MONITORING YEAR 0 ANNUAL REPORT

Final

August 2022

CROSS CREEK RANCH SITE

Montgomery County, NC
Yadkin River Basin
HUC 03040104

DMS Project No. 100138
NCDEQ Contract No. 7879-01
DMS RFP No. 16-007879 / Issued: May 6, 2019
USACE Action ID No. 2020-00051
DWR Project No. 2020-0016
Data Collection Dates: February 2022 – July 2022

PREPARED FOR:

NC Department of Environmental Quality
Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699-1652

August 26, 2022

Mr. Kelly Phillips
Project Manager
NCDEQ - Division of Mitigation Services
610 East Center Avenue, Suite 301
Mooresville, NC 28115

Subject: DRAFT MY0/As-Built Baseline Report & Record Drawings Review
Cross Creek Ranch Site
Yadkin River Basin – CU# 03040104
Montgomery County
DMS Project ID No. 100138
Contract #. 7879-01

Dear Mr. Phillips:

On August 11, 2022, Wildlands Engineering received comments from the North Carolina Division of Mitigation Services (DMS) regarding the DRAFT MY0/As-Built Baseline Report & Record Drawings dated July 13, 2022. The following letter documents DMS feedback and Wildlands' corresponding responses and revisions to the As-Built Report.

Report Cover: **Add RFP issuance date (Issued 5/6/2019).**
Response: RFP issuance date has been added.

Cover Page: **Please update the name to "Cross Creek Ranch Site" so the project name matches the DMS accounting system (CRM) and the project's Credit Ledger. Please update the project name report wide as necessary.**
Response: The project name throughout the report has been updated to "Cross Creek Ranch Site" to match the DMS accounting system.

Table 1 Project Quantities and Credits and Digital Support File (Report Tables 1-3 - Cross Creek Ranch MY0.xlsx): **Wetland 1 credits are incorrectly shown as 0.422. The wetland area is shown as 0.442 acres at a ratio of 1.0. Please update the credits for Wetland 1 to 0.442 and the Total Credits to 4.853 in both sections of Table 1 and the support files after validating these numbers.**
Response: Wetland 1 credits and Total Credits have been updated along with a note stating the credits were miscalculated at the Mitigation Plan stage.

Section 2 As-Built Condition (Baseline): **Please add an interpretative description of the expected site response following adjustments made during construction that differ from the design plans.**
Response: An interpretative description has now been added to Section 2.

Section 2 As-Built Condition: **Please note and discuss any monitoring device location changes from the IRT approved mitigation plan.**
Response: Monitoring device location changes are now noted in Section 2.

Section 2.1.5 UT1B: **Add discussion detailing the sediment accumulating in the pool at STA 400+00 - 400+21 to Section 3. Is the aggradation likely to require maintenance?**
Response: Discussion has been added to Section 2.1.5 about the sediment accumulation. Wildlands is currently monitoring the sediment and will take action if necessary.

Section 3: **Please add Table 18 (Summary of Performance Standards) from the approved mitigation plan to the report.**
Response: The contents of Table 18 from the approved Mitigation Plan are included in Table 2 of the Baseline Report. Table 2 is a required Table from the updated DMS monitoring template issued October 2020. Wildlands feels Table 2 suffices and includes all information contained in Table 18.

Section 3.3 Stream Assessment: **The description indicates there is little to no change in stream dimension. This report documents the baseline conditions so a comparative analysis indicating change cannot be made. Indicate if the constructed dimensions are consistent with the design specifications.**

Response: Constructed dimensions are consistent with design specifications and are now indicated in Section 3.3.

General: P**ebble counts are no longer a requirement of the IRT for monitoring. An agreement was reached on September 29, 2021 with the DMS Technical Work Group and IRT that pebble count data will not be required during the monitoring period for all future projects. Pebble counts are optional in accordance with the policy and your own professional judgment.**
Response: Wildlands plans to discontinue pebble counts in subsequent monitoring years and will note it in the MY1 Report.

Appendix A Visual Assessment Tables: **Thank you for including the data collection dates.**

Appendix A - Culvert Crossing Photographs: **Please add photos for the internal crossing at the beginning of Big Branch.**
Response: Sheet 1.2.1 of the Record Drawings mislabeled the utility easement, which is outside of the conservation easement, as an internal crossing. There is no internal or external crossing along Big Branch, therefore a photograph is not needed. Sheet 1.2.1 has now been updated to accurately reflect the utility easement.

Figure 1 and Figure 1B - CCPV: **Add the internal crossing shown on Sheet 1.2.1 of the Record Drawings to the figure.**
Response: Sheet 1.2.1 of the Record Drawings mislabeled the utility easement, which is outside of the conservation easement, as an internal crossing. There is no internal or external crossing along Big Branch, therefore the CCPV does not show one. Sheet 1.2.1 has now been updated to accurately reflect the utility easement.

Record Drawings: **Sheet 1.4.1: Native rock was installed within the conservation easement as stabilizing riprap along the road shoulder at the beginning of UT2B. Please indicate if this area will be a potential maintenance concern requiring construction access during monitoring or long-term Stewardship. If an easement modification is needed, IRT approval during this MY0/baseline review will be required prior to implementation.**
Response: A field call made by the construction team was intended to stabilize an existing culvert that goes under a private road. No future maintenance is anticipated.

Sheet 1.4.2: **Riprap lining was installed within the conservation easement for stability. Please indicate if this area will be a potential maintenance concern requiring construction access during monitoring or**

long-term Stewardship. If an easement modification is needed, IRT approval during this MY0/baseline review will be required prior to implementation.
Response: The rock was part of the in-stream structure around the pool and no future maintenance is anticipated.

Site Inspection Comments: **DMS conducted a site inspection on July 28, 2022. The conservation easement boundary was found to be adequately marked and protected, no encroachments were observed, and site conditions were consistent with the baseline report.**

Digital Deliverable Comments: **Please revise the wetland assets digital submission. There are discrepancies in the reported As-built assets and the digital file assets. Wetland polygons should be labeled in the digital files as they are labeled in the asset table (Wetland 1,2,3, and A-Q) and no polygons should overlap. The wetlands have expanded in the As-built submission as compared to the mitigation plan submission, 4.366 to 5.170 re-establishment, 0.467 rehabilitation – 0.700. There are polygons included in the re-establishment layer that appear to be wetland rehabilitation (handle CA and CB in the digital file submitted) and re-establishment and rehabilitation polygons that overlap.**
Response: The wetland assets digital file has now been revised.

Thank you for your review and providing comments on this submittal. If you have any further questions, please contact me at (919) 851-9986, or by email (jlorch@wildlandseng.com).

Sincerely,

Jason Lorch, *Monitoring Coordinator*

PREPARED BY:

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CROSS CREEK RANCH SITE
Monitoring Year 0 Annual Report

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TABLES

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APPENDICES

Section 1: Project Overview

The Cross Creek Ranch Site (Site) is located in Montgomery County, approximately 1.5 miles northwest of Mount Gilead and 4.5 miles east of Norwood. Table 3 presents information related to the project attributes.

1.1 Project Quantities and Credits

The Site is located on two parcels under one landowner and a conservation easement was recorded on 63.9 acres. Table 1 below shows stream credits by reach and the total amount of stream credits expected at closeout.

Table 1: Project Quantities and Credits

PROJECT MITIGATION QUANTITIES							
Project Segment	**Mitigation Plan Footage**	**As-Built Footage**	**Mitigation Category**	**Restoration Level**	**Mitigation Ratio (X:1)**	**Credits**	**Comments**
STREAMS							
Clarks Creek	3,479	3,479	Warm	EII	4.0	869.750	Fencing Out Livestock, Minor Bank Grading
Big Branch	64	15	Warm	R	N/A	0.000	DOT ROW
Big Branch	2,133	2,196	Warm	R	1.0	2,133.000	Full Channel Restoration, Fencing Out Livestock
UT1 R1	2,821	2,866	Warm	R	1.0	2,821.000	Full Channel Restoration, Fencing Out Livestock
UT1 R2	164	167	Warm	R	1.0	164.000	Full Channel Restoration, Fencing Out Livestock
UT1 R2	100	100	Warm	R	N/A	0.000	Culvert Crossing
UT1 R2	423	439	Warm	R	1.0	423.000	Full Channel Restoration, Fencing Out Livestock
UT1B	373	377	Warm	R	1.0	373.000	Full Channel Restoration, Fencing Out Livestock
UT1B	62	62	Warm	R	N/A	0.000	Culvert Crossing
UT1B	868	877	Warm	R	1.0	868.000	Full Channel Restoration, Fencing Out Livestock
UT3	33	47	Warm	R	N/A	0.000	Non-Jurisdictional
UT3 R1	748	754	Warm	R	1.0	748.000	Full Channel Restoration, Fencing Out Livestock
UT3 R2	2,432	2,437	Warm	EII	3.0	810.667	Fencing Out Livestock, Minor Bank Grading
UT3 R3	331	331	Warm	P	10.0	33.100	Conservation Easement
					Totals:	**9,243.517**	

WETLANDS							
Wetland 1	0.442	0.442	Riparian	R	1.0	0.442[3]	
Wetland 2[1]	2.163	2.163	Riparian	R	1.0	2.163	
Wetland 3	1.781	1.781	Riparian	R	1.0	1.781	
Wetland A	0.075	0.075	Riparian	RH	1.5	0.050	
Wetland B	0.116	0.116	Riparian	RH	1.5	0.077	
Wetland D	0.033	0.033	Riparian	RH	1.5	0.022	
Wetland E	0.102	0.102	Riparian	RH	1.5	0.068	
Wetland F	0.103	0.103	Riparian	RH	1.5	0.069	
Wetland G	0.051	0.051	Riparian	RH	1.5	0.034	
Wetland H	0.158	0.158	Riparian	RH	1.5	0.105	
Wetland Q	0.063	0.063	Riparian	RH	1.5	0.042	
					Total:	**4.853**	

1 Wetland 2 boundary includes conversion of the existing farm pond to wetland.
2 Crossing lengths have been removed from restoration footage.
3 Wetland 1 credits have been updated to account for an error in the Mitigation Plan.

Restoration Level	Stream	Riparian Wetland
	Warm	Riverine
Restoration[2]	7,530.000	
Enhancement II	1,680.417	
Preservation	33.100	
Re-Establishment		4.386
Rehabilitation		0.467
Total Stream Credit	**9,243.517**	
Total Wetland Credit		**4.853[1]**

1 Total Riparian Wetland Credits have been updated to account for an error in the Mitigation Plan.

1.2 Project Goals and Objectives

The project is intended to provide numerous ecological benefits. Table 2 below describes expected outcomes to water quality and ecological processes and provides project goals and objectives.

Table 2: Goals, Performance Criteria, and Functional Improvements

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Improve the stability of stream channels.	Reconstruct stream channels slated for restoration with stable dimensions and appropriate depth relative to the existing floodplain. Add bank revetments and instream structures to protect restored/ enhanced streams.	Reduce erosion and sediment inputs; maintain appropriate bed forms and sediment size distribution.	ER stays over 2.2 and BHR below 1.2 with visual assessments showing progression towards stability.	Cross-section monitoring and visual inspections.	No deviations from design.

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Exclude livestock from stream channels.	Install fencing to exclude livestock from stream channels, riparian areas, proposed wetland areas, and/or removed livestock from adjacent fields.	Reduce and control sediment inputs; reduce and manage nutrient inputs.	Fence conservation easement to exclude livestock. Install fenced and gated culvert crossings as needed.	Visually inspect the Site to ensure no cattle encroachment is occurring.	Cattle are excluded from project streams.
Improve instream and wetland habitat.	Install habitat features such as cover logs, log sills, and bush toes into restored/enhanced streams. Add woody materials to channel beds. Construct pools of varying depth. Remove farm pond and re-establish forested riparian wetland habitat.	Support biological communities and processes. Provide aquatic habitats for diverse populations of aquatic organisms.	There is no required performance standard for this metric.	N/A	N/A
Reconnect channels with floodplains and riparian wetlands.	Reconstruct stream channels with appropriate bankfull dimensions and depth relative to existing floodplain.	Reduce shear stress on channel; hydrate adjacent wetland areas; filter pollutants out of overbank flows; provide surface storage of water on floodplain; increase groundwater recharge while reducing outflow of stormwater.	Four bankfull events in separate years within monitoring period. 30 consecutive days of flow for intermittent channel.	Crest gauges and/or pressure transducers recording flow elevations.	Reported in MY1.
Restore wetland function and hydrology.	Restore wetlands through re-establishment of hydrology. Remove the drainage effects of agricultural ditching and maintenance.	Improve terrestrial habitat; and contribute to protection of or improvement of a Water Supply and Nutrient-Sensitive Water.	Free groundwater surface within 12 inches of the ground surface for a minimum of 12% (re-establishment) or 11% (rehabilitation) of the growing season for Montgomery County.	Groundwater gauges will be placed in wetland re-establishment and rehabilitation areas and monitored annually.	Reported in MY1.
Reduce sediment and nutrient input from adjacent agricultural fields.	Restore riparian stream corridor and pocket wetland areas to slow and filter runoff from adjacent agricultural fields.	Reduction of sediment and nutrients to 303(d) receiving waters.	There is no required performance standard for this metric.	N/A	N/A

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Restore and enhance native floodplain and wetland vegetation.	Convert active cattle pasture and previously maintained agricultural areas to forested riparian buffers along all Site streams and wetlands. Treat invasive vegetation along stream corridors. Protect and enhance existing forested riparian buffers.	Provide a canopy to shade streams and reduce thermal loadings; stabilize stream banks and floodplain; support water quality and habitat goals.	Survival rate of 320 stems per acre at MY3, 260 planted stems per acre and average height of 7ft at MY5, and 210 stems per acre and average height of 10 ft at MY7. *Shrub and subcanopy species will be omitted from average height calculations.	One hundred square meter vegetation plots are placed on 2% of the planted area of the Site and monitored annually.	All 29 vegetation plots have a planted stem density greater than 320 stems per acre.
Permanently protect the project Site from harmful uses.	Establish conservation easements on the Site.	Ensure that development and agricultural uses that would damage the Site or reduce the benefits of the project are prevented.	Prevent easement encroachment.	Visually inspect the perimeter of the Site to ensure no easement encroachment is occurring.	No easement encroachments.

1.3 Project Attributes

The Site was an active cattle farm composed of cattle pastures and previously deforested timber areas. Historical aerials from 1955 to 2018 (Wildlands, 2021) showed that onsite streams existed in their same approximate location for the last 65 years with minor changes to land management. Table 3 below and Table 8 in Appendix C present additional information on pre-restoration conditions.

Table 3: Project Attributes

PROJECT INFORMATION			
Project Name	Cross Creek Ranch Site	County	Montgomery County
Project Area (acres)	63.9	Project Coordinates	35.232211 N, 80.02425 W
PROJECT WATERSHED SUMMARY INFORMATION			
Physiographic Province	Piedmont	River Basin	Pee Dee
USGS HUC 8-digit	03040104	USGS HUC 14-digit	03040104020020
DWR Sub-basin	03-07-10	Land Use Classification	24% agriculture, 74% forested, 5% developed
Project Drainage Area (acres)	16,337	Percentage of Impervious Area	0.7%

RESTORATION TRIBUTARY SUMMARY INFORMATION					
Parameters	**Clarks Creek**	**Big Branch**	**UT1**	**UT1B**	**UT3**
Pre-project length (feet)	3,479	2,044	3,604	1,571	3,611
Post-project (feet)	3,479	2,211	3,535	1,292	3,568
Valley confinement	Unconfined	Unconfined	Moderately Confined	Moderately Confined	Confined
Drainage area (acres)	16,667	1,464	725	348	96
Perennial, Intermittent, Ephemeral	Perennial	Perennial	Perennial	Perennial	Perennial
DWR Water Quality Classification	C				
Dominant Stream Classification (existing)	N/A	C4/1	E4/1, G3c/1	B4c/1	F1
Dominant Stream Classification (proposed)	N/A	C4/1	C4/1	C4/1	B4
Dominant Evolutionary class (Simon) if applicable	V	II	III/IV	IV	III

REGULATORY CONSIDERATIONS			
Parameters	**Applicable?**	**Resolved?**	**Supporting Documentation**
Water of the United States - Section 404	Yes	Yes	USACE Nationwide Permit No. 27 and DWQ 401 Water Quality Certification No. 4134.
Water of the United States - Section 401	Yes	Yes	
Endangered Species Act	Yes	Yes	Categorical Exclusion in Mitigation Plan (Wildlands, 2021)
Historic Preservation Act	Yes	Yes	
Coastal Zone Management Act (CZMA or CAMA)	N/A	N/A	N/A
Essential Fisheries Habitat	N/A	N/A	N/A

Section 2: As-Built Condition (Baseline)

The Site construction and as-built surveys were completed in March 2022. The survey included developing an as-built topographic surface; as well as, surveying the as-built channel centerlines, top of banks, structures, and cross-sections.

Installed monitoring devices and plot locations closely mimic the locations of those proposed in the Site's Mitigation Plan. Deviations from these locations were made when professional judgement deemed them necessary to better represent as-built field conditions or when installation of the device in the proposed location was not physically feasible.

2.1 As-Built/Record Drawings

Changes were implemented at several locations during construction including material type, the addition and/or removal of structures, and grading. These changes were made due to unforeseen site conditions and availability of on-site materials. In all instances, the changes provide the same, if not better, stability, habitat, and functional uplift. A sealed half-size set of record drawings are in Appendix E which includes the post-construction survey, alignments, structures, and monitoring features. These include redlines for any significant field adjustments made during construction that differ from the design plans. Specific changes by each project area are detailed below:

2.1.1 Clarks Creek

- STA 110+15 - STA 111+63 – floodplain grading shifted to save trees;
- STA 111+60 - 112+73 – grading omitted to save trees;
- STA 112+83 - 113+31 – lunker log constructed in place of bank grading to stabilize bank and minimize impact on existing trees;
- STA 118+50 - STA 119+11 – brush toe constructed to add stability to left bank;
- STA 132+31 – log vane moved to save trees;
- STA 132+15 - 132+65 – grading required to install log vane; and
- STA 138+56 – debris jam washed out prior to construction.

2.1.2 Big Branch

- No deviations were made from design.

2.1.3 UT1 Reach 1

- STA 305+32 – boulder outlet installed to stabilize wetland outlet.

2.1.4 UT1 Reach 2

- STA 330+12 - 330+85 – rip-rap lining added along crossing and culvert to provide additional stability.

2.1.5 UT1B

- STA 400+00 – rip-rap harvested on-site added to increase stability, and limits of grading expanded to enhance floodplain relief;
- STA 400+00 - 400+21 – pool has filled in with sediment since construction. Source of the sediment is currently unknown but speculated that it might have washed in during construction before vegetation was established. Wildlands is monitoring the pool to determine if sediment flushes out or if maintenance will be required; and

- STA 403+84 - 404+45 – rip-rap lining added along crossing and culvert to provide additional stability.

2.1.6 UT3 Reach 1

- STA 500+00 – brush toe omitted due to sufficient stability.

2.1.7 UT3 Reach 2

- STA 509+16 – grading limited to save trees;
- STA 511+56 – log sill moved downstream to save trees;
- STA 513+06 - 513+25 – riffle omitted due to existing channel bed stability;
- STA 515+61 – log sill moved downstream to save trees;
- STA 516+67 - 517+06 – floodplain grading moved to left bank to save trees;
- STA 516+74 – log sill moved downstream to save trees;
- STA 518+32 – log sill moved downstream to save trees;
- STA 518+51 – log sill moved upstream to save trees;
- STA 519+05 - 519+35 – grading omitted to save trees providing additional bank stability;
- STA 521+08 – log sill moved downstream to save tree;
- STA 521+43 - 521+92 – downstream extent of grading omitted to save trees providing additional bank stability;
- STA 523+25 - 524+57 – additional grading occurred on left bank due to construction access;
- STA 530+03 - 530+16 – additional grading occurred to install log sill; and
- STA 530+09 – log sill moved downstream to save tree.

2.1.8 UT3 Reach 3

- No deviations were made from design.

Section 3: Monitoring Year 0 Data Assessment

Annual monitoring and site visits were conducted during MY0 to assess the condition of the project. The vegetation and stream success criteria for the Site follow the approved success criteria presented in the Mitigation Plan (Wildlands, 2021). Performance criteria for vegetation, stream, and hydrologic assessment are located in Section 1.2 Table 3: Goals, Performance Criteria, and Functional Improvements.

3.1 Vegetative Assessment

The MY0 vegetative survey was completed in March 2022. Vegetation monitoring resulted in a stem density range of 364 to 688 planted stems per acre which is well above the interim requirement of 320 stems per acre required at MY3. Average stem density was 578 planted stems per acre. All 29 vegetation plots exceeded the interim success criteria and are on track to meet the final success criteria required for MY7. Refer to Appendix A for Vegetation Plot Photographs and the Vegetation Condition Assessment Table, and Appendix B for Vegetation Plot Data.

3.2 Vegetation Areas of Concern

Dense Chinese Privet *(Ligustrum sinense),* along Clarks Creek (Figure 1a-b), was removed mechanically in March 2022 on 19.57 acres. Treated areas will be monitored and will receive follow up chemical treatments in the fall or winter of 2022.

3.3 Stream Assessment

Morphological surveys for MY0 were conducted in March 2022. The MY0 profiles generally match the profile design parameters. As-built channel slopes calculated for restoration and enhancement I reaches resulted in slopes slightly greater than those of design; however, as-built reviews showed no visual indicators of vertically instability. Variations from the design profile often reflect field changes during construction as a result of field conditions and do not constitute a problem or indicate a need for remedial actions. Channels profiles will continue to be assessed visually during the CCPV Site walks. Substrate measurements indicate the maintenance of coarser material in the riffle reaches and finer particles in the pools. Refer to Appendix A for the Visual Stream Morphology Stability Assessment Table and Stream Photographs. Refer to Appendix C for Stream Geomorphology Data.

3.4 Stream Areas of Concern

No stream areas of concern were identified during MY0.

3.5 Hydrology Assessment

Hydrologic data will be collected and reported during MY1.

3.6 Wetland Assessment

Wetland data recorded following completion of construction will be reported in the MY1 report.

3.7 Monitoring Year 0 Summary

Overall, the Site looks good, is performing as intended, and is on track to meet success criteria. All vegetation plots are on track to exceed the MY3 interim requirement of 320 planted stems per acre, and all streams within the Site are stable and meeting project goals. The 19.57 acres of mechanically treated Chinese privet will receive a follow up chemical treatment in MY1.

Summary information and data related to the performance of various project and monitoring elements can be found in the tables and figures in the report appendices. All raw data supporting the tables and figures in the appendices are available from DMS upon request.

Section 4: Methodology

Geomorphic data was collected following the standards outlined in The Stream Channel Reference Site: An Illustrated Guide to Field Techniques (Harrelson et al., 1994) and in Stream Restoration: A Natural Channel Design Handbook (Doll et al., 2003). All Integrated Current Condition Mapping was recorded using a Trimble handheld GPS with sub-meter accuracy and processed using Pathfinder and ArcGIS. Crest gauges and pressure transducers were installed in riffle cross-sections and monitored throughout the year. Hydrologic monitoring instrument installation and monitoring methods are in accordance with the United States Army Corps of Engineers standards (USACE, 2003). Vegetation monitoring protocols followed the Wilmington District Stream and Wetland Compensatory Mitigation Update (NCIRT, 2016).

Section 5: References

Doll, B.A., Grabow, G.L., Hall, K.A., Halley, J., Harman, W.A., Jennings, G.D., and Wise, D.E. 2003. Stream Restoration A Natural Channel Design Handbook.

Harrelson, C.C., Rawlins, C.L., Potyondy, J.P. 1994. *Stream Channel Reference Sites: An Illustrated Guide to Field Technique.* Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61 p.

Rosgen, D. L. 1994. A classification of natural rivers. *Catena* 22:169-199.

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Rosgen, D.L. 1997. A Geomorphological Approach to Restoration of Incised Rivers. Proceedings of the Conference on Management of Landscapes Disturbed by Channel Incision. Center For Computational Hydroscience and Bioengineering, Oxford Campus, University of Mississippi, Pages 12-22.

North Carolina Division of Water Resources (DWR). 2008. Yadkin-Pee Dee River Basin Plan.

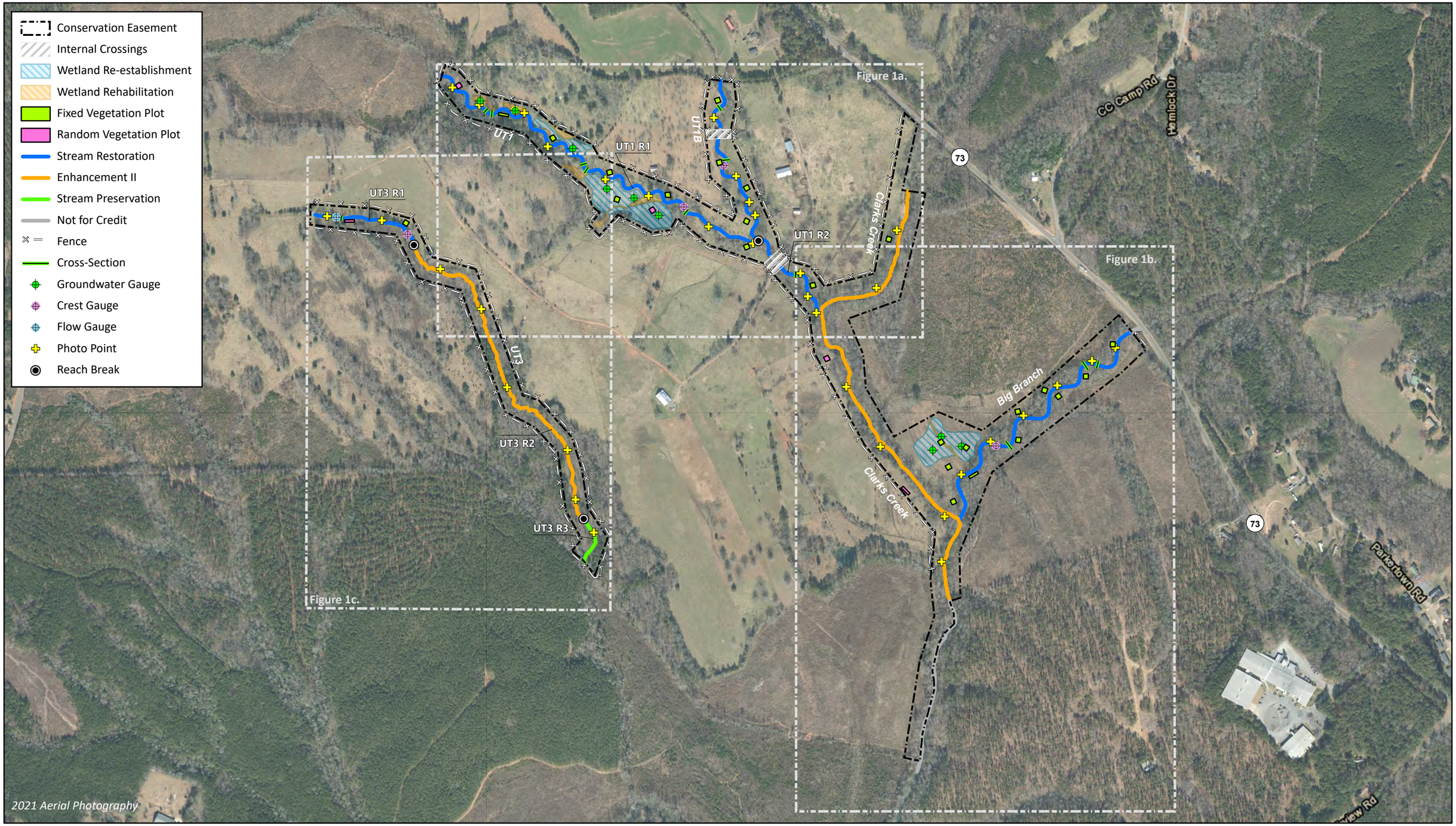
North Carolina Ecosystem Enhancement Program (EEP), 2009. Upper Yadkin River Basin Restoration Priorities.

North Carolina Interagency Review Team (NCIRT). 2016. Wilmington District Stream and Wetland Compensatory Mitigation Update.

United States Army Corps of Engineers. 2003. Stream Mitigation Guidelines. USACE, NCDENR-DWQ, USEPA, NCWRC.

United States Geological Survey. 1998. North Carolina Geology.

Wildlands Engineering, Inc. (2021). Cross Creek Ranch Mitigation Project Mitigation Plan. DMS, Raleigh, NC.



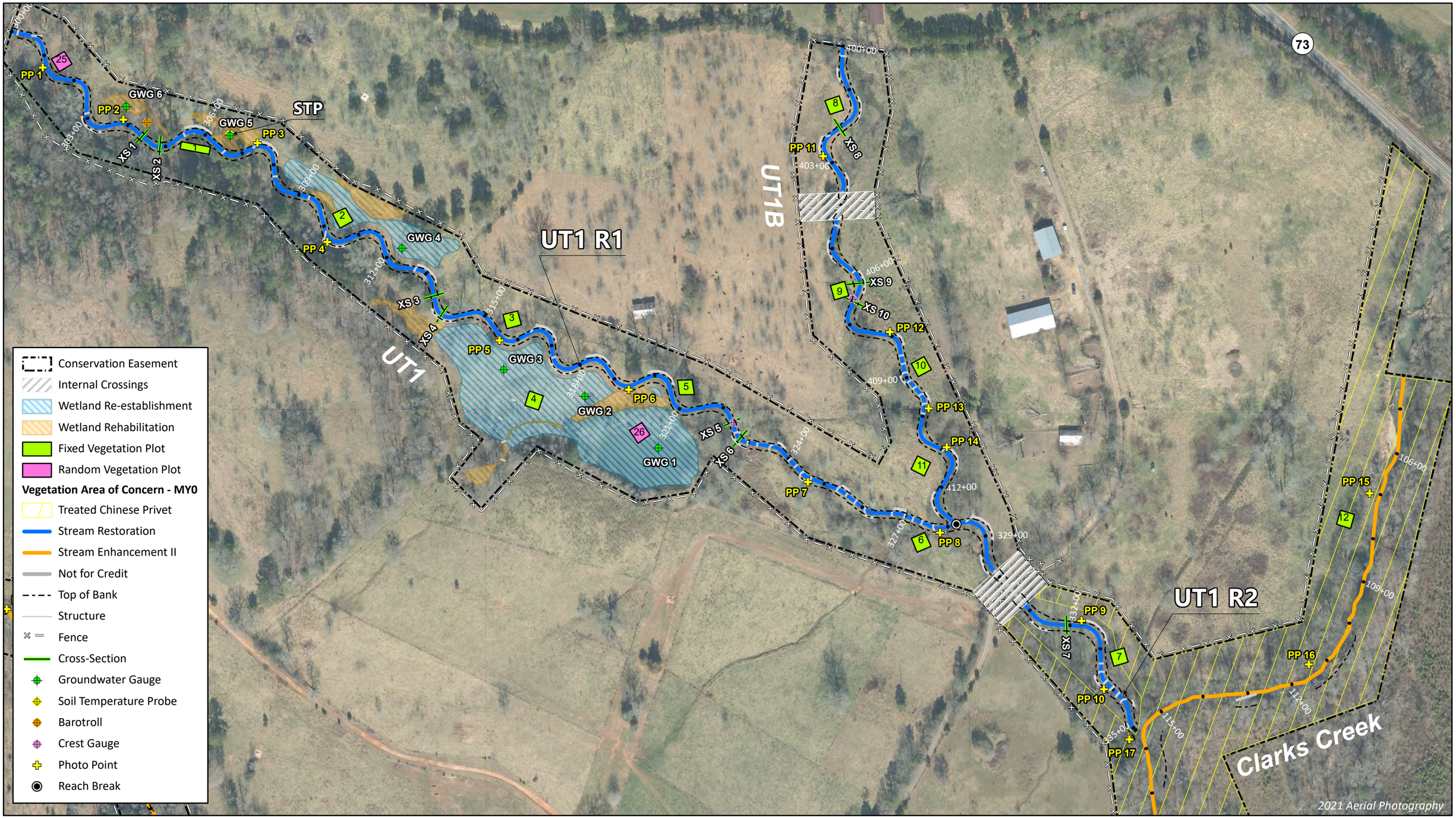
WILDLANDS ENGINEERING

0 600 1,200 Feet

N

Figure 1. Current Condition Plan View
Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Montgomery County, NC



WILDLANDS ENGINEERING

0 200 400 Feet

N

Figure 1a. Current Condition Plan View
Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Montgomery County, NC

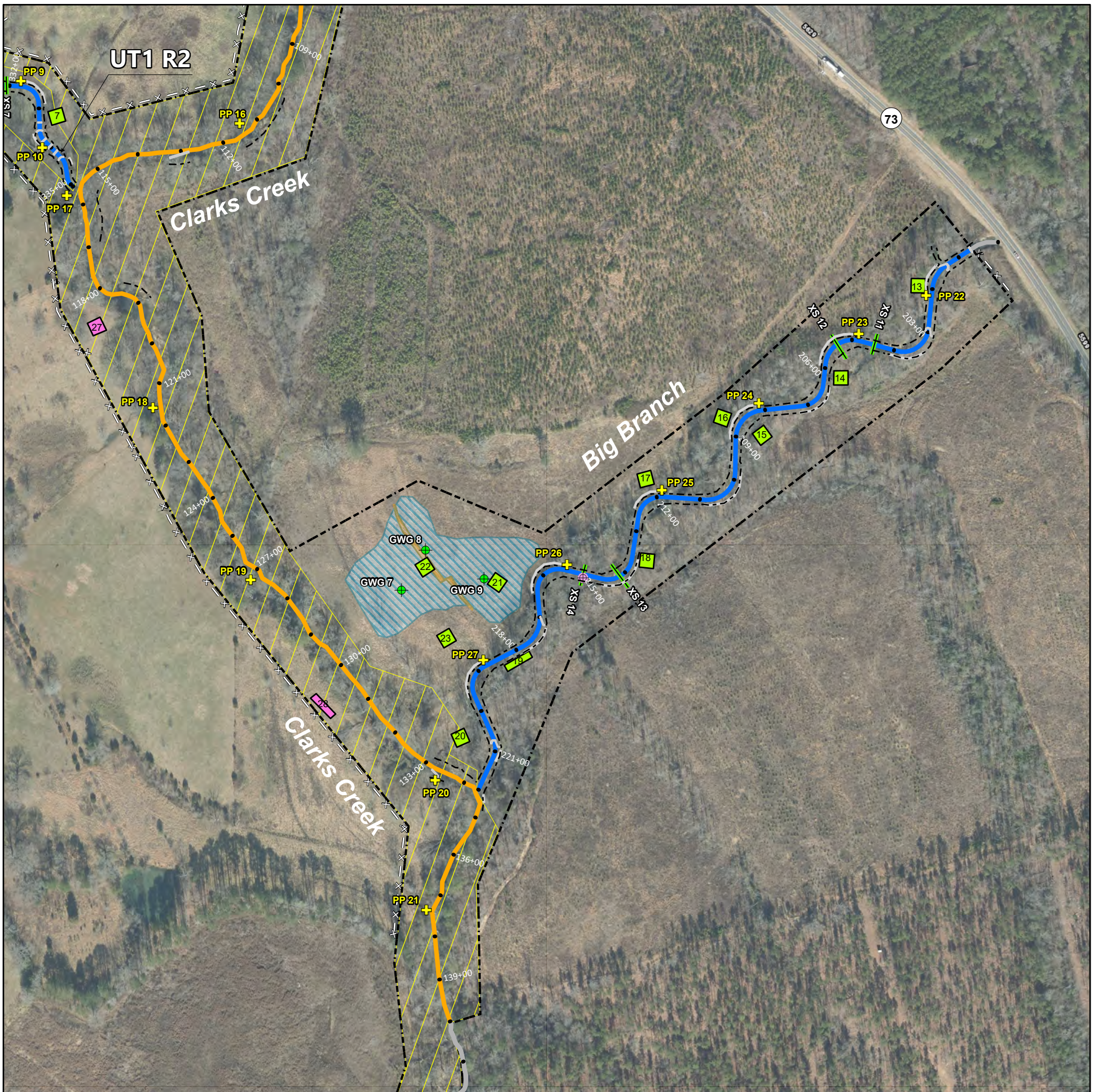
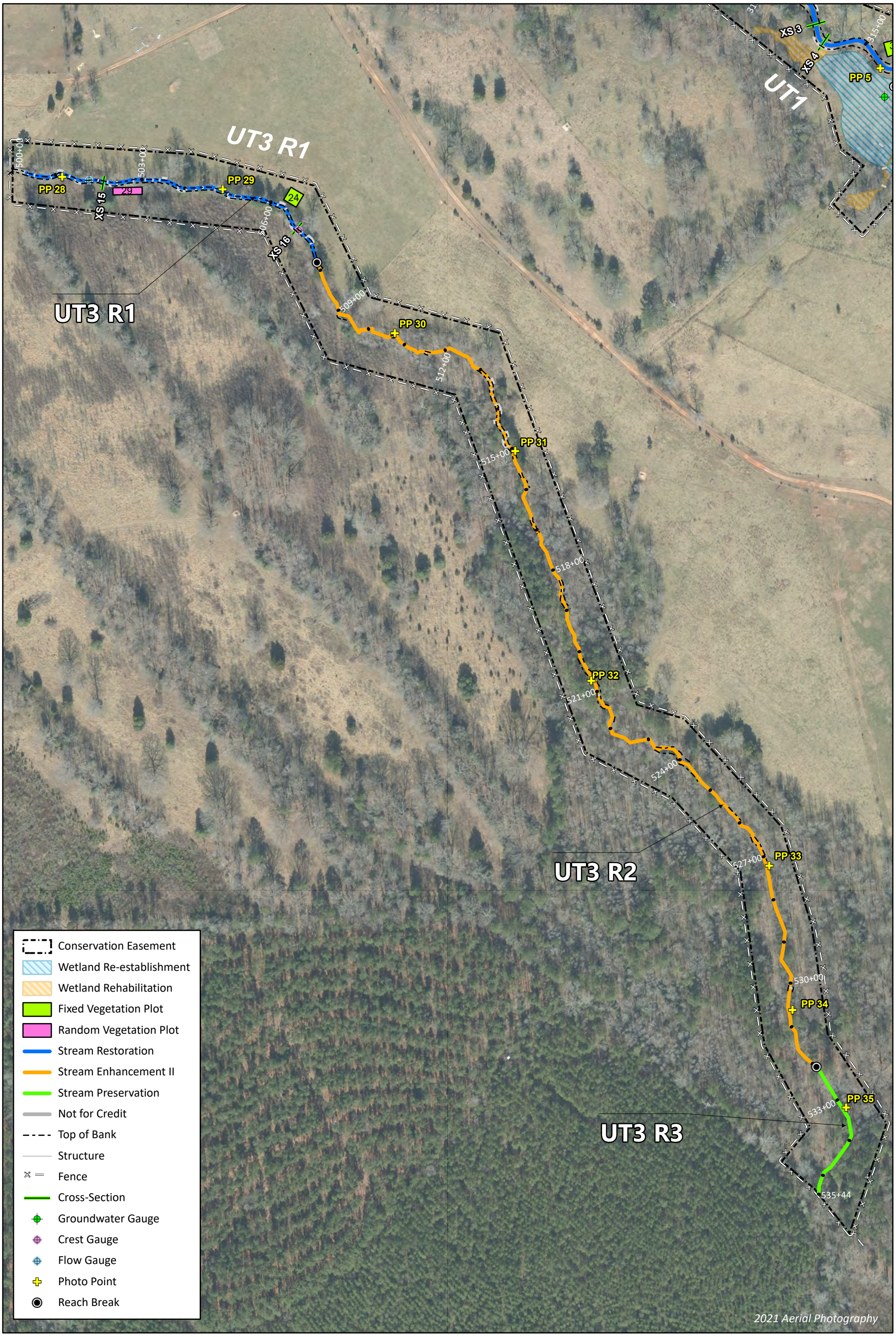


Figure 1b. Current Condition Plan View
Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Montgomery County, NC



WILDLANDS ENGINEERING

0 200 400 Feet

N

Figure 1c. Current Condition Plan View
Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Montgomery County, NC

APPENDIX A. VISUAL ASSESSMENT DATA

Table 4. Visual Stream Morphology Stability Assessment Table

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT1 R1

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	2,866
					Assessed Bank Length	5,732
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	9	9		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	17	17		100%

Visual assessment was completed May 26, 2022.

UT1 R2

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	606
					Assessed Bank Length	1,212
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	3	3		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	6	6		100%

Visual assessment was completed May 26, 2022.

Table 4. Visual Stream Morphology Stability Assessment Table

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT1B

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	1,254
					Assessed Bank Length	2,508
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	7	7		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	11	11		100%

Visual assessment was completed May 26, 2022.

Clark's Creek

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	3,479
					Assessed Bank Length	6,958
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	0	0		N/A
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	1	1		100%

Visual assessment was completed May 26, 2022.

Table 4. Visual Stream Morphology Stability Assessment Table

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Big Branch

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	2,196
					Assessed Bank Length	4,392
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	5	5		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	12	12		100%

Visual assessment was completed May 26, 2022.

UT3 R1

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	754
					Assessed Bank Length	1,508
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	13	13		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	8	8		100%

Visual assessment was completed May 26, 2022.

Table 4. Visual Stream Morphology Stability Assessment Table

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT3 R2

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	2,437
					Assessed Bank Length	4,874
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	3	3		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	5	5		100%

Visual assessment was completed May 26, 2022.

UT3 R3

Major Channel Category		Metric	Number Stable, Performing as Intended	Total Number in As-Built	Amount of Unstable Footage	% Stable, Performing as Intended
					Assessed Stream Length	331
					Assessed Bank Length	662
Bank	**Surface Scour/ Bare Bank**	Bank lacking vegetative cover resulting simply from poor growth and/or surface scour.			0	100%
	Toe Erosion	Bank toe eroding to the extent that bank failure appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	100%
	Bank Failure	Fluvial and geotechnical - rotational, slumping, calving, or collapse.			0	100%
				Totals:	**0**	**100%**
Structure	**Grade Control**	Grade control structures exhibiting maintenance of grade across the sill.	0	0		N/A
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	0	0		N/A

Visual assessment was completed May 26, 2022.

Table 5. Vegetation Condition Assessment Table
Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Planted Acreage **43.50**

Vegetation Category	Definitions	Mapping Threshold (ac)	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material.	0.10	0.00	0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on current MY stem count criteria.	0.10	0.00	0%
		Total	**0.00**	**0%**
Areas of Poor Growth Rates	Planted areas where average height is not meeting current MY Performance Standard.	0.10	0.00	0%
		Cumulative Total	**0.00**	**0%**

Visual assessment was completed May 26, 2022.

Easement Acreage **63.90**

Vegetation Category	Definitions	Mapping Threshold (ac)	Combined Acreage	% of Easement Acreage
Invasive Areas of Concern	Invasives may occur outside of planted areas and within the easement and will therefore be calculated against the total easement acreage. Include species with the potential to directly outcompete native, young, woody stems in the short-term or community structure for existing communities. Invasive species included in summation above should be identified in report summary.	0.10	0.00	0%
Easement Encroachment Areas	Encroachment may be point, line, or polygon. Encroachment to be mapped consists of any violation of restrictions specified in the conservation easement. Common encroachments are mowing, cattle access, vehicular access. Encroachment has no threshold value as will need to be addressed regardless of impact area.	none	0 Encroachments Noted / 0 ac	

Visual assessment was completed May 26, 2022.

STREAM PHOTOGRAPHS

	
PHOTO POINT 1 UT1 R1 – upstream *(03/13/2022)*	**PHOTO POINT 1 UT1 R1 – downstream *(03/13/2022)***
	
PHOTO POINT 2 UT1 R1 – upstream *(03/13/2022)*	**PHOTO POINT 2 UT1 R1 – downstream *(03/13/2022)***
	
PHOTO POINT 3 UT1 R1 – upstream *(03/13/2022)*	**PHOTO POINT 3 UT1 R1 – downstream *(03/13/2022)***

	
PHOTO POINT 4 UT1 R1 – upstream *(03/13/2022)*	**PHOTO POINT 4 UT1 R1 – downstream *(03/13/2022)***
	
PHOTO POINT 5 UT1 R1 – upstream *(03/13/2022)*	**PHOTO POINT 5 UT1 R1 – downstream *(03/13/2022)***
	
PHOTO POINT 6 UT1 R1 – upstream *(03/13/2022)*	**PHOTO POINT 6 UT1 R1 – downstream *(03/13/2022)***

PHOTO POINT 7 UT1 R1 – upstream *(03/13/2022)*

PHOTO POINT 7 UT1 R1 – downstream *(03/13/2022)*

PHOTO POINT 8 UT1 R1 – upstream *(03/13/2022)*

PHOTO POINT 8 UT1 R1 – downstream *(03/13/2022)*

PHOTO POINT 9 UT1 R2 – upstream *(03/13/2022)*

PHOTO POINT 9 UT1 R2 – downstream *(03/13/2022)*

	
PHOTO POINT 10 UT1 R2 – upstream *(03/13/2022)*	**PHOTO POINT 10 UT1 R2 – downstream *(03/13/2022)***
	
PHOTO POINT 11 UT1B – upstream *(03/14/2022)*	**PHOTO POINT 11 UT1B – downstream *(03/14/2022)***
	
PHOTO POINT 12 UT1B – upstream *(03/14/2022)*	**PHOTO POINT 12 UT1B – downstream *(03/14/2022)***

	
PHOTO POINT 13 UT1B – upstream *(03/14/2022)*	**PHOTO POINT 13 UT1B – downstream *(03/14/2022)***
	
PHOTO POINT 14 UT1B – upstream *(03/14/2022)*	**PHOTO POINT 14 UT1B – downstream *(03/14/2022)***
	
PHOTO POINT 15 Clarks Creek – upstream *(03/17/2022)*	**PHOTO POINT 15 Clarks Creek – downstream *(03/17/2022)***

	
PHOTO POINT 16 Clarks Creek – upstream *(03/17/2022)*	**PHOTO POINT 16 Clarks Creek – downstream *(03/17/2022)***
	
PHOTO POINT 17 Clarks Creek – upstream *(03/13/2022)*	**PHOTO POINT 17 Clarks Creek – downstream *(03/13/2022)***
	
PHOTO POINT 18 Clarks Creek – upstream *(03/17/2022)*	**PHOTO POINT 18 Clarks Creek – downstream *(03/17/2022)***

PHOTO POINT 19 Clarks Creek – upstream *(03/17/2022)*

PHOTO POINT 19 Clarks Creek – downstream *(03/17/2022)*

PHOTO POINT 20 Clarks Creek – upstream *(05/09/2022)*

PHOTO POINT 20 Clarks Creek – downstream *(05/09/2022)*

PHOTO POINT 21 Clarks Creek – upstream *(05/09/2022)*

PHOTO POINT 21 Clarks Creek – downstream *(05/09/2022)*

PHOTO POINT 22 Big Branch – upstream *(03/14/2022)*

PHOTO POINT 22 Big Branch – downstream *(03/14/2022)*

PHOTO POINT 23 Big Branch – upstream *(03/14/2022)*

PHOTO POINT 23 Big Branch – downstream *(03/14/2022)*

PHOTO POINT 24 Big Branch – upstream *(03/14/2022)*

PHOTO POINT 24 Big Branch – downstream *(03/14/2022)*

PHOTO POINT 25 Big Branch – upstream *(03/14/2022)*

PHOTO POINT 25 Big Branch – downstream *(03/14/2022)*

PHOTO POINT 26 Big Branch – upstream *(03/14/2022)*

PHOTO POINT 26 Big Branch – downstream *(03/14/2022)*

PHOTO POINT 27 Big Branch – upstream *(03/14/2022)*

PHOTO POINT 27 Big Branch – downstream *(03/14/2022)*

	
PHOTO POINT 28 UT3 R1 – upstream *(03/14/2022)*	**PHOTO POINT 28 UT3 R1 – downstream *(03/14/2022)***
	
PHOTO POINT 29 UT3 R1 – upstream *(03/14/2022)*	**PHOTO POINT 29 UT3 R1 – downstream *(03/14/2022)***
	
PHOTO POINT 30 UT3 R2 – upstream *(03/14/2022)*	**PHOTO POINT 30 UT3 R2 – downstream *(03/14/2022)***

	
PHOTO POINT 31 UT3 R2 – upstream *(03/17/2022)*	**PHOTO POINT 31 UT3 R2 – downstream *(03/17/2022)***
	
PHOTO POINT 32 UT3 R2 – upstream *(03/17/2022)*	**PHOTO POINT 32 UT3 R2 – downstream *(03/17/2022)***
	
PHOTO POINT 33 UT3 R2 – upstream *(03/17/2022)*	**PHOTO POINT 33 UT3 R2 – downstream *(03/17/2022)***

	
PHOTO POINT 34 UT3 R2 – upstream *(03/17/2022)*	**PHOTO POINT 34 UT3 R2 – downstream *(03/17/2022)***
	
PHOTO POINT 35 UT3 R3 – upstream *(03/17/2022)*	**PHOTO POINT 35 UT3 R3 – downstream *(03/17/2022)***

CULVERT CROSSING PHOTOGRAPHS

	
UT1 R2 - Looking Upstream *(05/09/2022)*	**UT1 R2 - Looking Downstream *(05/09/2022)***
	
UT1B - Looking Upstream *(02/08/2022)*	**UT1B - Looking Downstream *(02/08/2022)***

VEGETATION PLOT PHOTOGRAPHS

FIXED VEG PLOT 1 ***(03/17/2022)***

FIXED VEG PLOT 2 ***(03/17/2022)***

FIXED VEG PLOT 3 ***(03/17/2022)***

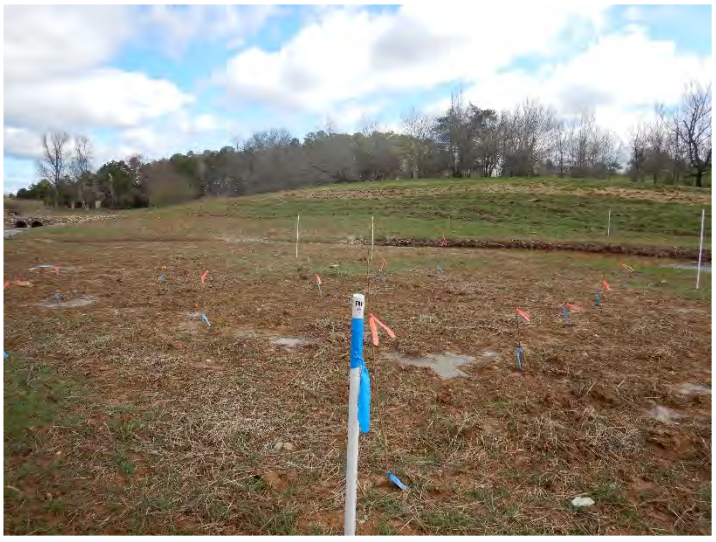
FIXED VEG PLOT 4 ***(03/17/2022)***

FIXED VEG PLOT 5 ***(03/17/2022)***

FIXED VEG PLOT 6 ***(03/17/2022)***

FIXED VEG PLOT 7 *(03/17/2022)*

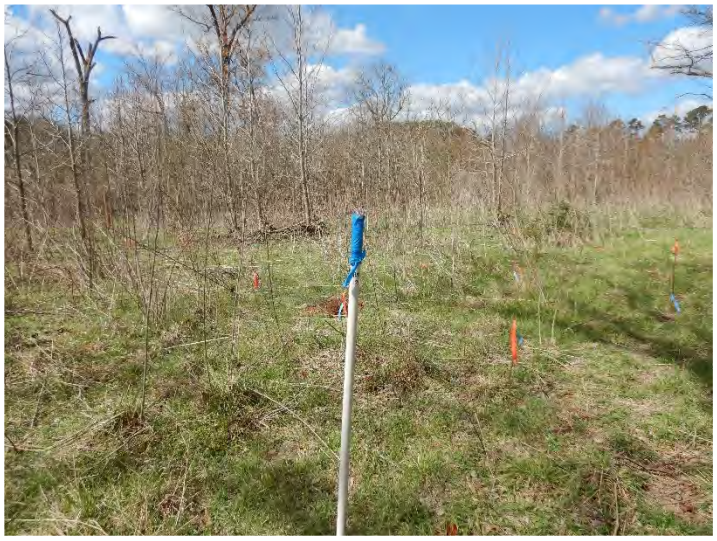
FIXED VEG PLOT 8 *(03/17/2022)*



FIXED VEG PLOT 9 *(03/17/2022)*

FIXED VEG PLOT 10 *(03/17/2022)*

FIXED VEG PLOT 11 *(03/17/2022)*



FIXED VEG PLOT 12 *(03/17/2022)*

FIXED VEG PLOT 13 ***(03/17/2022)***

FIXED VEG PLOT 14 ***(03/17/2022)***

FIXED VEG PLOT 15 ***(03/17/2022)***

FIXED VEG PLOT 16 ***(03/17/2022)***

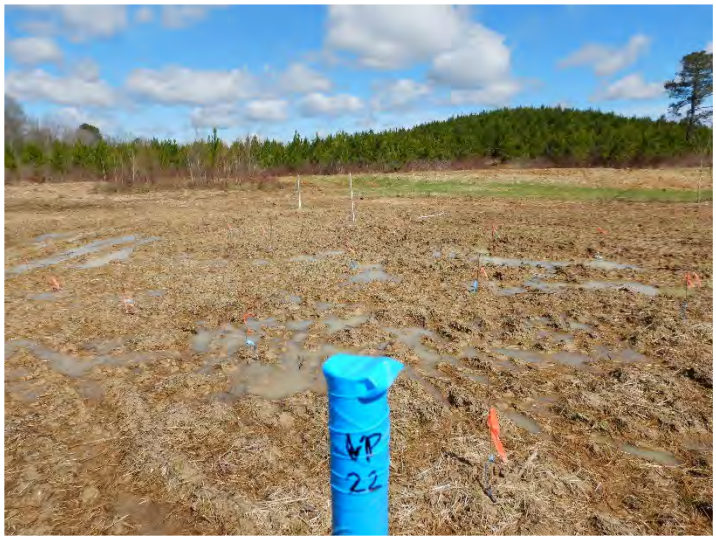
FIXED VEG PLOT 17 ***(03/17/2022)***

FIXED VEG PLOT 18 ***(03/17/2022)***

FIXED VEG PLOT 19 ***(03/17/2022)***

FIXED VEG PLOT 20 ***(03/17/2022)***

FIXED VEG PLOT 21 ***(03/17/2022)***



FIXED VEG PLOT 22 ***(03/17/2022)***

FIXED VEG PLOT 23 ***(03/17/2022)***

FIXED VEG PLOT 24 ***(03/17/2022)***

RANDOM VEG PLOT 25 *(03/17/2022)*

RANDOM VEG PLOT 26 *(03/17/2022)*

RANDOM VEG PLOT 27 *(03/17/2022)*

RANDOM VEG PLOT 28 *(03/17/2022)*

RANDOM VEG PLOT 29 *(03/17/2022)*

APPENDIX B. VEGETATION PLOT DATA

Table 6. Vegetation Plot Data
Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Planted Acreage	43.5
Date of Initial Plant	2022-03-10
Date of Current Survey	2022-03-17
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 1 F		Veg Plot 2 F		Veg Plot 3 F		Veg Plot 4 F		Veg Plot 5 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	Tag Alder	Tree	OBL							3	3		
	Asimina triloba	Pawpaw	Tree	FAC	1	1								
	Betula nigra	River Birch	Tree	FACW	4	4	3	3	2	2	2	2	2	2
	Celtis laevigata	Sugarberry	Tree	FACW	1	1			2	2			2	2
	Cephalanthus occidentalis	Buttonbush	Shrub	OBL							1	1		
	Diospyros virginiana	Common Persimmon	Tree	FAC	2	2							2	2
	Euonymus americanus	Strawberry Bush	Shrub	FAC	1	1							1	1
	Nyssa biflora	Swamp Gum	Tree	FACW										
	Platanus occidentalis	American Sycamore	Tree	FACW	1	1	1	1	3	3	4	4		
	Populus deltoides	Eastern Cottonwood	Tree	FAC	3	3			1	1			1	1
	Quercus lyrata	Overcup Oak	Tree	OBL			3	3						
	Quercus michauxii	Swamp Chestnut Oak	Tree	FACW	1	1	3	3	2	2	1	1	2	2
	Quercus phellos	Willow Oak	Tree	FAC	1	1			2	2			1	1
	Salix nigra	Black Willow	Tree	OBL			1	1						
	Sambucus canadensis	Elderberry	Tree	FAC							1	1		
	Ulmus americana	American Elm	Tree	FACW			2	2			2	2		
	Ulmus rubra	Slippery Elm	Tree	FAC	1	1			2	2			3	3
Sum				Performance Standard	16	16	13	13	14	14	14	14	14	14
Mitigation Plan Performance Standard				Current Year Stem Count		16		13		14		14		14
				Stems/Acre		648		526		567		567		567
				Species Count		10		6		7		7		8
				Dominant Species Composition (%)		25		23		21		29		21
				Average Plot Height (ft.)		2		3		3		2		2
				% Invasives		0		0		0		0		0
Post Mitigation Plan Performance Standard				Current Year Stem Count		16		13		14		14		14
				Stems/Acre		648		526		567		567		567
				Species Count		10		6		7		7		8
				Dominant Species Composition (%)		25		23		21		29		21
				Average Plot Height (ft.)		2		3		3		2		2
				% Invasives		0		0		0		0		0

Table 6. Vegetation Plot Data
Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Planted Acreage	43.5
Date of Initial Plant	2022-03-10
Date of Current Survey	2022-03-17
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 6 F		Veg Plot 7 F		Veg Plot 8 F		Veg Plot 9 F		Veg Plot 10 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	Tag Alder	Tree	OBL										
	Asimina triloba	Pawpaw	Tree	FAC	1	1	1	1			1	1	1	1
	Betula nigra	River Birch	Tree	FACW	1	1	2	2	3	3	3	3	2	2
	Celtis laevigata	Sugarberry	Tree	FACW	1	1	2	2	1	1	2	2	1	1
	Cephalanthus occidentalis	Buttonbush	Shrub	OBL										
	Diospyros virginiana	Common Persimmon	Tree	FAC	2	2	1	1	1	1			3	3
	Euonymus americanus	Strawberry Bush	Shrub	FAC	1	1	1	1	1	1			1	1
	Nyssa biflora	Swamp Gum	Tree	FACW										
	Platanus occidentalis	American Sycamore	Tree	FACW	3	3	3	3	3	3	3	3	1	1
	Populus deltoides	Eastern Cottonwood	Tree	FAC	1	1			1	1	2	2	3	3
	Quercus lyrata	Overcup Oak	Tree	OBL										
	Quercus michauxii	Swamp Chestnut Oak	Tree	FACW	2	2	1	1	3	3	1	1		
	Quercus phellos	Willow Oak	Tree	FAC	2	2	1	1	2	2	2	2	2	2
	Salix nigra	Black Willow	Tree	OBL										
	Sambucus canadensis	Elderberry	Tree	FAC										
	Ulmus americana	American Elm	Tree	FACW							1	1		
	Ulmus rubra	Slippery Elm	Tree	FAC			4	4						
Sum				Performance Standard	14	14	16	16	15	15	15	15	14	14
Mitigation Plan Performance Standard				Current Year Stem Count		14		16		15		15		14
				Stems/Acre		567		648		607		607		567
				Species Count		9		9		8		8		8
				Dominant Species Composition (%)		21		25		20		20		21
				Average Plot Height (ft.)		2		2		2		3		3
				% Invasives		0		0		0		0		0
Post Mitigation Plan Performance Standard				Current Year Stem Count		14		16		15		15		14
				Stems/Acre		567		648		607		607		567
				Species Count		9		9		8		8		8
				Dominant Species Composition (%)		21		25		20		20		21
				Average Plot Height (ft.)		2		2		2		3		3
				% Invasives		0		0		0		0		0

Table 6. Vegetation Plot Data
Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Planted Acreage	43.5
Date of Initial Plant	2022-03-10
Date of Current Survey	2022-03-17
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 11 F		Veg Plot 12 F		Veg Plot 13 F		Veg Plot 14 F		Veg Plot 15 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	Tag Alder	Tree	OBL										
	Asimina triloba	Pawpaw	Tree	FAC	1	1			1	1			1	1
	Betula nigra	River Birch	Tree	FACW	1	1	1	1	2	2	1	1	2	2
	Celtis laevigata	Sugarberry	Tree	FACW			1	1	1	1	1	1	2	2
	Cephalanthus occidentalis	Buttonbush	Shrub	OBL										
	Diospyros virginiana	Common Persimmon	Tree	FAC	3	3	1	1	3	3	1	1	2	2
	Euonymus americanus	Strawberry Bush	Shrub	FAC	1	1	1	1	1	1	1	1		
	Nyssa biflora	Swamp Gum	Tree	FACW										
	Platanus occidentalis	American Sycamore	Tree	FACW	2	2	1	1	2	2	3	3	2	2
	Populus deltoides	Eastern Cottonwood	Tree	FAC	1	1	2	2	1	1	2	2	1	1
	Quercus lyrata	Overcup Oak	Tree	OBL										
	Quercus michauxii	Swamp Chestnut Oak	Tree	FACW	2	2	3	3			2	2	1	1
	Quercus phellos	Willow Oak	Tree	FAC	1	1	2	2	2	2	1	1	1	1
	Salix nigra	Black Willow	Tree	OBL										
	Sambucus canadensis	Elderberry	Tree	FAC										
	Ulmus americana	American Elm	Tree	FACW										
	Ulmus rubra	Slippery Elm	Tree	FAC	2	2	3	3	2	2	2	2	2	2
Sum				Performance Standard	14	14	15	15	15	15	14	14	14	14
Mitigation Plan Performance Standard				Current Year Stem Count		14		15		15		14		14
				Stems/Acre		567		607		607		567		567
				Species Count		9		9		9		9		9
				Dominant Species Composition (%)		21		20		20		21		14
				Average Plot Height (ft.)		2		2		2		2		3
				% Invasives		0		0		0		0		0
Post Mitigation Plan Performance Standard				Current Year Stem Count		14		15		15		14		14
				Stems/Acre		567		607		607		567		567
				Species Count		9		9		9		9		9
				Dominant Species Composition (%)		21		20		20		21		14
				Average Plot Height (ft.)		2		2		2		2		3
				% Invasives		0		0		0		0		0

Table 6. Vegetation Plot Data
Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Planted Acreage	43.5
Date of Initial Plant	2022-03-10
Date of Current Survey	2022-03-17
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 16 F		Veg Plot 17 F		Veg Plot 18 F		Veg Plot 19 F		Veg Plot 20 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	Tag Alder	Tree	OBL										
	Asimina triloba	Pawpaw	Tree	FAC			1	1	2	2				
	Betula nigra	River Birch	Tree	FACW	3	3	1	1	6	6	3	3	3	3
	Celtis laevigata	Sugarberry	Tree	FACW	2	2	1	1	1	1	2	2	2	2
	Cephalanthus occidentalis	Buttonbush	Shrub	OBL										
	Diospyros virginiana	Common Persimmon	Tree	FAC	1	1			1	1	2	2	1	1
	Euonymus americanus	Strawberry Bush	Shrub	FAC	1	1			1	1			1	1
	Nyssa biflora	Swamp Gum	Tree	FACW										
	Platanus occidentalis	American Sycamore	Tree	FACW	2	2	4	4	3	3	2	2	1	1
	Populus deltoides	Eastern Cottonwood	Tree	FAC	1	1	1	1	1	1	2	2	3	3
	Quercus lyrata	Overcup Oak	Tree	OBL										
	Quercus michauxii	Swamp Chestnut Oak	Tree	FACW	3	3	2	2	1	1	2	2	2	2
	Quercus phellos	Willow Oak	Tree	FAC	2	2	2	2	1	1	1	1	1	1
	Salix nigra	Black Willow	Tree	OBL										
	Sambucus canadensis	Elderberry	Tree	FAC										
	Ulmus americana	American Elm	Tree	FACW										
	Ulmus rubra	Slippery Elm	Tree	FAC	1	1	2	2			1	1		
Sum				Performance Standard	16	16	14	14	17	17	15	15	14	14
Mitigation Plan Performance Standard				Current Year Stem Count		16		14		17		15		14
				Stems/Acre		648		567		688		607		567
				Species Count		9		8		9		8		8
				Dominant Species Composition (%)		19		29		35		20		21
				Average Plot Height (ft.)		2		2		3		3		2
				% Invasives		0		0		0		0		0
Post Mitigation Plan Performance Standard				Current Year Stem Count		16		14		17		15		14
				Stems/Acre		648		567		688		607		567
				Species Count		9		8		9		8		8
				Dominant Species Composition (%)		19		29		35		20		21
				Average Plot Height (ft.)		2		2		3		3		2
				% Invasives		0		0		0		0		0

Table 6. Vegetation Plot Data

Cross Creek Ranch Site

DMS Project No. 100138

Monitoring Year 0 - 2022

Planted Acreage	43.5
Date of Initial Plant	2022-03-10
Date of Current Survey	2022-03-17
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 21 F		Veg Plot 22 F		Veg Plot 23 F		Veg Plot 24 F	
					Planted	Total	Planted	Total	Planted	Total	Planted	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	Tag Alder	Tree	OBL	2	2	1	1				
	Asimina triloba	Pawpaw	Tree	FAC							1	1
	Betula nigra	River Birch	Tree	FACW	3	3	1	1	2	2	3	3
	Celtis laevigata	Sugarberry	Tree	FACW					2	2	1	1
	Cephalanthus occidentalis	Buttonbush	Shrub	OBL	1	1	1	1				
	Diospyros virginiana	Common Persimmon	Tree	FAC					3	3		
	Euonymus americanus	Strawberry Bush	Shrub	FAC					1	1	1	1
	Nyssa biflora	Swamp Gum	Tree	FACW			1	1				
	Platanus occidentalis	American Sycamore	Tree	FACW	4	4	1	1	2	2	2	2
	Populus deltoides	Eastern Cottonwood	Tree	FAC					2	2	1	1
	Quercus lyrata	Overcup Oak	Tree	OBL	2	2	2	2				
	Quercus michauxii	Swamp Chestnut Oak	Tree	FACW	1	1	3	3			1	1
	Quercus phellos	Willow Oak	Tree	FAC					2	2	4	4
	Salix nigra	Black Willow	Tree	OBL			1	1				
	Sambucus canadensis	Elderberry	Tree	FAC	1	1	1	1				
	Ulmus americana	American Elm	Tree	FACW	2	2	3	3				
	Ulmus rubra	Slippery Elm	Tree	FAC					1	1		
Sum				Performance Standard	16	16	15	15	15	15	14	14
Mitigation Plan Performance Standard				Current Year Stem Count		16		15		15		14
				Stems/Acre		648		607		607		567
				Species Count		8		10		8		8
				Dominant Species Composition (%)		25		20		20		29
				Average Plot Height (ft.)		3		2		2		3
				% Invasives		0		0		0		0
Post Mitigation Plan Performance Standard				Current Year Stem Count		16		15		15		14
				Stems/Acre		648		607		607		567
				Species Count		8		10		8		8
				Dominant Species Composition (%)		25		20		20		29
				Average Plot Height (ft.)		3		2		2		3
				% Invasives		0		0		0		0

Table 6. Vegetation Plot Data
Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Planted Acreage	43.5
Date of Initial Plant	2022-03-10
Date of Current Survey	2022-03-17
Plot size (ACRES)	0.0247

	Scientific Name	Common Name	Tree/ Shrub	Indicator Status	Veg Plot 25 R	Veg Plot 26 R	Veg Plot 27 R	Veg Plot 28 R	Veg Plot 29 R
					Total	Total	Total	Total	Total
Species Included in Approved Mitigation Plan	Alnus serrulata	Tag Alder	Tree	OBL					
	Asimina triloba	Pawpaw	Tree	FAC			2	1	1
	Betula nigra	River Birch	Tree	FACW	1	5	1	3	4
	Celtis laevigata	Sugarberry	Tree	FACW	1		1	1	
	Cephalanthus occidentalis	Buttonbush	Shrub	OBL					
	Diospyros virginiana	Common Persimmon	Tree	FAC			2	1	
	Euonymus americanus	Strawberry Bush	Shrub	FAC			1	1	
	Nyssa biflora	Swamp Gum	Tree	FACW					
	Platanus occidentalis	American Sycamore	Tree	FACW		3	1	3	3
	Populus deltoides	Eastern Cottonwood	Tree	FAC	7		2	2	1
	Quercus lyrata	Overcup Oak	Tree	OBL		2			
	Quercus michauxii	Swamp Chestnut Oak	Tree	FACW	1	1	1	2	
	Quercus phellos	Willow Oak	Tree	FAC	2		1	1	
	Salix nigra	Black Willow	Tree	OBL					
	Sambucus canadensis	Elderberry	Tree	FAC					
	Ulmus americana	American Elm	Tree	FACW					
	Ulmus rubra	Slippery Elm	Tree	FAC			3		
Sum				Performance Standard	12	11	15	15	9
Mitigation Plan Performance Standard				Current Year Stem Count	12	11	15	15	9
				Stems/Acre	445	445	607	607	364
				Species Count	5	4	10	9	4
				Dominant Species Composition (%)	58	45	20	20	44
				Average Plot Height (ft.)	2	2	2	3	3
				% Invasives	0	0	0	0	0
Post Mitigation Plan Performance Standard				Current Year Stem Count	12	11	15	15	9
				Stems/Acre	445	445	607	607	364
				Species Count	5	4	10	9	4
				Dominant Species Composition (%)	58	45	20	20	44
				Average Plot Height (ft.)	2	2	2	3	3
				% Invasives	0	0	0	0	0

Table 7. Vegetation Performance Standards Summary Table
Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

	Veg Plot 1 F				Veg Plot 2 F				Veg Plot 3 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	648	2	10	0	526	3	6	0	567	3	7	0
	Veg Plot 4 F				Veg Plot 5 F				Veg Plot 6 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	567	2	7	0	567	2	8	0	567	2	9	0
	Veg Plot 7 F				Veg Plot 8 F				Veg Plot 9 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	648	2	9	0	607	2	8	0	607	3	8	0
	Veg Plot 10 F				Veg Plot 11 F				Veg Plot 12 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	567	3	8	0	567	2	9	0	607	2	9	0
	Veg Plot 13 F				Veg Plot 14 F				Veg Plot 15 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	607	2	9	0	567	2	9	0	567	3	9	0

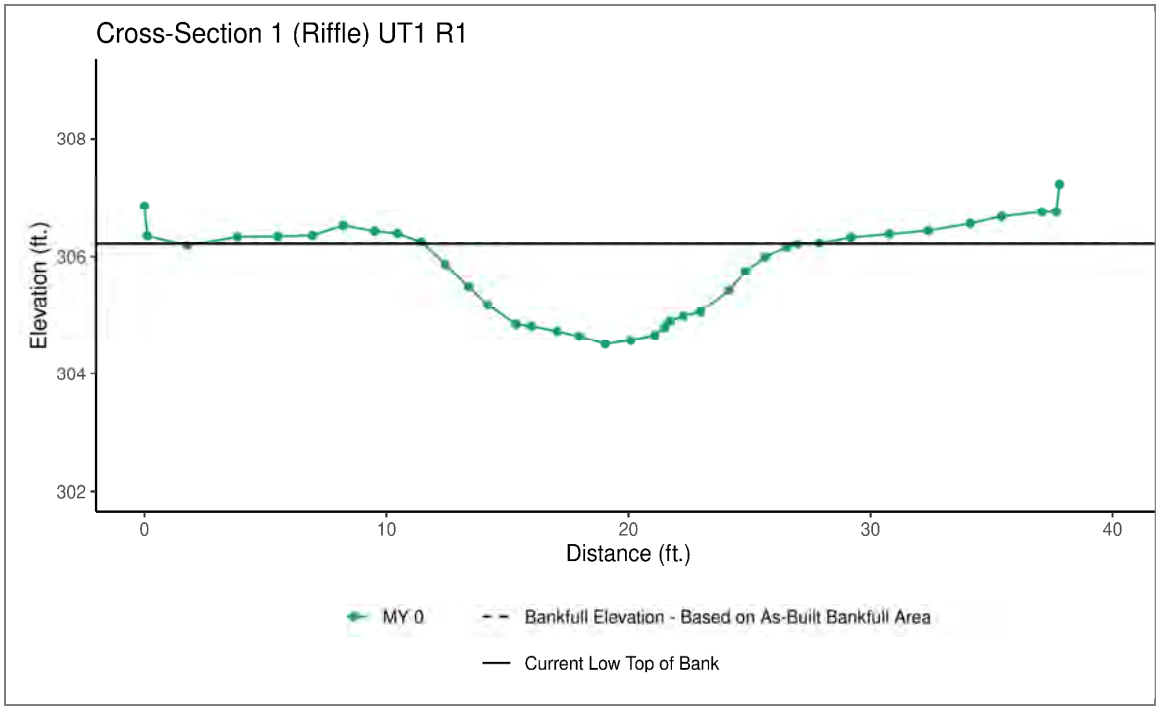
Table 7. Vegetation Performance Standards Summary Table
Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

	Veg Plot 16 F				Veg Plot 17 F				Veg Plot 18 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	648	2	9	0	567	2	8	0	688	3	9	0
	Veg Plot 19 F				Veg Plot 20 F				Veg Plot 21 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	607	3	8	0	567	2	8	0	648	3	8	0
	Veg Plot 22 F				Veg Plot 23 F				Veg Plot 24 F			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	607	2	10	0	607	2	8	0	567	3	8	0
	Veg Plot 25 R				Veg Plot 26 R				Veg Plot 27 R			
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	445	2	5	0	445	2	4	0	607	2	10	0
	Veg Plot 28 R				Veg Plot 29 R							
	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives	Stems/Ac.	Av. Ht. (ft)	# Species	% Invasives				
Monitoring Year 7												
Monitoring Year 5												
Monitoring Year 3												
Monitoring Year 2												
Monitoring Year 1												
Monitoring Year 0	607	3	9	0	364	3	4	0				

*Each monitoring year represents a different plot for the random vegetation plot "groups". Random plots are denoted with an R, and fixed plots with an F.

