**Concurrence Point 4B**
**Hydraulic Design Review**

and

**Concurrence Point 4C**
**Permit Drawing Review**

TIP Project No. R-5808
WBS 46972.1.1

U.S. Route 158 Improvements
From Acorn Hill Road (S.R. 1002) to the Pasquotank County Line
Gates County

**January 2023**

**Purpose of Today's Meeting:**

The purpose of this meeting is to discuss Concurrence Points 4B and 4C, reviewing the preliminary drainage design layout with the Merger Team and reviewing the permit drawings with the Merger Team prior to submittal of the Section 404/401 Permit application.

# *Eastern Merger Invitee List*

## *STIP No R-5808*

| Time:<br>January 11, 2023 | Requestor:<br>Ryan Shook | STIP No.: R-5808<br>Division: 1<br>County: Gates and Pasquotank<br>Purpose: C.P. 4B & 4C Merger meeting |
|---|---|---|
| **Project Team Leads:** | | |
| FHWA – Seth Wilcher (Lead Agency) | | USACE – Kyle W. Barnes |
| NCDOT – Ryan Shook | | USACE – Monte Matthews |
| **Team Members:** | | |
| USEPA – Amanetta Somerville | | ARPO – Angela Welsh |
| USFWS – Gary Jordan | | SHPO – Renee Gledhill-Earley |
| NCWRC – Travis Wilson | | NCDWR – Garcy Ward |
| NCDMF – Jimmy Harrison | | NCDCM – Greg Daisey |
| NCDCM – Cathy Brittingham | | NCDCR – John Mintz |
| NCDCR – Lindsay Ferrante | | NCDWR – Amy Chapman |
| NCDEQ – Robert Patterson | | USFWS Great Dismal Swamp – Chris Lowie |
| | | |
| **NCDOT SUPPORT STAFF:** | | |
| Division 1 – Ryan Shook | | Hydraulics – Erik Seiler |
| Division 1 – Barry Hobbs | | EPU – Colin Mellor |
| Division 1 – Paul Williams | | ECAP – Jason Dilday |
| Biological Surveys – Marissa Cox | | Mitigation & Modeling – Wes Cartner |
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| | | |
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| Consultant – Willie Sullivan<br>(willie.sullivan@kimley-horn.com) | | |

# 1. Introduction and Project Overview

## 1.1 Proposed Action

NCDOT proposes to improve approximately four miles of U.S. 158 in Gates County from Acorn Hill Road (S.R. 1002) to the Pasquotank County Line by widening the existing travel lanes and shoulders as well as stabilizing the side slopes. The proposed project is included in the North Carolina Department of Transportation's (NCDOT) *2020-2029 State Transportation Improvement Program (STIP)* as Project R-5808 with construction beginning in FY 2023.

## 1.2 Updates Since the Last Merger Meeting

The Merger meeting held on June 16, 2021 covered Concurrence Points 3 and 4A. Concurrence was reached on both Concurrence Points (see Section 1.5). A detailed history of the past Merger Concurrence Points is provided in **Appendix A**.

Since the June 2021 Merger meeting, the NCDOT project team has developed redline drainage plans and right-of-way plans. As part of developing the drainage plans, the NCDOT project team held a virtual Combined Field Inspection on August 16, 2022. FHWA approved the Type III Categorical Exclusion in September 2021 (**Appendix B**). Note, the initial hydraulic recommendations originally made in the CE that have been changed during final design are noted in Section 2.2 of this packet

## 1.3 Meeting Purpose

The purpose of today's meeting is to review the preliminary drainage design layout with the Merger Team (Concurrence Point 4B) and to review the permit drawings with the Merger Team (Concurrence Point 4C) prior to submittal of the Section 404/401 Permit application. At today's meeting, NCDOT will:

- Review the proposed structures, hydraulic features, and utility relocations with potential to affect protected resources
- Present the impacts to jurisdictional features resulting from the LEDPA selected in June 2021
- Discuss the permitting strategy, mitigation measures, and permitting schedule

## 1.4 Study Area Description

The project study area is a 1,000-foot corridor (500 feet on either side of the U.S. 158 centerline). The attached **Figure 1** shows the project vicinity. U.S. 158 is a major east-west route in northeastern North Carolina and is a designated NCDOT hurricane evacuation route. The existing facility is a two-lane road with a paved surface width of approximately 26 feet (approximately 11-foot wide lanes and 2-foot paved shoulders) with little to no graded shoulders. Slope degradation is currently occurring on the northern side slopes of U.S. 158 due to erosion from the adjacent standing water body and the burrowing of animals. The Great Dismal Swamp National Wildlife Refuge (Refuge) is located adjacent to the northern boundary of the proposed project.

# 2. Merger Concurrence Point 4B – Hydraulic Design Review

## 2.1 Redline Drainage Design

Redline drainage was approved by the NCDOT Hydraulic Unit on 9/12/2022. The approved drainage plans are included in **Appendix C** and the cross sections are included in **Appendix D**. The following structures are proposed, both of which would upgrade existing structures:

- Culvert 0031
    - Proposed 2 @ 14' x 7' RCBC, buried 1' at Sta. 24+60

    - Designed to 50-yr design storm
    - Existing 2 @ 12’ x 6’ RCBC
- Proposed 30” RCP at Sta 50+81
    - Designed to 50-yr design storm
    - Existing 18” RCP

All existing drainage patterns will be maintained. Drainage calculations for the project have been included in **Appendix E**. The State Floodplain Compliance (SFC) Package was submitted 9/15/2022.

### 2.2 Culvert Sizing Report

The R-5808 Project includes the proposed replacement of culvert 0031 which carries Acorn Hill Millpond under US 158. Acorn Hill Millpond is a FEMA regulated limited detail study stream as shown on the effective FIS for Gates County, NC revised July 20, 2009 (FIS #37073CV000A). The preliminary hydraulic model for Acorn Hill Millpond was used for the basis of the CSR. Hydrologic data used for this study was generated from the USGS Regression Equations (SIR 2009-5158) for Region 4 and Preliminary FEMA Discharges. A drainage area of 3.1 square miles was calculated using USGS Streamstats Program. The preliminary hydraulic design, as recommended in the attached CE, included a triple barrel culvert to replace the existing double barrel culvert. Upon further evaluation, it was determined that the existing 2 @ 12’ x 6’ RCBC will be removed and replaced with 2 @ 14’ x 7’ RCBC (buried at 1’) backfilled with native material. The Culvert Sizing Report is included in **Appendix F**.

### 2.3 Culvert Construction Sequence

The Culvert Construction Sequence is outlined below and detailed drawings can be found in **Appendix G**.

- Divert water through right barrel and construct upstream left barrel with channel improvements.
- Divert water through left barrel and construct upstream right barrel with channel improvements.
- Construct temporary road over newly constructed culverts.
- Divert water through left barrel and construct downstream right barrel with channel improvements.
- Divert water through right barrel and construct downstream left barrel with channel improvements.
- Complete remaining roadway improvements referencing traffic control plans.

## 3. Merger Concurrence Point 4C – Permit Drawings Review

### 3.1 Impact Sites and Quantities

<u>Proposed Impacts</u>

In total, the R-5808 Project will result in the following impacts to jurisdictional features:

- 7.02 acres of permanent fill in jurisdictional wetlands
- <0.01 acre of permanent excavation in jurisdictional wetlands
- 3.35 acres of temporary hand clearing in jurisdictional wetlands
- 0.07 acre/60 LF of permanent impacts to jurisdictional streams
- 0.03 acre/23 LF of temporary impacts to jurisdictional streams
- 0.25 acre of permanent impacts to jurisdictional open waters
- 0.36 acre of temporary impacts to jurisdictional open waters

The proposed impacts are spread across six impact sites, as described below. The draft R-5808 permit drawings have been included in this packet as **Appendix H**.

Impact Site 1 (*Sheet 5*)
Culvert replacement and road widening from Station -L- 21+88 to Station -L- 26+97.

- 0.25 acre of Permanent Fill in Wetland WA
- <0.01 acre of Permanent Excavation in Wetland WA
- 0.15 acre of Temporary Hand Clearing in Wetland WA
- 0.04 acre/21 linear feet of Permanent Stream Impact to Jones Pond Creek
- 0.03 acre/39 linear feet of Permanent No Net Loss Stream Impact to Jones Pond Creek
- 0.03 acre/23 linear feet of Temporary Stream Impact to Jones Pond Creek

Impact Site 2 (*Sheets 6-15*)
Road widening from Station -L- 44+47 to Station -L- 151+51

- 4.93 acres of Permanent Fill in Wetland WB
- 2.42 acres of Temporary Hand Clearing in Wetland WB

Impact Site 3 (*Sheets 17 & 18*)
Road widening from Station -L- 167+42 to Station -L- 186+61 (RT)

- 1.07 acres of Permanent Fill in Wetland WC
- 0.43 acre of Temporary Hand Clearing in Wetland WC

Impact Site 4 (*Sheets 21 & 22*)
Road widening from Station -L- 218+17 to Station -L- 234+00 (RT)

- 0.40 acre of Permanent Fill in Wetland WD
- 0.35 acre of Temporary Hand Clearing in Wetland WD

Impact Site 5 (*Sheets 8-14*)
Road widening from Station -L- 65+17 to Station -L- 130+26 (LT)

- 0.37 acre of Permanent Fill in Wetland WG

Impact Site 6 (*Sheets 14-15; 17-19; 21*)
Road widening from Station -L- 130+26 to Station -L- 222+43 (LT)

- 0.25 acre of Permanent Open Water Impact to Newland Drainage Canal
- 0.36 acre of Temporary Open Water Impact to Newland Drainage Canal

## 3.2 Avoidance and Minimization Measures

Previously Agreed-upon Measures

The Merger Team agreed to the following avoidance and minimization measures as part of the C.P. 4A concurrence point:

- Alternatives 1 and 2 reduce construction impacts by using offsite widening rather than asymmetrical widening, resulting in fewer environmentally sensitive areas being affect by construction.

- Alternatives 1 and 2 avoided permanent impacts within the Great Dismal Swamp National Wildlife Refuge by shifting the alignment.
- Alternative 3 was developed to reduce wetland impacts across from the Great Dismal Swamp National Wildlife Refuge and investigated a third option (symmetrical widening) west of the Great Dismal Swamp National Wildlife Refuge.
- Alternatives 2 and 3 included shifting the roadway alignment to minimize wetland impacts.
- Fill embankments with 3:1 slopes were applied along the entire corridor rather than the original 6:1 slopes envisioned to reduce impacts to resources.

Current Measures

As documented in the Stormwater Management Plan, NCDOT has attempted to avoid and minimize impacts to water resources for the LEDPA through the following measures:

- Fill embankments with 3:1 slopes were applied along the entire corridor rather than the original 6:1 slopes envisioned to reduce impacts to natural/environmental resources.
- Offset widening rather than symmetrical widening is proposed to minimize wetland impacts.
- Alignment has been selected to avoid impacts to the Great Dismal Swamp National Wildlife Refuge.
- Hand clearing has been proposed outside of the slope stakes to reduce permanent impacts to wetlands.
- Wing walls have been proposed at the culvert inlet and outlet along Jones Pond Creek to reduce the overall length of stream placed in the culvert.

## 3.3 Permitting Review

Permitting Strategy

- The R-5808 Project is a best-fit widening project proposed by the NCDOT – Division 1 to bring the US 158 roadway corridor to NCDOT and AASHTO standards, stabilize the slopes along the roadway, and improve the safety of a critical hurricane evacuation route from Acorn Hill Road to the Pasquotank County Line.
- The Project has received concurrence on Merger Concurrence Points 1 through 4A and is anticipated to complete the Interagency Review Process.
- A Public Meeting for the Project was held by the NCDOT in October 2018 and the Project was put on Public Notice by the USACE in February 2020. Both public involvement efforts received only minimal comments.
- While impacts to jurisdictional features are proposed along US-158, the Project is anticipated to result in only minimal individual and cumulative adverse environmental effects.
- For these reasons, the NCDOT recommends pursuing a Section 404 Regional General Permit #198200031 (RGP 31) and corresponding Section 401 General Water Quality Certification #4135. NCDOT plans to submit a Pre-Construction Notification (PCN) for the RGP 31. However, the USACE has directed NCDOT to *also* submit an Individual Permit application to initiate another Public Notice to assess any additional comments on the project.

Compensatory Mitigation

- NCDOT proposes to provide mitigation for the unavoidable permanent impacts resulting from the R-5808 Project through payment to the NC Division of Mitigation Services In-Lieu Fee Program.
- Compensatory mitigation is proposed at a 2:1 ratio for the permanent impacts to jurisdictional wetlands and streams resulting from the Project.

## 4. Schedule

- Submit Permit Application – Quarter 1 2023
- Let – July 2023

# Figures

**Figure 1: Vicinity Map**

**Figure 2: Study Area Map**

# Appendices

**Appendix A: Merger History**

**Appendix B: Type III Categorical Exclusion**

**Appendix C: Redline Drainage Plans**

**Appendix D: Drainage Cross Sections**

**Appendix E: Drainage Calculations**

**Appendix F: Culvert Sizing Report**

**Appendix G: Culvert Construction Sequence**

**Appendix H: Draft Permit Drawings**

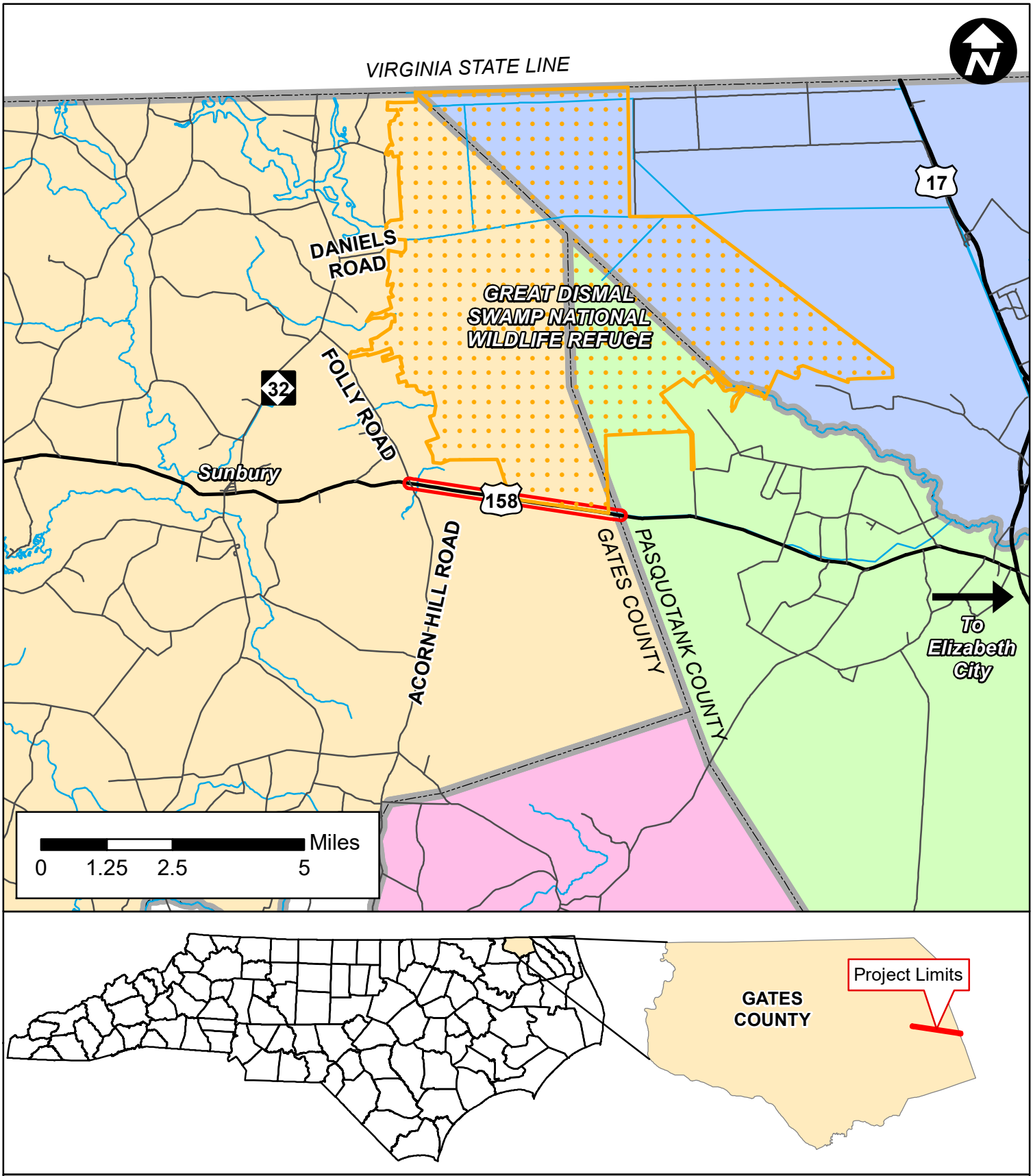
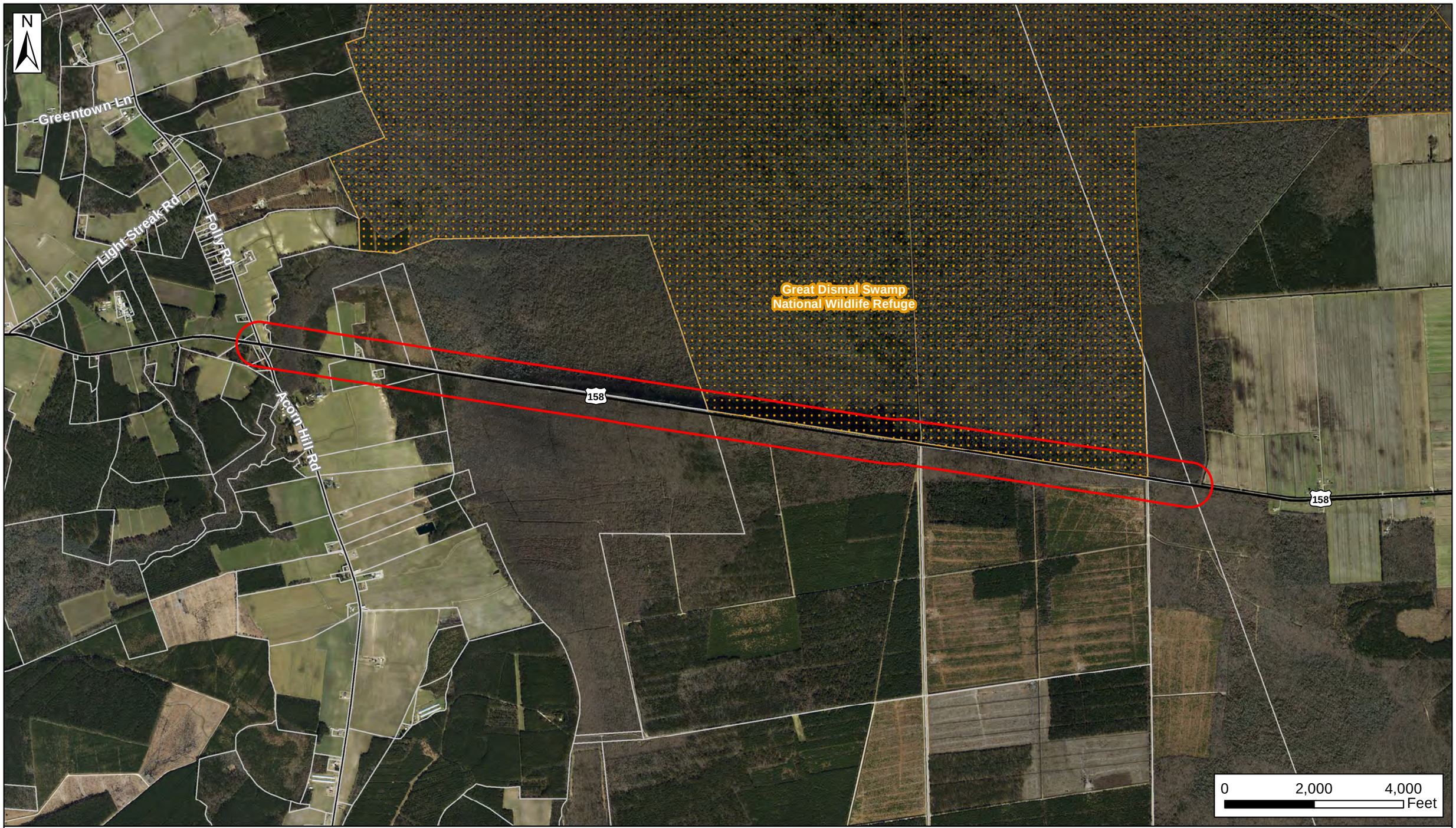



**Figure 1: Vicinity Map**
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County




StudyArea
Great Dismal Swamp National Wildlife Refuge
Parcels

**Figure 2: Study Area Map**
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

# Appendix A: Merger History

# TIP # R-5808 Merger History

U.S. Route 158 Improvements
From Acorn Hill Road (S.R. 1002) to the Pasquotank County Line
Gates County

*Prior to Entering Merger:* A public meeting was held on Thursday, October 4, 2018 at the Sunbury Fire Department in Sunbury, NC. A total of 27 individuals attended the public meeting, and two written comments were received during the comment period ending October 19, 2018.

*Concurrence Point 1:* Concurrence Point 1 for Project R-5808 was reached on February 21, 2019. The agreed upon study area and purpose and need for the project are as follows:

The proposed study area is a 1,000-foot wide corridor, 500 feet on either side of the U.S. 158 centerline, from Acorn Hill Road to the Pasquotank County Line as shown on the attached map.

*Facility Deficiency (primary need):* The existing traveled way and graded shoulders on U.S. 158 are below the minimum width for a roadway with a design speed of 60 mph and design volume above 2000 vehicles per day as listed in the NCDOT Roadway Design Manual and the AASHTO "A Policy on Geometric Design of Highways and Streets" (2011). Edges of the paved roadway have also been observed to be deteriorating due to unstable slopes and burrowing animals.

*Hurricane evacuation (secondary need)*: U.S. 158 is a hurricane evacuation route, but the current facility deficiencies create potential concerns for large vehicles using the road.

*Safety (secondary need)*: The crash rate for the study corridor, 205.73 crashes per 100 million vehicle miles traveled (MVMT), exceeds the critical crash rate (148.81 MVMT). The narrow road width and limited graded shoulder area may be contributing to some animal crashes and run-off the road crashes as the available recovery area for drivers is minimal.

*Facility Deficiency (purpose):* The purpose of this project is to bring the U.S. 158 corridor adjacent to the Refuge up to NCDOT and AASHTO standards and stabilize the slopes along the roadway from Acorn Hill Road to the Pasquotank County Line.

*Hurricane evacuation (other desirable outcome):* Another desirable outcome is to improve the hurricane evacuation route for vehicles along U.S. 158.

*Safety (other desirable outcome):* Another desirable outcome of this project is to improve safety along this section of the U.S. 158 corridor.

*Concurrence Point 2:* One detailed study alternative, Widen South, was proposed to be carried forward at the meeting held on February 21, 2019. The Merger Team asked NCDOT to also evaluate a Widen North alternative. Estimated impacts of the Widen North alternative were evaluated following the February 21 meeting and presented to the Merger Team at the April 18, 2019 meeting. Concurrence Point 2 for Project R-5808 was reached on April 18, 2019. The agreed upon alternatives to carry forward were:

- Alternative 1: Widen to the south, holding the northern right of way line and side slopes.
- Alternative 2: Widen to the north outside of the Refuge and widen to the south within the Refuge.

- Alternative 3: Widen to the north within NCDOT right-of-way with remaining widening to the south.
- No Build Alternative: Although the No Build Alternative does not meet purpose and need, it is recommended to be carried forward for comparison.

*Concurrence Point 2A:* Concurrence Point 2A for Project R-5808 was reached on April 18, 2019. The agreed upon major hydraulic structures were:

- Site 1 – Remove the existing double 12-foot by 6-foot reinforced concrete box culvert and replace with a triple 13-foot and 3-inch by 6-foot and 9-inch aluminum box culvert, buried one -foot.

*Concurrence Point 3:* Concurrence Point 3 for Project R-5808 was reached on June 21, 2021. The Merger Team agreed that the preferred alternative/LEDPA was Alternative 1:

- Alternative 1 – Widen the roadway to the south by holding the northern right-of-way line and side slopes.
- Typical Section – Two 12-foot lanes, 4-foot paved shoulders, and 6-foot graded shoulders, with slope stabilization measures on the northern side slopes in areas of deterioration.

*Concurrence Point 4A:* Concurrence Point 4A for Project R-5808 was reached on June 21, 2021. The Project Team has agreed to implement the following avoidance and minimization measures:

- Alternatives 1 and 2 reduce construction impacts by using offsite widening rather than asymmetrical widening, resulting in fewer environmentally sensitive areas being affect by construction.
- Alternatives 1 and 2 avoided permanent impacts within the Great Dismal Swamp National Wildlife Refuge by shifting the alignment.
- Alternative 3 was developed to reduce wetland impacts across from the Great Dismal Swamp National Wildlife Refuge and investigated a third option (symmetrical widening) west of the Great Dismal Swamp National Wildlife Refuge.
- Alternatives 2 and 3 included shifting the roadway alignment to minimize wetland impacts.
- Fill embankments with 3:1 slopes were applied along the entire corridor rather than the original 6:1 slopes envisioned to reduce impacts to resources.

# Appendix B: Type III Categorical Exclusion

# Type III Categorical Exclusion Action Classification Form

| | |
|---|---|
| STIP Project No. | **R-5808** |
| WBS Element | 46972.1.1 |
| Federal Project No. | NHP-0158(076) |

A. Project Description:
Project R-5808 proposes to modernize U.S. Route 158 by widening the existing lanes and improving the shoulders. The corridor covers approximately 4 miles, extending from the Acorn Hill Road (S.R. 1002) intersection in the west to the Pasquotank County line in the east. All widening is proposed to occur to the south of the existing roadway. A single box culvert located approximately 500 feet east of the Acorn Hill Road intersection with U.S. Route 158 would be replaced with a triple arch culvert.

This Project is included in NCDOT's 2020-2029 State Transportation Improvement Program (STIP). Right-of-way acquisition is scheduled to begin in fiscal year (FY) 2022 and construction in FY 2023.

B. Description of Need and Purpose:
U.S. 158 is a major east-west route in northeastern North Carolina and is a designated NCDOT hurricane evacuation route. The existing facility is a two-lane road with a paved surface width of approximately 26 feet (approximately 11-foot wide lanes and 2-foot paved shoulders) with little to no graded shoulders. Slope degradation is currently occurring on the northern side slopes of U.S. 158 due to erosion from the adjacent standing water body and the burrowing of animals.

Additionally, the crash rate for the study corridor, 205.73 crashes per 100 million vehicle miles traveled (MVMT), exceeds the critical crash rate (148.81 MVMT). The narrow road width and limited graded shoulder area may be contributing to some animal crashes and run-off the road crashes as the available recovery area for drivers is minimal.

The purpose of the Project is to modernize and improve the operational safety of this segment of the U.S. 158 corridor by widening the existing lanes and improving the shoulders. This would bring the U.S. 158 corridor up to NCDOT and American Association of State Highway and Transportation Officials (AASHTO) standards and stabilize the slopes along the roadway from Acorn Hill Road to the Pasquotank County Line.

C. Categorical Exclusion Action Classification:

**Type III**

D. Proposed Improvements:
The proposed typical section for Project R-5808 includes two 12-foot lanes with 4-foot paved and 6-foot graded shoulders as shown in **Figure 1**. The proposed standard right-of-way width is 100 feet. Side slopes of 6:1 were originally evaluated for the project, but 3:1 slopes are proposed to be carried forward to reduce impacts to water resources. Slopes steeper than 3:1 are not recommended to reduce the need for slope stabilization measures in the future again.

To stabilize the existing side slopes on the north side of the roadway, rip rap is proposed to be installed on the slope in deteriorating areas. Based on an initial evaluation of the slope condition, slope stabilization measures are anticipated on approximately 2.4 miles of the northern side slopes. Areas of open water are present along this side of the road. Rip rap may be placed partially within some open water.

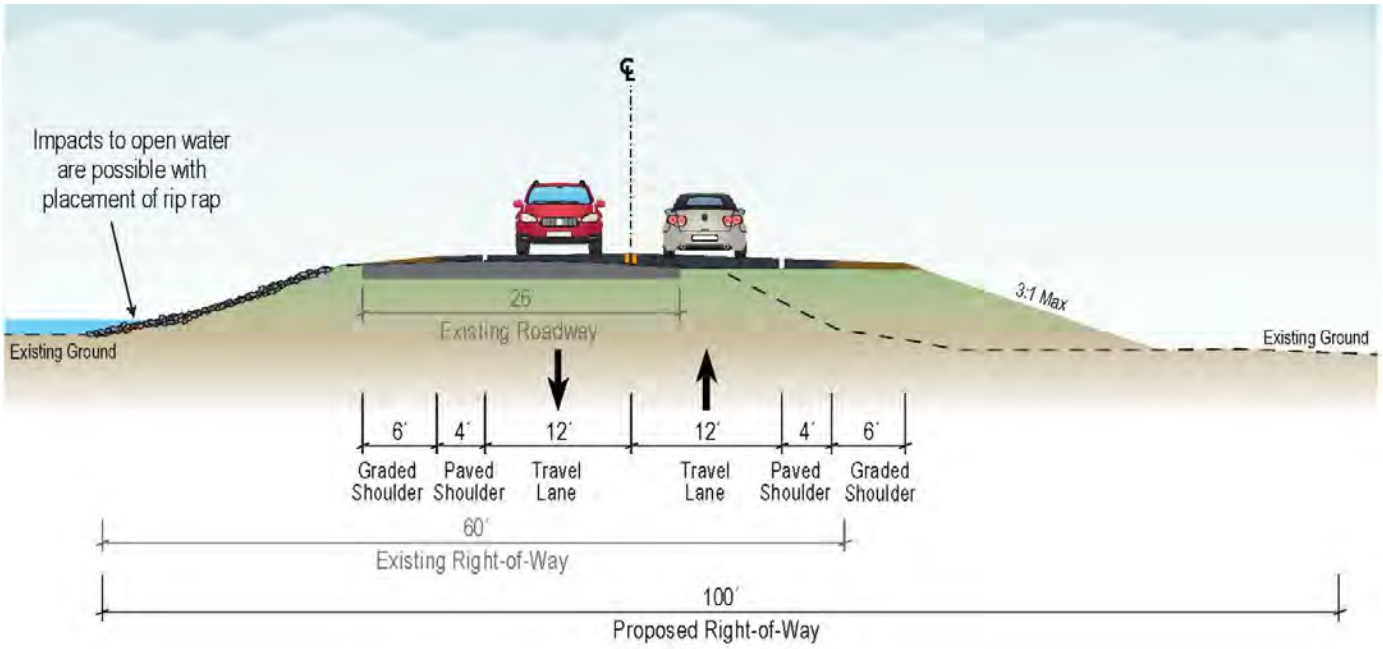



***Figure 1: Proposed Typical Section***

E. Special Project Information:

*Estimating Impacts:* A 25-foot buffer of the preliminary slope stakes was used where road widening is proposed to estimate impacts. In areas where resurfacing is proposed and no widening would occur, a 10-foot buffer was used to reflect a smaller potential impact footprint.

*Alternatives Analysis:* Four alternatives for the Project were evaluated, including a No Build Alternative and three build alternatives. The No Build Alternative does not meet the purpose and need of the Project but was carried forward for comparison. The following build alternatives were evaluated in detail for the Project:

1. Alternative 1 proposed to widen the roadway to the south by holding the northern right-of-way line and side slopes. Rip rap (rock plating) was proposed in areas of open water on the northern side slope.

2. Alternative 2 proposed to widen the roadway to the north by holding the southern right-of-way line and side slopes west of the Great Dismal Swamp National Park Refuge (Refuge). Rip rap would be used on the proposed fill slope to maintain slope stability. Where U.S. 158 runs adjacent to the Refuge, Alternative 2 proposed to widen to the south and maintain the existing northern side slope, as proposed in Alternative 1. Rip rap was proposed in areas of open water on the northern side slope.

3. Alternative 3 proposed to widen the roadway symmetrically west of the Refuge. Where U.S. 158 runs adjacent to the Refuge, this alternative proposed to only widen to the north to the extent possible while maintaining the permanent fill impacts within NCDOT right-of-way (approximately 4 feet). The remainder of the widening (approximately 5 feet) is proposed to the south. Rip rap (rock plating or a combination of rock embankment) would be used on the proposed fill slopes to maintain slope stability.

These alternatives were selected by NCDOT in coordination with state and federal agencies as part of the NEPA/404 Merger Process. Although not initially requested by the Merger Screening Agencies, NCDOT chose to complete the Merger Process in order to meet the requirements for the US Army Corps of Engineers (USACE) Regional General Permit No. 198200031 (GP 31) so that USACE would have the option to use this permit type.

Alternative 1 was determined to be the Least Environmentally Damaging Practicable Alternative (LEDPA) and will be carried forward for final design of the Project. Alternative 1 was chosen due to the:

- Lower potential for permanent direct impacts to the Great Dismal Swamp National Wildlife Refuge
- Fewer open water impacts
- Lower risk of future slope degradation and settlement due to construction in more suitable soils
- Greater use of standard construction equipment and practices. This would result in a shorter construction duration, less disruption to traffic during construction, a safer work zone environment, smaller footprint and impact to environmental resources, and a lower cost to construct. Additionally, fill materials would be able to be provided locally, resulting in less emissions and cost.

Additional information regarding identification of the detailed study alternatives to carry forward and the LEDPA can be found in the CP 1 & 2 (February 21, 2019), CP 2 & 2A (April 18, 2019), CP 3 & 4A (April 15, 2020), and second CP 3 & 4A (June 16, 2021) meeting materials.

*Minimization Measures:* NCDOT has implemented the following strategies to avoid and minimize impacts to water resources during the proposed development of Alternative 1:

- Offset widening rather than symmetrical widening used, resulting in fewer environmentally sensitive areas affected by construction.
- Avoid permanent impacts within the Refuge by shifting the alignment
- Fill embankments with 3:1 slopes applied along the corridor rather than the original 6:1 slopes proposed to reduce impacts to environmental resources.

Additional information regarding the mitigation measures implemented can be found in the CP 3 & 4A (June 16, 2021) meeting materials.

*Jurisdictional Features:* As documented in the *R-5808 Natural Resources Technical Report (NRTR) (May 2020)*, the jurisdictional features within the NRTR study area were delineated during field visits on February 28, 2018 and May 14, 2019. One stream (James Pond), four open water resources, and seven wetlands were identified within the study area during field investigations. James Pond is not subject to riparian buffer rules. No streams in the study area, or within 1.0 mile of the study area, are identified on the North Carolina 2020 Final 303(d) list of impaired waters, designated as Outstanding Resource Waters, High Quality Waters, or water supply watersheds. See the NRTR for additional details on jurisdictional features identified within the study area and shown in **Figures 2.A - 2.G**.

A total of 180 linear feet of stream, 2.8 acres of open water features, and 15.2 acres of wetland impacts are anticipated with the Project, as detailed in **Table 1** below.

***Table 1: Water Resources within Alternative 1***

| **Wetland Feature** | **Acres (ac)** |
|---|---|
| WA | 0.6 |
| WB | 11.1 |
| WC | 2.1 |
| WD | 1.3 |
| WE | 0 |
| WF | 0 |
| WG | 0.2 |
| **Total** | **15.2** |
| **Stream Feature** | **Linear Feet (LF)** |
| Jones Pond | 180 |

| Open Water Feature | Acres (ac) |
|---|---|
| Newland Drainage Canal | 2.7* |
| OWB | <0.1 |
| OWC | <0.1 |
| **Total** | **2.8*** |

Note: Wetland and Open Water impacts are rounded to the nearest 0.1-acre increment.
*Alternative 1 impacts include impacts due to the addition of riprap (fill) on the existing side slope and outside of the 10-foot buffer and are in addition to the impacts estimated within the 10-foot buffer.

*Floodplain Management:* This Project will require work within the non-encroachment areas (non-regulated floodway). A flood study will need to be performed and an NCDOT Memorandum of Agreement (MOA) will need to be prepared, but a Conditional Letter of Map Revision (CLOMR) or Letter of Map Revision (LOMR) is not anticipated to be required.

*Federally Protected Species:* As of August 31, 2021, the United States Fish and Wildlife (USFWS) Information for Planning and Consultation (IPaC) database lists five federally protected species under the Endangered Species Act (ESA) as potentially occurring in the study area, as shown in **Table 2**. **Table 2** also includes the bald eagle which is protected by the Bald and Golden Eagle Protection Act (BGPA). Additional information regarding documented species occurrences, presence of suitable habitat, and results of field surveys can be found in the *NRTR (May 2020)*.

***Table 2: Federally Protected Species Listed within the Study Area***

| Common Name | Scientific Name | Federal Status | Habitat Present | Biological Conclusion |
|---|---|---|---|---|
| **American alligator** | *Alligator mississippiensis* | T (S/A) | Yes | Not Required |
| **Northern long-eared bat** | *Myotis septentrionalis* | T | Yes | MA-LAA |
| **Red knot** | *Calidris canutus rufa* | T | No | No Effect |
| **Red-cockaded woodpecker** | *Picoides borealis* | E | Yes | No Effect |
| **Bald Eagle** | *Haliaeetus leucocephalus* | BGPA | Yes | No Effect |

BGPA = Bald and Golden Eagle Protection Act; E = Endangered; MA-LAA = May Affect-Likely to Adversely Affect;
T = Threatened; T (S/A) = Threatened due to Similarity of Appearance

The USFWS has revised the previous programmatic biological opinion (PBO) in conjunction with the Federal Highway Administration (FHWA), USACE, and NCDOT for the northern long-eared bat (NLEB) in eastern North Carolina. The programmatic determination for NLEB for the NCDOT program remains “May Affect, Likely to Adversely Affect.” The PBO provides incidental take coverage for NLEB and will ensure compliance with Section 7 of the Endangered Species Act for ten years for all NCDOT projects with a federal nexus in Divisions 1-8, which includes Gates and Pasquotank Counties in Division 1, where STIP R-5808 is located. This level of incidental take is authorized from the effective date of a final listing determination through December 31, 2030. Gates and Pasquotank Counties contain a current known/potential range of NLEB and are therefore subject to conservation measures. Conservation measures which will avoid/minimize mortality of NLEBs as included in the PBO are:

1) No tree clearing will occur within 150 feet of a known maternity roost tree May 1 – June 30 to protect non-volant young. Winter roost trees are not considered maternity roost trees.
2) At individual project sites where a total of 1.0 acre of more of tree clearing will occur, no tree clearing will occur during the potion of the day that the air temperature is <40 degrees Fahrenheit in order to protect NLEBs that may be in torpor.

A desktop-GIS assessment of the study area, as well as the area within a 1.0-mile radius of the project limits, was performed for bald eagle habitat on March 1, 2020, using color aerials. One water body, Newland Drainage Canal, was identified as a large enough or sufficiently open enough water body to

be considered a potential feeding source. A review of the North Carolina National Heritage Program (NCNHP) database, updated April 2020, revealed no known occurrences of this species in or within 1.0 mile of the project study area. Pedestrian surveys were conducted by Kimley-Horn Biologists on May 6, 2020 and no Bald or Golden Eagle individuals or nests were observed within the project study area or within 660 feet of the project study area. Due to the lack of known occurrences and the lack of observed individuals, it has been determined that the proposed project would have "No Effect" on the bald or golden eagle species.

Field surveys for red-cockaded woodpecker and bald eagle were conducted in May 2020 for purposes of rendering biological conclusions for these species. These pedestrian surveys will be valid until May 2022. Field surveys for both species should be reconducted prior to construction since construction is not anticipated to occur until after May 2022.

*Cultural Resources:* No sites listed on, or determined eligible for listing on, the National Register of Historic Places or as a Local Landmark were identified in the study area. NCDOT determined on February 27, 2018 that no survey was required for historic architecture and landscapes within the study area. The State Historic Preservation Office submitted a response requesting an archaeological survey be conducted within the area of potential effects (APE) on an identified archaeological site. An archaeological survey of the APE was completed on March 10, 2021. Subsurface investigations did not reveal the presence of any National Register of Historic Places eligible or listed archaeological sites.

A tribal coordination letter was sent to the Catawba Indian Nation on March 1, 2021. The Catawba Indian Nation provided a response dated April 8, 2021, indicating that the Catawba Indian Nation has no immediate concerns with regard to traditional cultural properties, sacred sites, or Native American archaeological sites within the boundaries of the proposed study area. The Catawba Indian Nation requested that they receive notification if Native American artifacts and/or human remains are located during the ground disturbance phase of this project.

Due to the lack of historic and archaeological resources, a Section 4(f) of the US Department of Transportation Act use determination and Section 106 of the National Historic Preservation Act effect assessment are not required for this project.

*Community Resources:* No community resources are present within the study area as documented in the August 2021 Direct and Indirect Screening Tool (DIST) completed on behalf of the project. As such, no impacts to community resources are anticipated.

*Farmland Protection:* Farmland soils eligible under Farmland Protection Policy Act (FPPA) are present within the project footprint. However, an assessment of the project resulted in a total score of 41 out of 160 points, which does not exceed the 60-point threshold established by Natural Resource Conservation Service (NRCS). Therefore, farmland conversion impacts are anticipated but not considered notable. Additional information can be found in the DIST (2021).

*Indirect and Cumulative Effects:* The project would not alter travel patterns, reduce travel time, affect access to properties in the area, or open areas for development or redevelopment. Due to its minimal transportation impact-causing activities, this project would neither influence nearby land uses nor stimulate growth. Therefore, a detailed indirect and cumulative effects study is not necessary.

*Public Involvement:* An open house public meeting was held on October 4, 2018 from 5:00-7:00 p.m. at the Sunbury Volunteer Fire Department in Sunbury. Approximately 27 individuals attended the public meeting, and a total of two written comments were received during the comment period ending on October 19, 2018. One of the comments received expressed concern regarding the increase of traffic and speed, which has resulted in more roadkill. Measures to mitigate wildlife impacts may be considered by NCDOT during final design. Prior to the public meeting, a postcard was distributed to property owners within the identified mailing list area and to all addresses on US Postal Service (USPS) routes which intersect the mailing list area via the USPS Every Door Direct Mail service.

*Environmental Justice and Limited English Proficiency:* Census data indicates a notable presence of populations meeting the criteria for Environmental Justice within the US Census Tracts intersecting the

study area, but no minority or low-income communities were observed within the study area during the field visit. While low-income communities are present in the study area, no notably adverse community impacts are anticipated with this project thus, impacts to minority and low-income populations do not appear to be disproportionately high and adverse. Benefits and burdens resulting from the project are anticipated to be equitably distributed throughout the community. and related statutes.

*Hazardous Materials:* A Phase I field investigation was completed on April 18, 2018 to identify geo-environmental sites of concern. No sites of concern were identified within the study area; therefore, no monetary or scheduling impacts are anticipated.

*Section 4(f):* The Project is estimated to temporarily impact 0.3 acres of the Refuge. These impacts would allow construction access to the U.S. 158 corridor. Additionally, NCDOT is proposing to place rip rap on existing slopes along the north side of U.S. 158 where there is currently water present along the slope that is potentially degrading the structure of the roadway embankment. It is not anticipated that this rip rap will extend beyond the existing right-of-way and into the Refuge property; this will be verified during final design. If the final designs indicate the rip rap will extend into Refuge property, the Refuge Manager will be notified prior to any additional work on the plans. Based on the anticipated impacts of this Project, NCDOT and FHWA recommend that the subject Project meet the requirements for a temporary occupancy exception. The Great Dismal Swamp National Wildlife Refuge Manager provided concurrence with this recommendation on September 23, 2021.

*Coastal Area Management Act (CAMA):* There are no areas of environmental concern (AEC) as defined by the CAMA, so no CAMA permit is anticipated. If a GP 31 Permit is pursued with USACE, the project is not anticipated to require a federal consistency review due to the lack of impacts to CAMA AECs and the previously completed programmatic review by the NC Division of Coastal Management which found that projects authorized by the GP 31 Permit are consistent with the NC Coastal Management Program. If an Individual Permit through USACE is determined to be required for the project, it is anticipated that the project would need to go through the federal consistency review process which would be circulated to state agencies.

F. Project Impact Criteria Checklists:

**F3. Type III Actions**

Proposed improvement(s) that fit Type III Actions (NCDOT-FHWA CE Programmatic Agreement, Appendix C) answer questions below.

- *NCDOT will certify the Categorical Exclusion for FHWA approval.*
- *If any questions are marked "Yes" then additional information will be required for those questions in Section G.*

| | | Yes | No |
|---|---|---|---|
| 1 | Does the project involve potential effects to Threatened or Endangered species listed by the US Fish and Wildlife Service (USFWS) or National Marine Fisheries Service (NMFS)? | ☑ | ☐ |
| 2 | Does the project result in impacts subject to the conditions of the Bald and Golden Eagle Protection Act (BGEPA)? | ☐ | ☑ |
| 3 | Does the project generate substantial controversy or public opposition, for any reason, following appropriate public involvement? | ☐ | ☑ |
| 4 | Does the project cause disproportionately high and adverse impacts relative to low-income and/or minority populations? | ☐ | ☑ |
| 5 | Does the project involve substantial residential or commercial displacements or right of way acquisition? | ☐ | ☑ |
| 6 | Does the project include a determination under Section 4(f)? | ☐ | ☑ |
| 7 | Is a project-level analysis for direct, indirect, or cumulative effects required based on the NCDOT community studies screening tool? | ☐ | ☑ |
| 8 | Does the project impact anadromous fish spawning waters? | ☐ | ☑ |
| 9 | Does the project impact waters classified as Outstanding Resource Waters (ORW), High Quality Waters (HQW), Water Supply Watershed Critical Areas, 303(d)-listed impaired water bodies, buffer rules, or submerged aquatic vegetation (SAV)? | ☐ | ☑ |
| 10 | Does the project impact Waters of the United States in any of the designated mountain trout streams? | ☐ | ☑ |
| 11 | Does the project require a US Army Corps of Engineers (USACE) Individual Section 404 Permit? | ☐ | ☑ |
| 12 | Will the project require an easement from a Federal Energy Regulatory Commission (FERC) licensed facility? | ☐ | ☑ |
| 13 | Does the project include Section 106 of the National Historic Preservation Act (NHPA) effects determination other than a No Effect, including archaeological remains? | ☐ | ☑ |
| 14 | Does the project involve GeoEnvironmental Sites of Concerns such as gas stations, dry cleaners, landfills, etc.? | ☐ | ☑ |
| 15 | Does the project require work encroaching and adversely effecting a regulatory floodway or work affecting the base floodplain (100-year flood) elevations of a water course or lake, pursuant to Executive Order 11988 and 23 CFR 650 subpart A? | ☑ | ☐ |
| 16 | Is the project in a Coastal Area Management Act (CAMA) county and substantially affects the coastal zone and/or any Areas of Environmental Concern (AEC)? | ☐ | ☑ |

| Type III Actions (continued) | | Yes | No |
|---|---|---|---|
| 17 | Does the project require a US Coast Guard (USCG) permit? | ☐ | ☑ |
| 18 | Does the project involve construction activities in, across, or adjacent to a designated Wild and Scenic River present within the project area? | ☐ | ☑ |
| 19 | Does the project involve Coastal Barrier Resource Act (CBRA) resources? | ☐ | ☑ |
| 20 | Does the project impact federal lands (e.g. US Forest Service (USFS), US Fish and Wildlife Service (USFWS), etc.) or Tribal (Trust) Lands? | ☑ | ☐ |
| 21 | Does the project involve any changes in access control or the modification or construction of an interchange on an interstate? | ☐ | ☑ |
| 22 | Does the project have a permanent adverse effect on local traffic patterns or community cohesiveness? | ☐ | ☑ |
| 23 | Will maintenance of traffic cause substantial disruption? | ☐ | ☑ |
| 24 | Is the project inconsistent with the STIP, and where applicable, the Metropolitan Planning Organization's (MPO's) Transportation Improvement Program (TIP)? | ☐ | ☑ |
| 25 | Does the project require the acquisition of lands under the protection of Section 6(f) of the Land and Water Conservation Act, the Federal Aid in Fish Restoration Act, the Federal Aid in Wildlife Restoration Act, TVA, Tribal Lands, or other unique areas or special lands that were acquired in fee or easement with public-use money and have deed restrictions or covenants on the property? | ☐ | ☑ |
| 26 | Does the project involve Federal Emergency Management Act (FEMA) buyout properties under the Hazard Mitigation Grant Program (HMGP)? | ☐ | ☑ |
| 27 | Is the project considered a Type I under the NCDOT's Noise Policy? | ☐ | ☑ |
| 28 | Is there prime or important farmland soil impacted by this project as defined by the Farmland Protection Policy Act (FPPA)? | ☑ | ☐ |
| 29 | Is the project in an Air Quality non-attainment or maintenance area for a National Ambient Air Quality Standard (NAAQS)? | ☐ | ☑ |
| 30 | Are there other issues that arose during the project development process that affected the project decision? | ☐ | ☑ |

G. Additional Documentation as Required from Section F (ONLY for questions marked 'Yes'):

**Question 1**

The programmatic determination for NLEB for the NCDOT program remains "May Affect, Likely to Adversely Affect." The PBO provides incidental take coverage for NLEB and will ensure compliance with Section 7 of the Endangered Species Act for ten years for all NCDOT projects with a federal nexus in Divisions 1-8, which includes Gates and Pasquotank Counties in Division 1, where STIP R-5808 is located. This level of incidental take is authorized from the effective date of a final listing determination through December 31, 2030. Gates and Pasquotank Counties contain a current known/potential range of NLEB and are therefore subject to conservation measures. Conservation measures which will avoid/minimize mortality of NLEBs as included in the PBO are:

1) No tree clearing will occur within 150 feet of a known maternity roost tree May 1 – June 30 to protect non-volant young. Winter roost trees are not considered maternity roost trees.
2) At individual project sites where a total of 1.0 acre of more of tree clearing will occur, no tree clearing will occur during the potion of the day that the air temperature is <40 degrees Fahrenheit in order to protect NLEBs that may be in torpor.

**Question 11**
NCDOT has pursued the Merger process in coordination with state and federal agencies to meet the requirements of the USACE GP 31 permit. USACE still reserves the right to request an Individual Permit (IP) be submitted and has indicated (see CP 3 & 4A meeting summary June 16, 2021) that a determination regarding whether an IP will be requested by USACE will be made once permit drawings with more detailed impacts are available for USACE review.

**Question 15**
This Project will require work within the non-encroachment areas (non-regulated floodway). A flood study will need to be performed and an NCDOT Memorandum of Agreement (MOA) will need to be prepared but a Conditional Letter of Map Revision (CLOMR) or Letter of Map Revision (LOMR) is not anticipated to be required.

**Question 20**
The Project would potentially have temporary direct impacts to the Refuge during construction. Based on the anticipated impacts of this Project, the USFWS may require a compatibility determination be made for this Project.

**Question 28**
Farmland soils eligible for protection under FPPA are present within the project footprint. A preliminary screening of farmland conversion impacts in the project area has been completed and a total score of 41 out of 160 points was calculated for the R-5808 project site. Since the total site assessment score does not exceed the 60-point threshold established by NRCS, farmland conversion impacts may be anticipated, but are not considered notable.

H. Project Commitments:

# NCDOT PROJECT COMMITMENTS

STIP Project No. **R-5808**
Modernization of U.S. Route 158
from Acorn Hill Road to Pasquotank County Line
Gates County
Federal Aid Project No. NHP-0158(076)
WBS Element 46972.1.1

**Floodplain Management**
A flood study will be performed and an NCDOT Memorandum of Agreement (MOA) will be prepared.

**Environmental Permits**
NCDOT will obtain environmental permits as necessary from the US Army Corps of Engineers and NC Department of Environmental Quality Division of Water Resources prior to construction. Construction of the project will adhere to all appropriate Section 404 (USACE) and Section 401 (NCDEQ DWR) permit conditions.

**Tribal Coordination**
The Catawba Indian Nation is to be notified if any Native American artifacts and/or human remains are located during the ground disturbance phase of this project.

**Great Dismal Swamp National Wildlife Refuge**
NCDOT will coordinate with US Fish and Wildlife staff to determine if a compatibility determination is required for the project, and complete one if necessary. If the final designs indicate the proposed rip rap will extend into Refuge property, the Refuge Manager will be notified prior to any additional work on the plans.

I. Categorical Exclusion Approval:

| | |
|---|---|
| STIP Project No. | **R-5808** |
| WBS Element | 46972.1.1 |
| Federal Project No. | NHP-0158(076) |

**Prepared By:**

9/29/2021
Date

DocuSigned by:
E3E1953073CC478...
Colin Frosch, PE
Kimley-Horn

**Prepared For:** NCDOT Division 1

**Reviewed By:**

9/29/2021
Date

DocuSigned by:
7C79B0D2941F47E...
Paul Williams, Jr.
Highway Division 1 Environmental Officer
North Carolina Department of Transportation

☐ ~~**Approved**~~

☑ **Certified** • If classified as Type III Categorical Exclusion.

9/29/2021
Date

DocuSigned by:
0C7D14031128433...
for Sterling Baker, P.E., Highway Division 1 Engineer
Ryan Shook, Highway Division 1 Project Engineer
North Carolina Department of Transportation

FHWA Approved: For Projects Certified by NCDOT (above), FHWA signature required.

9/29/2021
Date

DocuSigned by:
9967A500F8714F0...
*for* John F. Sullivan, III, PE, Division Administrator
Federal Highway Administration

*Note: Prior to ROW or Construction authorization, a consultation may be required (please see Section VII of the NCDOT-FHWA CE Programmatic Agreement for more details).*

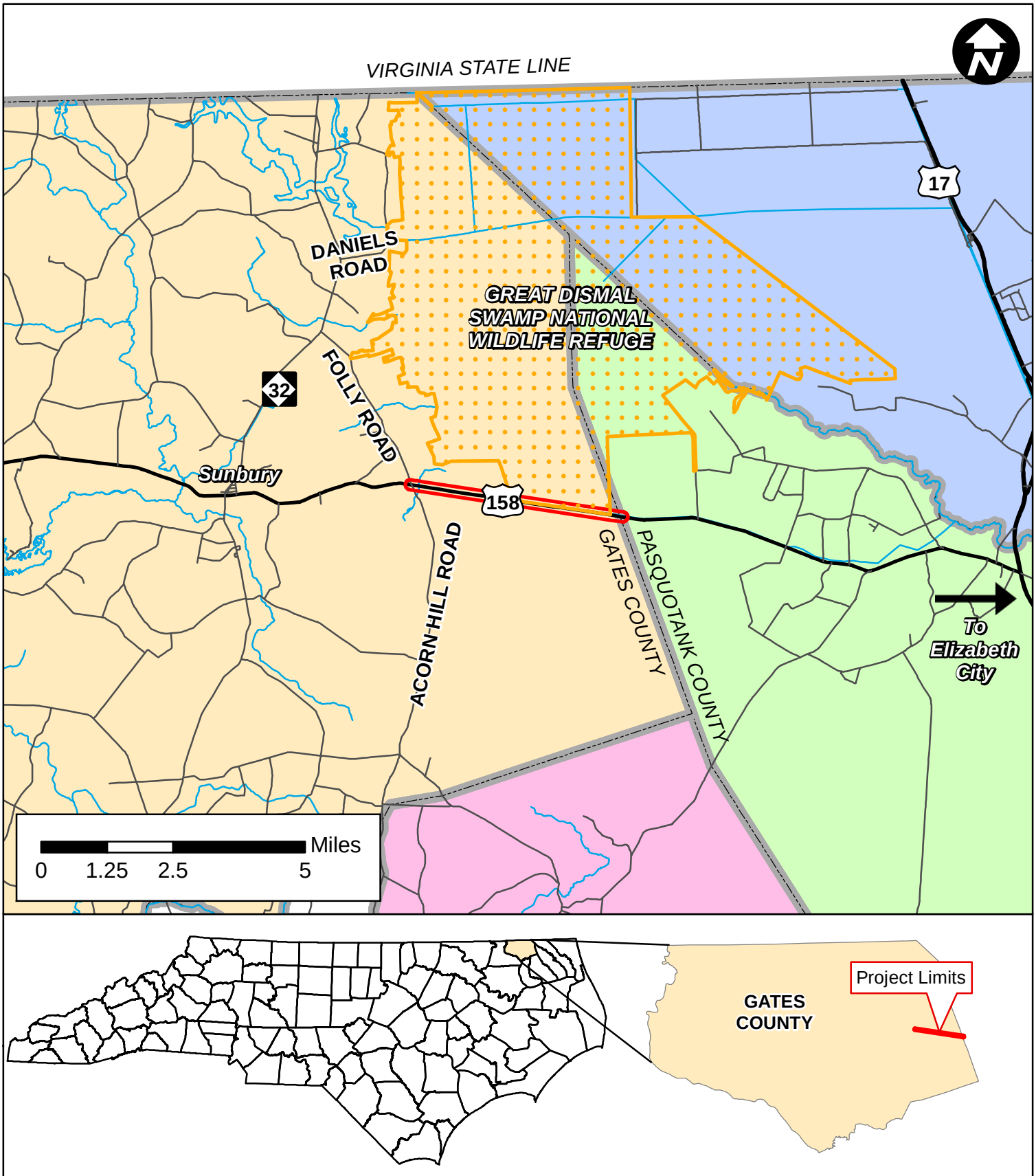



**Figure 1: Vicinity Map**
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County


Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Roadway Culvert
Proposed Slope Stakes
Proposed Right-of-Way
Delineated Streams
Delineated Wetlands
Alternative 1 Impact Area

**Figure 2.A:Anticipated Impacts Map**
Alternative 1 LEDPA
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County


Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Slope Stakes
Proposed Right-of-Way
Delineated Open Water
Delineated Wetlands
Alternative 1 Impact Area

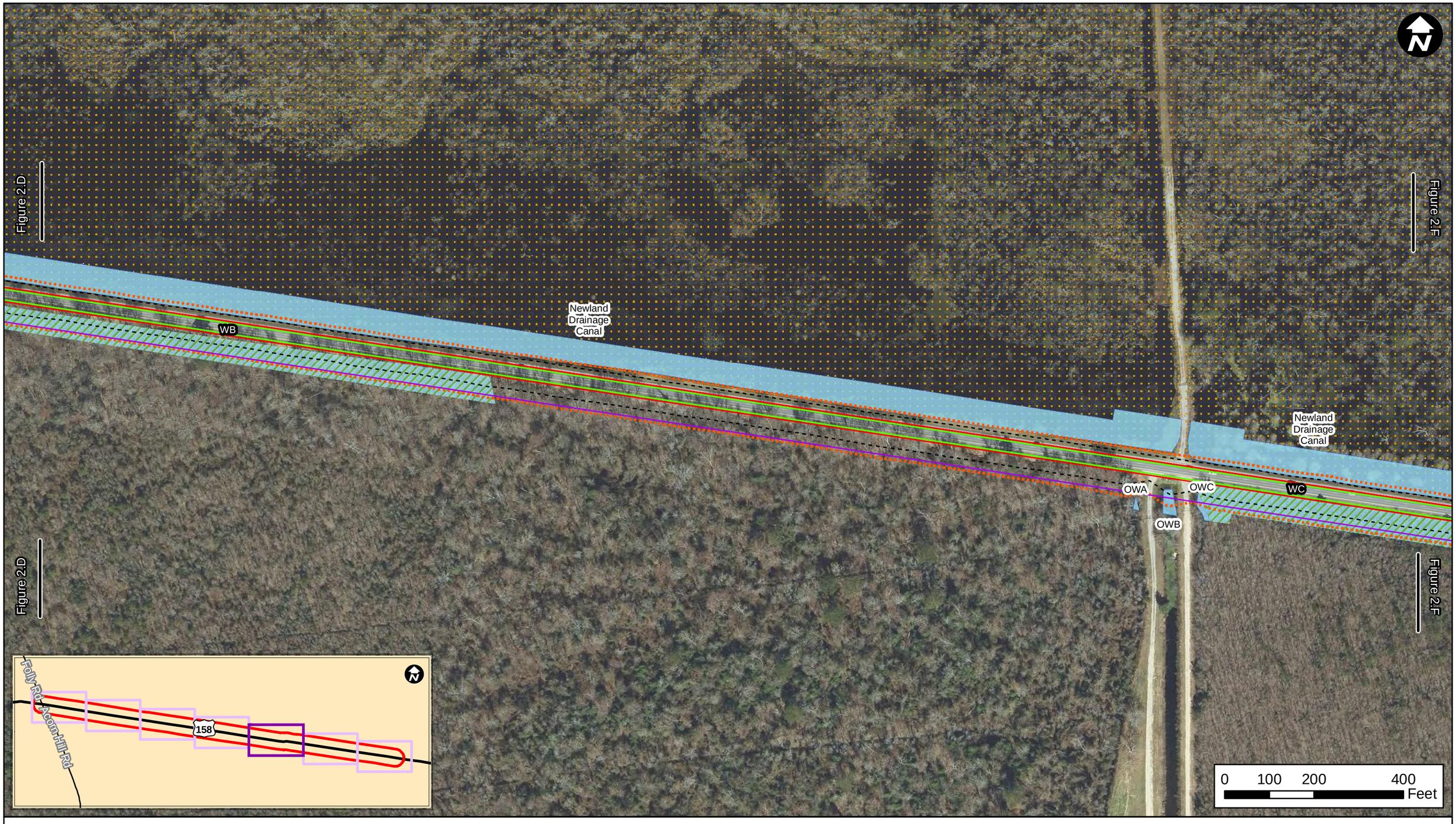
**Figure 2.B:Anticipated Impacts Map**
Alternative 1 LEDPA
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County


Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Slope Stakes
Proposed Right-of-Way
Delineated Wetlands
Alternative 1 Impact Area

**Figure 2.C:Anticipated Impacts Map**
Alternative 1 LEDPA
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

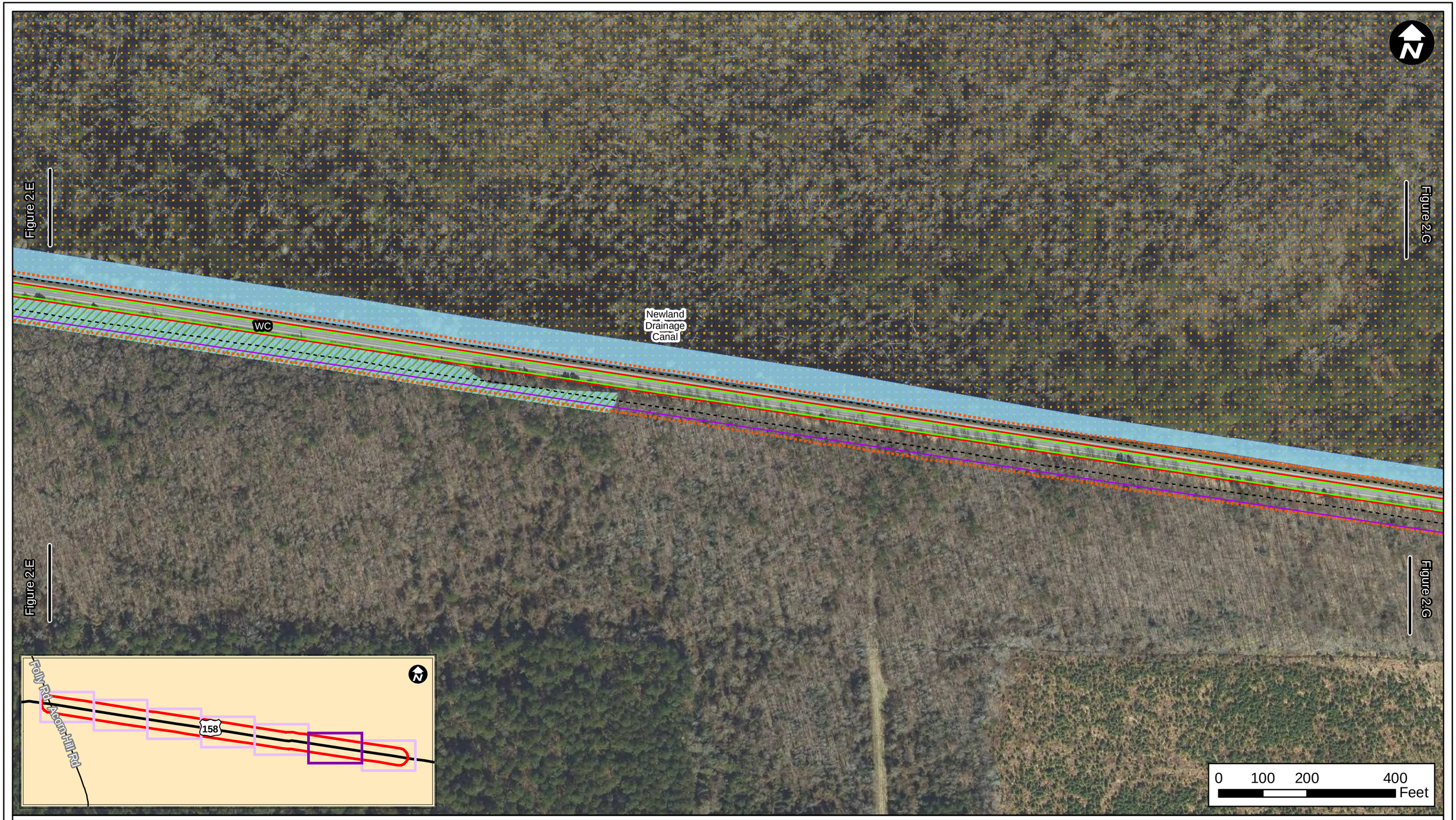

Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Slope Stakes
Proposed Right-of-Way
Delineated Open Water
Delineated Wetlands
Great Dismal Swamp National Wildlife Refuge
Alternative 1 Impact Area

