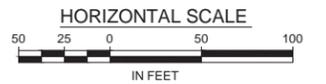


NOTES:

1. SURFACE CONTOURS CREATED FROM DIGITAL TERRAIN MODEL BY LIDAR METHODS FROM ROBERT PECCIA & ASSOCIATES, INC.
2. HORIZONTAL DATUM = NAD83 MONTANA STATE PLANE, VERTICAL DATUM = NAVD88
3. CONTOUR INTERVAL = 1 FT.
4. SOLID RED HATCH DENOTES AREA OF CUT.
5. SOLID GREEN HATCH DENOTES AREA OF FILL.



80% DESIGN - NOT FOR CONSTRUCTION

VERIFY SCALE! THESE PRINTS MAY BE REDUCED. LINE BELOW MEASURES ONE INCH ON ORIGINAL DRAWING. MODIFY SCALE ACCORDINGLY!		REVISIONS			
NO.	DESCRIPTION	DATE	BY		



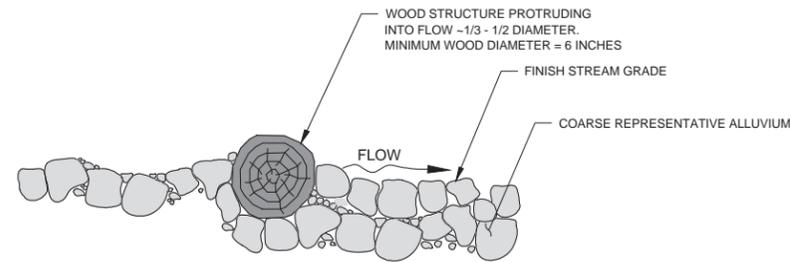
3011 Palmer St.
Missoula, MT 59808
Phone: (406) 542-8880
Fax: (406) 542-4801

COPYRIGHT © MORRISON-MAIERLE, INC., 2014

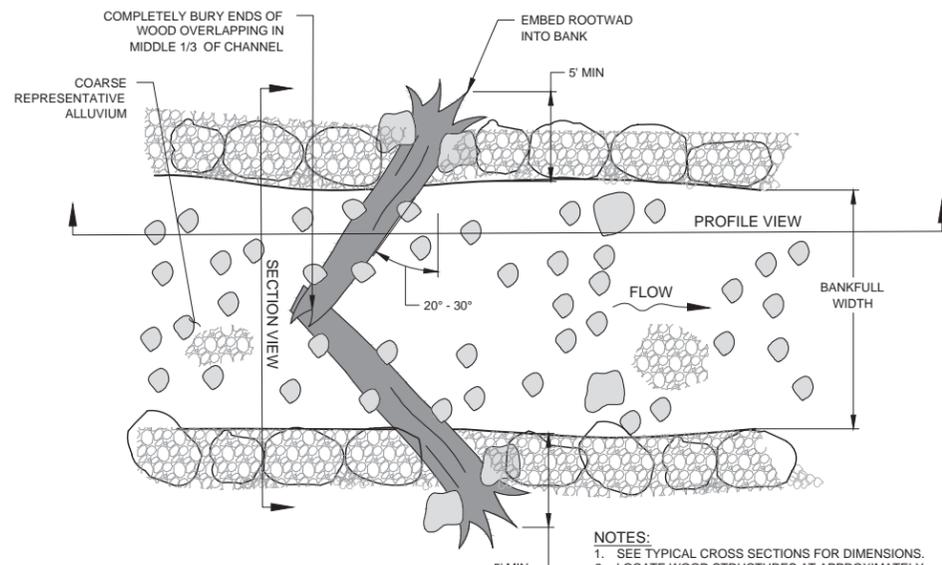
DRAWN BY: CRH
DSGN. BY: MDB
APPR. BY: RJA
DATE: ***
Q.C. REVIEW BY: ***
DATE: ***

