MONITORING YEAR 0 ANNUAL REPORT

Final

August 2023

COOL SPRINGS MITIGATION SITE

Harnett County, NC
Cape Fear River Basin
HUC 03030004

DMS Project No. 100166
NCDEQ Contract No. 0302-02
DMS RFP No. 16-20190302/Issued: December 20, 2019
USACE Action ID No. SAW-2020-01400
DWR Project No. 2020-1279

Data Collection Dates: August 2022 – January 2023

PREPARED FOR:

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

July 3, 2023

Jeremiah Dow
Project Management Supervisor – Eastern Region
NC DEQ Division of Mitigation Services
217 West Jones Street
Raleigh, NC 27603

Subject: DMS Comments on the MY0 and As-built/Record Drawings
DMS Project Number 100166
Harnett County, North Carolina
DMS Contract Number 0302-02

Dear Mr. Dow,

On June 29, 2023, Wildlands Engineering received comments from the North Carolina Division of Mitigation Services (DMS) regarding the DRAFT MY0/As-Built Baseline Report & Record Drawings dated June 6, 2023. The following letter documents DMS feedback and Wildlands' corresponding responses and revisions to the As-Built Report.

1. Title Page(s) – The RFP date of issue is incorrect. Please change to 12/20/2019.

   The Title Page now states the correct RFP date of issue of December 20, 2019.

2. Table 1. Project Quantities and Credits – Based on the reported credits in the Table, the total WMUs should be 1.327.

   Based on DMS credit rounding standards, the number displayed in Table 1: Project Quantities and Credits, 1.328, is correct. This number was established in the Cool Springs Mitigation Plan by rounding all individual wetland credits to the nearest thousandth, and then calculating the sum of the rounded credit values to get the total wetland credits. Wetland credit numbers within the MY0 Report excel support file submitted to DMS are a product of formulas in their respective cells, and are not rounded to the nearest thousandth. Therefore, when calculating the sum of all unrounded wetland credits within the excel table, the total wetland credits result in a value of 1.327. Wildlands has updated the Table 1: Project Quantities and Credits excel file to not include formulas within credit cells, and will attach the new excel file with Wildlands' digital submittal of Cool Springs MY0 Report – Final.

3. Please correct Table numbering throughout the report. There are two tables designated as Table 1.

   Table numbering throughout the report has been reviewed and corrected.

4. On the Goals, Performance Criteria, and Functional Improvements Table, please add a row for restoration of wetland hydrology and include performance criteria.

   A row for restoration of wetland hydrology that includes performance criteria has been added to Table 2: Goals, Performance Criteria, and Functional Improvements.

5. Sections 3.1 & 3.5 refer to a piping log sill on T8, but according to the photo log and CCPV, this should be a boulder sill.

   Sections 3.1 and 3.5 have been updated to reflect the correct structure type, which is a boulder sill.

6. A riffle on T4 (see Sheet 1.5.1) in the vicinity of STA 501+00 was determined during the site visit to have not been installed and should be called out.

   After verification with the Construction Admin for Cool Springs, the riffle on T4 at Station 500+89 – 501+03 was constructed, but some of the riffle material has washed away. However, the riffle was determined to be stable, and no repair is needed. The record drawings have been updated to reflect this.

7. On T6 (see Sheets 1.7.1. & 1.7.2) log sills at STA 702+03 and STA 702+64 were called out as replaced with a boulder sill, but field observations during the visit indicate that the log sills were installed as designed. Please remove these callouts from the drawings and section 2.1.11.

   The callouts on record drawing sheets 1.7.1 and 1.7.2 and report section 2.1.11 referencing log sill replacement at STA 702+03 and STA 702+64 have been removed.

If you have any questions, please contact me by phone (919) 851-9986, or by email (jlorch@wildlandseng.com).

Sincerely,

Jason Lorch, *Monitoring Coordinator*

PREPARED BY:

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Raleigh, NC 27609

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COOL SPRINGS MITIGATION SITE
Monitoring Year 0 Annual Report

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Section 1: PROJECT OVERVIEW

The Cool Springs Mitigation Site (Site) is located in western Harnett County, approximately 9.5 miles northwest of the City of Lillington and approximately 4.7 miles east of the Town of Broadway. Table 3 presents information related to the project attributes.

1.1 Project Quantities and Credits

The Site is located on a single parcel and a conservation easement was recorded on 21.12 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							
UT to Cedar Creek Reach 1	1,808	1,799	Warm	EII	2.5	723.200	Fenced Out Livestock, Minor Bank Grading
	64	61	Warm	EII	N/A	0.000	Internal Culvert Crossing
	489	491	Warm	EII	2.5	195.600	Fenced Out Livestock, Minor Bank Grading
UT to Cedar Creek Reach 2	354	359	Warm	R	1.0	354.00	Full Channel Restoration, Fenced Out Livestock
T1	418	425	Warm	EII	2.5	167.200	Fenced Out Livestock, Minor Bank Grading
T2	466	465	Warm	R	1.0	466.000	Full Channel Restoration, Fenced Out Livestock
T3 Reach 1	43	42	Warm	EII	N/A	0.000	Internal Culvert Crossing
	379	379	Warm	EII	2.5	151.600	Fenced Out Livestock, Minor Bank Grading
T3 Reach 2	366	371	Warm	R	1.0	366.000	Full Channel Restoration, Fenced Out Livestock
T3 Reach 3	295	300	Warm	EII	2.5	118.000	Fenced Out Livestock, Minor Bank Grading
T4 Reach 1	101	102	Warm	R	1.0	101.000	Full Channel Restoration, Fenced Out Livestock
T4 Reach 2	62	64	Warm	R	N/A	0.000	Internal Culvert Crossing
	787	790	Warm	R	1.0	787.000	Full Channel Restoration, Fenced Out Livestock
T5	134	134	Warm	R	1.0	134.000	Full Channel Restoration, Fenced Out Livestock
T6	499	502	Warm	R	1.0	499.000	Full Channel Restoration, Fenced Out Livestock
T7	156	155	Warm	EI	1.5	104.000	Bank Protection and Grade Control Structures Installed
T8	697	707	Warm	R	1.0	697.000	Full Channel Restoration, Fenced Out Livestock
					Total:	**4,863.600**	

WETLANDS							
Wetland A	0.066	0.066	Riverine	E	2.0	0.033	Planting, Cattle Exclusion
Wetland B	0.064	0.064	Riverine	E	2.0	0.032	Planting, Cattle Exclusion
Wetland C	0.160	0.160	Riverine	RH	1.5	0.107	Planting, Cattle Exclusion
Wetland D	0.088	0.088	Riverine	E	2.0	0.044	Planting, Cattle Exclusion
Wetland E	0.162	0.162	Riverine	E	2.0	0.081	Planting, Cattle Exclusion
Wetland F	0.265	0.265	Riverine	RH	1.5	0.177	Planting, Cattle Exclusion
Wetland G	0.138	0.138	Riverine	RH	1.5	0.092	Planting, Cattle Exclusion
Wetland H	0.139	0.139	Riverine	E	2.0	0.070	Cattle Exclusion
Wetland I	0.024	0.024	Riverine	E	2.0	0.012	Cattle Exclusion
Wetland J	0.028	0.028	Riverine	E	2.0	0.014	Cattle Exclusion
Wetland 1	0.087	0.087	Riverine	R	1.0	0.087	Planting, Cattle Exclusion
Wetland 2	0.090	0.090	Riverine	R	1.0	0.090	Planting, Cattle Exclusion
Wetland 3	0.227	0.227	Riverine	R	1.0	0.227	Planting, Cattle Exclusion
Wetland 4	0.262	0.262	Riverine	R	1.0	0.262	Planting, Cattle Exclusion
					Total:	**1.328**	

Restoration Level	Stream	Riparian Wetland
	Warm	Riverine
Restoration	3,404.000	
Enhancement I	104.000	
Enhancement II	1,355.600	
Re-Establishment		0.666
Rehabilitation		0.376
Enhancement		0.286
Total Stream Credit	**4,863.600**	
Total Wetland Credit		**1.328**

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.	Construct stream channels that will maintain a stable pattern and profile considering hydrologic and sediment inputs to the system; install bank revetments and grade control; install bank vegetation.	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.	There are minor deviations from design. Small, isolated areas of scouring on T2 and T8 will be repaired.
Exclude livestock from stream channels.	Install livestock fencing or relocate livestock as needed to exclude livestock from stream channels, riparian areas, proposed wetland areas and/or remove livestock from adjacent fields.	Reduce sediment and nutrients from agriculture/bank erosion. Eliminate livestock waste in streams and trampling of stream substrate.	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 water quality.	Stabilize stream banks. Plant riparian buffers with native trees. Construct BMPs to treat pasture runoff. Fence out livestock.	Reduce sediment and nutrient inputs from stream banks; reduce sediment, nutrient, and bacteria inputs from pasture runoff; keep livestock out of streams, further reducing pollutants in project streams.	There is no required performance standard for this metric.	N/A	N/A
Improve wetland hydrology.	Remove livestock to allow soil profiles to stabilize. Raise elevation of streambeds and realign stream channels closer to wetlands. Plant native trees and herbaceous plants suitable for saturated conditions.	Increased surface water residence time will provide contact treatment and groundwater recharge potential.	Free groundwater surface within 12 inches of the soil surface for each representative wetland's associated hydroperiod under normal precipitation conditions.	Seven groundwater gauges equipped with pressure transducers are located in representative wetland areas and monitored annually.	Data will be collected throughout the year and reported in MY1.

Goal	Objective/ Treatment	Likely Functional Uplift	Performance Criteria	Measurement	Cumulative Monitoring Results
Improve stream, wetland, and riparian habitat.	Install habitat features such as constructed steps, cover logs, and brush toes on restored reaches. Add woody materials/ LWD to channel beds. Construct pools of varying depth. Restore and enhance forested riparian wetland habitat.	Support biological communities and processes. Provide aquatic habitats for diverse populations of aquatic and riparian 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 the 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 channels.	Crest gauges and/or pressure transducers recording flow elevations.	Reported in MY1.
Restore/ improve riparian buffers.	Plant native tree species in riparian zone where currently insufficient.	Provide a canopy to shade streams and reduce thermal loadings; stabilize stream banks and floodplain.	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 10ft at MY7.	One hundred square meter vegetation plots are placed on 2% of the planted area of the Site and monitored annually.	All 12 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.	The entirety of the Site boundaries were visually inspected during MY0. A prescribed fire occurred on adjacent land during April 2023, and burned into the easement on portions of T2 and BMPs 3, 4, and 5.

1.3 Project Attributes

The Site was an active cattle and chicken farm with wooded buffers along some of the project streams. Review of aerial photos indicates the landcover in the project watersheds was very consistent between 1950 and 1998. Most of the area was wooded during this period except for the southeastern portion of the UT to Cedar Creek watershed, which was cleared prior to 1950 and appears to have been used for grazing livestock. A small pond was constructed at the headwaters of UT to Cedar Creek at some point in the 1960's. Most of the landcover changes that have occurred on the Site were between 1998 and 2006, including clearing of the pastures and construction of the chicken houses. Table 3 below and Table 8 in Appendix C present additional information on pre-restoration conditions.

Table 3: Project Attributes

PROJECT INFORMATION					
Project Name	Cool Springs Mitigation Site		County	Harnett County	
Project Area (acres)	21.12		Project Coordinates	35°26'50.17"N 78°58'5.78"W	
PROJECT WATERSHED SUMMARY INFORMATION					
Physiographic Province	Piedmont and Coastal Plain		River Basin	Cape Fear	
USGS HUC 8-digit	03030004		USGS HUC 14-digit	03030004010030	
DWR Sub-basin	03-06-07		Land Use Classification	43% agriculture, 25% forested, 15% herbaceous, 4% developed	
Project Drainage Area (ac)	255		Percentage of Impervious Area	<1%	
RESTORATION TRIBUTARY SUMMARY INFORMATION					
Parameters	**UT to Cedar Creek**	**T2**	**T3**	**T4**	
Pre-project length (feet)	2,797	473	1,096	1,091	
Post-project (feet)	2,649	465	1,050	892	
Valley confinement	Moderately Confined to Unconfined	Confined	Moderately Confined to Confined	Unconfined to Moderately Confined	
Drainage area (acres)	255	6	20	33	
Perennial, Intermittent, Ephemeral	Perennial	Intermittent	Intermittent/Perennial		
DWR Water Quality Classification	WS-IV				
Dominant Stream Classification (existing)	B4c	A4	A4	F4b	
Dominant Stream Classification (proposed)	C4/B4c	A4/B4a	B4/B4a	B4/B4a	
Dominant Evolutionary class	III/IV	IV	I/IV/III	I/III	
Parameters	**T5**	**T6**	**T7**	**T8**	
Pre-project length (feet)	142	499	124	722	
Post-project (feet)	134	502	155	707	
Valley confinement	Moderately Confined	Unconfined	Moderately Confined		
Drainage area (acres)	5	9	76	10	
Perennial, Intermittent, Ephemeral	Intermittent	Perennial			
DWR Water Quality Classification	WS-IV				
Dominant Stream Classification (existing)	N/A	A4	B4	A4/B4a	

Dominant Stream Classification (proposed)	N/A	A4/B4a	B4/C4b	A4/B4a
Dominant Evolutionary class	I	IV	III	IV
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, 2022)	
Historic Preservation Act	Yes	Yes		

Section 2: AS-BUILT CONDITION (BASELINE)

The Site construction and as-built surveys were completed in August 2022 and January 2023, respectively. The survey included portraying as-built topography and grading performed during construction, 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 UT to Cedar Creek Reach 1

- STA 101+70—STA 101+86 – boulder toe omitted due to the presence of bedrock in the bank.
- STA 116+90—STA 117+11 – brush toe partially installed to preserve existing trees. Also, a vegetated lateral bar had formed on the right bank at the time of construction, greatly reducing shear stress on the right bank.
- STA 117+85—STA 118+19 – brush toe added to provide additional bank stability.
- STA 118+53—STA 118+72 – riffle omitted due to bedrock and an existing, stable riffle.
- Rather than installing rock sills in pre-determined locations within the two existing ephemeral channels draining into UT to Cedar Creek, rock sill installation locations were determined in the field to be at the best position to provide the best grade control.

2.1.2 UT to Cedar Creek Reach 2

- STA 128+27—STA 128+43 – riffle omitted due to the presence of shallow bedrock.

2.1.3 T1

- No deviations were made from design.

2.1.4 T2

- No deviations were made from design.

2.1.5 T3 Reach 1

- STA 402+77 – log sill added to provide additional grade control.
- STA 403+03.45'—STA 403+09 – riffle added to provide additional grade control.
- STA 403+10 – log sill added to provide additional grade control.

2.1.6 T3 Reach 2

- STA 406+00—STA 406+19 – brush toe partially installed to avoid disturbance to existing, stable bank vegetation.

2.1.7 T3 Reach 3

- No deviations were made from design.

2.1.8 T4 Reach 1

- STA 500+89 – STA 501+03 – riffle was constructed, but some riffle material washed away before survey. Riffle is stable and no repair is needed.

2.1.9 T4 Reach 2

- STA 507+54—STA 507+60 – brush toe partially installed to avoid disturbance to existing tree.

2.1.10 T5

- STA 600+51—STA 600+56 – riffle not installed due to short distance between log sills.
- STA 600+86—STA 600+94 – brush toe omitted to avoid disturbance to existing root mass within the bank.

2.1.11 T6

- STA 702+37—STA 702+41 – brush toe replaced with boulder toe due to availability of materials at the time of installation.

2.1.12 T7

- No deviations were made from design.

2.1.13 T8

- STA 901+30—STA 901+42 – brush toe not installed due to a low and stable bank.
- STA 906+95—STA 907+02 – boulder toe installed to increase bank stability.
- STA 907+31—STA 907+38 – riffle added to provide stability due to grade changes made to tie into downstream bedrock.
- STA 907+43—STA 907+48 – riffle added to provide stability due to grade changes made to tie into downstream bedrock.
- STA 907+51—STA 907+66 – brush toe replaced with boulder toe to increase bank stability.
- STA 907+67 – Log vane omitted to allow stream to flow over existing bedrock.

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, 2022). Performance criteria for vegetation, stream, and hydrologic assessment are located in Section 1.2 Table 2: Goals, Performance Criteria, and Functional Improvements.

3.1 Monitoring Year 0 Summary

Overall, the Site is performing as intended, and is on course to meet success criteria. Vegetation plot data shows an average density of 620 planted stems per acre across vegetation plots. All plots are on track to exceed the MY3 interim requirement of 320 planted stems per acre. All project streams are stable, functioning as intended, and meeting project goals. A series of three structures on T2 have begun piping, resulting in scouring of the left bank, and will be repaired in MY1 or MY2. Water has begun flowing around a boulder sill on T8, causing erosion on the left bank, as well. A repair will occur on T8 in MY1 or MY2. Herbaceous vegetation is establishing itself across the Site and the floodplain is stable. An encroachment in the form of a prescribed fire took place in the beginning of April 2023, affecting approximately 1 acre of the conservation easement. Portions of T2 and BMP 3, 4, and 5 were burned; however, herbaceous vegetation has begun growing back in all burned areas and the majority of planted stems seem to have survived. Once the growing season ends, damage will be further assessed and reported during MY1. Stream and wetland hydrology data will be included in the MY1 annual report.

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.

3.2 Vegetative Assessment

The MY0 vegetative survey was completed in January 2023. Vegetation monitoring resulted in a stem density range of 445 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 620 planted stems per acre. All 12 vegetation plots exceeded the interim success criteria and are on track to meet the final success criteria required for MY7. Herbaceous vegetation is establishing itself across the Site. Refer to Appendix A for Vegetation Plot Photographs and the Vegetation Condition Assessment Table, and Appendix B for Vegetation Plot Data.

3.3 Vegetation Areas of Concern

Evidence of a fire was observed on April 14, 2023 throughout pastureland directly adjacent to the conservation easement. Based on the level of surface charring, the fire is estimated to have occurred within the first two weeks of April. The fire is the result of a landowner prescribed pasture management practice and is unrelated to Wildlands. The prescribed burn encroached into the following portions of the conservation easement: portions of T2 and BMP 3, 4, and 5 (see Figure 1a-1b). In total, approximately 1 acre of the conservation easement was affected by the prescribed fire. The entirety of vegetation plot 3 was burned; however, planted stems seem to have survived, as evidenced by new sprouts and new leaf growth (refer to Appendix A for Easement Encroachment Photographs). Herbaceous cover has started to return on all charred areas of T2, BMP 3, 4, and 5. Vegetation plot 3 will be monitored and reported on during MY1. A random (mobile) vegetation plot along T2 will be monitored and reported on during MY1 to assess the extent of burn damage, as well.

3.4 Stream Assessment

Morphological surveys for MY0 were conducted in December 2023. All streams on Site are stable and functioning as designed. Streams show minor deviations from design and visual assessments following construction indicate that streams remain stable. Cross-sections show entrenchment and width-to-depth ratios within an acceptable range of the design parameters, and bank height ratios are less than

1.2. Refer to Appendix A for the Visual Stream Morphology Stability Assessment Table and Stream Photographs. Refer to Appendix C for Stream Geomorphology Data

3.5 Stream Areas of Concern

Within the bottom half of T2 adjacent to photo point 8, water is piping around a series of structures consisting of a rock sill and two log sills, resulting in scouring of the left bank and dislodging of associated brush toe (refer to Appendix A for Stream Area of Concern Photographs). The affected area is approximately 24 linear feet in length (see Figure 1a). Hand repairs are planned to take place during MY1 or MY2. If hand-repairs are unsuccessful, mechanical repairs may be utilized.

Water is piping around a boulder sill on T8 adjacent to photo point 20, resulting in scouring of the left bank totaling approximately one foot (see Figure 1b and refer to Appendix A-Stream Area of Concern Photographs). Hand repairs are planned to take place during MY1 or MY2. If hand-repairs are unsuccessful, mechanical repairs may be utilized.

3.6 Hydrology Assessment

Two crest gauges were installed, one on T4 Reach 2 and one on UT to Cedar Creek Reach 2. Five flow gauges were installed on the Site, one on each of the following reaches, T2, T3 Reach 1, T5, T6, and T8. One barotroll was installed to record atmospheric pressure. Hydrologic data will be collected and reported during MY1.

3.7 Wetland Assessment

Seven groundwater gauges were installed across wetland areas. One soil temperature probe was installed. Groundwater gauge data will be collected and reported during MY1.

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

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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.

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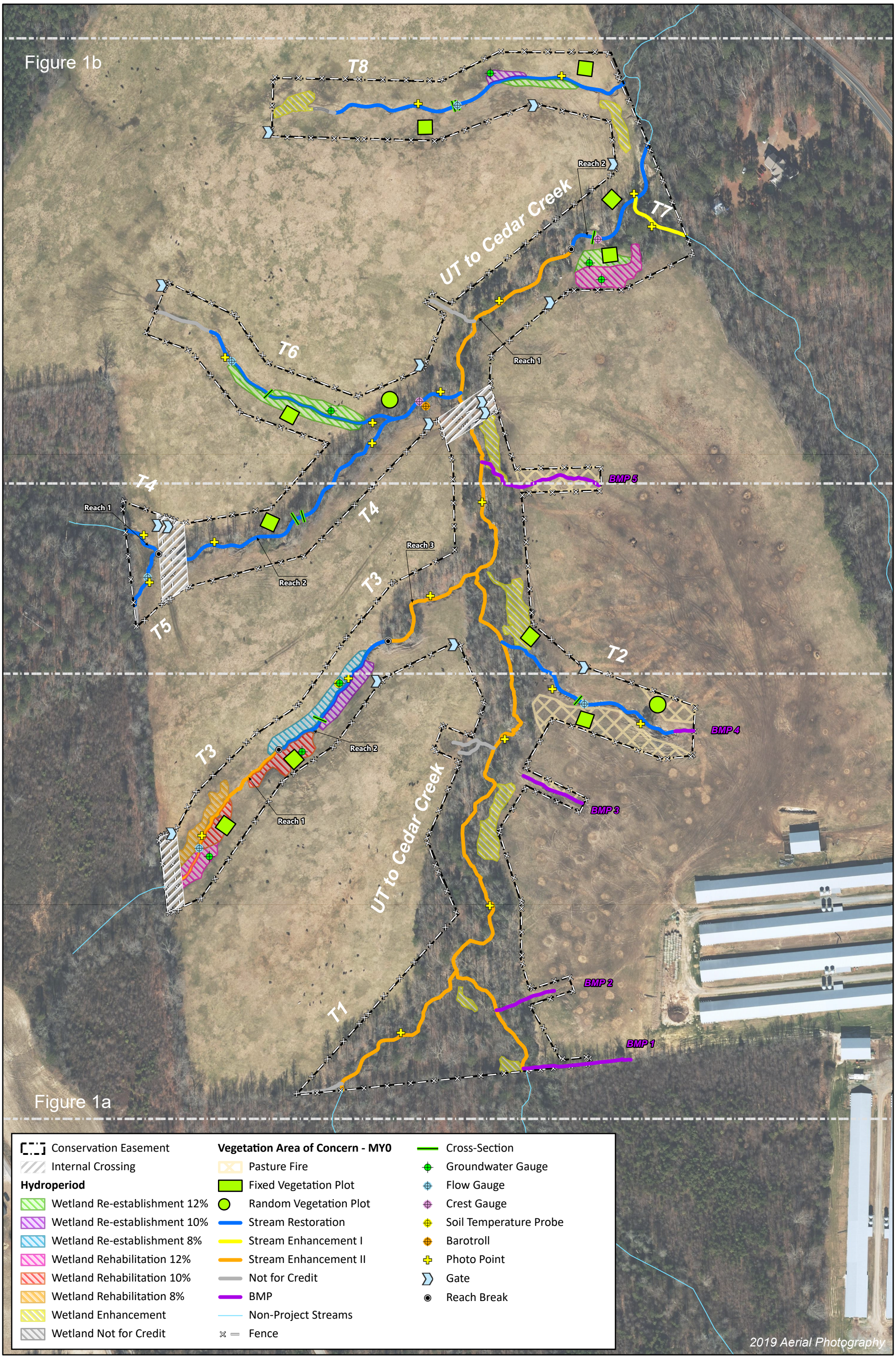


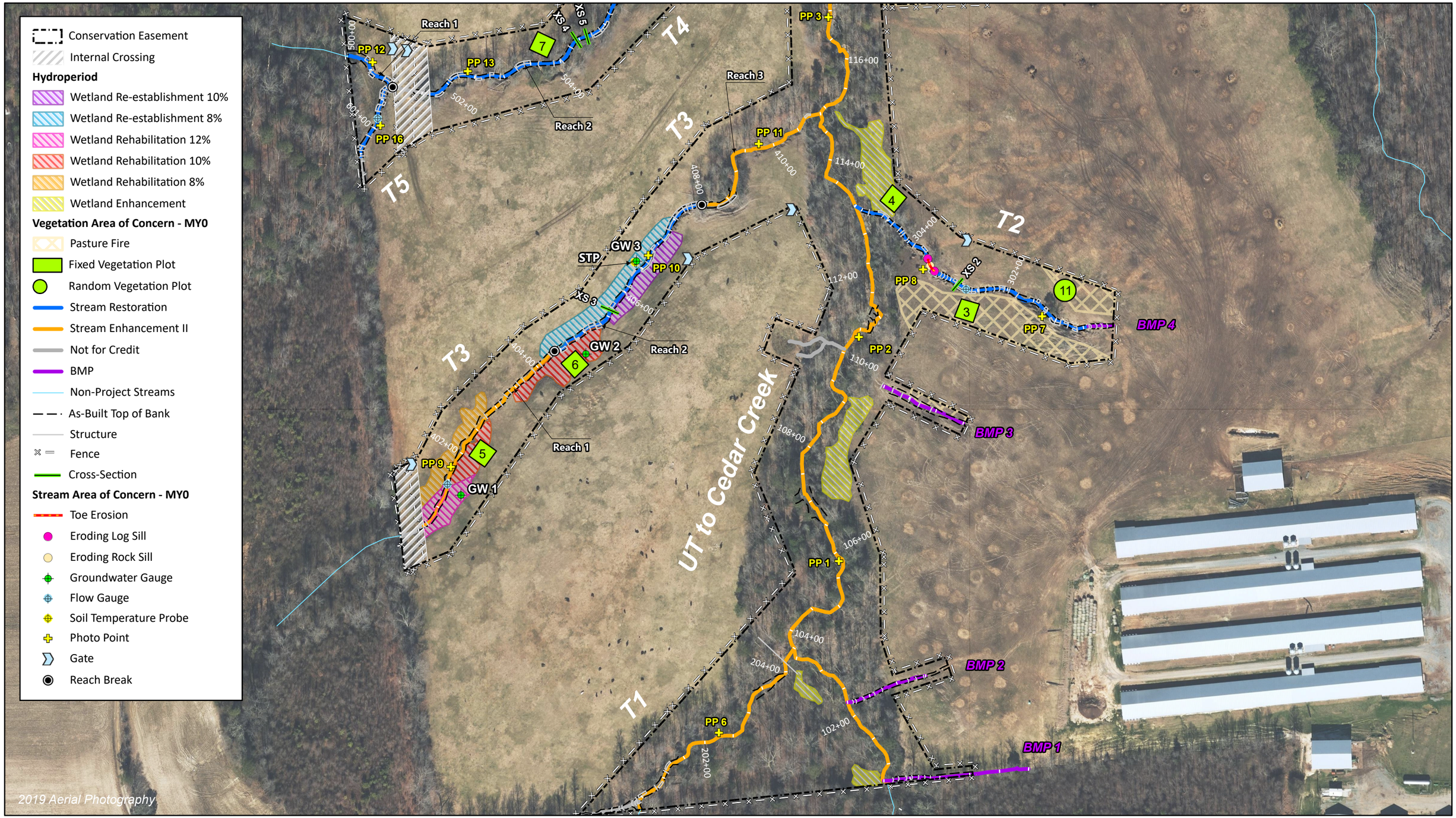
WILDLANDS ENGINEERING

0 200 400 Feet

N

Figure 1. Current Condition Plan View Key
Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

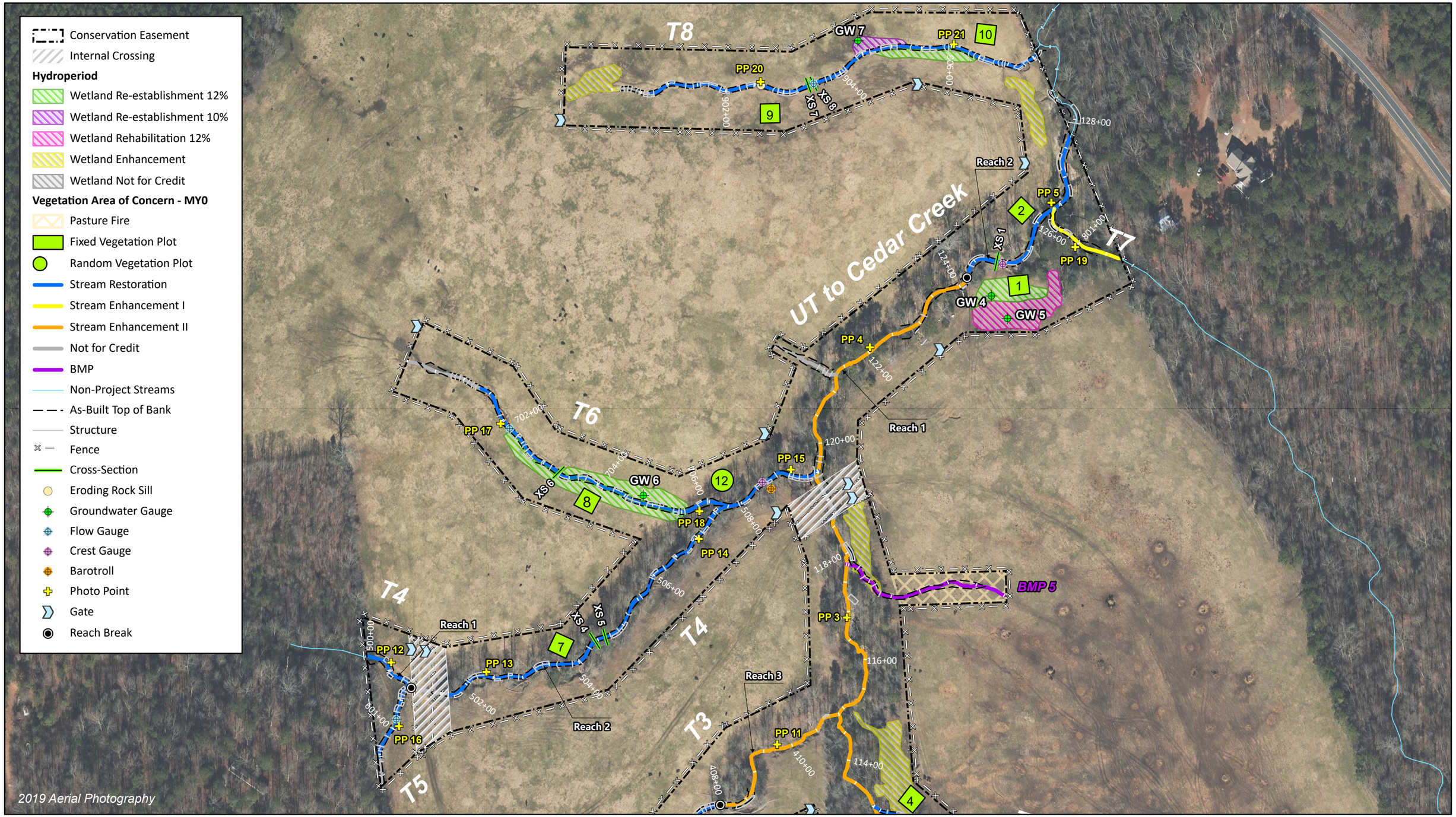
Harnett County, NC



WILDLANDS ENGINEERING

Figure 1a. Current Condition Plan View
Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

Harnett County, NC



WILDLANDS ENGINEERING

0 150 300 Feet

N

Figure 1b. Current Condition Plan View
Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

Harnett County, NC

APPENDIX A. VISUAL ASSESSMENT DATA

Table 4. Visual Stream Morphology Stability Assessment Table

Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

UT to Cedar Creek Reaches 1-2

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		2,649
				Assessed Bank Length		5,298
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%.	9	9		100%

Visual assessment was completed May 4th, 2023.

T1

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		425
				Assessed Bank Length		850
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%.	3	3		100%

Visual assessment was completed May 4th, 2023.

Table 4. Visual Stream Morphology Stability Assessment Table
Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

T2

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	465
					Assessed Bank Length	930
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.	27	30		90%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	14	15		93%

Visual assessment was completed May 4th, 2023.

T3 Reaches 1-3

Major Channel Category		Metric	Number Stable,	Total Number in	Amount of Unstable	% Stable, Performing as
					Assessed Stream Length	1,050
					Assessed Bank Length	2,100
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.	33	33		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	13	13		100%

Visual assessment was completed May 4th, 2023.

Table 4. Visual Stream Morphology Stability Assessment Table

Cool Springs Mitigation Site

DMS Project No. 100166

Monitoring Year 0 - 2023

T4 Reaches 1-2

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	892
					Assessed Bank Length	1,784
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.	33	33		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	26	26		100%

Visual assessment was completed May 4th, 2023.

T5

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	134
					Assessed Bank Length	268
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.	12	12		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	7	7		100%

Visual assessment was completed May 4th, 2023.

Table 4. Visual Stream Morphology Stability Assessment Table

Cool Springs Mitigation Site

DMS Project No. 100166

Monitoring Year 0 - 2023

T6

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	502
					Assessed Bank Length	1,004
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.	23	23		100%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	11	11		100%

Visual assessment was completed May 4th, 2023.

T7

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	155
					Assessed Bank Length	310
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%.	2	2		100%

Visual assessment was completed May 4th, 2023.

Table 4. Visual Stream Morphology Stability Assessment Table

Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

T8

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		707
				Assessed Bank Length		1,414
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.	46	47		98%
	Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%.	16	16		100%

Visual assessment was completed May 4th, 2023.

Table 5. Vegetation Condition Assessment Table
Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

Planted Acreage **13.80**

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 January 6, 2023.

Easement Acreage **21.12**

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	1 Encroachment Noted* / 1.00 ac	

Visual assessment was completed January 6, 2023.
*A landowner-prescribed fire burned approximately 1 acre of the conservation easement.

STREAM PHOTOGRAPHS

Photo Point 1 UT to Cedar Creek R1 – upstream *(11/8/2022)*

Photo Point 1 UT to Cedar Creek R1 – downstream *(11/8/2022)*

Photo Point 2 UT to Cedar Creek R1 – upstream *(11/8/2022)*

Photo Point 2 UT to Cedar Creek R1 – downstream *(11/8/2022)*

Photo Point 3 UT to Cedar Creek R1 – upstream *(11/8/2022)*

Photo Point 3 UT to Cedar Creek R1 – downstream *(11/8/2022)*

Photo Point 4 UT to Cedar Creek R1 – upstream *(11/8/2022)*

Photo Point 4 UT to Cedar Creek R1 – downstream *(11/8/2022)*

Photo Point 5 UT to Cedar Creek R2 – upstream *(11/8/2022)*

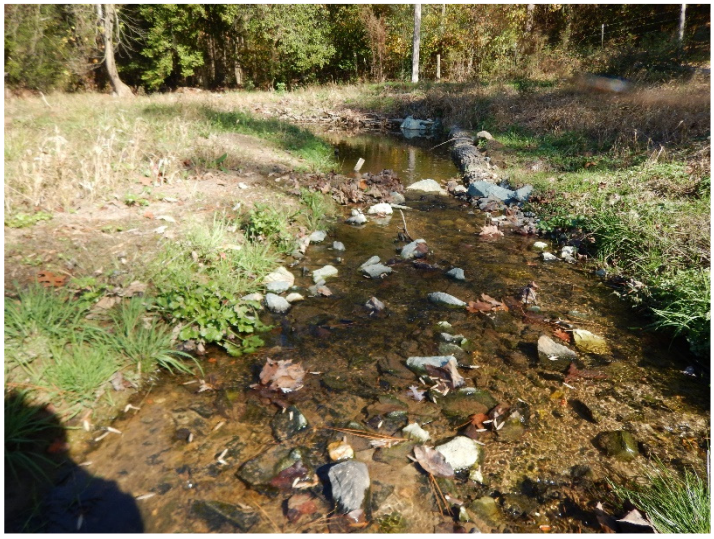


Photo Point 5 UT to Cedar Creek R2 – downstream *(11/8/2022)*

Photo Point 6 T1 – upstream *(11/8/2022)*

Photo Point 6 T1 – downstream *(11/8/2022)*

Photo Point 7 T2 – upstream *(1/31/2023)*

Photo Point 7 T2 – downstream *(1/31/2023)*

Photo Point 8 T2 – upstream *(1/31/2023)*

Photo Point 8 T2 – downstream *(1/31/2023)*

Photo Point 9 T3 R1 – upstream *(1/31/2023)*

Photo Point 9 T3 R1 – downstream *(1/31/2023)*

Photo Point 10 T3 R2 – upstream *(11/8/2022)*

Photo Point 10 T3 R2 – downstream *(11/8/2022)*

Photo Point 11 T3 R3 – upstream *(1/31/2023)*

Photo Point 11 T3 R3 – downstream *(1/31/2023)*

Photo Point 12 T4 R1 – upstream *(11/8/2022)*

Photo Point 12 T4 R1 – downstream *(11/8/2022)*

Photo Point 13 T4 R2 – upstream *(1/31/2023)*

Photo Point 13 T4 R2 – downstream *(1/31/2023)*

Photo Point 14 T4 R2 – upstream *(11/8/2022)*

Photo Point 14 T4 R2 – downstream *(11/8/2022)*

Photo Point 15 T4 R2 – upstream *(1/31/2023)*

Photo Point 15 T4 R2 – downstream *(1/31/2023)*

Photo Point 16 T5 – upstream *(1/31/2023)*

Photo Point 16 T5 – downstream *(1/31/2023)*

Photo Point 17 T6 – upstream *(1/31/2023)*

Photo Point 17 T6 – downstream *(1/31/2023)*

Photo Point 18 T6 – upstream *(11/14/2022)*

Photo Point 18 T6 – downstream *(11/14/2022)*

Photo Point 19 T7 – upstream *(1/31/2023)*

Photo Point 19 T7 – downstream *(1/31/2023)*

Photo Point 20 T8 – upstream *(1/31/2023)*

Photo Point 20 T8 – downstream *(1/31/2023)*

Photo Point 21 T8 – upstream *(11/8/2022)*

Photo Point 21 T8 – downstream *(11/8/2022)*

STREAM AREA OF CONCERN PHOTOGRAPHS

	
T2 STA 303+05-303+20: Before – Piping Log Sill Causing Dislodged Brush Toe and Scouring of the Left Bank *(4/7/2023)*	**T2 STA 303+05-303+20: Before – Piping Rock Sill Causing Dislodged Brush Toe and Scouring of the Left Bank *(4/7/2023)***
	
T2 STA 303+05-303+20: Before – Piping Log Sill Causing Dislodged Brush Toe and Scouring of the Left Bank *(4/7/2023)*	**T8 STA 902+59: Before –Piping Rock Sill Causing Localized Scouring *(4/7/2023)***

CULVERT CROSSING PHOTOGRAPHS

UT to Cedar Creek - Looking Upstream *(5/12/2023)*

UT to Cedar Creek - Looking Downstream *(5/12/2023)*

T4 R2 - Looking Upstream *(5/12/2023)*

T4 R2 - Looking Downstream *(5/12/2023)*

T3 - Looking Upstream *(5/12/2023)*

VEGETATION PLOT PHOTOGRAPHS

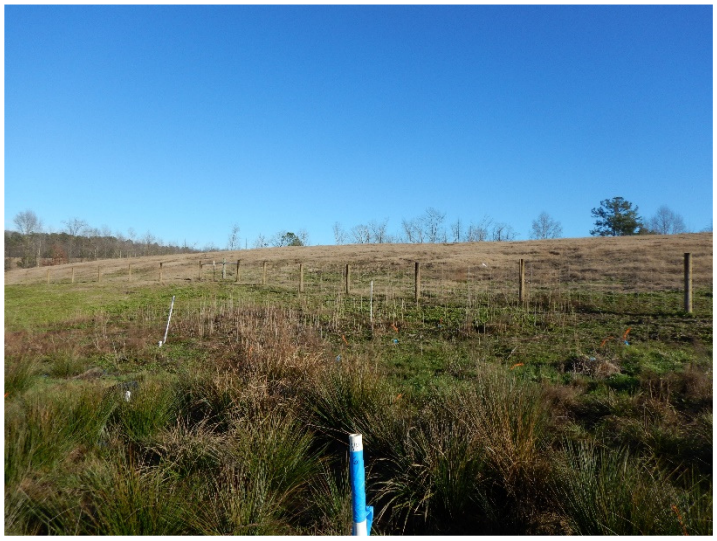
FIXED VEG PLOT 1 *(1/6/2023)*

FIXED VEG PLOT 2 *(1/6/2023)*

FIXED VEG PLOT 3 *(1/6/2023)*

FIXED VEG PLOT 4 *(1/6/2023)*

FIXED VEG PLOT 5 *(1/6/2023)*



FIXED VEG PLOT 6 *(1/6/2023)*

FIXED VEG PLOT 7 *(1/6/2023)*

FIXED VEG PLOT 8 *(1/6/2023)*

FIXED VEG PLOT 9 *(1/6/2023)*

FIXED VEG PLOT 10 *(1/6/2023)*

RANDOM VEG PLOT 11 *(1/6/2023)*

RANDOM VEG PLOT 12 *(1/6/2023)*

EASEMENT ENCROACHMENT PHOTOGRAPHS

	
T2 – Four Days After Burned Area First Discovered *(4/18/2023)*	**T2 – Four Days After Burned Area First Discovered *(4/18/2023)***
	
BMP 5 – Four Days After Burn First Discovered *(4/18/2023)*	**BMP 5 – Four Days After Burn First Discovered *(4/18/2023)***
	
T2 VP 3 – Three Weeks After Burned Area First Discovered *(5/3/2023)*	**T2 VP 3 – Three Weeks After Burned Area First Discovered *(5/3/2023)***

	
Aerial View of T2 Facing West – Three Weeks After Burned Area First Discovered *(5/3/2023)*	**Aerial View of T2 Facing West – Three Weeks After Burned Area First Discovered *(5/3/2023)***
	
Aerial View of BMP 5 and Adjacent Land Three Weeks After Burned Area First Discovered *(5/3/2023)*	**Aerial View of BMP 3 and Adjacent Land Three Weeks After Burned Area First Discovered *(5/3/2023)***
	
T2 – Four Weeks after Burned Area First Discovered *(5/12/2023)*	**T2 VP 3 – Four Weeks After Burned Area First Discovered *(5/12/2023)***

	
T2 RVP 11 – Four Weeks after Burned Area First Discovered *(5/12/2023)*	**T2 RVP 11 – Four Weeks After Burned Area First Discovered *(5/12/2023)***

BMP PHOTOGRAPHS

	
BMP 1 - Facing Uphill *(5/12/2023)*	**BMP 1 - Facing Downhill *(5/12/2023)***
	
BMP 2 - Facing Uphill *(5/12/2023)*	**BMP 2 - Facing Downhill *(5/12/2023)***
	
BMP 3 - Facing Uphill *(5/12/2023)*	**BMP 3 - Facing Downhill *(5/12/2023)***

	
BMP 4 - Facing Uphill *(5/12/2023)*	**BMP 4 - Facing Downhill *(5/12/2023)***
	
BMP 5 - Facing Downhill (4/18/2023)	**BMP 5 - Facing Downhill (4/18/2023)**

APPENDIX B. VEGETATION PLOT DATA

Table 6. Vegetation Plot Data

Cool Springs Mitigation Site

DMS Project No. 100166

Monitoring Year 0 - 2023

Planted Acreage	13.8
Date of Initial Plant	2023-01-05
Date of Current Survey	2023-01-06
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	Betula nigra	river birch	Tree	FACW	4	4			3	3	4	4	3	3
	Carya tomentosa*	mockernut hickory	Tree	FACU										
	Cephalanthus occidentalis*	common buttonbush	Shrub	OBL	1	1							1	1
	Cercis canadensis*	eastern redbud	Tree	UPL							1	1		
	Cornus florida*	flowering dogwood	Tree	FACU							1	1		
	Fraxinus pennsylvanica	green ash	Tree	FACW			1	1			1	1	1	1
	Juniperus virginiana	eastern redcedar	Tree	FACU					1	1	3	3	2	2
	Liriodendron tulipifera	tuliptree	Tree	FACU					1	1	1	1		
	Nyssa sylvatica	blackgum	Tree	FAC	2	2							2	2
	Platanus occidentalis	American sycamore	Tree	FACW	3	3					3	3	1	1
	Quercus alba	white oak	Tree	FACU			2	2	4	4	1	1		
	Quercus michauxii	swamp chestnut oak	Tree	FACW			2	2	3	3	1	1		
	Quercus rubra	northern red oak	Tree	FACU			1	1	2	2	1	1	1	1
	Rosa palustris*	swamp rose	Shrub	OBL									3	3
	Salix nigra	black willow	Tree	OBL	2	2								
	Sambucus canadensis*	American black elderberry	Tree	FACW	2	2							1	1
	Taxodium distichum	bald cypress	Tree	OBL	2	2							1	1
	Ulmus alata	winged elm	Tree	FACU			1	1						
	Ulmus americana	American elm	Tree	FAC			5	5	1	1			1	1
Sum				Performance Standard	16	16	12	12	15	15	17	17	17	17
Mitigation Plan Performance Standard				Current Year Stem Count		16		12		15		17		17
				Stems/Acre		648		486		607		688		688
				Species Count		7		6		7		10		11
				Dominant Species Composition (%)		25		42		27		24		18
				Average Plot Height (ft.)		2		2		2		2		2
				% Invasives		0		0		0		0		0
Post Mitigation Plan Performance Standard				Current Year Stem Count		16		12		15		17		17
				Stems/Acre		648		486		607		688		688
				Species Count		7		6		7		10		11
				Dominant Species Composition (%)		25		42		27		24		18
				Average Plot Height (ft.)		2		2		2		2		2
				% Invasives		0		0		0		0		0

*Species not subject to monitoring height requirement due to species growth habit.

1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.

2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).

3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

Table 6. Vegetation Plot Data
Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

Planted Acreage	13.8
Date of Initial Plant	2023-01-05
Date of Current Survey	2023-01-06
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		Veg Plot 11 R	Veg Plot 12 R
					Planted	Total	Planted	Total	Planted	Total	Planted	Total	Planted	Total	Total	Total
Species Included in Approved Mitigation Plan	Betula nigra	river birch	Tree	FACW	4	4	2	2			5	5			3	3
	Carya tomentosa*	mockernut hickory	Tree	FACU												1
	Cephalanthus occidentalis*	common buttonbush	Shrub	OBL	2	2										
	Cercis canadensis*	eastern redbud	Tree	UPL											1	
	Cornus florida*	flowering dogwood	Tree	FACU									1	1		
	Fraxinus pennsylvanica	green ash	Tree	FACW							2	2				1
	Juniperus virginiana	eastern redcedar	Tree	FACU			1	1	1	1	4	4	1	1	1	2
	Liriodendron tulipifera	tuliptree	Tree	FACU												1
	Nyssa sylvatica	blackgum	Tree	FAC	2	2			4	4						
	Platanus occidentalis	American sycamore	Tree	FACW			4	4	2	2			1	1	2	3
	Quercus alba	white oak	Tree	FACU			3	3	1	1	2	2	3	3		2
	Quercus michauxii	swamp chestnut oak	Tree	FACW			2	2	3	3	1	1	7	7	5	3
	Quercus rubra	northern red oak	Tree	FACU							2	2			2	
	Rosa palustris*	swamp rose	Shrub	OBL	1	1										
	Salix nigra	black willow	Tree	OBL												
	Sambucus canadensis*	American black elderberry	Tree	FACW	2	2			1	1						
	Taxodium distichum	bald cypress	Tree	OBL					1	1						
	Ulmus alata	winged elm	Tree	FACU					2	2	1	1	3	3	2	
	Ulmus americana	American elm	Tree	FAC			2	2	1	1			1	1		
Sum				Performance Standard	11	11	14	14	16	16	17	17	17	17	16	16
Mitigation Plan Performance Standard				Current Year Stem Count		11		14		16		17		17	16	16
				Stems/Acre		445		567		648		688		688	648	648
				Species Count		5		6		9		7		7	7	8
				Dominant Species Composition (%)		36		29		25		29		41	31	19
				Average Plot Height (ft.)		2		1		2		2		2	2	1
				% Invasives		0		0		0		0		0	0	0
Post Mitigation Plan Performance Standard				Current Year Stem Count		11		14		16		17		17	16	16
				Stems/Acre		445		567		648		688		688	648	648
				Species Count		5		6		9		7		7	7	8
				Dominant Species Composition (%)		36		29		25		29		41	31	19
				Average Plot Height (ft.)		2		1		2		2		2	2	1
				% Invasives		0		0		0		0		0	0	0

*Species not subject to monitoring height requirement due to species growth habit.
1). Bolded species are proposed for the current monitoring year, italicized species are not approved, and a regular font indicates that the species has been approved.
2). The "Species Included in Approved Mitigation Plan" section contains only those species that were included in the original approved mitigation plan. The "Post Mitigation Plan Species" section includes species that are being proposed through a mitigation plan addendum for the current monitoring year (bolded) , species that have been approved in prior monitoring years through a mitigation plan addendum (regular font), and species that are not approved (italicized).
3). The "Mitigation Plan Performance Standard" section is derived only from stems included in the original mitigation plan, whereas the "Post Mitigation Plan Performance Standard" includes data from mitigation plan approved, post mitigation plan approved, and proposed stems.

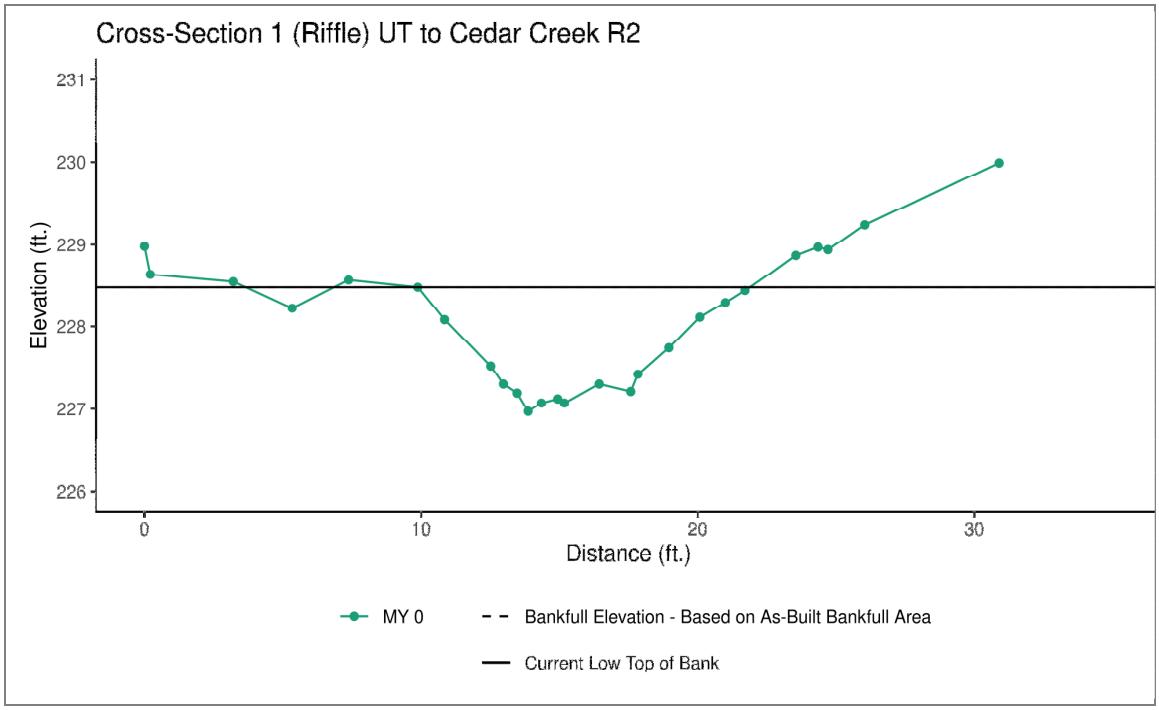
Table 7. Vegetation Performance Standards Summary Table
Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

	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	7	0	486	2	6	0	607	2	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	688	2	10	0	688	2	11	0	445	2	5	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	567	1	6	0	648	2	9	0	688	2	7	0
	Veg Plot 10 F				Veg Plot Group 11 R				Veg Plot Group 12 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	688	2	7	0	648	2	7	0	648	1	8	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.

