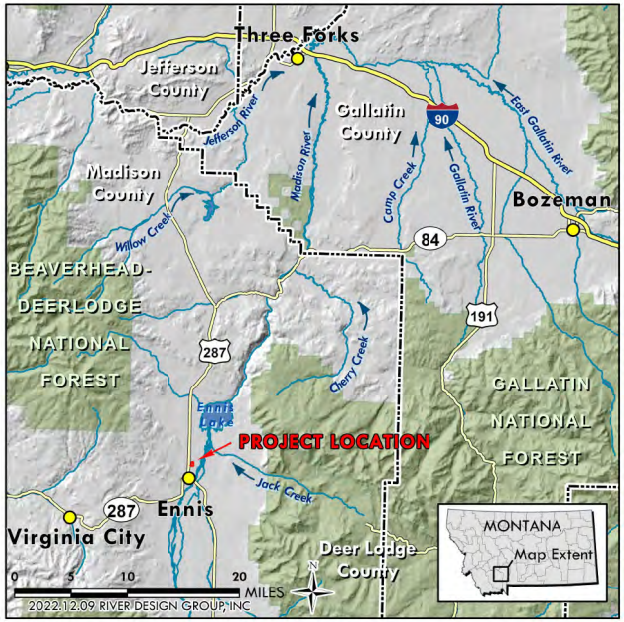
MOORE CREEK RESTORATION PROJECT
100% DESIGN PLAN SET

MOORE CREEK VICINITY MAP



LEGAL DESCRIPTION:
S28, R01 W, ACRES 45, TR IN SE4 & SW4.P.M., M
S28, T05 S, R01 W, C.O.S. 7/922, PARCEL 6.P.M., M
MADISON COUNTY, MONTANA

DRAWING INDEX

PROJECT PARTNERS

MADISON CONSERVATION DISTRICT
222 MAIN STREET
ENNIS, MONTANA 59729

MONTANA FISH, WILDLIFE & PARKS
3201 SPURGIN ROAD
MISSOULA, MONTANA 59804

NORTHWESTERN ENERGY
6700 RAINBOW DAM ROAD
GREAT FALLS, MONTANA 59404

GOGGINS FAMILY
22 GOGGINS DR.
ENNIS, MT 59729-9056

PROJECT DESCRIPTION

MOORE CREEK IS AN IMPORTANT ECOLOGICAL RESOURCE TO THE GREATER MADISON RIVER WATERSHED. ORIGINATING IN THE GRAVELLY RANGE NORTH AND WEST OF ENNIS, MONTANA, MOORE CREEK FLOWS APPROXIMATELY 16 MILES TO ITS CONFLUENCE WITH ENNIS LAKE AND THE MADISON RIVER.

DECADES OF HISTORICAL LAND USE PRACTICES INCLUDING GRAZING, AGRICULTURE, CHANNELIZATION, AND REMOVAL OF RIPARIAN VEGETATION HAS SIGNIFICANTLY ALTERED THE ECOLOGY OF MOORE CREEK. MOORE CREEK WAS CHANNELIZED AND STRAIGHTENED IN THE 1900'S WHICH RESULTED IN CHANNEL INCISION, FLOODPLAIN DISCONNECTION, AND WATER QUALITY IMPAIRMENT. THE MONTANA WATER QUALITY ACT PROVIDES FOR THE RESTORATION AND MAINTENANCE OF THE CHEMICAL, PHYSICAL, AND BIOLOGICAL INTEGRITY OF THE STATE'S SURFACES WATERS SO THAT THEY SUPPORT ALL DESIGNATED USES. WATER QUALITY STANDARDS ARE USED TO DETERMINE IMPAIRMENT, ESTABLISH WATER QUALITY TARGETS, AND TO FORMULATE TOTAL MAXIMUM DAILY LOADS (TMDLS) AND LOAD ALLOCATIONS. MOORE CREEK INCLUDING ENNIS LAKE AND THE MADISON RIVER ARE CLASSIFIED AS B-1 WATERBODIES AND ARE TO BE MAINTAINED FOR THE GROWTH AND PROPAGATION OF SALMONID FISHES AND ASSOCIATED AQUATIC LIFE, AND WATERFOWL. MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY HAS IDENTIFIED 15.83 MILES OF MOORE CREEK AS IMPAIRED FOR SEDIMENTATION (I.E. SILTATION), TEMPERATURE, TOTAL PHOSPHORUS, TOTAL NITROGEN, E.COLI, ARSENIC, AND ALTERATION IN STREAMSIDE VEGETATIVE COVER, AND THE STREAM IS CONSIDERED NON-SUPPORTING OF AQUATIC LIFE, DRINKING WATER AND CONTACT RECREATION. PRIMARY SOURCES OF WATER QUALITY IMPAIRMENT INCLUDE ERODING STREAMBANKS, LOSS OF RIPARIAN HABITAT, GRAZING IN RIPARIAN AREAS, AND AGRICULTURE.

IN 2022, NORTHWESTERN ENERGY RETAINED RIVER DESIGN GROUP, INC. TO EVALUATE RESTORATION OPPORTUNITIES AND DEVELOP FINAL DESIGN DRAWINGS. GEOMORPHIC AND VEGETATION ASSESSMENTS WERE CONDUCTED IN 2022. TO HELP GUIDE THE DEVELOPMENT OF RESTORATION STRATEGIES AND TECHNIQUES, THE FOLLOWING GOALS WERE DEVELOPED:

- IMPROVE AQUATIC, RIPARIAN, AND TERRESTRIAL HABITAT DIVERSITY FOR FISH AND WILDLIFE.
- RESTORE A SELF-MAINTAINING STREAM CHANNEL THAT INCLUDES COMPLEX AQUATIC HABITAT FEATURES INCLUDING RIFFLES, RUNS, POOLS, AND GLIDES.
- CONVERT AREAS WITHIN THE EXISTING UPLAND PLANT COMMUNITIES TO EMERGENT AND SCRUB-SHRUB WETLANDS BY CREATING NEW, LOWER FLOODPLAIN SURFACES IN REACH 1 OF THE PROJECT AREA.
- RESTORE WILLOW AND RIPARIAN SHRUB COMMUNITIES IN PATCHES ALONG STREAMBANKS AND WITHIN PORTIONS OF THE FLOODPLAIN.
- RECLAIM THE EXISTING CHANNELIZED SECTION OF MOORE CREEK IN REACH 1 TO RESTORE WETLAND HYDROLOGY.
- ENSURE RESTORATION ACTIONS ARE COMPATIBLE WITH AND SUPPORT EXISTING AND FUTURE LAND USE ACTIVITIES ON THE RANCH INCLUDING AGRICULTURE AND GRAZING.
- INTEGRATE A GRAZING MANAGEMENT PLAN INCLUDING FENCING EXCLOSURES, WATER GAPS, AND STREAM CROSSINGS TO PREVENT DAMAGE TO THE RESTORED STREAM CHANNEL AND FLOODPLAIN VEGETATION.

STANDARD OF PRACTICE

RIVER DESIGN GROUP, INC. WORKS EXCLUSIVELY IN THE RIVER ENVIRONMENT AND UTILIZES THE MOST CURRENT AND ACCEPTED PRACTICES AVAILABLE FOR PLANNING AND DESIGN OF RIVER, FLOODPLAIN, AND AQUATIC HABITAT RESTORATION PROJECTS. CURRENT STANDARDS FOR THE DESIGN OF RESTORATION PROJECTS VARY DEPENDING ON PROJECT GOALS. STABILITY CRITERIA INCLUDE DESIGNING STREAMBED AND STREAMBANK STRUCTURES FOR THE 25-YR RECURRENCE INTERVAL DISCHARGE FLOOD. REGIONAL CURVES WERE USED TO EVALUATE BANKFULL DISCHARGE, AND HIGHER RETURN INTERVAL DISCHARGES INCLUDING THE 100-YEAR FLOW.

REUSE OF DRAWINGS

RDG RIVER DESIGN GROUP
236 Wisconsin Avenue
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

COVER SHEET AND NOTES
MOORE CREEK RESTORATION
MADISON COUNTY, MT

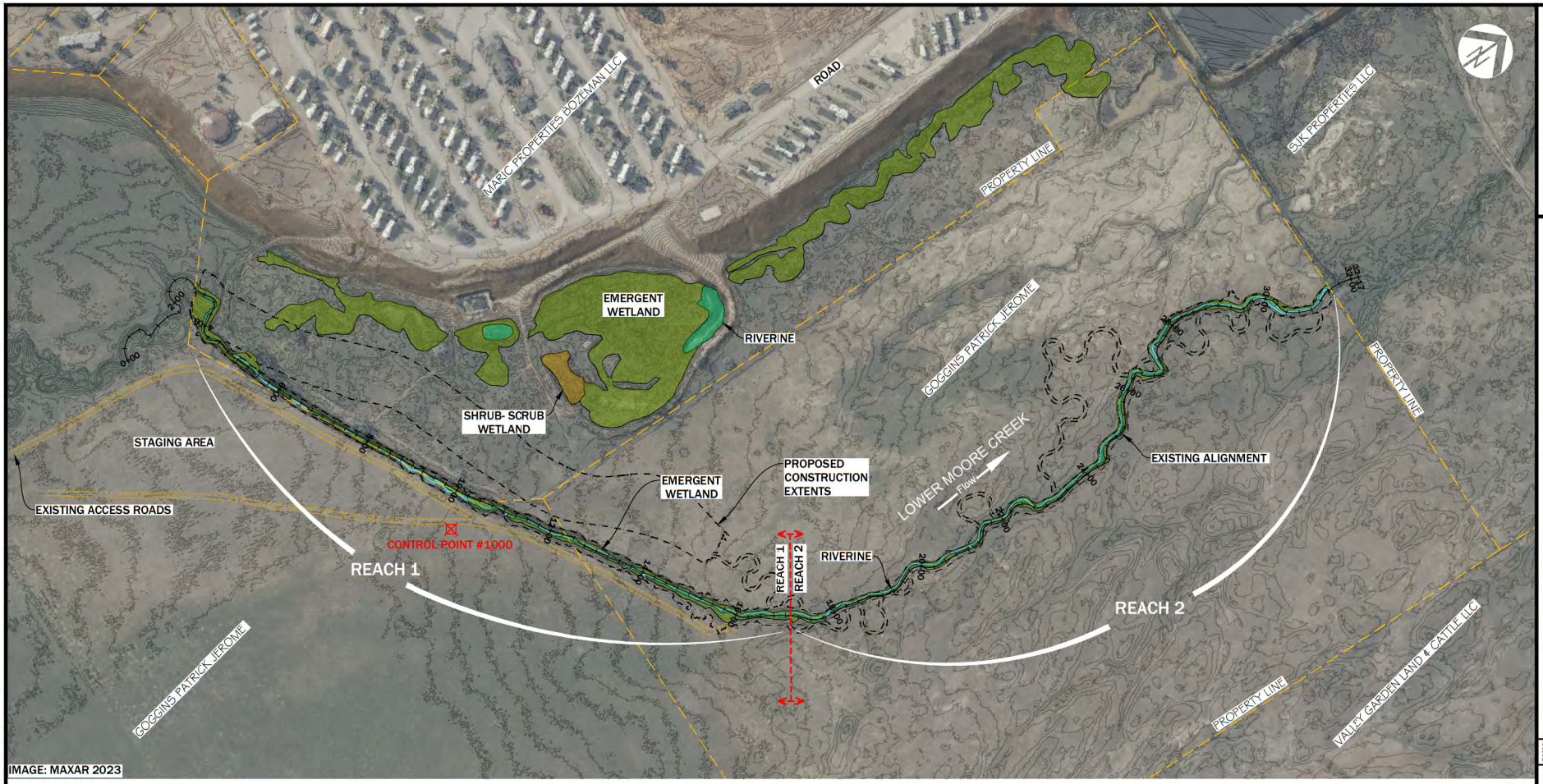
NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
1.0

Drawing 1 of 24

M:\Projects\2022\RDG-22-003 Moore Creek Restoration Project\CAD\RDG-22-003-Moore Creek Planset.dwg



1 EXISTING CONDITIONS
PLAN VIEW
1" = 200'

PROJECT DATUM	
THE PROJECT COORDINATES ARE BASED ON THE FOLLOWING:	
HORIZONTAL PROJECTION:	MONTANA STATE PLANE
HORIZONTAL DATUM:	NAD83 (CORS96 2002.00)
UNITS:	US SURVEY FEET
VERTICAL DATUM:	NAVD88 (GEOID 9)
TOPOGRAPHY AND CROSS SECTION GROUND LINES ARE BASED ON SURVEY WORK PERFORMED BY RDG SURVEYING IN JANUARY 2023. LIDAR DATA WAS CREATED IN 2023 AND COMBINED BY RDG.	

CONTROL POINTS

POINT NUMBER	EASTING	NORTHING	POINT ELEVATION	RAW DESCRIPTION
1000	415036.614	139833.307	4904.193'	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "RDG"

RIVER CHARACTERISTICS	
STREAM TYPE(s)	G5 (REACH 1; F4/C4 (REACH 2)
VALLEY SLOPE	0.03 FT/FT (0.3%)
AVERAGE CHANNEL WIDTH	6 FT.
CONTRIBUTING DRAINAGE AREA	33.7 SQ. MILES
1.5 YEAR FLOW (BANKFULL)	10 CFS
5 YEAR FLOW	179 CFS
50 YEAR FLOW	439 CFS
100 YEAR FLOW	788 CFS

RDG RIVER DESIGN GROUP

EXISTING CONDITIONS AND SURVEY CONTROL

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2.0

Drawing 2 of 24

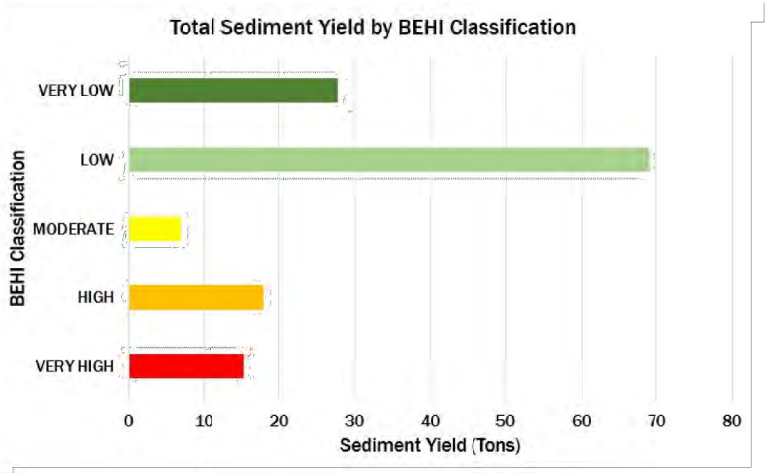
M:\Projects\2022\RDG-22-003 Moore Creek Restoration Project\CAD\RDG-22-003-Moore Creek Planset.dwg

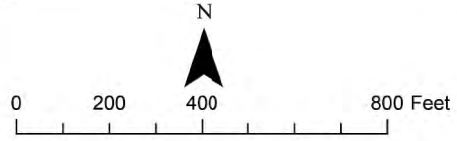
UPPER MOORE CREEK
Bank Erosion Hazard Index (BEHI) Assessment

BEHI CATEGORIES

- VERY LOW
- LOW
- MODERATE
- HIGH
- VERY HIGH
- EXTREME

BEHI CATEGORY	LENGTH (FT)	MIGRATION RATE (FT/YR)	HEIGHT (FT)	DENSITY (LBS/FT³)	YIELD (TONS)
VERY HIGH	130	0.39	6	100	15
HIGH	232	0.31	5	100	18
MODERATE	133	0.23	4.5	100	7
LOW	2,701	0.17	3.0	100	69
VERY LOW	4,813	0.1	2.5	100	28
NON-CONTRIBUTING	0	0	0	100	0
RIP-RAP	0	0	5.0	100	0
TOTAL	8,009				137





River Design Group. 8/18/2022. NAIP Imagery.

