APPENDIX A

EXISTING CONDITIONS

A1. Site Location
A2. Site Overview
A3. Site Topography
A4. Soils
A5. Historical Aerial Imagery
A6. Existing Longitudinal Profile
A7. Existing Cross-sections
A8. Pebble Count Data
A9. Bank Erodibility Assessment

Legend

Gill State Forest Boundary — Streams — Roads

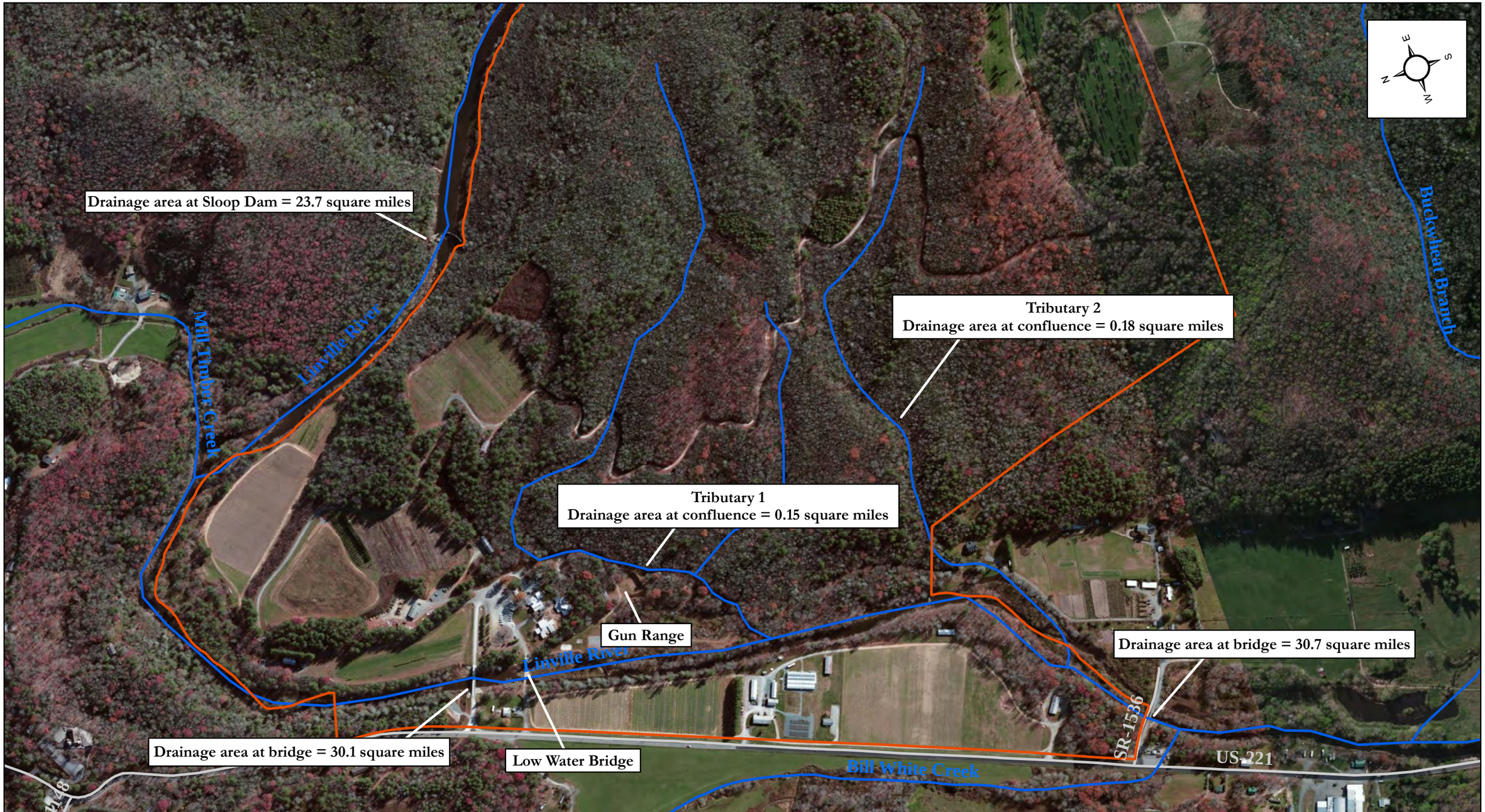
Aerial imagery from Bing Maps, (c) 2010 Microsoft Corporation and its data suppliers

Site Location

0 500 1,000 2,000 Feet

Linville River Restoration Project
Gill State Forest
Avery County, North Carolina

Sheet A1



Legend

Gill State Forest Boundary — Streams — Roads

Aerial imagery from Bing Maps, (c) 2010 Microsoft Corporation and its data suppliers

Site Overview

0 250 500 1,000 Feet

Linville River Restoration Project
Gill State Forest
Avery County, North Carolina

Sheet A2

Legend

Gill State Forest Boundary

Streams

Contour, interval 20 feet

Contour, interval 100 feet

Aerial imagery from Bing Maps, (c) 2010 Microsoft Corporation and its data suppliers

Site Topography

0 250 500 1,000 Feet

Linville River Restoration Project
Gill State Forest
Avery County, North Carolina

Sheet A3

CrE	Crossnore-Jeffrey complex
CrF	Crossnore-Jeffrey complex
CuA	Cullowhee loam
EpD	Edneytown-Pigeonroost complex
EtE	Edneyville-Chestnut complex
EtF	Edneyville-Chestnut complex
NkA	Nikwasi loam
OsB	Ostin cobbly fine sandy loam
RoA	Rosman loam
RsB	Rosman sandy loam
SaC	Saunook loam
SbD	Saunook loam
SoD	Soco-Ditney complex
SoE	Soco-Ditney complex
SoF	Soco-Ditney complex
SpD	Spivey cobbly loam
Ssb	Statler loam
StD	Stecoah-Soco complex
W	Water
WhB	Whiteoak fine sandy loam
WkC	Whiteoak fine sandy loam
WtD	Whiteoak fine sandy loam

Legend

Gill State Forest Boundary — Streams — Roads

Soil data from NRCS Web Soil Survey

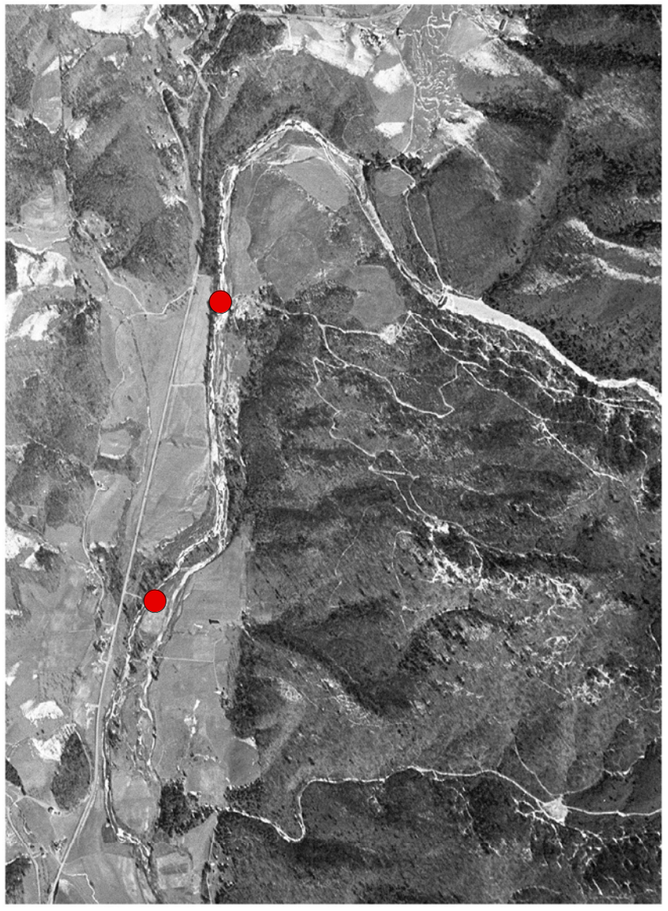
Soils

0 250 500 1,000 Feet

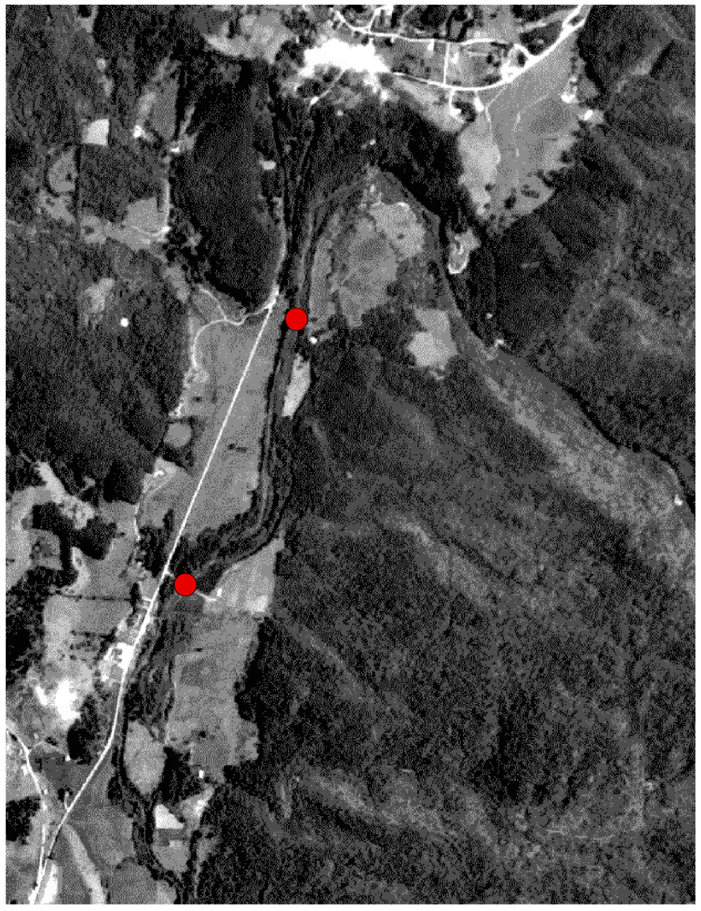
Linville River Restoration Project
Gill State Forest
Avery County, North Carolina

