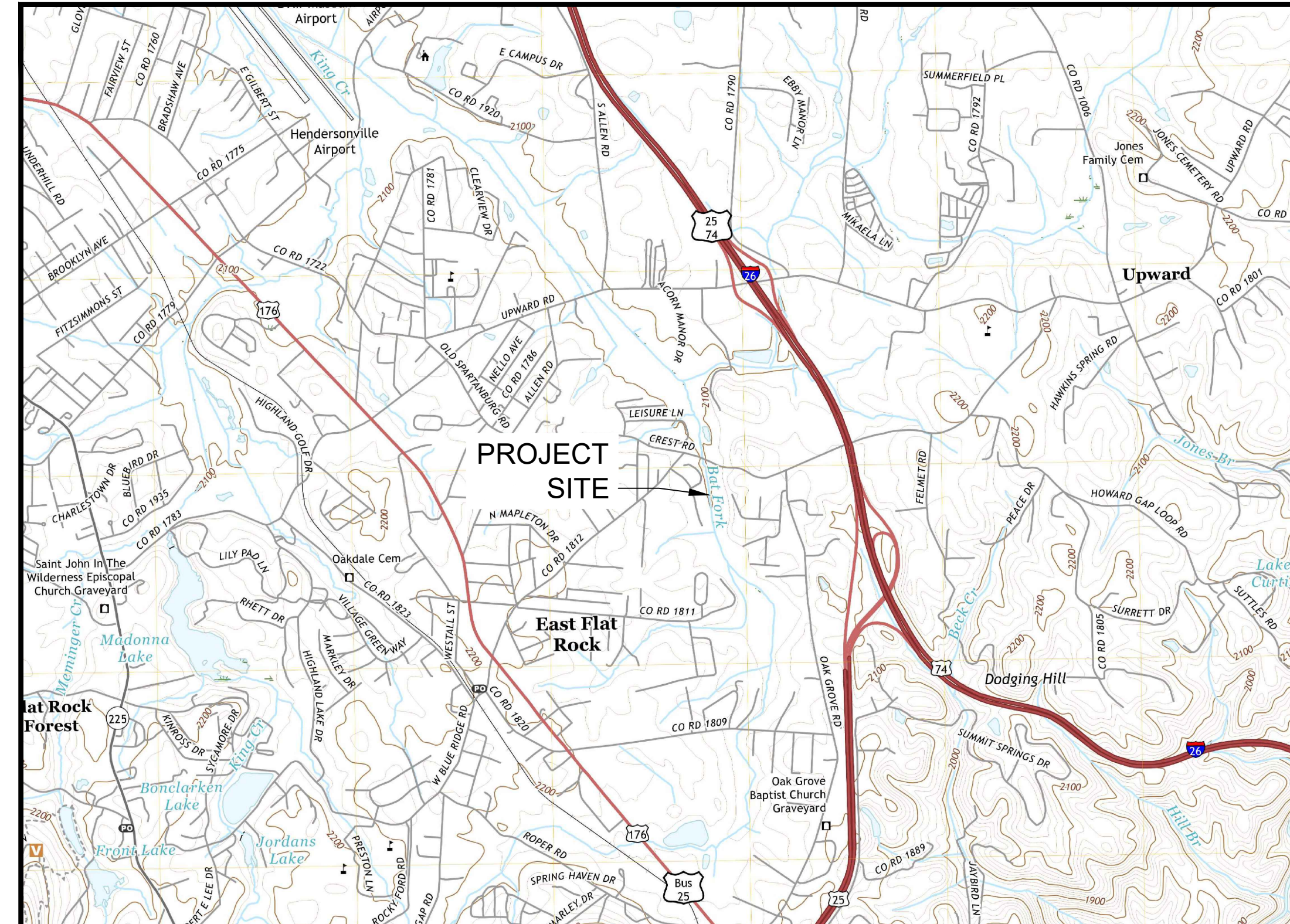


# BAT FORK STREAM RESTORATION

EAST FLAT ROCK, NC  
 HENDERSON COUNTY

FRENCH BROAD RIVER BASIN HUC: 06010105  
 USACE PIN: TBD

PROJECT DIRECTORY	
<b>LANDOWNER</b>	<b>HENDERSON COUNTY HABITAT FOR HUMANITY, INC.</b>
	Linda Saturno Executive Director lsaturno@habitat-hvl.org (828) 694-0340
<b>PROJECT SPONSOR</b>	<b>CONSERVING CAROLINA</b>
	Kieran Roe Executive Director kieran@conservingcarolina.org (828) 697-5777, x-201
DESIGN TEAM	
<b>ENGINEER</b>	<b>JENNINGS ENVIRONMENTAL PLLC</b>
	Greg Jennings, PHD, PE President (919) 600-4790 greg@jenningsenv.com



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**PERMIT DRAWING**

**OCTOBER 4, 2022**

**NOT RELEASED FOR CONSTRUCTION**



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**GENERAL PROJECT NOTES AND SPECIFICATIONS**

1. DEFINITIONS:
  - 1.1. CONSTRUCTION DOCUMENTS: THE CONTRACT AND APPLICABLE DRAWINGS, DETAILS, SPECIFICATIONS, PERMIT(S), AND/OR ANY OTHER DOCUMENTS (MEETING MINUTES, PUNCH LISTS, BID TABS, ETC.) FOR COMPLETE INFORMATION ABOUT THE REQUIRED ANY ONE OF THESE PARTS OF THE MAY NOT CONTAIN ALL OF THE INFORMATION REQUIRED TO COMPLETE THE PROJECT WORK.
  - 1.1. LANDOWNER: HENDERSON COUNTY HABITAT FOR HUMANITY, INC.
  - 1.2. PROJECT SPONSOR: CONSERVING CAROLINA
  - 1.3. ENGINEER: JENNINGS ENVIRONMENTAL PLLC
  - 1.4. SURVEYOR: PILOT SE, INC.
2. THE WORK ON THIS PROJECT SHALL ADHERE TO THE FOLLOWING SPECIFICATIONS, STANDARDS AND/OR REGULATIONS:
  - 2.1. NC DEMLR'S "EROSION AND SEDIMENT CONTROL PLANNING AND DESIGN MANUAL" (2013)
  - 2.2. NC DEMLR'S CONSTRUCTION GENERAL PERMIT NUMBER NCG01000
  - 2.3. GENERAL, REGIONAL AND SPECIAL CONDITIONS OF USACE'S 404 NATIONWIDE PERMIT NUMBER 27
  - 2.4. GENERAL AND SPECIAL CONDITIONS OF NCDWR'S 401 WATER QUALITY CERTIFICATION 4134
  - 2.5. THE CONSTRUCTION DOCUMENTS
3. NOT ALL EXISTING UTILITIES ARE SHOWN. SOME LOCATIONS MAY BE APPROXIMATE. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY LOCATION AND COORDINATION. ANY UTILITIES SHOWN ON THE CONSTRUCTION DOCUMENTS ARE FOR INFORMATIONAL PURPOSES ONLY AND IN NO WAY RELIEVES THE CONTRACTOR FROM COORDINATING, VERIFYING AND PROTECTING EXISTING UTILITIES.
4. ALL UTILITIES SHALL BE PROTECTED AND REMAIN ACTIVE UNLESS OTHERWISE NOTED.
5. THE CONTRACTOR IS RESPONSIBLE FOR THE PROJECT AREA UNTIL COMPLETION AND FINAL ACCEPTANCE BY THE ENGINEER AND PROJECT OWNER. THE CONTRACTOR SHALL CONFINE ALL ACTIVITIES, INCLUDING EQUIPMENT STORAGE, TO THE LIMITS OF DISTURBANCE, STAGING AREAS, AND DESIGNATED CONSTRUCTION ACCESS POINTS.
6. THE MANNER IN WHICH THE CONTRACTOR DEALS WITH PEOPLE AND THEIR PROPERTIES WHILE PERFORMING THIS WORK IS EXTREMELY IMPORTANT. THEREFORE, THE CONTRACTOR AND THE CONTRACTOR'S REPRESENTATIVES SHALL MANIFEST A SPIRIT OF FRIENDLINESS AND COOPERATION WHEN DEALING WITH PROPERTY OWNERS AND THE GENERAL PUBLIC WHILE PERFORMING WORK ON THE SITE.
7. EXTREME CARE AND DILIGENCE SHALL BE EXERCISED BY THE CONTRACTOR TO ASSURE THE SAFETY OF PERSONS, ANIMALS, AND PROPERTY. IF AT ANY TIME THE OWNER OR ENGINEER DETERMINES THAT THE CONTRACTOR'S METHODS OR EQUIPMENT ARE INADEQUATE FOR SECURING THE SAFETY OF THE CONTRACTOR'S EMPLOYEES OR THE PUBLIC, THE DESIGNATED REPRESENTATIVE MAY DIRECT THE CONTRACTOR TO TAKE SPECIFIC ACTIONS TO ENSURE SAFETY. THE CONTRACTOR SHALL IMPROVE METHODS AS DEEMED APPROPRIATE BY THE DESIGNATED REPRESENTATIVE WITHOUT ADDITIONAL COST TO THE PROJECT OWNER, SO AS TO ASSURE COMPLIANCE WITH SAFETY CONCERNS. FAILURE OF THE DESIGNATED REPRESENTATIVE TO MAKE THIS DEMAND SHALL NOT RELIEVE THE CONTRACTOR OF ANY OBLIGATION TO ENSURE THE SAFE CONDUCT OF ITS WORK.
8. THE CONTRACTOR SHALL MAINTAIN ALL LIGHTS, GUARDS, SIGNS, TEMPORARY PASSAGES, OR OTHER PRECAUTIONS NECESSARY FOR THE SAFETY OF ALL PERSONS. THE CONTRACTOR SHALL ABIDE BY ALL SAFETY RULES AND CONSTRUCTION CONDITIONS REQUIRED BY GOVERNMENTAL AUTHORITIES AND OTHER ENTITIES, INCLUDING RAILROADS, SO THE PUBLIC IS SAFEGUARDED FROM ACCIDENTS AND DELAYS. GUARDS AND FLAGS REQUIRED BY GOVERNMENTAL OR RAILROAD AUTHORITIES SHALL BE PROVIDED AT THE CONTRACTOR'S EXPENSE, UNLESS DIRECTED OTHERWISE BY THE DESIGNATED REPRESENTATIVE. CONTRACTOR SHALL AT NO TIME COMPROMISE EITHER SAFETY OR ENVIRONMENTAL REQUIREMENTS.
9. THE CONTRACTOR SHALL ONLY USE ACCESS PATHS AND STAGING AREAS SHOWN ON THE DRAWINGS. ANY ALTERNATE ACCESS PLANNED BY THE CONTRACTOR SHALL BE APPROVED BY THE ENGINEER AND PROJECT OWNER PRIOR TO USE.
10. NO NON-PERMITTED FILL IN WETLANDS MAY OCCUR. ALL EXCESS SOILS FROM STABILIZATION AND GRADING WORK SHALL BE PLACED IN DESIGNATED AREAS ON THE SITE.
11. SITE SHOULD BE "STORM READY" AT THE END OF EACH WORK DAY AND WORK WEEK.

**TOPOGRAPHIC NOTES AND SPECIFICATIONS**

13. HORIZONTAL DATUM IS NAD83(2011) & VERTICAL DATUM IS NAVD88. ALL COORDINATES ARE BASED ON NAD83(2011) AND ALL ELEVATIONS ARE BASED ON NAVD88.
14. A DETAILED TOPOGRAPHIC AND TREE SURVEY OF THE WORK AREA WAS COMPLETED BY PILOT SE INC. IN APRIL 2022.
15. THE DESIGN ELEVATIONS AND GRADES SHOWN IN THE DRAWINGS ARE BASED ON THE EXISTING GROUND SURFACE FROM THE APRIL 2022 SURVEY FROM WHICH ALL COMPUTATIONS OF CUT AND FILL ARE BASED. DISCREPANCIES BETWEEN THE SURVEYED EXISTING GROUND SURFACE AND FIELD CONDITIONS AT THE TIME OF CONSTRUCTION CAN RESULT IN VARIATIONS OF TOTAL EXCAVATED QUANTITIES. THESE VARIATIONS SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.

**STREAM RESTORATION NOTES AND SPECIFICATIONS**

16. FIELD CONDITIONS MAY REQUIRE ADAPTATION OF THE DESIGN AND/OR DETAILS PROVIDED IN THE DRAWINGS. MINOR VARIATION(S) OR ADAPTATION(S) OF THE PROPOSED WORK SHOWN IN THE DRAWINGS AND DETAILS ARE CONSIDERED INCIDENTAL TO THE WORK. THE ENGINEER WILL WORK WITH THE CONTRACTOR TO ADDRESS ANY FIELD CHANGES.
17. IN-STREAM ROCK STRUCTURES MAY BE SUBSTITUTED WITH WOOD STRUCTURES WITH WRITTEN APPROVAL FROM THE ENGINEER.
18. THE CONTRACTOR SHALL MARK THE LOCATIONS OF BANK STABILIZATION STRUCTURES USING SURVEY GRADE GPS EQUIPMENT FOR REVIEW BY THE ENGINEER BEFORE BEGINNING EXCAVATION AND GRADING.
19. CONTRACTOR SHALL MINIMIZE, TO THE MAXIMUM EXTENT POSSIBLE, IMPACTS TO ADJACENT SIGNIFICANT TREES.
20. CONTRACTOR SHALL USE AN EXCAVATOR WITH A HYDRAULIC THUMB TO INSTALL BANK STABILIZATION STRUCTURES.
21. DESIGN ELEVATIONS SHALL BE CONSTRUCTED WITHIN 0.1' (VERTICAL), WIDTHS AND DEPTHS MUST FALL WITHIN RANGES SHOWN IN THE DRAWINGS AND DETAILS.
22. IF THE EXISTING GROUND IS LESS THAN 0.2' HIGHER THAN THE PROPOSED BANKFULL ELEVATION, IT IS NOT NECESSARY TO EXCAVATE TO THE PROPOSED ELEVATIONS AND GRADES IN THE CONSTRUCTION DOCUMENTS.
23. BANK STABILIZATION STRUCTURES SHALL BE INSTALLED AS SHOWN IN THE DRAWINGS AND DETAILS. ALL STRUCTURES SHALL BE FINISHED TO A SMOOTH SURFACE IN ACCORDANCE WITH THE LINES, GRADES AND ELEVATIONS SHOWN IN THE DRAWINGS AND DETAILS. THE FINISHED STRUCTURE SLOPES AND GRADES SHALL BE WITHIN 0.1' OF DESIGN ELEVATIONS.
24. AFTER THE STRUCTURE IS COMPLETE AND NORMAL FLOW IS RESTORED TO THE CHANNEL, SOME ADJUSTMENT TO THE STRUCTURE OR ADDITIONAL STABILIZATION MEASURE MAY BE NECESSARY TO ACHIEVE THE DESIRED FUNCTION.
25. THE GRADED RIVER BANKS SHALL BE STABILIZED AS SOON AS POSSIBLE BY TEMPORARY AND PERMANENT SEEDING, ADDING STRAW MULCH TO BARE SOIL AND INSTALLING EROSION CONTROL MATTING AS SHOWN IN THE DRAWINGS AND DETAILS. PRIOR TO INSTALLING THE EROSION CONTROL MATTING, PREPARE THE SOIL SURFACE BY LOOSENING 3 - 6" OF SOIL OR APPLYING 3 - 6" OF TOPSOIL TO THE DESIGN ELEVATIONS AND APPLY TEMPORARY AND PERMANENT SEED AND THEN STRAW MULCH. SEED SHALL BE BROADCAST EVENLY OVER THE AREA USING A BROADCAST SPREADER PRIOR TO COVERING WITH THE EROSION CONTROL MATTING. THE MATTING SHALL BE ROLLED OUT IN THE DIRECTION OF ANTICIPATED RUNOFF. INSTALL MATTING IN ACCORDANCE WITH THE DETAIL INCLUDED IN THE DRAWINGS. MATTING USED FOR STREAMBANK STABILIZATION MUST BE CERTIFIED WEED-FREE STRAW OR OTHER NATURAL WEED-FREE / NON-PROPAGATING VEGETATIVE MATERIALS. REWORKING OF AREAS THAT DO NOT ESTABLISH VEGETATION OR BECOME UNSTABLE SHALL BE NECESSARY IN THE MATTING SEPARATES FROM THE SOIL.
26. TOPSOIL SHALL BE REMOVED FROM EXCAVATION AND FILL AREAS PRIOR TO EXCAVATION AND GRADING AND RE-APPLIED TO AREAS AFTER ROUGH GRADING IS COMPLETE. 2 - 4" OF TOPSOIL SHALL BE PLACED ON DISTURBED AREAS TO THE ELEVATIONS AND GRADES INCLUDED IN THE DRAWINGS.

**EROSION AND SEDIMENTATION CONTROL NOTES AND SPECIFICATIONS**

27. ALL CONSTRUCTION ACTIVITIES SHALL ADHERE TO THE CONDITIONS AND REQUIREMENTS OF NCDEML'S N601 CONSTRUCTION GENERAL PERMIT.
28. ALL TREES, UTILITIES AND OTHER SITE FEATURES SHALL BE PROTECTED UNLESS MARKED FOR REMOVAL OR RELOCATION.
29. ALL WETLANDS AND STREAMS LOCATED WITHIN 50 FEET OF THE CONSTRUCTION AREA ON THE PROJECT SITE SHALL BE CLEARLY MARKED (EXAMPLE- ORANGE FABRIC FENCING) PRIOR TO ANY LAND DISTURBING ACTIVITIES AND MUST BE MAINTAINED ON THE PROPERTY UNTIL THE PROJECT PHASE IS COMPLETED. [15A NCAC 02H .0506 (B)(2)]
30. THE CONTRACTOR SHALL USE A STANDARD CONSTRUCTION ENTRANCE AT ALL SITE ACCESS POINTS TO PREVENT SEDIMENT FROM BEING TRACKED ONTO PUBLIC ROADS.
31. THE CONTRACTOR SHALL USE TEMPORARY SILT FENCE ALONG THE DOWNSLOPE SIDE OF ALL STAGING AREAS AND TEMPORARY STOCK PILE AREAS.
32. THE TURBIDITY STANDARD OF 50 NTUS (NEPHELOMETRIC TURBIDITY UNITS) SHALL NOT BE EXCEEDED AS DESCRIBED IN 15A NCAC 02B .0200. APPROPRIATE SEDIMENT AND EROSION CONTROL PRACTICES MUST BE USED TO MEET THIS STANDARD. [15A NCAC 02B .0211 (21)]
33. EQUIPMENT SHALL BE WELL-MAINTAINED, CLEANED PRIOR TO MOBILIZATION, AND CHECKED DAILY FOR LEAKS OF PETROLEUM PRODUCTS. FUELING, LUBRICATION AND GENERAL EQUIPMENT MAINTENANCE SHOULD NOT TAKE PLACE WITHIN 50 FEET OF A WATERBODY OR WETLANDS TO PREVENT CONTAMINATION BY FUEL AND OILS. [15A NCAC 02H .0506 (B)(3) AND 15A NCAC 02B .0211(12)]
34. CONSTRUCTION SHALL BE TIMED TO OCCUR DURING TIMES OF LOW FLOW.
35. THE DESIGNER OR HIS DESIGNEE SHALL SUPERVISE THE INSTALLATION OF IN-STREAM STRUCTURES. [15A NCAC 02H .0506(B)(1) AND (2)].
36. A TEMPORARY DIVERSION SHALL BE USED TO DURING ALL STREAM RESTORATION AND STABILIZATION WORK ON BAT FORK AS SHOWN IN THE DETAILS.
37. THE STREAM BANKS, IN-STREAM STRUCTURES AND WORK AREA MUST BE STABILIZED AT THE END OF EACH DAY BEFORE THE TEMPORARY IN-STREAM DIVERSIONS AND/OR PUMP AROUNDS ARE REMOVED AND FLOW IS RETURNED THE FULL CHANNEL.
38. EROSION CONTROL MATTING THAT INCORPORATES PLASTIC MESH AND/OR PLASTIC TWINE SHALL NOT BE USED ALONG STREAMBANKS OR WITHIN WETLANDS. DISTURBED AREAS SHOULD BE SEEDED, MULCHED, AND/OR MATTED AS SOON AS POSSIBLE, PREFERABLY AT THE END OF EACH WORKDAY. [15A NCAC 02B .0201]
39. IF BORROW OR WASTE MATERIAL IS REQUIRED OR GENERATED DURING GRADING OPERATIONS, AN APPROVED EROSION AND SEDIMENT CONTROL PERMIT MUST BE SECURED FOR THE BORROW OR WASTE MATERIAL SITE PRIOR TO INITIATION OF ANY LAND DISTURBING ACTIVITY. [15A NCAC 04B .0110].

**QUANTITIES AND MATERIALS NOTES AND SPECIFICATIONS**

40. THE CONTRACTOR SHALL FURNISH ALL MATERIALS NECESSARY TO COMPLETE THE PROPOSED WORK UNLESS OTHER PROVISIONS HAVE BEEN AGREED UPON PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL DELIVER ALL MATERIALS TO THE DESIGNATED ACCESS POINTS AND STAGING AREAS. MATERIAL QUANTITIES, DIMENSIONS AND SIZES SHALL CONFORM TO THE NOTES AND SPECIFICATIONS PROVIDED IN THE CONSTRUCTION DOCUMENTS. THE ENGINEER MAY INSPECT AND APPROVE ALL MATERIALS PRIOR TO CONSTRUCTION. IF MATERIALS DO NOT MEET THE MINIMUM REQUIREMENTS SPECIFIED IN THE CONSTRUCTION DOCUMENTS, THE ENGINEER SHALL REJECT THE MATERIALS.
41. COSTS INCURRED DUE TO PROJECT DELAYS RESULTING FROM FAILURE OF THE CONTRACTOR TO MEET THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS SHALL BE THE EXPENSE OF THE CONTRACTOR. QUANTITIES LISTED ARE ESTIMATES ONLY AND SHALL BE CONFIRMED BY THE CONTRACTOR.
42. THE EROSION CONTROL MEASURES DEPICTED ON THE DRAWINGS SHALL BE INSTALLED AS NEEDED TO KEEP ALL SEDIMENT ON SITE AND OUT OF STREAMS AND WETLANDS. ADDITIONAL EROSION CONTROL MEASURES (ABOVE THOSE SHOWN ON THE DRAWINGS) MAY BE REQUIRED IN ORDER TO KEEP ALL SEDIMENT ON SITE AND OUT OF STREAMS AND WETLANDS. THE CONTRACTOR SHALL OBTAIN APPROVAL FROM THE PROJECT OWNER AND ENGINEER PRIOR TO INSTALLATION OF ADDITIONAL EROSION CONTROL MEASURES.
43. ANY ADDITIONAL GRADING OTHER THAN WHAT IS SHOWN ON THE PLANS SHALL REQUIRE PRIOR APPROVAL FROM THE PROJECT OWNER AND ENGINEER.
44. THE USE OF ANY BRAND NAMES/MANUFACTURERS OR MODELS IS INTENDED SOLELY TO DENOTE THE QUALITY STANDARD OF THE DESIRED PRODUCT. ANY USE OF BRAND NAMES IS NOT INTENDED TO RESTRICT BIDDERS TO A SPECIFIC BRAND, MAKE, MANUFACTURER, OR THE BRAND NAMES / MANUFACTURERS OF MODELS ARE INTENDED TO CONVEY THE GENERAL STYLE, TYPE, CHARACTER, AND QUALITY OF PRODUCT. EQUIVALENT PRODUCTS WILL BE ACCEPTABLE IF THE PROJECT OWNER OR ENGINEER HAS GIVEN APPROVAL OF THE SPECIFIC PRODUCT IN WRITING.
46. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROVIDING STORAGE AREAS FOR CONSTRUCTION MATERIALS AND EQUIPMENT. THE MATERIAL AND EQUIPMENT STORAGE SHALL COMPLY WITH THE CONSTRUCTION DOCUMENTS AND ALL LOCAL, STATE AND FEDERAL REGULATIONS THROUGHOUT THE CONSTRUCTION PERIOD. THE CONTRACTOR SHALL RESTORE THE STORAGE AREA TO ITS ORIGINAL (OR BETTER) CONDITION UPON COMPLETION OF THE PROJECT OR UPON SUCH TIME AS DIRECTED BY THE PROJECT OWNER AND ENGINEER. SUCH RESTORATION SHALL BE AT NO ADDITIONAL COST TO THE PROJECT OWNER. THE CONTRACTOR SHALL WARRANTY ALL MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF ACCEPTANCE OF BY THE PROJECT OWNER AND SHALL REPLACE ANY PORTIONS THAT FAIL DUE TO FAULTY MATERIALS OR WORKMANSHIP, AT NO ADDITIONAL COST TO THE PROJECT OWNER. A SIX MONTH AND ELEVEN (11) MONTH INSPECTION WILL BE PERFORMED DURING THE WARRANTY PERIOD. THE CONTRACTOR SHALL IMMEDIATELY REPAIR ALL ITEMS DETERMINED BY THE PROJECT OWNER OR AUTHORIZED REPRESENTATIVE TO BE DEFECTIVE UPON NOTIFICATION. THE CONTRACTOR SHALL IMMEDIATELY REPAIR OR REPLACE FAILED ITEMS UPON NOTIFICATION BY THE PROJECT OWNER. SEASONALLY INSTALLED ITEMS SHALL BE REPAIRED OR REPLACED DURING THE NEXT AVAILABLE INSTALLATION PERIOD. ITEMS REPAIRED OR REPLACED UNDER THIS PROVISION SHALL HAVE AN ADDITIONAL ONE (1) YEAR WARRANTY PERIOD FROM THE NEW DATE OF ACCEPTANCE. AREAS AND/OR OTHER WORK DISTURBED WHILE ACCESSING AND/OR REPAIRING/REPLACING WARRANTY COVERED ITEMS SHALL BE STABILIZED.




