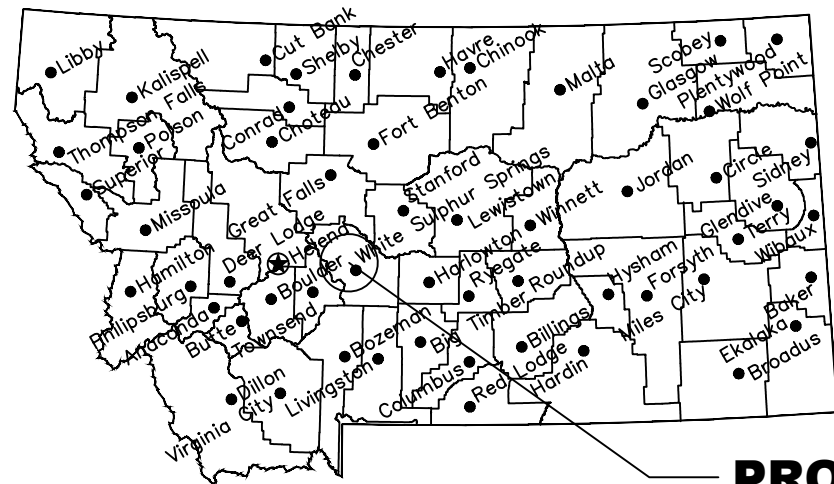


# MONTANA FISH, WILDLIFE & PARKS

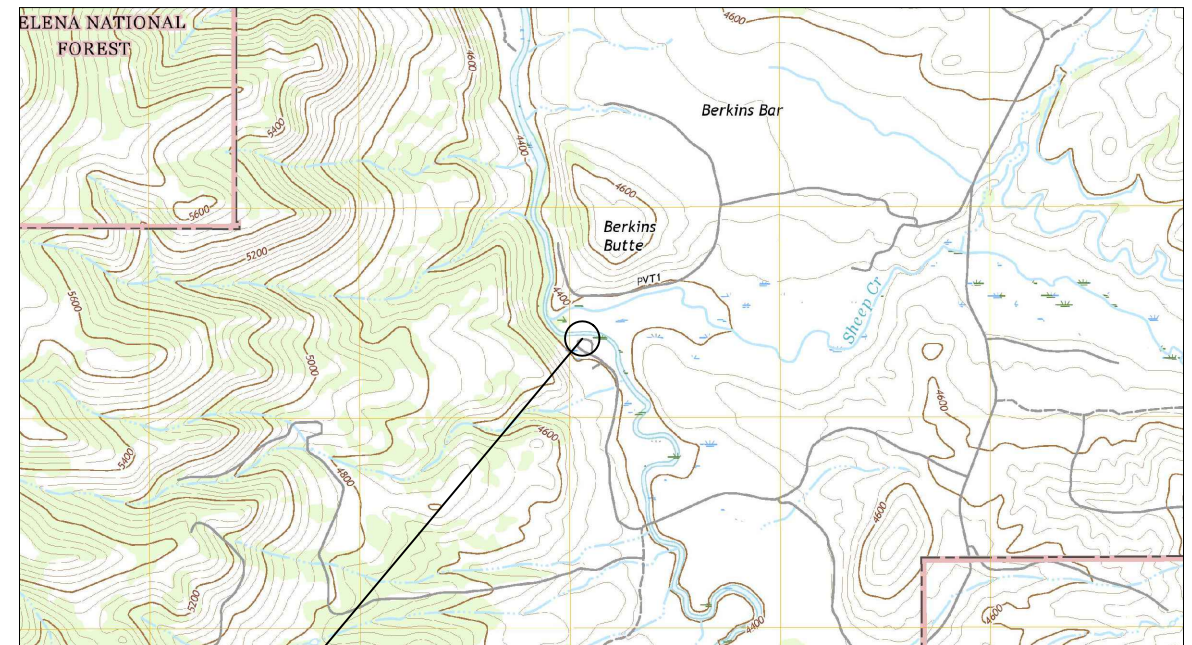
# CAMP BAKER

# STREAMBANK STABILIZATION



**PROJECT LOCATION**  
**Location Map**

No Scale



**PROJECT LOCATION**  
**Vicinity Map**

1" = 3,000' IMAGE SOURCE: USGS 7.5' QUAD

MONTANA FISH, WILDLIFE AND PARKS  
 DESIGN AND CONSTRUCTION

MAILING ADDRESS:  
 PO BOX 200701  
 HELENA, MT 59620-0701  
 TEL 406.841.4000  
 FAX 406.841.4004  
<https://fwp.mt.gov/aboutfwp/design-and-construction>

GEUM ENVIRONMENTAL  
 CONSULTING

MAILING ADDRESS:  
 PO BOX 1956  
 HAMILTON, MT 59840  
 AMY SACRY  
 TEL 406.363.2353

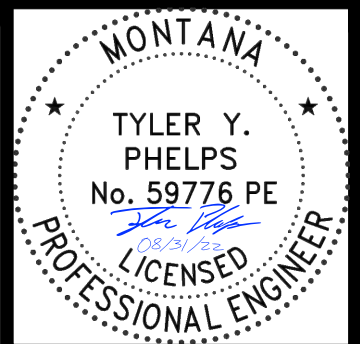
COLDWATER  
 ENGINEERING

MAILING ADDRESS:  
 1 N. LAST CHANCE GULCH,  
 SUITE 2  
 HELENA, MT 59601  
 TYLER PHELPS  
 TEL 406.431.2171

## DRAWING INDEX

SHEET 1: COVER SHEET  
 SHEET 2: SITE OVERVIEW  
 SHEET 3: DEMO/STAGING PLAN  
 SHEET 4: STREAMBANK PLAN  
 SHEET 5: STREAMBANK DETAILS  
 SHEET 6: FENCING DETAILS

SHEET 7: CROSS SECTIONS  
 SHEET 8: CROSS SECTIONS (CONT.)



T. PHELPS	JULY 2022
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APPROVED BY:	DATE:

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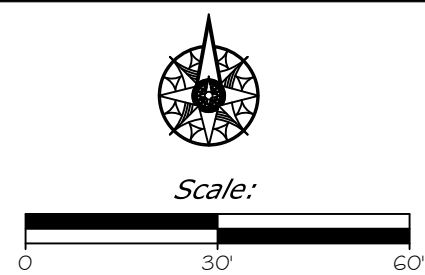
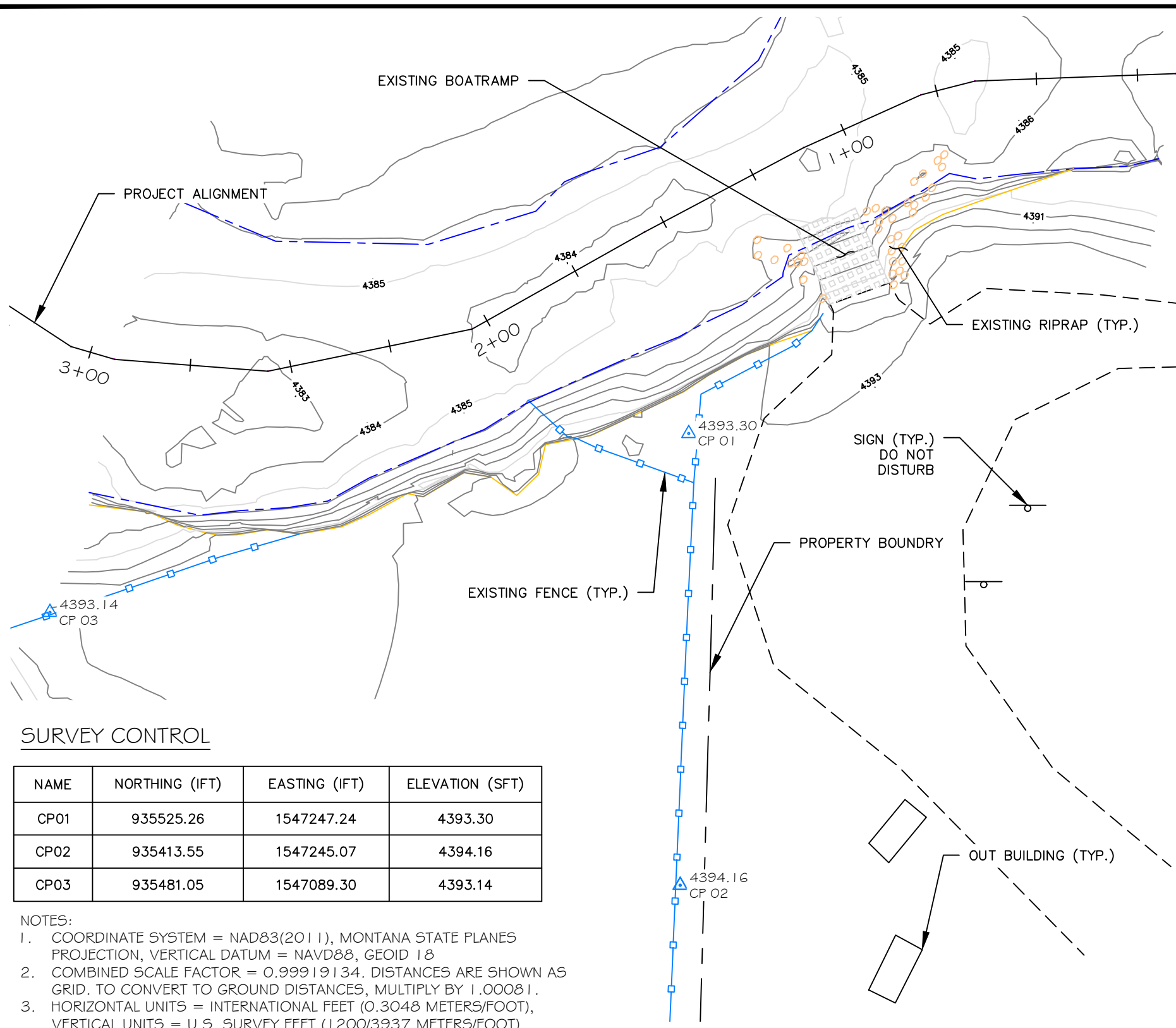
**MONTANA FISH,  
 WILDLIFE & PARKS**