FRENCH CREEK RESTORATION IN FRENCH GULCH	
DEER LODGE COUNTY	MONTANA
RESTORATION AREA 5 EARTHWORK	

PROJECT NUMBER 5002.004
SHEET NUMBER ...
DRAWING NUMBER C-18

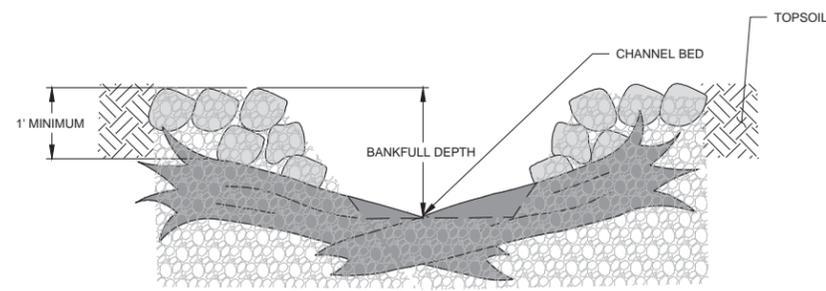


PROFILE VIEW



PLAN VIEW

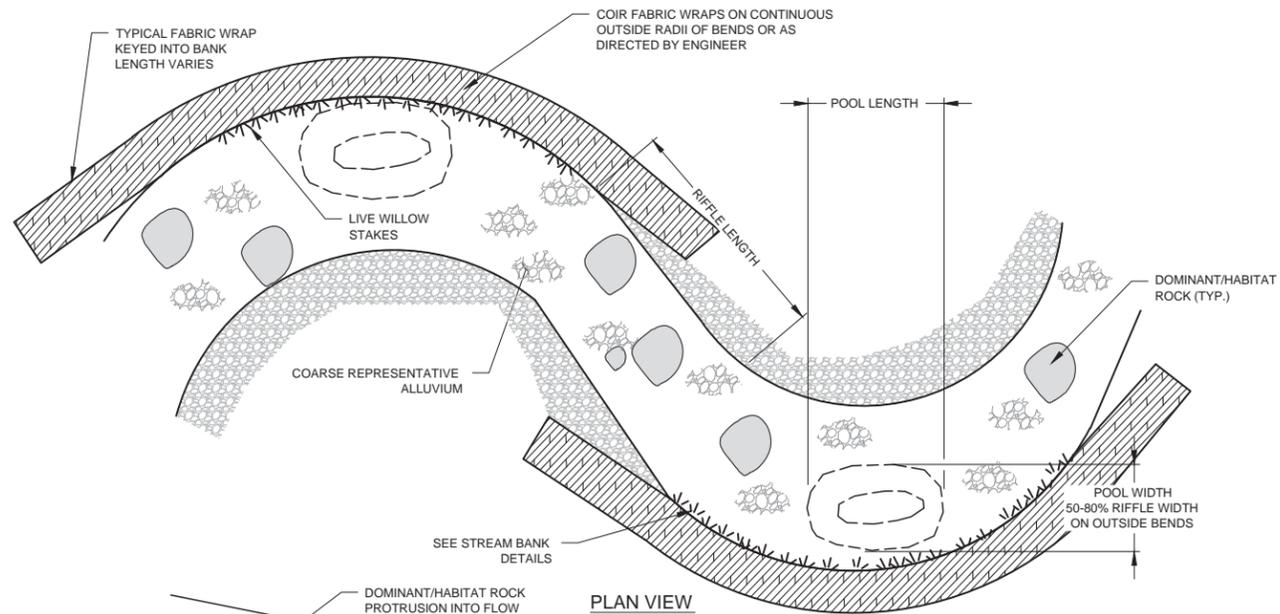
- NOTES:
1. SEE TYPICAL CROSS SECTIONS FOR DIMENSIONS.
 2. LOCATE WOOD STRUCTURES AT APPROXIMATELY 1/25 LF OF STREAM CHANNEL AND IN RIFFLE SECTIONS AS DIRECTED BY ENGINEER.
 3. SINGLE LOG STRUCTURES MAY BE INSTALLED TO SPAN 50-100% OF CHANNEL AS DIRECTED BY ENGINEER.



