represent jurisdictional boundaries. Within the state of Oregon, the Army Corps of Engineers and the Department of State Lands have the final authority in determining waters and wetlands boundaries and regulations.

Table with 3 columns: EARTHWORK QUANTITIES, CUT (CY), FILL (CY). Row: Excavation, 30,000, 30,000.

Table with 2 columns: TREATMENT QUANTITIES, TREATMENT TYPE, QUANTITY. Rows: Small whole tree (408), Log with rootwad (38), Post assisted brush mound (125 LF), Willow trench (7850 LF), Flood fence (1550 LF).

ABBREVIATIONS

Table of abbreviations including AC (Acre), BMP (Best Management Practices), B.O. (Biological Opinion), BPA (Bonneville Power Administration), CFS (Cubic Feet per Second), CO / C.O. (Contracting Officer), CP (Control Point), CSRO (Columbia-Snake Salmon Recovery Office), CWA (Clean Water Act), CY (Cubic Yards), DBH (Diameter at Breast Height), DC (Direct Current), DEQ (Department Environmental Quality), DSL (Department of State Lands), E (East), EI (Elevation), EPA (Environmental Protection Agency), ESA (Endangered Species Act), FCRPS (Federal Columbia River Power System), FG (Finished Grade), FT (Foot), GRMW (Grande Ronde Model Watershed), HIP (Habitat Improvement Program), Hwy (Highway), I (Interstate), IN (Inch), LBS (Pounds), LF (Linear Feet), LWM (Large Woody Material), MAX (Maximum), MC (Main Channel), MIN (Minimum), MW (Monitoring Well), N (North), NAD (North American Datum), NAVD (North American Vertical Datum), NEPA (National Environmental Policy Act), NMFS (National Marine Fisheries Service), NPDES (National Pollution Discharge Elimination System), ODFW (Oregon Department of Fish and Wildlife), ODOT (Oregon Department of Transportation), OHW (Ordinary High Water), OR (Oregon), OSHA (Occupational Safety and Health Administration), PDC (Pulsed Direct Current), PH (Phone), PLS/AC (Pure Live Seed per Acre), R (Range), S (South), SC (Side Channel), Sec. (Section), SHPO (State Historic Preservation Office), STA (Station), SWCD (Soil and Water Conservation District), SWPPP (Storm Water Pollution Prevention Plan), SY (Square Yards), T (Township), TESC (Temporary Erosion & Sediment Control), TOB (Top of Bank), Typ (Typical), U.S. (United States), USACE (United States Army Corps of Engineers), USBR (United State Bureau of Reclamation), USFS (United States Forest Service), USFWS (United States Fish & Wildlife Service), v (Volts), W (West), WSE (Water Surface Elevation), YR (Year), μs (Micro-Siemens).



501 Portway Avenue, Suite 101 Hood River, OR 97031 541-386-9003 www.inter-fluve.com

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COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM FCRPS HABITAT ENHANCEMENT PROGRAM - OREGON

GRANDE RONDE RIVER SUBBASIN

BUFFALO FLATS HABITAT IMPROVEMENT PROJECT

Not for Distribution

CONTRACTOR DRAWN

ACCEPTED

UNION, OR 2022-12-31

GENERAL NOTES, QUANTITIES & ABBREVIATIONS

LAST SAVED DATE 2022-12-30 10:58:15 AM SAVED BY NSM/TTH

CAD SYSTEM AutoCAD 2018 (LMS TECH) AutoCAD 2018 (LMS TECH) IFL\_BUFFALOFLATS.DWG

**HIP GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS**

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

**PROJECT DESIGN AND SITE PREPARATION.**

**1. STATE AND FEDERAL PERMITS.**

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

**2. TIMING OF IN-WATER WORK**

- A. APPROPRIATE STATE (OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW), WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), AND MONTANA FISH WILDLIFE AND PARKS (MFWP)) GUIDELINES FOR TIMING OF IN-WATER WORK WINDOWS (IWW) WILL BE FOLLOWED.
- B. CHANGES TO ESTABLISHED WORK WINDOWS WILL BE APPROVED BY REGIONAL STATE BIOLOGISTS AND BPA'S EC LEAD.
- C. BULL TROUT. FOR AREAS WITH DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT OR AREAS KNOWN TO HAVE BULL TROUT, PROJECT PROponents WILL CONTACT THE APPROPRIATE USFWS FIELD OFFICE TO INSURE THAT ALL REASONABLE IMPLEMENTATION MEASURES ARE CONSIDERED AND AN APPROPRIATE IN-WATER WORK WINDOW IS BEING USED TO MINIMIZE PROJECT EFFECTS.

- D. LAMPREY. WORKING IN STREAM OR RIVER CHANNELS THAT CONTAIN PACIFIC LAMPREY WILL BE AVOIDED FROM MARCH 1 TO JULY 1 FOR REACHES <5,000 FEET IN ELEVATION AND FROM MARCH 1 TO AUGUST 1 FOR REACHES >5,000 FEET. IF EITHER TIMEFRAME IS INCOMPATIBLE WITH OTHER OBJECTIVES, THE AREA WILL BE SURVEYED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF POSSIBLE. IF LAMPREYS ARE KNOWN TO EXIST, THE PROJECT SPONSOR WILL UTILIZE DEWATERING AND SALVAGE PROCEDURES (SEE FISH SALVAGE AND ELECTROFISHING SECTIONS) TO MINIMIZE ADVERSE EFFECTS.
- E. THE IN-WATER WORK WINDOW WILL BE PROVIDED IN THE CONSTRUCTION PLANS.

**3. CONTAMINANTS**

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

**4. SITE LAYOUT AND FLAGGING**

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

**5. TEMPORARY ACCESS ROADS AND PATHS**

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

**6. TEMPORARY STREAM CROSSINGS**

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

**7. STAGING, STORAGE, AND STOCKPILE AREAS**

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

**8. EQUIPMENT**

- A. MECHANIZED EQUIPMENT AND VEHICLES WILL BE SELECTED, OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE EFFECTS ON THE ENVIRONMENT (E.G., MINIMALLY-SIZED, LOW PRESSURE TIRES; MINIMAL HARD-TURN PATHS FOR TRACKED VEHICLES; TEMPORARY MATS OR PLATES WITHIN WET AREAS OR ON SENSITIVE SOILS).
- B. EQUIPMENT WILL BE STORED, FUELED, AND MAINTAINED IN AN CLEARLY IDENTIFIED STAGING AREA THAT MEETS STAGING AREA CONSERVATION MEASURES.
- C. EQUIPMENT WILL BE REFUELED IN A VEHICLE STAGING AREA OR IN AN ISOLATED HARD ZONE, SUCH AS A PAVED PARKING LOT OR ADJACENT, ESTABLISHED ROAD (THIS MEASURE APPLIES ONLY TO GAS-POWERED EQUIPMENT WITH TANKS LARGER THAN 5 GALLONS).
- D. BIODEGRADABLE LUBRICANTS AND FLUIDS WILL BE USED ON EQUIPMENT OPERATING IN AND ADJACENT TO THE STREAM CHANNEL AND LIVE WATER.
- E. EQUIPMENT WILL BE INSPECTED DAILY FOR FLUID LEAKS BEFORE LEAVING THE VEHICLE STAGING AREA FOR OPERATION WITHIN 150 FEET OF ANY NATURAL WATER BODY OR WETLAND.
- F. EQUIPMENT WILL BE THOROUGHLY CLEANED BEFORE OPERATION BELOW ORDINARY HIGH WATER, AND AS OFTEN AS NECESSARY DURING OPERATION, TO REMAIN GREASE FREE.

**9. EROSION CONTROL**

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

**10. DUST ABATEMENT**

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

**11. SPILL PREVENTION, CONTROL, AND COUNTER MEASURES**

- A. A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES WILL BE AVAILABLE ON-SITE.
- B. WRITTEN PROCEDURES FOR NOTIFYING ENVIRONMENTAL RESPONSE AGENCIES WILL BE POSTED AT THE WORK SITE.
- C. SPILL CONTAINMENT KITS (INCLUDING INSTRUCTIONS FOR CLEANUP AND DISPOSAL) ADEQUATE FOR THE TYPES AND QUANTITY OF HAZARDOUS MATERIALS USED AT THE SITE WILL BE AVAILABLE AT THE WORK SITE.
- D. WORKERS WILL BE TRAINED IN SPILL CONTAINMENT PROCEDURES AND WILL BE INFORMED OF THE LOCATION OF SPILL CONTAINMENT KITS.
- E. ANY WASTE LIQUIDS GENERATED AT THE STAGING AREAS WILL BE TEMPORARILY STORED UNDER AN IMPERVIOUS COVER, SUCH AS A TARPULIN, UNTIL THEY CAN BE PROPERLY TRANSPORTED TO AND DISPOSED OF AT A FACILITY THAT IS APPROVED FOR RECEIPT OF HAZARDOUS MATERIALS.
- F. PUMPS USED ADJACENT TO WATER SHALL USE SPILL CONTAINMENT SYSTEMS.

**12. INVASIVE SPECIES CONTROL**

- A. PRIOR TO ENTERING THE SITE, ALL VEHICLES AND EQUIPMENT WILL BE POWER WASHED, ALLOWED TO FULLY DRY, AND INSPECTED TO MAKE SURE NO PLANTS, SOIL, OR OTHER ORGANIC MATERIAL ADHERES TO THE SURFACE.
- B. WATERCRAFT, WADERS, BOOTS, AND ANY OTHER GEAR TO BE USED IN OR NEAR WATER WILL BE INSPECTED FOR AQUATIC INVASIVE SPECIES.
- C. WADING BOOTS WITH FELT SOLES ARE NOT TO BE USED DUE TO THEIR PROPENSITY FOR AIDING IN THE TRANSFER OF INVASIVE SPECIES UNLESS DECONTAMINATION PROCEDURES HAVE BEEN APPROVED BY THE EC LEAD.

**WORK AREA ISOLATION AND FISH SALVAGE.**

**1. WORK AREA ISOLATION.**

- A. ANY WORK AREA WITHIN THE WETTED CHANNEL WILL BE ISOLATED FROM THE ACTIVE STREAM WHENEVER ESA-LISTED FISH ARE REASONABLY CERTAIN TO BE PRESENT, OR IF THE WORK AREA IS LESS THAN 300-FEET UPSTREAM FROM KNOWN SPAWNING HABITATS.
- B. WORK AREA ISOLATION AND FISH SALVAGE ACTIVITIES WILL COMPLY WITH THE IN-WATER WORK WINDOW.
- C. DESIGN PLANS WILL INCLUDE ALL ISOLATION ELEMENTS AND AREAS (COFFER DAMS, PUMPS, DISCHARGE AREAS, FISH SCREENS, FISH RELEASE AREAS, ETC.).
- D. WORK AREA ISOLATION AND FISH CAPTURE ACTIVITIES WILL OCCUR DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS AND DEATH OF SPECIES PRESENT.

**2. FISH SALVAGE**

- A. MONITORING AND RECORDING WILL TAKE PLACE FOR DURATION OF SALVAGE. THE SALVAGE REPORT WILL BE COMMUNICATED TO AGENCIES VIA THE PROJECT COMPLETION FORM (PCF).
- B. SALVAGE ACTIVITIES SHOULD TAKE PLACE DURING CONDITIONS TO MINIMIZE STRESS TO FISH SPECIES, TYPICALLY PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES WHICH OCCUR IN THE MORNING VERSUS LATE IN THE DAY.
- C. SALVAGE OPERATIONS WILL FOLLOW THE ORDERING, METHODS, AND CONSERVATION MEASURES SPECIFIED BELOW:
  1. SLOWLY REDUCE WATER FROM THE WORK AREA TO ALLOW SOME FISH TO LEAVE VOLUNTIONALLY.
  2. BLOCK NETS WILL BE INSTALLED AT UPSTREAM AND DOWNSTREAM LOCATIONS AND MAINTAINED IN A SECURED POSITION TO EXCLUDE FISH FROM ENTERING THE PROJECT AREA.
  3. BLOCK NETS WILL BE SECURED TO THE STREAM CHANNEL BED AND BANKS UNTIL FISH CAPTURE AND TRANSPORT ACTIVITIES ARE COMPLETE. BLOCK NETS MAY BE LEFT IN PLACE FOR THE DURATION OF THE PROJECT TO EXCLUDE FISH AS LONG AS PASSAGE REQUIREMENTS ARE MET.
  4. NETS WILL BE MONITORED HOURLY DURING IN-STREAM DISTURBANCE.
  5. IF BLOCK NETS REMAIN IN PLACE MORE THAN ONE DAY, THE NETS WILL BE MONITORED AT LEAST DAILY TO ENSURE THEY ARE SECURED AND FREE OF ORGANIC ACCUMULATION. IF BULL TROUT ARE PRESENT, NETS ARE TO BE CHECKED EVERY 4 HOURS FOR FISH IMPINGEMENT.
  6. CAPTURE FISH THROUGH SEINING AND RELOCATE TO STREAMS.
  7. WHILE DEWATERING, ANY REMAINING FISH WILL BE COLLECTED BY HAND OR DIP NETS.
  8. SEINES WITH A MESH SIZE TO ENSURE CAPTURE OF THE RESIDING ESA-LISTED FISH WILL BE USED.
  9. MINNOW TRAPS WILL BE LEFT IN PLACE OVERNIGHT AND USED IN CONJUNCTION WITH SEINING.
  10. ELECTROFISH TO CAPTURE AND RELOCATED FISH NOT CAUGHT DURING SEINING PER ELECTROFISH CONSERVATION MEASURES.
  11. CONTINUE TO SLOWLY DEWATER STREAM REACH.
  12. COLLECT ANY REMAINING FISH IN COLD-WATER BUCKETS AND RELOCATED TO THE STREAM.
  13. LIMIT THE TIME FISH ARE IN A TRANSPORT BUCKET.
  14. MINIMIZE PREDATION BY TRANSPORTING COMPARABLE SIZES IN BUCKETS.
  15. BUCKET WATER TO BE CHANGED EVERY 15 MINUTES OR AERATED.
  16. BUCKETS WILL BE KEPT IN SHADED AREAS OR COVERED.
  17. DEAD FISH WILL NOT BE STORED IN TRANSPORT BUCKETS, BUT WILL BE LEFT ON THE STREAM BANK TO AVOID MORTALITY COUNTING ERRORS.
- D. SALVAGE GUIDELINES FOR BULL TROUT, LAMPREY, MUSSELS, AND NATIVE FISH.
  1. CONDUCT SITE SURVEY TO ESTIMATE SALVAGE NUMBERS.
  2. PRE-SELECT SITE(S) FOR RELEASE AND/OR MUSSEL BED RELOCATION.
  3. SALVAGE OF BULL TROUT WILL NOT TAKE PLACE WHEN WATER TEMPERATURES EXCEED 15 DEGREES CELSIUS.
  4. IF DRAWDOWN LESS THAN 48 HOURS, SALVAGE OF LAMPREY AND MUSSELS MAY NOT BE NECESSARY IF TEMPERATURES SUPPORT SURVIVAL IN SEDIMENTS.
  5. SALVAGE MUSSELS BY HAND, LOCATING BY SNORKELING OR WADING.
  6. SALVAGE LAMPREY BY ELECTROFISHING (SEE ELECTROFISHING FOR LARVAL LAMPREY SETTINGS AND LARVAL LAMPREY DRY SHOCKING SETTINGS).
  7. SALVAGE BONY FISH AFTER LAMPREY WITH NETS OR ELECTROFISHING (SEE ELECTROFISHING FOR APPROPRIATE SETTINGS).
  8. REGULARLY INSPECT DEWATERED SITE SINCE LAMPREY LIKELY TO EMERGE AFTER DEWATERING AND MUSSELS MAY BECAME VISIBLE.
  9. MUSSELS MAY BE TRANSFERRED IN COOLERS.
  10. MUSSELS WILL BE PLACED INDIVIDUALLY TO ENSURE ABILITY TO BURROW INTO NEW HABITAT.

**3. ELECTROFISHING**

- A. INITIAL SITE SURVEY AND INITIAL SETTINGS.
  1. IDENTIFY SPAWNING ADULTS AND ACTIVE REDDS TO AVOID.
  2. RECORD WATER TEMPERATURE. ELECTROFISHING WILL NOT OCCUR WHEN WATER TEMPERATURES ARE ABOVE 15 DEGREES CELSIUS.
  3. IF POSSIBLE, A BLOCK NET WILL BE PLACED DOWNSTREAM AND CHECKED REGULARLY TO CAPTURE STUNNED FISH THAT DRIFT DOWNSTREAM.
  4. INITIAL SETTINGS WILL BE 100 VOLTS, PULSE WIDTH OF 500 MICRO SECONDS, AND PULSE RATE OF 30 HERTZ.
  5. RECORDS FOR CONDUCTIVITY, WATER TEMPERATURE, AIR TEMPERATURE, ELECTROFISHING SETTINGS, ELECTROFISHER MODEL, ELECTROFISHER CALIBRATION, FISH CONDITIONS, FISH MORTALITIES, AND TOTAL CAPTURE RATES WILL BE INCLUDED IN THE SALVAGE LOG BOOK.

**B. ELECTROFISHING TECHNIQUE.**

- 1. SAMPLING WILL BEGIN USING STRAIGHT DC. POWER WILL REMAIN ON UNTIL THE FISH IS NETTED WHEN USING STRAIGHT DC. GRADUALLY INCREASE VOLTAGE WHILE REMAINING BELOW MAXIMUM LEVELS.
- 2. MAXIMUM VOLTAGE WILL BE 1100 VOLTS WHEN CONDUCTIVITY IS <100 MILLISECONDS, 800 VOLTS WHEN CONDUCTIVITY IS BETWEEN 100 AND 300 MILLISECONDS, AND 400 VOLTS WHEN CONDUCTIVITY IS >300 MILLISECONDS.
- 3. IF FISH CAPTURE IS NOT SUCCESSFUL USING STRAIGHT DC, THE ELECTROFISHER WILL BE SET TO INITIAL VOLTAGE FOR PDC. VOLTAGE, PULSE WIDTH, AND PULSE FREQUENCY WILL BE GRADUALLY INCREASED WITHIN MAXIMUM VALUES UNTIL CAPTURE IS SUCCESSFUL.
- 4. MAXIMUM PULSE WIDTH IS 5 MILLISECONDS. MAXIMUM PULSE RATE IS 70 HERTZ
- 5. ELECTROFISHING WILL NOT OCCUR IN ONE AREA FOR AN EXTENDED PERIOD.
- 6. THE ANODE WILL NOT INTENTIONALLY COME INTO CONTACT WITH FISH. THE ZONE FOR POTENTIAL INJURY OF 0.5 M FROM THE ANODE WILL BE AVOIDED.
- 7. SETTINGS WILL BE LOWERED IN SHALLOWER WATER SINCE VOLTAGE GRADIENTS LIKELY TO INCREASE.
- 8. ELECTROFISHING WILL NOT OCCUR IN TURBID WATER WHERE VISIBILITY IS POOR (I.E. UNABLE TO SEE THE BED OF THE STREAM).
- 9. OPERATIONS WILL IMMEDIATELY STOP IF MORTALITY OR OBVIOUS FISH INJURY IS OBSERVED. ELECTROFISHING SETTINGS WILL BE REEVALUATED.

**C. SAMPLE PROCESSING.**

- 1. FISH SHALL BE SORTED BY SIZE TO AVOID PREDATION DURING CONTAINMENT.
- 2. SAMPLERS WILL REGULARLY CHECK CONDITIONS OF FISH HOLDING CONTAINERS, AIR PUMPS, WATER TRANSFERS, ETC.
- 3. FISH WILL BE OBSERVED FOR GENERAL CONDITIONS AND INJURIES
- 4. EACH FISH WILL BE COMPLETELY REVIVED BEFORE RELEASE. ESA-LISTED SPECIES WILL BE PRIORITIZED FOR SUCCESSFUL RELEASE.

**D. BULL TROUT ELECTROFISHING.**

- 1. ELECTROFISHING FOR BULL TROUT WILL ONLY OCCUR FROM MAY 1 TO JULY 31. NO ELECTROFISHING WILL OCCUR IN ANY BULL TROUT OCCUPIED HABITAT AFTER AUGUST 15. IN FMO HABITATS ELECTROFISHING MAY OCCUR ANY TIME.
- 2. ELECTROFISHING OF BULL TROUT WILL NOT OCCUR WHEN WATER TEMPERATURES EXCEED 15 DEGREES CELSIUS.
- E. LARVAL LAMPREY ELECTROFISHING.
  1. PERMISSION FROM EC LEAD WILL BE OBTAINED IF LARVAL LAMPREY ELECTROFISHER IS NOT ONE OF FOLLOWING PRE-APPROVED MODELS: ABP-2 "WISCONSIN", SMITH-ROOT LR-24, OR SMITH-ROOT APEX BACKPACK.
  2. LARVAL LAMPREY SAMPLING WILL INCORPORATE 2-STAGE METHOD: "TICKLE" AND "STUN".
  3. FIRST STAGE: USE 125 VOLT DC WITH A 25 PERCENT DUTY CYCLE APPLIED AT A SLOW RATE OF 3 PULSES PER SECOND. IF TEMPERATURES ARE BELOW 10 DEGREES CELSIUS, VOLTAGE MAY BE INCREASED GRADUALLY (NOT TO EXCEED 200 VOLTS). BURSTED PULSES (THREE SLOW AND ONE SKIPPED) RECOMMENDED TO INCREASE EMERGENCE.
  4. SECOND STAGE (OPTIONAL FOR EXPERIENCED NETTERS): IMMEDIATELY AFTER LAMPREY EMERGE, USE A FAST PULSE SETTING OF 30 PULSES PER SECOND.
  5. USE DIP NETS FOR VISIBLE LAMPREY. SEINES AND FINE MESH NET SWEEPS MAY BE USED IN POOR VISIBILITY.
  6. SAMPLING WILL OCCUR SLOWLY (>60 SECONDS PER METER) STARTING AT UPSTREAM AND WORKING DOWNSTREAM.
  7. MULTIPLE SWEEPS TO OCCUR WITH 15 MINUTES BETWEEN SWEEPS.
  8. POST-DRAWDOWN "DRY-SHOCKING" WILL BE APPLIED IF LARVAL LAMPREY CONTINUE TO EMERGE. ANODES TO BE PLACED ONE METER APART TO SAMPLE ONE SQUARE METER AT A TIME FOR AT LEAST 60 SECONDS. FOR TEMPERATURES LESS THAN 10 DEGREES CELSIUS, MAXIMUM VOLTAGE MAY BE GRADUALLY INCREASED TO 400 VOLTS (DRY-SHOCKING ONLY).

**4. DEWATERING**

- A. DEWATERING WILL OCCUR AT A RATE SLOW ENOUGH TO ALLOW SPECIES TO NATURALLY MIGRATE OUT OF THE WORK AREA.
- B. WHERE A GRAVITY FEED DIVERSION IS NOT POSSIBLE, A PUMP MAY BE USED. PUMPS WILL BE INSTALLED TO AVOID REPETITIVE DEWATERING AND REWATERING.
- C. WHEN FISH ARE PRESENT, PUMPS WILL BE SCREENED IN ACCORDANCE WITH NMFS FISH SCREEN CRITERIA. NMFS ENGINEERING REVIEW AND APPROVAL WILL BE OBTAINED FOR PUMPS EXCEEDING 3 CUBIC FEET PER SECOND.
- D. DISSIPATION OF FLOW ENERGY AT THE BYPASS OUTFLOW WILL BE PROVIDED TO PREVENT DAMAGE TO THE STREAM CHANNEL AND RIPARIAN VEGETATION.
- E. SEEPAGE WATER WILL BE PUMPED TO A TEMPORARY STORAGE AND TREATMENT SITE OF INTO UPLAND AREAS TO ALLOW WATER TO PERCOLATE THROUGH SOIL AND VEGETATION PRIOR TO REENTERING THE STREAM CHANNEL.

**CONSTRUCTION AND POST CONSTRUCTION CONSERVATION MEASURES.**

**1. FISH PASSAGE**

- A. FISH PASSAGE WILL BE PROVIDED FOR ADULT AND JUVENILE FISH LIKELY TO BE PRESENT DURING CONSTRUCTION UNLESS PASSAGE DID NOT EXIST BEFORE CONSTRUCTION, THE STREAM IS NATURALLY IMPASSABLE, OR PASSAGE WILL NEGATIVELY IMPACT ESA-LISTED SPECIES OR THEIR HABITAT.
- B. FISH PASSAGE ALTERNATIVES WILL BE APPROVED BY THE BPA EC LEAD UNDER ADVICE BY THE NMFS HABITAT BIOLOGIST.

**2. CONSTRUCTION AND DISCHARGE WATER**

- A. SURFACE WATER MAY BE DIVERTED TO MEET CONSTRUCTION NEEDS ONLY IF DEVELOPED SOURCES ARE UNAVAILABLE OR INADEQUATE.
- B. DIVERSIONS WILL NOT EXCEED 10% OF THE AVAILABLE FLOW.
- C. CONSTRUCTION DISCHARGE WATER WILL BE COLLECTED AND TREATED TO REMOVE DEBRIS, NUTRIENTS, SEDIMENT, PETROLEUM HYDROCARBONS, METALS, AND OTHER POLLUTANTS.

**3. TIME AND EXTENT OF DISTURBANCE**

- A. EARTHWORK REQUIRING IN-STREAM MECHANIZED EQUIPMENT (INCLUDING DRILLING, EXCAVATION, DREDGING, FILLING, AND COMPACTING) WILL BE COMPLETED AS QUICKLY AS POSSIBLE.
- B. MECHANIZED EQUIPMENT WILL WORK FROM TOP OF BANK UNLESS WORK FROM ANOTHER LOCATION WILL RESULT IN LESS HABITAT DISTURBANCE (TURBIDITY, VEGETATION DISTURBANCE, ETC.).

