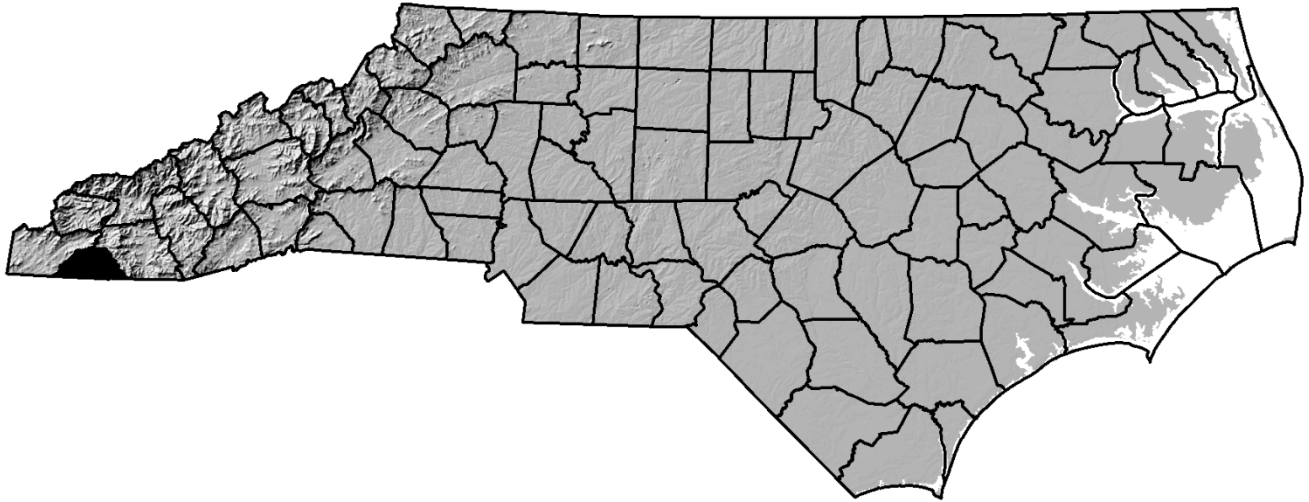


ANNUAL REPORT FOR 2025



Hyatt Mill Creek Site #5 Mitigation Site

ONE ID #: 022-001

Clay County

TIP No. A-0011C

COE Action ID: SAW-2019-00437

NCDWR Project #: 2019-0210



Prepared By:
Environmental Analysis Unit
North Carolina Department of Transportation
December 2025

TABLE OF CONTENTS

SUMMARY	1
1.0 INTRODUCTION:.....	2
.1 Project Description	2
.2 Purpose	2
.3 Project History	2
.4 Debit Ledger	2
2.0 STREAM ASSESSMENT:.....	4
.1 Success Criteria	4
.2 Stream Description	5
.2.1 Post Construction Conditions	5
.2.2 Monitoring Conditions	5
.3 Results of Stream Monitoring	7
.3.1 Site Data	7
3.0 VEGETATION	8
.1 Success Criteria	8
.2 Description of Species	9
.3 Results of Vegetation Monitoring	10
.4 Conclusions	10
4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS	11
5.0 REFERENCES:.....	11

FIGURES

Figure 1 – Site #5 Vicinity Map	3
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TABLES

Table 1 – Site #5 Abbreviated Morphological Summary	6
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APPENDICES

Appendix A – Cross Sections and Longitudinal Profile

Appendix B – Site Photographs

Appendix C – A-0011C Stream Relocation Monitoring Plan

Appendix D – Cross Section, Vegetation Plot & Photo Point Locations (As-Built Plans)

SUMMARY

The following report summarizes the stream monitoring activities that have occurred during the year 2025 at the Hyatt Mill Creek Site #5 mitigation site in Clay County. The North Carolina Department of Transportation (NCDOT) completed the streambank reforestation at this project in February 2021. This report provides the monitoring results for the fourth formal year of monitoring (2025). The year 2025 monitoring period is the fourth of seven scheduled years of monitoring on the Hyatt Mill Creek Site #5.

Based on the overall conclusions of monitoring at Hyatt Mill Creek Site #5, it has met the required monitoring protocols for stream stability for the fourth formal year of monitoring. In the fourth year of monitoring only visual monitoring of stream stability and vegetation success were required. By visual monitoring the stream channel remains stable throughout at this time.

2025 visual vegetation monitoring of the site revealed vegetation continues to thrive on the site. NCDOT conducted herbicide treatment of Kudzu across the site and during the 2025 growing season. Parrot feather was treated in the stream channel during April 2025.

NCDOT proposes to continue stream and vegetation monitoring at the Hyatt Mill Creek Site #5 in 2026.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the stream monitoring activities that have occurred during the Year 2025 at the Hyatt Mill Creek Site #5. Site #5 is located adjacent to NC 69 at the intersection with American Way Road in Clay County from Sta. 89+10 to 94+85 -L- Lt. (Roadway Plan Sheets 9 & 10, Figure 2). Site #5 was constructed to offset stream impacts associated with Transportation Improvement Program (TIP) number A-0011C in Clay County.

The mitigation site provided approximately 633 linear feet of stream relocation. Streambank reforestation was completed in February 2021 by NCDOT. The project involved relocating the channel adjacent to the widening of NC 69 under the A-0011C roadway project. A new floodplain and channel were excavated and several in- stream structures such as rock cross vanes and grade control riffles were installed. No utility easements affect this mitigation site.

1.2 Purpose

For a mitigation site to be considered successful, the site must meet the success criteria. This report details the monitoring in 2025 at the Hyatt Mill Creek Site #5. Hydrologic monitoring was not required for this site.

1.3 Project History

June 2020	Construction Completed
February 2021	Streambank Reforestation Completed
August 2021	As-Built Survey Completed
August 2022	Stream Channel and Vegetation Monitoring (Year 1)
March 2023	Supplemental Buffer Planting
July 2023	Vegetation Monitoring (Year 2)
August 2023	Invasive Species Herbicide Treatment
November 2023	Stream Channel and Vegetation Monitoring (Year 2)
February 2024	Supplemental Buffer Planting
August 2024	Vegetation Monitoring (Year 3)
December 2024	Stream Channel Monitoring (Year 3)
April 2025	Parrott Feather Herbicide Application
September 2025	Visual Stream and Vegetation Monitoring (Year 4)
September 2025	Kudzu Hericide Application

1.4 Debit Ledger

The Hyatt Mill Creek Site #5 stream mitigation site was used in its entirety to compensate for unavoidable stream impacts from the A-0011C project.

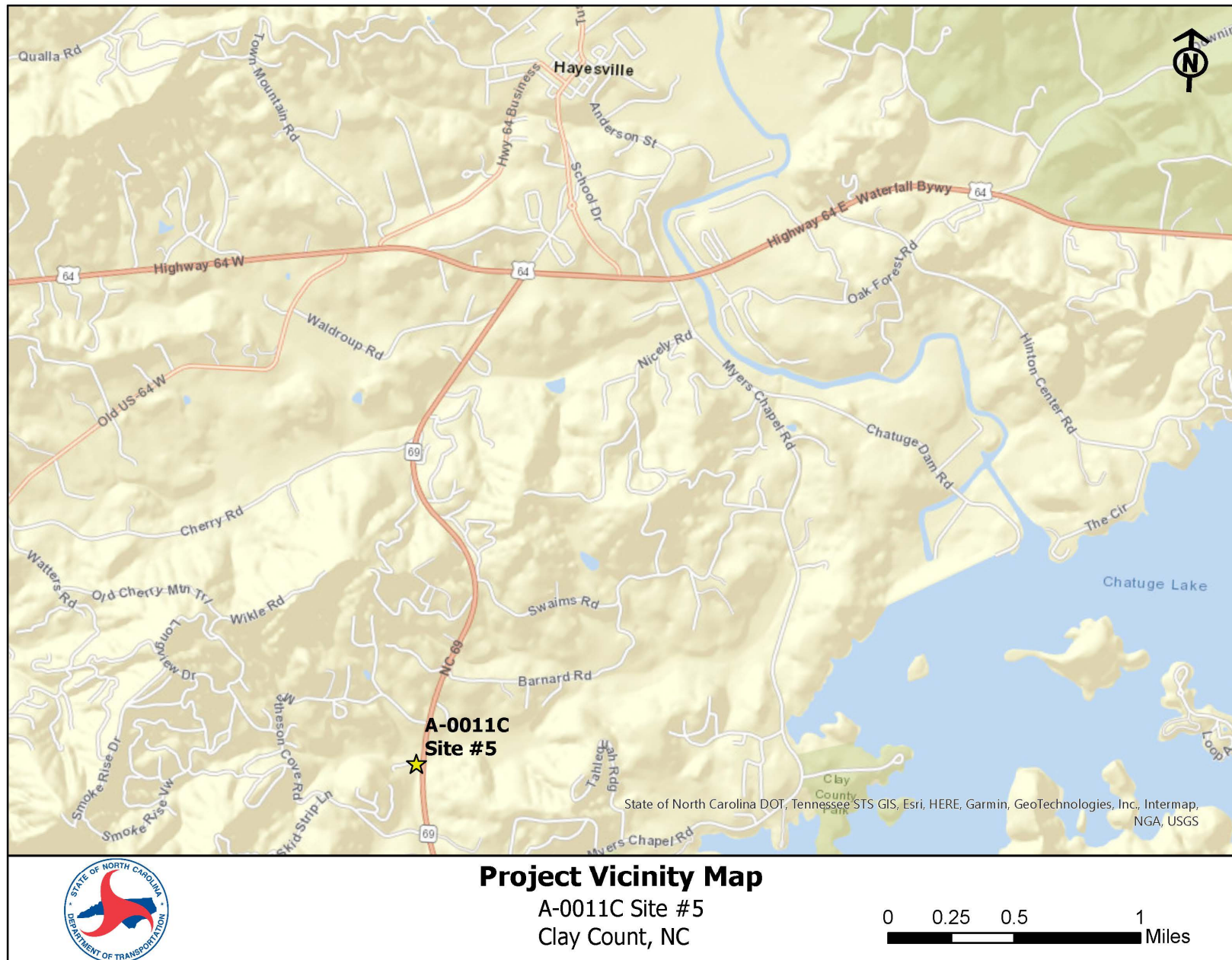


Figure 1. Site #5 Vicinity Map

2.0 STREAM ASSESSMENT

2.1 Success Criteria

Based on email correspondence with the Regulatory Agencies (July 1, 2020), it was agreed to follow the mitigation plan language as it relates to the vegetation monitoring.

USACE Condition #4

“This permit verification authorizes the relocation of stream 5, Hyatt Mill Creek. The relocation of Hyatt Mill Creek will be constructed and monitored in accordance with the enclosed document titled ‘A-0011C Stream Relocation Monitoring Plan’”. See Appendix C for A-0011C Stream Relocation Monitoring Plan

General Monitoring Plan

Monitoring requirements and success criteria outlined in the latest guidance by USACE (Wilmington District) in October 2016 (Stream and Wetland Compensatory Mitigation Update) (Guidelines) will be followed and are briefly outlined below. Monitoring data collected at the Site will include reference photos, plant survival analysis, and channel stability analysis and will be reported in the format specified by RGL 08-03.

Riparian vegetation and stream morphology is proposed to be monitored for a period of seven years with measurements completed in years 1-3, year 5, and year 7. Visual monitoring results will be reported in all monitoring reports. Photo documentation of stream stability will be included in monitoring reports for years 4 and 6. If monitoring demonstrates the Site is successful by year 5 and no concerns have been identified, NCDOT may propose, in writing, to terminate monitoring at the Site and forego monitoring requirements for years 6 and 7. If USACE determines that terminating the site monitoring is acceptable, USACE will notify NCDOT in writing. Early closure will only be provided through written approval from USACE. Monitoring will be conducted by NCDOT or its duly authorized representatives. Monitoring reports must be provided to USACE for review no later than April 1 for all seven years of monitoring.

2.2 Stream Description

2.2.1 Post-Construction Conditions

The Hyatt Mill Creek Site #5 project involved the relocation of the stream to a new channel and excavation of a floodplain. The stream reach runs parallel to NC 69 and flows through an arch pipe under American Way Road and continues to the confluence with Coleman Creek. A new floodplain and channel were excavated along with several in-stream structures such as rock cross vanes and grade control riffles were installed. The planted riparian buffer zone will average 40 feet on both sides of the stream. No utility easements affect this mitigation site.

2.2.2 Monitoring Conditions

The objective of the Hyatt Mill Creek Site #5 stream relocation was to construct a low to moderate width-to-depth ratio C-type stream. A total of four cross sections (two in a riffle and two in a pool) were surveyed. For this report, only cross sections containing riffles were used in the comparison of channel morphology presented below in Table 1.

Table 1. Site #5 Abbreviated Morphological Summary

Hyatt Mill Creek Site #5: Cross Section #1 @ Sta. 01+76						
Variable	As-Built 2021	2022	2023	2024	2026	2028
Width of the Floodprone Area (ft.)	41.2	42.3	45.5	47.9		
Bankfull Width (ft.)	13.0	12.9	7.3	8.5		
Entrenchment Ratio	3.2	3.3	6.3	5.6		
Bankfull Mean Depth (ft.)	0.6	0.5	0.7	0.71		
Maximum Bankfull Depth (ft.)	1.0	1.0	1.3	1.57		
Width/Depth Ratio	21	28.0	10.1	11.9		
Bankfull Cross Sectional Area (ft2)	8.1	5.9	5.2	6.08		

Hyatt Mill Creek Site #5: Cross Section #3 @ Sta. 05+58						
Variable	As-Built 2021	2022	2023	2024	2026	2028
Width of the Floodprone Area (ft.)	36.5	34.7	33.8	33.9		
Bankfull Width (ft.)	14.9	14.4	13.6	10.9		
Entrenchment Ratio	2.5	2.4	2.5	3.1		
Bankfull Mean Depth (ft.)	0.8	0.7	0.6	0.6		
Maximum Bankfull Depth (ft.)	1.1	1.0	0.9	1.4		
Width/Depth Ratio	18.8	21.1	23.9	19.1		
Bankfull Cross Sectional Area (ft2)	11.7	9.7	7.8	6.2		

*Riffle values are used for classification purposes, pool values are shown in Appendix A.

2.3 Results of the Stream Assessment

2.3.1 Site Data

The assessment included the visual monitoring of four cross sections and the longitudinal profile of the Hyatt Mill Creek Site #5 established by NCDOT after construction. The length of the profile along the Hyatt Mill Creek Site #5 was approximately 633 linear feet. Four cross sections were established during the as-built monitoring year. Cross section locations were subsequently based on the stationing of the longitudinal profile and are presented below. The location of the cross sections and longitudinal profile are shown in Appendix A.

Hyatt Mill Creek Site #5 Cross-Sections:

- ◆ Cross-Section #1: Hyatt Mill Creek Site #5, Station 01+76, Riffle
- ◆ Cross-Section #2: Hyatt Mill Creek Site #5, Station 02+09, Pool
- ◆ Cross-Section #3: Hyatt Mill Creek Site #5, Station 05+58, Riffle
- ◆ Cross-Section #4: Hyatt Mill Creek Site #4, Station 05+96, Pool

Visual monitoring for stream stability was conducted in 2025 for monitoring year 4. Results of visual monitoring reveal the stream remains stable and experience at least one bankfull event during the growing season as evidenced by presence of wrack lines. Visual inspection was documented in photos presented in Appendix B.

3.0 VEGETATION: HYATT MILL CREEK MITIGATION SITE (YEAR 4 MONITORING)

3.1 Success Criteria

Mitigation Plan:

General Monitoring Plan

Riparian vegetation is proposed to be monitored for a period of seven years with measurements completed in years 1-3, year 5, and year 7. Visual monitoring results will be reported in all monitoring reports.

Vegetation

Vegetation planting should be conducted between November 15 and March 15. After planting has been completed, an initial evaluation will be performed to verify planting methods and to determine initial species composition and density. Supplemental planting and additional Site modifications will be implemented, if necessary.

Two sample plots (0.02 acre in size, >2% of planted portion) will be installed within the Site due to small size of the project. Vegetation monitoring for each sample plot will be conducted between July 1st and leaf drop to account for an effects of climatic or other conditions that may affect vegetation survival. Visual observations of the percent cover of shrub and herbaceous species will also be documented by photograph.

Vegetation Performance Criteria

Within planted portions of the site, a minimum of 320 planted stems per acre must be surviving in the first three monitoring years. Subsequently, a minimum of 260 stems per acre must be present a year 5 and 210 stems per acre at year 7. Since this Site is located in the mountain region, trees in each plot must average 6 feet in height at year 5 and 8 feet in height a year 7. Volunteer stems of native plants will be considered in determining overall vegetation success; however, (1) volunteer stems will be counted separately from planted stems and (2) volunteer stems must be species from the approved planting list.

Visual Monitoring

The Site will be visually monitored each year to identify areas of concern (poor plant vigor, invasive plants, ect.)

Remedial Actions

Monitoring reports will include a remedial action plan to address the portions of the site that fail to meet one or more of the required functional goals/performance standards. USACE will be notified as soon as possible once a need is identified that will require remedial action. If portions of the site are not meeting required criteria, replanting of all or part of the site will be required. If supplemental plantings exceed 20% of the total planted area, additional vegetation monitoring may be required by USACE.

The site will be monitored for the presence of invasive species and adaptive management aimed at controlling the species will be conducted. Treatments with herbicides, in coordination with USACE, will be used as needed where invasive species are identified in areas of planted and/or desirable species.

The stream relocation and buffers will remain under state ownership in perpetuity. No mow signs and white stakes will be erected along the stream buffers to protect against maintenance activities.

3.2 Description of Species

The following live stake species were planted in the Streambank Area (Type I):

Salix nigra, Black Willow

Cornus amomum, Silky Dogwood

The following tree species were planted in the Buffer Area (Type II):

Liriodendron tulipifera, Tulip Poplar

Platanus occidentalis, Sycamore

Fraxinus pennsylvanica, Green Ash

Betula nigra, River Birch

Quercus nigra, Water Oak

Quercus phellos, Willow Oak

3.3 Results of Vegetation Monitoring

Plot #	Tulip Poplar	Sycamore	Green Ash	River Birch	Water Oak	Willow Oak	Total (Year 4)	Total (at planting)	Density (Trees/Acre)	Avg. Tree Height (ft)
1										
2										
Year 4									Visual Inspection	
Year 3									510	2.9
Year 2									267	3.8
Year 1									97	N/A

Site Notes: Streambank and buffer planted vegetation was doing well throughout the site. Other species noted within the site included red maple, black cherry, sumac, locust and various grasses. Parrot Feather herbicide applications have reduced the amount of this invasive specie noted within the site. Kudzu was sprayed by Div. 14 Roadside on September 23, 2025 after our Year 4 monitoring visit on September 3, 2025.

The stream relocation was stable and a bankfull event was noted by wrack lines observed along streambanks.

3.4 Conclusions

There are a total of 2 vegetation monitoring plots established throughout the buffer area. The 2025 vegetation monitoring of the site was visually inspected. Planted vegetation was doing well throughout the site. NCDOT plans to continue vegetation monitoring in 2026.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The Hyatt Mill Creek Site #5 mitigation site has met the required stream monitoring protocols for the fourth formal year of monitoring. The channel throughout the stream site remains stable after the fourth year of monitoring. The streambank and buffer area are meeting the minimum vegetation success criteria. Stream Channel monitoring and vegetation monitoring will continue in 2026.

5.0 REFERENCES

Mitigation Plan, US 19E Widening, Yancey and Mitchell Counties, North Carolina TIP Number A-0011C, WBS No. 35609.1.1, May 6, 2013 (Revised November 4, 2013)

Department of the Army Permit, Permittee: North Carolina Department of Transportation, Permit No. 2004-9987181 / 2004-30631, TIP No. A-0011C, Issuing Office: CESAW-RG-A

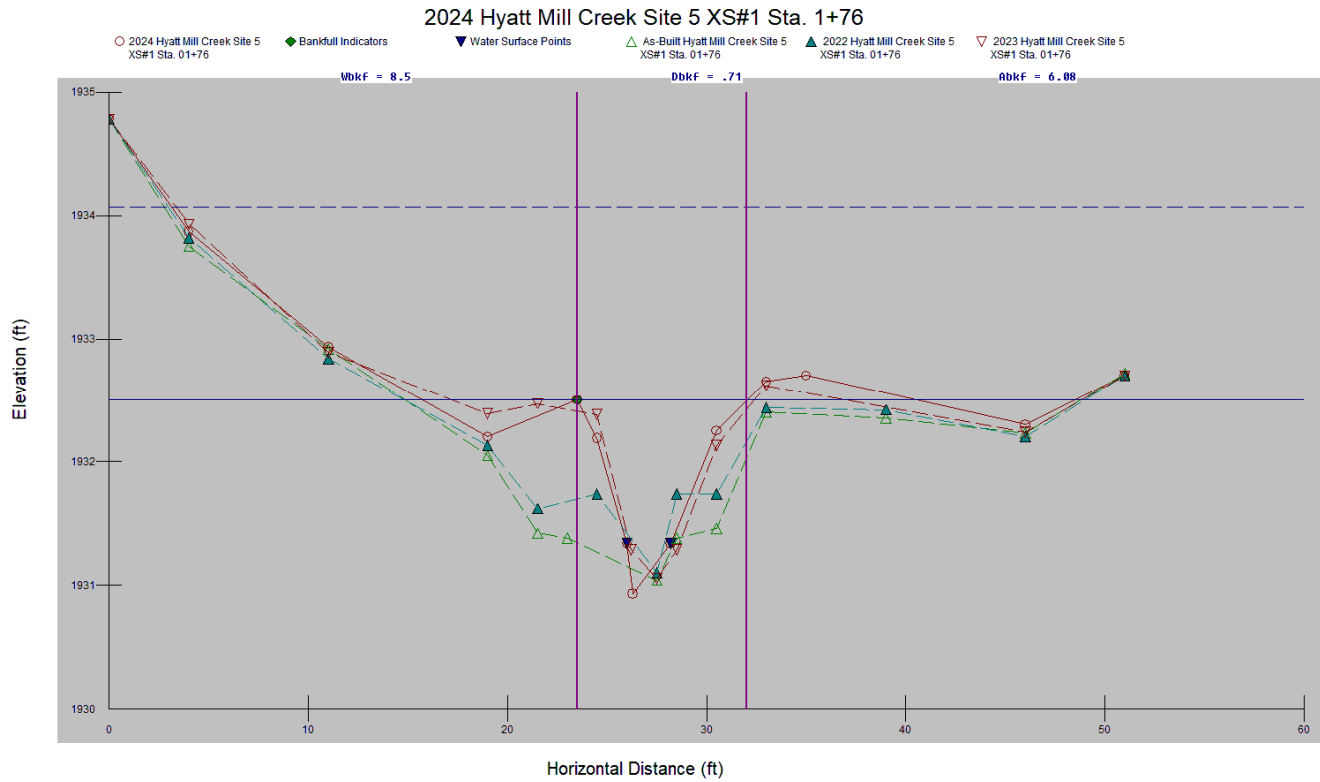
North Carolina Department of Environment and Natural Resources, Division of Water Resources, December 2, 2013, Proposed improvements to US 19E from SR 1186 in Yancey County to multilane section west of Spruce Pine in Mitchell County, State Project No. 6.909001T, WBS Element No. 35609.1.1, TIP R-2519B, NCDWR Project No. 2013-0743v.2

Rosgen, D.L, 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

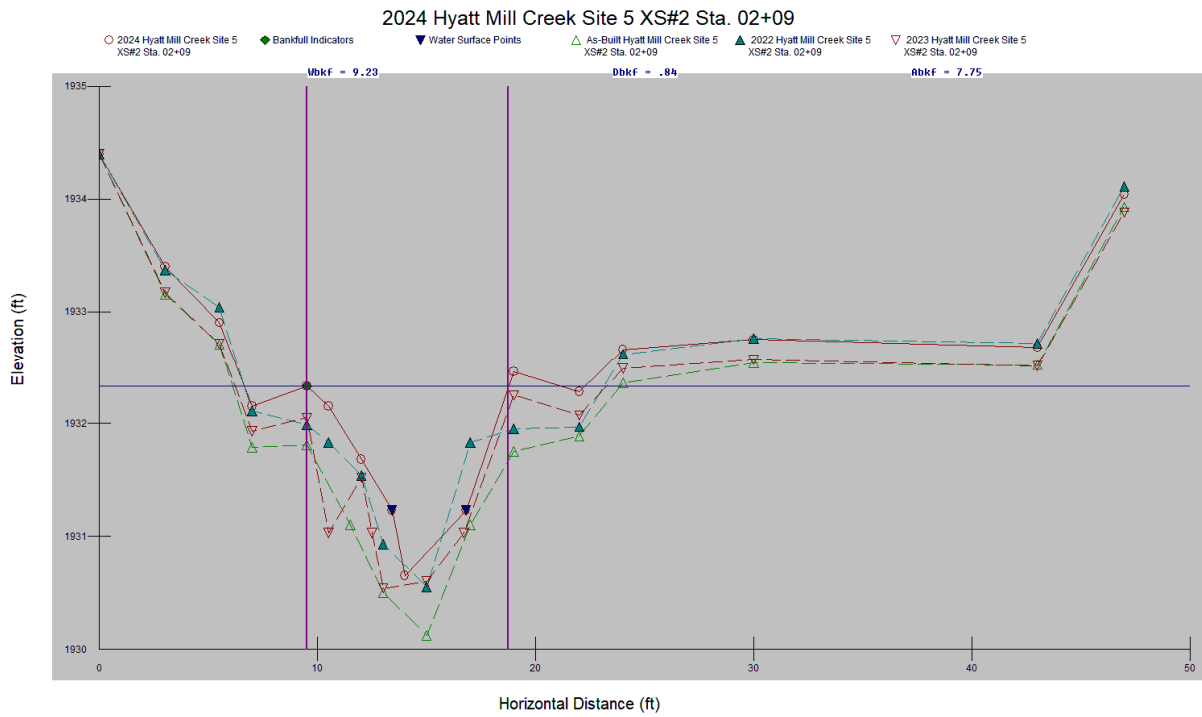
US Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines. Prepared with cooperation from the US Environmental Protection Agency, NC Wildlife Resources Commission, and the NC Division of Water Resources.

