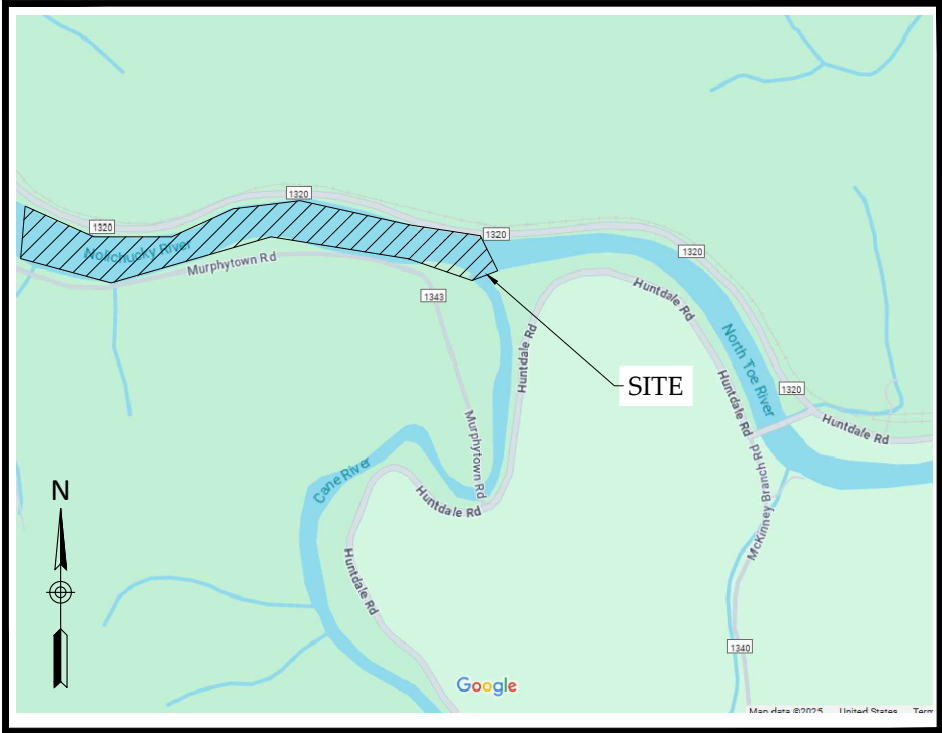


June 19, 2026
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19W North Emergency Repair Design
Cane River Work Package #2, Segment 4
Yancey County, North Carolina- Murphytown
for
NCDOT



Vicinity Map
Not to Scale



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NC ONE-CALL CENTER
IT'S THE LAW!