**4. CESSATION OF WORK**

- A. PROJECT OPERATIONS WILL CEASE WHEN HIGH FLOW CONDITIONS MAY RESULT IN INUNDATION OF THE PROJECT AREA (FLOOD EFFORTS TO DECREASE DAMAGES TO NATURAL RESOURCES PERMITTED).
- B. WATER QUALITY LEVELS EXCEEDED. SEE CWA SECTION 401 WATER QUALITY CERTIFICATION AND TURBIDITY MEASURES.

**5. SITE RESTORATION**

- A. DISTURBED AREAS, STREAM BANKS, SOILS, AND VEGETATION WILL BE CLEANED UP AND RESTORED TO IMPROVED OR PRE-PROJECT CONDITIONS.
- B. PROJECT-RELATED WASTE WILL BE REMOVED.
- C. TEMPORARY ACCESS ROADS AND STAGING WILL BE DECOMPACTED AND RESTORED. SOILS WILL BE LOOSENEED IF NEEDED FOR REVEGETATION OR WATER INFILTRATION.
- D. THE PROJECT SPONSOR WILL RETAIN THE RIGHT OF REASONABLE ACCESS TO THE SITE TO MONITOR AND MAINTAIN THE SITE OVER THE LIFE OF THE PROJECT.
- E. **REVEGETATION**
  - A. PLANTING AND SEEDING WILL OCCUR PRIOR TO OR AT THE BEGINNING OF THE FIRST GROWING SEASON AFTER CONSTRUCTION.
  - B. A MIX OF NATIVE SPECIES (INVASIVE SPECIES NOT ALLOWED) APPROPRIATE TO THE SITE WILL BE USED TO REESTABLISH VEGETATION, PROVIDE SHADE, AND REDUCE EROSION. REESTABLISHED VEGETATION SHOULD BE AT LEAST 70% OF PRE-PROJECT CONDITIONS WITHIN THREE YEARS.
  - C. VEGETATION SUCH AS WILLOWS, SEDGES, OR RUSH MATS WILL BE SALVAGED FROM DISTURBED OR ABANDONED AREAS TO BE REPLANTED.
  - D. SHORT-TERM STABILIZATION MEASURE MAY INCLUDE THE USE OF NON-NATIVE STERILE SEED MIX (WHEN NATIVE NOT AVAILABLE), WEED-FREE CERTIFIED STRAW, OR OTHER SIMILAR TECHNIQUES.
  - E. SURFACE FERTILIZER WILL NOT BE APPLIED WITHIN 50 FEET OF ANY STREAM, WATE BODY, OR WETLAND.
  - F. FENCING WILL BE INSTALLED AS NECESSARY TO PREVENT ACCESS TO REVEGETATED SITES BY LIVESTOCK OR UNAUTHORIZED PERSONS.
  - G. INVASIVE PLANTS WILL BE REMOVED OR CONTROLLED UNTIL NATIVE PLANT SPECIES ARE WELL ESTABLISHED (TYPICALLY THREE YEARS POST-CONSTRUCTION).

**7. SITE ACCESS AND IMPLEMENTATION MONITORING**

- A. THE PROJECT SPONSOR WILL PROVIDE CONSTRUCTION MONITORING DURING IMPLEMENTATION TO ENSURE ALL CONSERVATION MEASURES ARE ADEQUATELY FOLLOWED, EFFECTS TO LISTED SPECIES ARE NOT GREATER THAN PREDICTED, AND INCIDENTAL TAKE LIMITATIONS ARE NOT EXCEEDED.
- B. THE PROJECT SPONSOR OR DESIGNATED REPRESENTATIVE WILL SUBMIT THE PROJECT COMPLETION FORM (PCF) WITHIN 30 DAYS OF PROJECT COMPLETION.

**8. CWA SECTION 401 WATER QUALITY CERTIFICATION**

- A. THE PROJECT SPONSOR OR DESIGNATED REPRESENTATIVE WILL COMPLETE AND RECORD WATER QUALITY OBSERVATIONS (SEE TURBIDITY MONITORING) TO ENSURE IN-WATER WORK WILL NOT DEGRADING WATER QUALITY.
- B. DURING CONSTRUCTION, WATER QUALITY PROVISIONS PROVIDED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY, WASHINGTON DEPARTMENT OF ECOLOGY, IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY WILL BE FOLLOWED.

**STAGED REWATERING PLAN.**

- A. WHEN REINTRODUCING WATER TO DEWATERED AREAS AND NEWLY CONSTRUCTED CHANNELS, A STAGED REWATERING PLAN WILL BE APPLIED.
- B. THE FOLLOWING WILL BE APPLIED TO ALL REWATERING EFFORTS. COMPLEX REWATERING EFFORTS MAY REQUIRE ADDITIONAL NOTES OR A DEDICATED SHEET IN THE CONSTRUCTION DETAILS.
  1. TURBIDITY MONITORING PROTOCOL WILL BE APPLIED TO REWATERING EFFORTS.
  2. PRE-WASH THE AREA BEFORE REWATERING. TURBID WASH WATER WILL BE DETAINED AND PUMPED TO THE FLOODPLAIN OR SEDIMENT CAPTURE AREAS RATHER THAN DISCHARGING TO FISH-BEARING STREAMS.
  3. INSTALL SEINE NETS AT UPSTREAM END TO PREVENT FISH FROM MOVING DOWNSTREAM UNTIL 2/3 OF TOTAL FLOW IS RESTORED TO THE CHANNEL.
  4. STARTING IN EARLY MORNING INTRODUCE 1/3 OF NEW CHANNEL FLOW OVER PERIOD OF 1-2 HOURS.
  5. INTRODUCE SECOND THIRD OF FLOW OVER NEXT 1 TO 2 HOURS AND BEGIN FISH SALVAGE OF BYPASS CHANNEL IF FISH ARE PRESENT.
  6. REMOVE UPSTREAM SEINE NETS ONCE 2/3 FLOW IN REWATERED CHANNEL AND DOWNSTREAM TURBIDITY IS WITHIN ACCEPTABLE RANGE (LESS THAN 40 NTU OR LESS THAN 10% BACKGROUND).
  7. INTRODUCE FINAL THIRD OF FLOW ONCE FISH SALVAGE EFFORTS ARE COMPLETE AND DOWNSTREAM TURBIDITY VERIFIED TO BE WITHIN ACCEPTABLE RANGE.
  8. INSTALL PLUG TO BLOCK FLOW INTO OLD CHANNEL OR BYPASS. REMOVE ANY REMAINING SEINE NETS.
  9. IN LAMPREY SYSTEMS, LAMPREY SALVAGE AND DRY SHOCKING MAY BE NECESSARY.

**TURBIDITY MONITORING.**

- A. RECORD THE READING, LOCATION, AND TIME FOR THE BACKGROUND READING APPROXIMATELY 100 FEET UPSTREAM OF THE PROJECT AREA USING A RECENTLY CALIBRATED TURBIDIMETER OR VIA VISUAL OBSERVATION (SEE THE HIP HANDBOOK TURBIDITY MONITORING SECTION FOR A VISUAL OBSERVATION KEY).
- B. RECORD THE TURBIDITY READING, LOCATION, AND TIME AT THE MEASUREMENT COMPLIANCE LOCATION POINT.
  1. 50 FEET DOWNSTREAM FOR STREAMS LESS THAN 30 FEET WIDE.
  2. 100 FEET DOWNSTREAM FOR STREAMS BETWEEN 30 AND 100 FEET WIDE.
  3. 200 FEET DOWNSTREAM FOR STREAMS GREATER THAN 100 FEET WIDE.
  4. 300 FEET FROM THE DISCHARGE POINT OR NONPOINT SOURCE FOR LOCATIONS SUBJECT TO TIDAL OR COASTAL SCOUR.
- C. TURBIDITY SHALL BE MEASURED (BACKGROUND LOCATION AND COMPLIANCE POINTS) EVERY 4 HOURS WHILE WORK IS BEING IMPLEMENTED.
- D. IF THERE IS A VISIBLE DIFFERENCE BETWEEN A COMPLIANCE POINT AND THE BACKGROUND, THE EXCEEDANCE WILL BE NOTED IN THE PROJECT COMPLETION FORM (PCF). ADJUSTMENTS OR CORRECTIVE MEASURES WILL BE TAKEN IN ORDER TO REDUCE TURBIDITY.
- E. IF EXCEEDANCES OCCUR FOR MORE THAN TWO CONSECUTIVE MONITORING INTERVALS (AFTER 8 HOURS), THE ACTIVITY WILL STOP UNTIL THE TURBIDITY LEVEL RETURNS TO BACKGROUND. THE BPA EC LEAD WILL BE NOTIFIED OF ALL EXCEEDANCES AND CORRECTIVE ACTIONS AT PROJECT COMPLETION.
- F. IF TURBIDITY CONTROLS (COFFER DAMS, WADDOLES, FENCING, ETC.) ARE DETERMINED INEFFECTIVE, CREWS WILL BE MOBILIZED TO MODIFY AS NECESSARY. OCCURRENCES WILL BE DOCUMENTED IN THE PROJECT COMPLETION FORM (PCF).
- G. FINAL TURBIDITY READINGS, EXCEEDANCES, AND CONTROL FAILURES WILL BE SUBMITTED TO THE BPA EC LEAD USING THE PROJECT COMPLETION FORM (PCF).

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GRANDE RONDE RIVER SUBBASIN BUFFALO FLATS HABITAT IMPROVEMENT PROJECT

CONTRACTOR DRAWN

ACCEPTED

UNION, OR 2021-06-17



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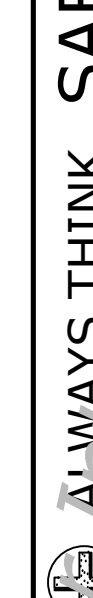


CONCEPTUAL OBLIQUE VIEW OF PROJECT SITE 5-10 YEARS POST CONSTRUCTION

PROJECT GOALS:

1. Enhance and restore aquatic habitat conditions and increase habitat diversity and complexity for salmonids;
2. Improve water quality conditions (temperature and sediment) for salmonids;
3. Promote conditions for restoring ecological function and improving soil health within the project area;
4. Raise water table within the project reach to support the establishment and growth of a diverse mosaic of herbaceous and woody riparian vegetation;
5. Reconnect Little Creek with its floodplains and expand quality floodplain habitat availability for salmonids within the project boundaries;
6. Increase streambank and floodplain storage of water and ice; thereby, increasing the potential for attenuating flows, and reducing ice formation within the project reach.

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U.S. DEPARTMENT OF THE INTERIOR  
BUREAU OF RECLAMATION

COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM  
FCRPS HABITAT ENHANCEMENT PROGRAM - OREGON

GRANDE RONDE RIVER SUBBASIN

BUFFALO FLATS HABITAT IMPROVEMENT

PROJECT

Not for Distribution

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OBJECTIVES NARRATIVE

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C-4

SHEET 4 OF 29

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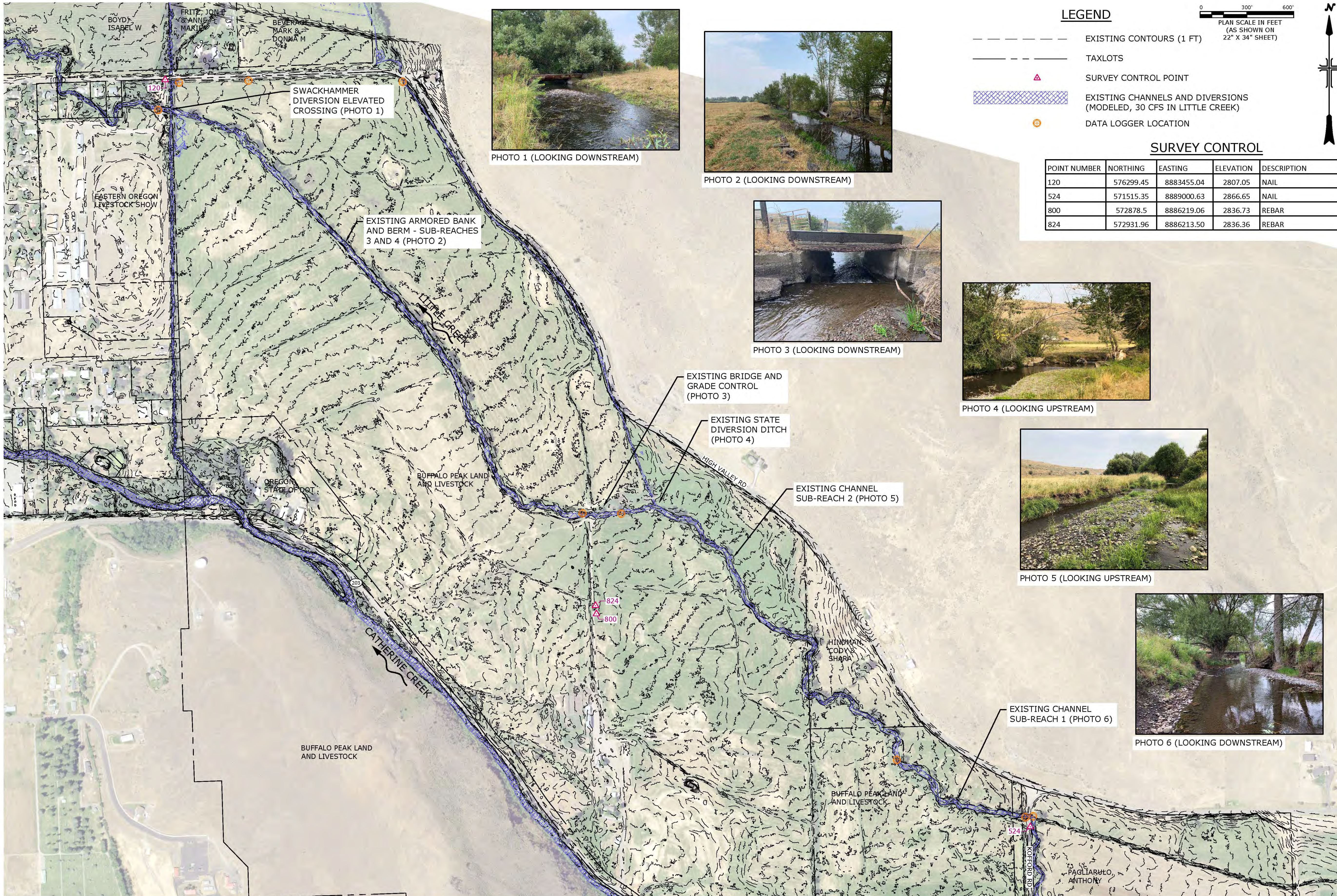


PHOTO 1 (LOOKING DOWNSTREAM)



PHOTO 2 (LOOKING DOWNSTREAM)



PHOTO 3 (LOOKING DOWNSTREAM)



PHOTO 4 (LOOKING UPSTREAM)



PHOTO 5 (LOOKING UPSTREAM)



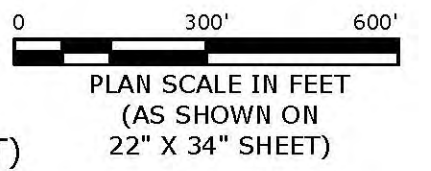
PHOTO 6 (LOOKING DOWNSTREAM)

LEGEND

- EXISTING CONTOURS (1 FT)
- - - TAXLOTS
- ▲ SURVEY CONTROL POINT
- ▨ EXISTING CHANNELS AND DIVERSIONS (MODELED, 30 CFS IN LITTLE CREEK)
- ⊙ DATA LOGGER LOCATION

SURVEY CONTROL

POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
120	576299.45	8883455.04	2807.05	NAIL
524	571515.35	8889000.63	2866.65	NAIL
800	572878.5	8886219.06	2836.73	REBAR
824	572931.96	8886213.50	2836.36	REBAR



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GRANDE RONDE RIVER SUBBASIN  
BUFFALO FLATS HABITAT IMPROVEMENT PROJECT

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EXISTING CONDITIONS  
& SURVEY CONTROL

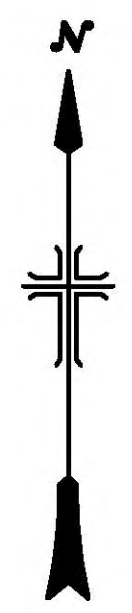
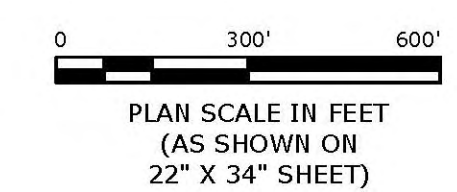
COLOR MAP LEGEND

PROPOSED CUT AND FILL

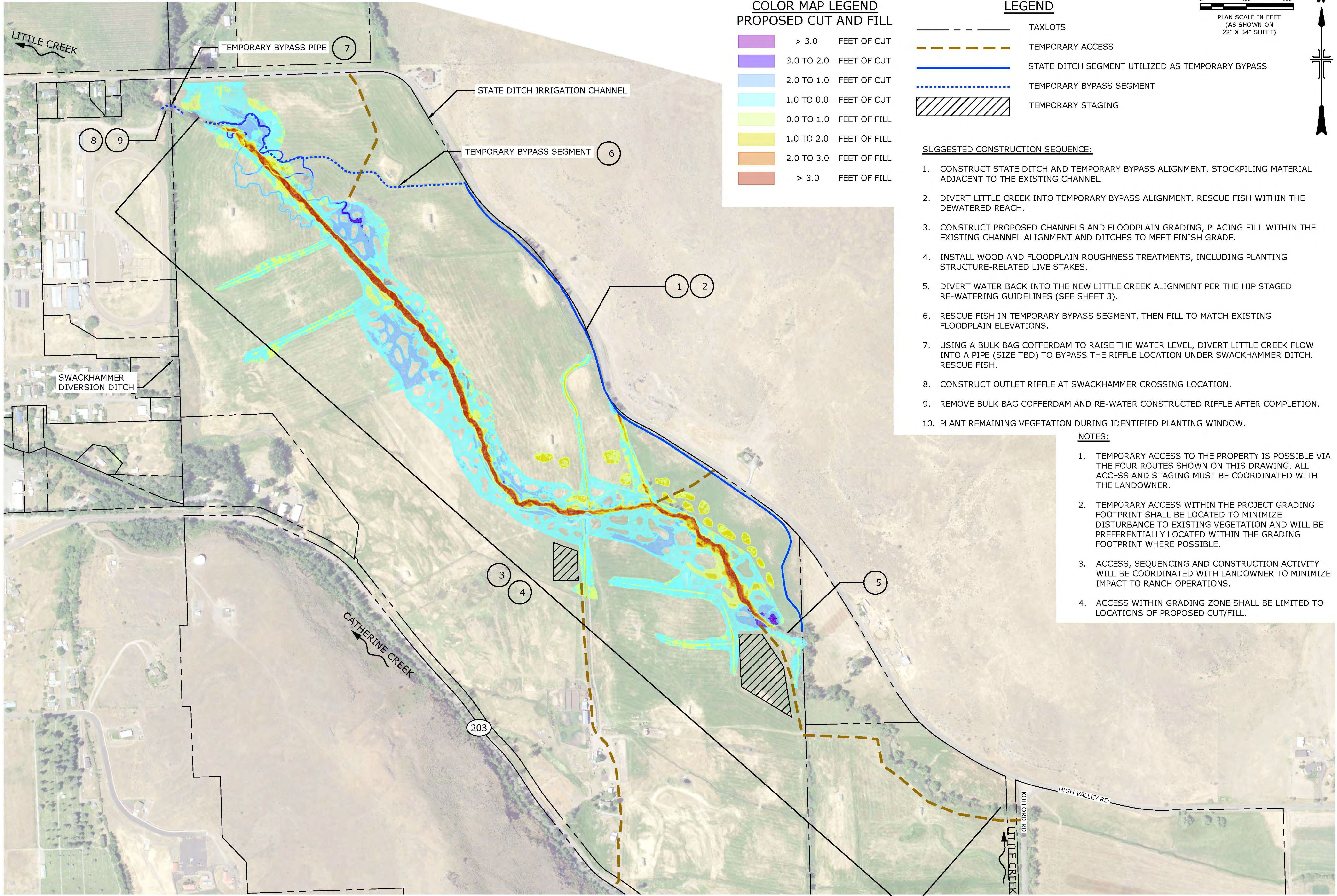
[Purple]	> 3.0	FEET OF CUT
[Light Purple]	3.0 TO 2.0	FEET OF CUT
[Light Blue]	2.0 TO 1.0	FEET OF CUT
[Cyan]	1.0 TO 0.0	FEET OF CUT
[Light Green]	0.0 TO 1.0	FEET OF FILL
[Yellow]	1.0 TO 2.0	FEET OF FILL
[Orange]	2.0 TO 3.0	FEET OF FILL
[Red]	> 3.0	FEET OF FILL

LEGEND

[Dashed Line]	TAXLOTS
[Dashed Line]	TEMPORARY ACCESS
[Solid Blue Line]	STATE DITCH SEGMENT UTILIZED AS TEMPORARY BYPASS
[Dotted Blue Line]	TEMPORARY BYPASS SEGMENT
[Hatched Box]	TEMPORARY STAGING



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SUGGESTED CONSTRUCTION SEQUENCE:

1. CONSTRUCT STATE DITCH AND TEMPORARY BYPASS ALIGNMENT, STOCKPILING MATERIAL ADJACENT TO THE EXISTING CHANNEL.
2. DIVERT LITTLE CREEK INTO TEMPORARY BYPASS ALIGNMENT. RESCUE FISH WITHIN THE DEWATERED REACH.
3. CONSTRUCT PROPOSED CHANNELS AND FLOODPLAIN GRADING, PLACING FILL WITHIN THE EXISTING CHANNEL ALIGNMENT AND DITCHES TO MEET FINISH GRADE.
4. INSTALL WOOD AND FLOODPLAIN ROUGHNESS TREATMENTS, INCLUDING PLANTING STRUCTURE-RELATED LIVE STAKES.
5. DIVERT WATER BACK INTO THE NEW LITTLE CREEK ALIGNMENT PER THE HIP STAGED RE-WATERING GUIDELINES (SEE SHEET 3).
6. RESCUE FISH IN TEMPORARY BYPASS SEGMENT, THEN FILL TO MATCH EXISTING FLOODPLAIN ELEVATIONS.
7. USING A BULK BAG COFFERDAM TO RAISE THE WATER LEVEL, DIVERT LITTLE CREEK FLOW INTO A PIPE (SIZE TBD) TO BYPASS THE RIFFLE LOCATION UNDER SWACKHAMMER DITCH. RESCUE FISH.
8. CONSTRUCT OUTLET RIFFLE AT SWACKHAMMER CROSSING LOCATION.
9. REMOVE BULK BAG COFFERDAM AND RE-WATER CONSTRUCTED RIFFLE AFTER COMPLETION.
10. PLANT REMAINING VEGETATION DURING IDENTIFIED PLANTING WINDOW.

NOTES:

1. TEMPORARY ACCESS TO THE PROPERTY IS POSSIBLE VIA THE FOUR ROUTES SHOWN ON THIS DRAWING. ALL ACCESS AND STAGING MUST BE COORDINATED WITH THE LANDOWNER.
2. TEMPORARY ACCESS WITHIN THE PROJECT GRADING FOOTPRINT SHALL BE LOCATED TO MINIMIZE DISTURBANCE TO EXISTING VEGETATION AND WILL BE PREFERENTIALLY LOCATED WITHIN THE GRADING FOOTPRINT WHERE POSSIBLE.
3. ACCESS, SEQUENCING AND CONSTRUCTION ACTIVITY WILL BE COORDINATED WITH LANDOWNER TO MINIMIZE IMPACT TO RANCH OPERATIONS.
4. ACCESS WITHIN GRADING ZONE SHALL BE LIMITED TO LOCATIONS OF PROPOSED CUT/FILL.