APPENDIX A

CROSS SECTIONS AND LONGITUDINAL PROFILE

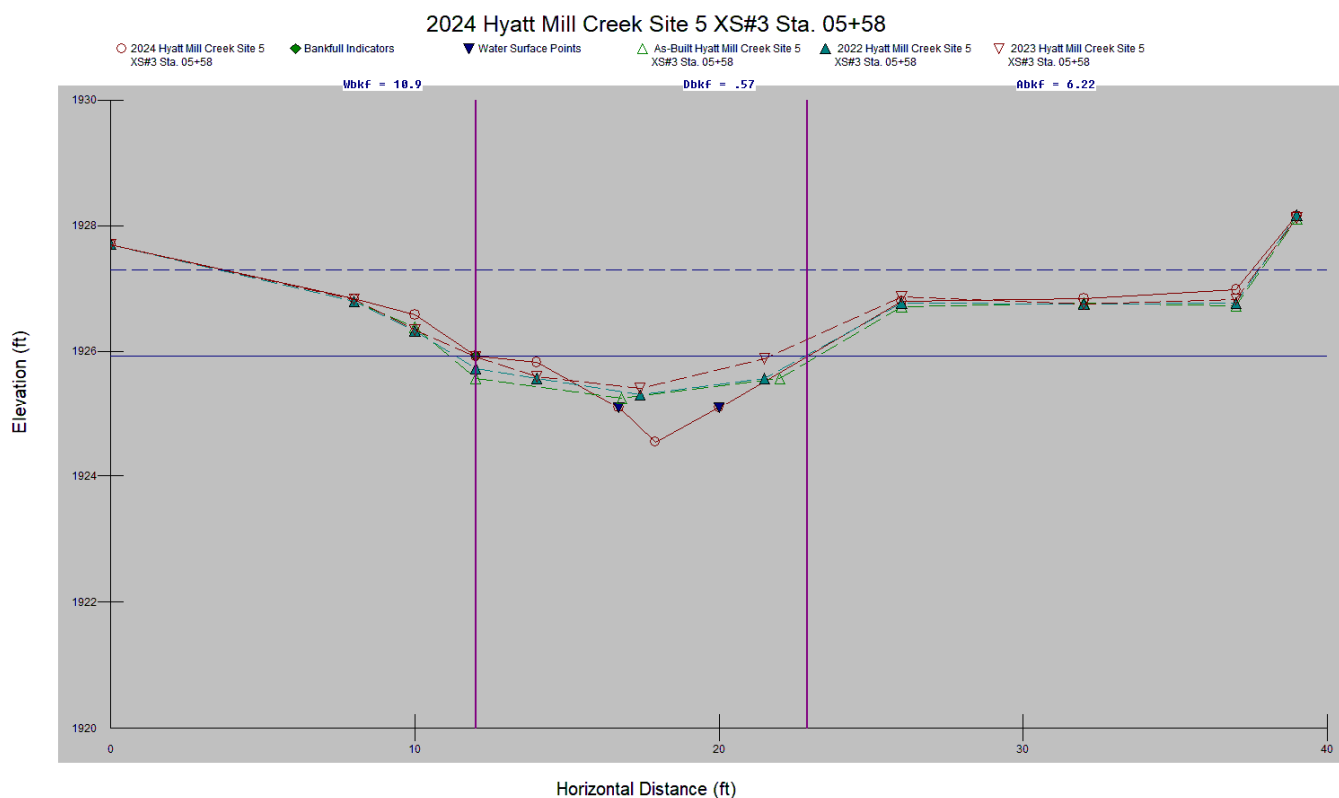


Site #5: Cross-Section #1 (Riffle) Abbreviated Morphological Summary						
Monitoring Year	As-Built (2021)	2022	2023	2024	2026	2028
Width of the Floodprone Area (ft.)	41.2	42.3	45.5	47.9		
Bankfull Width (ft.)	13.0	12.9	7.3	8.5		
Entrenchment Ratio	3.2	3.3	6.3	5.6		
Bankfull Mean Depth (ft.)	0.6	0.5	0.7	0.71		
Maximum Bankfull Depth (ft.)	1.0	1.0	1.3	1.57		
Width/Depth Ratio	21.0	28.0	10.1	11.9		
Bankfull Cross Sectional Area (ft ²)	8.1	5.9	5.2	6.08		

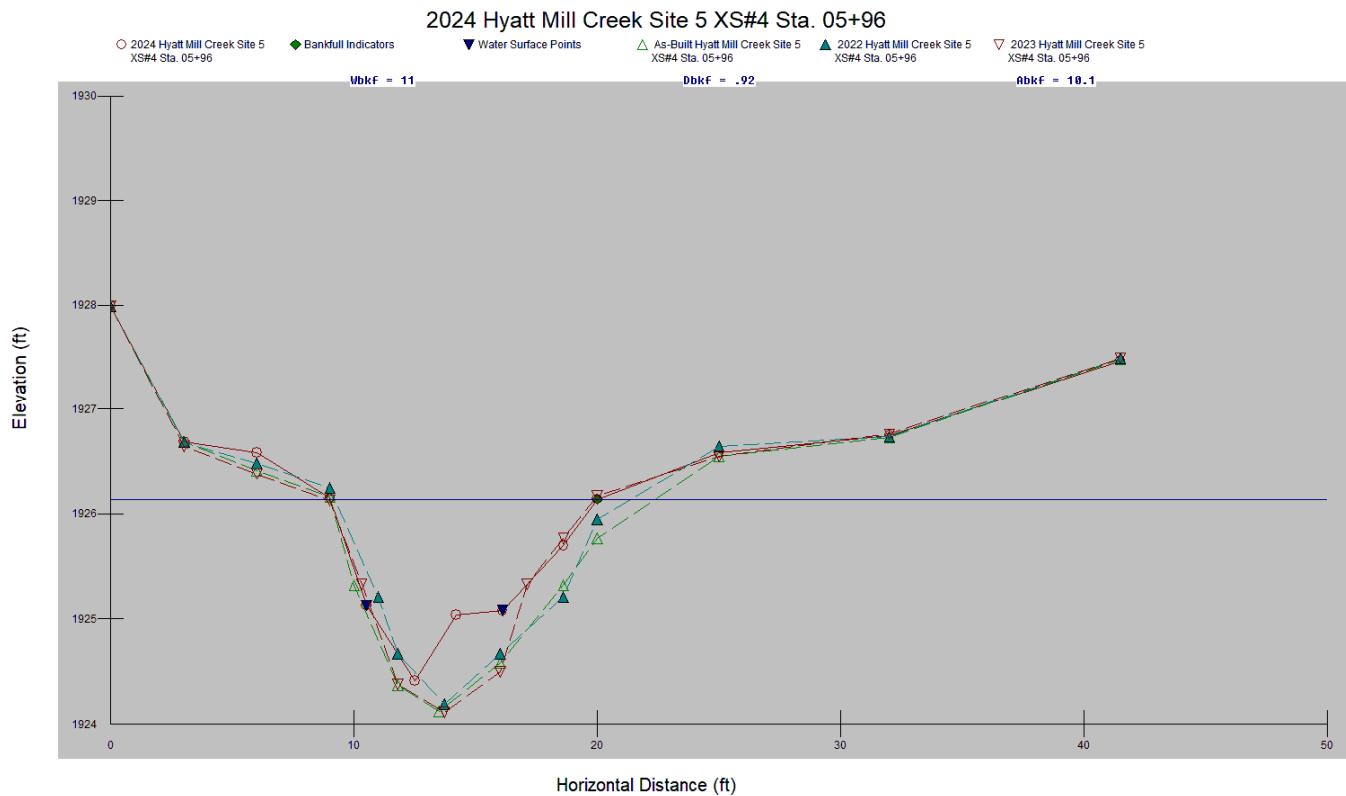


Site #5: Cross-Section #2 (Pool) Abbreviated Morphological Summary						
Monitoring Year	As-Built (2021)	2022	2023	2024	2026	2028
Bankfull Width (ft.)	9.3	9.3	12.6	9.2		
Bankfull Mean Depth (ft.)	0.8	0.6	0.9	0.8		
Maximum Bankfull Depth (ft.)	1.6	1.4	1.7	1.7		
Bankfull Cross Sectional Area (ft ²)	7.8	5.2	11.3	7.8		

*According to the Rosgen Classification of Natural Rivers floodprone width, entrenchment ratio, and width depth ratio are not measured in pool, glide, or run features.



Site #5: Cross-Section #3 (Riffle) Abbreviated Morphological Summary						
Monitoring Year	As-Built (2021)	2022	2023	2024	2026	2028
Width of the Floodprone Area (ft.)	36.5	34.7	33.8	33.9		
Bankfull Width (ft.)	14.9	14.4	13.6	10.9		
Entrenchment Ratio	2.5	2.4	2.5	3.1		
Bankfull Mean Depth (ft.)	0.8	0.7	0.6	0.6		
Maximum Bankfull Depth (ft.)	1.1	1.0	0.9	1.4		
Width/Depth Ratio	18.8	21.1	23.9	19.1		
Bankfull Cross Sectional Area (ft ²)	11.7	9.7	7.8	6.2		



Site #5: Cross-Section #4 (Pool) Abbreviated Morphological Summary						
Monitoring Year	As-Built (2021)	2022	2023	2024	2026	2028
Bankfull Width (ft.)	10.5	10.4	11.5	11.0		
Bankfull Mean Depth (ft.)	1.0	1.0	1.1	0.9		
Maximum Bankfull Depth (ft.)	1.7	1.8	2.1	1.73		
Bankfull Cross Sectional Area (ft ²)	10.4	10.9	13.1	10.1		

*According to the Rosgen Classification of Natural Rivers floodprone width, entrenchment ratio, and width depth ratio are not measured in pool, glide, or run features.

APPENDIX B

SITE PHOTOGRAPHS

Hyatt Mill Creek Site #5



Photo Point #1 Upstream



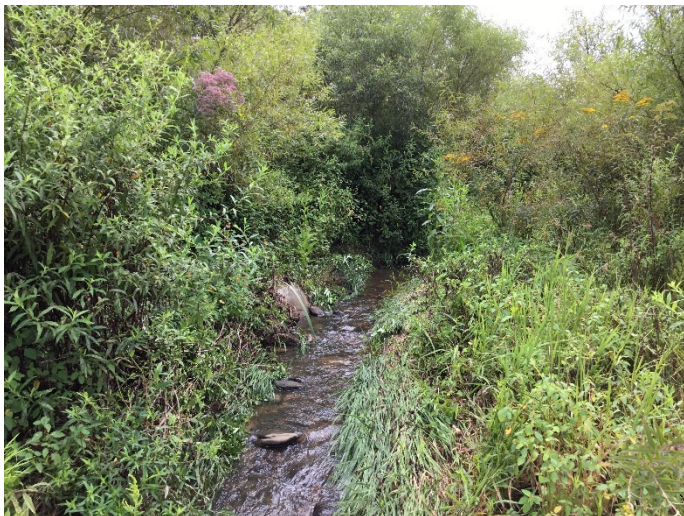
Photo Point #1 Downstream



Photo Point #2 Upstream



Photo Point #2 Downstream



Supplemental Photo Upstream of American Way
(Looking Upstream)
September 2025



Supplemental Photo Upstream of American Way
(Looking Downstream)

Hyatt Mill Creek Site #5



Photo Point #3 Upstream



Photo Point #3 Downstream



Photo Point #4 Upstream



Photo Point #4 Downstream



Upstream overview from American Way



Downstream overview from American Way

September 2025

Hyatt Mill Creek Site #5



Vegetation Plot #1



Vegetation Plot #2

September 2025

APPENDIX C

A-0011C STREAM RELOCATION MONITORING PLAN

A-0011C Stream Relocation Monitoring Plan

Hyatt Mill Creek

Clay County

Version 1.0

January 25, 2019

NCDOT Division 14

This plan addresses requirements for the relocation of a portion of Hyatt Mill Creek impacted for the widening of NC-69 from the Georgia Line to US 64, Clay County, NC (TIP A-0011C). The purpose of the project is to improve traffic service for motorists in the project area. Hyatt Mill Creek is closely confined between an existing business and NC-69 southbound. The property on the northbound side of NC-69 is deemed an historical property and through agency coordination could not be impacted. Therefor this portion of Hyatt Mill Creek would be impacted to complete the project. Specifically, the impact is a result of fill that is needed to for the two additional southbound lanes. The widening configuration was chosen in an effort to eliminate impacts to the historical property on the northbound side on NC-69.

The portion of Hyatt Mill Creek being relocated is approximately 600 linear feet. Existing Hyatt Mill Creek is a small stream (~0.35 mi² watershed) with an approximately 8-foot wide sand/gravel bed. The channel has a few areas of instability and is slightly entrenched. From Rogen Classification, this channel seems to be a straightened C channel. The designed (proposed low to moderate width-to-depth ratio C Type) channel is approximately 633 feet in length with a bankfull channel width of 10 feet. Average buffer width (measured from the bankfull channel limit) that will be replanted along the stream is 40 feet with widths ranging from 20 to 65 feet. There is an area on the left bank at approximate station 10+10 that has a buffer width of approximately 25 feet due to an existing pond that the R/W and buffer zone were brought in to avoid. In addition, two areas located at approximate stations 10+70 and 12+62 along the right bank have a buffer width ranging from 22 to 24 feet due to the stream alignment being generated to have an appropriate belt width based on the locations of the upstream pipe and the proposed driveway pipe arch. Floodplain access is expected to meet the success criteria based on design parameters. Hydrologic functions should be comparable to existing, but water quality and stream habitat functions should be lifted by improving bank stability, riffle habitat structures (habitat complexity), and reducing sediment inputs.

NCDOT will be responsible for implementing the monitoring plan. A consulting firm will be secured to complete the data collection and report writing.

GENERAL MONITORING PLAN

Monitoring requirements and success criteria outlined in the latest guidance by USACE (Wilmington District) in October 2016 (*Stream and Wetland Compensatory Mitigation Update*) (Guidelines) will be followed and are briefly outlined below. Monitoring data collected at the Site will include reference photos, plant survival analysis, and channel stability analysis and will be reported in the format specified by RGL 08-03.

Riparian vegetation and stream morphology is proposed to be monitored for a period of seven years with measurements completed in years 1-3, year 5, and year 7. Visual monitoring results will be reported in all monitoring reports. Photo documentation of stream stability will be included in monitoring reports for years 4 and 6. If monitoring demonstrates the Site is successful by year 5 and no concerns have been identified, NCDOT may propose, in writing, to terminate monitoring at the Site and forego monitoring requirements for years 6 and 7. If USACE determines that terminating the site monitoring is acceptable, USACE will notify NCDOT in writing. Early closure will only be provided through written approval from USACE. Monitoring will be conducted by NCDOT or its duly authorized representatives. Monitoring reports must be provided to USACE for review no later than April 1 for all seven years of monitoring.

Monitoring and success criteria for the Site will relate to project goals and objectives determined by NC SAM functional assessment method. Goals and objectives will be considered successful upon achieving stream and/or vegetation success criteria. **Table 1** provides a monitoring schedule for the Site.

Table 1. Monitoring Schedule

Resource	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Stream							
Vegetation							
Visual Assessment							
Report Submittal							

VEGETATION

Vegetation planting should be conducted between November 15 and March 15. After planting has been completed, an initial evaluation will be performed to verify planting methods and to determine initial species composition and density. Supplemental planting and additional Site modifications will be implemented, if necessary. Plants will be selected from the attached species list.

Two sample plots (0.02 ac in size, >2% of planted portion) will be installed within the Site (see Attachment A) due to small size of the project. Vegetation monitoring for each sample plot will be conducted between July 1st and leaf drop to account for an effects of climatic or other conditions that may affect vegetation survival. Visual observations of the percent cover of shrub and herbaceous species will also be documented by photograph.

Vegetation Performance Criteria

Within planted portions of the site, a minimum of 320 planted stems per acre must be surviving in the first three monitoring years. Subsequently, a minimum of 260 stems per acre must be present at year 5 and 210 stems per acre at year 7. Since this Site is located in the mountain region, trees in each plot must average 6 feet in height at year 5 and 8 feet in height at year 7. Volunteer stems of native plants will be considered in determining overall vegetation success; however, (1) volunteer stems will be counted separately from planted stems and (2) volunteer streams must be species from the approved planting list included in this plan.

STREAM CHANNEL STABILITY

Permanent, monumented cross-sections will be installed at an approximate frequency of one per 20 bankfull-widths, measured along the centerline of the channel (thalweg). In general, cross-section locations should be selected to represent 50% of pools and 50% of riffle areas. Locations of the cross sections will include areas predisposed to instability. Cross-section locations shall be detailed in the Site as-built survey. Monitoring cross section locations for the Site are depicted on the monitoring plan sheet (Attachment A).

Longitudinal profiles of the thalweg, water surface, bankfull, and top-of-bank shall be provided in the Site as-built survey from comparison with future geomorphological data. Unless there is evidence of channel bank or bed instability observed during monitoring efforts, additional profile surveys will not be required during the Stream Monitoring Period (years 1 through 7). In these cases where bed/bank instability is observed, USACE will determine if remedial measures are necessary. If remedial measures are necessary, additional longitudinal profiles may be required in these areas of concern to track changes in the channel and demonstrate stability

Determinations regarding the occurrence of bankfull events shall be based on the observation of overbank events utilizing physical evidence of overbank flooding. The need for crest gages to be installed to document the occurrence of bankfull events should not be necessary due to the length of stream restoration. Physical indicators, which are easily observable, include floodplain scour, vegetation flattening, sediment deposition on floodplains and wrack lines consisting of deposited debris associated with stream discharges. The presence of physical indicators supporting bankfull event determinations shall be photo-documented.

Stream Success Criteria

Criteria are included below in **Table 2**. During annual monitoring, if visual monitoring shows stream instability and/or causing more than a 15% increase in cross-sectional area, bank pins will be installed to assess the stability over time. During any given monitoring interval, bank height ratio (BHR) and entrenchment ratio (ER) will not change more than 10% from the baseline condition. Remedial actions in coordination with USACE may be needed if this criteria is not met.

Table 2. Functional Goal/Objectives and Performance Standards

Project Goal/Objective	Stream Success Criteria
(1) Hydrology	
(2) Flood Flow (Floodplain Access) (3) Streamside Area Attenuation	Four overbank events in separate monitoring years will be documented during the monitoring period.
(4) Wooded Riparian Buffer	Attaining vegetation success criteria including an average density of 320 planted stems per acre must be surviving in the first three monitoring years. Subsequently, 260 planted stems per acre must be surviving in year 5, and 210 planted stems per acre in year 7.
(3) Stream Stability (4) Channel Stability	Cross-sections, monitored annually, will be compared to as-built measurements to determine channel stability and maintenance of channel geomorphology. Bank Height Ratios and Entrenchment Ratios target is 10% max. increase between monitoring years and bank erosion will be minimized.
(4) Stream Geomorphology	Maintain a stable C-type channel.
(1) Water Quality	
(2) Streamside Area Vegetation (3) Upland Pollution Filtration	Attaining vegetation success criteria (Restore Wooded Riparian Buffer)
(1) Restore Habitat	
(2) In-stream Habitat (3) Stream Stability (3) In-stream Habitat	Attaining vegetation performance criteria (Restore Wooded Riparian Buffer) and stabilization of grade control/habitat structures.
(2) In-stream Habitat (3) Streamside Habitat (3) Thermoregulation	Attaining vegetation success criteria (Restore Wooded Riparian Buffer).

VISUAL MONITORING

The Site will be visually monitored each year to identify areas of concern (poor plant vigor, invasive plants, streambank instability, etc.). Results will be provided in the monitoring report in a plan view format and recommended courses of action will be identified for approval by USACE.

STREAM BUFFERS

Minimum stream buffer widths will be approximately 30 feet. Some areas of the stream buffer will exceed 30 feet, including widths in excess of 50 feet.

Note that, average buffer width (measured from the bankfull channel limit) that will be replanted along the stream is 40 feet with widths ranging from 20 to 65 feet. There is an area on the left bank at approximate station 10+10 that has a buffer width of approximately 25 feet due to an existing pond that the R/W and buffer zone were brought in to avoid. In addition, two areas located at approximate stations 10+70 and 12+62 along the right bank have a buffer width ranging from 22 to 24 feet due to the stream alignment being generated to have an appropriate belt width based on the locations of the upstream pipe and the proposed driveway pipe arch.

REMEDIAL ACTIONS

Monitoring reports will include a remedial action plan to address the portions of the site that fail to meet one or more of the required functional goals/performance standards. USACE will be notified as soon as possible once a need is identified that will require remedial action. If portions of the site are not meeting required criteria, replanting of all or part of the site will be required. If supplemental plantings exceed 20% of the total planted area, additional vegetation monitoring may be required by USACE.

If concerns regarding stream stability are identified from visual monitoring and/or >15% increase in cross-sectional area, bank pins may be used to help track bank stability. A reach that has >10% increase in bank height ratio may be a candidate for repair. In this case, coordination with USACE will be conducted to determine if remediation may be needed.

The site will be monitored for the presence of invasive species and adaptive management aimed at controlling the species will be conducted. Treatments with herbicides, in coordination with USACE, will be used as needed where invasive species are identified in areas of planted and/or desirable species. Beaver control will be implemented under NCDOT's statewide contract with USDA should beaver damage occur during the monitoring period. These activities will be documented in annual reports.

The stream relocation and buffers will remain under state ownership in perpetuity. No mow signs and white stakes will be erected along the stream buffers to protect against maintenance activities.

Planting and Volunteer Plant List

Stream Banks (TYPE I)

Cornus amomum Silky dogwood
Salix sericea Silky willow
Salix nigra Black willow
Cephalanthus occidentalis Buttonbush
Alnus serrulata Tag alder
Populus deltoides Cottonwood

Riparian-Upland Buffer (TYPE II)

Liriodendron tulipifera Tulip Poplar
Prunus serotina Black Cherry
Robinia pseudoacacia Black Locust
Acer rubrum Red Maple
Ulmus americana American elm
Fraxinus americana White ash
Cornus amomum silky dogwood
Carpinus caroliniana Ironwood
Cephalanthus occidentalis Buttonbush
Lindera benzoin Spicebush
Liquidambar styraciflua Sweetgum
Alnus serrulata Tag alder
Plantanus occidentalis Sycamore
Betula nigra River birch
Populus deltoides Cottonwood
Corylus americana American hazelnut
Quercus michauxii Swamp chestnut oak
Sambucus canadensis elderberry
Pinus strobus Eastern white pine
Pinus echinata Shortleaf pine
Pinus virginiana Virginia Pine
Quercus alba White oak
Quercus falcata Southern red oak
Quercus stellata Post oak
Juniperus virginiana Eastern red cedar
Diospyros virginiana Common persimmon
Juglans nigra Black walnut
Carya tomentosa Mockernut hickory
Carya glabra Pignut hickory
Ilex opaca American holly
Cornus florida Flowering dogwood
Juglans nigra Black walnut
Fagus grandifolia American beech
Cornus racemosa Gray dogwood
Hamamelis virginiana American witchhazel
Viburnum dentatum Southern arrowwood
Sambucus racemosa Red elderberry

APPENDIX D

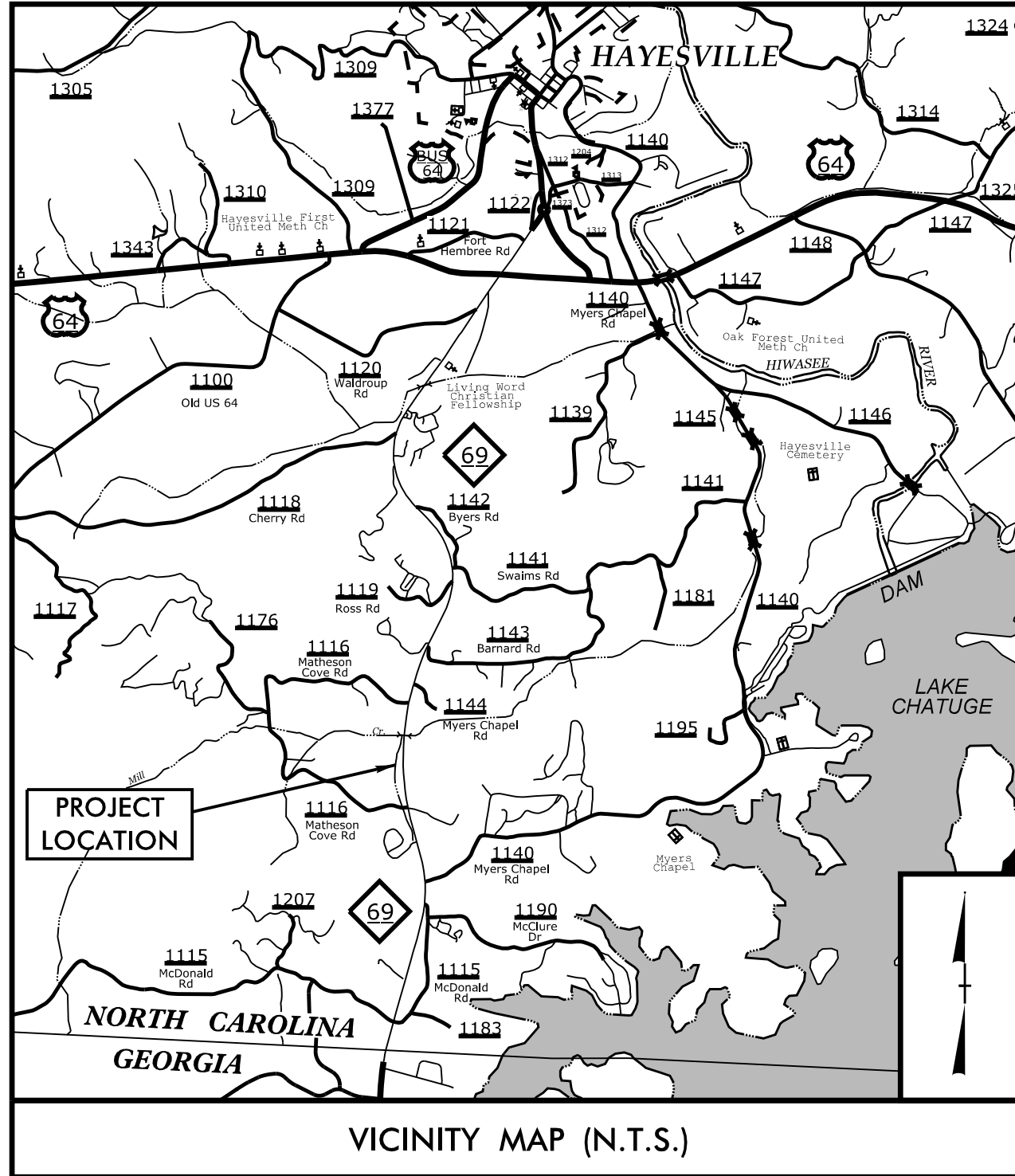
CROSS SECTION, VEGETATION PLOT & PHOTO POINT LOCATIONS (AS-BUILT PLANS)

05/08/2019

TIP PROJECT: A-0011C

CONTRACT:

See Sheet OSM-1A For Index of Sheets



STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

PLAN FOR ON-SITE MITIGATION
CLAY COUNTY

LOCATION: NC 69 FROM GEORGIA STATE LINE TO US 64

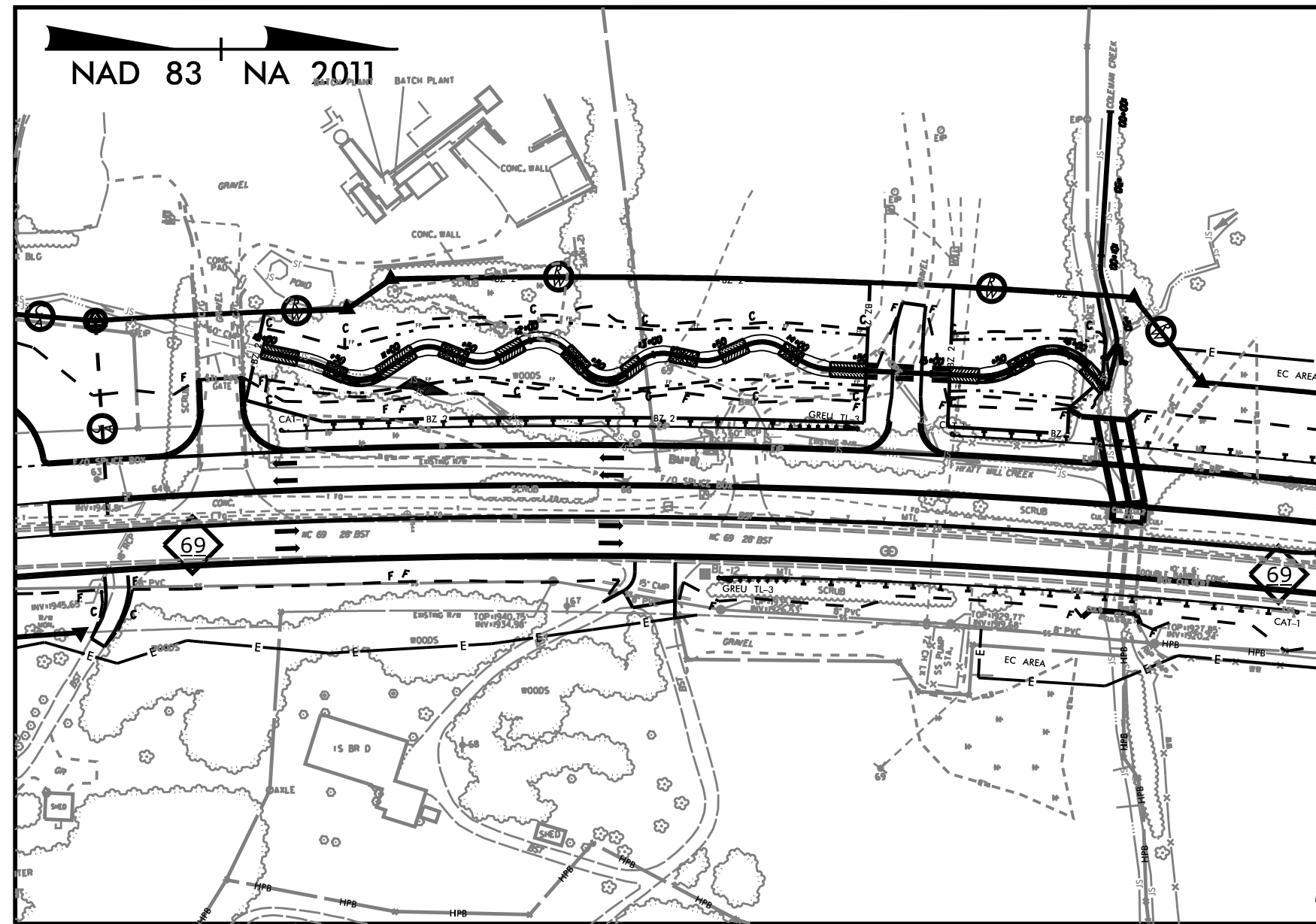
TYPE OF WORK: STREAM RELOCATION (GRADING & PLANTING)

As Built Plans

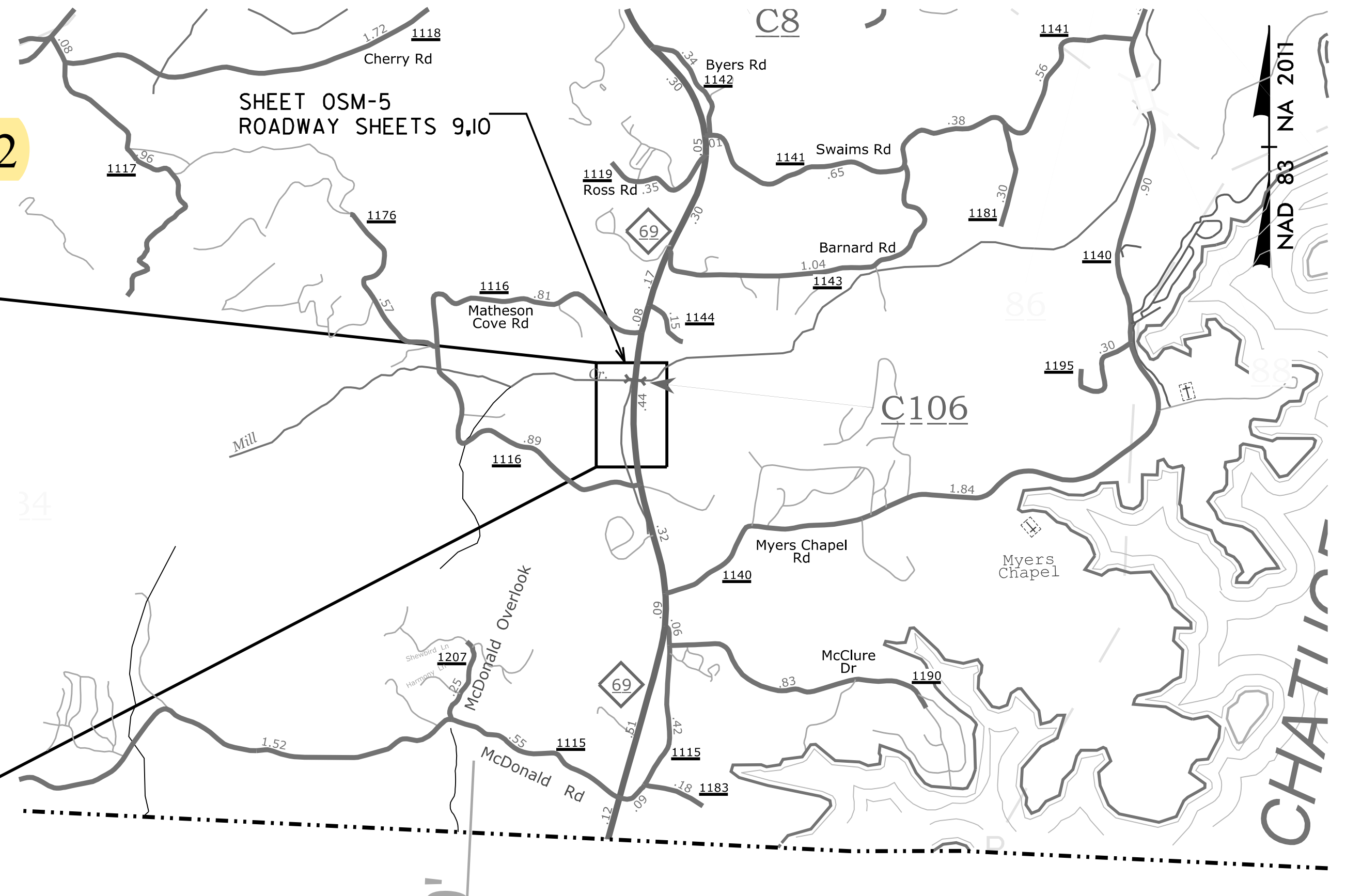
Site Completed 6-24-2020

As-Built Shots taken 9-27-2021

Planting Completed February 2022



N.T.S.



STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-0011C	OSM-1	28
STATE PROJ. NO.	P.A. PROJ. NO.	DESCRIPTION	
32574.1.FD7	APD-0069(007)	PE	
32574.2.4	APD-0069(007)	RW, UTILITIES	
32574.3.8	APD-0069(007)	CONSTRUCTION	

GRAPHIC SCALES



PLANS



PROFILE (HORIZONTAL)



PROFILE (VERTICAL)

PROJECT LENGTH

LENGTH OF TIP PROJECT A-0011C
STREAM RELOCATION = 633 LF (0.12 MI.)

2018 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

PROJECT ENGINEER

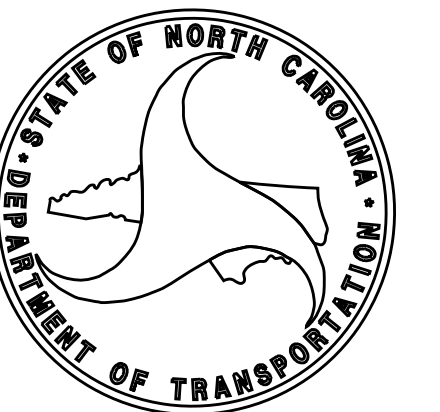
LETTING DATE:

PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE:

P.E.



GENERAL NOTES:

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE FOLLOWING STANDARDS:
- A) NORTH CAROLINA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" DATED JANURAY 2018, AND ANY SUPPLEMENTS THERETO ISSUED PRIOR TO THE DATE OF RECEIPT OF BIDS.

B) NORTH CAROLINA DEPARTMENT OF TRANSPORTATION "ROADWAY STANDARD DRAWINGS" DATED 2018, AND ANY SUPPLEMENTS THERETO ISSUED PRIOR TO THE DATE OF RECEIPT OF BIDS.

C) NORTH CAROLINA DEPARTMENT OF TRANSPORTATION "CONSTRUCTION MANUAL".
2. THE CONTRACTOR IS RESPONSIBLE FOR AVOIDING ANY DISTURBANCE OR DAMAGE TO EXISTING UTILITIES AND SHALL BE RESPONSIBLE FOR IMMEDIATELY REPAIRING ANY DAMAGES AT A COST INCIDENTAL TO THIS CONTRACT.
3. THE ABANDONED SECTION OF THE CHANNEL SHALL BE FILLED IN CONJUNCTION WITH THE ROADWAY WIDENING AND WILL NOT BE COMPLETED AS PART OF THE STREAM RELOCATION.
4. A PRECONSTRUCTION CONFERENCE SHALL BE COORDINATED BY THE ENGINEER PER DIVISION 16 OF THE NCDOT CONSTRUCTION MANUAL.

SEQUENCE OF CONSTRUCTION

PHASE 1 (ACCESS, PERIMETER CONTROLS, AND STAGING AND STOCKPILE AREAS FOR STREAM RELOCATION)

1. ESTABLISH CONSTRUCTION LIMITS AND LOCATION OF NEW STREAM ALIGNMNET. ONLY CLEAR AND GRUB AS NECESSARY FOR INSTALLATION OF PERIMETER CONTROLS. STABILIZE ALL DISTURBED AREAS AT THE END OF EACH DAY. THE ENGINEER MUST INSPECT AND APPROVE ALL LAYOUT WORK BEFORE CONSTRUCTION MAY BEGIN.
2. MOBILIZE EQUIPMENT AND MATERIALS TO THE SITE.
3. INSTALL TEMPORARY CONSTRUCTION GRAVEL ENTRANCE/EXIT PER EROSION AND SEDIMENT CONTROL PLAN.
4. ESTABLISH STAGING AREAS AND MARK CONSTRUCTION EQUIPMENT ACCESS LOCATIONS WITH VISIBLE MARKERS. CONSTRUCTION EQUIPMENT SHALL BE CONTAINED WITHIN THE LIMITS OF CONSTRUCTION AS DEPICTED IN THE PLANS OR SPECIFIED BY THE ENGINEER.
5. INSTALL TEMPORARY PIPE, CONSTRUCTION ACCESS PATH AND TEMPORARY GRAVEL DRIVEWAY. INSTALL SILT FENCE WITHIN STOCKPILE AREAS.

PHASE 2 (INSTREAM WORK AREA STA 101+60 TO 101+85 AND COLEMAN CREEK, STA 14+25 TO STA 16+33)

6. INSTALL PUMP AROUND ON COLEMAN CREEK AS SHOWN ON THE EROSION AND SEDIMENT CONTROL PLAN (PREPARED BY OTHERS). INSTALL ROCK CROSS VANE ALONG COLEMAN CREEK FROM STA 101+60 TO 101+85.
7. WORKING FROM DOWNSTREAM TO UPSTREAM, BEGIN CONSTRUCTION OF RELOCATED STREAM STRUCTURES AND GRADING. ONLY OPEN AS MUCH CHANNEL AS MAY BE STABILIZED AT THE END OF EACH WORK DAY USING STONE IN STREAM OR MATTING FOR ADJACENT SLOPES. INSTALL PROPOSED 95" X 67" CORRUGATED STEEL ARCH PIPE, AND ENDWALLS ON NEW STREAM ALIGNMENT AS SHOWN ON THE ROADWAY PLANS (PREPARED BY OTHERS). BACKFILL DRIVEWAY AND PROVIDE STONE FOR ACCESS FOR TEMPORARY DRIVEWAY AS SHOWN ON THE EROSION AND SEDIMENT CONTROL PLAN (PREPARED BY OTHERS). DEWATER WORK AREA TO A SPECIAL STILLING BASIN WHEN EQUIPMENT IS ACTIVE IN CHANNEL. CONTINUE WORKING UPSTREAM TO COMPLETE INSTREAM WORK ON NEW ALIGNMENT UP TO STA 14+25.
8. WHEN ALL AREAS ARE STABILIZED AND WITH PERMISSION FROM THE ENGINEER, REMOVE TEMPORARY GRAVEL DRIVEWAY AND OPEN DRIVEWAY ACCESS OVER NEW STREAM CULVERT.

PHASE 3 (INSTREAM WORK AREA STA 11+09 TO STA 14+25)

9. INSTALL COIR FIBER WATTLE BARRIER AS SHOWN ON THE EROSION AND SEDIMENT CONTROL PLAN (PREPARED BY OTHERS). WORKING FROM DOWNSTREAM TO UPSTREAM, BEGIN CONSTRUCTION OF RELOCATED STREAM STRUCTURES AND GRADING STARTING AT STA 14+25. ONLY OPEN AS MUCH CHANNEL AS MAY BE STABILIZED AT THE END OF EACH WORK DAY USING STONE IN STREAM OR MATTING FOR ADJACENT SLOPES. DEWATER WORK AREA TO A SPECIAL STILLING BASIN WHEN EQUIPMENT IS ACTIVE IN CHANNEL. CONTINUE WORKING UPSTREAM TO COMPLETE INSTREAM WORK ON NEW ALIGNMENT UP TO STA 11+09.

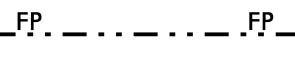
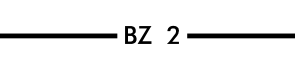
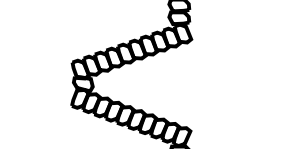
PHASE 4 (INSTREAM WORK AREA STA 10+00 TO STA 11+09)

10. DURING A 3-DAY DRY WEATHER FORECAST FROM THE NATIONAL WEATHER SERVICE, ESTABLISH STREAM DIVERSION/PUMP AROUND FROM STA 10+00 (EX 60" CMP) TO EXISTING CHANNEL AS SHOWN ON THE EROSION AND SEDIMENT CONTROL PLAN (PREPARED BY OTHERS). COMPLETE CONSTRUCTION OF STREAM STRUCTURES AND GRADING TO BRING RELOCATED STREAM ONLINE. ONLY OPEN AS MUCH CHANNEL AS MAY BE STABILIZED AT THE END OF EACH WORK DAY USING STONE IN STREAM OR MATTING FOR ADJACENT SLOPES. DEWATER WORK AREA TO A SPECIAL STILLING BASIN WHEN EQUIPMENT IS ACTIVE IN CHANNEL. DURING NON-WORK HOURS, MAINTAIN STREAM FLOW TO EXISTING CHANNEL USING IMPERVIOUS DIKES AS NEEDED. CONTINUE WORKING UPSTREAM TO COMPLETE INSTREAM WORK ON NEW ALIGNMENT UP TO STA 10+00. THE CONTRACTOR SHALL RECEIVE APPROVAL FROM THE ENGINEER PRIOR TO DIRECTING FLOW INTO THE NEW STREAM.
11. UPON PERMANENT STABILIZATION AND WITH APPROVAL FROM THE ENGINEER, REMOVE PERIMETER CONTROLS AND CONSTRUCTION ACCESS ROAD EXCLUDING TEMPORARY DRIVEWAY ACCESS PATH. IMMEDIATELY STABILIZE ANY DISTURBED AREAS RESULTING FROM THIS WORK.

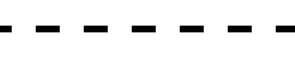
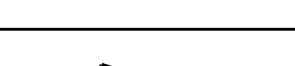
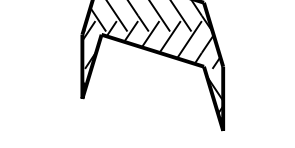
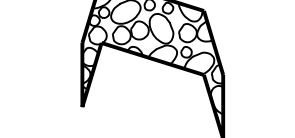
INDEX OF SHEETS

SHEET NUMBER	SHEET
OSM-1	TITLE SHEET
OSM-1A	INDEX OF SHEETS, CONSTRUCTION SEQUENCING AND GENERAL NOTES
OSM-1B	CONVENTIONAL PLAN SHEET SYMBOLS
OSM-2	TYPICAL SECTIONS
OSM-2A	DETAILS - WOOD DROP RIFFLE - RIFFLE GRADE CONTROL
OSM-2B	- ROCK CROSS VANE - ROCK TOE PROTECTION - STREAM PLUG
OSM-2C	- PUMP-AROUND OPERATION
OSM-2D	- MORPHOLOGICAL TABLE
OSM-3	SUMMARY OF QUANTITIES EARTHWORK SUMMARY
OSM-4	HORIZONTAL ALIGNMENT
OSM-5	PLAN SHEET
OSM-6	PROFILE SHEET
OSM-7-19	CROSS SECTIONS
OSM-20-22	REFORESTATION PLANS AND DETAILS

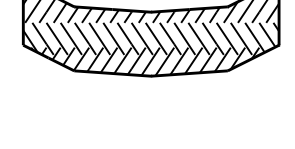
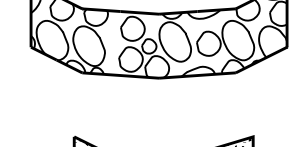
STREAM SYMBOLS

PLAN VIEW SYMBOLS	
	RIFFLE GRADE CONTROL
	WOOD DROP RIFFLE
	ROCK TOE PROTECTION
	STREAM PLUG
	PROPOSED 95" x 67" PIPE ARCH CULVERT
	FLOODPLAIN LINE
	BUFFER ZONE
	BACKFILL EXISTING CHANNEL
	ROCK CROSS VANE

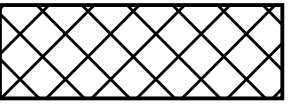
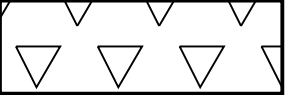
PROFILE SYMBOLS

	EXISTING GROUND ELEVATION
	PROPOSED GROUND ELEVATION
	PROPOSED BANKFULL
	PROPOSED RIFFFLE GRADE CONTROL
	PROPOSED WOOD DROP RIFFLE

CROSS SECTION SYMBOLS

	EXISTING GROUND ELEVATION
	PROPOSED GROUND ELEVATION
	PROPOSED RIFFFLE GRADE CONTROL
	PROPOSED WOOD DROP RIFFLE
	CHANNEL SUBSTRATE MATERIAL

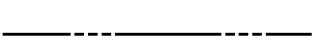
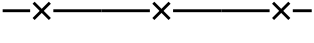
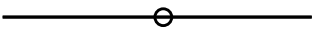
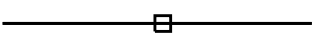
PLANTING SYMBOLS

	TYPE 1
	TYPE 2 - TREES AND SHRUBS
	TYPE 2 - EMBANKMENT SHRUBS

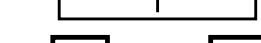
PROJECT REFERENCE NO.	SHEET NO.
A-0011C	OSM-1A
R/W SHEET NO.	
HYDRAULICS ENGINEER	
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

STATE OF NORTH CAROLINA, DIVISION OF HIGHWAYS
CONVENTIONAL PLAN SHEET SYMBOLS

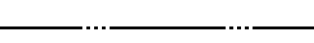
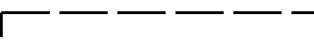
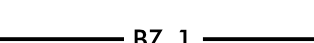
BOUNDARIES AND PROPERTY:

State Line	
County Line	
Township Line	
City Line	
Reservation Line	
Property Line	
Existing Iron Pin	
Computed Property Corner	
Property Monument	
Parcel/Sequence Number	
Existing Fence Line	
Proposed Woven Wire Fence	
Proposed Chain Link Fence	
Proposed Barbed Wire Fence	
Existing Wetland Boundary	
Proposed Wetland Boundary	
Existing Endangered Animal Boundary	
Existing Endangered Plant Boundary	
Existing Historic Property Boundary	
Known Contamination Area: Soil	
Potential Contamination Area: Soil	
Known Contamination Area: Water	
Potential Contamination Area: Water	
Contaminated Site: Known or Potential	

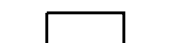
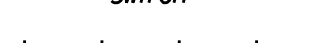
BUILDINGS AND OTHER CULTURE:

Gas Pump Vent or U/G Tank Cap	
Sign	
Well	
Small Mine	
Foundation	
Area Outline	
Cemetery	
Building	
School	
Church	
Dam	

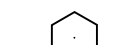
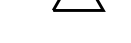
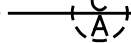
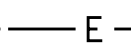
HYDROLOGY:

Stream or Body of Water	
Hydro, Pool or Reservoir	
Jurisdictional Stream	
Buffer Zone 1	
Buffer Zone 2	
Flow Arrow	
Disappearing Stream	
Spring	
Wetland	
Proposed Lateral, Tail, Head Ditch	
False Sump	

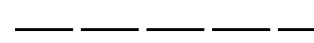
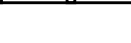
RAILROADS:

Standard Gauge	
RR Signal Milepost	
Switch	
RR Abandoned	
RR Dismantled	

RIGHT OF WAY & PROJECT CONTROL:

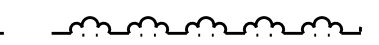
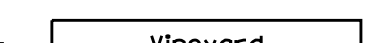
Secondary Horiz and Vert Control Point	
Primary Horiz Control Point	
Primary Horiz and Vert Control Point	
Exist Permanent Easment Pin and Cap	
New Permanent Easement Pin and Cap	
Vertical Benchmark	
Existing Right of Way Marker	
Existing Right of Way Line	
New Right of Way Line	
New Right of Way Line with Pin and Cap	
New Right of Way Line with Concrete or Granite R/W Marker	
New Control of Access Line with Concrete C/A Marker	
Existing Control of Access	
New Control of Access	
Existing Easement Line	
New Temporary Construction Easement	
New Temporary Drainage Easement	
New Permanent Drainage Easement	
New Permanent Drainage / Utility Easement	
New Permanent Utility Easement	
New Temporary Utility Easement	
New Aerial Utility Easement	

ROADS AND RELATED FEATURES:

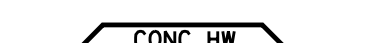
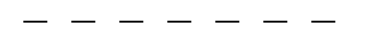
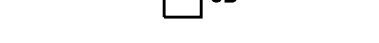
Existing Edge of Pavement	
Existing Curb	
Proposed Slope Stakes Cut	
Proposed Slope Stakes Fill	
Proposed Curb Ramp	
Existing Metal Guardrail	
Proposed Guardrail	
Existing Cable Guiderail	
Proposed Cable Guiderail	
Equality Symbol	
Pavement Removal	

VEGETATION:

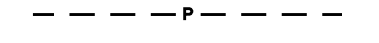
Single Tree	
Single Shrub	

Hedge	
Woods Line	
Orchard	
Vineyard	

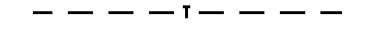
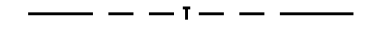
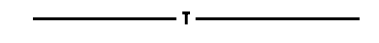
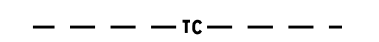
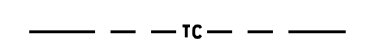
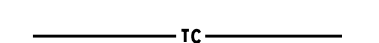
EXISTING STRUCTURES:

MAJOR:	
Bridge, Tunnel or Box Culvert	
Bridge Wing Wall, Head Wall and End Wall	
MINOR:	
Head and End Wall	
Pipe Culvert	
Footbridge	
Drainage Box: Catch Basin, DI or JB	
Paved Ditch Gutter	
Storm Sewer Manhole	
Storm Sewer	

UTILITIES:

POWER:	
Existing Power Pole	
Proposed Power Pole	
Existing Joint Use Pole	
Proposed Joint Use Pole	
Power Manhole	
Power Line Tower	
Power Transformer	
U/G Power Cable Hand Hole	
H-Frame Pole	
U/G Power Line LOS B (S.U.E.*)	
U/G Power Line LOS C (S.U.E.*)	
U/G Power Line LOS D (S.U.E.*)	

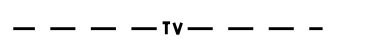
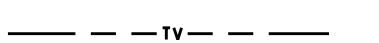
TELEPHONE:

Existing Telephone Pole	
Proposed Telephone Pole	
Telephone Manhole	
Telephone Pedestal	
Telephone Cell Tower	
U/G Telephone Cable Hand Hole	
U/G Telephone Cable LOS B (S.U.E.*)	
U/G Telephone Cable LOS C (S.U.E.*)	
U/G Telephone Cable LOS D (S.U.E.*)	
U/G Telephone Conduit LOS B (S.U.E.*)	
U/G Telephone Conduit LOS C (S.U.E.*)	
U/G Telephone Conduit LOS D (S.U.E.*)	
U/G Fiber Optics Cable LOS B (S.U.E.*)	
U/G Fiber Optics Cable LOS C (S.U.E.*)	
U/G Fiber Optics Cable LOS D (S.U.E.*)	

WATER:

Water Manhole	
Water Meter	
Water Valve	
Water Hydrant	
U/G Water Line LOS B (S.U.E.*)	
U/G Water Line LOS C (S.U.E.*)	
U/G Water Line LOS D (S.U.E.*)	
Above Ground Water Line	

TV:

TV Pedestal	
TV Tower	
U/G TV Cable Hand Hole	
U/G TV Cable LOS B (S.U.E.*)	
U/G TV Cable LOS C (S.U.E.*)	
U/G TV Cable LOS D (S.U.E.*)	
U/G Fiber Optic Cable LOS B (S.U.E.*)	
U/G Fiber Optic Cable LOS C (S.U.E.*)	
U/G Fiber Optic Cable LOS D (S.U.E.*)	

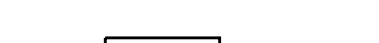
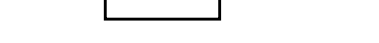
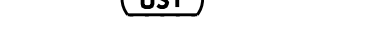
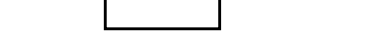
GAS:

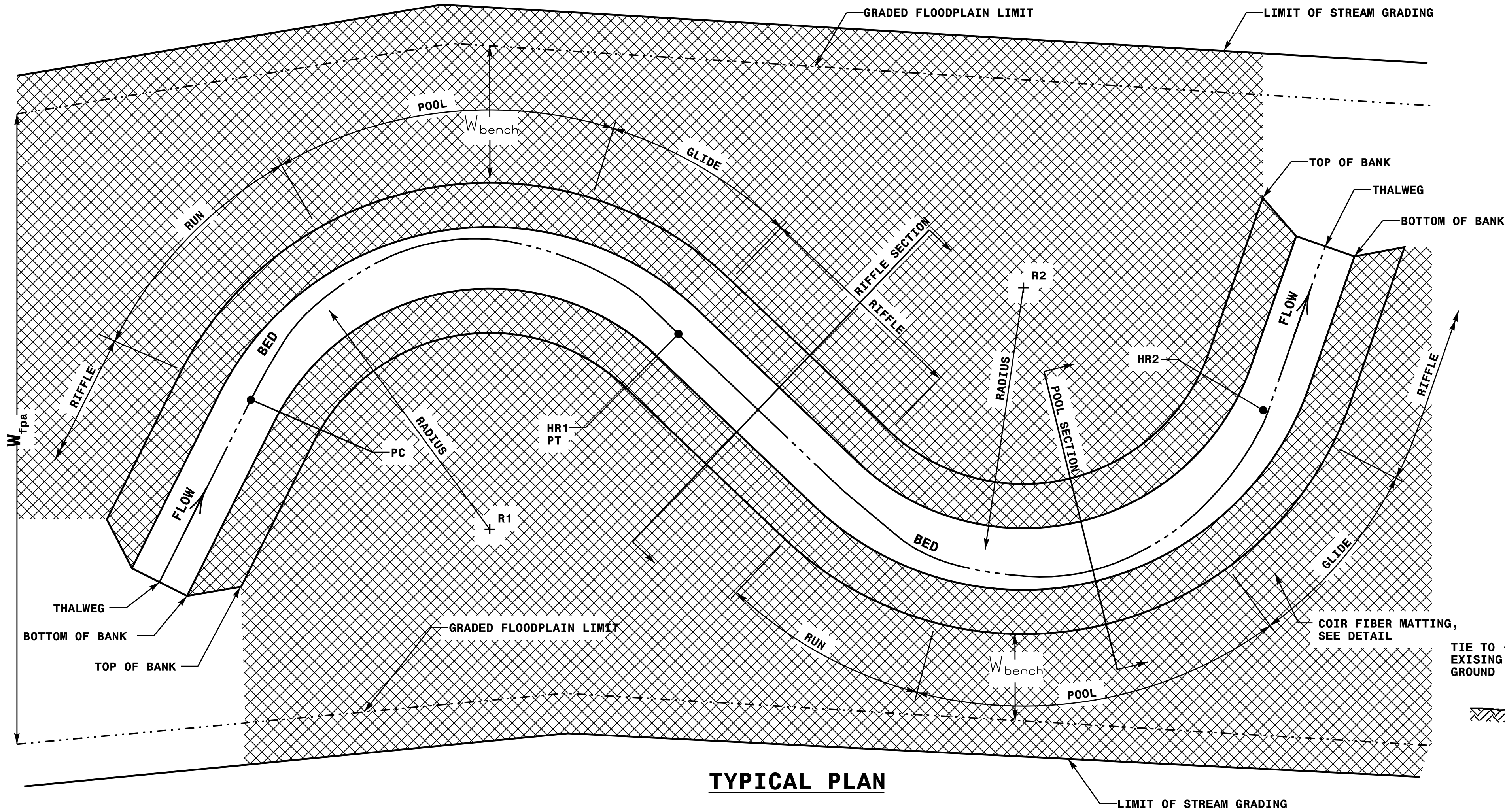
Gas Valve	
Gas Meter	
U/G Gas Line LOS B (S.U.E.*)	
U/G Gas Line LOS C (S.U.E.*)	
U/G Gas Line LOS D (S.U.E.*)	
Above Ground Gas Line	

SANITARY SEWER:

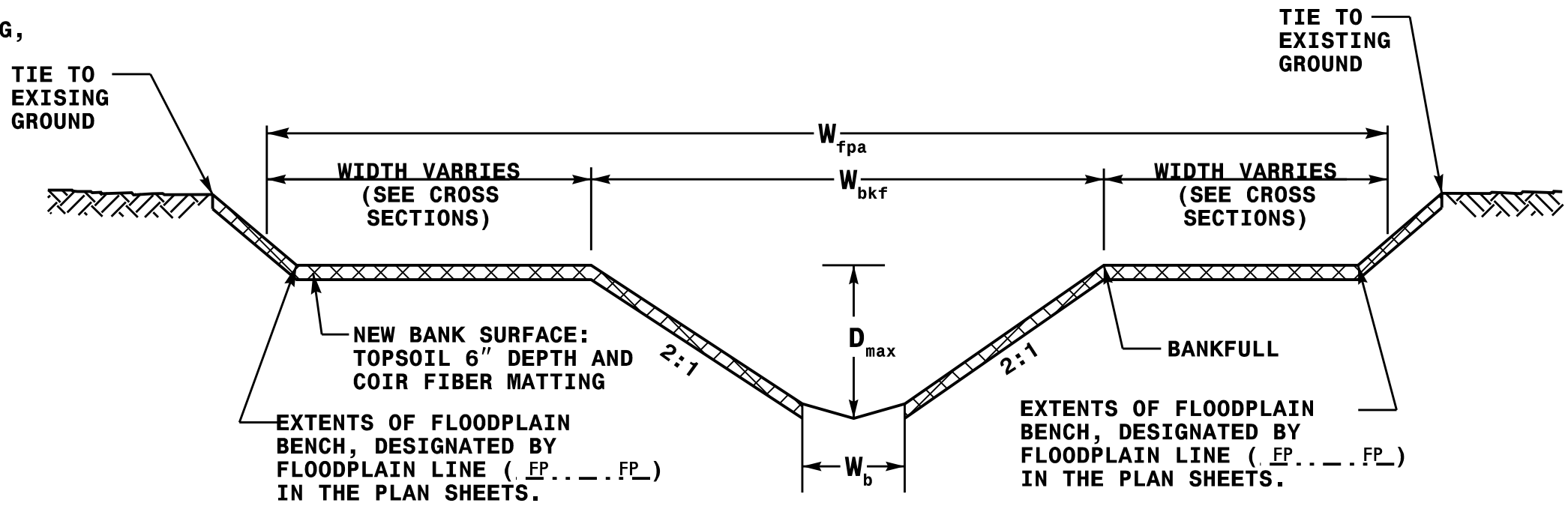
Sanitary Sewer Manhole	
Sanitary Sewer Cleanout	
U/G Sanitary Sewer Line	
Above Ground Sanitary Sewer	
SS Forced Main Line LOS B (S.U.E.*)	
SS Forced Main Line LOS C (S.U.E.*)	
SS Forced Main Line LOS D (S.U.E.*)	

MISCELLANEOUS:

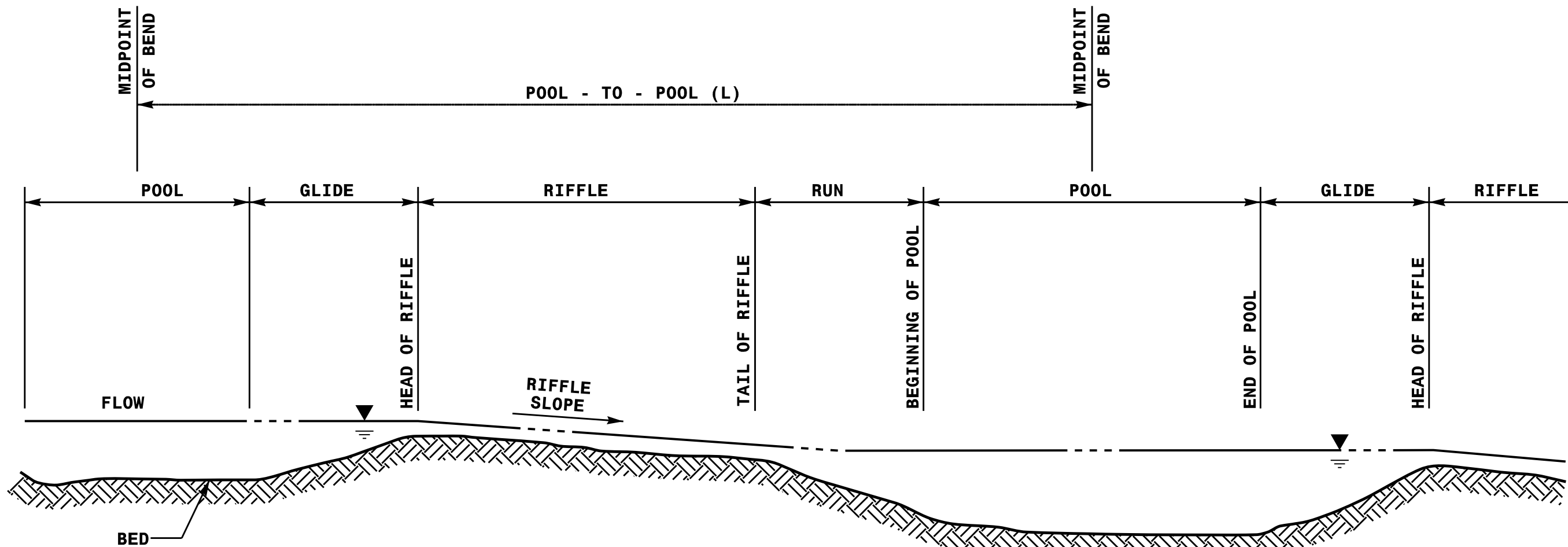
Utility Pole	
Utility Pole with Base	
Utility Located Object	
Utility Traffic Signal Box	
Utility Unknown U/G Line LOS B (S.U.E.*)	
U/G Tank; Water, Gas, Oil	
Underground Storage Tank, Approx. Loc.	
A/G Tank; Water, Gas, Oil	
Geoenvironmental Boring	
U/G Test Hole LOS A (S.U.E.*)	
Abandoned According to Utility Records	
End of Information	



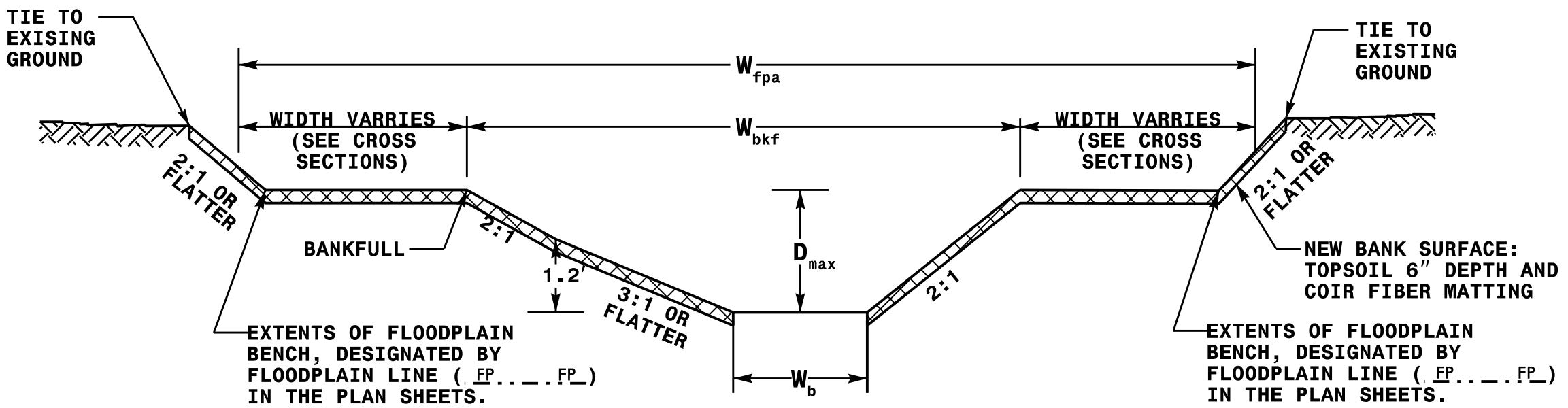
TYPICAL PLAN



TYPICAL RIFFLE WITH BANKFULL BENCH



TYPICAL PROFILE



TYPICAL POOL WITH BANKFULL BENCH

NOTES:
1) THE COORDINATES FOR EACH CENTER OF RADIUS (EX. "R1", "R2") AND EACH HEAD OF RIFFLE ("HR1", "HR2") ARE INDICATED ON THE PLAN SHEETS.

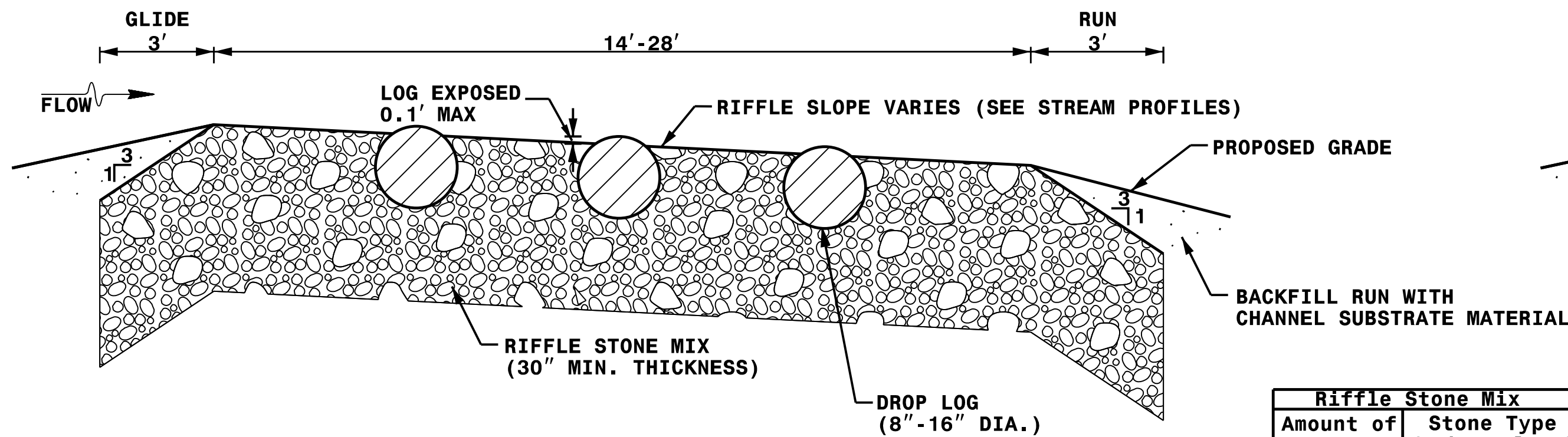
W_{bkf} = BANKFULL WIDTH
D_{max} = MAXIMUM DEPTH
W_b = BOTTOM WIDTH
W_{fpa} = FLOOD PRONE AREA WIDTH

CROSS SECTION DIMENSIONS (IN FEET)									
	RIFFLE				POOL				Width/Depth RATIO
	W _{bkf}	D _{max}	W _b	W _{fpa}	W _{bkf}	D _{max}	W _b	W _{fpa}	
HYATT MILL CREEK	10.0	1.2	6.0	SEE CROSS SECTIONS	11.0	2.2	0.6	SEE CROSS SECTIONS	11.6

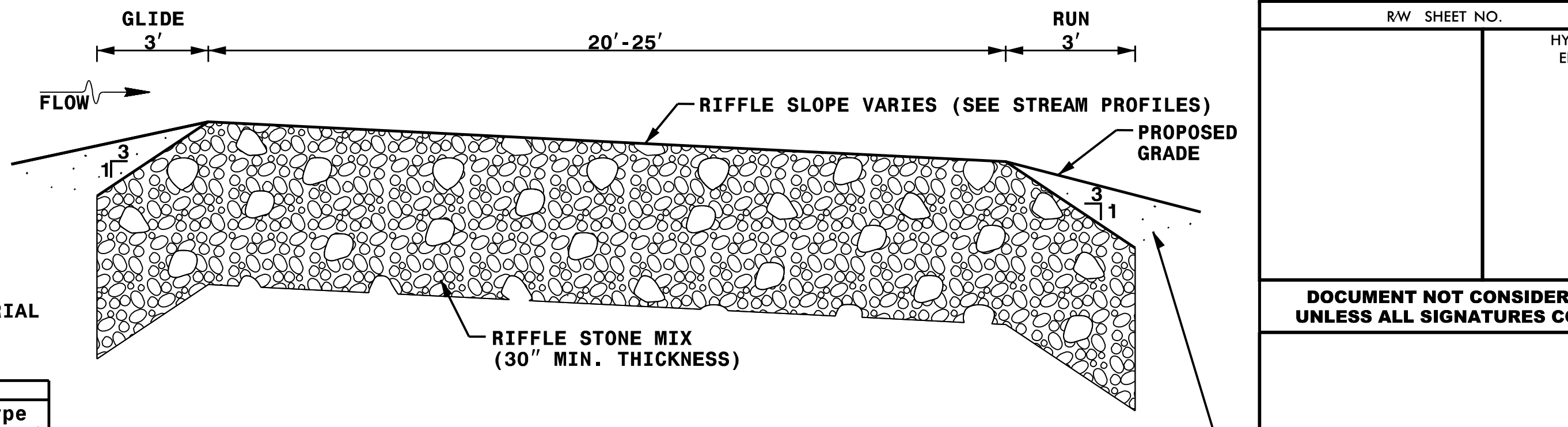
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A-0011C	OSM-2
R/W SHEET NO.	HYDRAULICS ENGINEER
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CHANNEL TYPICAL DETAIL

NOT TO SCALE



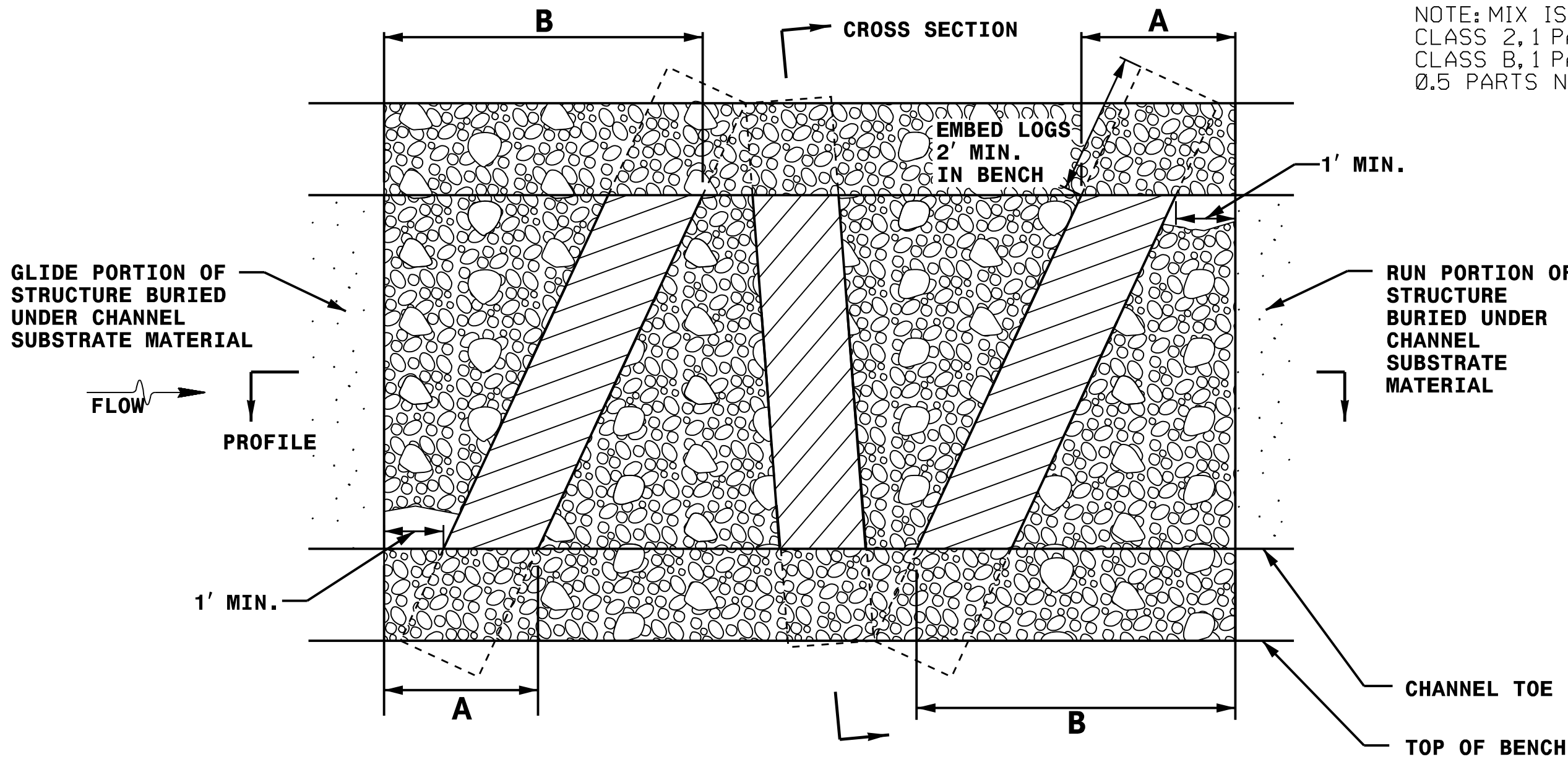
PROFILE VIEW



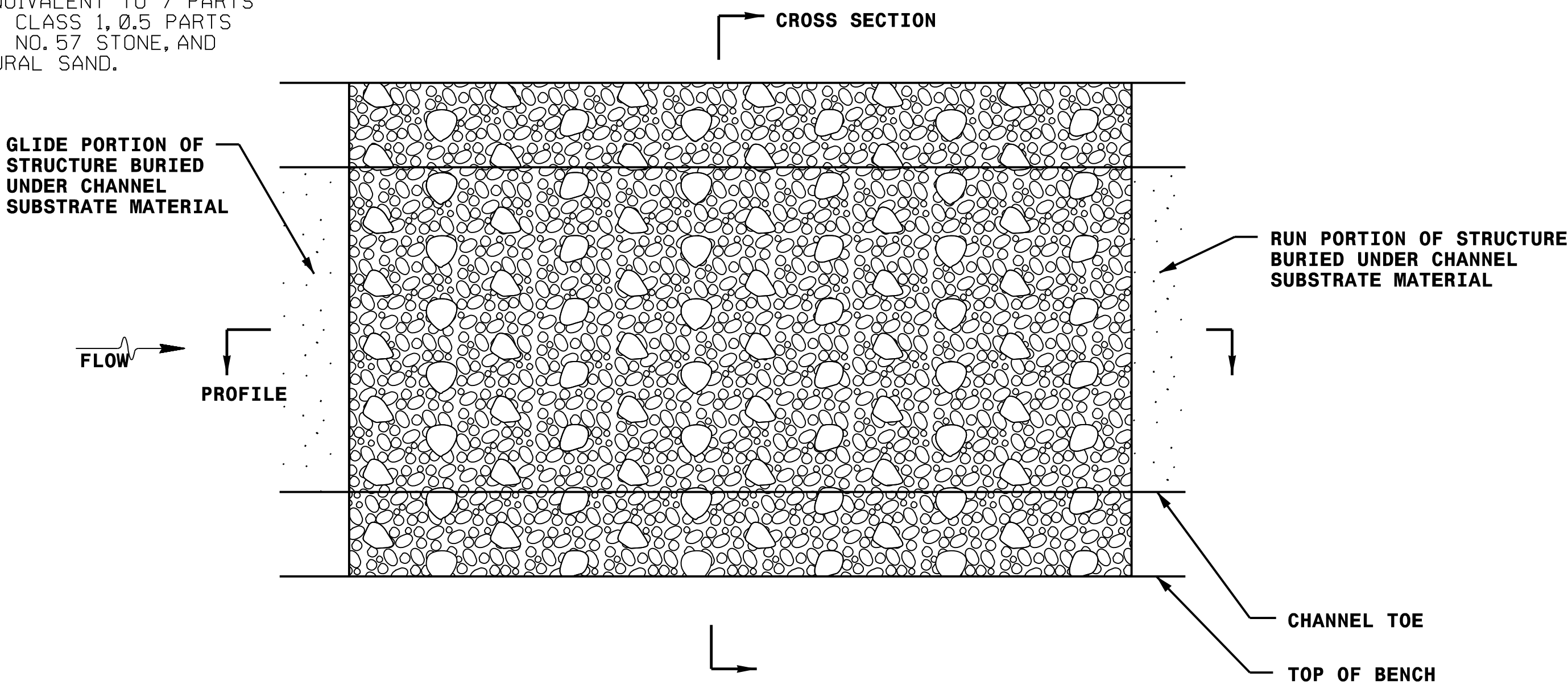
PROFILE VIEW

Riffle Stone Mix	
Amount of Stone (%)	Stone Type (% by Volume)
70%	Class 2
10%	Class 1
5%	Class B
10	NO. 57
5	NATURAL SAND
100%	Total

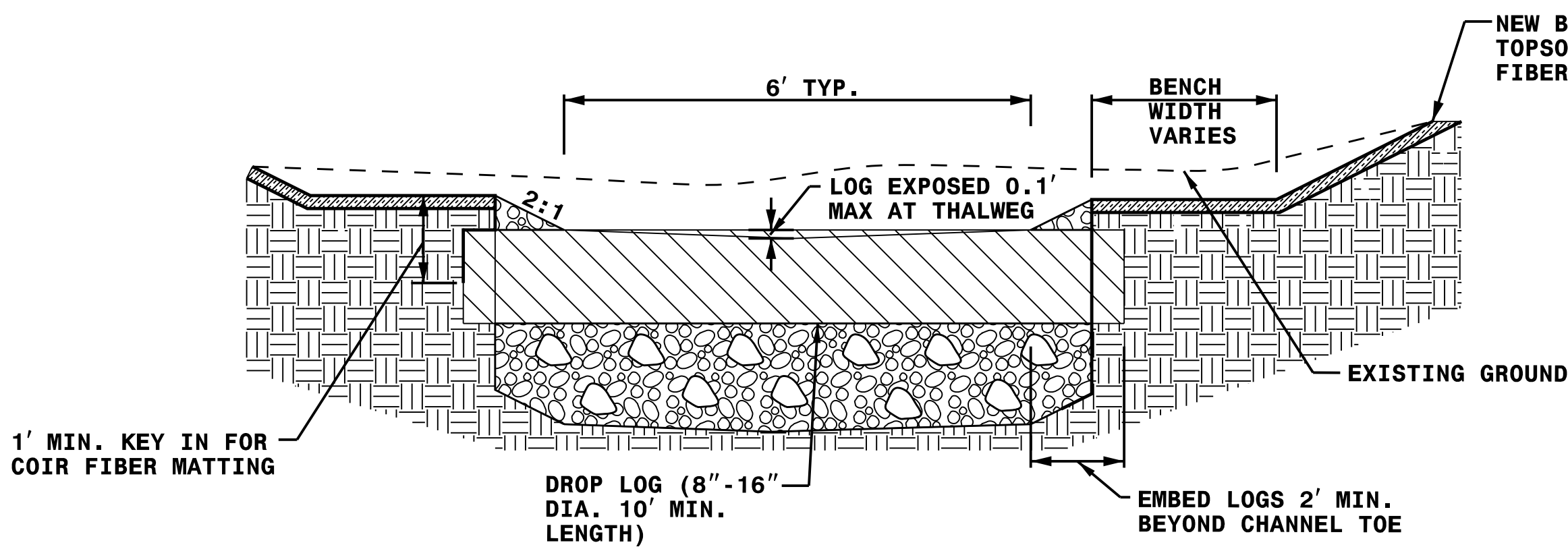
NOTE: MIX IS EQUIVALENT TO 7 PARTS CLASS 2, 1 PART CLASS 1, 0.5 PARTS CLASS B, 1 PART NO. 57 STONE, AND 0.5 PARTS NATURAL SAND.



PLAN VIEW



PLAN VIEW

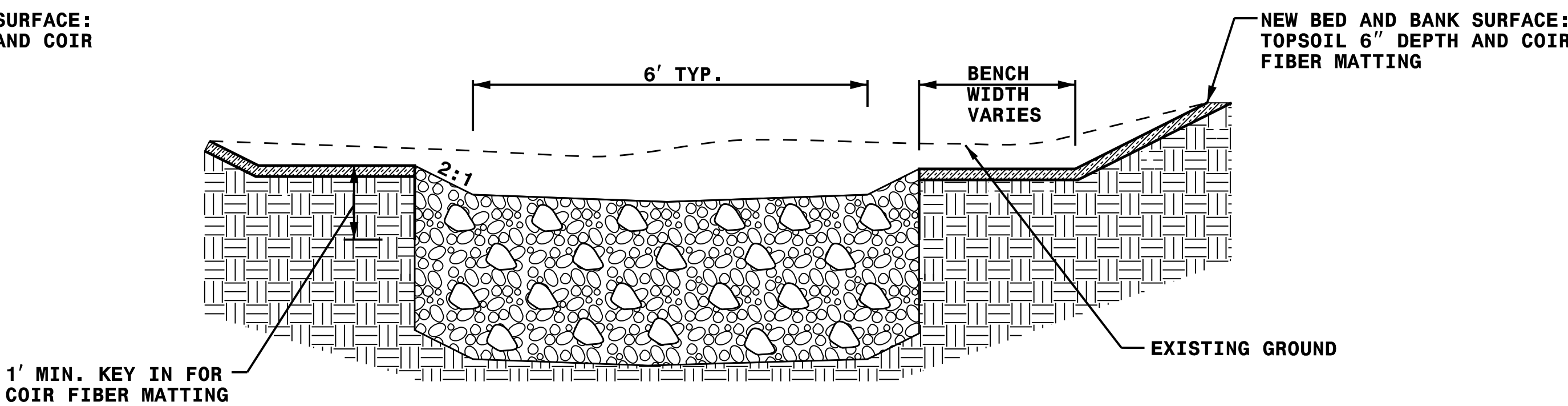


CROSS SECTION

WOOD DROP RIFFLE DETAIL

NOT TO SCALE

NOTES:
1) FURNISH AND INSTALL A WELL-GRADED RIFFLE MIX TO MINIMIZE VOIDS. ENSURE THAT THE RIFFLE MIX IS WELL MIXED.
2) FURNISH NATURAL SAND MEETING SIZE REQUIREMENTS OF 2S FINE AGGREGATE.
3) BANK AND BENCH DIMENSIONS VARY, SEE CROSS SECTIONS FOR DIMENSIONS AT EACH INDIVIDUAL STRUCTURE.
4) DROP LOG TO CONSIST OF HARDWOOD SPECIES APPROVED BY THE ENGINEER.



CROSS SECTION

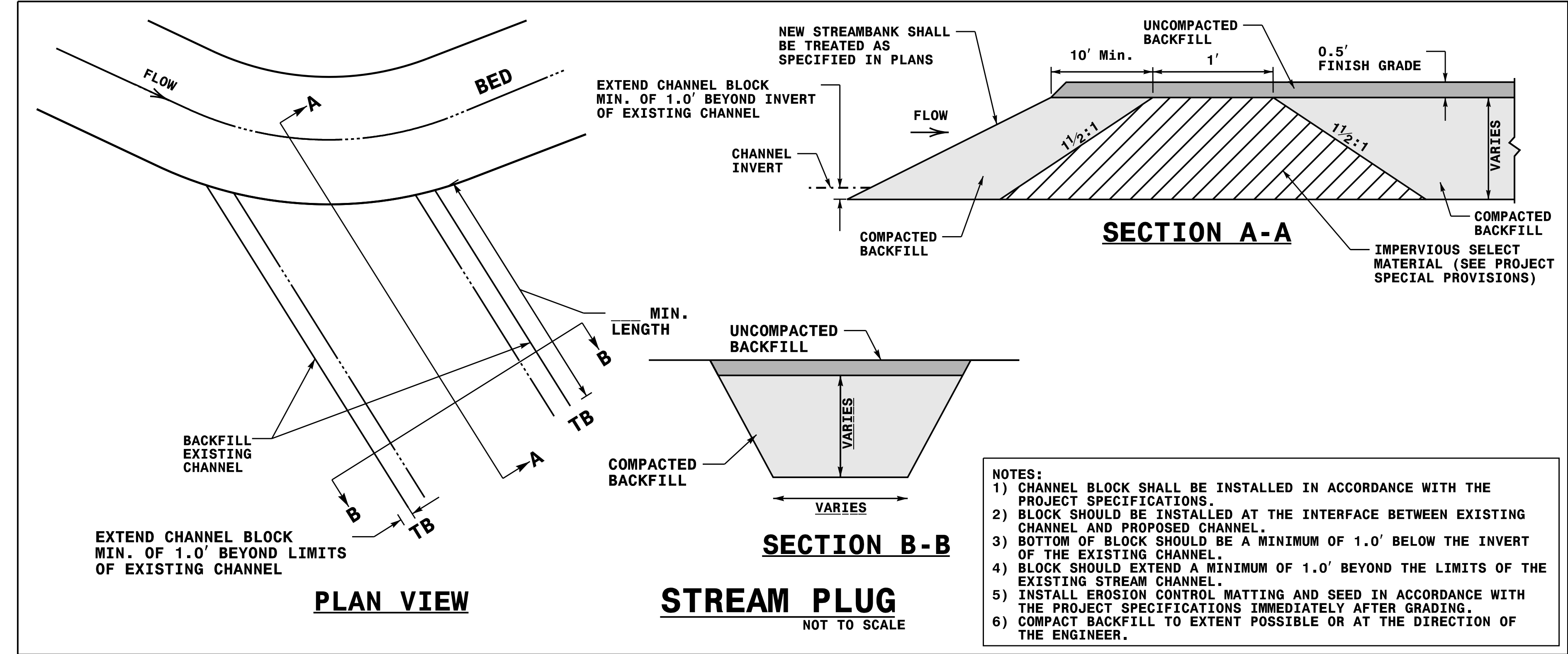
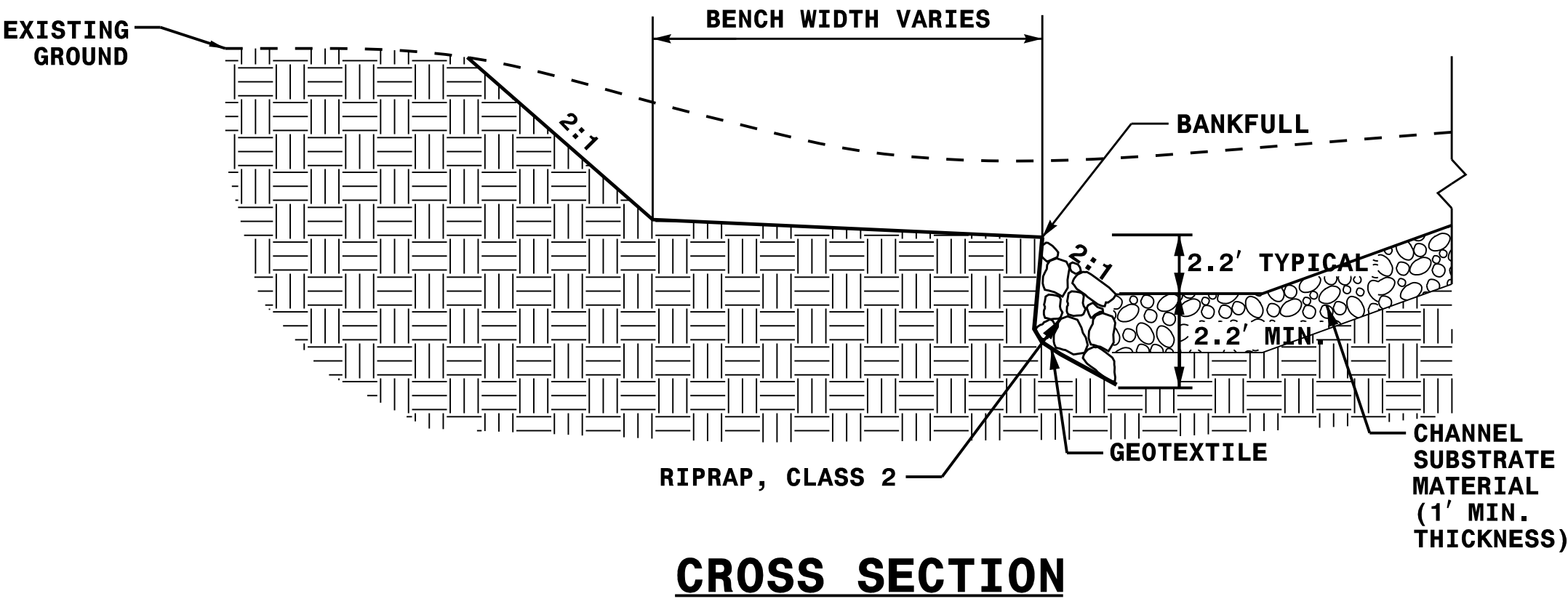
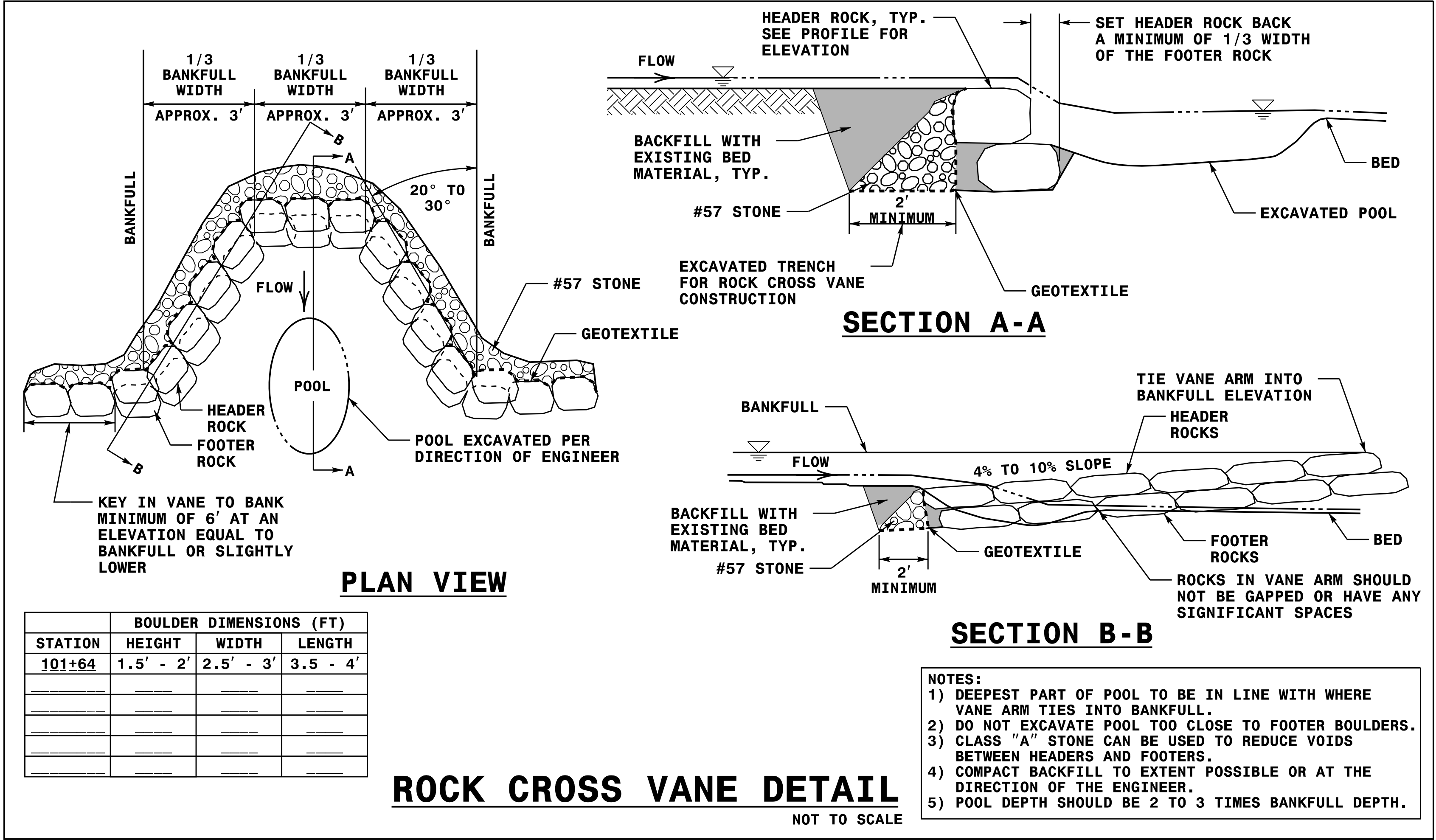
RIFFLE GRADE CONTROL DETAIL