RDG RIVER DESIGN GROUP

EXISTING BANK EROSION CONDITIONS
MOORE CREEK RESTORATION
MADISON COUNTY, MT

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PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
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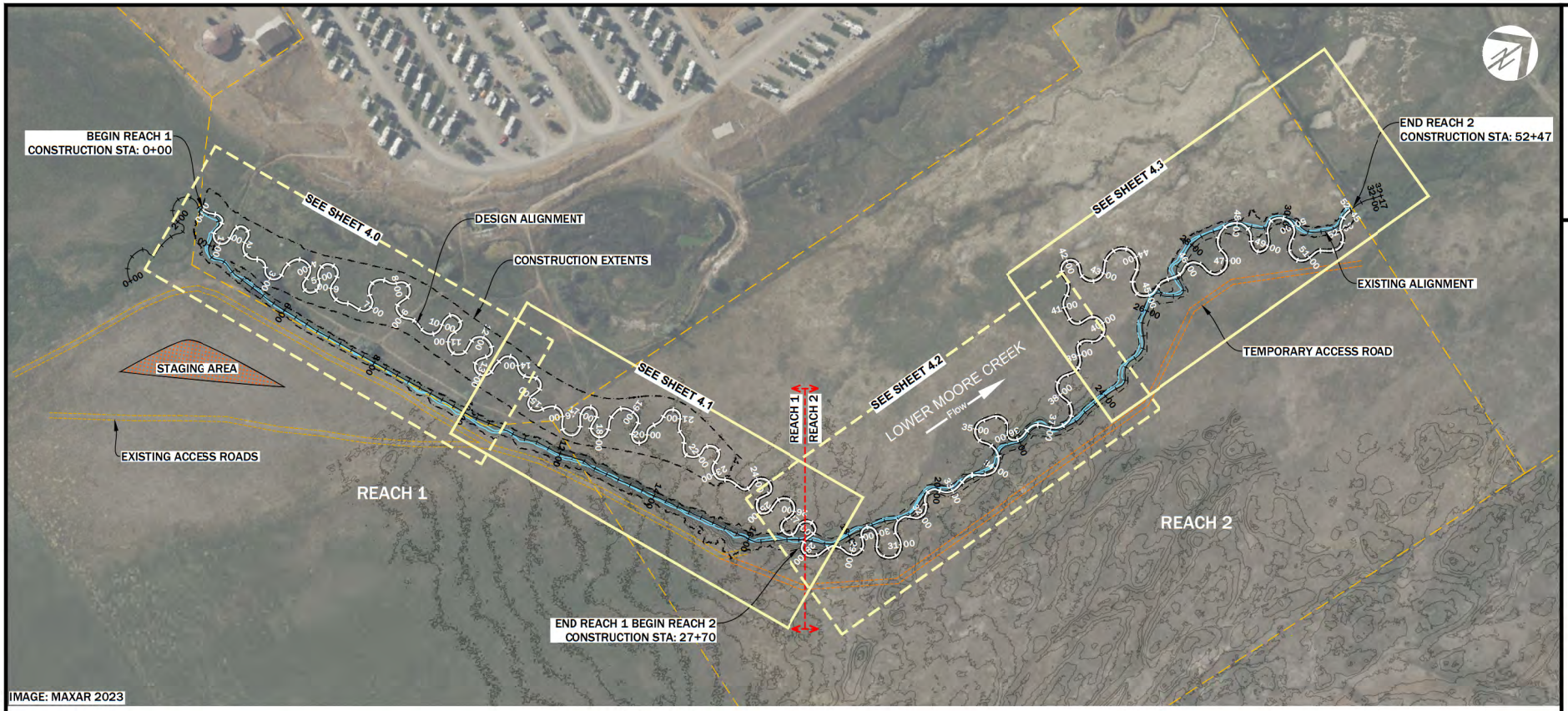
Drawing 3 of 24

M:\Projects\2022\RDG-22-003 Moore Creek Restoration Project\CAD\RDG-22-003-Moore Creek Planset.dwg



1 SITE PLAN
PLAN VIEW

1" = 200'

RESTORATION TREATMENTS

THE RESTORATION PLAN FOCUSES ON RESTORING ERODING STREAMBANKS, RE-ESTABLISHING CHANNEL CROSS-SECTIONS DIMENSIONS, PLAN FORM AND LONGITUDINAL PROFILE DIMENSIONS, AND INCREASING FLOODPLAIN CONNECTIVITY. THE FOLLOWING GUIDELINES WERE USED TO DEVELOP THE DESIGN:

- SHAPE THE CHANNEL TO FORM THE APPROPRIATE DIMENSIONS TYPICAL OF AN E4 STREAM TYPE INCLUDING RIFFLE, RUN, POOL AND GLIDE HABITAT FEATURES.
- RECONNECT THE FLOODPLAIN IN REACH 1 BY CONSTRUCTING AN INSET FLOODPLAIN TO MATCH UPSTREAM AND DOWNSTREAM FLOODPLAIN ELEVATIONS. ESTABLISH A MINIMUM MEANDER BELT WIDTH OF 100-FT.
- SLIGHTLY RAISE THE CHANNEL PROFILE IN REACH 2 TO MAXIMIZE FLOODPLAIN CONNECTION.
- FILL THE EXISTING CHANNEL IN REACH 1 TO FLOODPLAIN ELEVATION TO RESTORE SITE HYDROLOGY.
- INCREASE AQUATIC HABITAT COMPLEXITY BY INCREASING THE QUALITY AND FREQUENCY OF POOLS.
- INCORPORATE VEGETATED WOOD MATRIX AND BRUSH STRUCTURES FOR BANK STABILIZATION AND POOL HABITAT DEVELOPMENT.
- DIVERSIFY THE FLOODPLAIN THROUGH INSTALLATION OF WILLOW TRENCHES.

RESTORATION OBJECTIVES

- IMPROVE INSTREAM AQUATIC HABITAT CONDITIONS FOR SALMONIDS BY LOWERING CHANNEL WIDTH-TO-DEPTH RATIOS, INCREASING POOL FREQUENCY, OVERHEAD COVER, CHANNEL MARGIN COMPLEXITY, AND THE DISTRIBUTION OF RIFFLE, RUN, POOL AND GLIDE HABITAT FEATURES.
- DECREASE SURFACE WATER TEMPERATURE BY INCREASING VEGETATION COVER AND SHADE, AND ENHANCING HYPORHEIC FLOW EXCHANGE BETWEEN THE FLOODPLAIN, CHANNEL, AND EXISTING WETLANDS.
- REDUCE SEDIMENT SUPPLY TO MOORE CREEK BY RESTORING STREAMBANKS WITH DEEP BINDING VEGETATION AND WOOD.
- IMPLEMENT FLOODPLAIN RESTORATION TREATMENTS THAT SET THE STAGE FOR NATURAL RECRUITMENT OF RIPARIAN VEGETATION.
- IMPLEMENT A GRAZING MANAGEMENT PLAN TO PROTECT SENSITIVE FLOODPLAIN AND RIPARIAN AREAS.
- UTILIZE NATURAL CHANNEL DESIGN TECHNIQUES BASED ON REFERENCE REACH DATA COLLECTED ON STREAMS OF SIMILAR VALLEY AND CHANNEL MORPHOLOGY.

DRAWING LEGEND

SYMBOL	
	PROPERTY LINE
	EXISTING ALIGNMENT
	GRADING EXTENTS
	REACH BREAK
	STAGING AREA
	EXISTING ACCESS ROAD
	TEMPORARY ACCESS ROAD

RDG RIVER DESIGN GROUP

SITE PLAN AND INDEX

MOORE CREEK RESTORATION

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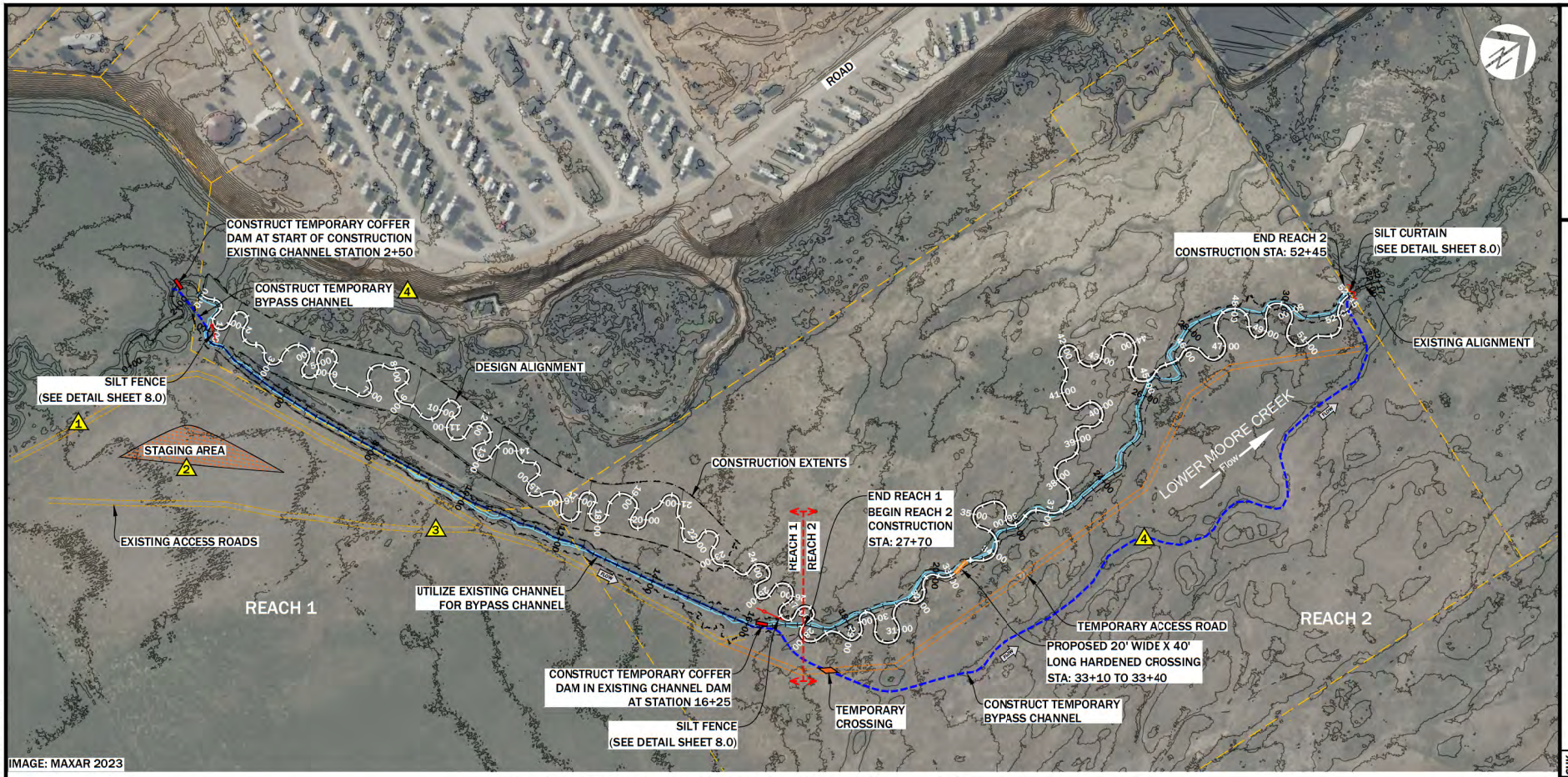
Drawing 4 of 24

M:\Projects\2022\RDG-22-003 Moore Creek Restoration Project\CAD\RDG-22-003-Moore Creek Planset.dwg



1 ACCESS, STAGING AND DEWATERING PLAN
PLAN VIEW

1" = 200'

ACCESS AND STAGING

1. DIRECTIONS TO THE SITE - FROM ENNIS, MONTANA, TRAVEL NORTH ON HIGHWAY 287 FOR APPROXIMATELY 0.7 MILES. TURN RIGHT ON GOGGINS DRIVE (FEEDS N NEEDS) AND HEAD EAST 0.25 TO UNIMPROVED RANCH ACCESS ROAD. TRAVEL NORTH 0.3 MILES ON UNIMPROVED RANCH ACCESS ROAD TO MATERIALS AND EQUIPMENT STAGING AREA IN REACH 1. CONTACT LANDOWNER FOR ACCESS PERMISSION AND GATE COMBINATION.
2. DEVELOPING EQUIPMENT AND MATERIALS STAGING AREA(S) WHERE NOTED OR AS APPROVED BY LANDOWNER.
3. LIMIT EQUIPMENT AND VEHICLE TRAFFIC TO SINGLE-TRACK ROAD (APPROXIMATE ALIGNMENT SHOWN).
4. EXCAVATE 4-FT. (WIDTH) BY 2-FT. (DEPTH) CLEARWATER BYPASS CHANNEL IN REACH 2 CONNECTING TO THE EXISTING CHANNEL IN REACH 1 (APPROXIMATE ALIGNMENT SHOWN). INTRODUCE STREAMFLOW TO REACH 2 BYPASS CHANNELS INCREMENTALLY. COORDINATE FISH RESCUE WITH MONTANA FISH, WILDLIFE & PARKS.

NOTES: CONTRACTOR IS RESPONSIBLE FOR MAINTAINING EXISTING AND TEMPORARY ACCESS ROADS. EQUIPMENT, MAINTENANCE AND MATERIALS TO BE STAGED MINIMUM 150' FROM RIVER.

WORK AREA ISOLATION PLAN

1. CONSTRUCT TEMPORARY BYPASS CHANNEL FROM EXISTING CHANNEL BETWEEN STATIONS 2+50 AND 4+00 AS SHOWN.
2. CONSTRUCT TEMPORARY COFFER DAM AT EXISTING CHANNEL STATION 2+50 ONCE REACH 1 CHANNEL CONSTRUCTION IS COMPLETED, REMOVE THE COFFER DAM AT STATION 2+50 TO ACTIVATE REACH 1.
3. REMOVE TEMPORARY BYPASS CHANNEL AND RESTORE TERRAIN TO EXISTING CONDITIONS.
4. CONSTRUCT REACH 2 TEMPORARY BYPASS CHANNEL FROM EXISTING CHANNEL STATIONS 16+50 TO 32+75.
5. CONSTRUCT TEMPORARY COFFER DAM EXISTING CHANNEL STATION 16+25. ONCE REACH 2 CHANNEL CONSTRUCTION IS COMPLETED, REMOVE THE COFFER DAM AT STATION 16+25 AND ACTIVATE REACH 2.
6. INSTALL A TEMPORARY CULVERT AT BYPASS CHANNEL CROSSING.
7. INSTALL SILT CURTAIN AT THE END OF REACH 2 PRIOR TO CONSTRUCTION.
8. INSTALL SILT FENCE ADJACENT TO ANY GRADING AND ACTIVE CHANNEL FLOW PRIOR TO CONSTRUCTION.

RDG RIVER DESIGN GROUP

SITE ACCESS, STAGING, DEWATERING PLAN
MOORE CREEK RESTORATION
MADISON COUNTY, MT

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DRAWING NUMBER
3.1

Drawing 5 of 24

M:\Projects\2022\RDG-22-003 Moore Creek Restoration Project\CAD\RDG-22-003-Moore Creek Planset.dwg

GENERAL NOTES

1. CONTOUR INTERVAL IS NOTED ON DRAWINGS.
2. SLOPES DESIGNATED AS 2:1, 1.5:1, ET CETERA, ARE THE RATIOS OF HORIZONTAL DISTANCE TO VERTICAL DISTANCE.
3. DIMENSIONS ARE GIVEN IN FEET AND TENTHS OF A FOOT.
4. TOPOGRAPHY AND CROSS SECTION GROUND LINES ARE BASED ON SURVEY WORK PERFORMED IN JANUARY, 2023 BY RDG.
5. ALL EXISTING CONDITIONS ARE TO BE VERIFIED IN THE FIELD PRIOR TO CONSTRUCTION AND ANY ADJUSTMENTS TO THE DRAWINGS SHALL BE MADE AS DIRECTED BY THE ENGINEER.
6. EXISTING PRIVATE IMPROVEMENTS, WHICH LIE WITHIN THE CONSTRUCTION LIMITS, UNLESS OTHERWISE NOTED WILL BE REMOVED BY THE OWNER PRIOR TO CONSTRUCTION OR ABANDONED IN PLACE.
7. PROTECT ALL TREES AND LAND AREAS NOT LOCATED WITHIN THE PROJECT CONSTRUCTION, STAGING OR EARTHWORK LIMITS. EXERCISE CARE IN AREAS NOT SO MARKED TO AVOID UNNECESSARY DAMAGE TO NATURAL VEGETATION.
8. THE PROJECT SPONSOR IS RESPONSIBLE FOR COMPLYING WITH ALL PERMITS AND EASEMENTS INCLUDING ALL FEDERAL, STATE, COUNTY, AND LOCAL PERMIT CONDITIONS.
9. EXCAVATION, TRENCHING, SHORING, AND SHIELDING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR PERFORMING THE WORK, THESE DRAWINGS ARE NOT INTENDED TO PROVIDE MEANS OR METHODS OF CONSTRUCTION.
10. EXCAVATION SHALL MEET THE REQUIREMENTS OF OSHA 29 CFR PART 1926, SUBPART P, EXCAVATIONS. ACTUAL SLOPES SHALL NOT EXCEED THE SLOPES AS INDICATED ON DRAWINGS.
11. ENGINEER WILL PROVIDE SURVEY CONTROL AND GRADING SURFACES FOR EQUIPMENT WITH GPS MACHINE CONTROL CAPABILITY. ENGINEER SHALL PROVIDE SURVEY STAKING AND LAYOUT FOR CONSTRUCTION.
12. VERTICAL TOLERANCE FOR CONSTRUCTION COMPLIANCE WILL BE 0.3 FEET. HORIZONTAL TOLERANCE WILL BE 1.0 FEET.
13. CONTRACTOR SHALL CONFIRM QUANTITIES. REPORTED VOLUMES ARE NEATLINE AND DO NOT INCLUDE ADJUSTMENTS FOR COMPACTION OR OTHER FACTORS.