**COVER SHEET**



**COLDWATER  
 ENGINEERING**

SHEET: 1 of 8



**LEGEND**

	PROPERTY BOUNDARY (ESTABLISHED BY OTHERS)
	EDGE OF WATER (5/24/22)
	EXISTING FENCE
	EXISTING EDGE OF ROAD
	EXISTING TOP OF BANK
	EXISTING BOATRAMP
	EXISTING RIPRAP
	SIGN
	CONTROL POINT

**LIST OF ABBREVIATIONS:**

" = INCHES  
 ' = FEET  
 % = PERCENT SLOPE  
 X:1 = HORIZONTAL : (1) VERTICAL SLOPE  
 CONT. = CONTINUED  
 CY = CUBIC YARD  
 DXX = PERCENT PASSING GRADATION  
 ELEV. = ELEVATION  
 ETC. = ETCETERA  
 FWP = FISH WILDLIFE AND PARKS  
 FT = FEET  
 IFT = INTERNATIONAL FEET  
 LF = LINEAR FEET

LS = LUMP SUM  
 NAD83 = NORTH AMERICAN DATUM 1983  
 NAVD88 = NORTH AMERICAN VERTICAL DATUM 1988  
 N.T.S. = NOT TO SCALE  
 Q = DISCHARGE (CFS)  
 SFT = U.S. SURVEY FEET  
 SQ YD = SQUARE YARD  
 TYP. = TYPICAL

**GENERAL NOTES:**

- CONTRACTOR IS RESPONSIBLE FOR VERIFICATION OF CURRENT CONDITIONS AND LOCATIONS OF ALL EXISTING ITEMS WITHIN OR ADJACENT TO THE WORK OR THAT MAY BE DISTURBED BY THE WORK.
- DRAWINGS ARE REPRESENTATIVE OF THE SITE SURVEY CONDUCTED 05/24/2022.
- CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL SURFACE AND SUBSURFACE UTILITIES.
- CONTRACTOR SHALL PROTECT AND REPAIR AT CONTRACTOR'S EXPENSE ANY DAMAGE TO UTILITIES CAUSED BY CONTRACTOR.
- EARTHWORK QUANTITIES ARE REPORTED AS THE MATERIAL RESTS IN IT'S UNDISTURBED, NATURAL STATE. NO SHRINK/SWELL FACTORS WERE APPLIED.
- DRAWINGS PLOTTED IN COLOR FOR REALIZATION OF ALL DESIGN FEATURES.
- CONTRACTOR MUST ABIDE BY THE CONDITIONS LISTED WITHIN THE PROJECT PERMITS. ANY DEVIATION FROM THE PROJECT PERMITTING CONDITIONS MUST BE APPROVED BY THE ENGINEER PRIOR TO COMMENCING WORK.
- CONSTRUCTION STAKING WILL BE PROVIDED BY THE ENGINEER. DAMAGED OR REMOVED STAKES WILL BE REPLACED AT CONTRACTOR'S EXPENSE.

**SURVEY CONTROL**

NAME	NORTHING (IFT)	EASTING (IFT)	ELEVATION (SFT)
CP01	935525.26	1547247.24	4393.30
CP02	935413.55	1547245.07	4394.16
CP03	935481.05	1547089.30	4393.14

- NOTES:**
- COORDINATE SYSTEM = NAD83(2011), MONTANA STATE PLANES PROJECTION, VERTICAL DATUM = NAVD88, GEOID 18
  - COMBINED SCALE FACTOR = 0.99919134. DISTANCES ARE SHOWN AS GRID. TO CONVERT TO GROUND DISTANCES, MULTIPLY BY 1.00081.
  - HORIZONTAL UNITS = INTERNATIONAL FEET (0.3048 METERS/FOOT), VERTICAL UNITS = U.S. SURVEY FEET (1.2003937 METERS/FOOT).
  - SURVEY CONTROL WAS DETERMINED VIA GPS OBSERVATIONS ON 05/24/2022.
  - CONTROL POINTS CONSIST OF 1/2" REBAR HAMMERED INTO GROUND, CAPPED AND FLAGGED.

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APPROVED BY:	DATE:

APPROVED BY:	DATE:
APPROVED BY:	DATE:

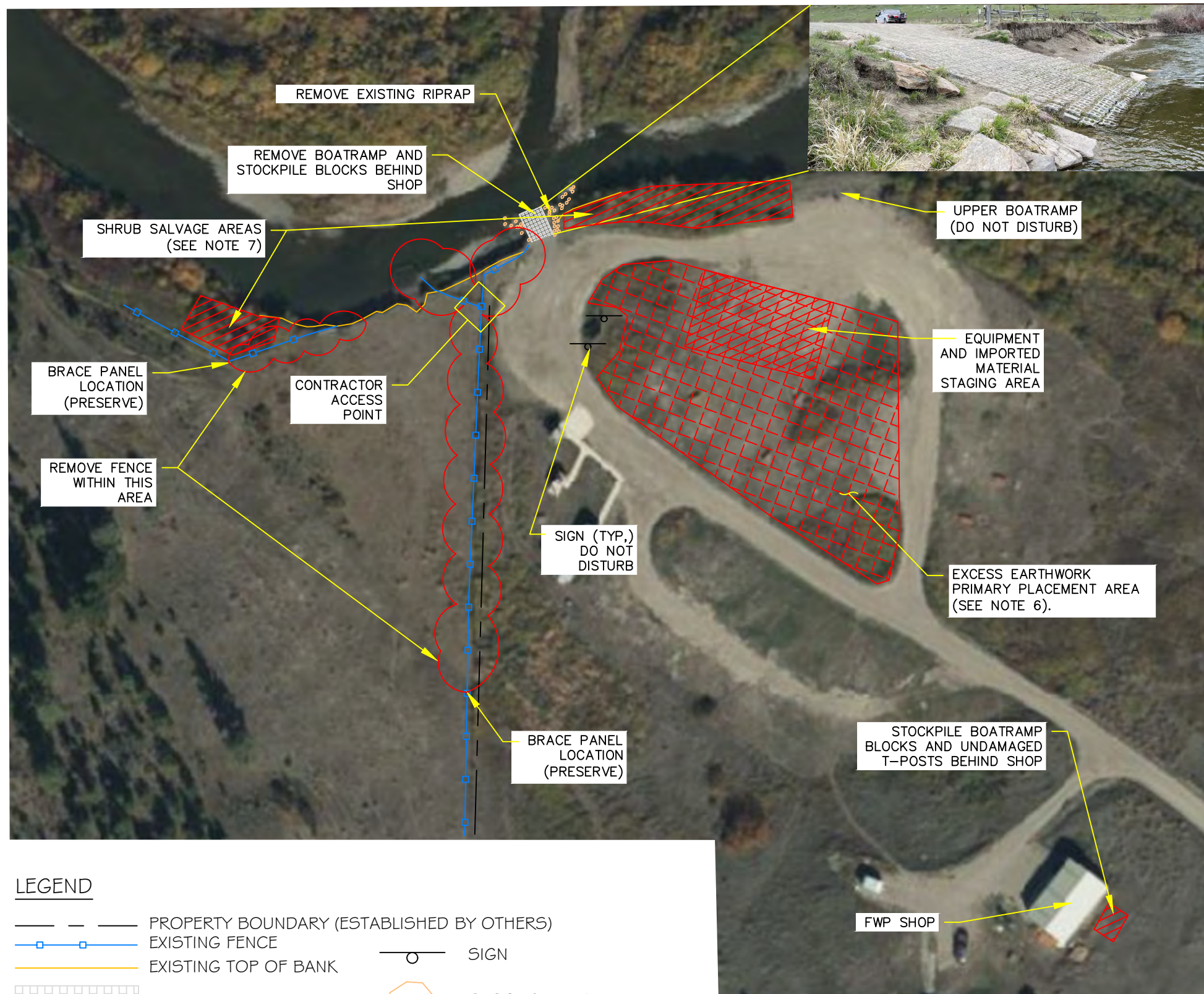


**MONTANA FISH,  
 WILDLIFE & PARKS**

**SITE OVERVIEW**



SHEET: 2 of 8



**LEGEND**

- — — — — PROPERTY BOUNDARY (ESTABLISHED BY OTHERS)
- □ — □ — EXISTING FENCE
- — — — — EXISTING TOP OF BANK
- □ □ □ □ EXISTING BOATRAMP
- ▨ ▨ ▨ ▨ ▨ PROPOSED STAGING, STOCKPILING, AND SALVAGE AREAS
- — ○ SIGN
- ◊ ◊ ◊ ◊ ◊ EXISTING RIPRAP
- ▨ ▨ ▨ ▨ ▨ PRIMARY EXCESS MATERIAL PLACEMENT AREA

**MATERIAL SCHEDULE**

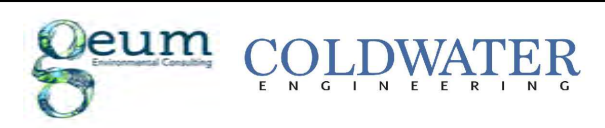
ITEM	QUANTITY	UNITS	DESCRIPTION
REMOVE BOATRAMP	1	LS	REMOVE AND STOCKPILE BLOCKS, DISPOSE OF GEOTEXTILE FABRIC (SEE NOTE 1 & 2).
REMOVE AND DISPOSE OF EXISTING FENCE	440	LF	REMOVE FENCE WHERE IDENTIFIED. (SEE NOTE 3).
REMOVE AND INTEGRATE EXISTING RIPRAP	40	EACH	APPROXIMATE NUMBER OF RIPRAP PIECES. DIAMETERS RANGE FROM 24-36" (SEE NOTE 4).

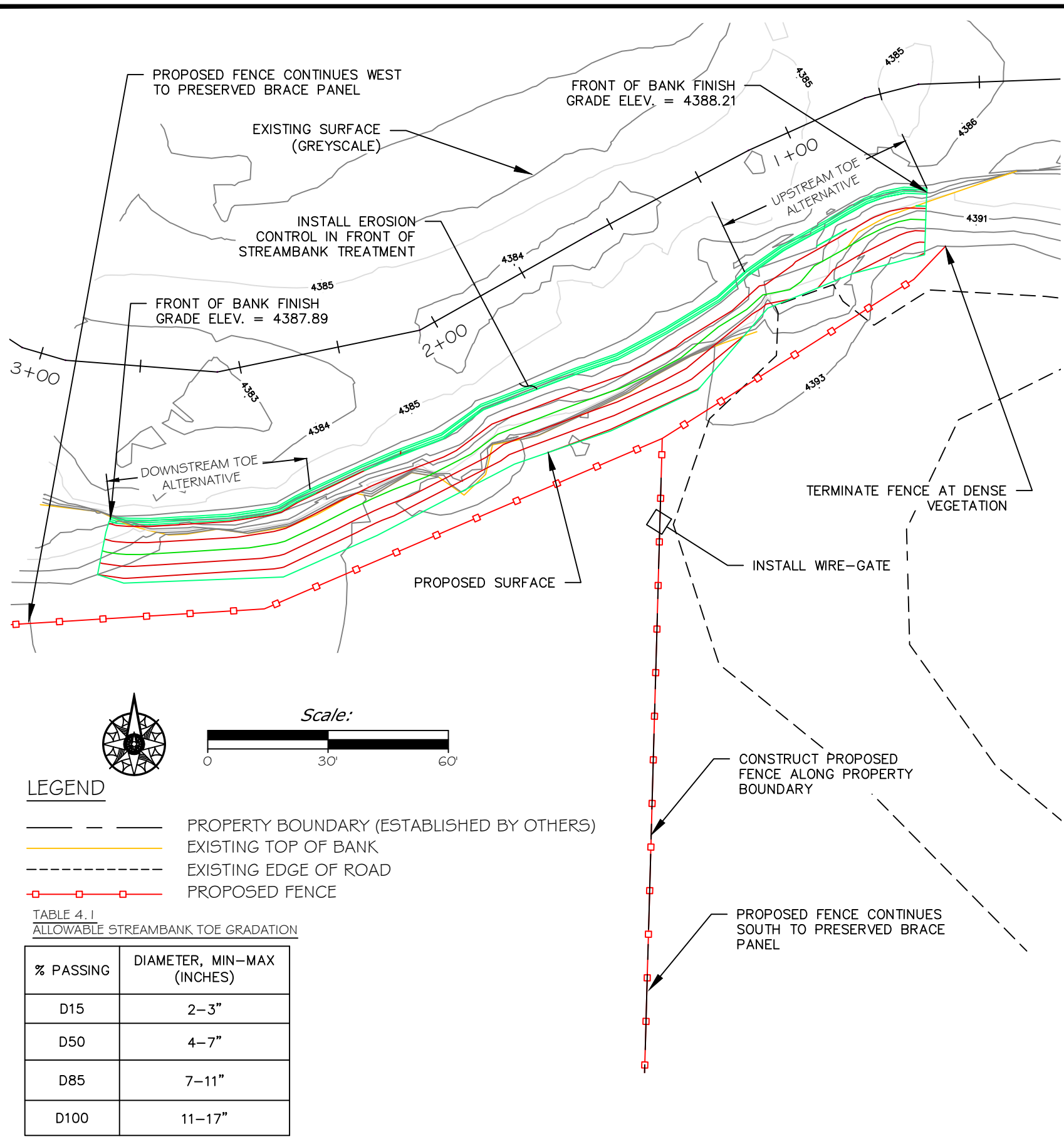
- NOTES:
- CONTRACTOR MAY ONLY ENTER AND EXIT PRIVATE PROPERTY VIA ACCESS POINT IDENTIFIED ON AERIAL. CONTRACTOR MAY NOT ACCESS PRIVATE PROPERTY AT OTHER POINTS. CONTRACTOR WILL NEED TO COORDINATE WITH PRIVATE PROPERTY OWNER TO ENSURE LIVESTOCK IS SECURE.
  - REMOVE BOATRAMP BLOCKS AND STOCKPILE BEHIND FWP'S SHOP AS IDENTIFIED ON AERIAL.
  - GEOTEXTILE FABRIC IS EXPOSED UNDERNEATH A PORTION OF THE EXISTING BOAT RAMP. IT IS ASSUMED THIS MATERIAL EXTENDS UNDERNEATH THE ENTIRE BOAT RAMP AREA AND IS TO BE REMOVED OFFSITE.
  - REMOVE EXISTING FENCING WHERE IDENTIFIED ON AERIAL. PRESERVE EXISTING BRACE PANELS WHERE THE PROPOSED FENCE WILL TIE INTO EXISTING FENCE. MOST OF THE EXISTING FENCE CONSISTS OF BARBED WIRE WITH SOME SPLIT RAIL NEAR THE WATER'S EDGE. SPLIT RAIL AND FENCE WIRE IS TO BE REMOVED OFFSITE. UNDAMAGED T-POSTS ARE TO BE STOCKPILED BEHIND FWP'S SHOP.
  - EXISTING RIPRAP CONSISTS OF LARGE ANGULAR ROCK WITH APPROXIMATE DIAMETERS RANGING FROM 24-36". 24" DIAMETER MATERIAL IS TO BE INTEGRATED INTO THE PROPOSED STREAMBANK TREATMENT (SEE SHEETS 4-5). LARGER MATERIAL IS TO BE PLACED ONSITE AT FWP'S DISCRETION.
  - PRIMARY PLACEMENT FOR EXCESS EARTHWORK (NET CUT) IS IDENTIFIED ON AERIAL. PLACED MATERIAL SHALL BE SEEDED AND SMOOTHLY TRANSITION INTO NATURAL GROUND. POSITIVE DRAINAGE SHALL BE MAINTAINED. SEE SHEET 4 FOR QUANTITIES.
  - SHRUB MATERIAL IS REQUIRED TO CONSTRUCT THE PROPOSED STREAMBANK TREATMENT. SALVAGE AREAS FOR SHRUB MATERIAL ARE IDENTIFIED ON THE AERIAL.

