STATE OF NORTH CAROLINA
# DEPARTMENT OF TRANSPORTATION

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December 11, 2013

U. S. Army Corps of Engineers
Raleigh Regulatory Field Office
3331 Heritage Trade Drive, Suite 105
Wake Forest, NC 27587

ATTN: Mr. Eric Alsmeyer
NCDOT Division 5 Project Coordinator

SUBJECT: **Application for Section 404 Individual Permit, Section 401 Water Quality Certification, North Carolina State General Permit for Impacts to Isolated and Other Non-404 Jurisdictional Wetlands and Waters, and Neuse River Riparian Buffer Authorization** for the proposed East End Connector from NC 147 (Durham Freeway/Buck Dean Expressway) to north of NC 98 (Holloway Street) in Durham, Durham County, North Carolina, Division 5. Federal Aid Project No. NHF–76–1(2), TIP No. U-0071.

Debit $570.00 from WBS Element No. 34745.1.1

Dear Sir:

The North Carolina Department of Transportation (NCDOT) proposes to construct the East End Connector from NC 147 (Durham Freeway/Buck Dean Expressway) to north of NC 98 (Holloway Street) in Durham. The project will link NC 147 and US 70 and will be a controlled-access facility. Proposed interchanges include freeway-to-freeway junctions between the East End Connector and NC 147 adjacent to where NC 147 crosses over SR 1171 (Ellis Road) and between the East End Connector and US 70 near the existing US 70/East End Avenue at-grade intersection. An interchange is also proposed along the proposed facility at Carr Road and the existing interchange between US 70 and NC 98 will be reconfigured. The proposed project will also upgrade US 70 to a freeway from NC 98 to SR 1815 (Pleasant Drive). The project will be comprised of three continuous lanes in each direction, plus auxiliary lanes as needed, with a 26-foot wide median, 12-foot inside shoulders, and 14-foot outside shoulders. A portion of the project will be on new location. In addition to work associated with the L-line construction, additional work is also proposed on several Y-lines along US 70.

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In addition to this cover letter, please find enclosed the ENG Form 4345, the North Carolina Ecosystem Enhancement Program (NCEEP) Mitigation Acceptance Letter, October 18, 1995 memorandum from the North Carolina Department of Cultural Resources regarding archaeological surveys, Interagency Hydraulic Design Review Concurrence Points (CP) 4B and 4C meeting minutes, Stormwater Management Plan, permit drawings, buffer drawings, utility permit drawings, and roadway plans associated with the subject project.

## PROJECT SCHEDULE

The proposed let date for this project is April 15, 2014, with a let review date of February 25, 2014. However, the let date may advance as additional funds become available.

## PURPOSE AND NEED

The purpose of the proposed East End Connector is to improve capacity on both NC 147 and US 70 and improve connectivity between these high speed routes, which provide direct access to Interstate 40 (I-40) to the south and Interstate 85 (I-85) to the north. The proposed improvement will offer a number of secondary benefits to travelers and residents in East Durham, including improving access to major employment centers, particularly the Research Triangle Park; enhancing connectivity between suburban areas to the north and east of downtown Durham; and diverting through traffic away from local surface streets, such as Magnum Street and US 15/501 Business (Roxboro Street).

## NEPA DOCUMENT STATUS

A Final Environmental Impact Statement (FEIS) and Section 4(f) Statement was originally completed for this project in January 1982. A Draft Re-evaluation of the FEIS was completed in 1998. An Environmental Assessment (EA) was approved in December 2009 and a Finding of No Significant Impact (FONSI) was approved in December 2011. All documents have been provided to regulatory review agencies. The EA and FONSI are available on the NCDOT Website at https://connect.ncdot.gov/resources/Environmental/Pages/default.aspx, under *Quick Links > Environmental Documents*.

## INDEPENDENT UTILITY

The subject project is in compliance with 23 CFR Part 771.111(f), which lists the Federal Highway Administration (FHWA) characteristics of independent utility of a project:

(1) The project connects logical termini and is of sufficient length to address environmental matters on a broad scope;

(2) The project is usable and a reasonable expenditure due to both sections being constructed at the same time;

(3) The project does not restrict consideration of alternatives for other reasonably foreseeable transportation improvements.

## RESOURCE STATUS

Wetland delineations for the U-0071 construction footprint followed the field delineation method outlined in the *1987 Corps of Engineers Wetland Delineation Manual* (Environmental Laboratory, 1987) and the subsequent *Regional Supplement to the Corps of Engineers Delineation Manual: Eastern Mountains and Piedmont Region* (U.S Army Corps of Engineers [USACE]; Interim Version [2010], Version 2.0 [2012]). The regional supplement was only used on wetlands either added or modified after the supplement was released. Stream identification and classification followed the *Identification Methods for the Origins of Intermittent and Perennial Streams* (North Carolina Division of Water Quality [NCDWQ], Versions 3.0 – 4.1.1). Within the U-0071 construction footprint for the preferred alternative, 17 streams, 10 wetlands, and two ponds were identified.

Jurisdictional features associated within the original project study area and the proposed alternatives within it were verified by USACE Regulatory Specialist Eric Alsmeyer under a Notification of Jurisdictional Determination (JD), dated February 17, 2005 (Action ID No. 200420005). Additionally, previously un-verified jurisdictional features within areas added to the project study area were verified by Mr. Alsmeyer via an on-site field visit on November 2, 2006. No written JD tear sheet was received for the verification of these added features.

Since the original JD was set to expire, a re-verification of jurisdictional features associated with the project was pursued in 2011. Jurisdictional features within the construction footprint presented at CP 4B (features that were previously verified, plus modified and/or added features) were verified by Mr. Alsmeyer under an Approved Notification of JD, dated July 20, 2011 (Action ID No. SAW-2011-00796). Additionally, an area containing previously un-verified jurisdictional features was added to the construction footprint during the permitting process. These features were verified by Mr. Alsmeyer on a separate Preliminary Notification of JD tear sheet, dated May 2, 2013, but were included under the same Action ID No. as the 2011 re-verification.

NCDWQ issued an On-Site Determination for Subjectivity to the Neuse River Riparian Area Protection Rules on August 19, 2004 for buffer determinations made by Regulatory Specialist Steven Mitchell within the original project study area. An On-Site Determination for Applicability to the Neuse River Basin Buffer Rules was issued on June 15, 2005 for additional buffer determinations made within the original project study area by Regulatory Specialists John Hennessy and Nicole Thomson. Regulatory Specialist Rob Ridings attended the above-referenced November 2, 2006 on-site field visit and made calls on features within the added portions of the study area. A written verification was not received for the 2006 calls.

A JD request packet was sent to Mr. Ridings for the 2011 verification of features within the CP 4B construction footprint. Mr. Ridings did not attend, but stated that he would agree with the calls made by Mr. Alsmeyer and NCDOT and the calls previously made by NCDWQ. Mr. Ridings was also sent a JD request packet for the features added during the permitting process and deferred to the calls made by Mr. Alsmeyer and NCDOT.

The study area lies within the Piedmont physiographic province of North Carolina. Jurisdictional features with the project footprint are located within both the Neuse River Basin (Hydrologic Unit [HUC] 03020201) and the Cape Fear River Basin (HUC 03030002) in Durham County. Jurisdictional streams within the Neuse Basin that will be impacted by this project include three Unnamed Tributaries (UT) of Goose Creek (North Carolina Division of Water Resources [NCDWR] Classification WS-IV NSW; NCDWR Index No. 27-5-1) and 11 UTs of Little Lick Creek (NCDWR Classification WS-IV NSW; NCDWR Index No. 27-9-[0.5]). Jurisdictional streams within the Cape Fear Basin that will be impacted by this project include three UTs of Northeast Creek (NCDWR Classification WS-V NSW; NCDWR Index No. 16-41-1-17-[0.3]).

There are no designated Outstanding Resource Waters (ORW), High Quality Waters (HQW), Water Supply I (WS-I), or Water Supply II (WS-II) waters within 1.0 mile of the project. Within 1.0 mile of the construction footprint, Little Lick Creek (NCDWR Index No. 27-9-[0.5]), UT2 of Little Lick Creek (NCDWR Index No. 27-9-[0.5]ut2), and Third Fork Creek (NCDWR Index No. 16-41-1-12-[1]) are listed on the 2012 303(d) List of Impaired Waters of North Carolina. Little Lick Creek is listed for impaired aquatic life due to low dissolved oxygen and turbidity; UT2 of Little Lick Creek is listed for impaired aquatic life due to low dissolved oxygen; and Third Fork Creek is listed for impaired aquatic life due to copper, zinc, and low dissolved oxygen.

## IMPACTS TO WATERS OF THE UNITED STATES

### Surface Waters

Neuse River Basin

Total jurisdictional stream impacts within the Neuse River Basin (HUC 03020101) include 5,447 linear feet of permanent stream impacts, which includes bank stabilization, and 568 linear feet of temporary stream impacts. Of those impacts, a total of 419 linear feet of permanent stream impacts, which includes bank stabilization, and 15 linear feet of temporary stream impacts will occur along Stream S-26, which is an isolated stream. The jurisdictional stream impacts for this basin are summarized below in Table 1. In addition to stream impacts, there will be 0.78 acres of surface water impacts to jurisdictional Pond W-8 (Site 13) and 0.19 acres of surface water impacts to jurisdictional Pond W-12 (Site 18) in this basin.

*Utilities*

Of the 5,447 linear feet of permanent stream impacts listed above, a total of 20 linear feet are bank stabilization impacts associated with utility work at Wetland and Stream Utility Permit Site U-1. Temporary dewatering and trenching will also occur at this site to allow for the placement of an 8-inch sewer pipe across Stream S-25; however, these temporary impacts will occur within the same footprint as the permanent bank stabilization impacts. The pipe will be completely buried.

Jurisdictional stream impacts resulting from utility work will occur at two additional locations; however, these impacts are within the right-of-way (ROW) limits, where roadway-related stream impacts have already been calculated. These utility impacts include:

(1) On Plan Sheet No. 6, an 8-inch sewer line will be installed. Temporary utility stream impacts will occur where the line crosses Stream S-A. However, at that location, permanent stream impacts related to roadway construction will also occur, which supersede the temporary utility impacts. The permanent impacts are accounted for as part of Permit Site No. 2.

(2) On Plan Sheet No. 11, a 16-inch sewer line will be installed. Temporary utility stream impacts will occur where the line crosses Stream S-6. However, at that location, temporary stream impacts related to culvert construction will also occur; therefore, temporary stream impacts where there is overlap are accounted for as part of Permit Site No. 17.

**Table 1. Surface Water Impacts within the Neuse River Basin (HUC 03020201)**

| Permit Site No. | Stream Name | Stream ID[1] | Intermittent /Perennial | Impact Type | Impacts (lin. ft.) | Impacts Requiring USACE mitigation (lin. ft.) | USACE Mitigation Ratio | Impacts Requiring 1:1 DWR mitigation (lin. ft.) |
|---|---|---|---|---|---|---|---|---|
| 1 | UT of Goose Creek | S-B | Intermittent | Perm. Fill | 412 | 0[2] | | 0[3] |
| 2 | UT of Goose Creek | S-A | Intermittent | Temp. Fill | 14 | 0 | | 0 |
| | | | | Perm. Fill | 673 | 0[2] | | 0[3] |
| | | | | Bank Stabil. | 20 | 0[5] | | 0[3] |
| 3 | UT of Goose Creek | S-35 | Intermittent | Perm. Fill | 410 | 0[2] | | 0[3] |
| 4 | UT of Little Lick Creek | S-26 | Intermittent (**Isolated**) | Temp. Fill | 15 | 0 | | 0 |
| | | | | Perm. Fill | 349 | 0[4] | | 0[3] |
| | | | | Bank Stabil. | 70 | 0[4] | | 0[3] |
| 6 | UT of Little Lick Creek | S-25 | Intermittent | Temp. Fill | 15 | 0 | | 0 |
| 7 | UT of Little Lick Creek | S-18 | Perennial | Temp. Fill | 110 | 0 | | 0 |
| | | | | Perm. Fill | 665 | 665 | 2:1 | 665 |
| | | | | Bank Stabil. | 250 | 0[5] | | 250 |
| 8 | UT of Little Lick Creek | S-19 | Intermittent | Perm. Fill | 443 | 0[2] | | 0[3] |

**Table 1. Surface Water Impacts within the Neuse River Basin (HUC 03020201) (Continued)**

| Permit Site No. | Stream Name | Stream ID[1] | Intermittent /Perennial | Impact Type | Impacts (lin. ft.) | Impacts Requiring USACE mitigation (lin. ft.) | USACE Mitigation Ratio | Impacts Requiring 1:1 DWR mitigation (lin. ft.) |
|---|---|---|---|---|---|---|---|---|
| 9 | UT of Little Lick Creek | S-24 | Intermittent | Perm. Fill | 29 | 0[2] | | 0[3] |
| | | | | Bank Stabil. | 43 | 0[5] | | 0[3] |
| 12 | UT of Little Lick Creek | S-16 | Intermittent | Temp. Fill | 132 | 0 | | 0 |
| | | | | Perm. Fill | 705 | 0[2] | | 0[3] |
| | | | | Bank Stabil. | 42 | 0[5] | | 0[3] |
| 17 | UT of Little Lick Creek | S-6 | Perennial | Temp. Fill | 39 | 0 | | 0 |
| | | | | Perm. Fill | 479 | 479 | 2:1 | 479 |
| | | | | Bank Stabil. | 61 | 0[5] | | 61 |
| 17A | UT of Little Lick Creek | S-12 | Intermittent | Temp. Fill | 56 | 0 | | 0 |
| 17B | UT of Little Lick Creek | S-14 | Intermittent | Temp. Fill | 7 | 0 | | 0 |
| 23 | UT of Little Lick Creek | S-6 | Perennial | Temp. Fill | 124 | 0 | | 0 |
| | | | | Perm. Fill | 280 | 280 | 2:1 | 280 |
| | | | | Bank Stabil. | 79 | 0[5] | | 79 |
| 24 | UT of Little Lick Creek | S-7 | Intermittent | Temp. Fill | 23 | 0 | | 0 |
| | | | | Perm. Fill | 104 | 0[2] | | 0[3] |
| 25 | UT of Little Lick Creek | S-2 | Intermittent | Temp. Fill | 10 | 0 | | 0 |
| | | | | Perm. Fill | 168 | 0[2] | | 0[3] |
| | | | | Bank Stabil. | 35 | 0[5] | | 0[3] |

**Table 1. Surface Water Impacts within the Neuse River Basin (HUC 03020201) (Continued)**

| Permit Site No. | Stream Name | Stream ID[1] | Intermittent /Perennial | Impact Type | Impacts (lin. ft.) | Impacts Requiring USACE mitigation (lin. ft.) | USACE Mitigation Ratio | Impacts Requiring 1:1 DWR mitigation (lin. ft.) |
|---|---|---|---|---|---|---|---|---|
| 26 | UT of Little Lick Creek | S-2 | Intermittent | Temp. Fill | 23 | 0 | | 0 |
| | | | | Perm. Fill | 50 | 0[2] | | 0[3] |
| | | | | Bank Stabil. | 50 | 0[5] | | 0[3] |
| 27 | UT of Little Lick Creek | S-6 | Perennial | Bank Stabil. | 10 | 0[5] | | 10[6] |
| U-1 | UT of Little Lick Creek | S-25 | Intermittent | Utility/ Bank Stabil. | 20 | 0[5] | | 0[3] |
| Temporary Fill Impacts (Non-isolated) | | | | | 553 | 0 | | 0 |
| Temporary Fill Impacts (Isolated) | | | | | 15 | 0 | | 0 |
| Permanent Fill Impacts (Non-isolated) | | | | | 4,418 | 1,424 | | 1,424 |
| Permanent Fill Impacts (Isolated) | | | | | 349 | 0[4] | | 0 |
| Bank Stabilization Impacts (Non-isolated) | | | | | 610 | 0 | | 400 |
| Bank Stabilization Impacts (Isolated) | | | | | 70 | 0[4] | | 0 |
| **TOTAL TEMPORARY IMPACTS** | | | | | **568** | **0** | | **0** |
| **TOTAL PERMANENT IMPACTS** | | | | | **5,447** | **1,424** | | **1,824** |

[1]Stream IDs are from the JD re-verification packet, dated April 7, 2011.

[2]Per USACE, no compensatory mitigation is required for permanent impacts (including bank stabilization) to USACE-regulated intermittent streams associated with this project.

[3] Per the NCDWQ Public Memorandum dated August 14, 2009, any NCDOT project within the Merger 01 process that has reached CP 4A prior to the effective date of October 16, 2009 is not subject to the NCDWR Intermittent Stream Mitigation Policy. This project reached CP 4A on December 13, 2007 and is not subject to this policy. Therefore, no compensatory mitigation for permanent impacts along intermittent streams is required by NCDWR for this project.

[4]Isolated streams are not regulated by USACE.

[5]Per USACE, bank stabilization impacts do not require compensatory mitigation.

[6]Although this Site does not individually exceed the 150 linear foot threshold set by NCDWR for requiring compensatory mitigation, when combined with other Sites along the same stream, the cumulative impact to the stream exceeds that threshold.

Cape Fear River Basin

Total jurisdictional stream impacts within the Cape Fear River Basin (HUC 03030002) include 501 linear feet of permanent stream impacts, which includes bank stabilization, and 68 linear feet of temporary stream impacts. The jurisdictional stream impacts within this basin are summarized below in Table 2.

Due to an error in the Location and Surveys file, which listed ephemeral channels on the upstream end of S-30/S-P as jurisdictional that were not, impacts were mistakenly calculated in the CP 4C drawings upstream of current Site 20. This area was listed as part of Site 22 in the CP 4C drawings and showed impacts along the main ephemeral channel as well as an ephemeral channel spur. Since this area is actually non-jurisdictional beyond the point shown on the current drawings, these impacts were removed. In the initial draft of the final permit drawings, this area was still included as Site 19; although the impacts have been removed, the site is still listed on the impact summary sheet (with no impacts) as a place holder to identify that there are no longer impacts at that location, since a significant amount of stream impacts were shown in that area in the 4C drawings.

*Utilities*

No utility impacts associated with this project will occur in this basin.

**Table 2. Surface Water Impacts within the Cape Fear River Basin (HUC 03030002)**

| Permit Site No. | Stream Name | Stream ID[1] | Intermittent /Perennial | Impact Type | Impacts (lin. ft.) | Impacts Requiring USACE mitigation (lin. ft.) | USACE Mitigation Ratio | Impacts Requiring 1:1 DWR mitigation (lin. ft.) |
|---|---|---|---|---|---|---|---|---|
| 20 | UT of Northeast Creek | S-30/ S-P | Perennial | Temp. Fill | 17 | 0 | | 0 |
| | | | | Perm. Fill | 218 | 218 | 2:1 | 218 |
| 21 | UT of Northeast Creek | S-30/ S-P | Perennial | Perm. Fill | 28 | 28 | 2:1 | 28[3] |
| 22 | UT of Northeast Creek | S-30/ S-P | Perennial | Perm. Fill | 23 | 23 | 2:1 | 23[3] |
| 28 | UT of Northeast Creek | S-R | Perennial | Temp. Fill | 20 | 0 | | 0 |
| | | | | Perm. Fill | 121 | 121 | 2:1 | 0 |
| 29 | UT of Northeast Creek | S-30/ S-P | Perennial | Perm. Fill | 40 | 40 | 2:1 | 40[3] |

**Table 2. Surface Water Impacts within the Cape Fear River Basin (HUC 03030002) (Continued)**

| Permit Site No. | Stream Name | Stream ID[1] | Intermittent /Perennial | Impact Type | Impacts (lin. ft.) | Impacts Requiring USACE mitigation (lin. ft.) | USACE Mitigation Ratio | Impacts Requiring 1:1 DWR mitigation (lin. ft.) |
|---|---|---|---|---|---|---|---|---|
| 30 | UT of Northeast Creek | S-30/ S-P | Perennial | Perm. Fill | 10 | 10 | 2:1 | 10[3] |
| 31 | UT of Northeast Creek | S-30/ S-P | Perennial | Temp. Fill | 22 | 0 | | 0 |
| | | | | Bank Stabil. | 61 | 0[2] | | 61[3] |
| 32 | UT of Northeast Creek | S-G | Intermittent | Temp. Fill | 9 | 0 | | 0 |
| Temporary Fill Impacts | | | | | 68 | 0 | | 0 |
| Permanent Fill Impacts | | | | | 440 | 440 | | 319 |
| Bank Stabilization Impacts | | | | | 61 | 0 | | 61 |
| **TOTAL TEMPORARY IMPACTS** | | | | | **68** | **0** | | **0** |
| **TOTAL PERMANENT IMPACTS** | | | | | **501** | **440** | | **380** |

[1]Stream IDs are from the JD re-verification packet, dated April 7, 2011.

[2]Per USACE, bank stabilization impacts fewer than 500 linear feet on a single stream (perennial streams, for this project) do not require compensatory mitigation.

[3]Although this Site does not individually exceed the 150 linear foot threshold set by NCDWR for requiring compensatory mitigation, when combined with other Sites along the same stream, the cumulative impact to the stream exceeds that `threshold.

## Wetlands

Neuse River Basin

There will be a total of 0.46 acres of permanent wetland impacts and 0.01 acres of temporary wetland impacts within the Neuse River Basin (HUC 03020101). A total of 0.38 acres of the permanent wetland impacts are to riparian wetlands, which includes 0.19 acres of permanent impacts to isolated wetlands. The remaining 0.08 acres of permanent impacts are to non-riparian wetlands, all of which are isolated. These impacts are summarized in Table 3.

*Utilities*

Jurisdictional wetland impacts resulting from the installation of an 8-inch sewer line will occur in Wetland W-B on Plan Sheet No. 6. However, these impacts are within the ROW limits and in an area that overlaps with roadway-related wetland impacts. The area where there is overlap is considered a roadway-related wetland impact and is accounted for as part of Permit Site No. 2.

**Table 3. Wetland Impacts within the Neuse River Basin (HUC 03020201)**

| Permit Site No. | Wetland ID | Wetland Type | Impact Type | Permanent Impacts (ac.) | Impacts Requiring USACE mitigation (ac.)[1] | Temporary Impacts (ac.) |
|---|---|---|---|---|---|---|
| 2 | W-B | Riparian | Fill | 0.08 | 0.08 | 0 |
| 3 | W-30 | Riparian | Fill | 0.06 | 0.06 | 0 |
| 4 | W-29 | Riparian (**Isolated**) | Fill | 0.05 | 0[2] | 0 |
| 5 | W-39 | Riparian (**Isolated**) | Fill | 0.06 | 0[2] | 0 |
| 8 | W-28 | Riparian | Fill | 0.04 | 0.04 | 0 |
| 10 | W-25 | Riparian | Fill | 0.01 | 0.01 | 0.01 |
| 11 | W-24 | Riparian | Mechanized Clearing | <0.01 | <0.01 | 0 |
| 14 | W-10A | Riparian (**Isolated**) | Fill | 0.08 | 0[2] | 0 |
| 15 | W-PX | Non-Riparian (**Isolated**) | Fill | 0.03 | 0[2] | 0 |
| 16 | W-11 | Non-Riparian (**Isolated**) | Fill | 0.05 | 0[2] | 0 |
| Riparian, Non-Isolated Impacts | | | | 0.19 | 0.19 | 0.01 |
| Riparian, Isolated Impacts | | | | 0.19 | 0[2] | 0 |
| Non-Riparian, Isolated Impacts | | | | 0.08 | 0[2] | 0 |
| **TOTAL IMPACTS** | | | | **0.46[3]** | **0.19[3]** | **0.01** |

[1] Mitigation ratio for all applicable wetland sites is 2:1.

[2] Isolated wetlands are not regulated by the USACE. Additionally, NCDOT does not anticipate compensatory mitigation being required by NCDWR for isolated wetlands because total wetland impacts for the project do not exceed 1.0 acre.

[3] Rounded total is based on the sum of the actual impacts.

Cape Fear River Basin

There are no wetland impacts (roadway or utility) within this basin.

**Buffers**

Neuse River Basin

Within the Neuse River Basin (HUC 03020101), there will be a total of 46,609 square feet of Allowable buffer impacts associated with project, with 28,259 square feet occurring in buffer Zone 1 and 18,350 square feet occurring in buffer Zone 2. Additionally, there will be a total of 594,470 square feet of Mitigable buffer impacts, with 352,197 square feet occurring in Zone 1

and 242,273 square feet occurring in Zone 2. These impacts are summarized in Table 4. Please refer to the Wetland Impact Summary Sheet and Wetlands in Buffer Sheet for site-by-site impacts.

*Utilities*

Of the Allowable riparian buffer impacts mentioned above, a total of 4,559 square feet are associated with utility work, with 2,599 square feet occurring in buffer Zone 1 and 1,960 square feet occurring in buffer Zone 2. Additionally, of the above-mentioned Mitigable riparian buffer impacts, a total of 329 square feet are associated with utility work, all of which occur in Zone 1.

At Utility Buffer Site U-2, additional utility work will occur that is not accounted for within the utility impacts listed for that site. This is due to the fact that some of the utility-related impacts at this location will occur within an existing, cleared City of Durham sewer easement. This portion of the impact was considered to be occurring within existing use rather than as a new impact.

At Utility Buffer Site No. U-3, additional buffer impacts will occur that are not accounted for within the utility totals listed for that site. This is due to the fact that some of the utility-related buffer impacts at this location will occur within the project right-of-way (ROW), where roadway-related buffer impacts will also occur. Impacts in the area where this overlap occurs inside of the ROW limits were accounted for as roadway impacts as part of Buffer Permit Site No. 17. The remaining impacts at this site outside of the ROW limits were accounted for as part of Utility Buffer Site No. U-3.

Utility-related riparian buffer impacts will occur at three additional locations where the utility buffer impacts are completely overlapped by the roadway buffer impacts within the ROW limits. At these locations, buffer impacts were accounted for as roadway-related buffer impacts. These areas include:

(1) On Plan Sheet No. 6, an 8-inch sewer line will be installed within the buffer of Stream S-A. The area where there is overlap between utility buffer impacts and roadway buffer impacts has been accounted for as part of Buffer Permit Site No. 1.

(2) On Plan Sheet No. 9, a 12-inch sewer line will be installed within the buffer of Stream S-16. The area where there is overlap between utility buffer impacts and roadway buffer impacts has been accounted for as part of Buffer Permit Site No. 6.

(3) On Plan Sheet No. 20, a 16-inch sewer line will be installed within the buffer of Stream S-6. The area where there is overlap between utility buffer impacts and roadway buffer impacts has been accounted for as part of Buffer Permit Site No. 13.

At two additional locations, one on Plan Sheet No. 11 and one on Plan Sheet No. 20, utility work in the form of manhole cover installation will be performed within 50 feet of buffered streams. However, both areas are within existing, cleared City of Durham sewer easements and are, therefore, considered to be occurring within existing use rather than as new buffer impacts.

**Table 4. Riparian Buffer Impacts within the Neuse River Basin (HUC 03020101)**

| Impact Type[1] | Zone 1 Impacts (sq. ft.) | Zone 2 Impacts (sq. ft.) | Buffer Impact Total (sq. ft.) |
|---|---|---|---|
| Allowable Stormwater Management Impacts | 5,584 | 3,789 | 9,373 |
| Allowable Utility Impacts | 2,599 | 1,960 | 4,559 |
| Allowable Road Crossing Impacts | 20,076 | 12,601 | 32,677 |
| Mitigable Utility Impacts | 329 | 0 | 329 |
| Mitigable Parallel Impacts | 5,317 | 7,867 | 13,184 |
| Mitigable Road Crossing Impacts | 346,551 | 234,406 | 580,957 |
| Total Allowable Impacts | 28,259 | 18,350 | 46,609 |
| Total Mitigable Impacts | 352,197 | 242,273 | 594,470 |
| Wetlands in Buffer Within Mitigable Impacts | 6,999 | 2,335 | 9,334 |
| Total Mitigable Impacts, Minus Wetlands In Buffer | 345,198 | 239,938 | 585,136 |
| **TOTAL IMPACTS** | **380,456** | **260,623** | **641,079** |
| **TOTAL WETLANDS IN BUFFER** | **6,999** | **2,335** | **9,334** |
| **TOTAL IMPACTS, MINUS WETLANDS IN BUFFER** | **373,457** | **258,288** | **631,745** |

[1]See Buffer Impact Summary Sheet in the attached buffer drawings for site-by-site impacts.

Cape Fear River Basin

Per the memorandum from NCDOT to NCDWQ dated August 20, 2010, this project is grandfathered from the Jordan Lake Riparian Buffer Rules. Therefore, buffer impacts will not be considered for either roadway or utility work in the Jordan Lake Watershed (HUC 03030002) in this permit application.

## MITIGATION OPTIONS

The USACE has adopted, through the Council on Environmental Quality (CEQ), a wetland mitigation policy that embraces the concept of "no net loss of wetlands" and sequencing. The purpose of this policy is to restore and maintain the chemical, biological, and physical integrity of the waters of the United States. CEQ has defined mitigation of wetland and surface water impacts to include: avoiding impacts, minimizing impacts, rectifying impacts, reducing impacts over time, and compensating for impacts (40 CFR 1508.20).

The NCDOT is committed to incorporating all reasonable and practicable design features to avoid and minimize jurisdictional impacts, and to provide full compensatory mitigation of all

remaining, unavoidable jurisdictional impacts. Avoidance measures were taken during the planning phase and minimization measures were incorporated as part of the project design. Minimization includes the examination of appropriate and practicable steps to reduce the adverse impacts.

**Avoidance and Minimization**

Avoidance and minimization has been employed in the project area to the maximum extent practicable. Listed below are some of the measures implemented on the project:

- NCDOT's Best Management Practices (BMPs) for the Protection of Surface Waters will be enforced.
- Design Standards in Sensitive Watersheds will be employed on portions of the project within the Neuse River Basin.

EA/CP 4A Meeting Minutes

- The proposed East End Connector was shifted to avoid stream S-11. It also was shifted to a 90-degree skew to cross stream S-6. The proposed alignment also avoids wetland W-40, and ponds 41 and 42. Additionally, the narrowest median that meets design standards was selected for the corridor.
- The Rowena Avenue Extension was eliminated. Instead, access was provided along East End Avenue Extension. As a result, impacts to wetland W-26, Pond 23 (W-23) and streams S-18 and S-24 were avoided (at that location).
- The northbound NC 147 flyover ramp was replaced with a left exit off the East End Connector, reducing the impact to stream S-30 (at that location).
- The Miami Boulevard northbound exit ramp was shifted closer to US 70, reducing the length of impact to S-18 (at that location).
- Jurisdictional impacts were further minimized by adding guardrail, which allows fill slope limits to be reduced at stream and wetland crossings.

Stormwater Management Plan

- Where possible, open roadway shoulders with roadway ditches and rip rap pads at pipe outlets were employed.
- Where possible, the following stormwater conveyances were also employed: lateral "V" ditches, lateral base ditches, lateral "V" diversion ditches, lateral base diversion ditches, special cut ditches, standard base ditches, special base ditches, tail ditches, and tail base ditches.
- Sixteen grassed swales will be constructed along the project to convey and treat stormwater and reduce stormwater velocities. Swales were a very practical BMP for this project because there was available pervious area along the linear highway corridor and they can easily be substituted for ditches. Grassed swales were designed in areas where appropriate slopes could be graded out and required length could be met. Rock checks were added to some of the swales to slow velocities.
- Seventeen pre-formed scour holes (PSH) will be constructed along the project at pipe outlets and will function as stormwater energy dissipators.
- Four dry detention basins will be constructed at the following locations: –L– STA. 56+00 RT, –Y5– STA. 22+04 LT, –L– STA. 121+98 LT, and –L– STA. 129+75 LT. The function

of these basins will be stormwater catchment, treatment, and discharge. The basin located at –L– STA. 56+00 RT required a larger water quality volume than 3:1 slopes would allow with the location's surface area constraints. Thus, the basin was designed with 2:1 slopes and with stabilization requirements.

- One level spreader with a rip rap-lined tail ditch will be installed at –US70FLY– STA. 43+30 LT and will function as a stormwater energy dissipator. The tail ditch will allow for some treatment while the level spreader effectively diffuses flow.
- Two special trapezoidal grassed swales with rock berms will be constructed from –Y4– STA. 15+83 to STA. 18+56 LT and from –Y4– STA. 20+38 to STA. 27+00 LT. These swales are located in a large grade-separated interchange (directly over Stream S-18 on Plan Sheet 9) that presented difficulty in treating the stormwater runoff. On the north side of the interchange the alignments of –L– and –Y4– resulted in a large void area between them split by Stream S-18. The void areas are receiving areas for 8 point outfalls, two on the north side of S-18 and 6 on the south side of S-18. PSH's were initially considered at this location, but they were replaced with the special grassed swale over concerns that the flow from numerous PSH's might re-concentrate before the flow reached the stream because the cumulative runoff encompasses a large area. The entire area between the fills on each side of the stream can be graded out to create an expanded grassed swale feature with large rock check dams perpendicularly covering the bottom of the swale every 100 linear feet. Though unconventional, flow is subdued and the runoff enters the buffered areas on both sides of the stream with acceptable velocities.

The EA document estimated a total of 5,711 linear feet of stream impacts and 1.13 acres of pond impacts, while the FONSI estimated 5,890 linear feet of stream impacts and 1.06 acres of pond impacts. The increase in stream impacts between the EA and FONSI was a result of the Carr Road interchange being added to the proposed project. After final design, permanent stream impacts increased to 5,948 linear feet, which is an increase of 58 linear feet when compared to the FONSI. This increase is due to changes in the project design. Pond impacts decreased to 0.97 acres after final design.

The EA document estimated a total of 0.29 acres of wetland impacts, while the FONSI estimated 0.41 acres of wetland impacts. The increase in wetland impacts between the EA and FONSI was, again, a result of the addition of the Carr Road interchange, as well as the identification of a new wetland (Wetland W-10A) within the proposed project footprint. After final design, permanent wetland impacts are 0.46 acres. This is a slight increase from the FONSI. Although impacts to Wetland W-31 were eliminated from the project (0.07 acres) between the FONSI and the final design, four wetlands were impacted by the final design that were not addressed in the FONSI (Wetlands W-24, W-29, W-30, and W-PX [identified after the FONSI]). Impacts to these new wetlands totaled 0.14 acres of impacts; that increase, plus modifications made between the preliminary and final designs in areas where previously-impacted wetlands were located, resulted in the 0.05-acre overall increase.

The EA document estimated a total of 7.19 acres (313,194 square feet) of Zone 1 buffer impacts and 4.81 acres (209,522 square feet) of Zone 2 buffer impacts within the Neuse River Basin, while the FONSI estimated 7.34 acres (319,728 square feet) of Zone 1 buffer impacts and 4.91 acres (213,878 square feet) of Zone 2 buffer impacts within the Neuse Basin. The increase in buffer impacts between the EA and FONSI, again, was a result of modifications to the Carr Road interchange being added to the proposed project. After final design, total buffer impacts (Allowable and Mitigable combined) are 380,456 square feet of Zone 1 impacts and 260,623

square feet of Zone 2 impacts. This increase between the FONSI and the final design is due to changes in the project design.

## **Compensatory Mitigation**

Neuse River Basin

Compensatory mitigation requirements for permanent stream, wetland, and buffer impacts associated with U-0071 within the Neuse River Basin (HUC 03020101) are summarized below in Table 5.

*Stream and Wetland Impacts*

A total of 5,447 linear feet of permanent warm water stream impacts will occur within the Neuse Basin. Of that total, 400 linear feet are bank stabilization impacts along perennial streams, which do not require compensatory mitigation per USACE; 3,204 linear feet are permanent impacts to intermittent streams (including 210 linear feet of bank stabilization) that do not require mitigation per USACE (this designation is project-specific); and 419 linear feet (including 70 linear feet of bank stabilization) are along isolated Stream S-26, which is not regulated by USACE. This results in a total of 1,424 linear feet of permanent warm water stream impacts that will require compensatory mitigation per the USACE at a 2:1 ratio.

NCDWR-mandated compensatory mitigation is not required for any permanent impacts along intermittent streams (including bank stabilization) per the NCDWQ Public Memorandum dated August 14, 2009, which states that any NCDOT project within the Merger 01 process that has reached CP 4A prior to the effective date of October 16, 2009 is not subject to the NCDWR Intermittent Stream Mitigation Policy. This project reached CP 4A on December 13, 2007 and is, therefore, not subject to this policy. Additionally, mitigation is not required on impacts to isolated stream S-26 because it is an intermittent stream. However, NCDWR does require mitigation along perennial streams if the total permanent impacts along a given stream, including bank stabilization, exceed 150 linear feet. Therefore, NCDWR will require compensatory mitigation for 1,824 linear feet of permanent warm water stream impacts at a 1:1 ratio.

The total USACE mitigation requirement exceeds the NCDWR mitigation requirement; therefore NCDOT will request that NCEEP provide compensatory mitigation for 1,424 linear feet of stream impact at a 2:1 ratio for this basin. NCEEP will also provide mitigation for the 0.19 acres (2:1 ratio) of permanent riparian, non-isolated wetland impacts resulting from roadway fill and mechanized clearing.

*Buffers*

A total of 641,079 square feet of permanent buffer impacts are associated with this project in the Neuse Basin, with 9,334 square feet being wetlands in buffers. Of the remaining 631,745 square feet of permanent buffer impacts, 373,457 square feet occur in Buffer Zone 1 and 258,288 square feet occur in Buffer Zone 2. Of those impacts, 345,198 square feet of Zone 1 impacts and 239,938 square feet of Zone 2 impacts are Mitigable. NCEEP will provide compensatory mitigation for the Mitigable Zone 1 buffer impacts at a 3:1 ratio and the Mitigable Zone 2 buffer impacts at a 1.5:1 ratio.

**Table 5. Neuse River Basin Compensatory Mitigation Summary**

| | Stream Impacts (lin. ft.) | Riparian Wetland Impacts (ac.) | Mitigable Zone 1 Buffer Impacts (sq. ft.) | Mitigable Zone 2 Buffer Impacts sq. (ft.) |
|---|---|---|---|---|
| **Impacts Requiring Mitigation** | 1,424 | 0.19 | 345,198 | 239,938 |
| **Mitigation Ratio** | 2:1 | 2:1 | 3:1 | 1.5:1 |
| **Total NCEEP Mitigation Required** | **2,848** | **0.38** | **1,035,594** | **359,907** |

Cape Fear River Basin

A total of 501 linear feet of permanent warm water stream impacts will occur within the Cape Fear River Basin (HUC 03030002), 61 linear feet of which are bank stabilization impacts that do not require compensatory mitigation per USACE. This results in a total of 440 linear feet of stream impacts requiring compensatory mitigation per the USACE at a 2:1 ratio.

NCDWR requires mitigation on perennial streams if the total permanent impacts along a given stream, including bank stabilization, exceed 150 linear feet. Therefore, NCDWR will require compensatory mitigation for 380 linear feet of permanent stream impacts at a 1:1 ratio.

The total USACE mitigation requirement exceeds the NCDWR mitigation requirement; therefore NCDOT will request that NCEEP provide compensatory mitigation for 440 linear feet of stream impact at a 2:1 ratio for this basin. Compensatory mitigation requirements for permanent stream impacts associated with U-0071 within this basin are summarized below in Table 6. There are no wetland impacts and this project is grandfathered from the Jordan Lake Riparian Buffer Rules within this basin.

**Table 6. Cape Fear River Basin Compensatory Mitigation Summary**

| | Stream Impacts (lin. ft.) |
|---|---|
| **Impacts Requiring Mitigation** | 440 |
| **Mitigation Ratio** | 2:1 |
| **Total NCEEP Mitigation Required** | **880** |

## FEDERALLY PROTECTED SPECIES

Plants and animals with a Federal classification of Endangered (E) or Threatened (T) are protected under provisions of Section 7 and Section 9 of the Endangered Species Act (ESA) of 1973, as amended. As of December 26, 2012, the U.S. Fish and Wildlife Service (USFWS) lists two federally protected species for Durham County: Michaux's sumac (*Rhus michauxii*) and smooth coneflower (*Echinacea laevigata*). The Biological Conclusion listed for each species in both the EA and FONSI was "No Effect". Re-surveys were performed by NCDOT biologists for each species on June 19, 2012. Suitable habitat was present; however, no individuals of either species were observed. Additionally, a review of North Carolina Natural Heritage Program (NCNHP) GIS data (most recently on October 14, 2013) revealed no known occurrences of either species within 1.0 mile of the construction footprint. Therefore, the Biological Conclusions of "No Effect" remain valid.

## CULTURAL RESOURCES

In a memorandum dated October 18, 1995, The North Carolina Department of Cultural Resources, State Historic Preservation Office (HPO) stated that archaeological surveys would not be recommended. This memorandum is included in the permit application packet. Additionally, HPO conducted a review of the project and, in a memorandum dated August 14, 2006, stated that they are not aware of any historic resources that would be affected by the project and had no comment. This memorandum is located in Appendix A of the EA. Per personal communication with the NCDOT Human Environment Section – Archaeology Group on December 6, 2013, it was confirmed that the decisions made in these two memorandums remain valid.

## FEMA COMPLIANCE

There are streams within the project limits that are within Federal Emergency Management Agency (FEMA)-designated flood zones. Coordination between the NCDOT Hydraulics Unit and FEMA will occur prior to Let to ensure that NCDOT is in full compliance with applicable floodplain ordinances.

## INDIRECT AND CUMULATIVE EFFECTS

An assessment of the Indirect and Cumulative Effects of U-0071 was provided to the NCDOT in a 2007 report, and summarized in the 2009 Environmental Assessment. Additional copies of those documents are available upon request. While it is acknowledged that the East End Connector has the potential to have a moderate effect on land use development patterns, it is also acknowledged that development will not occur without supportive local land use policies, local development incentives, availability of developable and a good investment climate.

Land use changes in the project study area are guided by the land use and growth management plans of the City-County government of Durham and regional planning authorities. These plans and their implementation will determine to a large extent the future land use patterns and intensities of development that will occur in Durham County with, or without, the proposed

project. The proposed East End Connector project is supported by, and consistent with, the local land use plans and policies.

The potential development that may occur is expected to be primarily industrial and commercial uses along with some in-fill and increased density of residential uses, which is consistent with the local land use and growth management plans. Due to the urbanizing character of the southern portion of the study area, local planning authorities anticipate that increased development will continue in the southern portion of the County regardless of whether the proposed project is constructed. Further, the primary function of the East End Connector facility is not to promote development but to provide increased capacity and connectivity for freeway travel within the southeastern region of Durham.

Corridor management plans help to preserve the overall function and intent of the highway corridor and provide the greatest safety and operational benefits of the facility. The Durham City-County governments have adopted land use policies and guidelines and zoning ordinances to control the densities and types of development that are permitted to occur within the study area and the County. The Urban Growth Area (UGA) was established to reflect limitations as to the areas that will be provided with utility services and extensions in an effort to restrict development within water supply watersheds. The Unified Development Ordinance (UDO) for the Durham area contains the various development and permitting standards by which the zoning regulations and development policies of the Durham Comprehensive Plan are implemented. The UDO also specifies the environmental protection standards and permit regulations for the City and County. The State Development Zone designation qualifies businesses for tax or franchise tax credits. Most of the East End Connector study area located east of Angier Avenue and north of Pleasant Drive is located within the State Development Zone.

## WILD AND SCENIC RIVERS

This project will not impact any designated Wild and Scenic Rivers or any rivers included in the list of study rivers (Public Law 90-542, as amended) or North Carolina Natural and Scenic Rivers.

## ESSENTIAL FISH HABITAT

The project will not impact any essential fish habitat afforded protection under the Magnuson-Stevens Act of 1996 (16 U.S.C 1801 *et seq*.).

## REGULATORY APPROVALS

Application is hereby made for a Department of the Army Section 404 Individual Permit as required for the above-described activities for the proposed T.I.P. Project U-0071.

We are also hereby requesting a Section 401 Water Quality Certification, North Carolina State General Permit for Impacts to Isolated and Other Non-404 Jurisdictional Wetlands and Waters, and a Neuse River Riparian Buffer Authorization from NCDWR. In compliance with Section 143-215.3D (e) of the NCAC, we will provide $570.00 to act as payment for processing the

Section 401 permit. We are providing two copies of this application to the North Carolina Department of Environment and Natural Resources (NCDENR), NCDWR, for their review and approval.

A copy of this permit application and its distribution list will be posted on the NCDOT website at https://connect.ncdot.gov/resources/Environmental/Pages/default.aspx, under *Quick Links > Permit Applications*. Thank you for your time and assistance with this project. Please contact James Mason at either jsmason@ncdot.gov or (919) 707-6136 if you have any questions or need additional information.

Sincerely,

E. L. Lusk

for Richard W. Hancock, P.E., Manager
Project Development and Environmental Analysis Unit

**Cc:**
NCDOT Permit Application Standard Distribution List

U.S. ARMY CORPS OF ENGINEERS

**APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT**

33 CFR 325. The proponent agency is CECW-CO-R.

OMB APPROVAL NO. 0710-0003
EXPIRES: 28 FEBRUARY 2013

Public reporting for this collection of information is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of the collection of information, including suggestions for reducing this burden, to Department of Defense, Washington Headquarters, Executive Services and Communications Directorate, Information Management Division and to the Office of Management and Budget, Paperwork Reduction Project (0710-0003). Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. Please DO NOT RETURN your form to either of those addresses. Completed applications must be submitted to the District Engineer having jurisdiction over the location of the proposed activity.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned.

**(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)**

| 1. APPLICATION NO. | 2. FIELD OFFICE CODE | 3. DATE RECEIVED | 4. DATE APPLICATION COMPLETE |
|---|---|---|---|
| | | | |

***(ITEMS BELOW TO BE FILLED BY APPLICANT)***

| 5. APPLICANT'S NAME | 8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required) |
|---|---|
| First - Richard Middle - W. Last - Hancock | First - Middle - Last - |
| Company - NCDOT-PDEA | Company - |
| E-mail Address - jsmason@ncdot.gov | E-mail Address - |
| 6. APPLICANT'S ADDRESS: | 9. AGENT'S ADDRESS: |
| Address- 1598 Mail Service Center | Address- |
| City - Raleigh State - NC Zip - 27699 Country - 1598 | City - State - Zip - Country - |
| 7. APPLICANT'S PHONE NOs. w/AREA CODE | 10. AGENTS PHONE NOs. w/AREA CODE |
| a. Residence b. Business 919-707-6136 c. Fax 919-212-5785 | a. Residence b. Business c. Fax |

**STATEMENT OF AUTHORIZATION**

11. I hereby authorize, _____ to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

_____ SIGNATURE OF APPLICANT _____ DATE

**NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY**

12. PROJECT NAME OR TITLE (see instructions)
U-0071

| 13. NAME OF WATERBODY, IF KNOWN (if applicable) | 14. PROJECT STREET ADDRESS (if applicable) |
|---|---|
| Goose Creek, Little Lick Creek, Northeast Creek | Address |
| 15. LOCATION OF PROJECT<br>Latitude: °N 35.970457 Longitude: °W -78.859948 | City - State- Zip- |

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)
State Tax Parcel ID Municipality Durham
Section - Durham County Township - Range -

17. DIRECTIONS TO THE SITE

Please see attached vicinity map and cover letter.

18. Nature of Activity (Description of project, include all features)

The North Carolina Department of Transportation (NCDOT) proposes to construct the East End Connector from NC 147 (Durham Freeway/Buck Dean Expressway) to north of NC 98 (Holloway Street) in Durham. The project will link NC 147 and US 70 and will be a controlled-access facility. Proposed interchanges include freeway-to-freeway junctions between the East End Connector and NC 147 adjacent to where NC 147 crosses over SR 1171 (Ellis Road) and between the East End Connector and US 70 near the existing US 70/East End Avenue at-grade intersection. An interchange is also proposed along the proposed facility at Carr Road and the existing interchange between US 70 and NC 98 will be reconfigured. The proposed project will also upgrade US 70 to a freeway from NC 98 to SR 1815 (Pleasant Drive). The project will be comprised of three continuous lanes in each direction, plus auxiliary lanes as needed, with a 26-foot wide median, 12-foot inside shoulders, and 14-foot outside shoulders. A portion of the project will be on new location.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

Please see attached cover letter.

**USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED**

20. Reason(s) for Discharge

Impacts will result from improving the existing roadway and shoulders, construction of new roadway and interchanges (some on new location), and work associated with secondary roads along the project.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

| Type<br>Amount in Cubic Yards | Type<br>Amount in Cubic Yards | Type<br>Amount in Cubic Yards |
|---|---|---|
| See attached cover letter & permit drawings | | |

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres See attached cover letter & permit drawings.

or

Linear Feet See attached cover letter & permit drawings.

23. Description of Avoidance, Minimization, and Compensation (see instructions)

See attached cover letter.

24. Is Any Portion of the Work Already Complete? ☐ Yes ☒ No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- See permit drawings packet.

City - State - Zip -

b. Address-

City - State - Zip -

c. Address-

City - State - Zip -

d. Address-

City - State - Zip -

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

| AGENCY | TYPE APPROVAL* | IDENTIFICATION NUMBER | DATE APPLIED | DATE APPROVED | DATE DENIED |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

E. Luke for Richard W. Hancock, PE Dec 10, 2013

SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Ecosystem Enhancement PROGRAM

December 10, 2013

Mr. Richard W. Hancock, P.E.
Project Development and Environmental Analysis Unit
North Carolina Department of Transportation
1548 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Mr. Hancock:

Subject: EEP Mitigation Acceptance Letter:

**U-0071,** East End Connector from NC 147 (Buck Dean Fwy) to North of NC 98, Durham County

The purpose of this letter is to notify you that the Ecosystem Enhancement Program (EEP) will provide the stream, riparian wetland and buffer mitigation for the subject project. Based on the information supplied by you on December 3, 2013, the stream impacts are located in CU 03030002 of the Cape Fear River basin and the stream, riparian wetland and buffer impacts are located in CU 03020201 of the Neuse River basin in the Central Piedmont (CP) Eco-Region, and are as follows:

| **Stream and Wetlands** | River Basin | CU Location | Eco-Region | Stream | | | Wetlands | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Cold | Cool | Warm | Riparian | Non-Riparian | Coastal Marsh |
| Impacts | Cape Fear | 03030002 | CP | 0 | 0 | 440 | 0 | 0 | 0 |
| Impacts | Neuse | 03020201 | CP | 0 | 0 | 1,424 | 0.19 | 0 | 0 |

*Some of the stream and wetland impacts may be proposed to be mitigated at a 1:1 mitigation ratio. See permit application for details.

All buffer mitigation requests and approvals are administrated through the Riparian Restoration Buffer Fund. The NCDOT will be responsible to ensure that appropriate compensation for the buffer mitigation will be provided in the agreed upon method of fund transfer. Upon receipt of the NCDWQ's Buffer Authorization Certification, EEP will transfer funds from the NCDOT 2984 Fund into the Riparian Restoration Buffer Fund. Upon completion of transfer payment, NCDOT will have completed its riparian buffer mitigation responsibility for TIP Number U-0071. Subsequently, EEP will conduct a review of current NCDOT ILF Program mitigation projects in the river basin to determine if available buffer mitigation credits exist. If there are buffer mitigation credits available, then the Riparian Restoration Buffer Fund will purchase the appropriate amount of buffer mitigation credits from NCDOT ILF Program.

| Buffer | River Basin | CU | Eco-Region | Buffer Impacts | | |
|---|---|---|---|---|---|---|
| | | | | Zone 1 | Zone 2 | TOTAL |
| Impacts | Neuse | 03020201 | CP | 345,198.0 | 239,938.0 | 585,136.0 |

EEP commits to implementing sufficient compensatory stream and riparian wetland mitigation credits and mitigation for the buffer impacts to offset the impacts associated with this project as determined by the regulatory agencies in accordance with the N.C. Department of Environment and Natural Resources' Ecosystem Enhancement Program In-Lieu Fee Instrument dated July 28, 2010. If the above referenced impact amounts are revised, then this mitigation acceptance letter will no longer be valid and a new mitigation acceptance letter will be required from EEP.

If you have any questions or need additional information, please contact Ms. Beth Harmon at 919-707-8420.

Sincerely,

James B. Stanfill
EEP Asset Management Supervisor

Cc: Mr. Eric Alsmeyer, USACE – Raleigh Regulatory Field Office
Ms. Amy Chapman, NC Division of Water Quality
File: U-0071

# North Carolina Department of Cultural Resources

James B. Hunt, Jr., Governor
Betty Ray McCain, Secretary

Division of Archives and History
William S. Price, Jr., Director

October 18, 1995

MEMORANDUM

TO: H. Franklin Vick, P.E., Manager
Planning and Environmental Branch
Division of Highways
Department of Transportation

FROM: David Brook
Deputy State Historic Preservation Officer

SUBJECT: East End Connector, NC 147 Buck Dean Freeway to US 70, U-71, Durham County, 96-E-4220-0147

We have examined the aerial photographs for the above project supplied by your staff and offer the following comments.

As expected, the proposed project area has been previously disturbed by development and other activities. It is unlikely that the East End Connector project as currently proposed will affect any National Register-eligible archaeological properties. We do not recommend any archaeological survey.

The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

Thank you for your cooperation and consideration. If you have questions concerning the above comment, please contact Renee Gledhill-Earley, environmental review coordinator, at 919/733-4763.

DB:slw

cc: State Clearinghouse
N. Graf
T. Padgett

Subject: Minutes from the Interagency 4B Hydraulic Design Review Meeting on March 17, 2011 for U-0071 in Durham County

**Team Members:**

| | |
|---|---|
| Eric Alsmeyer-USACE | (present) |
| Gary Jordan-USFWS | (absent) |
| Travis Wilson-NCWRC | (present) |
| Rob Ridings-NCDWQ | (present) |
| Chris Militscher- EPA | (absent) |
| Felix Davila-FHWA | (present) |
| Rachelle Beauregard-NEU | (present) |
| Liza Mundt-PDEA | (present) |
| Dennis Jernigan-Division 5 | (absent) |

**Participants:**
Wally Bowman, NCDOT Division 5
Marshall Clawson, NCDOT Hydraulics
Vincent Rivers, NCDOT Hydraulics
Mark Staley, NCDOT REU
Phil Harris, NCDOT NEU
Ron McCollum, NCDOT RDU
David Scheffel, NCDOT RDU
David Clodgo, NCDOT Roadway
Theo Beach, NCDOT Structures
Betsy Cox, NCDOT Structures
Julie Bollinger, NCDOT TPB
Monroe Brown, NCDOT Utilities
Roger Weadon, MA Engineering
Arvin Maniktala, MA Engineering
Bobby Porter, MA Engineering
Burke Evans, MA Engineering
Gail Kogut, MA Engineering

The general introduction was initiated by Marshall Clawson. Introductions were made by all in attendance.

Sheets 4 -8
No comments

**Sheets 9**
Investigate moving pipe outlet near STA 26+50 Right from discharging directly into the wetlands (topography may not permit).

**Sheets 10**
Stream on parcel 184 Left of Y2 is disconnected/not continuous. There is concern that the disconnected stream segment in a post construction environment may be a less favorable scenario than mitigating any impacts for showing a proposed connection on the design. A follow up field visit will be done by the CORP before 4C to determine the possibility of reconnecting the channels.

For the Pond at –L STA 123+00 (Parcels 82 & 84) some additional wetland limits have been identified just upstream of the pond due to beaver activity. Site is considered an isolated wetland.

**Sheet 11**
An additional isolated wetland has been identified that will be impacted by the proposed roadway fill (Note site is located within the existing power line easement near –L- STA 131+50).

Sheets 12-25
No comments

Meeting Adjourned

Subject: Minutes from the Interagency 4C Hydraulic Design Review Meeting on January 23, 2013 2:30pm in the NCDOT Structures Conference Room C for U-0071 in Durham County

**Team Members:**

| | |
|---|---|
| Eric Alsmeyer-USACE | (present) |
| Gary Jordan-USFWS | (present) |
| Travis Wilson-NCWRC | (present) |
| Rob Ridings-NCDWQ | (present) |
| Chris Militscher- EPA | (absent) |
| Felix Davila-FHWA | (present) |
| Mark Staley-REU | (present) |
| Liza Mundt-PDEA | (present) |
| Dennis Jernigan-Division 5 | (absent) |

**Participants:**
Vincent Rivers, NCDOT Hydraulics
Rachelle Beauregard, NCDOT NEU
Jim Mason, NCDOT NEU
Doug Calhoun, NCDOT Structures
Monroe Brown, NCDOT Utilities
Roger Weadon, MA Engineering
Paul Cameron, MA Engineering
Bobby Porter, MA Engineering
Gail Kogut, MA Engineering
Chris Murray, Division 5
Andrew Young, NCDOT Roadway
Tyler Crumbley, USACE
David Stark, NCDOT SMU

The general introduction was initiated by Vincent Rivers. Introductions were made by all in attendance.
Note: Permit drawing plan sheets are laid out corresponding to roadway design plan sheets. Therefore, some sites may be shown across several sheets. Sites were numbered according to impact to a particular stream. Thus, several impacts share the same site number if they impact the same resource. Comments are organized according to site.

GENERAL

Show Buffer lines on the drawings.

Show stream linear impacts to nearest foot.

Add stars to denote locations of isolated wetlands.

NEU requests that the linear impacts in areas of riprap be shown on a separate line in the impact summary sheet from impacts directly to the stream. Both types of impacts can be classified as permanent but NEU wants them shown separately.

SITE 1

**There are two separate JS lines.** Division 5 noted that the USACE map does not show a break in the stream as shown by the Location Survey JS line; it is continuous. Both lines (one from NEU and one from Location Survey) were left in as there appears to be conflicting. In many cases, the NEU line seems to reflect what is found in the field and the LS line indicates top of bank. In other cases, LS seems to be a better representation of field conditions. This area need re-survey.

Site 1 is a total take.

SITE 2

The sanitary sewer line will be bored and jacked. The proposed manhole is shown on the stream bank. Even if the manhole is moved, the receiving pit for the sewer will possibly conflict with the stream bank. More survey will be required in this area before final utility design as the

existing sewer seems to run along the creek. It has not been determined who will be preparing final utility designs.

SITE 3 SITE 2

Site 3 should be renumbered as it is the same stream as Site 2.

SITE 4 SITE 2

Division 5 requests that we add a detail showing countersunk pads to prevent headcuts at origin of stream. USACE and DWQ concurred.

SITE 5 SITE 3

Site 5 is total take

NEU suggested to removing the "F" patterning from wetland in order to prevent contractor from filling the wetland where there is no need or requirement to do so. We should still count the area toward the permanent wetland take. USACE stated that the orange fence would prevent the contractor from unnecessarily filling the wetland. We will leave patterning as is and add a note indicating that the wetland should not be filled.

SITE 6 SITE 4

Extend riprap to proposed right-of-way line and all impacts should be shown as permanent.

SITE 7 SITE 4

Extend riprap to proposed control of access line and all impacts should be shown as permanent.

NEU wants to remove fill pattern from wetland. However, Site 7 is a total take because it will migrate toward the new lateral V-ditch along -Y7LPA-.

SITE 8 SITE 5

No comments.

SITE 9 SITE 6

Items to consider during final utility design:

- Will receiving pit have enough space
- If open cut to install new manhole, use countersunk riprap at cut.

SITE 10 SITE 7

Extend riprap about 10 feet along bend in stream at eastern limit.

At the western limit, add riprap along the back slope of ditch. Stop limits of temporary impact at sanitary sewer easement as we will not need to dewater past this limit.

SITE 11 SITE 8

Site 10 to Site 11 should have shallow riprap swale between streams.

Be sure that riprap covers tie-in points of diversion channels. This will be shown in diversion details.

SITE 12 SITE 8

No comments.

SITE 13 SITE 9

Add riprap along the backslope of ditch on both sides.

SITE 14 SITE 10

This area needs re-survey as stream is shown much wider than in reality.

Add legends for "Fill in Wetlands" and "Temporary Fill in Wetlands" to sheet.

SITE 15 SITE 12

Extend riprap at eastern end of stream to re-define channel. Add 10 feet of temporary impacts beyond end of this additional riprap. Add a ditch detail shows countersunk riprap.

Add 10 feet of permanent impacts to western end of ditch to reconnect systems

Add a ditch detail shows countersunk riprap.

SITE 16 SITE 13

No comments.

SITE 17 SITE 14

Extend Fill in Wetlands to have emergency spillway (change portion shown as temporary) to be permanent.

SITE 18 SITE 17

Split out another site number as stream on northern (inlet) end of culvert is a different resource than on southern (outlet) end.

Buffer drawings show a stream at the inlet end of the box culvert. This resource is not shown on the surface water impact drawings. (This is due to the discrepancy between NEU and LS stream lines.)

SITE 19 SITE 18

No comments.

SITE 20 SITE 16

No comments.

SITE 21 SITE 15

No comments.

SITE 22 SITE 20

Division 5 requests that we add a detail showing countersunk pads to prevent headcuts at origin of stream. USACE and DWQ concurred.

SITE 23 SITES 21 & 22

Division 5 requests that we add a detail showing countersunk pads. USACE and DWQ concurred. Add a note to armor the flow line and backslope. These locations are incised gulleys.

We are conservative showing more impacts than will probably occur at these locations as we are in the Cape Fear River Basin.

USACE would like a note added stating that the contractor should not grub trees on the stream banks.

Shoulder cut shown stopping at top of stream bank at -DFWB- 60+20? More survey is needed here. Top of bank line is important in this location.

SITE 24 SITE 12

Be sure that riprap covers tie-in points of diversion channels and that the proposed riprap lines up with the diversion channel. This will be shown in diversion details.

Will this utilize a level spreader for soil or concrete? Level spreader is per NCDOT standard detail

SITE 25 SITE 23

No comments.

SITE 26 SITE 24

Division 5 requests that we add a detail showing countersunk pads to prevent headcuts at origin of stream. USACE and DWQ concurred.

Add 5 more linear feet of riprap at southern (inlet) end of culvert.

SITE 27 SITE 25 & SITE 26

Extend riprap at northeastern end of 66" RCP.

North Carolina Department of Transportation

Highway Stormwater Program

# STORMWATER MANAGEMENT PLAN

FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released July 2012)

**Project/TIP No.:** U-0071 **County(ies):** Durham 

## General Project Information

| | | | | | |
|---|---|---|---|---|---|
| **Project No.:** | U-0071 | | **Project Type:** | New Location and Roadway Widening | **Date:** 10/31/2012 |
| **NCDOT Contact:** | Marshall W. Clawson, PE | | **Contractor / Designer:** | MA Engineering Consultants, Inc.; Roger S. Weadon, PE | |
| **Address:** | 1590 Mail Service Center<br>Raleigh, 27699-1590<br>1020 Birch Ridge Road, Raleigh, NC 27610 (DELIVERY) | | **Address:** | 598 East Chatham Street, Suite 137<br>Cary, NC 27511-6956 | |
| **Phone:** | 919.707.6713 | | **Phone:** | 919.297.0220 x-113 | |
| **Email:** | mclawson@ncdot.gov | | **Email:** | rweadon@maec.com | |
| **City/Town:** | Durham | | **County(ies):** | Durham | |
| **River Basin(s):** | Neuse | Cape Fear | **CAMA County?** | No | |
| **Primary Receiving Water:** | Little Lick Cr, Goose Cr, Third Fork Cr, & Northeast Cr. | | **NCDWQ Stream Index No.:** | 27-9-(0.5), 16-41-1-12-(1), 16-41-1-17-(0.3), | |

| **NCDWQ Surface Water Classification for Primary Receiving Water** | | | | | |
|---|---|---|---|---|---|
| | **Primary:** | | Water Supply IV (WS-IV) | Class C | Water Supply V (WS-V) |
| | **Supplemental:** | | Nutrient Sensitive Waters (NSW) | Nutrient Sensitive Waters (NSW) | Nutrient Sensitive Waters (NSW) |
| **Other Stream Classification:** | None | None | None | None | |
| **303(d) Impairments:** | dissolved oxygen (DO) | | fecal coliform | | |
| **Buffer Rules in Effect** | Neuse | | | | |

## Project Description

| | | | |
|---|---|---|---|
| **Project Length (lin. Miles or feet):** | 3.956 miles | **Surrounding Land Use:** | Overall low density residential development with wooded undeveloped tracks and some |

| | **Proposed Project** | **Existing Site** |
|---|---|---|
| **Project Built-Upon Area (ac.)** | 123.32 ac. | 64.90 ac. |
| **Typical Cross Section Description:** | Three continuous lanes in each direction plus auxiliary lanes as need with 26 feet wide median, 12 feet wide inside shoulders, and 14 feet outside shoulders | US70: 4 lane divided highway on northern half; 4 lane undivided highway w/ varying shoulder widths on southern half. NC 147: 4 lane divided highway w/ 10' shoulders |
| **Average Daily Traffic (veh/hr/day):** | Design/Future: 116100 | Existing: 65700 |

**General Project Narrative:** Durham East End Connector from NC 147 to north of NC 98: See attached word document for complete summary.

## References

## Project Environmental Summary

### Surface Water Impacts

| Sheet No. | Station (From / To) | Feature Impacted | Water / Wetland / Buffer Type | Receiving Surface Water Name | NRTR Map ID | NCDWQ Stream Index | NCDWQ Surface Water Classification | 303(d) Impairments | Type of Impact | Existing SCM | Proposed SCM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | L 32+58 RT<br>L 36+59 RT | Stream | Intermittent | UT to Little Lick Creek | S-B | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Excavation | N/A | Swale |
| 6 | L 37+00 RT<br>L 38+56 LT | Stream | Intermittent | UT to Little Lick Creek | S-A | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | PFSH |
| 6 | SR1 36+13 LT<br>SR1 37+36 LT | Wetland | Riverine Swamp Forest | Little Lick Creek | W-B | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | |
| 6 | L 44+75 LT<br>L 48+72 LT | Stream | Intermittent | UT to Little Lick Creek | S-35 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | |
| 6 | L 48+70 LT<br>L 48+81 LT | Wetland | Unknown | Little Lick Creek | W-30 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | |
| 9 | SR2 32+85 LT<br>SR2 33+45 LT | Buffer | Neuse | Little Lick Creek | S-26 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Excavation | N/A | Swale |
| 9 | SR2 36+47 LT<br>SR2 37+36 RT | Stream | Intermittent | UT to Little Lick Creek | S-26 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | |
| 9 | Y7 16+93 LT<br>Y7 17+36 RT | Stream | Intermittent | UT to Little Lick Creek | S-26 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | |
| 9 | Y5 23+22 RT<br>Y5 23+33 RT | Buffer | Neuse | UT to Little Lick Creek | S-24 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Excavation | N/A | Dry Detention Basin |
| 9 | Y7 29+00 LT<br>Y7 29+00 RT | Stream | Intermittent | UT to Little Lick Creek | S-24 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | |
| 9 | Y7 28+34 LT<br>Y7 28+98 LT | Buffer | Neuse | UT to Little Lick Creek | S-24 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | PFSH |
| 9 | Y6 11+07 RT<br>Y6 11+09 RT | Buffer | Neuse | UT to Little Lick Creek | S-24 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | |
| 9 | Y6 16+38 LT<br>Y6 16+79 LT | Buffer | Neuse | UT to Little Lick Creek | S-18 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | Swale |
| 9 | Y7RPD 7+57 RT<br>Y4 19+31 LT | Stream | Perennial | UT to Little Lick Creek | S-18 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | |
| 9 | Y7RPD 8+45 RT<br>Y7RPD 7+60 RT | Buffer | Neuse | UT to Little Lick Creek | S-18 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | Swale |
| 9 | L 95+21 RT<br>Y7RPA 20+36 RT | Stream | Perennial | UT to Little Lick Creek | S-18 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | |
| 9 | Y4 20+93 LT<br>Y4 20+21 LT | Buffer | Neuse | UT to Little Lick Creek | S-18 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | Swale |

* List all stream and surface water impact locations regardless of jurisdiction or size.
Equalizer Pipes to be noted as a minimization of impacts.
All proposed SCMs listed must also be listed under Swales, Preformed Sour Holes and other Energy Dissipators, or Other Stormwater Control Measures.

### Description of Minimization of Impacts or Mitigation

### References

## Project Environmental Summary

### Surface Water Impacts

| Sheet No. | Station (From / To) | Feature Impacted | Water / Wetland / Buffer Type | Receiving Surface Water Name | NRTR Map ID | NCDWQ Stream Index | NCDWQ Surface Water Classification | 303(d) Impairments | Type of Impact | Existing SCM | Proposed SCM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 9 | Y7RPA 22+34 RT<br>Y7RPA 21+79 RT | Buffer | Neuse | UT to Little Lick Creek | S-18 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | Swale |
| 9 | Y6 17+00 RT<br>Y6 17+57 RT | Buffer | Neuse | UT to Little Lick Creek | S-18 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | Energy Dissipation |
| 9 | Y4 20+27 LT<br>Y4 22+31 LT | Stream | Intermittent | UT to Little Lick Creek | S-19 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | |
| 9 | Y6 21+50 RT<br>Y6 22+27RT | Buffer | Neuse | UT to Little Lick Creek | S-19 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | |
| 9 | Y4 24+40 RT<br>Y4 25+59 RT | Wetland | Unknown | UT to Little Lick Creek | W-28 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | Swale |
| 10 | Y2 28+50 LT<br>Y2 27+95 LT | Buffer | Neuse | UT to Little Lick Creek | S-16 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | Swale |
| 10 | Y2 26+69 RT<br>Y2 27+87 LT | Stream | Intermittent | UT to Little Lick Creek | S-16 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | |
| 10 | Y4 35+00 RT<br>Y4 35+91 LT | Stream | Intermittent | UT to Little Lick Creek | S-16 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | |
| 10 | Y4 36+18 RT<br>Y4 34+83 RT | Buffer | Neuse | UT to Little Lick Creek | S-16 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | Swale |
| 10 | L 110+01 RT<br>Y4 35+51 LT | Wetland | Headwater Wetland | UT to Little Lick Creek | W-8 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | |
| 10 | L 122+93 RT<br>L 123+04 LT | Wetland | Unknown | UT to Little Lick Creek | W-10a | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | Dry Detention Basin |
| 11 | L 133+04 LT<br>L 133+63 LT | Buffer | Neuse | UT to Little Lick Creek | S-6 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | Energy Dissipation |
| 11 | L 133+62 RT<br>L 133+20 LT | Stream | Perennial | UT to Little Lick Creek | S-6 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | |
| 11 | L 132+14 RT<br>L 132+50 RT | Wetland | Unknown | UT to Little Lick Creek | W-11 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | |
| 11 | L 131+95 LT<br>L 132+38 LT | Wetland | Unknown | UT to Little Lick Creek | W-PX | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | |
| 12 | DFLW 35+20 RT<br>DFLW 37+05 LT | Stream | Perennial | UT to Little Lick Creek | S-30 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | |
| 13 | DFEB 67+65 RT<br>DFLW 52+66 LT | Stream | Perennial | UT to Northeast Creek | S-R | 16-41-1-17-(.3) | WS-V, NSW | None | Culvert | N/A | |

* List all stream and surface water impact locations regardless of jurisdiction or size.
Equalizer Pipes to be noted as a minimization of impacts.
All proposed SCMs listed must also be listed under Swales, Preformed Sour Holes and other Energy Dissipators, or Other Stormwater Control Measures.

### Description of Minimization of Impacts or Mitigation

### References

**Project/TIP No.:** U-0071 **County(ies):** Durham 

## Project Environmental Summary

### Surface Water Impacts

| Sheet No. | Station (From / To) | Feature Impacted | Water / Wetland / Buffer Type | Receiving Surface Water Name | NRTR Map ID | NCDWQ Stream Index | NCDWQ Surface Water Classification | 303(d) Impairments | Type of Impact | Existing SCM | Proposed SCM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 20 | US70FLY 41+68 RT<br>US70FLY 41+48 LT | Stream | Intermittent | UT to Little Lick Creek | S-16 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | |
| 20 | US70FLY 43+35 LT<br>US70FLY 42+87 LT | Buffer | Neuse | UT to Little Lick Creek | S-6 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | Level Spreader |
| 20 | EEC70E 31+15 RT<br>US70FLY 45+48 LT | Stream | Perennial | UT to Little Lick Creek | S-6 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | |
| 20 | US70FLY<br>46+93 LT | Buffer | Neuse | UT to Little Lick Creek | S-6 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | PFSH |
| 20 | EEC70E 30+56 RT<br>EEC70E31+09 RT | Buffer | Neuse | UT to Little Lick Creek | S-6 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | Swale |
| 20 | Y3 39+86 RT<br>Y3 40+73 RT | Stream | Intermittent | UT to Little Lick Creek | S-7 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | |
| 22 | Y3 57+15 RT<br>Y3 57+63 RT | Buffer | Neuse | UT to Little Lick Creek | S-2 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Excavation | N/A | Swale |
| 22 | Y3 58+22 RT<br>Y3 57+71 RT | Buffer | Neuse | UT to Little Lick Creek | S-2 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Excavation | N/A | Swale |
| 22 | Y3 57+68 RT<br>Y3 57+74 LT | Stream | Intermittent | UT to Little Lick Creek | S-2 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | |
| 22 | Y3 58+46 RT<br>Y3 57+74 LT | Buffer | Neuse | UT to Little Lick Creek | S-2 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | Swale |
| 22 | Y9 26+87 RT<br>Y9 27+93 LT | Stream | Intermittent | UT to Little Lick Creek | S-2 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Culvert | N/A | |
| 22 | Y9 27+00 LT<br>Y9 27+93 LT | Buffer | Neuse | UT to Little Lick Creek | S-2 | 27-9-(.5) | WS-IV, NSW | dissolved oxygen (DO) | Fill | N/A | Swale |
| | | | | | | | | | | | |
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* List all stream and surface water impact locations regardless of jurisdiction or size.
Equalizer Pipes to be noted as a minimization of impacts.
All proposed SCMs listed must also be listed under Swales, Preformed Sour Holes and other Energy Dissipators, or Other Stormwater Control Measures.

### Description of Minimization of Impacts or Mitigation

### References

North Carolina Department of Transportation

Highway Stormwater Program
STORMWATER MANAGEMENT PLAN
FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released July 2012)

**Project/TIP No.:** U-0071 **County(ies):** Durham 

## Swales

| Sheet No. | Station (From / To) | Stream Crossing Station | Base Width (ft) | Front Slope (H:V) | Back Slope (H:V) | Drainage Area (ac) | Recommended Treatment Length (ft) | Actual Length (ft) | Longitudinal Slope (%) | Q2 (cfs) | V2 (fps) | Q10 (cfs) | V10 (fps) | Rock Checks Used |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 5 | RAMPC 12+95 RT<br>RAMPC 19+80 RT | RAMPC 20+27.34 | 6.0 | 3 | 3 | 6.26 | 626 | 739 | 0.30% | 25.7 | 1.9 | 33.1 | 2.0 | Yes |
| 8/9 | SR2 25+93 LT<br>SR2 33+45 LT | SR2 32+85 | 6.0 | 4 | 3 | 5.80 | 580 | 700 | 0.30% | 13.0 | 1.6 | 16.8 | 1.7 | Yes |
| 9 | Y6 13+79 LT<br>Y6 16+79 LT | Y6 16+98 | 4.0 | 3 | 3 | 3.00 | 300 | 333 | 0.50% | 6.3 | 1.6 | 8.2 | 1.9 | Yes |
| 9 | Y7RPD 10+30 RT<br>Y7RPD 7+60 RT | Y7RPD 8+24.50 | 6.0 | 3 | 3 | 1.10 | 110 | 247 | 0.50% | 2.1 | 1.1 | 2.8 | 2.0 | Yes |
| 9 | Y7RPA 24+40 RT<br>Y7RPA 21+80 RT | Y7RPA 20+41.77 | 4.0 | 3 | 3 | 2.55 | 255 | 260 | 0.50% | 6.6 | 1.6 | 8.5 | 1.8 | Yes |
| 10 | ~~US70PLT 38+80~~<br>~~US70PRT 37+20 RT~~ | NA | 2.0 | 3 | 3 | 0.90 | 90 | 143 | 0.50% | 3.2 | 1.4 | 4.2 | 1.5 | No |
| 10 | Y2 29+00 LT<br>Y2 27+88 LT | Y2 27+31.36 | 2.0 | 3 | 4 | 0.50 | 50 | 115 | 1.71% | 1.2 | 1.7 | 1.5 | 1.9 | No |
| 10 | Y2 30+51 LT<br>Y2 29+00 LT | Y2 27+31.36 | 0.0 | 3 | 4 | 0.50 | 50 | 153 | 1.71% | 1.7 | 1.8 | 2.2 | 2.0 | No |
| 10 | Y4 40+00 LT<br>Y4 38+00 LT | NA | 2.0 | 3 | 3 | 1.13 | 113 | 200 | 0.80% | 3.7 | 1.7 | 4.7 | 1.9 | No |
| 10 | Y4 37+50 RT<br>Y4 35+00 RT | Y4 35+47.76 | 4.0 | 3 | 3 | 2.50 | 250 | 266 | 1.25% | 4.2 | 2.0 | 5.4 | 2.1 | No |
| 20 | EEC70E 28+55 RT<br>EEC70E 31+10 RT | EEC70E 31+04.57 | 5.0 | 3 | 3 | 2.40 | 240 | 240 | 0.80% | 5.4 | 1.8 | 7.0 | 1.9 | No |
| 20/21 | Y3 44+00 LT<br>Y3 42+70 LT | Y3 41+60.31 | 4.0 | 3 | 3 | 1.00 | 100 | 135 | 1.50% | 3.2 | 1.9 | 4.1 | 2.1 | No |
| 22 | Y3 56+67 RT<br>Y3 57+67 RT | Y3 57+71.25 | 4.0 | 3 | 4 | 0.90 | 90 | 105 | 1.00% | 3.0 | 1.6 | 3.8 | 1.9 | No |
| 22 | Y3 59+00 RT<br>Y3 57+67 RT | Y3 57+71.25 | 2.0 | 3 | 3 | 1.30 | 130 | 133 | 0.50% | 4.3 | 1.5 | 5.5 | 1.8 | No |
| 22 | Y3 58+60 RT<br>Y3 57+75 RT | Y3 57+71.25 | 4.0 | 3 | 3 | 0.80 | 80 | 85 | 1.00% | 3.1 | 1.7 | 3.9 | 2.0 | No |
| 22 | Y9 26+50 LT<br>Y9 27+93 LT | Y9 27+33.12 | 4.0 | 3 | 3 | 1.15 | 115 | 158 | 1.15% | 3.4 | 1.8 | 4.4 | 2.0 | No |
| | | | | | | | 0 | | | | | | | |
| | | | | | | | 0 | | | | | | | |
| | | | | | | | 0 | | | | | | | |
| | | | | | | | 0 | | | | | | | |

☑ YES ☐ NO Have minimum design criteria, as presented in the NCDOT Best Management Practices Toolbox, Version 1 (March 2008), been met and verified? If No, provide further explanantion of why design criteria was not met.

**Additional Comments**

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released July 2012)

**Project/TIP No.:** U-0071 **County(ies):** Durham 

## Preformed Scour Holes and Energy Dissipators

| Sheet No. | Station | Energy Dissipator Type | Riprap Type | Drainage Area (ac) | Conveyance Structure | Pipe/Structure Dimensions (in) | Q10 (cfs) | V10 (fps) |
|---|---|---|---|---|---|---|---|---|
| 6 | -L- 38+21 RT (172') | PFSH | Class 'B' | 1.85 | Pipe | 18 | 7.5 | < 2 |
| 9 | -Y7- 25+36 LT (71') | PFSH | Class 'B' | 0.33 | Pipe | 18 | 1.0 | < 2 |
| 9 | -Y7- 28+53.5 LT (95') | PFSH | Class 'B' | 0.96 | Pipe | 18 | 4.2 | < 2 |
| 9 | -Y7RPD- 1+95 RT (64) | PFSH | Class 'B' | 1.28 | Pipe | 18 | 5.9 | < 2 |
| 9 | -Y7RPD- 6+28 RT (55') | PFSH | Class 'B' | 0.76 | Pipe | 18 | 3.0 | < 2 |
| 9 | -Y6- 12+08 RT (63') | PFSH | Class 'B' | 0.46 | Pipe | 15 | 2.4 | < 2 |
| 9 | -Y6- 13+98 RT (59') | PFSH | Class 'B' | 1.15 | Pipe | 18 | 5.1 | < 2 |
| 10 | -US70FLY- 35+50 RT (80') | PFSH | Class 'B' | 0.74 | Pipe | 15 | 3.7 | < 2 |
| 11 | -L- 128+34 LT (180') | PFSH | Class 'B' | 1.80 | Pipe | 18 | 8.0 | < 2 |
| 11 | -L- 129+71 LT (187') | PFSH | Class 'B' | 1.40 | Pipe | 18 | 7.1 | < 2 |
| 11 | -L- 131+20 LT (210') | PFSH | Class 'B' | 1.85 | Pipe | 18 | 9.4 | < 2 |
| 12 | -LDFWB- 12+50 RT (79.4') | PFSH | Class 'B' | 1.86 | Pipe | 18 | 9.5 | < 2 |
| 12 | -LDFWB- 15+17 RT (70.3) | PFSH | Class 'B' | 0.31 | Pipe | 15 | 1.6 | < 2 |
| 20 | -US70FLY- 46+88 LT (101') | PFSH | Class 'B' | 2.82 | Pipe | 18 | 8.5 | < 2 |
| 20 | -EEC70E- 32+45 RT (72') | PFSH | Class 'B' | 1.47 | Pipe | 18 | 7.1 | < 2 |
| 22 | -Y9- 29+25 LT (52") | PFSH | Class 'B' | 1.72 | Pipe | 18 | 7.5 | < 2 |
| 24R | -Y12- 21+96 RT (44') | PFSH | Class 'B' | 2.25 | Pipe | 18 | 8.5 | < 2 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

☑ YES ☐ NO Have minimum design criteria, as presented in the NCDOT Best Management Practices Toolbox (2008), NCDOT Standard Details, or FHWA HEC-14 (July 2006), been met and verified, as applicable? If No, provide further explanantion of why design criteria was not met.

**Additional Comments**

The performed scour holes for U-0071 have been implemented in areas that are flat to encourage the most dissipation of flow. If the receiving areas weren't flat enough they have been regraded to appropriate elevations per design. The result is that all designed PFSH will have minimal outlet velocities less then 2 fps.

* Refer to the NCDOT Best Management Practices Toolbox, Version 1 (March 2008), NCDOT Standard Details, the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 14 (HEC-14), Third Edition, Hydraulic Design of Energy Dissipators for Culverts and Channels (July 2006), as applicable, for design guidance and criteria.

North Carolina Department of Transportation

Highway Stormwater Program

STORMWATER MANAGEMENT PLAN

FOR LINEAR ROADWAY PROJECTS

(Version 1.2; Released July 2012)

**Project/TIP No.:** U-0071 **County(ies):** Durham 

## Other Stormwater Control Measures

| Sheet No. | Station | SCM Type | Drainage Area (ac) | Required / Minimum Treatment | | | Design Treatment | | All Design Criteria Met? |
|---|---|---|---|---|---|---|---|---|---|
| 7 | L 56+00 RT | Dry Detention Basin | 21.65 | WQv (cf) | 45298.50 | cf | 183198.00 | cf | Yes |
| 9 | Y5 22+04 LT | Dry Detention Basin | 14.00 | WQv (cf) | 28738.50 | cf | 31171.00 | cf | Yes |
| 10 | L 121+98 LT | Dry Detention Basin | 3.30 | WQv (cf) | 6969.00 | cf | 23098.00 | cf | Yes |
| 11 | L 129+75 LT | Dry Detention Basin | 6.33 | WQv (cf) | 9625.50 | cf | 37922.00 | cf | Yes |
| 20 | US70FLY 43+30 LT (115') | Level Spreader | 0.54 | 10-year Storm, Level Spreader Length (ft) | 31.20 | ft | 60.00 | ft | Yes |

**Additional Comments**

* Equalizer Pipes to be noted as a minimization of impacts.

## Additional Comments

U-0071 was a unique project because the large hydraulic footprint covered two river separate basins with different regulations. The eastern half of the project required buffers because it was in the Neuse River Basin. The western half was in the Cape Fear River Basin but there were not buffers shown since the project was “grandfathered in” before the Cape Fear and Jordon Lake buffer rules came into law. Two of the four receiving waters (Little Lick Creek and Third Fork Creek) were listed as having 303d impairments.

The hydraulic design for this project has attempted to minimize surface water impacts while providing treatment and attenuation. Numerous best management practices (BMP) were incorporated into the hydraulic design of U-0071. These include one level spreader, grassed swales, preformed scour holes (PSH), dry detention basins, open shoulder with roadway ditches, rip rap pads at pipe outlets, and some areas of alternate designs that better met the hydraulic needs of the area.

Level spreaders were evaluated at most of the outfalls but in every situation except at one site, they were deemed impractical due to variable downstream topography at the outfalls and larger drainage areas. Only one level spreader was designed at -US70FLY- 43+30 LT. The smaller drainage area and topography at this location did allow for a 60 ft level spreader in combination with a rip rap lined tail ditch. The tail ditch allows for some treatment while the level spreader effectively diffuses flow. After evaluation the sites for level spreaders, Grassed swales and preformed scour holes (PSH) were evaluated as treatment devices for the roadway system and at point impact outfalls. Swales were a very practical BMP for the U-0071 project because there was available pervious area along the linear highway corridor and they can easily be substituted for ditches. Grassed swales were designed in areas where appropriate slopes could be graded out and required length could be met. In total, there were 16 grassed swales within the project limits. Rock checks were added to some of the swales to slow velocities to 2 ft/s for the 10 year event.

At numerous point discharges locations PSH’s were implemented when the outfall was out of the clear recovery zone, drainage areas were relatively small, and the system outlet discharged into downgrade areas flat enough to prevent reconcentration. Since a PSH has a smaller footprint they were also more practical then level spreaders at Q10 point discharges less than 10 cfs. There were a total of 17 PSH within the project limits.

In places with larger contributing drainage areas area that might negatively impact downstream property owner due to the increase runoff, dry detention ponds were evaluated to provide treatment and peak runoff attenuation. The result was 4 sites were identified as being suitable for dry detention basins. Three of the basins were designed in areas where the footprint area was not an issue, but the fourth had to have special design considerations. This basin, located on Plan Sheet 7 at -L- 56+00 RT, required a larger water quality volume then 3:1 slopes would allow with the area constraints. Thus, the basin was designed with 2:1 slopes and with stabilization requirements. All four of the basins captured runoff for 2-5 days and discharged it downstream in non-damaging velocities.

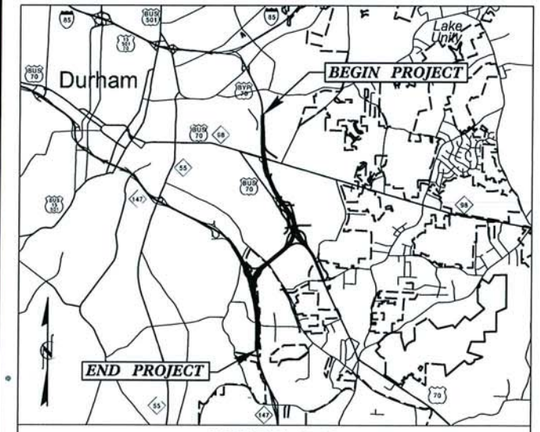
A unique BMP used on this project is the special trapezoidal grassed swale. They are located in a large grade separated interchange (directly over stream S-18 on Plan Sheet 9) that presented difficulty in treating the stormwater runoff. On the north side of the interchange the alignments of -L- and -Y4- resulted in a large void area between them split by S-18. The void areas are receiving areas for 8 point outfalls, two on the north side of S-18 and 6 on the south side of S-18. PSH’s were initially considered at this location but they were replaced with the special grassed swale over concerns that the flow from numerous PSH’s might reconcentrate before the flow reached the stream because the cumulative runoff encompasses a large area. The entire area between the fills on each side of the stream can be graded out to create an expanded grassed swale feature with large rock check dams perpendicularly covering the bottom of the swale every 100 linear feet. Though unconventional, flow is subdued and the runoff enters the buffered areas on both sides of the stream with acceptable velocities.

09/08/99

TIP PROJECT: U-0071

CONTRACT:

See Sheet 1-A For Index of Sheets




VICINITY MAP

# STATE OF NORTH CAROLINA
# DIVISION OF HIGHWAYS

Permit Drawing
Sheet 1 of 1

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | U-0071 | 1 | |

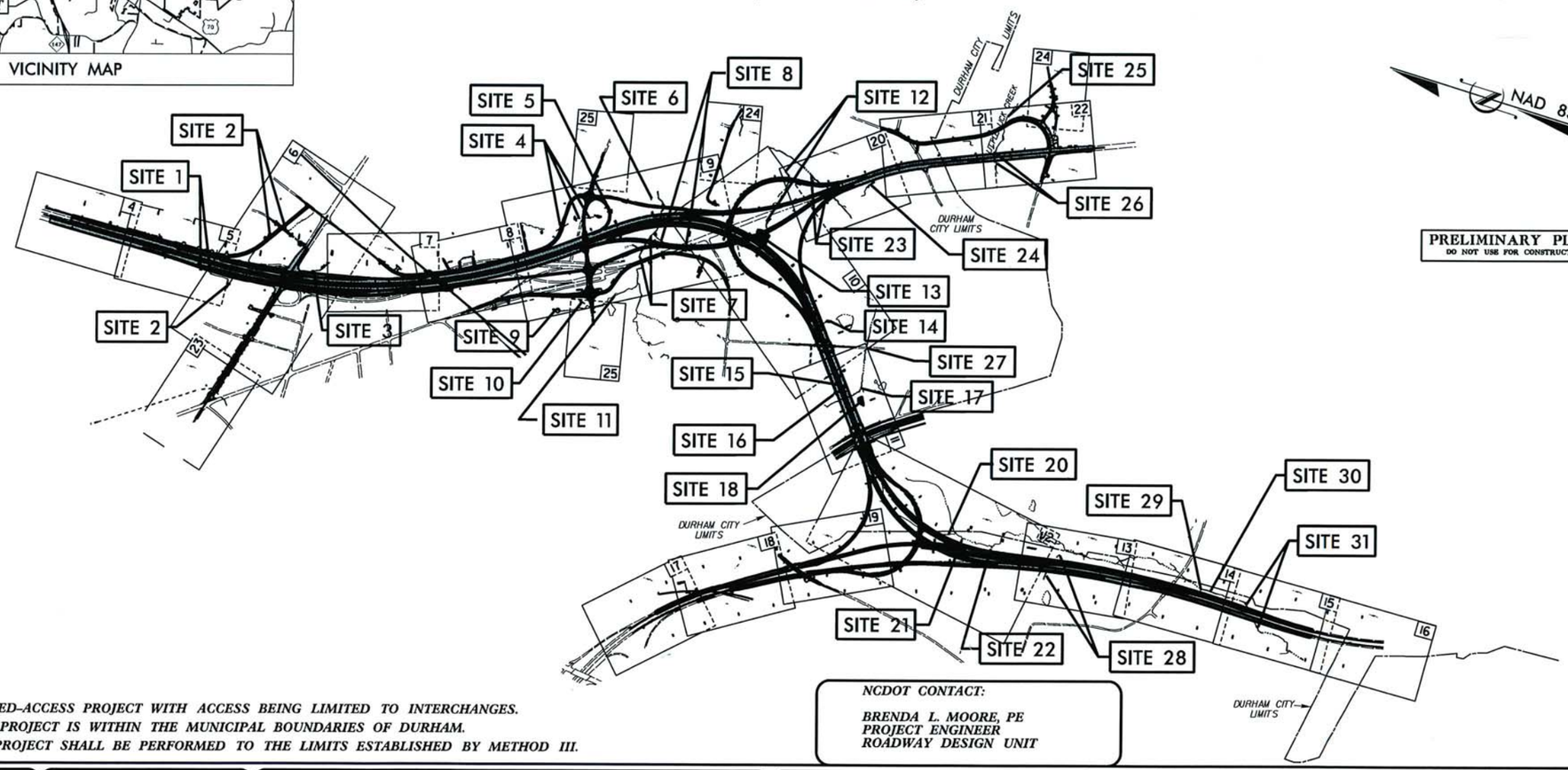
| STATE PROJ. NO. | F.A. PROJ. NO. | DESCRIPTION |
|---|---|---|
| 34745.1.1 | NHF-76-1(2) | PE |
| 34745.2.8 | NHF-76-1(2) | R/W, UTILITIES |

# *DURHAM COUNTY*

***LOCATION: DURHAM EAST END CONNECTOR, FROM NC 147 (BUCK DEAN FREEWAY) TO NORTH OF NC 98***

***TYPE OF WORK: GRADING, DRAINAGE, PAVING, CURB & GUTTER, SIGNALS, STRUCTURES, AND SIGNING***

**WETLAND AND SURFACE WATER IMPACTS PERMIT**




PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

*THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.*
*A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF DURHAM.*
*CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.*

***NCDOT CONTACT:***

***BRENDA L. MOORE, PE***
***PROJECT ENGINEER***
***ROADWAY DESIGN UNIT***

***GRAPHIC SCALES***

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

***DESIGN DATA***

ADT 2015 = 65,700
ADT 2035 = 116,100
DHV = 10 %
D = 55 %
T = 14 % *
V = 70 MPH
* TTST 8 DUAL 6
FUNCT. CLASS. = INTERSTATE

***PROJECT LENGTH***

| | | |
|---|---|---|
| LENGTH ROADWAY PROJECT U-0071 | = | 3.783 mi. |
| LENGTH STRUCTURE PROJECT U-0071 | = | 0.173 mi. |
| TOTAL LENGTH OF TIP PROJECT U-0071 | = | 3.956 mi. |

LENGTH OF PROJECT BASED ON -L- AND -LDFEB-

Prepared For:
***DIVISION OF HIGHWAYS***
*1000 Birch Ridge Dr., Raleigh NC, 27610*
By:
M A Engineering Consultants, Inc.
598 East Chatham Street - Suite 137
Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

*2012 STANDARD SPECIFICATIONS*

***RIGHT OF WAY DATE:***
APRIL 13, 2012

***LETTING DATE:***
APRIL 15, 2014

BURKE EVANS, PE
*PROJECT ENGINEER*

KEVIN S. HUTCHENS
*PROJECT DESIGN ENGINEER*

***HYDRAULICS ENGINEER***

*SIGNATURE:* *P.E.*

***ROADWAY DESIGN ENGINEER***

*SIGNATURE:* *P.E.*

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

9/20/2013
username
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 5 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

Permit Drawing
Sheet 2 of 91

**PRELIMINARY PLANS**
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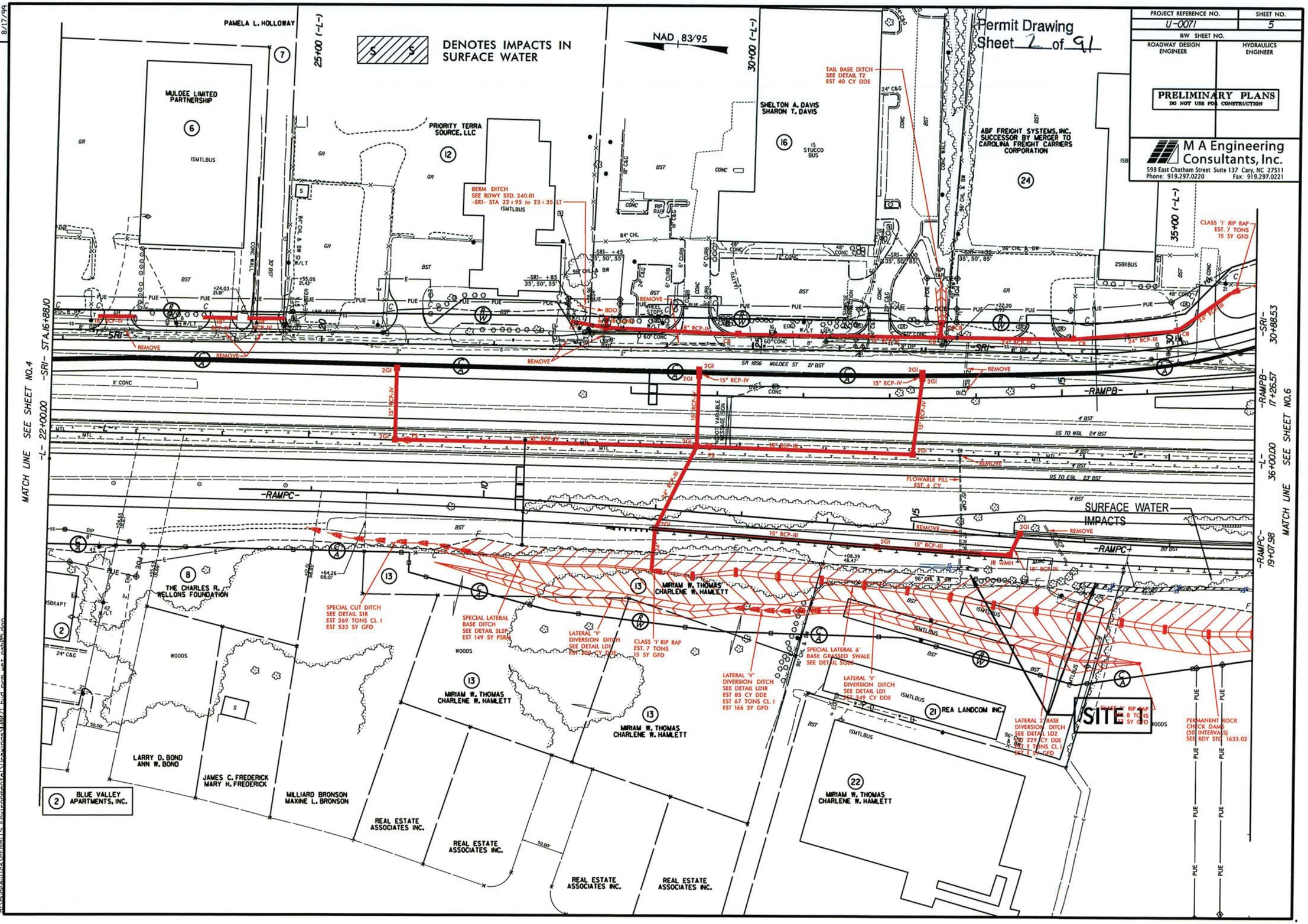


REVISIONS

R/W REVISION / /202 RWP PARCEL NOS.13,17,& 18 COMBINED INTO PARCEL NO.13.