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FILE: BUFFALOFLATS.DWG

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GRANDE RONDE RIVER SUBBASIN  
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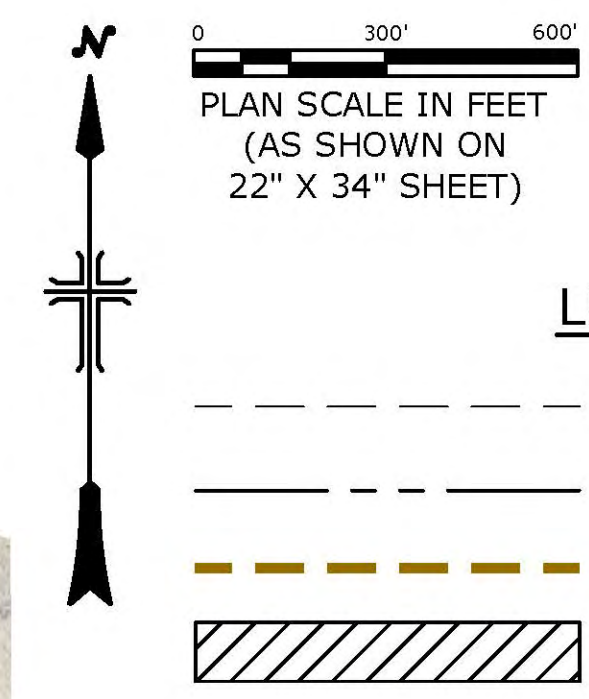
ACCESS, STAGING,  
PHASING, DEWATERING  
& EROSION CONTROL

C-6

SHEET 6 OF 29



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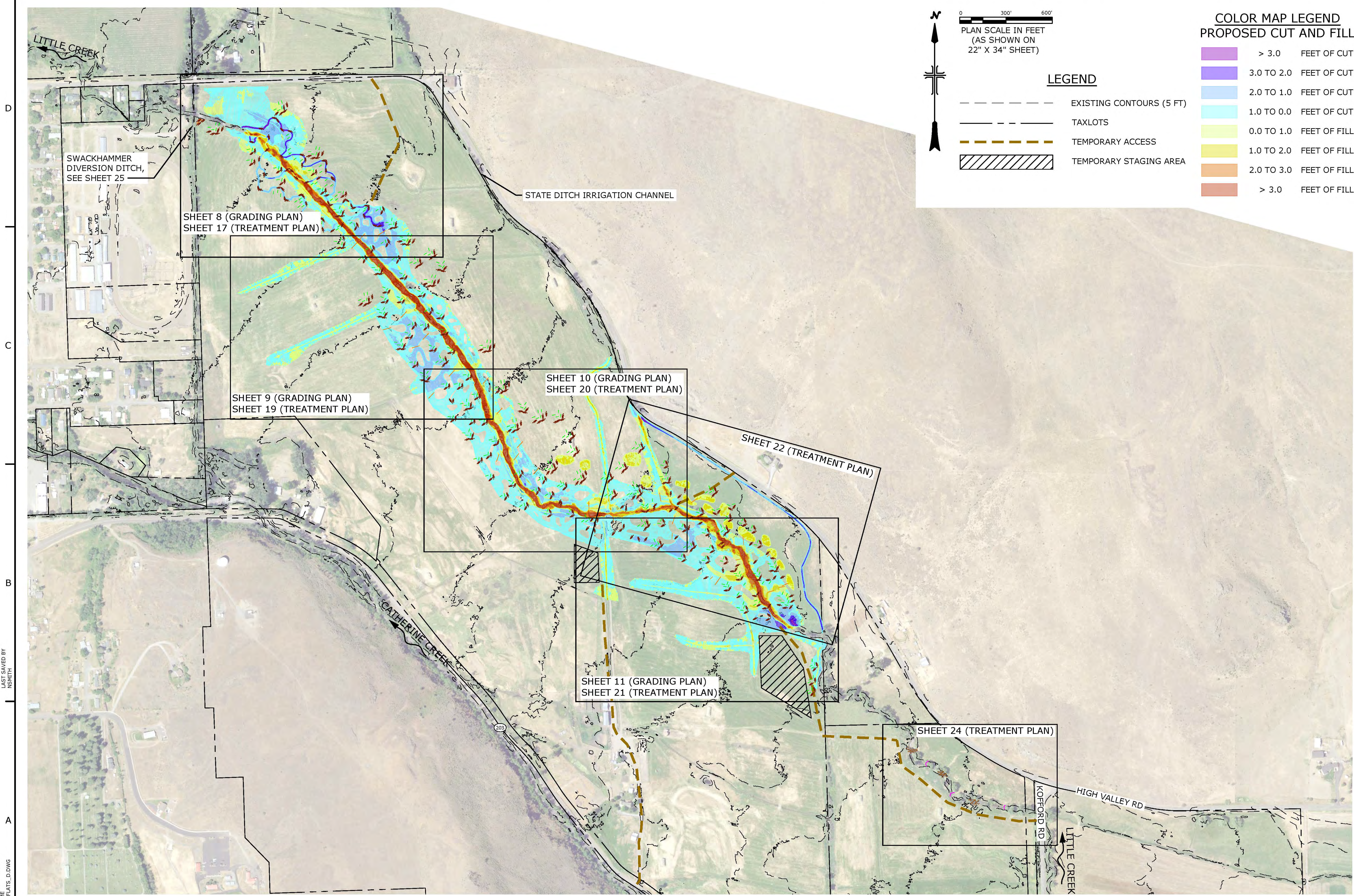
PLAN SCALE IN FEET  
(AS SHOWN ON  
22" X 34" SHEET)

LEGEND

- EXISTING CONTOURS (5 FT)
- - - TAXLOTS
- - - TEMPORARY ACCESS
- ▨ TEMPORARY STAGING AREA

COLOR MAP LEGEND  
PROPOSED CUT AND FILL

[Purple]	> 3.0	FEET OF CUT
[Light Purple]	3.0 TO 2.0	FEET OF CUT
[Light Blue]	2.0 TO 1.0	FEET OF CUT
[Cyan]	1.0 TO 0.0	FEET OF CUT
[Light Green]	0.0 TO 1.0	FEET OF FILL
[Yellow]	1.0 TO 2.0	FEET OF FILL
[Orange]	2.0 TO 3.0	FEET OF FILL
[Red]	> 3.0	FEET OF FILL



SWACKHAMMER  
DIVERSION DITCH,  
SEE SHEET 25

SHEET 8 (GRADING PLAN)  
SHEET 17 (TREATMENT PLAN)

SHEET 9 (GRADING PLAN)  
SHEET 19 (TREATMENT PLAN)

SHEET 10 (GRADING PLAN)  
SHEET 20 (TREATMENT PLAN)

SHEET 11 (GRADING PLAN)  
SHEET 21 (TREATMENT PLAN)

SHEET 22 (TREATMENT PLAN)

SHEET 24 (TREATMENT PLAN)

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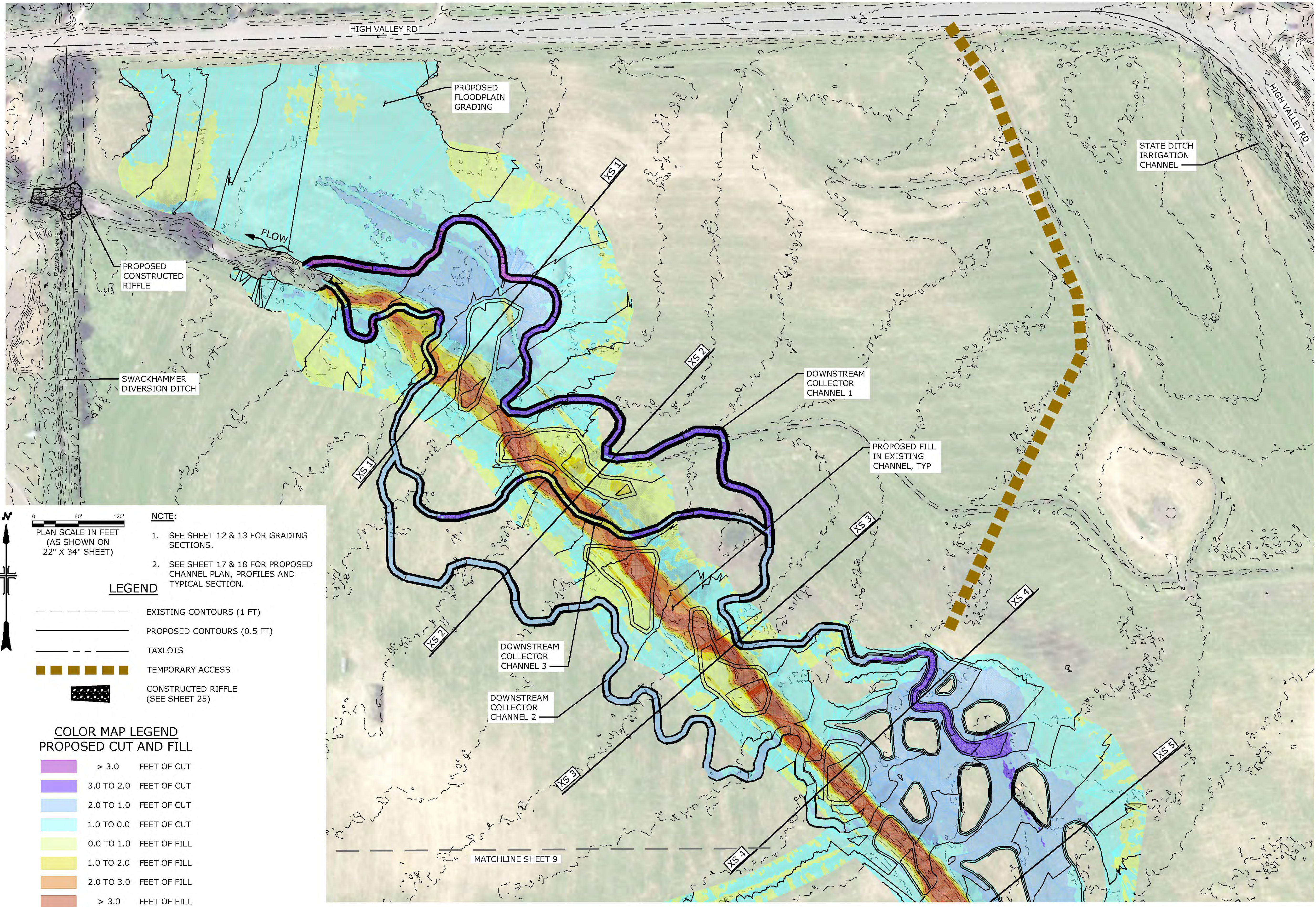
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PROPOSED CONDITIONS  
& SHEET INDEX



**NOTE:**

1. SEE SHEET 12 & 13 FOR GRADING SECTIONS.
2. SEE SHEET 17 & 18 FOR PROPOSED CHANNEL PLAN, PROFILES AND TYPICAL SECTION.

**LEGEND**

- EXISTING CONTOURS (1 FT)
- PROPOSED CONTOURS (0.5 FT)
- TAXLOTS
- TEMPORARY ACCESS
- CONSTRUCTED RIFFLE (SEE SHEET 25)

**COLOR MAP LEGEND  
PROPOSED CUT AND FILL**

	> 3.0	FEET OF CUT
	3.0 TO 2.0	FEET OF CUT
	2.0 TO 1.0	FEET OF CUT
	1.0 TO 0.0	FEET OF CUT
	0.0 TO 1.0	FEET OF FILL
	1.0 TO 2.0	FEET OF FILL
	2.0 TO 3.0	FEET OF FILL
	> 3.0	FEET OF FILL

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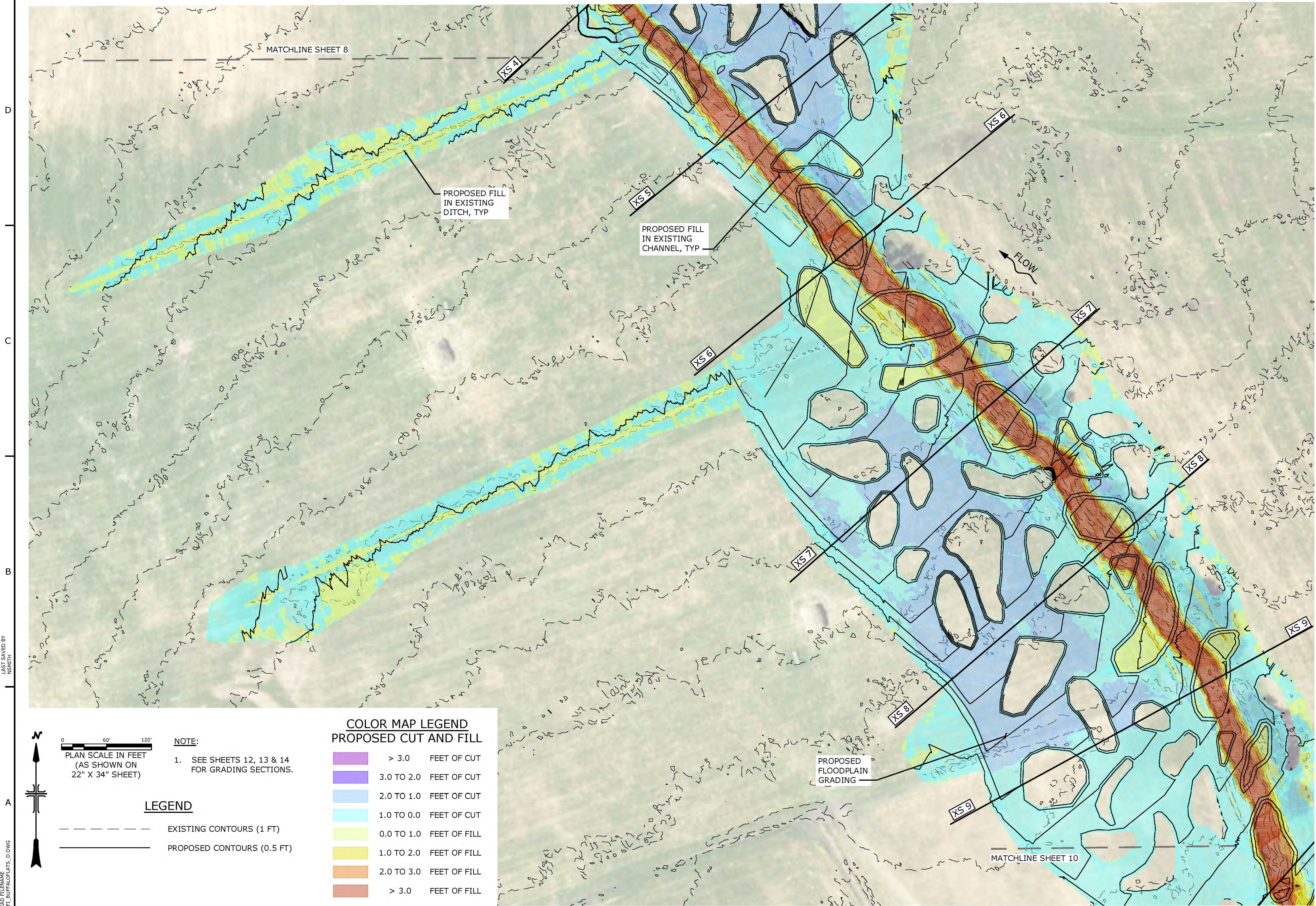


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PROPOSED GRADING PLAN (1 OF 4)





MATCHLINE SHEET 8

PROPOSED FILL  
IN EXISTING  
DITCH, TYP

PROPOSED FILL  
IN EXISTING  
CHANNEL, TYP

FLOW

D

C

B

A

D

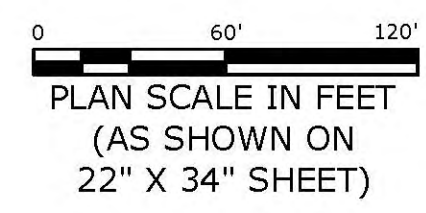
C

B

A

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**NOTE:**  
1. SEE SHEETS 12, 13 & 14 FOR GRADING SECTIONS.

**LEGEND**

- EXISTING CONTOURS (1 FT)
- PROPOSED CONTOURS (0.5 FT)

**COLOR MAP LEGEND  
PROPOSED CUT AND FILL**

	> 3.0	FEET OF CUT
	3.0 TO 2.0	FEET OF CUT
	2.0 TO 1.0	FEET OF CUT
	1.0 TO 0.0	FEET OF CUT
	0.0 TO 1.0	FEET OF FILL
	1.0 TO 2.0	FEET OF FILL
	2.0 TO 3.0	FEET OF FILL
	> 3.0	FEET OF FILL

PROPOSED  
FLOODPLAIN  
GRADING

MATCHLINE SHEET 10

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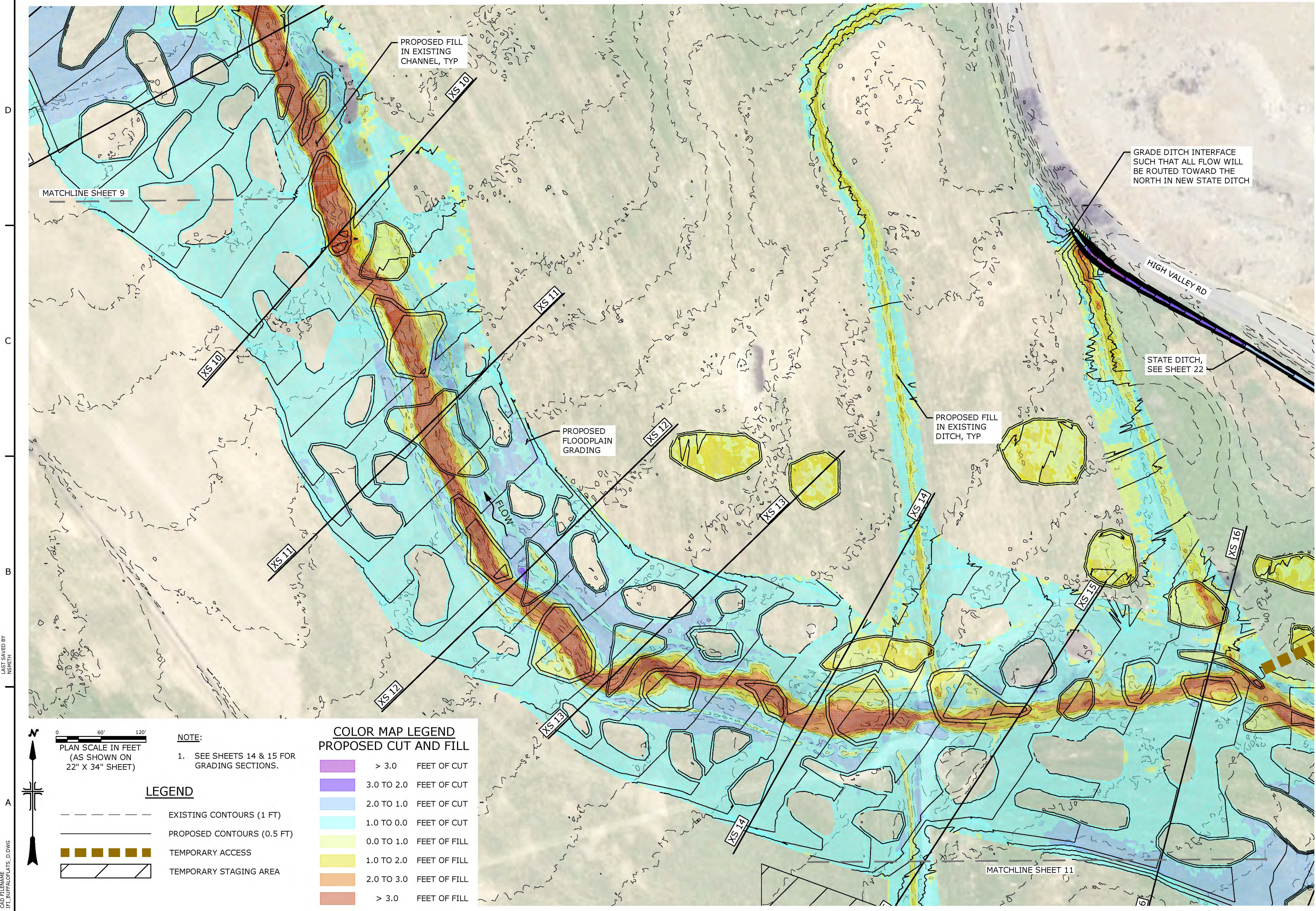
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PROJECT**

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PROPOSED GRADING PLAN (2 OF 4)



GRADE DITCH INTERFACE SUCH THAT ALL FLOW WILL BE ROUTED TOWARD THE NORTH IN NEW STATE DITCH

HIGH VALLEY RD

STATE DITCH, SEE SHEET 22

PROPOSED FILL IN EXISTING DITCH, TYP

PROPOSED FLOODPLAIN GRADING

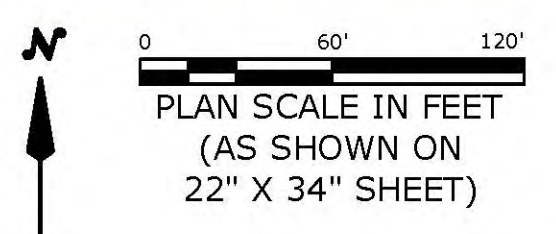
PROPOSED FILL IN EXISTING CHANNEL, TYP

MATCHLINE SHEET 9

MATCHLINE SHEET 11

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**NOTE:**  
1. SEE SHEETS 14 & 15 FOR GRADING SECTIONS.

**LEGEND**

- EXISTING CONTOURS (1 FT)
- PROPOSED CONTOURS (0.5 FT)
- TEMPORARY ACCESS
- ▨ TEMPORARY STAGING AREA

**COLOR MAP LEGEND  
PROPOSED CUT AND FILL**

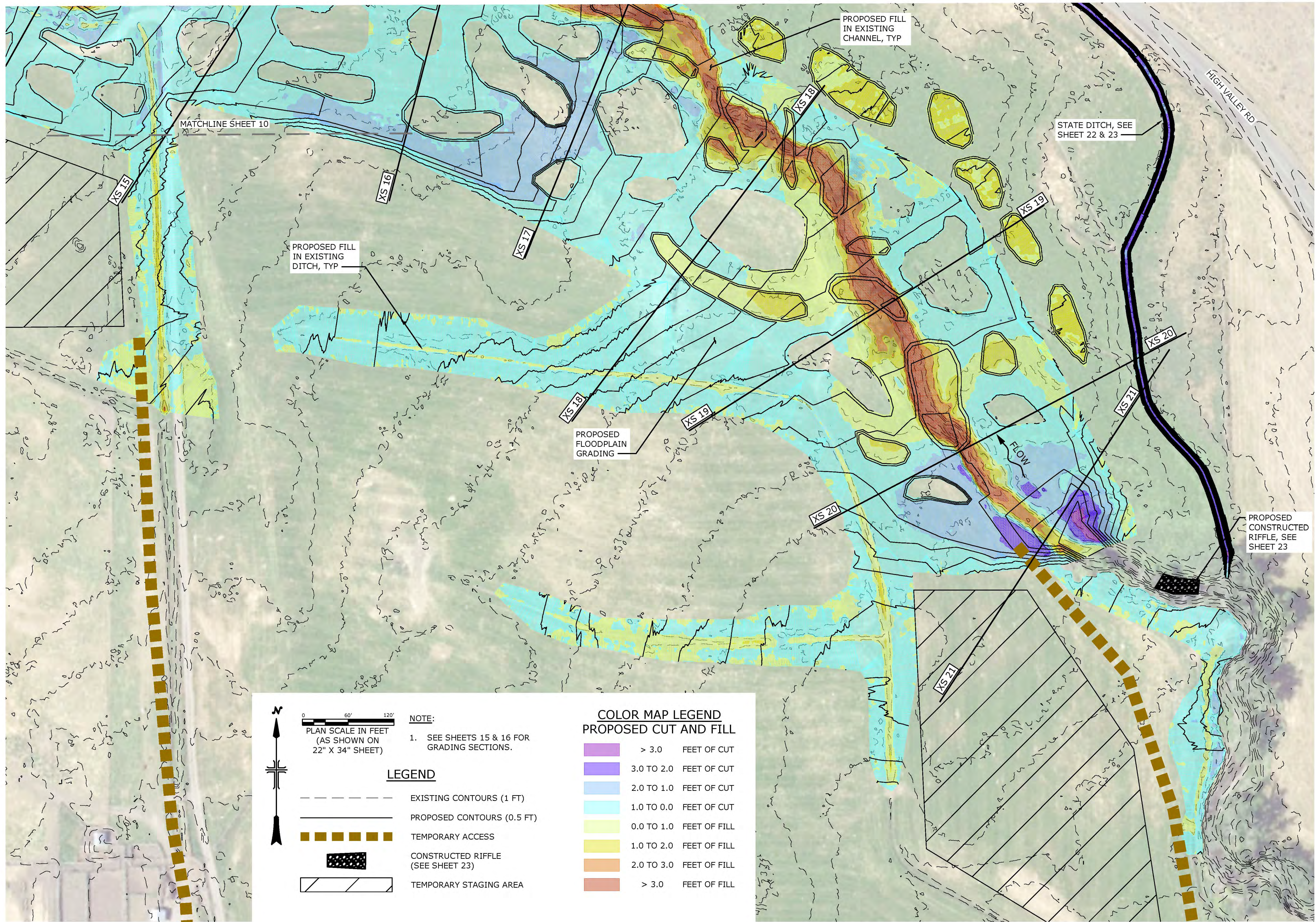
	> 3.0	FEET OF CUT
	3.0 TO 2.0	FEET OF CUT
	2.0 TO 1.0	FEET OF CUT
	1.0 TO 0.0	FEET OF CUT
	0.0 TO 1.0	FEET OF FILL
	1.0 TO 2.0	FEET OF FILL
	2.0 TO 3.0	FEET OF FILL
	> 3.0	FEET OF FILL

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PROPOSED GRADING PLAN (3 OF 4)



MATCHLINE SHEET 10

PROPOSED FILL IN EXISTING CHANNEL, TYP

STATE DITCH, SEE SHEET 22 & 23

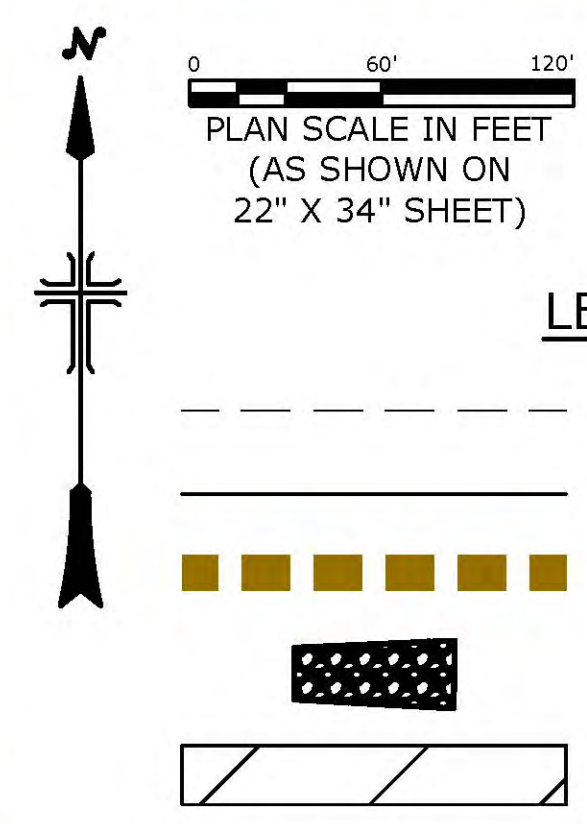
PROPOSED FILL IN EXISTING DITCH, TYP

PROPOSED FLOODPLAIN GRADING

PROPOSED CONSTRUCTED RIFFLE, SEE SHEET 23

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**NOTE:**  
1. SEE SHEETS 15 & 16 FOR GRADING SECTIONS.