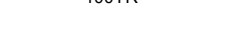





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**BAT FORK STREAM RESTORATION**  
**BAT FORK**  
**EAST FLAT ROCK, NC**  
**HENDERSON COUNTY**  
**PERMIT DRAWING**  
**PROJECT NOTES AND SPECIFICATIONS**  
**NOT FOR CONSTRUCTION**

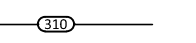




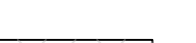

  
 7 SAMUEL ASHE DRIVE  
 ASHEVILLE, NC 28805

**STANDARD LINES AND SYMBOLS**




**EXISTING SITE FEATURES**

-  PARCEL BOUNDARY
-  EXISTING MAJOR CONTOUR
-  EXISTING MINOR CONTOUR
-  FEMA SFHA ZONE AE
-  EXISTING CULVERT
-  EXISTING STREAM CENTERLINE
-  EXISTING SANITARY SEWER
-  EXISTING OVERHEAD POWER
-  EXISTING WETLAND


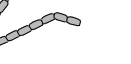
**DESIGN SITE FEATURES**

-  DESIGN MAJOR CONTOUR
-  DESIGN MINOR CONTOUR
-  DESIGN STREAM CENTERLINE
-  DESIGN STREAM BANKFULL
-  DESIGN FLOODPLAIN TOE OF SLOPE
-  DESIGN GRADING LIMITS
-  DESIGN CHANNEL PLUG

**DESIGN STREAM FEATURES**

-  DESIGN CONSTRUCTED RIFFLE
-  DESIGN ROCK TOE PROTECTION
-  DESIGN BRUSH TOE PROTECTION

**DESIGN STREAM FEATURES**

-  DESIGN LOG J-HOOK VANE
-  DESIGN BOULDER J-HOOK VANE

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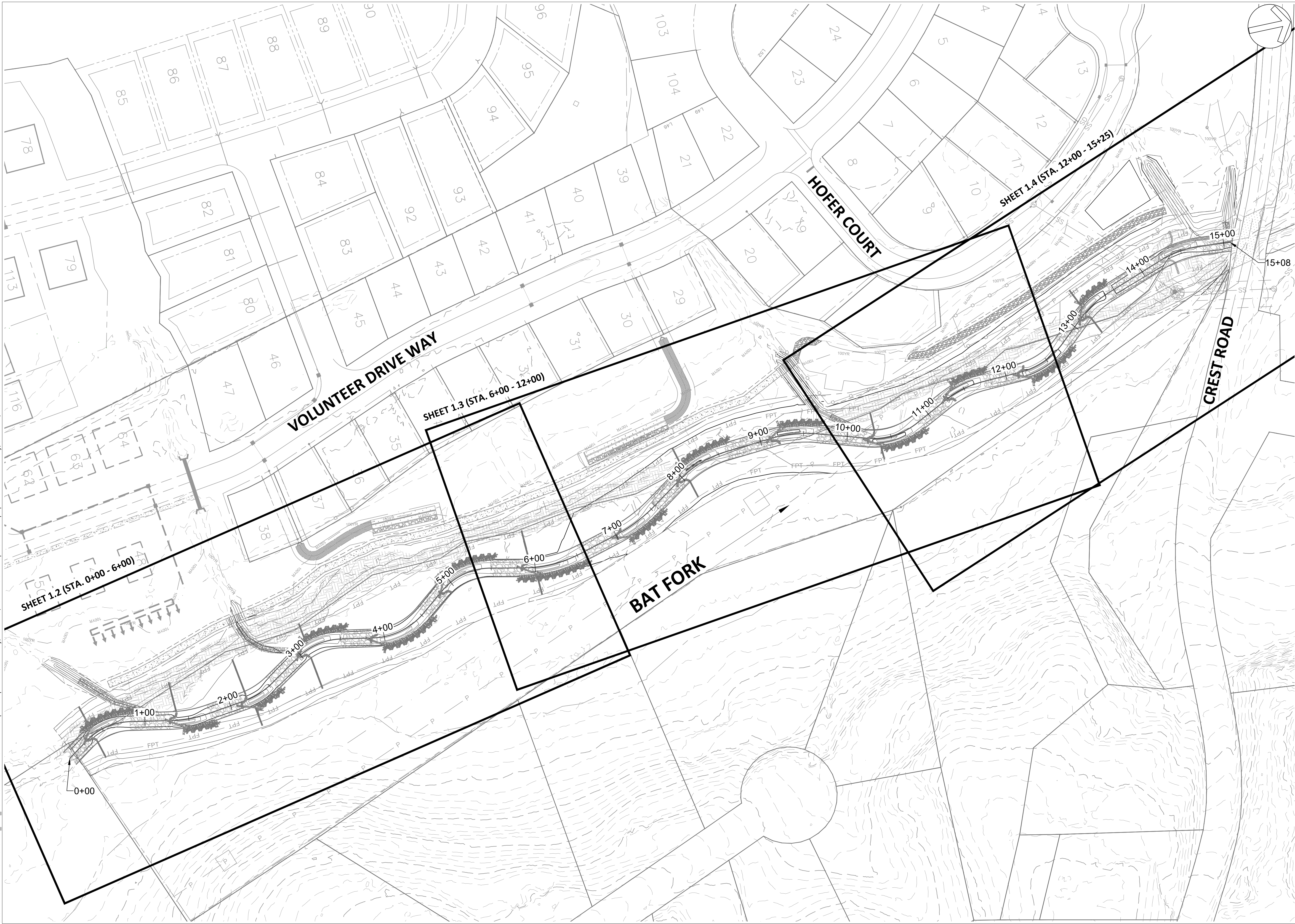








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**BAT FORK STREAM RESTORATION**  
**BAT FORK**  
**EAST FLAT ROCK, NC**  
**HENDERSON COUNTY**

PERMIT DRAWING  
 SITE PLAN OVERVIEW

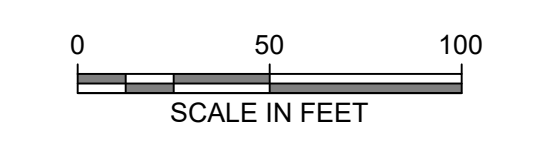
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7 SAMUEL ASHE DRIVE  
 ASHEVILLE, NC 28805

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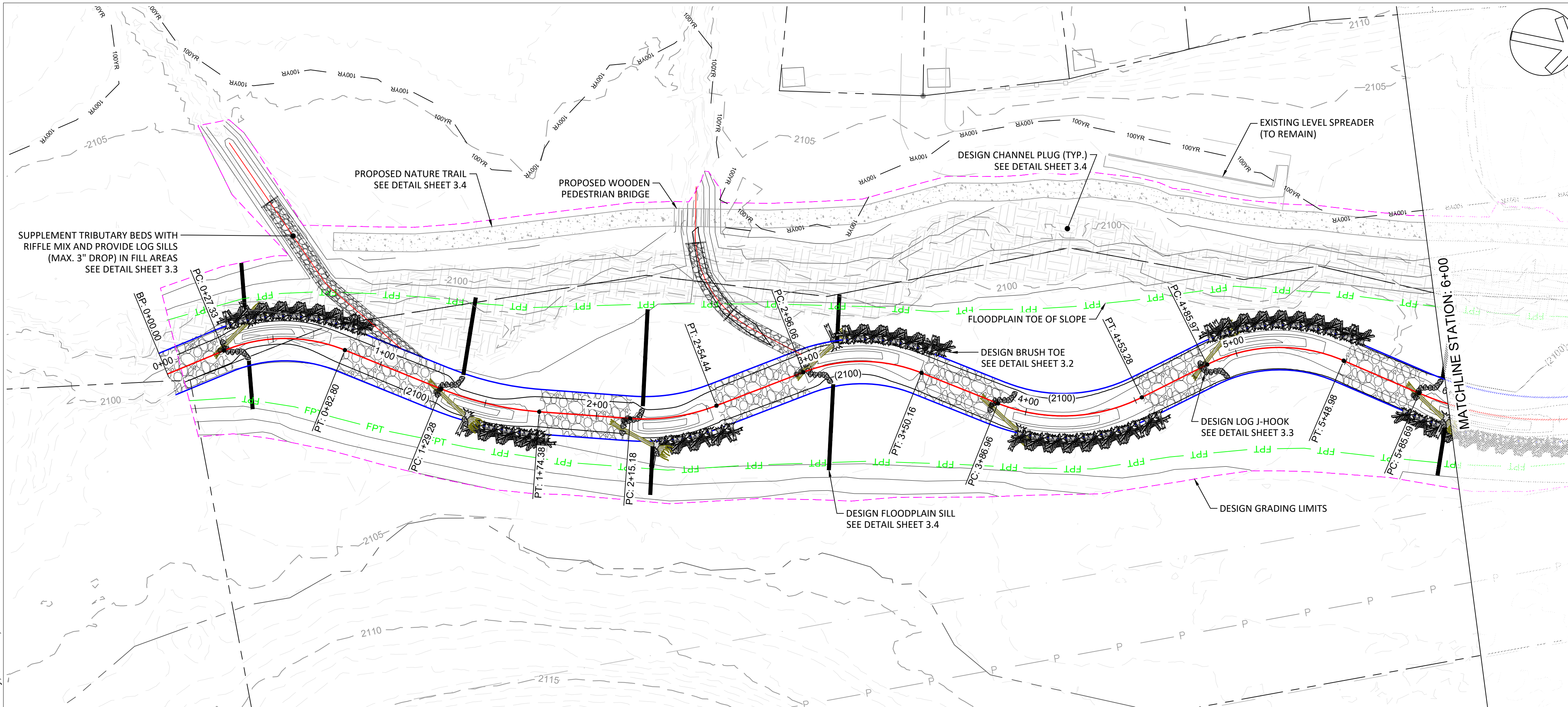
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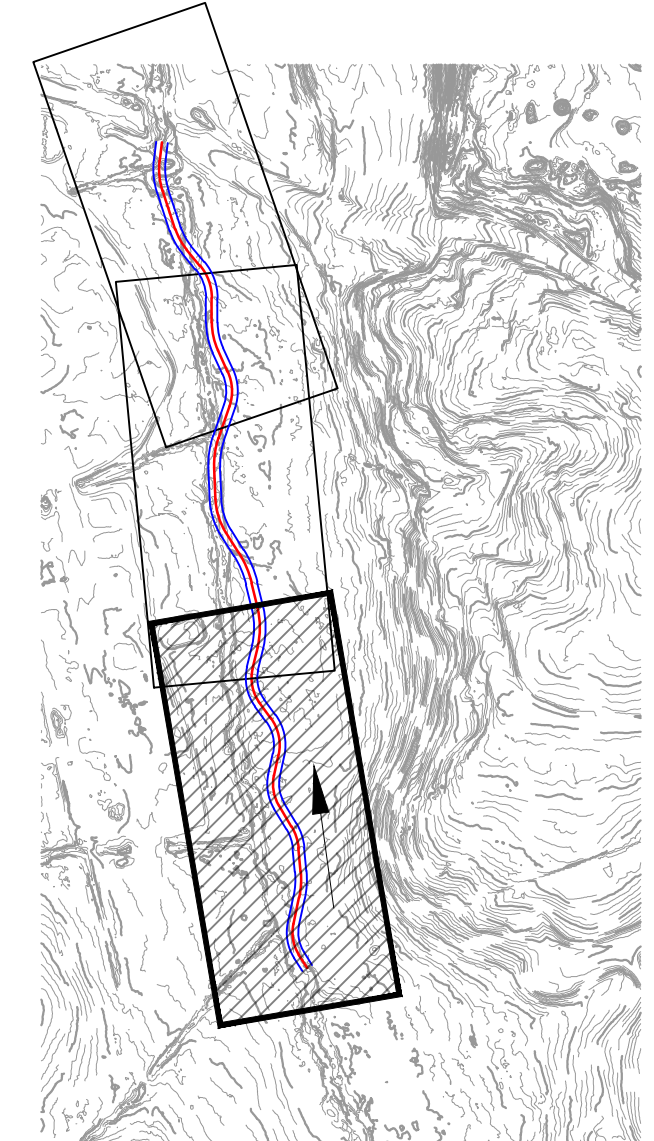
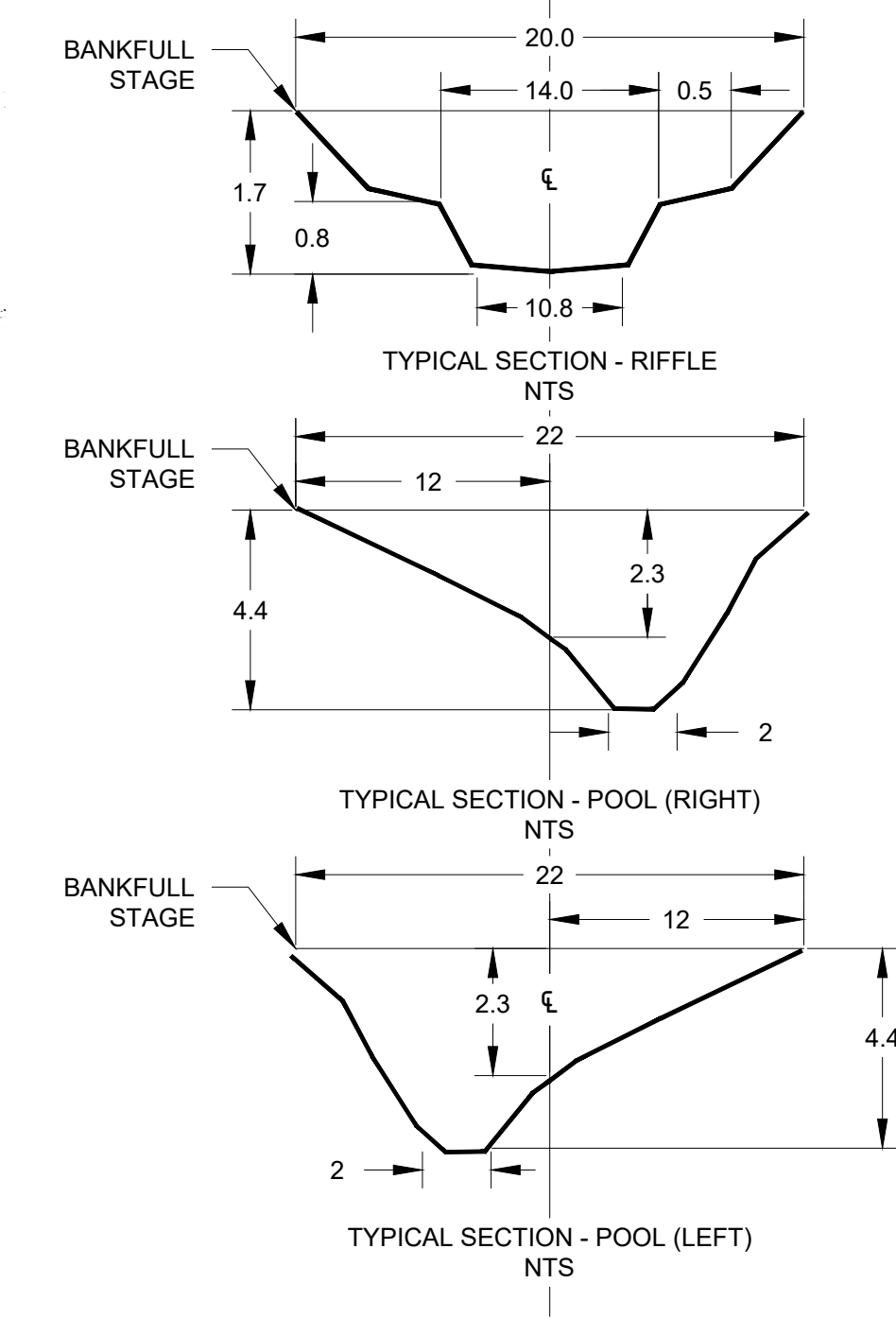
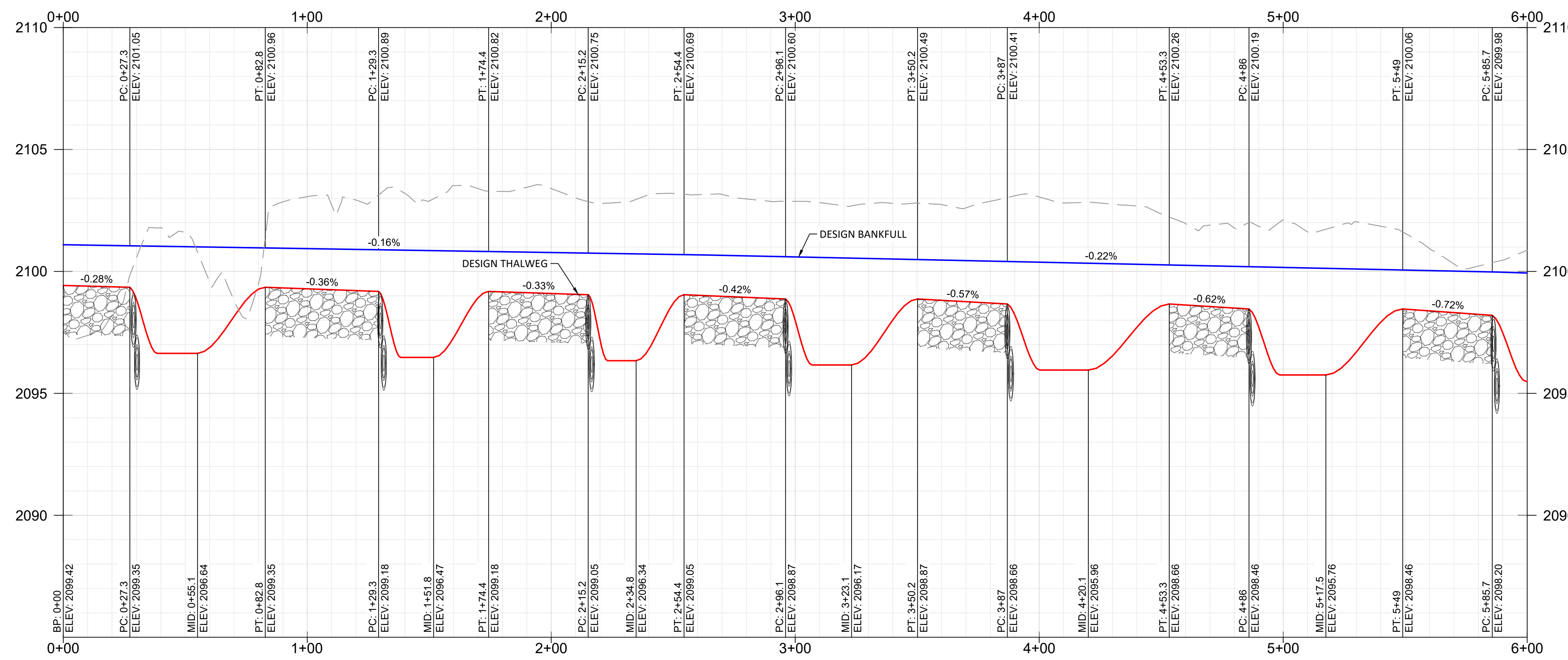
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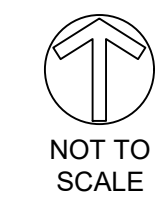
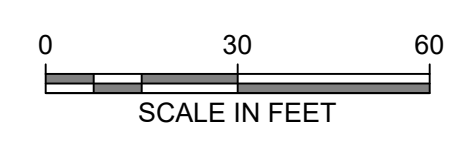
**BAT FORK STREAM RESTORATION**  
**BAT FORK**  
**EAST FLAT ROCK, NC**  
**HENDERSON COUNTY**

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**Jennings Environmental**  
 7 SAMUEL ASHE DRIVE  
 ASHVILLE, NC 28805

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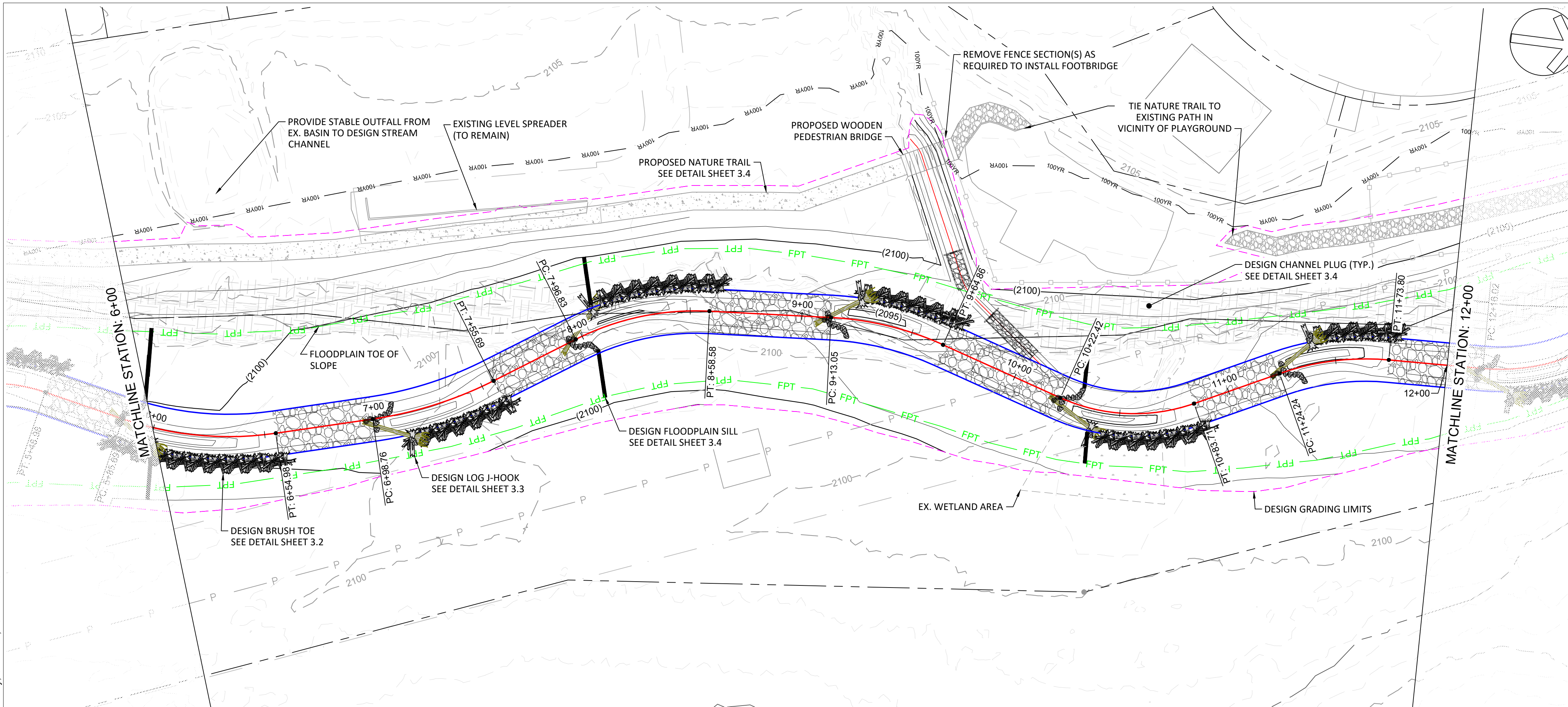
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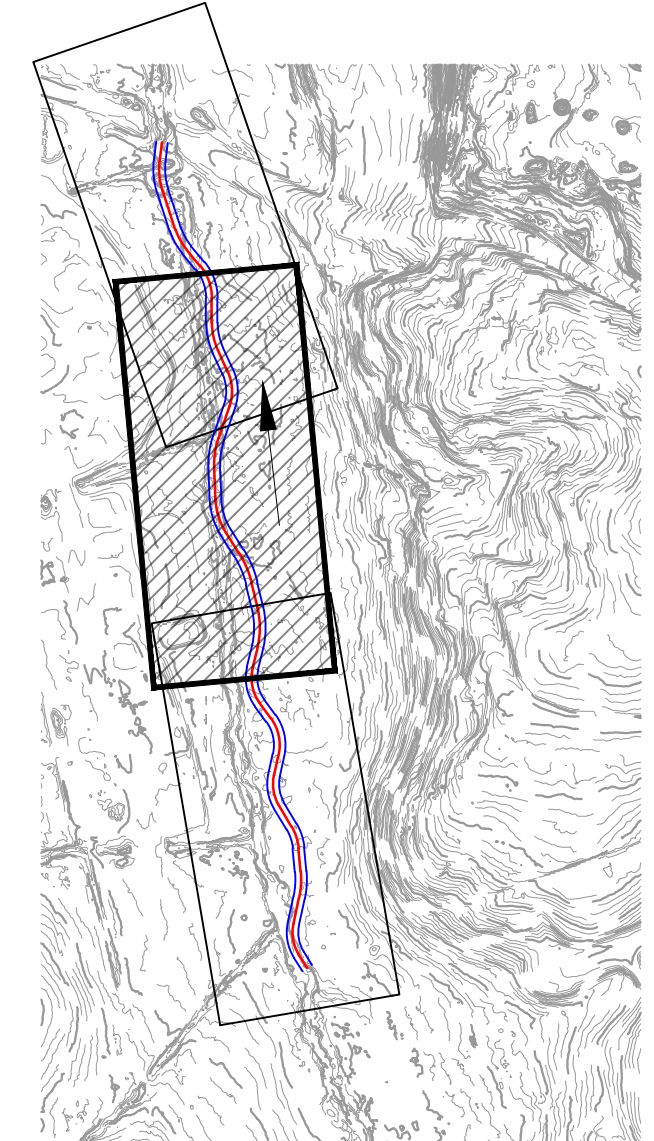
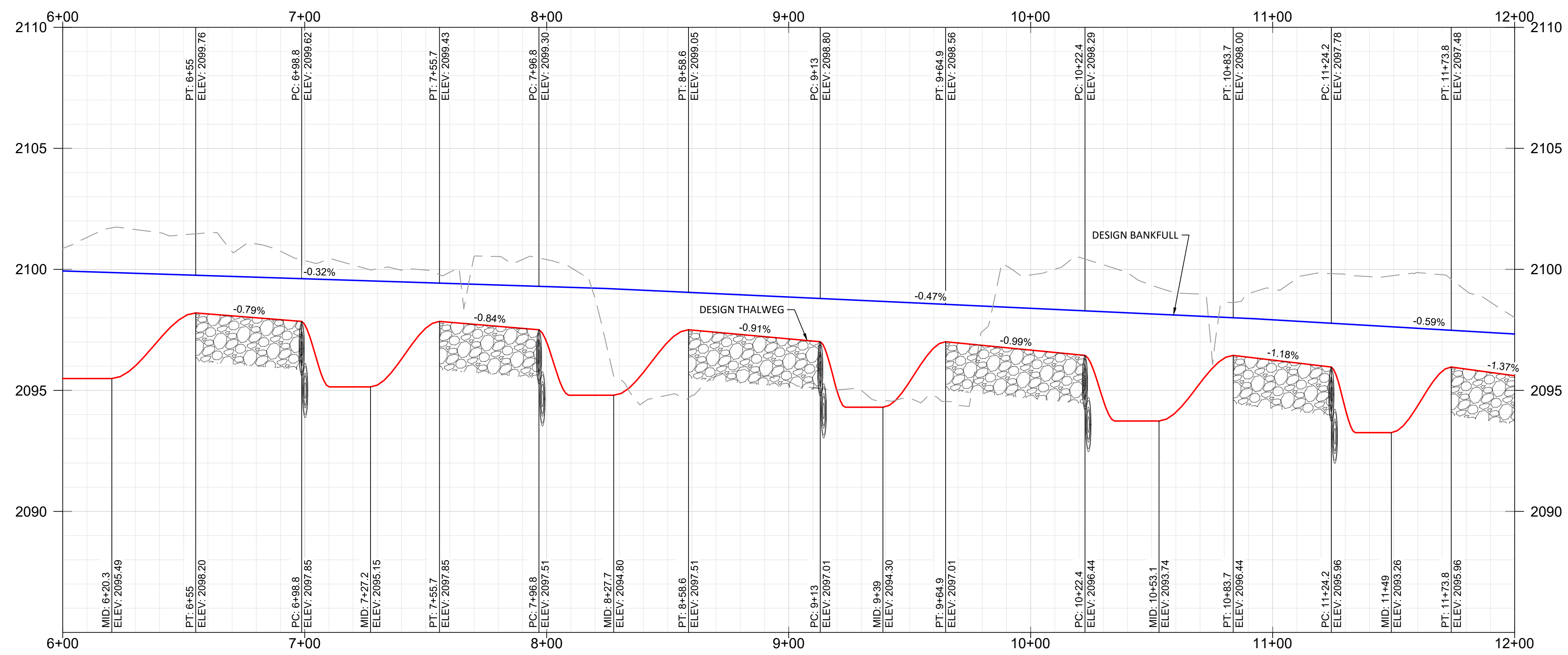
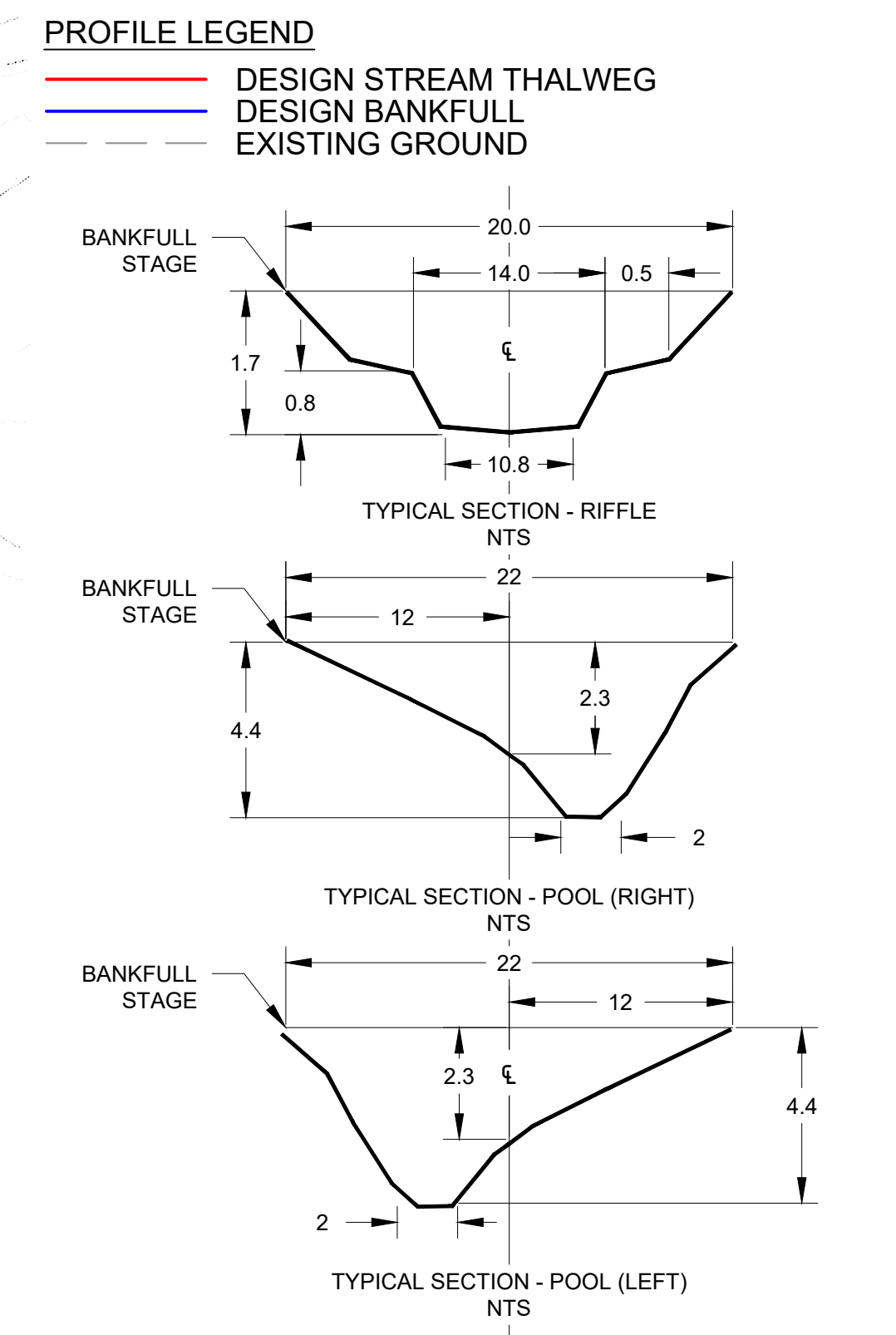
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- PLAN LEGEND**
- DESIGN STREAM CENTER LINE
  - DESIGN BANKFULL
  - DESIGN FLOODPLAIN TOE
  - DESIGN GRADING LIMITS
  - (483) DESIGN MAJOR CONTOUR
  - 479 DESIGN MINOR CONTOUR
  - EXISTING MAJOR CONTOUR
  - EXISTING MINOR CONTOUR
  - PROPOSED NATURE TRAIL (NATURAL SURFACE)
  - PROPOSED NATURE TRAIL (GRAVEL SURFACE)
  - PROPOSED WOODEN PEDESTRIAN BRIDGE
- STRUCTURE LEGEND**
- DESIGN RIFFLE
  - CHANNEL PLUG
  - BRUSH TOE
  - ROCK TOE
  - LOG J-HOOK
  - BOULDER J-HOOK
  - FLOODPLAIN LOG SILL
  - FLOODPLAIN BOULDER SILL