GENERAL SPECIFICATIONS

1. THE PROJECT SHALL BE CONSTRUCTED ACCORDING TO THE PLAN SET. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER OF ANY CHANGES PRIOR TO IMPLEMENTATION. THE CONSTRUCTION MANAGER FOR THIS PROJECT SHALL BE A DESIGNATED RIVER DESIGN GROUP REPRESENTATIVE.
2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY ALL UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION. CALL U-DIG PRIOR TO CONSTRUCTION.
3. COSTS INCURRED DUE TO PROJECT DELAYS RESULTING FROM FAILURE OF THE CONTRACTOR TO MEET THE REQUIREMENTS OF THE GENERAL SPECIFICATIONS, CONTRACTOR QUALIFICATIONS, CONSTRUCTION SPECIFICATIONS, MATERIALS SPECIFICATIONS AND REVEGETATION SPECIFICATIONS SHALL BE THE EXPENSE OF THE CONTRACTOR.

CONTRACTOR QUALIFICATIONS

1. THE CONTRACTOR SHALL HAVE AT LEAST TWO (2) YEARS OF RIVER RESTORATION CONSTRUCTION EXPERIENCE AND SHALL HAVE COMPLETED AT LEAST FIVE (5) RIVER RESTORATION PROJECTS. OR, THE CONTRACTOR SHALL HAVE AT LEAST ONE (1) YEAR OF RIVER RESTORATION EXPERIENCE, SHALL HAVE COMPLETED AT LEAST THREE (3) RIVER RESTORATION PROJECTS, AND SHALL HAVE COMPLETED AN APPROVED RIVER RESTORATION TRAINING CLASS. APPROVED TRAINING CLASSES INCLUDE THOSE SPONSORED BY WILDLAND HYDROLOGY, INC., OR A SIMILARLY QUALIFIED PRACTITIONER OF NATURAL CHANNEL DESIGN STREAM RESTORATION PRINCIPLES.
2. IF THE CONTRACTOR CHOOSES TO DESIGNATE AN EMPLOYEE WITHOUT QUALIFIED STREAM RESTORATION EXPERIENCE, THE CONTRACTOR SHALL BE ON-SITE AT ALL TIMES WHEN THE EMPLOYEE IS PERFORMING RIVER RESTORATION WORK. FAILURE TO ABIDE BY THIS CONDITION WITHOUT PREVIOUS AGREEMENT WITH THE CONSTRUCTION MANAGER WOULD BE GROUNDS FOR TERMINATION.
3. THE CONTRACTOR SHALL MAINTAIN AT LEAST $2,000,000 IN LIABILITY INSURANCE AND HAVE PROOF OF LIABILITY INSURANCE ON-SITE DURING THE ENTIRETY OF PROJECT CONSTRUCTION.
4. THE CONTRACTOR SHALL HAVE PROOF OF WORKER'S COMPENSATION INSURANCE ON-SITE DURING THE ENTIRETY OF PROJECT CONSTRUCTION.
5. COPIES OF ALL PROJECT PERMITS SHALL BE POSTED ON-SITE IN A VISIBLE LOCATION. THE CONTRACTOR SHALL COMPLY WITH THE PROVISIONS OF THE PERMITS. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER OF ANY KNOWN CHANGES OR ACTIVITIES THAT COULD VIOLATE PERMIT REQUIREMENTS PRIOR TO IMPLEMENTATION. THE CONSTRUCTION MANAGER SHALL BE RESPONSIBLE FOR ALL CORRESPONDENCE WITH PERMIT AGENCIES.

TEMPORARY DIVERSION PROCEDURES

1. TEMPORARY DIVERSIONS SHALL BE ACTIVATED OR DEACTIVATED INCREMENTALLY IN TWO STAGES TO ALLOW RESIDENT AQUATIC LIFE TO EXIT THE DEWATERED AREA.
2. A PERIOD OF APPROXIMATELY ONE HOUR SHALL BE ALLOWED BETWEEN THE TWO STAGES.
3. EFFORTS SHALL BE MADE TO LIMIT TURBIDITY DURING DIVERSION ACTIVATION AND DEACTIVATION. MATERIAL USED TO DIVERT FLOW DURING STAGED DIVERSIONS SHALL BE CLEAN AND DEVOID OF FINES.
4. EFFORTS SHALL BE MADE TO LIMIT DISTURBANCE TO VEGETATION.
5. EFFORTS SHALL BE MADE TO AVOID FATALITIES OF AQUATIC LIFE.

CONSTRUCTION SPECIFICATIONS

1. CONSTRUCTION SHALL OCCUR IN ACCORDANCE WITH THE PLAN SET, CONSTRUCTION SPECIFICATIONS, EQUIPMENT SPECIFICATIONS, MATERIAL SPECIFICATIONS, REVEGETATION SPECIFICATIONS AND GENERAL SPECIFICATIONS.
2. CONSTRUCTION ACCESS SHALL BE DETERMINED BY THE CONSTRUCTION MANAGER. THE CONTRACTOR SHALL LEAVE ALL GATES, WHETHER OPEN OR CLOSED, AS FOUND.
3. STREAM CROSSINGS SHALL BE MINIMIZED DURING CONSTRUCTION. CONTRACTOR SHALL USE CULVERTS AT STREAM CROSSINGS SO THAT EQUIPMENT CAN CROSS THE STREAM WITHOUT GENERATING EXCESS TURBIDITY.
4. STRAW BALES AND SILT FENCING SHALL BE AVAILABLE AND INSTALLED BY THE CONTRACTOR IF DEEMED NECESSARY BY THE CONSTRUCTION MANAGER. CONSTRUCTION FENCING (LIMITS OF DISTURBANCE) SHALL BE INSTALLED BY THE CONTRACTOR IF DEEMED NECESSARY BY THE CONSTRUCTION MANAGER.
5. INITIALLY, THE CONTRACTOR SHALL EXCAVATE THE CHANNEL TO APPROXIMATE DESIGN DIMENSIONS. EXCAVATION SHALL COMPLY WITH CONSTRUCTION STAKES AND THE PLAN SET. EXCAVATION SHALL ESTABLISH CHANNEL ELEVATIONS WITHIN ONE-HALF FOOT OF FINAL ELEVATIONS. THE CONSTRUCTION MANAGER SHALL INSPECT THE CHANNEL EXCAVATION FOR COMPLIANCE WITH THE PLAN SET. ALL EXCAVATED MATERIALS SHALL BE STOCKPILED ON-SITE, ABOVE THE BANKFULL CHANNEL UNTIL HAULED OFF-SITE OR USED ON-SITE. DISTURBANCE TO RIPARIAN VEGETATION, CHANNEL BANKS AND SOD SHALL BE MINIMIZED. EXCAVATED SOD AND RIPARIAN SHRUB TRANSPLANTS SHALL BE CAREFULLY STOCKPILED AND REUSED FOR PLANTING FLOODPLAINS OR STREAM BANKS.
6. AFTER EXCAVATING THE CHANNEL, THE CONTRACTOR SHALL INSTALL BANK STABILIZATION AND HABITAT STRUCTURES USING THE EXCAVATOR. EACH STRUCTURE SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE LOCATIONS AND SPECIFICATIONS PROVIDED IN THE PLAN SET. THE CONSTRUCTION MANAGER SHALL INSPECT AND APPROVE ALL STRUCTURES PRIOR TO BACKFILLING.
7. AFTER ALL STRUCTURES ARE INSTALLED, THE CHANNEL WILL BE SHAPED TO WITHIN 0.3 FEET OF THE FINAL ELEVATIONS SPECIFIED ON THE PLAN SET USING AN EXCAVATOR. THE CONSTRUCTION MANAGER SHALL CHECK THE FINAL ELEVATIONS FOR COMPLIANCE WITH THE PLAN SET. ALL EXCAVATED MATERIALS SHALL BE STOCKPILED ON-SITE, ABOVE THE BANKFULL CHANNEL UNTIL HAULED TO AN ON-SITE REPOSITORY DESIGNATED BY THE CONSTRUCTION MANAGER. DISTURBANCE TO RIPARIAN VEGETATION, CHANNEL BANKS AND SOD SHALL BE MINIMIZED.
8. THE CONTRACTOR SHALL REMOVE EXCESS MATERIALS, TEMPORARY CULVERTS AND EQUIPMENT FROM THE SITE. THE CONTRACTOR SHALL REGRADE DISTURBED AREAS AND CONSTRUCTION ACCESS ROADS TO THEIR ORIGINAL GRADES. THE CONTRACTOR SHALL TREAT COMPACTED SOIL AREAS INCLUDING ACCESS ROADS AND MATERIAL STOCKPILE AREAS. THE CONTRACTOR SHALL REMOVE SOIL FROM THE PROJECT SITE IF THE SOIL IS TAINTED WITH PETROLEUM-BASED FLUIDS.

EQUIPMENT SPECIFICATIONS

1. THE CONTRACTOR SHALL FURNISH ALL EQUIPMENT NECESSARY TO CONSTRUCT THE PROJECT. THE CONTRACTOR SHALL MOBILIZE ALL EQUIPMENT TO THE PROJECT AREA AS DIRECTED BY THE CONSTRUCTION MANAGER.
2. AT A MINIMUM, THE CONTRACTOR SHALL PROVIDE THE FOLLOWING EQUIPMENT FOR THIS PROJECT:

   EXCAVATOR - ONE (1) EXCAVATOR SHALL BE REQUIRED. THE EQUIPMENT SHALL BE MINIMUM 200 CLASS. THE BUCKET VOLUME SHALL BE MINIMUM OF ONE (1) CUBIC YARD. THE BUCKET SHALL BE EQUIPPED WITH A HYDRAULIC THUMB FOR GRASPING LOGS, ROCKS, AND OTHER MATERIALS. THE EQUIPMENT MUST BE CAPABLE OF CROSSING WATER AND WORKING ON OR ADJACENT TO STEEP SLOPES. A CHAIN OR STRAP SHALL BE AVAILABLE FOR ATTACHING CULVERTS, PUMPS AND OTHER EQUIPMENT OR MATERIALS TO THE BUCKET FOR TRANSPORT ON-SITE.

   ALL SURFACE VEHICLE - ONE (1) ALL-SURFACE VEHICLE (ASV) SHALL BE REQUIRED. THE EQUIPMENT SHALL BE EQUIPPED WITH SOD TRACKS TO MINIMIZE DISTURBANCE TO FRAGILE AREAS.

   CHAINSAW - ONE (1) CHAINSAW SHALL BE REQUIRED. THE CHAINSAW MUST BE CAPABLE OF COMPLETELY SAWING LOGS OF THE DIAMETER SPECIFIED IN THE MATERIAL SPECIFICATIONS.
3. ALL EQUIPMENT SHALL BE WASHED PRIOR TO MOBILIZATION TO THE SITE TO MINIMIZE THE INTRODUCTION OF FOREIGN MATERIALS AND FLUIDS TO THE PROJECT SITE. ALL EQUIPMENT SHALL BE FREE OF OIL, HYDRAULIC FLUID, AND DIESEL FUEL LEAKS. TO PREVENT INVASION OF NOXIOUS WEEDS OR THE SPREAD OF WHIRLING DISEASE SPORES, ALL EQUIPMENT SHALL BE POWER WASHED OR CLEANED TO REMOVE MUD AND SOIL PRIOR TO MOBILIZATION INTO THE PROJECT AREA. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO INSURE THAT ADEQUATE MEASURES HAVE BEEN TAKEN.
4. EQUIPMENT SHALL BE IN A WELL-MAINTAINED CONDITION TO MINIMIZE THE LIKELIHOOD OF A FLUID LEAK. IF A FLUID LEAK DOES OCCUR, THE CONSTRUCTION MANAGER SHALL BE NOTIFIED IMMEDIATELY, AND ALL WORK CEASED UNTIL THE LEAK HAS BEEN RECTIFIED. AT ALL TIMES DURING THE CONSTRUCTION PHASE, FLUID SPILL CONTAINMENT EQUIPMENT SHALL BE PRESENT ON-SITE AND READY FOR DEPLOYMENT SHOULD AN ACCIDENTAL SPILL OCCUR.
5. THE CONTRACTOR SHALL MAINTAIN A COMPLETE TOOL SET WITH COMMONLY REPLACED PARTS (E.G. O-RINGS) TO MINIMIZE DOWNTIME IN THE EVENT OF EQUIPMENT MALFUNCTION. THE CONTRACTOR SHALL HAVE AN EMERGENCY SPILL KIT ON SITE DURING THE PROJECT.

RDG RIVER DESIGN GROUP

NOTES AND SPECIFICATIONS

MOORE CREEK RESTORATION

MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
3.2

M:\Projects\2022\RDG-22-003 Moore Creek Restoration Project\CAD\RDG-22-003-Moore Creek Planset.dwg

TOTAL WOOD QUANTITIES

ITEM	QUANTITY	DIAMETER	LENGTH	ROOTWAD
CATEGORY 3 WOOD	5,820	2 IN <	8-10 FT	NO
TYPE 2- WILLOW CUTTINGS	14,550	0.25 IN	6-8 FT	-
WILLOW TRENCH- WILLOW CUTTINGS	13,125	0.25 IN	6-8 FT	-
TOTAL WILLOW CUTTINGS	27,625			

NOTE:
WOOD LENGTHS SHOWN WILL PRODUCE THE PROPER AMOUNT OF MATERIAL FOR STRUCTURES WHEN CUT INTO APPROPRIATE SIZES DURING CONSTRUCTION. IT IS CONTRACTOR'S RESPONSIBILITY TO CUT WOOD INTO APPROPRIATE SIZE LENGTHS TO FIT STRUCTURE DIMENSIONS.

TOTAL ROCK QUANTITIES

ITEM	QUANTITY	SIZE (IN)
CHANNEL ALLUVIUM (*)	1,301 CY	

GRADATION

SIZE (IN)	PERCENT PASSING	REPRESENTANTIVE CLASS
4	95	D100
3	65-95	D65-D94
2	50-65	D50
1	30-50	D35
0.5	20-30	D15
0.08	20	

NOTE:
(*) CONTRACTOR SHALL STRIP ANY SALVAGE AND COMPETENT EXISTING MOORE CREEK CHANNEL STREAMBED ALLUVIUM.

TOTAL EARTHWORK QUANTITIES

ITEM	QUANTITY (CY)
CUT	4683
FILL	2999
NET CUT	1683

NOTE:
VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.

SOD BANK STRUCTURE QUANTITIES

ITEM	QUANTITY (LF)
SOD BANK STRUCTURE - TYPE 1	7,581
SOD BANK STRUCTURE - TYPE 2	2,910

CONSTRUCTED CHANNEL STREAMBED QUANTITIES

ITEM	QUANTITY (LF)
CONSTRUCTED RIFFLE	3,237

MISCELLANEOUS QUANTITIES

ITEM	QUANTITY (LF)
SILT FENCE	100
SILT CURTAIN	20

SEEDING SCHEDULE

LOCATION FLOODPLAIN (1.59 ACRES)	SPECIES	PLS LBS/ACRE	TOTAL PLS LBS
SLENDER WHEATGRASS	*ELYMUS TRACHYCAULUS*	9.00	14.31
BLUEJOINT REEDGRASS	*CALAMAGROSTIS CANADENSIS*	4.00	6.36
TUFTED HAIRGRASS	*DESCHAMPSIA CAESPITOSA*	0.25	0.40
MEADOW BARLEY	*HORDEUM BRACHYANTHERUM*	6.25	9.94
		TOTAL	31.04
STAGING, ACCESS ROUTES (1.01 ACRES)	**SPECIES**	**PLS LBS/ACRE**	**TOTAL PLS LBS**
STREAMBANK WHEATGRASS	*PHLEUM PRATENSE*	8.00	8.08
WESTERN WHEATGRASS	*PASCOPYRUM SMITHII*	14.22	14.36
IDAHO FESCUE	*AGROSTIS STOLONIFERA*	3.56	3.59
		TOTAL	26.04

RDG RIVER DESIGN GROUP

MATERIALS AND SPECIFICATIONS

MOORE CREEK RESTORATION

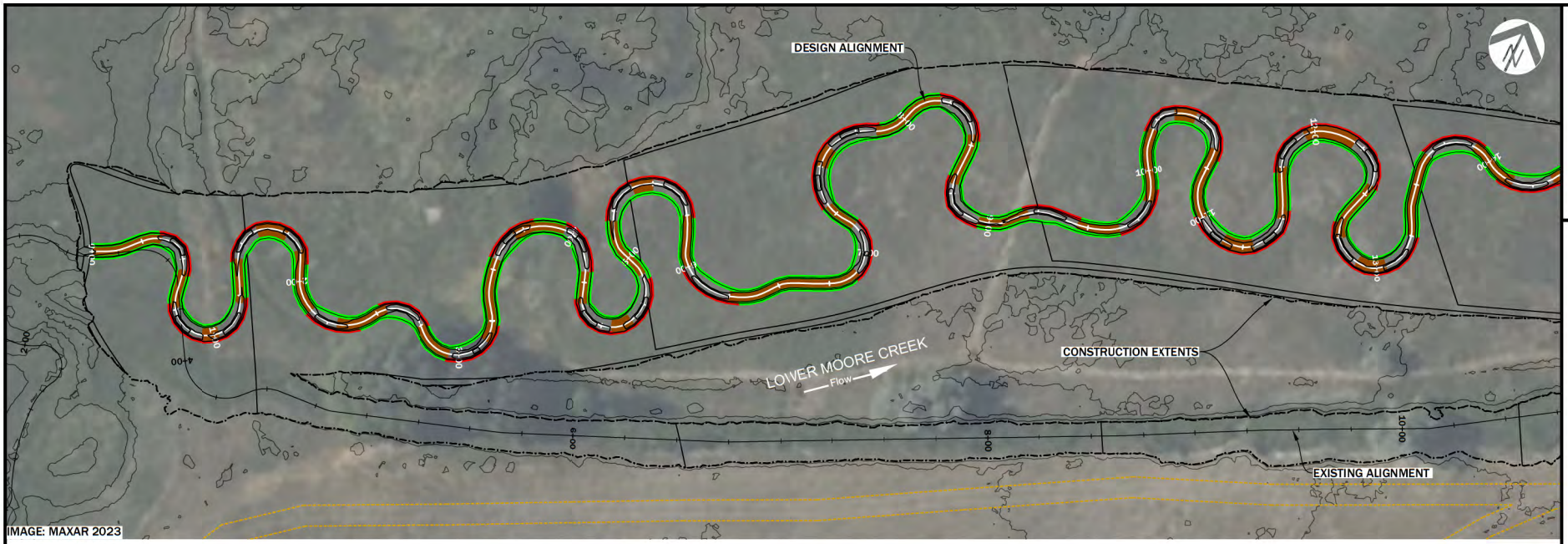
MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
3.3