**LEGEND**

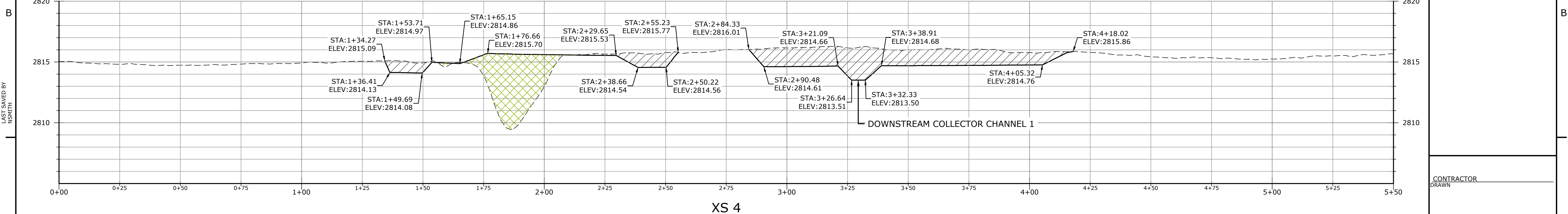
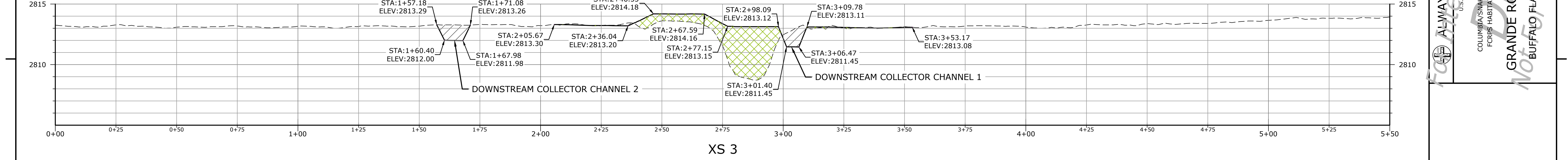
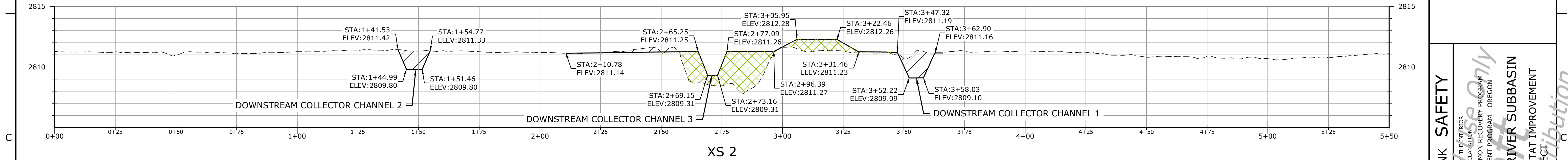
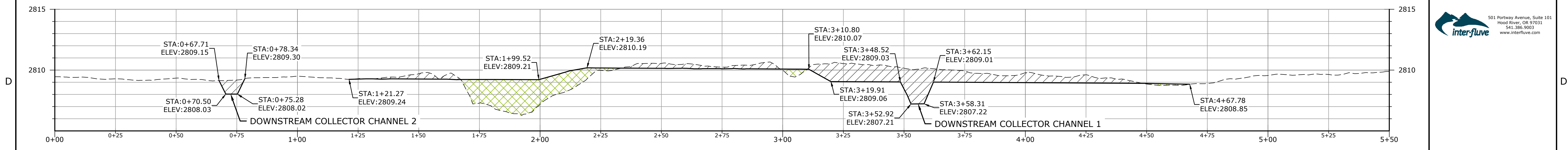
- EXISTING CONTOURS (1 FT)
- PROPOSED CONTOURS (0.5 FT)
- - - - - TEMPORARY ACCESS
- CONSTRUCTED RIFFLE (SEE SHEET 23)
- ▨ TEMPORARY STAGING AREA

**COLOR MAP LEGEND  
PROPOSED CUT AND FILL**

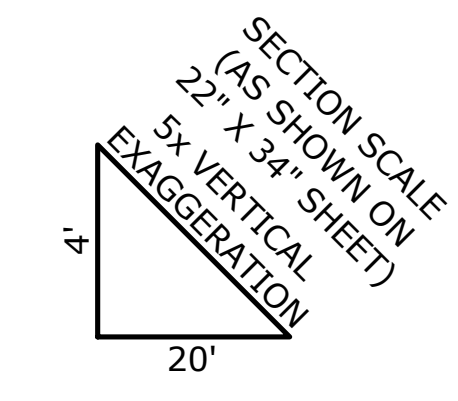
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	3.0 TO 2.0	FEET OF CUT
	2.0 TO 1.0	FEET OF CUT
	1.0 TO 0.0	FEET OF CUT
	0.0 TO 1.0	FEET OF FILL
	1.0 TO 2.0	FEET OF FILL
	2.0 TO 3.0	FEET OF FILL
	> 3.0	FEET OF FILL



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**LEGEND**

- EXISTING GROUND
- PROPOSED GROUND
- /// CUT
- XXX FILL

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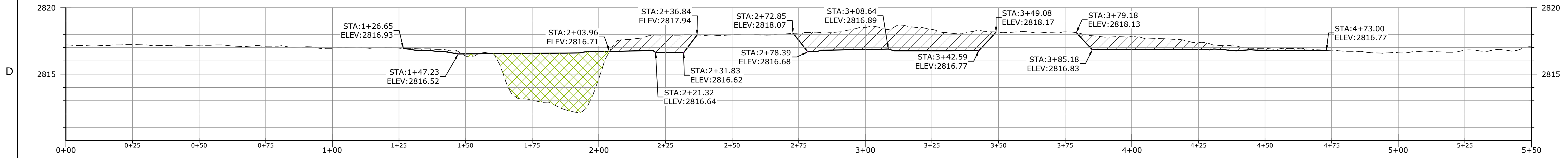
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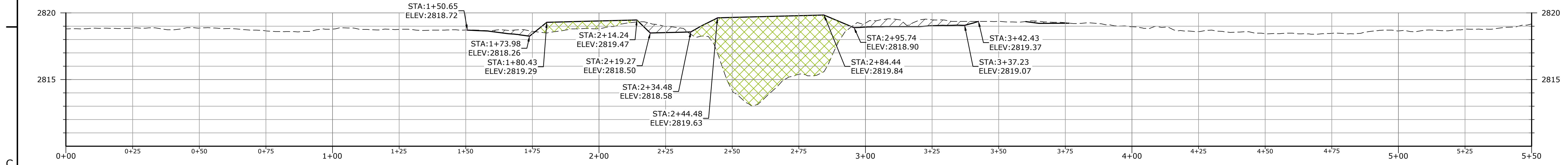
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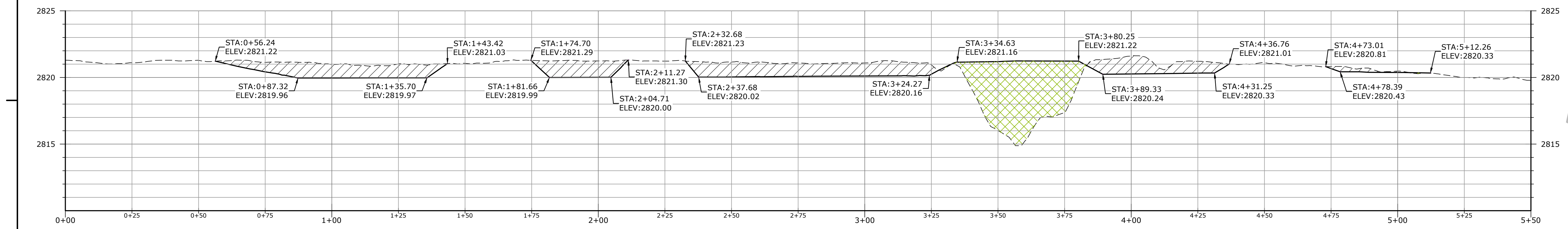
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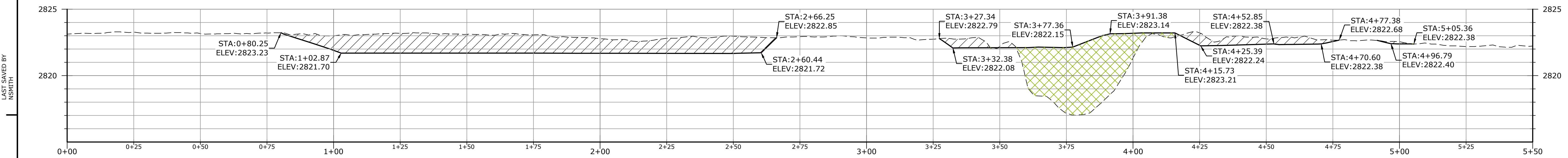
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XS 6



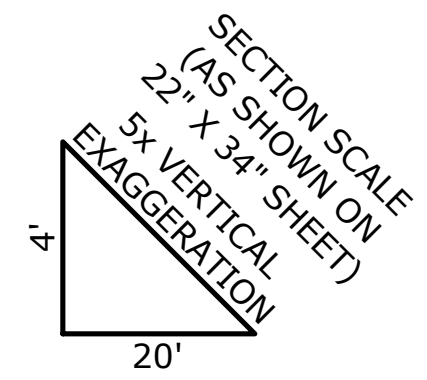
XS 7



XS 8

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LEGEND

- EXISTING GROUND
- PROPOSED GROUND
- /// CUT
- XXX FILL

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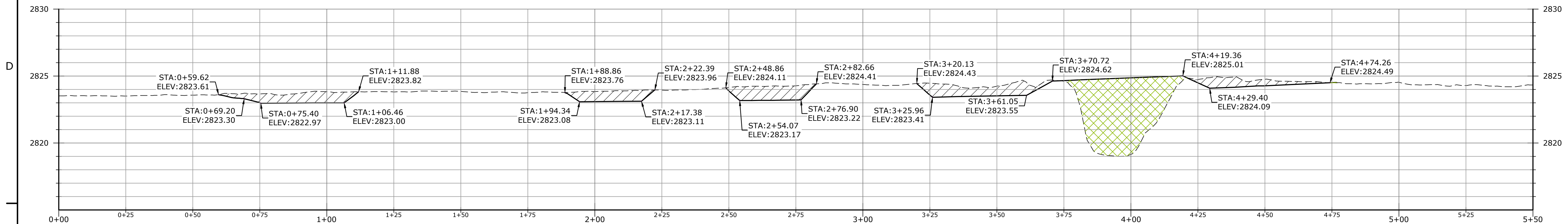
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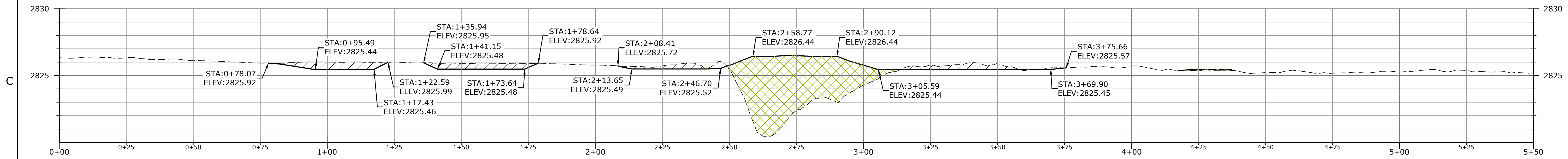
PROPOSED GRADING SECTIONS (2 OF 5)



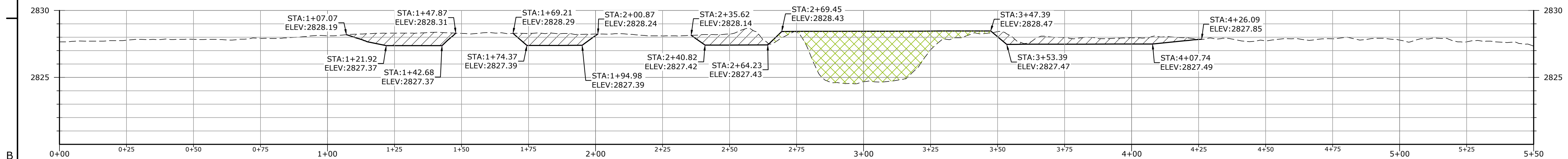
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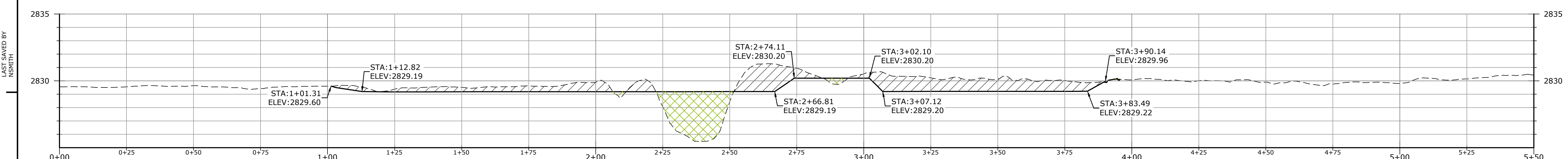
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XS 10

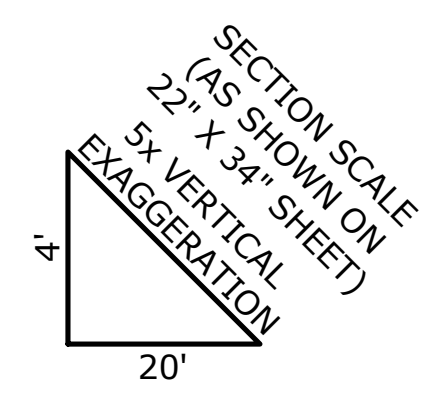


XS 11



XS 12

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**LEGEND**

---	EXISTING GROUND
—	PROPOSED GROUND
▨	CUT
▩	FILL

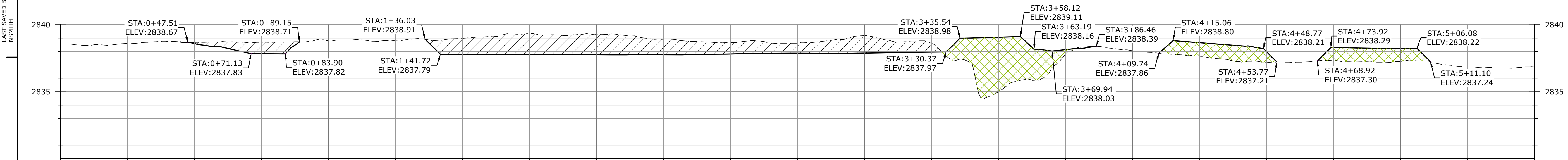
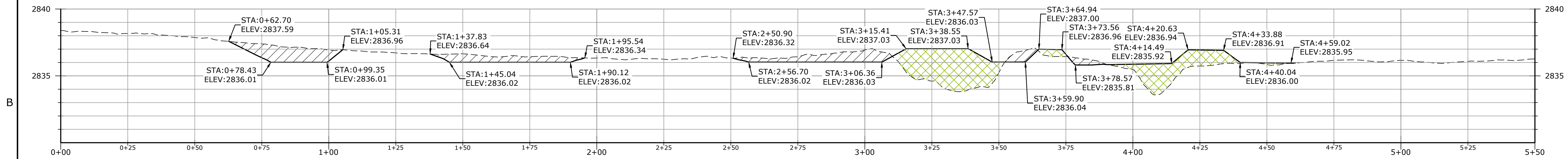
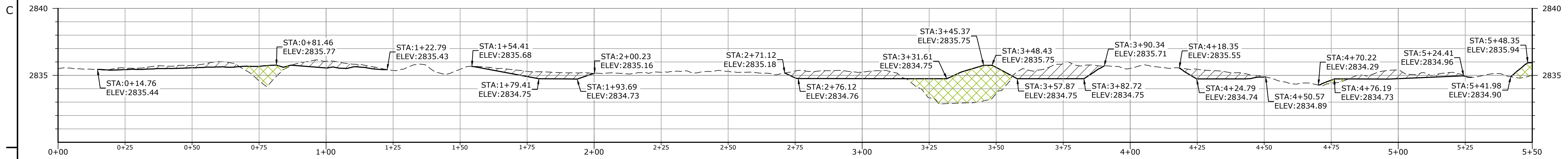
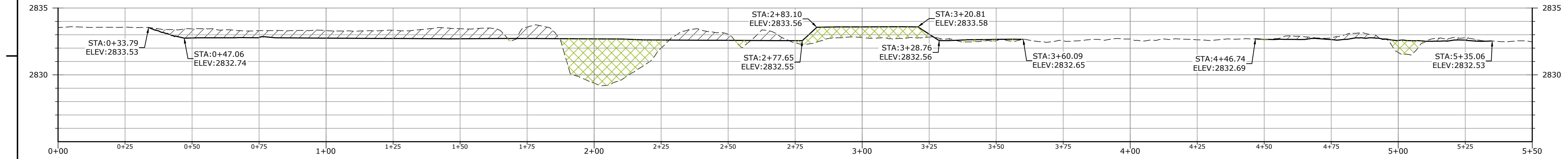
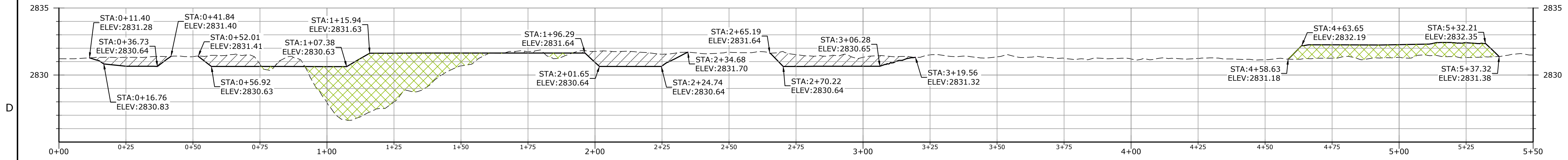
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PROPOSED GRADING SECTIONS (3 OF 5)



**LEGEND**

- EXISTING GROUND
- PROPOSED GROUND
- ▨ CUT
- ▩ FILL

SECTION SCALE (AS SHOWN ON 22" X 34" SHEET)  
5X VERTICAL ENLARGEMENT  
20'

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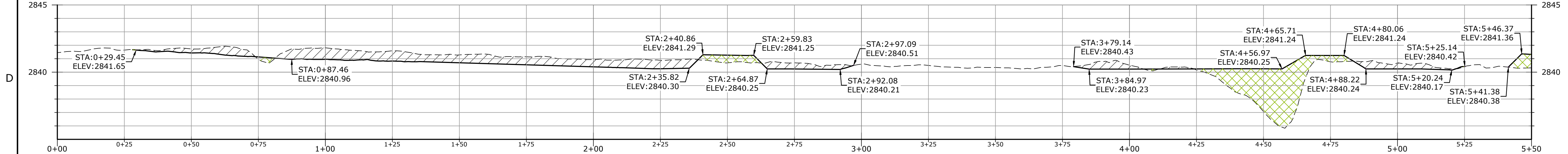
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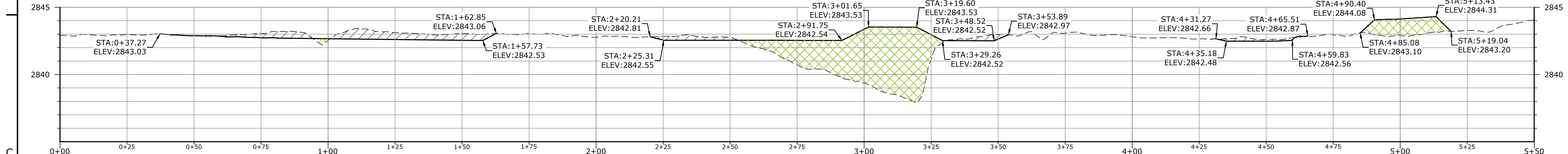
PROPOSED GRADING SECTIONS (4 OF 5)

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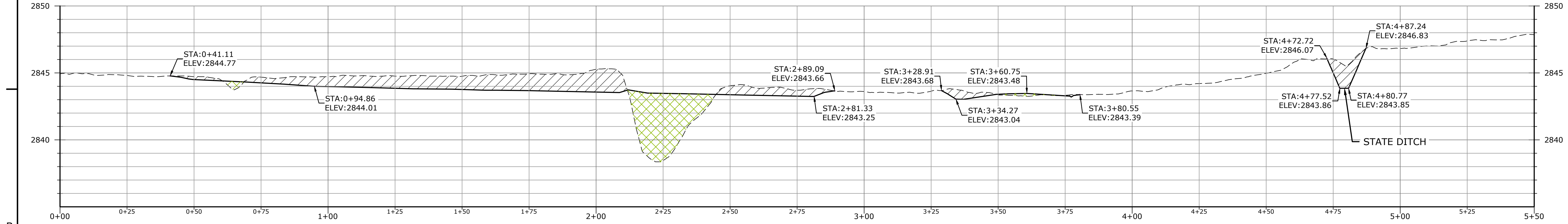
**C-15**  
SHEET 15 OF 29



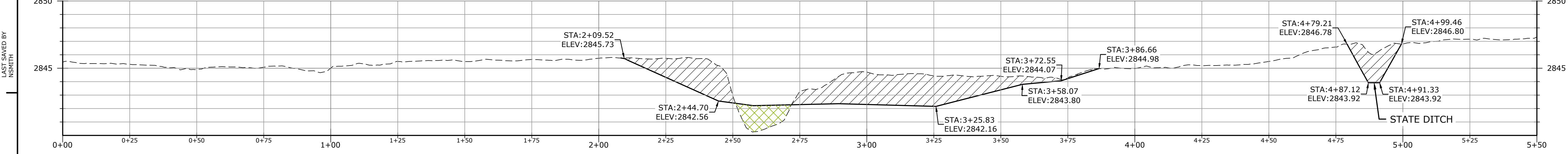
XS 18



XS 19

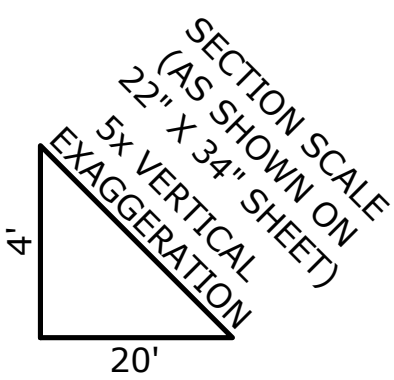


XS 20



XS 21

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**LEGEND**

---	EXISTING GROUND
—	PROPOSED GROUND
▨	CUT
▩	FILL

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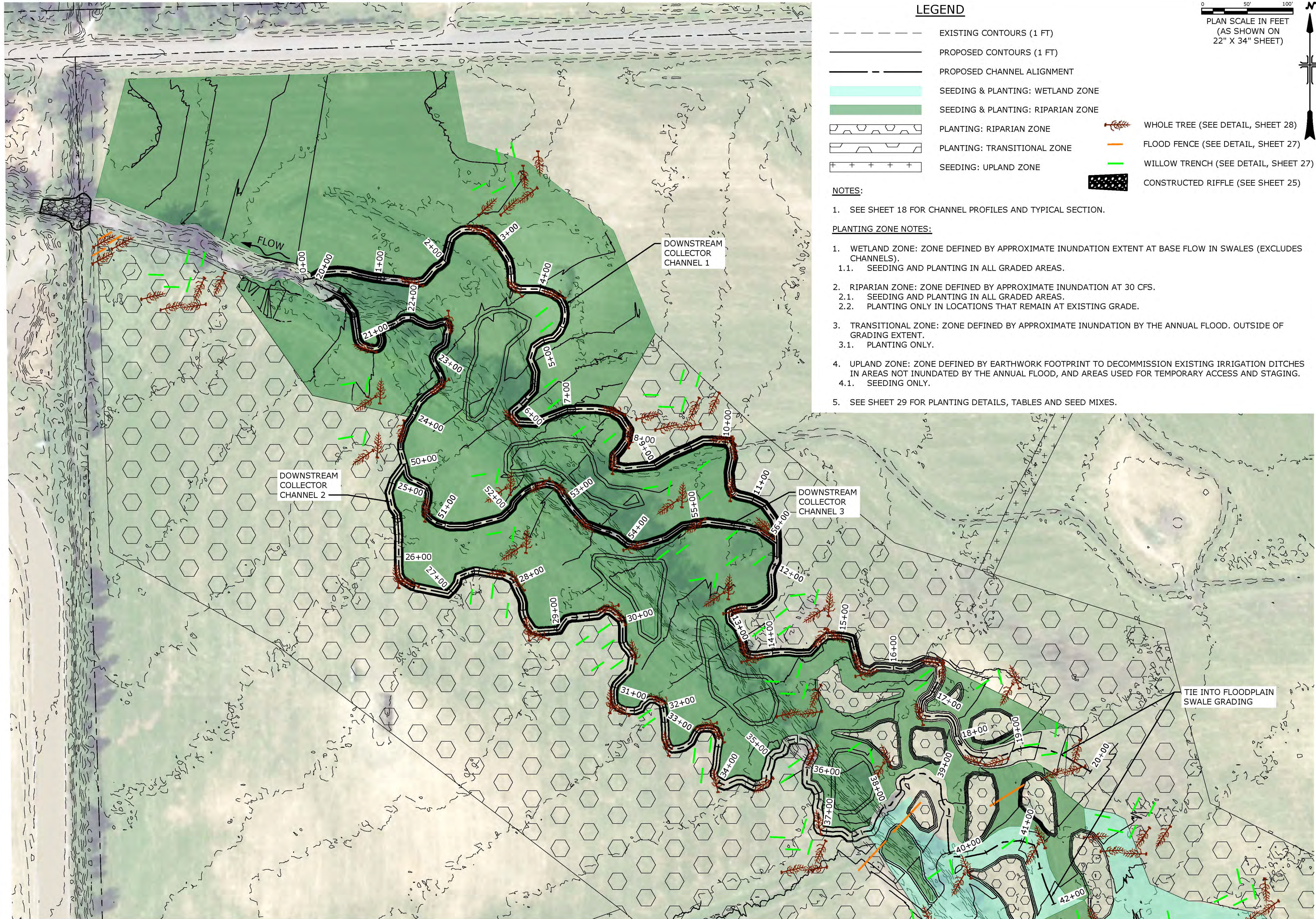
PROPOSED GRADING SECTIONS (5 OF 5)

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C-16

SHEET 16 OF 29



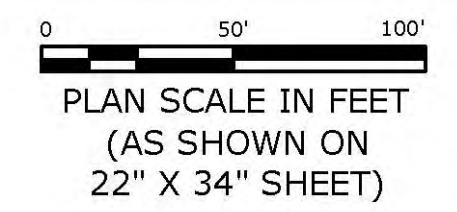


LEGEND

- EXISTING CONTOURS (1 FT)
- PROPOSED CONTOURS (1 FT)
- PROPOSED CHANNEL ALIGNMENT
- SEEDING & PLANTING: WETLAND ZONE
- SEEDING & PLANTING: RIPARIAN ZONE
- PLANTING: RIPARIAN ZONE
- PLANTING: TRANSITIONAL ZONE
- SEEDING: UPLAND ZONE
- WHOLE TREE (SEE DETAIL, SHEET 28)
- FLOOD FENCE (SEE DETAIL, SHEET 27)
- WILLOW TRENCH (SEE DETAIL, SHEET 27)
- CONSTRUCTED RIFFLE (SEE SHEET 25)

NOTES:

1. SEE SHEET 18 FOR CHANNEL PROFILES AND TYPICAL SECTION.
- PLANTING ZONE NOTES:**
1. WETLAND ZONE: ZONE DEFINED BY APPROXIMATE INUNDATION EXTENT AT BASE FLOW IN SWALES (EXCLUDES CHANNELS).
    - 1.1. SEEDING AND PLANTING IN ALL GRADED AREAS.
  2. RIPARIAN ZONE: ZONE DEFINED BY APPROXIMATE INUNDATION AT 30 CFS.
    - 2.1. SEEDING AND PLANTING IN ALL GRADED AREAS.
    - 2.2. PLANTING ONLY IN LOCATIONS THAT REMAIN AT EXISTING GRADE.
  3. TRANSITIONAL ZONE: ZONE DEFINED BY APPROXIMATE INUNDATION BY THE ANNUAL FLOOD. OUTSIDE OF GRADING EXTENT.
    - 3.1. PLANTING ONLY.
  4. UPLAND ZONE: ZONE DEFINED BY EARTHWORK FOOTPRINT TO DECOMMISSION EXISTING IRRIGATION DITCHES IN AREAS NOT INUNDATED BY THE ANNUAL FLOOD, AND AREAS USED FOR TEMPORARY ACCESS AND STAGING.
    - 4.1. SEEDING ONLY.
  5. SEE SHEET 29 FOR PLANTING DETAILS, TABLES AND SEED MIXES.