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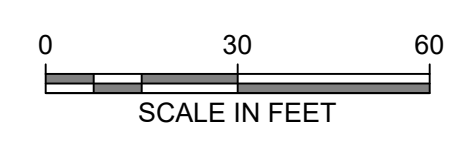
BAT FORK STREAM RESTORATION  
 BAT FORK  
 EAST FLAT ROCK, NC  
 HENDERSON COUNTY

PERMIT DRAWING  
 DESIGN PLAN & PROFILE SHEET 2  
 STA 6+00 - STA 12+00  
 NOT FOR CONSTRUCTION

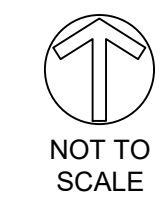
**Jennings Environmental**  
 7 SAMUEL ASHE DRIVE  
 ASHVILLE, NC 28805

PERMIT DRAWING  
 NOT FOR CONSTRUCTION

DATE: 10/4/2022  
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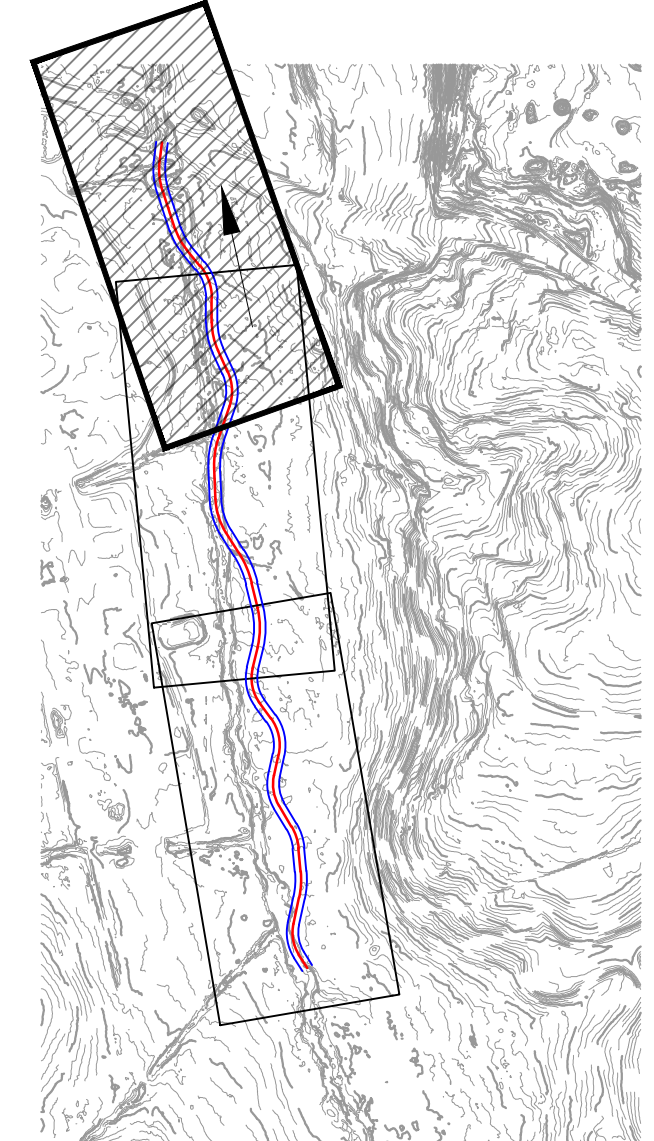
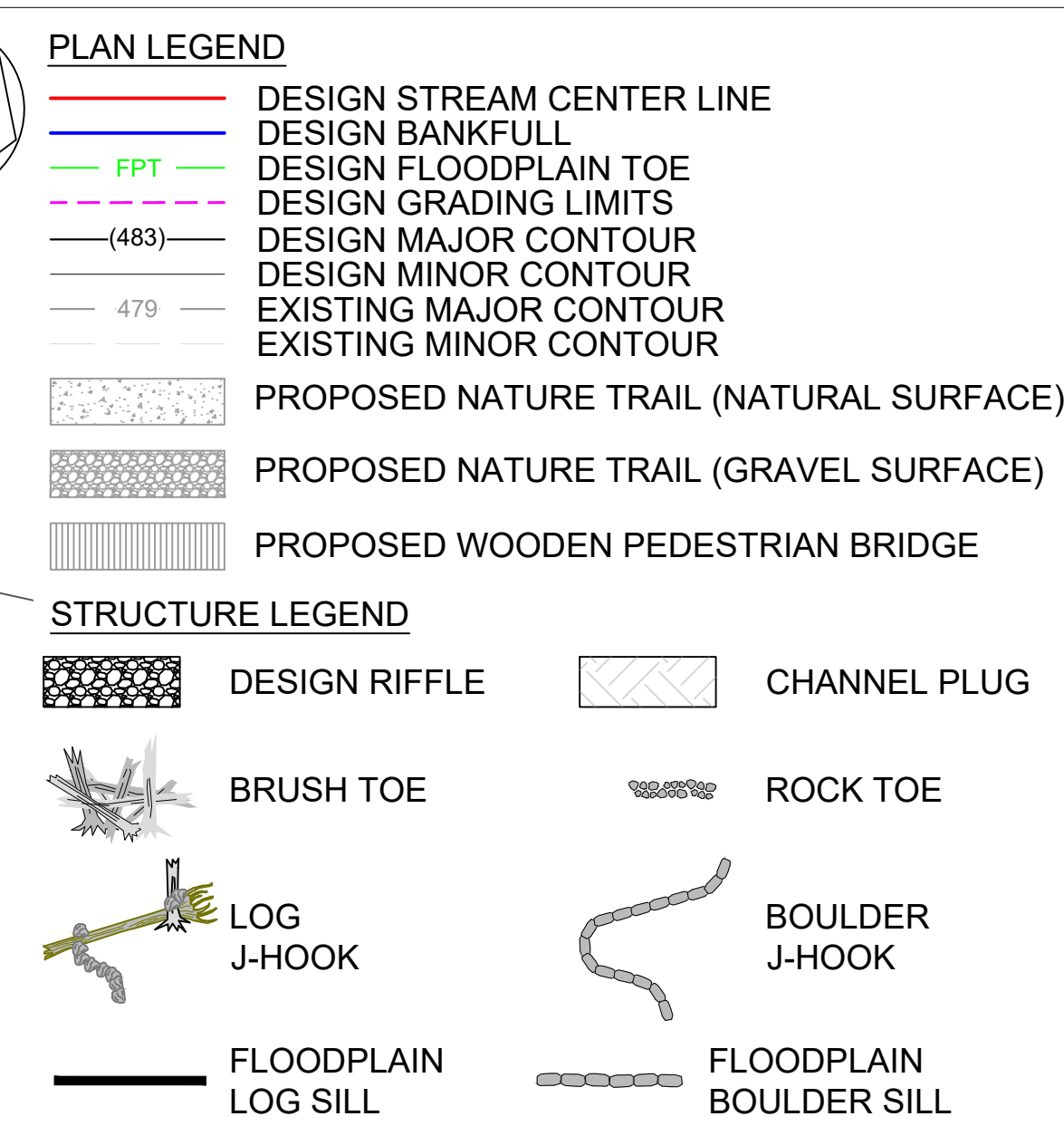
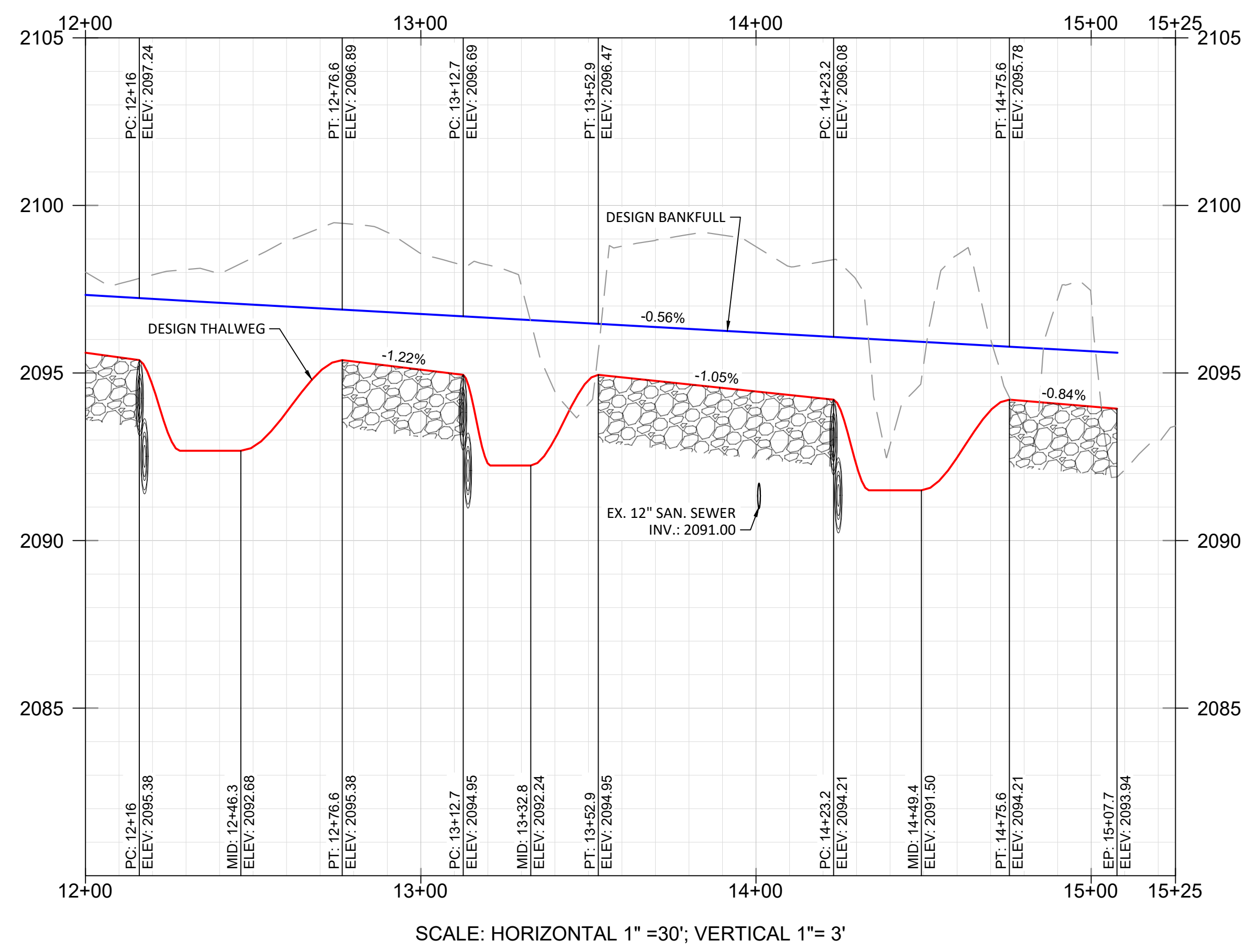
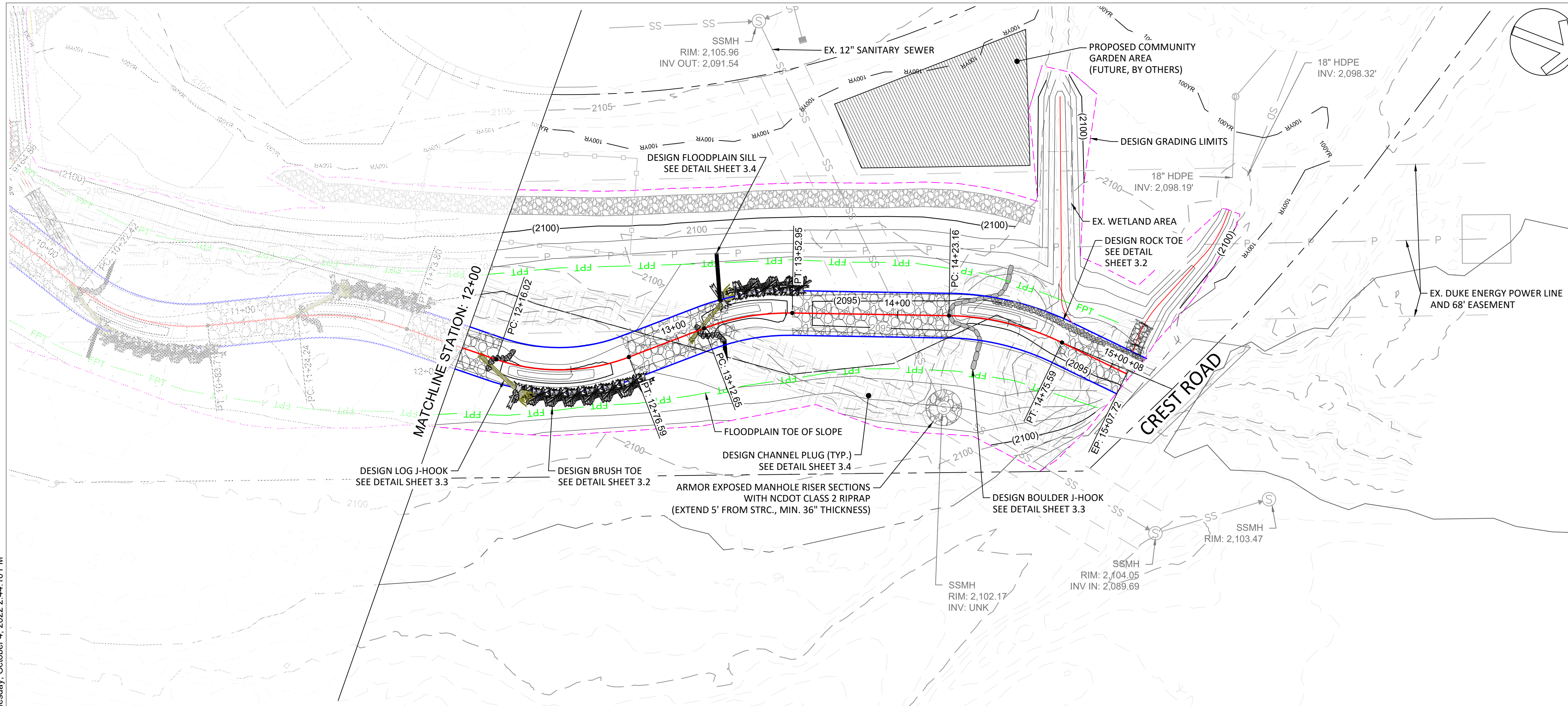


SHEET NUMBER  
 1.3 OF 20





C:\USERS\MIKE\DESKTOP\2022\BAT\_FORK\CADD\SHEETS\PLR.DWG | MIKE | SAVED: Tuesday, October 4, 2022 2:27:39 PM | ACAD.CTB | PLOTTED: Tuesday, October 4, 2022 2:44:10 PM



APPROVED BY: MUG	CHECKED BY: MUG	DRAWN BY: MUG
APPROV	DESCRIPTION	DRAFT 30% DESIGN PLAN SET
REV	DESCRIPTION	
A		

BAT FORK STREAM RESTORATION  
 BAT FORK  
 EAST FLAT ROCK, NC  
 HENDERSON COUNTY

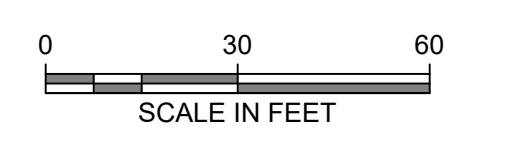
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 NOT FOR CONSTRUCTION



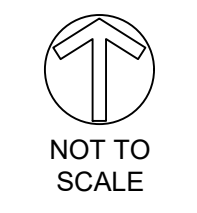
7 SAMUEL ASHE DRIVE  
 ASHVILLE, NC 28805

PERMIT DRAWING  
 NOT FOR CONSTRUCTION

DATE: 10/4/2022  
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 SCALE (17"X11"): 1" = 60'