STREAM PLANS
ISSUED JUNE 19, 2026

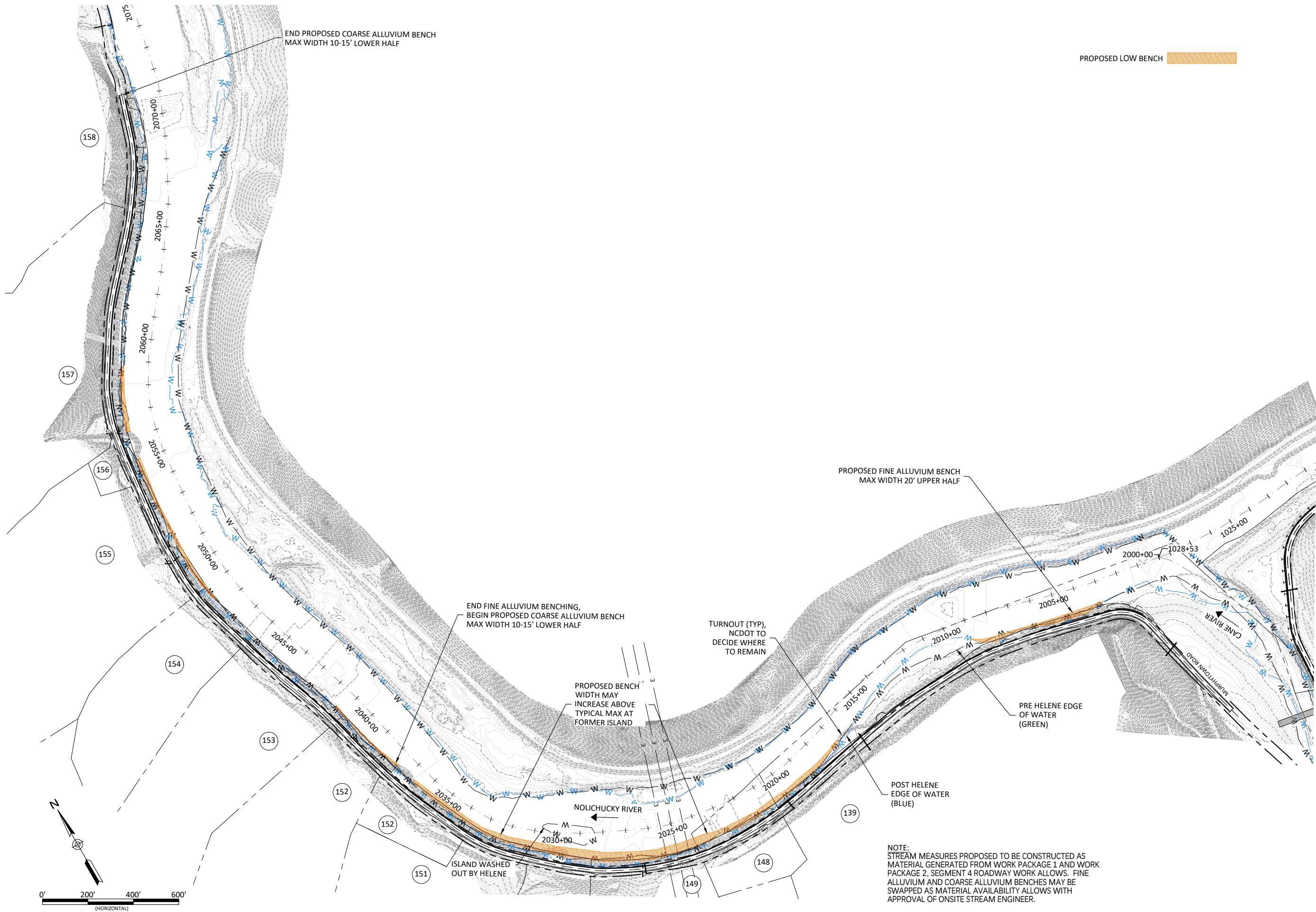
Sheet Index

Cover Sheet	R-0.1
Overview Sheet	R-1.0
Restoration Practice Details	R-2.1 - R-2.2
Planting	R-3.1

Project Directory

<u>Engineering:</u> Wildlands Engineering, Inc License No. F-0831 167-B Haywood Rd Asheville, NC 28806 Jake McLean, Project Engineer 828-545-3865	<u>Structural Engineering:</u> VIAS Infrastructure 150 Fayetteville Street, Suite 1340 Raleigh, NC 27601 Holly Christenbury, Transportation Project Manager 704-763-5042
<u>Roadway Engineering:</u> JMT- Johnson, Mirmiran & Thompson, Inc 4700 Falls of Neuse Road, Suite 100 Raleigh, NC 27609 Chad Rogers, Vice President	

June 19, 2026
x:\Shared\Projects\w16100_cane_river\Cadd\References\W16100-Design-Area3-Murphytown.dwg



