

19W North Emergency Repair Design

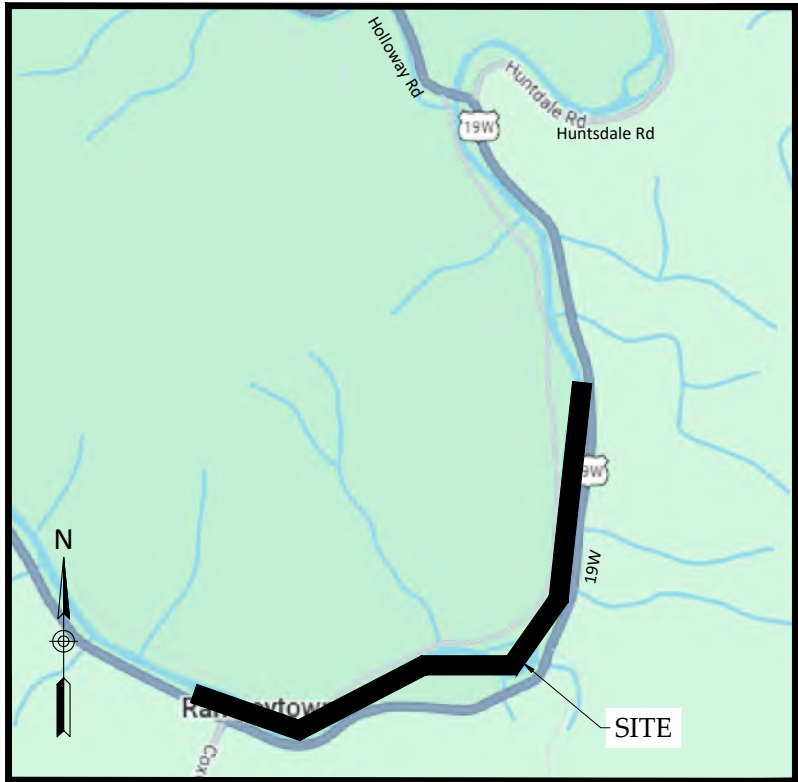
Cane River Work Package #2

Stream Plan Submittal- BRIDGE 178

Will Higgins/Ramseytown

for

NCDOT



Vicinity Map
Not to Scale



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STREAM PLANS
ISSUED JUNE 29, 2026

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Project Directory

<u>Engineering:</u> Wildlands Engineering, Inc License No. F-0831 167-B Haywood Rd Asheville, NC 28806 Jake McLean, P.E. 828-545-3865	<u>Structural Engineering:</u> Wetherill Engineering 1223 Jones Franklin Road Raleigh, NC 27606 Farrell Nicholson, P.E. 704-475-2488
<u>Roadway Engineering:</u> JMT- Johnson, Mirmiran & Thompson, Inc 4700 Falls of Neuse Road, Suite 100 Raleigh, NC 27609 Chad Rogers, Vice President	

1. All erosion and sediment control practices shall comply with the North Carolina Erosion and Sediment Control Planning and Design Manual.
2. The contractor shall ensure safe working conditions are always maintained at the Site. Contractor shall monitor river flows and weather forecasts and move equipment from flood prone areas if rain is predicted. All materials shall be stored in an orderly manner, away from waterways, and in appropriate containers and/or enclosures.
3. Under no circumstances will Contractor exceed the limits of disturbance and/or go outside of temporary disaster construction easement (TDCE) areas shown in the plans.

1. Vegetation onsite to be used as transplant material (river cane, small trees, and sod mats) shall not be disturbed until Contractor is prepared to install transplants. These will be identified by the Engineer during the pre-construction site walk.
2. Contractor is to make every effort to avoid damaging or removing existing trees. Any required tree clearing shall occur outside of bat moratoria.
3. If necessary due to timing, trees will be removed pre-project with no or minimal ground disturbance. Trees will be cut at their base leaving root balls in place. All pre-project tree clearing shall occur between August 1 and April 30 in accordance with permit requirements to protect potential bat habitat.
4. Non-native vegetation encountered during clearing, grubbing, and grading shall be hauled offsite.

1. Contact North Carolina "One Call" Center (800-632-4949) before any excavation. Contact the Division of Energy, Mineral, and Land Resources (DEMLR) Asheville Regional Office at 828-296-4500 to schedule a pre-construction meeting at least 48 hours prior to project activation.
2. Mobilize equipment and materials to the Site.
3. Identify and establish construction access points, staging and stockpile areas, and silt fence.
 - a. Construction access is located off 19W and Will Higgins Road. Access points are shared with Bridge 178 work.
 - b. Preliminary locations for staging and stockpile areas have been provided in the plans, but these may be field adjusted by the contractor with engineer approval given the following conditions are met.
 - i. Stockpiles, laydown or waste areas, concrete washouts, portable toilets, and fuels must be located within the permitted limits of disturbance, the TDCE, and are at least 50 feet away from any open water conveyances, such as basins, ditches, storm drain inlets, etc.
 - ii. Additional stockpile areas and staging areas not meeting these conditions will require approval of the Division of Energy, Mineral, and Land Resources, the client, and the engineer.
4. Establish haul roads.
 - a. All haul roads shall be monitored for sediment loss daily. In the event of sediment loss, a double row of silt fence or other acceptable sediment and erosion control practices shall be installed. Silt fence outlets shall be located at points of low elevation or a maximum spacing of 150 ft and offset between double rows of silt fence to maximize sediment capture.
5. Set up temporary facilities, locate equipment within the staging area, and stockpile materials needed for the initial stages of construction within the stockpile area(s).
6. NPDES Preparation and Monitoring
 - a. Install and maintain an onsite rain gauge and logbook to record the rainfall amounts and dates.
 - b. Maintain an approved copy of the E&SC plan with placard and approval letter and a copy of the NPDES permit. Twelve months of complete inspection forms shall be kept on-site and available for inspection at all times until project closure by NCDEQ.
 - c. The contractor shall conduct self-inspections of the erosion and sedimentation control measures and complete the following combined self-inspection form found on the DEMLR website:
<https://deq.nc.gov/about/divisions/energy-mineral-land-resources/erosion-sediment-control/forms>.
 - d. Monitor site for sediment loss and inspect all erosion control features after each rain event and as dictated by the NPDES Permit. Maintain erosion control features according to the North Carolina Erosion and Sediment Control Planning and Design Manual.
7. Stream work consists of two main elements: Bench construction in cut and bench construction in fill. Contractor will work in and adjacent to the live channel. Erosion will be managed with careful phasing of work.
 - a. Bench construction in fill: Bench construction within the live channel shall begin with installation of a rock dam around the work area, to be incorporated into the bench as construction progresses.
 - i. If dewatering the bench work area is necessary, dewatering pump shall discharge to a dewatering bag on a stabilized outlet as shown in the details. Contractor shall continuously monitor the dewatering bag during operation.
 - ii. All disturbed areas shall be stabilized with mulch at the end of each workday.
 - iii. Contractor shall maintain a dedicated crew to the bench construction area and not advance to the next bench work until the current bench work area is completed and stabilized, unless a second crew is mobilized.
- b. Bench construction in cut: When excavating adjacent to live water, construction equipment shall sit on land.
 - i. Contractor shall grade from waters edge upslope to minimize interaction with water.
 - ii. Should excessive sedimentation in water be observed, contractor shall install a rock dam around the work area to contain sediment and encourage settling.
 - iii. All bench areas shall be straw mulched at the end of the work day.

- 8. Routine crossing of the live river is not anticipated due to an existing bridge and road access on both sides of the channel. The designated haul road must be utilized per the approved plan to conduct stream enhancement work.

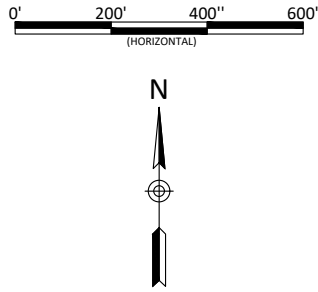
1. Contractor shall develop a phasing plan and schedule for stream work to be approved by the engineer prior to beginning work. It is anticipated that stream work may be completed to a point to support bridge construction, then be stabilized and finalized later after bridge construction is underway or complete. Contractor shall adhere to the approved phasing plan and schedule unless otherwise approved by the engineer. All aspects of construction should be considered within the proposed phasing plan and schedule.
2. After initial erosion control measures are installed as discussed in Initial Site Preparation and Erosion Control, cobble/gravel bars called out within the plans called out for removal shall be harvested and stockpiled for use in construction of stream elements. Additional bars on the lower Cane River, near the confluence with the Nolichucky, may be harvested and stockpiled as directed by the engineer.
3. Begin construction of stream elements. Where feasible and if multiple dedicated crews are available, multiple sections of stream work may be constructed concurrently.
4. If bedrock is encountered, work with onsite stream engineer to adjust the stream profile/cross section. Bedrock/large boulder blasting is not desirable and should be avoided if possible.
5. Pool depths may be increased to generate more rocky material, as site conditions allow and as approved by onsite stream engineer.
6. Excess excavation material may be used to increase the slope of the low in-stream benches. See notes on cross sections and work with onsite stream engineer to locate areas where stream bench slopes can be increased consistently across the project area.
7. Upon completion of stream elements, transplant vegetation as directed by the engineer.
8. Seed all disturbed areas with a mix of temporary (erosion control) and permanent riparian seed mix as completed and in compliance with the NPDES permit, as detailed below.
 - a. Ground stabilization will be applied within 14 calendar days from last land disturbing activity on flatter areas.
 - b. For steep slopes, that area must be stabilized within 7 calendar days.
 - c. Prepare floodplain for seeding by ripping and raking/smoothing between bankfull and the grading limits.
 - d. Any areas within the TDCE that have not been graded shall be treated according to the planting plan.
9. Install live stakes, bare roots, and containerized plantings along the stream banks in the dormant season (October 10 to April 25) according to the plans and specifications.

1. Contractor shall ensure that the site is free of trash and leftover materials prior to demobilization of equipment from the site.
2. Complete the removal of any additional stockpiled material from the site.
3. Perform final walkthrough with engineer and complete punch list items before removing grading equipment and construction materials from the site.
4. Demobilize grading equipment from the site.
5. All rock and other stockpiled materials must be removed from within the limits of disturbance and TDCE. All areas within the TDCE that do not have a project design element shall be returned to pre-project conditions or better.
6. Seed, mulch, and stabilize staging areas, stockpile areas, haul roads, and construction entrances.
7. Remove all temporary erosion control measures once permanent stabilization has been achieved.

Existing Features	Proposed Features
 POST-HELENE EDGE OF WATER	 PROPOSED EDGE OF WATER
 POST-HELENE CENTERLINE - CORRECTED	 PROPOSED BACK OF BENCH
 EXISTING MAJOR CONTOUR	 PROPOSED CENTERLINE
 EXISTING MINOR CONTOUR	 PROPOSED TEMPORARY DISASTER CONSTRUCTION EASEMENT
 EXISTING PROPERTY LINE	 PROPOSED GUARDRAIL (PRELIM)
 EXISTING PARCEL NUMBERS	 PROPOSED ROAD CENTERLINE (PRELIM)
 EXISTING RIVER ROCK FOR RECLAMATION	 PROPOSED MAJOR CONTOUR
 POTENTIAL EXISTING RIFFLE FEATURE	 PROPOSED MINOR CONTOUR
 POTENTIAL EXISTING BOULDER	 PROPOSED BOULDER CLUSTER
	 PROPOSED TRANSVERSE GLIDE

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Yancey County, North Carolina

Project Overview

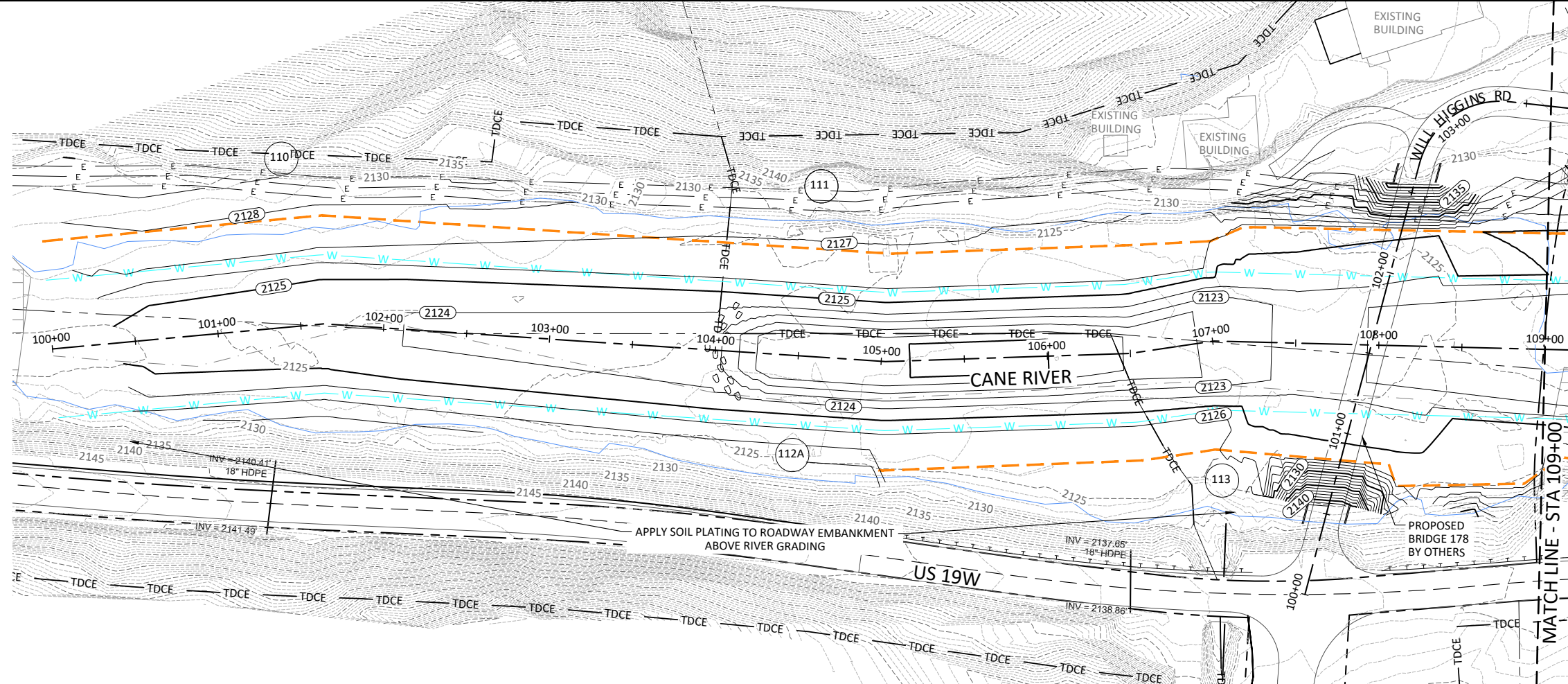
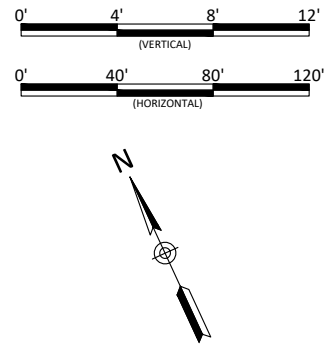
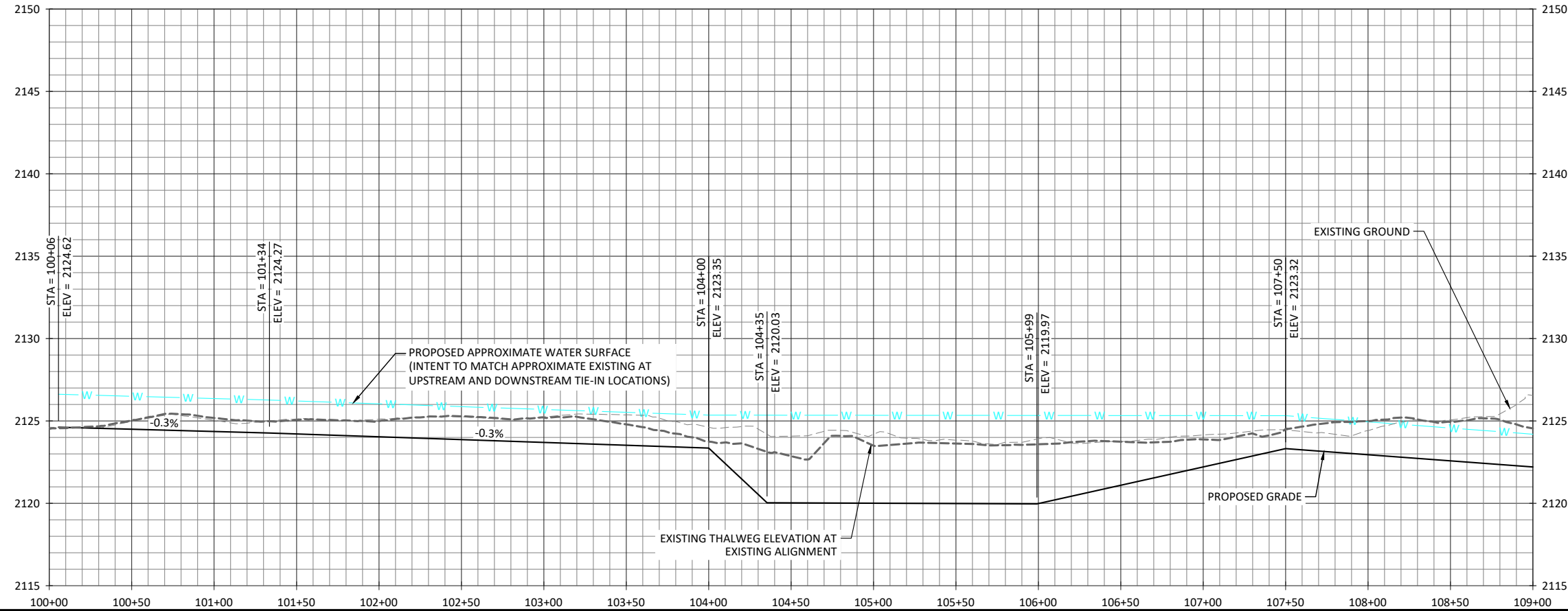
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Checked By:	CDB

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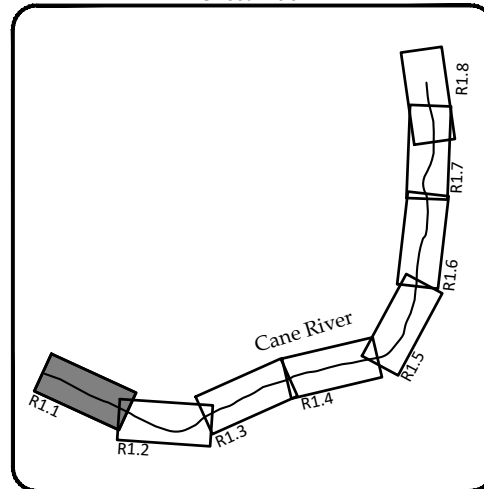
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NOTE:
1. RECLAIM RIVER ROCK USED IN
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Yancey County, North Carolina