**Figure 2.D:Anticipated Impacts Map**
Alternative 1 LEDPA
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County



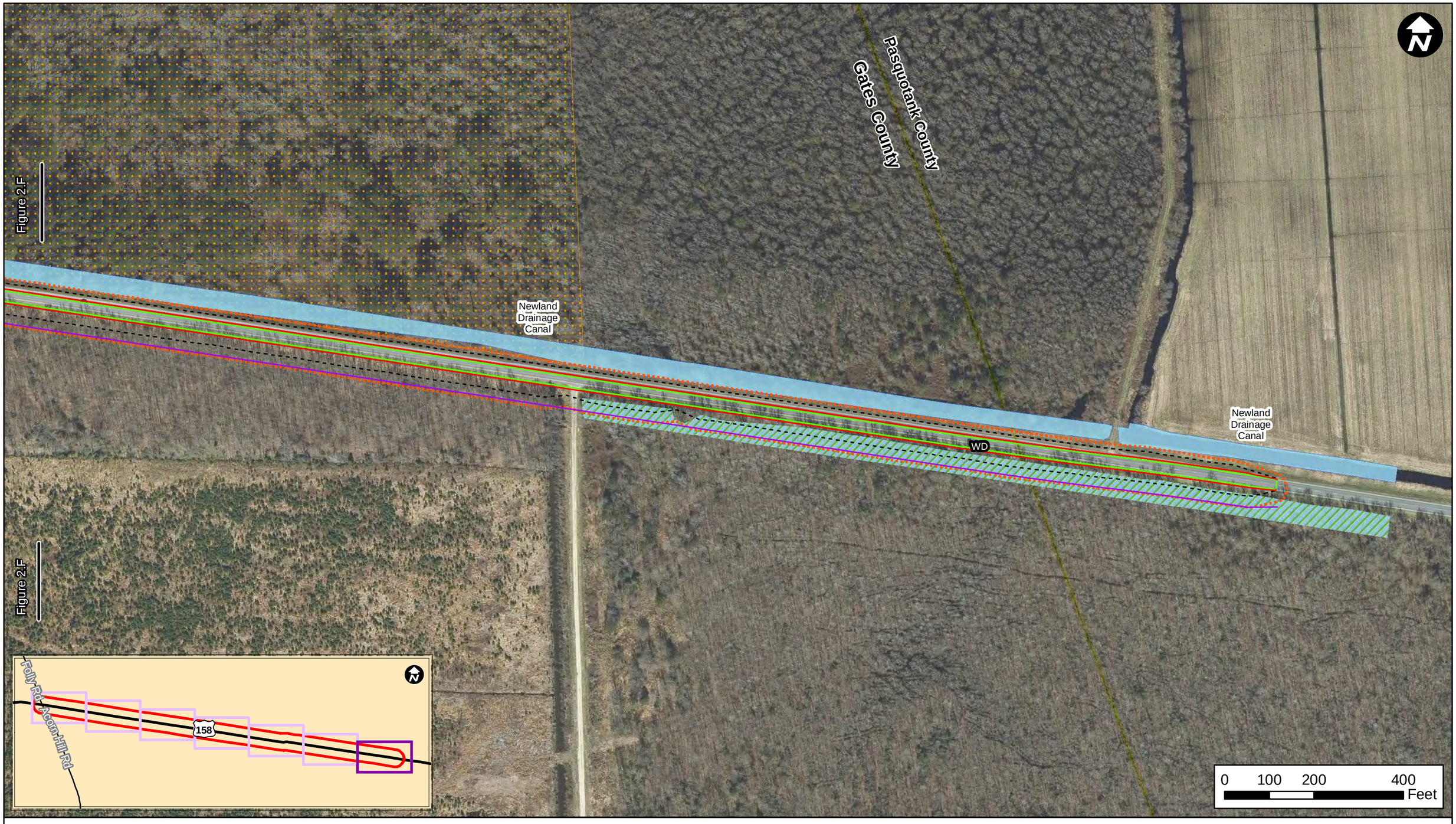

Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Slope Stakes
Proposed Right-of-Way
Delineated Open Water
Delineated Wetlands
Great Dismal Swamp National Wildlife Refuge
Alternative 1 Impact Area

**Figure 2.E:Anticipated Impacts Map**
Alternative 1 LEDPA
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County




Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Slope Stakes
Proposed Right-of-Way
Delineated Open Water
Delineated Wetlands
Great Dismal Swamp National Wildlife Refuge
Alternative 1 Impact Area

**Figure 2.F:Anticipated Impacts Map**
Alternative 1 LEDPA
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County




Proposed Edge of Travel
Proposed Paved Shoulder
Proposed Slope Stakes
Proposed Right-of-Way
Delineated Open Water
Delineated Wetlands
Great Dismal Swamp National Wildlife Refuge
Alternative 1 Impact Area

**Figure 2.G:Anticipated Impacts Map**
Alternative 1 LEDPA
NCDOT Project No. R-5808
Improvements to U.S. 158
Gates County

# Appendix C: Redline Drainage Plans

09/08/99

**TIP PROJECT: R–5808**

**CONTRACT:**

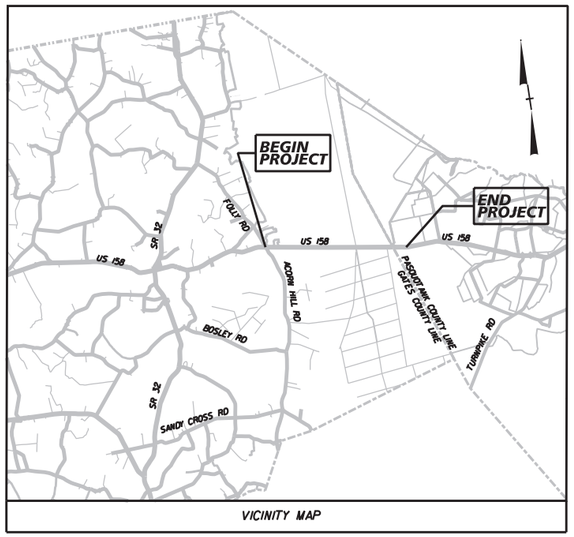
8/19/2022

# STATE OF NORTH CAROLINA
# DIVISION OF HIGHWAYS

# *GATES COUNTY*

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | R–5808 | 1 | |
| STATE PROJ. NO. | F. A. PROJ. NO. | DESCRIPTION | |
| 46972.1.1 | NHP-0158(076) | | |

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**



VICINITY MAP

***LOCATION:*** *US 158 FROM THE INTERSECTION OF SR 1002 (ACORN HILL ROAD) AND US 158 TO THE PASQUOTANK COUNTY LINE*

***TYPE OF WORK:*** *GRADING, DRAINAGE, PAVING, WIDENING, AND CULVERT*

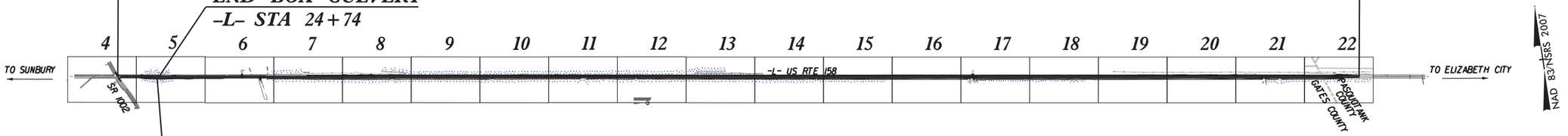
*REDLINE DRAINAGE*
*RESUBMITTAL*
*AUGUST 19, 2022*

***BEGIN TIP PROJECT R–5808***
***–L– STA 17+59.05***

***END BOX CULVERT***
***–L– STA 24+74***

***BEGIN BOX CULVERT***
***–L– STA 24+46***

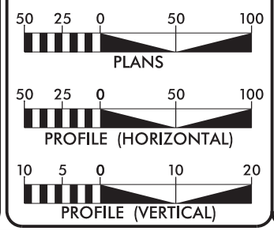
***END TIP PROJECT R–5808***
***–L– STA 234+37.39***




CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III
THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARY

***SUBMITTAL:***
***DATE:*** June 24, 2022

***GRAPHIC SCALES***




***DESIGN DATA***

ADT 2023 = 4,300
ADT 2043 = 6,200
K = 10%
D = 55%
T = 12%
V = 60 MPH

CLASSIFICATION:
OTHER PRINCIPAL ARTERIAL
* 7% TTST 5% DUAL
STATEWIDE TIER

***PROJECT LENGTH***

LENGTH ROADWAY TIP PROJECT R–5808 = 4.101 MILES
LENGTH OF STRUCTURE TIP PROJECT R–5808 = .005 MILES
TOTAL LENGTH TIP PROJECT R–5808 = 4.106 MILES

*Prepared In the Office of:*
Kimley»Horn
© 2021
NC LICENSED #P-0102
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

*2018 STANDARD SPECIFICATIONS*

***RIGHT OF WAY DATE:***
AUGUST 23, 2022

***LETTING DATE:***
JULY 18, 2023

***VINCENT RICCIO, PE***
*PROJECT ENGINEER*

***BRANDON GREGG, PE***
*PROJECT DESIGN ENGINEER*

***RYAN SHOOK***
*PROJECT MANAGER*
*NCDOT HIGHWAY DIVISION*

***HYDRAULICS ENGINEER***

*SIGNATURE:* *P.E.*

***ROADWAY DESIGN ENGINEER***

*SIGNATURE:* *P.E.*

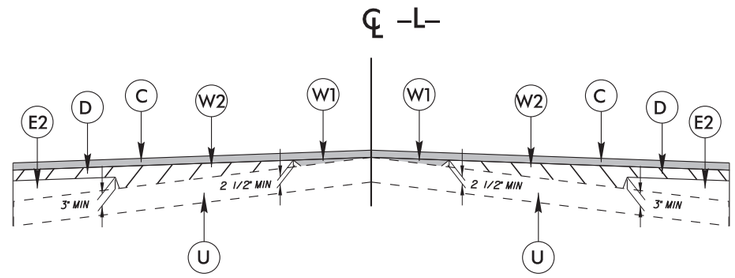
STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION

5/14/99

REVISIONS

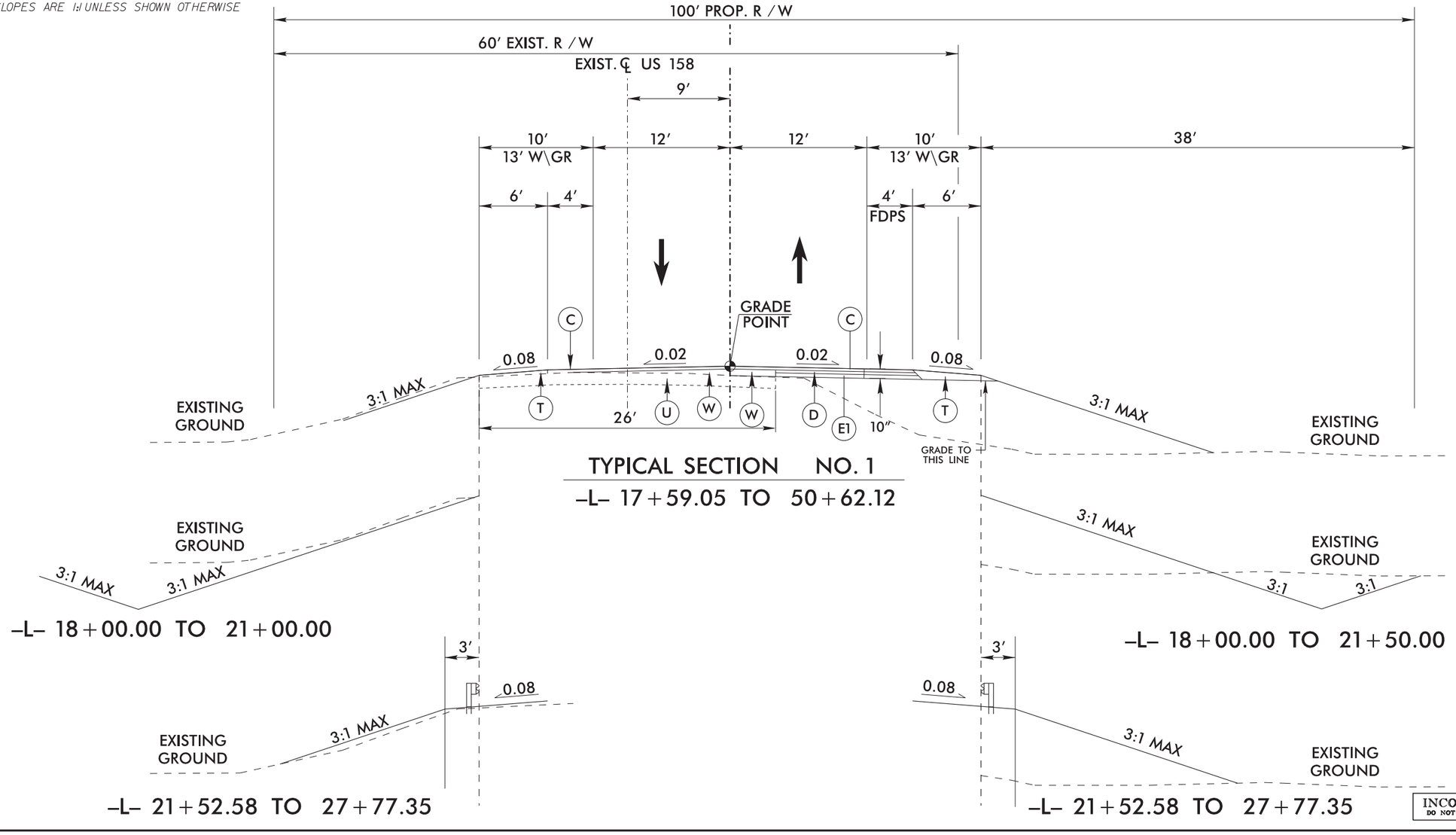
| PRELIMINARY PAVEMENT SCHEDULE | |
|---|---|
| C | PROP. APPROX. 2" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS. |
| D | PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 119.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD. |
| E1 | PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD. |
| E2 | PROPOSED VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 3" OR GREATER THAN 5.5" IN DEPTH. |
| T | EARTH MATERIAL |
| U | EXISTING PAVEMENT |
| W | PAVEMENT WEDGING |

NOTE: PAVEMENT SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE




DETAIL SHOWING METHOD OF WEDGING

## ℄ –L– US 158




TYPICAL SECTION NO. 1

–L– 17+59.05 TO 50+62.12

–L– 18+00.00 TO 21+00.00

–L– 18+00.00 TO 21+50.00

–L– 21+52.58 TO 27+77.35

–L– 21+52.58 TO 27+77.35

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

7/27/2022

Kimley»Horn ©2021
4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 2A-1 |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

5/14/99

## PRELIMINARY PAVEMENT SCHEDULE

| | |
|---|---|
| C | PROP. APPROX. 2" ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YD. IN EACH OF TWO LAYERS. |
| D | PROP. APPROX. 4" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 119.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD. |
| E1 | PROP. APPROX. 4" ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YD. |
| E2 | PROPOSED VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YD. PER 1" DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 3" OR GREATER THAN 5.5" IN DEPTH. |
| T | EARTH MATERIAL. |
| U | EXISTING PAVEMENT. |
| W | PAVEMENT WEDGING |

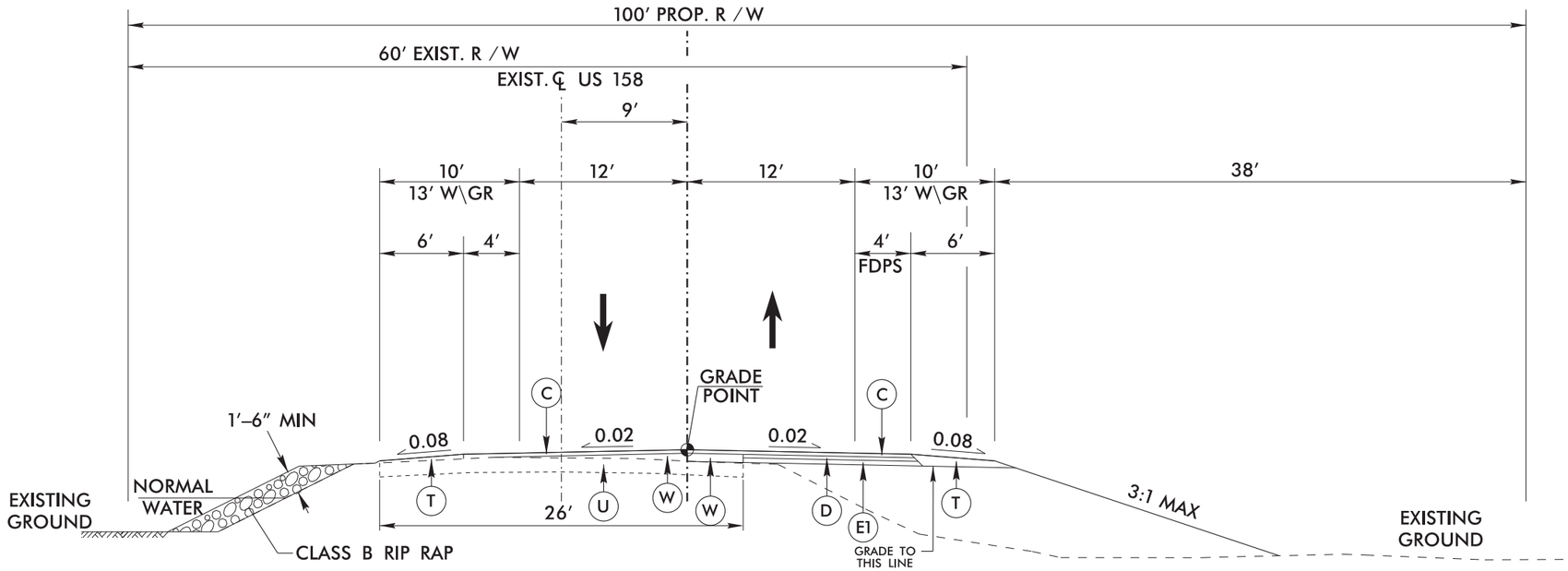
NOTE: PAVEMENT SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE

Kimley»Horn ©2021
4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 2A-2 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

℄ –L– US 158




## TYPICAL SECTION NO. 2

–L– 50+62.12 TO 234+37.39

7/27/2022

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

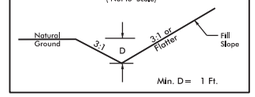
5/14/99

REVISIONS

-L-

PI Sta 16+15.38
△ = 0° 04' 44.4" (LT)
D = 0° 04' 45.0"
L = 99.80'
T = 49.90'
R = 72,370.32'

**DETAIL 1**
SPECIAL LATERAL 'V' DITCH
( Not to Scale)




FROM STA. 18+00 TO STA. 21+00 -L- (LT)
FROM STA. 18+00 TO STA. 21+50 -L- (RT)

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 4 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

10 15 20

BEGIN TIP PROJECT R-5808
-L- POT Sta. 17+59.05

SR 1002 FOLLY RD

SPECIAL LATERAL 'V' DITCH SEE DETAIL 1

-L- US RTE 158

S 81° 20' 39.5" E

S 81° 25' 23.9" E

R 35.00'

R 25.00'

50'

RETAIN

15" RCP

18" RCP

INV=40.21'

INV=45.49'

46' R/W TO EIP

FELTON J. OUTLAND, JR. & TRUDY O. OUTLAND DB 1211 PG 359 PC 1 SLIDE 74-2

HARVEY ELLIOTT & FRANCES ELLIOTT DB 180 PG 145 PC 1 SLIDE 174-2

WILLIAM WALTER PARKER, JR. CAROLYN L. PARKER & JOHNNY E. PARKER DB 194 PG 564

CAROLINA TELEPHONE & TELEGRAPH COMPANY DB 156 PG 294 DB 156 PG 296

WILLIAM C. JORDAN, JR. CARLEASE J. JACKSON KEBA JORDAN BALL DB [illegible] PG 698

SR 1002 ACORN HILL RD

TO NC 32 MCCOY RD

US RTE 158 24' BST ROADWAY

EXIST R/W

CULT

WOODS

WOOD POST

CAR PORT

GUY POLE

EIP .33' EIP TO R/W

N 57°45'51" E 265.76'

S 57°45'51" W 620.39'

S 67°22'43" W 325.16'

N 88°14'31" W 44°45'52" W N 39°13'37" W

MATCHLINE -L- STA 20+00.00 SEE PLAN SHEET 5

SEE SHEET NO. 23 FOR -L- PROFILE

5/14/99

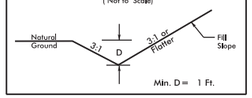
REVISIONS

-L-

PI Sta 21+61.22
Δ = 1° 34' 37.8" (RT)
D = 0° 29' 53.6"
L = 316.56'
T = 158.29'
R = 11,500.00'

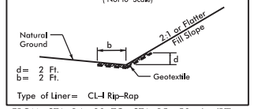
PI Sta 24+74.63
Δ = 1° 32' 44.9" (LT)
D = 0° 29' 53.6"
L = 310.26'
T = 155.14'
R = 11,500.00'

**DETAIL 1**
SPECIAL LATERAL 'V' DITCH
( Not to Scale)




FROM STA. 18+00 TO STA. 21+00 -L- (LT)
FROM STA. 18+00 TO STA. 21+50 -L- (RT)

**DETAIL 2**
TOE PROTECTION
( Not to Scale)




FROM STA. 24+90 TO STA. 25+50 -L- (RT)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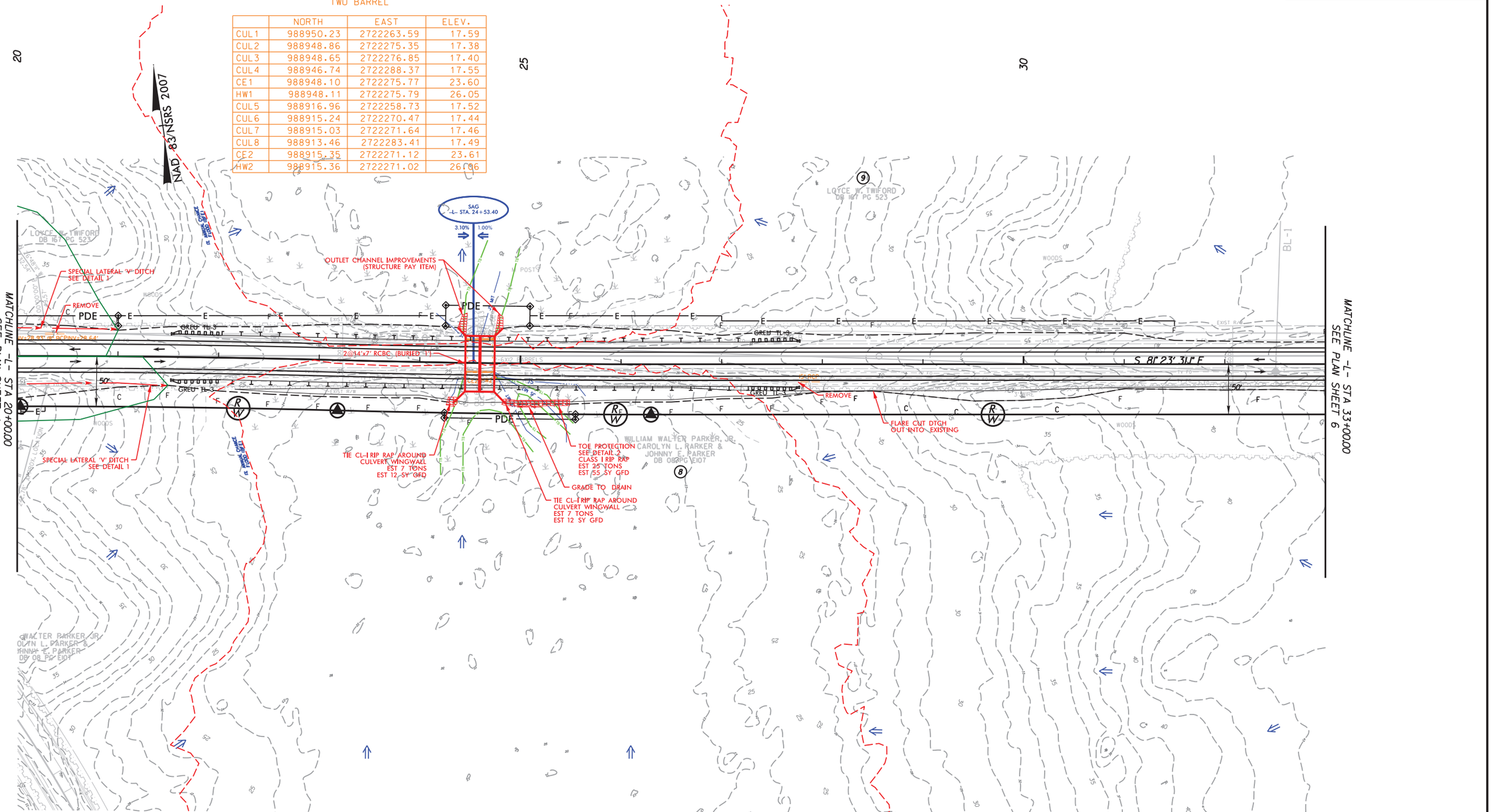
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 5 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

CULVERT #1
TWO BARREL

| | NORTH | EAST | ELEV. |
|---|---|---|---|
| CUL1 | 988950.23 | 2722263.59 | 17.59 |
| CUL2 | 988948.86 | 2722275.35 | 17.38 |
| CUL3 | 988948.65 | 2722276.85 | 17.40 |
| CUL4 | 988946.74 | 2722288.37 | 17.55 |
| CE1 | 988948.10 | 2722275.77 | 23.60 |
| HW1 | 988948.11 | 2722275.79 | 26.05 |
| CUL5 | 988916.96 | 2722258.73 | 17.52 |
| CUL6 | 988915.24 | 2722270.47 | 17.44 |
| CUL7 | 988915.03 | 2722271.64 | 17.46 |
| CUL8 | 988913.46 | 2722283.41 | 17.49 |
| CE2 | 988915.35 | 2722271.12 | 23.61 |
| HW2 | 988915.36 | 2722271.02 | 26.06 |



| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 6 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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VIRGINIA BEACH, VA 23462

REVISIONS
5/14/99

NAD 83/NSRS 2007

MATCHLINE -L- STA 33+00.00
SEE PLAN SHEET 5

MATCHLINE -L- STA 45+00.00
SEE PLAN SHEET 7

35 40 45

LOYCE W. TWIFORD
DB 167 PG 523

WILLIAM J. BRIGGS
DB 301 PG 479
PC 3 SLIDE 13-5

WILLIAM J. BRIGGS
PC 3 SLIDE 51-2

CREST
-L- STA. 38+11.07
0.62% 3.15%

RETAIN
RETAIN

S 85° 16' 24" E

S 85° 23' 31" E

WILLIAM WALTER PARKER, JR.
CAROLYN L. PARKER &
JOHNNY E. PARKER
DB 08 PG 0107

GEORGE T. BRIGGS
DB 301 PG 481
PC 3 SLIDE 13-5

GEORGE T. BRIGGS
DB 301 PG 481
PC 3 SLIDE 13-5

GEORGE TIMOTHY BRIGGS
DB 224 PG 267
PC 2 SLIDE 85-3

REMOVE
REMOVE
15" PIPE

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 7 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

REVISIONS 5/14/99

-L-

PI Sta 56+83.31
Δ = 0° 25' 44.9" (LT)
D = 0° 25' 27.9"
L = 101.11'
T = 50.56'
R = 13,500.00'

45 50 55

NAD 83/NSRS 2007

SAG
-L- STA. 50+04.13*
3.15% 0.30%

CREST
-L- STA. 54+69.58
0.30% 0.20%

BEGIN PLACEMENT OF CLASS B RIP RAP
-L- STA. 50+62.12

RIPRAP PAD AT OUTLET
8 TONS CLASS B RIP RAP
21 S.Y. GEOTEXTILE

REPLACE EXISTING PIPE WITH A 30" RCP-IV

S 81° 23' 31" E

MATCHLINE -L- STA 45+00.00
SEE PLAN SHEET 6

MATCHLINE -L- STA 57+00.00
SEE PLAN SHEET 8

(9) LOYCE W. TWIFORD
DB 167 PG 523

(10) WILLIAM J. BRIGGS
DB 301 PG 479
PC 3 SLIDE 13-5

(11) GEORGE T. BRIGGS
DB 301 PG 481
PC 3 SLIDE 13-5

(12) JORGE TIMOTHY BRIGGS
DB 224 PG 267
PC 2 SLIDE 85-13

LIMNON SC

WOODS

BLDG

EXIST R/W

5/14/99

REVISIONS

-L-

PI Sta 56+83.31
Δ = 0° 25' 44.9" (LT)
D = 0° 25' 27.9"
L = 101.11'
T = 50.56'
R = 13,500.00'

PI Sta 59+83.31
Δ = 0° 26' 17.4" (RT)
D = 0° 25' 27.9"
L = 103.24'
T = 51.62'
R = 13,500.00'

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VIRGINIA BEACH, VA 23462

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 8 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

60

65

SAG
-L- STA. 57+55.00
0.20% 0.20%

CREST
-L- STA. 59+78.00
0.20% 0.30%

SAG
-L- STA. 68+60.90
0.41% 0.30%

9 LOYCE W. TWIFORD
DB 167 PG 523

11 GEORGE T. BRIGGS
DB 301 PG 481
PC 5 / SLIDE 13-5

13 REVOCABLE TRUST AGREEMENT
OF MARCIE W. BLEVINS
DB 330 PG 9

JS NONMT

S 81° 49' 16.0" E

S 81° 22' 58.6" E

50'

MATCHLINE -L- STA 57+00.00
SEE PLAN SHEET 7

MATCHLINE -L- STA 69+00.00
SEE PLAN SHEET 9

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 9 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

REVISIONS
5/14/99

NAD 83/NSRS 2007

70 75 80

CREST -L- STA. 69+50.00 | SAG -L- STA. 72+25.00 | CREST -L- STA. 74+99.61 | SAG -L- STA. 76+78.64 | CREST -L- STA. 78+26.75 | SAG -L- STA. 80+31.00

0.30% 0.30% | 0.30% 0.30% | 0.30% 0.30% | 0.30% 0.32% | 0.32% 0.30% | 0.30% 0.30%

BL-4

LOYCE W. TWIFORD
DB 167 PG 523

WOODS

EXIST R/W

S 81° 22' 58.6" E

50'

MATCHLINE -L- STA 69+00.00
SEE PLAN SHEET 8

MATCHLINE -L- STA 81+00.00
SEE PLAN SHEET 10

REVOCABLE TRUST AGREEMENT
OF MARGIE W. BLEVINS
DB 330 PG 9

5/14/99

REVISIONS

-L-

PI Sta 82+51.22
Δ = 0° 09' 36.0" (LT)
D = 0° 09' 17.5"
L = 103.32'
T = 51.66'
R = 37,000.00'

PI Sta 89+96.70
Δ = 0° 03' 13.2" (RT)
D = 0° 03' 07.5"
L = 103.05'
T = 51.53'
R = 110,000.00'

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VIRGINIA BEACH, VA 23462

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 10 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

85

90

CREST -L- STA. 81+23.49 0.30% 0.32%

SAG -L- STA. 85+16.65 0.32% 0.30%

CREST -L- STA. 87+30.00 0.30% 0.30%

SAG -L- STA. 89+65.00 0.30% 0.30%

CREST -L- STA. 91+50.00 0.30% 0.30%

R5808-3

R5808-4

9 LOYCE W. TWIFORD DB 167 PG 523

-L- US RTE 158

S 81° 32' 34.6" E

S 81° 29' 21.3" E

50'

50'

EXIST R/W

WOODS

2-1' CONDOS

13 REVOCABLE TRUST AGREEMENT OF MARGIE W. BLEVINS DB 330 PG 9

MATCHLINE -L- STA 81+00.00 SEE PLAN SHEET 9

MATCHLINE -L- STA 93+00.00 SEE PLAN SHEET 11

SEE SHEET NO. 25 FOR -L- PROFILE

5/14/99

REVISIONS

-L-

PI Sta 94+91.90
Δ = 0° 07' 12.6" (RT)
D = 0° 06' 52.5"
L = 104.87'
T = 52.44'
R = 50,000.00'

PI Sta 103+03.52
Δ = 0° 08' 23.7" (RT)
D = 0° 07' 59.7"
L = 105.00'
T = 52.50'
R = 43,000.00'

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VIRGINIA BEACH, VA 23462

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 11 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

95 100 105

SAG -L- STA. 94+25.00 0.30% 0.30%
CREST -L- STA. 97+25.00 0.30% 0.30%
SAG -L- STA. 100+75.00 0.30% 0.30%
CREST -L- STA. 103+10.00 0.30% 0.30%

9 LOYCE W. TWIFORD DB 167 PG 523

13 REVOCABLE TRUST AGREEMENT OF MARGIE W. BLEVINS DB 330 PG 9

ABAND

-L- US RTE 158

S 81° 29' 21.3" E

S 81° 22' 08.7" E

S 81° 13' 45.0" E

50'

EXIST R/W

MATCHLINE -L- STA 93+00.00
SEE PLAN SHEET 10

MATCHLINE -L- STA 105+00.00
SEE PLAN SHEET 12

SEE SHEET NO. 25 AND 26 FOR -L- PROFILE

| REVISIONS | |
|---|---|
| 5/14/99 | |

-L-

PI Sta 114+83.26
△ = 0° 02' 45.5" (LT)
D = 0° 02' 45.0"
L = 100.27'
T = 50.13'
R = 125,000.00'

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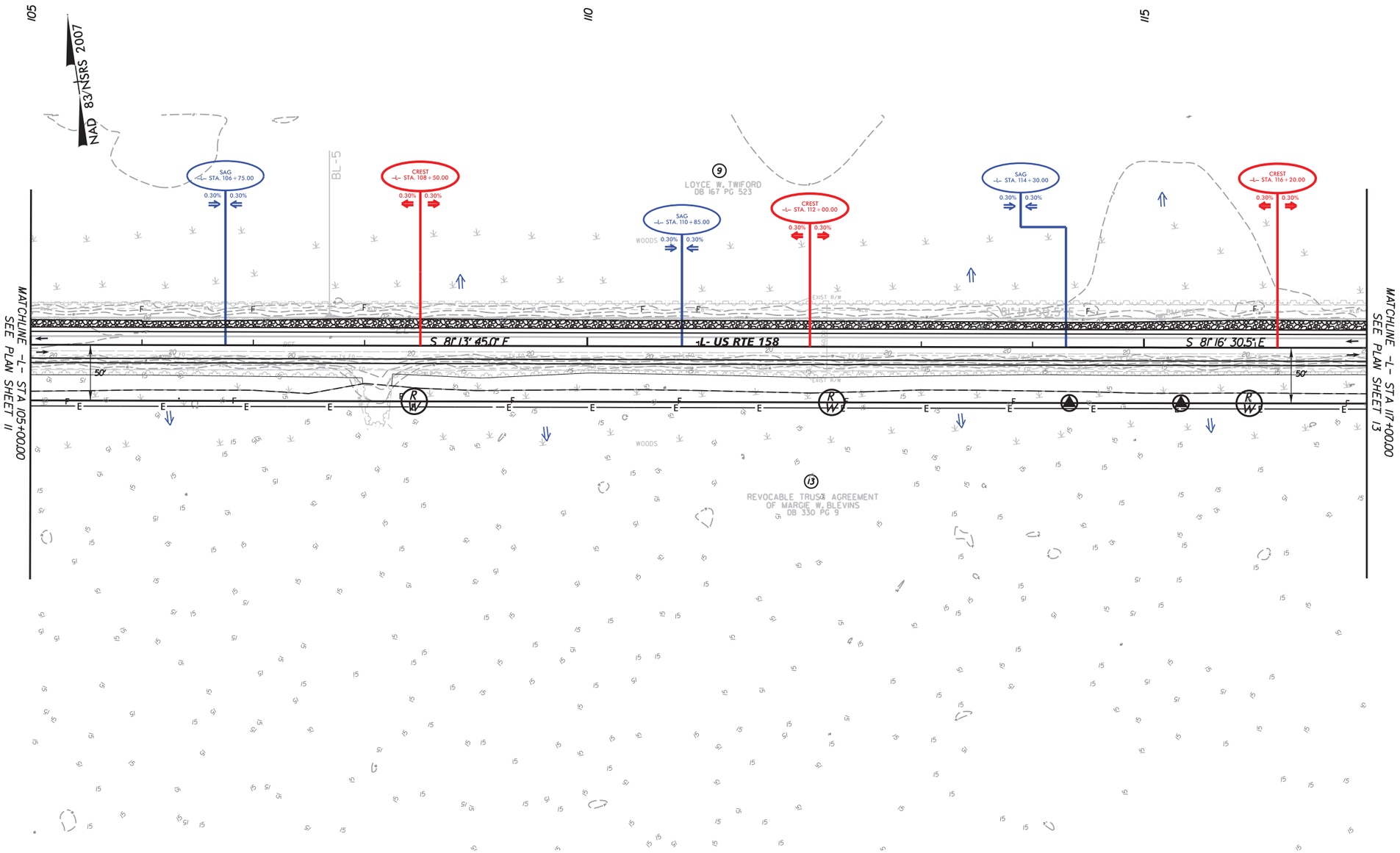
VIRGINIA BEACH, VA 23462

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 12 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |




SEE SHEET NO. 26 FOR -L- PROFILE

5/14/99

REVISIONS

-L-

PI Sta 119+83.31
△ = 0° 07' 00.6" (LT)
D = 0° 06' 52.5"
L = 101.95'
T = 50.97'
R = 50,000.00'

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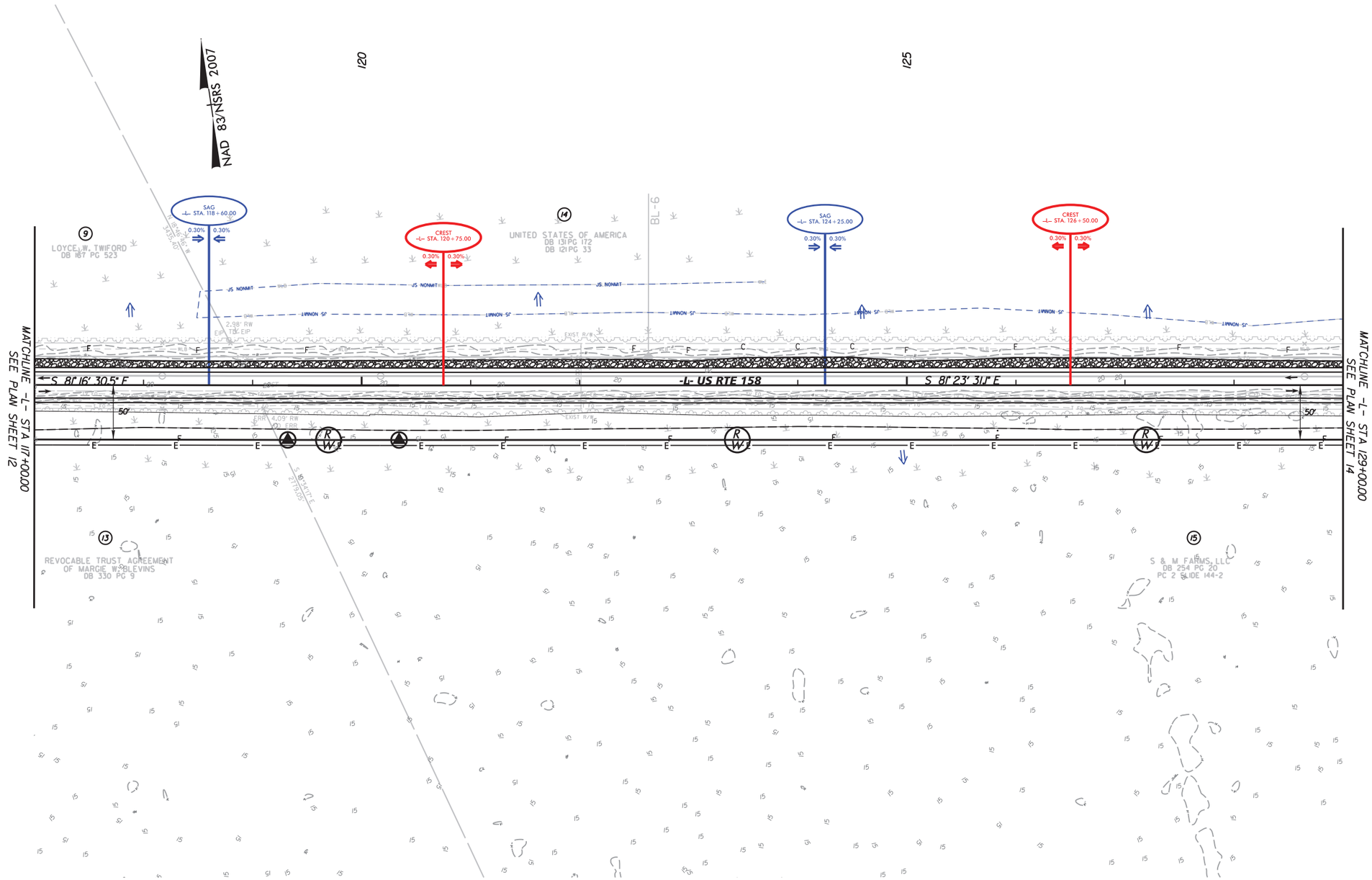
VIRGINIA BEACH, VA 23462

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 13 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |




SEE SHEET NO. 26 AND 27 FOR -L- PROFILE

| Kimley»Horn ©2021 | PROJECT REFERENCE NO. | SHEET NO. |
|---|---|---|
| 4525 MAIN STREET, SUITE 1000 | R-5808 | 14 |
| VIRGINIA BEACH, VA 23462 | R/W SHEET NO. | |
| | ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

REVISIONS

5/14/99

NAD 83/NSRS 2007

130 135 140

SAG -L- STA. 129+10.00 0.30% 0.30%

CREST -L- STA. 131+65.00 0.30% 0.30%

SAG -L- STA. 134+05.00 0.30% 0.30%

CREST -L- STA. 135+25.00 0.30% 0.30%

SAG -L- STA. 137+00.00 0.30% 0.30%

CREST -L- STA. 139+60.00 0.30% 0.30%

(14) UNITED STATES OF AMERICA
DB 131PG 172
DB 121PG 33

(15) S & M FARMS, LLC
DB 254 PG 20
PC 2 SLIDE 144-2

BL - 7

WOODS

LYNNON ST

EXIST R/W

S 81° 23' 31" E -L- US RTE 158

50'

MATCHLINE -L- STA 129+00.00
SEE PLAN SHEET 13

MATCHLINE -L- STA 141+00.00
SEE PLAN SHEET 15

SEE SHEET NO. 27 FOR -L- PROFILE

| Kimley»Horn ©2021 | PROJECT REFERENCE NO. | SHEET NO. |
|---|---|---|
| 4525 MAIN STREET, SUITE 1000 | R-5808 | 15 |
| VIRGINIA BEACH, VA 23462 | R/W SHEET NO. | |
| | ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

REVISIONS

5/14/99

NAD 83/NSRS 2007

145

150

MATCHLINE -L- STA 141+00.00
SEE PLAN SHEET 14

MATCHLINE -L- STA 153+00.00
SEE PLAN SHEET 16

(14) UNITED STATES OF AMERICA
DB 131PG 172
DB 121PG 33

SAG
-L- STA. 141+90.00
0.30% 0.30%

CREST
-L- STA. 143+75.00
0.30% 0.30%

SAG
-L- STA. 146+25.00
0.30% 0.30%

CREST
-L- STA. 147+75.00
0.30% 0.30%

SAG
-L- STA. 150+00.00
0.30% 0.30%

CREST
-L- STA. 153+00.00
0.30% 0.30%

BL-8

WOODS

-L- US RTE 158

S 81° 23' 31.1" E

LYNNON ST

EXIST R/W

50'

RW

(15) S & M FARMS, LLC
DB 254 PG 20
PC 2 SLIDE 144-2

wetlands need to stop at wland wb2 going

SEE SHEET NO. 27 FOR -L- PROFILE

| REVISIONS | |
|---|---|
| 5/14/99 | |

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 16 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

155 160 165

CREST -L- STA. 153+00.00 0.30% 0.30%
SAG -L- STA. 154+60.00 0.30% 0.30%
CREST -L- STA. 156+75.00 0.30% 0.30%
SAG -L- STA. 159+25.00 0.30% 0.30%
CREST -L- STA. 163+50.00 0.30% 0.30%

MATCHLINE -L- STA 153+00.00 SEE PLAN SHEET 15

MATCHLINE -L- STA 165+00.00 SEE PLAN SHEET 17

-L- US RTE 158 S 81° 23' 31" E

50'

14 UNITED STATES OF AMERICA DB 131 PG 172 DB 121 PG 33

15 S & D FARMS, LLC DB 254 PG 20 PC 2 SLIDE 144-2

FOM (LOCATE STATION)

WOODS

EXIST R/W

LIMNON SC

F E RW

SEE SHEET NO. 27 AND 28 FOR -L- PROFILE

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 17 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

REVISIONS
5/14/99

NAD 83/NSRS 2007

165 170 175

SAG -L- STA. 166+25.00
CREST -L- STA. 169+00.00
SAG -L- STA. 171+50.00
CREST -L- STA. 174+50.00
SAG -L- STA. 177+00.00
0.30% 0.30%

R5808-5

UNITED STATES OF AMERICA
DB 131 PG 172
DB 121 PG 33

WOODS

-L- US RTE 158

S 81° 23' 31" E

MATCHLINE -L- STA 165+00.00
SEE PLAN SHEET 16

MATCHLINE -L- STA 177+00.00
SEE PLAN SHEET 18

50'

R/W

S & W FARMS, LLC
DB 254 PG 20
PC 2 SLIDE 144-2

SWAIN & TEMPLE, INC
DB 254 PG 33
PC 2 SLIDE 144-2

SEE SHEET NO. 28 FOR -L- PROFILE

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 18 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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VIRGINIA BEACH, VA 23462

REVISIONS
5/14/99

NAD 83/NSRS 2007

180

185

SAG
-L- STA. 177+00.00
0.30% 0.30%

CREST
-L- STA. 179+50.00
0.30% 0.30%

SAG
-L- STA. 180+70.00
0.30% 0.30%

CREST
-L- STA. 185+25.00
0.30% 0.20%

SAG
-L- STA. 186+90.00
0.30% 0.30%

UNITED STATES OF AMERICA
DB 131 PG 172
DB 121 PG 133

WOODS

JS-NONMT

-L- US RTE 158

S 81° 23' 31" E

50'

MATCHLINE -L- STA 177+00.00
SEE PLAN SHEET 17

MATCHLINE -L- STA 189+00.00
SEE PLAN SHEET 19

SWAIN & TEMPLE, INC
DB 254 PG 33
PC 2 SLIDE 144-2

SEE SHEET NO. 28 AND 29 FOR -L- PROFILE

5/14/99

REVISIONS

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 19 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

190 195 200

MATCHLINE -L- STA 189+00.00
SEE PLAN SHEET 18

MATCHLINE -L- STA 201+00.00
SEE PLAN SHEET 20

CREST
-L- STA. 189+50.00
0.30% 0.30%

SAG
-L- STA. 191+25.00
0.30% 0.30%

CREST
-L- STA. 193+75.00
0.30% 0.30%

SAG
-L- STA. 196+25.00
0.30% 0.30%

CREST
-L- STA. 200+50.00
0.30% 0.30%

JS NONMT

-L- US RTE 158 S 81° 23' 31" E

50'

UNITED STATES OF AMERICA
DB 1312 PG 172
DB 1212 PG 33

SWAIN & TEMPLE, INC
DB 294 PG 33
PC 2 SLIDE 144-2

WOODS

SEE SHEET NO. 29 FOR -L- PROFILE

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 20 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

REVISIONS
5/14/99

NAD 83/NSRS 2007

205

210

SAG
-L- STA. 203+30.00
0.30% 0.30%

CREST
-L- STA. 205+10.00
0.30% 0.30%

SAG
-L- STA. 208+15.00
0.30% 0.30%

CREST
-L- STA. 211+10.00
0.30% 0.30%

SAG
-L- STA. 212+50.00
0.30% 0.30%

14
UNITED STATES OF AMERICA
DB 131 PG 172
DB 121 PG 33

15
SWAIN & TEMPLE, INC
DB 254 PG 33
PC 2 SLIDE 144-2

S 81° 23' 31" E -L- US RTE 158

MATCHLINE -L- STA 201+00.00
SEE PLAN SHEET 19

MATCHLINE -L- STA 213+00.00
SEE PLAN SHEET 21

SEE SHEET NO. 29 AND 30 FOR -L- PROFILE

5/14/99

REVISIONS

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 21 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

215 220 225

APPROX. LOCATION
PPROX. LOCATION

CREST
-L- STA. 214+25.00
0.30% 0.30%

SAG
-L- STA. 215+80.00
0.30% 0.30%

CREST
-L- STA. 218+65.00
0.30% 0.30%

SAG
-L- STA. 221+10.00
0.30% 0.30%

CREST
-L- STA. 223+25.00
0.30% 0.30%

SAG
-L- STA. 224+85.00
0.30% 0.30%

(14) UNITED STATES OF AMERICA
DB 1319 PG 172
DB 127 PG 33

(9) LOYCE W. TWIFORD
DB 566 PG 625

WOODS

JS NONMT

EXIST R/W

S 81° 23' 31" E

-L- US RTE 158

50'

R 80'

R 530'

(15) SWAIN & TEMPLE, INC
DB 254 PG 33
PC 2/SLIDE 144-2

S & M FARMS, LLC
DB 254 PG 20
PC 2 SLIDE 144-2

(17) TRACY L. SWAIN &
CECIL HODGES TEMPLE
DB 349 PG 433

PASQUOTANK COUNTY APPROX. LOCATION
GATES COUNTY APPROX. LOCATION

MATCHLINE -L- STA 213+00.00
SEE PLAN SHEET 20

MATCHLINE -L- STA 225+00.00
SEE PLAN SHEET 22

SEE SHEET NO. 30 FOR -L- PROFILE

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 22 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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VIRGINIA BEACH, VA 23462

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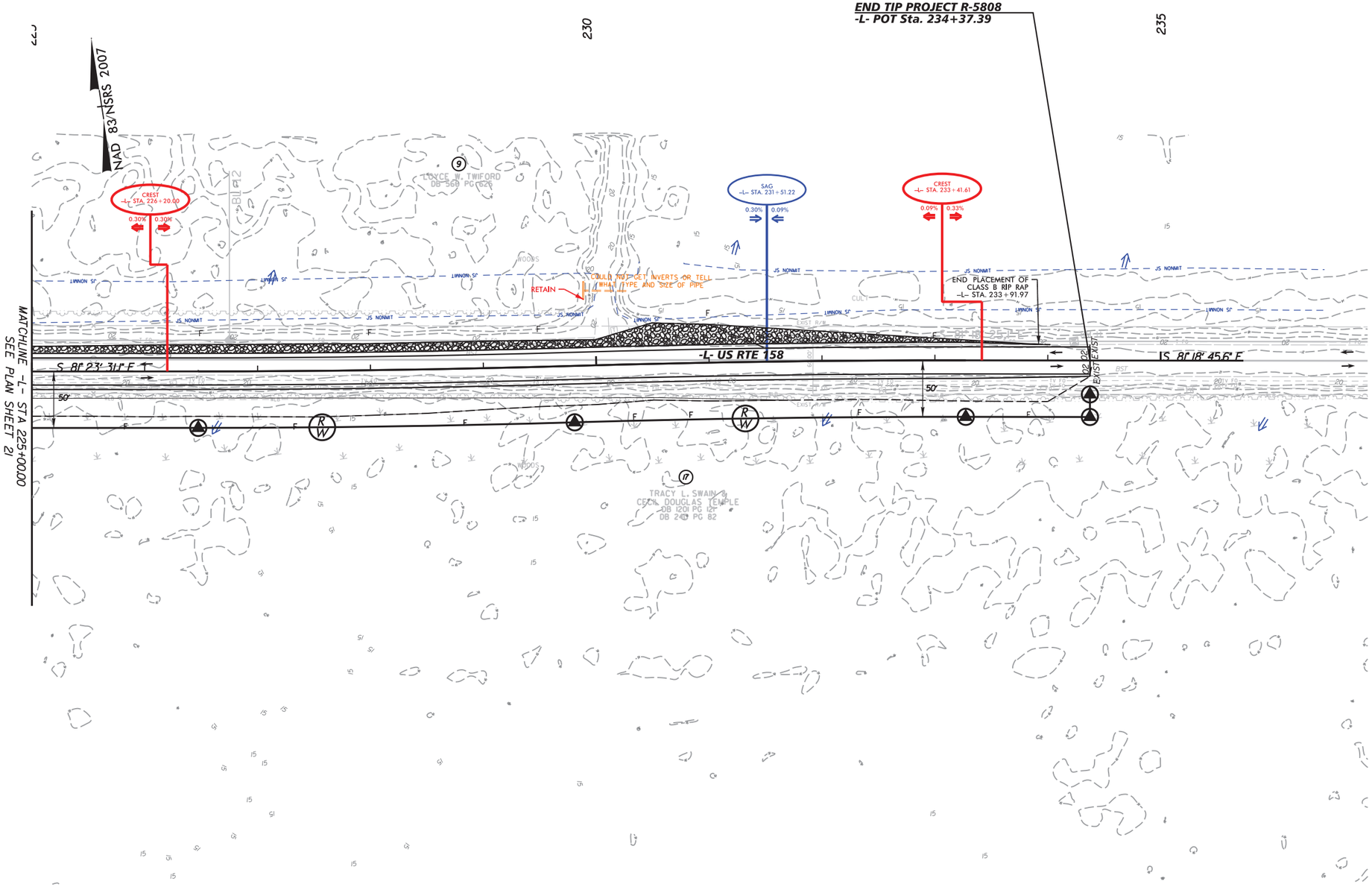
REVISIONS

-L-

PI Sta 228+13.41
Δ = 1° 39' 16.0" (LT)
D = 0° 29' 53.6"
L = 332.07'
T = 166.04'
R = 11,500.00'

PI Sta 231+53.44
Δ = 1° 44' 01.4" (RT)
D = 0° 29' 53.6"
L = 347.98'
T = 174.00'
R = 11,500.00'

**END TIP PROJECT R-5808**
**-L- POT Sta. 234+37.39**




SEE SHEET NO. 30 FOR -L- PROFILE

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VIRGINIA BEACH, VA 23462

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 23 |

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

**BEGIN CONSTRUCTION**
**BEGIN TIP PROJECT R-5808**
**-L- Sta. 17+59.05**

SSD = 1066'
ex = -0'
PI = 19+10.00
K = 155
EL = 37.20'
VC = 170'

ex = 3'
PI = 23+10.00
K = 137
EL = 24.80'
VC = 560'

40.21

(-)12.0000%
(-)13.0995%
(-)12.5312%
(-)12.45%
(-)13.0995%
(+)1.0000%

PROPOSED GRADE
EXISTING GROUND

BEGIN SPECIAL DITCH GRADE RT
-L- STA 18+00
ELEV = 36.58'

BEGIN SPECIAL DITCH GRADE LT
-L- STA 18+00
ELEV = 36.58'

END SPECIAL DITCH GRADE LT
-L- STA 21+00
ELEV = 29.00'

END SPECIAL DITCH GRADE RT
-L- STA 21+50
ELEV = 28.00'

39.40 38.37 37.21 35.89 34.41 32.87 31.49 30.28 29.26 28.43 27.78 27.31 27.02

BM-A ELEVATION = 26.07
N 988979 E 2722075
BL STATION 9+99.00 0 LEFT
ROD & CAP IN GROUND

**SEE SHEET NO. 4 AND 5 FOR -L- PLAN**
**-L- US 158**

CULVERT HYDRAULIC DATA
2 @ 14'x7' RCBC (BURIED 1')
STA 24+60 -L-

| | |
|---|---|
| DESIGN DISCHARGE | = 600 CFS |
| DESIGN FREQUENCY | = 50 YRS |
| DESIGN HW ELEVATION | = 22.85 FT |
| BASE DISCHARGE | = 1290 CFS |
| BASE FREQUENCY | = 100 YRS |
| BASE HW ELEVATION | = 25.08 FT |
| OVERTOPPING DISCHARGE | = 1800 CFS |
| OVERTOPPING FREQUENCY | = 500+ YRS |
| OVERTOPPING ELEVATION | = 26.91 FT |

SSD = 631'
ex = -1'
PI = 32+40.00
K = 160
EL = 44.49'
VC = 400'

ex = 1'
PI = 27+50.00
K = 142
EL = 29.20'
VC = 300'

(+)1.0000%
(+)3.1200%
(+)3.1200%
(+)0.6172%

PROPOSED GRADE
EXISTING GROUND

27.02 26.91 26.99 27.26 27.70 28.29 29.05 29.99 31.11 32.41 33.88 35.44 37.00 38.55 40.00 41.30 42.44 43.42 44.24 44.91 45.42 45.78 46.09 46.40 46.71 47.02 47.32 47.60 47.72

BM-B ELEVATION = 28.29
N 988903 E 2722568
BL STATION 14+98.00 15 LEFT
ROD & CAP IN GROUND

BM-C ELEVATION = 45.67
N 988722 E 2723543
BL STATION 24+90.00 20 RIGHT
ROD & CAP IN GROUND

**SEE SHEET NO. 5 AND 6 FOR -L- PLAN**
**-L- US 158**

8/19/2022

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RIGHT-OF-WAY REV.

CONST. REV.