NOT TO SCALE

NOTES:
1) FURNISH AND INSTALL A WELL-GRADED RIFFLE MIX TO MINIMIZE VOIDS. ENSURE THAT THE RIFFLE MIX IS WELL MIXED.
2) FURNISH NATURAL SAND MEETING SIZE REQUIREMENTS OF 2S FINE AGGREGATE.
3) BANK AND BENCH DIMENSIONS VARY, SEE CROSS SECTIONS FOR DIMENSIONS AT EACH INDIVIDUAL STRUCTURE.
4) DROP LOG TO CONSIST OF HARDWOOD SPECIES APPROVED BY THE ENGINEER.

DROP LOGS			
STATION FROM	STATION TO	A	B
10+46	10+60	2.5	5
11+33	11+52	3.5	6.5
12+27	12+46	3.5	6.5
13+12	13+31	3.5	6.5
13+93	14+08	2.5	5
15+56	15+72	3	5.5

PROJECT REFERENCE NO.	SHEET NO.
A-0011C	OSM-2B
R/W SHEET NO.	HYDRAULICS ENGINEER
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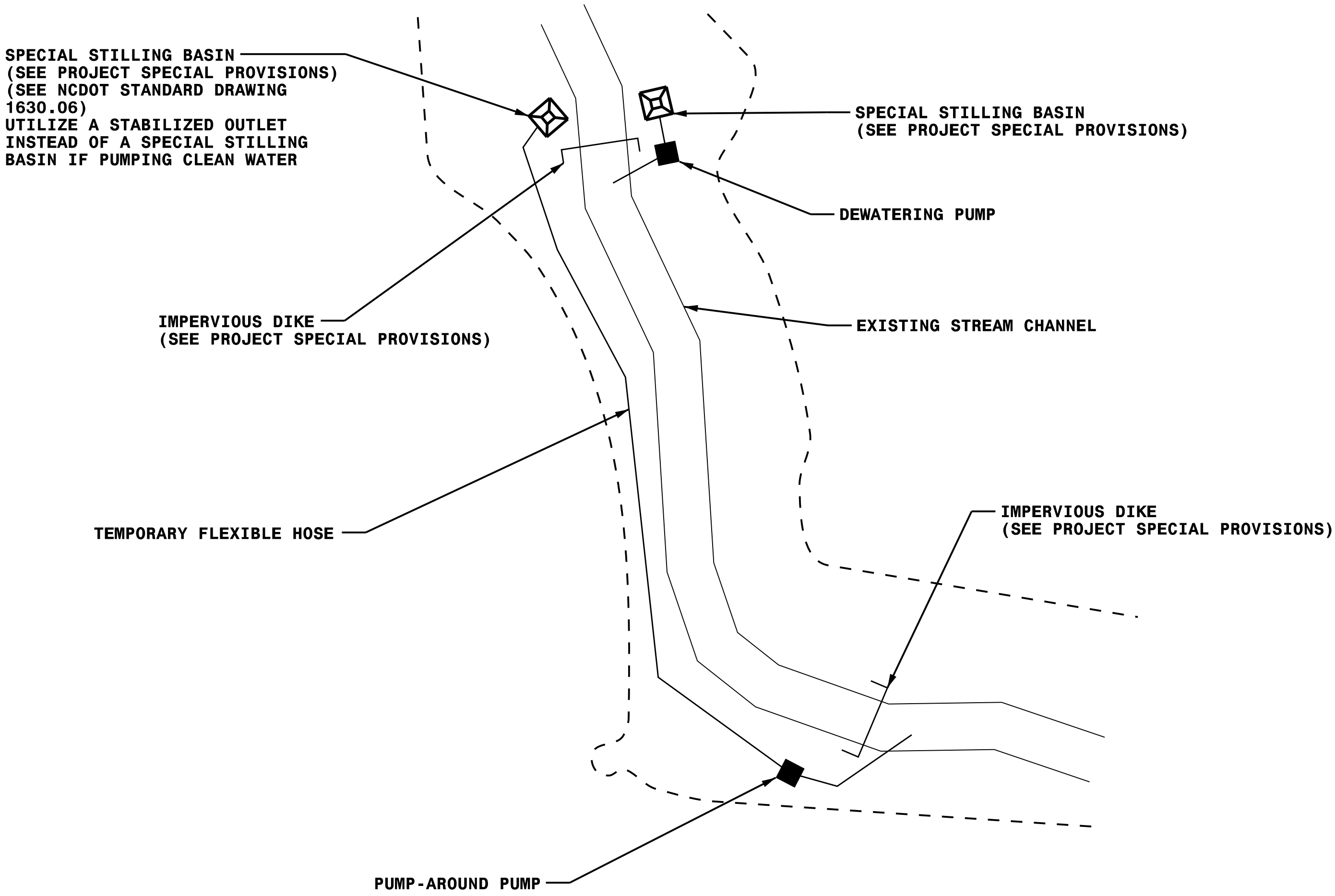


PROJECT REFERENCE NO.	SHEET NO.
A-0011C	OSM-2C
R/W SHEET NO.	
	HYDRAULICS ENGINEER
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- NOTES:
- 1) ALL EXCAVATION SHALL BE PERFORMED IN ONLY DRY OR ISOLATED SECTIONS OF CHANNEL.
 - 2) IMPERVIOUS DIKES ARE TO BE USED TO ISOLATE WORK FROM STREAM FLOW WHEN NECESSARY.
 - 3) ALL GRADED AREAS SHALL BE STABILIZED WITHIN 24 HOURS.
 - 4) MAINTENANCE OF STREAM FLOW OPERATIONS SHALL BE INCIDENTAL TO THE WORK. THIS INCLUDES POLYETHYLENE SHEETING, DIVERSION PIPES, PUMPS AND HOSES.
 - 5) PUMPS AND HOSES SHALL BE OF SUFFICIENT SIZE TO DEWATER THE WORK AREA.

- SEQUENCE OF CONSTRUCTION FOR PUMP AROUND OPERATION
1. INSTALL SPECIAL STILLING BASIN(S).
 2. INSTALL UPSTREAM PUMP AND TEMPORARY FLEXIBLE HOSE.
 3. PLACE UPSTREAM IMPERVIOUS DIKE AND BEGIN PUMPING OPERATIONS FOR STREAM DIVERSION.
 4. PLACE DOWNSTREAM IMPERVIOUS DIKE AND PUMPING APPARATUS. DEWATER ENTRAPPED AREA. AREA TO BE DEWATERED SHALL BE EQUAL TO ONE DAY'S WORK.
 5. PERFORM STREAM RESTORATION WORK IN ACCORDANCE WITH THE PLANS.
 6. EXCAVATE ANY ACCUMULATED SILT AND DEWATER BEFORE REMOVAL OF IMPERVIOUS DIKES. REMOVE IMPERVIOUS DIKES, PUMPS, AND TEMPORARY FLEXIBLE HOSE. (DOWNSTREAM IMPERVIOUS DIKES FIRST).
 7. ALL GRADING AND STABILIZATION MUST BE COMPLETED IN ONE DAY WITHIN THE PUMP AROUND AREAS BETWEEN THE IMPERVIOUS DIKES. THE IMPERVIOUS DIKE LOCATIONS AS SHOWN ON THE SHEET ONLY SHOW THE UPPER AND LOWER EXTENT OF WORK FOR EACH STREAM SEGMENT. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION OF THE IMPERVIOUS DIKE(S) FOR EACH DAY'S WORK.
 8. REMOVE SPECIAL STILLING BASIN(S) AND BACKFILL. STABILIZE DISTURBED AREA WITH SEED AND MULCH.

EXAMPLE OF PUMP-AROUND OPERATION



Variable		Existing		Proposed Design		Reference Reach 1		Reference Reach 2	
1	Stream Type	C4		C4		C4b		C4	
2	Drainage Area (sq mi)	0.35		0.35		0.31		0.41	
3	Bankfull Width (ft)	Mean:	8.7	Mean:	10.0	Mean:	9.9	Mean:	9.6
		Range:	8.6 8.8	Range:	-- --	Range:	-- --	Range:	-- --
4	Bankfull Mean Depth (ft)	Mean:	1.0	Mean:	0.9	Mean:	0.9	Mean:	0.7
		Range:	0.8 1.2	Range:	-- --	Range:	-- --	Range:	-- --
5	Width-to-Depth Ratio	Mean:	8.1	Mean:	11.6	Mean:	10.7	Mean:	13.0
		Range:	5.5 10.6	Range:	-- --	Range:	-- --	Range:	-- --
6	Bankfull Cross-Sectional Area (sq ft)	Mean:	8.0	Mean:	8.6	Mean:	9.1	Mean:	7.0
		Range:	7.3 8.6	Range:	-- --	Range:	-- --	Range:	-- --
7	Bankfull Mean Velocity (ft/s)	Mean:	5.7	Mean:	4.7	Mean:	4.9	Mean:	3.9
		Range:	4.8 6.5	Range:	-- --	Range:	-- --	Range:	-- --
8	Bankfull Discharge (cfs)	Mean:	45.3	Mean:	40.6	Mean:	44.9	Mean:	27.3
		Range:	35.1 55.5	Range:	-- --	Range:	-- --	Range:	-- --
9	Bankfull Max Depth (ft)	Mean:	1.5	Mean:	1.2	Mean:	1.2	Mean:	1.0
		Range:	1.3 1.7	Range:	-- --	Range:	-- --	Range:	-- --
10	Ratio of Bankfull Max Depth to Bankfull Mean Depth	Mean:	1.5	Mean:	1.4	Mean:	1.3	Mean:	1.4
		Range:	1.4 1.6	Range:	-- --	Range:	-- --	Range:	-- --
11	Ratio of Low Bank Height to Bankfull Max Depth	Mean:	0.8	Mean:	1.0	Mean:	1.0	Mean:	1.0
		Range:	0.6 1.0	Range:	-- --	Range:	-- --	Range:	-- --
12	Width of Flood-Prone Area (ft)	Mean:	27.7	Mean:	37.4	Mean:	23.8	Mean:	31.1
		Range:	22.7 32.7	Range:	30.4 45.4	Range:	-- --	Range:	-- --
13	Entrenchment Ratio	Mean:	3.7	Mean:	3.7	Mean:	2.4	Mean:	3.3
		Range:	2.6 4.8	Range:	3.0 4.5	Range:	-- --	Range:	-- --
14	Meander Length (ft)	Mean:	88	Mean:	81	Mean:	93	Mean:	48
		Range:	44 123	Range:	68 89	Range:	-- --	Range:	37 55
15	Ratio of Meander Length to Bankfull Width	Mean:	10.1	Mean:	8.1	Mean:	9.4	Mean:	5.0
		Range:	5.0 14.3	Range:	6.8 8.9	Range:	-- --	Range:	3.9 5.7
16	Radius of Curvature (ft)	Mean:	17	Mean:	28	Mean:	22	Mean:	21
		Range:	6 36	Range:	20 40	Range:	19 25	Range:	17 28
17	Ratio of Radius of Curvature to Bankfull Width	Mean:	1.9	Mean:	2.8	Mean:	2.2	Mean:	2.2
		Range:	0.7 4.2	Range:	2.0 4.0	Range:	1.9 2.5	Range:	1.7 2.9
18	Belt Width (ft)	Mean:	20	Mean:	26	Mean:	36	Mean:	26
		Range:	15 24	Range:	19 32	Range:	27 44	Range:	23 31
19	Meander Width Ratio	Mean:	2.3	Mean:	2.6	Mean:	3.6	Mean:	2.7
		Range:	1.7 2.8	Range:	1.9 3.2	Range:	2.8 4.4	Range:	2.4 3.2
20	Sinuosity	Mean:	1.04	Mean:	1.08	Mean:	1.21	Mean:	1.22
		Range:	-- --	Range:	-- --	Range:	-- --	Range:	-- --
21	Valley Slope (ft/ft)	Mean:	0.020	Mean:	0.017	Mean:	0.026	Mean:	0.014
		Range:	-- --	Range:	-- --	Range:	-- --	Range:	-- --
22	Average Slope (ft/ft)	Mean:	0.017	Mean:	0.016	Mean:	0.022	Mean:	0.011
		Range:	-- --	Range:	-- --	Range:	-- --	Range:	-- --
23	Riffle Slope (ft/ft)	Mean:	0.042	Mean:	0.030	Mean:	0.051	Mean:	0.049
		Range:	0.019 0.069	Range:	0.026 0.035	Range:	0.005 0.088	Range:	0.012 0.112
24	Ratio of Riffle Slope to Average Slope	Mean:	2.5	Mean:	1.9	Mean:	2.3	Mean:	4.5
		Range:	1.1 4.1	Range:	1.6 2.2	Range:	0.2 4.0	Range:	1.1 10.2
25	Pool Slope (ft/ft)	Mean:	0.008	Mean:	0.004	Mean:	0.005	Mean:	0.004
		Range:	0.000 0.031	Range:	0.000 0.006	Range:	0.004 0.005	Range:	0.002 0.006
26	Ratio of Pool Slope to Average Slope	Mean:	0.5	Mean:	0.3	Mean:	0.2	Mean:	0.3
		Range:	0.0 1.8	Range:	0.0 0.4	Range:	0.2 0.2	Range:	0.1 0.5
27	Maximum Pool Depth (ft)	Mean:	1.8	Mean:	2.2	Mean:	1.3	Mean:	1.1
		Range:	-- --	Range:	-- --	Range:	-- --	Range:	-- --
28	Ratio of Pool Depth to Average Bankfull Depth	Mean:	1.8	Mean:	2.6	Mean:	1.4	Mean:	1.6
		Range:	1.5 2.3	Range:	-- --	Range:	-- --	Range:	-- --
29	Pool Width (ft)	Mean:	6.5	Mean:	11.0	Mean:	9.8	Mean:	6.6
		Range:	-- --	Range:	-- --	Range:	-- --	Range:	-- --
30	Ratio of Pool Width to Bankfull Width	Mean:	0.7	Mean:	1.1	Mean:	1.0	Mean:	0.7
		Range:	0.7 0.8	Range:	-- --	Range:	-- --	Range:	-- --
31	Pool Area (sq ft)	Mean:	8.0	Mean:	13.6	Mean:	8.7	Mean:	4.8
		Range:	-- --	Range:	-- --	Range:	-- --	Range:	-- --
32	Ratio of Pool Area to Bankfull Area	Mean:	1.0	Mean:	1.6	Mean:	1.0	Mean:	0.7
		Range:	0.9 1.1	Range:	-- --	Range:	-- --	Range:	-- --
33	Pool to Pool Spacing (ft)	Mean:	70.0	Mean:	43.2	Mean:	54.0	Mean:	22.2
		Range:	23.5 107.5	Range:	37.0 50.5	Range:	-- --	Range:	9.5 37.0
34	Ratio of Pool to Pool Spacing to Bankfull Width	Mean:	8.0	Mean:	4.3	Mean:	5.5	Mean:	2.3
		Range:	2.7 12.5	Range:	3.7 5.1	Range:	-- --	Range:	1.0 3.9

* There is a 100 ft radius curve where the proposed alignment transitions into the existing alignment at the upstream limits. This curve isn't included in the table since it skews the Meander Length, Radius of Curvature, and Belt Width results based on the majority of the

PROJECT REFERENCE NO.		SHEET NO.	
A-0011C		OSM-2D	
RW SHEET NO.			
		HYDRAULICS ENGINEER	
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SUMMARY OF QUANTITIES

DESCRIPTION	SECTION	QUANTITY	UNIT	ITEM DESCRIPTION
1077000000-E	SP	112	TON	NO. 57 STONE
3628000000-E	876	66	TON	RIPRAP, CLASS 1
3635000000-E	876	378	TON	RIPRAP, CLASS 2
3642000000-E	876	1	TON	RIPRAP, CLASS A
3649000000-E	876	66	TON	RIPRAP, CLASS B
3651000000-E	SP	16	TON	BOULDERS
3656000000-E	876	127	SY	GEOTEXTILE FOR DRAINAGE
6037000000-E	SP	2315	SY	COIR FIBER MAT
6084000000-E	1660	1	ACR	SEEDING AND MULCHING
6126000000-E	SP	1	ACR	STREAMBANK REFORESTATION
6132000000-N	SP	18	EA	LOGS
6133000000-N	SP	1	LS	SURVEYING FOR MITIGATION
6133000000-N	SP	1	LS	SITE GRADING FOR MITIGATION
6133000000-N	SP	1	LS	DIVERSION PUMPING
6138000000-E	SP	5	CY	IMPERVIOUS SELECT MATERIAL
6150000000-E	SP	104	TON	CHANNEL SUBSTRATE MATERIAL
6150000000-E	SP	21	TON	NATURAL SAND
6900000000-E	SP	386	CY	TOPSOIL

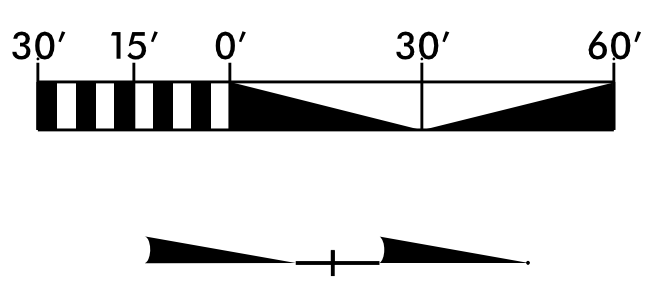
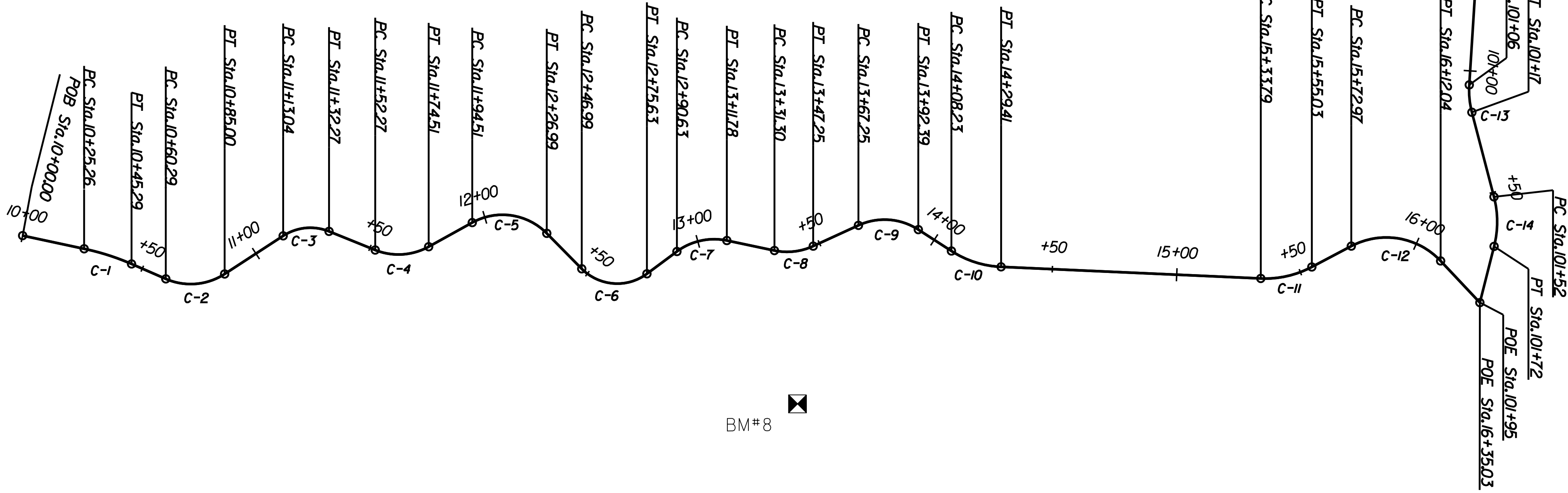
SUMMARY OF EARTHWORK FOR MITIGATION

MITIGATION UNCLASSIFIED EXCAV. (CU. YD.)	MITIGATION EMBANKMENT	MITIGATION BORROW (CU. YD.)	MITIGATION WASTE (CU. YD.)
2428	14	0	2414

PROJECT REFERENCE NO.	SHEET NO.
A-0011C	OSM-3
R/W SHEET NO.	
	HYDRAULICS ENGINEER
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REVISIONS

C-1 PI Sta 10+35.31 Δ = 1° 28' 21.7" (RT) D = 57° 17' 44.8" L = 20.02' T = 10.05' R = 100.00'	C-2 PI Sta 10+73.76 Δ = 56° 38' 22.9" (LT) D = 229° 10' 59.2" L = 24.71' T = 13.47' R = 25.00'	C-3 PI Sta 11+23.47 Δ = 55° 04' 43.6" (RT) D = 286° 28' 44.0" L = 19.23' T = 10.43' R = 20.00'	C-4 PI Sta 11+64.19 Δ = 50° 58' 34.4" (LT) D = 229° 10' 59.2" L = 22.24' T = 11.92' R = 25.00'	C-5 PI Sta 12+13.50 Δ = 74° 25' 27.5" (RT) D = 229° 10' 59.2" L = 32.47' T = 18.98' R = 25.00'	C-6 PI Sta 12+64.39 Δ = 82° 03' 23.6" (LT) D = 286° 28' 44.0" L = 28.64' T = 17.40' R = 20.00'	C-7 PI Sta 13+01.89 Δ = 48° 28' 48.0" (RT) D = 229° 10' 59.2" L = 21.15' T = 11.26' R = 25.00'
C-8 PI Sta 13+39.56 Δ = 36° 33' 34.4" (LT) D = 229° 10' 59.2" L = 15.95' T = 8.26' R = 25.00'	C-9 PI Sta 13+81.00 Δ = 57° 36' 08.4" (RT) D = 229° 10' 59.2" L = 25.13' T = 13.74' R = 25.00'	C-10 PI Sta 14+19.08 Δ = 30° 20' 00.7" (LT) D = 143° 14' 22.0" L = 21.18' T = 10.88' R = 40.00'	C-11 PI Sta 15+44.67 Δ = 30° 25' 41.4" (LT) D = 143° 14' 22.0" L = 21.24' T = 10.88' R = 40.00'	C-12 PI Sta 15+95.83 Δ = 74° 36' 28.8" (RT) D = 190° 59' 09.4" L = 39.06' T = 22.86' R = 30.00'	C-13 PI Sta 101+11.21 Δ = 18° 11' 51.5" (LT) D = 163° 42' 09.2" L = 11.12' T = 5.61' R = 35.00'	C-14 PI Sta 101+62.12 Δ = 28° 48' 42.3" (RT) D = 143° 14' 23.0" L = 20.11' T = 10.27' R = 40.00'



	Station	Northing	Easting	Bearings	Radius
POB=	100+00	492402.9370	555098.7879	S 86°24'08" E	
PC=	101+06	492396.3089	555204.2049	S 86°24'08" E	
PI =	101+11	492395.9572	555209.7992	N 75°24'00" E	
CC	492431.2400	555206.4012			35.00'
PT=	101+17	492397.3701	555215.2236	N 75°24'00" E	
PC=	101+52	492406.2226	555249.2088	N 75°24'00" E	
PI =	101+62	492408.8125	555259.1517	S 75°47'17" E	
CC	492367.5142	555259.2915			40.00'
PT=	101+72	492406.2900	555269.1118	S 75°47'17" E	
POE=	101+95	492400.5648	555291.7178	S 75°47'17" E	

	Station	Northing	Easting	Bearings	Raduis
POB=	10+00	491815.4160	555264.7930	N 12°03'43" E	
PC=	10+25	491840.1229	555270.0726	N 12°03'43" E	
PI =	10+35	491849.9465	555272.1718	N 23°32'05" E	
CC	491819.2259	555367.8648			100.00'
PT=	10+45	491859.1564	555276.1829	N 23°32'05" E	
PC=	10+60	491872.9086	555282.1725	N 23°32'05" E	
PI =	10+74	491885.2603	555287.5520	N 33°06'18" W	
CC	491882.8912	555259.2520			25.00'
PT=	10+85	491896.5456	555280.1938	N 33°06'18" W	
PC=	11+13	491920.0359	555264.8778	N 33°06'18" W	
PI =	11+23	491928.7719	555259.1818	N 21°58'26" E	
CC	491930.9594	555281.6312			20.00'
PT=	11+32	491938.4431	555263.0841	N 21°58'26" E	
PC=	11+52	491956.9902	555270.5677	N 21°58'26" E	
PI =	11+64	491968.0424	555275.0272	N 29°00'09" W	
CC	491966.3447	555247.3839			25.00'
PT=	11+75	491978.4659	555269.2488	N 29°00'09" W	
PC=	11+95	491995.9579	555259.5519	N 29°00'09" W	
PI =	12+13	492012.5616	555250.3474	N 45°25'19" E	
CC	492008.0791	555281.4169			25.00'
PT=	12+27	492025.8864	555263.8699	N 45°25'19" E	
PC=	12+47	492039.9240	555278.1157	N 45°25'19" E	
PI =	12+64	492052.1389	555290.5118	N 36°38'05" W	
CC	492054.1699	555264.0781			20.00'
PT=	12+76	492066.1041	555280.1272	N 36°38'05" W	
PC=	12+91	492078.1410	555271.1766	N 36°38'05" W	
PI =	13+02	492087.1738	555264.4598	N 11°50'43" E	
CC	492093.0587	555291.2380			25.00'

	Station	Northing	Easting	Bearings	Raduis
PT=	13+12	492098.1905	555266.7704	N 11°50'43" E	
PC=	13+31	492117.2922	555270.7767	N 11°50'43" E	
PI =	13+40	492125.3745	555272.4719	N 24°42'51" W	
CC	492122.4240	555246.3091			25.00'
PT=	13+47	492132.8763	555269.0192	N 24°42'51" W	
PC=	13+67	492151.0444	555260.6573	N 24°42'51" W	
PI =	13+81	492163.5300	555254.9109	N 32°53'17" E	
CC	492161.4967	555283.3675			25.00'
PT=	13+92	492175.0717	555262.3741	N 32°53'17" E	
PC=	14+08	492188.3788	555270.9790	N 32°53'17" E	
PI =	14+19	492197.4839	555276.8667	N 2°33'17" E	
CC	492210.0988	555237.3897			40.00'
PT=	14+29	492208.3159	555277.3499	N 2°33'17" E	
PI =	14+54	492233.2911	555278.4642	N 2°33'17" E	
PI =	15+12	492291.2335	555281.0493	N 2°33'17" E	
PC=	15+34	492312.5929	555282.0023	N 2°33'17" E	
PI =	15+45	492323.4604	555282.4872	N 27°52'25" W	
CC	492314.3758	555242.0421			40.00'
PT=	15+55	492333.0767	555277.4013	N 27°52'25" W	
PC=	15+73	492348.9332	555269.0151	N 27°52'25" W	
PI =	15+96	492369.1385	555258.3288	N 46°44'04" E	
CC	492362.9589	555295.5345			30.00'
PT=	16+12	492384.8044	555274.9731	N 46°44'04" E	
POE=	16+35	492400.5648	555291.7178	N 46°44'04" E	

Benchmark	Northing	Easting	Elevation	Description
BM7	491218	555482	1959.43	CHISELED 'X' ON CONC HW
BM8	492127	555332	1935.65	CHISELED 'X' ON CONC HW
BM9	493082	555480	1960.73	PAINTED BOLT ON FH

THE LOCALIZED COORDINATE SYSTEM DEVELOPED FOR THIS PROJECT IS BASED ON THE STATE PLANE COORDINATES ESTABLISHED BY NCDOT FOR MONUMENT "GPS 105" WITH NAD 83/NA 2011 STATE PLANE GRID COORDINATES OF NORTHING: 494294.9050(ft), EASTING: 555946.2770(ft). THE AVERAGE COMBINED GRID FACTOR USED ON THIS PROJECT (GROUND TO GRID) IS: 0.999792861. ALL LINEAR DISTANCES ARE LOCALIZED HORIZONTAL DISTANCES. THE VERTICAL DATUM IS BASED ON NCDOT MONUMENT "GPS 105" (ELEV. 2000.22 FT.) (NAVD 1988).