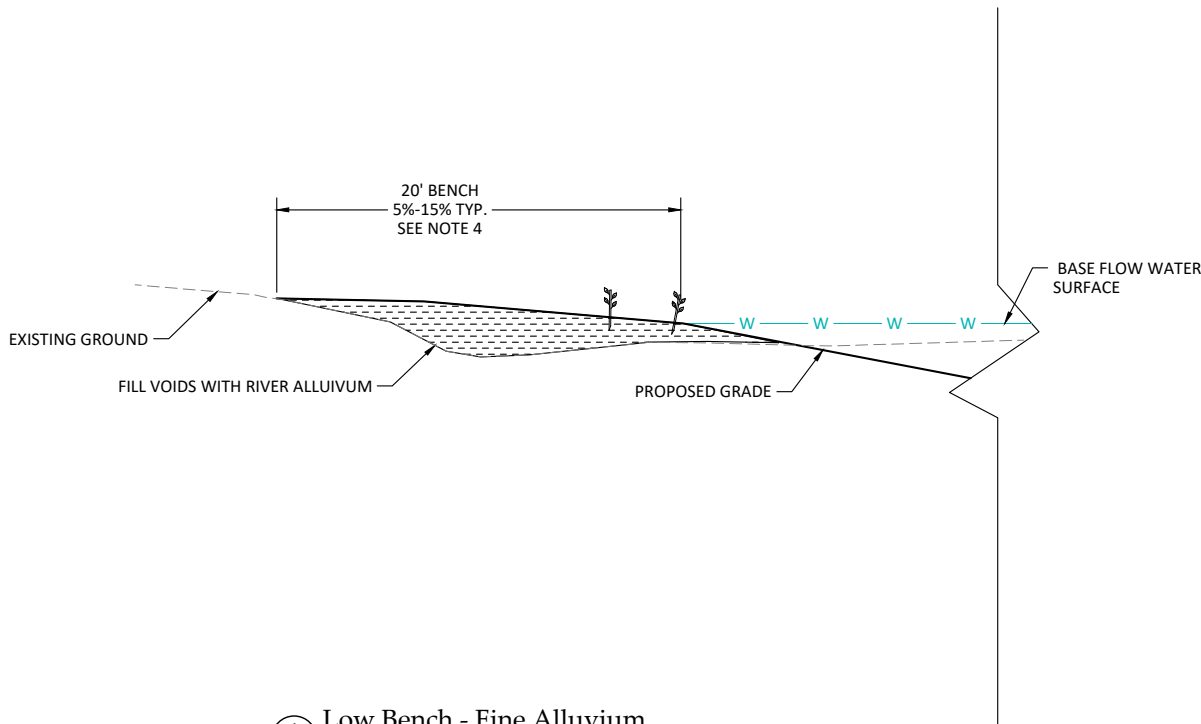
Cane River - Murphytown
Yancey County, North Carolina

Overview Sheet

Date:	June 19, 2026
Job Number:	W16100
Project Engineer:	JPM
Drawn By:	CDR, JCK
Checked By:	JPM