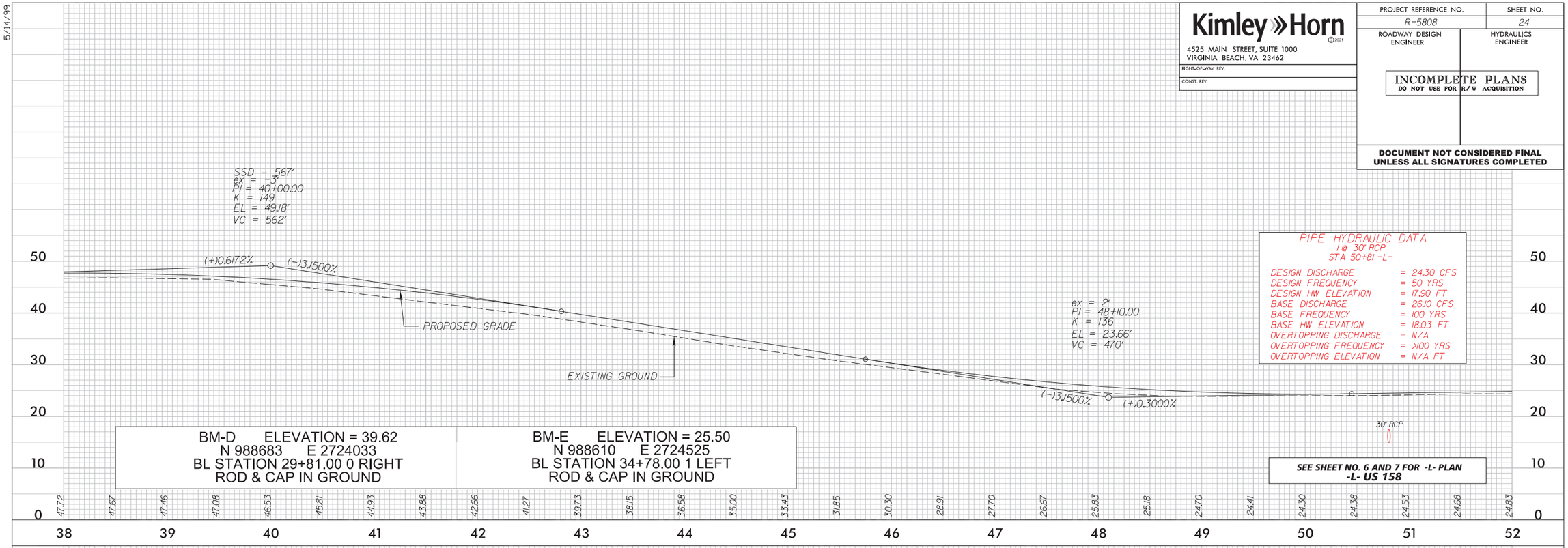
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 24 |

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

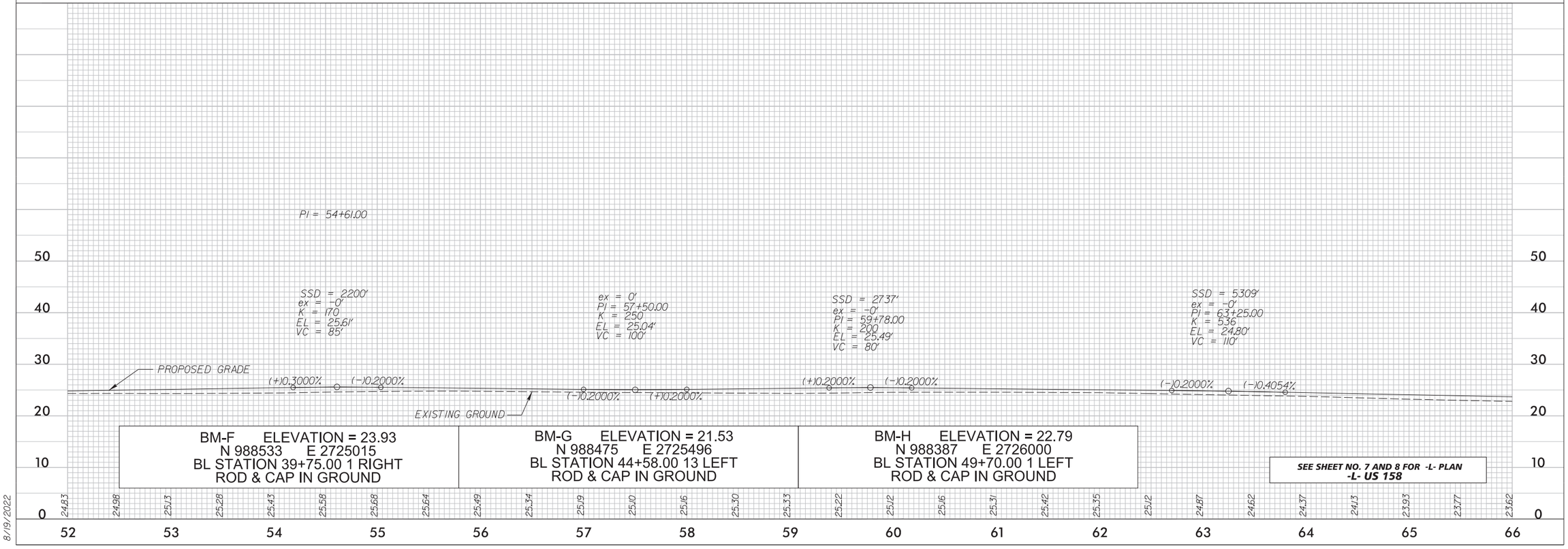
**INCOMPLETE PLANS**
**DO NOT USE FOR R/W ACQUISITION**

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**




PIPE HYDRAULIC DATA
1 @ 30" RCP
STA 50+81 -L-

| | |
|---|---|
| DESIGN DISCHARGE | = 24.30 CFS |
| DESIGN FREQUENCY | = 50 YRS |
| DESIGN HW ELEVATION | = 17.90 FT |
| BASE DISCHARGE | = 26.10 CFS |
| BASE FREQUENCY | = 100 YRS |
| BASE HW ELEVATION | = 18.03 FT |
| OVERTOPPING DISCHARGE | = N/A |
| OVERTOPPING FREQUENCY | = >100 YRS |
| OVERTOPPING ELEVATION | = N/A FT |

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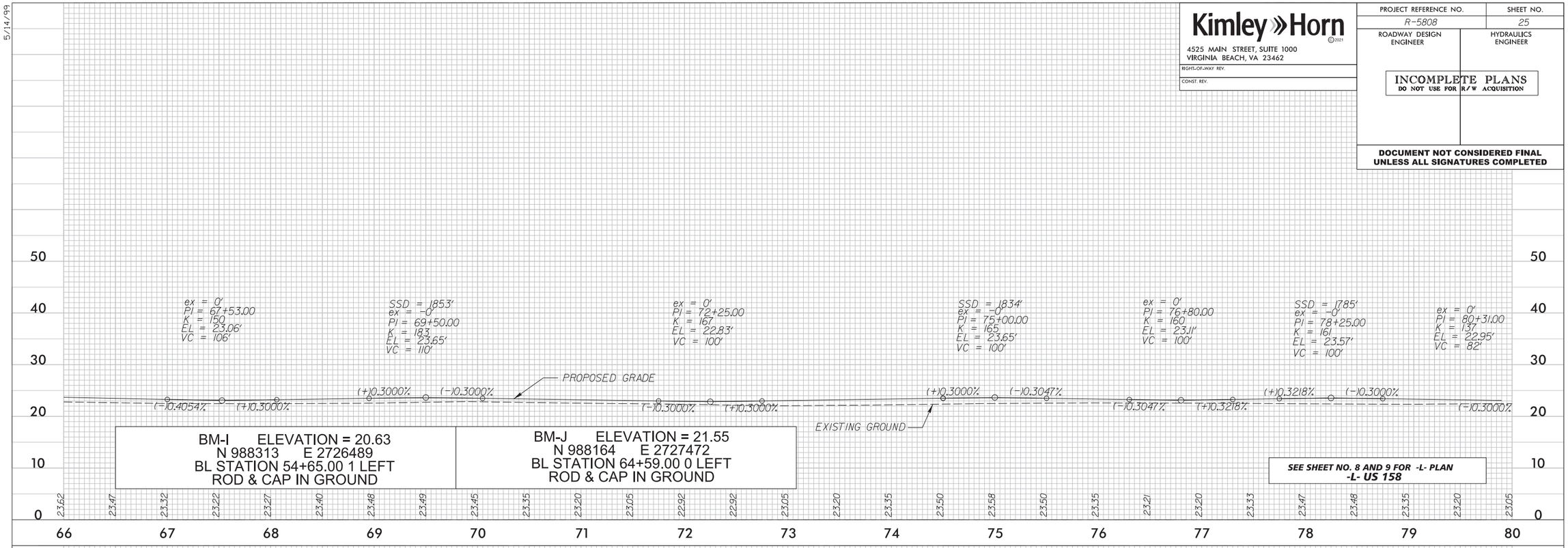
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 25 |

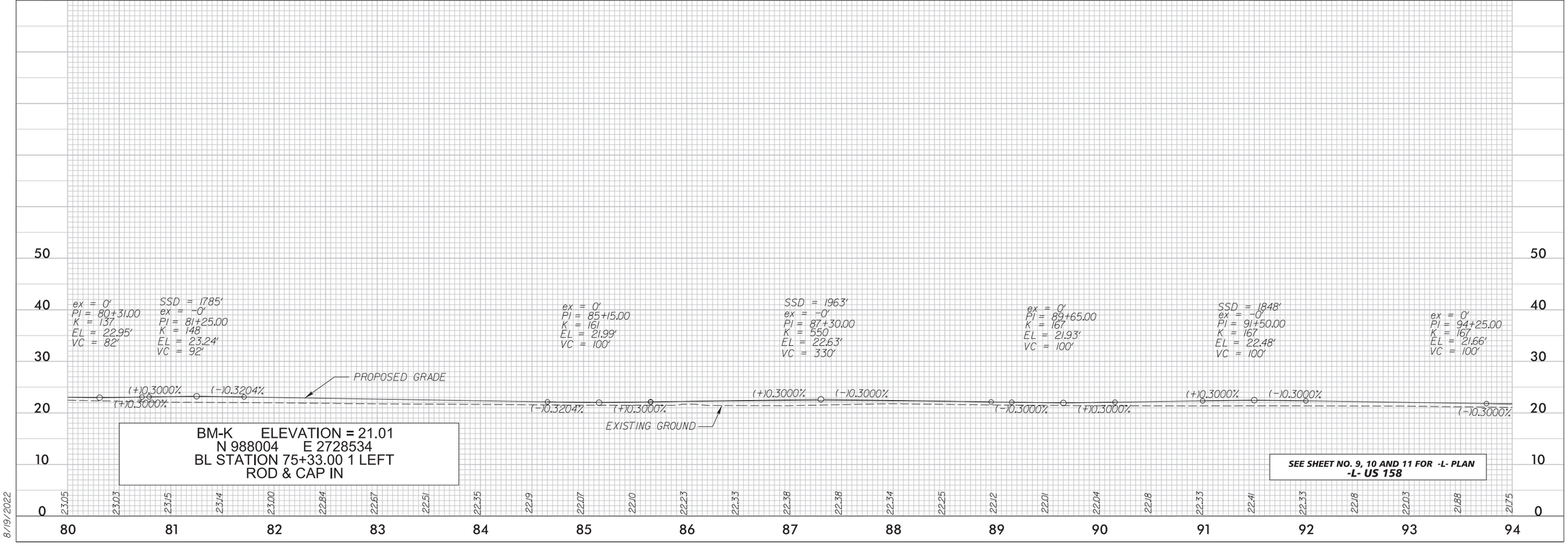
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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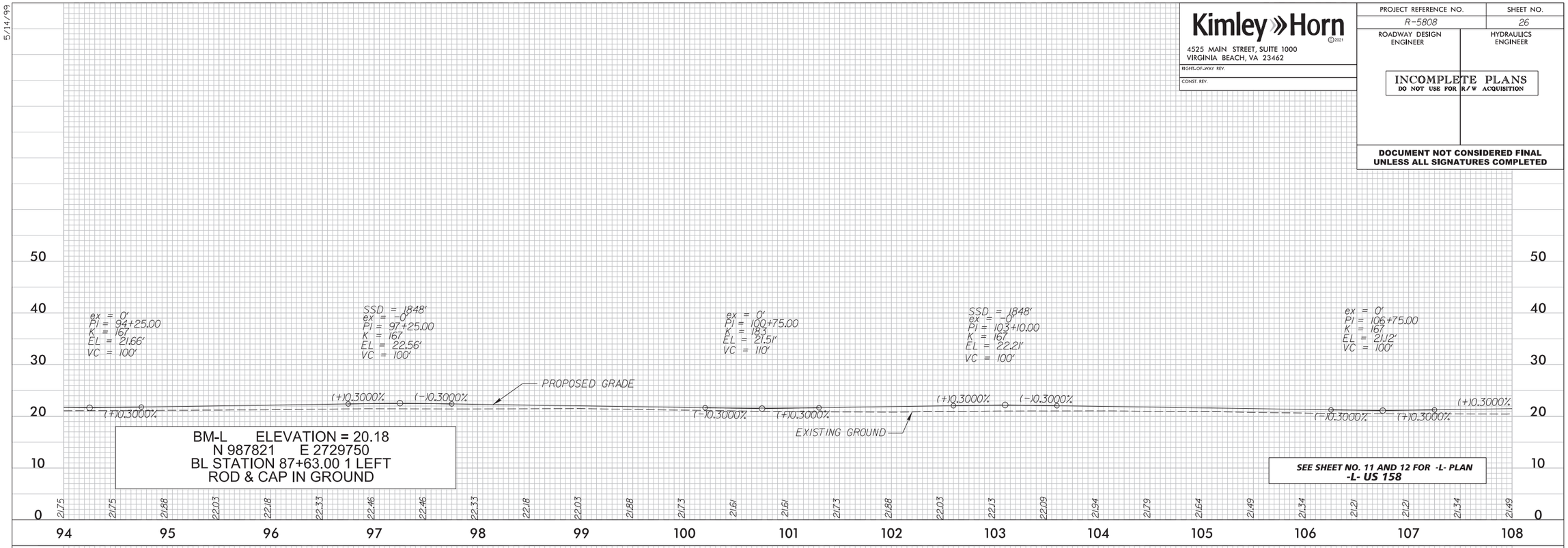
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 26 |

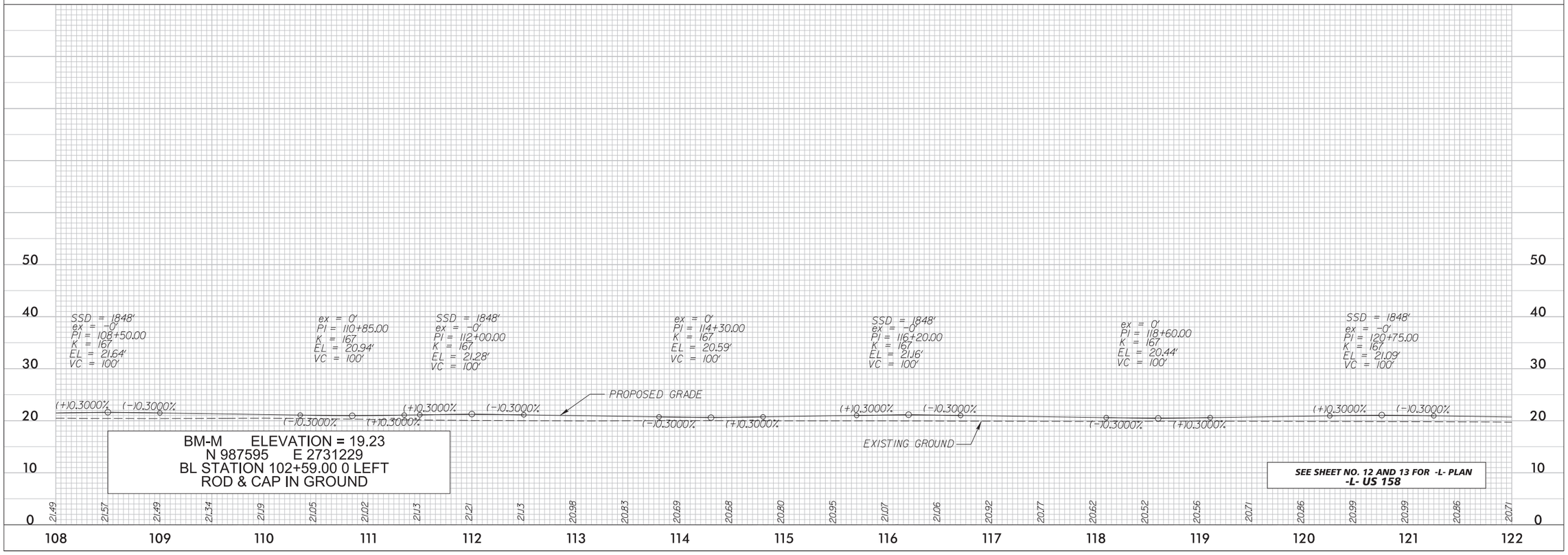
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

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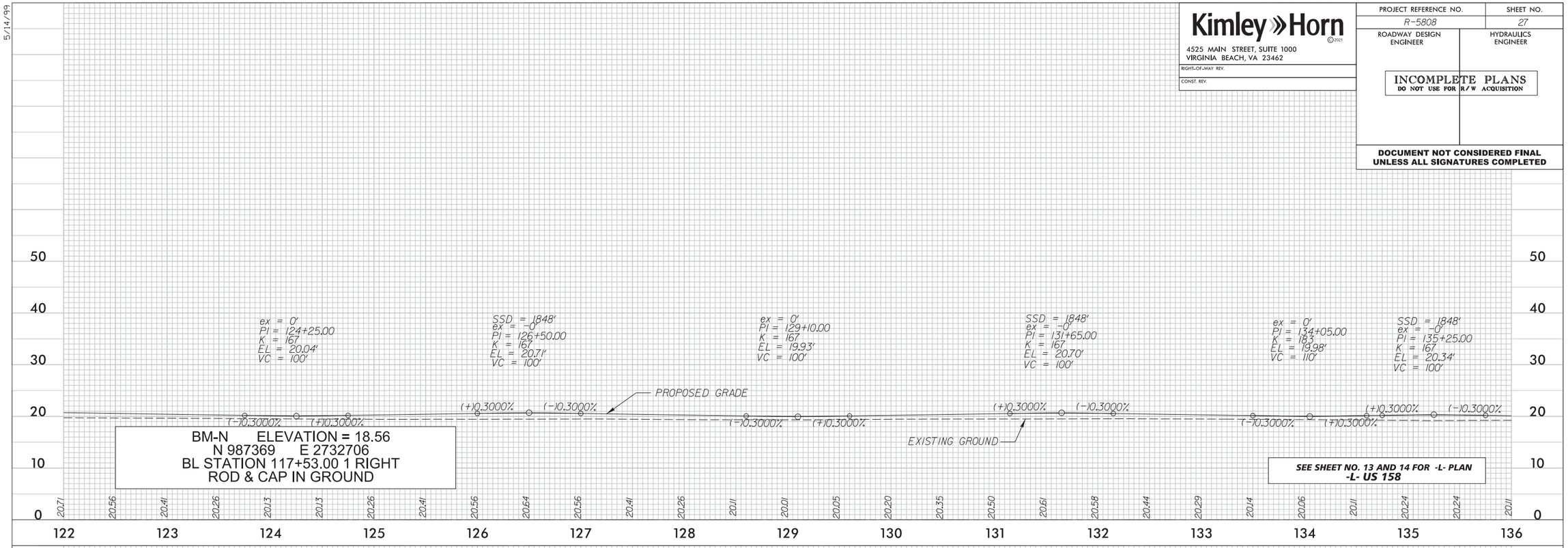
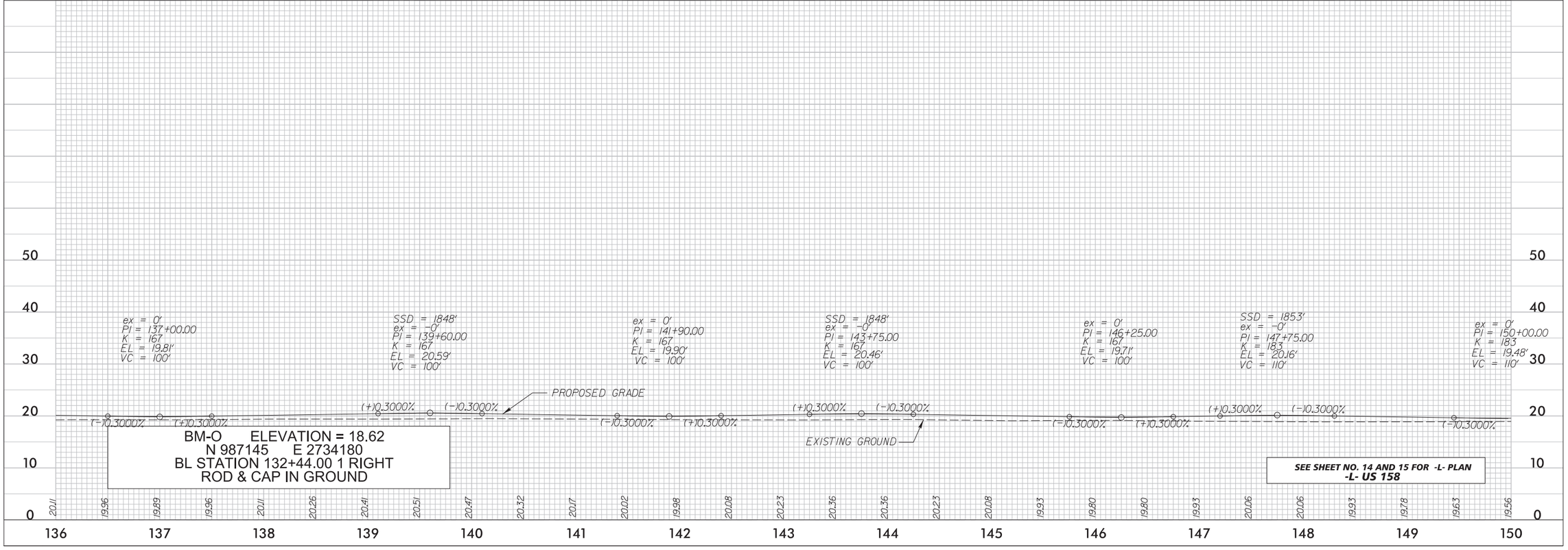
CONST. REV.

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 27 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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RIGHT-OF-WAY REV.
CONST. REV.

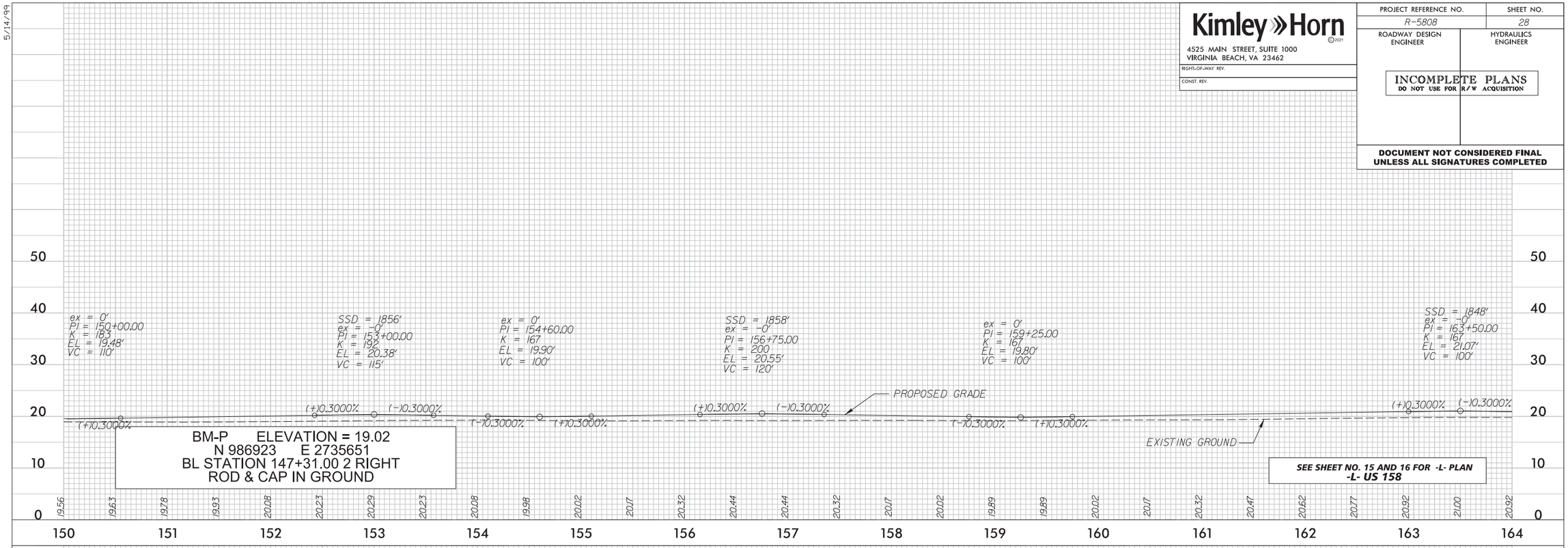
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 28 |

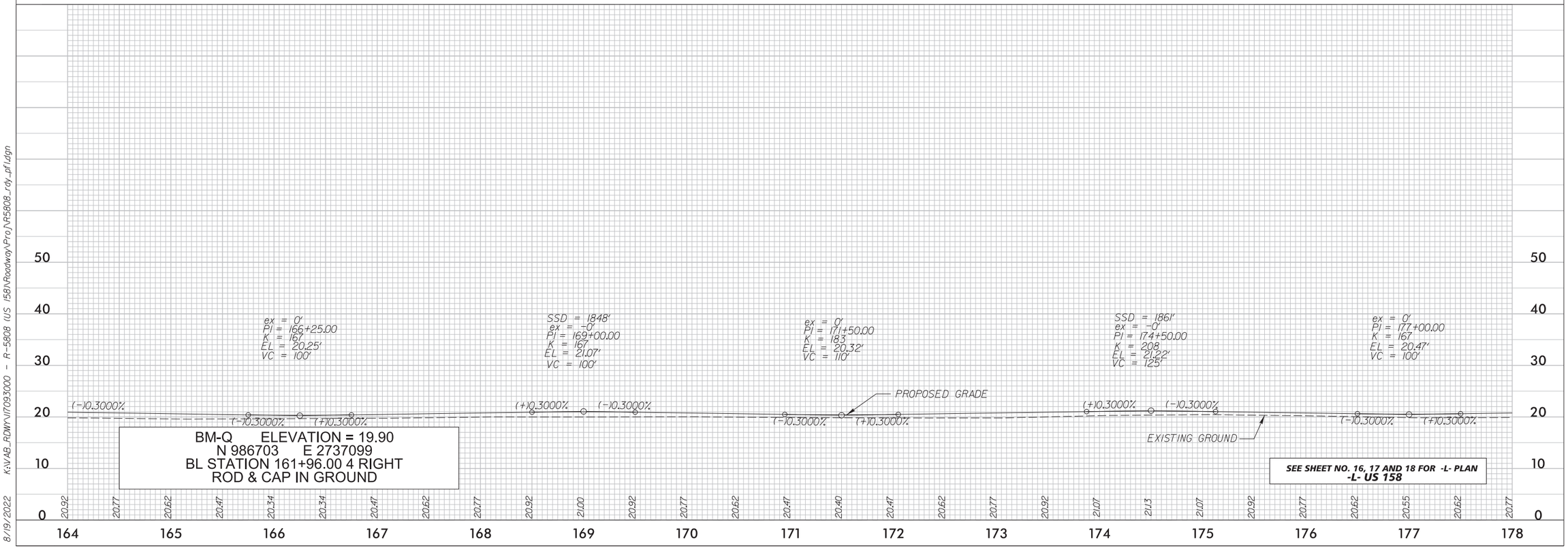
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**




K:\VAB_RDWY\I7093000 - R-5808 US 158\Roadway\Pro\NR5808_rdy_pf1.dgn
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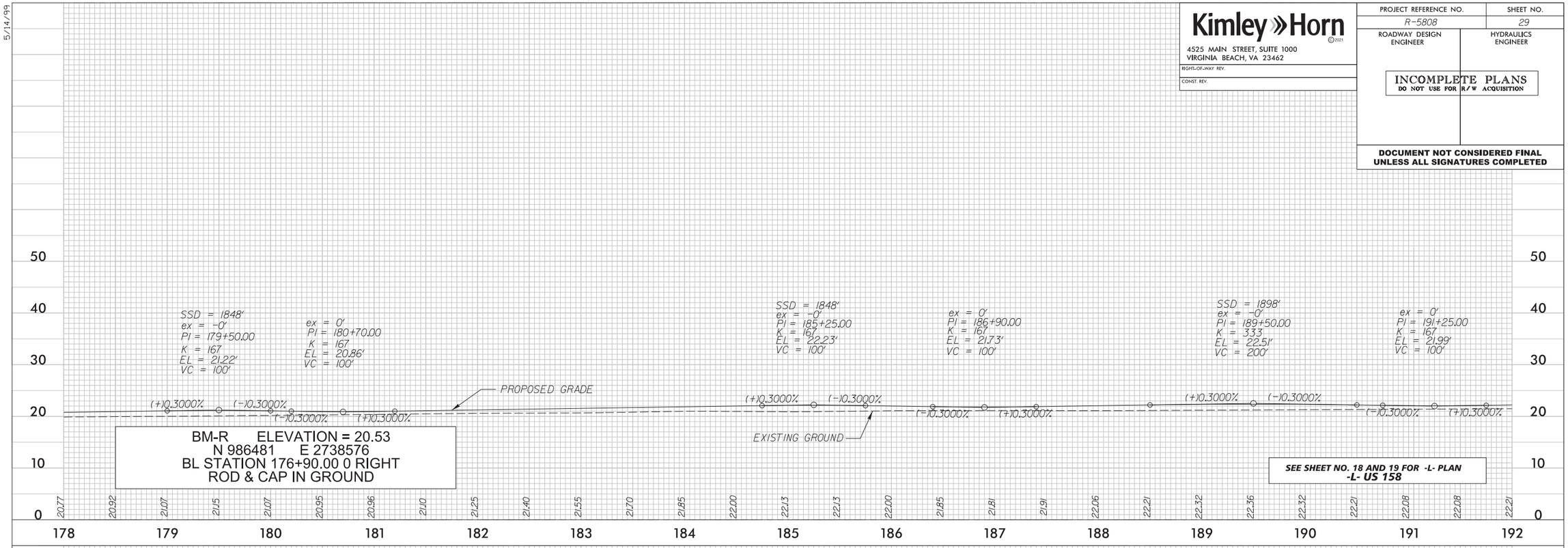
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 29 |

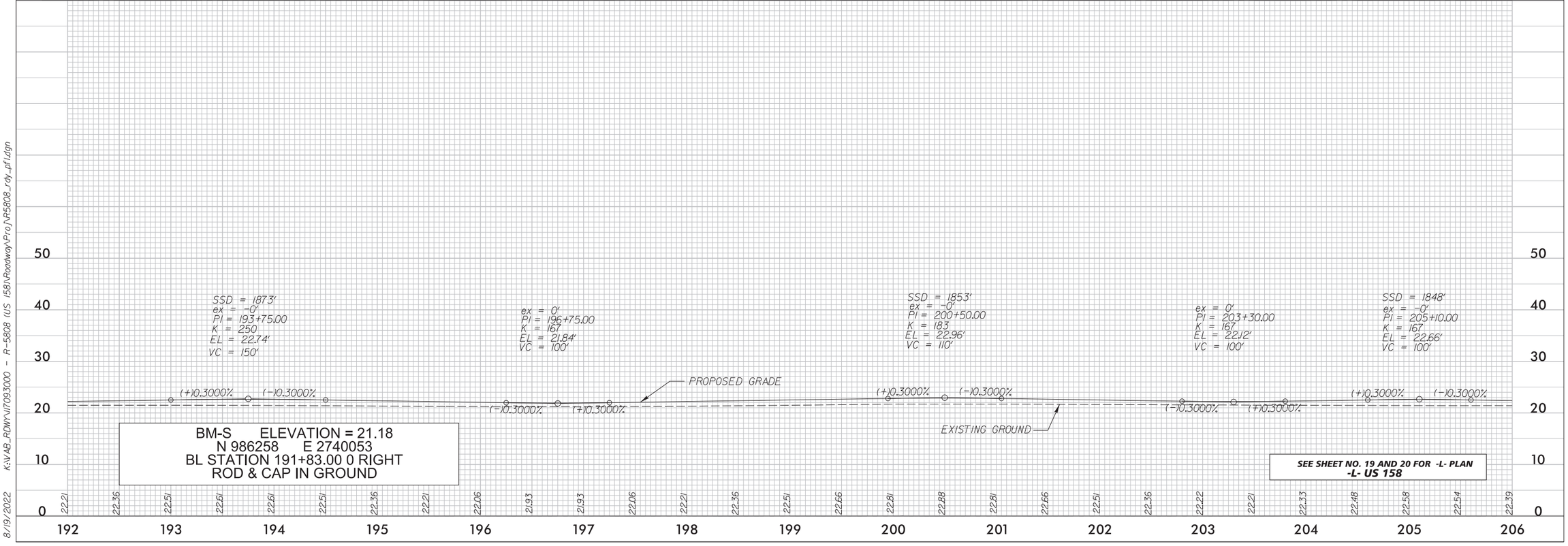
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**



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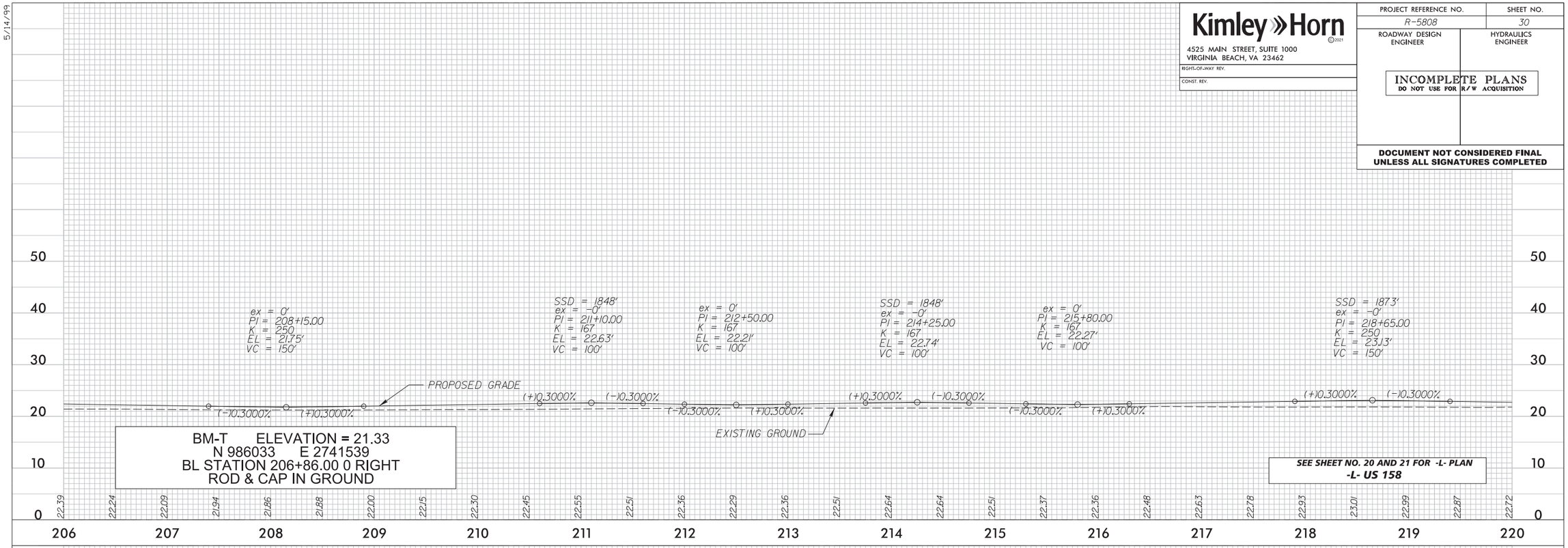
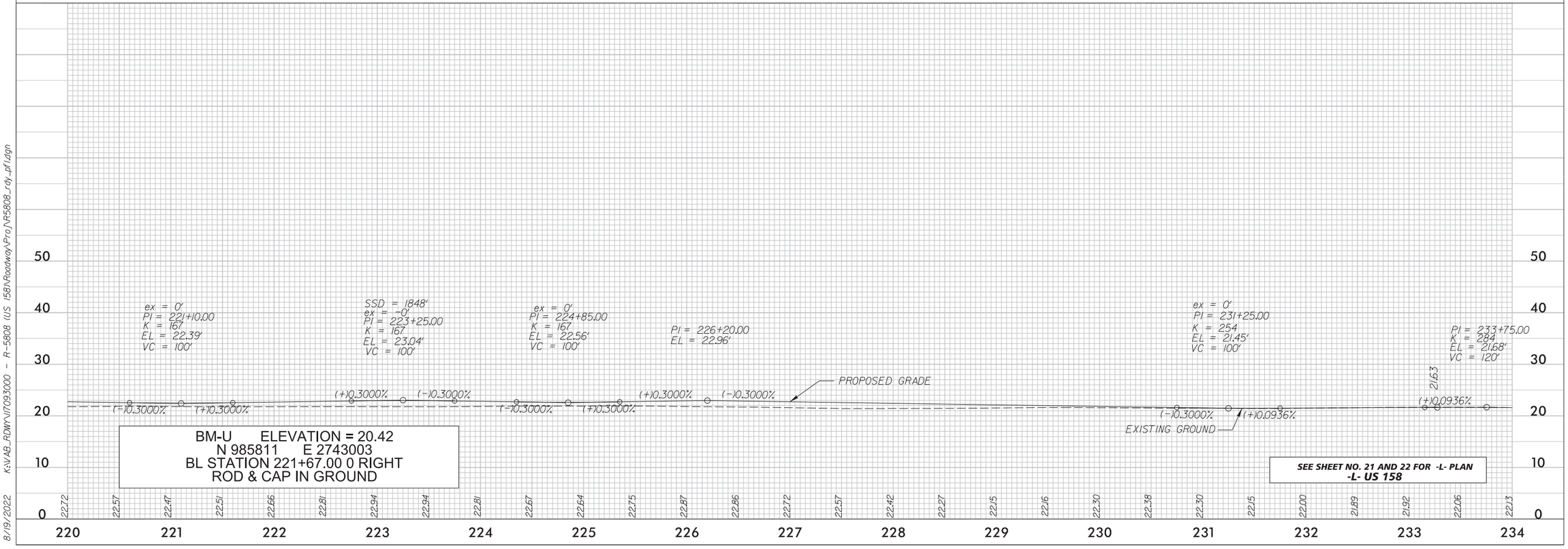
VIRGINIA BEACH, VA 23462
RIGHT-OF-WAY REV.
CONST. REV.

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 30 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

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8/19/2022

5/14/99

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VIRGINIA BEACH, VA 23462
RIGHT-OF-WAY REV.
CONST. REV.

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 31 |

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

***END CONSTRUCTION***
***END TIP PROJECT R-5808***
***-L- Sta. 234+37.39***

***END GRADE***
***US 158 Sta. 234+37.39***
***ELEV = 21.26'***

21.47
(-)0.3286%
21.42

234 235

***SEE SHEET NO. 22 FOR -L- PLAN***
***-L- US 158***

**-DRW1-**

-DRW1- POT Sta. 10+00.00
-L- POT Sta. 39+30.30=
ELEV = 47.25'
PI = 10+16.00
EL = 46.93'
PI = 10+27.00
EL = 46.05'
END CONSTRUCTION
END GRADE
-DRW1- Sta. 10+32.00
ELEV = 45.98'
(-)12.0000%
(-)8.0000%
(-)11.4353%
EXISTING GROUND
PROPOSED GRADE

***SEE SHEET NO. 6 FOR -DRW1- PLAN***

**-DRW2-**

-DRW2- POT Sta. 10+00.00
-L- POT Sta. 42+51.37=
ELEV = 41.23'
PI = 10+16.00
EL = 40.91'
PI = 10+23.00
EL = 41.47'
END CONSTRUCTION
END GRADE
-DRW2- Sta. 10+29.00
ELEV = 41.77'
(-)12.0000%
(+)15.0000%
(+)18.0000%
PROPOSED GRADE
EXISTING GROUND

***SEE SHEET NO. 6 FOR -DRW2- PLAN***

**-DRW3-**

-DRW3- POT Sta. 10+00.00
-L- POT Sta. 116+36.91=
ELEV = 20.33'
PI = 10+16.00
EL = 20.01'
PI = 10+75.00
EL = 15.29'
END CONSTRUCTION
END GRADE
-DRW3- Sta. 11+00.00
ELEV = 14.87'
(-)12.0000%
(-)18.0000%
(-)11.6647%
EXISTING GROUND
PROPOSED GRADE

***SEE SHEET NO. 17 FOR -DRW3- PLAN***

**-DRW4-**

-DRW4- POT Sta. 10+00.00
-L- POT Sta. 166+91.63=
ELEV = 20.45'
PI = 10+16.00
EL = 20.13'
PI = 10+23.00
EL = 19.57'
END CONSTRUCTION
END GRADE
-DRW4- Sta. 10+25.00
ELEV = 19.46'
(-)2.0000%
(-)18.0000%
PROPOSED GRADE
EXISTING GROUND

***SEE SHEET NO. 17 FOR -DRW4- PLAN***

9 10 11

8/19/2022 K:\NAB_RDWY\17093000 - R-5808 (US 158)\Roadway\Proj\R5808_rdy_pf1.dgn

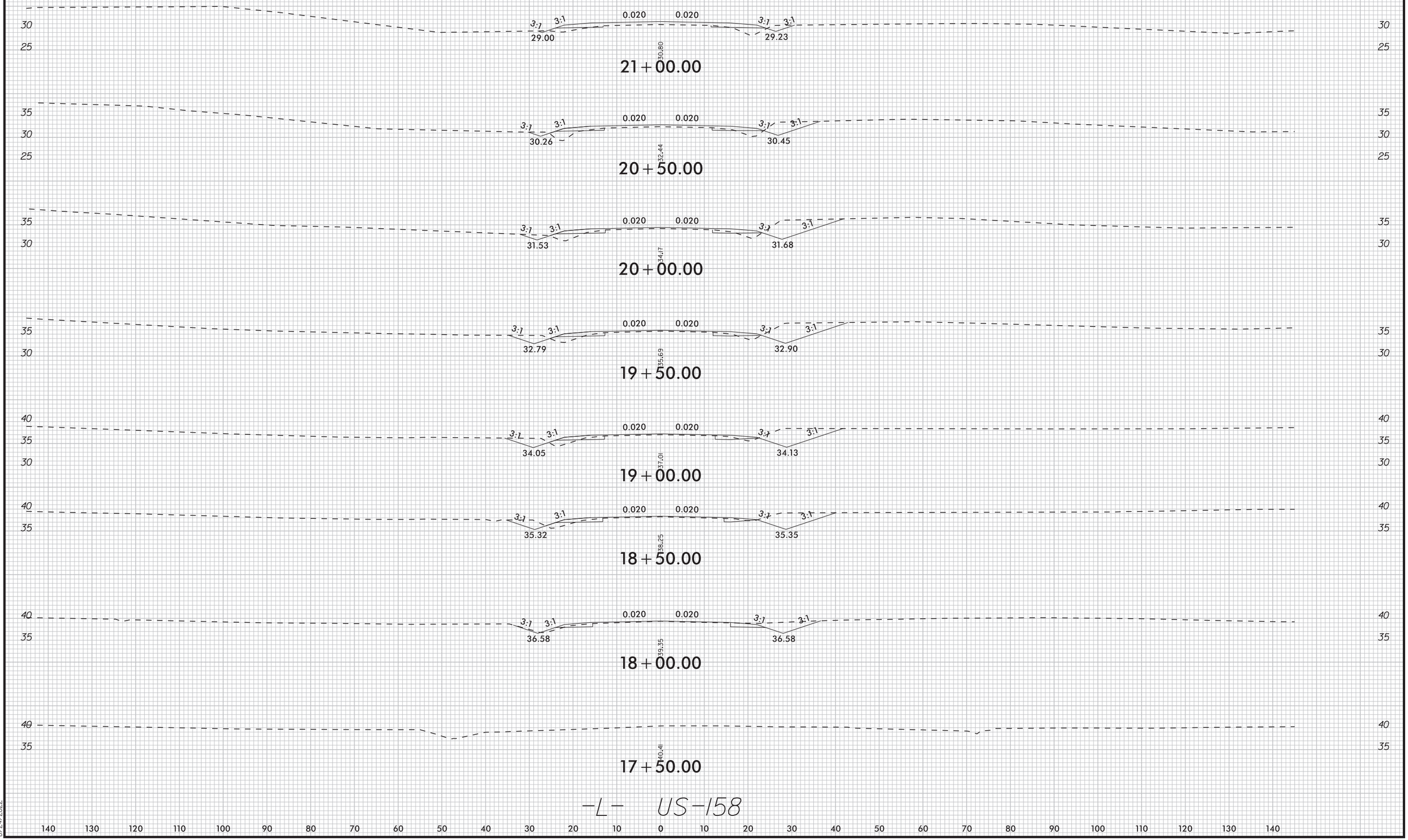
# Appendix D: Drainage Cross Sections

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-2 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



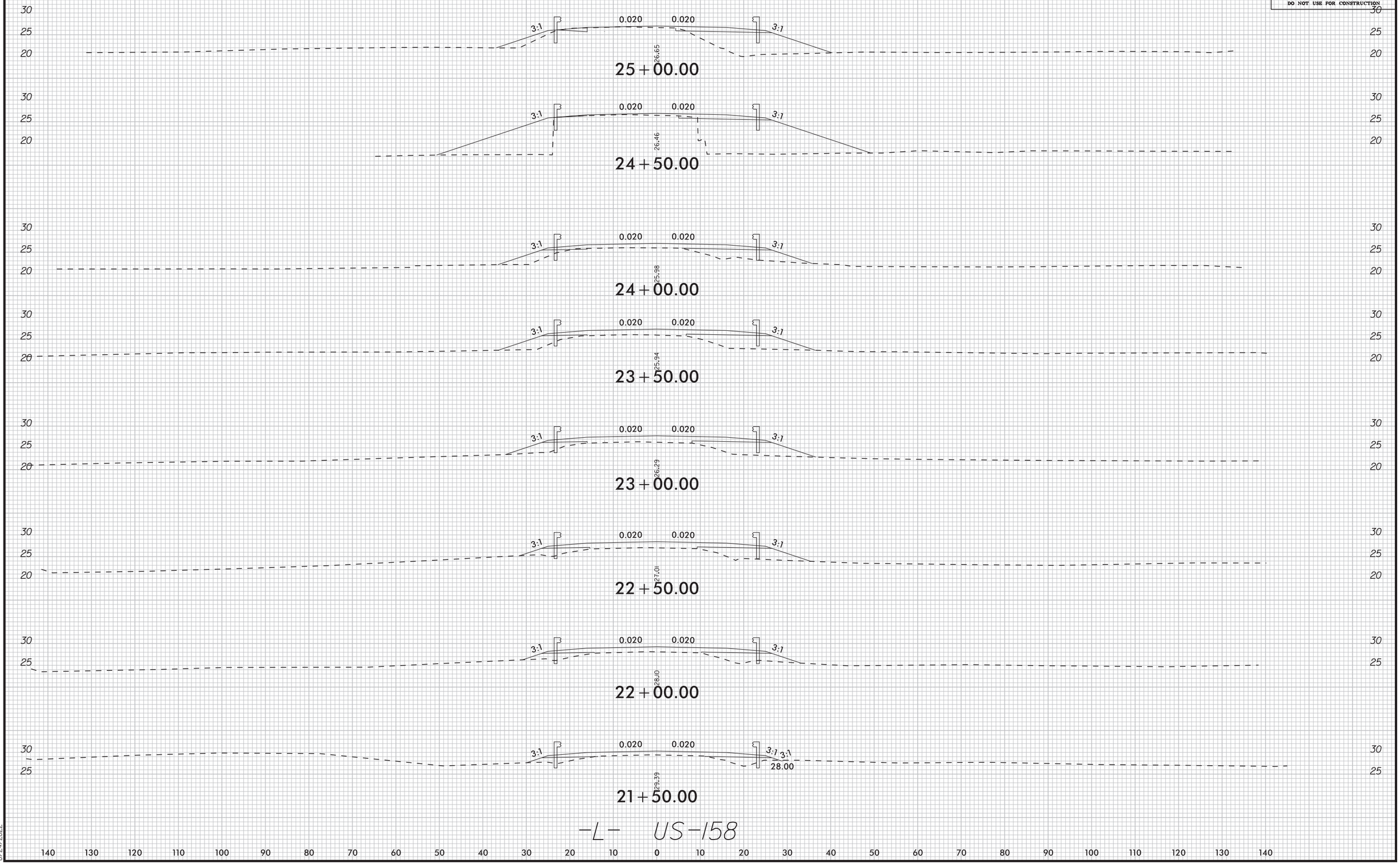

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-3 |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



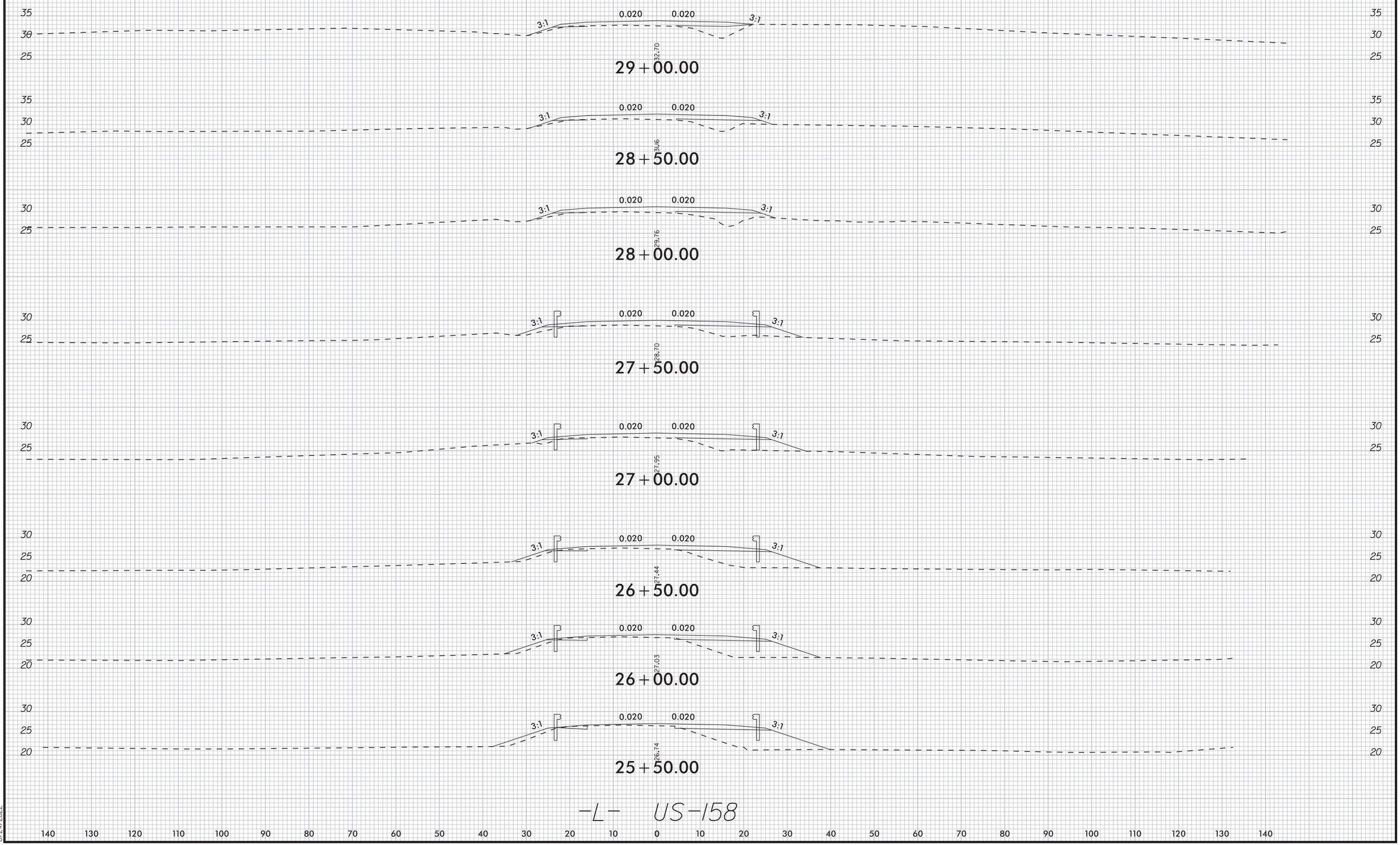

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-4 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




8/24/2022

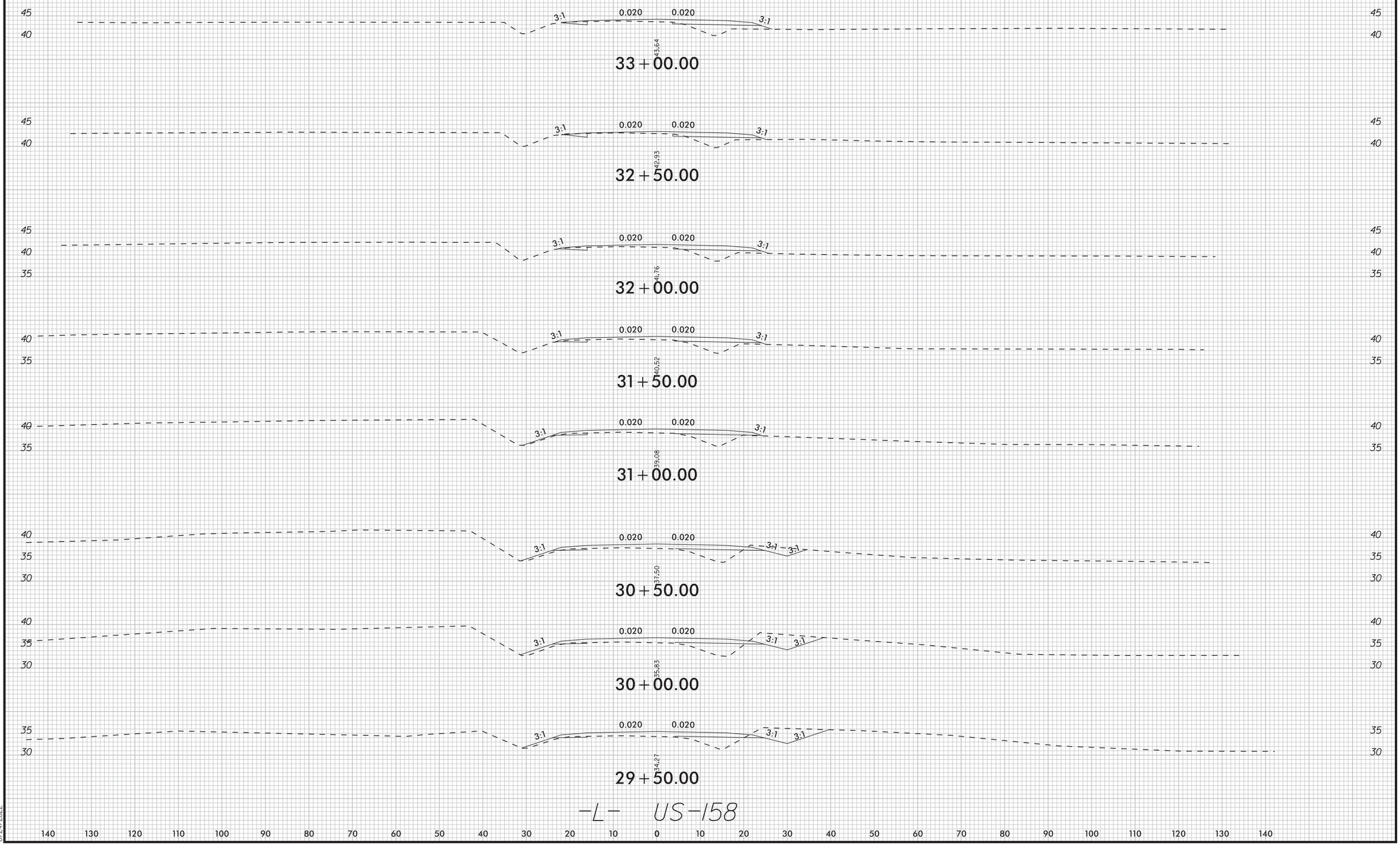
8/23/99

0 5 10

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | X-5 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




8/24/2022

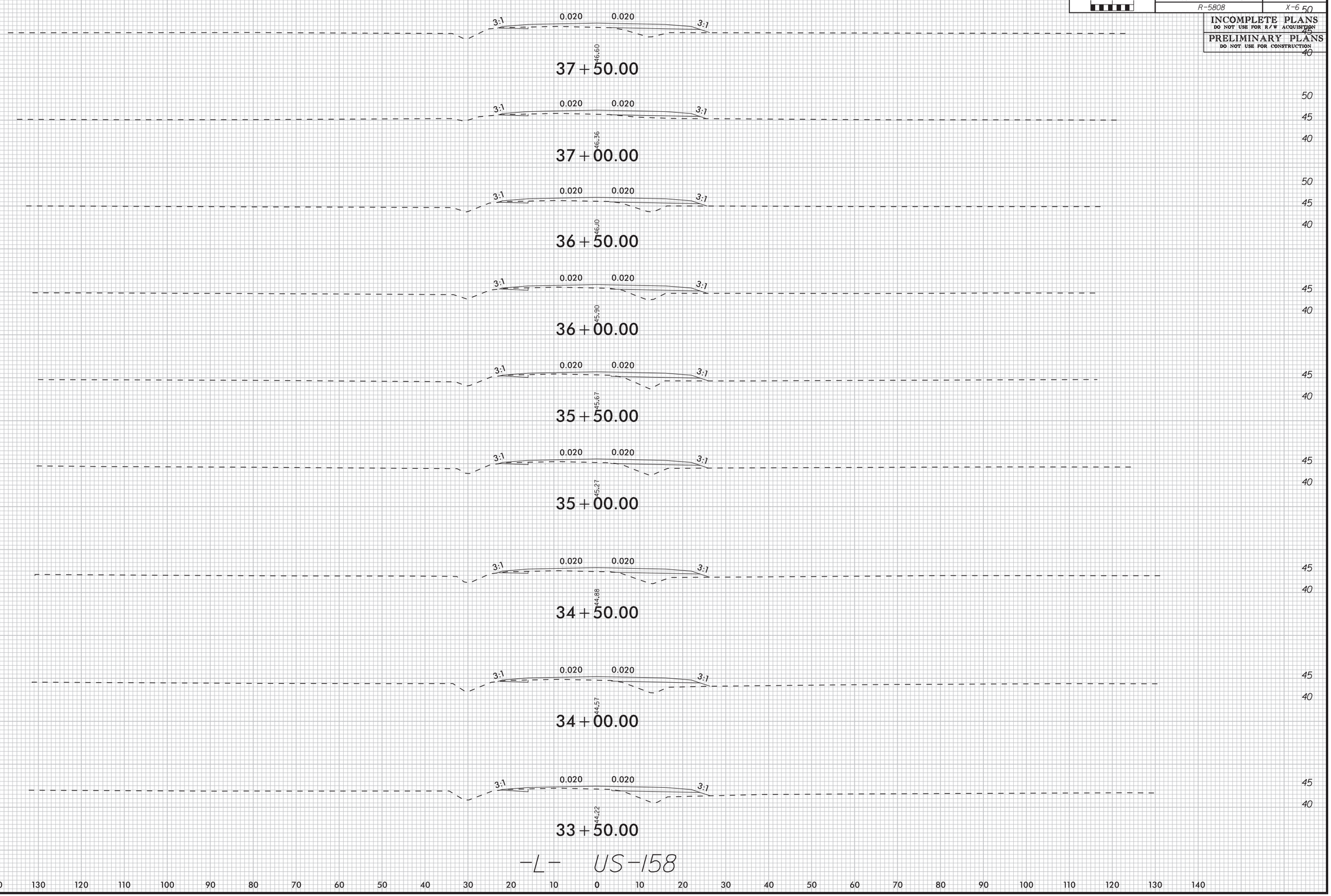
8/23/99

0 5 10

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | X-6 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



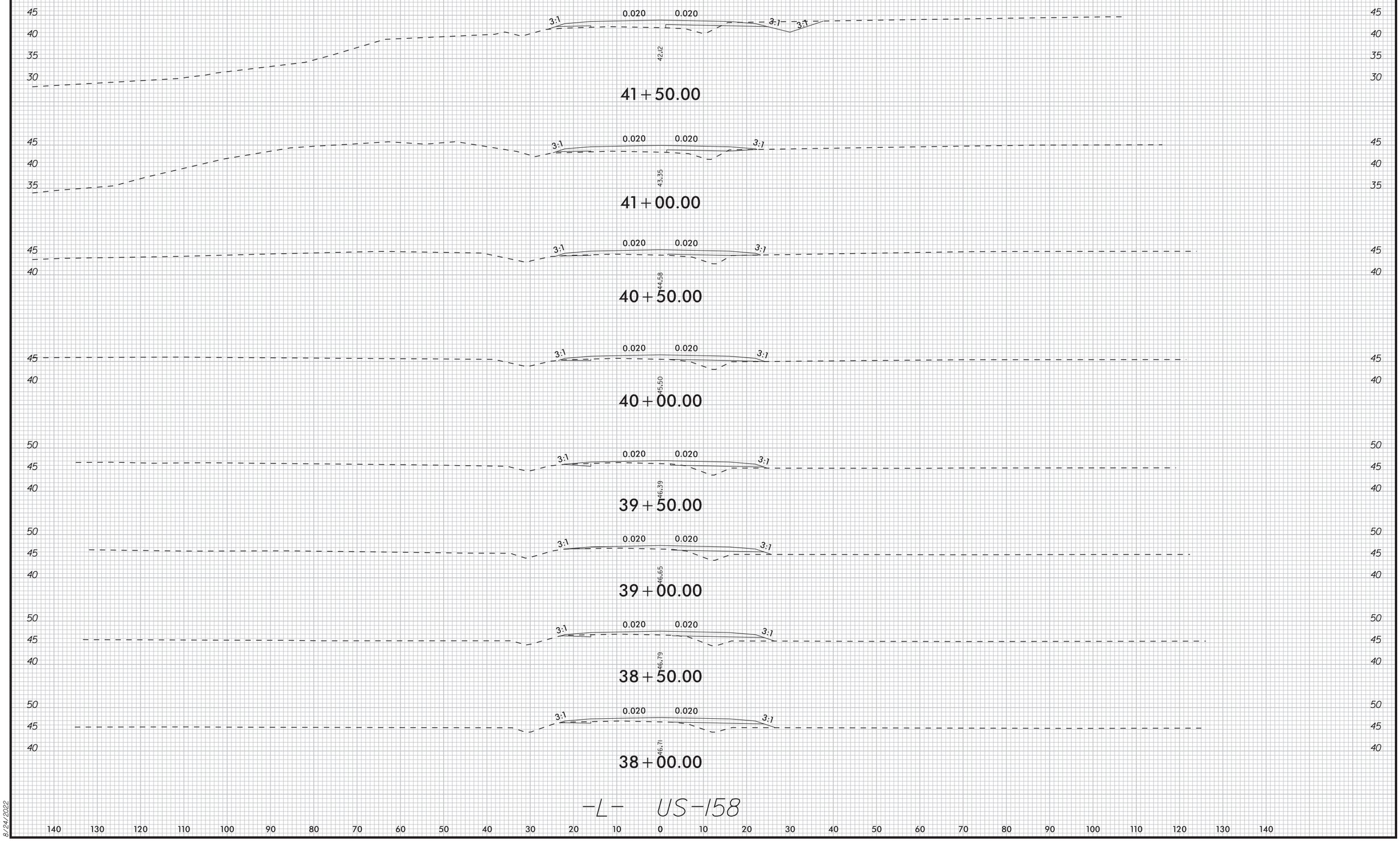

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-7 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



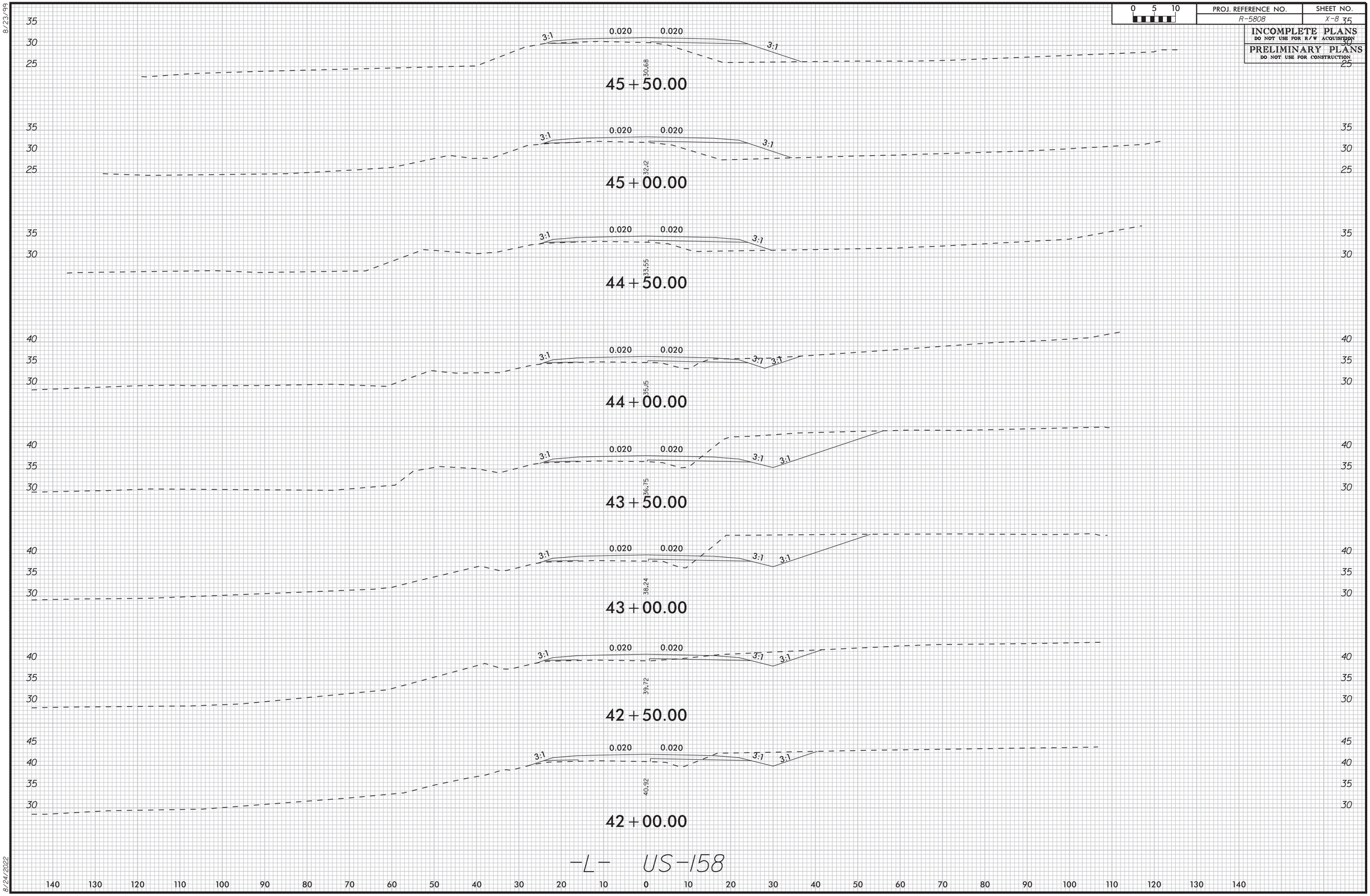

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-8 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



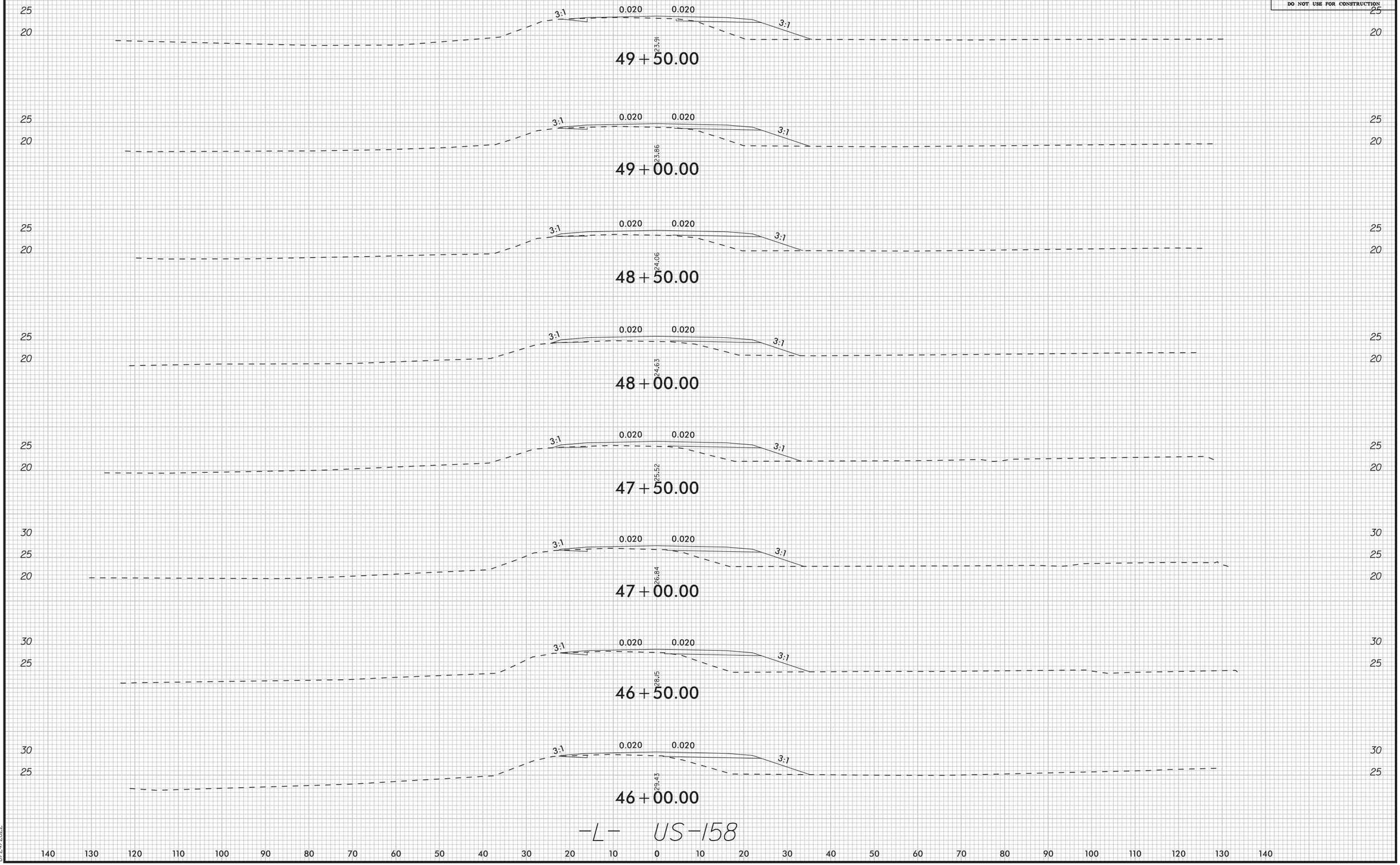

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-9 |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