Cane River
Stream Plan and Profile



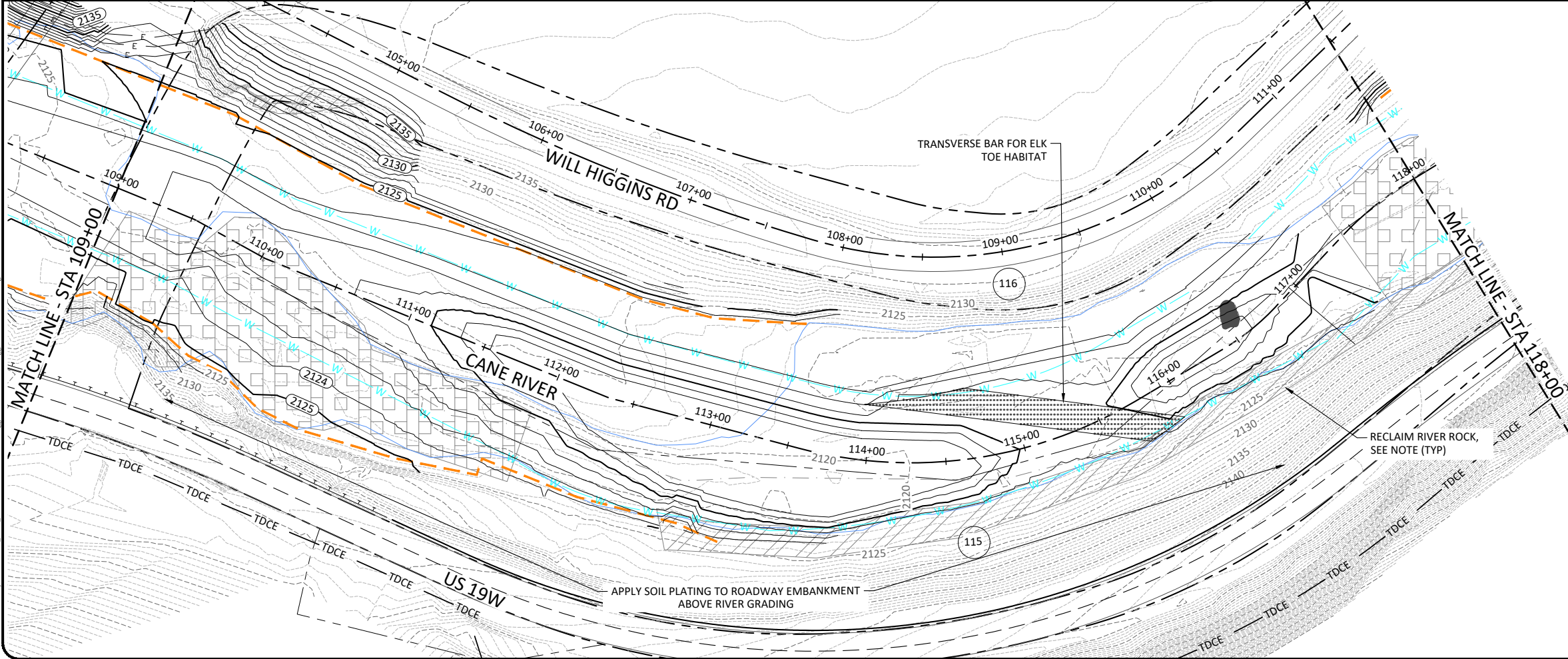
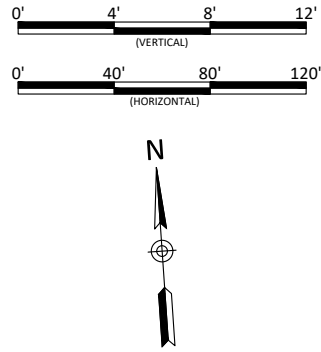
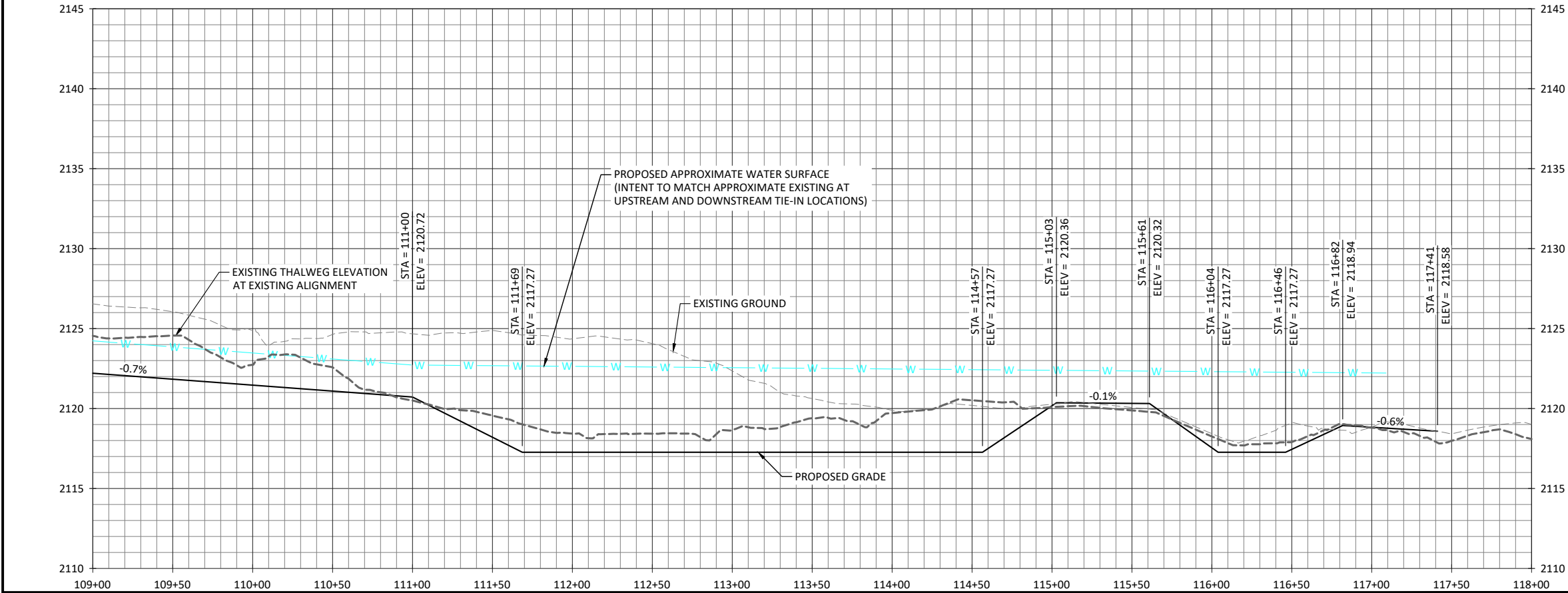
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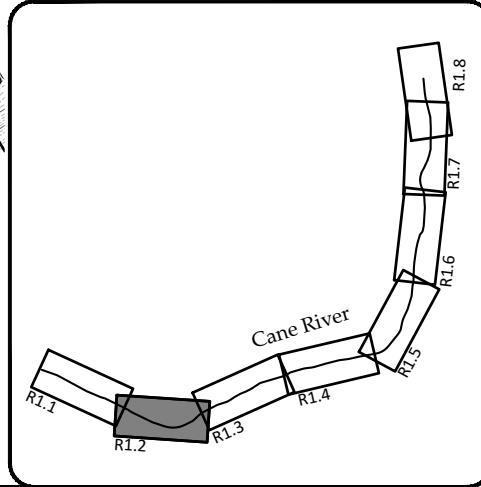
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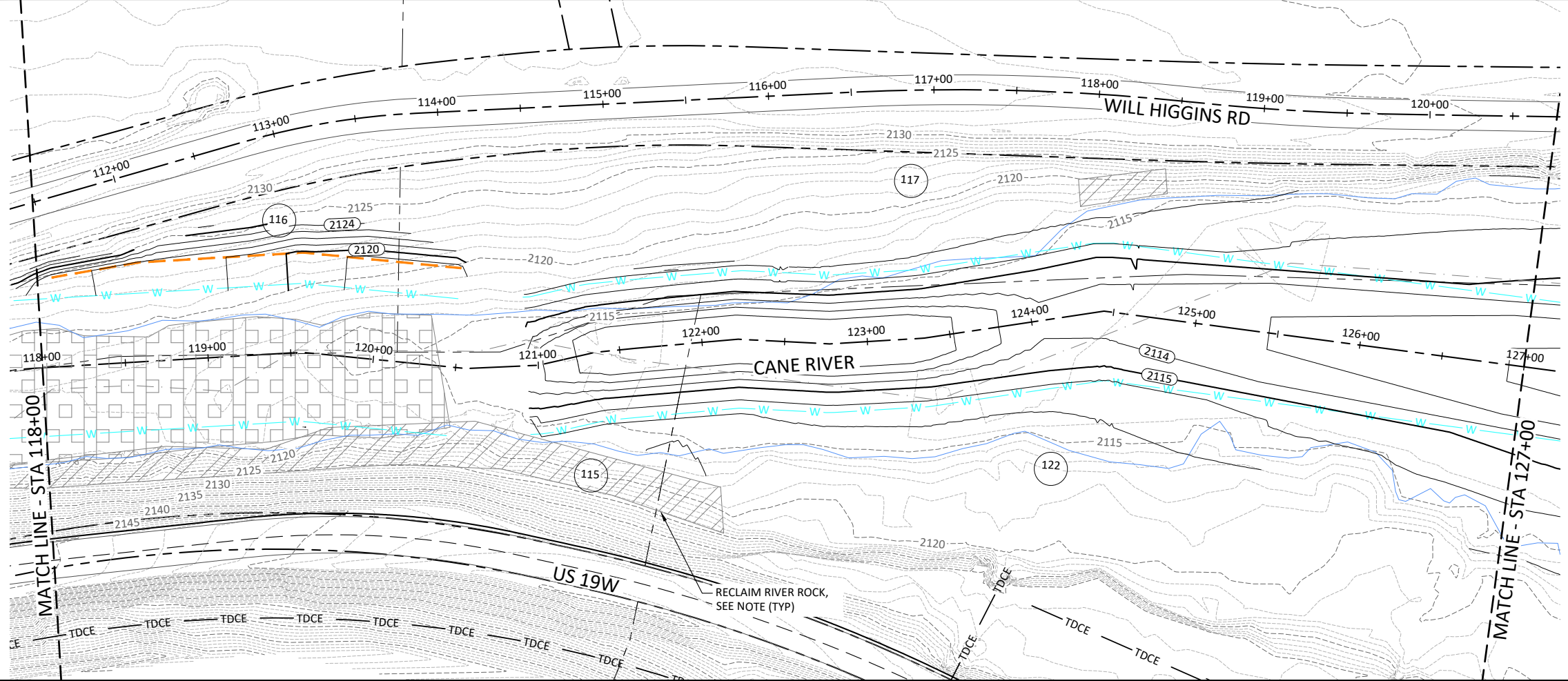
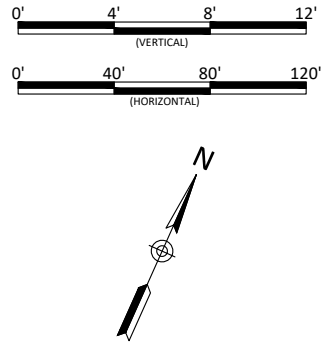
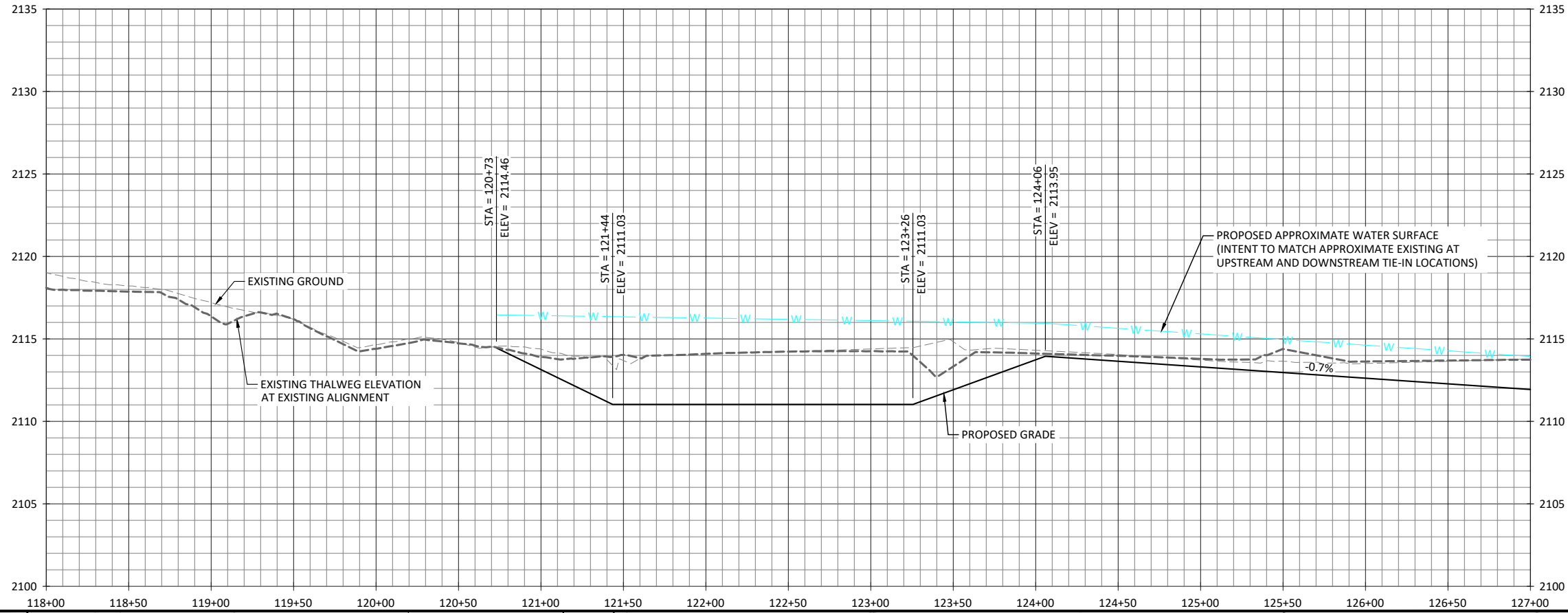


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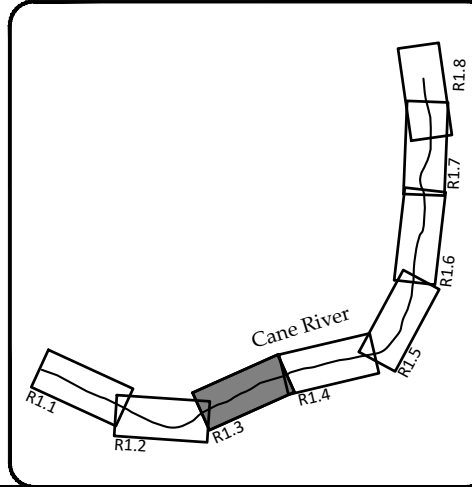
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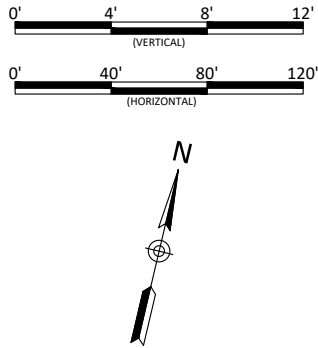
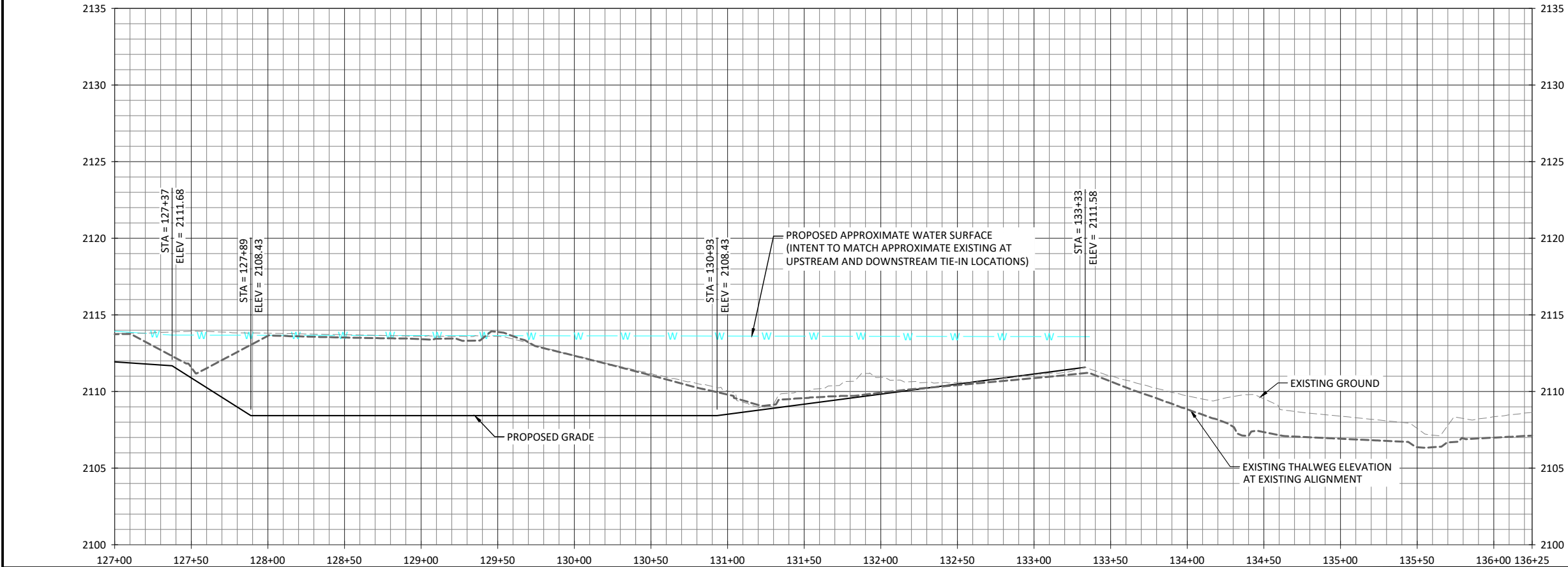
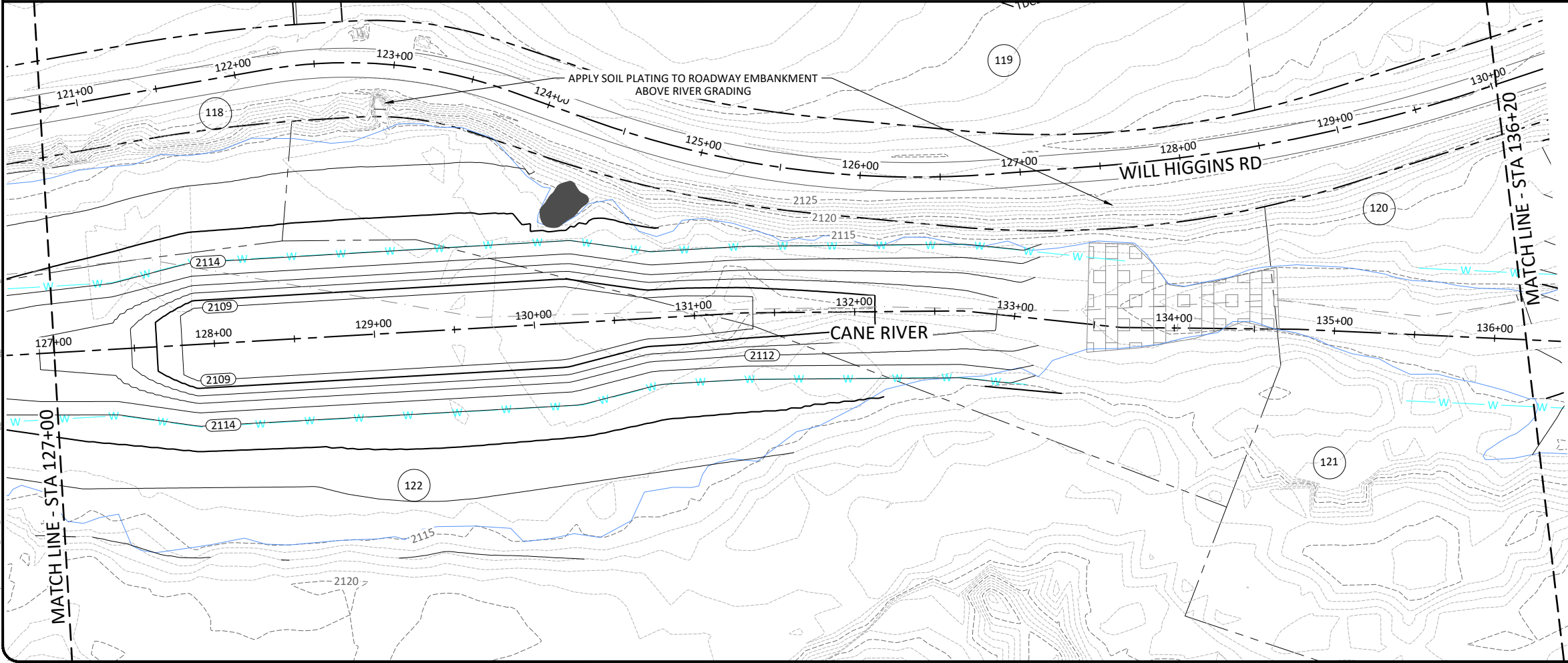
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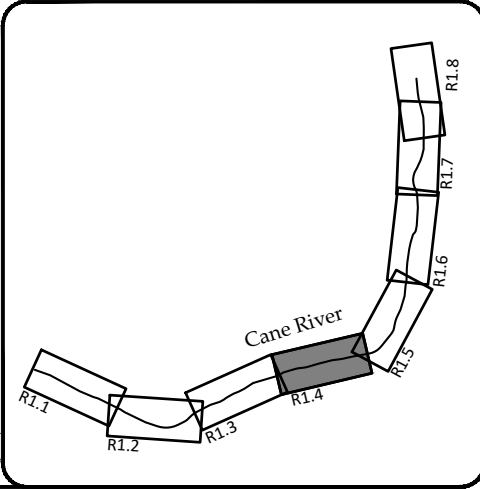
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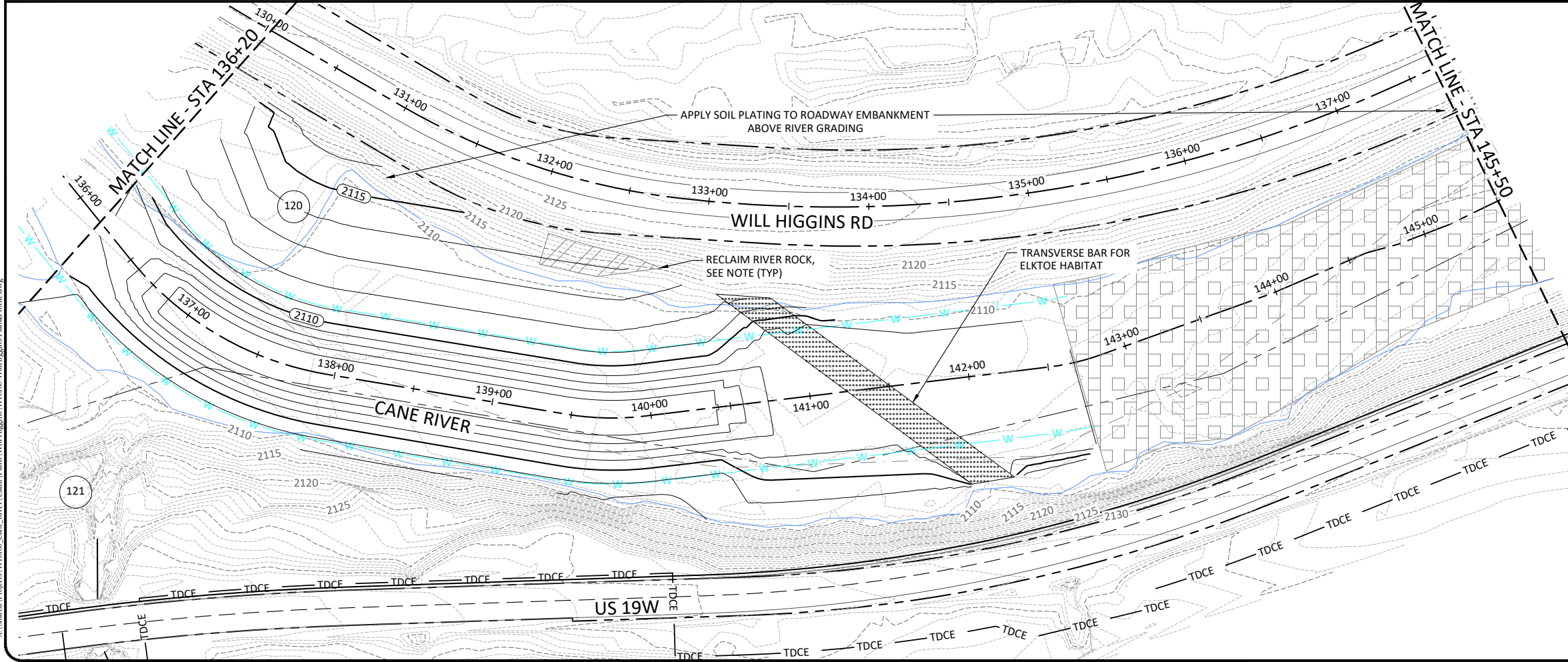
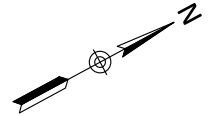
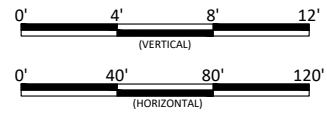
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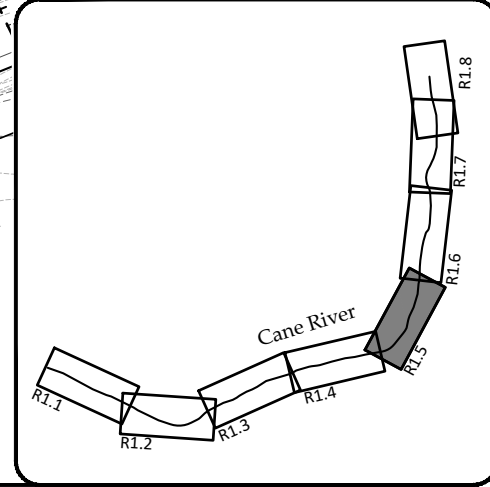
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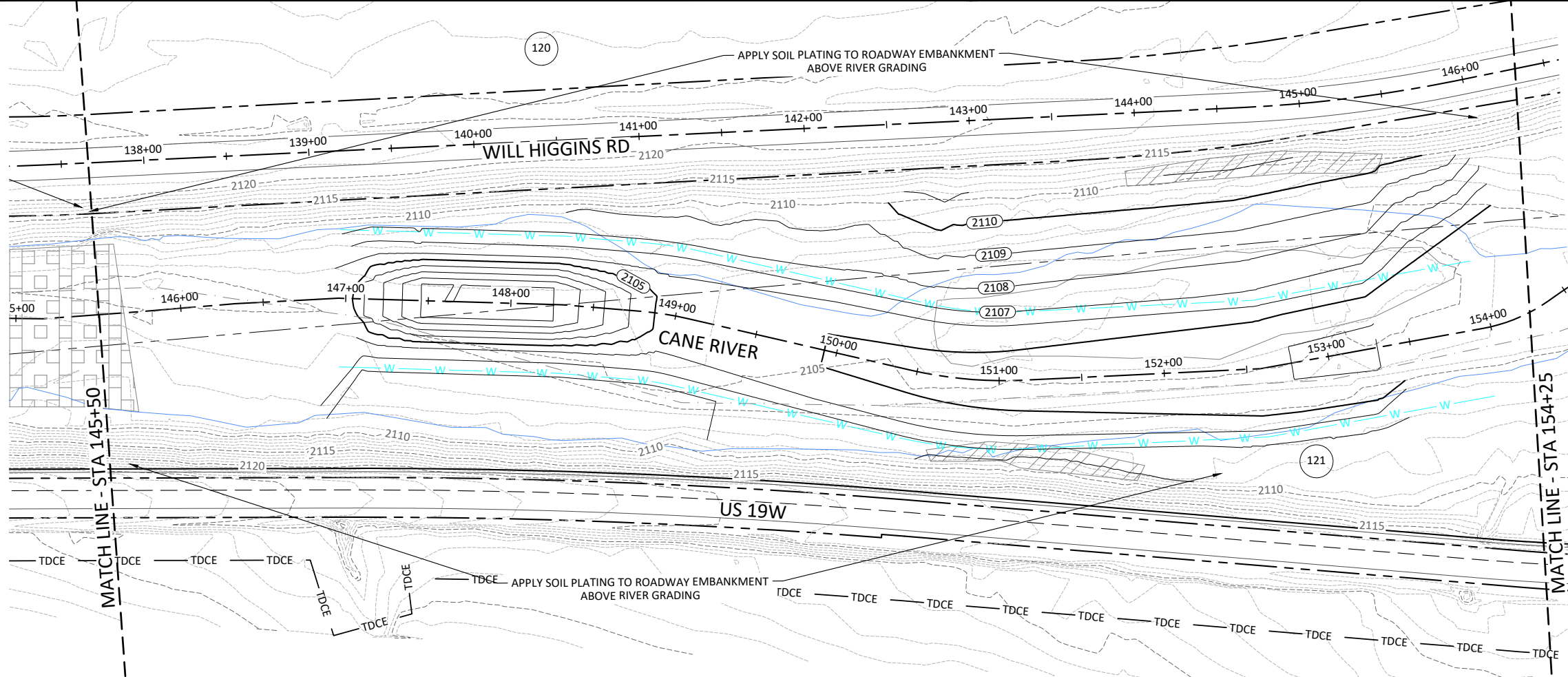
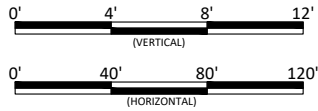
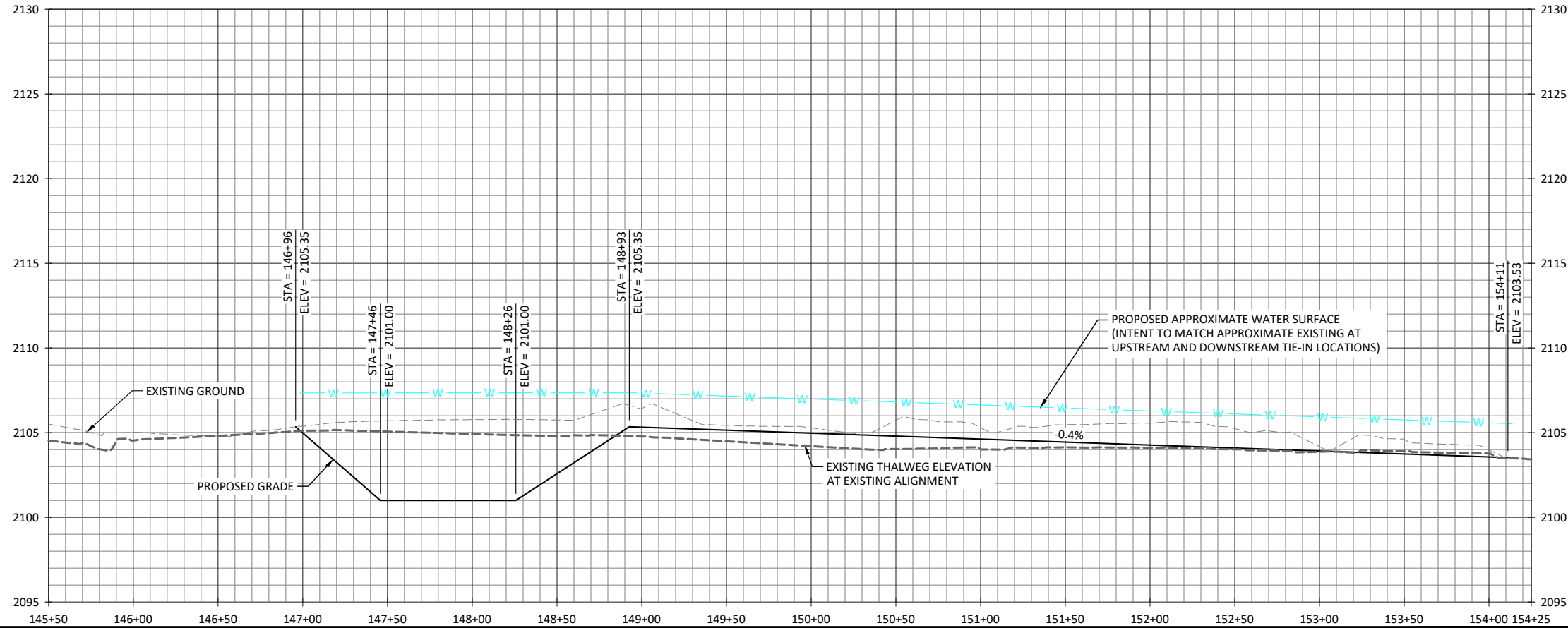
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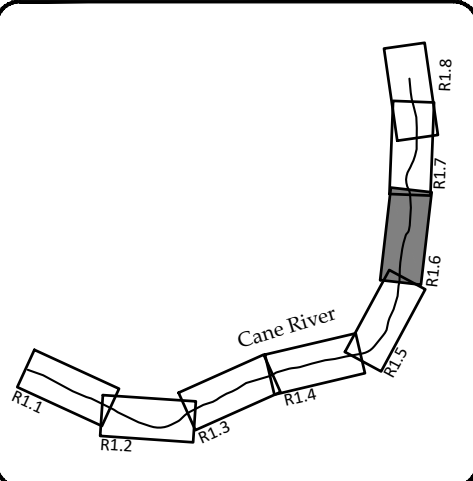
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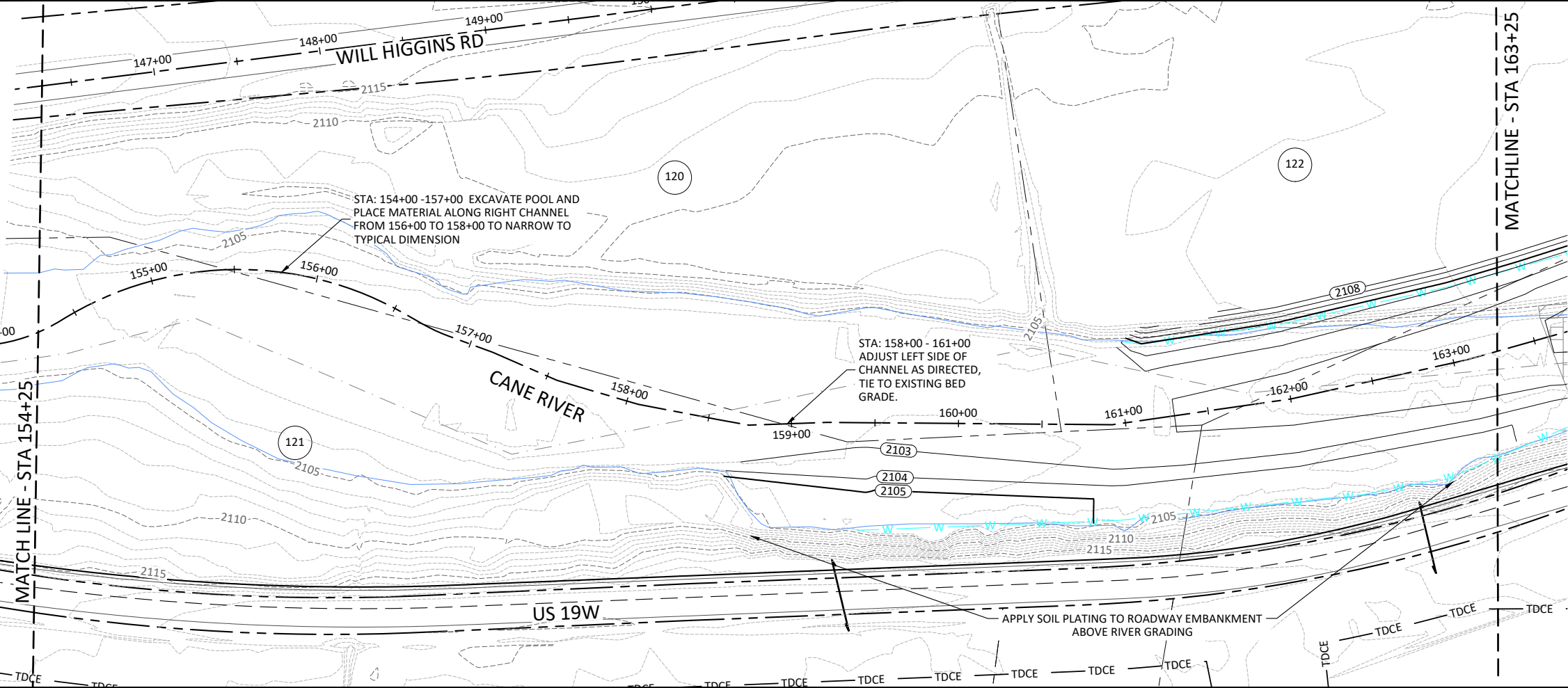
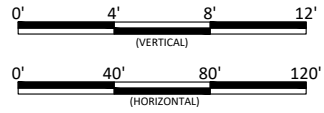
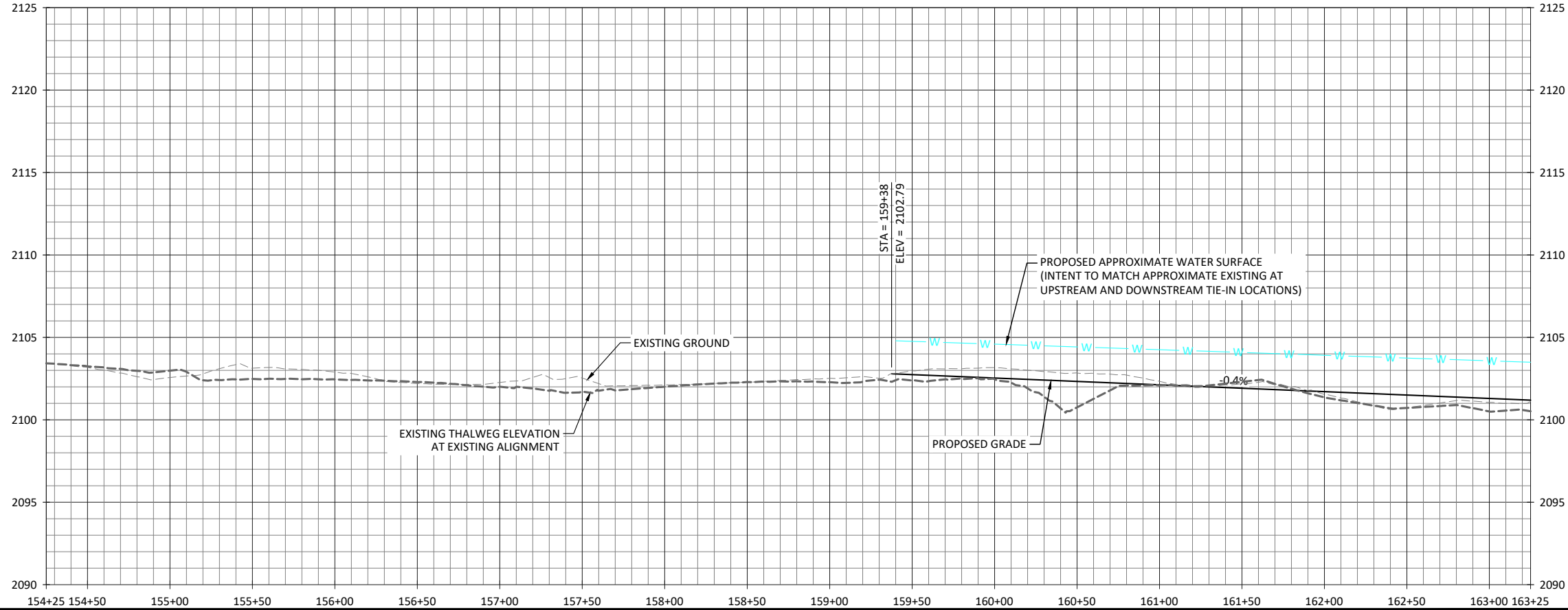
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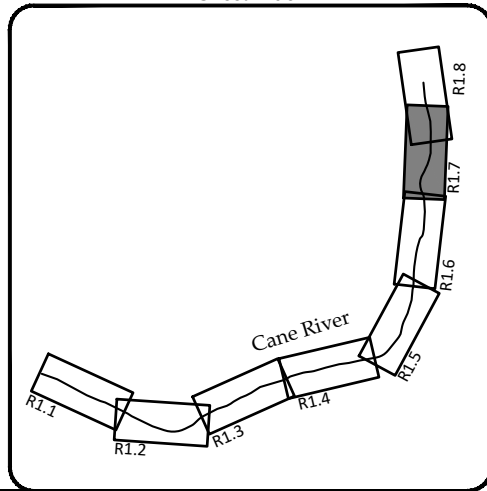
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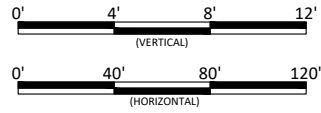
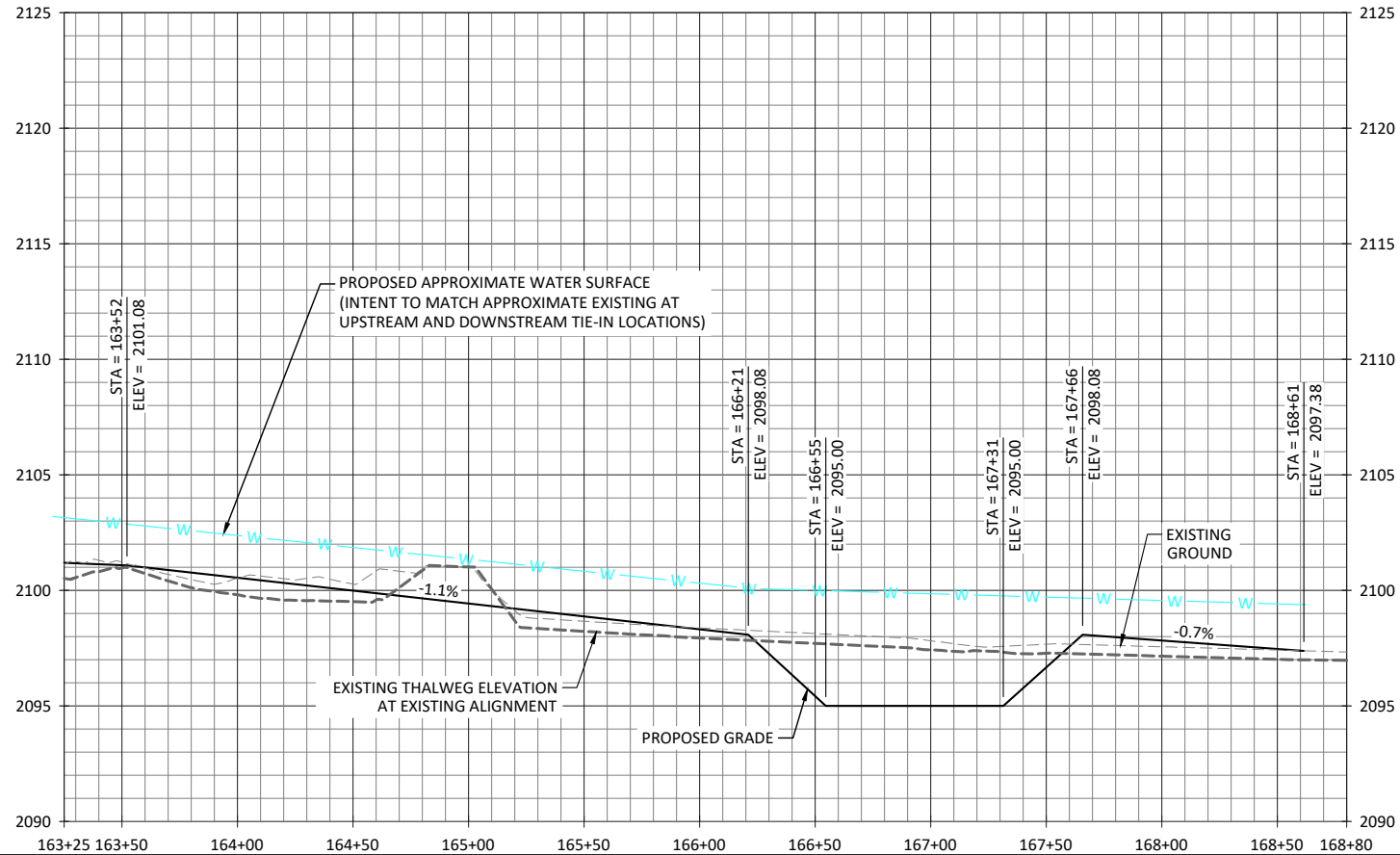
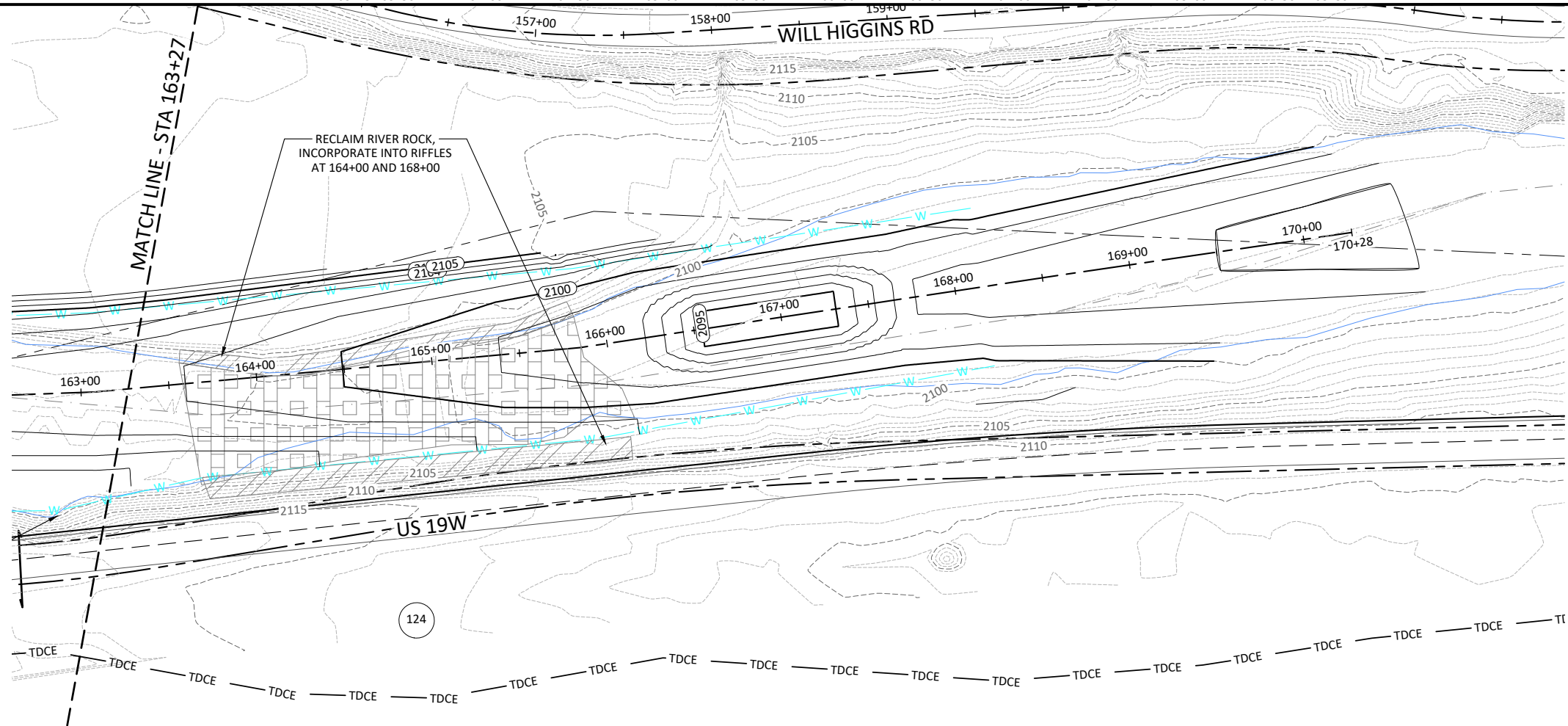