M:\Projects\2022\RDG-22-003 Moore Creek Restoration Project\CAD\RDG-22-003-Moore Creek Planset.dwg



1 REACH 1 - STA: 0+00 TO 14+00
PLAN VIEW
1" = 50'

STRUCTURE SCHEDULE				STRUCTURE SCHEDULE				STRUCTURE SCHEDULE				STRUCTURE SCHEDULE			
STATION START	STATION END	STRUCTURE	BANK	STATION START	STATION END	STRUCTURE	BANK	STATION START	STATION END	STRUCTURE	BANK	STATION START	STATION END	STRUCTURE	BANK
0+00	0+33	SB 1	L	3+55	3+81	SB 2	L	7+87	8+20	SB 1	L	12+42	12+71	CCS	C
0+00	0+72	SB 1	R	3+77	3+97	CCS	C	8+20	8+48	SB 2	L	12+46	13+65	SB 1	L
0+00	0+35	CCS	C	3+81	3+95	SB 1	L	8+44	8+70	CCS	C	12+68	13+25	SB 2	R
0+33	0+58	SB 2	L	3+95	4+20	SB 2	L	8+48	9+18	SB 1	L	12+90	13+02	CCS	C
0+54	0+74	CCS	C	4+16	4+35	CCS	C	8+67	8+95	SB 2	R	13+21	13+68	CCS	C
0+58	1+41	SB 1	L	4+20	5+20	SB 1	L	8+91	9+21	CCS	C	13+25	14+08	SB 1	R
0+72	1+24	SB 2	R	4+33	4+87	SB 2	R	8+95	9+65	SB 1	R	13+65	13+94	SB 2	L
0+91	1+02	CCS	C	4+52	4+64	CCS	C	9+18	9+46	SB 2	L	13+90	14+11	CCS	C
1+20	1+43	CCS	C	4+83	5+23	CCS	C	9+42	9+68	CCS	C	13+94	14+50	SB 1	L
1+24	2+15	SB 1	R	4+87	6+00	SB 1	R	9+46	10+18	SB 1	L				
1+41	1+92	SB 2	L	5+20	5+77	SB 2	L	9+65	9+91	SB 2	R				
1+60	1+71	CCS	C	5+42	5+53	CCS	C	9+87	10+20	CCS	C				
1+89	2+17	CCS	C	5+73	6+03	CCS	C	9+91	10+98	SB 1	R				
1+92	2+52	SB 1	L	5+77	7+30	SB 1	L	10+18	10+70	SB 2	L				
2+15	2+40	SB 2	R	6+00	6+30	SB 2	R	10+36	10+47	CCS	C				
2+36	2+54	CCS	C	6+26	6+90	CCS	C	10+66	11+01	CCS	C				
2+40	2+94	SB 1	R	6+30	6+87	SB 1	R	10+70	11+72	SB 1	L				
2+52	2+77	SB 2	L	6+87	7+15	SB 2	R	10+98	11+54	SB 2	R				
2+73	2+97	CCS	C	7+11	7+32	CCS	C	11+19	11+30	CCS	C				
2+77	3+55	SB 1	L	7+15	8+67	SB 1	R	11+50	11+75	CCS	C				
2+94	3+23	SB 2	R	7+30	7+87	SB 2	L	11+54	12+68	SB 1	R				
3+19	3+58	CCS	C	7+51	7+62	CCS	C	11+72	12+46	SB 2	L				
3+23	4+33	SB 1	R	7+83	8+22	CCS	C	11+94	12+23	CCS	C				

DETAIL LEGEND

SYMBOL		DETAIL SHEET #
	SOD BANK STRUCTURE - TYPE 1	6.0
	SOD BANK STRUCTURE - TYPE 2	6.0
	CONSTRUCTED CHANNEL STREAMBED	6.1

RDG RIVER DESIGN GROUP

PLAN VIEW AND STRUCTURE LAYOUT-REACH 1
MOORE CREEK RESTORATION
MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
4.0

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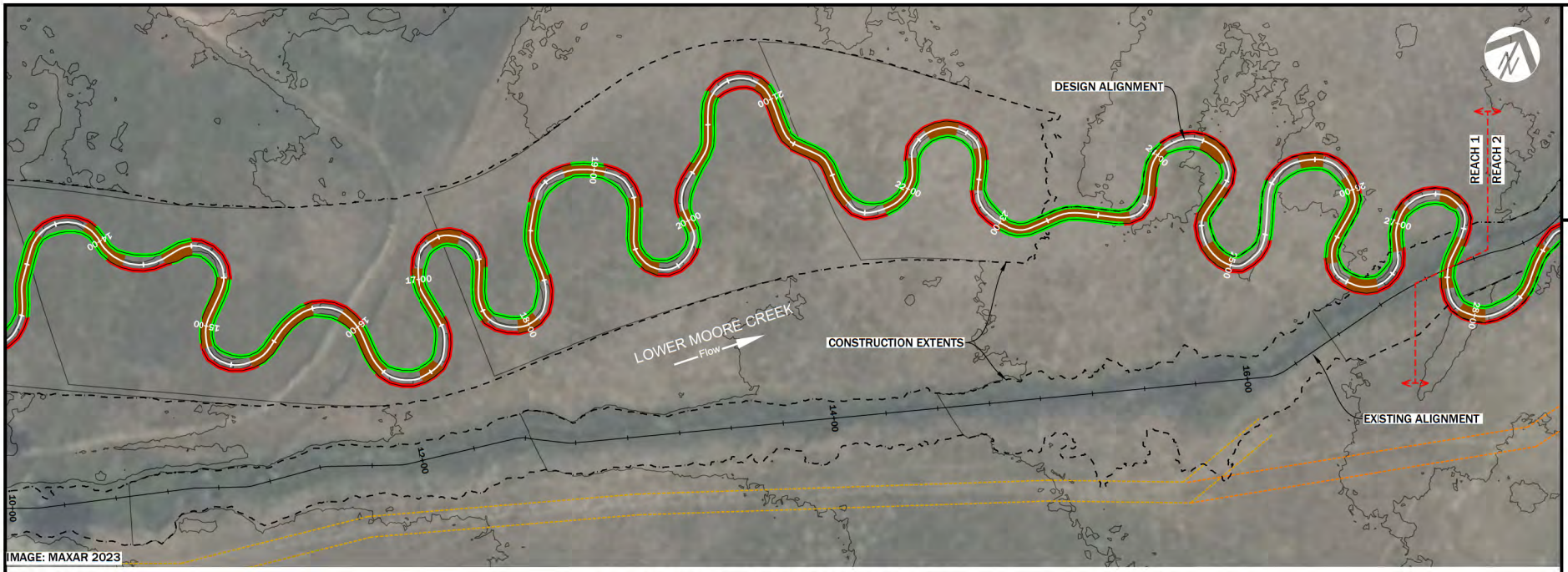

1 REACH 1 - STA: 14+00 TO 27+70
PLAN VIEW
1" = 50'

STRUCTURE SCHEDULE				STRUCTURE SCHEDULE				STRUCTURE SCHEDULE				STRUCTURE SCHEDULE			
STATION START	STATION END	STRUCTURE	BANK	STATION START	STATION END	STRUCTURE	BANK	STATION START	STATION END	STRUCTURE	BANK	STATION START	STATION END	STRUCTURE	BANK
14+08	14+37	SB 2	R	18+27	19+58	SB 1	R	22+80	23+02	SB 2	R	27+23	27+34	CCS	C
14+33	14+53	CCS	C	18+63	18+89	SB 2	L	22+99	23+64	CCS	C	27+54	27+77	CCS	C
14+37	15+08	SB 1	R	18+85	19+07	CCS	C	23+02	23+62	SB 1	R				
14+50	14+76	SB 2	L	18+89	19+04	SB 1	L	23+62	23+84	SB 2	R				
14+72	15+11	CCS	C	19+04	19+30	SB 2	L	23+81	24+07	CCS	C				
14+76	15+72	SB 1	L	19+26	19+61	CCS	C	23+84	24+70	SB 1	R				
15+08	15+37	SB 2	R	19+30	20+03	SB 1	L	24+05	24+58	SB 2	L				
15+33	15+75	CCS	C	19+58	19+87	SB 2	R	24+23	24+34	CCS	C				
15+37	16+23	SB 1	R	19+83	20+06	CCS	C	24+54	24+72	CCS	C				
15+72	16+01	SB 2	L	19+87	21+63	SB 1	R	24+58	25+50	SB 1	L				
15+97	16+26	CCS	C	20+03	20+29	SB 2	L	24+70	25+23	SB 2	R				
16+01	17+02	SB 1	L	20+25	20+68	CCS	C	24+88	24+99	CCS	C				
16+23	16+78	SB 2	R	20+29	20+65	SB 1	L	25+19	25+52	CCS	C				
16+43	16+55	CCS	C	20+65	20+94	SB 2	L	25+23	26+35	SB 1	R				
16+74	17+04	CCS	C	20+90	21+65	CCS	C	25+50	26+03	SB 2	L				
16+78	17+78	SB 1	R	20+94	22+14	SB 1	L	25+68	25+79	CCS	C				
17+02	17+54	SB 2	L	21+63	21+85	SB 2	R	25+99	26+37	CCS	C				
17+20	17+31	CCS	C	21+82	22+16	CCS	C	26+03	27+05	SB 1	L				
17+50	17+80	CCS	C	21+85	22+80	SB 1	R	26+35	26+88	SB 2	R				
17+54	18+63	SB 1	L	22+14	22+67	SB 2	L	26+53	26+64	CCS	C				
17+78	18+27	SB 2	R	22+32	22+43	CCS	C	26+84	27+07	CCS	C				
17+95	18+05	CCS	C	22+63	22+82	CCS	C	26+88	27+75	SB 1	R				
18+23	18+66	CCS	C	22+67	24+05	SB 1	L	27+05	27+58	SB 2	L				

DETAIL LEGEND

SYMBOL		DETAIL SHEET #
	SOD BANK STRUCTURE - TYPE 1	6.0
	SOD BANK STRUCTURE - TYPE 2	6.0
	CONSTRUCTED CHANNEL STREAMBED	6.1

RDG RIVER DESIGN GROUP

PLAN VIEW AND STRUCTURE LAYOUT-REACH 1

MOORE CREEK RESTORATION
MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
4.1

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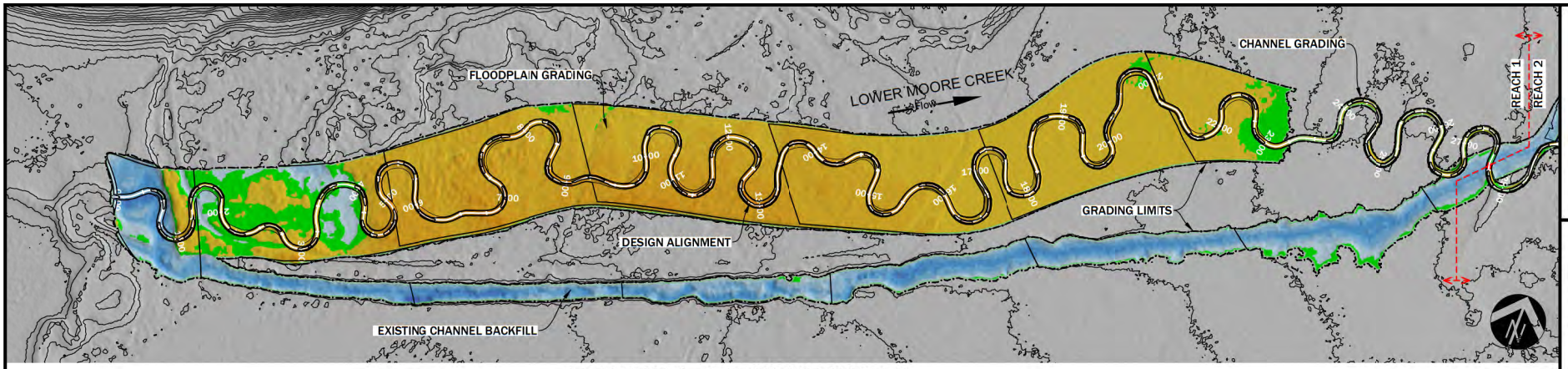


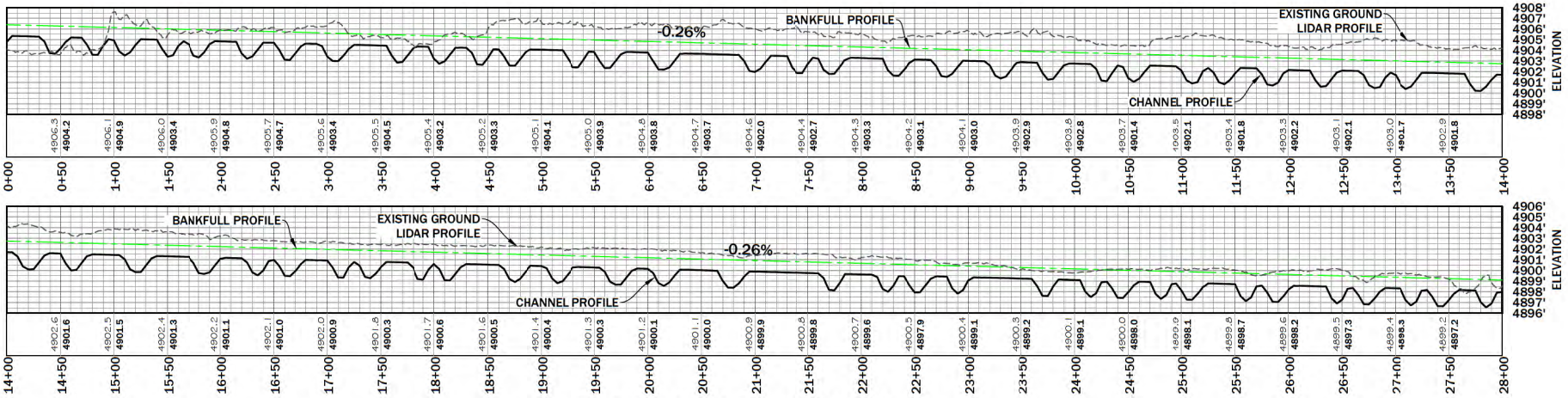
1 REACH 1 - STA: 00+00 TO 27+70
PLAN VIEW

1" = 100'

< -9.0' -8.0' -7.0' -6.0' -5.0' -4.0' -3.0' -2.5' -2.0' -1.5' -1.0' -0.3' 0.3' 1.0' 1.5' 2.0' 2.5 3.0' 4.0' 5.0' 6.0' 7.0' 8.0' 9.0' >

CUT — FILL

EXISTING GROUND COMPARED TO RDG DESIGN SURFACE



2 REACH 1 - STA: 00+00 TO 27+70
PROFILE VIEWS

HOR: 1" = 100'
VER: 1: = 10'

EARTHWORK VOLUMES	
STATION 0+00 TO 27+70	
ITEM	QUANTITY (CY)
CUT	4104
BACKFILL	1911
NET CUT	2193

NOTE:
VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.