8/17/99

9/19/2013
username
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 5 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

Permit Drawing
Sheet 3 of 34

**PRELIMINARY PLANS**
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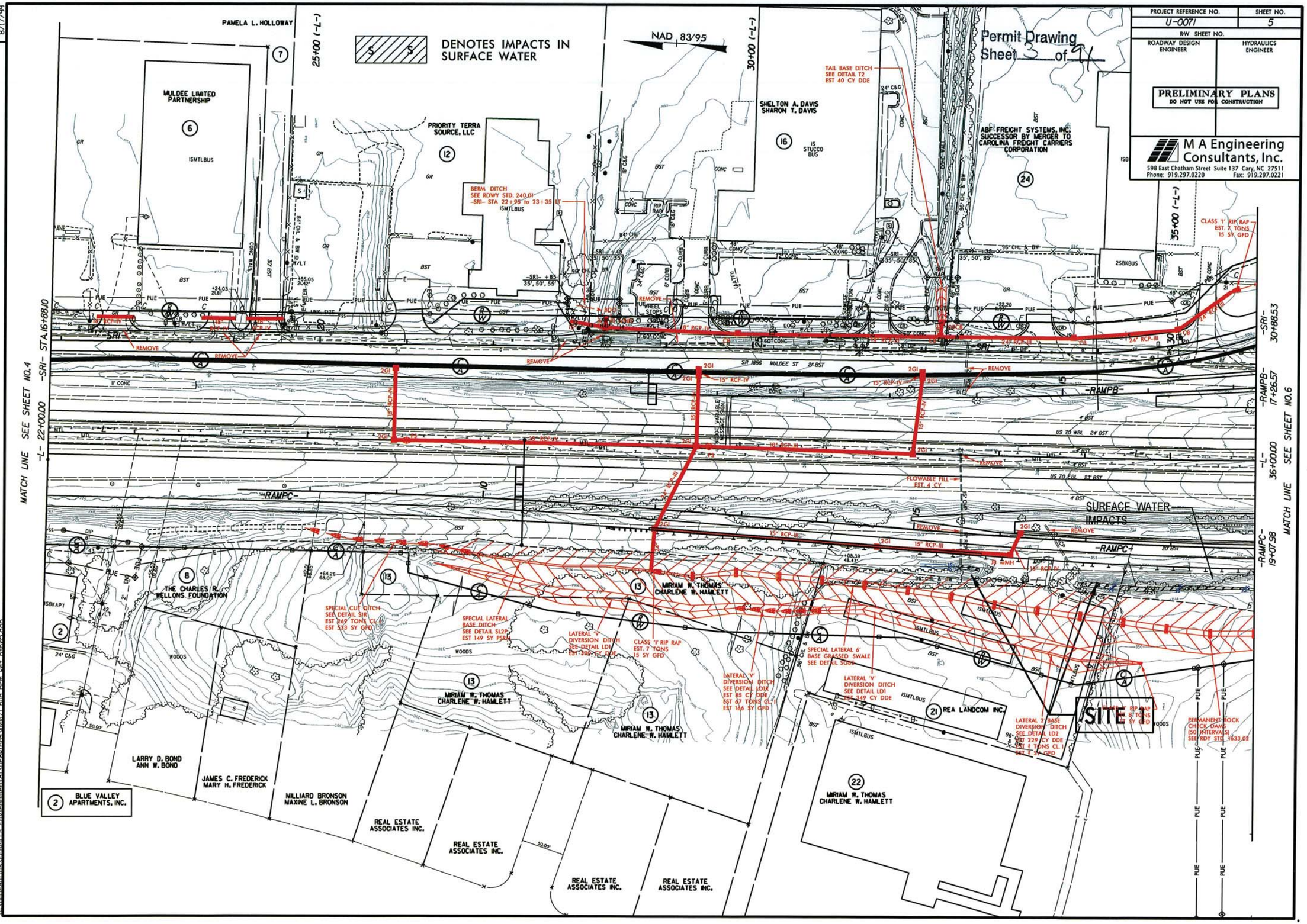

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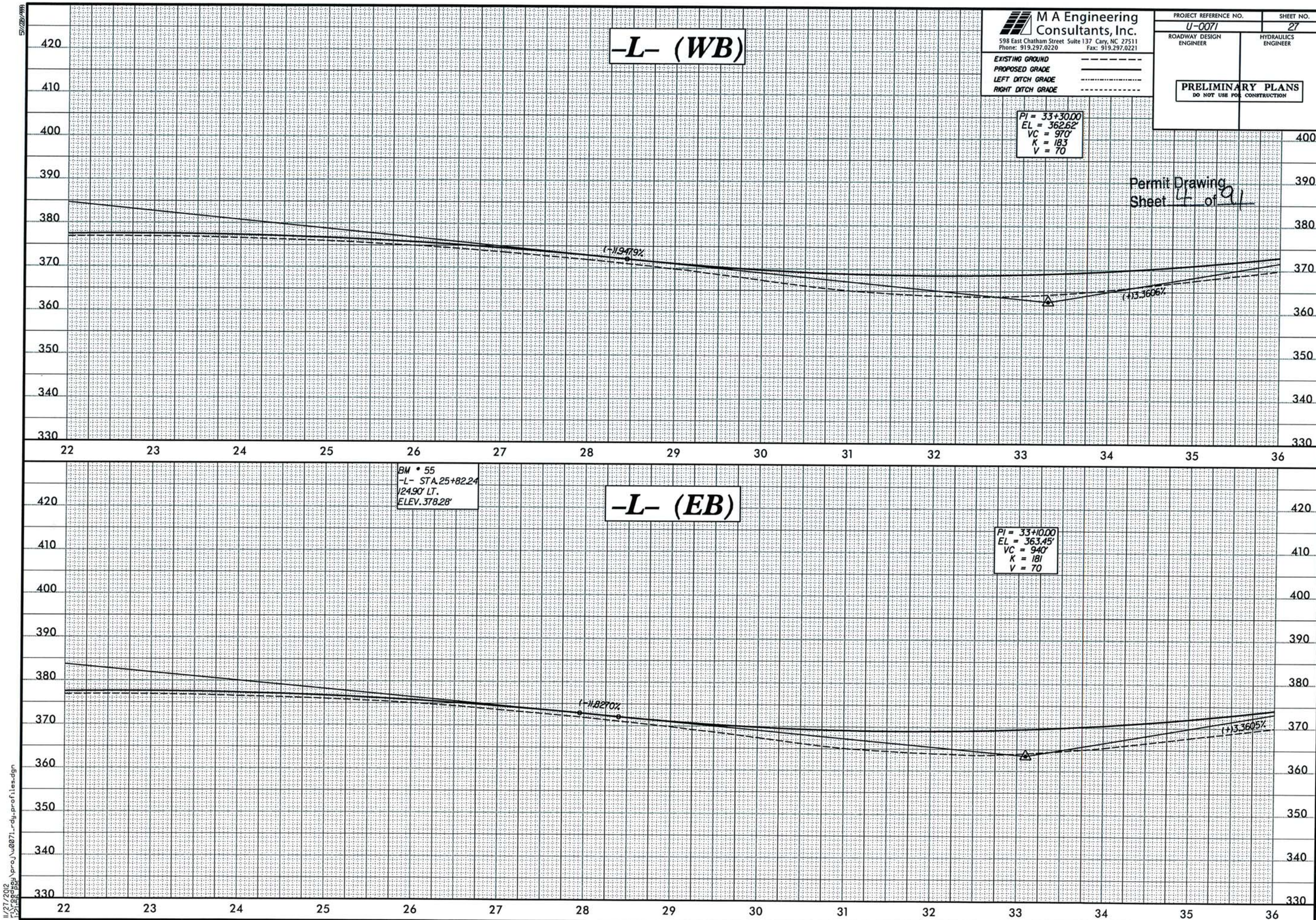
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 27 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

Permit Drawing
Sheet 4 of 9

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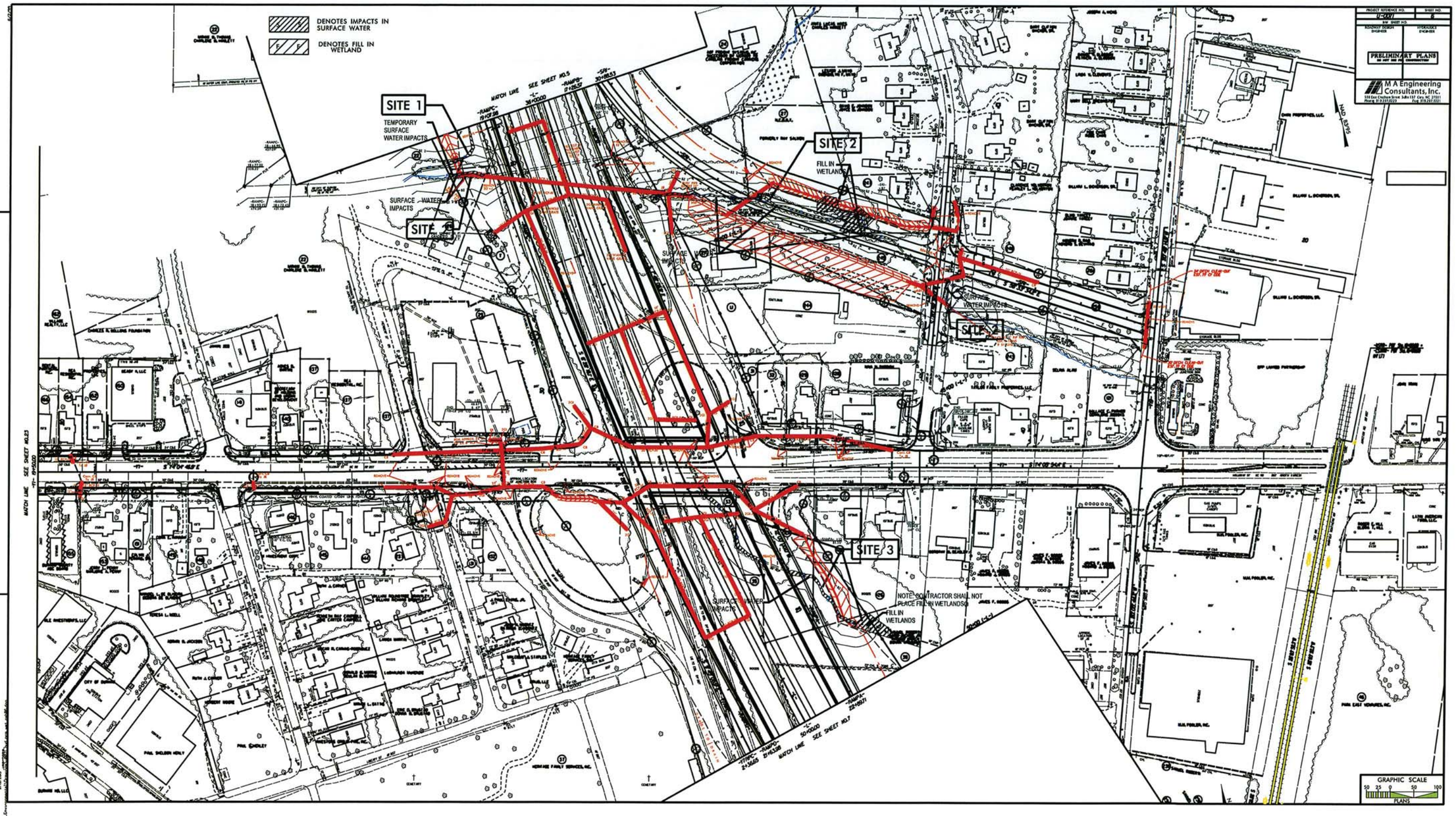
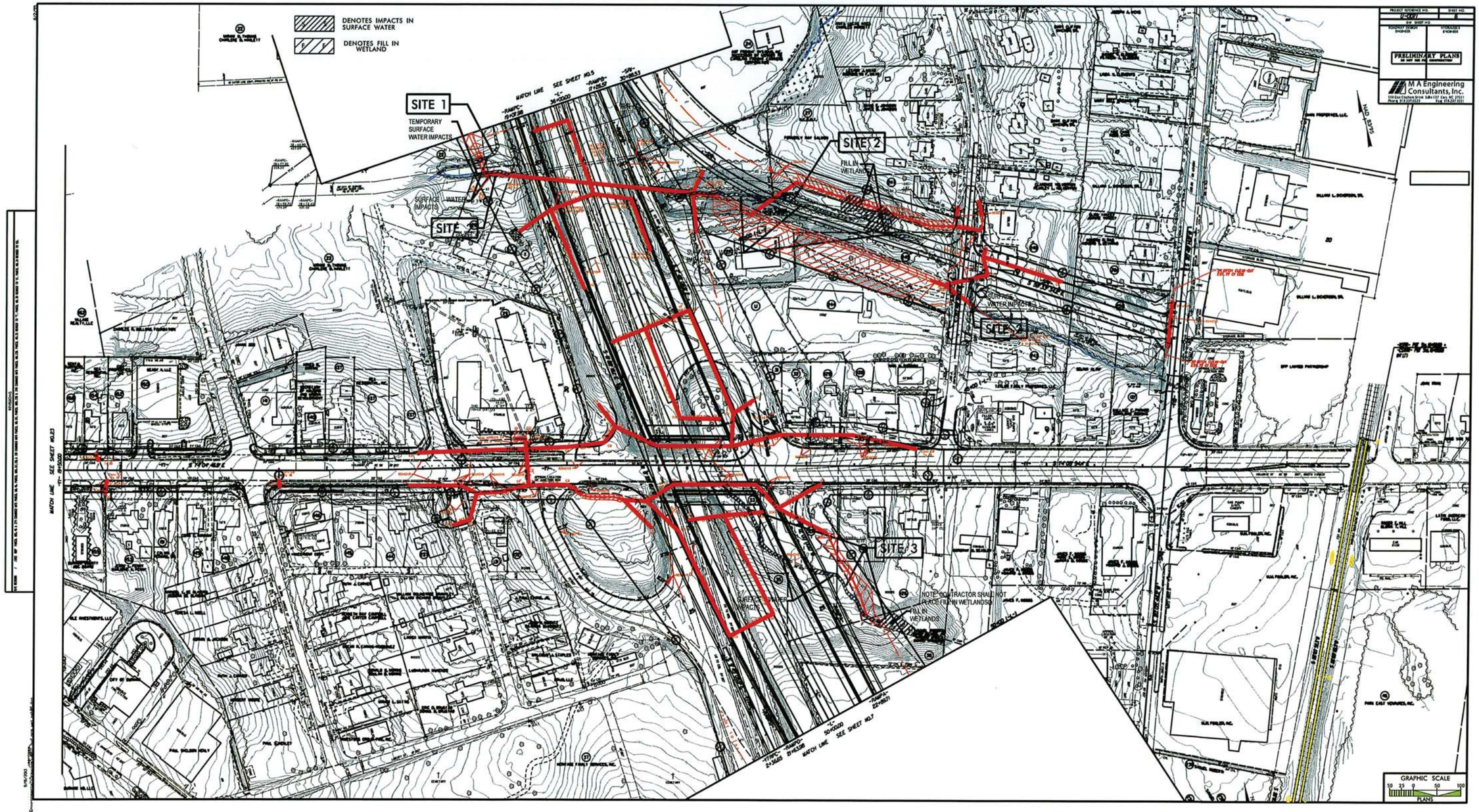
Permit Drawing
Sheet 5 of 91



Permit Drawing
Sheet 6 of 91



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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 28 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

Permit Drawing
Sheet 7 of 9

## -L- (WB)

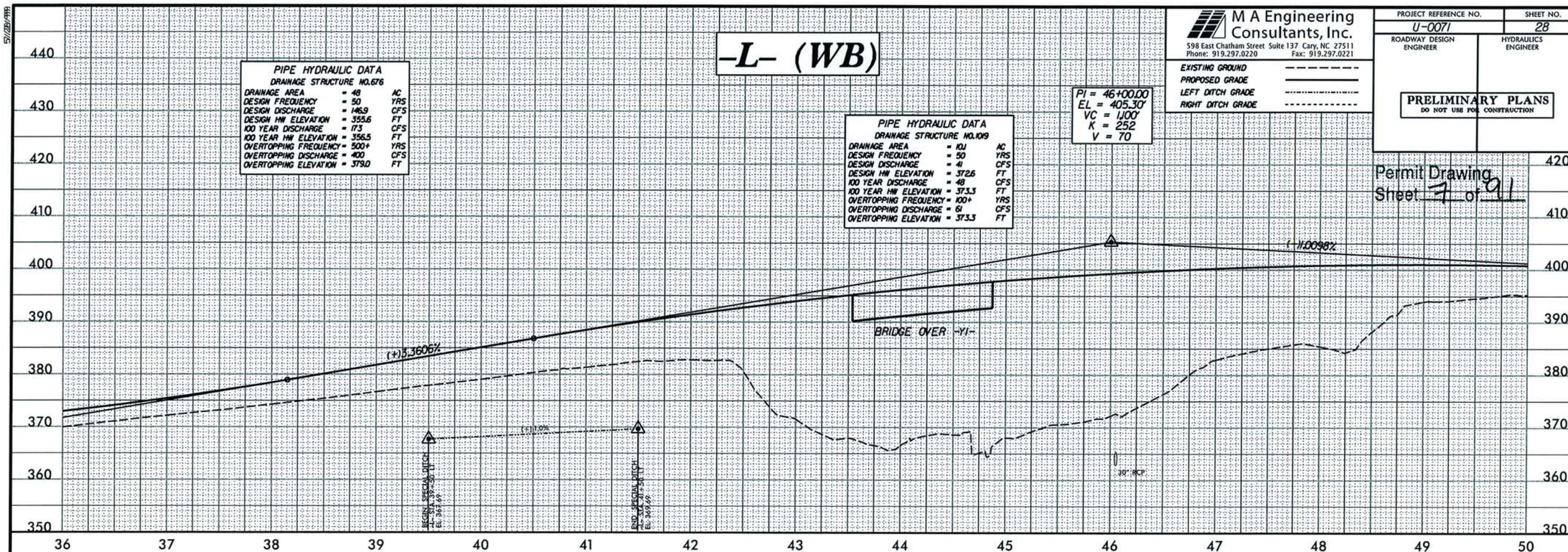
**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO.676

| | | |
|---|---|---|
| DRAINAGE AREA | = 48 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 146.9 | CFS |
| DESIGN HW ELEVATION | = 355.6 | FT |
| 100 YEAR DISCHARGE | = 173 | CFS |
| 100 YEAR HW ELEVATION | = 356.5 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 400 | CFS |
| OVERTOPPING ELEVATION | = 379.0 | FT |

**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO.1019

| | | |
|---|---|---|
| DRAINAGE AREA | = 101 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 41 | CFS |
| DESIGN HW ELEVATION | = 372.6 | FT |
| 100 YEAR DISCHARGE | = 48 | CFS |
| 100 YEAR HW ELEVATION | = 373.3 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 61 | CFS |
| OVERTOPPING ELEVATION | = 373.3 | FT |

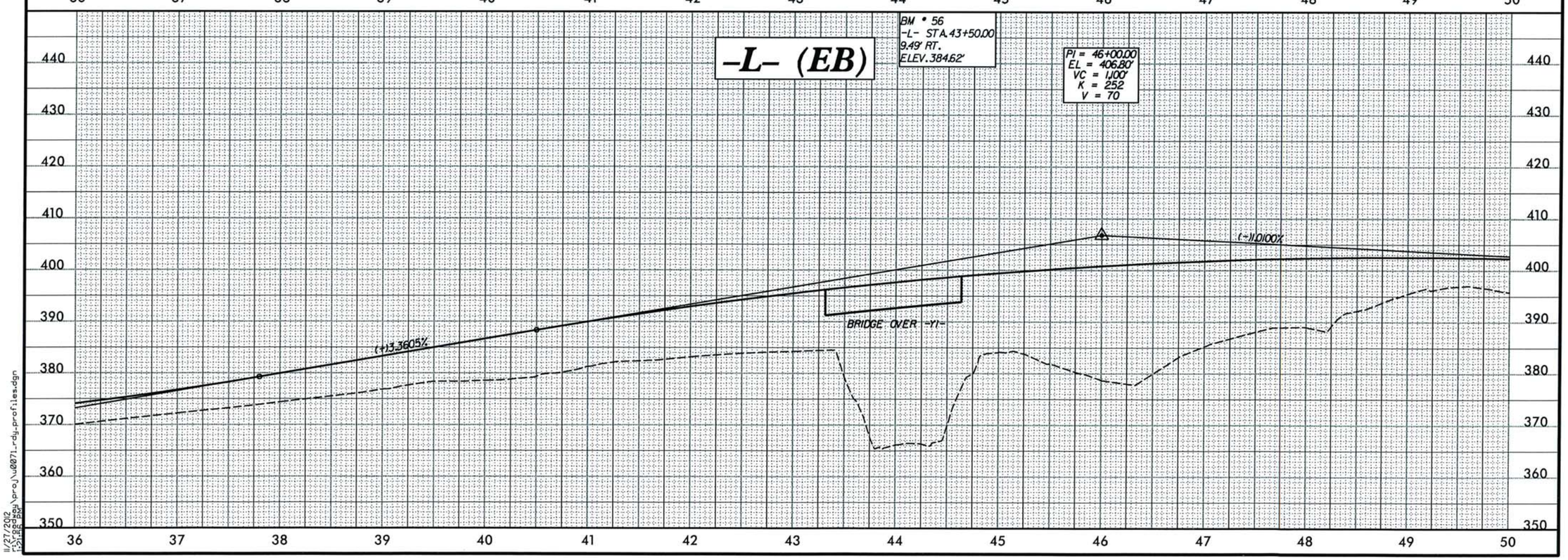
PI = 46+00.00
EL = 405.30'
VC = 1,100'
K = 252
V = 70




## -L- (EB)

BM # 56
-L- STA. 43+50.00
9.49' RT.
ELEV. 384.62'

PI = 46+00.00
EL = 406.80'
VC = 1,100'
K = 252
V = 70

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 42 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
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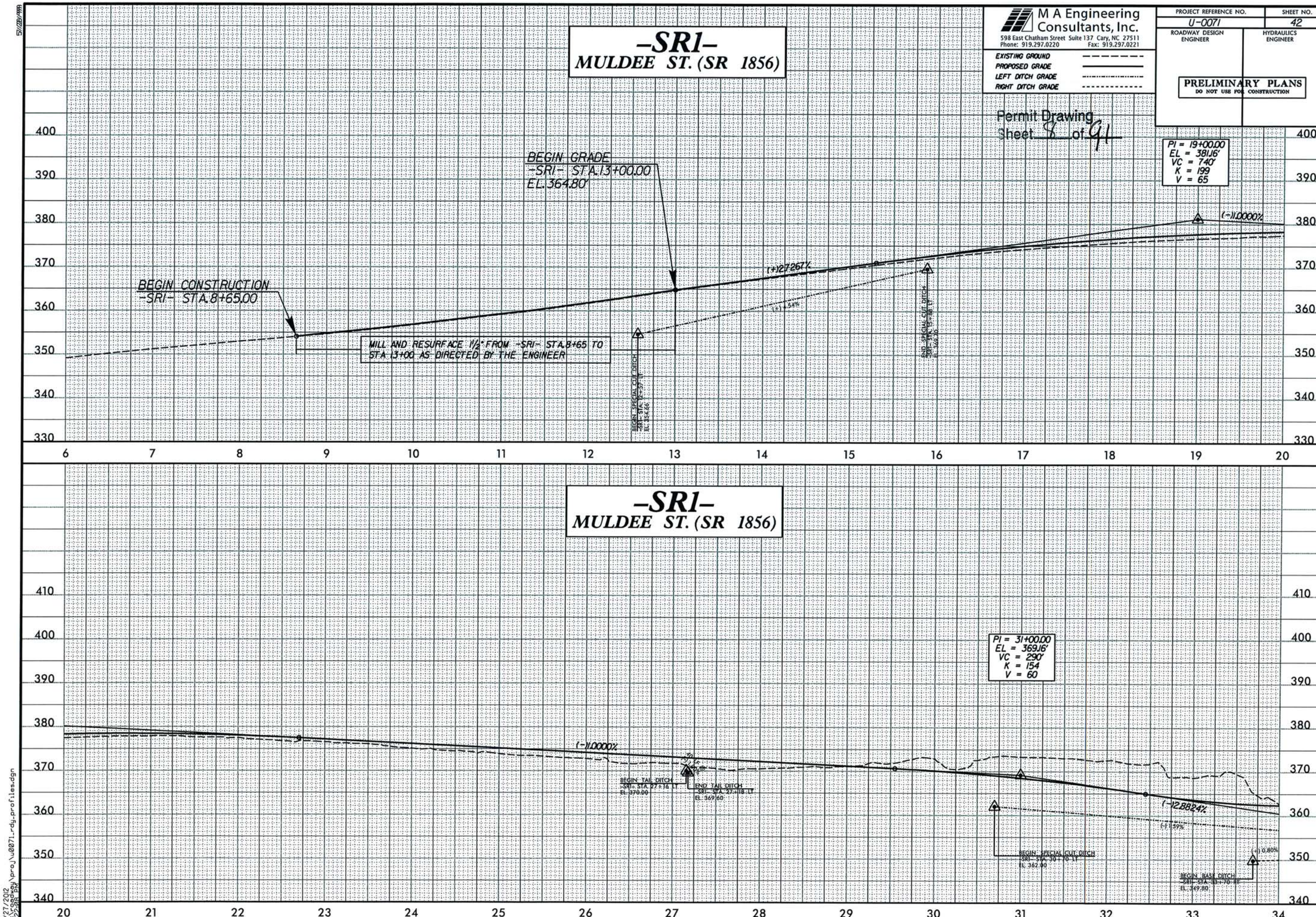
Permit Drawing
Sheet 8 of 94

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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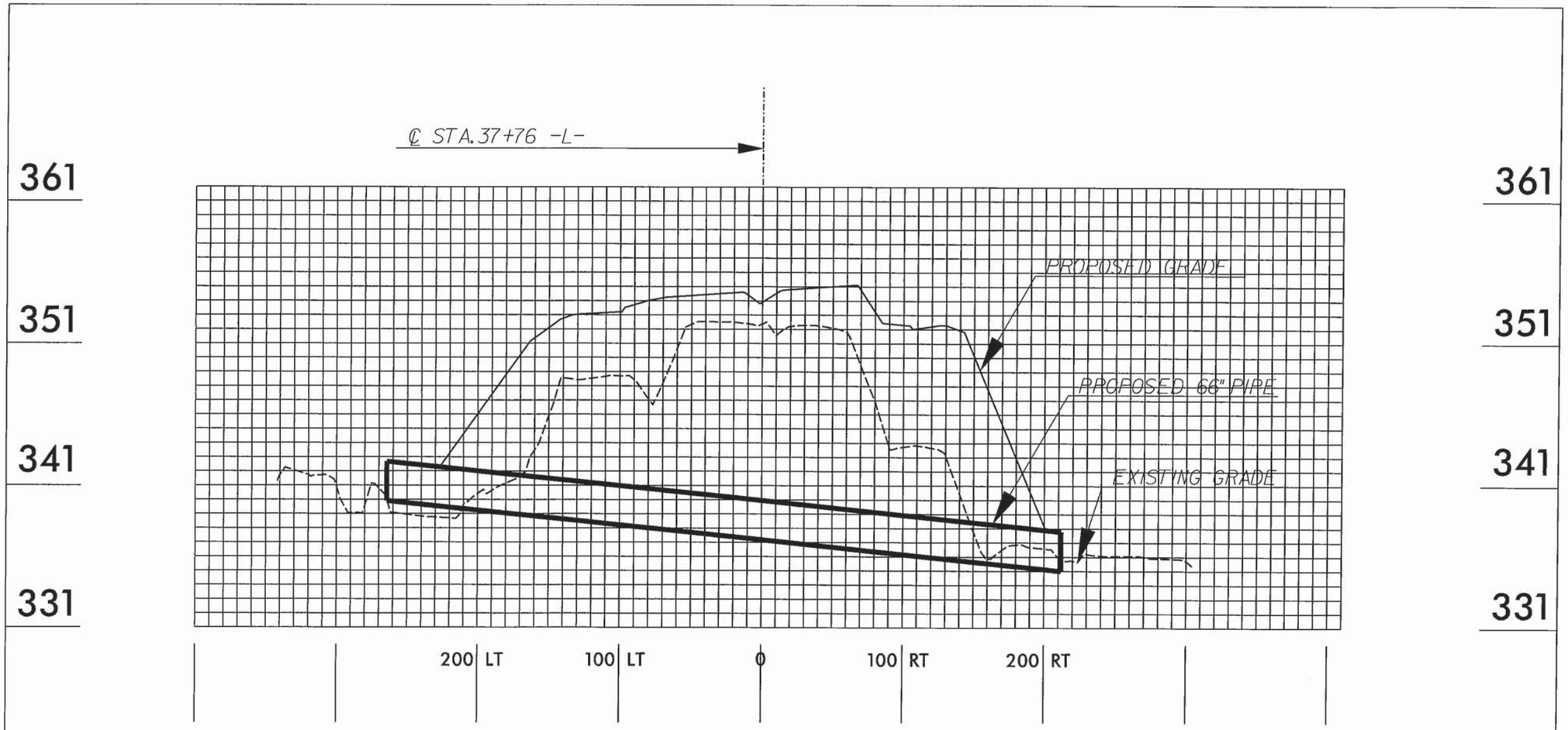


# PROFILE

| PIPE HYDRAULIC DATA | | |
|---|---|---|
| DRAINAGE STRUCTURE NO.676 | | |
| DRAINAGE AREA | = 48 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 146.9 | CFS |
| DESIGN HW ELEVATION | = 355.6 | FT |
| 100 YEAR DISCHARGE | = 173 | CFS |
| 100 YEAR HW ELEVATION | = 356.5 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 400 | CFS |
| OVERTOPPING ELEVATION | = 379.0 | FT |

NCDOT
DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: U-0071
DURHAM EAST END CONNECTOR,
FROM NC 147
(BUCK DEAN FREEWAY) TO
NORTH OF NC 98

SHEET OF 12/27/12

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 6-A |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
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PRELIMINARY PLANS
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Permit Drawing
Sheet 10 of 14

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SITE 1

TEMPORARY SURFACE WATER IMPACTS

SURFACE WATER IMPACTS

SITE 2

Site continued on Sheet 6-B
Complete site shown on Sheet 6

PSH SEE DETAIL P1
GRADE TO EL. 351
EST. EX. 12 C.Y.

SPECIAL LATERAL 6' BASE GRASSED SWALE SEE DETAIL SG6S 10-YR VELOCITY @ BUFFER=1.95 FT/SEC

PERMANENT ROCK CHECK DAMS (50' INTERVALS) SEE RDY STD 1633.02

25' CITY OF DURHAM SANITARY SEWER ESMT. PB 117 PG 147

-RAMPC- +37.14 138.82'

REMOVE

REMOVE 30' +/-

BURY PIPE INVERT 12"

15" RCP-IV

66" RCP-V

15" RCP-III

18" RCP-III

18" CSP

2GI WANGLE VANE GRATE

15" RCP-IV

FILL 2 FLOW FILL 13

PUE

BZ 1

BZ 2

JS

SF

W. THOMAS
W. HAMLETT

REVISIONS

8/17/99

9/19/2013
username
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 6-A |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
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PRELIMINARY PLANS
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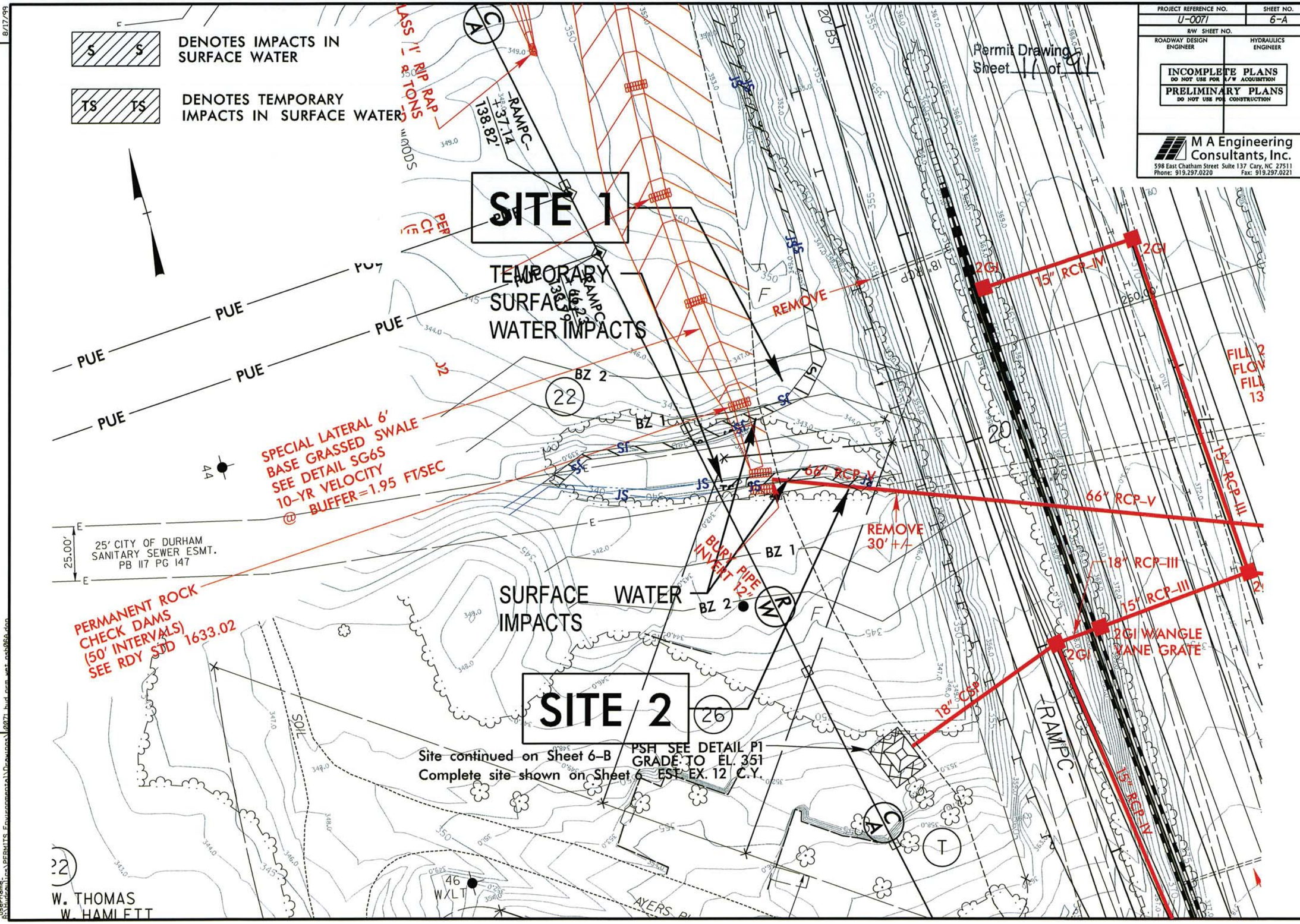
Permit Drawing
Sheet 11 of 41




REVISIONS

8/17/99

9/19/2013
username
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 6-B |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

DENOTES IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

DAVID E. JOHNSON
JOYCE B. JOHNSON

Permit Drawing
Sheet 12 of 91

N.C.D.O.T.

LATERAL BASE DITCH
SEE DETAIL L2R
EST 671 CY DDE
EST 273 TONS CL I
EST 567 SY GFD

Site continued on Sheets 6-A and 6-C
Complete site shown on Sheet 6

SITE 2

FORMERLY RAY SALMON

BEGIN RETAINING WALL 2
BEG. 2 LINES SINGLE
FACED CONC. BARRIER
-L- STA.38+35.00 LT
-RAMPB- STA.19+58.19 RT

BEGIN EXPRWY.GUTTER
-RAMPB- STA.19+00.00

RETAIN

CLASS 'I' RIP RAP
EST. 7 TONS
15 SY GFD

REMOVE

FILL IN WETLANDS

-SR1- POT STA. 38+93.08=
-Y17- POT STA. 12+42.03

BURY PIPE
INVERT 12"

CLASS 'II' RIP RAP
EST. 32 TONS
64 SY GFD

30' CITY OF DURHAM
SANITARY SEWER ESMT
PB 56 PG 87

SURFACE WATER IMPACTS

40+00 (-L-)

-RAMPB- ST
Sta. 20+85.43

SPECIAL CUT DITCH
SEE DETAIL S1

SPECIAL BASE DITCH
SEE DETAIL S5

CLASS 'I' RIP RAP
EST. 11 TONS
22 SY GFD
NOTE: RIPRAP PAD TO
BE COUNTERSUNK

EXPRESSWAY GUTTER

S 7° 48' 06.9" E

-Y17-
+44
EX. R/W

-SR1-
+87
75'

ISMTLBUS

8/17/99

REVISIONS

9/19/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 6-B |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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598 East Chatham Street Suite 137 Cary, NC 27511
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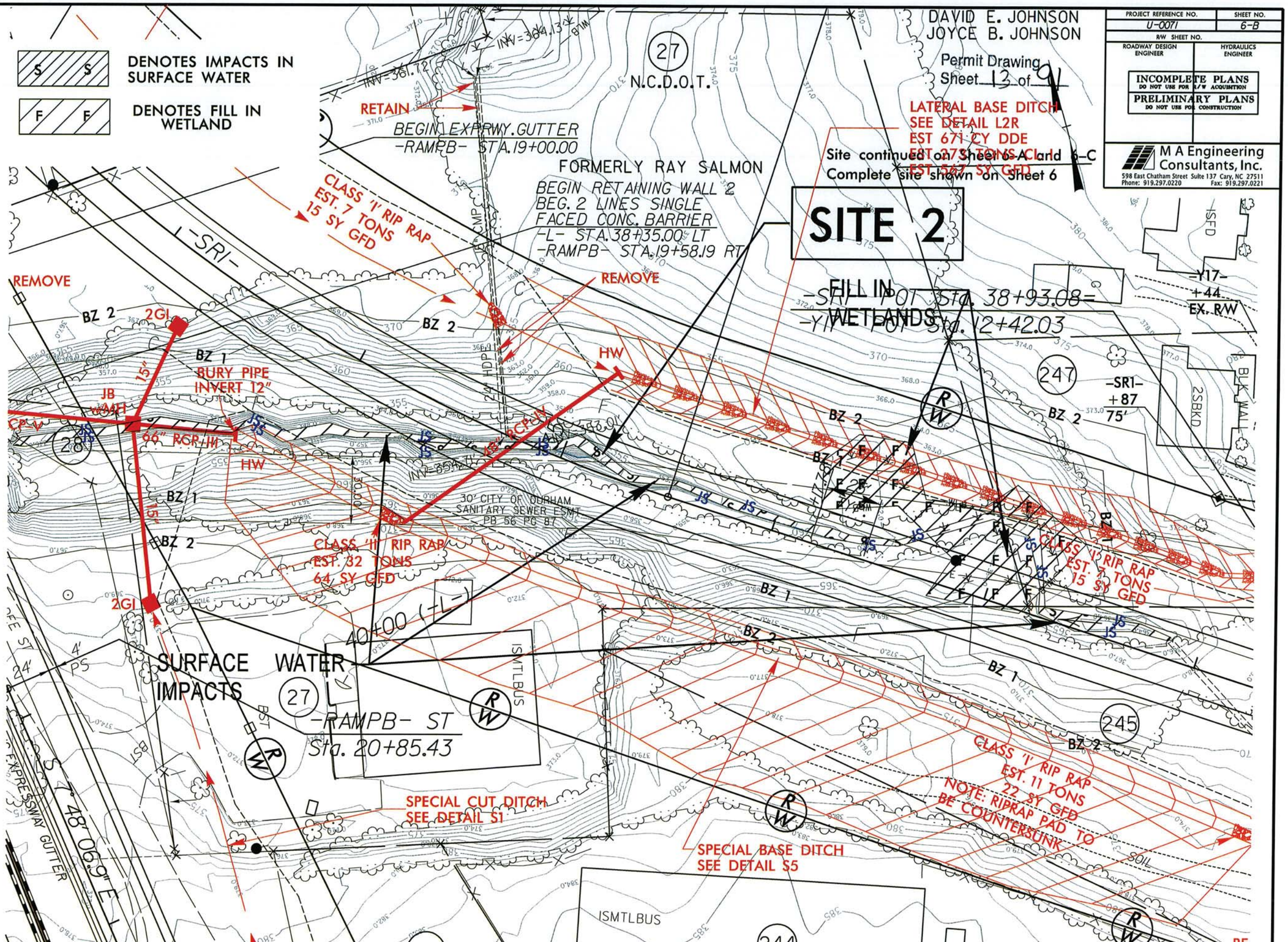


REVISIONS

8/17/99

9/19/2013
username=
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8/23/99

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-91 |

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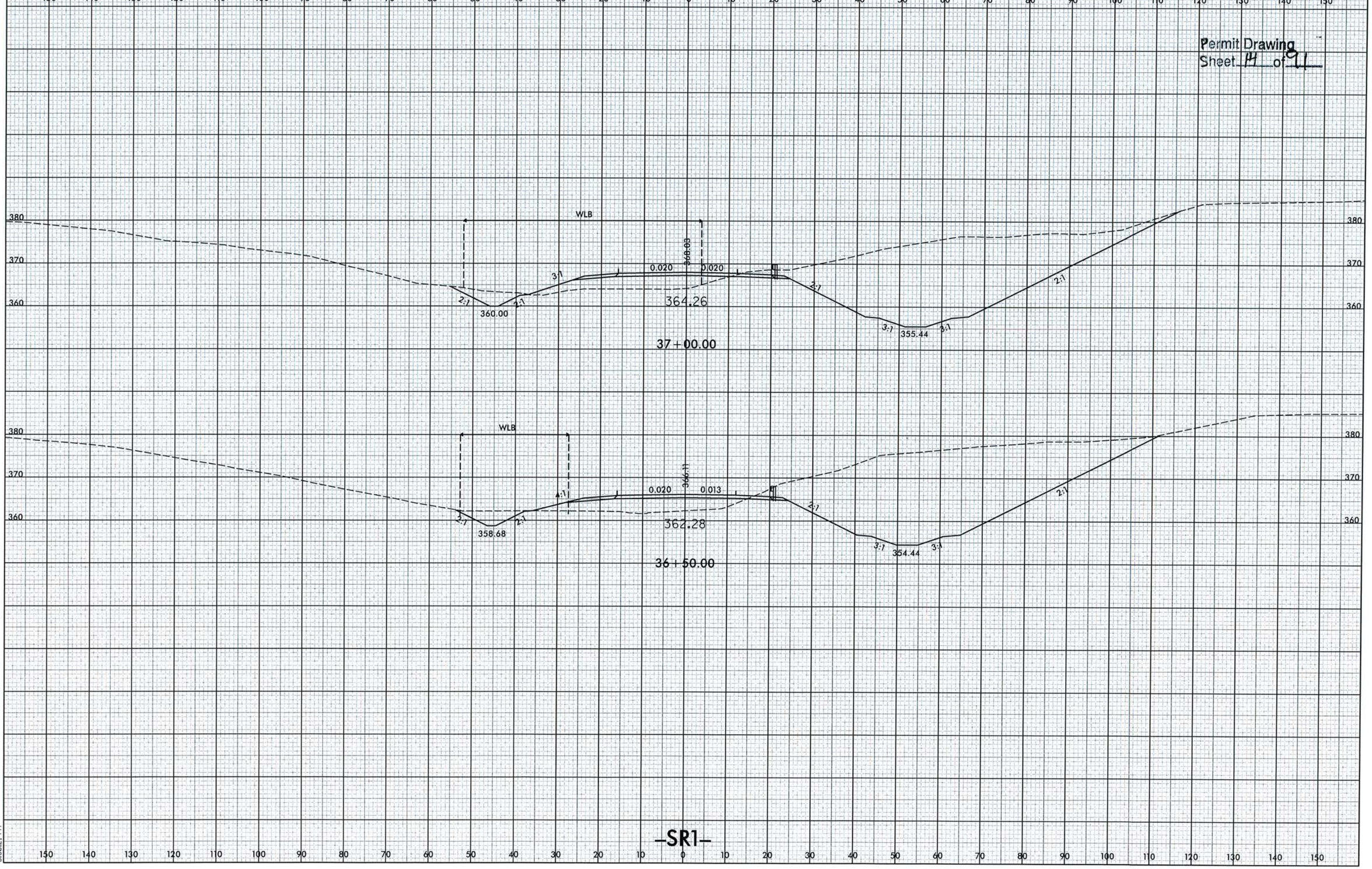
Permit Drawing
Sheet 14 of 91

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 6-C |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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Permit Drawing
Sheet 15 of 91

SPECIAL CUT DITCH
SEE DETAIL S1R
EST 27 TONS CL I
EST 60 SY GFD

SITE 2

BZ 2 Site continued on Sheet 6-B
Complete site shown on Sheet 6

SURFACE WATER IMPACTS

SITE 2

CLASS 'I' RIP RAP
EST. 4 TONS
9 SY GFD

-Y17- PT Sta. 11+77.22

-Y17- POT Sta. 14+50.00

END CONSTRUCTION
-Y17- STA.14+20.00

GUARDRAIL BARRICADE WITH
END OF ROAD MARKERS

END
FENCE (48" CL)

-SR1- S 56°33'34.2" E

S 20°59'20.0" W

-SR1- +46.32

15" RCP-IV

24" RCP-IV

30" RCP

JB w/MH

CB

DI

TAYLOR FAMILY PROPERTIES, LLC

SELINA ALAM

WALLACE GERALDIN

30' CITY OF DURHAM SANITARY SEWER ESMT. PB 133 PG 204

SOUTHERLAND ST

DENOTES IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

REVISIONS

8/17/99

9/19/2013 username
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 6-C |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
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PRELIMINARY PLANS
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Permit Drawing
Sheet 16 of 91

SPECIAL CUT DITCH
SEE DETAIL S1R
EST 27 TONS CL I
EST 60 SY GFD

SITE 2

BZ 2 Site continued on Sheet 6-B
Complete site shown on Sheet 6

SURFACE WATER IMPACTS

CLASS I RIP RAP
EST. 4 TONS
9 SY GFD

-Y17- PT Sta. 11+77.22

-Y17- POT Sta. 14+50.00

END CONSTRUCTION
-Y17- STA.14+20.00

TAYLOR FAMILY PROPERTIES, LLC

GUARDRAIL BARRICADE WITH
END OF ROAD MARKERS

END
FENCE (48" CL)

30' CITY OF DURHAM
SANITARY SEWER ESMT.
PB 133 PG 204

SELINA ALAM

WALLACE
GERALDIN

DENOTES IMPACTS IN SURFACE WATER

DENOTES FILL IN WETLAND

REVISIONS

8/17/99

9/19/2013
username=

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 6-D |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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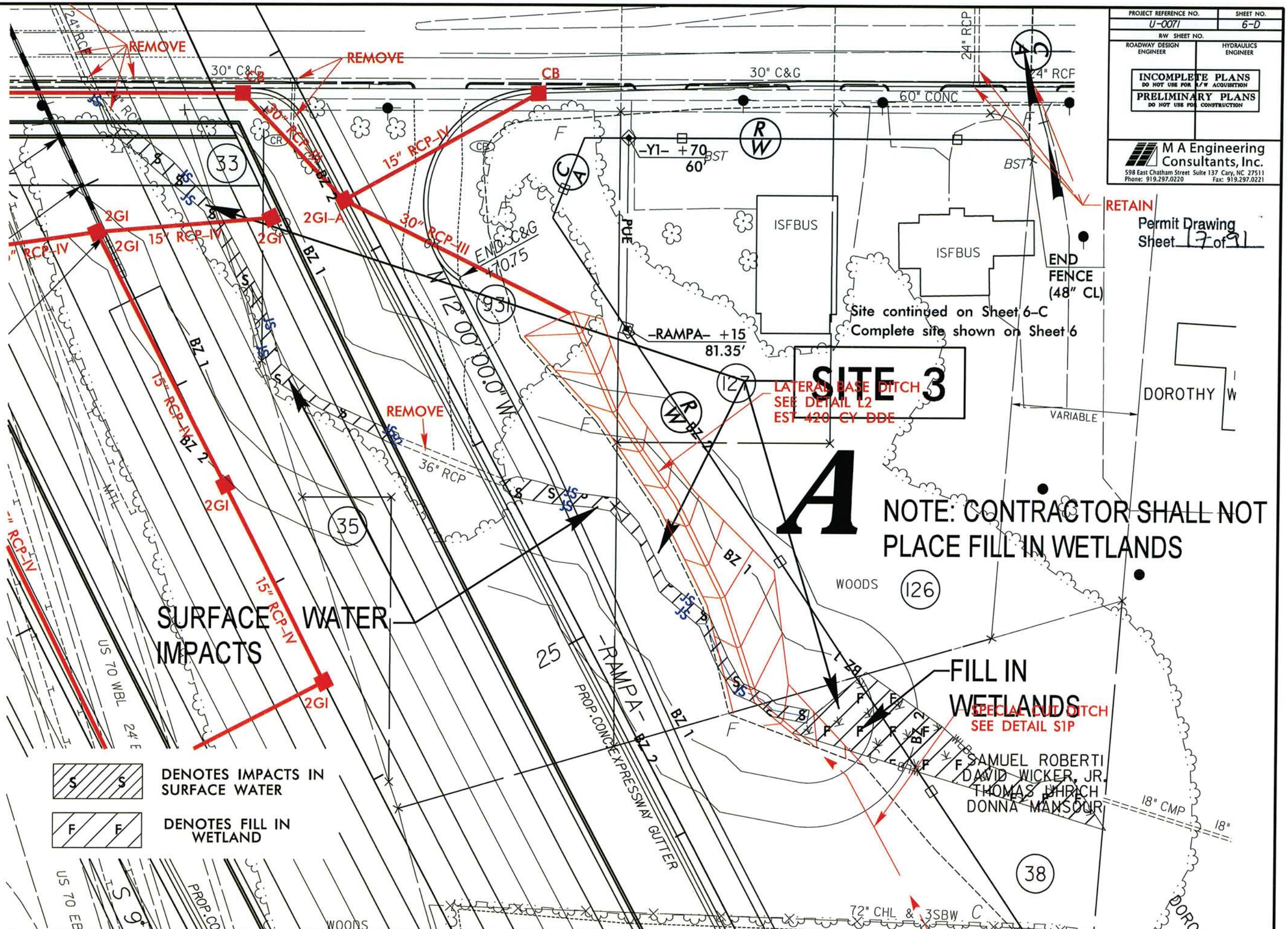
Permit Drawing
Sheet 17 of 91

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8/17/99

9/19/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 6-D |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
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PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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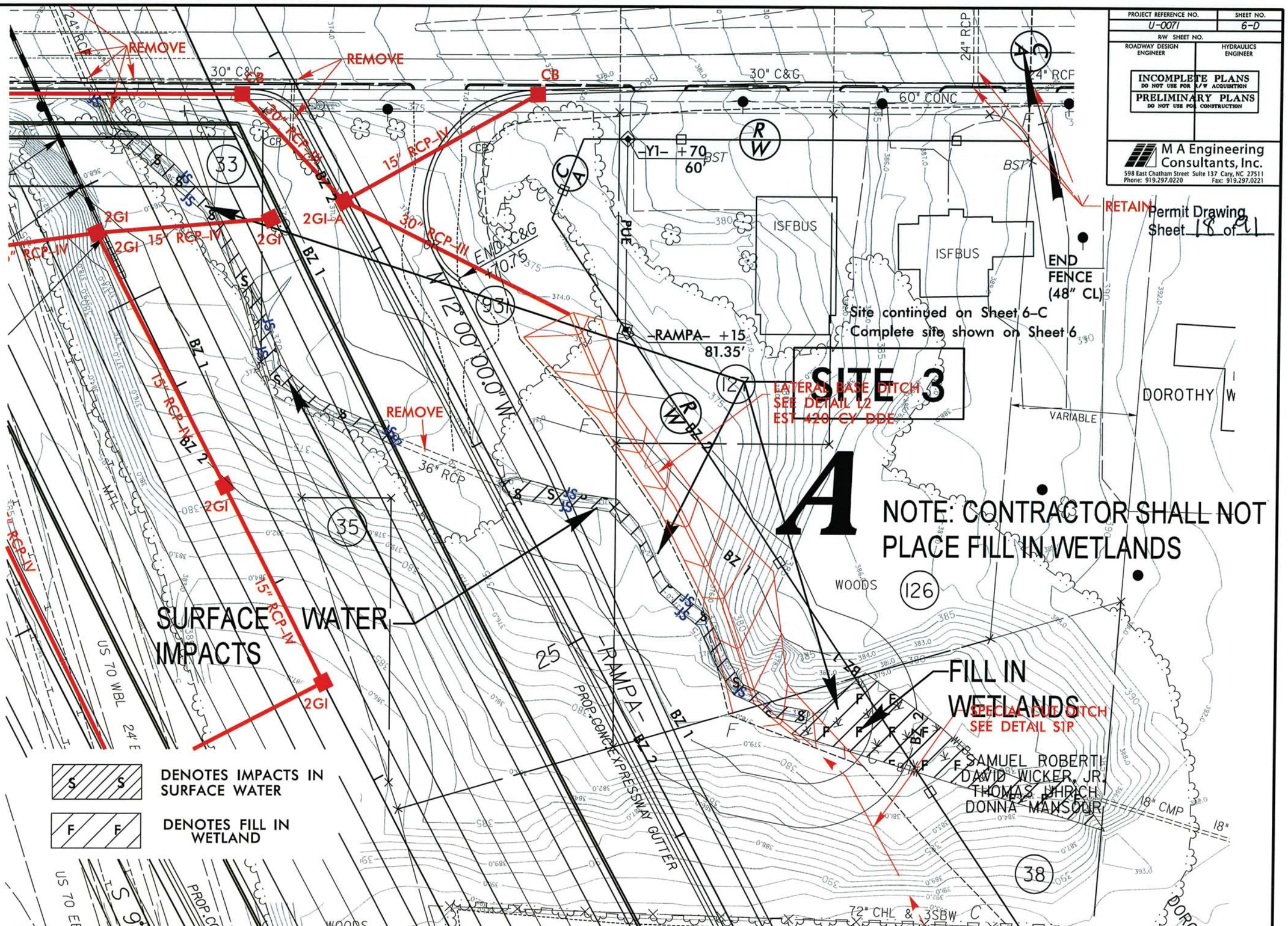
Permit Drawing
Sheet 18 of 21




REVISIONS

8/17/99

9/9/2013
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| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-16 |

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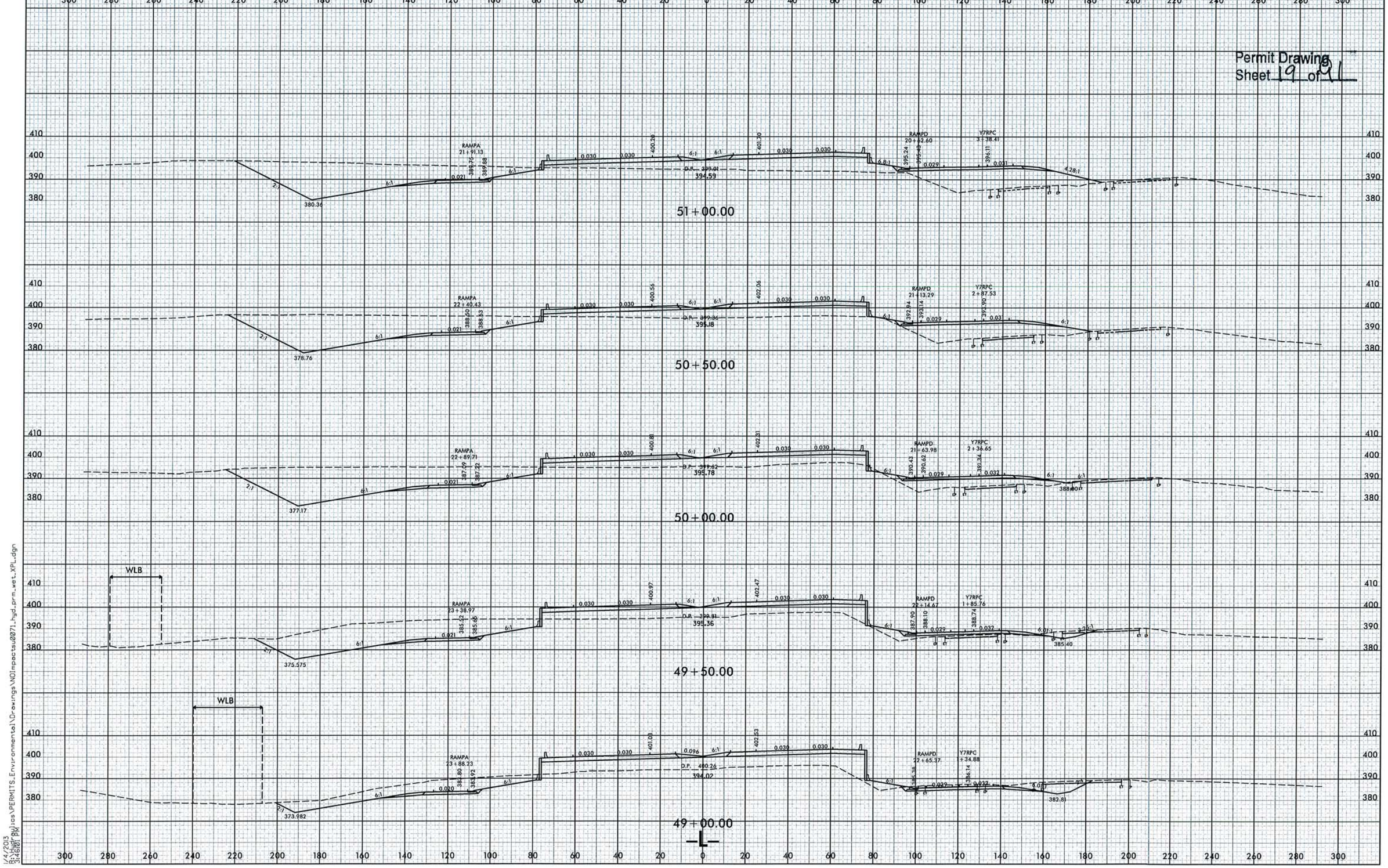
Permit Drawing
Sheet 19 of 21

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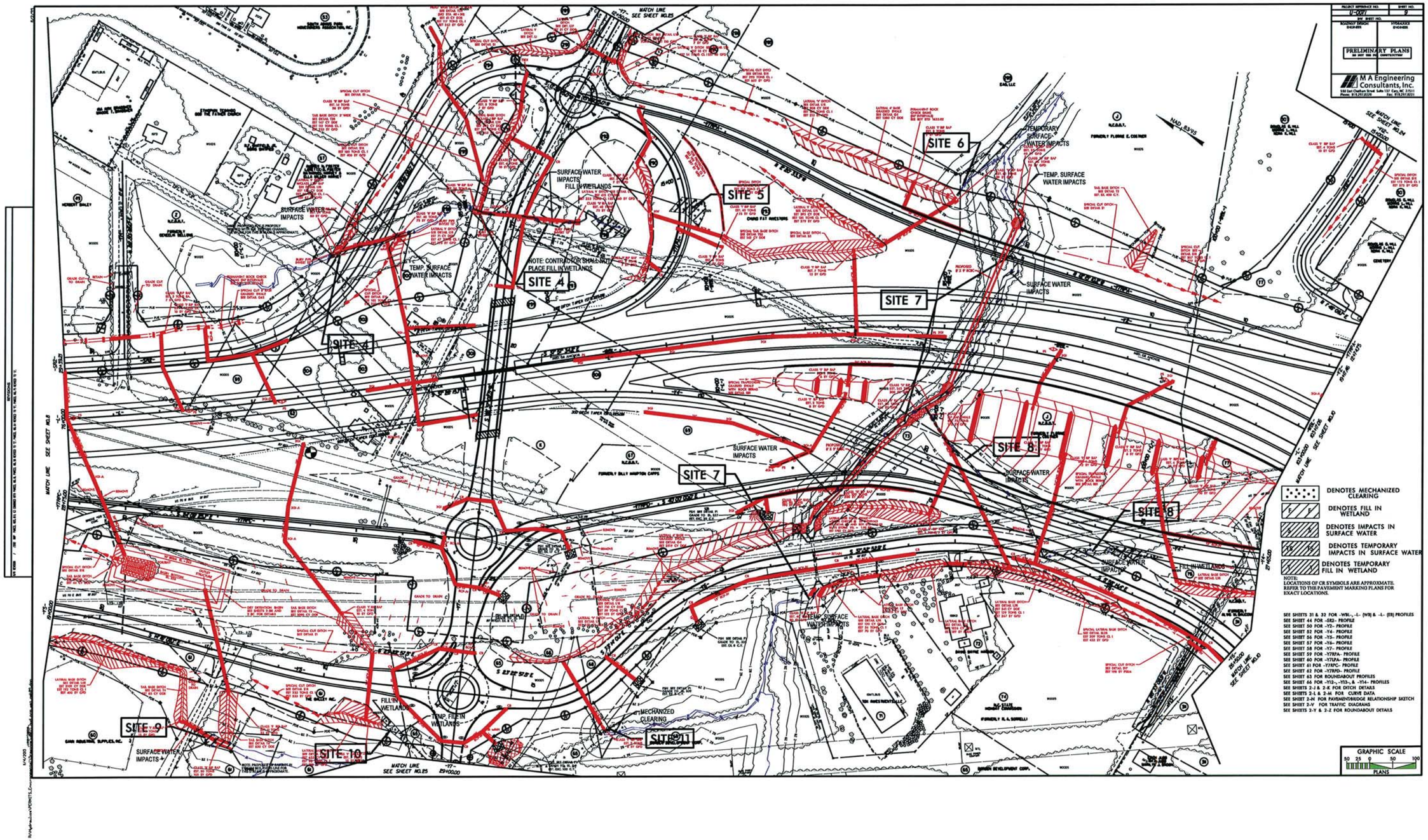
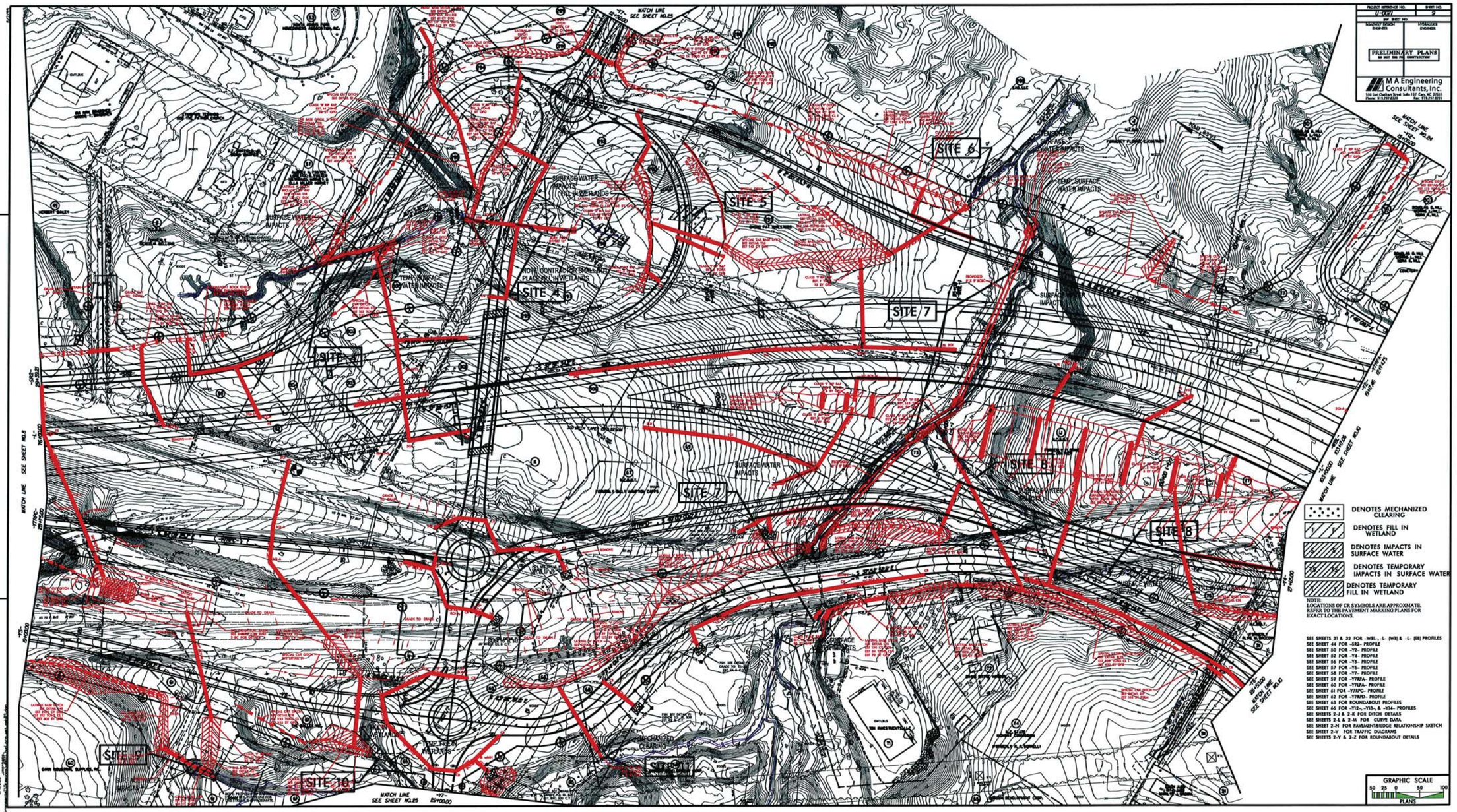

PROJECT REFERENCE NO. U-0071
SHEET NO. 9
PRELIMINARY PLANS
M A Engineering Consultants, Inc.
SITE 4
SITE 5
SITE 6
SITE 7
SITE 8
SITE 9
SITE 10
SITE 11
SURFACE WATER IMPACTS
TEMP. SURFACE WATER IMPACTS
FILL IN WETLANDS
TEMP. FILL IN WETLANDS
MECHANIZED CLEARING
NOTE: CONTRACTOR SHALL NOT PLACE FILL IN WETLANDS
MATCH LINE SEE SHEET NO.8
MATCH LINE SEE SHEET NO.10
NAD 83/95
DENOTES MECHANIZED CLEARING
DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES TEMPORARY FILL IN WETLAND
NOTE:
LOCATIONS OF CR SYMBOLS ARE APPROXIMATE. REFER TO THE PAVEMENT MARKING PLANS FOR EXACT LOCATIONS.
SEE SHEETS 31 & 33 FOR -WBL-, -L- (WB) & -L- (EB) PROFILES
SEE SHEET 44 FOR -SR2- PROFILE
SEE SHEET 50 FOR -Y2- PROFILE
SEE SHEET 52 FOR -Y4- PROFILE
SEE SHEET 56 FOR -Y5- PROFILE
SEE SHEET 57 FOR -Y6- PROFILE
SEE SHEET 58 FOR -Y7- PROFILE
SEE SHEET 59 FOR -Y7RFA- PROFILE
SEE SHEET 60 FOR -Y7LFA- PROFILE
SEE SHEET 61 FOR -Y7RFC- PROFILE
SEE SHEET 62 FOR -Y7RFD- PROFILE
SEE SHEET 63 FOR ROUNDABOUT PROFILES
SEE SHEET 66 FOR -Y12-, -Y13-, & -Y14- PROFILES
SEE SHEETS 2-J & 2-K FOR DITCH DETAILS
SEE SHEETS 2-L & 2-M FOR CURVE DATA
SEE SHEET 2-N FOR PAVEMENT&BRIDGE RELATIONSHIP SKETCH
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS
SEE SHEETS 2-Y & 2-Z FOR ROUNDABOUT DETAILS
GRAPHIC SCALE
50 25 0 50 100
PLANS

Permit Drawing
Sheet 21 of 91



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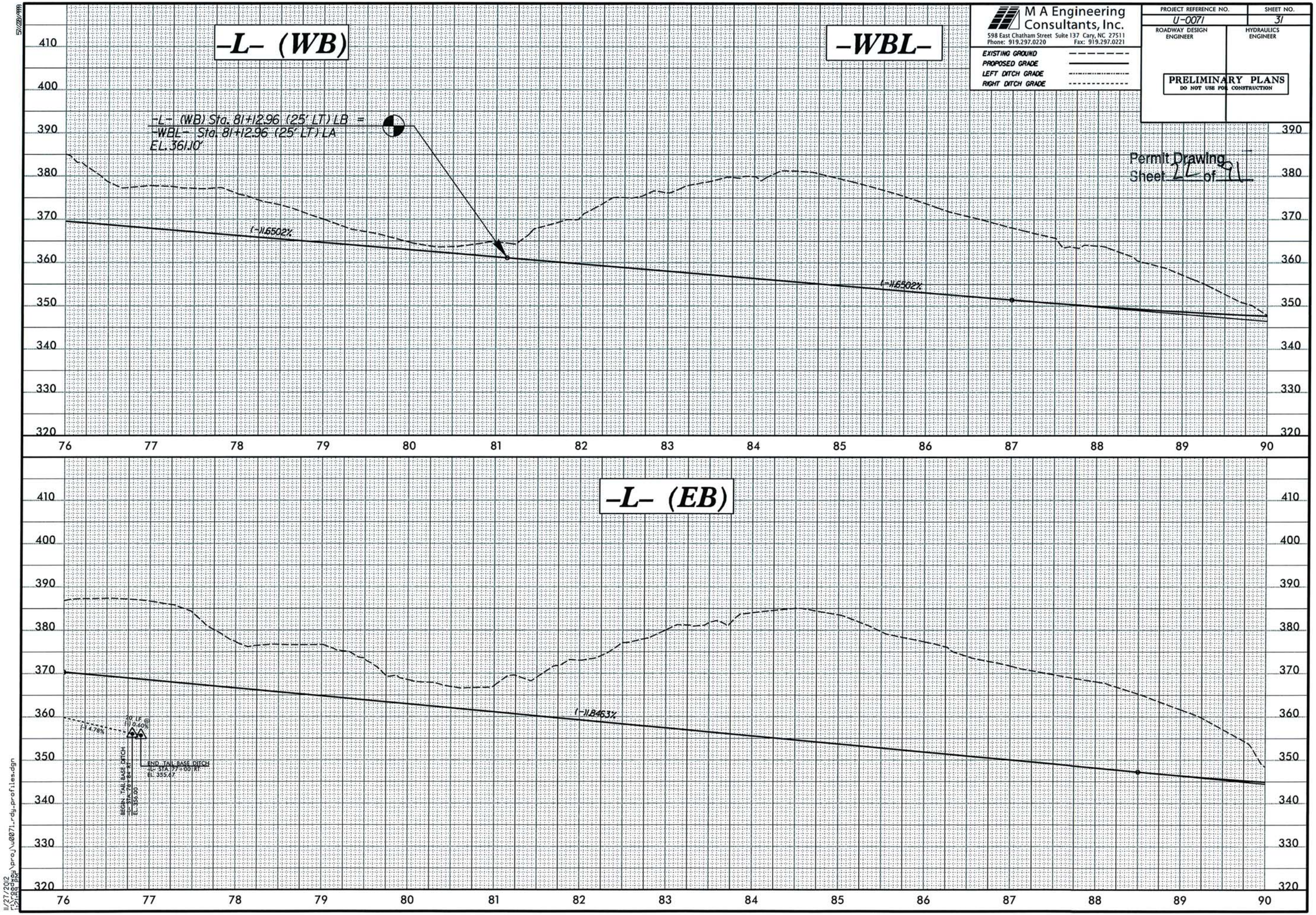
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 31 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

Permit Drawing
Sheet 22 of 91

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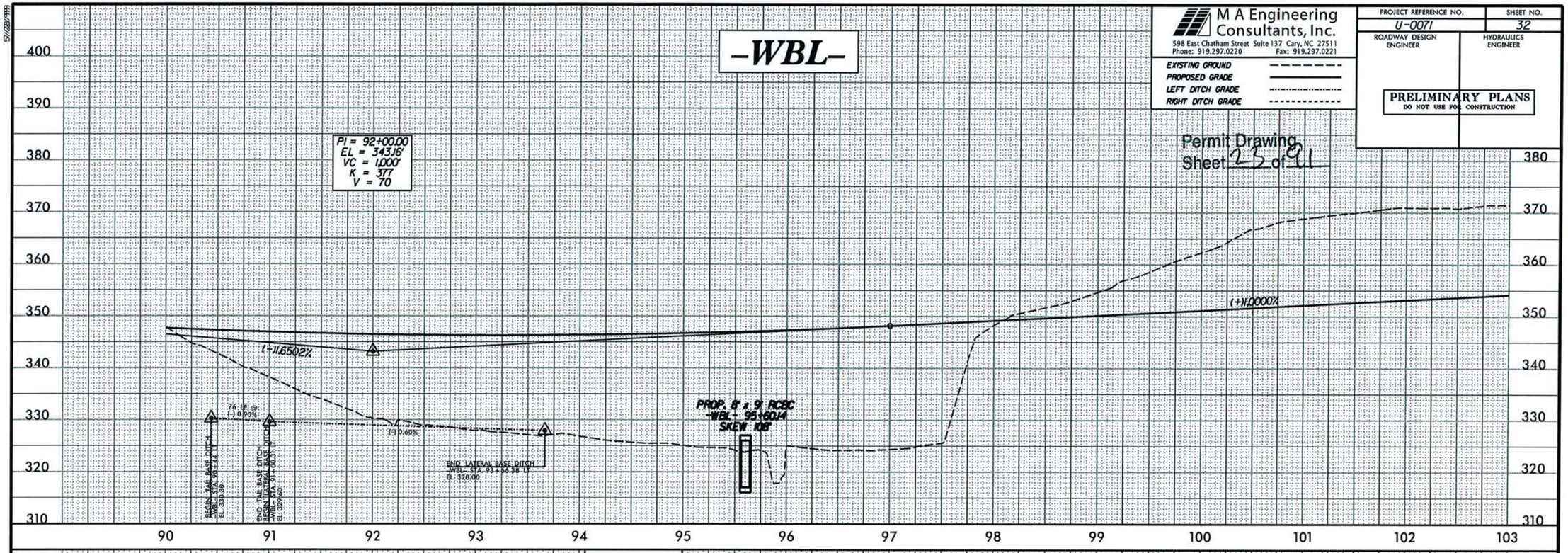
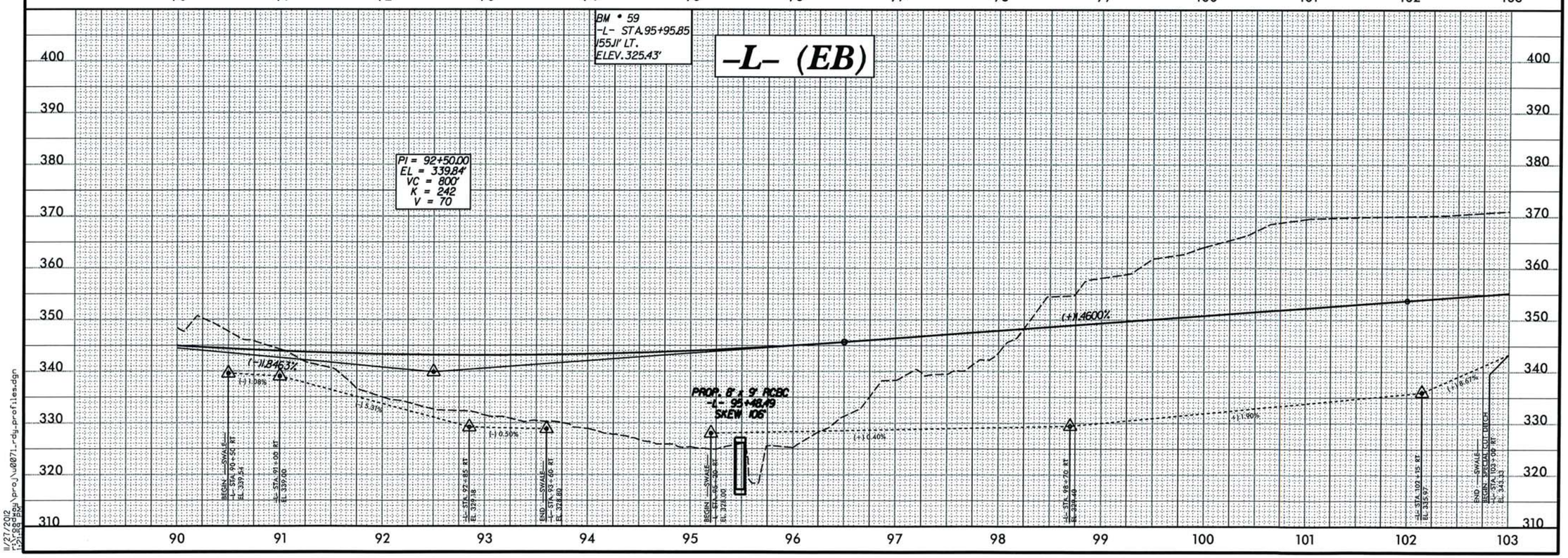
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 32 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

Permit Drawing
Sheet 23 of 91

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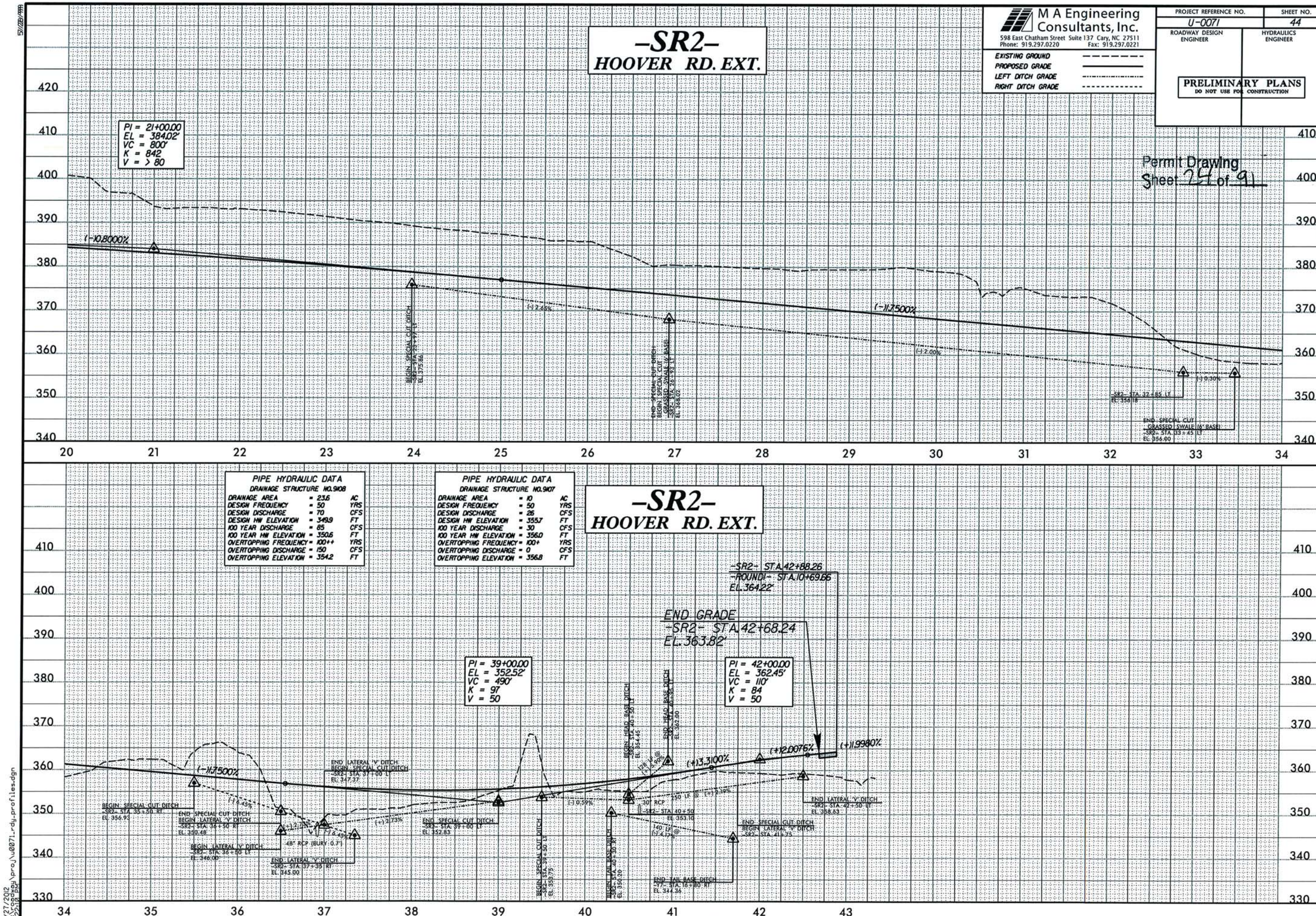
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 44 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

Permit Drawing
Sheet 24 of 91

# -SR2- HOOVER RD. EXT.

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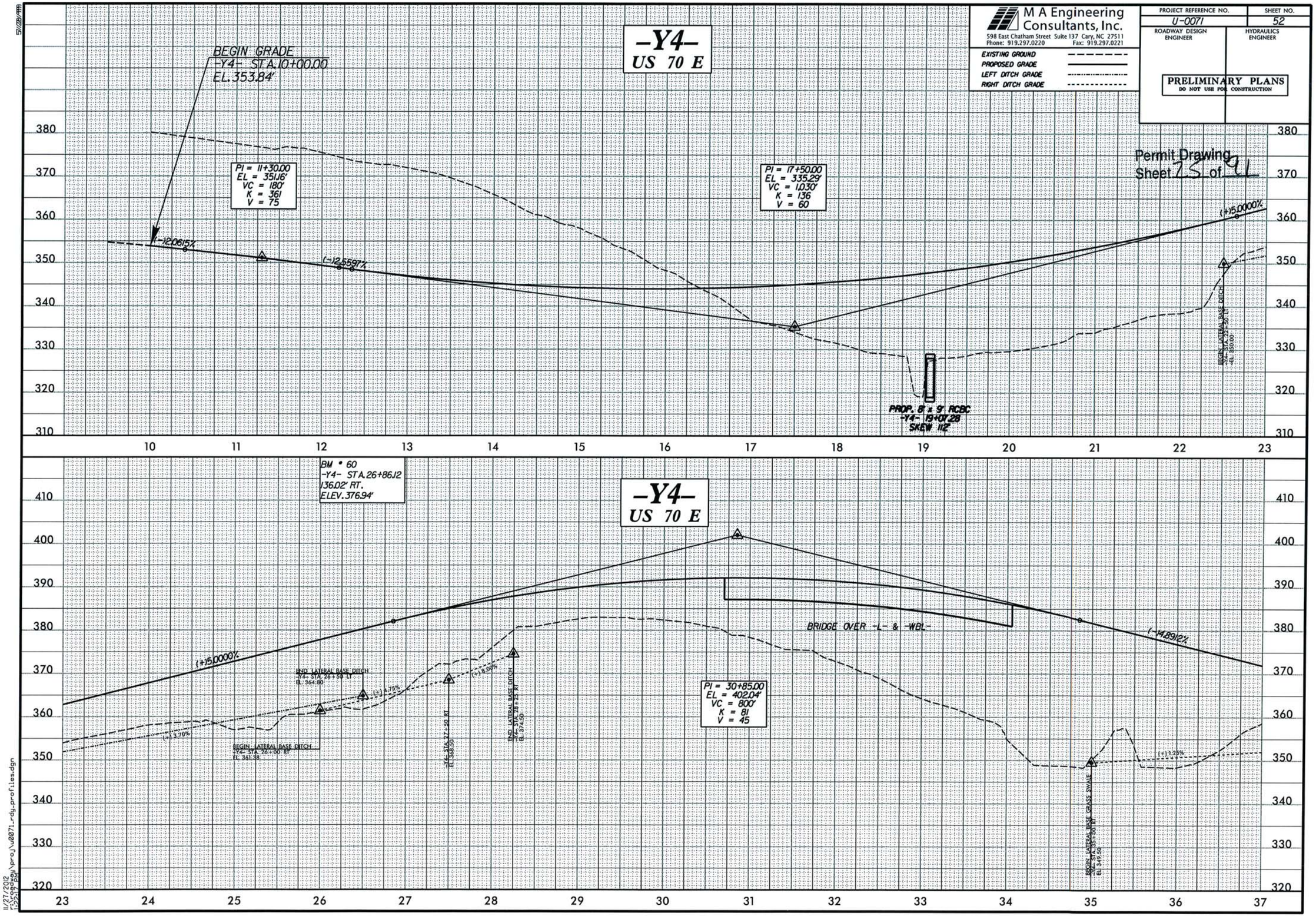
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 52 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

Permit Drawing
Sheet 25 of 41

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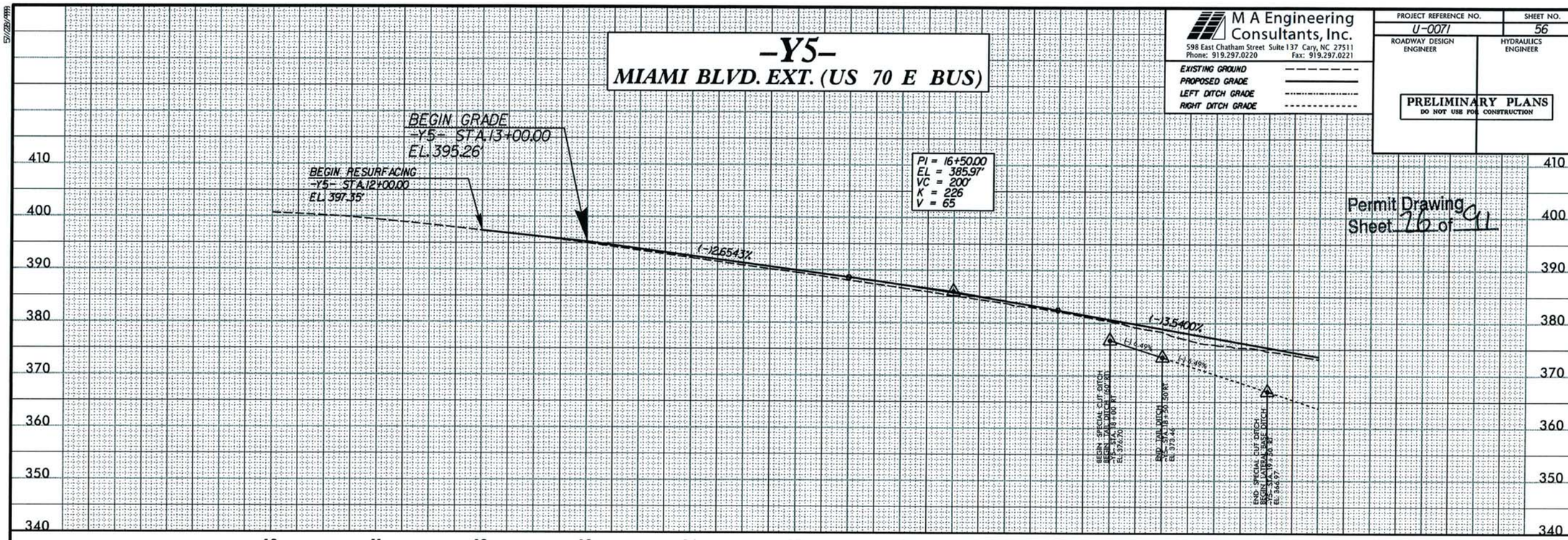
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 56 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

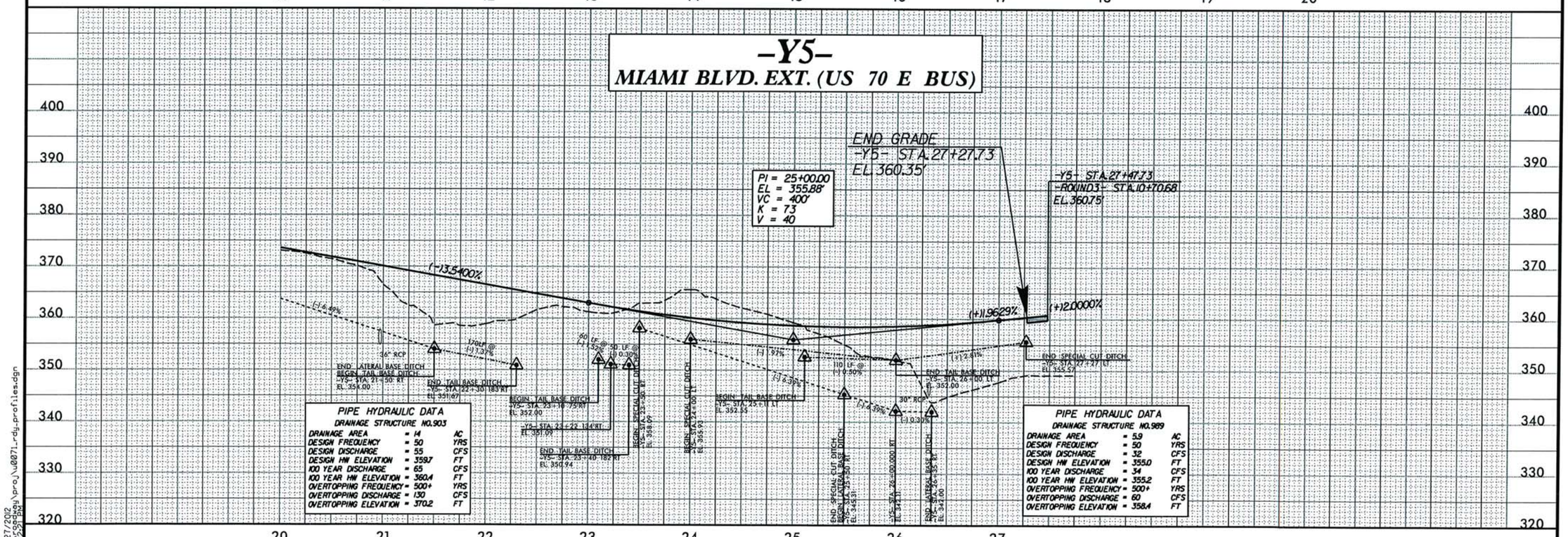
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 26 of 41

# -Y5-
## MIAMI BLVD. EXT. (US 70 E BUS)




# -Y5-
## MIAMI BLVD. EXT. (US 70 E BUS)




**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO.903

| | | |
|---|---|---|
| DRAINAGE AREA | = 14 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 55 | CFS |
| DESIGN HW ELEVATION | = 359.7 | FT |
| 100 YEAR DISCHARGE | = 65 | CFS |
| 100 YEAR HW ELEVATION | = 360.4 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 130 | CFS |
| OVERTOPPING ELEVATION | = 370.2 | FT |

**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO.989

| | | |
|---|---|---|
| DRAINAGE AREA | = 5.9 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 32 | CFS |
| DESIGN HW ELEVATION | = 355.0 | FT |
| 100 YEAR DISCHARGE | = 34 | CFS |
| 100 YEAR HW ELEVATION | = 355.2 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 60 | CFS |
| OVERTOPPING ELEVATION | = 358.4 | FT |

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| PIPE HYDRAULIC DATA | | |
|---|---|---|
| DRAINAGE STRUCTURE NO.934 | | |
| DRAINAGE AREA | = 1.5 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 5.1 | CFS |
| DESIGN HW ELEVATION | = 342.1 | FT |
| 100 YEAR DISCHARGE | = 5.4 | CFS |
| 100 YEAR HW ELEVATION | = 342.2 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 32 | CFS |
| OVERTOPPING ELEVATION | = 354.0 | FT |

# -Y6- EAST END DR.


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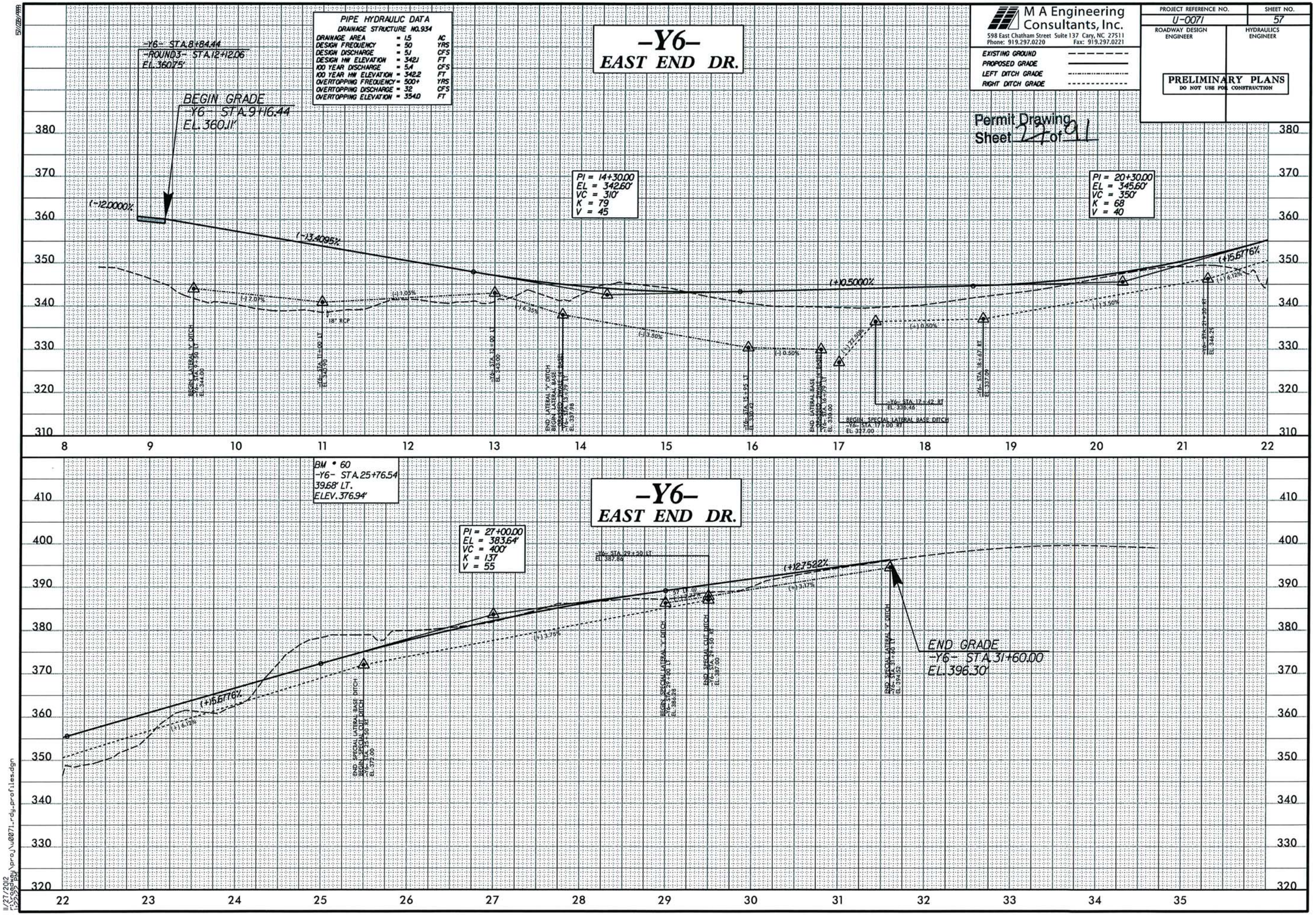
| | |
|---|---|
| EXISTING GROUND | |
| PROPOSED GRADE | |
| LEFT DITCH GRADE | |
| RIGHT DITCH GRADE | |

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 57 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 27 of 91



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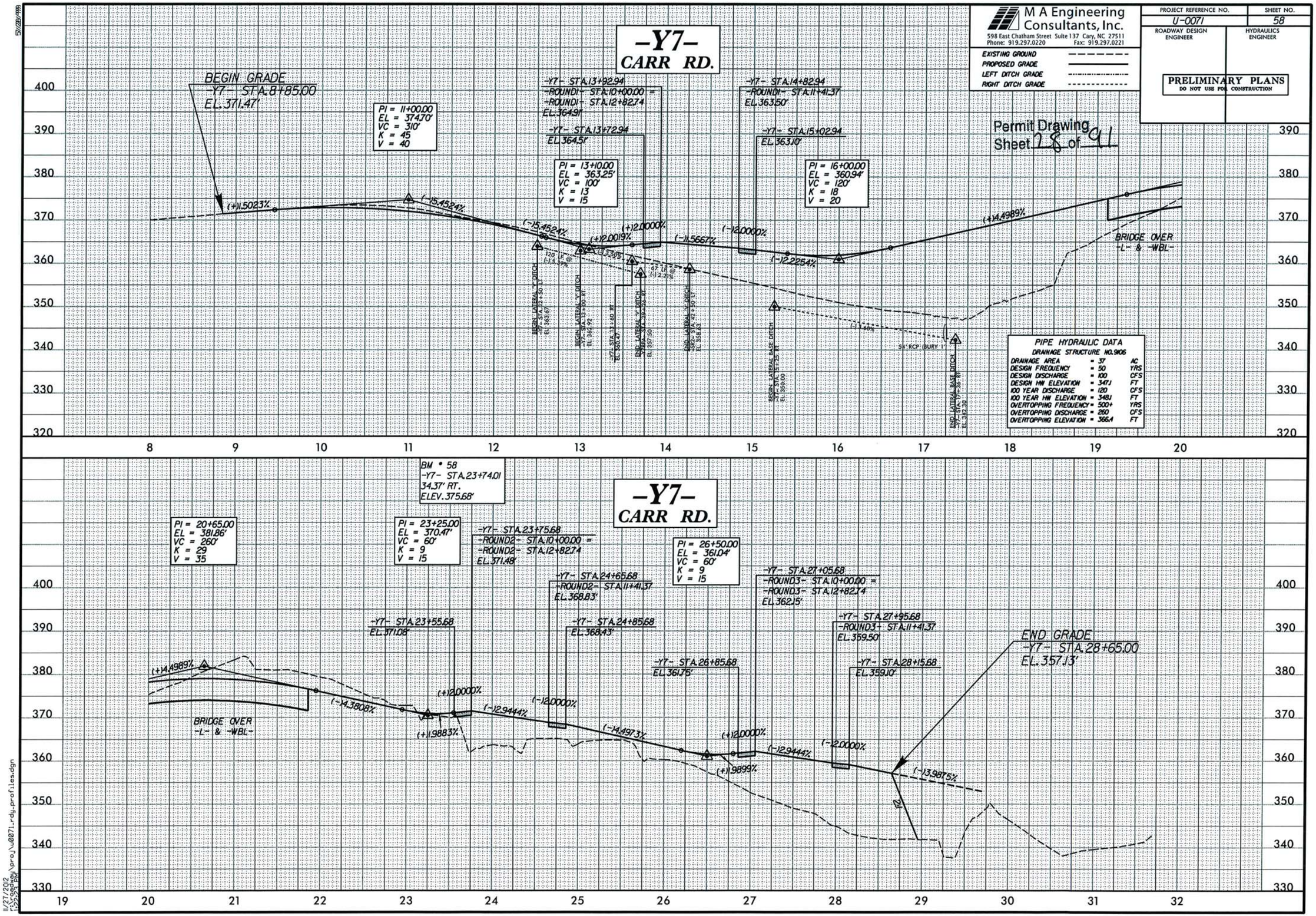
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 58 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 28 of 41

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 59 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 29 of 91

# -Y7RPA-

PI = 11+15.00
EL = 361.70'
VC = 210'
K = 151
V = 60

PI = 17+25.00
EL = 354.50'
VC = 550'
K = 359
V = 75

(+)0.2087%
(-)1.1803%
(-)4.00%
(+)0.30%
(-)12.7126%
(+)0.50%

BEGIN GRADE
-Y7RPA- STA.10+00.00
EL.361.46'

BEGIN SPECIAL CUT DITCH
-Y7RPA- STA.15+62.81 RT
EL.352.29

BEGIN TAIL DITCH
-Y7RPA- STA.17+43 RT
EL.344.2

100' LF @ (-)0.80%

END TAIL DITCH
-Y7RPA- STA.17+74 RT
EL.343.80

END SPECIAL CUT DITCH
-Y7RPA- STA.19+33 RT
EL.344.60

PROP. 8' x 9' RCBC
-Y7RPA- 20+41.77
SKEW 95°

BEGIN LATERAL BASE
GRASSED SWALE (4' BASE)
-Y7RPA- STA.21+80 RT
EL.319.37

# -Y7RPA-

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.9132

| | | |
|---|---|---|
| DRAINAGE AREA | = 49 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 130 | CFS |
| DESIGN HW ELEVATION | = 334.2 | FT |
| 100 YEAR DISCHARGE | = 150 | CFS |
| 100 YEAR HW ELEVATION | = 334.8 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 325 | CFS |
| OVERTOPPING ELEVATION | = 342.9 | FT |

END GRADE
-Y7RPA- STA.29+53.56
EL.363.87'

-Y7RPA- STA.29+86.03
-ROUND1- STA.12+33.92
EL.364.57'

PI = 24+00.00
EL = 336.19'
VC = 800'
K = 104
V = 50

(+)2.1558%
(+)5.0004%
(+)6.21%
(+)5.76%
(+)4.00%
(+)0.50%
(-)12.7126%

54" RCP (BURY 1')

BEGIN LATERAL 'V' DITCH
-Y7RPA- STA.22+91 LT
EL.326.04

END LATERAL 'V' DITCH
BEGIN SPECIAL CUT DITCH
-Y7RPA- STA.25+00 LT
EL.336.95

END SPECIAL CUT DITCH
-Y7RPA- STA.26+00 LT
EL.344.24

END SPECIAL CUT DITCH
-Y7RPA- STA.29+42 RT
EL.357.56

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-A |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
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PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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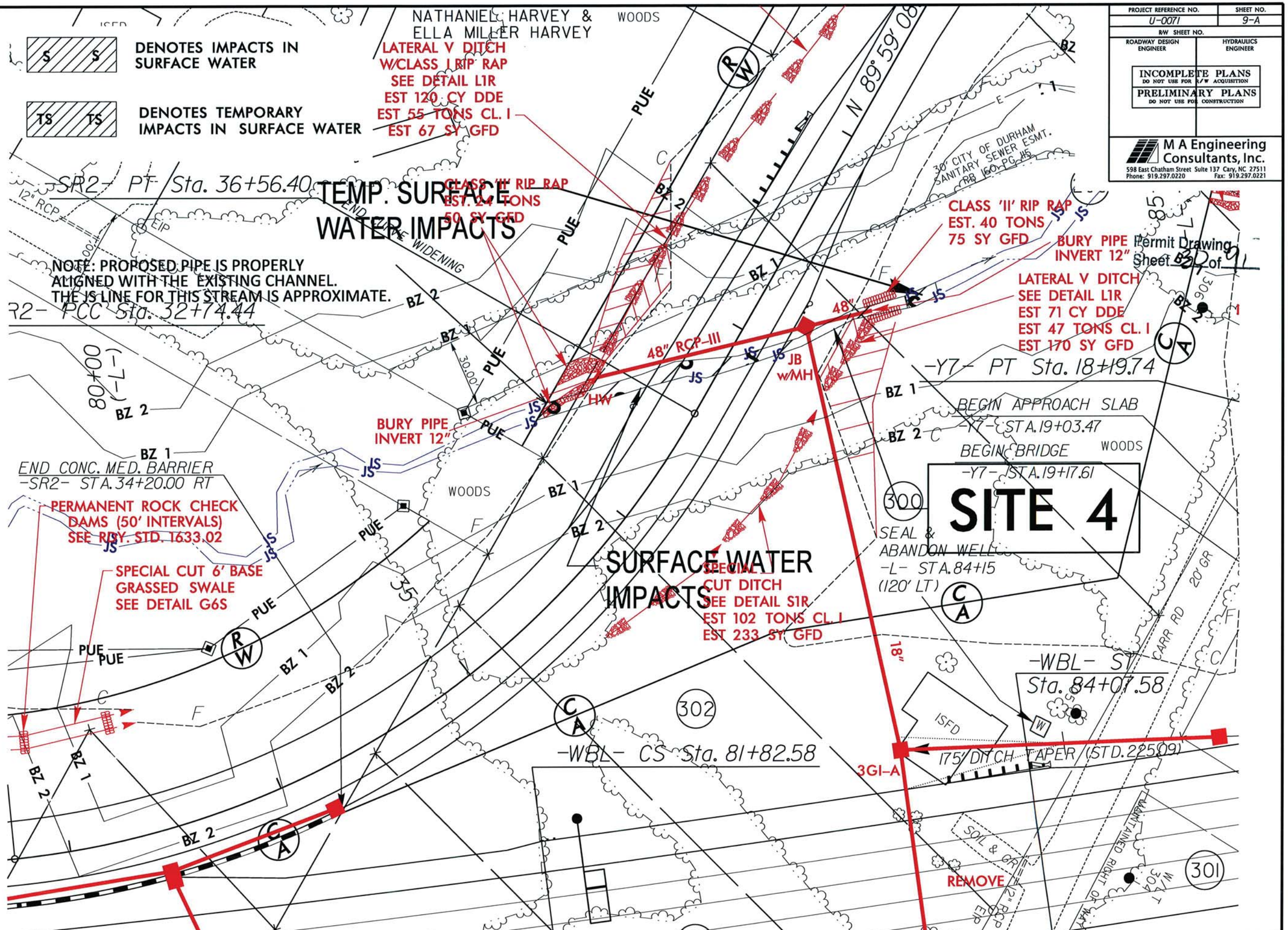
Phone: 919.297.0220 Fax: 919.297.0221




Permit Drawing
Sheet 32 of 91

REVISIONS

8/17/99

10/31/2013
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-A |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
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PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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Permit Drawing
Sheet 21 of 91

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

NATHANIEL HARVEY & ELLA MILLER HARVEY

LATERAL V DITCH
W/CLASS I RIP RAP
SEE DETAIL L1R
EST 120 CY DDE
EST 55 TONS CL.I
EST 67 SY GFD

-SR2- PT Sta. 36+56.40

TEMP. SURFACE WATER IMPACTS

CLASS III RIP RAP
EST. 24 TONS
50 SY GFD

NOTE: PROPOSED PIPE IS PROPERLY ALIGNED WITH THE EXISTING CHANNEL. THE JS LINE FOR THIS STREAM IS APPROXIMATE.