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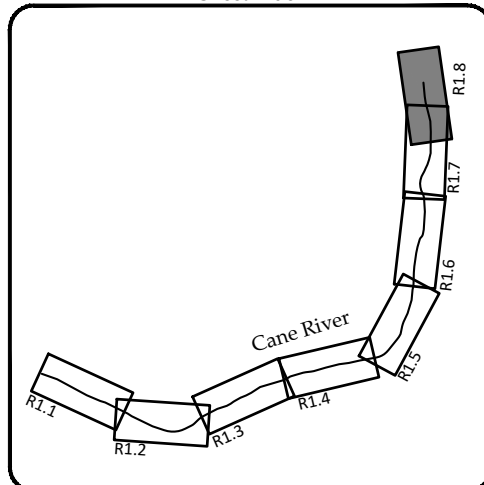
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Yancey County, North Carolina
Cross Section Overview
Cross-Sections

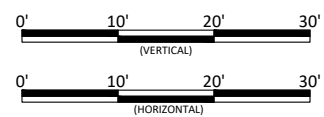
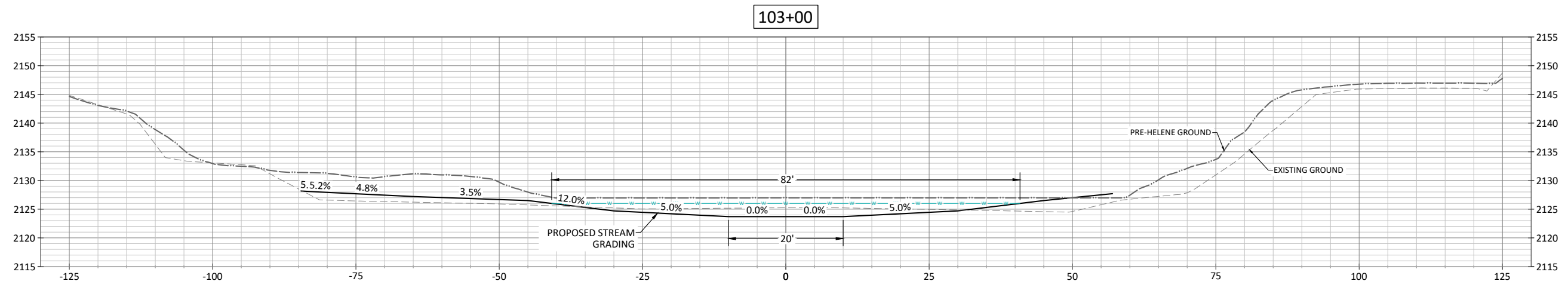
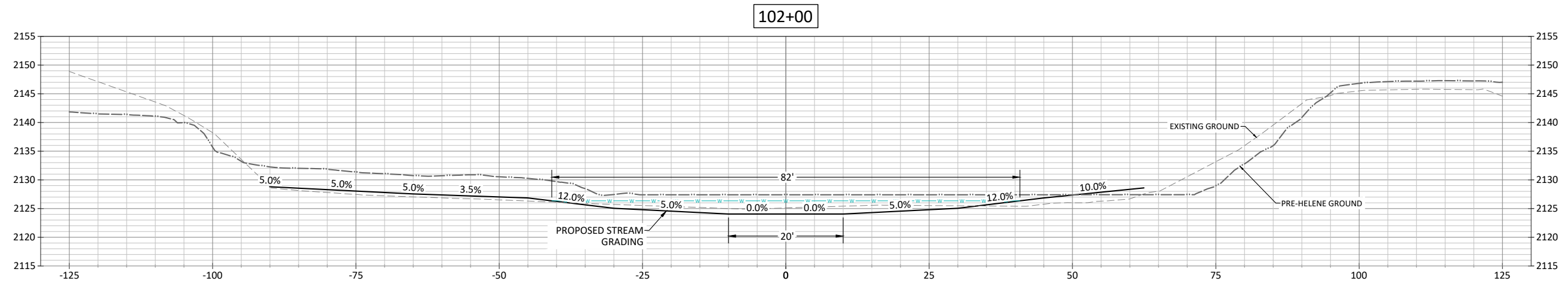
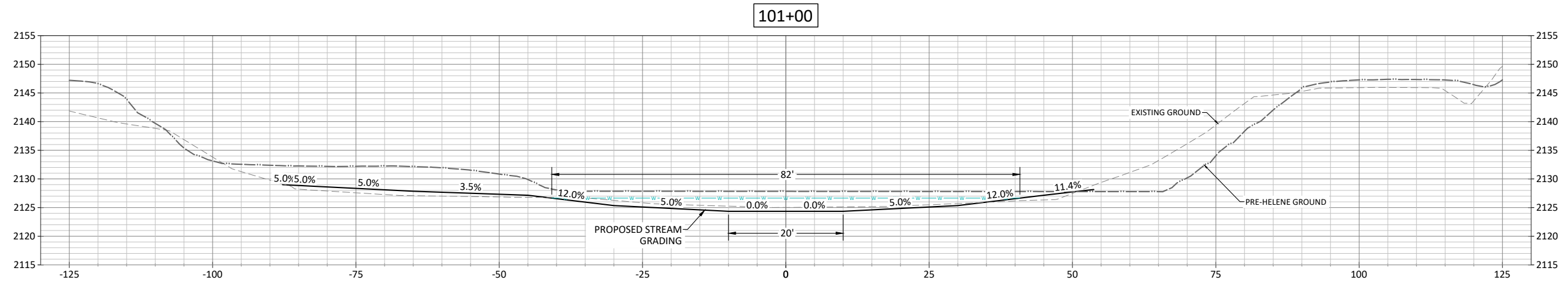
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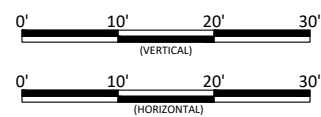
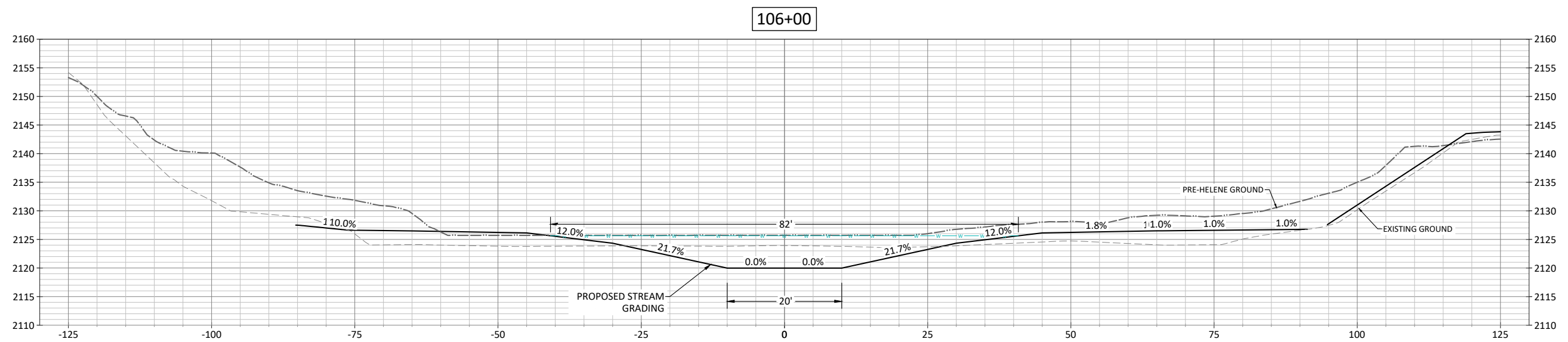
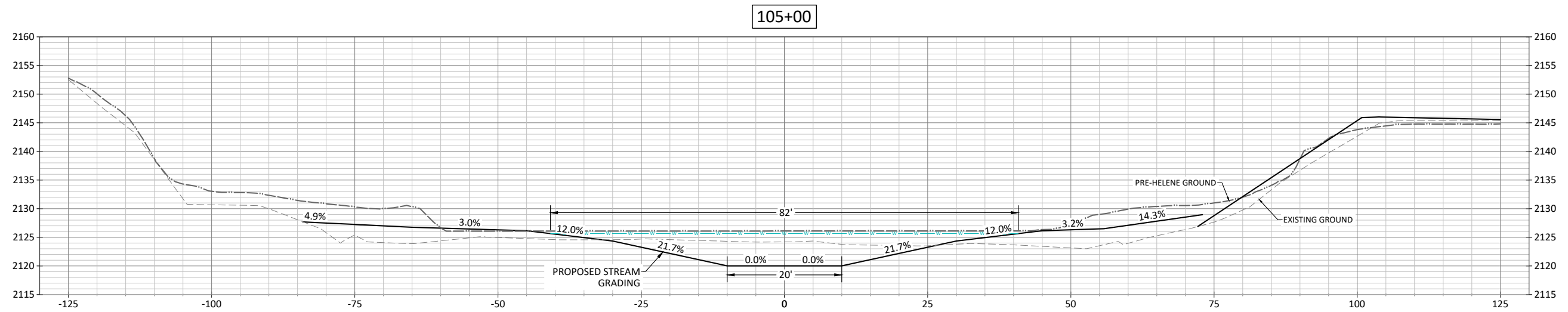
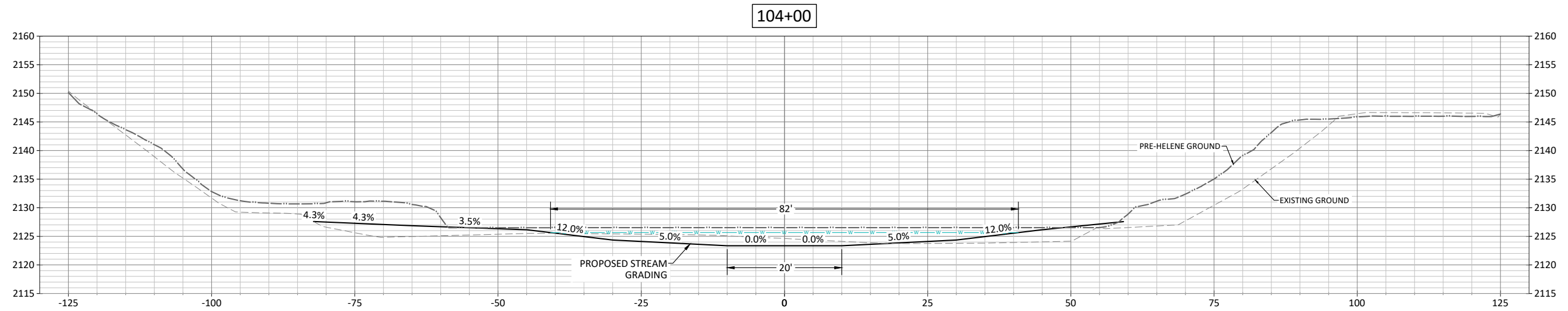
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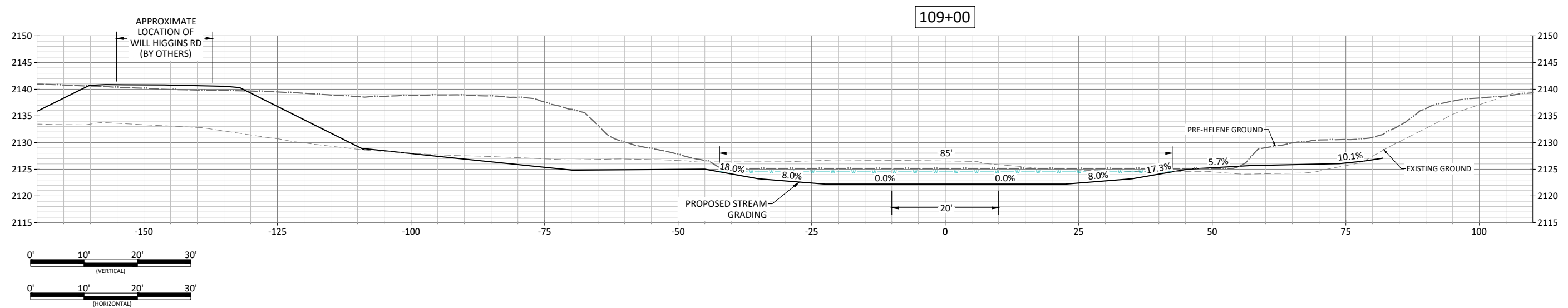
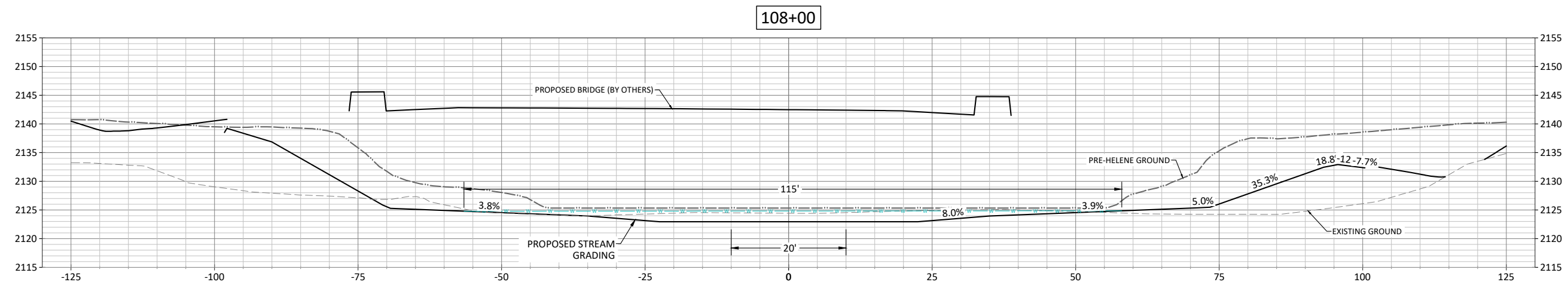
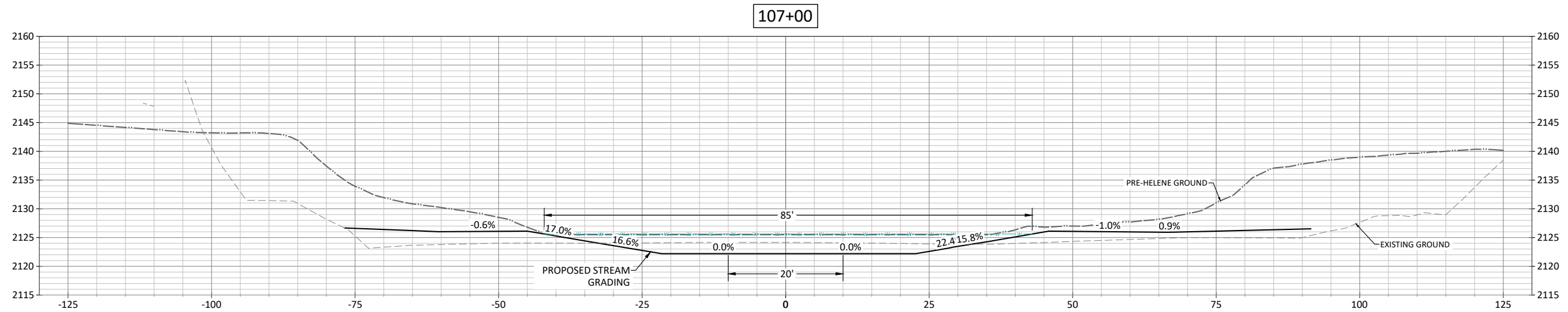
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Cross Sections 104+00-106+00
Cross-Sections