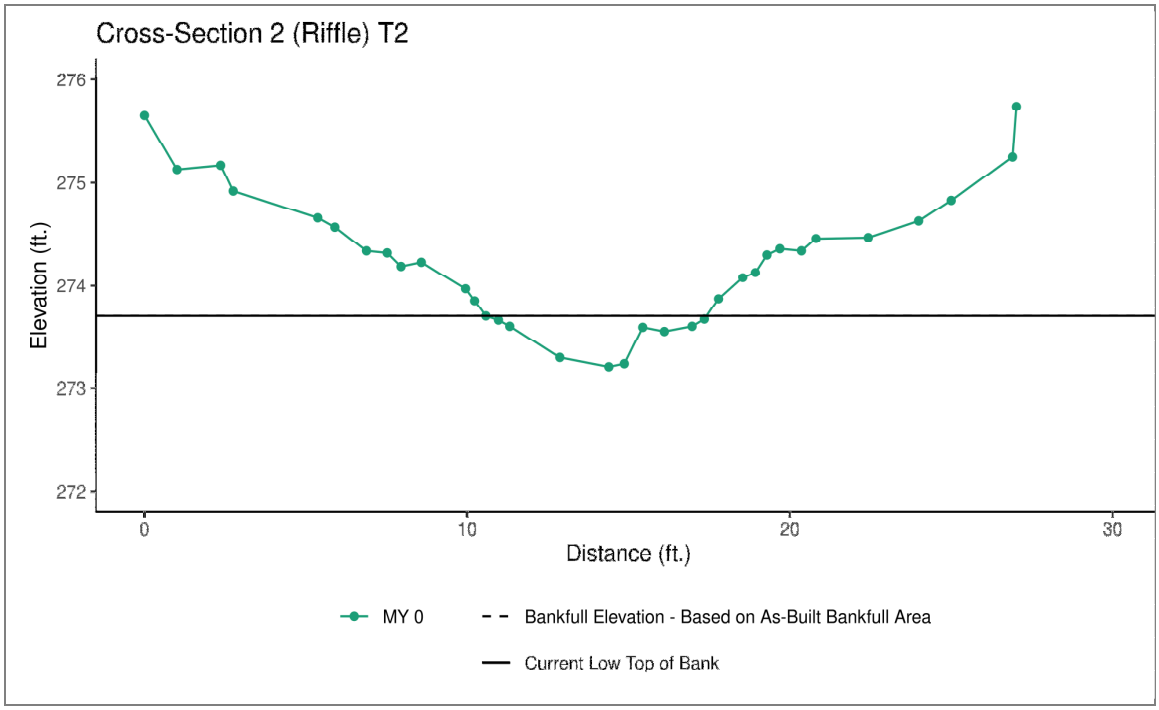
APPENDIX C. STREAM GEOMORPHOLOGY DATA

CROSS-SECTION PLOTS



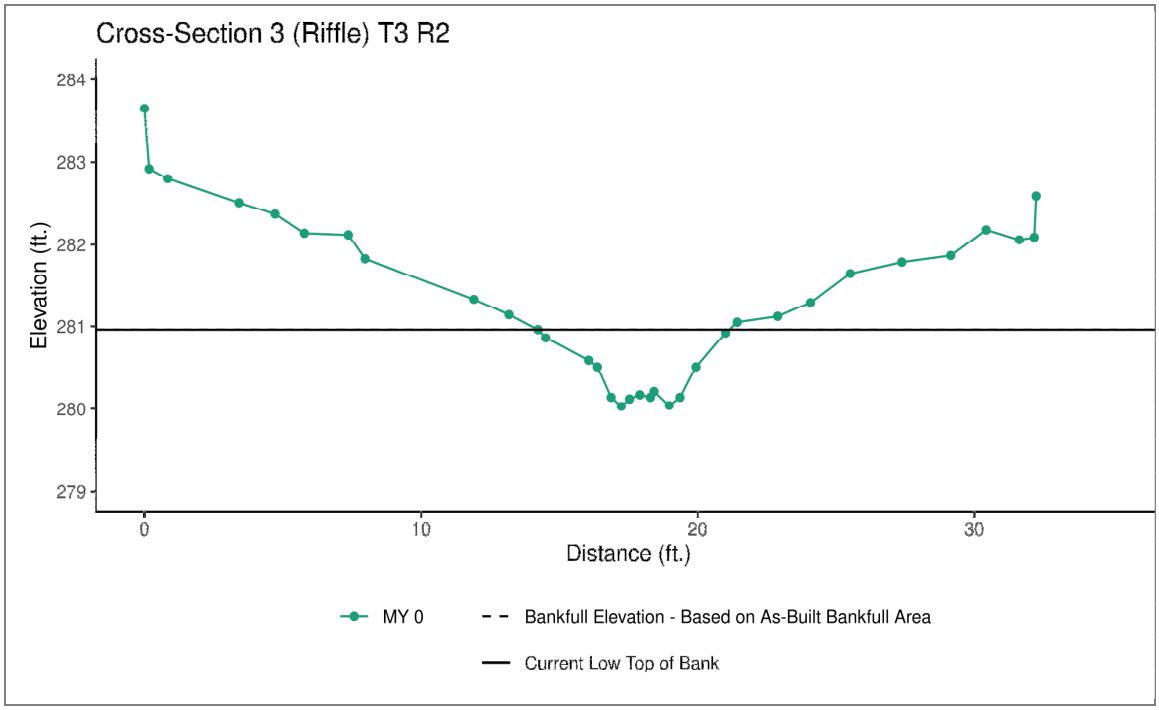
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	228.48					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	226.97					
LTOB Elevation	228.48					
LTOB Max Depth	1.51					
LTOB Cross-Sectional Area	10.14					

Downstream *(11/8/2022)*



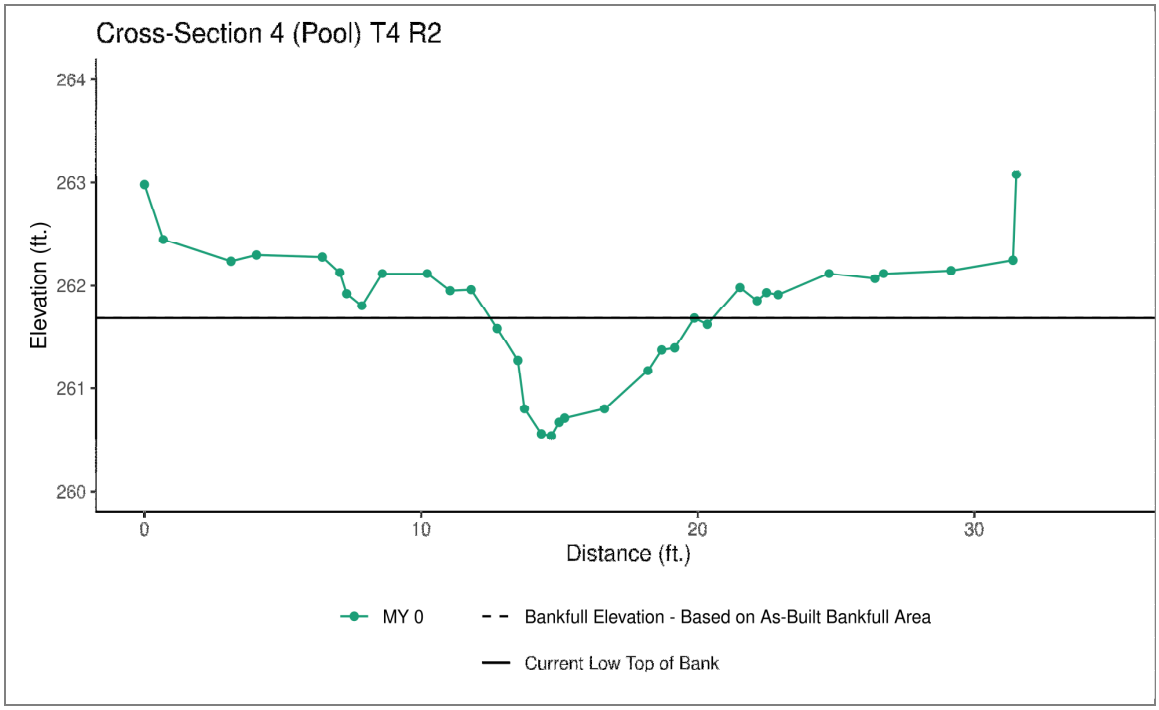
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	273.70					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	273.21					
LTOB Elevation	273.70					
LTOB Max Depth	0.49					
LTOB Cross-Sectional Area	1.71					

Downstream *(8/9/2022)*



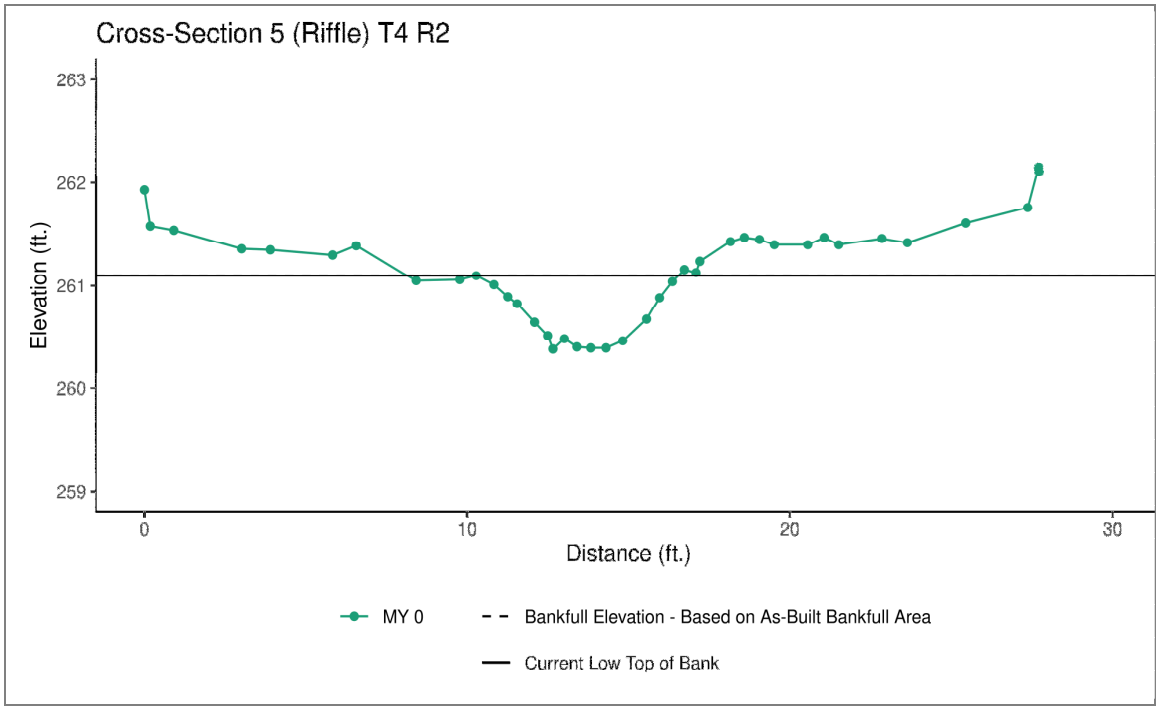
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	280.86					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	280.03					
LTOB Elevation	280.86					
LTOB Max Depth	0.83					
LTOB Cross-Sectional Area	2.89					

Downstream *(11/8/2022)*



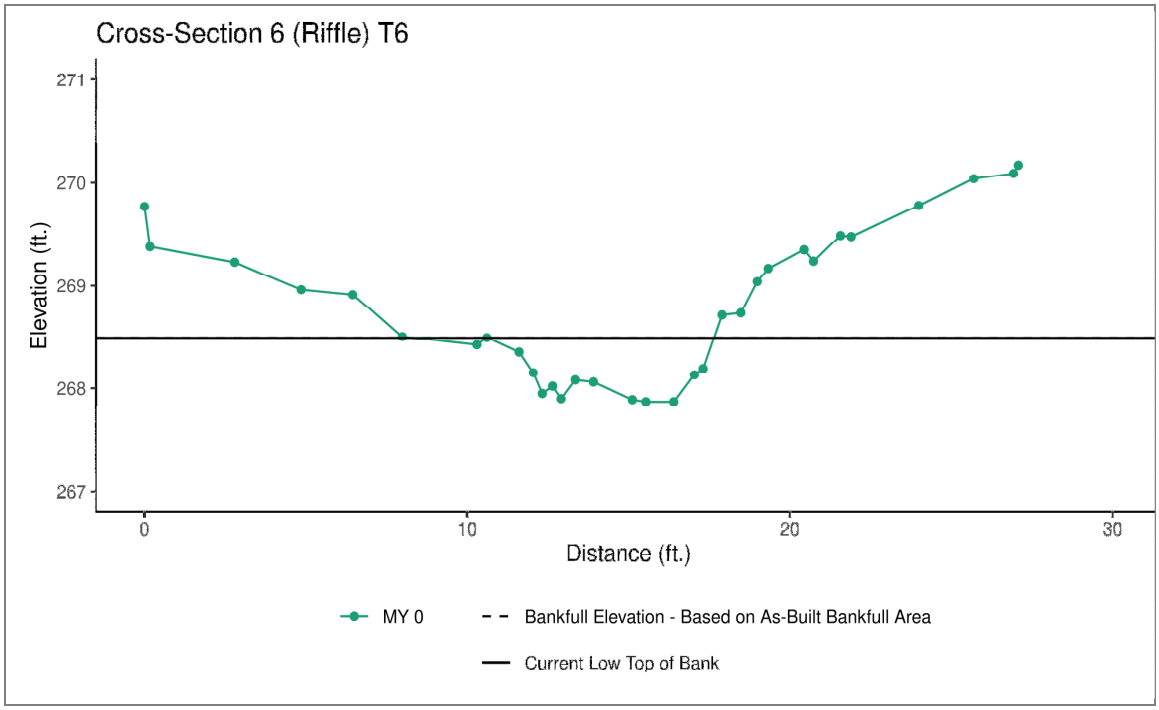
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	N/A					
Bank Height Ratio - Based on AB-Bankfull Area	N/A					
Thalweg Elevation	260.54					
LTOB Elevation	261.68					
LTOB Max Depth	1.14					
LTOB Cross-Sectional Area	4.75					

Downstream *(11/8/2022)*



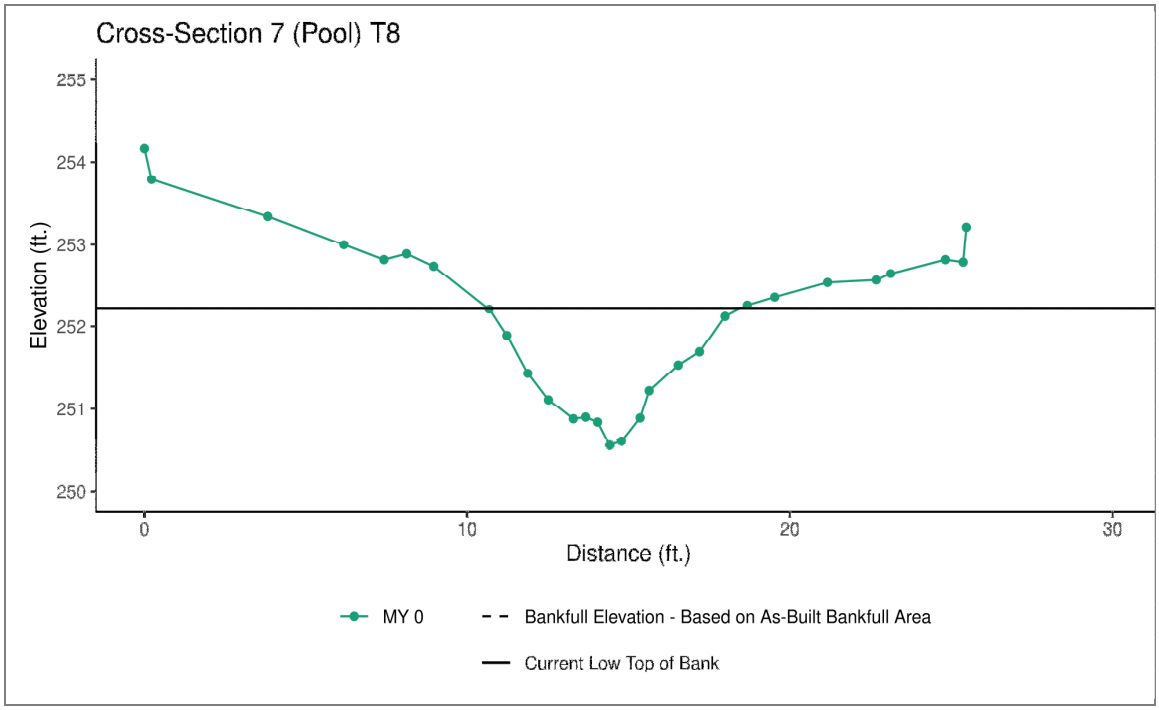
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	261.10					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	260.38					
LTOB Elevation	261.10					
LTOB Max Depth	0.72					
LTOB Cross-Sectional Area	2.75					

Downstream *(11/8/2022)*



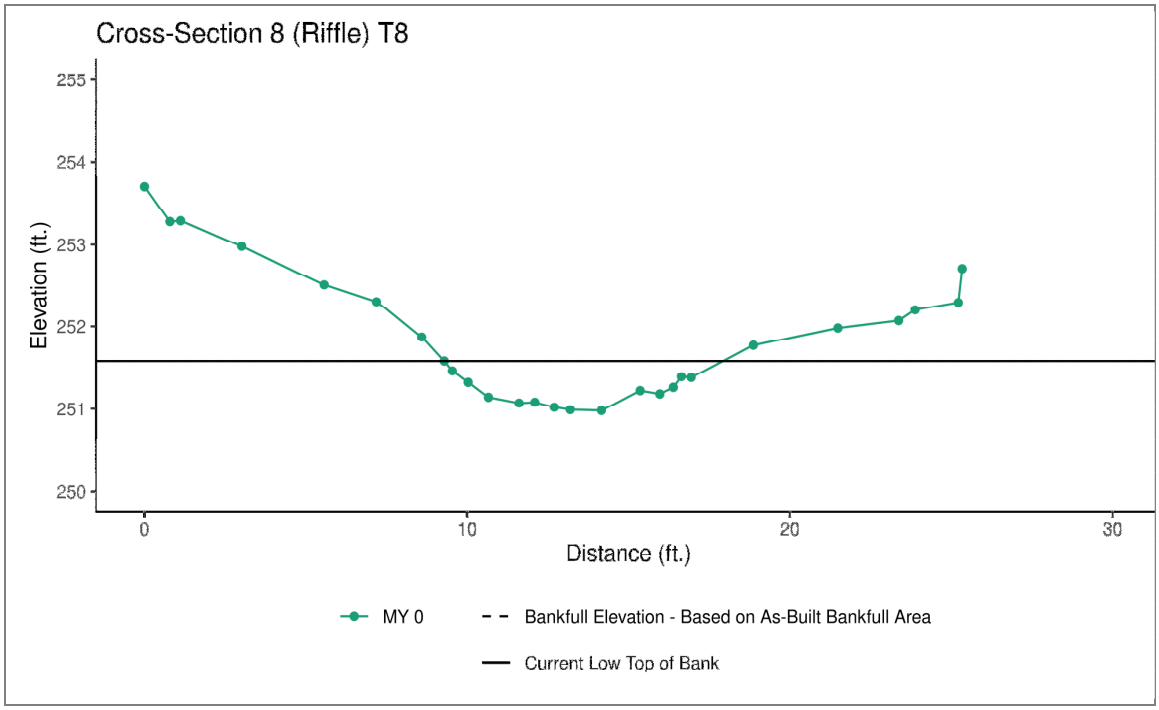
	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	268.49					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	267.87					
LTOB Elevation	268.49					
LTOB Max Depth	0.62					
LTOB Cross-Sectional Area	2.92					

Downstream *(8/9/2022)*



	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	250.56					
LTOB Elevation	252.21					
LTOB Max Depth	1.65					
LTOB Cross-Sectional Area	6.72					

Downstream *(11/8/2022)*



	MY0	MY1	MY2	MY3	MY5	MY7
Bankfull Elevation - Based on AB-Bankfull Area	251.58					
Bank Height Ratio - Based on AB-Bankfull Area	1.00					
Thalweg Elevation	250.98					
LTOB Elevation	251.58					
LTOB Max Depth	0.60					
LTOB Cross-Sectional Area	3.38					

Downstream *(11/8/2022)*

LONGITUDINAL PROFILE PLOTS

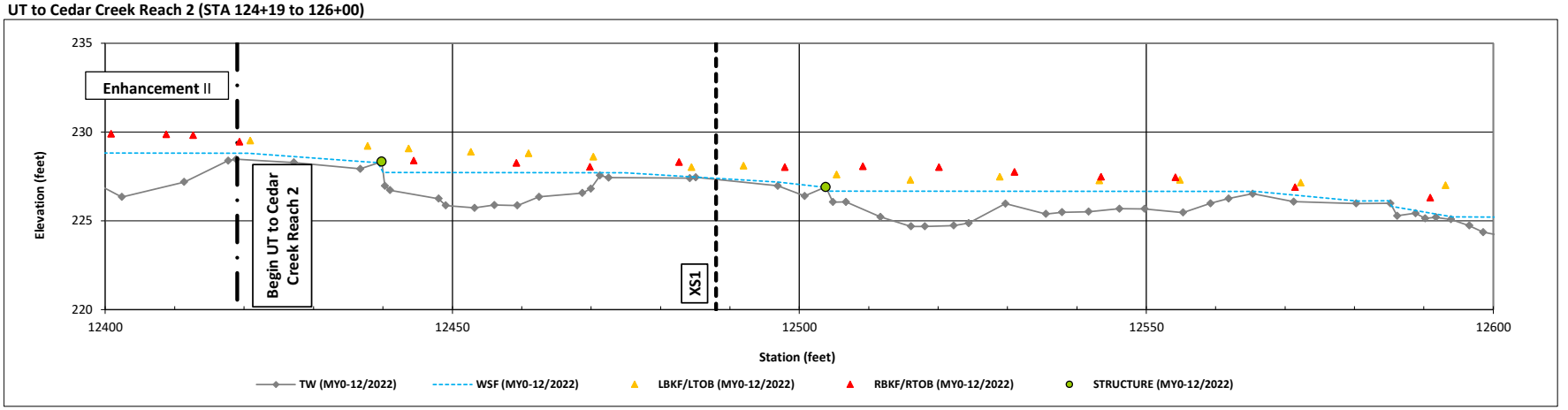
Longitudinal Profile Plots

Cool Springs Mitigation Site

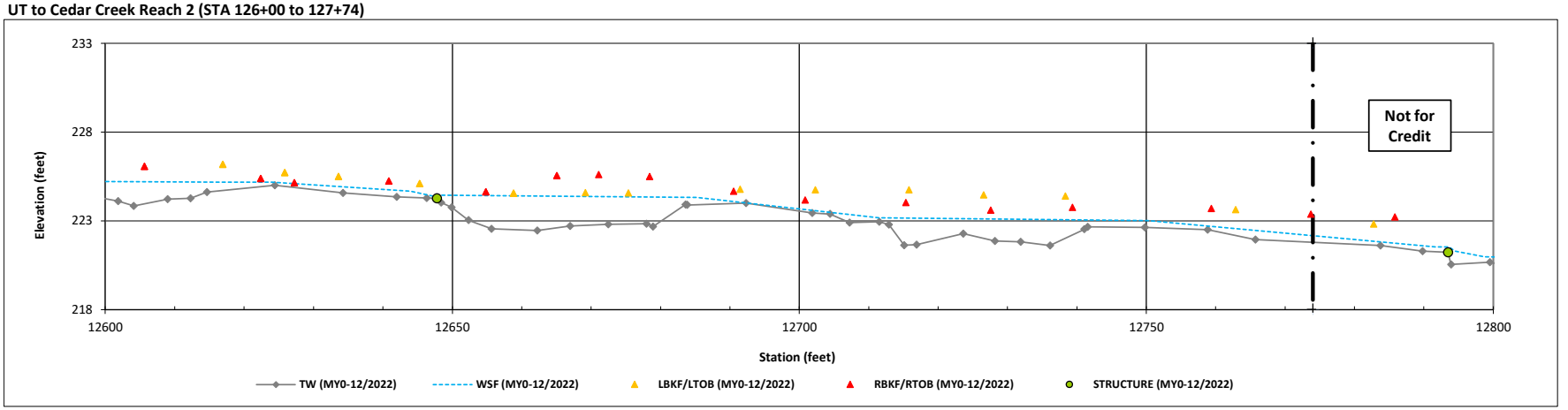
DMS Project No. 100166

Monitoring Year 0 - 2023

UT to Cedar Creek Reach 2 (STA 124+19 to 126+00)



UT to Cedar Creek Reach 2 (STA 126+00 to 127+74)



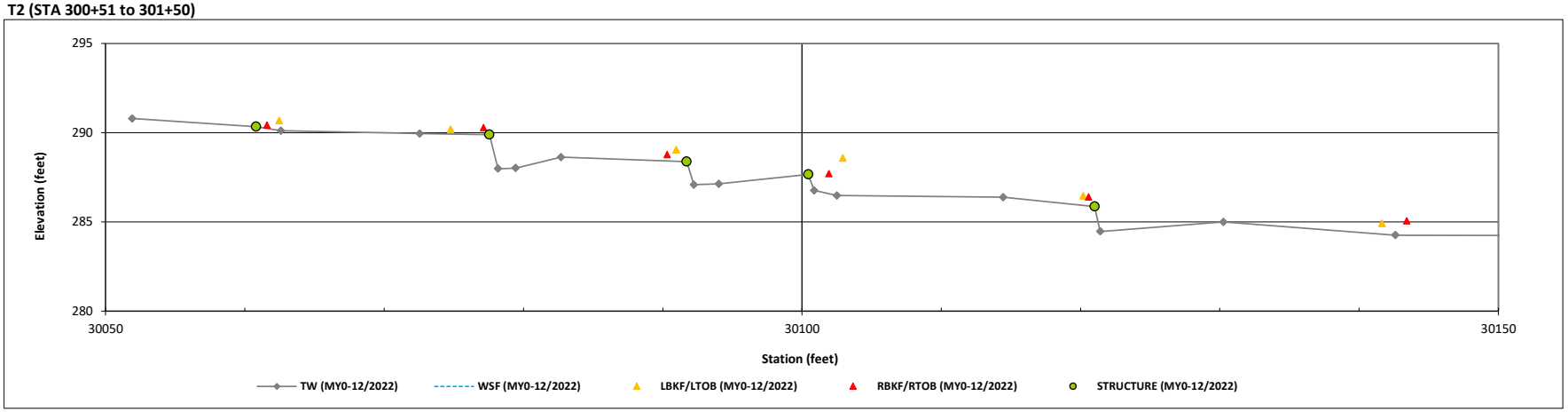
Longitudinal Profile Plots

Cool Springs Mitigation Site

DMS Project No. 100166

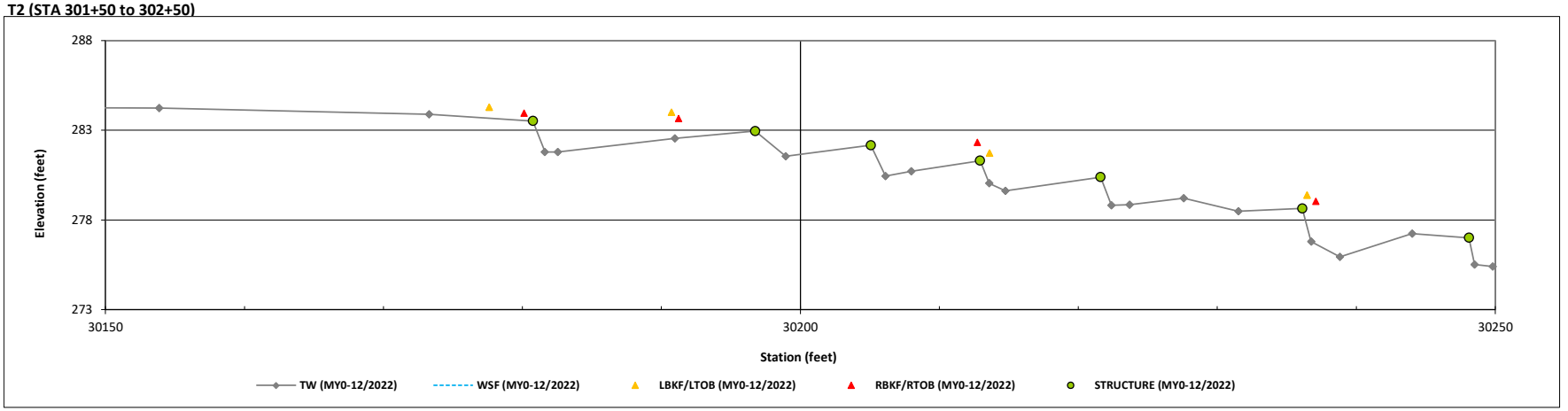
Monitoring Year 0 - 2023

T2 (STA 300+51 to 301+50)



*No water present in channel at the time of survey, water surface not shown.

T2 (STA 301+50 to 302+50)



*No water present in channel at the time of survey, water surface not shown.

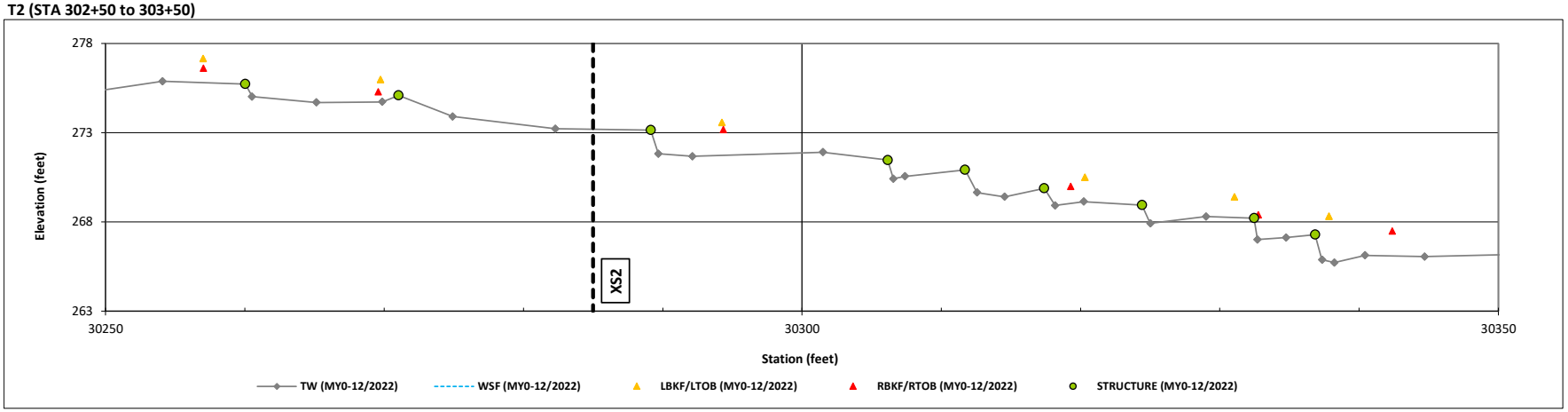
Longitudinal Profile Plots

Cool Springs Mitigation Site

DMS Project No. 100166

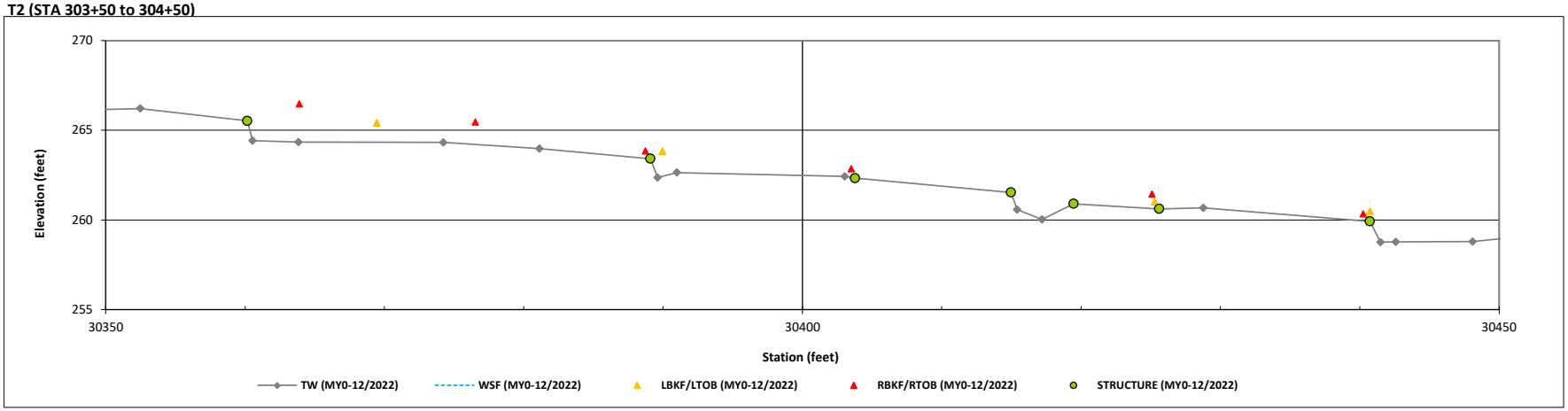
Monitoring Year 0 - 2023

T2 (STA 302+50 to 303+50)



*No water present in channel at the time of survey, water surface not shown.

T2 (STA 303+50 to 304+50)



*No water present in channel at the time of survey, water surface not shown.

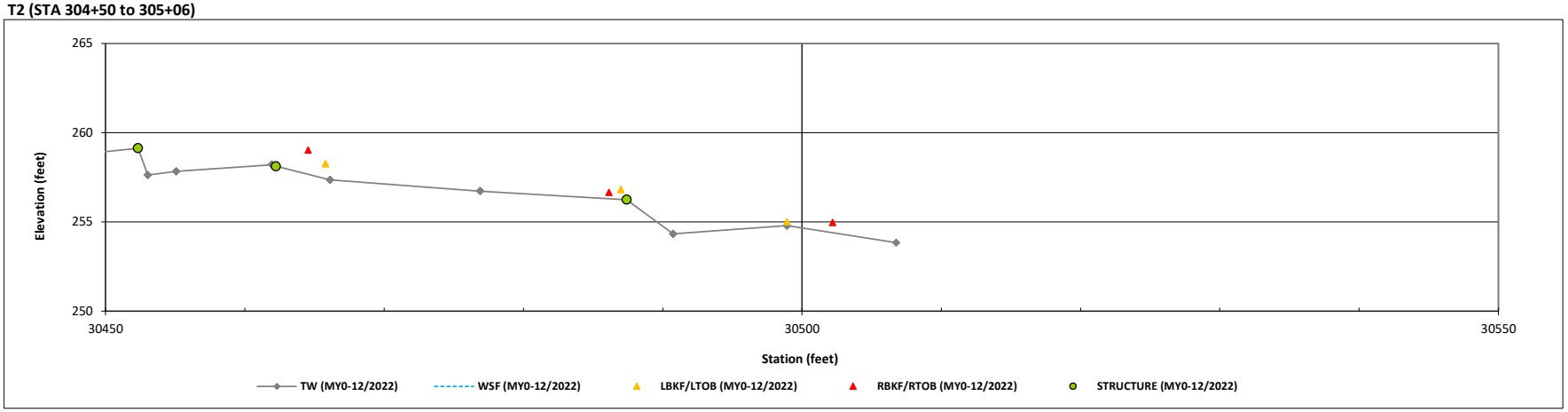
Longitudinal Profile Plots

Cool Springs Mitigation Site

DMS Project No. 100166

Monitoring Year 0 - 2023

T2 (STA 304+50 to 305+06)



*No water present in channel at the time of survey, water surface not shown.

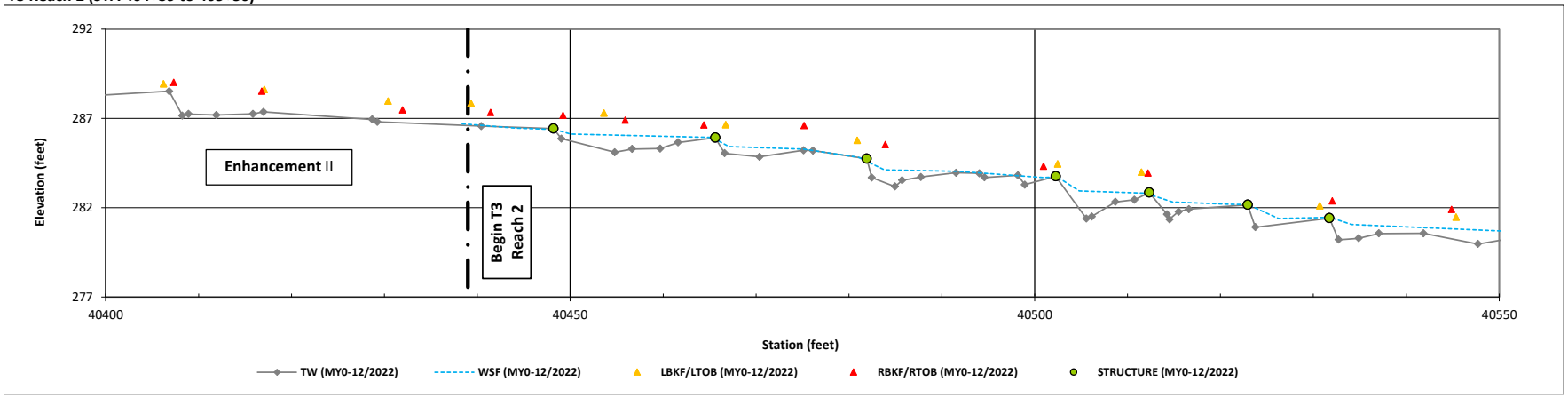
Longitudinal Profile Plots

Cool Springs Mitigation Site

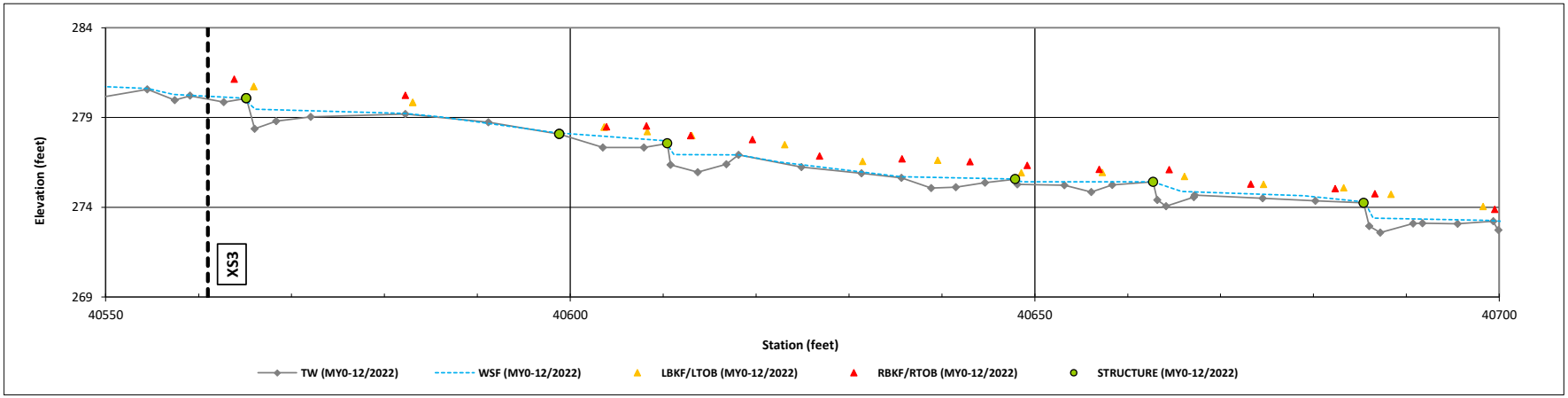
DMS Project No. 100166

Monitoring Year 0 - 2023

T3 Reach 2 (STA 404+39 to 405+50)

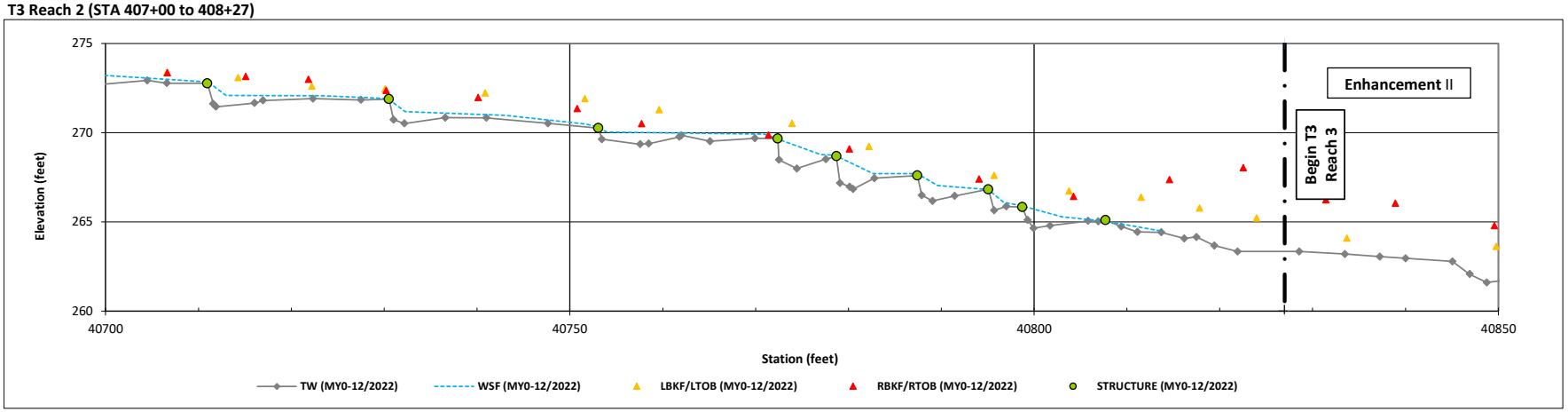


T3 Reach 2 (STA 405+50 to 407+00)



Longitudinal Profile Plots
Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

T3 Reach 2 (STA 407+00 to 408+27)



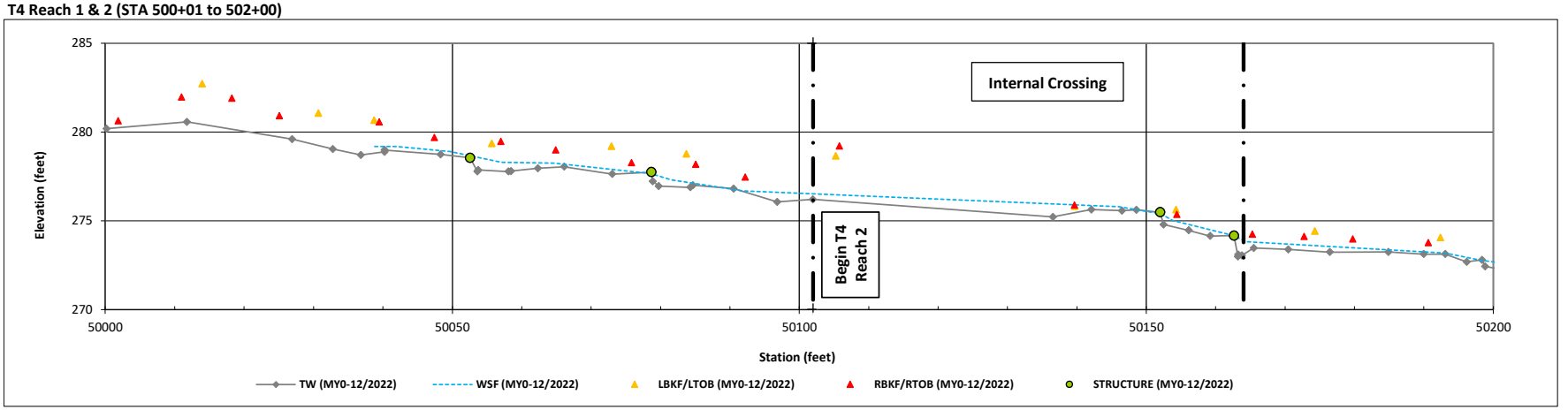
Longitudinal Profile Plots

Cool Springs Mitigation Site

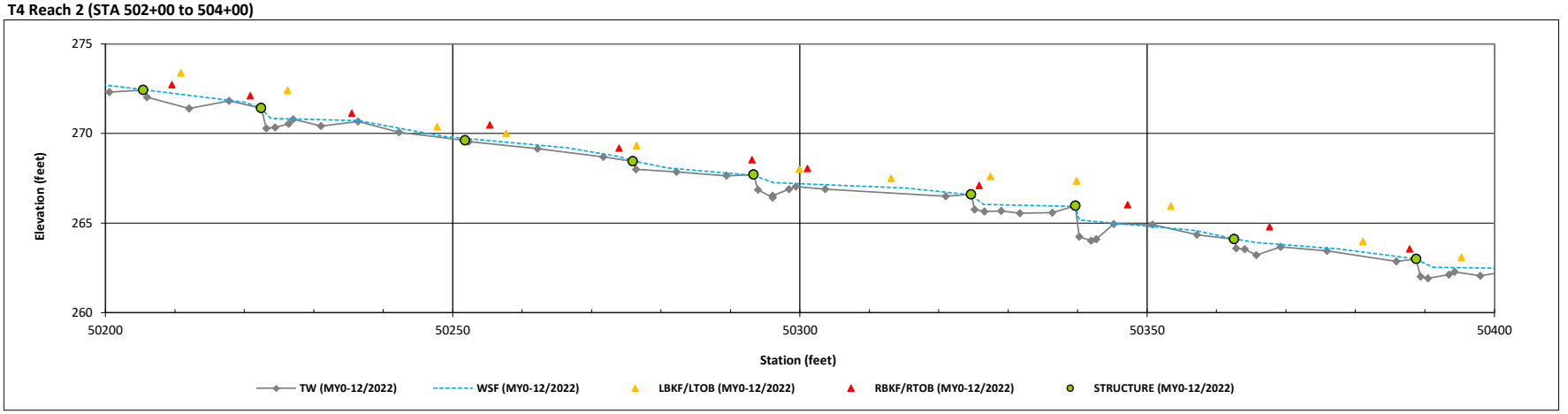
DMS Project No. 100166

Monitoring Year 0 - 2023

T4 Reach 1 & 2 (STA 500+01 to 502+00)



T4 Reach 2 (STA 502+00 to 504+00)



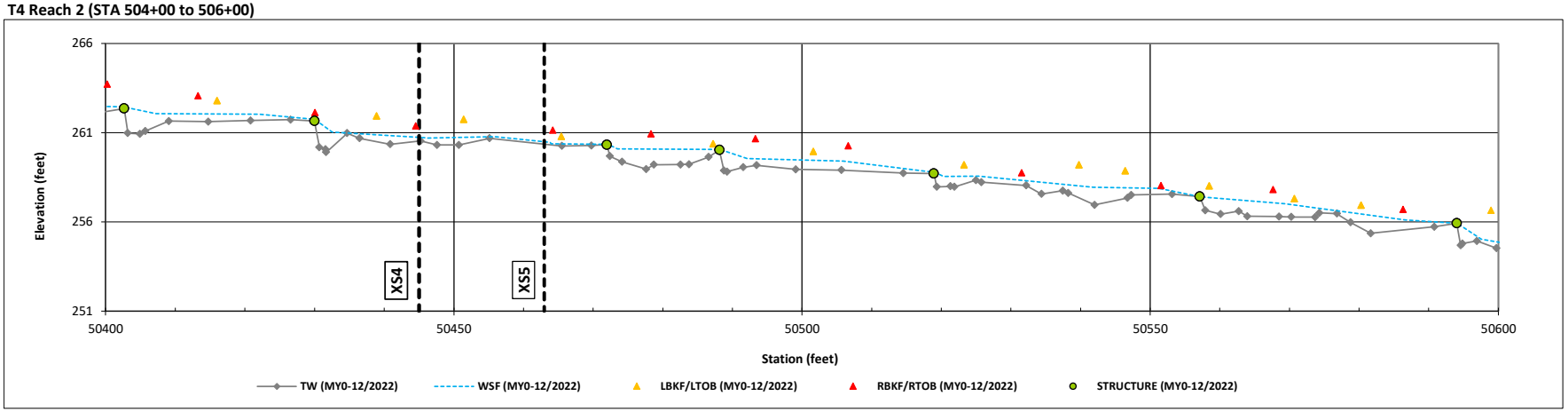
Longitudinal Profile Plots

Cool Springs Mitigation Site

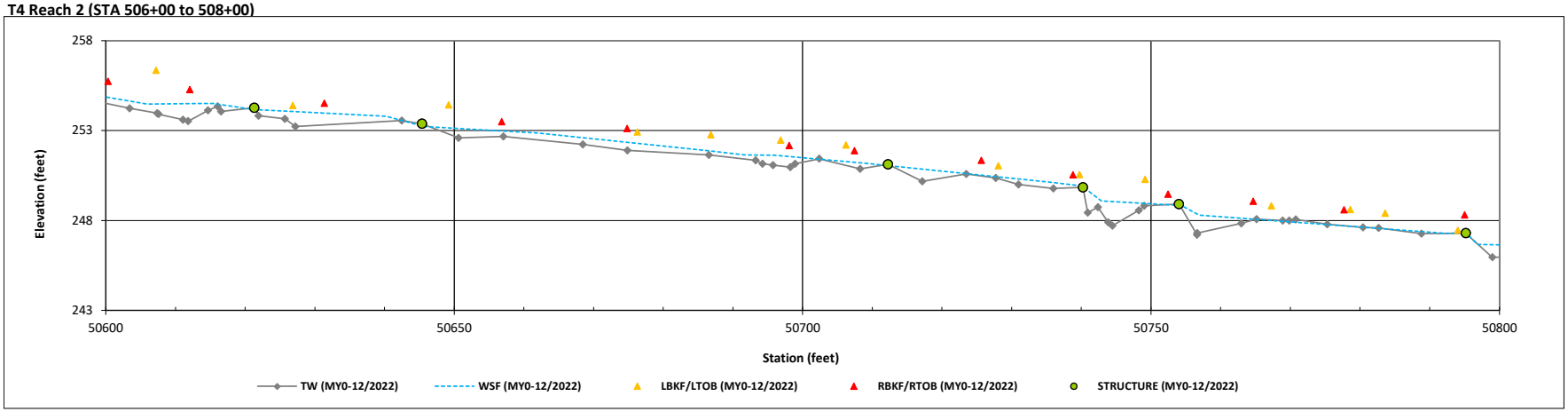
DMS Project No. 100166

Monitoring Year 0 - 2023

T4 Reach 2 (STA 504+00 to 506+00)



T4 Reach 2 (STA 506+00 to 508+00)



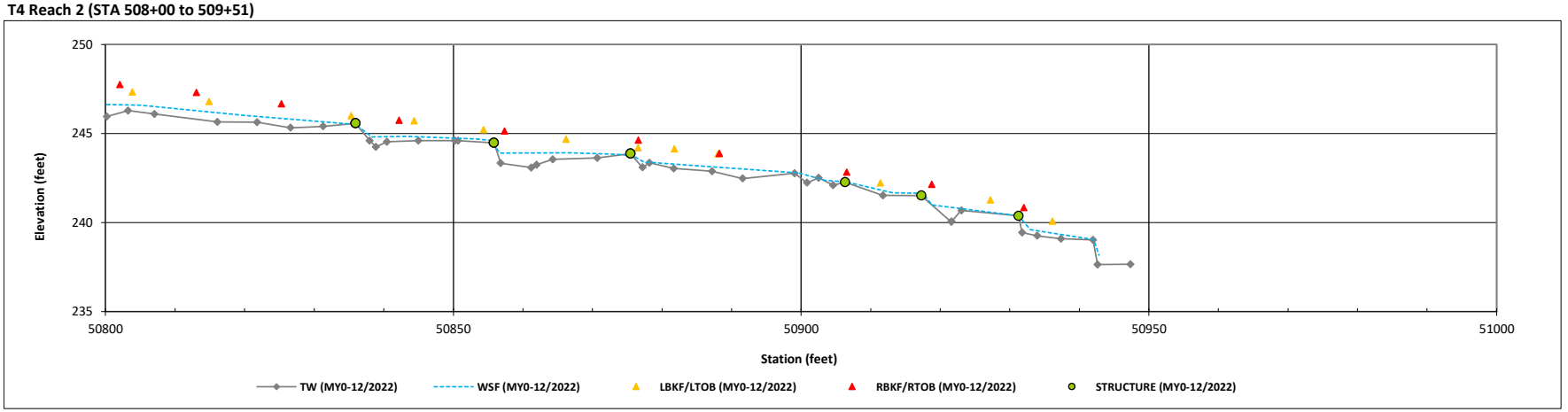
Longitudinal Profile Plots

Cool Springs Mitigation Site

DMS Project No. 100166

Monitoring Year 0 - 2023

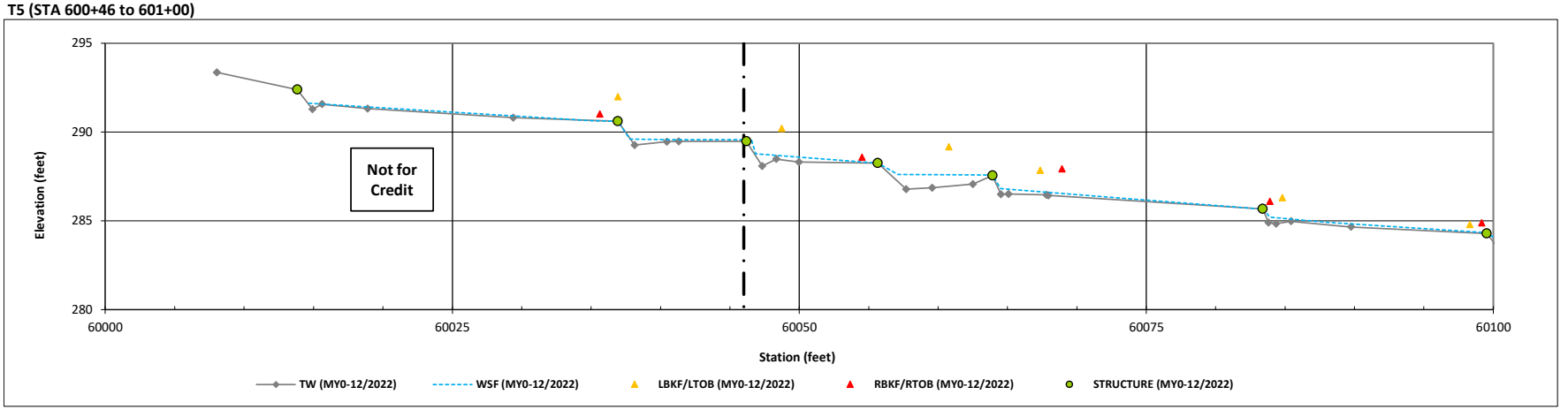
T4 Reach 2 (STA 508+00 to 509+51)



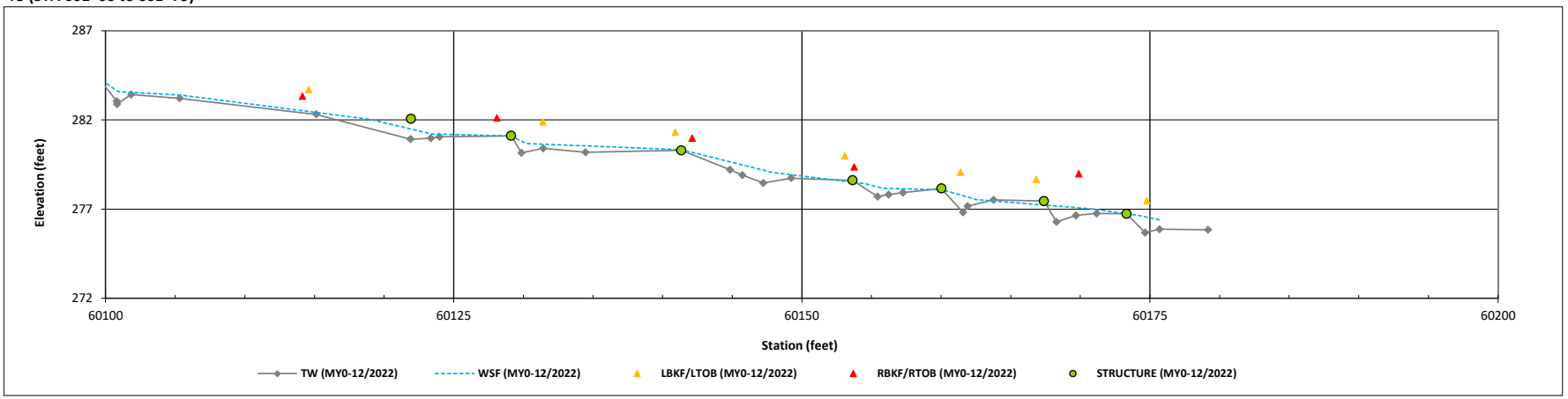
Longitudinal Profile Plots

Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

T5 (STA 600+46 to 601+00)



T5 (STA 601+00 to 601+79)



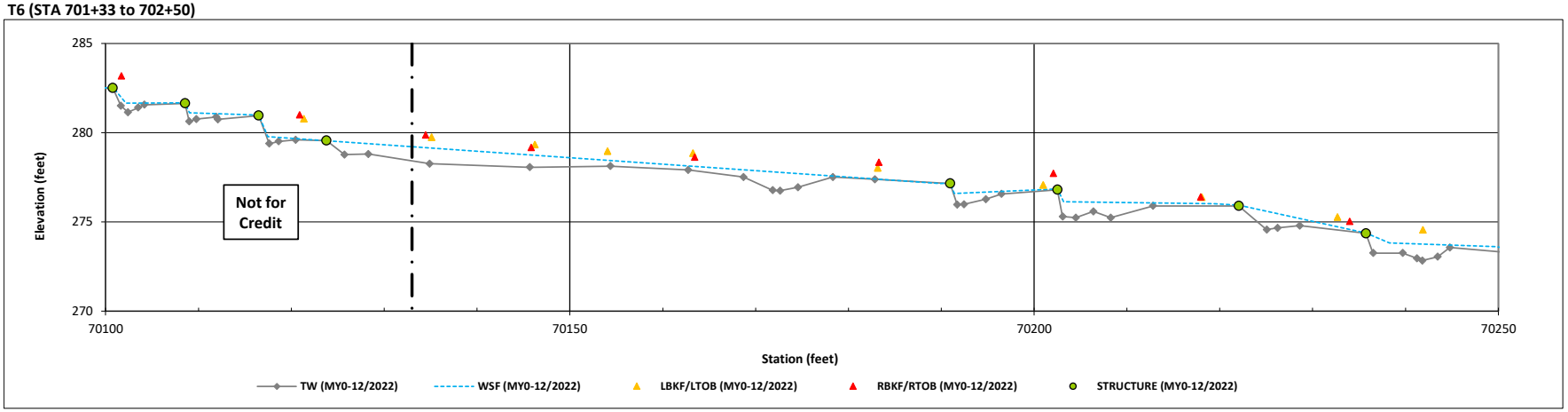
Longitudinal Profile Plots

Cool Springs Mitigation Site

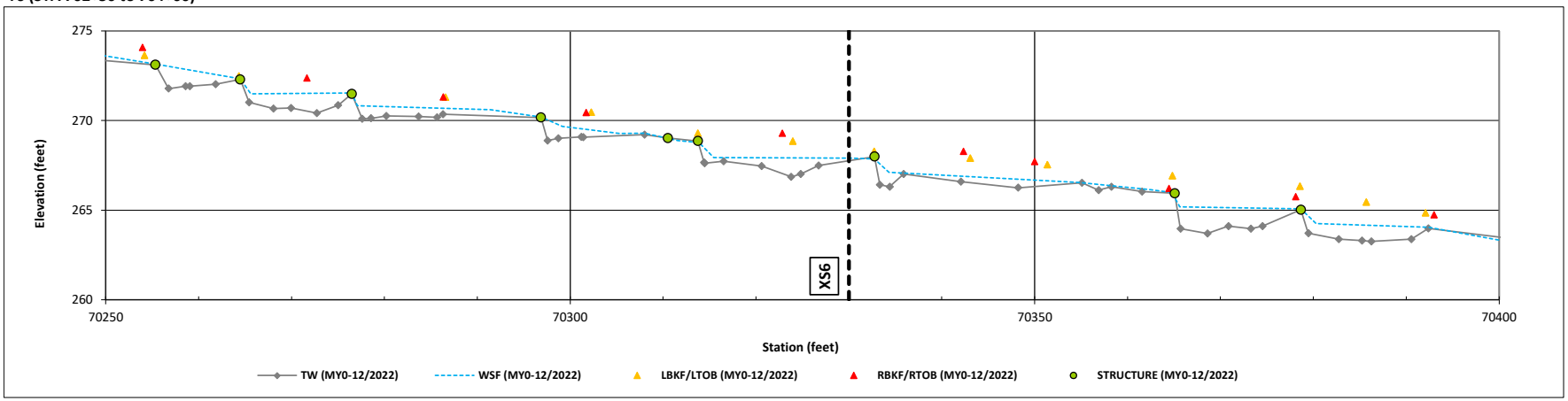
DMS Project No. 100166

Monitoring Year 0 - 2023

T6 (STA 701+33 to 702+50)