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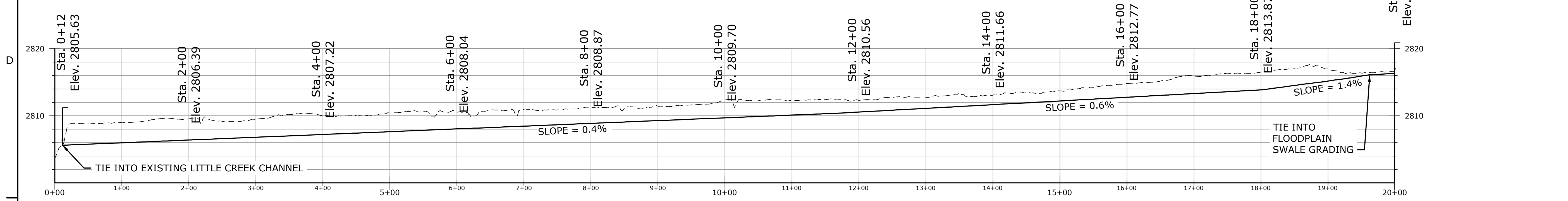
U.S. DEPARTMENT OF THE INTERIOR  
BUREAU OF RECLAMATION  
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM  
FCRBS HABITAT ENHANCEMENT PROGRAM - OREGON  
**GRANDE RONDE RIVER SUBBASIN**  
BUFFALO FLATS HABITAT IMPROVEMENT PROJECT

CONTRACTOR  
DRAWN

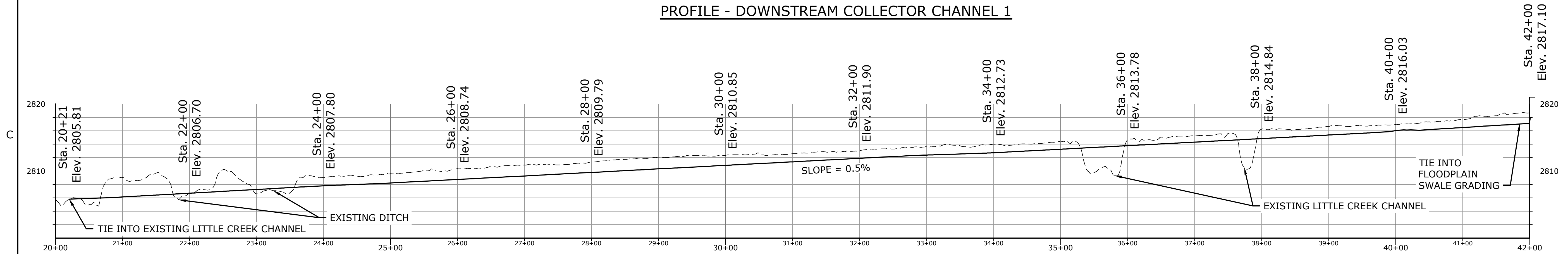
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UNION, OR 2021-06-17

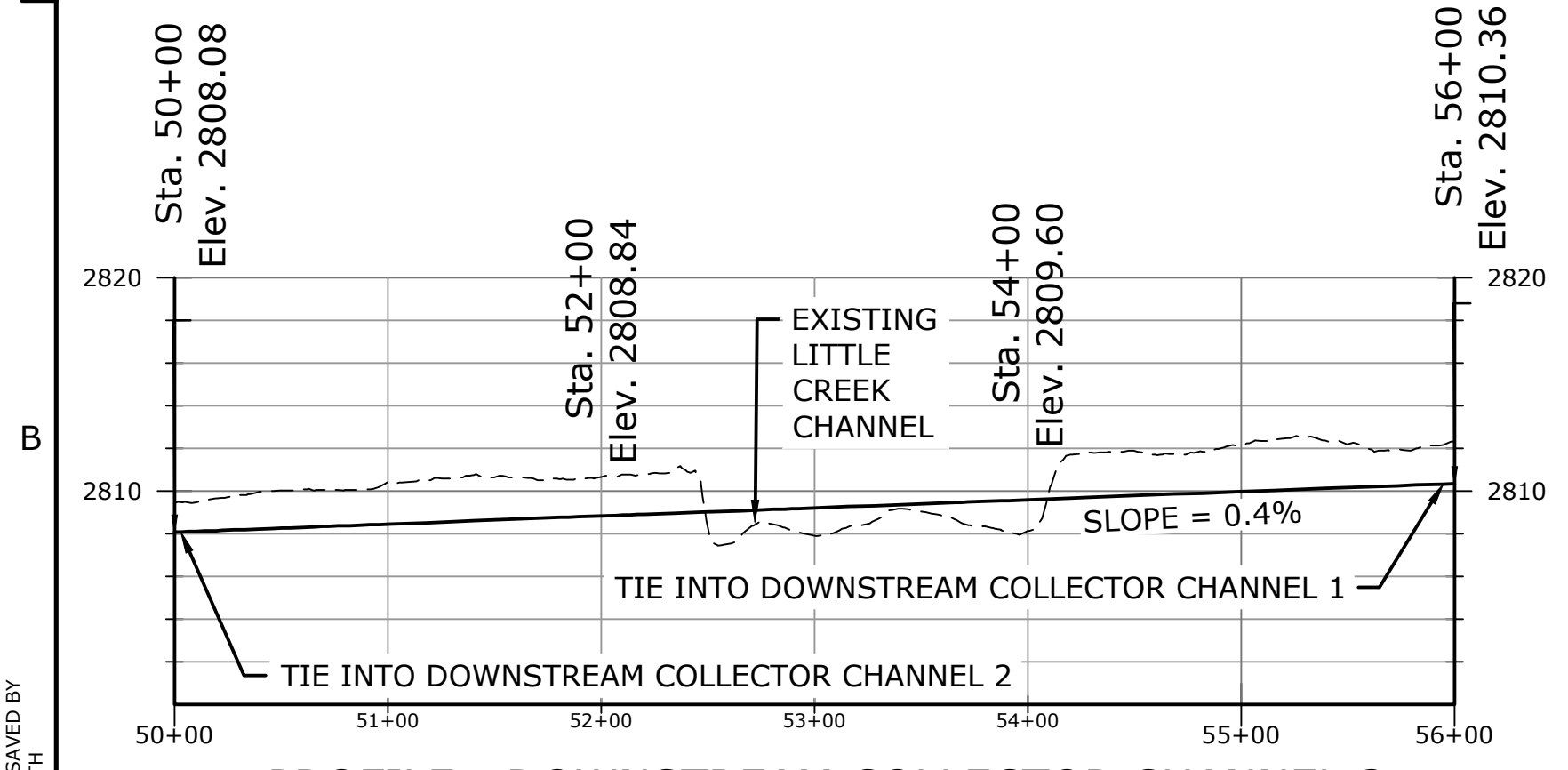
PROPOSED TREATMENT  
PLAN - DOWNSTREAM  
CONNECTOR CHANNELS



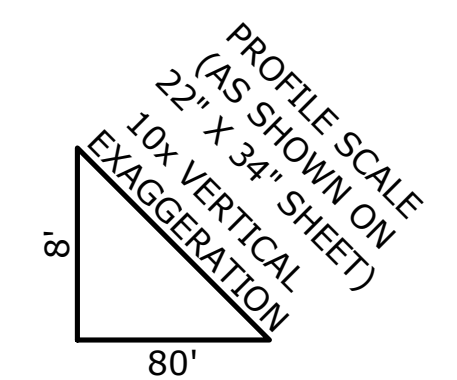
PROFILE - DOWNSTREAM COLLECTOR CHANNEL 1



PROFILE - DOWNSTREAM COLLECTOR CHANNEL 2



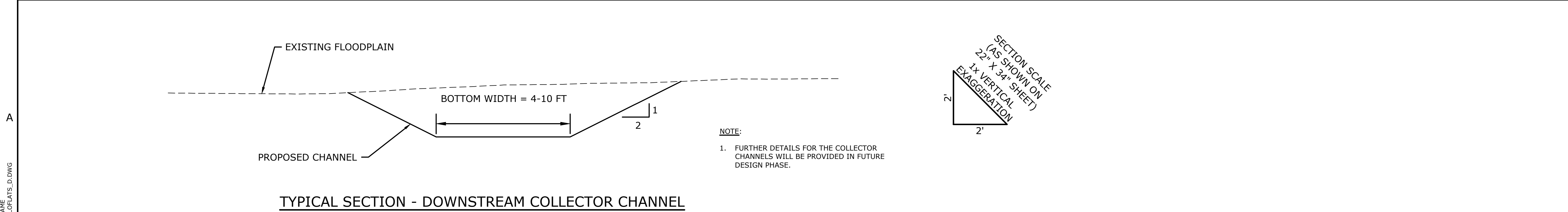
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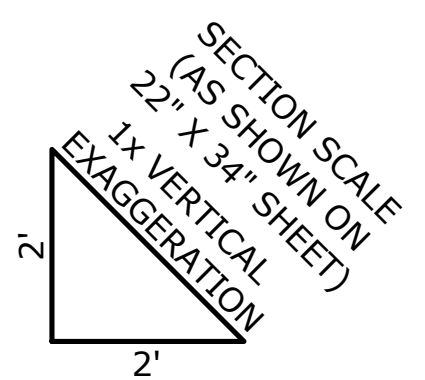
**LEGEND**

----- EXISTING GROUND

———— PROPOSED GROUND



TYPICAL SECTION - DOWNSTREAM COLLECTOR CHANNEL



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CAD SYSTEM AutoCAD 2015 (LMS TECH)  
PROJECT: JFL BUFFALOFLATS.DWG

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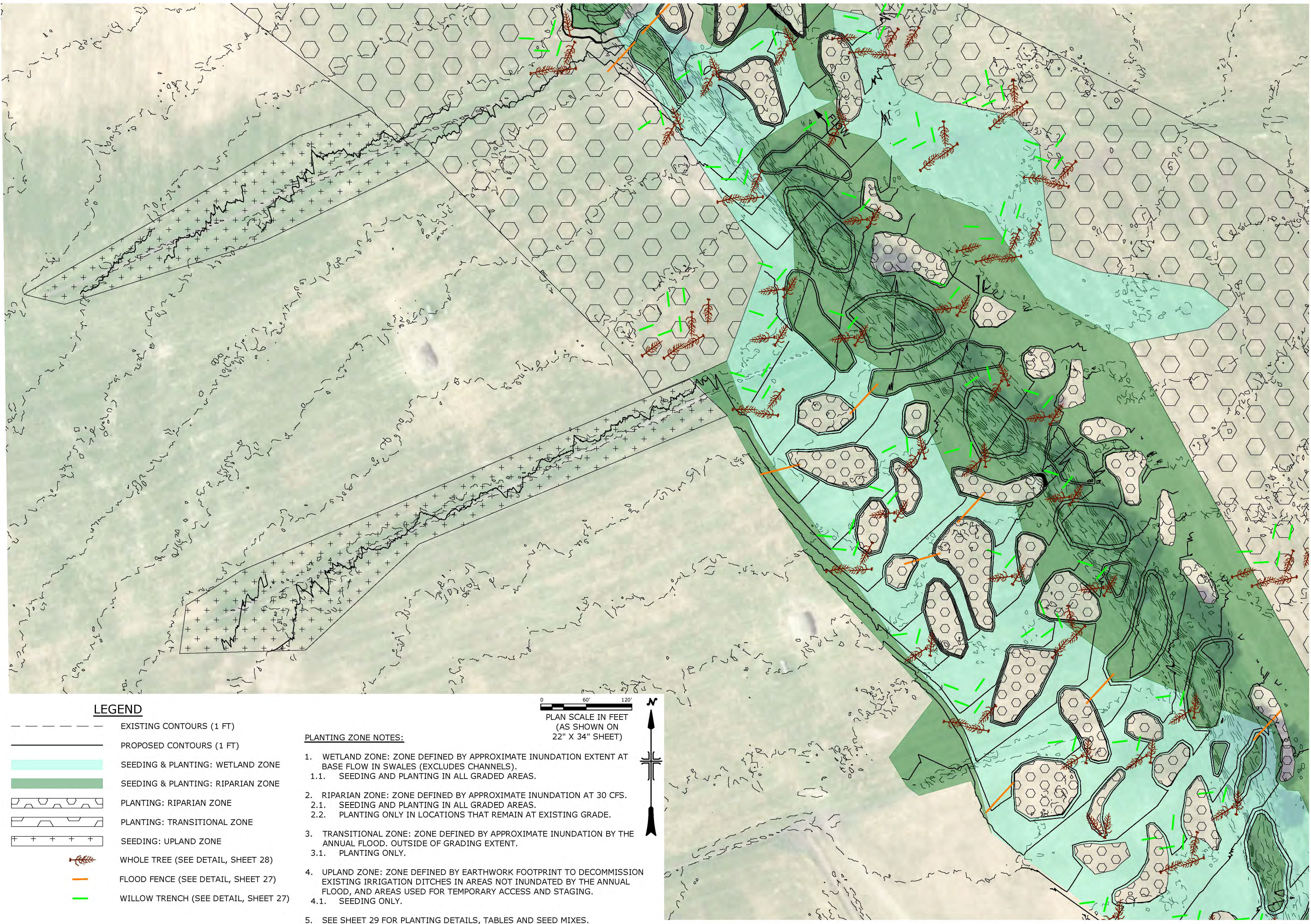
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BUFFALO FLATS HABITAT IMPROVEMENT PROJECT

CONTRACTOR DRAWN



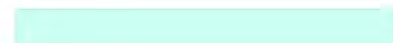


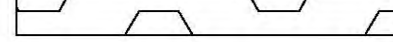
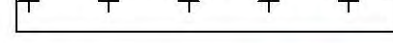



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PROFILE AND TYPICAL SECTION - DOWNSTREAM COLLECTOR CHANNELS

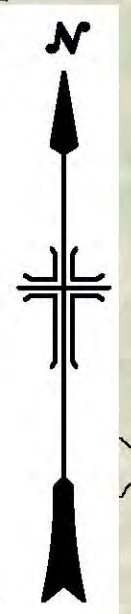
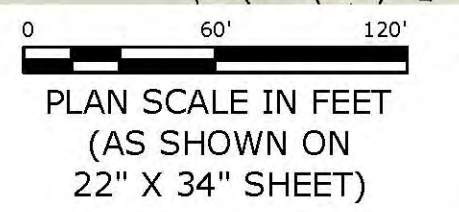


**LEGEND**

-  EXISTING CONTOURS (1 FT)
-  PROPOSED CONTOURS (1 FT)
-  SEEDING & PLANTING: WETLAND ZONE
-  SEEDING & PLANTING: RIPARIAN ZONE
-  PLANTING: RIPARIAN ZONE
-  PLANTING: TRANSITIONAL ZONE
-  SEEDING: UPLAND ZONE
-  WHOLE TREE (SEE DETAIL, SHEET 28)
-  FLOOD FENCE (SEE DETAIL, SHEET 27)
-  WILLOW TRENCH (SEE DETAIL, SHEET 27)

**PLANTING ZONE NOTES:**

1. WETLAND ZONE: ZONE DEFINED BY APPROXIMATE INUNDATION EXTENT AT BASE FLOW IN SWALES (EXCLUDES CHANNELS).
  - 1.1. SEEDING AND PLANTING IN ALL GRADED AREAS.
2. RIPARIAN ZONE: ZONE DEFINED BY APPROXIMATE INUNDATION AT 30 CFS.
  - 2.1. SEEDING AND PLANTING IN ALL GRADED AREAS.
  - 2.2. PLANTING ONLY IN LOCATIONS THAT REMAIN AT EXISTING GRADE.
3. TRANSITIONAL ZONE: ZONE DEFINED BY APPROXIMATE INUNDATION BY THE ANNUAL FLOOD, OUTSIDE OF GRADING EXTENT.
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  - 4.1. SEEDING ONLY.
5. SEE SHEET 29 FOR PLANTING DETAILS, TABLES AND SEED MIXES.



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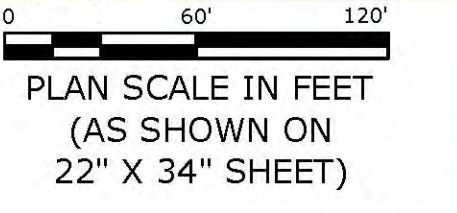
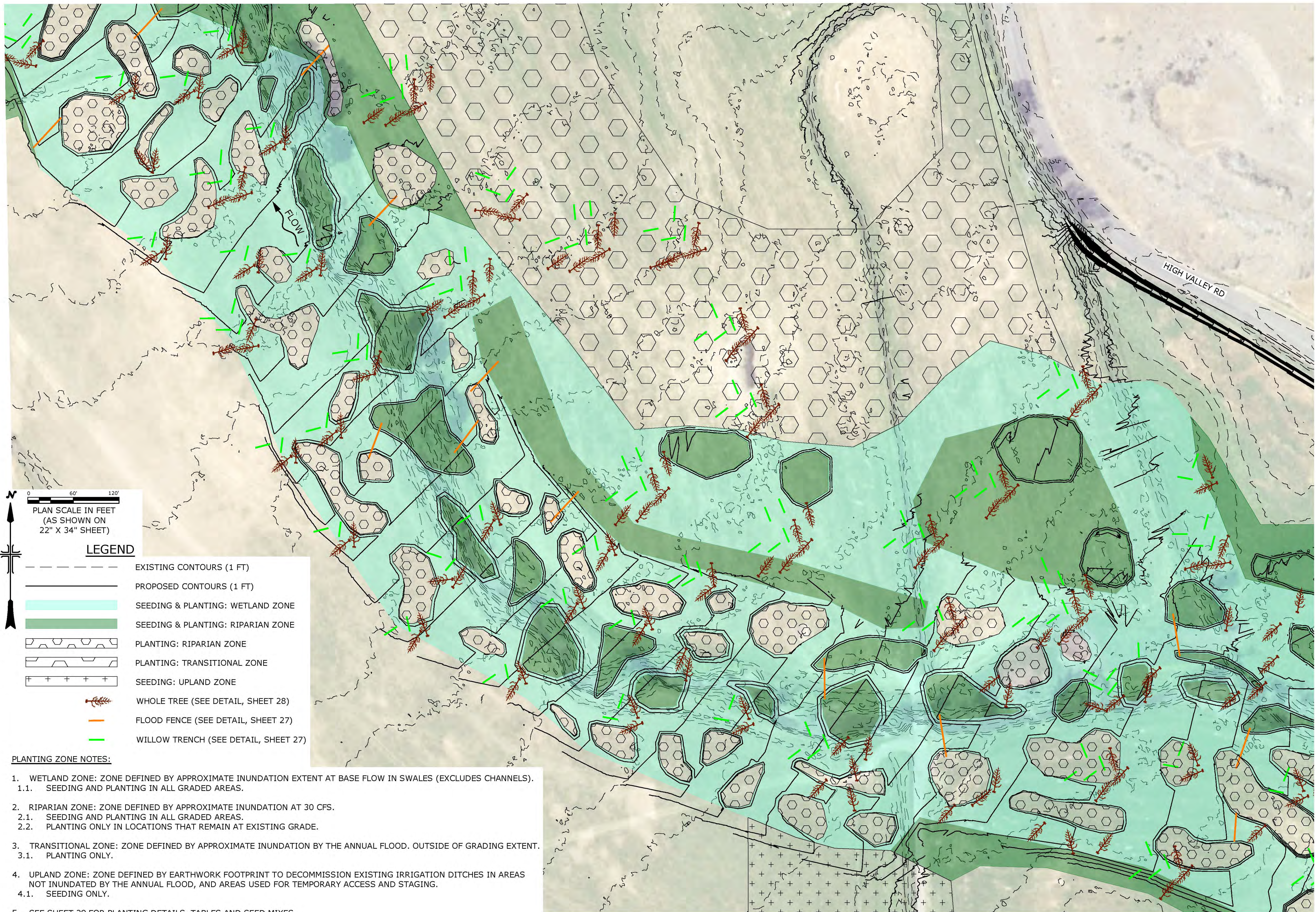
CAD SYSTEM  
AutoCAD 2015 (LMS TECH)  
JFL\_BUFFALOFLATS.DWG

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DRAWN

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PROPOSED TREATMENT  
PLAN - FLOODPLAIN  
GRADING (1 OF 3)



**LEGEND**

- EXISTING CONTOURS (1 FT)
- PROPOSED CONTOURS (1 FT)
- SEEDING & PLANTING: WETLAND ZONE
- SEEDING & PLANTING: RIPARIAN ZONE
- PLANTING: RIPARIAN ZONE
- PLANTING: TRANSITIONAL ZONE
- SEEDING: UPLAND ZONE
- WHOLE TREE (SEE DETAIL, SHEET 28)
- FLOOD FENCE (SEE DETAIL, SHEET 27)
- WILLOW TRENCH (SEE DETAIL, SHEET 27)