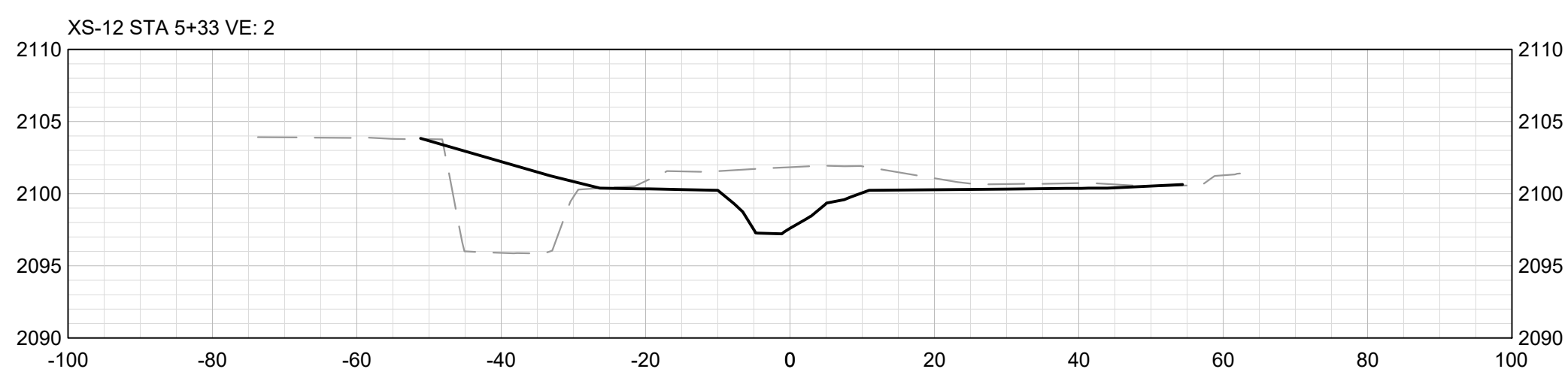
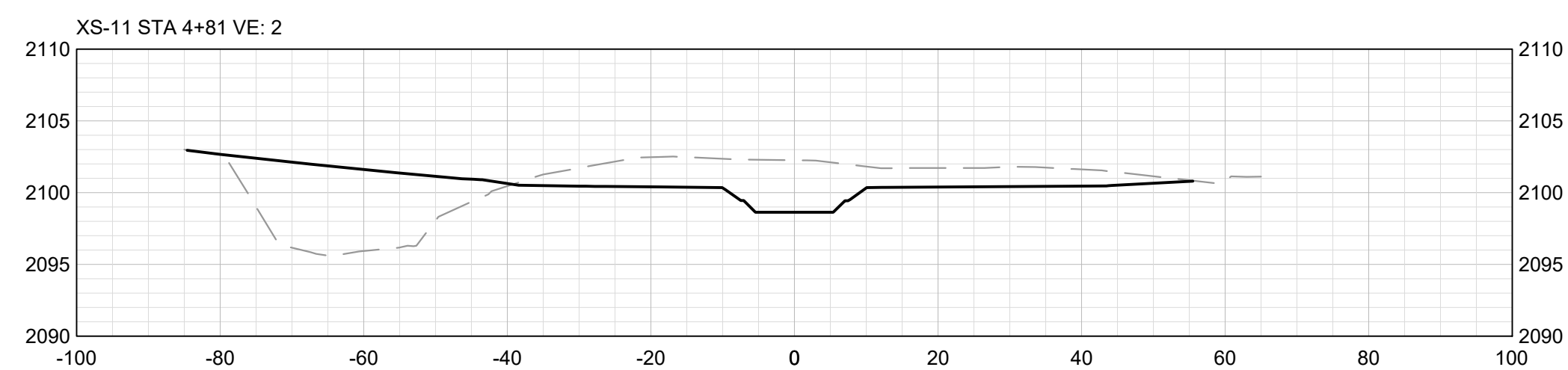
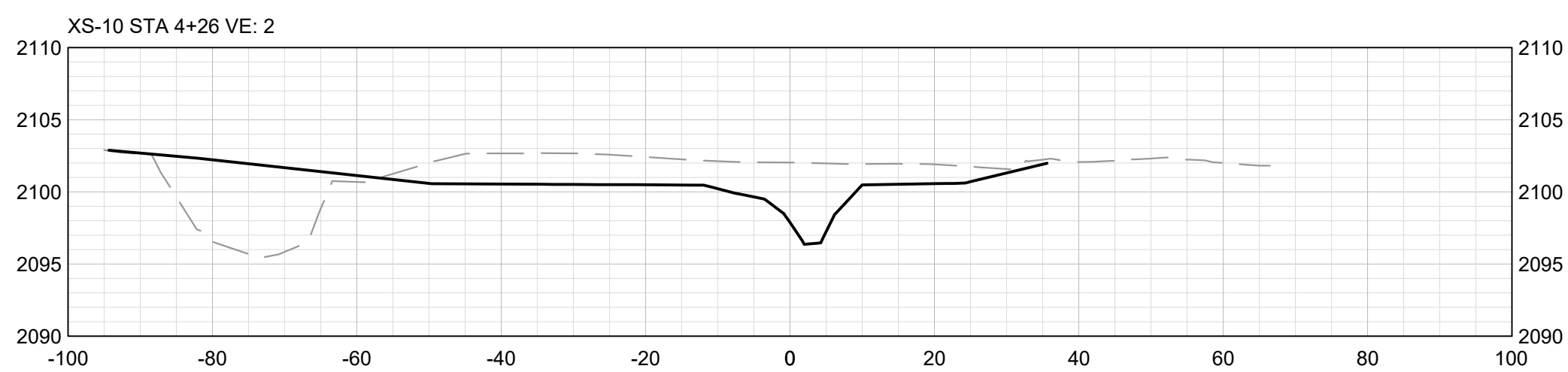
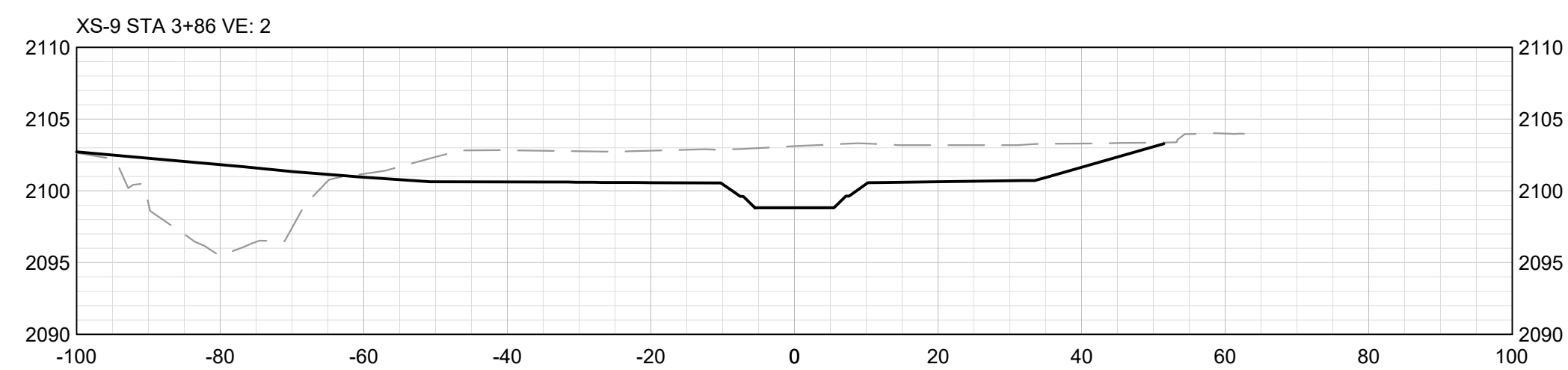
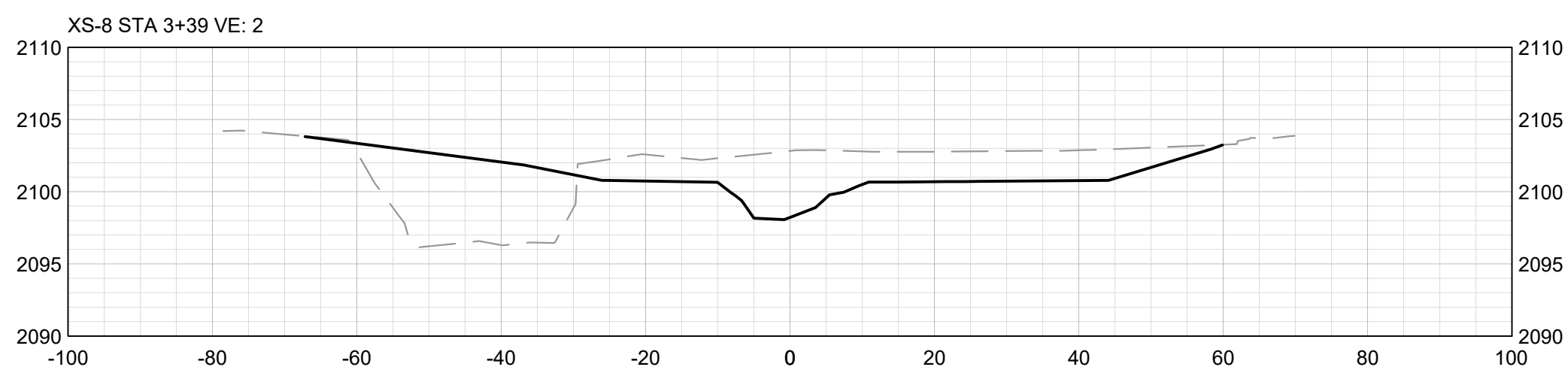
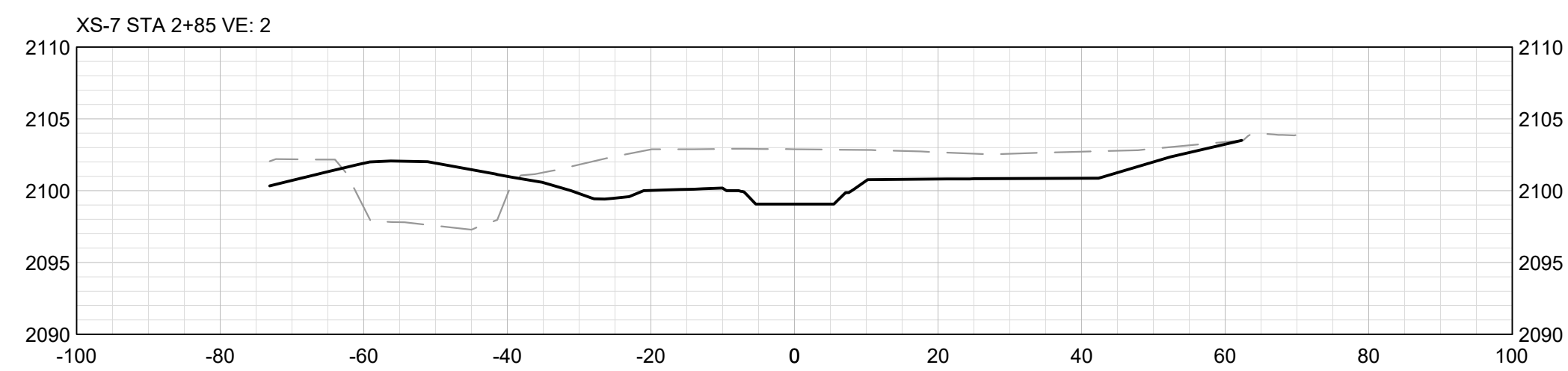
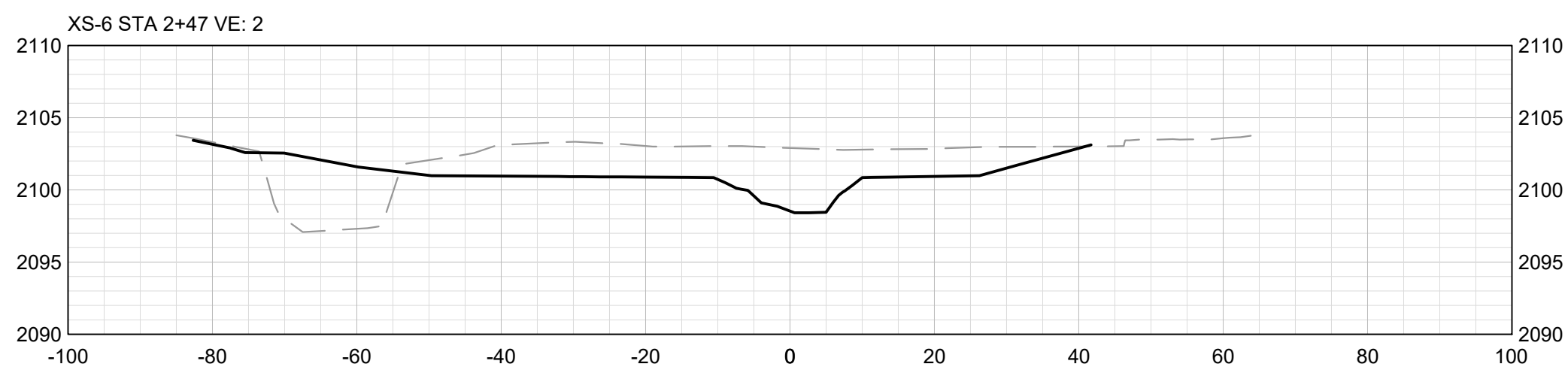
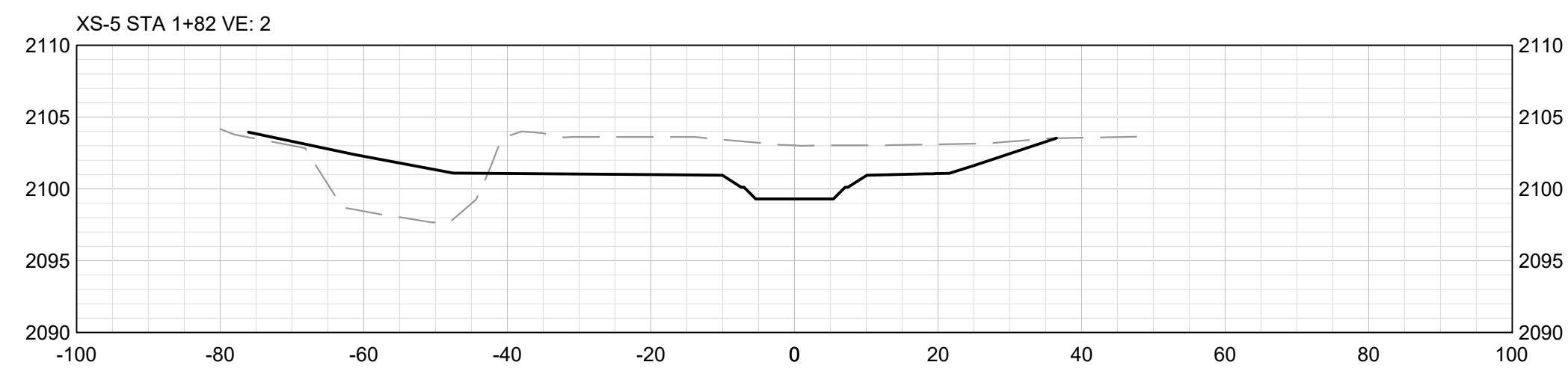
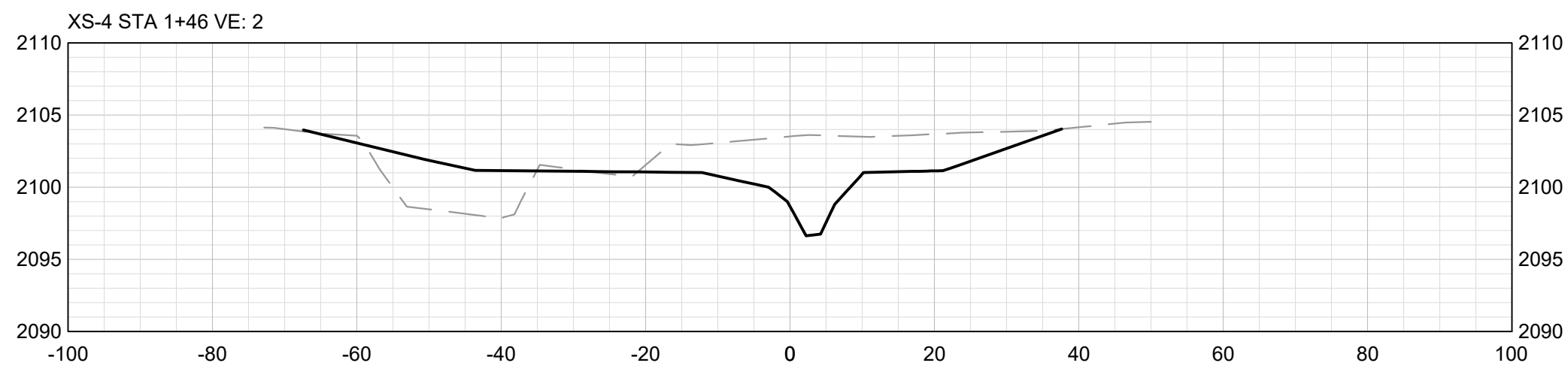
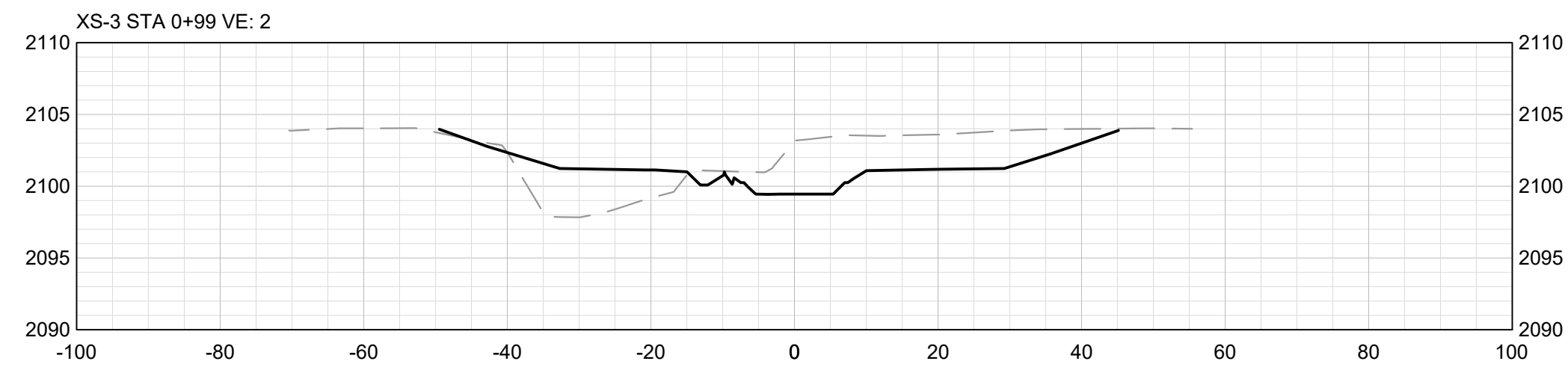
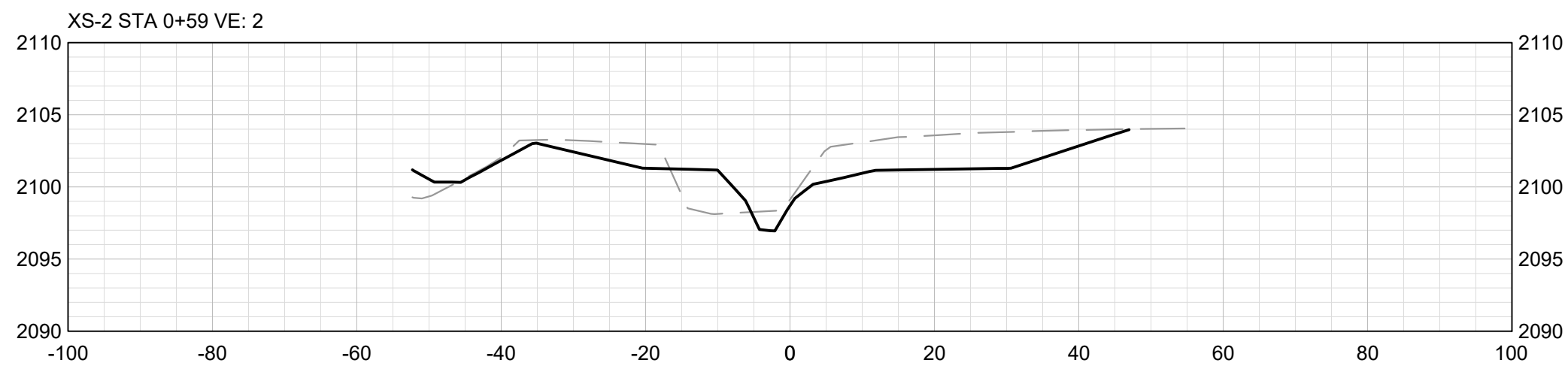
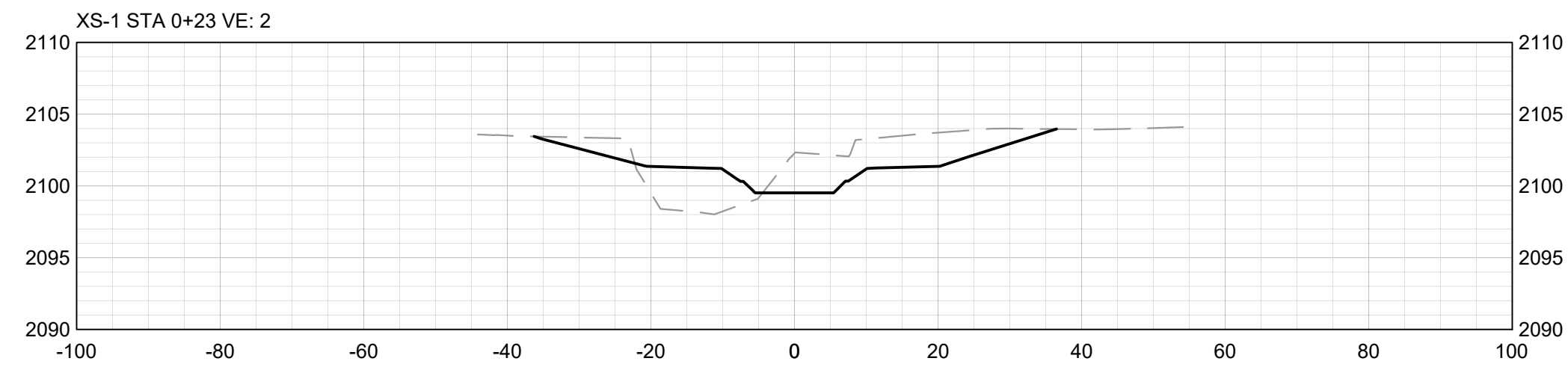


SHEET NUMBER  
 1.4 OF 20





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**SECTION LEGEND**  
 ——— DESIGN SURFACE  
 - - - EXISTING GROUND

APPROVED BY: MUG	CHECKED BY: MUG	DRAWN BY: MUG
REV	DESCRIPTION	
A	DRAFT 30% DESIGN PLAN SET	

**BAT FORK STREAM RESTORATION**  
**BAT FORK**  
**EAST FLAT ROCK, NC**  
**HENDERSON COUNTY**

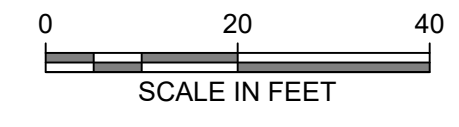
PERMIT DRAWING  
 DESIGN CROSS-SECTIONS SHEET 1  
 XS 1 - XS 12  
 NOT FOR CONSTRUCTION



7 SAMUEL ASHE DRIVE  
 ASHEVILLE, NC 28805

PERMIT DRAWING  
 NOT FOR CONSTRUCTION

DATE: 10/4/2022  
 SCALE (34"X22"): 1" = 20'  
 SCALE (17"X11"): 1" = 40'



SHEET NUMBER  
 2.1 OF 20







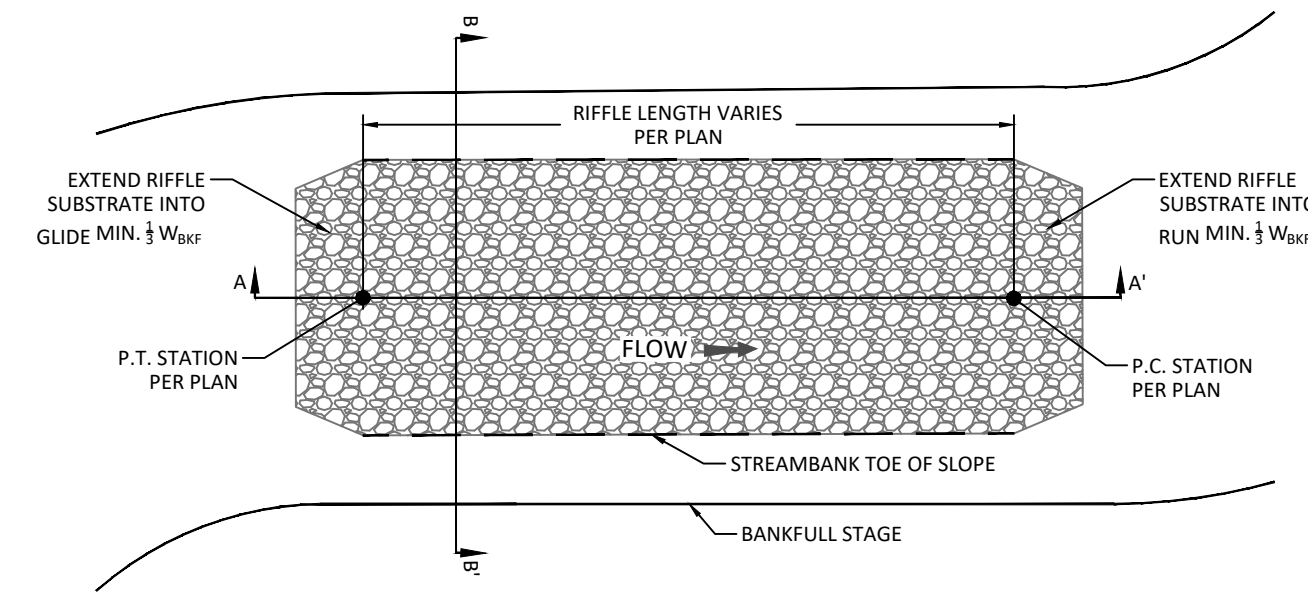




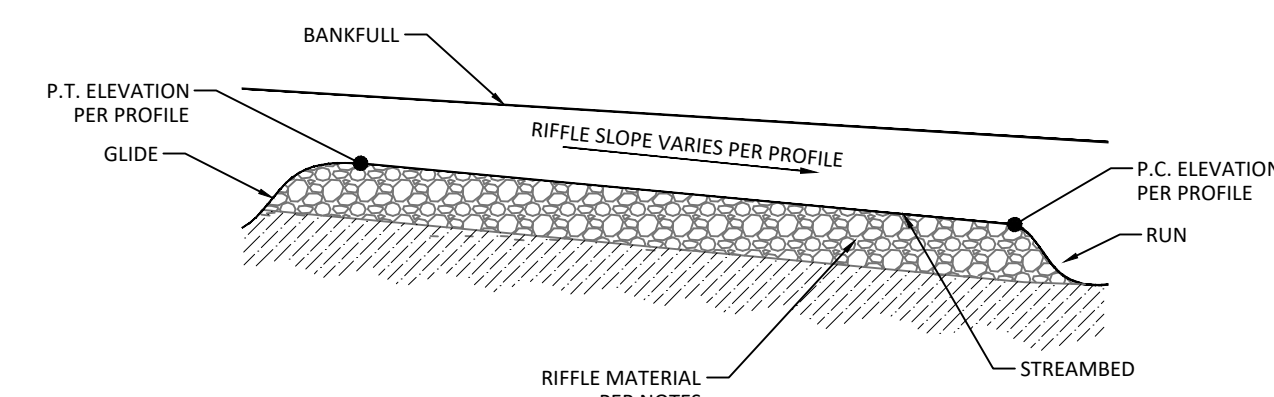
C:\USERS\MIKE\DROPBOX\2022\_BAT\_FORK\C3D\DETAIL\BAT\_FORK\_DESIGN\_DETAILS.DWG | MIKE | SAVED: Tuesday, October 4, 2022 11:15:57 AM | A:CAD.CTB | PLOTTED: Tuesday, October 4, 2022 2:44:29 PM

**CONSTRUCTED RIFFLE SPECIFICATIONS**

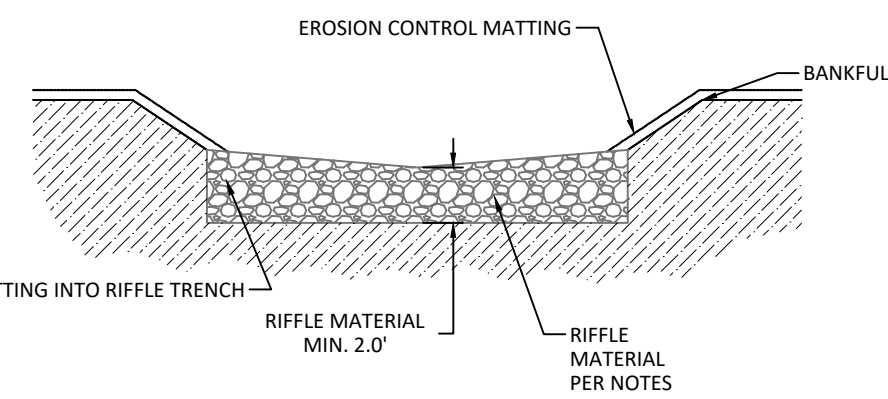
- FOR INSTALLATION, THE CONTRACTOR SHALL OVER EXCAVATE THE LENGTH OF THE RIFFLE AND BACKFILL THE TRENCH WITH THE SPECIFIED RIFFLE SUBSTRATE MATERIAL TO THE ELEVATIONS SHOWN ON THE PROPOSED PROFILE.
- RIFFLE MATERIAL SHALL EXTEND A MINIMUM OF  $\frac{1}{3} W_{\text{riff}}$  U/S OF THE P.T. INTO THE GLIDE AND A MINIMUM OF  $\frac{1}{3} W_{\text{riff}}$  D/S OF THE P.C. INTO THE RUN.
- THE RIFFLE MATERIAL SHALL BE PLACED AT A UNIFORM THICKNESS SUCH THAT, IN CROSS-SECTION, ITS LOWEST ELEVATION OCCURS IN THE CENTER OF THE CHANNEL.
- RIFFLE MATERIAL SHALL BE COMPACTED USING AN EXCAVATOR BUCKET SUCH THE DEEPEST POINT OF THE CHANNEL IS ALONG THE CENTERLINE AND THAT FUTURE SETTLEMENT OF THE MATERIAL IS KEPT TO A MINIMUM.
- CONSTRUCTED RIFFLES SHALL BE BACKFILLED WITH RIFFLE MATERIAL CONSISTING OF QUARRIED STONE. RIFFLE MATERIAL SHALL BE PLACED AT A UNIFORM THICKNESS SUCH THAT, IN CROSS-SECTION, ITS LOWEST ELEVATION OCCURS IN THE CENTER OF THE CHANNEL. RIFFLE MATERIAL SHALL BE COMPACTED USING AN EXCAVATOR BUCKET SUCH THAT FUTURE SETTLEMENT OF THE MATERIAL IS KEPT TO A MINIMUM.
- CONSTRUCTED RIFFLE MATERIAL SPECIFICATIONS:
  - NCDOT CLASS 1 - 70%
  - NCDOT CLASS B - 30%
- THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR INVERT ELEVATIONS SHALL BE WITHIN 0.1 FT OF THE GRADES AND ELEVATIONS INDICATED.
- RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.



**DETAILED PLAN**  
NOT TO SCALE

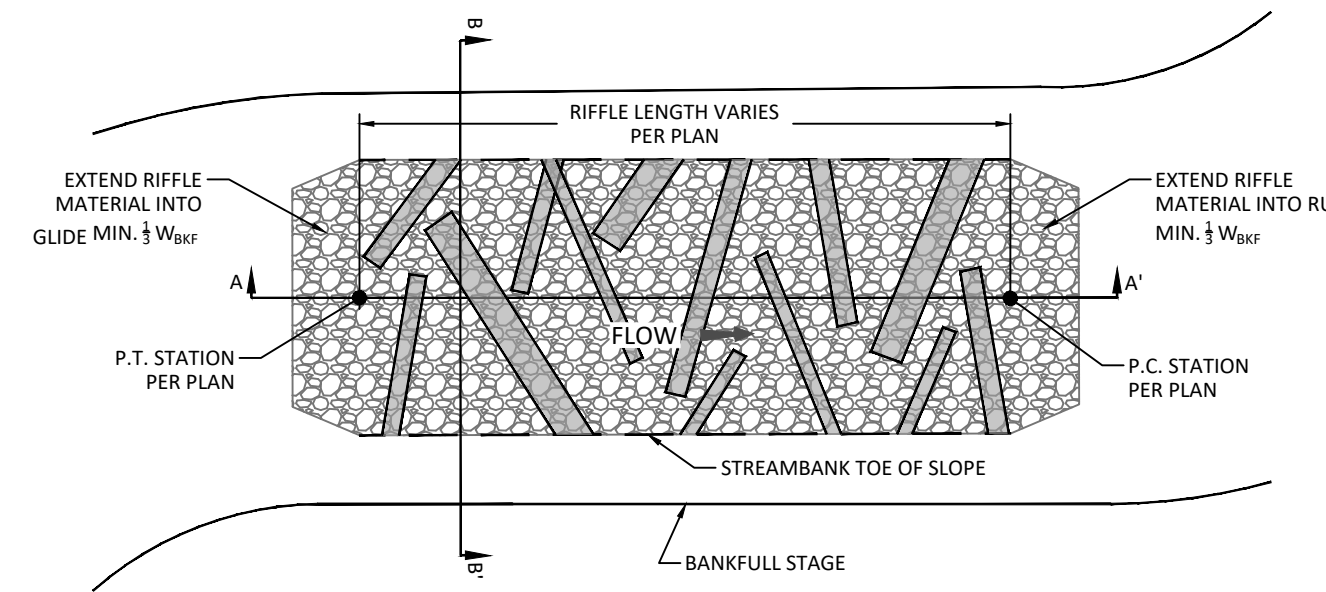


**DETAILED SECTION A - A'**  
NOT TO SCALE

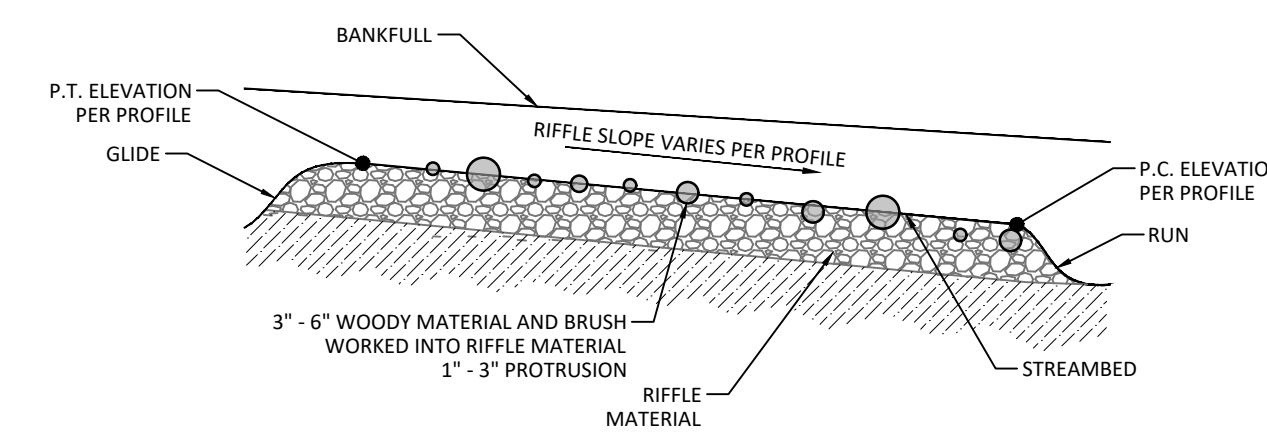


**DETAILED SECTION B - B'**  
NOT TO SCALE

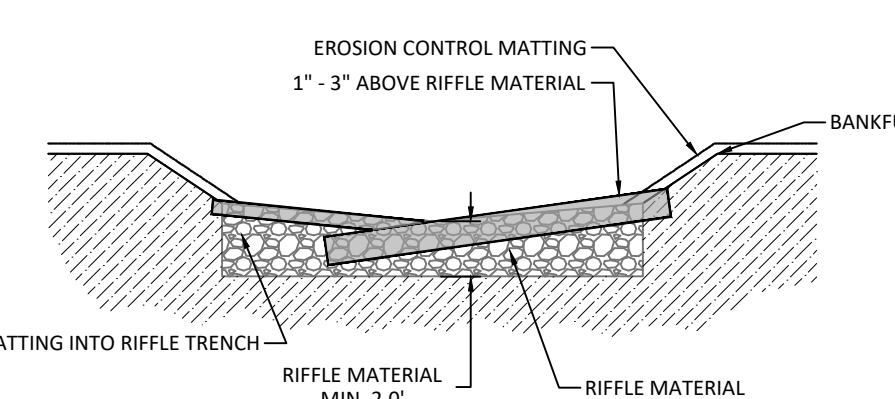
**CONSTRUCTED RIFFLE DETAIL**



**DETAILED PLAN**  
NOT TO SCALE



**DETAILED SECTION A - A'**  
NOT TO SCALE



**DETAILED SECTION B - B'**  
NOT TO SCALE

**WOODY RIFFLE DETAIL**

**WOODY RIFFLE SPECIFICATIONS**

- FOR INSTALLATION, THE CONTRACTOR SHALL OVER EXCAVATE THE LENGTH OF THE RIFFLE AND BACKFILL THE TRENCH WITH THE SPECIFIED RIFFLE SUBSTRATE MATERIAL TO THE ELEVATIONS SHOWN ON THE PROPOSED PROFILE.
- RIFFLE MATERIAL SHALL EXTEND A MINIMUM OF  $\frac{1}{3} W_{\text{riff}}$  U/S OF THE P.T. INTO THE GLIDE AND A MINIMUM OF  $\frac{1}{3} W_{\text{riff}}$  D/S OF THE P.C. INTO THE RUN.
- THE RIFFLE MATERIAL SHALL BE PLACED AT A UNIFORM THICKNESS SUCH THAT, IN CROSS-SECTION, ITS LOWEST ELEVATION OCCURS IN THE CENTER OF THE CHANNEL.
- WOODY RIFFLES SHALL BE BACKFILLED WITH RIFFLE MATERIAL CONSISTING OF QUARRIED STONE. RIFFLE MATERIAL SHALL BE PLACED AT A UNIFORM THICKNESS SUCH THAT, IN CROSS-SECTION, ITS LOWEST ELEVATION OCCURS IN THE CENTER OF THE CHANNEL. RIFFLE MATERIAL SHALL BE COMPACTED USING AN EXCAVATOR BUCKET SUCH THAT FUTURE SETTLEMENT OF THE MATERIAL IS KEPT TO A MINIMUM.
- CONSTRUCTED RIFFLE MATERIAL SPECIFICATIONS:
  - NCDOT CLASS 1 - 70%
  - NCDOT CLASS B - 30%
- WOODY MATERIAL 3" - 6" IN SIZE SHALL BE INTEGRATED INTO THE RIFFLE SUBSTRATE TO ENHANCE FLOW DIVERSITY AND HYDROHEIC EXCHANGE. WOODY MATERIAL SHALL PROTRUDE 1" - 3" ABOVE THE FINISHED RIFFLE SUBSTRATE.
- RIFFLE MATERIAL SHALL BE COMPACTED USING AN EXCAVATOR BUCKET SUCH THE DEEPEST POINT OF THE CHANNEL IS ALONG THE CENTERLINE AND THAT FUTURE SETTLEMENT OF THE MATERIAL IS KEPT TO A MINIMUM.
- THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR INVERT ELEVATIONS SHALL BE WITHIN 0.1 FT OF THE GRADES AND ELEVATIONS INDICATED.
- RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.