T6 (STA 702+50 to 704+00)



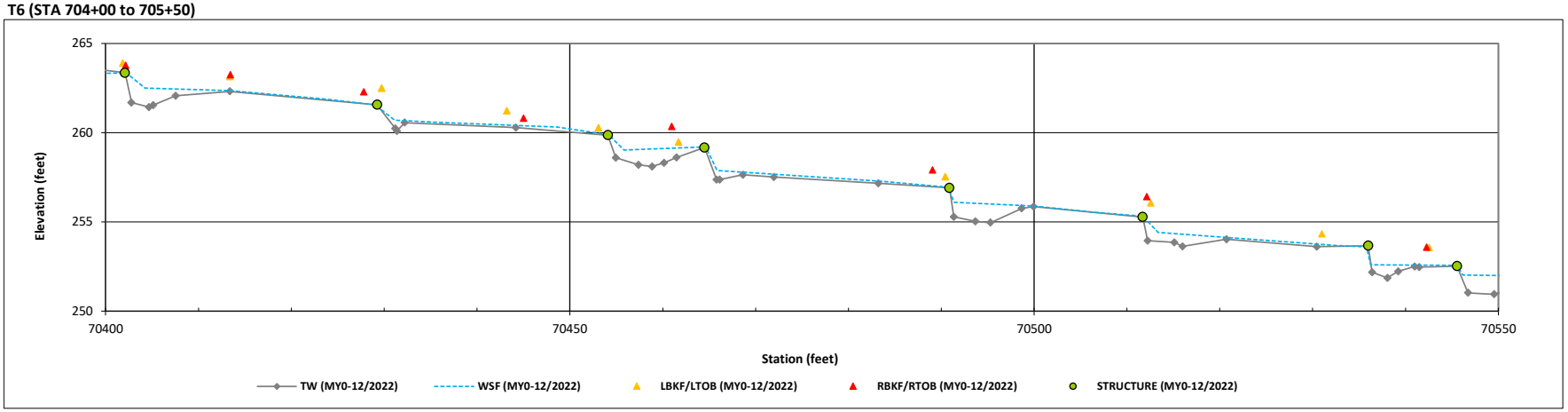
Longitudinal Profile Plots

Cool Springs Mitigation Site

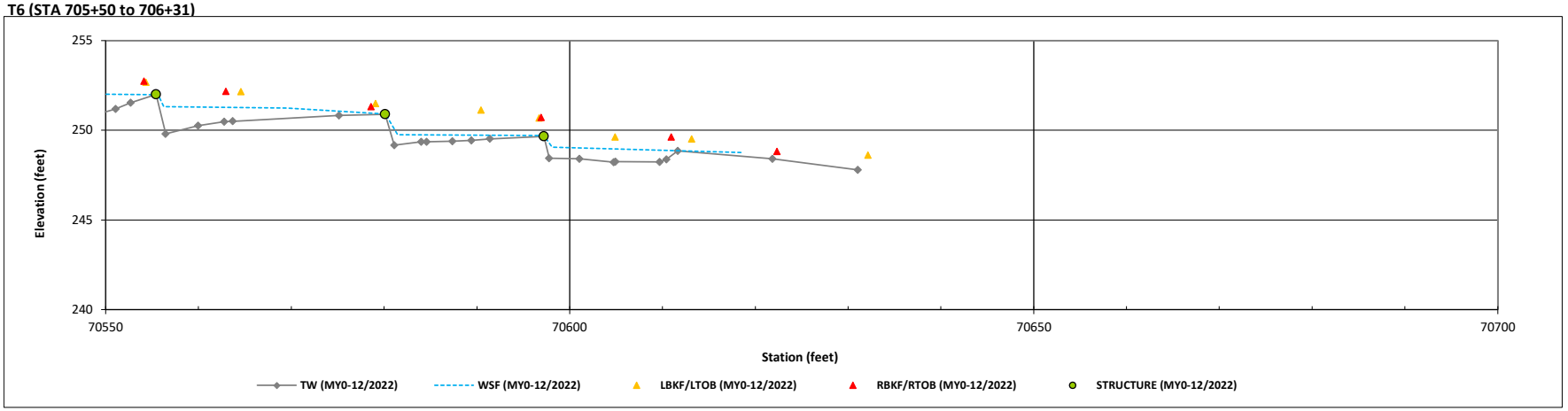
DMS Project No. 100166

Monitoring Year 0 - 2023

T6 (STA 704+00 to 705+50)



T6 (STA 705+50 to 706+31)



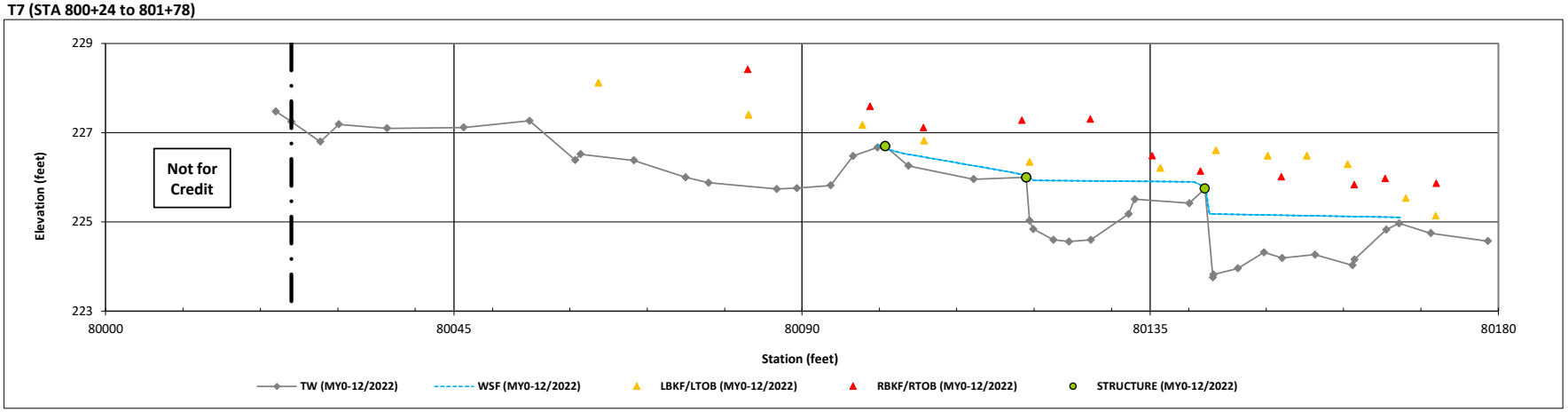
Longitudinal Profile Plots

Cool Springs Mitigation Site

DMS Project No. 100166

Monitoring Year 0 - 2023

T7 (STA 800+24 to 801+78)



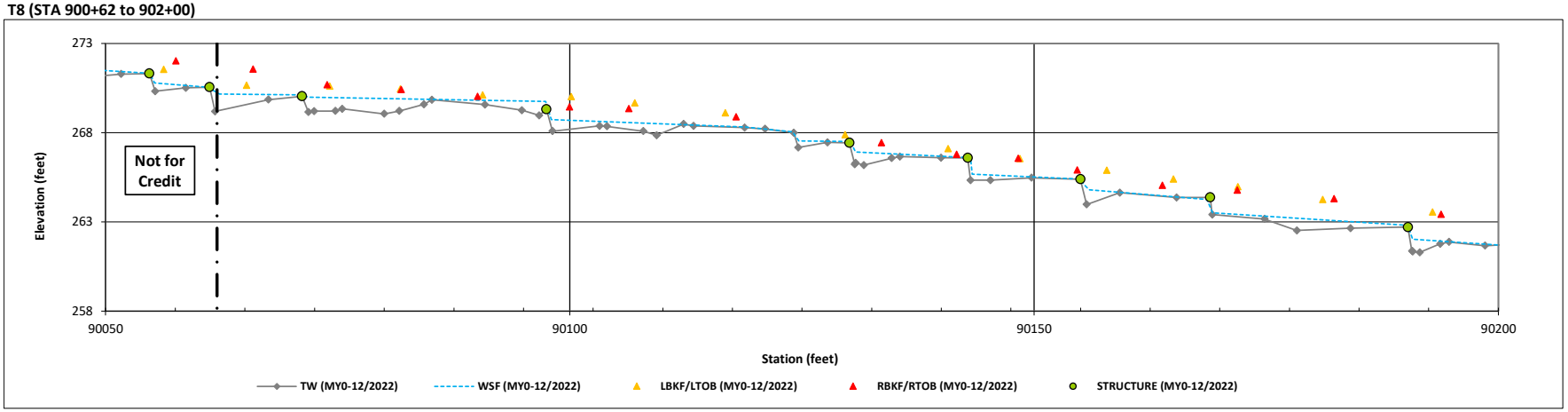
Longitudinal Profile Plots

Cool Springs Mitigation Site

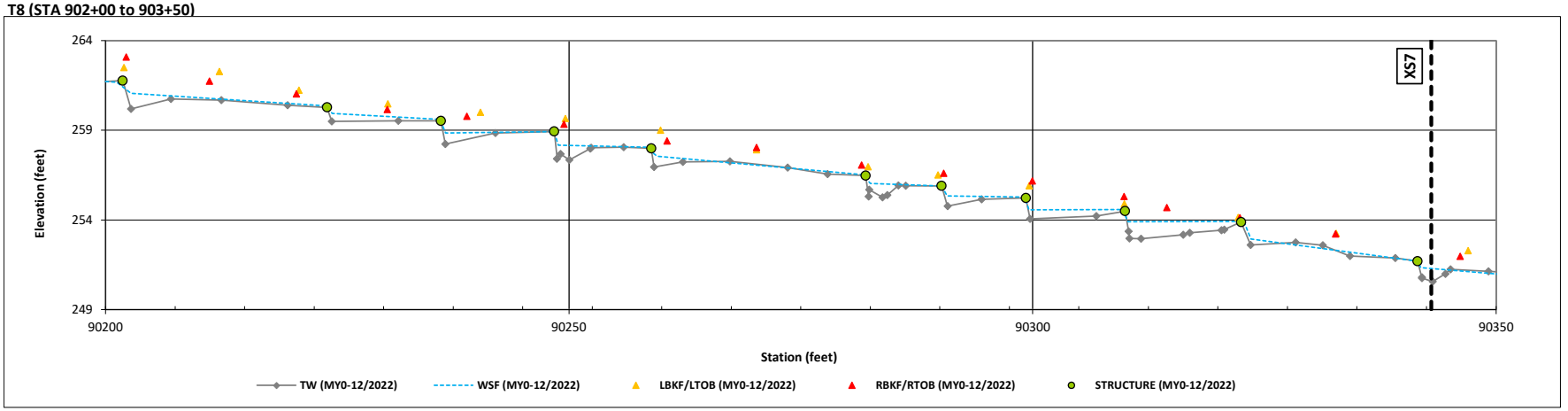
DMS Project No. 100166

Monitoring Year 0 - 2023

T8 (STA 900+62 to 902+00)



T8 (STA 902+00 to 903+50)



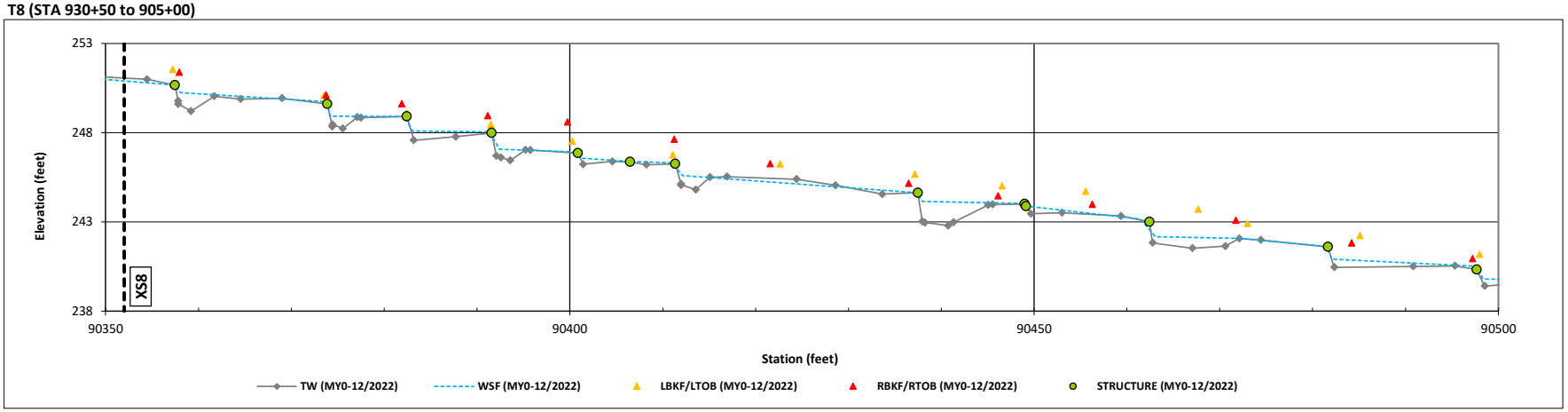
Longitudinal Profile Plots

Cool Springs Mitigation Site

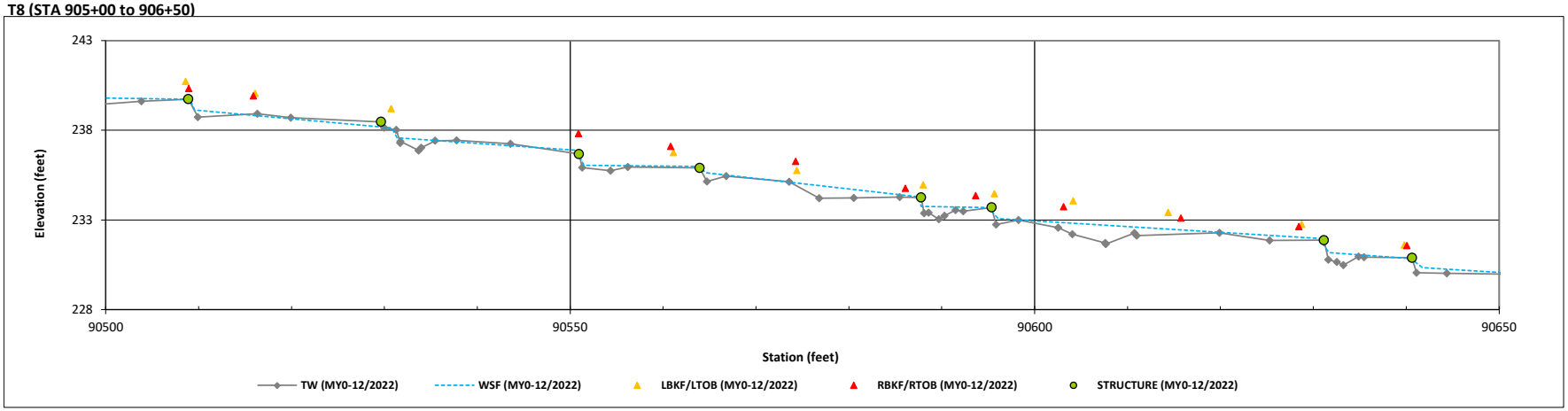
DMS Project No. 100166

Monitoring Year 0 - 2023

T8 (STA 930+50 to 905+00)



T8 (STA 905+00 to 906+50)



Longitudinal Profile Plots

Cool Springs Mitigation Site

DMS Project No. 100166

Monitoring Year 0 - 2023

T8 (STA 906+50 to 907+59)

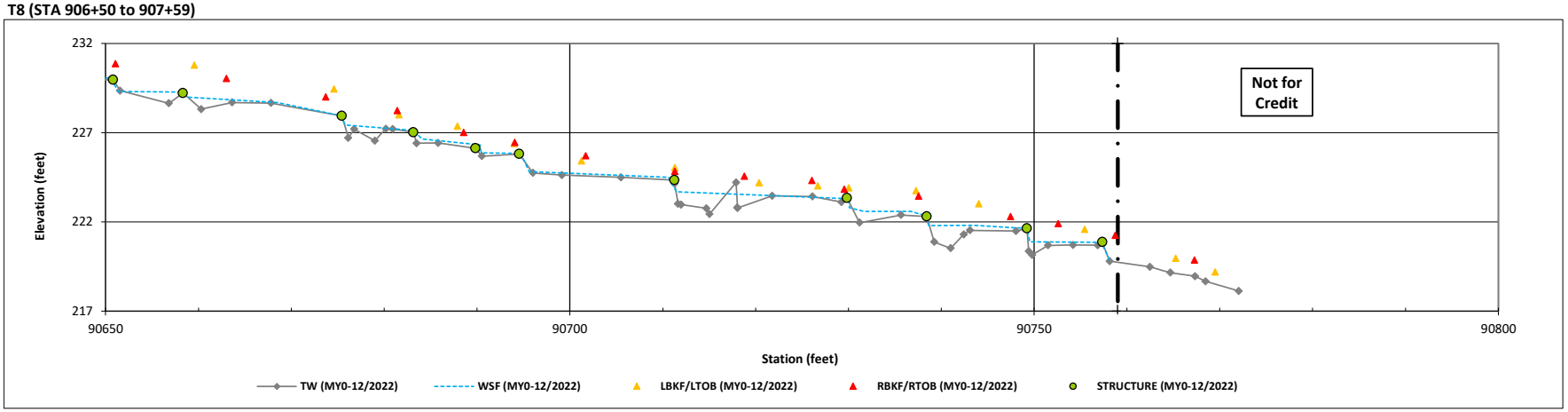


Table 8. Baseline Stream Data Summary
Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)		
Parameter	**UT to Cedar Creek**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	8.2		1	12.5		12.0		1
Floodprone Width (ft)	12.2		1	28.0	63.0	15.2		1
Bankfull Mean Depth (ft)	0.5		1	0.9		0.8		1
Bankfull Max Depth (ft)	0.8		1	1.0	1.3	1.5		1
Bankfull Cross Sectional Area (ft^2)	4.1		1	10.7		10.1		1
Width/Depth Ratio	16.4		1	15.0		14.2		1
Entrenchment Ratio	1.5		1	2.2	5.0	1.3		1
Bank Height Ratio	3.4		1	1.0		1.0		1
Max particle size (mm) mobilized at bankfull	49			58		52		
Rosgen Classification	B4			C4/B4c		C4/B4c		
Bankfull Discharge (cfs)	17.1		1	43.0		47.5		1
Sinuosity	1.03			1.20		1.20		
Water Surface Slope (ft/ft)	0.0340			0.0110		0.0210		
Other	---			---		---		
Parameter	**T2**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	2.9		1	5.4		6.8		1
Floodprone Width (ft)	4.2		1	8.0	12.0	10.3		1
Bankfull Mean Depth (ft)	0.3		1	0.4		0.2		1
Bankfull Max Depth (ft)	0.5		1	0.5	0.6	0.5		1
Bankfull Cross Sectional Area (ft^2)	0.9		1	2.2		1.7		1
Width/Depth Ratio	9.7		1	14.0		27.4		1
Entrenchment Ratio	1.4		1	2.2	5.0	1.5		1
Bank Height Ratio	12.6		1	1.0		1.0		1
Max particle size (mm) mobilized at bankfull	42			153		61		
Rosgen Classification	A4			A4/B4a		A4/B4a		
Bankfull Discharge (cfs)	3.1		1	9.4		7.1		1
Sinuosity	1.07			1.10		1.10		
Water Surface Slope (ft/ft)	0.0510			0.0768		0.0813		
Other	---			---		---		
Parameter	**T3 R2**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	2.6	4.6	2	6.3		6.3		1
Floodprone Width (ft)	3.6	5.1	2	9.0	14.0	6.3		1
Bankfull Mean Depth (ft)	0.8	0.4	2	0.5		0.5		1
Bankfull Max Depth (ft)	1.0	0.7	2	0.6	0.7	0.8		1
Bankfull Cross Sectional Area (ft^2)	2.2	1.7	2	2.9		2.9		1
Width/Depth Ratio	3.3	11.5	2	14.0		13.9		1
Entrenchment Ratio	1.4	1.1	2	2.2	5.0	1.0		1
Bank Height Ratio	2.6	4.1	2	1.0		1.0		1
Max particle size (mm) mobilized at bankfull	86	51	2	115		77		
Rosgen Classification	A4			B4/B4a		B4/B4a		
Bankfull Discharge (cfs)	12.5	6.8	2	13.0		14.9		1
Sinuosity	1.04			1.15		1.15		
Water Surface Slope (ft/ft)	0.0540			0.0522		0.0598		
Other	---			---		---		

Table 8. Baseline Stream Data Summary
Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

	PRE-EXISTING CONDITIONS			DESIGN		MONITORING BASELINE (MY0)		
Parameter	**T4 R2**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	4.8	7.1	2	7.0		6.3		1
Floodprone Width (ft)	6.0	8.0	2	10.0	15.0	27.4		1
Bankfull Mean Depth (ft)	0.6	0.4	2	0.5		0.4		1
Bankfull Max Depth (ft)	0.8	0.5	2	0.6	0.8	0.7		1
Bankfull Cross Sectional Area (ft^2)	2.7	2.8	2	3.7		2.7		1
Width/Depth Ratio	8.0	17.8	2	13.0		14.3		1
Entrenchment Ratio	1.3	1.1	2	2.2	5.0	4.4		1
Bank Height Ratio	4.8	5.8	2	1.0		1.0		1
Max particle size (mm) mobilized at bankfull	48	36	2	108		59		
Rosgen Classification	F4b			B4/B4a		B4/B4a		
Bankfull Discharge (cfs)	11.3	9.6	2	16.0		1.2		1
Sinuosity	1.23			1.10		1.10		
Water Surface Slope (ft/ft)	0.0310			0.0432		0.0456		
Other	---			---		---		
Parameter	**T6**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	1.3		1	5.8		7.0		1
Floodprone Width (ft)	1.7		1	8.0	13.0	9.4		1
Bankfull Mean Depth (ft)	0.6		1	0.4		0.4		1
Bankfull Max Depth (ft)	0.8		1	0.5	0.6	0.6		1
Bankfull Cross Sectional Area (ft^2)	0.8		1	2.4		2.9		1
Width/Depth Ratio	2.2		1	14.0		17.0		1
Entrenchment Ratio	1.3		1	2.2	5.0	1.3		1
Bank Height Ratio	4.8		1	1.0		1.0		1
Max particle size (mm) mobilized at bankfull	81			132		70		
Rosgen Classification	A4			A4/B4a		A4/B4a		
Bankfull Discharge (cfs)	4.0		1	10.0		14.1		1
Sinuosity	1.03			1.10		1.10		
Water Surface Slope (ft/ft)	0.0840			0.0650		0.0585		
Other	---			---		---		
Parameter	**T8**							
Riffle Only	**Min**	**Max**	**n**	**Min**	**Max**	**Min**	**Max**	**n**
Bankfull Width (ft)	5.1		1	6.0		8.6		1
Floodprone Width (ft)	91.8		1	8.0	13.0	16.2		1
Bankfull Mean Depth (ft)	0.3		1	0.4		0.4		1
Bankfull Max Depth (ft)	0.3		1	0.5	0.6	0.6		1
Bankfull Cross Sectional Area (ft^2)	1.3		1	2.5		3.4		1
Width/Depth Ratio	17.0		1	14.0		22.1		1
Entrenchment Ratio	18.0		1	1.4	2.2	1.9		1
Bank Height Ratio	7.7		1	1.0		1.0		1
Max particle size (mm) mobilized at bankfull	39			146		85		
Rosgen Classification	A4/B4a			A4/B4a		A4/B4a		
Bankfull Discharge (cfs)	4.3		1	11.0		17.9		1
Sinuosity	1.04			1.10		1.10		
Water Surface Slope (ft/ft)	0.0530			0.0680		0.0719		
Other	---			---		---		

Table 9. Cross-Section Morphology Monitoring Summary

Cool Springs Mitigation Site

DMS Project No. 100166

Monitoring Year 0 - 2023

	UT to Cedar Creek R2						T2						T3 R2					
	Cross-Section 1 (Riffle)						Cross-Section 2 (Riffle)						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	228.48						273.70						280.86					
Bank Height Ratio - Based on AB Bankfull[1] Area	1.00						1.00						1.00					
Thalweg Elevation	226.97						273.21						280.03					
LTOB[2] Elevation	228.48						273.70						280.86					
LTOB[2] Max Depth (ft)	1.51						0.49						0.83					
LTOB[2] Cross Sectional Area (ft^2)	10.14						1.71						2.89					
	T4 R2												T6					
	Cross-Section 4 (Pool)						Cross-Section 5 (Riffle)						Cross-Section 6 (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	N/A						261.10						268.49					
Bank Height Ratio - Based on AB Bankfull[1] Area	N/A						1.00						1.00					
Thalweg Elevation	260.54						260.38						267.87					
LTOB[2] Elevation	261.68						261.10						268.49					
LTOB[2] Max Depth (ft)	1.14						0.72						0.62					
LTOB[2] Cross Sectional Area (ft^2)	4.75						2.75						2.92					
	T8																	
	Cross-Section 7 (Pool)						Cross-Section 8 (Riffle)											
	MY0	MY1	MY2	MY3	MY5	MY7	MY0	MY1	MY2	MY3	MY5	MY7						
Bankfull Elevation (ft) - Based on AB-Bankfull[1] Area	N/A						251.58											
Bank Height Ratio - Based on AB Bankfull[1] Area	N/A						1.00											
Thalweg Elevation	250.56						250.98											
LTOB[2] Elevation	252.21						251.58											
LTOB[2] Max Depth (ft)	1.65						0.60											
LTOB[2] Cross Sectional Area (ft^2)	6.72						3.38											

[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.

APPENDIX D. PROJECT TIMELINE AND CONTACT INFORMATION

Table 10. Project Activity and Reporting History

Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

Activity or Deliverable		Data Collection Complete	Task Completion or Deliverable Submission
Project Instituted		NA	July 2020
Mitigation Plan Approved		NA	January 2022
Construction (Grading) Completed		NA	August 2022
Planting Completed		NA	January 2023
As-Built Survey Completed		December 2022	December 2022
Baseline Monitoring Document (Year 0)	Stream Survey	December 2022	May 2023
	Vegetation Survey	January 2023	
	Prescribed Fire Encroachment	May 2023	
Year 1 Monitoring	Stream Survey	2023	December 2023
	Vegetation Survey	2023	
Year 2 Monitoring	Stream Survey	2024	December 2024
	Vegetation Survey	2024	
Year 3 Monitoring	Stream Survey	2025	December 2025
	Vegetation Survey	2025	
Year 4 Monitoring			December 2026
Year 5 Monitoring	Stream Survey	2027	December 2027
	Vegetation Survey	2027	
Year 6 Monitoring			December 2028
Year 7 Monitoring	Stream Survey	2029	December 2029
	Vegetation Survey	2029	

Table 11. Project Contact Table

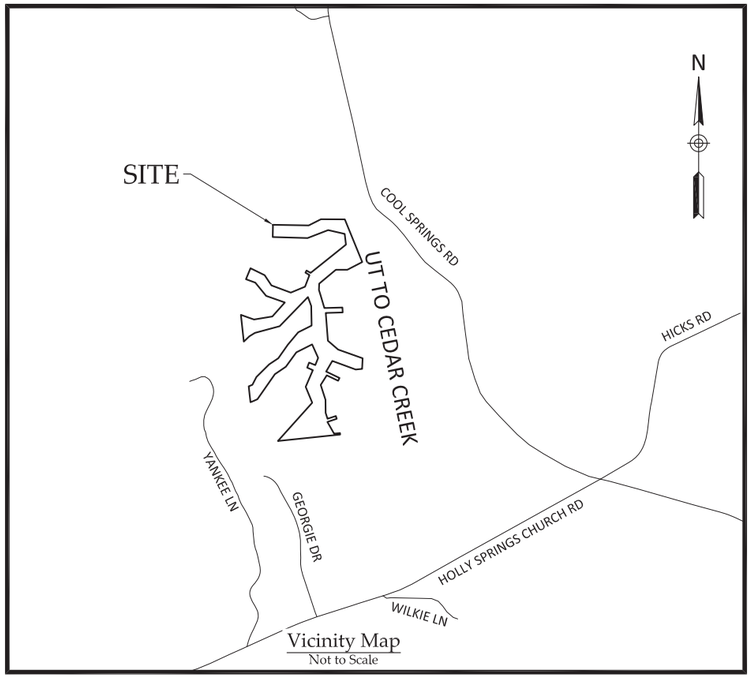
Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

Designer Nicole Millns, 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
Monitoring Performers Monitoring, POC	**Wildlands Engineering, Inc.** Jason Lorch 919.851.9986

APPENDIX E. RECORD DRAWINGS

June 5, 2023

Cool Springs Mitigation Site
Cape Fear River Basin 03030004
Harnett County, North Carolina
for
NCDEQ Division of Mitigation Services



Vicinity Map
Not to Scale

I, JOHN A. RUDOLPH, CERTIFY THAT THE SURVEY TO COLLECT AS-BUILT DATA WAS COMPLETED UNDER MY DIRECT AND RESPONSIBLE CHARGE FROM AN ACTUAL SURVEY MADE UNDER MY SUPERVISION; THAT THE TOPOGRAPHIC SURVEY WAS PERFORMED AT THE 95 PERCENT CONFIDENCE LEVEL TO MEET FEDERAL GEOGRAPHIC DATA COMMITTEE STANDARDS; THAT THIS SURVEY WAS PERFORMED TO MEET THE REQUIREMENTS FOR A TOPOGRAPHIC SURVEY TO THE HORIZONTAL ACCURACY OF CLASS A AND THE VERTICAL ACCURACY WHEN APPLICABLE TO CLASS C STANDARD, AND THAT THE ORIGINAL DATA WAS OBTAINED IN 11-18-2020; THAT THE SURVEY WAS COMPLETED ON 2-13-2023; AND ALL COORDINATES ARE BASED ON NAD83 (2011) AND ALL ELEVATIONS ARE BASED ON NAVD88. WITNESS MY ORIGINAL SIGNATURE, LICENSE NUMBER, AND SEAL
THIS 5th DAY OF JUNE, 2023.

JOHN A RUDOLPH
Digitally signed by JOHN A RUDOLPH
Date: 2023.06.06 07:44:31 -04'00'
JOHN A. RUDOLPH, P.L.S. #L-4194

NORTH CAROLINA PROFESSIONAL SEAL L-4194 LAND SURVEYOR JOHN ASHLEY RUDOLPH

I, JOHN A. RUDOLPH, AS A DULY REGISTERED PROFESSIONAL LAND SURVEYOR IN THE STATE OF NORTH CAROLINA, HEREBY CERTIFY THAT THE DATA SHOWN ON THIS DRAWING, WAS OBTAINED UNDER MY SUPERVISION, IS AN ACCURATE AND COMPLETE REPRESENTATION OF WHAT WAS CONSTRUCTED IN THE FIELD, AND THAT THE PHYSICAL DIMENSIONS OR ELEVATIONS SHOWN THUS ARE AS-BUILT CONDITIONS EXCEPT WHERE OTHERWISE NOTED HEREON. WITNESS MY ORIGINAL SIGNATURE, REGISTRATION NUMBER, AND SEAL THIS 5th DAY OF JUNE, 2023.

JOHN A RUDOLPH
Digitally signed by JOHN A RUDOLPH
Date: 2023.06.06 07:45:00 -04'00'
JOHN A. RUDOLPH, P.L.S. #L-4194

NORTH CAROLINA PROFESSIONAL SEAL L-4194 LAND SURVEYOR JOHN ASHLEY RUDOLPH

AS-BUILT AND RECORD DRAWINGS ISSUED JUNE 5, 2023

Stream Origins

Stream	Latitude	Longitude
UT TO CEDAR CREEK	N35° 26' 56.11"	W78° 58' 16.54"
T1	N35° 26' 55.68"	W78° 58' 21.54"
T2	N35° 27' 03.65"	W78° 58' 12.52"
T3	N35° 27' 00.18"	W78° 58' 26.37"
T4	N35° 27' 08.11"	W78° 58' 27.43"
T5	N35° 27' 06.45"	W78° 58' 27.17"
T6	N35° 27' 12.53"	W78° 58' 25.11"
T7	N35° 27' 14.67"	W78° 58' 12.22"
T8	N35° 27' 17.39"	W78° 58' 21.75"
BMP1	N35° 26' 56.27"	W78° 58' 14.84"
BMP2	N35° 26' 57.88"	W78° 58' 15.79"
BMP3	N35° 27' 02.05"	W78° 58' 15.03"
BMP4	N35° 27' 03.66"	W78° 58' 12.01"
BMP5	N35° 27' 09.11"	W78° 58' 14.58"

Sheet Index

Project Directory

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

Surveying:
K2 Design Group
774 S Beston Road
La Grange, NC 28551
252-582-3097
www.k2designgroup.com
John A. Rudolph, PLS

Owner:
NCDEQ DMS
1652 Mail Services Center
Raleigh, NC 27699-1652
Attention: Jeremiah Dow
919-791-4248

NCDEQ Contract No. 0302-02
DMS ID No. 100166
USACE Action ID No.
SAW-2020-01400
RFP #: 16-20190302

WILDLANDS ENGINEERING
312 W. Millbrook Rd, Suite 225
Raleigh, NC 27609
Tel: 919-851-9986
License No. F-0831

NORTH CAROLINA PROFESSIONAL SEAL 030107 ENGINEER JEFFERSON C. KEATON 6-24-23

Cool Springs Mitigation Site
Harnett County, North Carolina

Title Sheet

Revisions:
REV 1: ADDRESSING DMS COMMENTS

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 0.1

X:\Shared\Projects\WI02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-Cover.dwg

June 5, 2023

Existing Features

- EXISTING TOP OF BANK (TB)
- EXISTING FENCE (X)
- EXISTING STORM PIPE
- EXISTING RIGHT-OF-WAY (R/W)
- EXISTING PROPERTY LINE
- EXISTING CONSERVATION EASEMENT (CE)
- EXISTING CONSERVATION EASEMENT INTERNAL CROSSING (CE-IX)
- EXISTING BEDROCK
- EXISTING SPRING
- EXISTING OAK TREE
- EXISTING PINE TREE
- EXISTING GUM TREE
- EXISTING HICKORY TREE
- EXISTING POPLAR/MAPLE/BIRCH/ASH TREE

Designed Features

- DESIGNED ALIGNMENT NOT FOR CREDIT (100+00)
- DESIGNED ALIGNMENT PRESERVATION REACH (100+00)
- DESIGNED ALIGNMENT ENHANCEMENT I REACH (100+00)
- DESIGNED ALIGNMENT ENHANCEMENT II REACH (100+00)
- DESIGNED ALIGNMENT RESTORATION REACH (100+00)
- DESIGNED BMP ALIGNMENT (100+00)
- DESIGNED BANKFULL
- DESIGNED MAJOR CONTOUR (100)
- DESIGNED MINOR CONTOUR
- DESIGNED BOULDER SILL
- DESIGNED CURVED BOULDER SILL
- DESIGNED ANGLED LOG SILL
- DESIGNED LOG J-HOOK
- DESIGNED BOULDER SILL WITH BOULDER TOE PROTECTION
- DESIGNED PERMANENT CULVERT CROSSING
- DESIGNED DROP INLET
- DESIGNED WETLAND RE-ESTABLISHMENT
- DESIGNED WETLAND REHABILITATION
- DESIGNED STEP-POOL STORMWATER CONVEYANCE
- DESIGNED RIFFLE
- DESIGNED STREAM BANK GRADING
- DESIGNED BMP VEGETATED SWALE
- DESIGNED ROCK OUTLET
- DESIGNED BRUSH TOE
- DESIGNED BOULDER TOE
- DESIGNED COVER LOG
- DESIGNED FLOODPLAIN SILL
- DESIGNED FARM ROAD

As-Built Features

- AS-BUILT THALWEG
- AS-BUILT BANKFULL
- AS-BUILT MAJOR CONTOUR (100)
- AS-BUILT MINOR CONTOUR (101)
- CROSS SECTION (XS#)
- LIMITS OF DISTURBANCE (LOD)
- PHOTO POINT (PP ##)
- MONITORING DEVICES (GW#, FG, STP, BAROTROLL)
- VEGETATION PLOT (VP ##, VEG)
- AS-BUILT BOULDER SILL
- AS-BUILT CURVED BOULDER SILL
- AS-BUILT ANGLED LOG SILL
- AS-BUILT LOG J-HOOK
- AS-BUILT PERMANENT CULVERT CROSSING
- AS-BUILT DROP INLET
- AS-BUILT FARM PATH
- AS-BUILT RIFFLE
- AS-BUILT BMP VEGETATED SWALE
- AS-BUILT ROCK OUTLET
- AS-BUILT BRUSH TOE
- AS-BUILT BOULDER TOE
- AS-BUILT COVER LOG
- AS-BUILT FARM ROAD

NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE 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 031027 — 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

General Notes and Symbols

Revisions:

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 0.2

X:\Shared\Projects\W02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built-Set\Plans\02189-General Notes and Symbols.dwg

June 5, 2023

COOL SPRINGS RD

CAMERON
D.B. 1136, PG. 345
M.B. 2006, PG. 19

CAMERON
D.B. 1136, PG. 345

PATTERSON
& SONS, INC
D.B. 1323, PG. 001
M.B. 2002, PG.791
PIN 0601-97-9821

WICKER
D.B. 3148, PG. 857

PATTERSON
D.B. 2044, PG. 357

PATTERSON
& SONS, INC
D.B. 1622, PG.187
M.B. 2002, PG. 791
PIN 0601-89-2857

PATTERSON
D.B. 905, PG. 673
M.B. 2011, PG. 417

WELLS
D.B. 1031, PG. 956

WELLS
D.B. 681, PG. 673

TRUITT
D.B. 2779, PG. 623

STA. 801+80
END T7
(ENHANCEMENT I)
STA. 126+37
UT TO CEDAR CREEK
REACH 2 (RESTORATION)

STA. 800+24
BEGIN T7
(ENHANCEMENT I)

STA. 127+73
END UT TO CEDAR CREEK
REACH 2 (RESTORATION)
BEGIN UT TO CEDAR CREEK
REACH 2 (RESTORATION)
NOT FOR CREDIT

STA. 128+74
END UT TO CEDAR CREEK
REACH 2 (RESTORATION)
NOT FOR CREDIT

STA. 907+59
END T8
(RESTORATION)

STA. 907+75
END T8
(RESTORATION)
NOT FOR CREDIT

STA. 124+19
END UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)
BEGIN UT TO CEDAR CREEK
REACH 2 (RESTORATION)

STA. 180+00
BEGIN BMP5

STA. 118+65
INTERNAL CROSSING
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 411+00
END T3 REACH 3
(ENHANCEMENT II)
STA. 114+87
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 305+12
END T2
(RESTORATION)
STA. 112+99
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 300+00
BEGIN BMP4

STA. 300+42
END BMP4
BEGIN T2
(RESTORATION)

PROPOSED 30' ACCESS EASEMENT
ALONG CENTERLINE OF EXISTING
GRAVEL AREAS (2.01 ACRES)

STA. 170+00
BEGIN BMP3

STA. 171+47
END BMP3

STA. 160+00
BEGIN BMP2

STA. 150+95
BEGIN BMP1

STA. 100+58
BEGIN UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 152+44
END BMP1
STA. 100+68
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 161+39
END BMP2
STA. 102+26
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 204+44
END T1
(ENHANCEMENT II)
STA. 103+68
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 200+27
BEGIN T1
(ENHANCEMENT II)

STA. 182+95
END BMP5

STA. 119+29
INTERNAL CROSSING
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 509+51
END T4 REACH 2
(RESTORATION)
STA. 119+53
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 706+32
END T6
(RESTORATION)
STA. 507+77
T4 REACH 2
(RESTORATION)

STA. 501+64
INTERNAL CROSSING
T4 REACH 2
(RESTORATION)

STA. 408+05
END T3 REACH 2
(RESTORATION)
BEGIN T3 REACH 3
(ENHANCEMENT II)

STA. 404+39
END T3 REACH 1
(ENHANCEMENT II)
BEGIN T3 REACH 2
(RESTORATION)

STA. 400+60
INTERNAL CROSSING
T3 REACH 1
(ENHANCEMENT II)

STA. 400+17
BEGIN T3 REACH 1
(ENHANCEMENT II)

STA. 900+62
T8 (RESTORATION)
CREDITS BEGIN

STA. 900+00
BEGIN T8
NOT FOR CREDIT

STA. 701+33
T6 (RESTORATION)
CREDITS BEGIN

STA. 700+00
BEGIN T6
NOT FOR CREDIT

STA. 600+46
T5 (RESTORATION)
CREDITS BEGIN

STA. 500+01
BEGIN T4 REACH 1
(RESTORATION)

STA. 500+98
END T4 REACH 1
(RESTORATION)
BEGIN T4 REACH 2
(RESTORATION)
STA. 601+80
END T5
(RESTORATION)

STA. 501+02
INTERNAL CROSSING
T4 REACH 2
(RESTORATION)

UT TO CEDAR CREEK

T1 T2 T3 T4 T5 T6 T8

1.1.1 1.1.2 1.1.3 1.1.4 1.1.5 1.1.6 1.1.7
1.2.1 1.2.2
1.3.1 1.3.2 1.3.3
1.4.1 1.4.2 1.4.3 1.4.4 1.4.5
1.5.1 1.5.2 1.5.3 1.5.4 1.5.5
1.6.1
1.7.1 1.7.2 1.7.3
1.8.1
1.9.1 1.9.2 1.9.3 1.9.4

CE CE-IX

NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

0' 100' 200' 300'
(HORIZONTAL)

N

X:\Shared\Projects\WI02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-Project Overview.dwg

WILDLANDS ENGINEERING
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 — 6-5-23

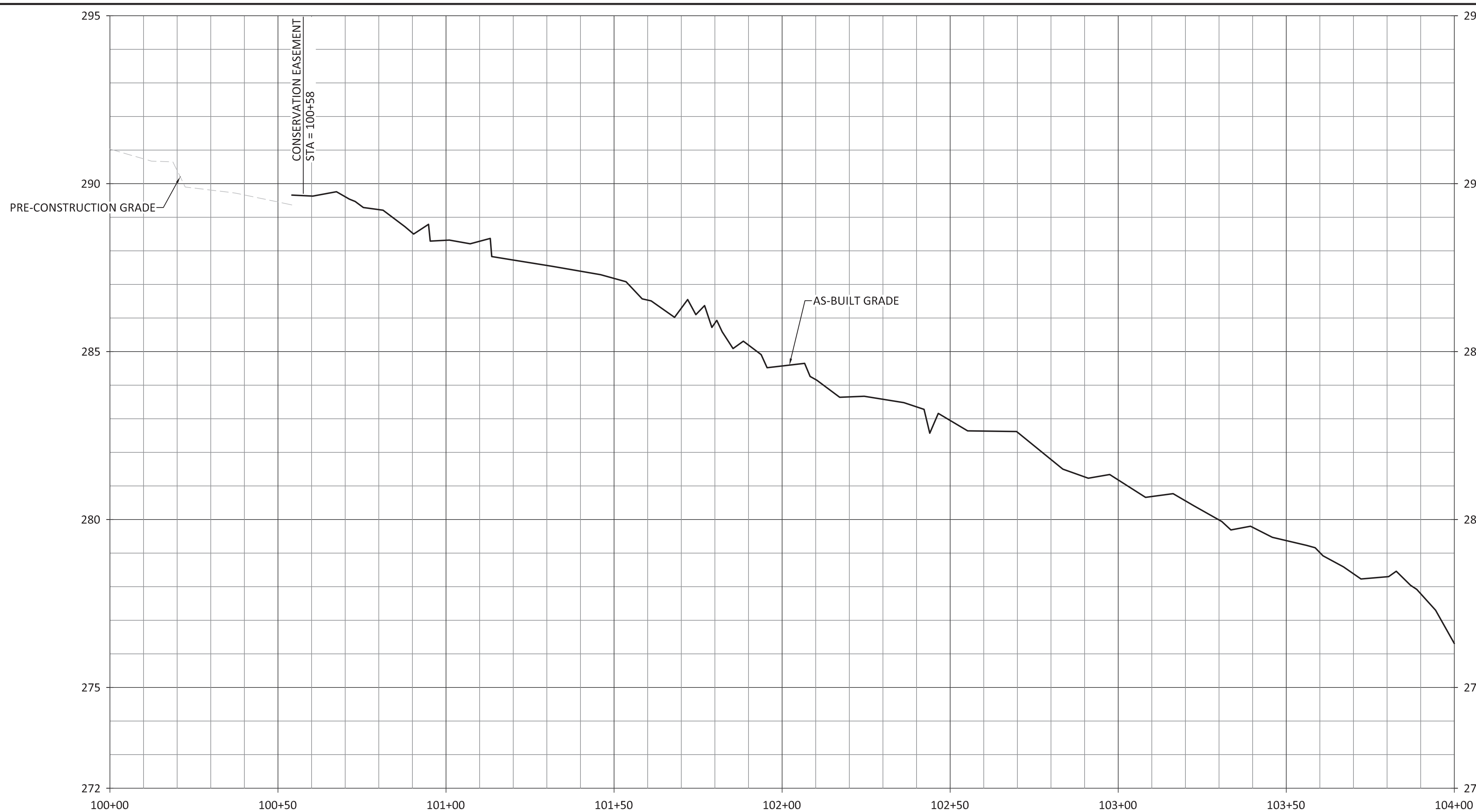
Cool Springs Mitigation Site
Harnett County, North Carolina

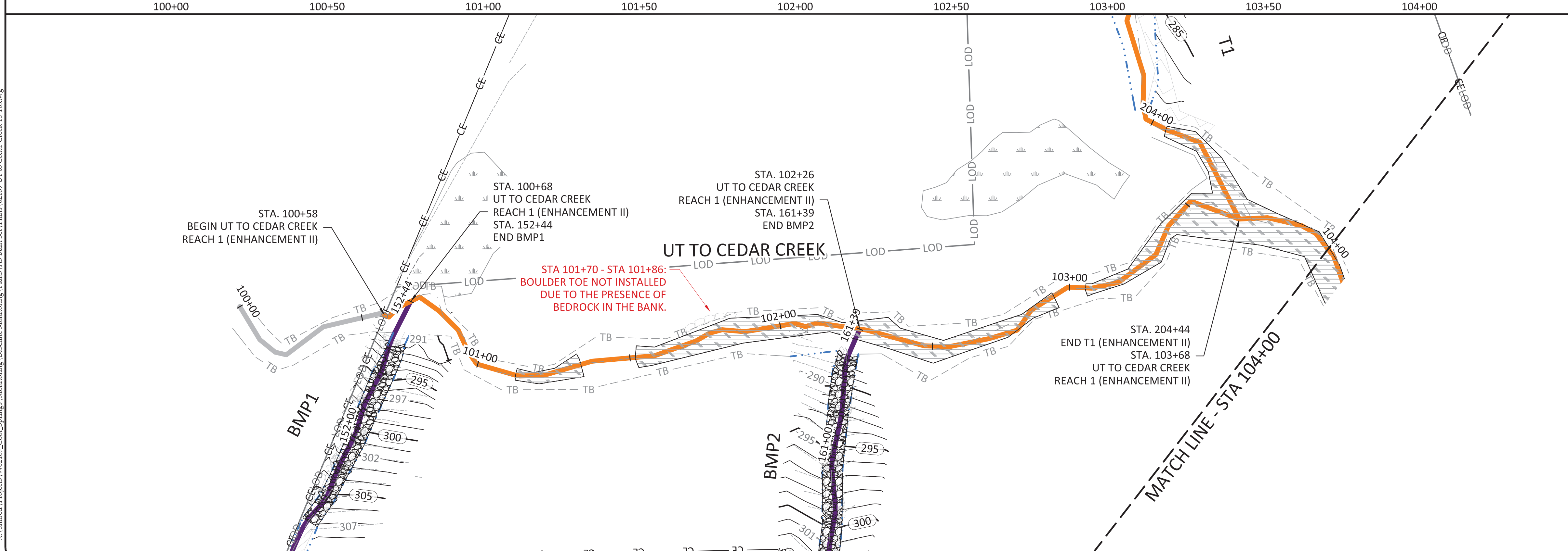
Project Overview

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

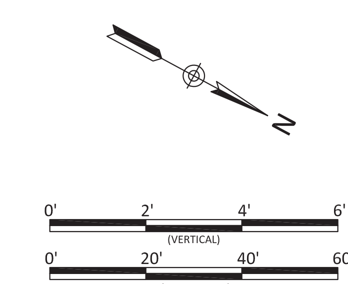
Sheet 0.3





NOTES:

1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR BMP1 IS ADDRESSED ON SHEET 2.1.
2. AS-BUILT INFORMATION FOR BMP2 IS ADDRESSED ON SHEET 2.2.
2. AS-BUILT INFORMATION FOR T1 IS ADDRESSED ON SHEETS 1.2.1 THROUGH 1.2.2.



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Raleigh, NC 27609
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License No. F-0831

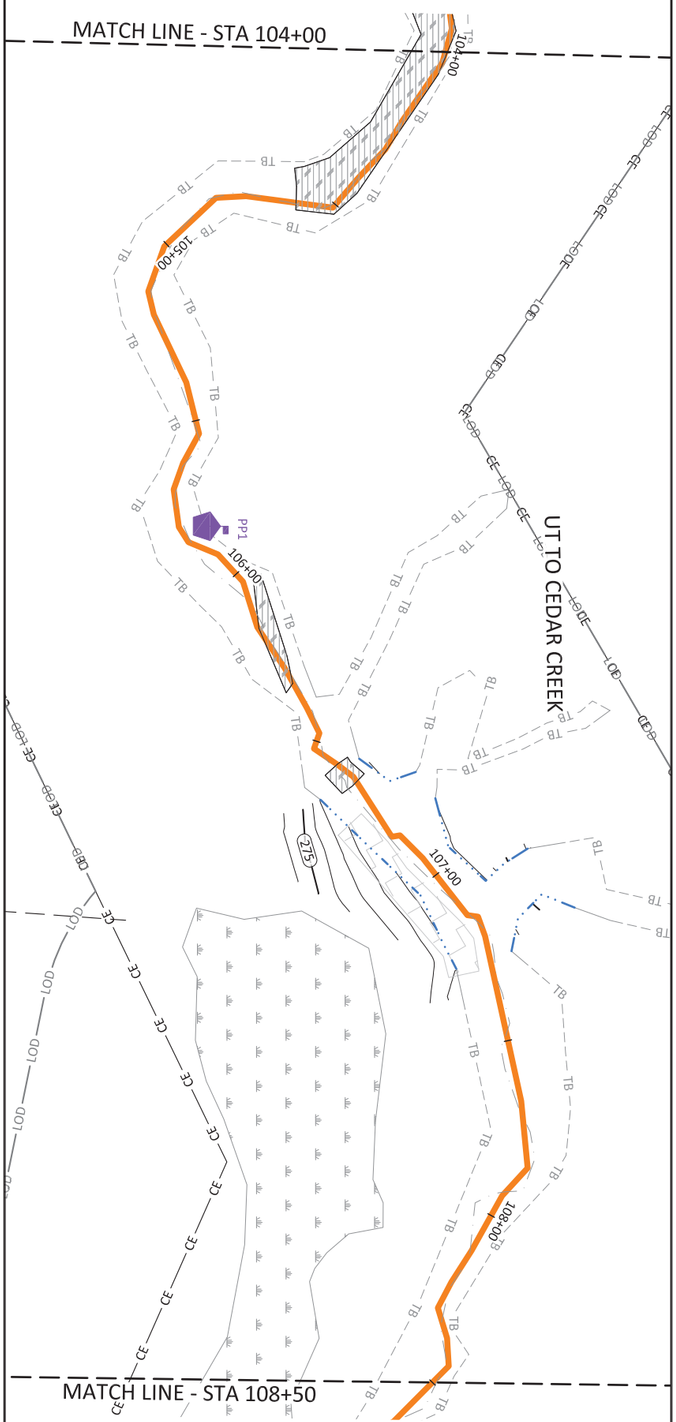
Cool Springs Mitigation Site
Harnett County, North Carolina

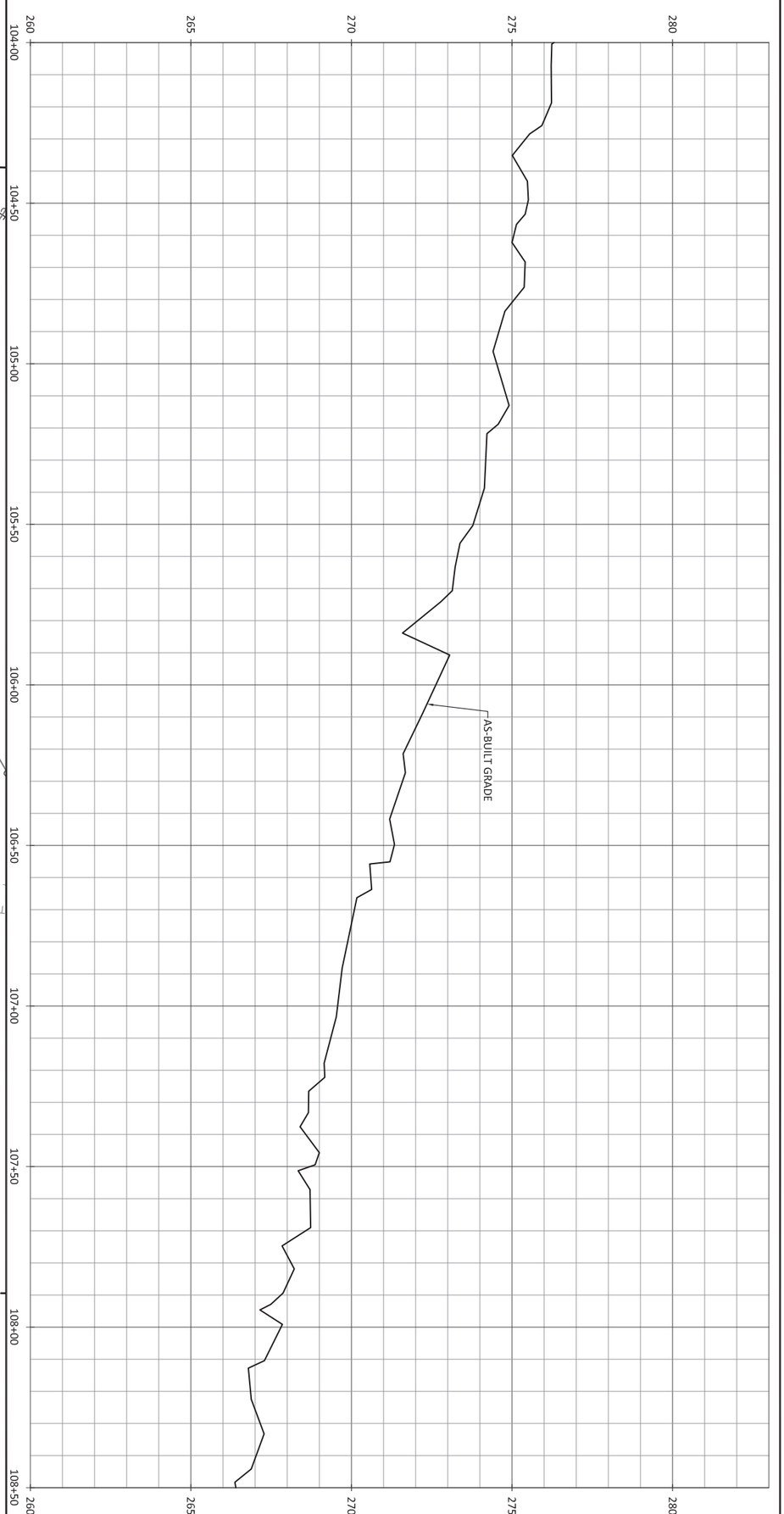
UT to Cedar Creek
Stream Plan and Profile

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Revisions:

Sheet 1.1.1





NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

0' 20' 40' 60' (HORIZONTAL)
0' 2' 4' 6' (VERTICAL)

N

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Revisions:

1.1.2
Sheet

Cool Springs Mitigation Site
Harnett County, North Carolina

UT to Cedar Creek
Stream Plan and Profile

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 6-5-23

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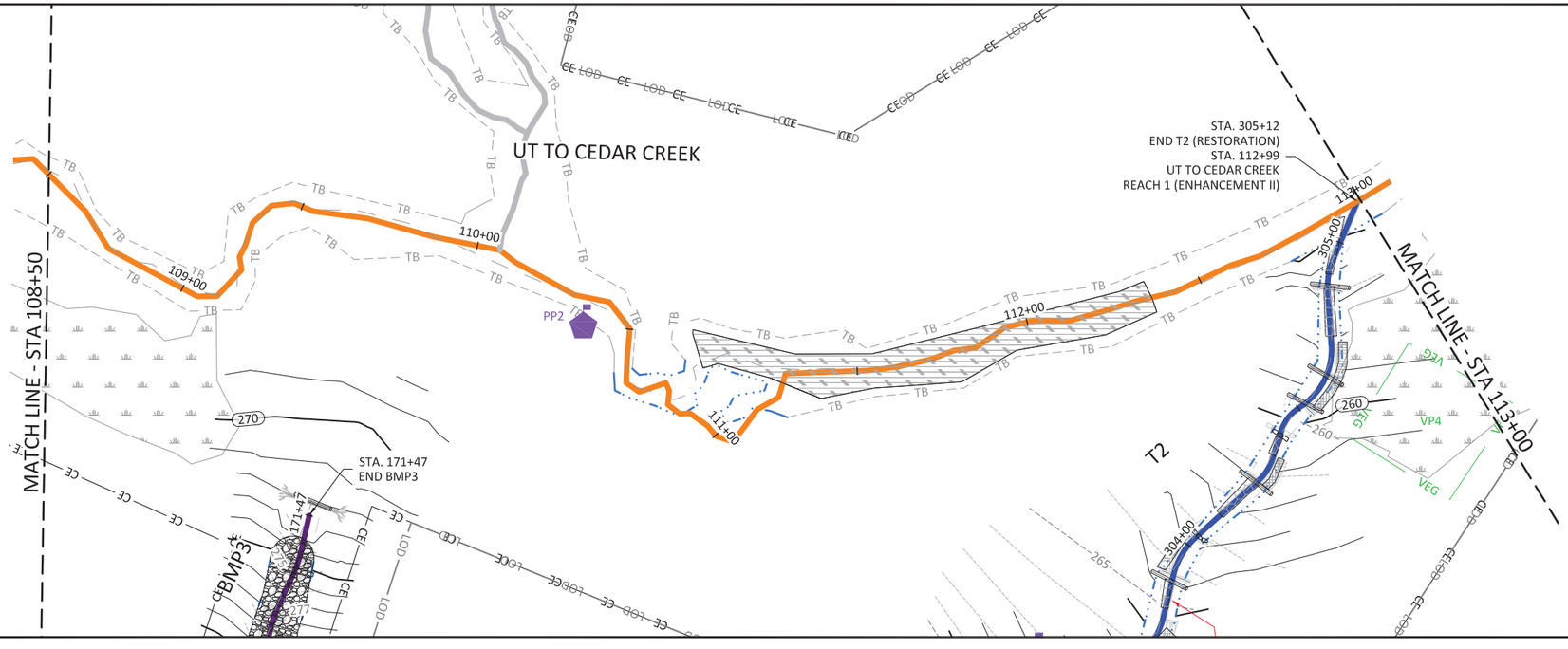
License No. F-0831

June 5, 2023



NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR BMP3 IS ADDRESSED ON SHEET 2.3.
2. AS-BUILT INFORMATION FOR T3 IS ADDRESSED ON SHEETS 1.3.1 THROUGH 1.4.5.