Sheet A4

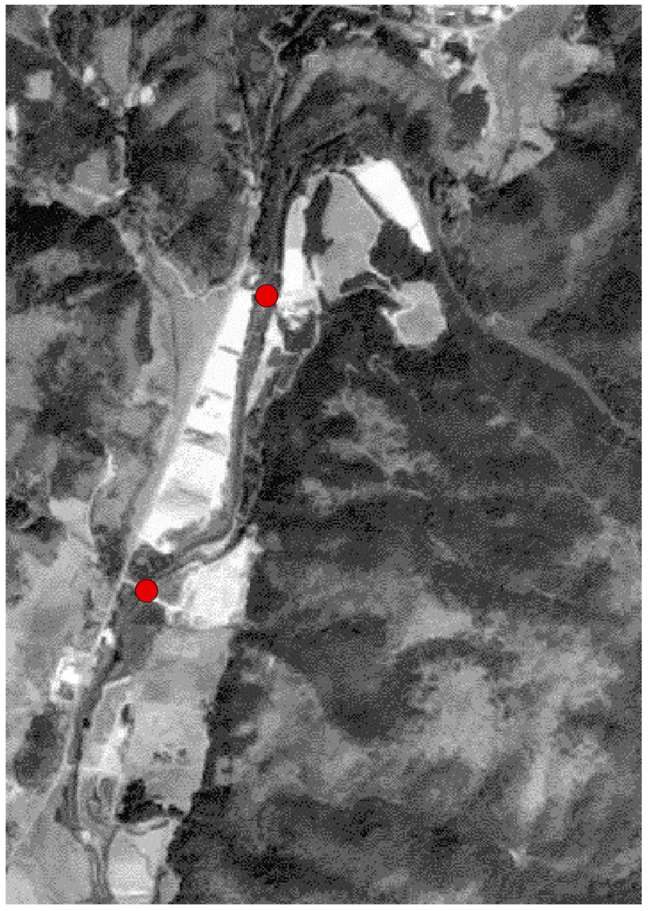
February 11, 1947



June 30, 1961



April 5, 1976



Legend

Approximate positions of low-water and Greene Road bridges

Historical aerial imagery from USGS Earth Explorer

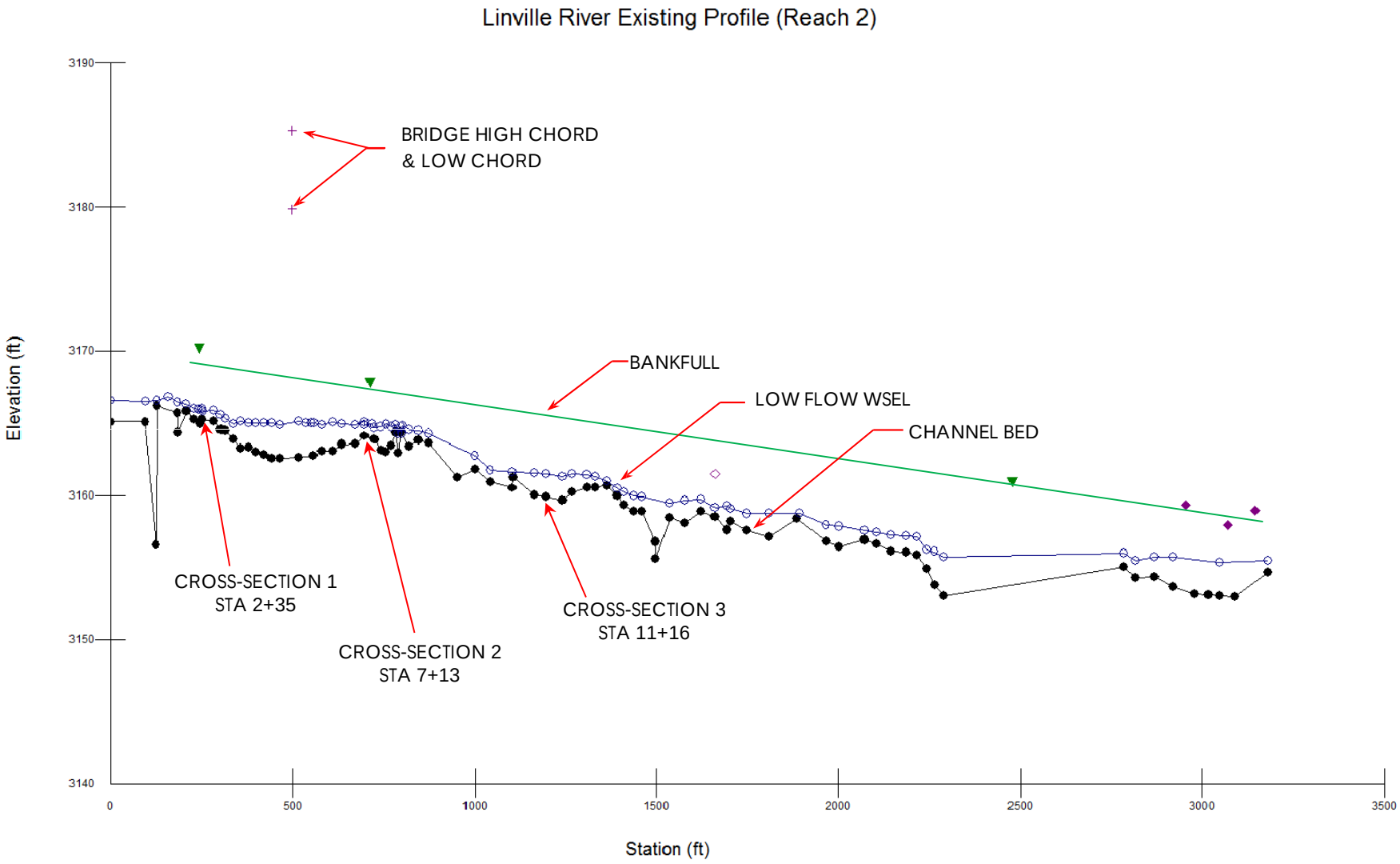
Historical Aerial Imagery

Minor variations in scale and orientation among photos

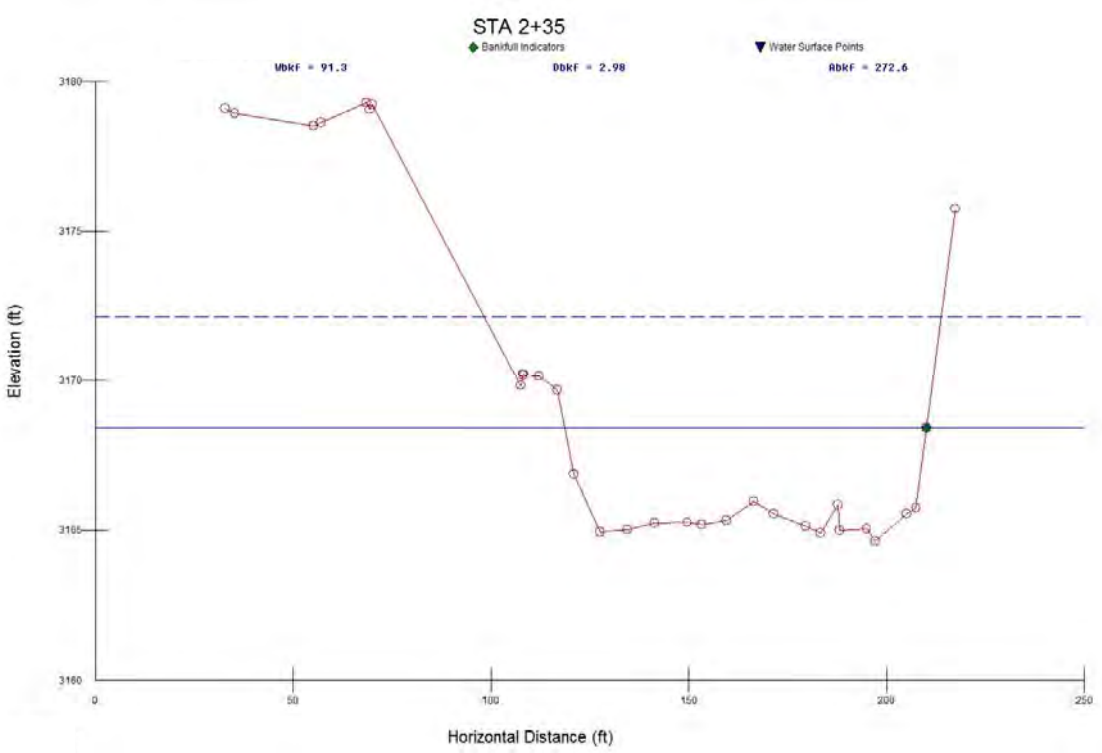
Linville River Restoration Project
Gill State Forest
Avery County, North Carolina