ANSWER HERE

Job Number: W16100
 Project Engineer: JPM
 Drawn By: WPC/ICK
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R-2.2



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19W North Emergency Repair Design
Yancey County, North Carolina

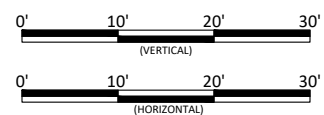
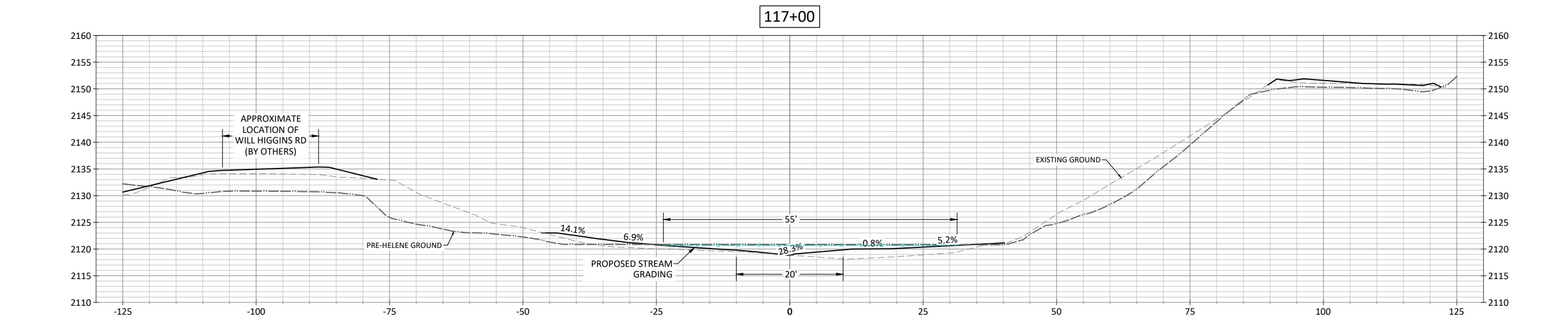
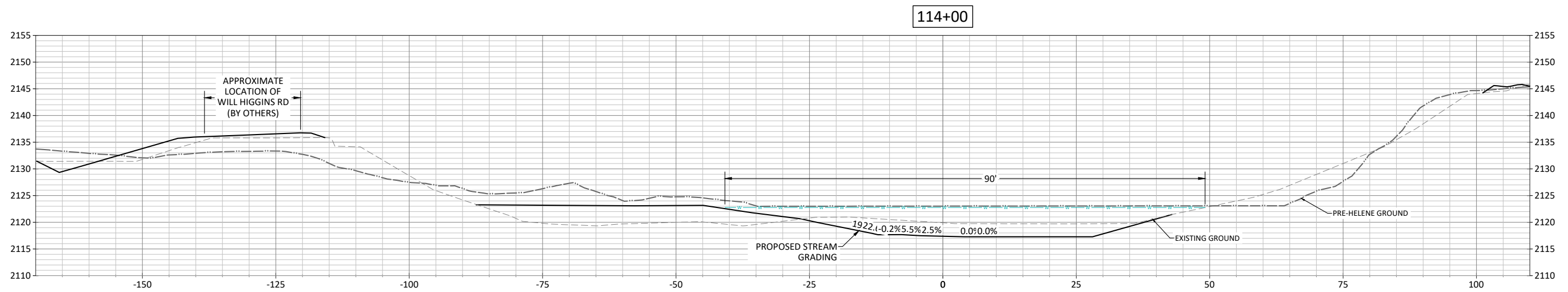
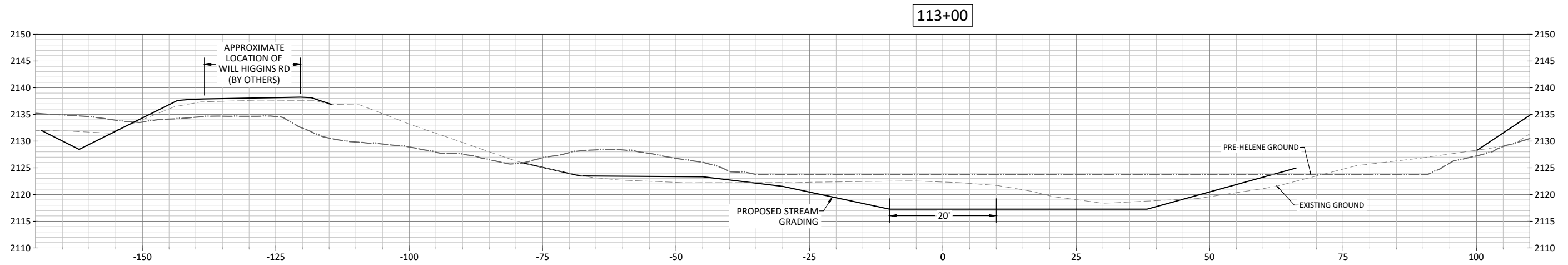
Cross Sections 107+00-109+00
Cross-Sections

Revisions;

Date: June 26, 2026
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Project Engineer: JPM
Drawn By: WPC/jck
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19W North Emergency Repair Design
Yancey County, North Carolina

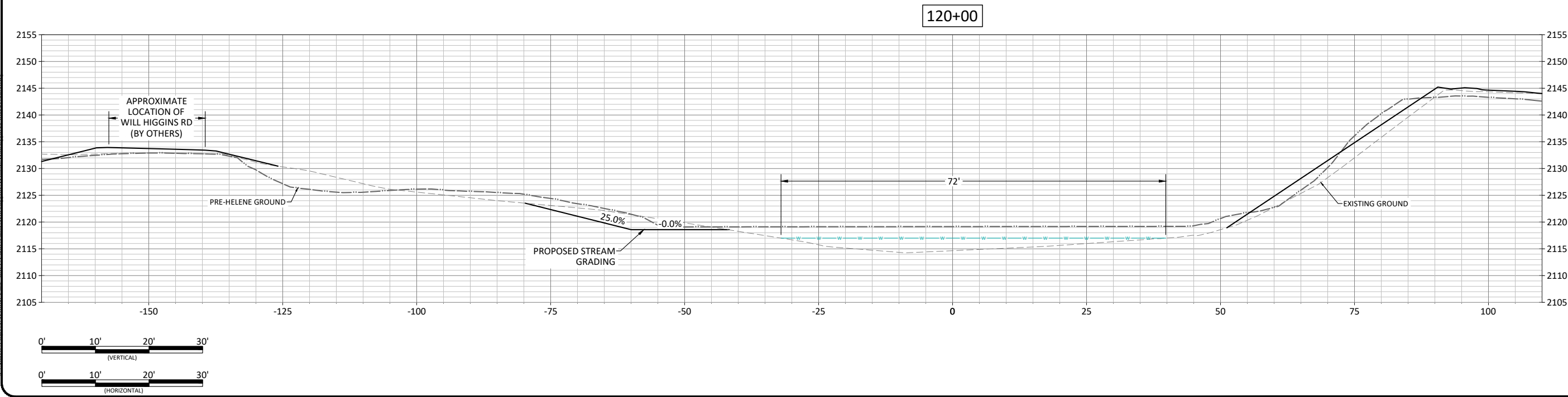
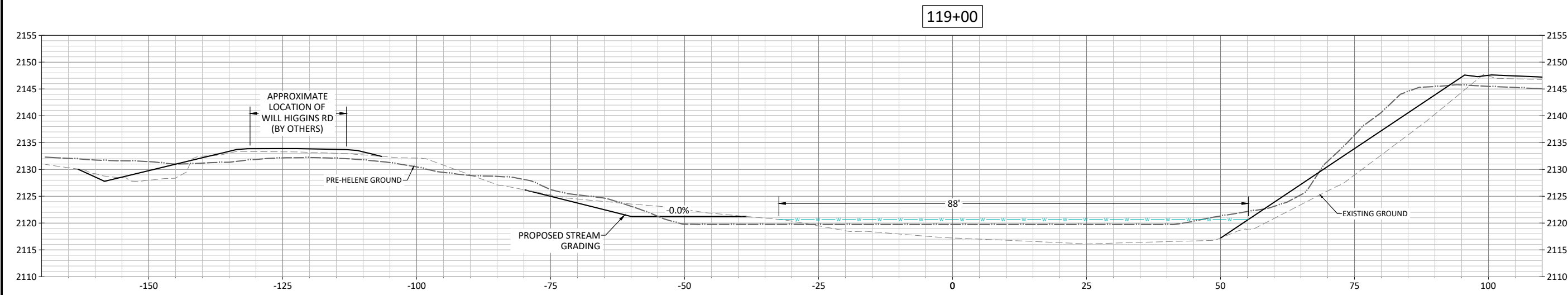
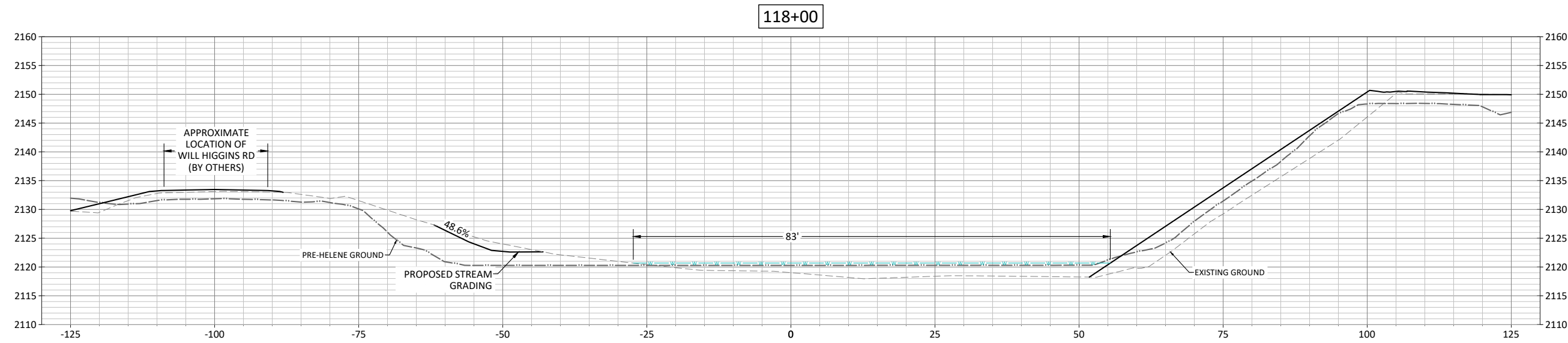
Cross-Sections

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 Project Engineer: JPM
 Drawn By: WPC/ICK
 Checked By: CDB

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R-2.5

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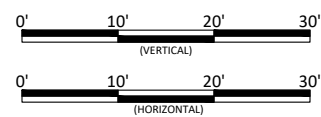
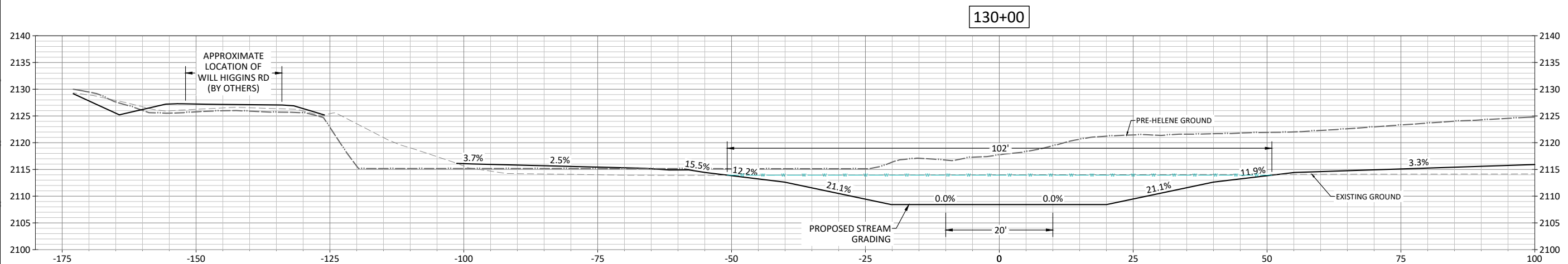
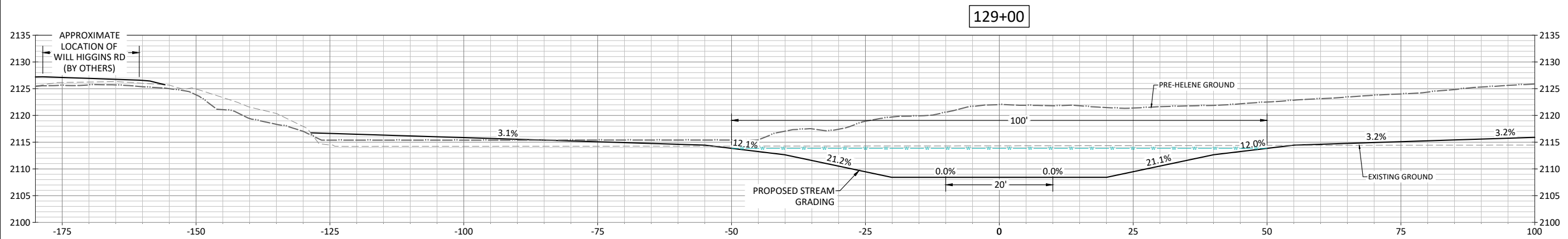
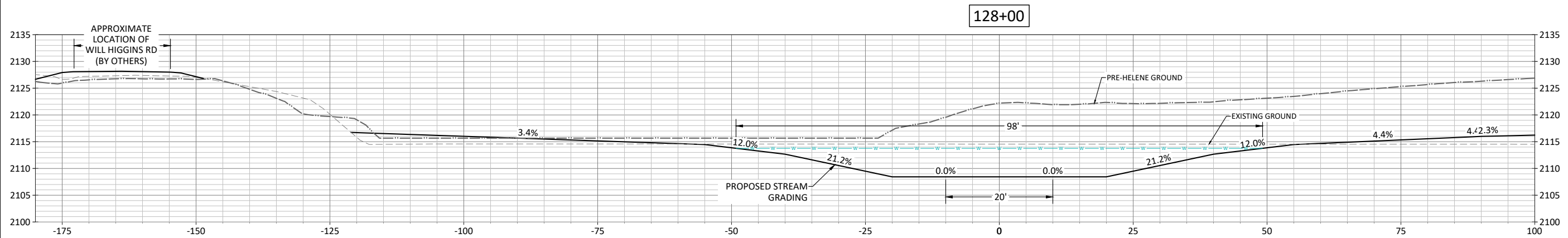
19W North Emergency Repair Design
Yancey County, North Carolina

Cross Sections 118+00-120+00
Cross-Sections

Date:	June 26, 2026
Job Number:	W16100
Project Engineer:	JDM
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19W North Emergency Repair Design
Yancey County, North Carolina

Cross Sections 128+00-130+00
Cross-Sections

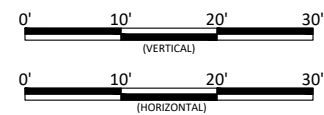
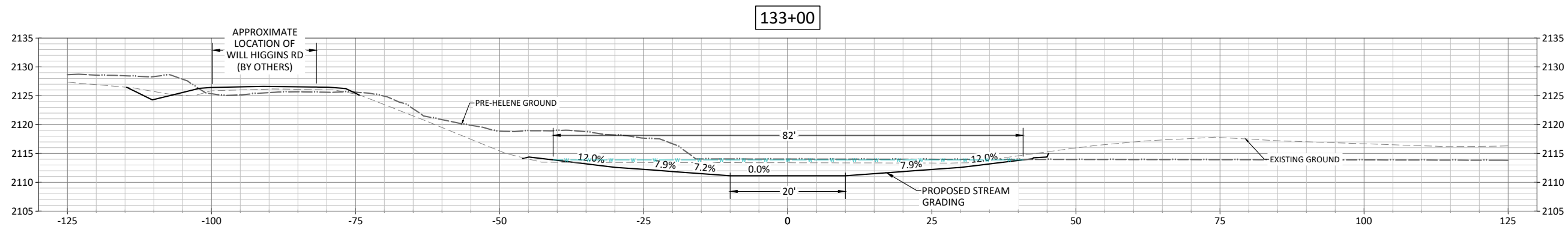
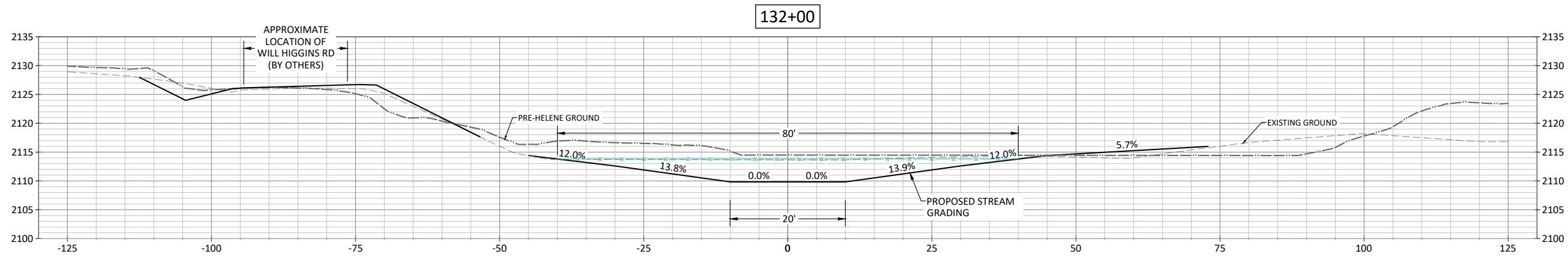
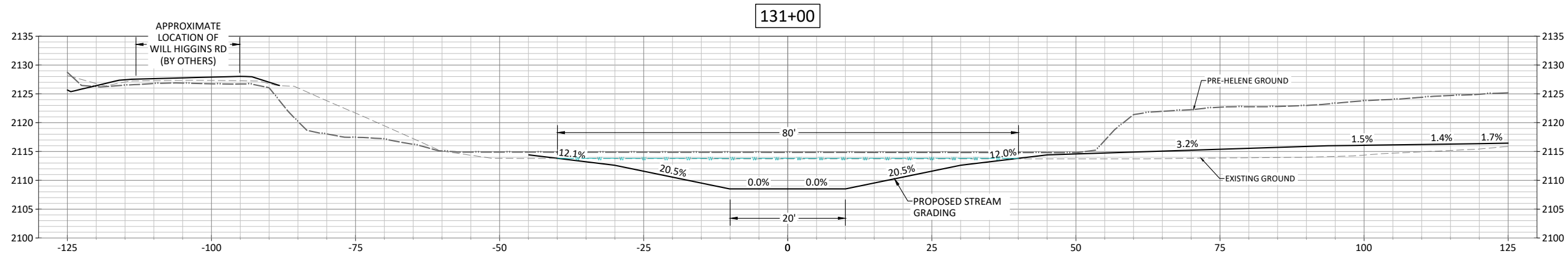
Revisions:

Date: June 26, 2026
 Job Number: W16100
 Project Engineer: JPM
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R-2.8

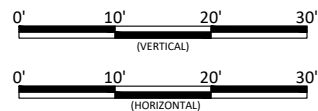
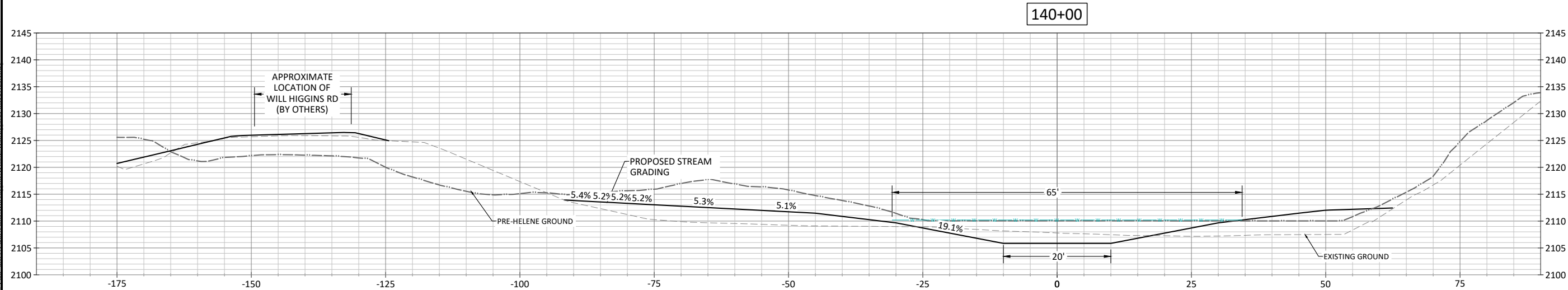
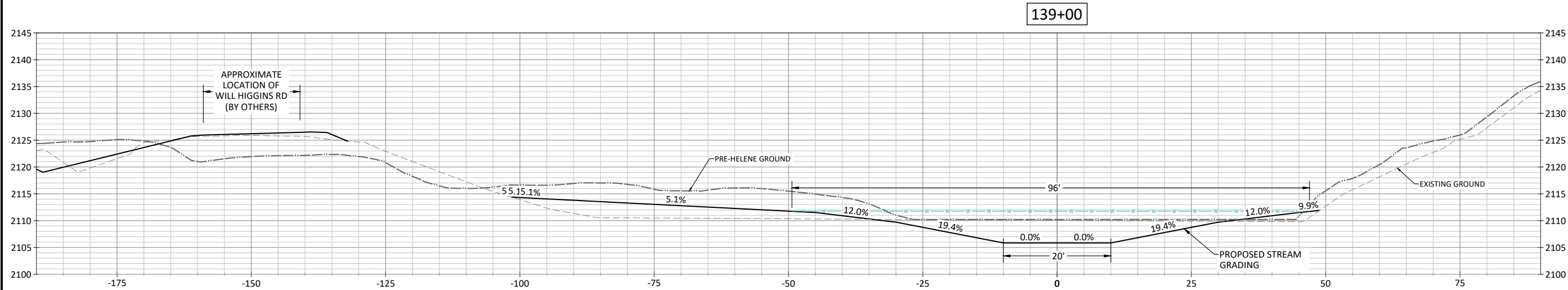
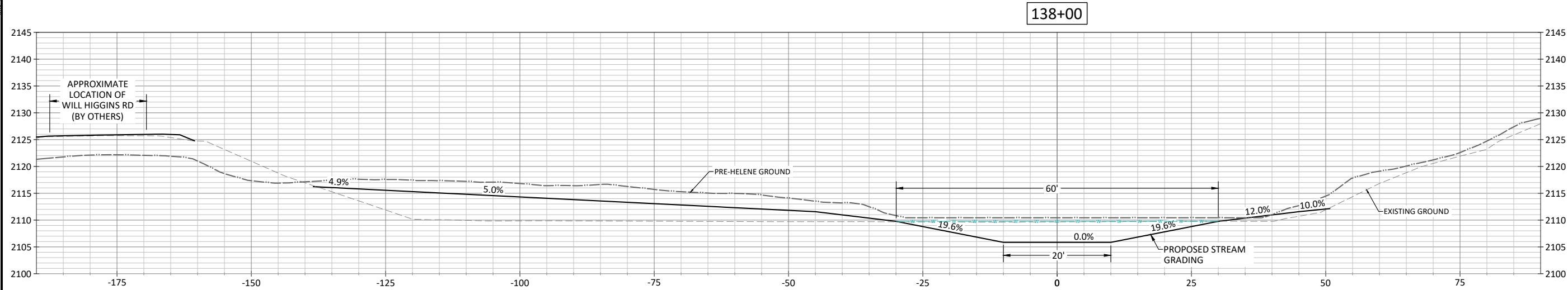
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NOTE:
1. EXISTING GROUND SURFACE HERE IS 2025 LIDAR AND DOES NOT SHOW THE TRUE CHANNEL BED ELEVATION. TIE PROPOSED GRADING TO EXISTING CHANNEL BED.