N

0' 2' 4' 6' (VERTICAL)

0' 20' 40' 60' (HORIZONTAL)

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Cool Springs Mitigation Site
Harnett County, North Carolina

UT to Cedar Creek
Stream Plan and Profile

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.1.3

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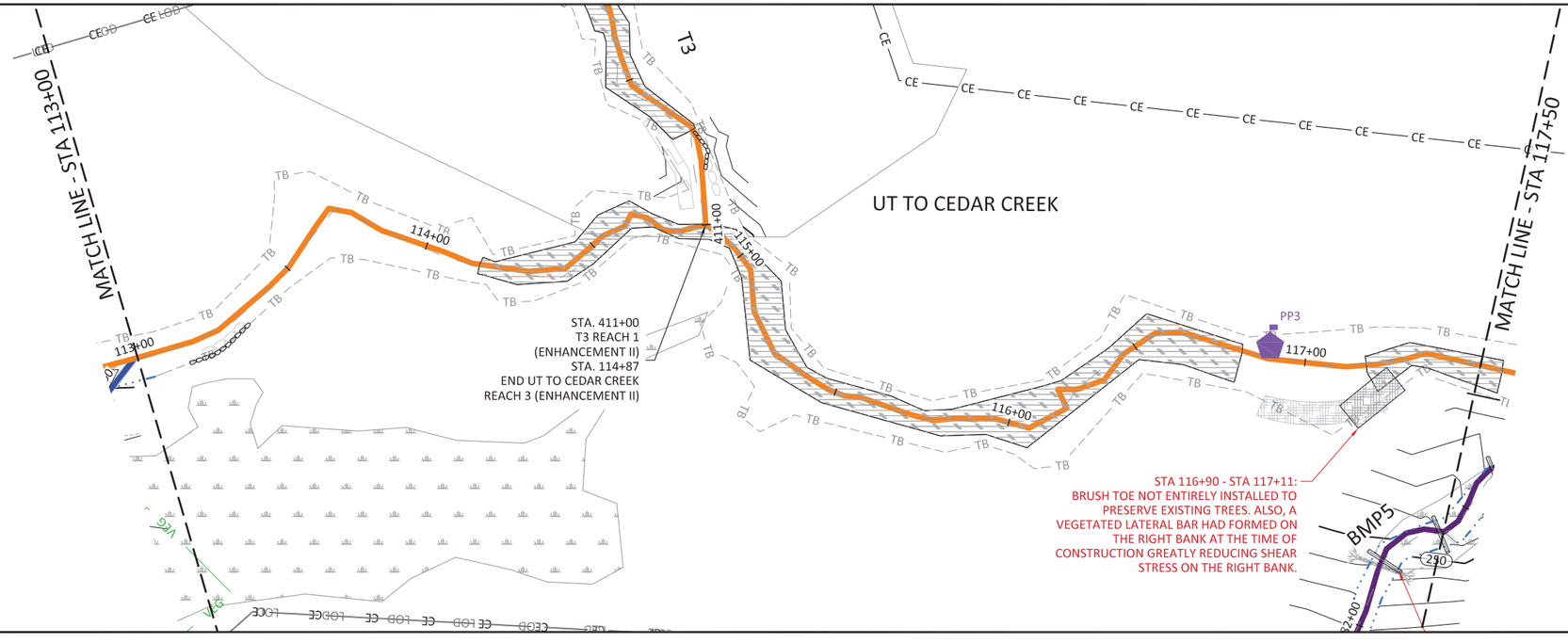
June 5, 2023



NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR T3 IS ADDRESSED ON SHEETS 1.4.1 THROUGH 1.4.5.
3. AS-BUILT INFORMATION FOR BMP5 IS ADDRESSED ON SHEETS 2.5 THROUGH 2.6.

STA 116+90 - STA 117+11:
BRUSH TOE NOT ENTIRELY INSTALLED TO PRESERVE EXISTING TREES. ALSO, A VEGETATED LATERAL BAR HAD FORMED ON THE RIGHT BANK AT THE TIME OF CONSTRUCTION GREATLY REDUCING SHEAR STRESS ON THE RIGHT BANK.

N

0' 2' 4' 6' (VERTICAL)

0' 20' 40' 60' (HORIZONTAL)

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Cool Springs Mitigation Site
Harnett County, North Carolina
UT to Cedar Creek
Stream Plan and Profile

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.1.4

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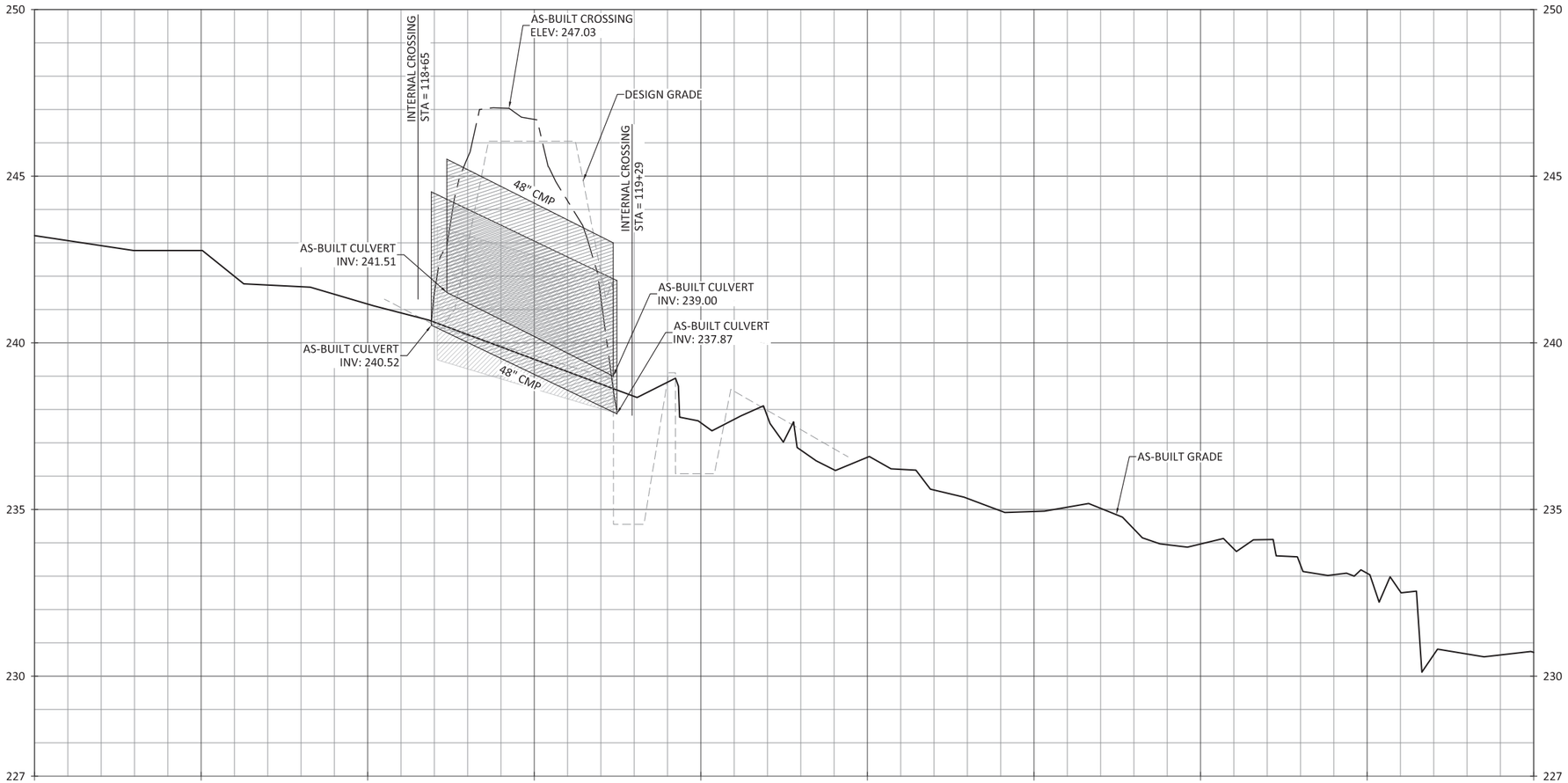
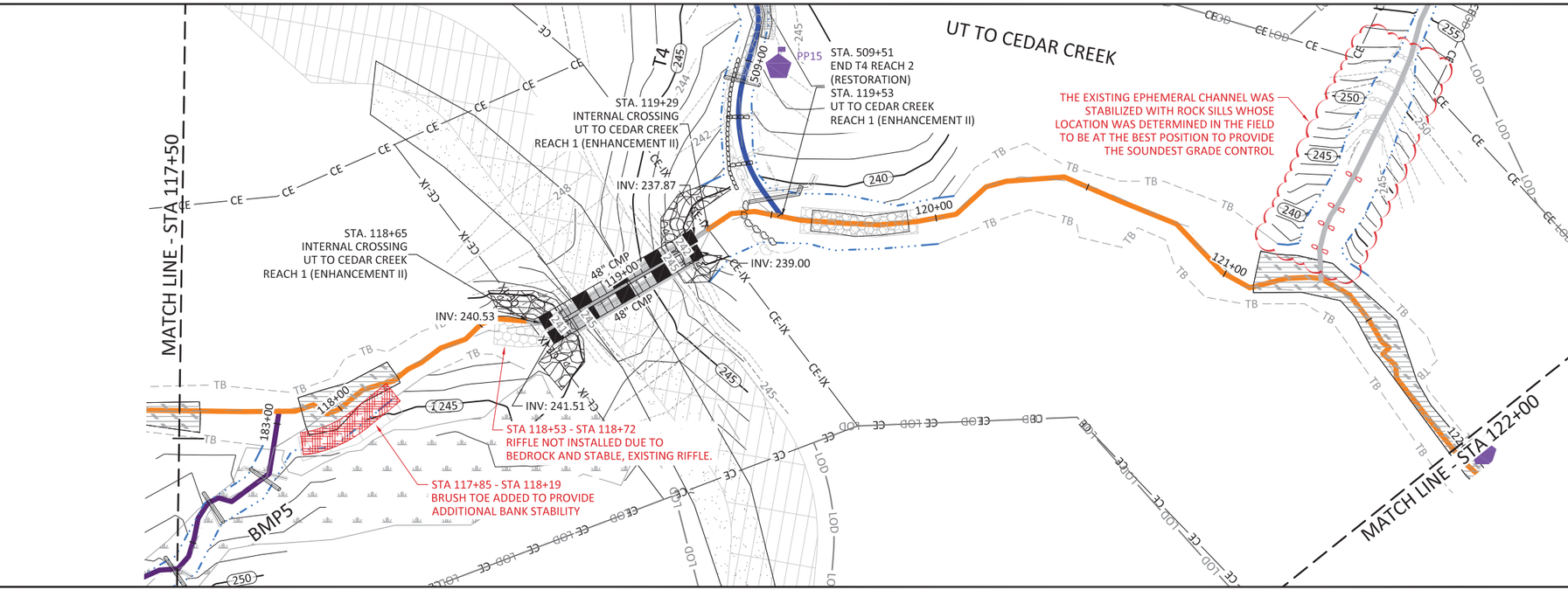
June 5, 2023





NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR BMP5 IS ADDRESSED ON SHEETS 2.5 THROUGH 2.6.
3. AS-BUILT INFORMATION FOR T4 IS ADDRESSED ON SHEETS 1.5.1 THROUGH 1.5.5.

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Cool Springs Mitigation Site
Harnett County, North Carolina
UT to Cedar Creek
Stream Plan and Profile

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.1.5

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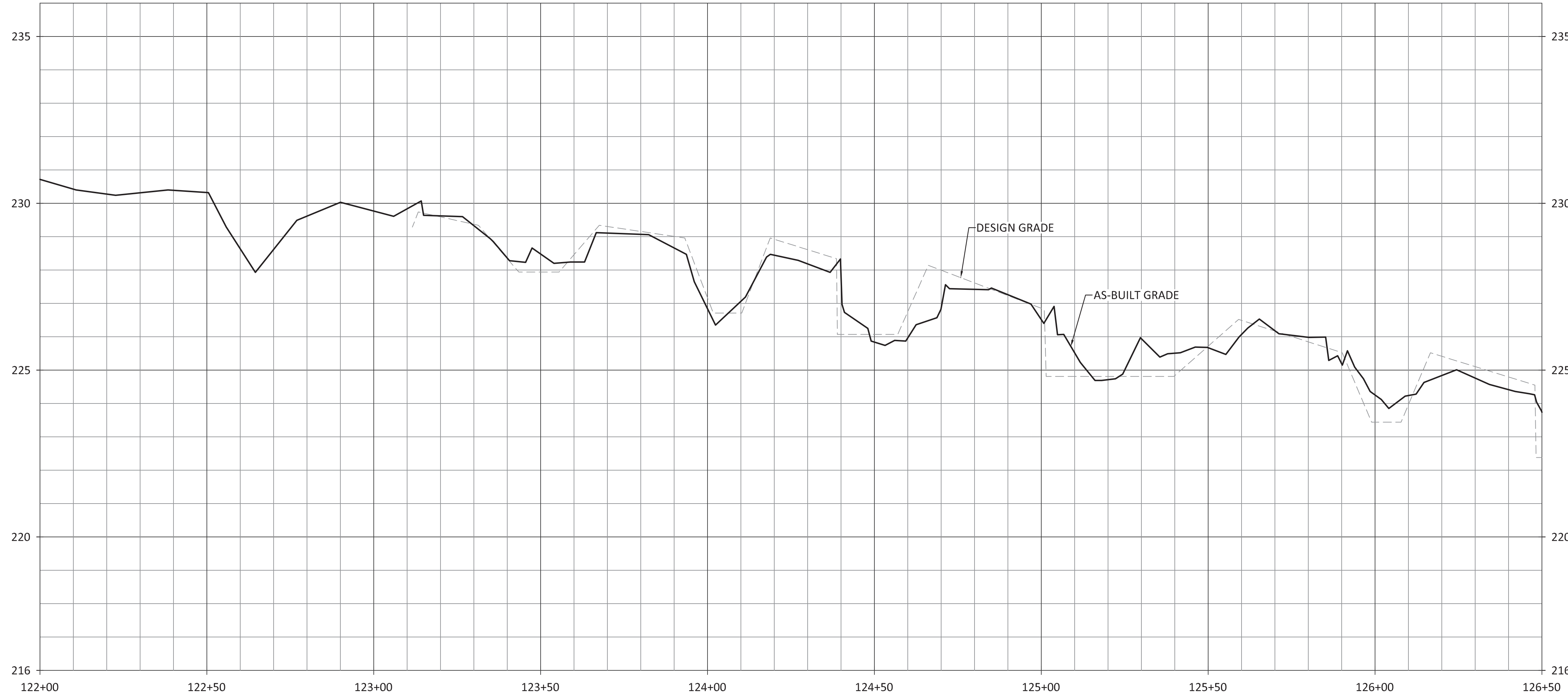
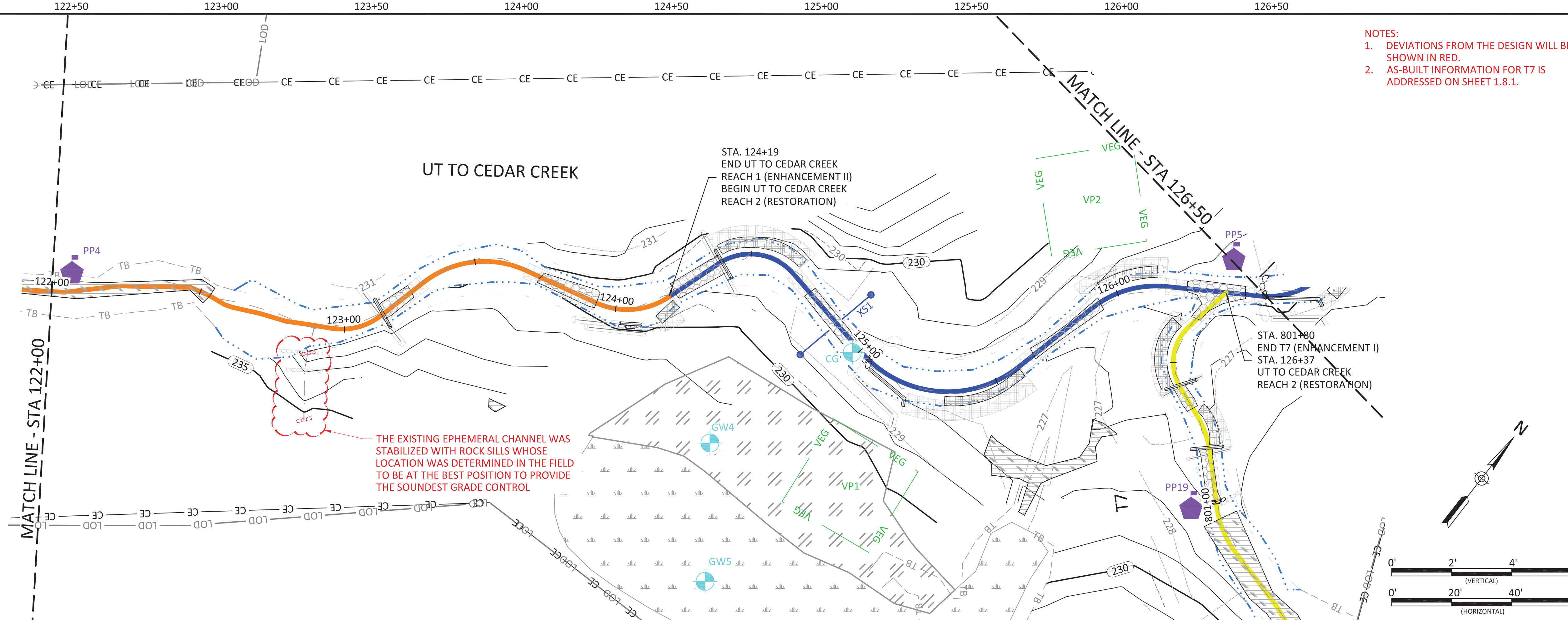
June 5, 2023



NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR T7 IS ADDRESSED ON SHEET 1.8.1.



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6-5-23

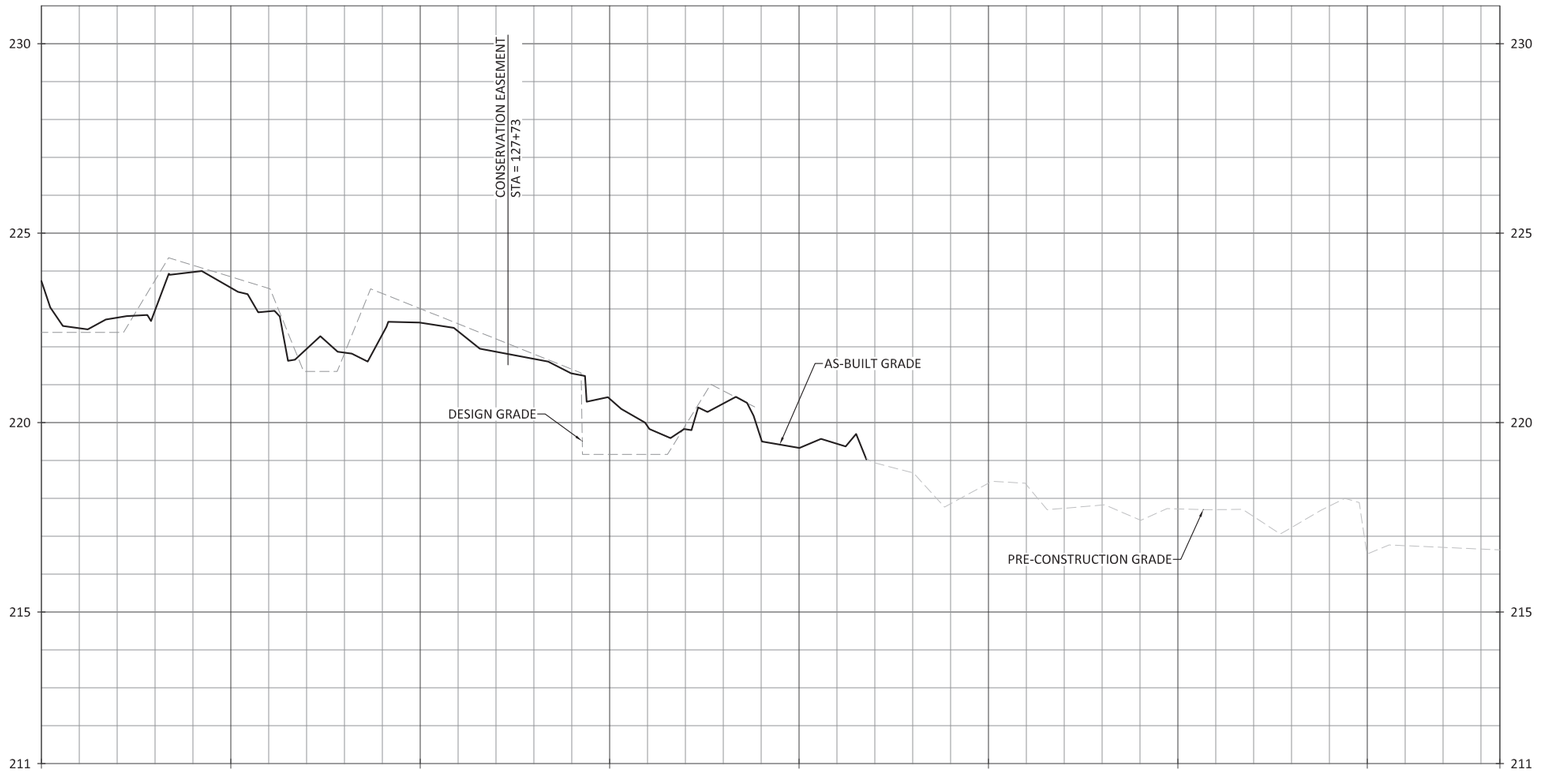
Cool Springs Mitigation Site
Harnett County, North Carolina

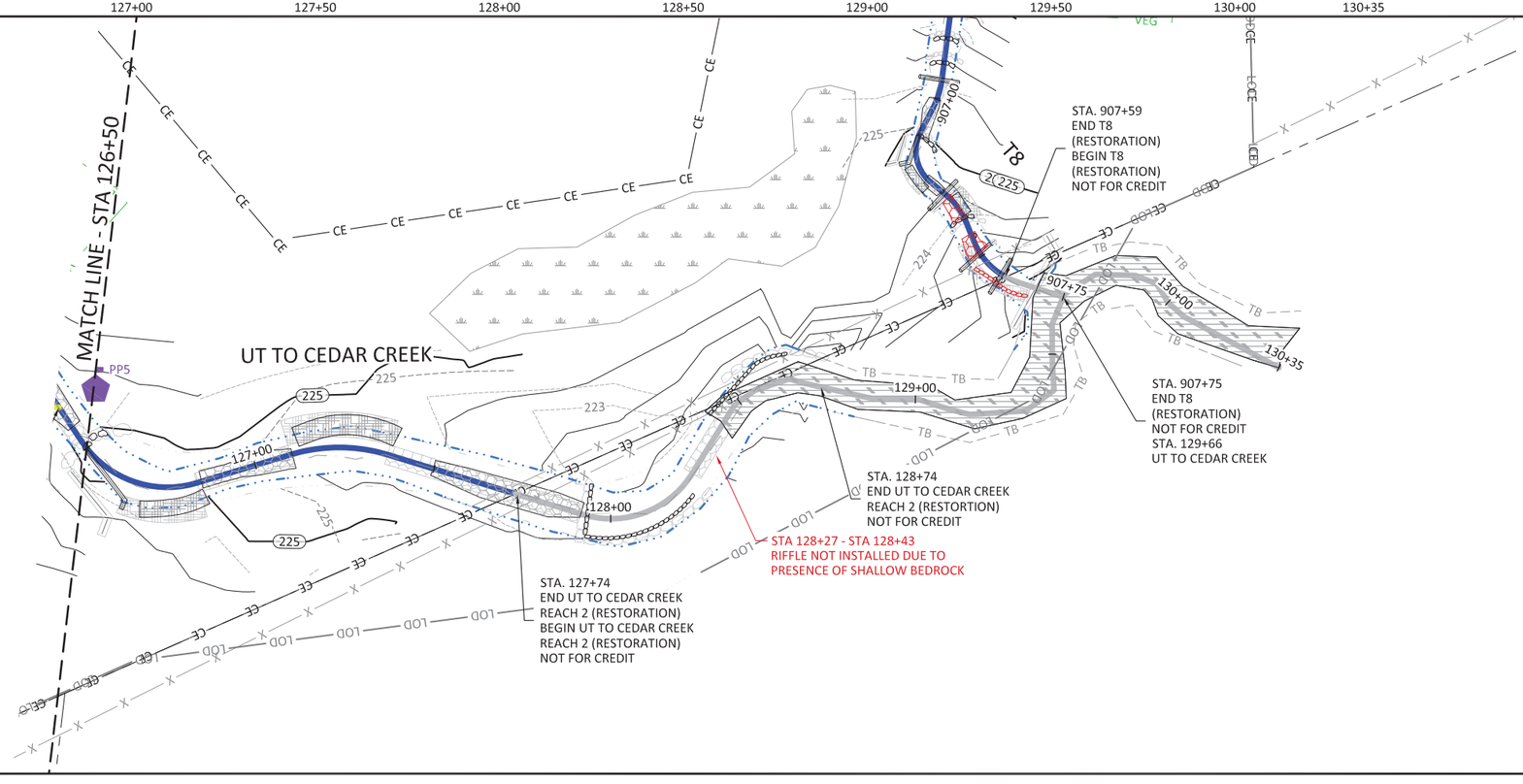
UT to Cedar Creek
Stream Plan and Profile

Revisions:

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 1.1.6





NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR T8 IS ADDRESSED ON SHEETS 1.9.1 THROUGH 1.9.4.

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Cool Springs Mitigation Site
Harnett County, North Carolina

UT to Cedar Creek
Stream Plan and Profile

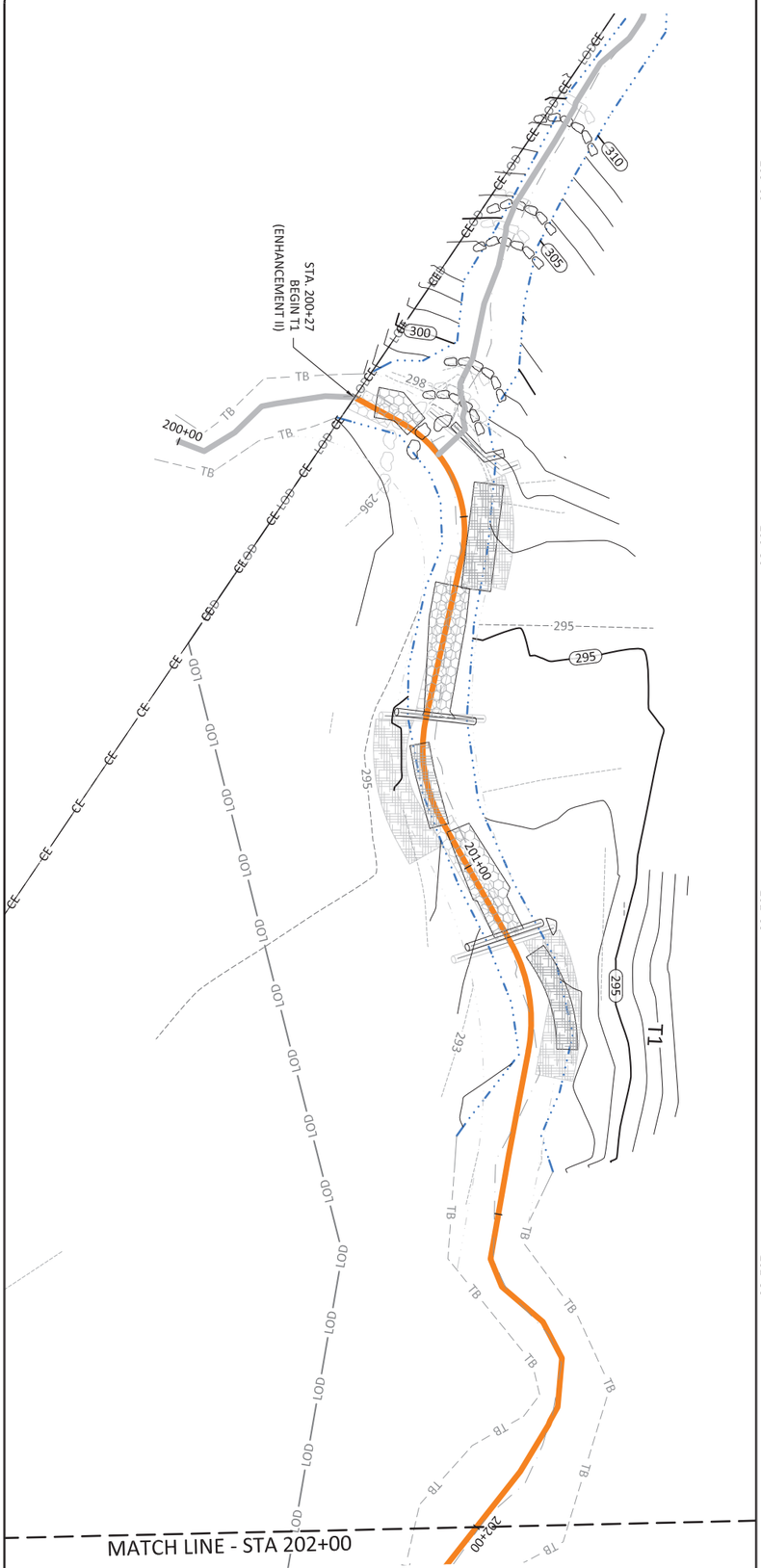
Revisions:

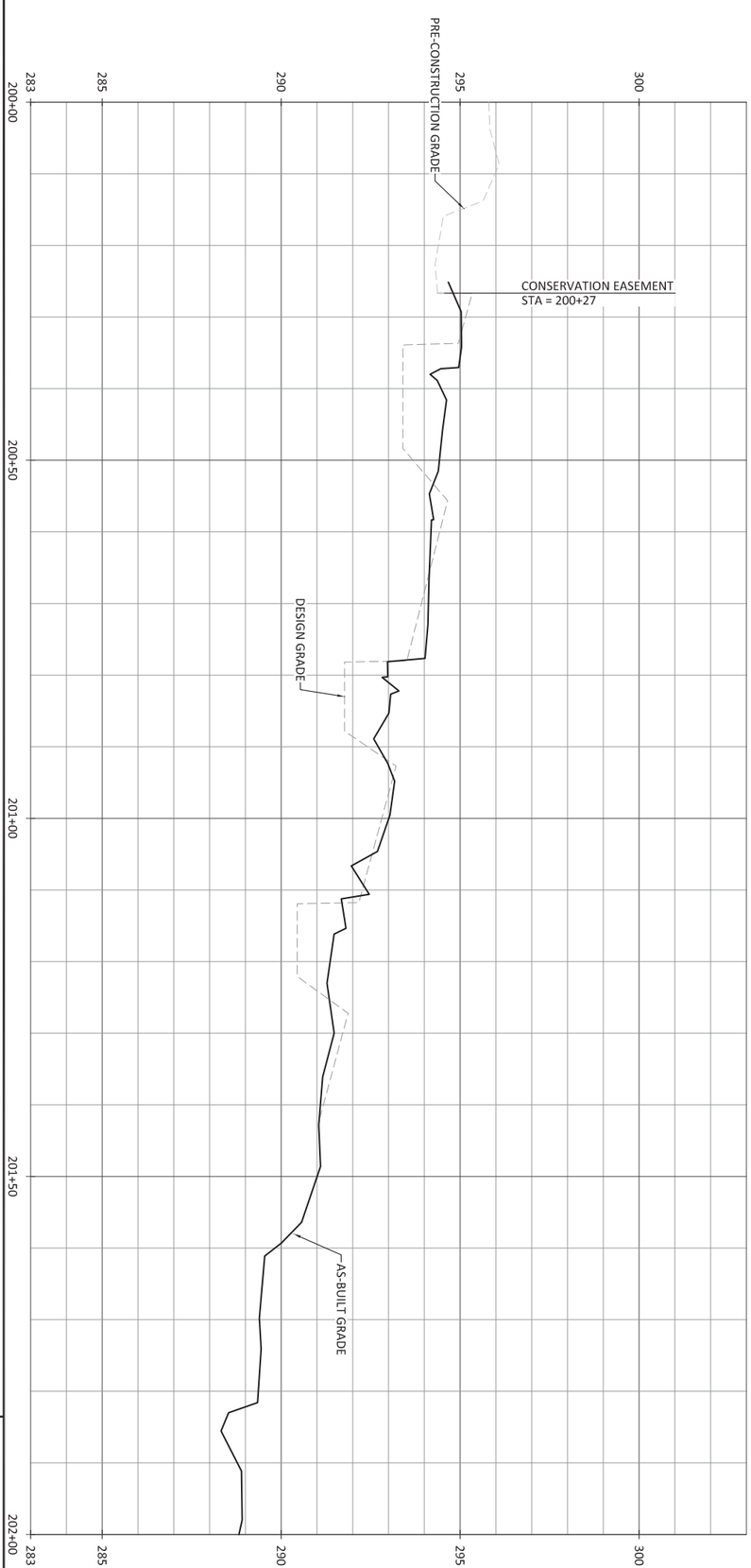
Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.1.7

June 5, 2023

X:\Shared\Projects\WI02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-LTT to Cedar Creek T5 T6.dwg





NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

0' 10' 20' 30' (HORIZONTAL)
0' 2' 4' 6' (VERTICAL)

N

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

1.2.1
Sheet

Revisions:

Cool Springs Mitigation Site
Harnett County, North Carolina

T1
Stream Plan and Profile

NORTH CAROLINA PROFESSIONAL SEAL 031027 ENGINEER JENNIFER K. JOHNSON 6-5-23

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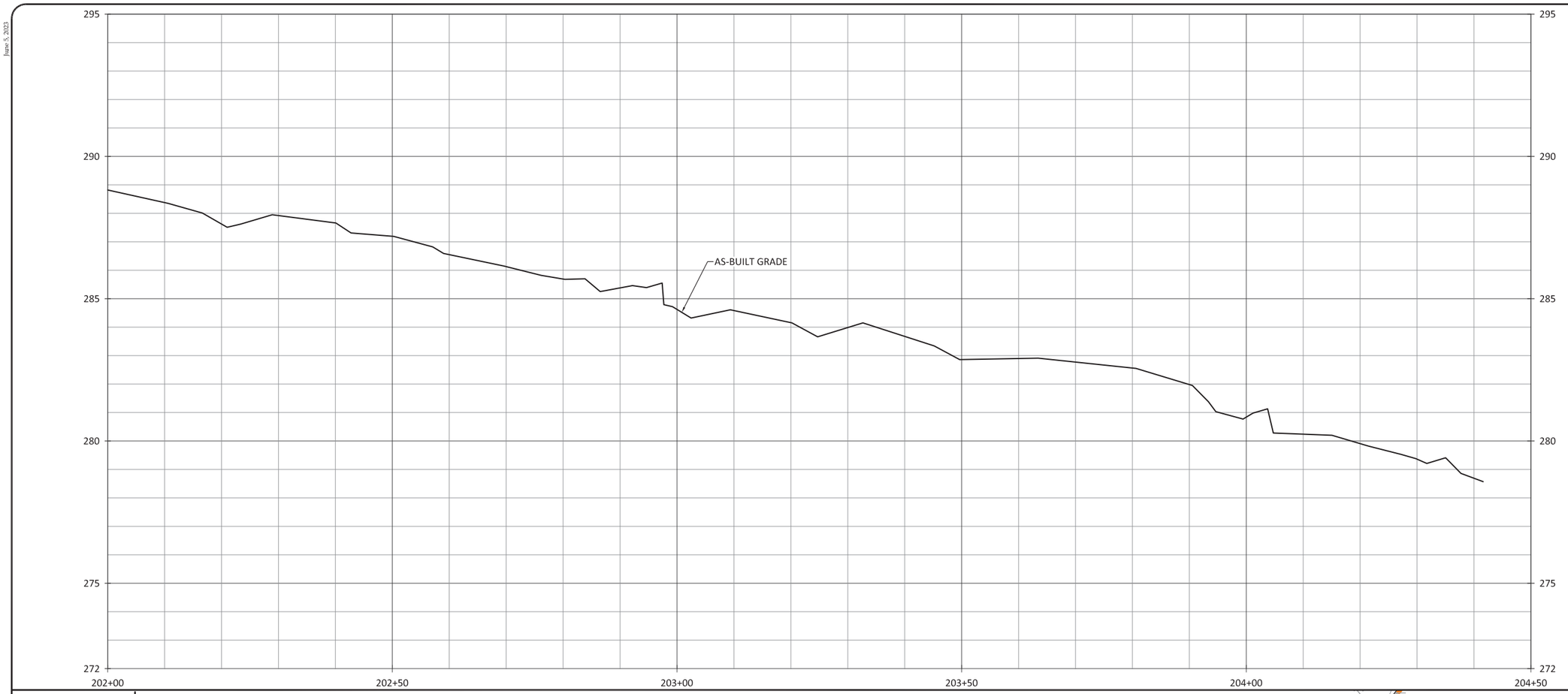

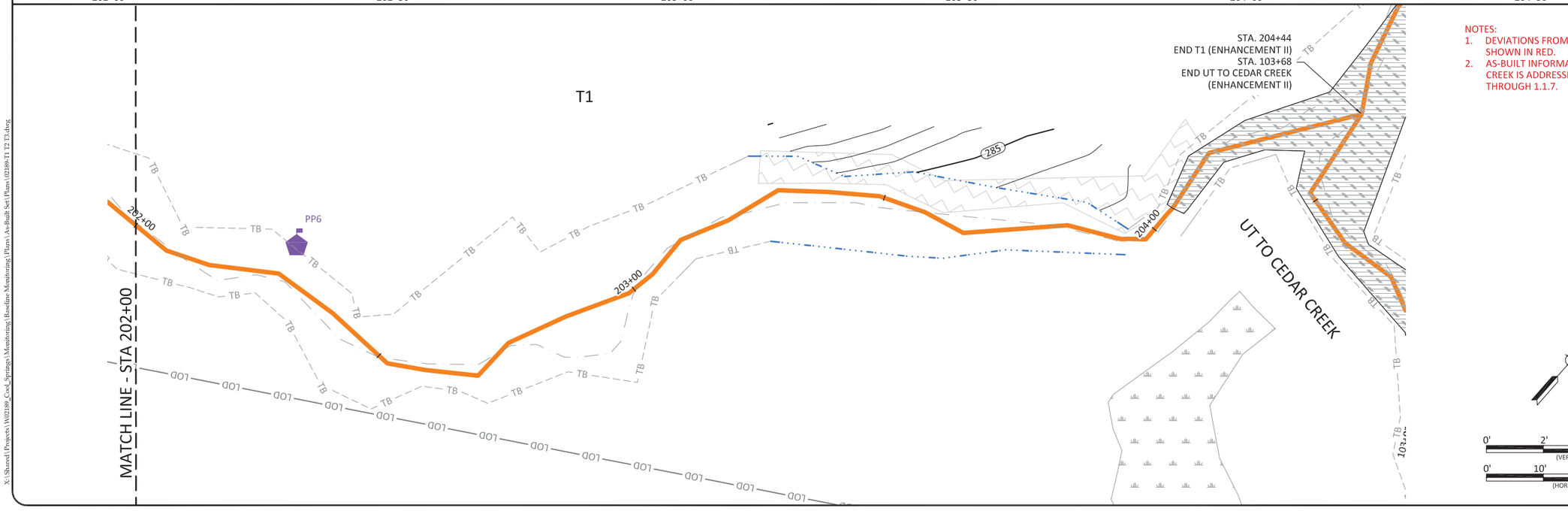

NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR UT TO CEDAR CREEK IS ADDRESSED ON SHEETS 1.1.1 THROUGH 1.1.7.

June 5, 2023

X:\Shared\Projects\WH02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-T1 T2 T3.dwg

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

T1
Stream Plan and Profile

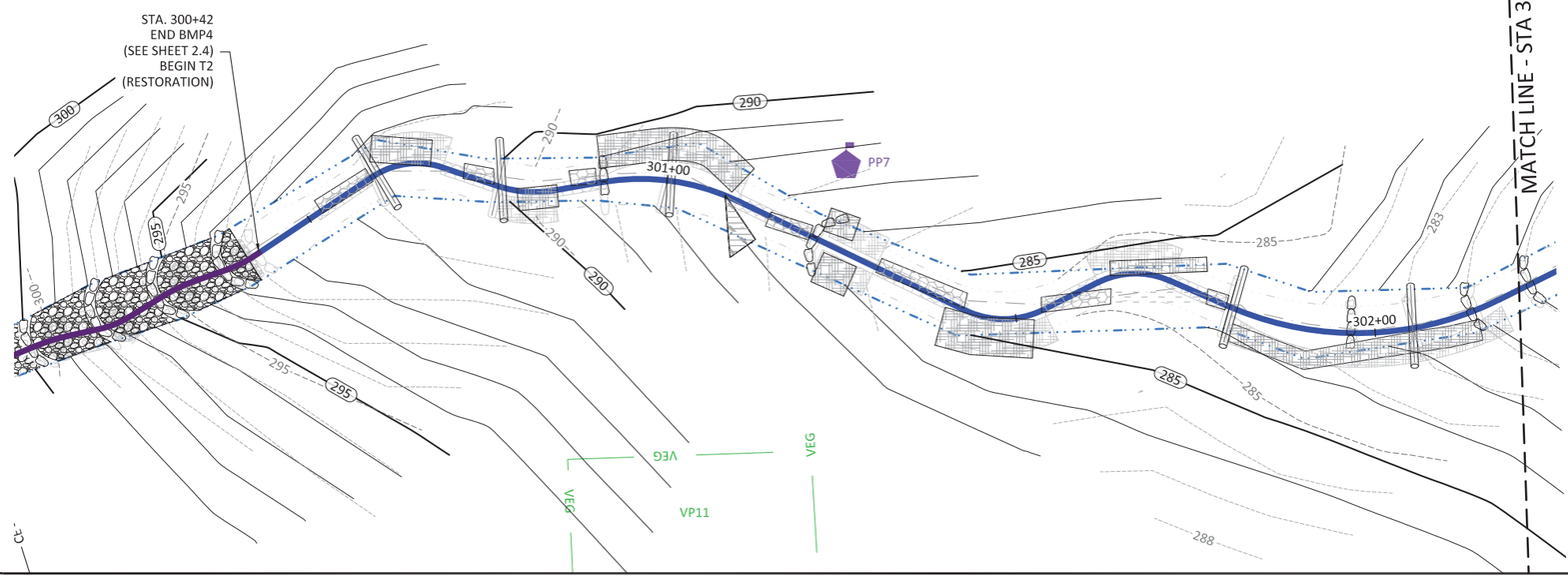
Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

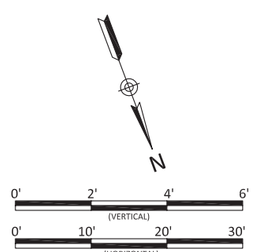
Sheet 1.2.2

June 5, 2023

T2



NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR BMP 4 IS ADDRESSED ON SHEET 2.4.



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Cool Springs Mitigation Site
Harnett County, North Carolina

T2
Stream Plan and Profile

Revisions:

Date: 06.05.2023
Job Number: 500-02169
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.3.1

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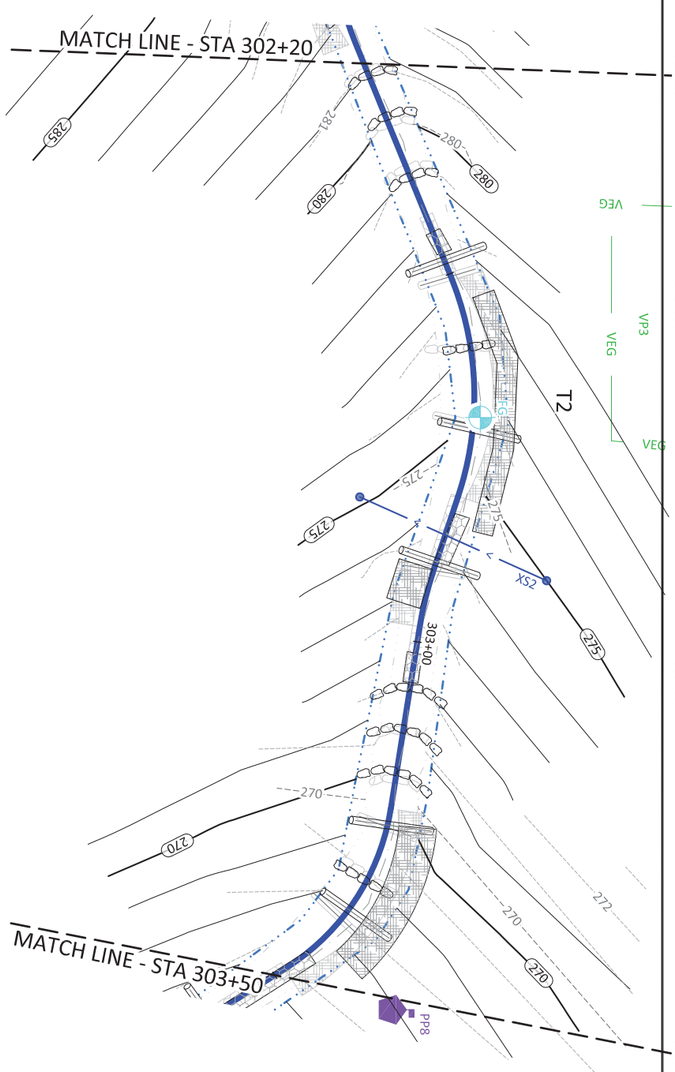
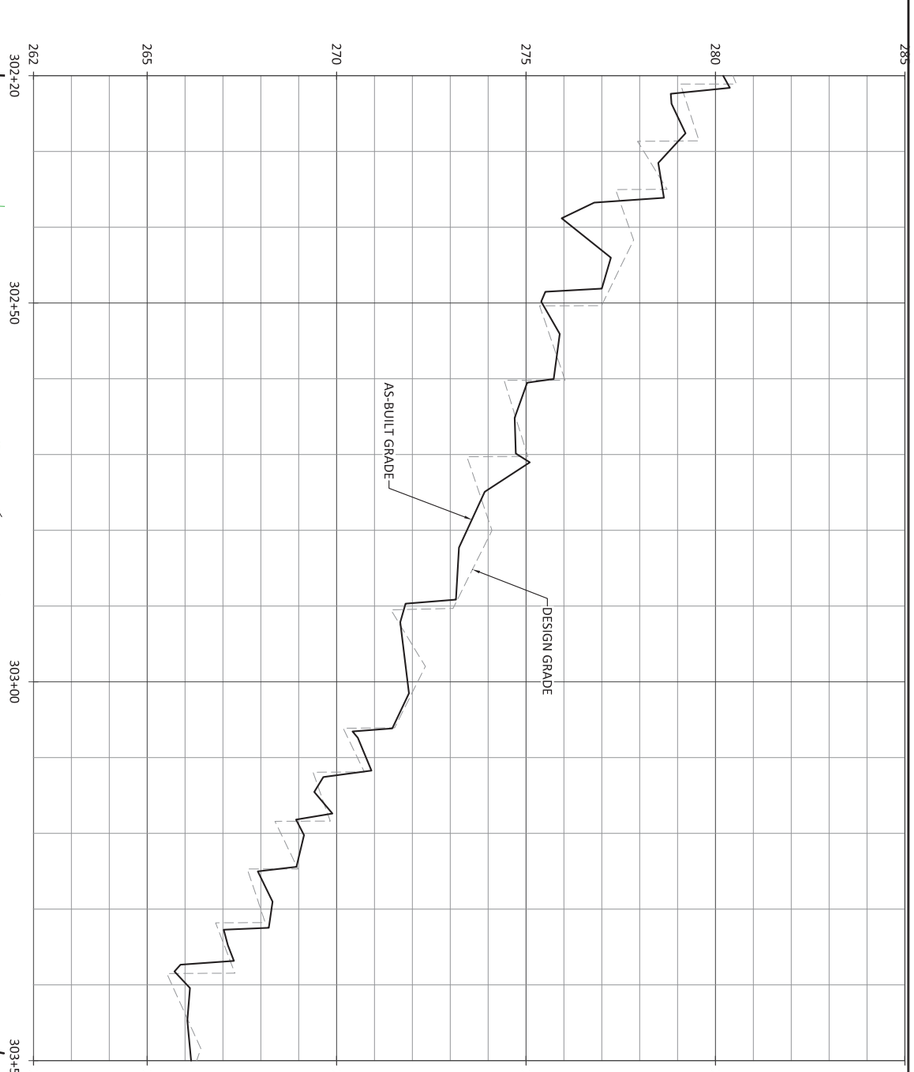
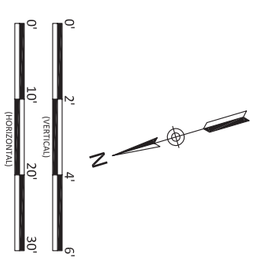




NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.



Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

1.3.2
Sheet

Revisions:

Cool Springs Mitigation Site
Harnett County, North Carolina

T2
Stream Plan and Profile

NORTH CAROLINA PROFESSIONAL SEAL 031027 ENGINEER JENNIFER N. KOTON 6-5-25

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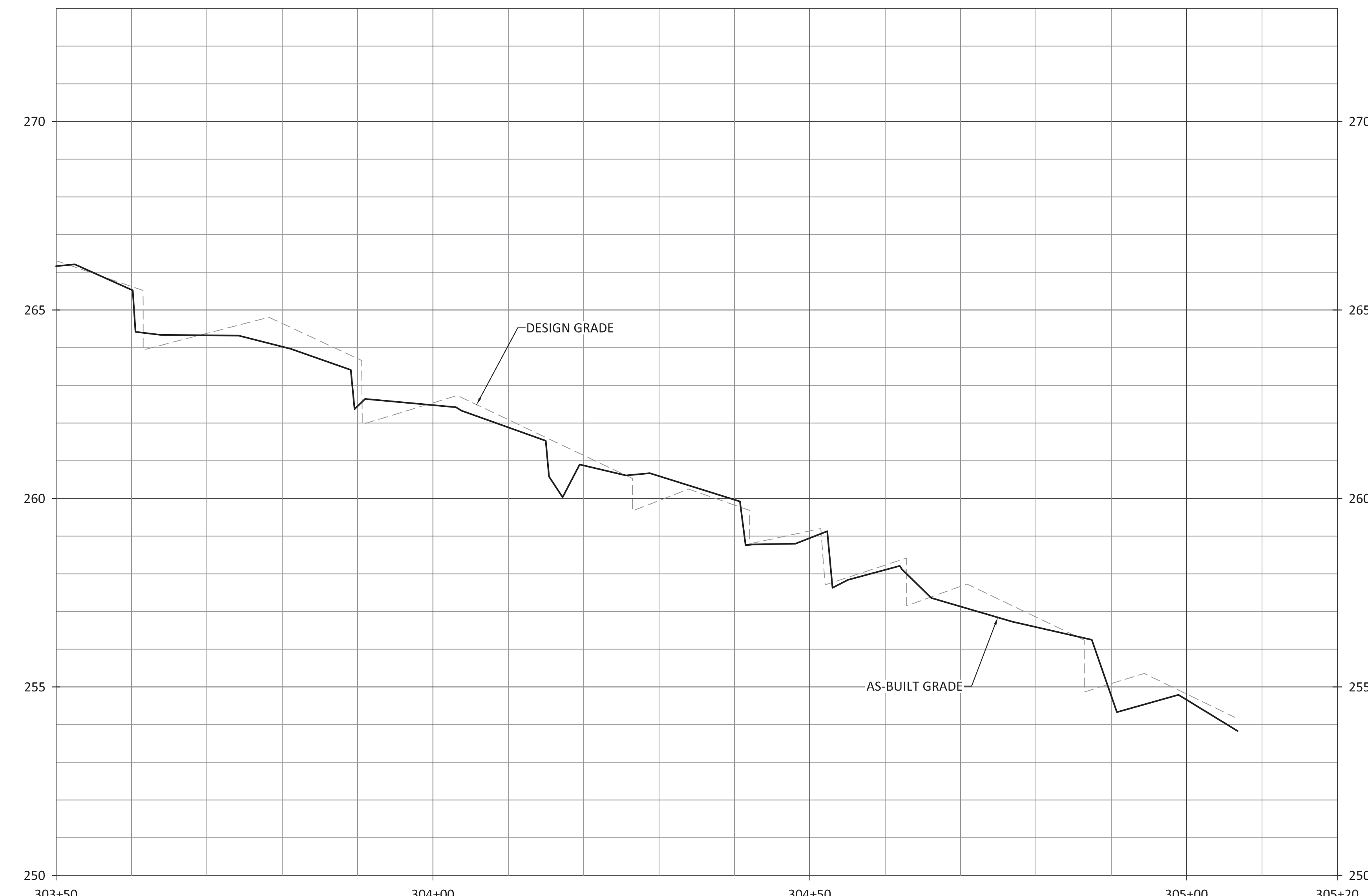
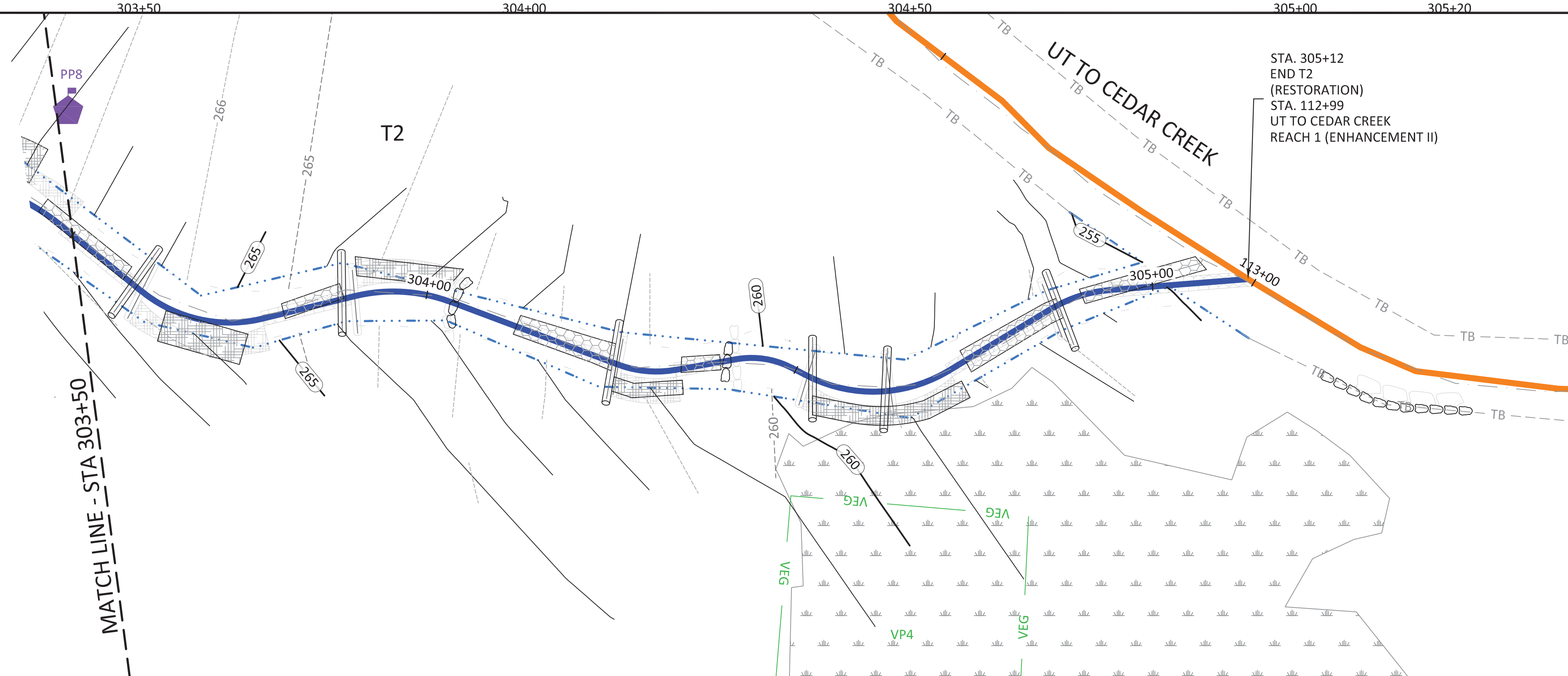
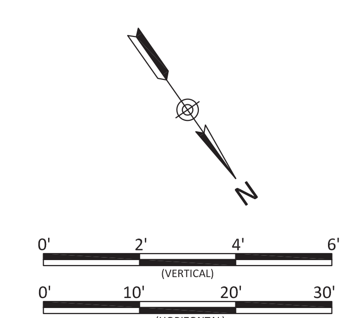




NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR UT TO CEDAR CREEK IS ADDRESSED ON SHEETS 1.1.1 THROUGH 1.1.7.