-SR2- PCC Sta. 32+74.44

CLASS III RIP RAP
EST. 40 TONS
75 SY GFD

BURY PIPE INVERT 12"

LATERAL V DITCH
SEE DETAIL L1R
EST 71 CY DDE
EST 47 TONS CL. I
EST 170 SY GFD

48" RCP-III

JB w/MH

-Y7- PT Sta. 18+19.74

BEGIN APPROACH SLAB
-Y7- STA.19+03.47

BEGIN BRIDGE
-Y7- STA.19+17.61

BURY PIPE INVERT 12"

END CONC. MED. BARRIER
-SR2- STA.34+20.00 RT

PERMANENT ROCK CHECK DAMS (50' INTERVALS)
SEE RDY. STD. 1633.02

SPECIAL CUT & BASE GRASSED SWALE
SEE DETAIL C6S

SURFACE WATER IMPACTS

SPECIAL CUT DITCH
SEE DETAIL S1R
EST 102 TONS CL. I
EST 233 SY GFD

SITE 4

SEAL & ABANDON WELL
-L- STA.84+15
(120' LT)

-WBL- ST Sta. 84+07.58

-WBL- CS Sta. 81+82.58

175' DITCH TAPER (STD.225.01)

3GI-A

REMOVE

REVISIONS

8/17/99

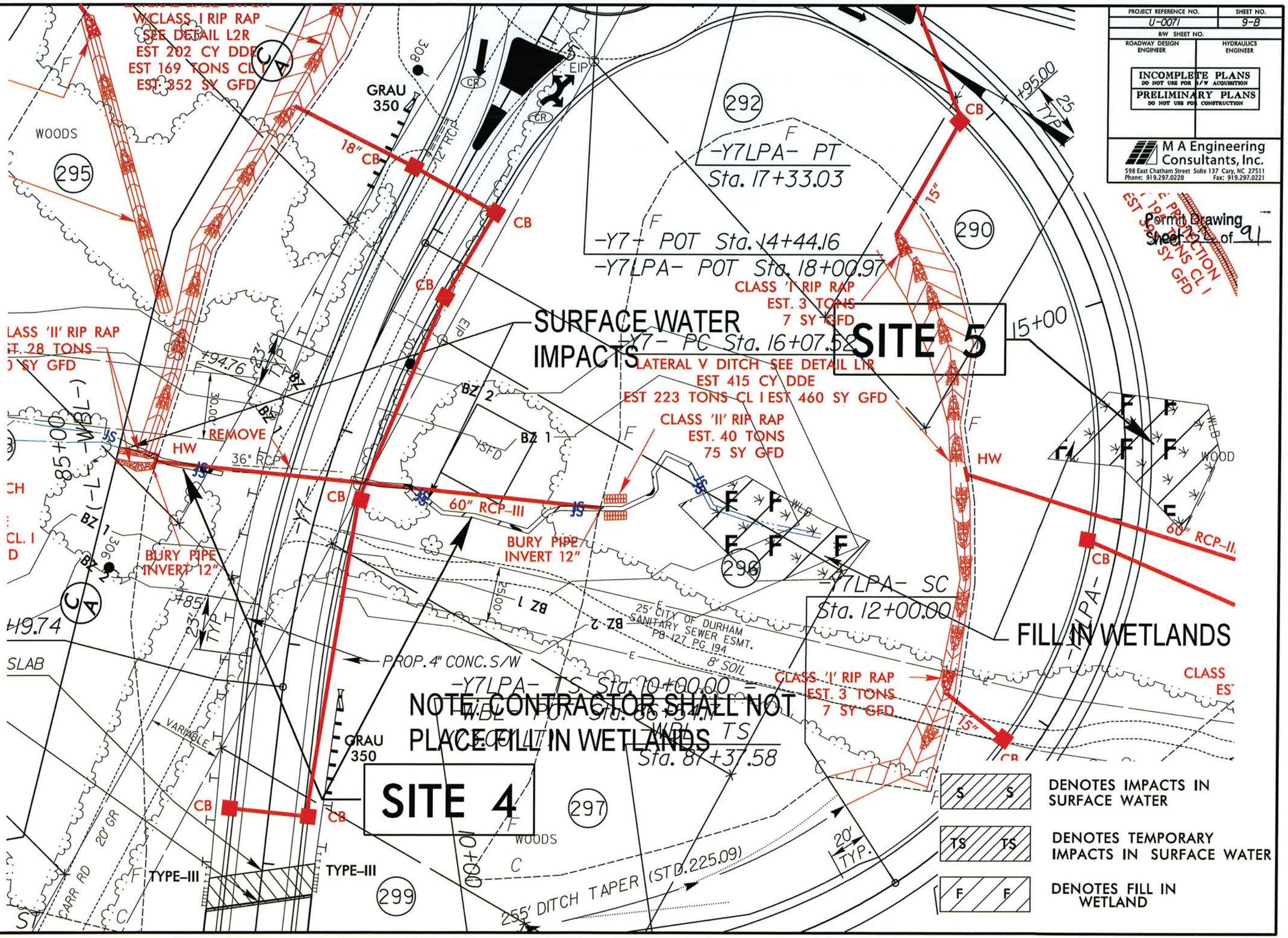
10/3/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-B |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 22 of 91




REVISIONS

8/17/99

9/19/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-B |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
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M A Engineering Consultants, Inc.
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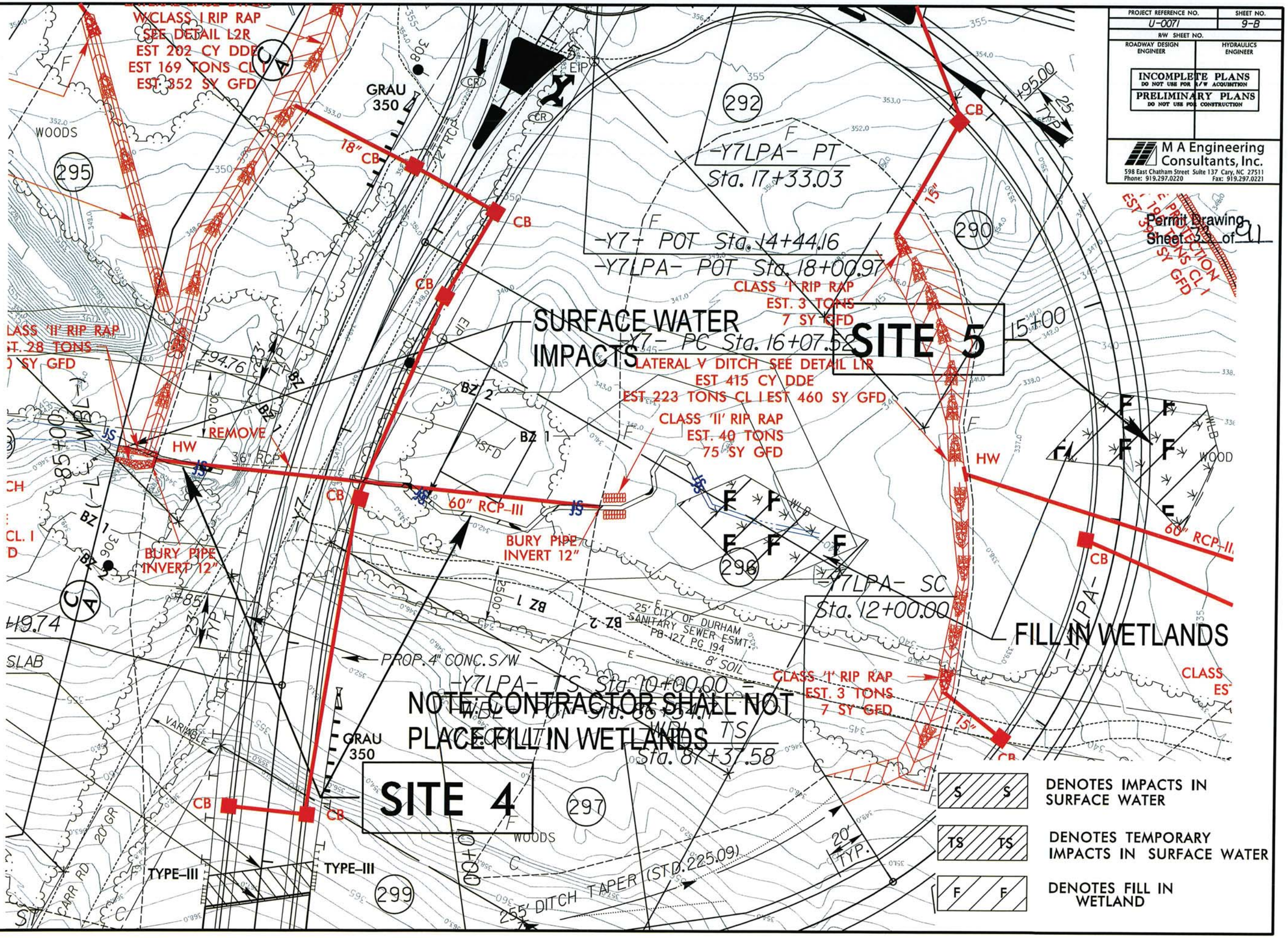
Permit Drawing
Sheet 33 of 91




8/17/99

REVISIONS

9/19/2013
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8/23/99

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-230 |

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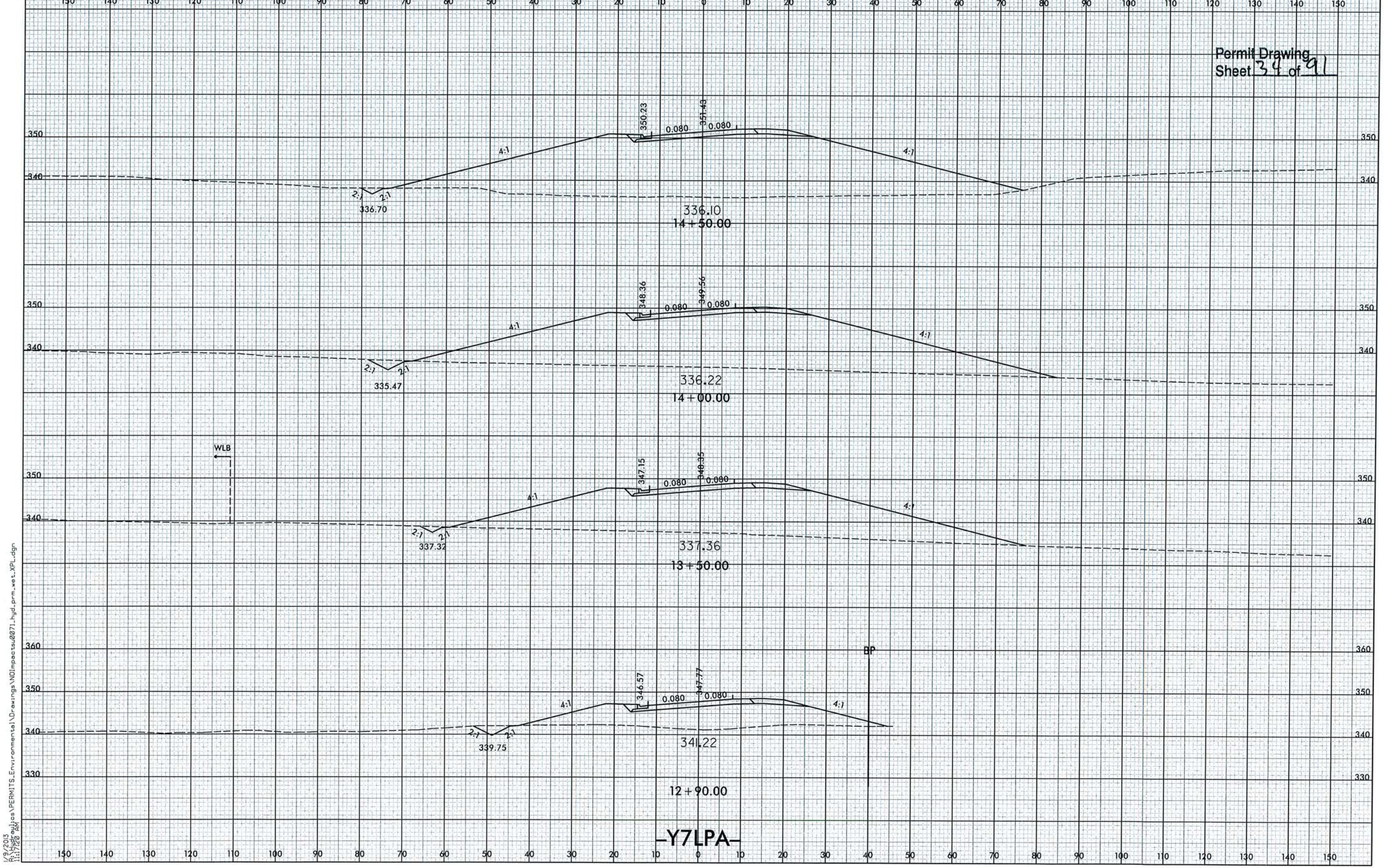
Permit Drawing
Sheet 34 of 91

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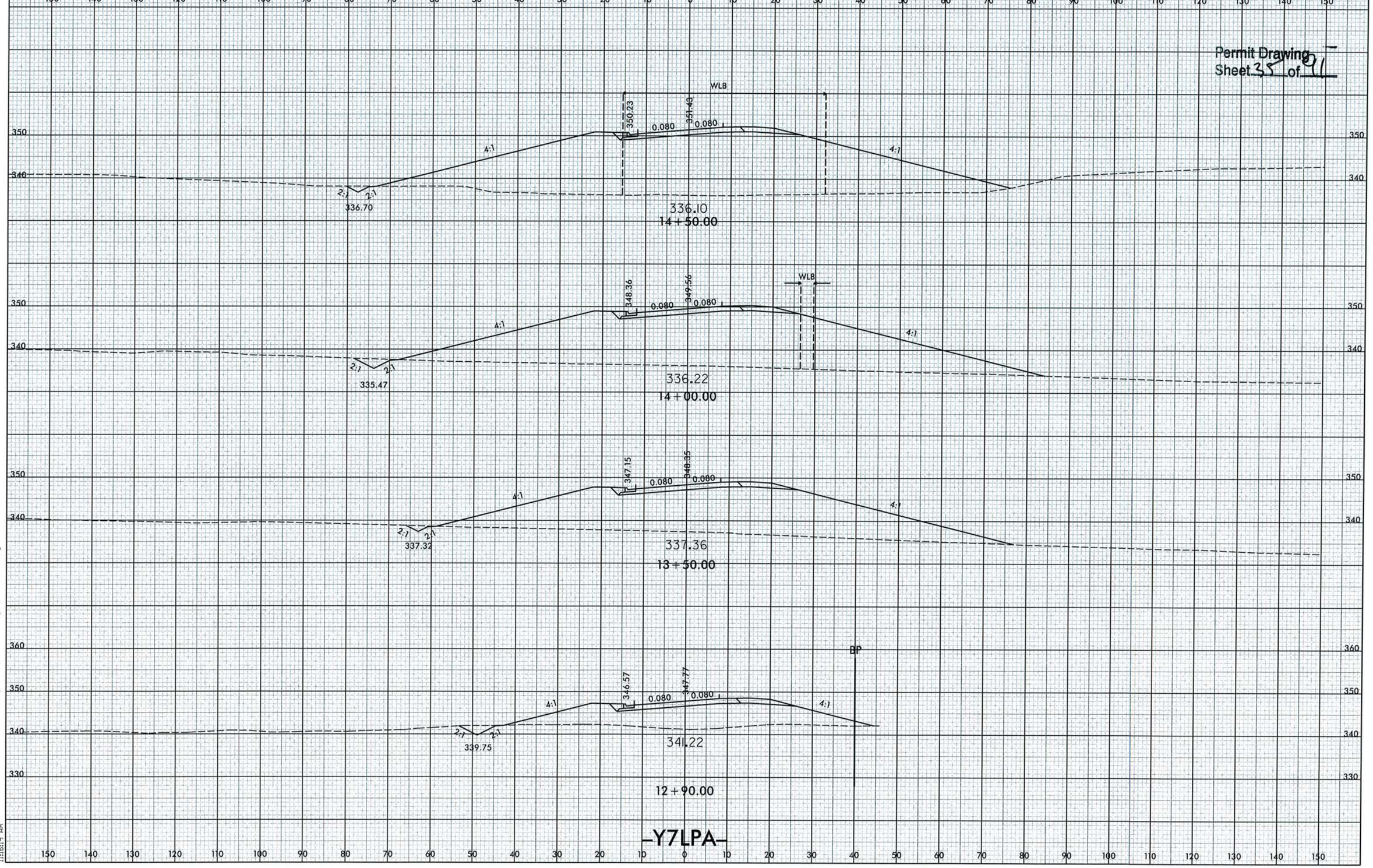
8/23/99

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-230 |

0 5 10

Permit Drawing
Sheet 35 of 91

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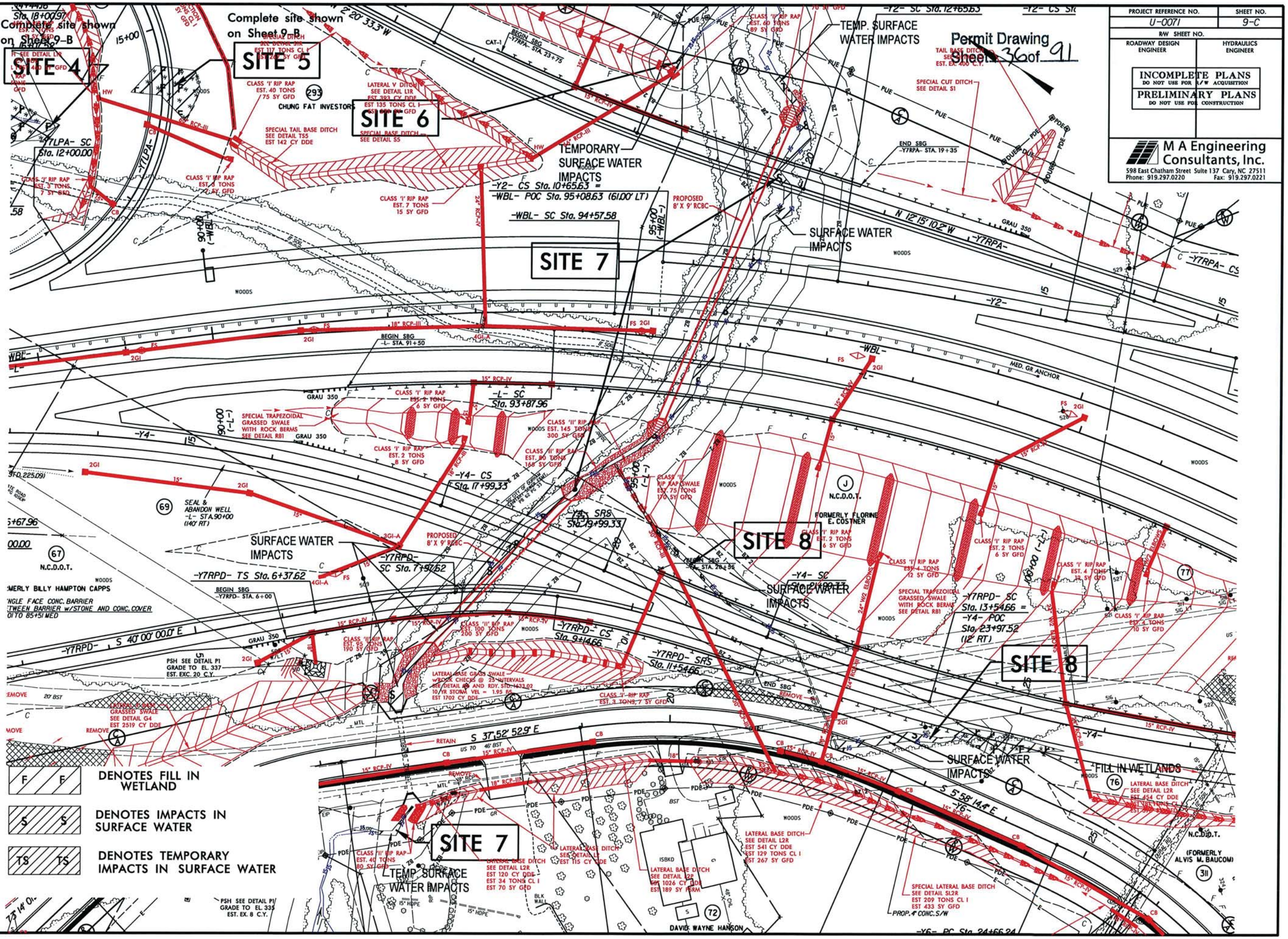
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-C |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 36 of 91




REVISIONS

8/17/99

10/9/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-C |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
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PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
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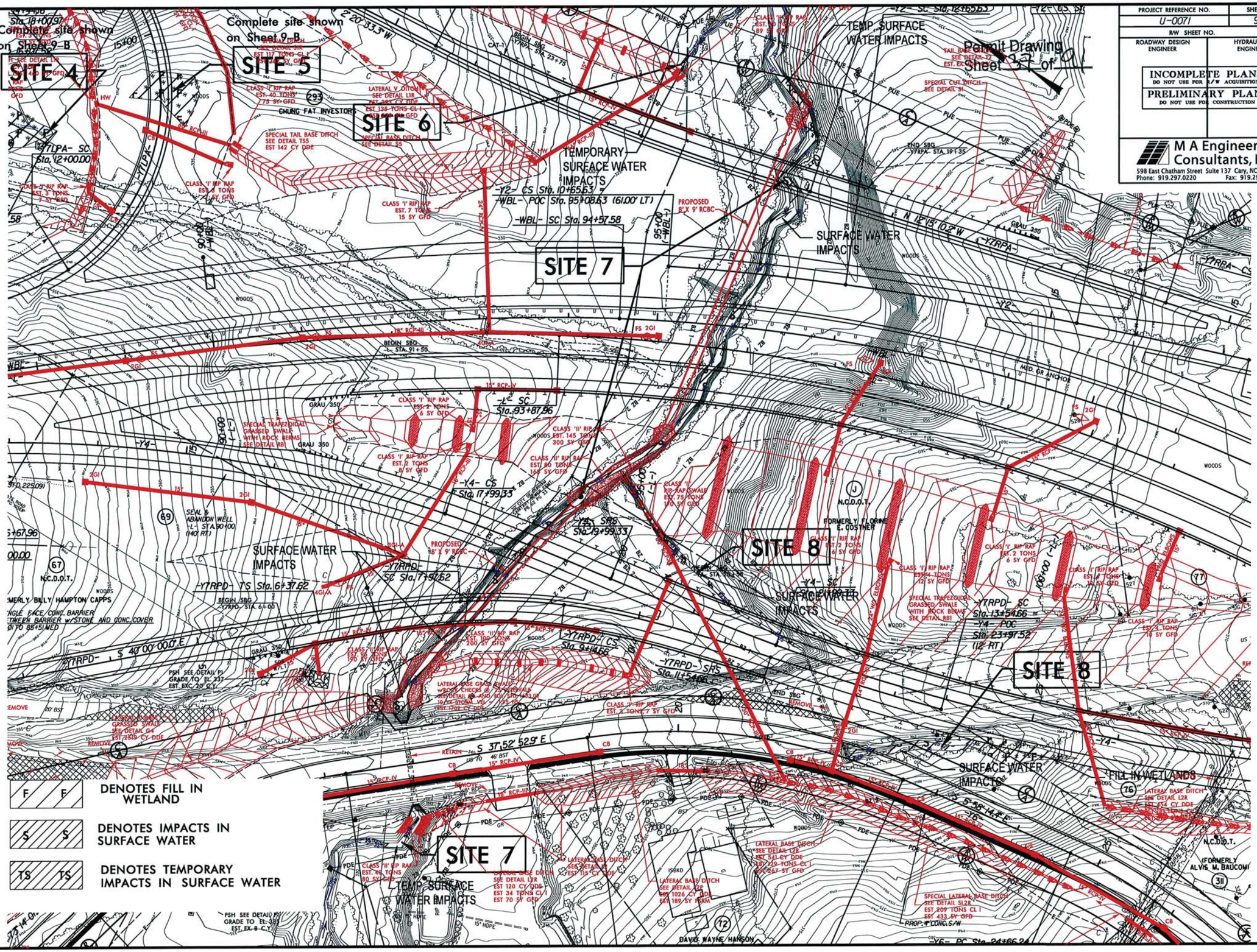
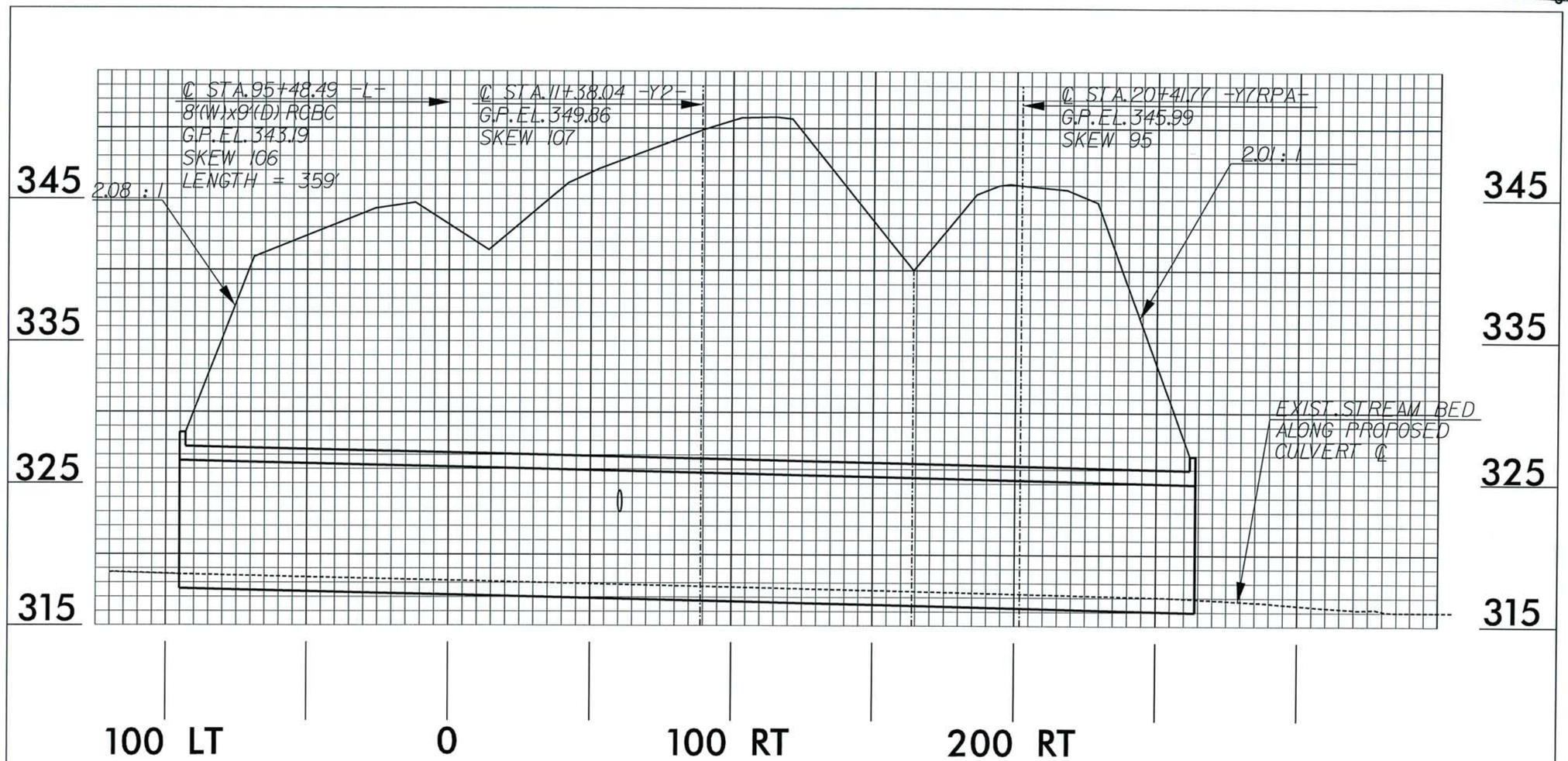
Permit Drawing
Sheet 37 of 91




REVISIONS

8/17/99

10/9/2013




PROFILE

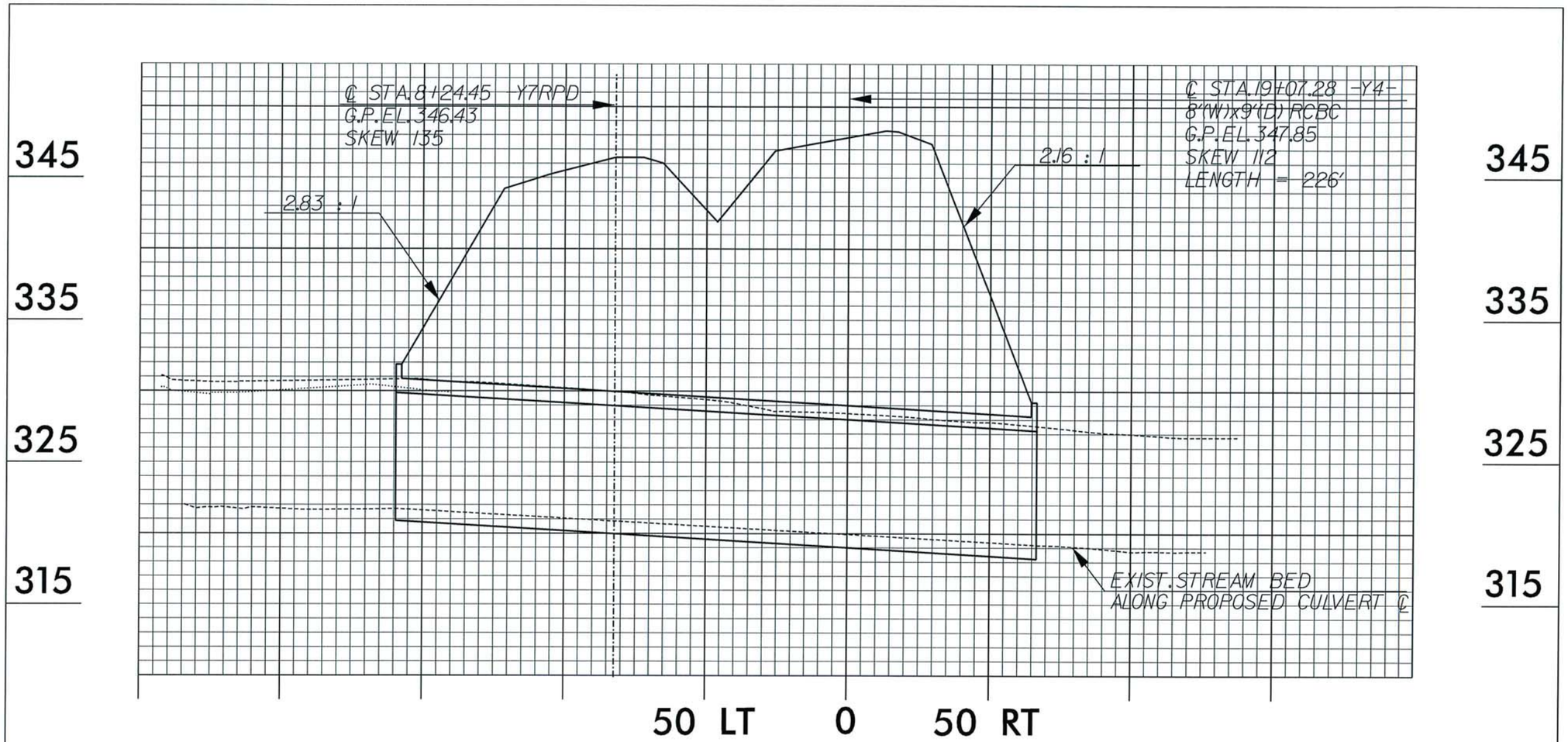
CULVERT HYDRAULIC DATA

| | | |
|---|---|---|
| DESIGN DISCHARGE | = 611 | CFS |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN HW ELEVATION | = 327.7 | FT |
| BASE DISCHARGE | = 689 | CFS |
| BASE FREQUENCY | = 100 | YRS |
| BASE HW ELEVATION | = 329.0 | FT |
| OVERTOPPING DISCHARGE | = 1400 | CFS |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING ELEVATION | = 343.1 | FT |

NCDOT

DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: U-0071
DURHAM EAST END CONNECTOR,
FROM NC 147
(BUCK DEAN FREEWAY) TO
NORTH OF NC 98

SHEET OF 12/27/12



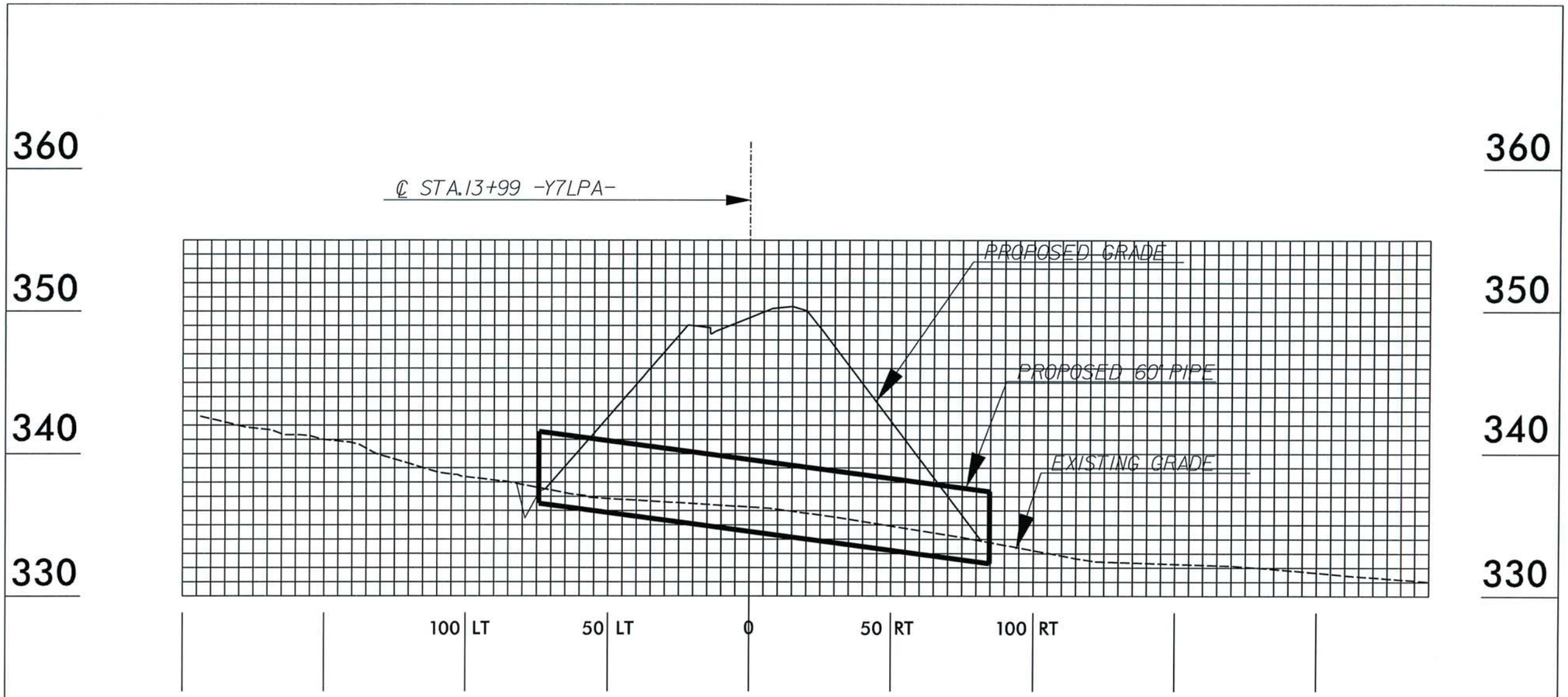

PROFILE

CULVERT HYDRAULIC DATA

| | | |
|---|---|---|
| DESIGN DISCHARGE | = 611 | CFS |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN HW ELEVATION | = 336.2 | FT |
| BASE DISCHARGE | = 689 | CFS |
| BASE FREQUENCY | = 100 | YRS |
| BASE HW ELEVATION | = 337.1 | FT |
| OVERTOPPING DISCHARGE | = 1000 | CFS |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING ELEVATION | = 344.0 | FT |

NCDOT
DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: U-0071
DURHAM EAST END CONNECTOR,
FROM NC 147
(BUCK DEAN FREEWAY) TO
NORTH OF NC 98

SHEET OF 12/27/12

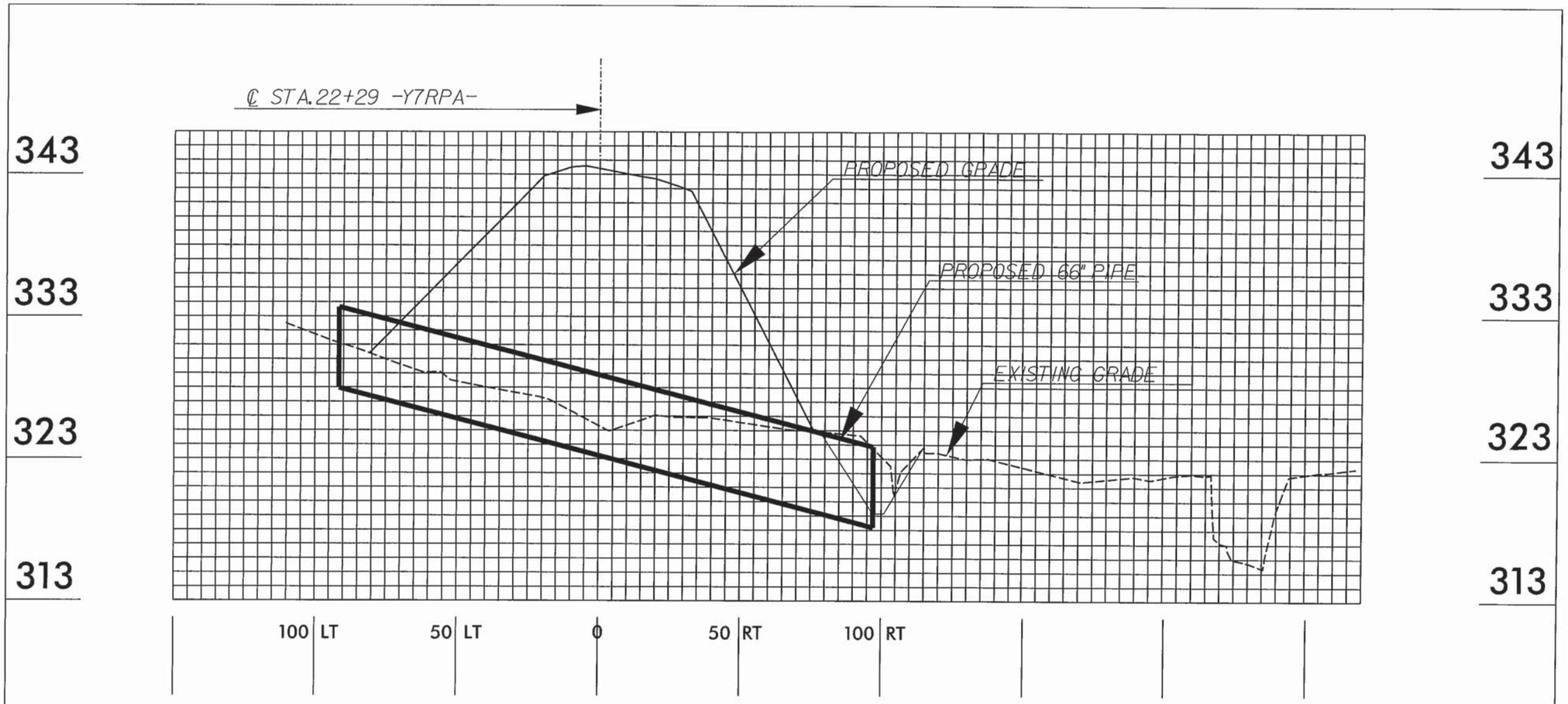



# PROFILE

| PIPE HYDRAULIC DATA | | |
|---|---|---|
| DRAINAGE STRUCTURE NO.9124 | | |
| DRAINAGE AREA | = 40 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 105 | CFS |
| DESIGN HW ELEVATION | = 342.4 | FT |
| 100 YEAR DISCHARGE | = 125 | CFS |
| 100 YEAR HW ELEVATION | = 343.3 | FT |
| OVERTOPPING FREQUENCY | = 100++ | YRS |
| OVERTOPPING DISCHARGE | = 200 | CFS |
| OVERTOPPING ELEVATION | = 347.8 | FT |

NCDOT
DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: U-0071
DURHAM EAST END CONNECTOR,
FROM NC 147
(BUCK DEAN FREEWAY) TO
NORTH OF NC 98

SHEET OF 12/27/12




# PROFILE

| PIPE HYDRAULIC DATA | | |
|---|---|---|
| DRAINAGE STRUCTURE NO.9132 | | |
| DRAINAGE AREA | = 49 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 130 | CFS |
| DESIGN HW ELEVATION | = 334.2 | FT |
| 100 YEAR DISCHARGE | = 150 | CFS |
| 100 YEAR HW ELEVATION | = 334.8 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 325 | CFS |
| OVERTOPPING ELEVATION | = 342.9 | FT |

NCDOT
DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: U-0071
DURHAM EAST END CONNECTOR,
FROM NC 147
(BUCK DEAN FREEWAY) TO
NORTH OF NC 98

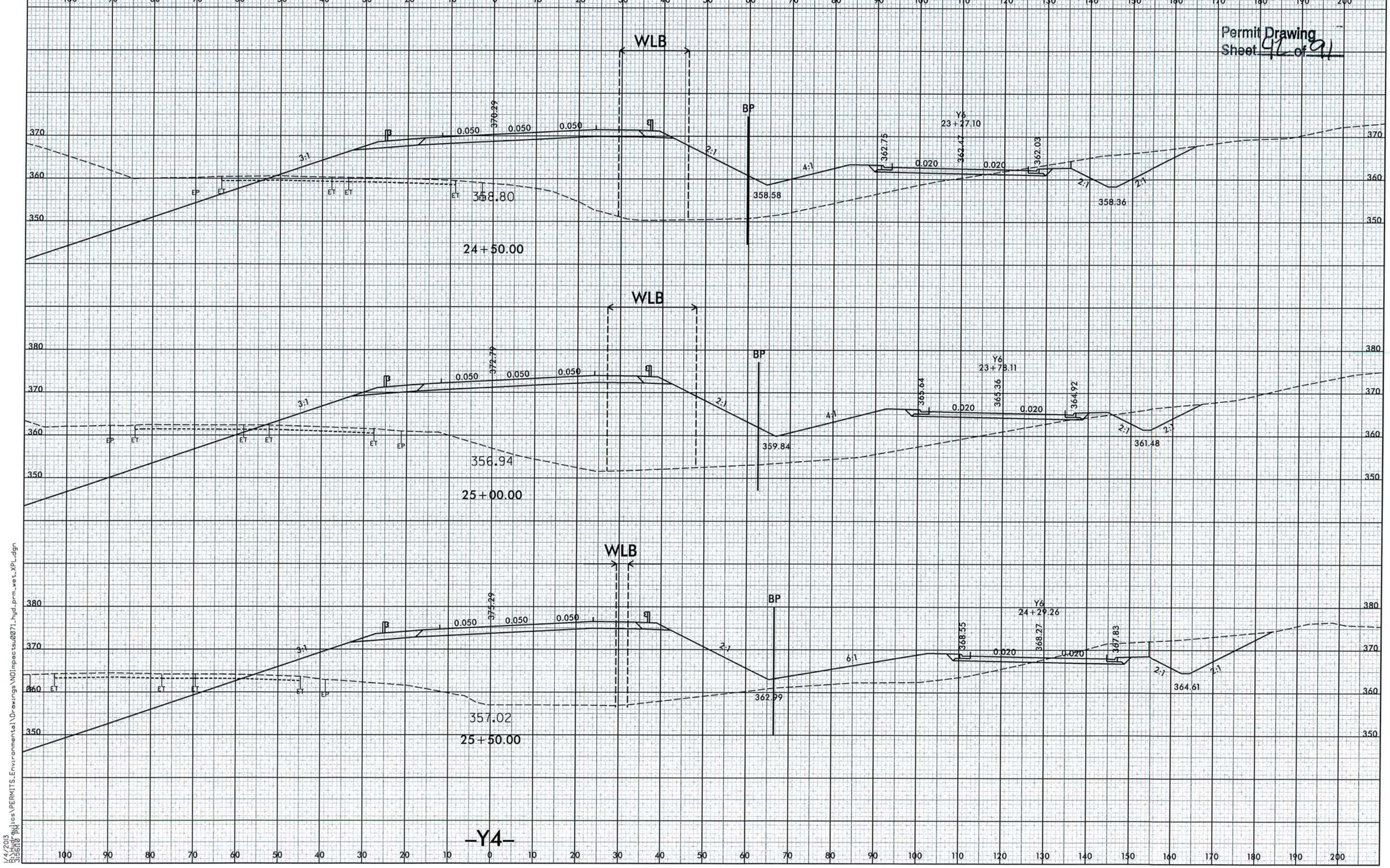
SHEET OF 12/27/12

8/23/99

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-138 |

0 5 10

Permit Drawing
Sheet 92 of 91




-Y4-

1/4/2013
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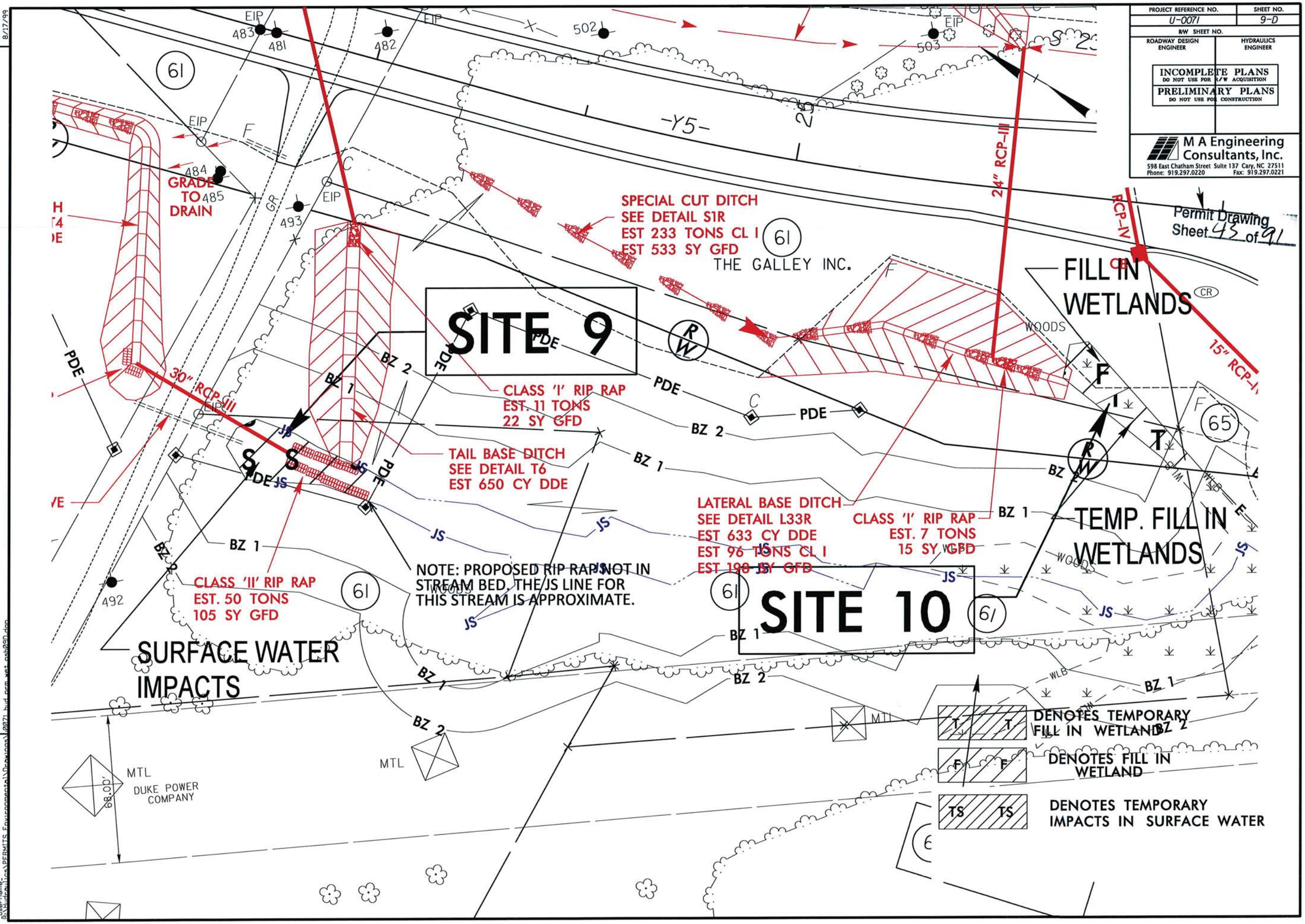
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-D |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 43 of 91




REVISIONS

8/17/99

11/4/2013

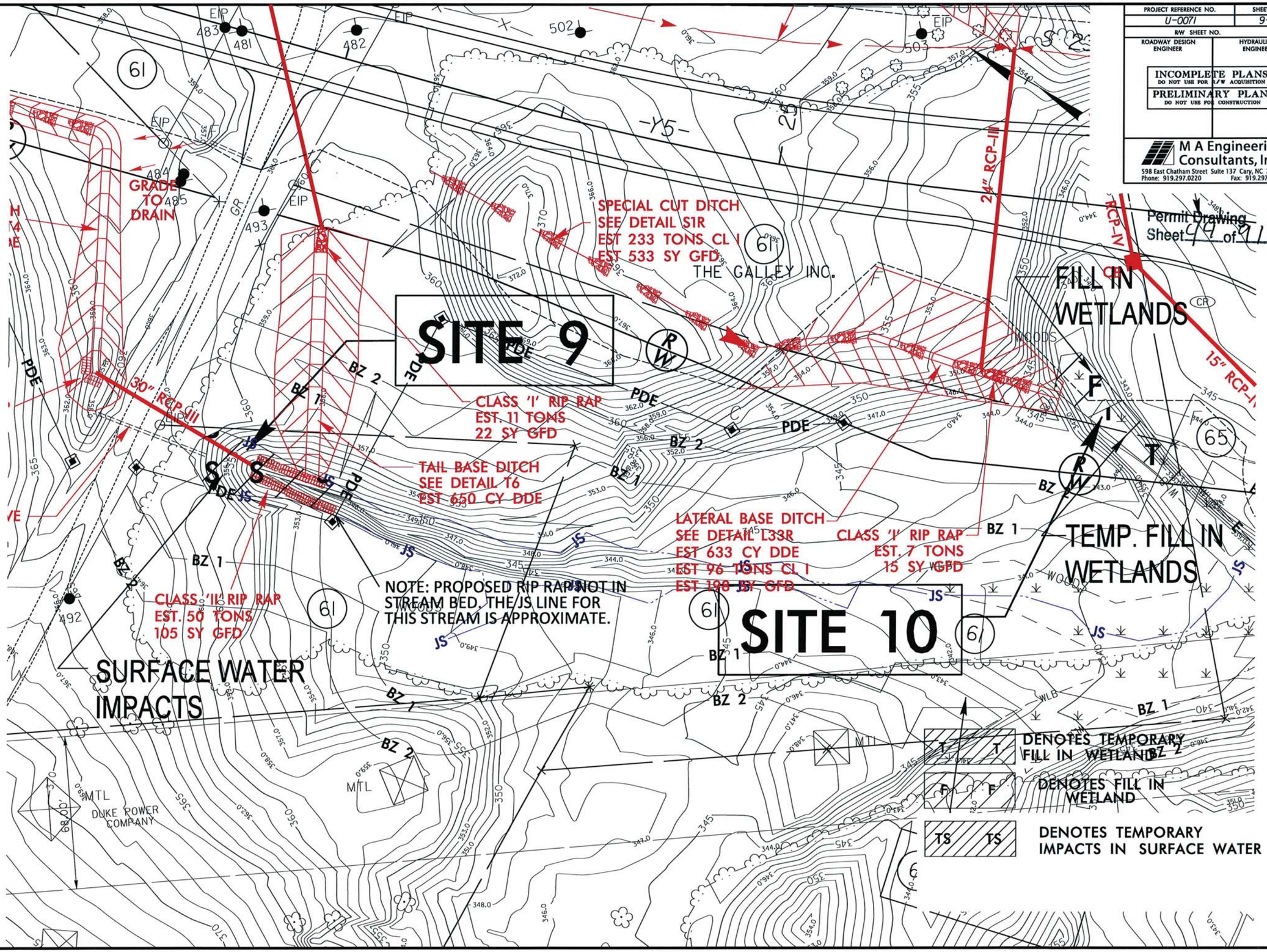
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-D |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 44 of 91




REVISIONS

8/17/99

11/4/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-E |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 45 of 91

# SITE 11

REMOVE
EST 370 C.Y. DDE
505
66
68
65
S 73° 14' 01.1" E
23° 22' 57.5" E
WOODS
CB
15" RCP-IV
18" RCP-III
PDE
RW
BZ 1
BZ 2
PSH SEE DETAIL P1
GRADE TO EL. 339
EST. EX. 5 C.Y.
CLASS 'I' RIP RAP
EST. 4 TONS
40 SY GFD
BORDEN DEVELOPMENT CORP.
PSH SEE DETAIL P1
GRADE TO EL. 341
EST. EXC. 100 C.Y.
MECHANIZED CLEARING
MTL
68.00'
DUKE POWER COMPANY
DUKE POWER COMPANY ESMT.
JS
DENOTES MECHANIZED CLEARING

REVISIONS
8/17/99
9/19/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-E |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
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PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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Permit Drawing
Sheet 46 of 91

# SITE 11

REMOVE 1 EST. 370 C.Y. DIDE

S73°14'01.1" E

S73°22'57.5" E

15" RCP-IV

18" RCP-III

CB

CB

505

66

68

65

65

WOODS

WOODS

WOODS

PDE

PDE

PDE

PDE

PDE

PDE

PDE

PDE

PSH SEE DETAIL P1
GRADE TO EL. 339
EST. EX. 5 C.Y.

PSH SEE DETAIL P1
GRADE TO EL. 341
EST. EXC. 100 C.Y.

MECHANIZED CLEARING

CLASS 'I' RIP RAP
EST. 4 TONS
40 SY GFD

BORDEN DEVELOPMENT CORP.

DUKE POWER COMPANY

DUKE POWER COMPANY ESMT.

MTL

68.00'

68.00'

BZ 1

BZ 2

JS

E

RW

DENOTES MECHANIZED CLEARING

REVISIONS

8/17/99

9/19/2013

8/23/99

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-207 |

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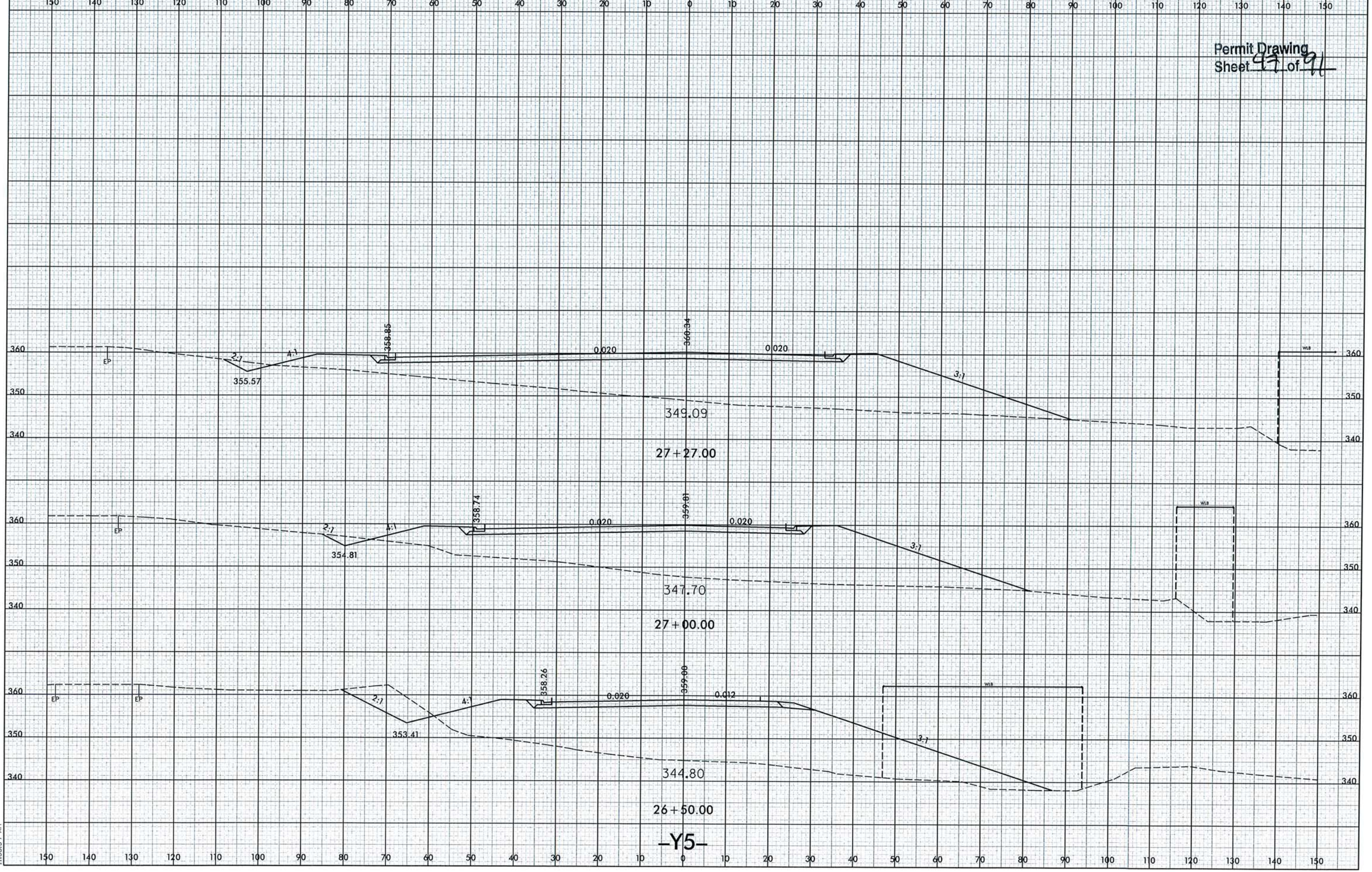
Permit Drawing
Sheet 97 of 91




-Y5-

1/9/2013
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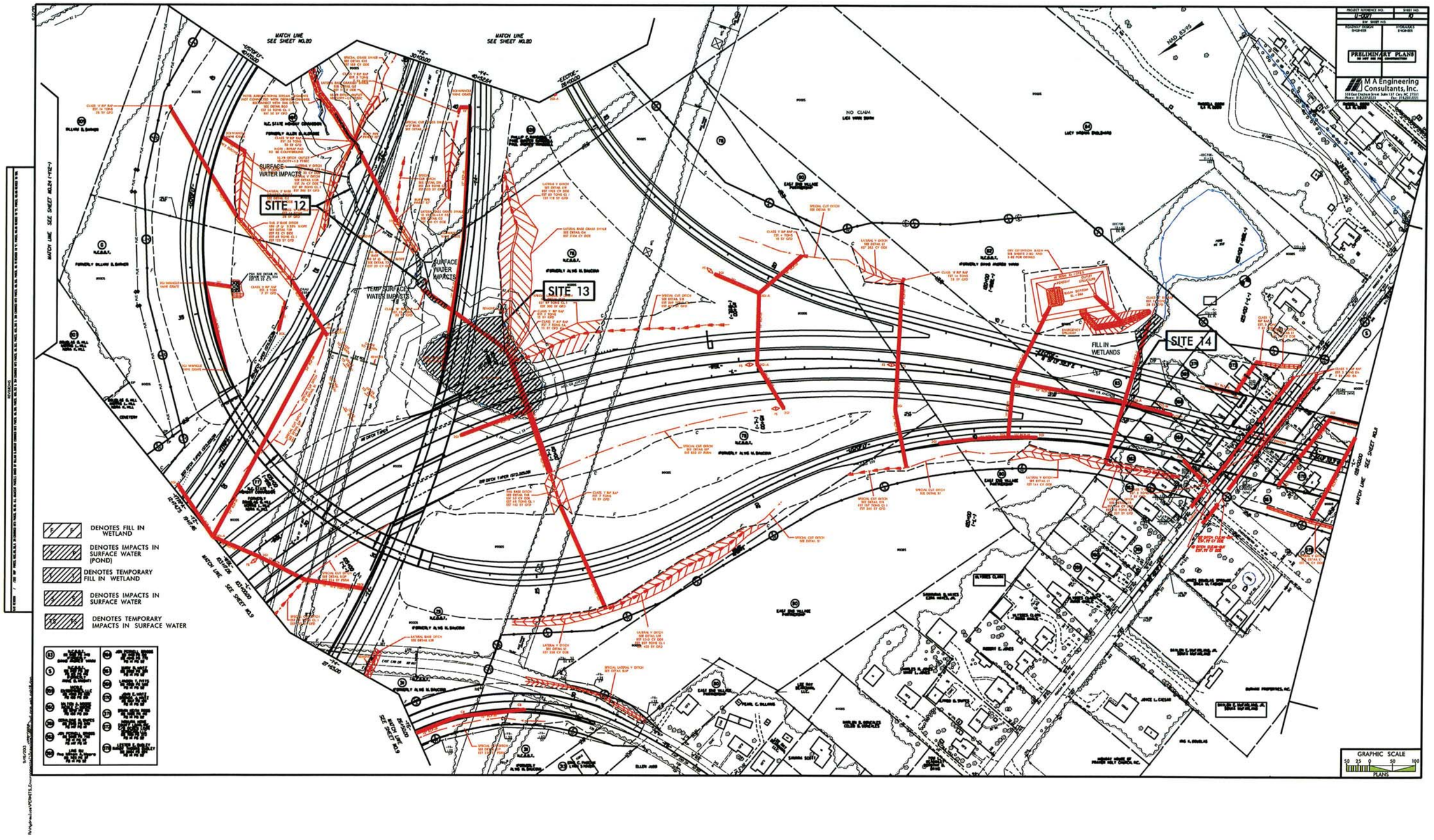
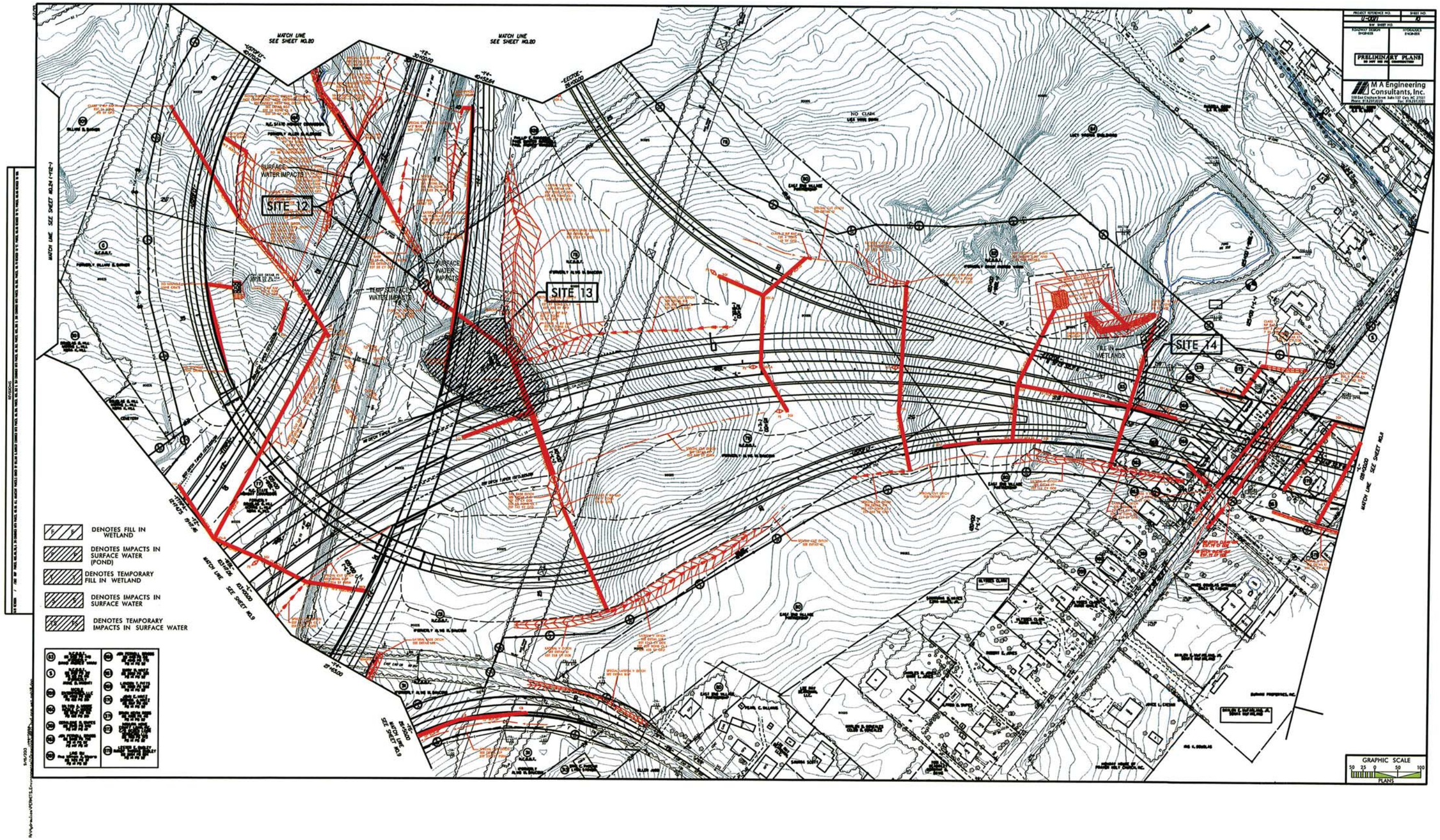
Permit Drawing
Sheet 48 of 71




MATCH LINE SEE SHEET NO.20
MATCH LINE SEE SHEET NO.19
SITE 12
SITE 13
SITE 14
SURFACE WATER IMPACTS
TEMP SURFACE WATER IMPACTS
FILL IN WETLANDS
NO CLAIM
DENOTES FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER (POND)
DENOTES TEMPORARY FILL IN WETLAND
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
PRELIMINARY PLANS
M A Engineering Consultants, Inc.
GRAPHIC SCALE
PLANS

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 50 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

Permit Drawing
Sheet 80 of 91

## -Y2- US 70 W

BEGIN GRADE
-Y2- STA 10+65.63
EL 349.61'

PI = 12+70.00
EL = 350.22'
VC = 350'
K = 264
V = 70

PI = 22+20.00
EL = 365.65'
VC = 700'
K = 161
V = 60

(+)0.2985%
(+)1.6242%
(-)1.2721%
(-)3.32%
(-)1.05%

PROP. 8' x 9' RCBC
-Y2- 11+38.04
SKEW 107°

BEGIN SPECIAL CUT DITCH
-Y2- STA 21+50 RT
EL 353.80

-Y2- STA 21+50 RT
EL 355.50

END SPECIAL CUT DITCH
-Y2- STA 23+87 RT
EL 353.00

## -Y2- US 70 W

BM • 65
-Y2- STA 32+04.12
136.08' RT.
ELEV. 342.33'

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 1007

| | | |
|---|---|---|
| DRAINAGE AREA | = 1.8 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 7.5 | CFS |
| DESIGN HW ELEVATION | = 354.5 | FT |
| 100 YEAR DISCHARGE | = 7.9 | CFS |
| 100 YEAR HW ELEVATION | = 354.7 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 15 | CFS |
| OVERTOPPING ELEVATION | = 356.0 | FT |

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 1061

| | | |
|---|---|---|
| DRAINAGE AREA | = 17.8 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 59.2 | CFS |
| DESIGN HW ELEVATION | = 344.2 | FT |
| 100 YEAR DISCHARGE | = 69.9 | CFS |
| 100 YEAR HW ELEVATION | = 345.1 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 91 | CFS |
| OVERTOPPING ELEVATION | = 347.0 | FT |

END GRADE
-Y2- STA 33+71.33
EL 344.91'

BEGIN GRADE
-Y3- STA 33+71.33
EL 345.27'

PI = 29+50.00
EL = 345.78'
VC = 450'
K = 179
V = 65

PI = 36+00.00
EL = 344.80'
VC = 456'
K = 97
V = 50

(-)2.7219%
(-)1.0206%
(-)1.0205%
(+)4.4800%
(+)0.50%
(-)1.71%
(-)9.00%
(-)7.71%
(-)9.86%
(-)15.96%
(-)1.71%

18" RCP
SKEW 121°

36" RCP
SKEW 128°

180 LF @ 2.33%
80 LF @ 0.96%
(-)0.50%

BEGIN TAIL BASE DITCH
-Y2- STA 24+58 (T1)
EL 344.00

END TAIL BASE DITCH
-Y2- STA 25+32 (T2)
EL 338.00

BEGIN LATERAL DITCH
-Y2- STA 261+00 LT
EL 347.78

BEGIN TAIL BASE DITCH
-Y2- STA 26+25 RT
EL 340.77

END TAIL BASE DITCH
BEGIN SPECIAL CUT DITCH
-Y2- STA 27+00 RT
EL 340.00

-Y2- STA 271+00 LT
EL 337.94

END LATERAL DITCH
BEGIN LATERAL BASE GRASS SWALE
-Y2- STA 97+88 RT
EL 339.50

END SPECIAL CUT DITCH
-Y2- STA 28+00 RT
EL 346.90

END LATERAL BASE GRASS SWALE
BEGIN SPECIAL GRASS SWALE
-Y2- STA 29+50 RT
EL 339.41

END SPECIAL GRASS SWALE
BEGIN LATERAL DITCH
-Y2- STA 30+51 LT
EL 342.00

-Y2- STA 32+00 LT
EL 337.70

END LATERAL DITCH
-Y2- STA 32+35 LT
EL 335.00

BEGIN GRASS SWALE
-Y3- STA 34+50 RT
EL 335.10

PROP. 8' x 10' RCBC
-Y3- 34+45.00
SKEW 65°

11/27/2012
R:\Roadway\proj\u0071_rdy_profiles.dgn

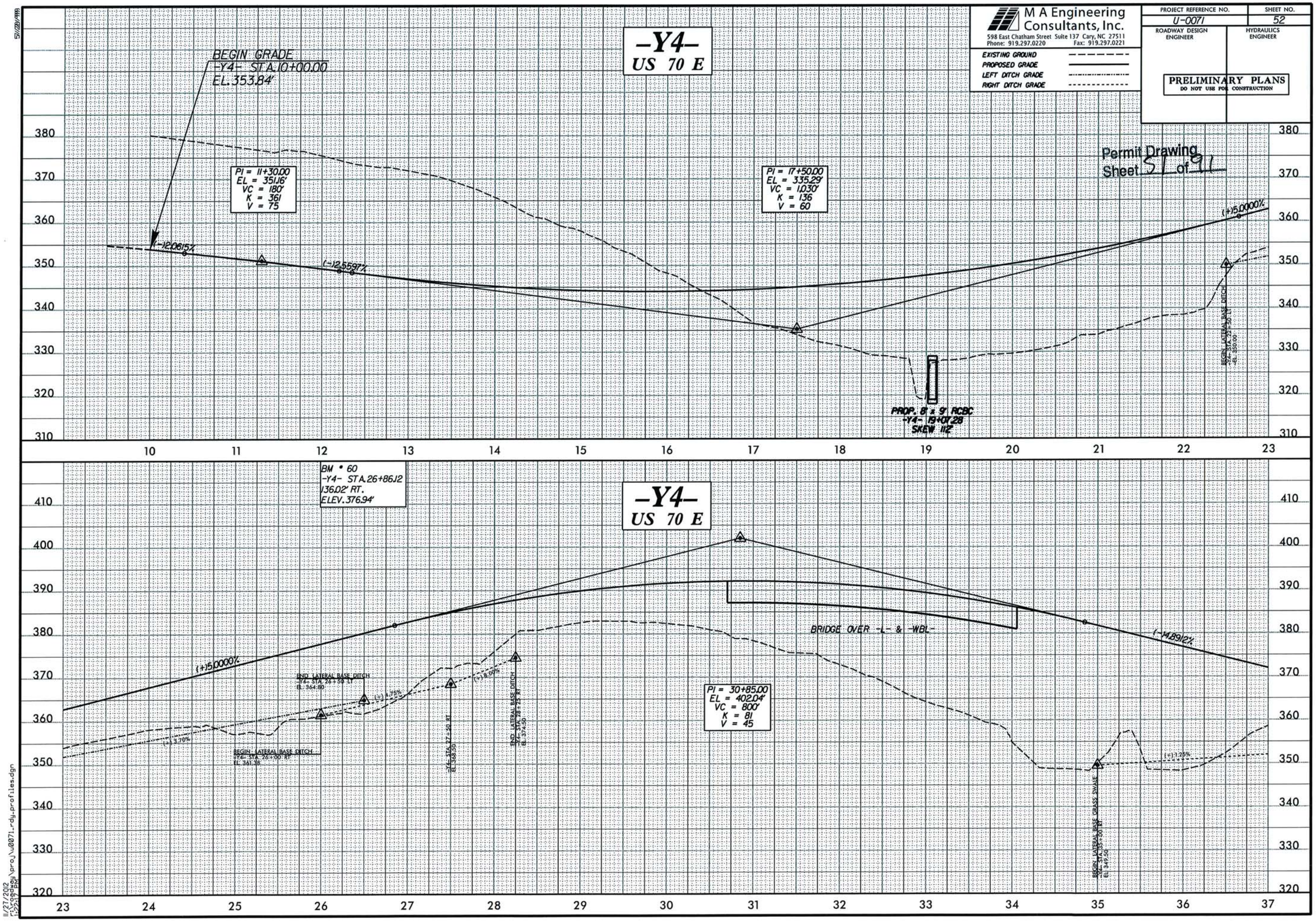
M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 52 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 51 of 91




11/27/2012
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5/28/1999

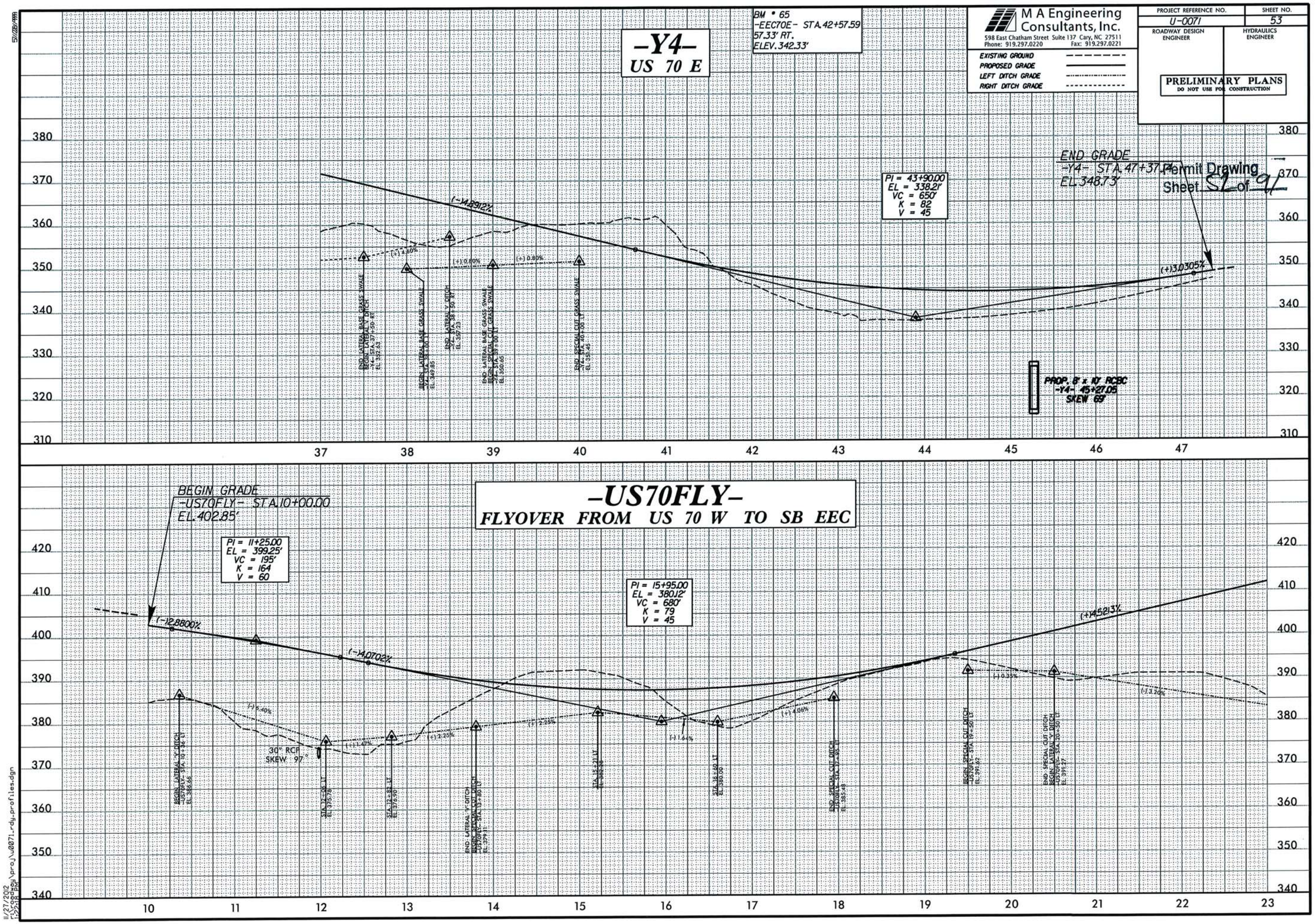
BM * 65
-EEC70E- STA. 42+57.59
57.33' RT.
ELEV. 342.33'

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

| | |
|---|---|
| EXISTING GROUND | - - - - - - - - |
| PROPOSED GRADE | ———— |
| LEFT DITCH GRADE | -·-·-·-·-·- |
| RIGHT DITCH GRADE | - - - - - - - - |

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 53 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION







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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 10-A |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 53 of 91

SURFACE WATER IMPACTS

TEMP SURFACE WATER IMPACTS

TEMP SURFACE WATER IMPACTS

SITE 12

Site continued on Sheets 10-B and 20

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN SURFACE WATER

SITE 12

Site continued on Sheets 10-B and 20

SURFACE WATER IMPACTS

SPECIAL GRASS SWALE SEE DETAIL G1S EST 188 CY DDE

CLASS 'I' RIP RAP EST. 3 TONS 7 SY GFD

LATERAL BASE GRASSED SWALE SEE DETAIL G2 EST 11 CY DDE

10-YR DITCH OUTLET VELOCITY=1.9 FT/SEC

BURY PIPE INVERT 12"

SPECIAL CUT GRASS SWALE w/2' BASE SEE DETAIL G2S

SPECIAL CUT DITCH SEE DETAIL S1R EST 133 TONS CL. II EST 303 SY GFD

15" RCP-III

48" RCP-III

LATERAL BASE GRASS SWALE 10 YR VEL=1.9 F/S SEE DETAIL G2 EST 50 CY DDE

GI W/ANGLE VANE GRATE

JURISDICTIONAL STREAM SEGMENTS RECONNECTED WITH DEFINED CHANNEL

RECONNECT WITH TAIL DITCH SEE DETAIL BG3 EST 26 TONS CL. II EST 50 SY GFD

N.C. STATE HIGHWAY COMMISSION

FORMERLY ALLEN D. ALDRIDGE

CLASS 'II' RIP RAP EST. 26 TONS 50 SY GFD

NOTE: RIPRAP PAD TO BE COUNTERSUNK

10-YR DITCH OUTLET VELOCITY=1.3 FT/SEC

LATERAL V DITCH SEE DETAIL L13 EST 33 CY DDE

LATERAL V DITCH SEE DETAIL L13R EST 76 CY DDE EST 89 TONS CL. I EST 200 SY GFD

CLASS 'I' RIP RAP EST. 3 TONS 7 SY GFD

15" W/2 ELBOWS

LATERAL BASE GRASS SWALE SEE DETAIL G2 EST 472 CY DDE

CLASS 'I' RIP RAP EST. 14 TONS 28 SY GFD

TAIL 3' BASE DITCH 80 LF @ 3.33% SLOPE SEE DETAIL T3R EST 20 CY DDE

TAIL BASE DITCH 3' BASE 80 LF @ 0.96% SLOPE SEE DETAIL T3 EST 20 CY DDE

REMOVE

24" RCP

400' PS1 TRANSITION

CLASS 'II' RIP RAP EST. 15 TONS 30 SY GFD

WOODS

184

REVISIONS

8/17/99

9/19/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 10-A |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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598 East Chatham Street Suite 137 Cary, NC 27511
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Permit Drawing
Sheet 5 of 11

SURFACE WATER IMPACTS

TEMP SURFACE WATER IMPACTS

TEMP SURFACE WATER IMPACTS

SITE 12

Site continued on Sheets 10-B and 20

SITE 12

Site continued on Sheets 10-B and 20

SURFACE WATER IMPACTS

TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S DENOTES IMPACTS IN SURFACE WATER

N.C. STATE HIGHWAY COMMISSION
FORMERLY ALLEN D. ALDRIDGE
184

SPECIAL GRASS SWALE SEE DETAIL G1S EST 188 CY DDE
CLASS 'I' RIP RAP EST. 3 TONS 7 SY GFD
LATERAL BASE GRASSED SWALE SEE DETAIL G2 EST 11 CY DDE
10-YR DITCH OUTLET VELOCITY = 1.9 FT/SEC
BURY PIPE INVERT 12"
SPECIAL CUT GRASS SWALE w/ 2' BASE SEE DETAIL G1S
SPECIAL CUT DITCH SEE DETAIL S1R EST 133 TONS CL. I EST 303 SY GFD
15" RCP-III
48" RCP-III
24" RCP
REMOVE
TAIL BASE DITCH 3' BASE 80 LF @ 0.96% SLOPE SEE DETAIL T3 EST 20 CY DDE
LATERAL BASE GRASS SWALE 10 YR VEL = 1.9 F/S SEE DETAIL G2 EST 20 CY DDE
G1 W/ANGLE VANE GRATE
15" W/2 ELBOWS
CLASS 'II' RIP RAP EST. 26 TONS 50 SY GFD
NOTE: RIPRAP PAD TO BE COUNTERSUNK
10-YR DITCH OUTLET VELOCITY = 1.3 FT/SEC
LATERAL V DITCH SEE DETAIL L13 EST 33 CY DDE
LATERAL V DITCH SEE DETAIL L13R EST 76 CY DDE
EST 89 TONS CL. I EST 200 SY GFD
CLASS 'I' RIP RAP EST. 3 TONS 7 SY GFD
LATERAL BASE GRASSED SWALE SEE DETAIL G2 EST 472 CY DDE
CLASS 'I' RIP RAP EST. 14 TONS 28 SY GFD
3' BASE DITCH @ 3.33% SLOPE SEE DETAIL T3R
CLASS 'II' RIP RAP EST. 15 TONS 30 SY GFD
TAIL DITCH SEE DETAIL BG3 EST 26 TONS CL. II EST 50 SY GFD
JURISDICTIONAL STREAM SEGMENTS DISCONNECTED WITH DEFINED CHANNEL RECONNECT WITH TAIL DITCH SEE DETAIL BG3 EST 26 TONS CL. II EST 50 SY GFD
INVERT PIPE 12" SEE DETAIL BG3
WOODS
BEGIN U-5710

REVISIONS

8/17/99

9/18/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 10-B |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
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Permit Drawing
Sheet 55 of 91

N.C.D.O.T.
(FORMERLY ALVIS M. BAUCOM)

WOODS

# SITE 13

SPECIAL LATERAL V DITCH
SEE DETAIL SLTR
EST 97 TONS CL. I
EST 300 SY GFD

CLASS 'I' RIP RAP
EST. 7 TONS
15 SY GFD

# SITE 12

Site continued on
Sheet 10-A

SLOPE
400' PST TRANSITION
300' TRANSITION
15" RCP-III
REMOVE
18" RCP
TBDI W/ANGLE VANE GRATE
DRAIN POND
TYPE B-77
24" RCP-III
2GI
GRAU 350
8:1 TAPER
MED. GR ANCHOR
PROACH SLAB
OC STA. 33+86.10
IN SBG
- STA. 33+72.21
BRIDGE
POC STA. 33+62.43
WALL
ICTURE
S
BARRIER
(61' LT)
POC Sta. 32+13.85
+45.55

| | |
|---|---|
| P P | DENOTES IMPACTS IN SURFACE WATER (POND) |
| S S | DENOTES IMPACTS IN SURFACE WATER |
| TS TS | DENOTES TEMPORARY IMPACTS IN SURFACE WATER |

REVISIONS

8/17/99

9/19/2013
AXISPrint Inc.