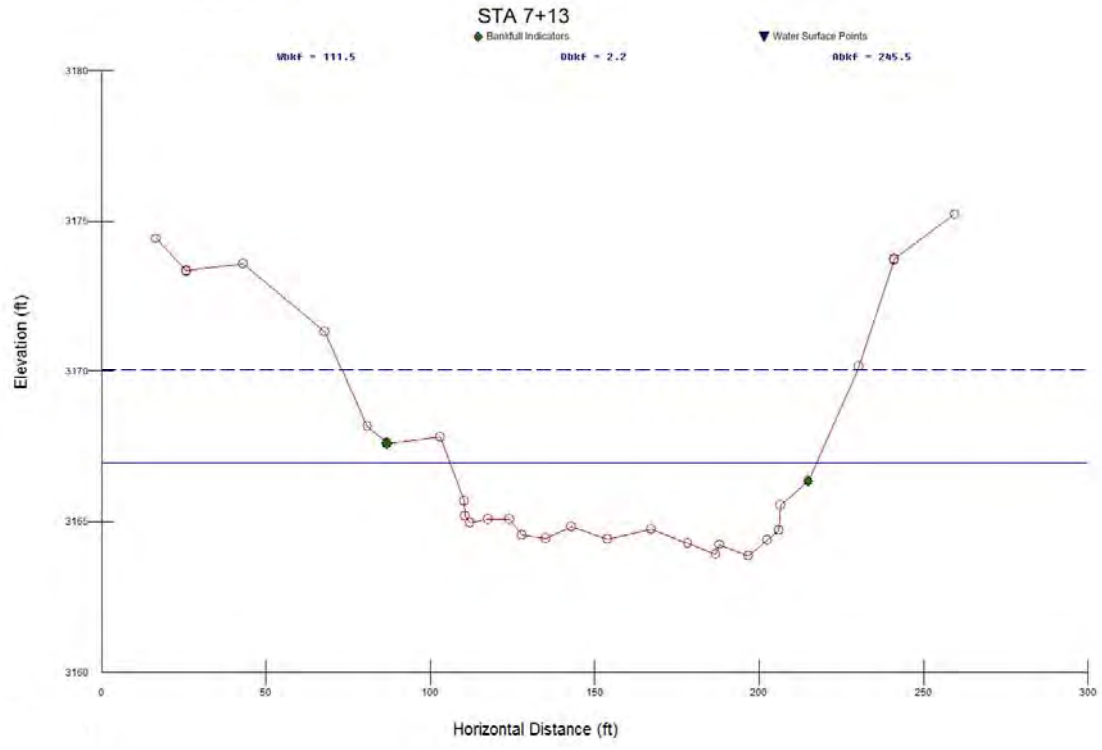
Sheet A5

A6. Existing Longitudinal Profile

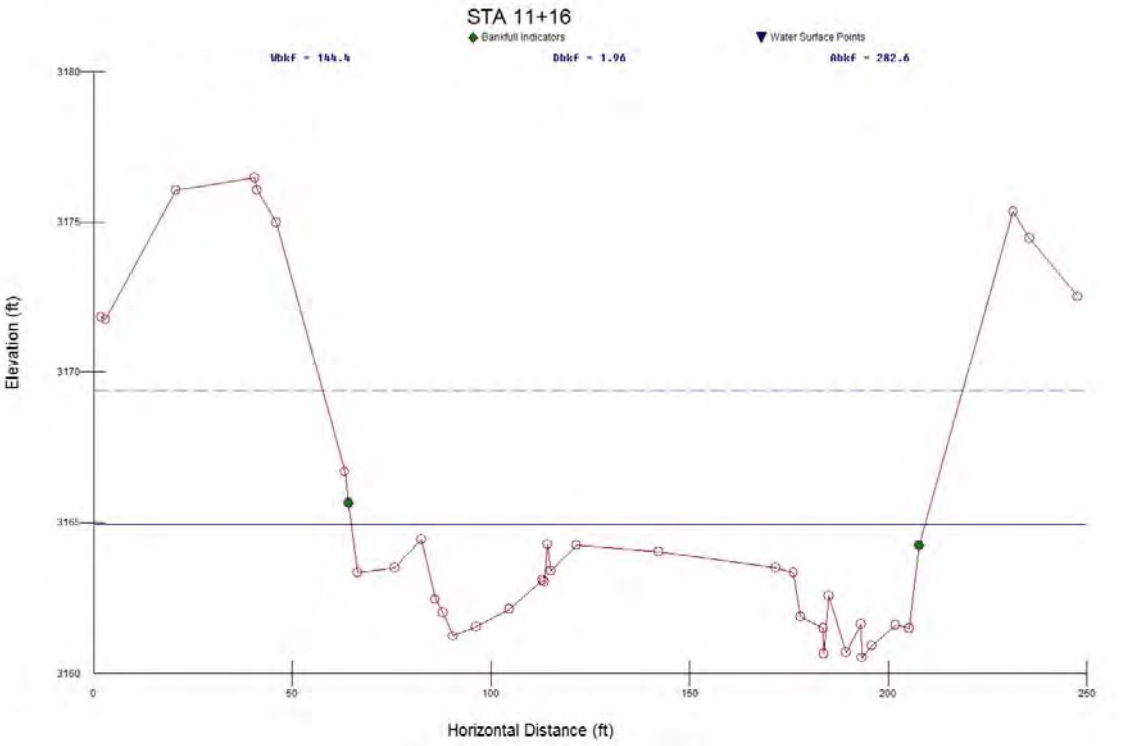


A7. Existing Cross-sections



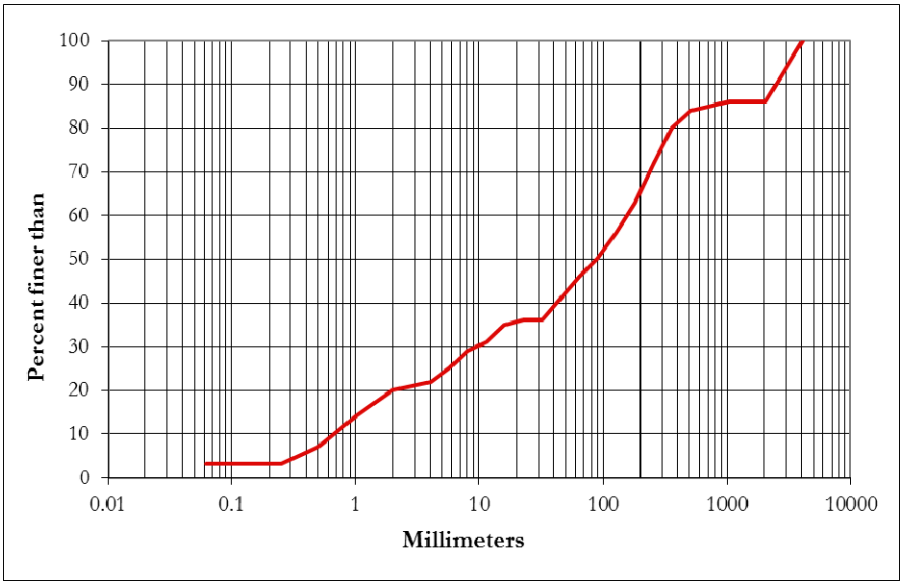


A7. Existing Cross-sections (continued)



A8. Pebble Count Data

d_{16} (mm)	1.3
d_{35} (mm)	16
d_{50} (mm)	90
d_{84} (mm)	512
d_{95} (mm)	bedrock
d_{100} (mm)	bedrock



Class Name	Particle Size Class (mm)	Total	Cumulative %
Silt/Clay	<0.062	3	3
Very Fine Sand	0.062 - 0.125	0	3
Fine Sand	0.125 - 0.25	0	3
Medium Sand	0.25 - 0.5	4	7
Coarse Sand	0.5 - 1.0	7	14
Very Coarse Sand	1.0 - 2.0	6	20
Very Fine Gravel	2.0 - 4.0	2	22
Fine Gravel	4.0 - 5.7	3	25
Fine Gravel	5.7 - 8.0	4	29
Medium Gravel	8.0 - 11.3	2	31
Medium Gravel	11.3 - 16.0	4	35
Coarse Gravel	16.0 - 22.6	1	36
Coarse Gravel	22.6 - 32	0	36
Very Coarse Gravel	32 - 45	5	41
Very Coarse Gravel	45 - 64	5	46
Small Cobble	64 - 90	4	50
Small Cobble	90 - 128	6	56
Large Cobble	128 - 180	7	63
Large Cobble	180 - 256	9	72
Small Boulder	256 - 362	8	80
Small Boulder	362 - 512	4	84
Medium Boulder	512 - 1024	2	86
Large Boulder	1024 - 2048	0	86
Bedrock	>2048	14	100