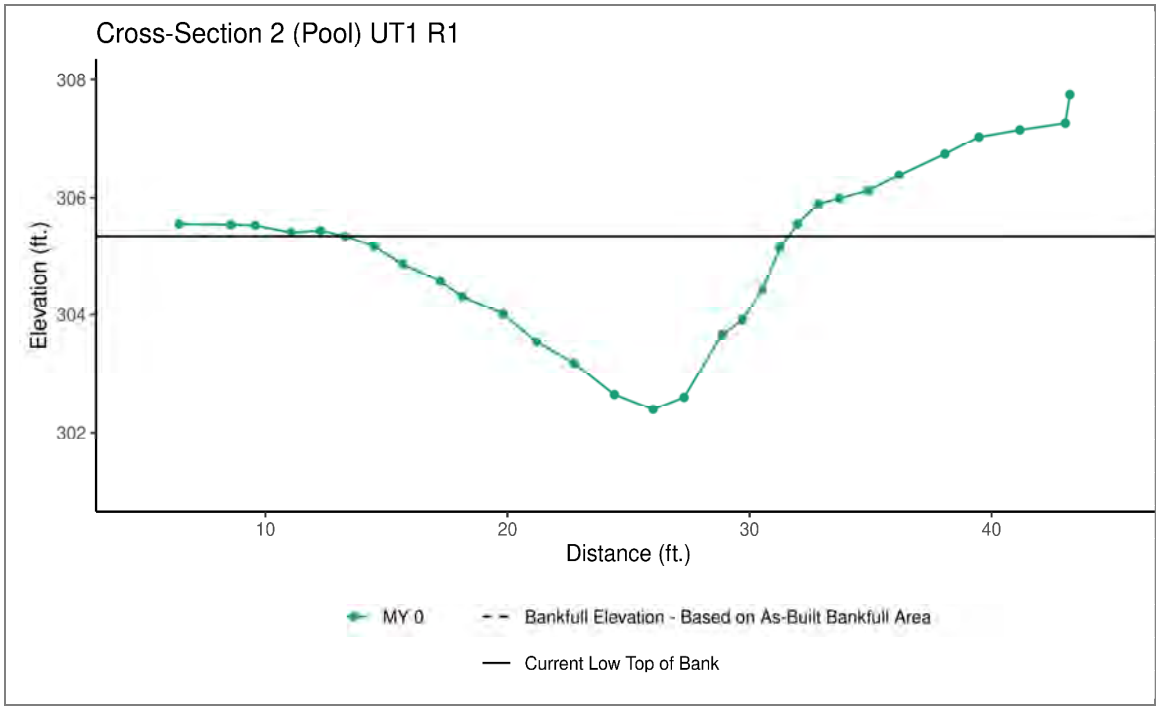
APPENDIX C. STREAM GEOMORPHOLOGY DATA

Cross-Section Plots



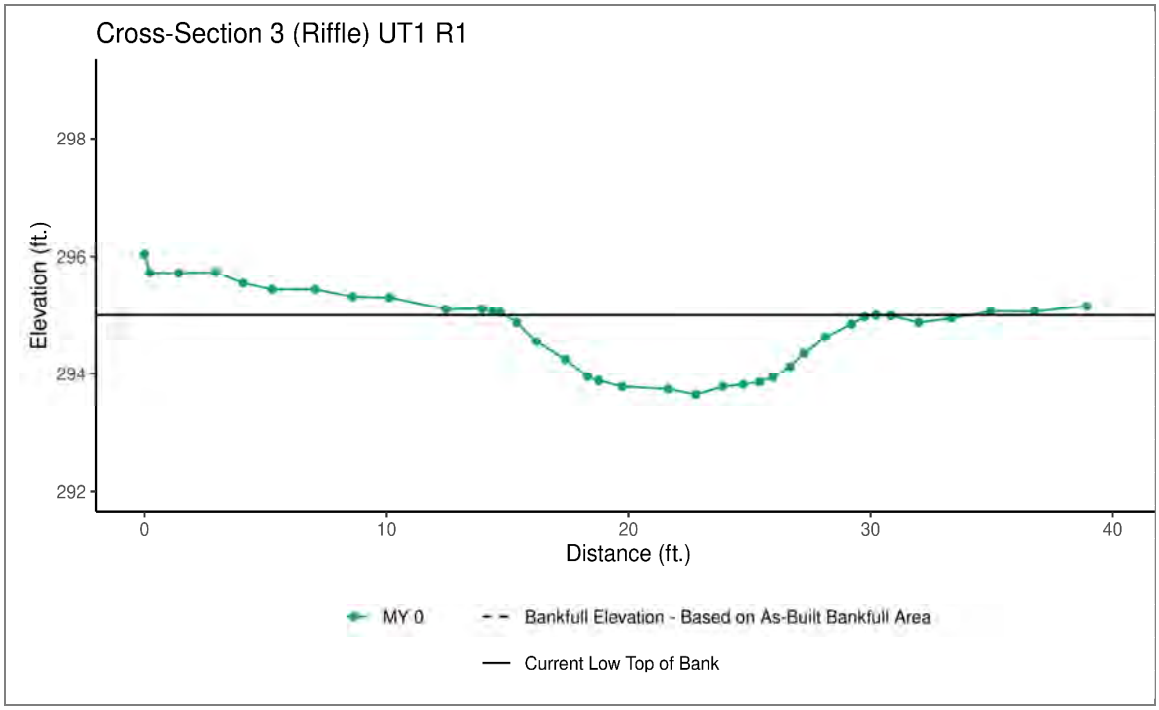
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	306.21					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	304.50					
LTOB Elevation	306.21					
LTOB Max Depth	1.71					
LTOB Cross-Sectional Area	16.20					

Downstream *(02/08/2022)*



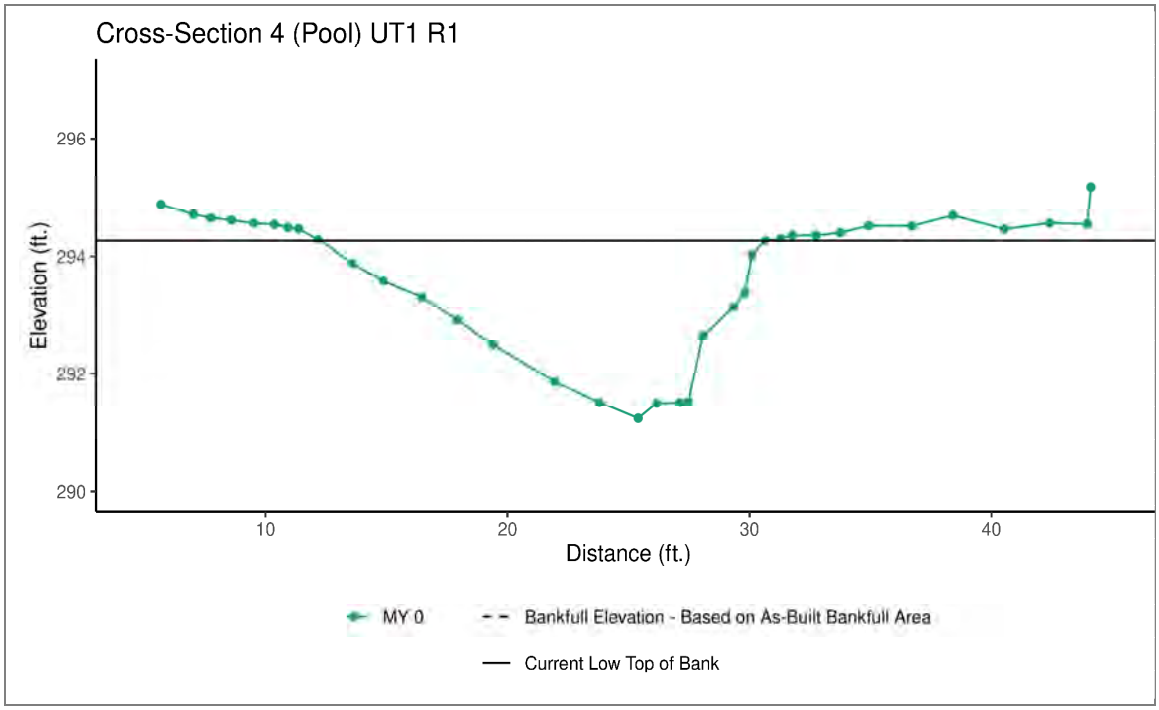
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A					
Bank Height Ratio - Based on AB-Bankfull Area	N/A					
Thalweg Elevation	302.39					
LTOB Elevation	305.35					
LTOB Max Depth	2.96					
LTOB Cross-Sectional Area	27.97					

Downstream *(02/08/2022)*



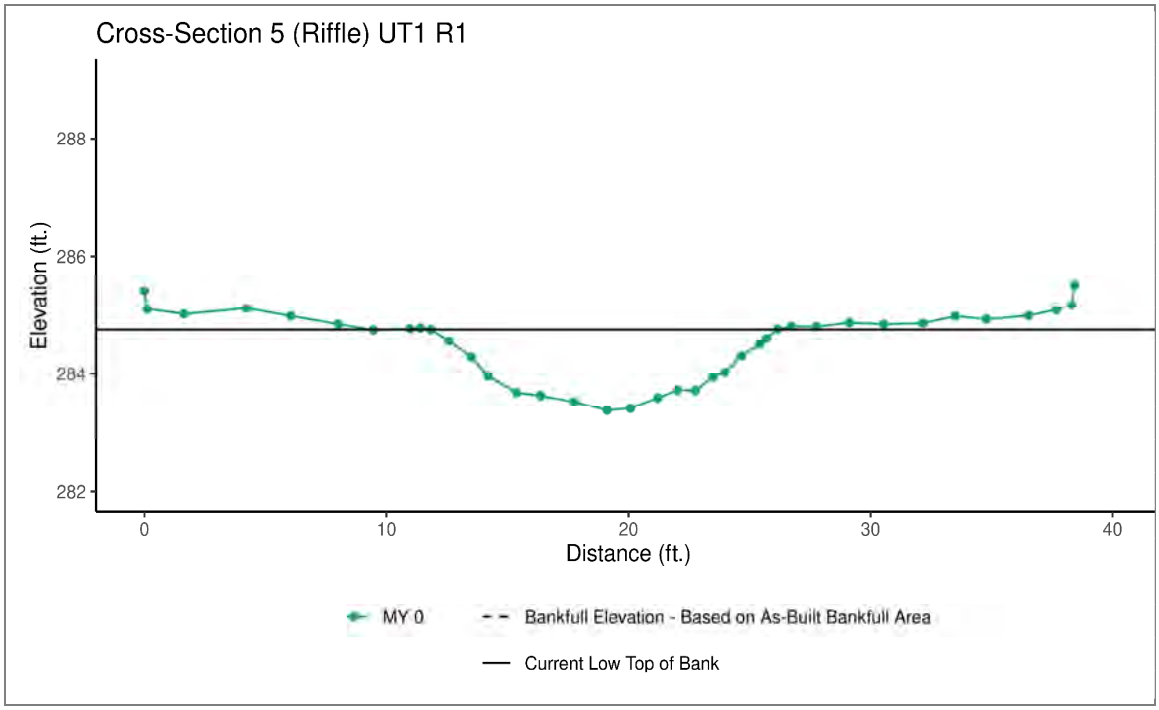
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	294.99					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	293.65					
LTOB Elevation	294.99					
LTOB Max Depth	1.35					
LTOB Cross-Sectional Area	12.96					

Downstream *(02/08/2022)*



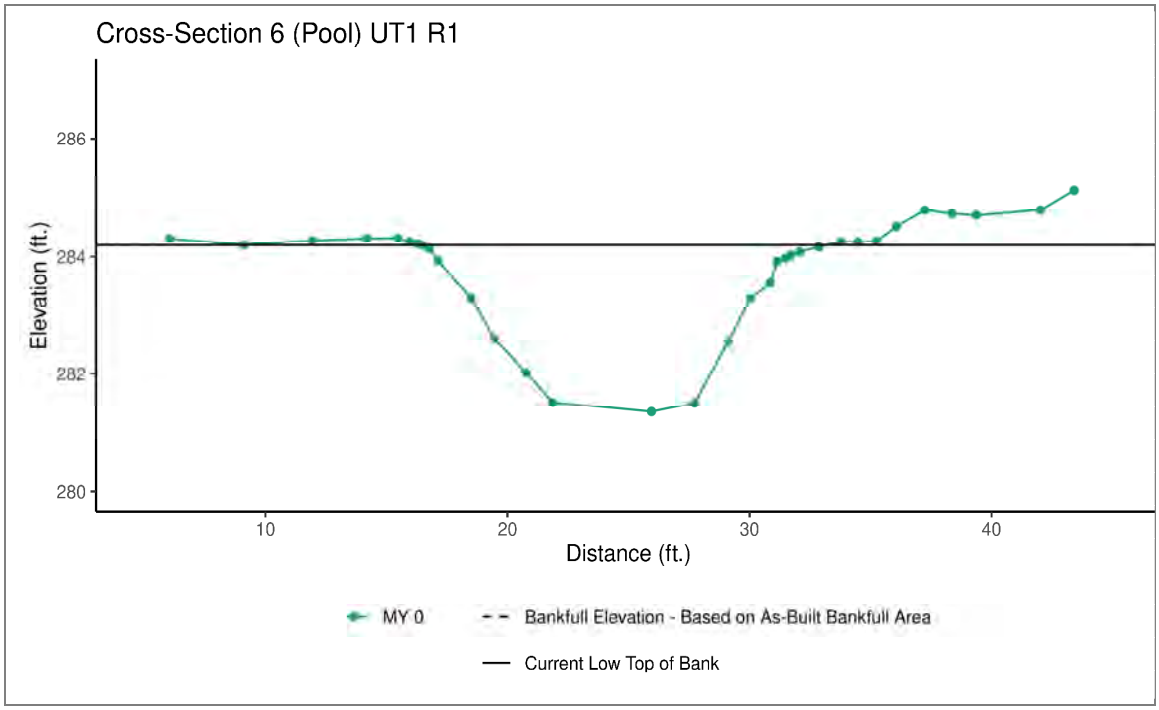
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A					
Bank Height Ratio - Based on AB-Bankfull Area	N/A					
Thalweg Elevation	291.24					
LTOB Elevation	294.28					
LTOB Max Depth	3.04					
LTOB Cross-Sectional Area	30.77					

Downstream *(02/08/2022)*



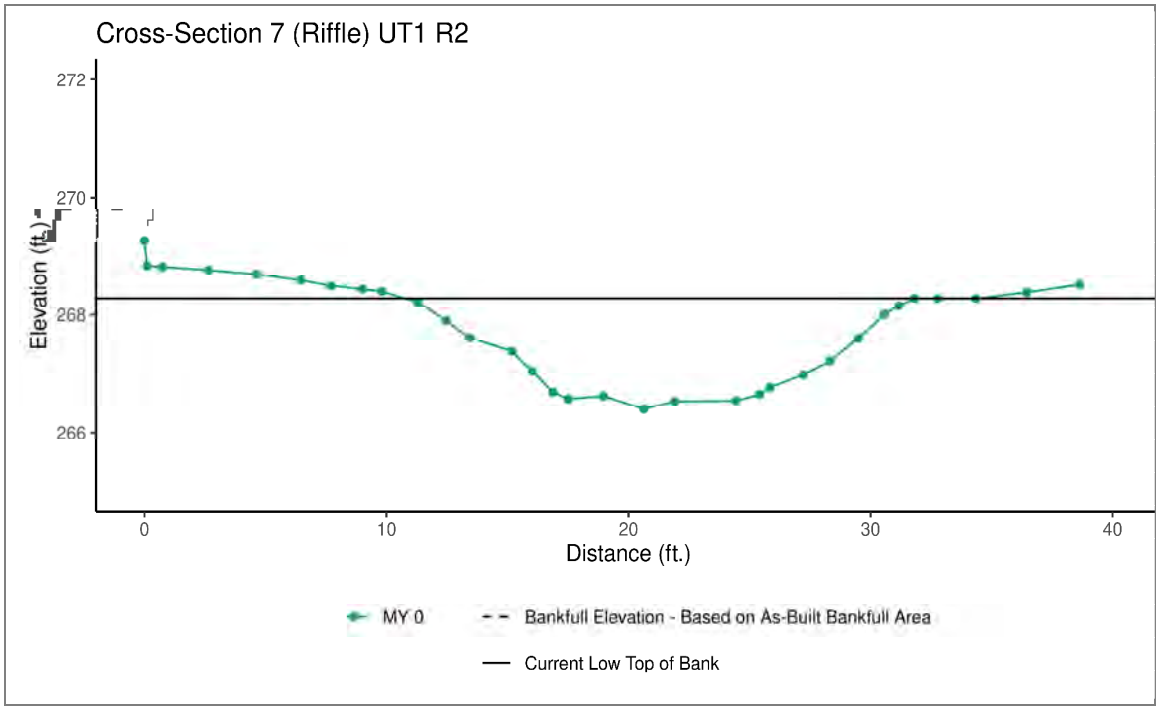
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	284.75					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	283.38					
LTOB Elevation	284.75					
LTOB Max Depth	1.37					
LTOB Cross-Sectional Area	12.58					

Downstream *(02/08/2022)*



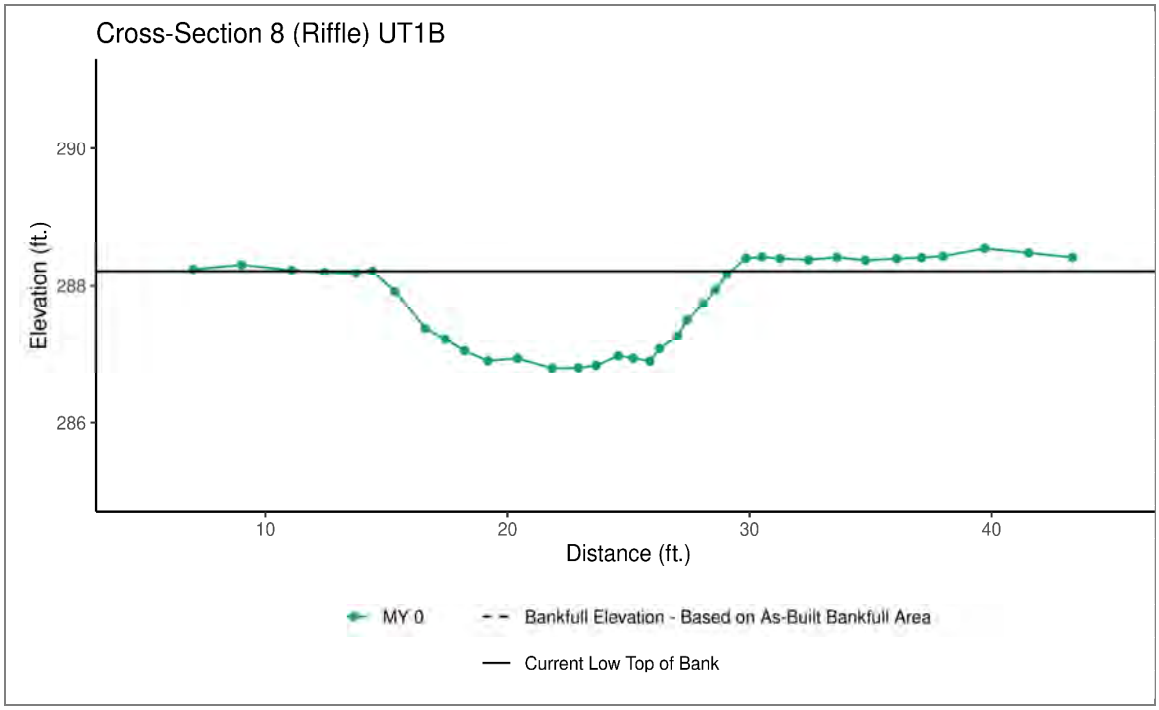
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A					
Bank Height Ratio - Based on AB-Bankfull Area	N/A					
Thalweg Elevation	281.35					
LTOB Elevation	284.20					
LTOB Max Depth	2.85					
LTOB Cross-Sectional Area	28.69					

Downstream *(02/08/2022)*



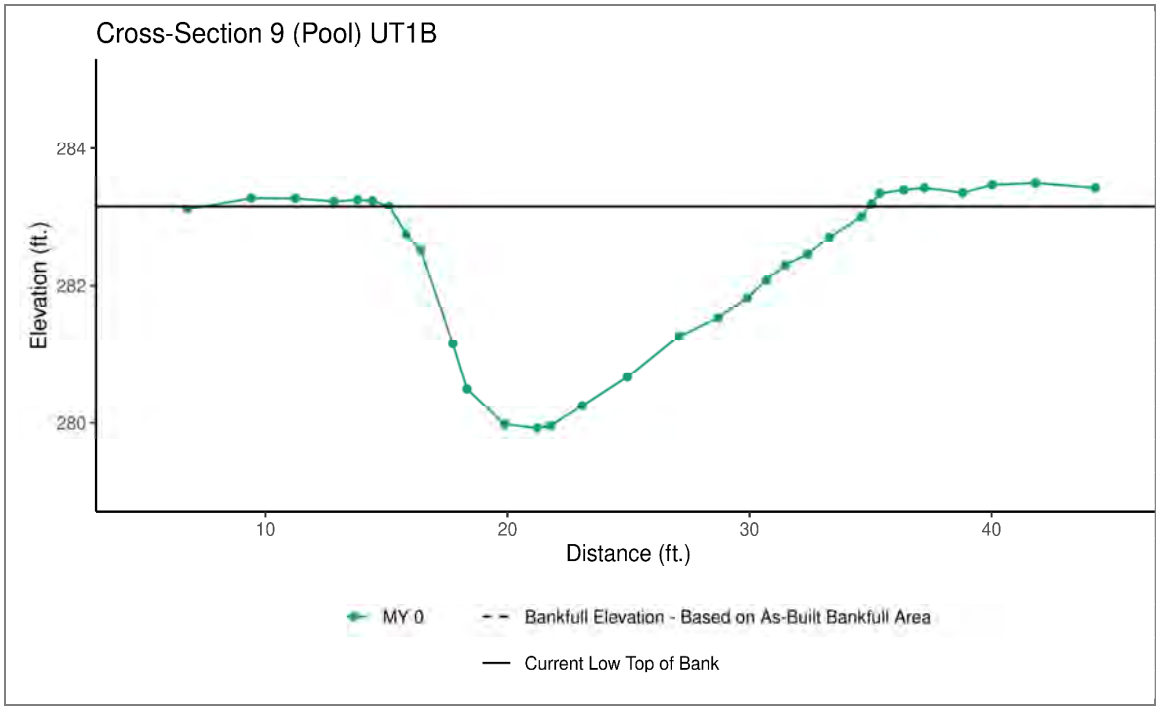
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	268.28					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	266.40					
LTOB Elevation	268.28					
LTOB Max Depth	1.88					
LTOB Cross-Sectional Area	24.72					

Downstream *(02/08/2022)*



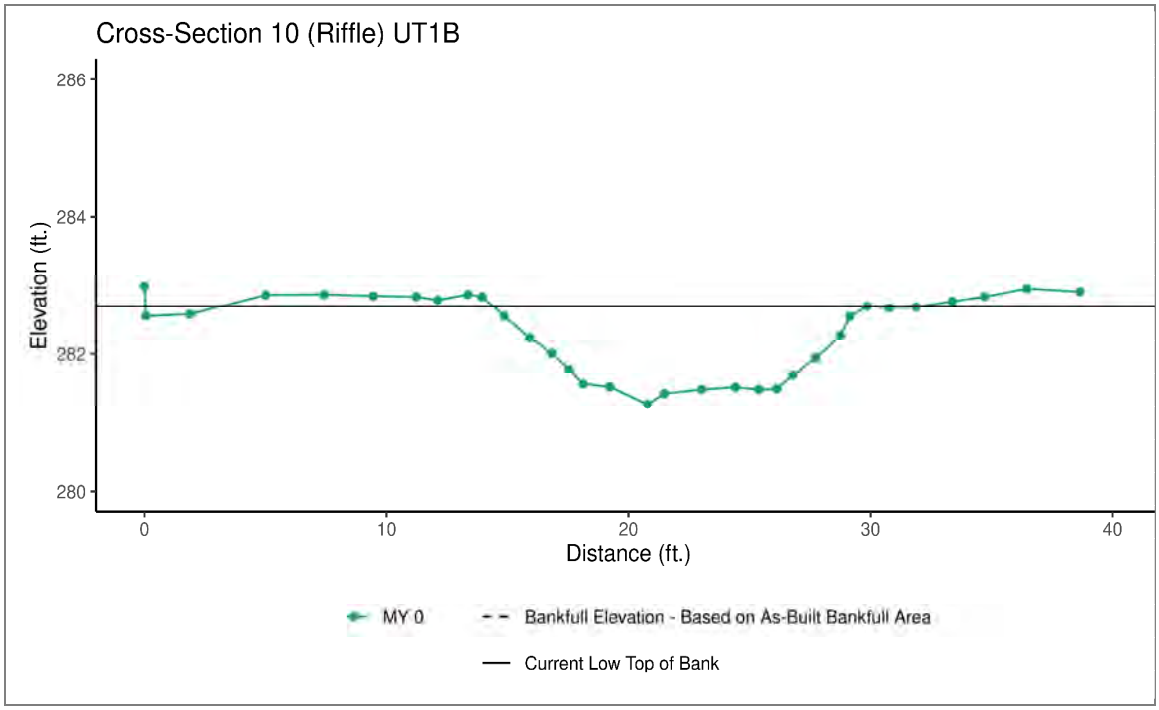
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	288.22					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	286.80					
LTOB Elevation	288.22					
LTOB Max Depth	1.42					
LTOB Cross-Sectional Area	14.94					

Downstream *(02/08/2022)*



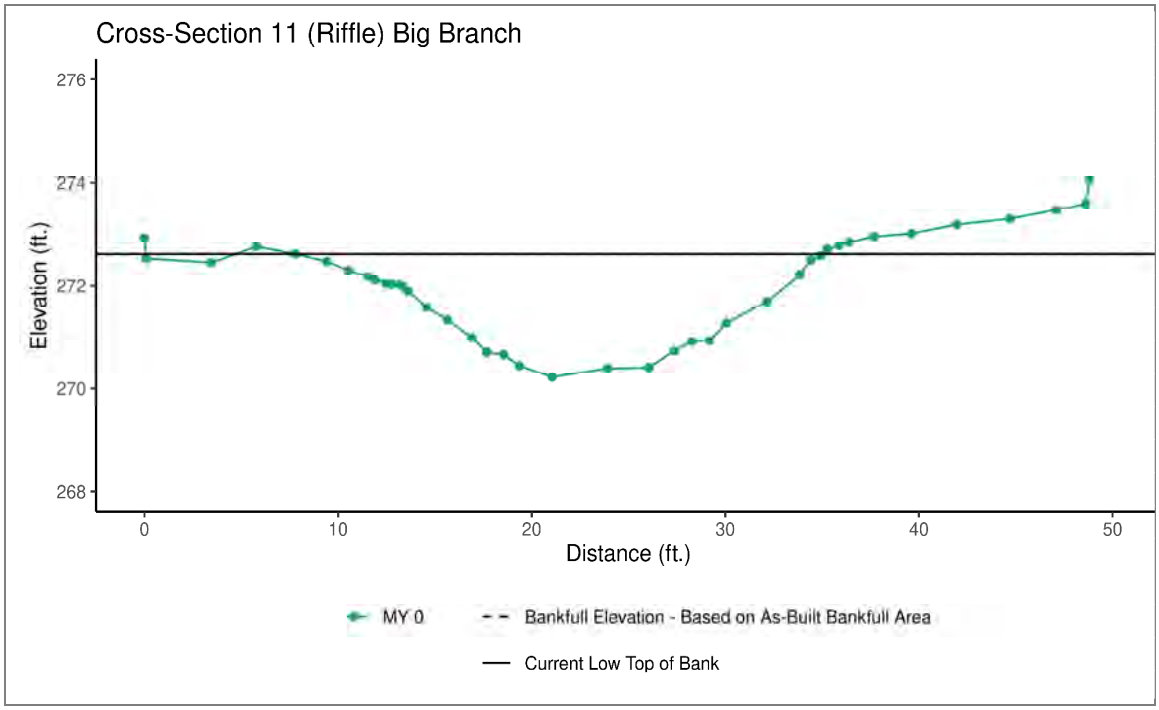
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A					
Bank Height Ratio - Based on AB-Bankfull Area	N/A					
Thalweg Elevation	279.93					
LTOB Elevation	283.16					
LTOB Max Depth	3.24					
LTOB Cross-Sectional Area	36.04					

Downstream *(02/08/2022)*



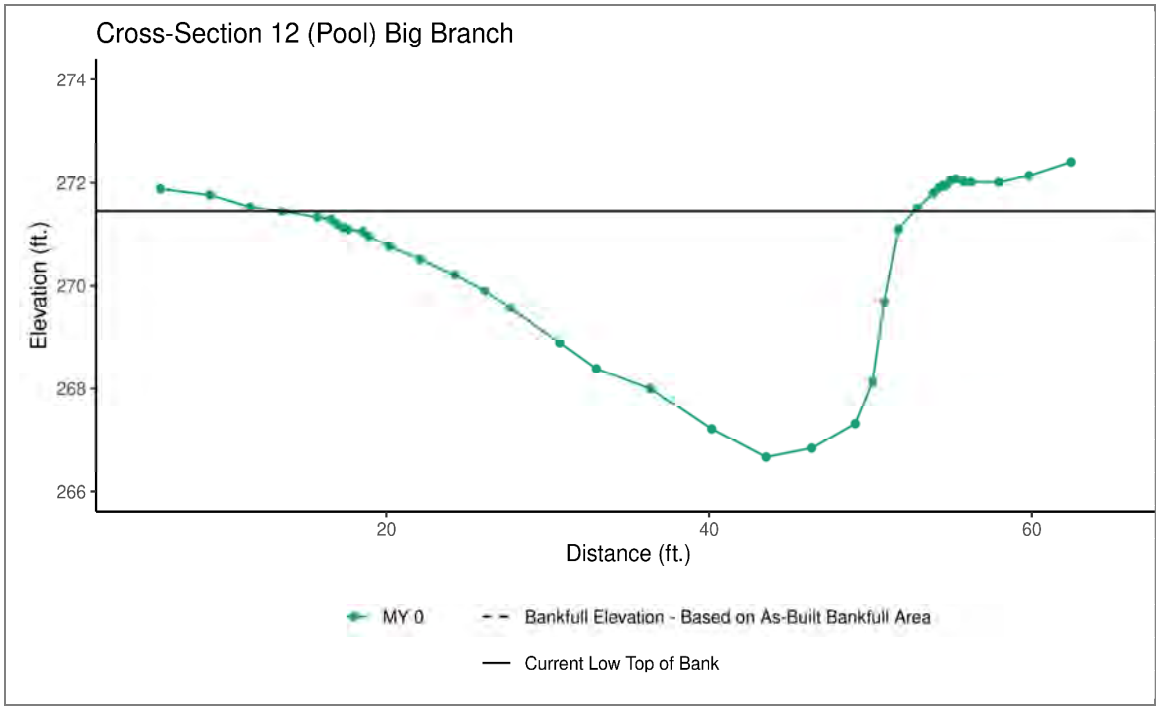
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	282.69					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	281.27					
LTOB Elevation	282.69					
LTOB Max Depth	1.42					
LTOB Cross-Sectional Area	14.21					

Downstream *(02/08/2022)*



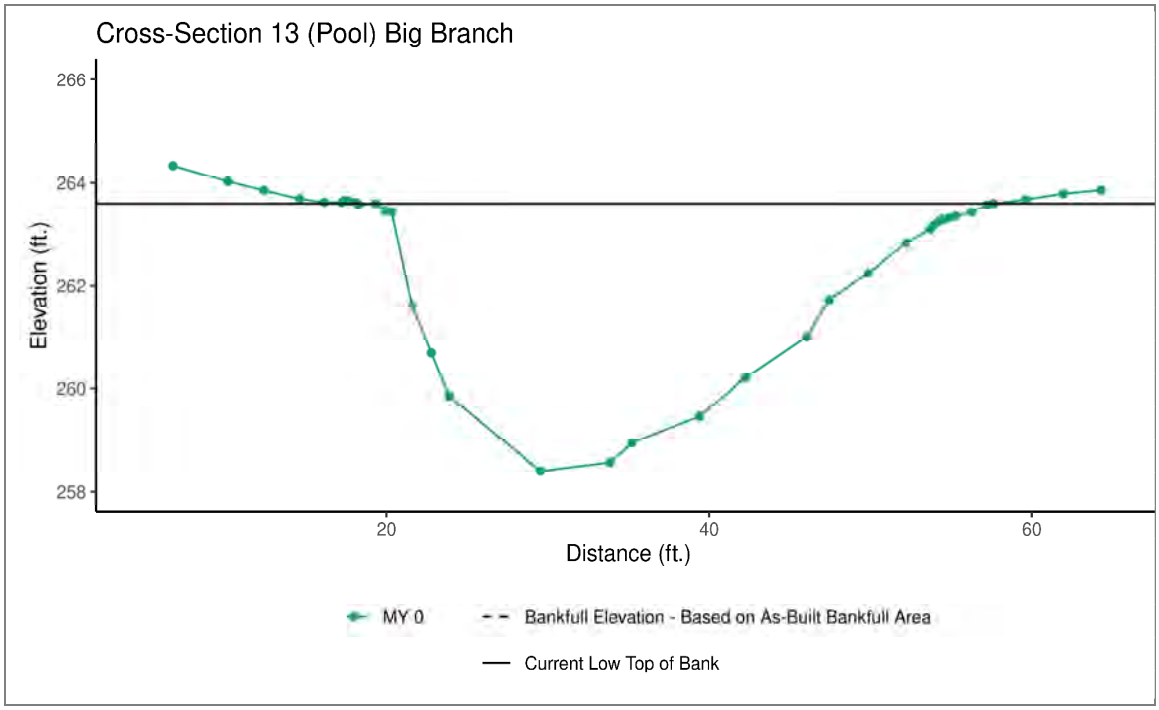
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	272.62					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	270.22					
LTOB Elevation	272.62					
LTOB Max Depth	2.40					
LTOB Cross-Sectional Area	36.87					

Downstream *(02/23/2022)*



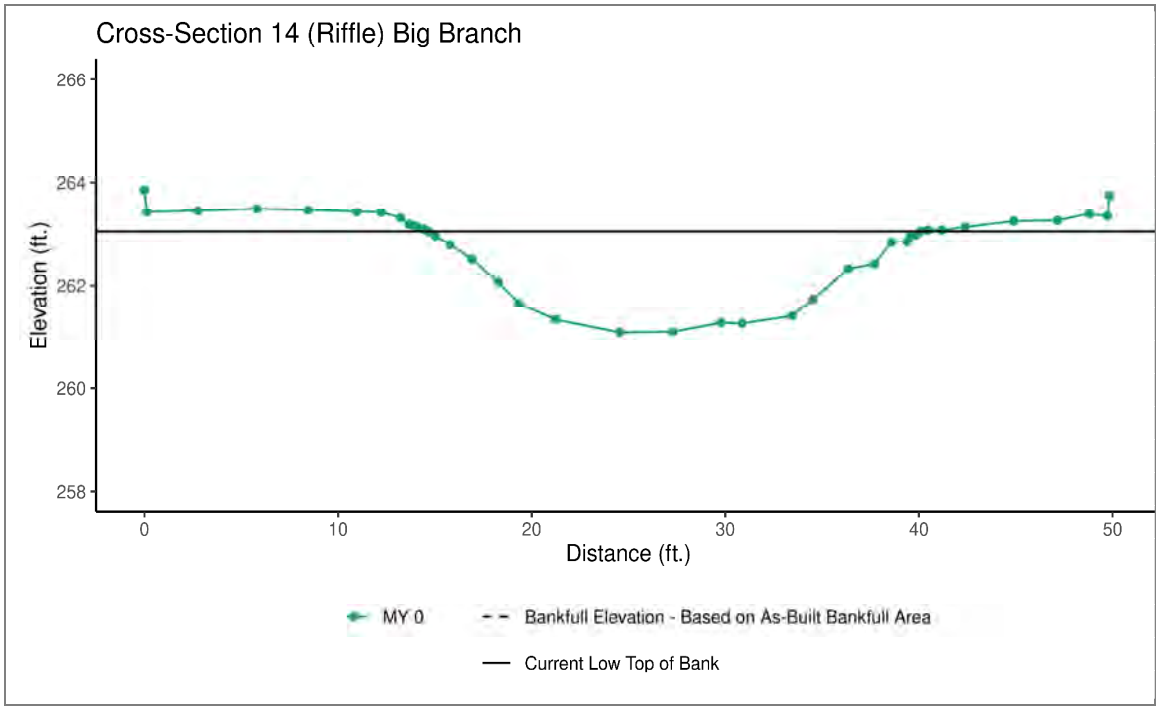
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A					
Bank Height Ratio - Based on AB-Bankfull Area	N/A					
Thalweg Elevation	266.67					
LTOB Elevation	271.45					
LTOB Max Depth	4.77					
LTOB Cross-Sectional Area	96.74					

Downstream *(02/23/2022)*



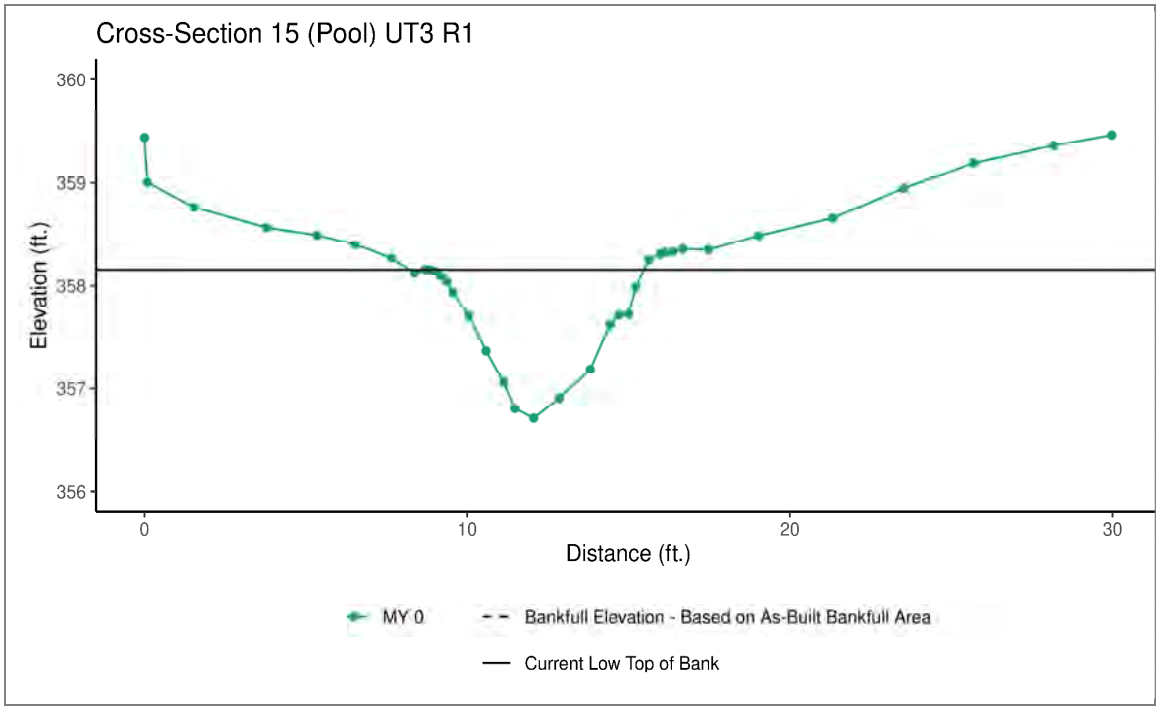
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A					
Bank Height Ratio - Based on AB-Bankfull Area	N/A					
Thalweg Elevation	258.40					
LTOB Elevation	263.60					
LTOB Max Depth	5.20					
LTOB Cross-Sectional Area	113.83					

Downstream *(02/23/2022)*



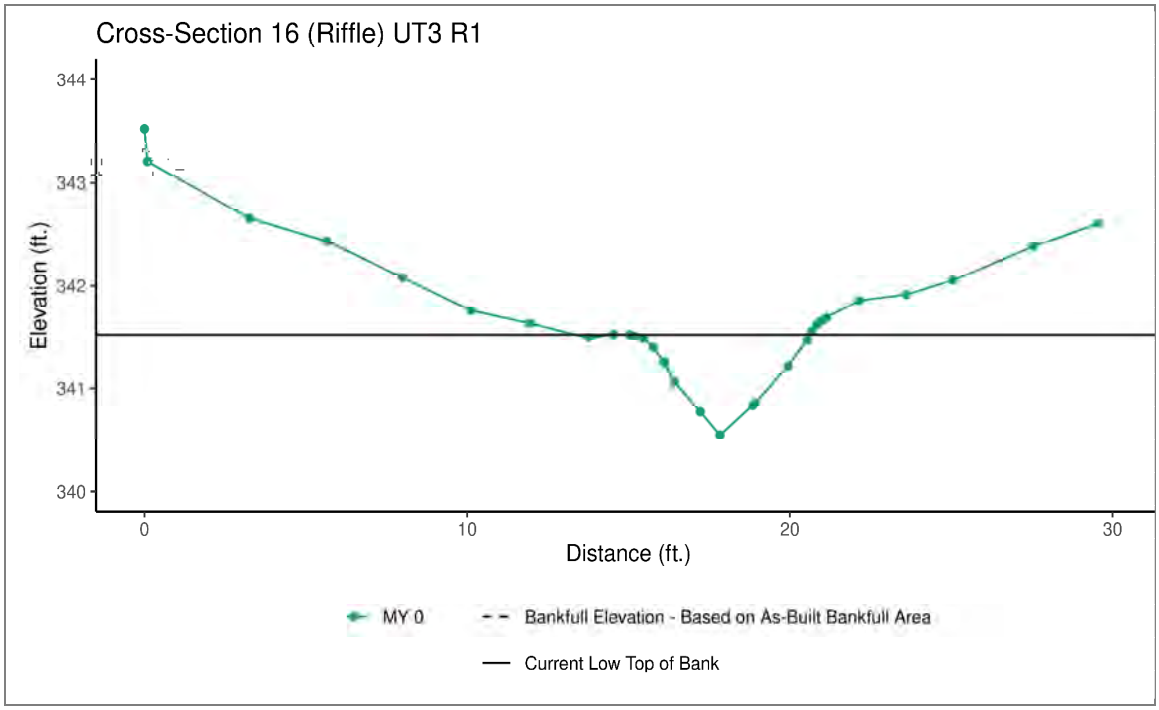
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	263.06					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	261.09					
LTOB Elevation	263.06					
LTOB Max Depth	1.97					
LTOB Cross-Sectional Area	33.50					

Downstream *(02/23/2022)*



	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A					
Bank Height Ratio - Based on AB-Bankfull Area	N/A					
Thalweg Elevation	356.71					
LTOB Elevation	358.16					
LTOB Max Depth	1.45					
LTOB Cross-Sectional Area	5.29					

Downstream *(02/23/2022)*



	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	341.52					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	340.55					
LTOB Elevation	341.52					
LTOB Max Depth	0.97					
LTOB Cross-Sectional Area	2.72					

Downstream *(02/23/2022)*

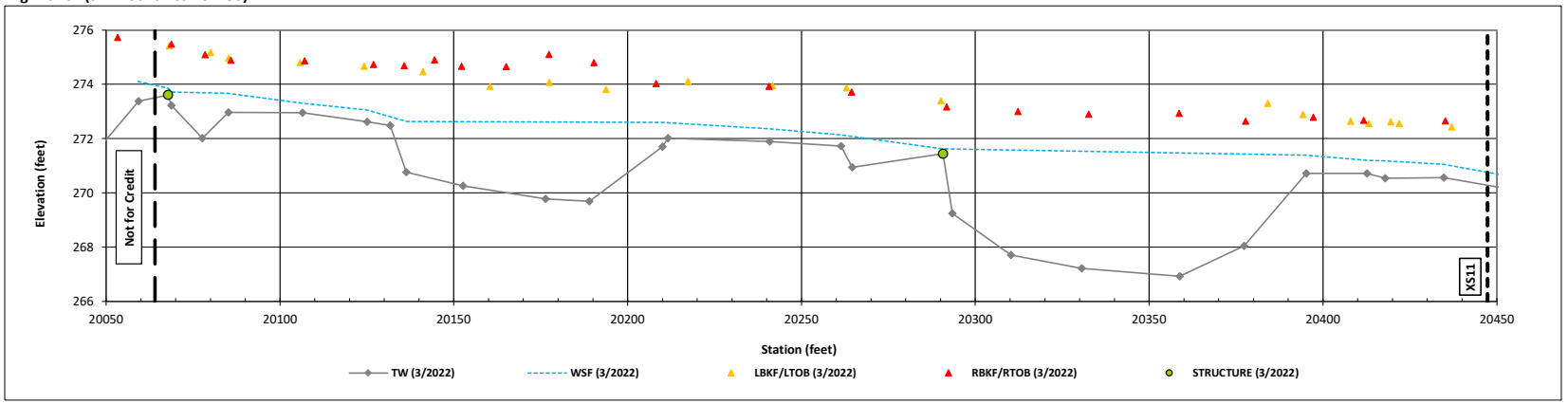
Longitudinal Profile Plots

Cross Creek Ranch Site

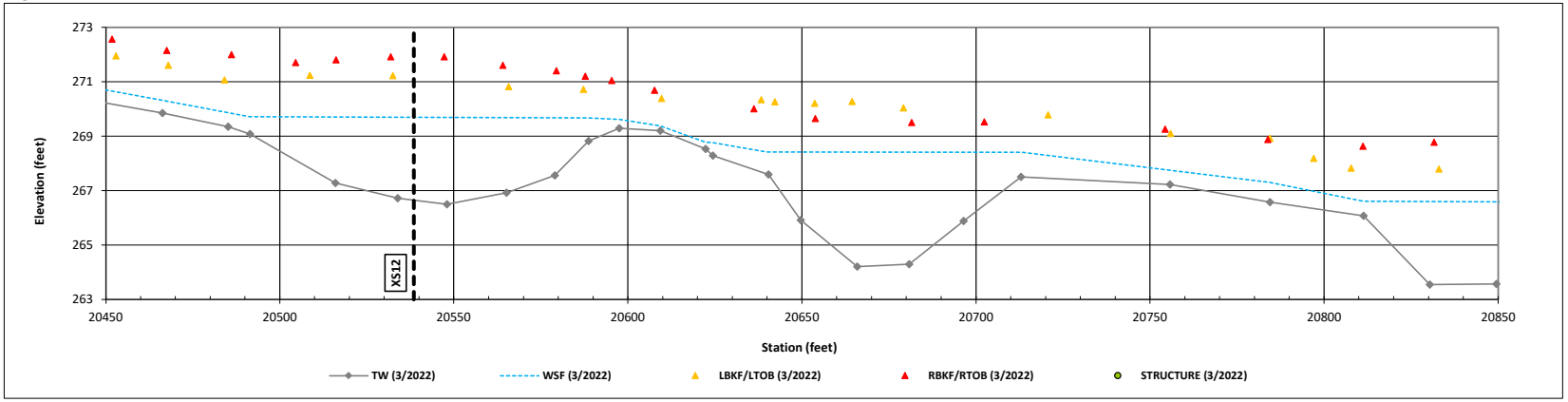
DMS Project No. 100138

Monitoring Year 0 - 2022

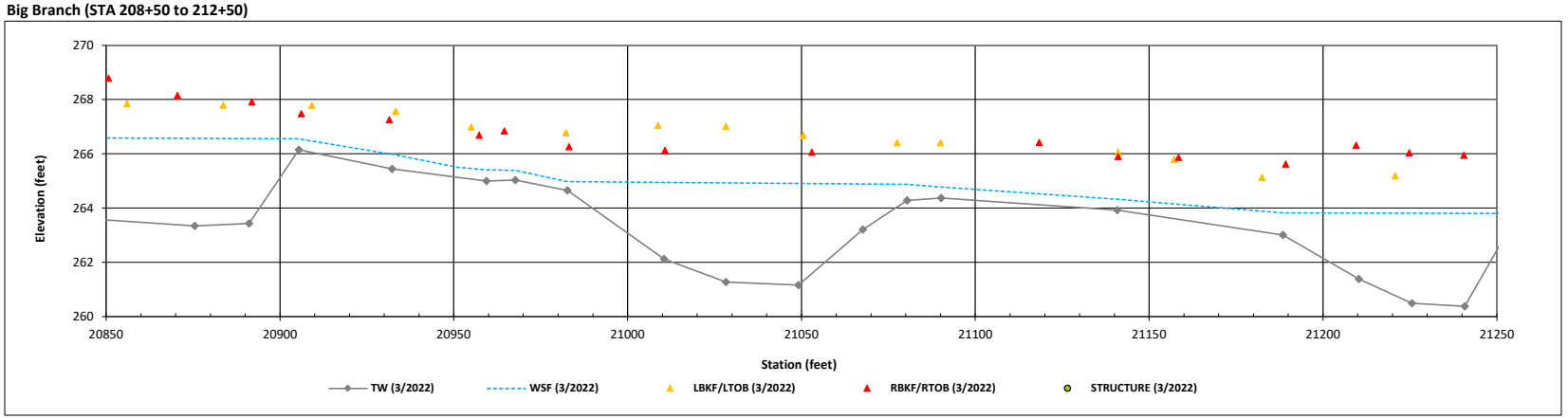
Big Branch (STA 200+64 to 204+50)



Big Branch (STA 204+50 to 208+50)



Big Branch (STA 208+50 to 212+50)



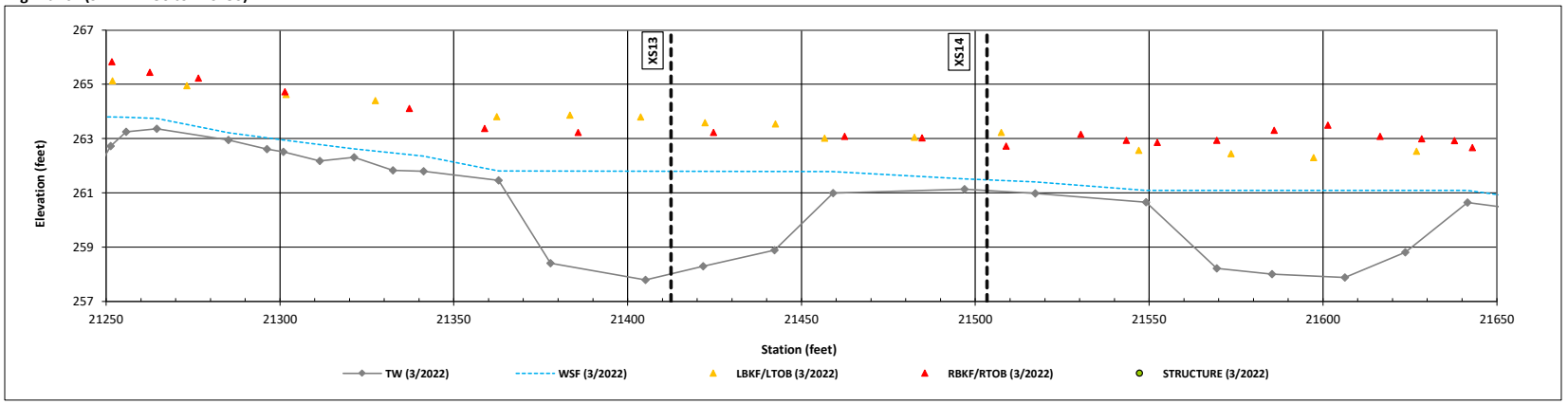
Longitudinal Profile Plots

Cross Creek Ranch Site

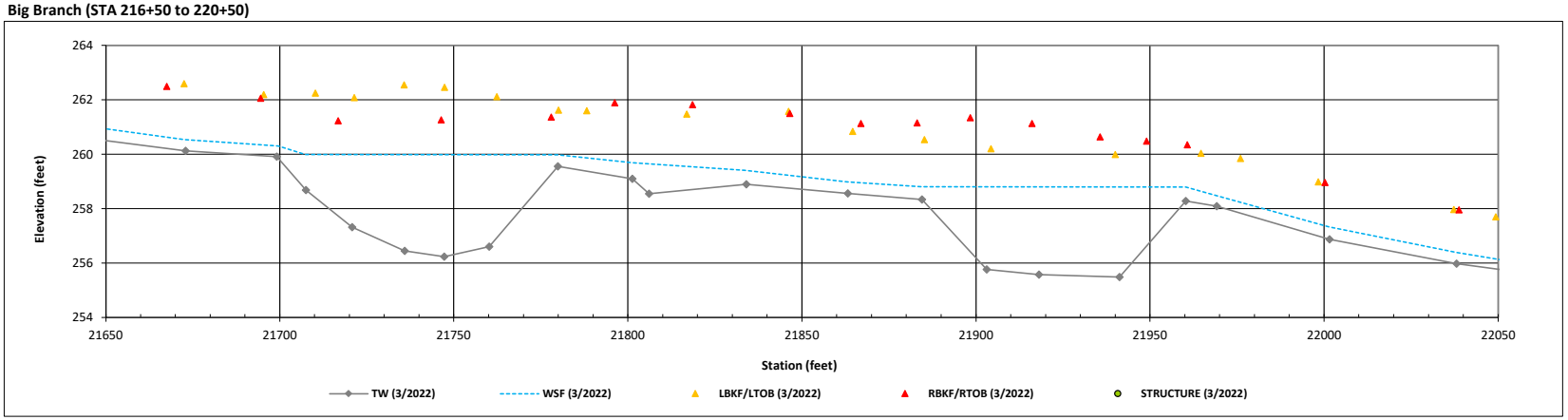
DMS Project No. 100138

Monitoring Year 0 - 2022

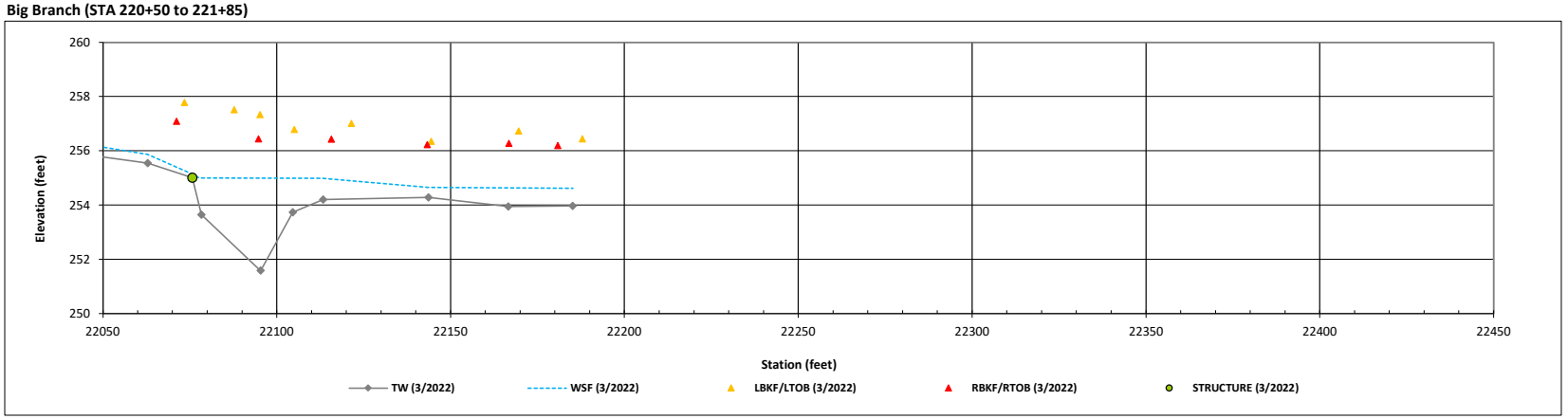
Big Branch (STA 212+50 to 216+50)



Big Branch (STA 216+50 to 220+50)



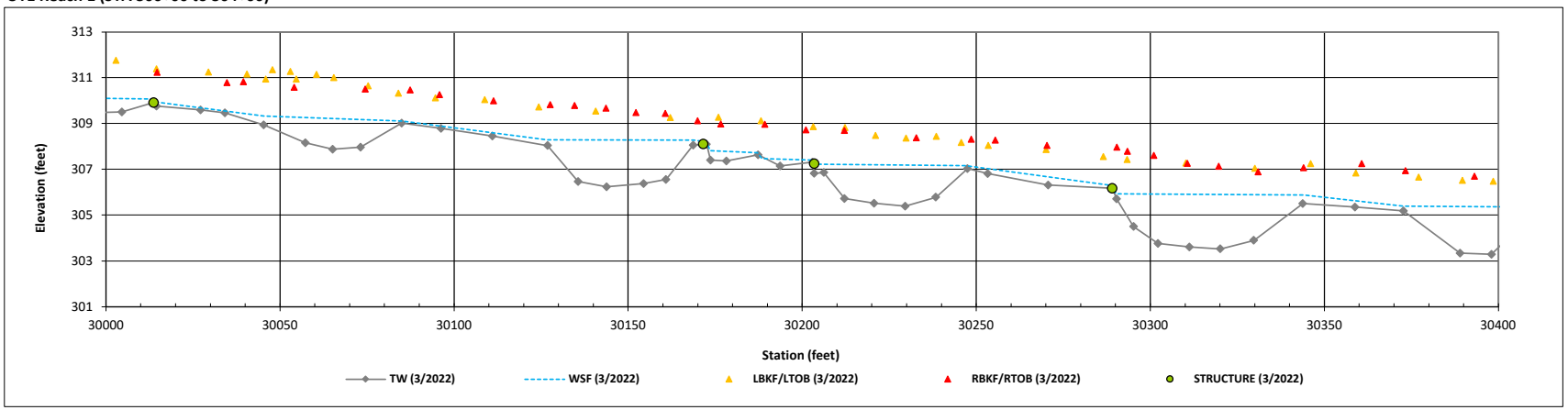
Big Branch (STA 220+50 to 221+85)



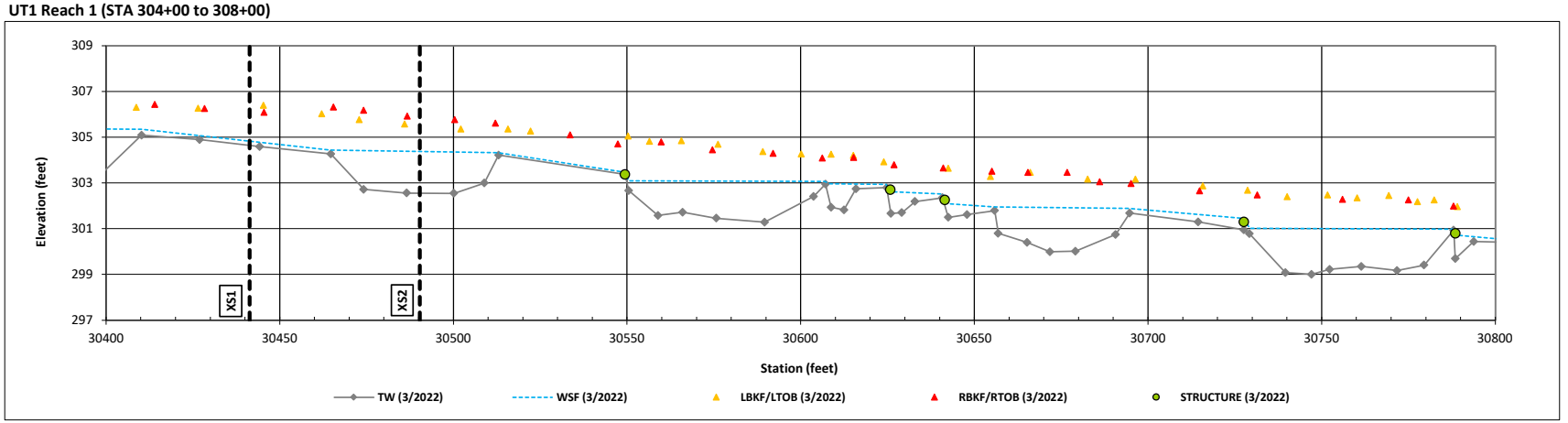
Longitudinal Profile Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT1 Reach 1 (STA 300+00 to 304+00)



UT1 Reach 1 (STA 304+00 to 308+00)



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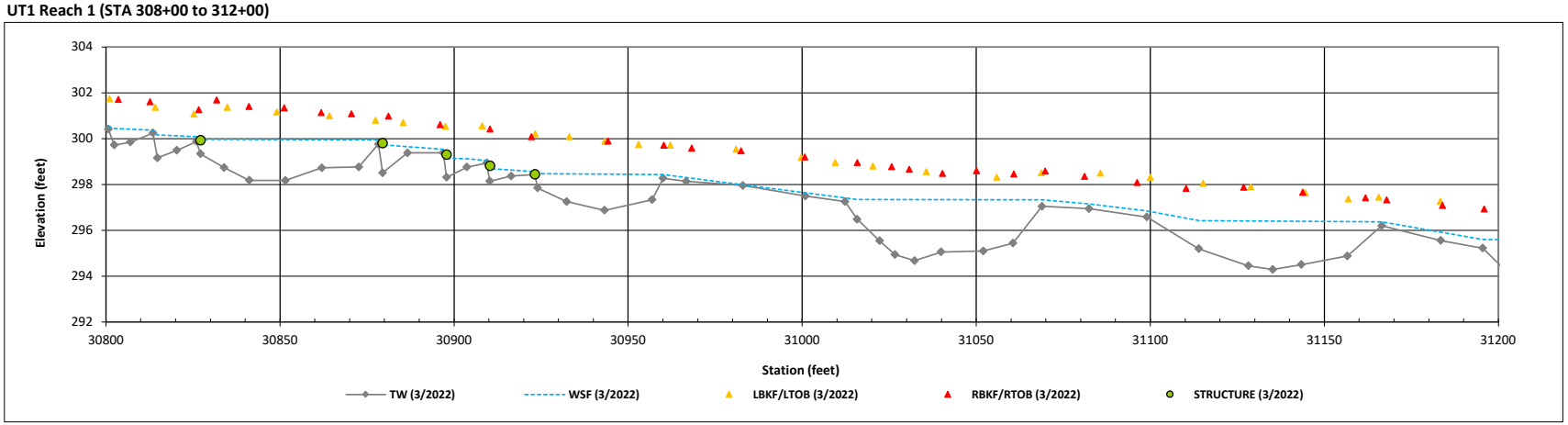
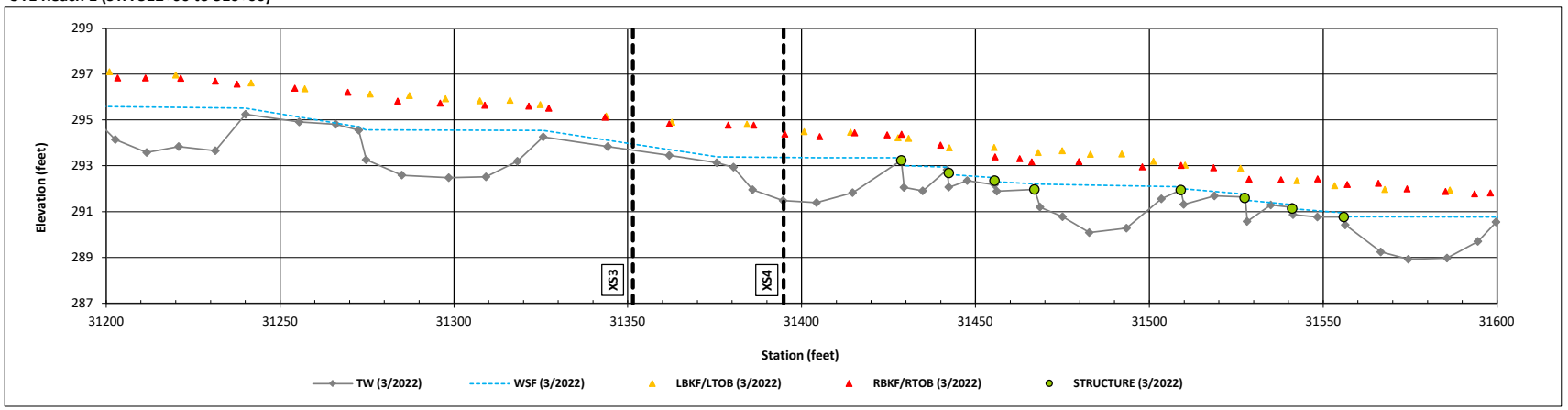


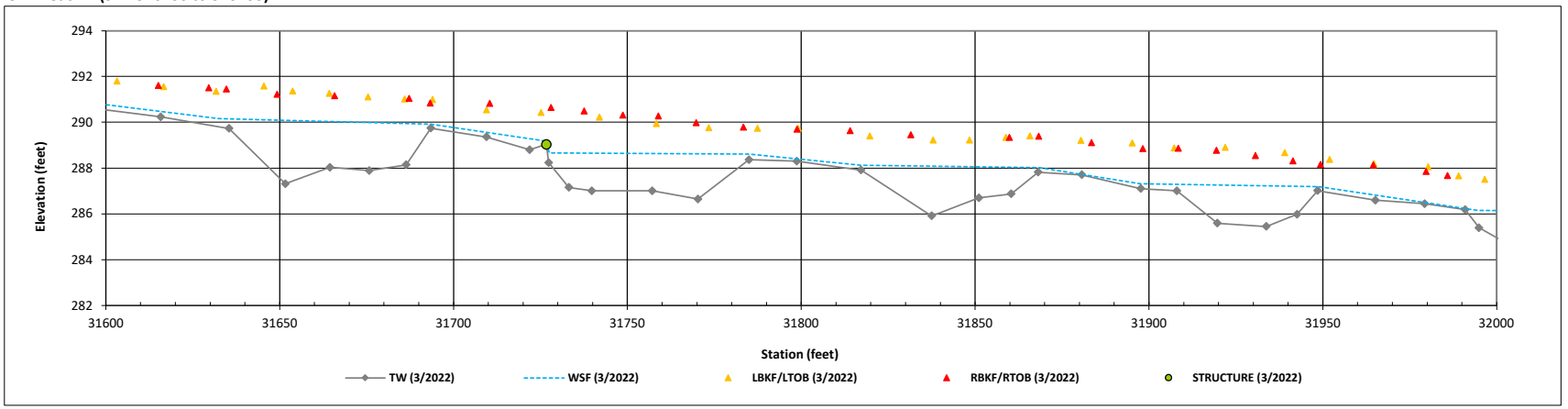
Longitudinal Profile Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT1 Reach 1 (STA 312+00 to 316+00)



UT1 Reach 1 (STA 316+00 to 320+00)



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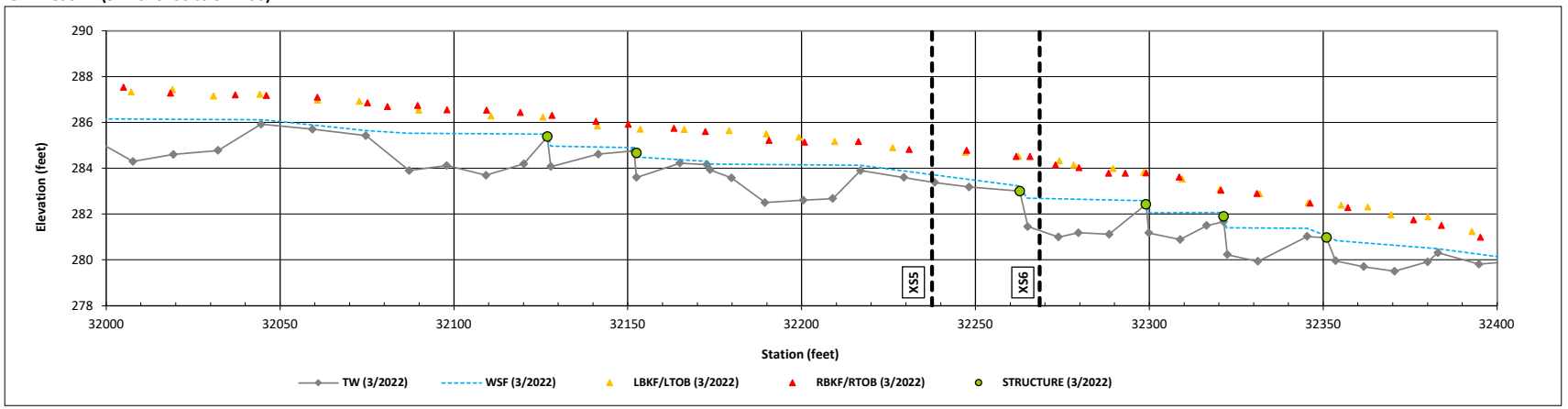


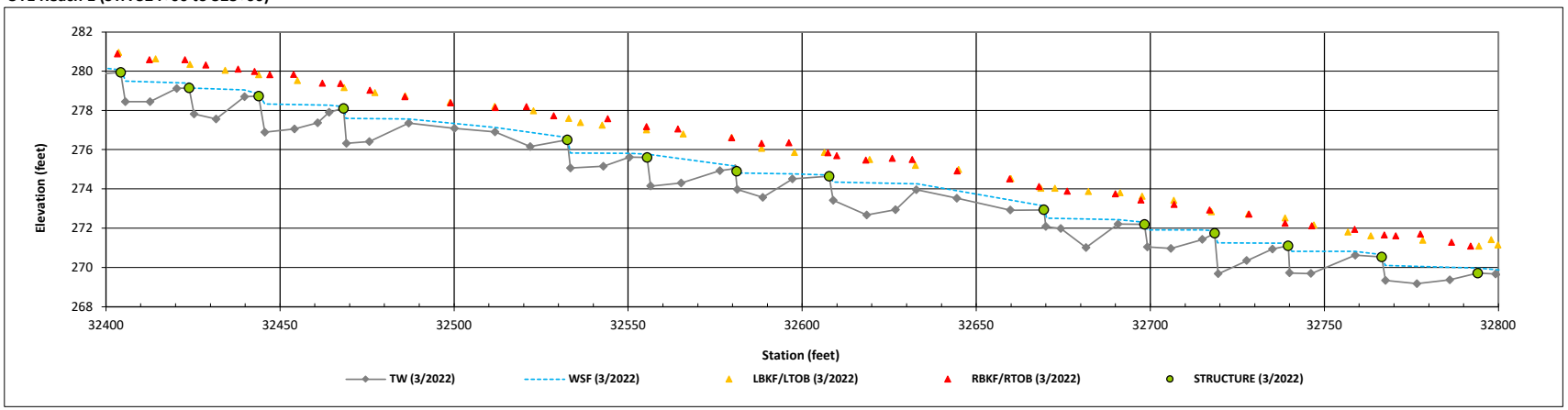
Longitudinal Profile Plots

Cross Creek Ranch Site

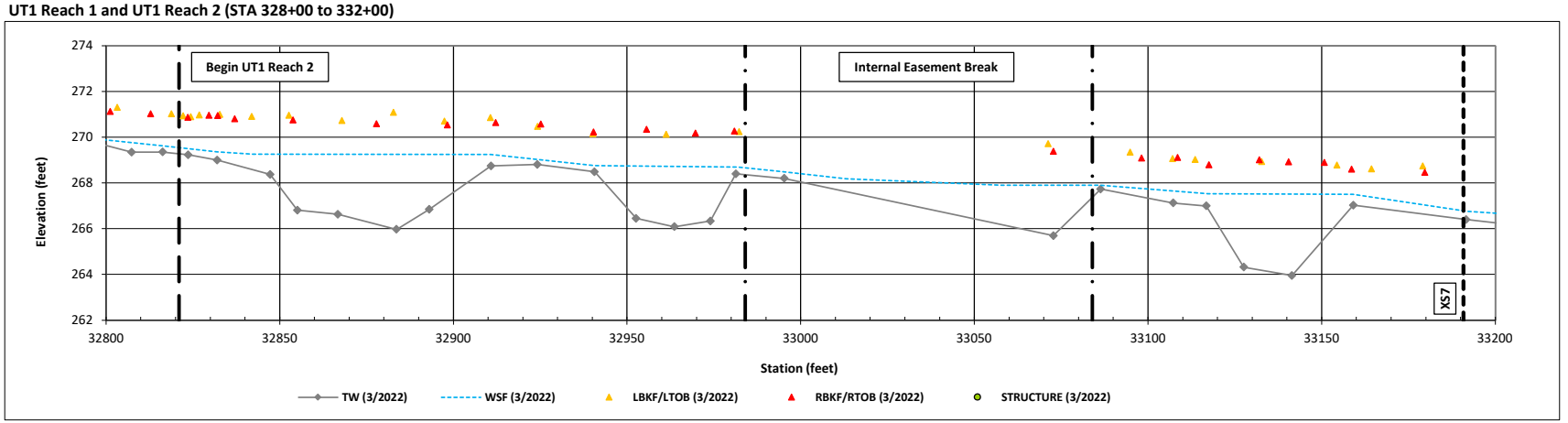
DMS Project No. 100138

Monitoring Year 0 - 2022

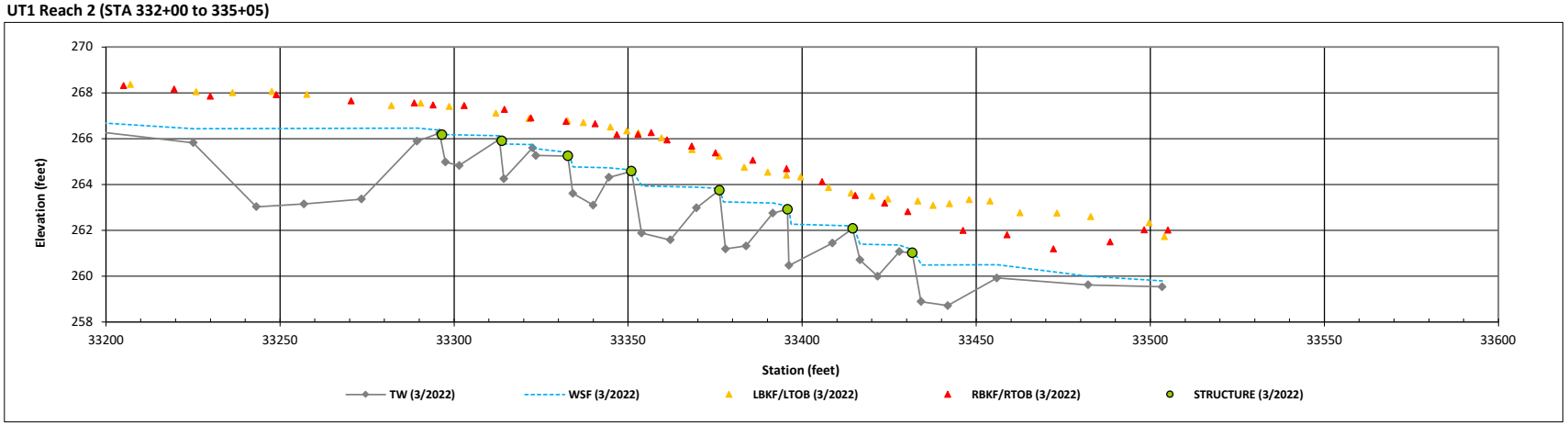
UT1 Reach 1 (STA 324+00 to 328+00)



UT1 Reach 1 and UT1 Reach 2 (STA 328+00 to 332+00)



UT1 Reach 2 (STA 332+00 to 335+05)