PROJECT REFERENCE NO.
A-0011C

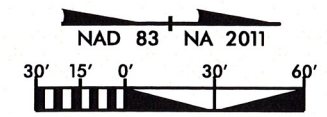
SHEET NO.
OSM-4

R/W SHEET NO.

HYDRAULICS
ENGINEER

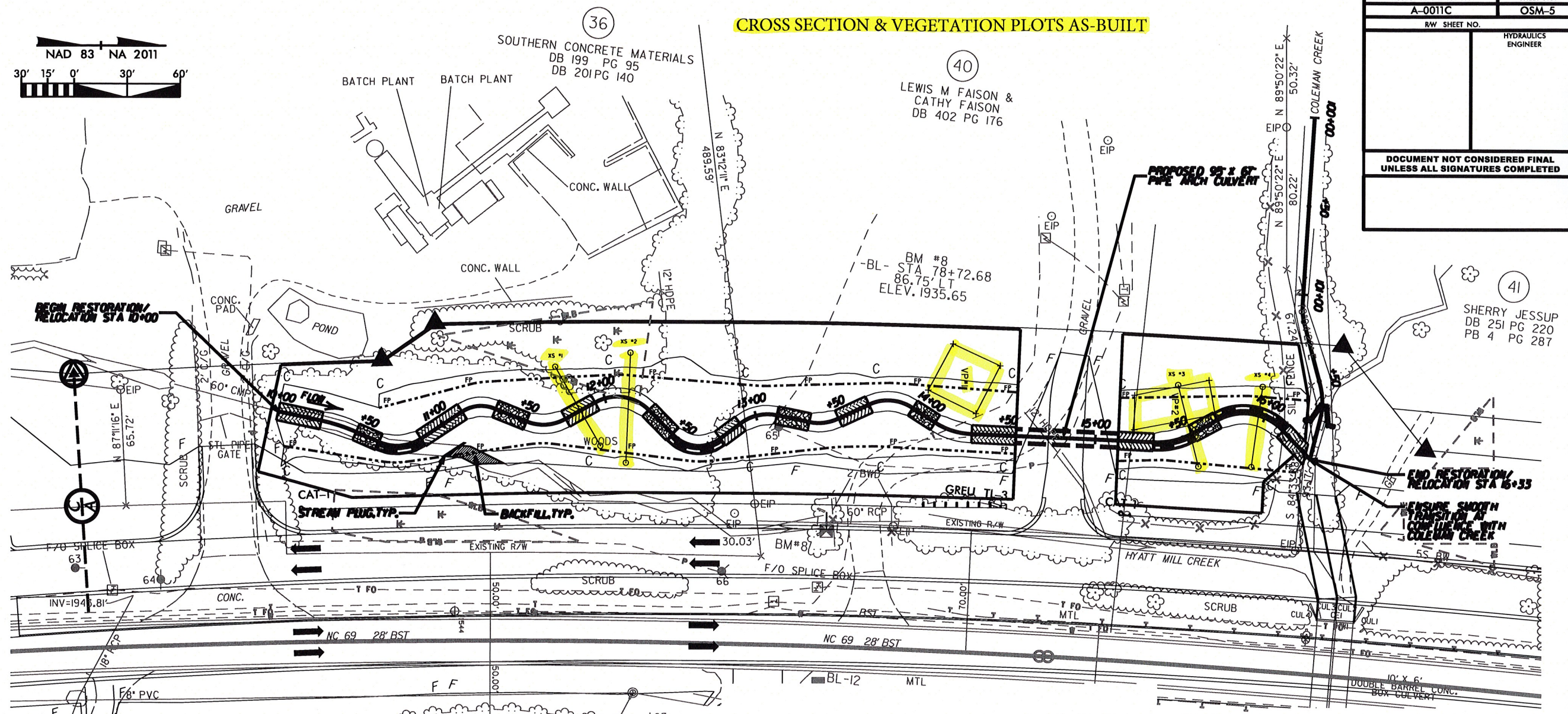
DOCUMENT NOT CONSIDERED FINAL
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8/17/19



CROSS SECTION & VEGETATION PLOTS AS-BUILT

PROJECT REFERENCE NO.	SHEET NO.
A-0011C	OSM-5
R/W SHEET NO.	HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	



As-Built Elevation Shots

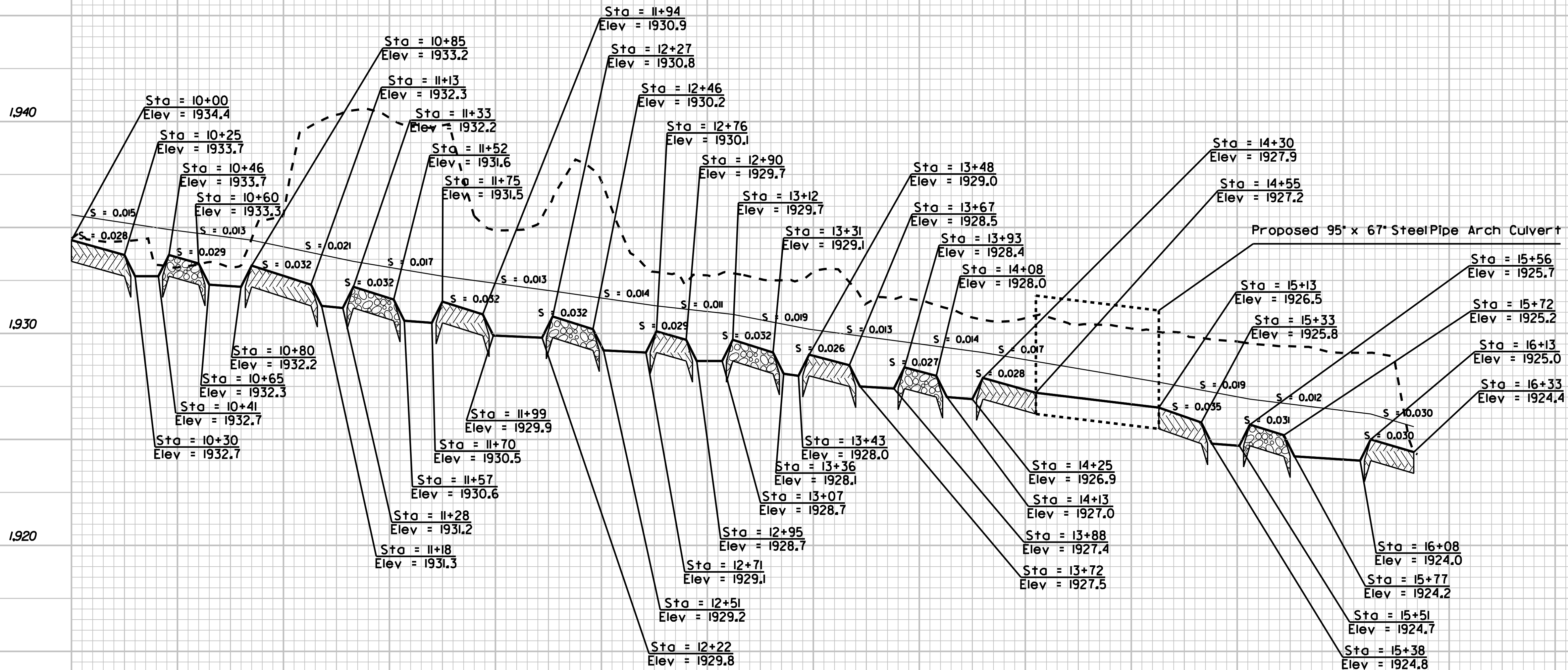
Structure Locations									
Structure Type	Station From*	Start Elevation	Tape Sta. 9-27-21	Elevation Shot 9-27-21	Difference	Station To*	End Elevation	Tape Sta. 9-27-21	Elevation Shot 9-27-21
Riffle Grade Control	10+00	1934.4	10+00	1934.58	0.18	10+25	1933.7		
Wood Drop Riffle	10+46	1933.7	10+50	1933.57	-0.13	10+60	1933.3		
Rock Toe Protection	10+60					10+85			
Stream Plug	10+82					11+06			
Riffle Grade Control	10+85	1933.2	10+79	1932.96	-0.24	11+13	1932.3		
Wood Drop Riffle	11+33	1932.2	11+37	1932.15	-0.05	11+52	1931.6	11+42	1932.03
Riffle Grade Control	11+75	1931.5	11+76	1931.04	-0.46	11+94	1930.9		
Wood Drop Riffle	12+27	1930.8	12+29	1930.4	-0.4	12+46	1930.2	12+37	1930.59
Rock Toe Protection	12+46					12+76			
Riffle Grade Control	12+76	1930.1	12+65	1929.87	-0.23	12+90	1929.7	12+82	1929.22
Wood Drop Riffle	13+12	1929.7	13+10	1929.11	-0.59	13+31	1929.1	13+25	1929.3
Riffle Grade Control	13+48	1929	13+41	1928.92	-0.08	13+67	1928.5	13+58	1928.31
Wood Drop Riffle	13+93	1928.4	13+98	1928.23	-0.17	14+08	1928		
Riffle Grade Control	14+30	1927.9	14+29	1927.32	-0.58	14+55	1927.2		
95" x 67" Pipe Arch Culvert	14+55	1926.2	14+49	1926.49	0.29	15+13	1925.5	15+09	1925.89
Riffle Grade Control	15+13	1926.5				15+33	1925.8	15+28	1925.45
Rock Toe Protection	15+33		15+39	1924.76		15+56		15+58	1925.27
Wood Drop Riffle	15+56	1925.7				15+72	1925.2	15+71	1924.82
Rock Toe Protection	15+72		15+77	1924.24		16+13			
Riffle Grade Control	16+13	1925	16+14	1924.39	-0.61	16+33	1924.4	16+33	1923.51
Rock Cross Vane	101+64					101+75			

- NOTES:
- SEE SHEET OSM-4 FOR BASELINE INFORMATION.
 - ROADWAY AND STRUCTURE INFORMATION PROVIDED ON THIS SHEET IS FOR INFORMATION PURPOSES ONLY. SEE ROADWAY PLANS (PREPARED BY OTHERS) FOR PROPOSED ROADWAY AND STRUCTURE INFORMATION.

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
A-001C	OSM-6
	HYDRAULICS ENGINEER
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See table on OSM-5 for asbuilt elevation shots



1,900 10+00

11+00

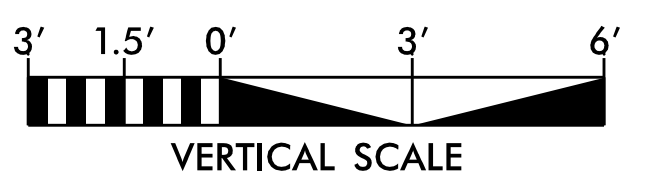
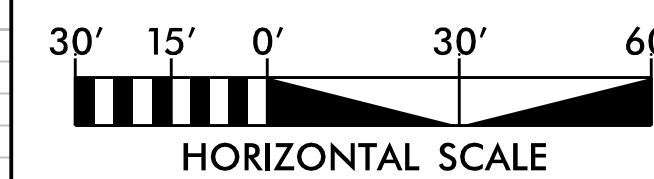
12+00

13+00

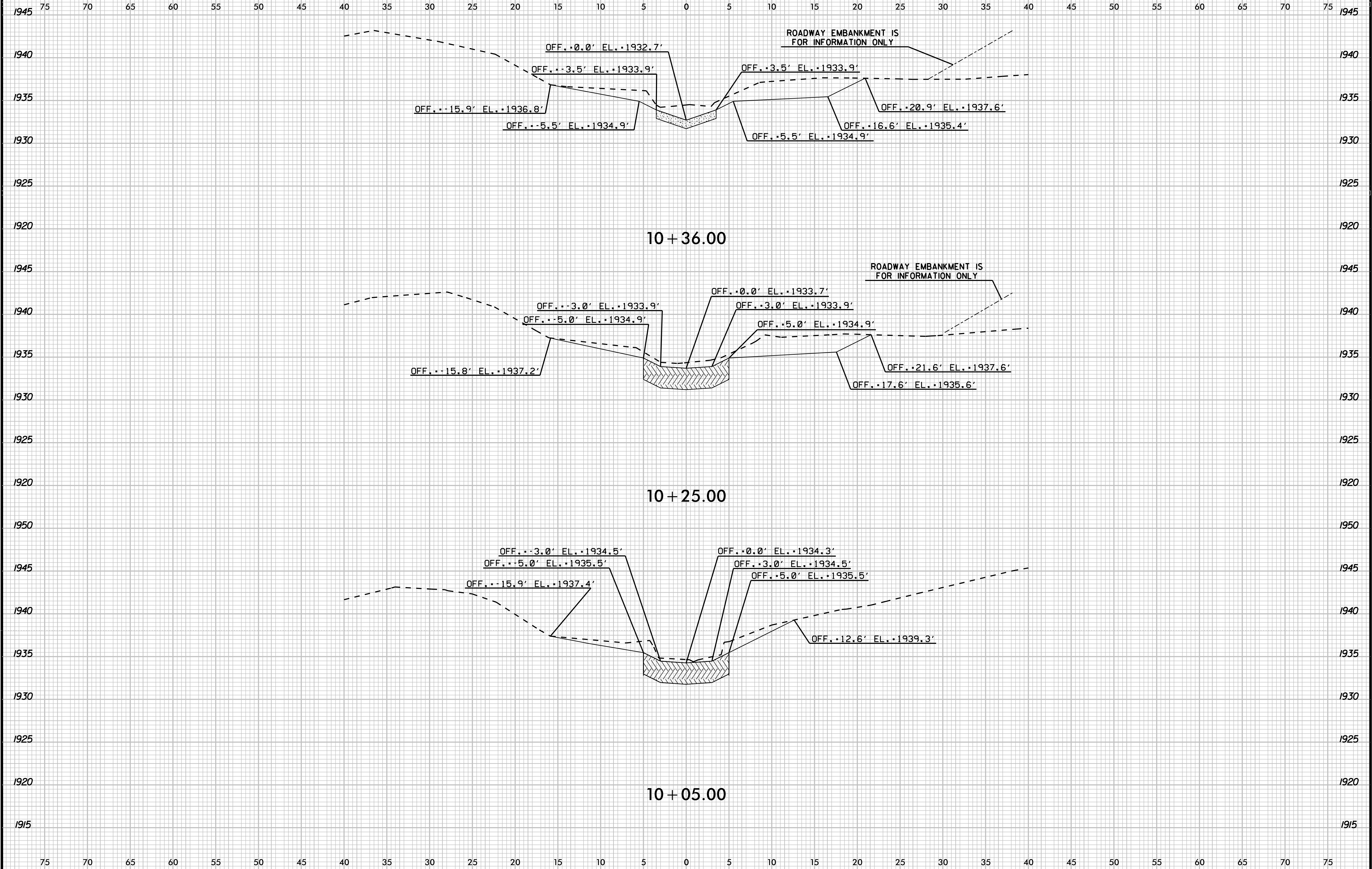
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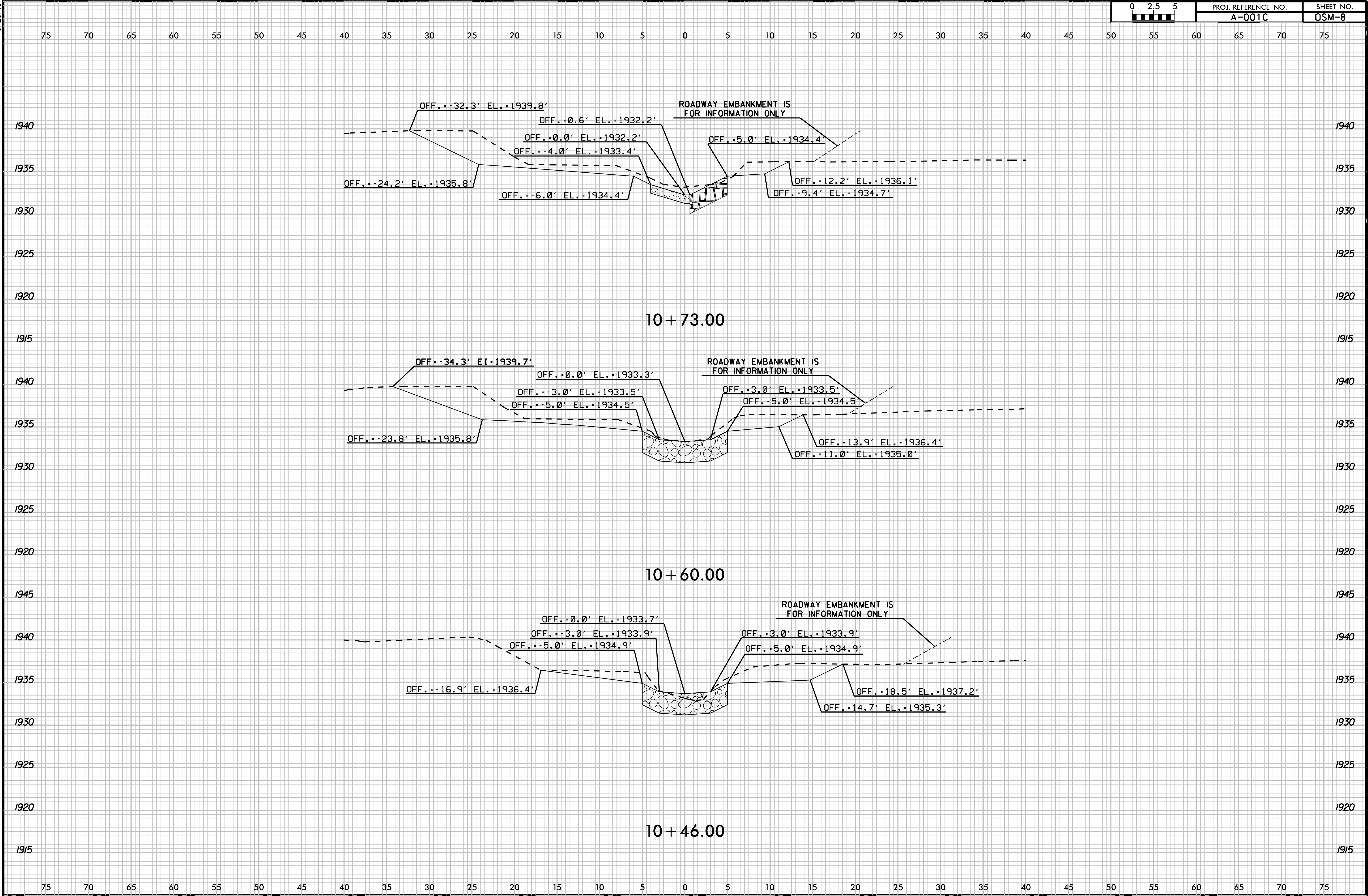
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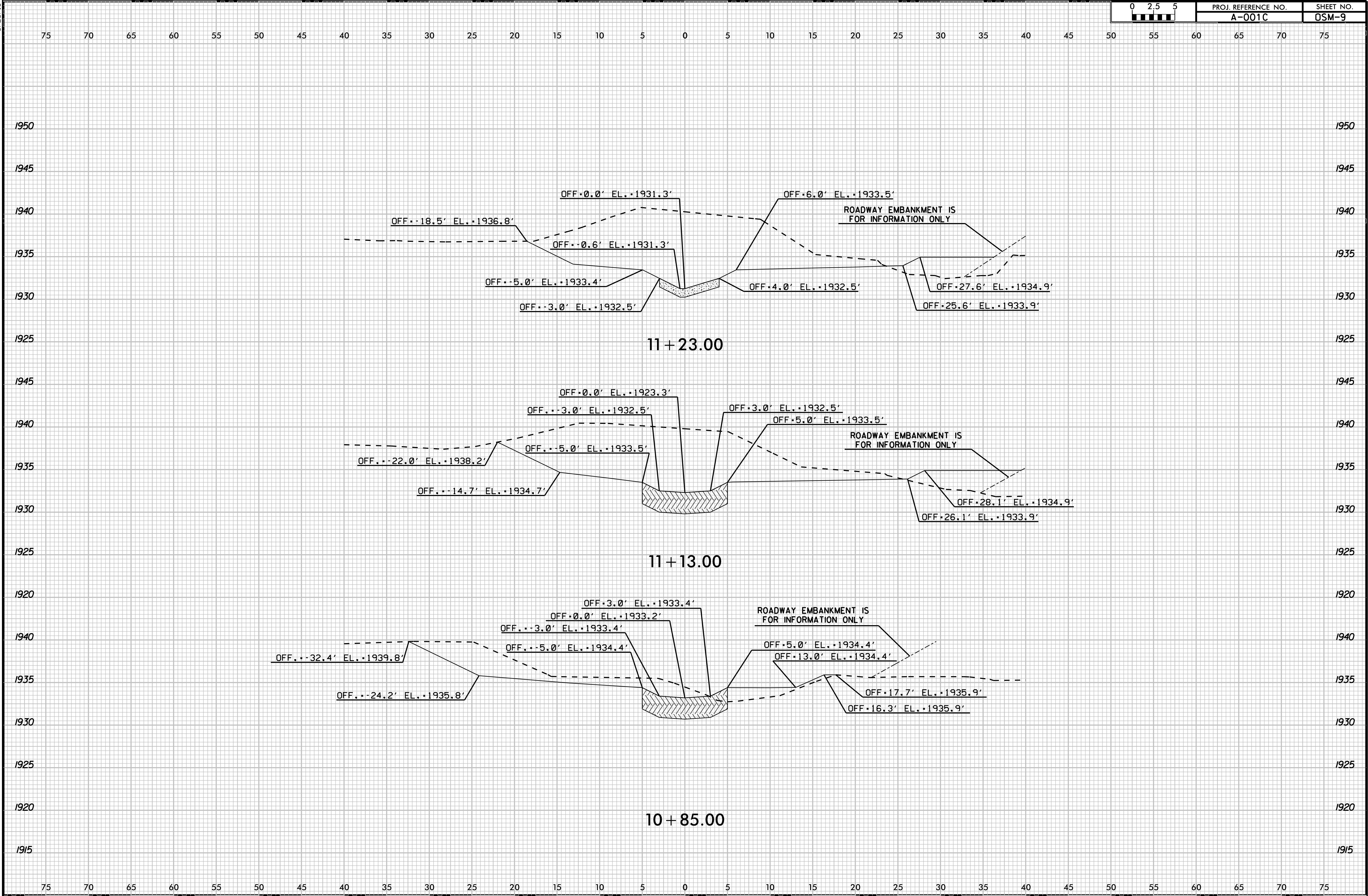
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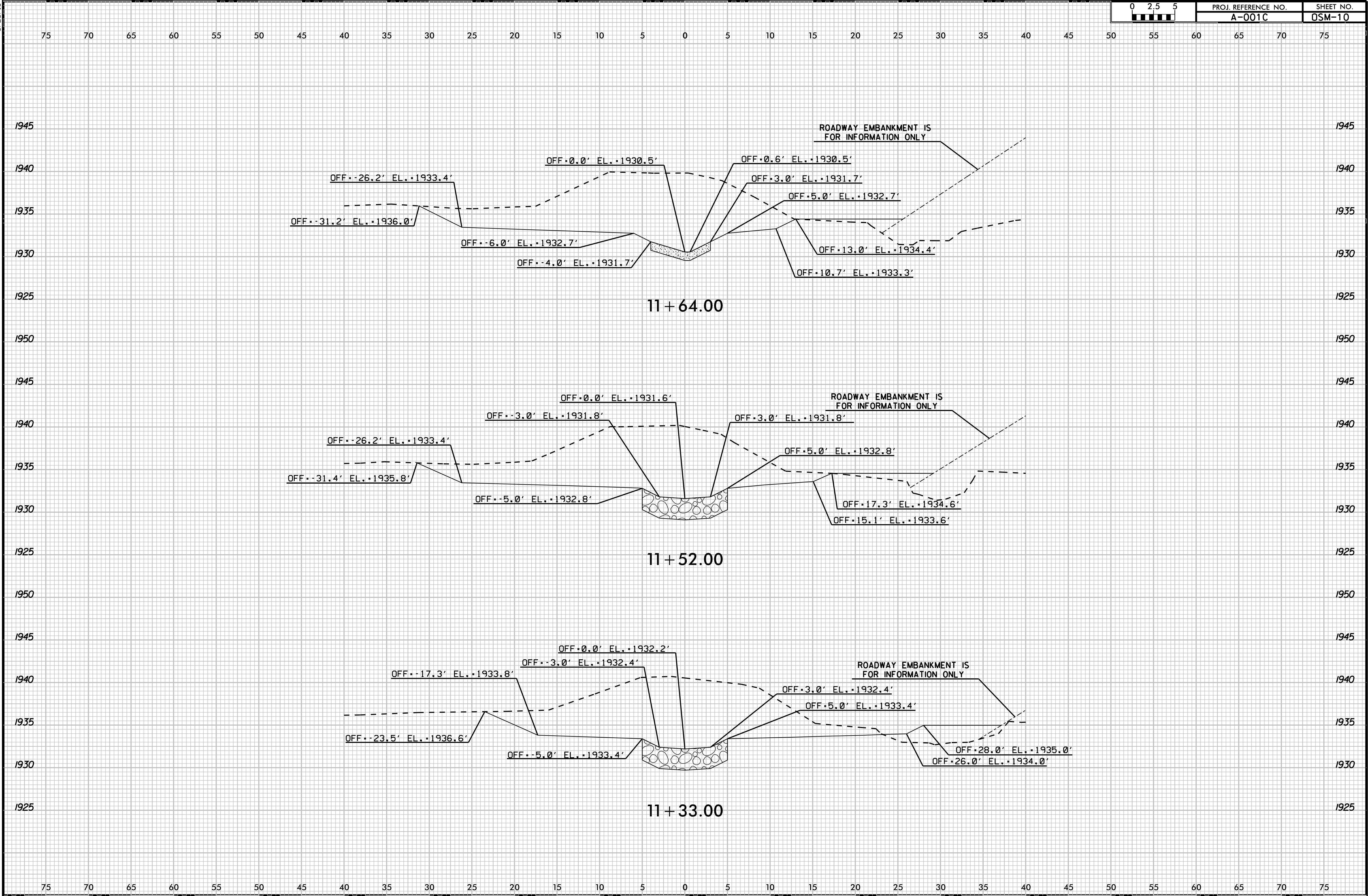