T. PHELPS DRAWN BY:	JULY 2022 DATE:	T. PHELPS REVISED BY:	AUGUST 2022 DATE:	APPROVED BY:	DATE:
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**MONTANA FISH, WILDLIFE & PARKS DEMO/STAGING PLAN**



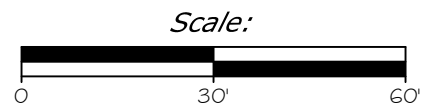


**MATERIAL SCHEDULE**

ITEM	QUANTITY	UNITS	DESCRIPTION
EARTHWORK	72 (CUT)	CY	EXISTING SURFACE COMPARED TO PROPOSED SURFACE, NET VOLUME FROM BACKSLOPE AND BENCHING (SEE NOTE 2)
STREAMBANK TREATMENT	230	LF	CONSTRUCT STREAMBANK STABILIZATION TREATMENT (SEE NOTE 3 AND SHEET 5 FOR DETAILS)
STREAMBANK TOE	50	CY	TOE PORTION OF STREAMBANK TREATMENT UNDERNEATH BOTTOM COIR LOG (SEE NOTE 4)
UPSTREAM TOE ALTERNATIVE	50	LF	INTEGRATE 24" TYPE RIPRAP INTO UPSTREAM PORTION OF STREAMBANK TOE (SEE NOTE 4.1)
DOWNSTREAM TOE ALTERNATIVE	50	LF	INTEGRATE WHOLE CONIFERS INTO DOWNSTREAM PORTION OF STREAMBANK TOE
PROPOSED FENCE	550	LF	CONSTRUCT PROPOSED FENCE (SEE SHEET 6 FOR DETAILS)

**NOTES:**

1. SEE SHEET 5 FOR STREAMBANK DETAILS. SEE SHEET 6 FOR FENCING DETAILS.
2. COMPARING THE EXISTING GROUND SURFACE TO PROPOSED GROUND SURFACE RESULTS IN THE FOLLOWING EARTHWORK QUANTITIES:  
 CUT = 110 CY  
 FILL = 38 CY  
 NET (CUT) = 72 CY
  - 2.1. EARTHWORK QUANTITIES DO NOT ACCOUNT FOR EXCAVATION AND BACKFILL REQUIRED TO INSTALL THE STREAMBANK TOE BELOW FINISH GRADE ELEVATION.
  - 2.2. ALL EARTHWORK SHALL TRANSITION SMOOTHLY INTO UNDISTURBED NATURAL GROUND.
  - 2.3. EXCESS EARTHWORK (NET CUT) IS TO BE USED TO FILL HOLES ON FWP PROPERTY AND SPREAD IN DESIGNATED AREAS. SPREAD MATERIAL IS TO BE SEEDED AND TRANSITION SMOOTHLY INTO UNDISTURBED NATURAL GROUND. SEE SHEET 3 FOR PRIMARY PLACEMENT AREA.
3. CONSTRUCT STREAMBANK TREATMENT ITEM INCLUDES ALL EARTHWORK BELOW FINISH GRADE, WILLOW INSTALLATION, COIR LOG AND FABRIC ACQUISITION AND INSTALLATION, STAKING, ETC. ASSOCIATED WITH CONSTRUCTING THE STREAMBANK TREATMENT.
4. SEE TABLE 4.1 FOR ALLOWABLE STREAMBANK TOE GRADATIONS. STREAMBANK TOE GRADATIONS SHALL BE APPROVED BY THE ENGINEER BEFORE DELIVERING MATERIAL TO SITE.
  - 4.1. INTEGRATE 24" DIAMETER RIPRAP MATERIAL INTO THE STREAMBANK TOE ALONG THE UPSTREAM TOE ALTERNATIVE PORTION. WORK ASSOCIATED WITH THIS ITEM IS ASSUMED TO BE ACCOUNTED FOR IN THE "REMOVE AND INTEGRATE EXISTING RIPRAP" ITEM FROM SHEET 3.
  - 4.2. INTEGRATE WHOLE CONIFERS INTO THE STREAMBANK TOE ALONG THE DOWNSTREAM TOE ALTERNATIVE.



**LEGEND**

- — — — — PROPERTY BOUNDARY (ESTABLISHED BY OTHERS)
- — — — — EXISTING TOP OF BANK
- - - - - EXISTING EDGE OF ROAD
- — — — — PROPOSED FENCE

TABLE 4.1  
ALLOWABLE STREAMBANK TOE GRADATION

% PASSING	DIAMETER, MIN-MAX (INCHES)
D15	2-3"
D50	4-7"
D85	7-11"
D100	11-17"

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APPROVED BY: DATE:

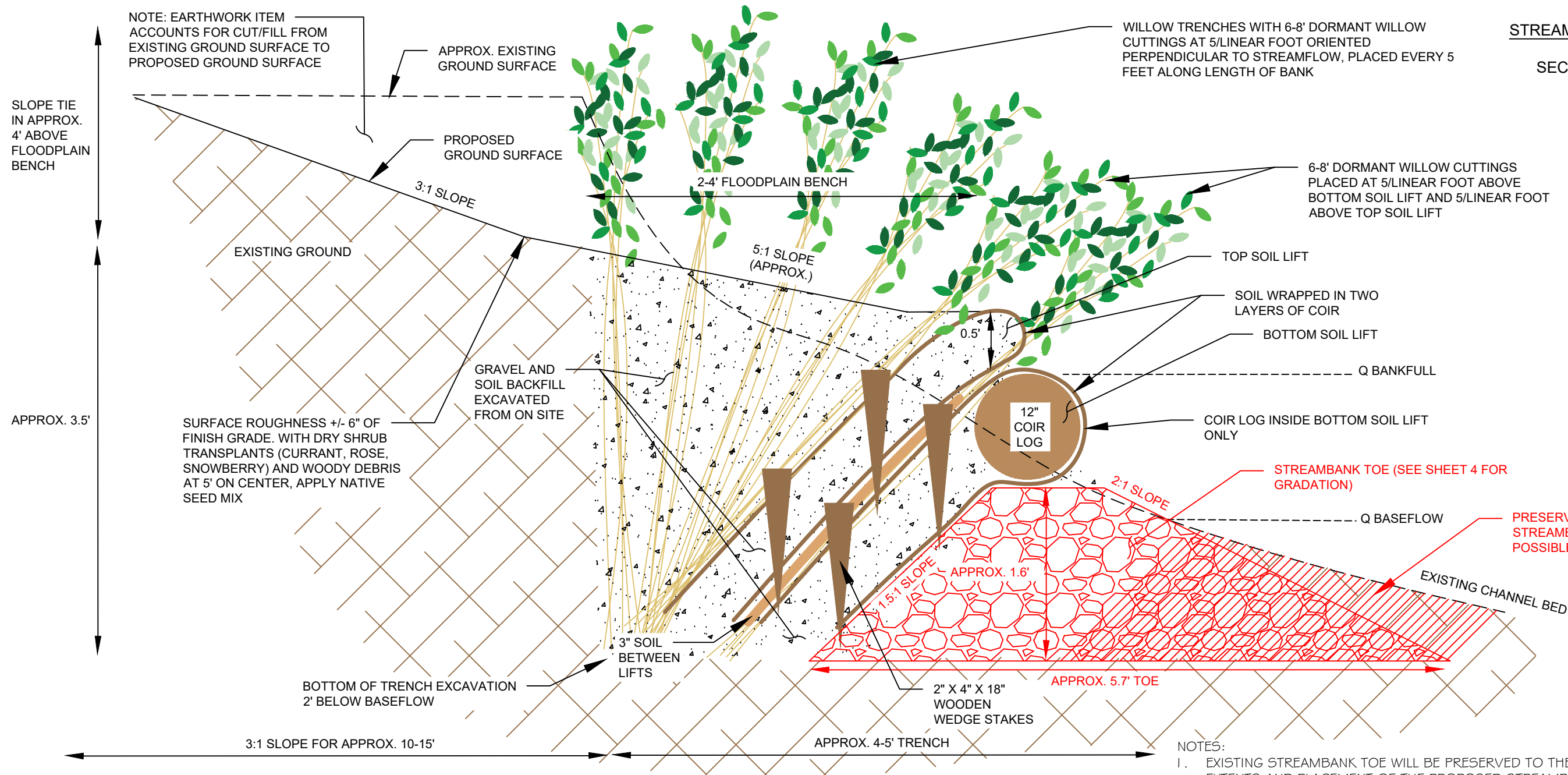
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**MONTANA FISH, WILDLIFE & PARKS** **STREAMBANK PLAN**