A9. Bank Erodibility Assessment

Description	Begin Station (feet)	End Station (feet)	Bank	BEHI	NBS	Erosion Rate (feet/year)	Erosion Volume (tons/year)
Upstream of new bridge	0	70	L	very low	low	0.02	0.3
	0	70	R	low	low	0.02	0.3
Under new bridge	70	110	L	low	low	0.02	0.2
	70	110	R	low	low	0.02	0.2
Between new bridge and low-water bridge	110	440	L	moderate	low	0.02	1.5
	110	440	R	moderate	low	0.02	1.5
Through first mid-channel bar	440	800	L	moderate	high	0.12	9.6
	440	800	R	moderate	very high	0.28	22.4
Through second mid-channel bar	800	1300	L	low	high	0.12	13.3
	800	1300	R	moderate	very high	0.28	31.1
To confluence with Tributary 1	1300	1780	L	low	low	0.02	2.1
	1300	1780	R	moderate	low	0.02	2.1
Through large pool	1780	2450	L	low	low	0.02	3.0
	1780	2450	R	moderate	low	0.02	3.0
To end of reach (beginning of mid-channel bar)	2450	2810	L	moderate	high	0.12	9.6
	2450	2810	R	low	low	0.02	1.6

APPENDIX B

STAKEHOLDER INPUT

March 26, 2013 Meeting Notes (prepared by NCFS)

Linville River/Gill State Forest Water Resource Master Plan
March 26, 2013 Stakeholder Meeting Notes: Morganton NC

Attendees:
Hunter Birckhead: NCFS Lenoir District Forester-D2.
Michael Cheek: NCFS Asst. Regional Forester-R3.
Tom Gerow, Jr.: NCFS Staff Forester.
Ron Hollifield: NCFS Regional Ranger-R3.
Clyde Leggins: NCFS Tree Improvement Supv.-West
Ken Roeder: NCFS Forest Geneticist.
Bill Swartley: NCFS Forest Hydrologist.
Greg Yates: NCFS Regional Forester-R3.
Greg Jennings, PE: Stantec.
Jason Zink, PE: Zink Environmental, PLLC.

Chasity Carnett: NCFS Admin. Assistant-Crossnore

Swartley explained intent and purpose: NCFS is hiring Jennings Environmental to assess current conditions, evaluate options, and prepare a master plan related to water resources on entire Gill State Forest (GSF) property, including potential restoration in the Linville River. Cost of plan will be paid from a grant awarded by NC Division of Water Resources to NCFS last year. We are working through NCDACS and State Construction Office to hire Jennings Environmental. Not all stream restoration projects are the same: Some projects are done for compensatory mitigation and monies are exchanged between parties for the right to do restoration. Some projects are done solely to improve the natural resources. Some projects are done to fix/repair/remediate degradation problems which impact human activities (flooding, bank erosion, stream crossings, etc.)

Roeder: Any work done at GSF should not increase potential for contamination of nursery stock from root-rot fungus or other pathogens which could jeopardize the nursery's operations. If there is increased public access to the GSF, this would increase potential for contamination.

Hollifield: NCFS does not have staffing to make GSF an open, public facility. Only have 2 FTE's (and 1 is now vacant). The main purpose of the property is to host training events and support nursery. Also, before work is done on-the-ground, the adjoining (downstream) private property owners should be informed and made aware of potential work. The NCFS local/regional staff should be the main point-of-contact with any landowners, not contractors.

Several commented that current traditional users of Linville River (fishermen) usually park in areas on the west side of the River off the highway, either in designated areas or anywhere they can park. NCFS needs to keep public fishermen parking on the west side of river, we cannot support public/fishing parking on the east side "at the Facility" itself.

Several stated there is no desire to create a trail network. There are current footpaths leading to the river from Linville Falls highway, those paths are fine. Some are contributing sedimentation or bank erosion and may need work. Yates said that NCFS would support an educational/training trail coming directly from the Training Facility, down to the River, for instruction of students, etc.

Jennings: There are no options "on" or "off" the table: this plan is being prepared for the NCFS with no pre-conceived notions of what should be done or should not be done. Now is the time to get all of our

wants, needs, concerns, limitations, goals on the table so that the plan accurately reflects NCFS long term management mission for this property (as it relates to water resources).

Much discussion was had on irrigation needs for nursery beds. Currently there is 1 pump house feeding into a 6-inch line. That line crosses the river on the low-water bridge, then goes north to the fields on east side of River. There was no consensus on what the ideal solution would be if the irrigation system was modified in the future, but generally the group recognized that if the low-water bridge is removed, the irrigation system could be altered to maintain irrigation. Some options included: burying the 6-inch line below the river; installing dry-hydrants in the river down south and up north, then using a portable pump as needed, or multiple portable pumps. Or installing a new permanent intake and pump up north to use it for irrigating the east-side fields, and leaving the existing pump & intake to irrigate the west-side fields. Also possibly hanging a new irrigation line off the high-water bridge to cross the river. There may be other options. Jennings noted that if restoration was done on the Linville River, there may be opportunities to create small pools in the river which could be tapped by the irrigation intake(s), thus assuring water availability even during droughts or low-flow conditions in the river.

Much discussion was had about the low-water bridge. Currently the east-side section has settled and heavy equipment is restricted from driving across. The gates are kept locked until access is needed. A tractor-pulled mower may be too wide to fit through the high-water bridge, but general consensus was that all other NCFS heavy equipment would fit through the high-water bridge "if you're careful, not much room for error". Group agreed that the old low-water bridge needs to be addressed, either removed completely or repaired. Group generally understood the benefits of removing the structure and supported a replacement large stone-cobble-aggregate ford crossing at the same location that could be included if the Linville River was restored. A low-water ford crossing would satisfy NCFS needs for large equipment crossing on a limited basis while eliminating the low bridge structure. Jennings and Swartley noted that most likely, a grant fund or permitting agency would almost certainly require that the low bridge (and the gravel island "bar" in the middle of the river) to be removed as a condition of funding or allowing a restoration project to proceed in the Linville River, in an effort to functionally "restore" and improve the river conditions and remove obstacles.

Jennings asked about potential to improve or expand existing riparian buffers, mainly along the Linville River. Yates noted that some of the grassy mowed areas could be naturalized, but that we should maintain some readily-accessible areas for users of the Training Facility: the river naturally draws attention from visitors and we do not want to prohibit or restrict all access. Roeder and Leggins stated that further discussions with supervisor (James West) would be needed to determine how much, if any, of current nursery fields could be sacrificed to create or expand riparian buffers. There may be some places where mowing along or within a buffer can stop and not interfere with nursery beds, thus allowing natural vegetation re-growth, but in other places we would likely have to give up production area to add to buffer zones. Issue needs to be investigated further.

Hollifield, Yates and others agreed that work is needed to better control stormwater runoff from the parking lots and driveways and shops situated on the adjoining hillslope. Some work has been done to control runoff, but more work would be welcomed to keep sediment out of the river and prevent erosion wash-outs of the driveways and parking lot.

Linville River/Gill State Forest Water Resource Master Plan
March 26, 2013 Stakeholder Meeting Notes: Morganton NC

Needs

- Irrigation capabilities from the Linville River for nursery bed fields on each side of the River
- Ability to drive wide, large, oversized equipment across the River on a limited basis; at another location besides the high-water bridge

Concerns

- Side-effects of restoration work that would attract more public visitation/use of river corridor; we need to keep public use confined within the corridor. No additional parking expansion for fishermen.

Limitations

- Minimize impact to nursery operations/infrastructure
- Minimize impact to Mountain Training Facility operations/infrastructure
- Retain gun firing range operations in place: recognize the need to expand or install new barriers within the shooting gallery area if current terrain is altered (to maintain safety certification)
- No negative impact to adjoining private property owners downstream (hydro-trespass)

Goals

- Improve flood protection for Mountain Training Facility and Linville River Nursery infrastructure
- Improve stormwater runoff management from adjoining hillslopes, roads, parking lots
- Improve sediment control, aquatic habitat, and environmental conditions of Linville River
- Resolve failed old low-water bridge: either need to fix it or remove it
- Improve footer protection of new high-water bridge from being undermined during floods
- Protect (improve?) existing high quality headwater streams up on Gill State Forest
- Resolve sedimentation/road erosion problems up on Gill State Forest