PROFILE LEGEND

ALIGNMENT STATION 111+00 — 2768.8 / 2764.2 — CHANNEL ELEVATION — BANKFULL ELEVATION

BANKFULL SURFACE
EXISTING SURFACE
THALWEG SURFACE

RDG RIVER DESIGN GROUP

GRADING PLAN AND PROFILE-REACH 1

MOORE CREEK RESTORATION

MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
4.2

Drawing 10 of 24

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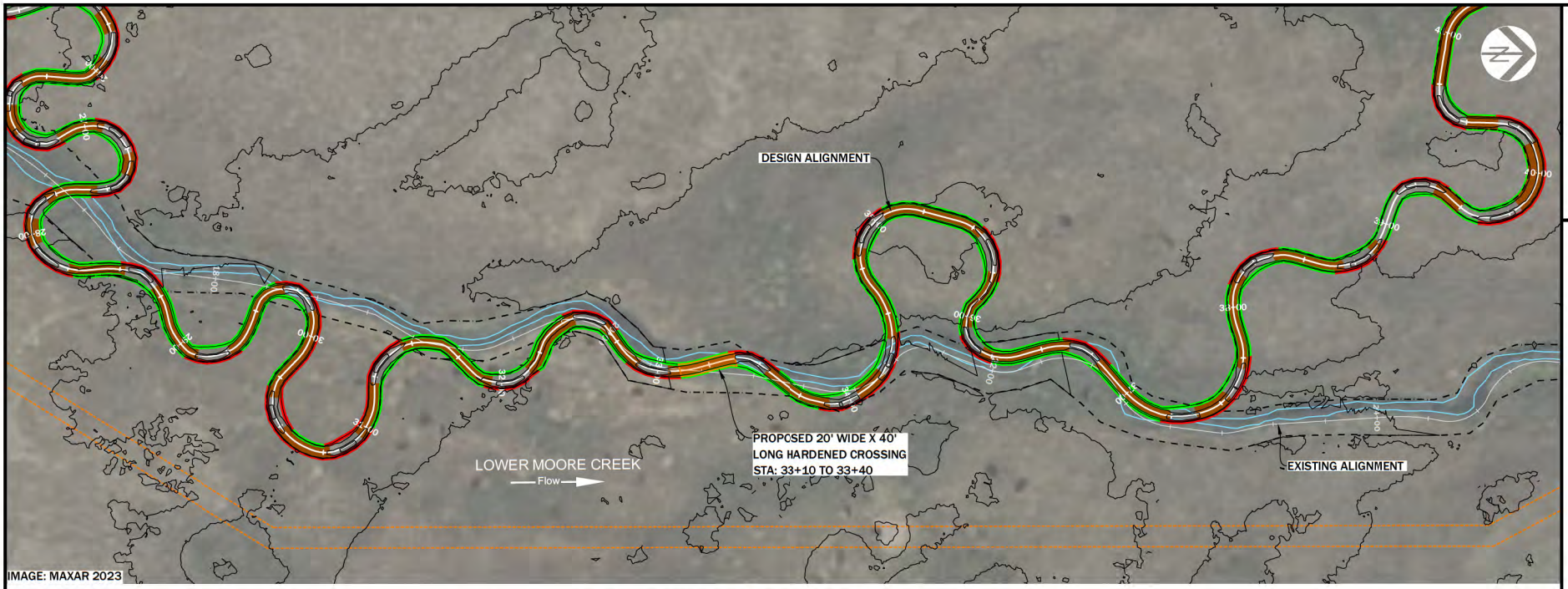

1 REACH 2 - STA: 27+70 TO 40+00
PLAN VIEW
1" = 50'

STRUCTURE SCHEDULE				STRUCTURE SCHEDULE				STRUCTURE SCHEDULE			
STATION START	STATION END	STRUCTURE	BANK	STATION START	STATION END	STRUCTURE	BANK	STATION START	STATION END	STRUCTURE	BANK
27+58	28+50	SB 1	L	31+92	32+18	SB 2	R	36+22	36+62	CCS	C
27+75	28+28	SB 2	R	32+14	32+48	CCS	C	36+26	37+20	SB 1	R
27+93	28+04	CCS	C	32+18	32+85	SB 1	R	36+60	36+85	SB 2	L
28+24	28+52	CCS	C	32+45	32+71	SB 2	L	36+81	37+22	CCS	C
28+28	29+05	SB 1	R	32+67	32+88	CCS	C	36+85	38+10	SB 1	L
28+50	28+72	SB 2	L	32+71	33+35	SB 1	L	37+20	37+76	SB 2	R
28+69	29+08	CCS	C	32+85	33+11	SB 2	R	37+39	37+53	CCS	C
28+72	29+65	SB 1	L	33+07	33+37	CCS	C	37+72	38+13	CCS	C
29+05	29+31	SB 2	R	33+11	33+85	SB 1	R	37+76	38+65	SB 1	R
29+27	29+68	CCS	C	33+35	33+60	SB 2	L	38+10	38+38	SB 2	L
29+31	30+30	SB 1	R	33+56	33+87	CCS	C	38+34	38+68	CCS	C
29+65	29+91	SB 2	L	33+60	34+80	SB 1	L	38+38	39+15	SB 1	L
29+87	30+33	CCS	C	33+85	34+41	SB 2	R	38+65	38+93	SB 2	R
29+91	31+20	SB 1	L	34+04	34+18	CCS	C	38+89	39+17	CCS	C
30+30	30+56	SB 2	R	34+37	34+83	CCS	C	38+93	39+60	SB 1	R
30+52	30+78	CCS	C	34+41	36+00	SB 1	R	39+15	39+40	SB 2	L
30+56	30+75	SB 1	R	34+80	35+06	SB 2	L	39+36	39+63	CCS	C
30+75	31+01	SB 2	R	35+02	35+56	CCS	C	39+40	40+50	SB 1	L
30+97	31+23	CCS	C	35+06	35+53	SB 1	L	39+60	40+36	SB 2	R
31+01	31+92	SB 1	R	35+53	35+79	SB 2	L	39+80	40+13	CCS	C
31+20	31+46	SB 2	L	35+75	36+03	CCS	C				
31+42	31+95	CCS	C	35+79	36+60	SB 1	L				
31+46	32+45	SB 1	L	36+00	36+26	SB 2	R				

DETAIL LEGEND

SYMBOL		DETAIL SHEET #
	SOD BANK STRUCTURE - TYPE 1	6.0
	SOD BANK STRUCTURE - TYPE 2	6.0
	CONSTRUCTED CHANNEL STREAMBED	6.1

RDG RIVER DESIGN GROUP

PLAN VIEW AND STRUCTURE LAYOUT-REACH 2
MOORE CREEK RESTORATION
MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
4.3

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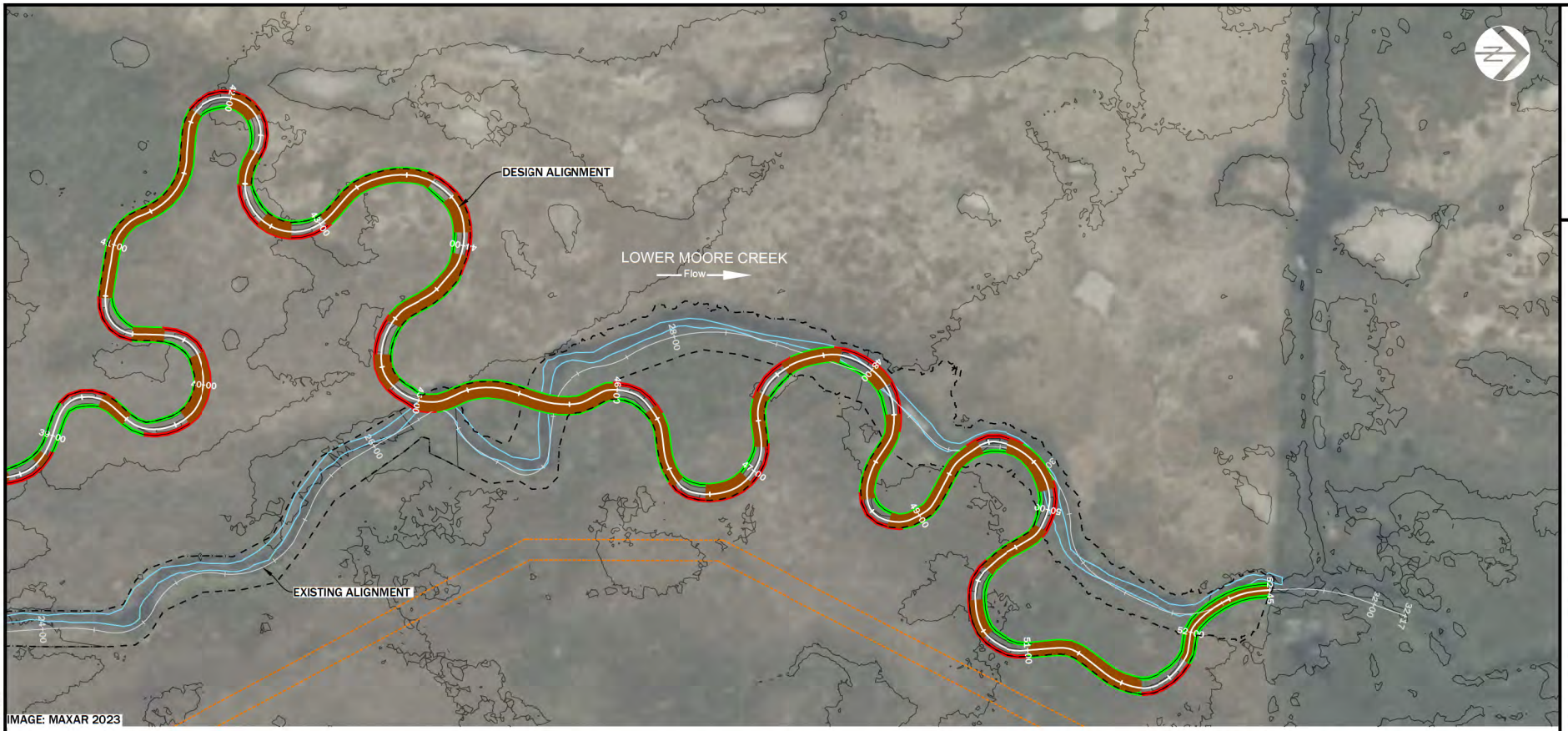

STRUCTURE SCHEDULE				STRUCTURE SCHEDULE				STRUCTURE SCHEDULE			
STATION START	STATION END	STRUCTURE	BANK	STATION START	STATION END	STRUCTURE	BANK	STATION START	STATION END	STRUCTURE	BANK
40+32	40+52	CCS	C	44+50	45+09	SB 2	R	48+33	49+40	SB 1	L
40+36	42+50	SB 1	R	44+69	44+86	CCS	C	48+65	48+91	SB 2	R
40+50	40+75	SB 2	L	45+05	46+01	CCS	C	48+87	49+43	CCS	C
40+71	41+83	CCS	C	45+09	46+55	SB 1	R	48+91	50+40	SB 1	R
40+75	41+80	SB 1	L	45+98	46+24	SB 2	L	49+40	49+66	SB 2	L
41+80	42+35	SB 2	L	46+20	46+57	CCS	C	49+62	49+90	CCS	C
42+00	42+12	CCS	C	46+24	47+35	SB 1	L	49+66	49+87	SB 1	L
42+31	42+53	CCS	C	46+55	47+14	SB 2	R	49+87	50+13	SB 2	L
42+35	43+60	SB 1	L	46+74	46+91	CCS	C	50+09	50+42	CCS	C
42+50	43+04	SB 2	R	47+10	47+37	CCS	C	50+13	52+45	SB 1	L
42+70	42+81	CCS	C	47+14	48+65	SB 1	R	50+40	51+00	SB 2	R
43+00	43+62	CCS	C	47+35	47+60	SB 2	L	50+59	50+77	CCS	C
43+04	44+50	SB 1	R	47+56	47+82	CCS	C	50+96	51+63	CCS	C
43+60	44+13	SB 2	L	47+60	47+80	SB 1	L	51+00	5160	SB 1	R
43+79	43+90	CCS	C	47+80	48+33	SB 2	L	51+60	51+86	SB 2	R
44+09	44+52	CCS	C	47+99	48+10	CCS	C	51+82	52+45	CCS	C
44+13	45+98	SB 1	L	48+29	48+68	CCS	C	51+86	52+45	SB 1	R

1 REACH 2 - STA: 40+00 TO 53+48
PLAN VIEW
1" = 50'

DETAIL LEGEND		
	SYMBOL	DETAIL SHEET #
	SOD BANK STRUCTURE - TYPE 1	6.0
	SOD BANK STRUCTURE - TYPE 2	6.0
	CONSTRUCTED CHANNEL STREAMBED	6.1

RDG RIVER DESIGN GROUP

PLAN VIEW AND STRUCTURE LAYOUT-REACH 2

MOORE CREEK RESTORATION
MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
4.4

Drawing 12 of 24

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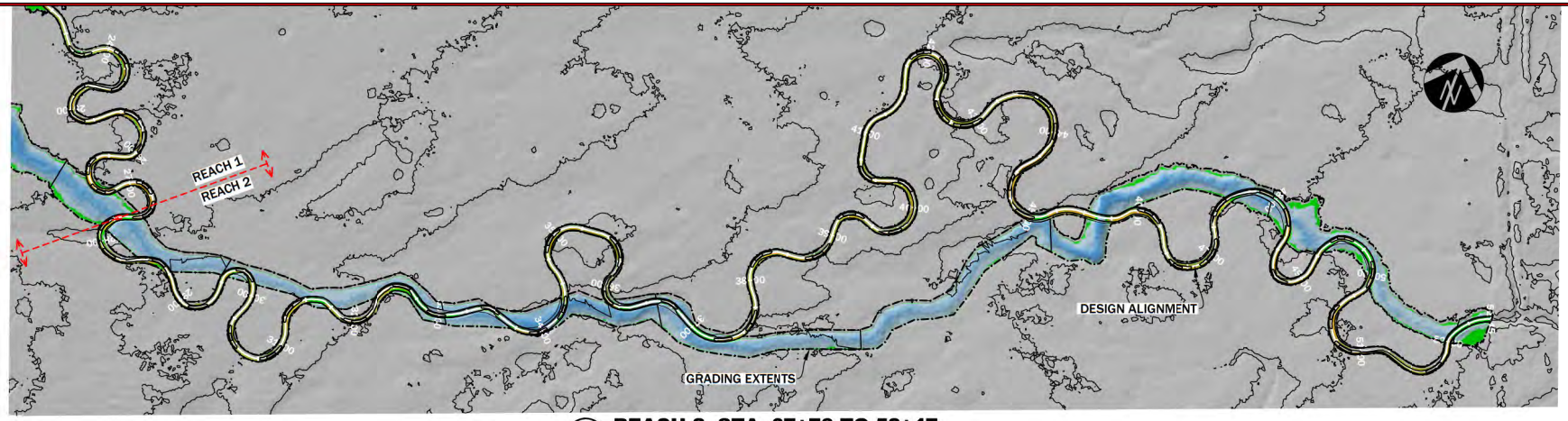
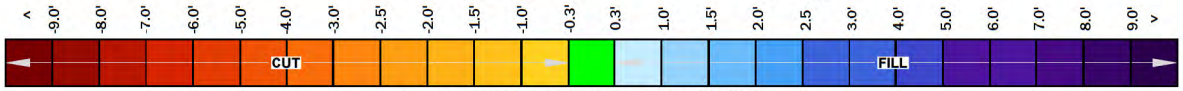
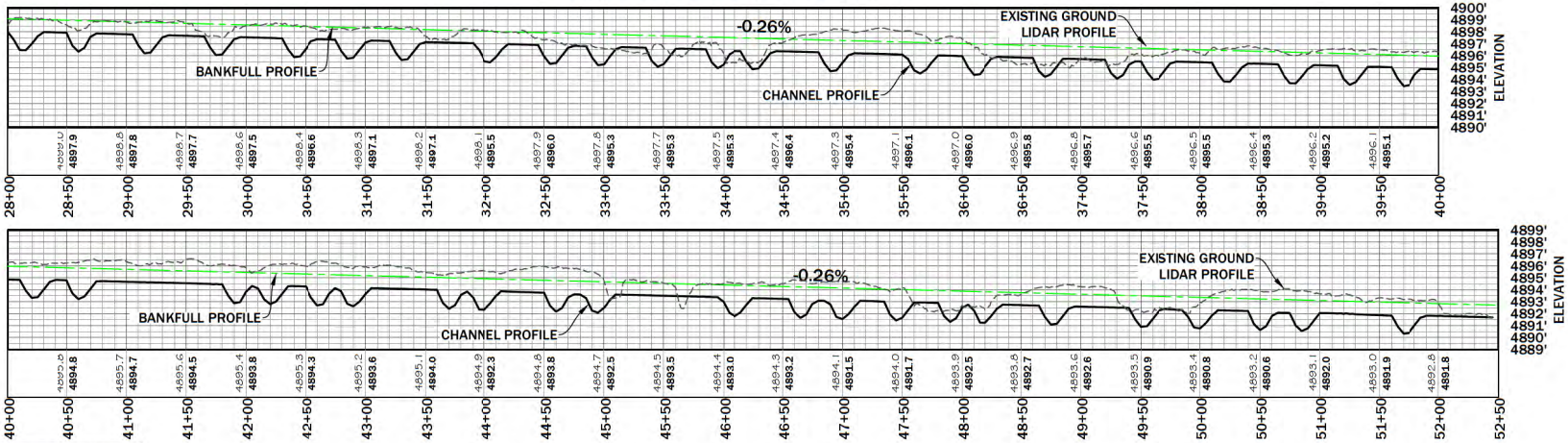


1 REACH 2- STA: 27+70 TO 52+47
PLAN VIEW 1" = 100'



EXISTING GROUND COMPARED TO RDG DESIGN SURFACE



2 REACH 2- STA: 27+70 TO 52+47
PROFILE VIEWS
HOR: 1" = 100'
VER: 1: = 10'

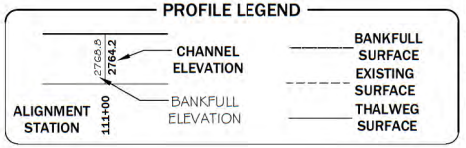
REACH 2 EARTHWORK VOLUMES

STATION 27+70 TO 52+45

ITEM	QUANTITY (CY)
CUT	578
BACKFILL	1088
NET FILL	509

NOTE:
VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.