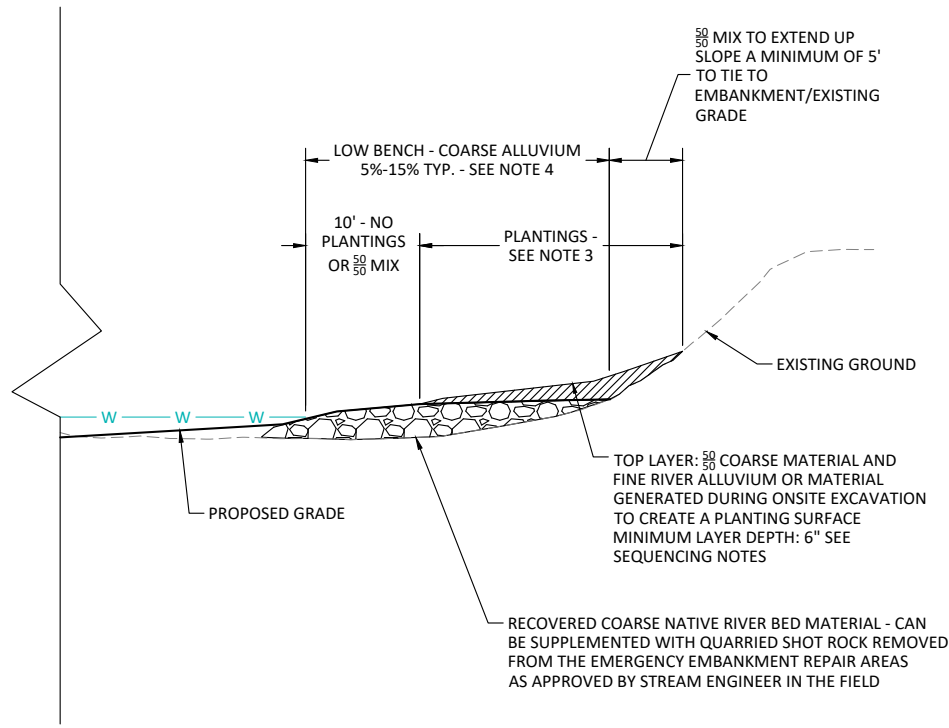
R-1.0

Sheet



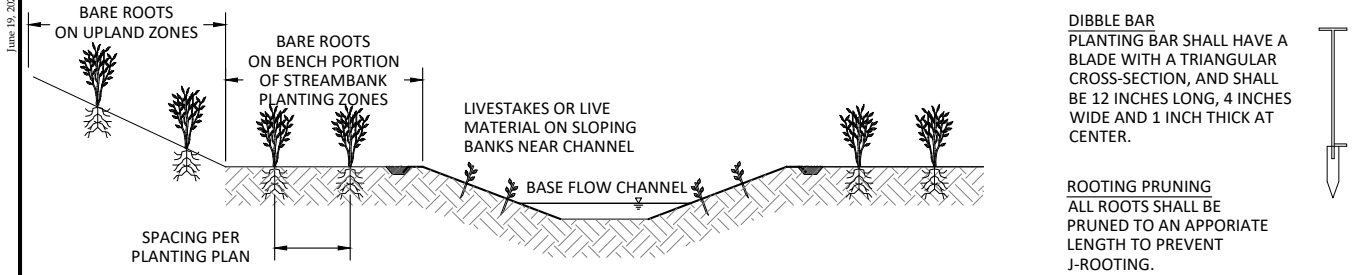
NOTES:

1. BACKFILL SHALL CONSIST OF A UNIFORM MIX OF FINE AND COARSE ALLUVIUM USING QUARRIED SHOT ROCK REMOVED FROM THE EMERGENCY EMBANKMENT REPAIR AREAS AS APPROVED BY FIELD STREAM ENGINEER.
2. PLACE FINER MATERIAL GENERATED DURING ONSITE EXCAVATIONS ON TOP TO PROVIDE A PLANTING SURFACE.
3. WHERE EXCESS LIVE CUTTINGS ARE AVAILABLE FROM OTHER ONSITE AREAS, WORK INTO FILL AREAS AS DIRECTED BY ONSITE STREAM ENGINEER.
4. THE SLOPE OF THE BENCH BUILT IN FILL MAY BE ADJUSTED UP TO A MAXIMUM OF 15% TO HELP BALANCE EARTHWORK. WORK WITH STREAM ENGINEER TO DETERMINE WHERE SLOPES WILL BE INCREASED - MAINTAIN CONSISTENCY AND SMOOTH TRANSITIONS.
5. APPLY PERMANENT AND EROSION CONTROL SEED MIX UPON COMPLETION. IF CONSTRUCTED IN THE DORMANT SEASON, INSTALL LIVE STAKES AND BARE ROOTS FROM SHEET 3.1 IMMEDIATELY UPON COMPLETION. IF CONSTRUCTED IN THE GROWING SEASON, RETURN IN THE DORMANT SEASON TO INSTALL LIVE STAKES AND BARE ROOTS FROM SHEET 3.1.