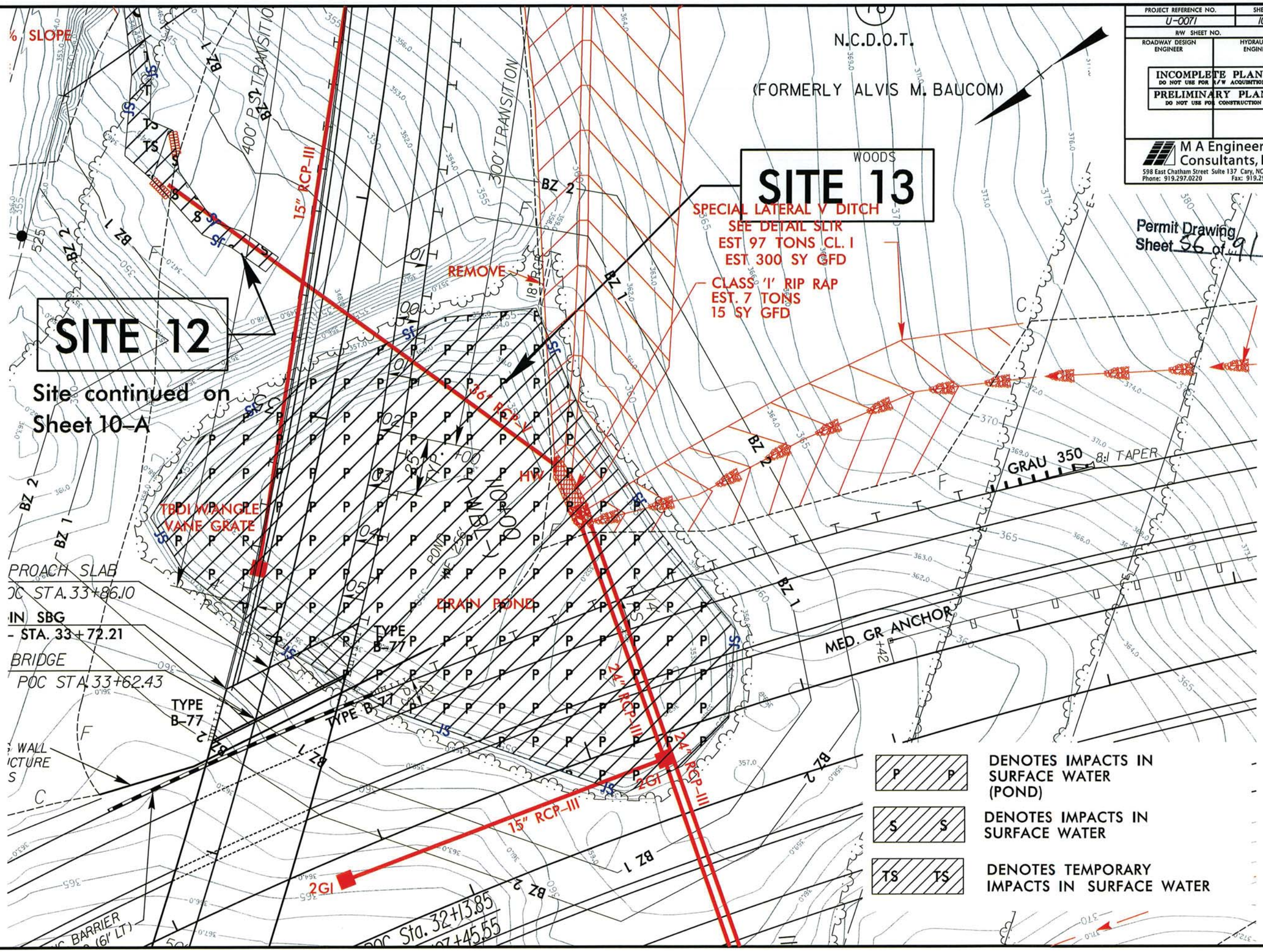
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 10-B |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 56 of 91




REVISIONS

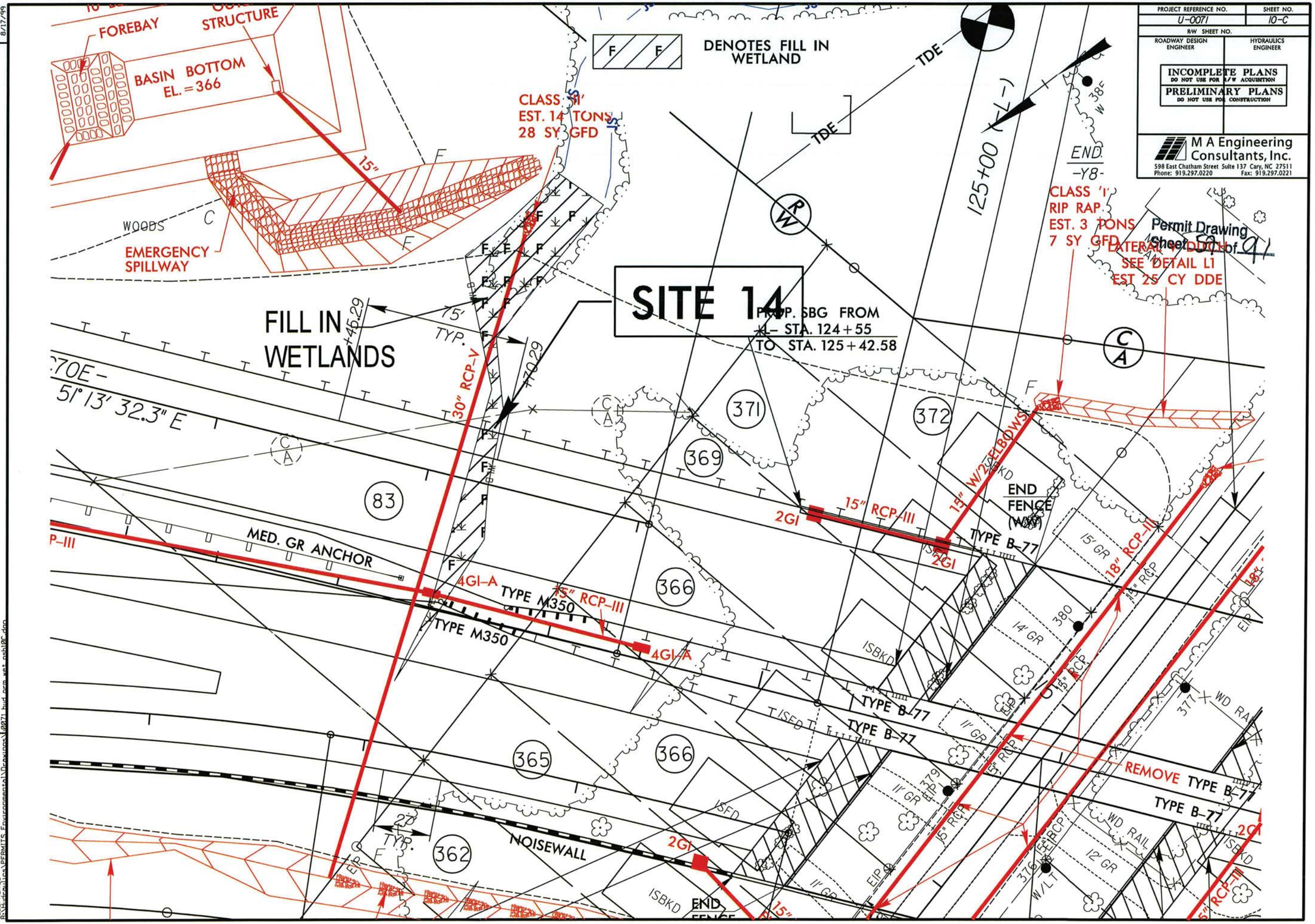
8/17/99

9/19/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 10-C |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221




REVISIONS

8/17/99

9/9/2013
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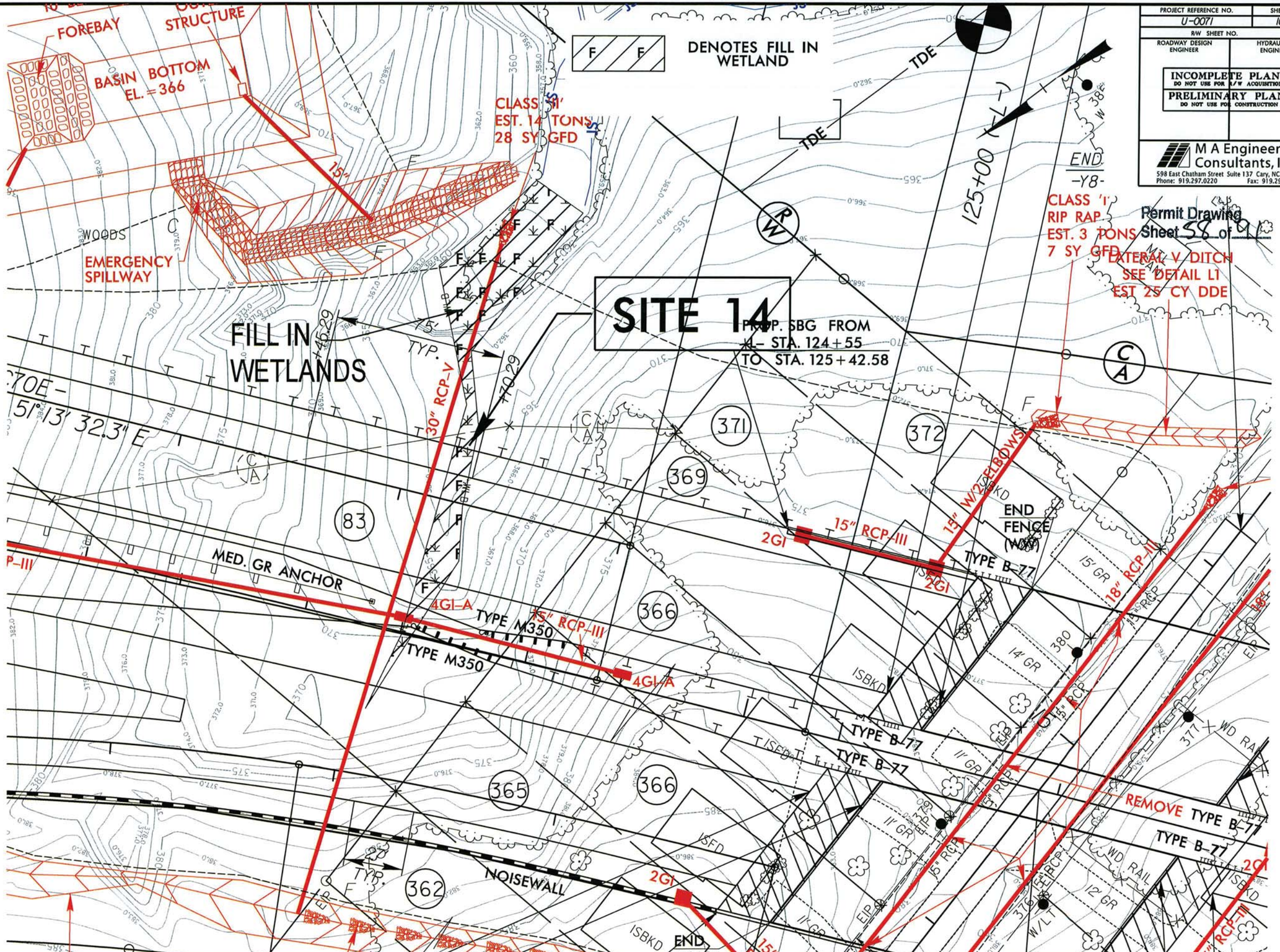
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 10-C |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 58 of 91




REVISIONS

8/17/99

9/19/2013
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8/23/99

| PROJ. REFERENCE NO. | SHEET NO. |
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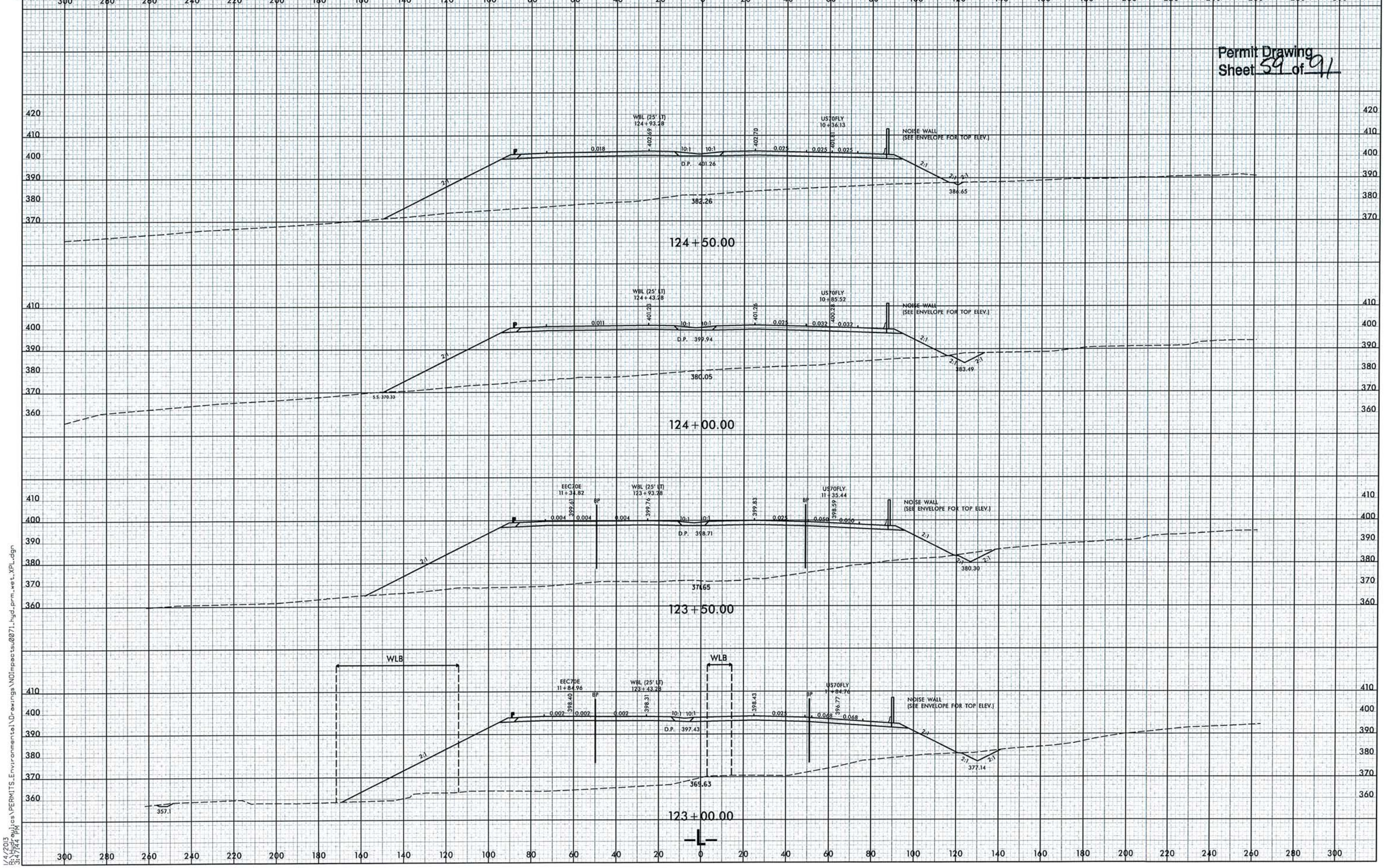
| U-0071 | X-45 |

0 10 20

Permit Drawing
Sheet 59 of 91

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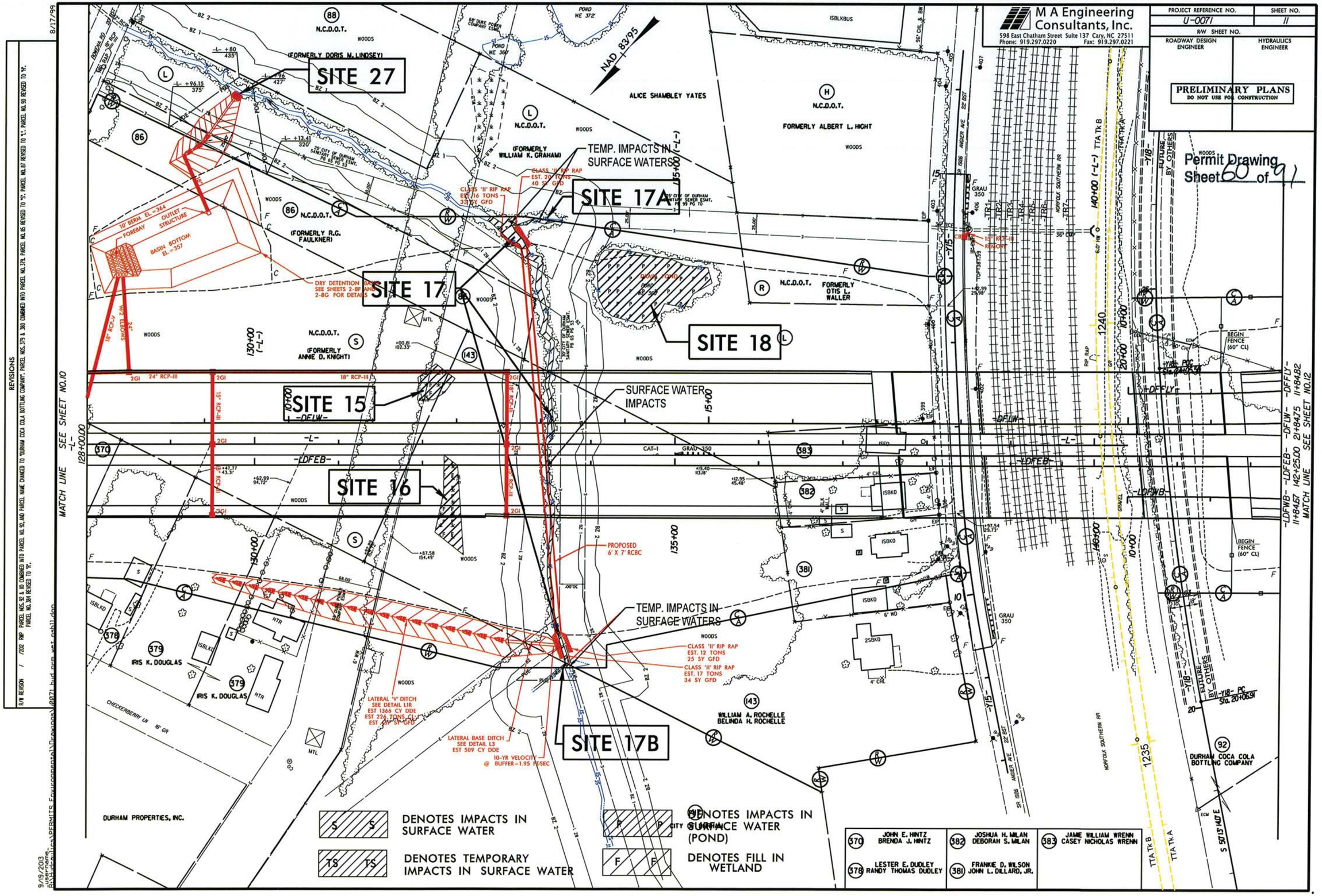
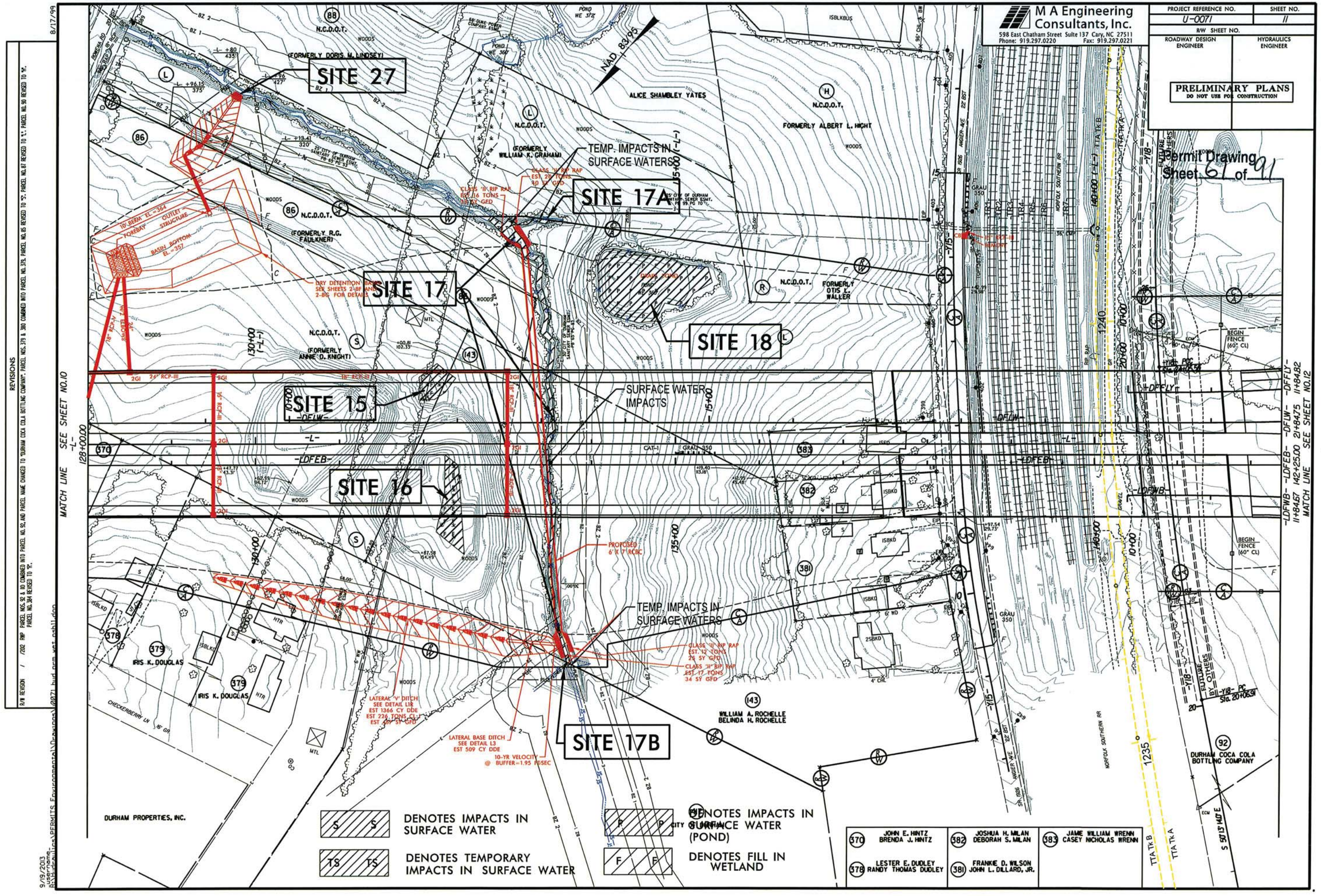

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221
PROJECT REFERENCE NO.
U-0071
SHEET NO.
11
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing
Sheet 60 of 91
NAD 83/95
SITE 27
SITE 17A
SITE 17
SITE 18
SITE 15
SITE 16
SITE 17B
TEMP. IMPACTS IN SURFACE WATERS
SURFACE WATER IMPACTS
PROPOSED 6' X 7' RCBC
DRY DETENTION BASIN SEE SHEETS 2-BF AND 2-BG FOR DETAILS
CLASS 'II' RIP RAP EST. 20 TONS 40 SY GFD
CLASS 'II' RIP RAP EST. 16 TONS 33 SY GFD
CLASS 'II' RIP RAP EST. 12 TONS 25 SY GFD
CLASS 'II' RIP RAP EST. 17 TONS 34 SY GFD
LATERAL 'V' DITCH SEE DETAIL L1R EST 1366 CY DDE EST 224 TONS CLII EST 209 SY GFD
LATERAL BASE DITCH SEE DETAIL L3 EST 509 CY DDE
10-YR VELOCITY @ BUFFER=1.95 FT/SEC
ALICE SHAMBLEY YATES
FORMERLY ALBERT L. HIGHT
FORMERLY OTIS L. WALLER
FORMERLY DORIS M. LINDSEY
FORMERLY WILLIAM K. GRAHAM
FORMERLY R.G. FAULKNER
FORMERLY ANNIE D. KNIGHT
IRIS K. DOUGLAS
WILLIAM A. ROCHELLE
BELINDA H. ROCHELLE
DURHAM COCA COLA BOTTLING COMPANY
DURHAM PROPERTIES, INC.
JOHN E. HINTZ
BRENDA J. HINTZ
LESTER E. DUDLEY
RANDY THOMAS DUDLEY
JOSHUA H. MILAN
DEBORAH S. MILAN
FRANKIE D. WILSON
JOHN L. DILLARD, JR.
JAME WILLIAM WRENN
CASEY NICHOLAS WRENN
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER (POND)
DENOTES FILL IN WETLAND
MATCH LINE SEE SHEET NO.10
MATCH LINE SEE SHEET NO.12
REVISIONS
R/W REVISION
8/17/99
9/19/2013


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221
PROJECT REFERENCE NO.
U-0071
SHEET NO.
11
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
Permit Drawing Sheet 67 of 91
NAD 83/95
SITE 27
SITE 17A
SITE 17
SITE 18
SITE 15
SITE 16
SITE 17B
TEMP. IMPACTS IN SURFACE WATERS
SURFACE WATER IMPACTS
TEMP. IMPACTS IN SURFACE WATERS
DRY DETENTION BASIN SEE SHEETS 2-BF AND 2-BG FOR DETAILS
10' BERM EL=364
FOREBAY
OUTLET STRUCTURE
BASIN BOTTOM EL=357
PROPOSED 6' X 7' RCBC
CLASS 'II' RIP RAP EST. 12 TONS 28 SY GFD
CLASS 'II' RIP RAP EST. 17 TONS 34 SY GFD
LATERAL 'V' DITCH SEE DETAIL L1B EST 1366 CY DDE EST 226 TONS CLASS 'II' RIP RAP EST 49 SY GFD
LATERAL BASE DITCH SEE DETAIL L3 EST 509 CY DDE
10-YR VELOCITY @ BUFFER=1.95 FT/SEC
N.C.D.O.T.
(FORMERLY DORIS M. LINDSEY)
ALICE SHAMBLEY YATES
FORMERLY ALBERT L. HIGHT
(FORMERLY WILLIAM K. GRAHAM)
(FORMERLY R.G. FAULKNER)
(FORMERLY ANNIE D. KNIGHT)
FORMERLY OTIS L. WALLER
IRIS K. DOUGLAS
WILLIAM A. ROCHELLE
BELINDA H. ROCHELLE
DURHAM COCA COLA BOTTLING COMPANY
DURHAM PROPERTIES, INC.
NORFOLK SOUTHERN RR
CHECKERBERRY LN
MATCH LINE SEE SHEET NO.10
MATCH LINE SEE SHEET NO.12
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES IMPACTS IN SURFACE WATER (POND)
DENOTES FILL IN WETLAND
370 JOHN E. HINTZ BRENDA J. HINTZ
378 LESTER E. DUDLEY RANDY THOMAS DUDLEY
381 FRANKIE D. WILSON JOHN L. DILLARD, JR.
382 JOSHUA H. MILAN DEBORAH S. MILAN
383 JAMIE WILLIAM WRENN CASEY NICHOLAS WRENN
REVISIONS
8/17/99
9/19/2003

| EXISTING GROUND | |
|---|---|
| PROPOSED GRADE | |
| LEFT DITCH GRADE | |
| RIGHT DITCH GRADE | |

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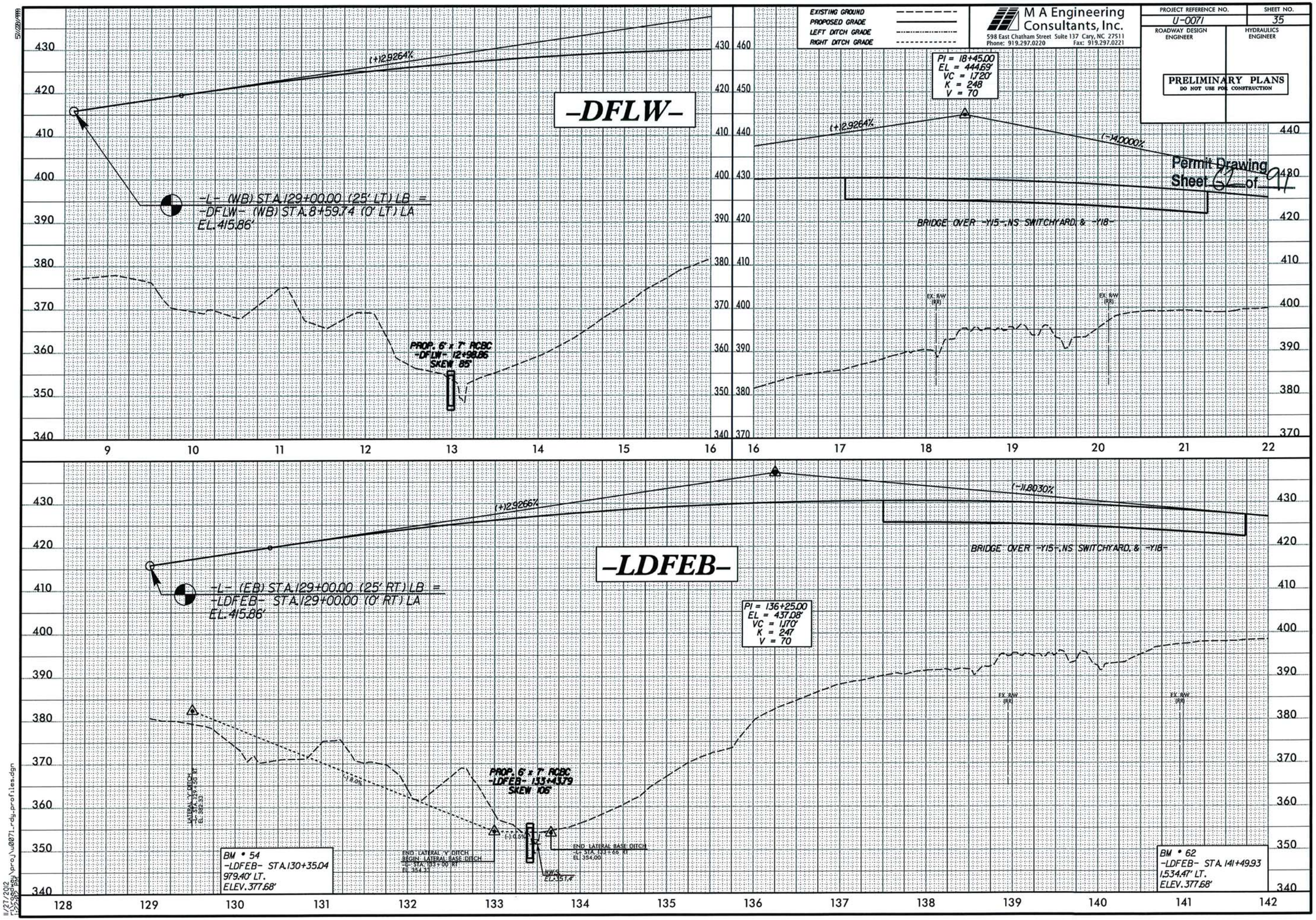
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 35 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 61 of 97

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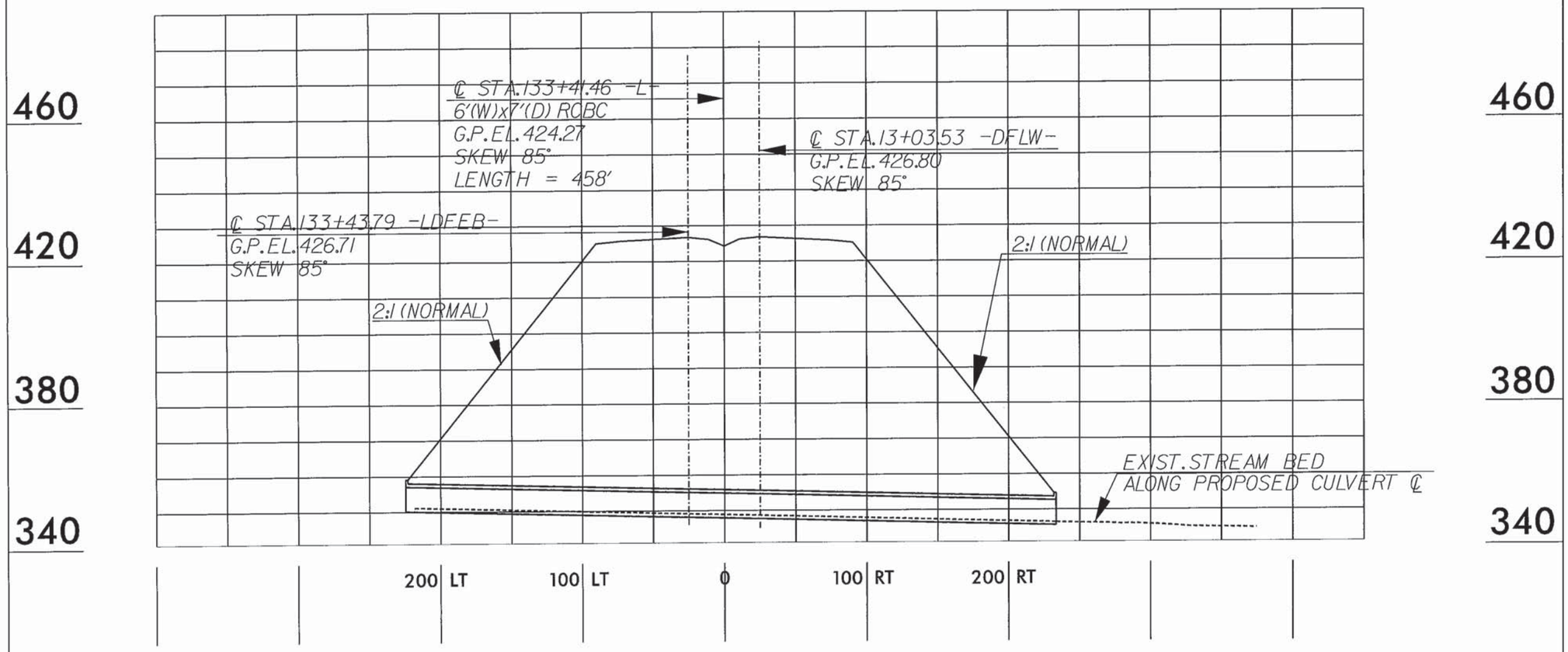



# PROFILE

| CULVERT HYDRAULIC DATA | | |
|---|---|---|
| DESIGN DISCHARGE | = 280 | CFS |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN HW ELEVATION | = 358.0 | FT |
| BASE DISCHARGE | = 330 | CFS |
| BASE FREQUENCY | = 100 | YRS |
| BASE HW ELEVATION | = 358.8 | FT |
| OVERTOPPING DISCHARGE | = N/A | CFS |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING ELEVATION | = N/A | FT |

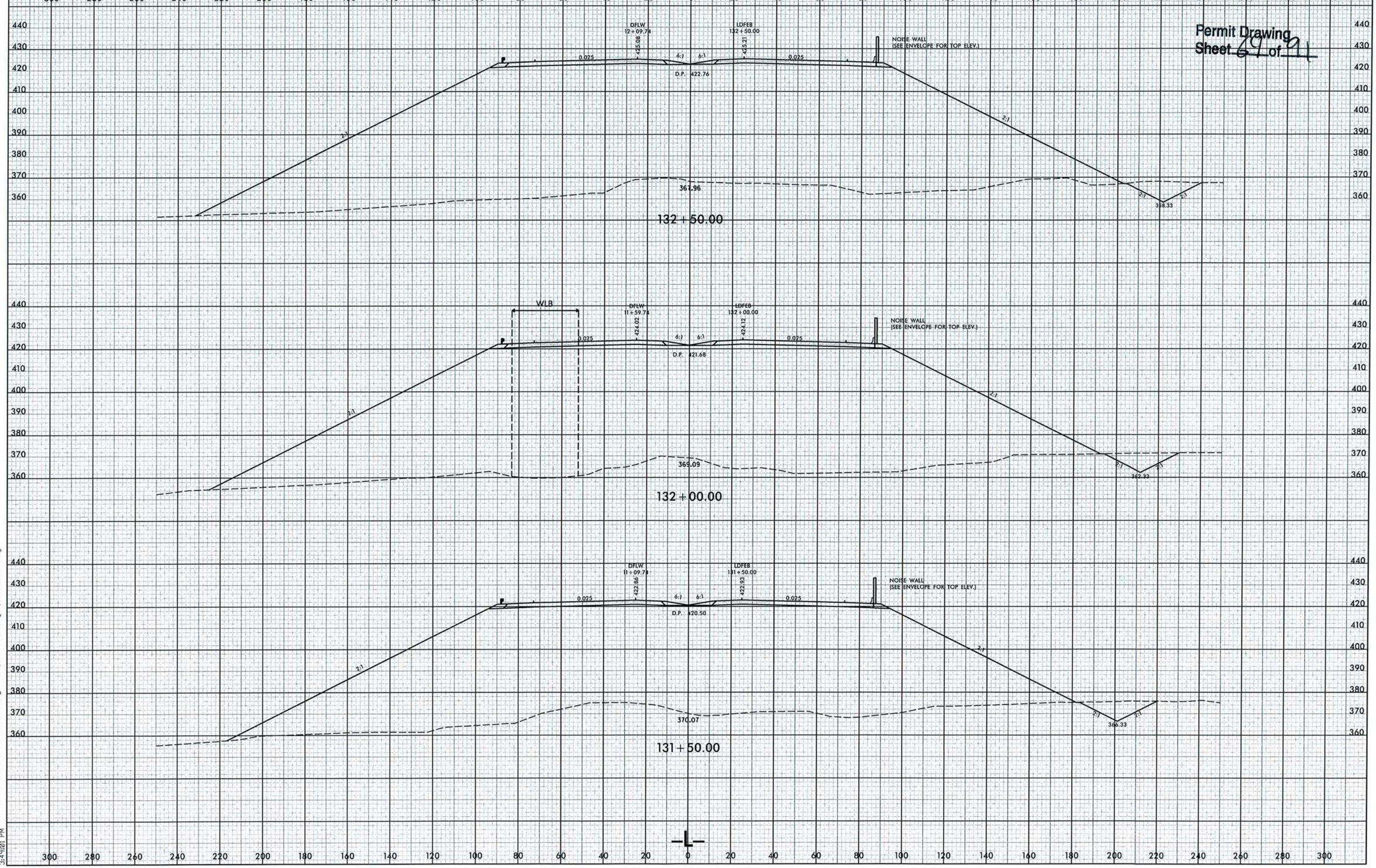
NCDOT
DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: U-0071
DURHAM EAST END CONNECTOR,
FROM NC 147
(BUCK DEAN FREEWAY) TO
NORTH OF NC 98

SHEET OF 12/27/12

8/23/99

| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-49 |

Permit Drawing
Sheet 69 of 91

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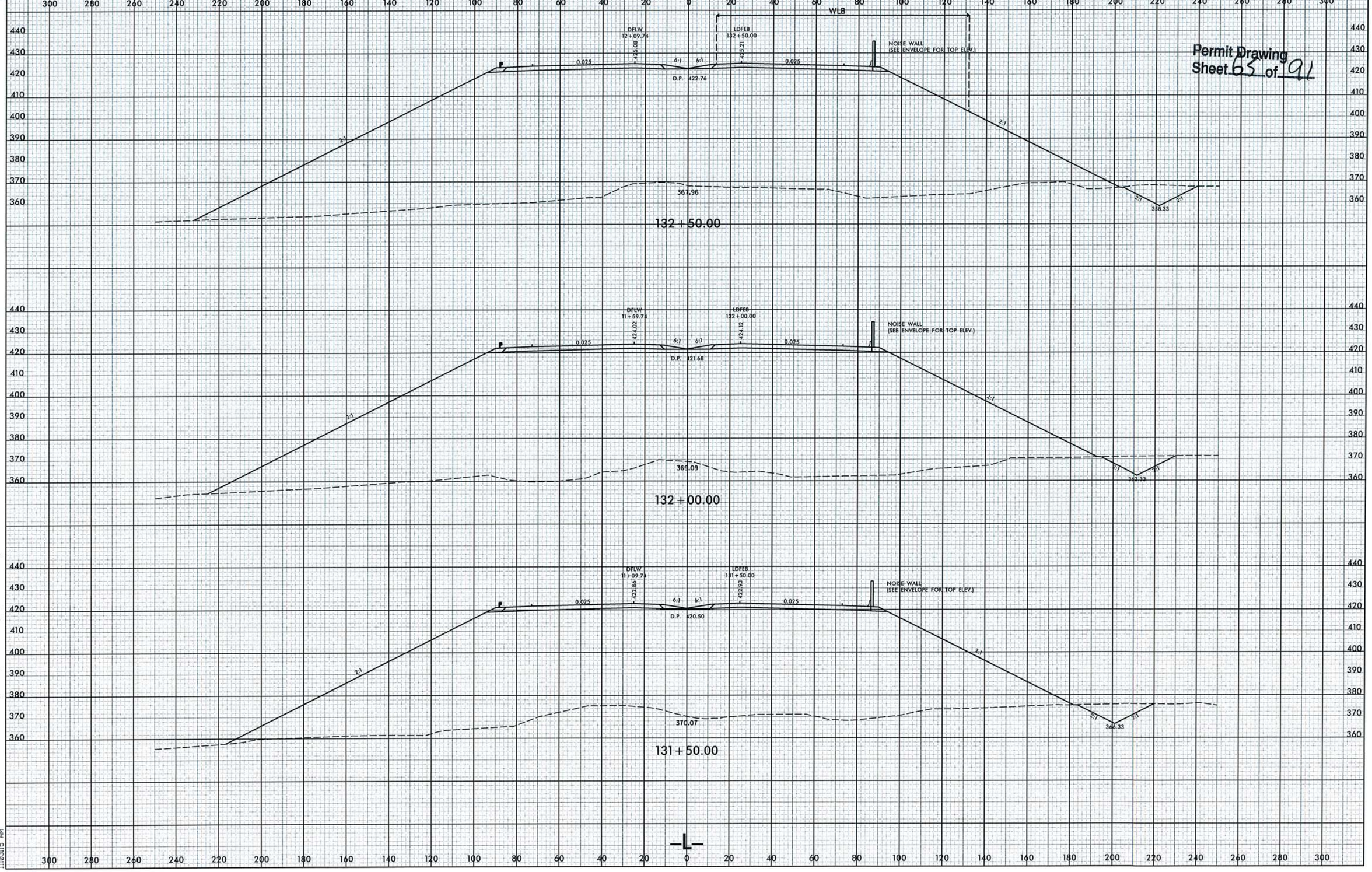
8/23/99

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-49 |

0 10 20

Permit Drawing
Sheet 65 of 91





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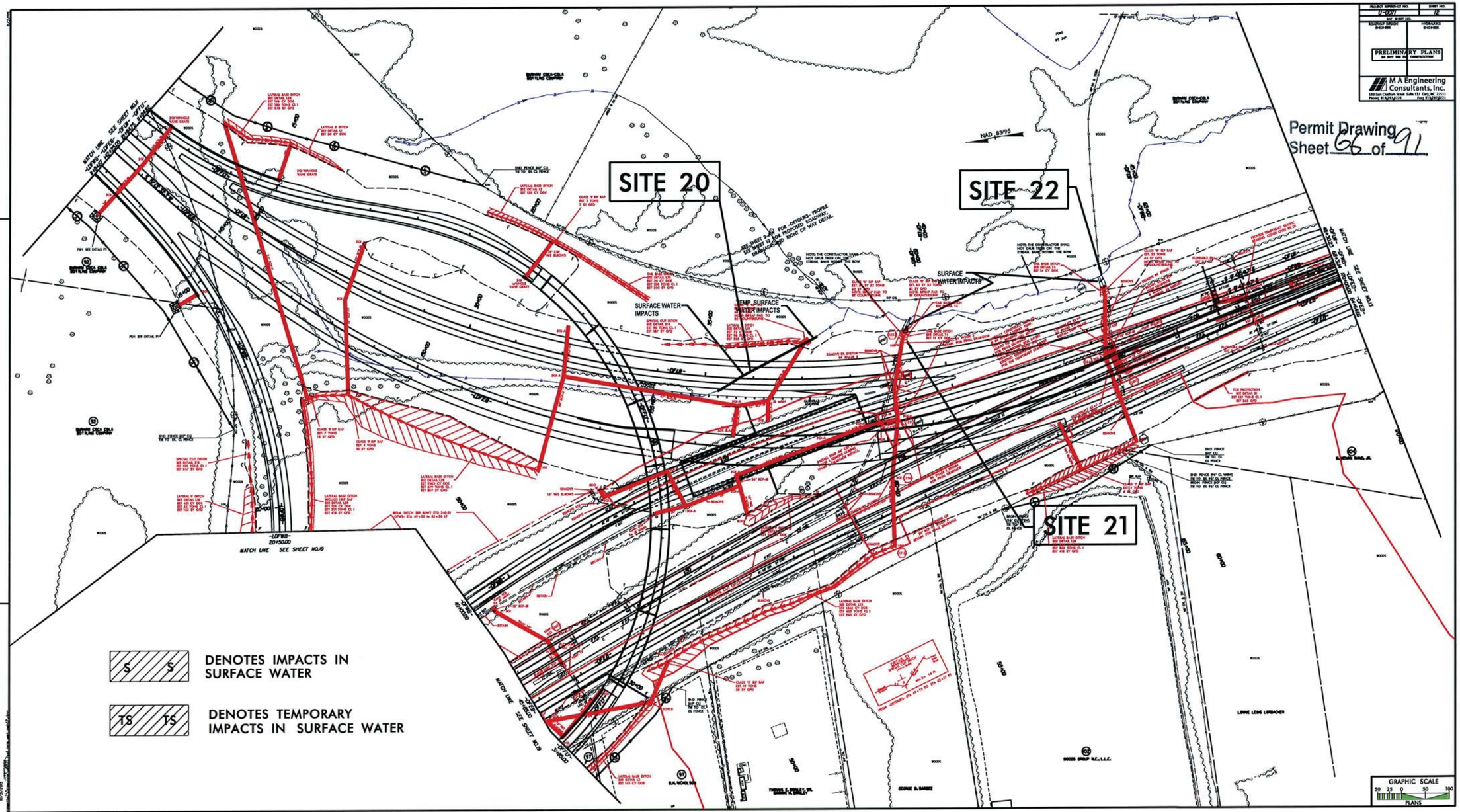
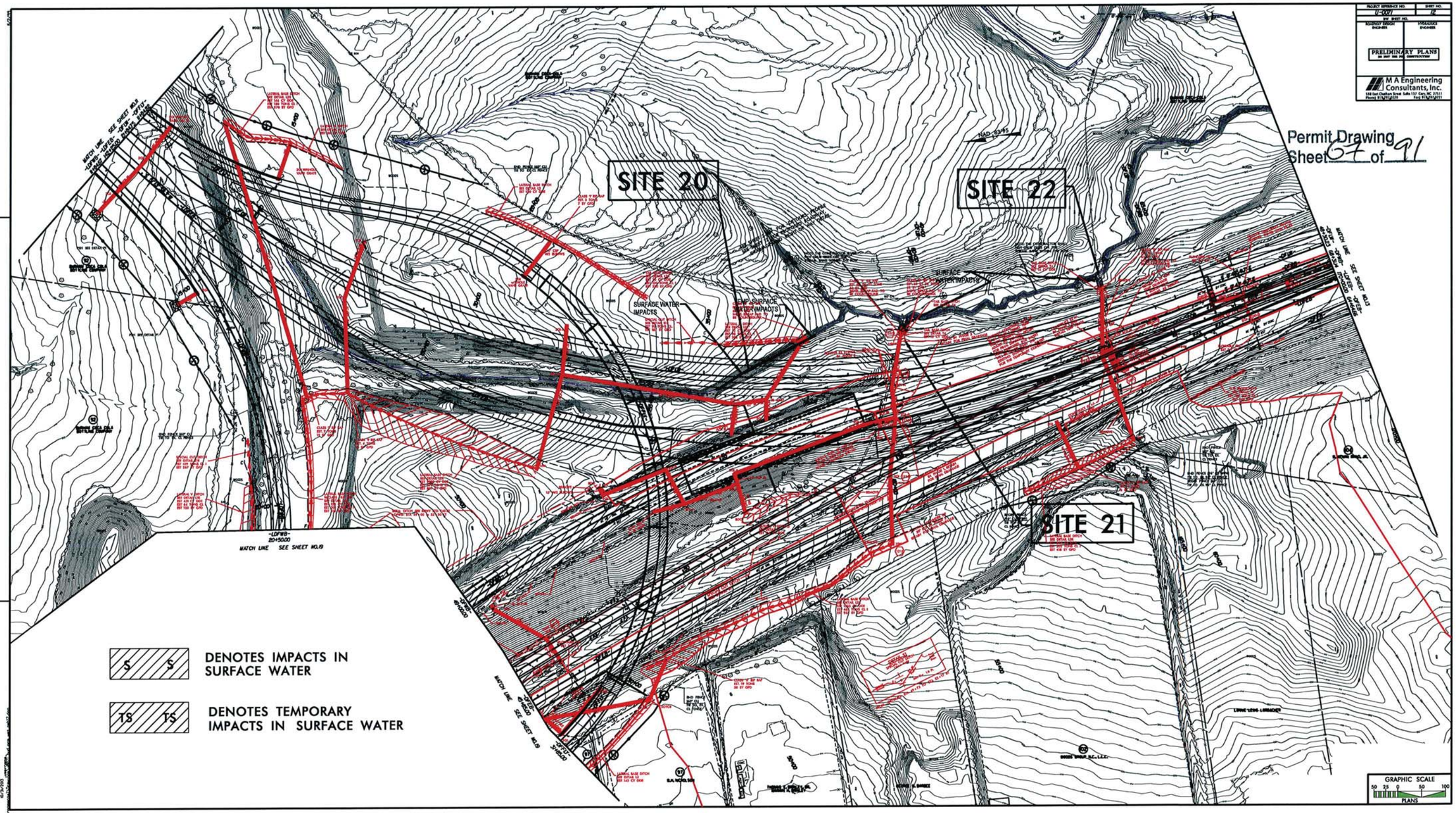

PRELIMINARY PLANS
M A Engineering Consultants, Inc.
Permit Drawing
Sheet 66 of 91
SITE 20
SITE 22
SITE 21
SURFACE WATER IMPACTS
TEMP. SURFACE WATER IMPACTS
NAD 83/95
MATCH LINE SEE SHEET M0.19
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
PLANS


PROJECT REFERENCE NO.
U-0001
SHEET NO.
12
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
M A Engineering Consultants, Inc.
Permit Drawing
Sheet 67 of 91
SITE 20
SITE 22
SITE 21
SURFACE WATER IMPACTS
TEMP. SURFACE WATER IMPACTS
MATCH LINE SEE SHEET #19
-L-PR-B-
20+50.00
S S DENOTES IMPACTS IN SURFACE WATER
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
GRAPHIC SCALE
50 25 0 50 100
PLANS

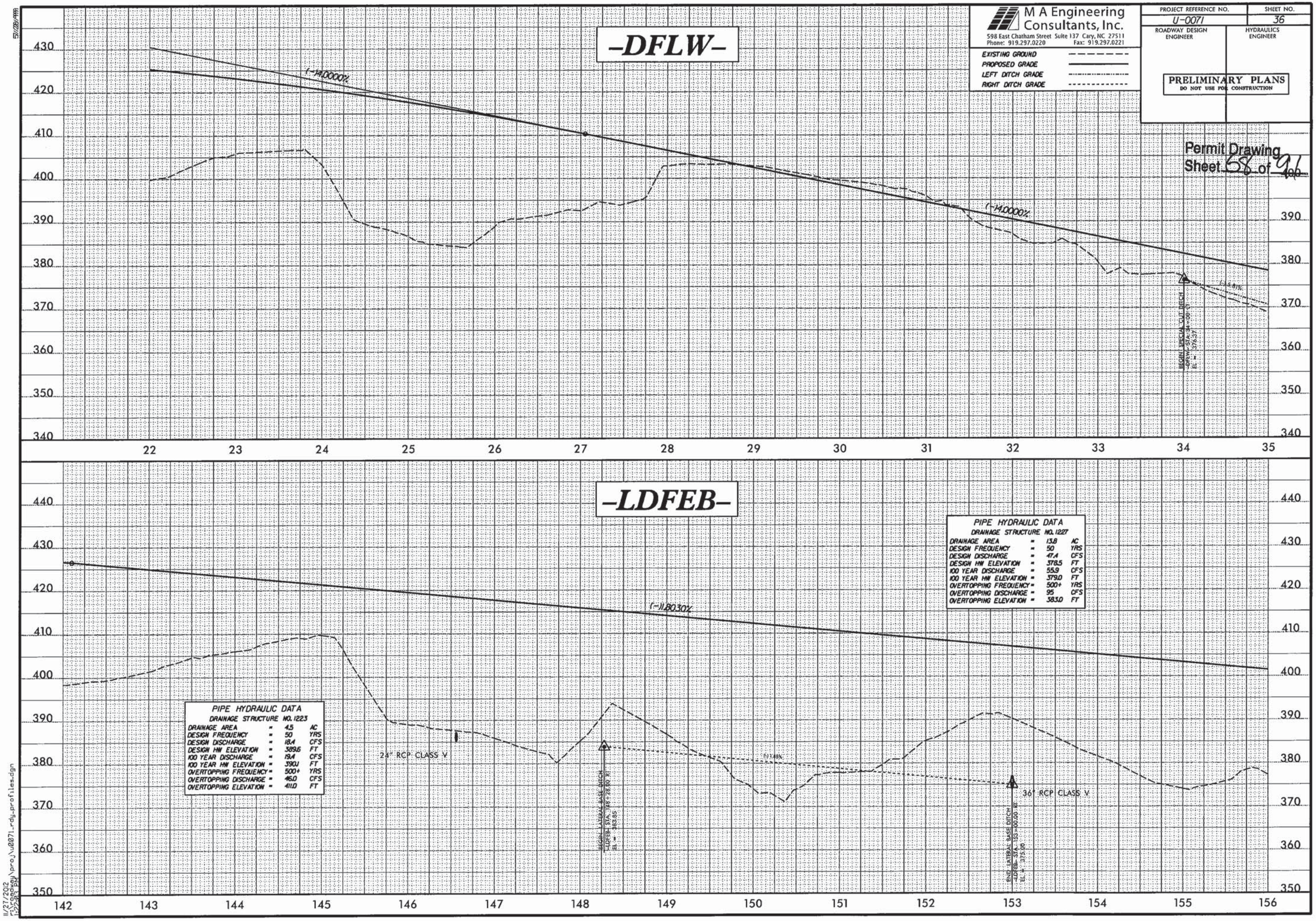
M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 36 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

Permit Drawing
Sheet 58 of 96




PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 1227

| | | | |
|---|---|---|---|
| DRAINAGE AREA | = | 13.8 | AC |
| DESIGN FREQUENCY | = | 50 | YRS |
| DESIGN DISCHARGE | = | 47.4 | CFS |
| DESIGN HW ELEVATION | = | 378.5 | FT |
| 100 YEAR DISCHARGE | = | 55.9 | CFS |
| 100 YEAR HW ELEVATION | = | 379.0 | FT |
| OVERTOPPING FREQUENCY | = | 500+ | YRS |
| OVERTOPPING DISCHARGE | = | 95 | CFS |
| OVERTOPPING ELEVATION | = | 383.0 | FT |

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 1223

| | | | |
|---|---|---|---|
| DRAINAGE AREA | = | 4.5 | AC |
| DESIGN FREQUENCY | = | 50 | YRS |
| DESIGN DISCHARGE | = | 18.4 | CFS |
| DESIGN HW ELEVATION | = | 389.6 | FT |
| 100 YEAR DISCHARGE | = | 19.4 | CFS |
| 100 YEAR HW ELEVATION | = | 390.1 | FT |
| OVERTOPPING FREQUENCY | = | 500+ | YRS |
| OVERTOPPING DISCHARGE | = | 46.0 | CFS |
| OVERTOPPING ELEVATION | = | 411.0 | FT |

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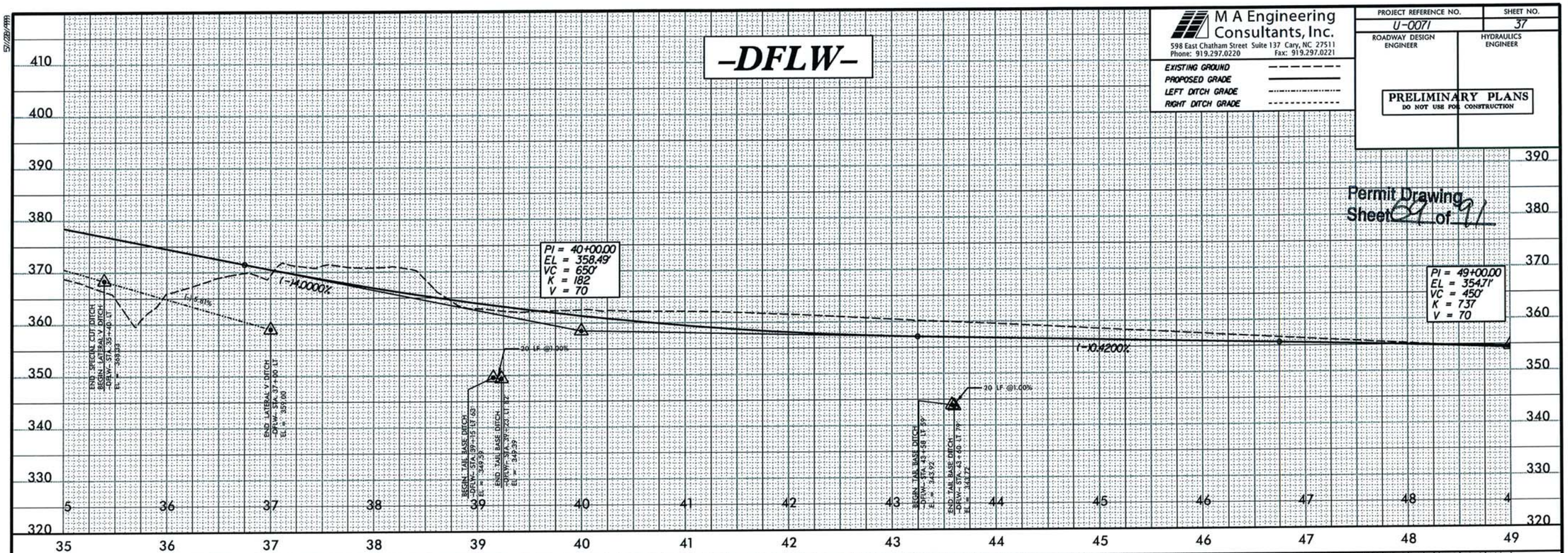
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

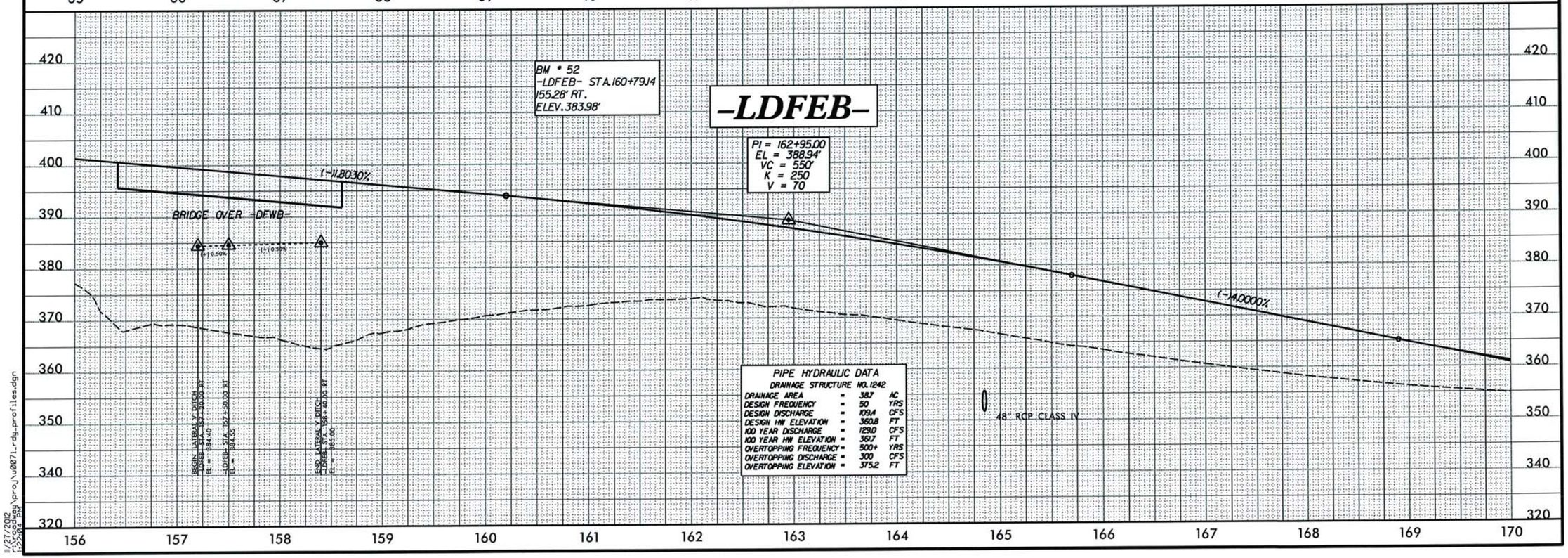
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 37 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

Permit Drawing
Sheet 89 of 91

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 12-A |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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Permit Drawing
Sheet 23 of 91

# SITE 20

LATERAL BASE DITCH
SEE DETAIL L2
EST 120 CY DDE

CLASS 'I' RIP RAP
EST. 3 TONS
7 SY GFD

This stream is not jurisdictional as shown in the planimetric file.

15" CSP
W/2 ELBOWS

2GI
w/ANGLE
VANE GRATE

TAIL BASE DITCH
SEE DETAIL L2R
EST 20 CY DDE
EST 120 TONS CL I
EST 250 SY GFD

SURFACE WATER IMPACTS

TEMP. SURFACE WATER IMPACTS

CLASS 'I' RIP RAP
EST. 3 TONS
6 SY GFD
NOTE: RIPRAP PAD TO BE COUNTERSUNK

SPECIAL CUT DITCH
SEE DETAIL S1R
EST 90 TONS CL. I
EST 180 SY GFD

LATERAL V DITCH
SEE DETAIL L1R
EST 72 CY DDE
EST 98 TONS CL. I
EST 203 SY GFD

Channel is not jurisdictional upstream of this point.

CLASS 'I' RIP RAP
EST. 7 TONS
15 SY GFD

CLASS 'I' RIP RAP
EST. 4 TONS
10 SY GFD

LATERAL BASE DITCH
SEE DETAIL L2R
EST 9383 CY DDE
EST 379 TONS CL. I
EST 807 SY GFD

LATERAL
W/CLASS
SEE DE
EST 125
EST 201
EST 418

LATERAL BASE
W/CLASS I RIP RA
SEE DETAIL L2R
EST 25CY DDE
EST 40 TONS CL I
EST 82 SY GFD
CLASS 'I' RIP RAP
EST. 4 TONS
SY GFD

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

LATERAL V DITCH
SEE DETAIL L1
EST 107 CY DDE

REMOVE
15" W/2 ELBOWS
REMOVE 3GI
REMOVE
Conn 3GI To JB W/MH
DI IN APP. SLAB
JB wMH
GUIDERAIL ANCHOR
BDO

WOODS
-DFLW-
-LDFEB-
-DFFLY-
-LDFWB-
NC 147 NBL 24" CONC
4" BST
147 SBL 24" CONC

REVISIONS

8/17/99

9/19/2013
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 12-A |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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Permit Drawing
Sheet 27 of 91

# SITE 20

LATERAL BASE DITCH
SEE DETAIL L2
EST 120 CY DDE

CLASS 'I' RIP RAP
EST. 3 TONS
7 SY GFD

This stream is not jurisdictional as shown in the planimetric file.

15" CSP
W/2 ELBOWS

2GI
w/ANGLE
VANE GRATE

TAIL BASE DITCH
SEE DETAIL L2R
EST 20 CY DDE
EST 120 TONS CL I
EST 250 SY GFD

SURFACE WATER IMPACTS

TEMP. SURFACE WATER IMPACTS

SPECIAL CUT DITCH
SEE DETAIL S1R
EST 90 TONS CL I
EST 187 SY GFD

LATERAL V DITCH
SEE DETAIL L1R
EST 72 CY DDE
EST 98 TONS CL I
EST 203 SY GFD

NOTE: RIPRAP PAD TO BE COUNTERSUNK

Channel is not jurisdictional upstream of this point.

CLASS 'I' RIP RAP
EST. 7 TONS
15 SY GFD

CLASS 'I' RIP RAP
EST. 4 TONS
10 SY GFD

LATERAL BASE DITCH
SEE DETAIL L2R
EST 9383 CY DDE
EST 379 TONS CL I
EST 807 SY GFD

LATERAL V DITCH
SEE DETAIL L1
EST 107 CY DDE

REMOVE
15" W/2 ELBOWS

REMOVE 3GI

Conn. 3GI To JB W/MH

DI IN APP. SLAB

GUIDERAIL ANCHOR

JB w/MH

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

REVISIONS

8/17/99

9/19/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 12-B |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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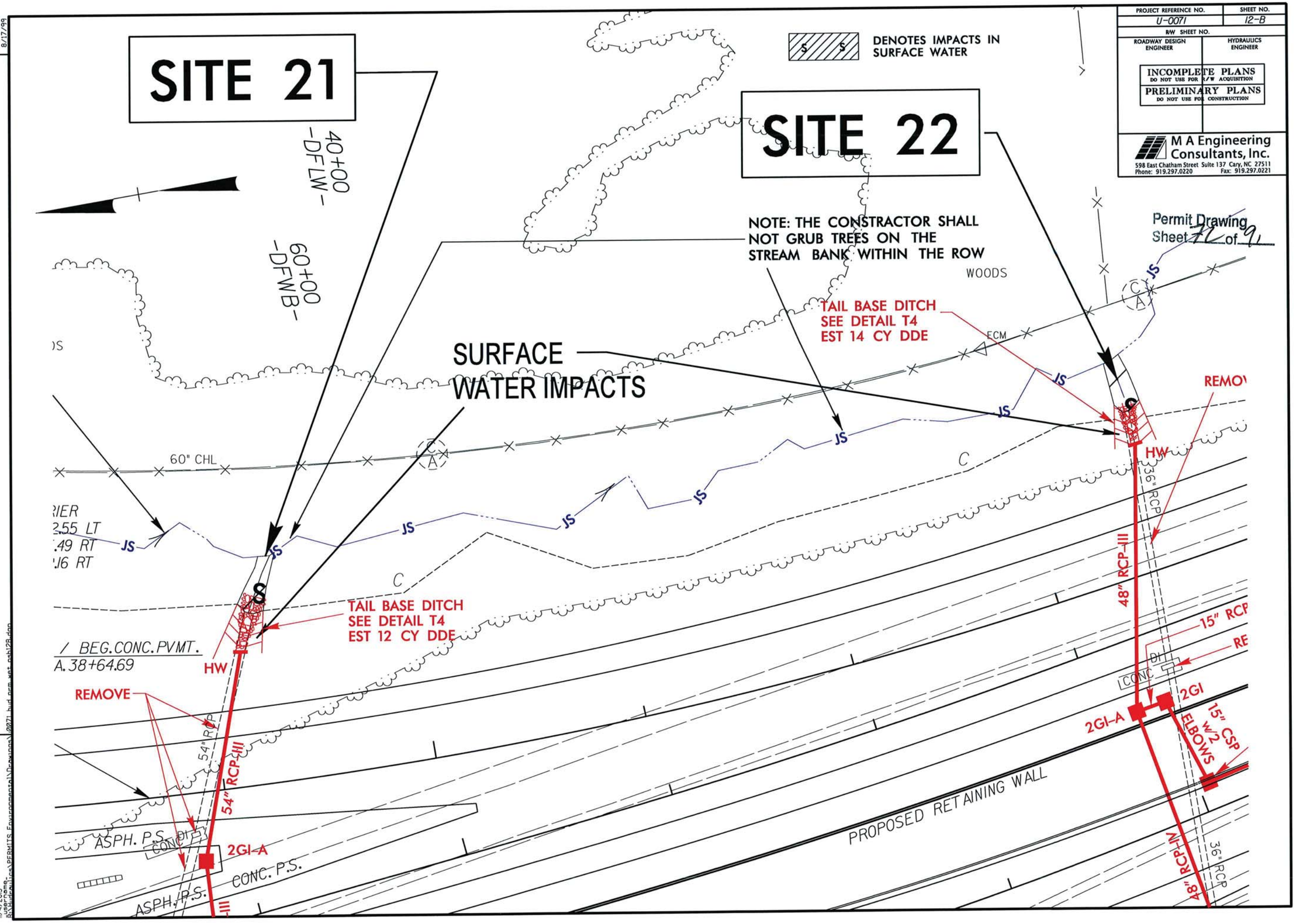
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 12 of 21




8/17/99
REVISIONS
11/4/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 12-B |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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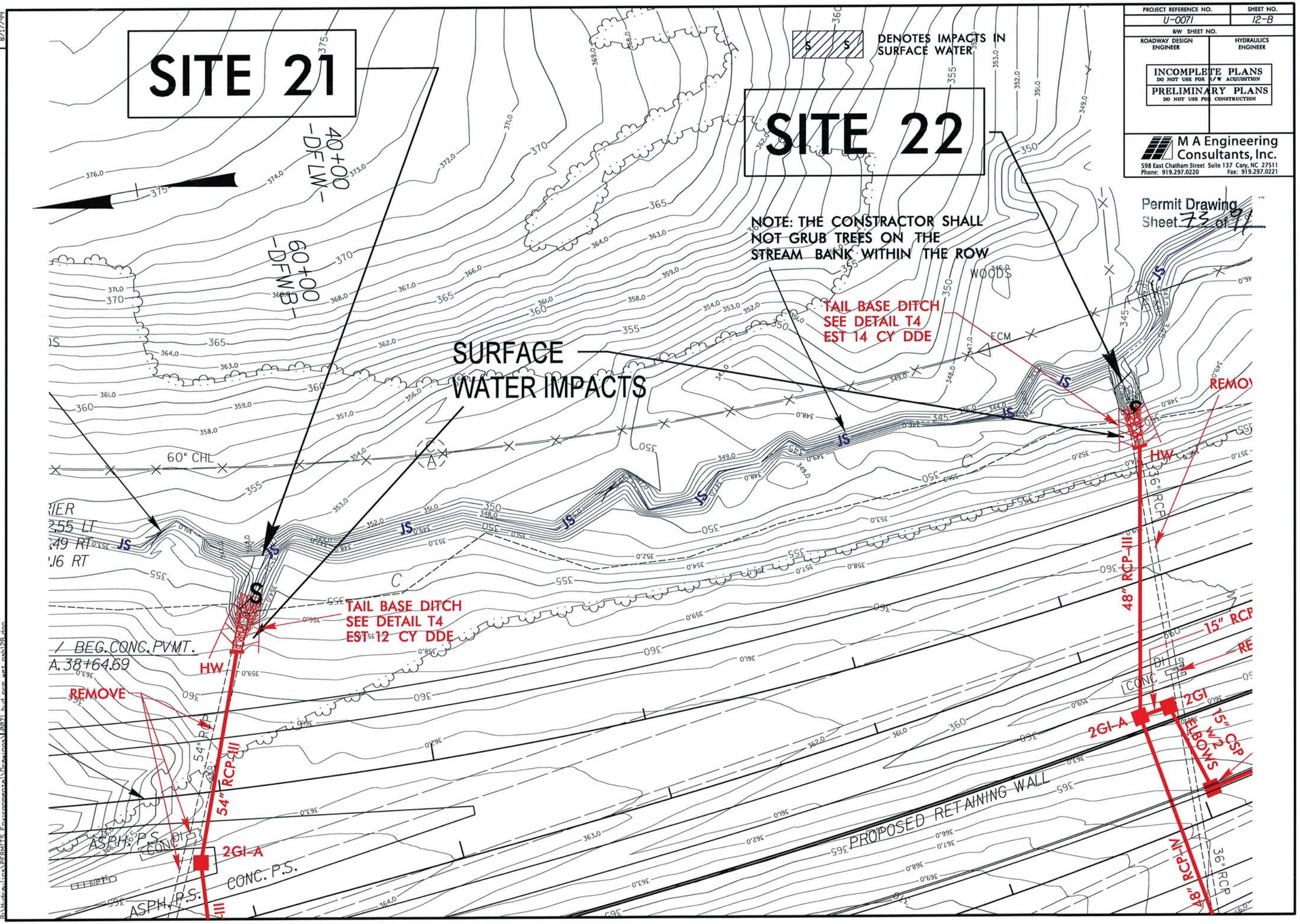
Permit Drawing
Sheet 73 of 91




REVISIONS

8/17/99

10/31/2013
User name:
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 20 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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598 East Chatham Street Suite 137 Cary, NC 27511
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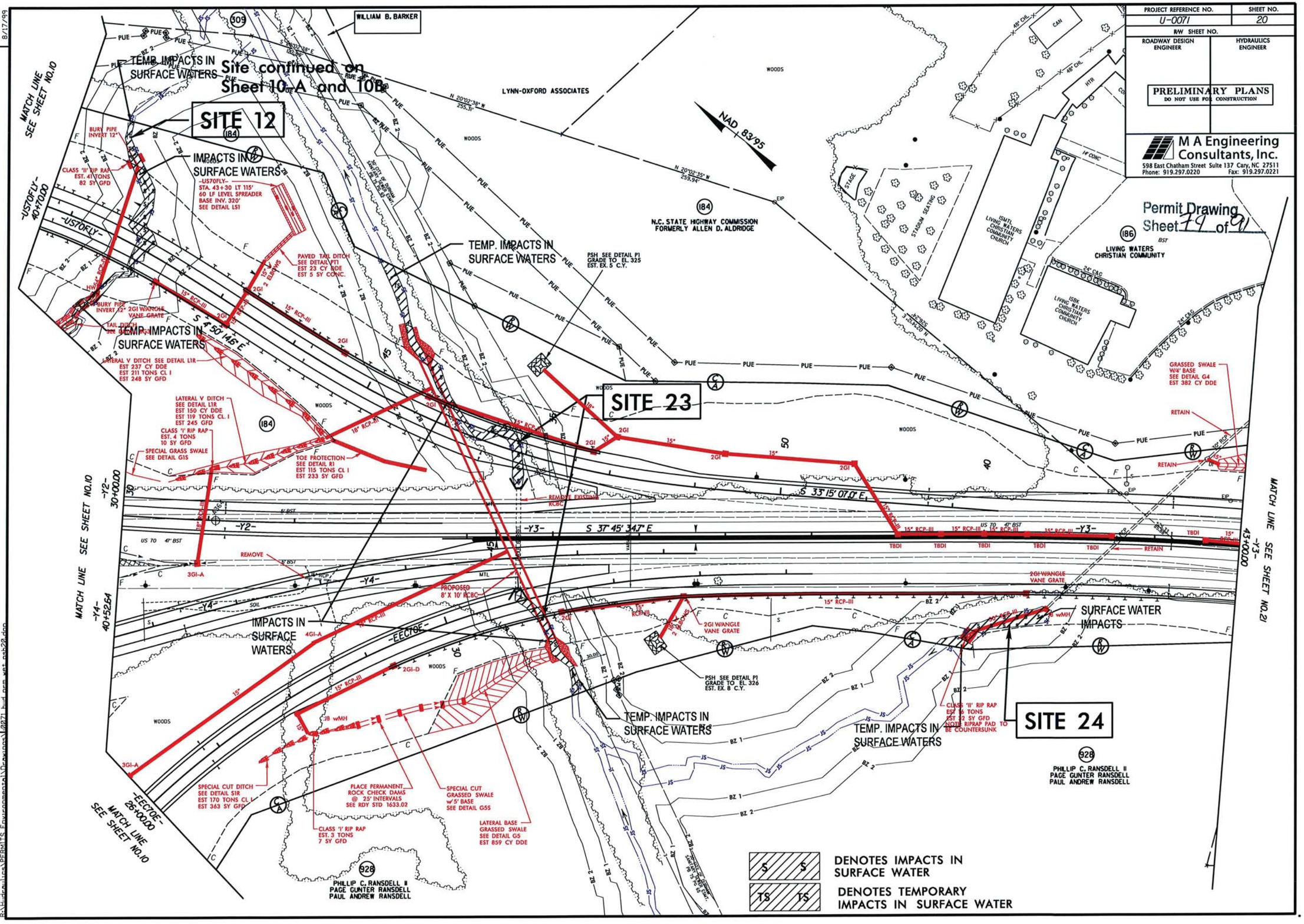
Permit Drawing
Sheet 79 of 91




REVISIONS

8/17/99

10/31/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 20 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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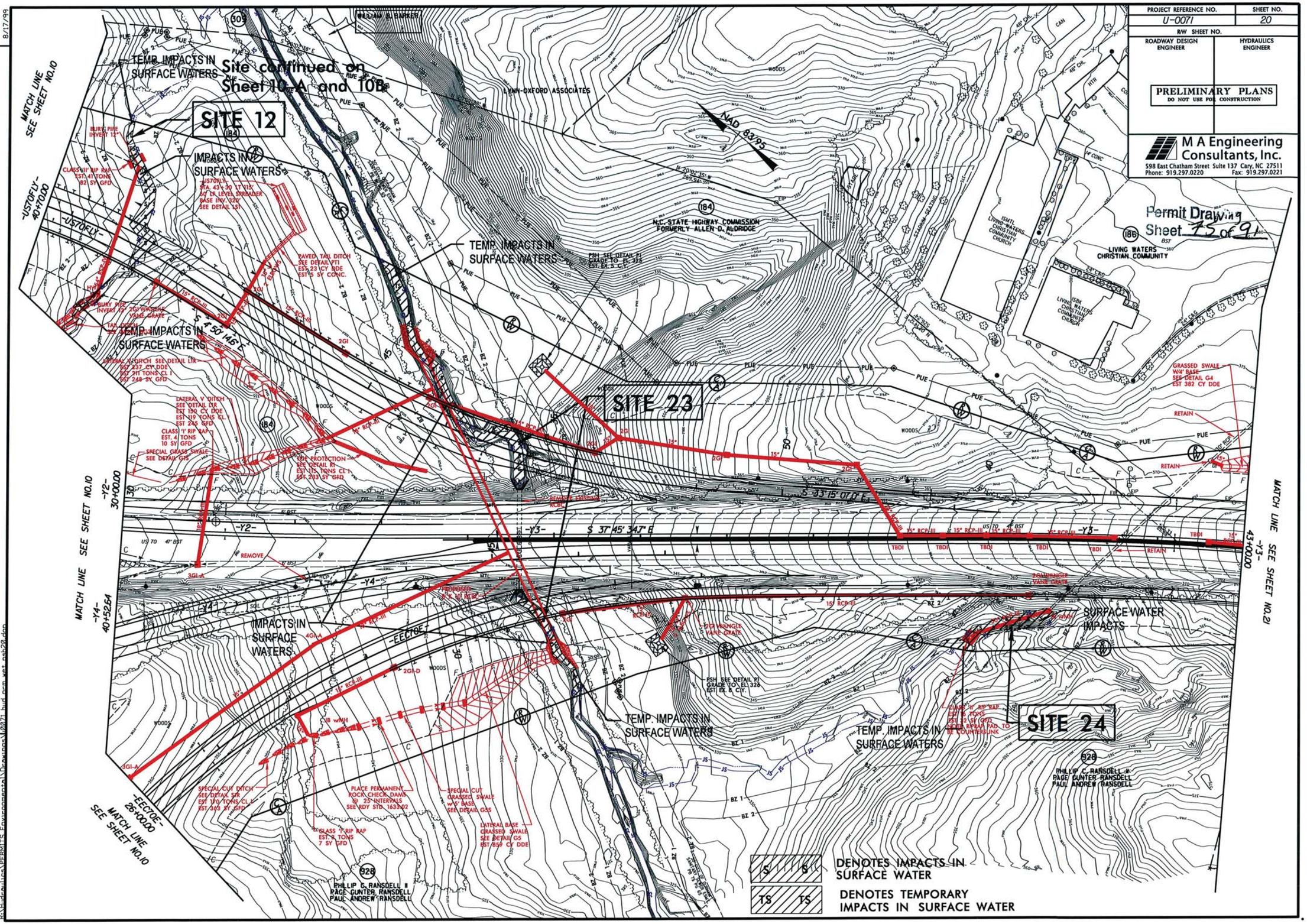
Permit Drawing
Sheet 75 of 91




REVISIONS

R/W REVISION / /202 RWP ALL ADJACENT PARCELS OWNED BY WILLIAM B. BARKER COMBINED INTO PARCEL NO. 326. PARCEL NO. 85 REVISED TO 328.

8/17/99

10/31/2013
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 51 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

(Permit Drawing Sheet 76 of 91)

# -Y3- US 70 W

PI = 41+00.00
EL = 367.20'
VC = 470'
K = 1093
V = 70

PI = 47+82.00
EL = 400.69'
VC = 450'
K = 47
V = 40

(+)4.4800%
(+)4.9106%
(+)1.5%
(+)0.5%

END GRASS SWALE
-Y3- STA. 38+30 RT
EL. 335.00

BEGIN LATERAL BASE GRASS SWALE
-Y3- STA. 43+50 RT
EL. 368.64

END LATERAL BASE GRASS SWALE
-Y3- STA. 44+00 RT
EL. 370.49

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 2121

| | | |
|---|---|---|
| DRAINAGE AREA | = 6.9 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 35.3 | CFS |
| DESIGN HW ELEVATION | = 362.3 | FT |
| 100 YEAR DISCHARGE | = 37.4 | CFS |
| 100 YEAR HW ELEVATION | = 362.5 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 50 | CFS |
| OVERTOPPING ELEVATION | = 367.5 | FT |

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 2214

| | | |
|---|---|---|
| DRAINAGE AREA | = 31.0 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 94.8 | CFS |
| DESIGN HW ELEVATION | = 354.8 | FT |
| 100 YEAR DISCHARGE | = 111.8 | CFS |
| 100 YEAR HW ELEVATION | = 355.5 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 180 | CFS |
| OVERTOPPING ELEVATION | = 359.4 | FT |

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 2215

| | | |
|---|---|---|
| DRAINAGE AREA | = 1.3 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 7.2 | CFS |
| DESIGN HW ELEVATION | = 365.6 | FT |
| 100 YEAR DISCHARGE | = 7.8 | CFS |
| 100 YEAR HW ELEVATION | = 365.7 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 15 | CFS |
| OVERTOPPING ELEVATION | = 367.5 | FT |

-Y3- US 70 W

BM # 66
-Y3- STA. 58+27.63
87.84' LT.
ELEV. 355.49'

END RESURFACING
AND WIDENING
-Y3- STA. 71+00.00

PI = 57+55.00
EL = 355.36'
VC = 380'
K = 46
V = 30

(-)4.6586%
(-)2.74%
(-)2.14%
(-)1.5%
(-)1.78%
(-)2.86%
(-)1.0%
(+)0.5%
(+)1.00%
(+)1.82%
(+)8.76%
(+)3.6606%
(+)1.0%
(+)2.5%
(+)3.08%
(+)6.05%
(-)0.8963%

BEGIN SPECIAL CUT DITCH
-Y3- STA. 54+84 RT
EL. 359.96

END SPECIAL CUT DITCH
BEGIN LATERAL "V" DITCH
-Y3- STA. 54+00 LT
EL. 363.56

END LATERAL "V" DITCH
BEGIN TAIL DITCH
-Y3- STA. 54+00 RT
EL. 340.25

BEGIN TAIL BASE DITCH
-Y3- STA. 53+65 LT/RT
EL. 361.

END LATERAL BASE DITCH
-Y3- STA. 58+00 RT
EL. 359.00

BEGIN SPECIAL CUT DITCH
-Y3- STA. 56+00 RT
EL. 360.18

END SPECIAL CUT DITCH
BEGIN SPECIAL CUT GRASS SWALE
-Y3- STA. 56+67 RT
EL. 351.70

BEGIN SPECIAL CUT DITCH
END SPECIAL CUT GRASS SWALE
-Y3- STA. 59+00 RT
EL. 350.87

END SPECIAL CUT DITCH
-Y3- STA. 61+50 RT
EL. 360.97

END SPECIAL CUT DITCH
-Y3- STA. 63+50 LT
EL. 362.86

BEGIN LATERAL "V" DITCH
-Y3- STA. 60+90 LT
EL. 361.75

END LATERAL "V" DITCH
BEGIN LATERAL "V" DITCH
-Y3- STA. 60+35 LT
EL. 361.77

END LATERAL "V" DITCH
BEGIN TAIL DITCH
-Y3- STA. 60+00 LT
EL. 359.00

END TAIL DITCH
-Y3- STA. 61+77 LT
EL. 359.00

END LATERAL "V" DITCH
BEGIN SPECIAL CUT DITCH
-Y3- STA. 63+50 RT
EL. 362.20

END LATERAL "V" DITCH
-Y3- STA. 63+85
EL. 365.00

END SPECIAL CUT DITCH
-Y3- STA. 64+00 RT
EL. 365.58

BEGIN LATERAL "V" DITCH
-Y3- STA. 61+50 RT
EL. 364.00

END LATERAL "V" DITCH
BEGIN TAIL DITCH
-Y3- STA. 61+45 LT
EL. 364.00

END TAIL DITCH
-Y3- STA. 61+77 LT
EL. 359.00

END LATERAL "V" DITCH
BEGIN SPECIAL CUT DITCH
-Y3- STA. 63+50 RT
EL. 362.20

END LATERAL "V" DITCH
-Y3- STA. 63+85
EL. 365.00

END SPECIAL CUT DITCH
-Y3- STA. 64+00 RT
EL. 365.58

END LATERAL "V" DITCH
BEGIN TAIL DITCH
-Y3- STA. 56+50 LT
EL. 346.50

END TAIL DITCH
-Y3- STA. 56+50 RT
EL. 346.50

END LATERAL "V" DITCH
BEGIN TAIL DITCH
-Y3- STA. 56+50 RT
EL. 346.00

END GRASSED SWALE
BEGIN LATERAL "V" DITCH
-Y3- STA. 58+50 LT
EL. 346.15

BEGIN GRASSED SWALE
-Y3- STA. 57+28 LT
EL. 343.50

END LATERAL "V" DITCH
BEGIN SPECIAL CUT DITCH
-Y3- STA. 59+26 LT
EL. 351.02

END SPECIAL CUT DITCH
-Y3- STA. 59+50 LT
EL. 360.97

END SPECIAL CUT DITCH
-Y3- STA. 63+50 LT
EL. 362.86

BEGIN LATERAL "V" DITCH
-Y3- STA. 60+90 LT
EL. 361.75

END LATERAL "V" DITCH
BEGIN TAIL DITCH
-Y3- STA. 61+45 LT
EL. 364.00

END TAIL DITCH
-Y3- STA. 61+77 LT
EL. 359.00

END LATERAL "V" DITCH
BEGIN SPECIAL CUT DITCH
-Y3- STA. 63+50 RT
EL. 362.20

END LATERAL "V" DITCH
-Y3- STA. 63+85
EL. 365.00

END SPECIAL CUT DITCH
-Y3- STA. 64+00 RT
EL. 365.58

30" RCP
SKEW 126°

60" RCP
SKEW 92°

18" RCP
SKEW 95°

50 LF @ 3.63%

PI = 64+65.00
EL = 381.35'
VC = 160'
K = 35
V = 35

END GRADE/
BEGIN RESURFACING
AND WIDENING
-Y3- STA. 66+00.00
EL. 380.14'

11/27/2012
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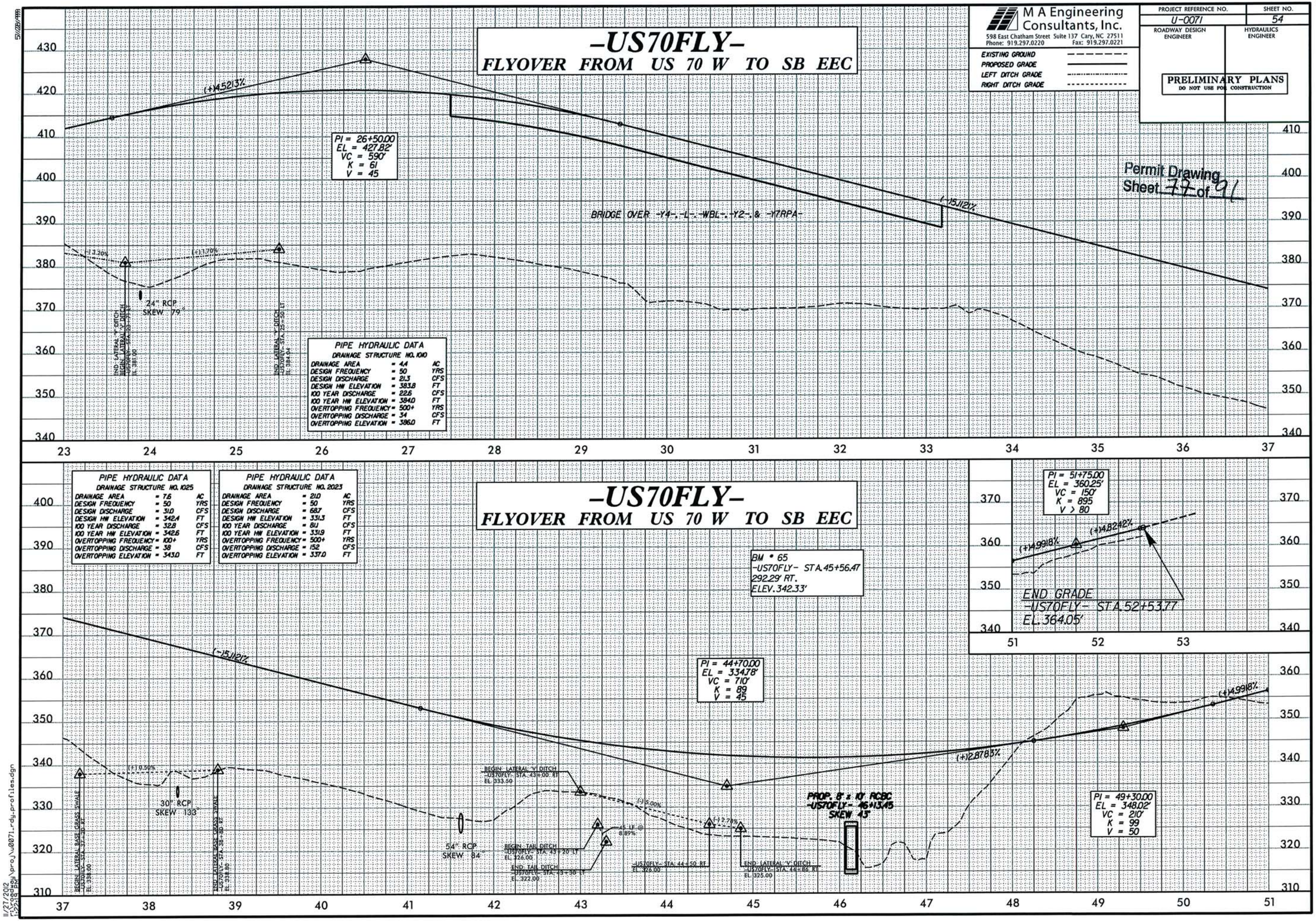
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 54 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

Permit Drawing
Sheet 77 of 91

# -US70FLY-
## FLYOVER FROM US 70 W TO SB EEC

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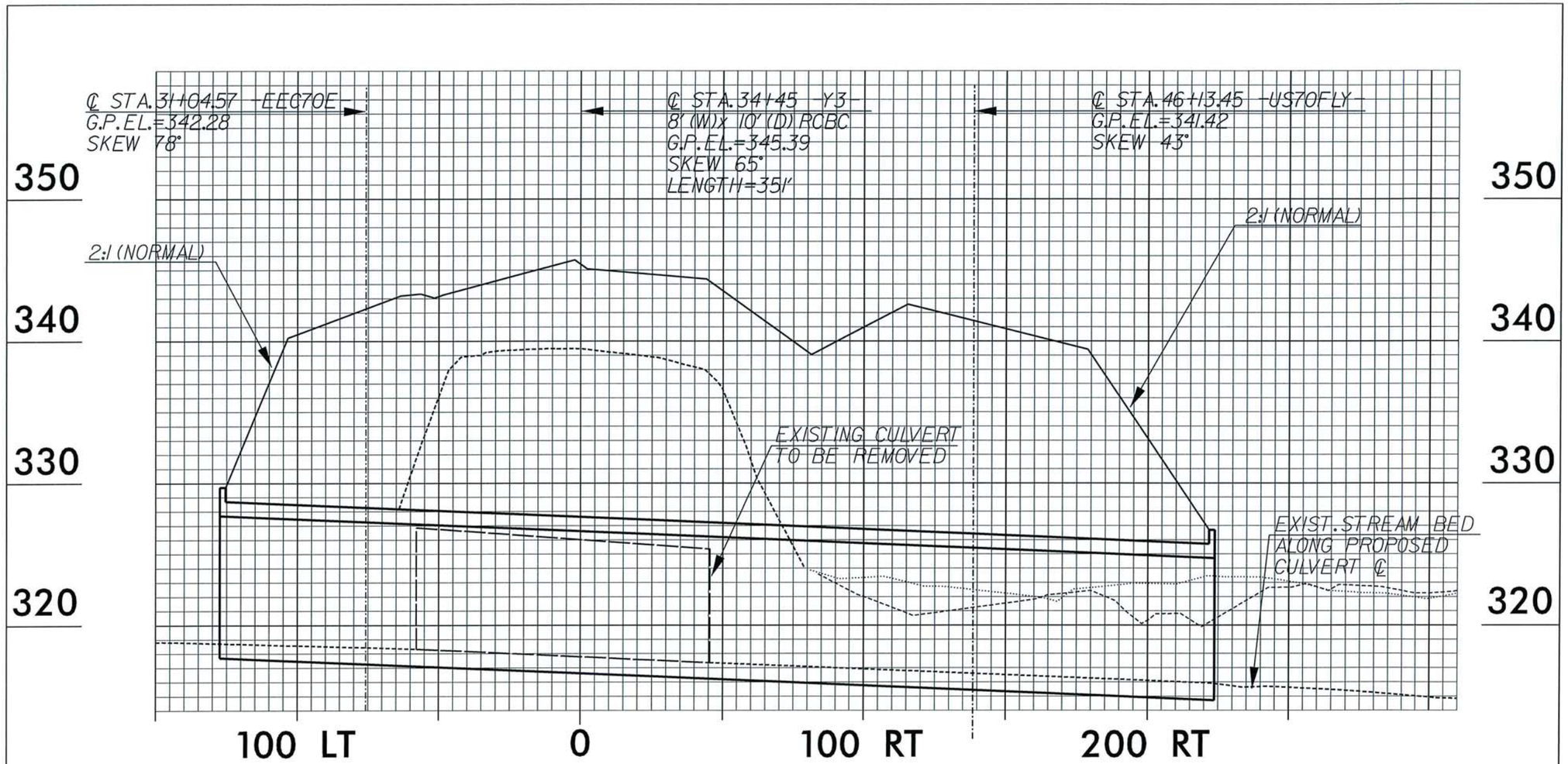


PROFILE

| CULVERT HYDRAULIC DATA | | |
|---|---|---|
| DESIGN DISCHARGE | = 662 | CFS |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN HW ELEVATION | = 328.5 | FT |
| BASE DISCHARGE | = 746 | CFS |
| BASE FREQUENCY | = 100 | YRS |
| BASE HW ELEVATION | = 329.3 | FT |
| OVERTOPPING DISCHARGE | = 1650 | CFS |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING ELEVATION | = 344.9 | FT |

NCDOT

DIVISION OF HIGHWAYS

DURHAM COUNTY

PROJECT: U-0071

DURHAM EAST END CONNECTOR,
FROM NC 147
(BUCK DEAN FREEWAY) TO
NORTH OF NC 98

SHEET OF 12/27/12

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 22 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION


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Permit Drawing
Sheet 19 of 91

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER

SITE 25

SITE 26

TEMP. SURFACE WATER IMPACTS

SURFACE WATER IMPACTS

MATCH LINE SEE SHEET NO.21

MATCH LINE SEE SHEET NO.24

WESTWOOD HOLDINGS LLC

WILBURN V. CLAYTON
DOROTHY G. CLAYTON

LEE RAY BERGMAN, LLC

W. VANCE CLAYTON
DOROTHY G. CLAYTON

TSOUMBOS DIMITRIOS

TSOUMBOS ARISTOTELIS

LESHA WHITLEY

MATTHEW M. JOHNSON
FANNIE JOHNSON

BETTY W. CARTHEN

NAEGLE OUTDOOR ADVERTISING, INC.

JAMES RODNEY TAYLOR
SHELIA TAYLOR

JOHN CURTIS PICKARD

FAST FARE MARKETS OF N.C., INC.

JOHN TUBIOLO
VIDA S. TUBIOLO
dbo J&V RENTAL PROPERTIES

GEORGE W. BRIDGERS
KATY BUNTING WALDEN

RICHARD C. NOKES, SR.

RENEE N. McGINLEY
JOSEPH D. McGINLEY

PARKSIDE PROPERTIES LLC.

EUGENE M. EVANS, JR.

NAD 83/95

REVISIONS

R/W REVISION / /202 RNP PARCEL NOS. 198, 199, & 204 COMBINED INTO PARCEL NOS. 400 & 401 COMBINED INTO PARCEL NO. 400.
R/W REVISION 6 / 27 /202 DBE ADDED SIDEWALK ALONG PARCELS NO. 205 & 206.

8/17/99

9/19/2003
jmcginnis
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 22 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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598 East Chatham Street Suite 137 Cary, NC 27511
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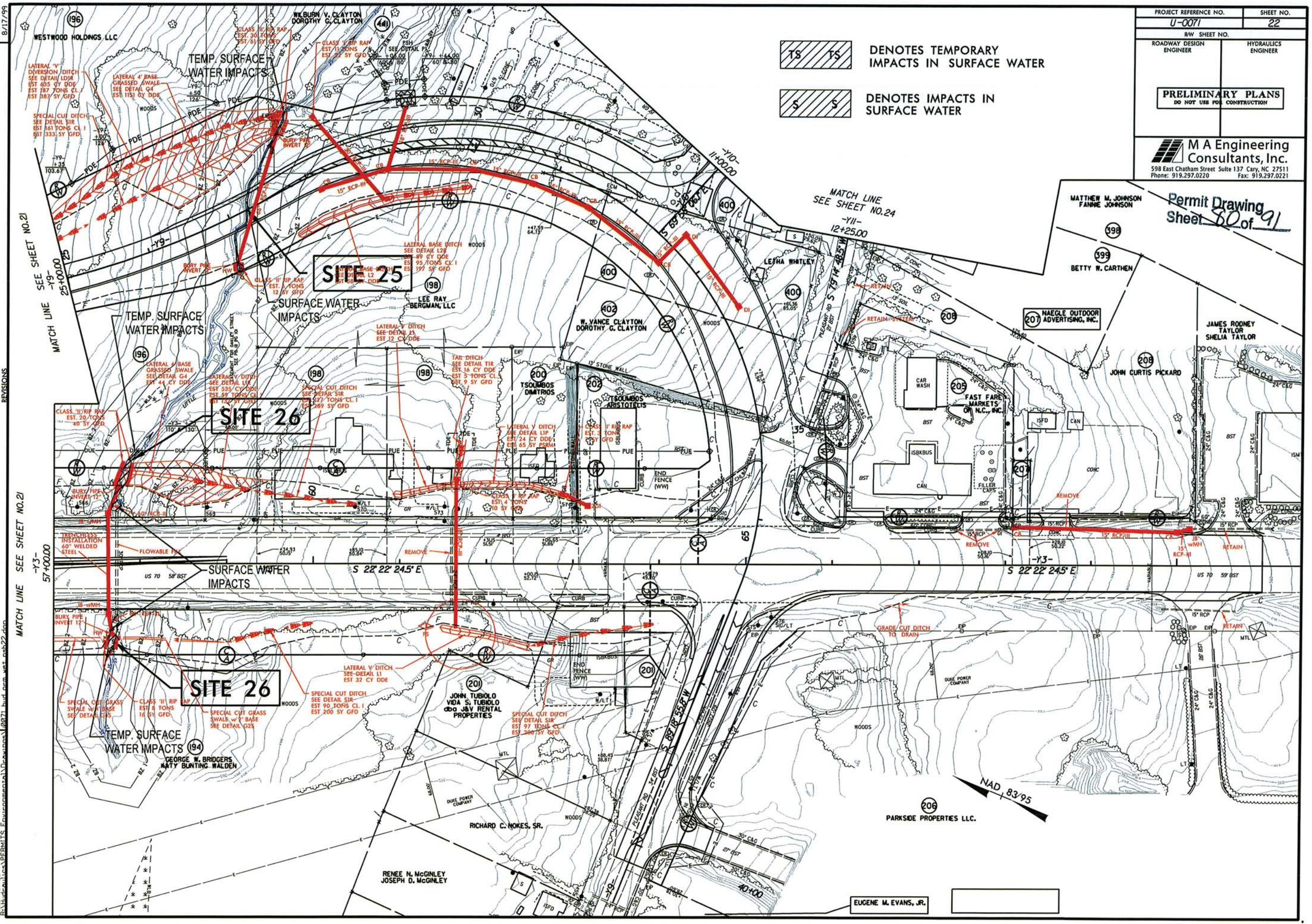
Permit Drawing
Sheet 80 of 91

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER




REVISIONS

R/W REVISION 6 / 27 /202 BBE ADDED SIDEWALK ALONG PARCELS NO. 205 & 206.

R/W REVISION / /202 RMP PARCEL NOS. 198, 199, & 204 COMBINED INTO PARCEL NO. 198. PARCEL NOS. 400 & 401 COMBINED INTO PARCEL NO. 400.