**STREAMBANK STABILIZATION TREATMENT SECTION VIEW (N.T.S.)**



NOTE: EARTHWORK ITEM ACCOUNTS FOR CUT/FILL FROM EXISTING GROUND SURFACE TO PROPOSED GROUND SURFACE

WILLOW TRENCHES WITH 6-8' DORMANT WILLOW CUTTINGS AT 5' LINEAR FOOT ORIENTED PERPENDICULAR TO STREAMFLOW, PLACED EVERY 5 FEET ALONG LENGTH OF BANK

6-8' DORMANT WILLOW CUTTINGS PLACED AT 5' LINEAR FOOT ABOVE BOTTOM SOIL LIFT AND 5' LINEAR FOOT ABOVE TOP SOIL LIFT

SURFACE ROUGHNESS +/- 6" OF FINISH GRADE. WITH DRY SHRUB TRANSPLANTS (CURRANT, ROSE, SNOWBERRY) AND WOODY DEBRIS AT 5' ON CENTER, APPLY NATIVE SEED MIX

TOP SOIL LIFT  
SOIL WRAPPED IN TWO LAYERS OF COIR  
BOTTOM SOIL LIFT

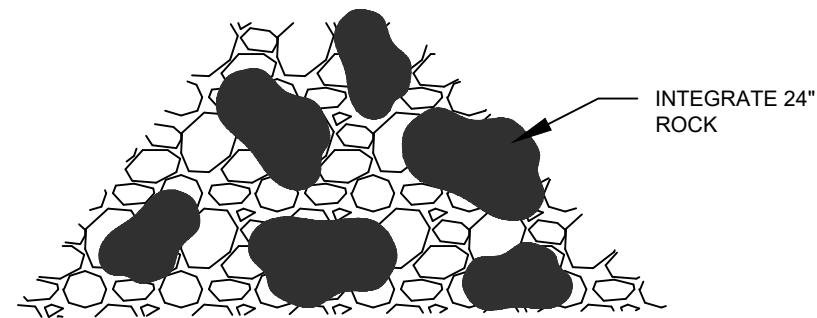
12" COIR LOG  
COIR LOG INSIDE BOTTOM SOIL LIFT ONLY

STREAMBANK TOE (SEE SHEET 4 FOR GRADATION)

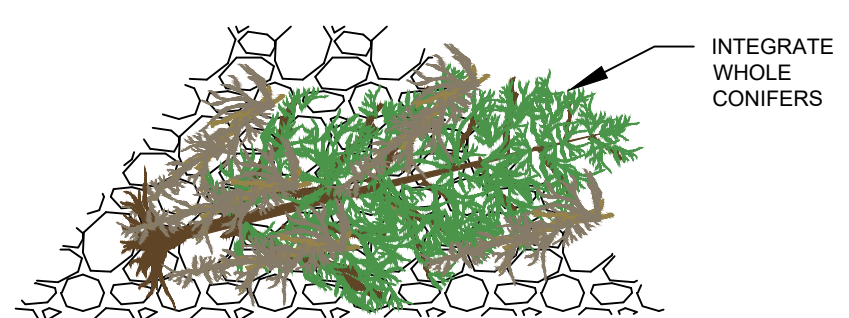
PRESERVE EXISTING STREAMBANK TOE AS POSSIBLE (SEE NOTE 1)

- NOTES:
- EXISTING STREAMBANK TOE WILL BE PRESERVED TO THE EXTENT POSSIBLE. THE EXTENTS AND PLACEMENT OF THE PROPOSED STREAMBANK TOE WILL BE DIRECTED BY THE ENGINEER. ALL STREAMBANK TOE CONSTRUCTION SHALL BE CONSTRUCTED IN 1' LIFTS AND MACHINE COMPACTED.
  - INTEGRATE EXISTING RIPRAP (24" DIAMETER MATERIAL) INTO THE PROPOSED STREAMBANK TREATMENT ALONG THE UPSTREAM TOE ALTERNATIVE. LARGER MATERIAL IS TO BE PLACED ONSITE AT FWP'S DISCRETION.
  - INTEGRATE WHOLE CONIFERS ALONG THE DOWNSTREAM TOE ALTERNATIVE AS DIRECTED BY THE ENGINEER.
  - SOIL LIFT AND TRENCH BACKFILL SHALL CONSIST OF GRAVEL AND SOIL MIX GENERATED FROM ONSITE EXCAVATION.

**UPSTREAM TOE ALTERNATIVE SECTION VIEW (N.T.S.)**



**DOWNSTREAM TOE ALTERNATIVE SECTION VIEW (N.T.S.)**



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**MONTANA FISH, WILDLIFE & PARKS**