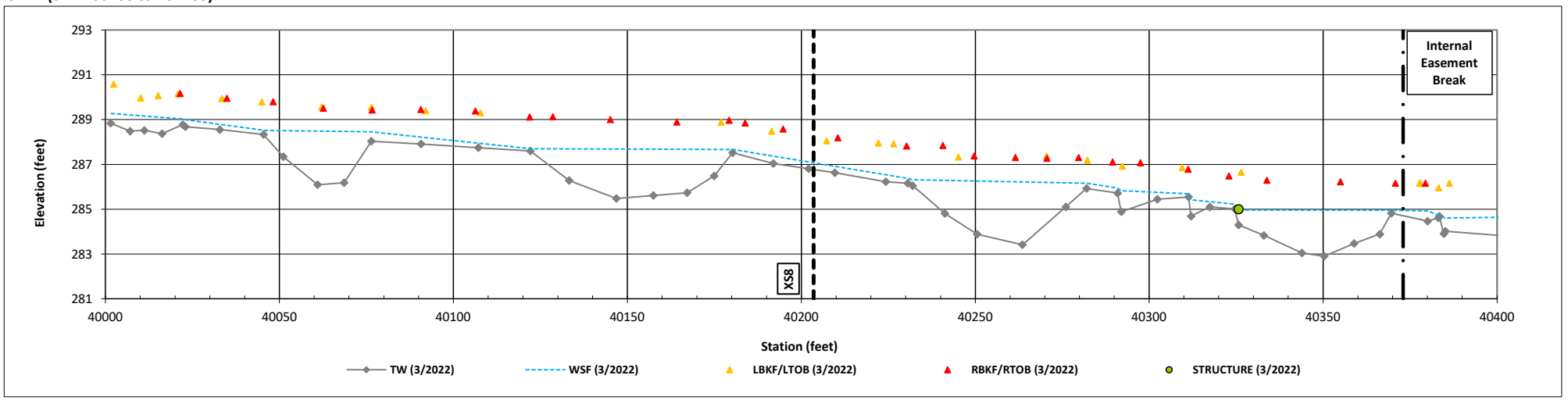
Longitudinal Profile Plots

Cross Creek Ranch Site

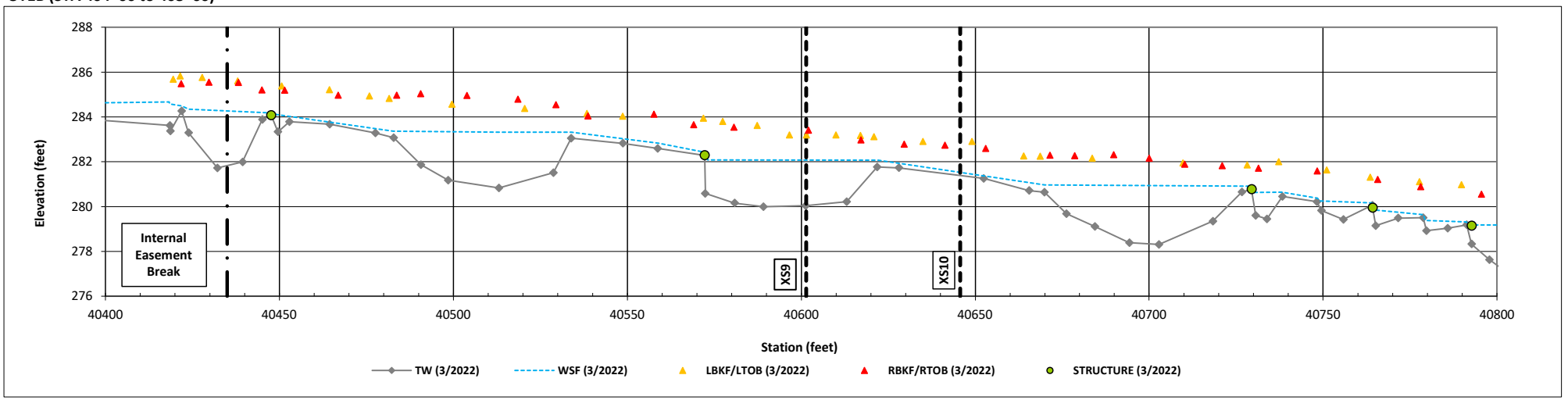
DMS Project No. 100138

Monitoring Year 0 - 2022

UT1B (STA 400+00 to 404+00)



UT1B (STA 404+00 to 408+00)



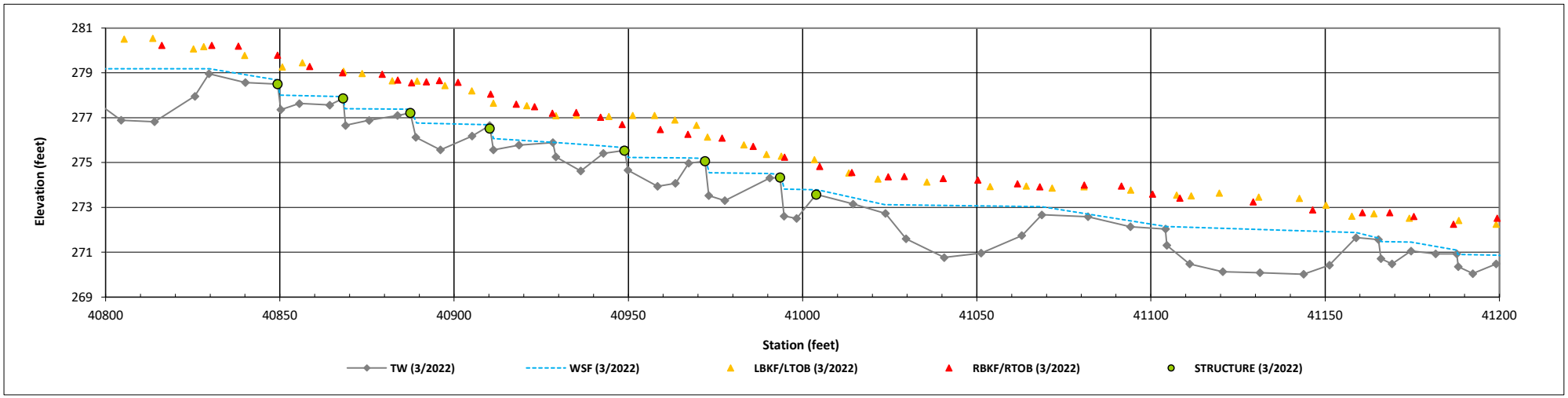
Longitudinal Profile Plots

Cross Creek Ranch Site

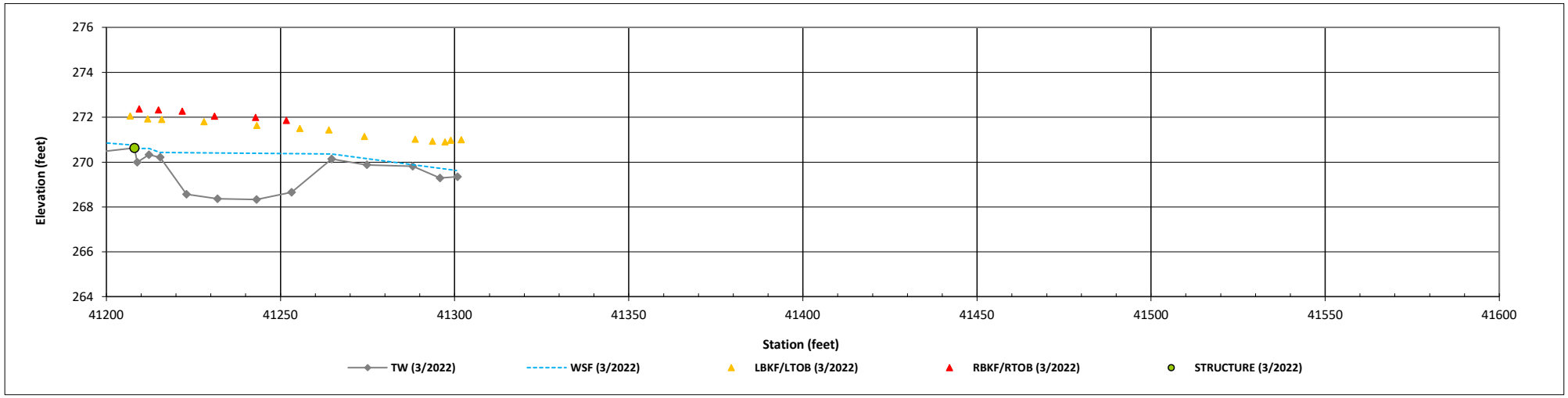
DMS Project No. 100138

Monitoring Year 0 - 2022

UT1B (STA 408+00 to 412+00)



UT1B (STA 412+00 to 413+03)



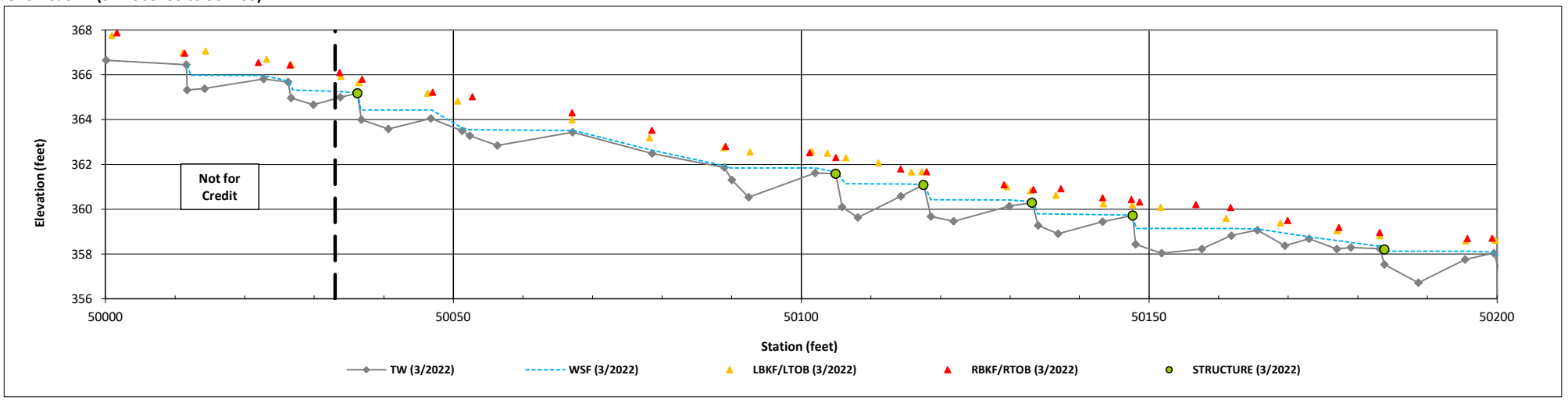
Longitudinal Profile Plots

Cross Creek Ranch Site

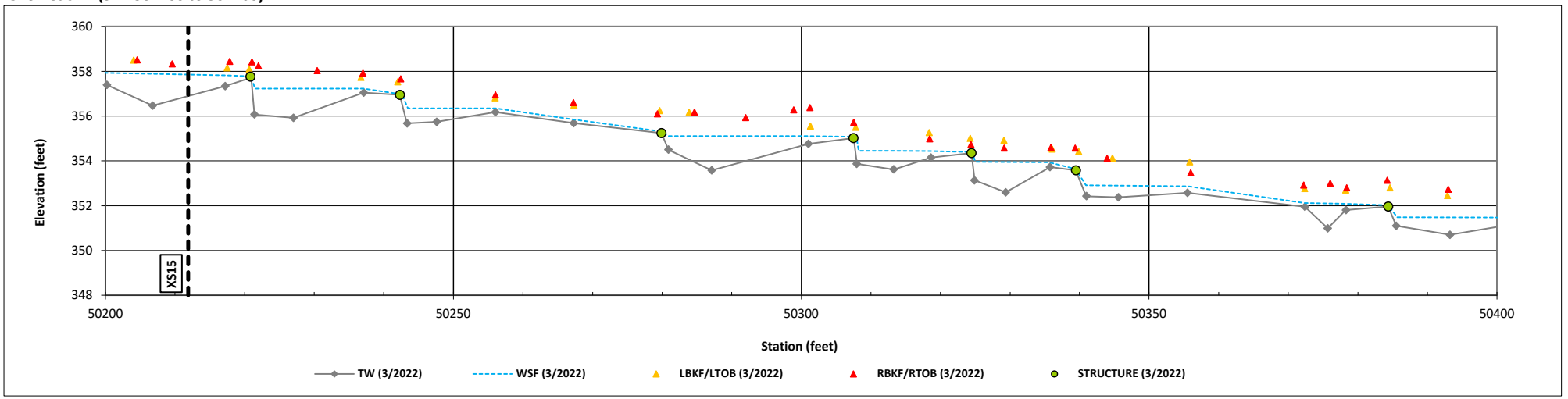
DMS Project No. 100138

Monitoring Year 0 - 2022

UT3 Reach 1 (STA 500+33 to 502+00)



UT3 Reach 1 (STA 502+00 to 504+00)



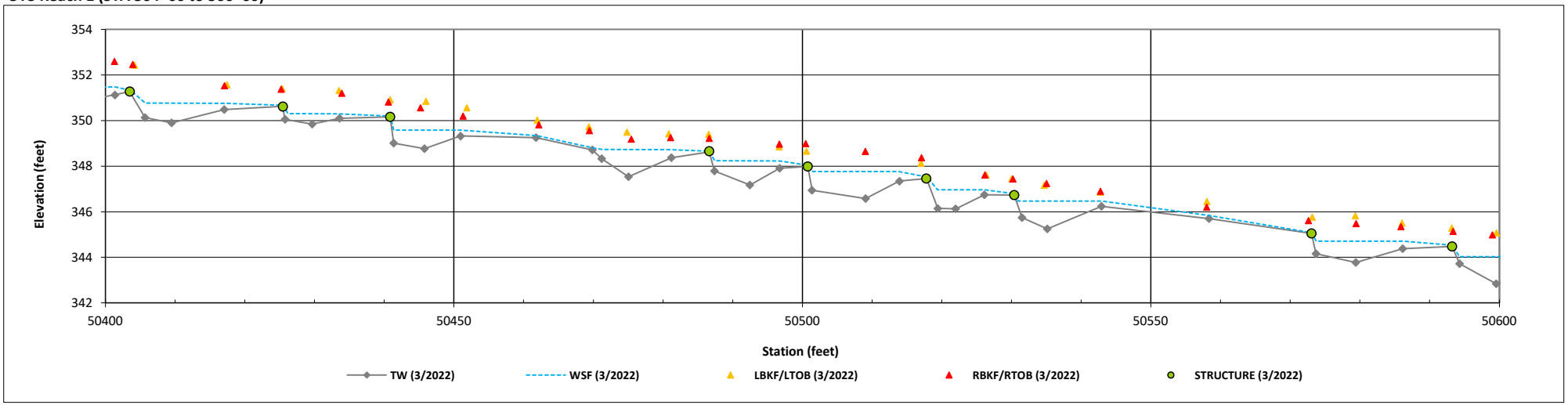
Longitudinal Profile Plots

Cross Creek Ranch Site

DMS Project No. 100138

Monitoring Year 0 - 2022

UT3 Reach 1 (STA 504+00 to 506+00)



UT3 Reach 1 (STA 506+00 to 507+81)

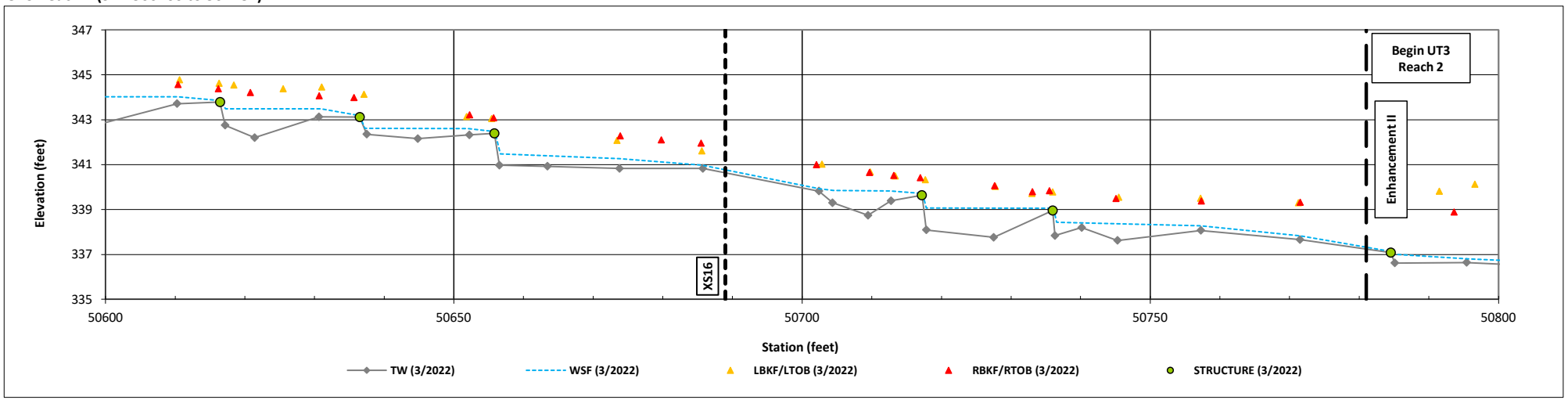


Table 8. Baseline Stream Data Summary

Cross Creek Ranch Site

DMS Project No. 100138

Monitoring Year 0 - 2022

	PRE-EXISTING CONDITIONS			DESIGN			MONITORING BASELINE (MY0)		
Parameter	**UT1 R1**								
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**n**	**Min**	**Max**	**n**
Bankfull Width (ft)	10.3		1	14.5			14.3	15.4	3
Floodprone Width (ft)	50.0		1	31.9	72.5		132.0	195.0	3
Bankfull Mean Depth	1.3		1	1.0			0.8	1.1	3
Bankfull Max Depth	2.4		1	1.3			1.3	1.7	3
Bankfull Cross Sectional Area (ft^2)	13.3		1	13.8			12.6	16.2	3
Width/Depth Ratio	8.0		1	15.3			14.7	18.1	3
Entrenchment Ratio	>2.2		1	2.2	5.0		8.6	13.6	3
Bank Height Ratio	1.0		1	1.0			1.0		3
Max part size (mm) mobilized at bankfull	42			44			44		
Rosgen Classification	E4/1			C4/1			C4/1		
Bankfull Discharge (cfs)	58.5		1	52.0			50.0	72.1	3
Sinuosity	1.19			1.20			1.20		
Water Surface Slope ($ft/ft)^2$	0.0130			0.0118			0.0140		
Other	---			---			---		
Parameter	**UT1 R2**								
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**n**	**Min**	**Max**	**n**
Bankfull Width (ft)	11.6		1	20.0			21.1		1
Floodprone Width (ft)	13.8		1	44.0	100.0		240.0		1
Bankfull Mean Depth	1.0		1	1.2			1.2		1
Bankfull Max Depth	1.4		1	1.5			1.9		1
Bankfull Cross Sectional Area (ft^2)	11.9		1	23.3			24.7		1
Width/Depth Ratio	11.2		1	17.2			17.9		1
Entrenchment Ratio	1.2		1	2.2	5.0		11.4		1
Bank Height Ratio	4.6		1	1.0			1.0		1
Max part size (mm) mobilized at bankfull	47			50			50		
Rosgen Classification	G3c/1			C4/1			C4/1		
Bankfull Discharge (cfs)	54.5		1	85.0			120.6		1
Sinuosity	1.17			1.20			1.20		
Water Surface Slope ($ft/ft)^2$	0.0160			0.0080			0.0143		
Other	---			---			---		
Parameter	**UT1B**								
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**n**	**Min**	**Max**	**n**
Bankfull Width (ft)	11.7		1	15.2			14.8	15.4	2
Floodprone Width (ft)	19.1		1	33.4	76.0		105.0	140.0	2
Bankfull Mean Depth	0.9		1	1.0			0.9	1.0	2
Bankfull Max Depth	1.6		1	1.3			1.4		2
Bankfull Cross Sectional Area (ft^2)	10.7		1	14.7			14.2	14.8	2
Width/Depth Ratio	12.9		1	15.7			14.7	16.8	2
Entrenchment Ratio	1.6		1	2.2	5.0		7.1	9.1	2
Bank Height Ratio	2.0		1	1.0			1.0		2
Max part size (mm) mobilized at bankfull	34			45			45		
Rosgen Classification	F1			B4			B4		
Bankfull Discharge (cfs)	40.5		1	49.0			60.1	66.5	2
Sinuosity	1.19			1.20			1.20		
Water Surface Slope ($ft/ft)^2$	0.0130			0.0092			0.0151		
Other	---			---			---		

Table 8. Baseline Stream Data Summary

Cross Creek Ranch Site

DMS Project No. 100138

Monitoring Year 0 - 2022

	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)		
Parameter	**Big Branch**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	15.8	23.3	2	24.0		20.0	25.4	2
Floodprone Width (ft)	19.4	50.0	2	52.8	120.0	230.0	260.0	2
Bankfull Mean Depth	1.6	1.8	2	1.4		1.2	1.4	2
Bankfull Max Depth	2.2	2.6	2	2.0		2.0	2.4	2
Bankfull Cross Sectional Area (ft^2)	28.5	34.4	2	34.0		33.4	36.8	2
Width/Depth Ratio	8.8	13.3	2	16.9		19.3	20.1	2
Entrenchment Ratio	1.2	2.3	2	2.2	5.0	9.1	9.6	2
Bank Height Ratio	2.3	3.0	2	1.0		1.0		2
Max part size (mm) mobilized at bankfull	44			37		37		
Rosgen Classification	C4/1 - G4c/1			C4/1		C4/1		
Bankfull Discharge (cfs)	136.0		2	144.0		139.8	156.8	2
Sinuosity	1.14			1.20		1.20		
Water Surface Slope ($ft/ft)^2$	0.0070			0.0083		0.0090		
Other	---			---		---		
Parameter	**UT3 R1**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	6.4		1	5.2		5.6		1
Floodprone Width (ft)	8.7		1	7.3	11.4	24.0		1
Bankfull Mean Depth	0.3		1	0.4		0.5		1
Bankfull Max Depth	1.0		1	0.5		1.0		1
Bankfull Cross Sectional Area (ft^2)	2.0		1	1.9		2.7		1
Width/Depth Ratio	20.6		1	14.6		11.5		1
Entrenchment Ratio	1.3		1	1.4	2.2	4.3		1
Bank Height Ratio	2.4		1	1.0		1.0		1
Max part size (mm) mobilized at bankfull	39			52		52		
Rosgen Classification	F1			B4		B4		
Bankfull Discharge (cfs)	7.6		1	10.0		11.6		1
Sinuosity	1.00			1.10		1.10		
Water Surface Slope ($ft/ft)^2$	0.0290			0.0327		0.0372		
Other	---			---		---		

Table 9. Cross-Section Morphology Monitoring Summary

Cross Creek Ranch Site

DMS Project No. 100138

Monitoring Year 0 - 2022

	UT1 R1																	
	Cross-Section 1 (Riffle)						Cross-Section 2 (Pool)						Cross-Section 3 (Riffle)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	306.21						N/A						294.99					
Bank Height Ratio - Based on AB Bankfull[1] Area	1.00						N/A						1.00					
Thalweg Elevation	304.50						302.39						293.65					
LTOB[2] Elevation	306.21						305.35						294.99					
LTOB[2] Max Depth (ft)	1.709						2.955						1.345					
LTOB[2] Cross Sectional Area (ft^2)	16.20						27.97						12.96					
	UT1 R1																	
	Cross-Section 4 (Pool)						Cross-Section 5 (Riffle)						Cross-Section 6 (Pool)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	N/A						284.75						N/A					
Bank Height Ratio - Based on AB Bankfull[1] Area	N/A						1.00						N/A					
Thalweg Elevation	291.24						283.38						281.35					
LTOB[2] Elevation	294.28						284.75						284.20					
LTOB[2] Max Depth (ft)	3.036						1.368						2.846					
LTOB[2] Cross Sectional Area (ft^2)	30.77						12.58						28.69					
	UT1 R2						UT1B											
	Cross-Section 7 (Riffle)						Cross-Section 8 (Riffle)						Cross-Section 9 (Pool)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	268.28						288.22						N/A					
Bank Height Ratio - Based on AB Bankfull[1] Area	1.00						1.00						N/A					
Thalweg Elevation	266.40						286.80						279.93					
LTOB[2] Elevation	268.28						288.22						283.16					
LTOB[2] Max Depth (ft)	1.879						1.423						3.238					
LTOB[2] Cross Sectional Area (ft^2)	24.72						14.94						36.04					

[1]Bank Height Ratio (BHR) takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation.

[2]LTOB Area and Max depth - These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Table 9. Cross-Section Morphology Monitoring Summary

Cross Creek Ranch Site

DMS Project No. 100138

Monitoring Year 0 - 2022

	UT1B						Big Branch											
	Cross-Section 10 (Riffle)						Cross-Section 11 (Riffle)						Cross-Section 12 (Pool)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	282.69						272.62						N/A					
Bank Height Ratio - Based on AB Bankfull[1] Area	1.00						1.00						N/A					
Thalweg Elevation	281.27						270.22						266.67					
LTOB[2] Elevation	282.69						272.62						271.45					
LTOB[2] Max Depth (ft)	1.424						2.401						4.772					
LTOB[2] Cross Sectional Area (ft^2)	14.21						36.87						96.74					
	Big Branch						UT3 R1											
	Cross-Section 13 (Pool)						Cross-Section 14 (Riffle)						Cross-Section 15 (Pool)					
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	N/A						263.06						N/A					
Bank Height Ratio - Based on AB Bankfull[1] Area	N/A						1.00						N/A					
Thalweg Elevation	258.40						261.09						356.71					
LTOB[2] Elevation	263.60						263.06						358.16					
LTOB[2] Max Depth (ft)	5.202						1.973						1.447					
LTOB[2] Cross Sectional Area (ft^2)	113.83						33.50						5.29					
	UT3 R1																	
	Cross-Section 16 (Riffle)																	
	MY0	MY1	MY2	MY3	MY5	MY7												
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	341.52																	
Bank Height Ratio - Based on AB Bankfull[1] Area	1.00																	
Thalweg Elevation	340.55																	
LTOB[2] Elevation	341.52																	
LTOB[2] Max Depth (ft)	0.973																	
LTOB[2] Cross Sectional Area (ft^2)	2.72																	

[1]Bank Height Ratio (BHR) takes the As-built bankful area as the basis for adjusting each subsequent years bankfull elevation.

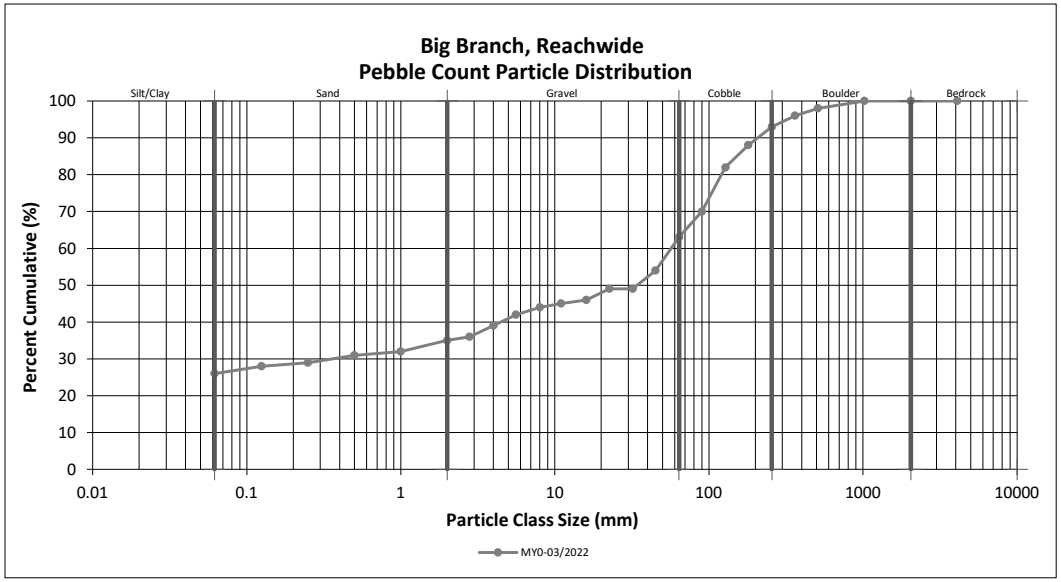
[2]LTOB Area and Max depth - These are based on the LTOB elevation for each years survey (The same elevation used for the LTOB in the BHR calculation). Area below the LTOB elevation will be used and tracked for each year as above. The difference between the LTOB elevation and the thalweg elevation (same as in the BHR calculation) will be recroded and tracked above as LTOB max depth.

Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Big Branch, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062		26	26	26	26
SAND	Very fine	0.062	0.125		2	2	2	28
	Fine	0.125	0.250		1	1	1	29
	Medium	0.25	0.50		2	2	2	31
	Coarse	0.5	1.0		1	1	1	32
	Very Coarse	1.0	2.0		3	3	3	35
GRAVEL	Very Fine	2.0	2.8		1	1	1	36
	Very Fine	2.8	4.0		3	3	3	39
	Fine	4.0	5.6		3	3	3	42
	Fine	5.6	8.0		2	2	2	44
	Medium	8.0	11.0		1	1	1	45
	Medium	11.0	16.0		1	1	1	46
	Coarse	16.0	22.6		3	3	3	49
	Coarse	22.6	32					49
	Very Coarse	32	45	5		5	5	54
	Very Coarse	45	64	9		9	9	63
COBBLE	Small	64	90	7		7	7	70
	Small	90	128	11	1	12	12	82
	Large	128	180	6		6	6	88
	Large	180	256	5		5	5	93
BOULDER	Small	256	362	3		3	3	96
	Small	362	512	2		2	2	98
	Medium	512	1024	2		2	2	100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**



Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	2.00
D_{50} =	34.3
D_{84} =	143.4
D_{95} =	322.5
D_{100} =	1024.0

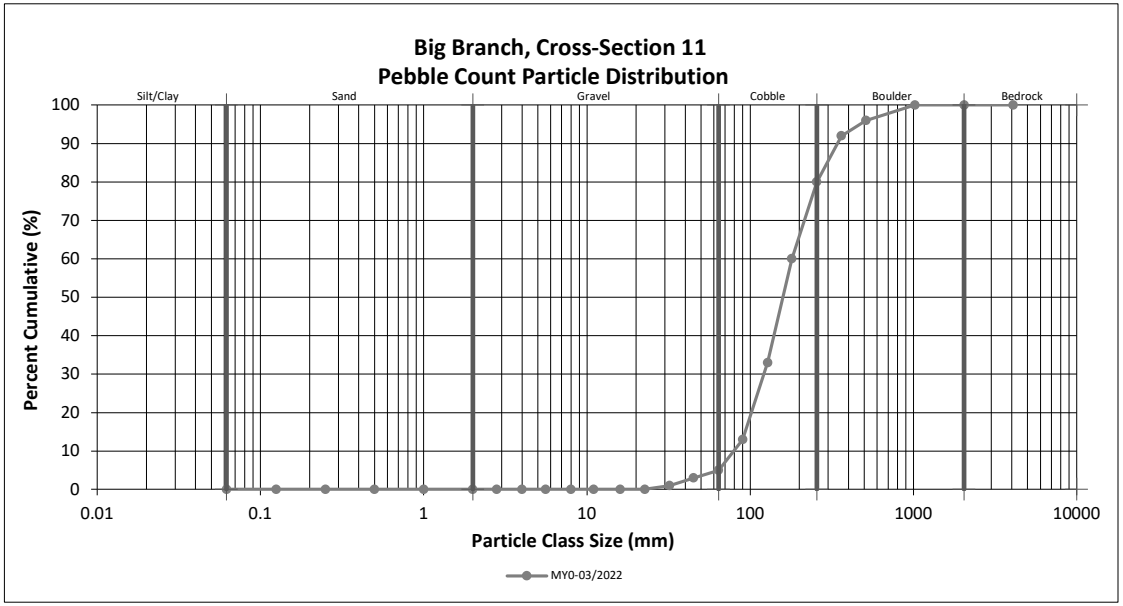
Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Big Branch, Cross-Section 11

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0			0
	Medium	8.0	11.0			0
	Medium	11.0	16.0			0
	Coarse	16.0	22.6			0
	Coarse	22.6	32	1	1	1
	Very Coarse	32	45	2	2	3
	Very Coarse	45	64	2	2	5
COBBLE	Small	64	90	8	8	13
	Small	90	128	20	20	33
	Large	128	180	27	27	60
	Large	180	256	20	20	80
BOULDER	Small	256	362	12	12	92
	Small	362	512	4	4	96
	Medium	512	1024	4	4	100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 11	
Channel materials (mm)	
D_{16} =	94.88
D_{35} =	131.27
D_{50} =	158.6
D_{84} =	287.3
D_{95} =	469.5
D_{100} =	1024.0



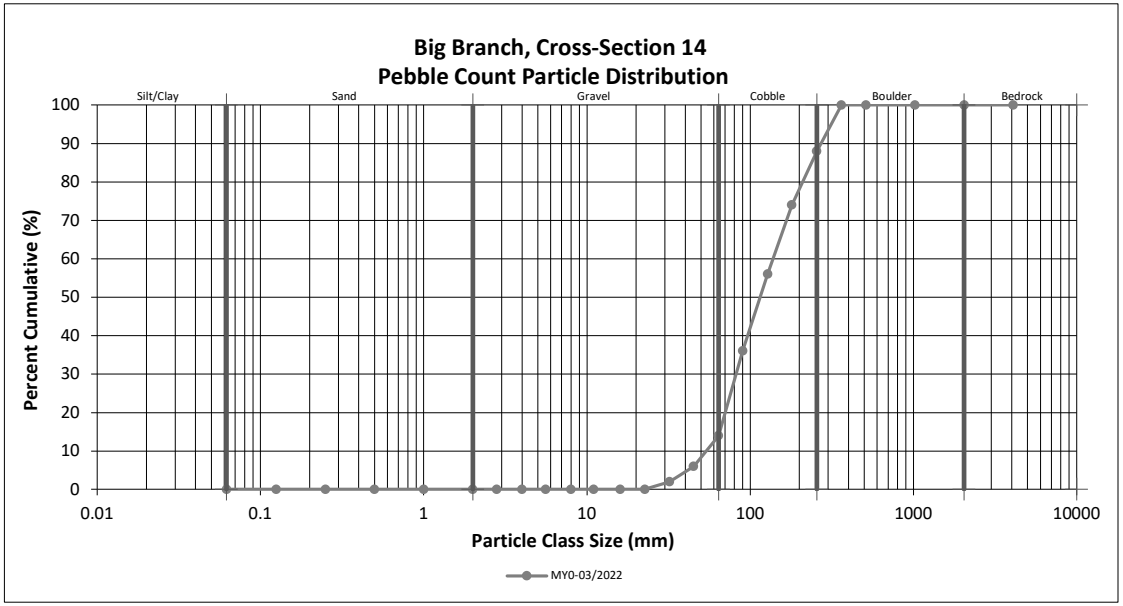
Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Big Branch, Cross-Section 14

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0			0
	Medium	8.0	11.0			0
	Medium	11.0	16.0			0
	Coarse	16.0	22.6			0
	Coarse	22.6	32	2	2	2
	Very Coarse	32	45	4	4	6
	Very Coarse	45	64	8	8	14
COBBLE	Small	64	90	22	22	36
	Small	90	128	20	20	56
	Large	128	180	18	18	74
	Large	180	256	14	14	88
BOULDER	Small	256	362	12	12	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 14	
Channel materials (mm)	
D_{16} =	66.01
D_{35} =	88.62
D_{50} =	115.2
D_{84} =	231.5
D_{95} =	313.3
D_{100} =	362.0

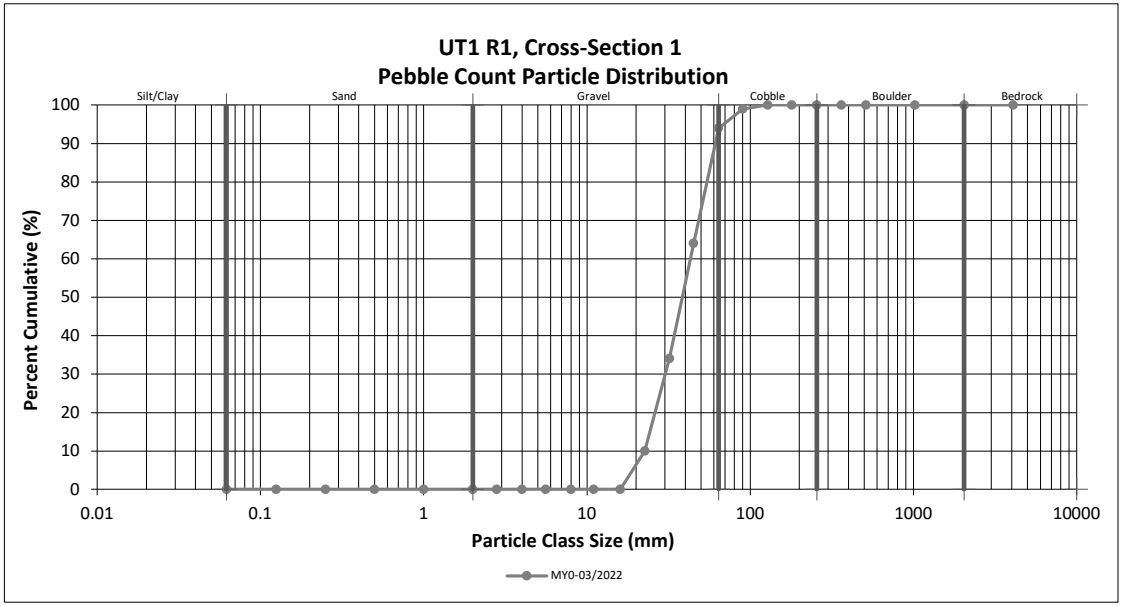


Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT1 R1, Cross-Section 1

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0			0
	Medium	8.0	11.0			0
	Medium	11.0	16.0			0
	Coarse	16.0	22.6	10	10	10
	Coarse	22.6	32	24	24	34
	Very Coarse	32	45	30	30	64
	Very Coarse	45	64	30	30	94
COBBLE	Small	64	90	5	5	99
	Small	90	128	1	1	100
	Large	128	180			100
	Large	180	256			100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**



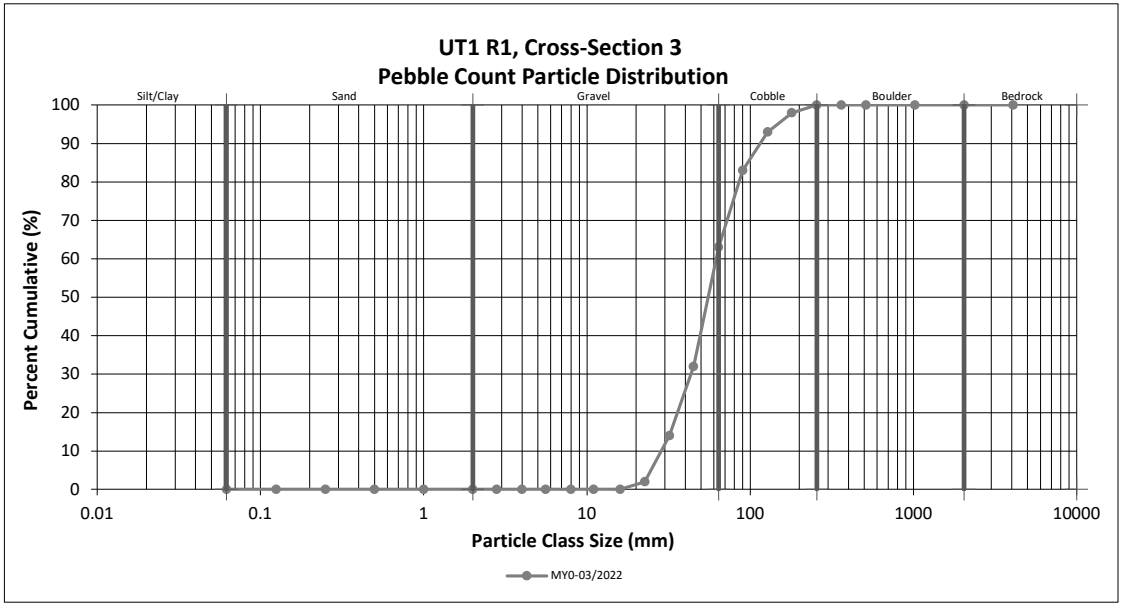
Cross-Section 1	
Channel materials (mm)	
D_{16} =	24.65
D_{35} =	32.37
D_{50} =	38.4
D_{84} =	56.9
D_{95} =	68.5
D_{100} =	128.0

Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT1 R1, Cross-Section 3

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0			0
	Medium	8.0	11.0			0
	Medium	11.0	16.0			0
	Coarse	16.0	22.6	2	2	2
	Coarse	22.6	32	12	12	14
	Very Coarse	32	45	18	18	32
	Very Coarse	45	64	31	31	63
COBBLE	Small	64	90	20	20	83
	Small	90	128	10	10	93
	Large	128	180	5	5	98
	Large	180	256	2	2	100
BOULDER	Small	256	362			100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**



Cross-Section 3	
Channel materials (mm)	
D_{16} =	33.24
D_{35} =	46.56
D_{50} =	55.2
D_{84} =	93.2
D_{95} =	146.7
D_{100} =	256.0

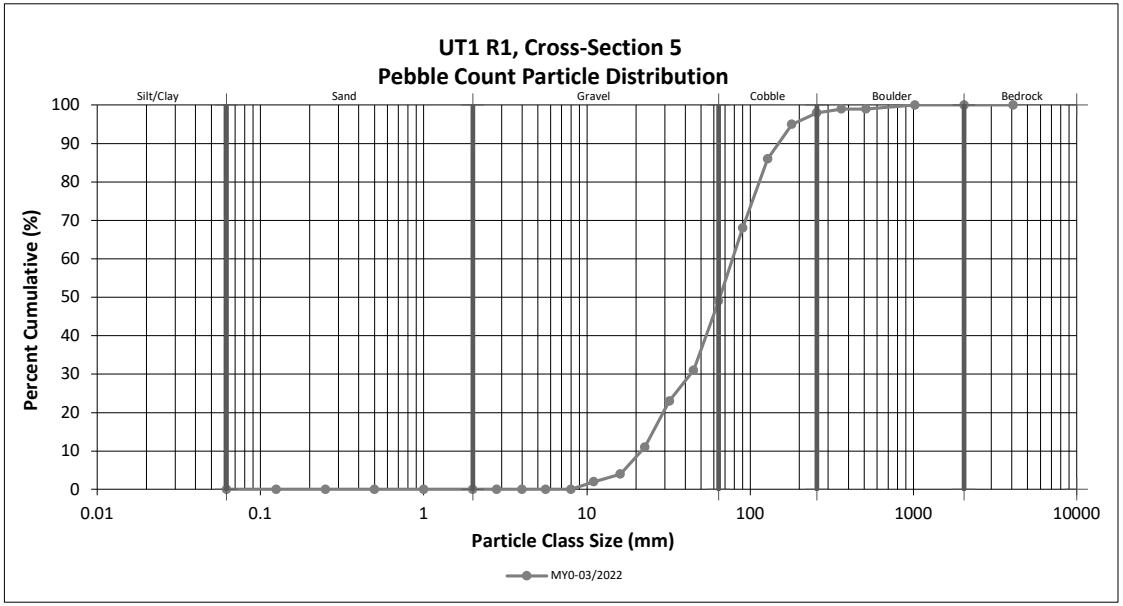
Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT1 R1, Cross-Section 5

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0			0
	Medium	8.0	11.0	2	2	2
	Medium	11.0	16.0	2	2	4
	Coarse	16.0	22.6	7	7	11
	Coarse	22.6	32	12	12	23
	Very Coarse	32	45	8	8	31
	Very Coarse	45	64	18	18	49
COBBLE	Small	64	90	19	19	68
	Small	90	128	18	18	86
	Large	128	180	9	9	95
	Large	180	256	3	3	98
BOULDER	Small	256	362	1	1	99
	Small	362	512			99
	Medium	512	1024	1	1	100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 5	
Channel materials (mm)	
D_{16} =	26.12
D_{35} =	48.66
D_{50} =	65.2
D_{84} =	123.1
D_{95} =	180.0
D_{100} =	1024.0

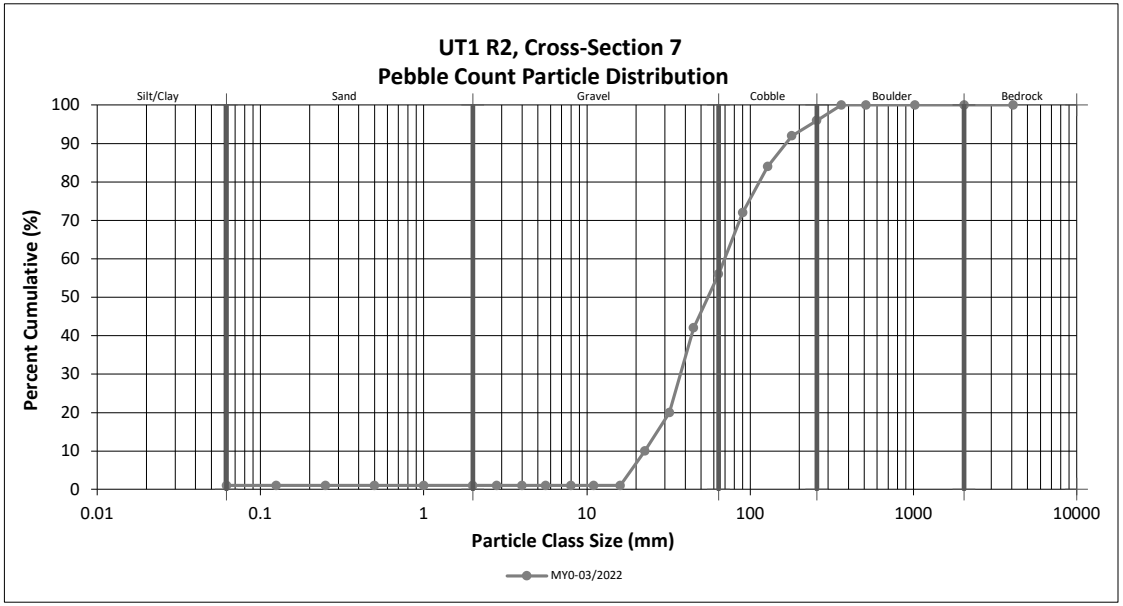


Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT1 R2, Cross-Section 7

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	1	1	1
SAND	Very fine	0.062	0.125			1
	Fine	0.125	0.250			1
	Medium	0.25	0.50			1
	Coarse	0.5	1.0			1
	Very Coarse	1.0	2.0			1
GRAVEL	Very Fine	2.0	2.8			1
	Very Fine	2.8	4.0			1
	Fine	4.0	5.6			1
	Fine	5.6	8.0			1
	Medium	8.0	11.0			1
	Medium	11.0	16.0			1
	Coarse	16.0	22.6	9	9	10
	Coarse	22.6	32	10	10	20
	Very Coarse	32	45	22	22	42
	Very Coarse	45	64	14	14	56
COBBLE	Small	64	90	16	16	72
	Small	90	128	12	12	84
	Large	128	180	8	8	92
	Large	180	256	4	4	96
BOULDER	Small	256	362	4	4	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**



Cross-Section 7	
Channel materials (mm)	
D_{16} =	27.84
D_{35} =	40.37
D_{50} =	55.0
D_{84} =	128.0
D_{95} =	234.4
D_{100} =	362.0

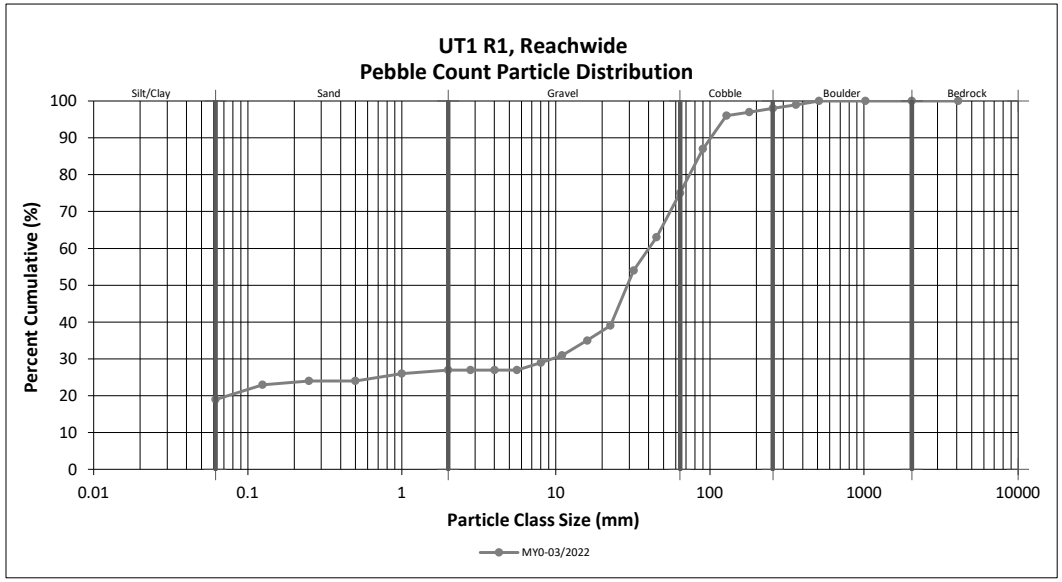
Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT1 R1, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062		19	19	19	19
SAND	Very fine	0.062	0.125		4	4	4	23
	Fine	0.125	0.250		1	1	1	24
	Medium	0.25	0.50					24
	Coarse	0.5	1.0		2	2	2	26
	Very Coarse	1.0	2.0		1	1	1	27
GRAVEL	Very Fine	2.0	2.8					27
	Very Fine	2.8	4.0					27
	Fine	4.0	5.6					27
	Fine	5.6	8.0	1	1	2	2	29
	Medium	8.0	11.0	2		2	2	31
	Medium	11.0	16.0	2	2	4	4	35
	Coarse	16.0	22.6	4		4	4	39
	Coarse	22.6	32	7	8	15	15	54
	Very Coarse	32	45	7	2	9	9	63
	Very Coarse	45	64	8	4	12	12	75
COBBLE	Small	64	90	10	2	12	12	87
	Small	90	128	5	4	9	9	96
	Large	128	180	1		1	1	97
	Large	180	256	1		1	1	98
BOULDER	Small	256	362	1		1	1	99
	Small	362	512	1		1	1	100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**

Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	16.00
D_{50} =	29.2
D_{84} =	82.6
D_{95} =	123.1
D_{100} =	512.0

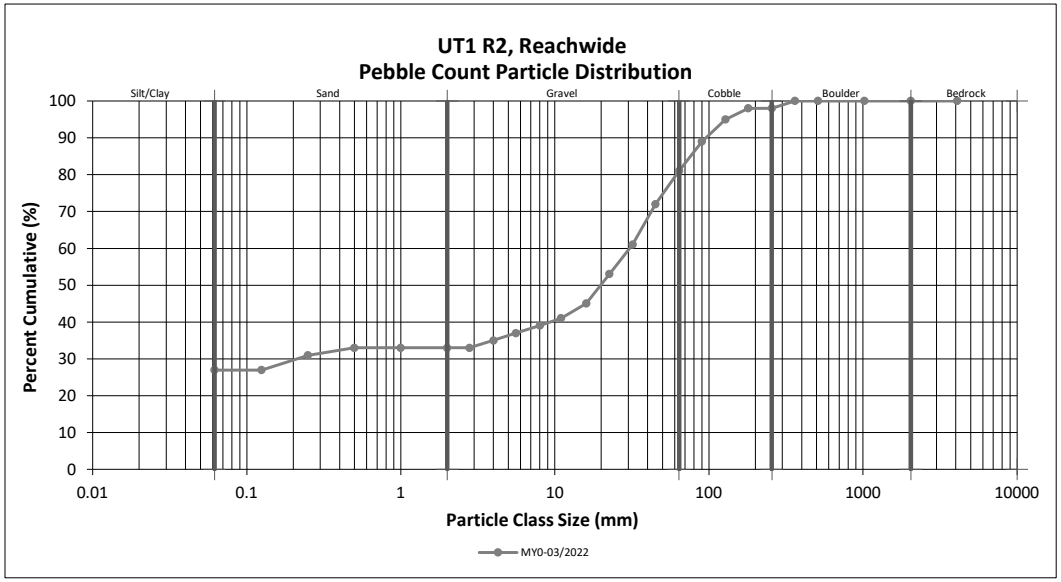


Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT1 R2, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	1	26	27	27	27
SAND	Very fine	0.062	0.125					27
	Fine	0.125	0.250		4	4	4	31
	Medium	0.25	0.50		2	2	2	33
	Coarse	0.5	1.0					33
	Very Coarse	1.0	2.0					33
GRAVEL	Very Fine	2.0	2.8					33
	Very Fine	2.8	4.0		2	2	2	35
	Fine	4.0	5.6		2	2	2	37
	Fine	5.6	8.0		2	2	2	39
	Medium	8.0	11.0		2	2	2	41
	Medium	11.0	16.0	1	3	4	4	45
	Coarse	16.0	22.6	4	4	8	8	53
	Coarse	22.6	32	8		8	8	61
	Very Coarse	32	45	8	3	11	11	72
	Very Coarse	45	64	9		9	9	81
COBBLE	Small	64	90	8		8	8	89
	Small	90	128	6		6	6	95
	Large	128	180	3		3	3	98
	Large	180	256					98
BOULDER	Small	256	362	2		2	2	100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**



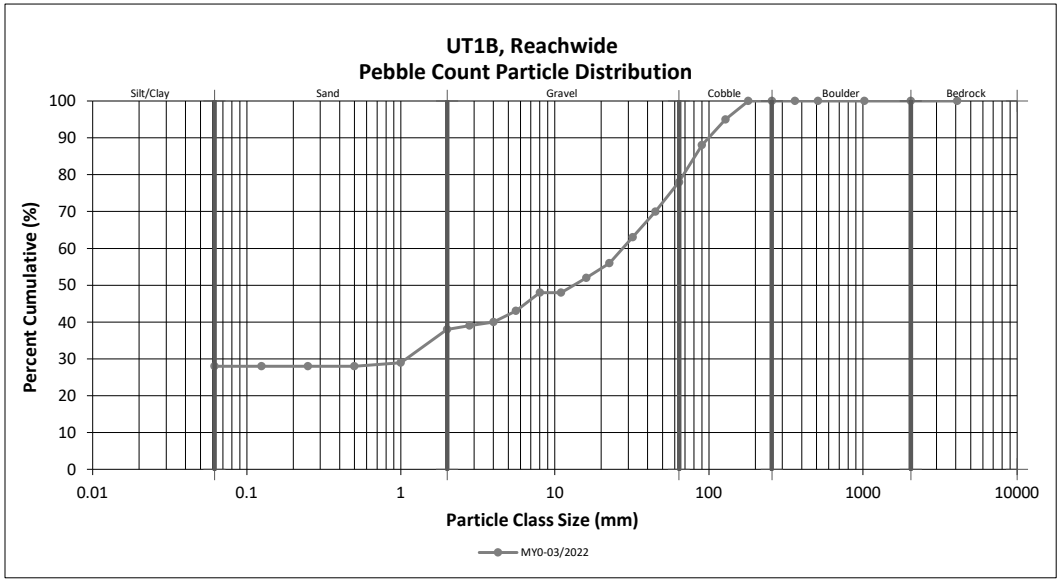
Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	4.00
D_{50} =	19.9
D_{84} =	72.7
D_{95} =	128.0
D_{100} =	362.0

Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT1B, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062		28	28	28	28
SAND	Very fine	0.062	0.125					28
	Fine	0.125	0.250					28
	Medium	0.25	0.50					28
	Coarse	0.5	1.0		1	1	1	29
	Very Coarse	1.0	2.0		9	9	9	38
GRAVEL	Very Fine	2.0	2.8		1	1	1	39
	Very Fine	2.8	4.0		1	1	1	40
	Fine	4.0	5.6		3	3	3	43
	Fine	5.6	8.0	1	4	5	5	48
	Medium	8.0	11.0					48
	Medium	11.0	16.0	2	2	4	4	52
	Coarse	16.0	22.6	4		4	4	56
	Coarse	22.6	32	6	1	7	7	63
	Very Coarse	32	45	7		7	7	70
	Very Coarse	45	64	8		8	8	78
COBBLE	Small	64	90	10		10	10	88
	Small	90	128	7		7	7	95
	Large	128	180	5		5	5	100
	Large	180	256					100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**50**	**50**	**100**	**100**	**100**



Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	1.59
D_{50} =	13.3
D_{84} =	78.5
D_{95} =	128.0
D_{100} =	180.0

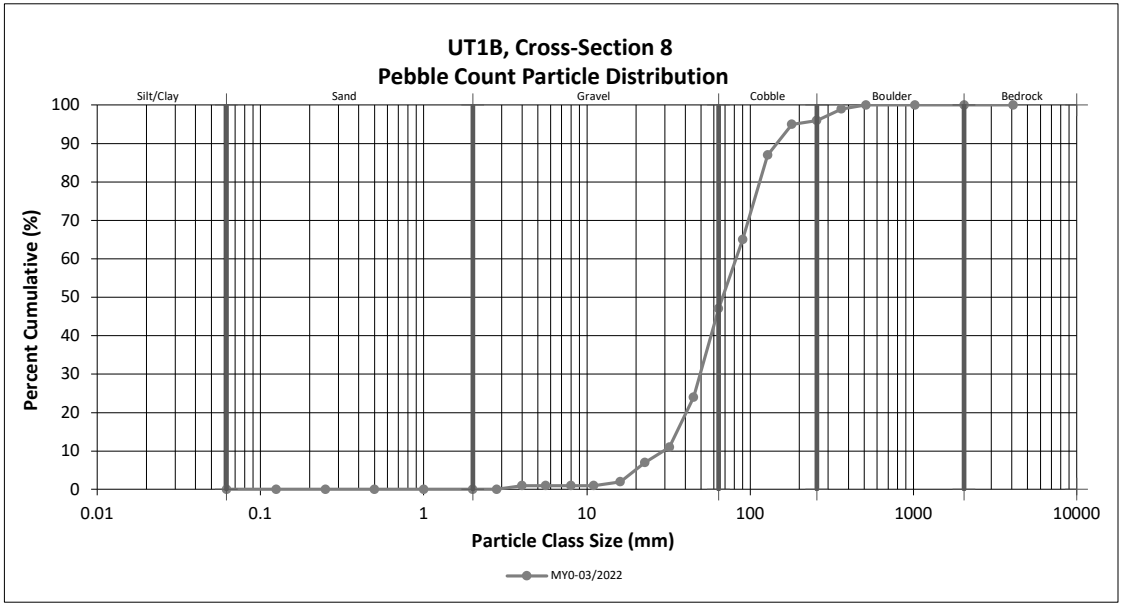
Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT1B, Cross-Section 8

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0	1	1	1
	Fine	4.0	5.6			1
	Fine	5.6	8.0			1
	Medium	8.0	11.0			1
	Medium	11.0	16.0	1	1	2
	Coarse	16.0	22.6	5	5	7
	Coarse	22.6	32	4	4	11
	Very Coarse	32	45	13	13	24
	Very Coarse	45	64	23	23	47
COBBLE	Small	64	90	18	18	65
	Small	90	128	22	22	87
	Large	128	180	8	8	95
	Large	180	256	1	1	96
BOULDER	Small	256	362	3	3	99
	Small	362	512	1	1	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 8	
Channel materials (mm)	
D_{16} =	36.48
D_{35} =	53.26
D_{50} =	67.7
D_{84} =	122.0
D_{95} =	180.0
D_{100} =	512.0



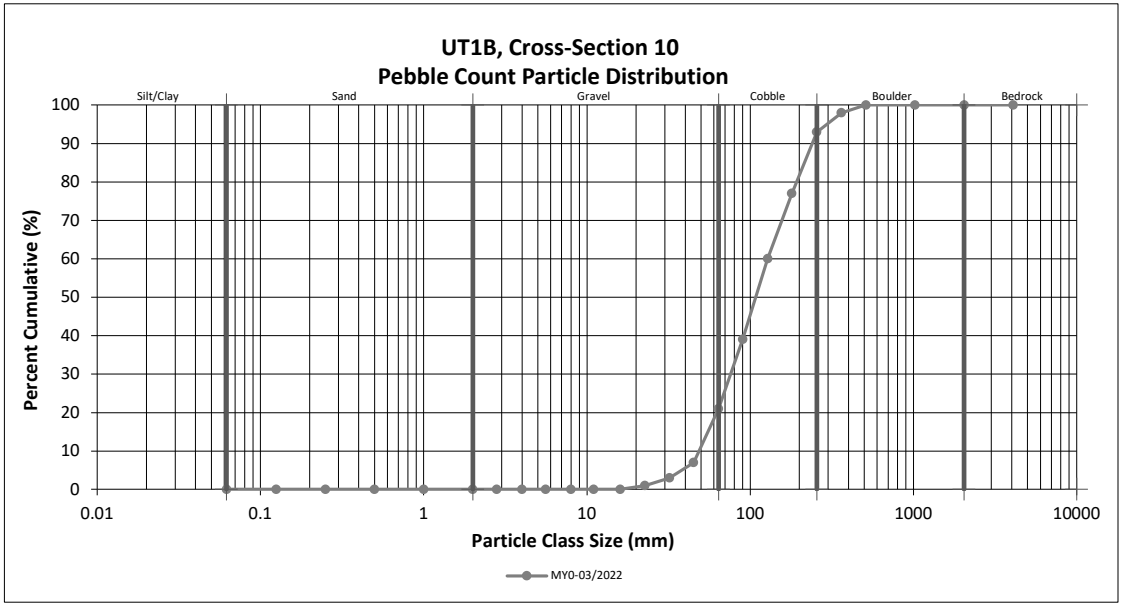
Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT1B, Cross-Section 10

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062			0
SAND	Very fine	0.062	0.125			0
	Fine	0.125	0.250			0
	Medium	0.25	0.50			0
	Coarse	0.5	1.0			0
	Very Coarse	1.0	2.0			0
GRAVEL	Very Fine	2.0	2.8			0
	Very Fine	2.8	4.0			0
	Fine	4.0	5.6			0
	Fine	5.6	8.0			0
	Medium	8.0	11.0			0
	Medium	11.0	16.0			0
	Coarse	16.0	22.6	1	1	1
	Coarse	22.6	32	2	2	3
	Very Coarse	32	45	4	4	7
	Very Coarse	45	64	14	14	21
COBBLE	Small	64	90	18	18	39
	Small	90	128	21	21	60
	Large	128	180	17	17	77
	Large	180	256	16	16	93
BOULDER	Small	256	362	5	5	98
	Small	362	512	2	2	100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 10	
Channel materials (mm)	
D_{16} =	56.44
D_{35} =	83.43
D_{50} =	108.2
D_{84} =	210.0
D_{95} =	294.1
D_{100} =	512.0



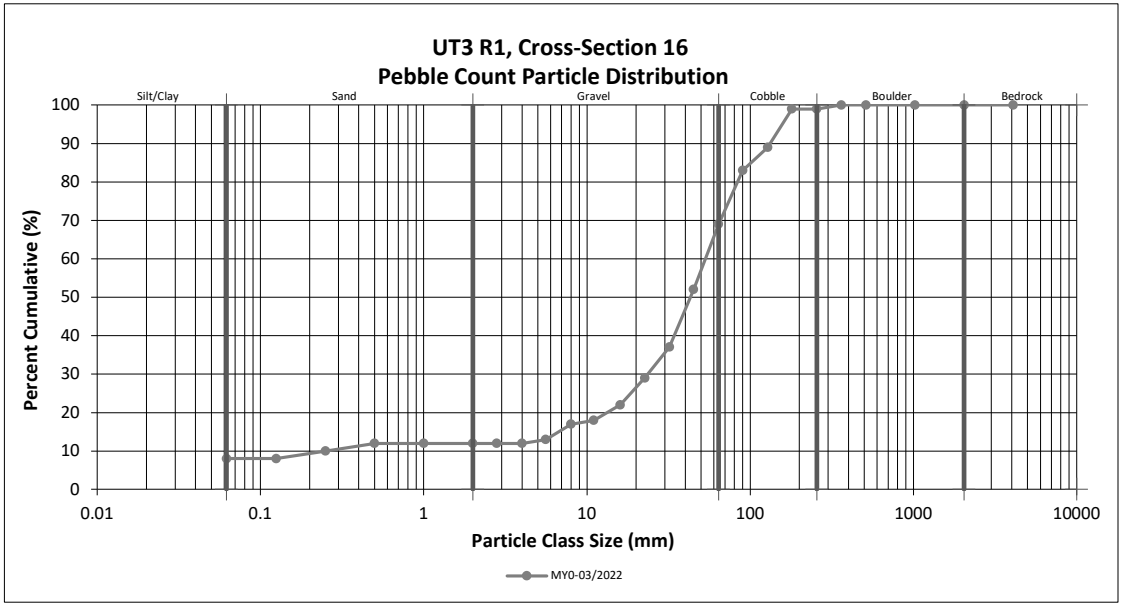
Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT3 R1, Cross-Section 16

Particle Class		Diameter (mm)		Riffle 100-Count	Summary	
		min	max		Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	8	8	8
SAND	Very fine	0.062	0.125			8
	Fine	0.125	0.250	2	2	10
	Medium	0.25	0.50	2	2	12
	Coarse	0.5	1.0			12
	Very Coarse	1.0	2.0			12
GRAVEL	Very Fine	2.0	2.8			12
	Very Fine	2.8	4.0			12
	Fine	4.0	5.6	1	1	13
	Fine	5.6	8.0	4	4	17
	Medium	8.0	11.0	1	1	18
	Medium	11.0	16.0	4	4	22
	Coarse	16.0	22.6	7	7	29
	Coarse	22.6	32	8	8	37
	Very Coarse	32	45	15	15	52
	Very Coarse	45	64	17	17	69
COBBLE	Small	64	90	14	14	83
	Small	90	128	6	6	89
	Large	128	180	10	10	99
	Large	180	256			99
BOULDER	Small	256	362	1	1	100
	Small	362	512			100
	Medium	512	1024			100
	Large/Very Large	1024	2048			100
BEDROCK	Bedrock	2048	>2048			100
			Total	**100**	**100**	**100**

Cross-Section 16	
Channel materials (mm)	
D_{16} =	7.32
D_{35} =	29.34
D_{50} =	43.0
D_{84} =	95.4
D_{95} =	157.1
D_{100} =	362.0

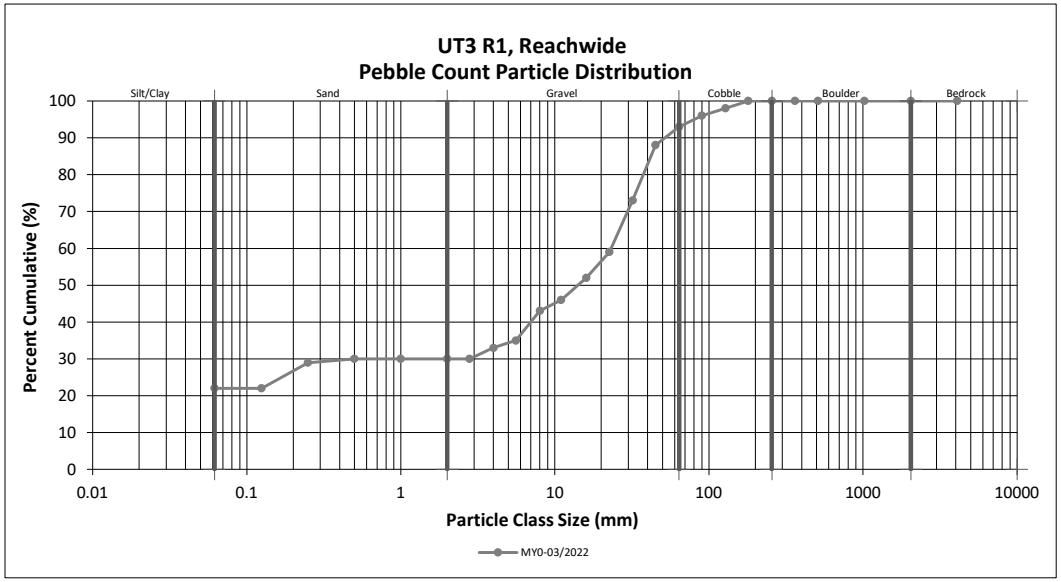


Reachwide and Cross-Section Pebble Count Plots

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

UT3 R1, Reachwide

Particle Class		Diameter (mm)		Particle Count			Reach Summary	
		min	max	Riffle	Pool	Total	Class Percentage	Percent Cumulative
SILT/CLAY	Silt/Clay	0.000	0.062	2	20	22	22	22
SAND	Very fine	0.062	0.125					22
	Fine	0.125	0.250		7	7	7	29
	Medium	0.25	0.50		1	1	1	30
	Coarse	0.5	1.0					30
	Very Coarse	1.0	2.0					30
GRAVEL	Very Fine	2.0	2.8					30
	Very Fine	2.8	4.0		3	3	3	33
	Fine	4.0	5.6		2	2	2	35
	Fine	5.6	8.0	1	7	8	8	43
	Medium	8.0	11.0	1	2	3	3	46
	Medium	11.0	16.0	3	3	6	6	52
	Coarse	16.0	22.6	5	2	7	7	59
	Coarse	22.6	32	9	5	14	14	73
	Very Coarse	32	45	11	4	15	15	88
	Very Coarse	45	64	3	2	5	5	93
COBBLE	Small	64	90	2	1	3	3	96
	Small	90	128	1	1	2	2	98
	Large	128	180	2		2	2	100
	Large	180	256					100
BOULDER	Small	256	362					100
	Small	362	512					100
	Medium	512	1024					100
	Large/Very Large	1024	2048					100
BEDROCK	Bedrock	2048	>2048					100
			Total	**40**	**60**	**100**	**100**	**100**



Reachwide	
Channel materials (mm)	
D_{16} =	Silt/Clay
D_{35} =	5.60
D_{50} =	14.1
D_{84} =	41.1
D_{95} =	80.3
D_{100} =	180.0

APPENDIX D. PROJECT TIMELINE AND CONTACT INFO

Table 10. Project Activity and Reporting History

Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Activity or Deliverable		Data Collection Complete	Task Completion or Deliverable Submission
Project Instituted		NA	November 2019
Mitigation Plan Approved		NA	September 2021
Construction (Grading) Completed		NA	February 2022
Planting Completed		NA	March 2022
As-Built Survey Completed		March 2022	March 2022
Baseline Monitoring Document (Year 0)	Stream Survey	March 2022	July 2022
	Vegetation Survey	March 2022	
Invasive Vegetation Treatment			March 2022
Year 1 Monitoring	Stream Survey	2022	December 2022
	Vegetation Survey	2022	
Year 2 Monitoring	Stream Survey	2023	December 2023
	Vegetation Survey	2023	
Year 3 Monitoring	Stream Survey	2024	December 2024
	Vegetation Survey	2024	
Year 4 Monitoring			December 2025
Year 5 Monitoring	Stream Survey	2026	December 2026
	Vegetation Survey	2026	
Year 6 Monitoring			December 2027
Year 7 Monitoring	Stream Survey	2028	December 2028
	Vegetation Survey	2028	

Table 11. Project Contact Table

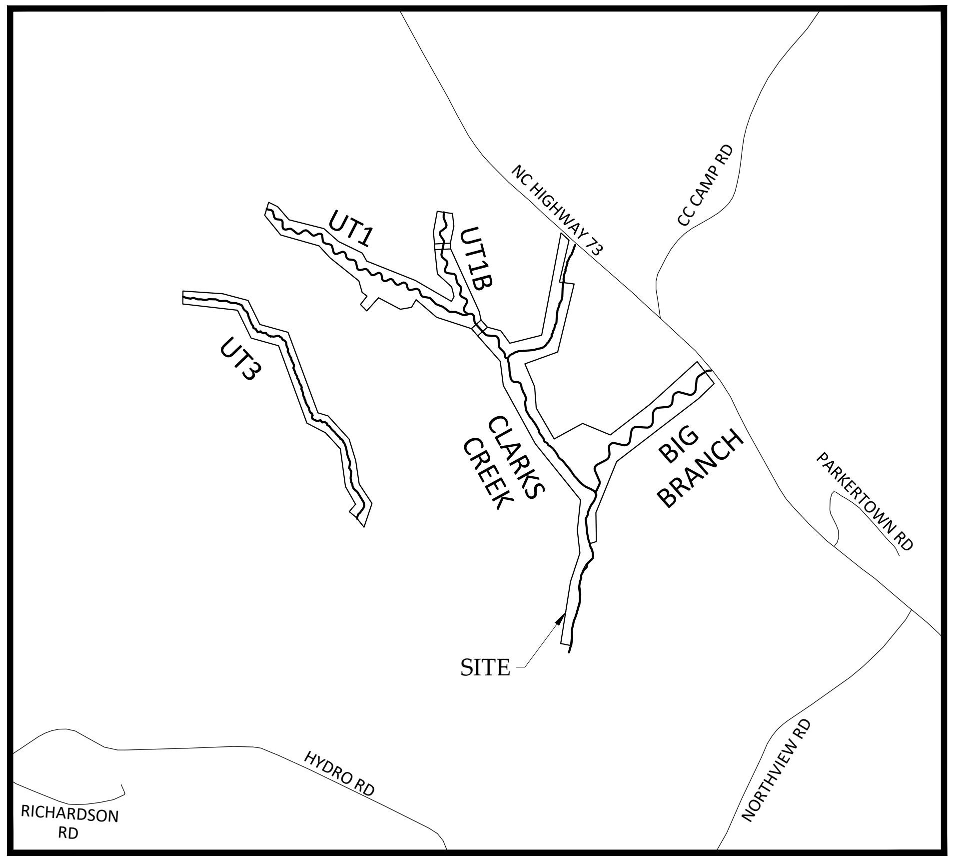
Cross Creek Ranch Site
DMS Project No. 100138
Monitoring Year 0 - 2022

Designer Abigail Vieira, PE	**Wildlands Engineering, Inc.** 312 West Millbrook Road, Suite 225 Raleigh, NC 27609 919.851.9986	
Construction Contractors	**Wildlands Construction** 312 West Millbrook Road, Suite 225 Raleigh, NC 27609	**Main Stream Earthwork, Inc.** 631 Camp Dan Valley Rd. Reidsville, NC 27320
Monitoring Performers Monitoring, POC	**Wildlands Engineering, Inc.** Jason Lorch 919.851.9986	

APPENDIX E. RECORD DRAWINGS

Cross Creek Ranch Site Record Drawings

Montgomery County, North Carolina
for
NC DEQ
Division of Mitigation Services



Vicinity Map
Not to Scale

N

NC Environmental Quality

As-Built and Record Drawings
August 25, 2022

Project Information

Stream	Latitude	Longitude
Clarks Creek	N35° 14' 08.6"	W80° 01' 20.7"
Big Branch	N35° 13' 55.9"	W80° 01' 04.4"
UT1	N35° 14' 10.8"	W80° 01' 59.7"
UT1B	N35° 14' 12.1"	W80° 01' 37.4"
UT3	N35° 14' 03.1"	W80 °02' 09.5"

Sheet Index

Project Directory

Engineering:
Wildlands Engineering, Inc
License No. F-0831
312 W. Millbrook Rd, Suite 225
Raleigh, NC 27609
Jefferson Keaton, PE, Project Manager
Abigail Vieira, PE, Project Engineer
919-851-9986

Surveying:
Kee Mapping and Surveying, PA
88 Central Avenue
Asheville, NC 28801
Drew V. Duinkerken, PLS
828-645-8275

Owner:
DEQ NCDMS
1652 Mail Service Center
Raleigh, NC 27699-1652
Attention: Kelly Phillips
919-723-7565

NCDEQ Contract No. 7879-01
DMS ID No. 100138
USACE Action ID No. 2020-00051
Yadkin River Basin
HUC 03040104
DWR No. 20200016

WILDLANDS ENGINEERING
312 W. Millbrook Rd, Suite 225
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Tel: 919.851.9986
License No. F-0831

Cross Creek Ranch Site
Montgomery County, North Carolina

Title Sheet

Date: 07.11.2022
Job Number: 005-02186
Project Engineer: ARV
Drawn By: FHM
Checked By: TWW

Sheet 0.1

Pre-Construction Features

- PRE-CONSTRUCTION STORM PIPE
- PRE-CONSTRUCTION PROPERTY LINE
- OVERHEAD UTILITY EASEMENT
- OVERHEAD UTILITY LINE
- UNDERGROUND UTILITY EASEMENT
- UNDERGROUND UTILITY LINE
- RIGHT OF WAY
- PRE-CONSTRUCTION BEDROCK
- PRE-CONSTRUCTION FARM ROAD
- PRE-CONSTRUCTION ASPHALT ROAD
- PRE-CONSTRUCTION WETLAND
- PRE-CONSTRUCTION DEBRIS AREA
- PRE-CONSTRUCTION BUILDING

Design Features

- 100+00 DESIGN NOT FOR CREDIT
- 100+00 DESIGN PRESERVATION
- 100+00 DESIGN ENHANCEMENT II
- 100+00 DESIGN RESTORATION
- DESIGN BANKFULL
- DESIGN MAJOR CONTOUR
- DESIGN MINOR CONTOUR
- DESIGN CONSERVATION EASEMENT
- DESIGN CONSERVATION EASEMENT INTERNAL CROSSING
- DESIGN FENCE
- DESIGN LOG VANE
- DESIGN LOG SILL
- DESIGN BOULDER SILL
- DESIGN LOG J-HOOK
- DESIGN BOULDER STEP POOL
- DESIGN BOULDER CASCADE
- DESIGN CULVERT
- DESIGN LOG STEP POOL
- DESIGN TYPICAL UTILITY CONDUIT
- DESIGN RIFFLE
- DESIGN STREAM BANK GRADING
- DESIGN WETLAND RE-ESTABLISHMENT
- DESIGN WETLAND REHABILITATION
- DESIGN ROCK OUTLET
- DESIGN WETLAND DITCH PLUG
- DESIGN BRUSH TOE
- DESIGN BOULDER TOE

As-Built Features

- AS-BUILT THALWAG
- AS-BUILT BANKFULL
- AS-BUILT MAJOR CONTOUR
- AS-BUILT MINOR CONTOUR
- AS-BUILT FENCE
- LIMITS OF DISTURBANCE
- XS-# CROSS-SECTION
- PP-## PHOTO POINT
- SG STREAM GAUGE
- GWG-# GROUNDWATER GAUGE
- VEG VP-## VEGETATION PLOT
- AS-BUILT LOG VANE
- AS-BUILT LOG SILL
- AS-BUILT BOULDER SILL
- AS-BUILT LOG J-HOOK
- AS-BUILT BOULDER STEP POOL
- AS-BUILT BOULDER CASCADE
- AS-BUILT CULVERT
- AS-BUILT LOG STEP POOL
- AS-BUILT TYPICAL UTILITY CONDUIT
- AS-BUILT RIFFLE
- AS-BUILT WETLAND RE-ESTABLISHMENT
- AS-BUILT WETLAND REHABILITATION
- AS-BUILT ROCK OUTLET
- AS-BUILT WETLAND DITCH PLUG
- AS-BUILT BRUSH TOE
- AS-BUILT BOULDER TOE

NOTES:
1. DEVIATIONS FROM THE DESIGN ARE SHOWN IN RED.