**PLANTING ZONE NOTES:**

1. WETLAND ZONE: ZONE DEFINED BY APPROXIMATE INUNDATION EXTENT AT BASE FLOW IN SWALES (EXCLUDES CHANNELS).
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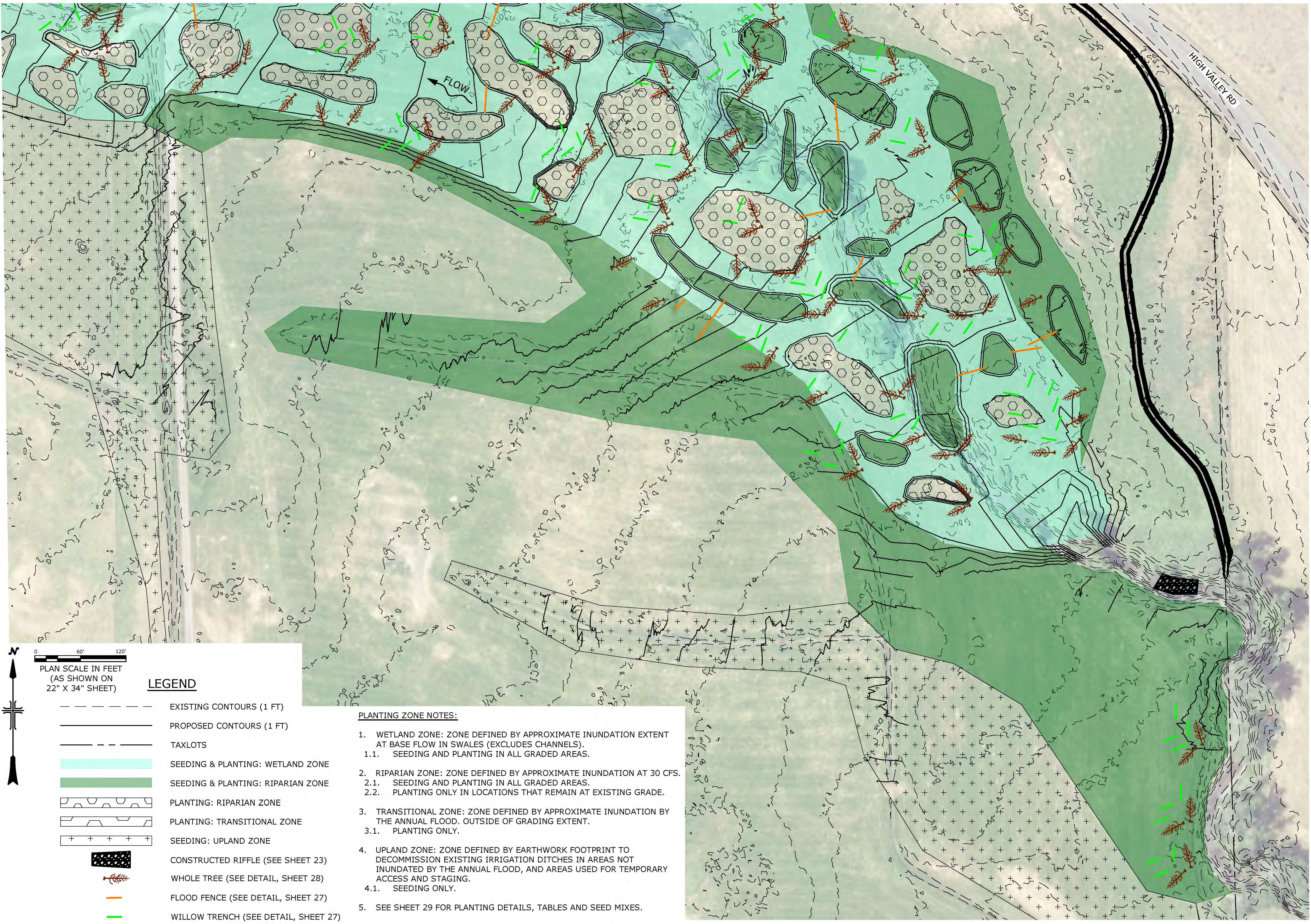
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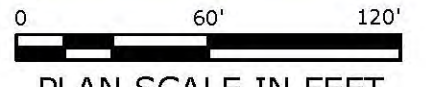
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PROPOSED TREATMENT  
PLAN - FLOODPLAIN  
GRADING (2 OF 3)



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PLAN SCALE IN FEET  
(AS SHOWN ON  
22" X 34" SHEET)

**LEGEND**

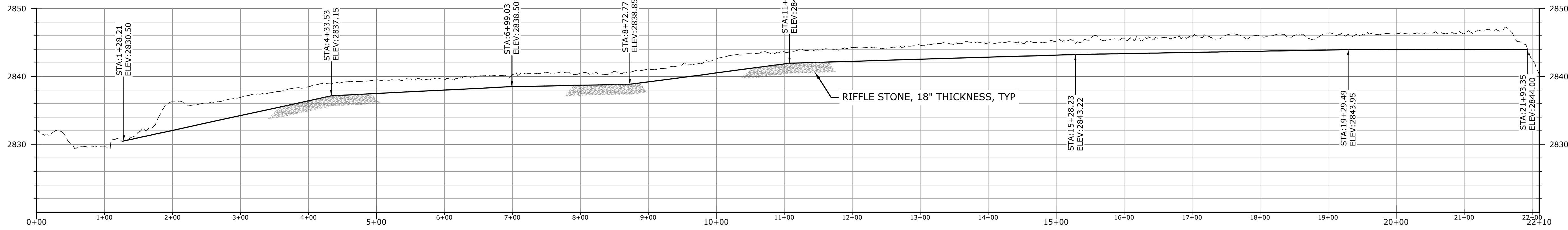
- EXISTING CONTOURS (1 FT)
- PROPOSED CONTOURS (1 FT)
- TAXLOTS
- SEEDING & PLANTING: WETLAND ZONE
- SEEDING & PLANTING: RIPARIAN ZONE
- PLANTING: RIPARIAN ZONE
- PLANTING: TRANSITIONAL ZONE
- SEEDING: UPLAND ZONE
- CONSTRUCTED RIFFLE (SEE SHEET 23)
- WHOLE TREE (SEE DETAIL, SHEET 28)
- FLOOD FENCE (SEE DETAIL, SHEET 27)
- WILLOW TRENCH (SEE DETAIL, SHEET 27)

**PLANTING ZONE NOTES:**

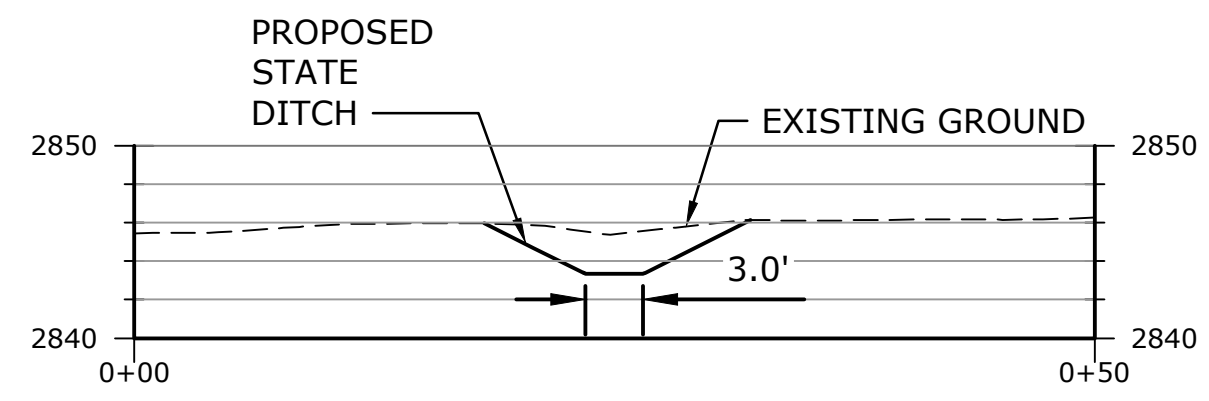
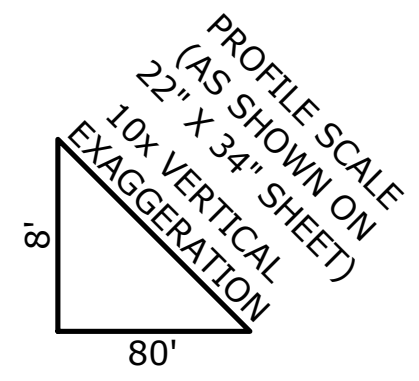
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  - 4.1. SEEDING ONLY.
5. SEE SHEET 29 FOR PLANTING DETAILS, TABLES AND SEED MIXES.

CAD SYSTEM  
AutoCAD 2015 (LMS TECH)  
JFL\_BUFFALOFLATS.DWG

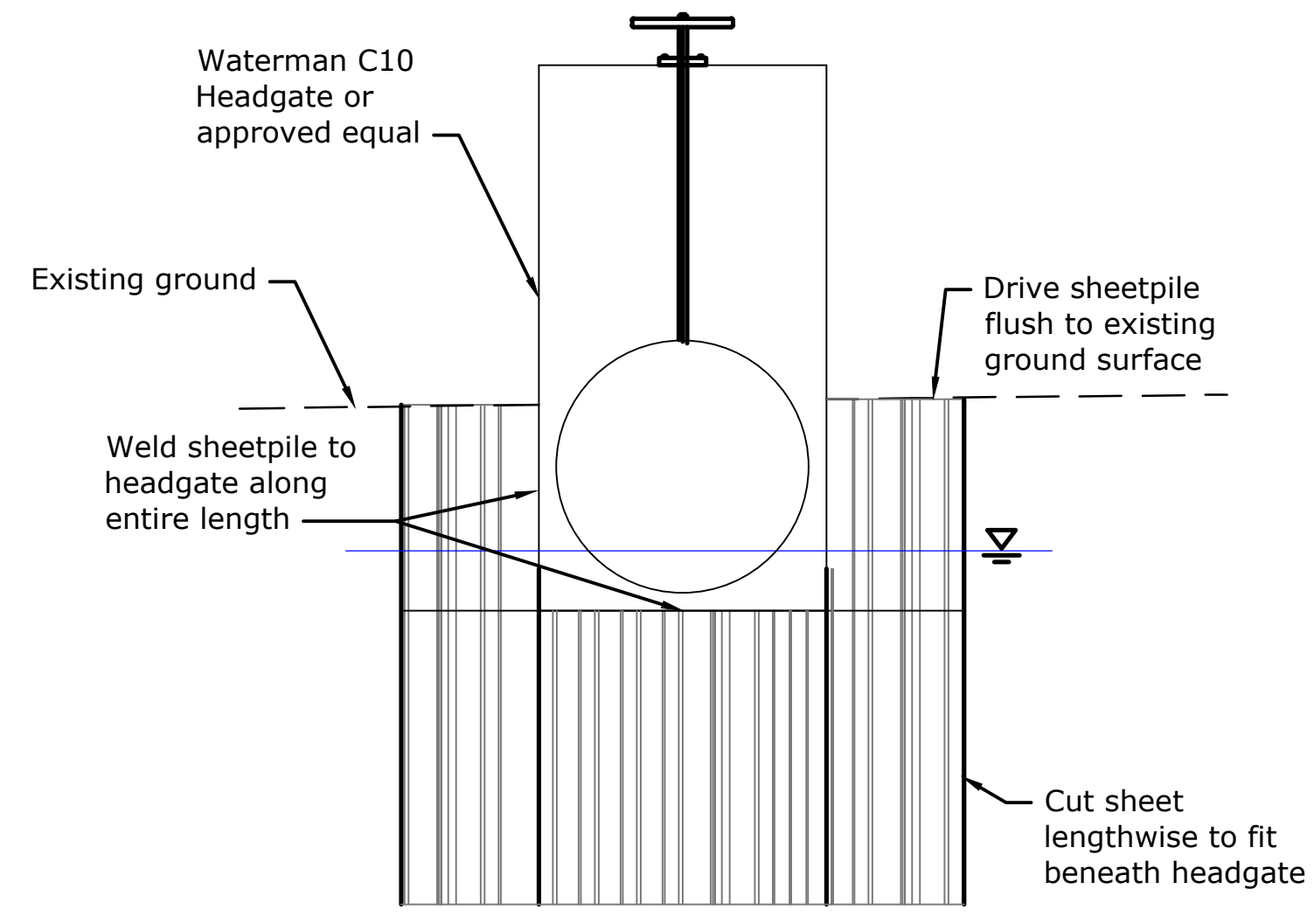
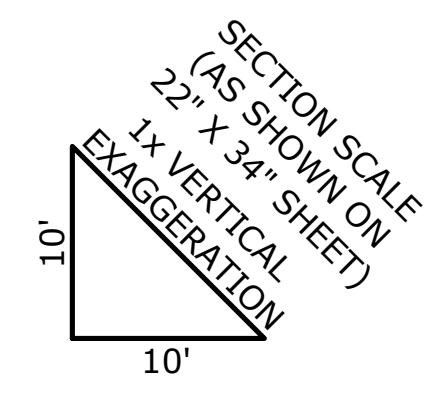




PROFILE - STATE DITCH



TYPICAL SECTION - PROPOSED STATE DITCH

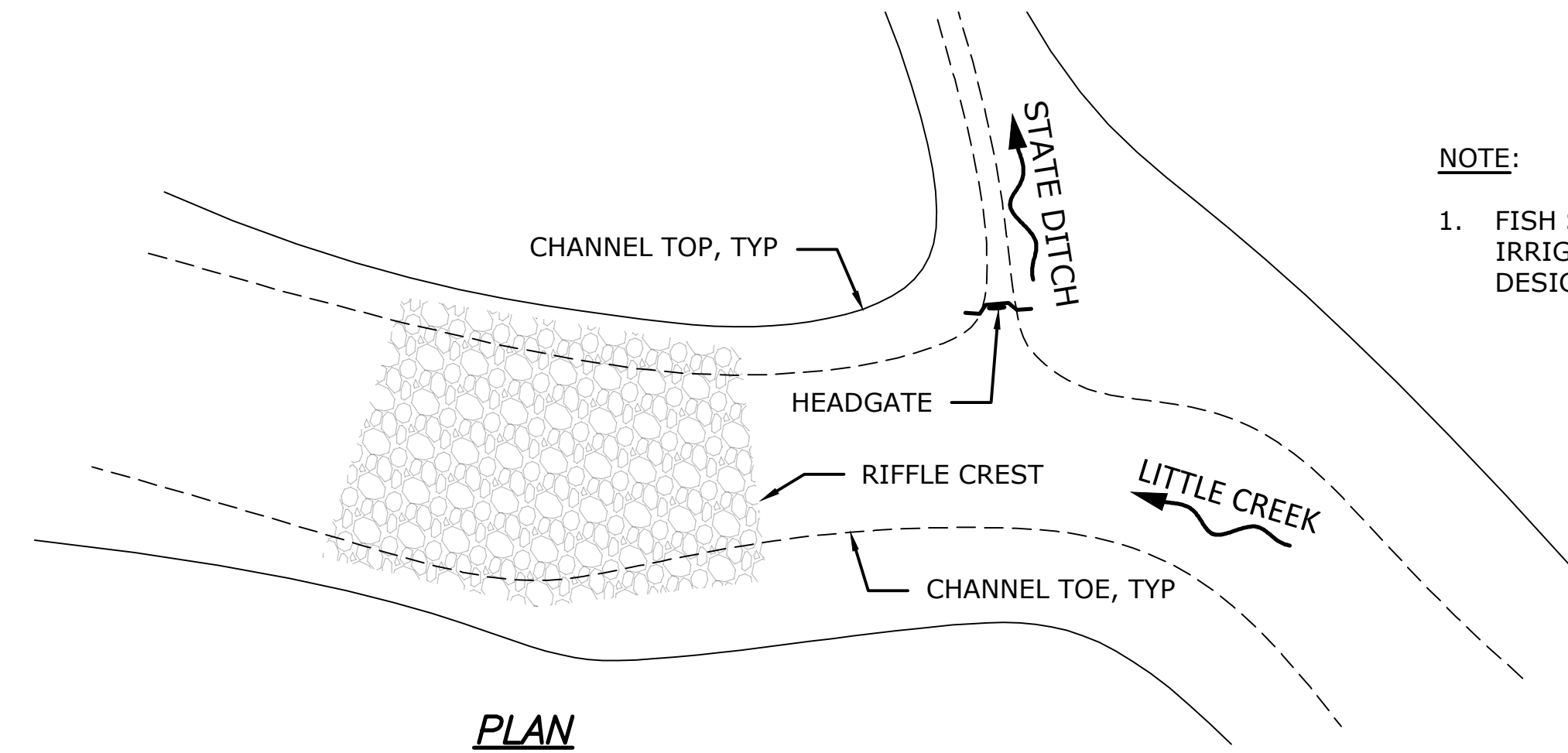


SECTION VIEW



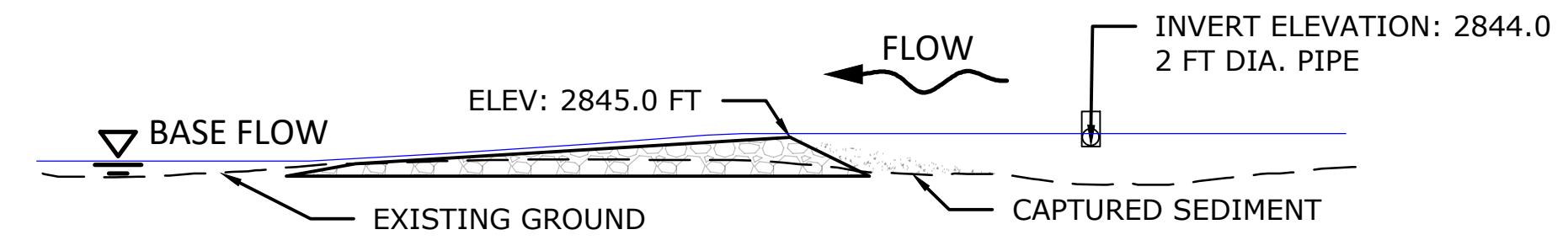
TYPICAL PHOTO

TYPICAL DETAIL - HEADGATE NOT TO SCALE



PLAN

- NOTE:
1. FISH SCREEN ON IRRIGATION DITCH TO BE DESIGNED BY OTHERS.



PROFILE

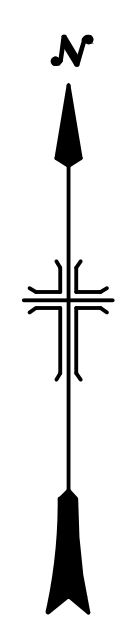
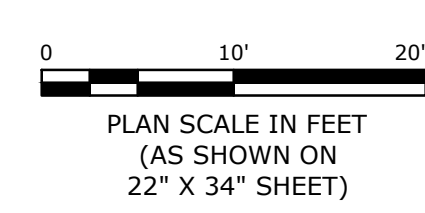
TYPICAL DETAIL - CONSTRUCTED RIFFLE 1" = 20'

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 PLOT FILE: JFL\_BUFFALOFLATS.DWG







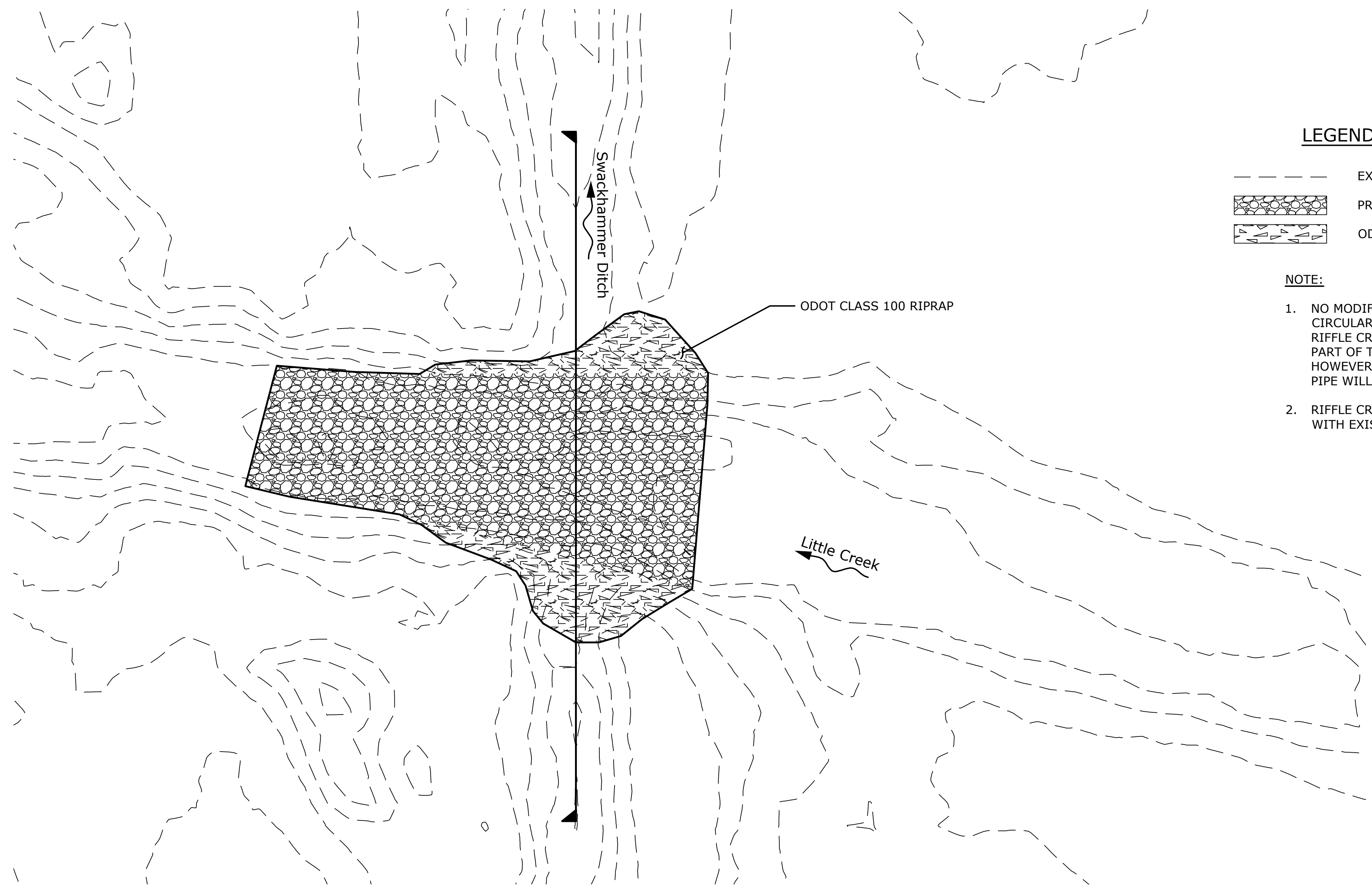
**BUREAU OF RECLAMATION**  
 interfluve  
 501 Portway Avenue, Suite 101  
 Hood River, OR 97031  
 541-386-9903  
 www.interfluve.com

**LEGEND**

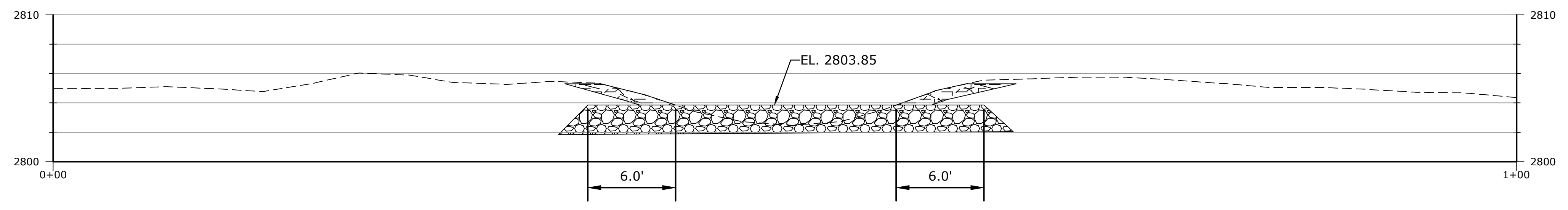
- EXISTING CONTOURS (1 FT)
- PROPOSED RIFFLE
- ODOT CLASS 100 RIPRAP

**NOTE:**

1. NO MODIFICATIONS TO THE HALF CIRCULAR PIPE SPANNING THE RIFFLE CREST ARE PRESENTED AS PART OF THIS DESIGN ITERATION. HOWEVER, REPLACEMENT OF THIS PIPE WILL LIKELY BE NECESSARY.
2. RIFFLE CREST TO BE ALIGNED WITH EXISTING DITCH LEVEE.