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Cool Springs Mitigation Site
Harnett County, North Carolina

T2
Stream Plan and Profile

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.3.3

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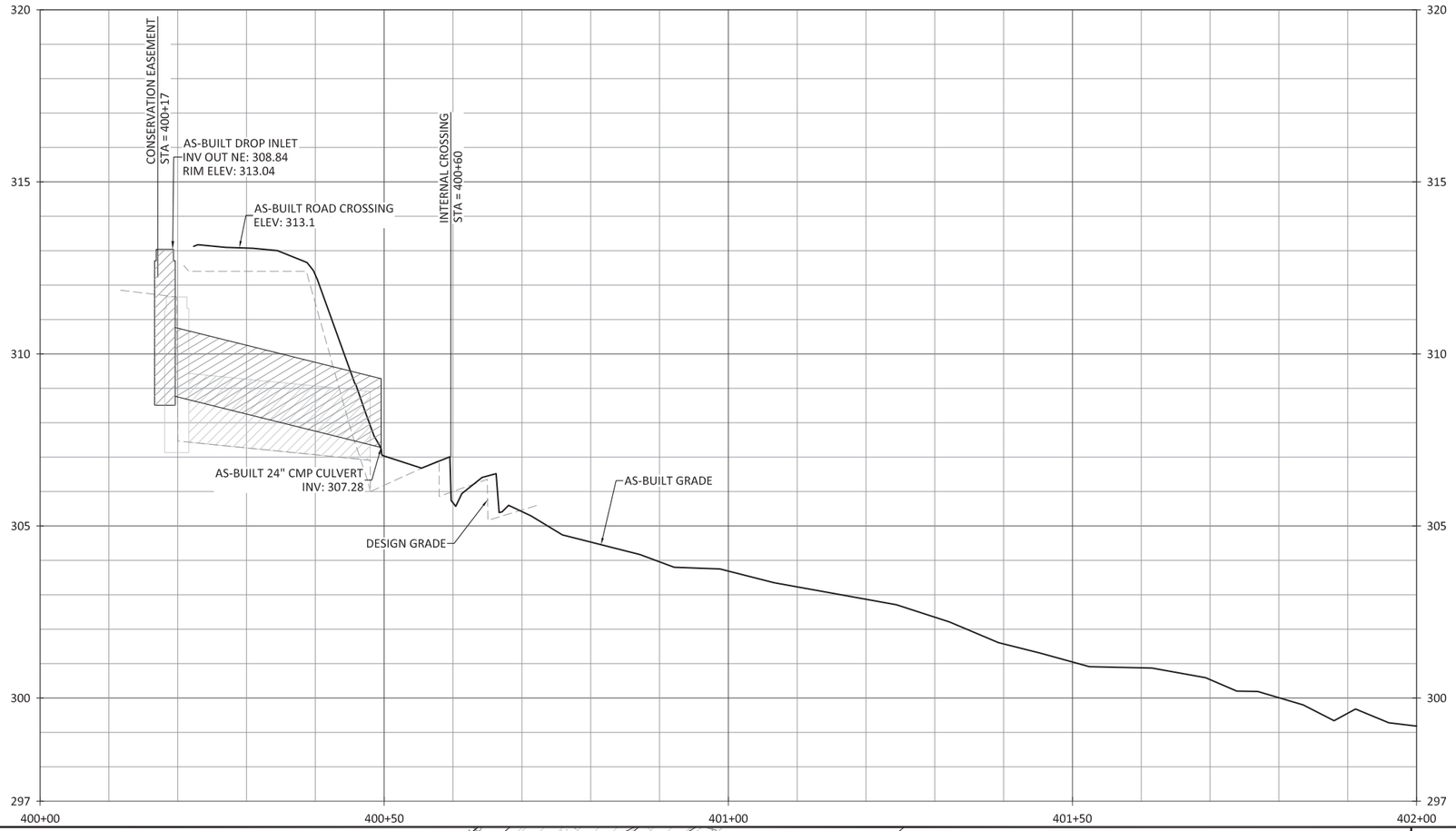
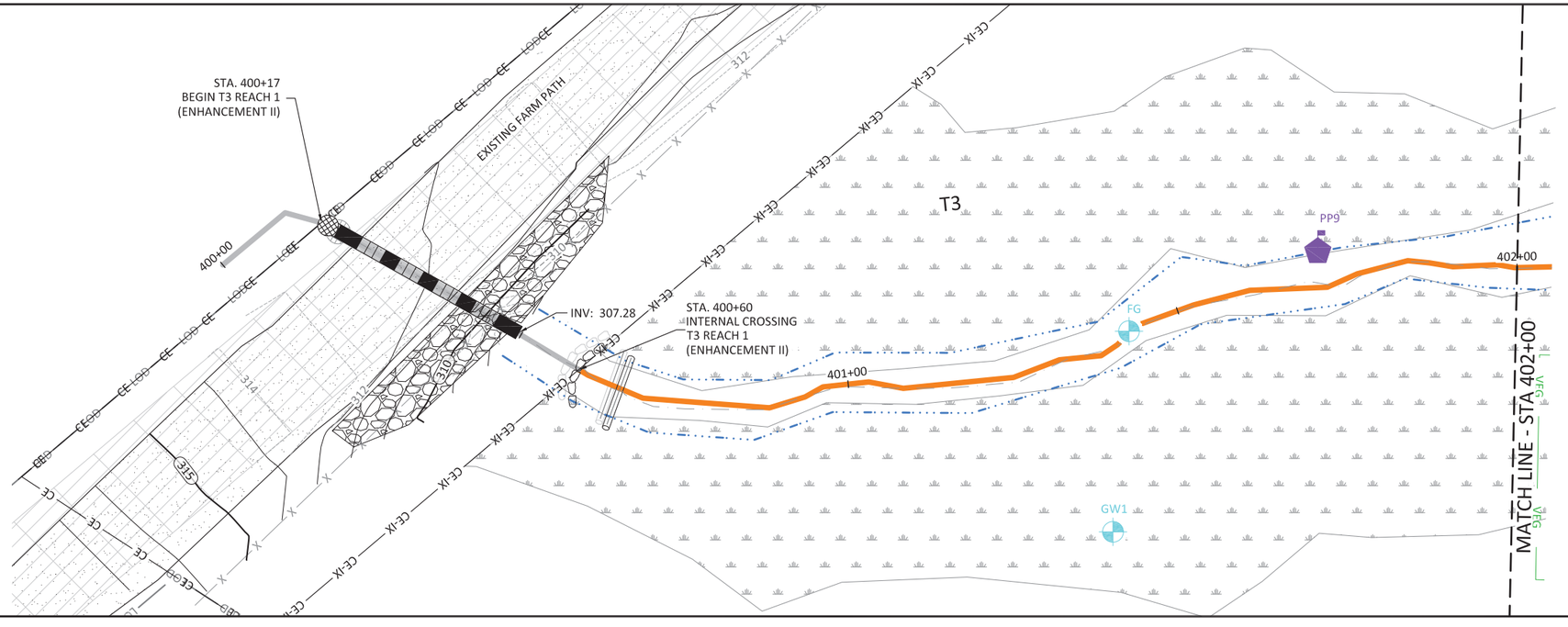
June 5, 2023





NOTES:
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Cool Springs Mitigation Site
Harnett County, North Carolina

T3
Stream Plan and Profile

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.4.1

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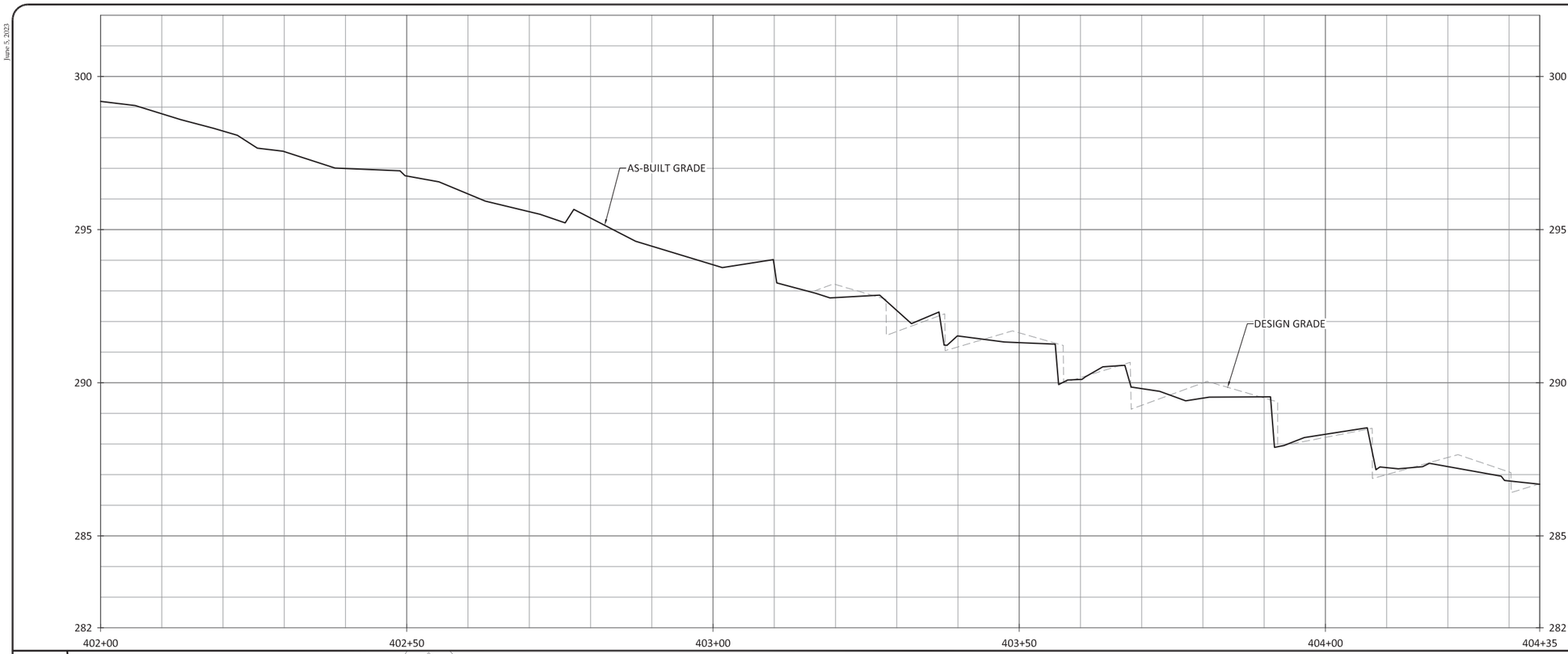

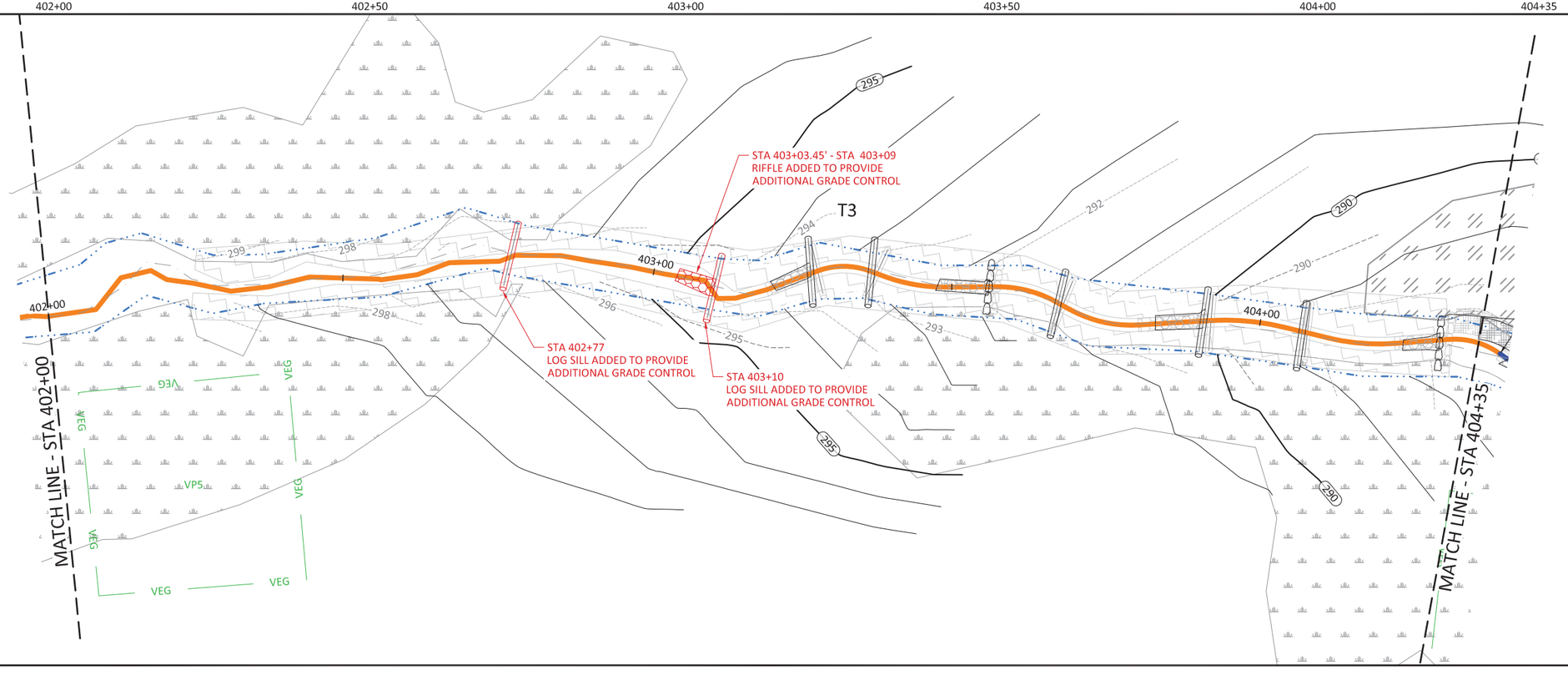

NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

0' 2' 4' 6'
(VERTICAL)
0' 10' 20' 30'
(HORIZONTAL)

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

T3
Stream Plan and Profile

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.4.2

June 5, 2023

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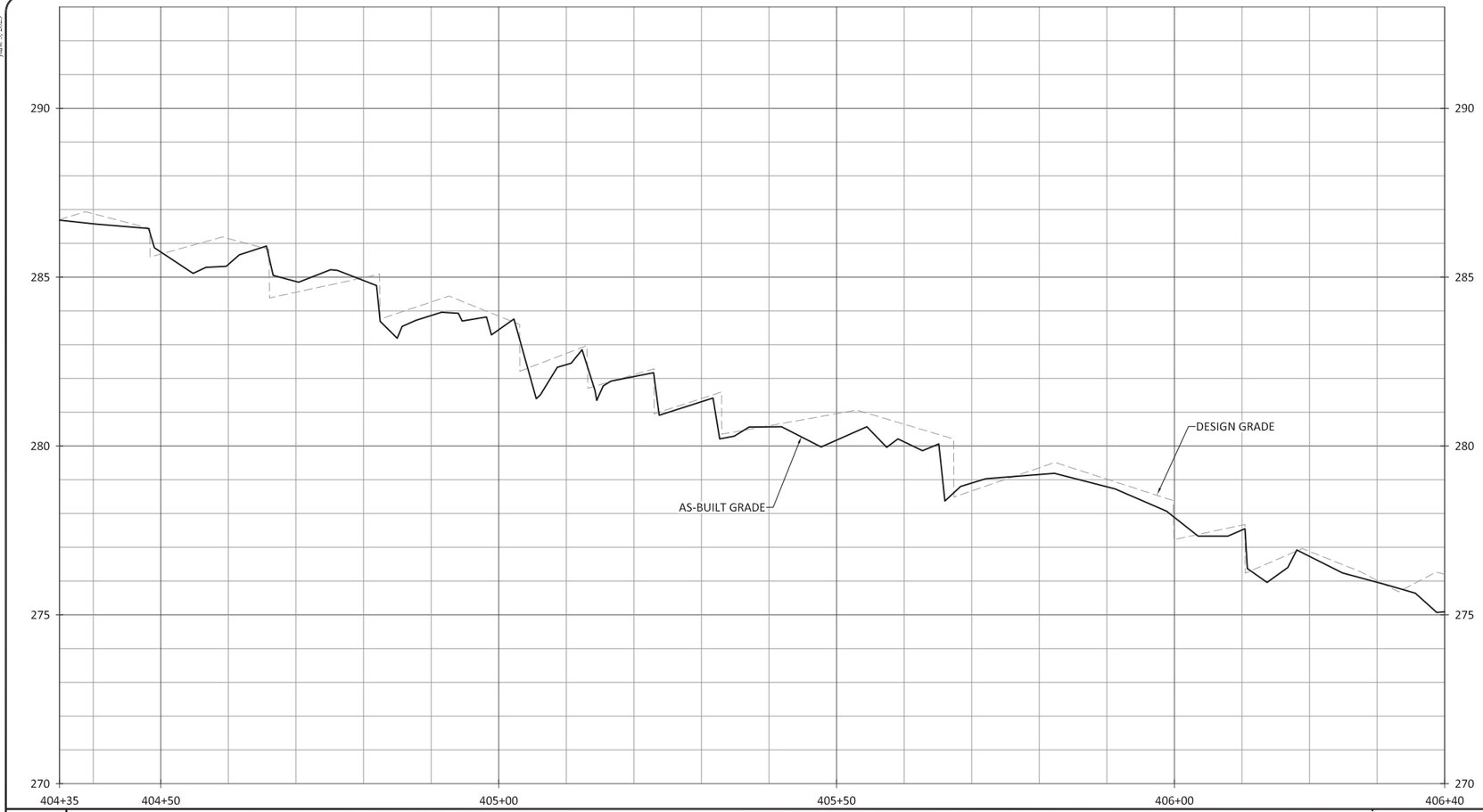
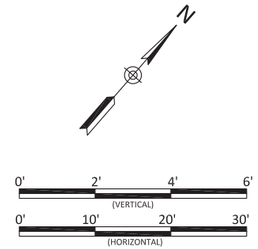
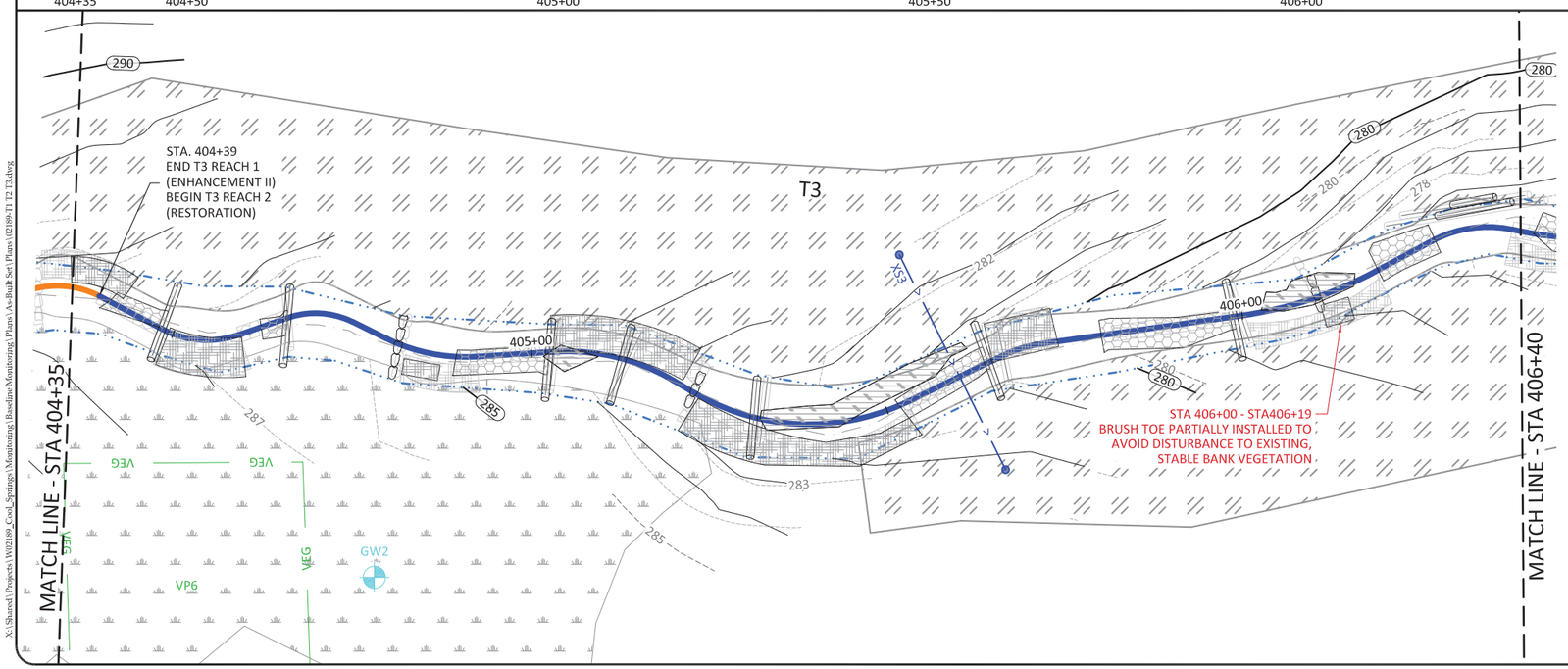
June 5, 2023







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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 — 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

T3
Stream Plan and Profile

Revisions:

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 1.4.3

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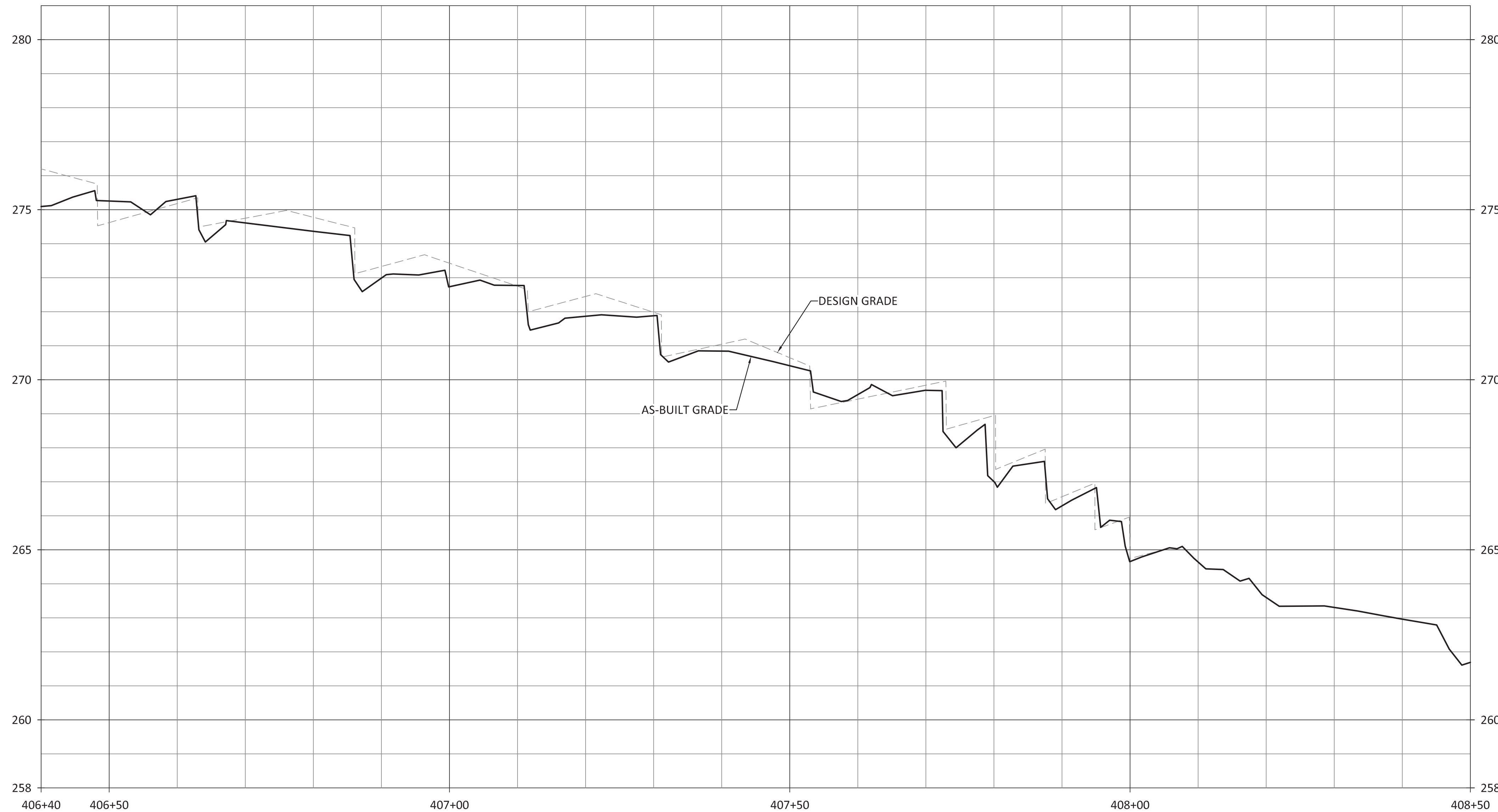
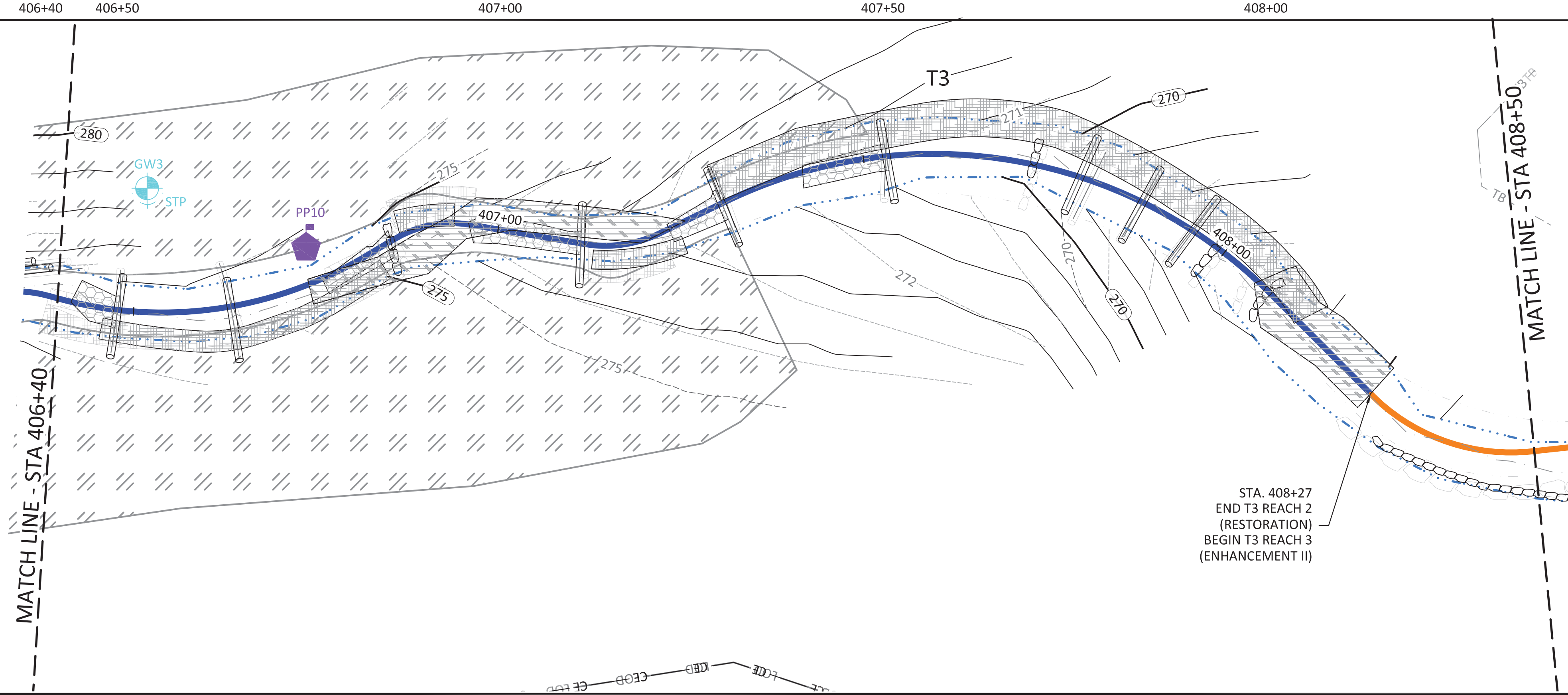


0' 2' 4' 6'
(VERTICAL)
0' 10' 20' 30'
(HORIZONTAL)



NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR UT? IS ADDRESSED ON SHEETS ## THROUGH ##.

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Cool Springs Mitigation Site
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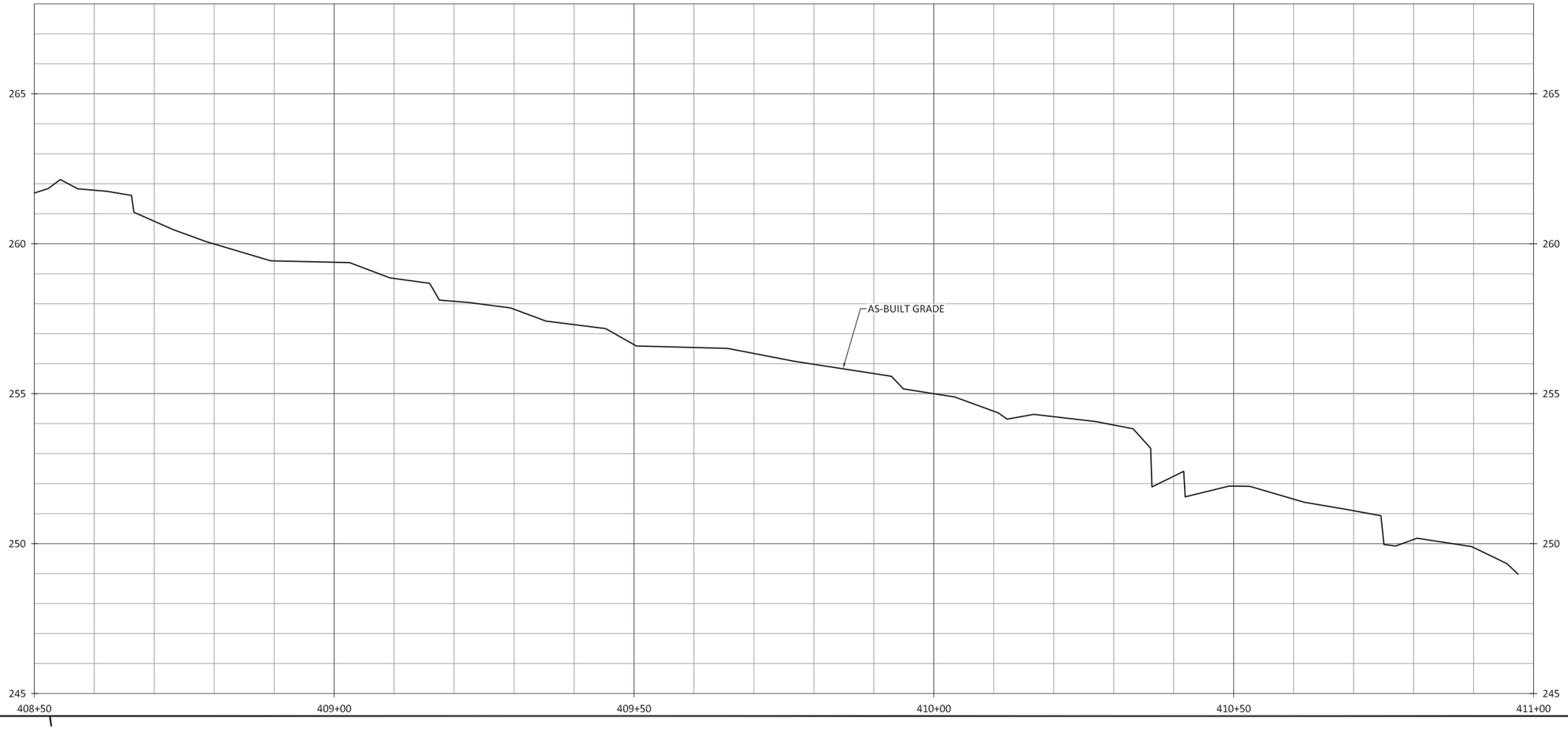
T3
Stream Plan and Profile

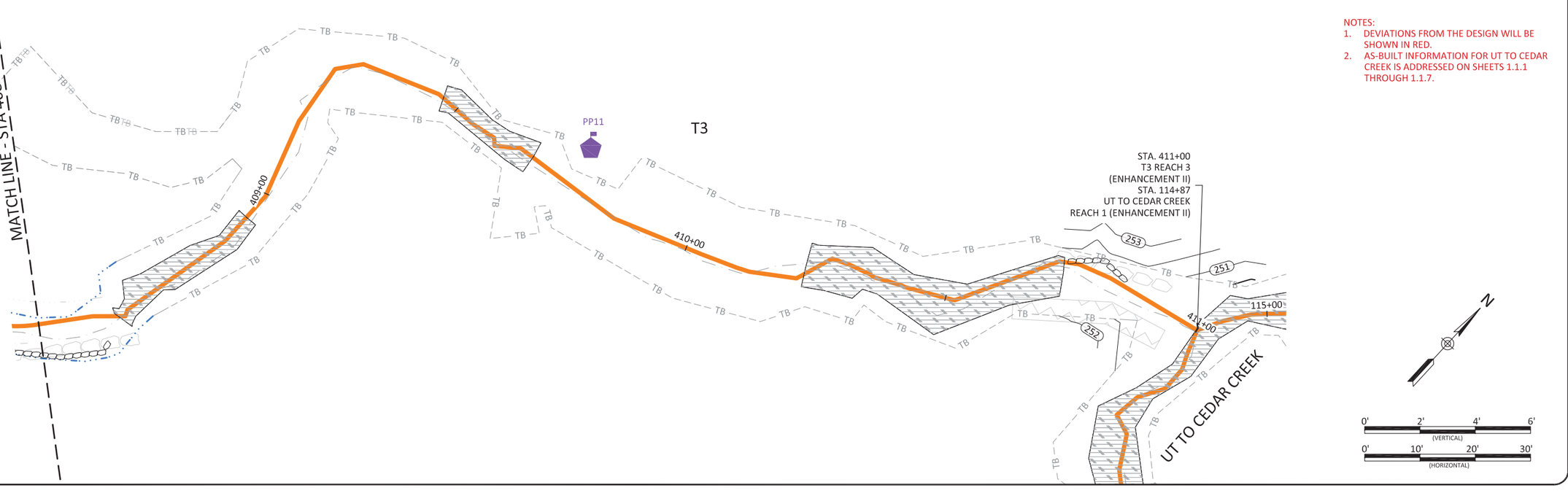
Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.4.4

June 5, 2023





NOTES:
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 — 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

T3
Stream Plan and Profile

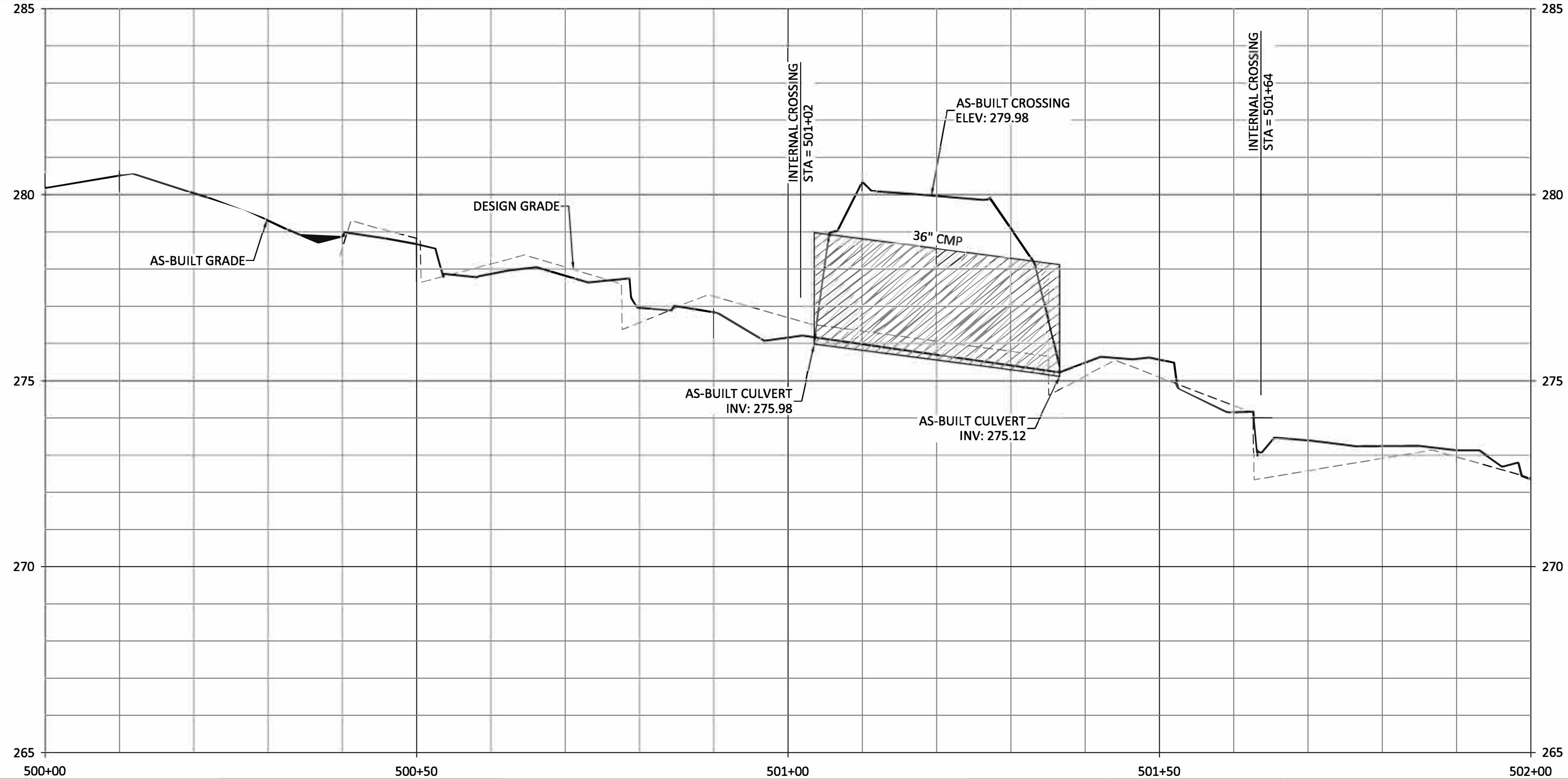
Revisions:

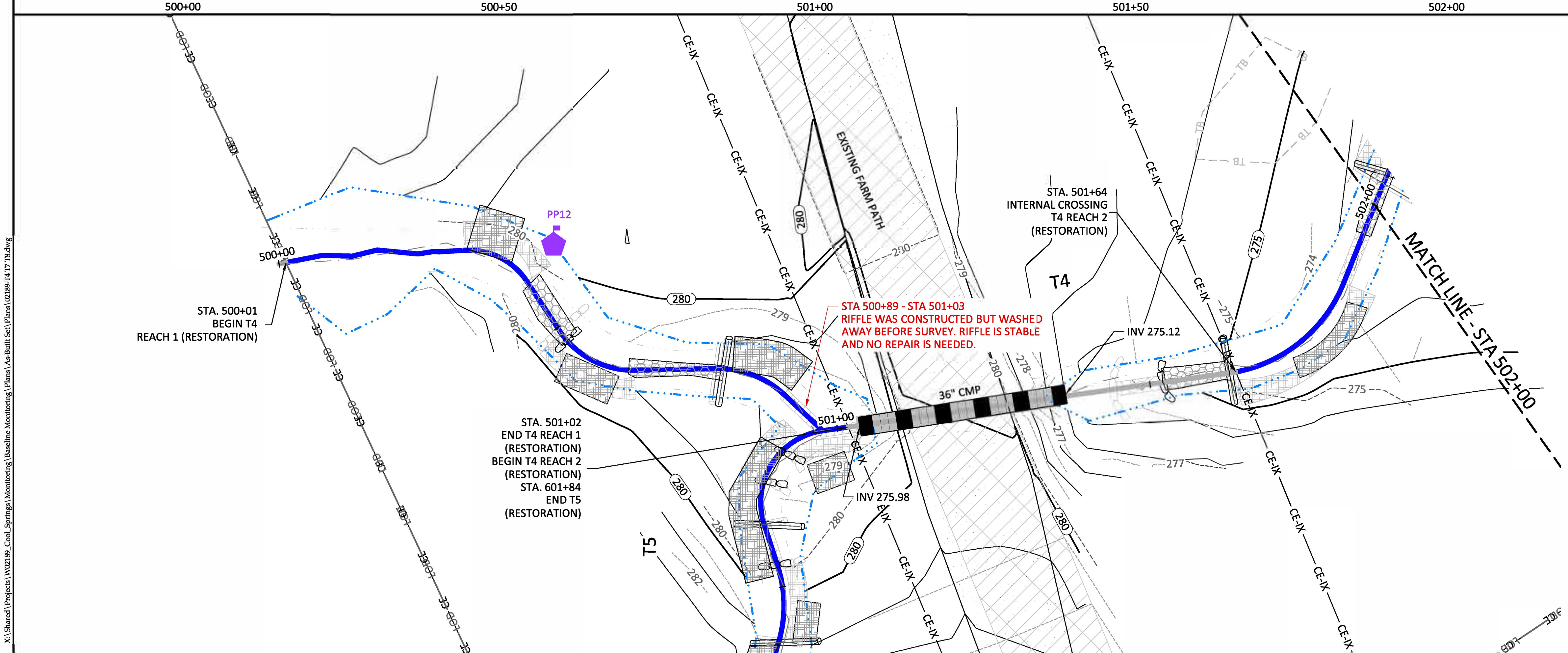
Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 1.4.5

X:\Shared\Projects\WI02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-T1 T2 T3.dwg

June 30, 2023





NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR T5 IS ADDRESSED ON SHEET 1.6.1.

0' 2' 4' 6' (VERTICAL)
0' 10' 20' 30' (HORIZONTAL)

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Cool Springs Mitigation Site
Harnett County, North Carolina

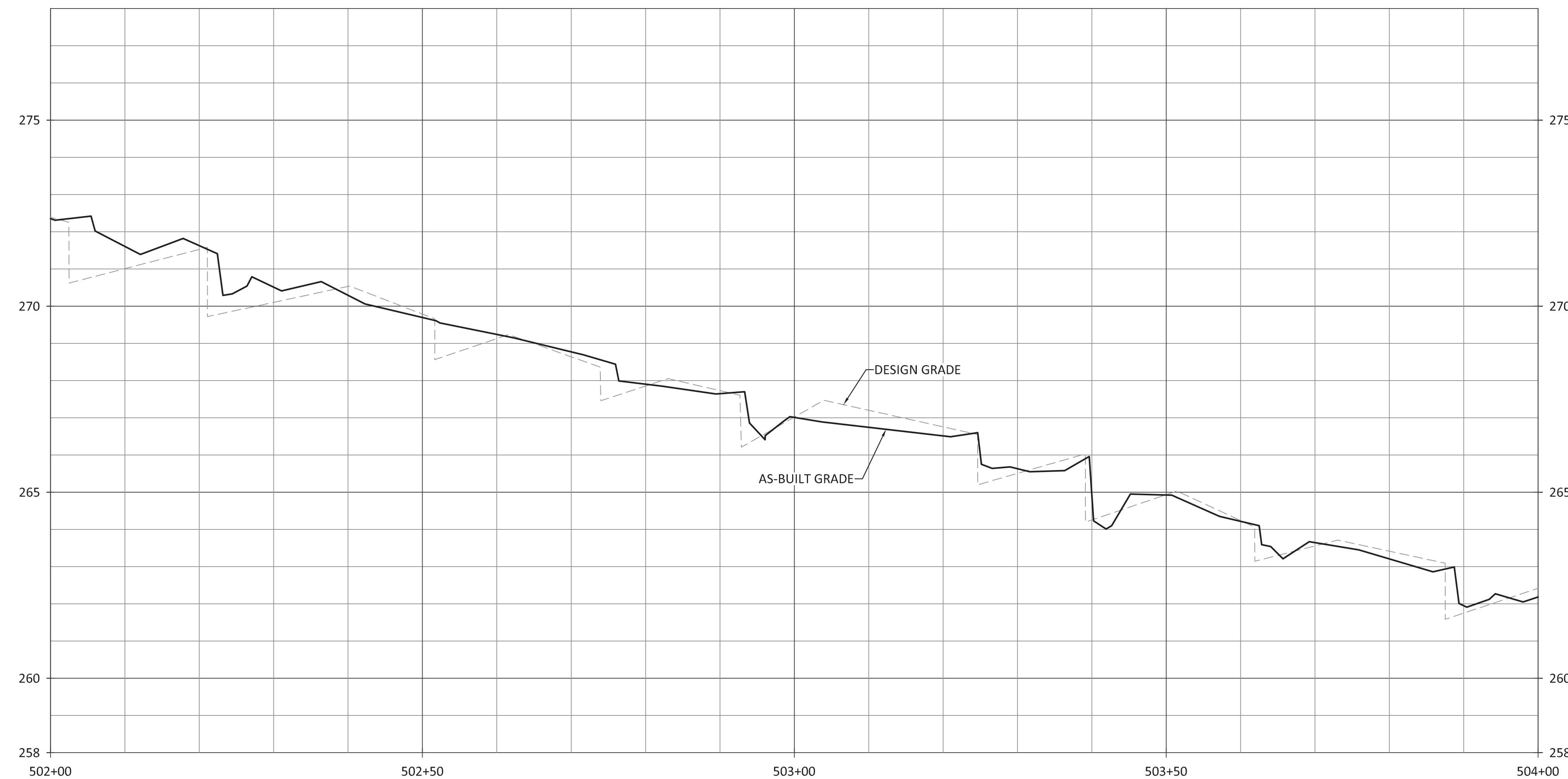
T4
Stream Plan and Profile

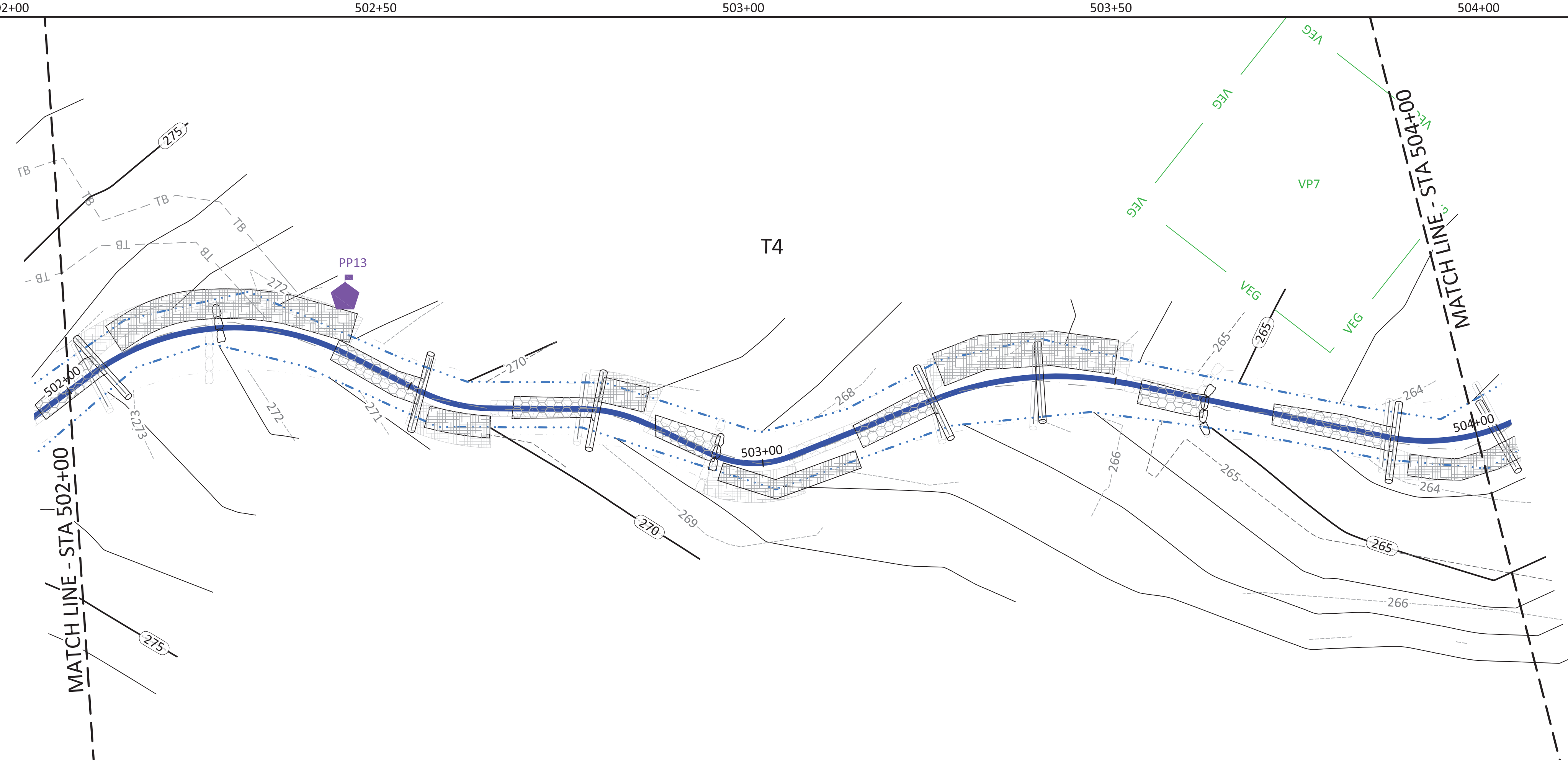
Revisions:
REV 1: ADDRESSING DMS COMMENTS

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet
1.5.1

X:\Shared\Projects\W02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-T4 T7 T8.dwg





NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

N

0' 2' 4' 6'
(VERTICAL)

0' 10' 20' 30'
(HORIZONTAL)

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Cool Springs Mitigation Site
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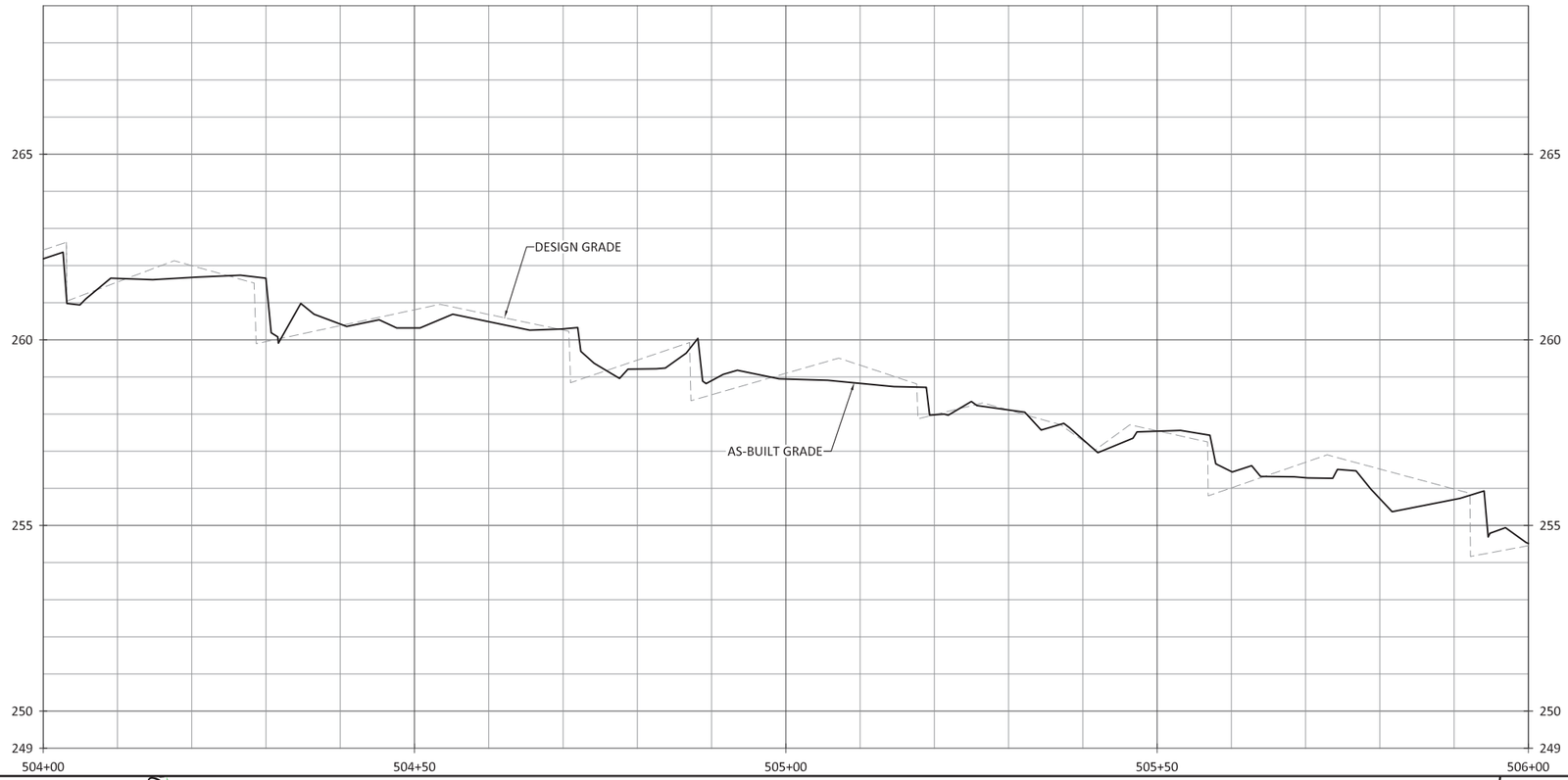
T4
Stream Plan and Profile