8/17/99

9/19/2013
User name: bkirkpatrick
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| | |
|---|---|
| EXISTING GROUND | |
| PROPOSED GRADE | |
| LEFT DITCH GRADE | |
| RIGHT DITCH GRADE | |

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 65 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

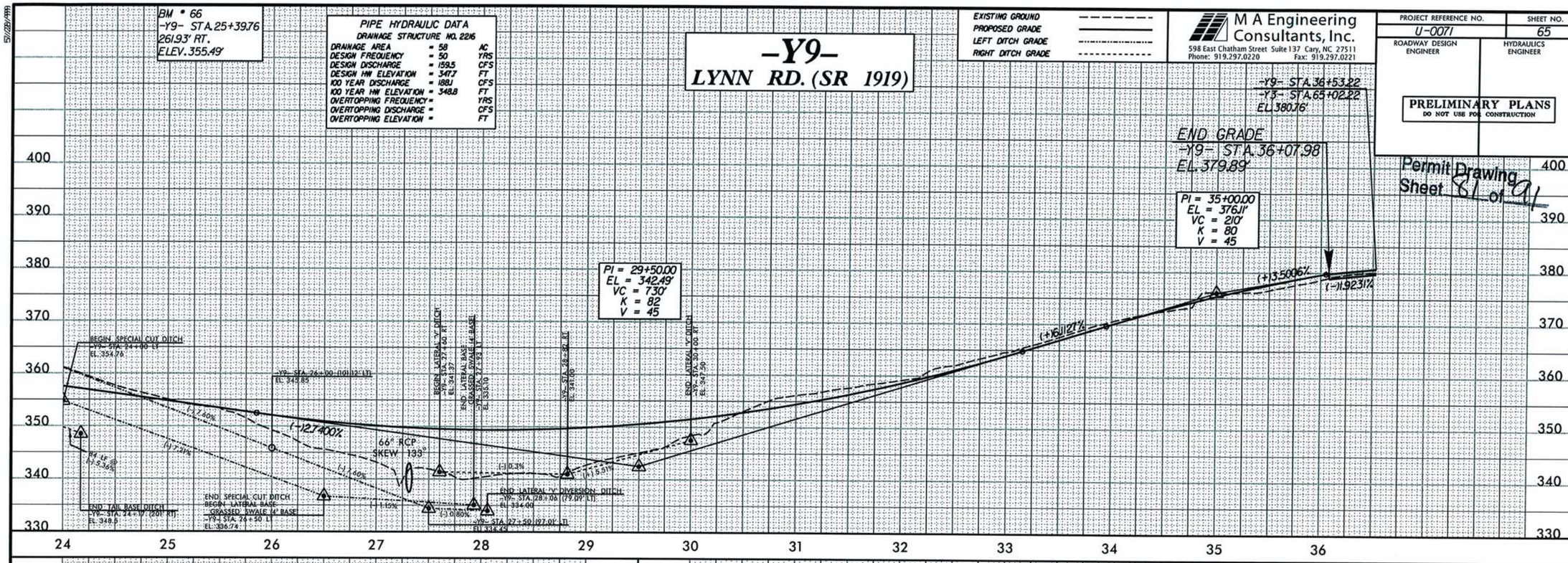
Permit Drawing
Sheet 81 of 91

BM • 66
-Y9- STA. 25+39.76
261.93' RT.
ELEV. 355.49'

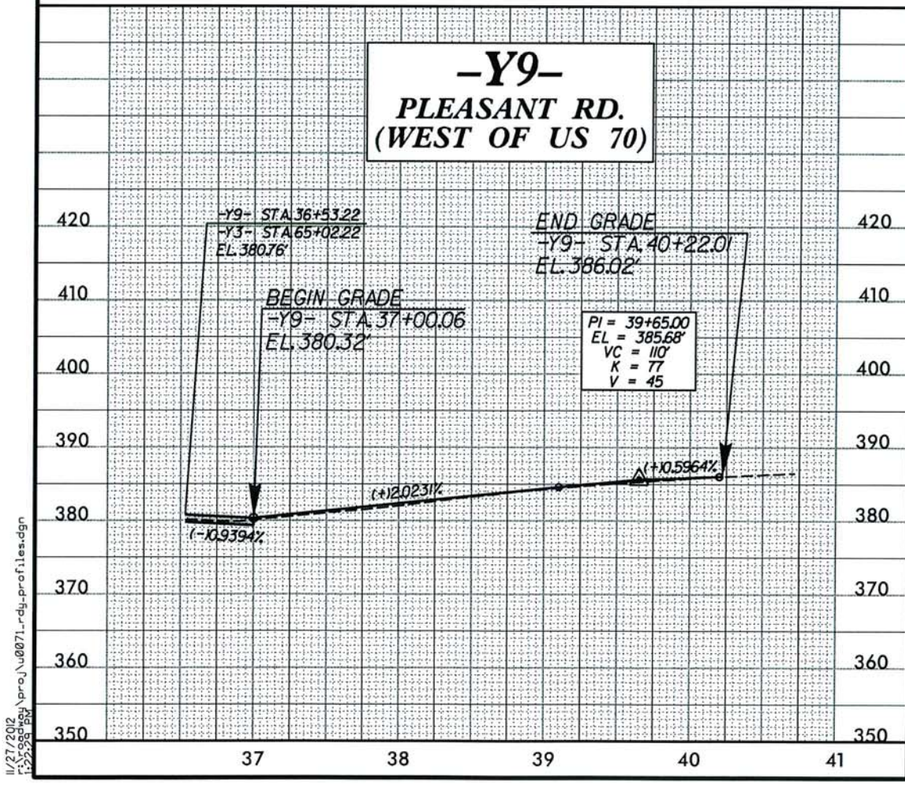
**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO. 2216

| | | |
|---|---|---|
| DRAINAGE AREA | = 58 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 159.5 | CFS |
| DESIGN HW ELEVATION | = 347.7 | FT |
| 100 YEAR DISCHARGE | = 188.1 | CFS |
| 100 YEAR HW ELEVATION | = 348.8 | FT |
| OVERTOPPING FREQUENCY | = | YRS |
| OVERTOPPING DISCHARGE | = | CFS |
| OVERTOPPING ELEVATION | = | FT |

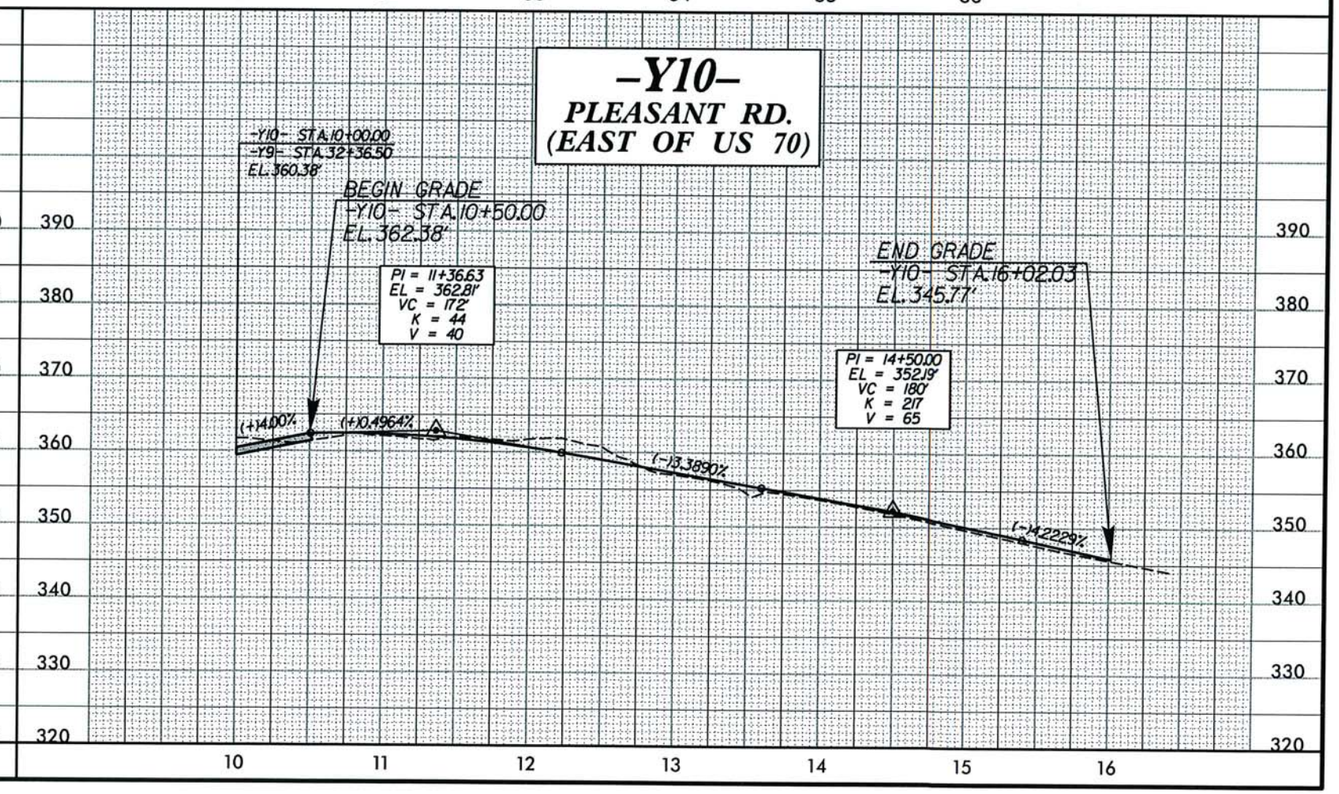
# -Y9-
## LYNN RD. (SR 1919)




# -Y9-
## PLEASANT RD. (WEST OF US 70)



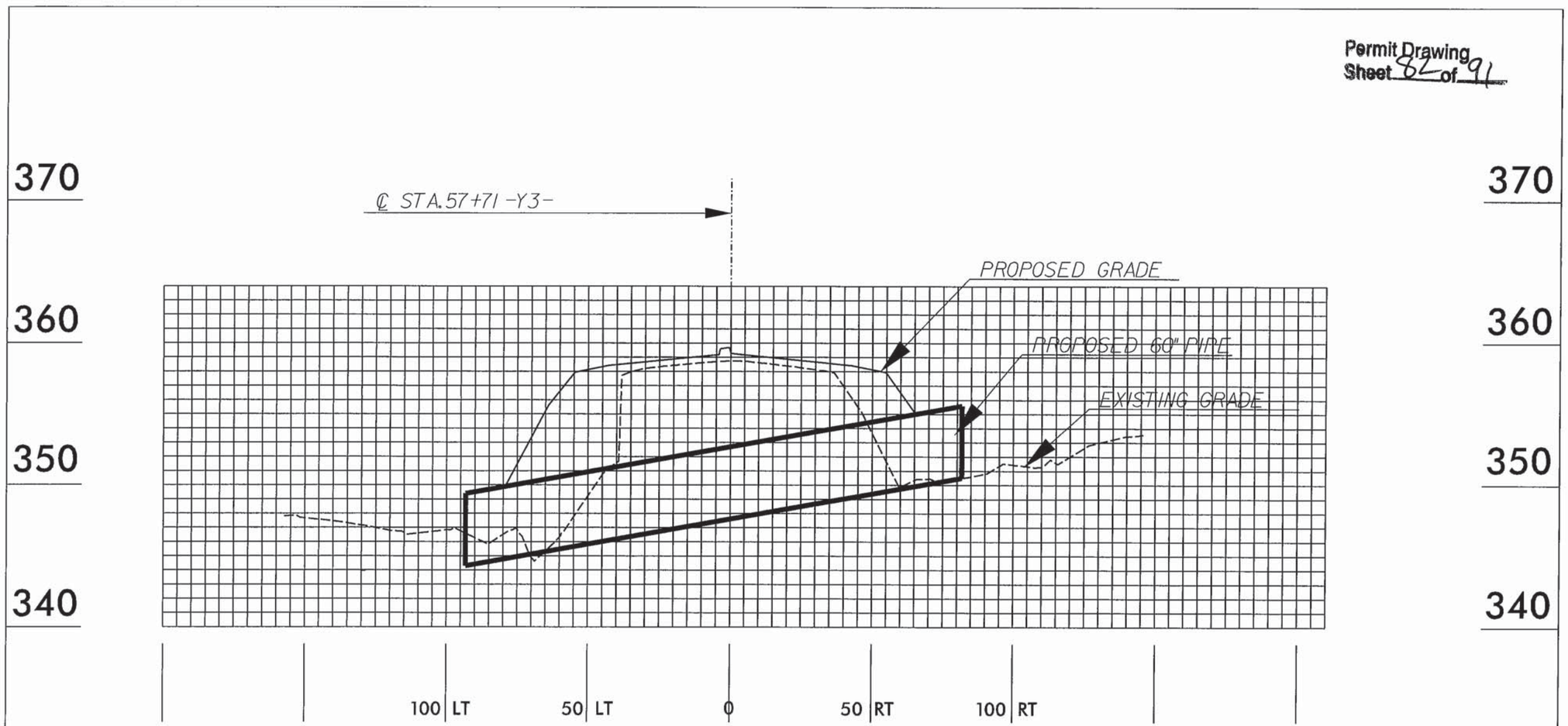

# -Y10-
## PLEASANT RD. (EAST OF US 70)




5/28/1999

11/27/2012
r:\roadway\proj\u0071_rdy_profiles.dgn
12:22:24 PM

Permit Drawing
Sheet 82 of 94



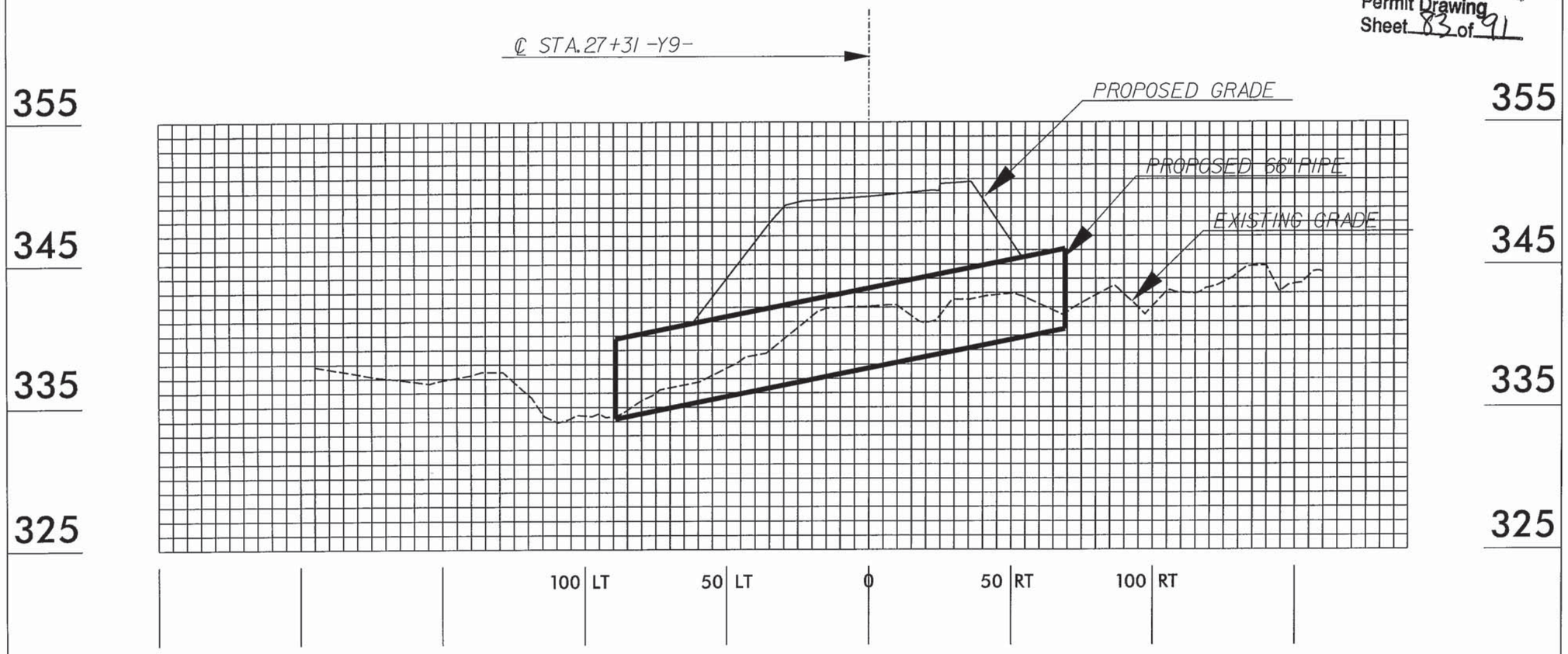

# PROFILE

| PIPE HYDRAULIC DATA | | |
|---|---|---|
| DRAINAGE STRUCTURE NO. 2214 | | |
| DRAINAGE AREA | = 31.0 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 94.8 | CFS |
| DESIGN HW ELEVATION | = 354.8 | FT |
| 100 YEAR DISCHARGE | = 111.8 | CFS |
| 100 YEAR HW ELEVATION | = 355.5 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 180 | CFS |
| OVERTOPPING ELEVATION | = 359.4 | FT |

NCDOT
DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: U-0071
DURHAM EAST END CONNECTOR,
FROM NC 147
(BUCK DEAN FREEWAY) TO
NORTH OF NC 98

SHEET OF 12/27/12

Permit Drawing
Sheet 83 of 91




# PROFILE

| PIPE HYDRAULIC DATA | | |
|---|---|---|
| DRAINAGE STRUCTURE NO. 2216 | | |
| DRAINAGE AREA | = 58 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 159.5 | CFS |
| DESIGN HW ELEVATION | = 347.7 | FT |
| 100 YEAR DISCHARGE | = 188.1 | CFS |
| 100 YEAR HW ELEVATION | = 348.8 | FT |
| OVERTOPPING FREQUENCY | = | YRS |
| OVERTOPPING DISCHARGE | = | CFS |
| OVERTOPPING ELEVATION | = | FT |

NCDOT
DIVISION OF HIGHWAYS
DURHAM COUNTY
PROJECT: U-0071
DURHAM EAST END CONNECTOR,
FROM NC 147
(BUCK DEAN FREEWAY) TO
NORTH OF NC 98

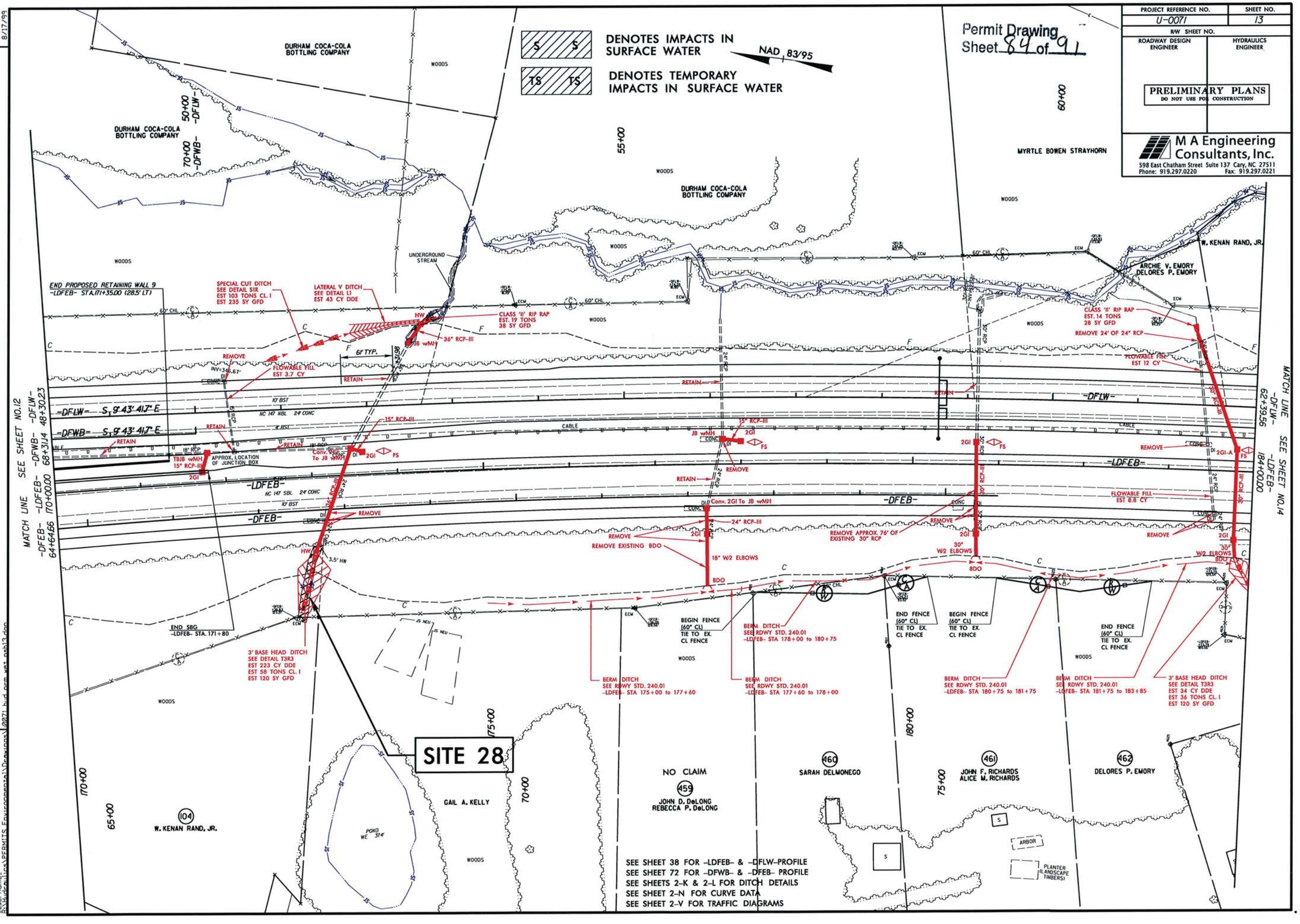
SHEET OF 12/27/12

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 13 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

Permit Drawing
Sheet 84 of 91

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221




REVISIONS

8/17/99

10/7/2013
aberhame
\\WinFalls\PERMITS Environmental\Drawings\0071_hyd_prm_wet_psh13.dgn

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 13 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

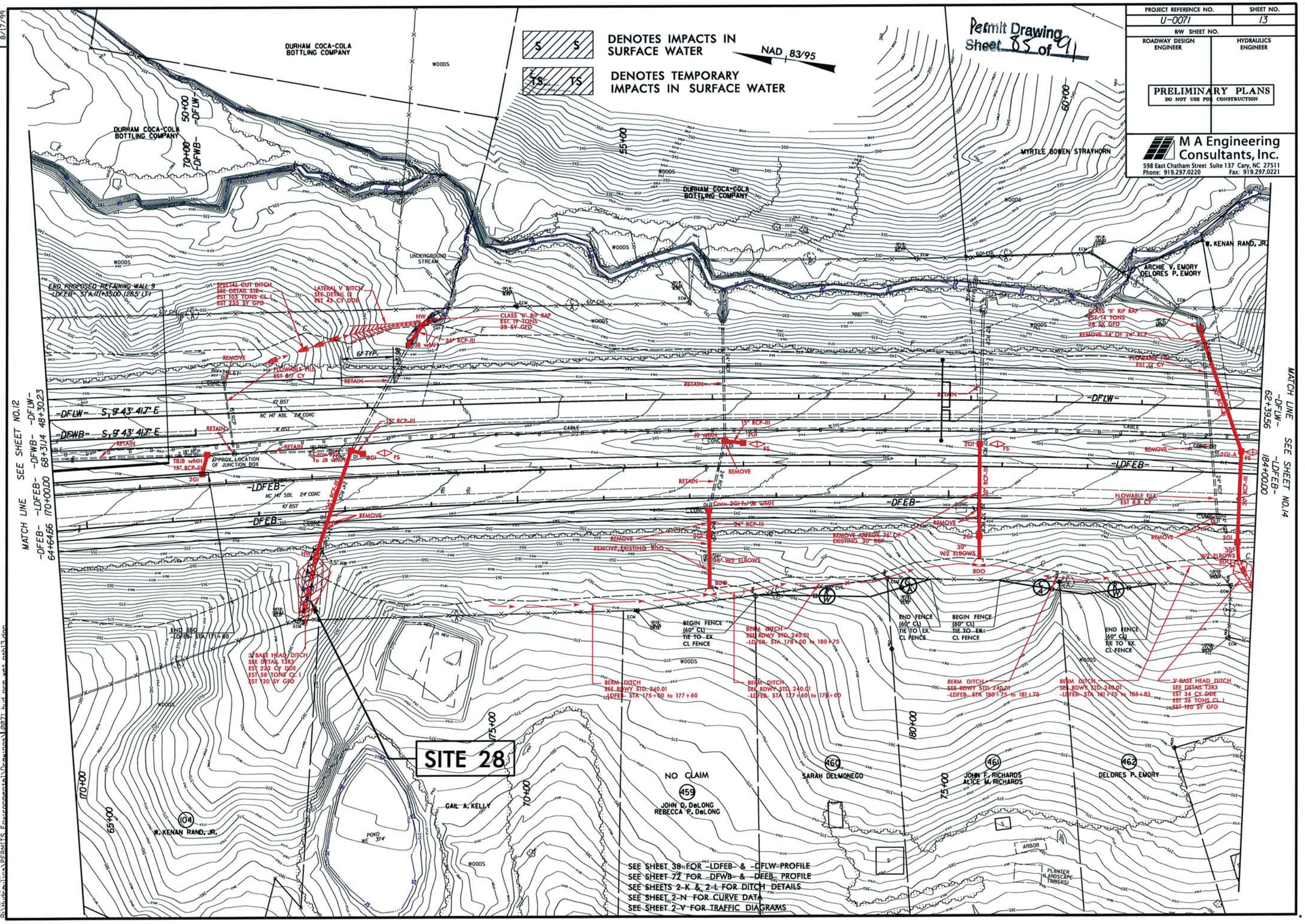
M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 85 of 91

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

NAD 83/95




REVISIONS

8/17/99

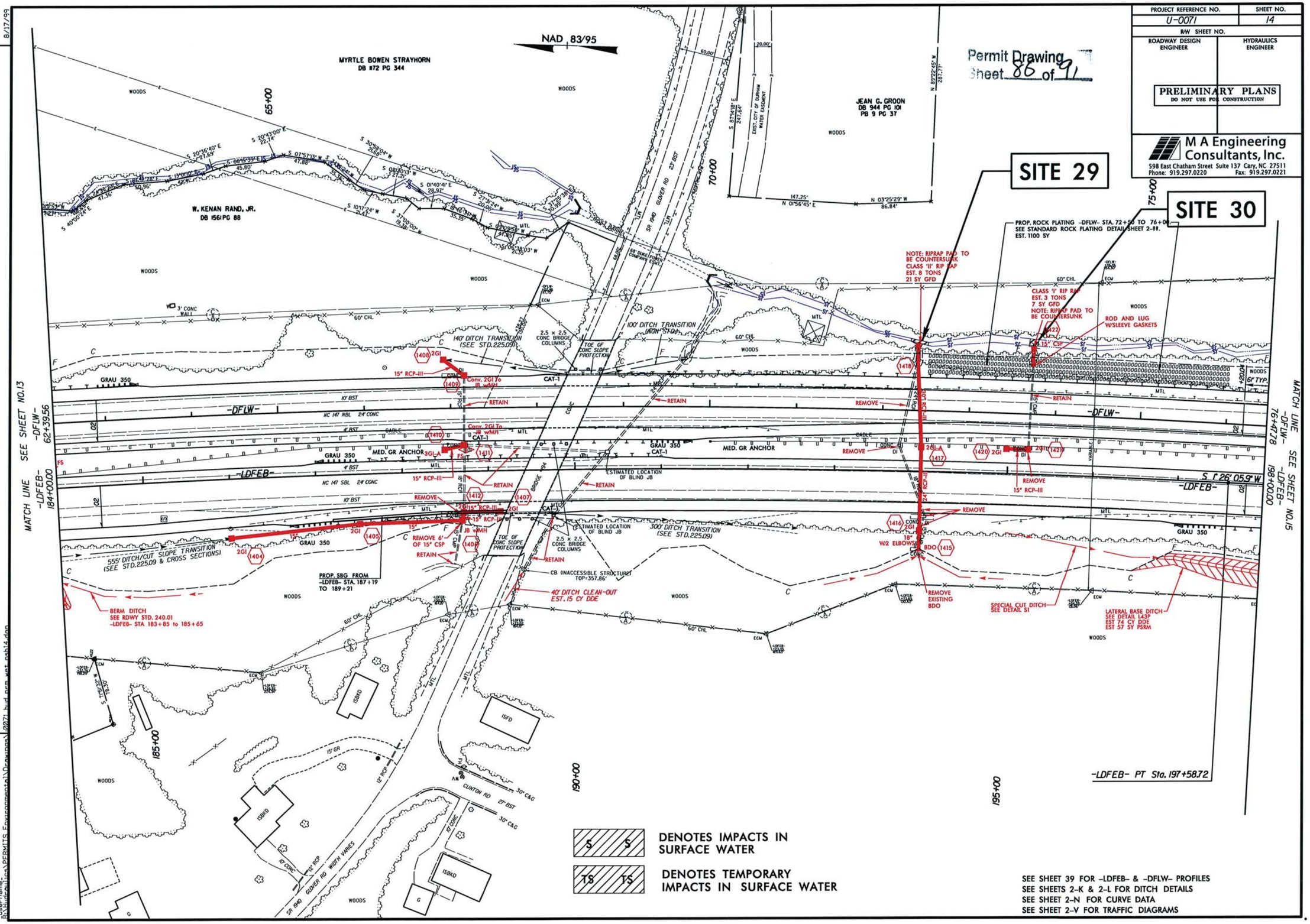
10/7/2013
username
S:\Hydraulics\PERMITS Environmental\Projects\0071 bid pm set pah13.dgn

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 14 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 86 of 91




SEE SHEET 39 FOR -LDFEB- & -DFLW- PROFILES
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-N FOR CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

REVISIONS

8/17/99

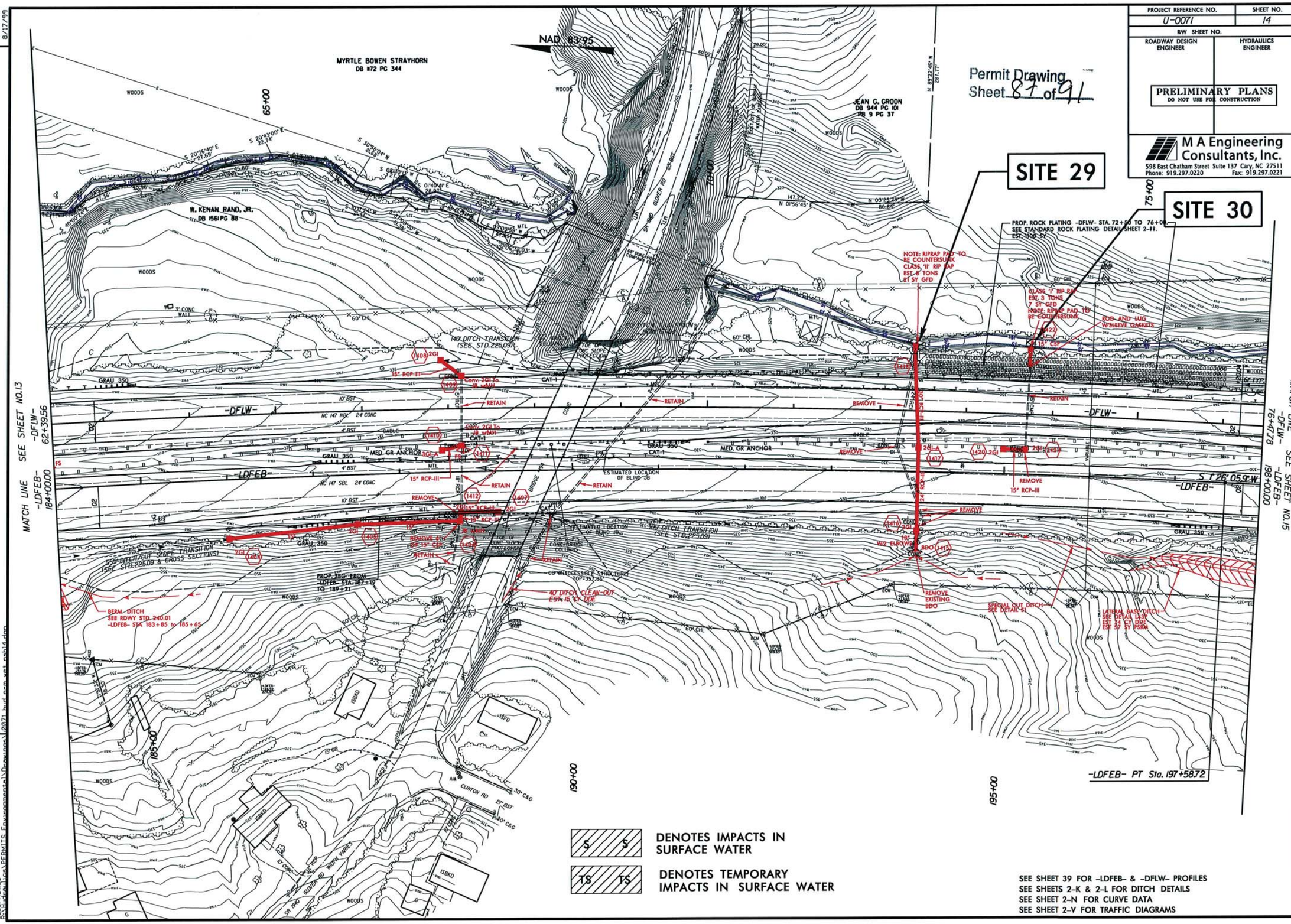
10/31/2013
R:\Hydraulics\PERMITS Environmental\Drawings\2071 hyd pcm wet psh14.dgn

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 14 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 87 of 91




S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

SEE SHEET 39 FOR -LDFEB- & -DFLW- PROFILES
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-N FOR CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

REVISIONS

8/17/99

10/31/2013
BKH:dpt:tcs\PERMITS Environmental\Drawings\0071 hyd prm wet nb14.dgn

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 15 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

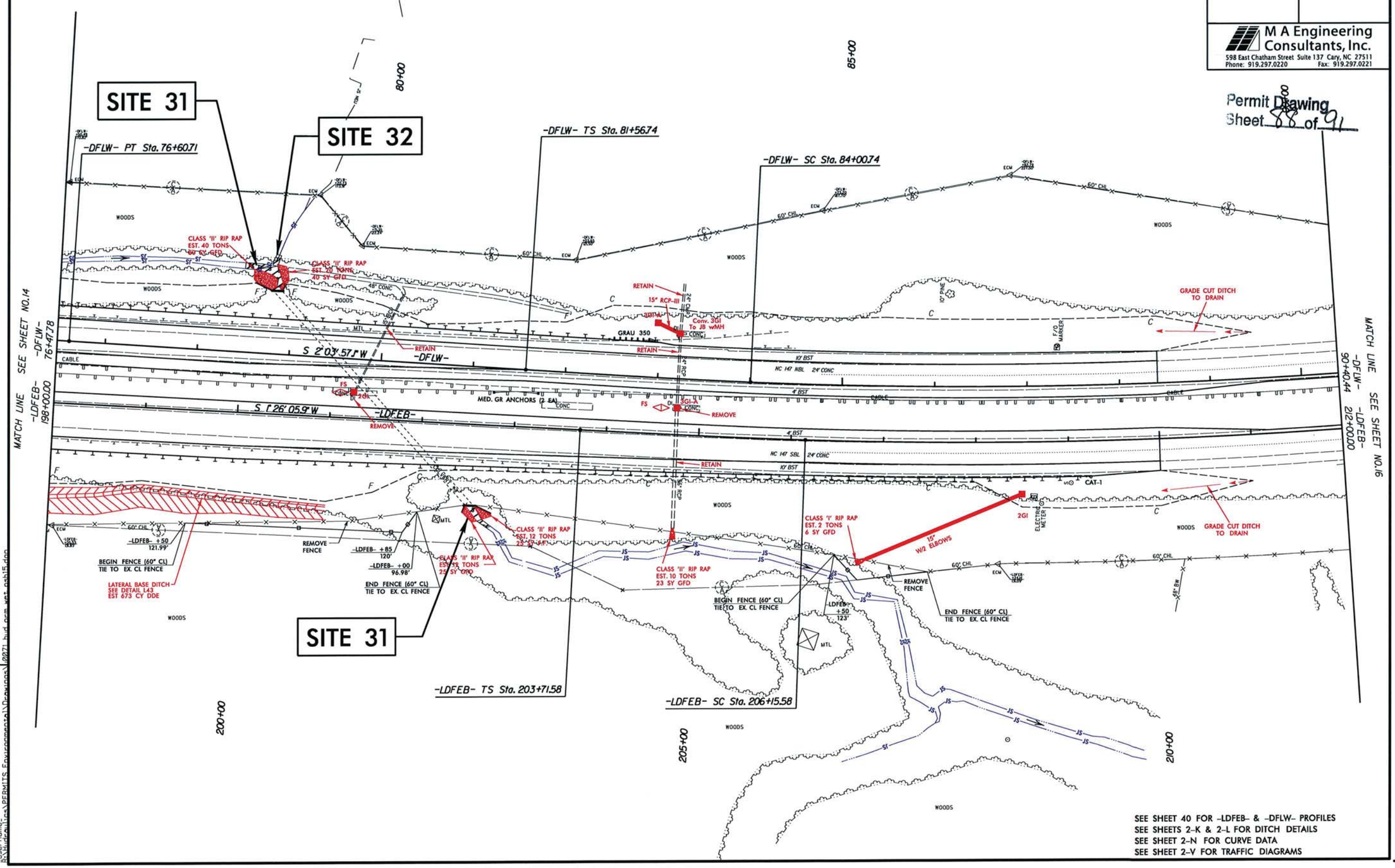
M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 88 of 91

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

NAD 83/95




SEE SHEET 40 FOR -LDFEB- & -DFLW- PROFILES
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-N FOR CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

REVISIONS

8/17/99

10/7/2013
Username
R:\Hydraulics\PERMITS Environmental\Drawings\0071_hid_prm_wet_psh15.dgn

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 15 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

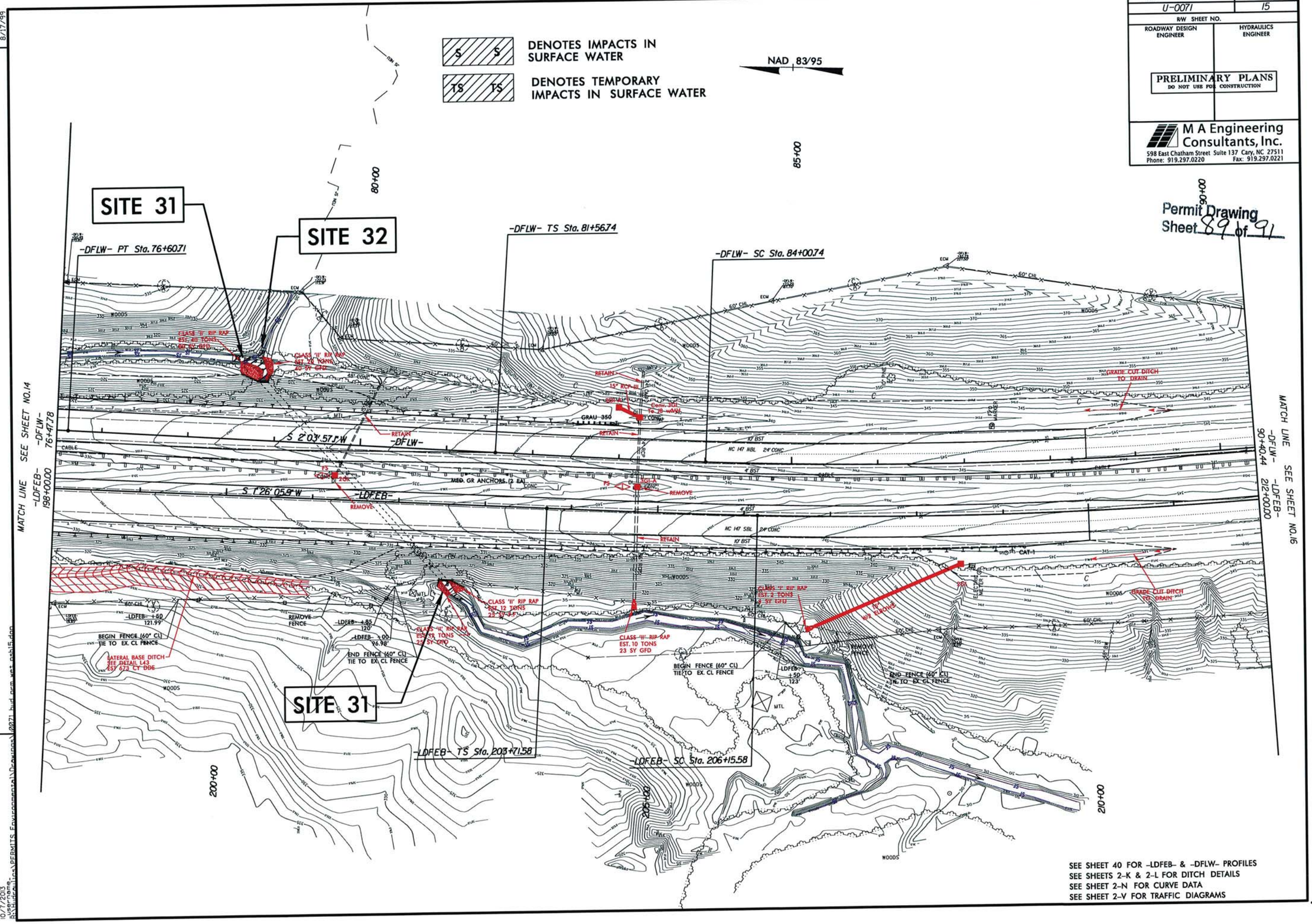
M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

Permit Drawing
Sheet 89 of 91

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

NAD 83/95




SEE SHEET 40 FOR -LDFEB- & -DFLW- PROFILES
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-N FOR CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

REVISIONS

8/17/99

10/17/2013
R:\Hydraulics\PERMITS Environmental\Drawings\0071 bid pem set pab15.dgn

## WETLAND PERMIT IMPACT 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 32+58 to 36+64 | FILL | | | | | | 0.04 | | 412 | | |
| 2 | L 37+75 - SR1 34+84 Y17 11+14 | 66" RCP-IV, 48"RCP-III, 24"RCP-III | 0.08 | | | | | 0.07 | <0.01 | 673 | 14 | |
| | | BANK STABILIZATION | | | | | | | | 20 | | |
| 3 | L 44+53 | 30" RCP-III | 0.06 | | | | | 0.06 | | 410 | | |
| * 4 | SR2 36+89 Y7 17+24 | 48" RCP-III, 60" RCP-III | 0.05 | | | | | 0.03 | <0.01 | 349 | 15 | |
| | | BANK STABILIZATION | | | | | | | | 70 | | |
| * 5(T) | Y7LPA 13+98 | 60" RCP-III | 0.06 | | | | | | | | | |
| 6 | Y7RPA 21+78 | 66" RCP-III | | | | | | | <0.01 | | 15 | |
| 7 | Y7RPA 20+75 to Y6 15+90 | 8'x9' RCBC | | | | | | 0.16 | 0.02 | 665 | 110 | |
| | | BANK STABILIZATION | | | | | | | | 250 | | |
| 8 | Y4 19+63 to 22+30 and Y4 23+04 to 25+59 | 30" RCP-III, FILL | 0.04 | | | | | 0.07 | | 443 | | |
| 9 | Y5 23+20 RT. | 30" RCP-III | | | | | | 0.03 | <0.01 | 29 | 0 | |
| | | BANK STABILIZATION | | | | | | | | 43 | | |
| 10 | Y5 26+62 RT. | FILL | 0.01 | 0.01 | | | | | | | | |
| 11 | Y6 11+15 off 104 RT. | 18" RCP-III | | | | <0.01 | | | | | | |
| 12 | Y2 26+53 to 27+90 LT. | 48" RCP-III & RECHANNELIZATION | | | | | | 0.11 | 0.03 | 705 | 132 | |
| | | BANK STABILIZATION | | | | | | | | 42 | | |
| 13(T) | Y4 35+48 | 36" RCP-IV | | | | | | 0.78 | | | | |
| * 14(T) | L 122+93 | 30" RCP-V | 0.08 | | | | | | | | | |
| * 15(T) | L 132+13 | FILL | 0.03 | | | | | | | | | |
| * 16(T) | L 132+33 RT. | FILL | 0.05 | | | | | | | | | |
| 17 | L 133+41 | 6'x7' RCBC | | | | | | 0.06 | 0.01 | 479 | 39 | |
| | | BANK STABILIZATION | | | | | | | | 61 | | |
| 17A | L 133+26 264' LT | FILL | | | | | | | <0.01 | | 56 | |
| SUB-TOTALS (page 1 of 2): | | | 0.46 | 0.01 | | <0.01 | | 1.41 | 0.06 | 4651 | 381 | |

*Rounded totals are sum of actual impacts

NOTES:
* indicates isolated wetland

(T) Indicates Total Take

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

DURHAM COUNTY
WBS - 34745.1.1 (U-0071)

## WETLAND PERMIT IMPACT 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) |
| 17B | L 133+69 263' RT | FILL | | | | | | | <0.01 | | 7 | |
| 18(T) | L 134+53 LT. | FILL | | | | | | 0.19 | | | | |
| 19 | not jurisdictional | 0 | | | | | | | | | | |
| 20 | DFLW 27+34 to 38+06 | 42" RCP-III | | | | | | 0.02 | <0.01 | 218 | 17 | |
| 21 | DFLW 39+19 | FILL | | | | | | 0.01 | | 28 | | |
| 22 | DFLW 41+62 | FILL | | | | | | 0.01 | | 23 | | |
| 23 | Y3 34+45 | 8'x10' CULVERT | | | | | | 0.08 | 0.02 | 280 | 124 | |
| | | BANK STABILIZATION | | | | | | | | 79 | | |
| 24 | Y3 40+16.69 RT | 30" RCP-III | | | | | | 0.04 | 0.01 | 104 | 23 | |
| 25 | Y9 28+10 LT to 26+85 RT | 66" RCP-III | | | | | | 0.01 | <0.01 | 168 | 10 | |
| | | BANK STABILIZATION | | | | | | | | 35 | | |
| 26 | Y3 57+75 LT to RT | 60" RCP-III | | | | | | 0.01 | <0.01 | 50 | 23 | |
| | | BANK STABILIZATION | | | | | | | | 50 | | |
| 27 | L 129+77 414LT. | BANK STABILIZATION | | | | | | | | 10 | | |
| 28 | DFLW 52+08 LT & RT | 36" RCP | | | | | | 0.02 | 0.01 | 121 | 20 | |
| 29 | DFLW 72+35 LT | FILL | | | | | | < 0.01 | | 40 | | |
| 30 | DFLW 73+72 LT | FILL | | | | | | < 0.01 | | 10 | | |
| 31 | DFLW 78+76 LT& 81+14 RT | BANK STABILIZATION | | | | | | | | 61 | | |
| | | Construction Activity | | | | | | | <0.01 | | 22 | |
| 32 | DFLW 78+79 LT | Construction Activity | | | | | | | <0.01 | | 9 | |
| SUB-TOTALS (page 2 of 2): | | | 0.00 | 0.00 | | 0.00 | | 0.39 | 0.04 | 1277 | 255 | |
| SUB-TOTALS (page 1 of 2): | | | 0.46 | 0.01 | | <0.01 | | 1.41 | 0.06 | 4651 | 381 | |
| TOTALS: | | | 0.46 | 0.01 | | <0.01 | | 1.80 | 0.10 | 5928 | 636 | |

*Rounded totals are sum of actual impacts

NOTES:
* indicates isolated wetland

(T) Indicates Total Take

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

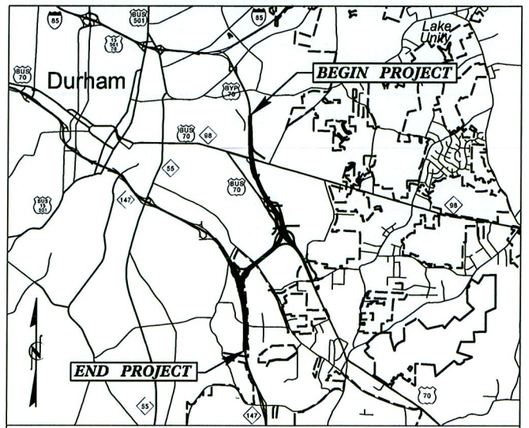
DURHAM COUNTY
WBS - 34745.1.1 (U-0071)

09/08/99

TIP PROJECT: U-0071

CONTRACT:

See Sheet 1-A For Index of Sheets




VICINITY MAP

# STATE OF NORTH CAROLINA
# DIVISION OF HIGHWAYS

# *DURHAM COUNTY*

***LOCATION: DURHAM EAST END CONNECTOR, FROM NC 147 (BUCK DEAN FREEWAY) TO NORTH OF NC 98***

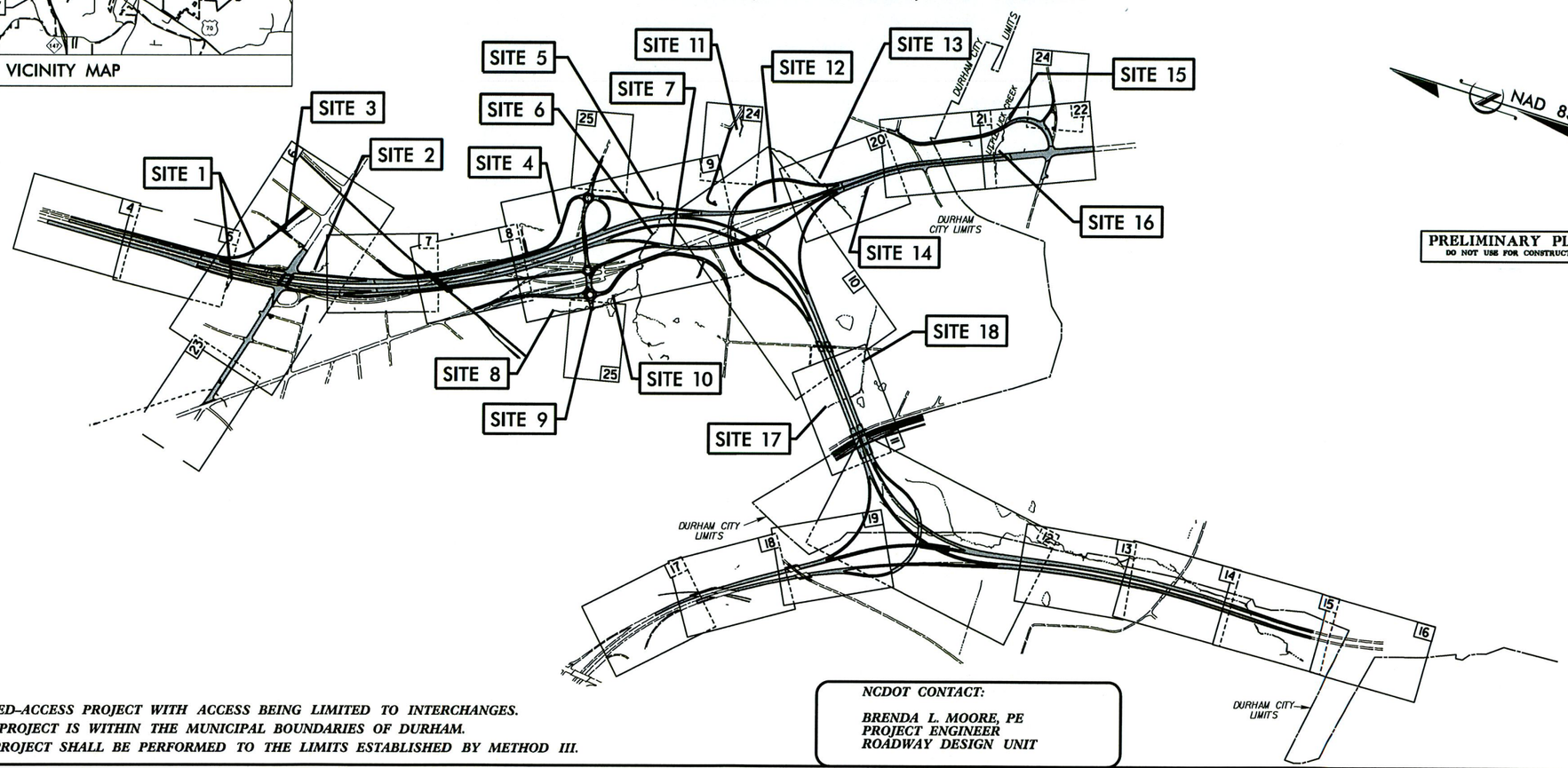
***TYPE OF WORK: GRADING, DRAINAGE, PAVING, CURB & GUTTER, SIGNALS, STRUCTURES, AND SIGNING***

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | U-0071 | 1 | |

| STATE PROJ. NO. | F. A. PROJ. NO. | DESCRIPTION |
|---|---|---|
| 34745.1.1 | NHF-76-1(2) | PE |
| 34745.2.8 | NHF-76-1(2) | R/W, UTILITIES |

**BUFFER IMPACTS PERMIT**

BUFFER DRAWING SHEET 1 OF 8




PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

***THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.***
***A PORTION OF THIS PROJECT IS WITHIN THE MUNICIPAL BOUNDARIES OF DURHAM.***
***CLEARING ON THIS PROJECT SHALL BE PERFORMED TO THE LIMITS ESTABLISHED BY METHOD III.***

***NCDOT CONTACT:***

***BRENDA L. MOORE, PE***
***PROJECT ENGINEER***
***ROADWAY DESIGN UNIT***

***GRAPHIC SCALES***

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

***DESIGN DATA***

ADT 2015 = 65,700
ADT 2035 = 116,100
DHV = 10 %
D = 55 %
T = 14 % *
V = 70 MPH
* TTST 8 DUAL 6
FUNCT. CLASS. = INTERSTATE

***PROJECT LENGTH***

LENGTH ROADWAY PROJECT U-0071 = 3.783 mi.
LENGTH STRUCTURE PROJECT U-0071 = 0.173 mi.
TOTAL LENGTH OF TIP PROJECT U-0071 = 3.956 mi.
LENGTH OF PROJECT BASED ON -L- AND -LDFEB-

Prepared For:
***DIVISION OF HIGHWAYS***
*1000 Birch Ridge Dr., Raleigh NC, 27610*
By:
M A Engineering Consultants, Inc.
598 East Chatham Street - Suite 137
Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

*2012 STANDARD SPECIFICATIONS*

***RIGHT OF WAY DATE:***
APRIL 13, 2012

***LETTING DATE:***
APRIL 15, 2014

BURKE EVANS, PE
*PROJECT ENGINEER*

KEVIN S. HUTCHENS
*PROJECT DESIGN ENGINEER*

***HYDRAULICS ENGINEER***

SIGNATURE: P.E.

***ROADWAY DESIGN ENGINEER***

SIGNATURE: P.E.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

9/20/2013
username
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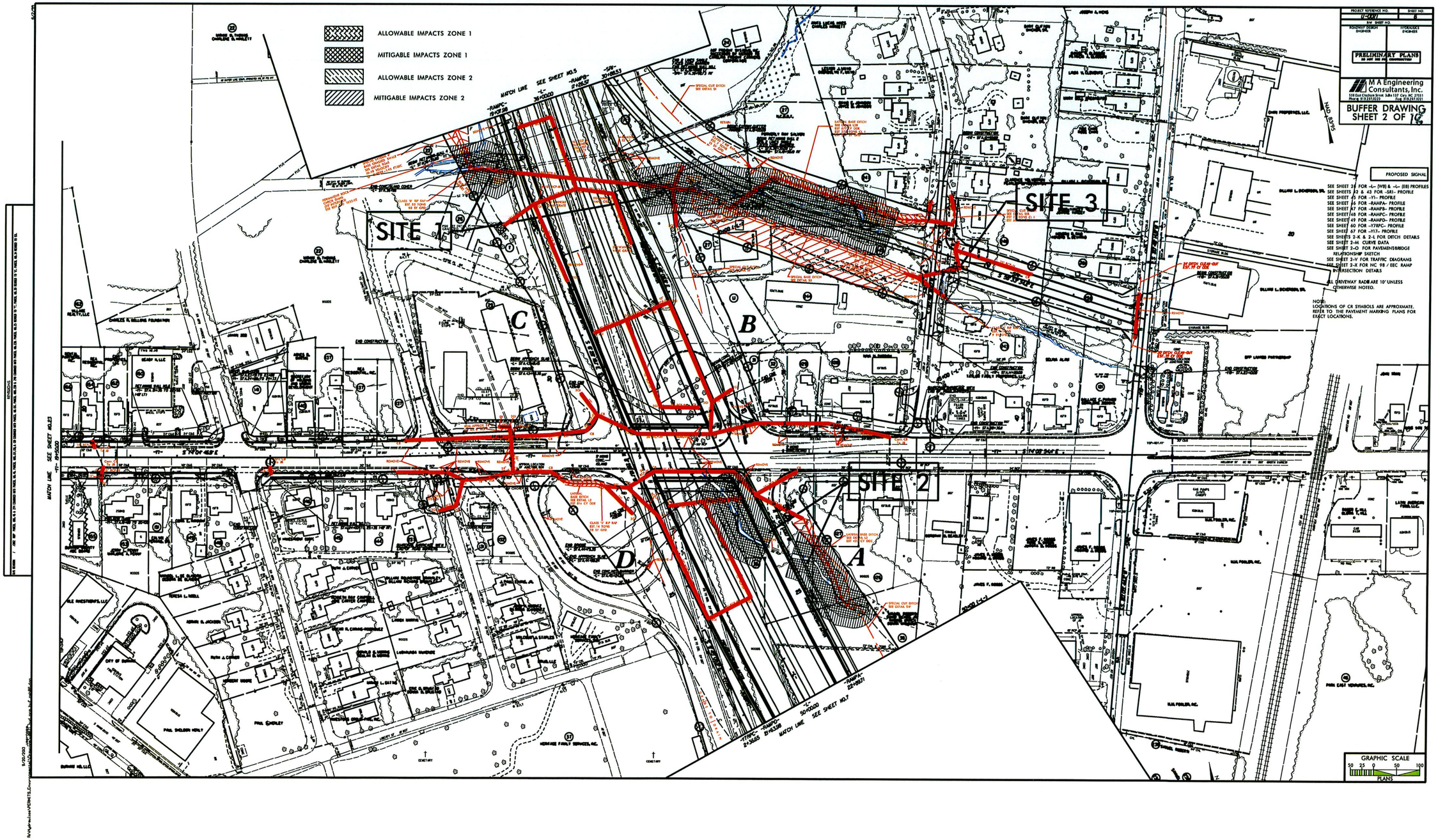

ALLOWABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2
MITIGABLE IMPACTS ZONE 2
SITE 1
SITE 2
SITE 3
A
B
C
D
MATCH LINE SEE SHEET NO.5
MATCH LINE SEE SHEET NO.7
PROJECT REFERENCE NO.
U-0011
SHEET NO.
6
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
M A Engineering Consultants, Inc.
BUFFER DRAWING
SHEET 2 OF 10
PROPOSED SIGNAL
SEE SHEET 28 FOR -L- (WB) & -L- (EB) PROFILES
SEE SHEETS 33 & 43 FOR -SR1- PROFILE
SEE SHEET 45 FOR -Y1- PROFILE
SEE SHEET 46 FOR -RAMPA- PROFILE
SEE SHEET 47 FOR -RAMPB- PROFILE
SEE SHEET 48 FOR -RAMPC- PROFILE
SEE SHEET 49 FOR -RAMPD- PROFILE
SEE SHEET 60 FOR -Y7RPC- PROFILE
SEE SHEET 67 FOR -Y17- PROFILE
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-M CURVE DATA
SEE SHEET 2-O FOR PAVEMENT/BRIDGE RELATIONSHIP SKETCH
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS
SEE SHEET 2-X FOR NC 98 / EEC RAMP INTERSECTION DETAILS
ALL DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED.
NOTE:
LOCATIONS OF CR SYMBOLS ARE APPROXIMATE. REFER TO THE PAVEMENT MARKING PLANS FOR EXACT LOCATIONS.
GRAPHIC SCALE
50 25 0 50 100
PLANS

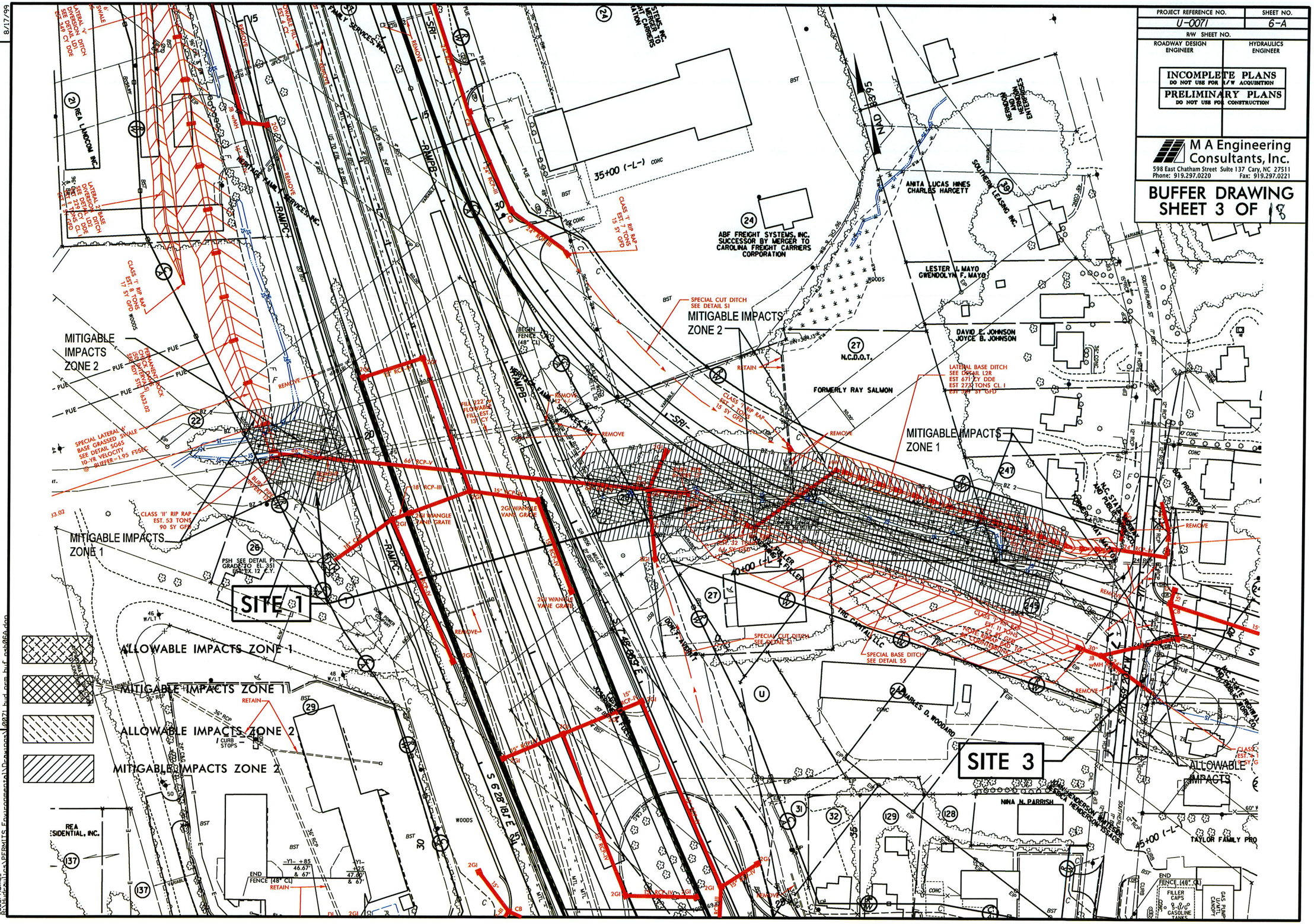
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 6-A |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


# BUFFER DRAWING SHEET 3 OF 18




REVISIONS

8/17/99

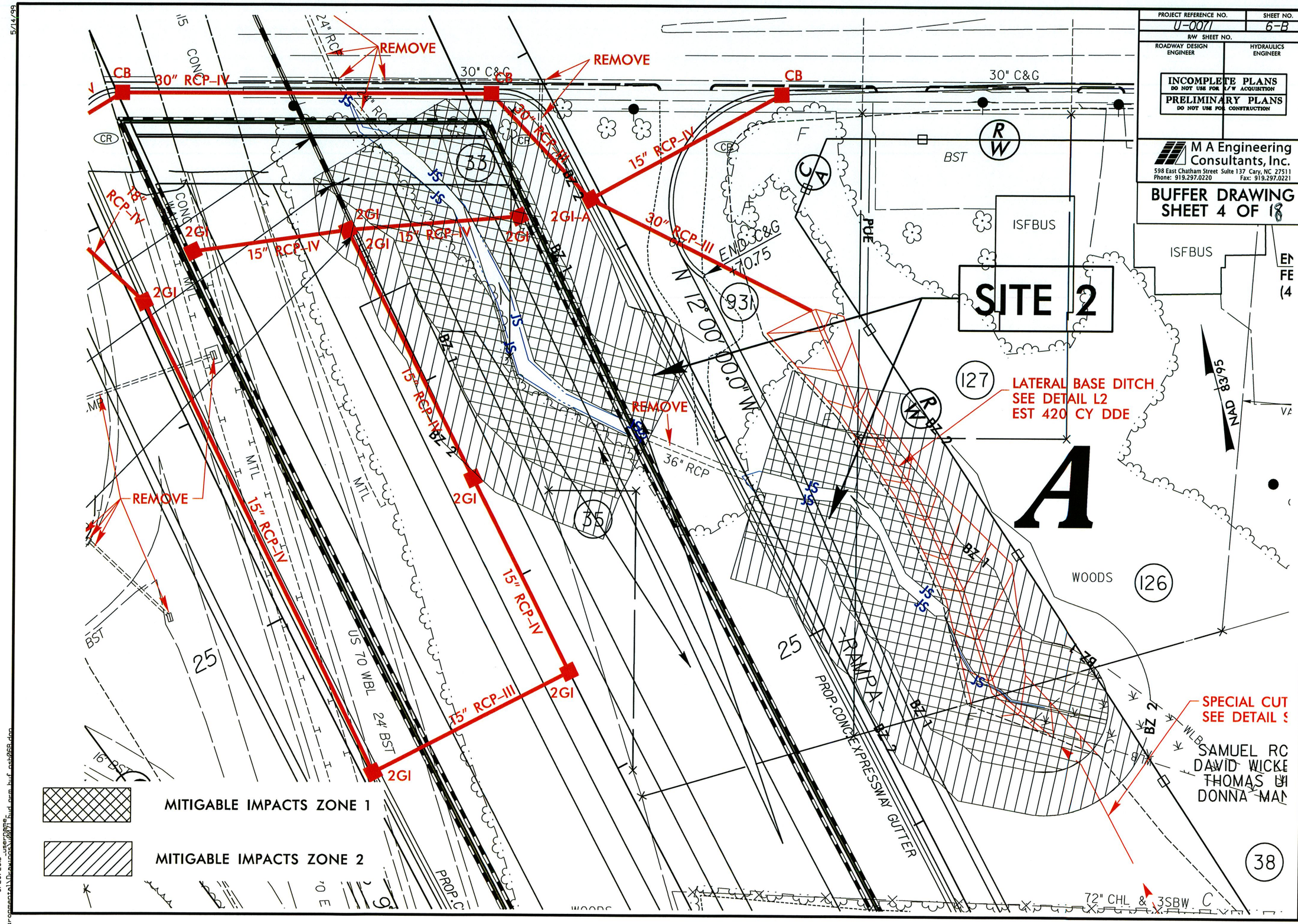
9/20/2013
username
R:\Hydraulics\PERMITS Environmental\Projects\0071 bid rem bnf psh969.dgn

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 6-B |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

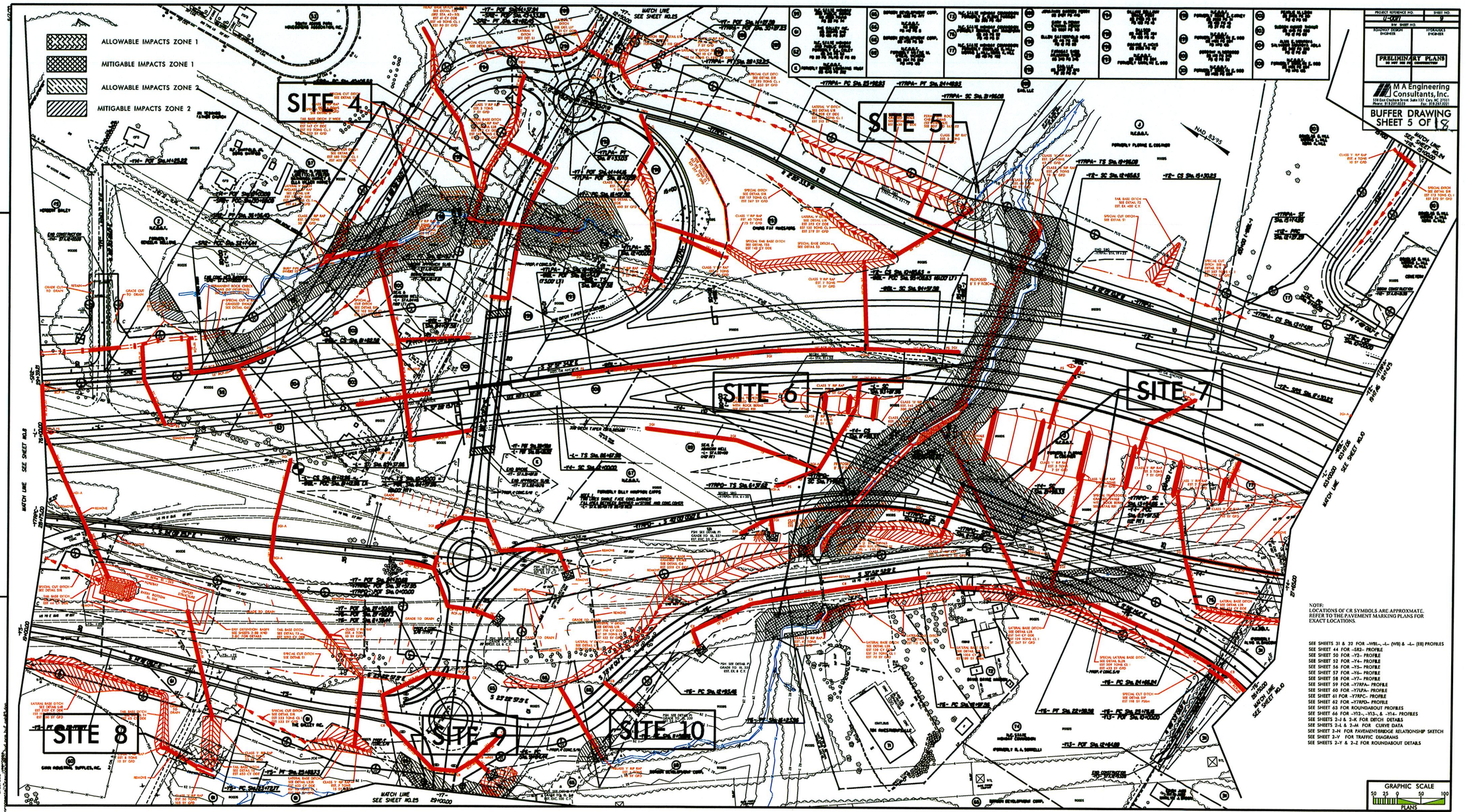
M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

BUFFER DRAWING
SHEET 4 OF 18




5/14/99

9/20/2013
-username-
environmental\Permits\U0071_bid_perm_bif_psh069.dgn




NOTE:
LOCATIONS OF CR SYMBOLS ARE APPROXMATE. REFER TO THE PAVEMENT MARKING PLANS FOR EXACT LOCATIONS.

SEE SHEETS 31 & 32 FOR -WBL-, -L- (WB) & -L- (EB) PROFILES
SEE SHEET 44 FOR -SR2- PROFILE
SEE SHEET 50 FOR -Y2- PROFILE
SEE SHEET 52 FOR -Y4- PROFILE
SEE SHEET 56 FOR -Y5- PROFILE
SEE SHEET 57 FOR -Y6- PROFILE
SEE SHEET 58 FOR -Y7- PROFILE
SEE SHEET 59 FOR -Y7RPA- PROFILE
SEE SHEET 60 FOR -Y7LPA- PROFILE
SEE SHEET 61 FOR -Y7RPC- PROFILE
SEE SHEET 62 FOR -Y7RPD- PROFILE
SEE SHEET 63 FOR ROUNDABOUT PROFILES
SEE SHEET 66 FOR -Y12-, -Y13-, & -Y14- PROFILES
SEE SHEETS 2-I & 2-K FOR DITCH DETAILS
SEE SHEETS 2-L & 2-M FOR CURVE DATA
SEE SHEET 2-N FOR PAVEMENT-BRIDGE RELATIONSHIP SKETCH
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS
SEE SHEETS 2-Y & 2-Z FOR ROUNDABOUT DETAILS

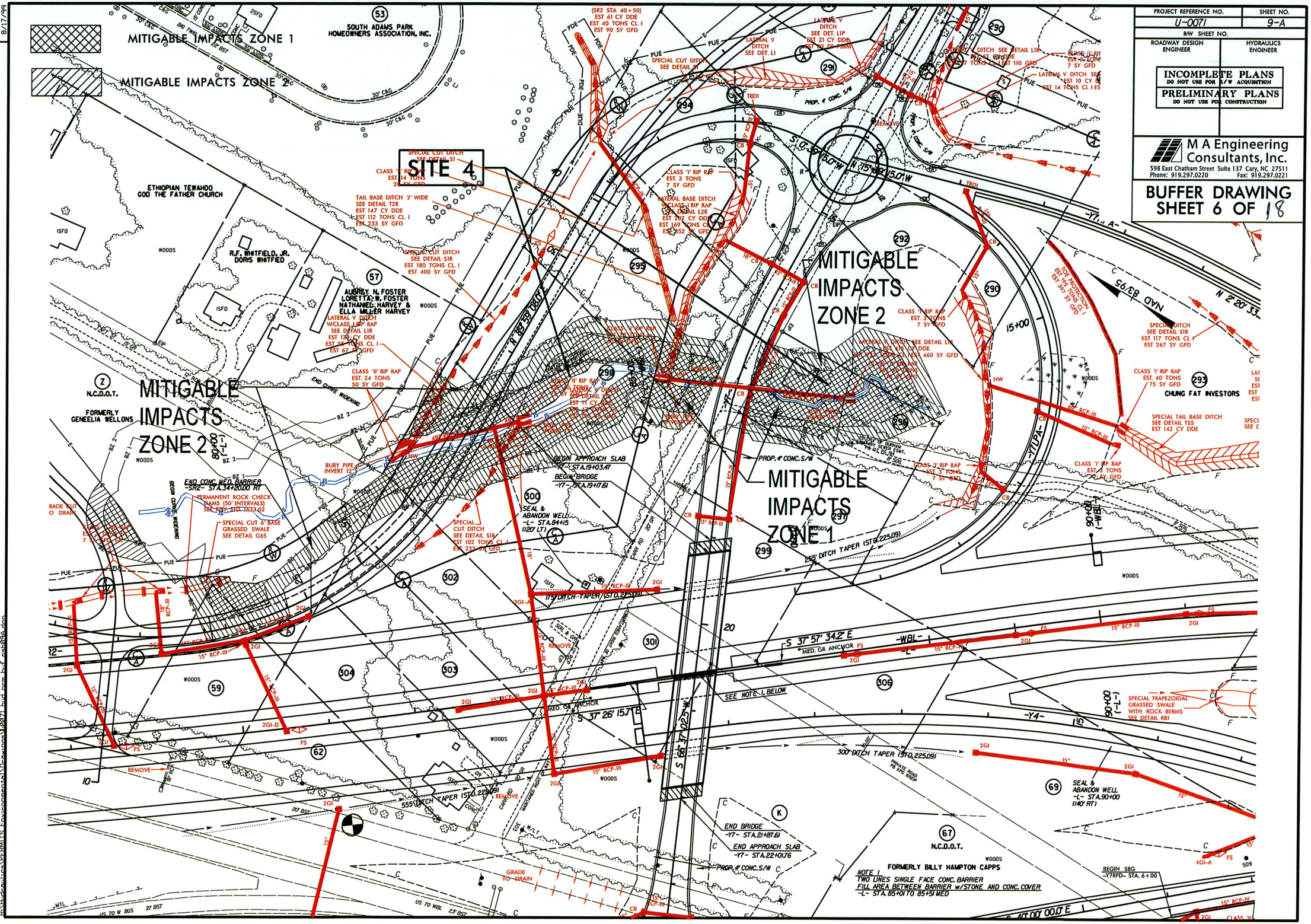
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-A |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


# BUFFER DRAWING SHEET 6 OF 18




REVISIONS

8/17/99

9/20/2013
u:\projects\PERMITS Environmental\Drawings\0071 bud pem buf psh039.dgn

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-B |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

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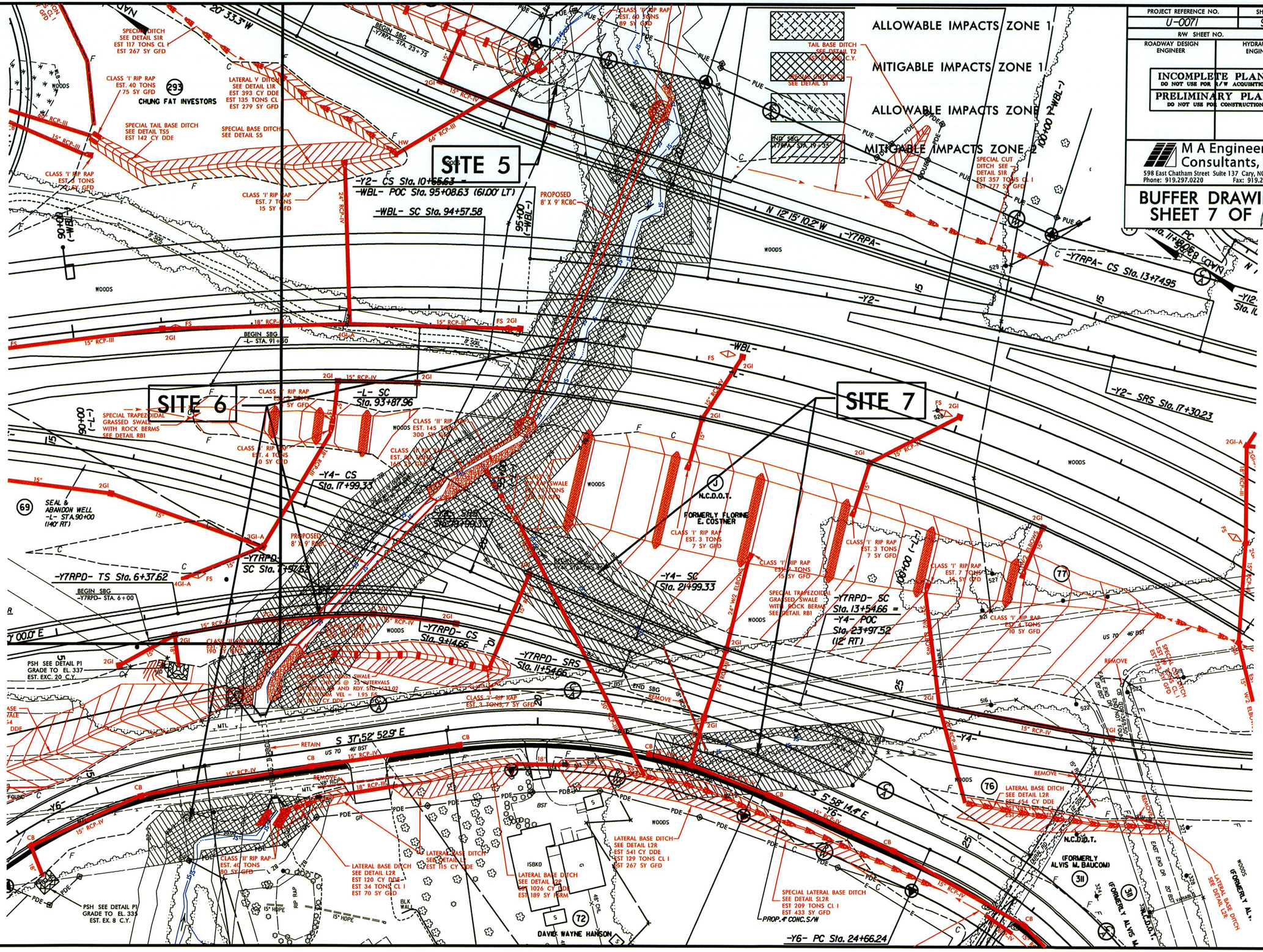
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

# BUFFER DRAWING
## SHEET 7 OF 18

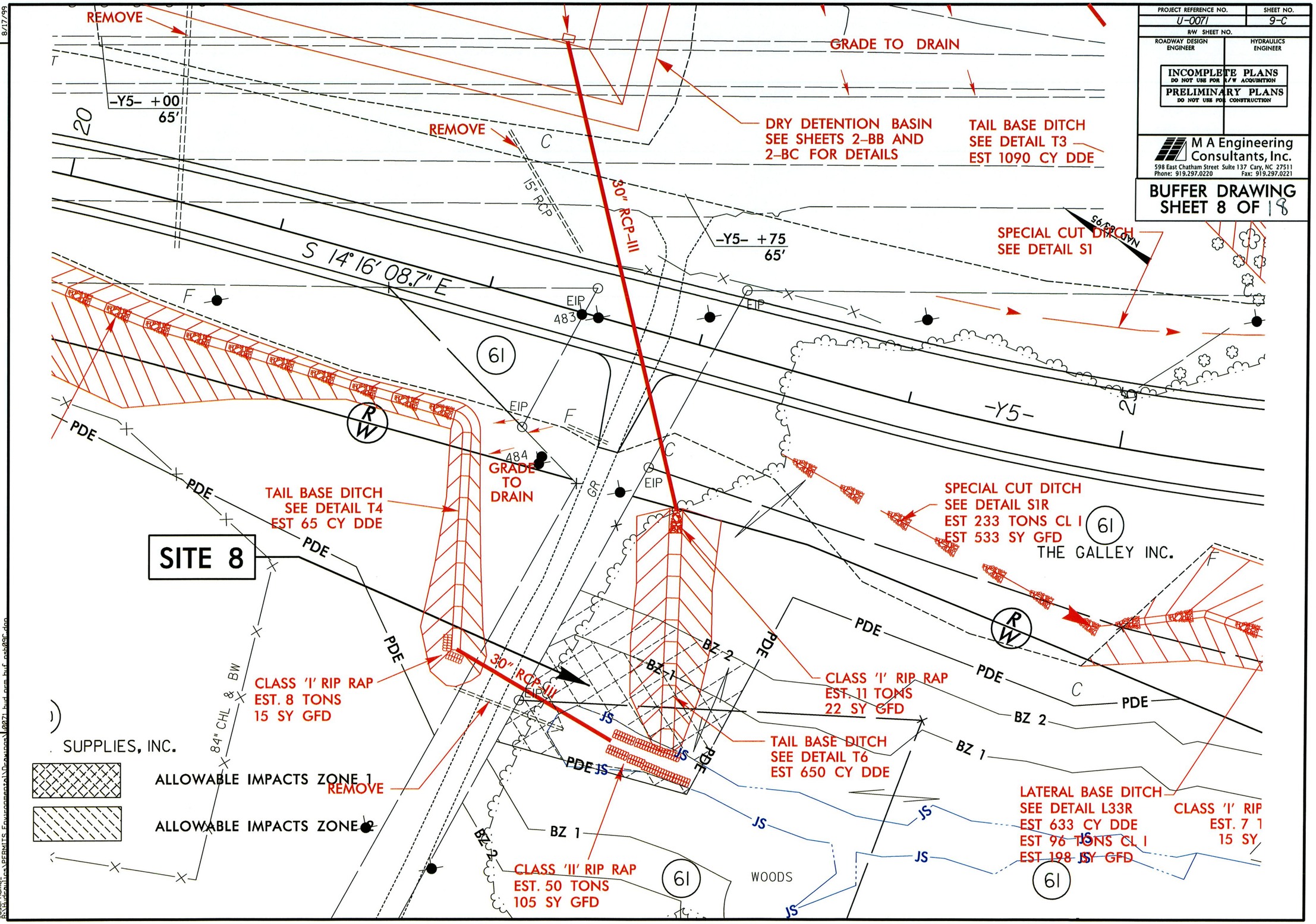


| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-C |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

**BUFFER DRAWING**
**SHEET 8 OF 18**




REVISIONS

8/17/99

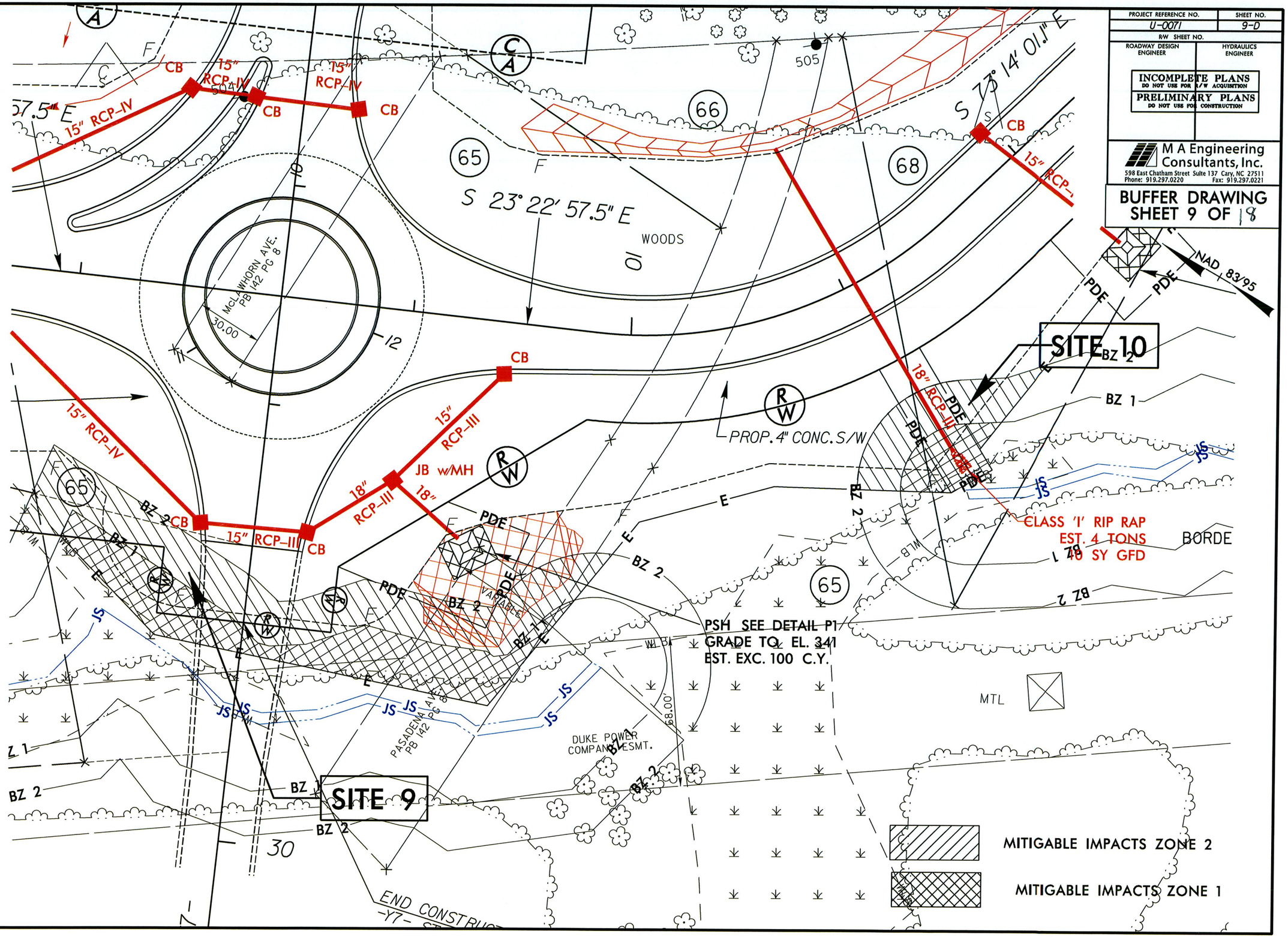
9/20/2013

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 9-D |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

# BUFFER DRAWING
SHEET 9 OF 18




REVISIONS

8/17/99

9/20/2013
username
R:\Hydraulics\PERMITS Environmental\Projects\0071 bid rem bif psh090.dgn

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 25 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

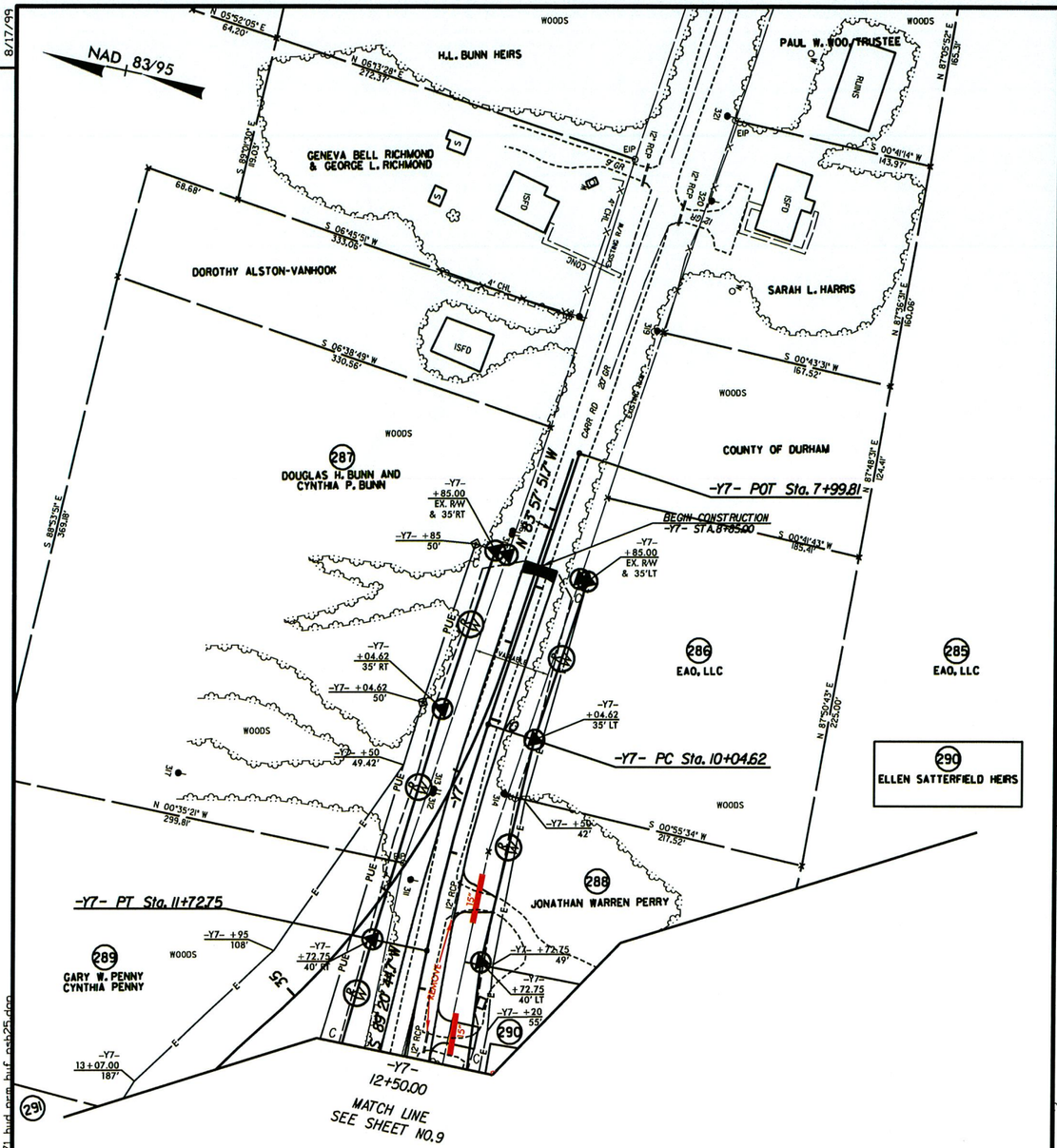
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

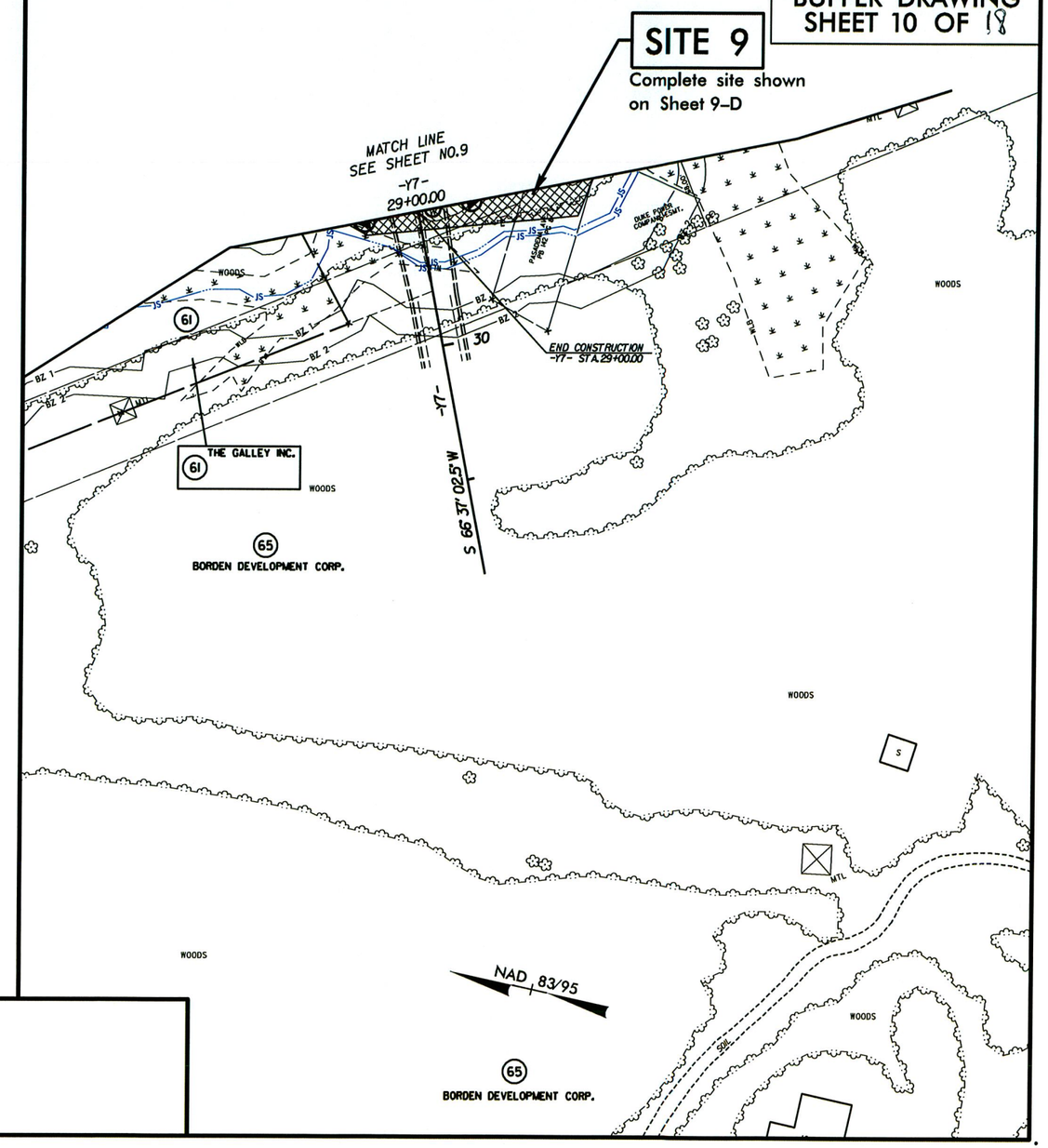
M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

# BUFFER DRAWING
SHEET 10 OF 18

MITIGABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 2



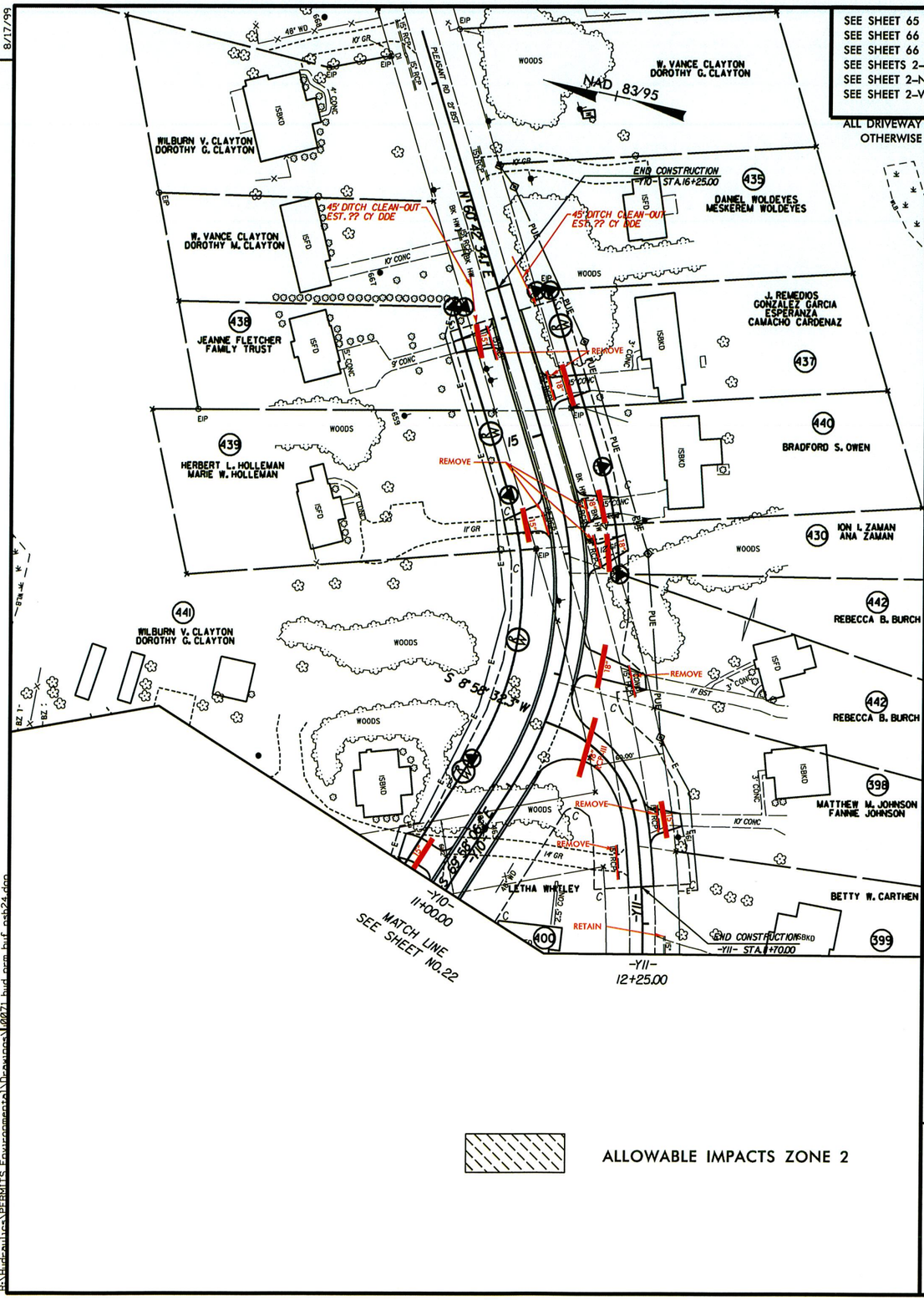

REVISIONS

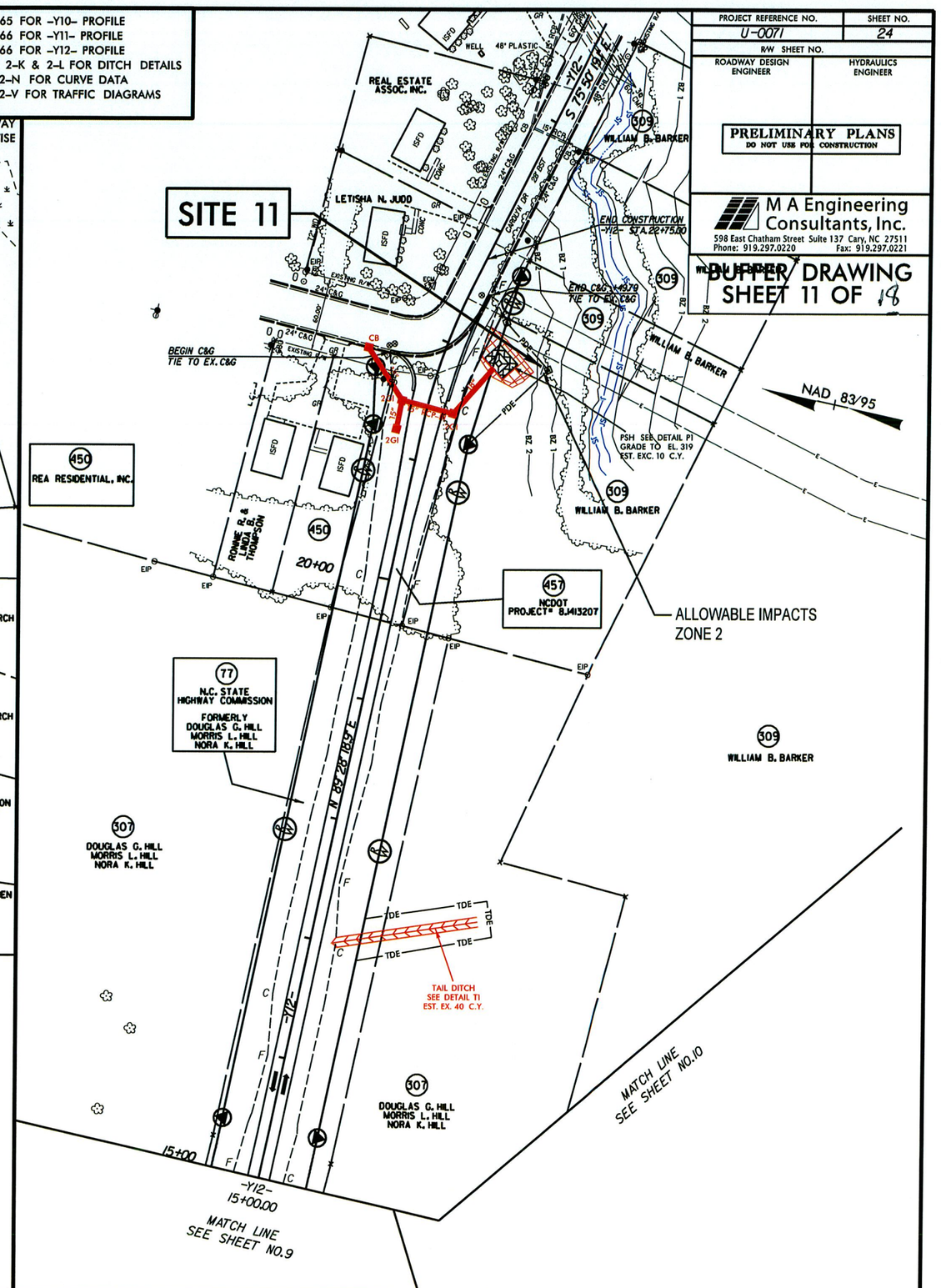
8/17/99

9/20/2013
username
N:\Projects\PERMITS Environmental\Projects\0071 hwy bridge\sh25.dgn

SEE SHEET 65 FOR -Y10- PROFILE
SEE SHEET 66 FOR -Y11- PROFILE
SEE SHEET 66 FOR -Y12- PROFILE
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-N FOR CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

ALL DRIVEWAY OTHERWISE




ALLOWABLE IMPACTS ZONE 2

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 24 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

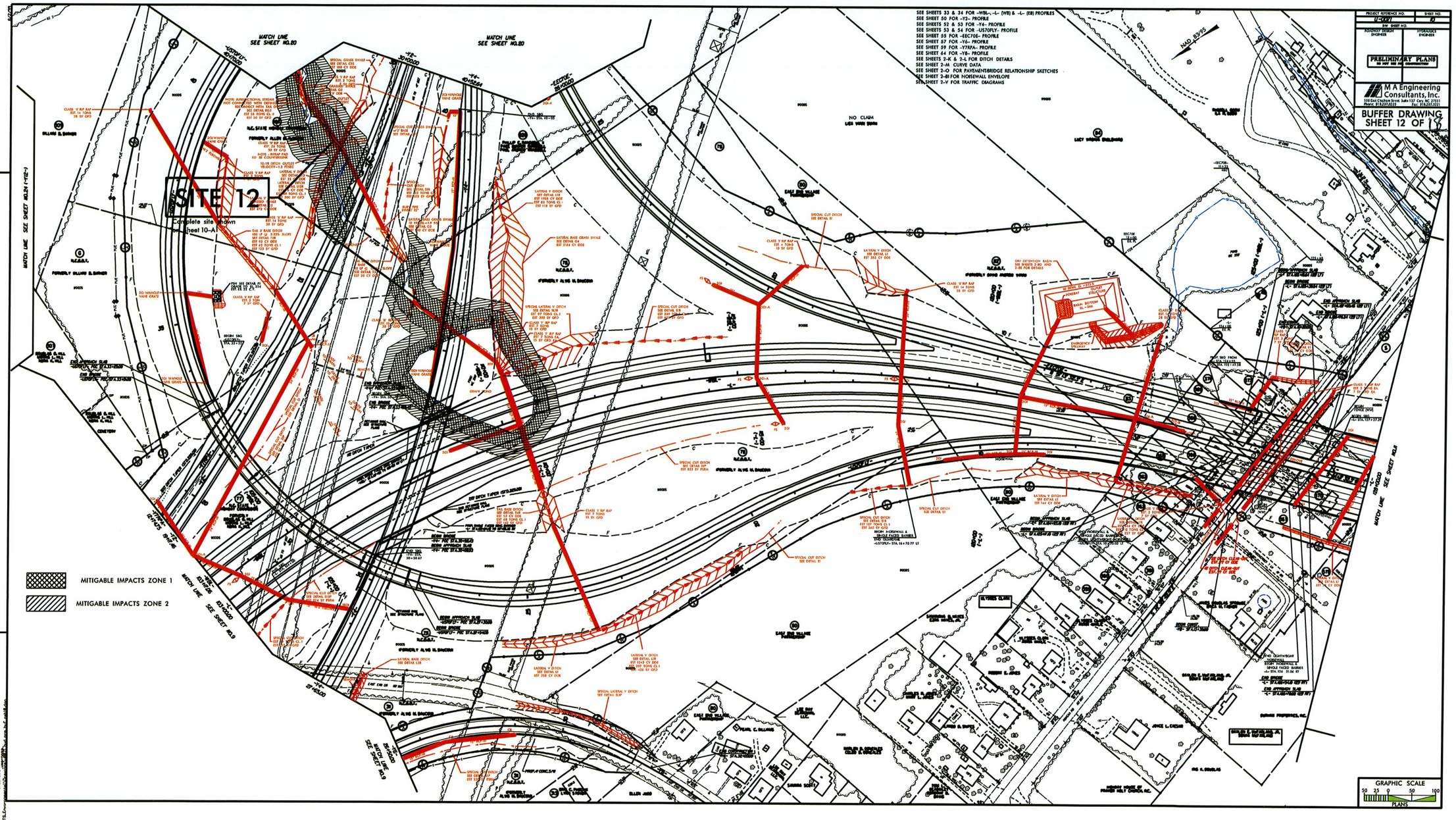

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


BUFFER DRAWING
SHEET 11 OF 19

REVISIONS
R/W REVISION / /2002 RWP ALL ADJACENT PARCELS OWNED BY WILLIAM B. BARKER COMBINED INTO PARCEL NO. 309, PARCEL NOS. 400 & 401 COMBINED INTO PARCEL NO. 400, PARCEL NOS. 442 & 443 COMBINED INTO PARCEL NO. 442.