WILDLANDS ENGINEERING
312 W. Millbrook Rd, Suite 225
Raleigh, NC 27609
Tel: 919.851.9986
License No. F-0831

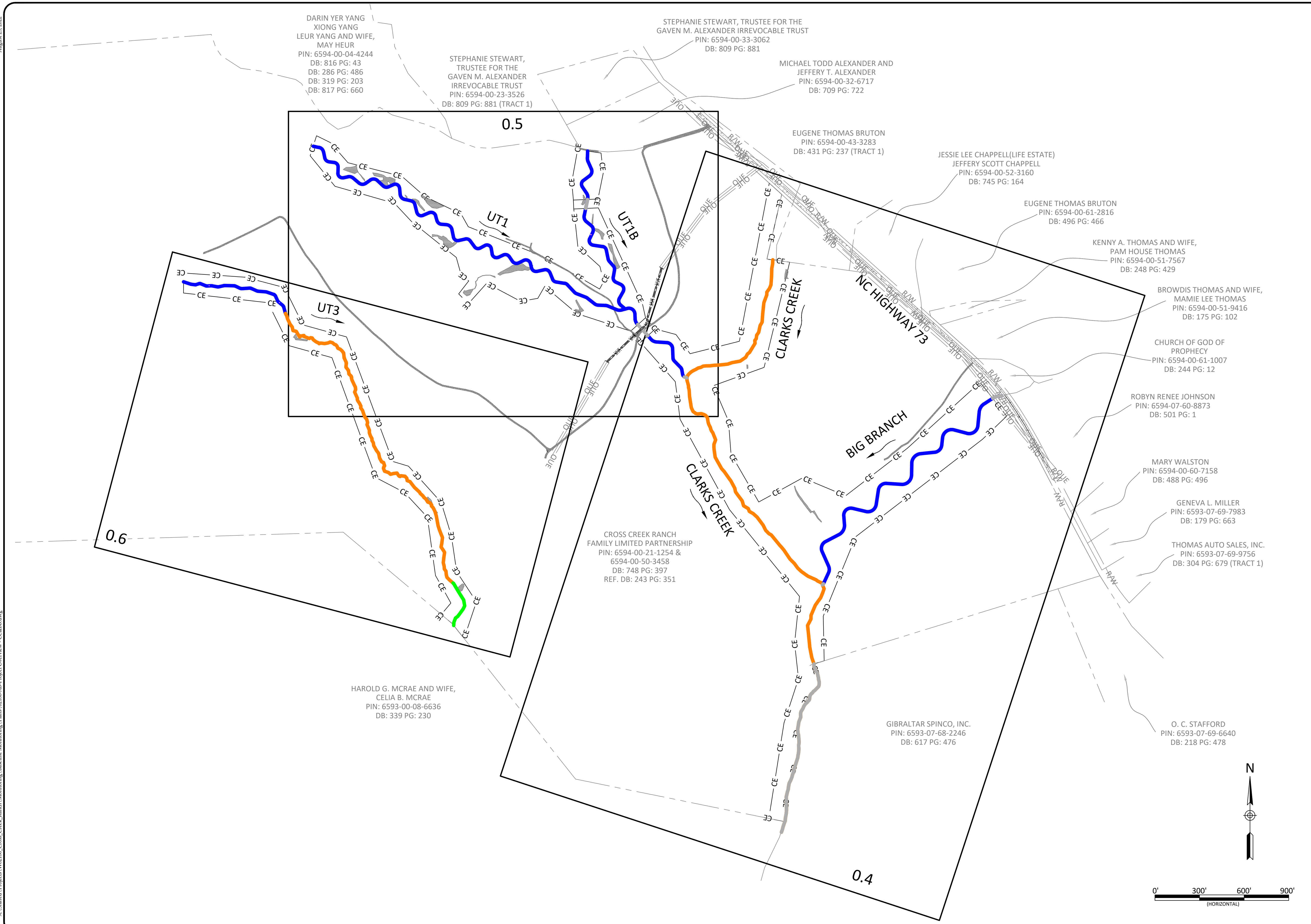
Cross Creek Ranch Site
Montgomery County, North Carolina

General Notes and Symbols

Revisions:

Date: 07.11.2022
Job Number: 005-02186
Project Engineer: ARV
Drawn By: FHM
Checked By: TWW

Sheet 0.2


DARIN YER YANG
XIONG YANG
LEUR YANG AND WIFE,
MAY HEUR
PIN: 6594-00-04-4244
DB: 816 PG: 43
DB: 286 PG: 486
DB: 319 PG: 203
DB: 817 PG: 660
STEPHANIE STEWART,
TRUSTEE FOR THE
GAVEN M. ALEXANDER
IRREVOCABLE TRUST
PIN: 6594-00-23-3526
DB: 809 PG: 881 (TRACT 1)
STEPHANIE STEWART, TRUSTEE FOR THE
GAVEN M. ALEXANDER IRREVOCABLE TRUST
PIN: 6594-00-33-3062
DB: 809 PG: 881
MICHAEL TODD ALEXANDER AND
JEFFERY T. ALEXANDER
PIN: 6594-00-32-6717
DB: 709 PG: 722
EUGENE THOMAS BRUTON
PIN: 6594-00-43-3283
DB: 431 PG: 237 (TRACT 1)
JESSIE LEE CHAPPELL(LIFE ESTATE)
JEFFERY SCOTT CHAPPELL
PIN: 6594-00-52-3160
DB: 745 PG: 164
EUGENE THOMAS BRUTON
PIN: 6594-00-61-2816
DB: 496 PG: 466
KENNY A. THOMAS AND WIFE,
PAM HOUSE THOMAS
PIN: 6594-00-51-7567
DB: 248 PG: 429
BROWDIS THOMAS AND WIFE,
MAMIE LEE THOMAS
PIN: 6594-00-51-9416
DB: 175 PG: 102
CHURCH OF GOD OF
PROPHECY
PIN: 6594-00-61-1007
DB: 244 PG: 12
ROBYN RENEE JOHNSON
PIN: 6594-07-60-8873
DB: 501 PG: 1
MARY WALSTON
PIN: 6594-00-60-7158
DB: 488 PG: 496
GENEVA L. MILLER
PIN: 6593-07-69-7983
DB: 179 PG: 663
THOMAS AUTO SALES, INC.
PIN: 6593-07-69-9756
DB: 304 PG: 679 (TRACT 1)
O. C. STAFFORD
PIN: 6593-07-69-6640
DB: 218 PG: 478
GIBRALTAR SPINCO, INC.
PIN: 6593-07-68-2246
DB: 617 PG: 476
CROSS CREEK RANCH
FAMILY LIMITED PARTNERSHIP
PIN: 6594-00-21-1254 &
6594-00-50-3458
DB: 748 PG: 397
REF. DB: 243 PG: 351
HAROLD G. MCRAE AND WIFE,
CELIA B. MCRAE
PIN: 6593-00-08-6636
DB: 339 PG: 230
0.5
0.6
0.4
UT1
UT1B
UT3
CLARKS CREEK
CLARKS CREEK
BIG BRANCH
NC HIGHWAY 73
CE
OHE
R/W
N
0'
300'
600'
900'
(HORIZONTAL)

August 25, 2022

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Raleigh, NC 27609
Tel: 919.851.9986
License No. F-0831

Cross Creek Ranch Site
Montgomery County, North Carolina

Project Overview

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

0.3

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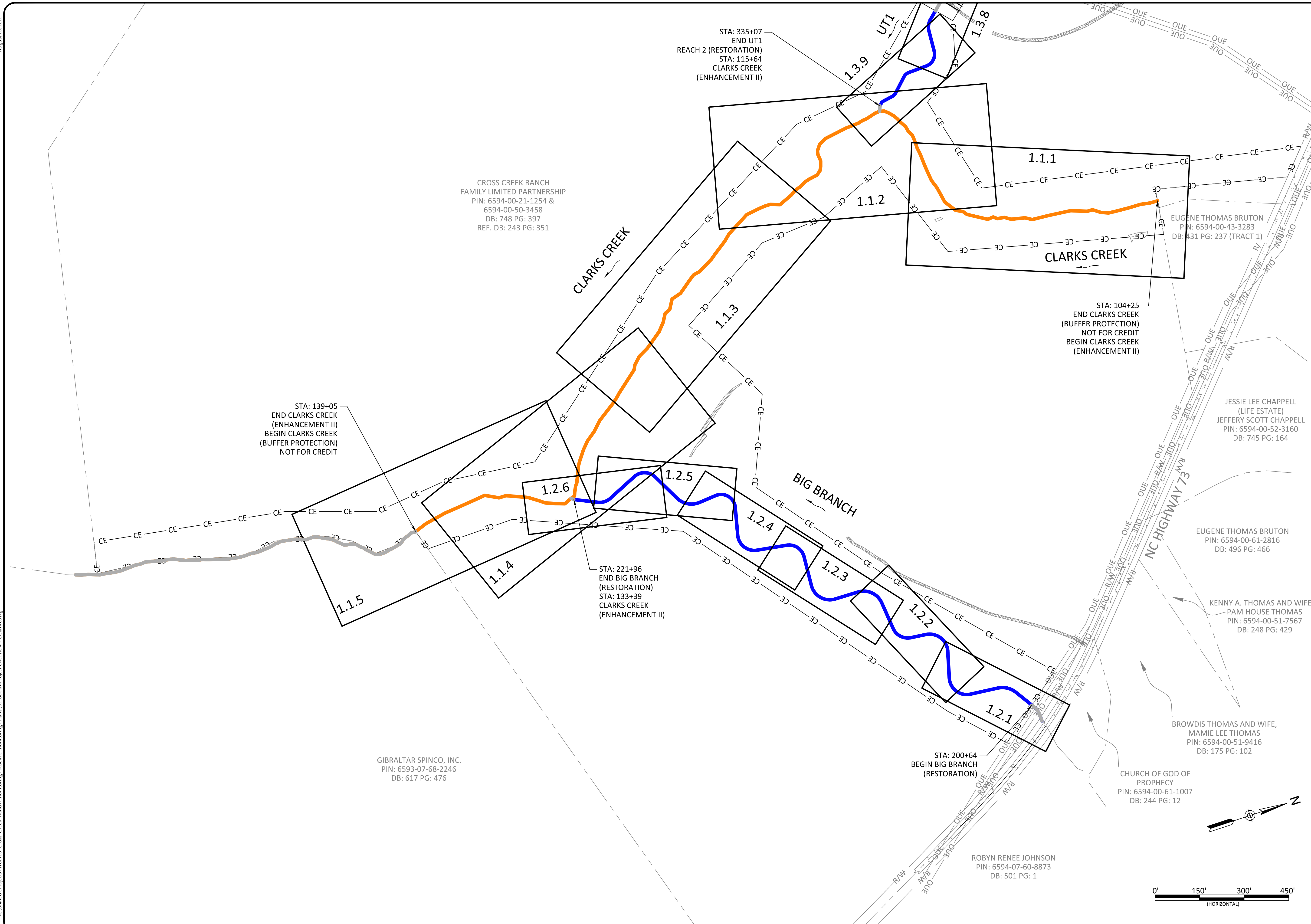

August 25, 2022

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Tel: 919.851.9986
License No. F-0831

NORTH CAROLINA PROFESSIONAL SEAL 048967 ENGINEER ABIGAIL R. VIERRA 7/11/22

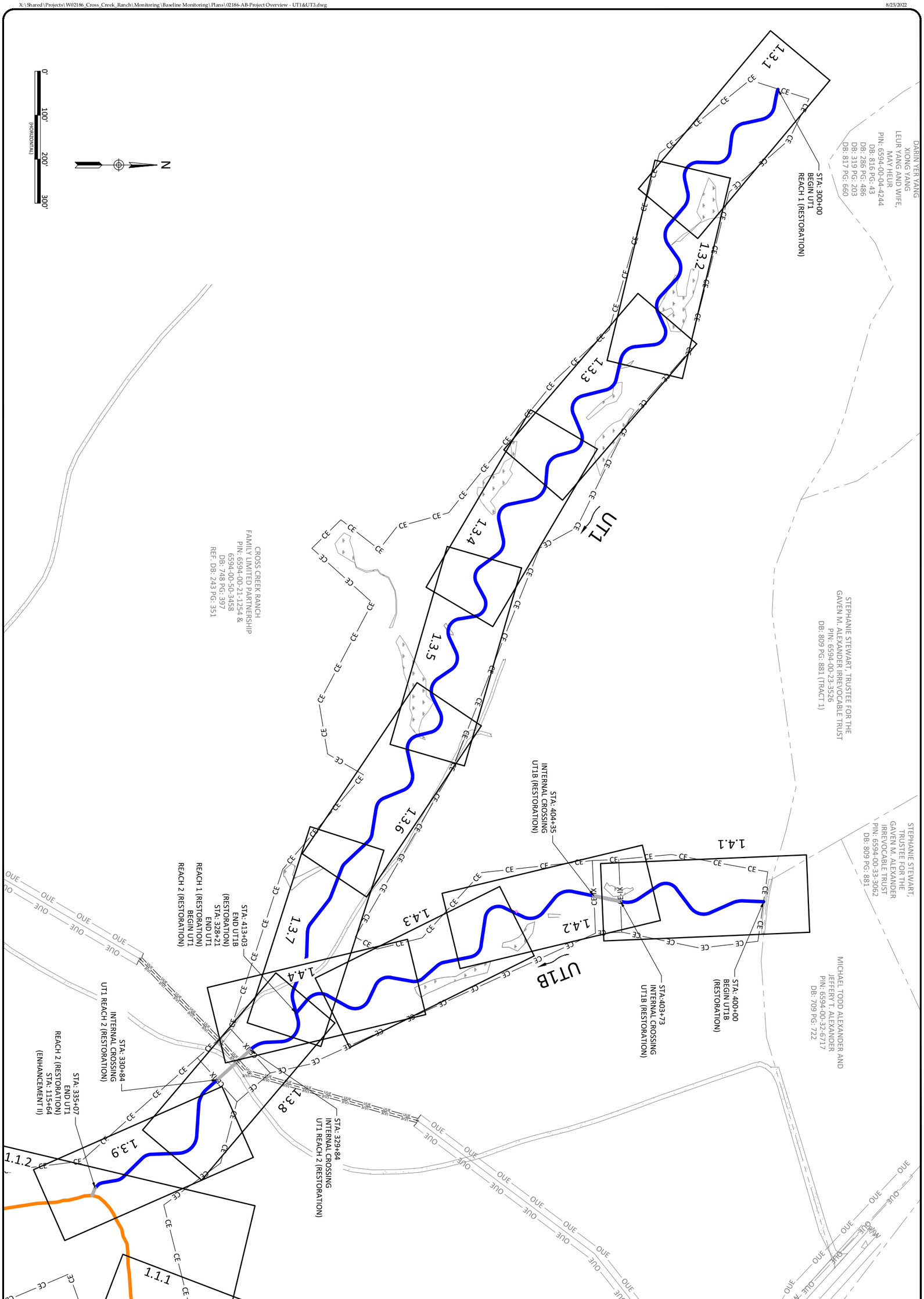
Cross Creek Ranch Site
Montgomery County, North Carolina

Clarks Creek and Big Branch
Project Overview

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 0.4



Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

0.5
Sheet

Cross Creek Ranch Site
Montgomery County, North Carolina

UT1 and UT1B
Project Overview

NORTH CAROLINA PROFESSIONAL SEAL 048967 ENGINEER ABIGAIL R. VIEIRA 11/8/22

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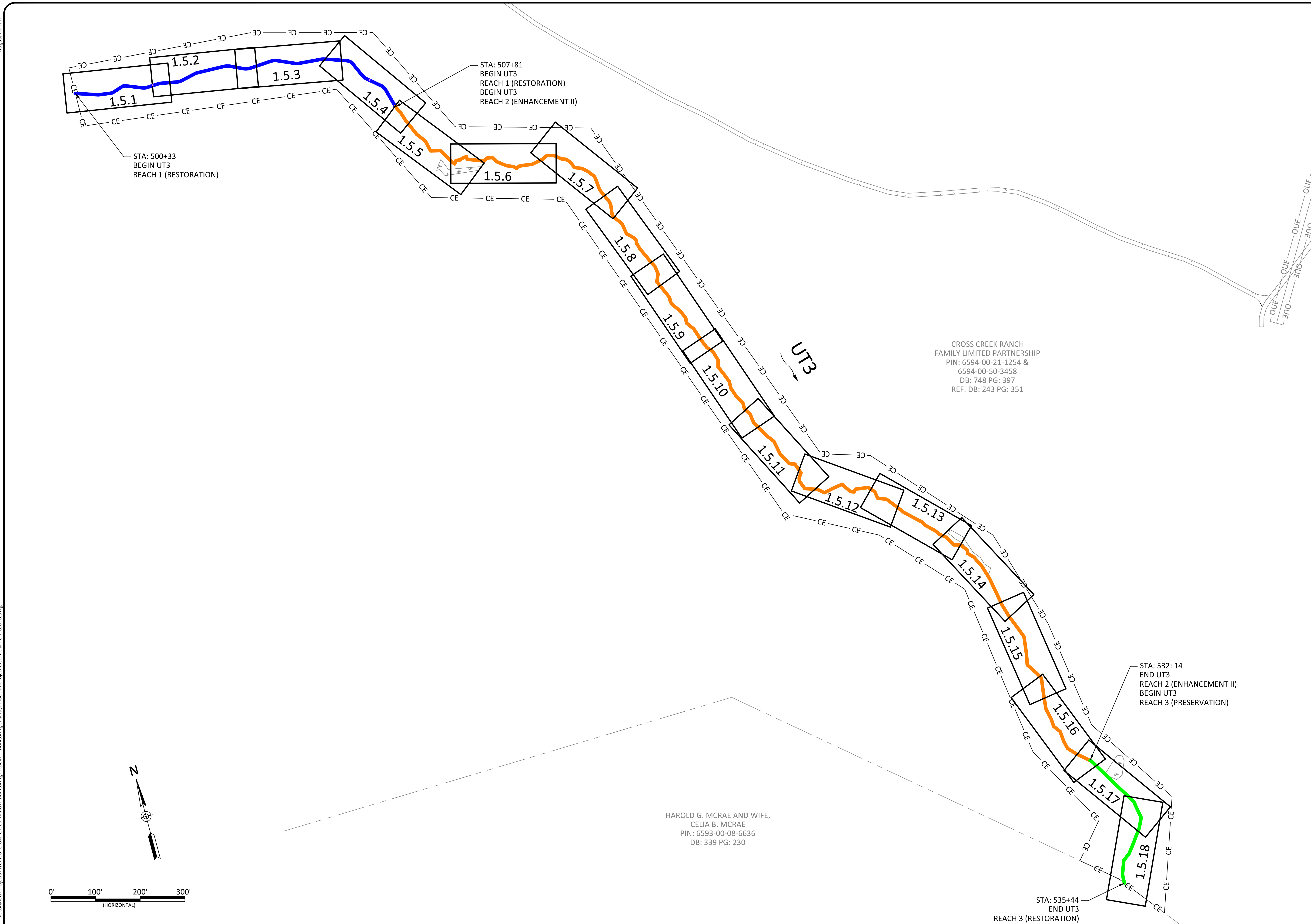

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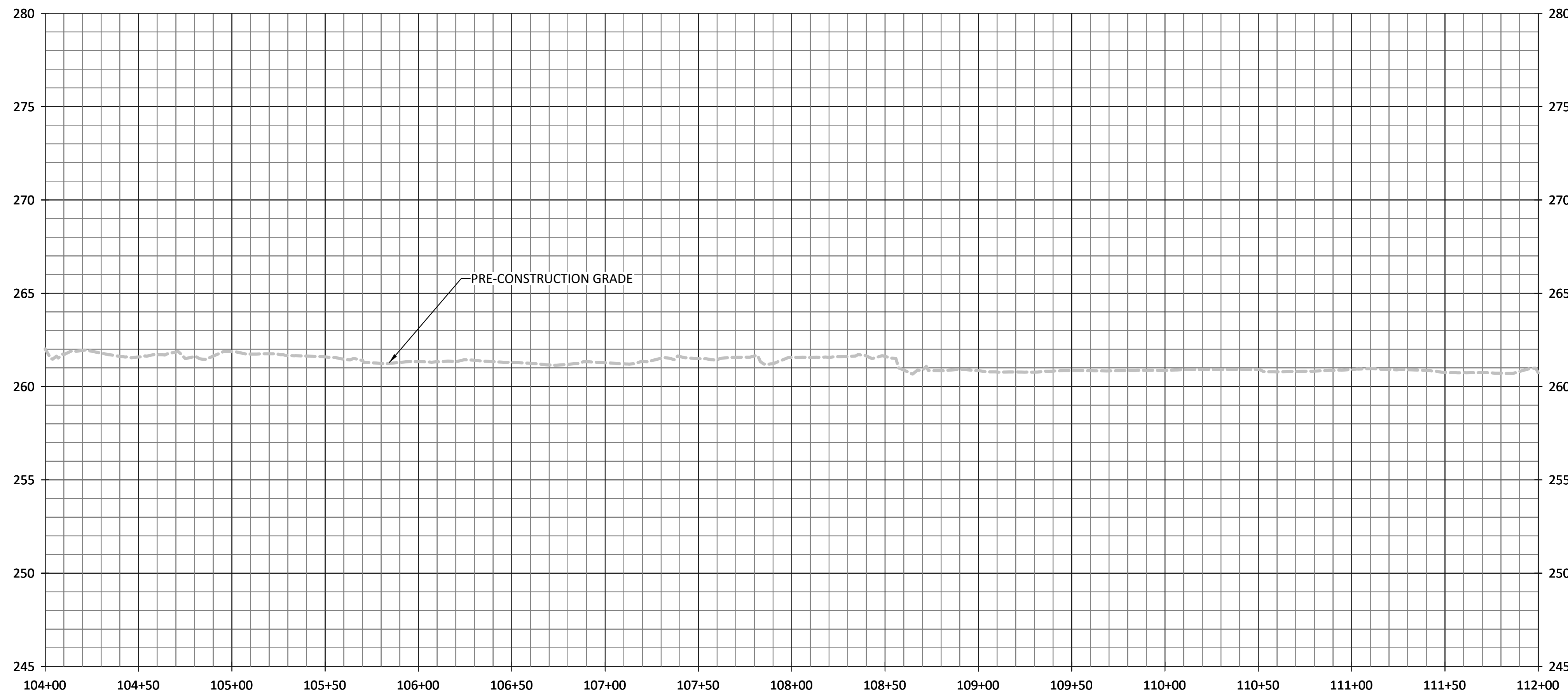
Cross Creek Ranch Site
Montgomery County, North Carolina

UT3
Project Overview

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

Sheet
0.6



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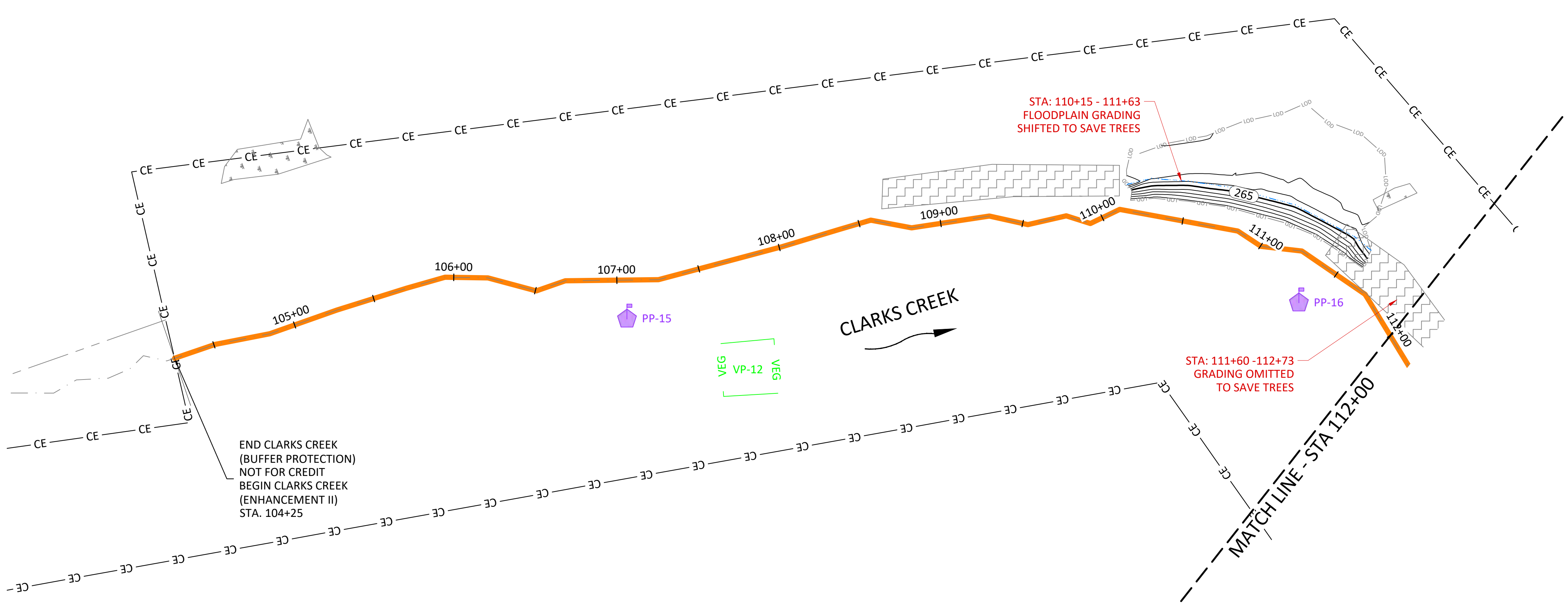

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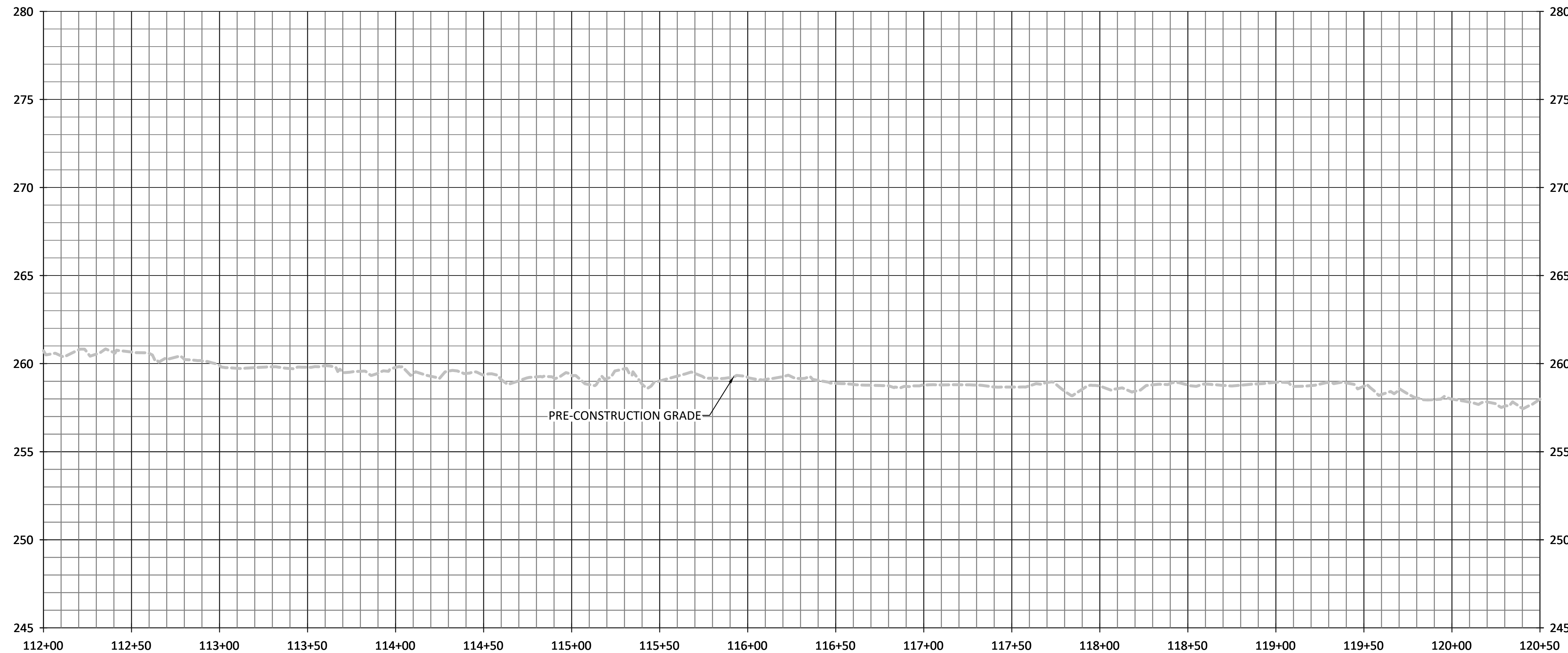
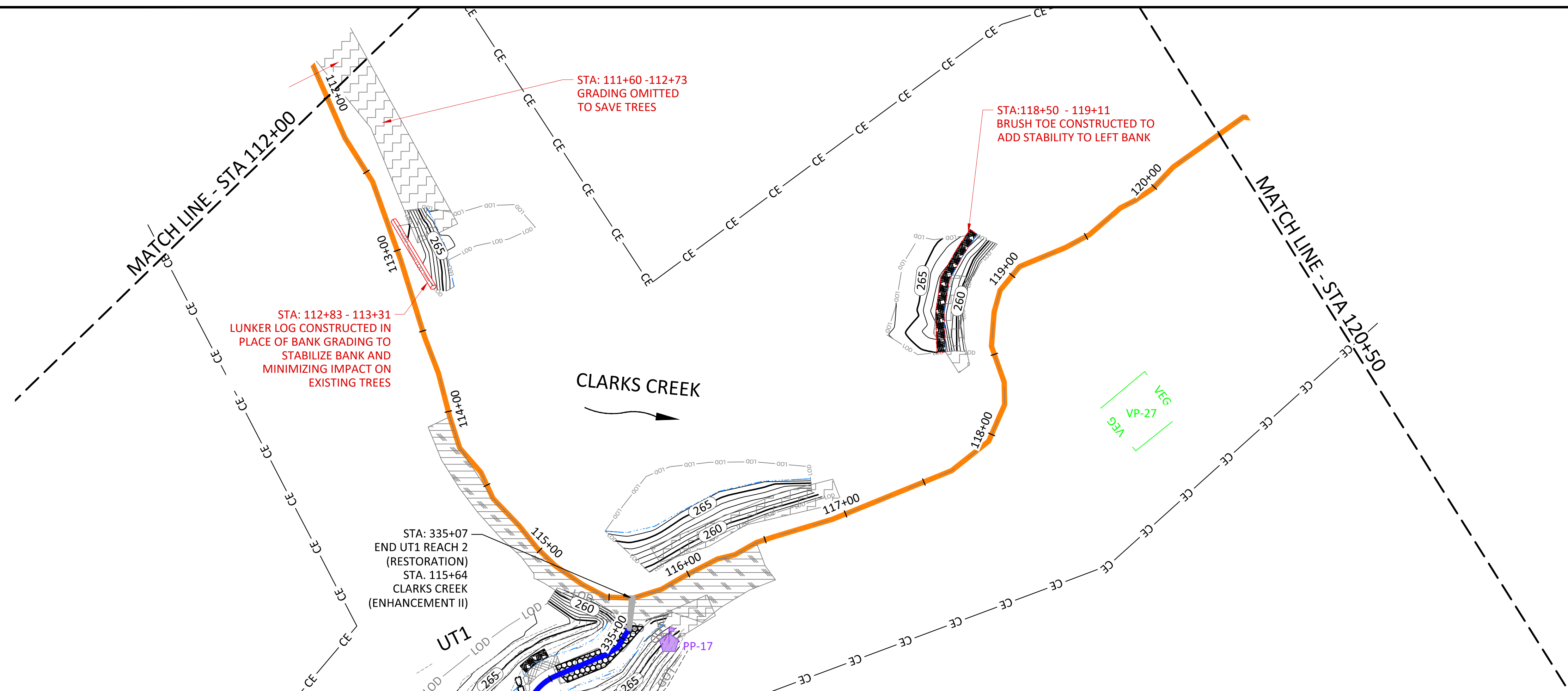
Cross Creek Ranch Site
Montgomery County, North Carolina

Clarks Creek
Stream Plan and Profile

Date: 07.11.2022
Job Number: 005-02186
Project Engineer: ARV
Drawn By: FHM
Checked By: TWW

Sheet 1.1.1





NOTES:
1. DEVIATIONS FROM THE DESIGN ARE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR UT1 IS ADDRESSED ON SHEETS 1.3.1 THROUGH 1.3.9

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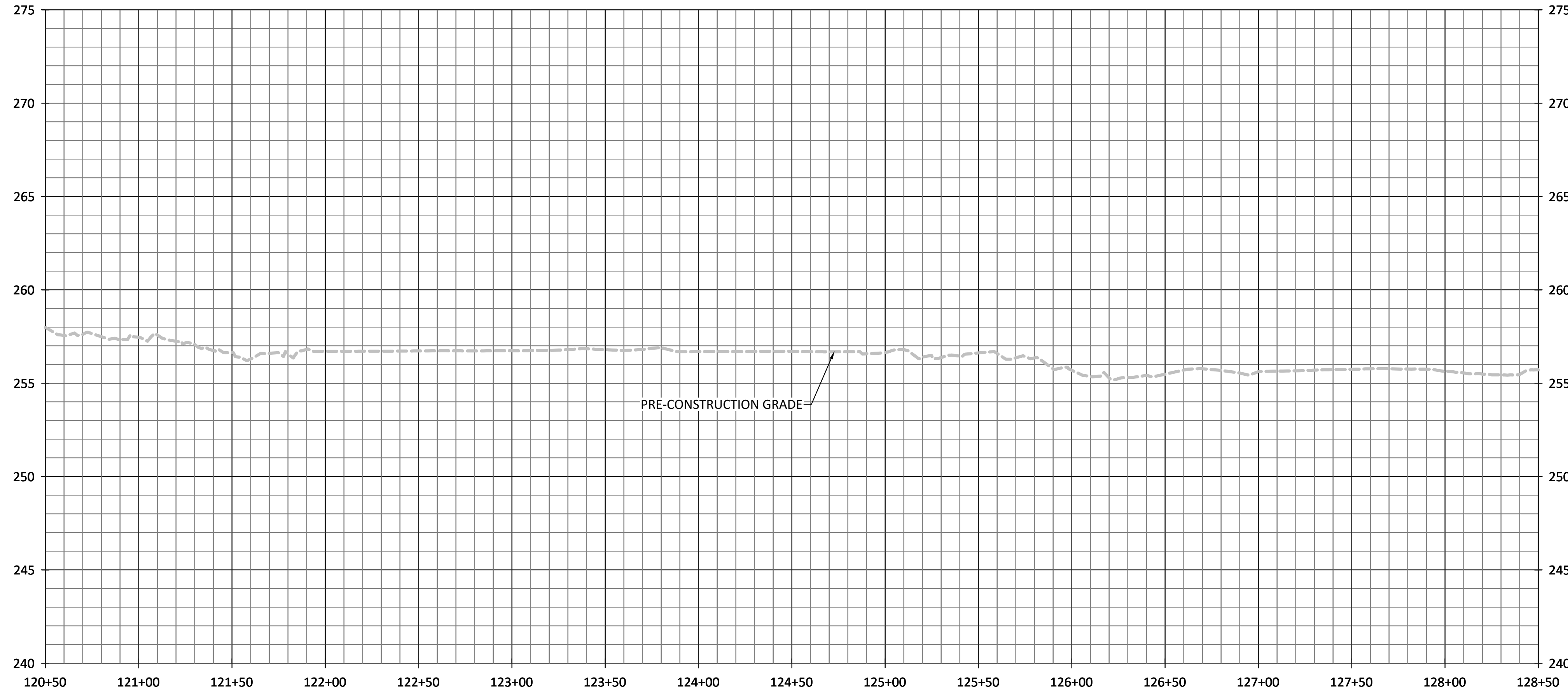
Cross Creek Ranch Site
Montgomery County, North Carolina

Clarks Creek
Stream Plan and Profile

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

Sheet 1.1.2



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(VERTICAL)

0' 40' 80' 120'
(HORIZONTAL)

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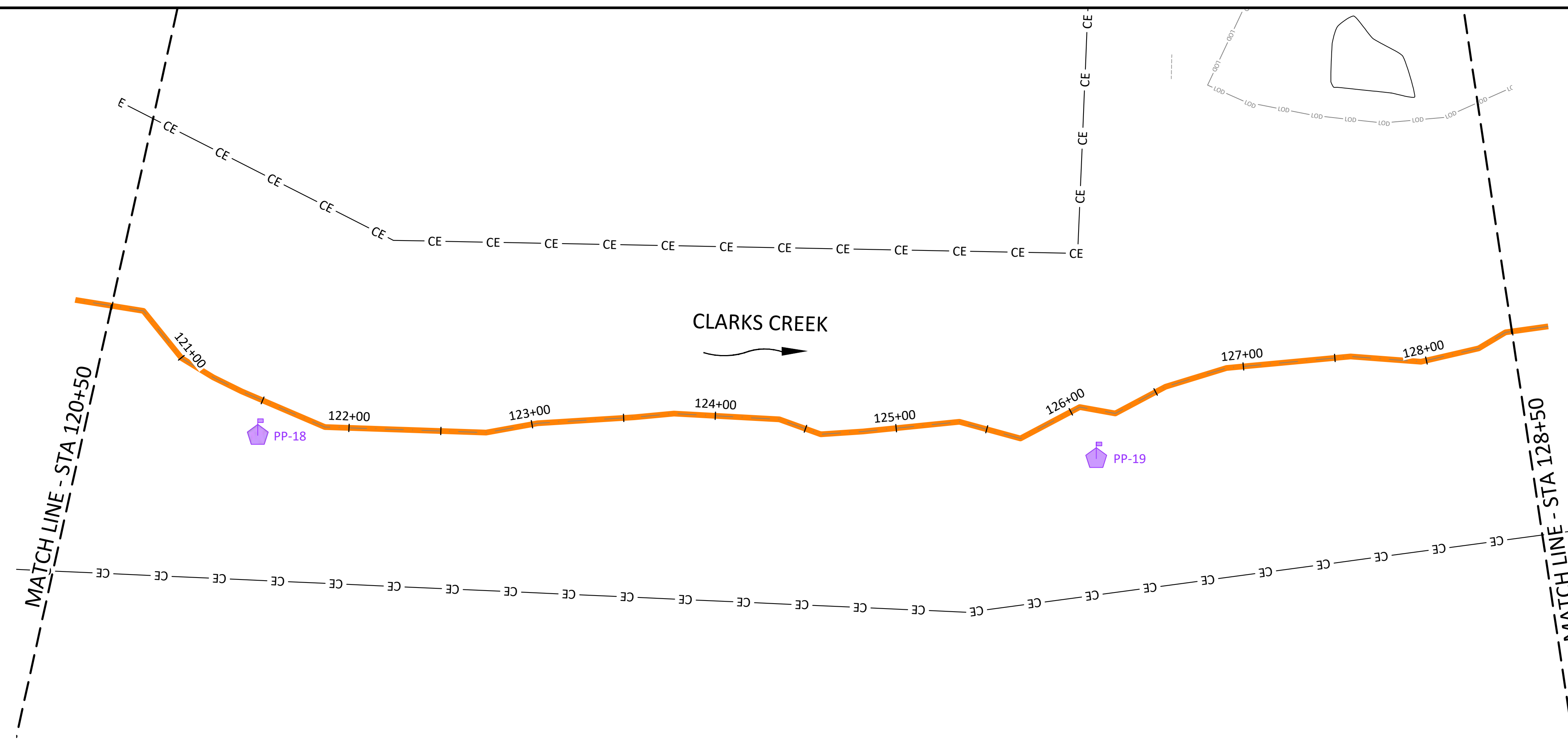

NOTES:
1. DEVIATIONS FROM THE DESIGN ARE SHOWN IN RED.

WILDLANDS ENGINEERING
312 W. Millbrook Rd, Suite 225
Raleigh, NC 27609
Tel: 919.851.9986
License No. F-0831

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 048967 ABIGAIL R. VIERA 7/11/22

Cross Creek Ranch Site
Montgomery County, North Carolina

Clarks Creek
Stream Plan and Profile

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

Sheet 1.1.3

August 25, 2022

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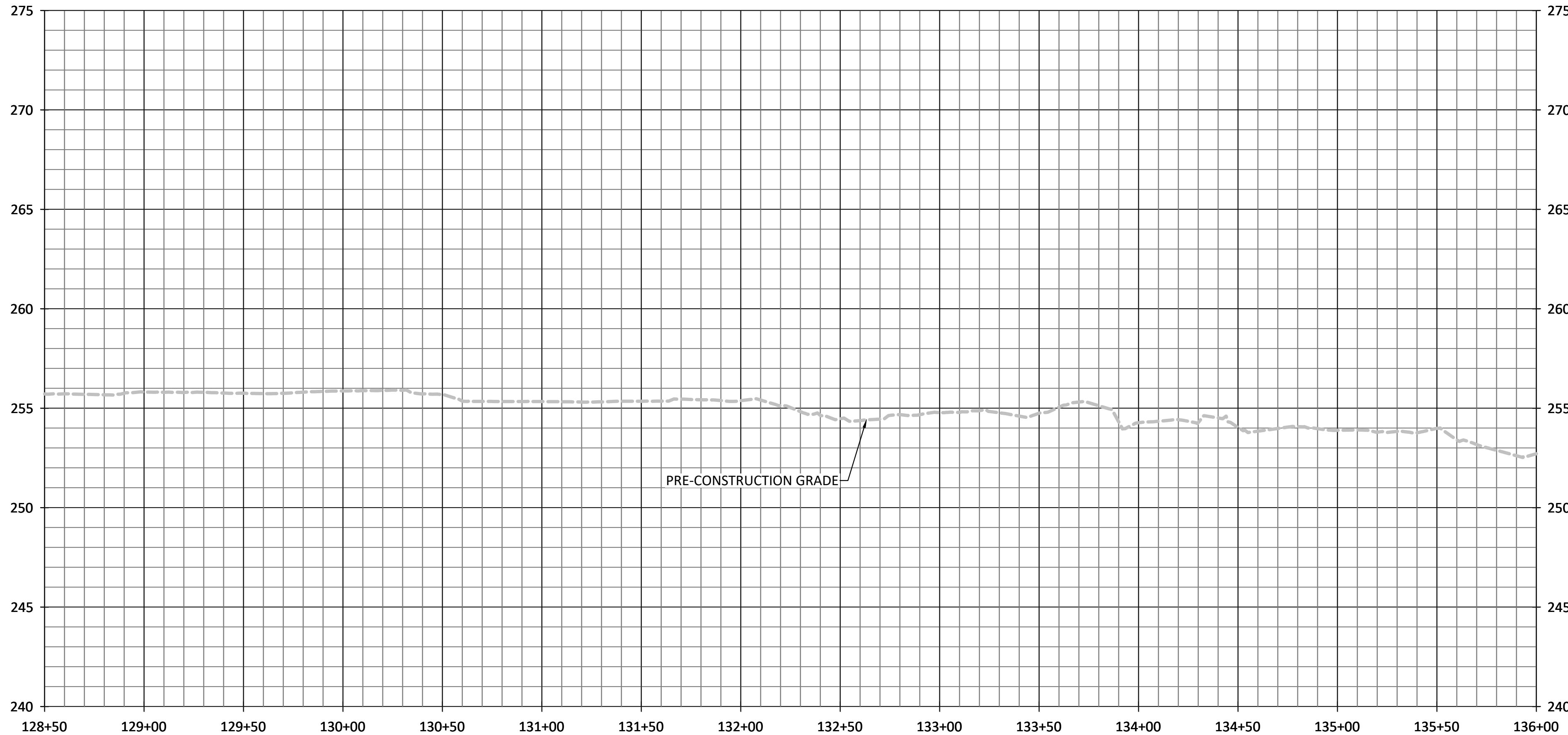
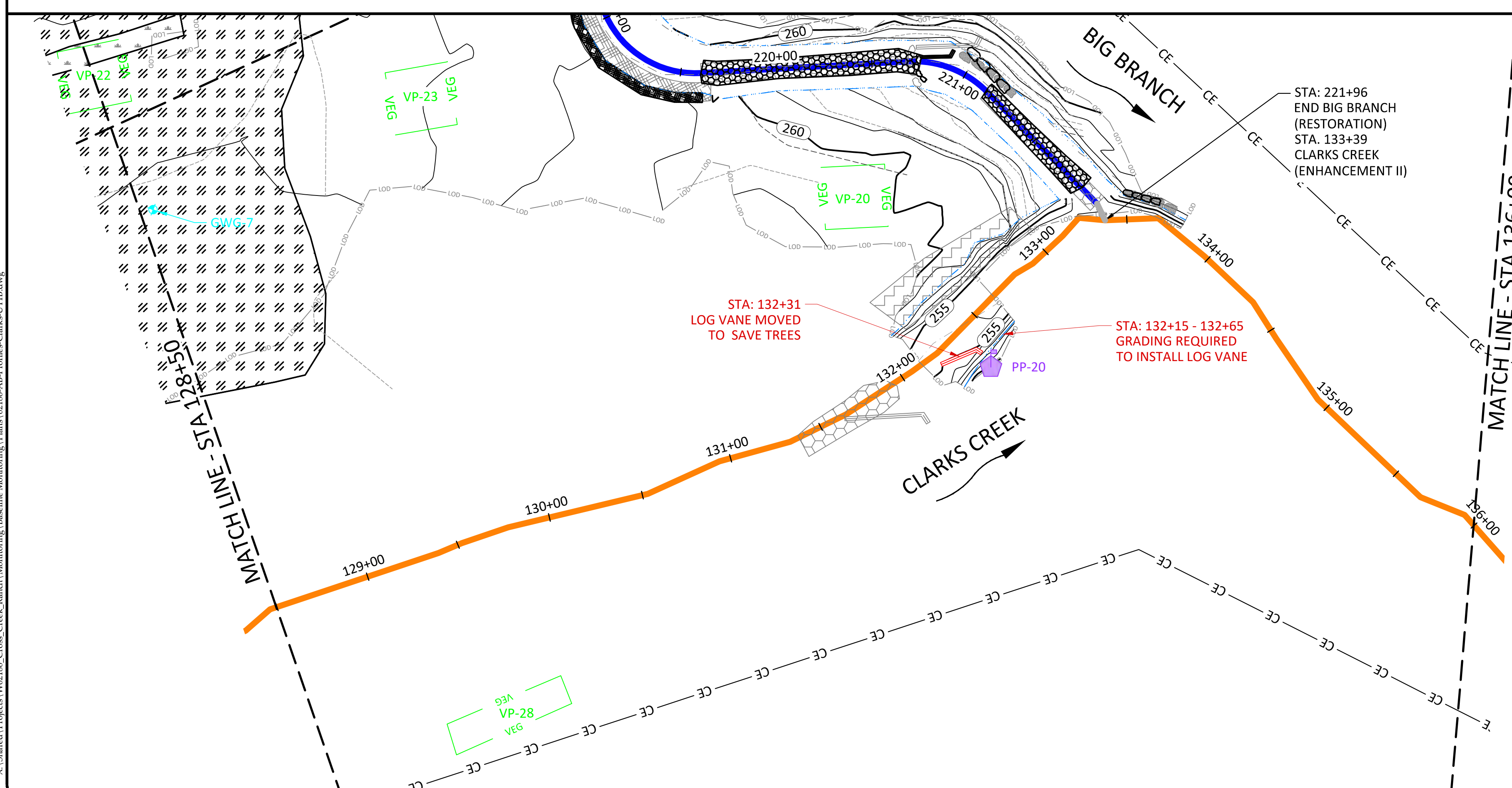
August 25, 2022



0' 4' 8' 12'
(VERTICAL)
0' 40' 80' 120'
(HORIZONTAL)



NOTES:
1. DEVIATIONS FROM THE DESIGN ARE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR BIG BRANCH IS ADDRESSED ON SHEETS 1.2.1 THROUGH 1.2.6

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312 W. Millbrook Rd, Suite 225
Raleigh, NC 27609
Tel: 919.851.9986
License No. F-0831

Cross Creek Ranch Site
Montgomery County, North Carolina

Clarks Creek
Stream Plan and Profile

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet
1.1.4

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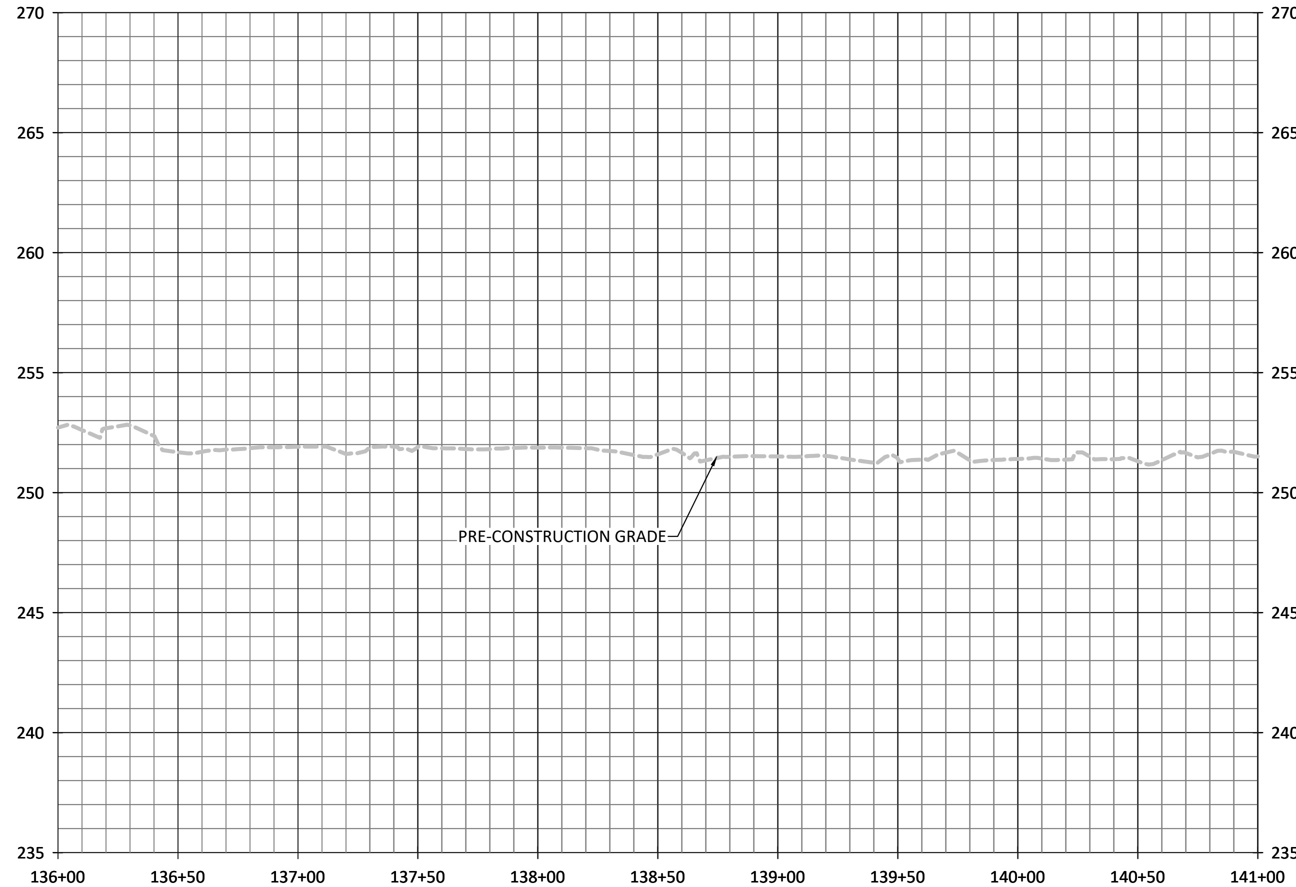
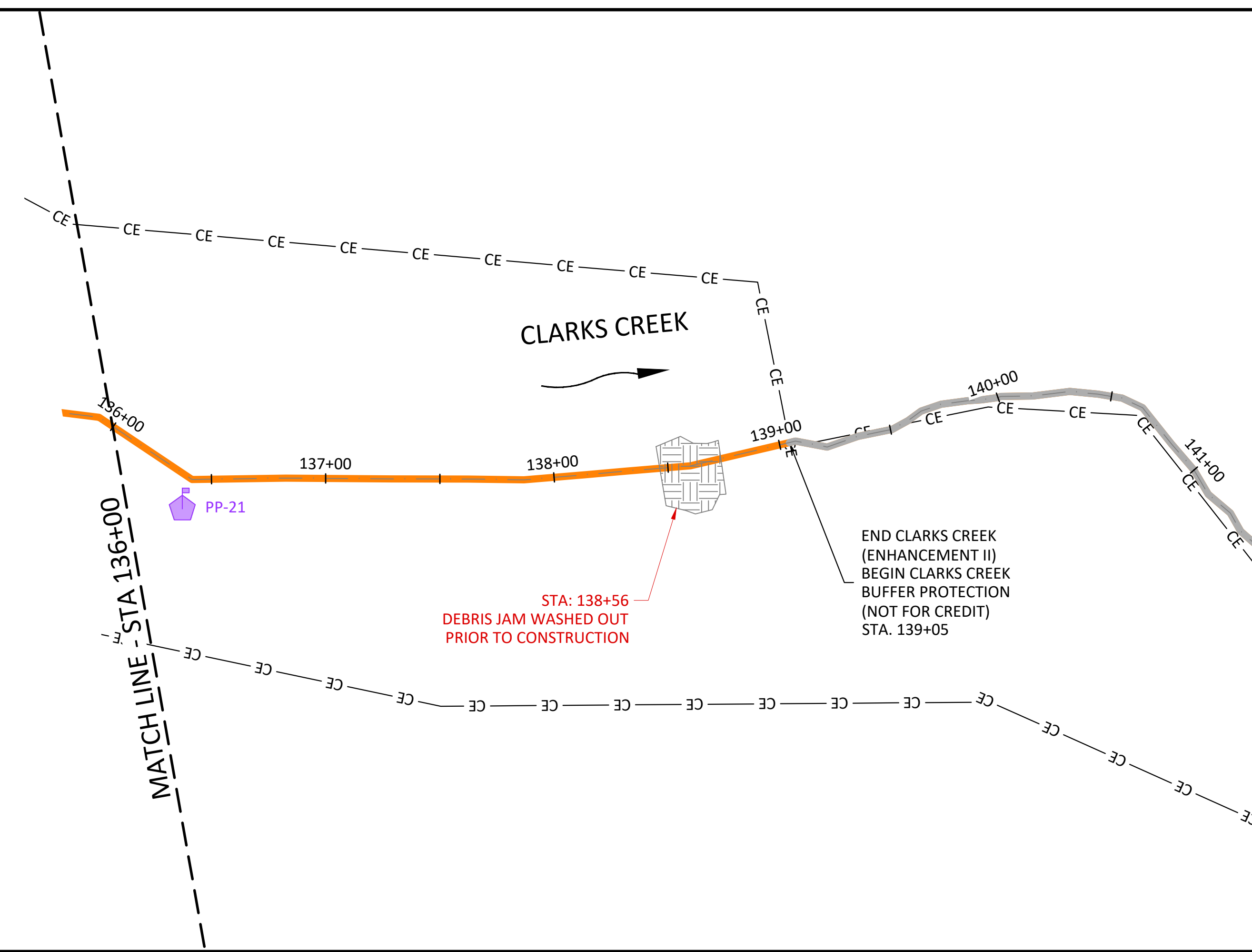
August 25, 2022



0' 4' 8' 12'
(VERTICAL)
0' 40' 80' 120'
(HORIZONTAL)

NOTES:
1. DEVIATIONS FROM THE DESIGN ARE SHOWN IN RED.



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NORTH CAROLINA PROFESSIONAL SEAL 048967 ENGINEER ABIGAIL R. VIEIRA 7/11/22

Cross Creek Ranch Site
Montgomery County, North Carolina

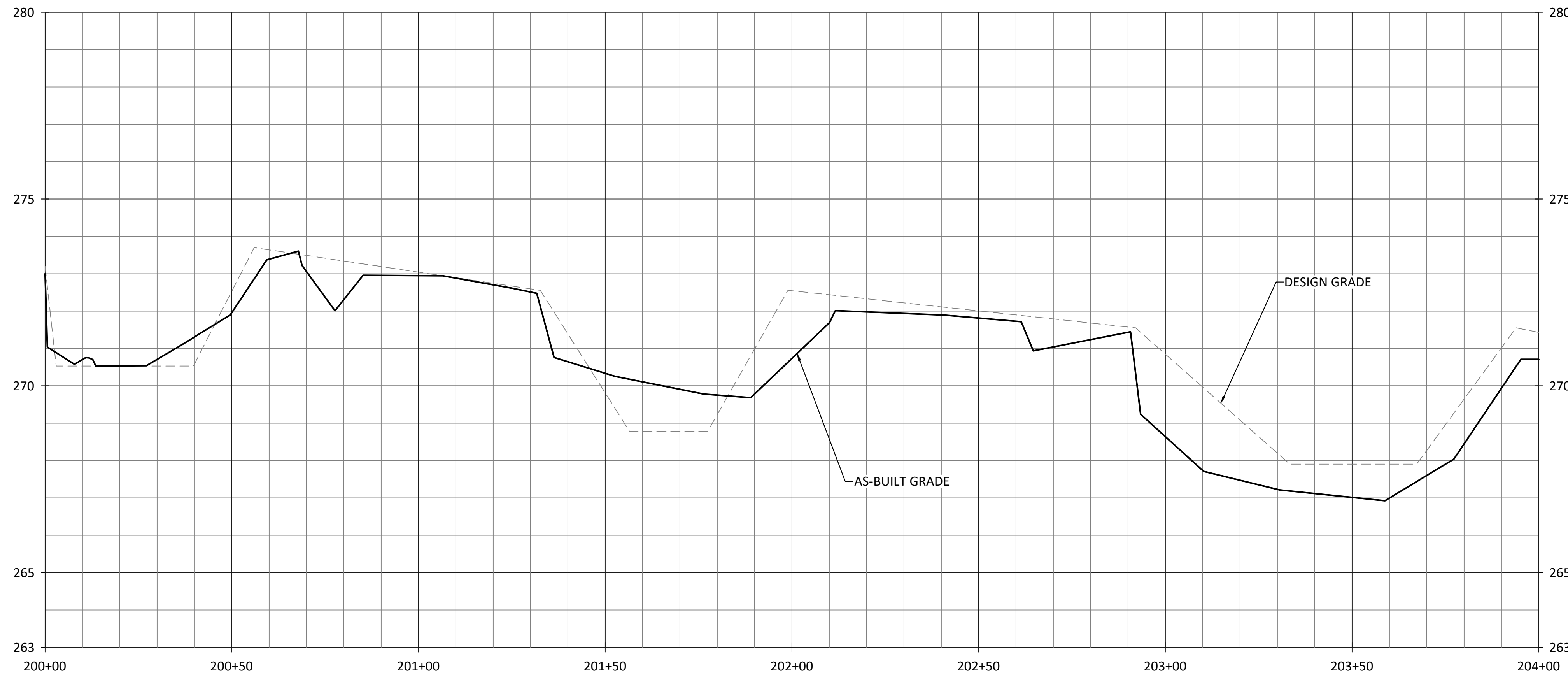
Clarks Creek
Stream Plan and Profile

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 1.1.5

August 25, 2022



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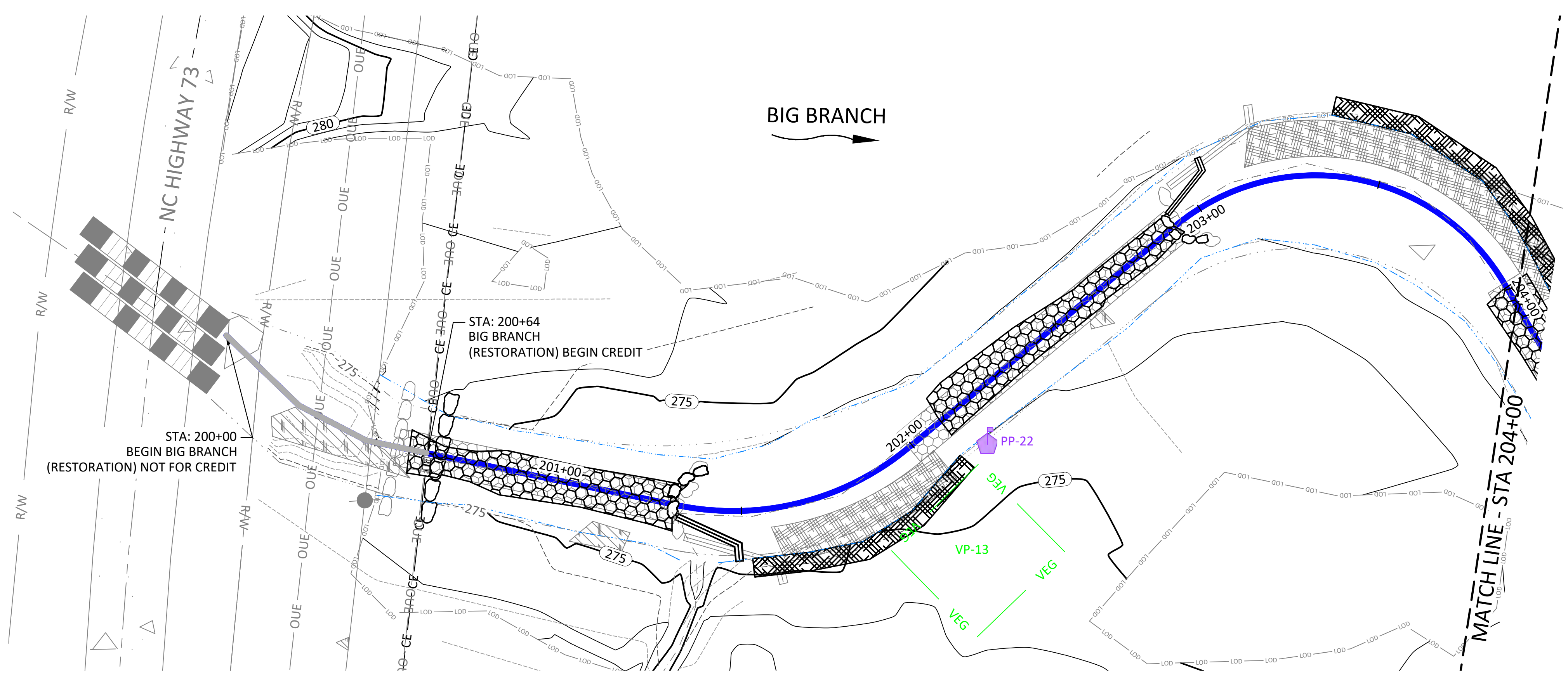
0' 20' 40' 60'
(HORIZONTAL)



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Cross Creek Ranch Site
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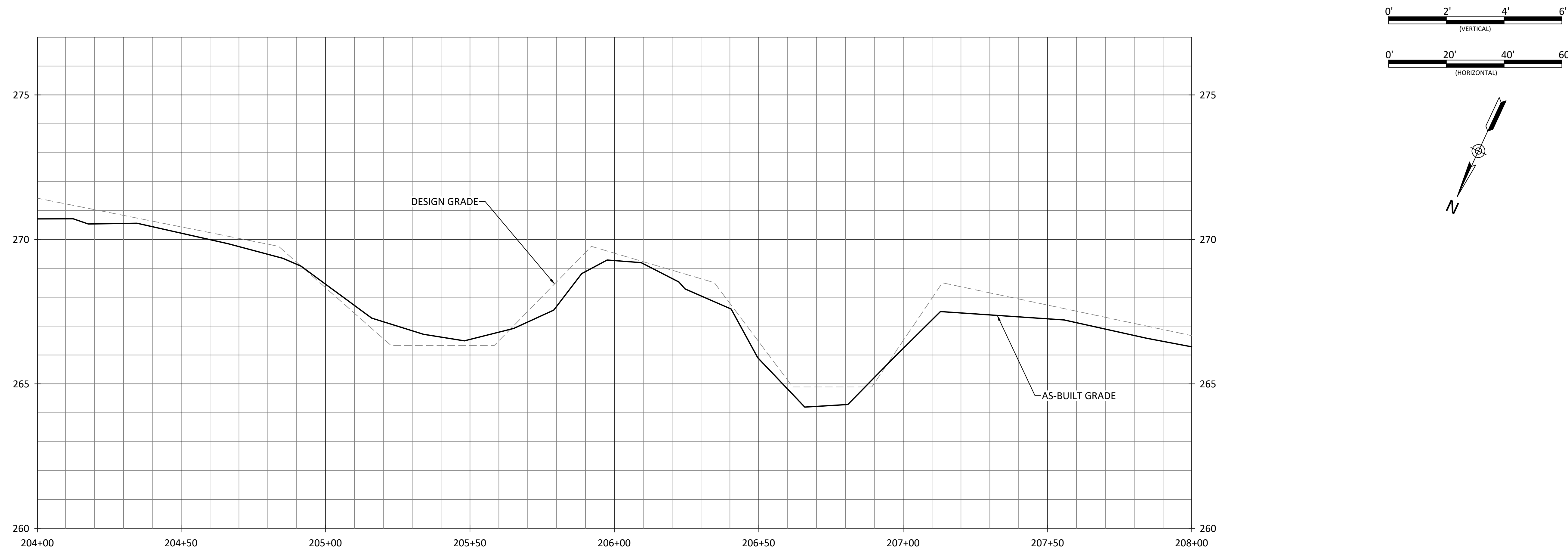
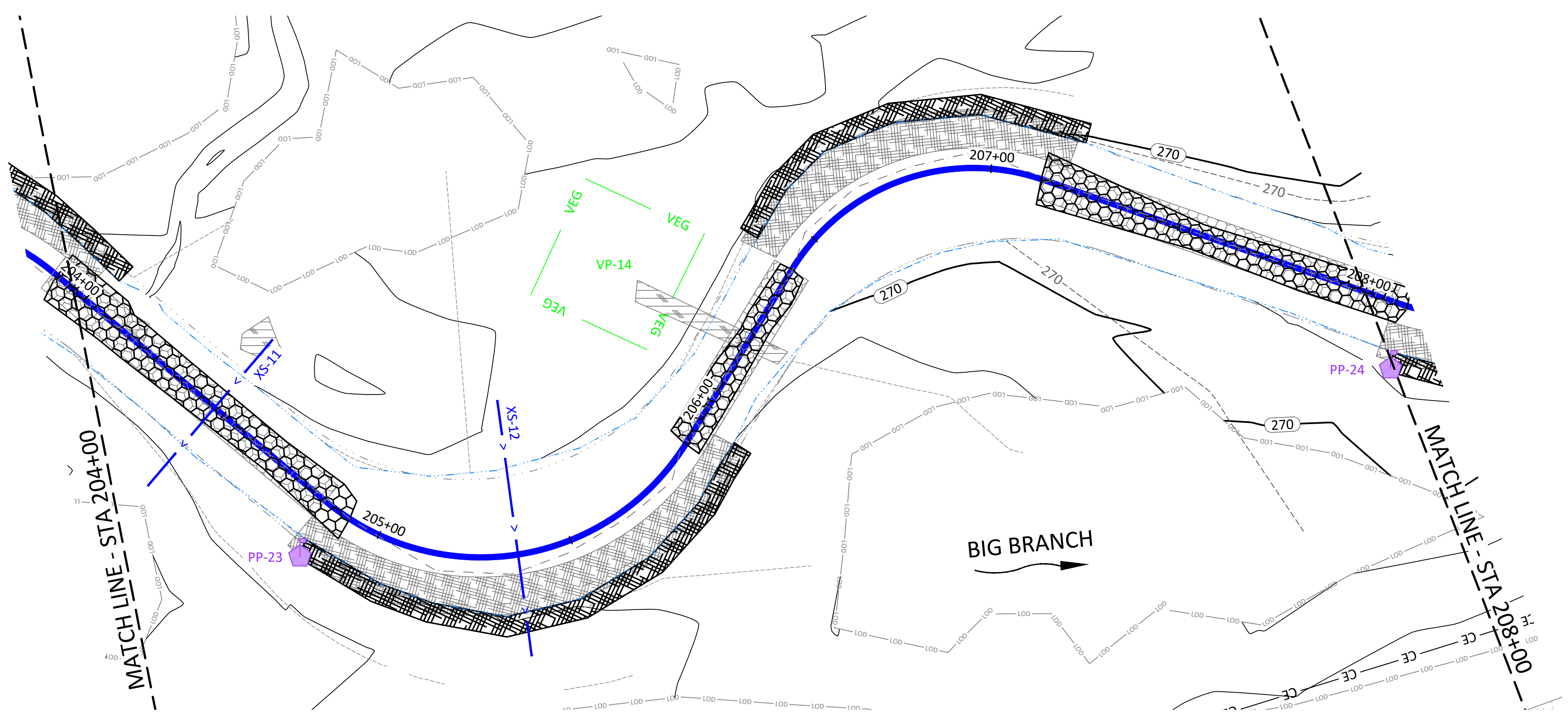
Big Branch
Stream Plan and Profile

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 1.2.1





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Cross Creek Ranch Site
Montgomery County, North Carolina

Big Branch
Stream Plan and Profile

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 1.2.2

August 25, 2022

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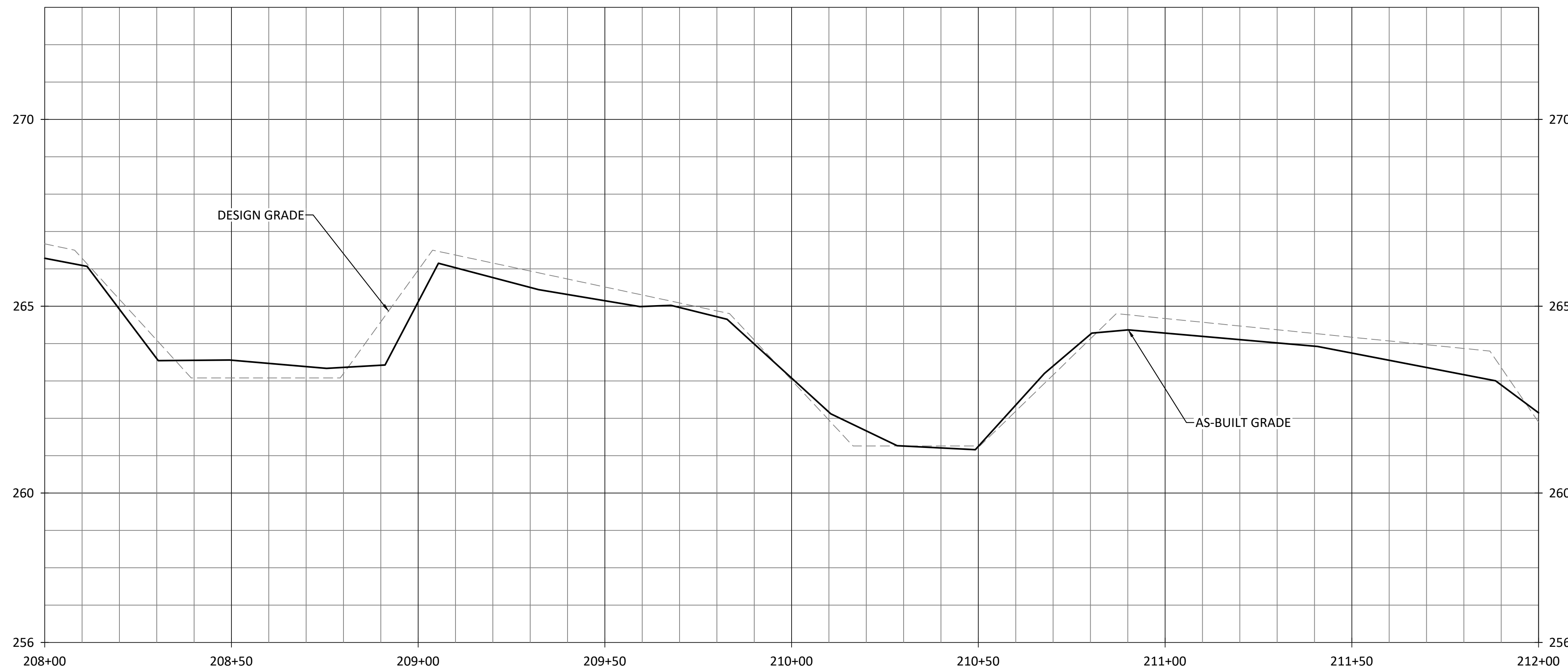