June 26, 2026
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NOTE:
1. EXISTING GROUND SURFACE HERE IS 2025 LIDAR AND DOES NOT SHOW THE TRUE CHANNEL BED ELEVATION. TIE PROPOSED GRADING TO EXISTING CHANNEL BED.

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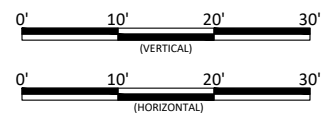
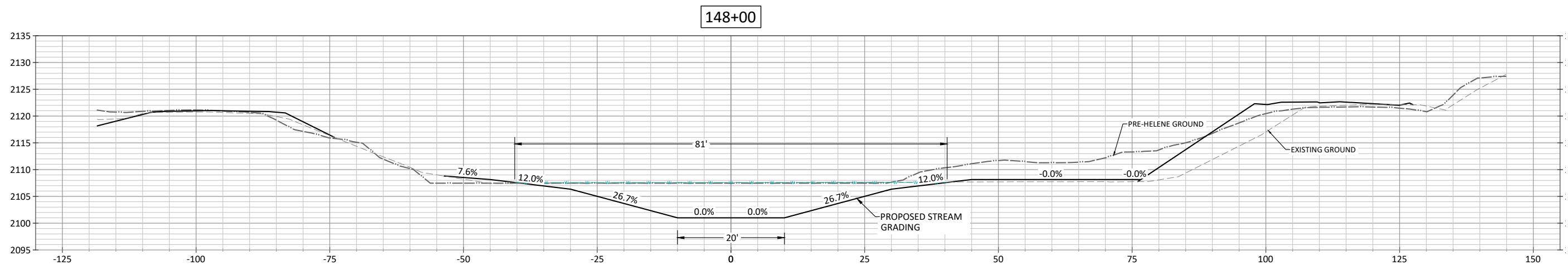
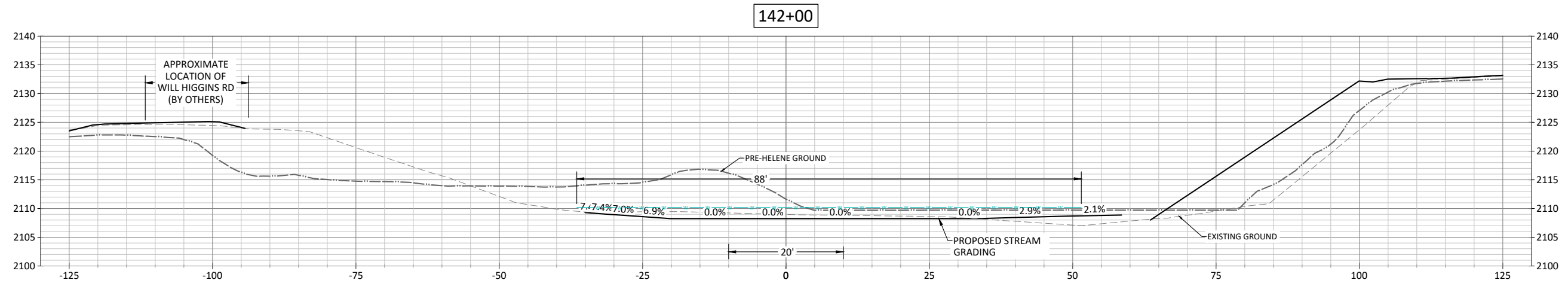
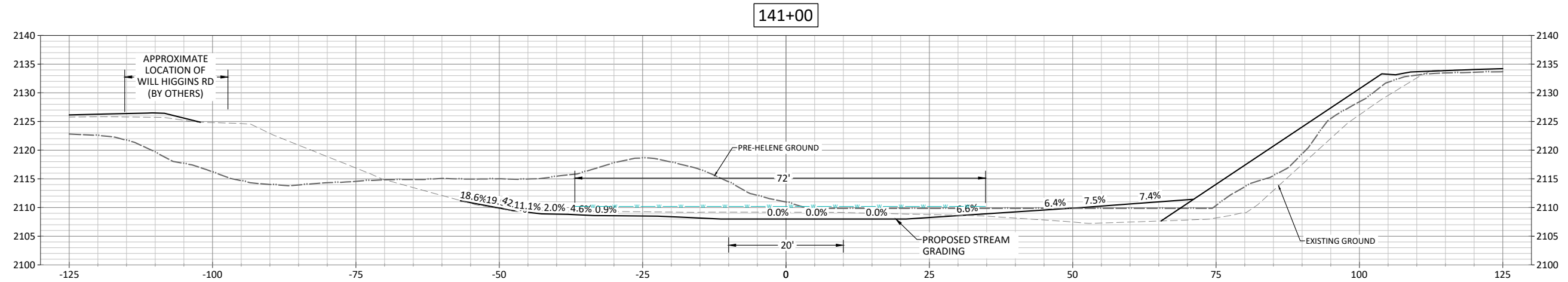
19W North Emergency Repair Design
Yancey County, North Carolina

Cross Sections 138+00-140+00
Cross-Sections

Date	June 26, 2026
Job Number	W16100
Project Engineer	JDM
Drawn By	WPC/JCK
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R-2.10

Sheet



NOTE:
1. EXISTING GROUND SURFACE HERE IS 2025 LIDAR AND DOES NOT SHOW THE TRUE CHANNEL BED ELEVATION. TIE PROPOSED GRADING TO EXISTING CHANNEL BED.

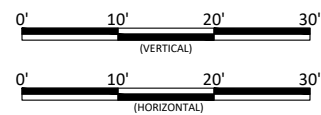
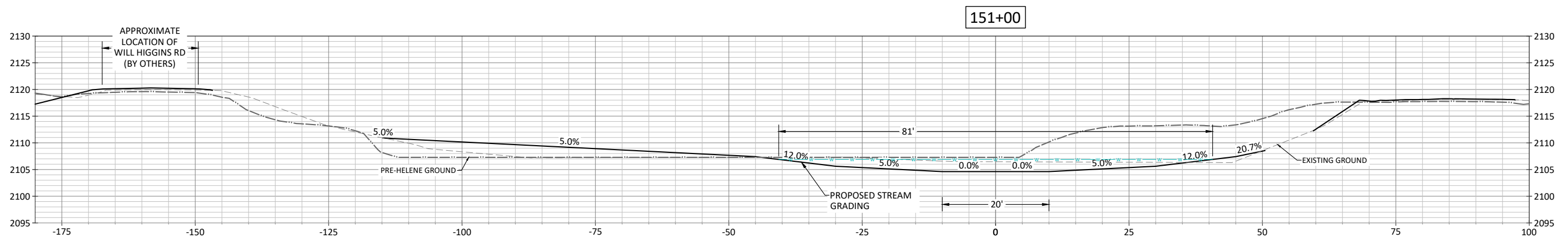
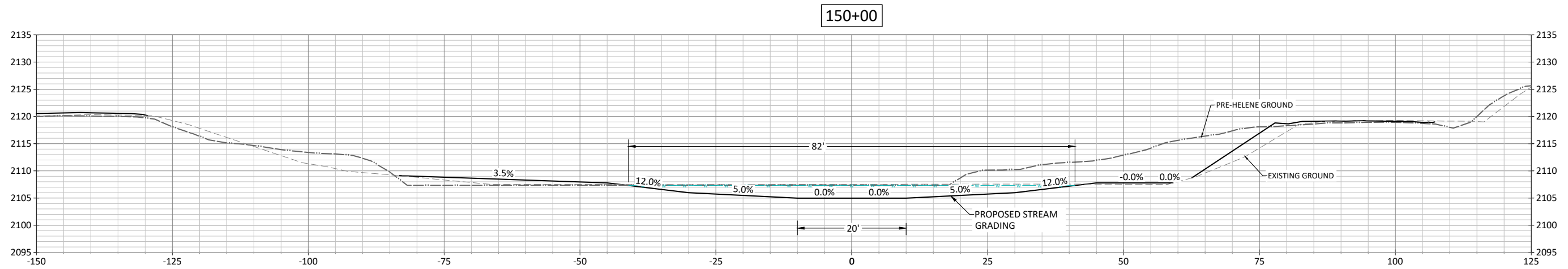
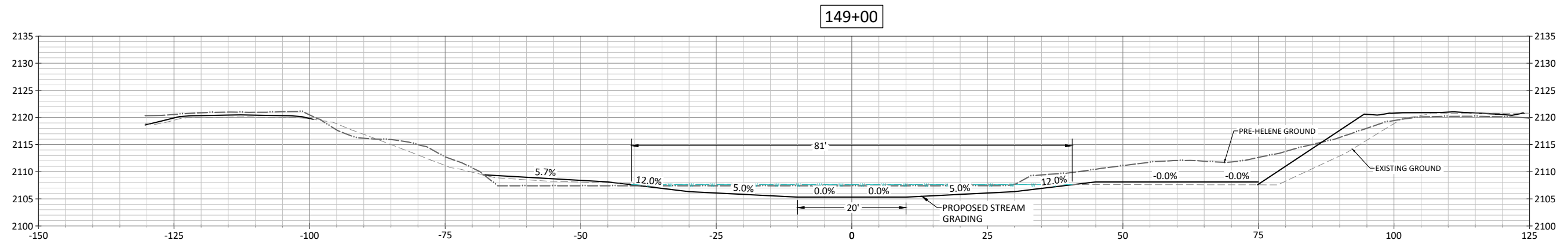
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19W North Emergency Repair Design
Yancey County, North Carolina

Cross-Sections

Job Number:	June 26, 2026
Project Engineer:	W16140
Drawn by:	HMA
Checked By:	WJC/JCK
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K-2.11



NOTE:
1. EXISTING GROUND SURFACE HERE IS 2025 LIDAR AND DOES NOT SHOW THE TRUE CHANNEL BED ELEVATION. TIE PROPOSED GRADING TO EXISTING CHANNEL BED.

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19W North Emergency Repair Design
Yancey County, North Carolina

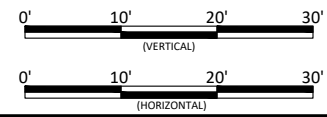
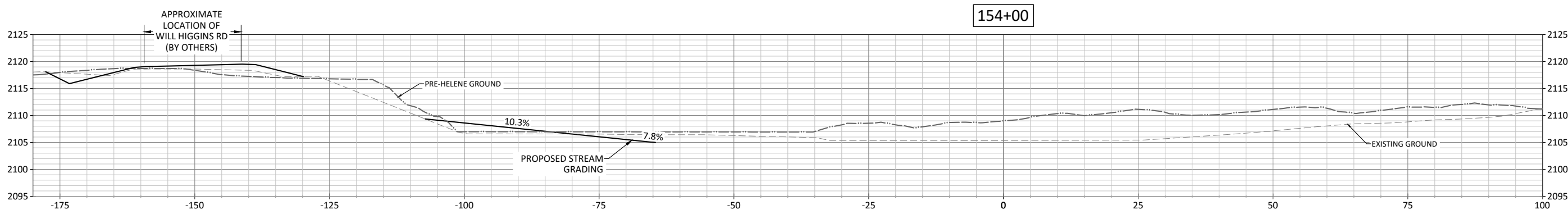
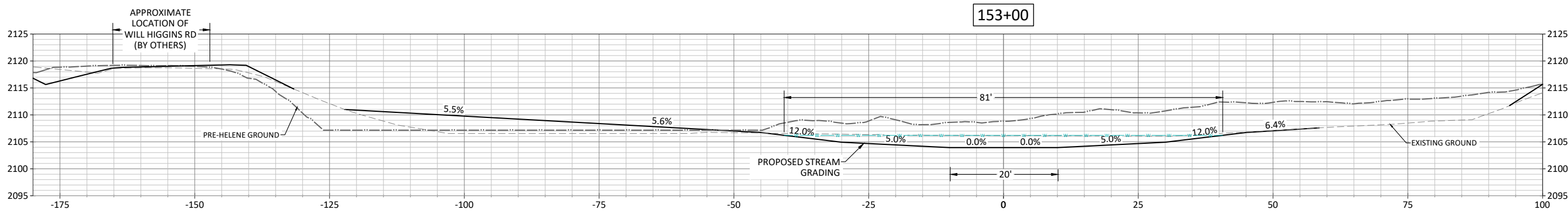
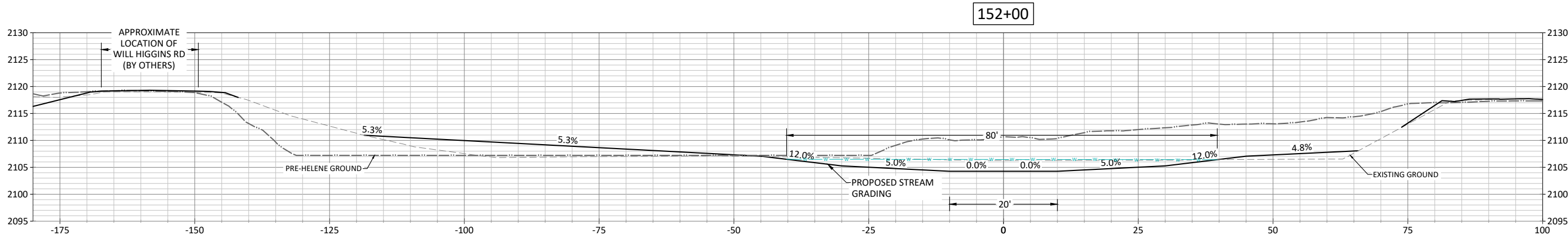
Cross-Sections

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Date: June 26, 2026
Job Number: W16100
Project Engineer: JPM
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Checked By: CDB

K-2.12

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June 26, 2026



NOTE:
1. EXISTING GROUND SURFACE HERE IS 2025 LIDAR AND DOES NOT SHOW THE TRUE CHANNEL BED ELEVATION. TIE PROPOSED GRADING TO EXISTING CHANNEL BED.

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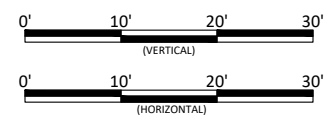
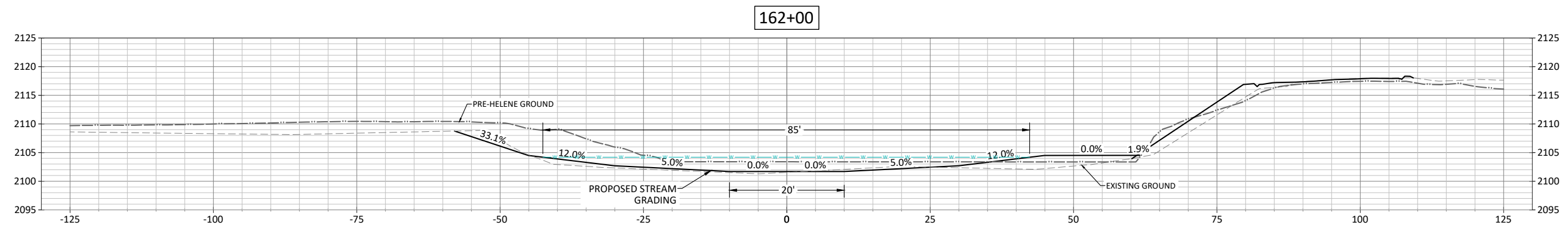
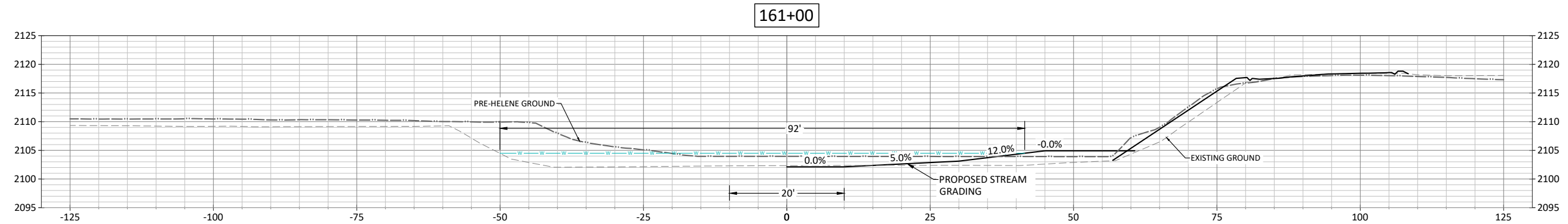
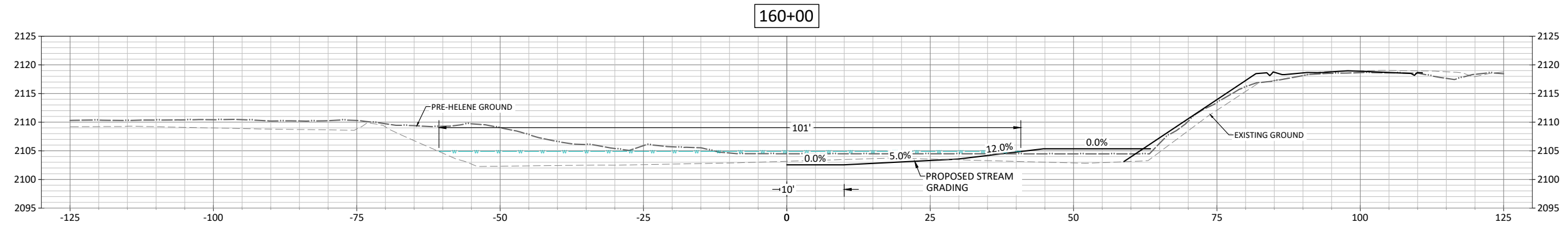
19W North Emergency Repair Design
Yancey County, North Carolina

Cross Sections 152+00-154+00
Cross-Sections

Date	June 26, 2026
Job Number	W16100
Project Engineer	JDM
Drawn By	WPC/JCK
Checked By	CDB

R-2.13

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NOTE:
1. EXISTING GROUND SURFACE HERE IS 2025 LIDAR AND DOES NOT SHOW THE TRUE CHANNEL BED ELEVATION. TIE PROPOSED GRADING TO EXISTING CHANNEL BED.

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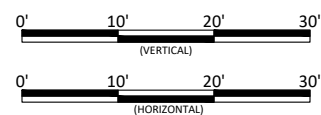
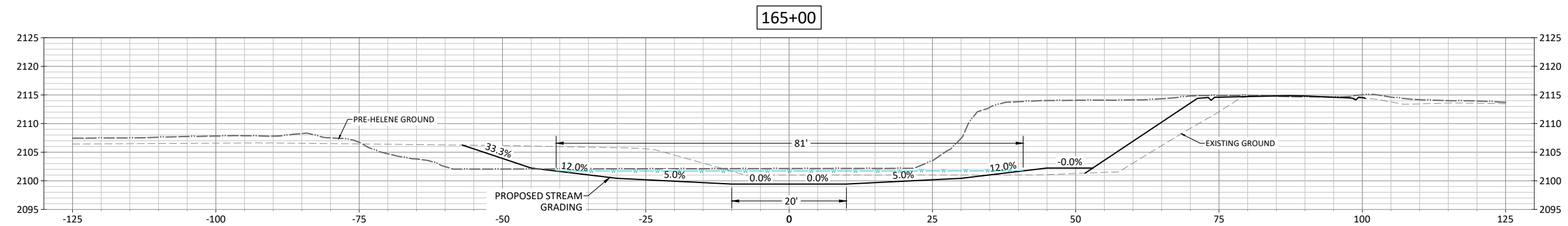
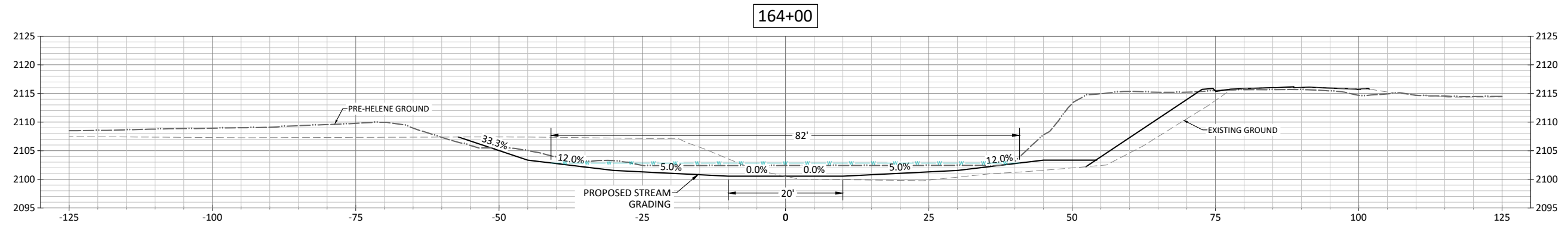
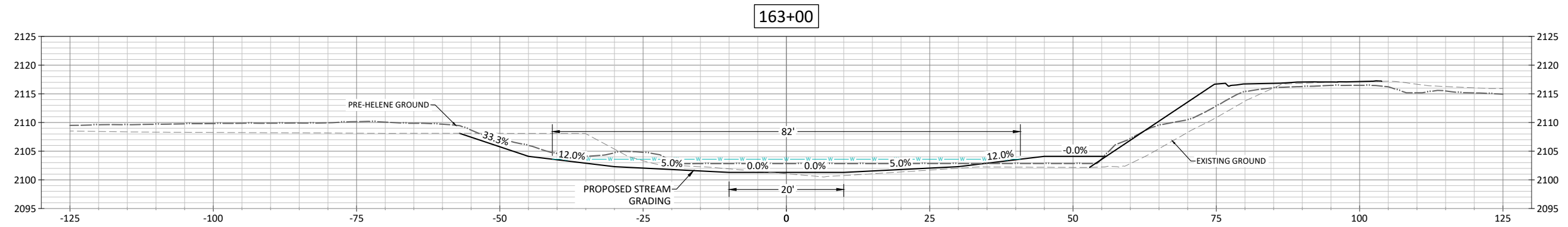
19W North Emergency Repair Design
Yancey County, North Carolina

Cross Sections 160+00-162+00
Cross-Sections

Revisions:

Date: June 26, 2026
 Job Number: W16100
 Project Engineer: JPM
 Drawn By: WPC/CK
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NOTE:
1. EXISTING GROUND SURFACE HERE IS 2025 LIDAR AND DOES NOT SHOW THE TRUE CHANNEL BED ELEVATION. TIE PROPOSED GRADING TO EXISTING CHANNEL BED.