PROFILE LEGEND



RDG RIVER DESIGN GROUP

GRADING PLAN AND PROFILE-REACH 2

MOORE CREEK RESTORATION

MADISON COUNTY, MT

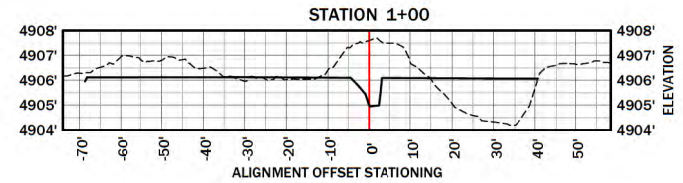
NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

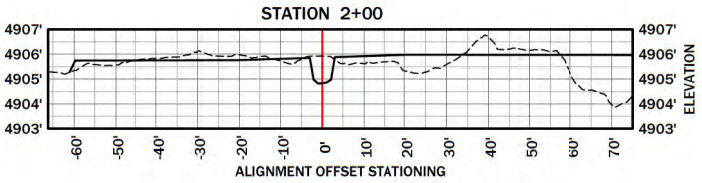
PROJECT NUMBER
RDG-22-003

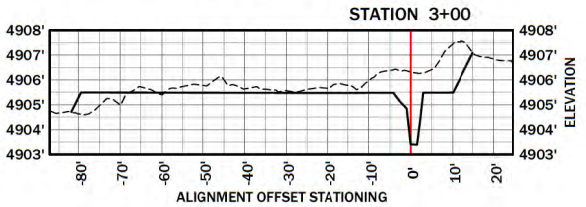
DRAWING NUMBER
4.5

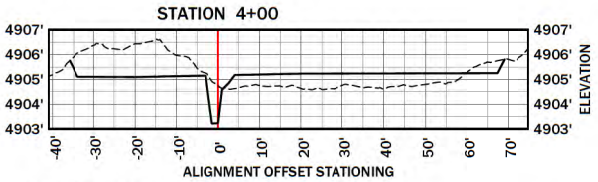
Drawing 13 of 24

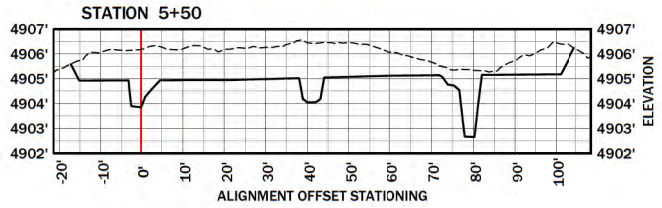
M:\Projects\2022\RDG-22-003 Moore Creek Restoration Project\CAD\RDG-22-003-Moore Creek Planset.dwg

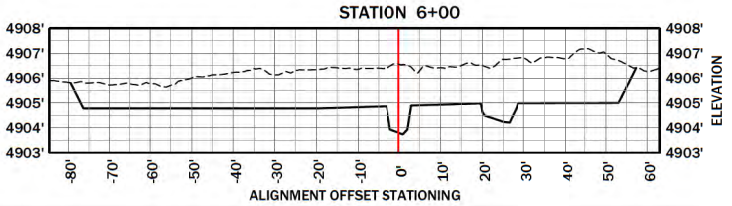


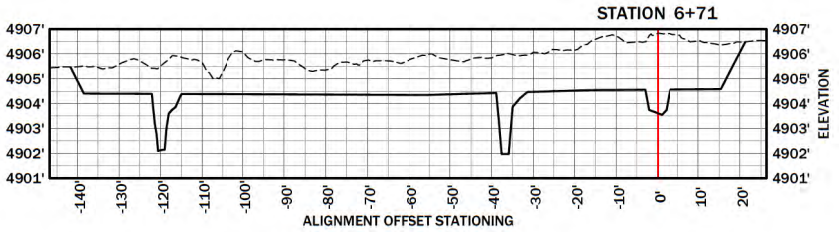


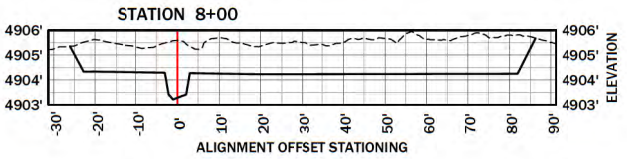


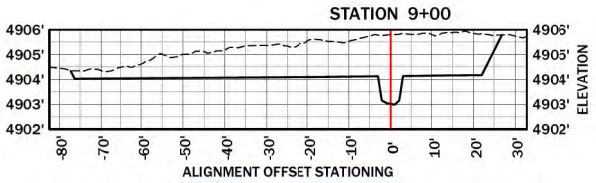


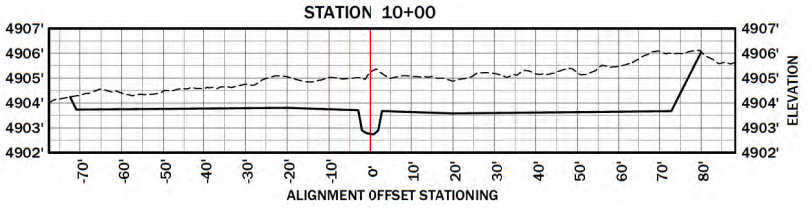


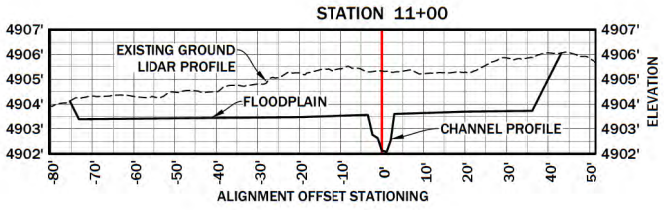












SCALE:

HOR: 1" = 30'
VER: 1" = 6'

LEGEND

EXISTING GROUND ELEVATION

FINISHED GRADE

RDG RIVER DESIGN GROUP

CROSS SECTIONS - REACH 1

MOORE CREEK RESTORATION

MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
5.0

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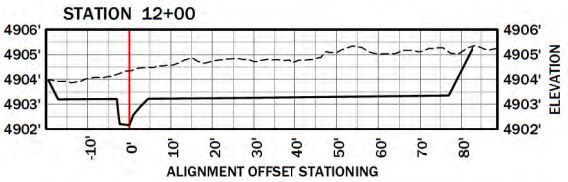

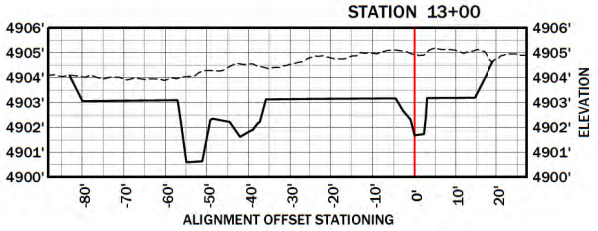

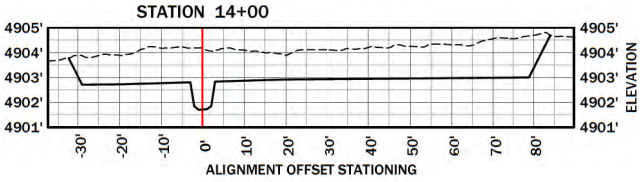

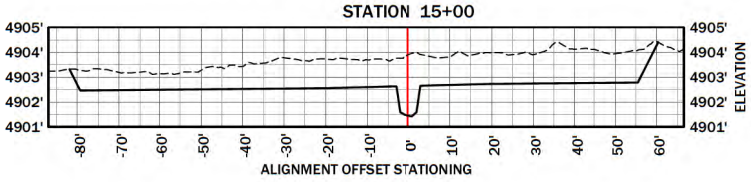

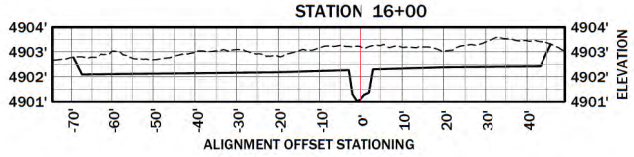

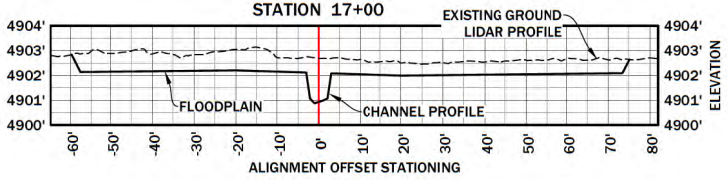

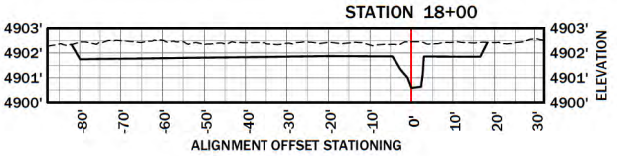

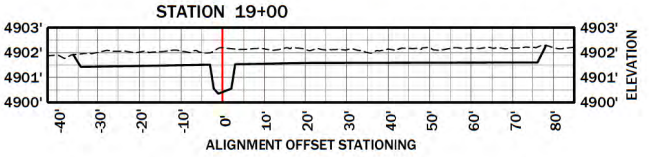

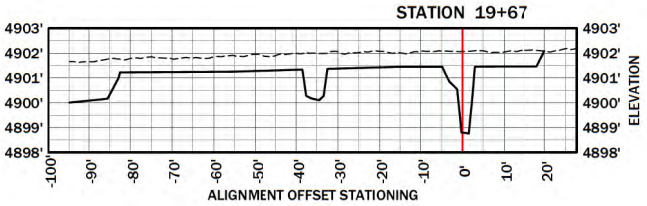

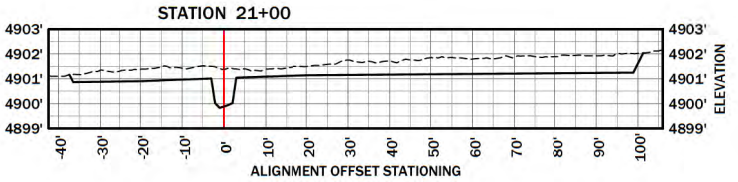

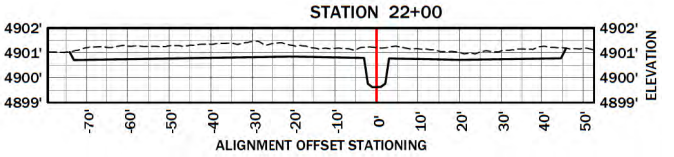

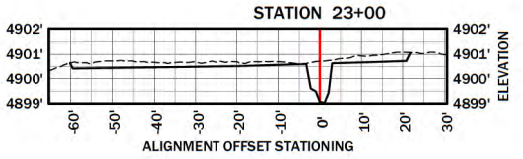

SCALE:

HOR: 1" = 30'
VER: 1" = 6'

LEGEND

EXISTING GROUND ELEVATION

FINISHED GRADE

RDG RIVER DESIGN GROUP

CROSS SECTIONS - REACH 1

MOORE CREEK RESTORATION

MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
5.1

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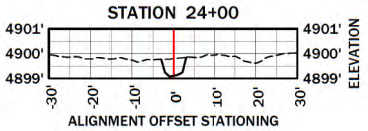

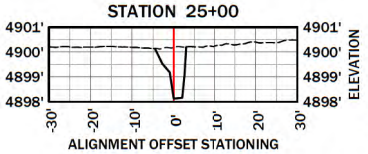

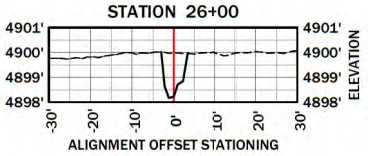

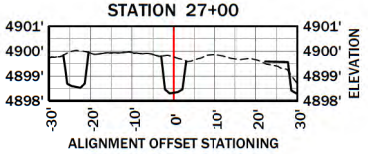

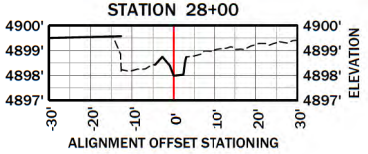

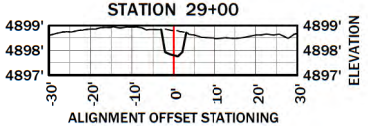

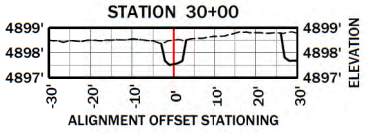

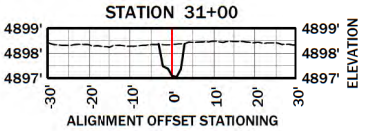

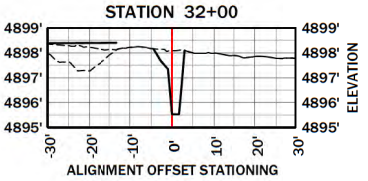

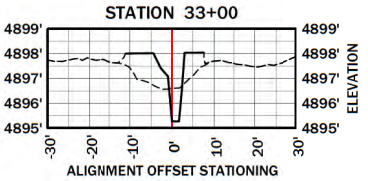

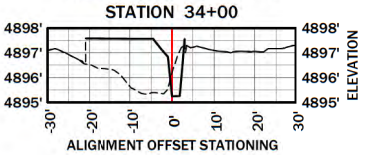

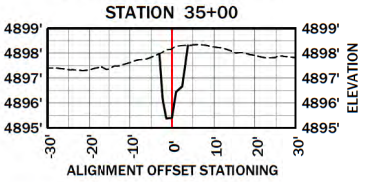

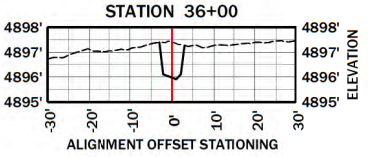

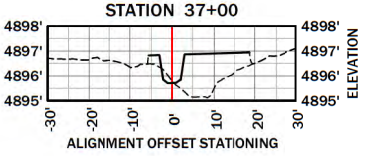

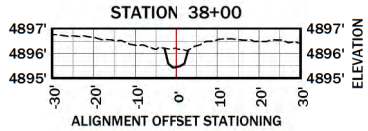

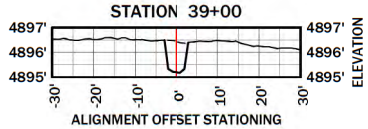

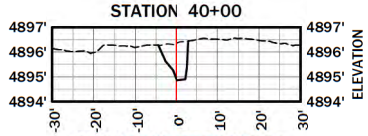

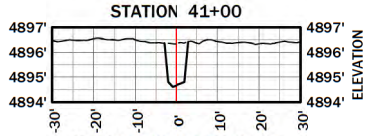

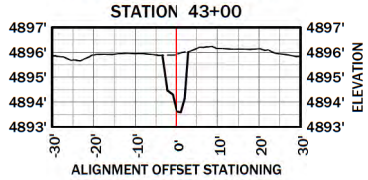

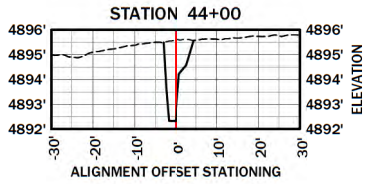

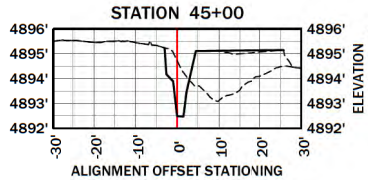

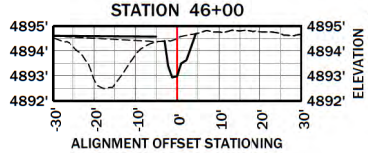

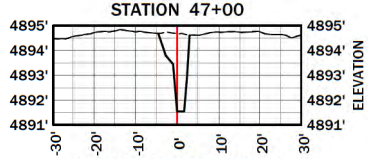

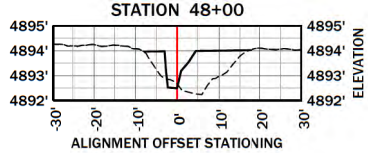

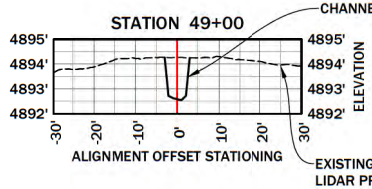

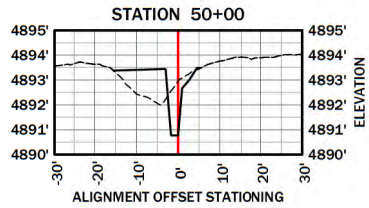

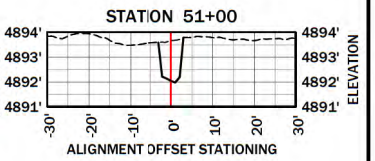

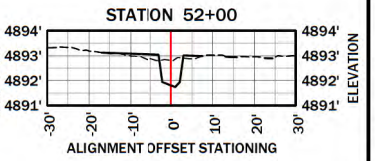

SCALE:

HOR: 1" = 30'

VER: 1" = 6'

LEGEND

EXISTING GROUND ELEVATION

FINISHED GRADE

CROSS SECTIONS - REACH 2

MOORE CREEK RESTORATION

MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
5.2

Drawing 16 of 24

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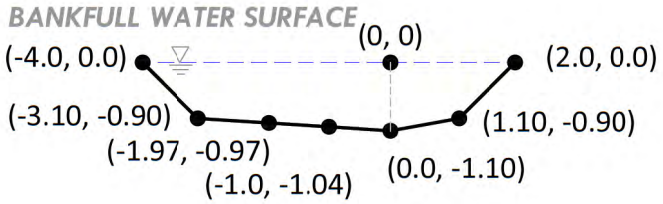
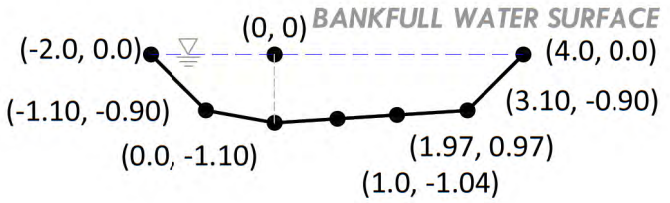
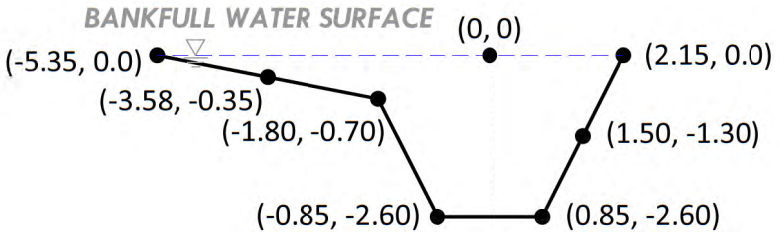


RIFFLE R



RIFFLE L



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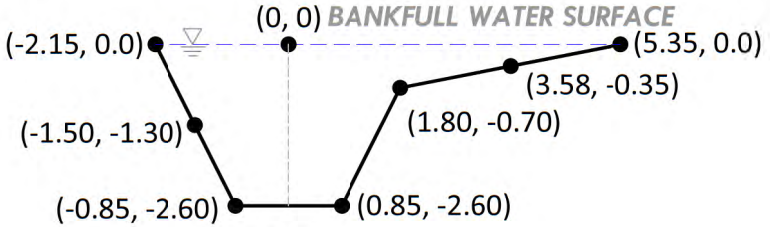

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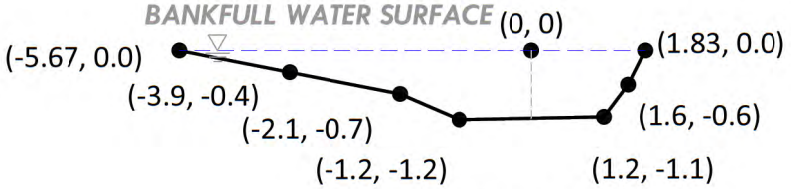

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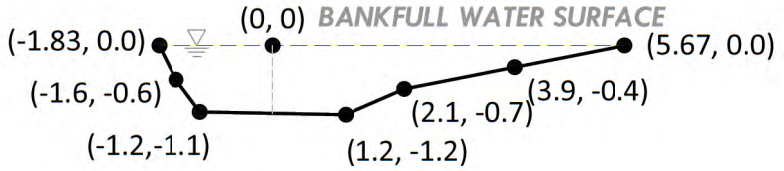


RUN L

RDG RIVER DESIGN GROUP

CROSS SECTION DIMENSIONS

MOORE CREEK RESTORATION

MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
5.3

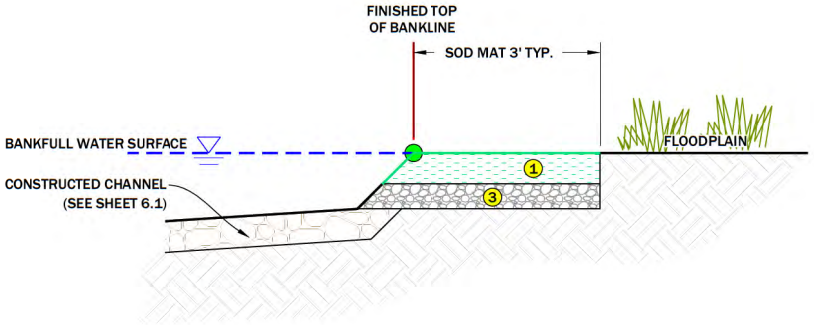
Drawing 17 of 24

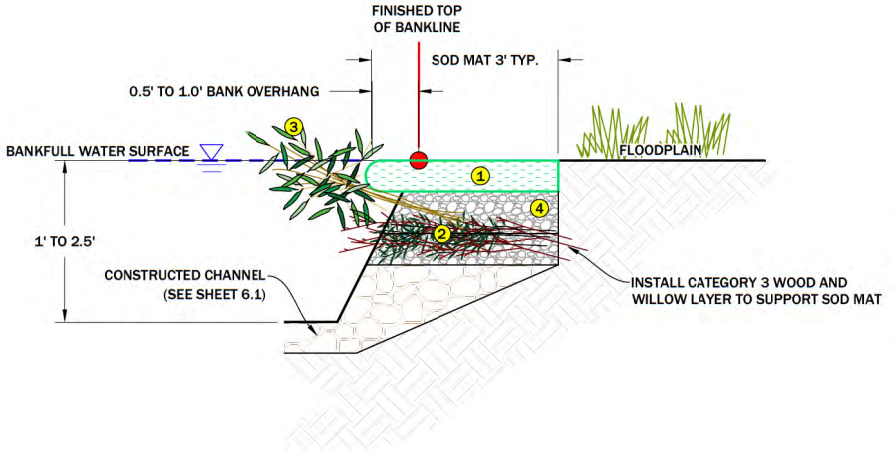
M:\Projects\2022\RDG-22-003 Moore Creek Restoration Project\CAD\RDG-22-003-Moore Creek Planset.dwg

EXAMPLE OF SOD BANK STRUCTURE STREAMBANK

NOTES ON SOD BANK STRUCTURE INSTALLATION

1. CONSTRUCTION OF THE SOD BANK WILL OCCUR BEFORE THE CHANNEL AND FLOODPLAIN BACKFILL IS PLACED AND THE CHANNEL STREAMBED IS CONSTRUCTED. INSTALLATION OF FLOODPLAIN TREATMENT SHALL BE COMPLETED AFTER SOD BANKS ARE INSTALLED.
2. IT IS CONTRACTOR'S RESPONSIBILITY TO CUT BRUSH INTO APPROPRIATE SIZE LENGTHS TO FIT STRUCTURE DIMENSIONS.
3. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED BY CONSTRUCTION MANAGER.
4. CONTRACTOR SHALL MARK AND CONSTRUCTION ENGINEER SHALL APPROVE THE GENERAL LOCATION FOR EACH SOD BANK STRUCTURE PRIOR TO CONSTRUCTION.
5. EXCAVATE TO THE EXCAVATION LIMITS AS SHOWN. EXCAVATED MATERIAL SHALL BE STOCKPILED ON THE FLOODPLAIN OUTSIDE OF THE IMMEDIATE WORK AREA.
6. WILLOWS AND CATEGORY 3 WOOD SHALL BE PLACED IN A LAYER AND JUST PRIOR TO THE INSTALLATION OF THE SOD MAT. PLACE 6 - 8 FT DORMANT WILLOW CUTTINGS AT A DENSITY OF 5 PER LINEAR FT ALONG THE TOP OF BANK LINE ELEVATION. STEMS MAY OVERLAP.
7. THE UPSTREAM AND DOWNSTREAM ENDS OF THE STRUCTURE SHALL TRANSITION SMOOTHLY INTO ADJACENT STREAMBANK STRUCTURES TO MINIMIZE EROSION, FLANKING, AND BANK FAILURE. STRUCTURE ENDS MAY BE STABILIZED WITH ADDITIONAL CATEGORY 1 ROCK AS APPROVED BY ENGINEER.





1 SOD BANK STRUCTURE - TYPE 1

SECTION VIEW 1" = 2'

TYPE 1 SOD BANK STRUCTURE MATERIAL SCHEDULE (PER LINEAR FOOT)			
ITEM		SIZE	QTY.
1	SOD MAT		3 SF
2	STREAMBANK ALLUVIUM	4" MINUS	0.1 CY

STREAMBED FILL GRADATION	
SIZE (IN)	PERCENT PASSING
4	95
3	65-95
2	50-65
1	30-50
0.5	20-30
0.08	20

NOTE: MIX SALVAGED MATERIAL AND IMPORTED MATERIAL TO ACHIEVE SPECIFIED GRADATION

2 SOD BANK STRUCTURE - TYPE 2

SECTION VIEW 1" = 2'

TYPE 2 SOD BANK STRUCTURE MATERIAL SCHEDULE (PER LINEAR FOOT)			
ITEM		SIZE	QTY.
1	SOD MAT		3 SF
2	CATEGORY 3 WOOD	< 2"	2
3	WILLOW CUTTINGS	0.25"-1.0"	5
4	STREAMBANK ALLUVIUM	4" MINUS	0.1 CY

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SOD BANK STRUCTURE DETAIL

MOORE CREEK RESTORATION

MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER RDG-22-003

DRAWING NUMBER 6.0

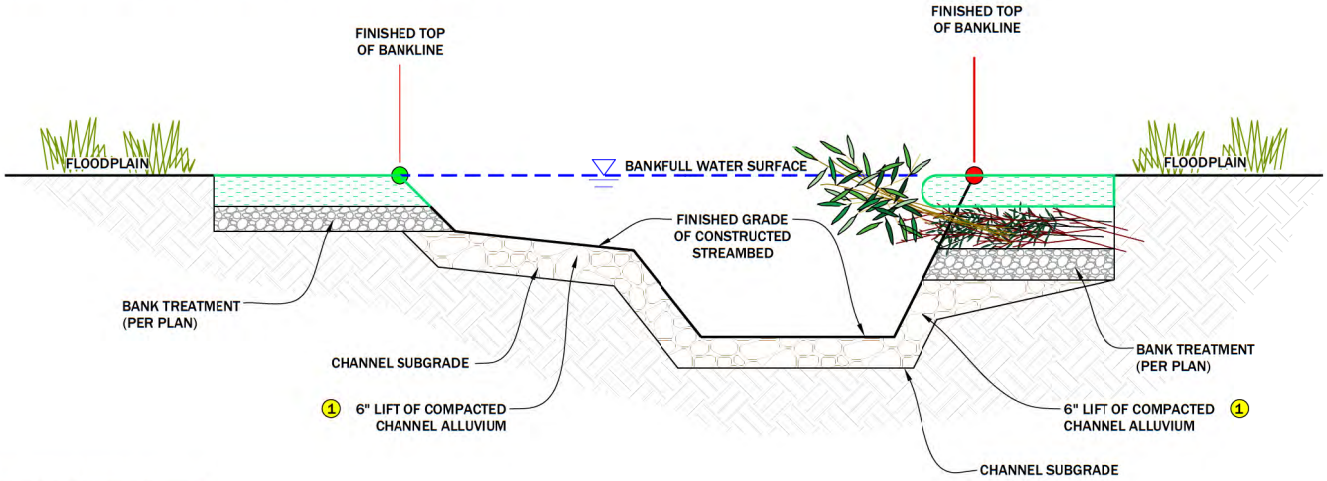
Drawing 18 of 24

M:\Projects\2022\RDG-22-003 Moore Creek Restoration Project\CAD\RDG-22-003-Moore Creek Planset.dwg

EXAMPLE OF CONSTRUCTED STREAM CHANNEL

NOTES ON CONSTRUCTED CHANNEL STREAMBED INSTALLATION

1. CONSTRUCTION OF THE CHANNEL STREAMBED WILL OCCUR AFTER THE CHANNEL SUBGRADE IS PREPARED.
2. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED THE CONSTRUCTION MANAGER.
3. CONTRACTOR SHALL MARK THE UPSTREAM AND DOWNSTREAM EXTENTS OF THE LOCATIONS OF THE CONSTRUCTED CHANNEL STREAMBED STRUCTURES.
4. PRIOR TO CONSTRUCTION OF THE CHANNEL STREAMBED, CONSTRUCTION MANAGER SHALL VERIFY CHANNEL SUBGRADE ELEVATIONS. CHANNEL SUBGRADE SERVES AS THE FOUNDATION FOR THE CONSTRUCTED CHANNEL STREAMBED.
5. CONTRACTOR SHALL STOCKPILE CHANNEL ALLUVIUM PER SPECIFICATIONS NOTED ON THE DRAWING.



1 CONSTRUCTED CHANNEL STREAMBED ALLUVIUM INSTALLATION SECTION VIEW
1" = 2'

STREAMBED FILL GRADATION	
SIZE (IN)	PERCENT PASSING
4	95
3	65-95
2	50-65
1	30-50
0.5	20-30
0.08	20
NOTE: MIX SALVAGED MATERIAL AND IMPORTED MATERIAL TO ACHIEVE SPECIFIED GRADATION	

MATERIAL SCHEDULE (PER FOOT)			
	ITEM	DIA. (IN)	QUANTITY (CY)
1	ALLUVIUM	SEE GRADATION TABLE	0.15

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CONSTRUCTED CHANNEL STREAMBED DETAIL

MOORE CREEK RESTORATION

MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
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PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
6.1

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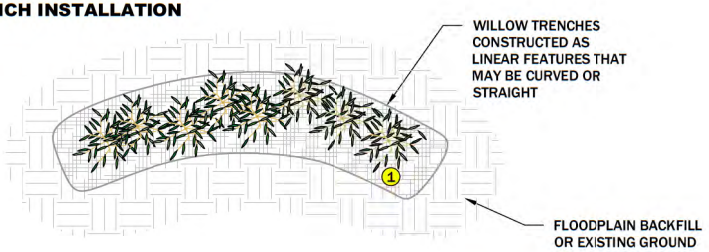
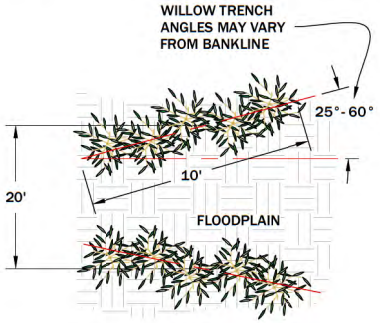
EXAMPLE OF A WILLOW TRENCH INSTALLATION

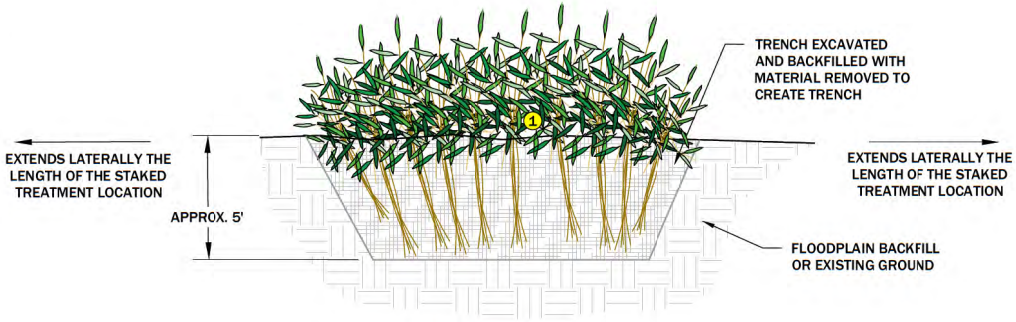
NOTES ON WILLOW TRENCH INSTALLATION

1. WILLOW TRENCHES WILL BE CONSTRUCTED WITHIN THE FLOODPLAIN AT THE DIRECTION OF THE CONSTRUCTION MANAGER.
2. CONSTRUCTION OF WILLOW TRENCHES WILL OCCUR AFTER OCTOBER 1ST AND BEFORE THE END OF THE CONSTRUCTION SEASON.
3. CONTRACTOR SHALL MARK THE UPSTREAM AND DOWNSTREAM EXTENTS OF THE LOCATIONS OF THE CONSTRUCTED CHANNEL STREAMBED STRUCTURES.
4. CONTRACTOR SHALL MARK AND ENGINEER SHALL APPROVE THE GENERAL CONSTRUCTION LOCATION FOR EACH VEGETATED BRUSH TRENCH PRIOR TO CONSTRUCTION.
5. A TRENCH WILL BE CONSTRUCTED APPROXIMATELY 5' DEEP AND EXTEND THE LENGTH OF THE STAKED TREATMENT LOCATION. LIVE WILLOW CUTTINGS WILL BE PLACED IN THE TRENCH SUCH THAT THEY ARE INTERMIXED AND ORIENTED AT A NEAR VERTICAL ANGLE.
6. THE TRENCH WILL THEN BE BACKFILLED WITH THE SAME MATERIAL REMOVED TO CREATE THE TRENCH AND SHOULD MATCH THE ELEVATION OF THE SURROUNDING FLOODPLAIN GRADE.