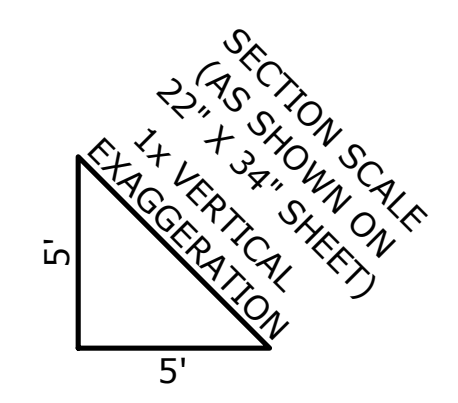


**PLAN VIEW**



**SECTION VIEW**

**TYPICAL DETAIL - SWACKHAMMER RIFFLE**



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PLOT DATE  
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**GRANDE RONDE RIVER SUBBASIN**  
 BUFFALO FLATS HABITAT IMPROVEMENT PROJECT

CONTRACTOR  
 DRAWN  
 ACCEPTED  
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TYPICAL DETAILS - SWACKHAMMER OUTLET

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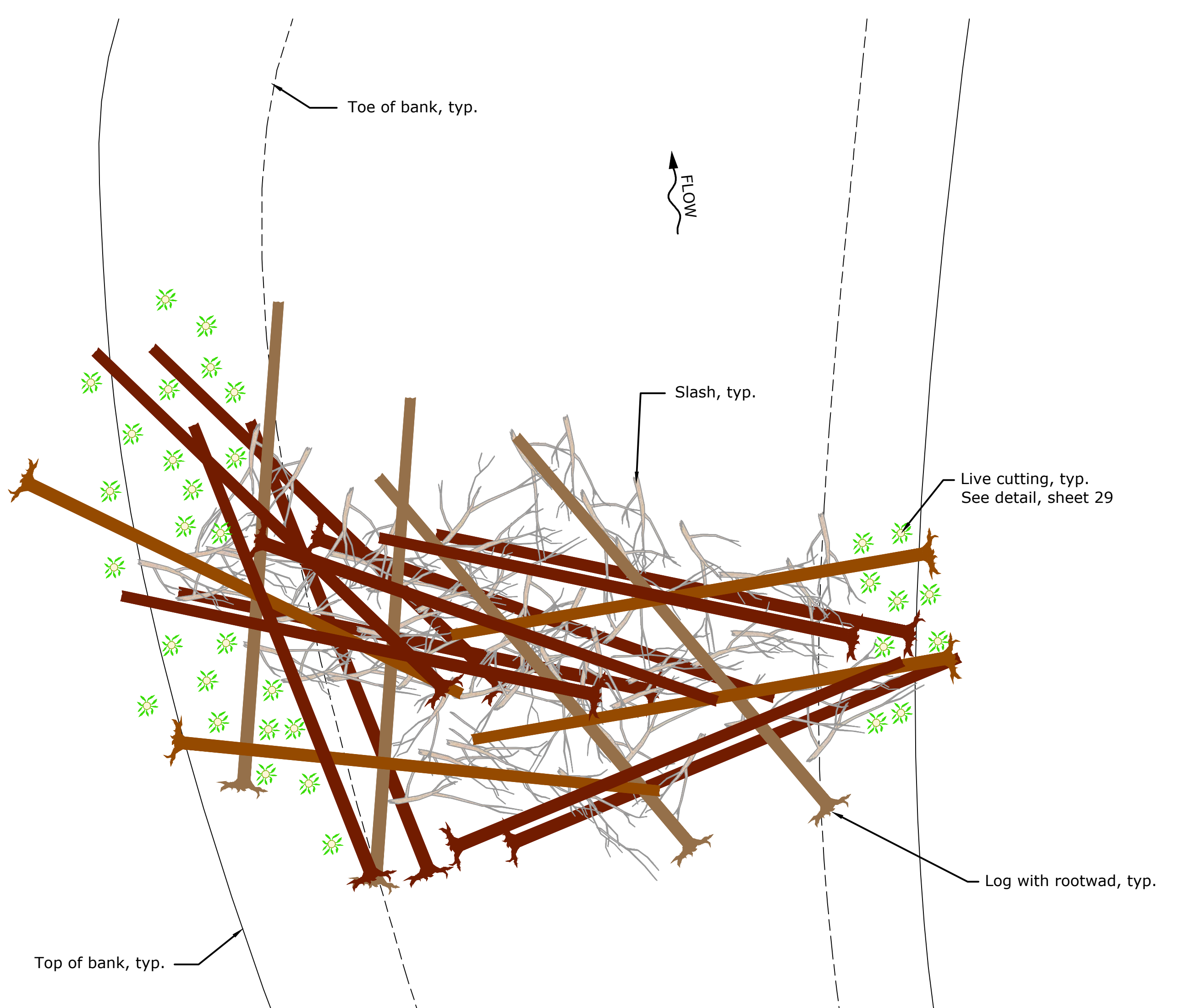
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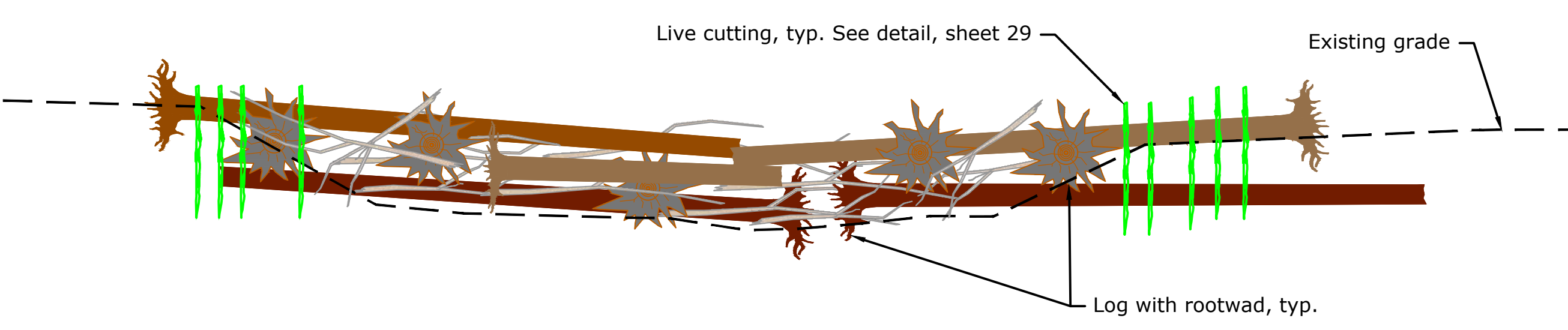
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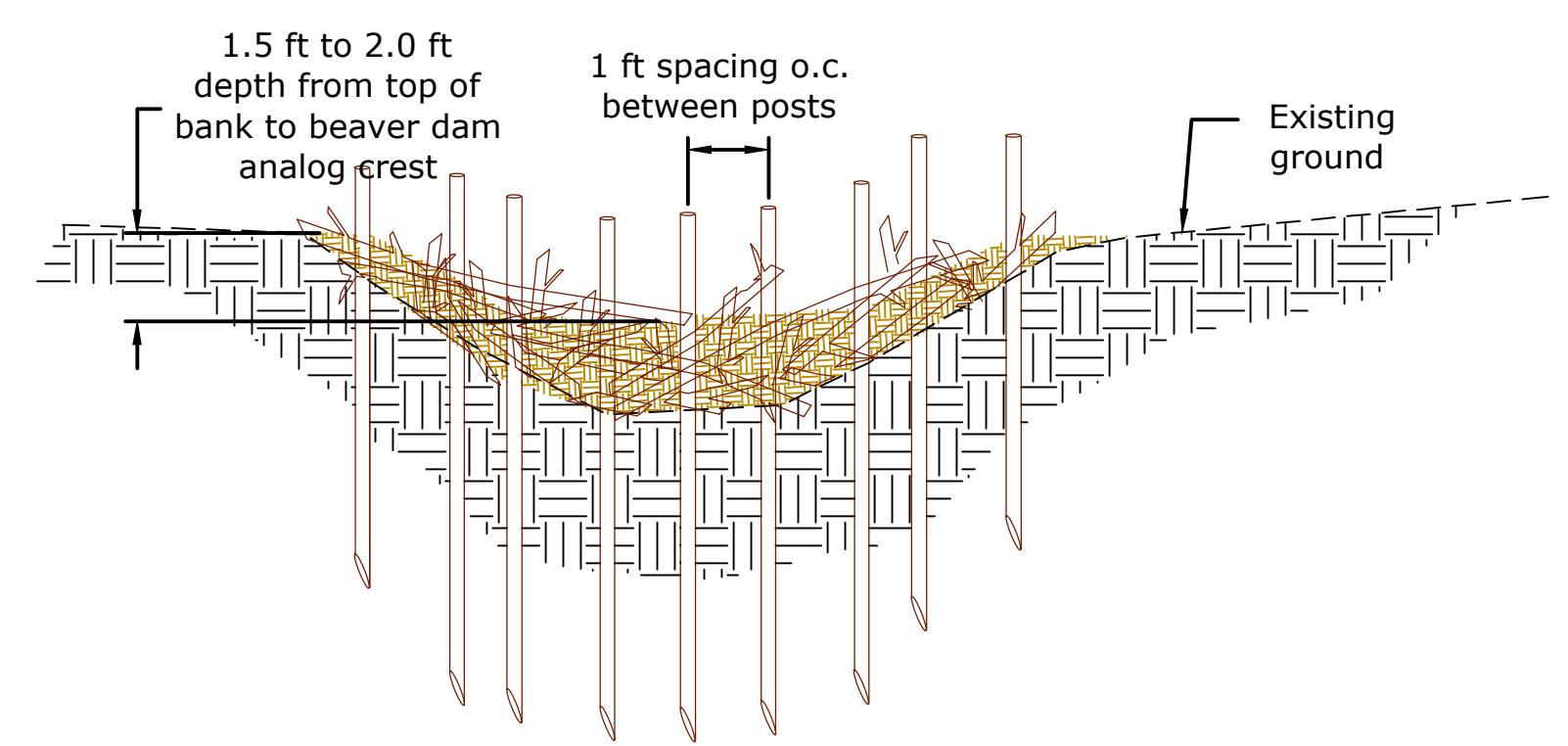


PLAN VIEW

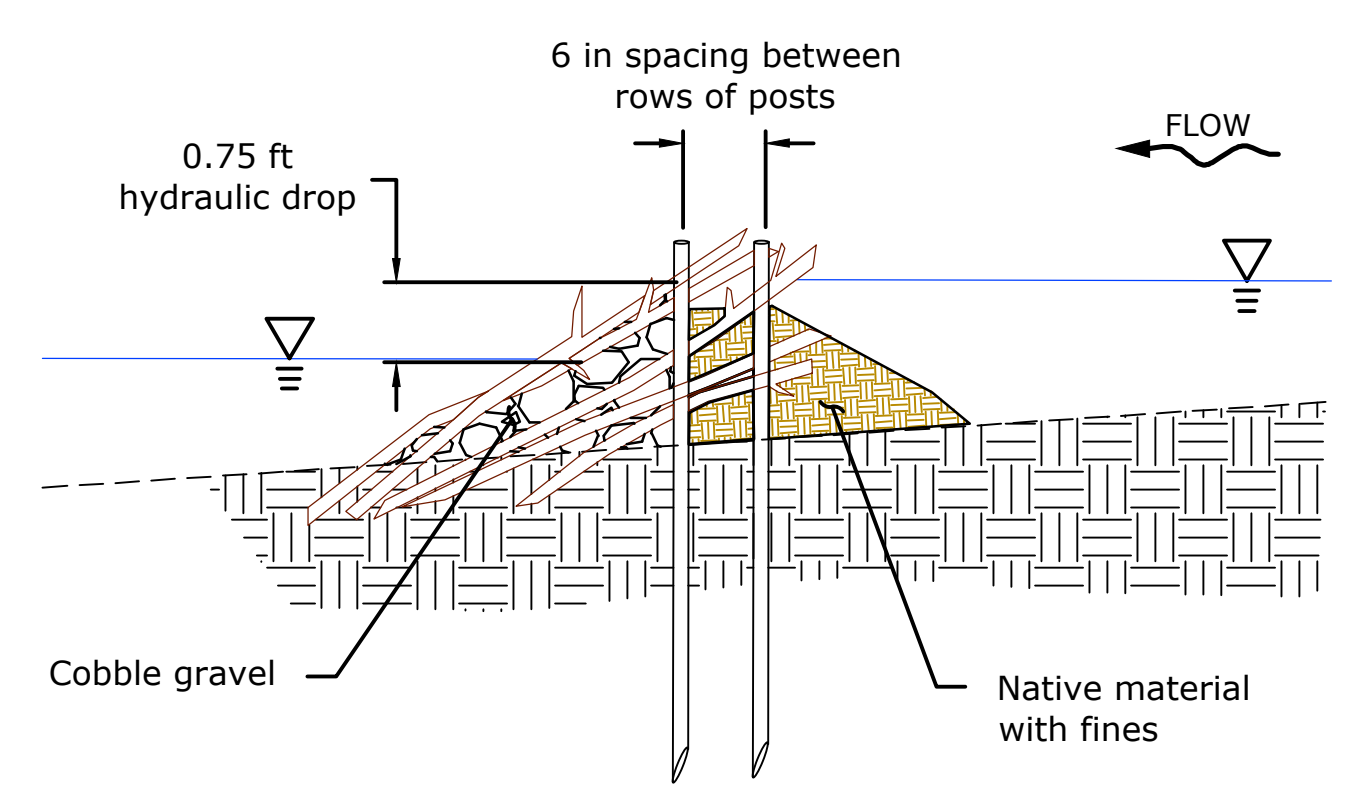


SECTION VIEW

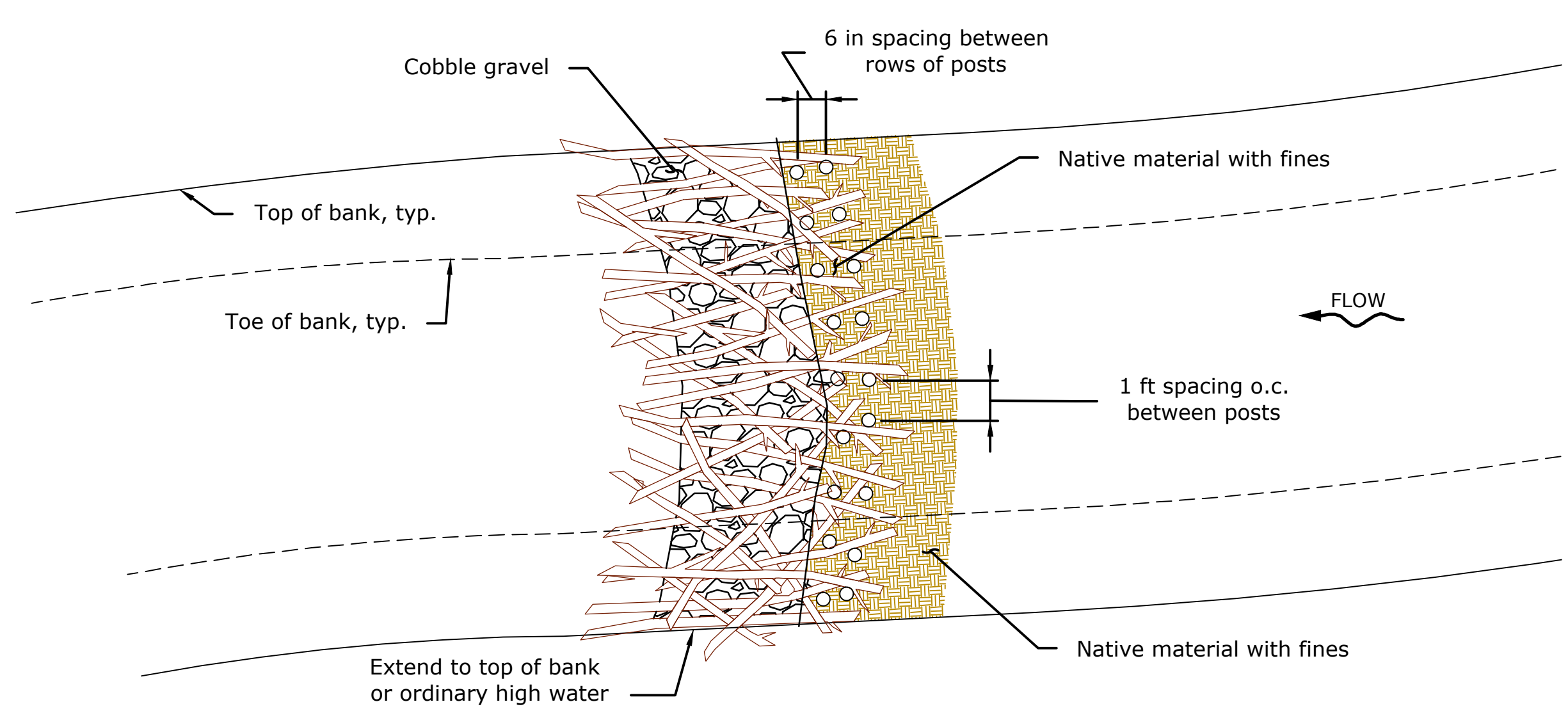
TYPICAL DETAIL – CHANNEL SPANNING LARGE WOOD STRUCTURE  
NOT TO SCALE



SECTION VIEW



PROFILE VIEW



PLAN VIEW

TYPICAL DETAIL – POST ASSISTED BRUSH MOUND  
NOT TO SCALE

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D

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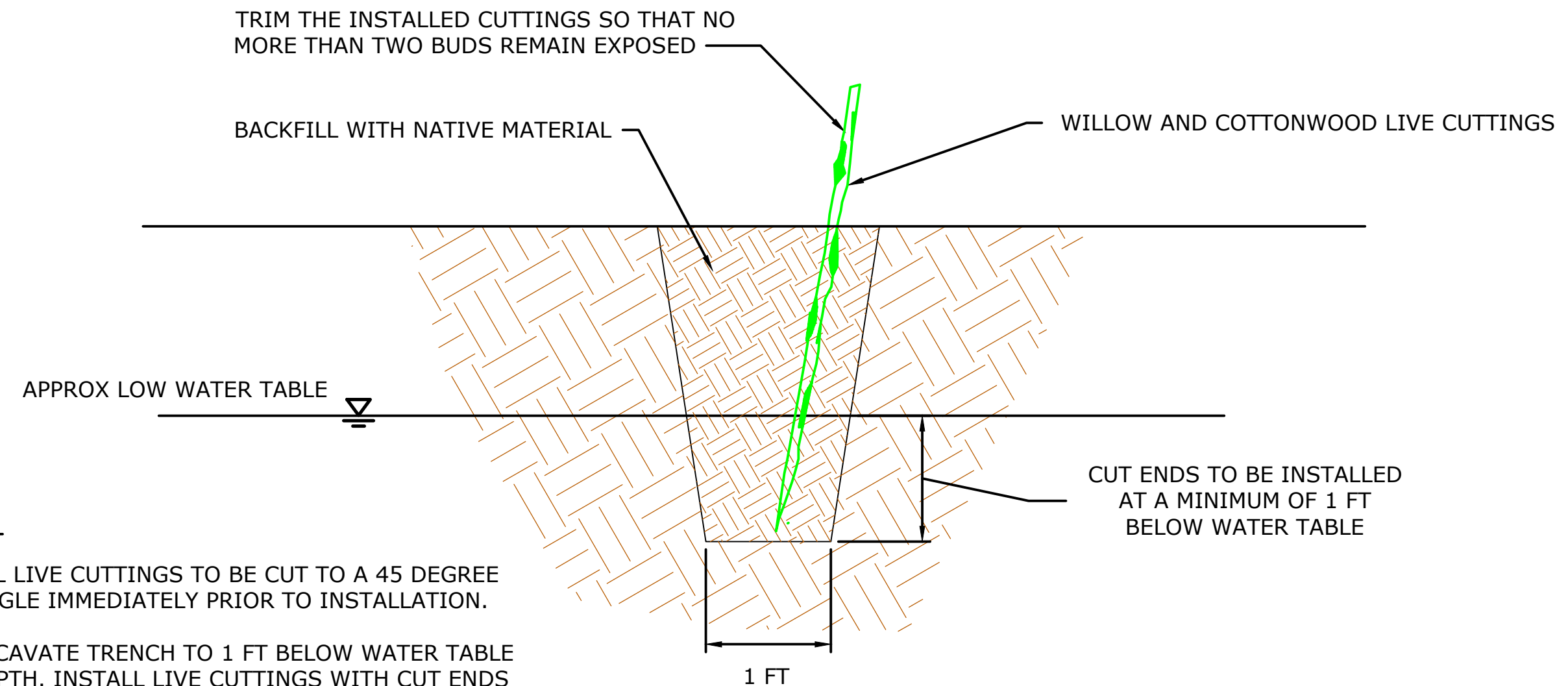
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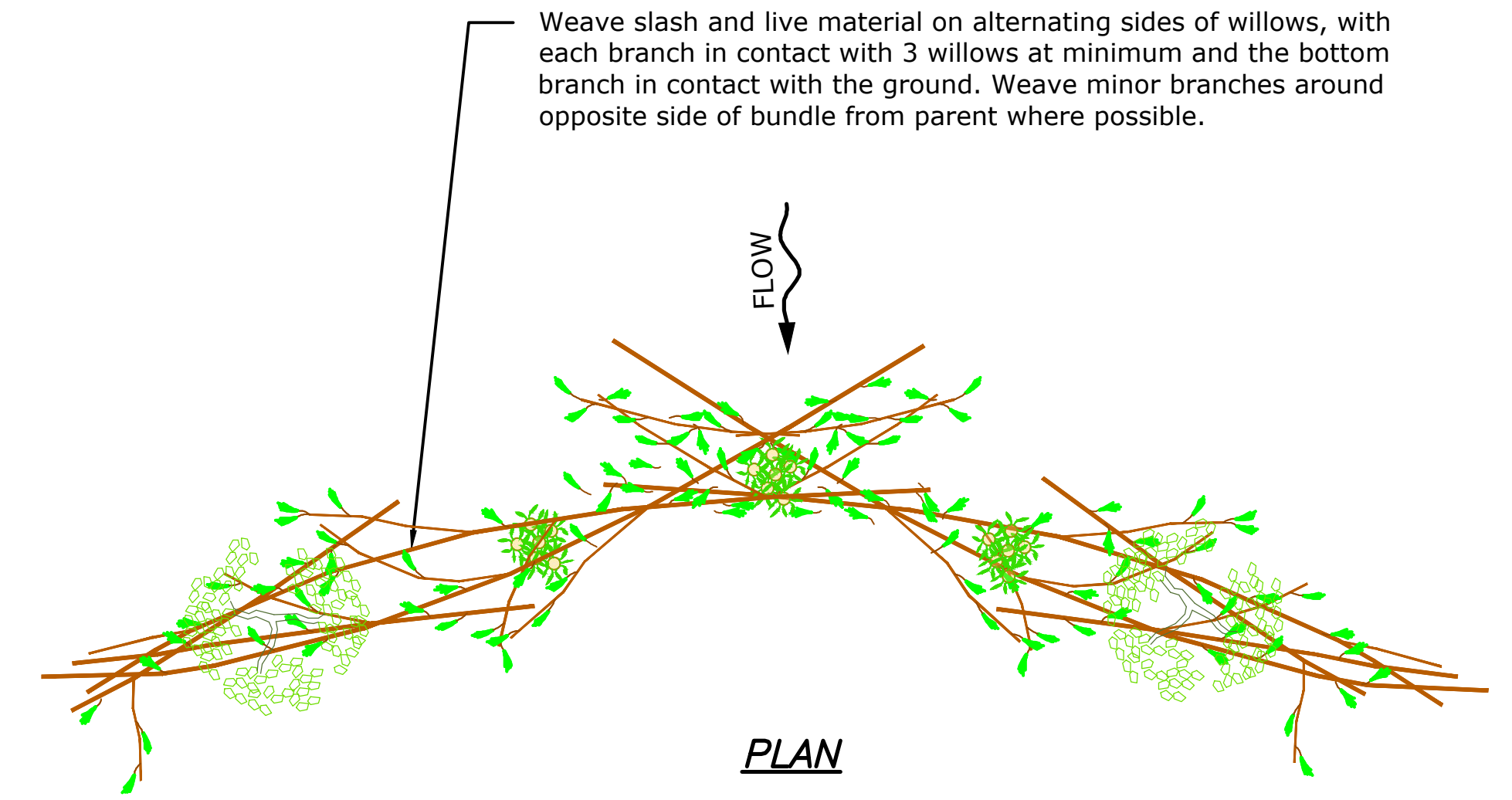
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- NOTES:**
1. ALL LIVE CUTTINGS TO BE CUT TO A 45 DEGREE ANGLE IMMEDIATELY PRIOR TO INSTALLATION.
  2. EXCAVATE TRENCH TO 1 FT BELOW WATER TABLE DEPTH. INSTALL LIVE CUTTINGS WITH CUT ENDS IN TOE OF TRENCH.
  3. PUMP WATER INTO TRENCH AND COMPACT SOIL BACKFILL IN LIFTS TO IMPROVE STEM TO SOIL CONTACT.
  4. "WATER IN" FINISHED CUTTING UNTIL WATER VISIBLY "BUBBLES" ON SURFACE.