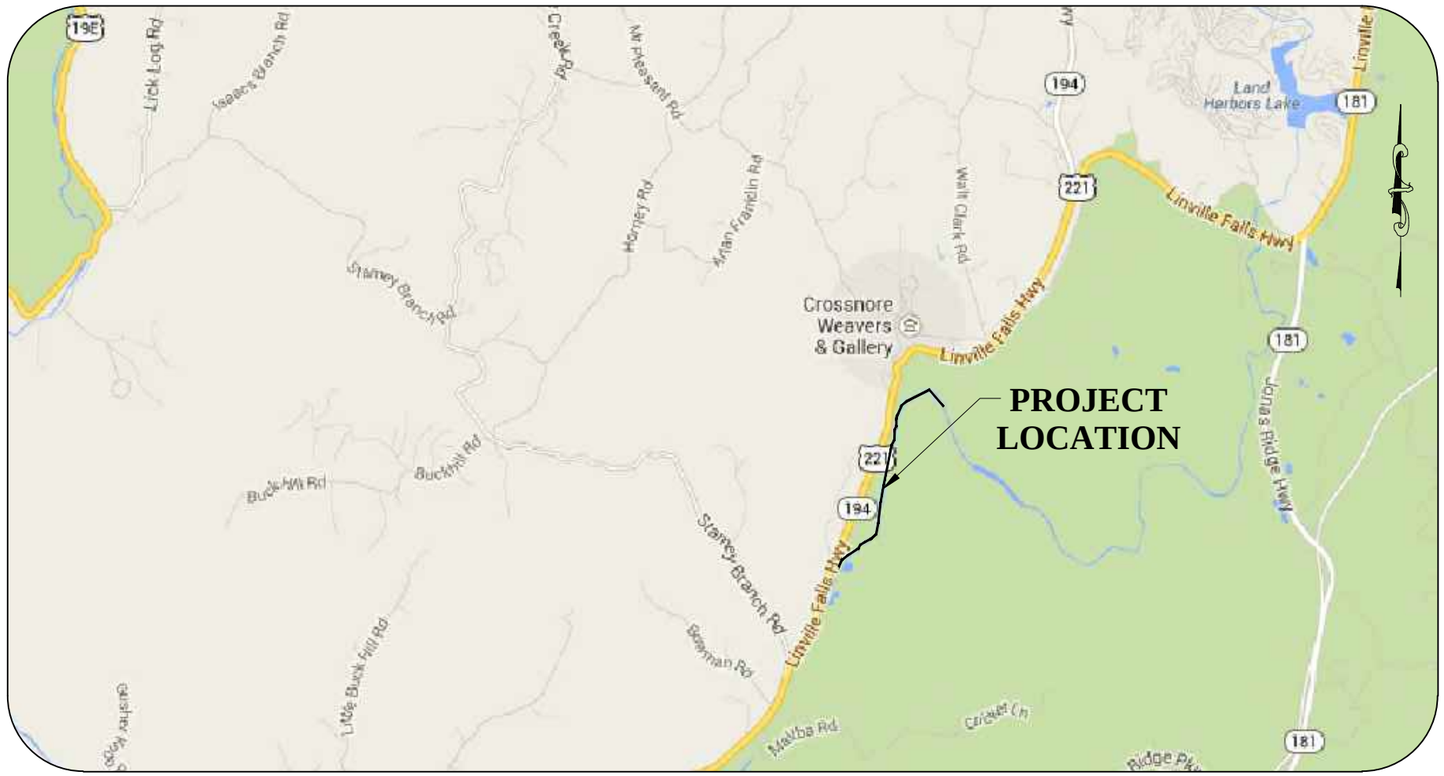
APPENDIX C

CONCEPTUAL DESIGN DRAWINGS

C1. Cover Sheet
C2. Plan View, Overview
C3. Plan View, Reach 1
C4. Plan View and Profile, Reach 2
C5. Plan View and Profile, Reach 2
C6. Plan View, Reach 3
C7. Typical Cross-sections and Hydraulic Geometry
C8. Typical Details (1 of 2)
C9. Typical Details (2 of 2)
C10. Planting Zones

Appendix C:
Conceptual Design Drawings
Linville River Stream Restoration
For North Carolina Forest Service
(Not For Construction)

INDEX OF SHEETS



VICINITY MAP

NTS

PROJECT LOCATION:
GILL STATE FOREST
NEWLAND, NC

2127 Ayrsley Town Boulevard, Suite 300
Charlotte, North Carolina 28273
www.stantec.com

Stantec
2127 Ayrsley Town Boulevard, Suite 300
Charlotte, North Carolina 28273
www.stantec.com

Legend

- INNER BERM
- BANKFULL
- NATIVE MATERIAL RIFFLE
- CHANNEL PLUG
- ROCK CROSS VANE
- WOOD TOE HABITAT REVETMENT
- LOG VANE WITH J-HOOK

Note:
PROPERTY BOUNDAIRES APPROXIMATE ONLY.

Client/Project
NCFS
LINVILLE RIVER RESTORATION
C2

Drawing No.
2 OF 10

Title
OVERALL PLAN

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Legend

- INNER BERM
- BANKFULL
- NATIVE MATERIAL RIFFLE
- IMPERVIOUS CHANNEL PLUG
- ROCK CROSS VANE
- WOOD TOE HABITAT REVETMENT
- LOG VANE WITH J-HOOK

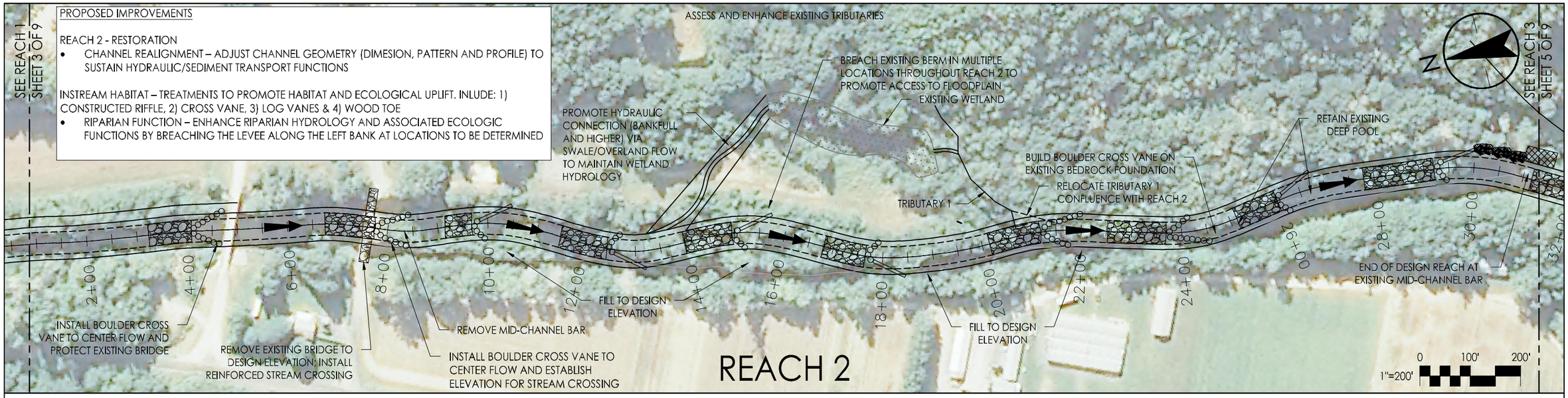
Notes

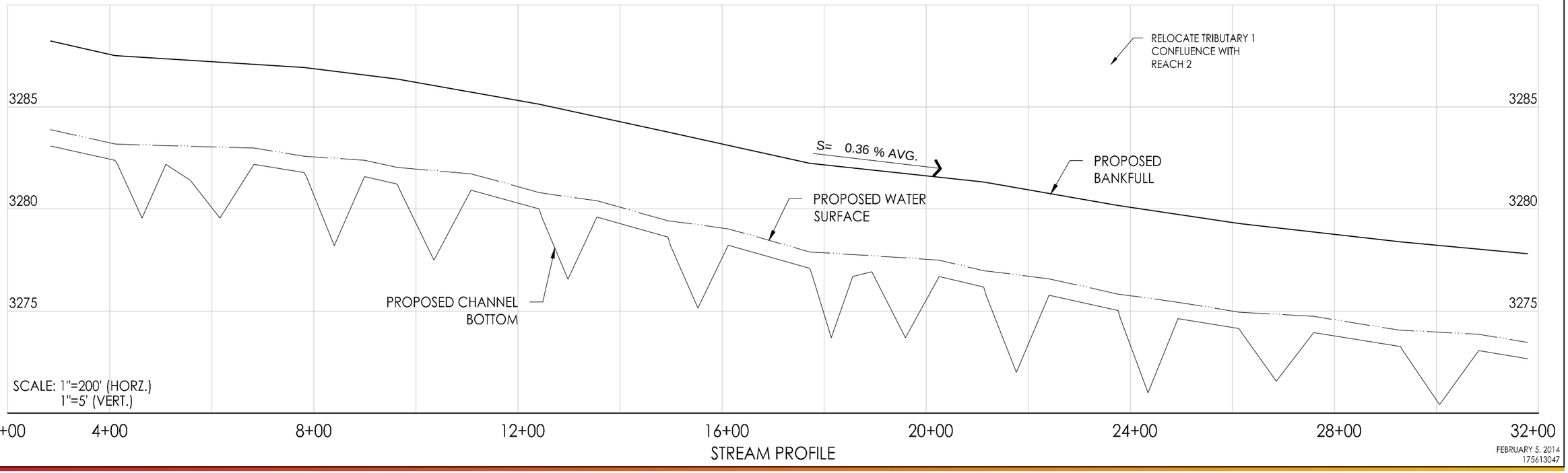
DETAILED ASSESSMENT AND DESIGN HAVE NOT BEEN PERFORMED FOR REACHES 1 AND 3. SPECIFIC TREATMENTS AND LOCATIONS OF TREATMENTS ARE SUBJECT TO CHANGE.

Client/Project
NCFS
LINVILLE RIVER RESTORATION
C3

Drawing No.
3 OF 10

Title
CONCEPTUAL PLAN
REACH 1





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Legend
- INNER BERM
- BANKFULL
- NATIVE MATERIAL RIFFLE
- IMPERVIOUS CHANNEL PLUG
- ROCK CROSS VANE
- WOOD TOE HABITAT REVETMENT
- LOG VANE WITH J-HOOK

Notes
DETAILED ASSESSMENT AND PRELIMINARY DESIGN ANALYSIS HAVE BEEN PERFORMED FOR REACH 2.