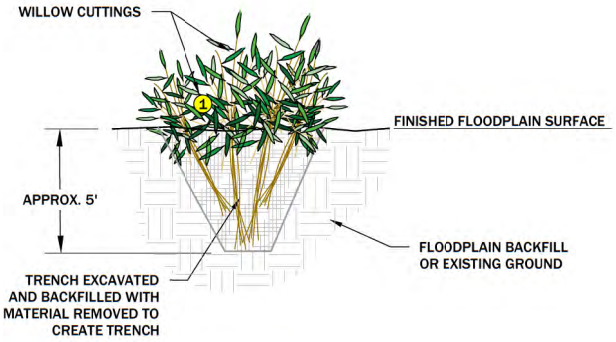




1 WILLOW TRENCH PLAN VIEW NTS



2 WILLOW TRENCH PROFILE VIEW NTS



3 WILLOW TRENCH SECTION VIEW NTS

MATERIAL SCHEDULE (PER LINEAL FOOT)			
	ITEM	DIA.	QUANTITY (EA)
1	WILLOW CUTTINGS	0.25"	3

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WILLOW TENCH DETAIL

MOORE CREEK RESTORATION

MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER RDG-22-003

DRAWING NUMBER 6.2

Drawing 20 of 24

M:\Projects\2022\RDG-22-003 Moore Creek Restoration Project\CAD\RDG-22-003-Moore Creek Planset.dwg

1 REACH 1- STA: 0 +00 TO 27+70
PLAN VIEW
1" = 100'

PLANTING AND SEEDING LEGEND
UPLAND SEEDING
FLOODPLAIN SEEDING
WILLOW TRENCH

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REVEGETATION PLAN - REACH 1

MOORE CREEK RESTORATION
MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
7.0

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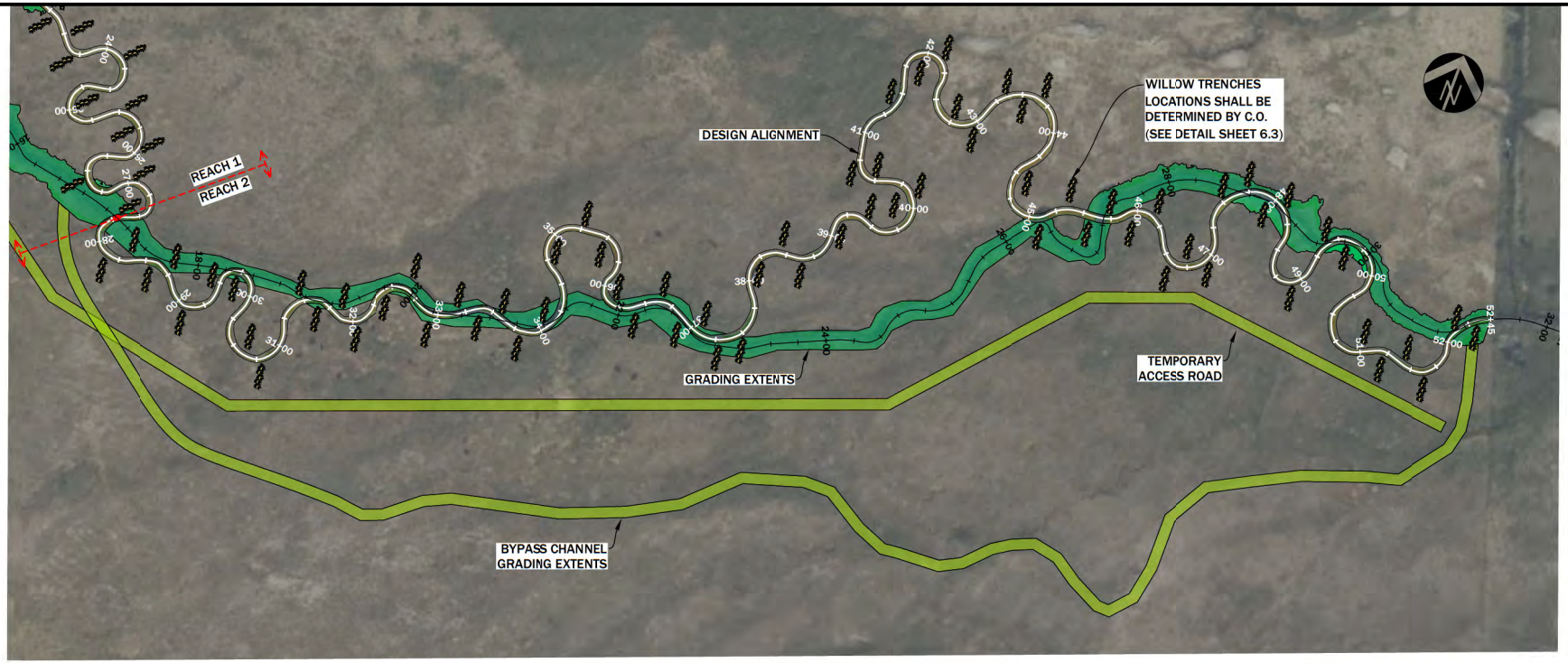

1 REACH 2- STA: 27+70 TO 52+47
PLAN VIEW
1" = 100'

PLANTING AND SEEDING LEGEND

- UPLAND SEEDING
- FLOODPLAIN SEEDING
- WILLOW TRENCH

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REVEGETATION PLAN - REACH 2

MOORE CREEK RESTORATION
MADISON COUNTY, MT

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RDG-22-003

DRAWING NUMBER
7.1

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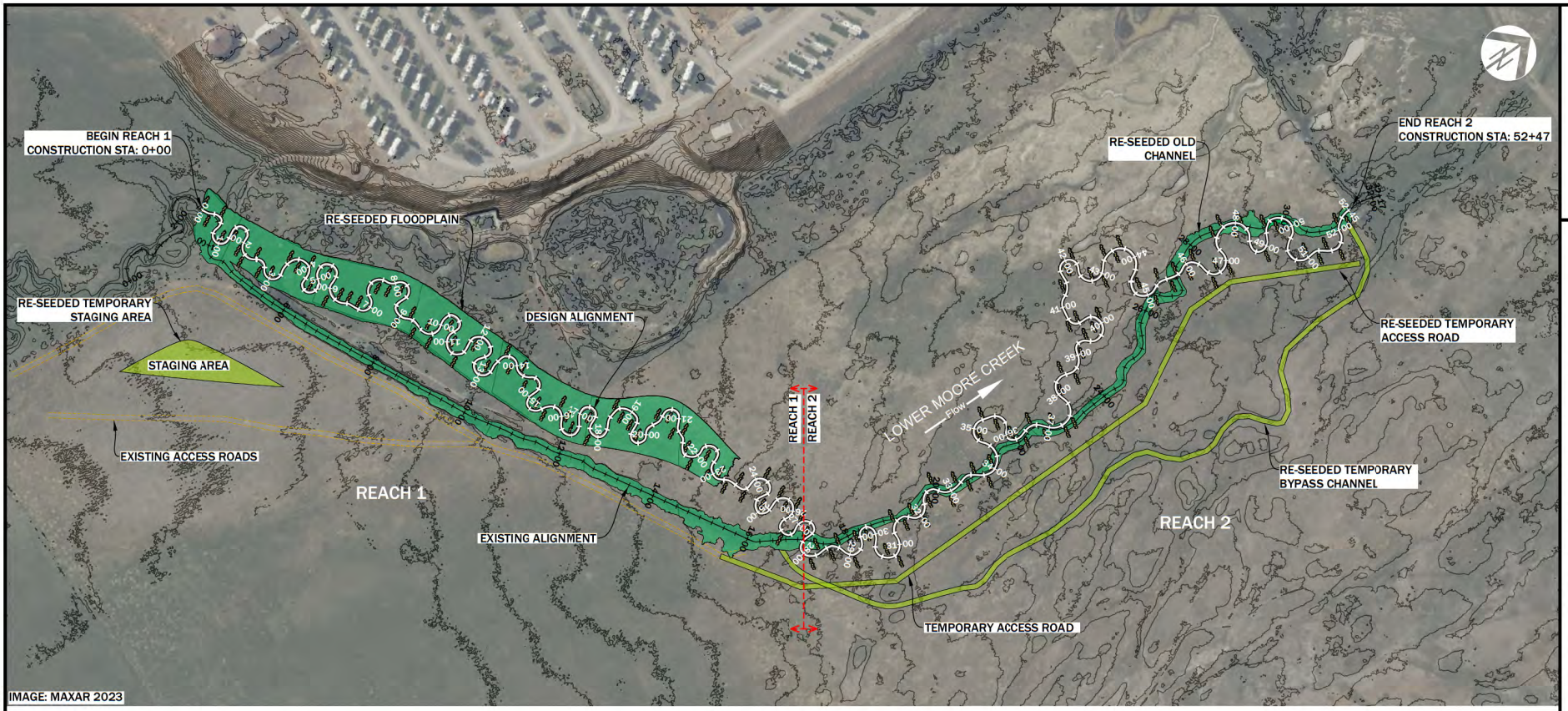

1 **SEEDING PLAN**
PLAN VIEW
1" = 200'

SEEDING SCHEDULE			
LOCATION			
FLOODPLAIN (1.59 ACRES)	SPECIES	PLS LBS/ACRE	TOTAL PLS LBS
SLENDER WHEATGRASS	*ELYMUS TRACHYCAULUS*	9.00	14.31
BLUEJOINT REEDGRASS	*CALAMAGROSTIS CANADENSIS*	4.00	6.36
TUFTED HAIRGRASS	*DESCHAMPSIA CAESPITOSA*	0.25	0.40
MEADOW BARLEY	*HORDEUM BRACHYANTHERUM*	6.25	9.94
		TOTAL	31.04
STAGING, ACCESS ROUTES (1.01 ACRES)	SPECIES	PLS LBS/ACRE	TOTAL PLS LBS
STREAMBANK WHEATGRASS	*PHLEUM PRATENSE*	8.00	8.08
WESTERN WHEATGRASS	*PASCOPYRUM SMITHII*	14.22	14.36
IDAHO FESCUE	*AGROSTIS STOLONIFERA*	3.56	3.59
		TOTAL	26.04

PLANTING AND SEEDING LEGEND

- UPLAND SEEDING
- FLOODPLAIN SEEDING
- WILLOW TRENCH

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SEEDING PLAN AND SCHEDULE

MOORE CREEK RESTORATION
MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER
RDG-22-003

DRAWING NUMBER
7.2

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GENERAL NOTES:

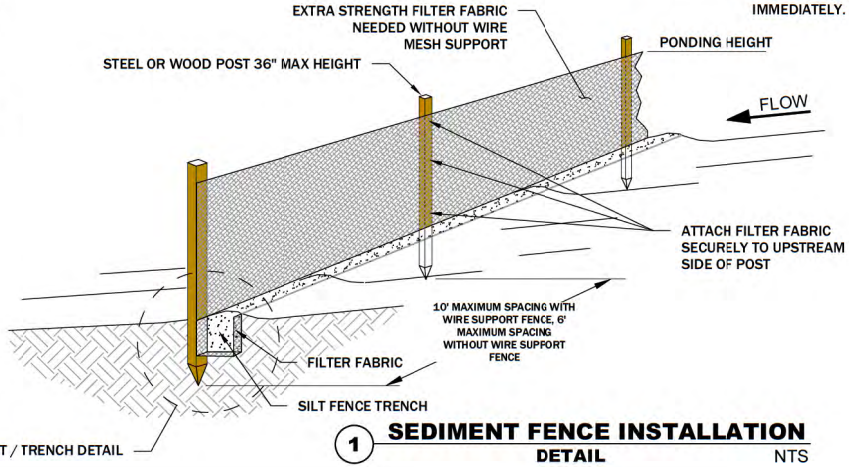
1. THE HEIGHT OF A SEDIMENT FENCE SHALL NOT EXCEED 36 INCHES. STORAGE HEIGHT AND PONDING HEIGHT SHALL NEVER EXCEED 18 INCHES.
2. THE FENCE LINE SHALL FOLLOW THE CONTOUR AS CLOSELY AS POSSIBLE.
3. IF POSSIBLE, THE FILTER FABRIC SHALL BE CUT FROM A CONTINUOUS ROLL TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED ONLY AT A SUPPORT POST, WITH A MINIMUM 6 INCH OVERLAP AND BOTH ENDS SECURELY FASTENED TO THE POST.
4. POSTS SHALL BE SPACED A MAXIMUM OF 10 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM OF 12 INCHES. WHEN EXTRA-STRENGTH FABRIC IS USED WITHOUT THE WIRE SUPPORT FENCE, POST SPACING SHALL NOT EXCEED 6 FEET.
5. TURN THE ENDS OF THE FENCE UPHILL.
6. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 4 INCHES WIDE AND 6 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.
7. WHEN STANDARD-STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY DUTY WIRE STAPLES AT LEAST 1INCH LONG, TIE WIRES OR HOG RINGS.
8. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 2 INCHES AND SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
9. THE STANDARD-STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 6 INCHES OF THE FABRIC SHALL EXTEND INTO THE TRENCH.
10. THE FABRIC SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
11. FLTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
12. WHEN EXTRA-STRENGTH FILTER FABRIC AND CLOSER POST SPACING ARE USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS.
13. THE TRENCH SHALL BE BACKFILLED AND THE SOIL COMPACTED OVER THE TOE OF THE FILTER FABRIC.
14. SEDIMENT FENCES PLACED AT THE TOE OF A SLOPE SHALL BE SET AT LEAST 6 FEET FROM THE TOE IN ORDER TO INCREASE PONDING VOLUME.
15. SEDIMENT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED AND ANY SEDIMENT STORED BEHIND THE SEDIMENT FENCE HAS BEEN REMOVED.

GENERAL NOTES - CONT:

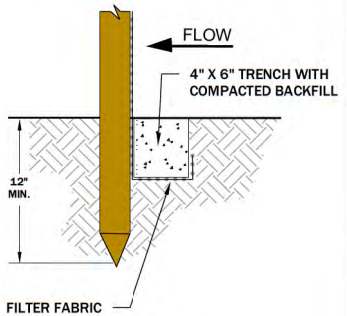
16. SEDIMENT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
17. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY. 9" MAXIMUM RECOMMENDED STORAGE HEIGHT.
18. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.

INSPECTION AND MAINTENANCE:

1. SEDIMENT FENCES AND FILTER BARRIERS SHALL BE INSPECTED WEEKLY AFTER EACH SIGNIFICANT STORM (0.25 INCH IN 24 HOUR).
2. ANY REQUIRED REPAIRS REQUIRED SHALL BE MADE IMMEDIATELY.
3. SEDIMENT SHOULD BE REMOVED WHEN IT REACHES 1/3 HEIGHT OF THE FENCE OR 9 INCHES MAXIMUM.
4. THE REMOVED SEDIMENT SHALL CONFORM WITH THE EXISTING GRADE AND BE VEGETATED OR OTHERWISE STABILIZED SHALL BE MADE IMMEDIATELY.

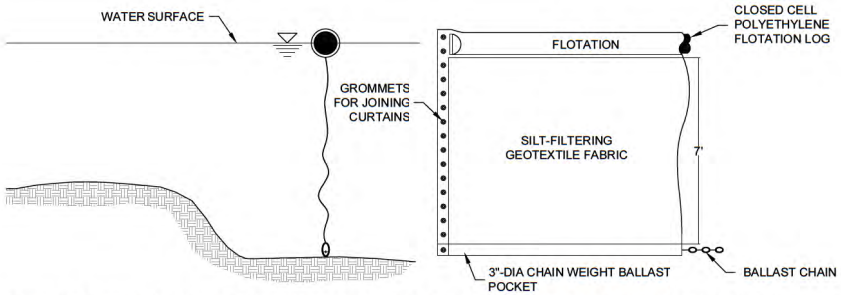


1 **SEDIMENT FENCE INSTALLATION DETAIL** NTS



POST / TRENCH DETAIL NTS

REFER TO PLAN FOR PLACEMENT OF BMP'S



FLOATING SILT CURTAIN SHALL BE A "LAYFIELD FSC 13" OR APPROVED EQUAL. THE BODY OF THE FLOATING SILT CURTAIN IS MADE FROM A STRONG, HIGH-FILTRATION FABRIC THAT RETAINS FINE SILTS AND SEDIMENTS ON-SITE. THE FLOAT AND BOTTOM SLEEVE ARE CONSTRUCTED FROM A UV-STABLE, HIGH-STRENGTH POLYETHYLENE (I.E. RIPSTOP-TYPE MATERIAL). THE FLOATING SILT CURTAIN IS INCREASED IN LENGTH BY JOINING ADDITIONAL SECTIONS OF CURTAIN, WHICH TYPICALLY COMES IN 50' LENGTHS.

2 **FLOATING SILT CURTAIN (OPTIONAL) DETAIL** NTS

REFER TO PLAN FOR PLACEMENT OF BMP'S

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BMP DETAILS

MOORE CREEK RESTORATION

MADISON COUNTY, MT

NO.	DATE	BY	DESCRIPTION	CHK
*	05/12/23	LS	100% DESIGN	JM

PROJECT NUMBER RDG-22-003

DRAWING NUMBER 8.0

Drawing 24 of 24

M:\Projects\2022\RDG-22-003 Moore Creek Restoration Project\CAD\RDG-22-003-Moore Creek Planset.dwg