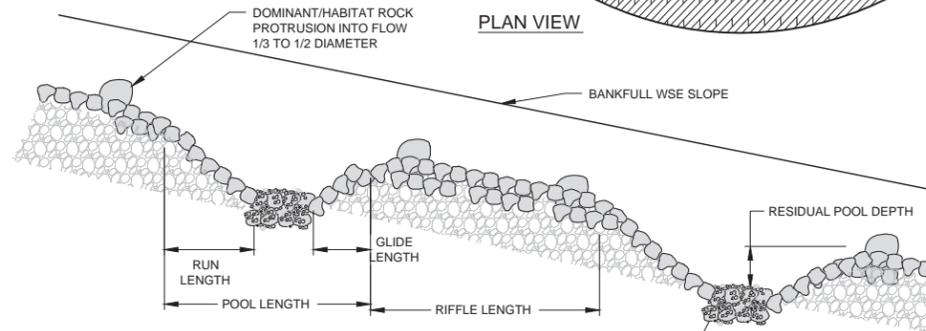
SECTION VIEW

EMBEDDED RIFFLE LOG DETAIL

SCALE: N.T.S.



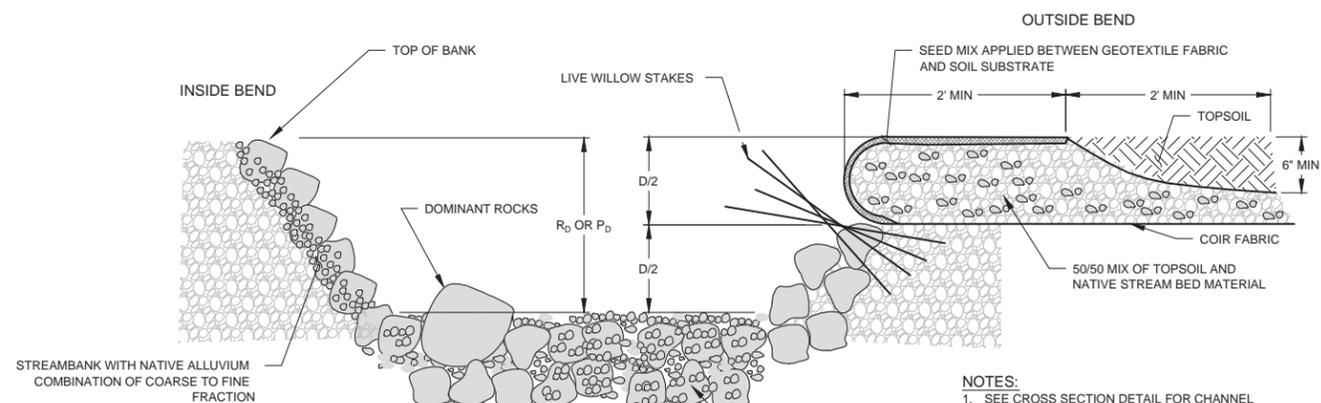
PLAN VIEW



PROFILE VIEW

POOL/RIFFLE SEQUENCE DETAIL

SCALE: N.T.S.

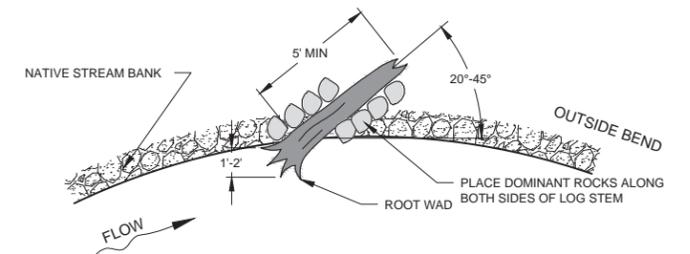


SECTION VIEW

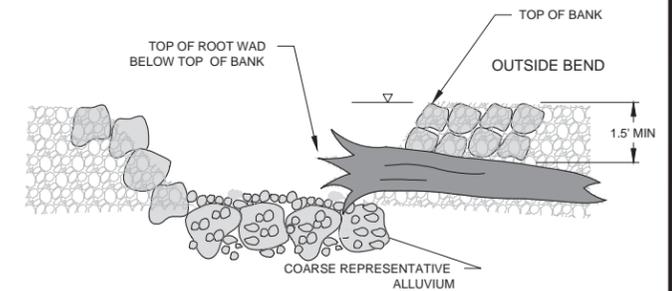
STREAM BANK SECTION DETAIL

SCALE: N.T.S.