8/17/99

9/20/2013
user=home-
B:\Hydraulics\PERMITS Environmental\Drawings\0071 bnd pem b1f eab24.dgn


SEE SHEETS 33 & 34 FOR -WBL-, -L- (WB) & -L- (EB) PROFILES
SEE SHEET 50 FOR -Y2- PROFILE
SEE SHEETS 52 & 53 FOR -Y4- PROFILE
SEE SHEETS 53 & 54 FOR -USTOFLY- PROFILE
SEE SHEET 55 FOR -SECTOS- PROFILE
SEE SHEET 57 FOR -Y6- PROFILE
SEE SHEET 59 FOR -Y7RPA- PROFILE
SEE SHEET 64 FOR -Y8- PROFILE
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-M CURVE DATA
SEE SHEET 2-O FOR PAVEMENT/BRIDGE RELATIONSHIP SKETCHES
SEE SHEET 2-BI FOR NOISEWALL ENVELOPE
SEE SHEET 2-Y FOR TRAFFIC DIAGRAMS
PROJECT REFERENCE NO.
U-2901
SHEET NO.
12
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
M A Engineering Consultants, Inc.
BUFFER DRAWING
SHEET 12 OF 15
SITE 12
Complete site shown on sheet 10-A
MATCH LINE SEE SHEET NO.20
MATCH LINE SEE SHEET NO.19
MATCH LINE SEE SHEET NO.13
NO CLAIM
MITIGABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 2
GRAPHIC SCALE
50 25 0 50 100
PLANS

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 10-A |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION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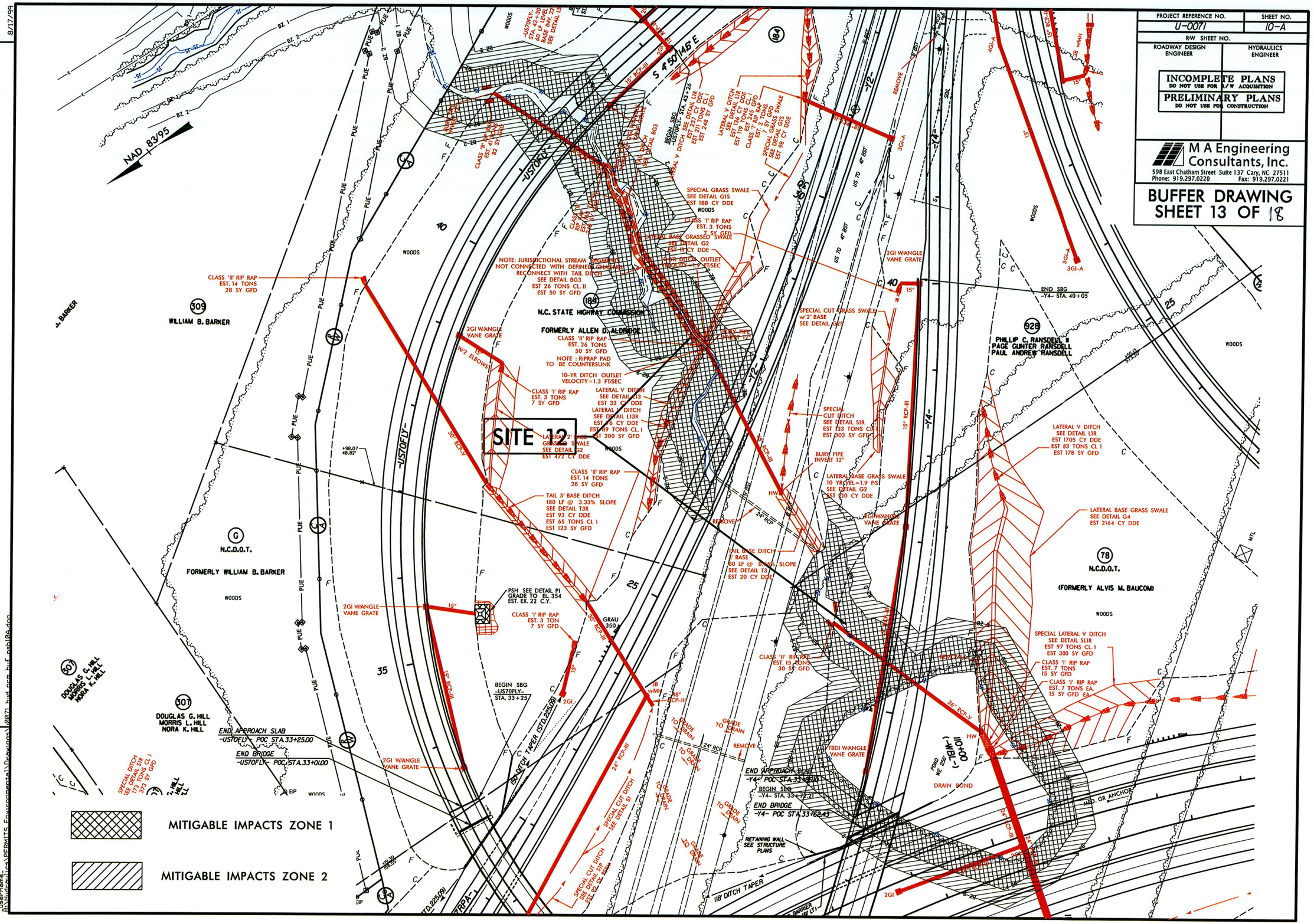
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


# BUFFER DRAWING
## SHEET 13 OF 18




REVISIONS

8/17/99

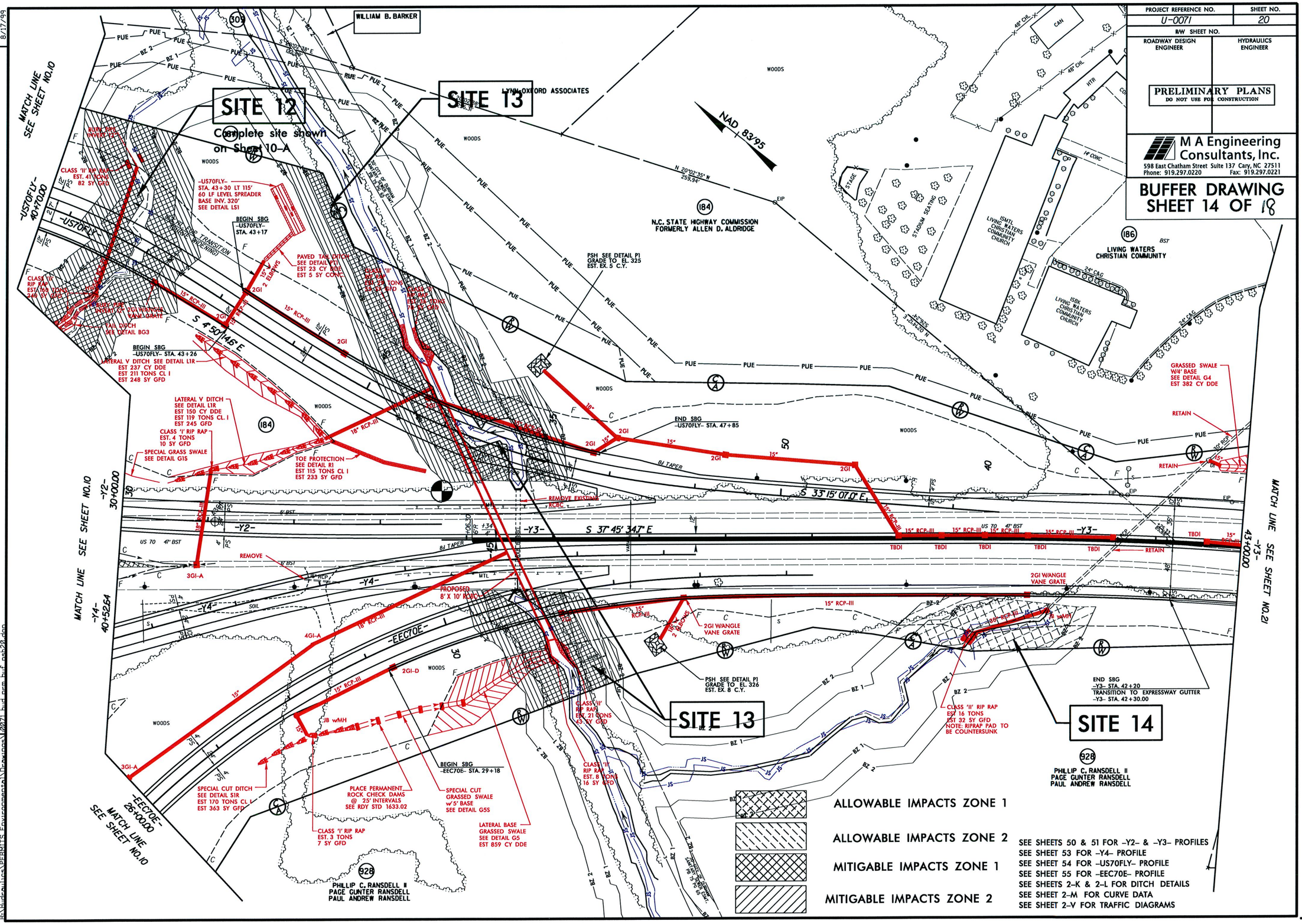
9/20/2013
R:\Hydraulics\PERMITS Environmental\Projects\U0071 hwy 421 bridge replacement\U0071_buffer_sheets10-18.dgn

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 20 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

# BUFFER DRAWING SHEET 14 OF 18




REVISIONS

R/W REVISION / /2012 RWP ALL ADJACENT PARCELS OWNED BY WILLIAM B. BARKER COMBINED INTO PARCEL NO. 309. PARCEL NO. 185 REVISED TO 928.

8/17/99

10/31/2013
ASPEN01
R:\Hydraulics\PERMITS Environmental\Drawings\U0071_hwd_rem_hyd_psh20.dgn

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 22 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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Phone: 919.297.0220 Fax: 919.297.0221

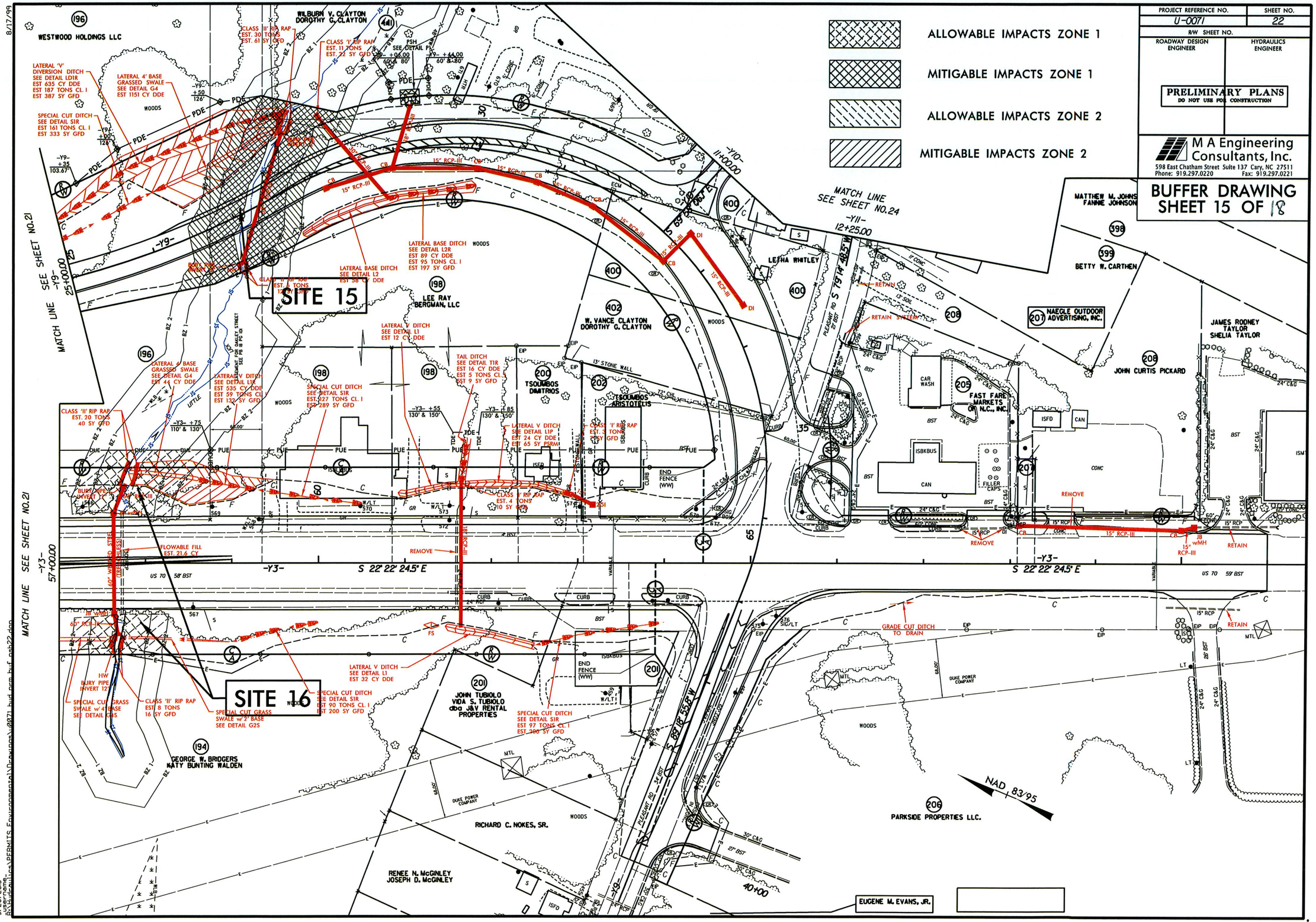
# BUFFER DRAWING
## SHEET 15 OF 18

ALLOWABLE IMPACTS ZONE 1

MITIGABLE IMPACTS ZONE 1

ALLOWABLE IMPACTS ZONE 2

MITIGABLE IMPACTS ZONE 2




8/17/99

R/W REVISION / /2012 RBP PARCEL NOS. 198, 199, & 204 COMBINED INTO PARCEL NO. 198, PARCEL NOS. 400 & 401 COMBINED INTO PARCEL NO. 400.
R/W REVISION 6 / 21 /2012 DBE ADDED SIDEWALK ALONG PARCELS NO. 205 & 206.

9/20/2013
R:\Roadway\Projects\PERMITS Environmental\Drawings\0071 bud perm bufr sch22.dgn

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 11 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION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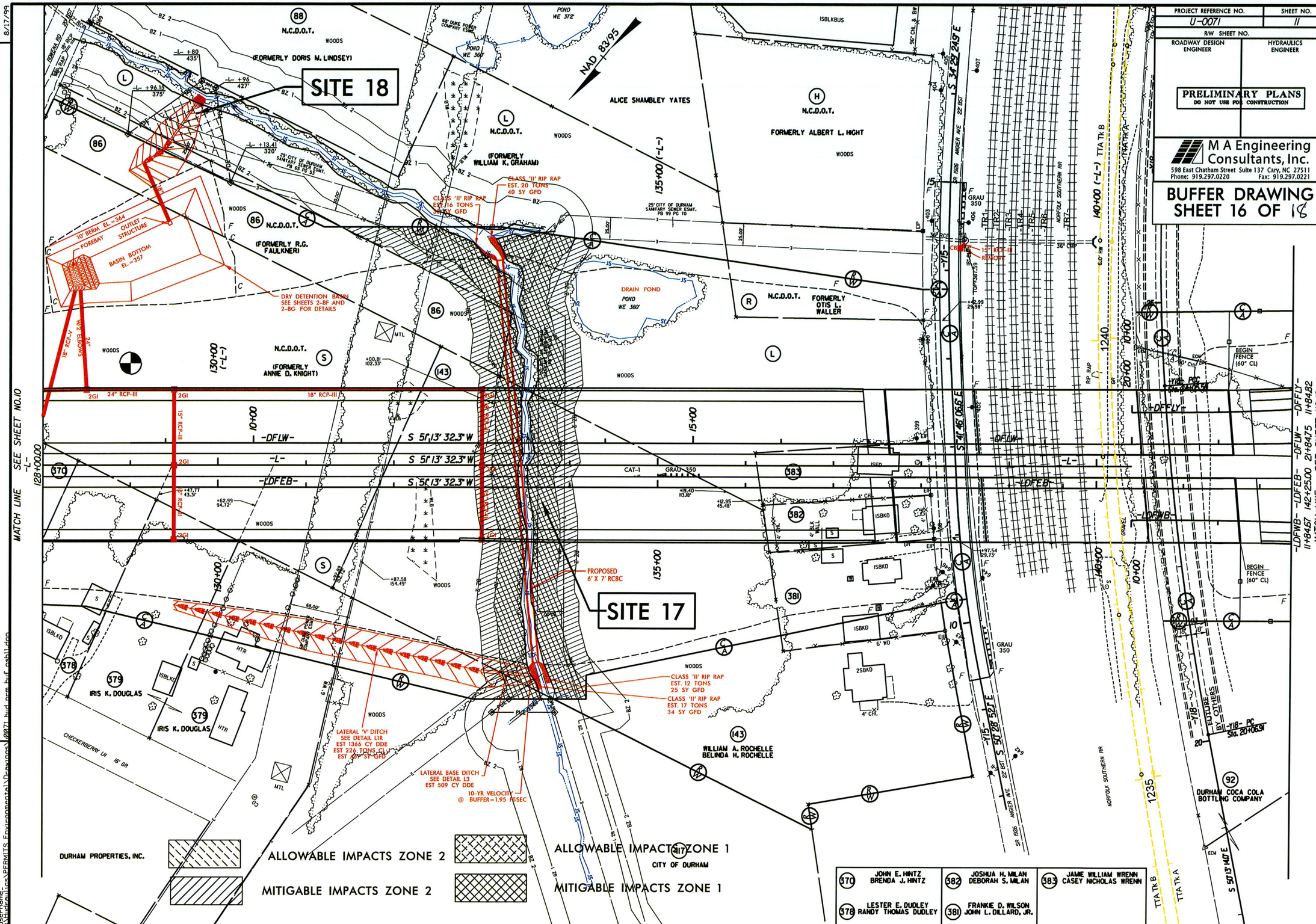
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


# BUFFER DRAWING
## SHEET 16 OF 16




REVISIONS

| R/W | REVISION | / |
|---|---|---|
| | 7/02 RWP PARCEL NOS. 92 & 80 COMBINED INTO PARCEL NO. 92, AND PARCEL NAME CHANGED TO "DURHAM COCA COLA BOTTLING COMPANY". PARCEL NOS. 379 & 380 COMBINED INTO PARCEL NO. 379, PARCEL NO. 85 REVISED TO "S", PARCEL NO. 87 REVISED TO "L", PARCEL NO. 90 REVISED TO "R". PARCEL NO. 384 REVISED TO "R". | |

8/17/99

9/20/2013
username-
R:\Hydraulics\PERMITS Environmental\Drawings\0071 bud-em b-f-esb11.dgn

# WETLANDS IN BUFFER IMPACTS SUMMARY

| SITE NO. | STATION (FROM/TO) | | WETLANDS IN BUFFERS ZONE 1 ($ft^2$) | WETLANDS IN BUFFERS ZONE 2 ($ft^2$) |
|---|---|---|---|---|
| 1 | L 36+86RT to 38+71LT | | 2986 | 431 |
| 2 | L 44+95 to 49+16 LT | | 2431 | 268 |
| 4 | SR2 32+99 to Y7 16+51 | | 899 | 969 |
| 7 | Y4 21+14 | | 616 | 535 |
| 9 | Y7 29+00 | | 61 | 132 |
| 10 | Y6 11+09 | | 6 | 0 |
| | | | | |
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| | | | | |
| | | | | |
| | | | | |
| **TOTAL:** | | | 6999 | 2335 |

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

DURHAM COUNTY
PROJECT: 34745.2.8 (U-0071)

10/31/2013
SHEET 17 OF 18

Rev. Jan 2009

# BUFFER IMPACTS SUMMARY

| | | | IMPACT | | | | | | | | | BUFFER REPLACEMENT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | TYPE | | | ALLOWABLE | | | MITIGABLE | | | | |
| SITE NO. | STRUCTURE SIZE / TYPE | STATION (FROM/TO) | ROAD CROSSING | BRIDGE | PARALLEL IMPACT | ZONE 1 ($ft^2$) | ZONE 2 ($ft^2$) | TOTAL ($ft^2$) | ZONE 1 ($ft^2$) | ZONE 2 ($ft^2$) | TOTAL ($ft^2$) | ZONE 1 ($ft^2$) | ZONE 2 ($ft^2$) |
| 1 | 66" RCP-V | L 36+86RT to 38+71LT | X | | | | | | 41408 | 26834 | 68242 | | |
| 2 | 30" RCP & 15"RCP | L 44+95 to 49+16 LT | X | | | | | | 22801 | 15534 | 38335 | | |
| 3 | 30" RCP-III | Y17 12+93 to 13+97 | X | | | 2222 | 997 | 3219 | | | | | |
| 4 | 18", 48" & 60" RCP | SR2 32+99 to Y7 16+51 | X | | | | | | 42060 | 34953 | 77013 | | |
| 5 | 66" RCP-III | Y7RPA 21+27 to 22+32 | X | | | 2342 | 3142 | 5484 | | | | | |
| 6 | TWO 8'x9' RCBC | Y7RPA 20+32 to Y7RPD 7+62 | X | | | | | | 61647 | 37348 | 98995 | | |
| 7 | 30" RCP-III | Y4 21+14 | X | | | | | | 24286 | 16780 | 41066 | | |
| 8 | DITCH | Y5 23+24 | STORMWATER MANAGEMENT | | | 3438 | 1805 | 5243 | | | | | |
| 9 | 15" RCP-III | Y7 29+00 | | | X | | | | 4340 | 6087 | 10427 | | |
| 10 | 18" RCP-III | Y6 11+09 | | | X | | | | 977 | 1780 | 2757 | | |
| 11 | PREFORMED SCOUR HOLE | Y12 10+00 | STORMWATER MANAGEMENT | | | | 87 | 87 | | | | | |
| 12 | 15", 24", & 36" RCP | L 109+80 to Y2 29+08 | X | | | | | | 77205 | 50757 | 127962 | | |
| 13 | 8'x10' RCBC | Y3 34+44 | X | | | | | | 27871 | 20229 | 48100 | | |
| 14 | 30" RCP | Y3 40+73 | X | | | 7822 | 3210 | 11032 | | | | | |
| 15 | 60" RCP | Y9 27+33 | X | | | | | | 13171 | 8861 | 22032 | | |
| 16 | 60" RCP | Y3 57+71 | X | | | 7690 | 5252 | 12942 | | | | | |
| 17 | 6'x7' RCBC | L 133+41 | X | | | | | | 36102 | 23110 | 59212 | | |
| 18 | DITCH | L 129+60 | STORMWATER MANAGEMENT | | | 2146 | 1897 | 4043 | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| **TOTAL:** | | | | | | 25660 | 16390 | 42050 | 351868 | 242273 | 594141 | | |

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

DURHAM COUNTY
PROJECT: 34745.2.8 (U-0071)

10/31/2013
SHEET 18 OF 18

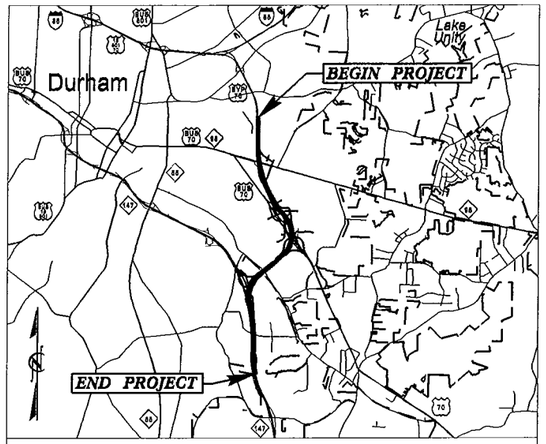
TIP PROJECT: U-0071

| T.I.P. NO. | SHEET NO. |
|---|---|
| U-0071 | US-1 |

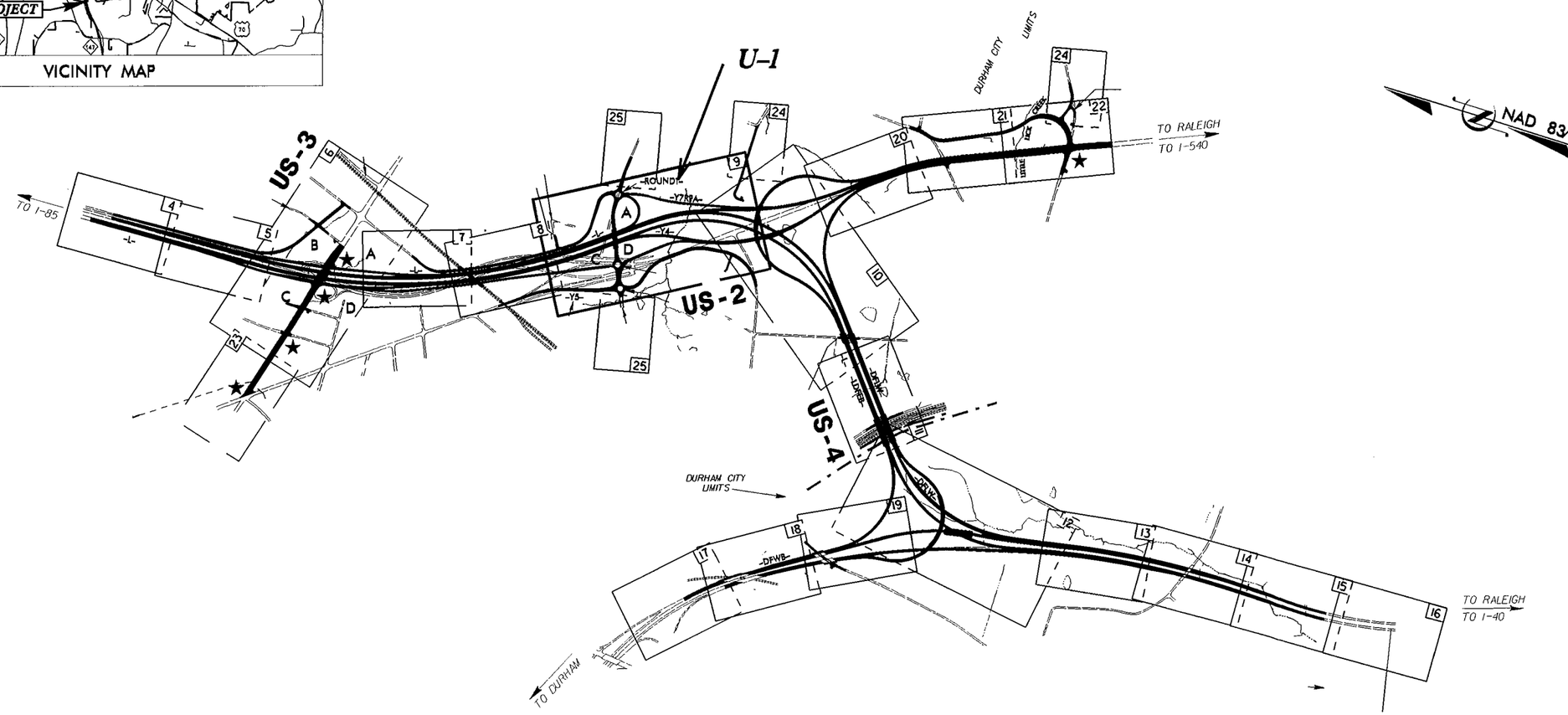
# STATE OF NORTH CAROLINA
# DIVISION OF HIGHWAYS

# *UTILITY PERMIT PLANS*
## *DURHAM COUNTY*
## *(SURFACE WATER IMPACT)*

**Utility Permit Drawing**
**Sheet 1 of 5**
**Revised 9/4/13**



VICINITY MAP




### *GRAPHIC SCALES*

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

### *INDEX OF SHEETS*

| *SHEET NO.* | *DESCRIPTION* |
|---|---|
| *US-1* | *TITLE SHEET* |
| *US-2 ~ US-4* | *UTILITY PERMIT SHEET* |

### *WATER AND SEWER OWNERS ON PROJECT*

*(1) SANITARY GRAVITY SEWER : CITY OF DURHAM*

*SEAL*


*PREPARED IN THE OFFICE OF:*
*DIVISION OF HIGHWAYS*
*UTILITIES UNIT*
*UTILITIES ENGINEERING*

*1555 MAIL SERVICES CENTER*
*RALEIGH NC 27699-1555*
*PHONE (919) 707-6690*
*FAX (919) 250-4151*

| | |
|---|---|
| *Roger Worthington, P.E.* | *UTILITIES SECTION ENGINEER* |
| *Ron. B. Wilkins, P.E.* | *UTILITIES SQUAD LEADER PROJECT ENGINEER* |
| *Jong-Tae Yoon* | *UTILITIES PROJECT DESIGNER* |



09/28/99
04-SEP-2013 13:07
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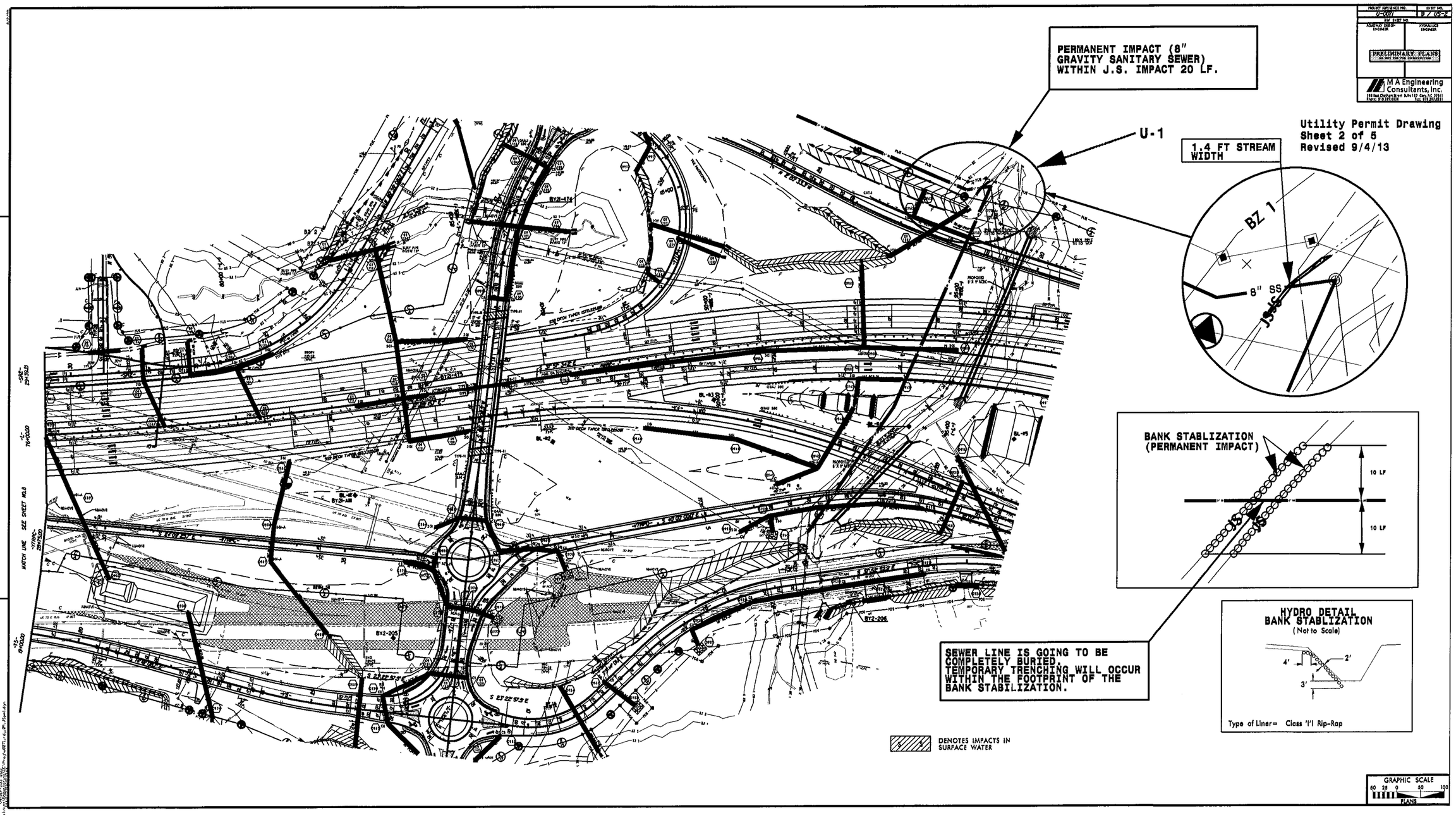
PROJECT REFERENCE NO. 0-0001 | EXHIBIT NO. 9 / 05-2
SHT. EXHIBIT NO.

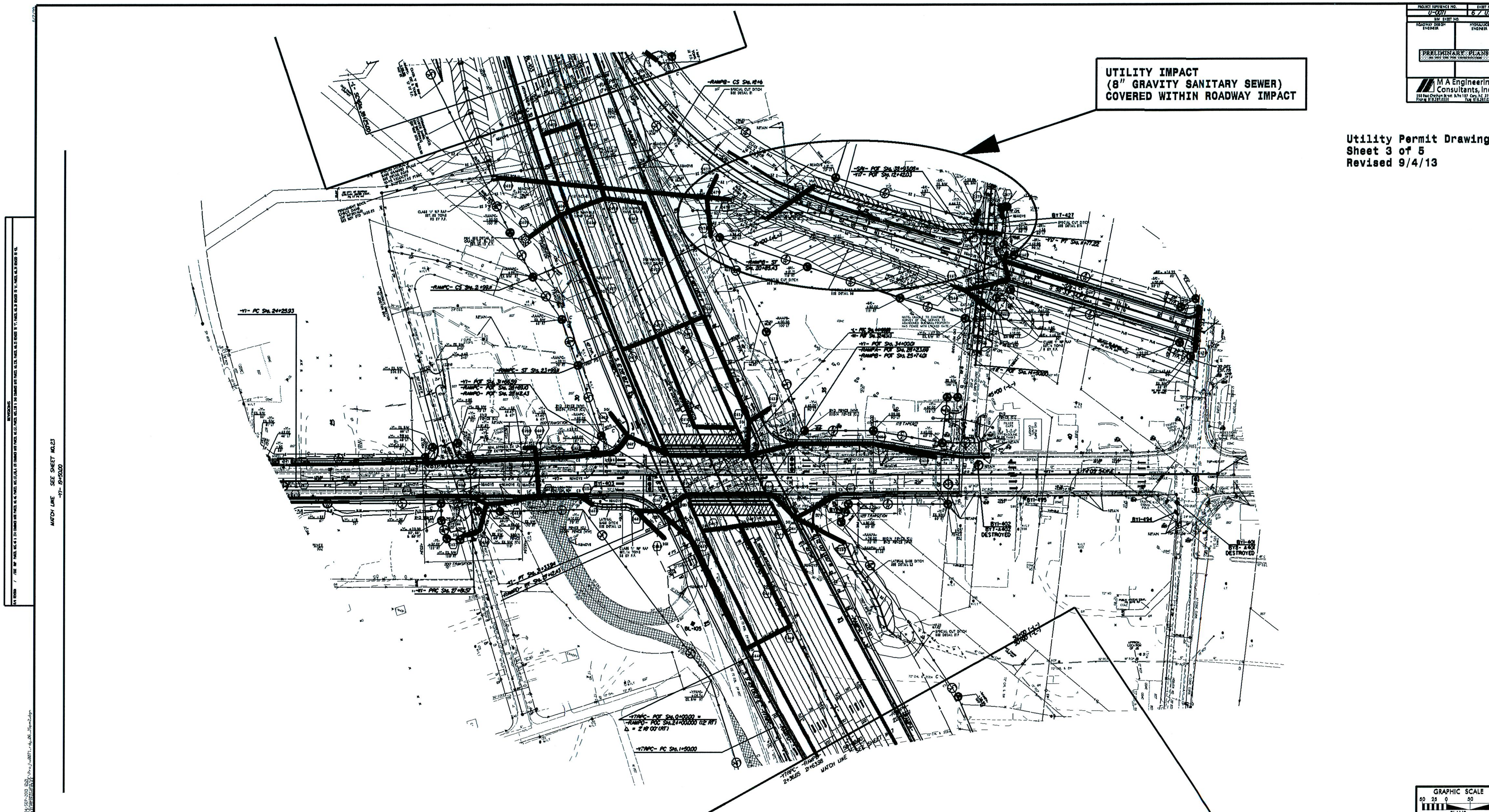
ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER

PRELIMINARY PLANS
NOT FOR CONSTRUCTION

M A Engineering Consultants, Inc.
[illegible]

Utility Permit Drawing
Sheet 2 of 5
Revised 9/4/13






UTILITY IMPACT
(8" GRAVITY SANITARY SEWER)
COVERED WITHIN ROADWAY IMPACT

Utility Permit Drawing
Sheet 3 of 5
Revised 9/4/13

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 6 / US-3 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

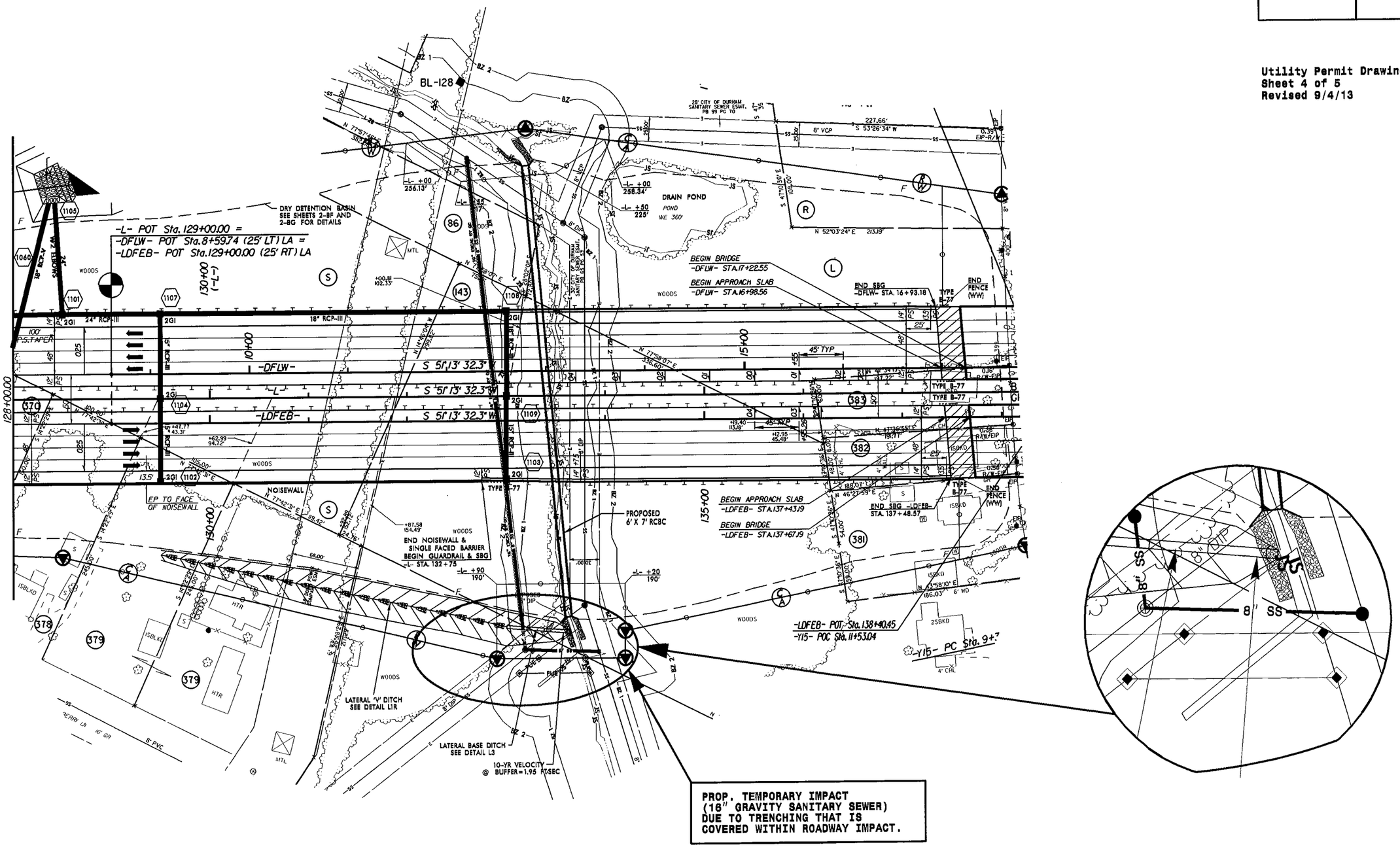
M A Engineering Consultants, Inc.

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 11 / US-4 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

**Utility Permit Drawing**
**Sheet 4 of 5**
**Revised 9/4/13**




**REVISIONS**

R/W REVISION / /2012 RWP PARCEL NOS. 92 & 93 CHANGED INTO PARCEL NO. 92, AND PARCEL NAME CHANGED TO DURHAM COCA COLA BOTTLING COMPANY. PARCEL NOS. 379 & 380 COMBINED INTO PARCEL NO. 379. PARCEL NO. 95 REVISED TO "S". PARCEL NO. 97 REVISED TO "T". PARCEL NO. 90 REVISED TO "R". PARCEL NO. 394 REVISED TO "R".

8/17/99

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## WETLAND PERMIT IMPACT 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) |
| U-1 | BANK STABLIZATION | 8 " SS | | | | | | 0.00 | 0.00 | 20 | | |
| TOTALS: | | | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 20 | 0.00 | 0.00 |

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS

DURHAM COUNTY
WBS - 34745.1.1 (U-0071)

ATN Revised 3/31/05

SHEET 5 O: 5 9/4/2013

09/08/99

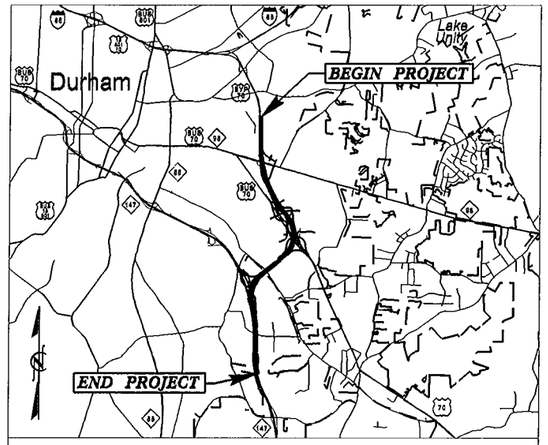
TIP PROJECT: U-0071

| T.I.P. NO. | SHEET NO. |
|---|---|
| U-0071 | UB-1 |

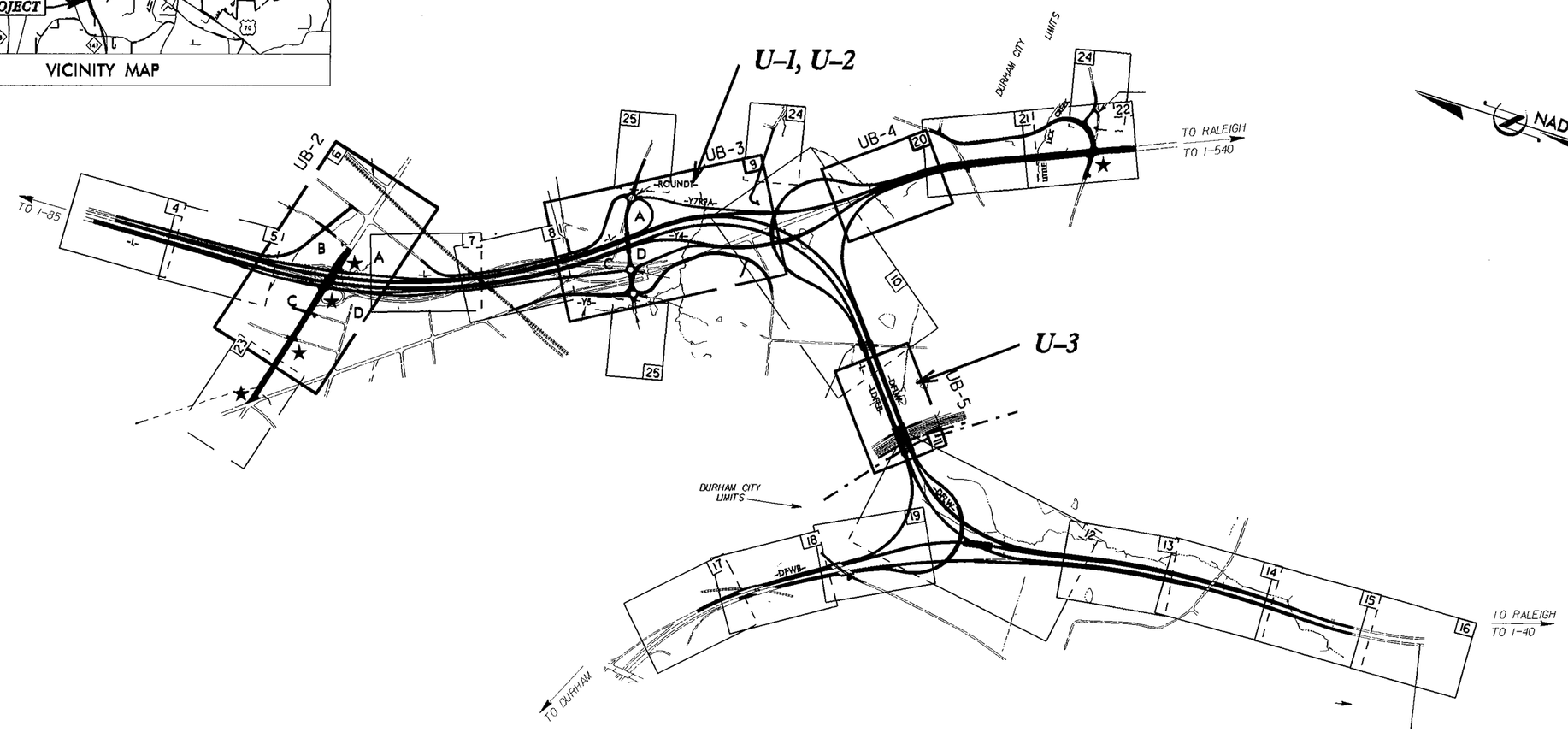
# STATE OF NORTH CAROLINA
# DIVISION OF HIGHWAYS

# *UTILITY PERMIT PLANS*
## *DURHAM COUNTY*
## *(BUFFER ZONE IMPACT)*

**Utility Permit Drawing**
**Sheet 1 of 6**
**Revised 9/4/13**



VICINITY MAP




### *GRAPHIC SCALES*

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

### *INDEX OF SHEETS*

| *SHEET NO.* | *DESCRIPTION* |
|---|---|
| *UB-1* | *TITLE SHEET* |
| *UB-2 ~ UB-5* | *UTILITY PERMIT SHEET* |

### *WATER AND SEWER OWNERS ON PROJECT*

*(1) SANITARY GRAVITY SEWER : CITY OF DURHAM*

*SEAL*


*PREPARED IN THE OFFICE OF:*
*DIVISION OF HIGHWAYS*
*UTILITIES UNIT*
*UTILITIES ENGINEERING*

*1555 MAIL SERVICES CENTER*
*RALEIGH NC 27699-1555*
*PHONE (919) 707-6690*
*FAX (919) 250-4151*

| | |
|---|---|
| *Roger Worthington, P.E.* | *UTILITIES SECTION ENGINEER* |
| *Ron. B. Wilkins, P.E.* | *UTILITIES SQUAD LEADER PROJECT ENGINEER* |
| *Jong-Tae Yoon* | *UTILITIES PROJECT DESIGNER* |


04-SEP-2013 13:22
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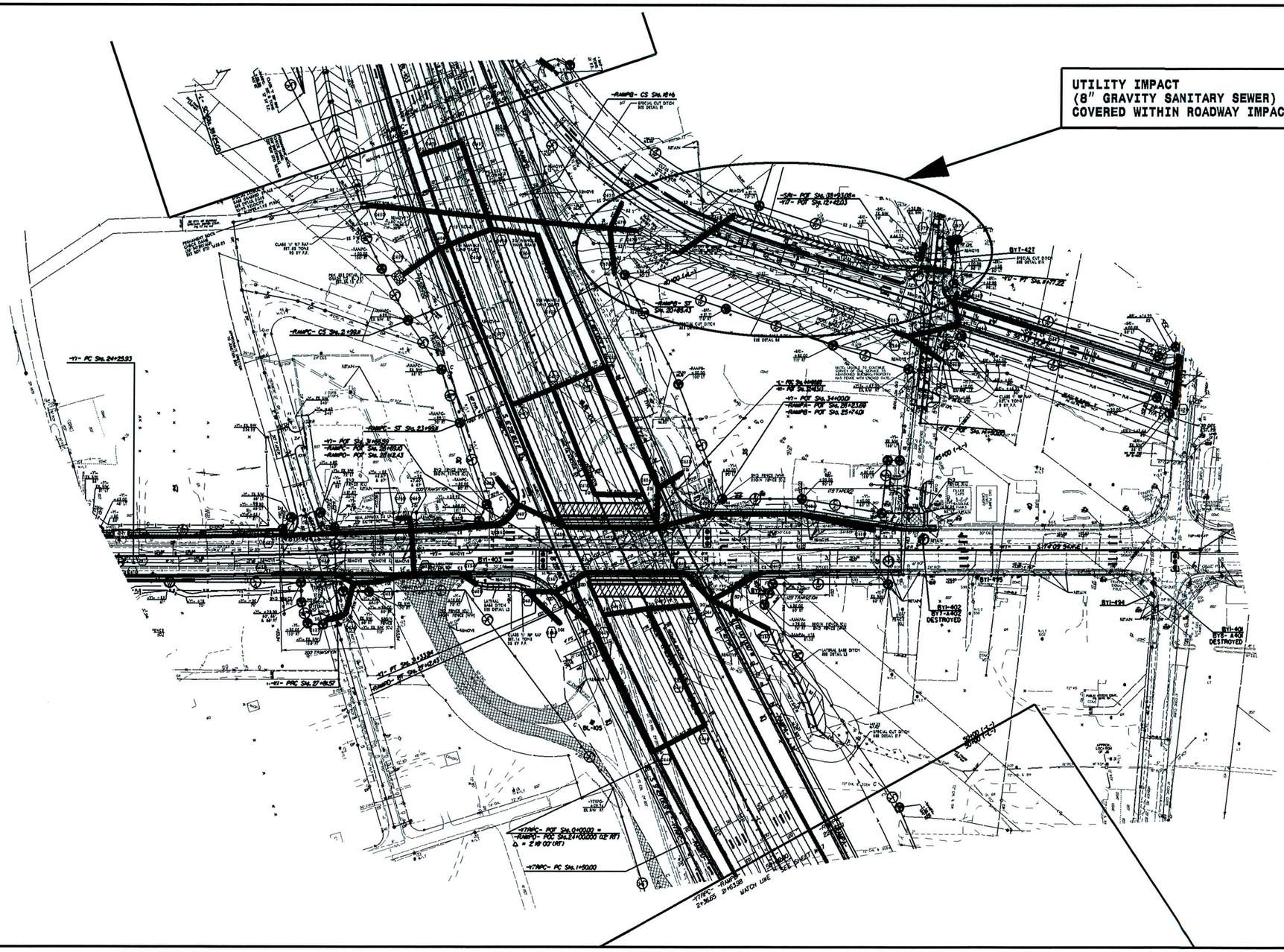
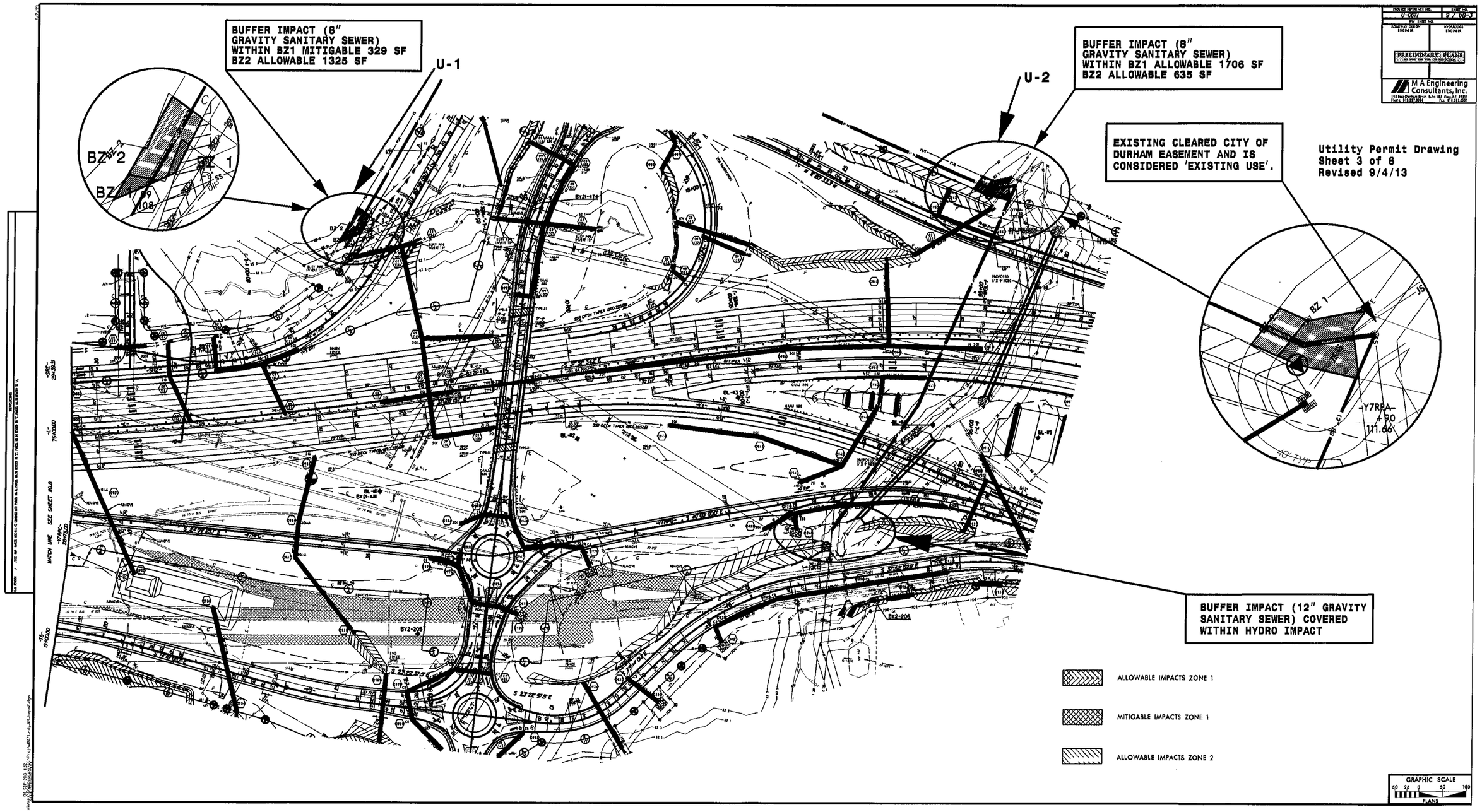
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0011 | 6 / UB-2 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
152 Nor Chatham Street Suite 110 Cary, NC 27511
Phone 919.387.0778 Fax 919.387.0781

**Utility Permit Drawing**
**Sheet 2 of 6**
**Revised 9/4/13**



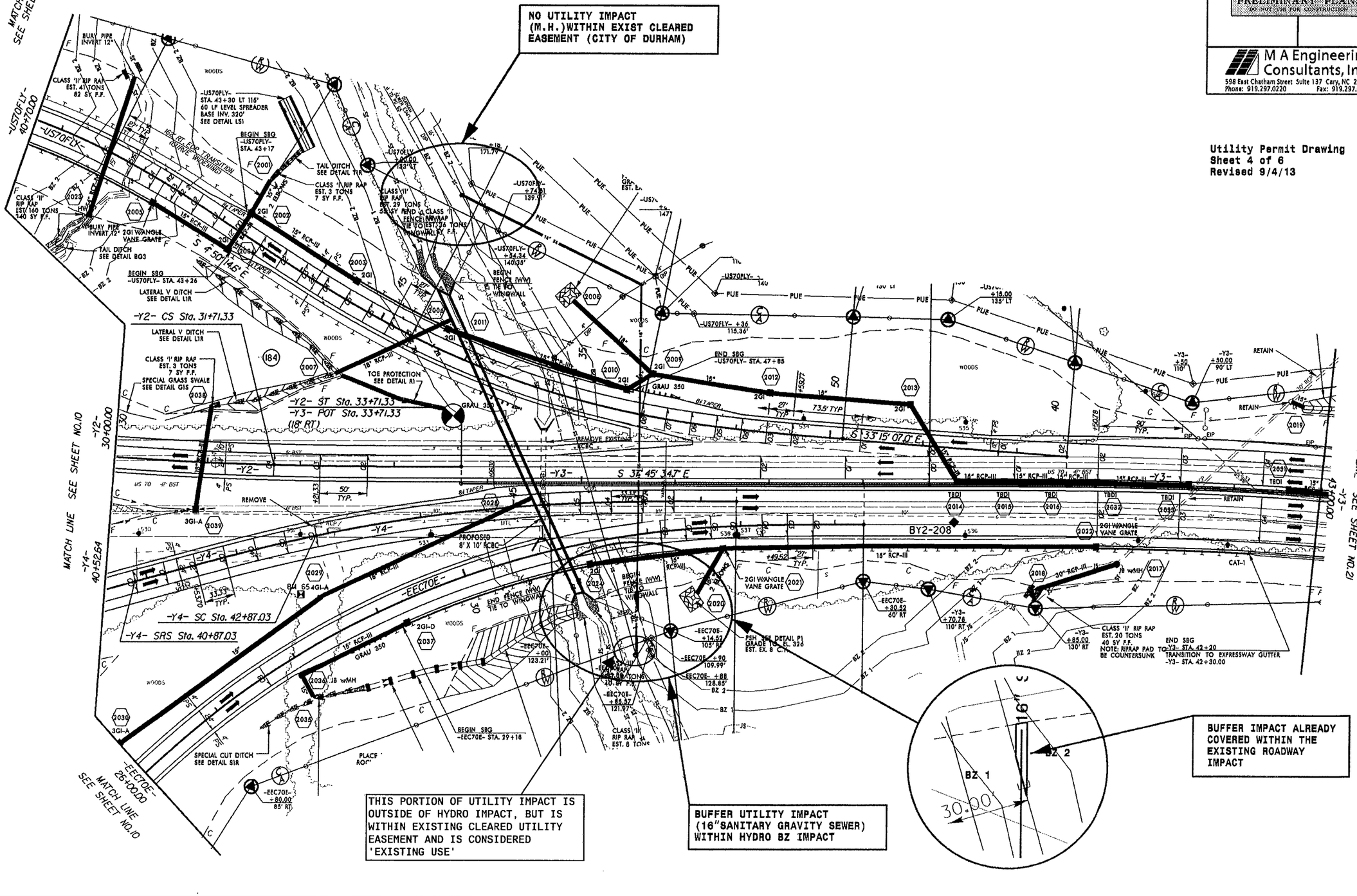

BUFFER IMPACT (8" GRAVITY SANITARY SEWER) WITHIN BZ1 MITIGABLE 329 SF BZ2 ALLOWABLE 1325 SF
U-1
U-2
BUFFER IMPACT (8" GRAVITY SANITARY SEWER) WITHIN BZ1 ALLOWABLE 1706 SF BZ2 ALLOWABLE 635 SF
EXISTING CLEARED CITY OF DURHAM EASEMENT AND IS CONSIDERED 'EXISTING USE'.
Utility Permit Drawing
Sheet 3 of 6
Revised 9/4/13
BZ 1
BZ 2
BUFFER IMPACT (12" GRAVITY SANITARY SEWER) COVERED WITHIN HYDRO IMPACT
ALLOWABLE IMPACTS ZONE 1
MITIGABLE IMPACTS ZONE 1
ALLOWABLE IMPACTS ZONE 2
GRAPHIC SCALE
PLANS
PRELIMINARY PLANS
M A Engineering Consultants, Inc.
MATCH LINE SEE SHEET #2.8

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 20 / UB-4 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


Utility Permit Drawing
Sheet 4 of 6
Revised 9/4/13




REVISIONS

R/W REVISION / /202 (BRP ALL ROUNDOUT PARCELS OWNED BY WILLIAM S. BURKER COMBINED INTO PARCEL NO. 305, PARCEL NO. 85 REVISED TO 324.

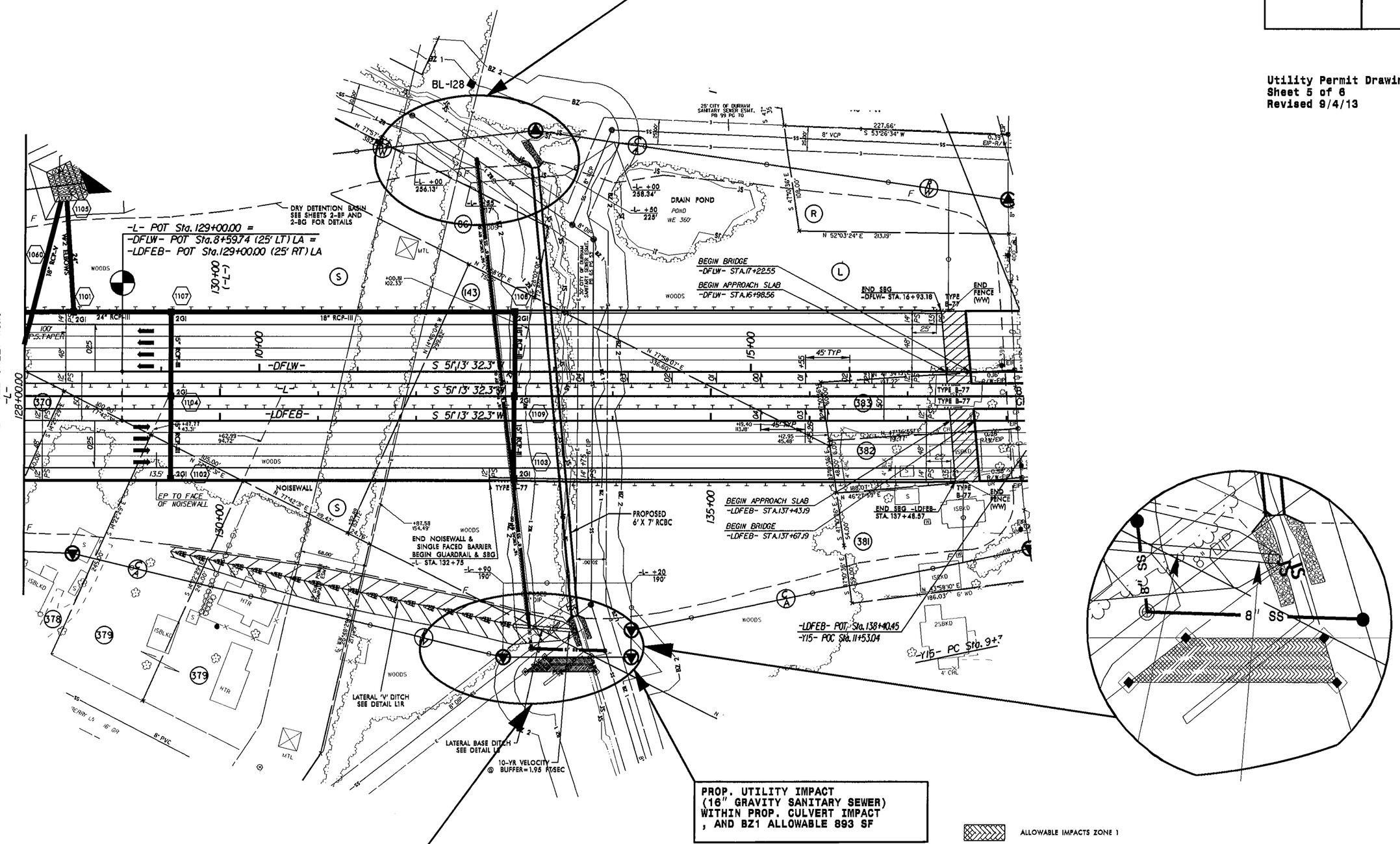
8/17/09

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 11 / UB-5 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

**Utility Permit Drawing**
**Sheet 5 of 6**
**Revised 9/4/13**




**REVISIONS**

R/W REVISION / /2012 RWP PARCEL NOS. 92 & 110 COMBINED INTO PARCEL NO. 92, AND PARCEL NAME CHANGED TO DURHAM COCA COLA BOTTLING COMPANY. PARCEL NOS. 379 & 380 COMBINED INTO PARCEL NO. 379. PARCEL NO. 85 REVISED TO "S". PARCEL NO. 87 REVISED TO "L". PARCEL NO. 90 REVISED TO "M". PARCEL NO. 384 REVISED TO "R".

8/17/99

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# BUFFER IMPACTS SUMMARY

| | | | IMPACT | | | | | | | | | BUFFER REPLACEMENT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | TYPE | | | ALLOWABLE | | | MITIGABLE | | | | |
| SITE NO. | STRUCTURE SIZE / TYPE | STATION (FROM/TO) | ROAD CROSSING | BRIDGE | PARALLEL IMPACT | ZONE 1 ($ft^2$) | ZONE 2 ($ft^2$) | TOTAL ($ft^2$) | ZONE 1 ($ft^2$) | ZONE 2 ($ft^2$) | TOTAL ($ft^2$) | ZONE 1 ($ft^2$) | ZONE 2 ($ft^2$) |
| U-1 | 8" SS | SR2 36+77LT to 37+38LT | | | | 0 | 1325 | 1325 | 329 | 0 | 329 | | |
| U-2 | 8" SS | Y7RPA 21+63RT to 22+29RT | | | | 1706 | 635 | 2341 | 0 | 0 | 0 | | |
| U-3 | PUE for 16" SS | L 133+12RT to 133+84RT | | | | 893 | 0 | 893 | 0 | 0 | 0 | | |
| TOTAL: | | | | | | 2599 | 1960 | 4559 | 329 | 0 | 329 | | |

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS

DURHAM COUNTY
PROJECT: 34745.2.8 (U-0071)

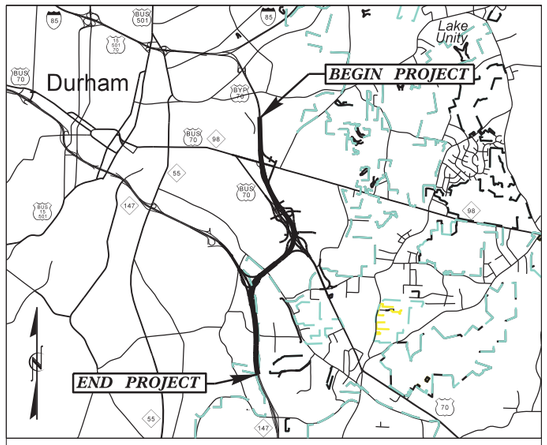
9/4/2013
SHEET 6 OF 6

09/08/99

TIP PROJECT: U-0071

CONTRACT: C203394

See Sheet 1-A For Index of Sheets




VICINITY MAP

# STATE OF NORTH CAROLINA
# DIVISION OF HIGHWAYS

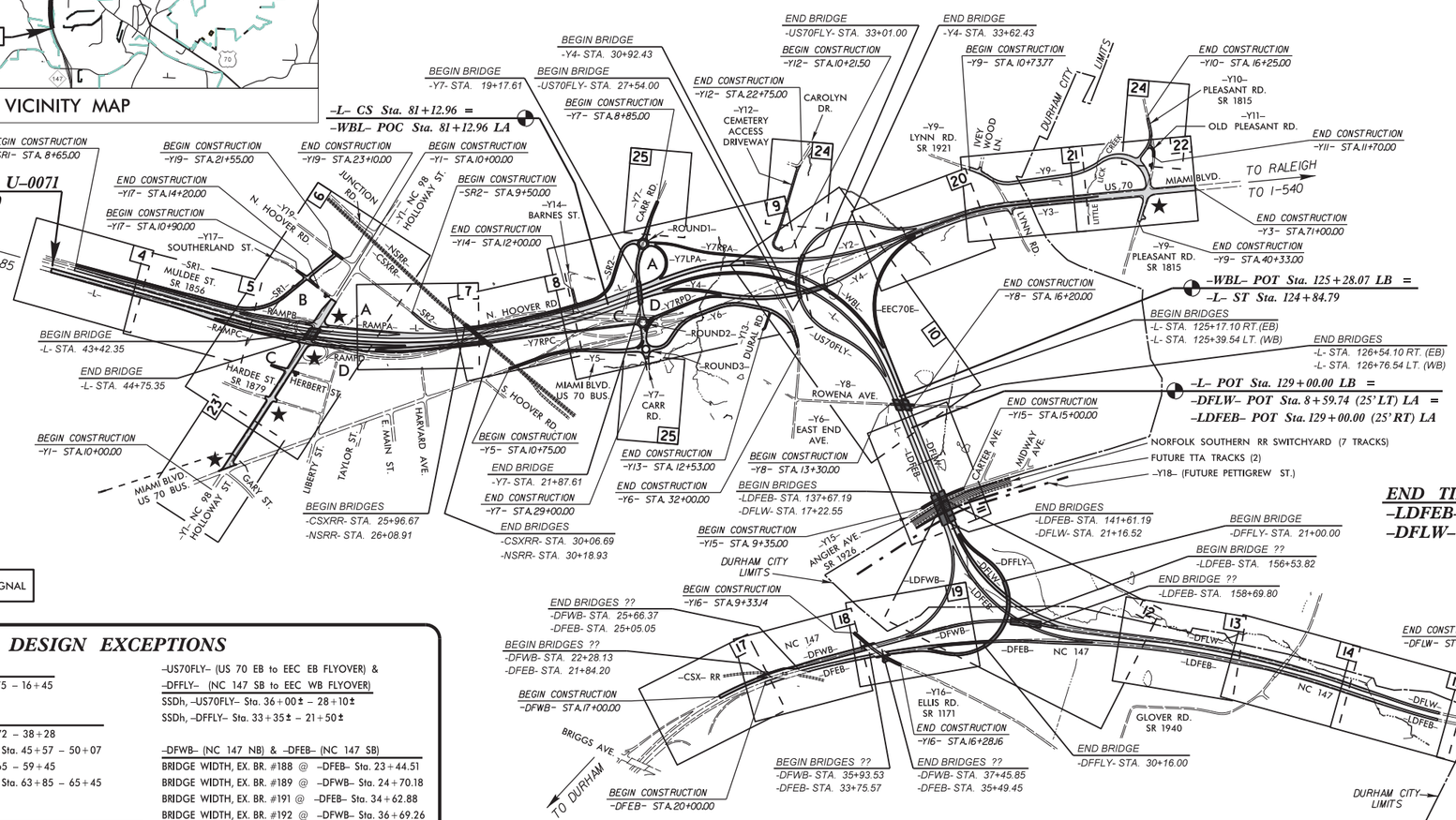
# DURHAM COUNTY

| STATE | STATE PROJECT REFERENCE NO. | SHEET NO. | TOTAL SHEETS |
|---|---|---|---|
| N.C. | U-0071 | 1 | |

| STATE PROJ. NO. | F.A. PROJ. NO. | DESCRIPTION |
|---|---|---|
| 34745.1.1 | NHF-76-1(2) | PE |
| 34745.2.8 | NHF-76-1(2) | R/W, UTILITIES |
| 34745.3.S2 | | CONSTRUCTION |

**LOCATION: DURHAM EAST END CONNECTOR FROM NORTH OF NC 98 TO NC 147 (BUCK DEAN FREEWAY)**

**TYPE OF WORK: GRADING, DRAINAGE, PAVING, STRUCTURES, AND SIGNALS**




PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

PROPOSED / UPGRADED SIGNAL

## DESIGN EXCEPTIONS

-Y1- (NC 98, HOLLOWAY ST.)
SAG VERTICAL CURVE K, -Y1- STA. 13+75 – 16+45

-Y3- (US 70, SOUTH MIAMI BLVD.)
SAG VERTICAL CURVE K, -Y3- Sta. 33+72 – 38+28
CREST VERTICAL CURVE K & SSDv, -Y3- Sta. 45+57 – 50+07
SAG VERTICAL CURVE K, -Y3- Sta. 55+65 – 59+45
CREST VERTICAL CURVE K & SSDv, -Y3- Sta. 63+85 – 65+45

-Y4- (EEC EB to US 70 EB RAMP)
CREST VERTICAL CURVE K, SSDh, & SSDv, -Y4- Sta. 24+00± – 32+60±
SAG VERTICAL CURVE K, -Y3- Sta. 40+65± – 47+15±

-US70FLY- (US 70 EB to EEC EB FLYOVER) & -DFLY- (NC 147 SB to EEC WB FLYOVER)
SSDh, -US70FLY- Sta. 36+00± – 28+10±
SSDh, -DFFLY- Sta. 33+35± – 21+50±

-DFWB- (NC 147 NB) & -DFEB- (NC 147 SB)
BRIDGE WIDTH, EX. BR. #188 @ -DFEB- Sta. 23+44.51
BRIDGE WIDTH, EX. BR. #189 @ -DFWB- Sta. 24+70.18
BRIDGE WIDTH, EX. BR. #191 @ -DFEB- Sta. 34+62.88
BRIDGE WIDTH, EX. BR. #192 @ -DFWB- Sta. 36+69.26

**THIS IS A CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO INTERCHANGES.**

**NCDOT CONTACT:**

**BRENDA L. MOORE, PE, CPM**
**PROJECT ENGINEER**
**ROADWAY DESIGN UNIT**

## GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

## DESIGN DATA

ADT 2015 = 65,700
ADT 2035 = 116,100
DHV = 11 %
D = 55 %
T = 14 % *
V = 70 MPH
* TTST=8%, DUAL=6%
FUNCT. CLASS. = INTERSTATE
STATEWIDE TIER

## PROJECT LENGTH

LENGTH ROADWAY PROJECT U-0071 = 3.789 mi.
LENGTH STRUCTURES PROJECT U-0071 = 0.167 mi.
TOTAL LENGTH OF TIP PROJECT U-0071 = 3.956 mi.
LENGTH OF PROJECT BASED ON -L- AND -LDFEB-

Prepared For:
**DIVISION OF HIGHWAYS**
1000 Birch Ridge Dr., Raleigh NC, 27610
By:
M A Engineering Consultants, Inc.
598 East Chatham Street - Suite 137
Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

2012 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:
APRIL 30, 2012

LETTING DATE:
APRIL 15, 2014

BURKE EVANS, PE
PROJECT ENGINEER

ROBERT W. PORTER, JR, PE
KEVIN S. HUTCHENS, PE
PROJECT DESIGN ENGINEERS

HYDRAULICS ENGINEER
SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER
SIGNATURE: P.E.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

10-OCT-2013 11:40
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$$$$USERNAME$$$$

04/16/11

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 1-B |

***Note: Not to Scale***

****S.U.E. = Subsurface Utility Engineering***

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

# CONVENTIONAL PLAN SHEET SYMBOLS

## *BOUNDARIES AND PROPERTY:*

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Existing Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Parcel/Sequence Number — 123
- Existing Fence Line
- Proposed Woven Wire Fence
- Proposed Chain Link Fence
- Proposed Barbed Wire Fence
- Existing Wetland Boundary — WLB
- Proposed Wetland Boundary — WLB
- Existing Endangered Animal Boundary — EAB
- Existing Endangered Plant Boundary — EPB
- Known Soil Contamination: Area or Site
- Potential Soil Contamination: Area or Site

## *BUILDINGS AND OTHER CULTURE:*

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

## *HYDROLOGY:*

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

## *RAILROADS:*

- Standard Gauge — CSX TRANSPORTATION
- RR Signal Milepost — MILEPOST 35
- Switch — SWITCH
- RR Abandoned
- RR Dismantled

## *RIGHT OF WAY:*

- Baseline Control Point
- Existing Right of Way Marker
- Existing Right of Way Line
- Proposed Right of Way Line — RW
- Proposed Right of Way Line with Iron Pin and Cap Marker — RW
- Proposed Right of Way Line with Concrete or Granite R/W Marker — RW
- Proposed Control of Access Line with Concrete C/A Marker — CA
- Existing Control of Access — CA
- Proposed Control of Access — CA
- Existing Easement Line — E
- Proposed Temporary Construction Easement — E
- Proposed Temporary Drainage Easement — TDE
- Proposed Permanent Drainage Easement — PDE
- Proposed Permanent Drainage / Utility Easement — DUE
- Proposed Permanent Utility Easement — PUE
- Proposed Temporary Utility Easement — TUE
- Proposed Aerial Utility Easement — AUE
- Proposed Permaent Construction Easement — PCE
- Proposed Permanent Easement with Iron Pin and Cap Marker

## *ROADS AND RELATED FEATURES:*

- Existing Edge of Pavement
- Existing Curb
- Proposed Slope Stakes Cut — C
- Proposed Slope Stakes Fill — F
- Proposed Curb Ramp — CR
- Existing Metal Guardrail
- Proposed Guardrail
- Existing Cable Guiderail
- Proposed Cable Guiderail
- Equality Symbol
- Pavement Removal

## *VEGETATION:*

- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — Vineyard

## *EXISTING STRUCTURES:*

MAJOR:

- Bridge, Tunnel or Box Culvert — CONC
- Bridge Wing Wall, Head Wall and End Wall — CONC WW

MINOR:

- Head and End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Box: Catch Basin, DI or JB — CB
- Paved Ditch Gutter
- Storm Sewer Manhole — S
- Storm Sewer — S

## *UTILITIES:*

POWER:

- Existing Power Pole
- Proposed Power Pole
- Existing Joint Use Pole
- Proposed Joint Use Pole
- Power Manhole — P
- Power Line Tower
- Power Transformer
- U/G Power Cable Hand Hole
- H-Frame Pole
- Recorded U/G Power Line — P
- Designated U/G Power Line (S.U.E.*) — P

TELEPHONE:

- Existing Telephone Pole
- Proposed Telephone Pole
- Telephone Manhole — T
- Telephone Booth
- Telephone Pedestal — T
- Telephone Cell Tower
- U/G Telephone Cable Hand Hole — HH
- Recorded U/G Telephone Cable — T
- Designated U/G Telephone Cable (S.U.E.*) — T
- Recorded U/G Telephone Conduit — TC
- Designated U/G Telephone Conduit (S.U.E.*) — TC
- Recorded U/G Fiber Optics Cable — T FO
- Designated U/G Fiber Optics Cable (S.U.E.*) — T FO

WATER:

- Water Manhole — W
- Water Meter
- Water Valve
- Water Hydrant
- Recorded U/G Water Line — W
- Designated U/G Water Line (S.U.E.*) — W
- Above Ground Water Line — A/G Water

TV:

- TV Satellite Dish
- TV Pedestal — C
- TV Tower
- U/G TV Cable Hand Hole — HH
- Recorded U/G TV Cable — TV
- Designated U/G TV Cable (S.U.E.*) — TV
- Recorded U/G Fiber Optic Cable — TV FO
- Designated U/G Fiber Optic Cable (S.U.E.*) — TV FO

GAS:

- Gas Valve
- Gas Meter
- Recorded U/G Gas Line — G
- Designated U/G Gas Line (S.U.E.*) — G
- Above Ground Gas Line — A/G Gas

SANITARY SEWER:

- Sanitary Sewer Manhole
- Sanitary Sewer Cleanout
- U/G Sanitary Sewer Line — SS
- Above Ground Sanitary Sewer — A/G Sanitary Sewer
- Recorded SS Forced Main Line — FSS
- Designated SS Forced Main Line (S.U.E.*) — FSS

MISCELLANEOUS:

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

6/2/99

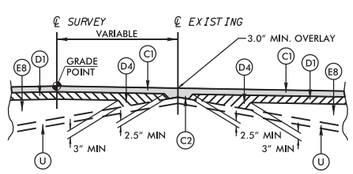
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2 |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

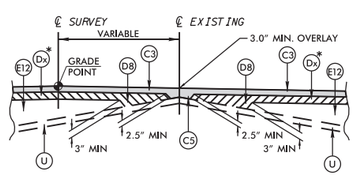
M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

# PAVEMENT SCHEDULE

| | | | | | |
|---|---|---|---|---|---|
| A1 | 12″ PORTLAND CEMENT CONCRETE PAVEMENT (WITH DOWELS) | E1 | PROP. APPROX. 12.5″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 475 LBS. PER SQ. YARD IN EACH OF THREE LAYERS. | K | BASE TO BE TREATED WITH LIME (METHOD-SLURRY) TO A DEPTH OF 8″, AT A RATE OF 20 LBS. PER SQ. YD. AS DIRECTED BY THE ENGINEER. OR BASE TO BE TREATED WITH CEMENT TO A DEPTH OF 7″, AT A RATE OF 55 LBS. PER SQ. YD. AS DIRECTED BY THE ENGINEER. |
| A2 | 12″ PORTLAND CEMENT CONCRETE PAVEMENT (WITHOUT DOWELS) | E2 | PROP. APPROX. 10″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YARD IN EACH OF TWO LAYERS. | | |
| A3 | 8″ PORTLAND CEMENT CONCRETE PAVEMENT (WITHOUT DOWELS) | E3 | PROP. APPROX. 9″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 513 LBS. PER SQ. YARD IN EACH OF TWO LAYERS. | N | GEOTEXTILE FOR PAVEMENT STABILIZATION (SEE CHART ON THIS SHEET FOR LOCATIONS) |
| C1 | PROP. APPROX. 3″ ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YARD IN EACH OF TWO LAYERS. | E4 | PROP. APPROX. 5.5″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 627 LBS. PER SQ. YARD. | P | PRIME COAT AT THE RATE OF .35 GAL. PER SQ. YD. |
| C2 | PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5C, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YARD PER 1″ DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 1.5″ OR GREATER THAN 2″ IN DEPTH. | E5 | PROP. APPROX. 5″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 570 LBS. PER SQ. YARD. | R1 | 2′-6″ CONCRETE CURB & GUTTER |
| C3 | PROP. APPROX. 3″ ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YARD IN EACH OF TWO LAYERS. | E6 | PROP. APPROX. 4.5″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 513 LBS. PER SQ. YARD. | R2 | 1′-6″ CONCRETE CURB & GUTTER |
| C4 | PROP. APPROX. 1.5″ ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 168 LBS. PER SQ. YARD. | E7 | PROP. APPROX. 3″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YARD. | R3 | 5″ MONOLITHIC CONCRETE ISLAND (KEYED IN) |
| C5 | PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE S9.5B, AT AN AVERAGE RATE OF 112 LBS. PER SQ. YARD PER 1″ DEPTH, TO BE PLACED IN LAYERS NOT LESS THAN 1.5″ OR GREATER THAN 2″ IN DEPTH. | E8 | PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YARD PER 1″ DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 3″ IN DEPTH OR GREATER THAN 5.5″ IN DEPTH. | R4 | CONCRETE SHOULDER BERM GUTTER |
| C6 | PROP. APPROX. 1.25″ ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 137.5 LBS. PER SQ. YARD. | E9 | PROP. APPROX. 4.5″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 513 LBS. PER SQ. YARD. | R5 | CONCRETE EXPRESSWAY GUTTER |
| C7 | PROP. VAR. DEPTH ASPHALT CONCRETE SURFACE COURSE, TYPE SF9.5A, AT AN AVERAGE RATE OF 110 LBS. PER SQ. YD. PER 1″ DEPTH. TO BE PLACED IN LAYERS NOT LESS THAN 1″ OR GREATER THAN 1.5″ IN DEPTH. | E10 | PROP. APPROX. 4″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YARD. | R6 | 9″x18″ CONCRETE CURB |
| C8 | PROP. APPROX. 5/8″ ULTRA-THIN BONDED WEARING COURSE, TYPE B, AT AN AVERAGE RATE OF 70 LBS. PER SQ. YARD. | E11 | PROP. APPROX. 3″ ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YARD. | R7 | SINGLE FACED CONCRETE BARRIER |
| D1 | PROP. APPROX. 4″ ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YARD. | E12 | PROP. VAR. DEPTH ASPHALT CONCRETE BASE COURSE, TYPE B25.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YARD PER 1″ DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 3″ IN DEPTH OR GREATER THAN 5.5″ IN DEPTH. | R8 | DOUBLE FACED CONCRETE BARRIER |
| D2 | PROP. APPROX. 3.5″ ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 399 LBS. PER SQ. YARD. | J1 | PROPOSED 10″ AGGREGATE BASE COURSE | R9 | 4″ CONCRETE CAP |
| D3 | PROP. APPROX. 3″ ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YARD. | J2 | PROPOSED 8″ AGGREGATE BASE COURSE | S | 4″ CONCRETE SIDEWALK |
| D4 | PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0C, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YARD PER 1″ DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 2.5″ IN DEPTH OR GREATER THAN 4″ IN DEPTH. | J3 | PROPOSED 4″ AGGREGATE BASE COURSE | T | EARTH MATERIAL |
| D5 | PROP. APPROX. 4″ ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 456 LBS. PER SQ. YARD. | J4 | PROPOSED VAR. AGGREGATE BASE COURSE | U | EXISTING PAVEMENT |
| D6 | PROP. APPROX. 3″ ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 342 LBS. PER SQ. YARD. | PAVEMENT EDGE SLOPES ARE 1:1 UNLESS SHOWN OTHERWISE. | | W | WEDGING (VARIABLE DEPTH ASPHALT PAVEMENT, SEE DETAILS ON THIS SHEET) |
| D7 | PROP. APPROX. 2.5″ ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 285 LBS. PER SQ. YARD. | | | | |
| D8 | PROP. VAR. DEPTH ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE I19.0B, AT AN AVERAGE RATE OF 114 LBS. PER SQ. YARD PER 1″ DEPTH TO BE PLACED IN LAYERS NOT LESS THAN 2.5″ IN DEPTH OR GREATER THAN 4″ IN DEPTH. | | | | |

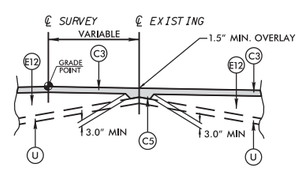



DETAIL SHOWING METHOD OF WEDGING FOR:
–L–, –Y3–, –Y4–, –DET1EB–, & –DET1WB–



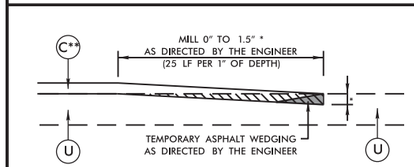

DETAIL SHOWING METHOD OF WEDGING FOR:
–Y1–, –Y5–, –Y6–, –Y9–, & –Y10–

* USE D5 FOR –Y1–, –Y6–, & –Y9–
USE D6 FOR –Y5–
USE D7 FOR –Y10–




DETAIL SHOWING METHOD OF WEDGING FOR:
–SR1–, –Y11–, & –Y17–

## MILLED BUTT JOINT TIE-IN DETAIL (PROFILE)




* MILL DEPTH AS SHOWN ON PLANS
OR AS DIRECTED BY THE ENGINEER

** SEE TYPICALS FOR MIX TYPE

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6/2/99

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone 919.297.0220 Fax 919.297.0221

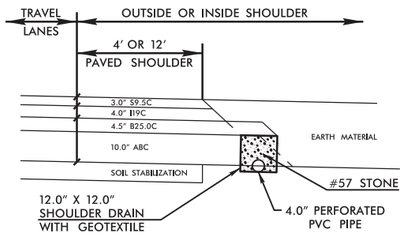
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-A |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

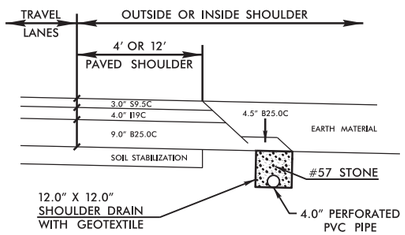
# SHOULDER DRAIN DETAIL

SEE SHOULDER DRAIN SUMMARY ON SHEET 3-W.
NOTE: USE IN CONJUNCTION WITH TYPICAL SECTION NOS. 1, 1D, 2, 4, 5, 7, & 8.