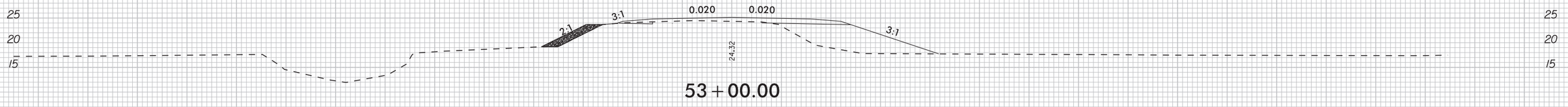

8/24/2022

8/23/99

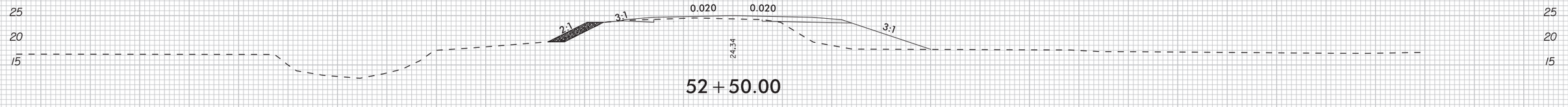
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-10 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




53+00.00

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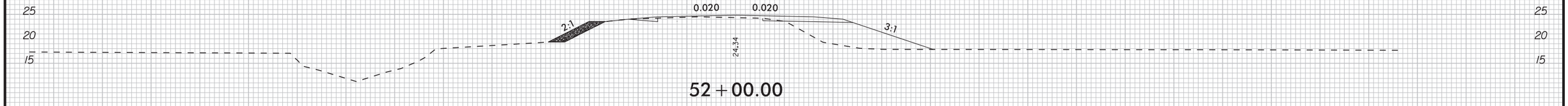


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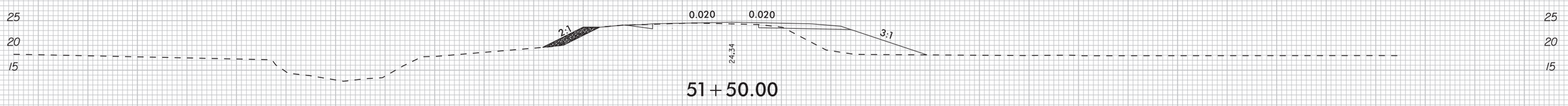
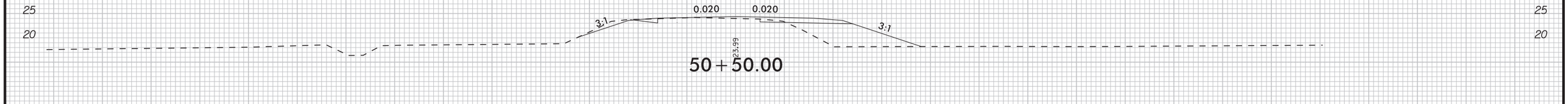
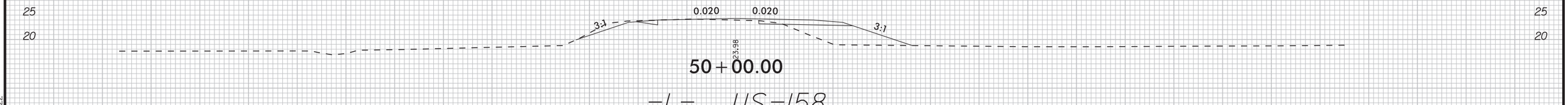



51+50.00


51+00.00




50+50.00




50+00.00

-L- US-158

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

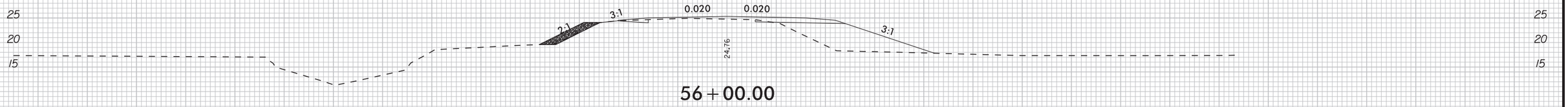
8/24/2022

8/23/99

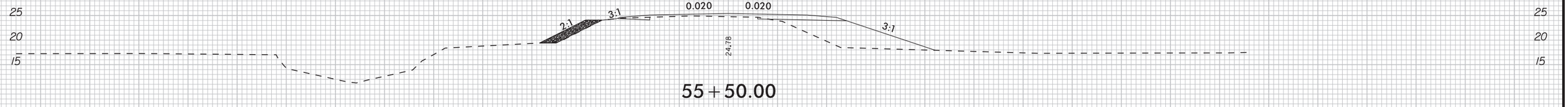
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-11 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




56+00.00

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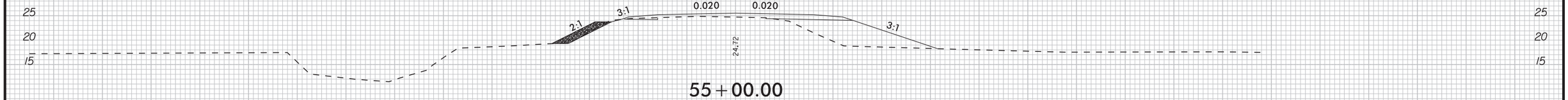
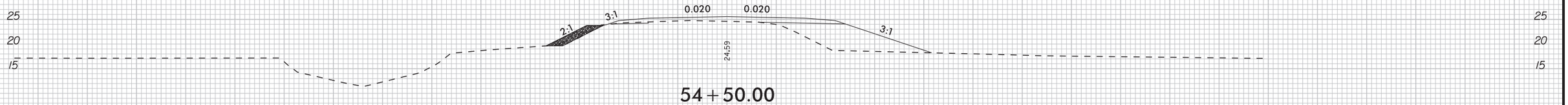
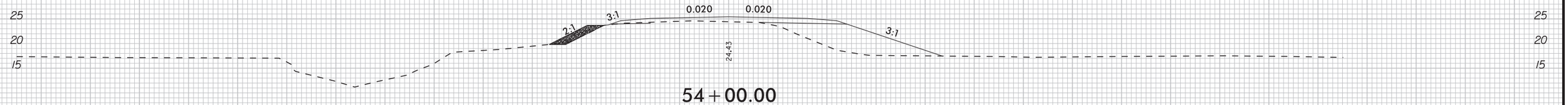



55+00.00




54+50.00

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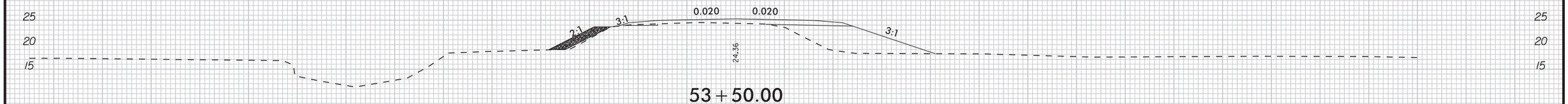



53+50.00

-L- US-158

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

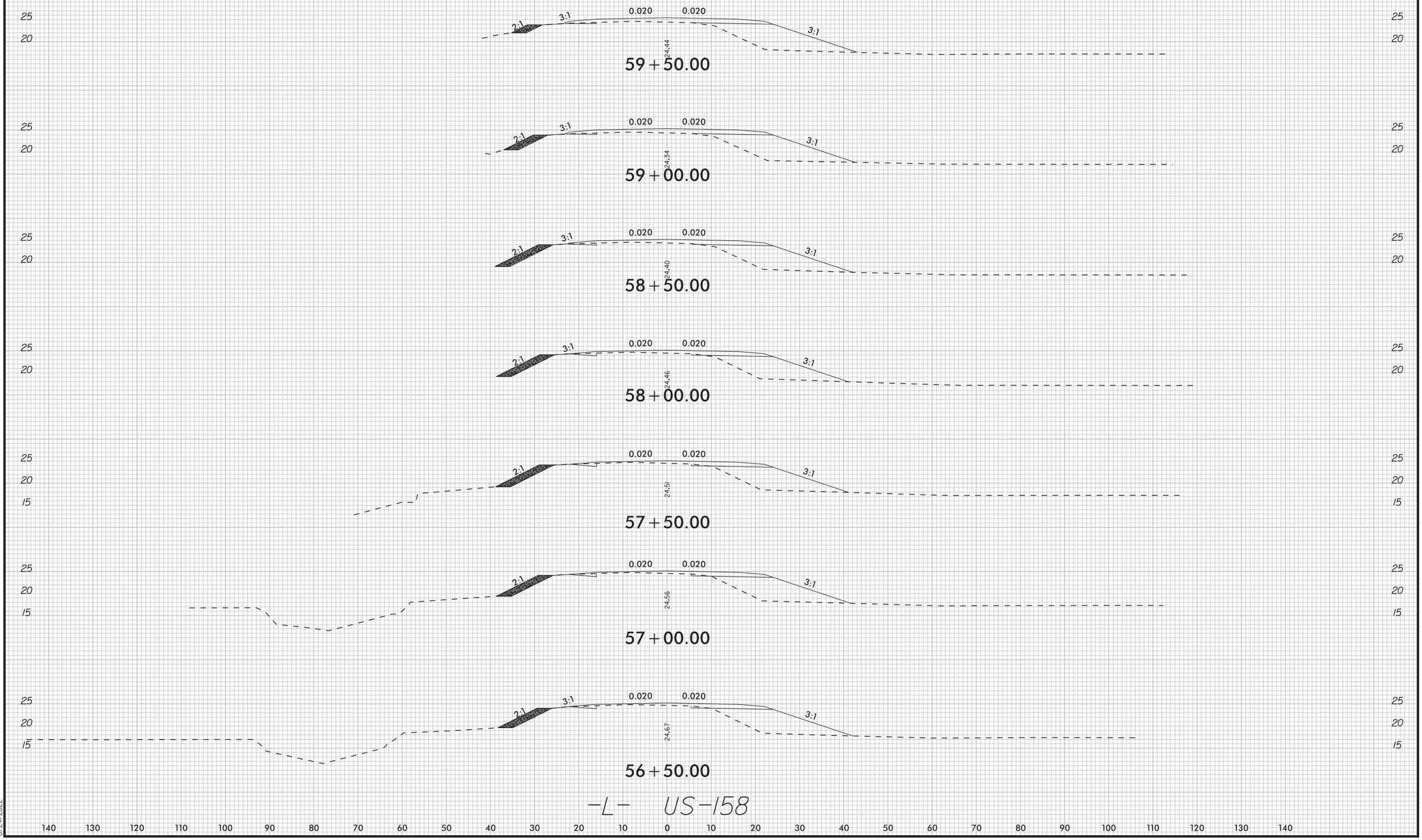
8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-12 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



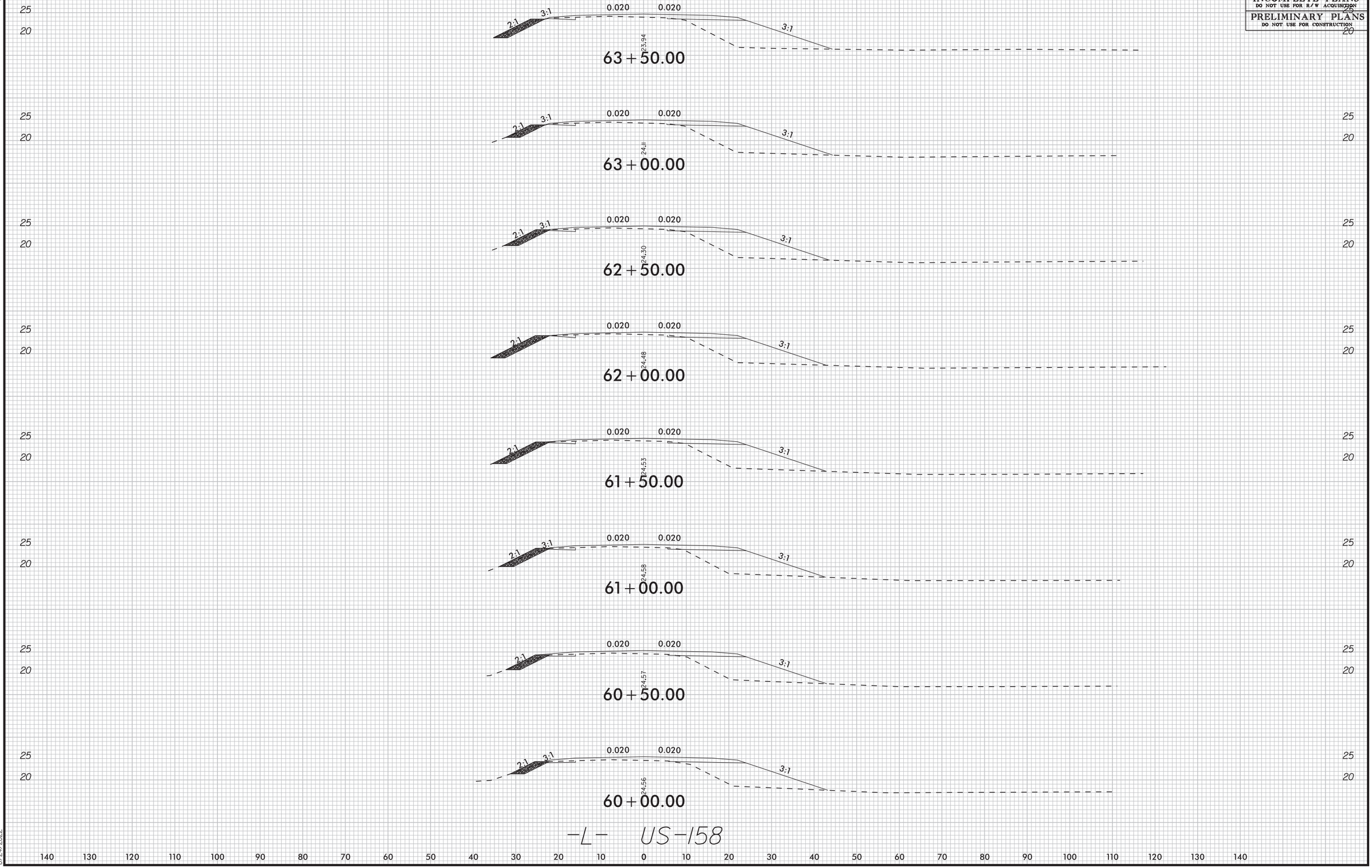

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-13 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



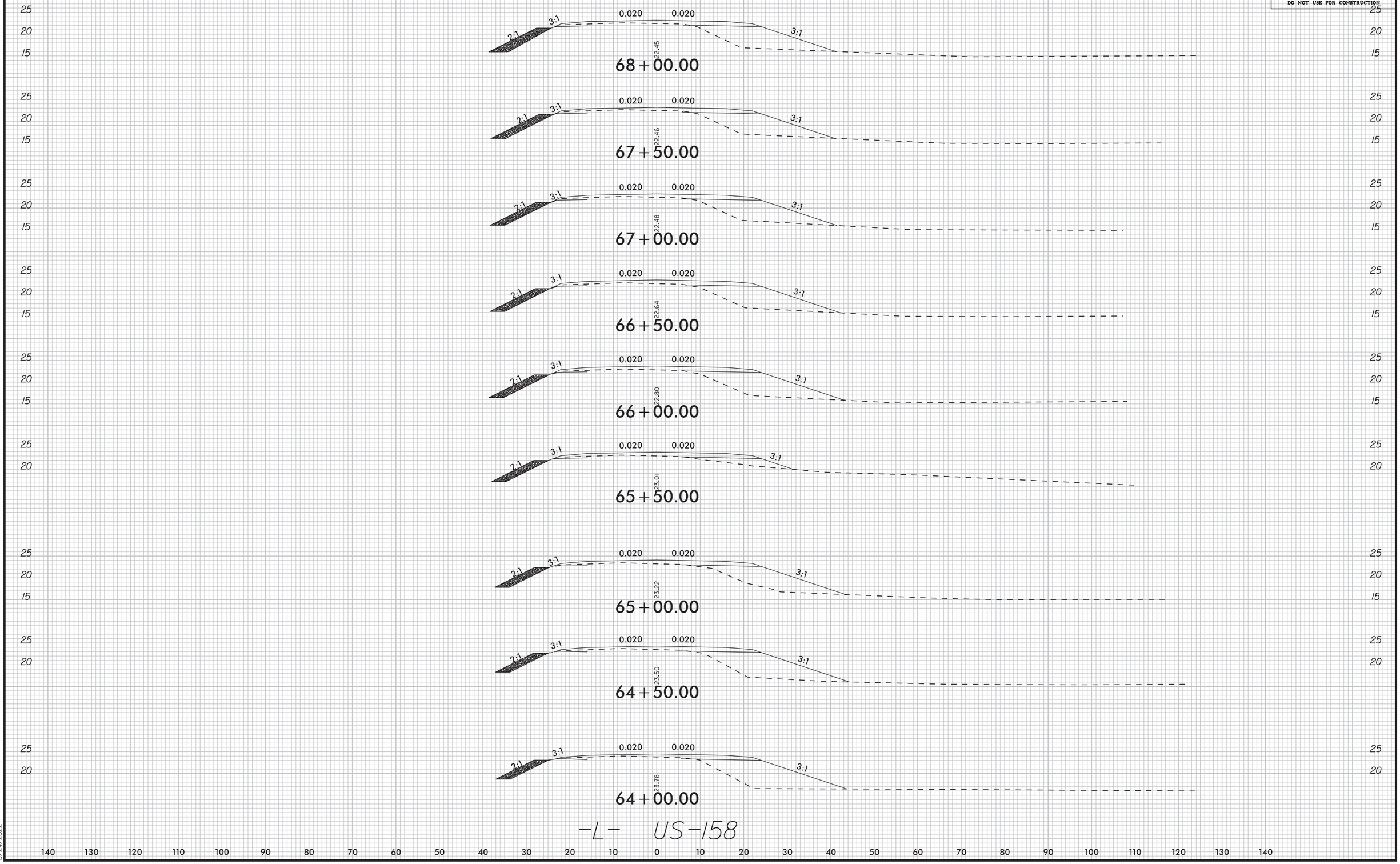

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-14 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



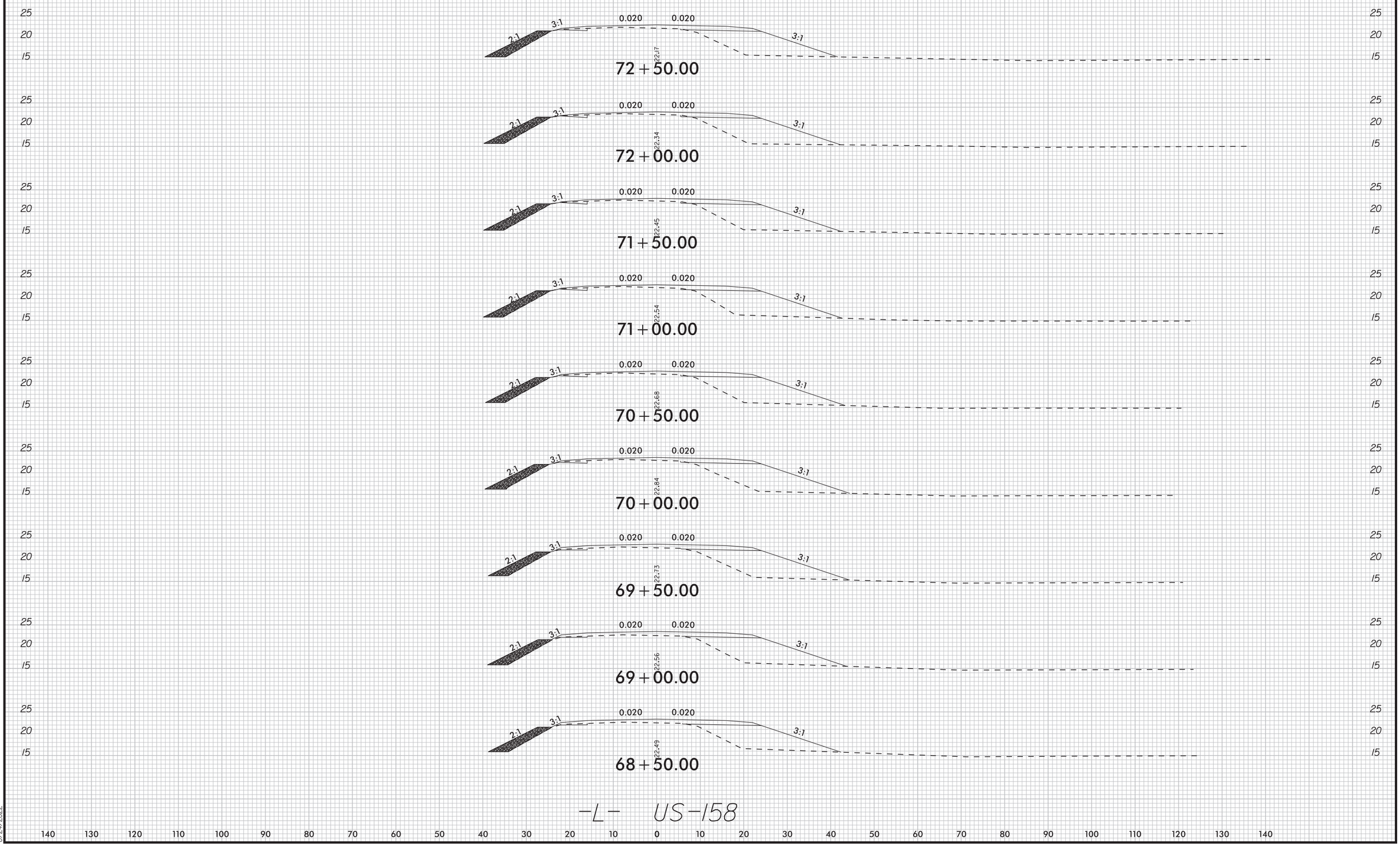

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-15 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




8/24/2022

8/23/99

0 5 10

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | X-16 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

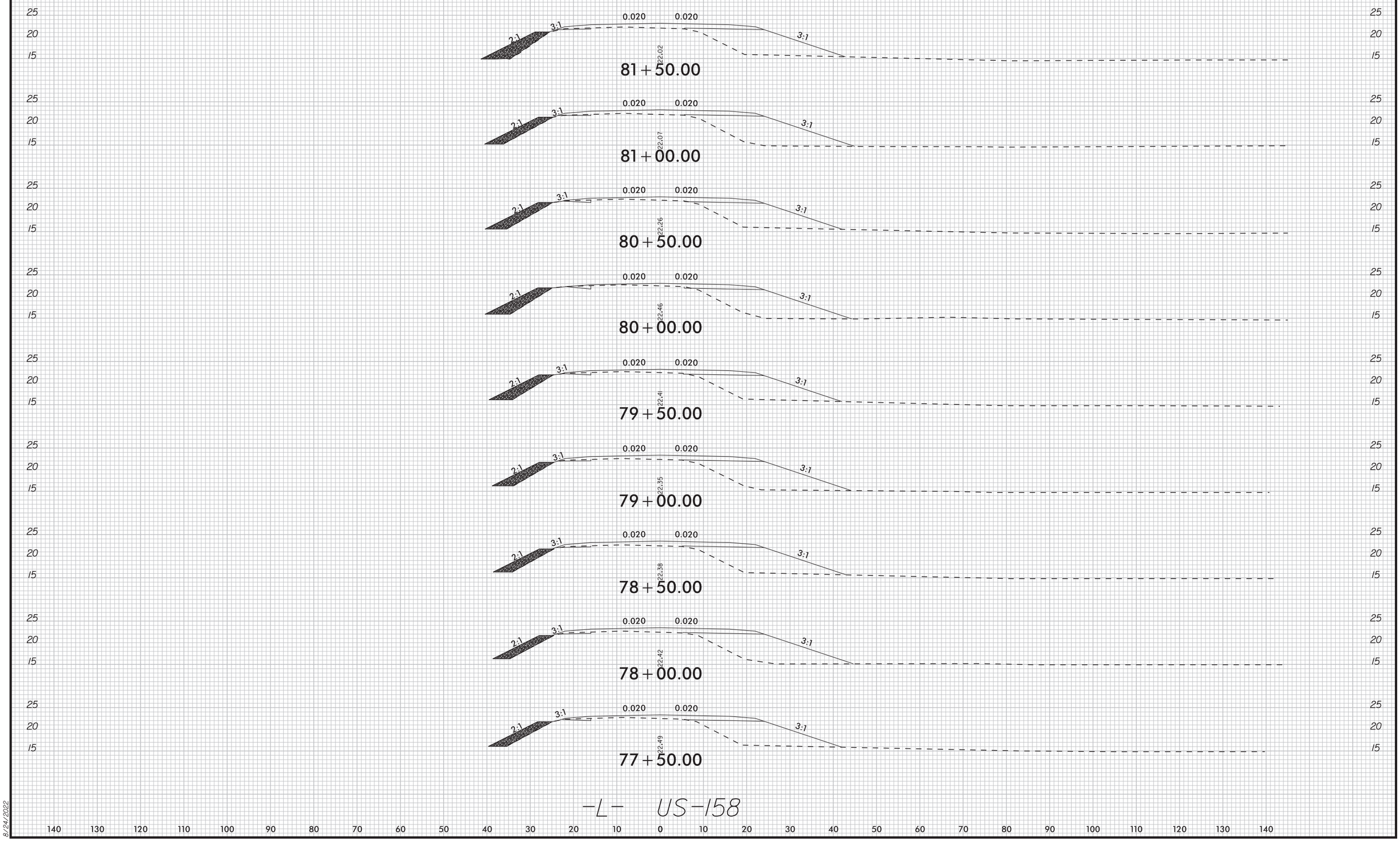

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-17 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-18 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


8/24/2022

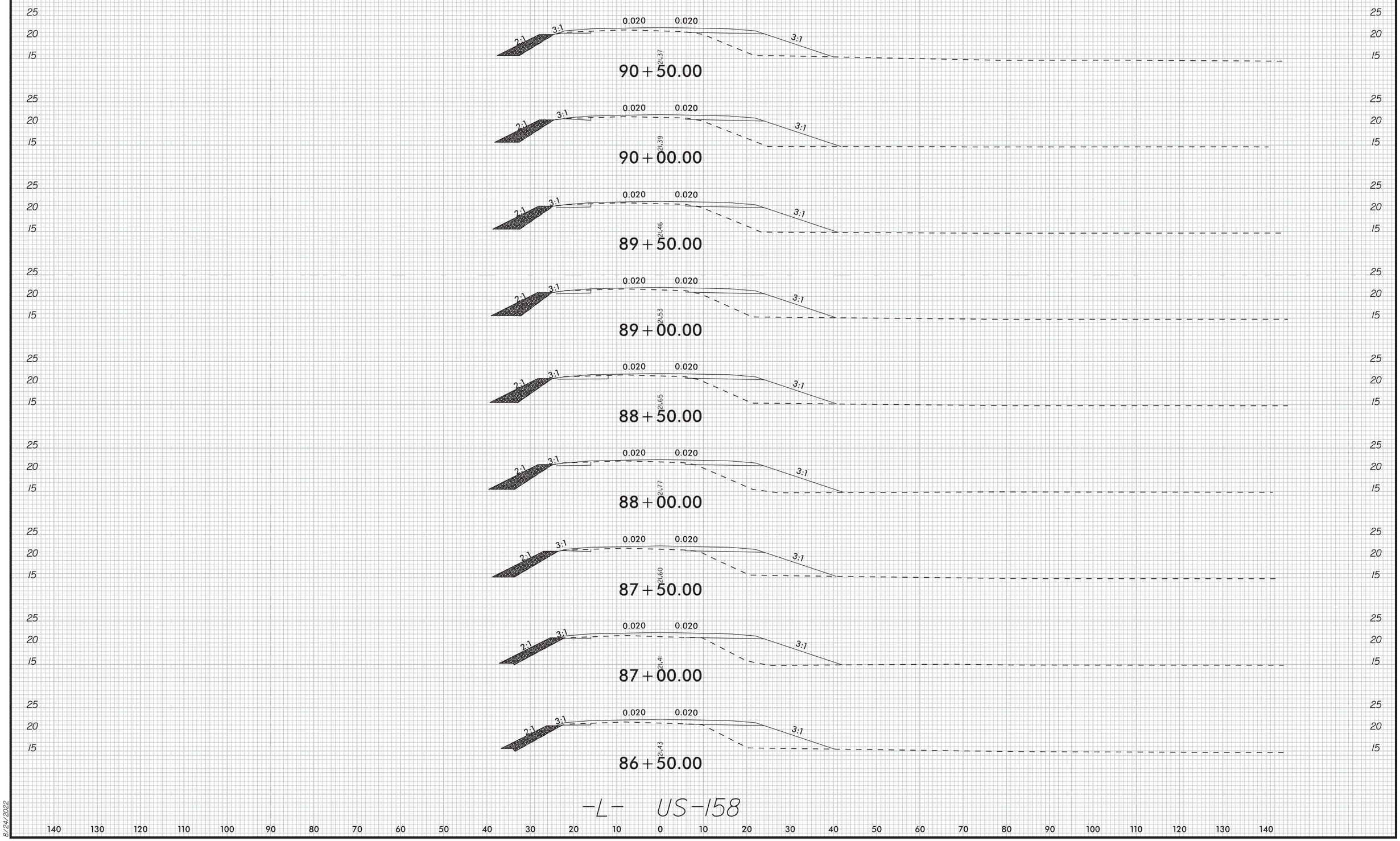
8/23/99

0 5 10

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | X-19 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



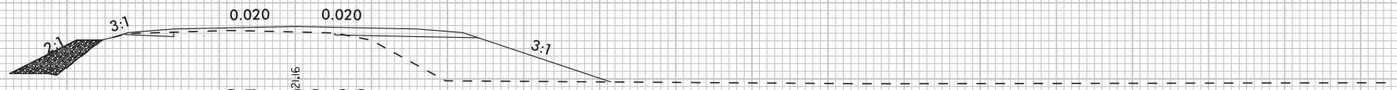

8/24/2022

8/23/99

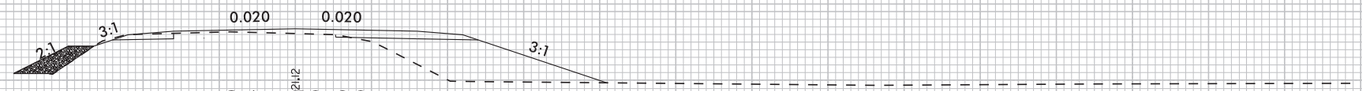
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-20 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

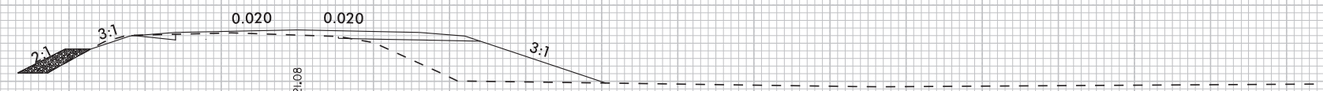
**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




95 + 00.00

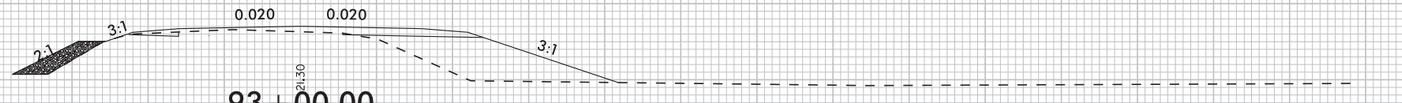



94 + 50.00



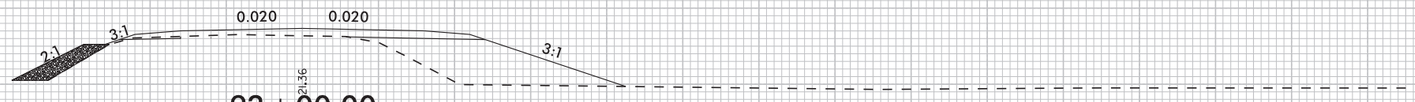

94 + 00.00


93 + 50.00



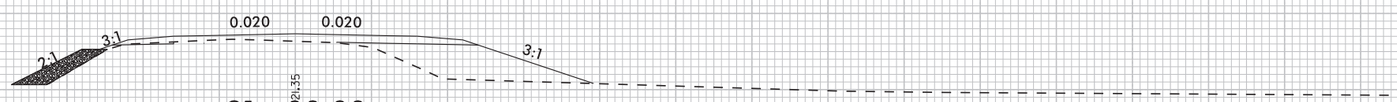

93 + 00.00


92 + 50.00




92 + 00.00


91 + 50.00




91 + 00.00

-L- US-158

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

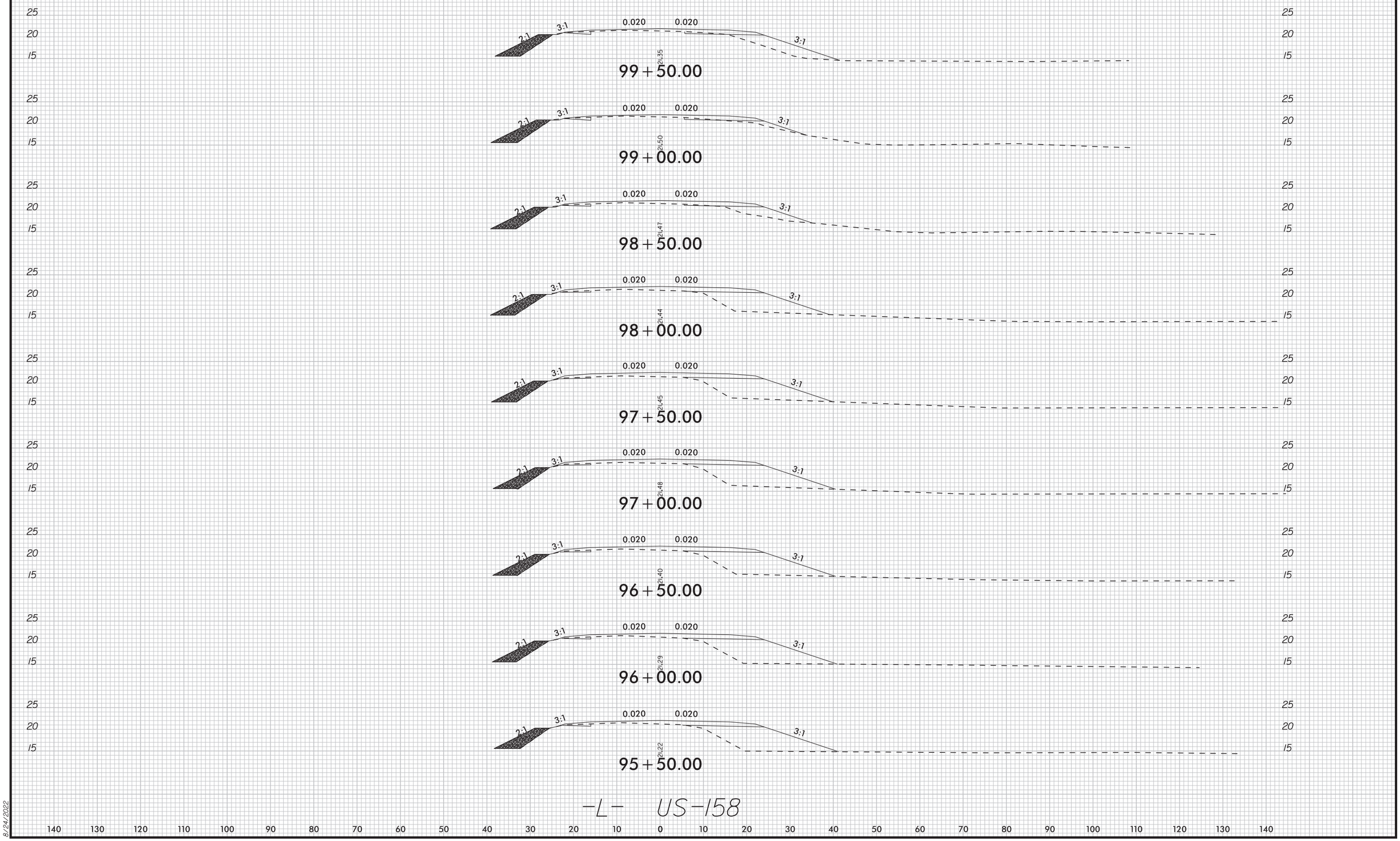
8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-21 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




8/24/2022

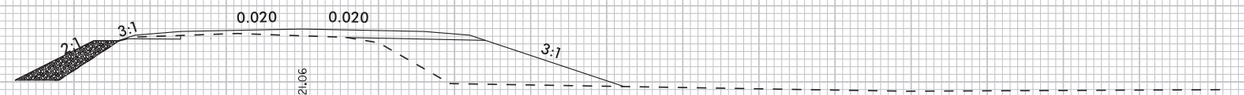
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-22 |

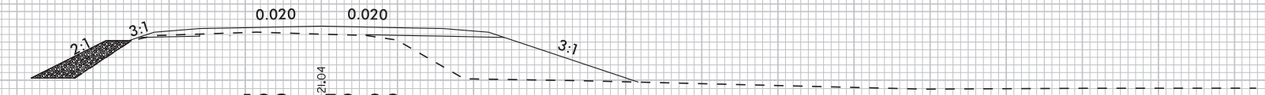
**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

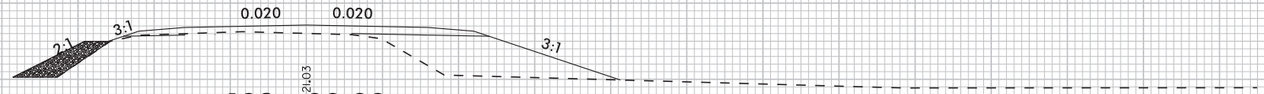
25
20
15



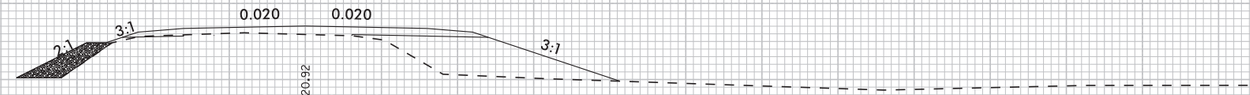

104 + 00.00



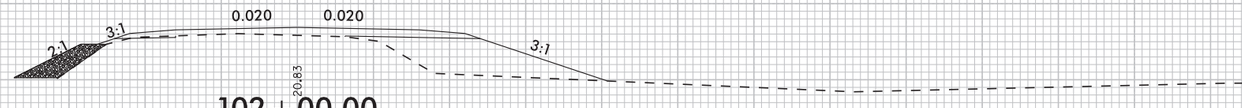

103 + 50.00



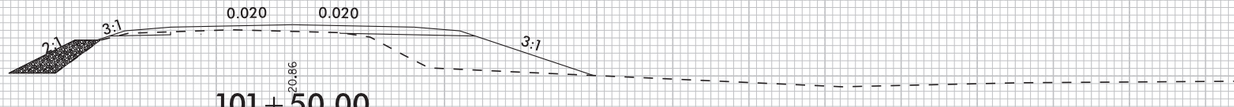

103 + 00.00



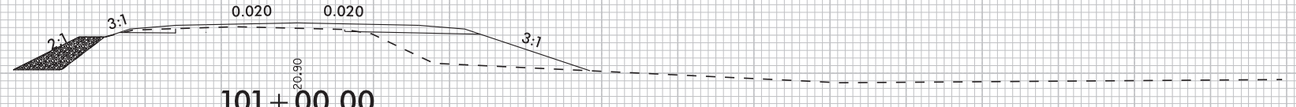

102 + 50.00



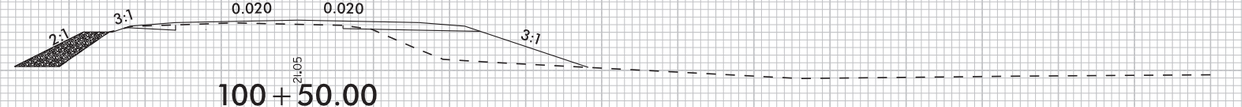

102 + 00.00



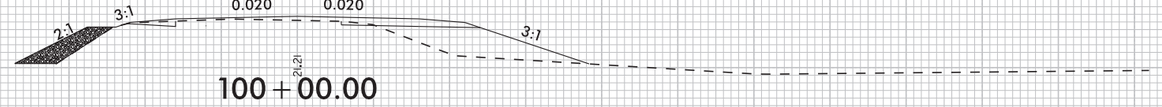

101 + 50.00




101 + 00.00




100 + 50.00




100 + 00.00

-L- US-158

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

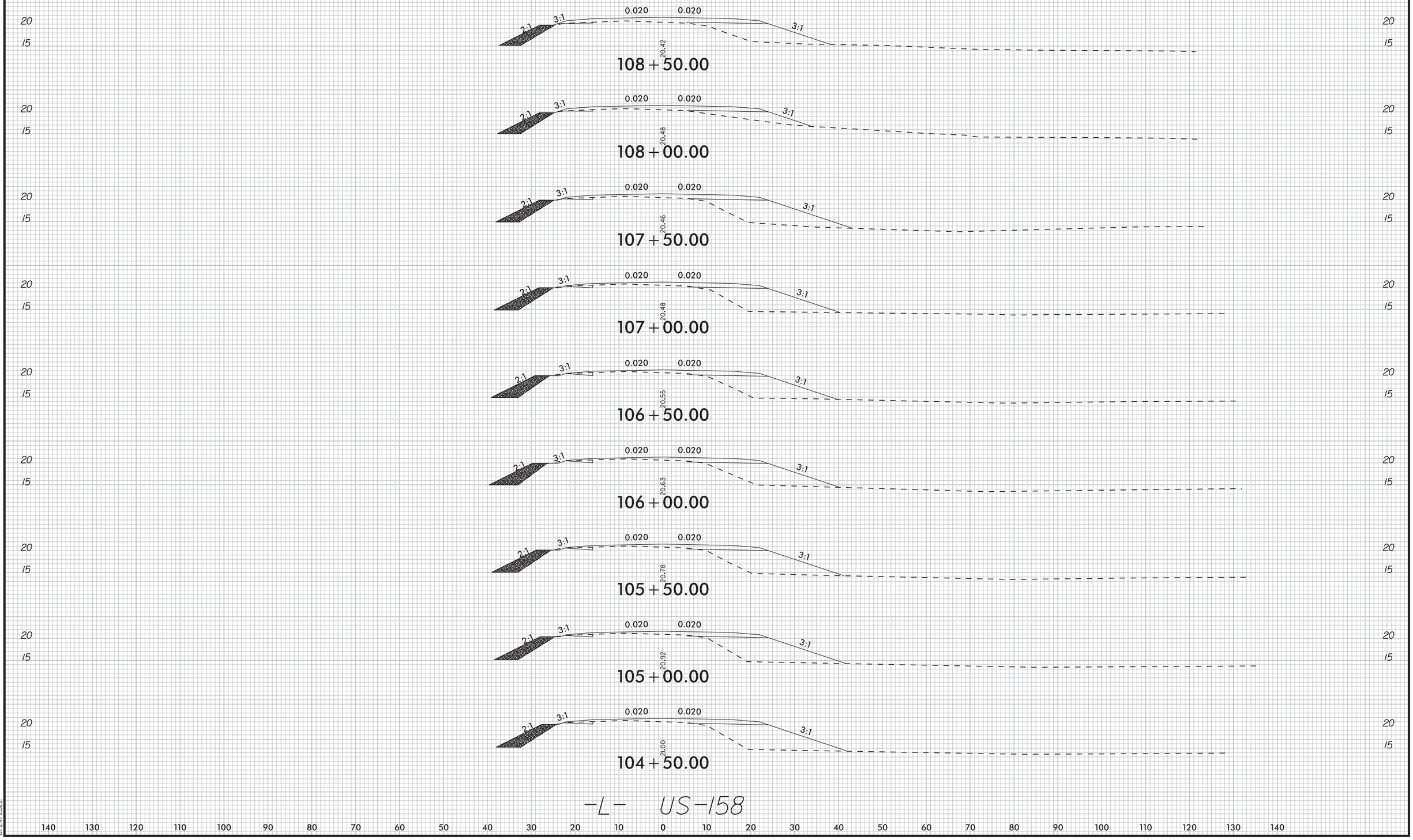
8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-23 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




8/24/2022

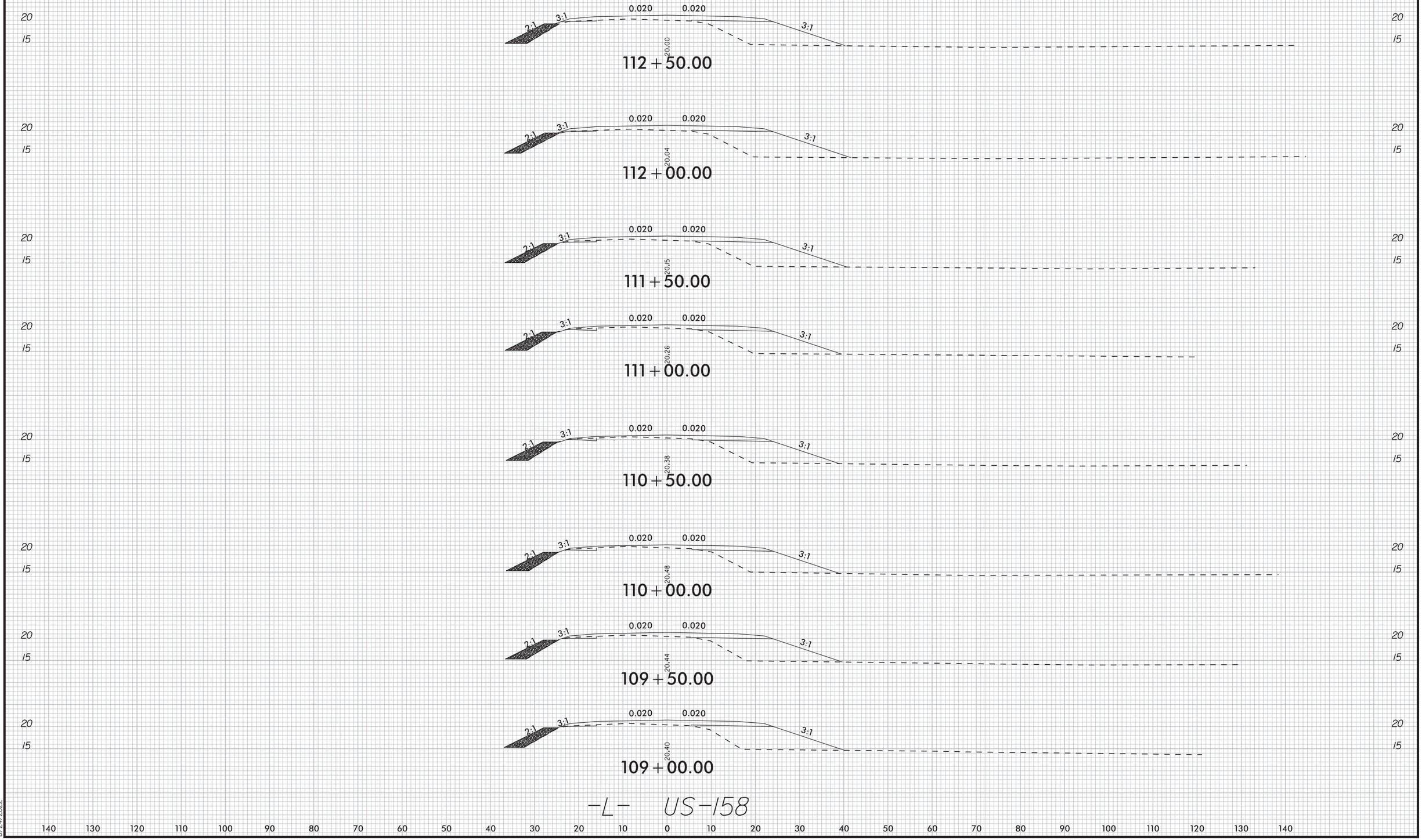
8/23/99

0 5 10

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | X-24 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




8/24/2022

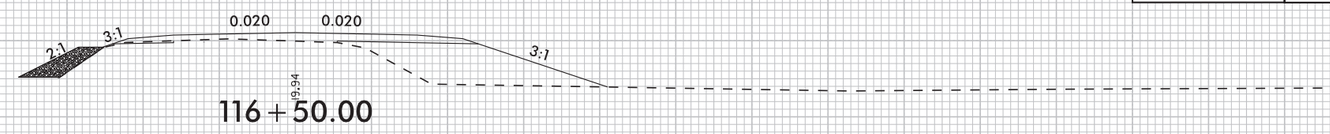
8/23/99

0 5 10

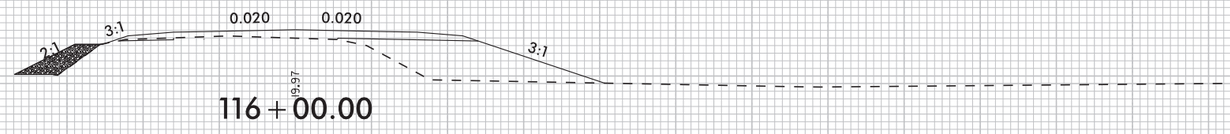
| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | X-25 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

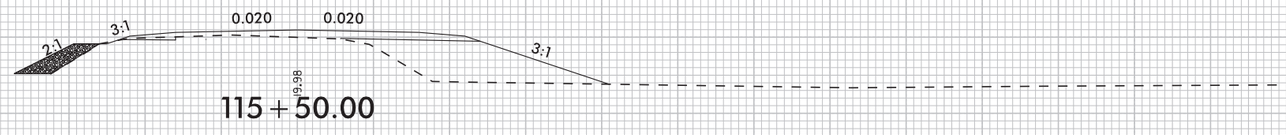
**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



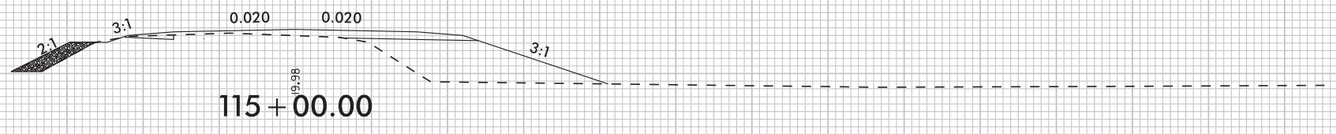

116 + 50.00



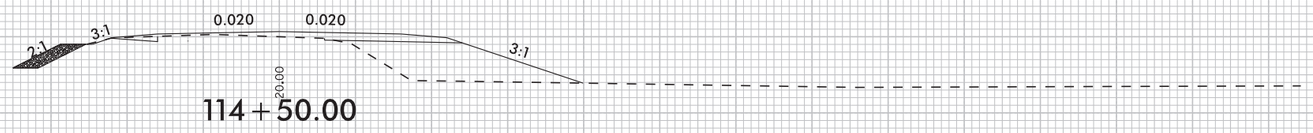

116 + 00.00



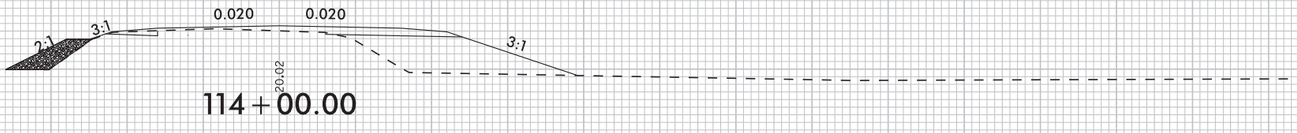

115 + 50.00



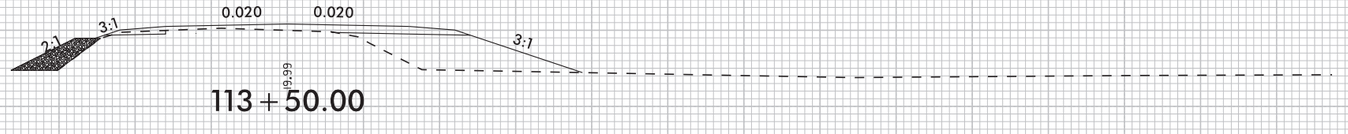

115 + 00.00



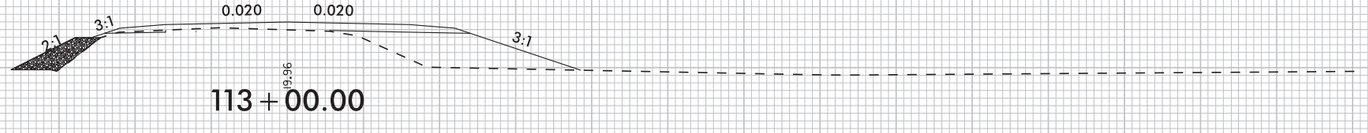

114 + 50.00




114 + 00.00




113 + 50.00




113 + 00.00

-L- US-158

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

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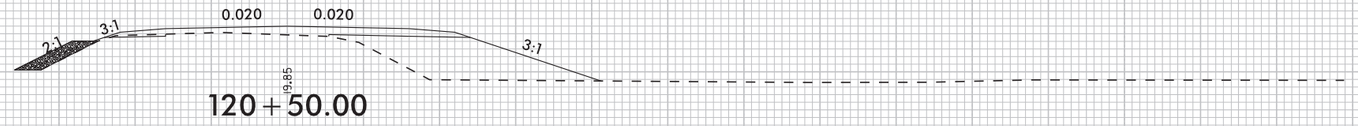
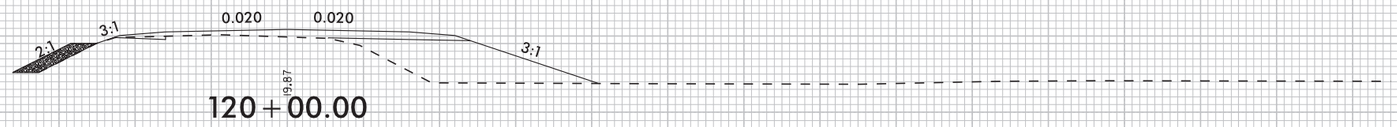
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-26 |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

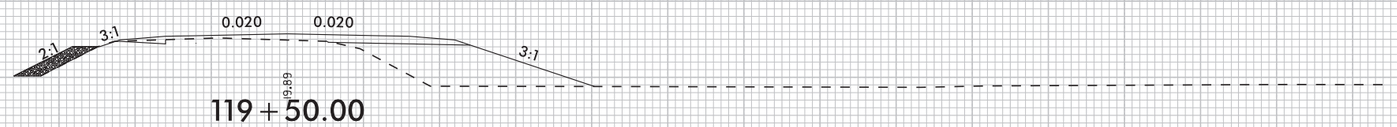
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



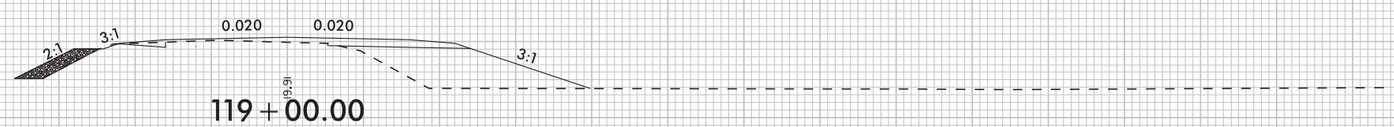

120 + 50.00



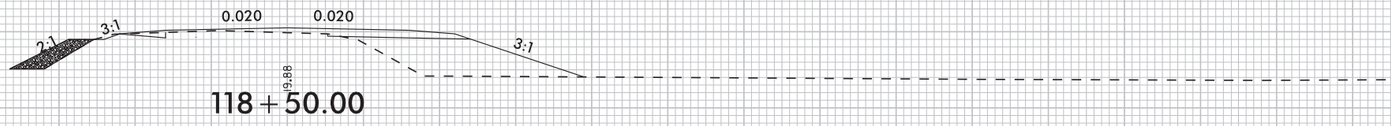

120 + 00.00



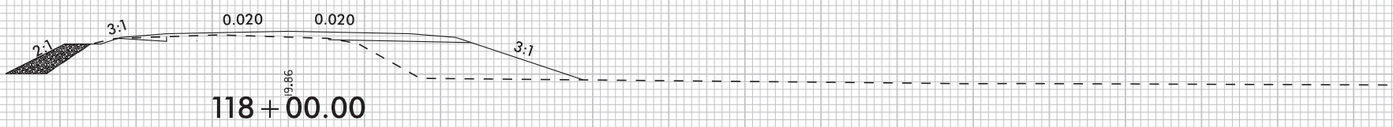

119 + 50.00



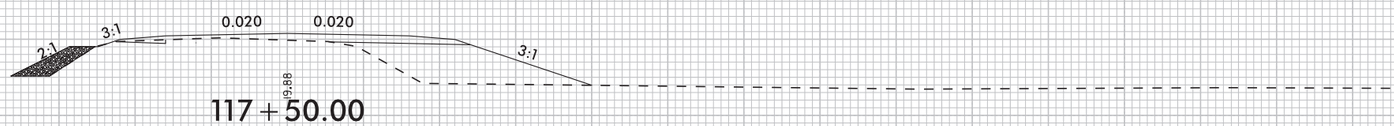

119 + 00.00



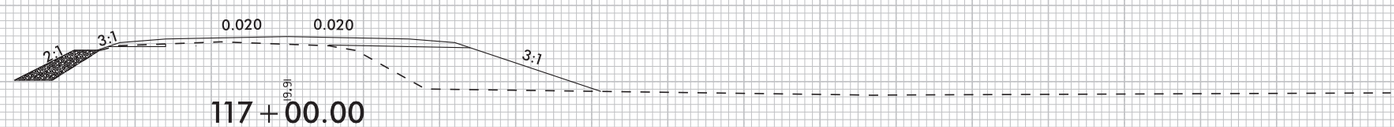

118 + 50.00




118 + 00.00




117 + 50.00




117 + 00.00

-L- US-158

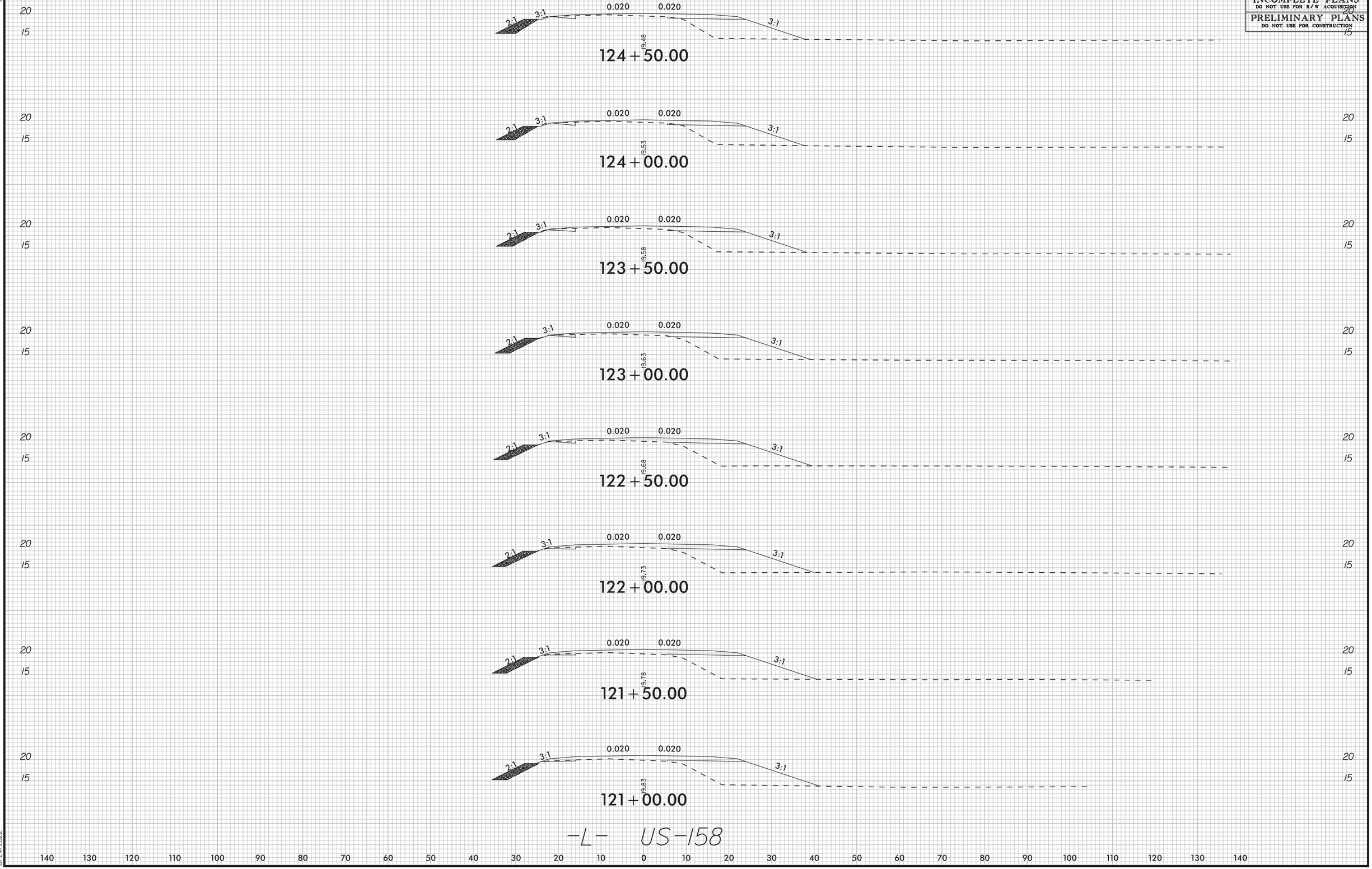
8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-27 |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



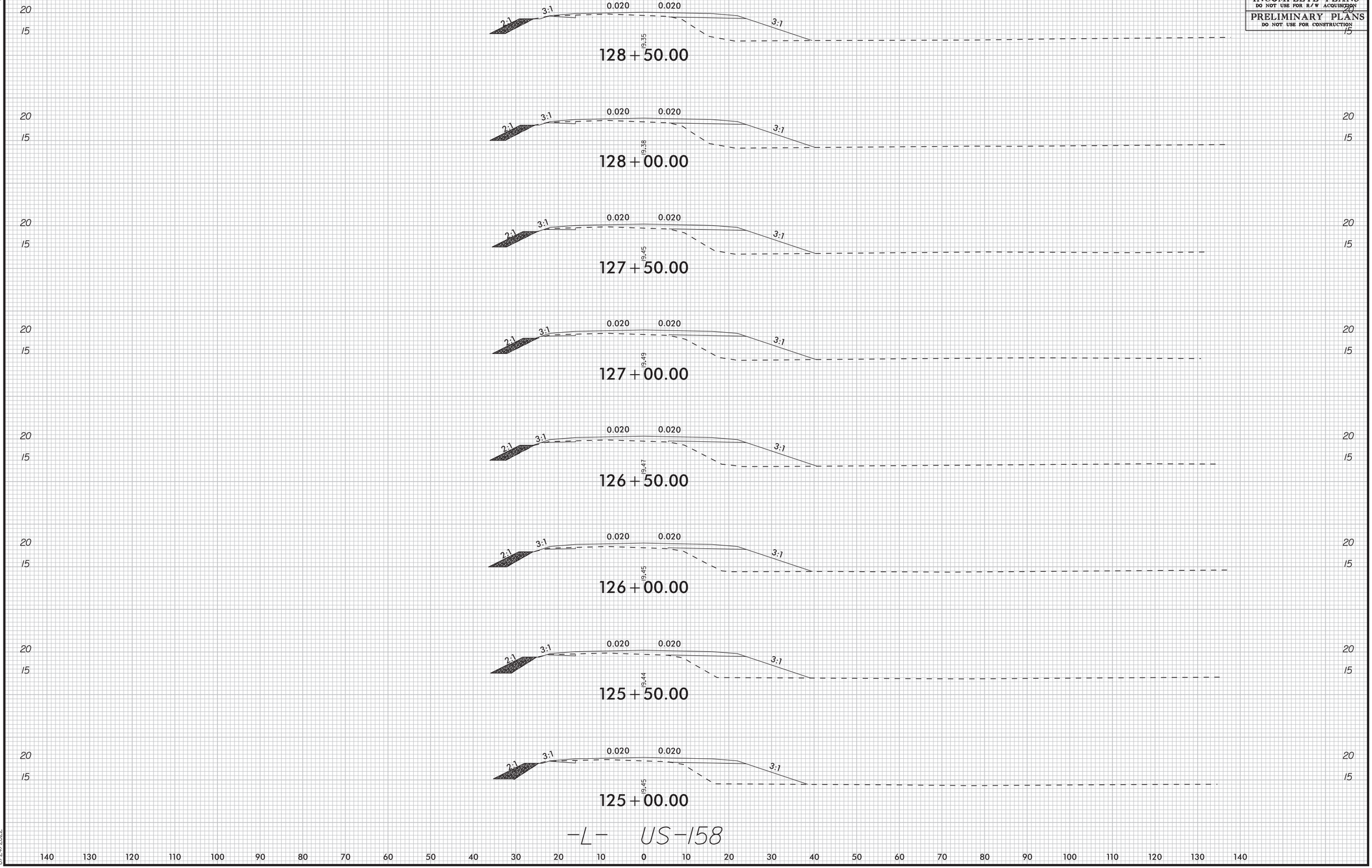

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-28 |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