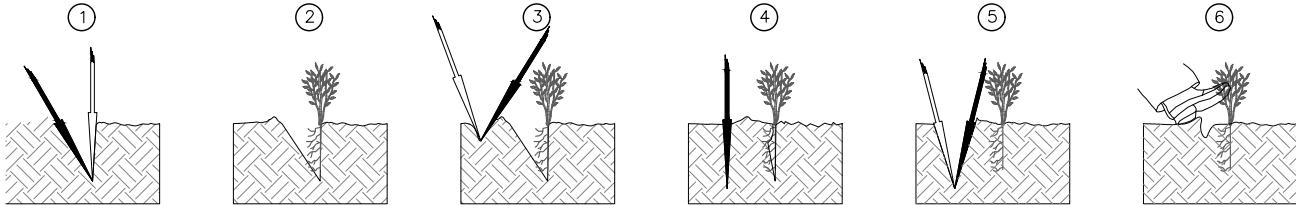


SEQUENCE FOR LOW BENCH - COARSE ALLUVIUM INSTALLATION

1. LOW BENCH - COARSE ALLUVIUM ADJACENT TO ROADWAY EMBANKMENTS TO BE USED AS AN ACCESS ROUTE DURING CONSTRUCTION SHALL BE CONSTRUCTED IN TWO PHASES.
2. PHASE 1 - USING RECOVERED NATIVE RIVER BED MATERIAL, CONSTRUCT THE FIRST LIFT OF LOW BENCH - COARSE ALLUVIUM. THIS LIFT SHALL BE BE PLACE TO ACHIEVE A TRAVEL SURFACE 0.5-1 FOOT ABOVE THE BASE FLOW WATER SURFACE. NOTE THAT THIS LIFT MAY BE CONSTRUCTED WITH QUARRIED SHOT ROCK REMOVED FROM THE EMERGENCY EMBANKMENT REPAIR AREAS AS NEEDED AND APPROVED BY THE STREAM ENGINEER.
3. PHASE 2 - ONCE USE AS AN ACCESS ROUTE IS COMPLETE, COMPLETE THE SECOND PHASE OF LOW BENCH - COARSE ALLUVIUM CONSTRUCTION. THE SECOND PHASE SEQUENCE WILL VARY BASED ON TIME OF YEAR OF INSTALLATION. COARSE MATERIAL SHALL BE QUARRIED SHOT ROCK REMOVED FROM THE EMERGENCY EMBANKMENT REPAIR .
 - a. DORMANT SEASON CONSTRUCTION (FROM 10/10-4/25): SCARIFY AND LOOSEN COMPACTED AREAS. PLACE LIVE WHIPS IN GOOD CONTACT WITH FINE ALLUVIUM MATERIAL, APPLYING A SHALLOW LAYER IF NECESSARY PRIOR TO WHIP PLACEMENT. THE CUTTING SHOULD BE PLACED TO GROW OUTWARD TOWARDS THE RIVER BY PLACING THE CUT END (BASE) ON THE UPLAND SIDE AND THE TOP OR BUDDING DIRECTION FACING THE RIVER AND PROTRUDING FROM SUBSEQUENT PLACED FILL 0.5-1 FOOT. INSTALL A 50/50 MIX OF COARSE AND FINE ALLUVIUM IN A MINIMUM 0.5 TO 1-FOOT LIFT. COMPACT LIGHTLY. INSTALL THE FINAL LAYER OF LIVE WHIPS AND A 50/50 MIX OF COARSE AND FINE ALLUVIUM TO FINAL GRADE. SEED AND MULCH THE TOP OF THE LOW BENCH - COARSE ALLUVIUM WITH TEMPORARY (EROSION CONTROL) AND PERMANENT SEED MIX AND INSTALL BARE ROOT SPECIES ON THE TOP OF THE LOW BENCH - COARSE ALLUVIUM. REFER TO SHEET 3.1 FOR ALL PLANTING MATERIALS.
 - b. GROWING SEASON CONSTRUCTION (FROM 4/25-10/10): INSTALL A 50/50 MIX OF COARSE AND FINE ALLUVIUM GENERATED DURING ROADWAY REPAIRS OR FROM BRIDGE 93 RIVER CONSTRUCTION TO FINAL GRADE, COMPACTING LIGHTLY. SEED AND MULCH THE COMPLETED LOW BENCH - COARSE ALLUVIUM WITH TEMPORARY (EROSION CONTROL) AND PERMANENT SEED MIX. RETURN DURING THE DORMANT SEASON (BETWEEN 10/10-4/25) TO JOINT PLANT ENTIRE LOW BENCH - COARSE ALLUVIUM STRUCTURE WITH LIVE STAKES. LIVE STAKE MATERIALS AND INSTALLATION SHALL FOLLOW THE BANK VEGETATION SPECIFICATIONS. REFER TO SHEET 3.1 FOR ALL PLANTING MATERIALS.
4. THE SLOPE OF THE LOW BENCH - COARSE ALLUVIUM MAY BE ADJUSTED UP TO A MAXIMUM OF 15% TO HELP BALANCE EARTHWORK. WORK WITH STREAM ENGINEER TO DETERMINE WHERE SLOPES WILL BE INCREASED AND TO ENSURE THAT SLOPE INCREASES ARE CONSISTENTLY APPLIED WITH GENTLE TRANSITIONS AS NECESSARY.