- NOTES:
1. SEE CROSS SECTION DETAIL FOR CHANNEL DIMENSIONS.
 2. SEE POOL/RIFFLE SEQUENCE DETAILS FOR NATIVE STREAMBED MATERIAL GRADATION.
 3. BANK ROCK SHALL BE PLACED ALONG CONTINUOUS OUTSIDE RADII OF BENDS FROM STREAMBED ELEVATION TO BASE OF COIR FABRIC WRAP. MINIMUM DIAMETER = 6 INCHES



PLAN VIEW



SECTION VIEW

- NOTES:
1. SEE HABITAT IMPROVEMENT PLAN SHEETS.
 2. PLACE WOOD AS DIRECTED BY ENGINEER.
 3. PLACE BANK ROCKS UNDER ROOT WAD AND AS BALLAST OVER LOG STEM.
 4. PLACE BANK ROCKS AS NEEDED WHERE STREAM BANK IS IMPACTED. MINIMIZE AMOUNT OF STREAM BANK IMPACT WHERE POSSIBLE.

BANK ROOT WAD DETAIL

SCALE: N.T.S.

NOTES:

1. DOMINANT/HABITAT ROCK MEDIAN DIAMETER = 0.5 - 1.0'. PLACE DOMINANT ROCKS RANDOMLY, COVERING 20% OF RIFFLE SURFACE, TO CREATE VARIABLE FLOW PATHS. PLACEMENT MAY BE AT DIRECTION OF ENGINEER.
2. SEE TYPICAL CROSS SECTION DETAILS FOR ADDITIONAL DIMENSIONS.
3. RIFFLE SLOPE IS EQUAL TO BANK FULL WATER SURFACE ELEVATION (WSE) SLOPE ± 0.5%. SEE C SHEETS FOR SLOPES.
4. FABRIC WRAP KEY SHALL BE BURIED 1.0' MINIMUM AND NOT VEGETATED INSIDE WRAP. OVERLAP END OF FABRIC WRAP MINIMUM 2.0' BACK ON ITSELF.

FEATURE	SECTION 1	SECTION 2
RIFFLE LENGTH	16' ± 5'	16' ± 5'
POOL LENGTH	14' ± 5'	11' ± 5'
RUN LENGTH	POOL LENGTH/2	
GLIDE LENGTH	POOL LENGTH/4	
RESIDUAL POOL DEPTH	0.6' ± 0.2'	

COARSE REPRESENTATIVE ALLUVIUM:

NATIVE - D ₁₅	2.6mm ± 10%
NATIVE D ₅₀	25.8mm ± 10%
NATIVE - D ₈₅	82.2mm ± 10%

1. APPROVED ALLUVIUM FOR STREAMBED AND BANK CONSTRUCTION SHALL HAVE MINIMUM 10% FINES. DETERMINATION SHALL BE MADE BY ENGINEER.

NO.	DESCRIPTION	REVISIONS	
		DATE	BY

VERIFY SCALE!
THESE PRINTS MAY BE REDUCED. LINE BELOW MEASURES ONE INCH ON ORIGINAL DRAWING.
MODIFY SCALE ACCORDINGLY!