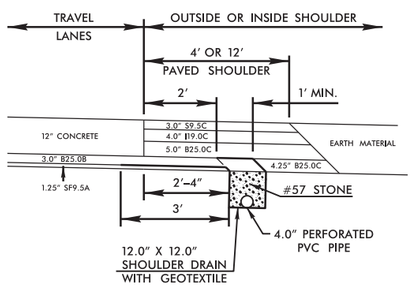
## ASPHALT / ABC PAVEMENT DESIGN




## ALL ASPHALT PAVEMENT DESIGN (ALTERNATE)

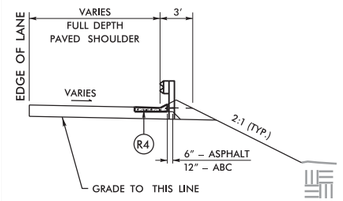



## CONCRETE PAVEMENT DESIGN




# DETAIL FOR SHOULDER BERM GUTTER

SEE CORRESPONDING TYPICAL SECTION FOR PAVEMENT DESIGN.
SEE TYPICAL SECTIONS AND PLANS FOR ACTUAL DIMENSIONS.




| LINE | STATIONS |
|---|---|
| -RAMPC- | 11+95.00 to 15+80.00 RT |
| -Y7RPC- | 14+80.00 to 18+09.00 RT |
| -Y7RPD- | 6+00.00 to 11+54.66 RT |
| -Y7RPA- | 19+35.00 to 23+75.00 RT |
| -Y4- | 20+55.00 to 30+50.67 LT |
| -Y4- | 33+72.21 to 40+05.00 LT |
| -US70FLY- | 33+25.00 to 43+26.00 RT |
| -US70FLY- | 43+17.00 to 47+85.00 LT |
| -EEC70E- | 29+18.00 to 42+30.00 RT |
| -LDFWB- | 11+50.78 to 15+25.00 RT |
| -DFFLY- | 11+36.00 to 15+04.00 LT |
| -DFFLY- | 20+52.00 to 20+76.00 RT |
| -DFFLY- | 30+40.00 to 31+80.00 RT |
| -DFWB- | 22+75.00 to 23+13.29 RT |
| -DFWB- | 26+46.82 to 35+33.95 LT |
| -DFWB- | 37+53.60 to 37+94.00 LT |
| -DFEB- | 36+11.51 to 36+25.00 RT |
| -L- | 91+50.00 to 104+00.00 RT |
| -L- | 124+55.00 to 125+42.58 LT |
| -L- /-DFLW- | -L- 127+27.39 to -DFLW- 16+93.18 LT |
| -LDFEB- | 132+75.00 to 137+48.57 RT |
| -LDFEB- | 153+50.00 to 155+54.31 LT |
| -LDFEB- | 159+79.48 to 171+80.00 LT |
| -LDFEB- | 187+19.00 to 189+21.00 RT |

# GEOTECHNICAL RECOMMENDATION FOR SLOPE DESIGNS

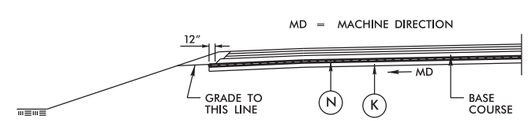
(CUT SLOPES IN THE FOLLOWING AREAS ARE REQUIRED TO BE CONSTRUCTED AT A RATIO OF 3:1 (H:V) OR FLATTER DUE TO TRIASSIC SEDIMENTARY ROCK DIP DIRECTION)

| LINE | STATIONS | OFFSETS |
|---|---|---|
| -L- | 61+50 to 71+50 | RIGHT |
| -L- | 61+50 to 77+50 | LEFT |
| -L- | 77+00 to 90+00 | RIGHT |
| -L- | 82+00 to 87+50 | LEFT |
| -L- | 97+00 to 108+00 | RIGHT |
| -L- | 101+00 to 106+00 | LEFT |
| -L- | 113+50 to 116+00 | LEFT |
| -L- | 115+00 to 116+00 | RIGHT |
| -LDFEB- | 168+00 to 195+50 | RIGHT |
| -LDFWB- | 23+50 to 24+68 | RIGHT |
| -LDFWB- | 23+00 to 24+68 | LEFT |
| -DFWB- | 43+50 to 46+50 | RIGHT |
| -DFWB- | 43+50 to 46+50 | LEFT |
| -EEC70E- | 20+50 to 28+00 | RIGHT |
| -EEC70E- | 20+50 to 28+00 | LEFT |
| -SR2- | 35+00 to 36+50 | RIGHT |
| -Y2- | 20+00 to 22+50 | RIGHT |
| -Y2- | 20+00 to 22+50 | LEFT |
| -Y3- | 36+00 to 40+00 | LEFT |
| -Y4- | 40+00 to 42+00 | RIGHT |
| -Y6- | 19+00 to 29+00 | RIGHT |

# GEOTEXTILE FOR PAVEMENT STABILIZATION (LOCATIONS & DETAIL)

(THE FOLLOWING AREAS SHOULD BE INVESTIGATED FOR NEED DURING CONSTRUCTION)

| LINE | STATIONS | LINE | STATIONS |
|---|---|---|---|
| -L- (WB) | 42+25 to 49+00 | -L- (EB) | 42+00 to 48+50 |
| -WBL- | 91+00 to 98+00 | -L- (EB) | 92+00 to 97+00 |
| -WBL- | 121+75 to 125+28.07 LB | -L- (EB) | 121+75 to 129+00 LB |
| -L- (WB) | 124+84.79 LA to 129+00 LB | | |
| -DFLW- | 8+59.74 LA to 28+00 | -LDFEB- | 129+00 LA to 169+00 |
| -US70FLY- | 10+00 to 13+25 | -RAMPC- | 13+50 to 21+50 |
| -US70FLY- | 20+00 to 48+00 | -RAMPD- | 13+25 to 20+50 |
| -EEC70E- | 10+95 to 18+25 | -Y7RPA- | 19+00 to 23+00 |
| -EEC70E- | 30+25 to 32+25 | -Y2- | 10+65 to 13+50 |
| -DFFLY- | 10+00 to 33+50 | -Y4- | 17+50 to 38+50 |
| -LDFWB- | 10+00 to 21+50 | -Y5- | 25+25 to 27+58 |
| -DFEB- | 49+50 to 62+50 | -Y7- | 14+50 to 17+00 |




USE GEOTEXTILE FOR PAVEMENT STABILIZATION DETAIL IN CONJUNCTION WITH APPROPRIATE TYPICAL SECTIONS AT LOCATIONS NOTED ABOVE.

| PAVEMENT SCHEDULE | |
|---|---|
| A1 | 12" PCCP (W/DOWELS) |
| A2 | 12" PCCP (W/O DOWELS) |
| A3 | 8" PCCP (W/O DOWELS) |
| C1 | 3" S9.5C |
| C2 | VAR. S9.5C |
| C3 | 3" S9.5B |
| C4 | 1.5" S9.5B |
| C5 | VAR. S9.5B |
| C6 | 1.25" SF9.5A |
| C7 | VAR. SF9.5A |
| C8 | 5/8" ULTRA THIN, TYPE B |
| D1 | 4" I19.0C |
| D2 | 3.5" I19.0C |
| D3 | 3" I19.0C |
| D4 | VAR. I19.0C |
| D5 | 4" I19.0B |
| D6 | 3" I19.0B |
| D7 | 2.5" I19.0B |
| D8 | VAR. I19.0B |
| E1 | 12.5" B25.0C |
| E2 | 10" B25.0C |
| E3 | 9" B25.0C |
| E4 | 5.5" B25.0C |
| E5 | 5" B25.0C |
| E6 | 4.5" B25.0C |
| E7 | 3" B25.0C |
| E8 | VAR. B25.0C |
| E9 | 4.5" B25.0B |
| E10 | 4" B25.0B |
| E11 | 3" B25.0B |
| E12 | VAR. B25.0B |
| J1 | 10" ABC |
| J2 | 8" ABC |
| J3 | 4" ABC |
| J4 | VAR. ABC |
| K | LIME OR CEMENT SUBGRADE STABILIZ. |
| N | GEOTEXTILE FOR PAVEMENT STABILIZ. |
| P | .35 PRIME COAT |
| R1 | 2'-6" C & G |
| R2 | 1'-6" C & G |
| R3 | 5" MONO. CONC. ISLAND (KEYED IN) |
| R4 | CONC. SHOULDER BERM GUTTER |
| R5 | CONC. EXPRESSWAY GUTTER |
| R6 | 9"x18" CONC. CURB |
| R7 | SINGLE FACED CONC. BARRIER |
| R8 | DOUBLE FACED CONC. BARRIER |
| R9 | 4" CONCRETE CAP |
| S | 4" SIDEWALK |
| T | EARTH MATERIAL |
| U | EXIST. PAVEMENT |
| W | WEDGING |

PAVEMENT EDGESLOPES 1:1 UNLESS NOTED OTHERWISE

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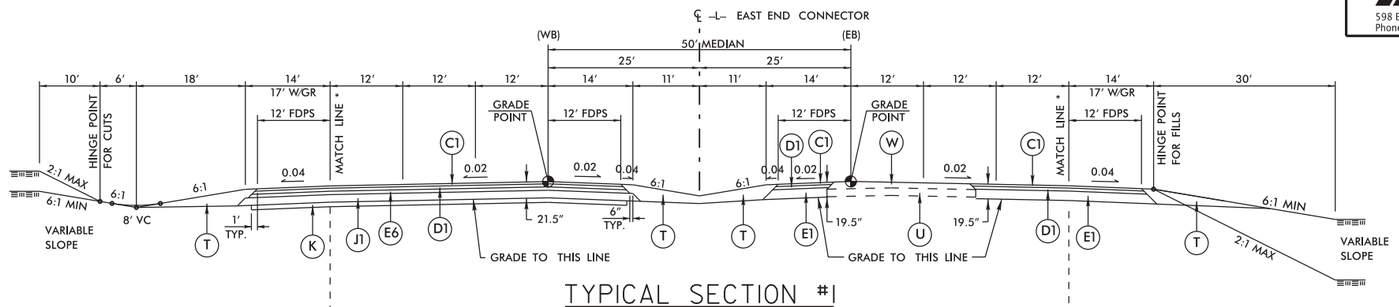
M:\Projects\U-0071\Roadway\Design\0071_rdy_typ.dgn
$$$$USERNAME$$$$

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone 919.297.0220 Fax 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-B |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




## TYPICAL SECTION #1

USE TYPICAL SECTION NO. 1:

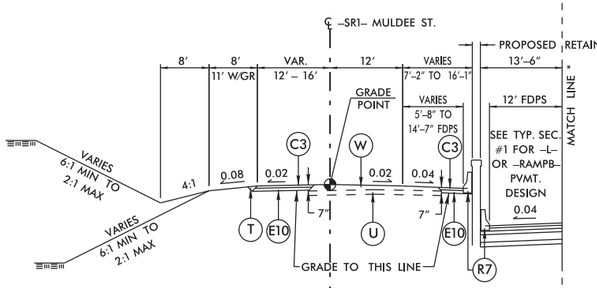
INCIDENTAL MILL AS NECESSARY TO ENSURE SMOOTH TIE-IN (SEE MILLED BUTT JOINT DETAIL ON SHT 2-A):
FROM -L- (WB) STA. 13+75.00 TO 14+25.00
FROM -L- (EB) STA. 11+00.00 TO 11+50.00

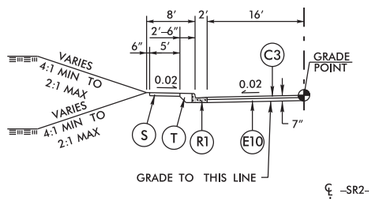
WITH NEW FULL WIDTH 21.5" PAVEMENT DEPTH TYPICAL:
FROM -L- (WB) STA. 29+50.00 TO STA. 43+42.35 (BEGIN BRIDGE)
FROM -L- (WB) STA. 44+75.35 (END BRIDGE) TO STA. 81+12.96 =
-WBL- (WB) STA. 81+12.96 LA
FROM -L- (EB) STA. 29+50.00 TO STA. 43+42.35 (BEGIN BRIDGE)
FROM -L- (EB) STA. 44+75.35 (END BRIDGE) TO STA. 81+12.96

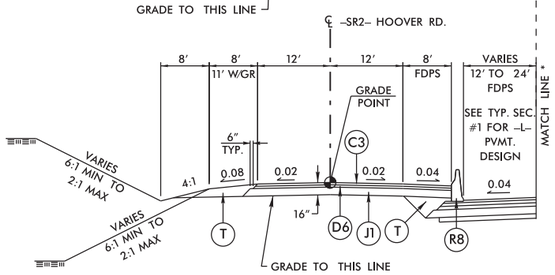
WITH WEDGING / WIDENING 19.5" PAVEMENT DEPTH TYPICAL:
FROM -L- (WB) STA. 14+25.00 TO STA. 29+50.00
FROM -L- (EB) STA. 11+00.00 TO STA. 29+50.00

NOTE: THE FULL DEPTH NEW PAVEMENT STRUCTURE AND THE WEDGING / WIDENING PAVEMENT STRUCTURE ARE INTERCHANGEABLE, AND MAY BE USED ON EITHER SIDE OF THE ABOVE TYPICAL SECTION AS REQUIRED, AND ACCORDING TO THE STATIONING SHOWN ABOVE.

* - USE MATCH LINES WITH TYPICAL SECTION NOS. 1, 1A, 1B, & 1C.




## TYPICAL SECTION #1A

USE TYPICAL SECTION NO. 1A IN CONJUNCTION WITH TYPICAL SECTIONS NO. 1 & 1C (-RAMP B-):
FROM -SR1- STA. 8+65.00 TO STA. 30+92.73

USE WITH WEDGING / WIDENING 7" PAVEMENT DEPTH TYPICAL:
FROM -SR1- STA. 13+00.00 TO STA. 29+50.00

USE WITH NEW FULL WIDTH 11" (C3 & J2) PAVEMENT DEPTH (SEE TYPICAL #1I):
FROM -SR1- STA. 29+50.00 TO STA. 30+92.73

USE 16' LANE WIDTH WITH CURB & GUTTER (SEE PARTIAL TYPICAL):
FROM -SR1- STA. 23+10.77 TO STA. 29+98.39 LT

USE FOR PAVED SHOULDER CONSTRUCTION:
FROM -SR1- STA. 9+13.00 TO STA. 13+00.00 RT.

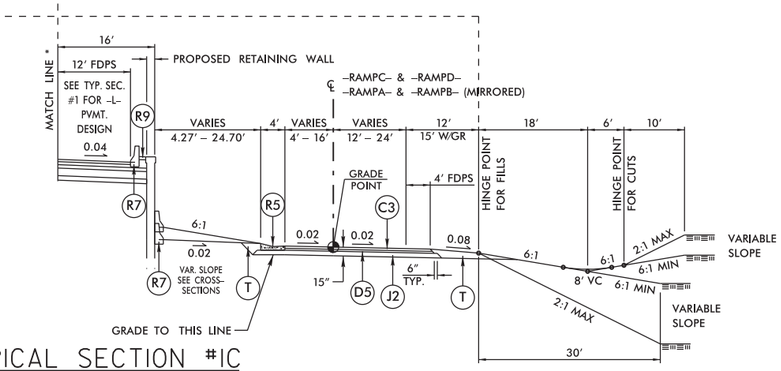
MILL AND RESURFACE -SR1- WITH C4 TO ENSURE SMOOTH TIE-IN (SEE MILLED BUTT JOINT DETAIL ON SHT 2-A):
FROM -SR1- STA. 8+65.00 TO STA. 13+00.00

SEE -L- CROSS SECTIONS FOR DITCH CONSTRUCTION BETWEEN -SR1- RET. WALL AND -RAMP B-:
FROM -L- STA. 34+00.00 TO STA. 36+00.00

## TYPICAL SECTION #1B

USE TYPICAL SECTION NO. 1B IN CONJUNCTION WITH TYPICAL SECTION NO. 1:

FROM -SR2- STA. 13+95.82 TO STA. 33+95.06




## TYPICAL SECTION #1C

USE TYPICAL SECTION NO. 1C IN CONJUNCTION WITH TYPICAL NO. 1 ON THE RIGHT SIDE OF -L-:

FROM -RAMPC- STA. 16+16.53 TO STA. 26+28.00
FROM -RAMPD- STA. 18+87.09 TO STA. 27+70.72

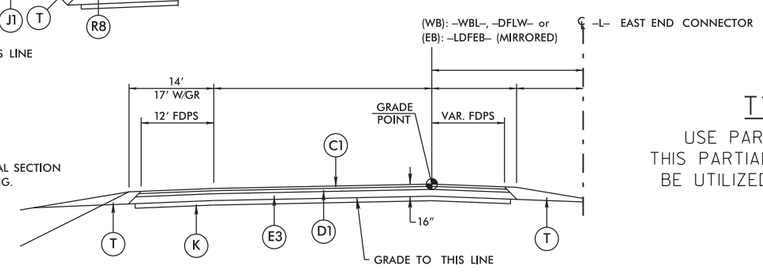
MIRROR TYPICAL AND USE ON THE LEFT SIDE OF -L-:

FROM -RAMPA- STA. 19+17.19 TO STA. 27+80.69
FROM -RAMPB- STA. 18+99.10 TO STA. 25+32.51

USE TYPICAL SECTION NO. 1C
WITH -L- (LT & RT) 21.5" PAVEMENT DESIGN (C1, D1, E6, & J1) AS SHOWN IN TYPICAL SECTION NO. 1 FOR -RAMPA-, -RAMPB-, -RAMPC-, -RAMPC- AND RAMP GORE AREAS:

FROM -RAMPA- STA. 10+00.00 TO STA. 19+17.19 (MIRRORED TYPICAL)
FROM -RAMPB- STA. 10+00.00 TO STA. 18+99.10 (MIRRORED TYPICAL)
FROM -RAMPC- STA. 7+16.79 TO STA. 16+16.53
FROM -RAMPD- STA. 10+00.00 TO STA. 18+87.09

(THESE LOCATIONS SUBJECT TO ALTERNATE PAVEMENT DESIGN, SEE TYPICAL SECTION NO. 1D)




NOTE: SEE APPROPRIATE TYPICAL SECTION FOR FULL DIMENSIONING.

## TYPICAL SECTION #1D - ALTERNATE PAVEMENT DESIGN

USE PARTIAL TYPICAL SECTION NO. 1D IN CONJUNCTION WITH TYPICAL SECTIONS NO. 1, 2, 3, AND 4. THIS PARTIAL TYPICAL SECTION REFLECTS A 16" ALL ASPHALT ALTERNATE PAVEMENT DESIGN THAT MAY BE UTILIZED BY THE CONTRACTOR IN PLACE OF THE 21.5" ABC/ASPHALT PAVEMENT DESIGN SHOWN ON TYPICAL SECTIONS 1, 2, 3 AND 4. SEE CONTRACT SPECIAL PROVISION. MIRROR TYPICAL SECTION AS NECESSARY.

| PAVEMENT SCHEDULE | |
|---|---|
| A1 | 12" PCCP (W/DOWELS) |
| A2 | 12" PCCP (W/O DOWELS) |
| A3 | 8" PCCP (W/O DOWELS) |
| C1 | 3" S9.5C |
| C2 | VAR. S9.5C |
| C3 | 3" S9.5B |
| C4 | 1.5" S9.5B |
| C5 | VAR. S9.5B |
| C6 | 1.25" SF9.5A |
| C7 | VAR. SF9.5A |
| C8 | 5/8" ULTRA THIN, TYPE B |
| D1 | 4" I19.0C |
| D2 | 3.5" I19.0C |
| D3 | 3" I19.0C |
| D4 | VAR. I19.0C |
| D5 | 4" I19.0B |
| D6 | 3" I19.0B |
| D7 | 2.5" I19.0B |
| D8 | VAR. I19.0B |
| E1 | 12.5" B25.0C |
| E2 | 10" B25.0C |
| E3 | 9" B25.0C |
| E4 | 5.5" B25.0C |
| E5 | 5" B25.0C |
| E6 | 4.5" B25.0C |
| E7 | 3" B25.0C |
| E8 | VAR. B25.0C |
| E9 | 4.5" B25.0B |
| E10 | 4" B25.0B |
| E11 | 3" B25.0B |
| E12 | VAR. B25.0B |
| J1 | 10" ABC |
| J2 | 8" ABC |
| J3 | 4" ABC |
| J4 | VAR. ABC |
| K | LIME OR CEMENT SUBGRADE STABILIZ. |
| N | GEOTEXTILE FOR PAVEMENT STABILIZ. |
| P | .35 PRIME COAT |
| R1 | 2'-6" C & G |
| R2 | 1'-6" C & G |
| R3 | 5" MONO. CONC. ISLAND (KEYED IN) |
| R4 | CONC. SHOULDER BERM GUTTER |
| R5 | CONC. EXPRESSWAY GUTTER |
| R6 | 9"x18" CONC. CURB |
| R7 | SINGLE FACED CONC. BARRIER |
| R8 | DOUBLE FACED CONC. BARRIER |
| R9 | 4" CONCRETE CAP |
| S | 4" SIDEWALK |
| T | EARTH MATERIAL |
| U | EXIST. PAVEMENT |
| W | WEDGING |

PAVEMENT EDGESLOPES 1:1 UNLESS NOTED OTHERWISE

6/2/99

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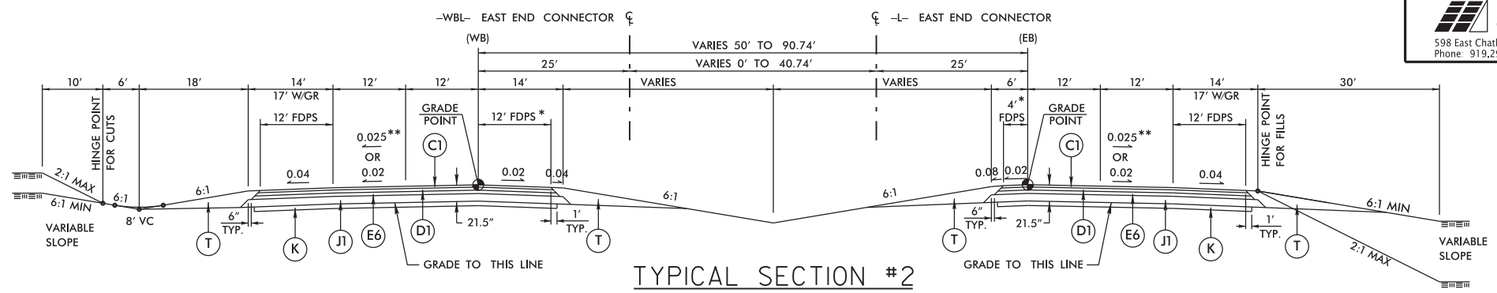
M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone 919.297.0220 Fax 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-C |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



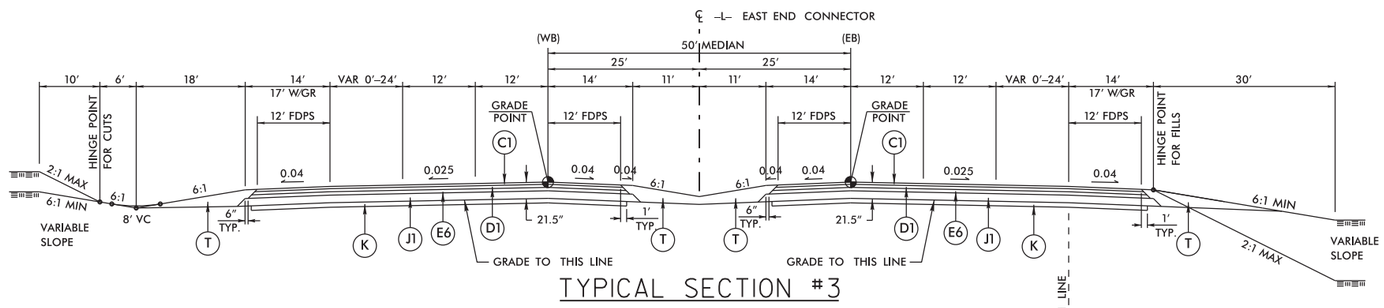

## TYPICAL SECTION #2

USE TYPICAL SECTION NO. 2:

WITH 0.02 NORMAL CROWN CROSS SLOPE:
FROM -WBL- (WB) STA. 81+12.96 TO STA. 117+57.90
FROM -L- (EB) STA. 81+12.96 TO STA. 118+84.79

**WITH 0.025 NORMAL CROWN CROSS SLOPE:
FROM -WBL- (WB) STA. 117+57.90 TO STA. 125+28.07 = -L- (WB) STA. 124+84.79 LA
FROM -L- (EB) STA. 118+84.79 TO STA. 124+84.79

* - 4' AND 12' FULL DEPTH PAVED SHOULDERS (FDPS) ARE USED WITH BOTH -L- AND -WBL-, AND ARE INTERCHANGABLE. SEE PLANS FOR PAVED SHOULDER TRANSITION LOCATIONS.



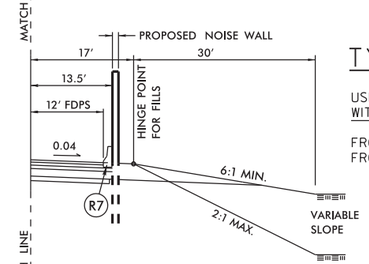

## TYPICAL SECTION #3

USE TYPICAL SECTION NO. 3:

FROM -L- (WB) STA. 124+84.79 TO STA. 125+39.54 (BEGIN BRIDGE)
FROM -L- (WB) STA. 126+76.54 (END BRIDGE) TO STA. 129+00.00

FROM -L- (EB) STA. 124+84.79 TO STA. 125+17.10 (BEGIN BRIDGE)
FROM -L- (EB) STA. 126+54.10 (END BRIDGE) TO STA. 129+00.00

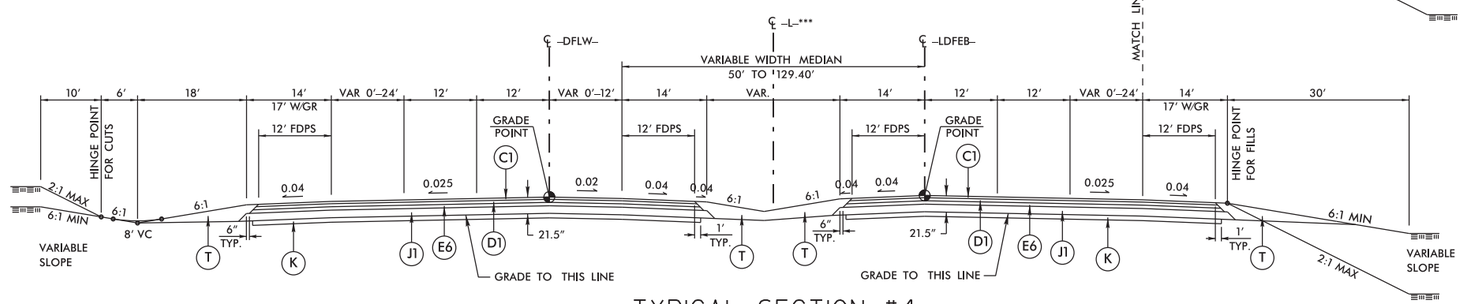
-L- POT STA. 129+00.00 LB =
-LDFEB- POT STA. 129+00.00 LA
-DFLW- TS STA. 8+59.74 LA




## TYPICAL SECTION #3A

USE TYPICAL SECTION NO. 3A IN CONJUNCTION WITH TYPICAL SECTION NOS. 3 & 4:

FROM -L- STA. 126+51.06 TO STA. 129+00.00 RT
FROM -LDFEB- STA. 129+00.00 TO STA. 132+75.00 RT




## TYPICAL SECTION #4

USE TYPICAL SECTION NO. 4:

FROM -DFLW- (WB) STA. 8+59.74 TO STA. 17+22.55 (BEGIN BRIDGE)
FROM -DFLW- (WB) STA. 21+16.52 (END BRIDGE) TO STA. 38+64.69

FROM -LDFEB- (EB) STA. 129+00.00 TO STA. 137+67.19 (BEGIN BRIDGE)
FROM -LDFEB- (EB) STA. 141+61.19 (END BRIDGE) TO STA. 156+53.82 (BEGIN BRIDGE)

*** - -L- ALIGNMENT ENDS AT 140+40.26. -LDFEB- & -DFLW- CROSS SECTIONS ARE LOCATED ON -L- CROSS SECTIONS TO THIS POINT.

| PAVEMENT SCHEDULE | |
|---|---|
| A1 | 12" PCCP (W/DOWELS) |
| A2 | 12" PCCP (W/O DOWELS) |
| A3 | 8" PCCP (W/O DOWELS) |
| C1 | 3" S9.5C |
| C2 | VAR. S9.5C |
| C3 | 3" S9.5B |
| C4 | 1.5" S9.5B |
| C5 | VAR. S9.5B |
| C6 | 1.25" SF9.5A |
| C7 | VAR. SF9.5A |
| C8 | 5/8" ULTRA THIN, TYPE B |
| D1 | 4" I19.0C |
| D2 | 3.5" I19.0C |
| D3 | 3" I19.0C |
| D4 | VAR. I19.0C |
| D5 | 4" I19.0B |
| D6 | 3" I19.0B |
| D7 | 2.5" I19.0B |
| D8 | VAR. I19.0B |
| E1 | 12.5" B25.0C |
| E2 | 10" B25.0C |
| E3 | 9" B25.0C |
| E4 | 5.5" B25.0C |
| E5 | 5" B25.0C |
| E6 | 4.5" B25.0C |
| E7 | 3" B25.0C |
| E8 | VAR. B25.0C |
| E9 | 4.5" B25.0B |
| E10 | 4" B25.0B |
| E11 | 3" B25.0B |
| E12 | VAR. B25.0B |
| J1 | 10" ABC |
| J2 | 8" ABC |
| J3 | 4" ABC |
| J4 | VAR. ABC |
| K | LIME OR CEMENT SUBGRADE STABILIZ. |
| N | GEOTEXTILE FOR PAVEMENT STABILIZ. |
| P | .35 PRIME COAT |
| R1 | 2'-6" C & G |
| R2 | 1'-6" C & G |
| R3 | 6" MONO. CONC. ISLAND (KEYED IN) |
| R4 | CONC. SHOULDER BERM GUTTER |
| R5 | CONC. EXPRESSWAY GUTTER |
| R6 | 9"x18" CONC. CURB |
| R7 | SINGLE FACED CONC. BARRIER |
| R8 | DOUBLE FACED CONC. BARRIER |
| R9 | 4" CONCRETE CAP |
| S | 4" SIDEWALK |
| T | EARTH MATERIAL |
| U | EXIST. PAVEMENT |
| W | WEDGING |
| PAVEMENT EDGESLOPES 1:1 UNLESS NOTED OTHERWISE | |

6/2/99

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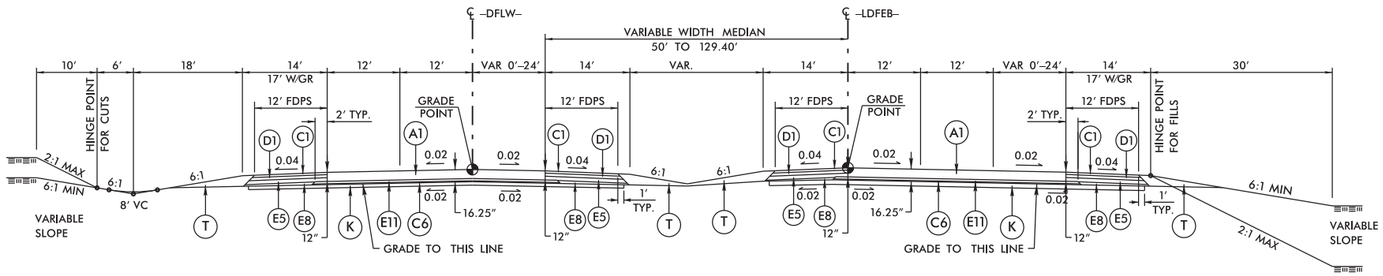
M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone 919.297.0220 Fax 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-D |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

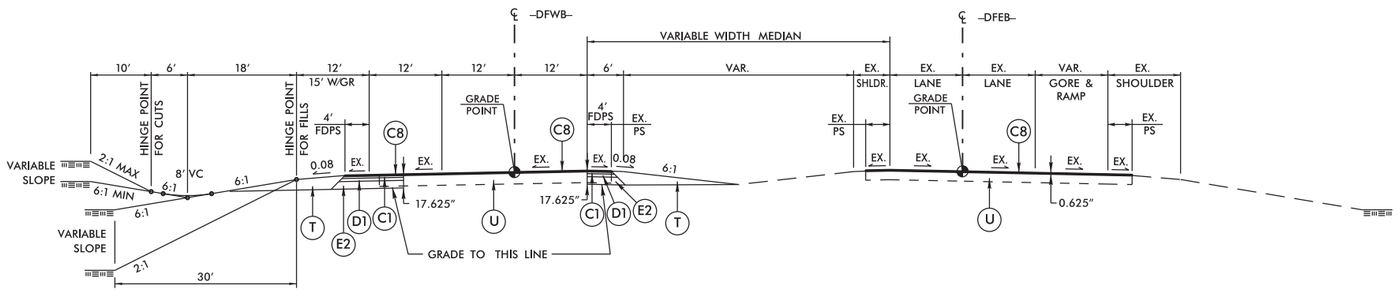
**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




## TYPICAL SECTION #5

USE TYPICAL SECTION NO. 5:

FROM -DFLW- (WB) STA. 38+64.69 TO STA. 88+42.53
FROM -LDFEB- (EB) STA. 158+69.80 (END BRIDGE) TO STA. 210+00.00




## TYPICAL SECTION #6

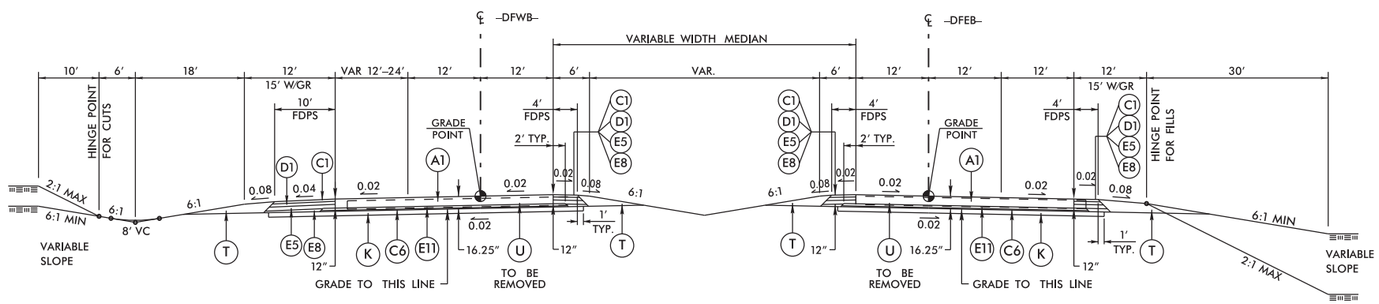
USE TYPICAL SECTION NO. 6:

FROM -DFWB- STA. 17+00.00 TO STA. 22+28.13 (BEGIN BRIDGE WIDENING)
FROM -DFEB- STA. 20+00.00 TO STA. 21+84.20 (BEGIN EXISTING BRIDGE)

NOTE:

WIDEN EXISTING CONCRETE PAVEMENT WITH ASPHALT AS SHOWN IN PLANS. USE EXISTING EDGE OF PAVEMENT AND EXISTING SUPERELEVATION AS CONTROL. USE STD. 560.02 AS REQUIRED FOR WIDENED PAVEMENT AND PAVED SHOULDERS.

RESURFACE EXISTING CONCRETE PAVEMENT, ASPHALT WIDENED PAVEMENT, AND EXISTING PAVED SHOULDERS WITH 5/8" OF ULTRA-THIN BONDED WEARING COURSE.



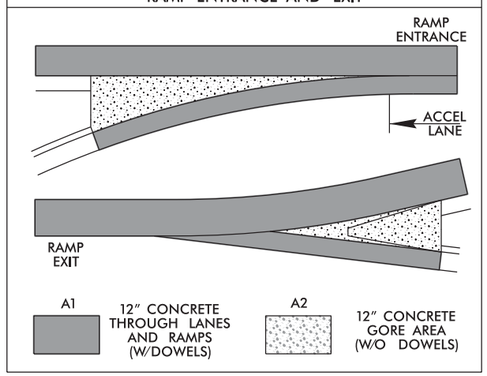

## TYPICAL SECTION #7

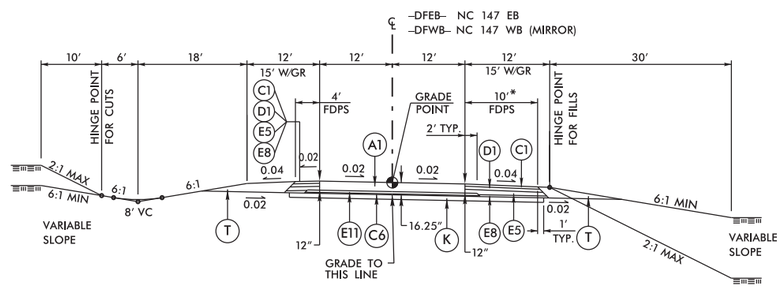
USE TYPICAL SECTION NO. 7:

FROM -DFEB- STA. 25+05.05 (END EXISTING BRIDGE) TO STA. 33+75.57 (BEGIN BRIDGE WIDENING)

FROM -DFWB- STA. 25+66.37 (END BRIDGE WIDENING) TO STA. 35+93.53 (BEGIN BRIDGE WIDENING)

### DETAIL OF CONCRETE PAVEMENT TYPE AT RAMP ENTRANCE AND EXIT




## TYPICAL SECTION #8

USE TYPICAL SECTION NO. 8:

FROM -DFEB- STA. 35+49.45 (END BRIDGE WIDENING) TO STA. 75+61.18
FROM -DFWB- STA. 37+45.85 (END BRIDGE WIDENING) TO STA. 70+00.00 (MIRROR)

USE 12' P.S. WITH 14' SHOULDER WIDTH (17' W/GR):

FROM -DFEB- STA. 60+15 +/- (END GUARDRAIL) TO STA. 75+61.18 RT.

*USE WITH MINIMUM 4' OUTSIDE P.S. AND CONCRETE INSIDE P.S. (SEE PLANS):

FROM -DFFLY- STA. 36+76.31 TO STA. 41+89.35 (MIRROR)
FROM -LDFWB- STA. 26+58.38 TO STA. 29+56.52

| PAVEMENT SCHEDULE | |
|---|---|
| A1 | 12" PCCP (W/DOWELS) |
| A2 | 12" PCCP (W/O DOWELS) |
| A3 | 8" PCCP (W/O DOWELS) |
| C1 | 3" S9.5C |
| C2 | VAR. S9.5C |
| C3 | 3" S9.5B |
| C4 | 1.5" S9.5B |
| C5 | VAR. S9.5B |
| C6 | 1.25" SF9.5A |
| C7 | VAR. SF9.5A |
| C8 | 5/8" ULTRA THIN, TYPE B |
| D1 | 4" I19.0C |
| D2 | 3.5" I19.0C |
| D3 | 3" I19.0C |
| D4 | VAR. I19.0C |
| D5 | 4" I19.0B |
| D6 | 3" I19.0B |
| D7 | 2.5" I19.0B |
| D8 | VAR. I19.0B |
| E1 | 12.5" B25.0C |
| E2 | 10" B25.0C |
| E3 | 9" B25.0C |
| E4 | 5.5" B25.0C |
| E5 | 5" B25.0C |
| E6 | 4.5" B25.0C |
| E7 | 3" B25.0C |
| E8 | VAR. B25.0C |
| E9 | 4.5" B25.0B |
| E10 | 4" B25.0B |
| E11 | 3" B25.0B |
| E12 | VAR. B25.0B |
| J1 | 10" ABC |
| J2 | 8" ABC |
| J3 | 4" ABC |
| J4 | VAR. ABC |
| K | LIME OR CEMENT SUBGRADE STABILIZ. |
| N | GEOTEXTILE FOR PAVEMENT STABILIZ. |
| P | .35 PRIME COAT |
| R1 | 2'-6" C & G |
| R2 | 1'-6" C & G |
| R3 | 5" MONO. CONC. ISLAND (KEYED IN) |
| R4 | CONC. SHOULDER BERM GUTTER |
| R5 | CONC. EXPRESSWAY GUTTER |
| R6 | 9"x18" CONC. CURB |
| R7 | SINGLE FACED CONC. BARRIER |
| R8 | DOUBLE FACED CONC. BARRIER |
| R9 | 4" CONCRETE CAP |
| S | 4" SIDEWALK |
| T | EARTH MATERIAL |
| U | EXIST. PAVEMENT |
| W | WEDGING |

PAVEMENT EDGESLOPES 1:1 UNLESS NOTED OTHERWISE

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M A Engineering Consultants, Inc.
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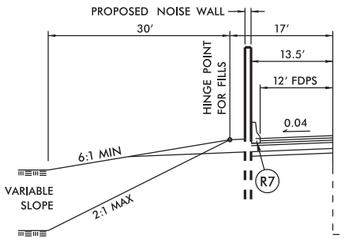
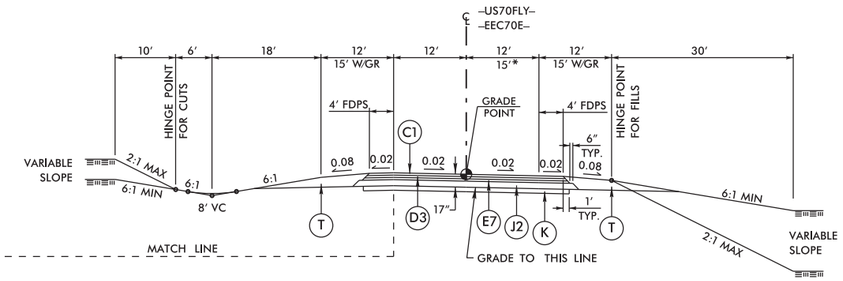
Phone 919.297.0220 Fax 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-E |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




## TYPICAL SECTION #9A

USE TYPICAL SECTION NO. 9A IN CONJUNCTION WITH TYPICAL SECTION NO. 9:

FROM -US70FLY- STA. 10+27.47 TO STA. 16+70.77 LT

USE CUT SLOPE TYPICAL FROM TYPICAL SECTION #9 AS NECESSARY.

## TYPICAL SECTION #9

USE TYPICAL SECTION NO. 9:

FROM -US70FLY- STA. 13+96.65 TO STA. 27+54.00 (BEGIN BRIDGE)
FROM -US70FLY- STA. 33+01.00 (END BRIDGE) TO STA. 47+88.96
FROM -EEC70E- STA. 17+14.52 TO STA. 30+90.68

*CURVE WIDENING - USE 15' INSIDE LANE, SEE PLANS:
FROM -US70FLY- STA. 22+68.18 - 41+59.68

USE TYPICAL SECTION NO. 9
WITH -L- (LT & RT) 21.5° PAVEMENT DESIGN (C1, D1, E6, & J1) AS SHOWN IN TYPICAL SECTION NO. 2 FOR -EEC70E- & US70FLY- AND RAMP GORE AREAS:

FROM -EEC70E- STA. 10+95.17 TO STA. 17+14.52
FROM -US70FLY- STA. 10+00.00 TO STA. 13+96.65

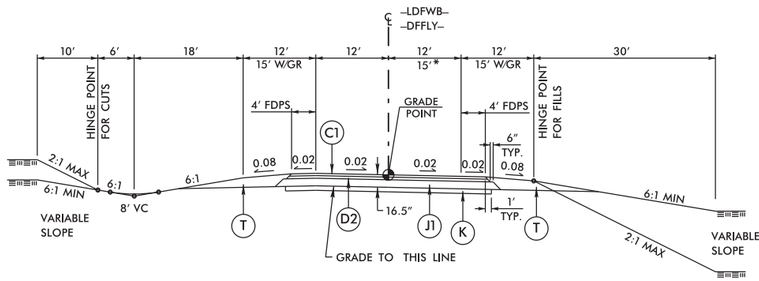
(THESE LOCATIONS SUBJECT TO ALTERNATE PAVEMENT DESIGN, SEE TYPICAL SECTION NO. 1D)

USE TYPICAL SECTION NO. 9
WITH -Y4- 19° PAVEMENT DESIGN (C1, D3, E7, & J1) AS SHOWN IN TYPICAL SECTION NO. 15 FOR -EEC70E- AND RAMP GORE AREAS:

FROM -EEC70E- STA. 30+90.68 TO STA. 34+30.52

USE TYPICAL SECTION NO. 9
WITH -Y3- 22.5° PAVEMENT DESIGN (C1, D1, E4, & J1) AS SHOWN IN TYPICAL SECTION NO. 16 FOR -US70FLY- AND RAMP GORE AREAS:

FROM -US70FLY- STA. 47+88.96 TO STA. 52+53.77




## TYPICAL SECTION #10

USE TYPICAL SECTION NO. 10:

FROM -DFFLY- STA. 14+12.24 TO 21+00.00 (BEGIN BRIDGE)
FROM -DFFLY- STA. 30+16.00 (END BRIDGE) TO STA. 36+76.31
FROM -LDFWB- STA. 14+57.98 TO STA. 26+58.38

*CURVE WIDENING - USE 15' INSIDE LANE, SEE PLANS:
FROM -DFFLY- STA. 18+39.65 - 34+28.52

USE TYPICAL SECTION NO. 10
WITH -DFLW- 21.5° PAVEMENT DESIGN (C1, D1, E6, & J1) AS SHOWN IN TYPICAL SECTION NO. 4 FOR -DFFLY- AND RAMP GORE AREAS:

FROM -DFFLY- STA. 11+13.33 (END BRIDGE) TO STA. 14+12.24

(THIS LOCATION SUBJECT TO ALTERNATE PAVEMENT DESIGN, SEE TYPICAL SECTION NO. 1D)

USE TYPICAL SECTION NO. 10
WITH -LDFEB- 21.5° PAVEMENT DESIGN (C1, D1, E6, & J1) AS SHOWN IN TYPICAL SECTION NO. 4 FOR -LDFWB- AND RAMP GORE AREAS:

FROM -LDFWB- STA. 11+24.05 (END BRIDGE) TO STA. 14+57.98

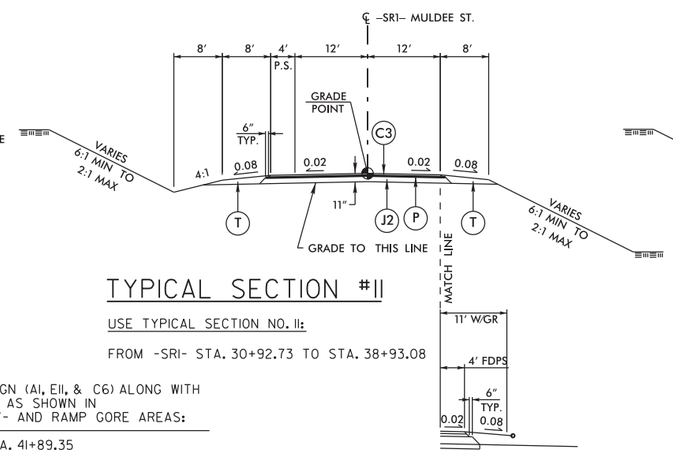
(THIS LOCATION SUBJECT TO ALTERNATE PAVEMENT DESIGN, SEE TYPICAL SECTION NO. 1D)

USE TYPICAL SECTION NO. 10
WITH -DFEB- 16.25° PAVEMENT DESIGN (A1, E11, & C6) ALONG WITH PAVED SHOULDERS (C1, D1, E5, & E8) AS SHOWN IN TYPICAL SECTION NO. 8 FOR -DFFLY- AND RAMP GORE AREAS:

FROM -DFFLY- STA. 36+76.31 TO STA. 41+89.35

USE TYPICAL SECTION NO. 10
WITH -DFWB- 16.25° PAVEMENT DESIGN (A1, E11, & C6) ALONG WITH PAVED SHOULDERS (C1, D1, E5, & E8) AS SHOWN IN TYPICAL SECTION NO. 8 FOR -LDFWB- AND RAMP GORE AREAS:

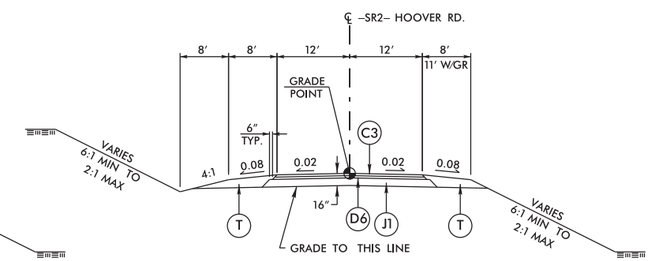
FROM -LDFWB- STA. 26+58.38 TO STA. 29+56.52




## TYPICAL SECTION #11

USE TYPICAL SECTION NO. 11:

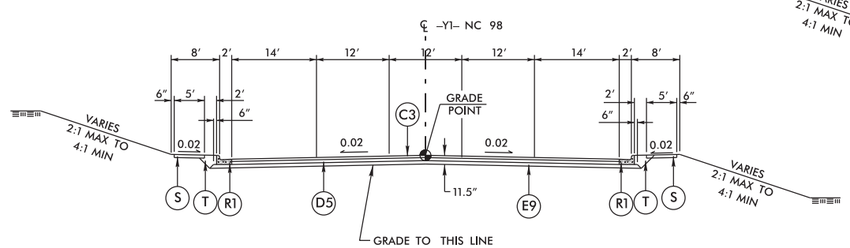
FROM -SR1- STA. 30+92.73 TO STA. 38+93.08




## TYPICAL SECTION #12

USE TYPICAL SECTION NO. 12:

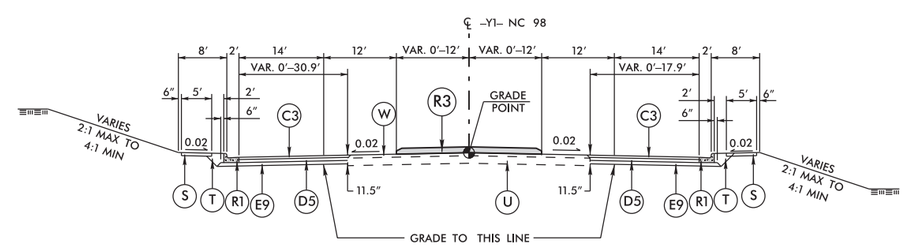
FROM -SR2- STA. 9+50.00 TO STA. 13+95.82
FROM -SR2- STA. 33+95.06 TO STA. 42+68.24




## TYPICAL SECTION #13

USE TYPICAL SECTION NO. 13:

FROM -Y1- STA. 13+12.44 TO STA. 16+00.00




## TYPICAL SECTION #14

USE TYPICAL SECTION NO. 14:

FROM -Y1- STA. 16+00.00 TO STA. 37+75.00

| PAVEMENT SCHEDULE | |
|---|---|
| A1 | 12" PCCP (W/DOWELS) |
| A2 | 12" PCCP (W/O DOWELS) |
| A3 | 8" PCCP (W/O DOWELS) |
| C1 | 3" S9.5C |
| C2 | VAR. S9.5C |
| C3 | 3" S9.5B |
| C4 | 1.5" S9.5B |
| C5 | VAR. S9.5B |
| C6 | 1.25" SF9.5A |
| C7 | VAR. SF9.5A |
| C8 | 5/8" ULTRA THIN, TYPE B |
| D1 | 4" I19.0C |
| D2 | 3.5" I19.0C |
| D3 | 3" I19.0C |
| D4 | VAR. I19.0C |
| D5 | 4" I19.0B |
| D6 | 3" I19.0B |
| D7 | 2.5" I19.0B |
| D8 | VAR. I19.0B |
| E1 | 12.5" B25.0C |
| E2 | 10" B25.0C |
| E3 | 9" B25.0C |
| E4 | 5.5" B25.0C |
| E5 | 5" B25.0C |
| E6 | 4.5" B25.0C |
| E7 | 3" B25.0C |
| E8 | VAR. B25.0C |
| E9 | 4.5" B25.0B |
| E10 | 4" B25.0B |
| E11 | 3" B25.0B |
| E12 | VAR. B25.0B |
| J1 | 10" ABC |
| J2 | 8" ABC |
| J3 | 4" ABC |
| J4 | VAR. ABC |
| K | LIME OR CEMENT SUBGRADE STABILIZ. |
| N | GEOTEXTILE FOR PAVEMENT STABILIZ. |
| P | .35 PRIME COAT |
| R1 | 2'-6" C & G |
| R2 | 1'-6" C & G |
| R3 | 5" MONO. CONC. ISLAND (KEYED IN) |
| R4 | CONC. SHOULDER BERM GUTTER |
| R5 | CONC. EXPRESSWAY GUTTER |
| R6 | 9"x18" CONC. CURB |
| R7 | SINGLE FACED CONC. BARRIER |
| R8 | DOUBLE FACED CONC. BARRIER |
| R9 | 4" CONCRETE CAP |
| S | 4" SIDEWALK |
| T | EARTH MATERIAL |
| U | EXIST. PAVEMENT |
| W | WEDGING |

PAVEMENT EDGESLOPES 1:1 UNLESS NOTED OTHERWISE

6/2/99

10-OCT-2013 11:41
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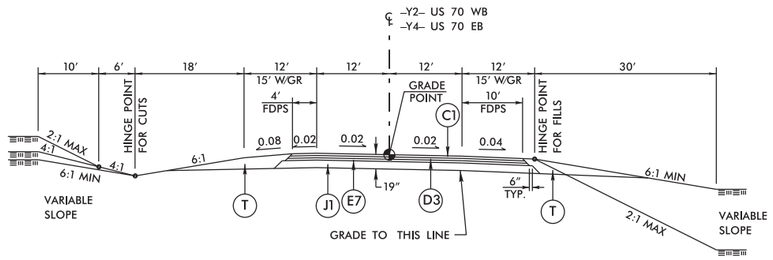
$$USERNAME$$

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone 919.297.0220 Fax 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-F |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




## TYPICAL SECTION #15

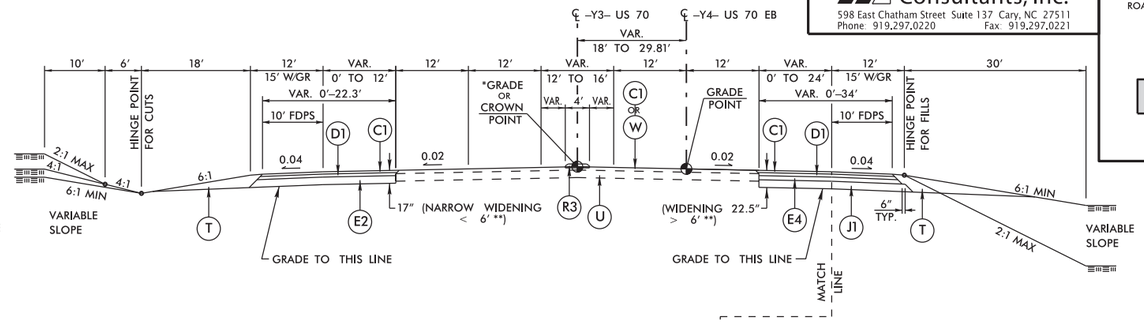
USE TYPICAL SECTION NO. 15:

FROM -Y2- STA. 16+13.15 TO STA. 33+71.33
FROM -Y4- STA. 14+25.50 TO STA. 30+92.43 (BEGIN BRIDGE)
FROM -Y4- STA. 33+62.43 (END BRIDGE) TO STA. 44+45.90

USE TYPICAL SECTION NO. 15
WITH -L- (LT & RT) 21.5" PAVEMENT DESIGN (C1, D1, E6, & J1) AS SHOWN IN TYPICAL SECTION NO. 2 FOR -Y2- & -Y4- AND RAMP GORE AREAS:

FROM -Y2- STA. 10+65.63 TO STA. 16+13.15
FROM -Y4- STA. 10+00.00 TO STA. 14+25.50

(THESE LOCATIONS SUBJECT TO ALTERNATE PAVEMENT DESIGN, SEE TYPICAL SECTION NO. 1D)




## TYPICAL SECTION #16

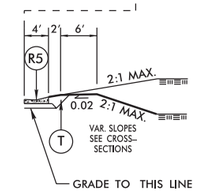
USE TYPICAL SECTION NO. 16:

WITH WEDGING / WIDENING 22.5" PAVEMENT DEPTH:
FROM -Y3- STA. 36+50.00 TO STA. 66+00.00
FROM -Y4- STA. 47+21.63 TO STA. 47+37.14

WITH NEW FULL WIDTH 22.5" PAVEMENT DEPTH:
FROM -Y3- STA. 33+71.33 TO STA. 36+50.00
FROM -Y4- STA. 44+45.90 TO STA. 47+21.63

*WIDEN EXISTING PAVEMENT USING EXISTING EOP AND SUPERELEVATION AS CONTROL.
RESURFACE EXISTING AND WIDENED PAVEMENT USING CROWN POINT AND 3.0" OVERLAY UTILIZING (C1).
FROM -Y3- STA. 66+00.00 TO STA. 71+00.00

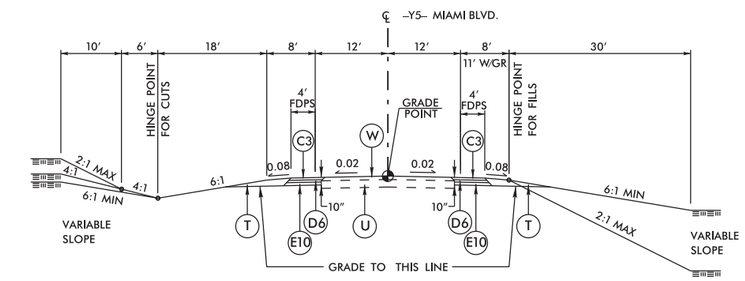
** NOTE: USE 17" ALL ASPHALT PAVEMENT DESIGN FOR NARROW WIDENING AREAS LESS THAN 6' IN WIDTH.




## TYPICAL SECTION #16A

USE TYPICAL SECTION NO. 16A IN CONJUNCTION WITH TYPICAL SECTION NO. 16:

FROM -Y3- STA. 42+20.01 TO STA. 47+81.27 RT



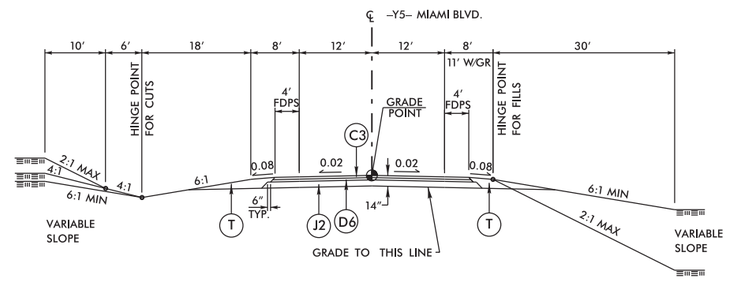

## TYPICAL SECTION #17

USE TYPICAL SECTION NO. 17:

FROM -Y5- STA. 13+00.00 TO STA. 18+00.00

WIDEN, MILL, AND RESURFACE -Y5- WITH C3:
FROM -Y5- STA. 12+00.00 TO STA. 13+00.00

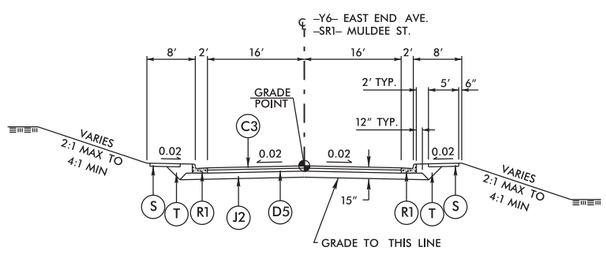
MILL AND RESURFACE -Y5- WITH C3:
FROM -Y5- STA. 10+75.00 TO STA. 12+00.00




## TYPICAL SECTION #18

USE TYPICAL SECTION NO. 18:

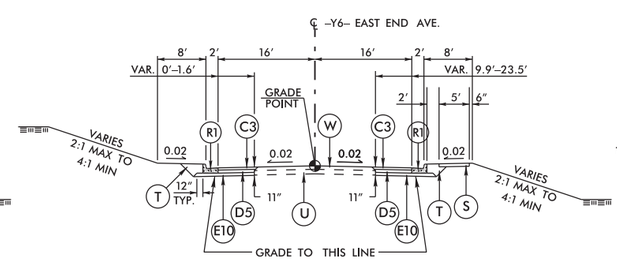
FROM -Y5- STA. 18+00.00 TO STA. 27+27.73




## TYPICAL SECTION #19

USE TYPICAL SECTION NO. 19:

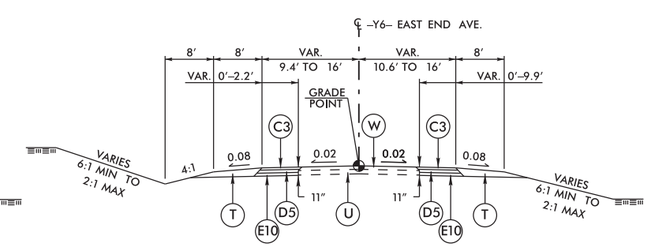
FROM -Y6- STA. 9+04.44 TO STA. 29+80.00
FROM -SR1- STA. 38+93.08 TO STA. 43+51.93




## TYPICAL SECTION #20

USE TYPICAL SECTION NO. 20:

FROM -Y6- STA. 29+80.00 TO STA. 30+60.00




## TYPICAL SECTION #21

USE TYPICAL SECTION NO. 21:

FROM -Y6- STA. 30+60.00 TO STA. 31+60.00

| PAVEMENT SCHEDULE | |
|---|---|
| A1 | 12" PCCP (W/DOWELS) |
| A2 | 12" PCCP (W/O DOWELS) |
| A3 | 8" PCCP (W/O DOWELS) |
| C1 | 3" S9.5C |
| C2 | VAR. S9.5C |
| C3 | 3" S9.5B |
| C4 | 1.5" S9.5B |
| C5 | VAR. S9.5B |
| C6 | 1.25" SF9.5A |
| C7 | VAR. SF9.5A |
| C8 | 5/8" ULTRA THIN, TYPE B |
| D1 | 4" I19.0C |
| D2 | 3.5" I19.0C |
| D3 | 3" I19.0C |
| D4 | VAR. I19.0C |
| D5 | 4" I19.0B |
| D6 | 3" I19.0B |
| D7 | 2.5" I19.0B |
| D8 | VAR. I19.0B |
| E1 | 12.5" B25.0C |
| E2 | 10" B25.0C |
| E3 | 9" B25.0C |
| E4 | 5.5" B25.0C |
| E5 | 5" B25.0C |
| E6 | 4.5" B25.0C |
| E7 | 3" B25.0C |
| E8 | VAR. B25.0C |
| E9 | 4.5" B25.0B |
| E10 | 4" B25.0B |
| E11 | 3" B25.0B |
| E12 | VAR. B25.0B |
| J1 | 10" ABC |
| J2 | 8" ABC |
| J3 | 4" ABC |
| J4 | VAR. ABC |
| K | LIME OR CEMENT SUBGRADE STABILIZ. |
| N | GEOTEXTILE FOR PAVEMENT STABILIZ. |
| P | .35 PRIME COAT |
| R1 | 2'-6" C & G |
| R2 | 1'-6" C & G |
| R3 | 5" MONO. CONC. ISLAND (KEYED IN) |
| R4 | CONC. SHOULDER BERM GUTTER |
| R5 | CONC. EXPRESSWAY GUTTER |
| R6 | 9"x18" CONC. CURB |
| R7 | SINGLE FACED CONC. BARRIER |
| R8 | DOUBLE FACED CONC. BARRIER |
| R9 | 4" CONCRETE CAP |
| S | 4" SIDEWALK |
| T | EARTH MATERIAL |
| U | EXIST. PAVEMENT |
| W | WEDGING |

PAVEMENT EDGESLOPES 1:1 UNLESS NOTED OTHERWISE

6/2/99

10-OCT-2013 14:41
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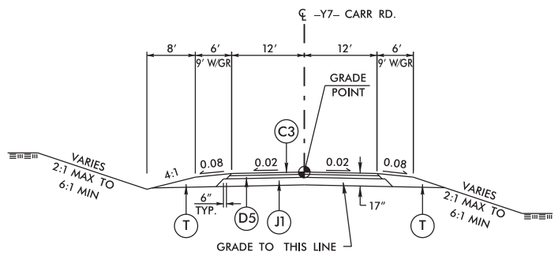
$$$$USERNAME$$$$

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone 919.297.0220 Fax 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-G |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

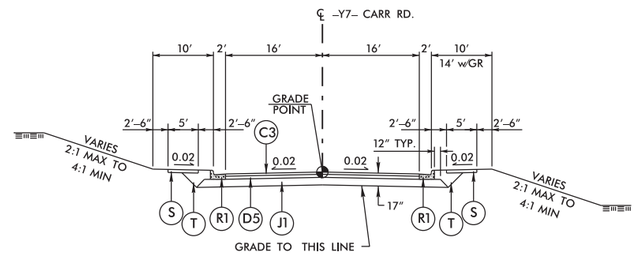
**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




## TYPICAL SECTION #22

USE TYPICAL SECTION NO. 22:

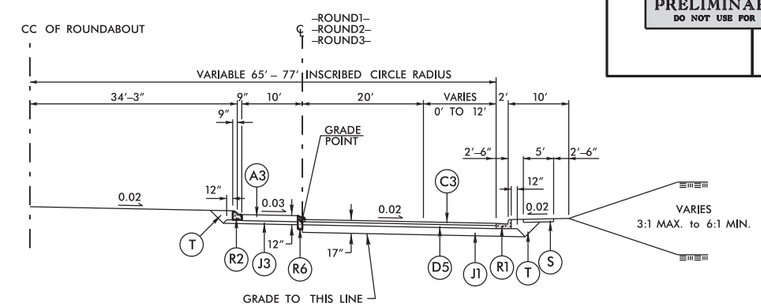
FROM -Y7- STA. 8+85.00 TO STA. 12+91.50




## TYPICAL SECTION #23

USE TYPICAL SECTION NO. 23:

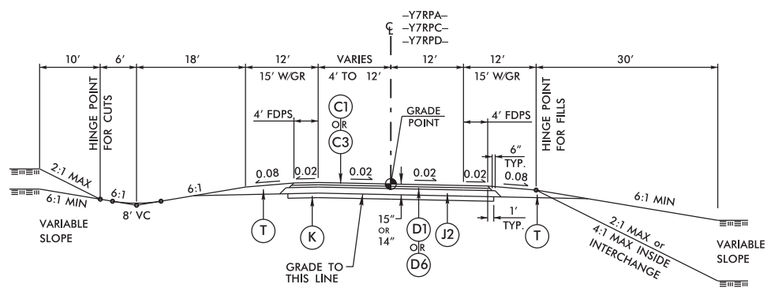
FROM -Y7- STA. 12+91.50 TO STA. 13+72.94 (BEGIN ROUNDABOUT1)
FROM -Y7- STA. 15+02.94 (END ROUNDABOUT1) TO STA. 19+17.61 (BEGIN BRIDGE)
FROM -Y7- STA. 21+87.61 (END BRIDGE) TO STA. 23+55.68 (BEGIN ROUNDABOUT2)
FROM -Y7- STA. 24+85.68 (END ROUNDABOUT2) TO STA. 26+85.68 (BEGIN ROUNDABOUT3)
FROM -Y7- STA. 28+15.68 (END ROUNDABOUT3) TO STA. 28+65.00




## TYPICAL SECTION #24

USE TYPICAL SECTION NO. 24:

FROM -ROUND1- STA. 10+00.00 TO STA. 12+82.74
FROM -ROUND2- STA. 10+00.00 TO STA. 12+82.74
FROM -ROUND3- STA. 10+00.00 TO STA. 12+82.74




## TYPICAL SECTION #25

USE TYPICAL SECTION NO. 25:

FROM -Y7RPA- STA. 16+16.35 TO STA. 29+65.68 (USE C1 & D1, 15″ DEPTH)
FROM -Y7RPC- STA. 5+25.15 TO STA. 36+92.95 (USE C3 & D6, 14″ DEPTH)
FROM -Y7RPD- STA. 0+65.00 TO STA. 9+35.49 (USE C1 & D1, 15″ DEPTH)

USE TYPICAL SECTION NO. 25
WITH -RAMPD- 15″ PAVEMENT DESIGN (C3, D5, & J2) AS SHOWN IN TYPICAL SECTION NO. 1C FOR -RAMPD- AND RAMP GORE AREAS:

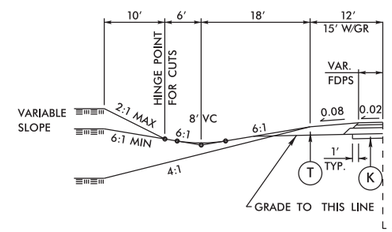
FROM -Y7RPC- STA. 0+00.00 TO STA. 5+25.15

USE TYPICAL SECTION NO. 25
WITH -Y4- 19″ PAVEMENT DESIGN (C1, D3, E7, & J1) AS SHOWN IN TYPICAL SECTION NO. 1S FOR -Y4- AND RAMP GORE AREAS:

FROM -Y7RPD- STA. 9+35.49 TO STA. 13+54.66

USE TYPICAL SECTION NO. 25
WITH -Y2- 19″ PAVEMENT DESIGN (C1, D3, E7, & J1) AS SHOWN IN TYPICAL SECTION NO. 1S FOR -Y7RPA- AND RAMP GORE AREAS:

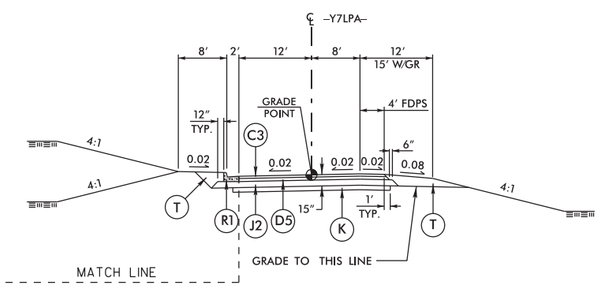
FROM -Y7RPA- STA. 10+00.00 TO STA. 16+16.35




## TYPICAL SECTION #26A

USE TYPICAL SECTION NO. 26A IN CONJUNCTION WITH TYPICAL SECTION NO. 26:

FROM -Y7LPA- STA. 10+00.00 TO STA. 12+00.00 LT




## TYPICAL SECTION #26

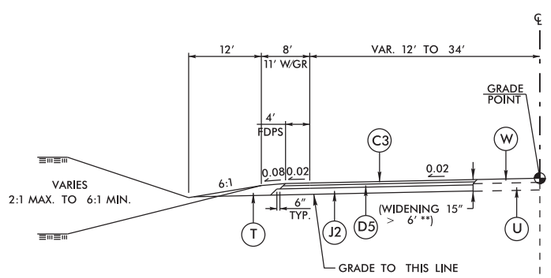
USE TYPICAL SECTION NO. 26:

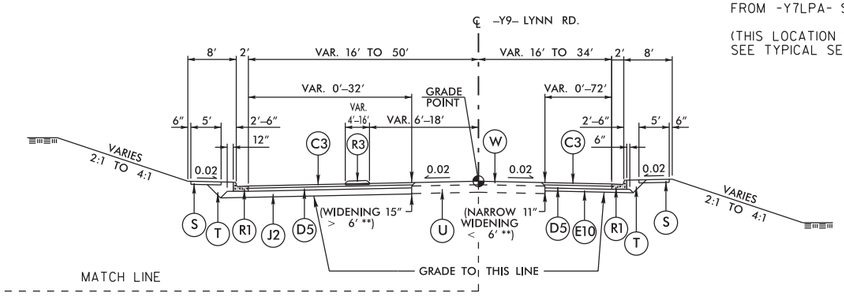
FROM -Y7LPA- STA. 12+12.84 TO STA. 17+34.64

USE TYPICAL SECTION NO. 26
WITH -L- (LT) 21.5″ PAVEMENT DESIGN (C1, D1, E6, & J1) AS SHOWN IN TYPICAL SECTION NO. 1F OR -Y7LPA- AND LOOP GORE AREAS:

FROM -Y7LPA- STA. 10+00.00 TO STA. 12+12.84

(THIS LOCATION SUBJECT TO ALTERNATE PAVEMENT DESIGN, SEE TYPICAL SECTION NO. 1D)




## TYPICAL SECTION #27A

USE TYPICAL SECTION NO. 27A IN CONJUNCTION WITH TYPICAL SECTION NO. 27:

FROM -Y9- STA. 13+11.61 TO STA. 32+36.50 LT

** NOTE: USE 11″ ALL ASPHALT PAVEMENT DESIGN FOR NARROW WIDENING AREAS LESS THAN 6′ IN WIDTH.

## TYPICAL SECTION #27

USE TYPICAL SECTION NO. 27:

WITH WEDGING / WIDENING 11″ OR 15″ PAVEMENT DEPTH:
FROM -Y9- STA. 10+73.77 TO STA. 14+32.00
FROM -Y9- STA. 34+75.00 TO STA. 36+07.98

WITH NEW FULL WIDTH 15″ PAVEMENT DEPTH:
FROM -Y9- STA. 14+32.00 TO STA. 34+75.00

NOTE: MIRROR TYPICALS AS NECESSARY.

| PAVEMENT SCHEDULE | |
|---|---|
| A1 | 12″ PCCP (W/DOWELS) |
| A2 | 12″ PCCP (W/O DOWELS) |
| A3 | 8″ PCCP (W/O DOWELS) |
| C1 | 3″ S9.5C |
| C2 | VAR. S9.5C |
| C3 | 3″ S9.5B |
| C4 | 1.5″ S9.5B |
| C5 | VAR. S9.5B |
| C6 | 1.25″ SF9.5A |
| C7 | VAR. SF9.5A |
| C8 | 5/8″ ULTRA THIN, TYPE B |
| D1 | 4″ I19.0C |
| D2 | 3.5″ I19.0C |
| D3 | 3″ I19.0C |
| D4 | VAR. I19.0C |
| D5 | 4″ I19.0B |
| D6 | 3″ I19.0B |
| D7 | 2.5″ I19.0B |
| D8 | VAR. I19.0B |
| E1 | 12.5″ B25.0C |
| E2 | 10″ B25.0C |
| E3 | 9″ B25.0C |
| E4 | 5.5″ B25.0C |
| E5 | 5″ B25.0C |
| E6 | 4.5″ B25.0C |
| E7 | 3″ B25.0C |
| E8 | VAR. B25.0C |
| E9 | 4.5″ B25.0B |
| E10 | 4″ B25.0B |
| E11 | 3″ B25.0B |
| E12 | VAR. B25.0B |
| J1 | 10″ ABC |
| J2 | 8″ ABC |
| J3 | 4″ ABC |
| J4 | VAR. ABC |
| K | LIME OR CEMENT SUBGRADE STABILIZ. |
| N | GEOTEXTILE FOR PAVEMENT STABILIZ. |
| P | .35 PRIME COAT |
| R1 | 2′-6″ C & G |
| R2 | 1′-6″ C & G |
| R3 | 5″ MONO. CONC. ISLAND (KEYED IN) |
| R4 | CONC. SHOULDER BERM GUTTER |
| R5 | CONC. EXPRESSWAY GUTTER |
| R6 | 9″x18″ CONC. CURB |
| R7 | SINGLE FACED CONC. BARRIER |
| R8 | DOUBLE FACED CONC. BARRIER |
| R9 | 4″ CONCRETE CAP |
| S | 4″ SIDEWALK |
| T | EARTH MATERIAL |
| U | EXIST. PAVEMENT |
| W | WEDGING |
| PAVEMENT EDGESLOPES 1:1 UNLESS NOTED OTHERWISE | |

6/2/99

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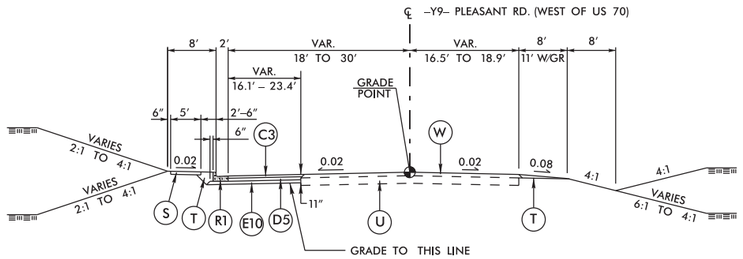
$$$$USERNAME$$$$

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone 919.297.0220 Fax 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-H |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

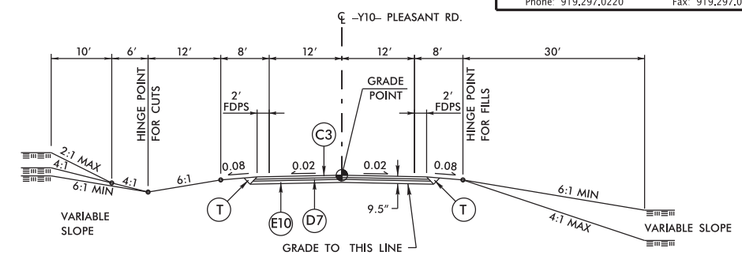
**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




## TYPICAL SECTION #28

USE TYPICAL SECTION NO. 28:

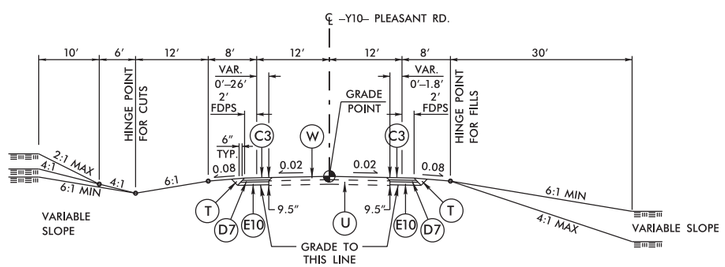
FROM -Y9- STA. 37+00.06 TO STA. 40+22.01




## TYPICAL SECTION #29

USE TYPICAL SECTION NO. 29:

FROM -Y10- STA. 10+50.00 TO STA. 13+37.97

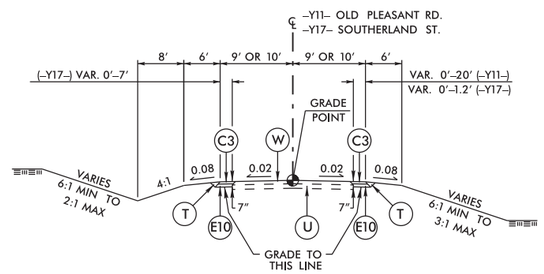



## TYPICAL SECTION #30

USE TYPICAL SECTION NO. 30:

FROM -Y10- STA. 13+37.97 TO STA. 16+02.03

MILL AND RESURFACE -Y10- with (C4):
FROM -Y10- STA. 16+02.03 TO STA. 16+25.00

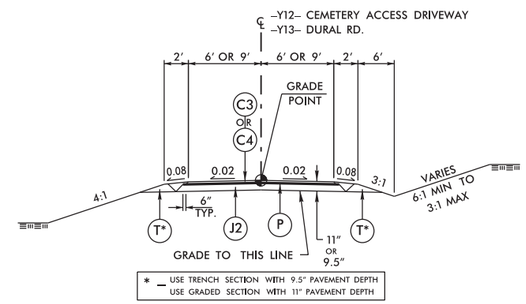



## TYPICAL SECTION #31

USE TYPICAL SECTION NO. 31:

WITH WEDGING / WIDENING PAVEMENT TYPICAL:
FROM -Y11- STA. 10+55.89 TO STA. 11+70.00 (10′ LANES)
FROM -Y17- STA. 10+90.00 TO STA. 12+25.65 (9′ LANES)
FROM -Y17- STA. 12+58.42 TO STA. 14+20.00 (9′ LANES)

WITH 7″ FULL DEPTH NEW PAVEMENT:
FROM -Y11- STA. 10+12.00 TO STA. 10+55.89 (10′ LANES

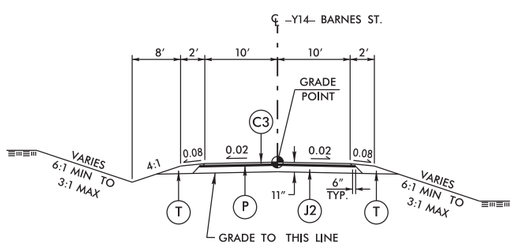



## TYPICAL SECTION #32

USE TYPICAL SECTION NO. 32:

FROM -Y12- STA. 10+37.00 TO STA. 21+97.01 (9′ LANES, USE C3, 11″ DEPTH)
FROM -Y13- STA. 10+16.04 TO STA. 12+53.00 (6′ LANES, USE C4, 9.5″ DEPTH)

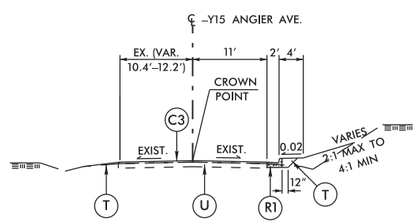
NOTE: CEMETERY ACCESS DRIVEWAY IS LOCATED OFF OF CAROLYN DR.
DURAL RD. IS A PRIVATE DRIVEWAY SERVING TWO PARCELS.




## TYPICAL SECTION #33

USE TYPICAL SECTION NO. 33:

FROM -Y14- STA. 10+12.02 TO STA. 12+00.00



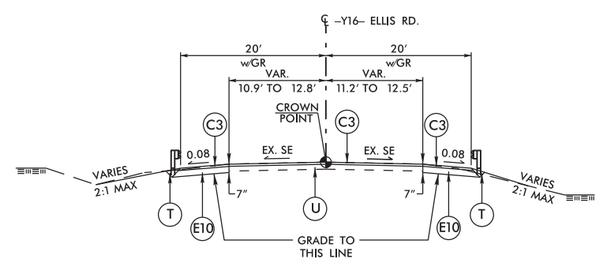

## TYPICAL SECTION #34

USE TYPICAL SECTION NO. 34:

FROM -Y15- STA. 9+35.00 TO STA. 15+00.00

USE CURB & GUTTER AS SHOWN ON THE RIGHT SIDE:
FROM -Y15- STA. 10+00 TO STA. 14+35.00 RT.

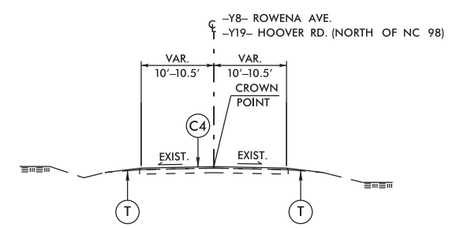
INCIDENTAL MILL AND RESURFACE -Y15- WITH C3 TO ENSURE
SMOOTH TIE-IN (SEE MILLED BUTT JOINT DETAIL ON SHT 2-A):
FROM -Y15- STA. 9+35.00 TO 10+10.00
FROM -Y15- STA. 14+25.00 TO 15+00.00




## TYPICAL SECTION #35

USE TYPICAL SECTION NO. 35

MILL 3″ AND RESURFACE -Y16- WITH C3:
FROM -Y16- STA. 9+33.14 TO STA. 16+28.16




## TYPICAL SECTION #36

USE TYPICAL SECTION NO. 36

FROM -Y8- STA. 13+30.00 TO STA. 16+20.00 (10′ LANES)

FROM -Y19- STA. 21+55.00 TO STA. 23+10.00 (10.5′ LANES)

NOTE: THIS TYPICAL IS USED FOR RESURFACING
THE EXISTING PAVEMENT.

| PAVEMENT SCHEDULE | |
|---|---|
| A1 | 12″ PCCP (W/DOWELS) |
| A2 | 12″ PCCP (W/O DOWELS) |
| A3 | 8″ PCCP (W/O DOWELS) |
| C1 | 3″ S9.5C |
| C2 | VAR. S9.5C |
| C3 | 3″ S9.5B |
| C4 | 1.5″ S9.5B |
| C5 | VAR. S9.5B |
| C6 | 1.25″ SF9.5A |
| C7 | VAR. SF9.5A |
| C8 | 5/8″ ULTRA THIN, TYPE B |
| D1 | 4″ I19.0C |
| D2 | 3.5″ I19.0C |
| D3 | 3″ I19.0C |
| D4 | VAR. I19.0C |
| D5 | 4″ I19.0B |
| D6 | 3″ I19.0B |
| D7 | 2.5″ I19.0B |
| D8 | VAR. I19.0B |
| E1 | 12.5″ B25.0C |
| E2 | 10″ B25.0C |
| E3 | 9″ B25.0C |
| E4 | 5.5″ B25.0C |
| E5 | 5″ B25.0C |
| E6 | 4.5″ B25.0C |
| E7 | 3″ B25.0C |
| E8 | VAR. B25.0C |
| E9 | 4.5″ B25.0B |
| E10 | 4″ B25.0B |
| E11 | 3″ B25.0B |
| E12 | VAR. B25.0B |
| J1 | 10″ ABC |
| J2 | 8″ ABC |
| J3 | 4″ ABC |
| J4 | VAR. ABC |
| K | LIME OR CEMENT SUBGRADE STABILIZ. |
| N | GEOTEXTILE FOR PAVEMENT STABILIZ. |
| P | .35 PRIME COAT |
| R1 | 2′-6″ C & G |
| R2 | 1′-6″ C & G |
| R3 | 5″ MONO. CONC. ISLAND (KEYED IN) |
| R4 | CONC. SHOULDER BERM GUTTER |
| R5 | CONC. EXPRESSWAY GUTTER |
| R6 | 9″x18″ CONC. CURB |
| R7 | SINGLE FACED CONC. BARRIER |
| R8 | DOUBLE FACED CONC. BARRIER |
| R9 | 4″ CONCRETE CAP |
| S | 4″ SIDEWALK |
| T | EARTH MATERIAL |
| U | EXIST. PAVEMENT |
| W | WEDGING |
| PAVEMENT EDGESLOPES 1:1 UNLESS NOTED OTHERWISE | |

6/2/99

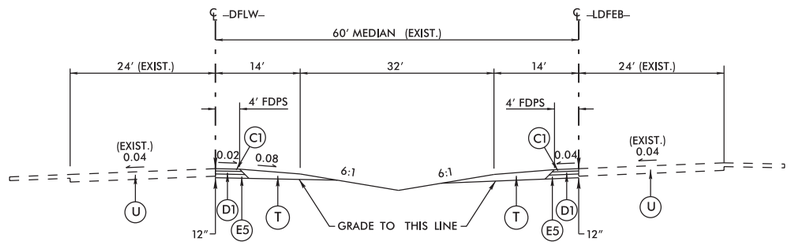
10-OCT-2013 16:41
r:\roadway\proj\u0071_rdy_typ.dgn
$$$$USERNAME$$$$

6/2/99

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone 919.297.0220 Fax 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-1 |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

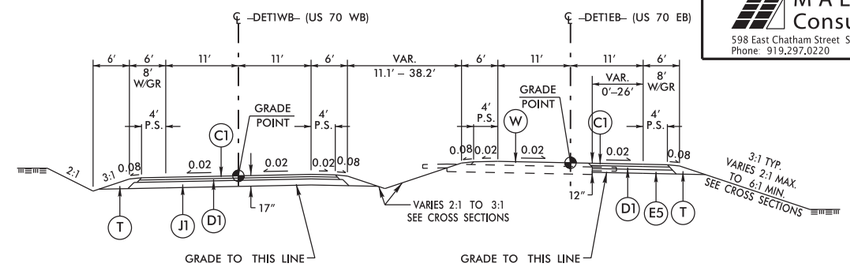



## TYPICAL SECTION #37

USE TYPICAL SECTION NO. 37:

FROM -LDFEB- STA. 210+00.00 TO STA. 219+51.76 LT
FROM -DFLW- STA. 88+42.35 TO STA. 98+21.53 RT

NOTE: THIS TYPICAL IS USED FOR REPLACING THE PAVED SHOULDERS AND REGRADING THE MEDIAN UPON REMOVAL OF -DETOUR3WB2-.



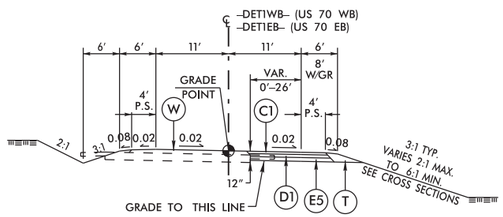

## TYPICAL SECTION #38

USE TYPICAL SECTION NO. 38:

WITH NEW FULL WIDTH 17" PAVEMENT DEPTH TYPICAL:
FROM -DET1WB- STA. 162+16.94 TO STA. 173+60.00
FROM -DET1EB- STA. 162+17.95 TO STA. 173+60.00

WITH WEDGING / WIDENING 12" PAVEMENT DEPTH TYPICAL:
FROM -DET1WB- STA. 157+00.00 TO STA. 162+16.94
FROM -DET1EB- STA. 157+00.00 TO STA. 162+17.95

NOTES:
WEDGING AND WIDENING SECTION SHOWN ON ONE SIDE FOR CLARITY.
NEW AND WIDENING TYPICALS CAN BE USED FOR EITHER ALIGNMENT AS NECESSARY.
-DET1EB- GRADING ON THE RIGHT SIDE WILL TIE TO PROP. -Y7RPC- GRADING AS SHOWN IN CROSS SECTIONS.



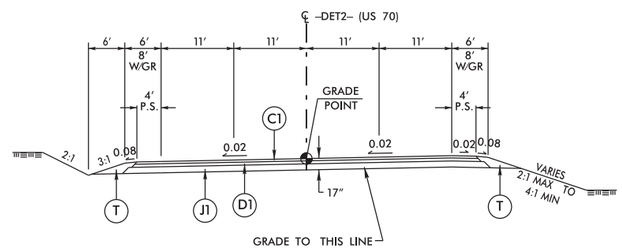

## TYPICAL SECTION #39

USE TYPICAL SECTION NO. 39:

WITH NEW FULL WIDTH 17" PAVEMENT DEPTH DESIGN SHOWN IN TYPICAL SECTION NO. 38:
FROM -DET1WB- STA. 173+60.00 TO STA. 177+00.00
FROM -DET1EB- STA. 173+60.00 TO STA. 174+78.39

WITH WEDGING / WIDENING 12" PAVEMENT DEPTH TYPICAL:
FROM -DET1WB- STA. 177+00.00 TO STA. 181+00.00
FROM -DET1EB- STA. 174+78.39 TO STA. 176+86.61

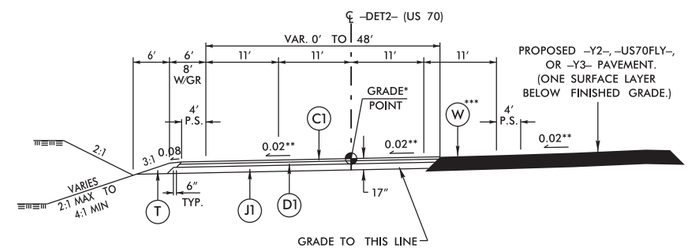
NOTE:
-DET1EB- GRADING ON THE RIGHT SIDE WILL TIE TO PROPOSED -Y7RPC- GRADING AS SHOWN IN CROSS SECTIONS.




## TYPICAL SECTION #40

USE TYPICAL SECTION NO. 40:

FROM -DET2- STA. 18+92.95 TO STA. 25+00.00 +/-




## TYPICAL SECTION #41

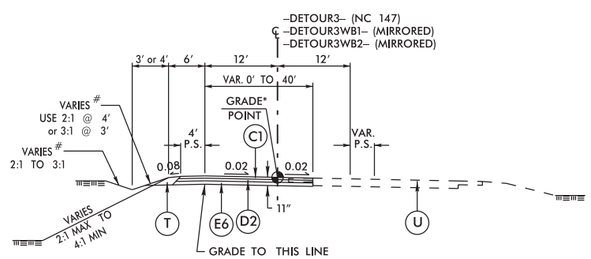
USE TYPICAL SECTION NO. 41:

FROM -DET2- STA. 16+24.66 TO STA. 18+92.95
FROM -DET2- STA. 25+00.00 +/- TO STA. 29+23.28

* WIDEN USING PROPOSED -Y2- OR -Y3- EDGE OF PAVEMENT ELEVATION AND PROPOSED -Y2- OR -Y3- SUPERELEVATION:
FROM -DET2- STA. 10+20.17 TO STA. 16+24.66
FROM -DET2- STA. 29+23.28 TO STA. 33+51.05

** THE PROPOSED -DET2- SUPERELEVATION APPROXIMATELY MATCHES THE PROPOSED -Y2- AND -Y3- SUPERELEVATION.

*** NOTE THAT -US70FLY- PROPOSED PAVEMENT CAN BE UTILIZED FOR THE -DET2- PAVEMENT, HOWEVER, THE SUPERELEVATION AND GRADES ON -US70FLY- NECESSITATE THE USE OF SLIGHT AMOUNTS OF WEDGING TO ACHIEVE THE DESIGN -DET2- GRADE. THIS WEDGING WILL NEED TO BE MILLED IN ORDER TO COMPLETE -US70FLY- TO FINAL GRADE AFTER THE -DET2- DETOUR IS NO LONGER IN USE. THIS SITUATION OCCURS FROM -DET2- STA. 25+00 +/- TO STA. 29+23.28.




## TYPICAL SECTION #42

USE TYPICAL SECTION NO. 42:

FROM -DETOUR3- STA. 27+24.44 TO STA. 31+60.00
FROM -DETOUR3- STA. 80+00.00 TO STA. 91+00.00
FROM -DETOUR3- STA. 106+00.00 TO STA. 110+59.17
FROM -DETOUR3WB1- STA. 28+85.18 TO STA. 31+60.00
FROM -DETOUR3WB2- STA. 107+50.00 TO STA. 111+05.15

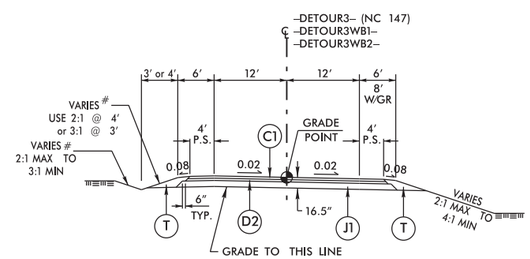
* WIDEN USING EXISTING EDGE OF PAVEMENT ELEVATION AND EXISTING SUPERELEVATION:
FROM -DETOUR3- STA. 24+76.99 TO STA. 27+22.44
FROM -DETOUR3- STA. 110+59.17 TO STA. 114+43.20
FROM -DETOUR3WB1- STA. 25+34.47 TO STA. 28+85.18
FROM -DETOUR3WB2- STA. 111+05.15 TO STA. 114+73.23

**# - NOTES**

USE 3' DITCH WITH 3:1 FRONT AND BACK SLOPES:
FROM -DETOUR3- STA. 24+76.99 TO STA. 56+00.00
FROM -DETOUR3WB1- STA. 25+34.47 TO STA. 33+16.79

USE 4' DITCH WITH 2:1 FRONT AND BACK SLOPES:
FROM -DETOUR3- STA. 56+00.00 TO STA. 114+43.20
FROM -DETOUR3WB2- STA. 104+53.63 TO STA. 114+73.23

FIELD CONDITIONS MAY REQUIRE ADJUSTMENT TO DITCH WIDTHS AND SLOPES IN ORDER TO MAINTAIN POSITIVE DRAINAGE.




## TYPICAL SECTION #43

USE TYPICAL SECTION NO. 43:

FROM -DETOUR3- STA. 31+60.00 TO STA. 33+19.36 (BEG. TEMP. BRIDGE) - (USE C1, D2, & E6 - 11" DEPTH)
FROM -DETOUR3- STA. 35+18.77 (END TEMP. BRIDGE) TO STA. 80+00.00
FROM -DETOUR3- STA. 91+00.00 TO STA. 106+00.00
FROM -DETOUR3WB1- STA. 31+60.00 TO STA. 33+16.79 LB
FROM -DETOUR3WB2- STA. 104+53.63 LA TO STA. 107+50.00

| PAVEMENT SCHEDULE | |
|---|---|
| A1 | 12" PCCP (W/DOWELS) |
| A2 | 12" PCCP (W/O DOWELS) |
| A3 | 8" PCCP (W/O DOWELS) |
| C1 | 3" S9.5C |
| C2 | VAR. S9.5C |
| C3 | 3" S9.5B |
| C4 | 1.5" S9.5B |
| C5 | VAR. S9.5B |
| C6 | 1.25" SF9.5A |
| C7 | VAR. SF9.5A |
| C8 | 5/8" ULTRA THIN, TYPE B |
| D1 | 4" I19.0C |
| D2 | 3.5" I19.0C |
| D3 | 3" I19.0C |
| D4 | VAR. I19.0C |
| D5 | 4" I19.0B |
| D6 | 3" I19.0B |
| D7 | 2.5" I19.0B |
| D8 | VAR. I19.0B |
| E1 | 12.5" B25.0C |
| E2 | 10" B25.0C |
| E3 | 9" B25.0C |
| E4 | 5.5" B25.0C |
| E5 | 5" B25.0C |
| E6 | 4.5" B25.0C |
| E7 | 3" B25.0C |
| E8 | VAR. B25.0C |
| E9 | 4.5" B25.0B |
| E10 | 4" B25.0B |
| E11 | 3" B25.0B |
| E12 | VAR. B25.0B |
| J1 | 10" ABC |
| J2 | 8" ABC |
| J3 | 4" ABC |
| J4 | VAR. ABC |
| K | LIME OR CEMENT SUBGRADE STABILIZ. |
| N | GEOTEXTILE FOR PAVEMENT STABILIZ. |
| P | .35 PRIME COAT |
| R1 | 2'-6" C & G |
| R2 | 1'-6" C & G |
| R3 | 6" MONO. CONC. ISLAND (KEYED IN) |
| R4 | CONC. SHOULDER BERM GUTTER |
| R5 | CONC. EXPRESSWAY GUTTER |
| R6 | 9"x18" CONC. CURB |
| R7 | SINGLE FACED CONC. BARRIER |
| R8 | DOUBLE FACED CONC. BARRIER |
| R9 | 4" CONCRETE CAP |
| S | 4" SIDEWALK |
| T | EARTH MATERIAL |
| U | EXIST. PAVEMENT |
| W | WEDGING |

PAVEMENT EDGESLOPES 1:1 UNLESS NOTED OTHERWISE

10-OCT-2013 11:41
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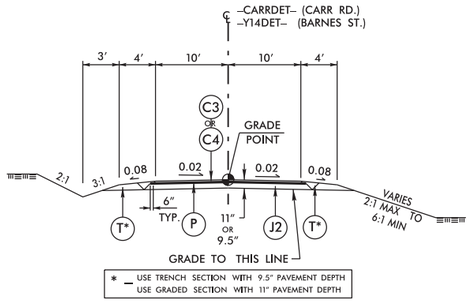
$$$$USERNAME$$$$

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone 919.297.0220 Fax 919.297.0221

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-J |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION



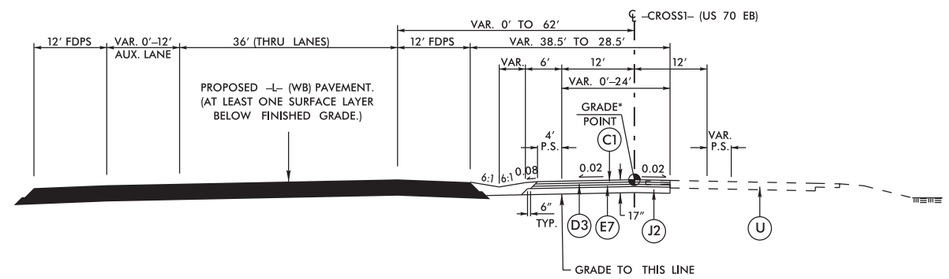

## TYPICAL SECTION #44

USE TYPICAL SECTION NO. 44:

FROM -CARRDET- STA. 10+25.51 TO STA. 23+82.53 (USE C3, 11" DEPTH)
FROM -CARRDET- STA. 30+80.28 TO STA. 36+85.35 (USE C3, 11" DEPTH)

FROM -Y14DET- STA. 10+39.48 TO STA. 11+59.81 (USE C3, 11" DEPTH)
FROM -Y14DET- STA. 11+79.81 TO STA. 15+27.58 (USE C4, 9.5" DEPTH)

NOTE: -CARRDET- STA. 23+82.53 TO STA. 30+80.28
UTILIZES THE PROPOSED -SR2- CONSTRUCTION FROM
-SR2- STA. 33+07.77 TO STA. 40+05.52.



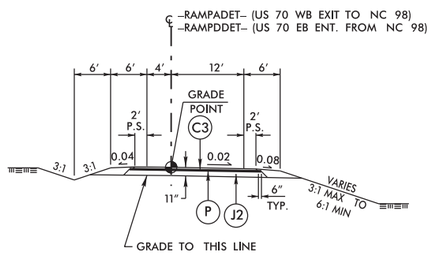

## TYPICAL SECTION #45

USE TYPICAL SECTION NO. 45:

FROM -CROSS1- STA. 17+78.42 TO STA. 22+28.17

* WIDEN USING EXISTING EDGE OF -L- (EB) PAVEMENT ELEVATION AND EXISTING -L- (EB) SUPERELEVATION:
FROM -CROSS1- STA. 13+00.00 TO STA. 17+78.42

* WIDEN USING PROPOSED -L- (WB) EDGE OF PAVEMENT ELEVATION AND PROPOSED -L- (WB) SUPERELEVATION:
FROM -CROSS1- STA. 22+28.17 TO STA. 28+53.78




## TYPICAL SECTION #46

USE TYPICAL SECTION NO. 46:

FROM -RAMPADET- STA. 98+38.72 TO STA. 104+12.07

UTILIZE PROPOSED -L- WB PAVEMENT FROM:
-RAMPADET- STA. 104+12.07 TO STA. 109+52.71

FROM -RAMPDDET-1- STA. 266+00.00 TO STA. 271+35.74
FROM -RAMPDDET-2- STA. 367+87.10 TO STA. 369+74.91

-RAMPDDET-1- UTILIZES PROPOSED -L- WB PAVEMENT FROM
STA. 267+57.57 +/- (PROP. -L- WB EOT) TO STA. 269+28.88.