Section View



1. INSERT THE DIBBLE, OR SHOVEL, STRAIGHT DOWN INTO THE SOIL TO THE FULL DEPTH OF THE BLADE AND PULL BACK ON THE HANDLE TO OPEN THE PLANTING HOLE. (DO NOT ROCK THE SHOVEL BACK AND FORTH AS THIS CAUSES SOIL IN THE PLANTING HOLE TO BE COMPACTED, INHIBITING ROOT GROWTH.

2. REMOVE THE DIBBLE, OR SHOVEL, AND PUSH THE SEEDLING ROOTS DEEP INTO THE PLANTING HOLE. PULL THE SEEDLING BACK UP TO THE CORRECT PLANTING DEPTH (THE ROOT COLLAR SHOULD BE 1 TO 3 INCHES BELOW THE SOIL SURFACE). GENTLY SHAKE THE SEEDLING TO ALLOW THE ROOTS TO STRAIGHTEN OUT. DO NOT TWIST OR SPIN THE SEEDLING OR LEAVE THE ROOTS J-ROOTED.

3. INSERT THE DIBBLE, OR SHOVEL, SEVERAL INCHES IN FRONT OF THE SEEDLING AND PUSH THE BLADE HALFWAY INTO THE SOIL. TWIST AND PUSH THE HANDLE FORWARD TO CLOSE THE TOP OF THE SLIT TO HOLD THE SEEDLING IN PLACE.

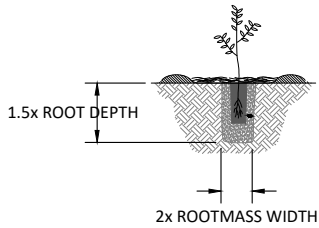
4. PUSH THE DIBBLE, OR SHOVEL, DOWN TO THE FULL DEPTH OF THE BLADE.

5. PULL BACK ON THE HANDLE TO CLOSE THE BOTTOM OF THE PLANTING HOLD. THEN PUSH FORWARD TO CLOSE THE TOP, ELIMINATING AIR POCKETS AROUND THE ROOT.

6. REMOVE THE DIBBLE, OR SHOVEL, AND CLOSE AND FIRM UP THE OPENING WITH YOUR HEEL. BE CAREFUL TO AVOID DAMAGING THE SEEDLING.

NOTE:
1. ALL PLANTS SHALL BE PROPERLY HANDLED PRIOR TO INSTALLATION TO INSURE SURVIVAL.

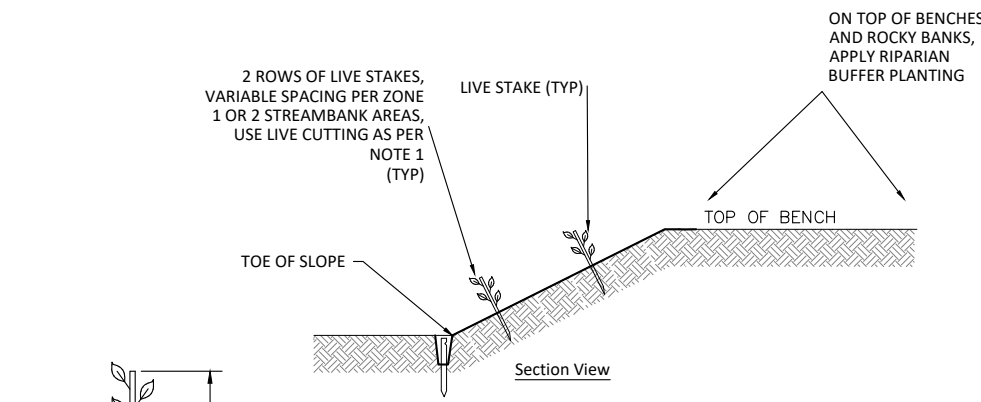
1 Bare Root Planting
R-2.2 Not to Scale



PREFERRED METHOD IS TO TRANSPLANT IMMEDIATELY. TRIM WOODY TRANSPLANTS AS DIRECTED.

CONTRACTOR SHALL HARVEST HERBACEOUS PLANTS AND SAPLINGS FROM ADJACENT AREAS WHEN CONSTRUCTING STREAMBANKS AND BENCHING THAT WILL NOT BE FURTHER DISTURBED BY CONSTRUCTION. THIS WORK WILL ONLY BE CONDUCTED WHEN TRANSPLANTS ARE AVAILABLE WITHIN 30' ON AVERAGE OF THE AREA BEING PROPOSED FOR FINAL PLACEMENT.