BAT FORK STREAM RESTORATION

BAT FORK  
EAST FLAT ROCK, NC  
HENDERSON COUNTY

PERMIT DRAWING  
STREAM RESTORATION DETAILS  
CONSTRUCTED RIFFLES  
NOT FOR CONSTRUCTION

APPROVED BY:	GDG								
REV	A								
CHECKED BY:	GDG								
DRAWN BY:	GDG								
DESCRIPTION	DRAFT 30% DESIGN PLAN SET								

**Jennings Environmental**

7 SAMUEL ASHE DRIVE  
ASHEVILLE, NC 28805

PERMIT DRAWING  
NOT FOR CONSTRUCTION

DATE: 10/4/2022  
SCALE (34"x22"): NTS  
SCALE (17"x11"): NTS

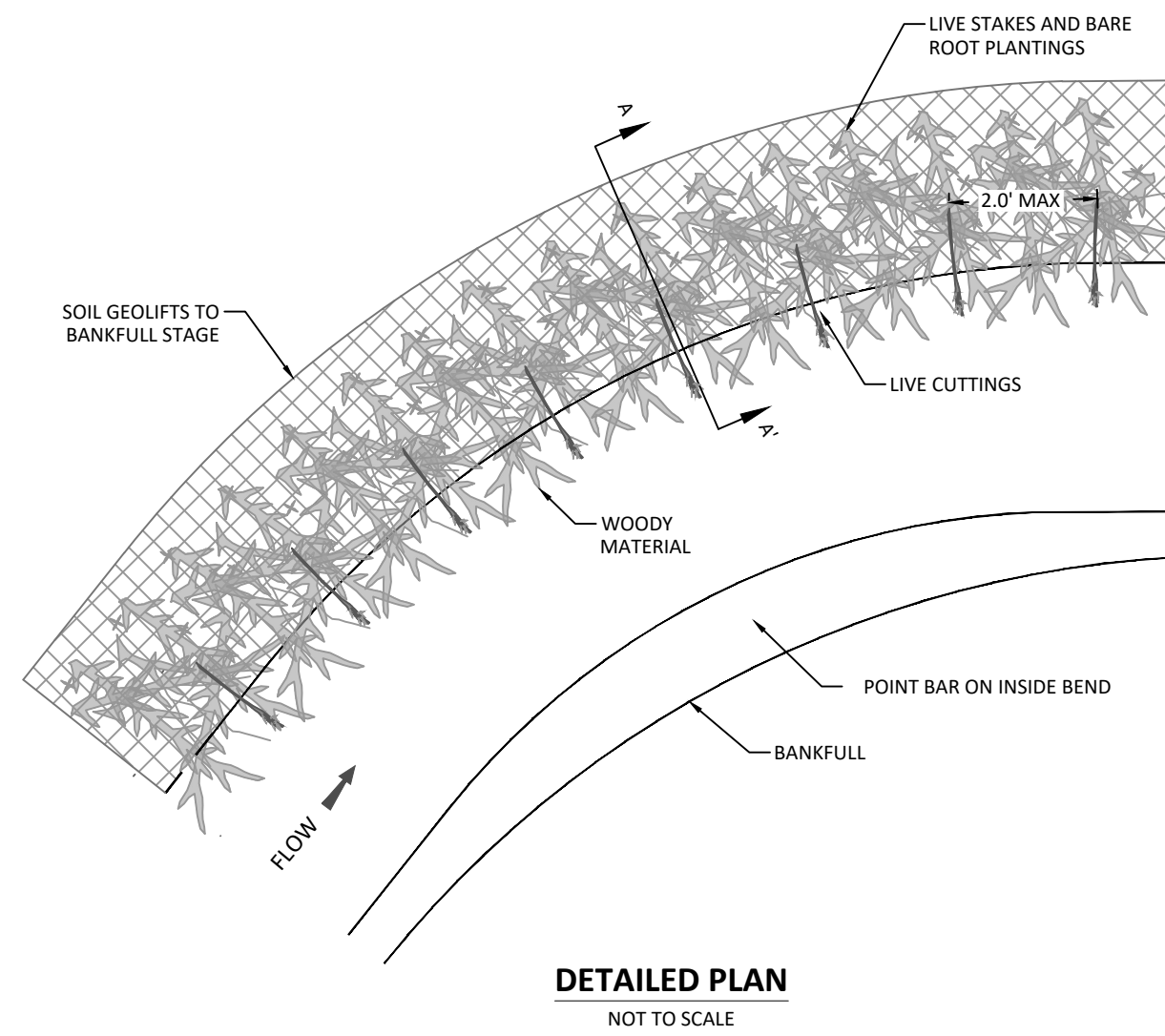
SHEET NUMBER  
3.1 OF 20



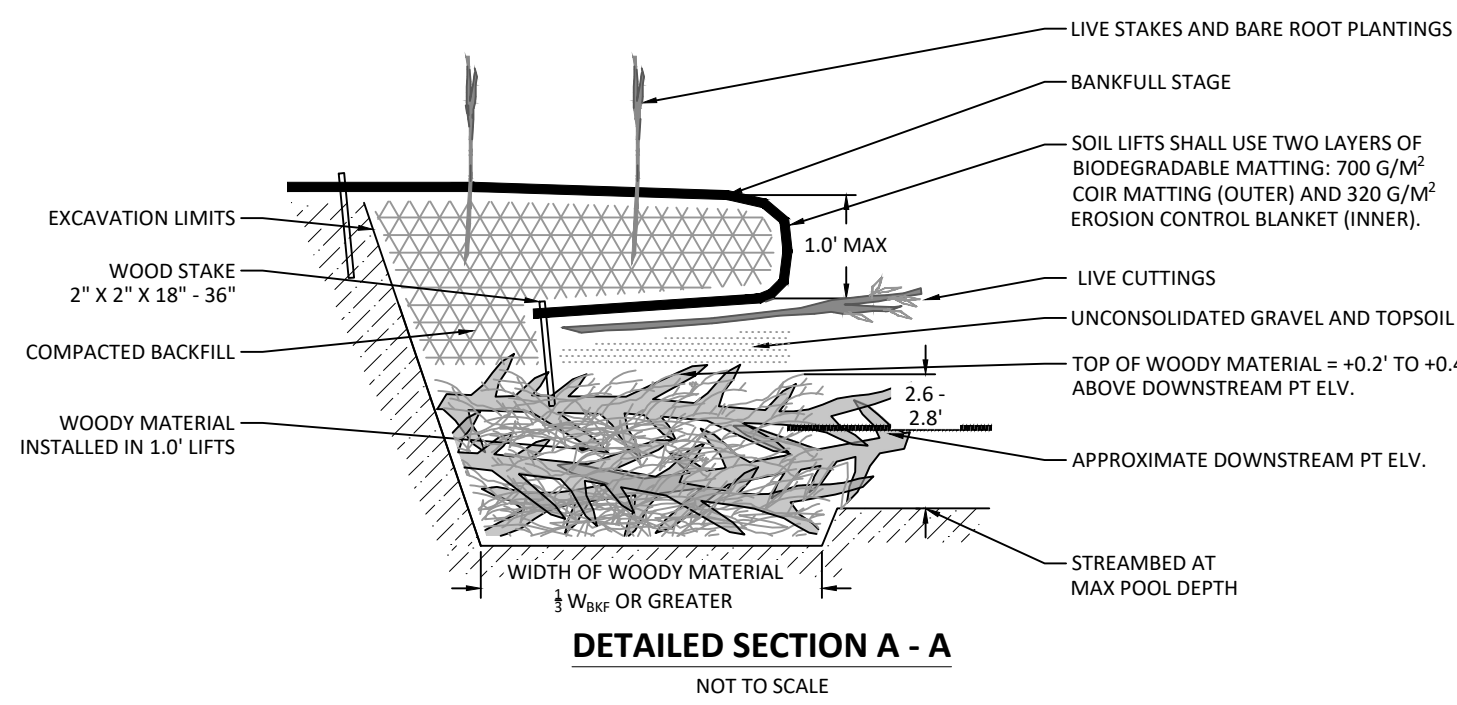
C:\USERS\MIKE\DROPBOX\2022\_BAT\_FORK\C3D\DETAIL\BAT\_FORK\_DESIGN\_DETAILS.DWG | MIKE | SAVED: Tuesday, October 4, 2022 11:15:57 AM | ACAD.CTB | PLOTTED: Tuesday, October 4, 2022 2:44:30 PM

**BRUSH TOE WITH SOIL LIFTS SPECIFICATIONS**

- WOODY MATERIAL USED IN THE BRUSH TOE SHALL CONSIST OF LOGS, LARGE BRANCHES AND WOODY DEBRIS RANGING IN DIAMETER FROM 1" TO 12". LARGE VOIDS SHALL BE FILLED WITH FINE WOODY MATERIAL AND DEBRIS. ALL MATERIALS ARE TO BE APPROVED BY THE ENGINEER. WOODY MATERIAL SHALL BE INSTALLED IN 1.0' LIFTS. EACH LIFT SHALL BE COMPACTED WITH THE EXCAVATOR BUCKET AND COVERED WITH A LAYER OF ALLUVIUM OR MIXED SOIL AND GRAVEL TO FORM A DENSE LAYER OF WOODY MATERIAL AND ALLUVIAL TO LINES, ELEVATIONS AND GRADES IN THE DRAWINGS.
- BRUSH TOE SHALL EXTEND A MINIMUM OF 5 FEET PAST THE DOWNSTREAM PC.
- UNCONSOLIDATED GRAVEL AND TOPSOIL SHALL BE INSTALLED ABOVE WOODY MATERIAL BEFORE THE LIVE CUTTINGS AND SOIL LIFTS ARE INSTALLED.
- PLACE LAYER OF LIVE CUTTINGS (MIN. 4" LENGTH) A 2.0' O.C. ON THE GRAVEL AND TOPSOIL LEVELING COURSE SUCH THAT APPROXIMATELY 6 INCHES TO 1 FOOT OF EACH LIVE BRANCH WILL BE EXPOSED AND THE REMAINDER (2" TO 4") OF EACH LIVE BRANCH WILL BE COVERED BY THE SOIL LIFT. LIVE BRANCHES SHALL BE AN EQUAL FRACTION OF SILKY WILLOW (*SALIX SERICEA*) AND SILKY DOGWOOD (*CORNUS AMOMUM*).
- INSTALL A SOIL LIFT ABOVE THE LIVE CUTTINGS. THE SOIL LIFT SHALL NOT EXCEED 1.0' THICKNESS. LIFTS SHALL INCLUDE ALL SOIL PREPARATION, TEMPORARY AND PERMANENT SEEDING AND MULCH. SOIL LIFTS SHALL USE TWO LAYERS OF BIODEGRADABLE MATTING: 700 G/M<sup>2</sup> COIR MATTING (OUTER) AND 320 G/M<sup>2</sup> EROSION CONTROL BLANKET (INNER). EROSION CONTROL PRODUCTS USED FOR SOIL LIFTS SHALL BE MADE OF 100% NATURAL FIBERS AND MATERIALS AND BE BIODEGRADABLE UNDER NORMAL CLIMATE CONDITIONS. EROSION CONTROL MATTING CONTAINING PLASTICS OR PLASTIC BASED MATERIALS SHALL NOT BE USED.
- LIVE TRANSPLANTS AVAILABLE ON THE SITE MAY REPLACE SOIL LIFTS AS DIRECTED BY THE ENGINEER.
- THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR ELEVATIONS SHALL BE WITHIN 0.1 FT OF THE GRADES AND ELEVATIONS INDICATED OR APPROVED BY THE ENGINEER.
- RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.

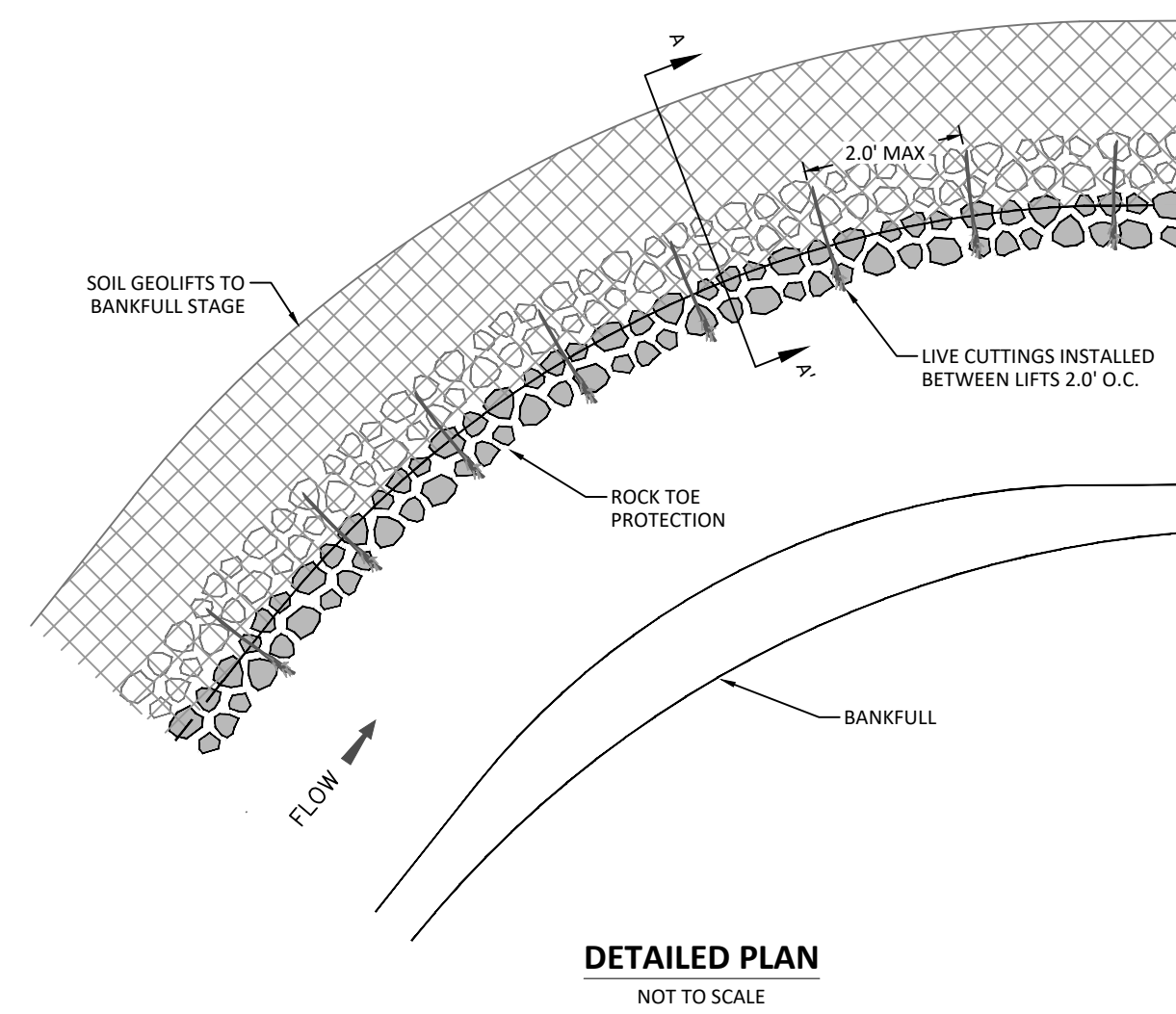


**DETAILED PLAN**  
NOT TO SCALE

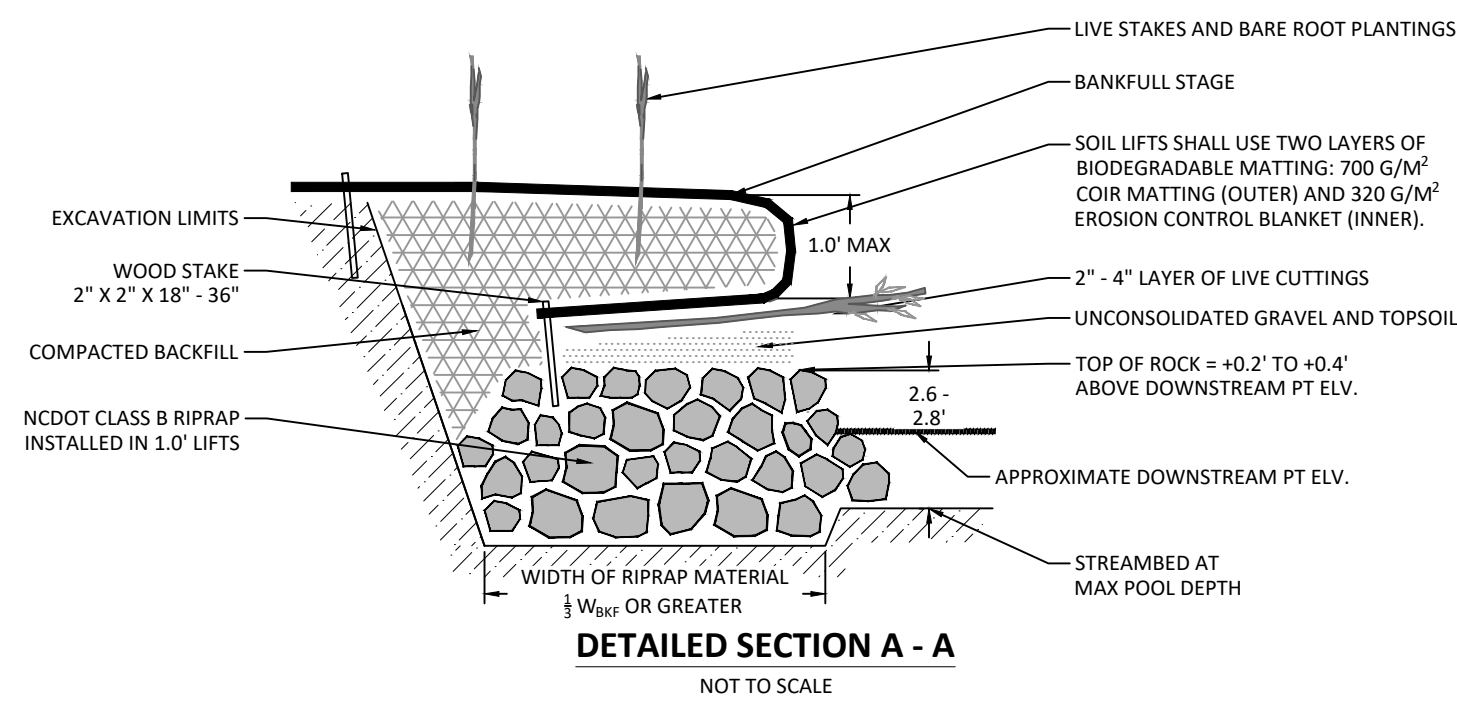


**DETAILED SECTION A - A**  
NOT TO SCALE

**BRUSH TOE WITH SOIL LIFTS DETAIL**



**DETAILED PLAN**  
NOT TO SCALE



**DETAILED SECTION A - A**  
NOT TO SCALE

**ROCK TOE DETAIL**

**ROCK TOE SPECIFICATIONS**

- ROCK USED IN THE ROCK TOE PROTECTION STRUCTURE SHALL CONSIST OF 100% NCDOT CLASS B RIPRAP. RIPRAP SHALL BE INSTALLED IN 1.0' LIFTS. EACH LIFT SHALL BE COMPACTED WITH THE EXCAVATOR BUCKET AND COVERED WITH A LAYER OF ALLUVIUM AND GRAVEL AVAILABLE ON-SITE AND WITHIN THE RIVER BED TO FORM A DENSE LAYER OF COMPACTED ROCK MATERIAL TO LINES, ELEVATIONS AND GRADES IN THE DRAWINGS AND DETAILS.
- GRAVEL AND TOPSOIL SHALL BE INSTALLED AS A LEVELING COURSE ABOVE THE FILTER FABRIC AND RIPRAP BEFORE THE LIVE CUTTINGS AND SOIL LIFTS ARE INSTALLED.
- PLACE LAYER OF LIVE CUTTINGS (MIN. 4" LENGTH) A 2.0' O.C. ON THE GRAVEL AND TOPSOIL LEVELING COURSE SUCH THAT APPROXIMATELY 6 INCHES TO 1 FOOT OF EACH LIVE BRANCH WILL BE EXPOSED AND THE REMAINDER (2" TO 4") OF EACH LIVE BRANCH WILL BE COVERED BY THE SOIL LIFT. LIVE BRANCHES SHALL BE AN EQUAL FRACTION OF SILKY WILLOW (*SALIX SERICEA*) AND SILKY DOGWOOD (*CORNUS AMOMUM*).
- INSTALL A SOIL LIFT ABOVE THE LIVE CUTTINGS. THE SOIL LIFT SHALL NOT EXCEED 1.0' THICKNESS. LIFTS SHALL INCLUDE ALL SOIL PREPARATION, TEMPORARY AND PERMANENT SEEDING AND MULCH. SOIL LIFTS SHALL USE TWO LAYERS OF BIODEGRADABLE MATTING: 700 G/M<sup>2</sup> COIR MATTING (OUTER) AND 320 G/M<sup>2</sup> EROSION CONTROL BLANKET (INNER). EROSION CONTROL PRODUCTS USED FOR SOIL LIFTS SHALL BE MADE OF 100% NATURAL FIBERS AND MATERIALS AND BE BIODEGRADABLE UNDER NORMAL CLIMATE CONDITIONS. EROSION CONTROL MATTING CONTAINING PLASTICS OR PLASTIC BASED MATERIALS SHALL NOT BE USED.
- THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR ELEVATIONS SHALL BE WITHIN 0.1 FT OF THE GRADES AND ELEVATIONS INDICATED OR APPROVED BY THE ENGINEER.
- RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.