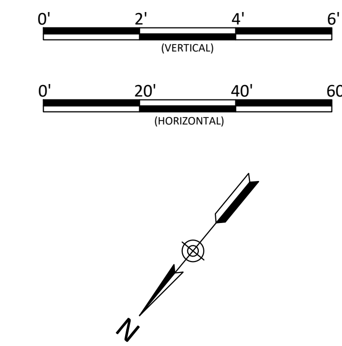

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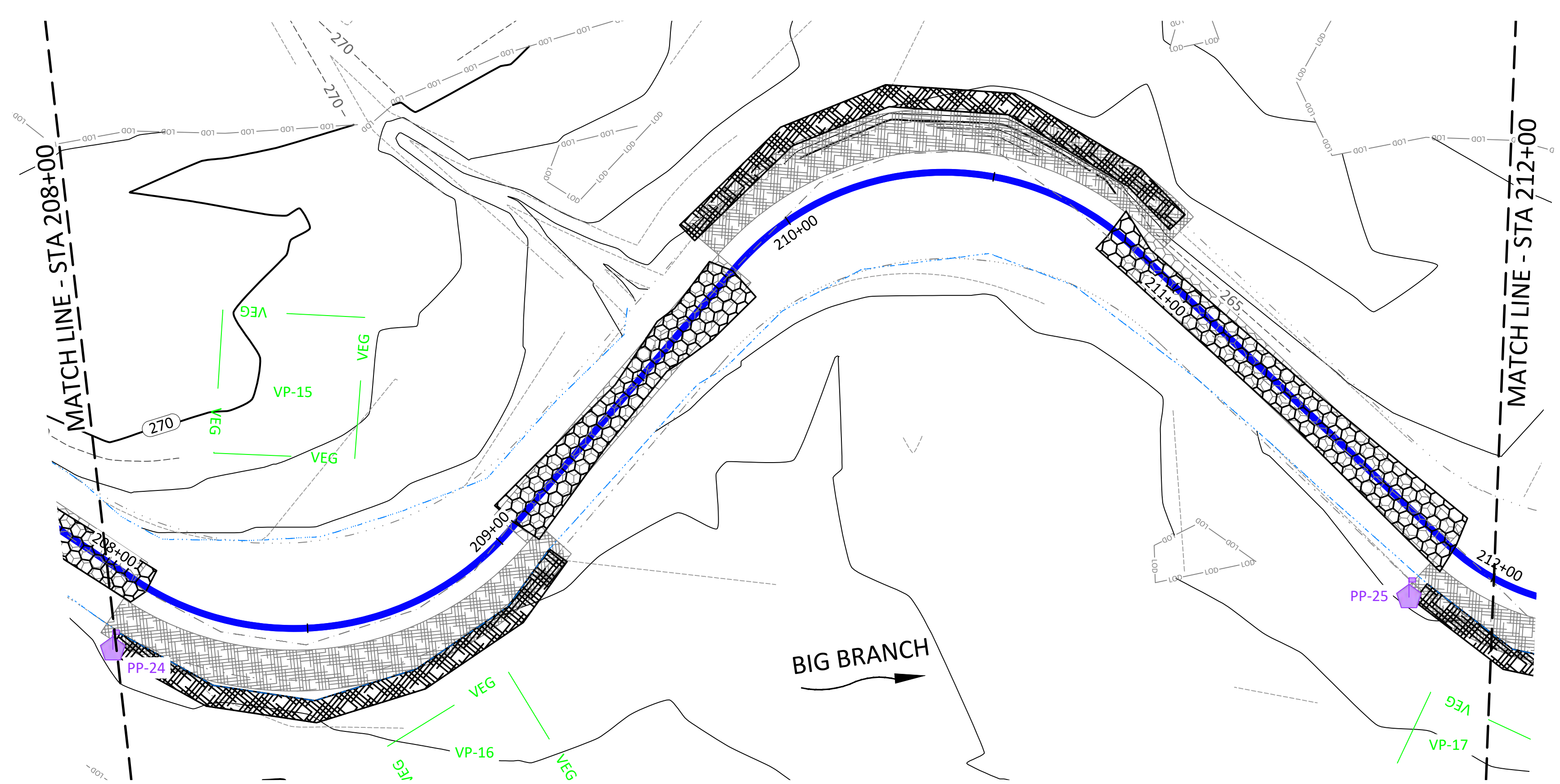

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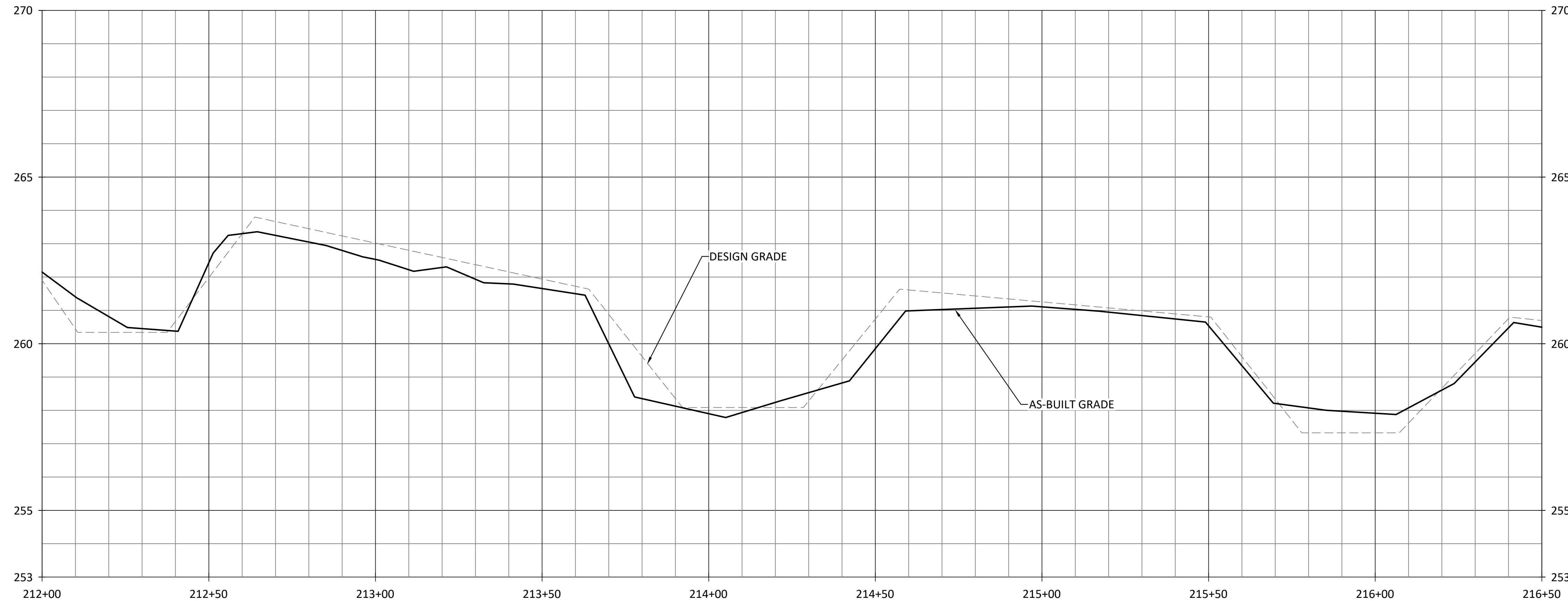
Big Branch
Stream Plan and Profile

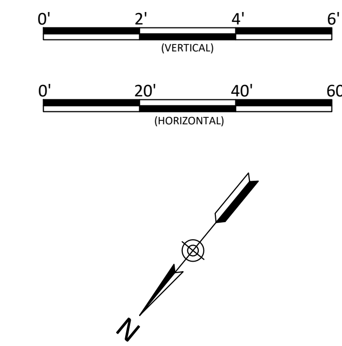
Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 1.2.3

August 25, 2022





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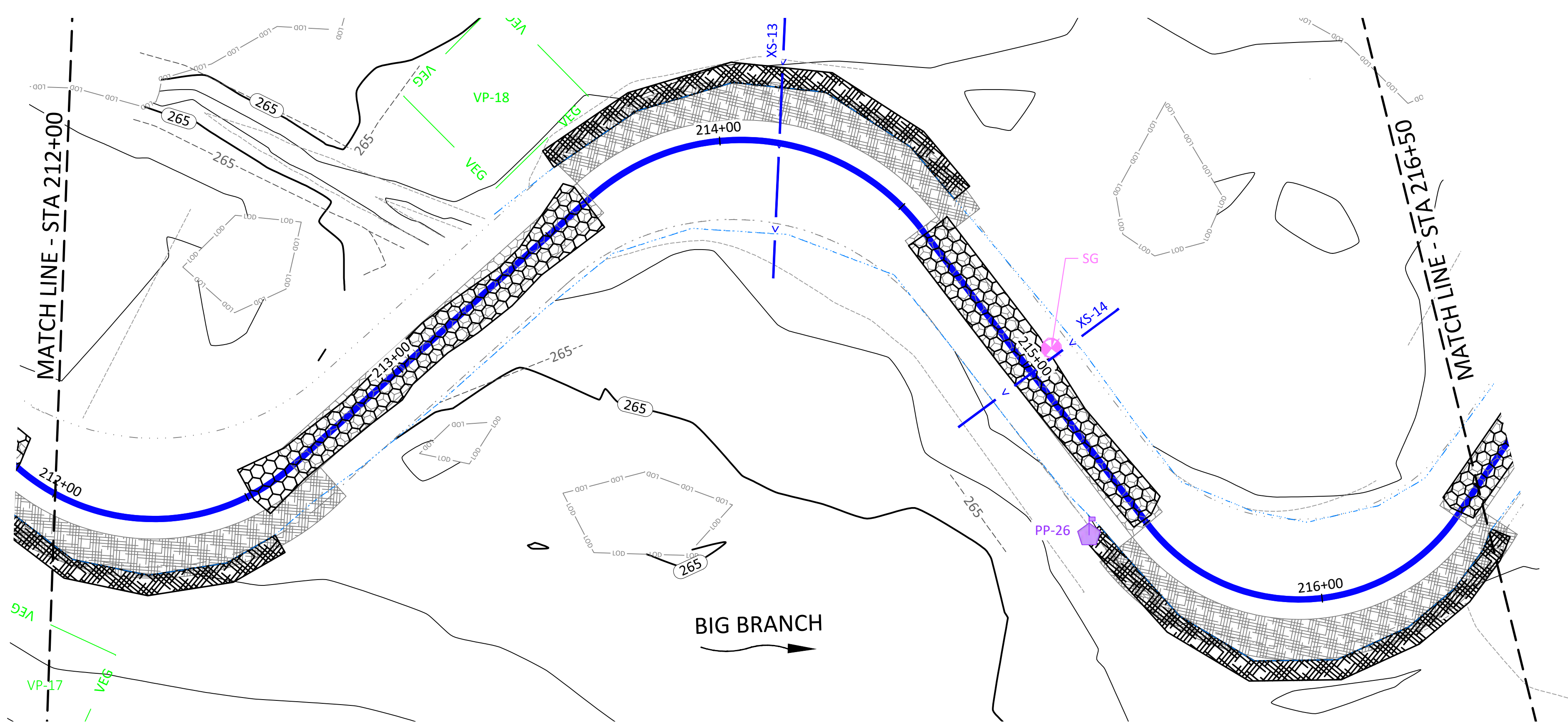

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Cross Creek Ranch Site
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Big Branch
Stream Plan and Profile

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 1.2.4

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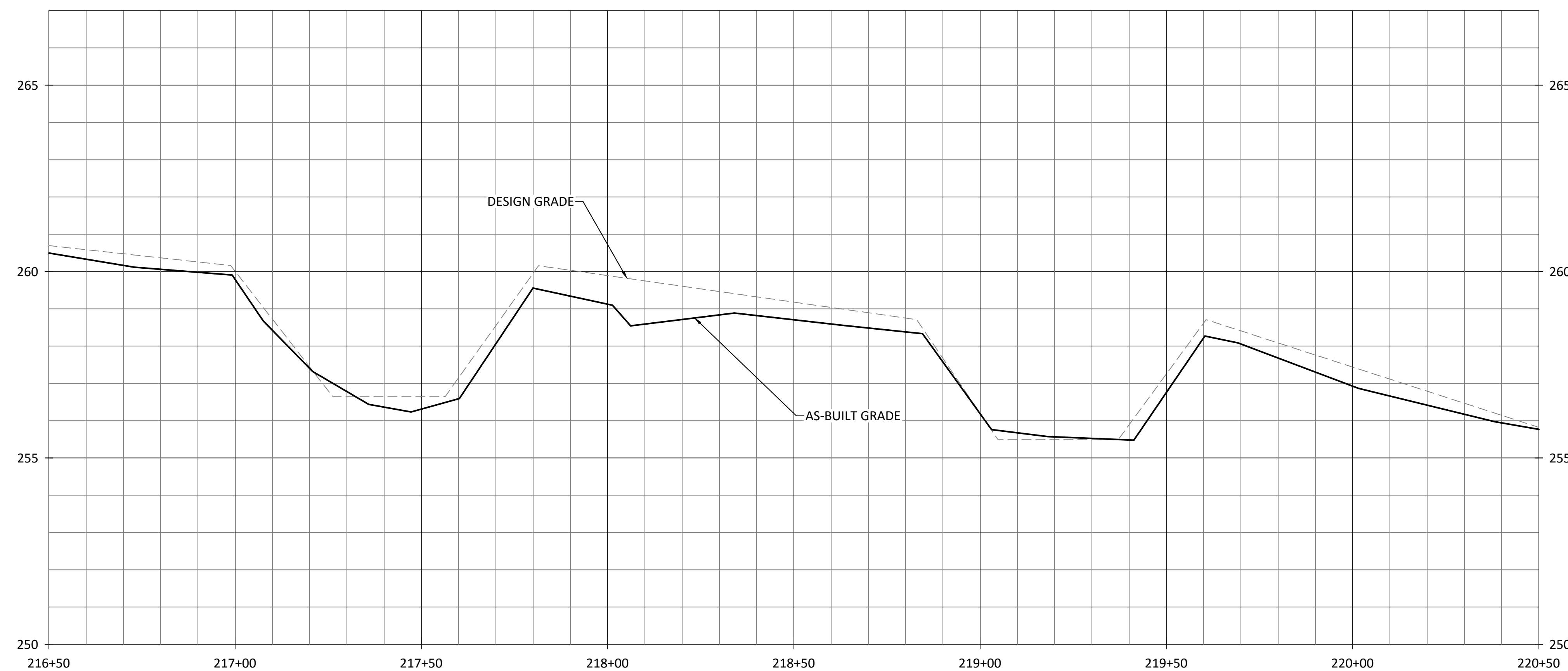

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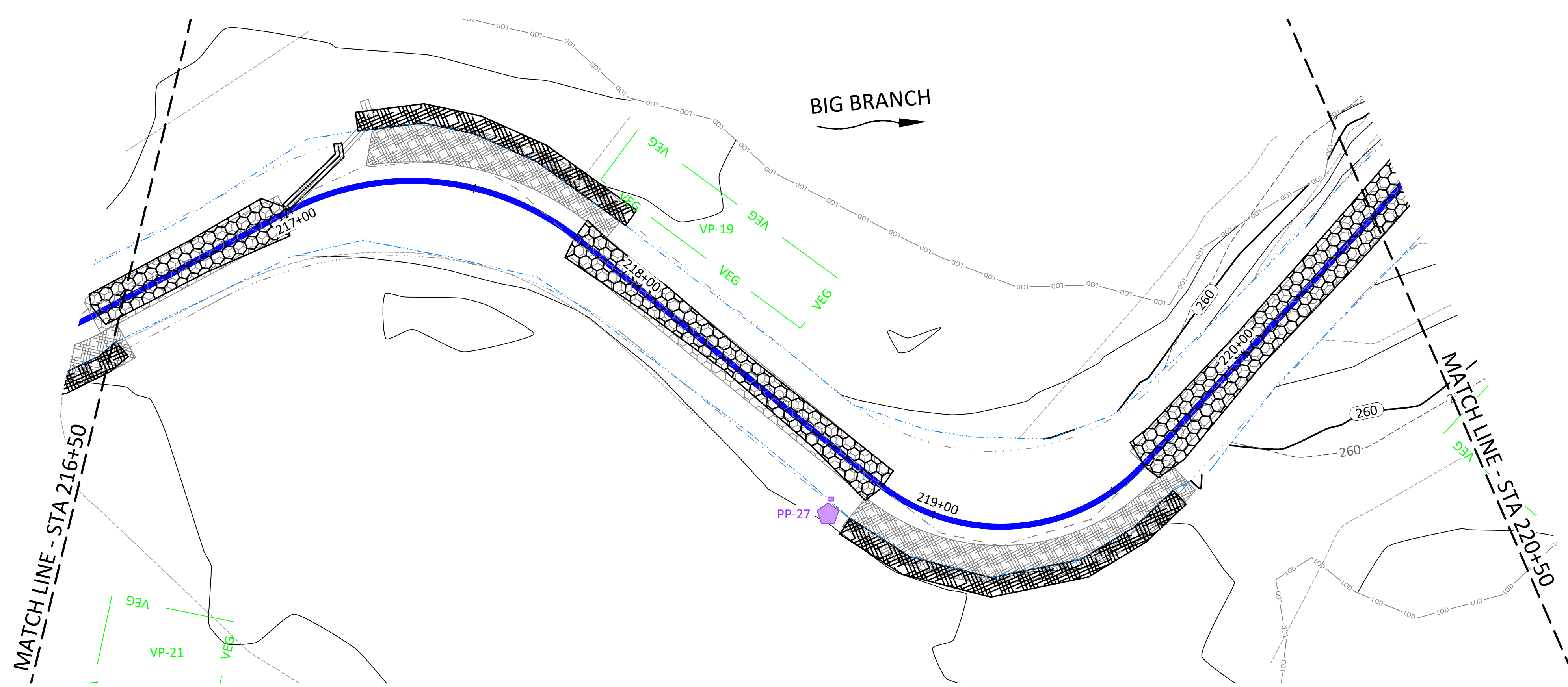
(VERTICAL)

0' 20' 40' 60'
(HORIZONTAL)



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Cross Creek Ranch Site
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Big Branch
Stream Plan and Profile

Revisions:

Date: 07.11.2022
Job Number: 005-02186
Project Engineer: ARV
Drawn By: FHM
Checked By: TWW

Sheet 1.2.5

August 25, 2022

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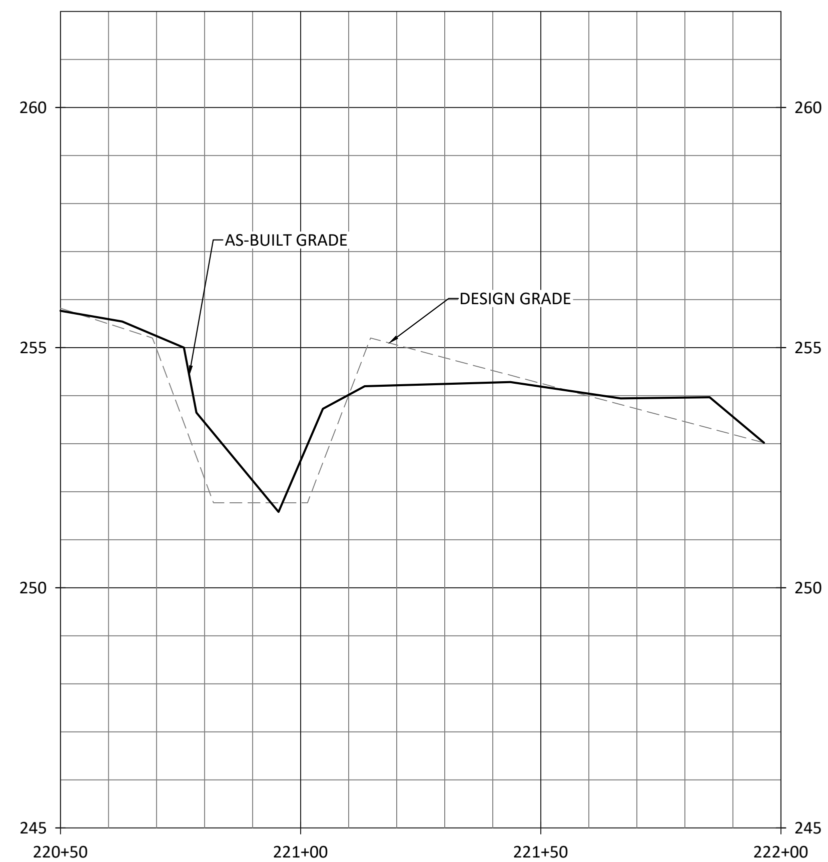
(VERTICAL)

0' 20' 40' 60'
(HORIZONTAL)



NOTES:
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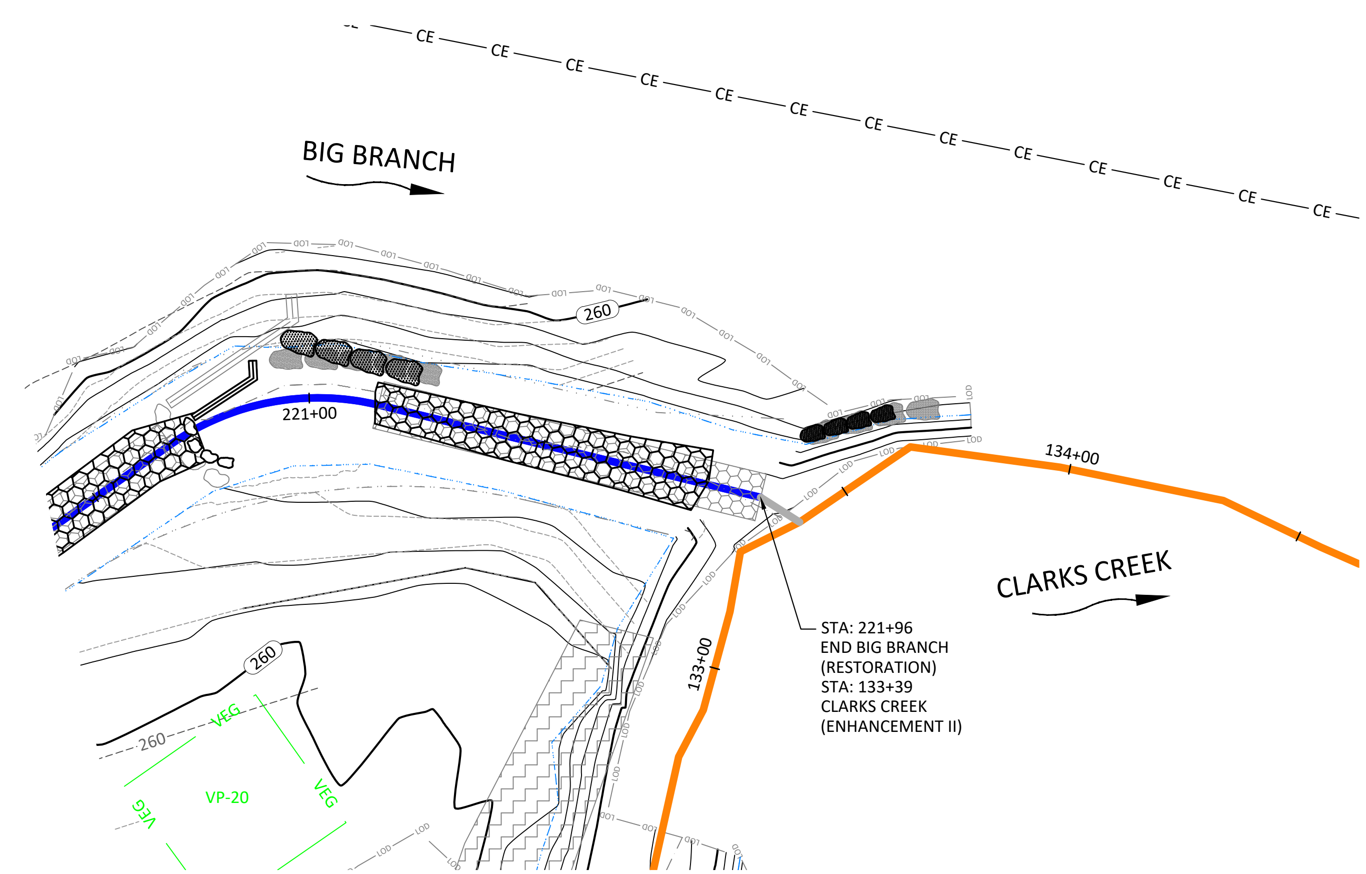
2. AS-BUILT INFORMATION FOR CLARKS CREEK IS ADDRESSED ON SHEETS 1.1.1 THROUGH 1.1.5



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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 048967 ABIGAIL R. VIENS

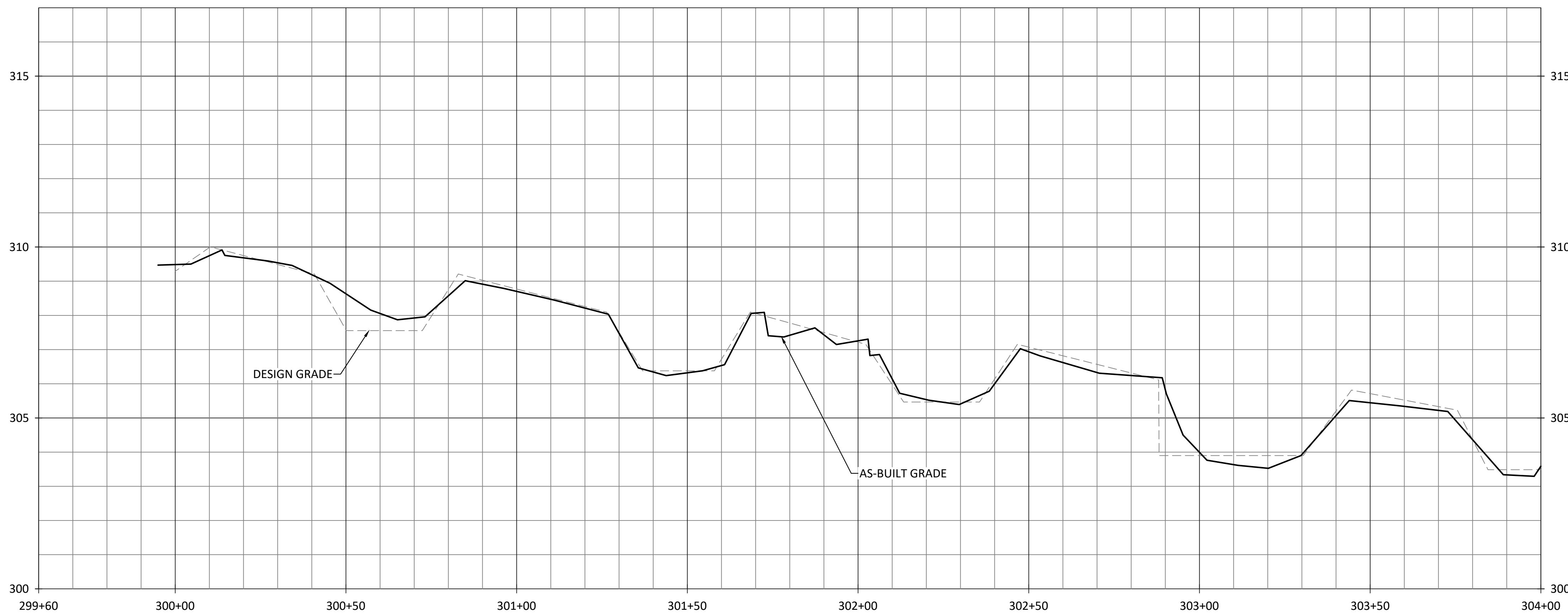
Cross Creek Ranch Site
Montgomery County, North Carolina

Big Branch
Stream Plan and Profile

Revisions:

Date: 07.11.2022
Job Number: 005-02186
Project Engineer: ARV
Drawn By: FHM
Checked By: TWW

Sheet 1.2.6



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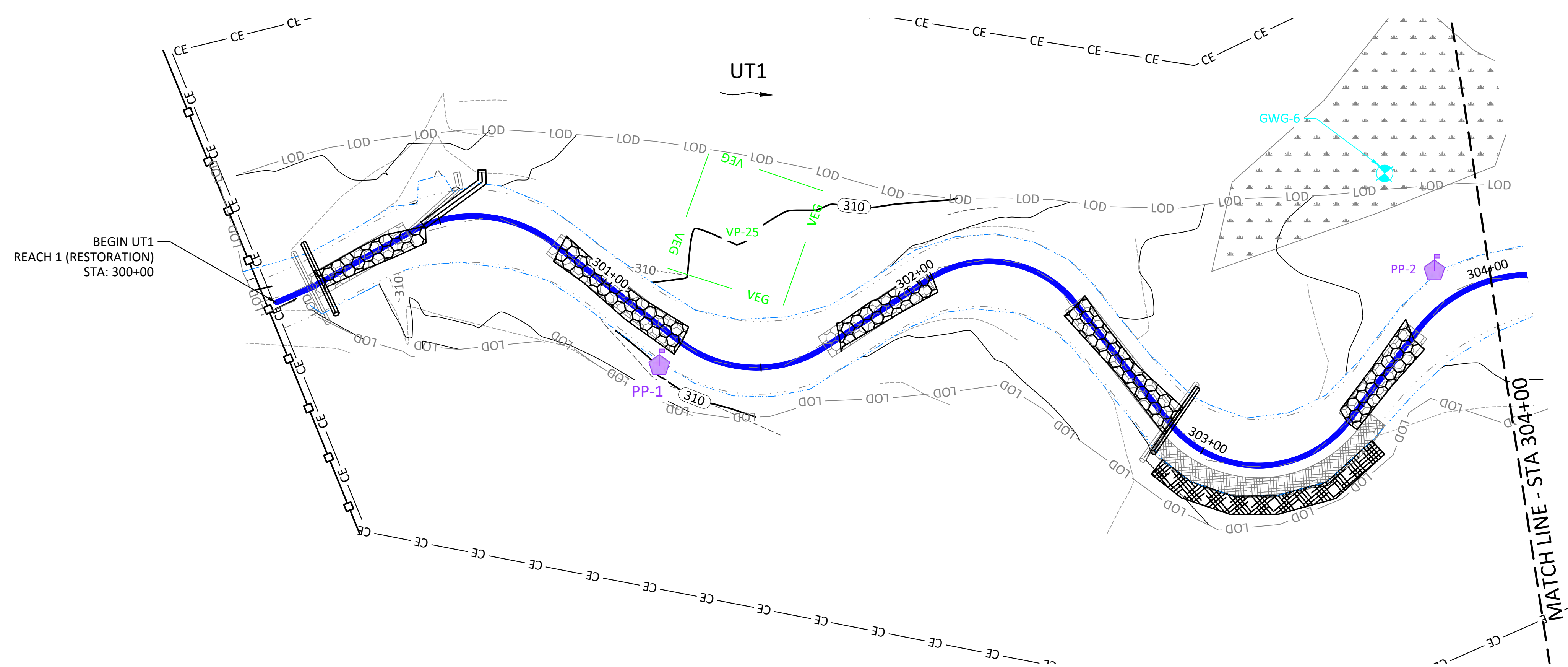

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Cross Creek Ranch Site
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UT1
Stream Plan and Profile

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

Sheet 1.3.1

August 25, 2022

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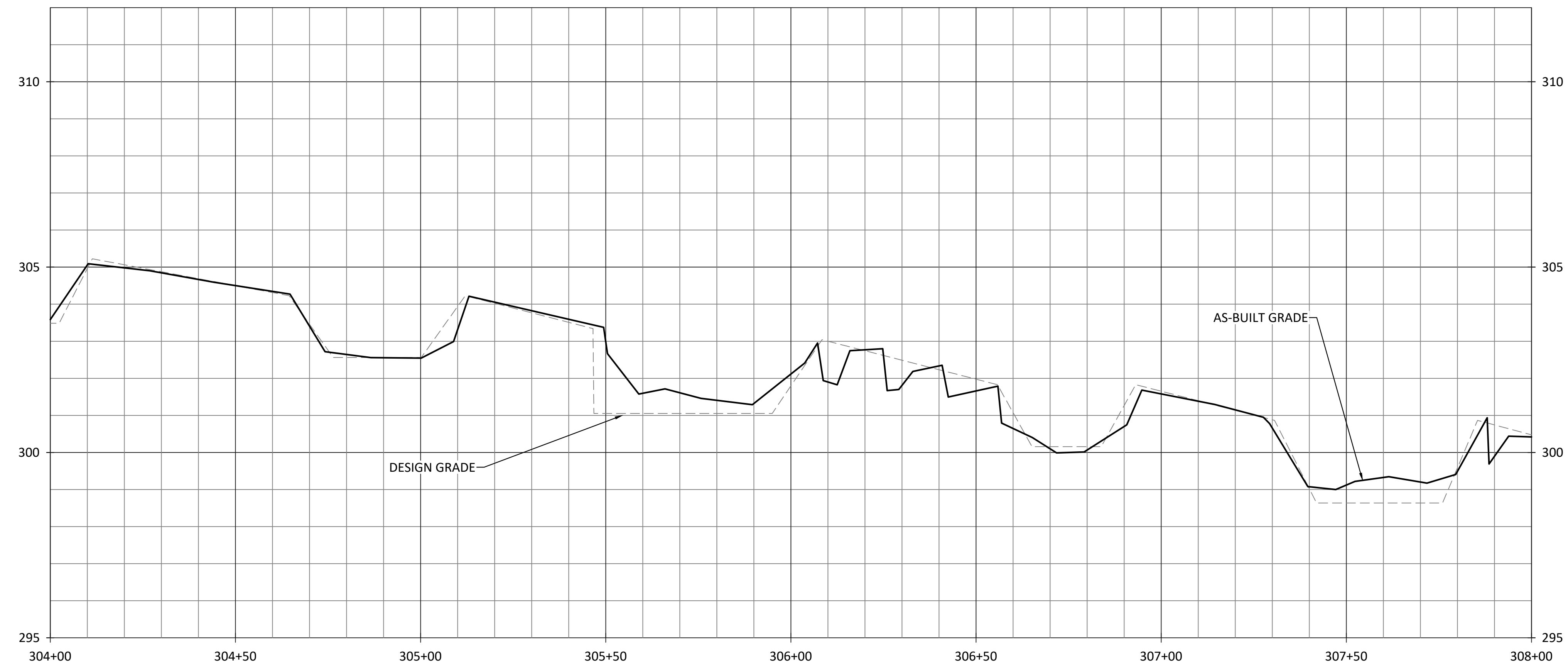

0' 2' 4' 6' (VERTICAL)

0' 20' 40' 60' (HORIZONTAL)

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NOTES:
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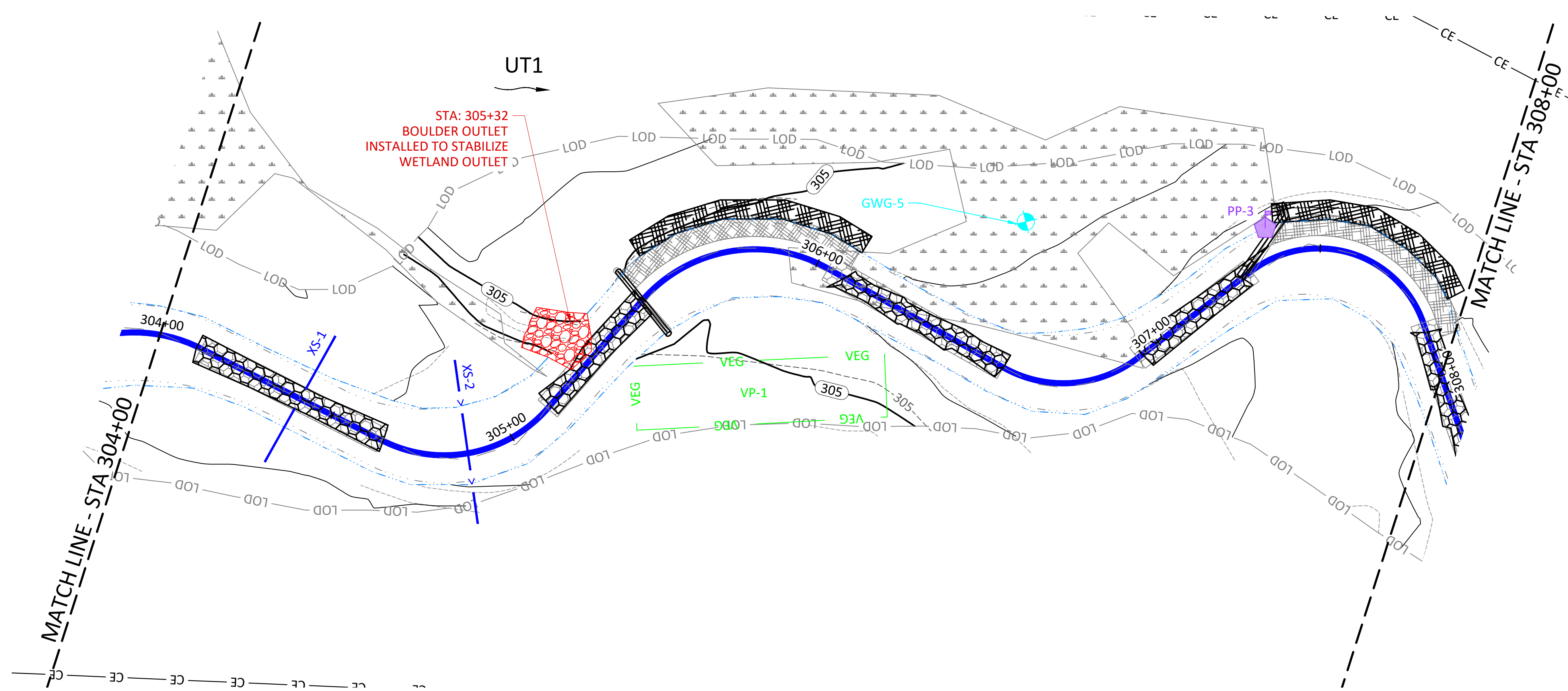

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Cross Creek Ranch Site
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UT1
Stream Plan and Profile

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

Sheet 1.3.2

August 25, 2022

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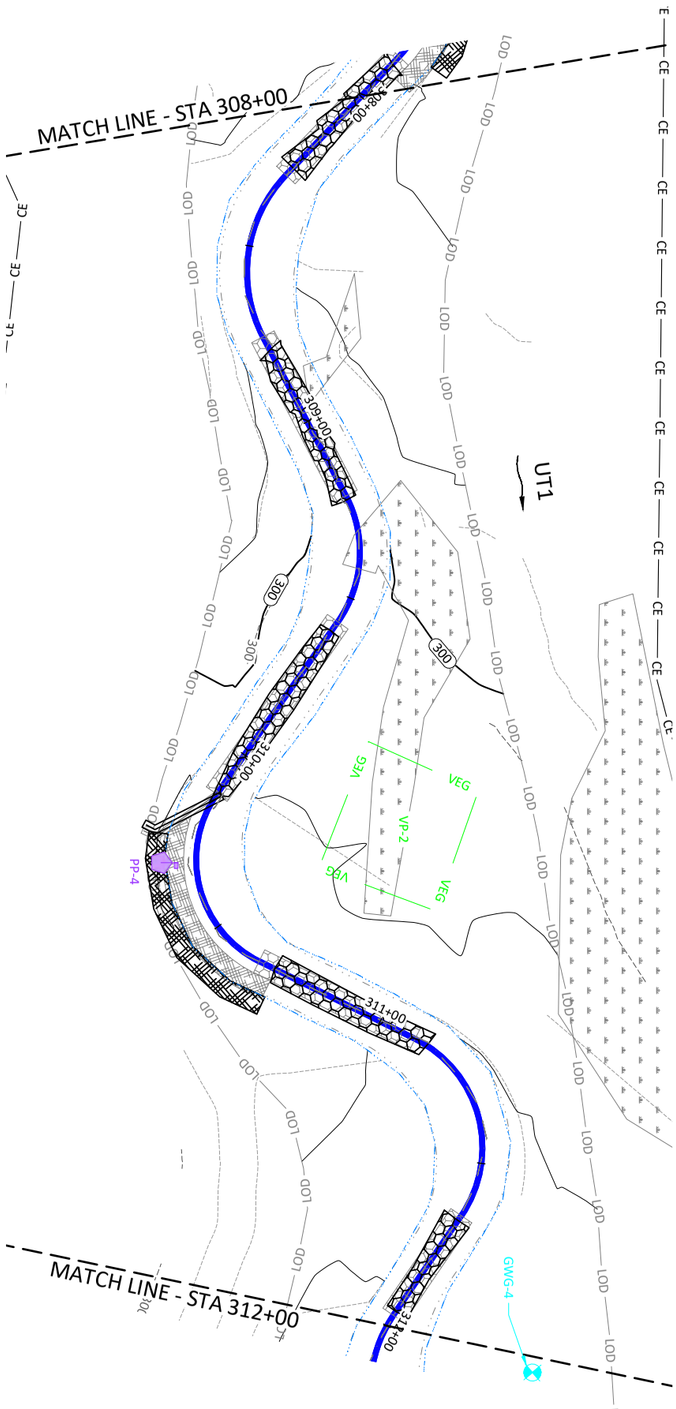

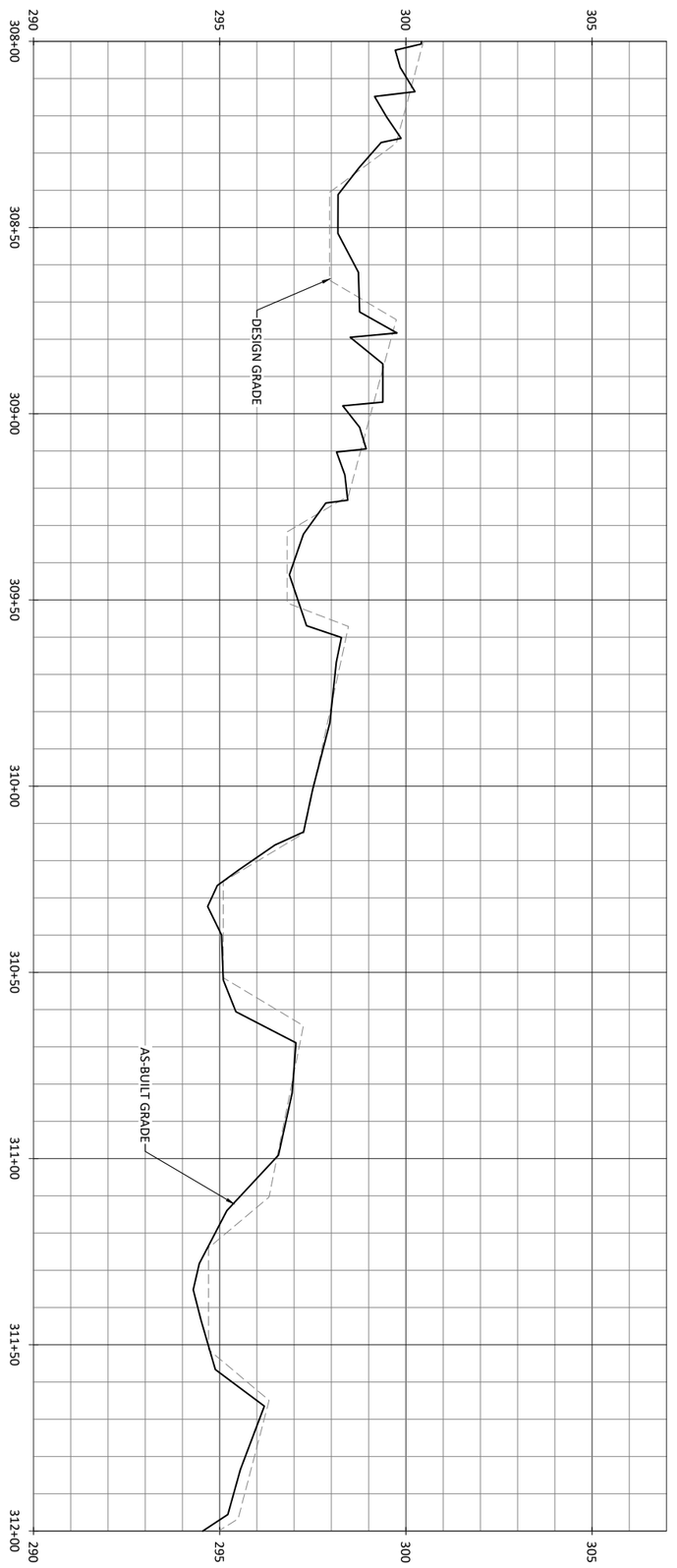

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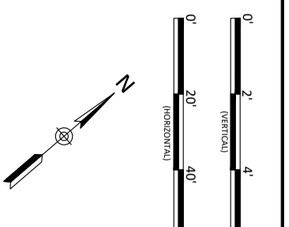

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

1.3.3
Sheet

Cross Creek Ranch Site
Montgomery County, North Carolina

UT1
Stream Plan and Profile

NORTH CAROLINA PROFESSIONAL SEAL 048967 ENGINEER ABIGAIL R. VIEIRA 7/11/22

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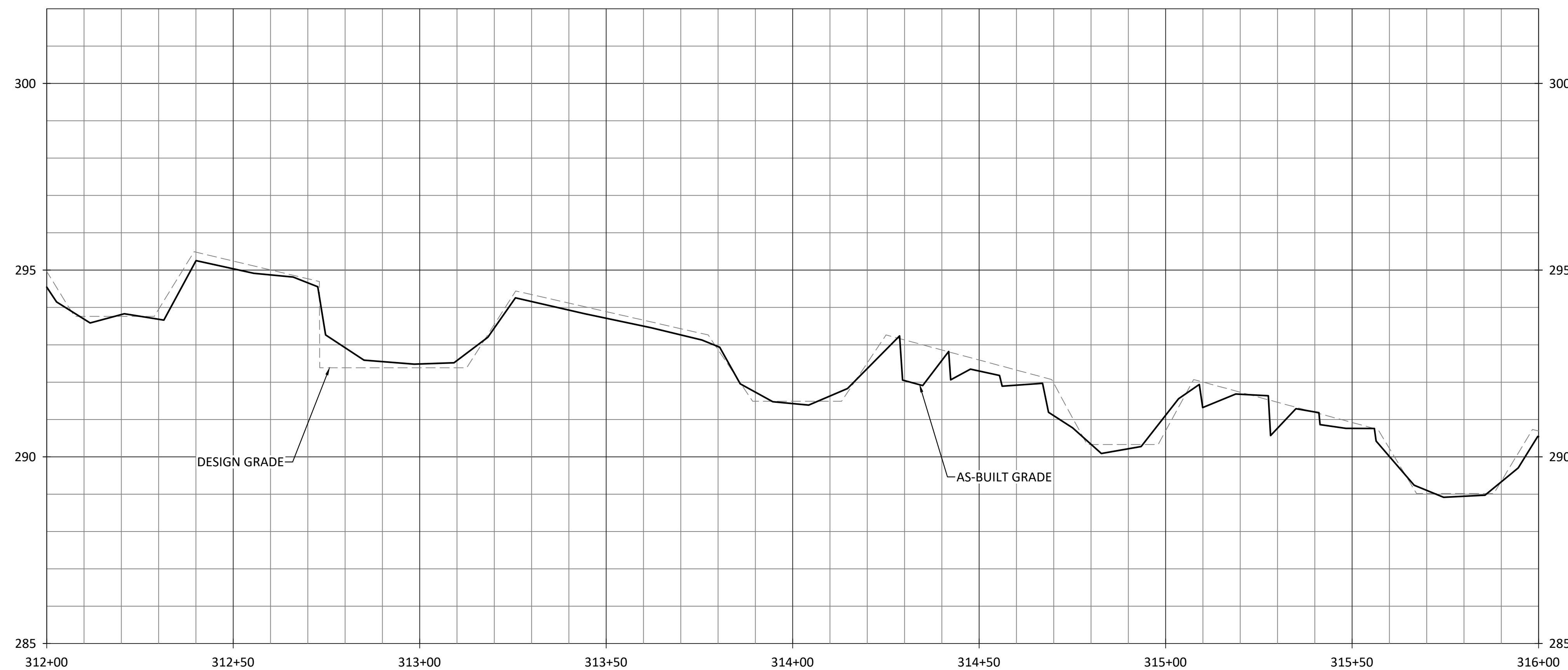

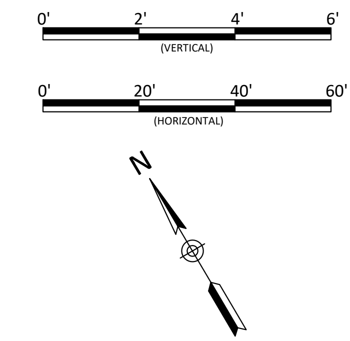

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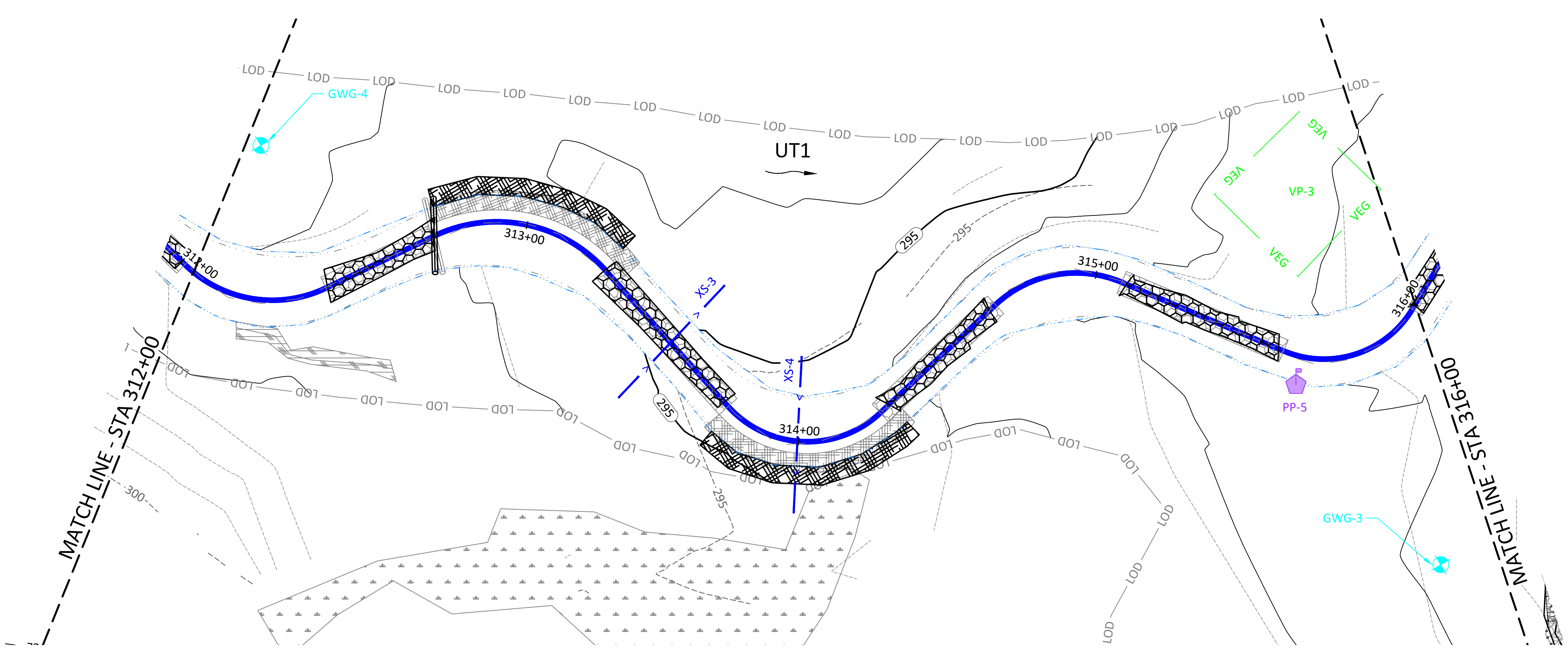

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 048967 ABIGAIL R. VIEW

Cross Creek Ranch Site
Montgomery County, North Carolina

UT1
Stream Plan and Profile

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 1.3.4

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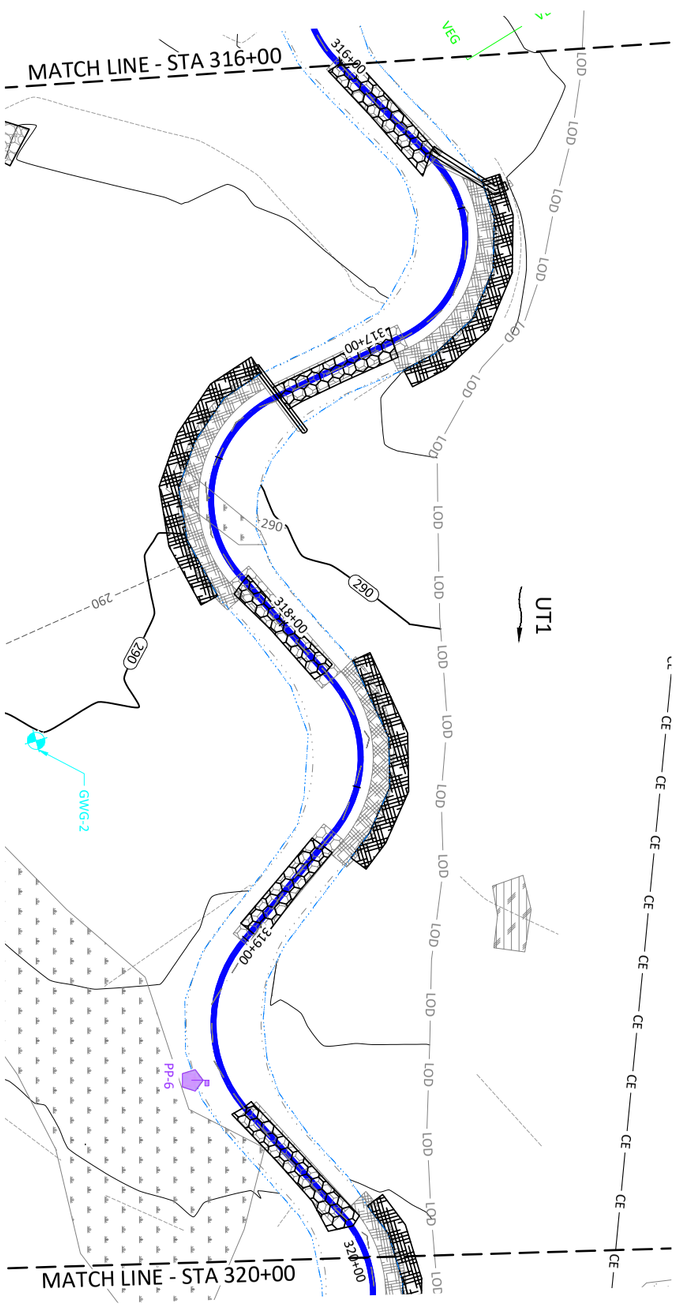
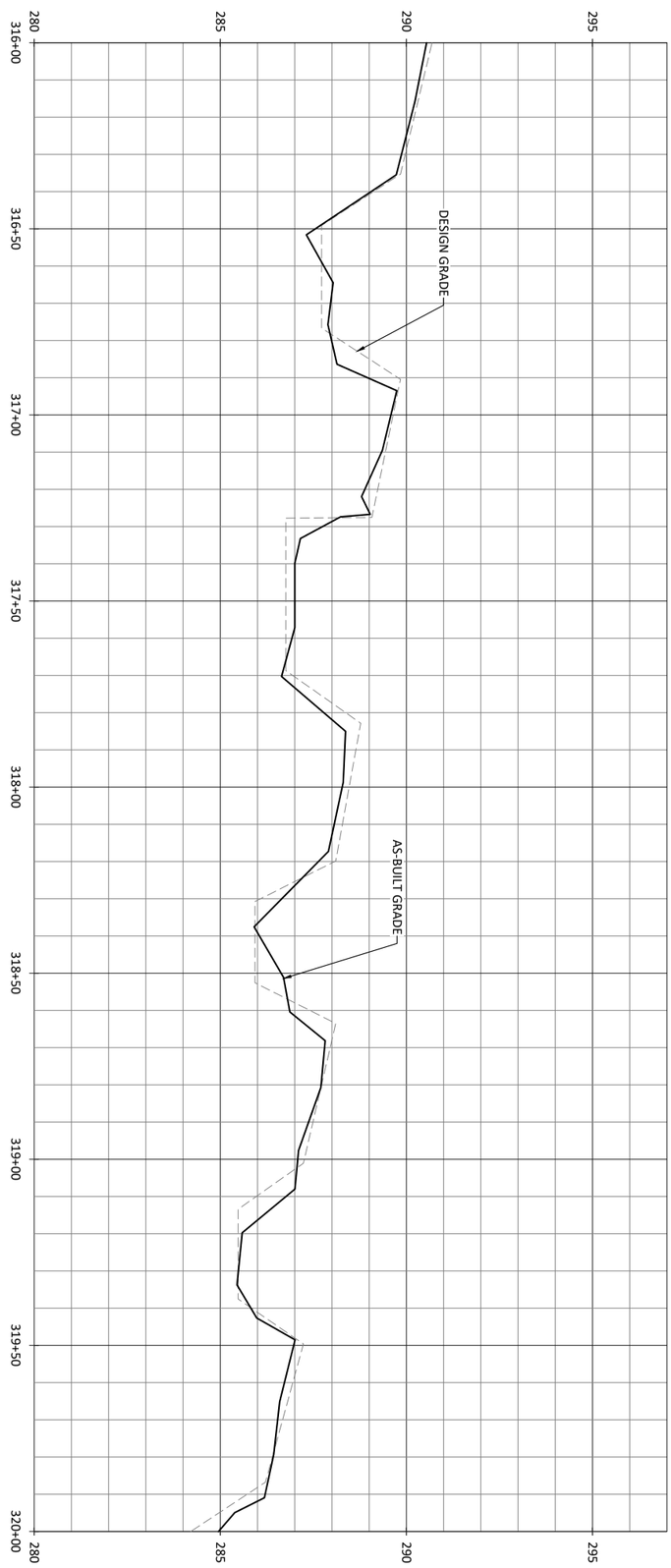
August 25, 2022





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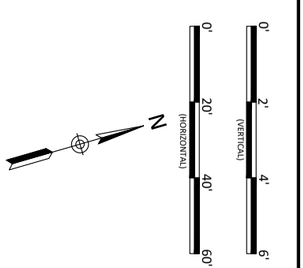

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

1.3.5
Sheet

Cross Creek Ranch Site
Montgomery County, North Carolina

UT1
Stream Plan and Profile

NORTH CAROLINA PROFESSIONAL SEAL 048967 ENGINEER ABIGAIL R. VIEIRA 7/11/22

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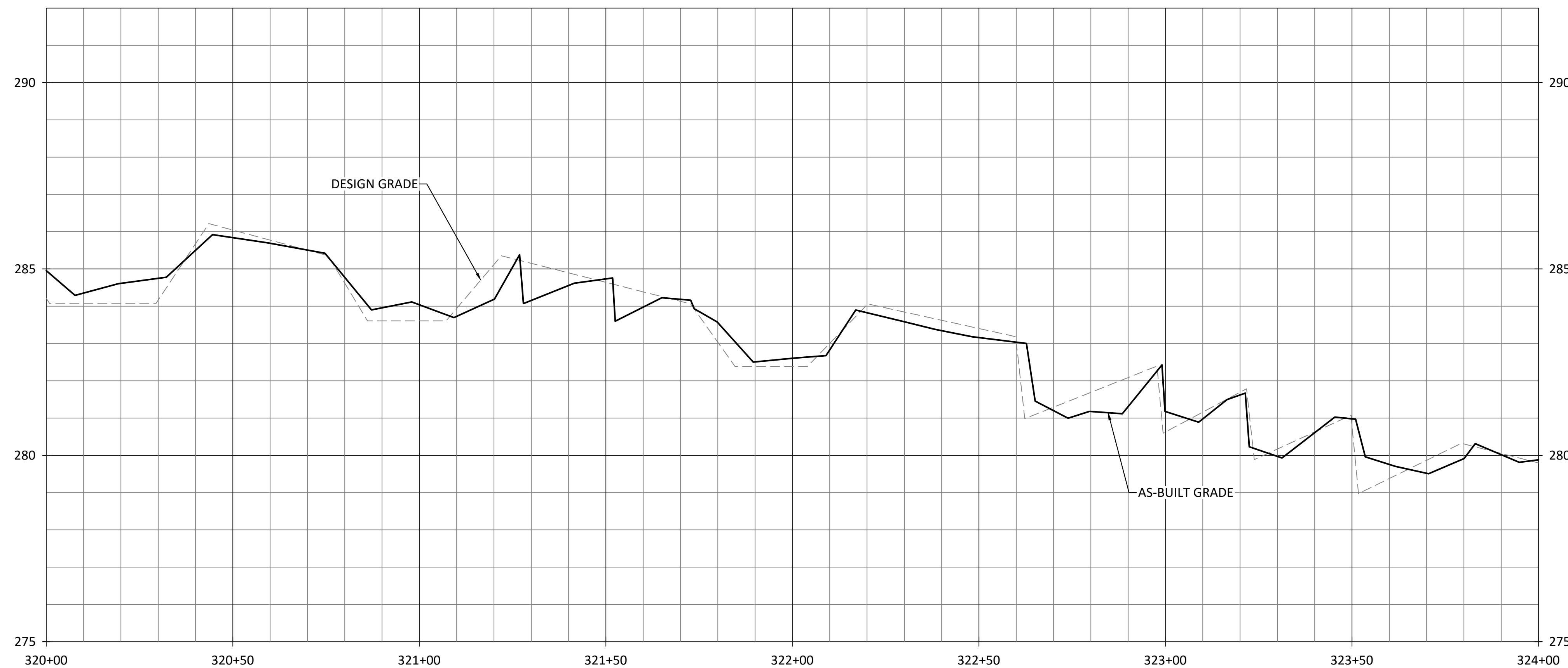
August 25, 2022



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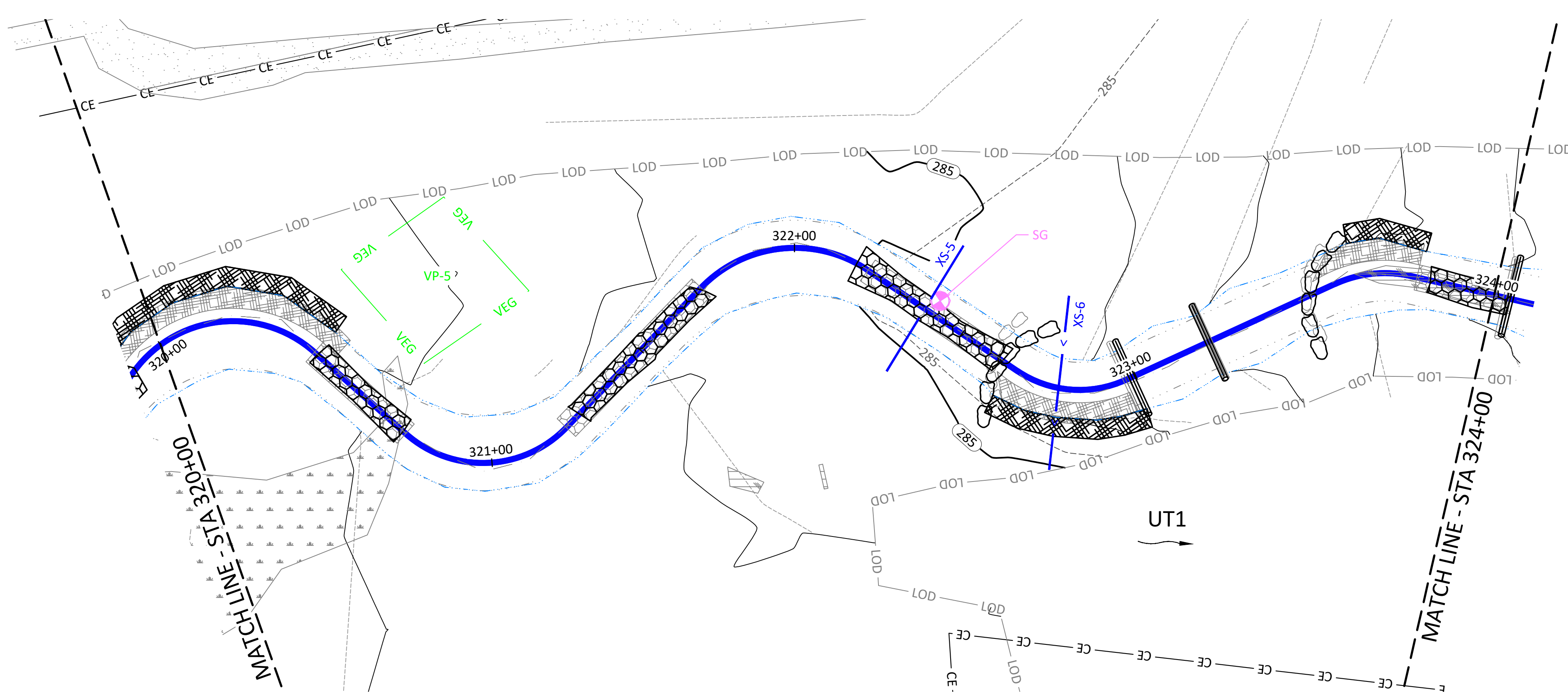
(VERTICAL)

0' 20' 40' 60'
(HORIZONTAL)



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Cross Creek Ranch Site
Montgomery County, North Carolina

UT1
Stream Plan and Profile

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

Sheet 1.3.6

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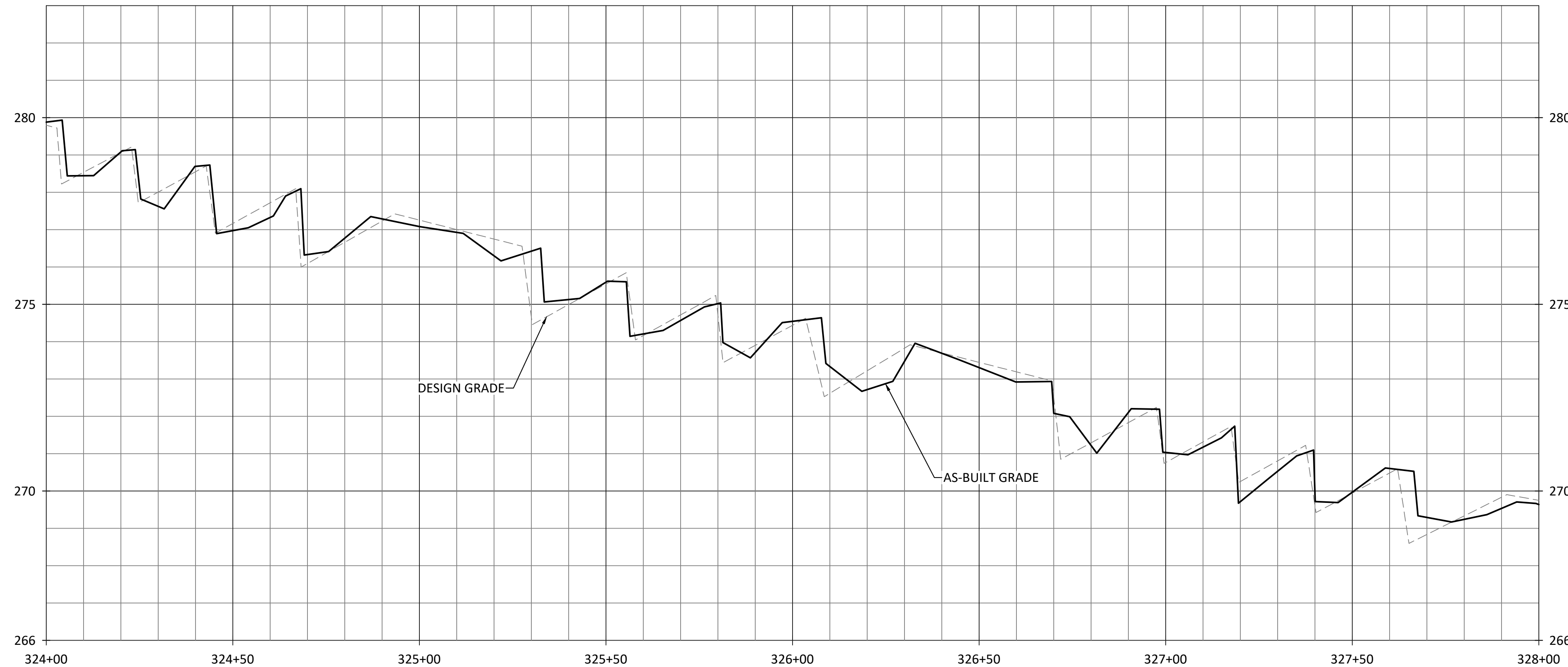

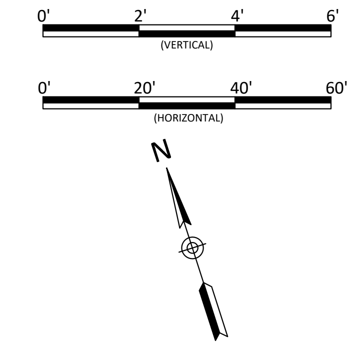

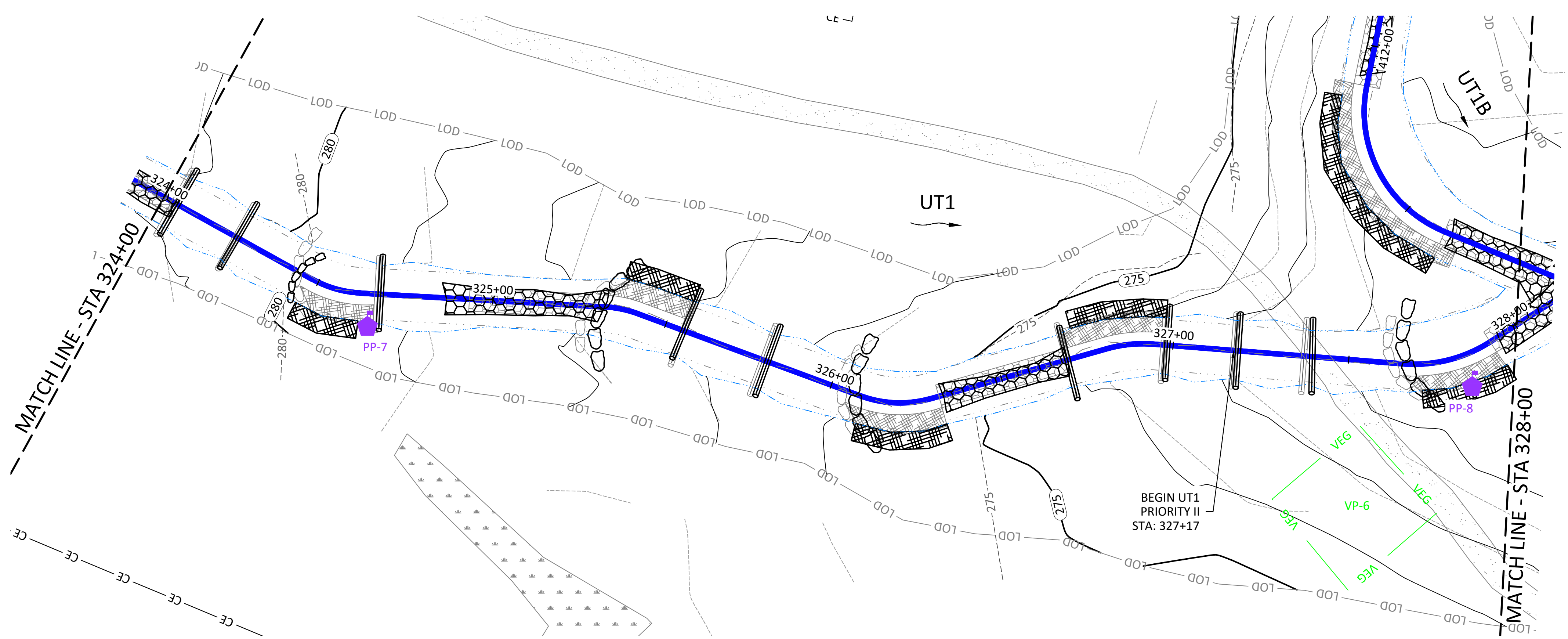

NOTES:

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Cross Creek Ranch Site
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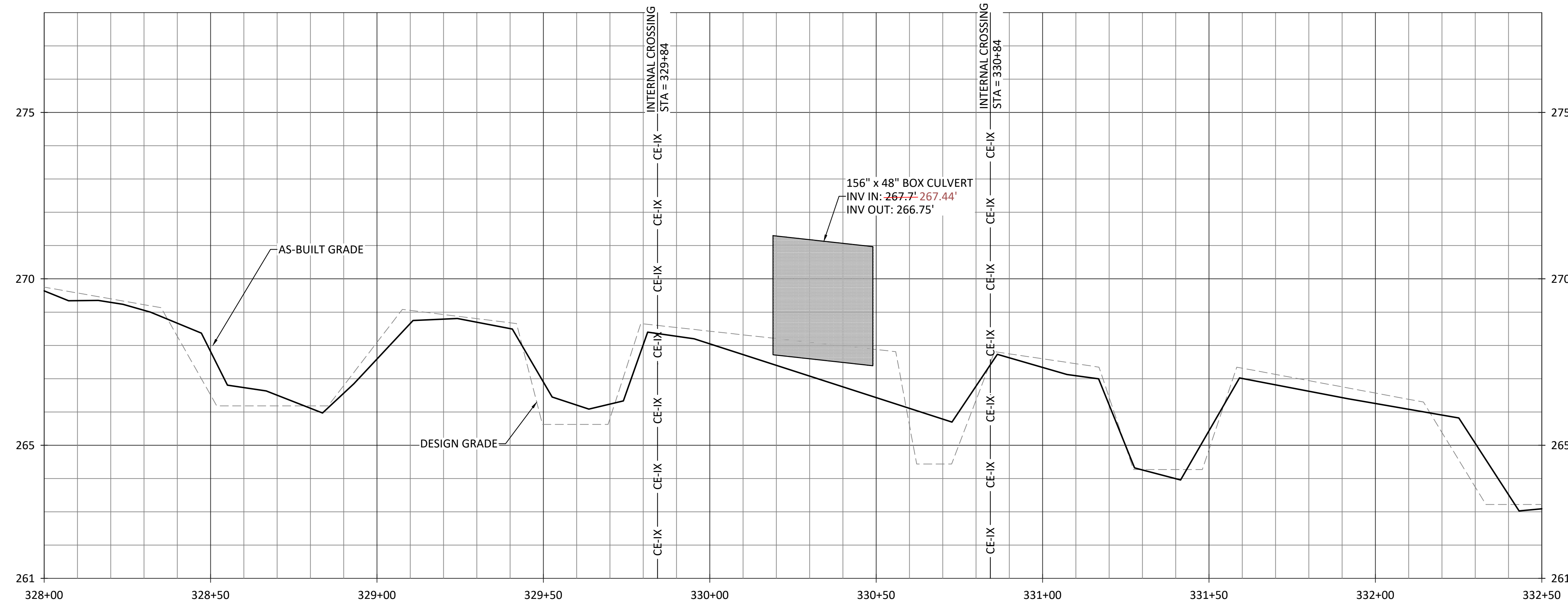
UT1
Stream Plan and Profile

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 1.3.7

August 25, 2022



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0' 20' 40' 60' (HORIZONTAL)