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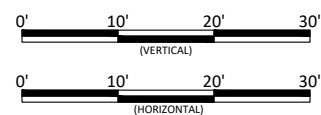
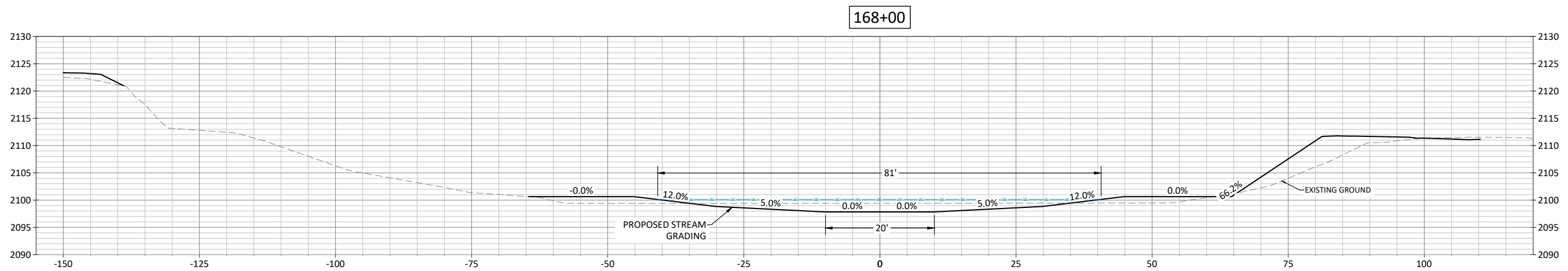
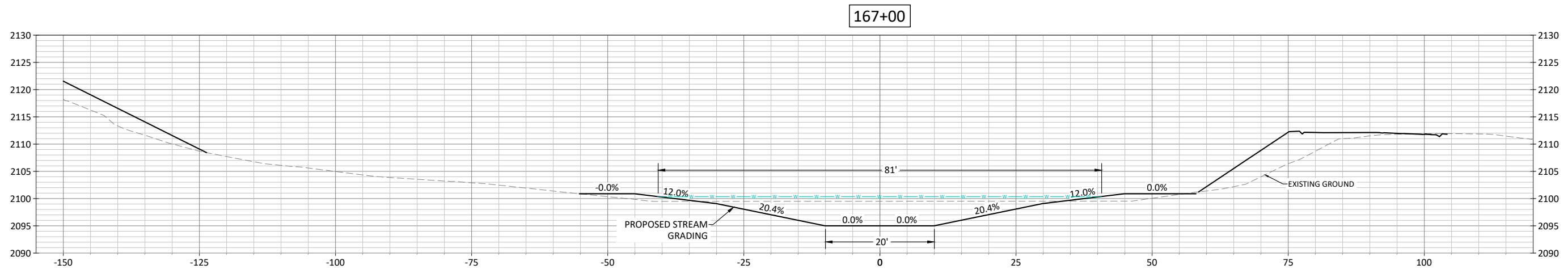
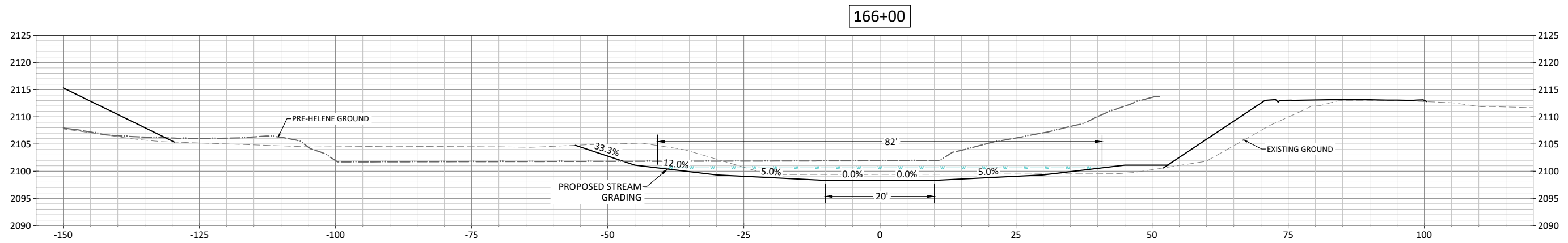
19W North Emergency Repair Design
Yancey County, North Carolina

Cross Sections 163+00-165+00
Cross-Sections

Revisions:

Date: June 26, 2026
Job Number: W16100
Project Engineer: JPM
Drawn By: WPC/JCK
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NOTE:
1. EXISTING GROUND SURFACE HERE IS 2025 LIDAR AND DOES NOT SHOW THE TRUE CHANNEL BED ELEVATION. TIE PROPOSED GRADING TO EXISTING CHANNEL BED.

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19W North Emergency Repair Design
Yancey County, North Carolina

Cross Sections 166+00-168+00
Cross-Sections

Date: June 26, 2026

Job Number: W16100

Project Engineer: TBM

Drawn By: WDC/JCK

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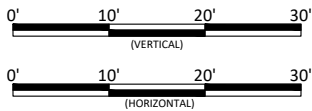
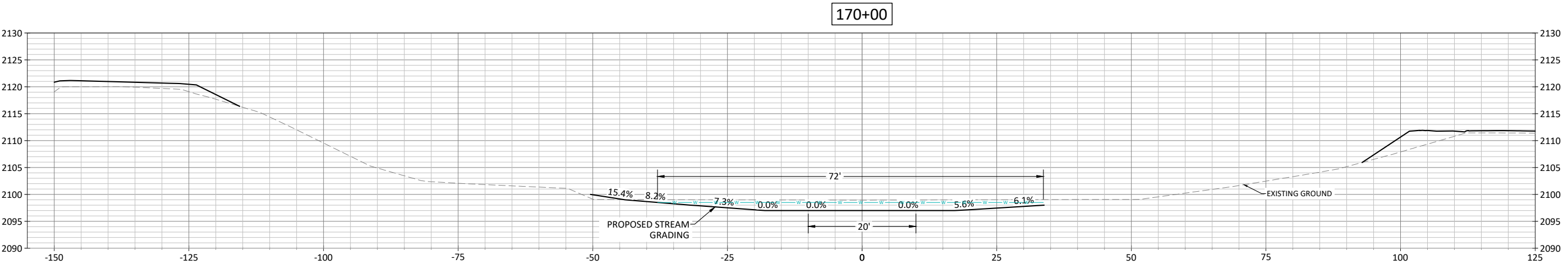
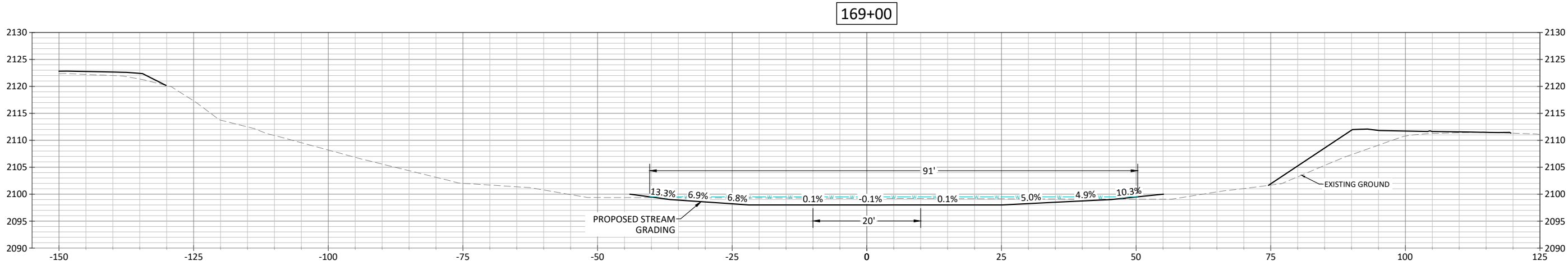
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June 26, 2026
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NOTE:
1. EXISTING GROUND SURFACE HERE IS 2025 LIDAR AND DOES NOT SHOW THE TRUE CHANNEL BED ELEVATION. TIE PROPOSED GRADING TO EXISTING CHANNEL BED.

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Streambank & Riparian Bench Planting Zone 1 - Cane River						
Live Stakes (for application on Streambank, see bench planting note below)						
Species	Common Name	Plant Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
Salix nigra	Black Willow	2' x 2 rows	0.5"-1.5" cal.	Canopy	OBL	50%
Cornus amomum	Silky Dogwood	2' x 2 rows	0.5"-1.5" cal.	Subcanopy	FACW	9%
Salix sericea	Silky Willow	2' x 2 rows	0.5"-1.5" cal.	Subcanopy	OBL	25%
Physocarpus opulifolius	Ninebark	2' x 2 rows	0.5"-1.5" cal.	Shrub	FACW	8%
Alnus serrulata	Buttonbush	2' x 2 rows	0.5"-1.5" cal.	Shrub	OBL	8%
						100%

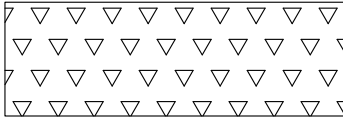
Bench planting - Riparian Buffer Planting Zone bare roots shall be applied to the flat benches in this zone. Whips and livestakes in the Zone 2 table above are for sloping and top of bank locations adjacent to the base flow channel.

Streambank & Riparian Bench Planting Zone 2- Cane River- Rocky Banks							
Live Whips (if final preparation during dormant season) or Live Stakes (if final preparation during growing season)							
Species	Common Name	Live Whip Spacing	Live Stake Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
Cornus amomum	Silky Dogwood	1' x 2 rows	3' x 2 rows	0.5"-1.5" cal.	Subcanopy	FACW	10%
Salix sericea	Silky Willow	1' x 2 rows	3' x 2 rows	0.5"-1.5" cal.	Subcanopy	OBL	50%
Cephalanthus occidentalis	Buttonbush	1' x 2 rows	3' x 2 rows	0.5"-1.5" cal.	Shrub	OBL	10%
Physocarpus opulifolius	Ninebark	1' x 2 rows	3' x 2 rows	0.5"-1.5" cal.	Shrub	FACW	10%
Salix nigra	Black Willow	1' x 2 rows	3' x 2 rows	0.5"-1.5" cal.	Canopy	OBL	20%
							100%

Bench planting - Riparian Buffer Planting Zone bare roots shall be applied to the flat benches in this zone. Whips and livestakes in the Zone 2 table above are for sloping and top of bank locations adjacent to the base flow channel.

Fascines, where proposed perpendicular to stream on benches in Zones 1 & 2, shall be a mix of at least 3 livestake species from streambank planting zone species lists.

Riparian Buffer Planting Zone						
Bare Root						
Species	Common Name	Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
Platanus occidentalis	American Sycamore	15 x 15 ft.	0.25"-1.0"	Canopy	FACW	10%
Betula lenta	Sweet Birch	15 x 15 ft.	0.25"-1.0"	Canopy	FACW	7%
Acer negundo	Boxelder	15 x 15 ft.	0.25"-1.0"	Canopy	FAC	10%
liriodendron tulipifera	Tulip Tree	15 x 15 ft.	0.25"-1.0"	Canopy	FACU	10%
Acer rubrum	Red Maple	15 x 15 ft.	0.25"-1.0"	Canopy	FAC	10%
Carpinus caroliniana	Ironwood	15 x 15 ft.	0.25"-1.0"	Subcanopy	FAC	5%
Quercus rubra	Northern Red Oak	15 x 15 ft.	0.25"-1.0"	Canopy	FACU	10%
Quercus alba	White Oak	15 x 15 ft.	0.25"-1.0"	Canopy	FACU	10%
Diospyros virgininiana	Persimmon	15 x 15 ft.	0.25"-1.0"	Canopy	FACU	10%
Tilia americana	American Basswood	15 x 15 ft.	0.25"-1.0"	Canopy	FACU	8%
Aesculus flava	Yellow Buckeye	15 x 15 ft.	0.25"-1.0"	Canopy	FACU	10%
						100%
Preferred alternates: Hamamelis virginiana						



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

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

19W North Emergency Repair Design
Yancey County, North Carolina

Revisions:

Date: 10/24/2025

Job Number: W16100

Project Engineer: JPM

Drawn By: JPM, CDB, KMB

Checked By: JPM

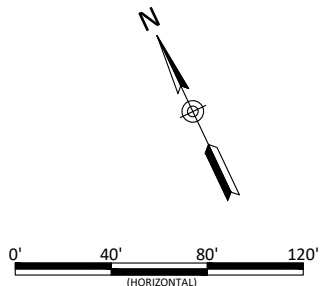
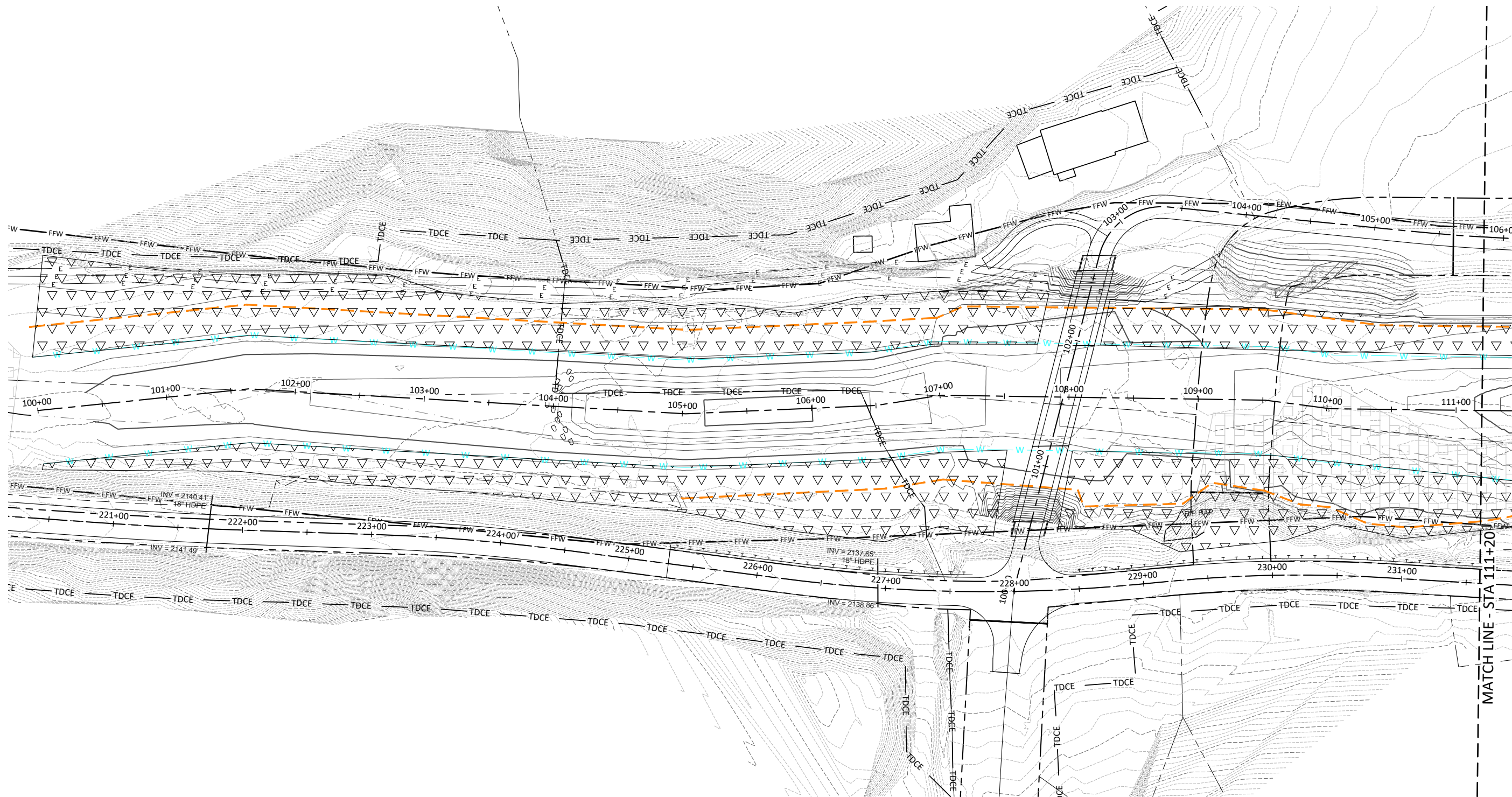
R-4.1

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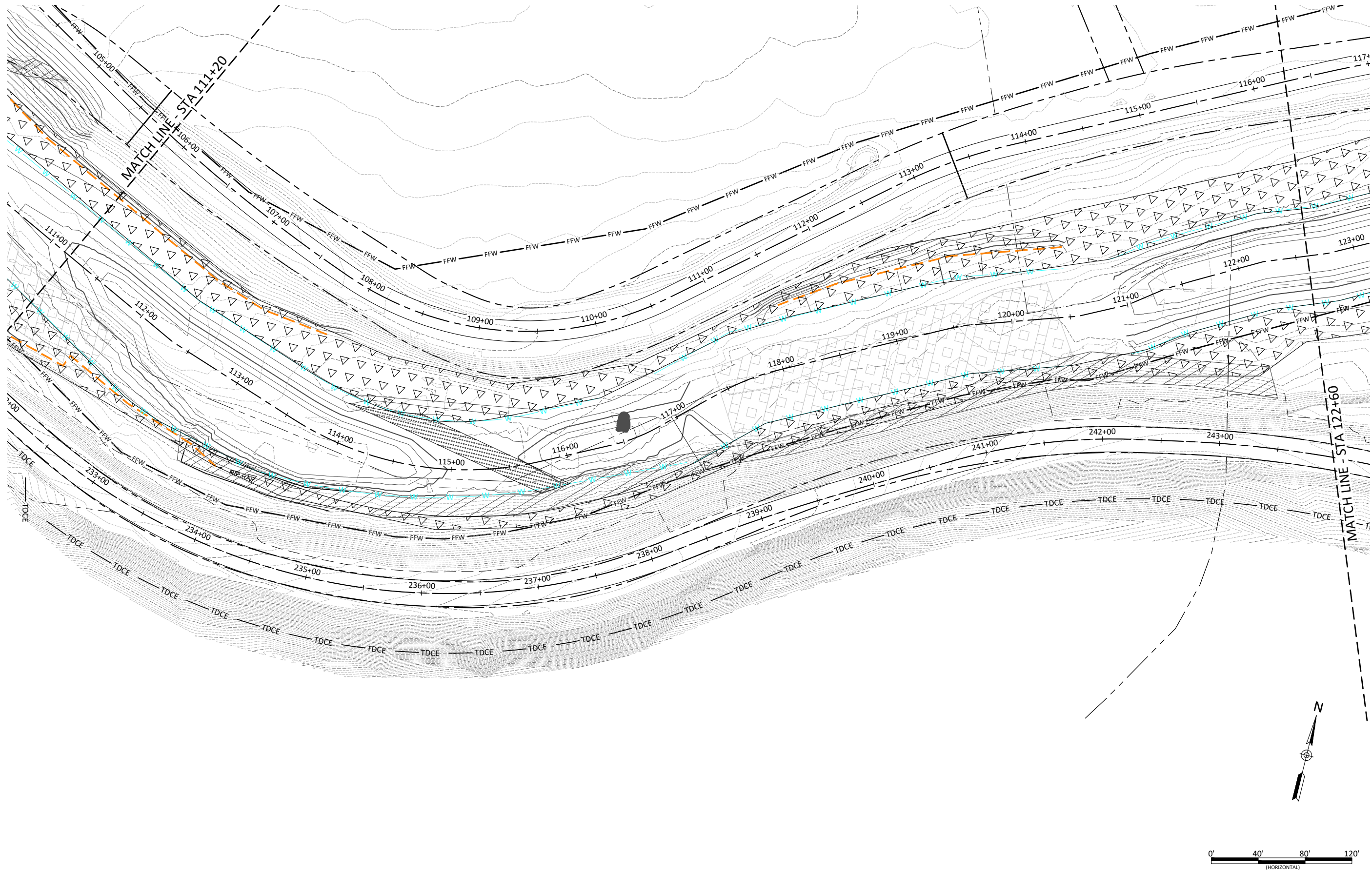
Planting Plan

Date:	June 26, 2026
Job Number:	W16100
Project Engineer:	JPM
Drawn By:	WPC/JCK
Checked By:	CDB

R-4.2

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19W North Emergency Repair Design
Yancey County, North Carolina

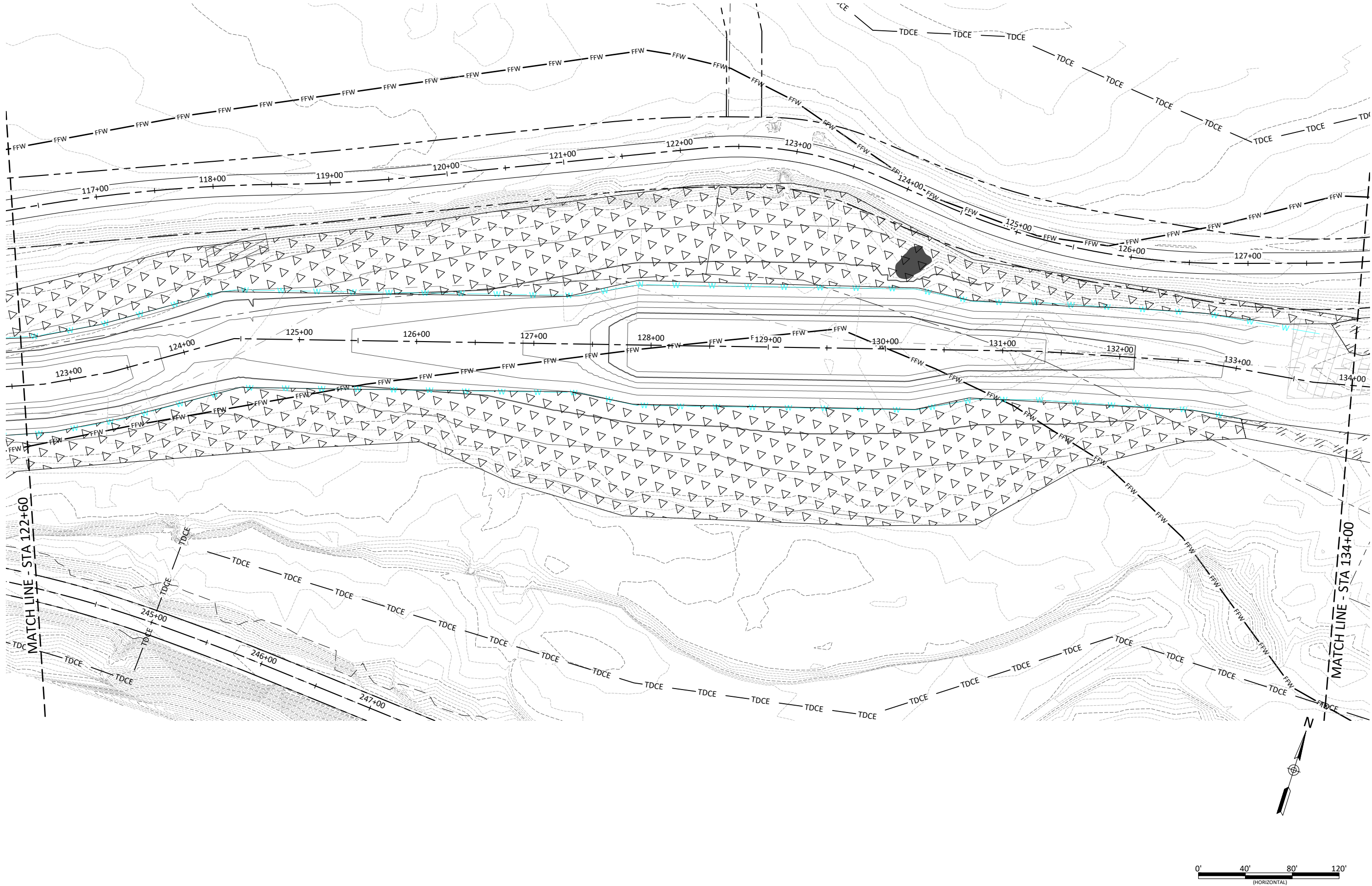
Planting Plan

Date:	June 26, 2026
Job Number:	W16100
Project Engineer:	JPM
Drawn By:	WPC/JCK
Checked By:	CDB

R-4.3

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19W North Emergency Repair Design
Yancey County, North Carolina

Planting Plan

Date:	June 26, 2026
Job Number:	W16100
Project Engineer:	JPM
Drawn By:	WPC/JCK
Checked By:	CDB

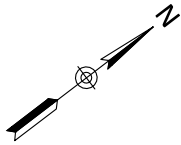
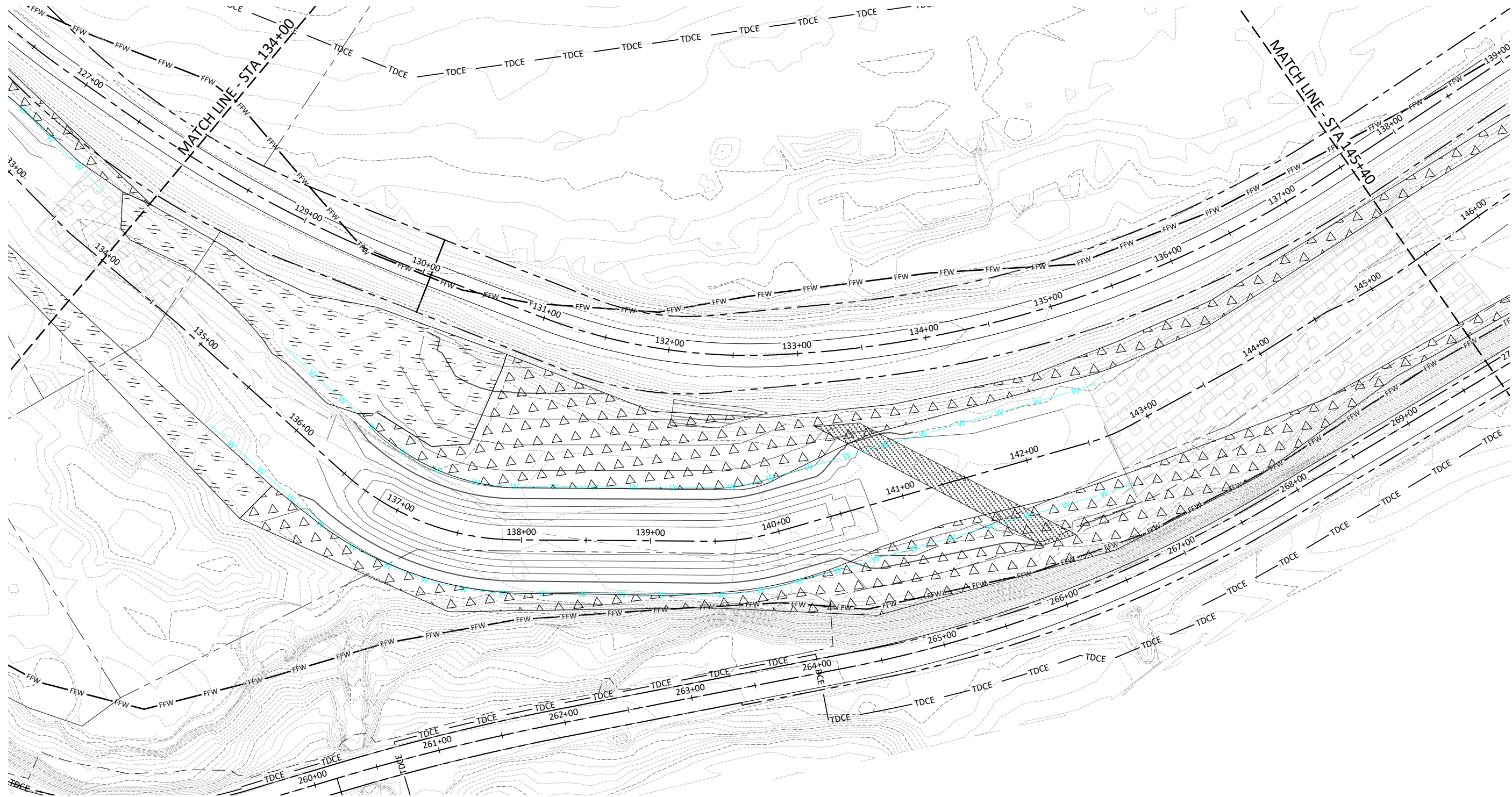
R-4.4