3 Transplants
R-2.2 Not to Scale

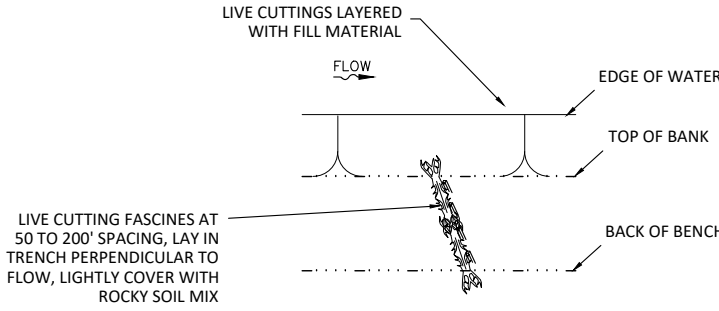


JOINT PLANTING:
1. IN ZONE 2 (ROCKY AREAS), WHEN LIVESTAKING IS NECESSARY, USE REBAR OR OTHER TECHNIQUE TO FORM PILOT HOLE. PILOT HOLE SHALL BE TO REQUIRED LIVE STAKING DEPTH AND SHOULD BE OF SIMILAR TO EQUAL DIAMETER AS LIVESTAKE TO PROMOTE GOOD SOIL CONTACT.

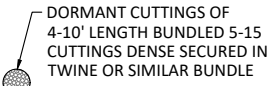
Live Stake Detail

2 Live Staking
R-2.2 Not to Scale

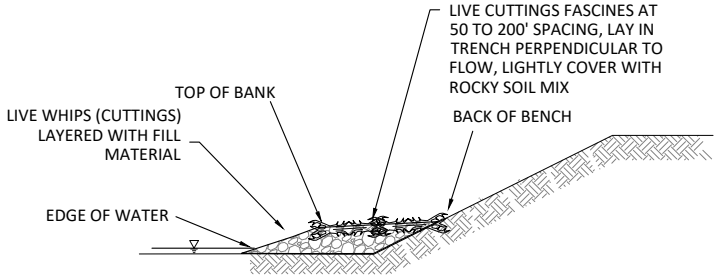
NOTES:
1. IN ZONE 2, LIVE CUTTINGS SHALL BE INCORPORATED IN LIEU OF LIVESTAKING WHEN CONSTRUCTING FINAL BENCH PREPARATION IN DORMANT SEASON.
2. LIVE CUTTINGS MAY BE USED IN ZONE 1 AREAS THAT ARE CONSTRUCTED IN FILL AT THE CONTRACTORS CONVENIENCE IN LIEU OF LIVESTAKING BUT IS NOT REQUIRED.
3. LIVE STAKING SHOULD BE COMPLETED DURING THE DORMANT SEASON.