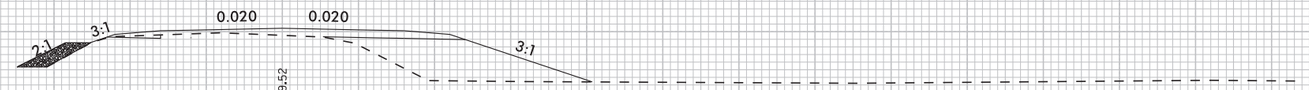

8/24/2022

8/23/99

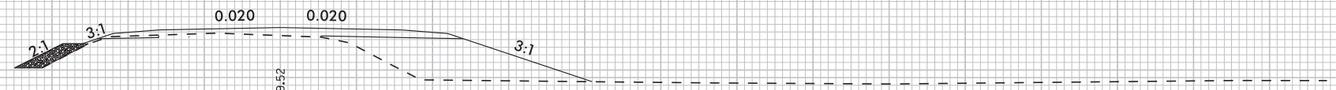
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-29 |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

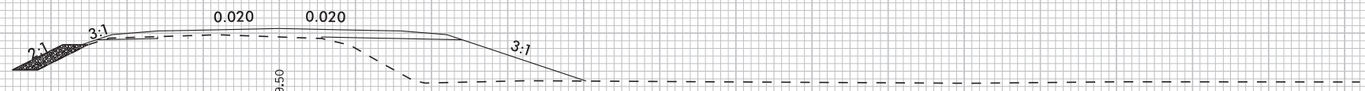
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



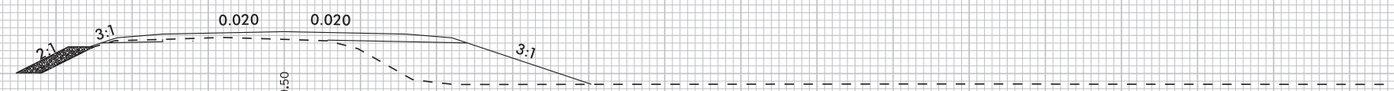

132 + 50.00



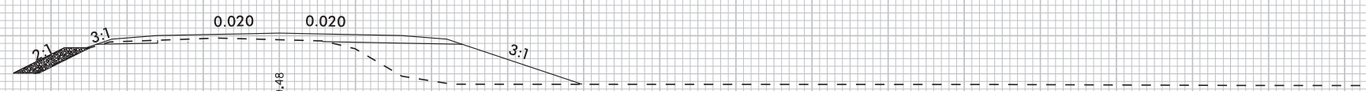

132 + 00.00



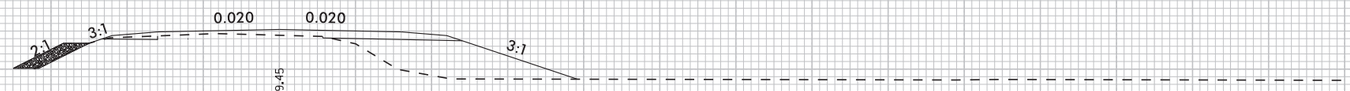

131 + 50.00



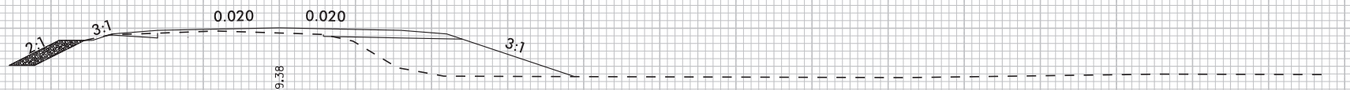

131 + 00.00



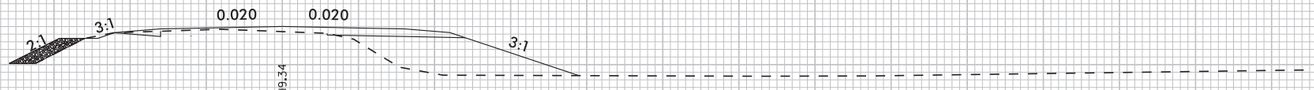

130 + 50.00




130 + 00.00




129 + 50.00




129 + 00.00

-L- US-158

20 15 20 15 20 15 20 15 20 15 20 15 20 15 20 15

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

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| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-30 |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION


8/24/2022

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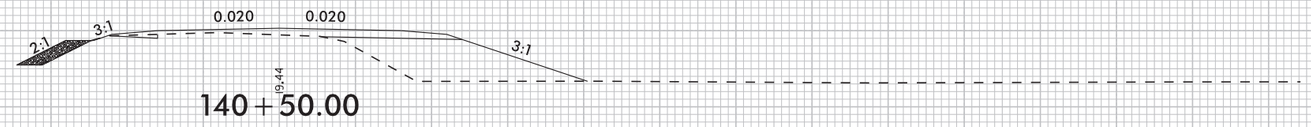
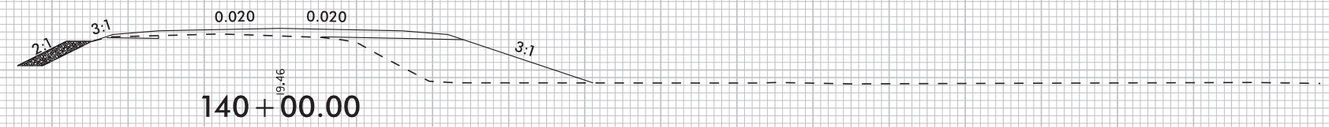
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-31 |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

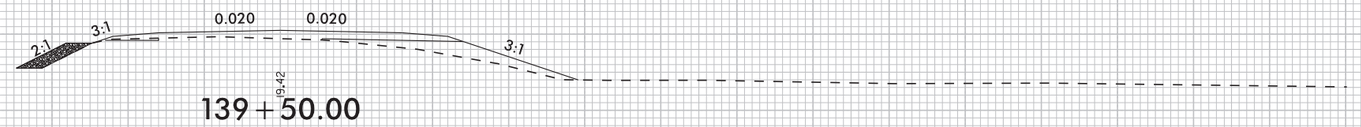
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION




140 + 50.00

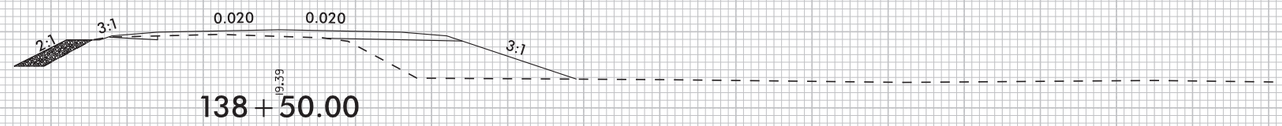



140 + 00.00

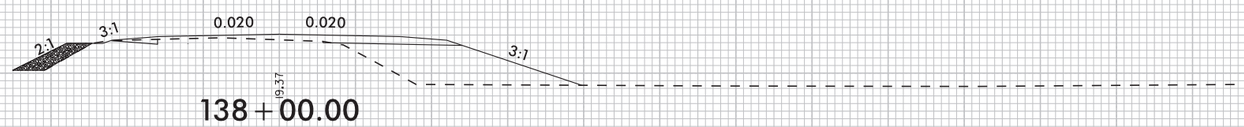



139 + 50.00

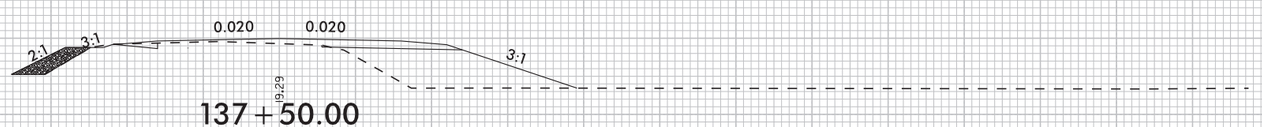

139 + 00.00



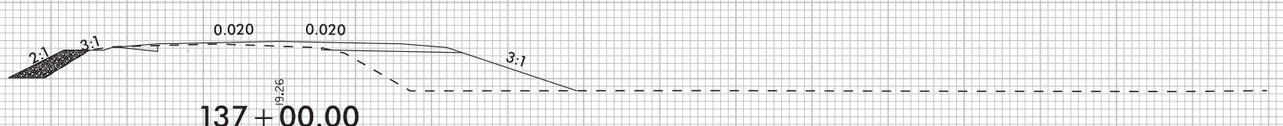

138 + 50.00




138 + 00.00




137 + 50.00




137 + 00.00

-L- US-158

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-32 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

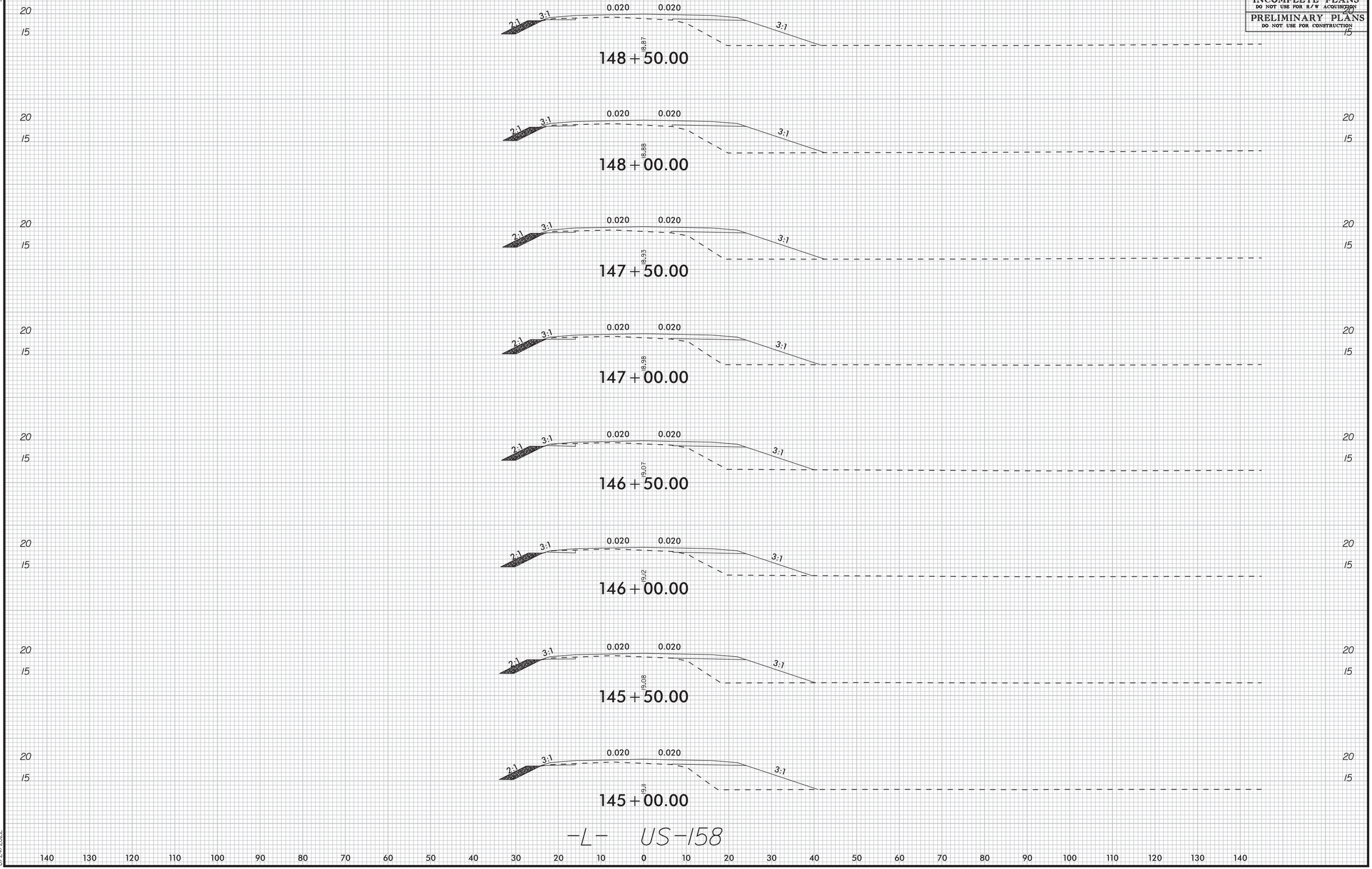

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-33 |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION




8/24/2022

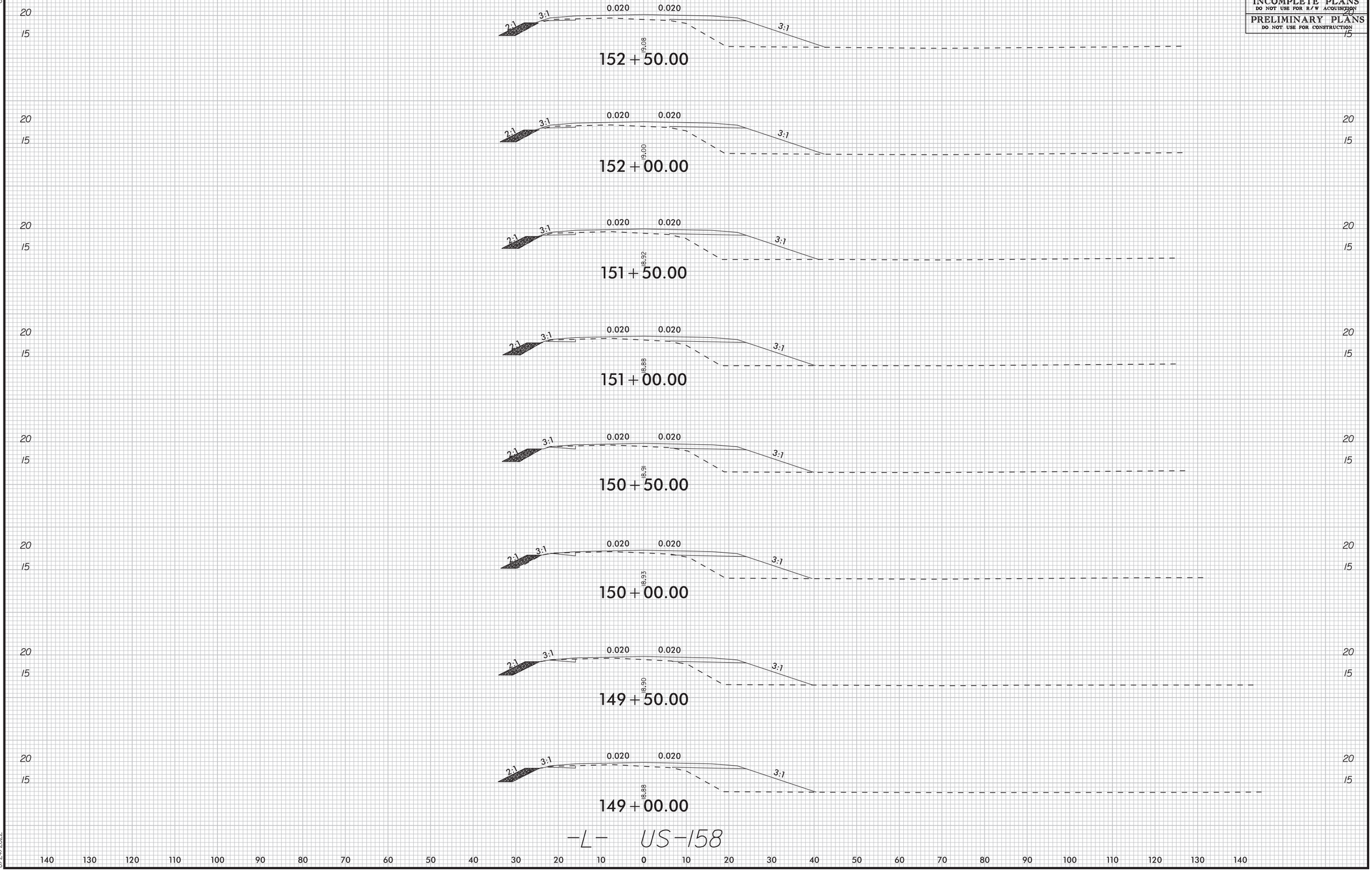
8/23/99

0 5 10

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | X-34 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



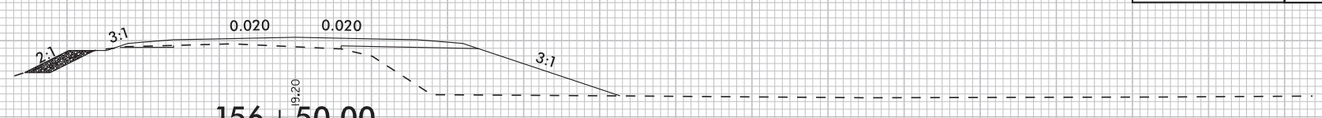

8/24/2022

8/23/99

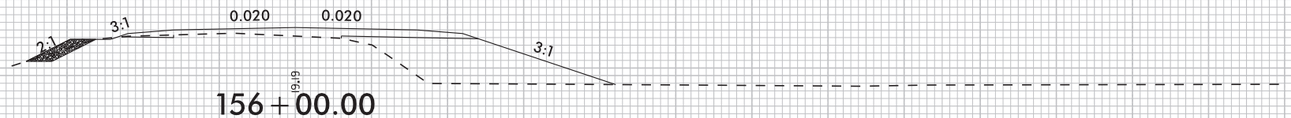
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-35 |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

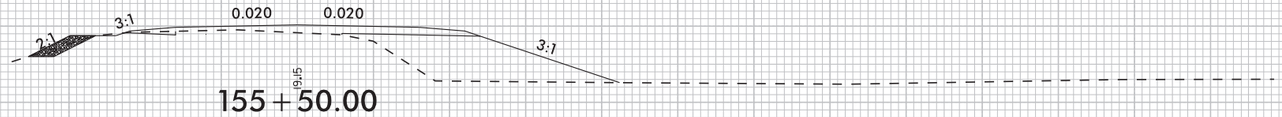
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



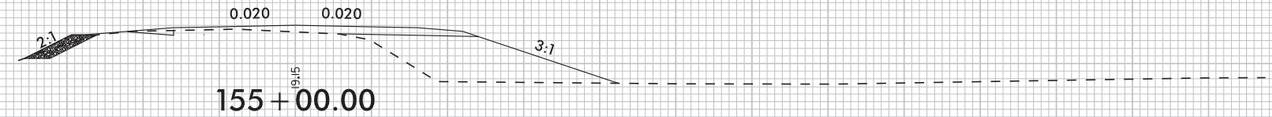

156 + 50.00



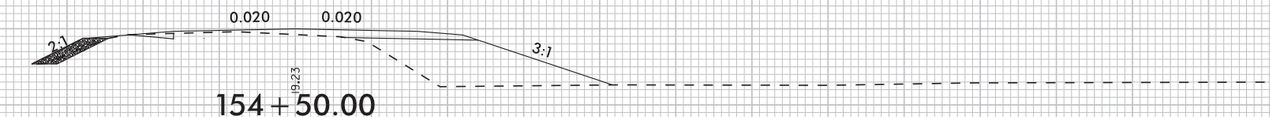

156 + 00.00



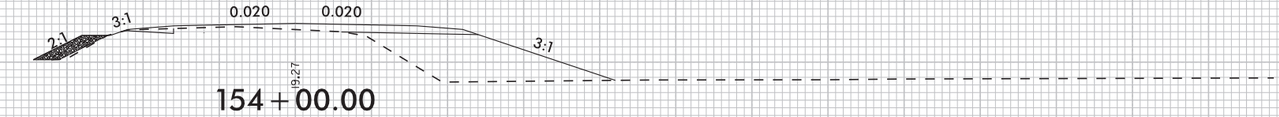

155 + 50.00



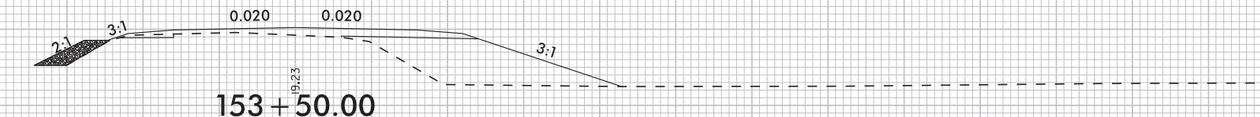

155 + 00.00



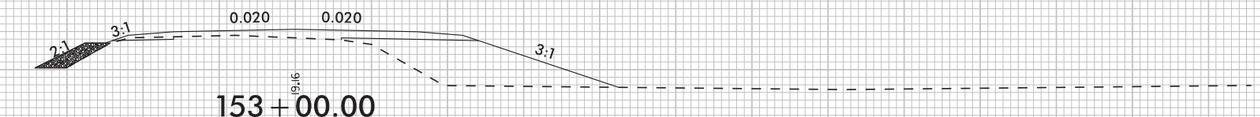

154 + 50.00




154 + 00.00




153 + 50.00




153 + 00.00

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8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-36 |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

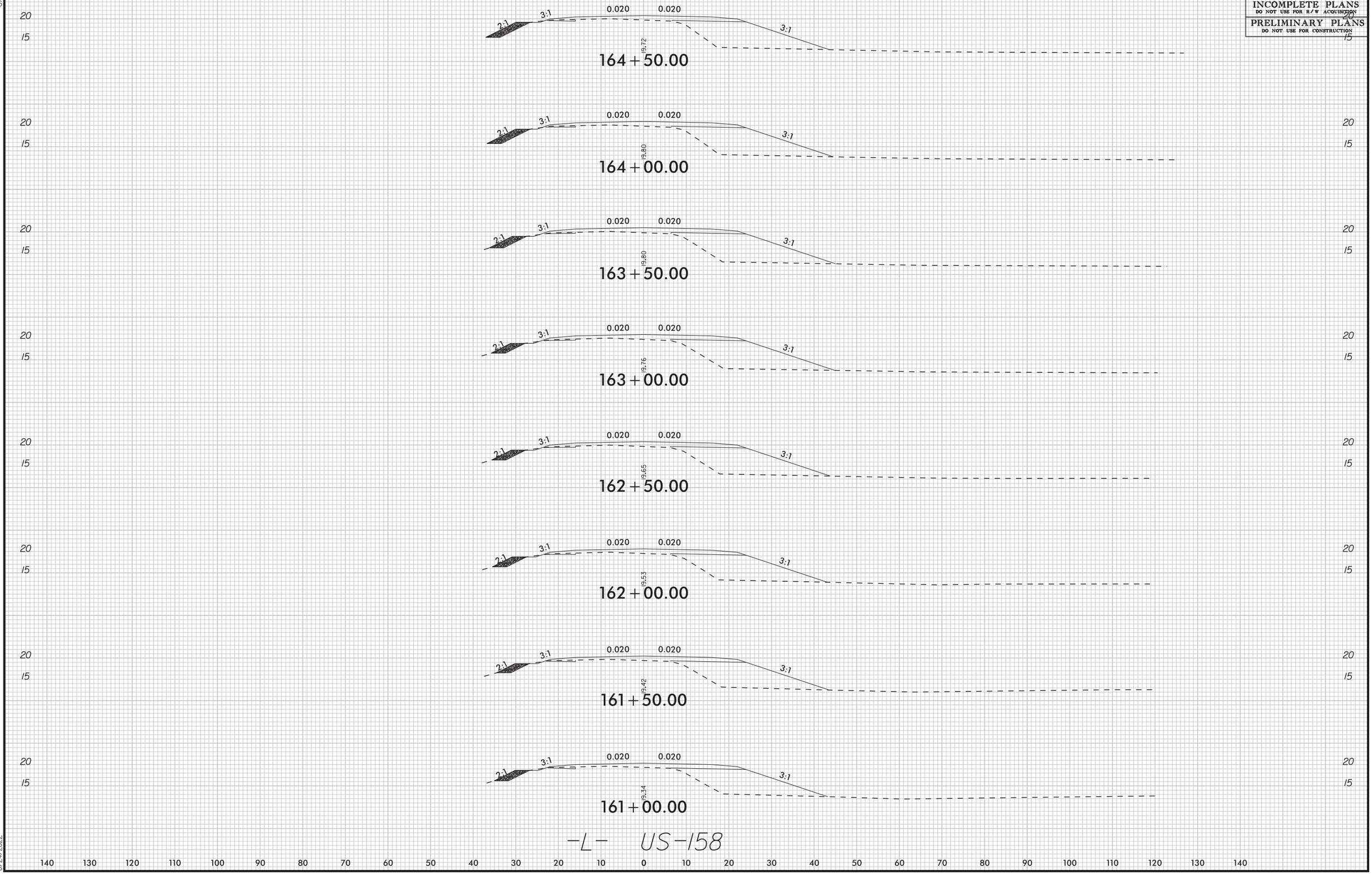

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-37 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



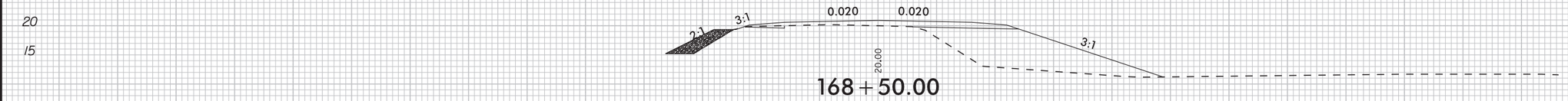

8/24/2022

8/23/99

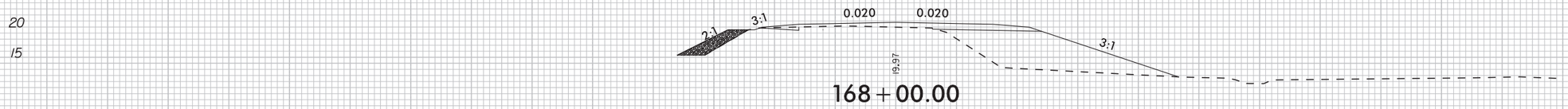
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-38 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

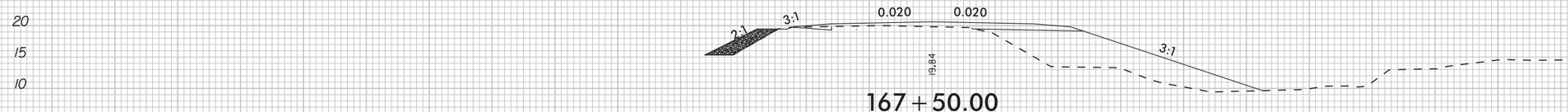
**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



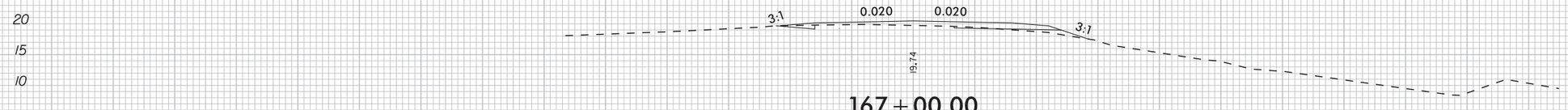

168 + 50.00



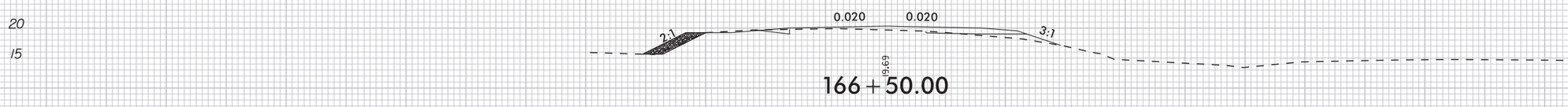

168 + 00.00



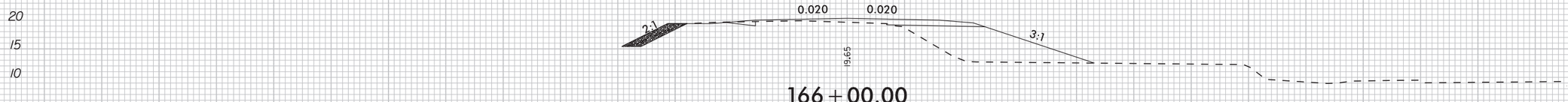

167 + 50.00



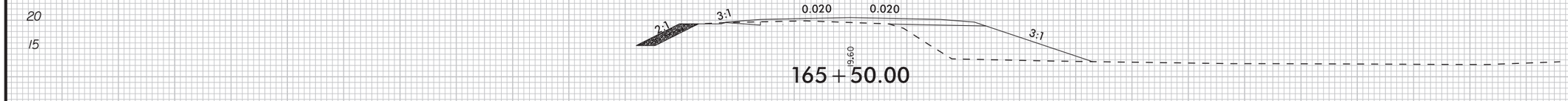

167 + 00.00



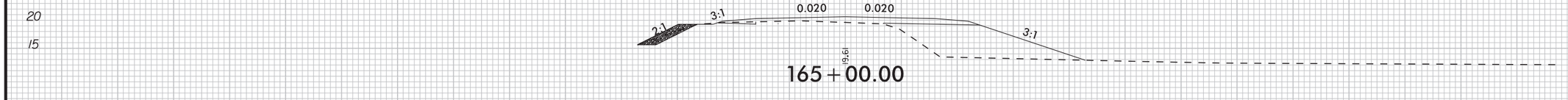

166 + 50.00




166 + 00.00




165 + 50.00




165 + 00.00

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140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

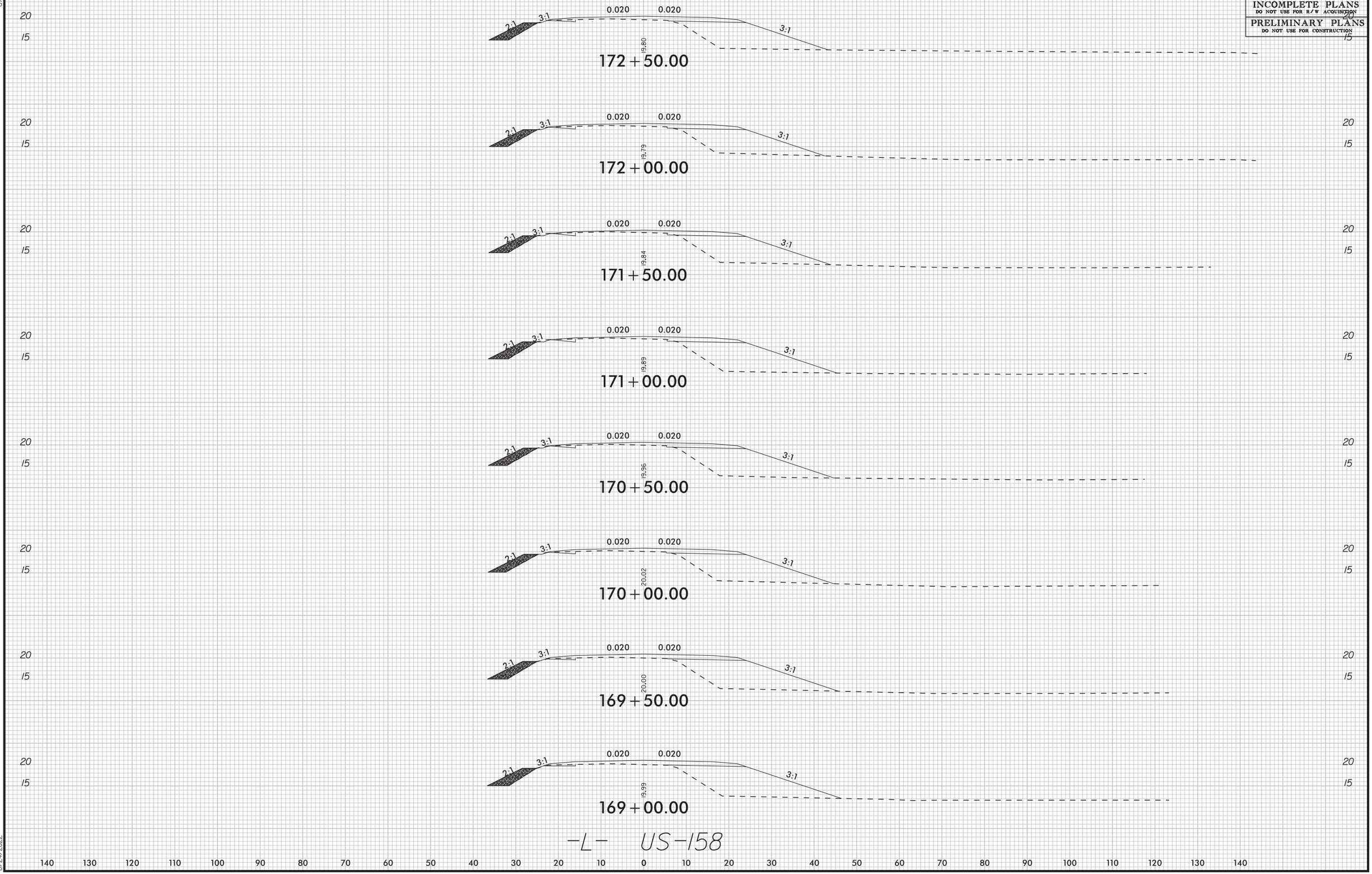
8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-39 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




8/24/2022

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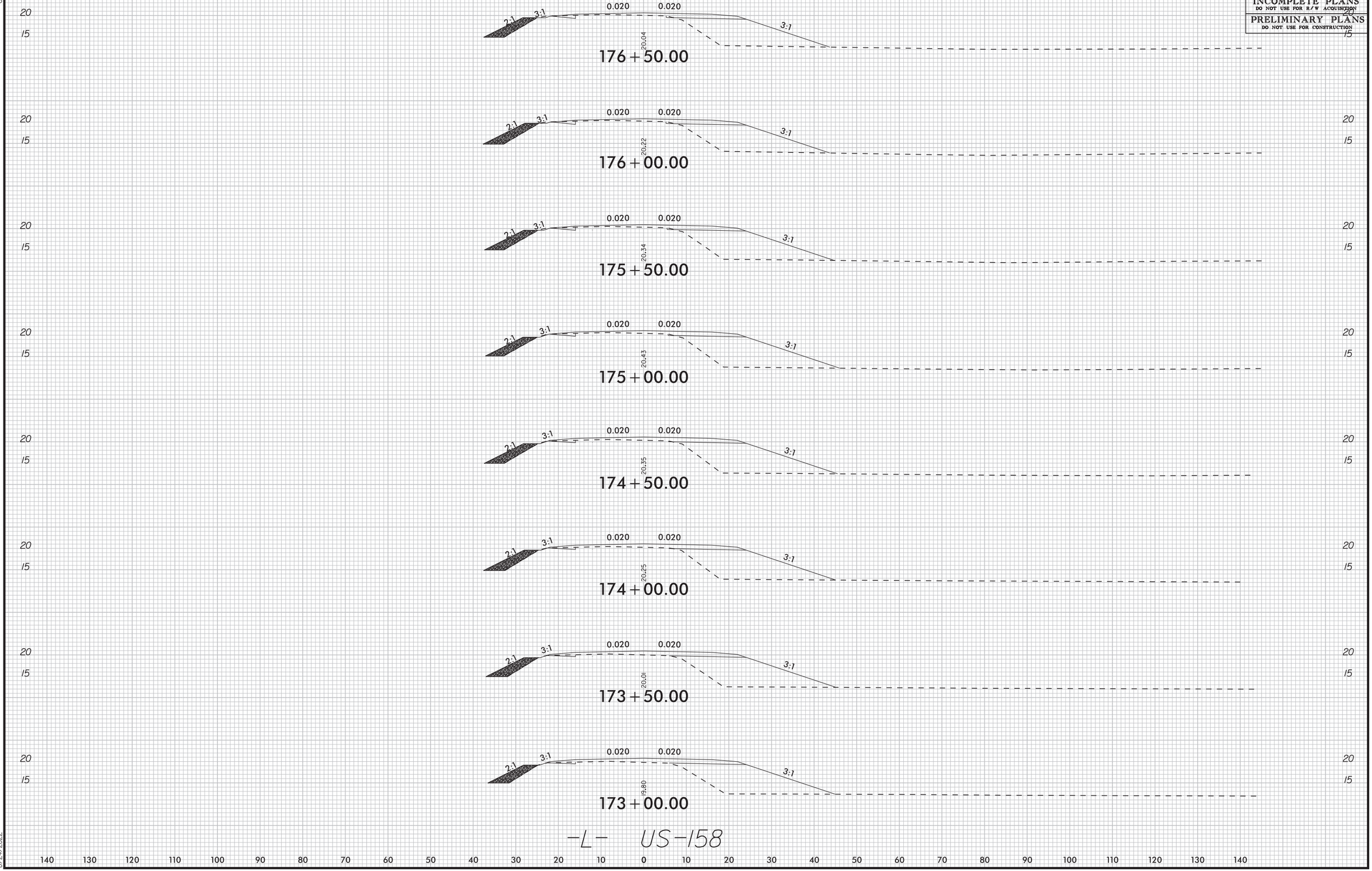
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-40 |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION




8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-41 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION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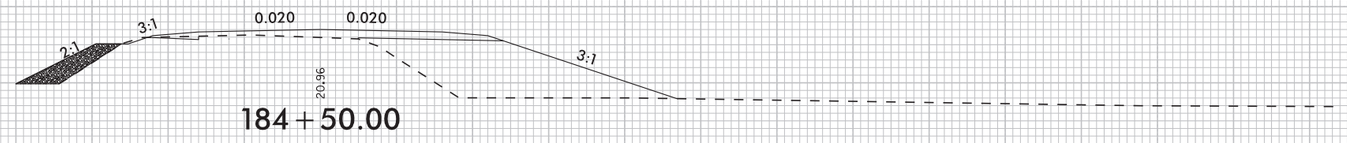
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-42 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

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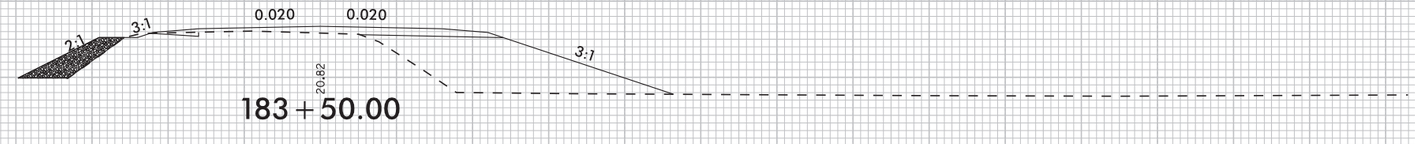
184 + 00.00

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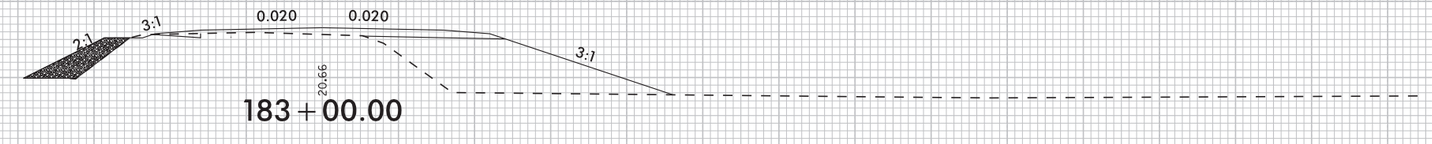


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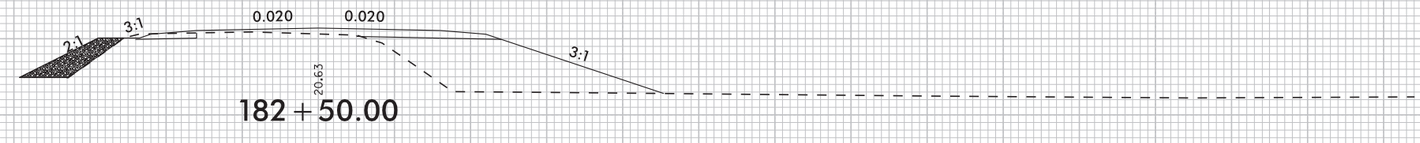


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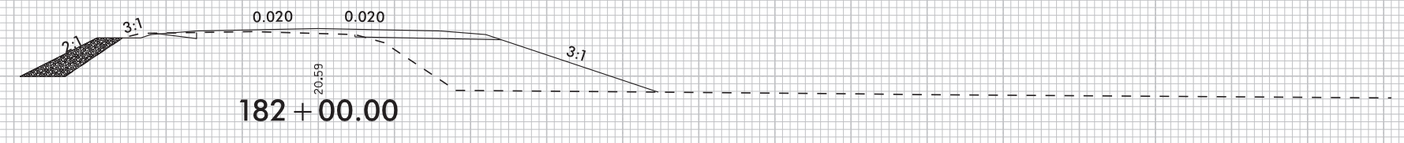


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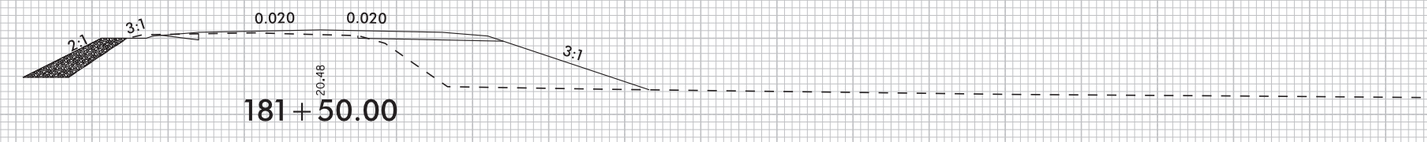


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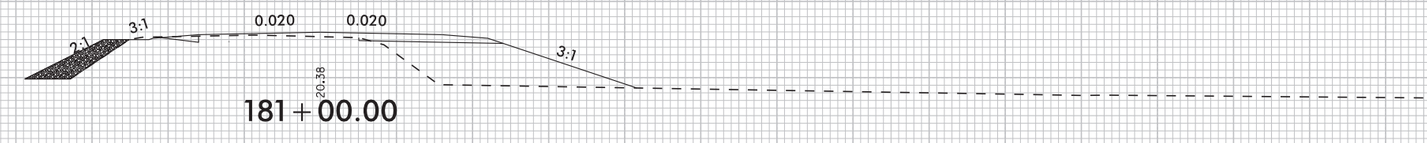



181 + 00.00

-L- US-158

8/24/2022

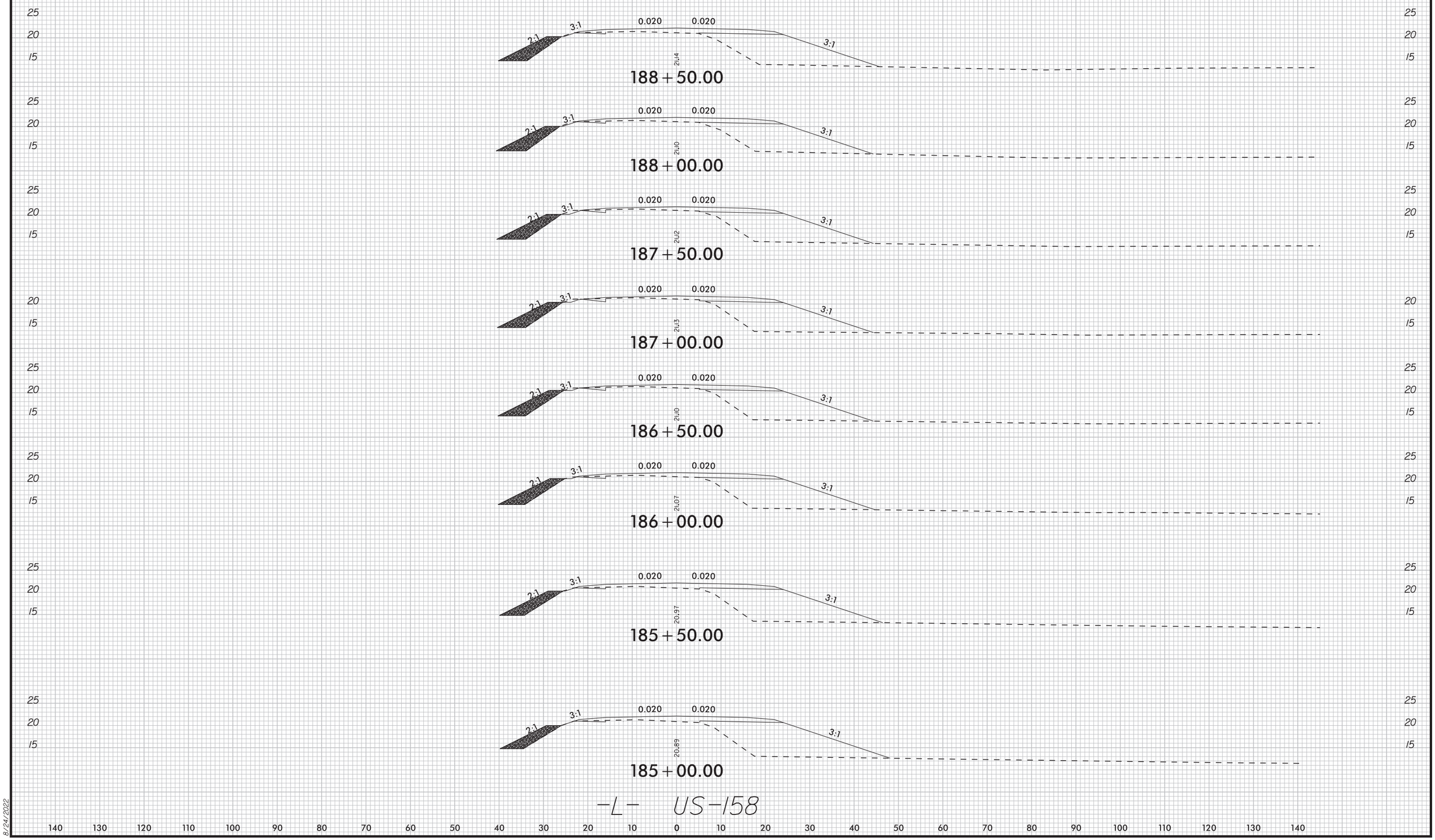
8/23/99

0 5 10

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | X-43 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




8/24/2022

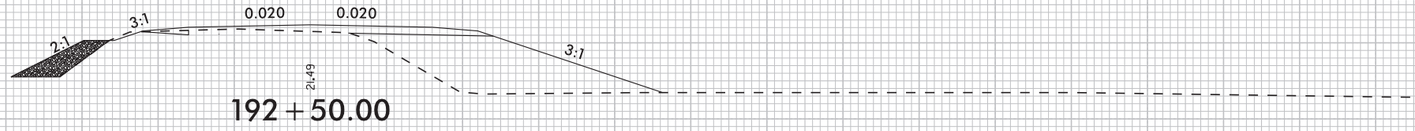
8/23/99

0 5 10

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | X-44 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

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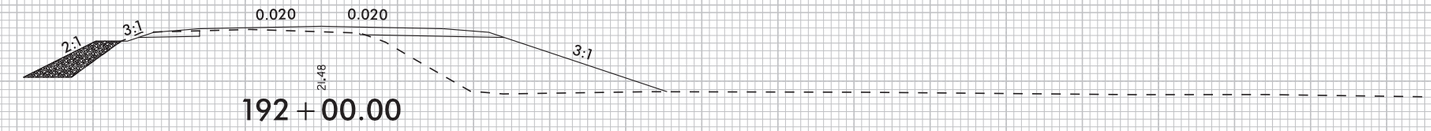


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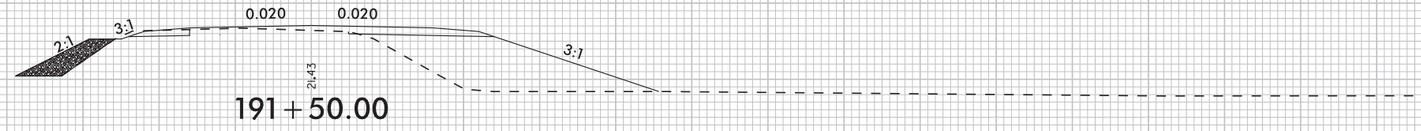


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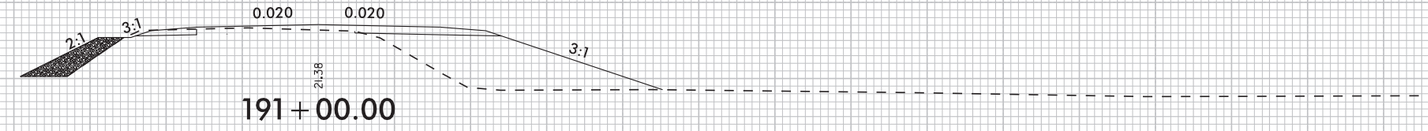


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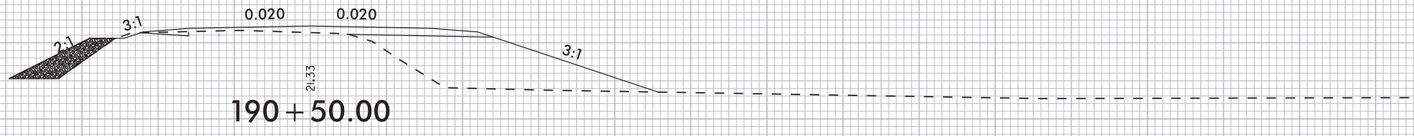


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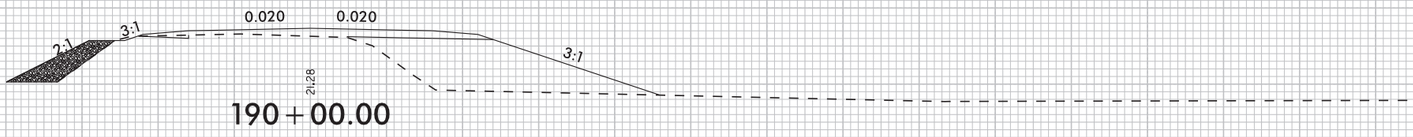


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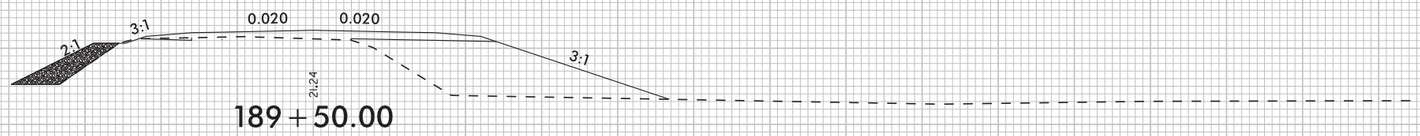


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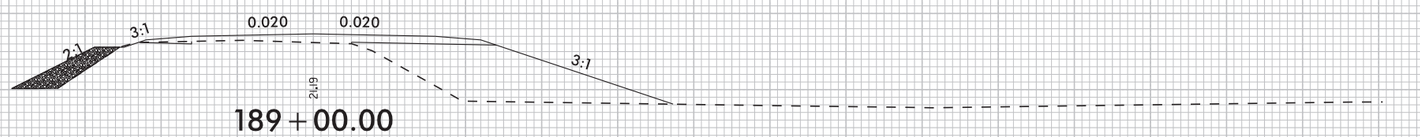


189 + 00.00

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8/24/2022

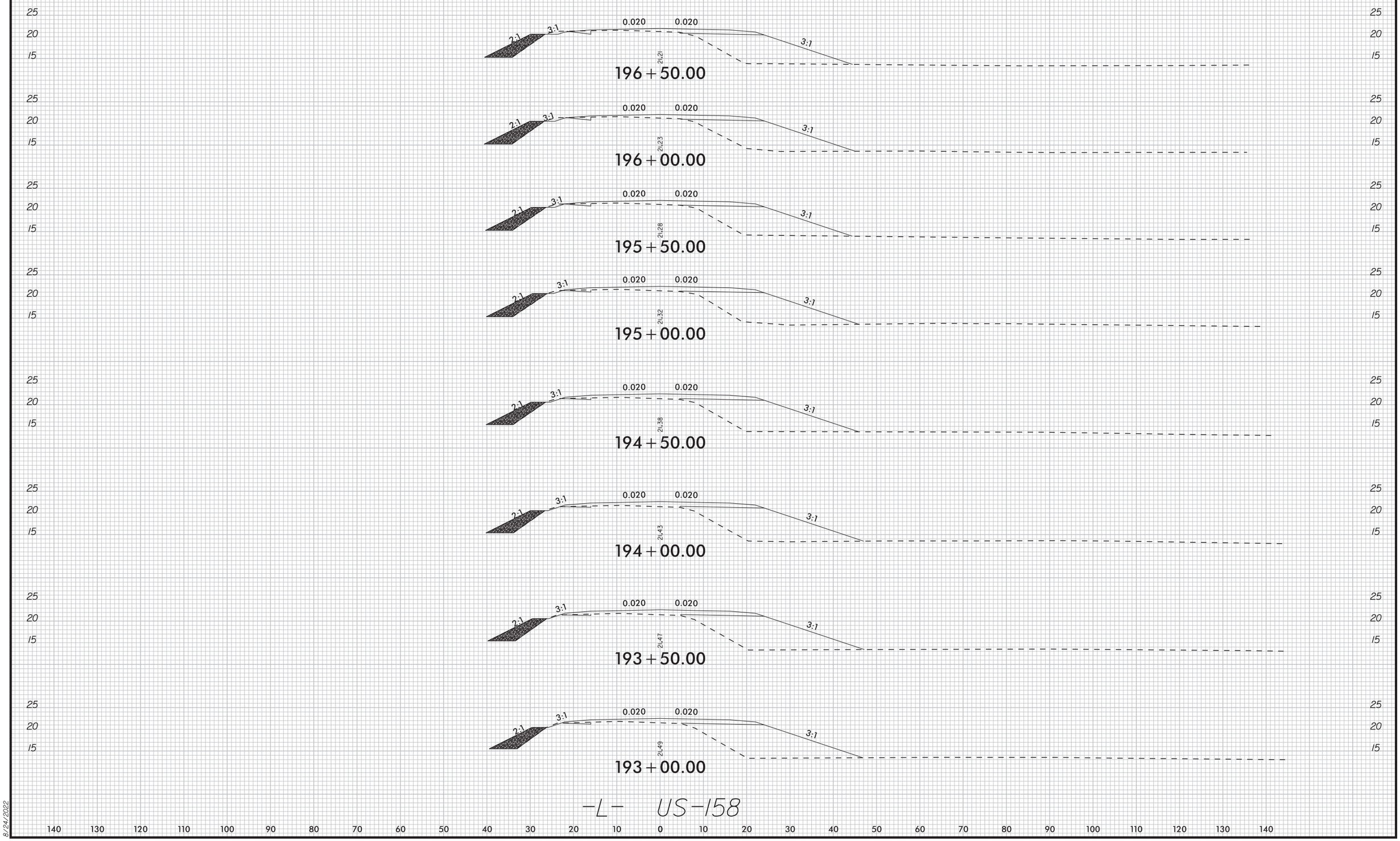
8/23/99

0 5 10

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | X-45 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



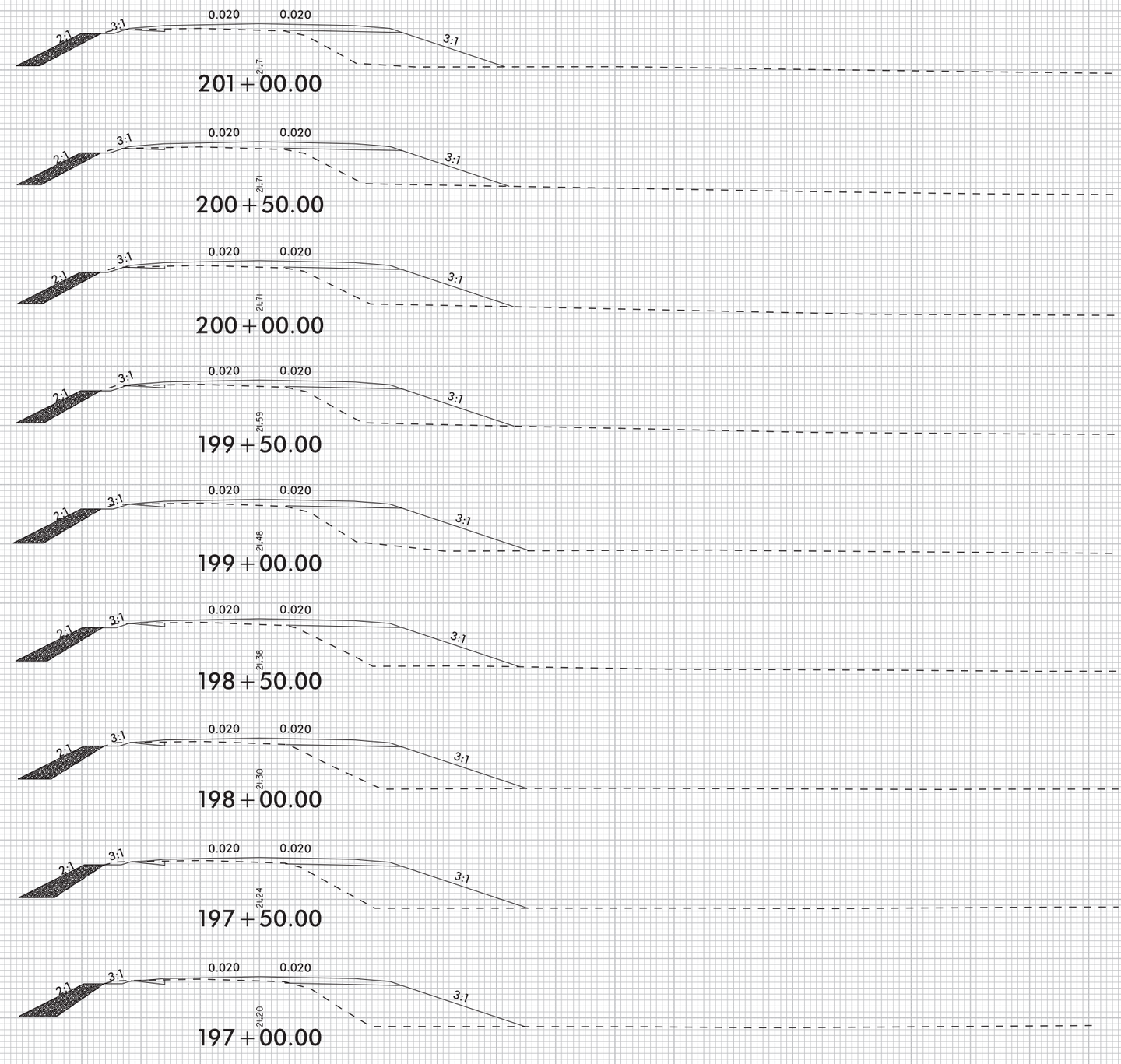

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-46 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




8/24/2022

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| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-47 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


8/24/2022

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| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-48 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-49 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

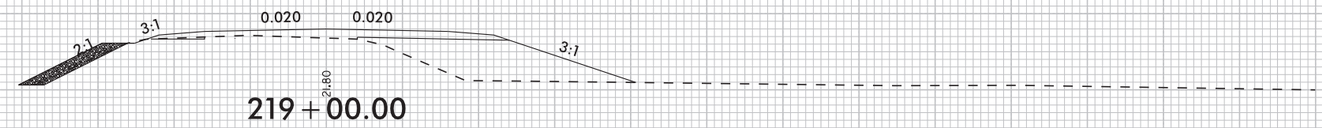

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-50 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

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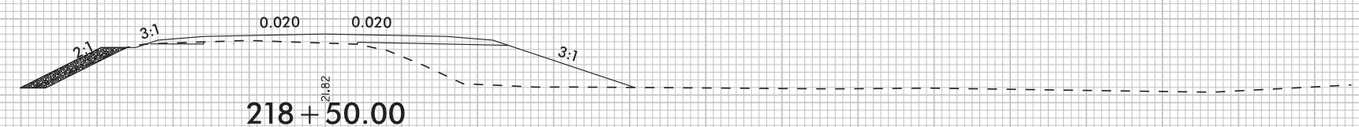


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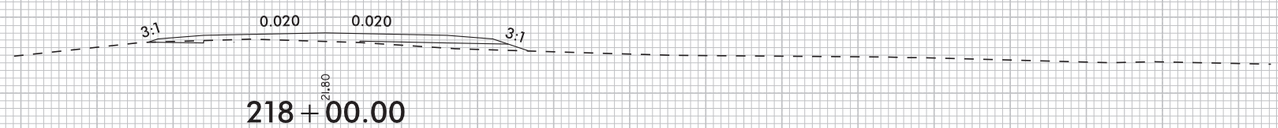


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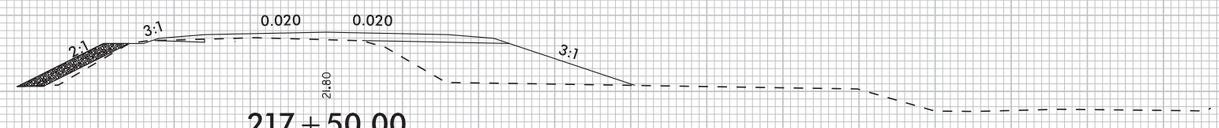


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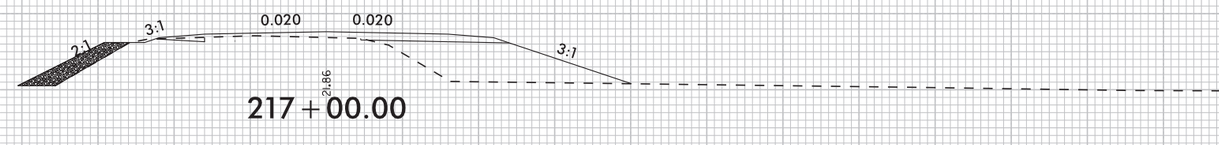


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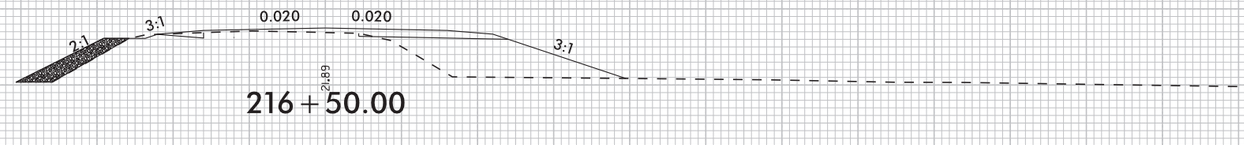


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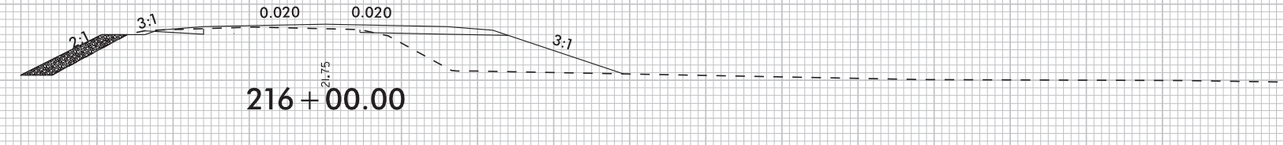


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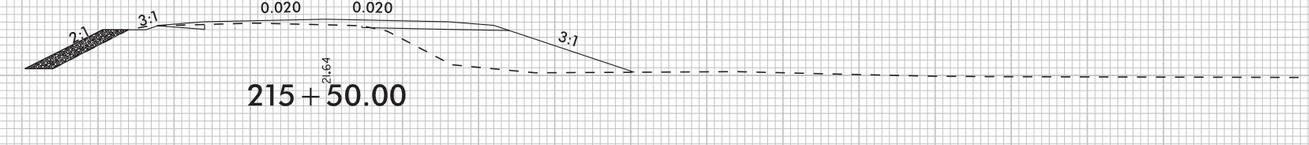


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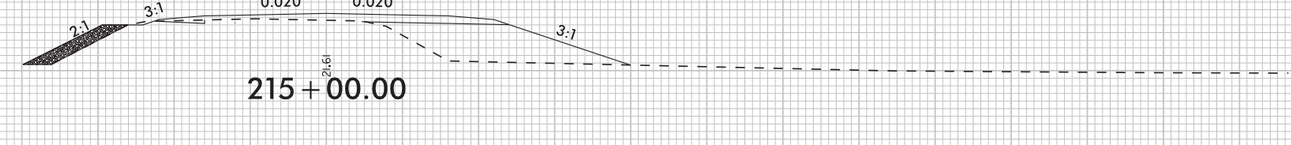


215 + 00.00

-L- US-158

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

8/24/2022

8/23/99

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| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | X-51 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


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8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-52 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