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19W North Emergency Repair Design
Yancey County, North Carolina

Planting Plan

Revisions:	

Date:	June 26, 2026
Job Number:	W16100
Project Engineer:	JPM
Drawn By:	WPC/JCK
Checked By:	CDB

R-4.5

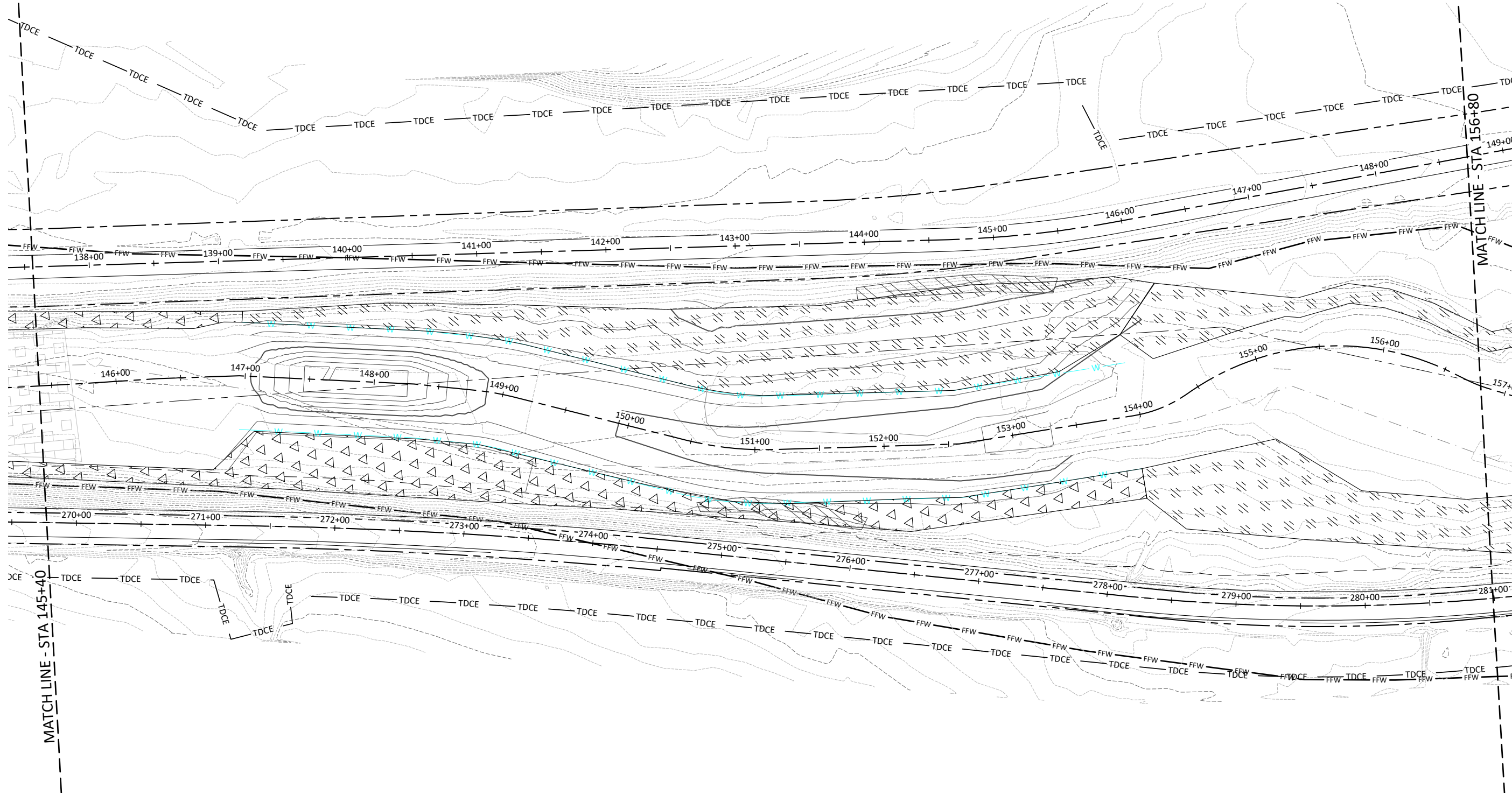
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19W North Emergency Repair Design
Yancey County, North Carolina

Planting Plan

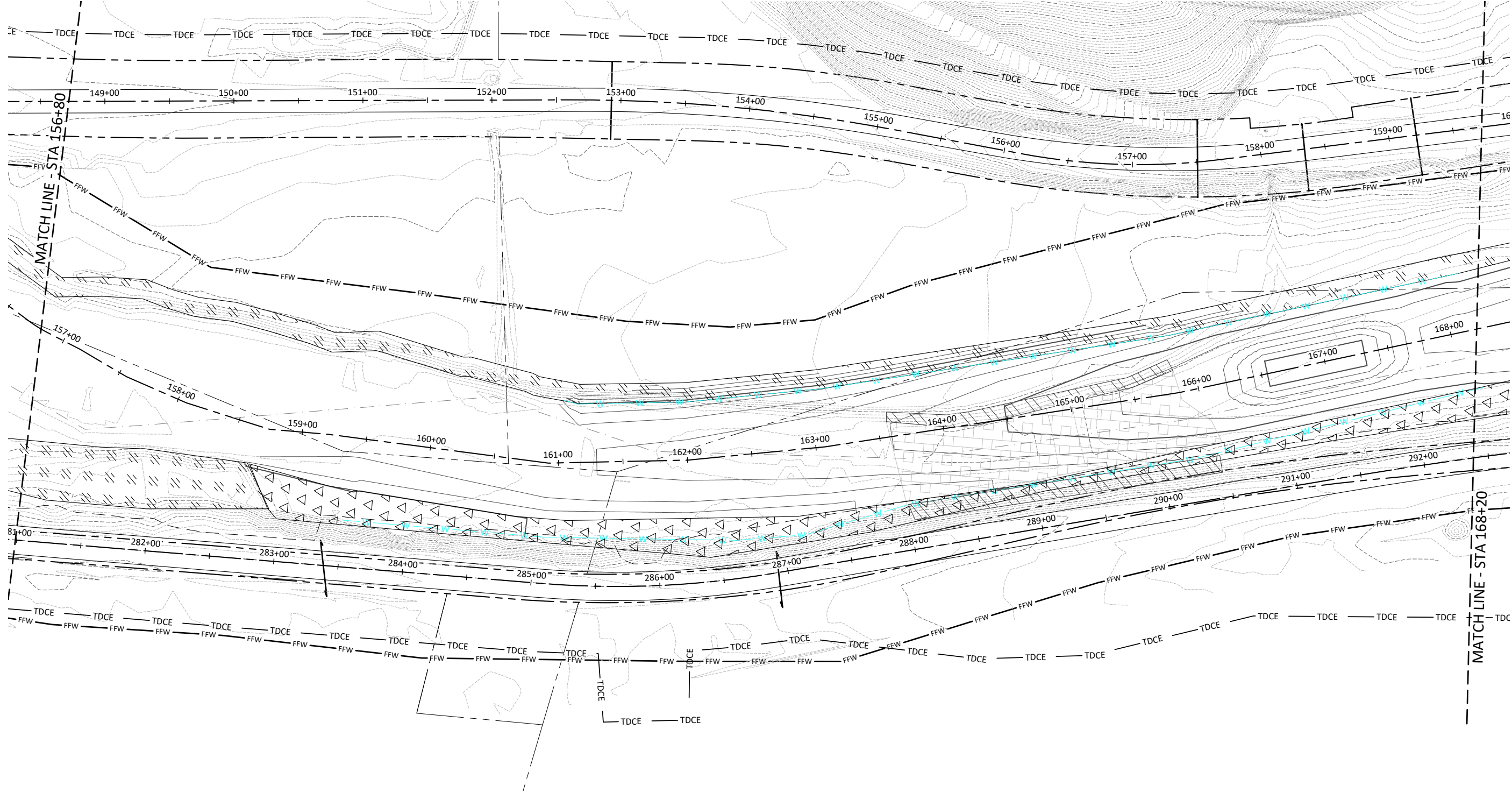
Revisions:

Date:	June 26, 2026
Job Number:	W16100
Project Engineer:	JPM
Drawn By:	WPC/JCK
Checked By:	CDB

R-4.6

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19W North Emergency Repair Design
Yancey County, North Carolina

Planting Plan

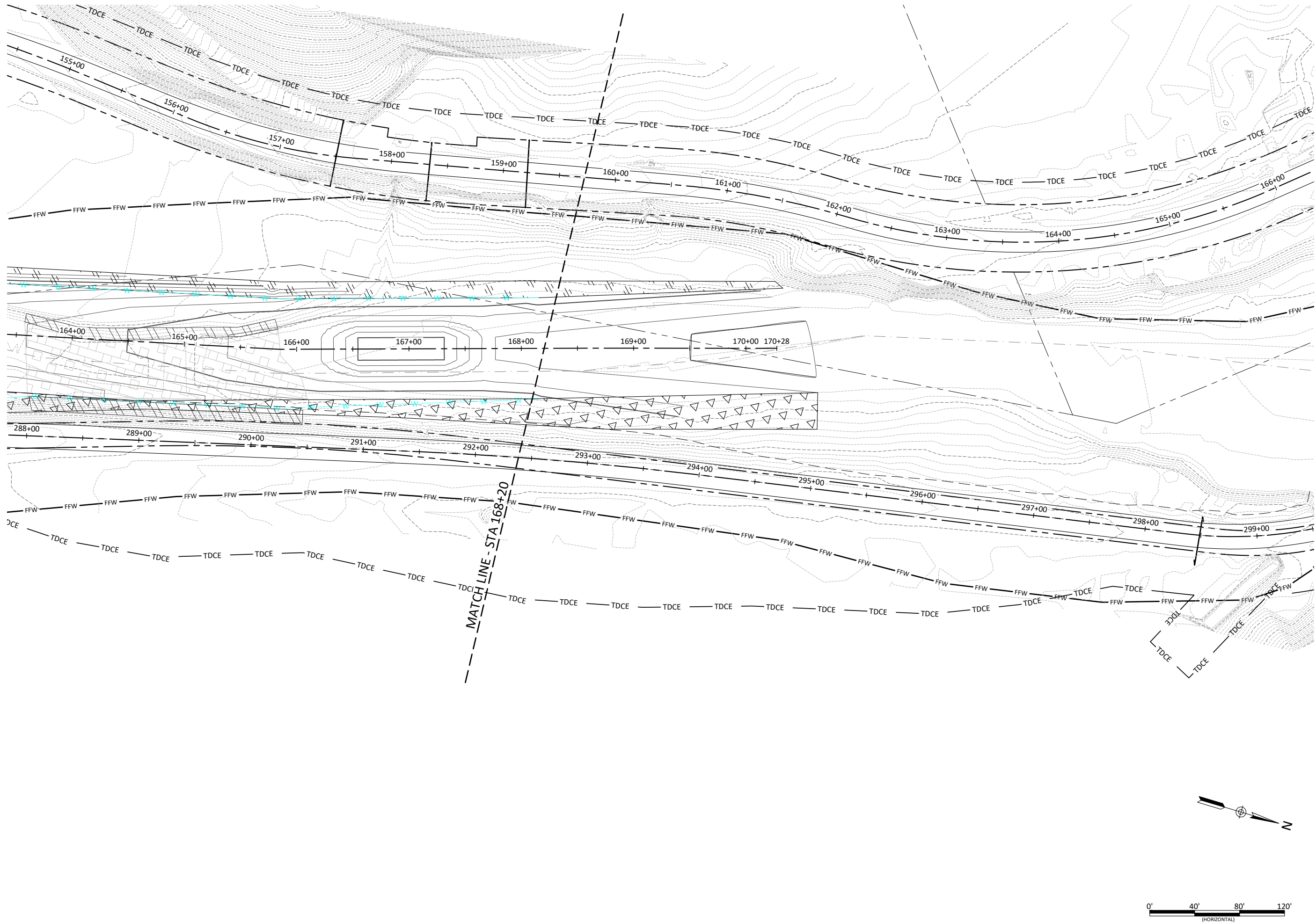
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Project Engineer:	JPM
Drawn By:	WPC/JCK
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R-4.7

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June 29, 2026



19W North Emergency Repair Design
Yancey County, North Carolina

Planting Plan

Date:	June 26, 2026
Job Number:	W16100
Project Engineer:	JPM
Drawn By:	WPC/JCK
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R-4.8

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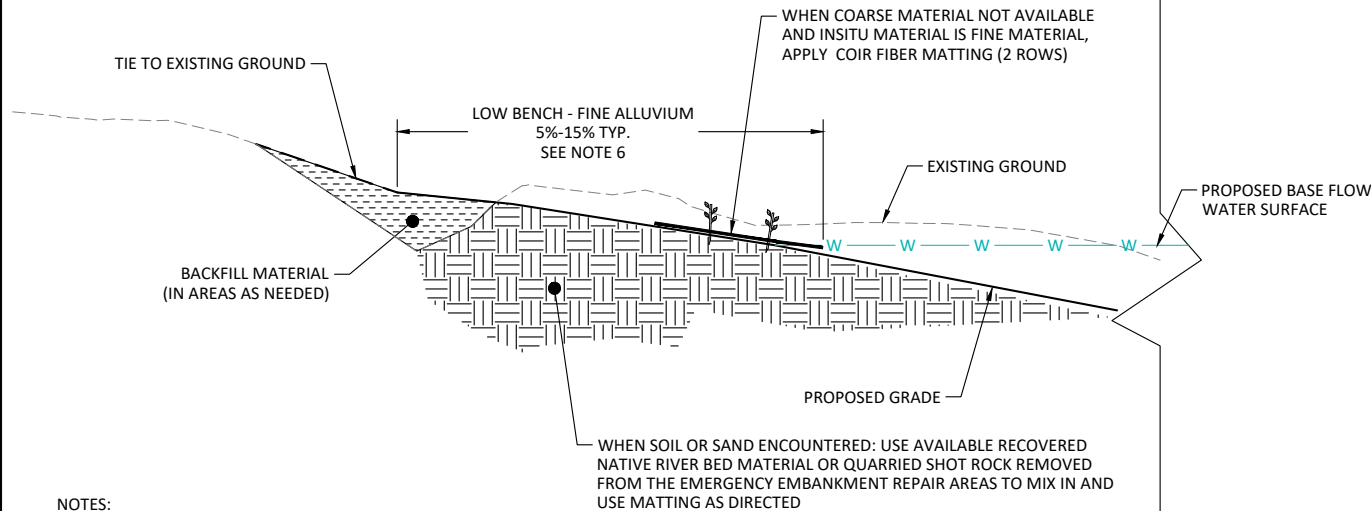
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June 29, 2026

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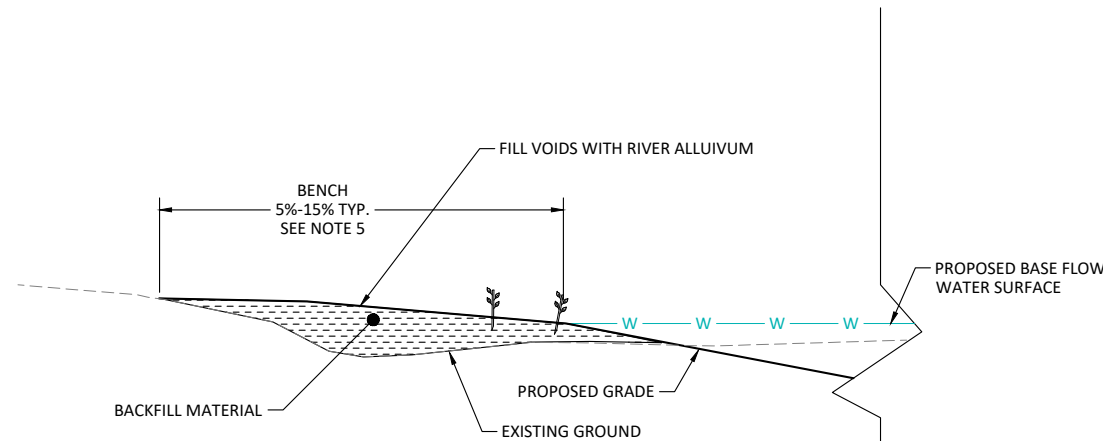
SCENARIO 1: BUILT IN CUT



NOTES:

1. BACKFILL SHALL CONSIST OF A UNIFORM MIX OF FINE AND COARSE ALLUVIUM, WHERE AVAILABLE.
2. IN AREAS AT LEAST 10' FROM FRONT OF LOW BENCH, ONSITE SOIL MAY BE INCORPORATED AT A RATIO OF 50%.
3. SEE STREAMBANK PLANTING ZONE 1 TABLE ON SHEET R-4.2. AND RIPARIAN AND TEMPORARY SEED MIX TABLES ON SHEET R-4.2.
4. SEE SHEET R-6.2 FOR EROSION CONTROL MATTING DETAIL.
5. REFER TO NOTES ON SHEET R-0.2 FOR CONSTRUCTION SEQUENCING.
6. THE SLOPE OF THE LOW BENCH - FINE ALLUVIUM BUILT IN FILL MAY BE ADJUSTED UP TO A MAXIMUM OF 15% TO HELP BALANCE EARTHWORK. WORK WITH STREAM ENGINEER TO DETERMINE WHERE SLOPES WILL BE INCREASED - MAINTAIN CONSISTENCY AND SMOOTH TRANSITIONS.

SCENARIO 2: BUILT IN FILL

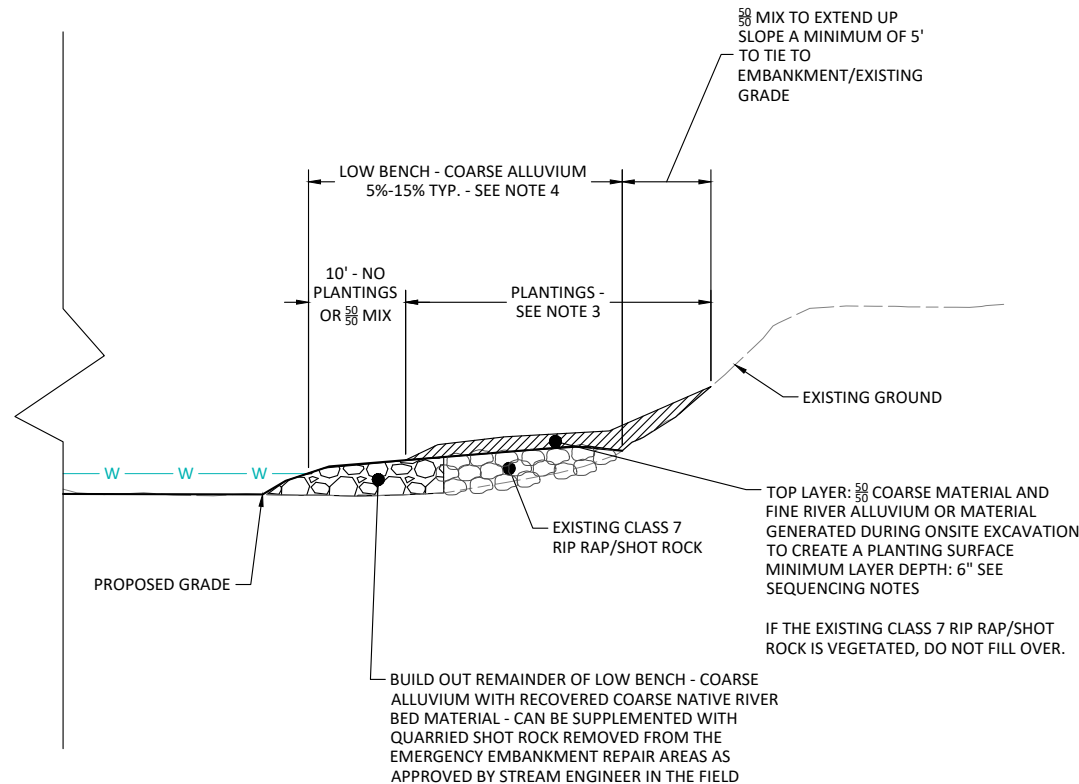


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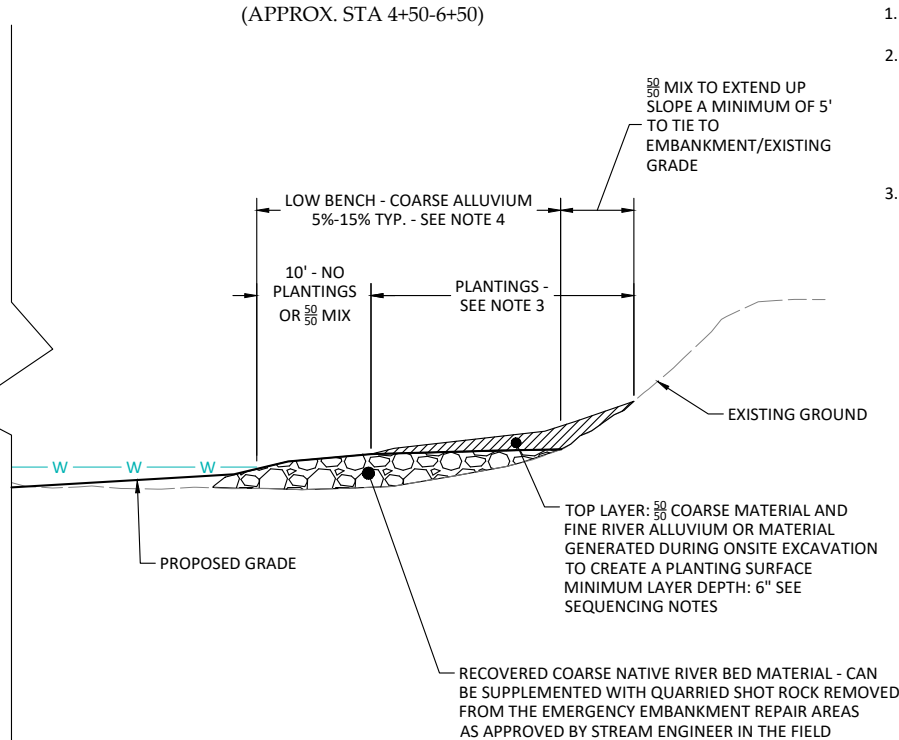
1. BACKFILL SHALL CONSIST OF A UNIFORM MIX OF FINE AND COARSE ALLUVIUM USING QUARRIED SHOT ROCK REMOVED FROM THE EMERGENCY EMBANKMENT REPAIR AREAS AS APPROVED BY FIELD STREAM ENGINEER.
2. PLACE FINER MATERIAL GENERATED DURING ONSITE EXCAVATIONS ON TOP TO PROVIDE A PLANTING SURFACE.
3. SEE STREAMBANK PLANTING ZONE 1 TABLE ON SHEET R-4.2 AND RIPARIAN AND TEMPORARY SEED MIX TABLES ON SHEET R-4.2.
4. WHERE EXCESS LIVE CUTTINGS ARE AVAILABLE FROM OTHER ONSITE AREAS, WORK INTO FILL AREAS AS DIRECTED BY ONSITE STREAM ENGINEER.
5. REFER TO NOTES ON SHEET R-0.2 FOR CONSTRUCTION SEQUENCING.
6. THE SLOPE OF THE BENCH BUILT IN FILL MAY BE ADJUSTED UP TO A MAXIMUM OF 15% TO HELP BALANCE EARTHWORK. WORK WITH STREAM ENGINEER TO DETERMINE WHERE SLOPES WILL BE INCREASED - MAINTAIN CONSISTENCY AND SMOOTH TRANSITIONS.