Client/Project
NCFS
LINVILLE RIVER RESTORATION
C4
Drawing No.
4 OF 10
Title
CONCEPTUAL PLAN AND PROFILE REACH 2

FEBRUARY 5, 2014
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REACH 3

RELOCATE TRIBUTARY 2 CONFLUENCE WITH REACH 3

ABANDON EXISTING SECONDARY FLOWPATH

IMPERVIOUS CHANNEL PLUG

APPROX. EXISTING TRIBUTARY 2

SEE REACH 2 SHEET 4 OF 9

TIE INTO EXISTING INSTREAM STRUCTURE IMMEDIATELY UPSTREAM OF CROSSING

LINVILLE RIVER

END PROJECT

LOG VANE WITH ROCK J-HOOK (1/7)

WOOD TOE HABITAT REVETMENT (1/8)

NATIVE MATERIAL RIFFLE (3/9)

20+00 22+00 24+00 26+00 28+00 30+00 32+00 34+00 36+00 38+00 40+00 42+00 43+65

LINVILLE FALLS HWY 194

PROPOSED IMPROVEMENTS

REACH 3 – RESTORATION (SIMILAR TO REACH 2)
- CHANNEL REALIGNMENT
- INSTREAM HABITAT

0 100' 200'
1"=200'

FEBRUARY 5, 2014
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Legend

- INNER BERM
- BANKFULL
- NATIVE MATERIAL RIFFLE
- IMPERVIOUS CHANNEL PLUG
- ROCK CROSS VANE
- WOOD TOE HABITAT REVETMENT
- LOG VANE WITH J-HOOK

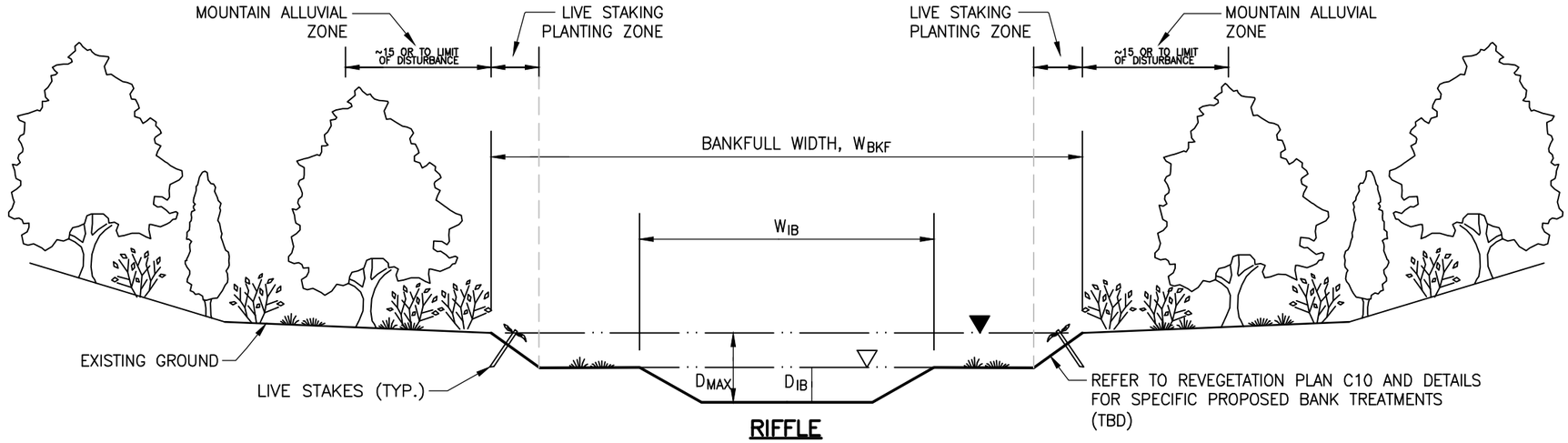
Notes

DETAILED ASSESSMENT AND DESIGN HAVE NOT BEEN PERFORMED FOR REACHES 1 AND 3. SPECIFIC TREATMENTS AND LOCATIONS OF TREATMENTS ARE SUBJECT TO CHANGE.

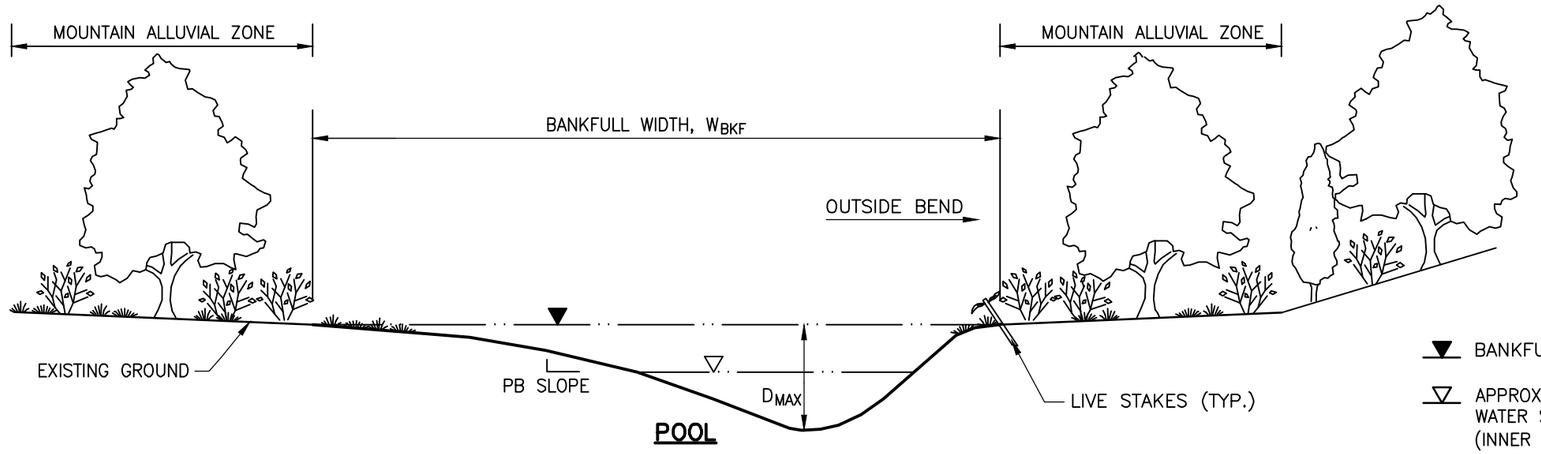
Client/Project
NCFS
LINVILLE RIVER RESTORATION
C5

Drawing No.
5 OF 10

Title
CONCEPTUAL PLAN
REACH 3



RIFFLE



POOL

DIMENSIONAL HYDRAULIC GEOMETRY

REACH	RIFFLE							POOL			
	A_{BKF} (ft2)	W_{BKF} (ft)	W_{IB} (ft)	D_{AVG} (ft)	D_{MAX} (ft)	D_{IB} (ft)	W/D	A_{BKF} (ft2)	W_{BKF} (ft)	D_{MAX} (ft)	PB SLOPE
1	-	-	-	-	-	-	-	-	-	-	-
2	235	68.6	34.3	3.4	5.1	1.7	20.0	358	82.3	8.2	
3	-	-	-	-	-	-	-	-	-	-	-

LONGITUDINAL HYDRAULIC GEOMETRY

REACH	AVERAGE SLOPE(ft)	RIFFLE LENGTH(ft)	RIFFLE LENGTH RATIO	RIFFLE SLOPE (ft)	RIFFLE SLOPE RATIO	POOL LENGTH(ft)	POOL LENGTH RATIO	POOL SLOPE (ft)	POOL SPACING(ft)	POOL SPACING RATIO	STEP HEIGHT(ft)
1	-	-	-	-	-	-	-	-	-	-	-
2	0.0036	126	1.8	0.0056	1.6	131	1.9	0.0000	278	1.9	0.35
3	-	-	-	-	-	-	-	-	-	-	-

NOTES:
1. THESE ARE TYPICAL DIMENSIONS. CONTRACTOR SHOULD REVIEW PROPOSED CONTOURS AND PROPOSED CROSS SECTIONS FOR ACTUAL DIMENSIONS.
2. GEOMETRY FOR REACHES 1 AND 3 TO BE DETERMINED FOLLOWING ADDITIONAL DATA COLLECTION.

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175613047

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Legend

Notes

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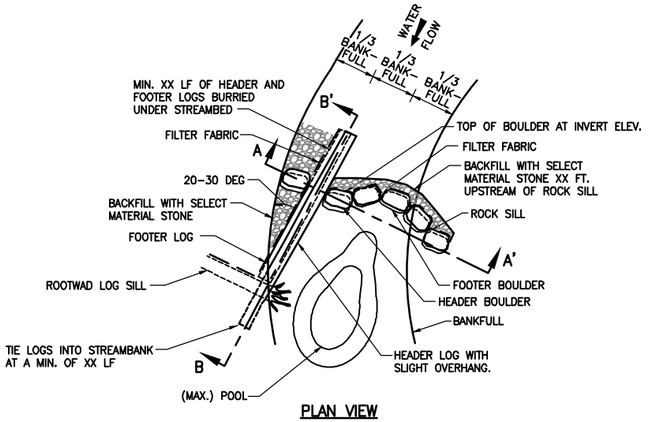
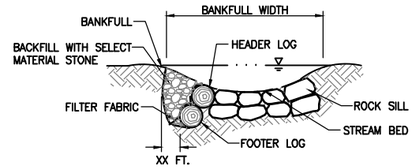
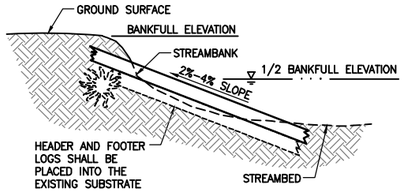
Client/Project
NCFS
LINVILLE RIVER RESTORATION
C6
Drawing No.
6 OF 10
Title
TYPICAL SECTION