3011 Palmer St.
Missoula, MT 59808
Phone: (406) 542-8880
Fax: (406) 542-4801

DRAWN BY: CRH
DSGN. BY: MDB
APPR. BY: RJA
DATE: ***
Q.C. REVIEW BY: ***
DATE: ***

DEER LODGE COUNTY

FRENCH CREEK RESTORATION IN FRENCH GULCH

MONTANA

CHANNEL DETAILS

PROJECT NUMBER

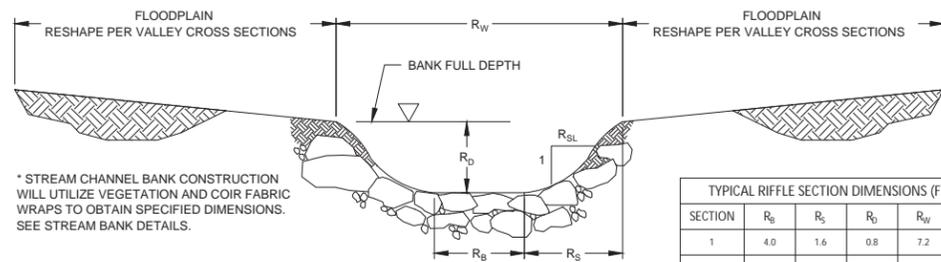
5002.004

SHEET NUMBER

...

DRAWING NUMBER

D-1

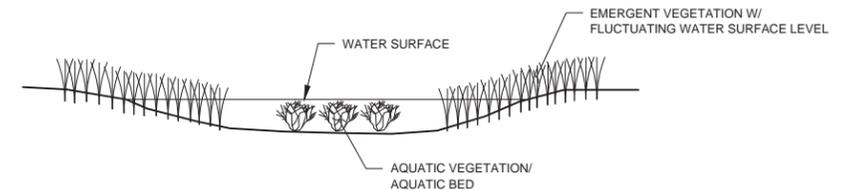
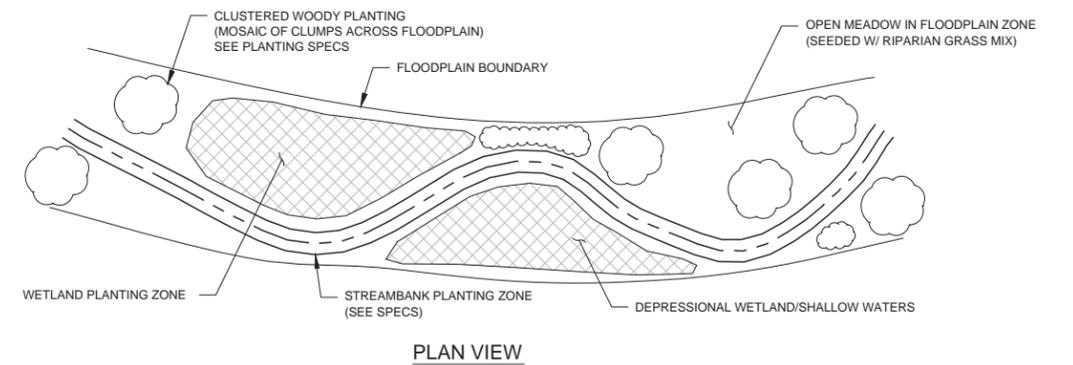


TYPICAL RIFFLE SECTION DIMENSIONS (FEET)					
SECTION	R _b	R _s	R _b	R _w	R _{sl}
1	4.0	1.6	0.8	7.2	2.0
2	3.0	1.5	0.75	6.0	2.0

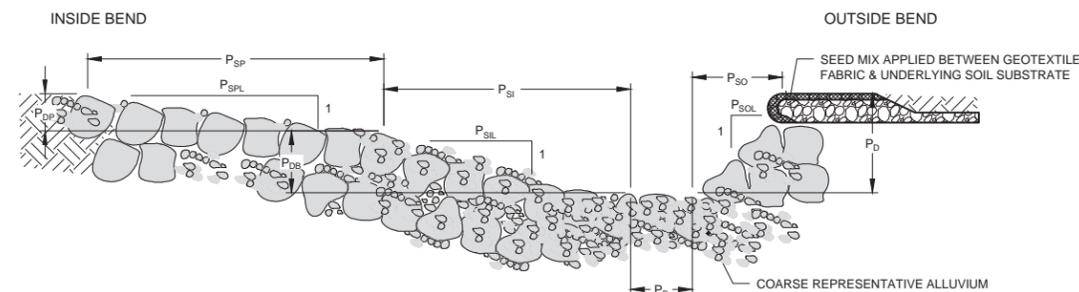
NOTE:

- SECTION 1 APPLIES TO CHANNEL RESTORATION BELOW CONFLUENCE WITH FIRST CHANCE CREEK (STA 34+90).
- SECTION 2 APPLIES TO CHANNEL RESTORATION ABOVE CONFLUENCE WITH FIRST CHANCE CREEK.
- ALL RIFFLE DIMENSIONS ± 10%
- SEE POOL/RIFFLE SEQUENCE DETAIL FOR POOL LENGTH AND PROFILE.
- SEE STREAM BANK SECTION DETAIL.

TYPICAL RIFFLE CROSS SECTION DETAIL
SCALE: N.T.S.



DEPRESSIONAL WETLANDS
SCALE: N.T.S.

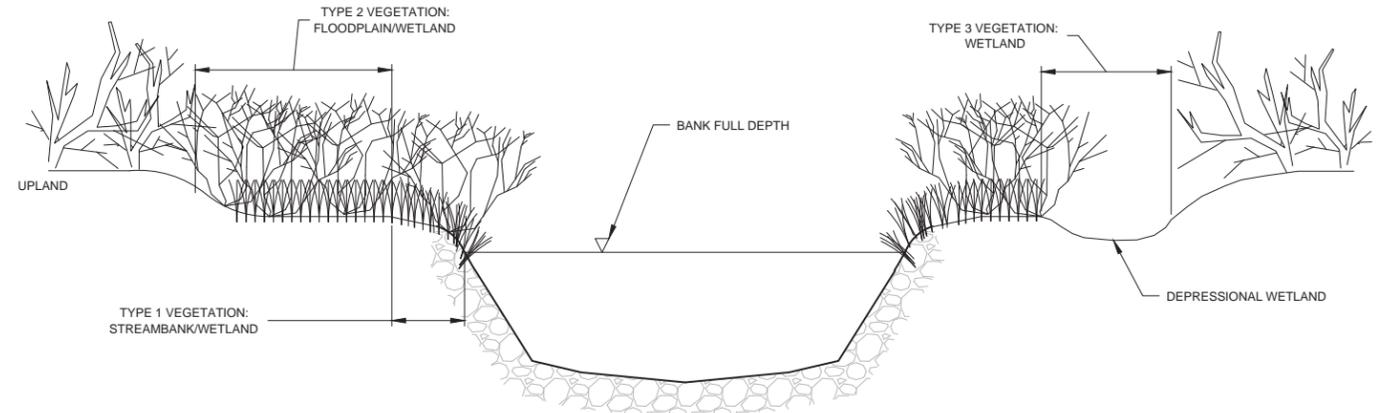


TYPICAL POOL SECTION DIMENSIONS (FEET)									
P _b	P _d	P _{db}	P _{dp}	P _{so}	P _{sl}	P _{sp}	P _{sol}	P _{sl}	P _{sp}
1.0	1.6	1.0	0.6	1.6	4.0	4.8	1.0	4.0	8.0

NOTE:

- ALL POOL DIMENSIONS ± 10%
- SEE POOL/RIFFLE SEQUENCE DETAIL FOR POOL LENGTH AND PROFILE.
- SEE STREAM BANK SECTION DETAIL.

TYPICAL POOL CROSS SECTION DETAIL
SCALE: N.T.S.