NOTES:
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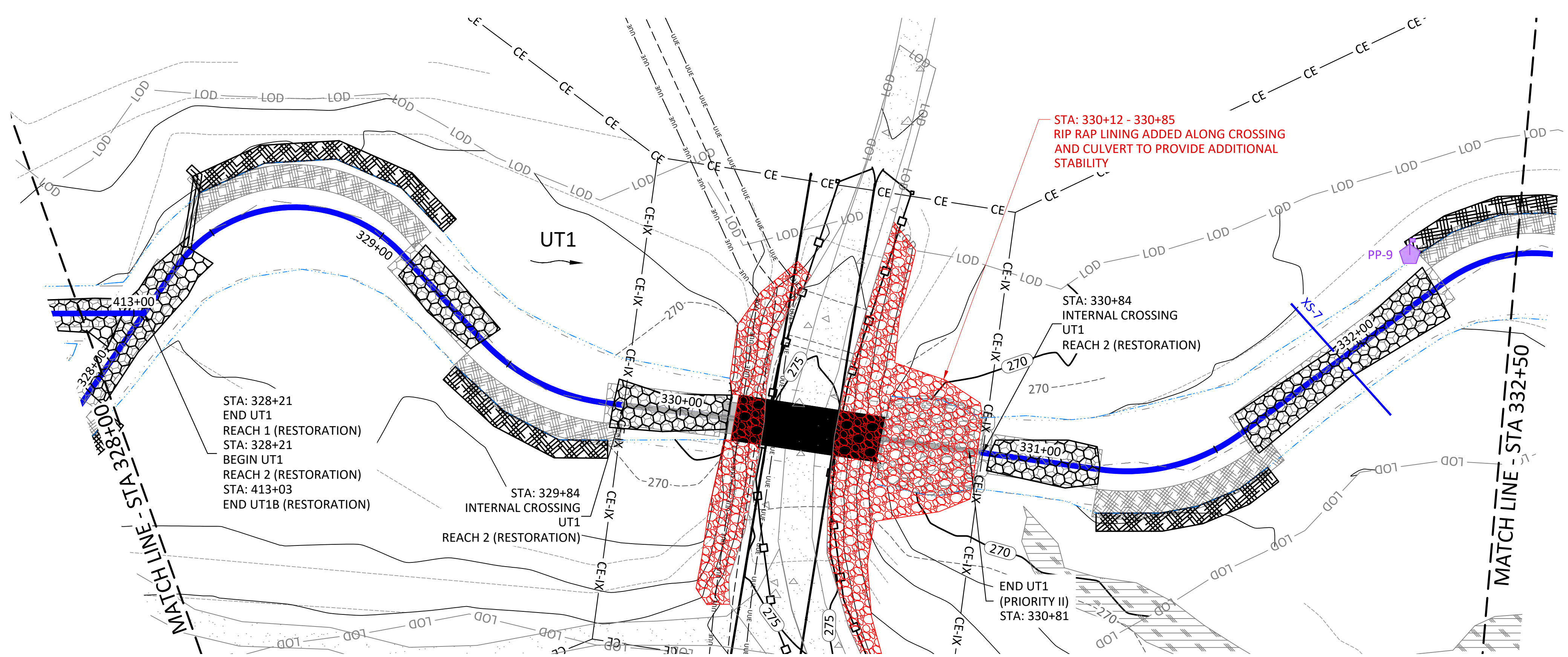

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Cross Creek Ranch Site
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UT1
Stream Plan and Profile

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

Sheet 1.3.8

August 25, 2022

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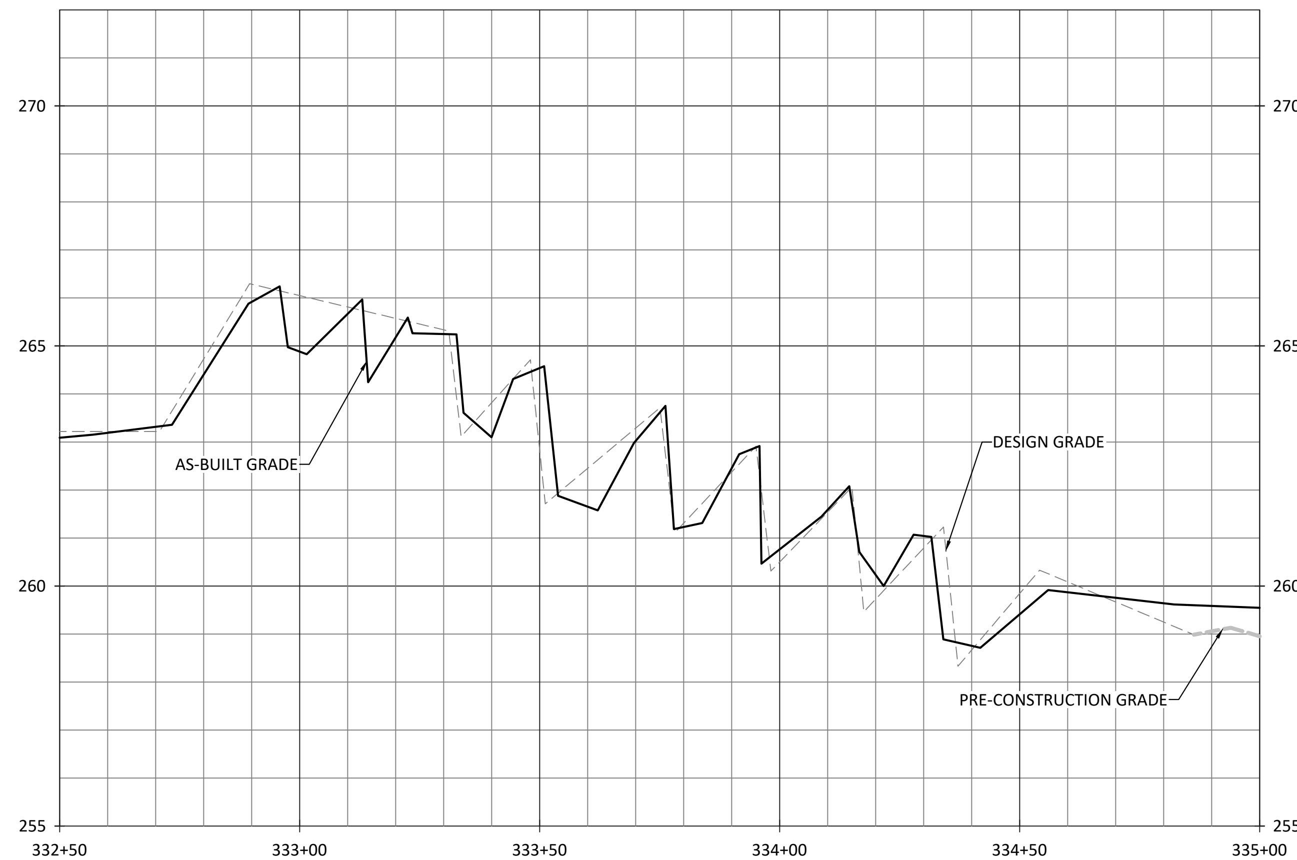
(VERTICAL)

0' 20' 40' 60'
(HORIZONTAL)



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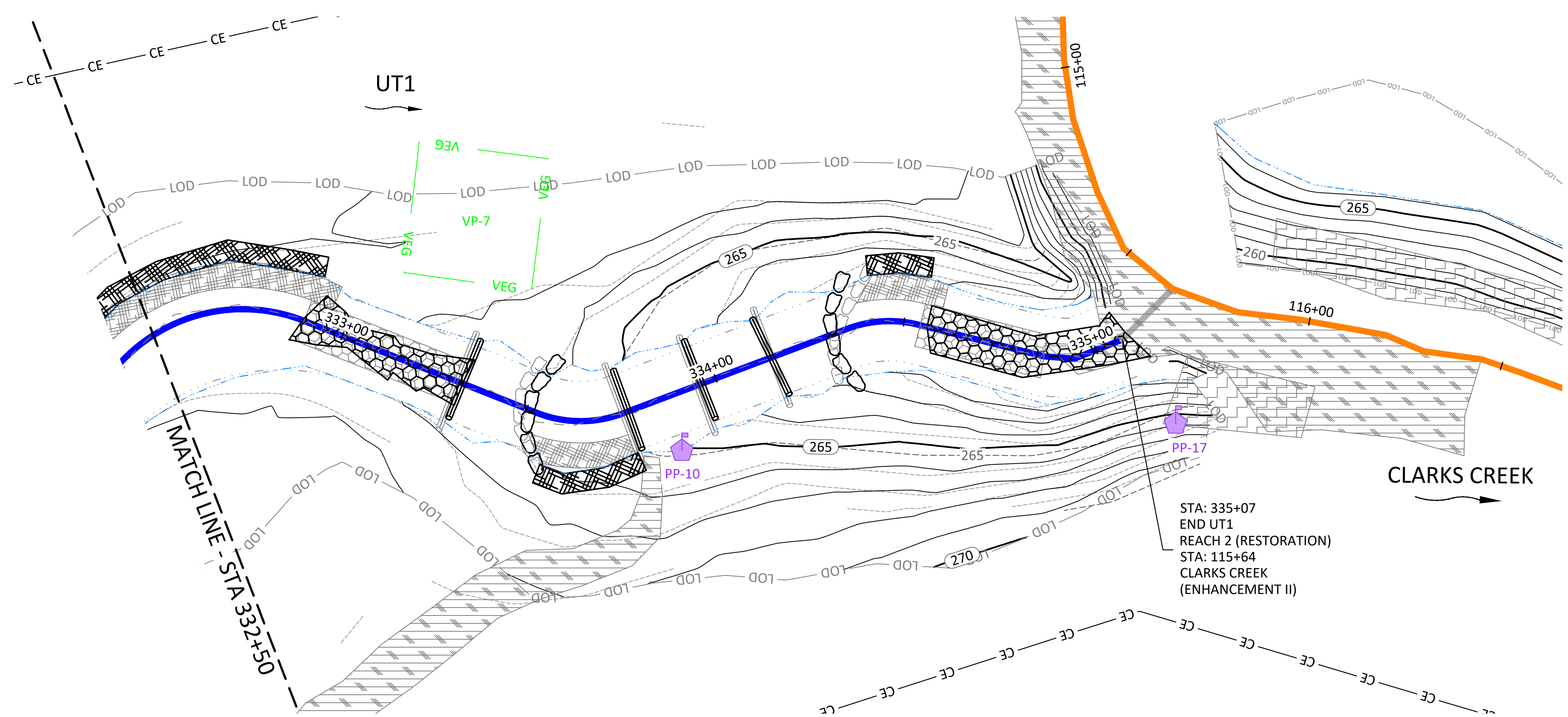

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Cross Creek Ranch Site
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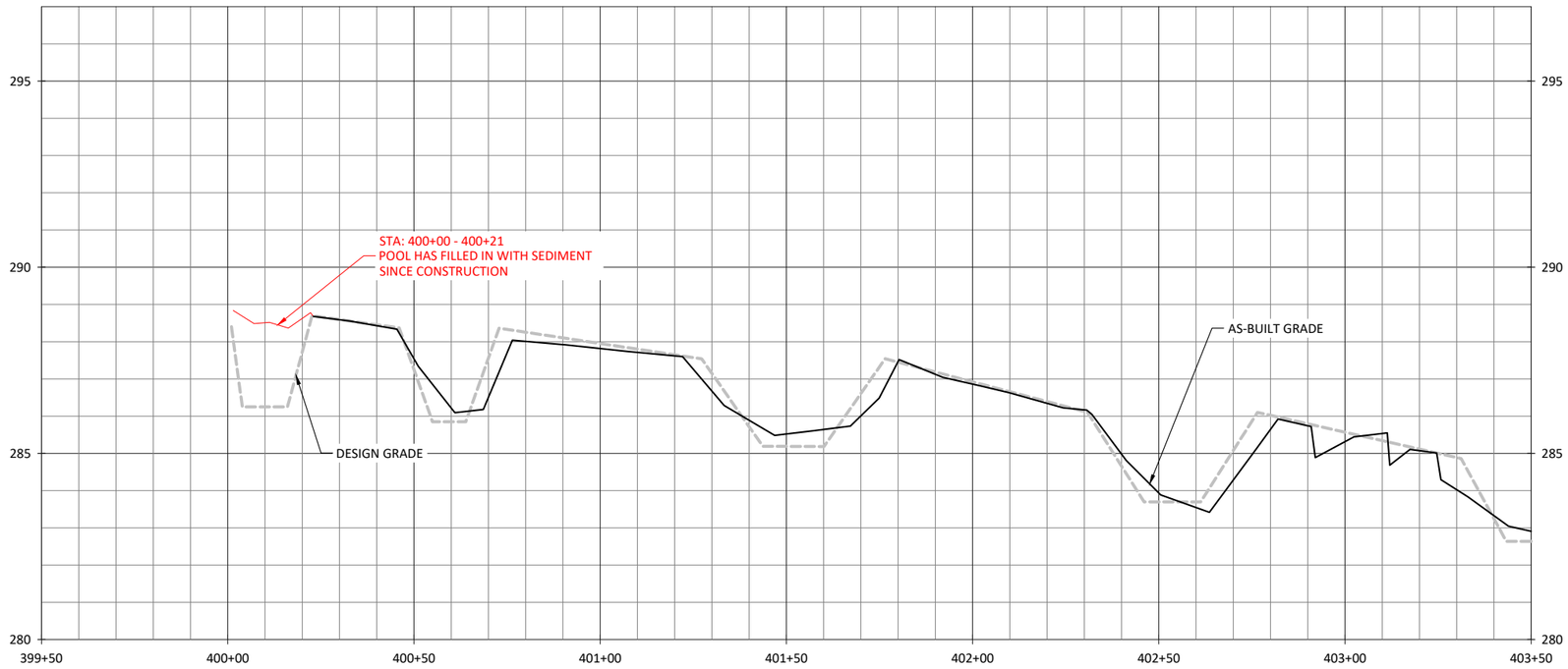
UT1
Stream Plan and Profile

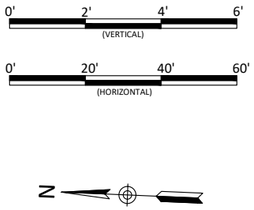
Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 1.3.9

August 25, 2023





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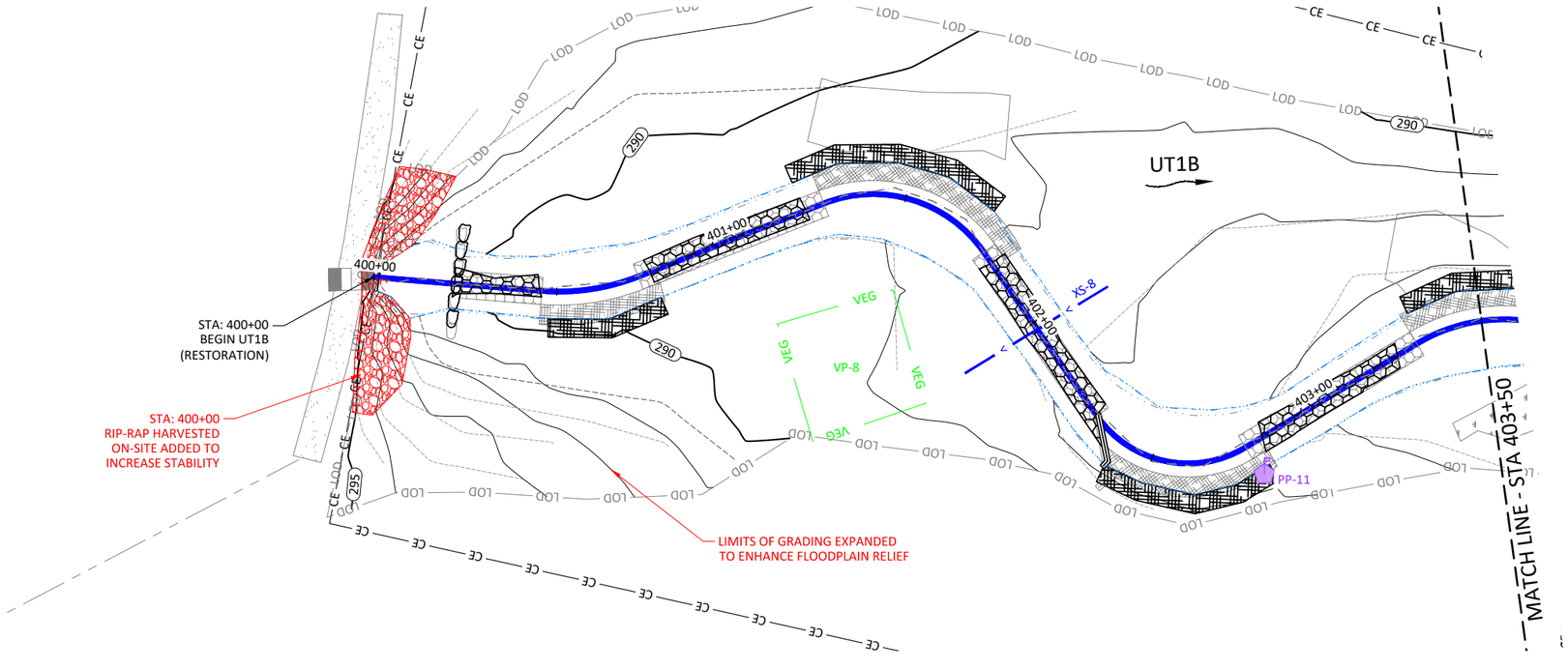

Cross Creek Ranch Site
Montgomery County, North Carolina

UT1B
Stream Plan and Profile

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 1.4.1

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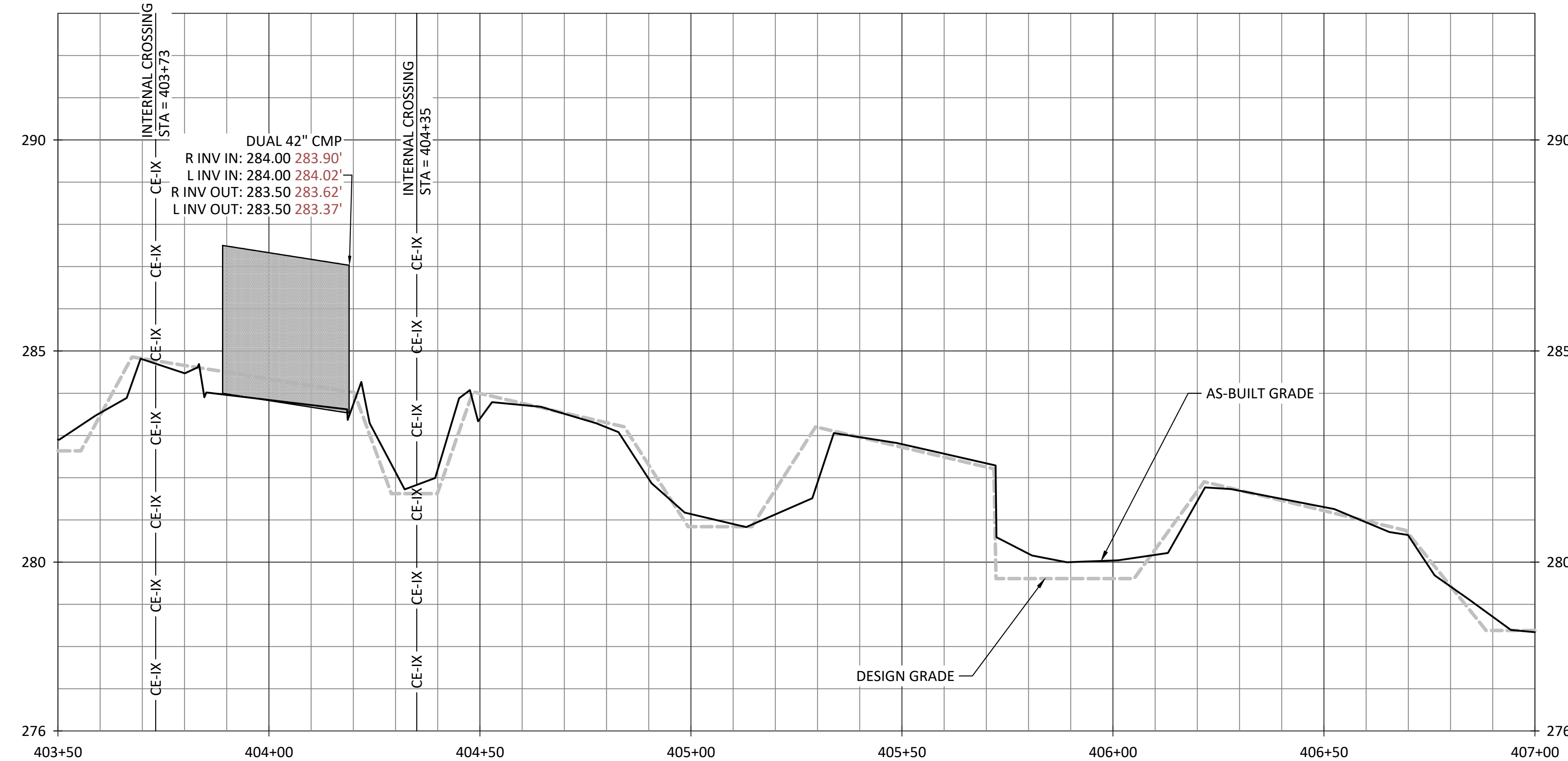

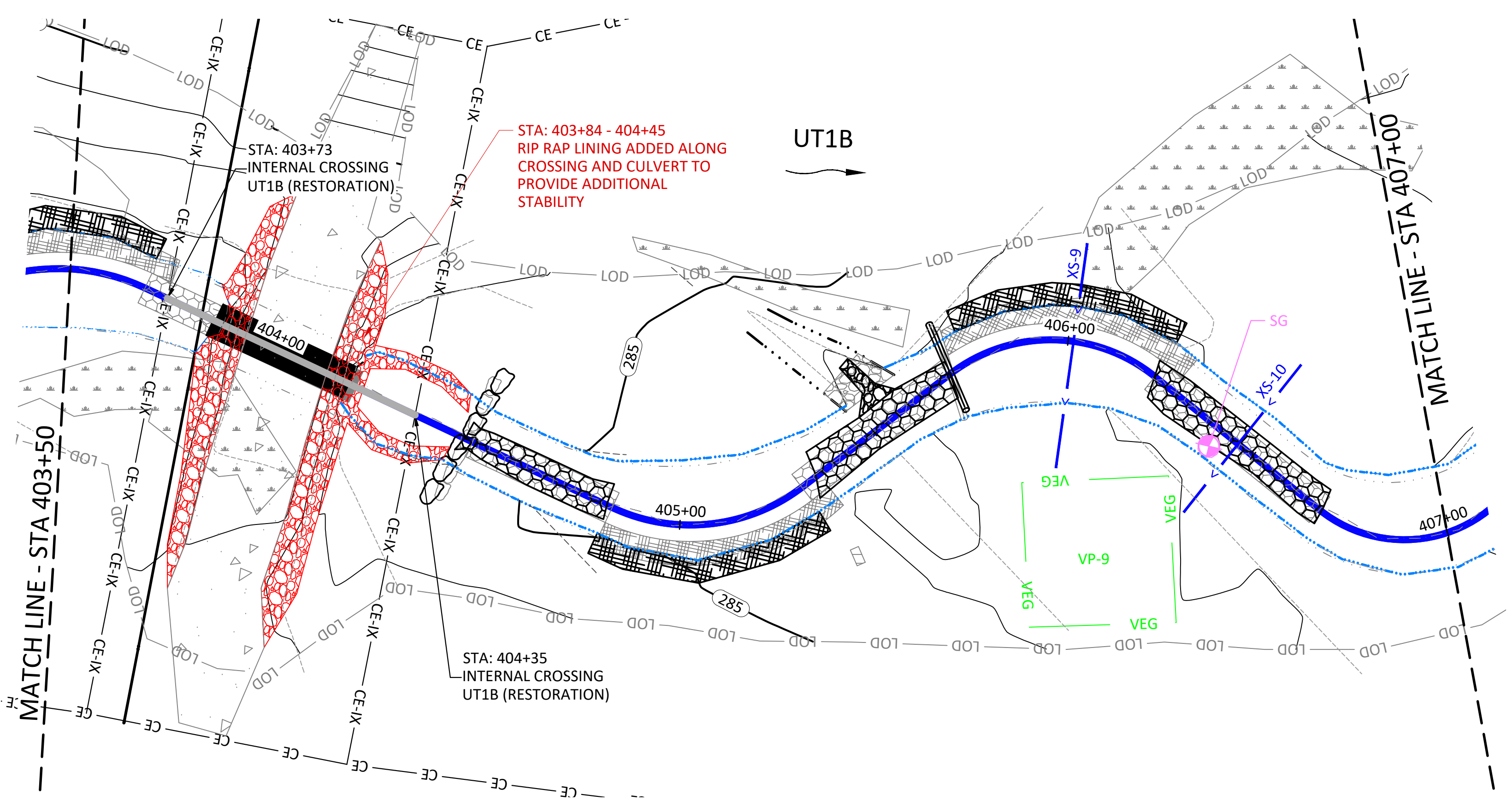

NOTES:
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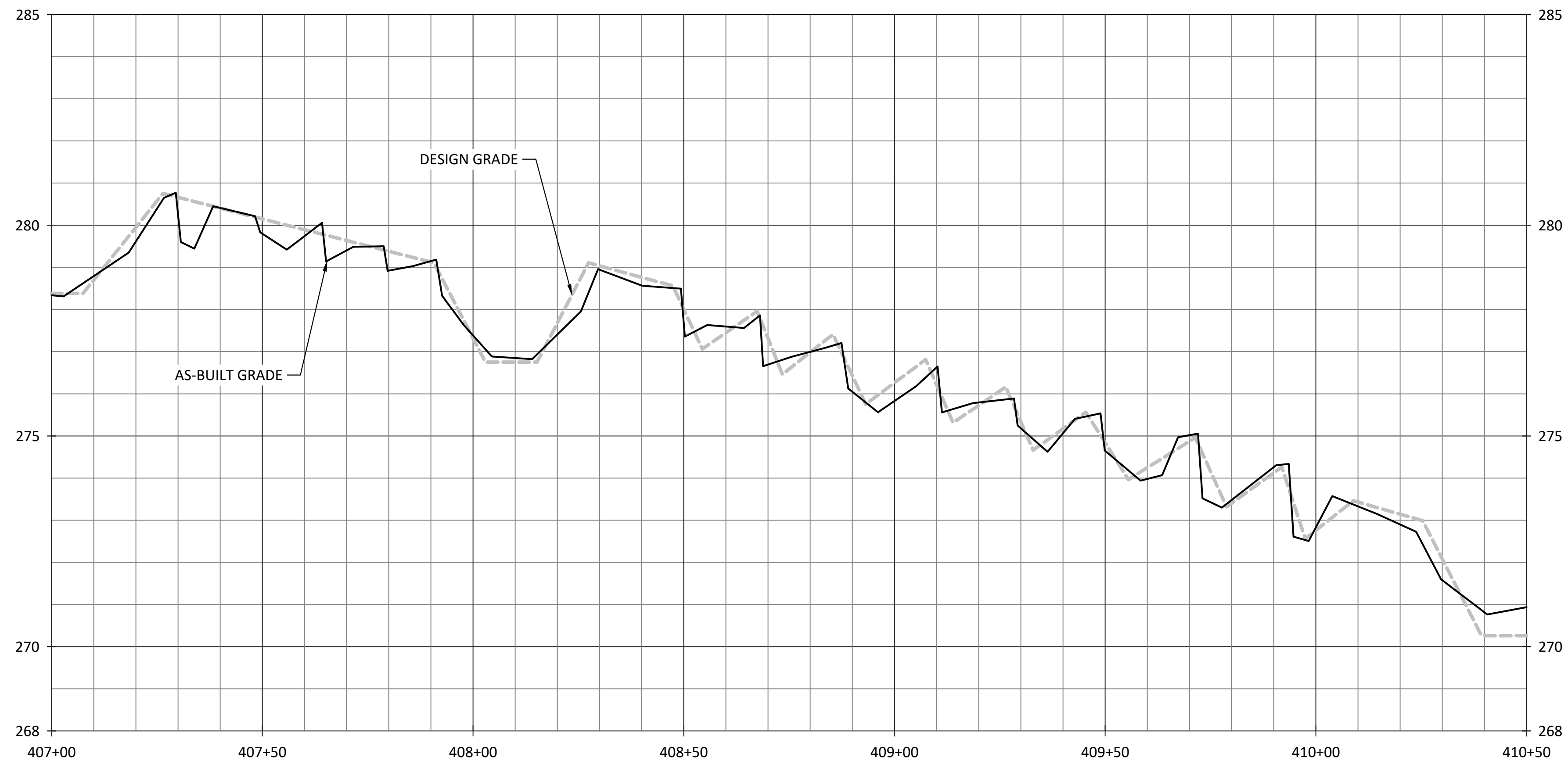
UT1B
Stream Plan and Profile

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

Sheet 1.4.2

August 25, 2022



0' 2' 4' 6' (VERTICAL)

0' 20' 40' 60' (HORIZONTAL)

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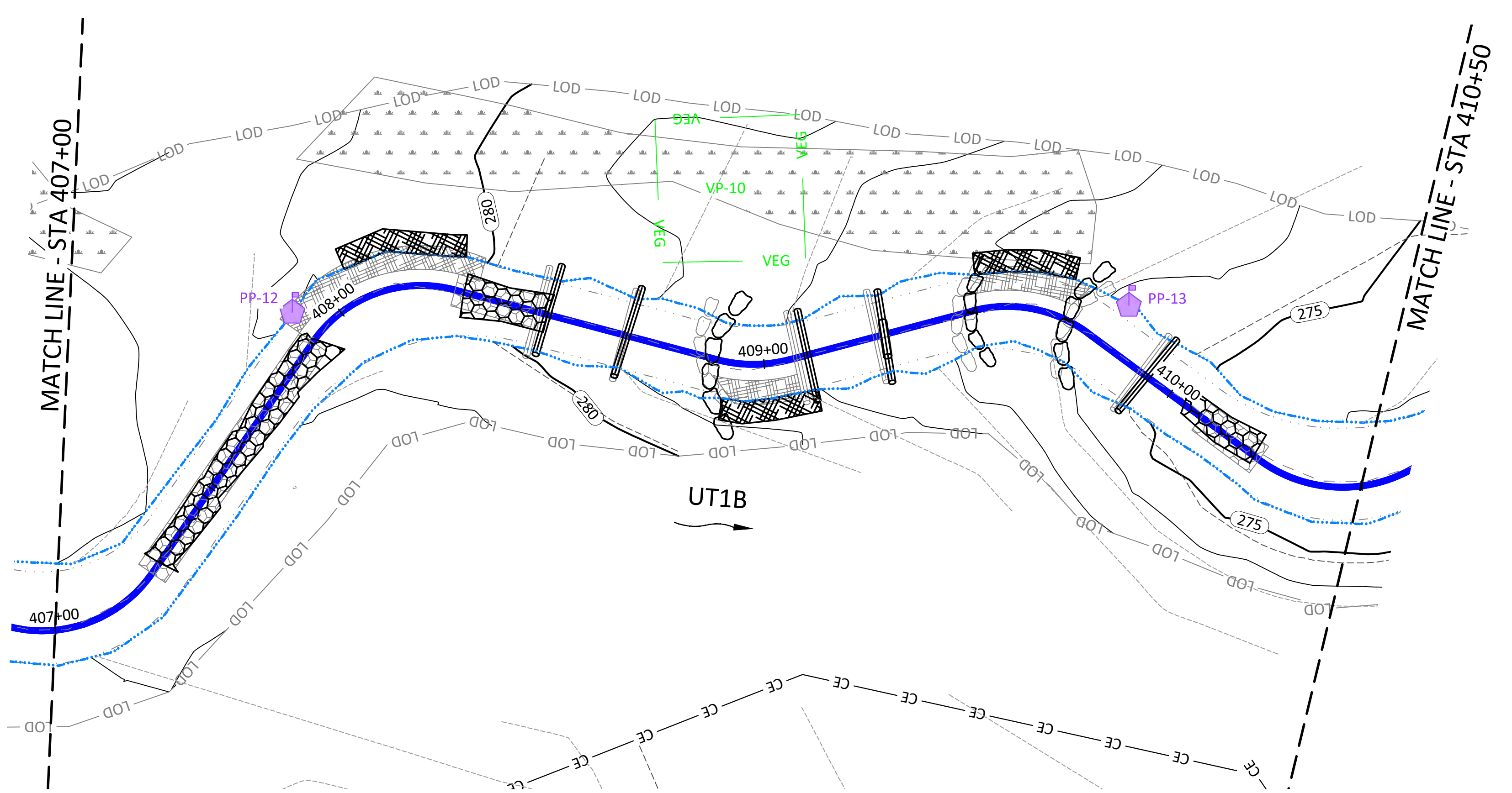

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Montgomery County, North Carolina

UT1B
Stream Plan and Profile

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 1.4.3

X:\Shared\Projects\W02186_Cross_Creek_Ranch\Monitoring\Baseline Monitoring\Plans\02186-AB-Profiles-Clark-UT1B.dwg

0' 2' 4' 6' (VERTICAL)

0' 20' 40' 60' (HORIZONTAL)

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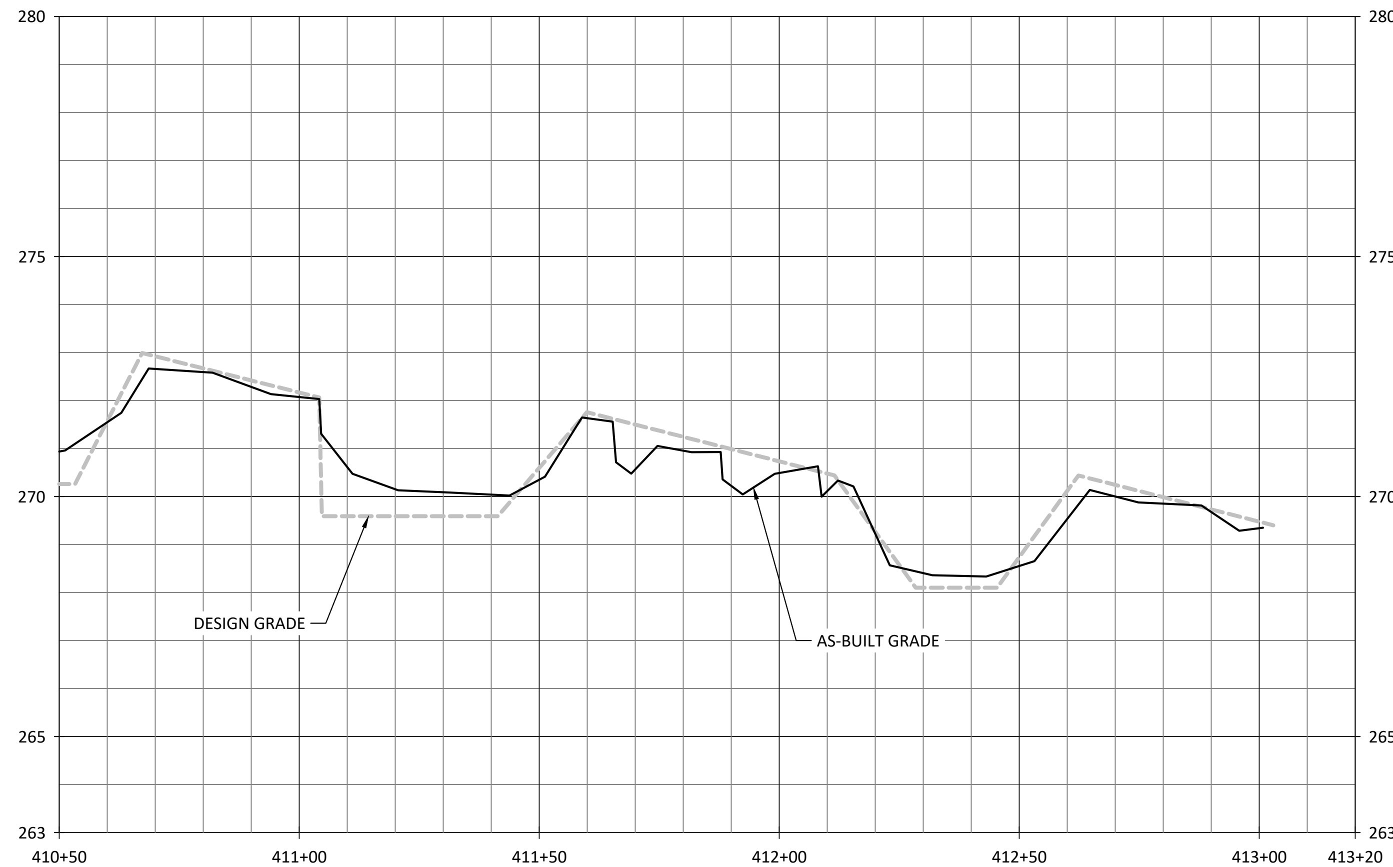

NOTES:
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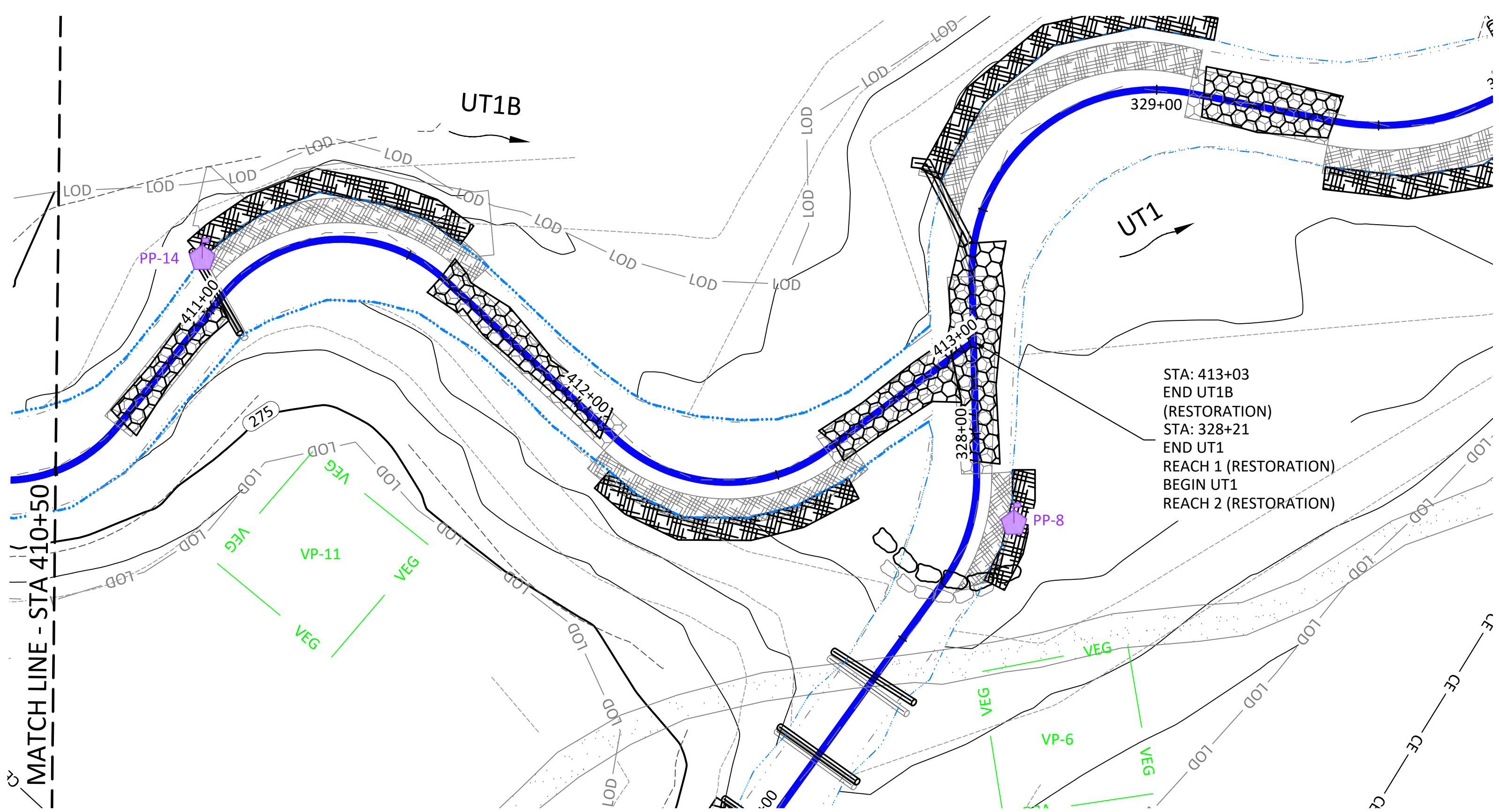
2. AS-BUILT INFORMATION FOR UT1 IS ADDRESSED ON SHEETS 1.3.1 THROUGH 1.3.9



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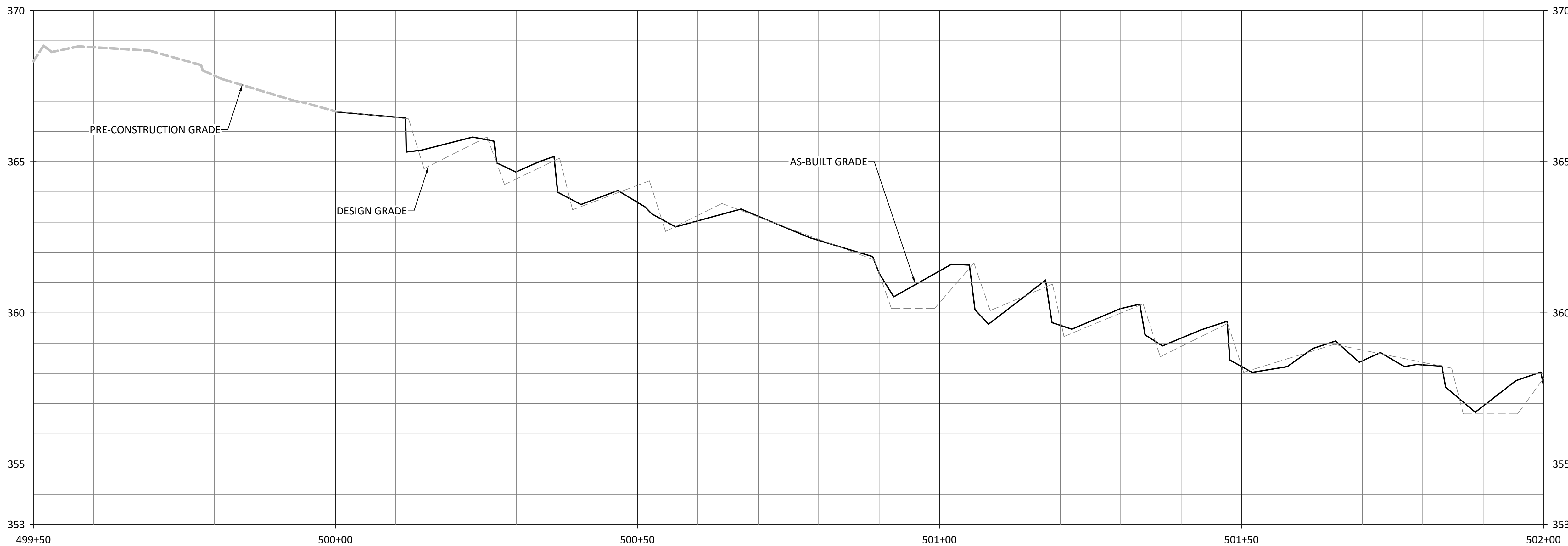
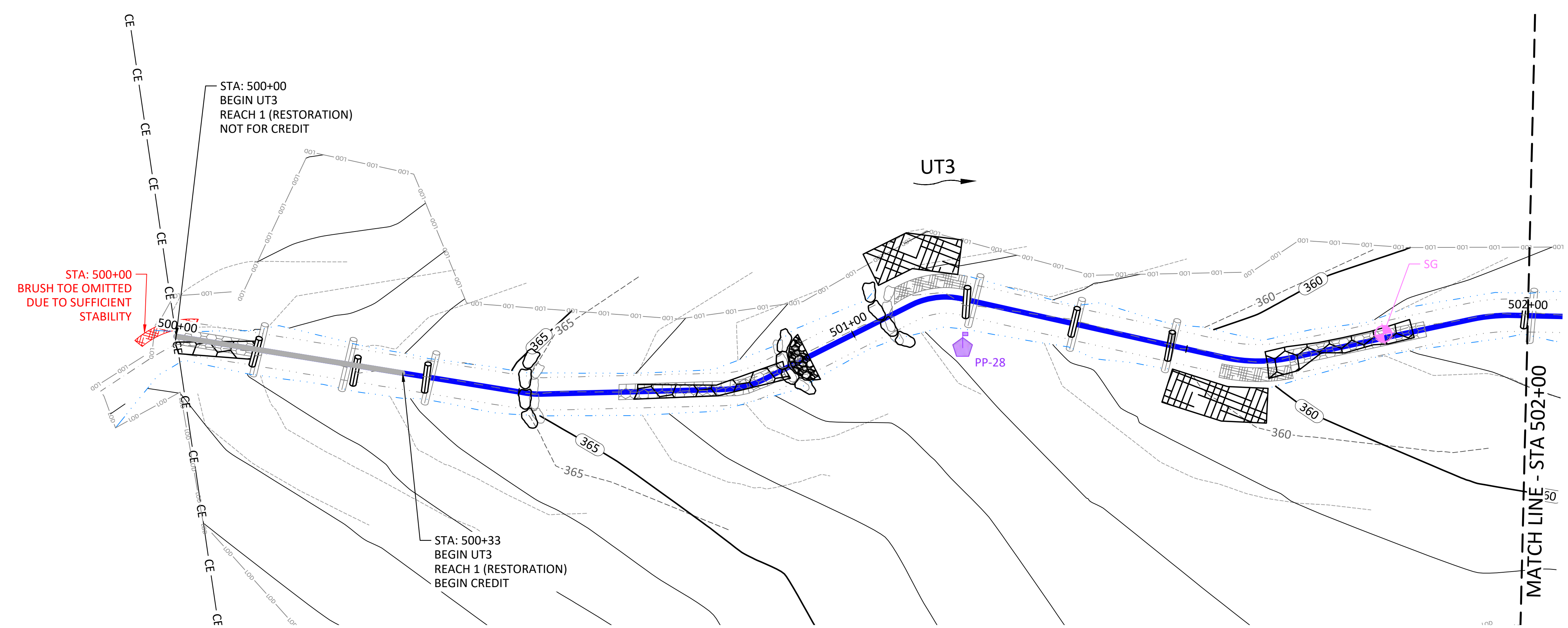
UT1B
Stream Plan and Profile

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

Sheet 1.4.4





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UT3
Stream Plan and Profile

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

Sheet 1.5.1

August 25, 2022

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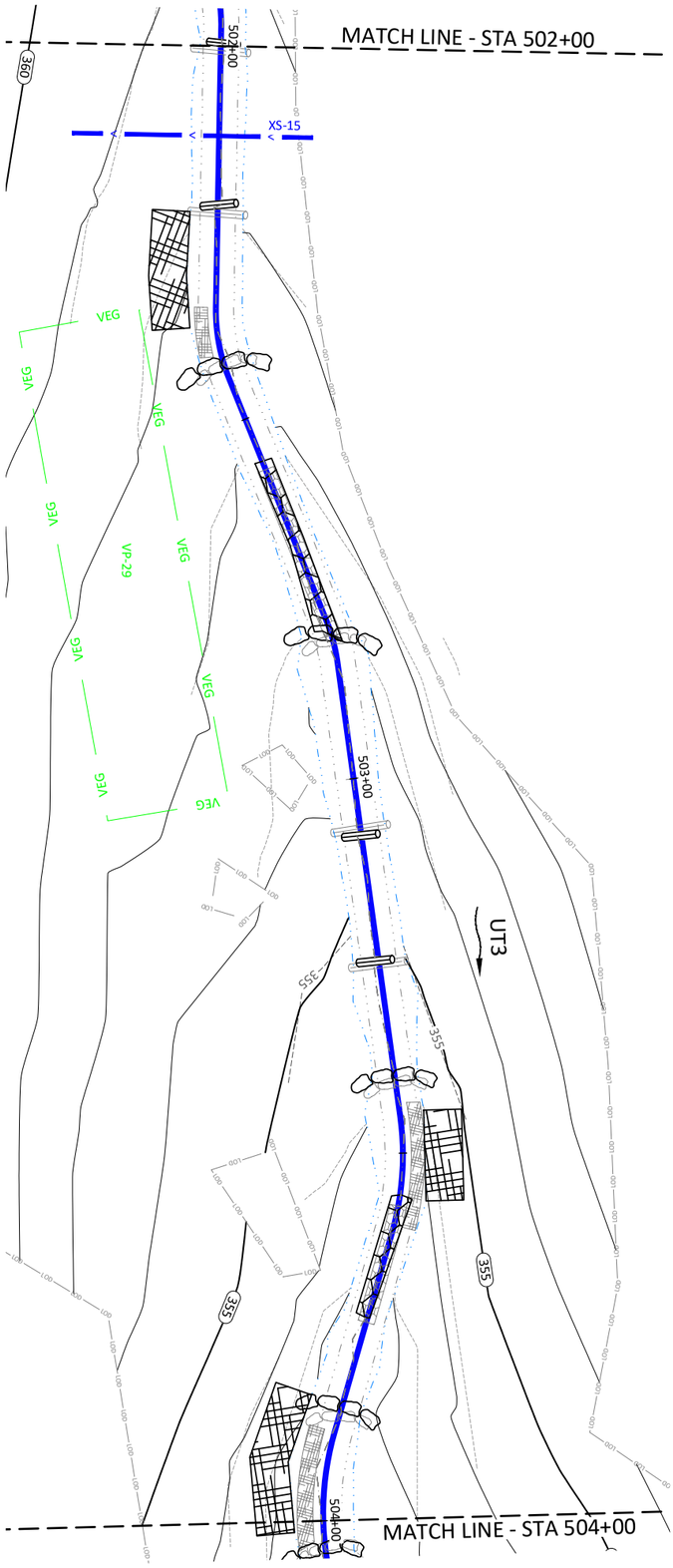

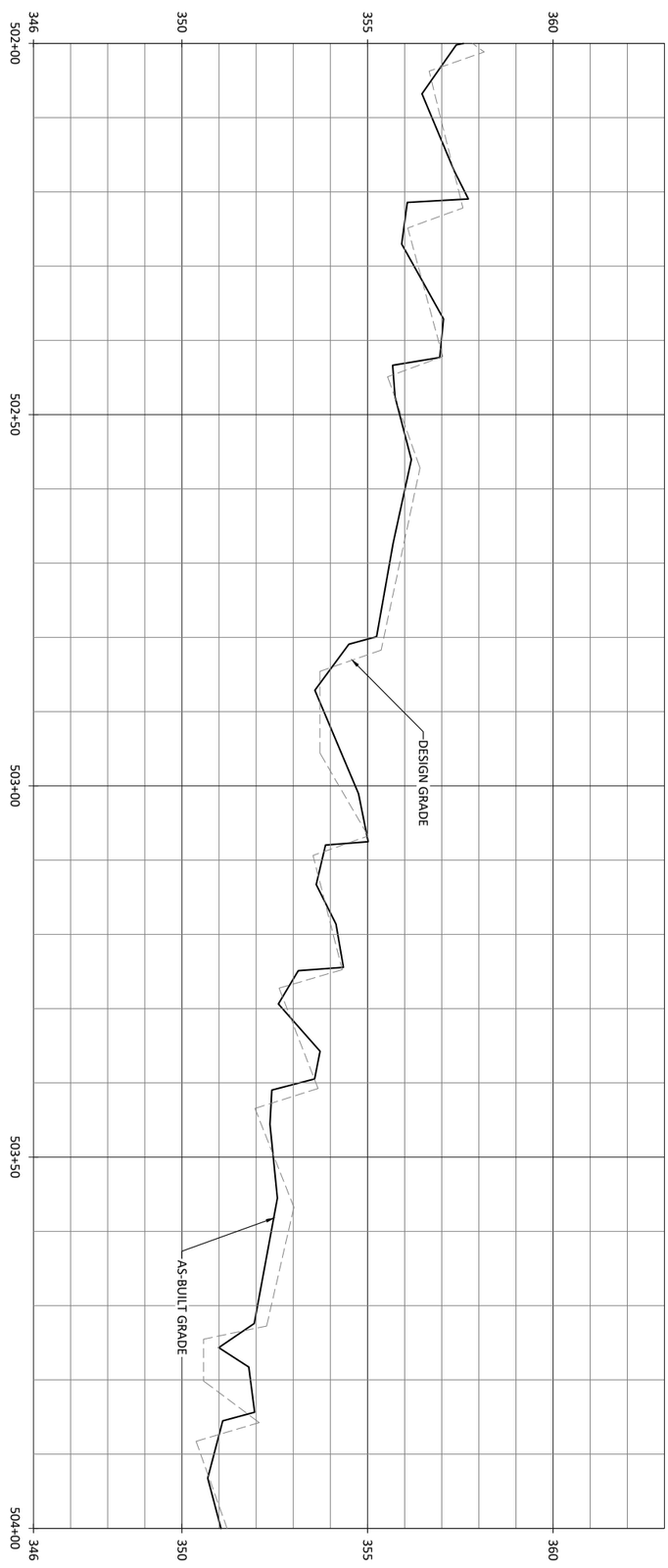

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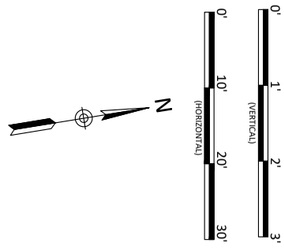

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

1.5.2
Sheet

Cross Creek Ranch Site
Montgomery County, North Carolina

UT3
Stream Plan and Profile

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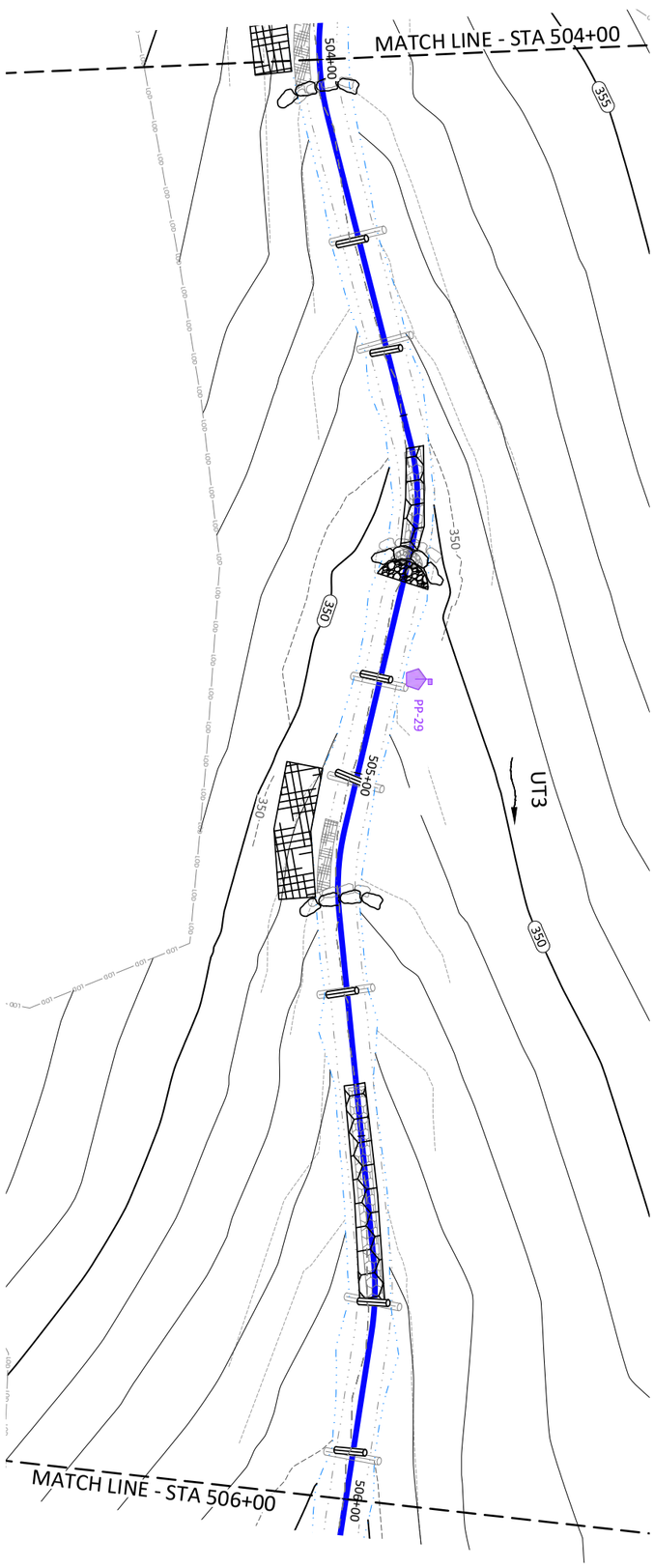

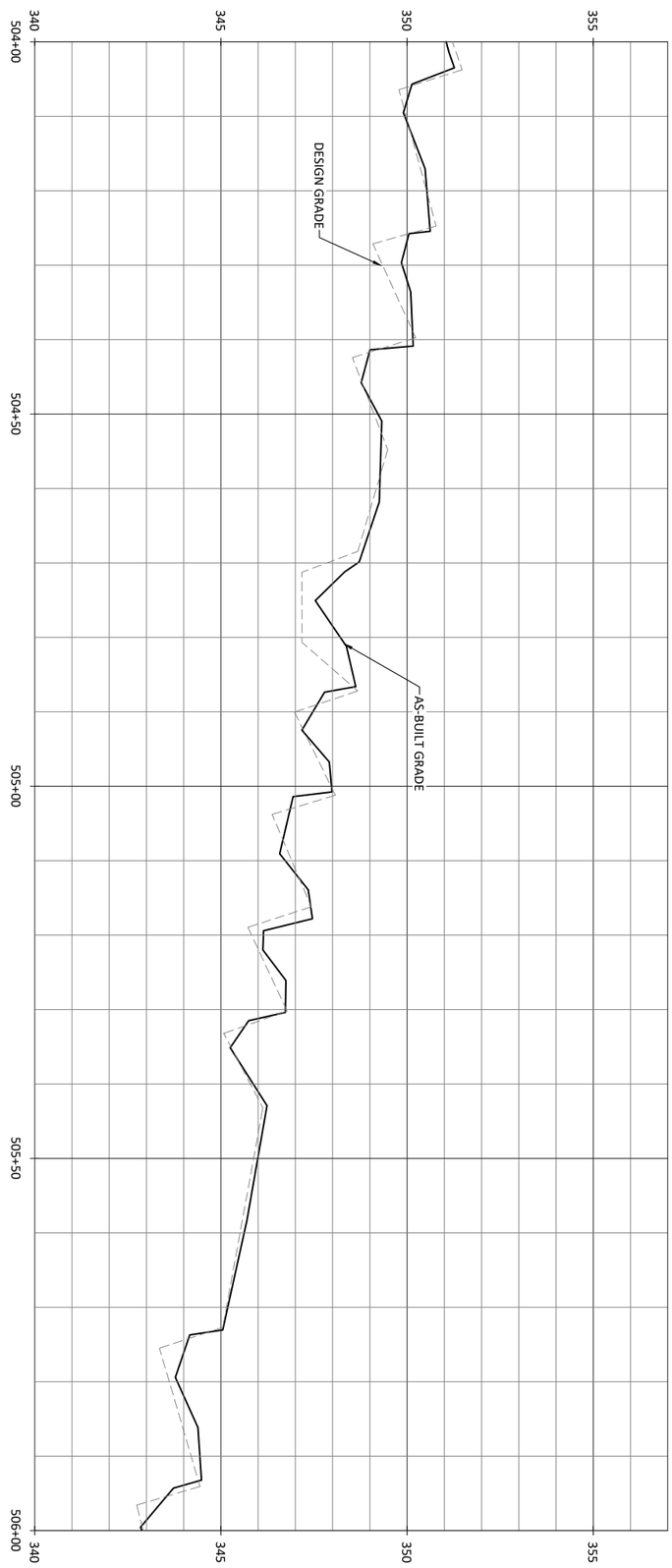

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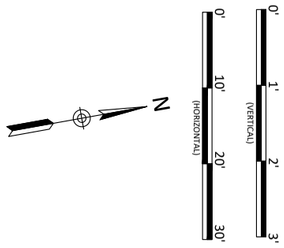

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

1.5.3
Sheet

Cross Creek Ranch Site
Montgomery County, North Carolina

UT3
Stream Plan and Profile

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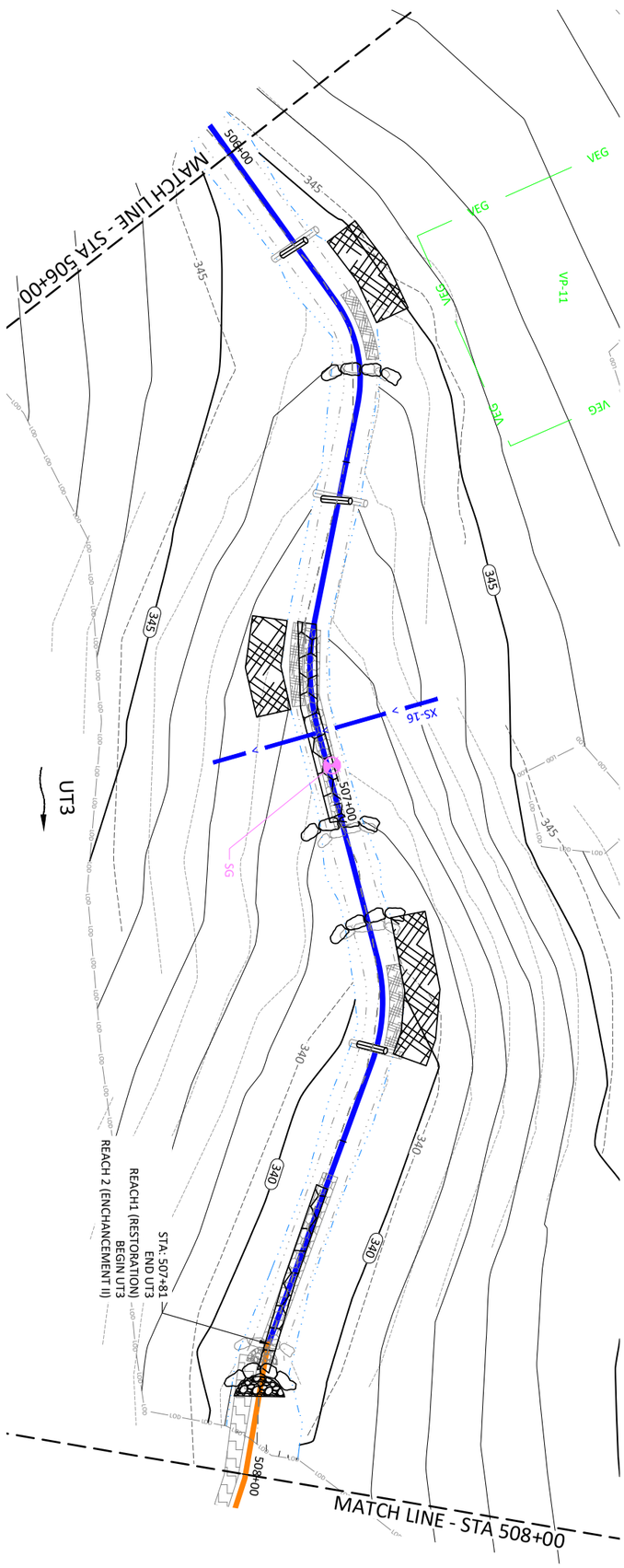

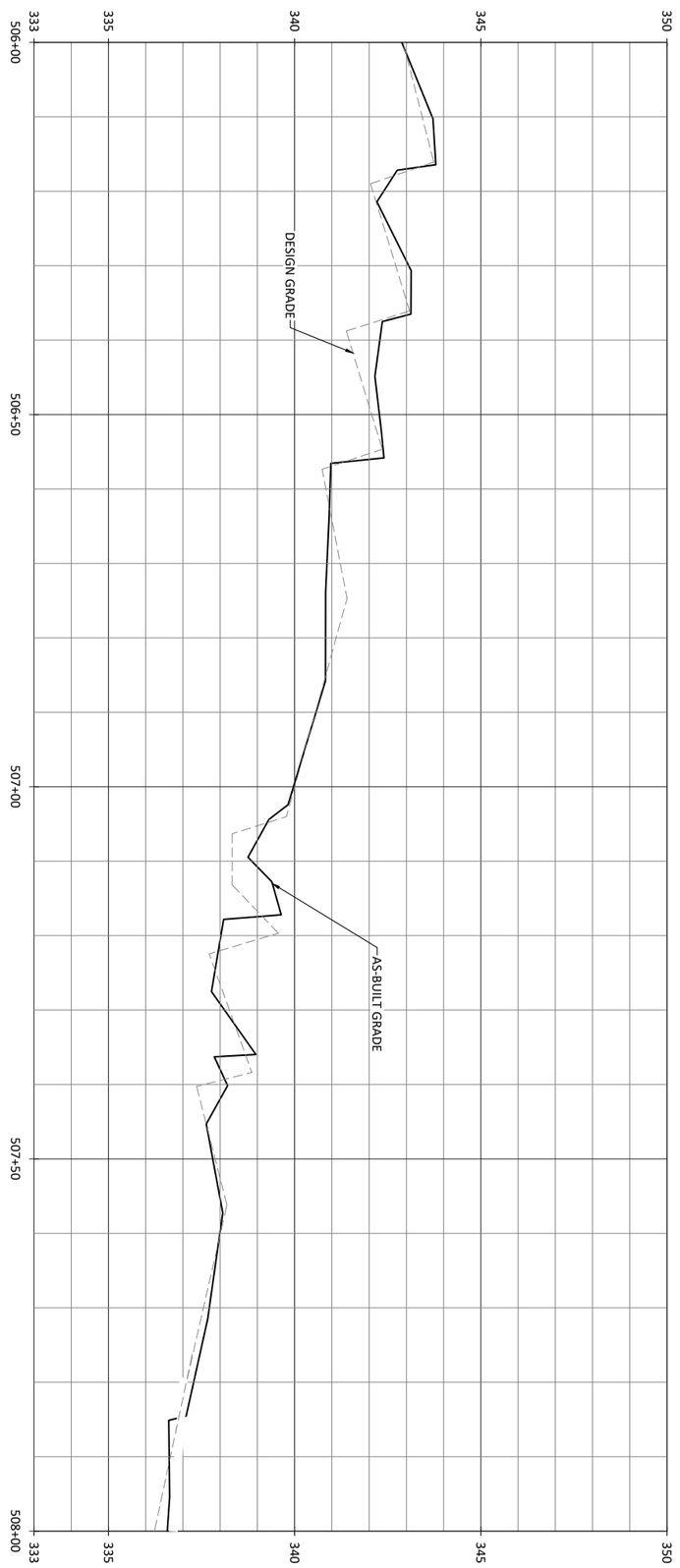

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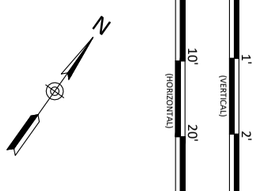

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

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1.5.4
Sheet

Cross Creek Ranch Site
Montgomery County, North Carolina

UT3
Stream Plan and Profile

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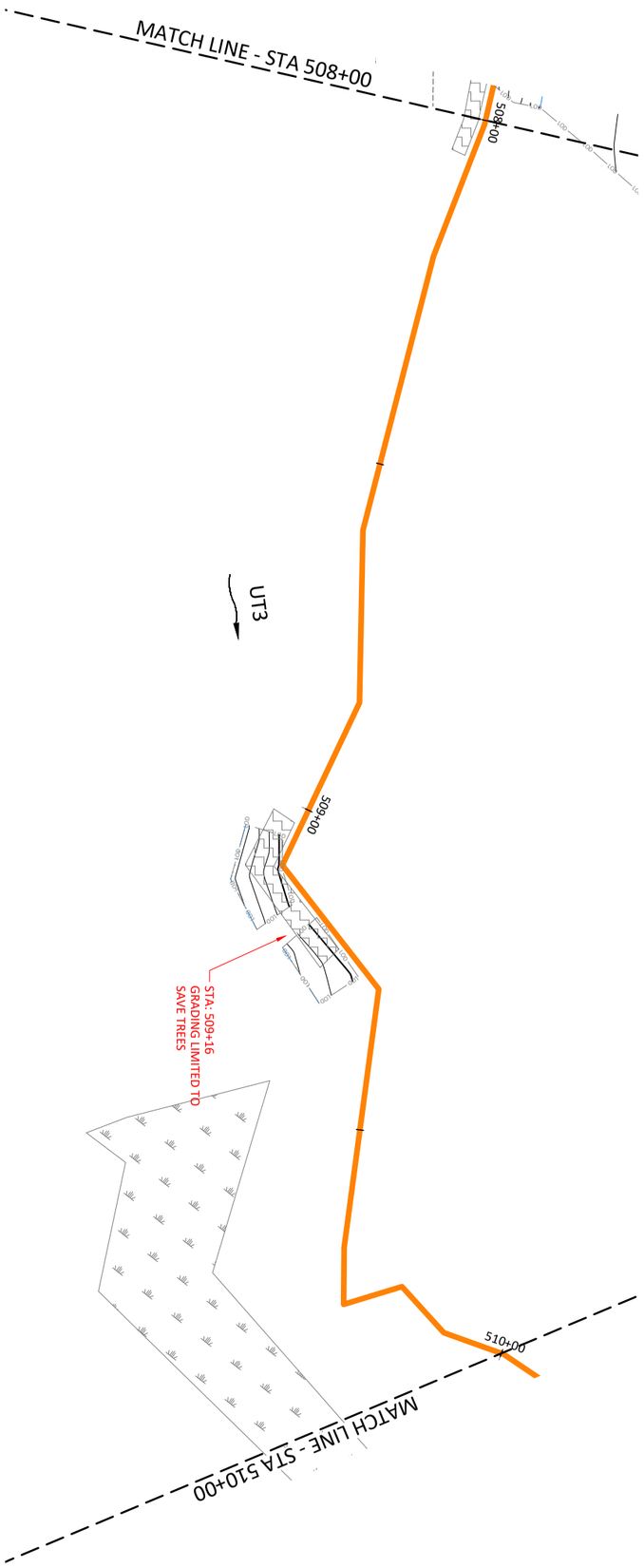

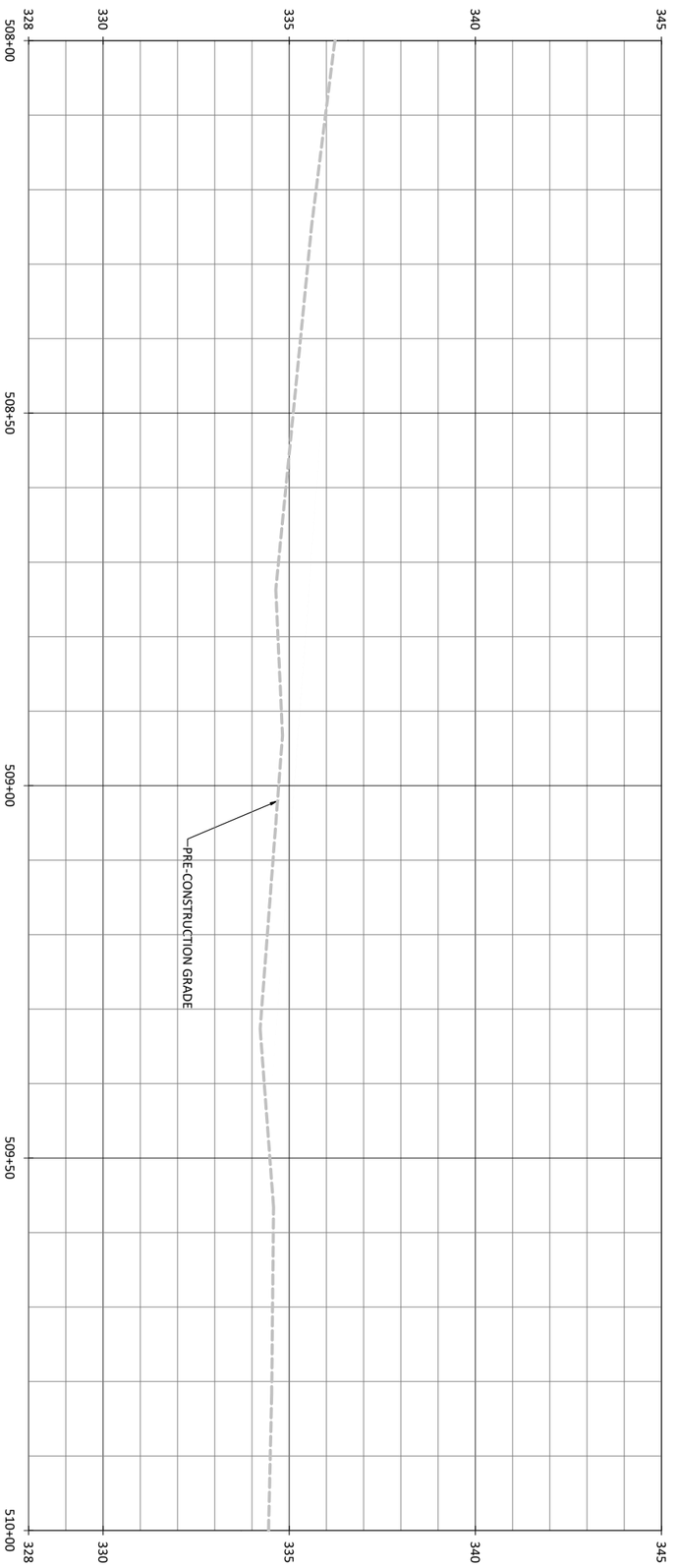

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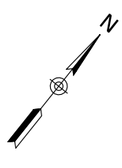

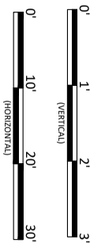

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

1.5.5
Sheet

Cross Creek Ranch Site
Montgomery County, North Carolina

UT3
Stream Plan and Profile

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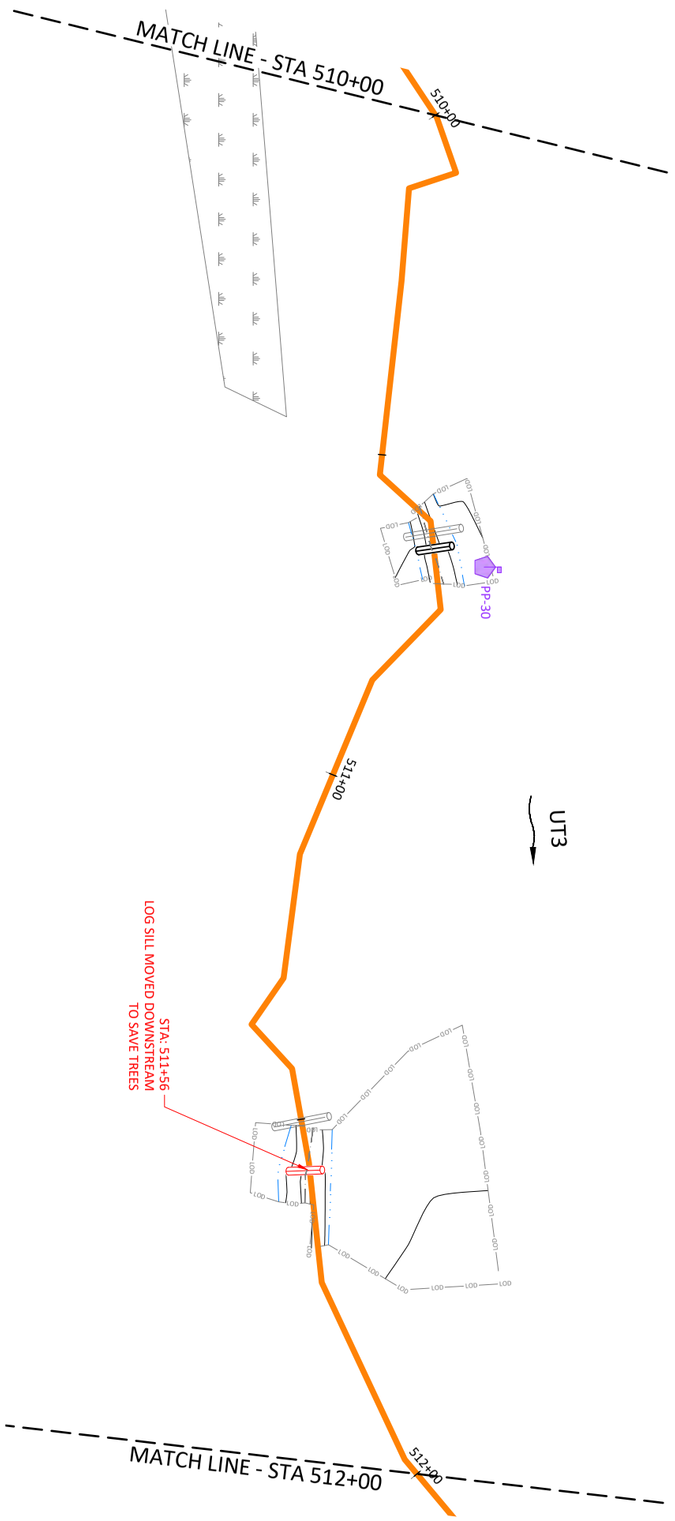