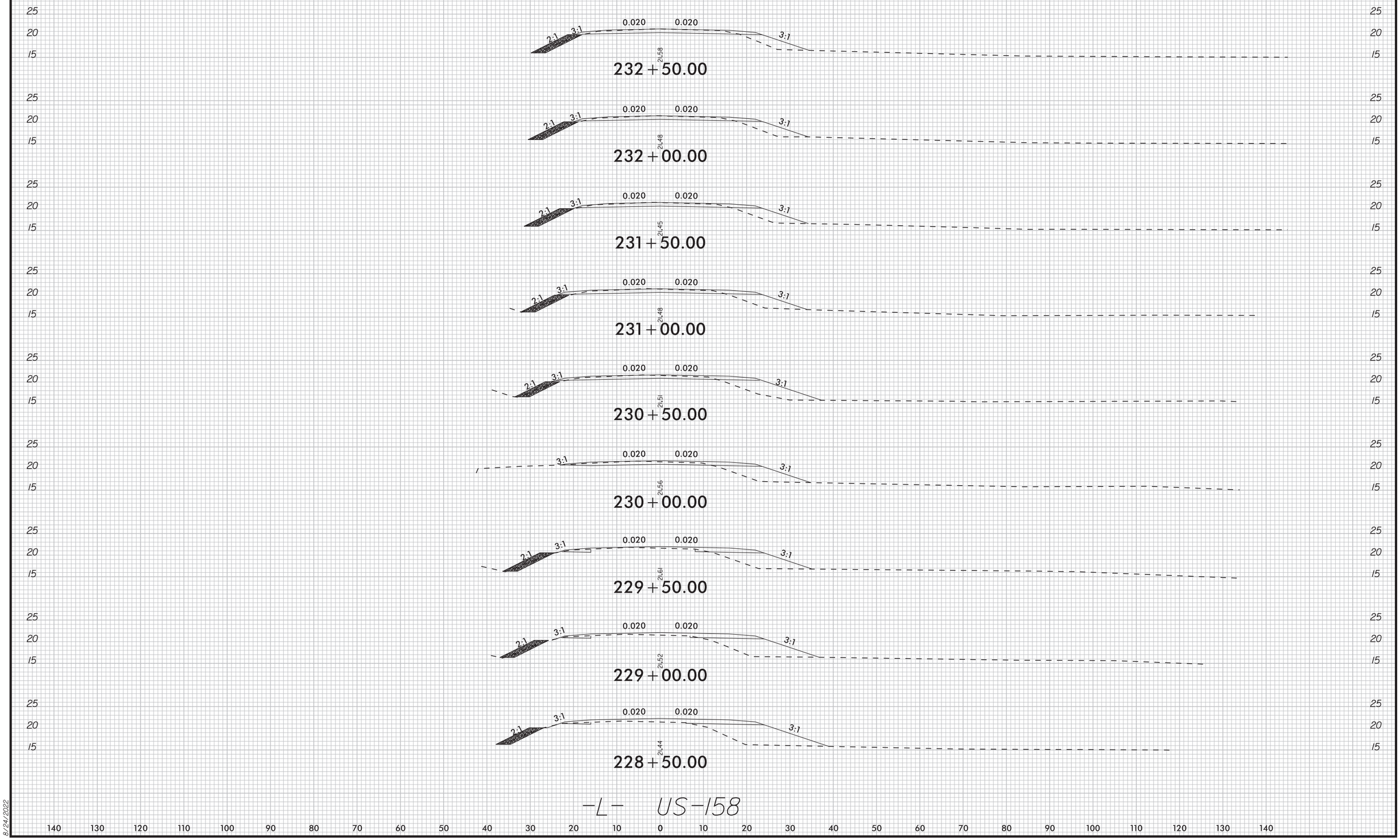

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-53 |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



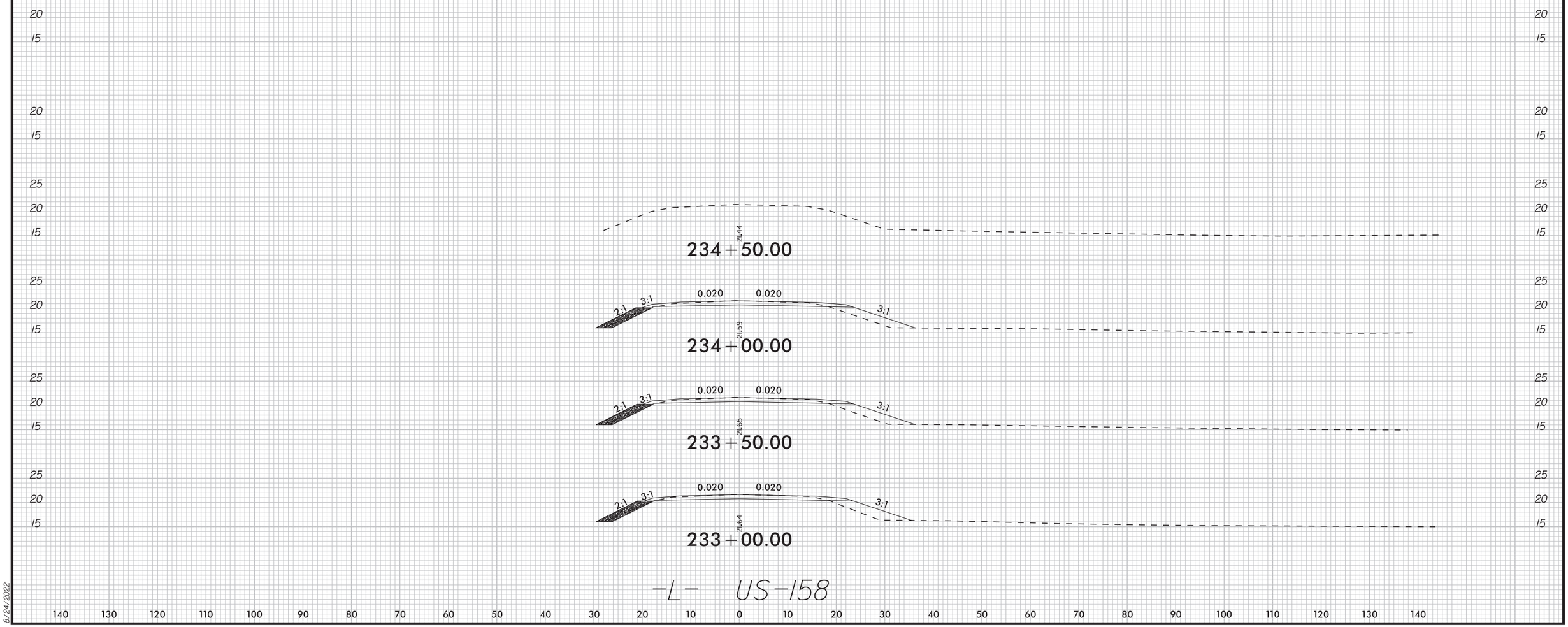

8/24/2022

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-54 |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION




8/24/2022

# Appendix E: Drainage Calculations

Date: **8/15/2022**

Project Number: **117093000**

County: **GATES**

Description: **R-5808**

Kimley-Horn & Associates, Inc.
Raleigh, NC

Designed By: **DLH**

Checked By:

# Ditch Computation Sheet

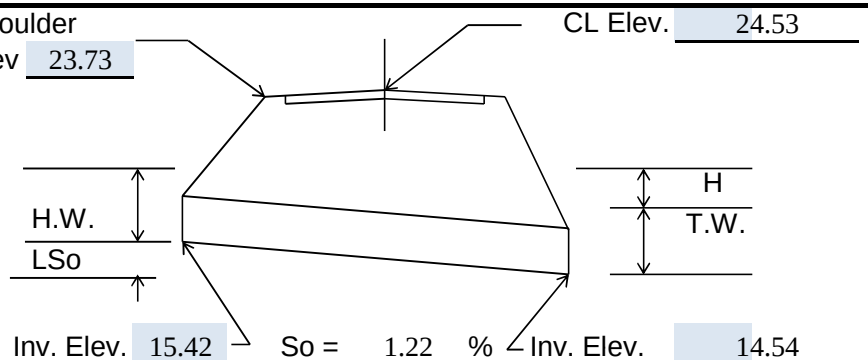
| Ditch Location | | | D.A. | C | Tc | I | Q10 | N-Val | Channel Slope | Normal Depth | Left Side Slope | Right Side Slope | Bottom Width | Flow Area | Wetted Perimeter | Hydraulic Radius | Top Width | Critical Depth | Critical Slope | Velocity | Velocity Head | Specific Energy | Froude Number | Flow Type | Shear Stress | Remarks | Liner Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| From | To | L/M/R | (acres) | | (min.) | (in./hr.) | (cfs) | | (ft/ft) | (ft) | (ft/ft (H:V)) | (ft/ft (H:V)) | (ft) | (ft²) | (ft) | (ft) | (ft) | (ft) | (ft/ft) | (ft/s) | (ft) | (ft) | | | (psf) | | |
| -L- 18+00 | -L- 21+00 | L | 1.75 | 0.35 | 10.0 | 6.60 | 4.04 | 0.035 | 0.025 | 0.66 | 3.00 | 3.00 | 0.00 | 1.30 | 4.20 | 0.31 | 3.95 | 0.65 | 0.03 | 3.11 | 0.15 | 0.81 | 0.96 | Subcritical | 1.03 | V-ditch | Grass |
| -L- 18+00 | -L- 21+50 | R | 0.58 | 0.45 | 10.0 | 6.60 | 1.72 | 0.035 | 0.025 | 0.48 | 3.00 | 3.00 | 0.00 | 0.70 | 3.00 | 0.23 | 2.88 | 0.46 | 0.03 | 2.48 | 0.10 | 0.58 | 0.89 | Subcritical | 0.73 | V-ditch | Grass |

# PIPE DATA SHEET

Date 6/24/2022 Sheet 1 of 1

Project No. 117093000 I.D. No. R-5808 County Gates Designed By GKS Checked By DLH

| | |
|---|---|
| Station | 50+81 -L- |
| Skew | 90.0 ° |
| Size/Type Pipe | 30" RCP |
| Type Entrance | Grooved End Proj. |
| Direction of Flow | RT to LT |
| Hydrological Method | Rational Method |
| HW Control Elev | 23.73 |




**PLAN SUMMARY DATA**

| | | |
|---|---|---|
| Drainage Area | 8.62 | ac |
| Design Freq. | 50 | yr |
| Design Disch. | 24.30 | cfs |
| Design H.W. Elev. | 17.90 | ft |
| Q100 Disch. | 26.10 | cfs |
| Q100 H.W. Elev. | 18.03 | ft |
| Overtopping Freq. | >100 | yr |
| Overtopping Disch. | N/A | cfs |
| Overtopping Elev. | N/A | ft |

| Size & Type Pipe | Freq (Yrs.) | Q (cfs) | Nat. H.W. | Allow. H.W. | T.W. | INLET CONTROL HW/D | INLET CONTROL H.W. | OUTLET CONTROL Ke | dc | (dc+d)/2 | ho | H | LSo | H.W. | H.W. Elev. | Vo (ft/s) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | |
| 30" RCP | 10 | 19.80 | | | 0.77 | 0.88 | 2.19 | 0.2 | 1.50 | 2.00 | 2.00 | 0.45 | 0.88 | 2.19 | 17.61 | 8.66 | Inlet Control |
| 30" RCP | 25 | 22.20 | | | 0.82 | 0.94 | 2.34 | 0.2 | 1.60 | 2.05 | 2.05 | 0.56 | 0.88 | 2.34 | 17.76 | 8.91 | Inlet Control |
| 30" RCP | 50 | 24.30 | | | 0.87 | 0.99 | 2.48 | 0.2 | 1.69 | 2.09 | 2.09 | 0.67 | 0.88 | 2.48 | 17.90 | 9.11 | Inlet Control |
| 30" RCP | 100 | 26.10 | | | 0.90 | 1.04 | 2.61 | 0.2 | 1.76 | 2.13 | 2.13 | 0.77 | 0.88 | 2.61 | 18.03 | 9.27 | Inlet Control |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |

SUMMARY AND RECOMMENDATIONS : Proposed 30" RCP w/ Grooved End Projection.

Water will not overtop roadway but will continue flowing up the -L- roadside fill slope

# Appendix F: Culvert Sizing Report

# CULVERT SURVEY & HYDRAULIC DESIGN REPORT

N. C. DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
HYDRAULICS UNIT
RALEIGH, N. C.

State Proj. Reference No. R-5808 WBS Project No. 46972.1.1 Proj. Station 24+65

County GATES Bridge Over ACORN HILL MILLPOND Struc. Inv. No. 003I

On Highway US 158 Between SR 1002 (ACORN HILL RD) and US 158 TO THE PASQUOTANK COUNTY LINE

Recommended Structure 2 @ 14' X 7' RCBC (BURIED 1') W/ WINGWALLS

Recommended Width of Roadway 32' SHOULDER PT. TO SHOULDER PT. Skew 90° 00' 00"

Recommended Location is ( Up, (At) Down) Stream from Existing Crossing. AT EXISTING

Longitude -76.54478 Latitude 36.44255

Statewide Tier ☐ Regional Tier ☒ Sub-Regional Tier ☐

Bench Mark is BM-A -L- (ROD & CAP IN GROUND)

N: 988979 E: 2722075 Elev. 26.07 ft. Datum: NAD83

Temporary Crossing NOT REQUIRED - ONSITE DETOUR - PHASING

9/15/2022

Designed by: DAVID HURSEY, P.E.

Assisted by: GARRISON SEITZ

Date 9/09/2022

NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 042074 DAVID HURSEY ENGINEER

9/15/2022

Kimley»Horn

KHA Project No.: 117093000

QA Review by: Erik Seiler Date 9/15/2022

Drainage Area 3.1 sq. mi Source USGS STREAM STATS

River Basin PASQUOTANK Character USGS REGION 4, RURAL, COASTAL

Stream Classification (Such as Trout, High Quality Water, etc.) C;Sw

Data on Existing Structure 2 @ 12'X6' RCBC; 33' ALONG CENTERLINE OF CULVERT WITH WINGWALLS

Total Waterway Opening 144 s.f.

Waterway Opening Below 100yr. WS EL. 144 s.f.

Debris Potential: Low ..... Moderate X High .....

Data on Structures Up and Down Stream 0.2 MI. US => STR #23I3 @ 59889; 2@72" RCP

0.46 MI. DS => GREAT DISMAL SWAMP

Gage Station No. N/A Period of Records N/A

Max. Discharge N/A c.f.s. Date N/A Frequency N/A

Historical Flood Information:

Date 10/2016 Elev. OVERTOPPING HURRICANE MATTHEW ft. Est. Freq. >100 yr. Source CHRIS BANTOS BRIDGE MAINTENANCE ENGINEER DIVISION 1 Period of Knowledge ..... yrs.

Date ------ Elev. ------ ft. Est. Freq. ------ yr. Source NO RESIDENT KNOWLEDGE Period of Knowledge ------ yrs.

Date ..... Elev. ..... ft. Est. Freq. ..... yr. Source ..... Period of Knowledge ..... yrs.

Allowable HW Elev. 25.4 (CORRECTED BFE @ 59917) Normal Water Surface Elev. 21.3 (OBSERVED 2/24/2022) ft.

Manning's n: Left O.B. 0.101 Channel 0.045 Right O.B. 0.101 Source EFFECTIVE FIS

Flood Study /Status EFFECTIVE FIS #37073CV000A, LIMITED DETAIL STUDY

Flood Study 100 yr. Discharge 1290 c.f.s.; WS Elev.: With Floodway 25.5 ft. Without Floodway 25.3 ft. @River Station 58898

## DESIGN DATA

Hydrological Method RURAL FLOOD-FREQ. EQN USGS SIR 2009-5158

Hydraulic Design Method HEC-RAS 5.0.7

Design Tailwater : $Q_{10}$ 21.9 ft.; $Q_{25}$ 22.6 ft.; $Q_{50}$ 22.5 ft.; $Q_{100}$ 23.7 ft.; $Q_{500}$ 23.4 ft.

INV. IN EL.=16.5, INV. OUT EL.=16.4 (BURIED 1')

SIZE & TYPE: 2@14'X7' RCBC @STATION 58917, APPROX. 29.8 UPSTREAM OF CULVERT.

| FREQUENCY | Q (cfs) | Inlet Control | | | Outlet Control | | Remarks |
|---|---|---|---|---|---|---|---|
| | | HW/D | H.W. | WSEL | H.W. | WSEL | |
| 10 YR | 350 | 0.5 | 3.2 | 19.6 | 5.6 | 22.0 | OUTLET CONTROL |
| 50 YR | 600 | 0.7 | 4.2 | 20.6 | 6.5 | 22.9 | OUTLET CONTROL |
| 100 YR | 1290 | 1.3 | 7.5 | 23.9 | 8.7 | 25.1 | OUTLET CONTROL |
| 500 YR | 1100 | 1.1 | 6.8 | 23.2 | 8.0 | 24.4 | OUTLET CONTROL |

Total Proposed Waterway Opening 168 s.f.

Outlet Velocity ($V_{10}$) 2.5 f.p.s. Natural Channel Velocity ($V_{10}$) 2.5 f.p.s.

Required Outlet Protection CL-II RIPRAP ON DOWNSTREAM BANKS ONLY

State Floodway Compliance Type SFC TYPE B - MAX DECREASE 0.4 @ RIVER STATION 59175

## INFORMATION TO BE SHOWN ON PLANS

| HYDRAULIC DATA | |
|---|---|
| DESIGN DISCHARGE | = 600 C.F.S. |
| FREQUENCY OF DESIGN FLOOD | = 50 YRS. |
| DESIGN HIGH WATER ELEVATION | = 22.9 |
| DRAINAGE AREA | = 3.1 SQ. MI. |
| BASIC DISCHARGE (Q100) | = 1290 C.F.S. |
| BASIC HIGH WATER ELEVATION | = 25.1 |
| **OVERTOPPING FLOOD DATA** | |
| OVERTOPPING DISCHARGE | = 1800 C.F.S. |
| FREQUENCY OF OVERTOPPING FLOOD | = >500 YRS. |
| OVERTOPPING FLOOD ELEVATION | = 26.9 * |

*OVERTOPPING WILL OCCUR AT STA. 24+53.40

WS EL. Taken @ River Station 58917

## ADDITIONAL INFORMATION AND COMPUTATIONS

USGS REGRESSION EQUATIONS — FEMA DISCHARGES

SOURCE: SIR 2009-5158

$Q_{10}$ = 350 CFS

$Q_{25}$ = 500 CFS

$Q_{50}$ = 600 CFS

$Q_{100}$ = 750 CFS (USE FEMA) $Q_{100}$ = 1290 CFS

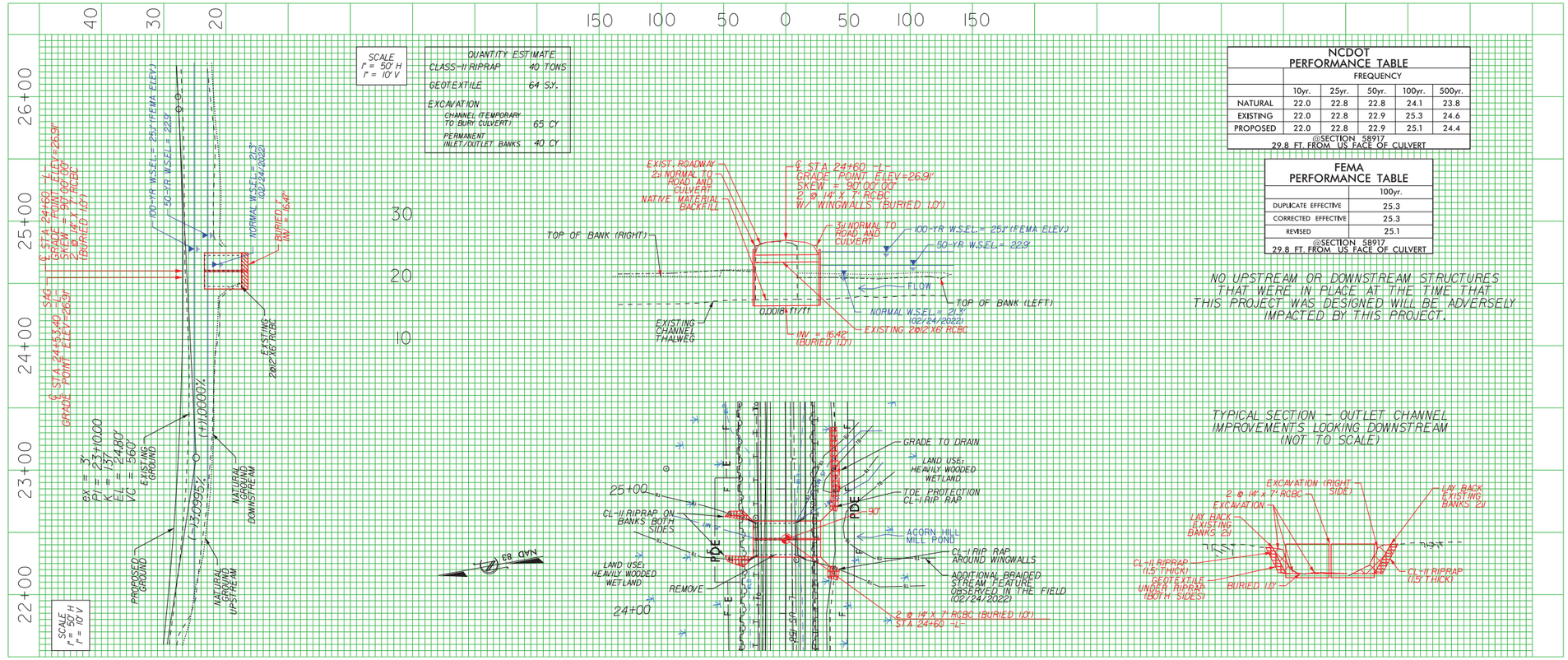
$Q_{500}$ = 1100 CFS

USGS APPLICATION OF METHODS TOOL VERSION 4.7.0
(100% HYDROLOGIC REGION 4), DA = 3.1 SQ. MI.

THIS PROJECT INCLUDES THE PROPOSED REPACEMENT OF CULVERT 003I WHICH CARRIES ACORN HILL MILLPOND UNDER US 158. ACORN HILL MILLPOND IS A FEMA REGULATED LIMITED DETAIL STUDY STREAM AS SHOWN ON THE EFFECTIVE FIS FOR GATES COUNTY, NC REVISED JULY 20, 2009 (FIS #37073CV000A). THE PRELIMINARY HYDRAULIC MODEL FOR ACORN HILL MILLPOND WAS USED FOR THE BASIS OF THE CSR. HYDROLOGIC DATA USED FOR THIS STUDY WAS GENERATED FROM USGS REGRESSION EQUATIONS (SIR 2009-5158) FOR REGION 4 AND PRELIMINARY FEMA DISCHARGES. A DRAINAGE AREA OF 3.1 SQ. MI. WAS CALCULATED USING USGS STREAMSTATS PROGRAM. THE EXISTING 2 @ 12' X 6' RCBC WILL BE REMOVED AND REPLACED WITH 2 @ 14' X 7' RCBC (BURIED 1') BACKFILLED WITH NATIVE MATERIAL.

NATIVE MATERIAL SPECIFICATION FOR BACKFILLING NOTE

- CULVERT BARREL SHOULD BE BACK FILLED WITH NATIVE MATERIAL TO BURY DEPTH (1.0')
- NATIVE MATERIAL CONSISTS OF MATERIAL THAT IS EXCAVATED FROM THE STREAM BED AT THE PROJECT SITE DURING CULVERT CONSTRUCTION. NATIVE MATERIAL IS SUBJECT TO APPROVAL BY THE ENGINEER AND MAY BE SUBJECT TO PERMIT CONDITIONS.



# Appendix G: Culvert Construction Sequence

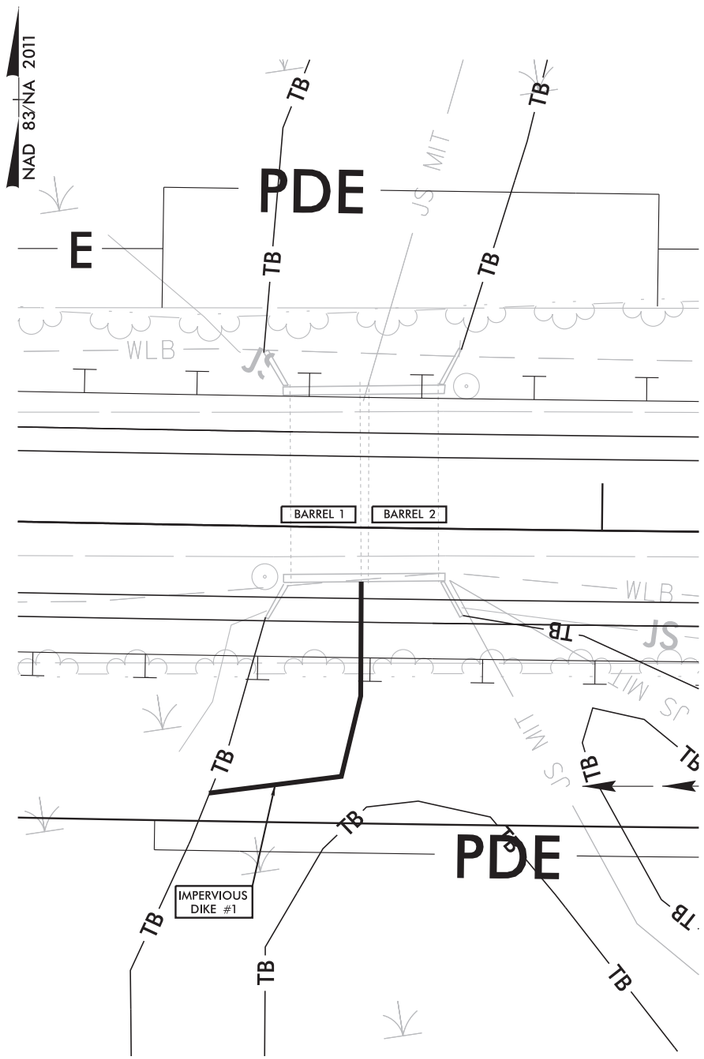
5/14/99

# CULVERT CONSTRUCTION SEQUENCE STA. 24+60–L–

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | EC-5A/CONST.5 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

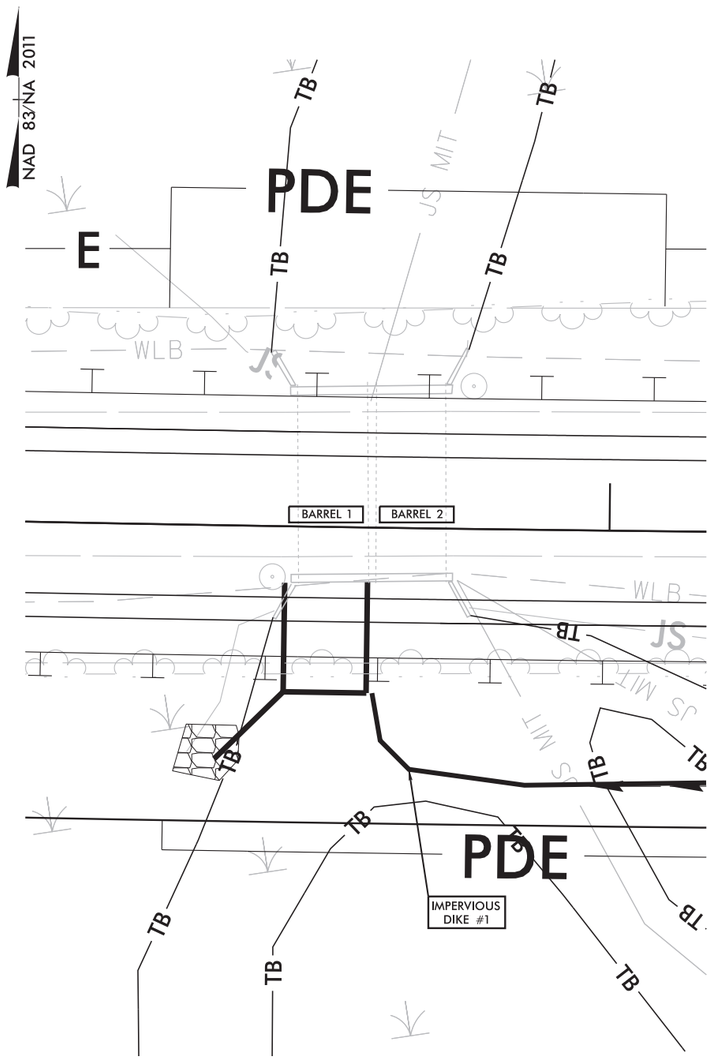
## PHASE I

1.) UTILIZE SPECIAL STILLING BASIN(S) DURING CONSTRUCTION AS NEEDED TO DEWATER WORK SITE. (TYP.)
2.) CONSTRUCT IMPERVIOUS DIKE 1 AS SHOWN ON PLANS, DIVERTING JS INTO EXISTING BARREL 2.
3.) CONSTRUCT THE SOUTH HALF OF PROPOSED BARREL 1 OF 2@14'x7' RCBC CULVERT AND CHANNEL IMPROVEMENTS. TIE TO EXISTING BARREL 1.
4.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.



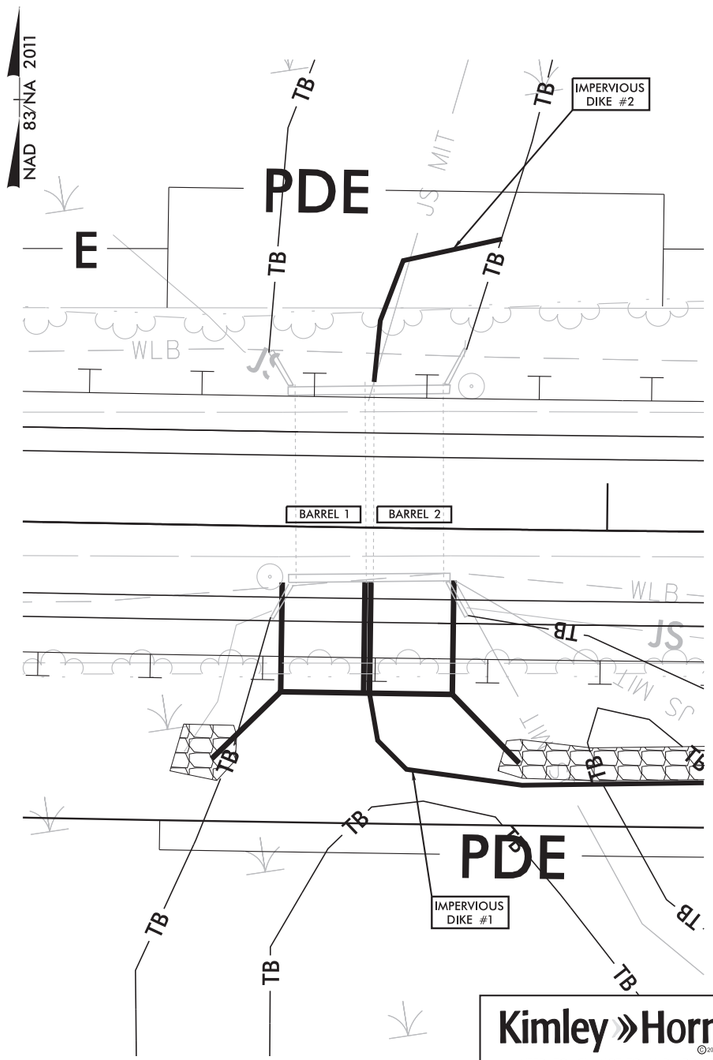

## PHASE II

1.) UTILIZE SPECIAL STILLING BASIN(S) DURING CONSTRUCTION AS NEEDED TO DEWATER WORK SITE. (TYP.)
2.) MOVE IMPERVIOUS DIKE 1 AS SHOWN ON PLANS, DIVERTING JS INTO EXISTING BARREL 1.
3.) CONSTRUCT THE SOUTH HALF OF PROPOSED BARREL 2 OF 2@14'x7' RCBC CULVERT AND CHANNEL IMPROVEMENTS. TIE TO EXISTING BARREL 2.
4.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.




## PHASE III

1.) UTILIZE SPECIAL STILLING BASIN(S) DURING CONSTRUCTION AS NEEDED TO DEWATER WORK SITE. (TYP.)
2.) REMOVE IMPERVIOUS DIKE 2 AND 4.
3.) REMOVE SPECIAL STILLING BASIN.
4.) STABILIZE DISTURBED AREA AND REMOVE ALL EROSION AND SEDIMENT CONTROL DEVICES AS DIRECTED.
5.) FINISH ROADWAY AND DRAINAGE CONSTRUCTION.
6.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.




10/28/2022

Kimley»Horn
© 2022
NEED TO CHANGE TO VAB ADDRESS
RALEIGH, NC 27601

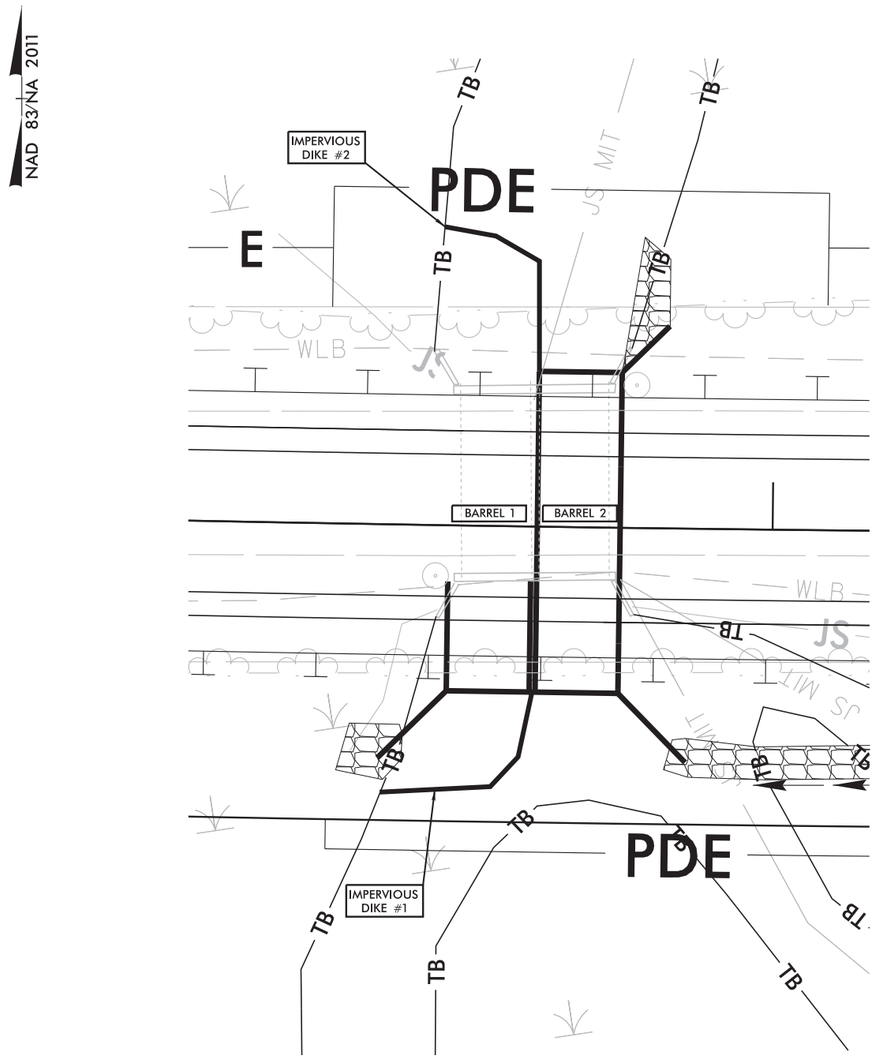
5/14/99

# CULVERT CONSTRUCTION SEQUENCE STA. 24+60–L–

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | EC-5B/CONST.5 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

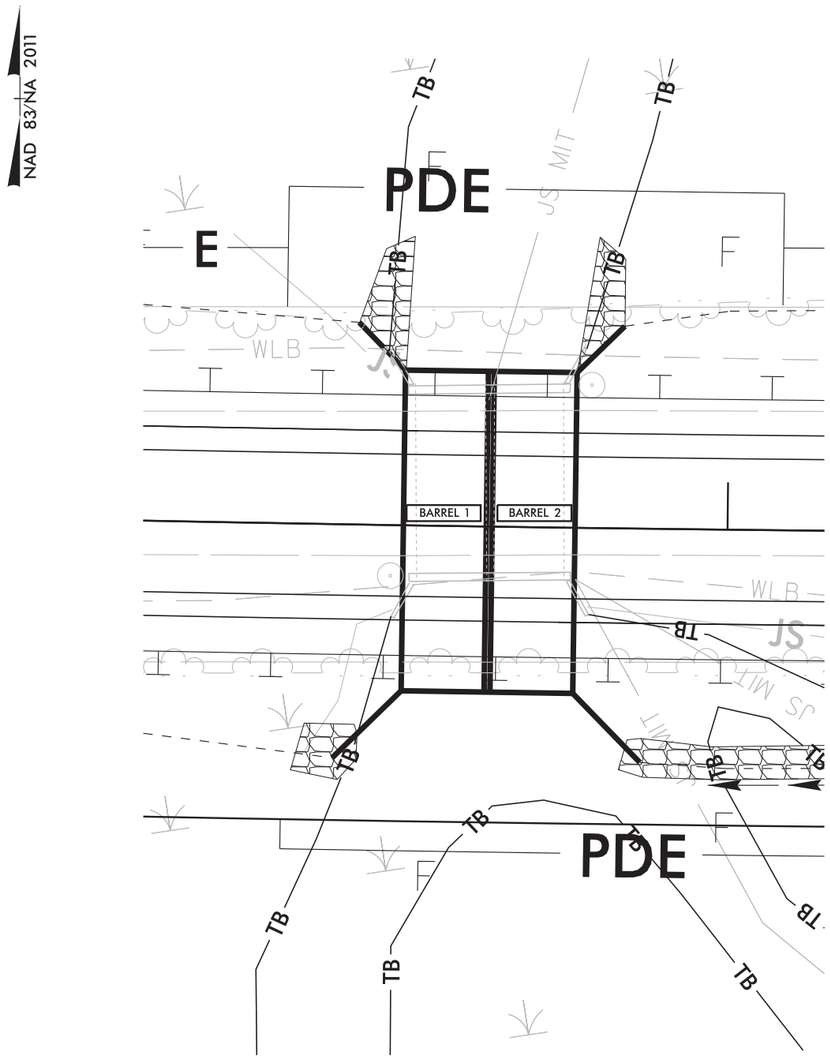
## PHASE IV

1.) UTILIZE SPECIAL STILLING BASIN(S) DURING CONSTRUCTION AS NEEDED TO DEWATER WORK SITE. (TYP.)
2.) MOVE IMPERVIOUS DIKE 1 AND 2 AS SHOWN ON PLANS, DIVERTING JS INTO EXISTING BARREL 2.
3.) CONSTRUCT THE NORTH HALF OF PROPOSED BARREL 1 OF 2@14'x7' RCBC CULVERT AND CHANNEL IMPROVEMENTS. TIE TO EXISTING BARREL 2.
4.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.




## PHASE V

1.) UTILIZE SPECIAL STILLING BASIN(S) DURING CONSTRUCTION AS NEEDED TO DEWATER WORK SITE. (TYP.)
2.) REMOVE IMPERVIOUS DIKE 1 AND 2, DIVERTING JS INTO PROPOSED 2@14'x7' RCBC.
3.) COMPLETE WESTBOUND ROADWAY IMPROVEMENTS, AND MOVE TRAFFIC OVER AFTER COMPLETION.
4.) REFERENCE TRAFFIC CONTROL PLANS FOR ADDITIONAL DETAIL REGARDING TRAFFIC MANAGEMENT.




10/28/2022

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NEED TO CHANGE TO VAB ADDRESS
RALEIGH, NC 27601

# Appendix H: Draft Permit Drawings

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 3.00; Released August 2021)

**WBS Element:** 46972.1.2 **TIP/Proj No:** R-5808 **County(ies):** Gates 

## General Project Information

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **WBS Element:** | 46972.1.2 | **TIP Number:** | R-5808 | **Project Type:** | Roadway Widening | **Date:** | 12/12/2022 |
| **NCDOT Contact:** | Paul Williams | | | **Contractor / Designer:** | David Hursey | | |
| **Address:** | Division Environmental Officer<br>113 Airport Drive #100<br>Edenton, NC, 27932 | | | **Address:** | Kimley-Horn<br>421 Fayetteville Street #600<br>Raleigh, NC, 27601 | | |
| **Phone:** | 252-452-1861 | | | **Phone:** | 919-653-2933 | | |
| **Email:** | pcwilliams2@ncdot.gov | | | **Email:** | david.hursey@kimley-horn.com | | |
| **City/Town:** | Sunbury | | | **County(ies):** | Gates | | |
| **River Basin(s):** | Pasquotank | | | **CAMA County?** | Yes | | |
| **Wetlands within Project Limits?** | Yes | | | | | | |

## Project Description

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Project Length (lin. miles or feet):** | 4.11 | **Surrounding Land Use:** | Rural | | | | |
| | **Proposed Project** | | | **Existing Site** | | | |
| **Project Built-Upon Area (ac.)** | 15.9 | ac. | | 11.0 | ac. | | |
| **Typical Cross Section Description:** | 2 @ 12' Lanes w/ 4' paved shoulder & 6' grass shoulder | | | 2 @ 11' Lanes w/ 1' paved shoulder | | | |
| **Annual Avg Daily Traffic (veh/hr/day):** | Design/Future: | 6200 | Year: 2043 | Existing: | 2023 | Year: | 4300 |

**General Project Narrative: (Description of Minimization of Water Quality Impacts)**

This is a Division 1 managed project. Existing drainage patterns to be maintained to the best extent practical. The following items were incorporated for the minimization of water quality impacts:

- Proposed culvert at Sta. 24+60 -L- was buried 1'
- 3:1 slopes were used from a soil stabilization standpoint
- Use of open channel design with rip rap on banks only where practical in areas of parallel jurisdictional stream impacts
- Channel improvements were used at culvert inlet and outlet
- Alignment was designed to minimize impacts to Great Dismal Swamp

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR NCDOT PROJECTS

(Version 3.00; Released August 2021)



## General Project Information

### Waterbody Information

| | | | | | | |
|---|---|---|---|---|---|---|
| **Surface Water Body (1):** | Jones Pond (Acorn Hill Millpond) | | **NCDWR Stream Index No.:** | 30-3-2-1-4 | | |
| **NCDWR Surface Water Classification for Water Body** | | **Primary Classification:** | Class C | | | |
| | | **Supplemental Classification:** | Swamp Waters (Sw) | | | |
| **Other Stream Classification:** | | | | | | |
| **Impairments:** | | | | | | |
| **Aquatic T&E Species?** | | Comments: | | | | |
| **NRTR Stream ID:** | Jones Pond | | | **Buffer Rules in Effect:** | N/A | |
| **Project Includes Bridge Spanning Water Body?** | No | **Deck Drains Discharge Over Buffer?** | N/A | **Dissipator Pads Provided in Buffer?** | No | |
| **Deck Drains Discharge Over Water Body?** | No | (If yes, provide justification in the General Project Narrative) | | (If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative) | | |
| (If yes, provide justification in the General Project Narrative) | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Surface Water Body (2):** | Newland Drainage Canal | | **NCDWR Stream Index No.:** | 30-3-1.5 | | |
| **NCDWR Surface Water Classification for Water Body** | | **Primary Classification:** | Class C | | | |
| | | **Supplemental Classification:** | Swamp Waters (Sw) | | | |
| **Other Stream Classification:** | | | | | | |
| **Impairments:** | | | | | | |
| **Aquatic T&E Species?** | | Comments: | | | | |
| **NRTR Stream ID:** | Newland Drainage Canal | | | **Buffer Rules in Effect:** | N/A | |
| **Project Includes Bridge Spanning Water Body?** | No | **Deck Drains Discharge Over Buffer?** | N/A | **Dissipator Pads Provided in Buffer?** | No | |
| **Deck Drains Discharge Over Water Body?** | No | (If yes, provide justification in the General Project Narrative) | | (If yes, describe in the General Project Narrative; if no, justify in the General Project Narrative) | | |
| (If yes, provide justification in the General Project Narrative) | | | | | | |

09/08/99

**TIP PROJECT: R-5808**

**CONTRACT:**

12/12/2022

# STATE OF NORTH CAROLINA
# DIVISION OF HIGHWAYS

# GATES COUNTY

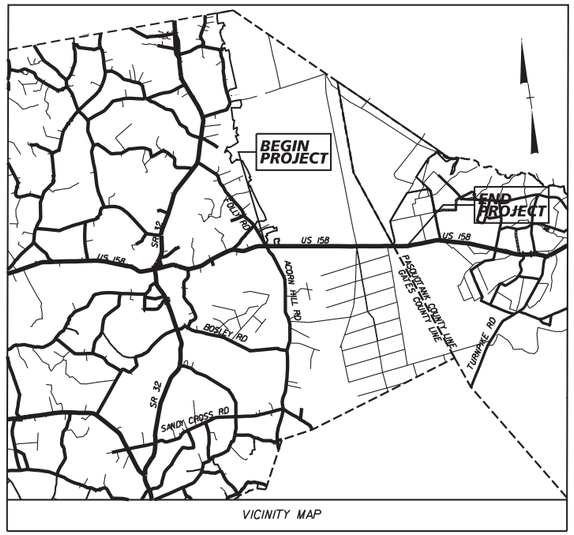
| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | R-5808 | 1 | |

| STATE PROJ. NO. | F. A. PROJ. NO. | DESCRIPTION |
|---|---|---|
| 46972.1.2 | NHP-0158(076) | PE |
| 46972.2.1 | NHP-0158(076) | R/W |
| 46972.2.2 | NHP-0158(076) | UTIL. |
| 46972.3.1 | NHP-0158(076) | CONSTR. |
| | | |
| | | |

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

***RIGHT OF WAY PLANS***

PERMIT DRAWING
SHEET 1 OF 54




VICINITY MAP

***LOCATION:*** *US 158 FROM THE INTERSECTION OF SR 1002 (ACORN HILL ROAD) AND US 158 TO THE PASQUOTANK COUNTY LINE*

***TYPE OF WORK:*** *GRADING, DRAINAGE, PAVING, WIDENING, AND CULVERT*

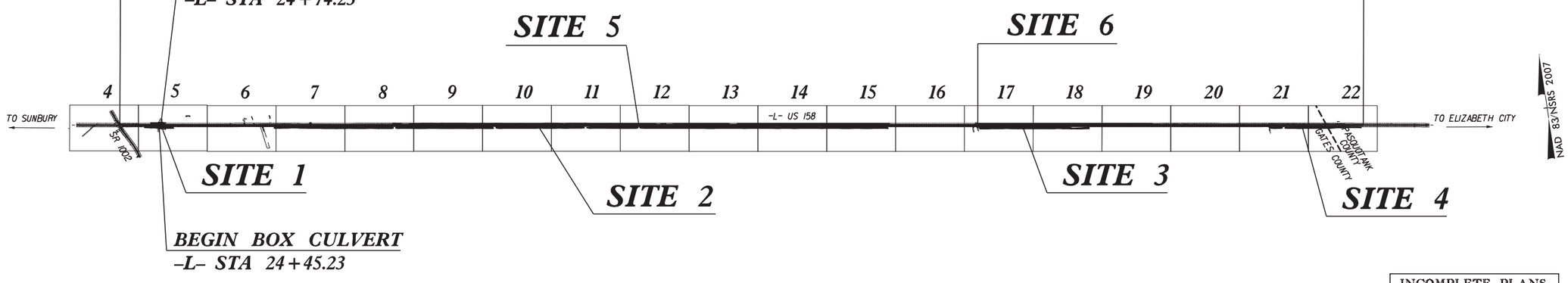
WETLAND AND STREAMS
IMPACTS PERMIT
DECEMBER 12, 2022

***BEGIN TIP PROJECT R-5808***
***-L- STA 17+59.05***

***END BOX CULVERT***
***-L- STA 24+74.23***

***BEGIN BOX CULVERT***
***-L- STA 24+45.23***

***END TIP PROJECT R-5808***
***-L- STA 234+37.39***



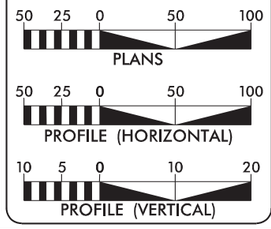

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

***SUBMITTAL:***
***DATE:*** August, 2022

CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III
THIS PROJECT IS NOT WITHIN ANY MUNICIPAL BOUNDARY

***GRAPHIC SCALES***




***DESIGN DATA***

ADT 2023 = 4,300
ADT 2043 = 6,200
K = 10%
D = 55%
T = 12%
V = 60 MPH

CLASSIFICATION:
OTHER PRINCIPAL ARTERIAL
* 7% TTST 5% DUAL
STATEWIDE TIER

***PROJECT LENGTH***

LENGTH ROADWAY TIP PROJECT R-5808 = 4.101 MILES
LENGTH OF STRUCTURE TIP PROJECT R-5808 = .005 MILES
TOTAL LENGTH TIP PROJECT R-5808 = 4.106 MILES

*Prepared in the Office of:*
Kimley»Horn
© 2021
NC LICENSE: C-0412
421 FAYETTEVILLE STREET, SUITE 600
RALEIGH, NORTH CAROLINA 27601
PHONE: (919) 677-2000

*2018 STANDARD SPECIFICATIONS*

***RIGHT OF WAY DATE:***
AUGUST 23, 2022

***LETTING DATE:***
JULY 18, 2023

***VINCENT RICCIO, PE***
*PROJECT ENGINEER*

***BRANDON GREGG, PE***
*PROJECT DESIGN ENGINEER*

***RYAN SHOOK***
*PROJECT MANAGER*
*NCDOT HIGHWAY DIVISION*

***HYDRAULICS ENGINEER***

*SIGNATURE:* *P.E.*

***ROADWAY DESIGN ENGINEER***

*SIGNATURE:* *P.E.*

STATE OF NORTH CAROLINA · DEPARTMENT OF TRANSPORTATION ·

5/14/99

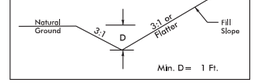
REVISIONS

$DATE$

## LEGEND

| | |
|---|---|
| F / F | FILL IN WETLAND |
| HC / HC | HAND CLEARING (NON-GRUBBING) |
| S / S | SURFACE WATER IMPACTS |
| P / P | OPEN WATER IMPACTS |
| TS / TS | TEMPORARY SURFACE WATER IMPACTS |

**DETAIL 1**
SPECIAL LATERAL 'V' DITCH
( Not to Scale)




FROM STA. 18+00 TO STA. 21+00 -L- (LT)
FROM STA. 18+00 TO STA. 21+50 -L- (RT)

Kimley»Horn ©2021
4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 2 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 4 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

**BEGIN TIP PROJECT R-5808**
**-L- POT Sta. 17+59.05**

**-L- US RTE 158**

**SR 1002 FOLLY RD**

**SR 1002 ACORN HILL RD**

SPECIAL LATERAL 'V' DITCH SEE DETAIL 1

4' PAVED SHOULDER

RETAIN

FELTON J. OUTLAND, JR. & TRUDY O. OUTLAND DB 1211 PG 359 PC 1 SLIDE 74-2

HARVEY ELLIOTT & FRANCES ELLIOTT DB 180 PG 147 PC 1 SLIDE 174-2

WILLIAM WALTER PARKER, JR. CAROLYN L. PARKER & JOHNNY E. PARKER DB 194 PG 564

WILLIAM C. JORDAN, JR., CARLEASE J. JACKSON & VERA JORDAN BALL DB 1[illegible] G 698

CAROLINA TELEPHONE & TELEGRAPH COMPANY DB 156 PG 294 DB 156 PG 296

WILLIAM WALTER PARKER, JR. CAROLYN L. PARKER & JOHNNY E. PARKER

MATCHLINE -L- STA 20+00.00 SEE PLAN SHEET 5

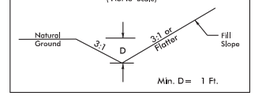
5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

DETAIL 1
SPECIAL LATERAL 'V' DITCH
( Not to Scale)




FROM STA. 18+00 TO STA. 21+00 -L- (LT)
FROM STA. 18+00 TO STA. 21+50 -L- (RT)

Kimley»Horn ©2021
4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 3 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 4 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

**BEGIN TIP PROJECT R-5808**
**-L- POT Sta. 17+59.05**

SR 1002 FOLLY RD

-L- US RTE 158

SR 1002 ACORN HILL RD

SPECIAL LATERAL 'V' DITCH SEE DETAIL 1

4' PAVED SHOULDER

RETAIN

FELTON J. OUTLAND, JR. & TRUDY O. OUTLAND DB 121 PG 359 PC 1 SLIDE 74-2

HARVEY ELLIOTT & FRANCES ELLIOTT DB 180 PG 145 PC 1 SLIDE 174-2

WILLIAM WALTER PARKER, JR. CAROLYN L. PARKER & JOHNNY E. PARKER DB 194 PG 564

WILLIAM C. JORDAN, JR., CARLEASE J. JACKSON & VERA JORDAN BALL DB [illegible] PG 698

CAROLINA TELEPHONE & TELEGRAPH COMPANY DB 156 PG 294 DB 156 PG 296

MATCHLINE -L- STA 20+00.00
SEE PLAN SHEET 5

$DATE$

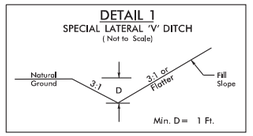
5/14/99

REVISIONS

## LEGEND

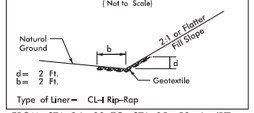
| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |
| E E | WETLAND EXCAVATION |

**DETAIL 1**
SPECIAL LATERAL 'V' DITCH
( Not to Scale)




FROM STA. 18+00 TO STA. 21+00 -L- (LT)
FROM STA. 18+00 TO STA. 21+50 -L- (RT)

**DETAIL 2**
TOE PROTECTION
( Not to Scale)




d= 2 Ft.
b= 2 Ft.
Type of Liner= CL-I Rip-Rap

FROM STA. 24+90 TO STA. 25+50 -L- (RT)

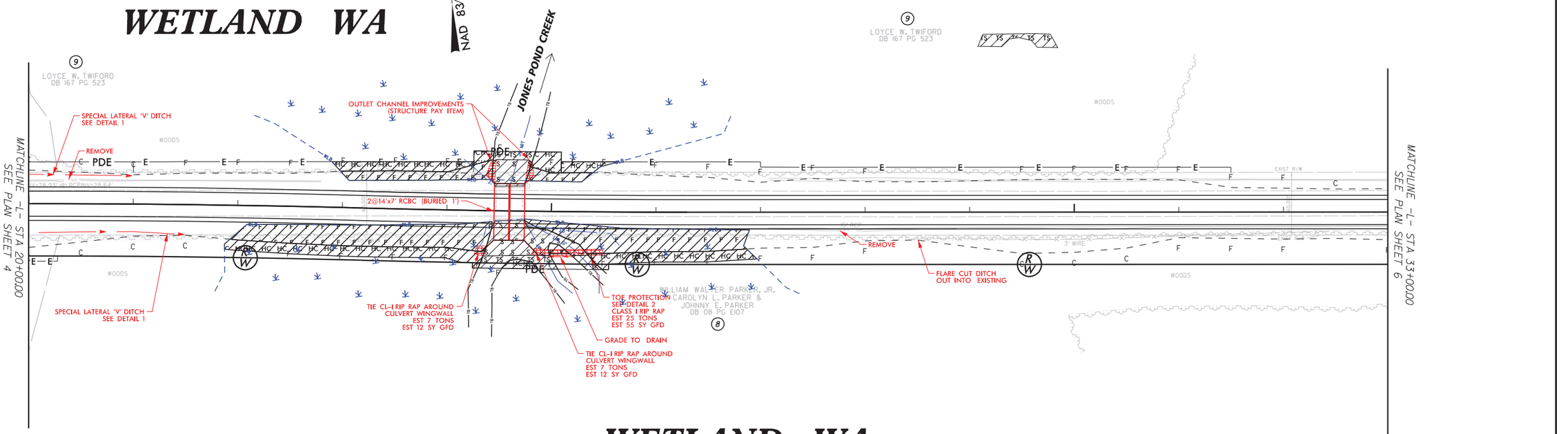

Kimley»Horn
© 2021
4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462


**PERMIT DRAWING**
**SHEET 4 OF 54**

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 5 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

# WETLAND WA

NAD 83/NSRS 2007




# WETLAND WA
# SITE 1


$DATE$

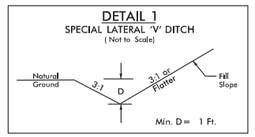
5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |
| E E | WETLAND EXCAVATION |

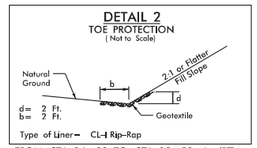
**DETAIL 1**
SPECIAL LATERAL 'V' DITCH
( Not to Scale)




Min. D= 1 Ft.