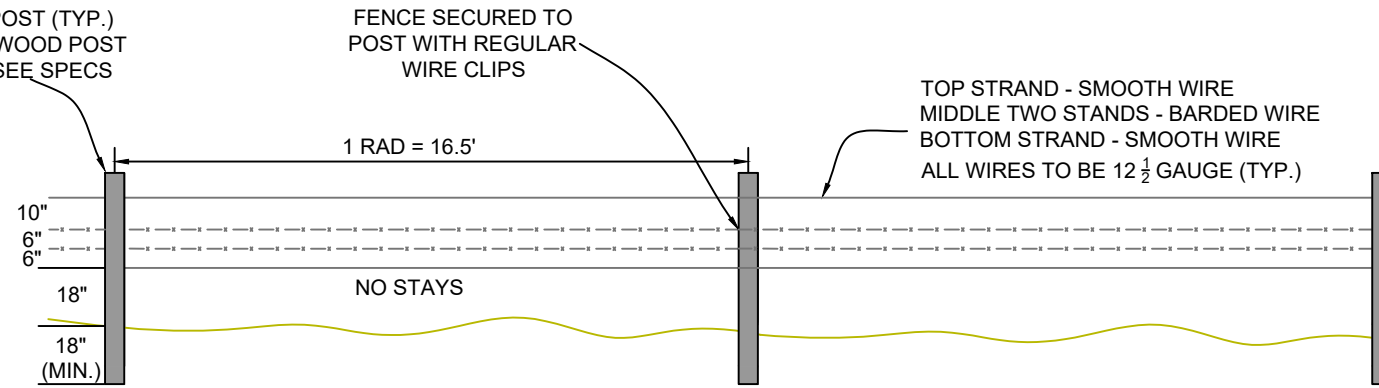
**STREAMBANK DETAILS**



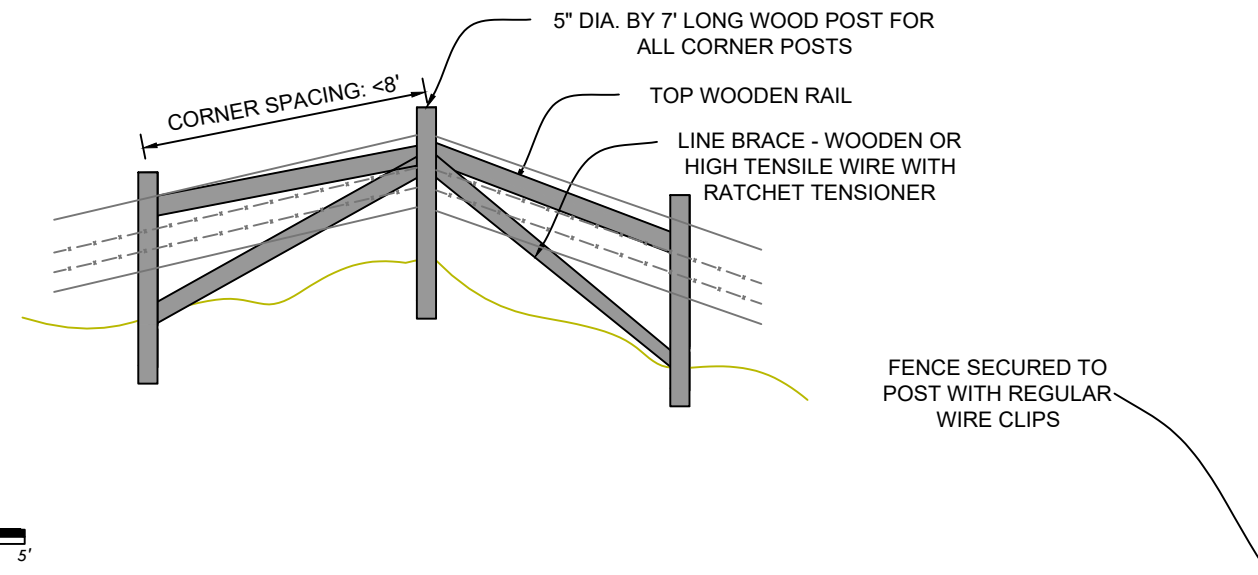
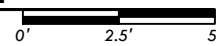
**COLDWATER ENGINEERING**

SHEET: 5 of 8

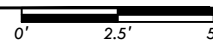
5 1/2' LONG STEEL POST (TYP.)  
5" DIA. BY 7' LONG WOOD POST  
EVERY 10 RADS, SEE SPECS



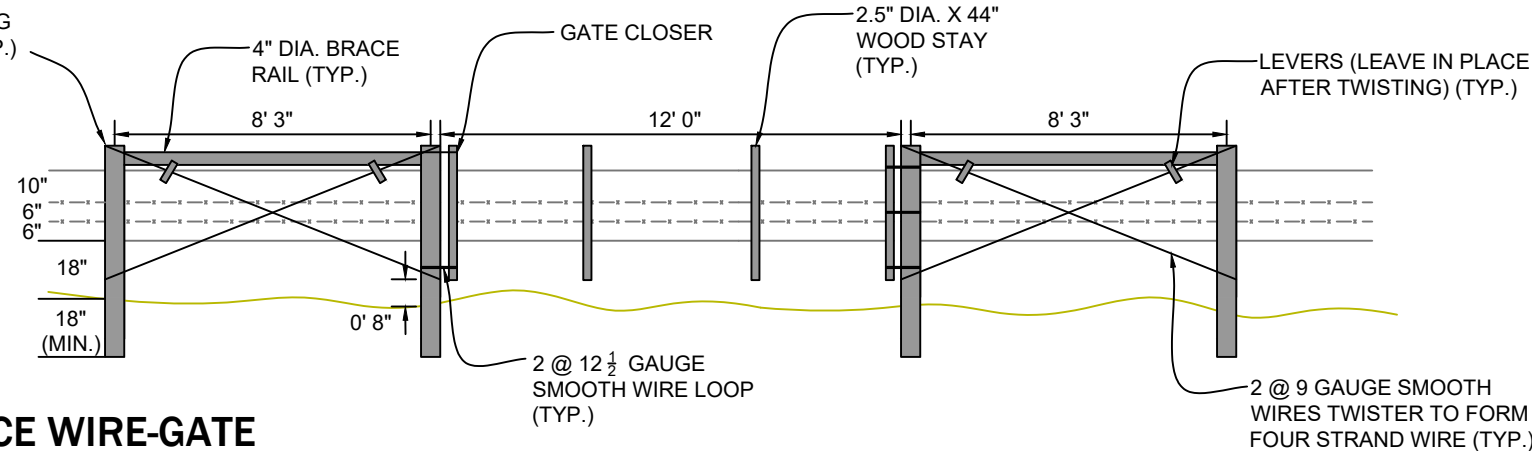
**FENCE LINE POST  
PROFILE VIEW**



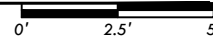
**FENCE CORNER  
PROFILE VIEW**



5" DIA. BY 7' LONG WOOD POST (TYP.)