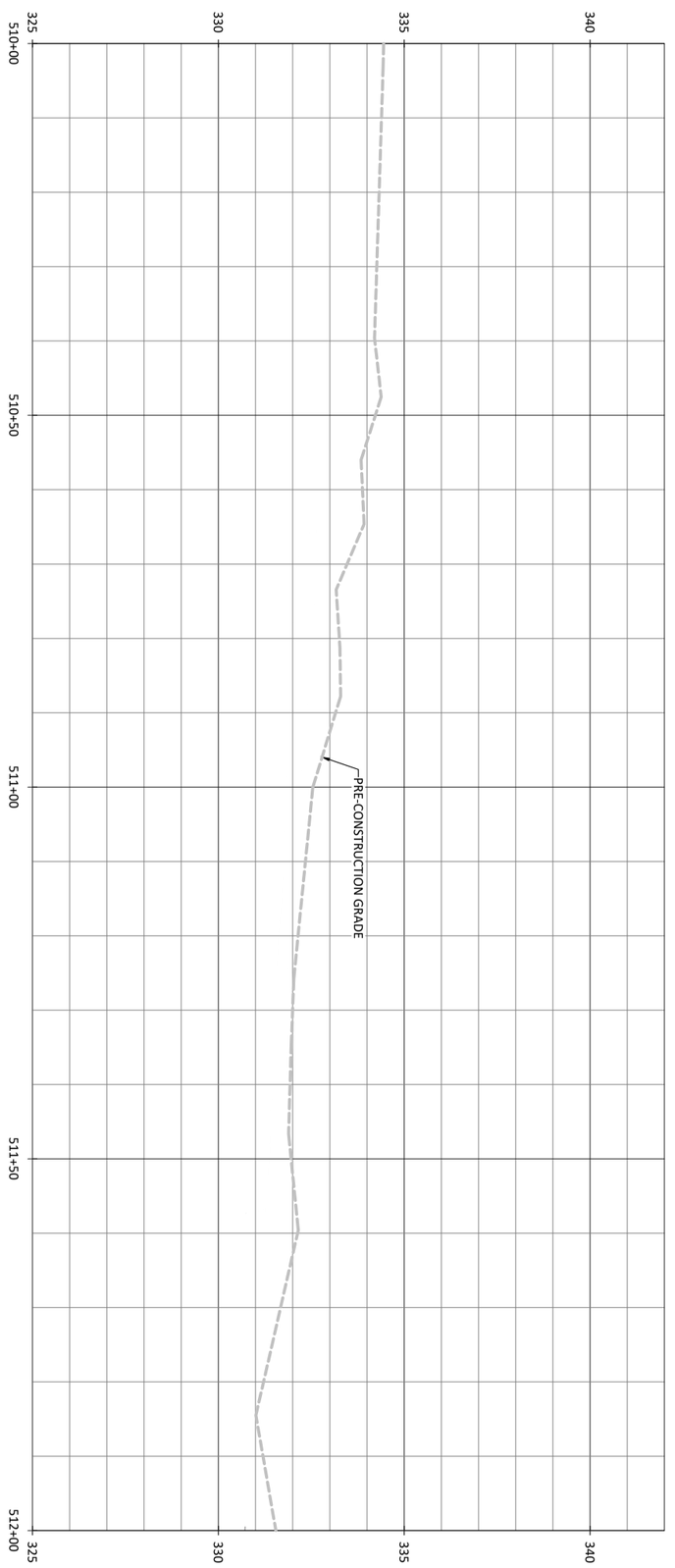

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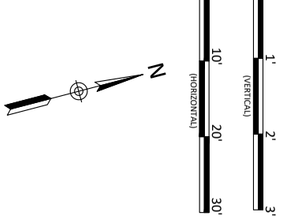

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

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1.5.6
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Cross Creek Ranch Site
Montgomery County, North Carolina

UT3
Stream Plan and Profile

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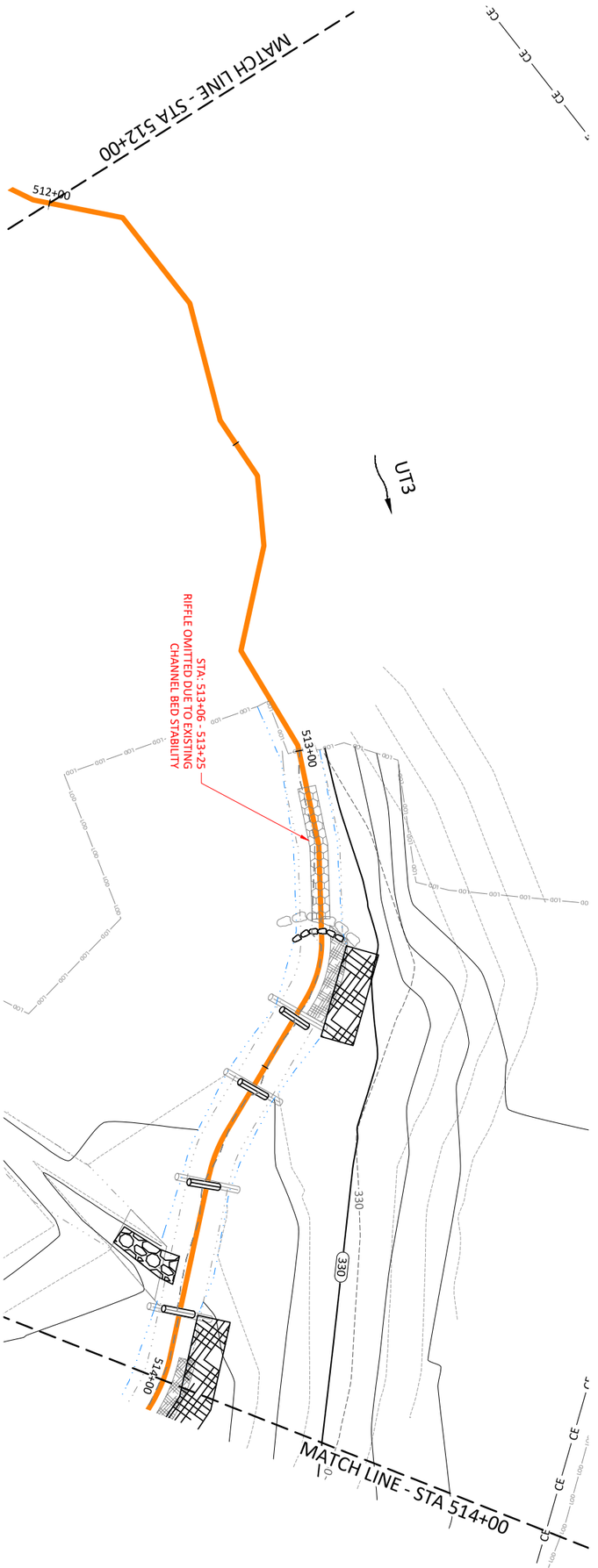

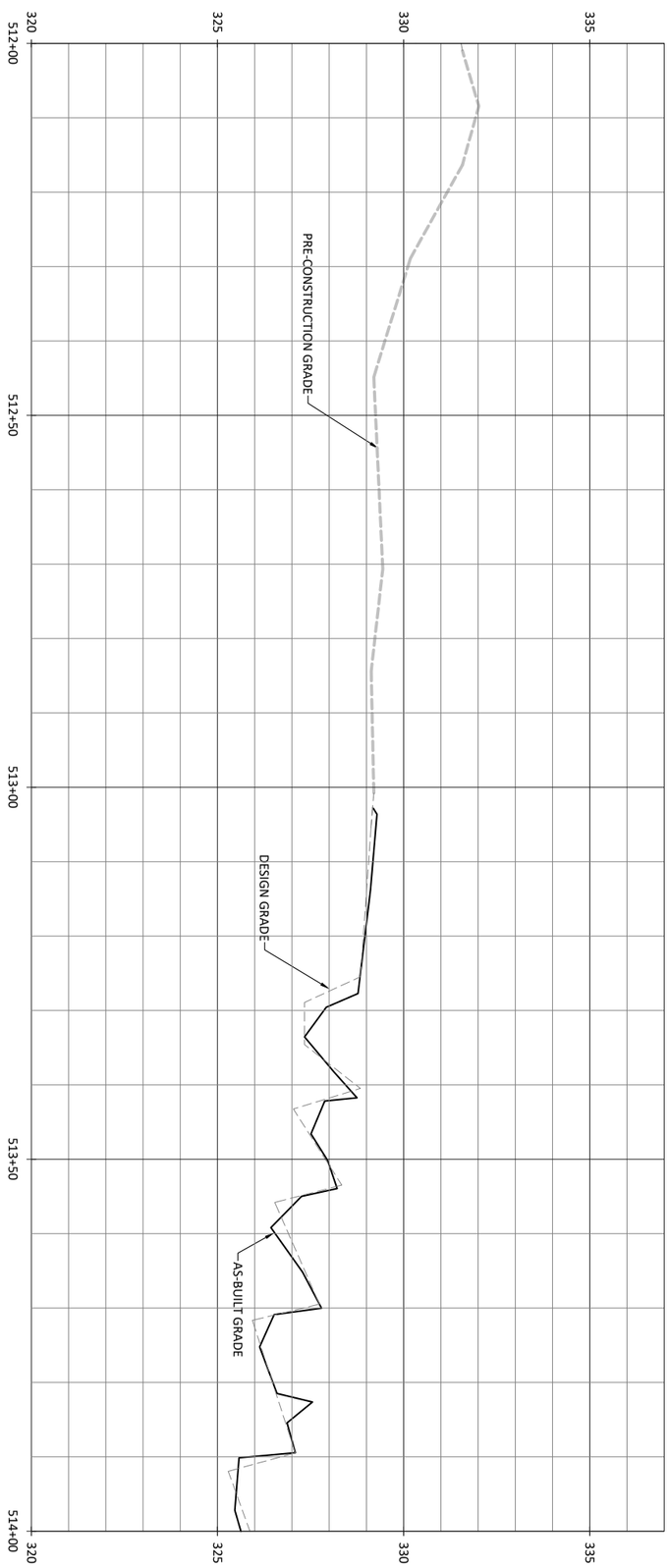

NOTES:
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N

0' 10' 20' 30' (HORIZONTAL)

0' 1' 2' 3' (VERTICAL)

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

1.5.7
Sheet

Cross Creek Ranch Site
Montgomery County, North Carolina

UT3
Stream Plan and Profile

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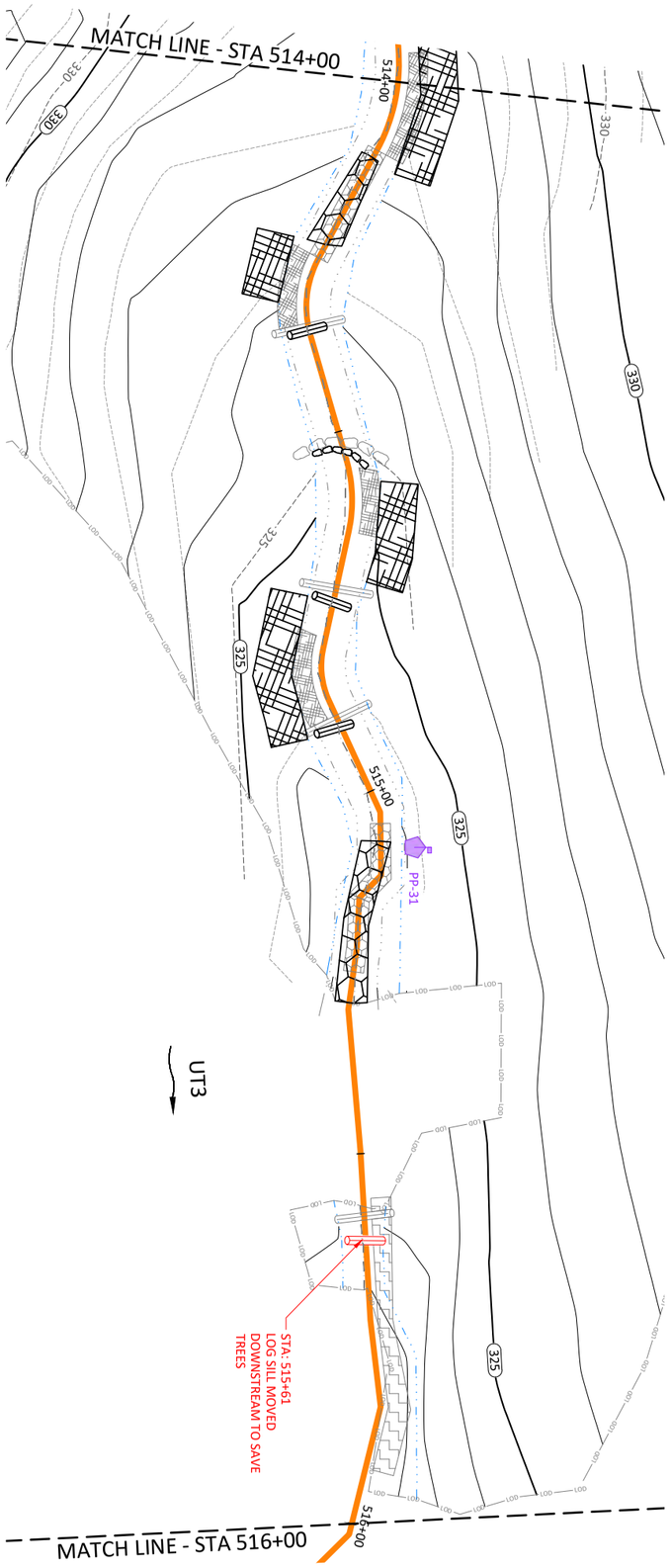

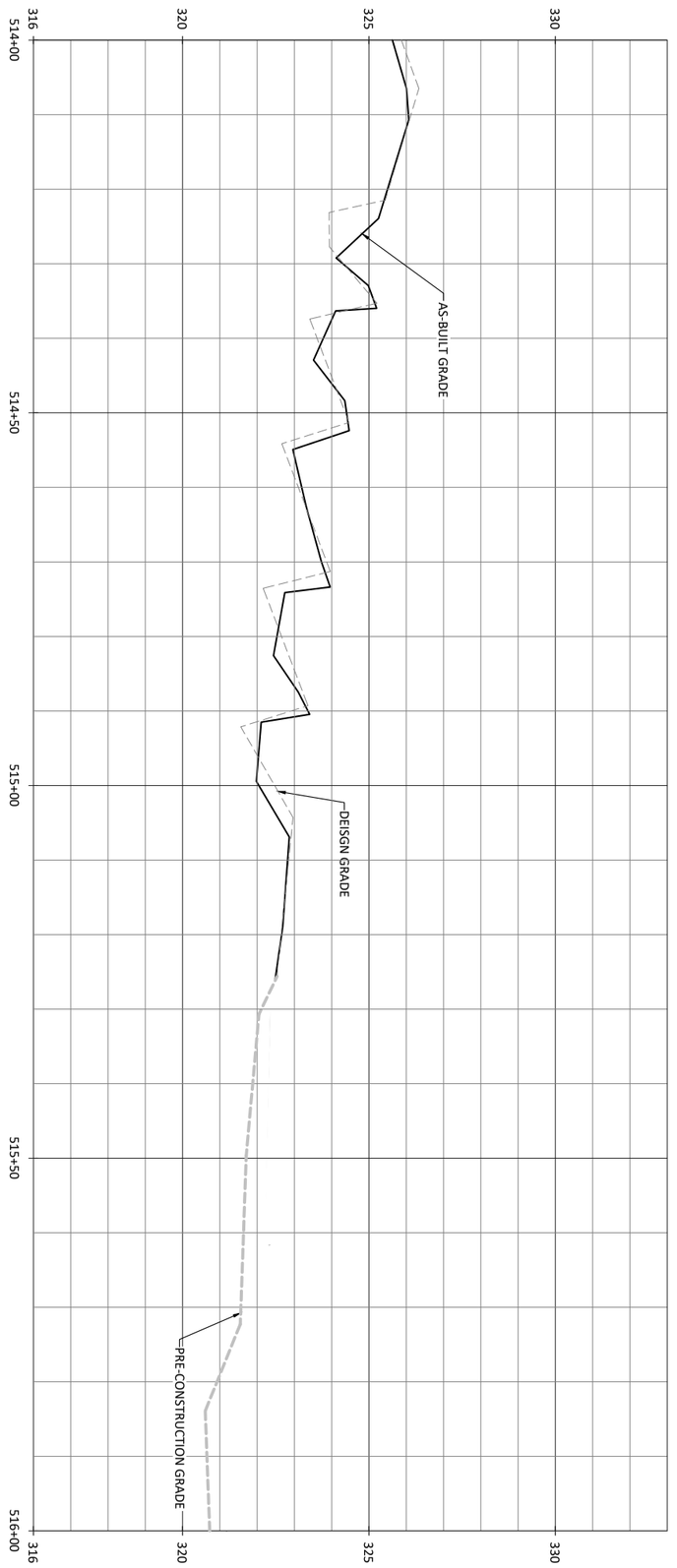

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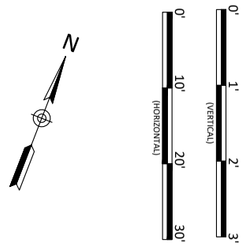

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

1.5.8
Sheet

Cross Creek Ranch Site
Montgomery County, North Carolina

UT3
Stream Plan and Profile

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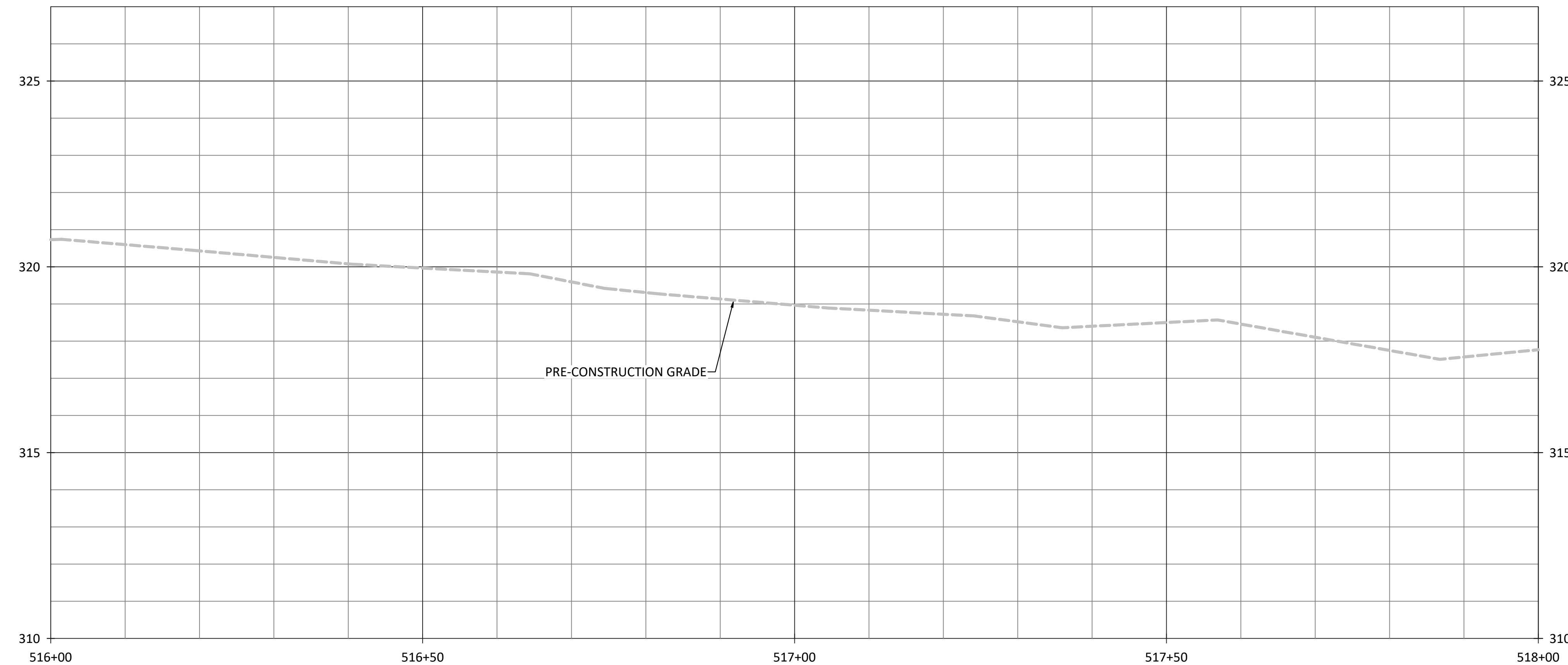

NOTES:
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0' 1' 2' 3' (VERTICAL)

0' 10' 20' 30' (HORIZONTAL)

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Cross Creek Ranch Site
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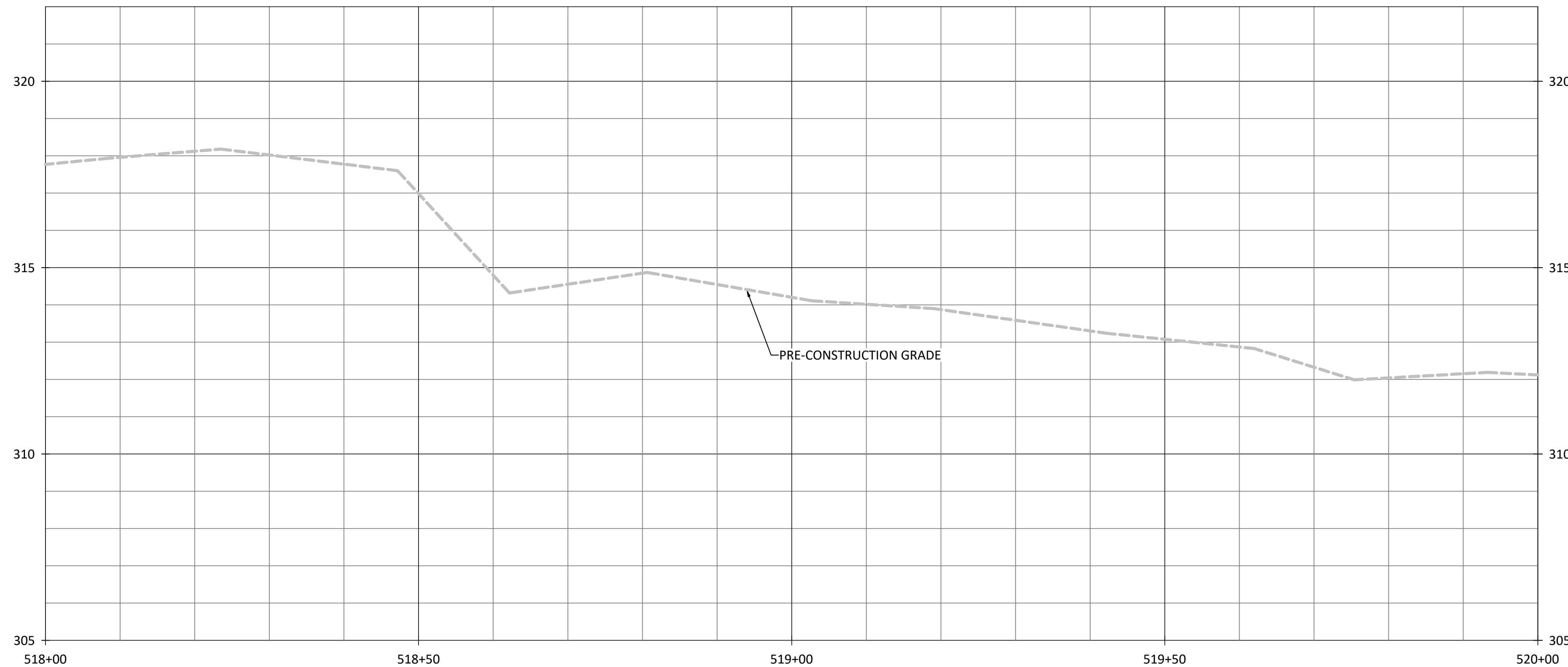
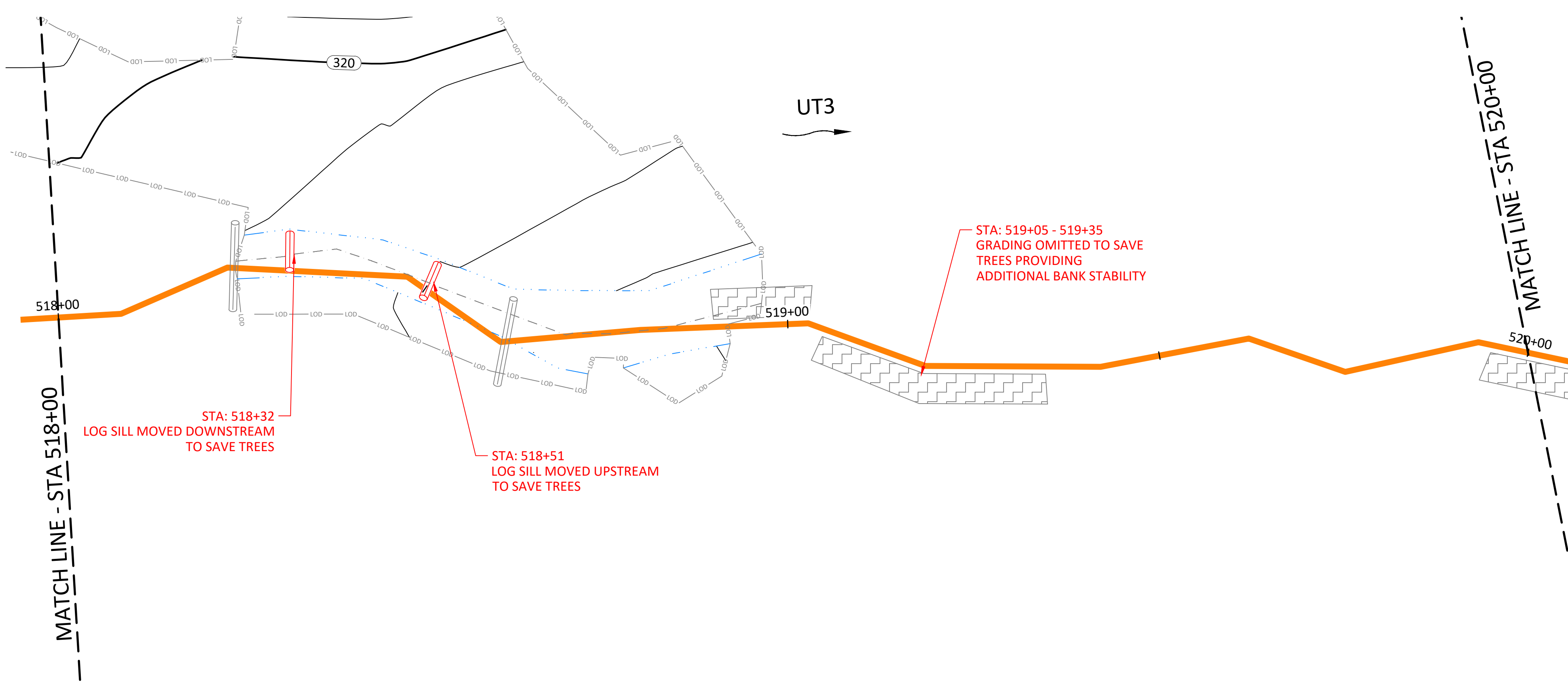
UT3
Stream Plan and Profile

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 1.5.9





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Cross Creek Ranch Site
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UT3
Stream Plan and Profile

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

1.5.10
Sheet

August 25, 2022
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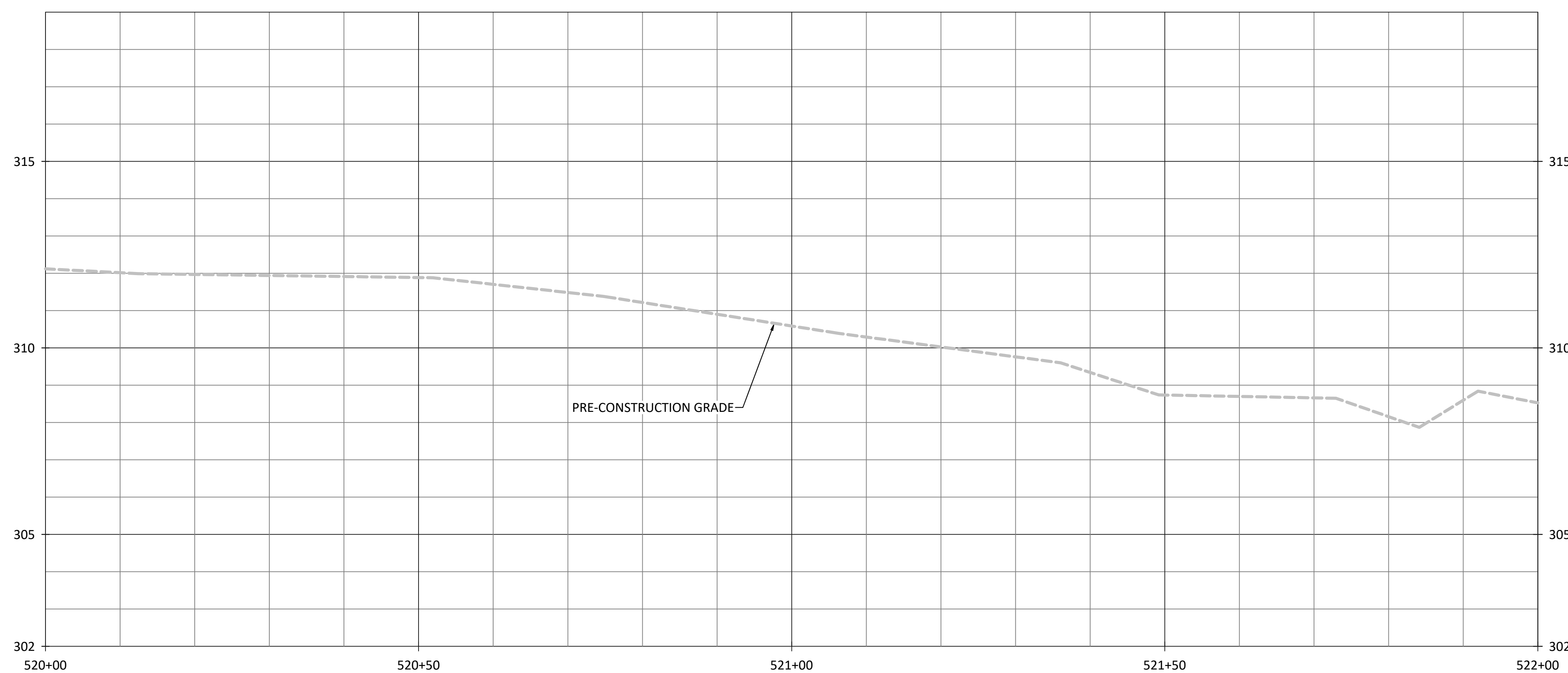

(VERTICAL) 0' 1' 2' 3'

(HORIZONTAL) 0' 10' 20' 30'

NOTES:
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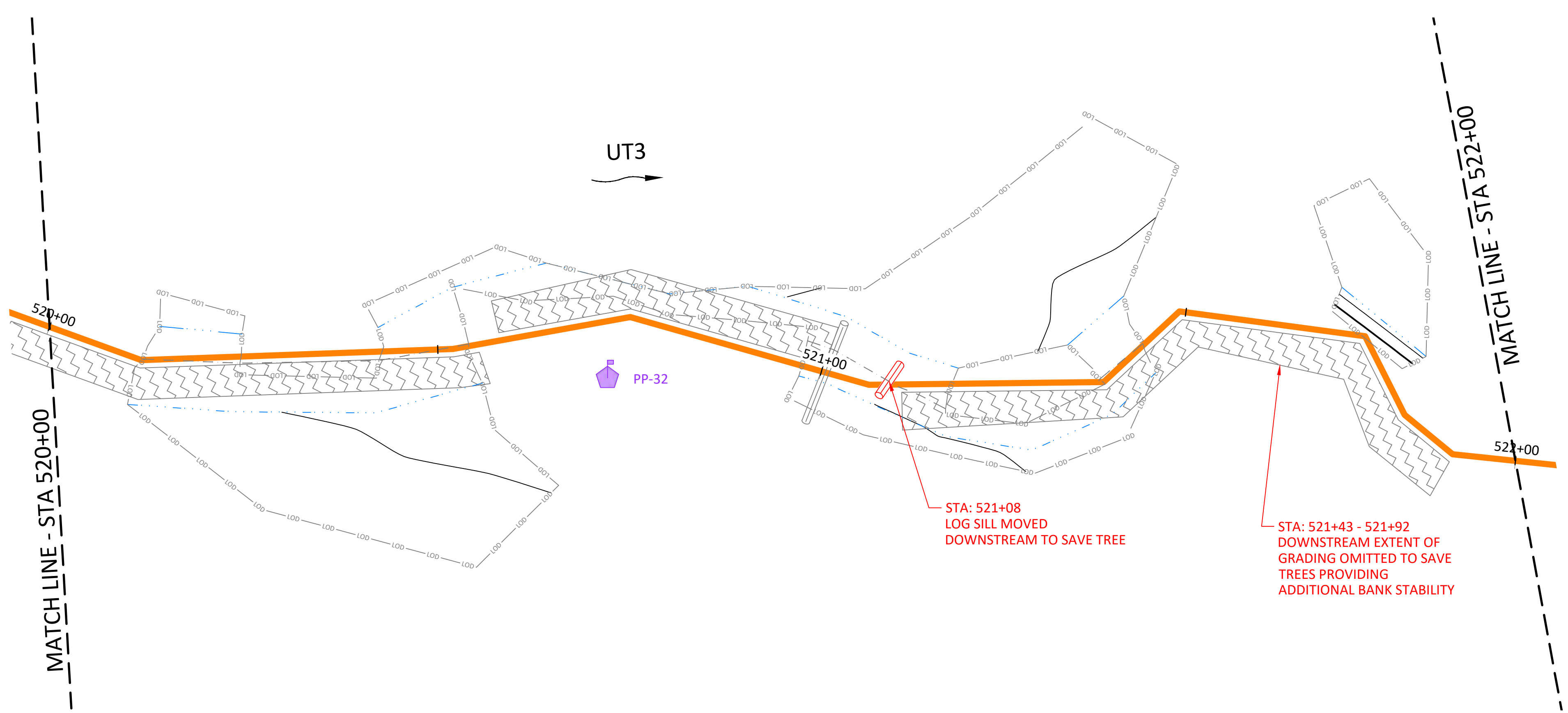

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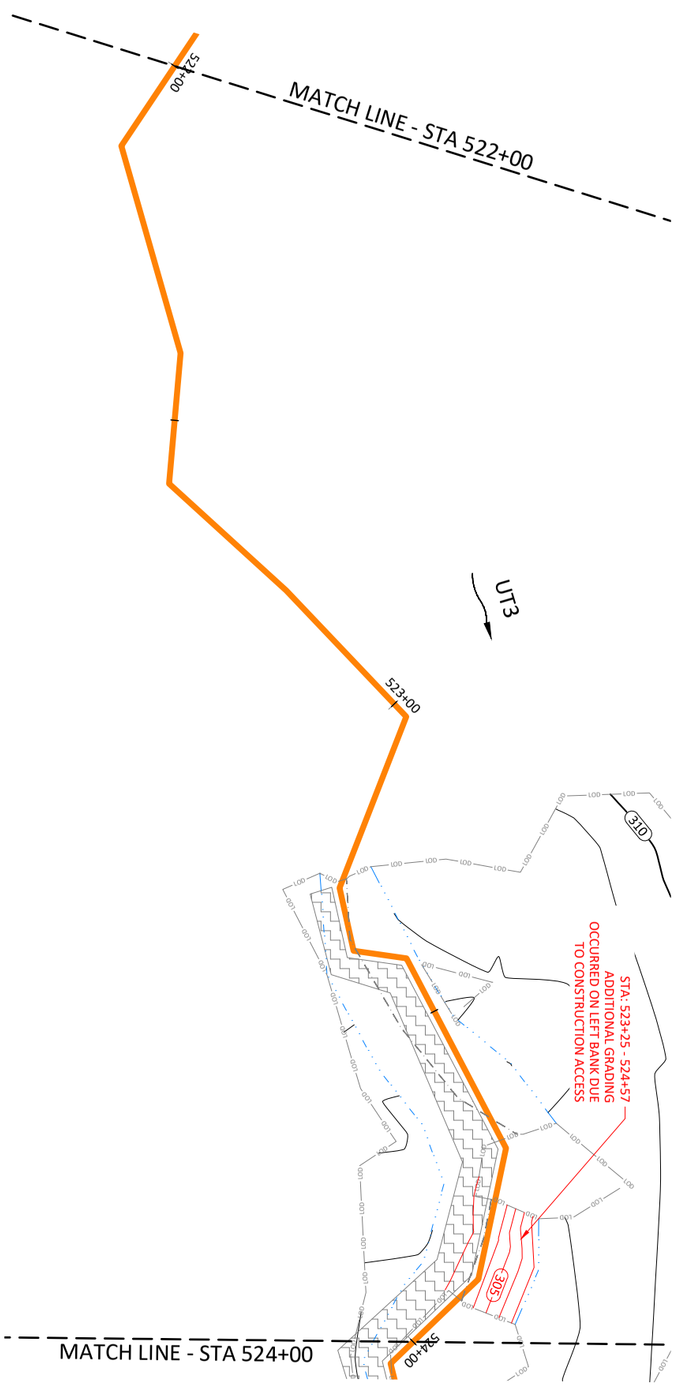
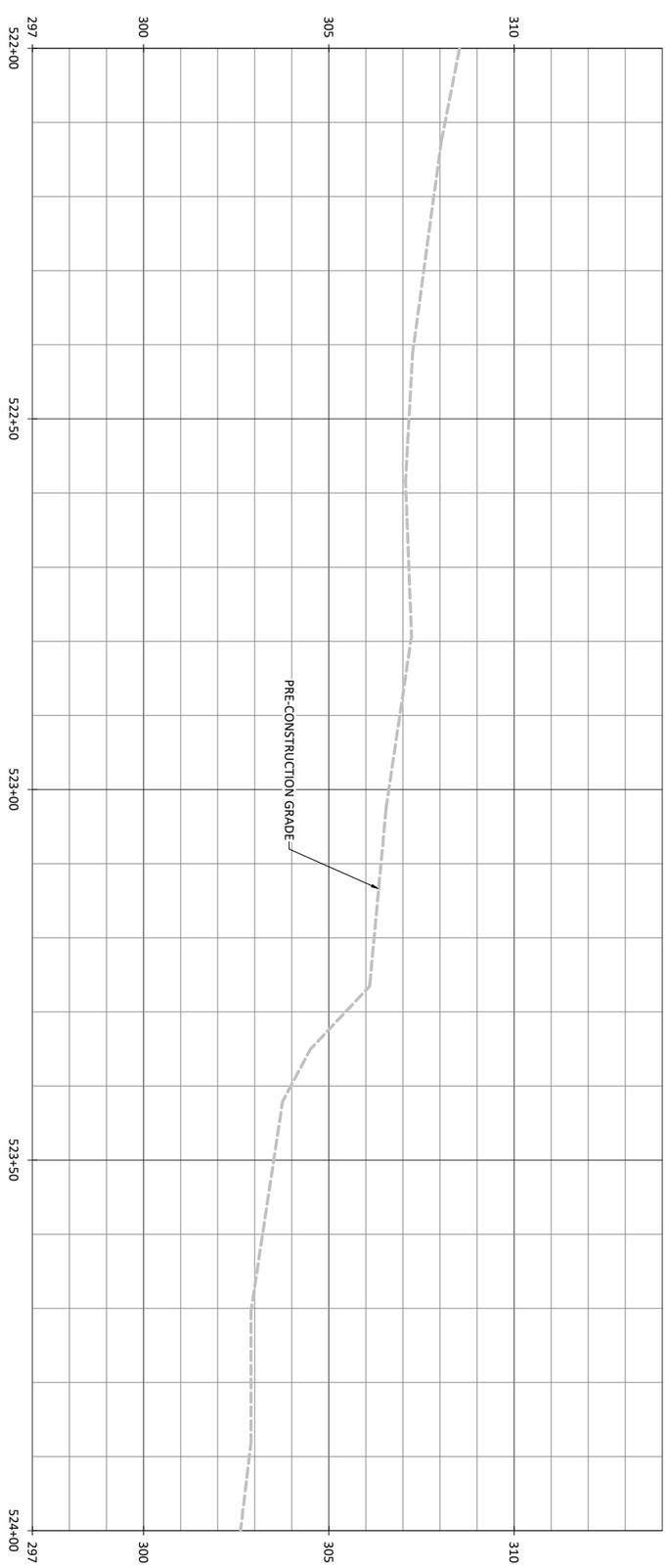
UT3
Stream Plan and Profile

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 1.5.11





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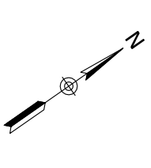

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

1.5.12
Sheet

Cross Creek Ranch Site
Montgomery County, North Carolina

UT3
Stream Plan and Profile

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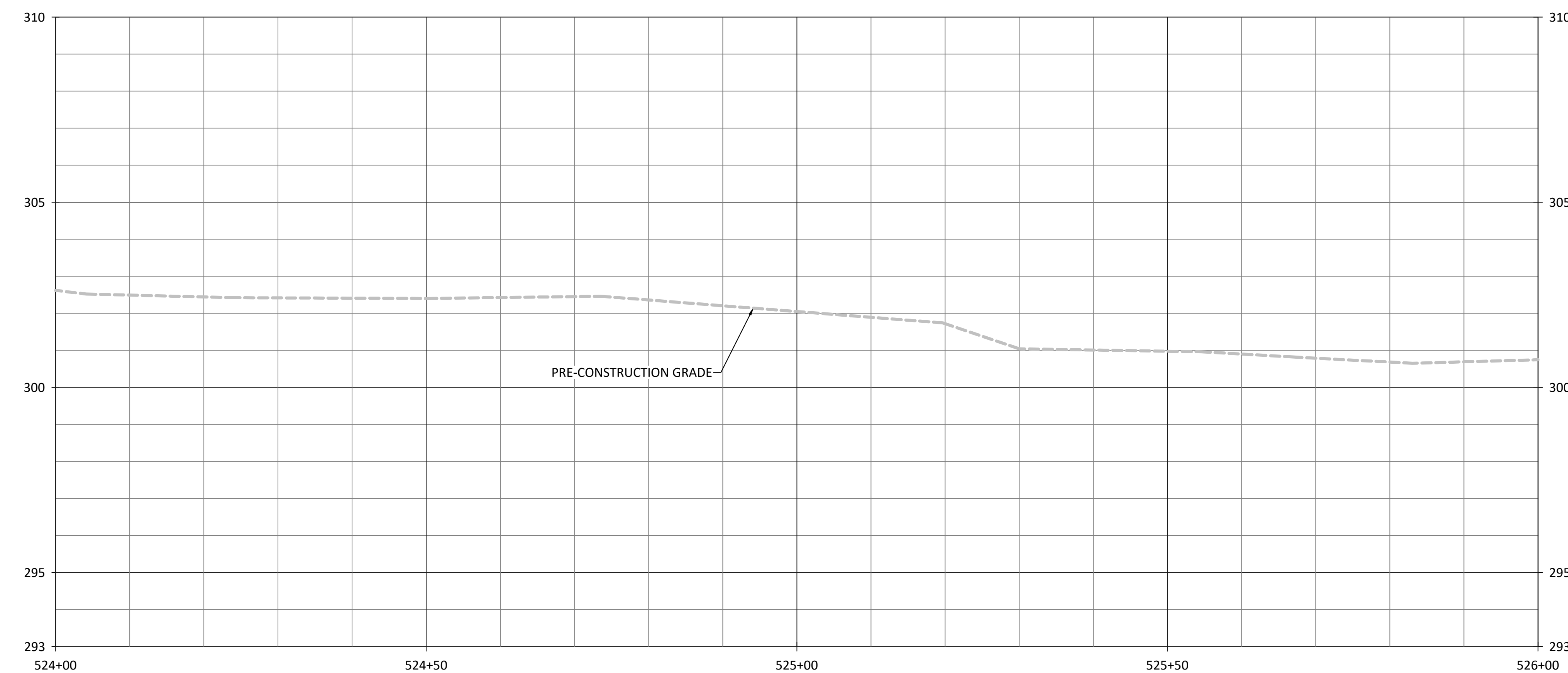

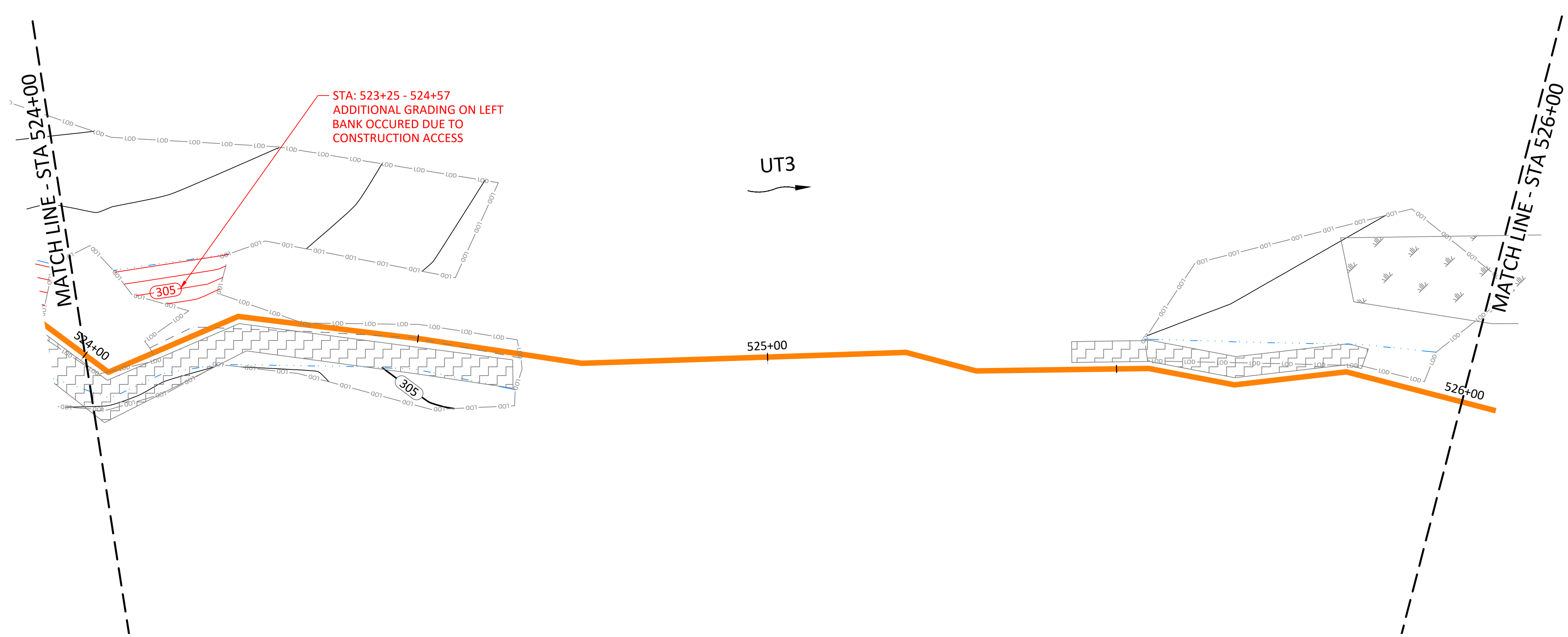

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Cross Creek Ranch Site
Montgomery County, North Carolina

UT3
Stream Plan and Profile

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

Sheet 1.5.13

August 25, 2022

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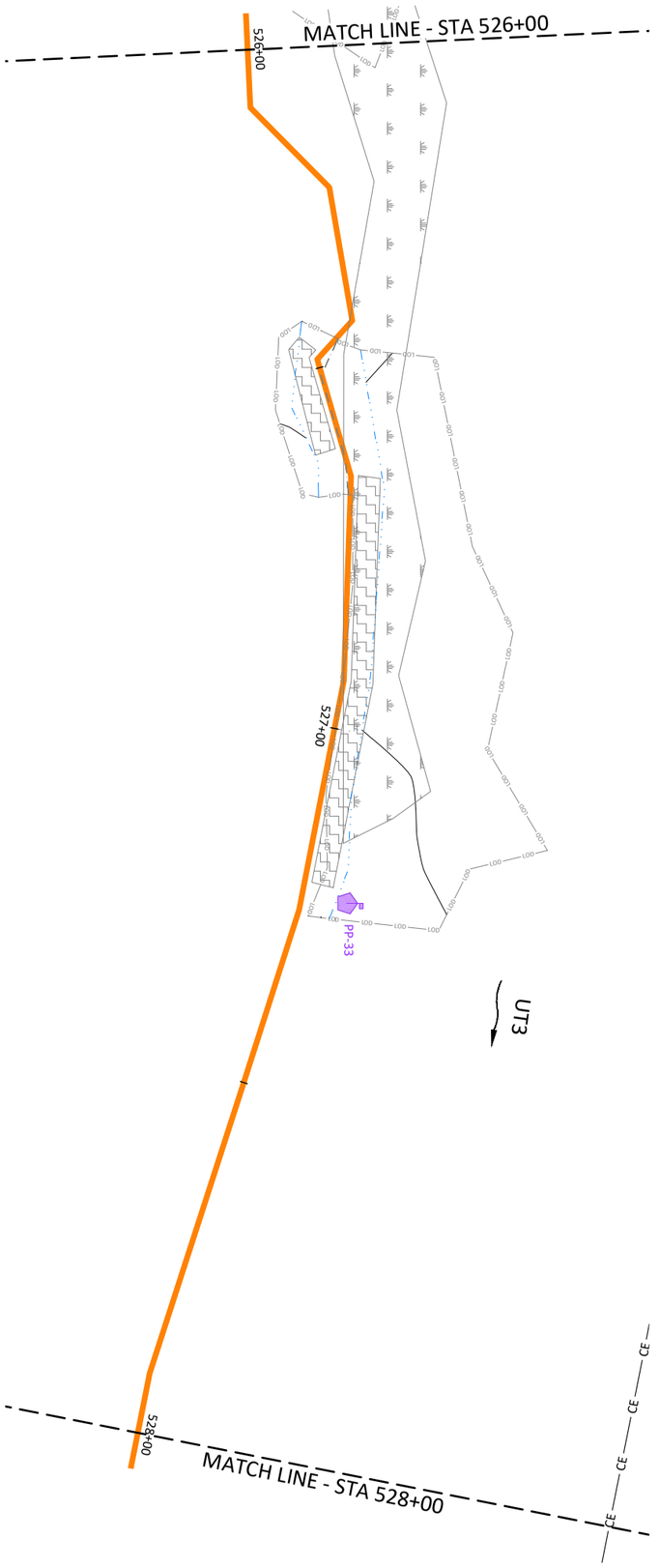

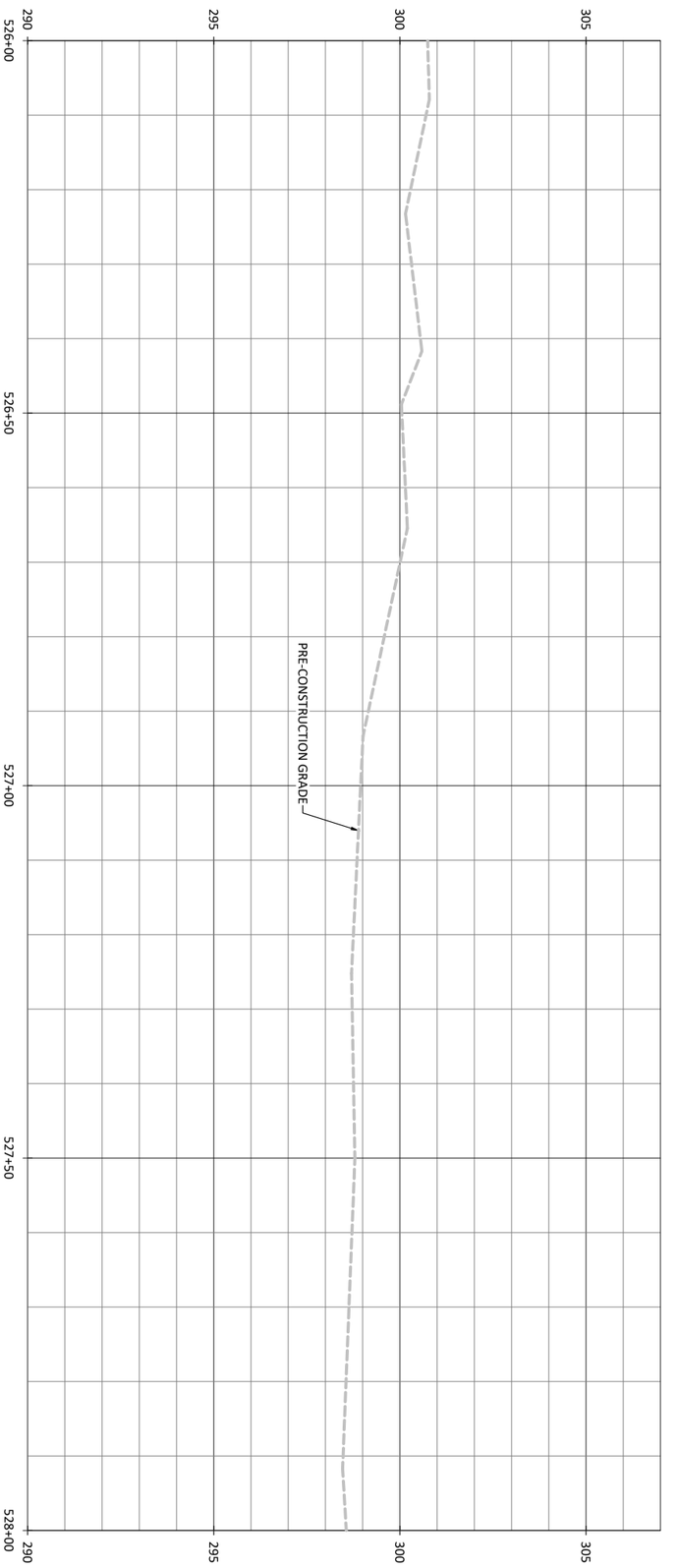

NOTES:
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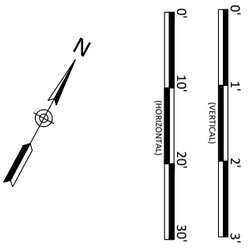

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Job Number:	005-02186
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1.5.14
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Cross Creek Ranch Site
Montgomery County, North Carolina

UT3
Stream Plan and Profile

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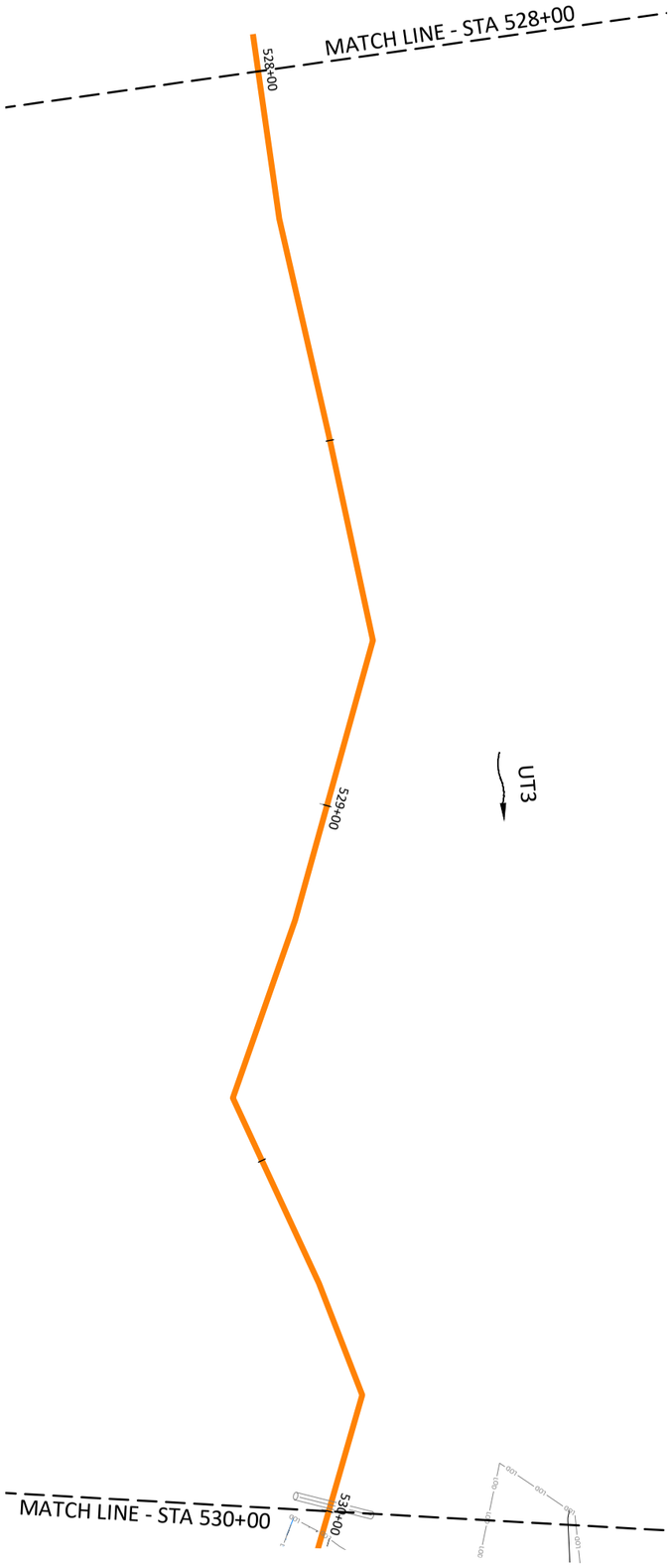

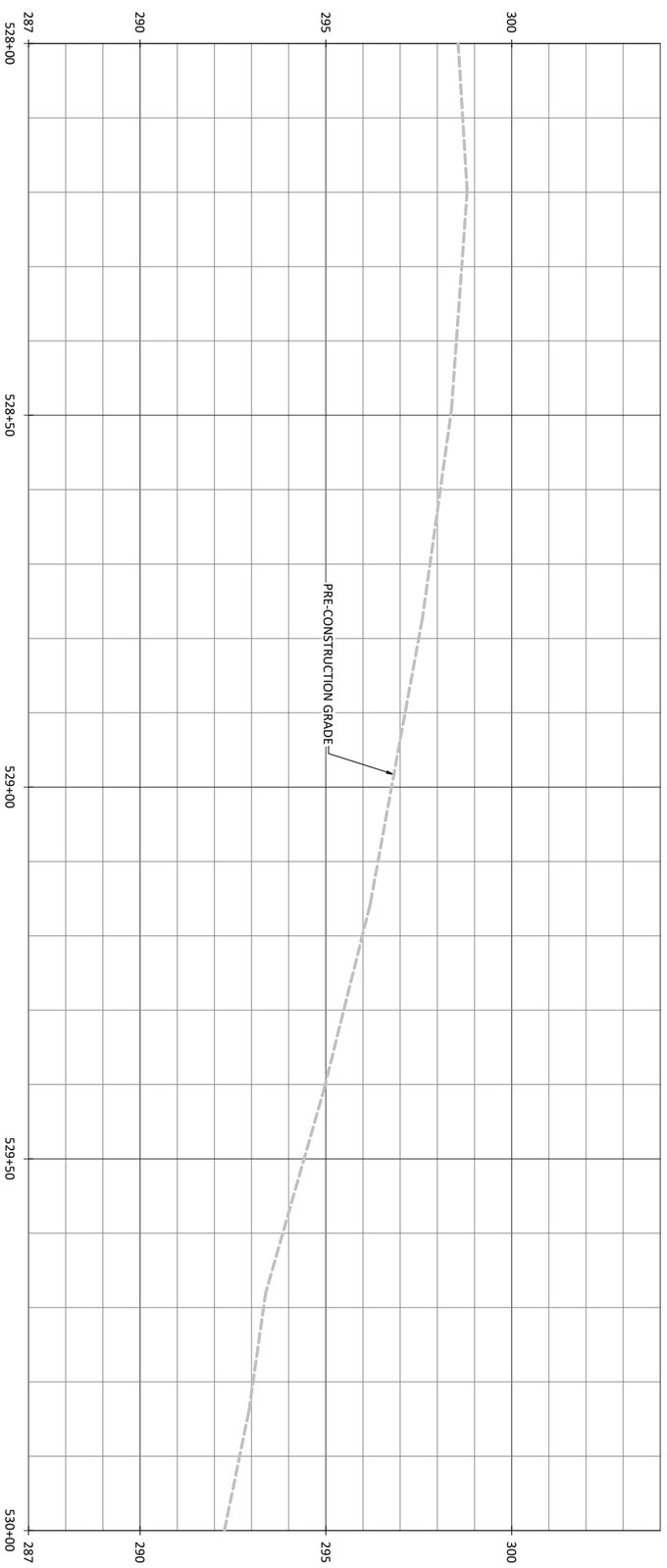

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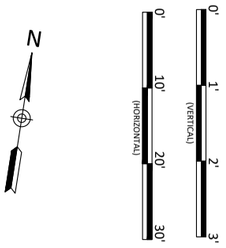

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Job Number:	005-02186
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Cross Creek Ranch Site
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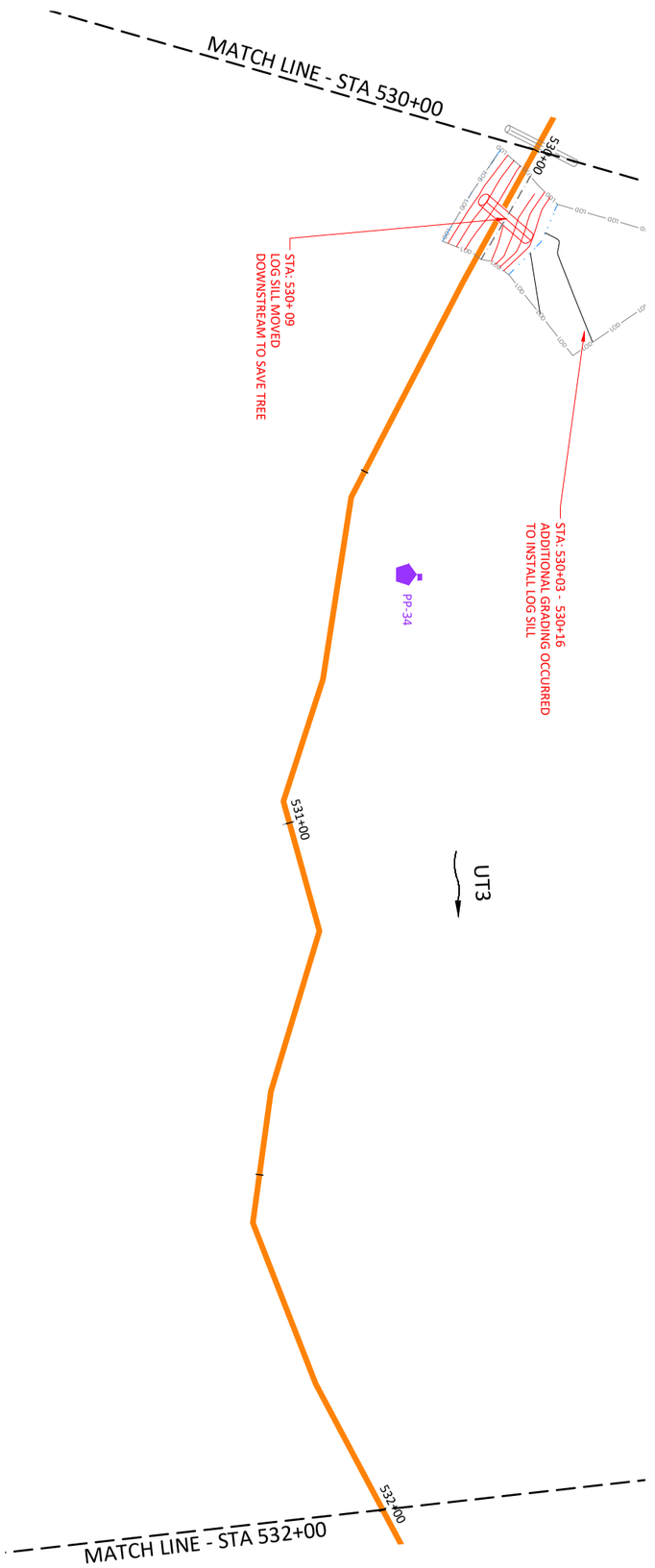

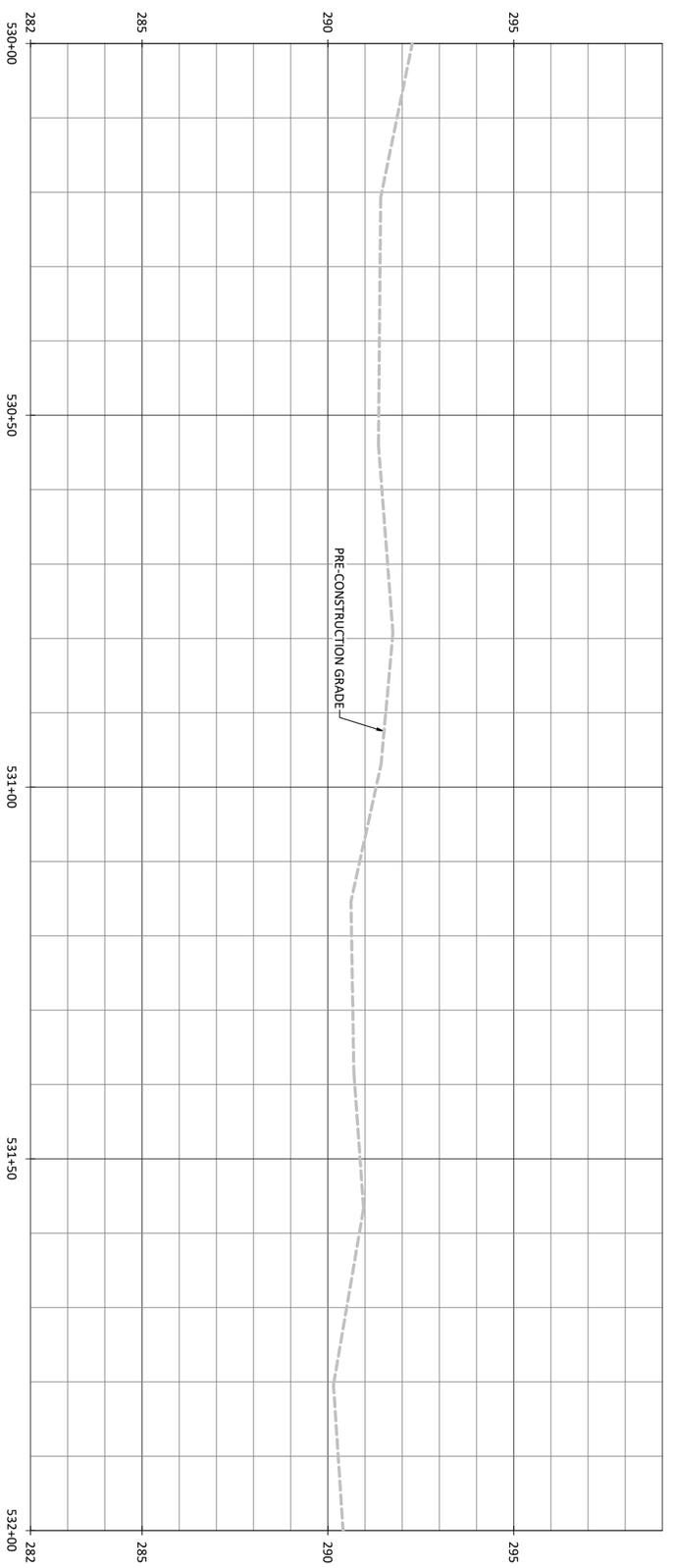

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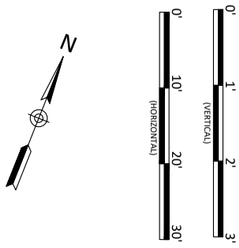

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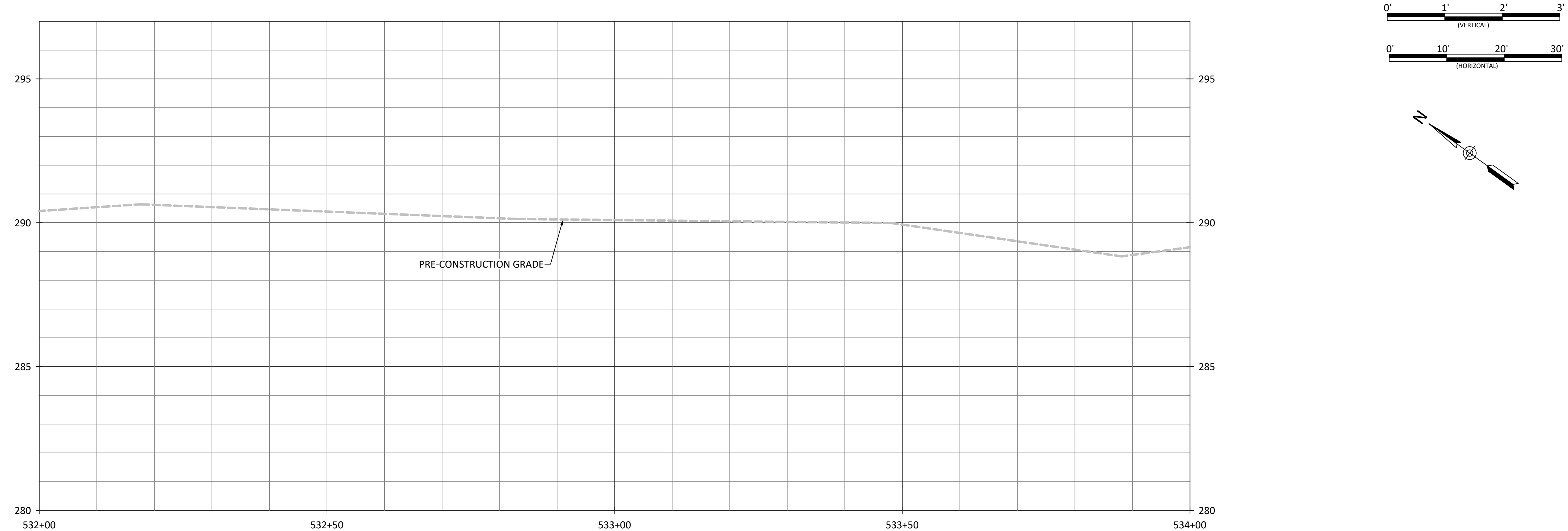

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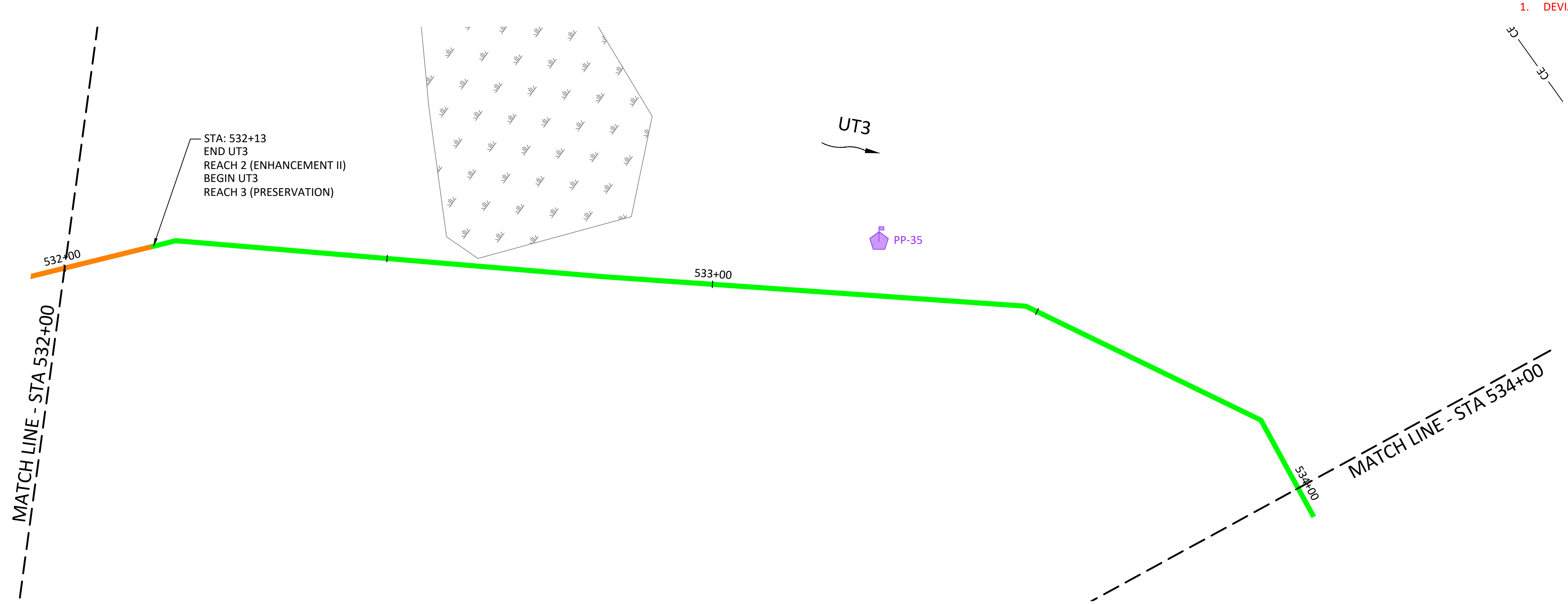