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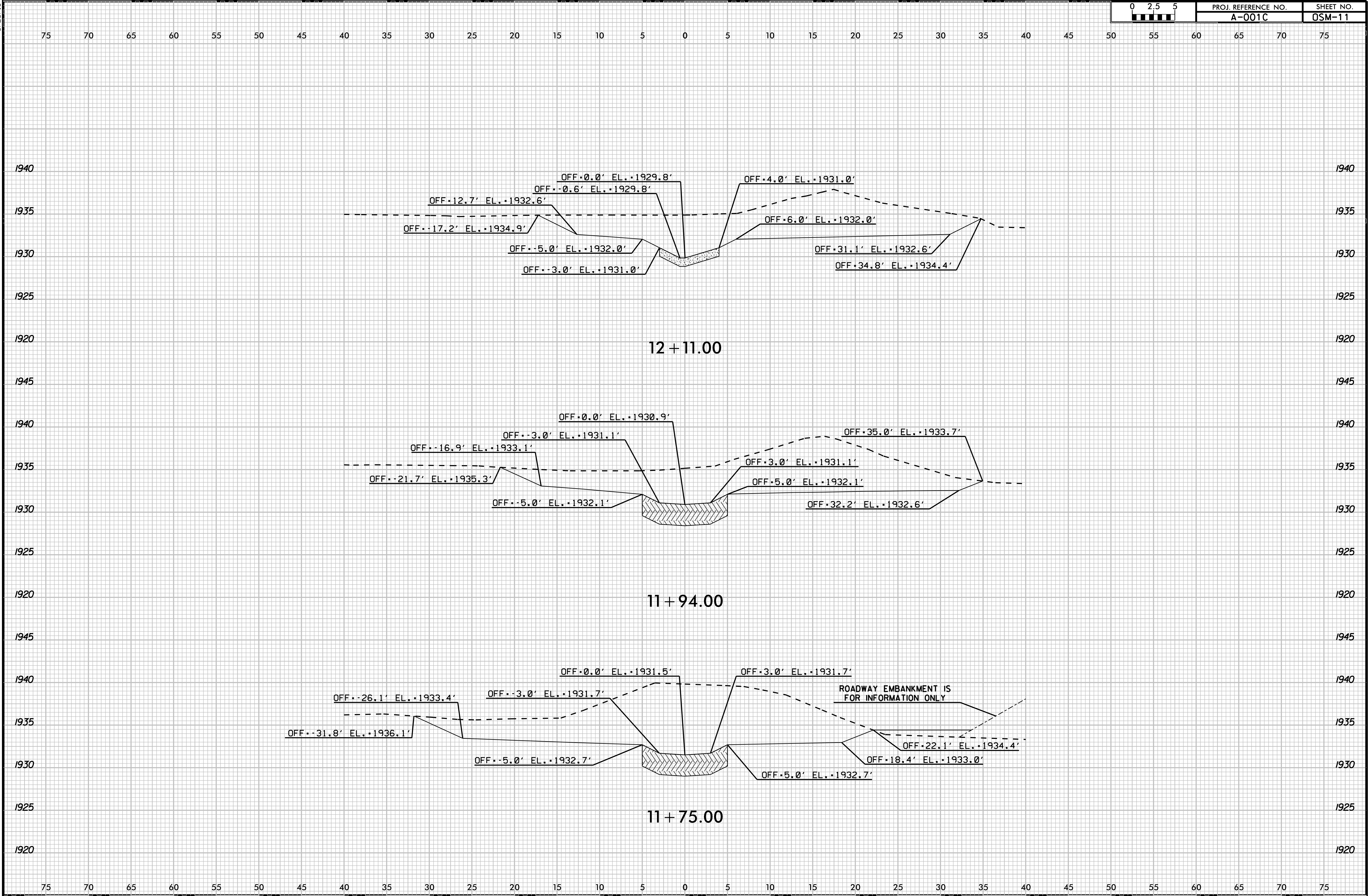


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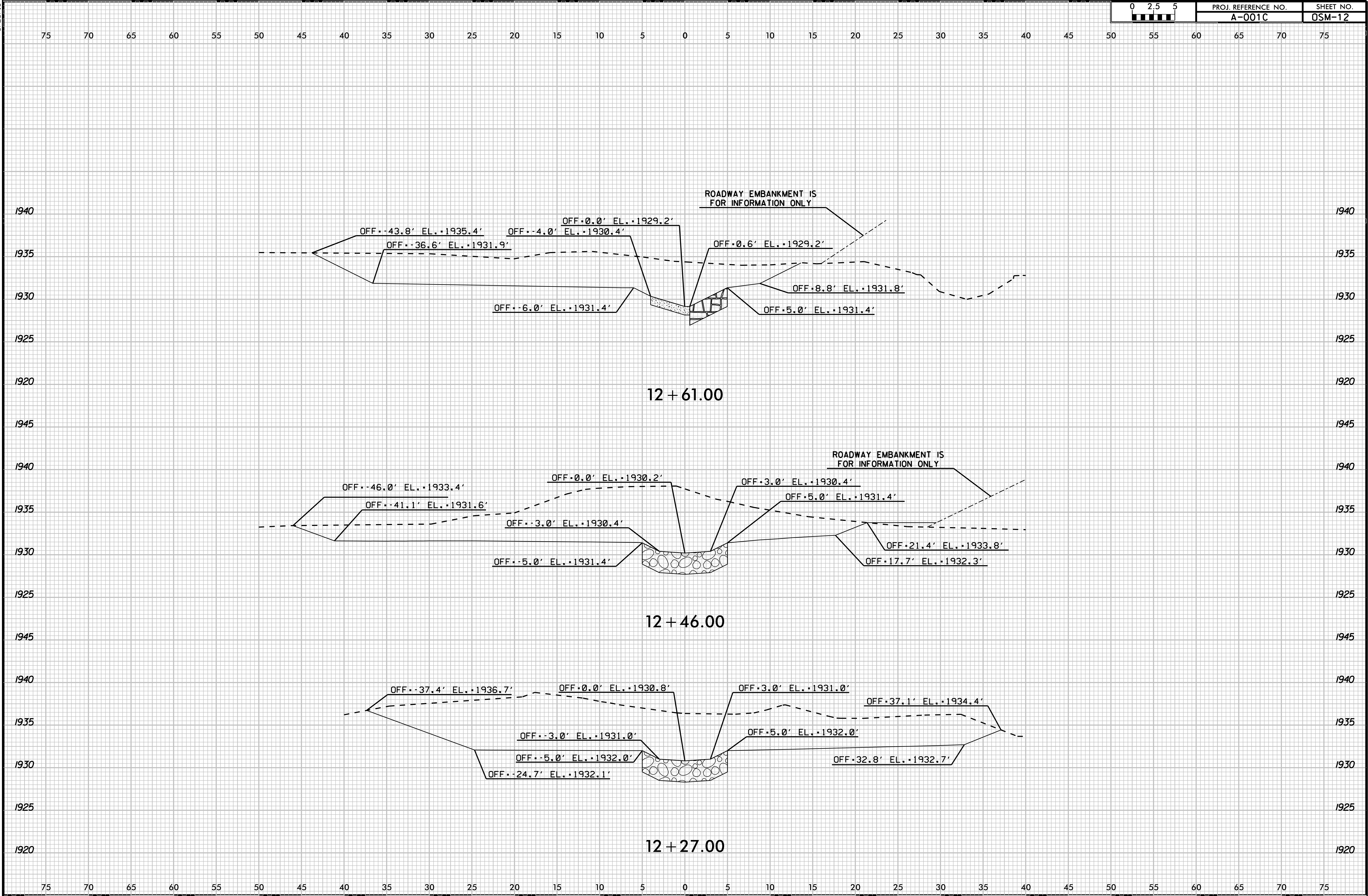


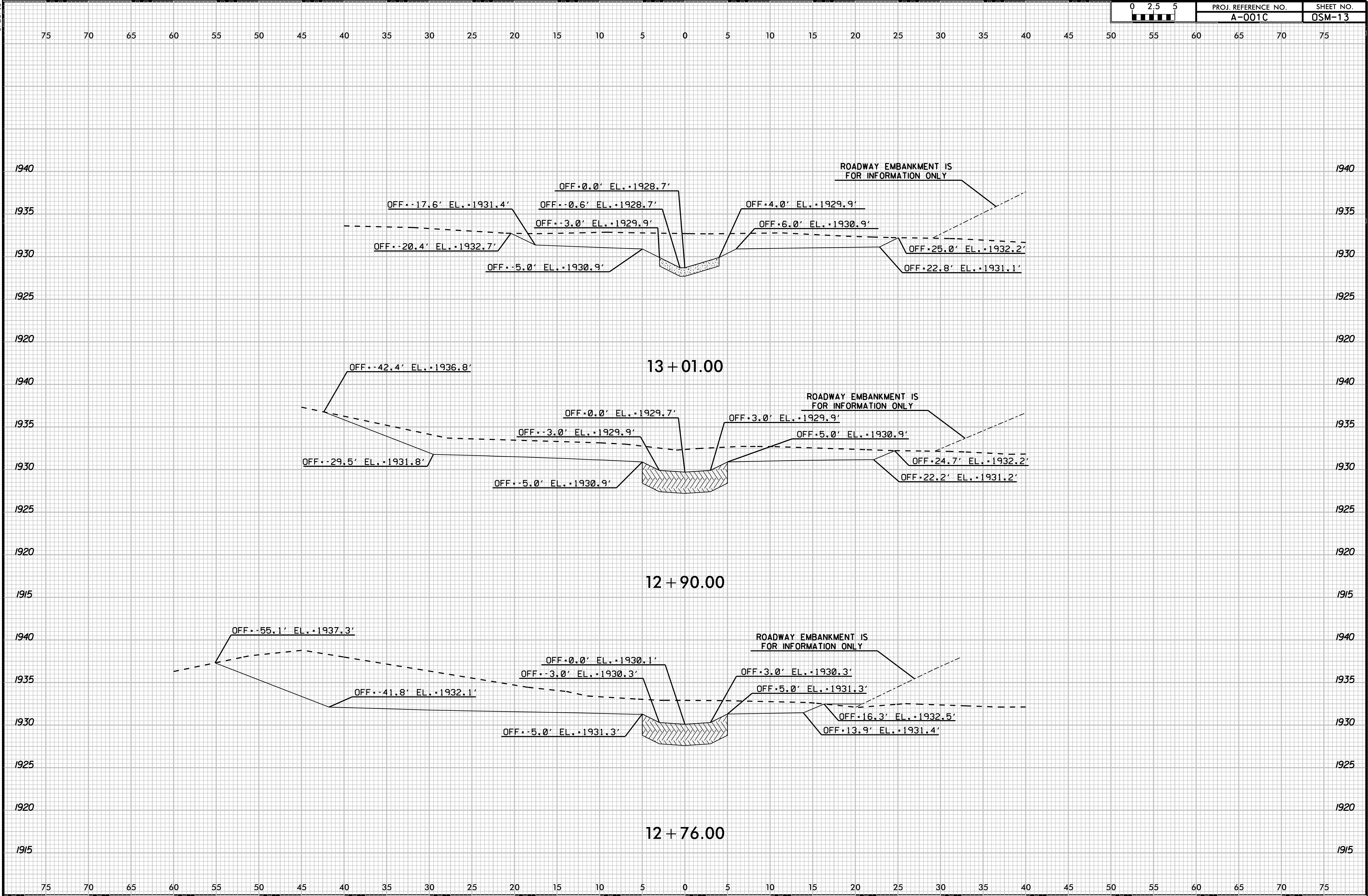


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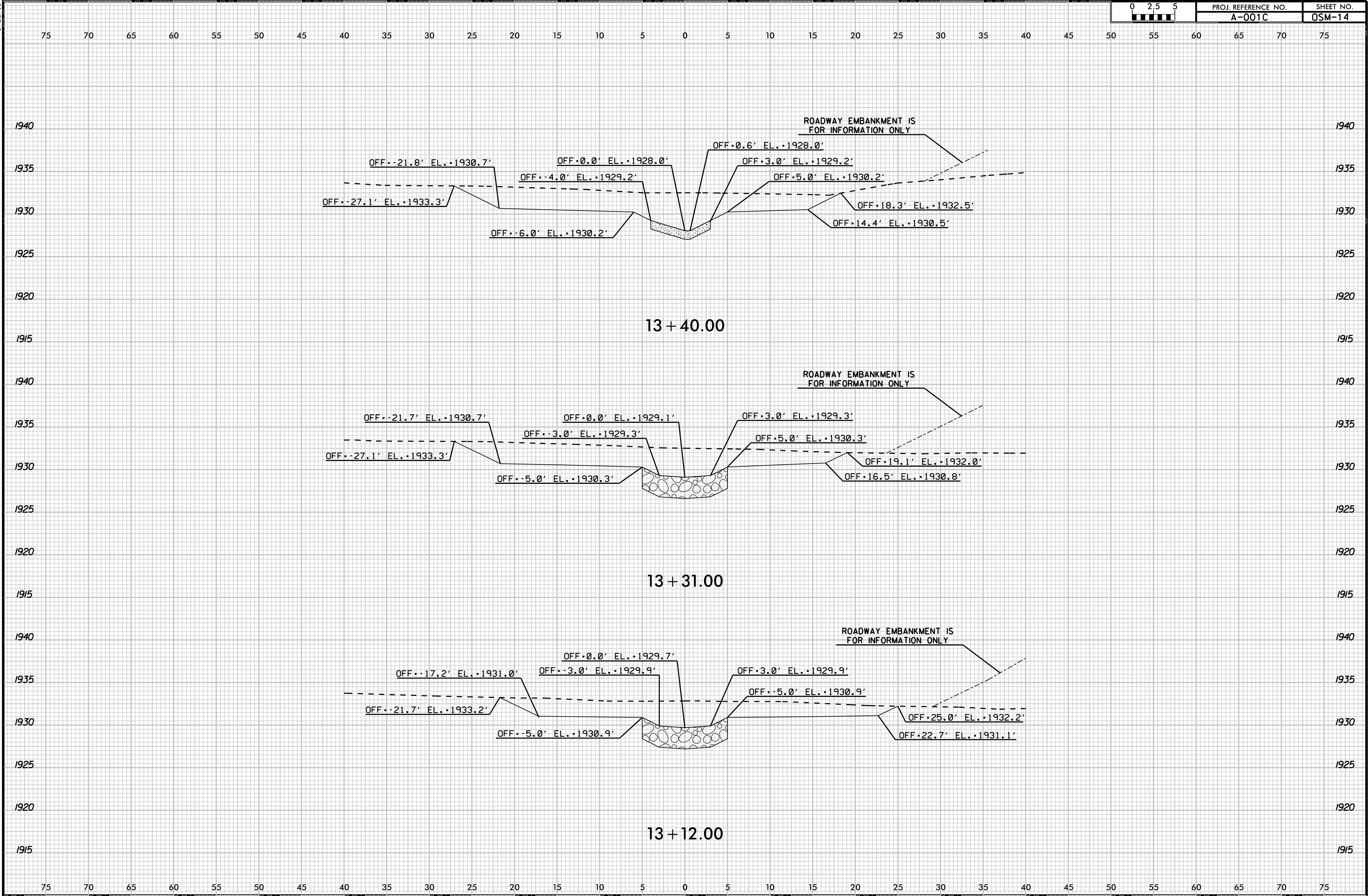


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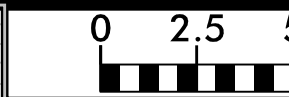




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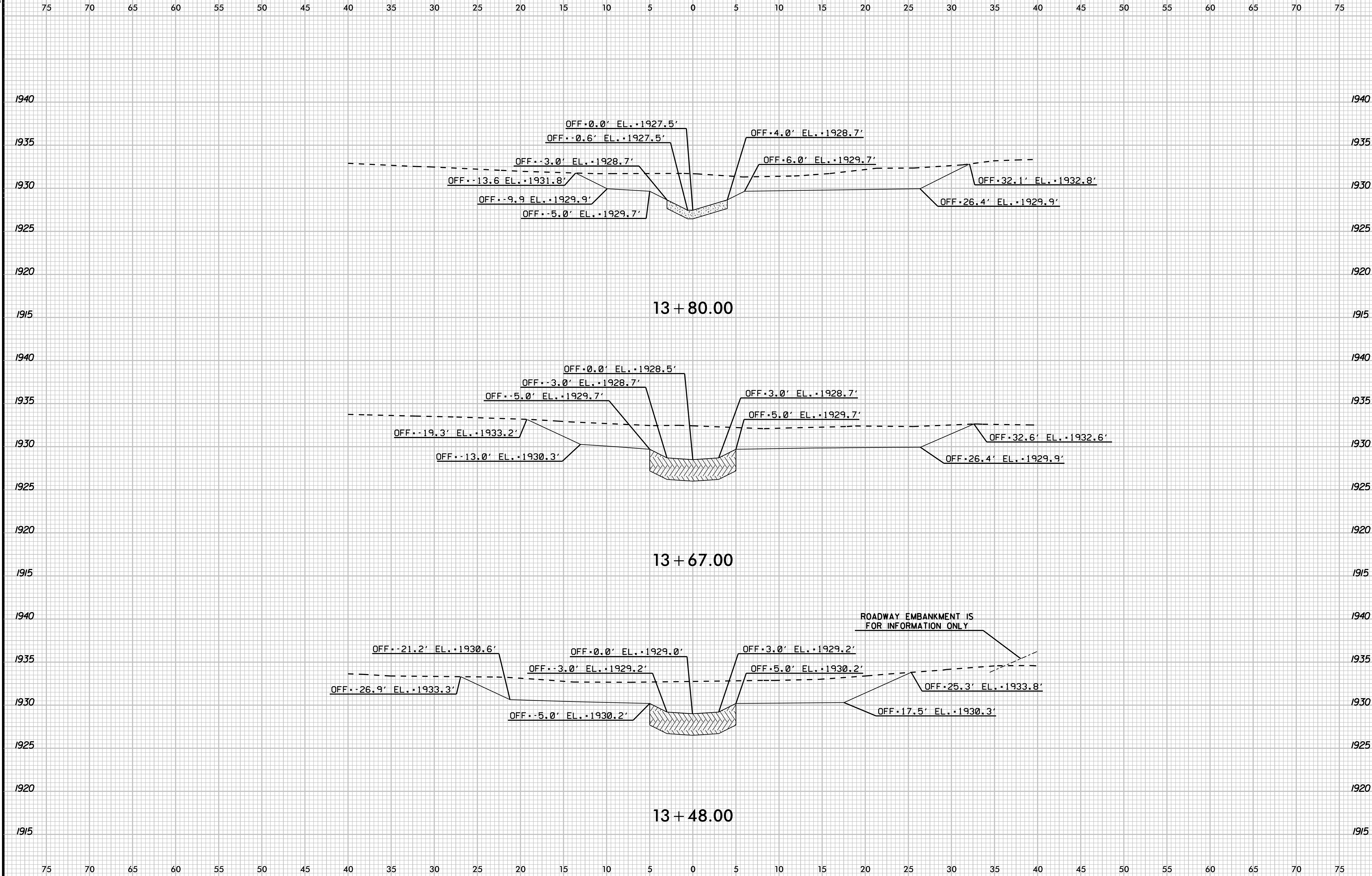


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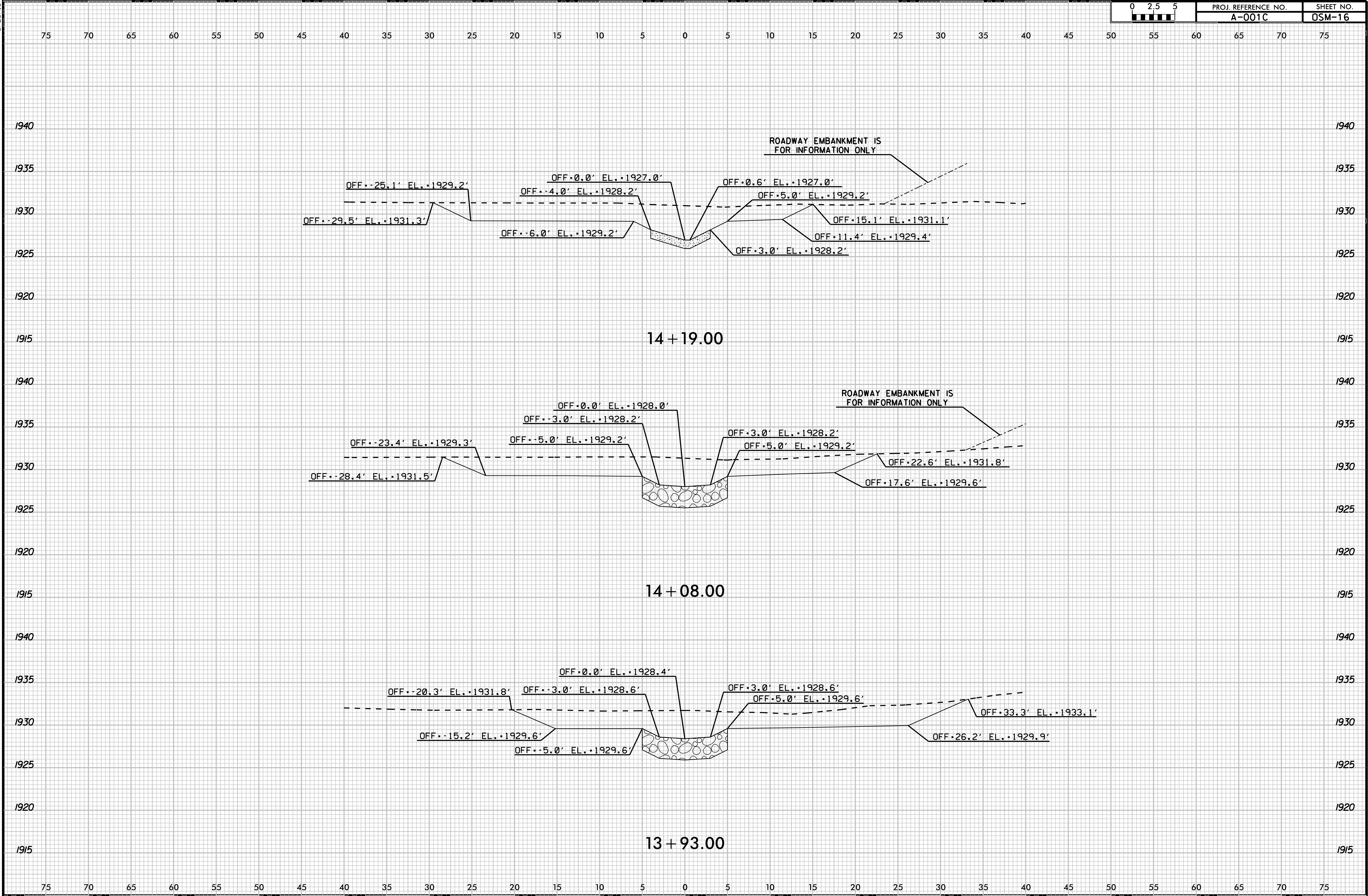


PROJ. REFERENCE NO.
A-001C

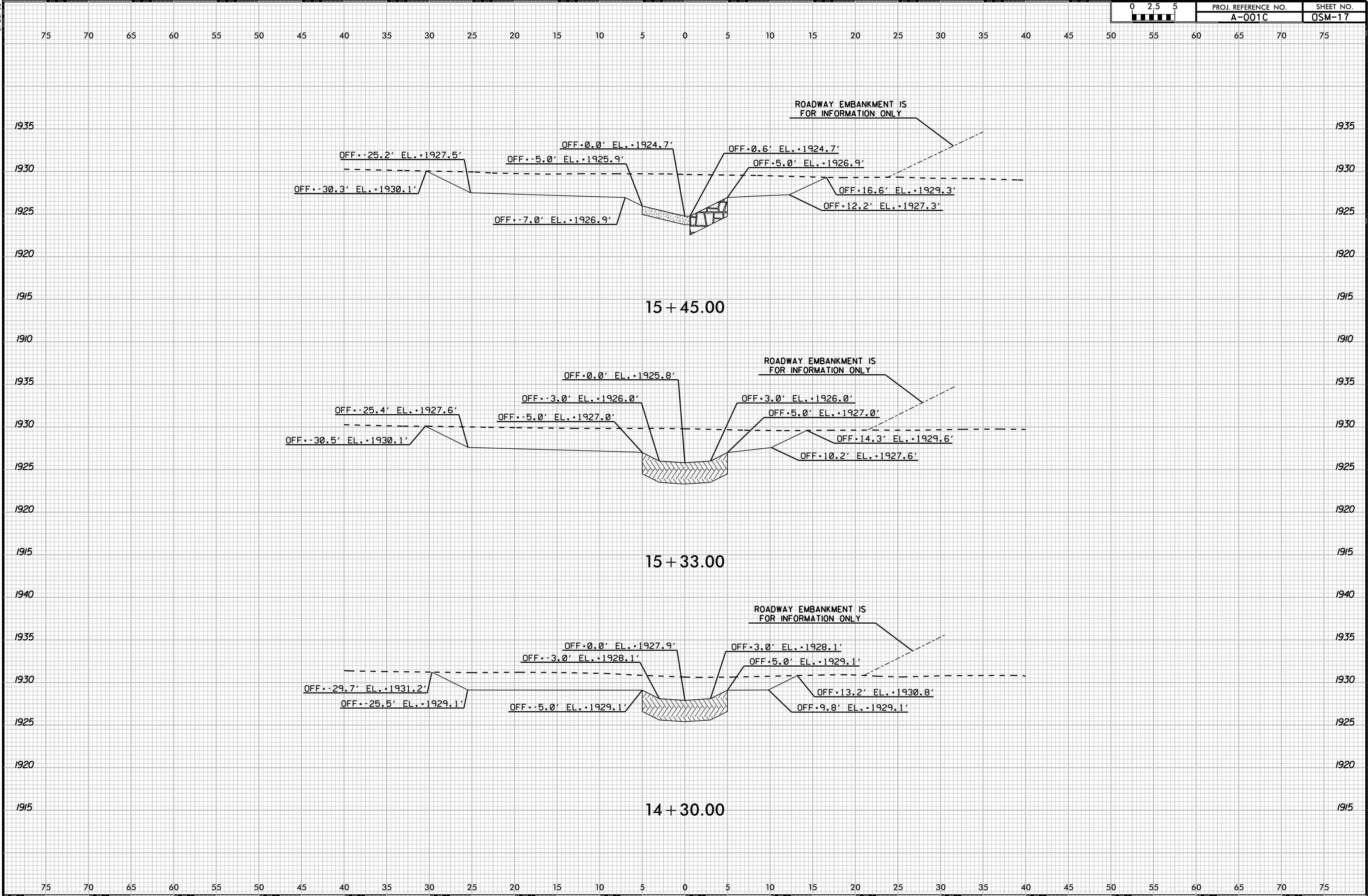
SHEET NO.
OSM-15



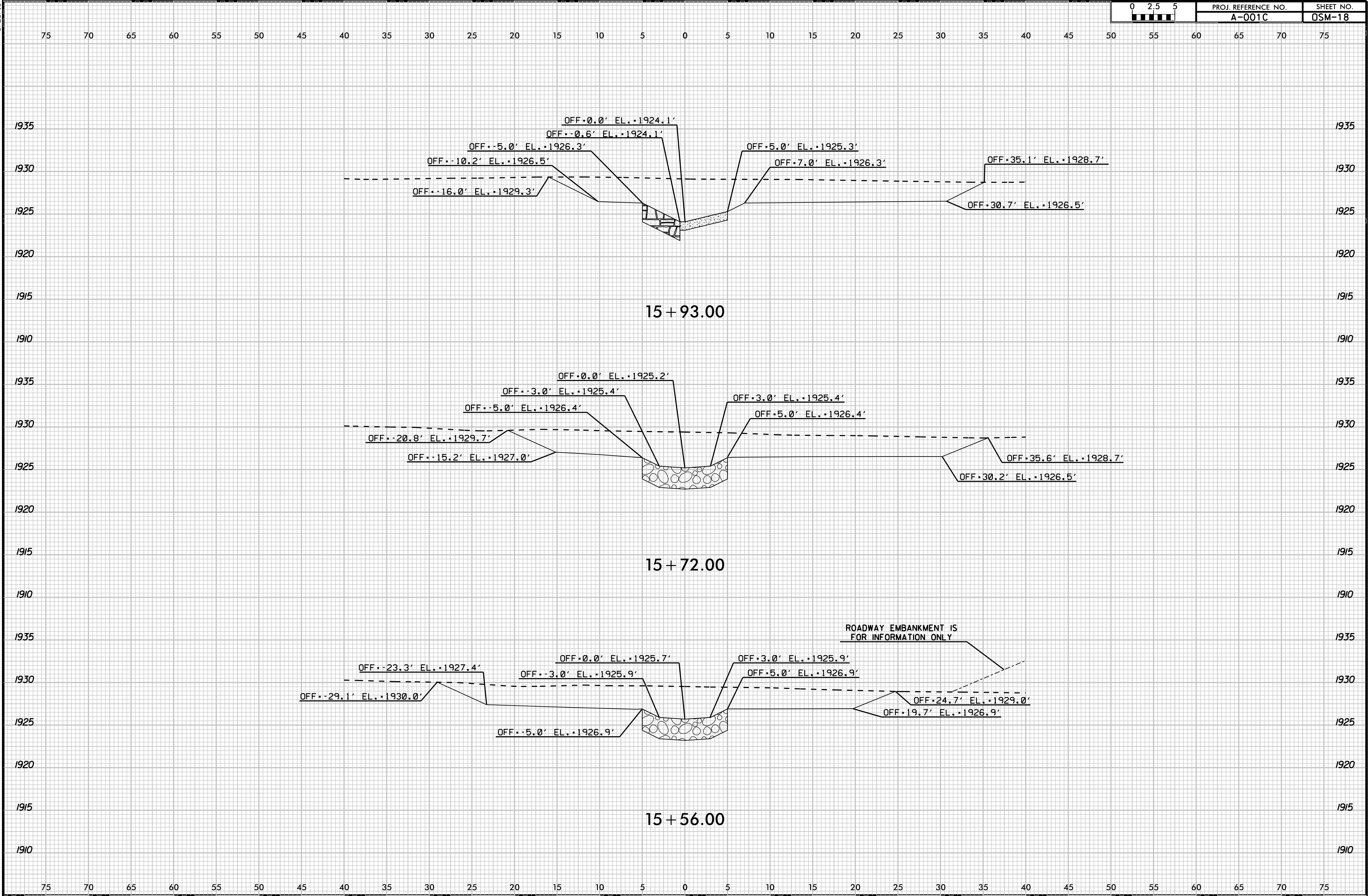
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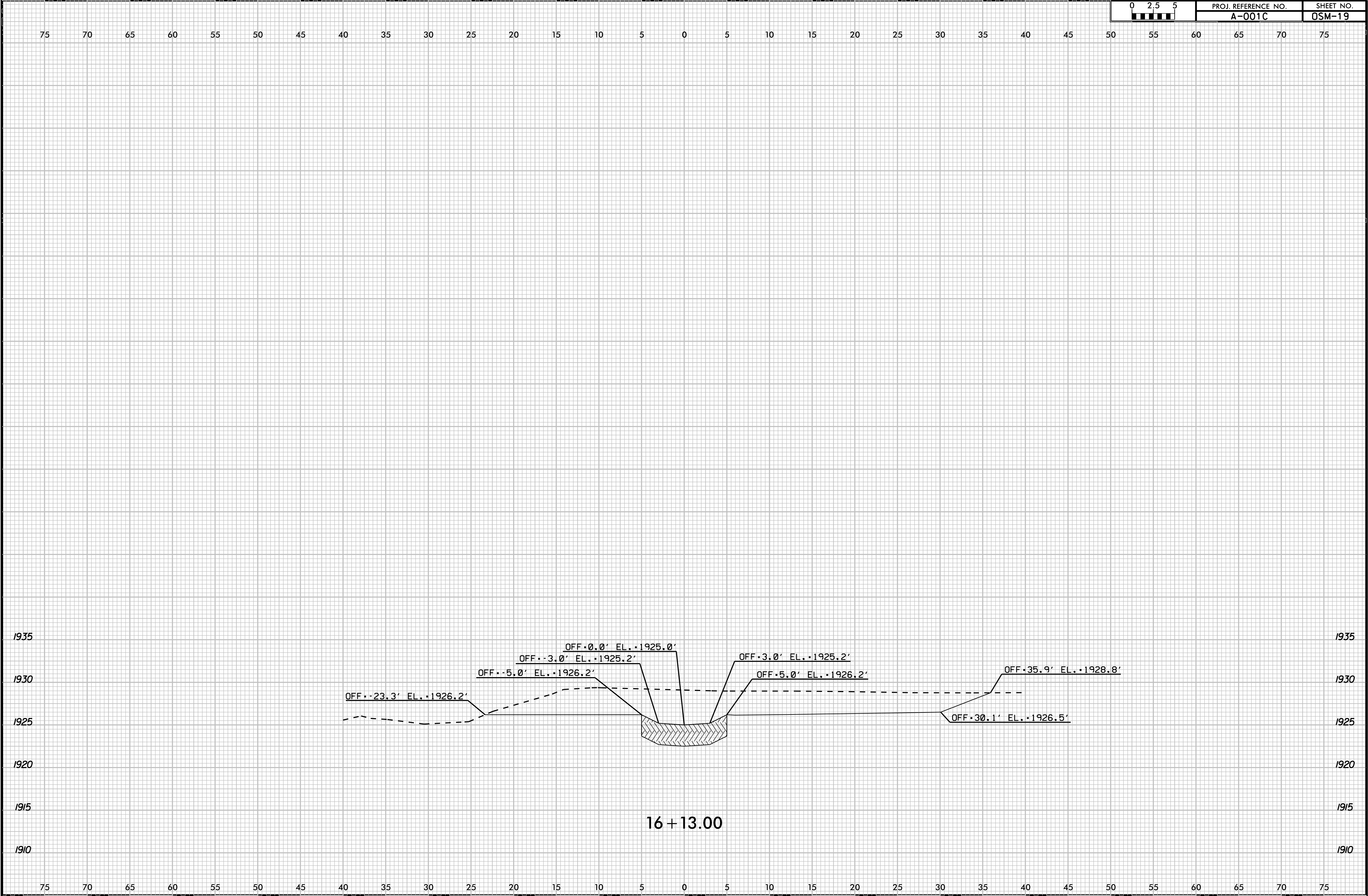
6/23/16