PLAN VIEW

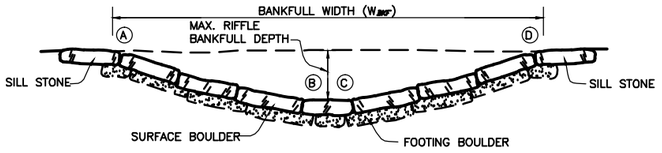


SECTION A–A

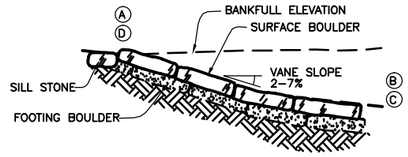


SECTION B–B

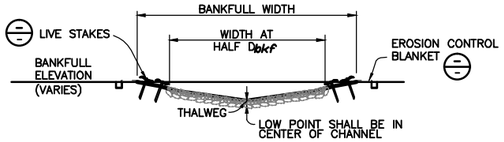
1/7 DETAIL – LOG VANE WITH ROCK J–HOOK
NOT TO SCALE



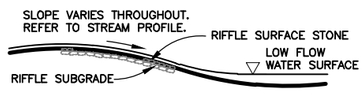
CROSS VANE TYPICAL CROSS–SECTION



CROSS VANE LONGITUDINAL PROFILE



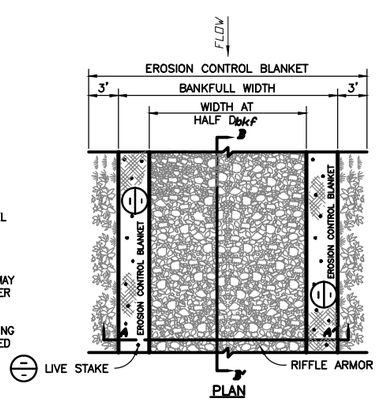
CROSS–SECTION A–A'



PROFILE B–B'

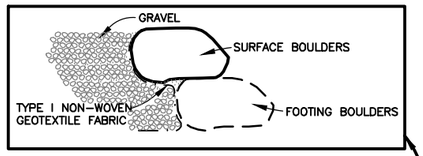
NOTES:

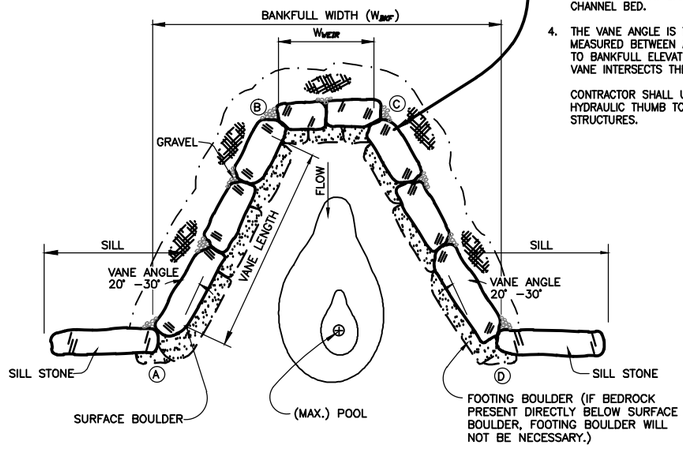
1. RIFFLE ARMOR DEPTH SHALL AVERAGE ___ FEET.
2. EXTEND RIFFLE ARMOR UP TO HALF BANKFULL DEPTH.
3. LOW POINT (THALWEG) SHALL BE IN THE CENTER OF CHANNEL.
4. RIFFLE SUBGRADE SHALL CONSIST OF A LAYER OF CLASS ___ CHANNEL LINING.
5. RIFFLE SURFACE STONE SHALL CONSIST OF A MIXTURE OF _____ ___ STONE.
6. GRAVEL SUBSTRATE FROM THE EXISTING CHANNEL SHALL BE STOCKPILED AND REUSED AS SURFACE STONE IN THE NEW CHANNEL WHERE FEASIBLE. GRAVEL SHALL BE PLACED AT EACH RIFFLE LOCATION IN ACCORDANCE WITH THE GRADATION SHOWN ON THESE PLANS.
7. SOME EXCAVATION OR UNDERCUTTING OF CHANNEL BED MATERIAL MAY BE NECESSARY PRIOR TO PLACEMENT OF RIFFLE TO ENSURE PROPER CROSS–SECTIONAL DIMENSIONS ONCE RIFFLE IS CONSTRUCTED.
8. RE–DRESSING OF CHANNEL AND BANKS MAY BE REQUIRED FOLLOWING CONSTRUCTION OF RIFFLES AND CHANNEL AND SHALL BE ACCOUNTED FOR IN CONTRACTOR'S BID ITEM.



PLAN

2/7 DETAIL – RIFFLE ARMOR
NOT TO SCALE





CROSS–VANE PLAN VIEW

NOTES FOR CROSS VANE INSTALLATION:

1. FOOTING BOULDERS ARE BOULDERS PLACED TO PROVIDE A FOUNDATION FOR THE SURFACE BOULDERS IN EACH STEP CROSS VANE. FOOTING BOULDERS SHALL BE DURABLE WITH A MINIMUM DIAMETER OF ___ FT.
2. SURFACE BOULDERS ARE THE TOP MOST COURSE OF BOULDERS USED IN EACH STEP CROSS VANE. SURFACE BOULDERS SHALL BE DURABLE WITH A MINIMUM INTERMEDIATE DIAMETER OF ___ FT.
3. THE VANE LENGTH IS THE STRAIGHT LINE PORTION OF CROSS VANE STRUCTURES MEASURED FROM THE STREAM BANK AT BANKFULL ELEVATION TO THE CHANNEL BED.
4. THE VANE ANGLE IS THE SMALLEST ANGLE MEASURED BETWEEN A VANE AND A LINE TANGENT TO BANKFULL ELEVATION AT THE POINT WHERE THE VANE INTERSECTS THE BANK.

   CONTRACTOR SHALL USE AN EXCAVATOR WITH A HYDRAULIC THUMB TO CONSTRUCT IN–STREAM STRUCTURES.

3/7 DETAIL – CROSS VANE
NOT TO SCALE

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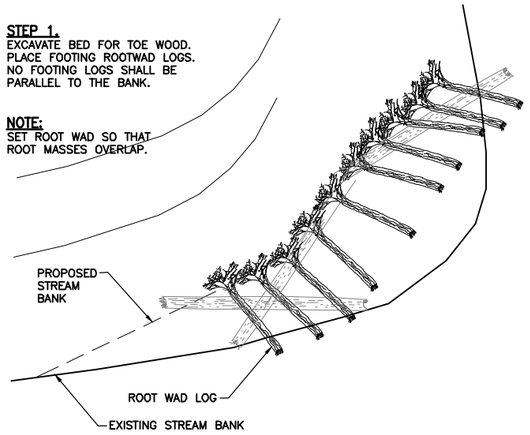
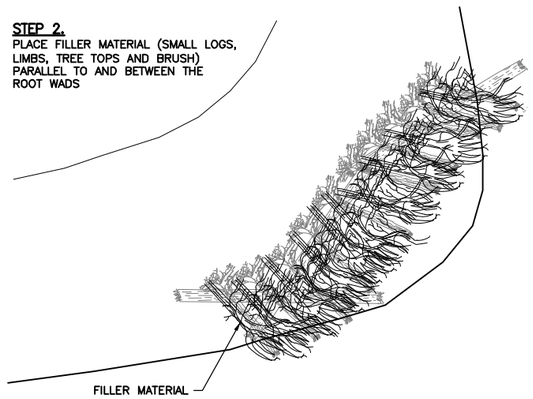
STEP 1.
EXCAVATE BED FOR TOE WOOD. PLACE FOOTING ROOTWAD LOGS. NO FOOTING LOGS SHALL BE PARALLEL TO THE BANK.

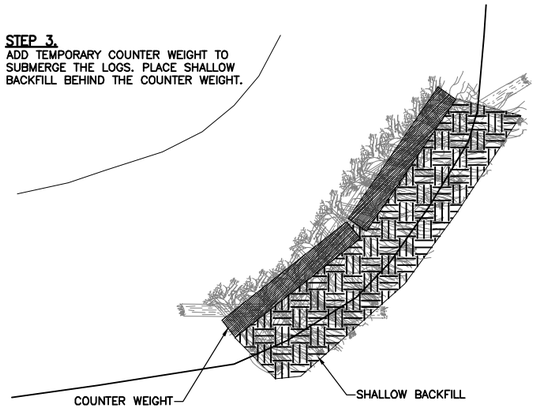
NOTE:
SET ROOT WAD SO THAT ROOT MASSES OVERLAP.



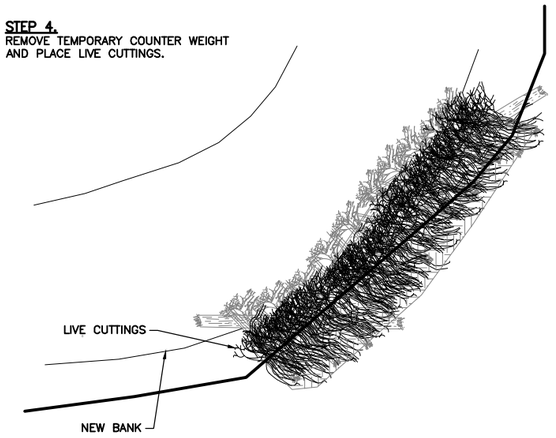
STEP 2.
PLACE FILLER MATERIAL (SMALL LOGS, LIMBS, TREE TOPS AND BRUSH) PARALLEL TO AND BETWEEN THE ROOT WADS



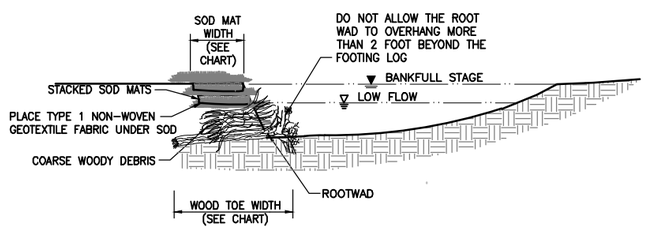
STEP 3.
ADD TEMPORARY COUNTER WEIGHT TO SUBMERGE THE LOGS. PLACE SHALLOW BACKFILL BEHIND THE COUNTER WEIGHT.