BAT FORK STREAM RESTORATION

BAT FORK  
EAST FLAT ROCK, NC  
HENDERSON COUNTY

PERMIT DRAWING  
STREAM RESTORATION DETAILS  
TOE REVETMENT  
NOT FOR CONSTRUCTION

APPROVED BY:	REV	DESCRIPTION	DATE	BY	CHKD BY:	DATE	APPV BY:
	A	DRAFT 30% DESIGN PLAN SET					

**Jennings**  
Environmental

7 SAMUEL ASHE DRIVE  
ASHEVILLE, NC 28805

PERMIT DRAWING  
NOT FOR  
CONSTRUCTION

DATE: 10/4/2022  
SCALE (34"x22"): NTS  
SCALE (17"x11"): NTS

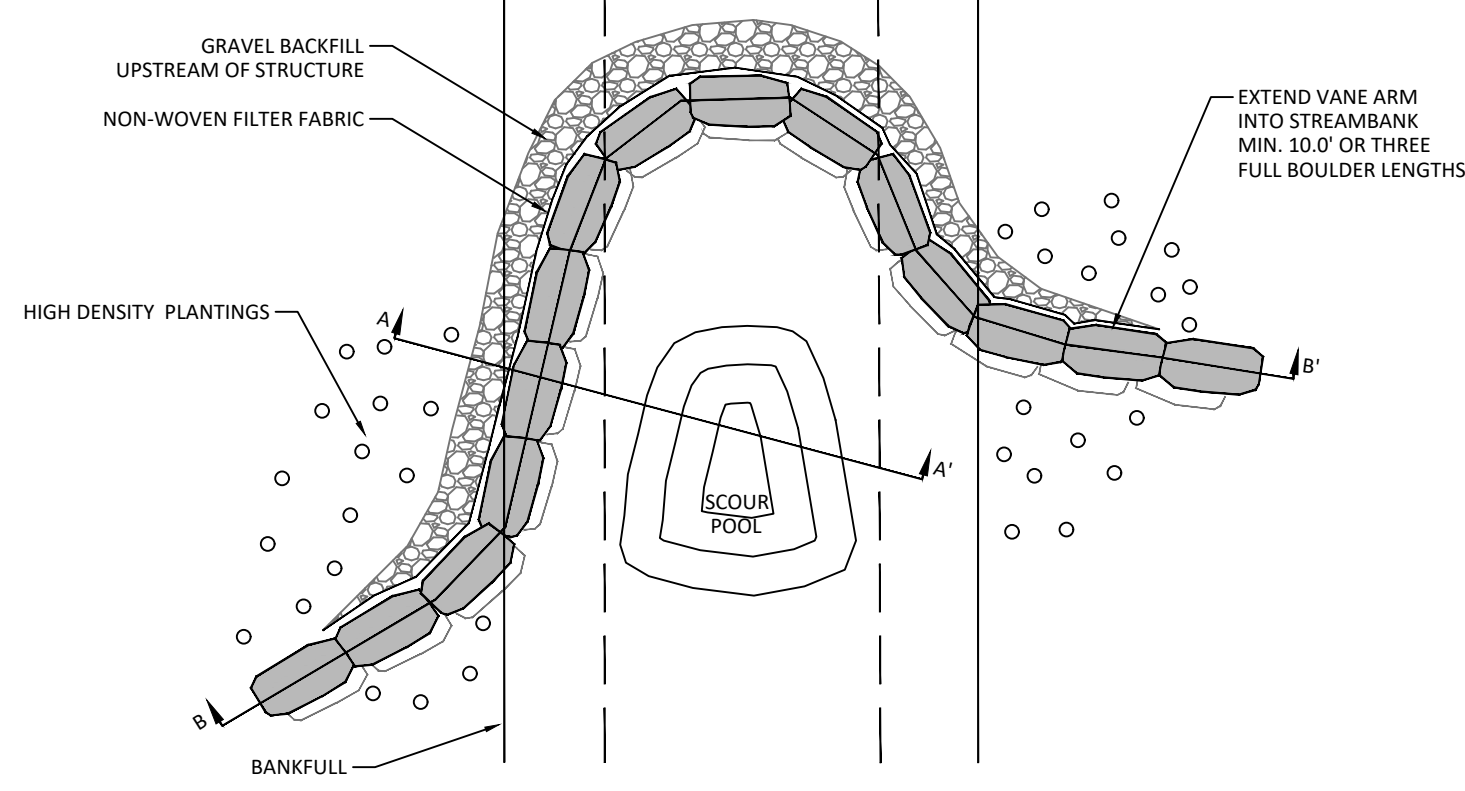
SHEET NUMBER  
3.2 OF 20



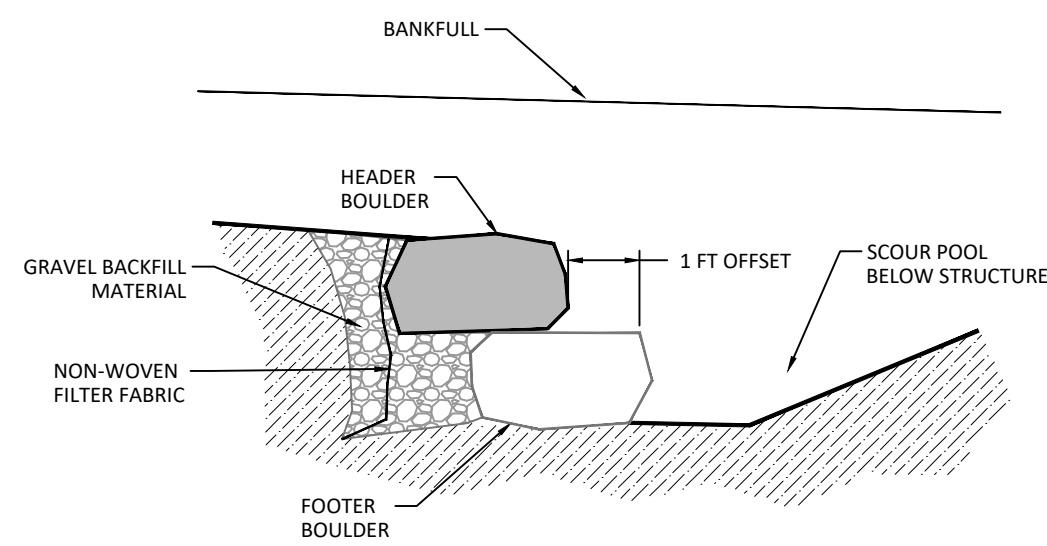
C:\USERS\MIKE\DROPBOX\2022\_BAT\_FORK\C3D\DETAIL\BAT\_FORK\_DESIGN\_DETAILS.DWG | MIKE | SAVED: Tuesday, October 4, 2022 11:15:57 AM | A:CAD.CTB | PLOTTED: Tuesday, October 4, 2022 2:44:32 PM

**BOULDER J-HOOK SPECIFICATIONS**

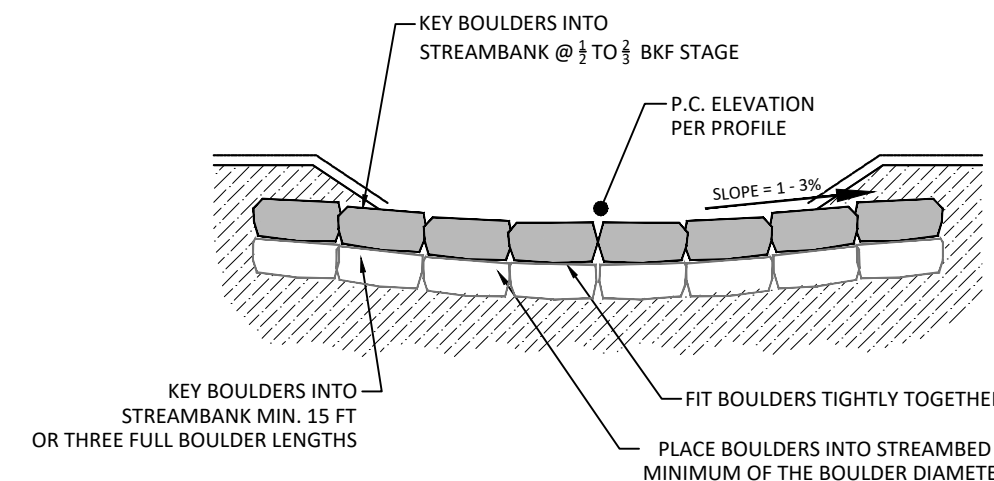
- ALL BOULDERS USED FOR THE PROPOSED STRUCTURE SHALL BE STRUCTURAL STONE, CUBICAL OR RECTANGULAR IN SHAPE. THE ENGINEER MUST APPROVE THE USE OF BOULDERS THAT MAY BE AVAILABLE ON-SITE. BOULDERS SHALL BE 3.0' X 5.0' X 2.5' (W X L X H) +/- 0.5'. THE MINIMUM ACCEPTABLE BOULDER THICKNESS (H) IS 2.0'. BOULDERS LONGER (L) THAN 5.5' WILL BE ACCEPTED.
- DIMENSIONS AND SLOPES OF STRUCTURES DESCRIBED IN THE DETAIL MAY BE ADJUSTED BY DESIGN ENGINEER TO FIT CONDITIONS ON-SITE. CONTRACTOR WILL BE REQUIRED TO FIT BOULDERS TOGETHER TIGHTLY.
- GAPS BETWEEN BOULDERS SHALL BE MINIMIZED BY FITTING BOULDERS TOGETHER AND PLUGGING WITH NC DOT CLASS A ROCK OR CHINKING STONE APPROVED BY ENGINEER.
- HEADER BOULDERS SHALL BE UNDERLAIN BY FOOTER BOULDERS TO PROVIDE A FOUNDATION UNLESS OTHERWISE DIRECTED BY THE ENGINEER. HEADER BOULDERS SHALL BE OFFSET 1.0 FT UPSTREAM OF THE FOOTER.
- SET BOULDER INVERTS AT ELEVATION SHOWN ON THE PLAN AND PROFILE SHEETS. NO ELEVATIONS OF THE BOULDERS MAY VARY FROM THE PLAN SHEETS WITHOUT DIRECTION FROM THE ENGINEER.
- NON-WOVEN GEOTEXTILE SHALL BE PLACED ON THE UPSTREAM SIDE OF THE STRUCTURE TO PREVENT WASHOUT OF SEDIMENT THROUGH BOULDER GAPS. FILTER FABRIC SHALL EXTEND FROM THE BOTTOM OF THE FOOTER BOULDER TO THE FINISHED GRADE ELEVATION AND SHALL BE PLACED THE ENTIRE LENGTH OF THE STRUCTURE. SELECT BACK FILL MATERIAL SHALL BE PLACED UPSTREAM OF THE GEOTEXTILE MATERIAL.
- GRAVEL MATERIAL CONSISTING OF A WELL-GRADED BLEND OF NCDOT CLASS A RIPRAP AND ASTM #57 ROCK MIXED WITH EARTH SHALL BE USED TO BACKFILL THE STRUCTURE. BACKFILL MATERIAL SHALL BE COMPACTED SUCH THAT FUTURE SETTLEMENT OF THE MATERIAL IS KEPT TO A MINIMUM.
- THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR INVERT ELEVATIONS SHALL BE WITHIN 0.1 FT OF THE GRADES AND ELEVATIONS INDICATED.
- RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.



**DETAILED PLAN**  
NOT TO SCALE

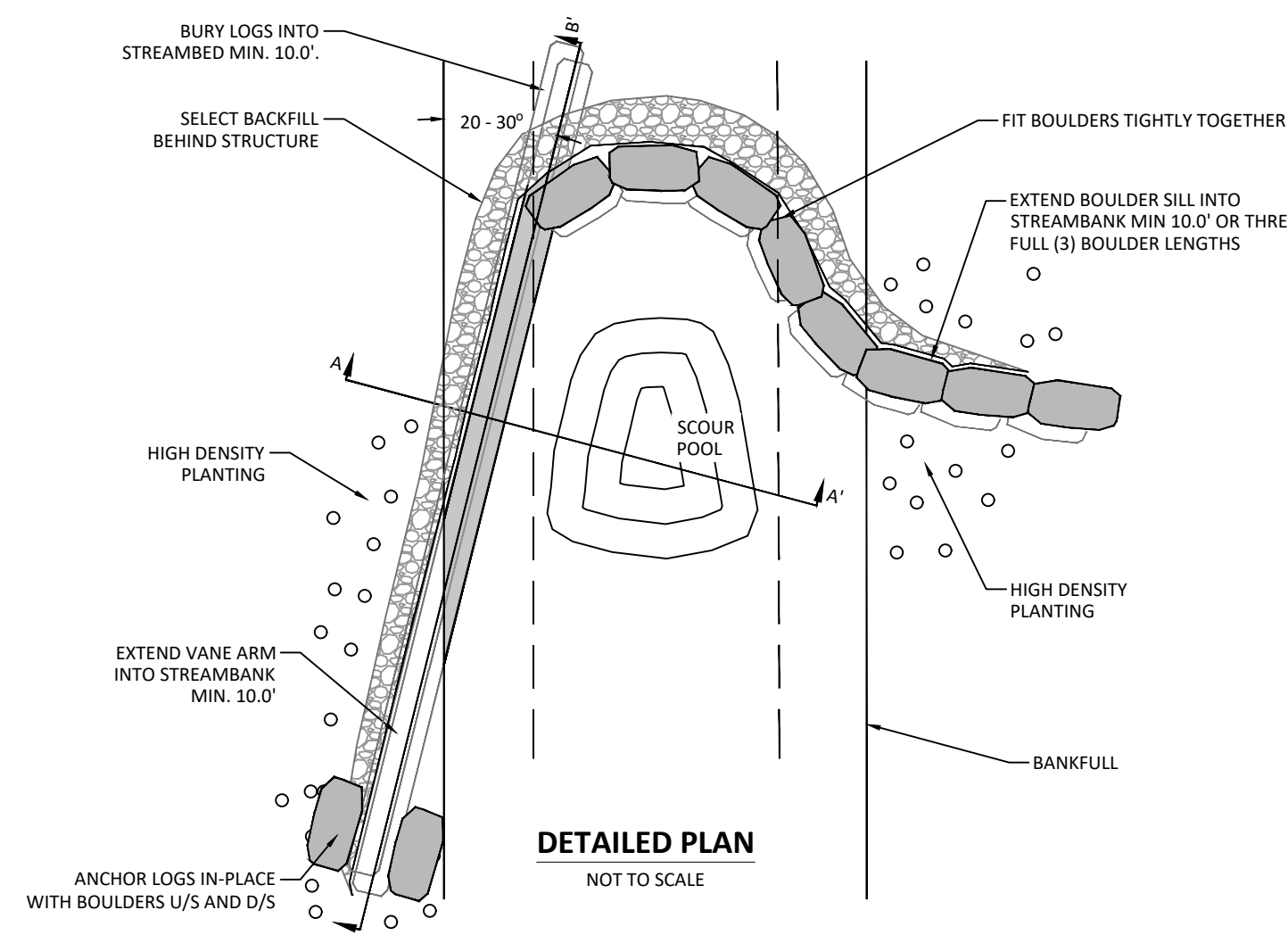


**DETAILED SECTION A - A'**  
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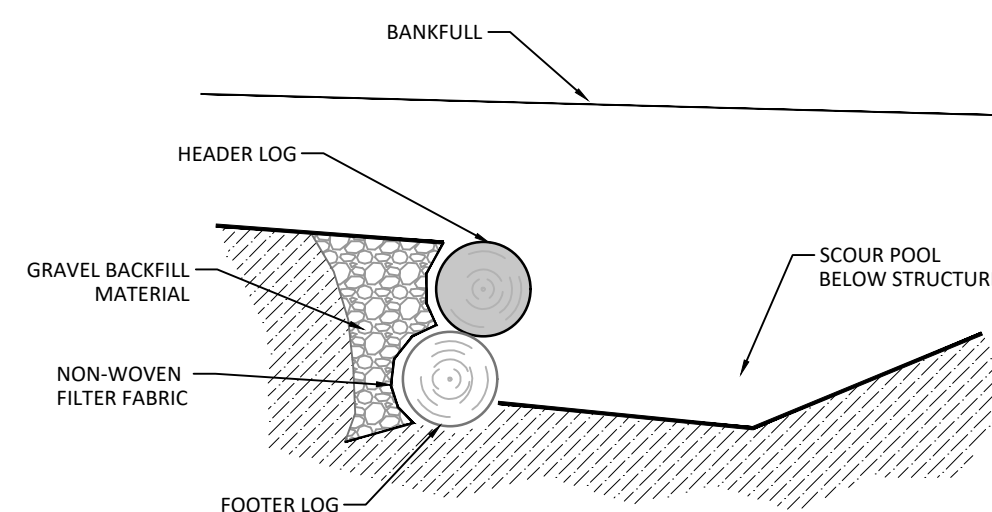


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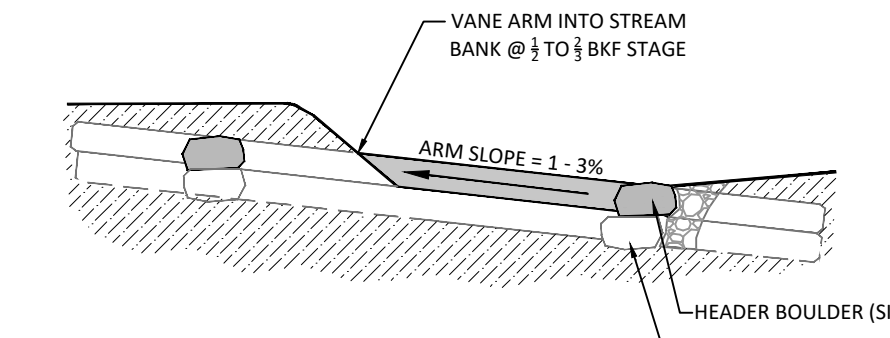
**BOULDER J-HOOK DETAIL**



**DETAILED PLAN**  
NOT TO SCALE



**DETAILED SECTION A - A'**  
NOT TO SCALE



**DETAILED SECTION B - B'**  
NOT TO SCALE

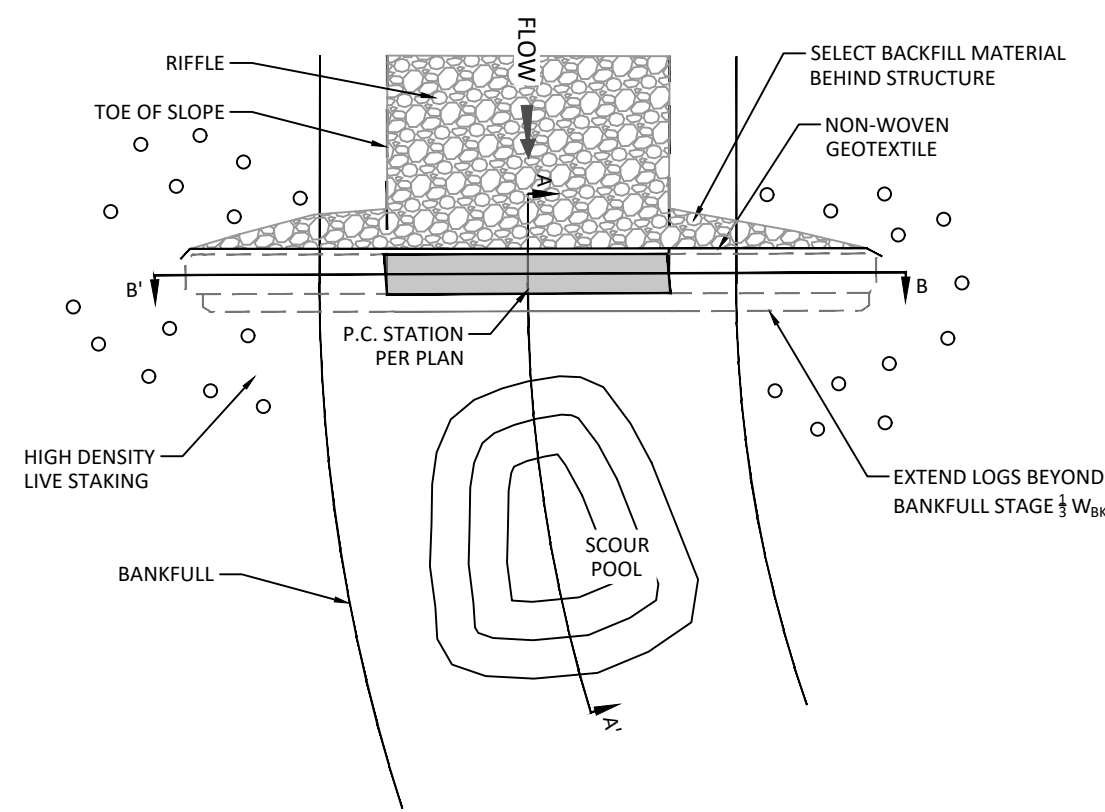
**LOG J-HOOK DETAIL**

**LOG J-HOOK SPECIFICATIONS**

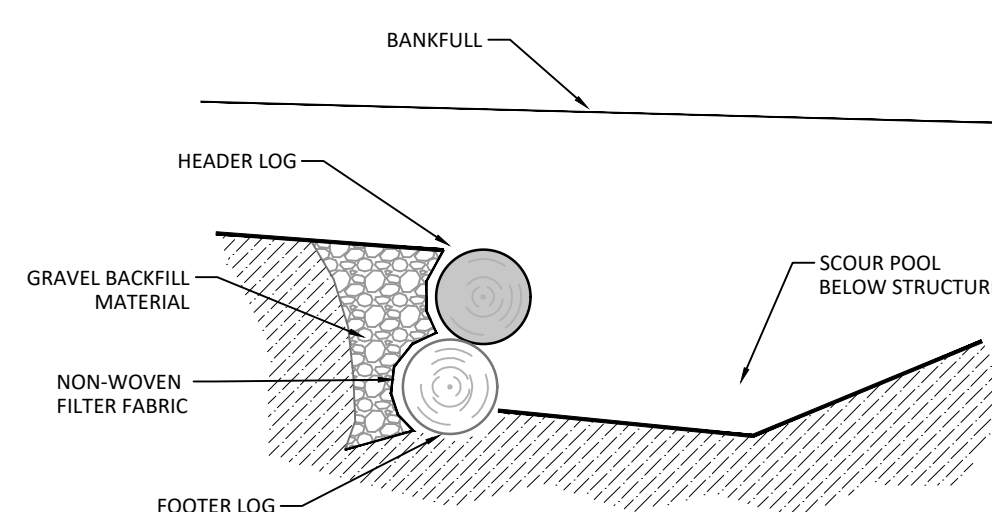
- ALL LOGS SHALL BE RELATIVELY STRAIGHT AND LIMBS AND BRANCHES SHALL BE TRIMMED FLUSH. LOGS SHALL HAVE MINIMUM DIAMETER OF 1.5'. HEADER LOGS SHALL BE UNDERLAIN BY FOOTER LOGS TO PROVIDE A SILL UNLESS OTHERWISE DIRECTED BY THE ENGINEER. HEADER LOGS SHALL BE OFFSET SLIGHTLY DOWNSTREAM OF THE FOOTER LOG. THE LOG VANE ARM SHALL EXTEND INTO THE STREAMBANK AT 1/3 TO 1/2 BANKFULL STAGE. THE LOG VANE ARM SHALL EXTEND INTO THE OUTSIDE STREAMBANK AND STREAMBED A MINIMUM OF 10.0 FT ON EACH END. ALL GAPS/VOIDS LARGER THAN 1 INCHES BETWEEN THE HEADER AND FOOTER LOGS SHALL BE CHINKED WITH LIMBS AND/OR BRUSH ON THE UPSTREAM SIDE PRIOR TO PLACEMENT OF THE GEOTEXTILE.
- ALL BOULDERS USED FOR THE STRUCTURE SHALL BE STRUCTURAL STONE, CUBICAL OR RECTANGULAR IN SHAPE. THE ENGINEER MUST APPROVE THE USE OF BOULDERS THAT MAY BE AVAILABLE ON-SITE. BOULDERS SHALL BE 3.0' X 5.0' X 2.5' (W X L X H) +/- 0.5'. THE MINIMUM ACCEPTABLE BOULDER THICKNESS (H) IS 2.0'. BOULDERS LONGER (L) THAN 5.5' WILL BE ACCEPTED. GAPS BETWEEN BOULDERS SHALL BE MINIMIZED BY FITTING BOULDERS TOGETHER AND PLUGGING WITH NC DOT CLASS A ROCK OR CHINKING STONE APPROVED BY ENGINEER. HEADER BOULDERS SHALL BE UNDERLAIN BY FOOTER BOULDERS TO PROVIDE A FOUNDATION UNLESS OTHERWISE DIRECTED BY THE ENGINEER. HEADER BOULDERS SHALL BE OFFSET 1.0 FT UPSTREAM OF THE FOOTER.
- SET BOULDER INVERTS AT ELEVATION SHOWN ON THE PLAN AND PROFILE SHEETS. NO ELEVATIONS OF THE BOULDERS MAY VARY FROM THE PLAN SHEETS WITHOUT DIRECTION FROM THE ENGINEER.
- ON THE UPSTREAM SIDE OF THE STRUCTURE A LAYER OF NON-WOVEN GEOTEXTILE FABRIC SHALL BE PLACED AS SHOWN IN THE DETAIL ALONG THE ENTIRE LENGTH OF THE LOG VANE AND BOULDER J-HOOK. SECURE ALL GEOTEXTILE FABRIC ON TOP OF FOOTER LOG USING 3 INCH 100 GALVANIZED COMMON NAIL ON 12 IN SPACING ALONG LOG. NAIL NON-WOVEN GEOTEXTILE TO EDGE OF HEADER LOG AND BACKFILL.
- GRAVEL MATERIAL CONSISTING OF A WELL-GRADED BLEND OF SURGE STONE AND ASTM #57 ROCK MIXED WITH EARTH SHALL BE USED TO BACKFILL THE STRUCTURE. BACKFILL MATERIAL SHALL BE COMPACTED SUCH THAT FUTURE SETTLEMENT OF THE MATERIAL IS KEPT TO A MINIMUM.
- PLACE BOULDERS UPSTREAM AND DOWNSTREAM OF THE LOG VANE ARM IN THE STREAMBANK. THE FINISHED ELEVATION OF THE BOULDERS SHALL BE BELOW THE FINISHED GRADE OF THE ADJACENT FLOODPLAIN AND SHALL NOT PROTRUDE OUT OF THE STREAMBANK.
- DIMENSIONS AND SLOPES OF STRUCTURES DESCRIBED IN THE DETAIL MAY BE ADJUSTED BY DESIGN ENGINEER TO FIT CONDITIONS ON-SITE.
- THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR INVERT ELEVATIONS SHALL BE WITHIN 0.1 FT OF THE GRADES AND ELEVATIONS INDICATED.
- RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.

**LOG STEP SPECIFICATIONS**

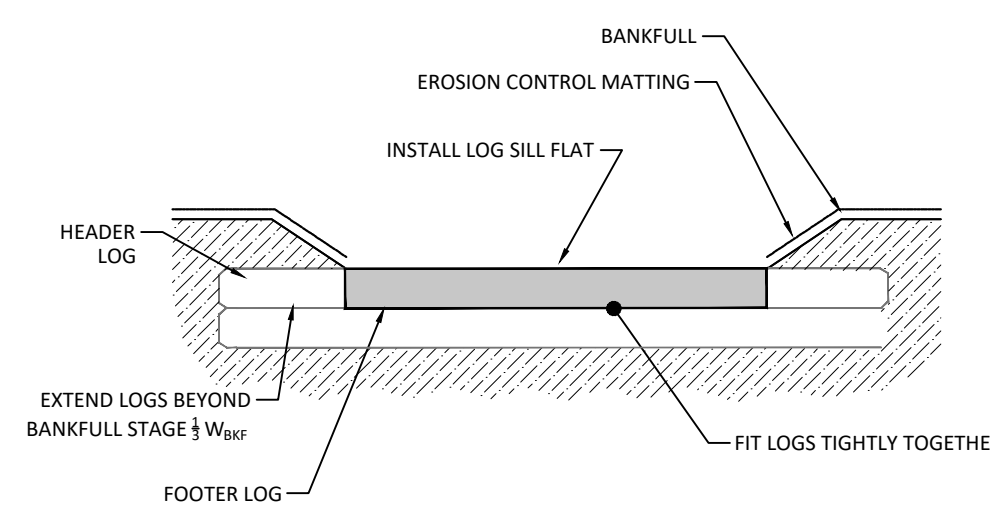
- ALL LOGS SHALL BE RELATIVELY STRAIGHT AND LIMBS AND BRANCHES SHALL BE TRIMMED FLUSH. LOGS SHALL HAVE MINIMUM DIAMETER OF 1.0'. LOGS USED FOR LOG SILLS SHALL BE SUFFICIENTLY LONG ENOUGH TO EXTEND BEYOND BANKFULL STAGE A MINIMUM OF 1/3 W<sub>BKF</sub> ON EACH END.
- HEADER LOGS SHALL BE UNDERLAIN BY FOOTER LOGS TO PROVIDE A FOUNDATION UNLESS OTHERWISE DIRECTED BY THE ENGINEER. HEADER LOGS SHALL BE OFFSET SLIGHTLY DOWNSTREAM OF THE FOOTER LOG.
- SET SILL INVERTS AT ELEVATION SHOWN ON THE PLAN AND PROFILE SHEETS. NO ELEVATIONS OF THE LOG SILL MAY VARY FROM THE PLAN SHEETS WITHOUT DIRECTION FROM THE ENGINEER.
- ALL GAPS/VOIDS LARGER THAN 1 INCHES BETWEEN THE HEADER AND FOOTER LOGS SHALL BE CHINKED WITH LIMBS AND/OR BRUSH ON THE UPSTREAM SIDE PRIOR TO PLACEMENT OF THE GEOTEXTILE.
- ON THE UPSTREAM SIDE OF THE LOGS A LAYER OF NON-WOVEN GEOTEXTILE FABRIC SHALL BE PLACED AS SHOWN IN THE DETAIL THE ENTIRE LENGTH OF THE LOG. SECURE ALL GEOTEXTILE FABRIC ON TOP OF FOOTER LOG USING 3 INCH 100 GALVANIZED COMMON NAIL ON 12 IN SPACING ALONG LOG. NAIL NON-WOVEN GEOTEXTILE TO EDGE OF HEADER LOG AND BACKFILL.
- COBBLE AND GRAVEL SHALL BE PLACED IMMEDIATELY DOWNSTREAM OF THE LOG STEP ALONG THE CHANNEL TOE OF SLOPE.
- THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LINES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR INVERT ELEVATIONS SHALL BE WITHIN 0.1 FT OF THE GRADES AND ELEVATIONS INDICATED.
- RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.