Plan View



Fascine



Section

4 Live Whips and Fascines
R-2.2 Not to Scale

Low Bench Planting							
Live Whips (if final preparation during dormant season) or Live Stakes (if final preparation during growing season)							
Species	Common Name	Live Whip Spacing	Live Stake Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
<i>Cornus amomum</i>	Silky Dogwood	1' x 2 rows	3' x 2 rows	0.5"-1.5" cal.	Subcanopy	FACW	10%
<i>Salix sericea</i>	Silky Willow	1' x 2 rows	3' x 2 rows	0.5"-1.5" cal.	Subcanopy	OBL	50%
<i>Cephalanthus occidentalis</i>	Buttonbush	1' x 2 rows	3' x 2 rows	0.5"-1.5" cal.	Shrub	OBL	10%
<i>Physocarpus opulifolius</i>	Ninebark	1' x 2 rows	3' x 2 rows	0.5"-1.5" cal.	Shrub	FACW	10%
<i>Salix nigra</i>	Black Willow	1' x 2 rows	3' x 2 rows	0.5"-1.5" cal.	Canopy	OBL	20%
							100%
Bare Root							
Species	Common Name	Spacing		Size	Stratum	Wetland Indicator Status	% of Stems
<i>Platanus occidentalis</i>	American Sycamore	15 x 15 ft.		0.25"-1.0"	Canopy	FACW	10%
<i>Betula lenta</i>	Sweet Birch	15 x 15 ft.		0.25"-1.0"	Canopy	FACW	7%
<i>Acer negundo</i>	Boxelder	15 x 15 ft.		0.25"-1.0"	Canopy	FAC	10%
<i>liriodendron tulipifera</i>	Tulip Tree	15 x 15 ft.		0.25"-1.0"	Canopy	FACU	10%
<i>Acer rubrum</i>	Red Maple	15 x 15 ft.		0.25"-1.0"	Canopy	FAC	10%
<i>Carpinus caroliniana</i>	Ironwood	15 x 15 ft.		0.25"-1.0"	Subcanopy	FAC	5%
<i>Quercus rubra</i>	Northern Red Oak	15 x 15 ft.		0.25"-1.0"	Canopy	FACU	10%
<i>Quercus alba</i>	White Oak	15 x 15 ft.		0.25"-1.0"	Canopy	FACU	10%
<i>Diospyros virginiana</i>	Persimmon	15 x 15 ft.		0.25"-1.0"	Canopy	FACU	10%
<i>Tilia americana</i>	American Basswood	15 x 15 ft.		0.25"-1.0"	Canopy	FACU	8%
<i>Aesculus flava</i>	Yellow Buckeye	15 x 15 ft.		0.25"-1.0"	Canopy	FACU	10%
							100%
Preferred alternates: <i>Hamamelis virginiana</i>							

Low Bench Permanent Seed Mix					
Pure Live Seed (20 lbs/acre)					
Approved Dates	Species Name	Common Name	Stratum	Wetland Indicator Status	Density (lbs/acre)
All Year	Elymus virginicus	Virginia wildrye	Herb	FACW	3
All Year	Dichanthelium clandestinum	Deertongue	Herb	FAC	2.8
All Year	Schizachyrium scoparium	Little Bluestem	Herb	FACU	2
All Year	Panicum dichotomiflorum	Smooth Panicgrass	Herb	FACW	1.5
All Year	Chamaecrista fasciculata	Partridge Pea	Herb	FACU	1
All Year	Coreopsis lanceolata	Lanceleaf Coreopsis	Herb	FACU	1
All Year	Panicum virgatum	Switchgrass	Herb	FAC	1
All Year	Rudbeckia hirta	Blackeyed Susan	Herb	FACU	1
All Year	Sorghastrum nutans	Indiangrass	Herb	FACU	1
All Year	Elymus riparius	Riverbank wildrye	Herb	FACW	1
All Year	Tripsacum dactyloides	Eastern gamagrass	Herb	FACW	1
All Year	Andropogon gerardii	Big bluestem	Herb	FAC	0.5
All Year	Elymus hystrix	Bottlebrush grass	Herb	UPL	0.5
All Year	Senna hebecarpa	Wild senna	Herb	FAC	0.5
All Year	Zizia aurea	Golden alexanders	Herb	FAC	0.5
All Year	Chasmanthium latifolium	River oats	Herb	FACU	0.3
All Year	Heliopsis helianthoides	Oxeye sunflower	Herb	FACU	0.3
All Year	Asclepias syriaca	Common milkweed	Herb	FACU	0.3
All Year	Bidens arisata	Showy tickseed sunflower	Herb	FACW	0.3
All Year	Rudbeckia triloba	Brown eyed susan	Herb	FACU	0.2
All Year	Achillea millefolium	Common yarrow	Herb	FACU	0.1
All Year	Juncus tenuis	Path rush	Herb	FAC	0.1
All Year	Pycnanthemum tenuifolium	Narrowleaf mountainmint	Herb	FACW	0.1
					20.0

Erosion Control Seed Mix - apply with Permanent Seed Mix				
Pure Live Seed				
Approved Dates	Species Name	Common Name	Stratum	Density (lbs/acre)
Aug 15 - May 14	Secale cereale	Rye Grain	Herb	150
May 15 - Aug 15	Fagopyrum esculentum	Buckwheat	Herb	30
May 15 - Aug 15	Urochloa ramosa	Browntop Millet	Herb	50
Aug 15 - May 31	Trifolium incarnatum	Crimson Clover	Herb	5
Aug 15 - May 31	Trifolium repens	White Ladino Clover	Herb	5