1 Low Bench - Fine Alluvium
R-5.1 Not to Scale

SCENARIO 1: EXISTING ROCK ON SLOPE



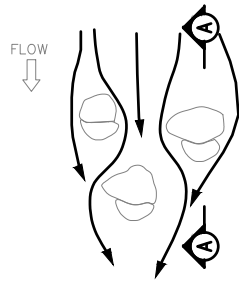
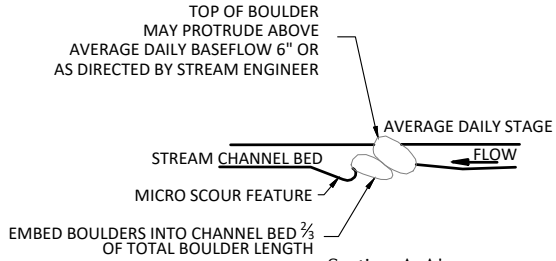
SCENARIO 2: NO EXISTING ROCK ON SLOPE
(APPROX. STA 4+50-6+50)



SEQUENCE FOR LOW BENCH - COARSE ALLUVIUM INSTALLATION

1. LOW BENCH - COARSE ALLUVIUM ADJACENT TO ROADWAY EMBANKMENTS TO BE USED AS AN ACCESS ROUTE DURING CONSTRUCTION SHALL BE CONSTRUCTED IN TWO PHASES.
2. PHASE 1 - USING RECOVERED NATIVE RIVER BED MATERIAL, CONSTRUCT THE FIRST LIFT OF LOW BENCH - COARSE ALLUVIUM. THIS LIFT SHALL BE BE PLACE TO ACHIEVE A TRAVEL SURFACE 0.5-1 FOOT ABOVE THE BASE FLOW WATER SURFACE. THIS LIFT SHALL ESTABLISH THE WETTED WIDTH OF THE CHANNEL AS SHOWN ON THE CROSS SECTIONS. NOTE THAT THIS LIFT MAY BE PARTIALLY CONSTRUCTED WITH QUARRIED SHOT ROCK REMOVED FROM THE EMERGENCY EMBANKMENT REPAIR AREAS AS NEEDED AND APPROVED BY THE STREAM ENGINEER.
3. PHASE 2 - ONCE USE AS AN ACCESS ROUTE IS COMPLETE, COMPLETE THE SECOND PHASE OF LOW BENCH - COARSE ALLUVIUM CONSTRUCTION. THE SECOND PHASE SEQUENCE WILL VARY BASED ON TIME OF YEAR OF INSTALLATION. COARSE MATERIAL SHALL BE NATIVE RIVER BED MATERIAL RECOVERED FROM THE EXISTING CHANNEL, OR QUARRIED SHOT ROCK REMOVED FROM THE EMERGENCY EMBANKMENT REPAIR IF SO DIRECTED AND APPROVED BY THE STREAM ENGINEER. SEE PLANTING TABLES ON SHEET R-4.2.
 - a. DORMANT SEASON CONSTRUCTION (FROM 10/10-4/25): SCARIFY AND LOOSEN COMPACTED AREAS. PLACE LIVE WHIPS IN GOOD CONTACT WITH FINE ALLUVIUM MATERIAL, APPLYING A SHALLOW LAYER IF NECESSARY PRIOR TO WHIP PLACEMENT. THE CUTTING SHOULD BE PLACED TO GROW OUTWARD TOWARDS THE RIVER BY PLACING THE CUT END (BASE) ON THE UPLAND SIDE AND THE TOP OR BUDDING DIRECTION FACING THE RIVER AND PROTRUDING FROM SUBSEQUENT PLACED FILL 0.5-1 FOOT. INSTALL A 50/50 MIX OF COARSE AND FINE RIVER ALLUVIUM IN A MINIMUM 0.5 TO 1-FOOT LIFT. COMPACT LIGHTLY. INSTALL THE FINAL LAYER OF LIVE WHIPS AND A 50/50 MIX OF COARSE AND FINE ALLUVIUM TO FINAL GRADE. SEED AND MULCH THE TOP OF THE LOW BENCH - COARSE ALLUVIUM WITH TEMPORARY (EROSION CONTROL) AND PERMANENT RIPARIAN SEED MIX AND INSTALL BARE ROOT SPECIES ON THE TOP OF THE LOW BENCH - COARSE ALLUVIUM.
 - b. GROWING SEASON CONSTRUCTION (FROM 4/25-10/10): INSTALL A 50/50 MIX OF COARSE AND FINE ALLUVIUM GENERATED DURING EXCAVATION TO FINAL GRADE, COMPACTING LIGHTLY. SEED AND MULCH THE COMPLETED LOW BENCH - COARSE ALLUVIUM WITH TEMPORARY (EROSION CONTROL) AND PERMANENT RIPARIAN SEED MIX. RETURN DURING THE DORMANT SEASON (BETWEEN 10/10-4/25) TO JOINT PLANT ENTIRE LOW BENCH - CAORSE ALLUVIUM STRUCTURE WITH LIVE STAKES. LIVE STAKE MATERIALS AND INSTALLATION SHALL FOLLOW THE BANK VEGETATION SPECIFICATIONS.
4. THE SLOPE OF THE LOW BENCH - COARSE ALLUVIUM MAY BE ADJUSTED UP TO A MAXIMUM OF 15% TO HELP BALANCE EARTHWORK. WORK WITH STREAM ENGINEER TO DETERMINE WHERE SLOPES WILL BE INCREASED AND TO ENSURE THAT SLOPE INCREASES ARE CONSISTENTLY APPLIED WITH GENTLE TRANSITIONS AS NECESSARY.

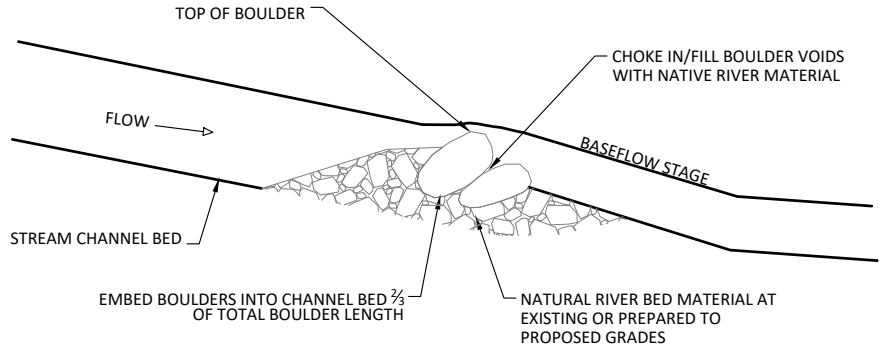
2 Low Bench - Coarse Alluvium
R-5.1 Not to Scale



Plan View

1 Boulder Cluster
R-5.2 Not to Scale

- NOTES:
1. BOULDER SIZE MUST BE MINIMUM OF 3'L x 2'W x 2'H
 2. BOULDERS SHOULD BE SHINGLED TO CREATE CONTACT BETWEEN ROCKS
 3. MUST BE FIELD FIT. CONFIGURATION AND NUMBER MAY VARY
 4. BOULDERS ARE NOT TO BE PLACED IN A STRAIGHT LINE



Section View

2 Transverse Bar Structure Typical Section
R-5.2 Not to Scale

- NOTES:
1. BOULDER SIZE MUST BE MINIMUM OF 3'L x 2'W x 2'H
 2. BOULDERS SHOULD BE SHINGLED TO CREATE CONTACT BETWEEN ROCKS

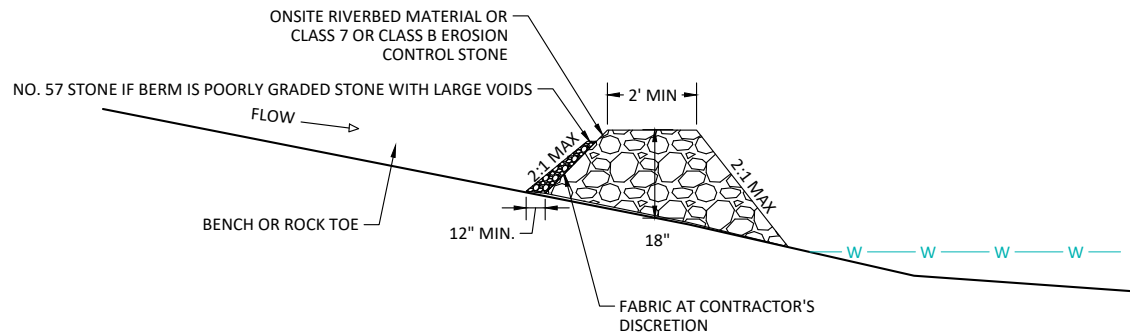
Date:	10/24/2025
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Project Engineer:	JPM
Drawn By:	JPM, CDB, KMB
Checked By:	JPM

Revisions:

19W North Emergency Repair Design
Yancey County, North Carolina

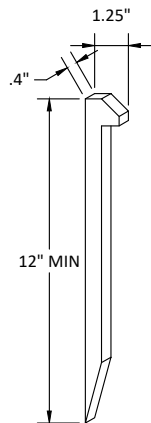
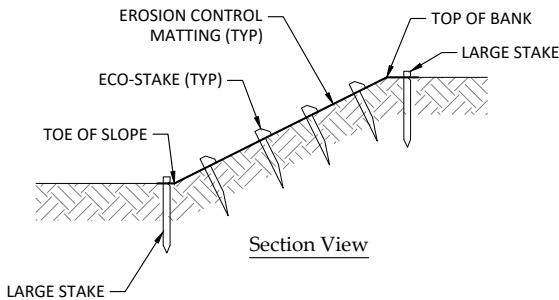
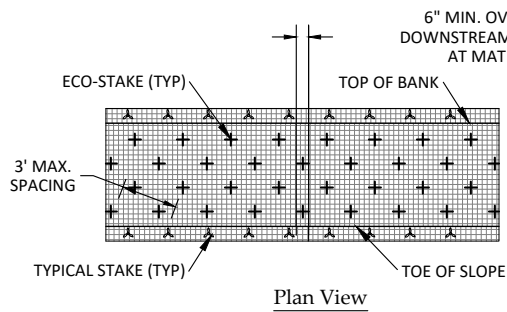
Restoration Practice Details
Details

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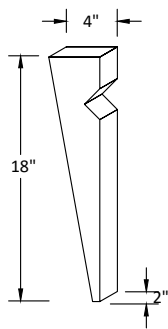


NOTE: WHERE USED, EROSION CONTROL STONE TO BE REPURPOSED ON STREAM BENCH AND VEGETATED ROCK TOE APPLICATIONS

1 Rock Berm
R-5.3 Not to Scale



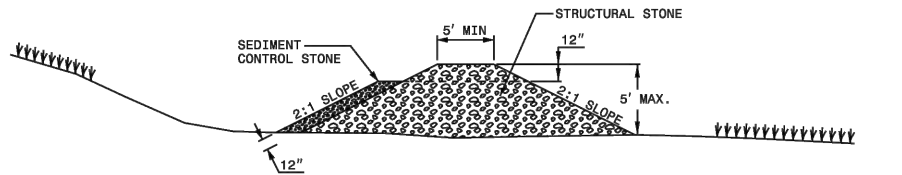
Eco-Stake



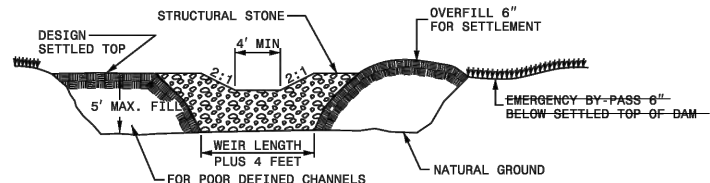
Large Stake

DIMENSIONS MAY VARY BY MANUFACTURER BUT SHALL BE SUBJECT TO DESIGNER APPROVAL. SHALL RESIST BREAKAGE PER SPEC.

3 Erosion Control (Coir Fiber) Matting
R-5.3 Not to Scale



PROFILE SECTION

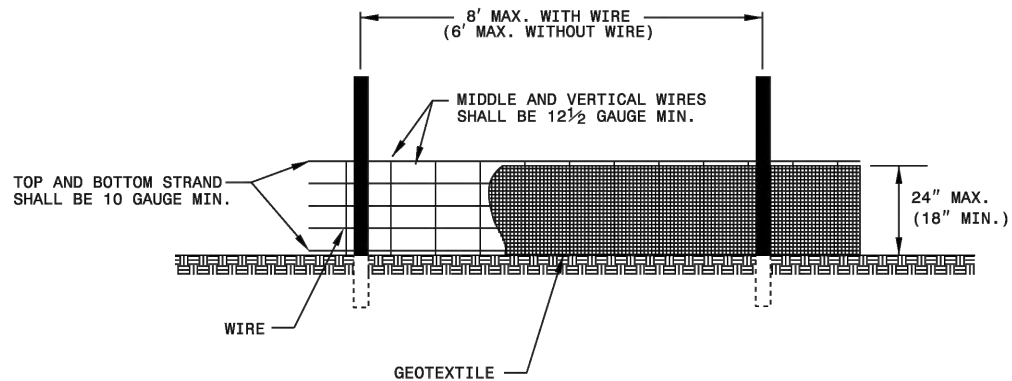


CROSS SECTION

NOTES

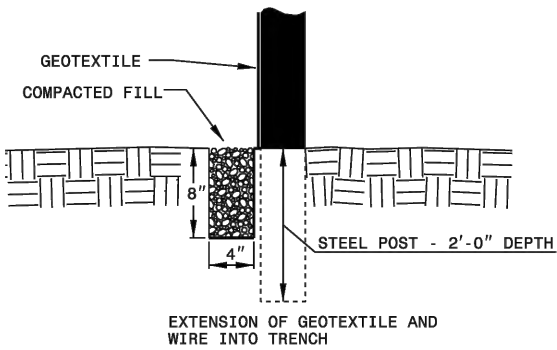
USE CLASS B EROSION CONTROL STONE FOR STRUCTURAL STONE.
USE NO. 5 OR NO. 57 STONE FOR SEDIMENT CONTROL STONE.
DIKE MAY EXTEND ALONG MORE THAN ONE SIDE OF THE TRAP AREA. PROVIDE A TOTAL SEDIMENT STORAGE VOLUME OF 3600± CUBIC FEET PER ACRE OF DISTURBED AREA. SOME OF THE REQUIRED VOLUME MAY BE PROVIDED BY OTHER UP OR DOWNSTREAM CONTROLS.
AN UNDERLAY OF STRUCTURAL STONE WITH FILTRATION GEOTEXTILE MAY BE REQUIRED AS DIRECTED.
INSTALL COIR FIBER BAFFLES ON THE UPSTREAM SIDE OF THE DAM IN ACCORDANCE WITH STANDARD DRAWING NO. 1640.01.
SEED AND PLACE MATTING FOR EROSION CONTROL ON ALL INTERIOR AND EXTERIOR SLOPES OF SEDIMENT BASIN AS DIRECTED.

2 Rock Filter Dam
R-5.3 Not to Scale



NOTES

USE GEOTEXTILE A MINIMUM OF 36" IN WIDTH AND FASTEN ADEQUATELY TO THE POSTS AND WIRE AS DIRECTED.
USE WIRE A MINIMUM OF 32" IN WIDTH AND WITH A MINIMUM OF 5 LINE WIRES WITH 12" VERTICAL SPACING.
PROVIDE 5'-0" STEEL POST OF THE SELF-FASTENER ANGLE STEEL TYPE.
FOR MECHANICAL SLICING METHOD INSTALLATION, GEOTEXTILE SHALL BE A MAXIMUM OF 18" ABOVE GROUND SURFACE.



4 Temporary Silt Fence
R-5.3 Not to Scale

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR
TEMPORARY ROCK SEDIMENT DAM TYPE B

SHEET 1 OF 1
1634.02

STATE OF NORTH CAROLINA
DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RALEIGH, N.C.

ROADWAY STANDARD DRAWING FOR
TEMPORARY SILT FENCE

SHEET 1 OF 1
1605.01

19W North Emergency Repair Design

Yancey County, North Carolina

Erosion Control Details
Details

Revisions:

Date: 10/24/2025
Job Number: W16100
Project Engineer: JPM
Drawn By: JPM, CDB, KMB
Checked By: JPM

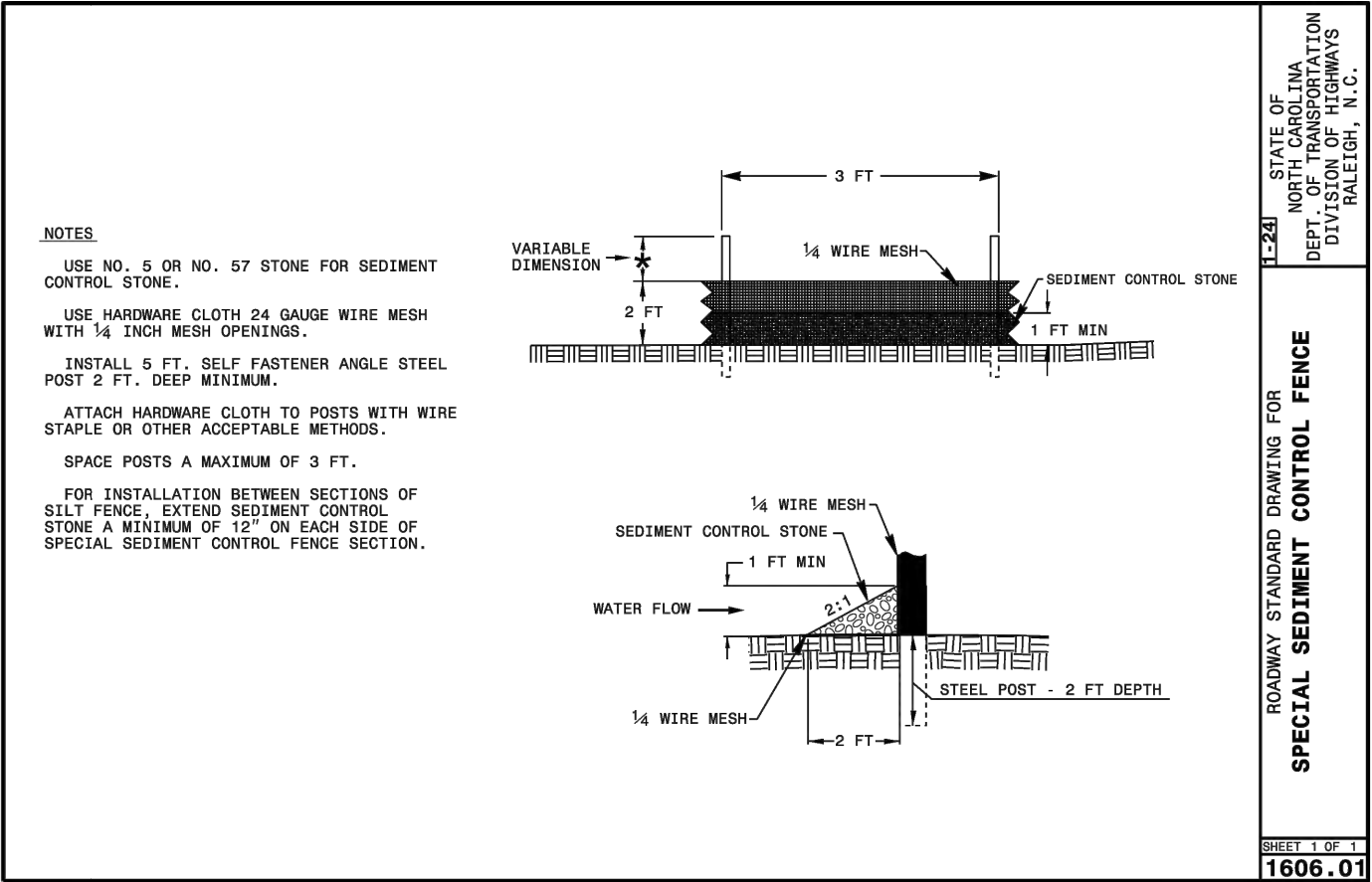
R-5.3

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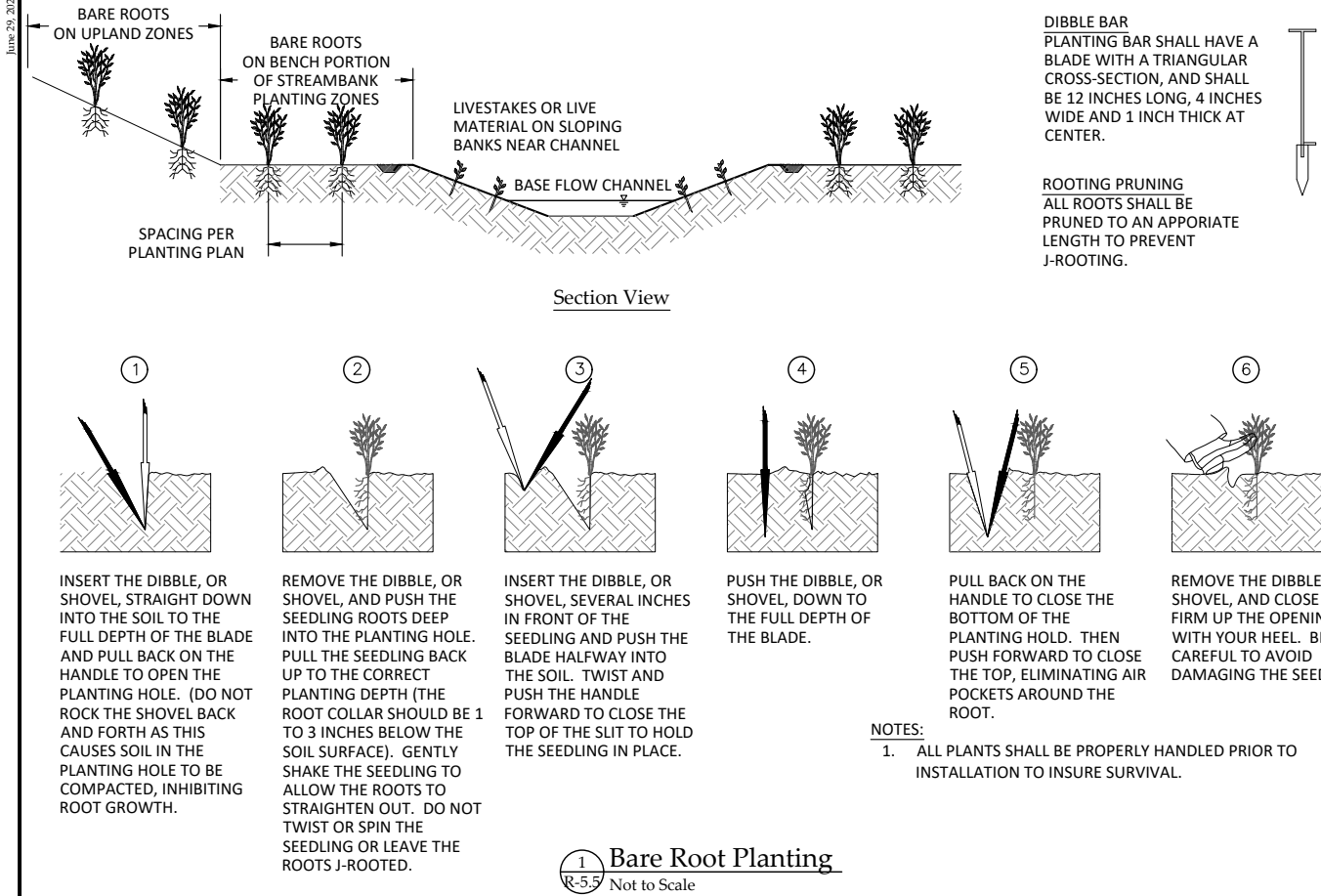
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R-5.4 Special Sediment Control Fence
Not to Scale

Date:	10/24/2025
Job Number:	W16100
Project Engineer:	JPM
Drawn By:	JPM, CDB, KMB
Checked By:	JPM

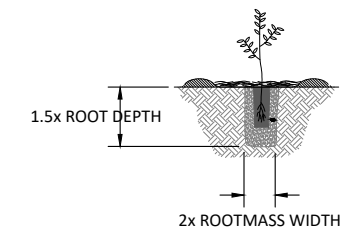
19W North Emergency Repair Design
Yancey County, North Carolina
Erosion Control Details
Details

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June 29, 2026



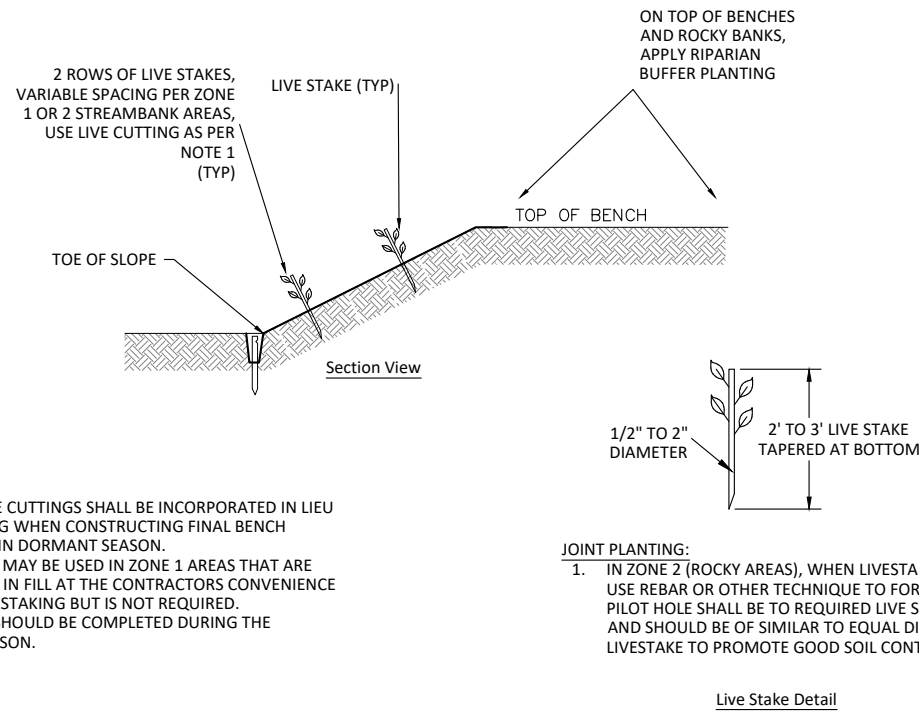
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PREFERRED METHOD IS TO TRANSPLANT IMMEDIATELY. TRIM WOODY TRANSPLANTS AS DIRECTED.

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

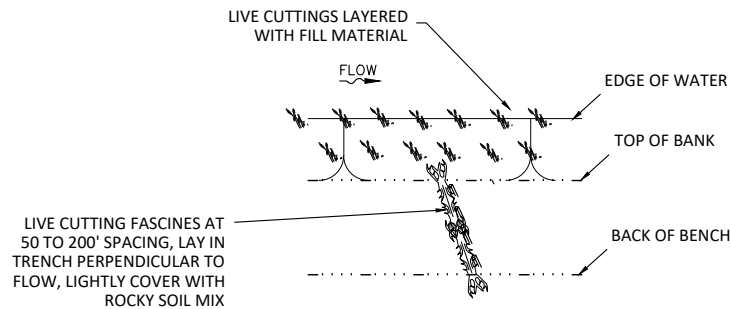
3 Transplants
R-5.5 Not to Scale



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

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

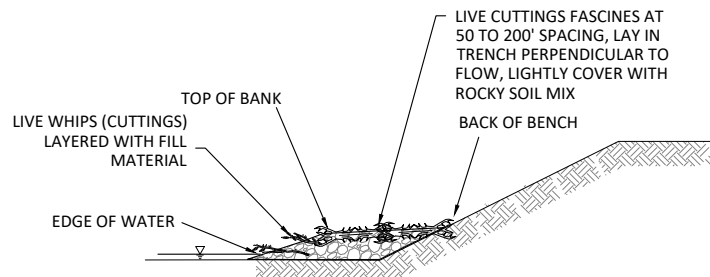
2 Live Staking
R-5.5 Not to Scale



Plan View

DORMANT CUTTINGS OF 4-10' LENGTH BUNDLED 5-15 CUTTINGS DENSE SECURED IN TWINE OR SIMILAR BUNDLE

Fascine



Section

4 Live Whips and Fascines
R-5.5 Not to Scale