**FENCE WIRE-GATE  
PROFILE VIEW**



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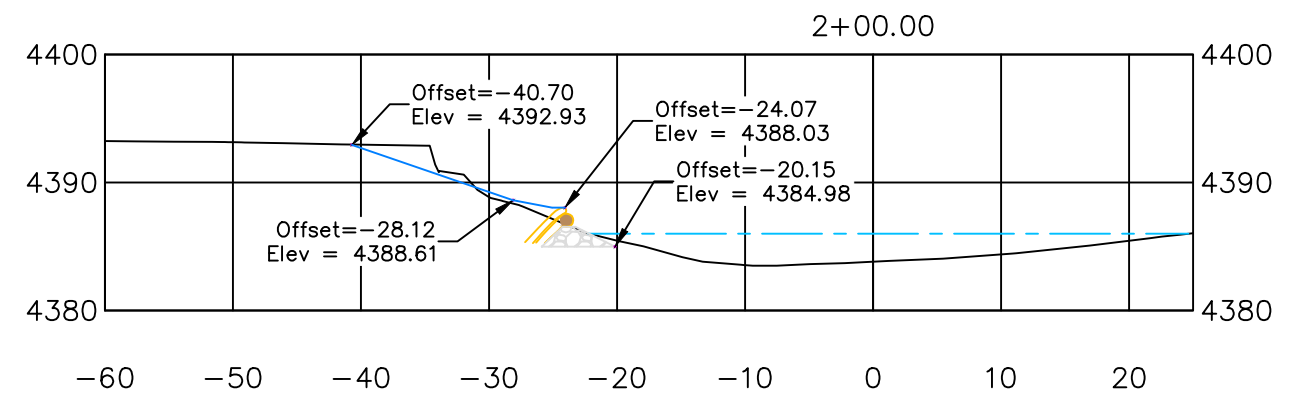
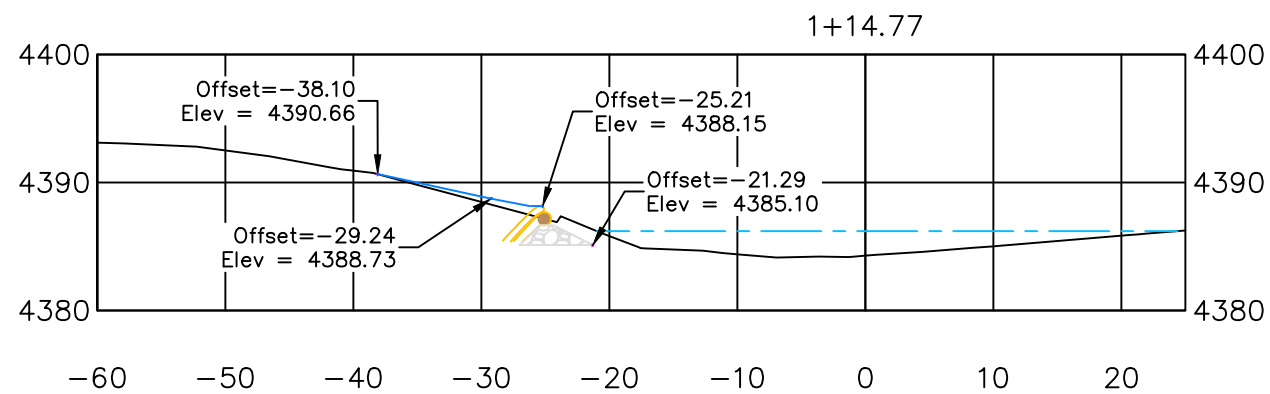
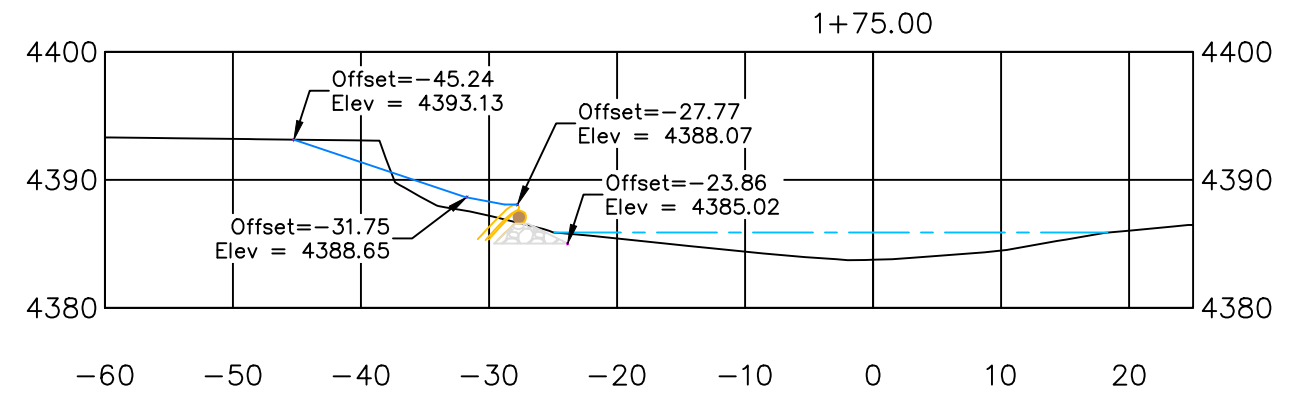
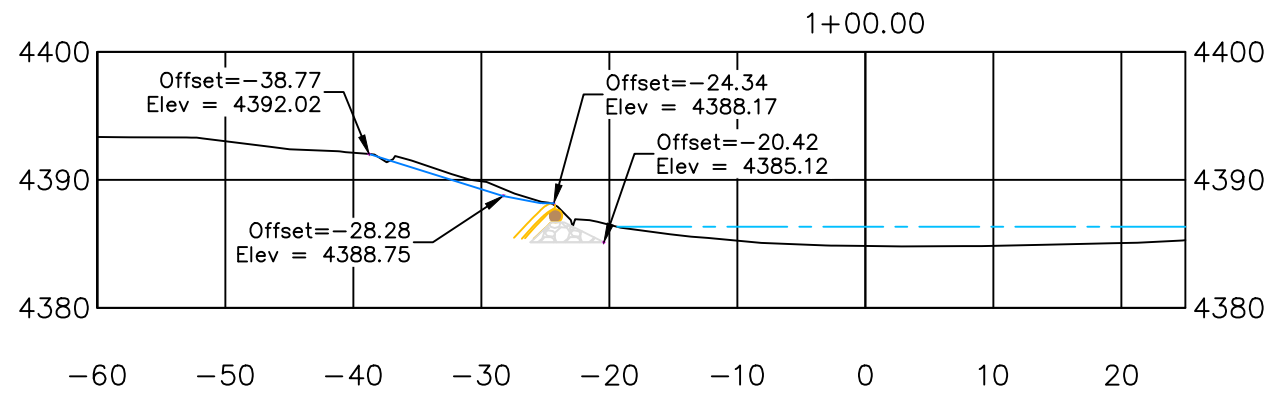
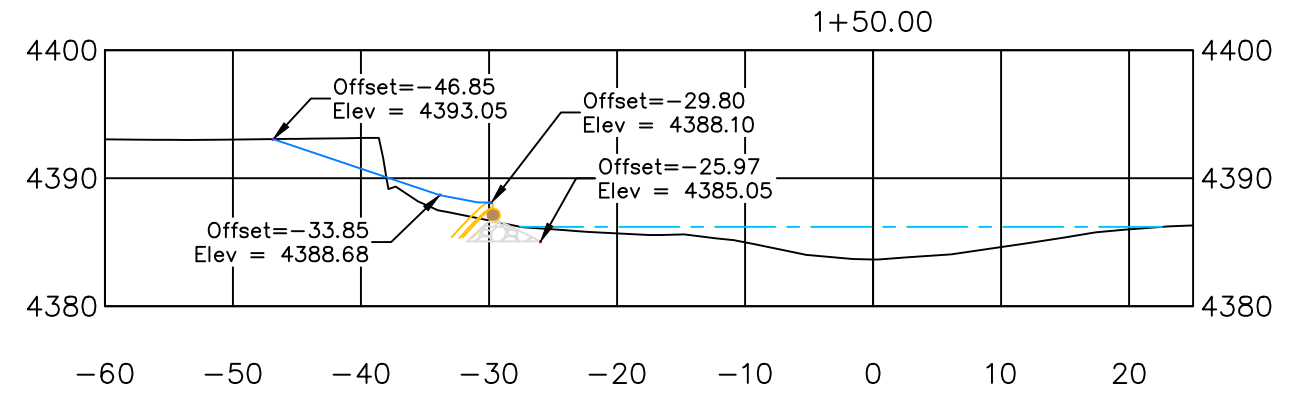
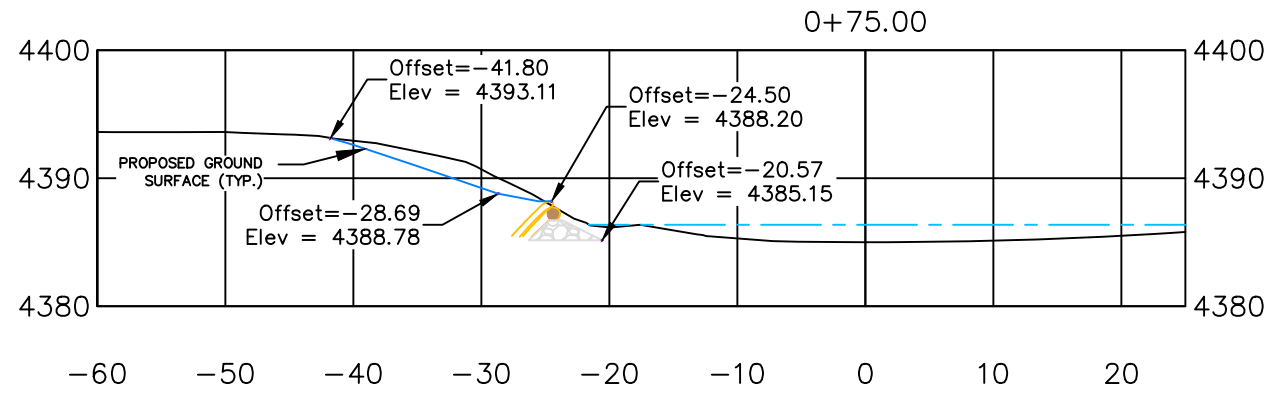
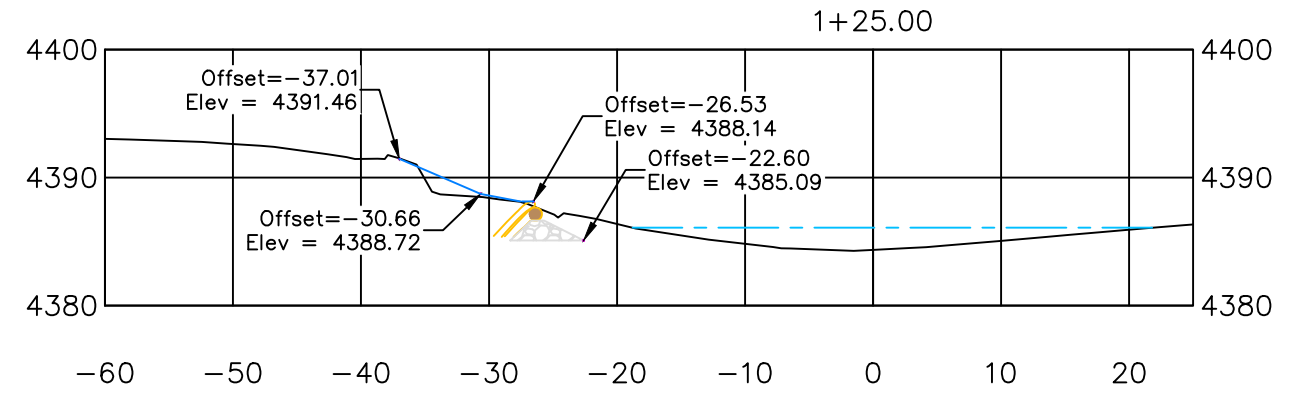
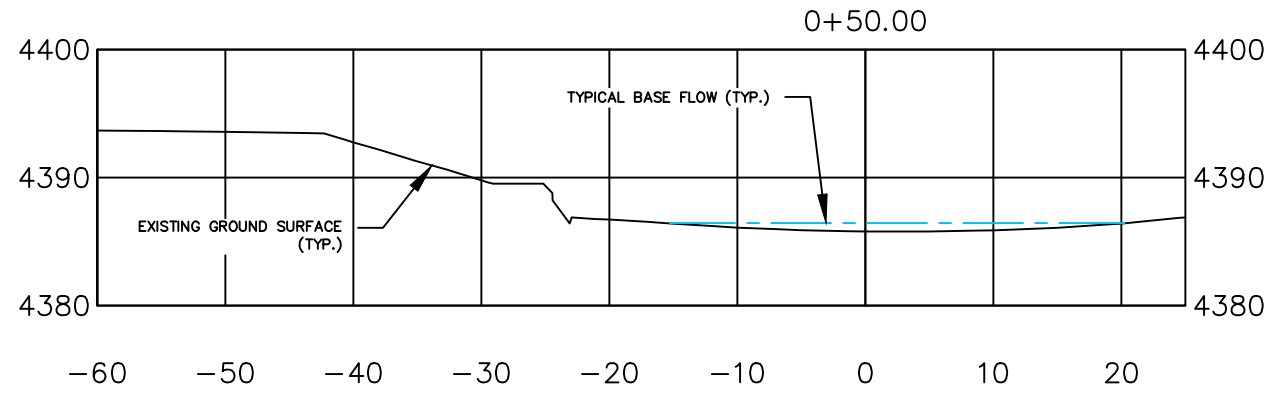
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**MONTANA FISH,  
WILDLIFE & PARKS** FENCING DETAILS