REVEGETATION NOTES

- TYPE 1 VEGETATION INCLUDES HERBACEOUS PLUGS, SEEDING, CONTAINERIZED PLANTS, AND WILLOW CUTTINGS. PLACE CUTTINGS ON STREAM BANKS JUST ABOVE AND BELOW BANKFULL DISCHARGE WHERE CUTTING WILL BE IN EITHER SATURATED SOIL DURING LOW WATER OR IN CONTACT WITH GROUNDWATER DURING THE GROWING SEASON. TYPICAL SPACING FOR LIVE WILLOW CUTTINGS WILL BE APPROXIMATELY ONE (OR MORE) CUTTINGS PER LINEAL FOOT. INTERSPERSE GRASS SEED MIX AND CONTAINERIZED PLANTS WITHIN WILLOW CUTTINGS AND UPSLOPE OF WETTED CHANNEL.
- TYPE 2 & 3 VEGETATION ALSO INCLUDES PLUGS, SEEDING, CONTAINERIZED PLANTS AND TRANSPLANTED WOODY VEGETATION. SELECTIVELY HARVEST WOODY VEGETATION AS TRANSPLANT STOCK FROM ROBUST, DENSE, UNDISTURBED AREAS WITHIN THE NEARBY FLOODPLAIN BY GENTLY REMOVING WITH SUITABLE CONSTRUCTION EQUIPMENT (E.G. EXCAVATOR WITH THUMB ATTACHMENT, ETC.). ALL TRANSPLANTED STOCK SHOULD BE OVERSIGHTED BY A VEGETATION SPECIALIST TO LOCATE APPROPRIATE STOCK.
- TYPE 1, 2, & 3 VEGETATION INCLUDES CONTAINER STOCK. INTER PLANT AREA WITH OTHER PLANT MATERIALS INCLUDING PLUGS AND CONTAINERIZED STOCK BASED ON SPACING LISTING IN PLANTING SPECS.
- PLACE TOP SOIL TO CREATE SUITABLE GROWTH MEDIA IN AREAS WHERE CONTAINER STOCK AND BROADCAST SEEDING METHODS WILL BE UTILIZED.
- IMMEDIATELY FOLLOWING PLANTING, THOROUGHLY WATER NEWLY INSTALLED PLANTING. THEREAFTER, WATER THE PLANTED AREA PERIODICALLY TO MAINTAIN SOIL MOISTURE CONDUCIVE TO ESTABLISHING ROOT GROWTH.
- SEE FIGURES FOR REVEGETATION AREAS AND GENERAL LOCATIONS OF TYPE 1 REVEGETATION.
- CONSTRUCTION ACCESS POINTS WILL BE RECLAIMED AND RESEEDED AS DIRECTED BY THE ENGINEER.

STREAM/FLOODPLAIN AREA REVEGETATION - CROSS SECTION
SCALE: N.T.S.

80% DESIGN - NOT FOR CONSTRUCTION

CROSS SECTION SUBSCRIPTS:

- B = BOTTOM WIDTH
- S = BANK WIDTH
- D = BANKFULL DEPTH
- DB = INSIDE BERM DEPTH
- DP = POINT BAR DEPTH
- W = TOP WIDTH
- SL = BANK SLOPE
- SO = OUTSIDE BANK WIDTH
- SI = INSIDE BANK WIDTH
- SP = POINT BANK WIDTH
- SOL = OUTSIDE BANK SLOPE
- SIL = INSIDE BANK SLOPE
- SPL = POINT BAR SLOPE

VERIFY SCALE! THESE PRINTS MAY BE REDUCED. LINE BELOW MEASURES ONE INCH ON ORIGINAL DRAWING. MODIFY SCALE ACCORDINGLY!	REVISIONS			
	NO.	DESCRIPTION	DATE	BY