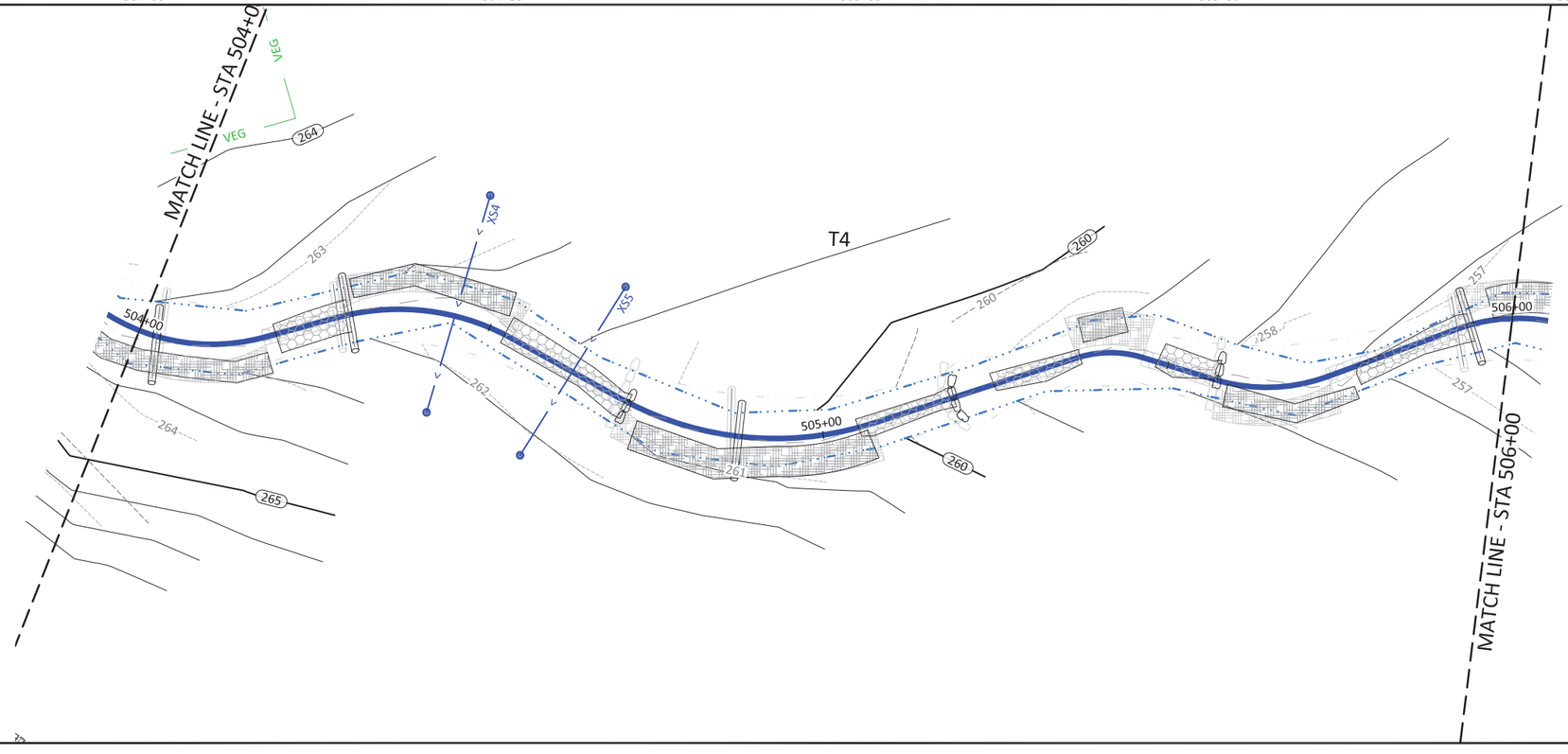
Revisions:

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 1.5.2

June 5, 2023





NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

0' 2' 4' 6'
(VERTICAL)
0' 10' 20' 30'
(HORIZONTAL)

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 — 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

T4
Stream Plan and Profile

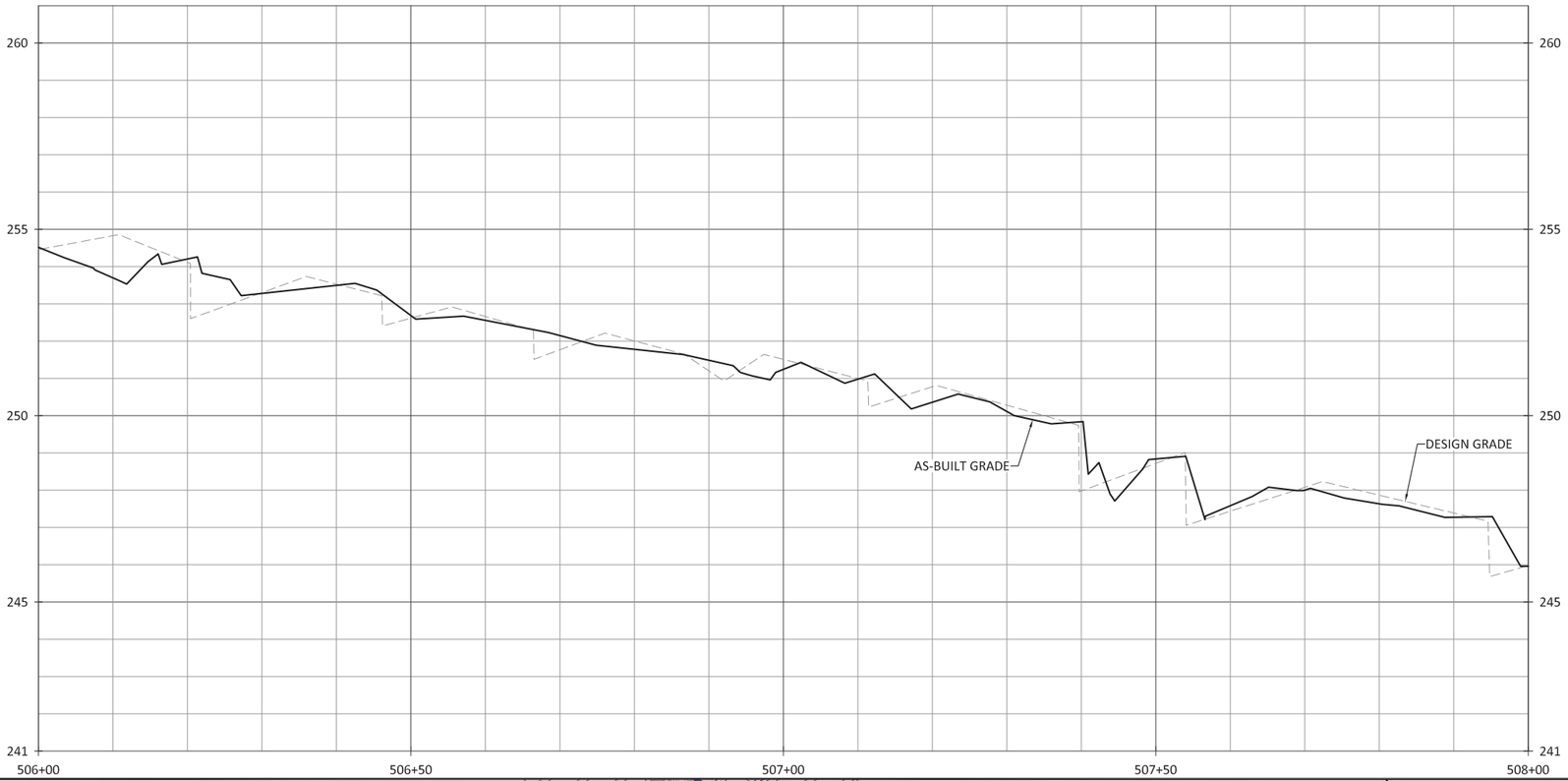
Revisions:

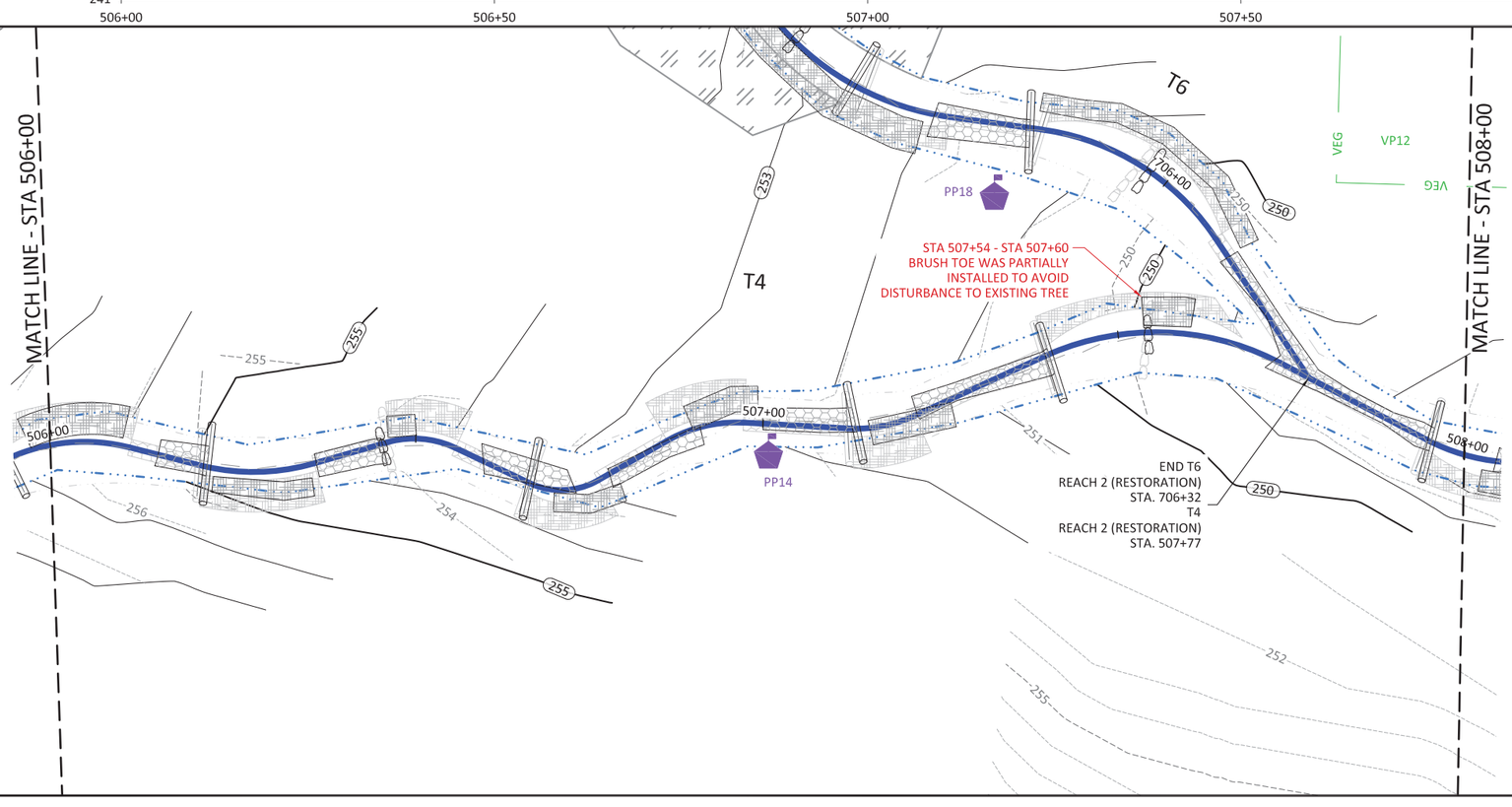
Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.5.3

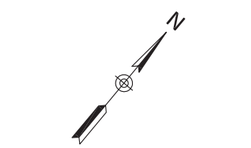
X:\Shared\Projects\WI02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-T4-TP-TR.dwg

June 5, 2023





NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR UT6 IS ADDRESSED ON SHEETS 1.7.1 THROUGH 1.7.3.



0' 2' 4' 6' (VERTICAL)

0' 10' 20' 30' (HORIZONTAL)

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Cool Springs Mitigation Site
Harnett County, North Carolina

T4
Stream Plan and Profile

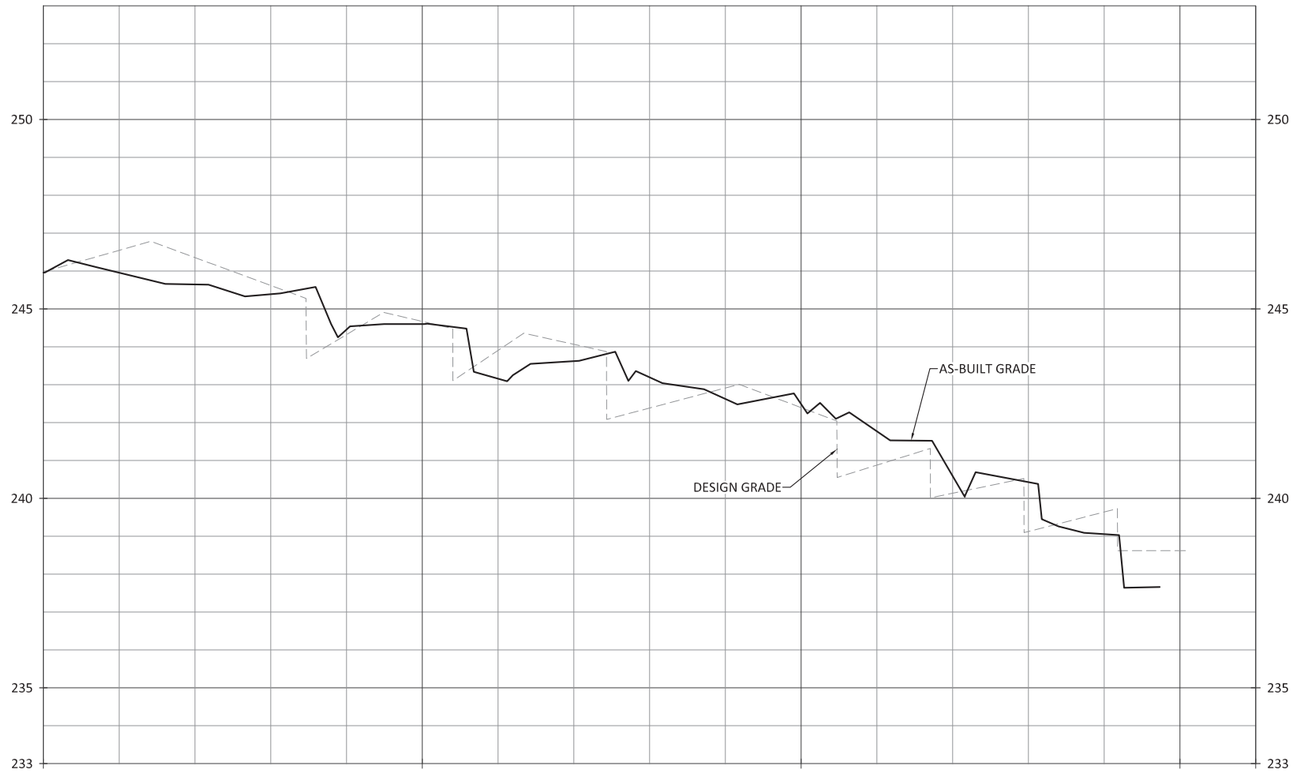
Revisions:

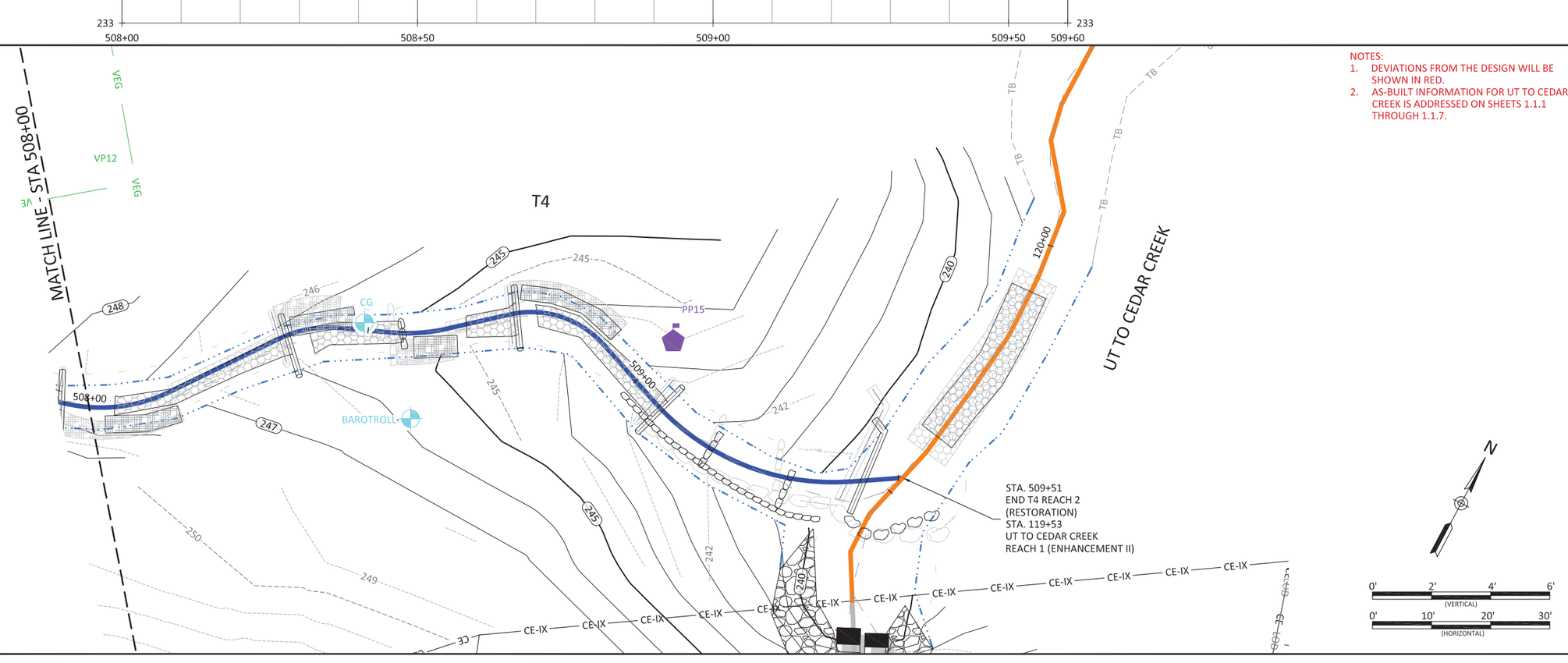
Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.5.4

X:\Shared\Projects\WI02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-T4 1.7 TR.dwg

June 5, 2023





NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR UT TO CEDAR CREEK IS ADDRESSED ON SHEETS 1.1.1 THROUGH 1.1.7.

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 — 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

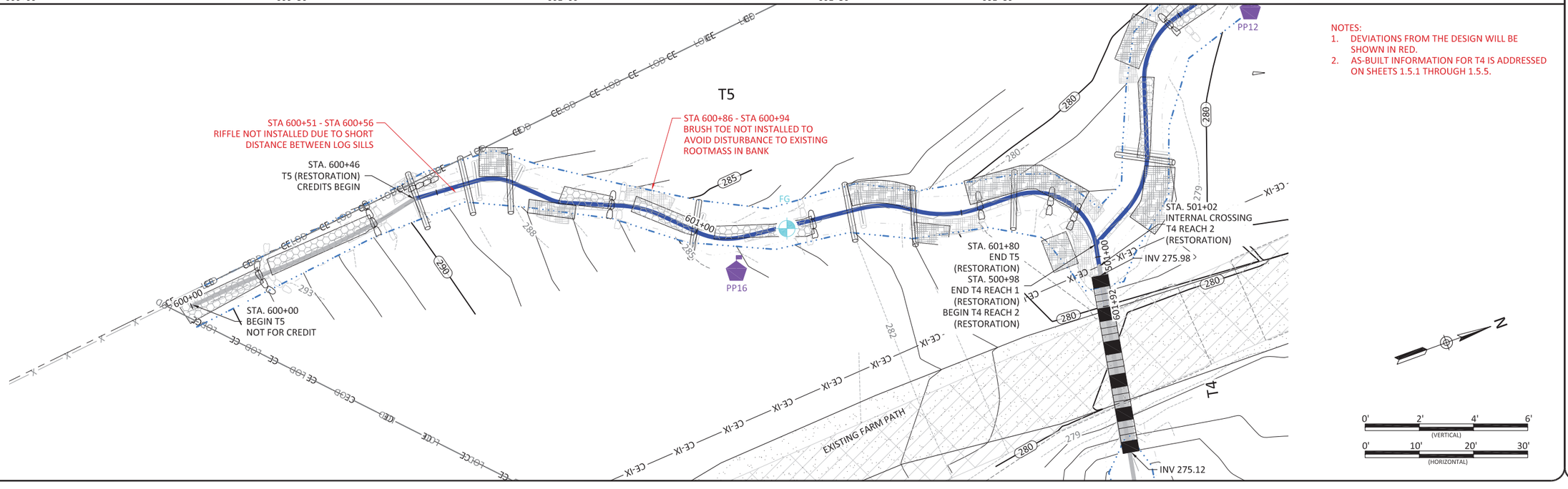
T4
Stream Plan and Profile

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.5.5

X:\Shared\Projects\WI02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189 T4 1.5 TB.dwg



NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR T4 IS ADDRESSED ON SHEETS 1.5.1 THROUGH 1.5.5.

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 — 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

T5
Stream Plan and Profile

Revisions:

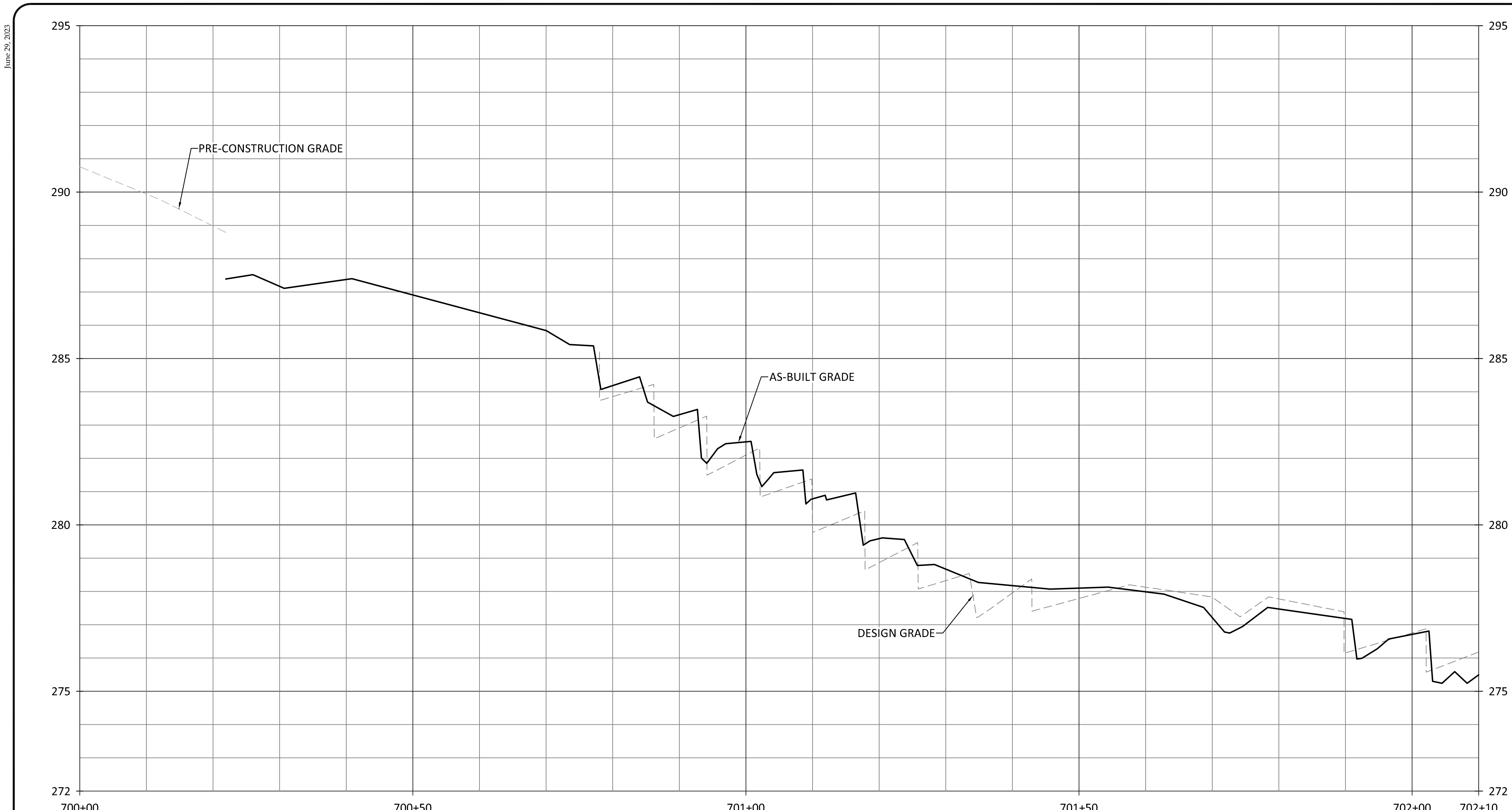
Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

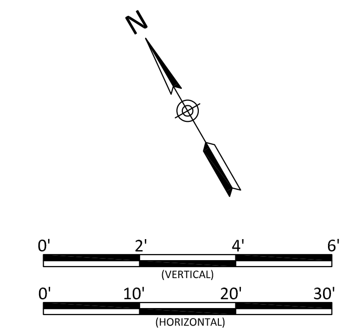
Sheet 1.6.1

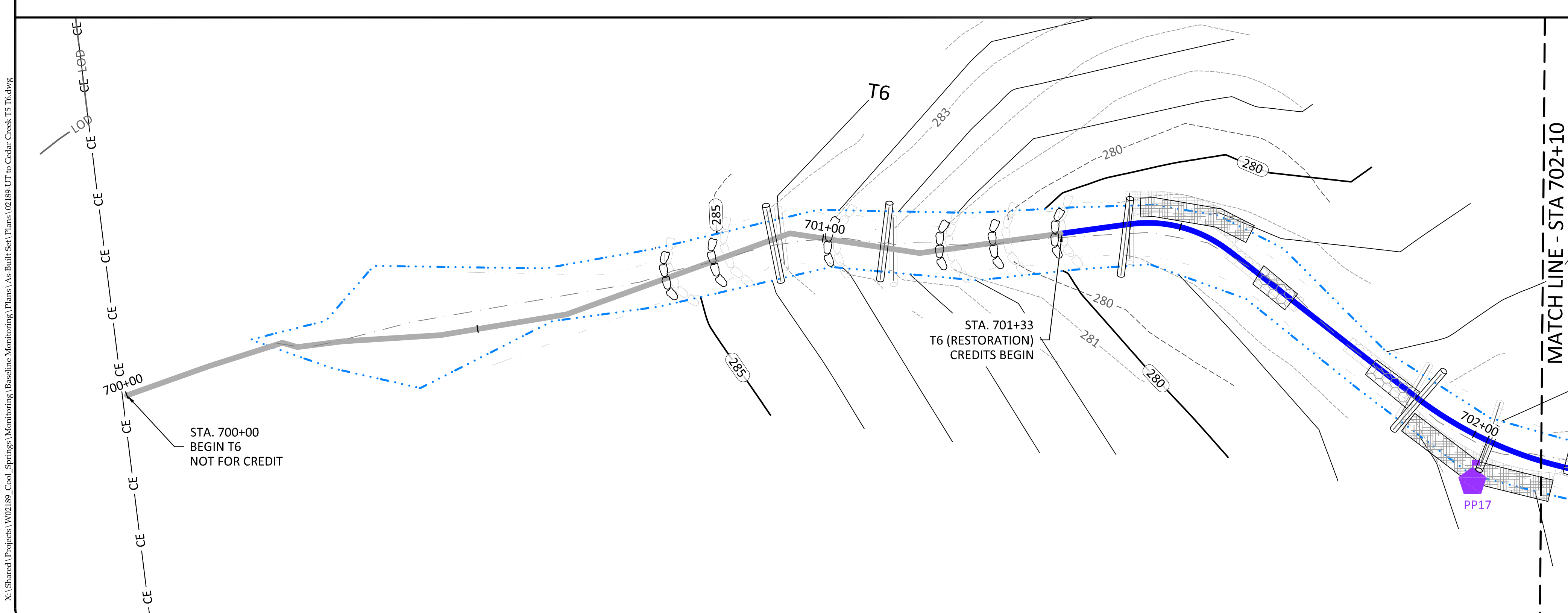
June 5, 2023

X:\Shared\Projects\WH2189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-LT5 to Cedar Creek_T5 To.dwg

June 29, 2023







NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

X:\Shared\Projects\W02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-UT to Cedar Creek T5 T6.dwg

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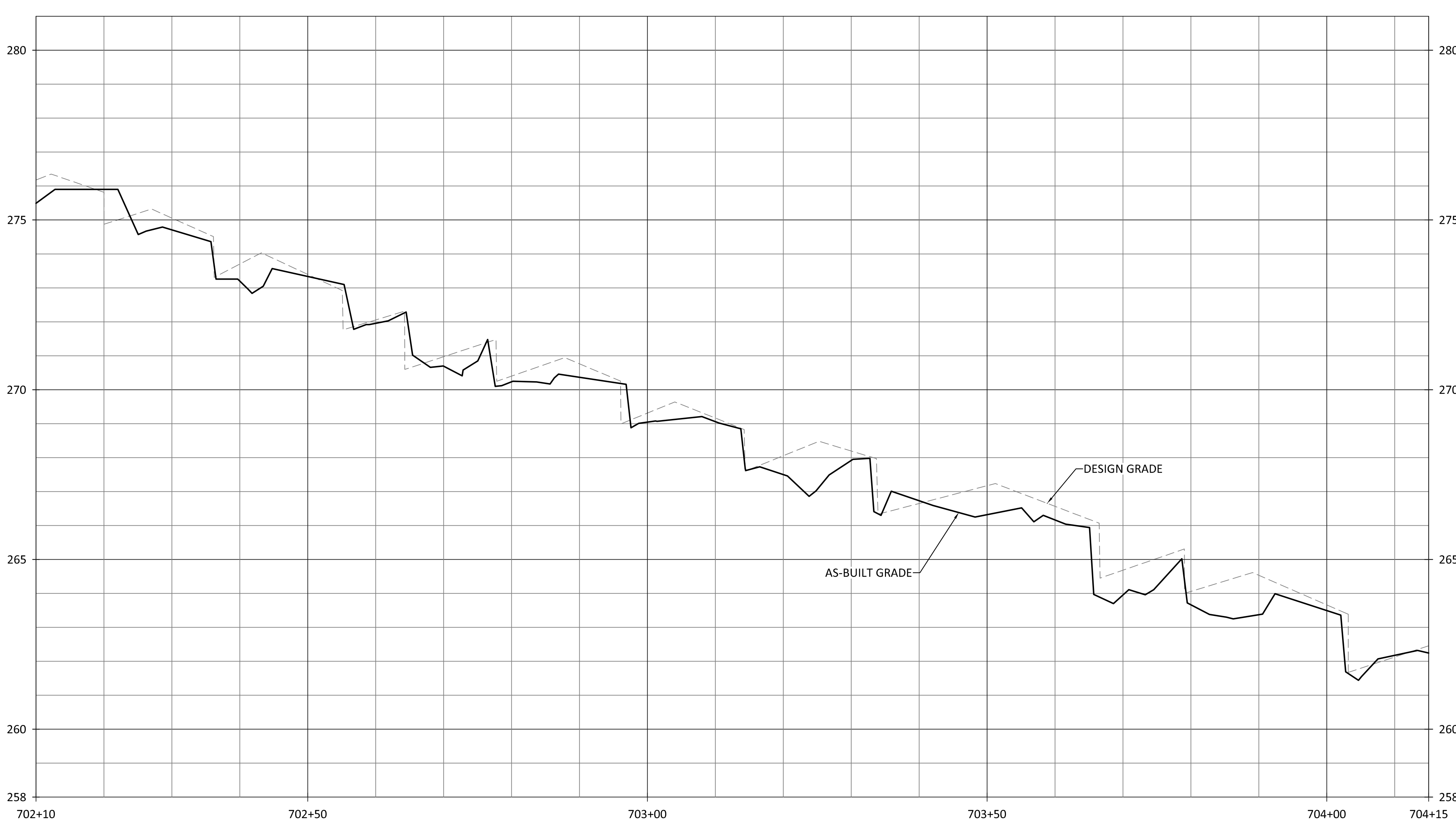
Cool Springs Mitigation Site
Harnett County, North Carolina

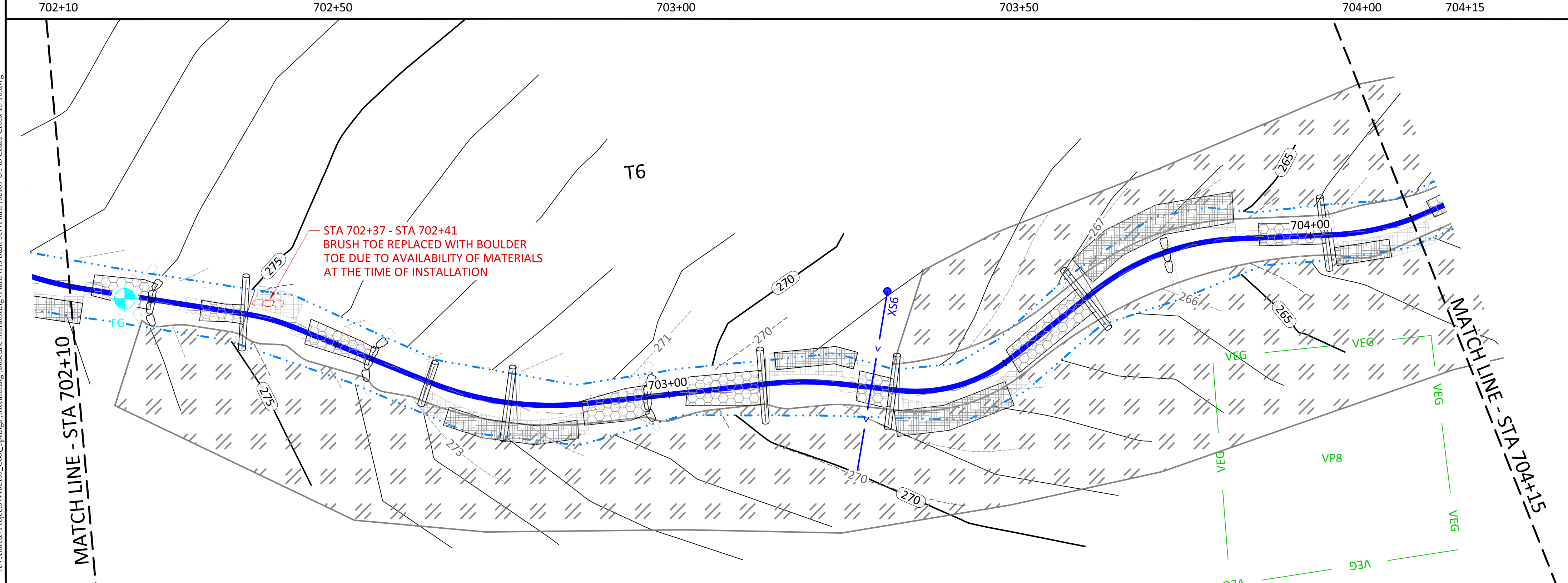
T6
Stream Plan and Profile

Revisions:
REV 1: ADDRESSING DMS COMMENTS

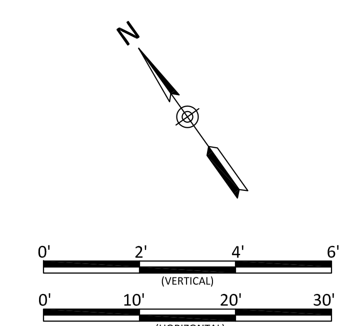
Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet
1.7.1





NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.



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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027

Cool Springs Mitigation Site
Harnett County, North Carolina

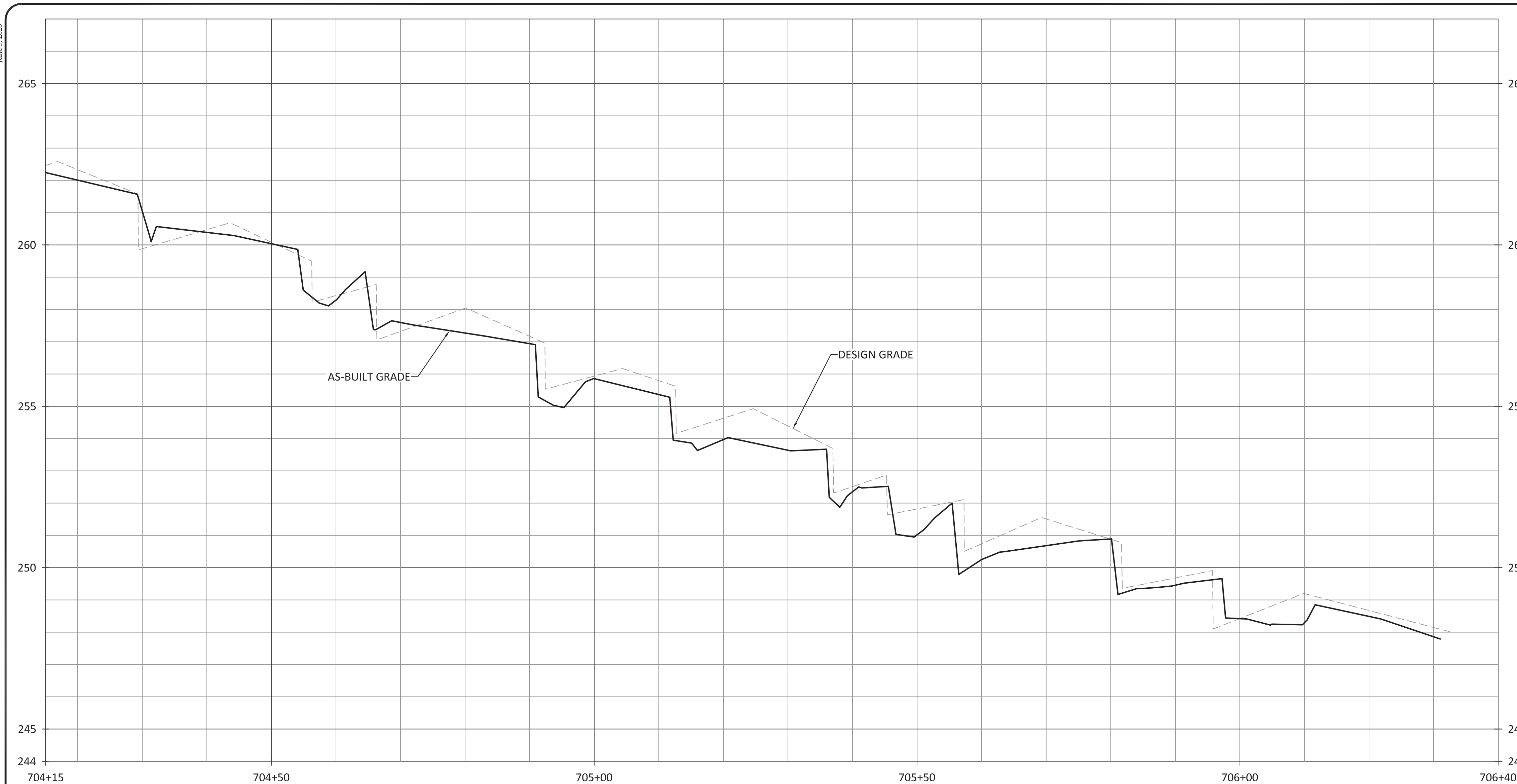
T6
Stream Plan and Profile

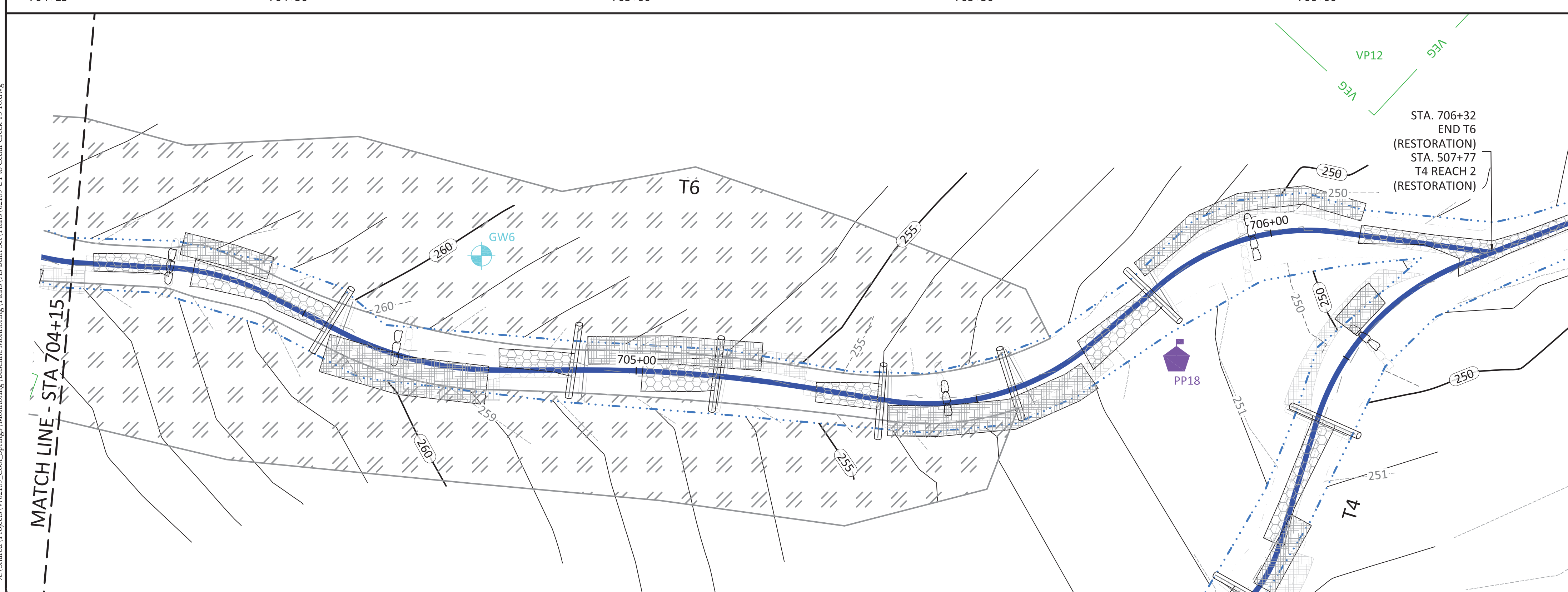
Revisions:
REV 1: ADDRESSING DMS COMMENTS

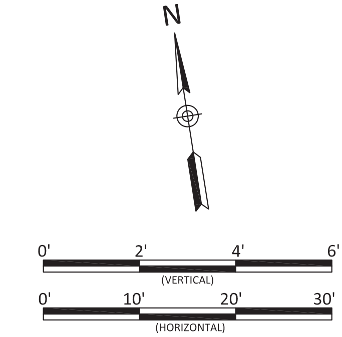
Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 1.7.2

June 5, 2023







NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR T4 IS ADDRESSED ON SHEETS 1.5.1 THROUGH 1.5.5.

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Cool Springs Mitigation Site
Harnett County, North Carolina

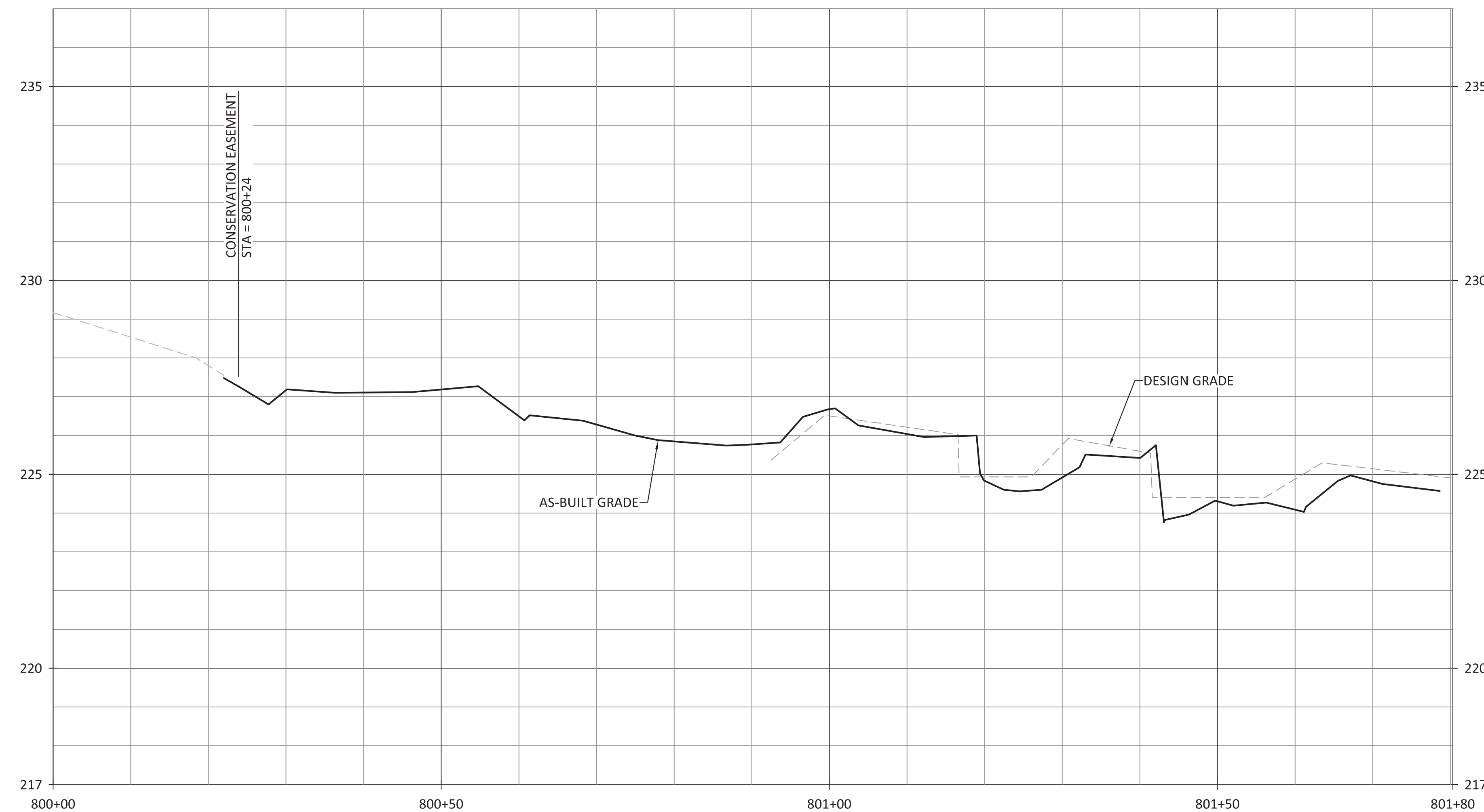
T6
Stream Plan and Profile

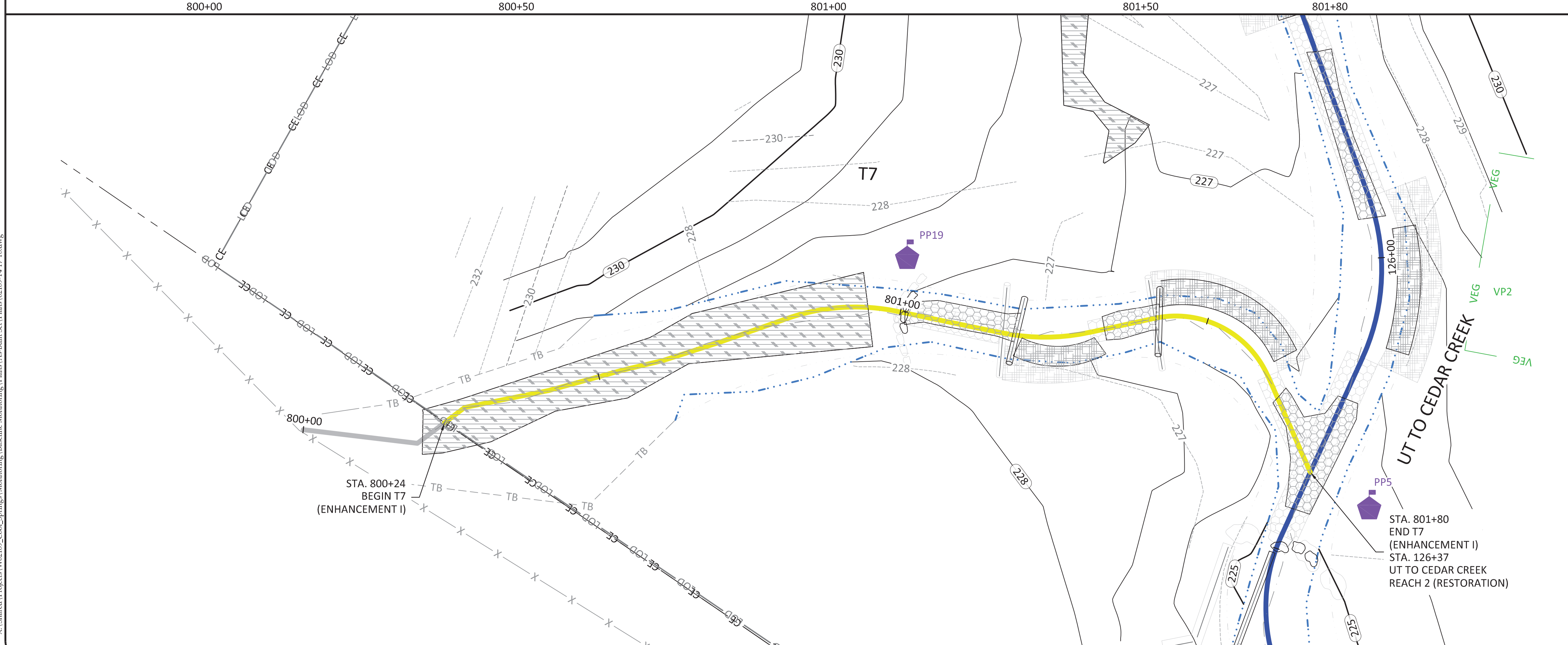
Revisions:

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

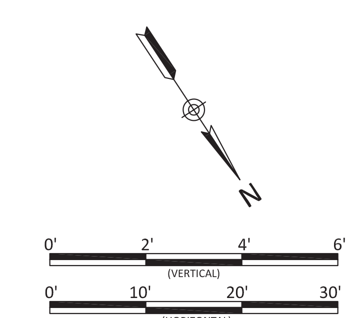
Sheet 1.7.3

X:\Shared\Projects\W02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-UT to Cedar Creek T5 T6.dwg





NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR UT TO CEDAR CREEK IS ADDRESSED ON SHEETS 1.1.1 THROUGH 1.1.7.



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Cool Springs Mitigation Site
Harnett County, North Carolina

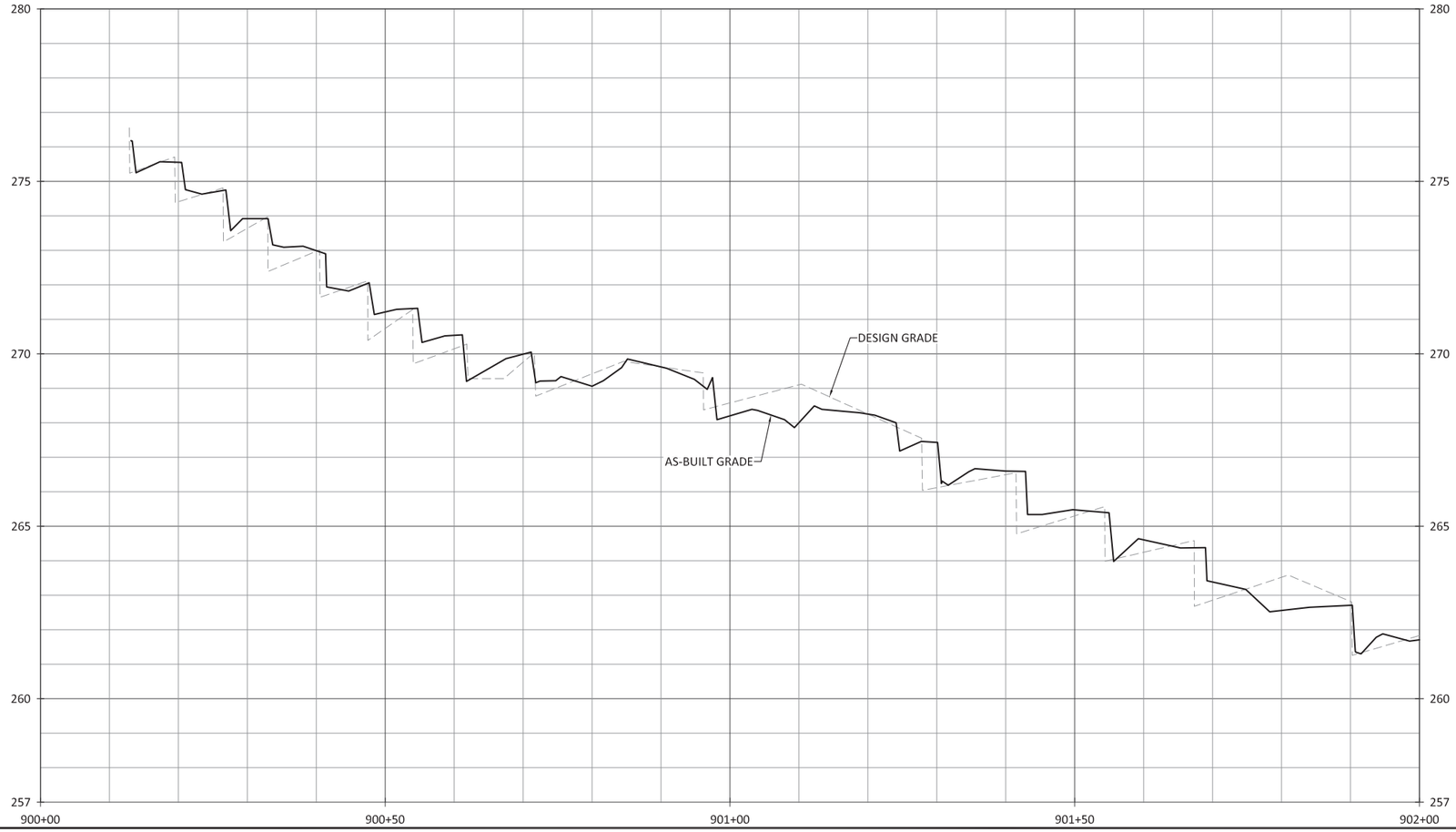
T7
Stream Plan and Profile

Revisions:

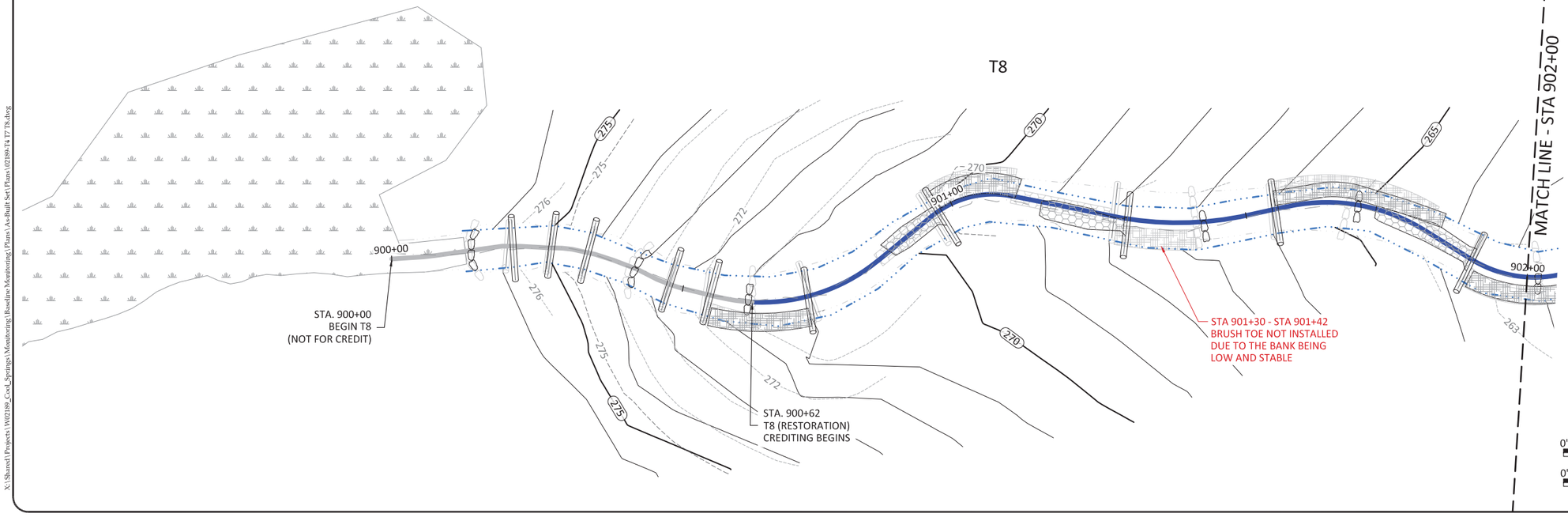
Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 1.8.1

June 5, 2023



NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.