SHEET: 6  
of  
8



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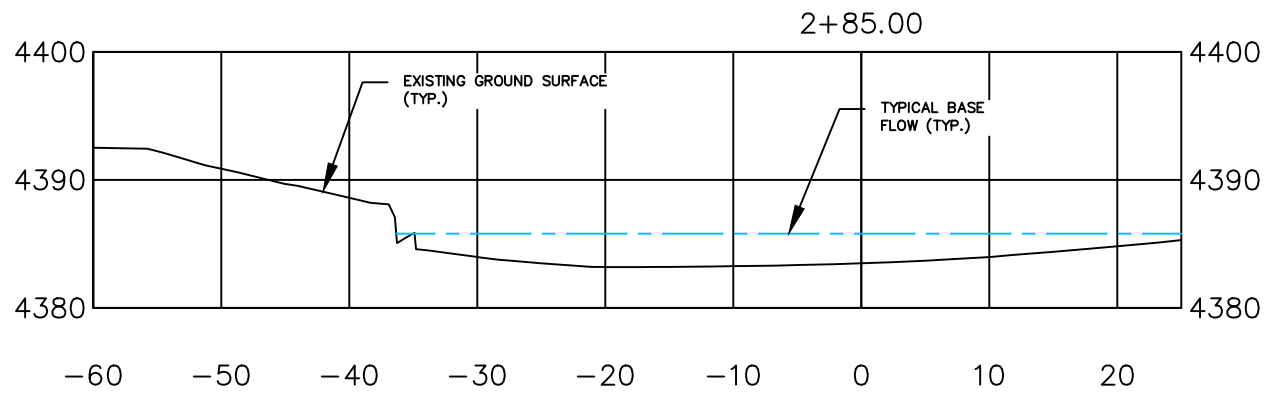
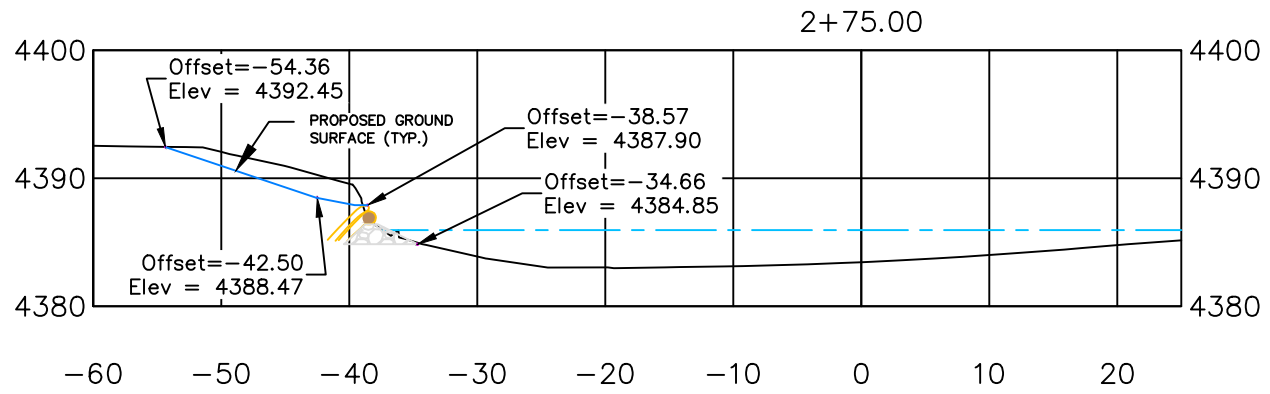
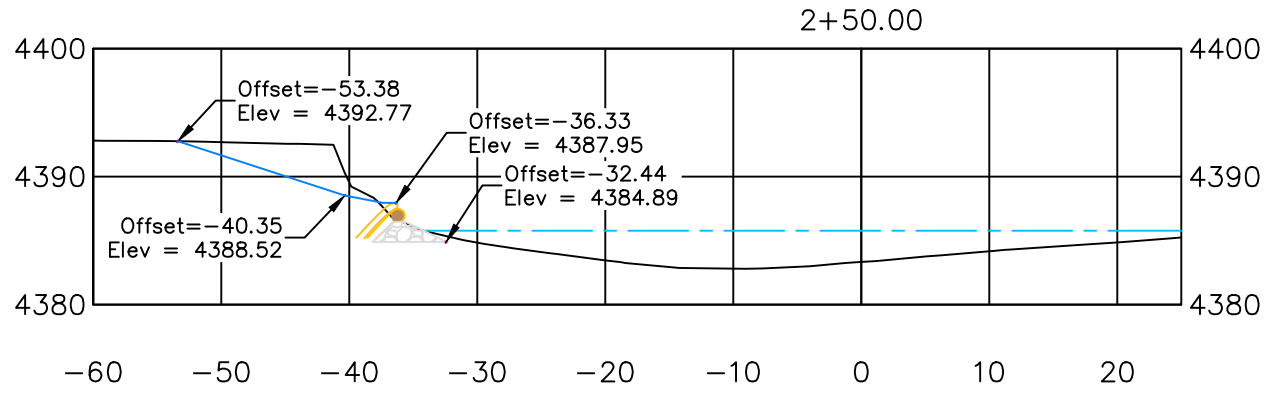
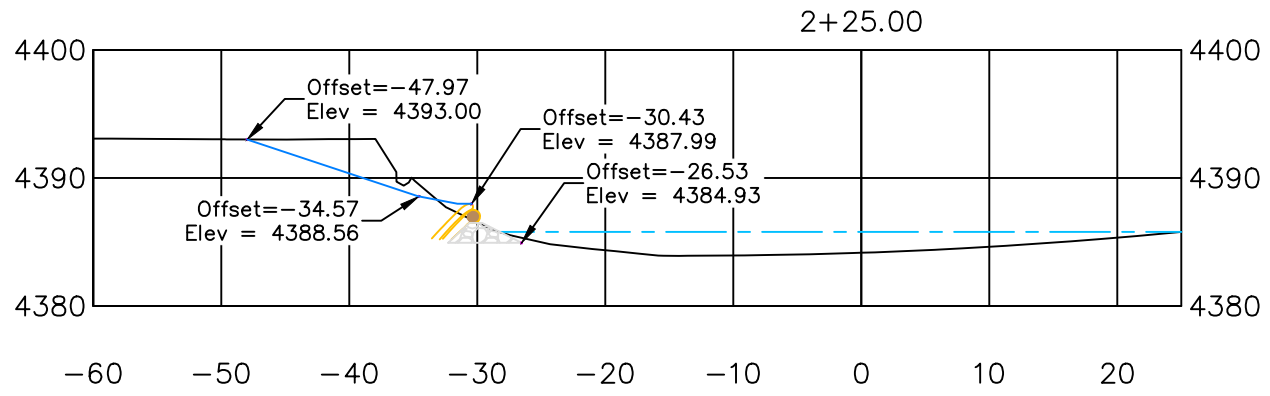


**MONTANA FISH,  
WILDLIFE & PARKS**

**CROSS SECTIONS**



SHEET: 7 of 8



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**MONTANA FISH,  
WILDLIFE & PARKS**

**CROSS SECTIONS**



**COLDWATER  
ENGINEERING**

SHEET: 8  
of  
8