FROM STA. 18+00 TO STA. 21+00 -L- (LT)
FROM STA. 18+00 TO STA. 21+50 -L- (RT)

**DETAIL 2**
TOE PROTECTION
( Not to Scale)




d= 2 Ft.
b= 2 Ft.
Type of Liner= CL-I Rip-Rap

FROM STA. 24+90 TO STA. 25+50 -L- (RT)

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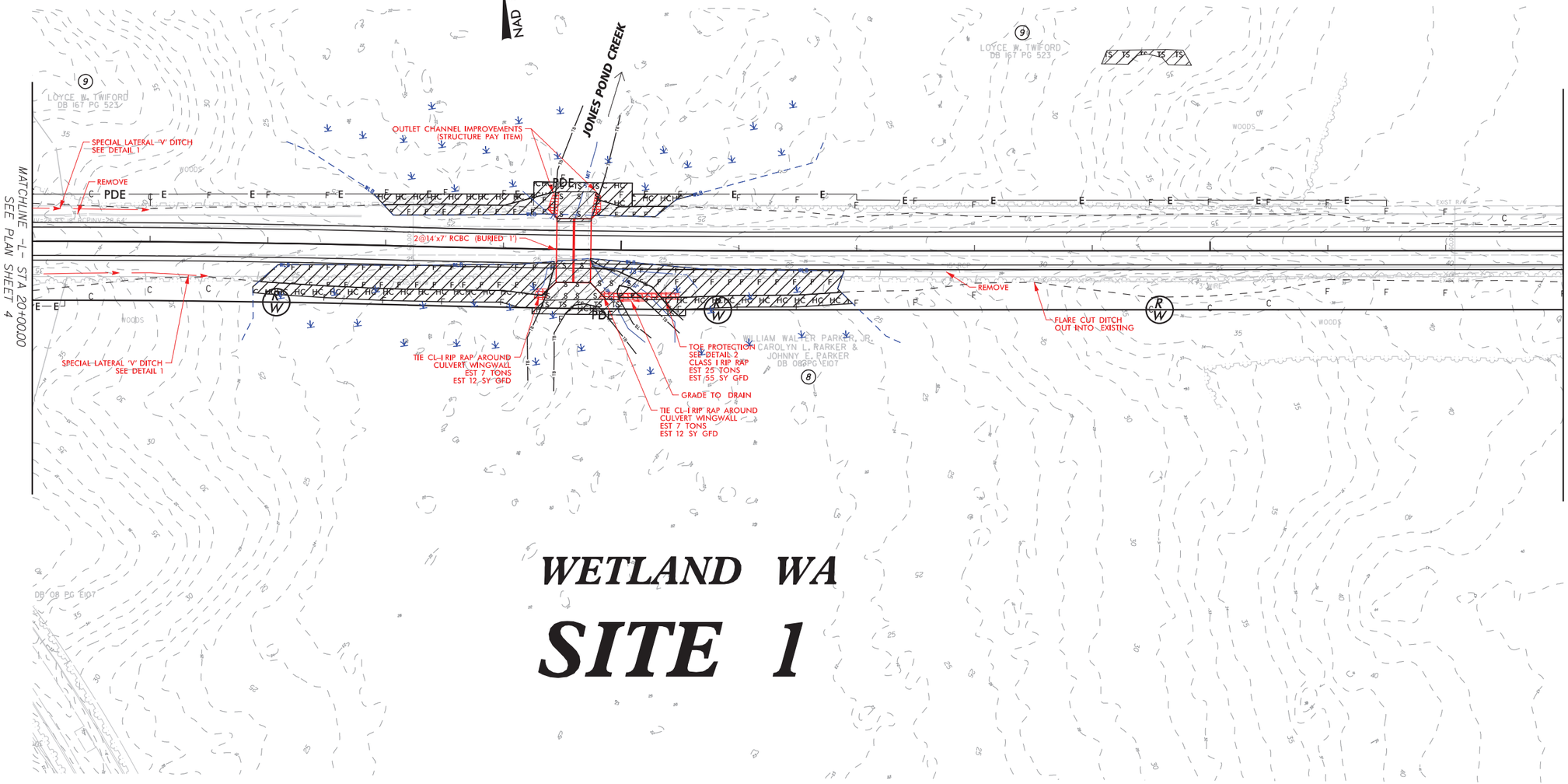
4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

**PERMIT DRAWING**
**SHEET 5 OF 54**

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 5 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# WETLAND WA




# WETLAND WA
# SITE 1

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

**PERMIT DRAWING SHEET 6 OF 54**

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 6 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# WETLAND WE

# WETLAND WB

# SITE 2

MATCHLINE -L- STA 33+00.00
SEE PLAN SHEET 5

MATCHLINE -L- STA 45+00.00
SEE PLAN SHEET 7

(9) LOYCE W. TWIFORD
DB 167 PG 523

(10) WILLIAM J. BRIGGS
DB 301 PG 479
PC 3 SLIDE 13-5

(10) WILLIAM J. BRIGGS
PC 3 SLIDE 51-2

(10) WILLIAM J. BRIGGS
DB 301 PG 479
PC 3 SLIDE 13-5

(8) WILLIAM WALTER PARKER, JR.
CAROLYN L. PARKER &
JOHNNY E. PARKER
DB 08 PG 0107

(11) GEORGE T. BRIGGS
DB 301 PG 481
PC 3 SLIDE 13-5

(K) GEORGE T. BRIGGS
DB 301 PG 481
PC 3 SLIDE 13-5

GEORGE TIMOTHY BRIGGS
DB 224 PG 267
PC 2 SLIDE 85-3

IS BK D
CONC
CULT
WOODS
EIP
EXIST R/W
RETAIN
REMOVE
2-WOOD POSTS
Ø60 15" PIPE
.03' EIP TO RW
.39' EIP TO RW
.13' RW TO EIP
INV=43.66' 15" RCP
INV=43.72'
INV=43.62' 12" CMP
R-BOX
SDR
RW

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 7 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 6 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# WETLAND WE

# WETLAND WB

# SITE 2

MATCHLINE -L- STA 33+00.00
SEE PLAN SHEET 5

MATCHLINE -L- STA 45+00.00
SEE PLAN SHEET 7

LOYCE W. TWIFORD
DB 167 PG 523

WILLIAM J. BRIGGS
DB 301PG 479
PC 3 SLIDE 13-5

WILLIAM J. BRIGGS
PC 3 SLIDE 51-2

WILLIAM WALTER PARKER, JR.
CAROLYN L. PARKER &
JOHNNY E. PARKER
DB 08 PG 0107

GEORGE T. BRIGGS
DB 301PG 481
PC 3 SLIDE 13-5

GEORGE TIMOTHY BRIGGS
DB 224 PG 267
PC 2 SLIDE 85-3

RETAIN

REMOVE

060
15" PIPE

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 8 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 7 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# NEWLAND DRAINAGE CANAL

# WETLAND WE

# WETLAND WF

# WETLAND WB

# SITE 2

(9) LOYCE W. TWIFORD
DB 167 PG 523

(10) WILLIAM J. BRIGGS
DB 301 PG 479
PC 3 SLIDE 13-5

(11) GEORGE T. BRIGGS
DB 301 PG 481
PC 3 SLIDE 13-5

GEORGE TIMOTHY BRIGGS
DB 224 PG 267
PC 2 SLIDE 85-3

RIPRAP PAD AT OUTLET
8 TONS CL-B RIP RAP
21 S.Y. GEOTEXTILE

REPLACE EXISTING PIPE
WITH A 30" RCP-IV

PDE
INV=114.54

MATCHLINE -L- STA 45+00.00
SEE PLAN SHEET 6

MATCHLINE -L- STA 57+00.00
SEE PLAN SHEET 8

WOODS

$DATE$

## LEGEND

- F F — FILL IN WETLAND
- HC HC — HAND CLEARING (NON-GRUBBING)
- S S — SURFACE WATER IMPACTS
- P P — OPEN WATER IMPACTS
- TS TS — TEMPORARY SURFACE WATER IMPACTS

NAD 83/NSRS 2007

# NEWLAND DRAINAGE CANAL

# WETLAND WE

# WETLAND WF

# WETLAND WB

# SITE 2

RIPRAP PAD AT OUTLET
.8 TONS CL-B RIP RAP
21 S.Y. GEOTEXTILE

REPLACE EXISTING (PIPE
WITH A 30" RCP-IV

PDE

WILLIAM J. BRIGGS
DB 301PG 479
PC 3 SLIDE 13-5

GEORGE T. BRIGGS
DB 301PG 481
PC 3 SLIDE 13-5

LOYCE W. TWIFORD
DB 167 PG 523

GEORGE TIMOTHY BRIGGS
DB 224 PG 267
PC 2 SLIDE 85-3

MATCHLINE -L- STA 45+00.00
SEE PLAN SHEET 6

MATCHLINE -L- STA 57+00.00
SEE PLAN SHEET 8

REVISIONS

5/14/99

$DATE$

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VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 9 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 7 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 10 OF 54

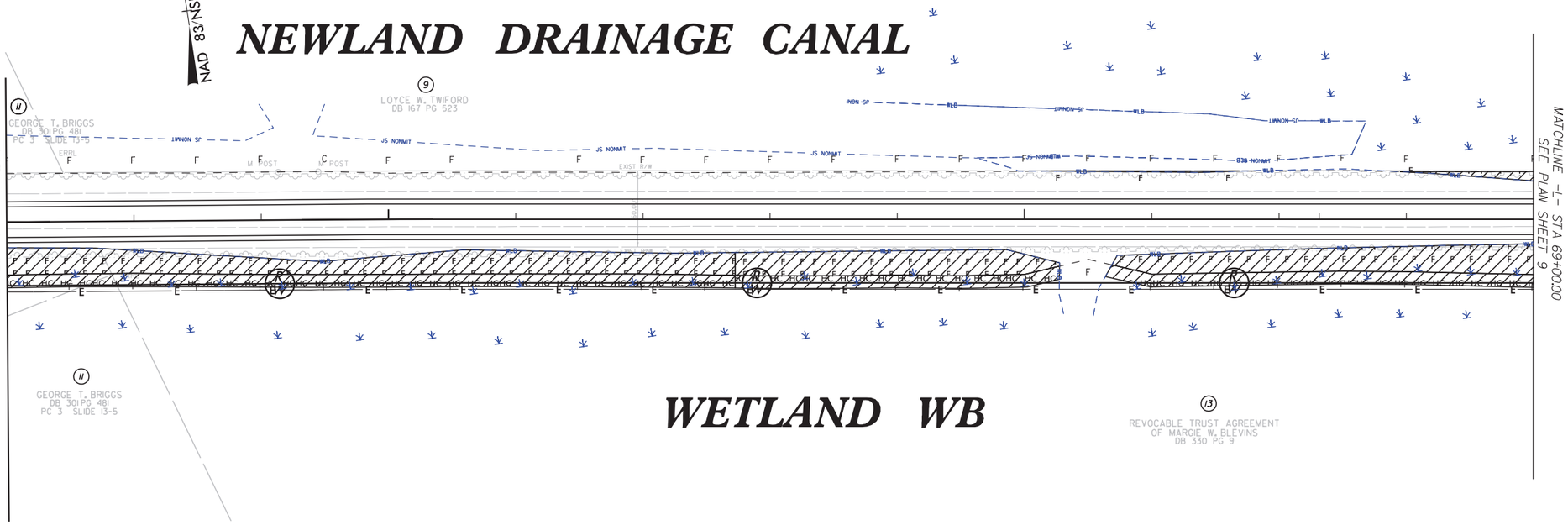
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 8 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

# SITE 5

## WETLAND WG

NAD 83/NSRS 2007

## NEWLAND DRAINAGE CANAL




# SITE 2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

**PERMIT DRAWING**
**SHEET 11 OF 54**

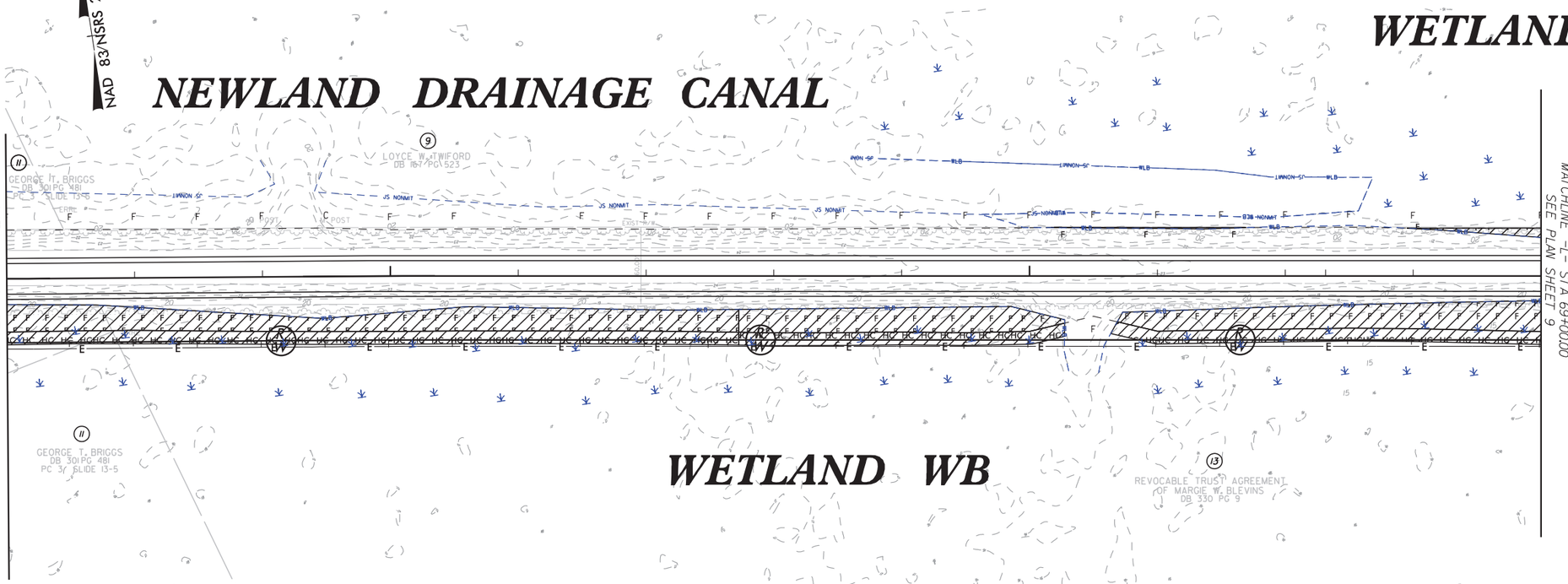
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 8 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# SITE 5

## WETLAND WG

## NEWLAND DRAINAGE CANAL




## WETLAND WB

# SITE 2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 12 OF 54

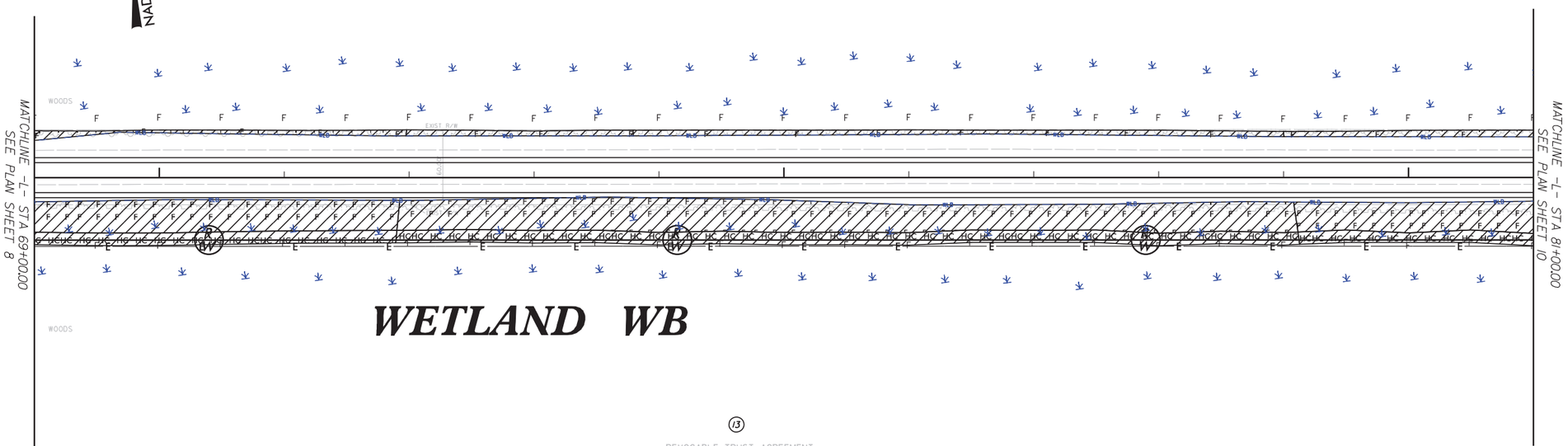
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 9 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

# SITE 5

NAD 83/NSRS 2007

## WETLAND WG

(9) LOYCE W. TWIFORD
DB 167 PG 523




(13) REVOCABLE TRUST AGREEMENT
OF MARGIE W. BLEVINS
DB 330 PG 9

## WETLAND WB

# SITE 2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 13 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 9 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

# SITE 5

NAD 83/NSRS 2007

## WETLAND WG

MATCHLINE -L- STA 69+00.00
SEE PLAN SHEET 8

MATCHLINE -L- STA 81+00.00
SEE PLAN SHEET 10

WOODS

LOYCE W. TWIFORD
DB 167 PG 523

EAST R/W

## WETLAND WB

WOODS

REVOCABLE TRUST AGREEMENT
OF MARGIE W. BLEVINS
DB 330 PG 9

# SITE 2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

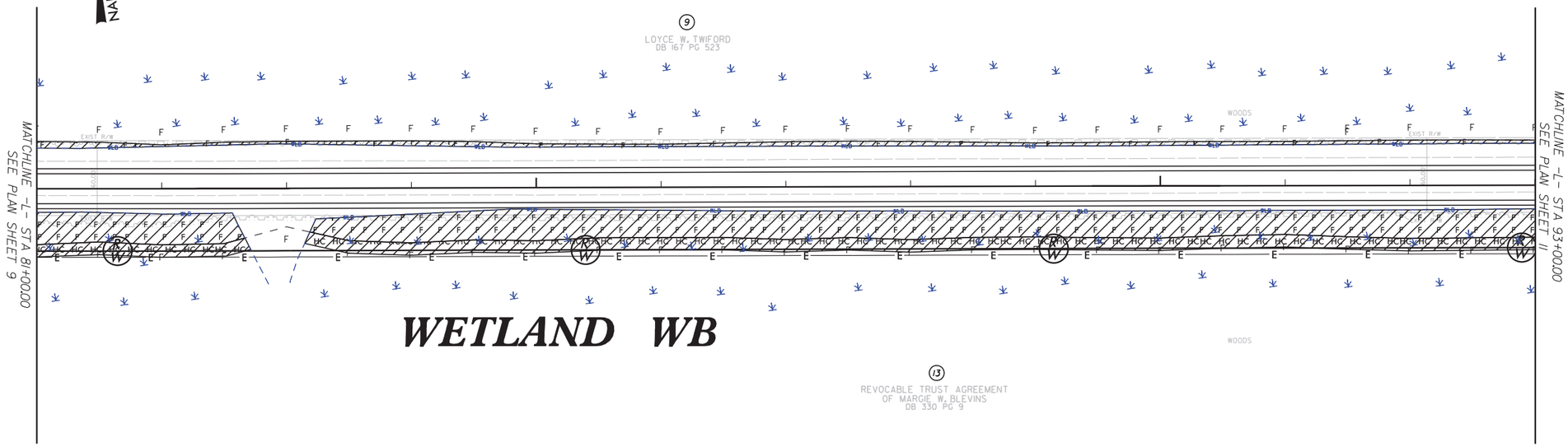
PERMIT DRAWING
SHEET 14 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 10 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

# SITE 5

## WETLAND WG

NAD 83/NSRS 2007




# SITE 2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

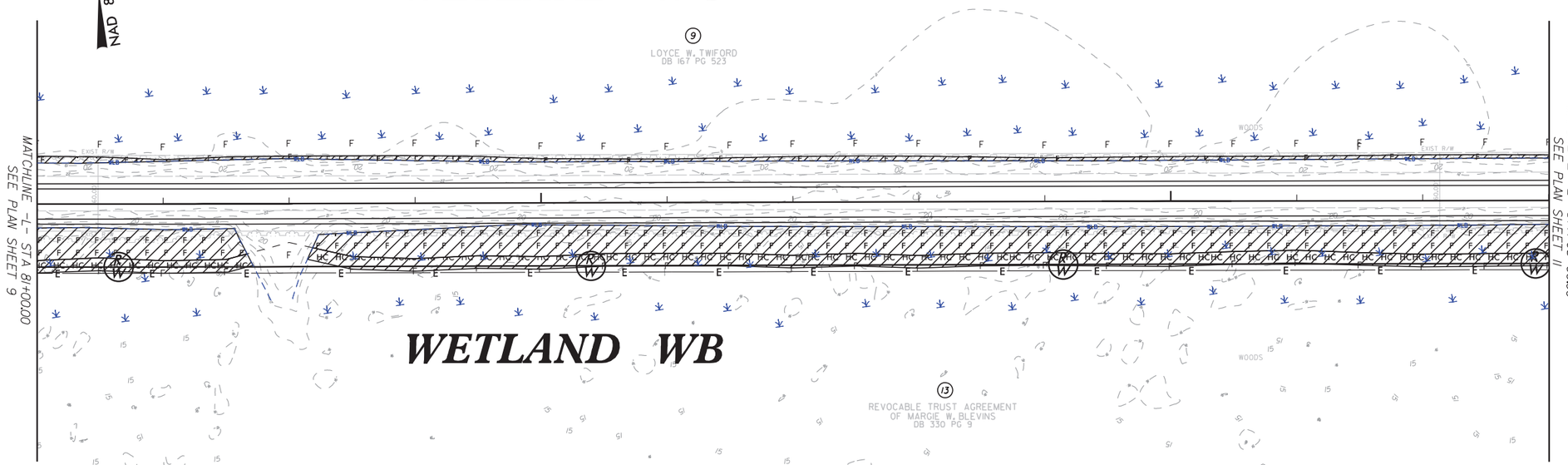
PERMIT DRAWING
SHEET 15 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 10 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

# SITE 5

NAD 83/NSRS 2007

## WETLAND WG




# SITE 2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 16 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 11 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

# SITE 5

NAD 83/NSRS 2007

## WETLAND WG

LOYCE W. TWIFORD
DB 167 PG 523

MATCHLINE -L- STA 93+00.00
SEE PLAN SHEET 10

MATCHLINE -L- STA 105+00.00
SEE PLAN SHEET 12

EXIST R/W

ABAND

## WETLAND WB

REVOCABLE TRUST AGREEMENT
OF MARGIE W. BLEVINS
DB 330 PG 9

# SITE 2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 17 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 11 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

# SITE 5

NAD 83/NSRS 2007

## WETLAND WG

(9) LOYCE W. TWIFORD
DB 167 PG 523

MATCHLINE -L- STA 93+00.00
SEE PLAN SHEET 10

MATCHLINE -L- STA 105+00.00
SEE PLAN SHEET 12

## WETLAND WB

(13) REVOCABLE TRUST AGREEMENT OF MARGIE W. BLEVINS
DB 330 PG 9

ABAND

# SITE 2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

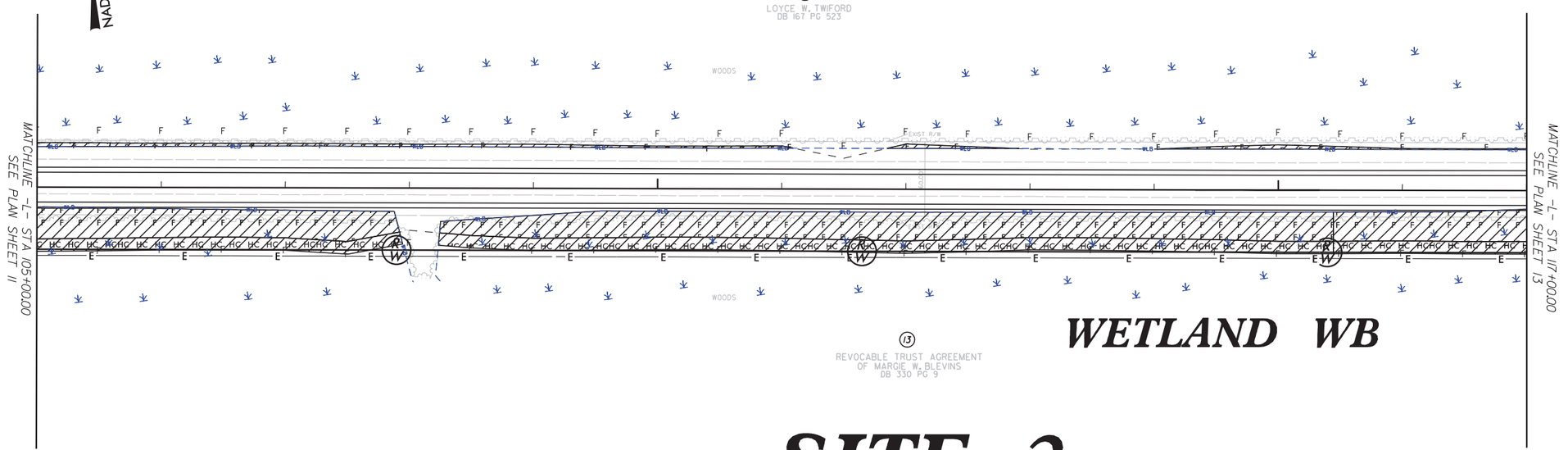
PERMIT DRAWING
SHEET 18 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 12 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# SITE 5

## WETLAND WG




## WETLAND WB

# SITE 2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

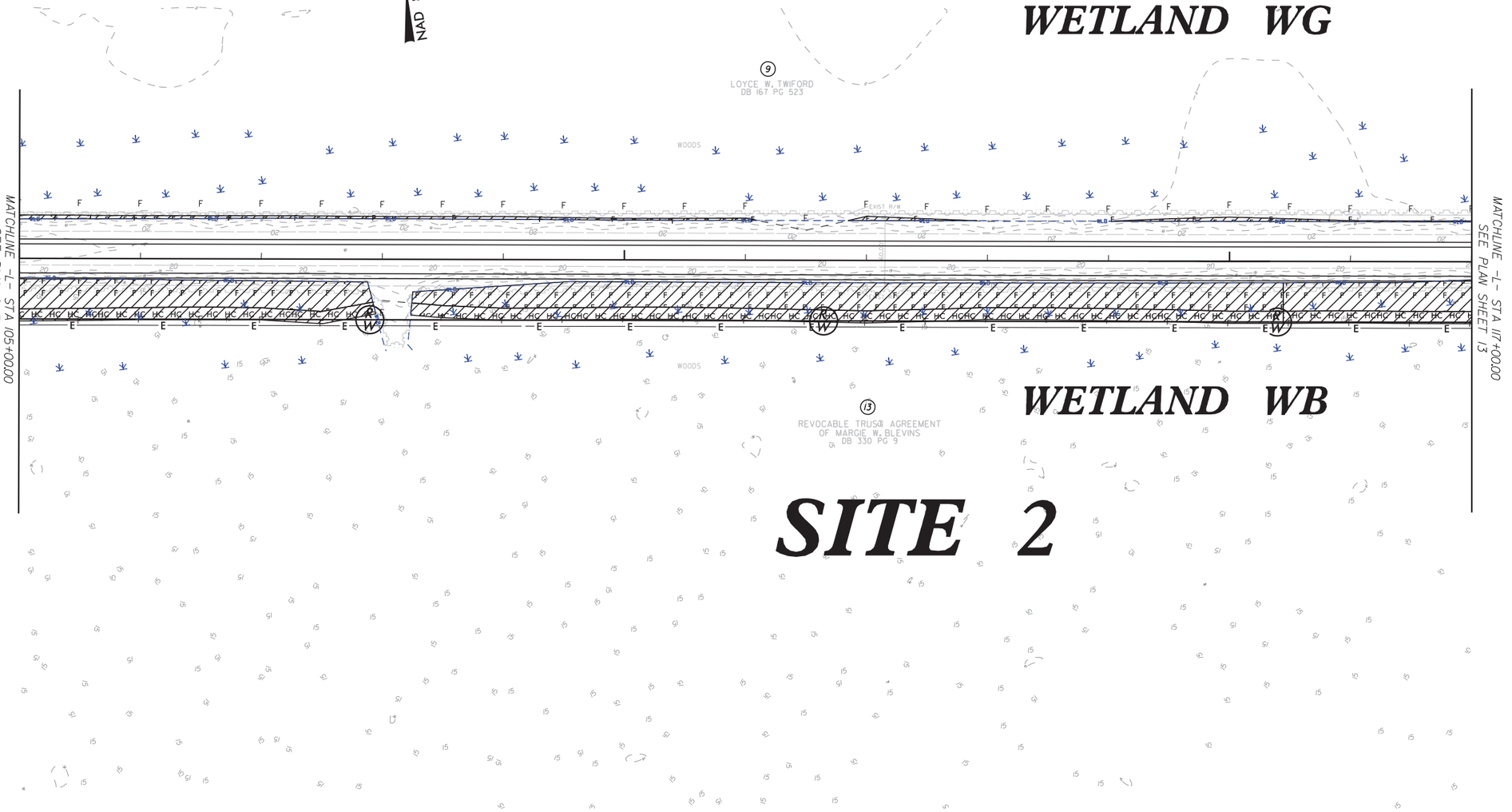
PERMIT DRAWING
SHEET 19 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 12 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# SITE 5

## WETLAND WG




$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

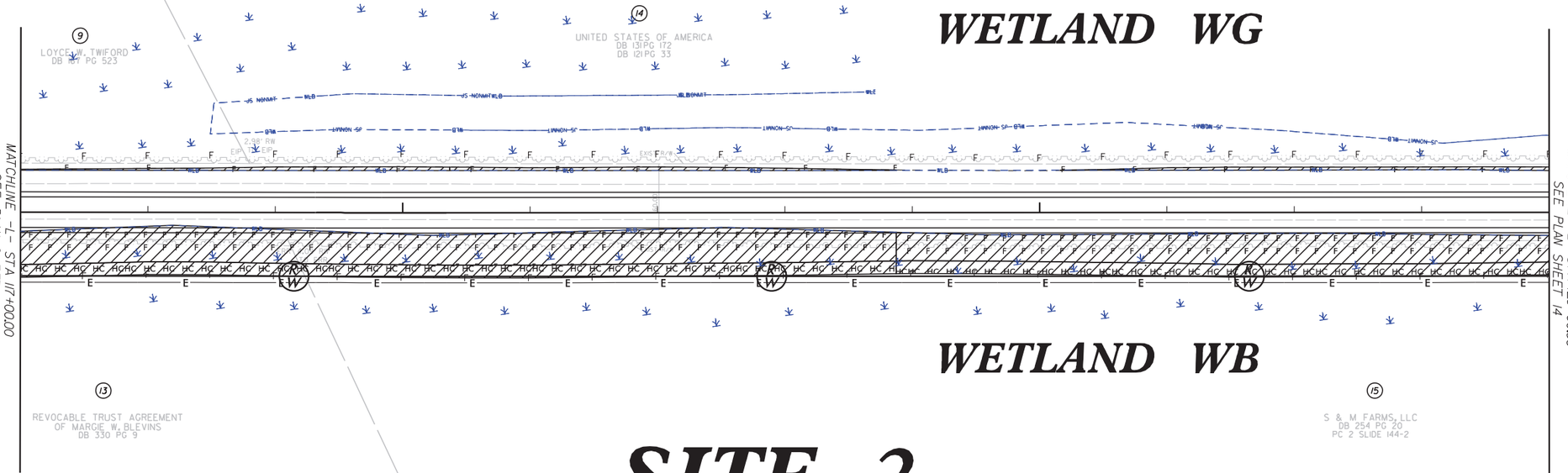
PERMIT DRAWING
SHEET 20 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 13 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# SITE 5

## WETLAND WG




## WETLAND WB

# SITE 2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

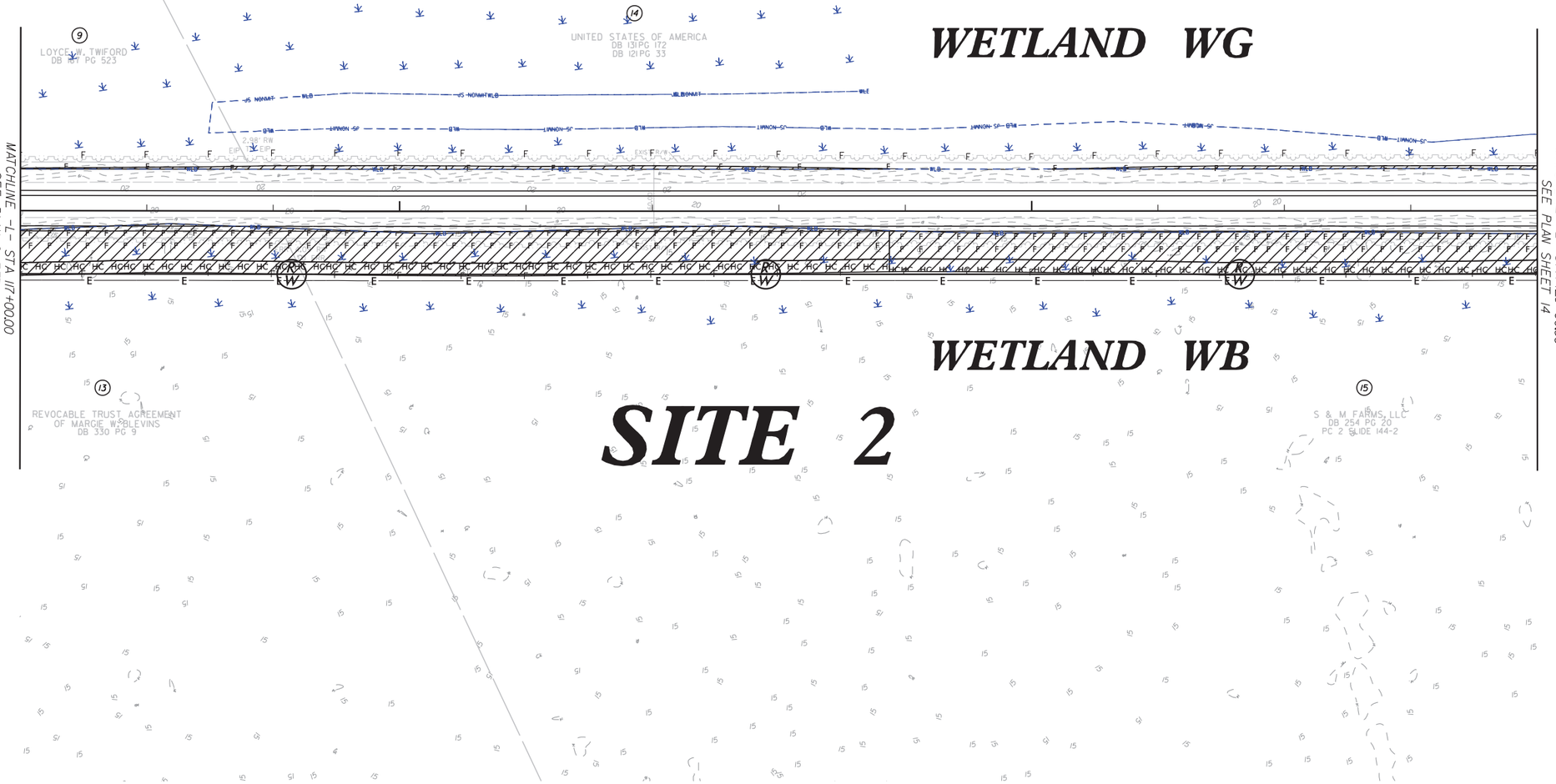
PERMIT DRAWING
SHEET 21 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 13 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# SITE 5

## WETLAND WG




$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

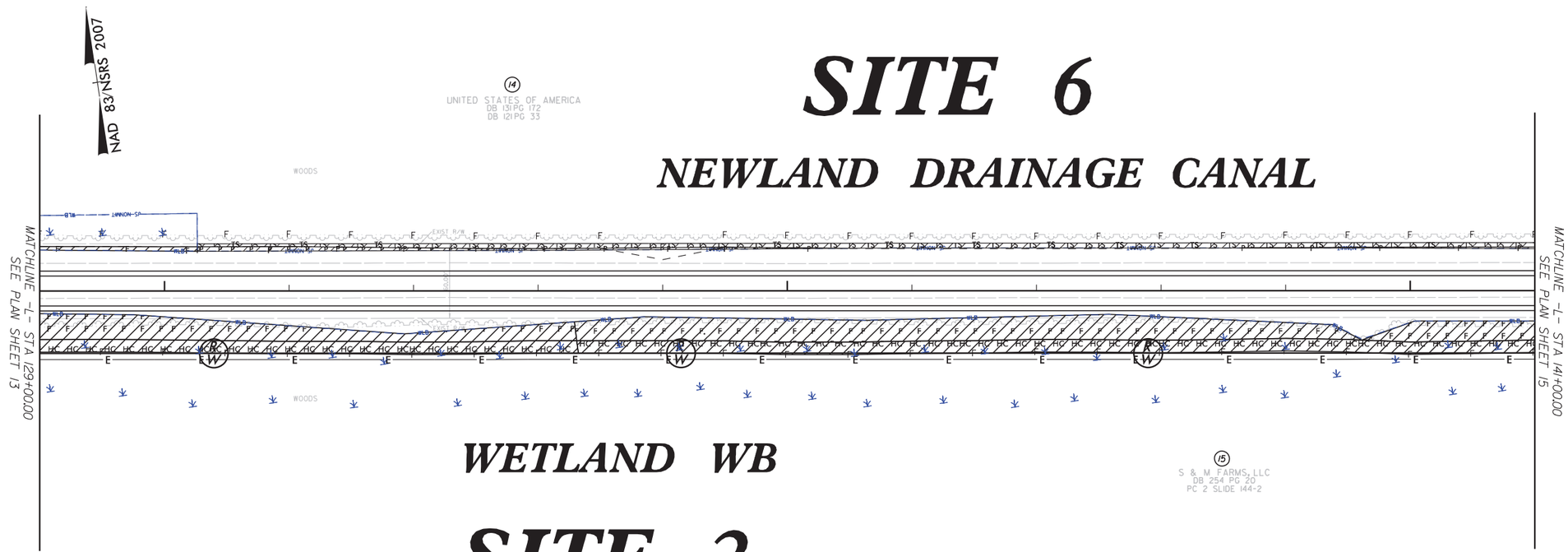
PERMIT DRAWING
SHEET 22 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 14 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# SITE 6

## NEWLAND DRAINAGE CANAL




## WETLAND WB

# SITE 2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

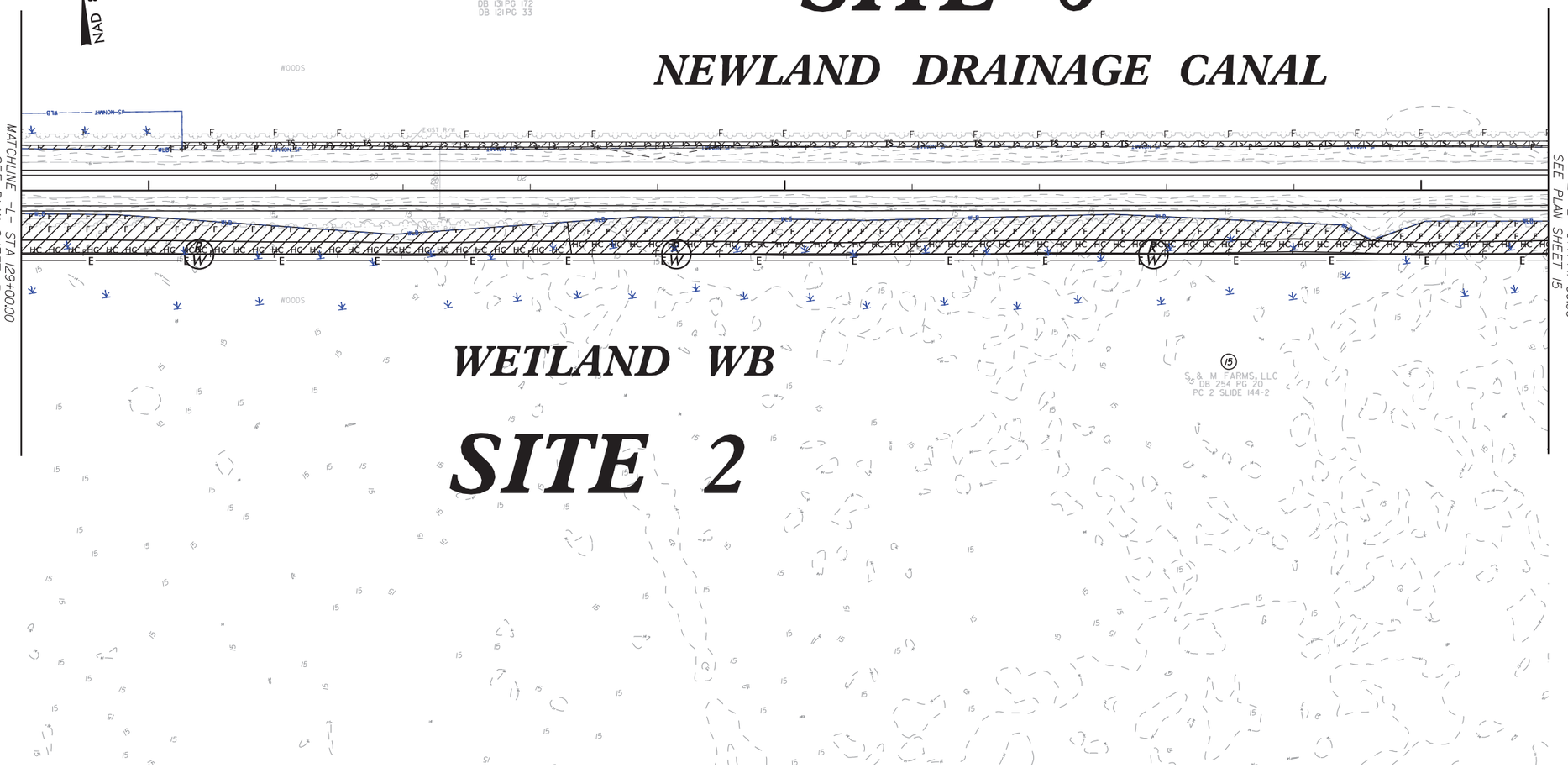
PERMIT DRAWING
SHEET 23 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 14 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# SITE 6

## NEWLAND DRAINAGE CANAL




## WETLAND WB

# SITE 2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

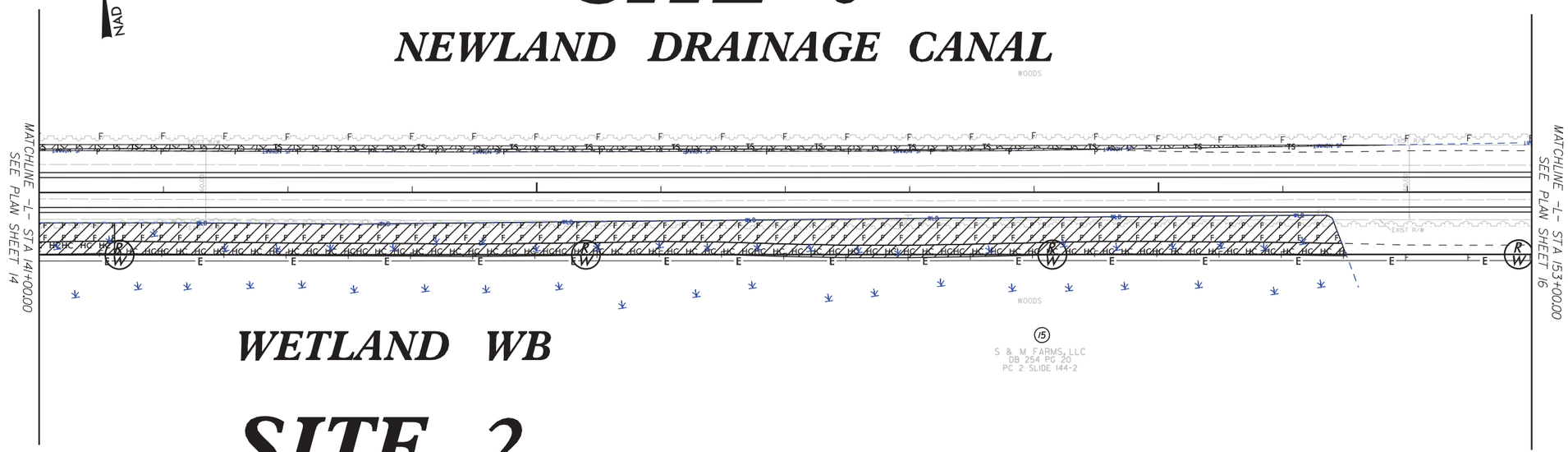
PERMIT DRAWING
SHEET 24 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 15 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# SITE 6

## NEWLAND DRAINAGE CANAL




## WETLAND WB

# SITE 2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

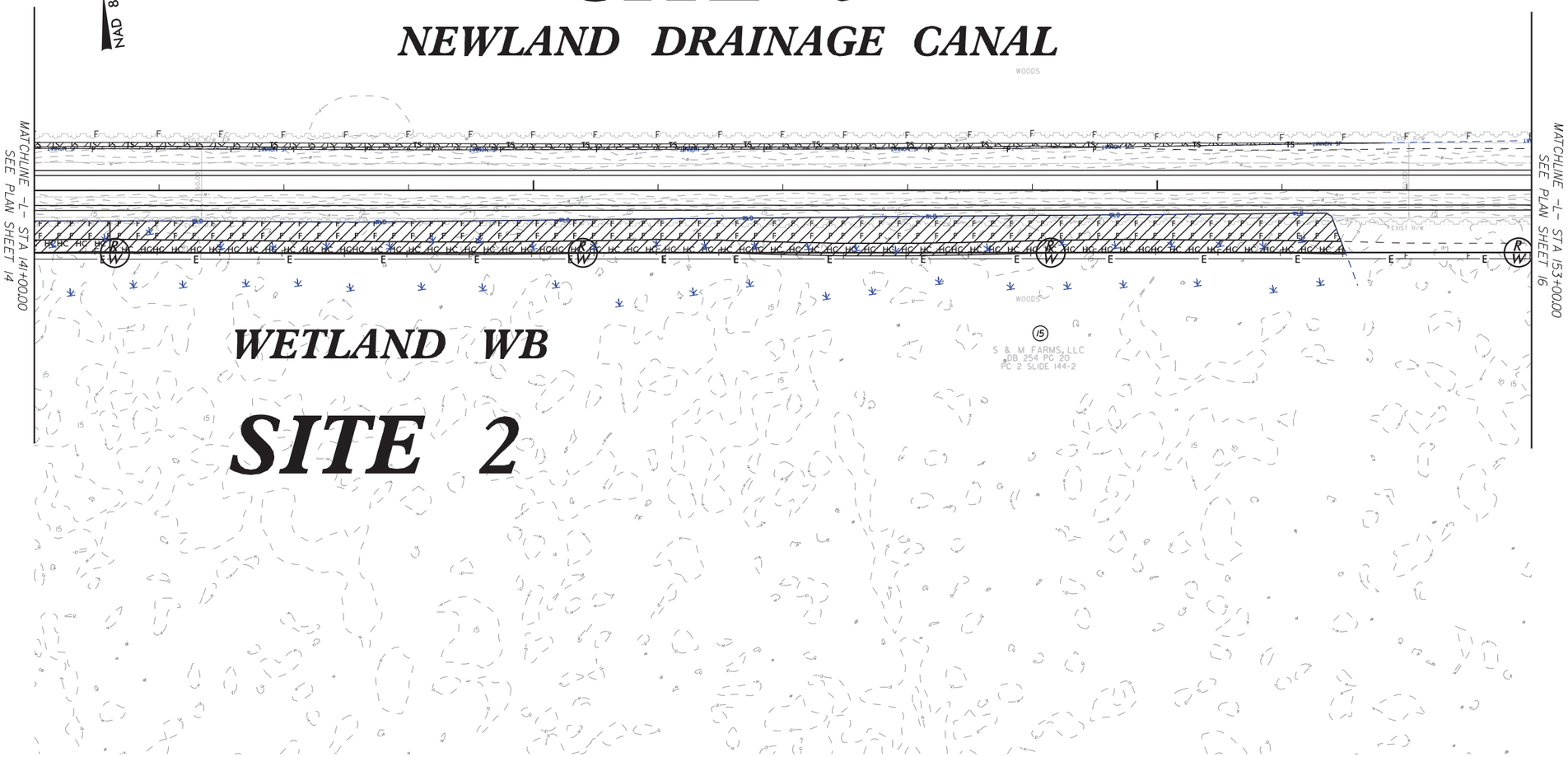
PERMIT DRAWING
SHEET 25 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 15 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# SITE 6

## NEWLAND DRAINAGE CANAL




$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 26 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 16 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

(14)
UNITED STATES OF AMERICA
DB 131PG 172
DB 121PG 33

# *NEWLAND DRAINAGE CANAL*

WOODS

LINNON ST

EXIST R/W

MATCHLINE -L- STA 153+00.00
SEE PLAN SHEET 15

MATCHLINE -L- STA 165+00.00
SEE PLAN SHEET 17

(15)
S & M FARMS, LLC
DB 254 PG 20
PC 2 SLIDE 144-2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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PERMIT DRAWING
SHEET 27 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 16 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

(14) UNITED STATES OF AMERICA
DB 131PG 172
DB 121PG 33

# *NEWLAND DRAINAGE CANAL*

WOODS

MATCHLINE -L- STA 153+00.00
SEE PLAN SHEET 15

MATCHLINE -L- STA 165+00.00
SEE PLAN SHEET 17

LIMNON SC

EXIST R/W

WOODS

(15) S & D FARMS, LLC
DB 254 PG 20
PC 2 SLIDE 144-2

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

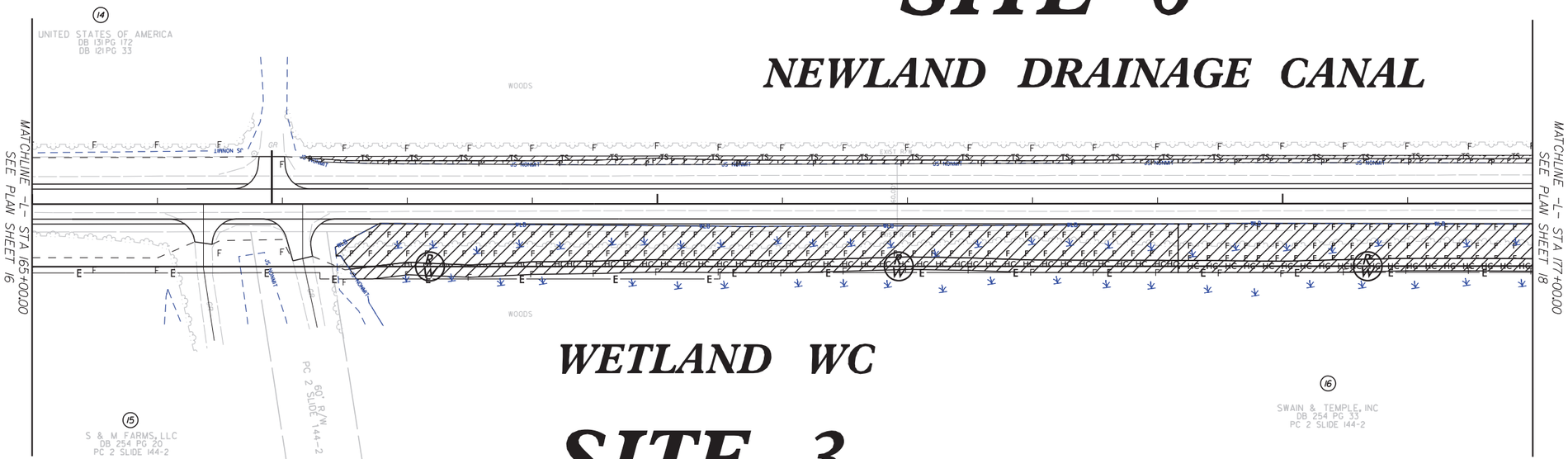
PERMIT DRAWING
SHEET 28 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 17 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# SITE 6

## NEWLAND DRAINAGE CANAL




## WETLAND WC

# SITE 3

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

NAD 83/NSRS 2007

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VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 29 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 17 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

# SITE 6

## NEWLAND DRAINAGE CANAL

MATCHLINE -L- STA 165+00.00
SEE PLAN SHEET 16

MATCHLINE -L- STA 177+00.00
SEE PLAN SHEET 18

(14) UNITED STATES OF AMERICA
DB 131 PG 172
DB 121 PG 33

(15) S & W FARMS, LLC
DB 254 PG 20
PC 2 SLIDE 144-2

(16) SWAIN & TEMPLE, INC
DB 254 PG 33
PC 2 SLIDE 144-2

WOODS

PC 2 SHDE 144-2

60' R/W

## WETLAND WC

# SITE 3

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 30 OF 54

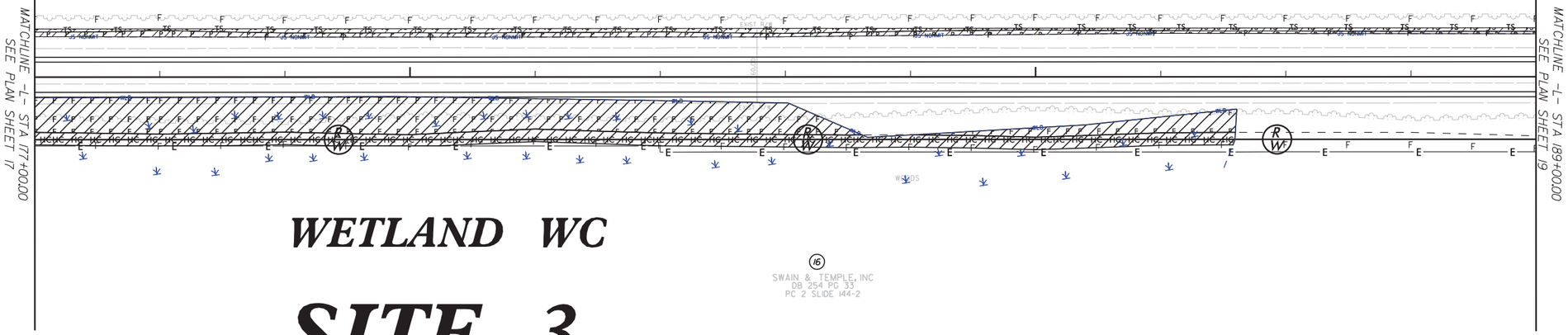
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 18 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

(14) UNITED STATES OF AMERICA
DB 131 PG 172
DB 121 PG 33

# SITE 6

## NEWLAND DRAINAGE CANAL




## WETLAND WC

(16) SWAIN & TEMPLE, INC
DB 254 PG 33
PC 2 SLIDE 144-2

# SITE 3

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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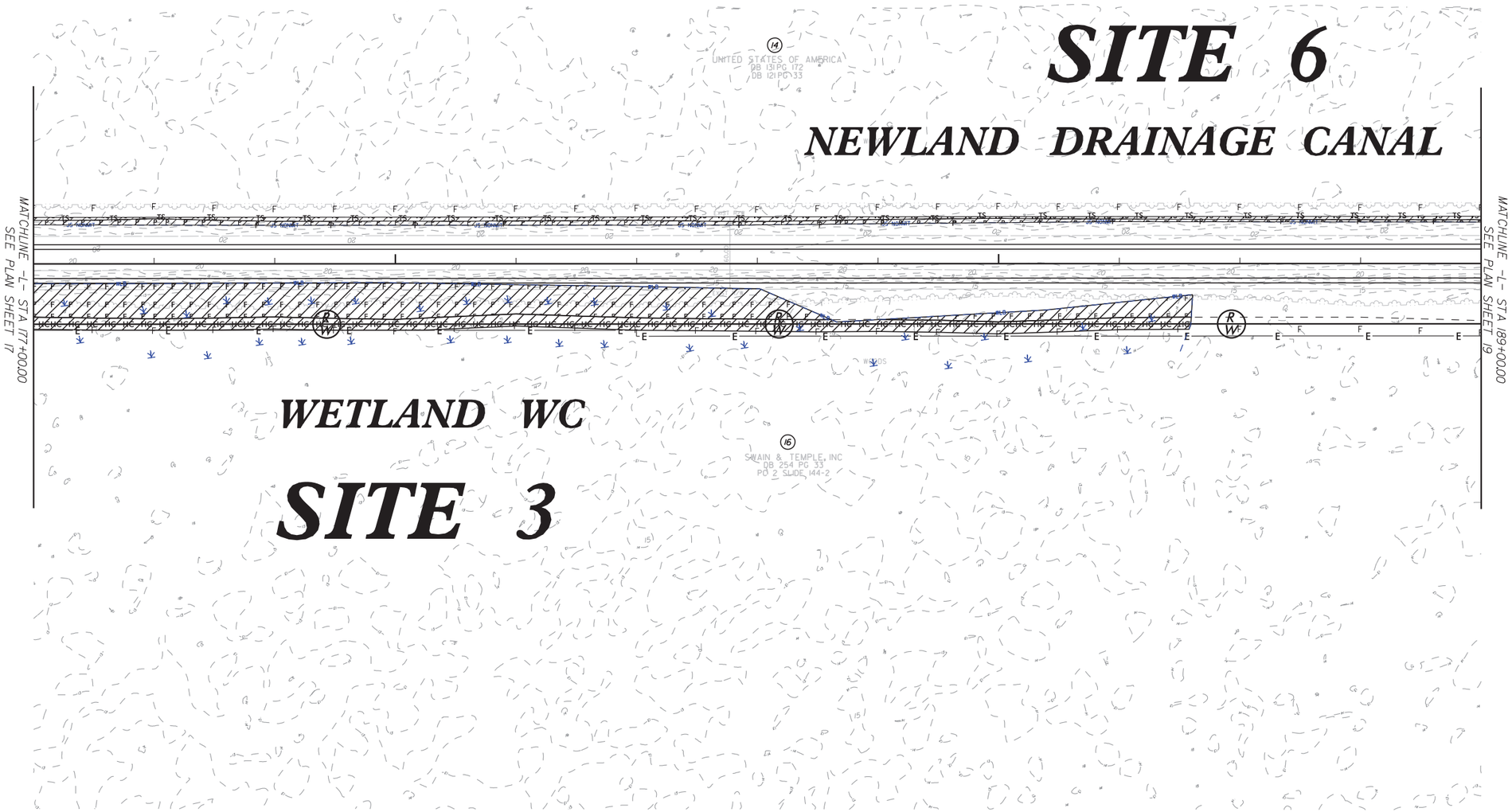
VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 31 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 18 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007




$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

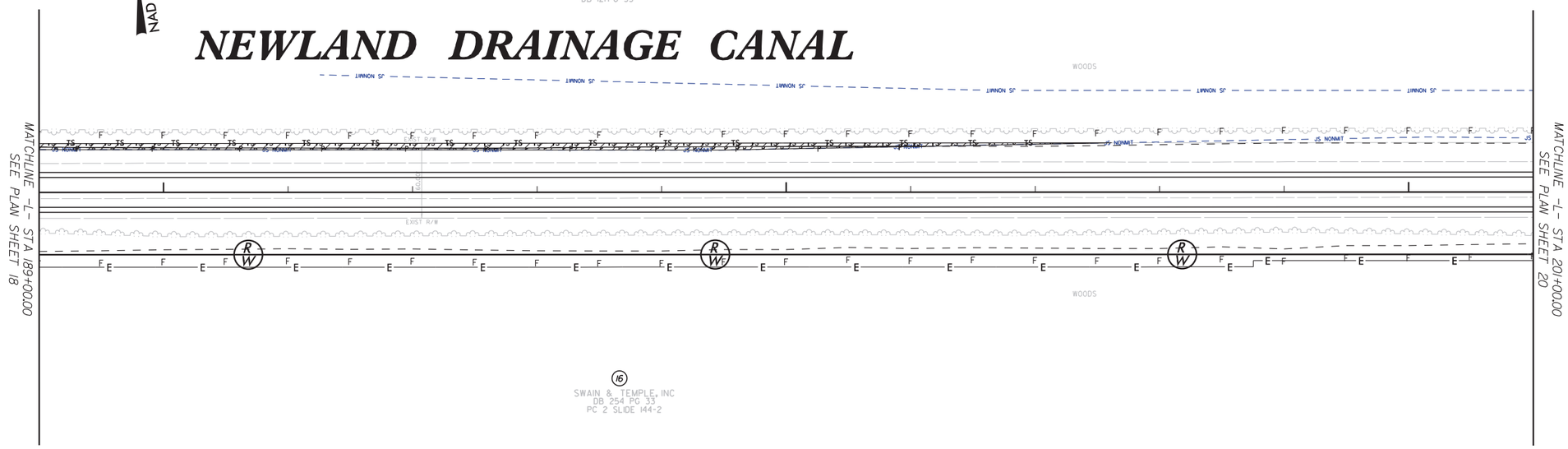
PERMIT DRAWING
SHEET 32 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 19 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# SITE 6

# NEWLAND DRAINAGE CANAL




$DATE$

5/14/99

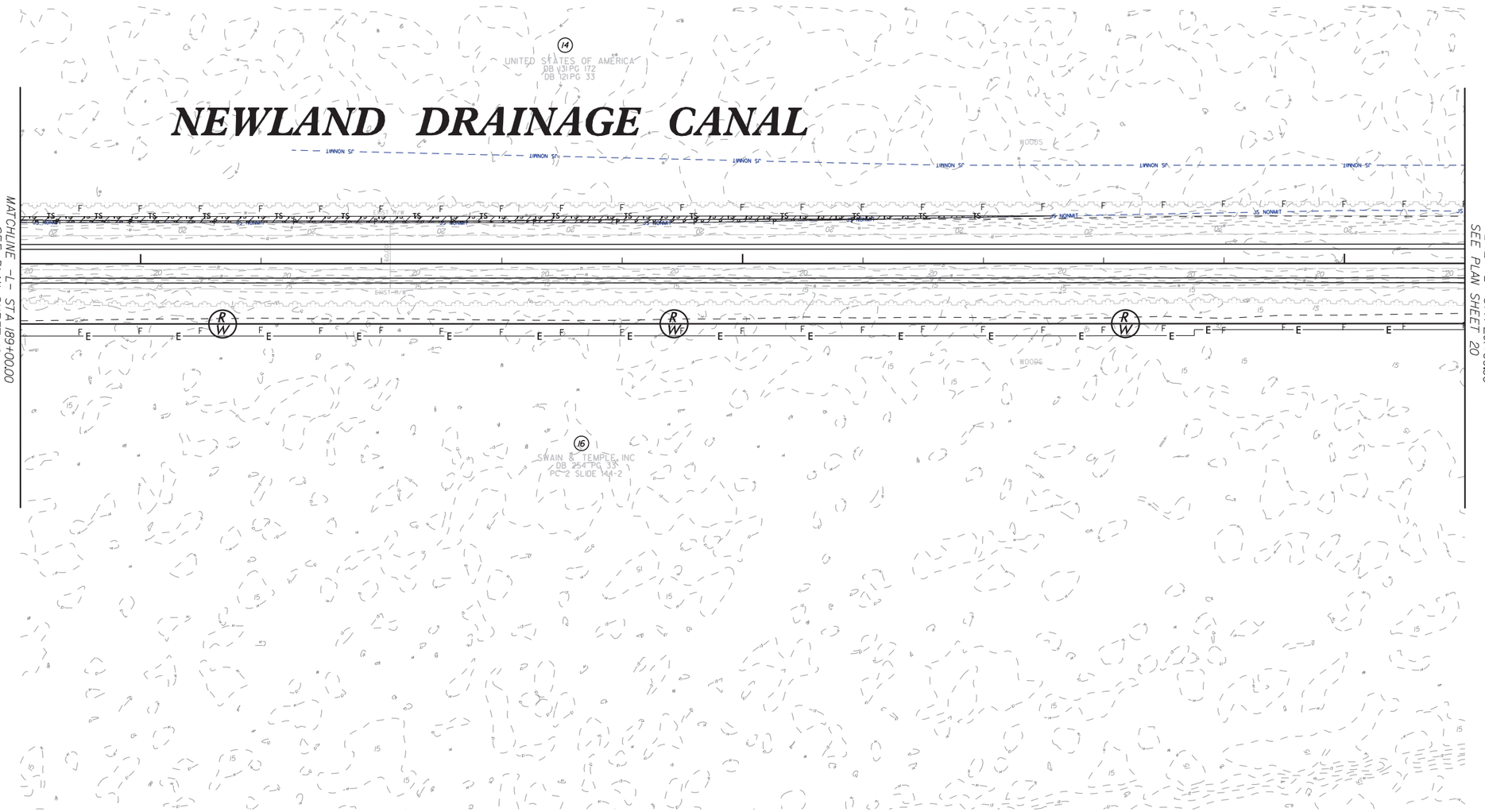
REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

NAD 83/NSRS 2007

# SITE 6




$DATE$

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VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 33 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 19 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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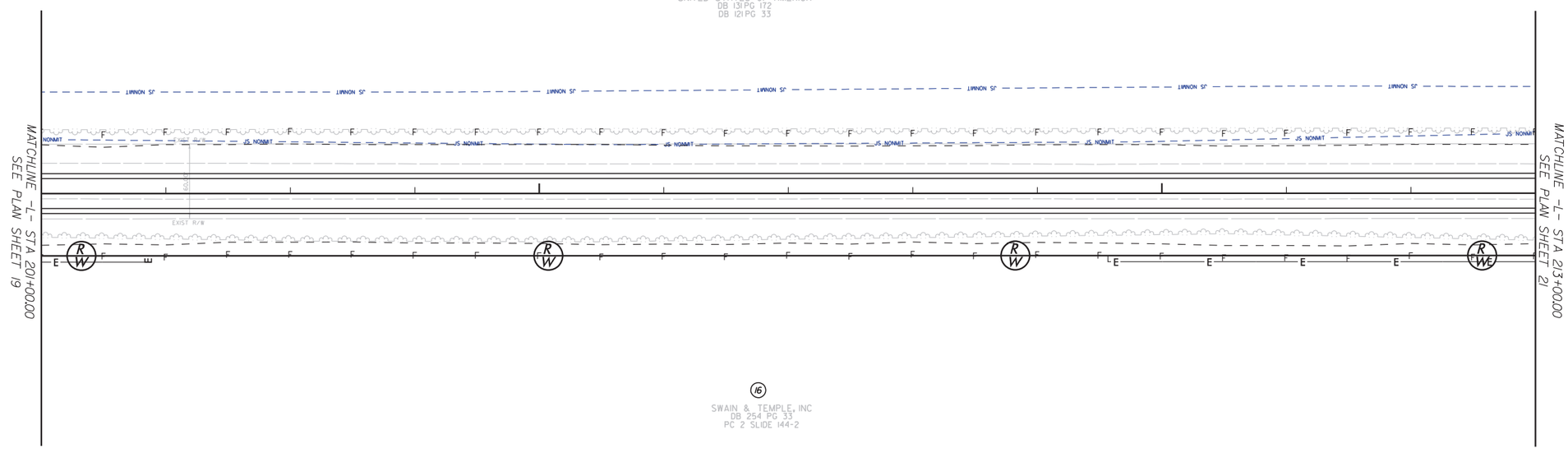
VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 34 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 20 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# *NEWLAND DRAINAGE CANAL*




$DATE$

5/14/99

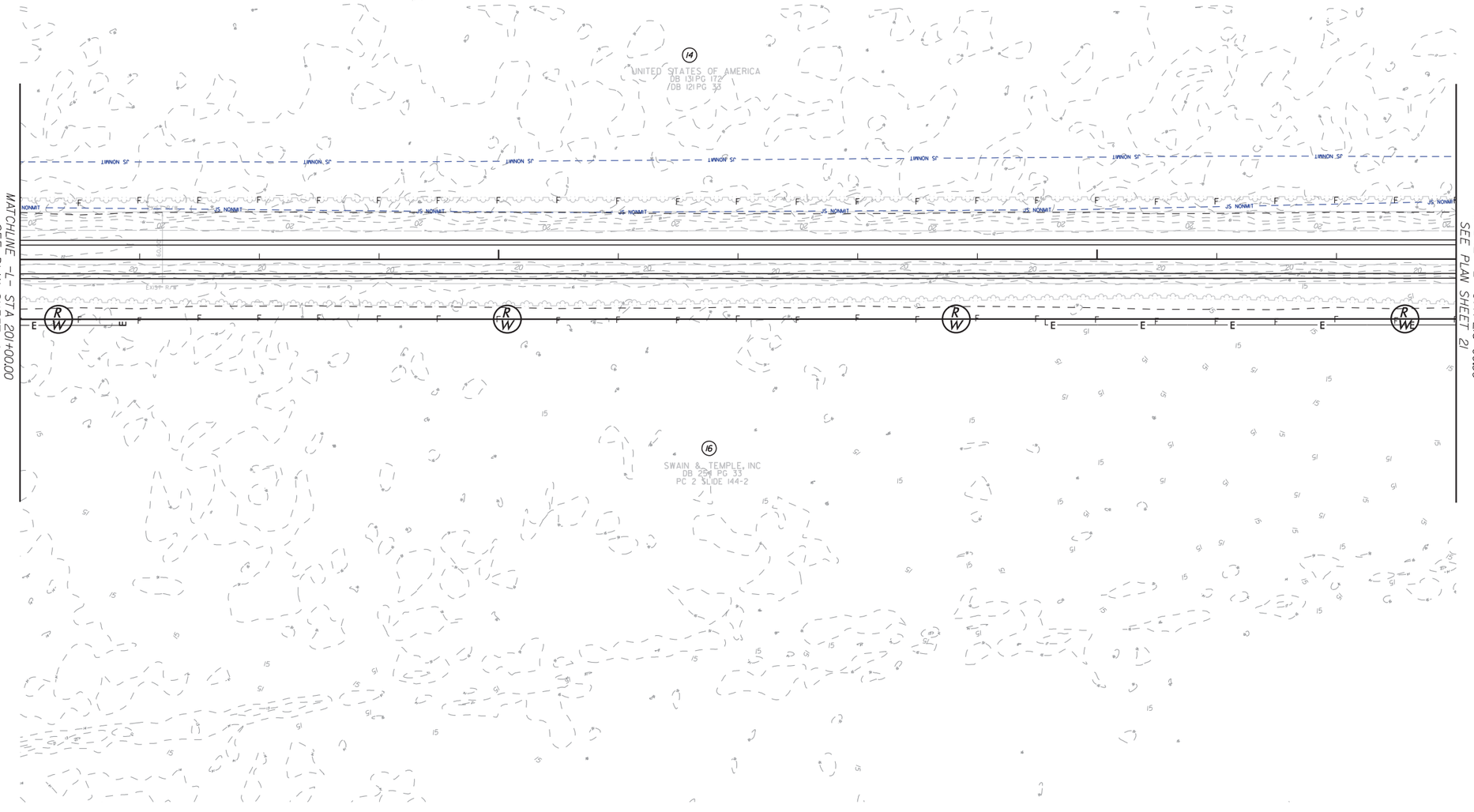
REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

NAD 83/NSRS 2007

# NEWLAND DRAINAGE CANAL

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PERMIT DRAWING
SHEET 35 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 20 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

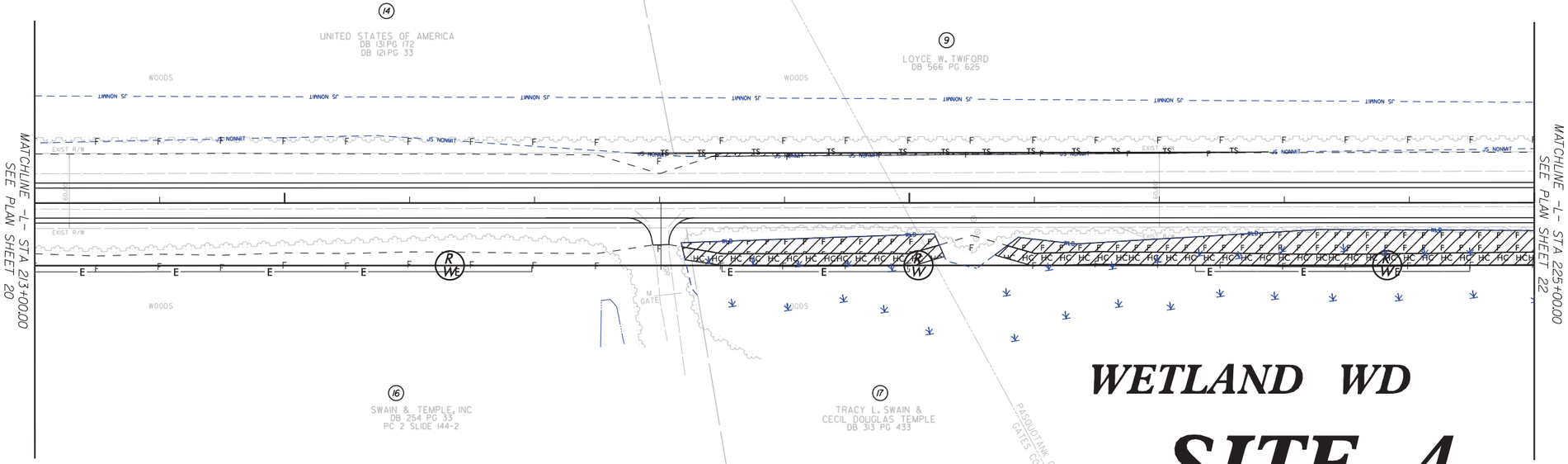
PERMIT DRAWING
SHEET 36 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 21 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# SITE 6