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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

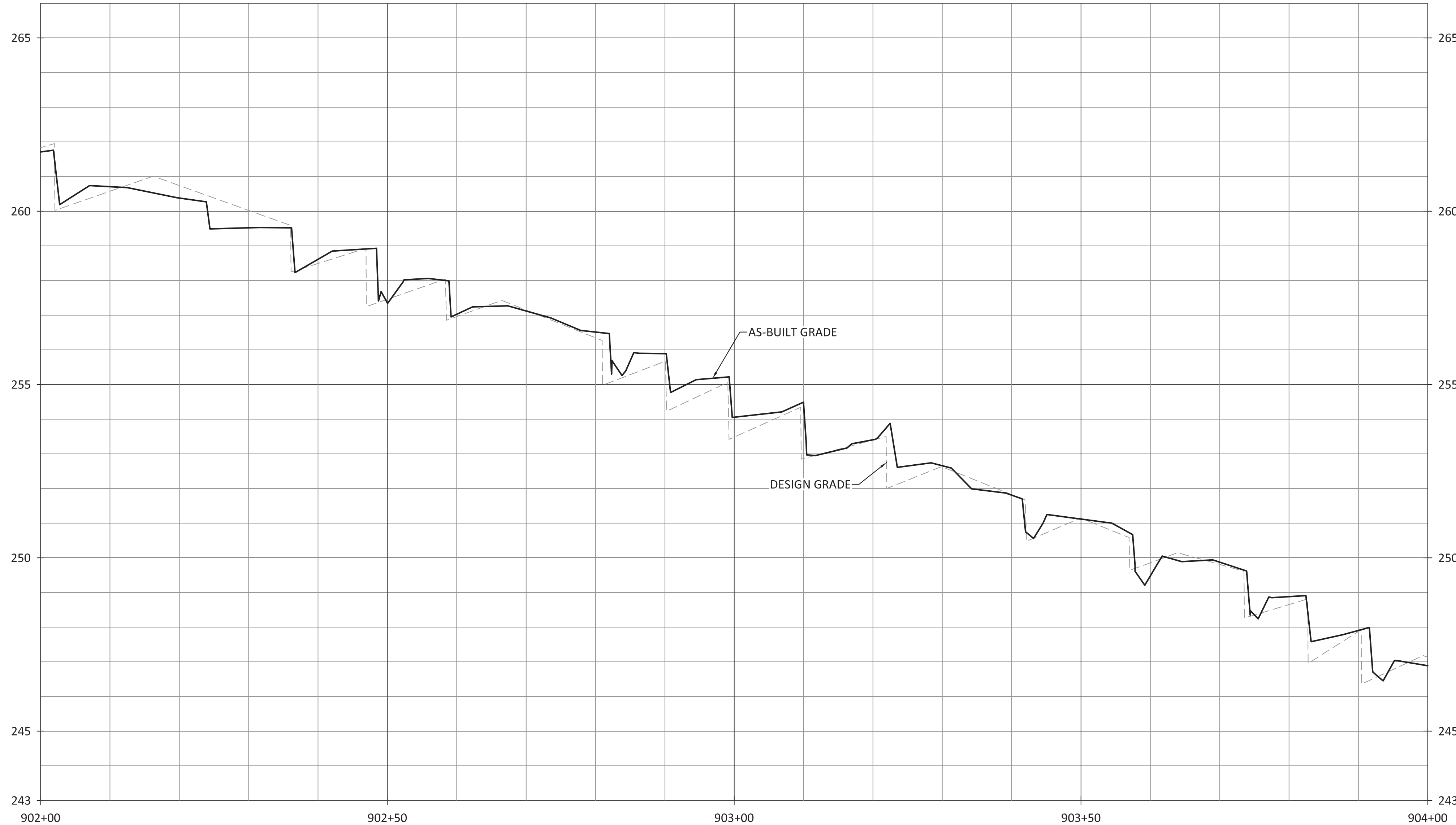
T8
Stream Plan and Profile

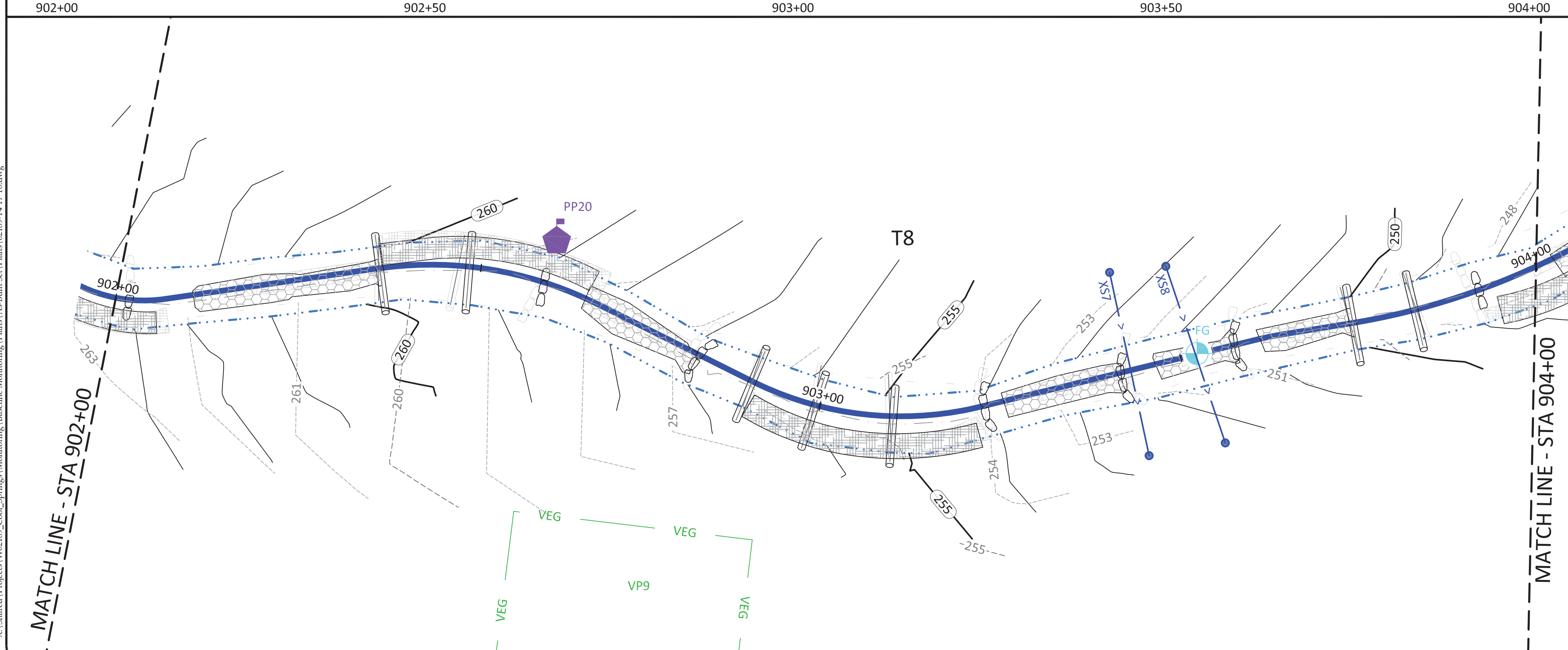
Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.9.1

X:\Shared\Projects\WH02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189_T4 T7 T8.dwg





NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

N

0' 2' 4' 6' (VERTICAL)

0' 10' 20' 30' (HORIZONTAL)

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027
6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

T8
Stream Plan and Profile

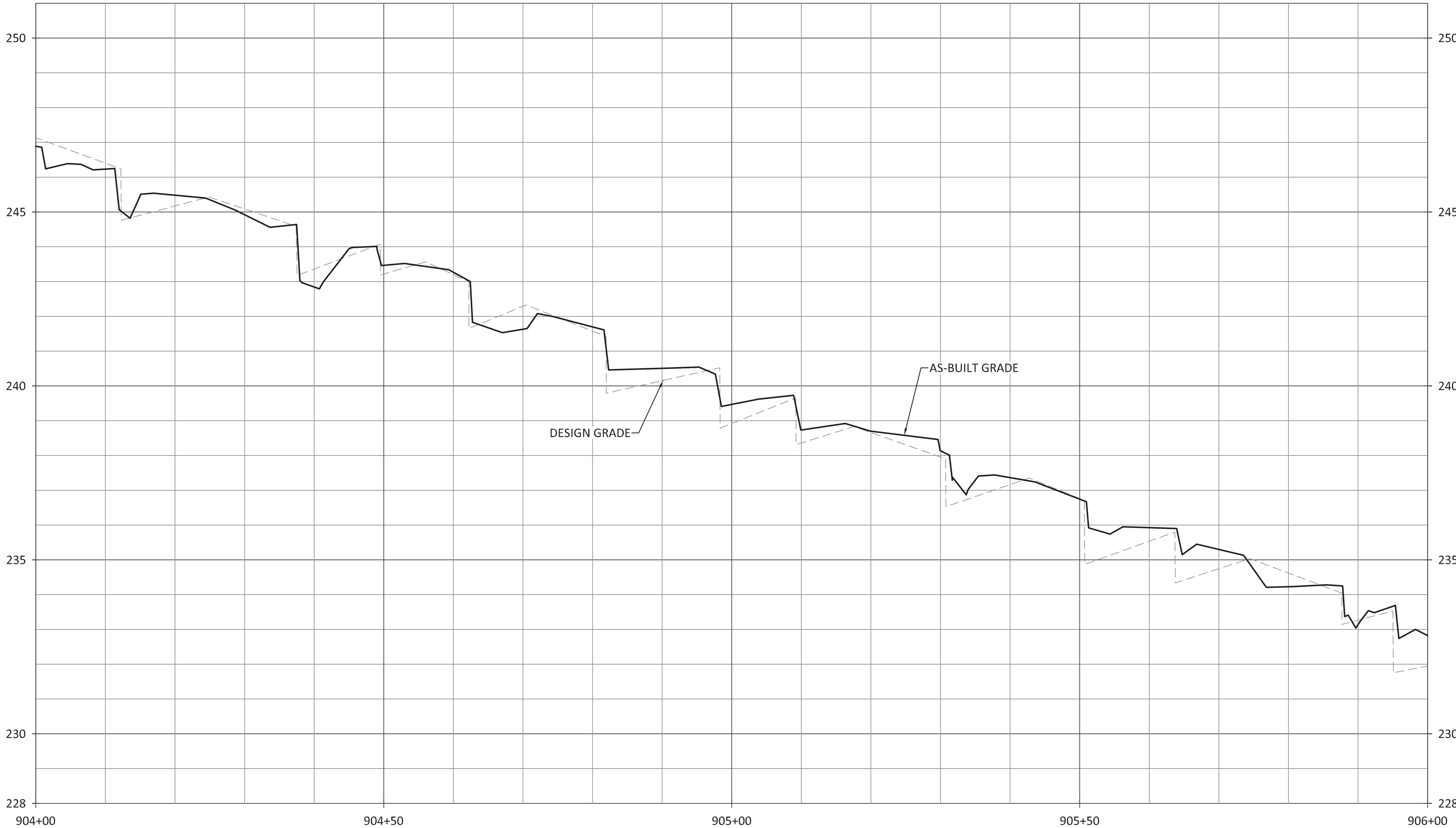
Revisions:

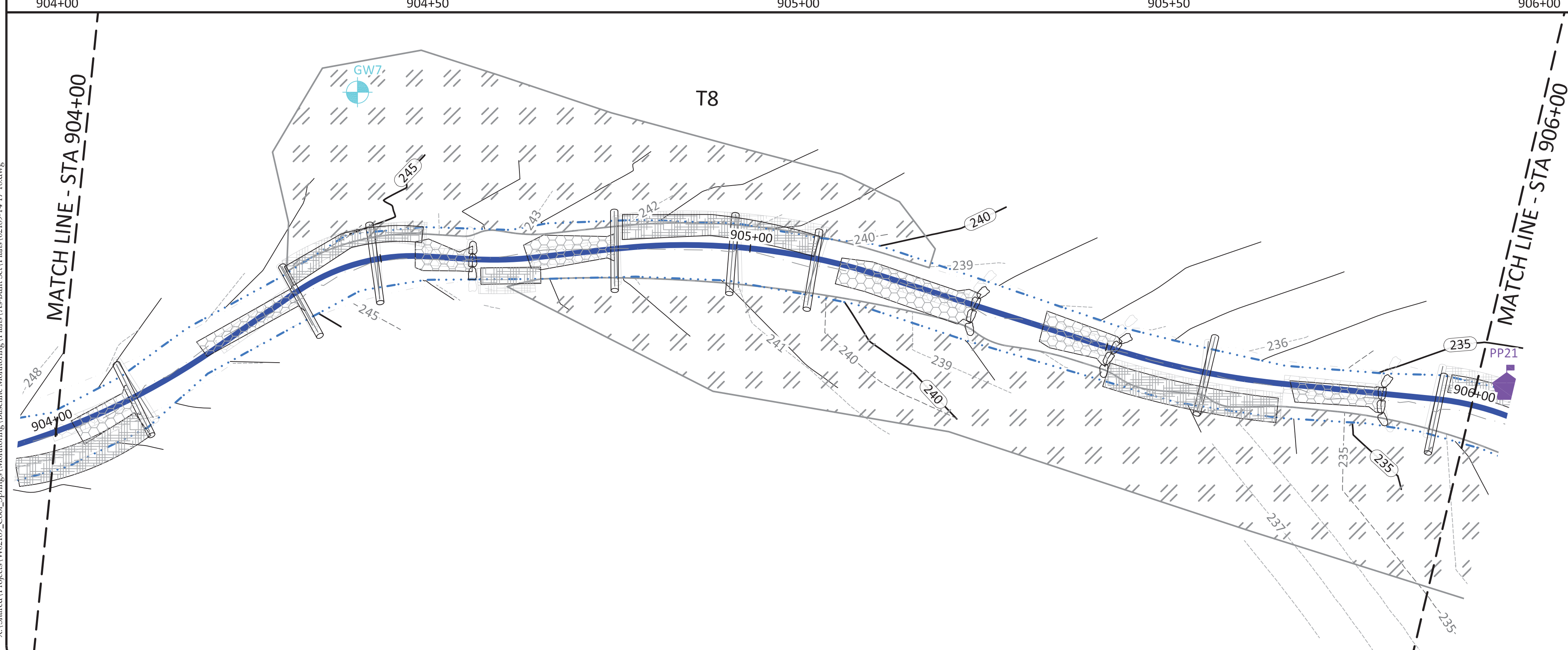
Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.9.2

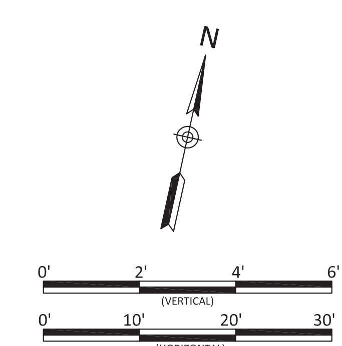
June 5, 2023

X:\Shared\Projects\W02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-T4 T7 T8.dwg





NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR UT? IS ADDRESSED ON SHEETS ## THROUGH ##.



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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027
6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

T8
Stream Plan and Profile

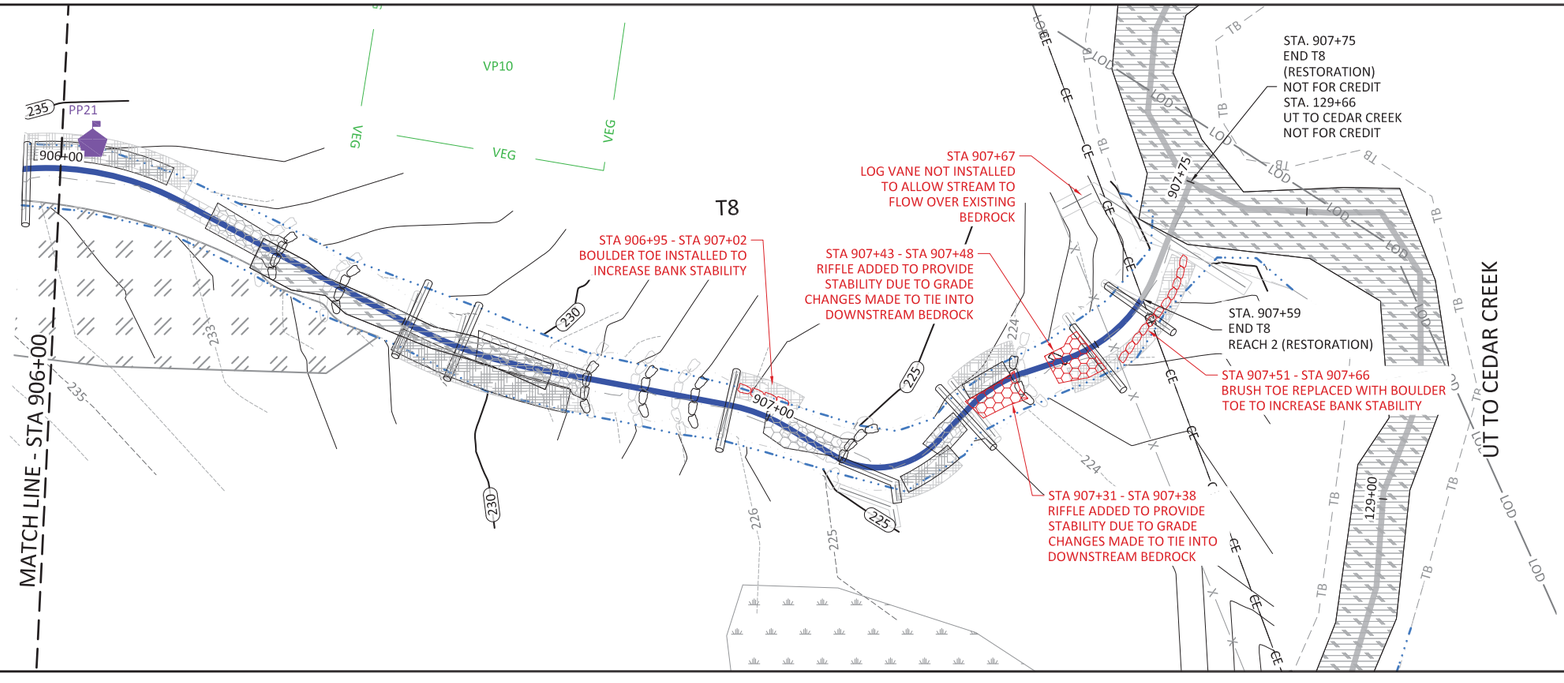
Revisions:

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 1.9.3

June 5, 2023

X:\Shared\Projects\W02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-T4 T7 T8.dwg



NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR UT TO CEDAR CREEK IS ADDRESSED ON SHEETS 1.1.1 THROUGH 1.1.7.

N

0' 2' 4' 6' (VERTICAL)

0' 10' 20' 30' (HORIZONTAL)

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 — 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

T8
Stream Plan and Profile

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 1.9.4

June 5, 2023

X:\Shared\Projects\WI02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189_T4_T7_T8.dwg

June 5, 2023

NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

COOL SPRINGS RD
R/W
R/W
R/W
R/W

STA. 801+80
END T7
(ENHANCEMENT I)
UT TO CEDAR CREEK
REACH 2 (RESTORATION)
STA. 126+37

STA. 127+73
END UT TO CEDAR CREEK
REACH 2 (RESTORATION)
BEGIN UT TO CEDAR CREEK
REACH 2 (RESTORATION)
NOT FOR CREDIT

STA. 800+24
BEGIN T7
(ENHANCEMENT I)

STA. 128+74
END UT TO CEDAR CREEK
REACH 2 (RESTORATION)
NOT FOR CREDIT

STA. 907+59
END T8
(RESTORATION)

STA. 907+75
END T8
(RESTORATION)
NOT FOR CREDIT

STA. 124+19
END UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)
BEGIN UT TO CEDAR CREEK
REACH 2 (RESTORATION)

STA. 118+65
INTERNAL CROSSING
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 180+00
BEGIN BMP5

STA. 182+95
END BMP5

STA. 119+29
INTERNAL CROSSING
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 509+51
END T4 REACH 2
(RESTORATION)
STA. 119+53
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 706+32
END T6
(RESTORATION)
STA. 507+77
T4 REACH 2
(RESTORATION)

STA. 305+12
END T2
(RESTORATION)
STA. 112+99
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 411+00
END T3 REACH 3
(ENHANCEMENT II)
STA. 114+87
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

PROPOSED 30' ACCESS EASEMENT
ALONG CENTERLINE OF EXISTING
GRAVEL AREAS (2.01 ACRES)

STA. 300+00
BEGIN BMP4

STA. 300+42
END BMP4
BEGIN T2
(RESTORATION)

STA. 170+00
BEGIN BMP3

STA. 171+47
END BMP3

STA. 160+00
BEGIN BMP2

STA. 150+95
BEGIN BMP1

STA. 100+58
BEGIN UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 152+44
END BMP1
STA. 100+68
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 161+39
END BMP2
STA. 102+26
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 204+44
END T1
(ENHANCEMENT II)
STA. 103+68
UT TO CEDAR CREEK
REACH 1 (ENHANCEMENT II)

STA. 200+27
BEGIN T1
(ENHANCEMENT II)

STA. 408+05
END T3 REACH 2
(RESTORATION)
BEGIN T3 REACH 3
(ENHANCEMENT II)

STA. 404+39
END T3 REACH 1
(ENHANCEMENT II)
BEGIN T3 REACH 2
(RESTORATION)

STA. 400+60
INTERNAL CROSSING
T3 REACH 1
(ENHANCEMENT II)

STA. 400+17
BEGIN T3 REACH 1
(ENHANCEMENT II)

STA. 900+62
T8 (RESTORATION)
CREDITS BEGIN

STA. 900+00
BEGIN T8
NOT FOR CREDIT

STA. 701+33
T6 (RESTORATION)
CREDITS BEGIN

STA. 700+00
BEGIN T6
NOT FOR CREDIT

STA. 501+64
INTERNAL CROSSING
T4 REACH 2
(RESTORATION)

STA. 500+01
BEGIN T4 REACH 1
(RESTORATION)

STA. 500+98
END T4 REACH 1
(RESTORATION)
BEGIN T4 REACH 2
(RESTORATION)
STA. 601+80
END T5
(RESTORATION)

STA. 501+02
INTERNAL CROSSING
T4 REACH 2
(RESTORATION)

STA. 600+46
T5 (RESTORATION)
CREDITS BEGIN

UT TO CEDAR CREEK
T1
T2
T3
T4
T5
T6
T8
2.1
2.2
2.3
2.4
2.5
2.6

N

0' 100' 200' 300'
(HORIZONTAL)

X:\Shared\Projects\W02169_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02169-BMP Overview.dwg

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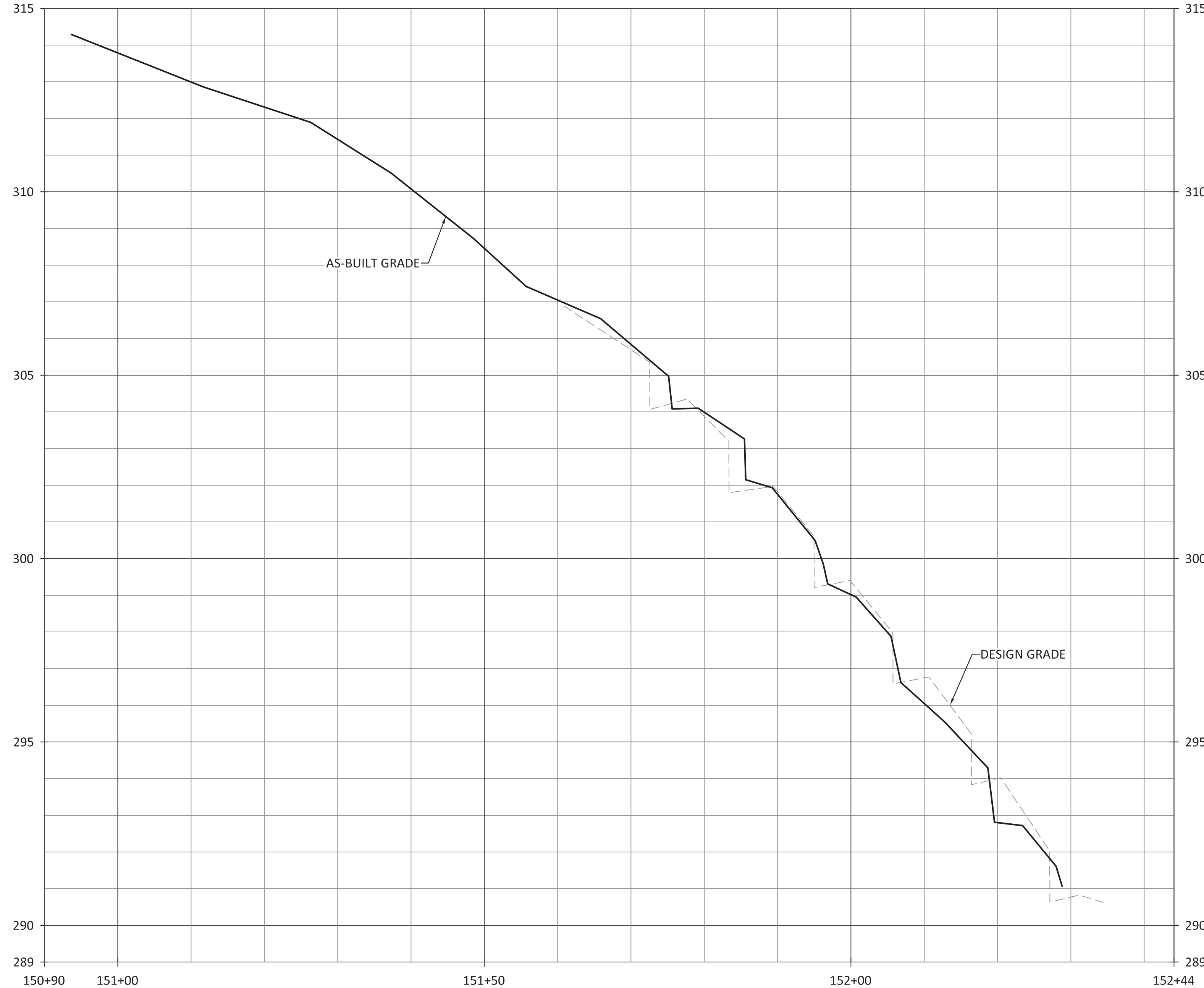
Cool Springs Mitigation Site
Harnett County, North Carolina

BMP Overview

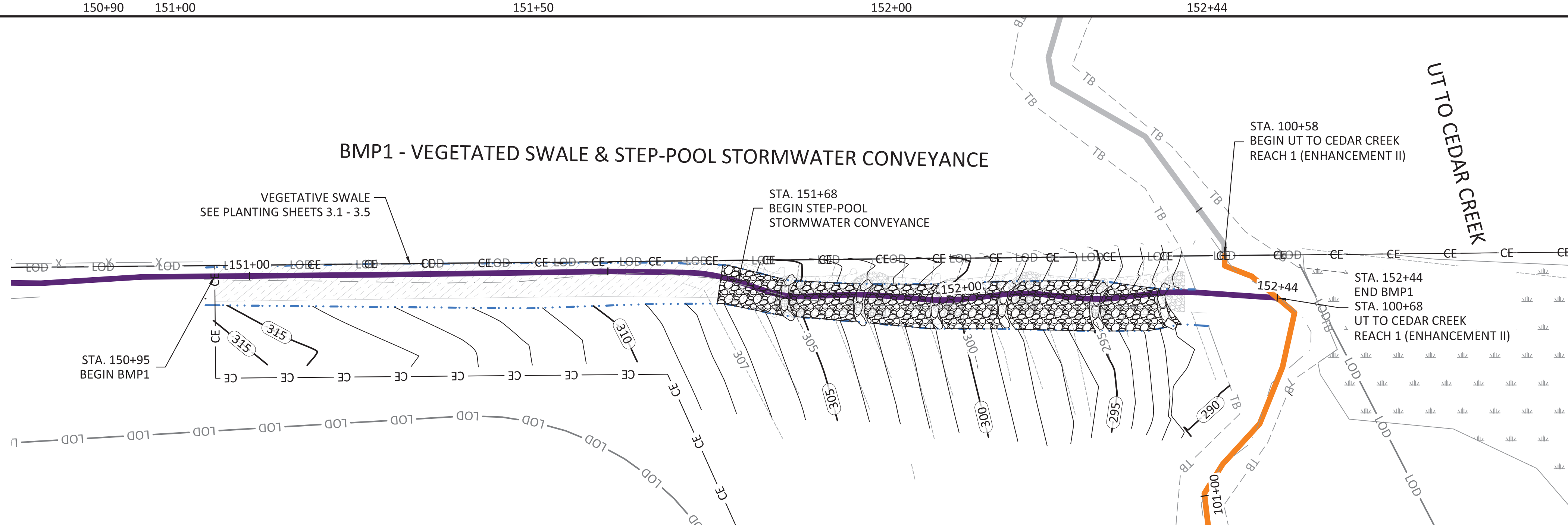
Revisions:

Date:	06.05.2023
Job Number:	500-02169
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 2.0



BMP1 - VEGETATED SWALE & STEP-POOL STORMWATER CONVEYANCE



NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR UT TO CEDAR CREEK IS ADDRESSED ON SHEETS 1.1.1 THROUGH 1.1.7.

0' 1' 2' 3' (VERTICAL)
0' 10' 20' 30' (HORIZONTAL)

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Cool Springs Mitigation Site
Harnett County, North Carolina

BMP1-Vegetated Swale & Step-Pool Stormwater Conveyance
BMPs

Revisions:

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 2.1

June 5, 2023

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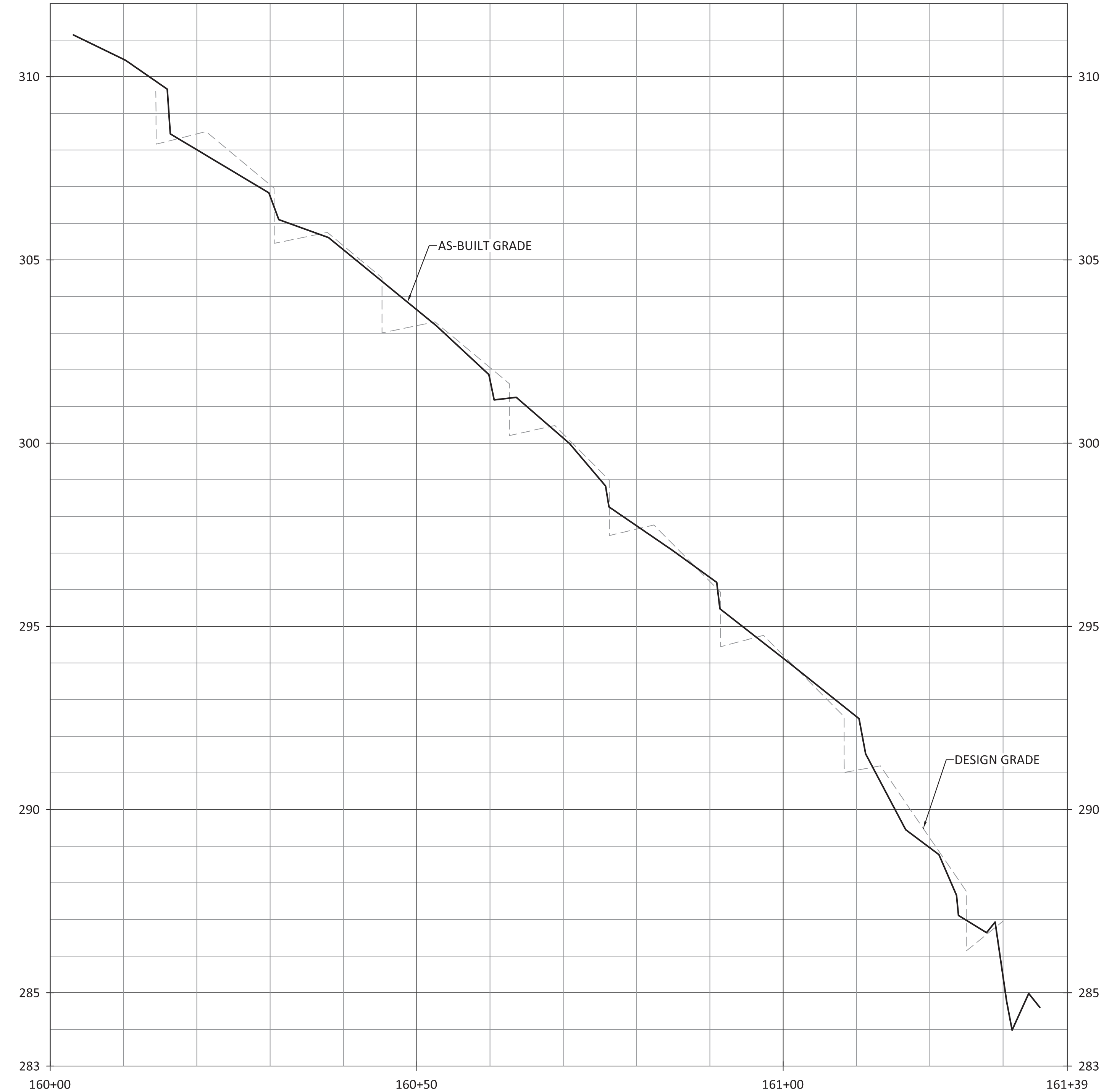

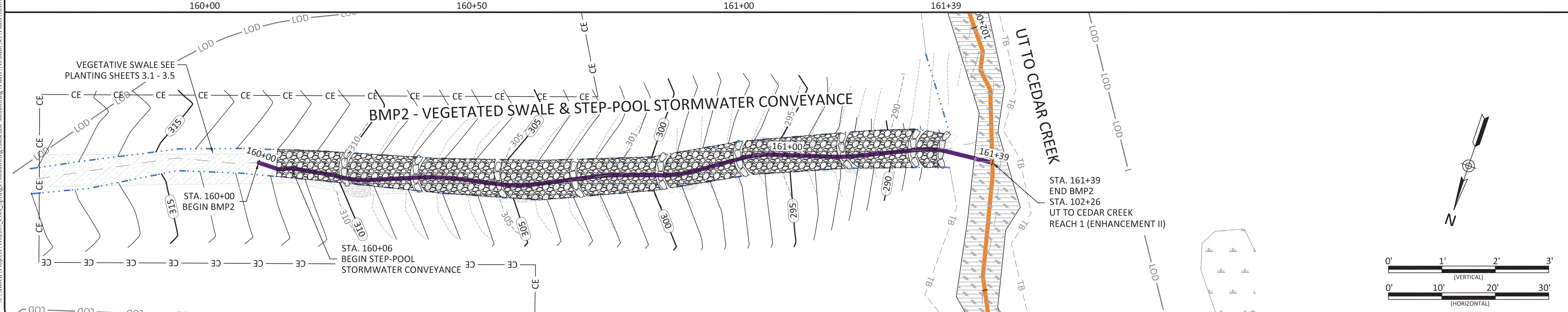

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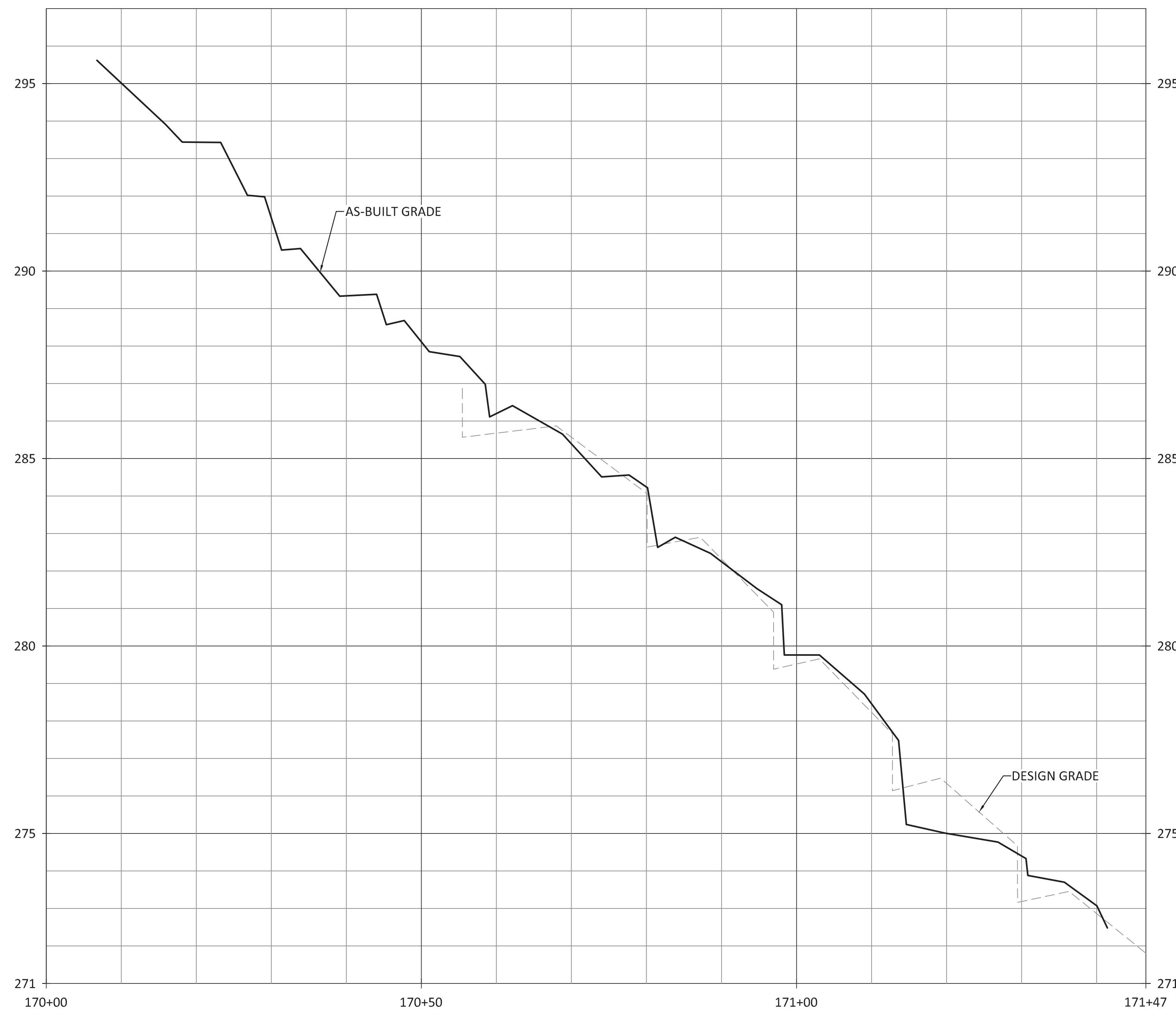
Cool Springs Mitigation Site
Harnett County, North Carolina

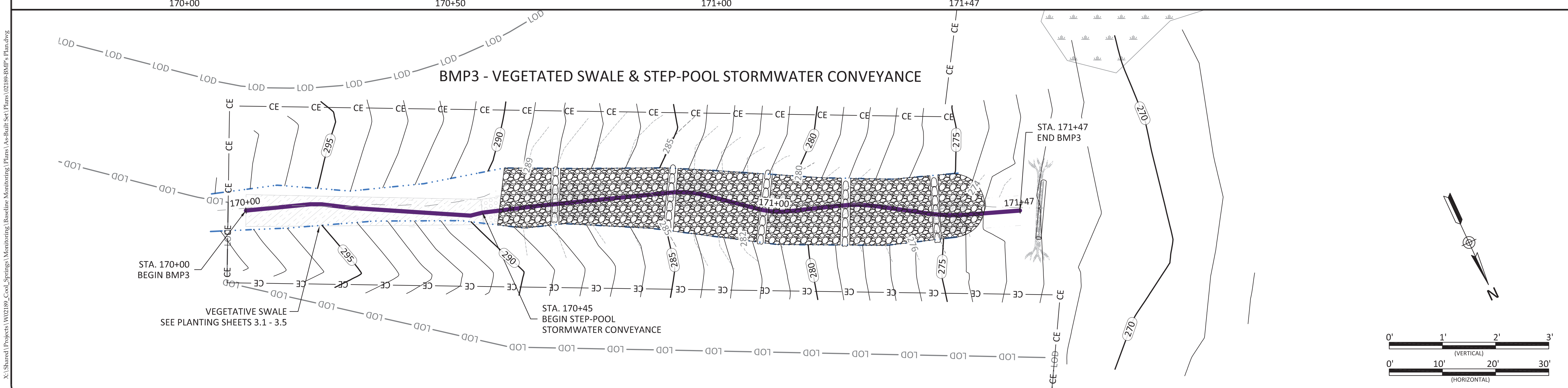
BMP2-Vegetated Swale & Step-Pool Stormwater Conveyance
BMPs

Revisions:

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 2.2





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Cool Springs Mitigation Site
Harnett County, North Carolina

BMP3-Vegetated Swale & Step-Pool Stormwater Conveyance
BMPs

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Revisions:

Sheet 2.3

June 5, 2023

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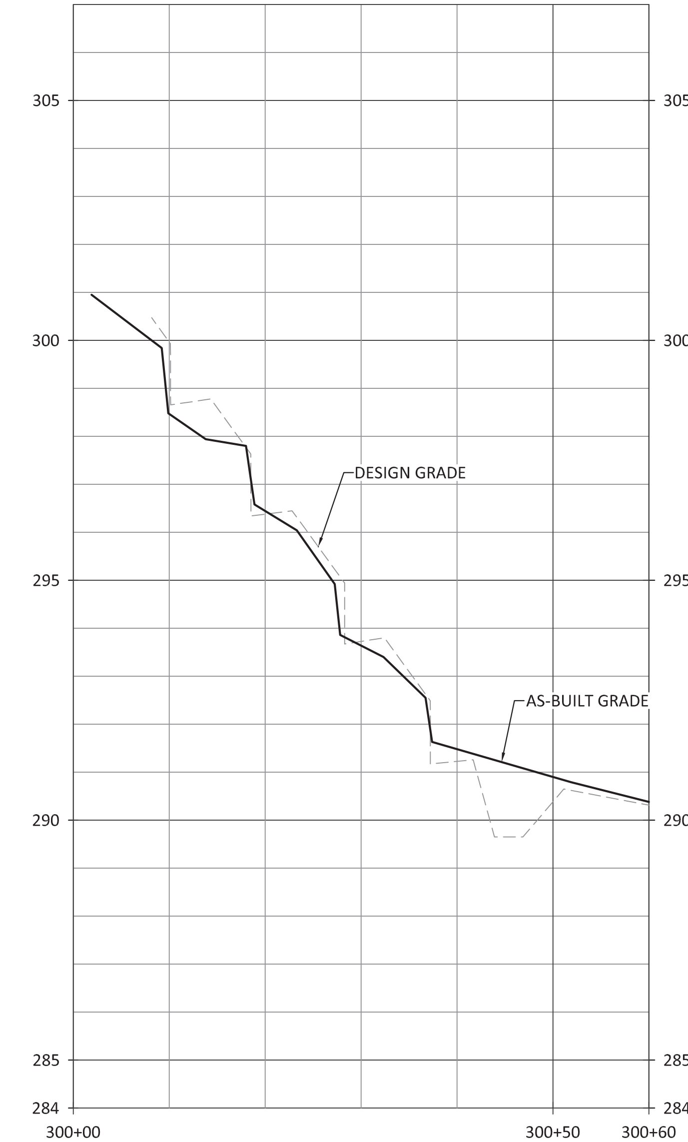

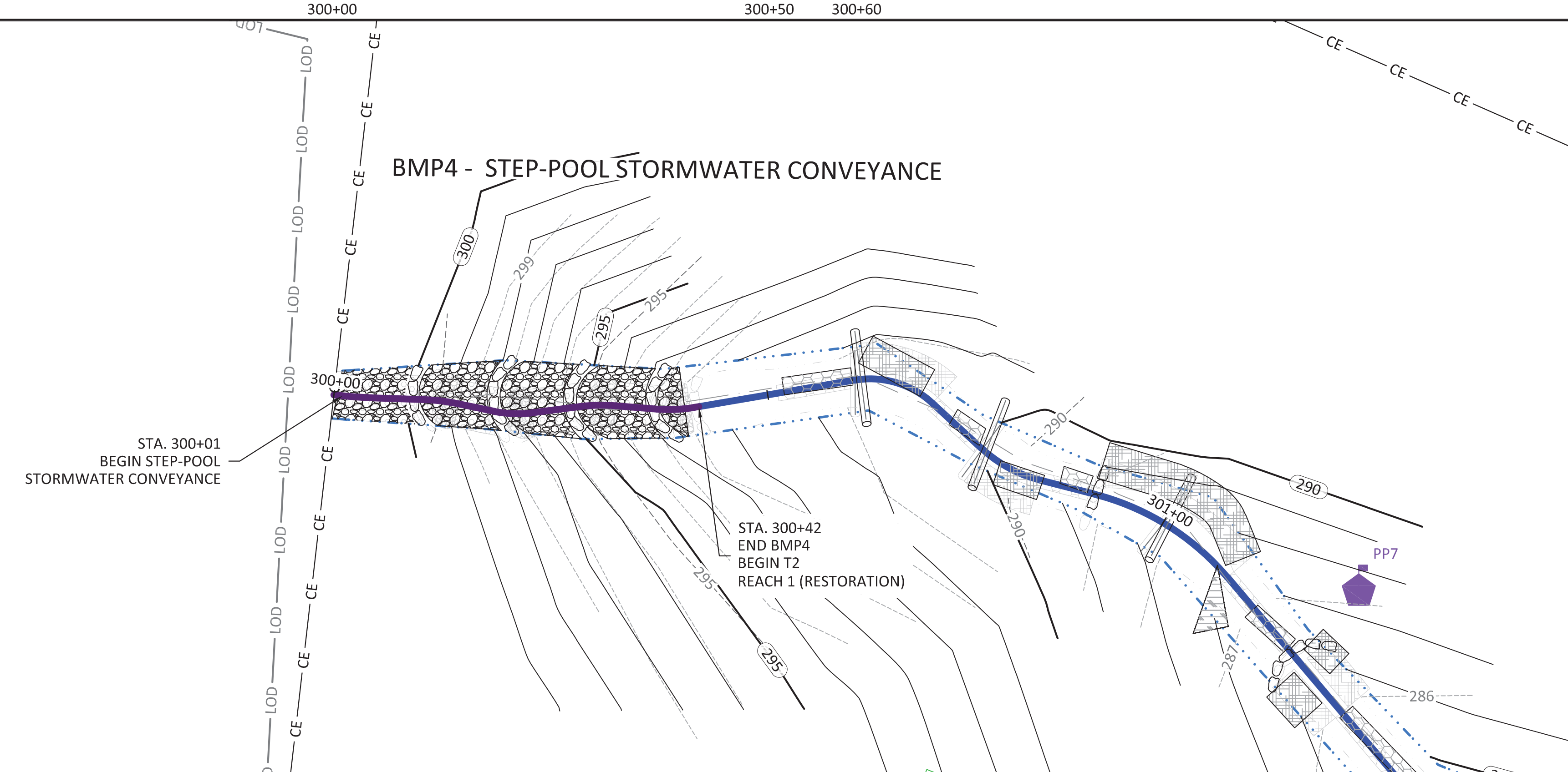

NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.
2. AS-BUILT INFORMATION FOR BMP T2 IS ADDRESSED ON SHEETS 1.3.1 THROUGH 1.3.3.

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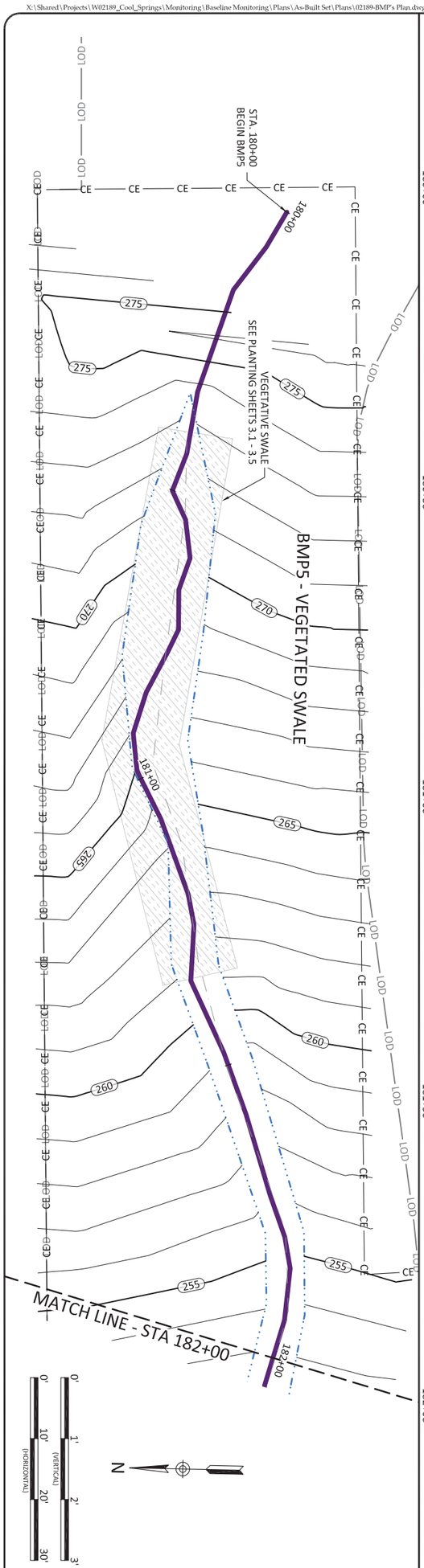
Cool Springs Mitigation Site
Harnett County, North Carolina

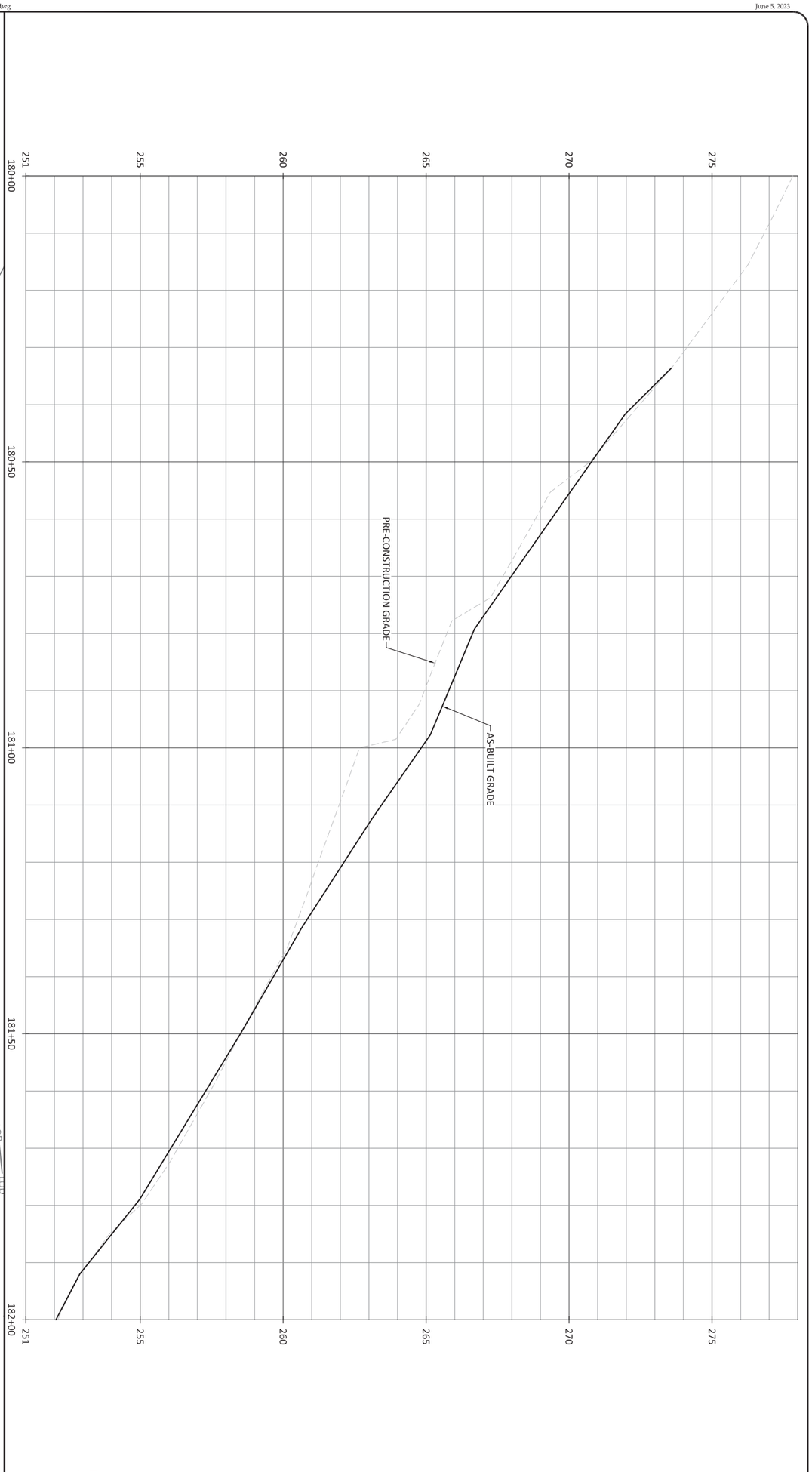
BMP4 - Step-Pool Stormwater Conveyance BMPs

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Revisions:

Sheet 2.4





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Job Number:	500-02189
Project Engineer:	NMM
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2.5
Sheet

Revisions:

Cool Springs Mitigation Site
Harnett County, North Carolina

BMP5 - Vegetated Swale
BMPs

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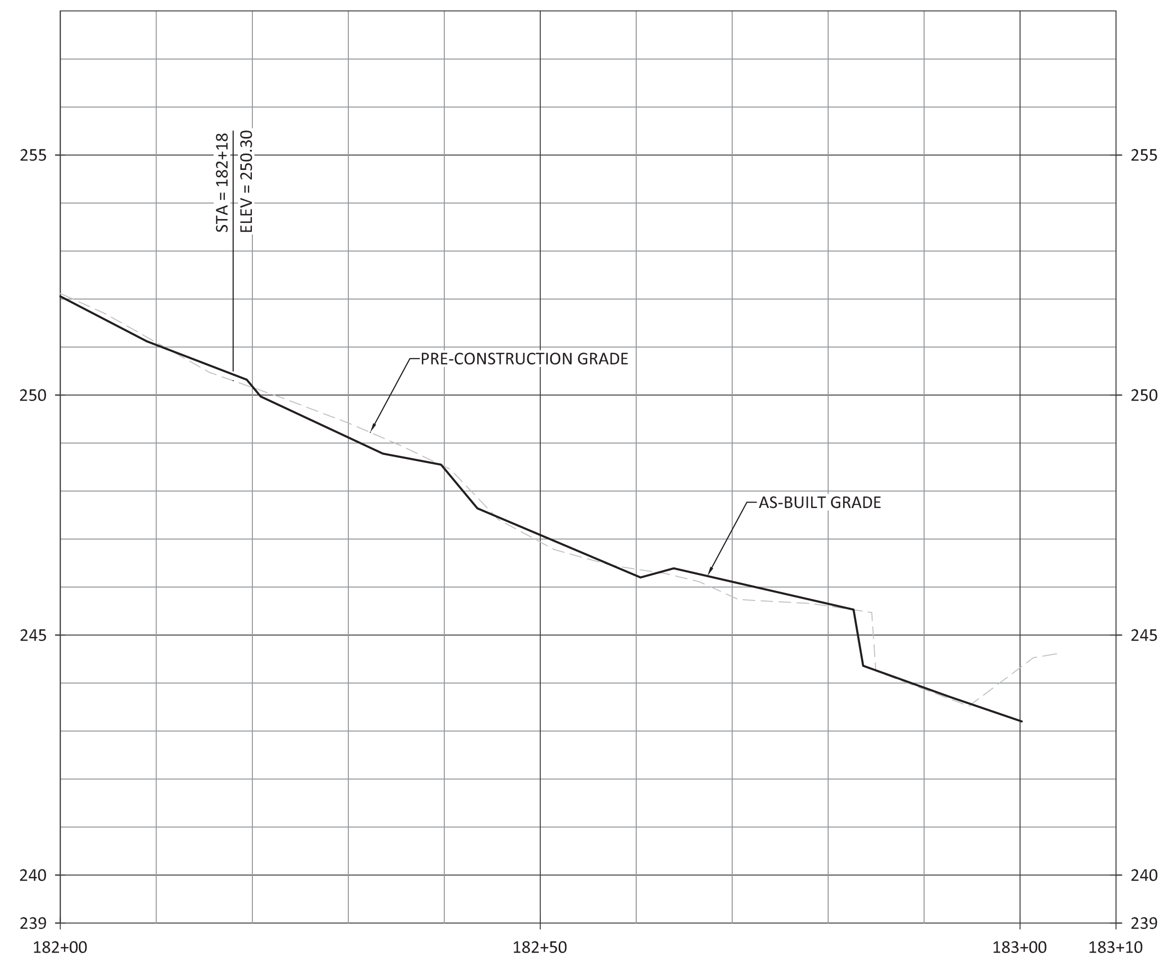

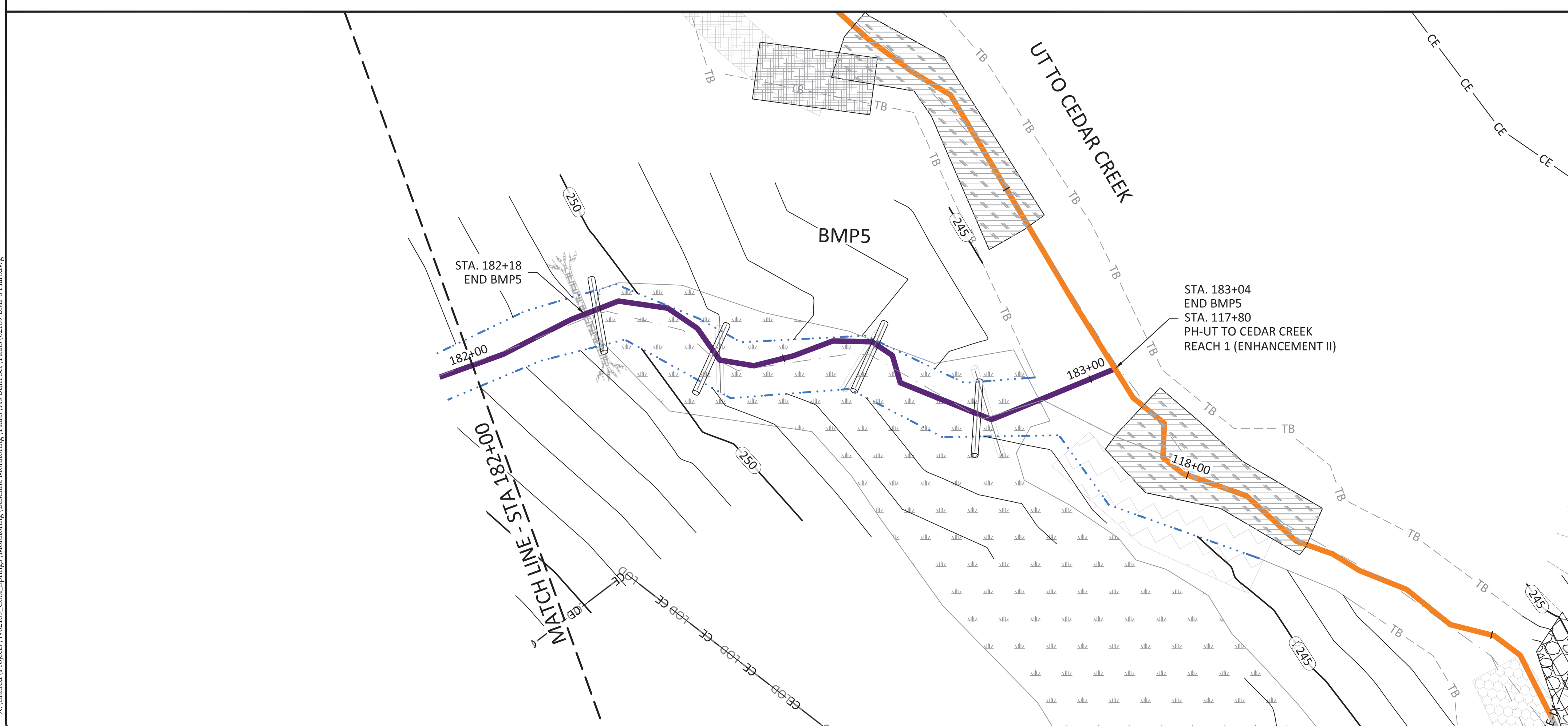

NOTES:

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0' 1' 2' 3' (VERTICAL)

0' 10' 20' 30' (HORIZONTAL)

N

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Cool Springs Mitigation Site
Harnett County, North Carolina

BMP5 - Vegetated Swale
BMPs

Revisions:

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 2.6

June 5, 2023

Streambank Planting Zone 1 - UT to Cedar Creek (0.3 acres)

Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
Live Stakes						
Salix nigra	Black Willow	3-6 ft.	0.5"-1.5" cal.	Canopy	OBL	40%
Salix sericea	Silky Willow	3-6 ft.	0.5"-1.5" cal.	Subcanopy	OBL	~~25%~~ 24%
Cornus amomum	Silky Dogwood	3-6 ft.	0.5"-1.5" cal.	Subcanopy	FACW	~~15%~~ 12%
Cephalanthus occidentalis	Buttonbush	3-6 ft.	0.5"-1.5" cal.	Shrub	OBL	~~10%~~ 12%
Sambucus canadensis	Elderberry	3-6 ft.	0.5"-1.5" cal.	Shrub	FACW	~~10%~~ 12%
						100%
Herbaceous Plugs						
Juncus Effusus	Soft Rush	4 ft.	1.0"- 2.0" plug	Herb	FACW	40%
Carex lurida	Lurid Sedge	4 ft.	1.0"- 2.0" plug	Herb	OBL	20%
Carex crinita	Fringed Sedge	4 ft.	1.0"- 2.0" plug	Herb	OBL	20%
Scirpus cyperinus	Woolgrass	4 ft.	1.0"- 2.0" plug	Herb	OBL	15%
Hibiscus moschuetos	Crimson-Eyed Rosemallow	4 ft.	1.0"- 2.0" plug	Herb	OBL	5%
						100%

Streambank Planting Zone 2 - T2, T3-R2, T4, T5, T6, T7, and T8 (0.7 acres)

Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
Live Stakes						
Salix nigra	Black Willow	3-6 ft.	0.5"-1.5" cal.	Canopy	OBL	~~10%~~ 9%
Salix sericea	Silky Willow	3-6 ft.	0.5"-1.5" cal.	Subcanopy	OBL	~~30%~~ 31%
Cornus amomum	Silky Dogwood	3-6 ft.	0.5"-1.5" cal.	Subcanopy	FACW	~~20%~~ 24%
Cephalanthus occidentalis	Buttonbush	3-6 ft.	0.5"-1.5" cal.	Shrub	OBL	20%
Sambucus canadensis	Elderberry	3-6 ft.	0.5"-1.5" cal.	Shrub	FACW	~~20%~~ 16%
						100%
Herbaceous Plugs						
Juncus Effusus	Soft Rush	4 ft.	1.0"- 2.0" plug	Herb	FACW	40%
Carex lurida	Lurid Sedge	4 ft.	1.0"- 2.0" plug	Herb	OBL	20%
Carex crinita	Fringed Sedge	4 ft.	1.0"- 2.0" plug	Herb	OBL	20%
Scirpus cyperinus	Woolgrass	4 ft.	1.0"- 2.0" plug	Herb	OBL	15%
Hibiscus moschuetos	Crimson-Eyed Rosemallow	4 ft.	1.0"- 2.0" plug	Herb	OBL	5%
						100%

Streambank Planting Zone 1
UT to Cedar Creek

Streambank Planting Zone 2
T1, T2, T3-R2, T4, T5, T6, T7, & T8

BMP Planting Zone 3

Buffer Planting Zone 4

Floodplain and Wetland Planting Zone 5

Permanent Seeding Outside Easement

Note: Non-hatched areas within easement were currently vegetated and were planted as needed to achieve target density. Buffer planting occured within the Limits of Disturbance.

NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

Buffer Planting Zone (11.9 acres)

Bare Root

Species	Common Name	Indiv. Spacing	Caliper Size	Stratum	Wetland Indicator Status	% of Stems
Quercus alba	White Oak	6-12 ft.	0.25"-1.0"	Canopy	FACU	10%
Quercus michauxii	Swamp Chestnut Oak	6-12 ft.	0.25"-1.0"	Canopy	FACW	13%
Platanus occidentalis	Sycamore	6-12 ft.	0.25"-1.0"	Canopy	FACW	13%
Ulmus americana	American Elm	6-12 ft.	0.25"-1.0"	Canopy	FAC	13%
*Carya tomentosa**	Mockernut Hickory	6-12 ft.	0.25"-1.0"	Canopy	FACU	3%
Quercus rubra	Northern Red Oak	6-12 ft.	0.25"-1.0"	Canopy	FACU	10%
Juniperus virginiana	Eastern Red Cedar	6-12 ft.	0.25"-1.0"	Canopy	FACU	10%
Liriodendron tulipifera	Tulip-poplar	6-12 ft.	0.25"-1.0"	Canopy	FACU	3%
Fraxinus pennsylvanica	Green Ash	6-12 ft.	0.25"-1.0"	Canopy	FACW	3%
*Cornus florida**	Flowering Dogwood	6-12 ft.	0.25"-1.0"	Subcanopy	FACU	1%
*Cercis canadensis**	Eastern Red Bud	6-12 ft.	0.25"-1.0"	Subcanopy	UPL	1%
Ulmus alata	Winged Elm	6-12 ft.	0.25"-1.0"	Canopy	FACU	7%
Betula nigra	River Birch	6-12 ft.	0.25"-1.0"	Canopy	FACW	13%
						100%

*Species not subject to monitoring height requirement due to species growth habit.

BMP Planting Zone (0.1 acres)

Herbaceous Plugs

Species	Common Name	Indiv. Spacing	Size	Stratum	Wetland Indicator Status	% of Stems
Carex albolutescens	Greenwhite Sedge	4 ft.	1.0"- 2.0" plug	Herb	FACW	20%
Juncus tenuis	Path Rush	4 ft.	1.0"- 2.0" plug	Herb	FAC	30%
Juncus coriaceus	Leathery Rush	4 ft.	1.0"- 2.0" plug	Herb	FACW	30%
Juncus effusus	Soft Rush	4 ft.	1.0"- 2.0" plug	Herb	OBL	20%
						100%

Wetland Planting Zone (1.9 acres)

Bare Root

Species	Common Name	Indiv. Spacing	Caliper Size	Stratum	Wetland Indicator Status	% of Stems
Nyssa biflora	Swamp Tupelo	6-12 ft.	0.25"-1.0"	Canopy	OBL	15%
Betula nigra	River Birch	6-12 ft.	0.25"-1.0"	Canopy	FACW	10%
Platanus occidentalis	Sycamore	6-12 ft.	0.25"-1.0"	Canopy	FACW	15%
~~*Ulmus americana*~~	~~American Elm~~	~~6-12 ft.~~	~~0.25"-1.0"~~	~~Canopy~~	~~FAC~~	~~15%~~
Cephalanthus americana	Beautyberry	6-12 ft.	0.25"-1.0"	Canopy	FAC	15%
Taxodium distichum	Bald Cypress	6-12 ft.	0.25"-1.0"	Canopy	OBL	15%
*Cephalanthus occidentalis**	Buttonbush	6-12 ft.	0.25"-1.0"	Shrub	OBL	5%
*Rosa palustris**	Swamp Rose	6-12 ft.	0.25"-1.0"	Shrub	OBL	5%
*Sambucus canadensis**	Common Elderberry	6-12 ft.	0.25"-1.0"	Shrub	FACW	5%
Live Stake						
Salix nigra	Black Willow	6-12 ft.	0.25"-1.0"	Canopy	OBL	15%
						100%

*Species not subject to monitoring height requirement due to species growth habit.

Note: Wetland zone species were planted on 6' spacing in rows spaced 12' apart.

Permanent Seeding Outside Easement (10.4 acres)

Approved Dates	Species Name	Common Name	Stratum	Density (lbs/acre)	Percentage
All Year	*Cynodon dactylon*	Coastal Bermudagrass	Herb	10	100%
					100%

Permanent Wetland Seeding (1.9 acres)

Pure Live Seed (20 lbs/acre)

Approved Dates	Species Name	Common Name	Stratum	Wetland Indicator Status	Density (lbs/acre)
All Year	*Coleataenia rigidula*	Redtop Panicgrass	Herb	FACW	*3*
All Year	*Elymus virginicus*	Virginia Wildrye	Herb	FACW	*3*
All Year	*Panicum virgatum*	Switchgrass	Herb	FAC	*1*
All Year	*Juncus effusus*	Soft Rush	Herb	FACW	*1*
All Year	*Juncus coriaceus*	Leathery Rush	Herb	FACW	*1*
All Year	*Carex vulpinoidea*	Fox Sedge	Herb	OBL	*2*
All Year	*Carex lurida*	Lurid Sedge	Herb	OBL	*1*
All Year	*Carex lupulina*	Hop Sedge	Herb	OBL	*1*
All Year	*Carex albolutescens*	Greenwhite Sedge	Herb	FACW	*1*
All Year	*Carex crinita*	Fringed Sedge	Herb	FACW	*1*
All Year	*Bidens aristosa*	Bur Marigold	Herb	FACW	*1.5*
All Year	*Helianthus angustifolia*	Swamp Sunflower	Herb	FACW	*2*
All Year	*Scirpus cyperinus*	Woolgrass	Herb	OBL	1
All Year	*Tripsacum dactyloides*	Eastern Gamagrass	Herb	FAC	0.5
					20.0

Permanent Riparian Seeding (11.9 acres)

Pure Live Seed (20 lbs/acre)

Approved Dates	Species Name	Common Name	Stratum	Wetland Indicator Status	lbs/acre
All Year	*Elymus virginicus*	Virginia Wildrye	Herb	FACW	3.0
All Year	*Panicum virgatum*	Switchgrass	Herb	FAC	1.0
All Year	*Schizachyrium scoparium*	Little Bluestem	Herb	FACU	2.5
All Year	*Tripsacum dactyloides*	Eastern Gamagrass	Herb	FACW	2.0
All Year	*Dichanthelium clandestinum*	Deertongue	Herb	FAC	3.0
All Year	*Chasmanthium latifolium*	River Oats	Herb	FACU	1.0
All Year	*Sorghastrum nutans*	Indiangrass	Herb	FACU	1.5
All Year	*Juncus tenuis*	Path Rush	Herb	FAC	0.5
All Year	*Rudbeckia hirta*	Blackeyed Susan	Herb	FACU	1.0
All Year	*Bidens aristosa*	Bur Marigold	Herb	FACW	1.0
All Year	*Helianthus angustifolia*	Swamp Sunflower	Herb	FACW	1.0
All Year	*Coreopsis lanceolata*	Lanceleaf Coreopsis	Herb	FACU	1.0
All Year	*Chamaecrista fasciculata var. fasciculata*	Partridge Pea	Herb	FACU	1.0
All Year	*Pycnanthemum tenuifolium*	Narrowleaf Mountain-Mint	Herb	FACW	0.5
					20.0

Temporary Seeding (24.3 acres)

Pure Live Seed

Approved Dates	Species Name	Common Name	Stratum	Density (lbs/acre)
August 15 - April 15	*Secale cereale*	Rye Grain	Herb	90
August 15 - April 15	*Avena sativa*	Winter Oats	Herb	30
April 15 - August 15	*Urochloa racemosa*	Browntop Millet	Herb	50
All Year	*Trifolium incarnatum*	Crimson Clover	Herb	5
All Year	*Trifolium repens*	Ladino Clover	Herb	5

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 NOVEMBER 5, 2024

Cool Springs Mitigation Site
Harnett County, North Carolina

Planting Tables

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 3.0

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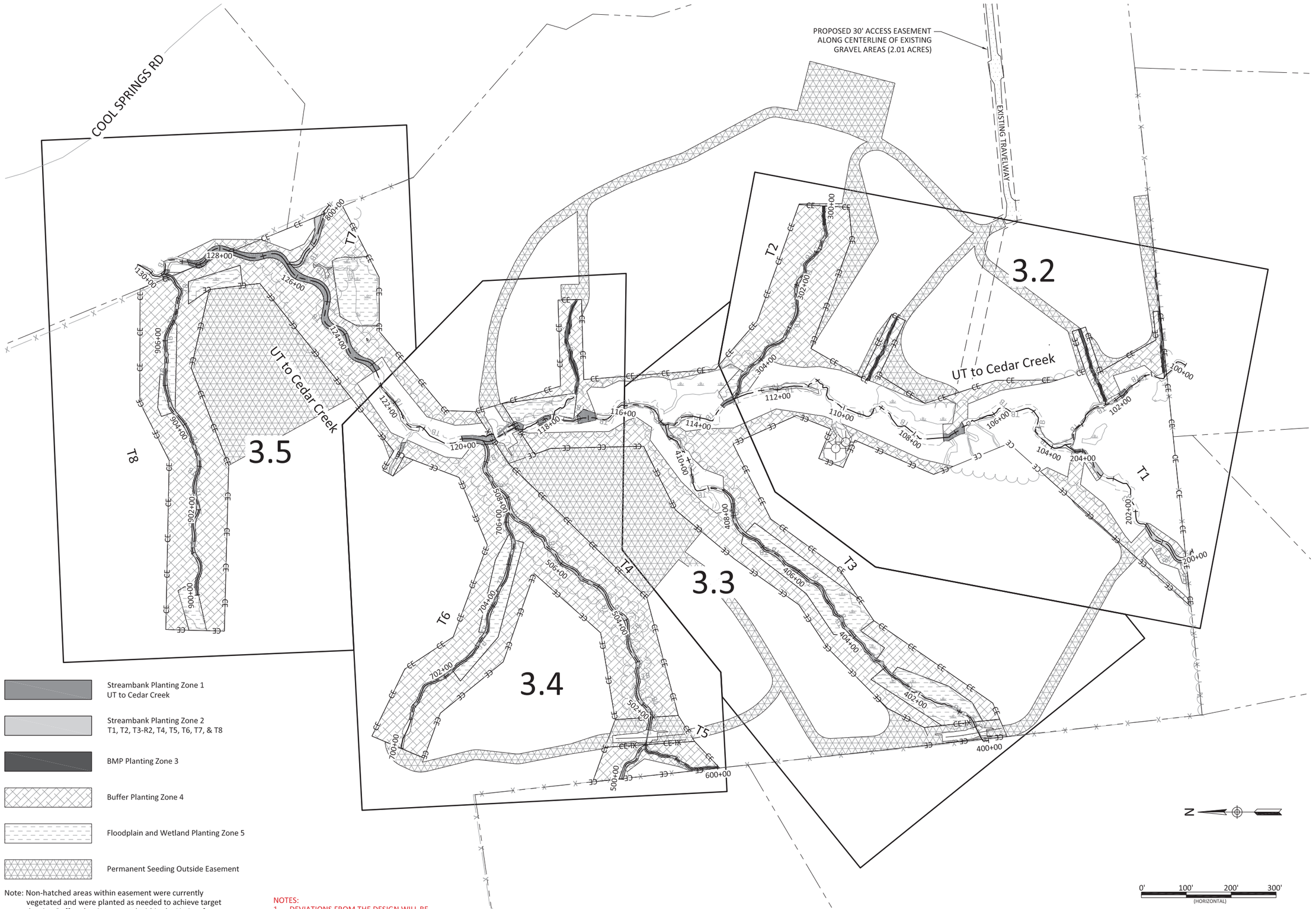
June 5, 2023



Streambank Planting Zone 1
UT to Cedar Creek

Streambank Planting Zone 2
T1, T2, T3-R2, T4, T5, T6, T7, & T8

BMP Planting Zone 3

Buffer Planting Zone 4

Floodplain and Wetland Planting Zone 5

Permanent Seeding Outside Easement

Note: Non-hatched areas within easement were currently vegetated and were planted as needed to achieve target density. Buffer planting occured within the Limits of Disturbance.

NOTES:
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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 — 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

Planting Overview

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 3.1

June 5, 2023

NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

N

0' 40' 80' 120'
(HORIZONTAL)

UT to Cedar Creek

MATCHLINE - STA 113+00

T1

T2

BMP1

BMP2

BMP3

Streambank Planting Zone 1
UT to Cedar Creek

Streambank Planting Zone 2
T1, T2, T3-R2, T4, T5, T6, T7, & T8

BMP Planting Zone 3

Buffer Planting Zone 4

Floodplain and Wetland Planting Zone 5

Permanent Seeding Outside Easement

Note: Non-hatched areas within easement were currently vegetated and were planted as needed to achieve target density. Buffer planting occured within the Limits of Disturbance.

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 — 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

Planting Plan

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 3.2

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June 5, 2023

Streambank Planting Zone 1
UT to Cedar Creek

Streambank Planting Zone 2
T1, T2, T3-R2, T4, T5, T6, T7, & T8

BMP Planting Zone 3

Buffer Planting Zone 4

Floodplain and Wetland Planting Zone 5

Permanent Seeding Outside Easement

Note: Non-hatched areas within easement were currently vegetated and were planted as needed to achieve target density. Buffer planting occured within the Limits of Disturbance.

NOTES:
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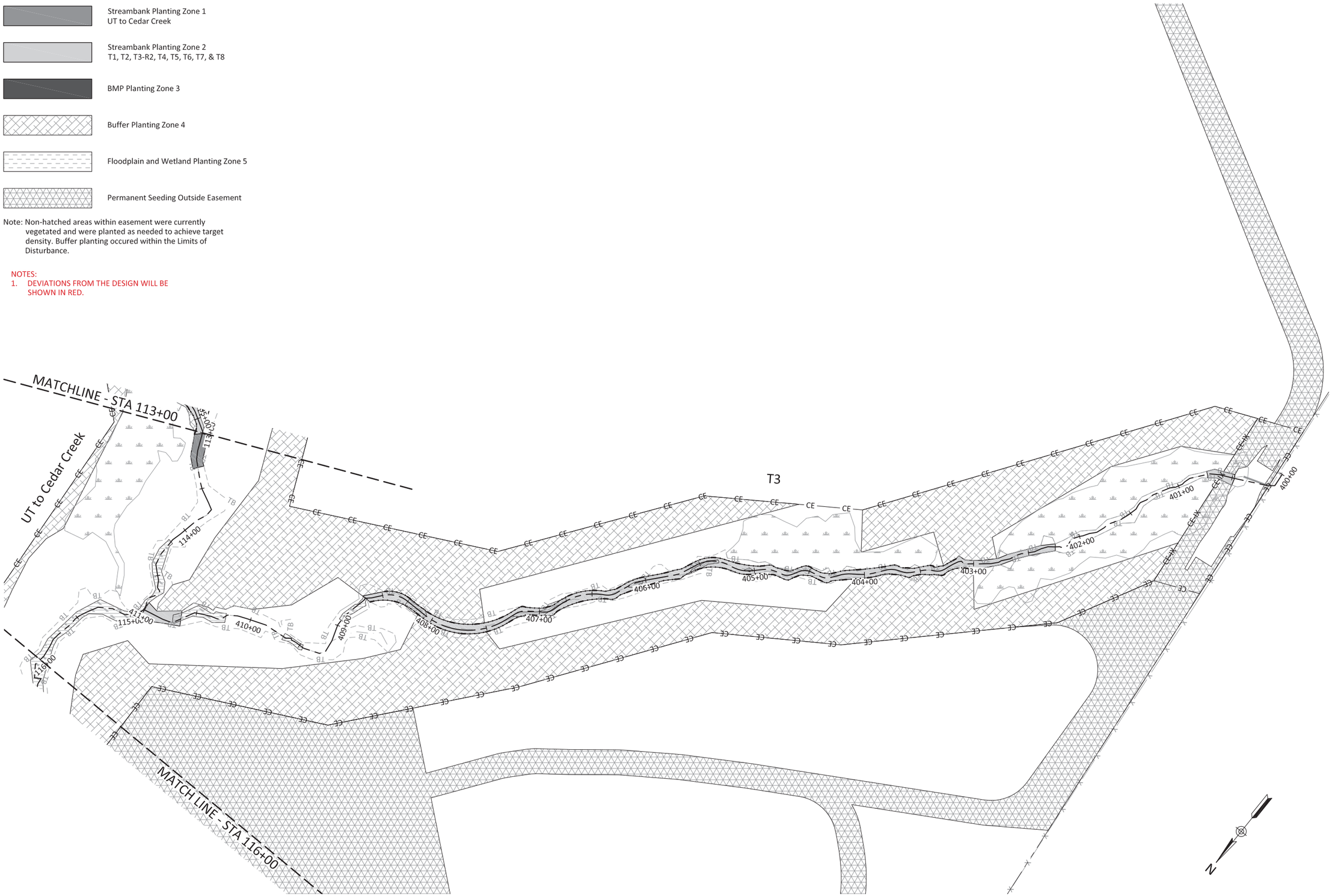

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 — 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

Planting Plan

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Revisions:

Sheet 3.3

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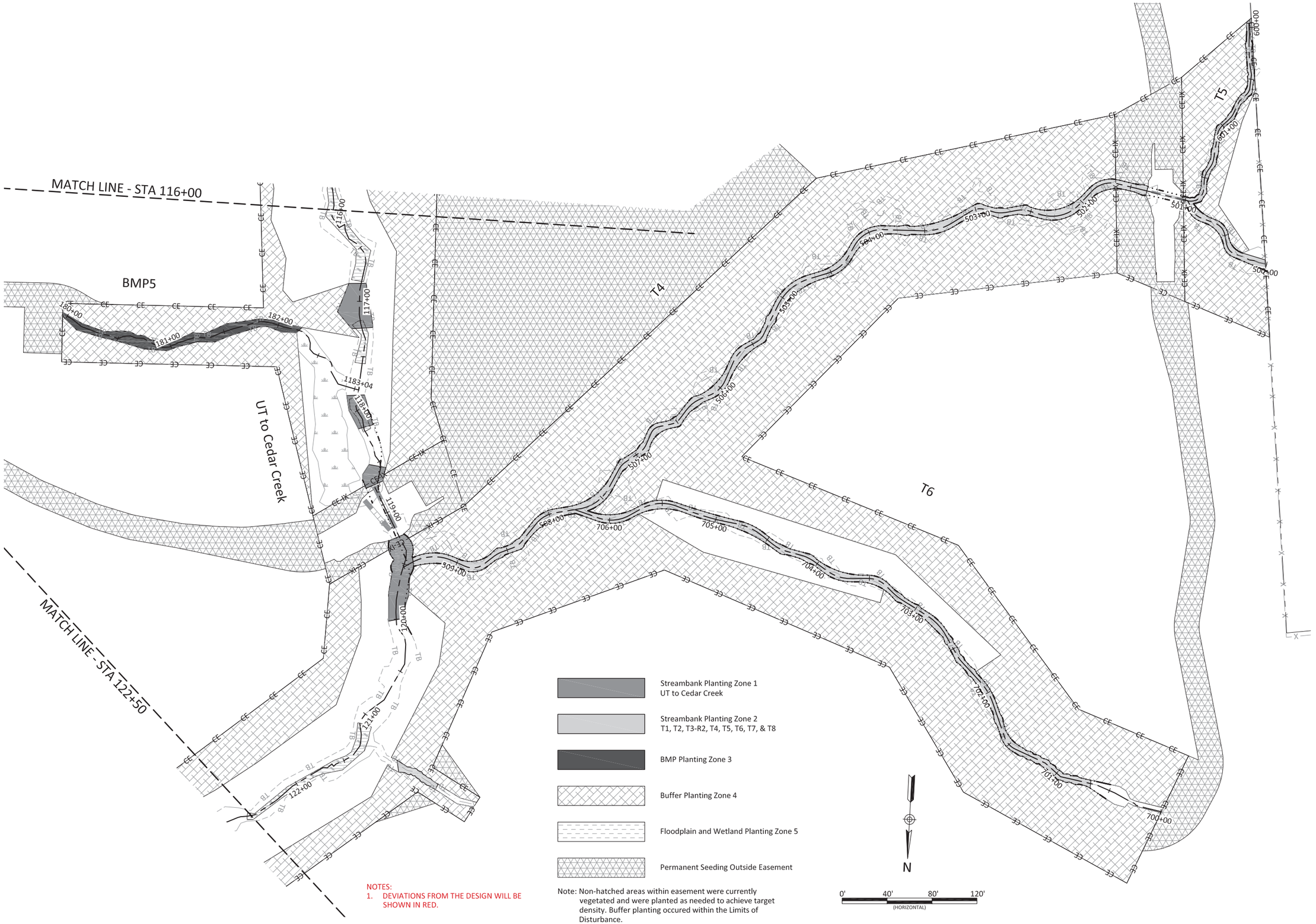

NOTES:
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Note: Non-hatched areas within easement were currently vegetated and were planted as needed to achieve target density. Buffer planting occured within the Limits of Disturbance.

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Cool Springs Mitigation Site
Harnett County, North Carolina

Planting Plan

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 3.4

June 5, 2023

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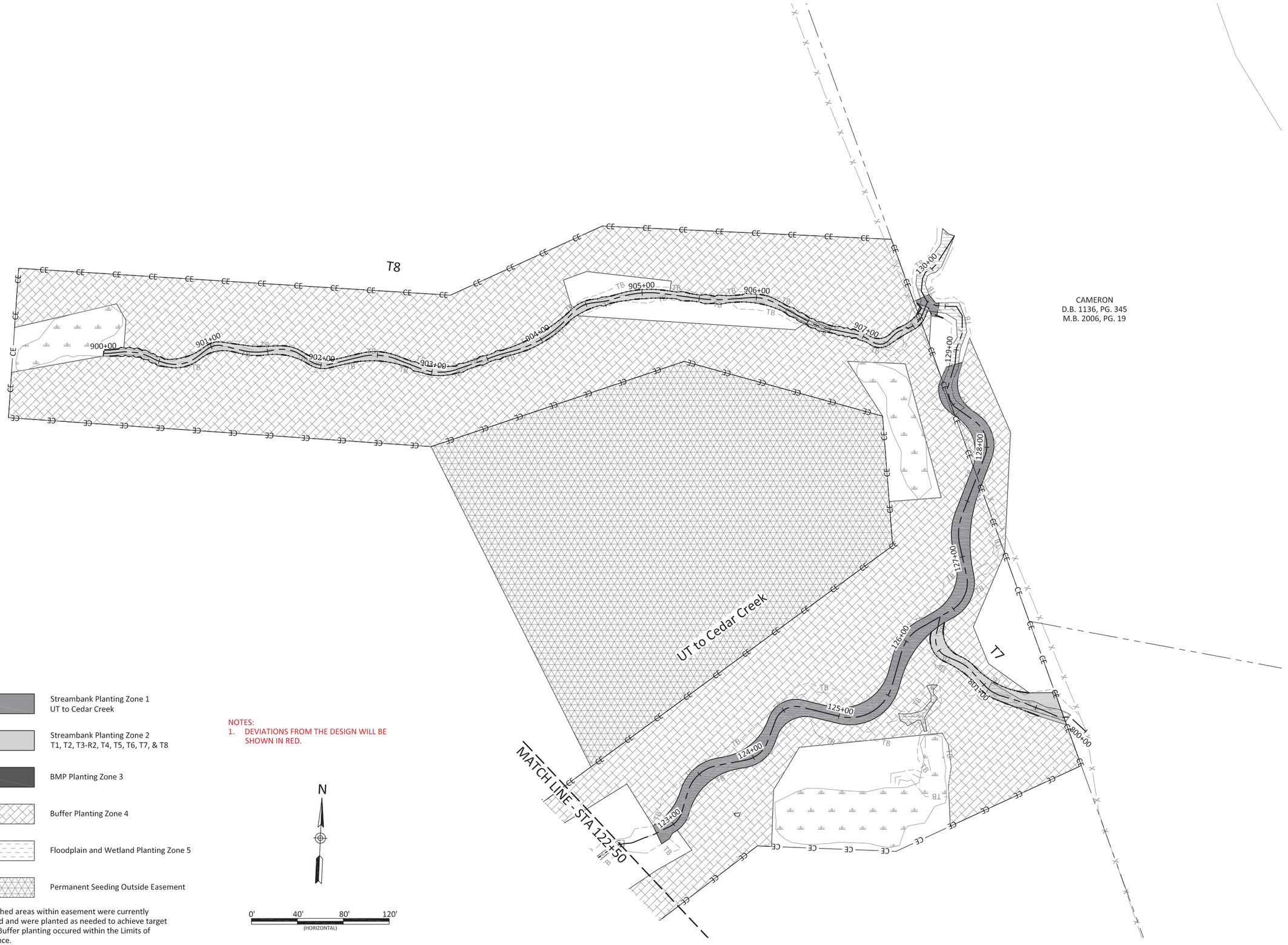
June 5, 2023



Streambank Planting Zone 1
UT to Cedar Creek

Streambank Planting Zone 2
T1, T2, T3-R2, T4, T5, T6, T7, & T8

BMP Planting Zone 3

Buffer Planting Zone 4

Floodplain and Wetland Planting Zone 5

Permanent Seeding Outside Easement

Note: Non-hatched areas within easement were currently vegetated and were planted as needed to achieve target density. Buffer planting occured within the Limits of Disturbance.

NOTES:
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N

0' 40' 80' 120'
(HORIZONTAL)

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Cool Springs Mitigation Site
Harnett County, North Carolina

Planting Plan

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 3.5

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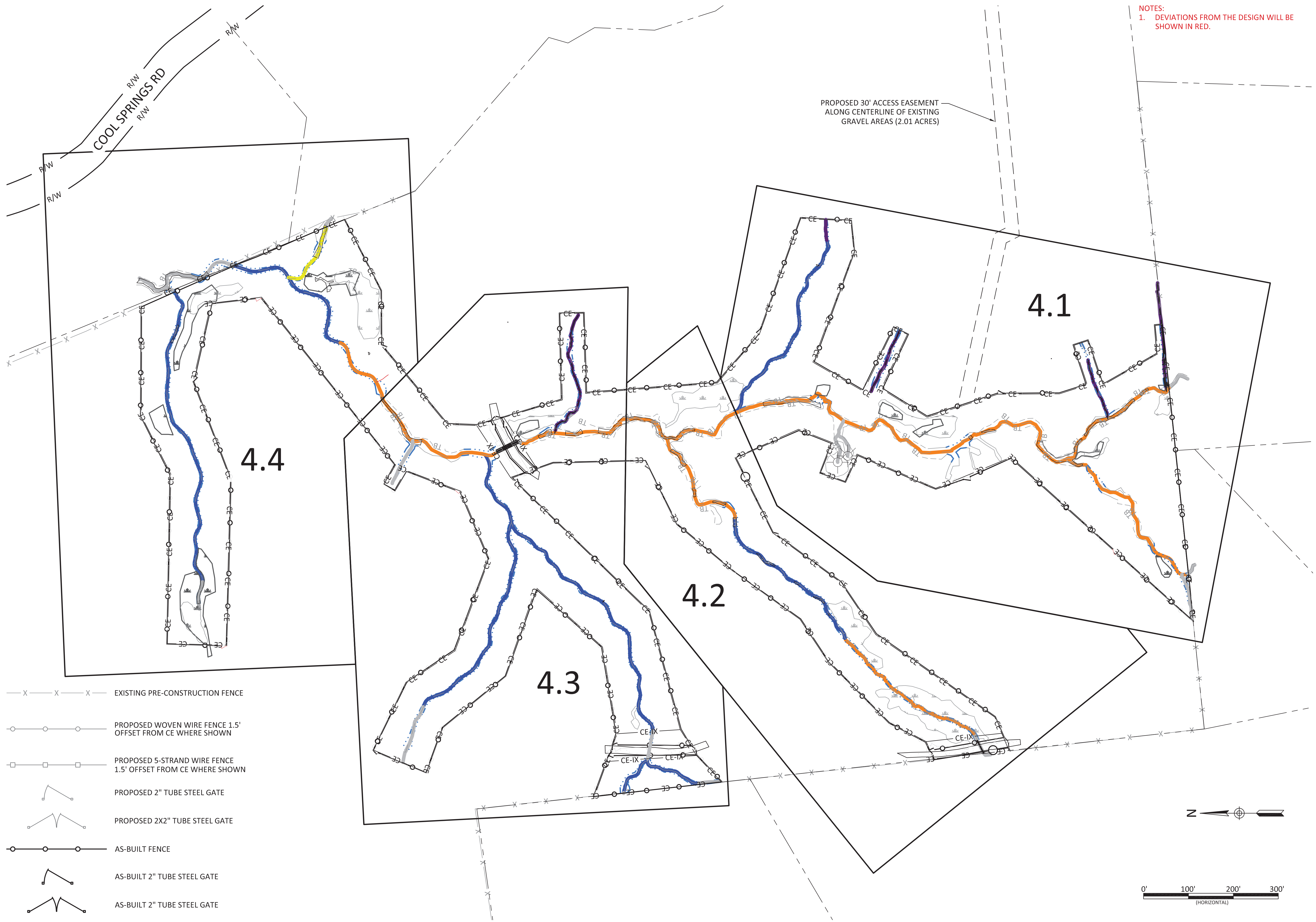

NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

EXISTING PRE-CONSTRUCTION FENCE

PROPOSED WOVEN WIRE FENCE 1.5' OFFSET FROM CE WHERE SHOWN

PROPOSED 5-STRAND WIRE FENCE 1.5' OFFSET FROM CE WHERE SHOWN

PROPOSED 2" TUBE STEEL GATE

PROPOSED 2X2" TUBE STEEL GATE

AS-BUILT FENCE

AS-BUILT 2" TUBE STEEL GATE

AS-BUILT 2" TUBE STEEL GATE

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 JEFFERSON N. KEATON 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

Fencing Overview

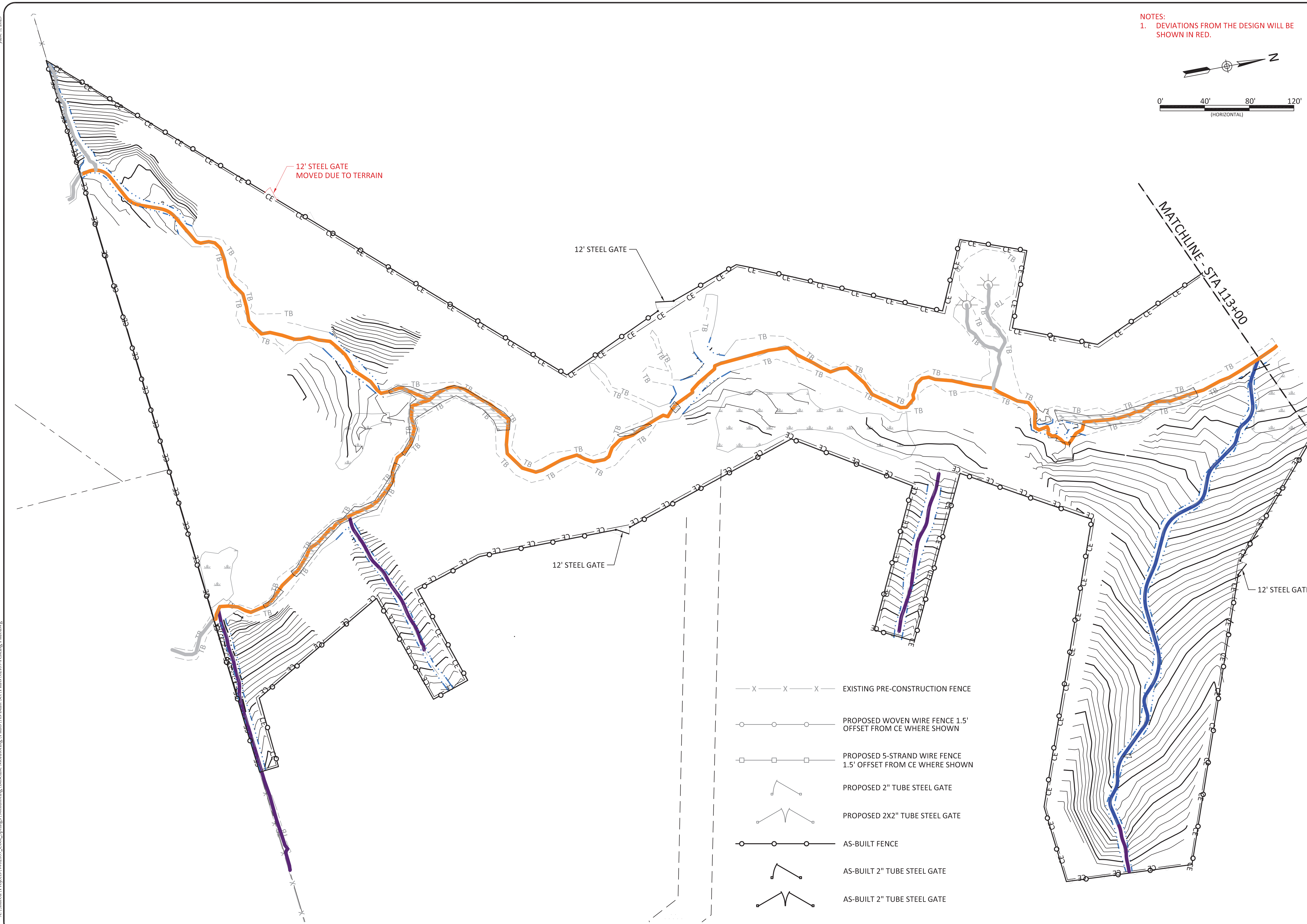
Revisions:

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 4.0

June 5, 2023

X:\Shared\Projects\W02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-Fencing Overview.dwg



June 5, 2023

X:\Shared\Projects\W02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189-Fencing Plan.dwg

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 JEFFERSON ... 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

Fencing Plan

Revisions:

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 4.1

June 5, 2023

NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

- PROPOSED WOVEN WIRE FENCE 1.5' OFFSET FROM CE WHERE SHOWN
- PROPOSED 5-STRAND WIRE FENCE 1.5' OFFSET FROM CE WHERE SHOWN
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- PROPOSED 2X2" TUBE STEEL GATE
- AS-BUILT FENCE
- AS-BUILT 2" TUBE STEEL GATE
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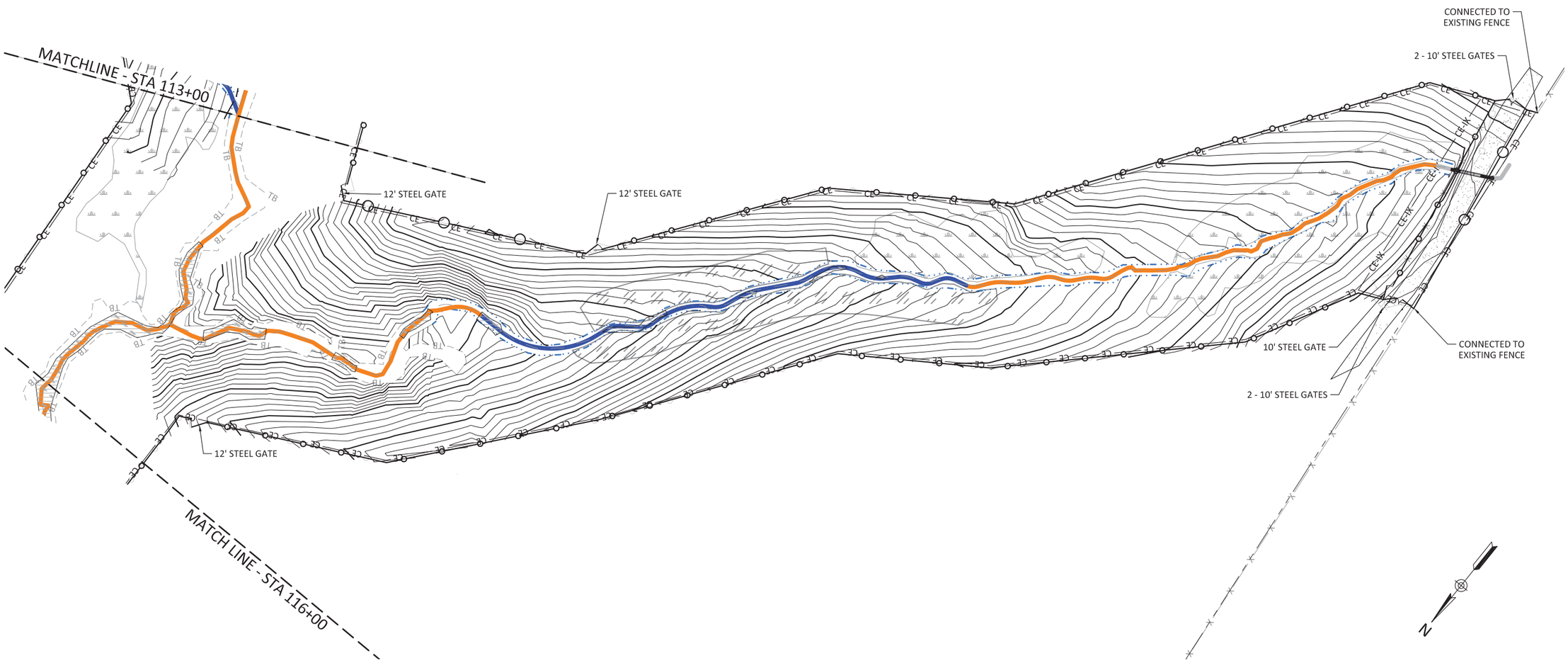

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 — 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

Fencing Plan

Revisions:

Date: 06.05.2023
Job Number: 500-02189
Project Engineer: NMM
Drawn By: CAW
Checked By: JNK

Sheet 4.2

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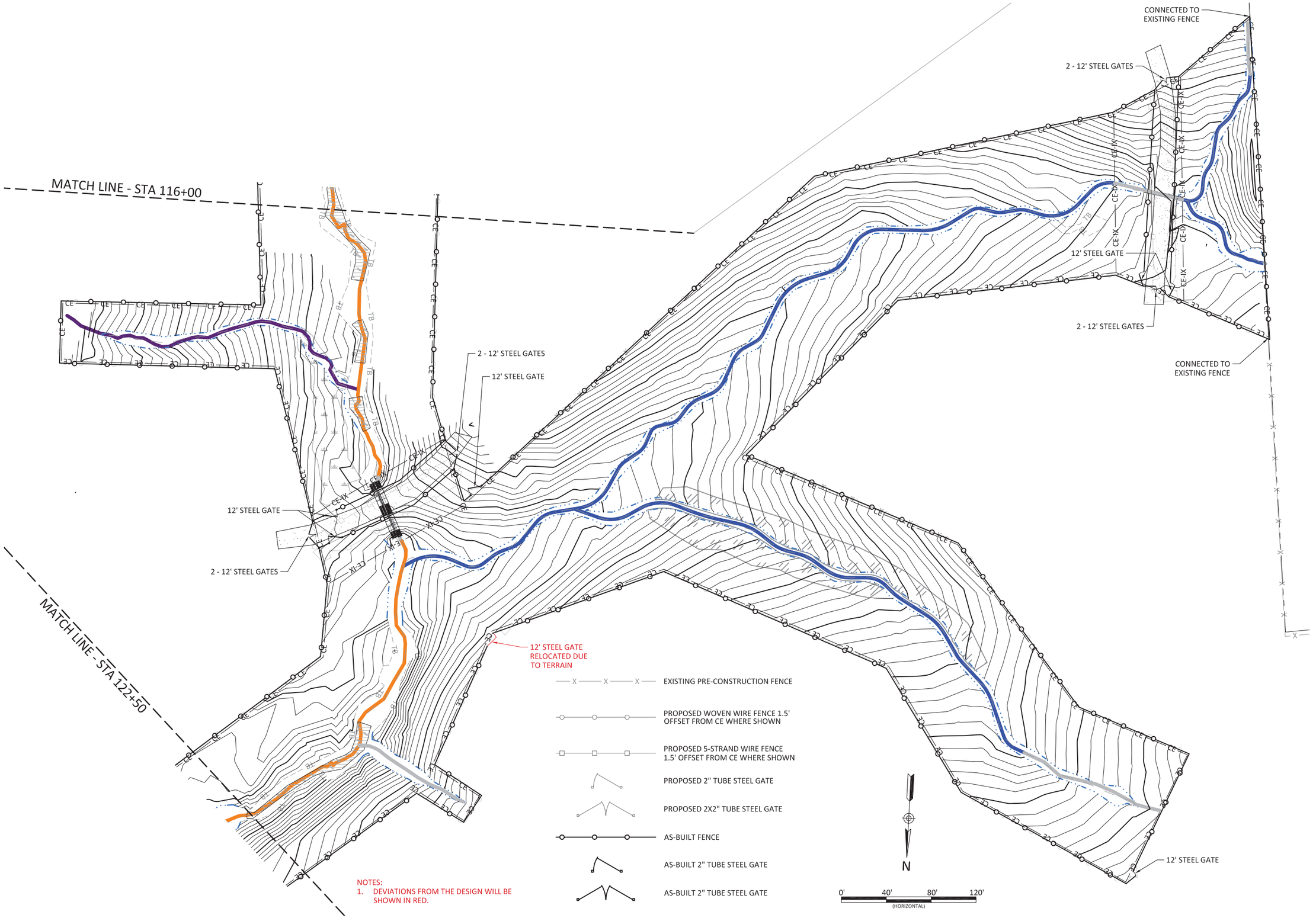
June 5, 2023



NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 — 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

Fencing Plan

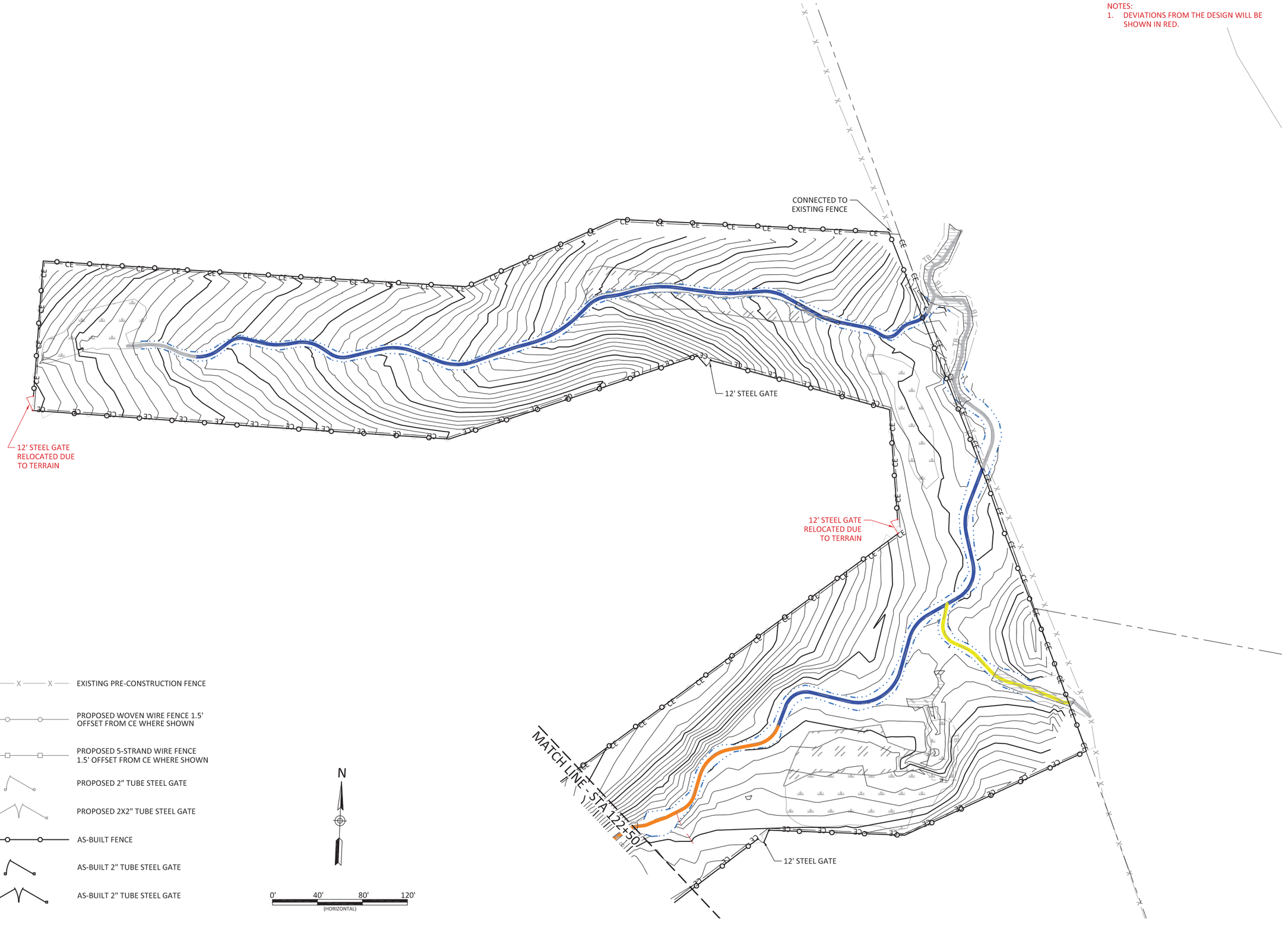
Revisions:

Date:	06.05.2023
Job Number:	500-02169
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 4.3

June 5, 2023

NOTES:
1. DEVIATIONS FROM THE DESIGN WILL BE SHOWN IN RED.



- EXISTING PRE-CONSTRUCTION FENCE
- PROPOSED WOVEN WIRE FENCE 1.5' OFFSET FROM CE WHERE SHOWN
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- PROPOSED 2" TUBE STEEL GATE
- PROPOSED 2X2" TUBE STEEL GATE
- AS-BUILT FENCE
- AS-BUILT 2" TUBE STEEL GATE
- AS-BUILT 2" TUBE STEEL GATE

X:\Shared\Projects\WI02189_Cool_Springs\Monitoring\Baseline Monitoring\Plans\As-Built Set\Plans\02189 Fencing Plan.dwg

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NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 031027 — 6-5-23

Cool Springs Mitigation Site
Harnett County, North Carolina

Fencing Plan

Revisions:

Date:	06.05.2023
Job Number:	500-02189
Project Engineer:	NMM
Drawn By:	CAW
Checked By:	JNK

Sheet 4.4

APPENDIX F. ADDITIONAL DOCUMENTATION

Soil Boring Descriptions

Cool Springs Mitigation Site
DMS Project No. 100166
Monitoring Year 0 - 2023

Soil Profile Description at Location of Groundwater Well 1:

Depth Range (in.)	Color	Redox	Texture	Notes
0-5	10YR 5/1 (95%)	2.5YR 4/6 (5%)	CL	
5-10	2.5Y 6/2 (80%)	5YR 5/8 (20%)	SCL	
10-15	2.5Y 7/1 (80%)	5YR 7/8 (20%)	CL	
15-20	2.5Y 7/4 (90%)	10YR 7/8 (10%)	CL	Old woody debris
20-26	2.5Y 7/1 (85%)	2.5Y 6/8 (15%)	CL	Old woody debris; consolidated bedrock after 26"

Soil Profile Description at Location of Groundwater Well 2:

Depth Range (in.)	Color	Redox	Texture	Notes
0-3	10YR		SiCL	
3-10	2.5Y 5/1 (95%)	2.5YR 3/6 (5%)	L	
10-21	5Y 5/1 (97%)	5YR 3/4 (3%)	CL	
21-33	2.5Y 5/1 (100%)		SL	
33-39	2.5Y 6/3 (90%)	2.5Y 6/6 (18%)	LS	
39-55	5Y 6/1 (90%)	10YR 6/8 (10%)	CL	

Soil Profile Description at Location of Groundwater Well 3:

Depth Range (in.)	Color	Redox	Texture	Notes
0-2	10YR 5/1		CL	
2-11	10YR 5/2		SC	
11-34	2.5Y 5/2		SC	
34-52	2.5Y 7/1 (50%)		SiCL	

Soil Profile Description at Location of Groundwater Well 4:

Depth Range (in.)	Color	Redox	Texture	Notes
0-5	10YR 4/1		SL	
5-8	10YR 5/2		SL	
8-18	2.5Y 5/3		SL	
18-22	2.5Y 6/2 (90%)	5.5YR 5/8 (10%)	SL	

Soil Profile Description at Location of Groundwater Well 5:

Depth Range (in.)	Color	Redox	Texture	Notes
0-3	7.5YR 4/1		L	
3-22	2.5Y 4/1 (97%)	5YR 5/8 (3%)	CL	
22-24	2.5YY 3/1		CL	

Soil Profile Description at Location of Groundwater Well 6:

Depth Range (in.)	Color	Redox	Texture	Notes
0-2	7.5YR 3/3 (100%)		L	
2-5	10YR 4/2 (100%)		CL	
5-20	2.5Y 4/1 (97%)	5Y 4/6 (3%)	CL	
20-27	2.5Y 5/2	7.5YR 5/6	C	Consolidated bedrock at 27"

Soil Profile Description at Location of Groundwater Well 7:

Depth Range (in.)	Color	Redox	Texture	Notes
0-5	2.5Y 5/2 (90%)	10YR 6/8	SL	
5-12	2.5Y 6/2 (88%)	7.5YR 7/8 (12%)	LS	
12-18	5Y 5/1 (100%)		SL	
18-25	2.5Y 5/3 (95%)	10YR 6/8 (5%)	SCL	
25-44	2.5Y 6/6 (60%)	10YR 6/8 (30%) 10YR 2/1 (10%)	C	