**DETAILED PLAN**  
NOT TO SCALE



**DETAILED SECTION A - A'**  
NOT TO SCALE



**DETAILED SECTION B - B'**  
NOT TO SCALE

**LOG STEP DETAIL**

**BAT FORK STREAM RESTORATION**  
**BAT FORK**  
**EAST FLAT ROCK, NC**  
**HENDERSON COUNTY**  
**PERMIT DRAWING**  
**STREAM RESTORATION DETAILS**  
**IN-STREAM STRUCTURES**  
**NOT FOR CONSTRUCTION**

**Jennings Environmental**  
7 SAMUEL ASHE DRIVE  
ASHEVILLE, NC 28805

PERMIT DRAWING  
NOT FOR CONSTRUCTION

DATE: 10/4/2022  
SCALE (34"x22"): NTS  
SCALE (17"x11"): NTS

SHEET NUMBER  
3.3 OF 20

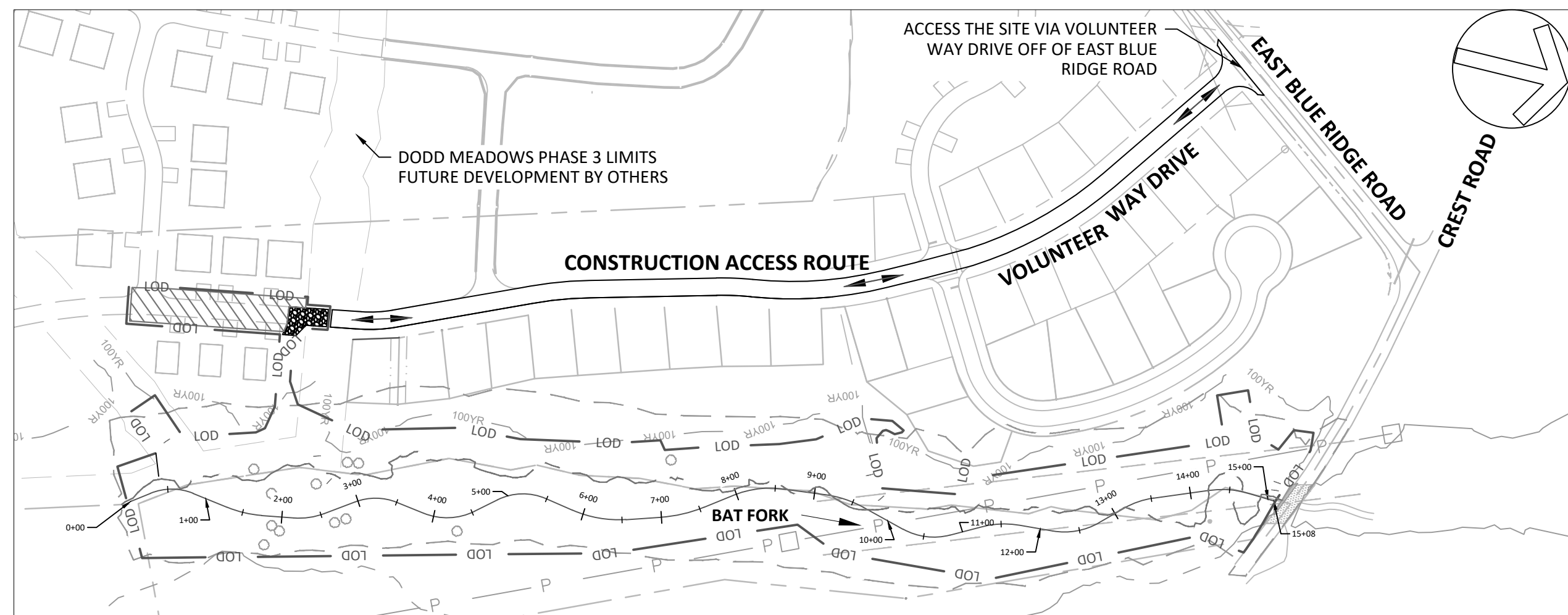
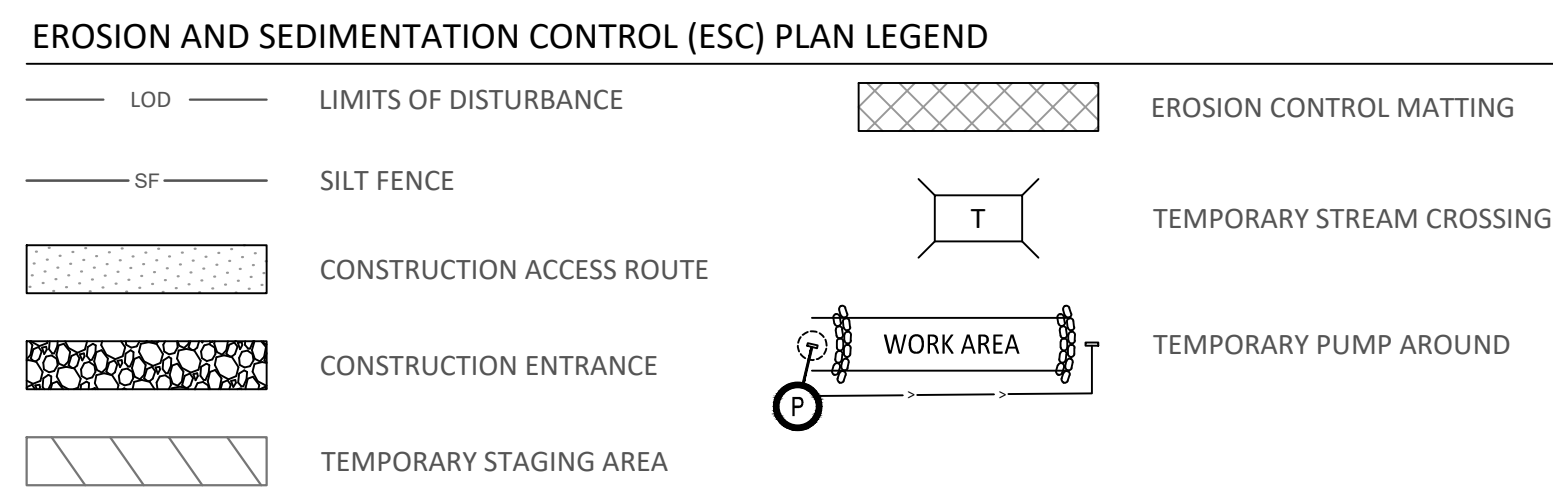
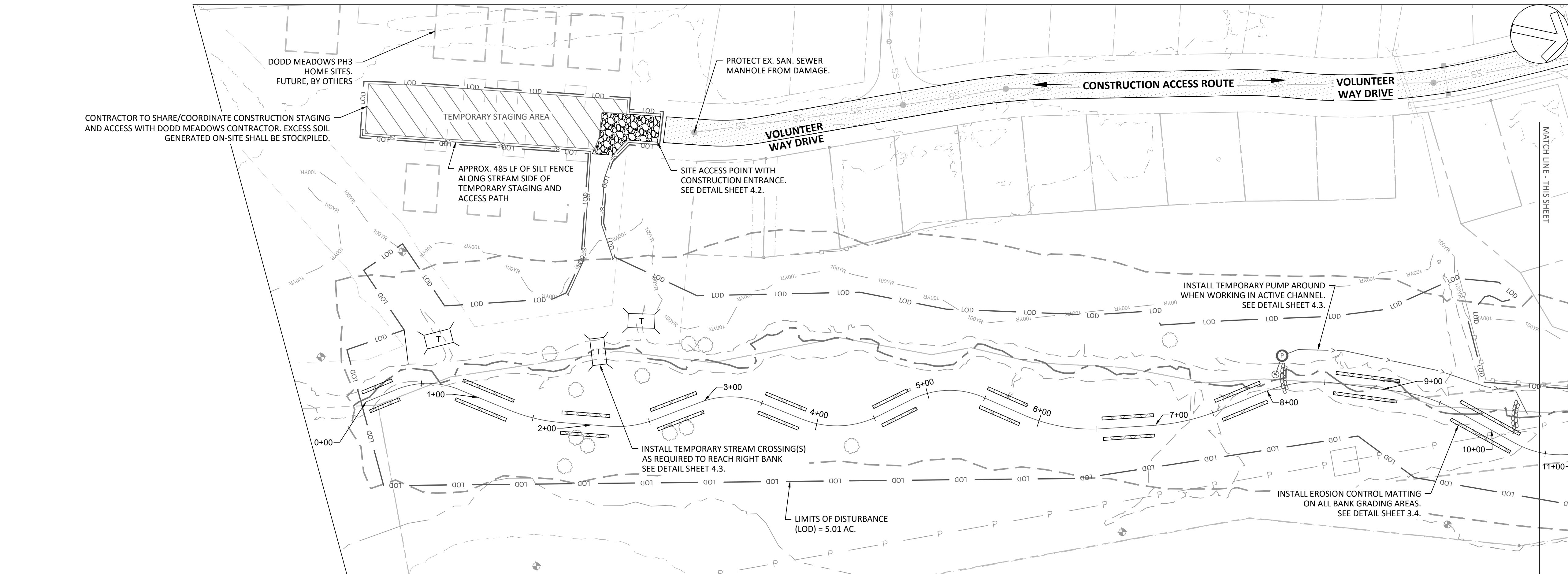
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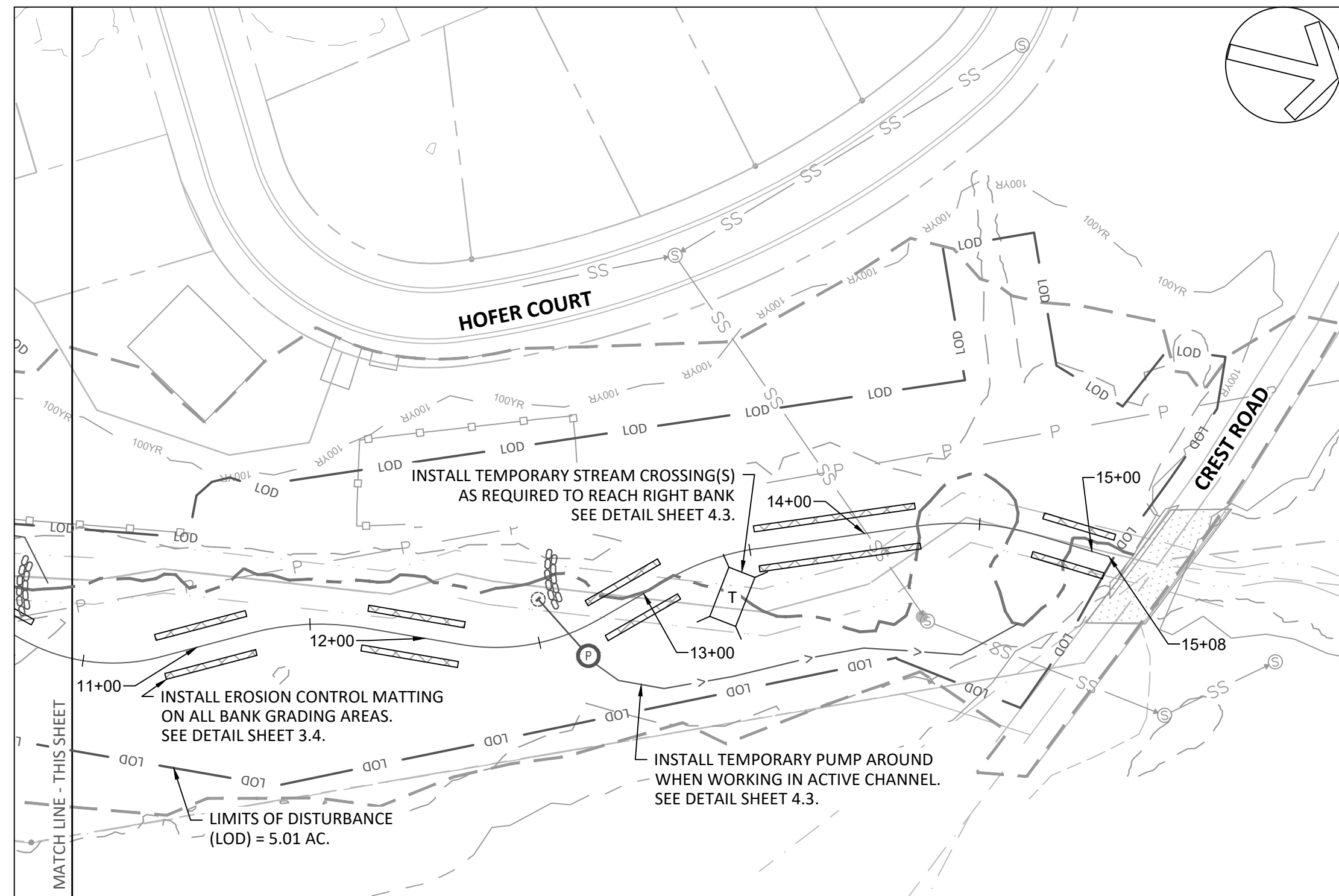
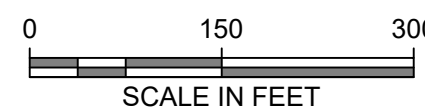




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CONSTRUCTION ACCESS ROUTE MAP



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**BAT FORK STREAM RESTORATION**

BAT FORK  
EAST FLAT ROCK, NC  
HENDERSON COUNTY

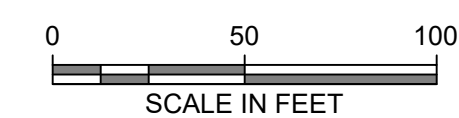
PERMIT DRAWING  
EROSION AND SEDIMENTATION CONTROL  
ESC PLAN  
NOT FOR CONSTRUCTION

**Jennings Environmental**

7 SAMUEL ASHE DRIVE  
ASHEVILLE, NC 28805

PERMIT DRAWING  
NOT FOR CONSTRUCTION

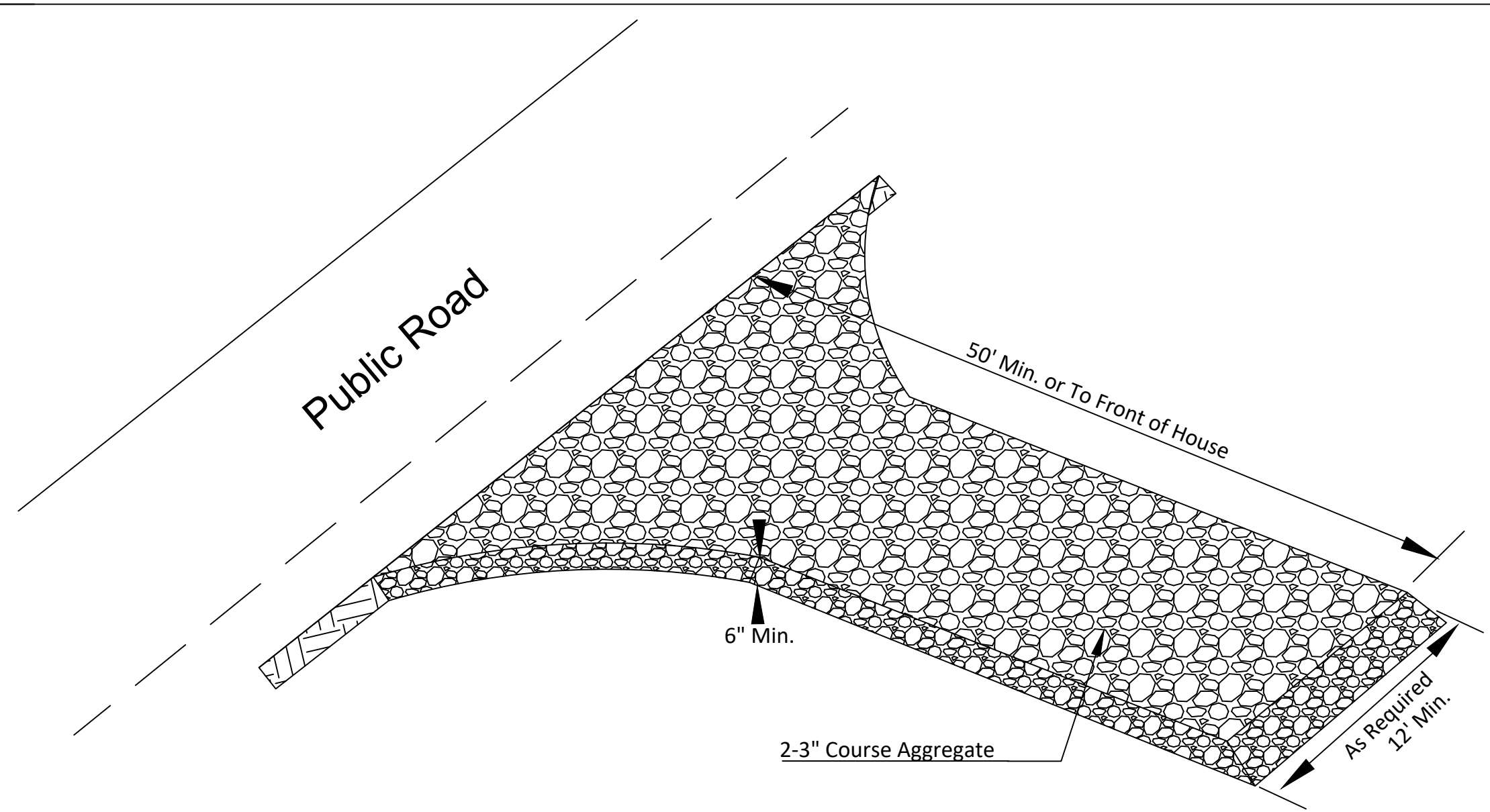
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SCALE (34"X22"): 1" = 50'  
SCALE (17"X11"): 1" = 100'



SHEET NUMBER  
4.1 OF 20



C:\USERS\MIKE\DRAWING\2022\BAT\_FORK\C3D\SHEETS\ESC.DWG | MIKE | SAVED: Tuesday, October 4, 2022 10:35:48 AM | ACAD.CTB | | PLOTTED: Tuesday, October 4, 2022 2:44:58 PM



**Construction:**  
 1. Clear the entrance and exit area of all vegetation, roots, and other objectionable material and properly grade it.  
 2. Place the gravel to the specific grade and dimensions shown on the plans, and smooth it.  
 3. Provide drainage to carry water to a sediment trap or other suitable outlet.  
 4. Use geotextile fabrics in order to improve stability of the foundation in locations subject to seepage or high water table.

**Maintenance:**  
 1. Per NCG-01 inspect at least once a week and after each 1 inch or greater rainfall; make any required repairs immediately.  
 2. Maintain the gravel pad in a condition to prevent mud or sediment from leaving the construction site. This may require periodic topdressing with 2 inch stone.  
 3. Immediately remove all objectionable materials spilled, washed or tracked onto public roadways.

**STANDARD CONSTRUCTION ENTRANCE / EXIT**

**EROSION AND SEDIMENTATION CONTROL NOTES AND SPECIFICATIONS**

- ALL CONSTRUCTION ACTIVITIES SHALL ADHERE TO THE CONDITIONS AND REQUIREMENTS OF NCDEMLR'S NG01 CONSTRUCTION GENERAL PERMIT.
- ALL TREES, UTILITIES AND OTHER SITE FEATURES SHALL BE PROTECTED UNLESS MARKED FOR REMOVAL OR RELOCATION.
- ALL WETLANDS AND STREAMS LOCATED WITHIN 50 FEET OF THE CONSTRUCTION AREA ON THE PROJECT SITE SHALL BE CLEARLY MARKED (EXAMPLE- ORANGE FABRIC FENCING) PRIOR TO ANY LAND DISTURBING ACTIVITIES AND MUST BE MAINTAINED ON THE PROPERTY UNTIL THE PROJECT PHASE IS COMPLETED. [15A NCAC 02H .0506 (B)(2)]
- THE TURBIDITY STANDARD OF 50 NTUS (NEPHELOMETRIC TURBIDITY UNITS) SHALL NOT BE EXCEEDED AS DESCRIBED IN 15A NCAC 02B .0200. APPROPRIATE SEDIMENT AND EROSION CONTROL PRACTICES MUST BE USED TO MEET THIS STANDARD. [15A NCAC 02B .0211 (21)]
- EQUIPMENT SHALL BE WELL-MAINTAINED, CLEANED PRIOR TO MOBILIZATION, AND CHECKED DAILY FOR LEAKS OF PETROLEUM PRODUCTS. FUELING, LUBRICATION AND GENERAL EQUIPMENT MAINTENANCE SHOULD NOT TAKE PLACE WITHIN 50 FEET OF A WATERBODY OR WETLANDS TO PREVENT CONTAMINATION BY FUEL AND OILS. [15A NCAC 02H .0506 (B)(3) AND 15A NCAC 02B .0211(12)]
- CONSTRUCTION SHALL BE TIMED TO OCCUR DURING TIMES OF LOW FLOW.
- THE DESIGNER OR HIS DESIGNEE SHALL SUPERVISE THE INSTALLATION OF IN-STREAM STRUCTURES. [15A NCAC 02H .0506(B)(1) AND (2)].
- THE CONTRACTOR SHALL TAKE ALL REASONABLE MEASURES TO CONSTRUCT IN-STREAM STRUCTURES WHILE KEEPING HEAVY EQUIPMENT OUT OF THE RIVER CHANNEL. ONLY EQUIPMENT THAT IS BEING USED TO INSTALL STRUCTURES OR REMOVE DEBRIS BLOCKAGES MAY ENTER THE RIVER CHANNEL. EQUIPMENT SHALL ACCESS THE RIVER AT THE CLOSEST POINT POSSIBLE TO REDUCE IMPACTS TO THE RIVER BED. THE MAJORITY OF FLOW SHALL BE DIVERTED AROUND WORK AREAS USING A TEMPORARY DIVERSION. ALL REASONABLE STEPS MUST BE TAKEN TO LIMIT THE AMOUNT OF DISTURBANCE IN THE CHANNEL AND TO THEREFORE REDUCE DOWNSTREAM TURBIDITY DURING CONSTRUCTION.
- THE RIVERBANKS, IN-STREAM STRUCTURES AND WORK AREA MUST BE STABILIZED AT THE END OF EACH DAY BEFORE THE TEMPORARY IN-STREAM DIVERSIONS ARE REMOVED AND FLOW IS RETURNED THE FULL CHANNEL.
- EROSION CONTROL MATTING THAT INCORPORATES PLASTIC MESH AND/OR PLASTIC TWINE SHALL NOT BE USED ALONG STREAMBANKS OR WITHIN WETLANDS. DISTURBED AREAS SHOULD BE SEEDED, MULCHED, AND/OR MATTED AS SOON AS POSSIBLE, PREFERABLY AT THE END OF EACH WORKDAY. [15A NCAC 02B .0201]
- IF BORROW OR WASTE MATERIAL IS REQUIRED OR GENERATED DURING GRADING OPERATIONS, AN APPROVED EROSION AND SEDIMENT CONTROL PERMIT MUST BE SECURED FOR THE BORROW OR WASTE MATERIAL SITE PRIOR TO INITIATION OF ANY LAND DISTURBING ACTIVITY. [15A NCAC 04B .0110].

**CONSTRUCTION SEQUENCE**

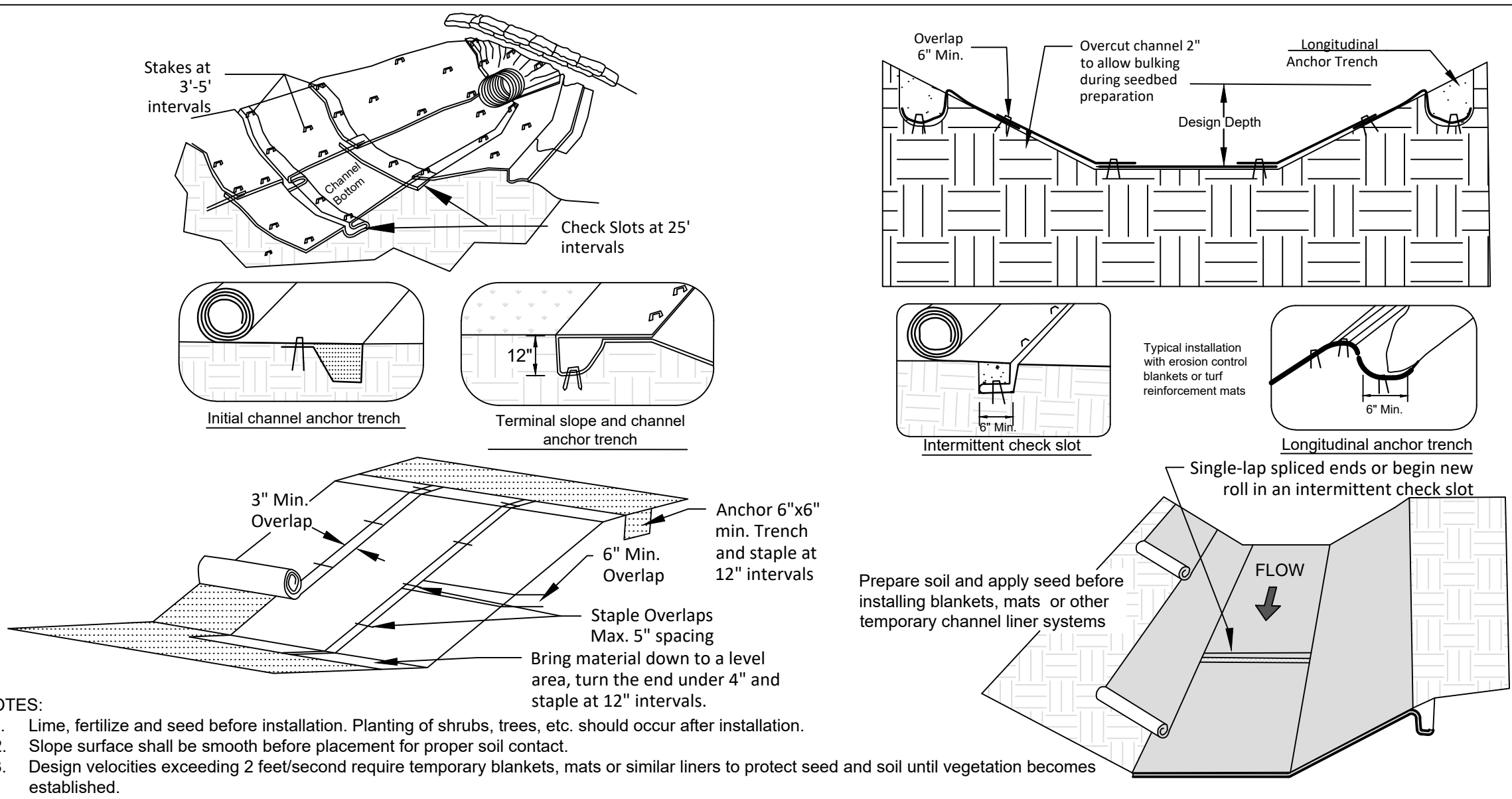
- OBTAIN AND REVIEW THE BAT FORK STREAM RESTORATION EROSION AND SEDIMENTATION CONTROL PLAN AND ALL OTHER APPLICABLE PERMITS.
- FLAG THE WORK LIMITS AND STAKE OUT THE LIMITS OF DISTURBANCE (LOD) OF THE PROJECT. THE TOTAL PROJECT LOD IS 5.01 AC.
- LOCATE ALL UNDERGROUND UTILITIES WITHIN THE WORK AREA.
- NOTIFY INSPECTOR FROM DEQ REGIONAL OFFICE PRIOR TO DISTURBANCE.
- POST CERTIFICATE OF APPROVAL FOR LAND DISTURBANCE AT SITE.
- INSTALL RAIN GAUGE AND PREPARE INSPECTION FORMS.
- HOLD PRE-CONSTRUCTION MEETING WITH THE PERMITEE, ENGINEER AND CONTRACTOR PRIOR TO STARTING ANY LAND DISTURBING ACTIVITIES.
- INSTALL ALL EROSION AND SEDIMENTATION CONTROL BMPS AS SHOWN IN THE DRAWINGS AND DETAILS. INSTALL CONSTRUCTION ENTRANCES AND STREAM CROSSINGS AT THE DESIGNATED CONSTRUCTION ACCESS POINTS AS SHOWN ON SHEET 4.1 AND IN THE DETAIL ON SHEET 4.3.
- INSTALL SILT FENCE ALONG THE DOWN SLOPE SIDE OF THE STAGING AREA AS SHOWN IN THE DETAIL ON SHEET 4.2.
- INSPECT EROSION PREVENTION AND SEDIMENT CONTROL BMPS DAILY AND AFTER SIGNIFICANT RAINFALL EVENTS. MAKE NEEDED REPAIRS IMMEDIATELY. KEEP ALL LOGS AND RECORDS UP-TO-DATE.
- ACQUIRE AND STORE MATERIALS FOR SITE (E.G. ROCK, LOGS, EROSION CONTROL MATTING AND FILTER FABRICS) IN THE TEMPORARY STAGING AREA.
- CLEAR EXISTING VEGETATION REQUIRED TO COMPLETE THE WORK TAKING CARE NOT TO DISTURB DESIRABLE VEGETATION TO REMAIN INTACT.
- GRADE THE RIVER BANKS AND INSTALL BANK STABILIZATION STRUCTURES ACCORDING TO THE PLANS AND DETAILS. WHEN POSSIBLE, PERFORM WORK FROM THE RIVER BANKS TO MINIMIZE TIME SPENT WORKING IN THE CHANNEL.
- WHEN WORKING IN AN ACTIVE STREAM CHANNEL, UTILIZE A TEMPORARY PUMP AROUND AS SHOWN ON DETAIL ON SHEET 4.3.
- INSTALL TEMPORARY SEEDING, PERMANENT SEEDING AND EROSION CONTROL MATTING ON ALL DISTURBED RIVER BANKS AND GRADED SLOPES AS SHOWN ON SHEET 3.4.
- ONCE THE WORK AREA IS STABILIZED AND CONSTRUCTION ACTIVITIES ARE COMPLETED, REMOVE AND DISPOSE OF ALL NON-BIODEGRADABLE EROSION AND SEDIMENTATION CONTROL BMPS.
- NOTIFY PERMITEE AND THE ENGINEER FOR A FINAL INSPECTION AND WALK THROUGH TO VERIFY FINAL STABILIZATION OF THE SITE.
- WHEN SEASONALLY APPROPRIATE, INSTALL PERMANENT PLANTINGS ON RIVER BANKS AND WITHIN THE RIPARIAN ZONES AS SHOWN ON SHEETS 5.1 AND 5.2.