3011 Palmer St.
Missoula, MT 59808
Phone: (406) 542-8880
Fax: (406) 542-4801

DRAWN BY: CRH
DSGN. BY: MDB
APPR. BY: RJA
DATE: ***
Q.C. REVIEW BY: ***
DATE: ***

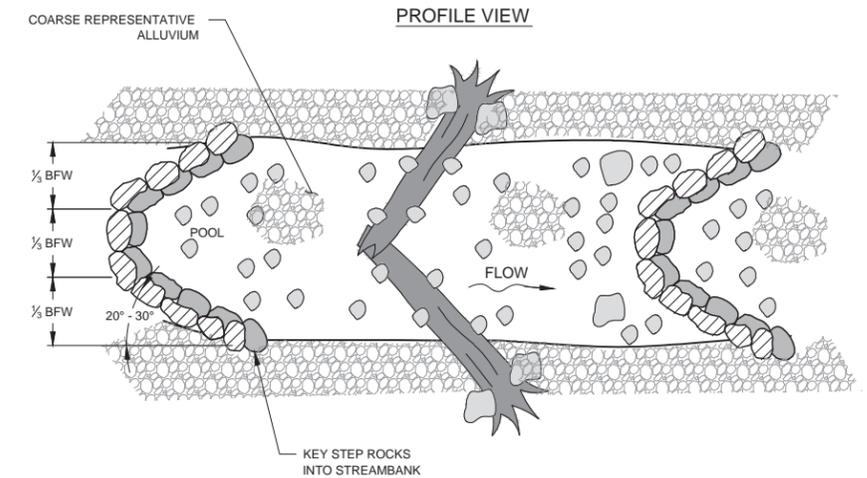
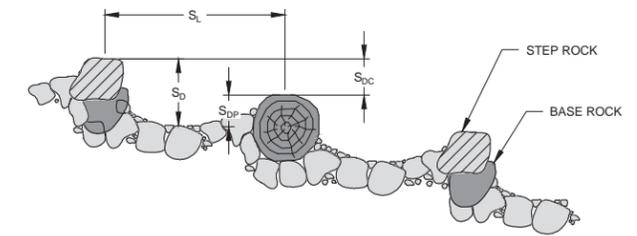
FRENCH CREEK RESTORATION IN FRENCH GULCH
DEER LODGE COUNTY MONTANA
CHANNEL TYPICAL SECTIONS AND REVEGETATION DETAILS

PROJECT NUMBER 5002.004
SHEET NUMBER ...
DRAWING NUMBER D-2



REPRESENTATIVE STEP/POOL STREAM CONSTRUCTION

TYPICAL STEP/POOL DIMENSIONS (FEET)		
FEATURE	DESIGN	RANGE
STEP SPACING (S_L)	12.7	10.5-14.9
STEP HEIGHT (S_D)	1.43	1.18-1.68
POOL DEPTH (S_{DP})	0.48	0.39-0.56
CREST HEIGHT (S_{DC})	0.95	0.79-1.12



PLAN VIEW

- NOTES:
- SEE SHEET C-8 FOR STEP/POOL FEATURE ORIENTATION.
 - SEE TYPICAL CROSS SECTION DETAILS FOR ADDITIONAL DIMENSIONS AND STREAMBANK DETAILS.
 - STEPS CAN BE CONSTRUCTED OF ROCK AND/OR LARGE WOOD.
 - STEP AND BASE ROCKS SHALL BE MINIMUM 1.0 FOOT AVERAGE DIAMETER. SET BASE ROCKS TO SUPPORT STEP ROCKS.
 - LOCATE MAX POOL DEPTH WITHIN 2xCREST HEIGHT DISTANCE FROM STEP CREST.

STEP/POOL FEATURE DETAIL (AT CULVERT REMOVAL)

SCALE: N.T.S.

NO.	DESCRIPTION	REVISIONS	
		DATE	BY

VERIFY SCALE!
THESE PRINTS MAY BE REDUCED. LINE BELOW MEASURES ONE INCH ON ORIGINAL DRAWING.
MODIFY SCALE ACCORDINGLY!



3011 Palmer St.
Missoula, MT 59808
Phone: (406) 542-8880
Fax: (406) 542-4801

COPYRIGHT © MORRISON-MAIERLE, INC., 2014

DRAWN BY: CRH
DSGN. BY: MDB
APPR. BY: RJA
DATE: ***
Q.C. REVIEW BY: ***
DATE: ***

FRENCH CREEK RESTORATION IN FRENCH GULCH
DEER LODGE COUNTY MONTANA
REPRESENTATIVE STREAM CONSTRUCTION

PROJECT NUMBER 5002.004
SHEET NUMBER ...
DRAWING NUMBER D-3