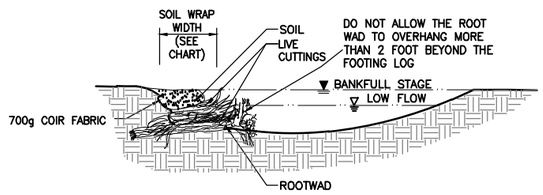
STEP 4.
REMOVE TEMPORARY COUNTER WEIGHT AND PLACE LIVE CUTTINGS.



STEP 5.
INSTALL STACKED SOD MATS OR WRAPPED SOIL LIFTS AND LAYERS OF CUTTINGS BETWEEN SOIL LIFTS UP TO BANKFULL STAGE.

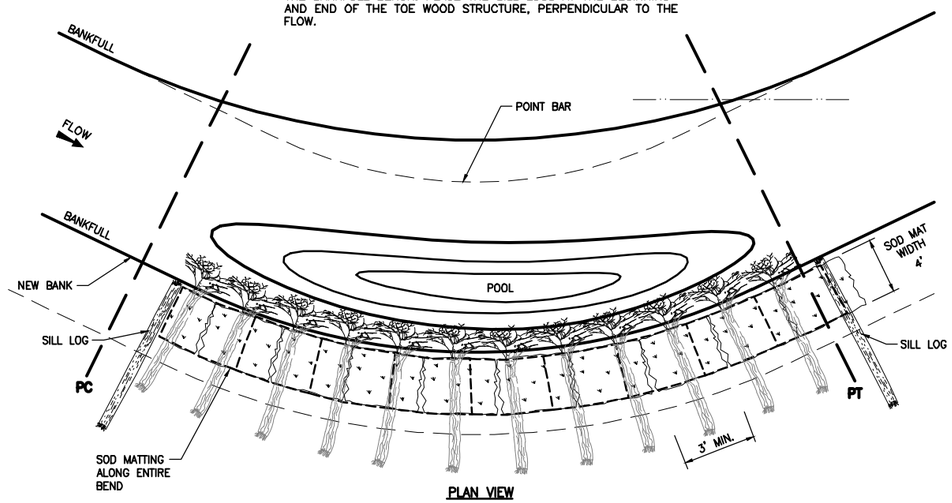


SOD MAT WITH WOOD TOE SECTION VIEW



LIVE BRUSH LAYER WITH WOOD TOE SECTION VIEW

STEP 6.
SILL LOGS ARE BURIED FLUSH OR 6 INCHES BELOW THE TOP OF THE BANKFULL BENCH. PLACE THE SILL LOGS AT THE BEGINNING AND END OF THE TOE WOOD STRUCTURE, PERPENDICULAR TO THE FLOW.



PLAN VIEW

1/8 DETAIL – WOOD TOE HABITAT REVETMENT
NOT TO SCALE

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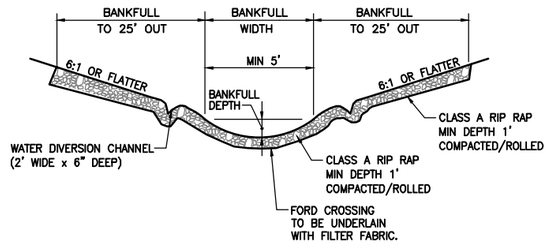
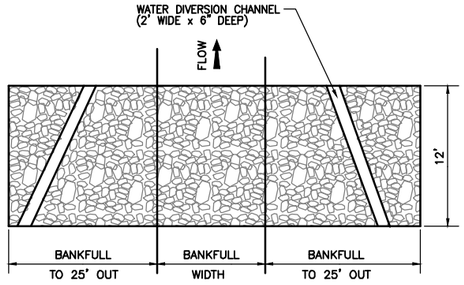


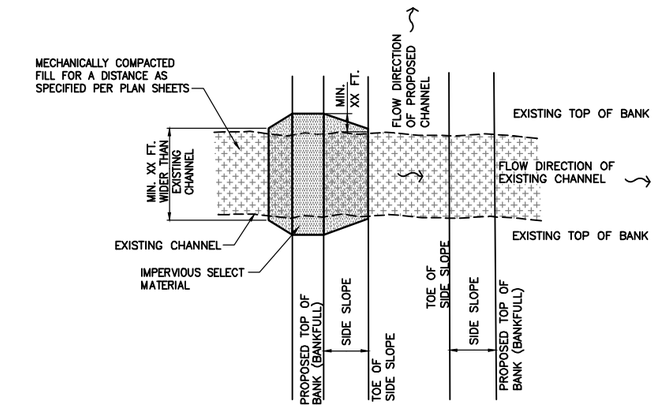
CROSS-SECTION



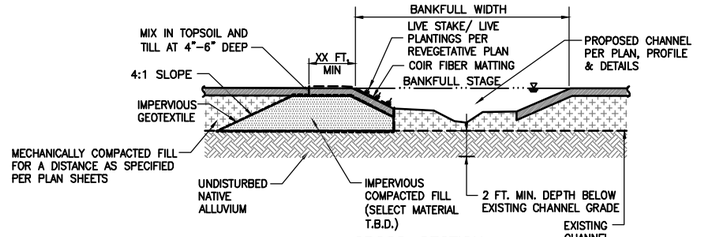
PLAN VIEW

NOTE:
ALL MATERIALS ARE TO BE APPROVED BY ENGINEER OR ENGINEER'S ONSITE CONSTRUCTION MANAGER.

1/9 DETAIL – PERMANENT FORD CROSSING
NOT TO SCALE

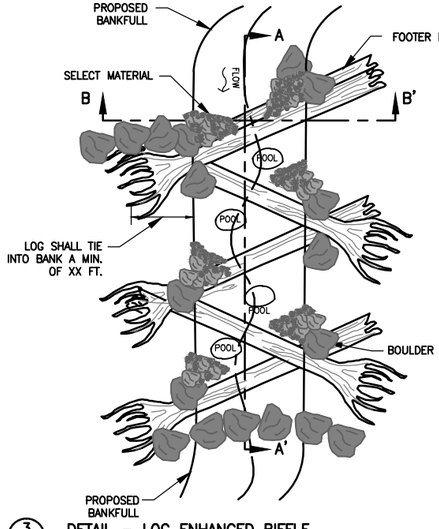


PLAN VIEW

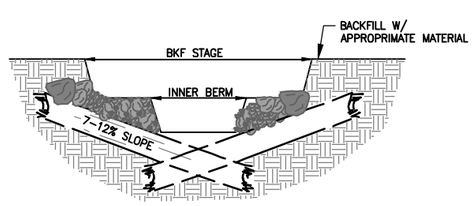


CROSS-SECTION

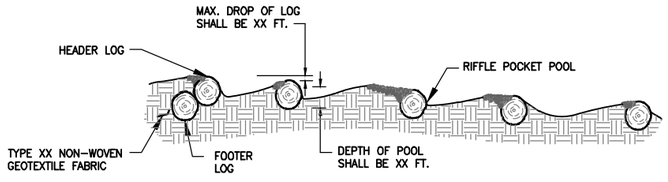
2/9 DETAIL – IMPERVIOUS STREAM CHANNEL PLUG
NOT TO SCALE



3/9 DETAIL – LOG ENHANCED RIFFLE
NOT TO SCALE



LOG ENHANCED RIFFLE – SECTION B–B'



LOG ENHANCED RIFFLE – PROFILE A–A'

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Zone	Common Name	Scientific Name
1 - Live Stakes	Silky willow	*Salix sericea*
	Buttonbush	*Cephalanthus occidentalis*
	Elderberry	*Sambucus nigra* ssp. *canadensis*
	Tag Alder	*Alnus serrulata*
2 - Bottomland Hardwood	River Birch	*Betula nigra*
	Sycamore	*Platanus occidentalis*
	Tulip poplar	*Liriodendron tulipifera*
	Green ash	*Fraxinus pennsylvanica*
	Ironwood	*Carpinus caroliniana*
	Eastern cottonwood	*Populus deltoides*

Notes

1. LIVESTAKE PLANTING ZONE FROM INNER BERM TO 1 ROW BEYOND BANKFULL
2. MOUNTAIN ALLUVIAL FOREST PLANTING ZONE MIN 15' OS TOP OF BANKFULL TO MAX LIMIT OF DISTURBANCE

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- INNER BERM
- BANKFULL
- NATIVE MATERIAL RIFFLE
- IMPERVIOUS CHANNEL PLUG
- ROCK CROSS VANE
- WOOD TOE HABITAT REVETMENT
- LOG VANE WITH J-HOOK

Notes

DETAILED ASSESSMENT AND PRELIMINARY DESIGN ANALYSIS HAVE BEEN PERFORMED FOR REACH 2.

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REACH 2