BAT FORK STREAM RESTORATION

BAT FORK  
EAST FLAT ROCK, NC  
HENDERSON COUNTY

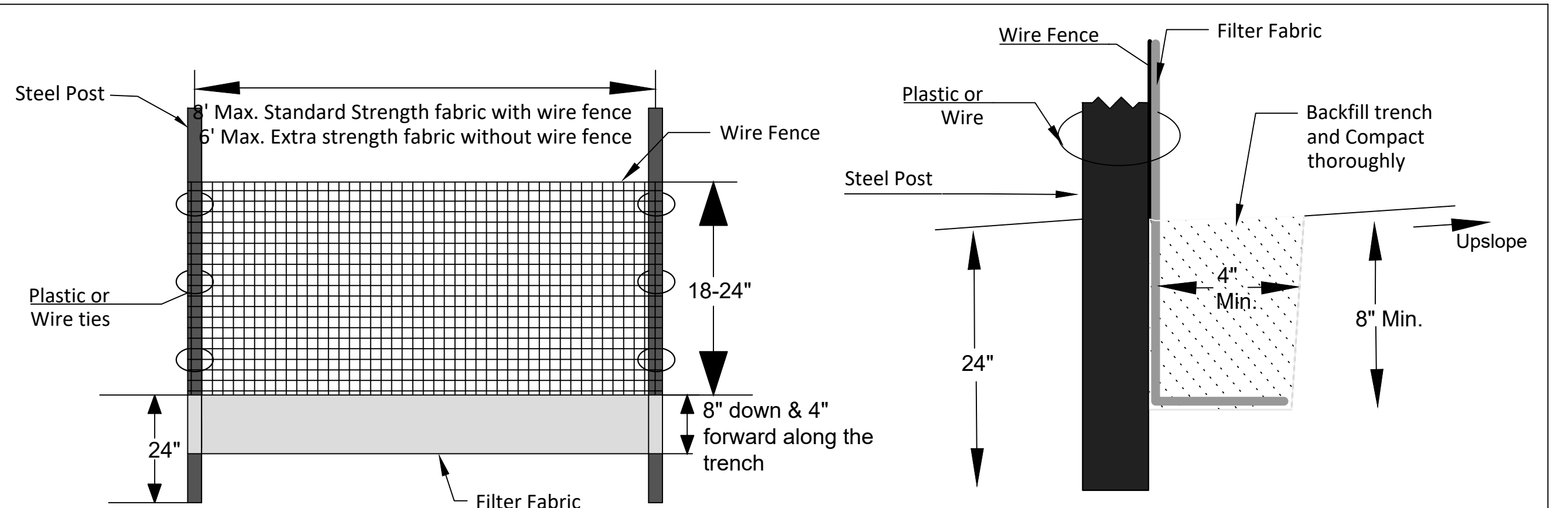
PERMIT DRAWING  
EROSION AND SEDIMENTATION CONTROL  
ESC NOTES & DETAILS  
NOT FOR CONSTRUCTION

APPROVED BY: MUG	CHECKED BY: MUG	DESCRIPTION	DATE
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- NOTES:**
- Lime, fertilizer and seed before installation. Planting of shrubs, trees, etc. should occur after installation.
  - Slope surface shall be smooth before placement for proper soil contact.
  - Design velocities exceeding 2 feet/second require temporary blankets, mats or similar liners to protect seed and soil until vegetation becomes established.
  - Terminal anchor trenches are required at RECP ends and intermittent check slots must be constructed across channels at 25 foot intervals.
  - Terminal anchor trenches should be a minimum of 12 inches in depth and 6 inches in width. Intermittent check slots should be 6 inches deep and 6 inches wide.
  - For installation on a slope, place RECP 2-3 feet over the top of the slope and into an excavated end trench measuring approximately 12 inches deep by 6 inches wide. Pin the RECP at 1 foot intervals along the bottom of the trench, backfill and compact. Unroll the RECP down the slope maintaining direct contact between the soil and RECP. Pin using staples or pins in a 3 feet center-to-center pattern.
  - 11 gauge, at least 6 inch by 1 inch staples or 12 inch minimum length wooden stakes are recommended for anchoring.
  - Grass-lined channels with design velocities exceeding 6 feet/second should include turf reinforcement mats
  - Check slots to be constructed per manufacturers specifications.
  - Staking or stapling layout per manufacturers specification.
  - If there is a berm at the top of slope, anchor upslope of the berm.
  - Do not stretch blankets/matting tight, allow the rolls to conform to any irregularities.
  - For slopes less than 3H:1V, rolls may be placed in horizontal strips.
- MAINTENANCE:**
- Inspect Rolled Erosion Control Products at least weekly and after each rain of 1 inch or greater, repair immediately.
  - Good contact with the ground must be maintained, and erosion must not occur beneath the RECP.
  - Any areas of the RECP that are damaged or not in close contact with the ground shall be repaired and stapled.
  - If erosion occurs due to poorly controlled drainage, the problem shall be fixed and the eroded area protected.
  - Monitor and repair the RECP as necessary until ground cover is established.

**ROLLED EROSION CONTROL PRODUCTS (RECP)**



- Construction:**
- Construct the sediment barrier of standard strength or extra strength synthetic filter fabrics.
  - Ensure that the height of the sediment fence does not exceed 24 inches above the ground. (Higher fences may impound volumes of water sufficient to cause failure of the structure)
  - Construct the filter fabric from a continuous roll out to the length of the barrier to avoid joints. When joints are necessary, securely fasten the filter cloth only at a support post with 4 feet minimum overlap to the next post.
  - Support standard strength filter fabric by wire mesh fastened securely to the upslope side of the posts. Extend the wire mesh support to the bottom of the trench. Fasten the wire reinforcement, then fabric on the upslope side of the fence post. Wire or plastic zip ties should have a minimum 50 pound tensile strength.
  - When a wire mesh support fence is used, space posts a maximum of 8 feet apart. Supports should be driven securely into the ground a minimum of 24 inches.
  - Extra strength filter fabric with 6 foot post spacing does not require a wire mesh support fence. Securely fasten the filter fabric directly to posts. Wire or plastic zip ties should have a minimum of 50 pound tensile strength.
  - Excavate the trench approximately 4 inches wide and 8 inches deep along the proposed line of the posts and upslope from the barrier.
  - Place 12 inches of fabric along the bottom and side of the trench.
  - Backfill the trench with soil placed over the filter fabric and compact. Thorough compaction of the backfill is critical to silt fence performance.
  - Do not attach filter fabric to existing trees.
- Maintenance:**
- Inspect sediment fences at least once a week and after each 1 inch or greater rainfall. Make any required repairs immediately.
  - Should the fabric of a sediment fence collapse, tear, decompose, or become ineffective, replace it promptly.
  - Remove sediment deposits as necessary to provide adequate storage volume for the next rain and reduce pressure on the fence. Take care to avoid undermining the fence during cleanouts.
  - Remove all fencing materials and unstable sediment deposits and bring the area to grade and stabilize it after the contributing drainage area has been properly stabilized.

**TEMPORARY SILT FENCE**

**Jennings Environmental**  
 7 SAMUEL ASHE DRIVE  
 ASHEVILLE, NC 28805

PERMIT DRAWING  
NOT FOR CONSTRUCTION

DATE: 10/4/2022  
 SCALE (34"x22"): NTS  
 SCALE (17"x11"): NTS

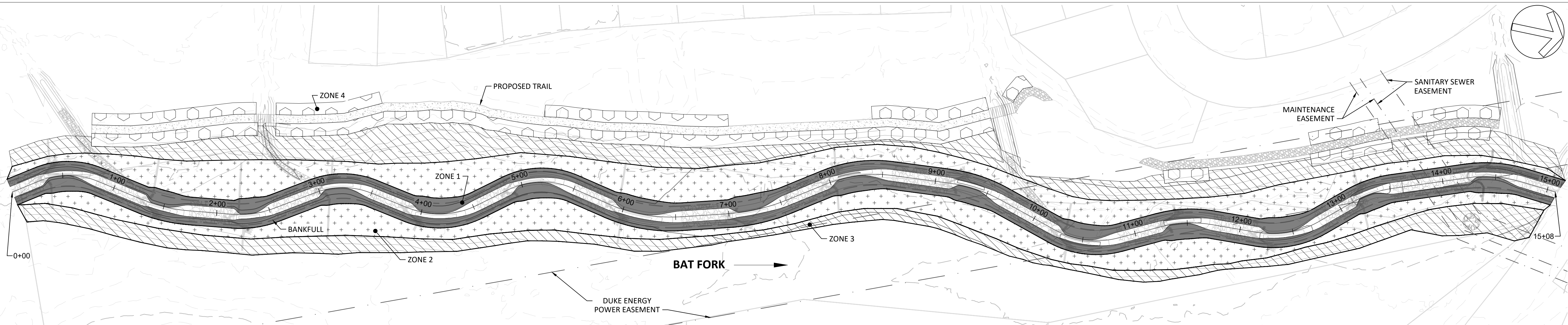
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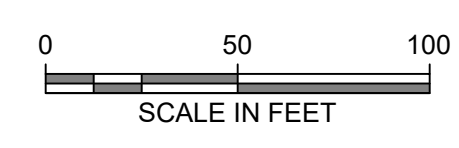
**BAT FORK STREAM RESTORATION**  
**BAT FORK**  
**EAST FLAT ROCK, NC**  
**HENDERSON COUNTY**  
**PERMIT DRAWING**  
**RE-VEGETATION PLAN**  
**NOT FOR CONSTRUCTION**



7 SAMUEL ASHE DRIVE  
ASHEVILLE, NC 28805

PERMIT DRAWING  
NOT FOR CONSTRUCTION

DATE: 10/4/2022  
SCALE (34"x22"): 1" = 50'  
SCALE (17"x11"): 1" = 100'



SHEET NUMBER  
5.1 OF 20

**GENERAL RE-VEGETATION PLAN NOTES**

- SOIL PREPARATION ELEMENTS, TEMPORARY AND PERMANENT SEED AND GROUND COVER SHALL BE SPREAD OVER ALL AREAS WITHIN THE LOD THAT ARE DISTURBED DURING CONSTRUCTION.
- CONTAINERIZED PLANTS AND BARE ROOT STOCK SHALL BE LOCATED WHERE SHOWN ON PLAN.
- ADJUSTMENTS TO THE VEGETATION PLAN SHALL BE MADE ONLY IF APPROVED BY THE PROJECT OWNER OR PROJECT ENGINEER.
- FINAL VEGETATION SPECIES SELECTION MAY CHANGE DUE TO REFINEMENT OR SPECIES AVAILABILITY AT THE TIME OF PLANTING. SPECIES SUBSTITUTIONS WILL BE COORDINATED BETWEEN THE ENGINEER AND PLANTING CONTRACTOR PRIOR TO THE PROCUREMENT OF PLANT/SEED STOCK.
- LARGER NATIVE TREE SPECIES TO BE PRESERVED WILL BE FLAGGED BY THE ENGINEER PRIOR TO CONSTRUCTION ACTIVITIES. ANY TREES HARVESTED FOR WOODY MATERIAL WILL BE UTILIZED TO PROVIDE BED AND BANK STABILIZATION AND COVER OR NESTING HABITAT ON THE FLOODPLAIN. ANY EXCESS WOODY MATERIALS MAY USED TO BACKFILL OLD CHANNELS.
- ALL DISTURBED AREAS WILL BE STABILIZED USING TEMPORARY AND PERMANENT SEEDING AS DEFINED IN THE SEEDING SCHEDULE AND THE APPROVED E&S PLAN.

**TEMPORARY SEEDING AND MULCHING NOTES**

- TEMPORARY SEEDING AND MULCHING SHALL BE APPLIED TO ALL AREAS AND ACCESS ROUTES DISTURBED DURING CONSTRUCTION.
- ALL SEED AND SEED VARIETIES MUST BE FREE OF STATE AND FEDERALLY LISTED NOXIOUS WEED SEED AND INVASIVE SPECIES.
- ALL DISTURBED AREAS WILL BE SEED WITH TEMPORARY SEED AND MULCHED WITH WHEAT STRAW. SEEDING WILL BE PERFORMED USING A BROADCAST SPREADER. OTHER METHODS MAY BE USED BUT MUST BE APPROVED BY ENGINEER IN ADVANCE OF INSTALLATION.
- MAINTENANCE OF SEED AREAS SHALL CONSIST OF WATERING, WEED AND PEST CONTROL, FERTILIZATION, EROSION REPAIR, RE-SEEDING, AND INCIDENTAL OPERATIONS AS NECESSARY TO ESTABLISH A HEALTHY, VIGOROUS, WEED FREE AND DISEASE FREE UNIFORM STAND OF GRASS. ALL AREAS WHICH FAIL TO SHOW A UNIFORM STAND OF GRASS FOR ANY REASON SHALL BE TREATED REPEATEDLY UNTIL A UNIFORM STAND OF AT LEAST 90% COVERAGE IS ATTAINED WITH NO BARE AREA GREATER THAN FIVE SQUARE FEET.

**PERMANENT SEEDING NOTES**

- PERMANENT SEEDING SHALL OCCUR IN CONJUNCTION WITH TEMPORARY SEEDING WHERE APPLICABLE. IDEALLY, PERMANENT SEEDING SHALL OCCUR DURING THE PLANTING SEASON FOR EACH SEED TYPE. AREAS FERTILIZED FOR TEMPORARY SEEDING SHALL BE SUFFICIENTLY FERTILIZED FOR PERMANENT SEEDING; ADDITIONAL FERTILIZER IS NOT REQUIRED FOR PERMANENT SEEDING.
- ALL SEED AND SEED VARIETIES MUST BE FREE OF STATE AND FEDERALLY LISTED NOXIOUS WEED SEED AND INVASIVE SPECIES.
- THE CONTRACTOR SHALL LOOSEN THE SOIL TO A MINIMUM DEPTH OF 4-INCHES AND GRADE TO A SMOOTH, EVEN SURFACE WITH A LOOSE, UNIFORMLY FINE TEXTURE. THE AREAS TO BE SEED ARE THEN TO BE ROLLED AND RAKED TO REMOVE RIDGES AND FILL DEPRESSIONS TO MEET FINISH GRADES. THE CONTRACTOR IS TO LIMIT SUB GRADE AND FINISH GRADE PREPARATION TO AREAS THAT WILL BE PLANTED IMMEDIATELY. PREPARED AREAS ARE TO BE RESTORED IF ERODED OR OTHERWISE DISTURBED AFTER FINE GRADING AND BEFORE PLANTING.
- SEED SHALL BE SOWN WITH A SPREADER OR A SEEDING MACHINE. SEED IS NOT TO BE BROADCAST OR DROPPED WHEN WIND VELOCITY EXCEEDS 5 MPH. SEED SHALL BE EVENLY DISTRIBUTED BY SOWING IN TWO DIRECTIONS AT RIGHT ANGLES TO EACH OTHER. WET SEED OR SEED THAT IS MOLDY OR OTHERWISE DAMAGED IN TRANSIT OR STORAGE IS NOT TO BE USED. AFTER BEGIN SOWN, THE SEED SHALL BE RAKED INTO THE TOP 1/4 INCH OF THE TOPSOIL, LIGHTLY ROLLED, AND WATERED WITH FINE SPRAY. SEED AREAS ON STREAM BANKS SHALL BE PROTECTED WITH COIR FIBER MATTING.

**BARE ROOTS, LIVE STAKES, AND CUTTINGS**

- CUTTINGS SHOULD BE INSTALLED THE SAME DAY THEY ARE CUT. THE STAKE SHOULD BE ORIENTED WITH THE BUDS POINTED UP, AND THE BOTTOM SHOULD BE CUT AT AN ANGLE FOR EASY INSERTION INTO THE GROUND.
- ABOUT 3/4 OF THE LENGTH OF THE STAKE SHOULD BE BELOW GROUND AND ANGLED DOWNSTREAM. AN IRON BAR CAN BE USED TO MAKE A PILOT HOLE TO PREVENT BARK FROM BEING DAMAGED DURING INSTALLATION.

**TRANSPLANTS AND CONTAINER STOCK**

- STOCK SHALL HAVE BEEN GROWN IN A CONTAINER LONG ENOUGH FOR THE ROOT SYSTEM TO HAVE DEVELOPED SUFFICIENTLY TO HOLD ITS SOIL TOGETHER ONCE REMOVED FROM THE CONTAINER.
- CONTAINER PLANTS WILL NEED TO BE WATERED REGULARLY AND PLACED IN SHADY CONDITIONS UNTIL PLANTING OCCURS. CREATE PLANTING AREA FOR EACH PLANT AND EXCAVATE PIT.
- THE DIAMETER OF THE PLANTING HOLES (PITS) FOR EACH PLANT SHOULD BE AT LEAST THREE TIMES THE DIAMETER OF THE ROOT MASS. SCARIFY THE PLANTING PIT PRIOR TO EACH PLANT INSTALLATION.
- SET PLANTS UPRIGHT IN THE CENTER OF THE PIT. THE BOTTOM OF THE ROOT MASS SHOULD BE RESTING ON UNDISTURBED SOIL.
- PLACE BACKFILL AROUND BASE AND SIDES OF ROOT MASS, AND WORK EACH LAYER TO SETTLE BACKFILL AND TO ELIMINATE VOIDS AND AIR POCKETS. WHEN PIT IS APPROXIMATELY 2/3 FULL, WATER THOROUGHLY BEFORE PLACING REMAINDER OF THE BACKFILL. WATER AGAIN AFTER PLACING FINAL LAYER OF BACKFILL. PREVENT BARK FROM BEING DAMAGED DURING INSTALLATION.

**ZONE 1: STREAMBANK**

- LIVESTAKES AND HERBACEOUS PLUGS LISTED IN THE PLANTING SCHEDULE SHALL BE PLANTED IN OFFSET ROWS AT A DENSITY OF 4,840 STEMS PER ACRE (3.0' O.C.) FROM TOE OF THE RESTORED CHANNEL TO 3.0' OUTSIDE THE BANKFULL STAGE. HERBACEOUS PLUGS SHALL BE PLANTED ALONG THE TOE OF THE CHANNEL AT RIFFLE SECTIONS.

**ZONE 2: FLOODPLAIN**

- WOODY SPECIES LISTED IN THE PLANTING SCHEDULE SHALL BE PLANTED IN OFFSET ROWS AT A DENSITY OF 440 STEMS PER ACRE (10.0' O.C.) FROM 3.0' OUTSIDE THE BANKFULL STAGE TO THE TOE OF SLOPE. EXACT PLACEMENT OF THE SPECIES SHALL BE DETERMINED BY THE CONTRACTOR'S VEGETATION SPECIALIST PRIOR TO SITE PLANTING AND BASED ON THE WETNESS CONDITIONS OF PLANTING LOCATIONS.

**ZONE 3: UPLAND**

- WOODY SPECIES LISTED IN THE PLANTING SCHEDULE SHALL BE PLANTED IN OFFSET ROWS AT A DENSITY OF 440 STEMS PER ACRE (10.0' O.C.) FROM TOE OF SLOPE TO THE GRADING LIMITS. EXACT PLACEMENT OF THE SPECIES SHALL BE DETERMINED BY THE CONTRACTOR'S VEGETATION SPECIALIST PRIOR TO SITE PLANTING AND BASED ON THE WETNESS CONDITIONS OF PLANTING LOCATIONS.

**ZONE 4: TRAIL BUFFER**

- 7 GALLON CONTAINER STOCK OF THE WOODY SPECIES LISTED IN THE PLANTING SCHEDULE SHALL BE PLANTED IN IN SINGLE ROW, ON EACH SIDE OF THE PROPOSED TRAIL, AT 25 FOOT INTERVALS. EXACT PLACEMENT OF THE SPECIES SHALL BE DETERMINED BY THE CONTRACTOR'S VEGETATION SPECIALIST PRIOR TO SITE PLANTING AND BASED ON THE WETNESS CONDITIONS OF PLANTING LOCATIONS.

**ZONE 5: EASEMENT**

- PLANTING IN EASEMENTS (POWER AND SANITARY SEWER) SHALL BE LIMITED TO SEEDMIX, HERBACEOUS PLUGS & LIVESTAKES, AND WOODY UNDERSTORY SHRUBBERY.

**PLANTING SCHEDULES**

TEMPORARY SEEDING		
DATE	TYPE	APP. RATE (LBS / AC)
JAN 1 - APR 30	RYE GRAIN ( <i>Secale cereale</i> )	120
	COMMON OATS ( <i>Avena sativ</i> )	100
	RED CLOVER ( <i>Trifolium incarnatum</i> )	20
	GROUND AG. LIMESTONE	2,000
	10-10-10 FERTILIZER	750
MAY 1 - JUL 31	STRAW MULCH	4,000
	GERMAN MILLET ( <i>Setaria italica</i> )	50
	COMMON OATS ( <i>Avena sativ</i> )	100
	RED CLOVER ( <i>Trifolium incarnatum</i> )	20
	GROUND AG. LIMESTONE	2,000
AUG 1 - DEC 31	10-10-10 FERTILIZER	750
	STRAW MULCH	4,000
	RYE GRAIN ( <i>Secale cereale</i> )	120
	COMMON OATS ( <i>Avena sativ</i> )	100
	RED CLOVER ( <i>Trifolium incarnatum</i> )	20
	GROUND AG. LIMESTONE	2,000
	10-10-10 FERTILIZER	750
	STRAW MULCH	4,000

PERMANENT RIPARIAN SEEDING - 25 LBS / AC		
SPECIES	COMMON NAME	PERCENT
<i>Juncus effusus</i>	COMMON RUSH	5%
<i>Coreopsis lanceolata</i>	LANCE LEAF TICKSEED	10%
<i>Agrostis perennans</i>	AUTUMN BENTGRASS	5%
<i>Elymus virginicus</i>	VIRGINIA WILDRYE	10%
<i>Andropogon gerardi</i>	BIG BLUESTEM	10%
<i>Schizachyrium scoparium</i>	LITTLE BLUESTEM	5%
<i>Panicum virgatum</i>	SWITCH GRASS	15%
<i>Tripsacum dactyloides</i>	EASTERN GAMAGRASS	5%
<i>Sorghastrum nutans</i>	INDIAN GRASS	5%
<i>Rudbeckia hirta</i>	BLACK-EYED SUSAN	10%
<i>Chamaecrista (Cassia) fasciculata</i>	SHOWY PARTRIDGE PEA	10%
<i>Bidens aristosa</i>	SHOWY BIDENS	5%
<i>Helianthus angustifolius</i>	SWAMP SUNFLOWER	5%
<b>TOTAL</b>		<b>100%</b>

ZONE 1 - STREAMBANK - 3' O.C. (4,840 STEMS / AC)		
SPECIES	COMMON NAME	% OF STEMS
<b>LIVE STAKES</b>		
<i>Cornus amomum</i>	SILKY DOGWOOD	40%
<i>Salix sericea</i>	SILKY WILLOW	30%
<i>Sambucus canadensis</i>	ELDERBERRY	15%
<i>Physocarpus opulifolius</i>	NINEBARK	15%
<b>TOTAL</b>		<b>100%</b>
<b>HERBACEOUS PLUGS</b>		
<i>Juncus effusus</i>	COMMON RUSH	60%
<i>Carex alata</i>	BROADWING SEDGE	40%
<b>TOTAL</b>		<b>100%</b>

ZONE 2 - FLOODPLAIN - 10' O.C. (440 STEMS / AC)		
SPECIES	COMMON NAME	% OF STEMS
<b>OVERSTORY</b>		
<i>Betula nigra</i>	RIVER BIRCH	15%
<i>Platanus occidentalis</i>	SYCAMORE	15%
<i>Nyssa sylvatica</i>	BLACK GUM	10%
<i>Liriodendron tulipifera</i>	YELLOW POPLAR	10%
<i>Quercus nigra</i>	WATER OAK	5%
<i>Quercus stellata</i>	POST OAK	5%
<i>Quercus alba</i>	WHITE OAK	5%
<b>UNDERSTORY</b>		
<i>Diospyros virginiana</i>	PERSIMMON	5%
<i>Alnus serrulata</i>	HAZEL ALDER	5%
<i>Prunus serotina</i>	BLACK CHERRY	5%
<i>Asimina triloba</i>	PAWPAW	5%
<i>Hamamelis virginiana</i>	WITCH HAZEL	5%
<i>Lindera benzoin</i>	SPICEBUSH	5%
<i>Carpinus caroliniana</i>	IRONWOOD	5%
<b>TOTAL</b>		<b>100%</b>

ZONE 3 - UPLAND - 10' O.C. (440 STEMS / AC)		
SPECIES	COMMON NAME	% OF STEMS
<b>OVERSTORY</b>		
<i>Betula nigra</i>	RIVER BIRCH	15%
<i>Platanus occidentalis</i>	SYCAMORE	15%
<i>Nyssa sylvatica</i>	BLACK GUM	10%
<i>Liriodendron tulipifera</i>	YELLOW POPLAR	10%
<i>Quercus nigra</i>	WATER OAK	5%
<i>Quercus stellata</i>	POST OAK	5%
<i>Quercus alba</i>	WHITE OAK	5%
<b>UNDERSTORY</b>		
<i>Diospyros virginiana</i>	PERSIMMON	5%
<i>Alnus serrulata</i>	HAZEL ALDER	5%
<i>Prunus serotina</i>	BLACK CHERRY	5%
<i>Asimina triloba</i>	PAWPAW	5%
<i>Hamamelis virginiana</i>	WITCH HAZEL	5%
<i>Lindera benzoin</i>	SPICEBUSH	5%
<i>Carpinus caroliniana</i>	IRONWOOD	5%
<b>TOTAL</b>		<b>100%</b>

ZONE 4 - TRAIL BUFFER - 25' SPACING		
SPECIES	COMMON NAME	% OF STEMS
<b>OVERSTORY</b>		
<i>Viburnum dentatum</i>	ARROW WOOD	20%
<i>Quercus phellos</i>	WILLOW OAK	15%
<i>Platanus occidentalis</i>	AMERICAN SYCAMORE	20%
<i>Kalmia latifolia</i>	MOUNTAIN LAUREL	15%
<i>Cornus florida</i>	FLOWERING DOGWOOD	15%
<i>Quercus stellata</i>	POST OAK	15%
<b>TOTAL</b>		<b>100%</b>