6/23/16

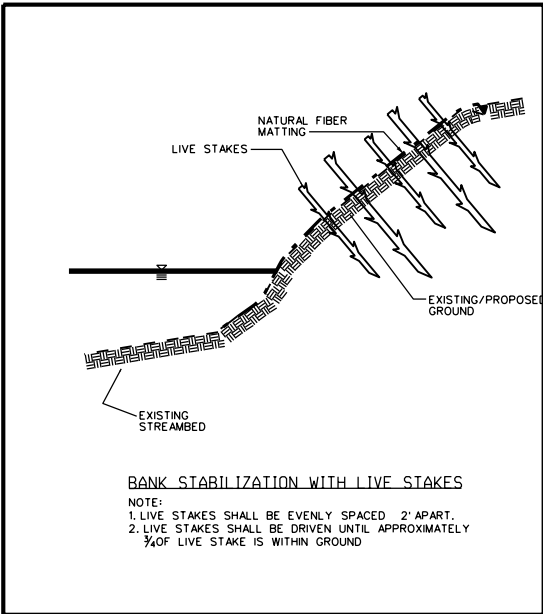
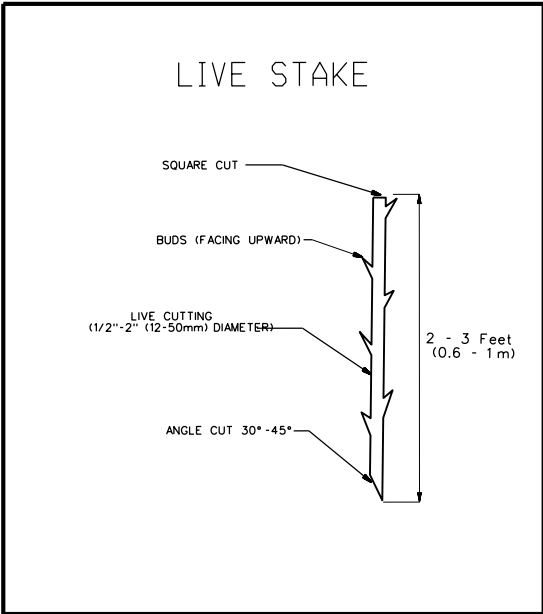


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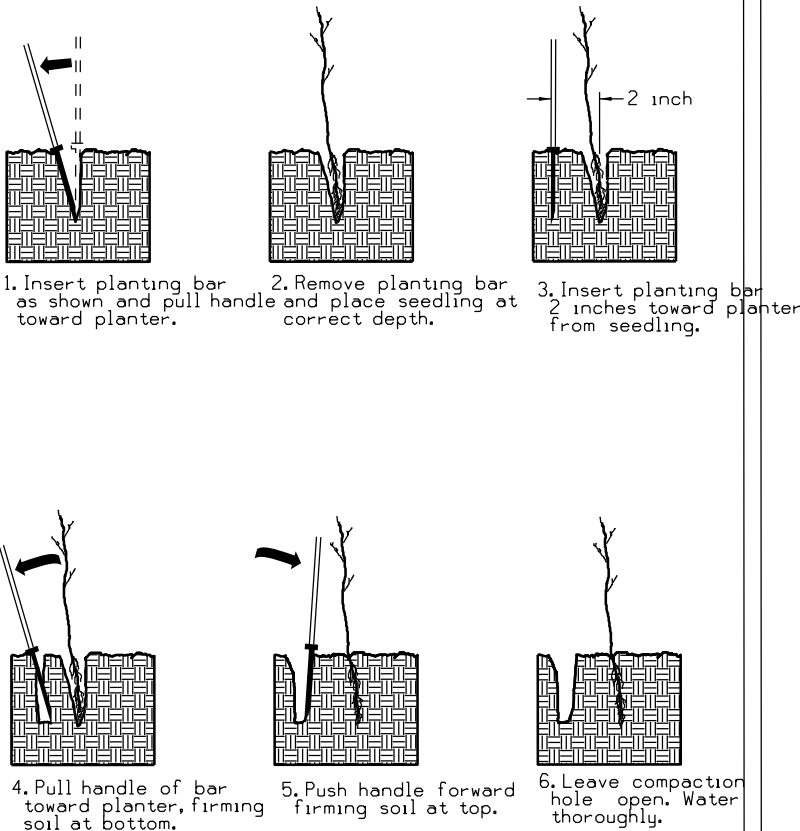


PLANTING DETAILS

LIVE STAKE PLANTING DETAIL



BAREROOT PLANTING DETAIL
DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



PLANTING NOTES:

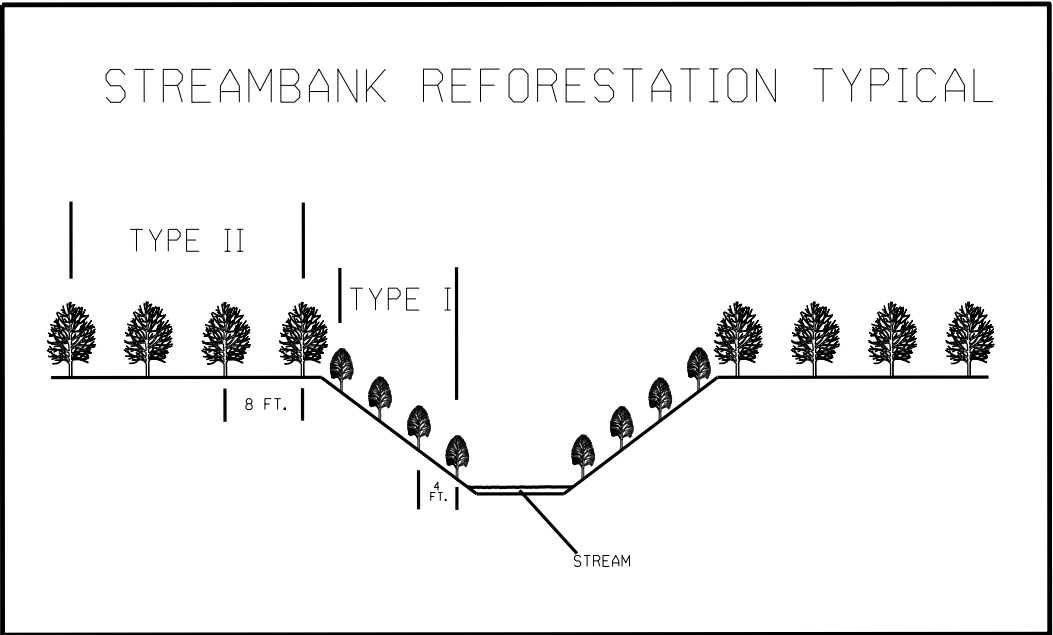
PLANTING BAG
During planting, seedlings shall be kept in a moist canvas bag or similar container to prevent the root systems from drying.

KBC PLANTING BAR
Planting bar shall have a blade with a triangular cross section, and shall be 12 inches long, 4 inches wide and 1 inch thick at center.

ROOT PRUNING
All seedlings shall be root pruned, if necessary, so that no roots extend more than 10 inches below the root collar.

REFORESTATION AS-BUILT PLANS

- TYPE 1 STREAMBANK REFORESTATION SHALL BE PLANTED 3 FT. TO 5 FT. ON CENTER, RANDOM SPACING, AVERAGING 4 FT. ON CENTER, APPROXIMATELY 2724 PLANTS PER ACRE.
- TYPE 2 STREAMBANK REFORESTATION SHALL BE PLANTED 6 FT. TO 10 FT. ON CENTER, RANDOM SPACING, AVERAGING 8 FT. ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.



REFORESTATION

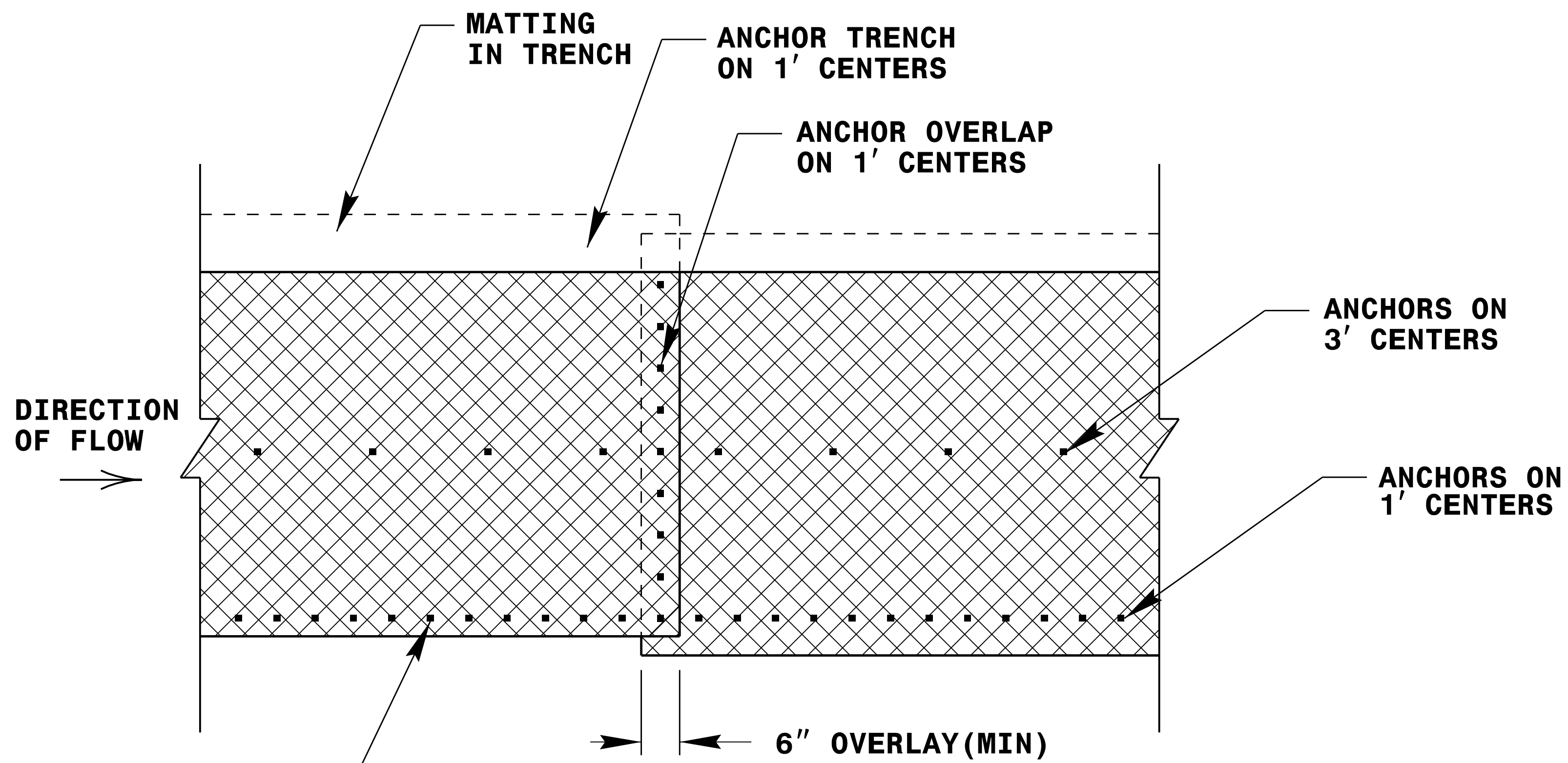
MIXTURE, TYPE, SIZE, AND FURNISH SHALL CONFORM TO THE FOLLOWING:

TYPE 1		
50% SALIX NIGRA	BLACK WILLOW	12 in - 18 in BR
50% CORNUS AMOMUM	SILKY DOGWOOD	12 in - 18 in BR
TYPE 2		
25% PLATANUS OCCIDENTALIS	SYCAMORE	12 in - 18 in BR
25% LIRIODENDRON TULIPIFERA	YELLOW POPLAR	12 in - 18 in BR
25% BETULA NIGRA	RIVER BIRCH	12 in - 18 in BR
25% FRAXINUS PENNSYLVANICA	GREEN ASH	12 in - 18 in BR

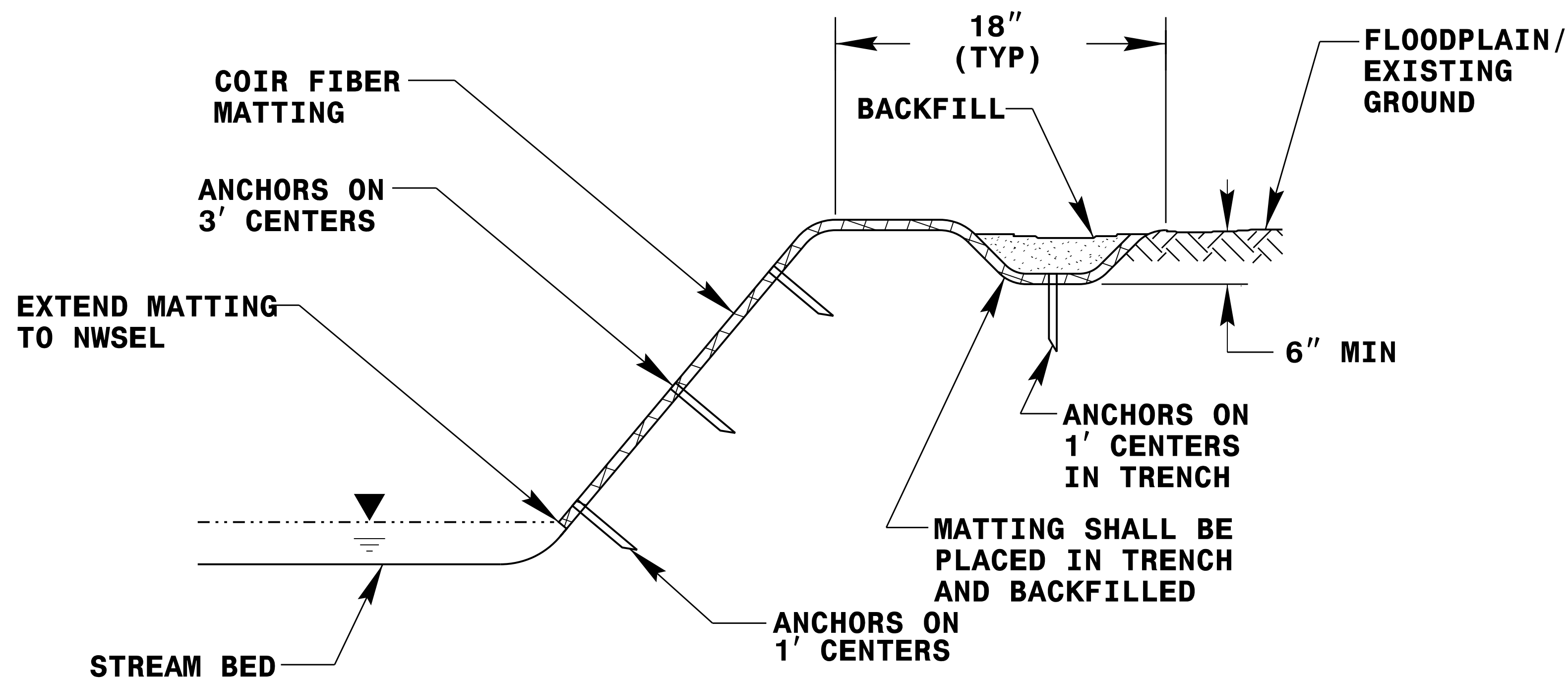
SEE PLAN SHEETS FOR AREAS TO BE PLANTED

8/17/99

REVISIONS



PLAN VIEW

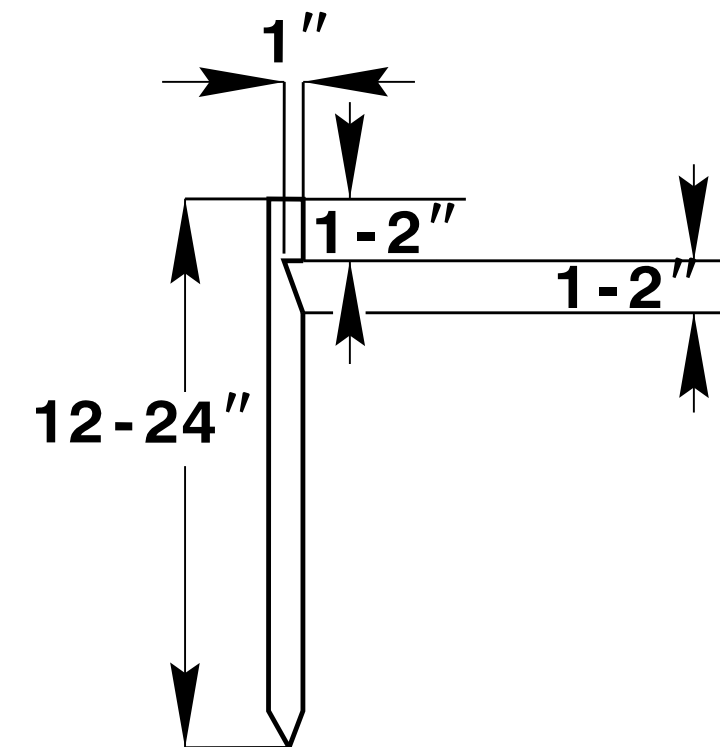


TYPICAL CROSS SECTION

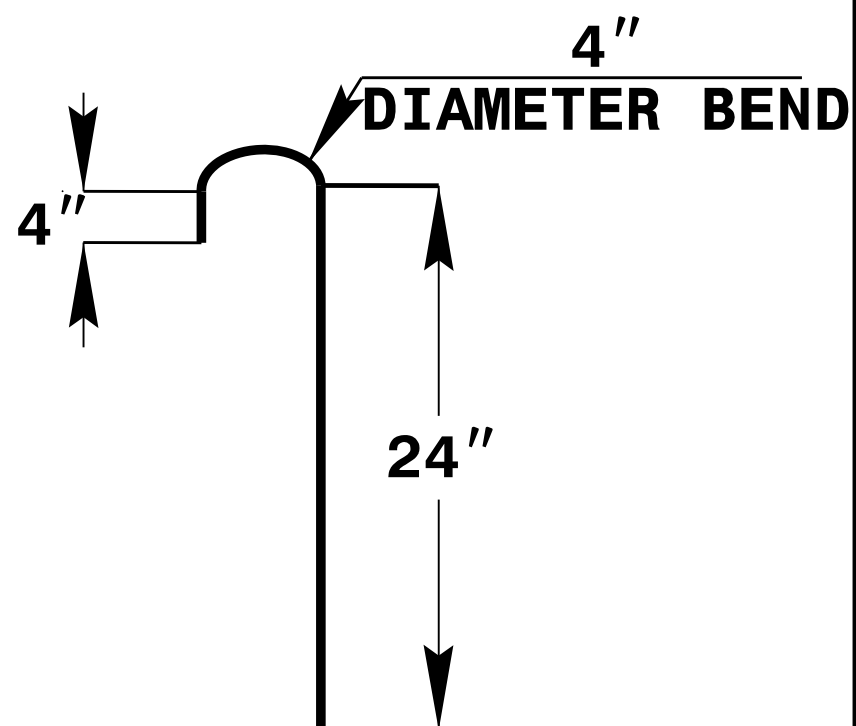
COIR FIBER MATTING DETAIL

NOT TO SCALE

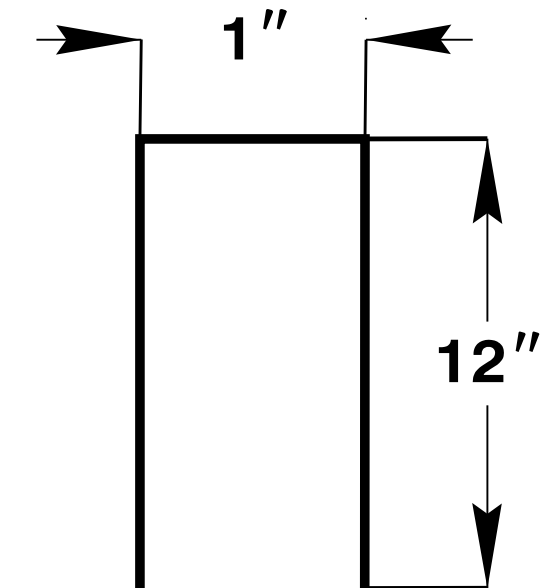
2" x 2" (nominal)
WOODEN STAKE



#10 STEEL
REINFORCEMENT BAR



1" (nominal)
STAPLE



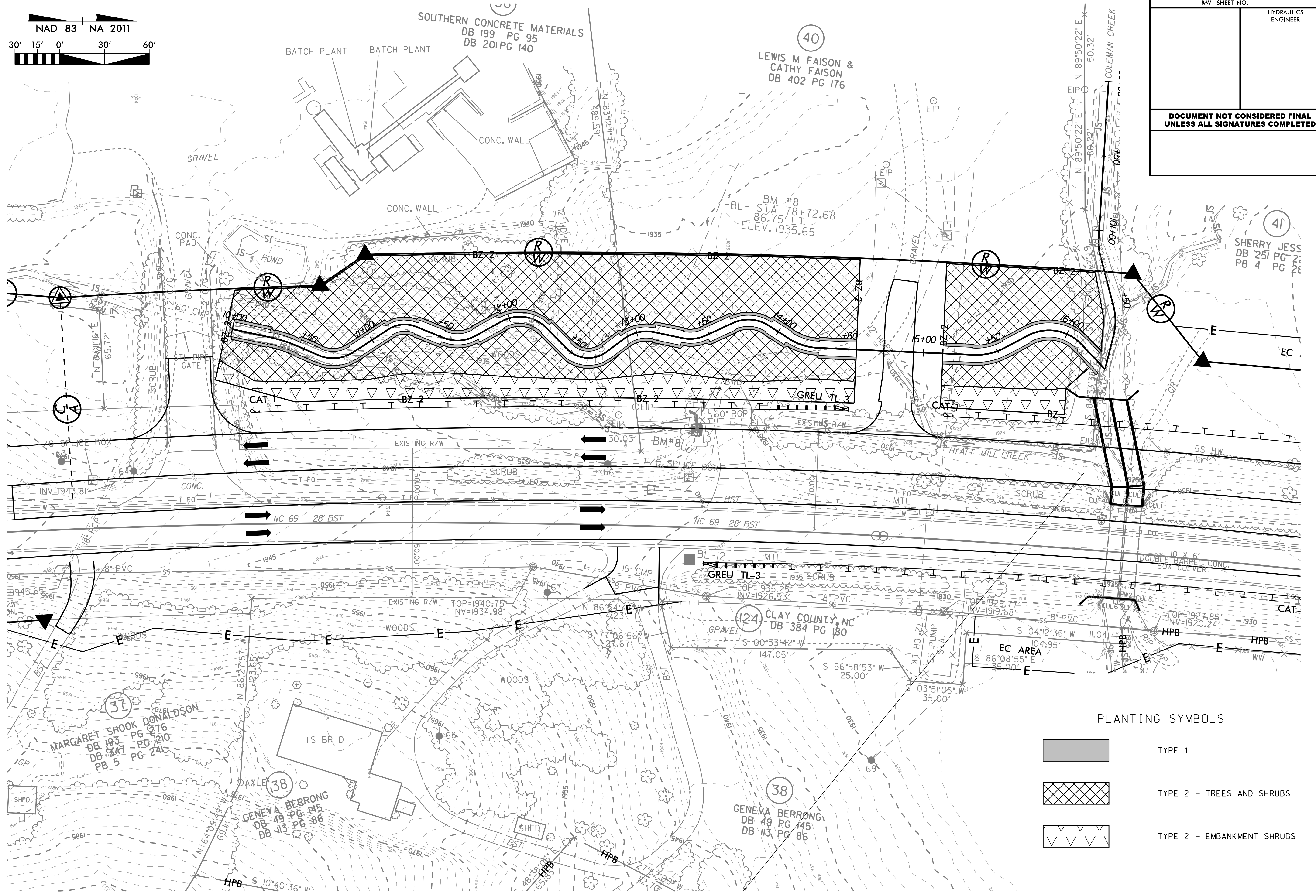
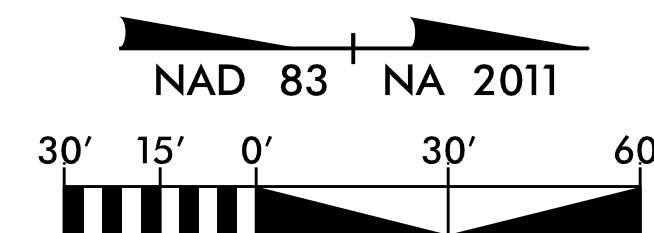
ANCHOR OPTIONS

STREAMBANK REFORESTATION

DETAIL SHEET 2 OF 2

N.C.D.O.T. – ROADSIDE ENVIRONMENTAL UNIT

PROJECT REFERENCE NO. A-0011C	SHEET NO. OSM-21
R/W SHEET NO.	HYDRAULICS ENGINEER
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PLANTING SYMBOLS

TYPE 1

TYPE 2 - TREES AND SHRUBS

TYPE 2 - EMBANKMENT SHRUBS