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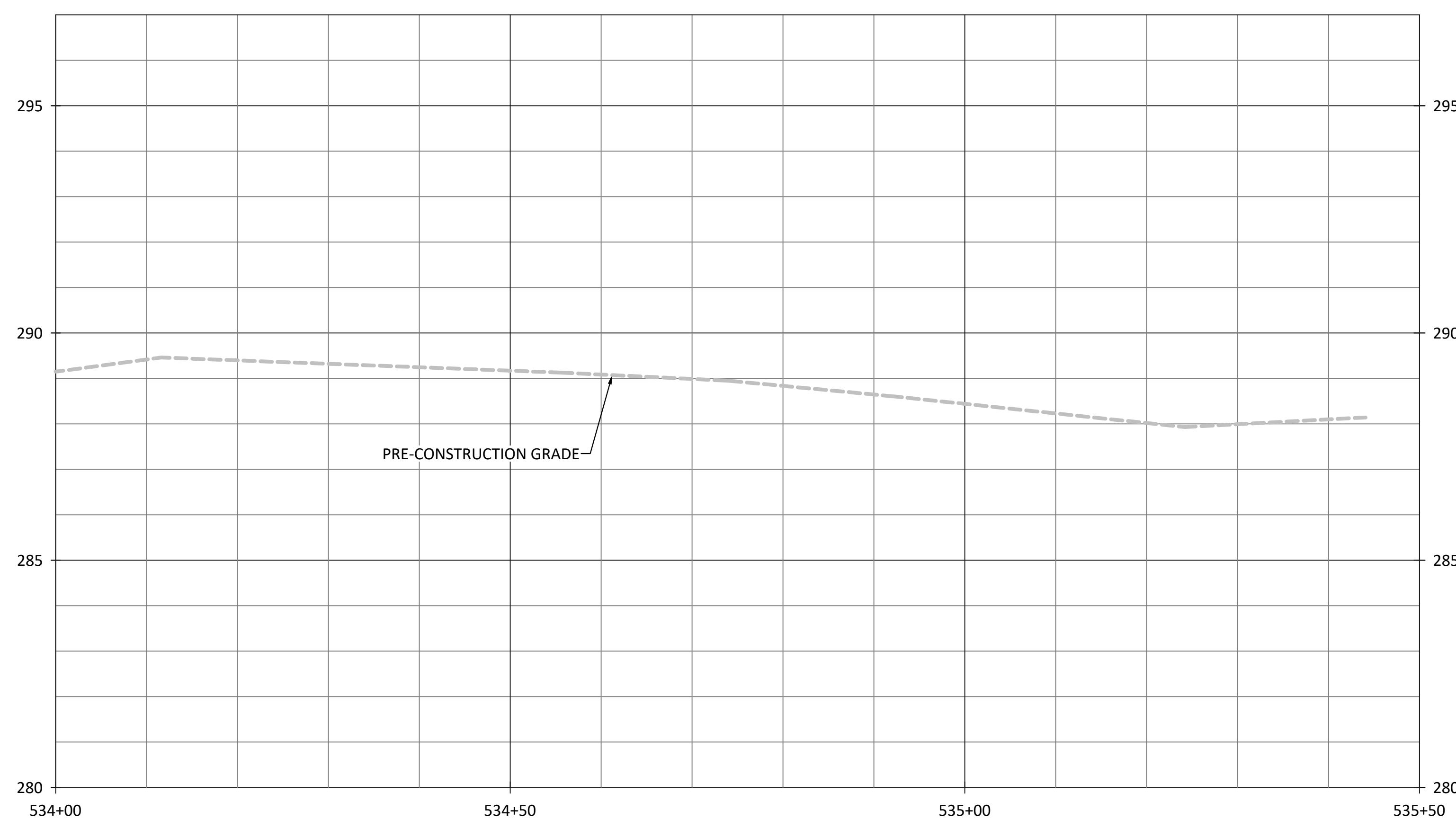
Sheet 1.5.17



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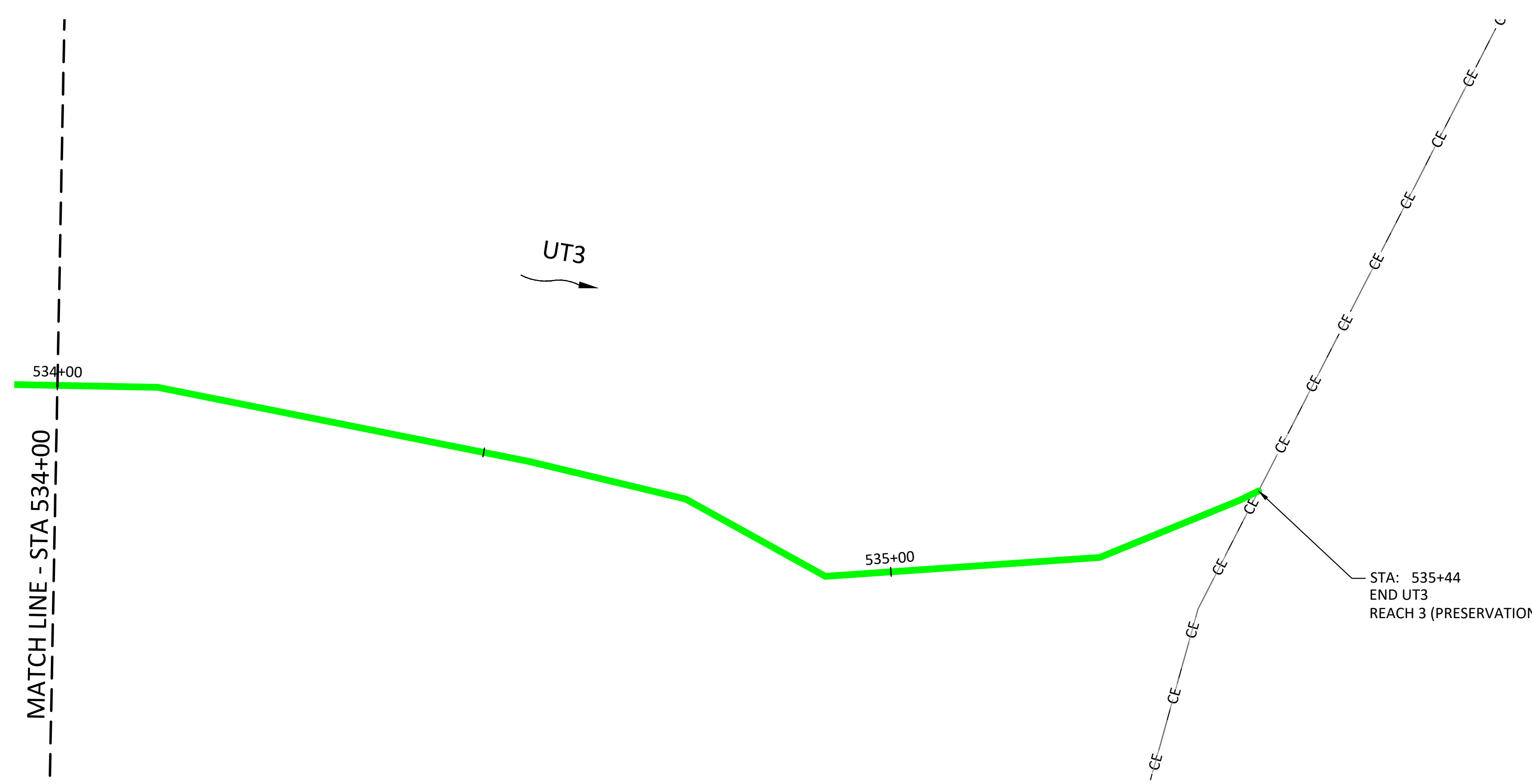

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0' 10' 20' 30' (HORIZONTAL)

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UT3
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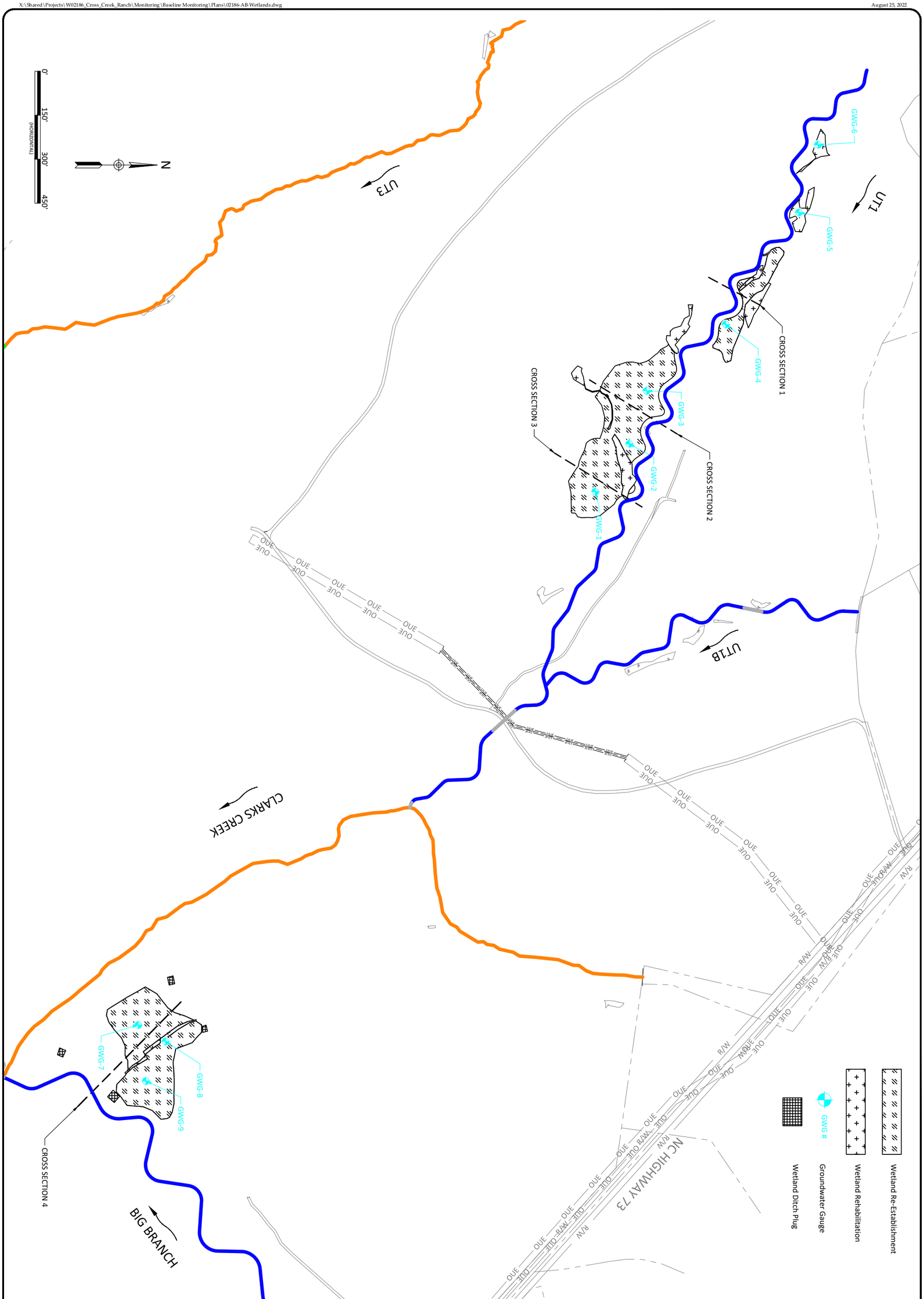
Sheet 1.5.18



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Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
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2.1
Sheet

Cross Creek Ranch Site
Montgomery County, North Carolina

Wetlands Overview
Wetlands

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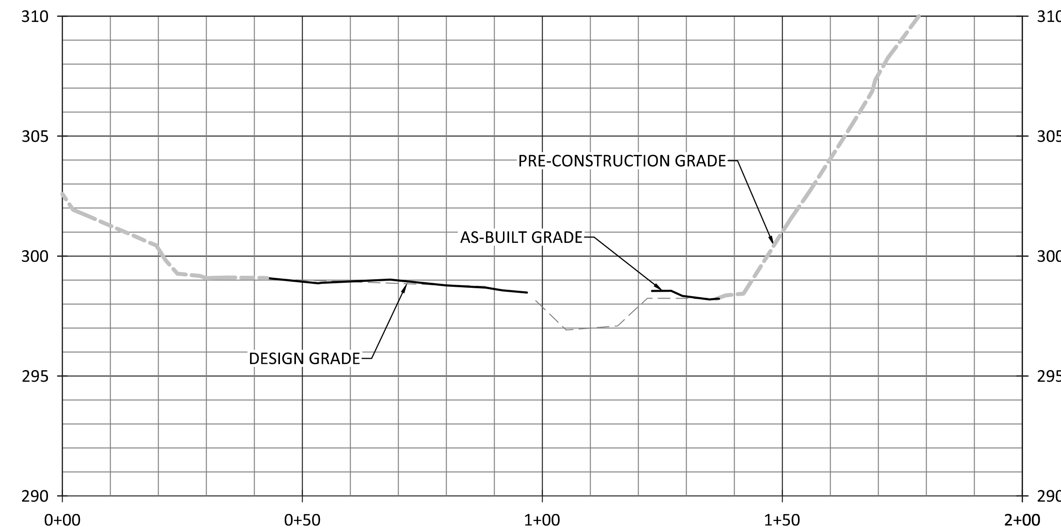
WETLAND CROSS SECTION 1



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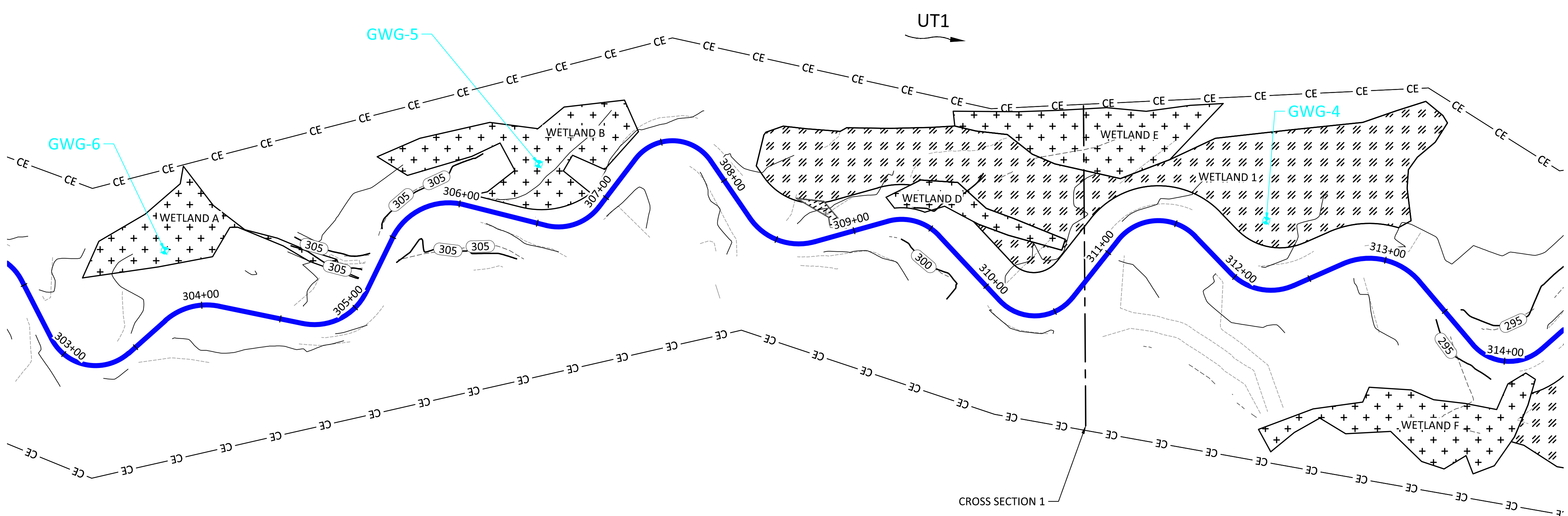

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Cross Creek Ranch Site
Montgomery County, North Carolina

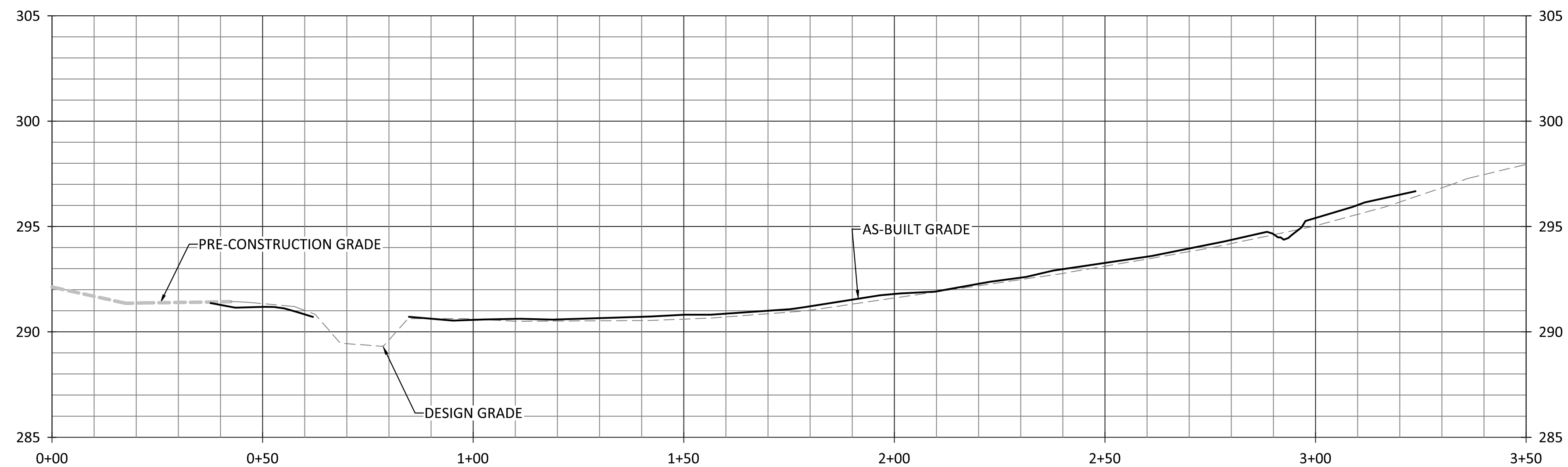
Cross Section 1
Wetlands

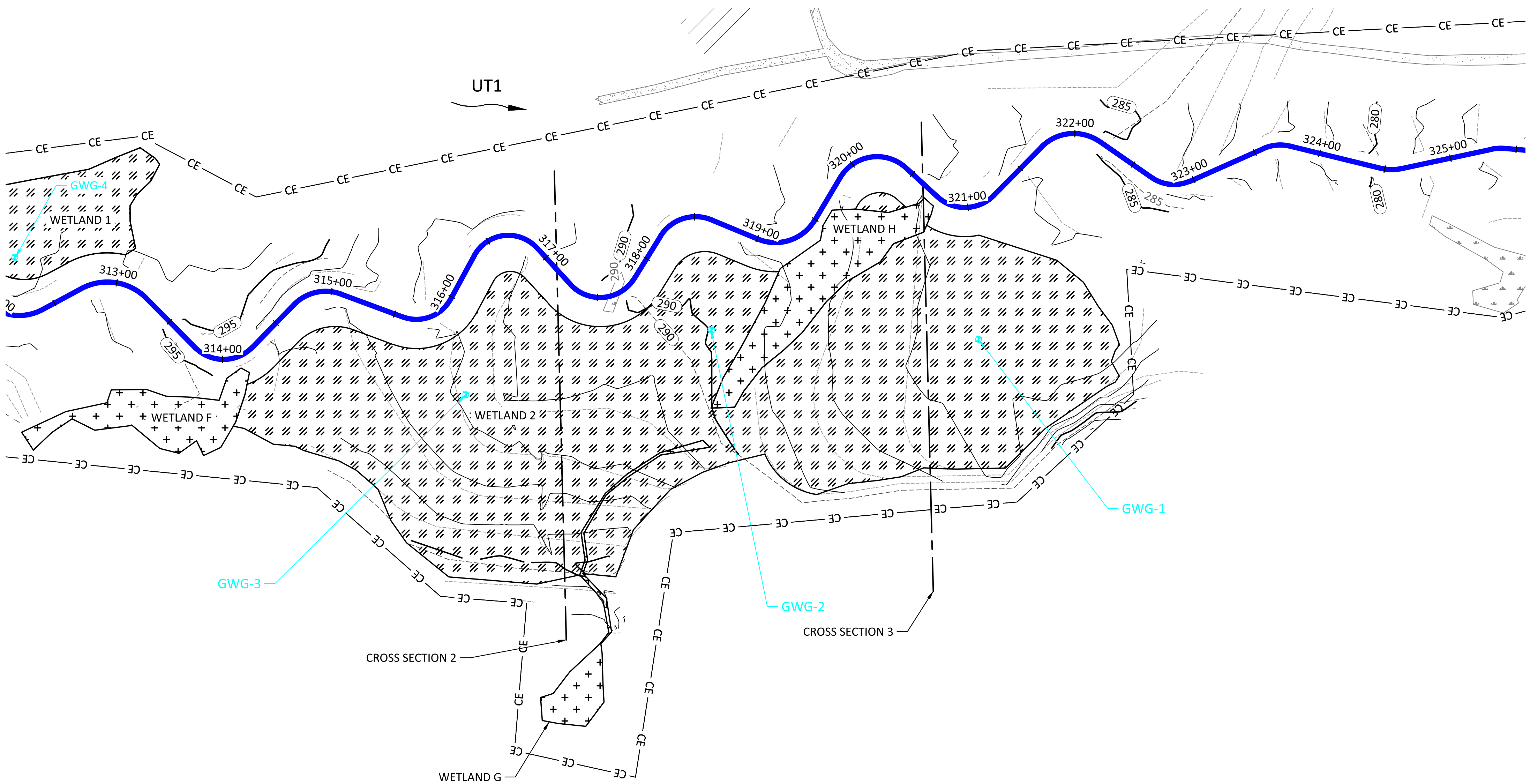
Revisions:

Date: 07.11.2022
Job Number: 005-02186
Project Engineer: ARV
Drawn By: FHM
Checked By: TWW

Sheet 2.2

WETLAND CROSS SECTION 2





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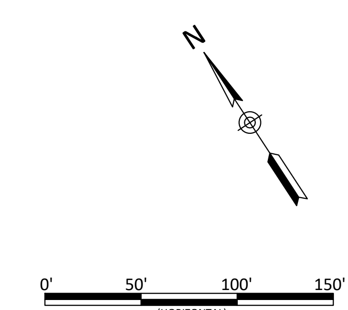

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Cross Creek Ranch Site
Montgomery County, North Carolina

Cross Section 2
Wetlands

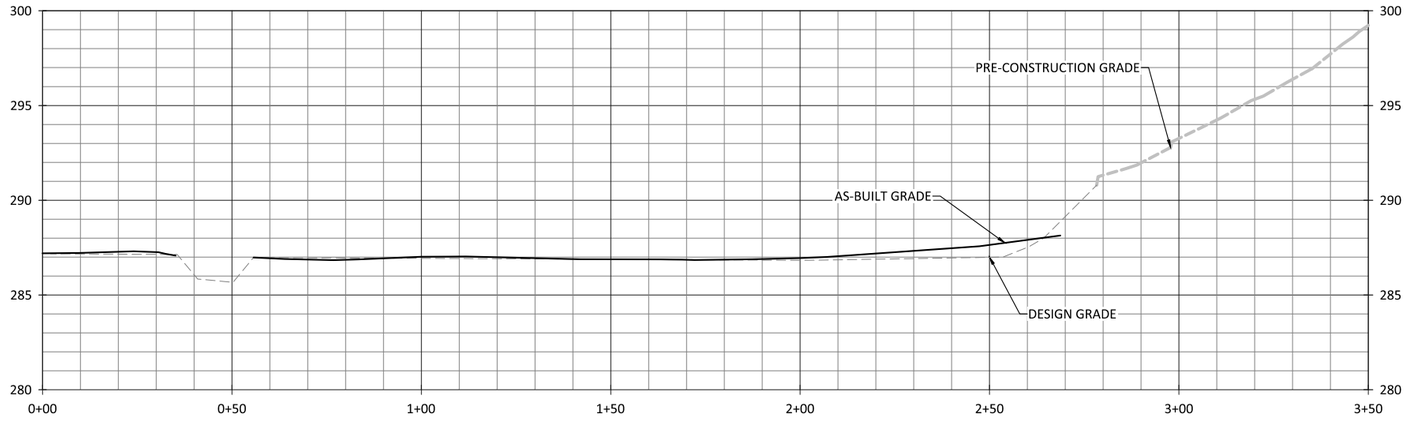
Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

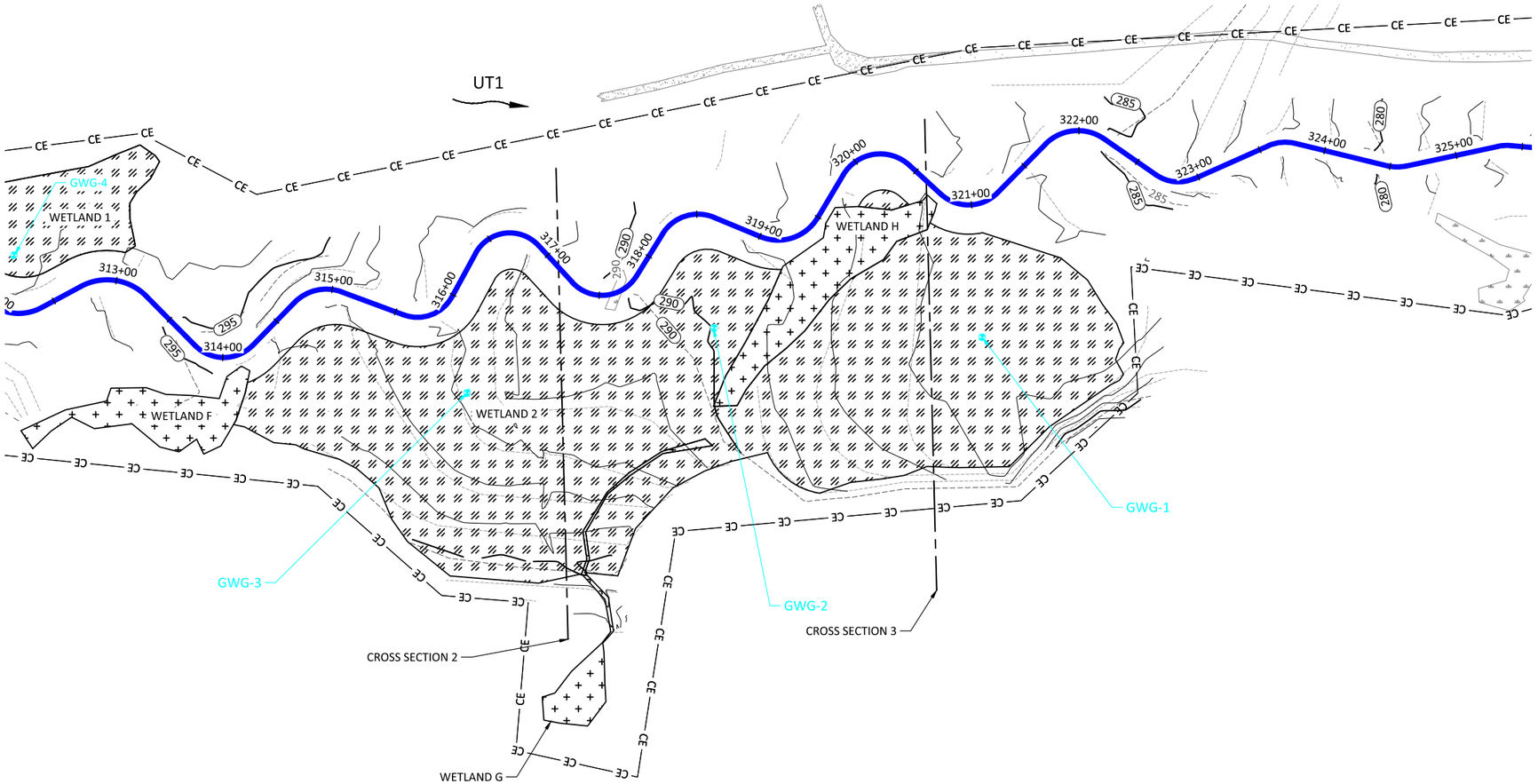
Revisions:

Sheet 2.3

August 25, 2023

WETLAND CROSS SECTION 3





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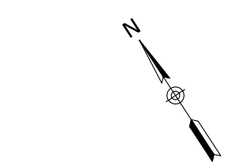

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Cross Creek Ranch Site
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Cross Section 3
Wetlands

Revisions:

Date: 07.11.2022
Job Number: 005-02186
Project Engineer: ARV
Drawn By: FHM
Checked By: TWW

Sheet 2.4

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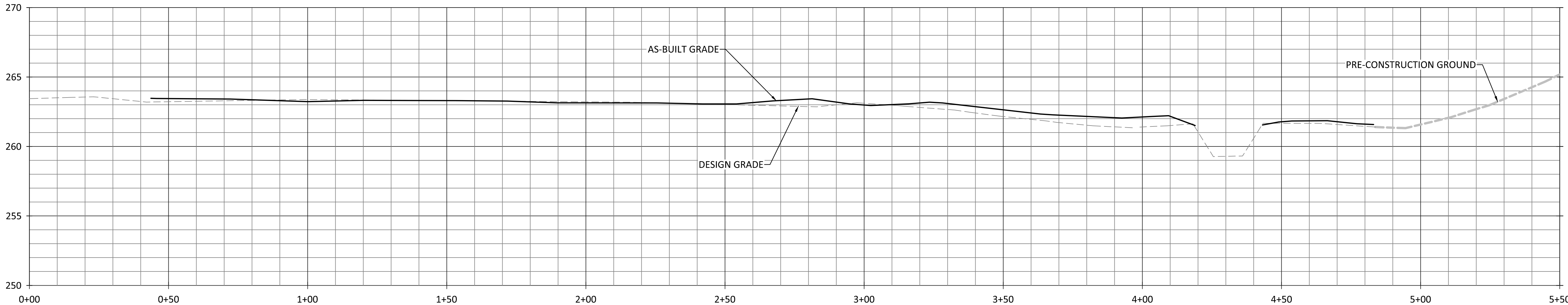
WETLAND CROSS SECTION 4



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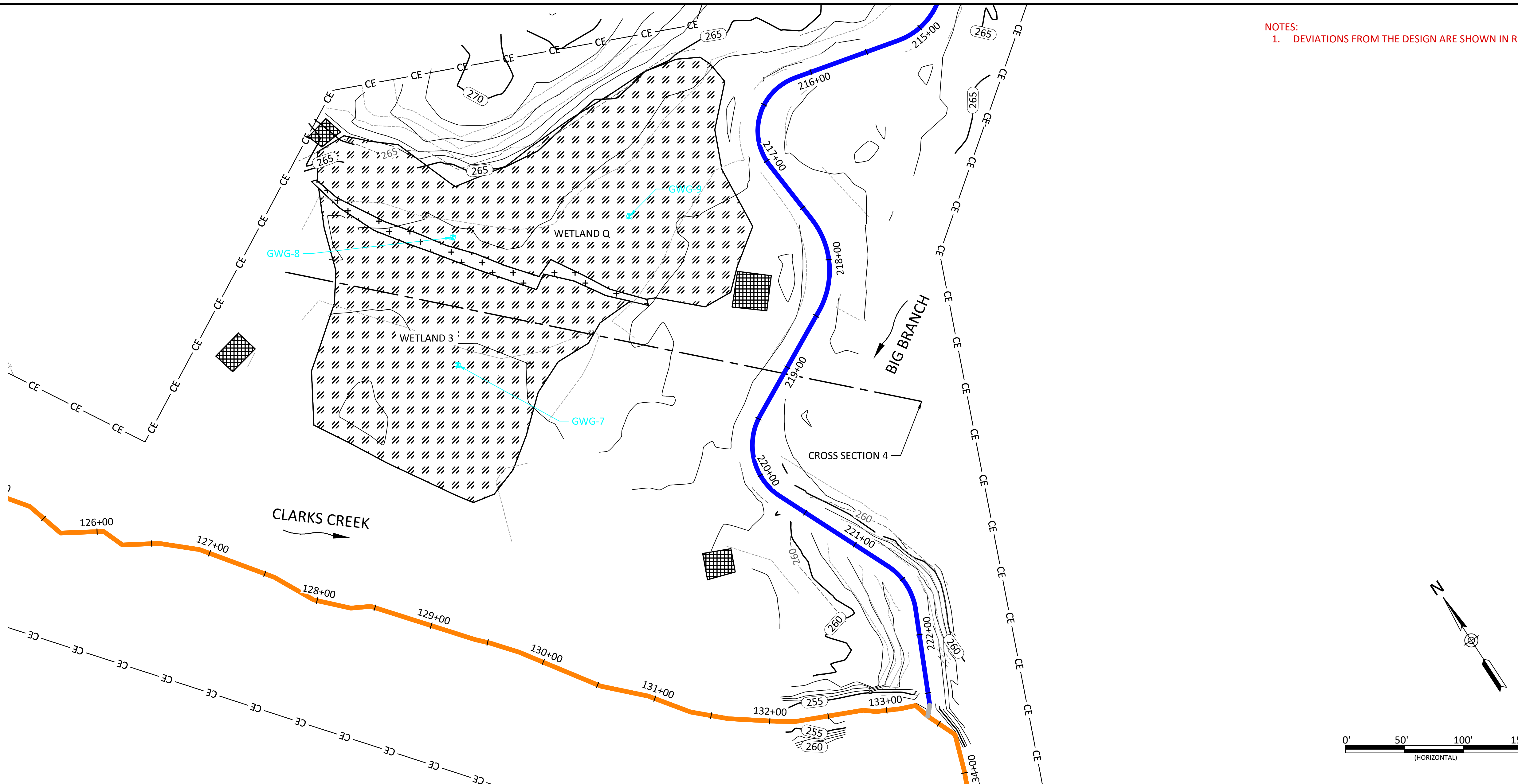

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Cross Creek Ranch Site
Montgomery County, North Carolina

Cross Section 4
Wetlands

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 2.5

Streambank Planting Zone 1						
Live Stakes						
Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
Salix nigra	Black Willow	6-8ft	0.5"-1.5" cal.	Canopy	OBL	50%
Cornus amomum	Silky Dogwood	6-8ft	0.5"-1.5" cal.	Shrub	FACW	10%
Cephalanthus occidentalis	Buttonbush	6-8ft	0.5"-1.5" cal.	Shrub	OBL	5%
Salix sericea	Silky Willow	6-8ft	0.5"-1.5" cal.	Shrub	OBL	25%
Sambucus canadensis	Elderberry	6-8ft	0.5"-1.5" cal.	Shrub	FAC	10%
						100%
Herbaceous Plugs						
Juncus effucus	Common Rush	3-5ft	1.0"-2.0" plug	Herb	FACW	40%
Carex lurida	Lurid Sedge	3-5ft	1.0"-2.0" plug	Herb	OBL	10%
Scirpus cyperinus	Woolgrass	3-5ft	1.0"-2.0" plug	Herb	FACW	10%
Carex lupulina	Hop Sedge	3-5ft	1.0"-2.0" plug	Herb	OBL	10%
Carex crinita	Fringed Sedge	3-5ft	1.0"-2.0" plug	Herb	OBL	15%
Carex vulpinoidea	Fox Sedge	3-5ft	1.0"-2.0" plug	Herb	OBL	15%
						100%

Streambank Planting Zone 2						
Live Stakes						
Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
Cornus amomum	Silky Dogwood	6-8ft	0.5"-1.5" cal.	Shrub	FACW	15%
Salix sericea	Silky Willow	6-8ft	0.5"-1.5" cal.	Shrub	OBL	50%
Cephalanthus occidentalis	Buttonbush	6-8ft	0.5"-1.5" cal.	Shrub	OBL	15%
Sambucus canadensis	Elderberry	6-8ft	0.5"-1.5" cal.	Shrub	FAC	20%
						100%
Herbaceous Plugs						
Juncus effucus	Common Rush	3-5ft	1.0"-2.0" plug	Herb	FACW	30%
Carex lurida	Lurid Sedge	3-5ft	1.0"-2.0" plug	Herb	OBL	10%
Scirpus cyperinus	Woolgrass	3-5ft	1.0"-2.0" plug	Herb	FACW	20%
Carex lupulina	Hop Sedge	3-5ft	1.0"-2.0" plug	Herb	OBL	20%
Carex crinita	Fringed Sedge	3-5ft	1.0"-2.0" plug	Herb	OBL	20%
						100%

Zone 1 - Streambank Planting Zone 1

Zone 2 - Streambank Planting Zone 2

Zone 3 - Buffer Planting Zone

Zone 4 - Wetland Planting Zone

Zone 5 - Permanent Seeding Outside Easement

Note: There are no changes to the as-built planting plan from the approved planting plan

Buffer Planting Zone - Zone 3						
Bare Root						
Species	Common Name	Indiv. Spacing	Caliper Size	Stratum	Wetland Indicator Status	% of Stems
Platanus occidentalis	American Sycamore	6-12ft	0.25"-1.0"	Canopy	FACW	15%
Betula nigra	River Birch	6-12ft	0.25"-1.0"	Canopy	FACW	15%
Diospyros virginiana	Common Persimmon	6-12ft	0.25"-1.0"	Canopy	FAC	10%
Quercus phellos	Willow Oak	6-12ft	0.25"-1.0"	Canopy	FAC	10%
Asimina tribola	Pawpaw	6-12ft	0.25"-1.0"	Sub-Canopy	FAC	5%
Populus deltoides	Eastern Cottonwood	6-12ft	0.25"-1.0"	Canopy	FAC	10%
Celtis laevigata	Sugarberry	6-12ft	0.25"-1.0"	Canopy	FACW	10%
Quercus michauxii	Swamp Chestnut Oak	6-12ft	0.25"-1.0"	Canopy	FACW	10%
Ulmus rubra	Slippery Elm	6-12ft	0.25"-1.0"	Canopy	FAC	10%
Euonymus americanus	Strawberry Bush	6-12ft	0.25"-1.0"	Shrub	FAC	5%
						100%

Wetland Planting Zone - Zone 4						
Bare Root						
Species	Common Name	Indiv. Spacing	Caliper Size	Stratum	Wetland Indicator Status	% of Stems
Platanus occidentalis	American Sycamore	6-12ft	0.25"-1.0"	Canopy	FACW	15%
Betula nigra	River Birch	6-12ft	0.25"-1.0"	Canopy	FACW	15%
Ulmus americana	American Elm	6-12ft	0.25"-1.0"	Canopy	FACW	15%
Quercus lyrata	Overcup Oak	6-12ft	0.25"-1.0"	Canopy	FAC	15%
Quercus michauxii	Swamp Chestnut Oak	6-12ft	0.25"-1.0"	Canopy	FACW	10%
Alnus serrulata	Tag Alder	6-12ft	0.25"-1.0"	Sub-Canopy	OBL	10%
Sambucus canadensis	Elderberry	6-12ft	0.25"-1.0"	Sub-Canopy	FAC	5%
Cephalanthus occidentalis	Buttonbush	6-12ft	0.25"-1.0"	Shrub	FAC	5%
Salix nigra	Black Willow	6-12ft	0.25"-1.0"	Canopy	OBL	5%
Nyssa biflora	Swamp Gum	6-12ft	0.25"-1.0"	Canopy	FAC	5%
						100%
Herbaceous Plugs						
Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
Juncus effucus	Common Rush	3-5ft	1.0"-2.0" plug	Herb	FACW	30%
Scirpus cyperinus	Woolgrass	3-5ft	1.0"-2.0" plug	Herb	FACW	25%
Carex vulpinoidea	Fox Sedge	3-5ft	1.0"-2.0" plug	Herb	OBL	25%
Carex lurida	Lurid Sedge	3-5ft	1.0"-2.0" plug	Herb	OBL	10%
Peltandra virginica	Arrow Arum	3-5ft	1.0"-2.0" plug	Herb	OBL	10%
						100%

Permanent Seeding Outside Easement - Zone 5				
Approved Dates	Species Name	Common Name	Stratum	Density (lbs/acre)
All Year	*Festuca arundinacea*	Tall Fescue	Herb	40
All Year	*Dactylis glomerata*	Orchardgrass	Herb	40
All Year	*Trifolium pratense*	Medium Red Clover	Herb	5
All Year	*Trifolium repens*	White Ladino Cover	Herb	5
				90

Permanent Riparian Seeding					
Pure Live Seed (20 lbs/acre)					
Approved Dates	Species Name	Common Name	Stratum	Wetland Indicator Status	Density (lbs/acre)
All-Year	*Schizachyrium scoparium*	Little Bluestem	Herb	FACU	3.0
All-Year	*Rudbeckia hirta*	Blackeyed Susan	Herb	FACU	1.0
All-Year	*Carex vulpinoidea*	Fox Sedge	Herb	OBL	1.0
All-Year	*Panicum clandestinum*	Deertongue	Herb	FAC	3.0
All-Year	*Elymus virginicus*	Virginia Wild Rye	Herb	FACW	3.0
All-Year	*Sorghastrum nutans*	Indiangrass	Herb	FACU	2.0
All-Year	*Coreopsis lanceolata*	Lanceleaf coreopsis	Herb	FACU	1.0
All-Year	*Bidens aristosa*	Bur-marigold	Herb	FACW	1.0
All-Year	*Andropogon gerardii*	Big Bluestem	Herb	FAC	1.0
All-Year	*Helianthus angustifolius*	Narrowleaf Sunflower	Herb	FACW	1.0
All-Year	*Coreopsis tinctoria*	Plains Coreopsis	Herb	FAC	1.0
All-Year	*Panicum virgatum*	Swtichgrass	Herb	FAC	2.0
					20.0

Permanent Wetland Seeding					
Pure Live Seed (20 lbs/acre)					
Approved Dates	Species Name	Common Name	Stratum	Wetland Indicator Status	Density (lbs/acre)
All-Year	*Coleataenia anceps*	Beaked Panicgrass	Herb	FAC	3.0
All-Year	*Carex vulpinoidea*	Fox Sedge	Herb	OBL	2.0
All-Year	*Carex lurida*	Lurid Sedge	Herb	OBL	0.5
All-Year	*Elymus virginicus*	Virginia Wildrye	Herb	FACW	4.0
All-Year	*Panicum clandestinum*	Deertongue	Herb	FAC	3.0
All-Year	*Bidens aristosa*	Bur-Marigold	Herb	FACW	1.0
All-Year	*Panicum virgatum*	Switchgrass	Herb	FAC	1.0
All-Year	*Polygonum pensylvanicum*	Smartweed	Herb	FAC	1.0
All-Year	*Panicum dichotomiflorum*	Panicgrass	Herb	FACW	1.0
All-Year	*Tripsacum dactyloides*	Eastern Gamagrass	Herb	FACW	0.5
All-Year	*Helianthus angustifolius*	Narrowleaf Sunflower	Herb	FACW	1.0
All-Year	*Juncus effucus*	Common Rush	Herb	FACW	0.5
All-Year	*Chasmanthium latifolium*	River Oats	Herb	FACU	0.5
All-Year	*Peltandra virginica*	Arrow Arum	Herb	OBL	1.0
					20.0

Temporary Seeding				
Pure Live Seed				
Approved Dates	Species Name	Common Name	Stratum	Density (lbs/acre)
Aug 15- May 1	*Avena sativa*	Winter Oats	Herb	30
Aug 15- May 1	*Secale cereale*	Rye Grain	Herb	110
May 1 - Aug 15	*Urochloa ramosa*	Browntop Millet	Herb	50
All Year	*Trifolium pratense*	Medium Red Clover	Herb	5
All Year	*Trifolium repens*	White Ladino Clover	Herb	5
				200

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Cross Creek Ranch Site
Montgomery County, North Carolina

Planting Tables

Revisions:

Date: 07.11.2022
Job Number: 005-02186
Project Engineer: ARV
Drawn By: FHM
Checked By: TWW

Sheet 3.1

Note: There are no changes to the as-built planting plan from the approved planting plan

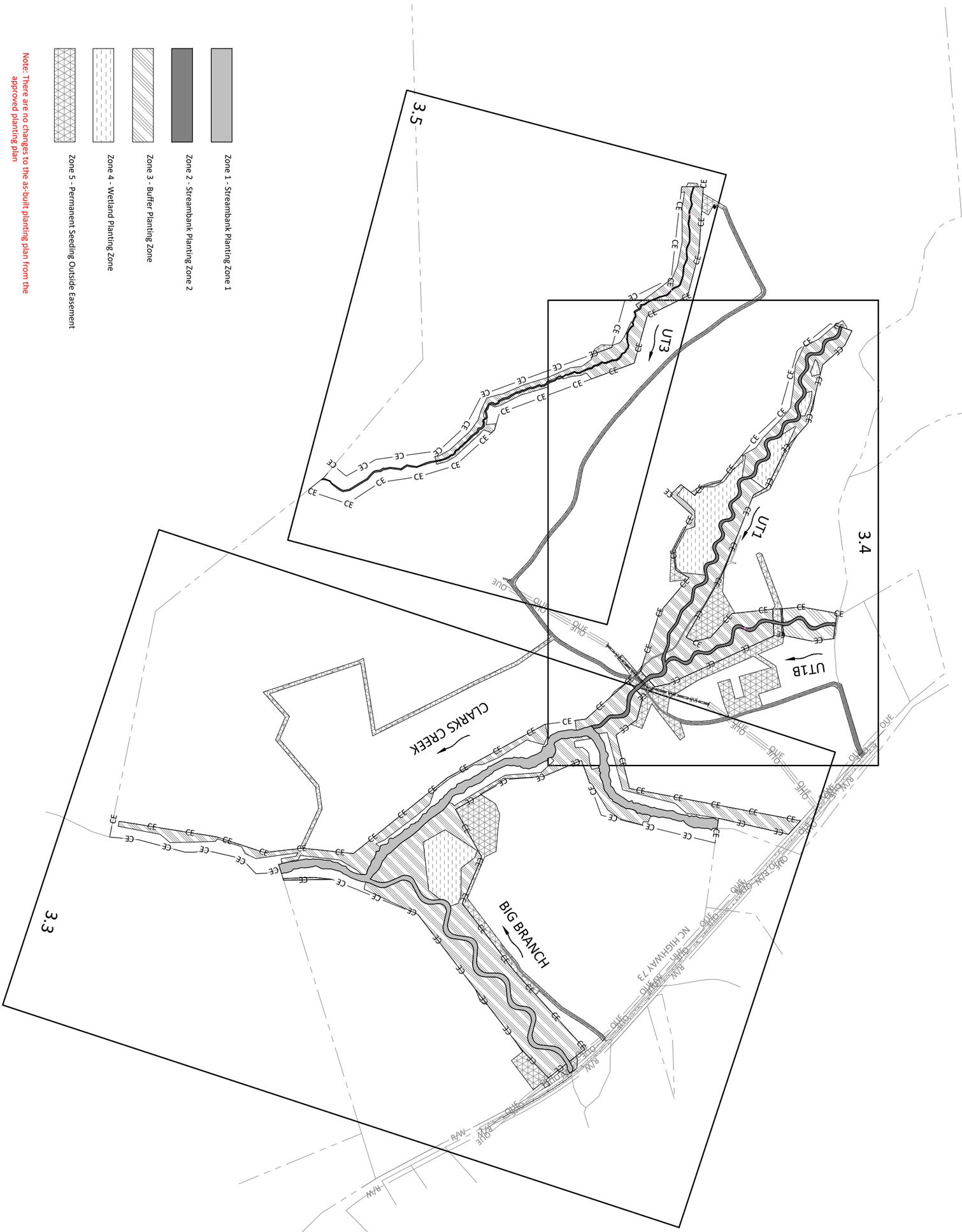
Zone 5 - Permanent Seeding Outside Easement

Zone 4 - Wetland Planting Zone

Zone 3 - Buffer Planting Zone

Zone 2 - Streambank Planting Zone 2

Zone 1 - Streambank Planting Zone 1



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Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

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3.2
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Cross Creek Ranch Site
Montgomery County, North Carolina

Planting Overview
Planting Plan

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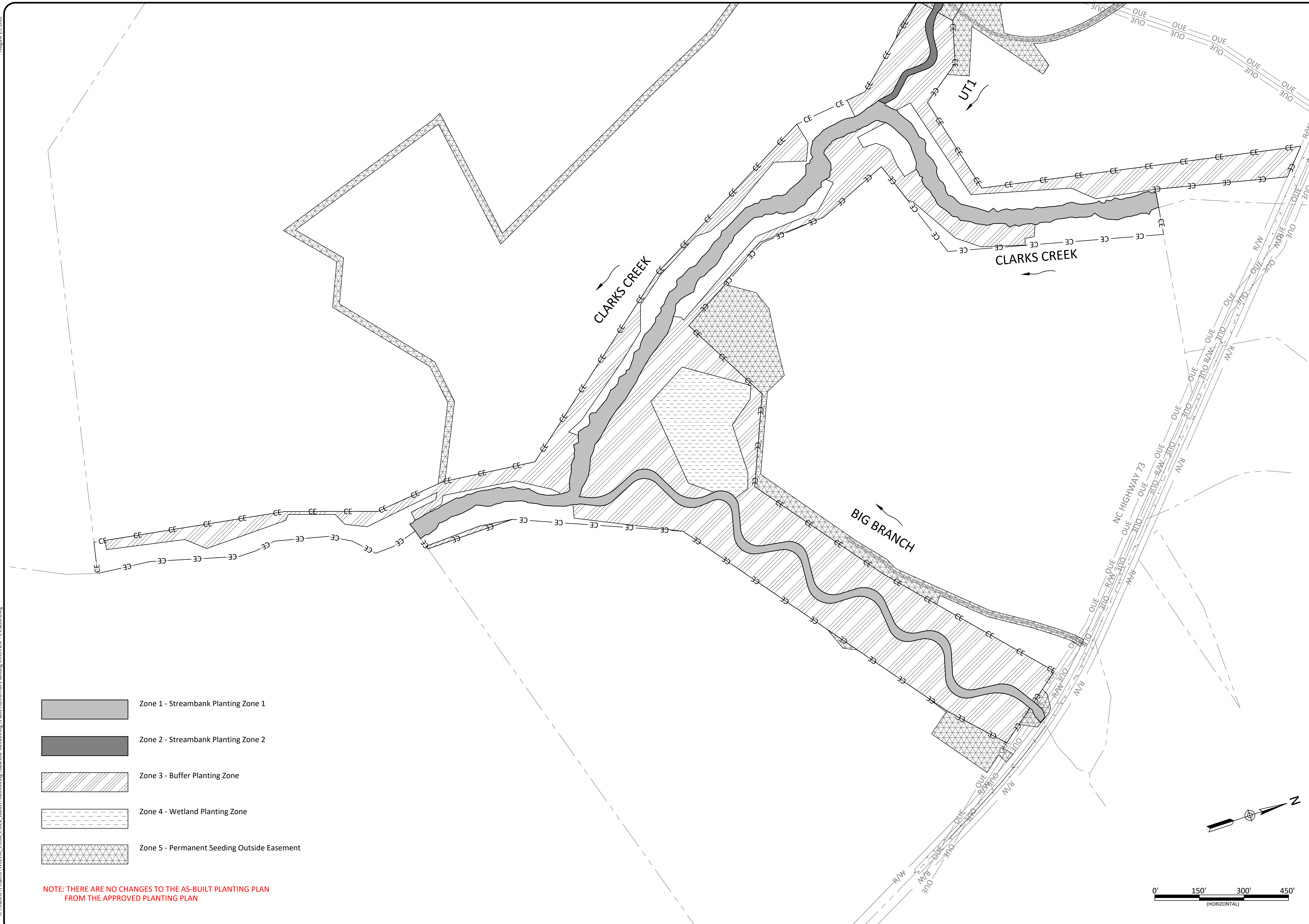

NOTE: THERE ARE NO CHANGES TO THE AS-BUILT PLANTING PLAN FROM THE APPROVED PLANTING PLAN

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Cross Creek Ranch Site
Montgomery County, North Carolina

Clarks Creek and Big Branch
Planting Plan

Revisions:

Date: 07.11.2022
Job Number: 005-02186
Project Engineer: ARV
Drawn By: FHM
Checked By: TWW

Sheet 3.3

August 25, 2022

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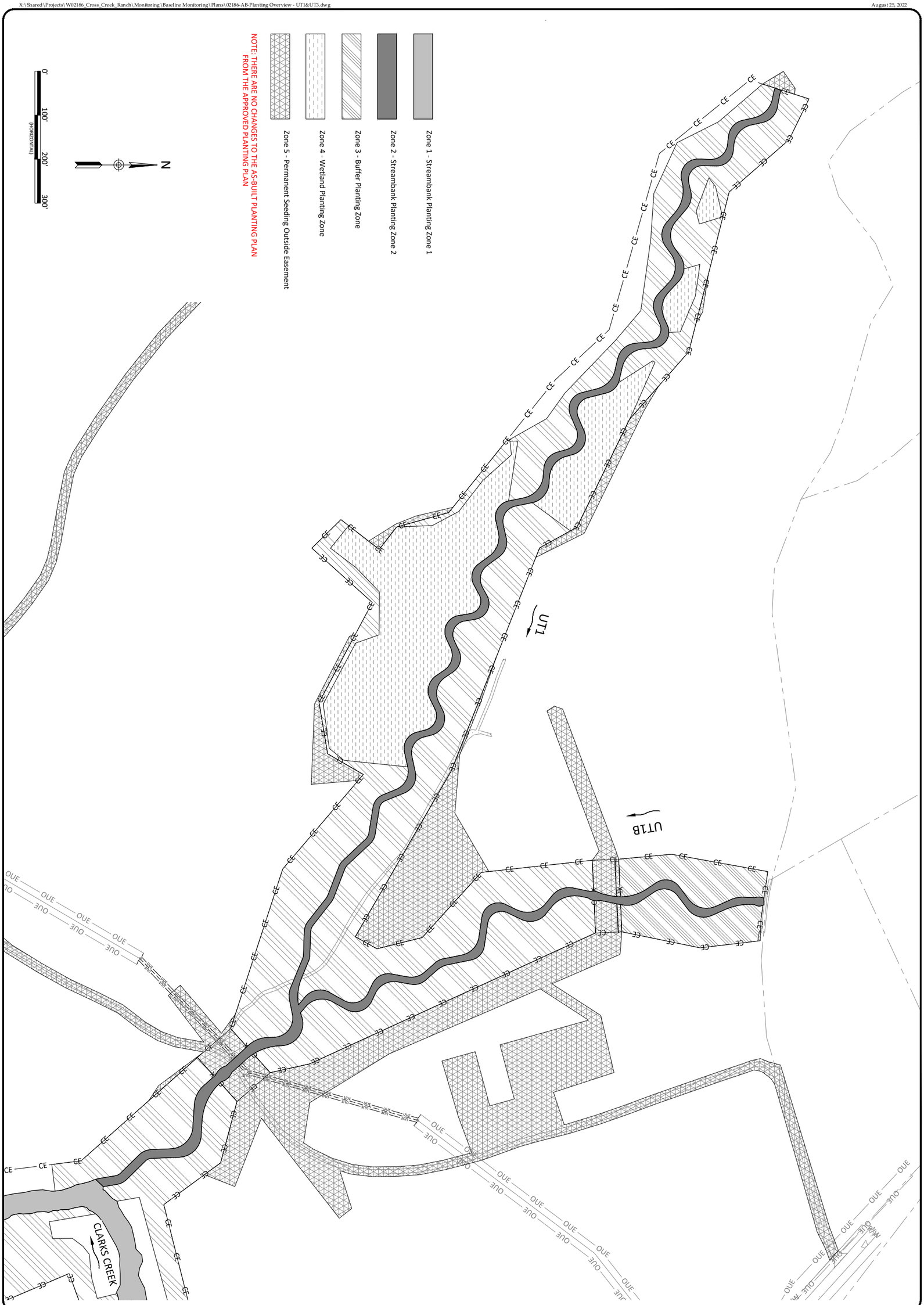

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

3.4
Sheet

Cross Creek Ranch Site
Montgomery County, North Carolina

UT1 and UT1B
Planting Plan

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Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

3.5
Sheet

Cross Creek Ranch Site
Montgomery County, North Carolina

UT3
Planting Plan

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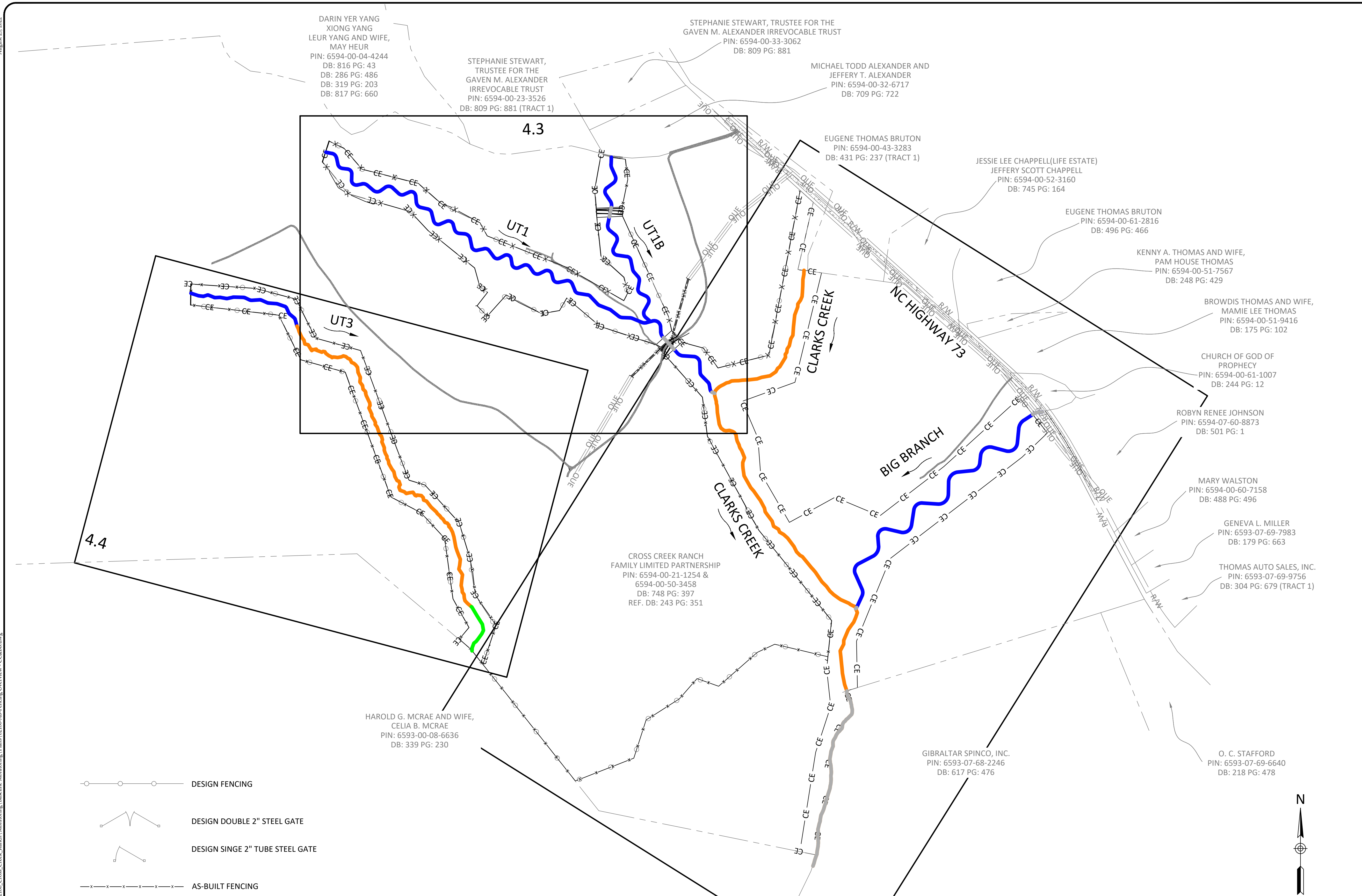

DARIN YER YANG
XIONG YANG
LEUR YANG AND WIFE,
MAY HEUR
PIN: 6594-00-04-4244
DB: 816 PG: 43
DB: 286 PG: 486
DB: 319 PG: 203
DB: 817 PG: 660
STEPHANIE STEWART,
TRUSTEE FOR THE
GAVEN M. ALEXANDER
IRREVOCABLE TRUST
PIN: 6594-00-23-3526
DB: 809 PG: 881 (TRACT 1)
STEPHANIE STEWART, TRUSTEE FOR THE
GAVEN M. ALEXANDER IRREVOCABLE TRUST
PIN: 6594-00-33-3062
DB: 809 PG: 881
MICHAEL TODD ALEXANDER AND
JEFFERY T. ALEXANDER
PIN: 6594-00-32-6717
DB: 709 PG: 722
EUGENE THOMAS BRUTON
PIN: 6594-00-43-3283
DB: 431 PG: 237 (TRACT 1)
JESSIE LEE CHAPPELL(LIFE ESTATE)
JEFFERY SCOTT CHAPPELL
PIN: 6594-00-52-3160
DB: 745 PG: 164
EUGENE THOMAS BRUTON
PIN: 6594-00-61-2816
DB: 496 PG: 466
KENNY A. THOMAS AND WIFE,
PAM HOUSE THOMAS
PIN: 6594-00-51-7567
DB: 248 PG: 429
BROWDIS THOMAS AND WIFE,
MAMIE LEE THOMAS
PIN: 6594-00-51-9416
DB: 175 PG: 102
CHURCH OF GOD OF
PROPHECY
PIN: 6594-00-61-1007
DB: 244 PG: 12
ROBYN RENEE JOHNSON
PIN: 6594-07-60-8873
DB: 501 PG: 1
MARY WALSTON
PIN: 6594-00-60-7158
DB: 488 PG: 496
GENEVA L. MILLER
PIN: 6593-07-69-7983
DB: 179 PG: 663
THOMAS AUTO SALES, INC.
PIN: 6593-07-69-9756
DB: 304 PG: 679 (TRACT 1)
O. C. STAFFORD
PIN: 6593-07-69-6640
DB: 218 PG: 478
GIBRALTAR SPINCO, INC.
PIN: 6593-07-68-2246
DB: 617 PG: 476
CROSS CREEK RANCH
FAMILY LIMITED PARTNERSHIP
PIN: 6594-00-21-1254 &
6594-00-50-3458
DB: 748 PG: 397
REF. DB: 243 PG: 351
HAROLD G. MCRAE AND WIFE,
CELIA B. MCRAE
PIN: 6593-00-08-6636
DB: 339 PG: 230
4.3
4.4
4.2
UT1
UT1B
UT3
CLARKS CREEK
CLARKS CREEK
BIG BRANCH
NC HIGHWAY 73
N
0' 300' 600' 900'
(HORIZONTAL)
DESIGN FENCING
DESIGN DOUBLE 2" STEEL GATE
DESIGN SINGE 2" TUBE STEEL GATE
AS-BUILT FENCING

NOTES:
1. THERE ARE NO CHANGES TO THE INSTALLATION OF GATES FROM THE APPROVED FENCING PLAN.

Cross Creek Ranch Site
Montgomery County, North Carolina

Fencing Overview
Fencing Plan

WILDLANDS ENGINEERING
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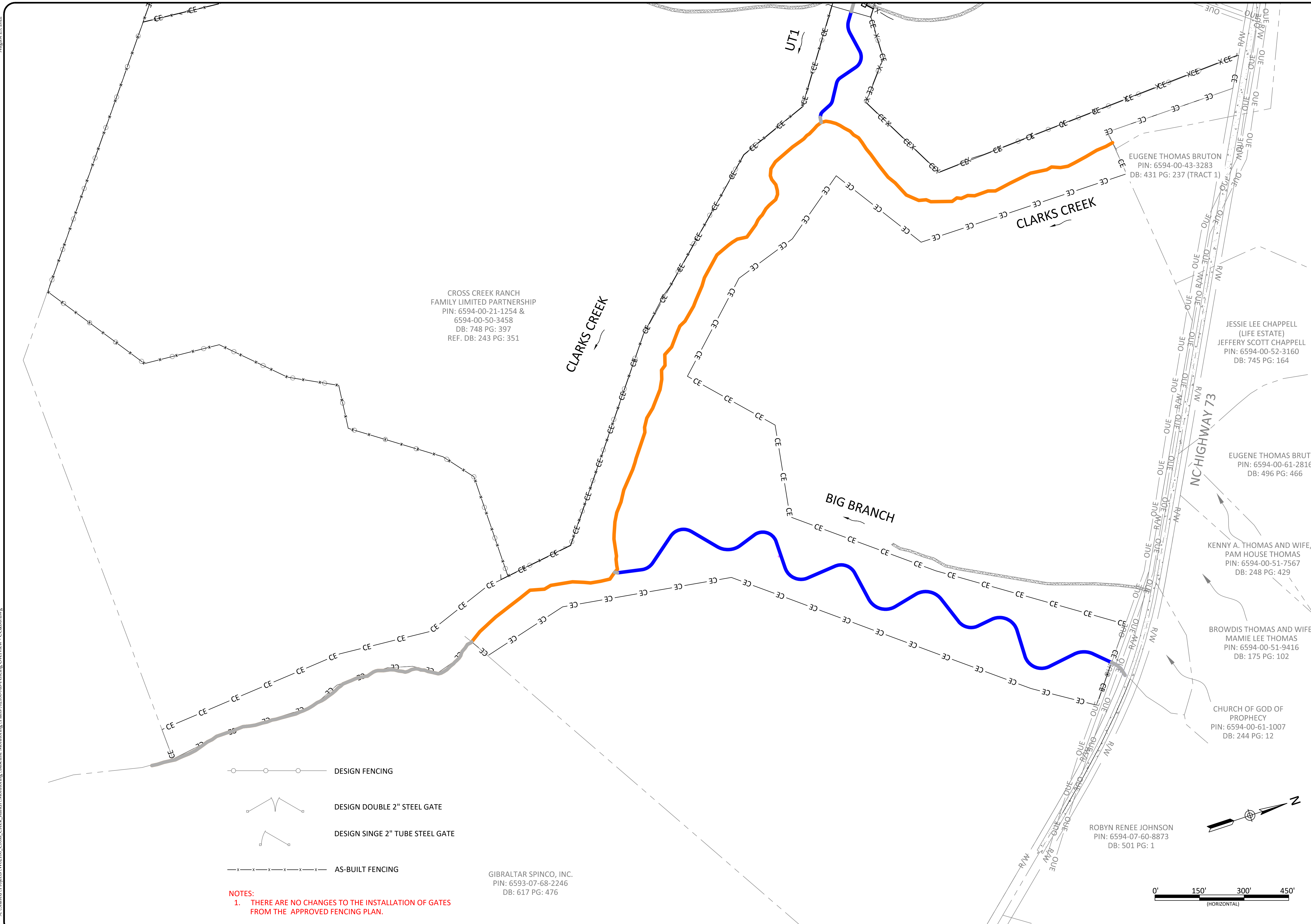
Tel: 919.851.9986
License No. F-0831

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

Sheet 4.1



UT1
CLARKS CREEK
CLARKS CREEK
BIG BRANCH
NC HIGHWAY 73
CROSS CREEK RANCH
FAMILY LIMITED PARTNERSHIP
PIN: 6594-00-21-1254 &
6594-00-50-3458
DB: 748 PG: 397
REF. DB: 243 PG: 351
EUGENE THOMAS BRUTON
PIN: 6594-00-43-3283
DB: 431 PG: 237 (TRACT 1)
JESSIE LEE CHAPPELL
(LIFE ESTATE)
JEFFERY SCOTT CHAPPELL
PIN: 6594-00-52-3160
DB: 745 PG: 164
EUGENE THOMAS BRUTON
PIN: 6594-00-61-2816
DB: 496 PG: 466
KENNY A. THOMAS AND WIFE,
PAM HOUSE THOMAS
PIN: 6594-00-51-7567
DB: 248 PG: 429
BROWDIS THOMAS AND WIFE,
MAMIE LEE THOMAS
PIN: 6594-00-51-9416
DB: 175 PG: 102
CHURCH OF GOD OF
PROPHECY
PIN: 6594-00-61-1007
DB: 244 PG: 12
ROBYN RENEE JOHNSON
PIN: 6594-07-60-8873
DB: 501 PG: 1
GIBRALTAR SPINCO, INC.
PIN: 6593-07-68-2246
DB: 617 PG: 476
DESIGN FENCING
DESIGN DOUBLE 2" STEEL GATE
DESIGN SINGE 2" TUBE STEEL GATE
AS-BUILT FENCING
NOTES:
1. THERE ARE NO CHANGES TO THE INSTALLATION OF GATES FROM THE APPROVED FENCING PLAN.
0'
150'
300'
450'
(HORIZONTAL)
N

August 25, 2022

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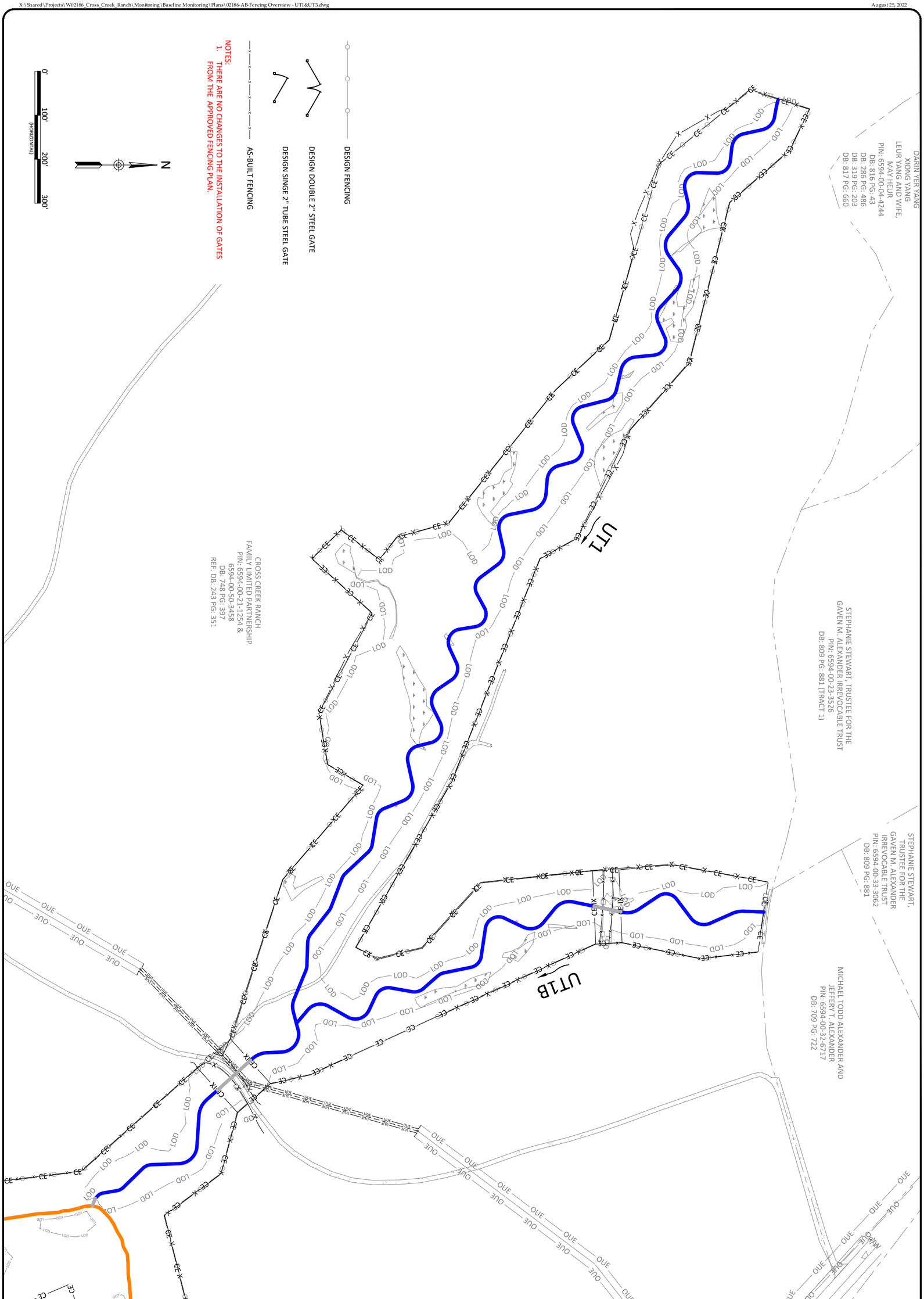
Cross Creek Ranch Site
Montgomery County, North Carolina

Clarks Creek and Big Branch Fencing Plan

Revisions:

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Sheet 4.2



Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

4.3
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Cross Creek Ranch Site
Montgomery County, North Carolina

UT1 and UT1B
Fencing Plan

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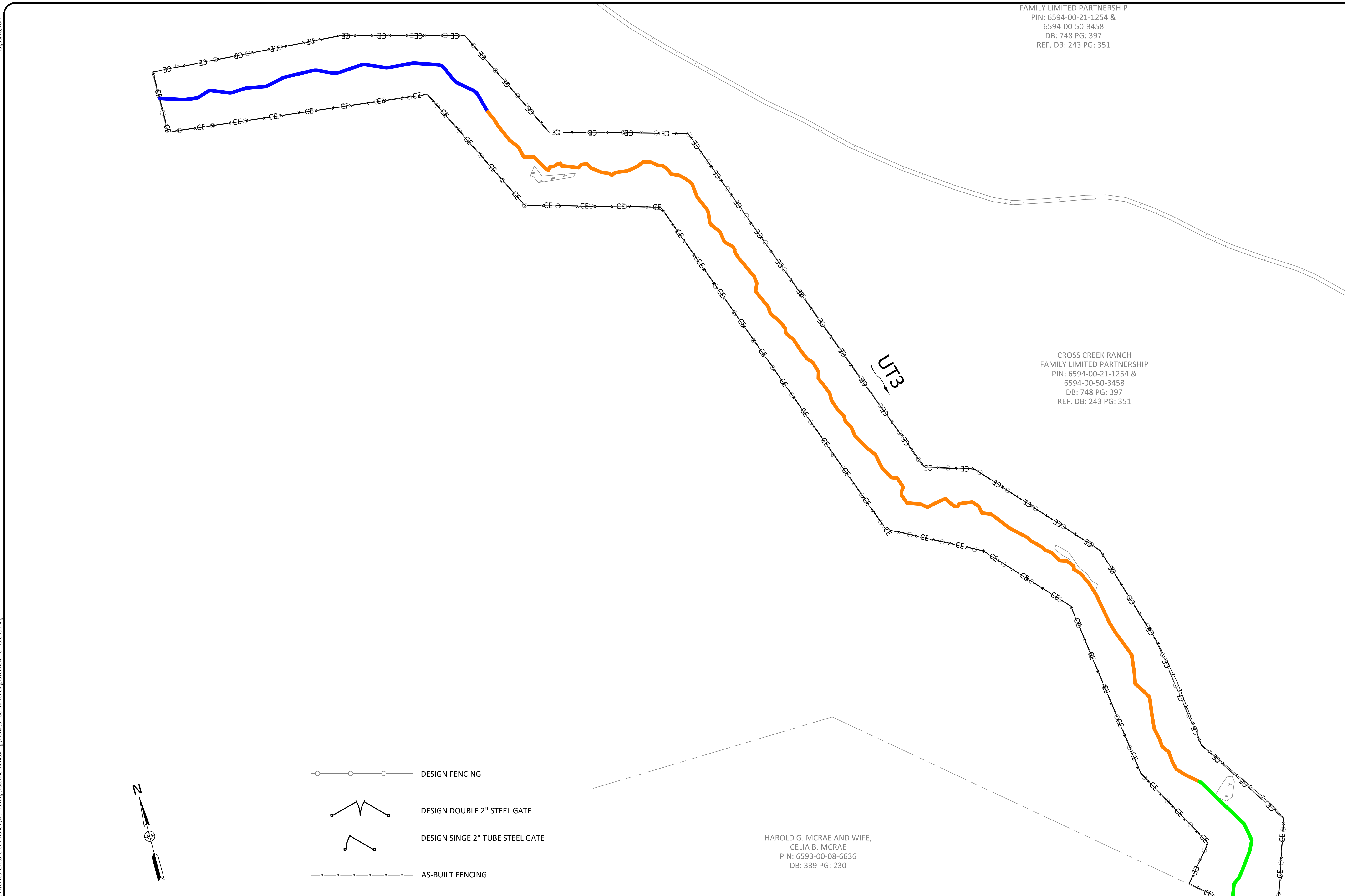

NOTES:
1. THERE ARE NO CHANGES TO THE INSTALLATION OF GATES FROM THE APPROVED FENCING PLAN.

August 25, 2022

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Cross Creek Ranch Site
Montgomery County, North Carolina

UT3
Fencing Plan

Date:	07.11.2022
Job Number:	005-02186
Project Engineer:	ARV
Drawn By:	FHM
Checked By:	TWW

Revisions:

Sheet 4.4