## NEWLAND DRAINAGE CANAL




## WETLAND WD

# SITE 4

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

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VIRGINIA BEACH, VA 23462

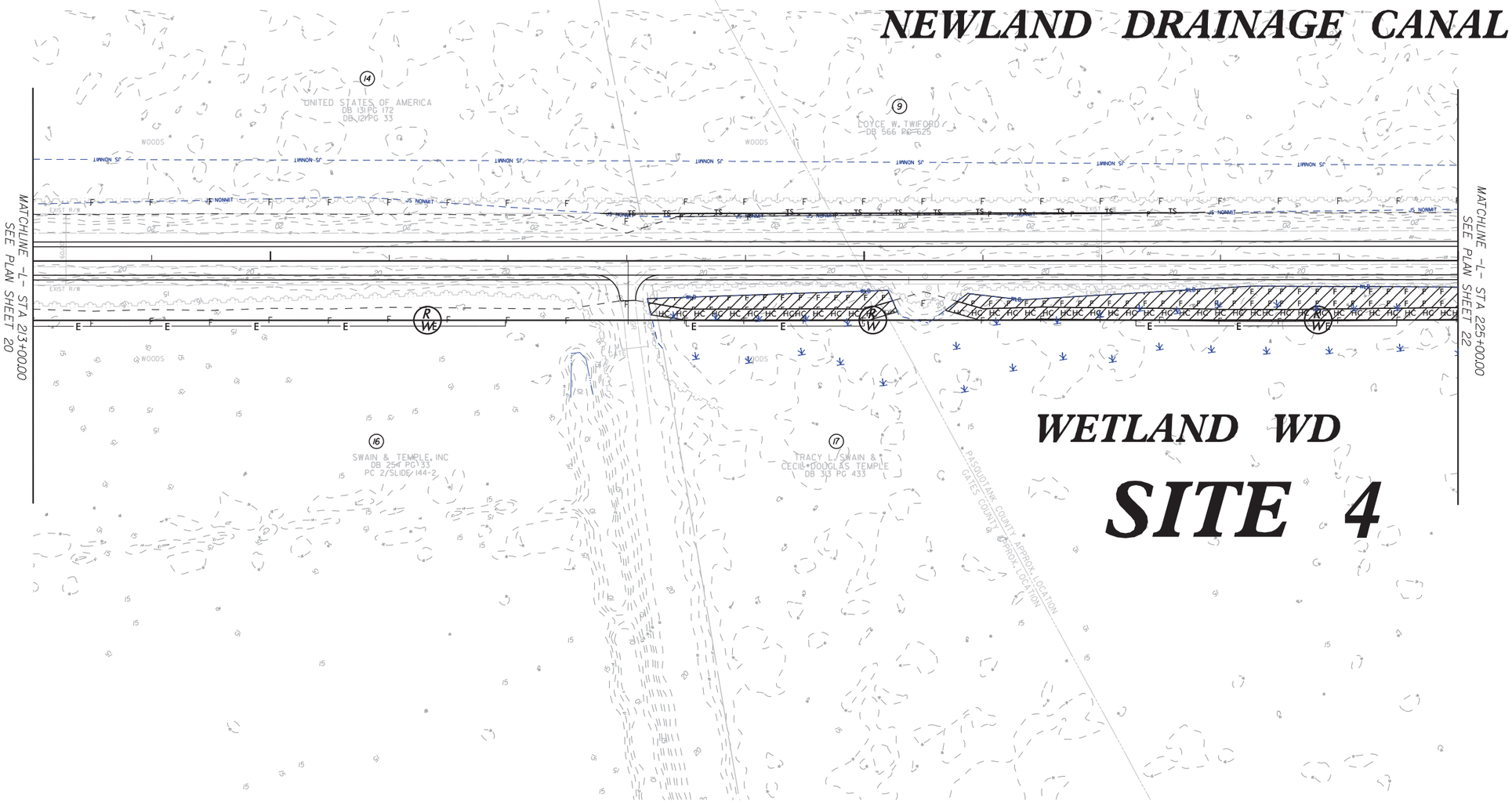
PERMIT DRAWING
SHEET 37 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 21 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

NAD 83/NSRS 2007

# SITE 6

## NEWLAND DRAINAGE CANAL




## WETLAND WD

# SITE 4

$DATE$

5/14/99

REVISIONS

## LEGEND

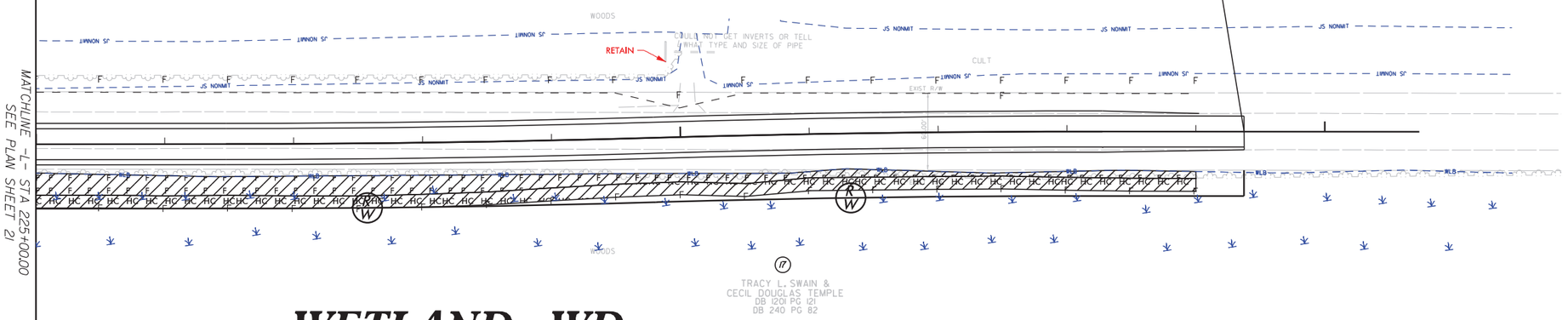
| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

NAD 83/NSRS 2007

**END TIP PROJECT R-5808**
**-L- POT Sta. 234+37.39**

9
LOYCE W. TWIFORD
DB 566 PG 625

# NEWLAND DRAINAGE CANAL




17
TRACY L. SWAIN &
CECIL DOUGLAS TEMPLE
DB 1201 PG 121
DB 240 PG 82

# WETLAND WD

# SITE 4

Kimley»Horn

4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 38 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 22 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

$DATE$

5/14/99

REVISIONS

## LEGEND

| | |
|---|---|
| F F | FILL IN WETLAND |
| HC HC | HAND CLEARING (NON-GRUBBING) |
| S S | SURFACE WATER IMPACTS |
| P P | OPEN WATER IMPACTS |
| TS TS | TEMPORARY SURFACE WATER IMPACTS |

NAD 83/NSRS 2007

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VIRGINIA BEACH, VA 23462

**PERMIT DRAWING**
**SHEET 39 OF 54**

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 22 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

***END TIP PROJECT R-5808***
***-L- POT Sta. 234+37.39***

MATCHLINE -L- STA 225+00.00
SEE PLAN SHEET 21

LOYCE R. TWIFORD
DB 560 PG 526

# NEWLAND DRAINAGE CANAL

RETAIN

CULVERT TO SET INVERTS OR TELL WHEN TYPE AND SIZE OF PIPE

TRACY L. SWAIN &
CECIL DOUGLAS TEMPLE
DB 1201 PG 127
DB 240 PG 82

# WETLAND WD

# SITE 4

$DATE$

5/14/99

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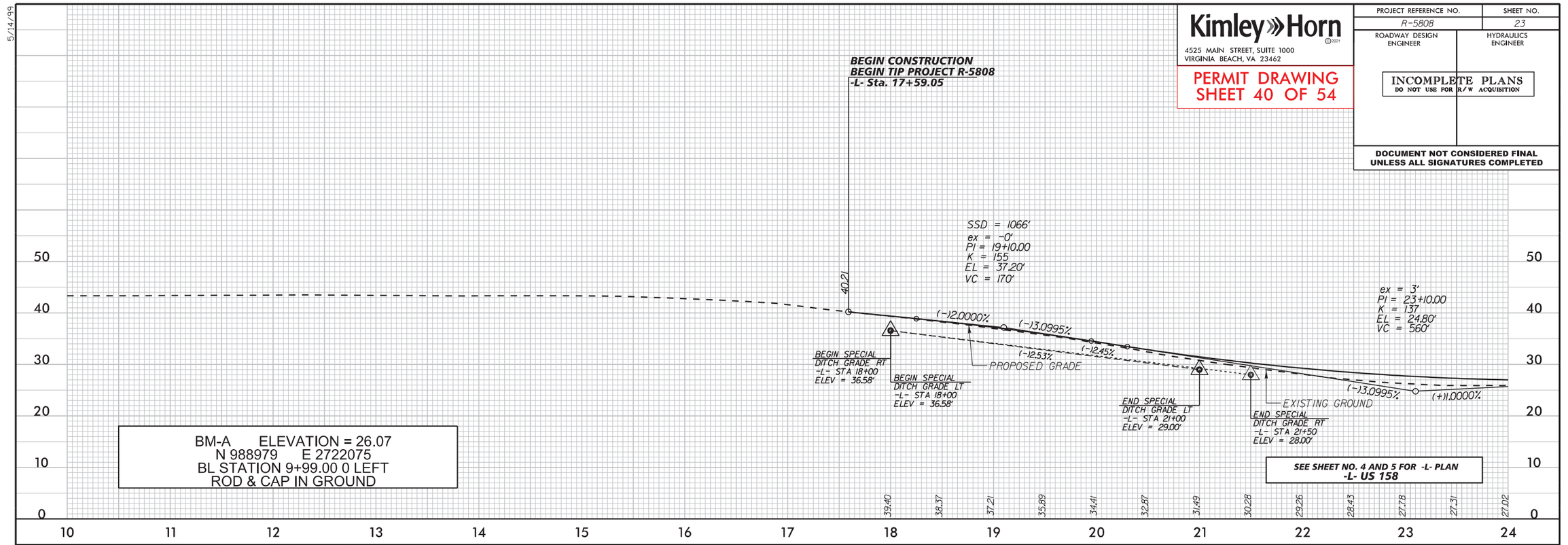
VIRGINIA BEACH, VA 23462

PERMIT DRAWING
SHEET 40 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 23 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED




$DATE$

5/14/99

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VIRGINIA BEACH, VA 23462

RIGHT-OF-WAY REV.

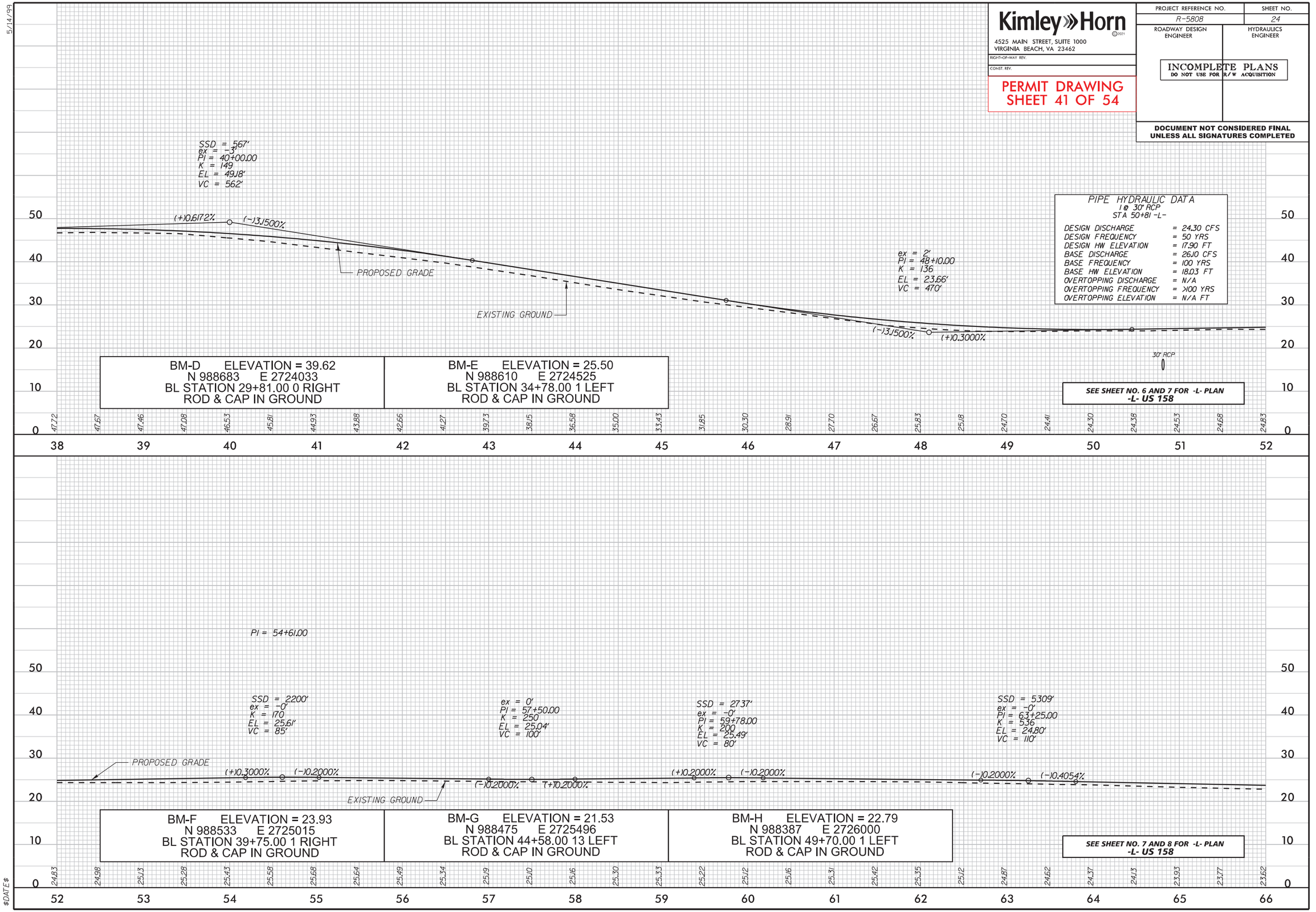
CONST. REV.

**PERMIT DRAWING
SHEET 41 OF 54**

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 24 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**




$DATE$

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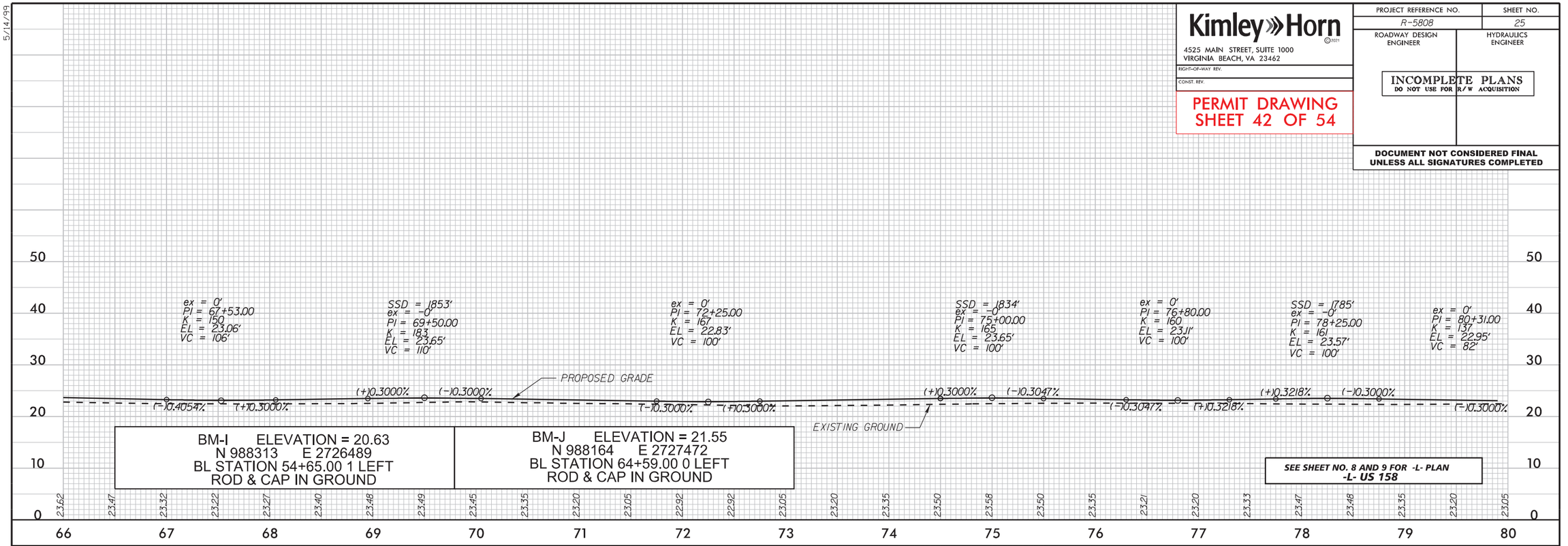
VIRGINIA BEACH, VA 23462
RIGHT-OF-WAY REV.
CONST. REV.

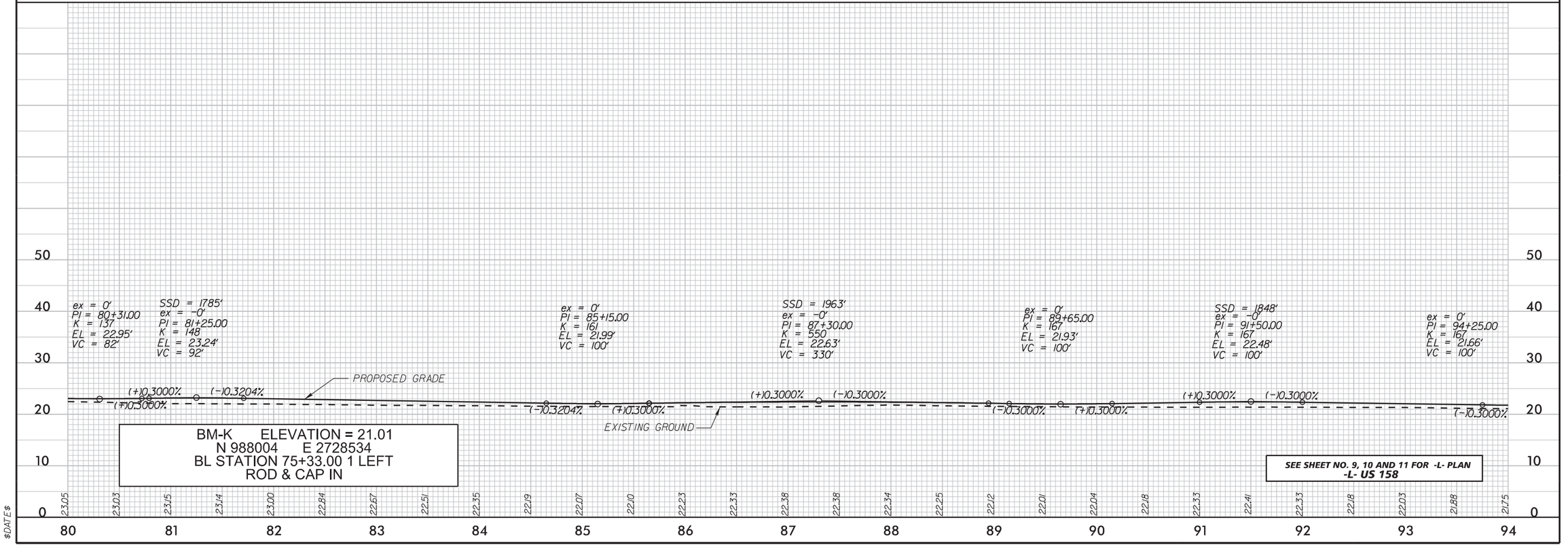
PERMIT DRAWING
SHEET 42 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 25 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED




$DATE$

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VIRGINIA BEACH, VA 23462

RIGHT-OF-WAY REV.

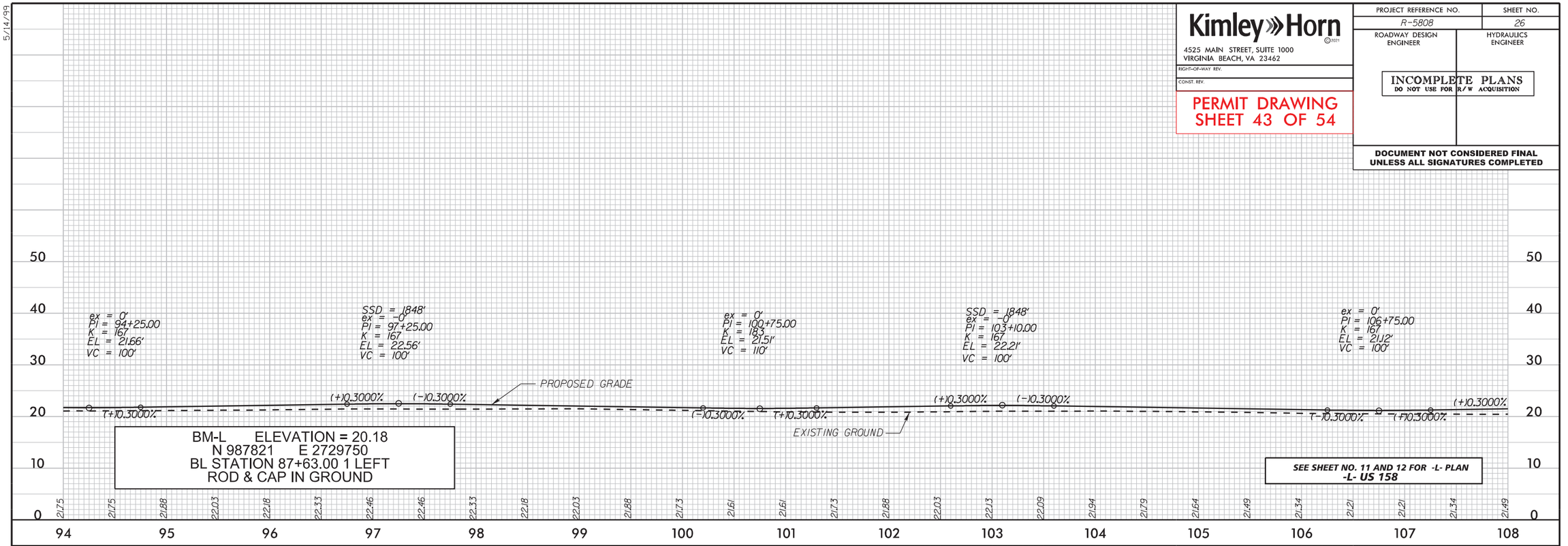
CONST. REV.

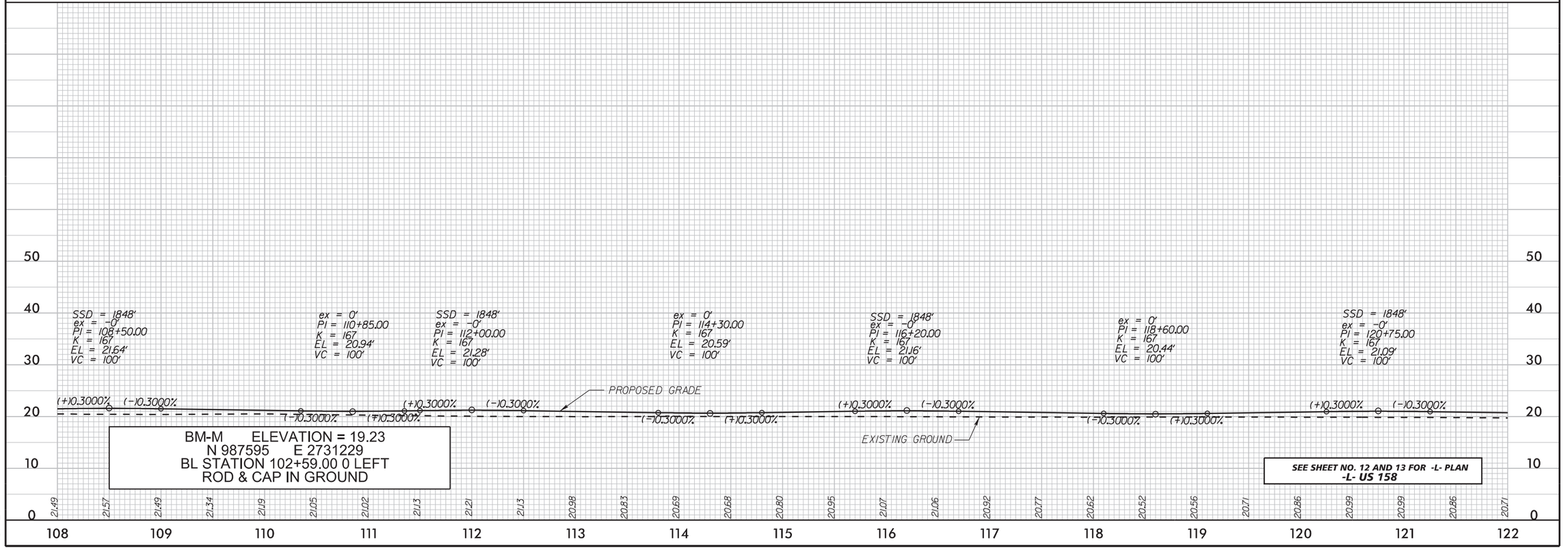
**PERMIT DRAWING
SHEET 43 OF 54**

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 26 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**




$DATE$

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VIRGINIA BEACH, VA 23462

RIGHT-OF-WAY REV.

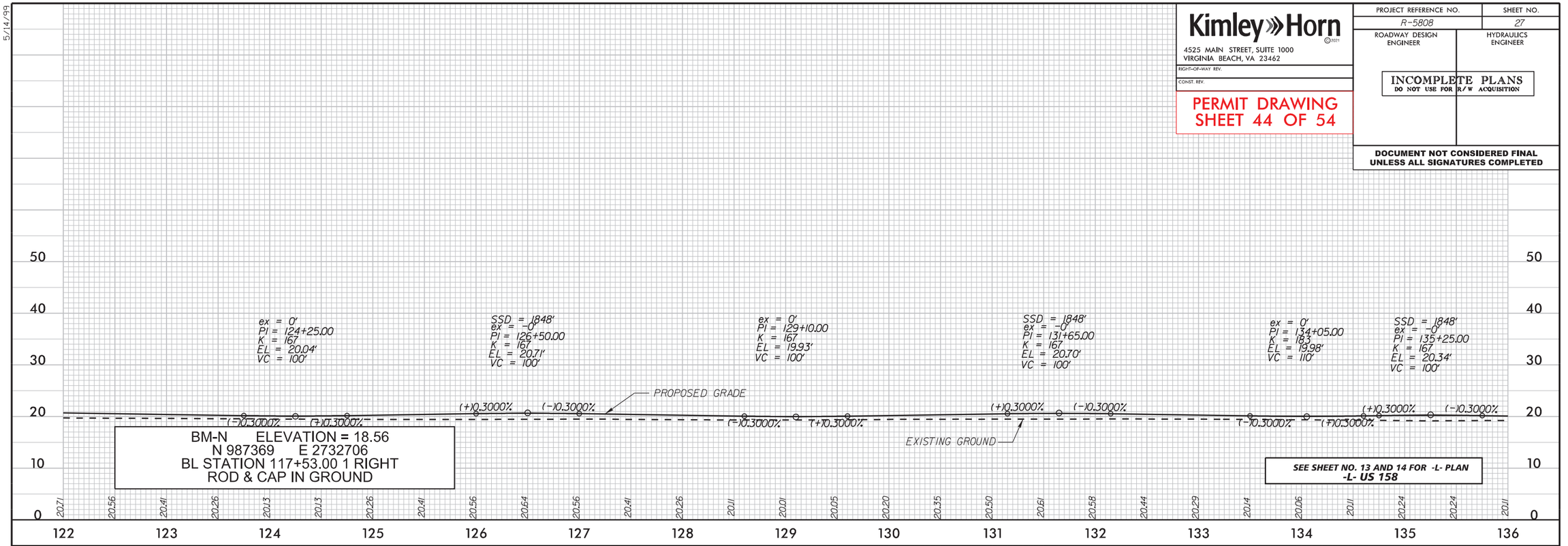
CONST. REV.

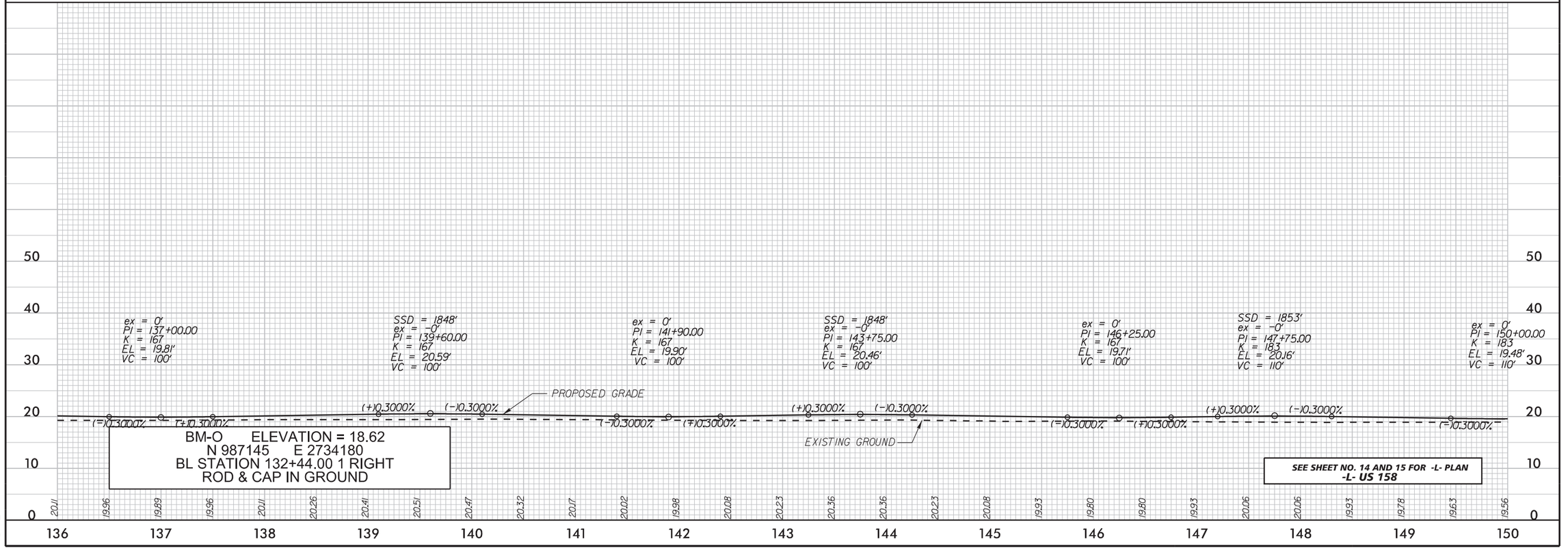
PERMIT DRAWING
SHEET 44 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 27 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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VIRGINIA BEACH, VA 23462

RIGHT-OF-WAY REV.

CONST. REV.

**PERMIT DRAWING**
**SHEET 45 OF 54**

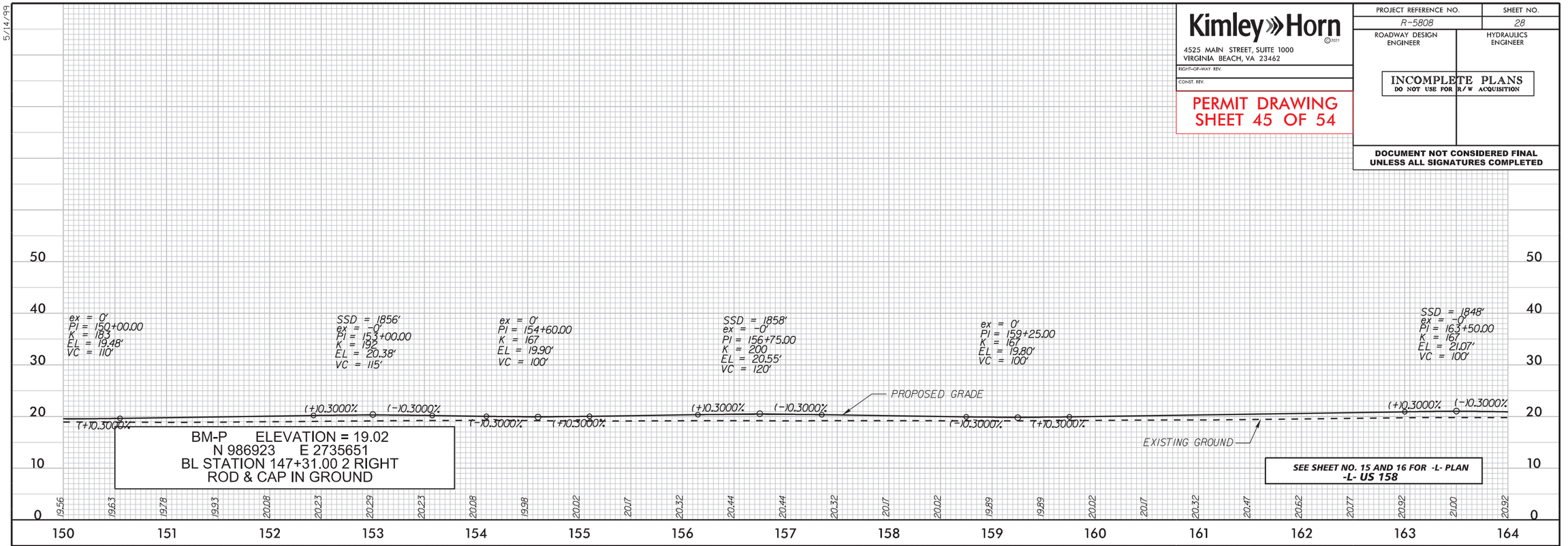
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 28 |

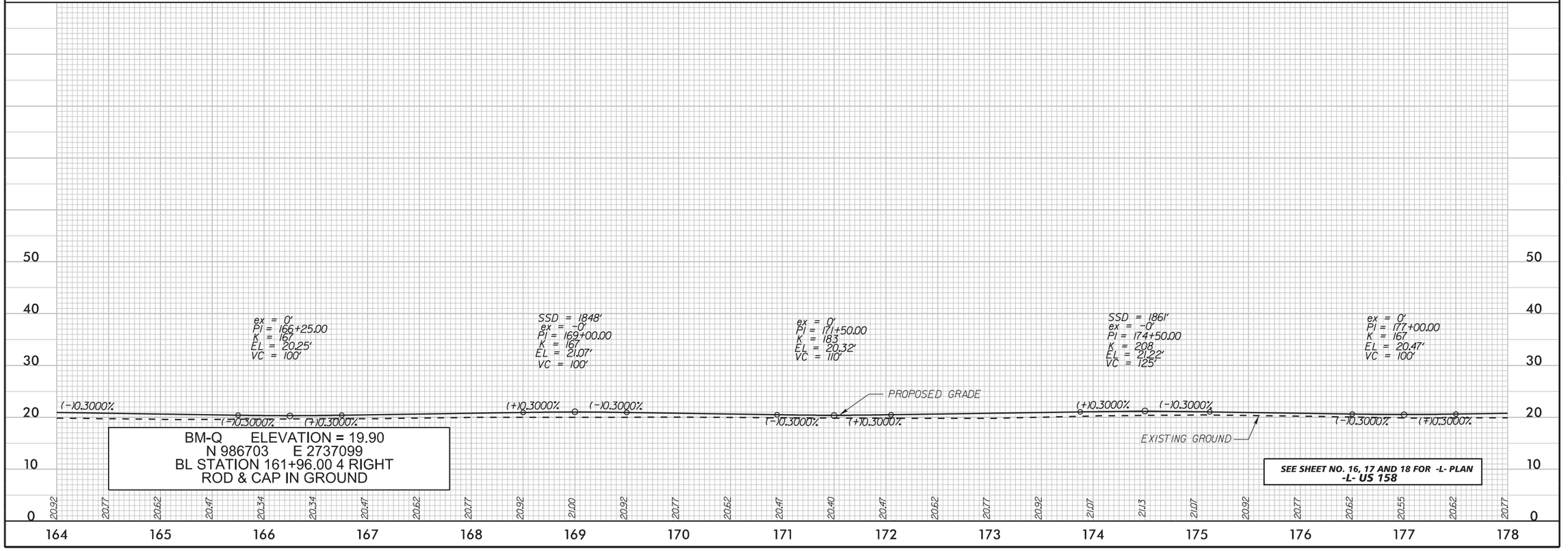
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**




$FILE$

$DATE$

5/14/99

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

RIGHT-OF-WAY REV.

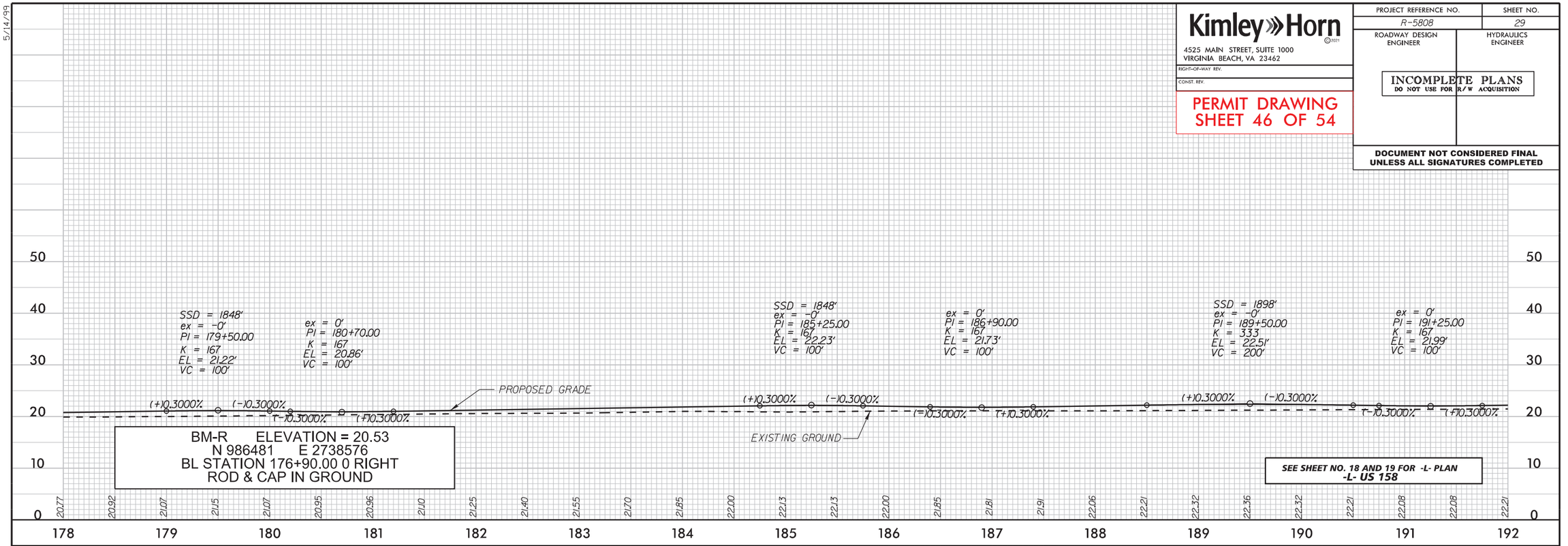
CONST. REV.

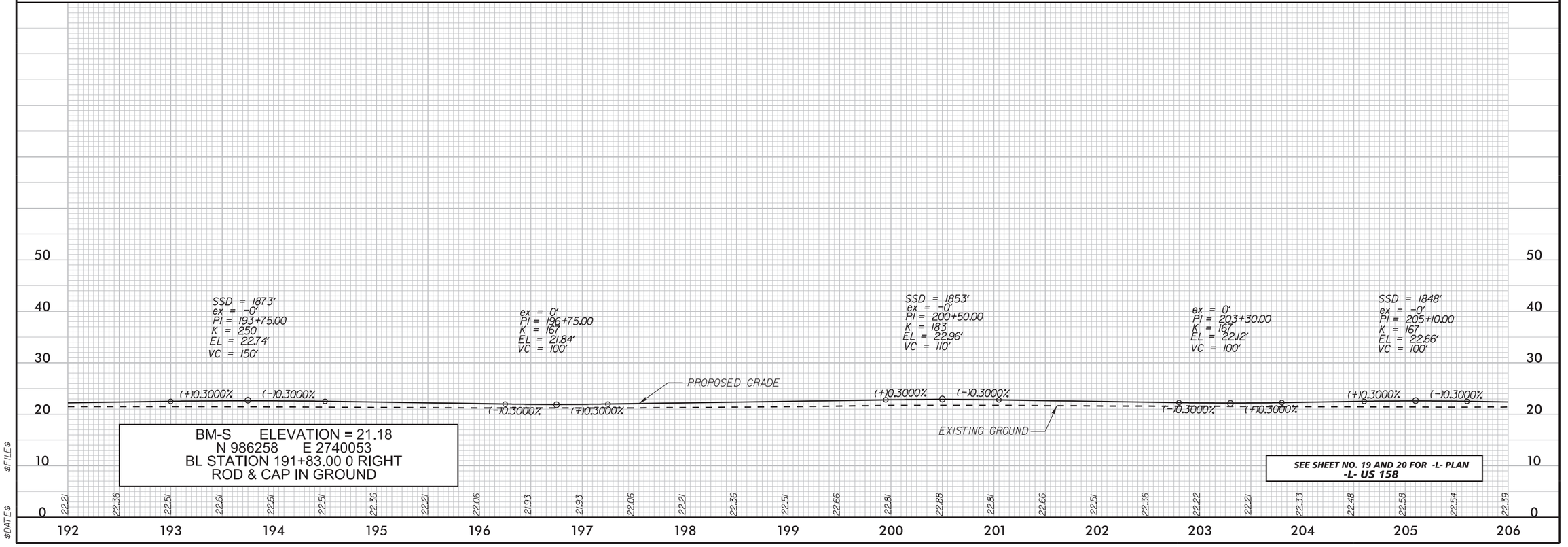
PERMIT DRAWING
SHEET 46 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 29 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED




$FILE$

$DATE$

5/14/99

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

RIGHT-OF-WAY REV.

CONST. REV.

**PERMIT DRAWING**
**SHEET 47 OF 54**

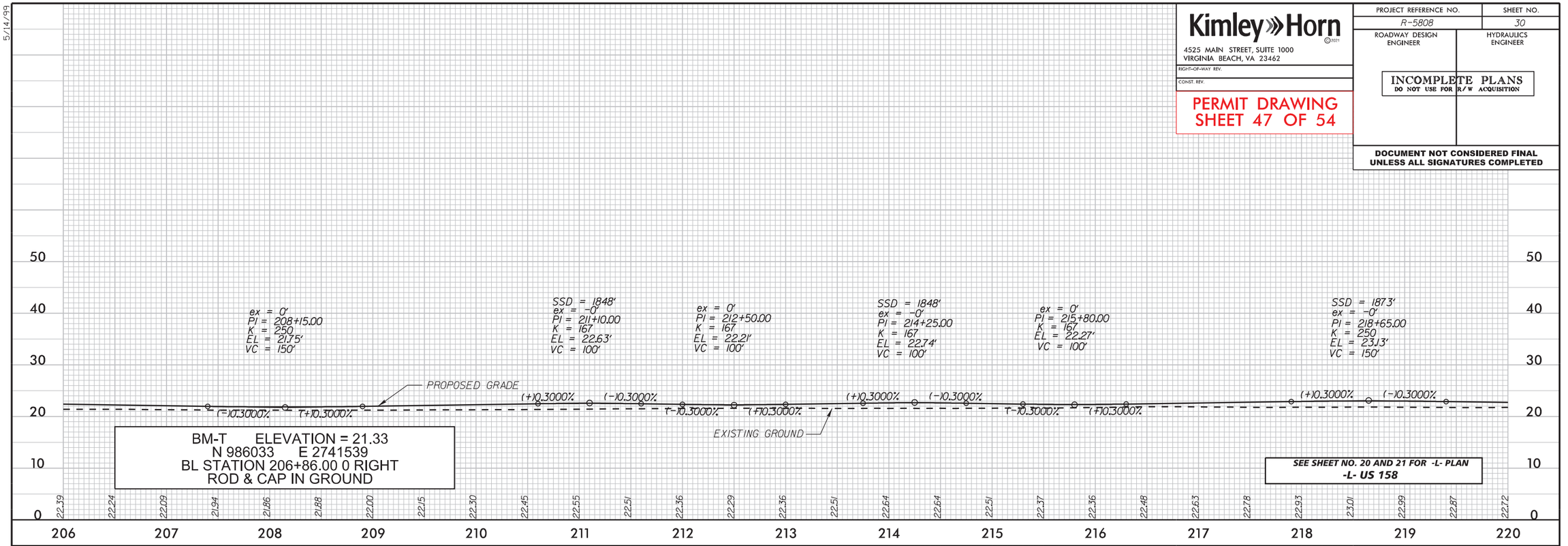
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 30 |

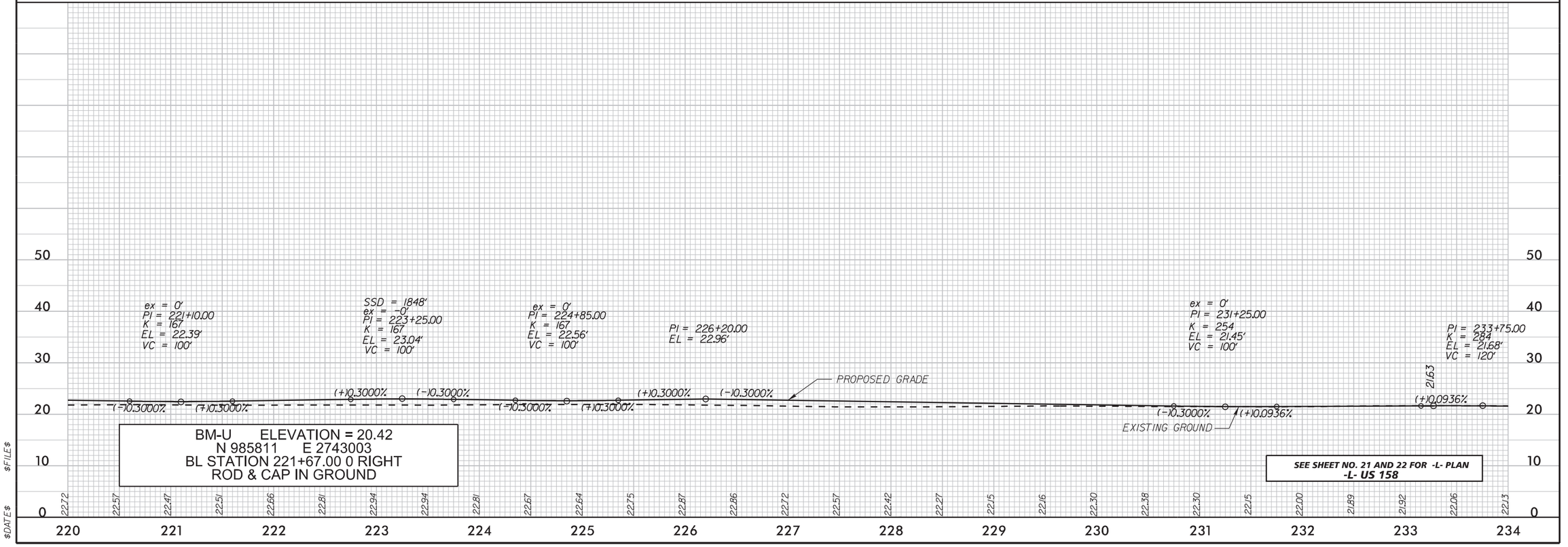
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

**INCOMPLETE PLANS**
DO NOT USE FOR R/W ACQUISITION

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**




$FILE$

$DATE$

5/14/99

**END CONSTRUCTION**
**END TIP PROJECT R-5808**
**-L- Sta. 234+37.39**

**END GRADE**
**US 158 Sta. 234+37.39**
**ELEV = 21.26'**

(-)0.3286%

21.47

21.42

50 40 30 20 10 0

234 235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VIRGINIA BEACH, VA 23462


RIGHT-OF-WAY REV.

CONST. REV.

PERMIT DRAWING
SHEET 48 OF 54

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 31 |

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED


SEE SHEET NO. 22 FOR -L- PLAN
-L- US 158


## -DRW1-

-DRW1- POT Sta. 10+00.00
-L- POT Sta. 39+30.30=
ELEV = 47.25'

END CONSTRUCTION
END GRADE
-DRW1- Sta. 10+32.00
ELEV = 45.98'

PI = 10+16.00
EL = 46.93'

PI = 10+27.00
EL = 46.05'

(-)12.0000%
(-)18.0000%
(-)11.4353%

EXISTING GROUND
PROPOSED GRADE


SEE SHEET NO. 6 FOR -DRW1- PLAN


## -DRW2-

-DRW2- POT Sta. 10+00.00
-L- POT Sta. 42+51.37=
ELEV = 41.23'

END CONSTRUCTION
END GRADE
-DRW2- Sta. 10+29.00
ELEV = 41.77'

PI = 10+16.00
EL = 40.91'

PI = 10+23.00
EL = 41.47'

(-)12.0000%
(+)5.0000%
(+)18.0000%

PROPOSED GRADE
EXISTING GROUND


SEE SHEET NO. 6 FOR -DRW2- PLAN


## -DRW3-

-DRW3- POT Sta. 10+00.00
-L- POT Sta. 116+36.91=
ELEV = 20.33'

END CONSTRUCTION
END GRADE
-DRW3- Sta. 11+00.00
ELEV = 14.87'

PI = 10+16.00
EL = 20.01'

PI = 10+75.00
EL = 15.29'

(-)12.0000%
(-)18.0908%
(-)11.6647%

PROPOSED GRADE
EXISTING GROUND


SEE SHEET NO. 17 FOR -DRW3- PLAN


## -DRW4-

-DRW4- POT Sta. 10+00.00
-L- POT Sta. 166+91.63=
ELEV = 20.45'

END CONSTRUCTION
END GRADE
-DRW4- Sta. 10+25.00
ELEV = 19.46'

PI = 10+16.00
EL = 20.13'

PI = 10+23.00
EL = 19.57'

(-)12.0000%
(-)18.0000%

PROPOSED GRADE
EXISTING GROUND


SEE SHEET NO. 17 FOR -DRW4- PLAN

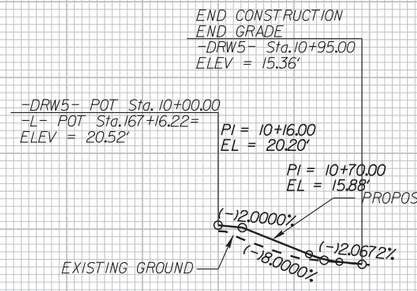

60 50 40 30 20 10 0

9 10 11

$FILE$

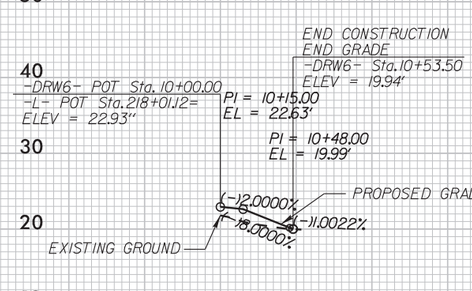
$DATE$

5/14/99




**SEE SHEET NO. 17 FOR -DRW5- PLAN**

**-DRW5-**




**SEE SHEET NO. 21 FOR -DRW6- PLAN**

**-DRW6-**

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4525 MAIN STREET, SUITE 1000
VIRGINIA BEACH, VA 23462

RIGHT-OF-WAY REV.

CONST. REV.

**PERMIT DRAWING**
**SHEET 49 OF 54**

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | 32 |

ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

**INCOMPLETE PLANS**
**DO NOT USE FOR R/W ACQUISITION**

**DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED**

$FILE$

$DATE$

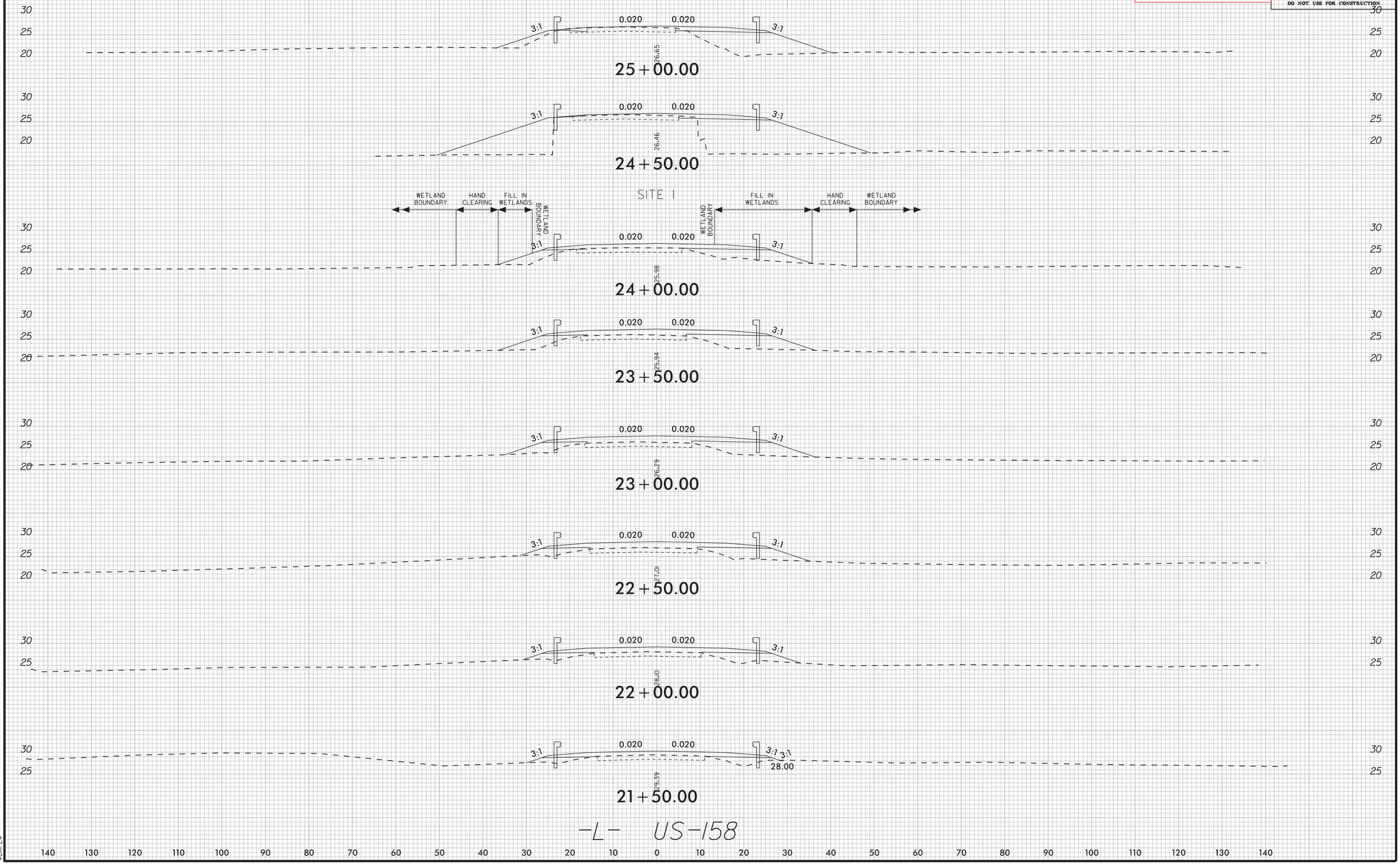
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-3 |

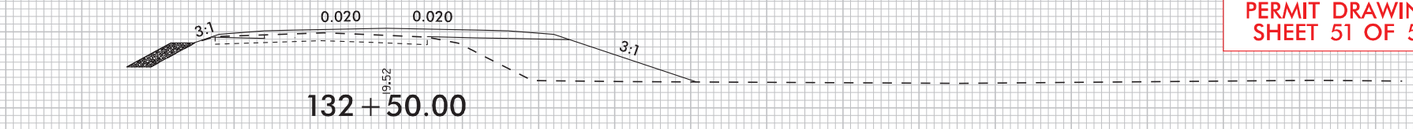
PERMIT DRAWING
SHEET 50 OF 54

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



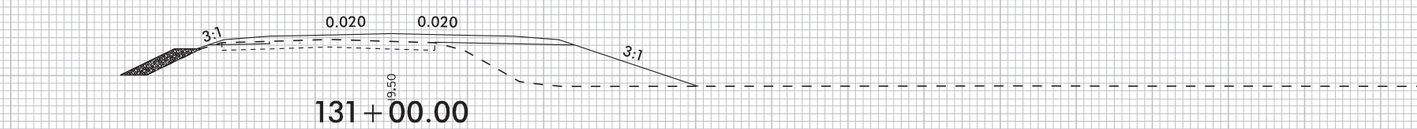

$DATE$



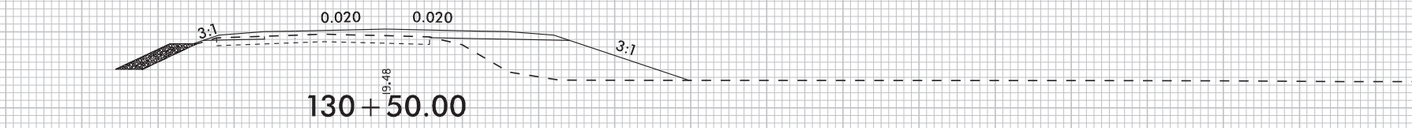

132 + 50.00


132 + 00.00

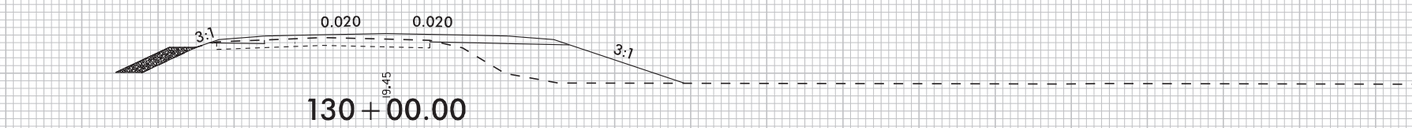

131 + 50.00



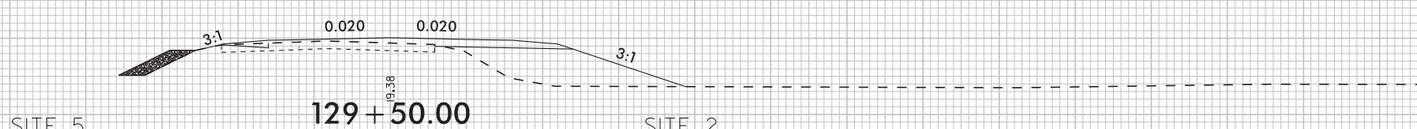

131 + 00.00




130 + 50.00




130 + 00.00




129 + 50.00


129 + 00.00

-L- US-158

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

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$DATE$

8/23/99

0 5 10

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| R-5808 | X-39 |

PERMIT DRAWING
SHEET 52 OF 54

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION


$DATE$

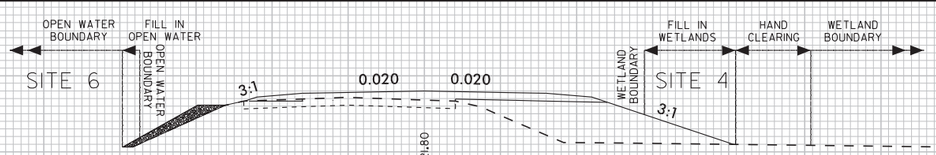
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | R-5808 | X-50 |

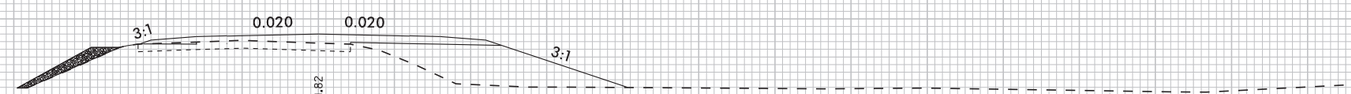
PERMIT DRAWING
SHEET 53 OF 54

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



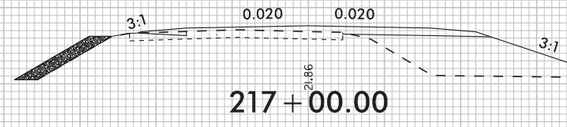

219+00.00



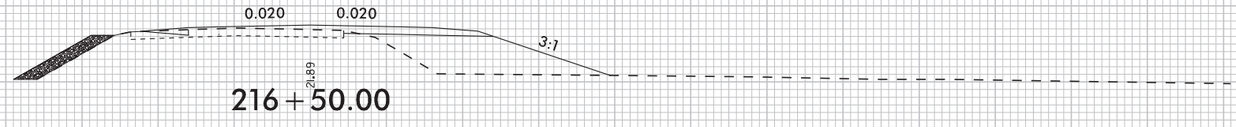

218+50.00


218+00.00

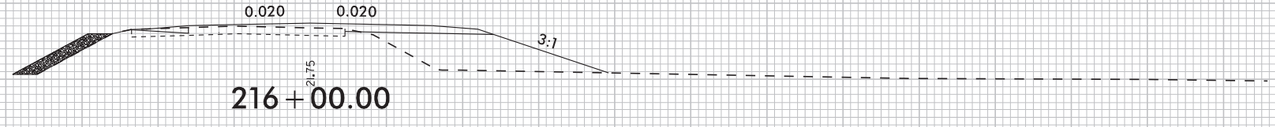

217+50.00



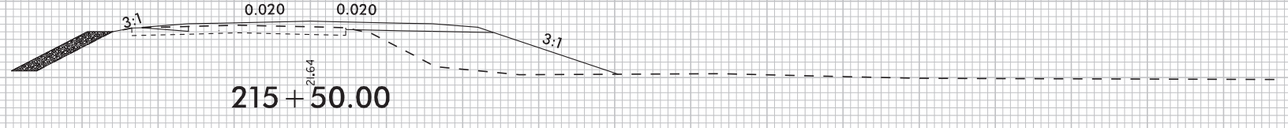

217+00.00



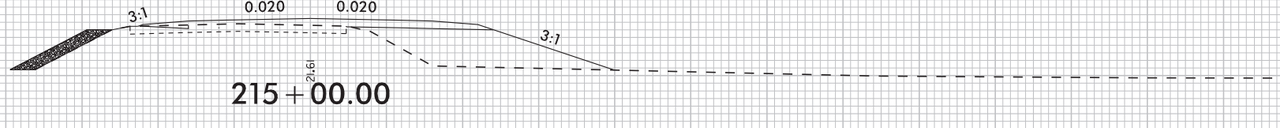

216+50.00




216+00.00




215+50.00




215+00.00

-L- US-158

140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

$DATE$

## WETLAND AND SURFACE WATER IMPACTS SUMMARY

| | | | WETLAND IMPACTS | | | | | SURFACE WATER IMPACTS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site No. | Station (From/To) | Structure Size / Type | Permanent Fill In Wetlands (ac) | Temp. Fill In Wetlands (ac) | Excavation in Wetlands (ac) | Mechanized Clearing in Wetlands (ac) | Hand Clearing in Wetlands (ac) | Permanent SW impacts (ac) | Temp. SW impacts (ac) | Existing Channel Impacts Permanent (ft) | Existing Channel Impacts Temp. (ft) | Natural Stream Design (ft) |
| 1 | -L- 24+45 / 24+74 | 2@14'x7' RCBC (Buried 1') | | | | | | 0.04 | | 21 | | |
| | -L- 24+45 / 24+74 | BANK STABILIZATION | | | | | | 0.03 | 0.03 | 39 | 23 | |
| | -L- 21+88 / 26+97 | WETLAND WA | 0.25 | | < 0.01 | | 0.15 | | | | | |
| 2 | -L- 44+47 / 151+51 | WETLAND WB | 4.93 | | | | 2.42 | | | | | |
| 3 | -L- 167+42 / 186+61 (RT) | WETLAND WC | 1.07 | | | | 0.43 | | | | | |
| 4 | -L- 218+17 / 234+00 (RT) | WETLAND WD | 0.40 | | | | 0.35 | | | | | |
| 5 | -L- 65+17 / 130+26 (LT) | WETLAND WG | 0.37 | | | | | | | | | |
| 6 | -L- 130+26 / 222+43 (LT) | NEWLAND DRAINAGE CANAL | | | | | | 0.25 | 0.36 | | | |
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| | | | | | | | | | | | | |
| TOTALS*: | | | 7.02 | | < 0.01 | | 3.35 | 0.32 | 0.39 | 60 | 23 | 0 |

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
12/12/2022
GATES COUNTY
R-5808