**SECTION**

**TYPICAL DETAIL – WILLOW AND COTTONWOOD TRENCH**  
NOT TO SCALE



**PLAN**



**ELEVATION**

**TYPICAL DETAIL – FLOOD FENCE**  
NOT TO SCALE

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TYPICAL DETAILS - FLOODPLAIN ROUGHNESS

----

C-27

SHEET 27 OF 29

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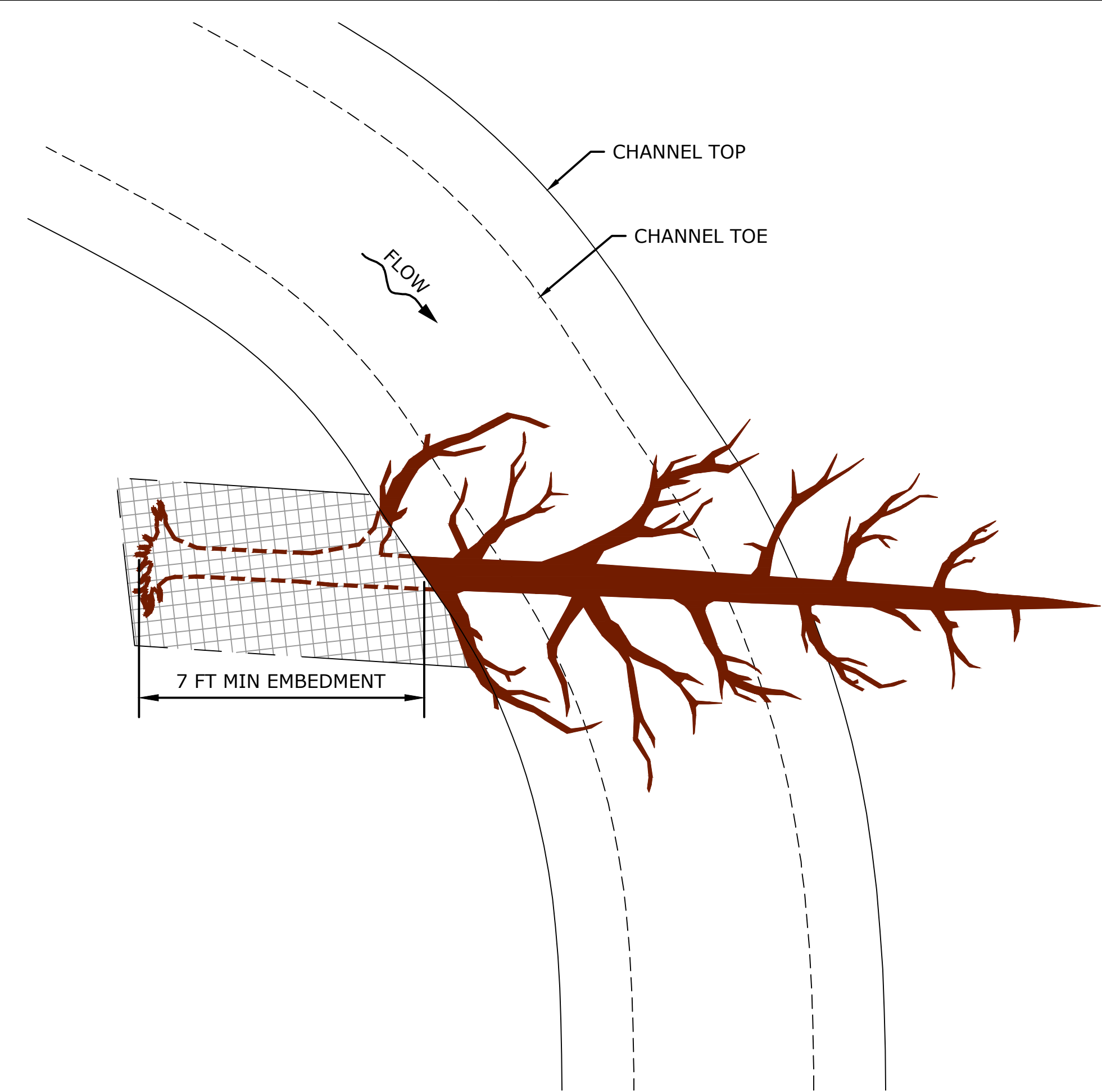
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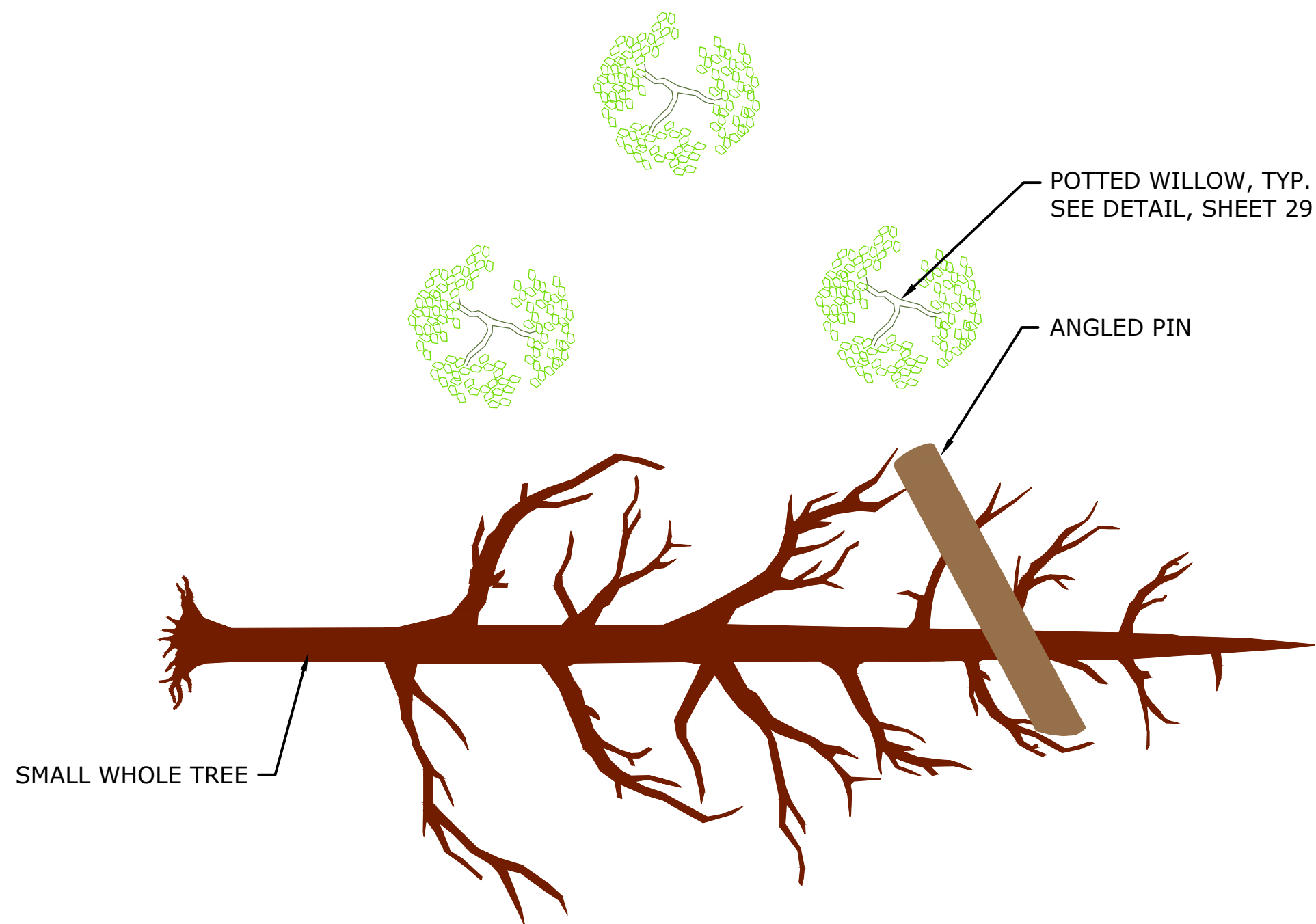
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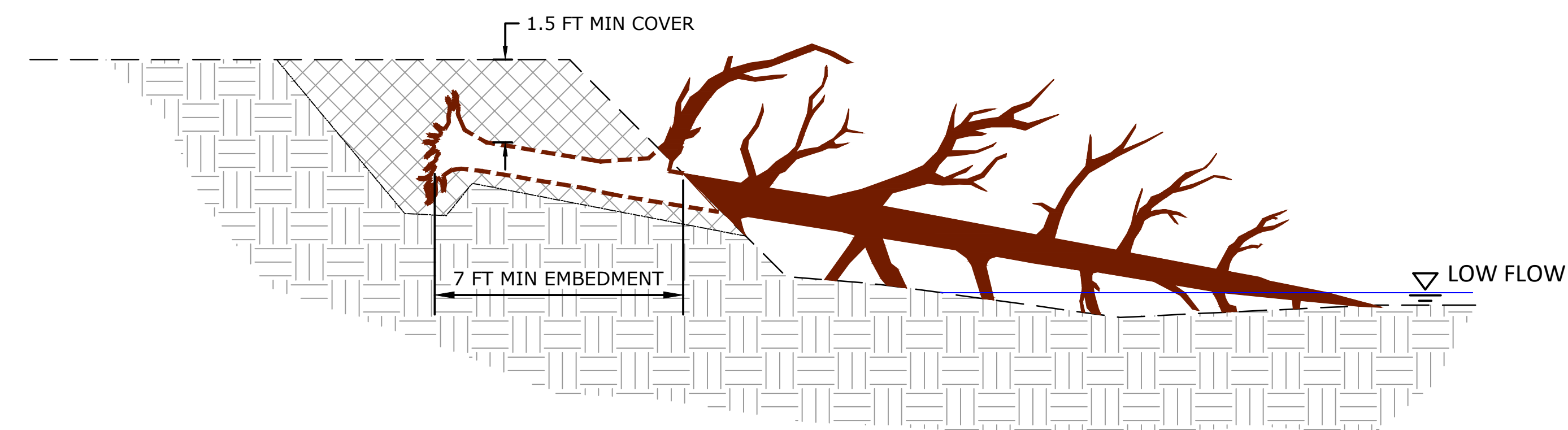
PLAN VIEW



TYPICAL PHOTO

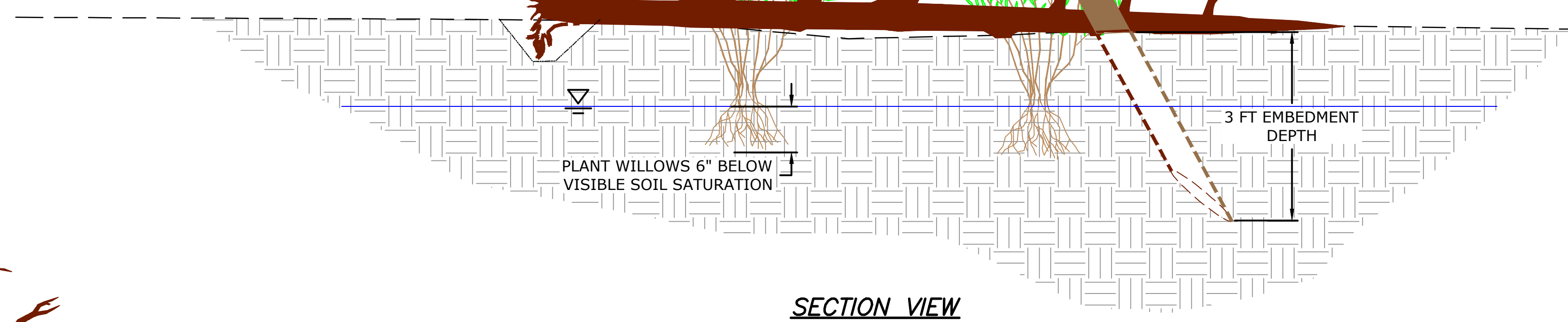


PLAN VIEW



SECTION VIEW

TYPICAL DETAIL - SMALL WHOLE TREE PLACEMENT (CHANNEL)  
NOT TO SCALE



SECTION VIEW

TYPICAL DETAIL - SMALL WHOLE TREE PLACEMENT (FLOODPLAIN)  
NOT TO SCALE

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2022-12-30  
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CAD SYSTEM  
AUG 24, 15 (LMS TECH)  
JFL BUFFALOFLATS.DWG

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TYPICAL DETAILS -  
WHOLE TREE PLACEMENT

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FCRPS HABITAT ENHANCEMENT PROGRAM - OREGON  
GRANDE RONDE RIVER SUBBASIN  
BUFFALO FLATS HABITAT IMPROVEMENT  
PROJECT  
Not for Distribution

SEEDING AND PLANTING: WETLAND ZONE

WETLAND SEEDING MIX (23.5 ACRES)		
Seeding rate: 30 lbs/acre (705 lbs)		
COMMON NAME	SCIENTIFIC NAME	PERCENT OF WHOLE MIX
Nebraska sedge	<i>Carex nebrascensis</i>	30%
Northwest territory sedge	<i>Carex utriculata</i>	30%
Common spikerush	<i>Eleocharis palustris</i>	20%
Daggerleaf rush	<i>Juncus ensifolius</i>	10%
Baltic rush	<i>Juncus balticus</i>	10%

WETLAND LIVE PLANTS (23.5 ACRES)						
COMMON NAME	SCIENTIFIC NAME	STOCK	TYPE	SIZE	DENSITY	QUANTITY (EA)
Nebraska sedge	<i>Carex nebrascensis</i>	Herbaceous	Plug	10 in3	3 ft on center	22760
Northwest territory sedge	<i>Carex utriculata</i>	Herbaceous	Plug	10 in3	3 ft on center	22760
Common spikerush	<i>Eleocharis palustris</i>	Herbaceous	Plug	10 in3	3 ft on center	22760
Daggerleaf rush	<i>Juncus ensifolius</i>	Herbaceous	Plug	10 in3	3 ft on center	22760
Baltic rush	<i>Juncus balticus</i>	Herbaceous	Plug	10 in3	3 ft on center	22760

SEEDING AND PLANTING: RIPARIAN ZONE

RIPARIAN SEED MIX (25.8 ACRES)		
Seeding rate: 30 lbs/acre (468 lbs)		
COMMON NAME	SCIENTIFIC NAME	PERCENT OF WHOLE MIX
Blue wildrye	<i>Elymus glaucus</i>	35%
Thickspike wheatgrass	<i>Elymus lanceolatus</i>	35%
Tufted hairgrass	<i>Deschampsia caespitosa</i>	15%
Bluejoint reedgrass	<i>Calamagrostis canadensis</i>	15%

RIPARIAN LIVE PLANTS (25.8 ACRES)						
COMMON NAME	SCIENTIFIC NAME	STOCK	TYPE	SIZE	DENSITY	QUANTITY (EA)
Coyote willow	<i>Salix exigua</i>	Shrub	Live cutting	3 ft, 1.5-2" diameter	Clusters of 4; 5 ft on center	179720
Coyote willow	<i>Salix exigua</i>	Shrub	Tubeling	10 in3	3 ft on center	39940
Red osier dogwood	<i>Cornus sericea</i>	Shrub	Tubeling	10 in3	3 ft on center	39940

PLANTING: RIPARIAN ZONE

RIPARIAN LIVE PLANTS (5.2 ACRES)						
COMMON NAME	SCIENTIFIC NAME	STOCK	TYPE	SIZE	DENSITY	QUANTITY (EA)
Coyote willow	<i>Salix exigua</i>	Shrub	Live cutting	3 ft, 1.5-2" diameter	Clusters of 4; 5 ft on center	36240
Coyote willow	<i>Salix exigua</i>	Shrub	Tubeling	10 in3	3 ft on center	8060
Red osier dogwood	<i>Cornus sericea</i>	Shrub	Tubeling	10 in3	3 ft on center	8060

PLANTING: TRANSITIONAL ZONE

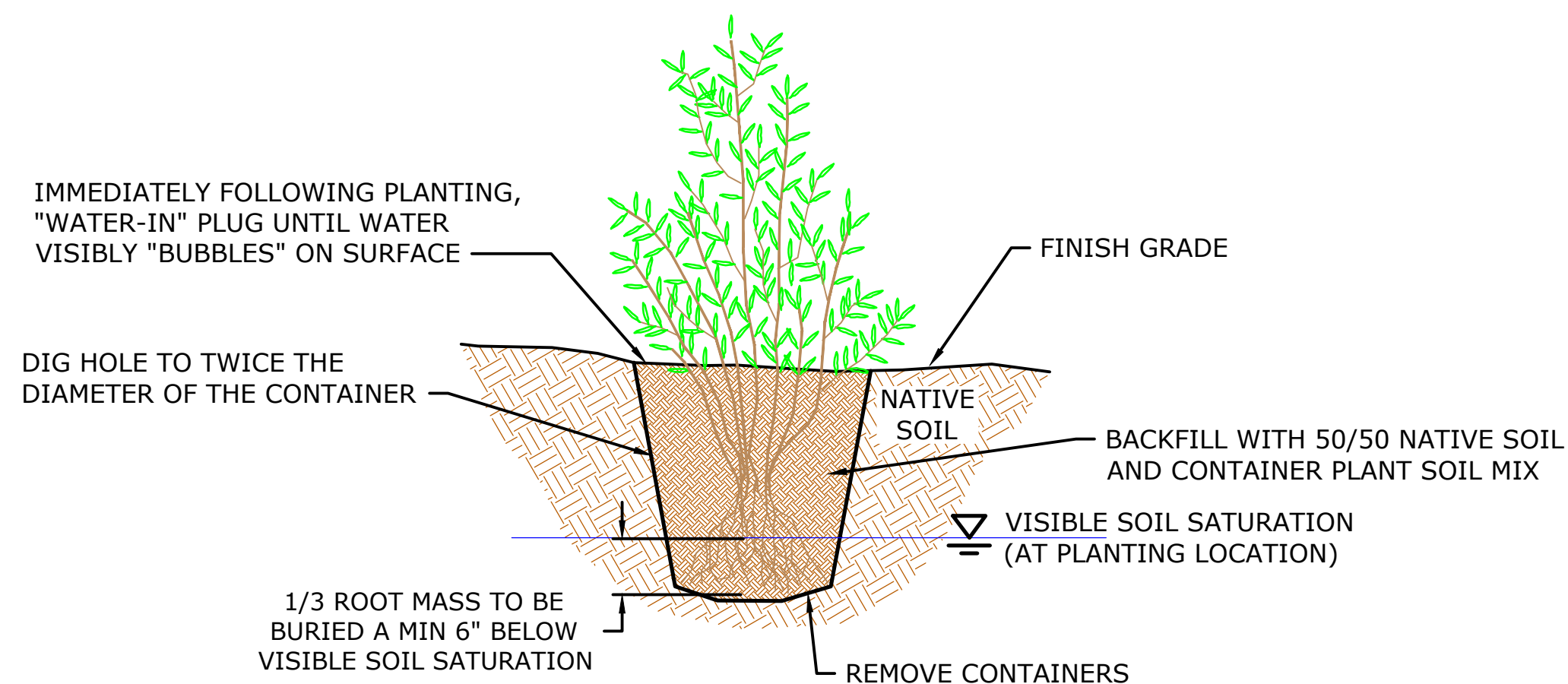
TRANSITIONAL LIVE PLANTS (29.9 ACRES)						
COMMON NAME	SCIENTIFIC NAME	STOCK	TYPE	SIZE	DENSITY	QUANTITY (EA)
Pacific willow	<i>Salix lasiandra</i>	Tree	Live cutting	3 ft, 1.5-2" diameter	Clusters of 4; 10 ft on center	17320
Pacific willow	<i>Salix lasiandra</i>	Tree	Tubeling	10 in3	10 ft on center	4330
Black cottonwood	<i>Populus trichocarpa</i>	Tree	Live cutting	3 ft, 1.5-2" diameter	Clusters of 4; 10 ft on center	17320

SEEDING: UPLAND ZONE

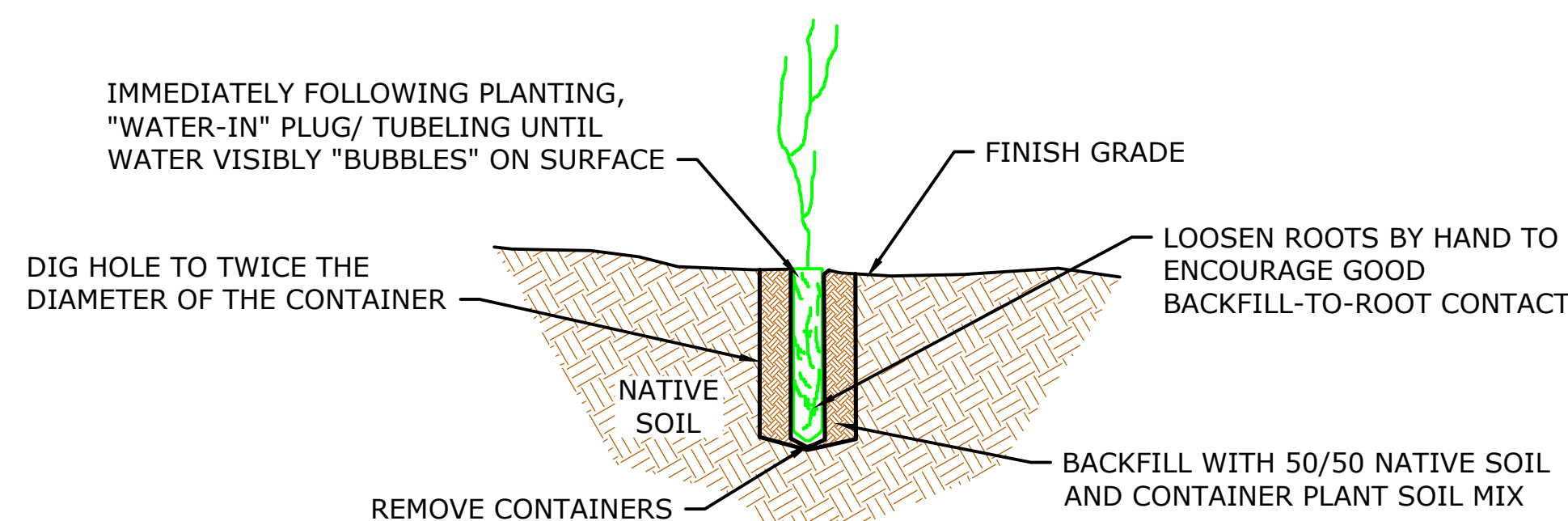
UPLAND SEED MIX (9.9 ACRES)		
Seeding rate: 40 lbs/acre (452 lbs)		
COMMON NAME	SCIENTIFIC NAME	PERCENT OF WHOLE MIX
Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	50%
Thickspike wheatgrass	<i>Elymus lanceolatus</i>	30%
Prairie junegrass	<i>Koeleria macrantha</i>	20%

NOTES:

- SOME PLANTING AREAS OVERLAP WITH LOG STRUCTURE PLACEMENTS AND SOME AREAS WILL BE MORE SUITABLE FOR PLANTING THAN OTHERS. PLANTING IN THESE AREAS WILL BE CONFIGURED TO WORK AROUND LOG STRUCTURES OR ADDED TO OTHER IDENTIFIED PLANTING AREAS TO OPTIMIZE PROJECT PERFORMANCE PER APPROVAL OF OWNER'S REPRESENTATIVE.
- AREAS WITH NO GROUND DISTURBANCE ARE BEING PLANTED ONLY, NOT SEEDED.

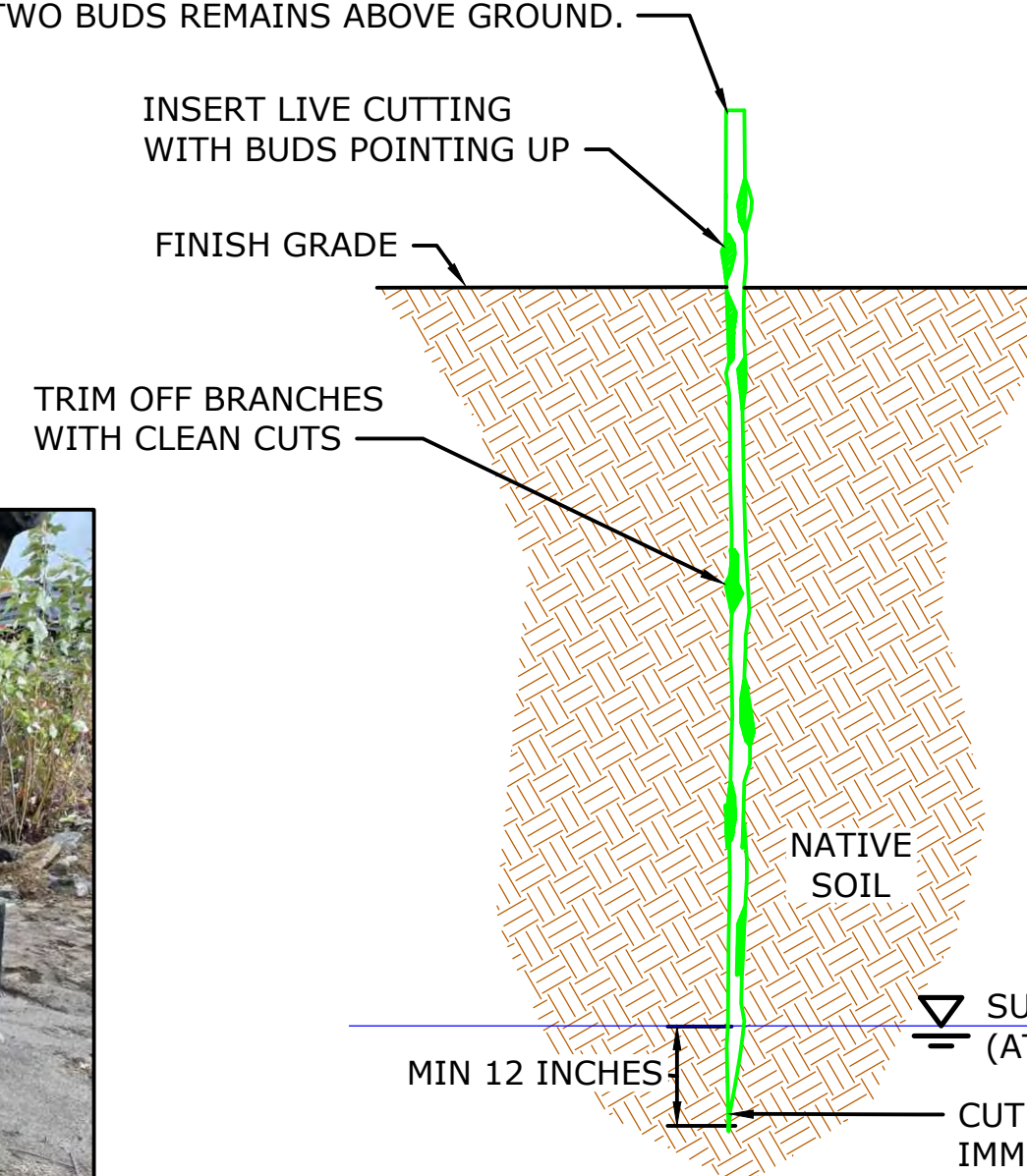


TYPICAL DETAIL - BURIED POTTED/ TUBELING WILLOW  
NOT TO SCALE



TYPICAL DETAIL - PLUG/ TUBELING  
NOT TO SCALE

DRIVE LIVE CUTTINGS INTO NATIVE SOIL SO THAT A MINIMUM OF 12 INCHES EXTENDS BELOW THE SUMMER WATER TABLE ELEVATION, AND A MINIMUM TWO BUDS REMAINS ABOVE GROUND.



NOTES:

- DEVELOP PILOT HOLE TO 1 FT BELOW WATER TABLE DEPTH. PUMP WATER INTO HOLE. INSTALL LIVE CUTTINGS WITH CUT ENDS DOWN (SEE PLANTING STINGER PHOTO FOR EXAMPLE PLANTING TOOL).
- CONTINUE TO PUMP WATER INTO HOLE AND COMPACT SOIL BACKFILL IN LIFTS TO IMPROVE STEM TO SOIL CONTACT.
- WATER IN FINISHED CUTTING UNTIL WATER VISIBLY "BUBBLES" ON SURFACE.



TYPICAL PHOTO - PLANTING STINGER

TYPICAL DETAIL - LIVE CUTTING  
NOT TO SCALE

ALWAYS THINK SAFETY  
U.S. DEPARTMENT OF THE INTERIOR  
BUREAU OF RECLAMATION  
COLUMBIA/SNAKE RIVER SALMON RECOVERY PROGRAM  
FCRPS HABITAT ENHANCEMENT PROGRAM - OREGON  
GRANDE RONDE RIVER SUBBASIN  
BUFFALO FLATS HABITAT IMPROVEMENT PROJECT

CONTRACTOR DRAWN

ACCEPTED

UNION, OR 2021-06-17

PLANTING DETAILS, TABLES AND SEED MIXES

LAST SAVED DATE: 2022-12-30 12:30 PM  
DRAWN BY: NSM/HT  
CHECKED BY: NSM/HT  
CAD SYSTEM: AutoCAD 2015 (LMS TECH)  
APP: C:\Program Files\Autodesk\AutoCAD 2015\BIN\PL\BUFFALOFLATS.DWG