CROSSOVER PAVING WILL BE REQUIRED IN THE FOLLOWING AREAS:
-RAMPDDET-1- STA. 266+00.00 TO STA. 267+57.57 (AREA BETWEEN -DETIEB- AND -L- EB PAVEMENT)
-RAMPDDET-2- STA. 369+12.31 TO -RAMPDDET-1- STA. 270+19.98 (MEDIAN AREA BETWEEN -L- EB AND -L- WB)

| PAVEMENT SCHEDULE | |
|---|---|
| A1 | 12" PCCP (W/DOWELS) |
| A2 | 12" PCCP (W/O DOWELS) |
| A3 | 8" PCCP (W/O DOWELS) |
| C1 | 3" S9.5C |
| C2 | VAR. S9.5C |
| C3 | 3" S9.5B |
| C4 | 1.5" S9.5B |
| C5 | VAR. S9.5B |
| C6 | 1.25" SF9.5A |
| C7 | VAR. SF9.5A |
| C8 | 5/8" ULTRA THIN, TYPE B |
| D1 | 4" I19.0C |
| D2 | 3.5" I19.0C |
| D3 | 3" I19.0C |
| D4 | VAR. I19.0C |
| D5 | 4" I19.0B |
| D6 | 3" I19.0B |
| D7 | 2.5" I19.0B |
| D8 | VAR. I19.0B |
| E1 | 12.5" B25.0C |
| E2 | 10" B25.0C |
| E3 | 9" B25.0C |
| E4 | 5.5" B25.0C |
| E5 | 5" B25.0C |
| E6 | 4.5" B25.0C |
| E7 | 3" B25.0C |
| E8 | VAR. B25.0C |
| E9 | 4.5" B25.0B |
| E10 | 4" B25.0B |
| E11 | 3" B25.0B |
| E12 | VAR. B25.0B |
| J1 | 10" ABC |
| J2 | 8" ABC |
| J3 | 4" ABC |
| J4 | VAR. ABC |
| K | LIME OR CEMENT SUBGRADE STABILIZ. |
| N | GEOTEXTILE FOR PAVEMENT STABILIZ. |
| P | .35 PRIME COAT |
| R1 | 2'-6" C & G |
| R2 | 1'-6" C & G |
| R3 | 5" MONO. CONC. ISLAND (KEYED IN) |
| R4 | CONC. SHOULDER BERM GUTTER |
| R5 | CONC. EXPRESSWAY GUTTER |
| R6 | 9"x18" CONC. CURB |
| R7 | SINGLE FACED CONC. BARRIER |
| R8 | DOUBLE FACED CONC. BARRIER |
| R9 | 4" CONCRETE CAP |
| S | 4" SIDEWALK |
| T | EARTH MATERIAL |
| U | EXIST. PAVEMENT |
| W | WEDGING |
| PAVEMENT EDGESLOPES 1:1 UNLESS NOTED OTHERWISE | |

6/2/99

10-OCT-2013 16:41
S:\Design\U-0071\U-0071_rdy_typ.dgn
$$$$USERNAME$$$$

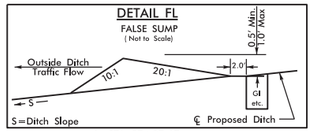
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-J |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

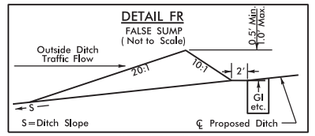

REVISIONS

## DETAIL FL
FALSE SUMP
( Not to Scale)



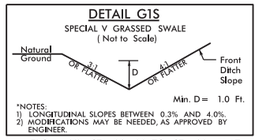

–L– STA 57+07 LT
–SR2– STA 39+40 LT
–Y9– STA 22+00 LT

## DETAIL FR
FALSE SUMP
( Not to Scale)




–Y3– STA 61+40 RT
–Y6– STA 21+30 RT

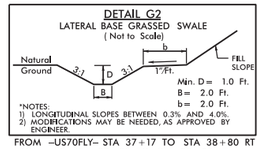
## DETAIL G1S
SPECIAL V GRASSED SWALE
( Not to Scale)




*NOTES:
1) LONGITUDINAL SLOPES BETWEEN 0.3% AND 4.0%.
2) MODIFICATIONS MAY BE NEEDED, AS APPROVED BY ENGINEER.

FROM –Y2– STA. 29+00 TO STA. 30+51 LT

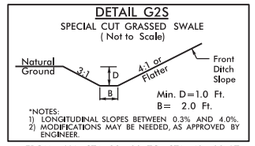
## DETAIL G2
LATERAL BASE GRASSED SWALE
( Not to Scale)




*NOTES:
1) LONGITUDINAL SLOPES BETWEEN 0.3% AND 4.0%.
2) MODIFICATIONS MAY BE NEEDED, AS APPROVED BY ENGINEER.

FROM –US70FLY– STA 37+17 TO STA 38+80 RT
FROM –Y2– STA 27+88 TO STA 29+00 LT
FROM –Y4– STA 38+00 TO STA 39+00 LT

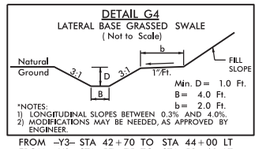
## DETAIL G2S
SPECIAL CUT GRASSED SWALE
( Not to Scale)




*NOTES:
1) LONGITUDINAL SLOPES BETWEEN 0.3% AND 4.0%.
2) MODIFICATIONS MAY BE NEEDED, AS APPROVED BY ENGINEER.

FROM –Y4– STA 39+00 TO STA 40+00 LT
FROM –Y3– STA 57+67 TO STA 59+00 RT

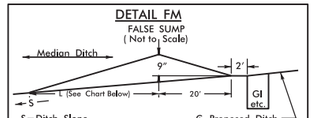
## DETAIL G4
LATERAL BASE GRASSED SWALE
( Not to Scale)




*NOTES:
1) LONGITUDINAL SLOPES BETWEEN 0.3% AND 4.0%.
2) MODIFICATIONS MAY BE NEEDED, AS APPROVED BY ENGINEER.

FROM –Y3– STA 42+70 TO STA 44+00 LT
FROM –Y3– STA 57+75 TO STA 58+60 LT
FROM –Y4– STA 35+00 TO STA 37+50 RT
FROM –Y6– STA 13+79 TO STA 16+79 LT
FROM –Y7RPA– STA 21+80 TO STA 24+40 RT
FROM –Y9– STA 26+50 RT STA 27+93 LT

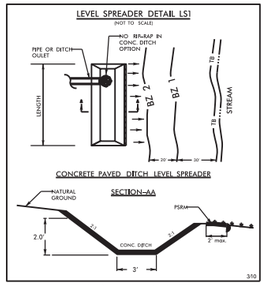
## DETAIL FM
FALSE SUMP
( Not to Scale)




| Ditch Grade | L | Ditch Grade | L |
|---|---|---|---|
| 0.0% To 2.0% | 20' | Over 4.0% To 6.0% | 40' |
| Over 2.0% To 4.0% | 30' | Over 6.0% | 50' |

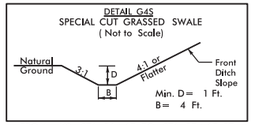
–L– STA 14+00 M
–L– STA 18+00 M
–L– STA 26+00 M
–L– STA 29+50 M
–L– STA 52+75 M
–L– STA 55+00 M
–L– STA 57+06 M
–L– STA 59+25 M
–L– STA 68+50 M
–L– STA 70+50 M
–L– STA 73+00 M
–L– STA 76+00 M
–L– STA 78+50 M
–L– STA 80+50 M
–L– STA 87+00 M
–L– STA 89+00 M
–L– STA 91+00 M
–L– STA 95+00 M
–L– STA 129+50 M
–L– STA 132+80 M
–LDFEB– STA 173+85 M
–LDFEB– STA 184+09 M
–LDFEB– STA 188+75 M
–LDFEB– STA 201+00 M
–LDFEB– STA 204+50 M

## LEVEL SPREADER DETAIL LS1
(NOT TO SCALE)



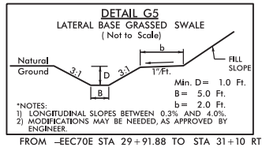

–US70FLY– STA. 43+30 LT

## DETAIL G4S
SPECIAL CUT GRASSED SWALE
( Not to Scale)




FROM –Y3– STA. 56+67 TO STA. 57+67 RT

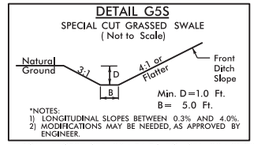
## DETAIL G5
LATERAL BASE GRASSED SWALE
( Not to Scale)




*NOTES:
1) LONGITUDINAL SLOPES BETWEEN 0.3% AND 4.0%.
2) MODIFICATIONS MAY BE NEEDED, AS APPROVED BY ENGINEER.

FROM –EEC70E STA 29+91.88 TO STA 31+10 RT

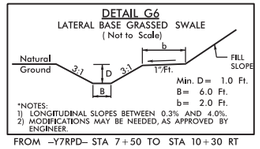
## DETAIL G5S
SPECIAL CUT GRASSED SWALE
( Not to Scale)




*NOTES:
1) LONGITUDINAL SLOPES BETWEEN 0.3% AND 4.0%.
2) MODIFICATIONS MAY BE NEEDED, AS APPROVED BY ENGINEER.

FROM EEC70E STA 28+54.56 TO STA 29+91.88 RT

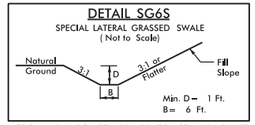
## DETAIL G6
LATERAL BASE GRASSED SWALE
( Not to Scale)




*NOTES:
1) LONGITUDINAL SLOPES BETWEEN 0.3% AND 4.0%.
2) MODIFICATIONS MAY BE NEEDED, AS APPROVED BY ENGINEER.

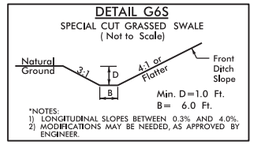
FROM –Y7RPD– STA 7+50 TO STA 10+30 RT

## DETAIL SG6S
SPECIAL LATERAL GRASSED SWALE
( Not to Scale)




FROM –RAMPC– STA 12+95 TO STA 19+80 RT

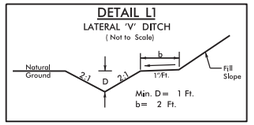
## DETAIL G6S
SPECIAL CUT GRASSED SWALE
( Not to Scale)




*NOTES:
1) LONGITUDINAL SLOPES BETWEEN 0.3% AND 4.0%.
2) MODIFICATIONS MAY BE NEEDED, AS APPROVED BY ENGINEER.

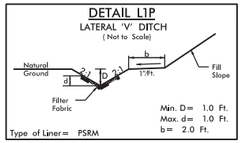
FROM –SR2– STA 26+93 TO STA 33+45 LT

## DETAIL L1
LATERAL 'V' DITCH
( Not to Scale)



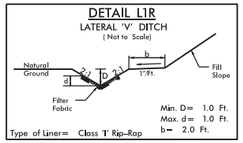

FROM –L– STA 125+50 TO STA 126+50 LT
FROM –L– STA 126+50 TO STA 128+00 RT
FROM –LDFEB– STA 157+20 TO STA 158+40 RT
FROM –DFLW– STA 51+82.75 TO STA 52+65 LT
FROM –SR2– STA 41+75 TO STA 42+50 LT
FROM –EEC70E– STA 17+17 TO STA 17+98 RT
FROM –US70FLY– STA 23+71 TO STA 25+50 LT
FROM –DFFLY– STA 15+02 TO STA 16+30 LT
FROM –Y3– STA 60+90 TO STA 61+65 LT
FROM –Y3– STA 61+50 TO STA 62+50 RT
FROM –Y6– STA 9+50 TO STA 13+00 LT
FROM –Y7– STA 13+60 RT TO –SR2– STA 41+75 LT

## DETAIL L1P
LATERAL 'V' DITCH
( Not to Scale)



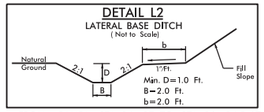

FROM –LDFWB– STA 21+00 TO STA 22+50 LT
FROM –Y3– STA 61+65 TO STA 62+95 LT
FROM –Y7– STA 13+00 RT TO STA 13+60 RT

## DETAIL L1R
LATERAL 'V' DITCH
( Not to Scale)



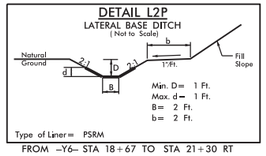

FROM –L– STA 129+50 TO STA 133+00 RT
FROM –DFLW– STA 35+40 TO STA 36+92 LT
FROM –US70FLY– STA 10+36 TO STA 12+06 LT
FROM –US70FLY– STA 20+50 TO STA 23+71 LT
FROM –US70FLY– STA 43+00 TO STA 44+86 RT
FROM –SR2– STA 36+50 TO STA 37+35 RT
FROM –Y2– STA. 30+51 TO STA. 32+35 LT
FROM –Y3– STA 54+00 TO STA 56+20 LT
FROM –Y3– STA 58+60 TO STA 59+26 LT
FROM –Y4– STA 37+50 TO STA 38+50 RT
FROM –Y6– STA 13+00 TO STA 13+79 LT
FROM –Y7– STA 12+50 LT TO –Y7RPA– STA 29+26 RT
FROM –Y7LPA– STA 12+40 TO STA 15+85 LT
FROM –Y7RPA– STA 22+91 TO STA 25+00 LT
FROM –Y7RPA– STA 24+40 TO STA 26+00 RT
FROM –LDFWB– STA 19+50 TO STA 22+00 RT

## DETAIL L2
LATERAL BASE DITCH
( Not to Scale)



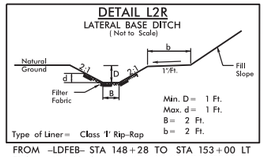

FROM –RAMPA– STA. 24+87 TO STA 26+34.5 LT
FROM –DFFLY– STA 19+26.74 TO STA 21+10 LT
FROM –DFFLY– STA 30+78 TO STA 34+00 LT
FROM –Y1– STA 30+30 TO STA 31+20 RT
FROM –Y3– STA 54+00 TO STA 55+00 RT
FROM –Y6– STA 17+42 TO STA 18+67 RT
FROM –Y9– STA 27+60 TO STA 28+82 RT

## DETAIL L2P
LATERAL BASE DITCH
( Not to Scale)



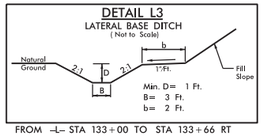

FROM –Y6– STA 18+67 TO STA 21+30 RT

## DETAIL L2R
LATERAL BASE DITCH
( Not to Scale)



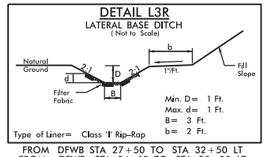

FROM –LDFEB– STA 148+28 TO STA 153+00 LT
FROM –DFFLY– STA 13+40 TO STA 15+02 LT
FROM –DFFLY– STA 21+10 TO STA 22+60 LT
FROM –LDFWB– STA 18+00 TO STA 21+00 LT
FROM –DFEB– STA 48+21 TO STA 54+00 RT
FROM –DFEB– STA 56+90 TO STA 59+41 RT
FROM –SR1– STA. 35+10 TO STA. 38+50 LT
FROM –Y4– STA 26+00 TO STA 28+25 RT
FROM –Y6– STA 17+00 TO STA 17+42 RT
FROM –Y7– STA 15+25 TO STA 17+36 RT
FROM –Y9– STA 28+82 TO STA 30+00 RT

## DETAIL L3
LATERAL BASE DITCH
( Not to Scale)



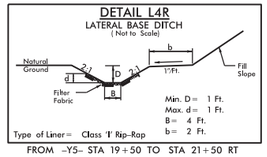

FROM –L– STA 133+00 TO STA 133+66 RT

## DETAIL L3R
LATERAL BASE DITCH
( Not to Scale)



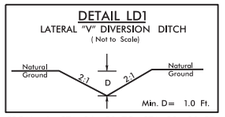

FROM DFWB STA 27+50 TO STA 32+50 LT
FROM –DFWB– STA 34+10 TO STA 35+20 LT

## DETAIL L4R
LATERAL BASE DITCH
( Not to Scale)



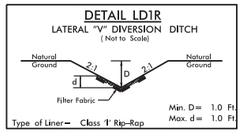

FROM –Y5– STA 19+50 TO STA 21+50 RT

## DETAIL LD1
LATERAL "V" DIVERSION DITCH
( Not to Scale)



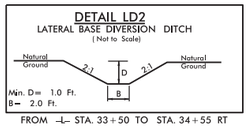

FROM –L– STA 26+50 TO STA 30+00 RT
FROM –L– STA 30+80 TO STA 33+50 RT

## DETAIL LD1R
LATERAL "V" DIVERSION DITCH
( Not to Scale)



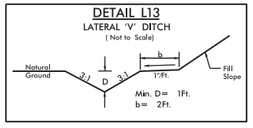

FROM –L– STA. 30+00 TO STA. 30+80 RT
FROM –Y9– STA 23+50 TO STA 28+06 LT

## DETAIL LD2
LATERAL BASE DIVERSION DITCH
( Not to Scale)



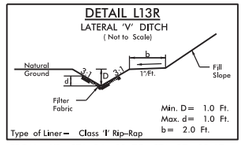

FROM –L– STA. 33+50 TO STA. 34+55 RT

## DETAIL L13
LATERAL 'V' DITCH
( Not to Scale)



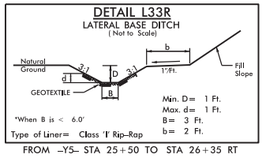

FROM –Y2– STA 27+00 TO STA 27+88 LT

## DETAIL L13R
LATERAL 'V' DITCH
( Not to Scale)



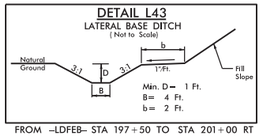

FROM –Y2– STA 26+00 TO STA 27+00 LT

## DETAIL L33R
LATERAL BASE DITCH
( Not to Scale)



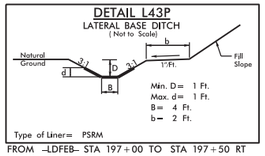

FROM –Y5– STA 25+50 TO STA 26+35 RT

## DETAIL L43
LATERAL BASE DITCH
( Not to Scale)




FROM –LDFEB– STA 197+50 TO STA 201+00 RT

## DETAIL L43P
LATERAL BASE DITCH
( Not to Scale)




FROM –LDFEB– STA 197+00 TO STA 197+50 RT

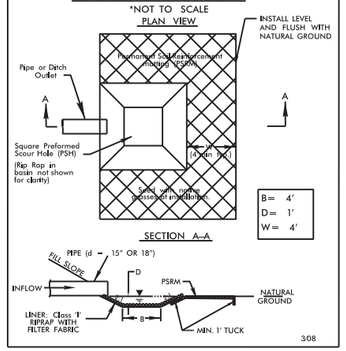

10/17/95
10-OCT-2013 14:41
$$$$USERNAME$$$$
$$$$DGN$$$$ ...\0071-rdy_psh02-JK_DitchDetails.dgn

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-K |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

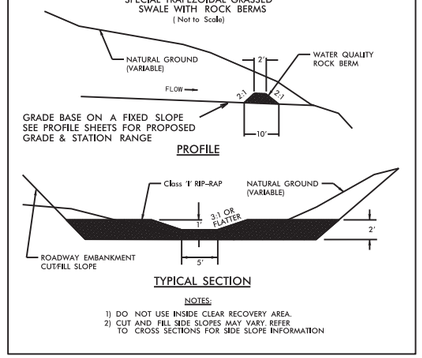

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


## DETAIL P1
### PREFORMED SCOUR HOLE
*NOT TO SCALE




–L– STA 38+21 RT 172'
–L– STA 128+34 LT 180'
–L– STA 129+71 LT 187'
–L– STA 131+20 LT 210'
–LDFEB– STA 206+82 RT 127'
–US70FLY– STA 46+88 LT 101'
–US70FLY– STA 35+50 RT 80'
–EEC70E– STA 32+45 RT 72'
–Y6– STA 12+08 RT 63'
–Y6– STA 13+98 RT 59'
–Y7– STA 25+36 LT 71'
–Y7– STA 28+54 LT 95'
–Y7RPD– STA 1+95 RT 64'
–Y7RPD– STA 6+28 RT 55'
–Y9– STA 29+25 LT 52'
–Y12– STA 21+96 RT 44'
–LDFWB– STA 12+15 RT 79'
–LDFWB– STA 15+17 RT 70'

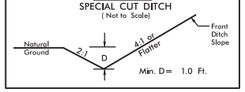
## DETAIL RB1
### SPECIAL TRAPEZOIDAL GRASSED SWALE WITH ROCK BERMS
( Not to Scale)




NOTES:
1) DO NOT USE INSIDE CLEAR RECOVERY AREA.
2) CUT AND FILL SIDE SLOPES MAY VARY. REFER TO CROSS SECTIONS FOR SIDE SLOPE INFORMATION

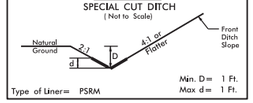
–Y4– STA. 15+83 TO 18+56 LT
–Y4– STA. 20+38 TO 27+00 LT

## DETAIL S1
### SPECIAL CUT DITCH
( Not to Scale)



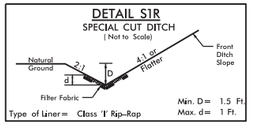

FROM –L– STA 39+50 TO STA 41+50 LT
FROM –L– STA 58+50 TO STA 60+76 RT
FROM –LDFEB– STA 195+00 TO STA 197+00 RT
FROM –EEC70E– STA 17+98 TO STA 21+00 RT
FROM –US70FLY– STA 13+80 TO STA 16+60 LT
FROM –US70FLY– STA 19+50 TO STA 20+50 LT
FROM –LDFWB– STA 22+00 TO STA 23+34 RT
FROM –SR1– STA 30+70 TO STA 35+10 LT
FROM –SR2– STA 11+90 TO STA 16+09 LT
FROM –SR2– STA 23+97 TO STA 26+93 LT
FROM –SR2– STA 39+50 TO STA 41+75 LT
FROM –Y2– STA 21+50 TO STA 23+87 RT
FROM –Y5– STA 24+00 TO STA 27+27 LT
FROM –Y7RPA– STA 17+74 TO STA 19+33 RT
FROM –Y9– STA 20+50 TO STA 22+00 LT

## DETAIL S1P
### SPECIAL CUT DITCH
( Not to Scale)



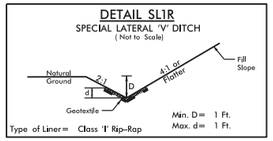

FROM –L– STA 110+00 TO STA 115+00 RT
FROM –RAMPA– STA 18+95 TO STA 24+87 LT
FROM –Y2– STA 20+50 TO STA 21+50 RT
FROM –Y6– STA 25+50 TO STA 29+50 RT
FROM –Y6– STA 29+00 TO STA 31+60 LT
FROM –Y9– STA 13+50 TO STA 15+50 LT
FROM –LDFWB– STA 22+50 TO STA 23+34 LT

## DETAIL S1R
### SPECIAL CUT DITCH
( Not to Scale)



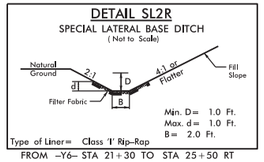

FROM –L– STA 111+50 TO STA 114+50 LT
FROM –RAMPC– STA 7+95 RT TO STA 9+95 RT
FROM –US70FLY– STA 16+60 TO STA 17+95 LT
FROM –EEC70E– STA 27+18.5 TO STA 28+54.56 RT
FROM –Y2– STA 26+70 TO STA 28+00 RT
FROM –Y3– STA 52+84 TO STA 54+00 LT
FROM –Y3– STA 55+50 TO STA 56+67 RT
FROM –Y3– STA 59+00 TO STA 60+00 RT
FROM –Y3– STA 59+26 TO STA 60+50 LT
FROM –Y3– STA 62+50 TO STA 64+00 RT
FROM –Y7RPA– STA 15+62 TO STA 17+74 RT
FROM –Y7RPA– STA 25+00 TO STA 26+00 LT
FROM –Y7RPA– STA 26+00TO STA 29+26 RT
FROM –Y9– STA 24+00 TO STA 26+50 LT
FROM –Y12– STA 12+50 TO STA 14+74 RT
FROM –DFLW– STA 34+00 TO STA 35+40 LT
FROM –DFLW– STA 50+82.08 TO STA 51+82.75 LT
FROM –Y17– STA 11+50 TO STA 11+80 LT
FROM –L– STA 74+00 TO STA 76+80 RT
FROM –SR2– STA 35+50 TO STA 36+50 RT
FROM –SR2– STA 37+00 TO STA 39+00 LT
FROM –Y5– STA 18+00 TO STA 19+50 RT
FROM –Y5– STA 23+50 TO STA 25+50 RT
FROM –LDFWB– STA 18+50 TO STA 19+50 RT

## DETAIL SL1R
### SPECIAL LATERAL 'V' DITCH
( Not to Scale)



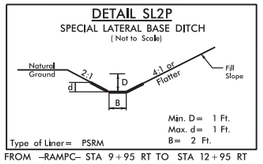

FROM –L– STA 110+00 TO STA 111+50 LT
FROM –Y9– STA 19+00 TO STA 20+50 LT
FROM –Y9– STA 20+00 TO STA 21+41 RT

## DETAIL SL2R
### SPECIAL LATERAL BASE DITCH
( Not to Scale)



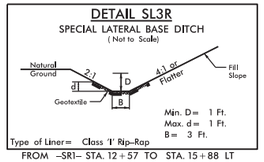

FROM –Y6– STA 21+30 TO STA 25+50 RT

## DETAIL SL2P
### SPECIAL LATERAL BASE DITCH
( Not to Scale)



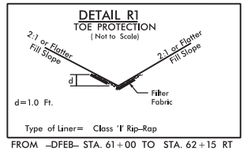

FROM –RAMPC– STA 9+95 RT TO STA 12+95 RT

## DETAIL SL3R
### SPECIAL LATERAL BASE DITCH
( Not to Scale)



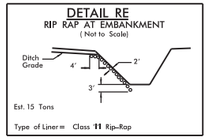

FROM –SR1– STA. 12+57 TO STA. 15+88 LT

## DETAIL R1
### TOE PROTECTION
( Not to Scale)



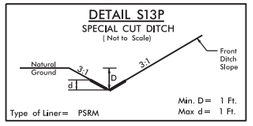

FROM –DFEB– STA. 61+00 TO STA. 62+15 RT
FROM –Y2– STA. 32+50 TO STA. 33+50 LT
FROM –Y7LPA– STA 14+00 TO STA 15+70 RT

## DETAIL RE
### RIP RAP AT EMBANKMENT
( Not to Scale)



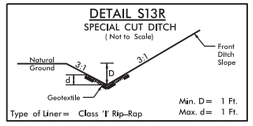

–DFWB– STA. 34+37 TO STA. 34+47 LT.

## DETAIL S13P
### SPECIAL CUT DITCH
( Not to Scale)



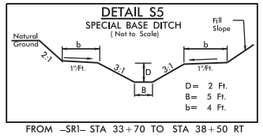

FROM –L– STA. 103+00 TO STA. 104+00 RT

## DETAIL S13R
### SPECIAL CUT DITCH
( Not to Scale)



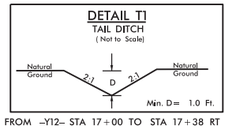

FROM –L– STA. 104+00 TO STA. 105+40 RT

## DETAIL S5
### SPECIAL BASE DITCH
( Not to Scale)



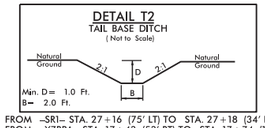

FROM –SR1– STA 33+70 TO STA 38+50 RT
FROM –WBL– STA 91+00 TO STA 93+66 LT

## DETAIL T1
### TAIL DITCH
( Not to Scale)



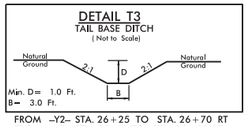

FROM –Y12– STA 17+00 TO STA 17+38 RT

## DETAIL T2
### TAIL BASE DITCH
( Not to Scale)



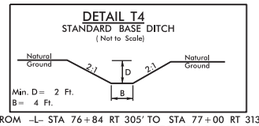

FROM –SR1– STA. 27+16 (75' LT) TO STA. 27+18 (34' LT)
FROM –Y7RPA– STA 17+43 (53' RT) TO STA 17+74 (149' RT)
FROM –Y9– STA. 14+02 TO STA. 14+12 RT

## DETAIL T3
### TAIL BASE DITCH
( Not to Scale)



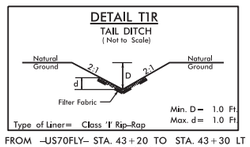

FROM –Y2– STA. 26+25 TO STA. 26+70 RT
FROM –Y5– STA 25+11 TO STA 26+00 LT

## DETAIL T4
### STANDARD BASE DITCH
( Not to Scale)



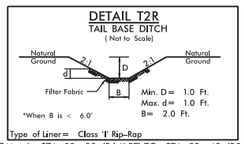

FROM –L– STA 76+84 RT 305' TO STA 77+00 RT 313'
FROM –DFLW– STA 39+15 LT 63' TO STA 39+23 LT 82'
FROM –DFLW– STA 43+58 LT 59' TO STA 43+60 LT 79'

## DETAIL T1R
### TAIL DITCH
( Not to Scale)



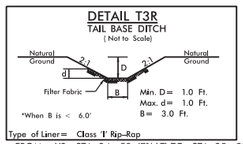

FROM –US70FLY– STA. 43+20 TO STA. 43+30 LT
FROM –Y3– STA 56+20 TO STA 56+70 LT
FROM –Y3– STA 61+65 TO STA 61+72 LT

## DETAIL T2R
### TAIL BASE DITCH
( Not to Scale)



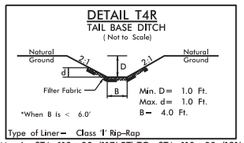

FROM –L– STA 53+39 (264' RT) TO STA 53+49 (294' RT)
FROM –SR2– STA 40+30 (43' RT) TO –Y7– STA 16+80 RT
FROM –SR2– STA 40+50 TO STA 40+95 LT
FROM –Y3– STA 53+63 TO STA 54+00 RT
FROM –Y5– 18+00 (60' RT) TO STA 18+50 (50' RT)

## DETAIL T3R
### TAIL BASE DITCH
( Not to Scale)



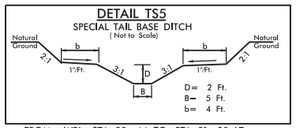

FROM –Y2– STA 24+58 (71' LT) TO STA 25+32 (237' LT)
FROM –Y3– STA 53+63 TO STA 56+67 LT

## DETAIL T4R
### TAIL BASE DITCH
( Not to Scale)



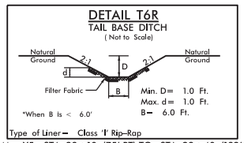

FROM –L– STA 110+00 (117' RT) TO STA 110+00 (191' RT)
FROM –Y5– STA. 22+00 (63' RT) TO STA 22+30 (183' RT)

## DETAIL TS5
### SPECIAL TAIL BASE DITCH
( Not to Scale)



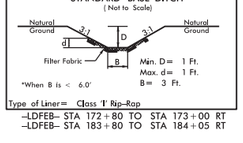

FROM –WBL– STA 90+44 TO STA 91+00 LT

## DETAIL T6R
### TAIL BASE DITCH
( Not to Scale)




FROM –Y5– STA. 23+10 (75' RT) TO STA. 23+40 (182' RT)

## DETAIL T3R3
### STANDARD BASE DITCH
( Not to Scale)




–LDFEB– STA 172+80 TO STA 173+00 RT
–LDFEB– STA 183+80 TO STA 184+05 RT

REVISIONS

8/17/99

10-OCT-2013 14:41
s:\Roadway\Proj\0071_rdy_psh02_JK_DitchDetails.dgn
$$$$USERNAME$$$$

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-L |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

# CURVE DATA

## -L-

| PIs Sta 34+58.33 | PI Sta 58+90.40 | PIs Sta 81+87.96 | PIs Sta 91+48.74 | PI Sta 108+19.74 | PIs Sta 120+85.20 |
|---|---|---|---|---|---|
| Θs = 0° 44' 58.0" | Δ = 34° 23' 04.7" (LT) | Θs = 0° 50' 35.3" | Θs = 10° 06' 39.7" | Δ = 70° 07' 35.3" (RT) | Θs = 8° 25' 33.1" |
| Ls = 200.00' | D = 0° 44' 58.0" | Ls = 225.00' | Ls = 720.00' | D = 2° 48' 31.0" | Ls = 600.00' |
| LT = 133.33' | L = 4,587.96' | LT = 150.00' | LT = 480.79' | L = 2,496.83' | LT = 400.45' |
| ST = 66.67' | T = 2,365.40' | ST = 75.00' | ST = 240.71' | T = 1,431.78' | ST = 200.41' |
| | R = 7,645.00' | | | R = 2,040.00' | |
| | SE = 0.03 | | | SE = 0.08 | |
| | V = 70 MPH | | | V = 70 MPH | |

## -WBL-

| PI Sta 81+47.77 | PIs Sta 82+57.58 | PIs Sta 92+18.44 | PI Sta 108+17.74 | PIs Sta 120+33.35 |
|---|---|---|---|---|
| Δ = 0° 31' 18.5" (LT) | Θs = 0° 50' 35.3" | Θs = 10° 34' 39.7" | Δ = 69° 47' 33.8" (RT) | Θs = 8° 48' 53.0" |
| D = 0° 44' 58.0" | Ls = 225.00' | Ls = 720.00' | D = 2° 56' 17.7" | Ls = 600.00' |
| L = 69.62' | LT = 150.00' | LT = 480.86' | L = 2,375.32' | LT = 400.50' |
| T = 34.81' | ST = 75.00' | ST = 240.78' | T = 1,360.15' | ST = 200.45' |
| R = 7,645.00' | | | R = 1,950.00' | |
| SE = 0.03 | | | SE = 0.08 | |
| V = 70 MPH | | | V = 70 MPH | |

## -SR1- (MULDEE ST.)

| PI Sta 9+15.55 | PI Sta 32+37.61 |
|---|---|
| Δ = 0° 38' 13.0" (LT) | Δ = 54° 22' 58.2" (LT) |
| D = 0° 22' 55.1" | D = 7° 57' 27.9" |
| L = 166.75' | L = 683.39' |
| T = 83.38' | T = 369.89' |
| R = 15,000.00' | R = 720.00' |
| SE = EXIST. | SE = 0.04 |
| V = 70 MPH | V = 40 MPH |

## -SR2- (HOOVER RD.)

| PI Sta 9+40.35 | PI Sta 12+99.47 | PI Sta 16+67.19 | PI Sta 21+42.28 | PI Sta 29+59.34 | PI Sta 34+81.39 | PI Sta 41+82.57 |
|---|---|---|---|---|---|---|
| Δ = 4° 20' 23.2" (RT) | Δ = 45° 34' 42.0" (LT) | Δ = 3° 22' 59.4" (LT) | Δ = 5° 50' 42.7" (LT) | Δ = 4° 48' 01.8" (LT) | Δ = 54° 42' 43.6" (LT) | Δ = 90° 40' 07.0" (RT) |
| D = 1° 12' 04.2" | D = 13° 28' 52.9" | D = 0° 48' 45.7" | D = 1° 05' 43.9" | D = 0° 45' 40.7" | D = 14° 19' 26.2" | D = 32° 44' 25.6" |
| L = 361.30' | L = 338.08' | L = 416.28' | L = 533.55' | L = 630.56' | L = 381.96' | L = 276.93' |
| T = 180.73' | T = 178.56' | T = 208.20' | T = 267.01' | T = 315.47' | T = 206.95' | T = 177.05' |
| R = 4,770.00' | R = 425.00' | R = 7,050.00' | R = 5,230.00' | R = 7,526.00' | R = 400.00' | R = 175.00' |
| SE = 0.02 | SE = 0.04 | SE = NC | SE = NC | SE = NC | SE = 0.04 | SE = 0.04 |
| V = 45 MPH | V = 35 MPH | V = 45 MPH | V = 40 MPH | V = 45 MPH | V = 35 MPH | V = 25 MPH |

## -Y17- (SOUTHERLAND ST.)

| PI Sta 10+88.62 |
|---|
| Δ = 1° 41' 32.5" (RT) |
| D = 0° 57' 17.7" |
| L = 177.22' |
| T = 88.62' |
| R = 6,000.00' |
| SE = NC |
| V = STOP COND. |

## -Y1- (NC 98)

| PI Sta 26+03.77 | PI Sta 29+57.77 |
|---|---|
| Δ = 2° 02' 15.6" (LT) | Δ = 2° 01' 08.1" (RT) |
| D = 0° 34' 22.6" | D = 0° 34' 22.6" |
| L = 355.64' | L = 352.37' |
| T = 177.84' | T = 176.20' |
| R = 10,000.00' | R = 10,000.00' |
| SE = NC | SE = NC |
| V = 70 MPH | V = 70 MPH |

## -RAMPA-

| PIs Sta 11+09.58 | PI Sta 14+76.75 | PIs Sta 18+19.38 |
|---|---|---|
| Θs = 0° 45' 19.7" | Δ = 7° 32' 23.8" (RT) | Θs = 1° 21' 51.1" |
| Θs = 1° 21' 51.1" | D = 1° 21' 51.1" | Ls = 200.00' |
| Ls = 200.00' | L = 552.71' | LT = 133.34' |
| LT = 109.58' | T = 276.75' | ST = 66.67' |
| ST = 90.44' | R = 4,200.00' | |
| | SE = 0.05 | |
| | V = 70 MPH | |

## -RAMPB-

| PIs Sta 11+33.33 | PI Sta 15+42.93 | PIs Sta 19+52.10 |
|---|---|---|
| Θs = 0° 42' 58.3" | Δ = 4° 54' 32.6" (LT) | Θs = 0° 42' 58.3" |
| Ls = 200.00' | D = 0° 42' 58.3" | Ls = 200.00' |
| LT = 133.33' | L = 685.43' | LT = 133.33' |
| ST = 66.67' | T = 342.93' | ST = 66.67' |
| | R = 8,000.00' | |
| | SE = 0.03 | |
| | V = 55 MPH | |

## -RAMPC-

| PIs Sta 8+50.12 | PI Sta 10+00.05 | PIs Sta 11+49.98 | PIs Sta 16+33.34 | PI Sta 19+49.76 | PIs Sta 22+65.78 |
|---|---|---|---|---|---|
| Θs = 0° 49' 06.6" | Δ = 1° 21' 46.7" (RT) | Θs = 0° 49' 06.6" | Θs = 1° 08' 45.3" | Δ = 5° 43' 09.8" (LT) | Θs = 1° 08' 45.3" |
| Ls = 200.00' | D = 0° 49' 06.6" | Ls = 200.00' | Ls = 200.00' | D = 1° 08' 45.3" | Ls = 200.00' |
| LT = 133.33' | L = 166.52' | LT = 133.33' | LT = 133.34' | L = 499.11' | LT = 133.34' |
| ST = 66.67' | T = 83.26' | ST = 66.67' | ST = 66.67' | T = 249.76' | ST = 66.67' |
| | R = 7,000.00' | | | R = 5,000.00' | |
| | SE = 0.03 | | | SE = 0.03 | |
| | V = 60 MPH | | | V = 55 MPH | |

## -RAMPD-

| PIs Sta 10+66.67 | PIs Sta 16+39.50 | PI Sta 22+11.00 |
|---|---|---|
| Θs = 0° 44' 36.7" | Θs = 1° 08' 45.3" | Δ = 11° 31' 51.7" (RT) |
| Ls = 200.00' | Ls = 200.00' | D = 1° 08' 45.3" |
| LT = 133.33' | LT = 133.34' | L = 1,006.27' |
| ST = 66.67' | ST = 66.67' | T = 504.84' |
| R = 7,706.00' | | R = 5,000.00' |
| SE = 0.03 | | SE = 0.03 |
| V = 60 MPH | | V = 55 MPH |

## -CSXRR-

| PI Sta 21+88.39 |
|---|
| Δ = 3° 27' 51.8" (LT) |
| D = 0° 30' 00.0" |
| L = 692.88' |
| T = 346.55' |
| R = 11,459.19' |

## -NSRR-

| PI Sta 21+87.97 |
|---|
| Δ = 3° 27' 51.8" (LT) |
| D = 0° 29' 00.0" |
| L = 716.77' |
| T = 358.49' |
| R = 11,854.33' |

NOTE: CHORD DEFINITION USED.

## -Y2- (US 70 WB)

| PIs Sta 11+52.93 | PI Sta 13+97.97 | PIs Sta 15+96.90 | PIs Sta 18+63.56 | PI Sta 25+55.81 | PIs Sta 32+38.00 |
|---|---|---|---|---|---|
| Θs = 1° 16' 22.6" | Δ = 3° 22' 08.2" (RT) | Θs = 1° 16' 23.7" | Θs = 1° 25' 56.6" | Δ = 17° 46' 39.2" (LT) | Θs = 1° 25' 56.6" |
| Θs = 2° 50' 57.9" | D = 1° 16' 23.7" | Ls = 200.00' | Ls = 200.00' | D = 1° 25' 56.6" | Ls = 200.00' |
| Ls = 200.00' | L = 264.60' | LT = 133.34' | LT = 133.34' | L = 1,241.11' | LT = 133.34' |
| LT = 112.79' | T = 132.34' | ST = 66.67' | ST = 66.67' | T = 625.58' | ST = 66.67' |
| ST = 87.30' | R = 4,500.00' | | | R = 4,000.00' | |
| | SE = 0.04 | | | SE = 0.04 | |
| | V = 60 MPH | | | V = 60 MPH | |

## -Y3- (US 70)

| PIs Sta 41+70.91 | PI Sta 44+26.67 | PIs Sta 46+82.54 | PI Sta 53+89.99 |
|---|---|---|---|
| Θs = 5° 01' 33.4" | Δ = 4° 43' 39.8" (RT) | Θs = 5° 01' 33.4" | Δ = 0° 36' 23.6" (RT) |
| Ls = 450.00' | D = 2° 14' 01.5" | Ls = 450.00' | D = 0° 17' 11.3" |
| LT = 300.12' | L = 211.65' | LT = 300.12' | L = 211.73' |
| ST = 150.11' | T = 105.88' | ST = 150.11' | T = 105.86' |
| | R = 2,565.00' | | R = 20,000.00' |
| | SE = 0.06 | | SE = 0.02 |
| | V = 60 MPH | | V = 60 MPH |

## -Y4- (US 70 EB)

| PIs Sta 11+33.36 | PI Sta 15+03.72 | PIs Sta 18+66.03 | PIs Sta 21+32.68 | PI Sta 30+81.43 | PIs Sta 39+53.71 | PIs Sta 42+20.39 | PI Sta 44+12.32 | PIs Sta 46+03.83 |
|---|---|---|---|---|---|---|---|---|
| Θs = 3° 49' 11.0" | Δ = 22° 53' 34.1" (RT) | Θs = 3° 49' 11.0" | Θs = 2° 26' 17.2" | Δ = 41° 08' 53.4" (LT) | Θs = 2° 26' 17.2" | Θs = 3° 22' 13.2" | Δ = 8° 25' 46.3" (RT) | Θs = 3° 22' 13.2" |
| Ls = 200.00' | D = 3° 49' 11.0" | Ls = 200.00' | Ls = 200.00' | D = 2° 26' 17.2" | Ls = 200.00' | Ls = 200.00' | D = 3° 22' 13.2" | Ls = 200.00' |
| LT = 133.36' | L = 599.33' | LT = 133.36' | LT = 133.35' | L = 1,687.70' | LT = 133.35' | LT = 133.36' | L = 250.11' | LT = 133.36' |
| ST = 66.69' | T = 303.72' | ST = 66.69' | ST = 66.68' | T = 882.09' | ST = 66.68' | ST = 66.69' | T = 125.28' | ST = 66.69' |
| | R = 1,500.00' | | | R = 2,350.00' | | | R = 1,700.00' | |
| | SE = 0.06 | | | SE = 0.05 | | | SE = 0.06 | |
| | V = 60 MPH | | | V = 60 MPH | | | V = 60 MPH | |

## -EEC70E-

| PIs Sta 18+33.65 | PI Sta 26+84.65 | PIs Sta 32+86.60 |
|---|---|---|
| Θs = 6° 26' 44.8" | Δ = 78° 07' 23.4" (RT) | Θs = 6° 26' 44.8" |
| Ls = 216.00' | D = 5° 58' 05.9" | Ls = 216.00' |
| LT = 144.10' | L = 1,308.97' | LT = 144.10' |
| ST = 72.09' | T = 779.10' | ST = 72.09' |
| | R = 960.00' | |
| | SE = 0.08 | |
| | $V_{des.}$ = 55 MPH | |

## -US70FLY- (US 70 WB FLYOVER)

| PIs Sta 11+44.06 | PI Sta 15+61.16 | PIs Sta 19+60.23 | PIs Sta 22+12.25 | PI Sta 52+41.98 | PIs Sta 42+13.75 | PIs Sta 44+65.78 | PI Sta 46+68.53 | PIs Sta 48+69.86 |
|---|---|---|---|---|---|---|---|---|
| Θs = 5° 09' 23.8" | Δ = 32° 05' 38.5" (LT) | Θs = 5° 09' 23.8" | Θs = 6° 33' 18.1" | Δ = 15° 31' 14" 03.0" (RT) | Θs = 6° 33' 18.1" | Θs = 6° 26' 44.8" | Δ = 15° 31' 22.7" (LT) | Θs = 6° 26' 44.8" |
| Ls = 216.00' | D = 4° 46' 28.7" | Ls = 216.00' | Ls = 162.00' | D = 8° 05' 33.4" | Ls = 162.00' | Ls = 216.00' | D = 5° 58' 05.9" | Ls = 216.00' |
| LT = 144.06' | L = 672.18' | LT = 144.06' | LT = 108.07' | L = 1,893.50' | LT = 108.07' | LT = 144.10' | L = 260.09' | LT = 144.10' |
| ST = 72.06' | T = 345.16' | ST = 72.06' | ST = 54.07' | T = 2,975.81' | ST = 54.07' | ST = 72.09' | T = 130.85' | ST = 72.09' |
| | R = 1,200.00' | | | R = 708.00' | | | R = 960.00' | |
| | SE = 0.08 | | | SE = 0.06 | | | SE = 0.08 | |
| | V = 60 MPH | | | V = 45 MPH | | | V = 55 MPH | |

## -Y5- (MIAMI BLVD.)

| PI Sta 17+93.52 | PI Sta 24+77.97 |
|---|---|
| Δ = 22° 31' 00.2" (RT) | Δ = 9° 06' 48.8" (LT) |
| D = 3° 58' 43.9" | D = 4° 20' 26.1" |
| L = 565.91' | L = 209.96' |
| T = 286.65' | T = 105.20' |
| R = 1,440.00' | R = 1,320.00' |
| SE = 0.04 | SE = 0.03 |
| V = 40 MPH | V = 30 MPH |

## -Y6- (EAST END AVE.)

| PI Sta 10+77.39 | PI Sta 14+63.95 | PI Sta 20+83.40 | PI Sta 28+35.96 | PI Sta 32+52.22 |
|---|---|---|---|---|
| Δ = 49° 51' 03.6" (LT) | Δ = 35° 21' 08.2" (RT) | Δ = 31° 54' 38.5" (RT) | Δ = 67° 49' 12.0" (RT) | Δ = 13° 59' 21.7" (RT) |
| D = 28° 38' 52.4" | D = 10° 42' 34.2" | D = 8° 48' 53.0" | D = 10° 25' 02.7" | D = 5° 12' 31.3" |
| L = 174.01' | L = 330.10' | L = 362.02' | L = 651.03' | L = 268.58' |
| T = 92.95' | T = 170.49' | T = 185.84' | T = 369.72' | T = 134.96' |
| R = 200.00' | R = 535.00' | R = 650.00' | R = 550.00' | R = 1,100.00' |
| SE = 0.04 | SE = 0.04 | SE = 0.04 | SE = 0.04 | SE = MATCH EXIST. |
| V = 25 MPH | V = 40 MPH | V = 40 MPH | V = 40 MPH | V = 40 MPH+ |

## -Y7- (CARR RD.)

| PI Sta 10+88.78 | PI Sta 17+15.04 |
|---|---|
| Δ = 6° 41' 23.6" (LT) | Δ = 22° 43' 42.2" (LT) |
| D = 3° 58' 43.9" | D = 10° 42' 34.2" |
| L = 168.14' | L = 212.23' |
| T = 84.16' | T = 107.53' |
| R = 1,440.00' | R = 535.00' |
| SE = 0.03 | SE = 0.03 |
| V = 40 MPH | V = 25 MPH |

## -Y7RPA-

| PIs Sta 11+33.34 | PI Sta 12+87.50 | PIs Sta 14+41.63 | PIs Sta 21+29.43 | PI Sta 23+22.67 | PI Sta 27+13.12 |
|---|---|---|---|---|---|
| Θs = 1° 54' 35.5" | Δ = 3° 20' 28.9" (RT) | Θs = 1° 54' 35.5" | Θs = 2° 48' 31.0" | Δ = 7° 06' 05.9" (RT) | Δ = 13° 18' 41.7" (LT) |
| Ls = 200.00' | D = 1° 54' 35.5" | Ls = 200.00' | Ls = 200.00' | D = 2° 48' 31.0" | D = 5° 33' 45.7" |
| LT = 133.34' | L = 174.95' | LT = 133.34' | LT = 133.35' | L = 252.85' | L = 239.30' |
| ST = 66.67' | T = 87.50' | ST = 66.67' | ST = 66.68' | T = 126.59' | T = 120.19' |
| | R = 3,000.00' | | | R = 2,040.00' | R = 1,030.00' |
| | SE = 0.05 | | | SE = 0.05 | SE = 0.04 |
| | V = 65 MPH | | | V = 55 MPH | V = 30 MPH |

## -Y7LPA-

| PIs Sta 11+34.68 | PI Sta 17+26.24 |
|---|---|
| Θs = 24° 54' 40.4" | Δ = 132° 47' 00.4" (LT) |
| Ls = 200.00' | D = 24° 54' 40.4" |
| LT = 134.68' | L = 533.03' |
| ST = 67.89' | T = 526.24' |
| | R = 230.00' |
| | SE = 0.08 |
| | V = 30 MPH |

## -Y7RPC-

| PI Sta 5+97.05 | PI Sta 17+77.31 | PI Sta 21+58.30 |
|---|---|---|
| Δ = 13° 20' 59.0" (LT) | Δ = 3° 03' 19.9" (LT) | Δ = 2° 00' 00.0" (RT) |
| D = 1° 29' 59.6" | D = 0° 44' 23.5" | D = 0° 34' 22.6" |
| L = 890.05' | L = 412.98' | L = 349.07' |
| T = 447.05' | T = 206.54' | T = 174.55' |
| R = 3,820.00' | R = 7,744.00' | R = 10,000.00' |
| SE = 0.03 | SE = 0.02 | SE = NC |
| V = 50 MPH | V = 55 MPH | V = 65 MPH |

## -Y7RPD-

| PIs Sta 7+44.37 | PI Sta 8+56.30 | PIs Sta 9+94.92 | PIs Sta 12+88.00 |
|---|---|---|---|
| Θs = 1° 07' 42.8" | Δ = 10° 25' 43.2" (RT) | Θs = 10° 41' 34.2" | Θs = 2° 25' 32.6" |
| Ls = 160.00' | D = 8° 54' 38.5" | Ls = 240.00' | Ls = 200.00' |
| LT = 106.75' | L = 117.04' | LT = 160.29' | LT = 133.35' |
| ST = 53.41' | T = 58.68' | ST = 80.27' | ST = 66.68' |
| | R = 643.00' | | |
| | SE = 0.06 | | |
| | V = 45 MPH | | |

## -ROUND1-, -ROUND2-, -ROUND3-

| PI Sta Undefined | PI Sta Undefined |
|---|---|
| Δ = 180° 00' 00.0" (LT) | Δ = 180° 00' 00.0" (LT) |
| D = 127° 19' 26.2" | D = 127° 19' 26.2" |
| L = 141.37' | L = 141.37' |
| T = Undefined | T = Undefined |
| R = 45.00' | R = 45.00' |
| SE = 0.02 | SE = 0.02 |

10-OCT-2013 11:41
R:\Roadway\Proj\u0071_rdy_psh02-LM_CurveData.dgn
$$$$USERNAME$$$$

# CURVE DATA

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-M |
| ROADWAY DESIGN ENGINEER | PAVEMENT DESIGN ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

## -Y9- (LYNN RD./PLEASANT RD.)

| | | | |
|---|---|---|---|
| PI Sta 12+18.08<br>Δ = 16° 25' 24.8" (RT)<br>D = 5° 43' 46.5"<br>L = 286.64'<br>T = 144.31'<br>R = 1,000.00'<br>SE = 0.03<br>V = 35 MPH | PI Sta 14+99.00<br>Δ = 40° 58' 01.0" (LT)<br>D = 15° 26' 37.0"<br>L = 265.27'<br>T = 138.59'<br>R = 371.00'<br>SE = 0.04<br>V = 35 MPH | PI Sta 25+35.64<br>Δ = 27° 16' 38.6" (LT)<br>D = 5° 43' 46.5"<br>L = 476.08'<br>T = 242.64'<br>R = 1,000.00'<br>SE = 0.03<br>V = 35 MPH | PI Sta 38+30.54<br>Δ = 141° 28' 07.9" (RT)<br>D = 15° 26' 37.0"<br>L = 916.04'<br>T = 1,061.45'<br>R = 371.00'<br>SE = 0.04<br>V = 35 MPH |

## -Y10- (PLEASANT RD.)

| |
|---|
| PI Sta 13+39.85<br>Δ = 49° 19' 19.9" (LT)<br>D = 19° 05' 54.9"<br>L = 258.25'<br>T = 137.74'<br>R = 300.00'<br>SE = 0.04<br>V = STOP COND. |

## -Y11- (OLD.PLEASANT RD.)

| | |
|---|---|
| PI Sta 10+73.90<br>Δ = 62° 10' 07.5" (RT)<br>D = 57° 17' 44.8"<br>L = 108.50'<br>T = 60.29'<br>R = 100.00'<br>SE = 0.04<br>V = STOP COND. | PI Sta 11+83.00<br>Δ = 8° 06' 08.9" (RT)<br>D = 6° 39' 55.8"<br>L = 121.56'<br>T = 60.88'<br>R = 859.59'<br>SE = MATCH EX.<br>V = STOP COND. |

## -Y12- (CAROLYN DR.)

| | | |
|---|---|---|
| PI Sta 11+90.61<br>Δ = 96° 17' 16.7" (RT)<br>D = 88° 08' 50.5"<br>L = 109.24'<br>T = 72.56'<br>R = 65.00' | PI Sta 13+84.92<br>Δ = 8° 35' 07.5" (LT)<br>D = 2° 43' 42.1"<br>L = 314.67'<br>T = 157.63'<br>R = 2,100.00' | PI Sta 21+86.05<br>Δ = 14° 41' 22.0" (RT)<br>D = 11° 27' 33.0"<br>L = 128.19'<br>T = 64.45'<br>R = 500.00' |

## -LDFEB-

| | | | | | | |
|---|---|---|---|---|---|---|
| Pls Sta 145+30.38<br>θs = 5° 41' 52.5"<br>Ls = 360.00'<br>LT = 240.12'<br>ST = 120.11' | PI Sta 155+53.40<br>Δ = 53° 02' 08.4" (LT)<br>D = 3° 09' 55.8"<br>L = 1,675.42'<br>T = 903.14'<br>R = 1,810.00'<br>SE = 0.08<br>V = 70 MPH | Pls Sta 164+45.79<br>θs = 5° 41' 52.5"<br>Ls = 360.00'<br>LT = 240.12'<br>ST = 120.11' | Pls Sta 167+45.68<br>θs = 0° 13' 03.3"<br>Ls = 90.00'<br>LT = 60.00'<br>ST = 30.00' | PI Sta 182+75.13<br>Δ = 14° 25' 23.8" (RT)<br>D = 0° 29' 00.6"<br>L = 2,983.04'<br>T = 1,499.45'<br>R = 11,850.00'<br>SE = 0.02<br>V = 70 MPH | Pls Sta 205+34.25<br>θs = 1° 12' 56.4"<br>Ls = 244.00'<br>LT = 162.67'<br>ST = 81.34' | PI Sta 213+11.06<br>Δ = 13° 47' 35.7" (LT)<br>D = 0° 59' 47.2"<br>L = 1,384.24'<br>T = 695.48'<br>R = 5,750.00'<br>SE = 0.04<br>V = 70 MPH |

## -DFLW-

| | | | | | |
|---|---|---|---|---|---|
| Pls Sta 22+40.10<br>θs = 5° 01' 07.0"<br>Ls = 360.00'<br>LT = 240.10'<br>ST = 120.09' | PI Sta 33+38.35<br>Δ = 50° 55' 00.0" (LT)<br>D = 2° 47' 17.2"<br>L = 1,826.20'<br>T = 978.35'<br>R = 2,055.00'<br>SE = 0.08<br>V = 70 MPH | Pls Sta 43+06.29<br>θs = 5° 01' 07.0"<br>Ls = 360.00'<br>LT = 240.10'<br>ST = 120.09' | PI Sta 64+60.78<br>Δ = 11° 47' 38.8" (RT)<br>D = 0° 29' 22.9"<br>L = 2,408.40'<br>T = 1,208.47'<br>R = 11,700.00'<br>SE = 0.02<br>V = 70 MPH | Pls Sta 83+19.41<br>θs = 1° 13' 42.5"<br>Ls = 244.00'<br>LT = 162.67'<br>ST = 81.34' | PI Sta 91+20.12<br>Δ = 14° 24' 40.7" (LT)<br>D = 1° 00' 25.0"<br>L = 1,431.18'<br>T = 719.39'<br>R = 5,690.00'<br>SE = 0.04<br>V = 70 MPH |

## -DFWB-

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| PI Sta 19+23.00<br>Δ = 18° 26' 16.5" (RT)<br>D = 1° 28' 15.6"<br>L = 1,253.42'<br>T = 632.17'<br>R = 3,895.00'<br>SE = 0.04<br>V = 60 MPH | Pls Sta 25+97.58<br>θs = 1° 10' 36.5"<br>Ls = 160.00'<br>LT = 106.67'<br>ST = 53.34' | Pls Sta 46+47.12<br>θs = 2° 16' 43.7"<br>Ls = 210.00'<br>LT = 140.01'<br>ST = 70.01' | PI Sta 52+30.67<br>Δ = 22° 01' 00.0" (RT)<br>D = 2° 10' 13.1"<br>L = 1,014.46'<br>T = 513.56'<br>R = 2,640.00'<br>SE = 0.06<br>V = 60 MPH | Pls Sta 58+01.57<br>θs = 2° 16' 43.7"<br>Ls = 210.00'<br>LT = 140.01'<br>ST = 70.01' | Pls Sta 60+81.57<br>θs = 1° 54' 35.5"<br>Ls = 210.00'<br>LT = 140.01'<br>ST = 70.01' | PI Sta 61+80.78<br>Δ = 1° 03' 46.4" (LT)<br>D = 1° 49' 08.1"<br>L = 58.44'<br>T = 29.22'<br>R = 3,150.00'<br>SE = 0.05<br>V = 60 MPH | Pls Sta 62+56.67<br>θs = 1° 16' 23.7"<br>Ls = 140.00'<br>LT = 93.34'<br>ST = 46.67' |

## -DFEB-

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| PI Sta 15+92.86<br>Δ = 17° 00' 00.0" (RT)<br>D = 1° 30' 00.0"<br>L = 1,133.33'<br>T = 570.86'<br>R = 3,819.72'<br>SE = EX.SE | Pls Sta 22+55.35<br>θs = 2° 15' 00.0"<br>Ls = 300.00'<br>LT = 200.02'<br>ST = 100.01' | PI Sta 28+49.07<br>Δ = 3° 50' 07.3" (RT)<br>D = 0° 35' 48.6"<br>L = 642.62'<br>T = 321.43'<br>R = 9,600.00'<br>SE = 0.02<br>V = 70 MPH | PI Sta 40+12.02<br>Δ = 8° 49' 31.9" (RT)<br>D = 0° 31' 31.0"<br>L = 1,680.20'<br>T = 841.76'<br>R = 10,907.93'<br>SE = 0.02<br>V = 70 MPH | Pls Sta 48+84.21<br>θs = 0° 09' 27.3"<br>θs = 0° 20' 50.1"<br>Ls = 60.00'<br>LT = 33.76'<br>ST = 26.24' | PI Sta 51+10.96<br>Δ = 4° 38' 20.6" (RT)<br>D = 1° 09' 27.0"<br>L = 400.79'<br>T = 200.50'<br>R = 4,950.00'<br>SE = 0.04<br>V = 70 MPH | Pls Sta 53+51.24<br>θs = 0° 41' 40.2"<br>Ls = 120.00'<br>LT = 80.00'<br>ST = 40.00' | Pls Sta 54+91.24<br>θs = 0° 14' 56.8"<br>Ls = 90.00'<br>LT = 60.00'<br>ST = 30.00' | PI Sta 56+28.67<br>Δ = 1° 11' 21.9" (LT)<br>D = 0° 33' 12.9"<br>L = 214.86'<br>T = 107.43'<br>R = 10,350.00'<br>SE = 0.02<br>V = 70 MPH | Pls Sta 57+80.85<br>θs = 0° 14' 27.5"<br>θs = 0° 14' 56.8"<br>Ls = 90.00'<br>LT = 45.25'<br>ST = 44.75' | PI Sta 66+95.54<br>Δ = 9° 17' 27.2" (RT)<br>D = 0° 32' 07.7"<br>L = 1,735.08'<br>T = 869.44'<br>R = 10,700.00'<br>SE = 0.02<br>V = 70 MPH |

## -DFFLY-

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pls Sta 12+33.98<br>θs = 13° 11' 35.2"<br>Ls = 350.00'<br>LT = 233.98'<br>ST = 117.26' | PI Sta 14+27.09<br>Δ = 11° 35' 00.0" (LT)<br>D = 7° 32' 20.1"<br>L = 153.65'<br>T = 77.09'<br>R = 760.00'<br>SE = 0.08<br>V = MPH | Pls Sta 15+67.74<br>θs = 7° 14' 14.5"<br>Ls = 192.00'<br>LT = 128.11'<br>ST = 64.10' | Pls Sta 17+91.71<br>θs = 6° 24' 56.5"<br>Ls = 144.00'<br>LT = 96.06'<br>ST = 48.06' | PI Sta 36+85.02<br>Δ = 141° 34' 45.6" (RT)<br>D = 8° 54' 38.5"<br>L = 1,588.87'<br>T = 1,845.37'<br>R = 643.00'<br>SE = 0.06<br>V = 45 MPH | Pls Sta 34+76.57<br>θs = 6° 24' 56.5"<br>Ls = 144.00'<br>LT = 96.06'<br>ST = 48.06' | Pls Sta 37+00.62<br>θs = 7° 14' 14.5"<br>Ls = 192.00'<br>LT = 128.11'<br>ST = 64.10' | PI Sta 37+81.11<br>Δ = 2° 30' 06.7" (LT)<br>D = 7° 32' 20.1"<br>L = 33.19'<br>T = 16.60'<br>R = 760.00'<br>SE = 0.08<br>V = MPH | Pls Sta 38+61.80<br>θs = 7° 14' 14.5"<br>Ls = 192.00'<br>LT = 128.11'<br>ST = 64.10' |

## -LDFWB-

| | | |
|---|---|---|
| Pls Sta 13+41.27<br>θs = 15° 13' 09.1"<br>Ls = 510.00'<br>LT = 341.27'<br>ST = 171.15' | PI Sta 22+69.04<br>Δ = 76° 39' 51.5" (RT)<br>D = 5° 58' 05.9"<br>L = 1,284.52'<br>T = 759.04'<br>R = 960.00'<br>SE = 0.08<br>V = 55 MPH | Pls Sta 28+48.56<br>θs = 4° 50' 03.6"<br>Ls = 162.00'<br>LT = 108.04'<br>ST = 54.04' |

## -Y15- (ANGIER AVE.)

| | |
|---|---|
| PI Sta 10+47.61<br>Δ = 8° 42' 45.5" (RT)<br>D = 4° 00' 00.0"<br>L = 217.82'<br>T = 109.12'<br>R = 1,432.39' | PI Sta 14+50.44<br>Δ = 7° 16' 41.7" (RT)<br>D = 2° 12' 13.3"<br>L = 330.28'<br>T = 165.36'<br>R = 2,600.00' |

## -Y16- (ELLIS RD.)

| |
|---|
| PI Sta 13+89.33<br>Δ = 18° 38' 17.7" (LT)<br>D = 3° 22' 13.2"<br>L = 553.01'<br>T = 278.97'<br>R = 1,700.00' |

## -Y18- (PETTIGREW ST.)

| | |
|---|---|
| PI Sta 22+06.51<br>Δ = 7° 23' 31.1" (RT)<br>D = 1° 51' 15.2"<br>L = 398.65'<br>T = 199.60'<br>R = 3,090.00'<br>SE = 0.03<br>V = 40 MPH | PI Sta 25+81.28<br>Δ = 8° 44' 15.4" (RT)<br>D = 2° 29' 28.0"<br>L = 350.75'<br>T = 175.72'<br>R = 2,300.00'<br>SE = 0.03<br>V = 40 MPH |

NOTE: PETTIGREW ST. IS A FUTURE ROAD TO BE BUILT BY OTHERS.

## -CSX-

| |
|---|
| PI Sta 16+56.35<br>Δ = 26° 03' 41.7" (RT)<br>D = 2° 01' 13.1"<br>L = 1,289.98'<br>T = 656.35'<br>R = 2,836.00' |

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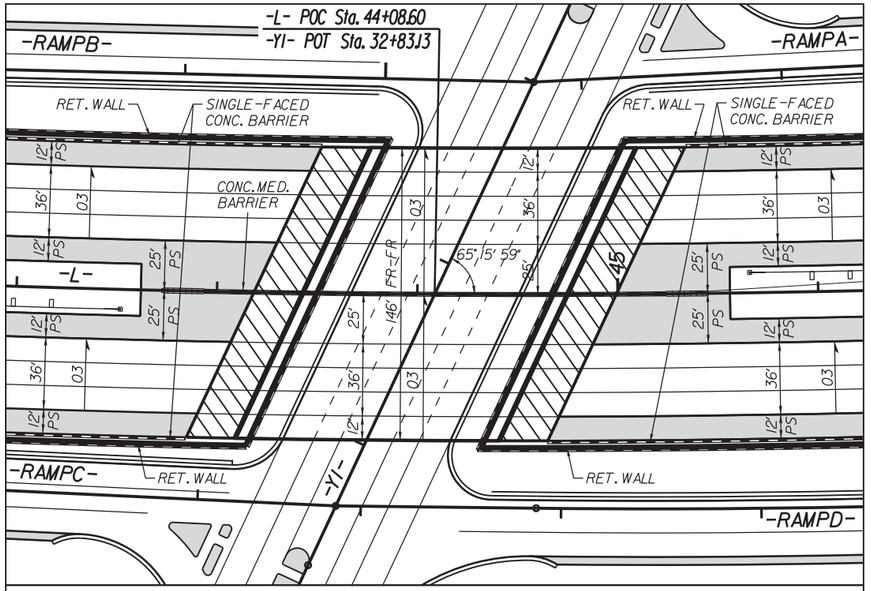
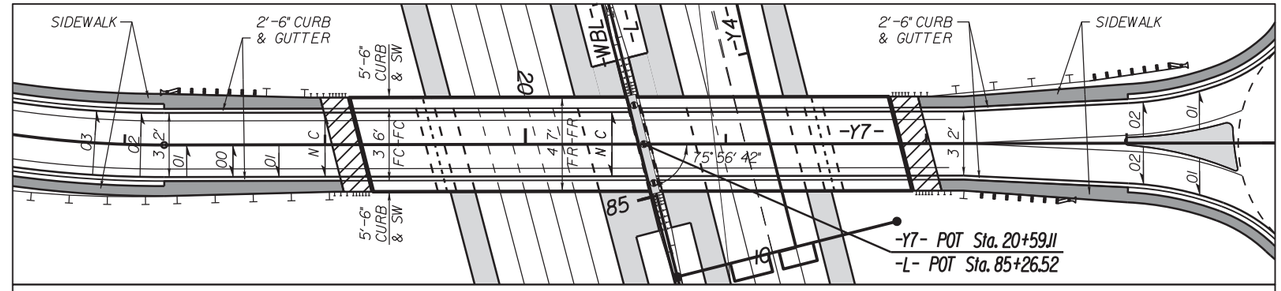
DO NOT USE FOR CONSTRUCTION

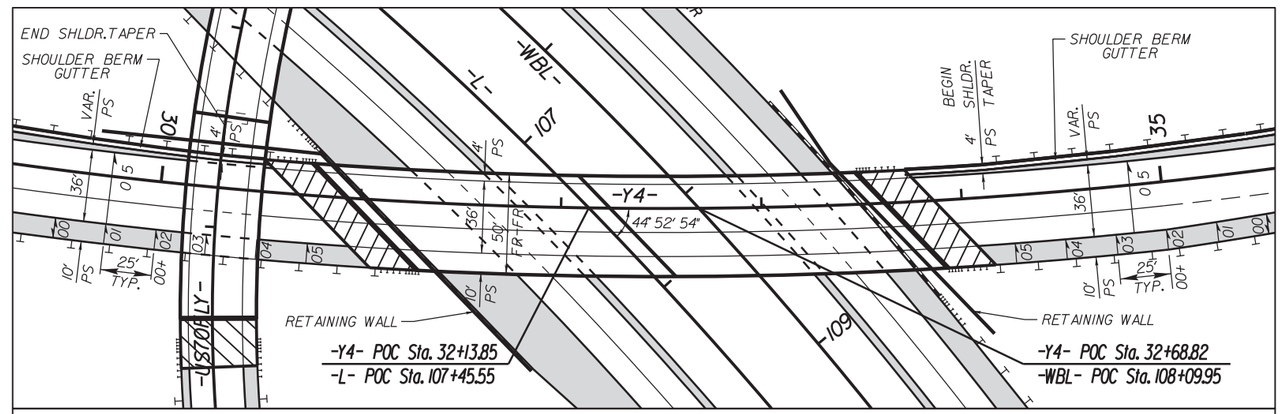
# PAVEMENT / BRIDGE RELATIONSHIP SKETCHES



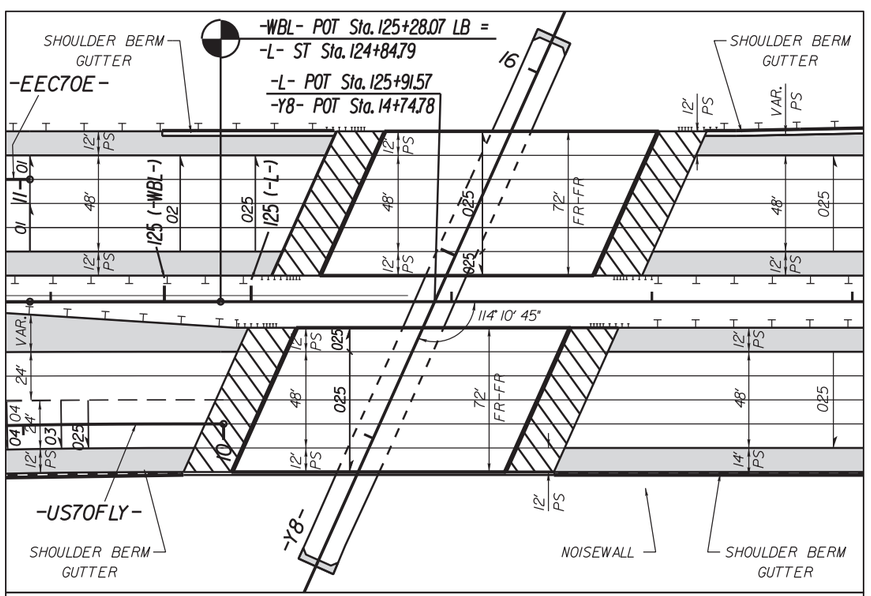

DETAIL SHOWING PAVEMENT / BRIDGE RELATIONSHIP FOR –L– OVER –Y1–



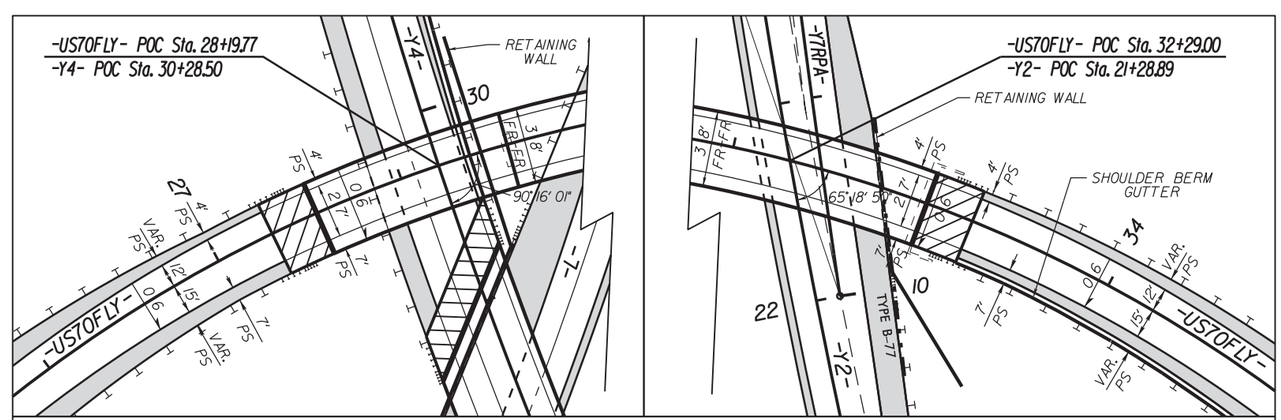

DETAIL SHOWING PAVEMENT / BRIDGE RELATIONSHIP FOR –Y7– OVER –L–, –WBL–, & –Y4–




DETAIL SHOWING PAVEMENT / BRIDGE RELATIONSHIP FOR –Y4– OVER –L– & –WBL–




DETAIL SHOWING PAVEMENT / BRIDGE RELATIONSHIP FOR –L– OVER –Y8–




DETAIL SHOWING PAVEMENT / BRIDGE RELATIONSHIP FOR –US70FLY– OVER –Y4–, –L–, –WBL–, –Y2–, & –Y7RPA–

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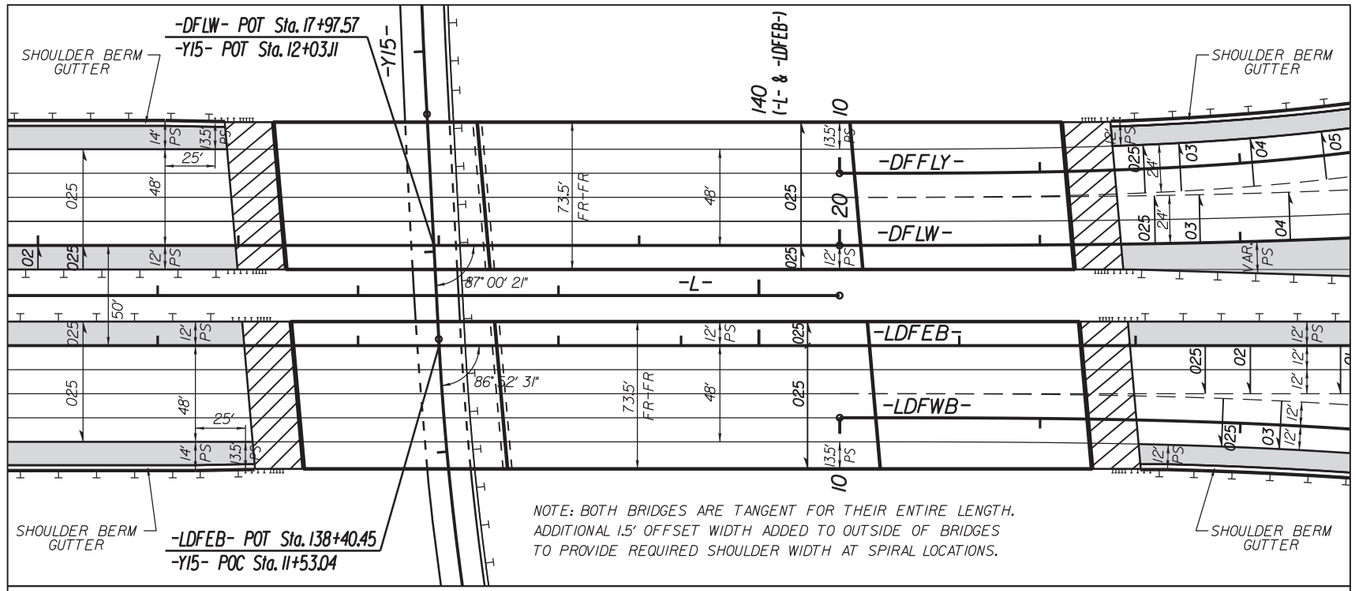
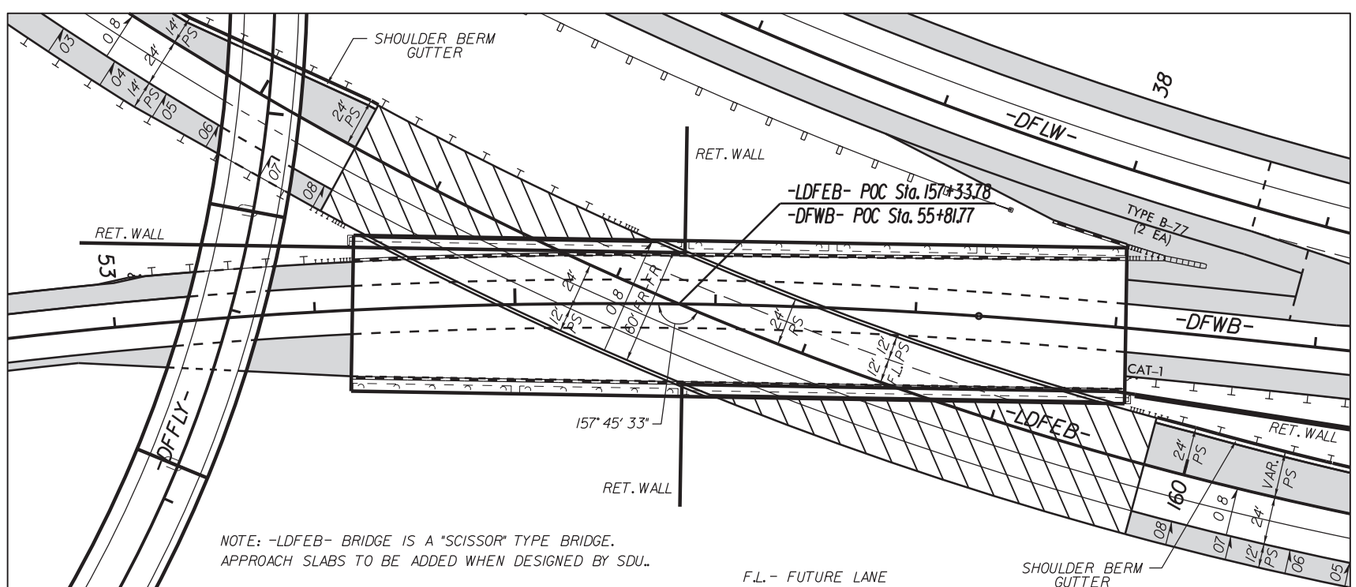
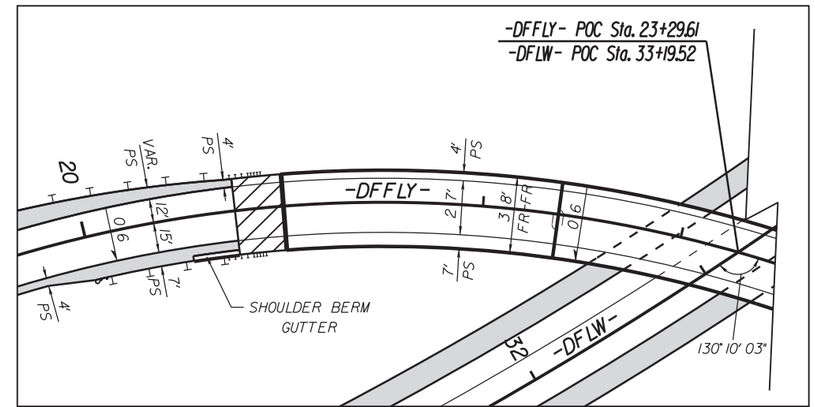
# PAVEMENT / BRIDGE RELATIONSHIP SKETCHES

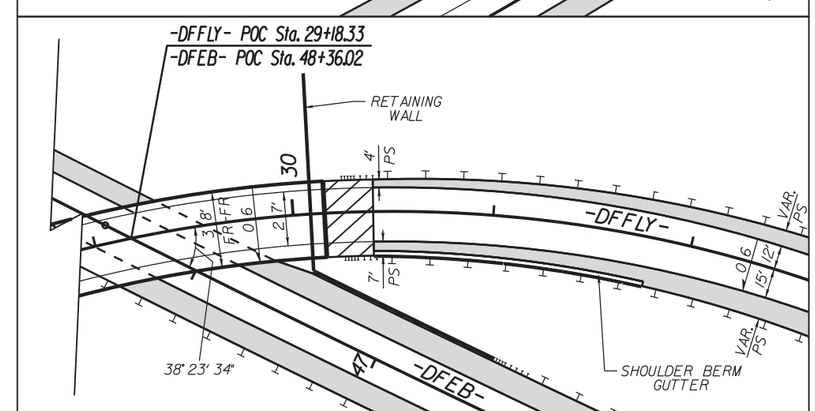



DETAIL SHOWING PAVEMENT / BRIDGE RELATIONSHIP FOR –L– OVER –Y15–, RR SWITCHYARD, FUTURE TTA, & FUTURE –Y18–




DETAIL SHOWING PAVEMENT / BRIDGE RELATIONSHIP FOR –LDFEB– OVER –DFWB–




DETAIL SHOWING PAVEMENT / BRIDGE RELATIONSHIP FOR –DFFLY– OVER –DFLW–, –LDFEB–, –DFWB–, & –DFEB–

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THE DASHED SUPERELEVATION ON THE NC 147 BRIDGES OVER CSX RAILROAD AND ELLIS ROAD APPROXIMATES THE EXISTING SUPERELEVATION AS PER ORIGINAL DESIGN PLANS AND RECENT DECK SURVEYS. AT THE DIRECTION OF THE ENGINEER, THE CONTRACTOR MAY NEED TO ADJUST THE PROPOSED SUPERELEVATION AND PROFILES ON THE ROADWAY APPROACHES TO MATCH THE BRIDGE OVERLAYS AND FIELD CONDITIONS.

# PAVEMENT / BRIDGE RELATIONSHIP SKETCHES


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Phone 919.297.0220 Fax 919.297.0221


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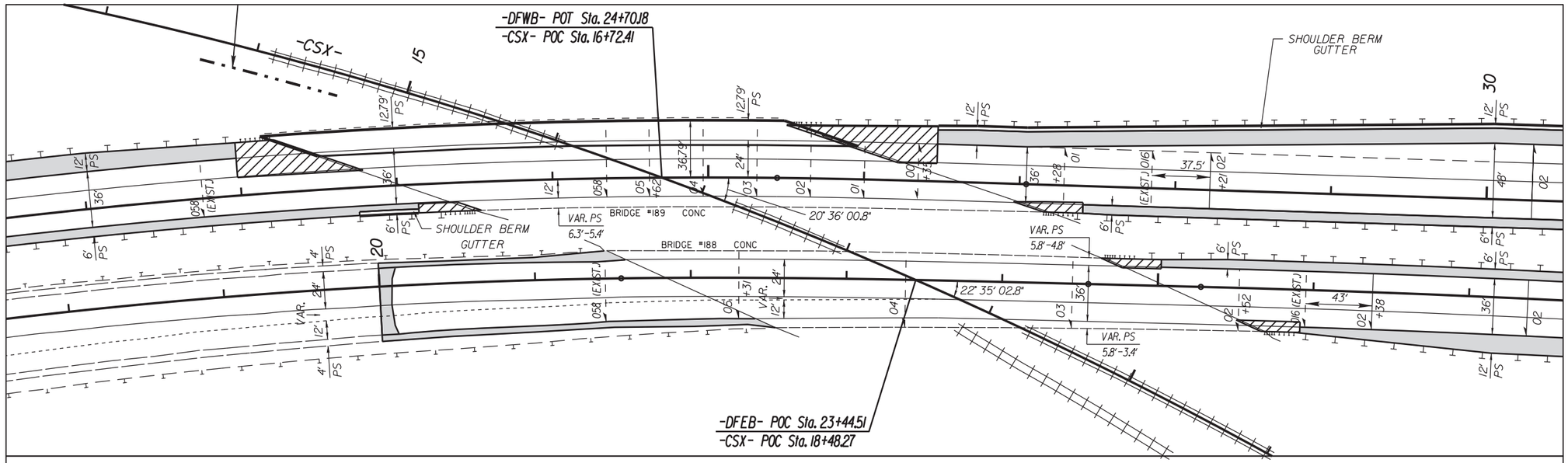
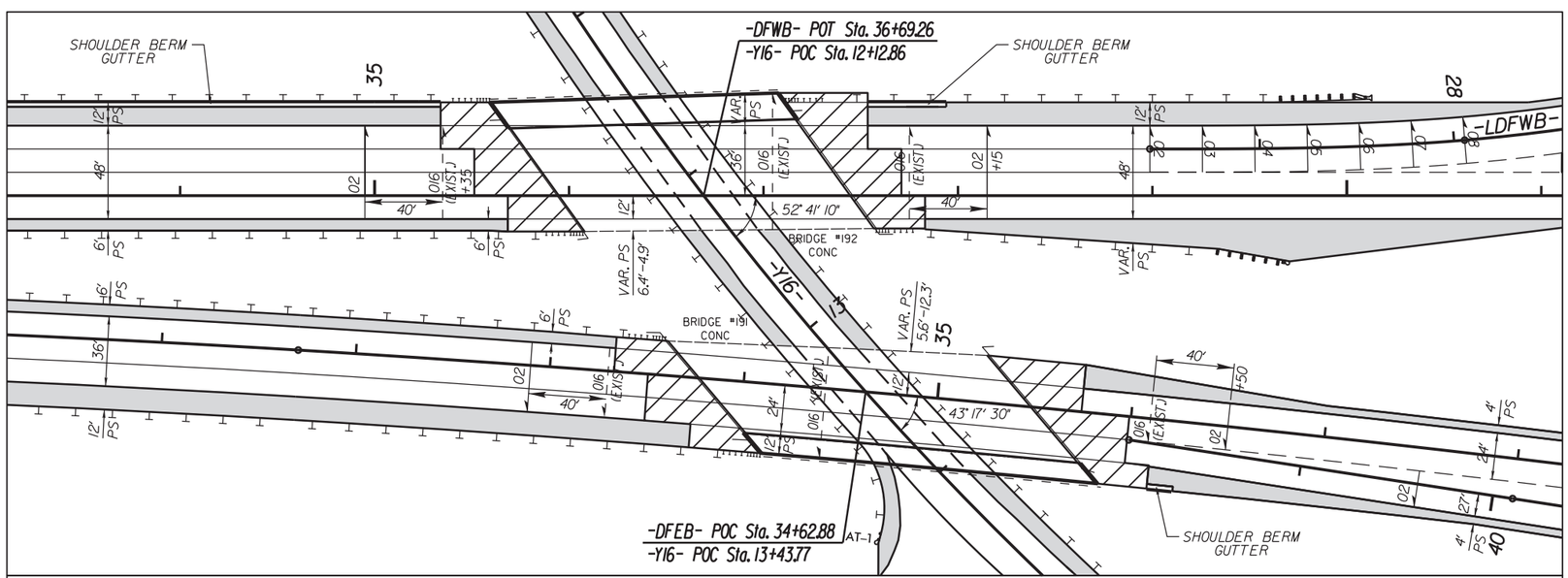
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION




DETAIL SHOWING PAVEMENT / BRIDGE RELATIONSHIP FOR –DFWB– OVER –CSX– RAILROAD




DETAIL SHOWING PAVEMENT / BRIDGE RELATIONSHIP FOR –DFWB– & –DFEB– OVER –Y16–

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8/17/99

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| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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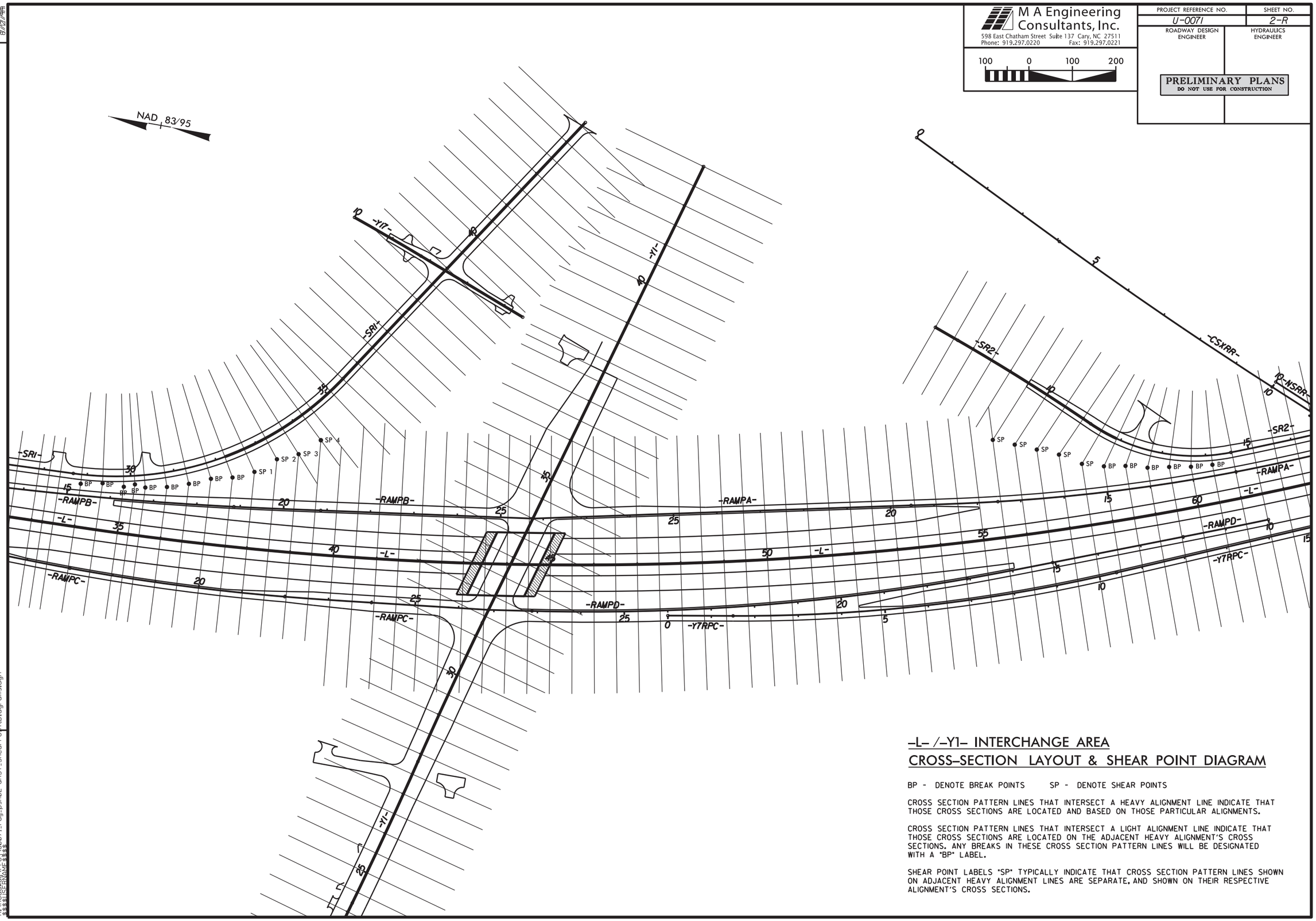


## -L- /-Y1- INTERCHANGE AREA
## CROSS-SECTION LAYOUT & SHEAR POINT DIAGRAM

BP - DENOTE BREAK POINTS SP - DENOTE SHEAR POINTS

CROSS SECTION PATTERN LINES THAT INTERSECT A HEAVY ALIGNMENT LINE INDICATE THAT THOSE CROSS SECTIONS ARE LOCATED AND BASED ON THOSE PARTICULAR ALIGNMENTS.

CROSS SECTION PATTERN LINES THAT INTERSECT A LIGHT ALIGNMENT LINE INDICATE THAT THOSE CROSS SECTIONS ARE LOCATED ON THE ADJACENT HEAVY ALIGNMENT'S CROSS SECTIONS. ANY BREAKS IN THESE CROSS SECTION PATTERN LINES WILL BE DESIGNATED WITH A "BP" LABEL.

SHEAR POINT LABELS "SP" TYPICALLY INDICATE THAT CROSS SECTION PATTERN LINES SHOWN ON ADJACENT HEAVY ALIGNMENT LINES ARE SEPARATE, AND SHOWN ON THEIR RESPECTIVE ALIGNMENT'S CROSS SECTIONS.

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03/12/1999

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| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

# -L- /-WBL- // -Y7- INTERCHANGE AREA
# CROSS-SECTION LAYOUT & SHEAR POINT DIAGRAM

BP - DENOTE BREAK POINTS SP - DENOTE SHEAR POINTS

CROSS SECTION PATTERN LINES THAT INTERSECT A HEAVY ALIGNMENT LINE INDICATE THAT THOSE CROSS SECTIONS ARE LOCATED AND BASED ON THOSE PARTICULAR ALIGNMENTS.

CROSS SECTION PATTERN LINES THAT INTERSECT A LIGHT ALIGNMENT LINE INDICATE THAT THOSE CROSS SECTIONS ARE LOCATED ON THE ADJACENT HEAVY ALIGNMENT'S CROSS SECTIONS. ANY BREAKS IN THESE CROSS SECTION PATTERN LINES WILL BE DESIGNATED WITH A "BP" LABEL.

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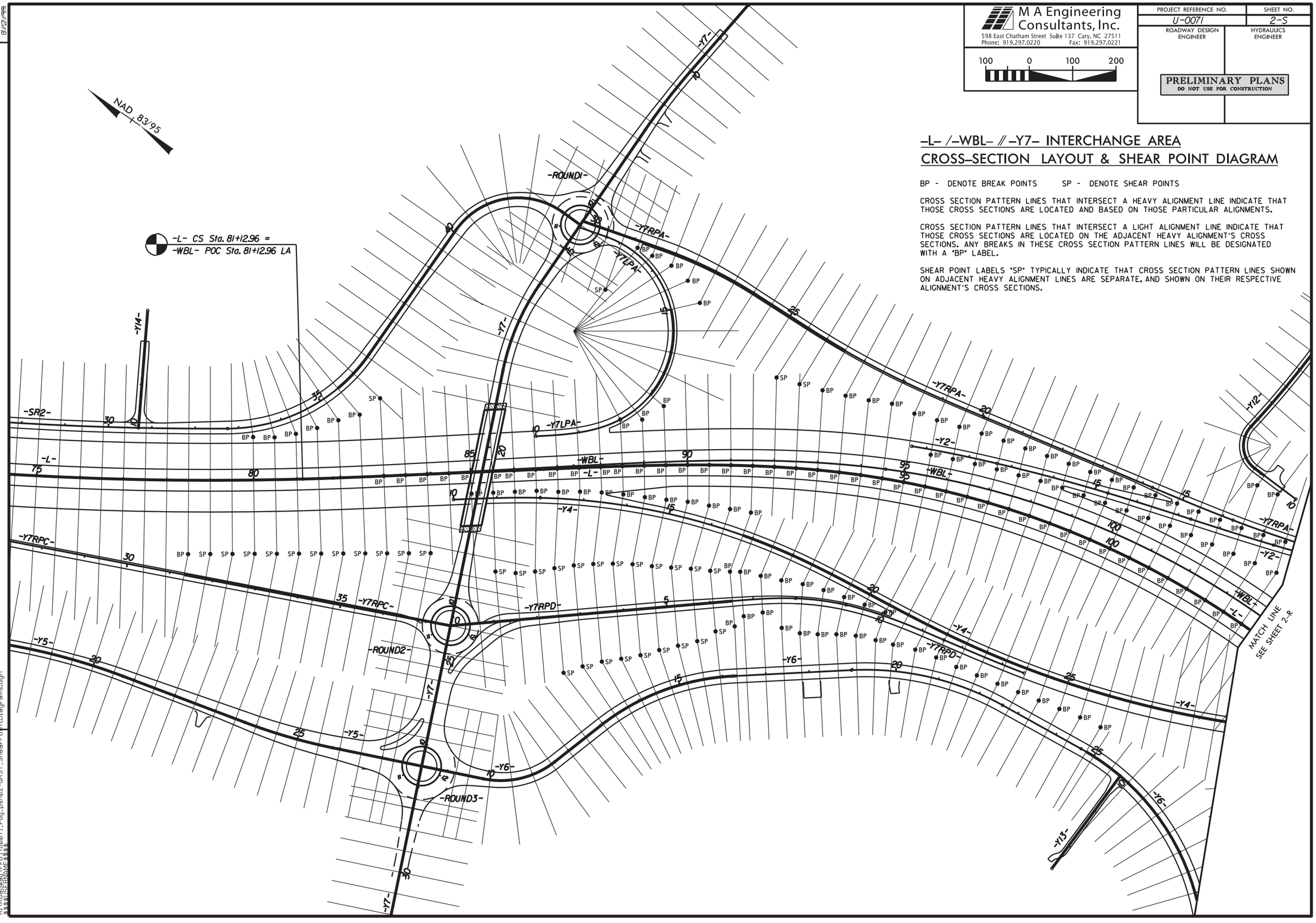


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**PRELIMINARY PLANS**
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# -L- /-WBL- //-Y2- /-Y4- INTERCHANGE AREA
# CROSS-SECTION LAYOUT & SHEAR POINT DIAGRAM

BP - DENOTE BREAK POINTS SP - DENOTE SHEAR POINTS

CROSS SECTION PATTERN LINES THAT INTERSECT A HEAVY ALIGNMENT LINE INDICATE THAT THOSE CROSS SECTIONS ARE LOCATED AND BASED ON THOSE PARTICULAR ALIGNMENTS.

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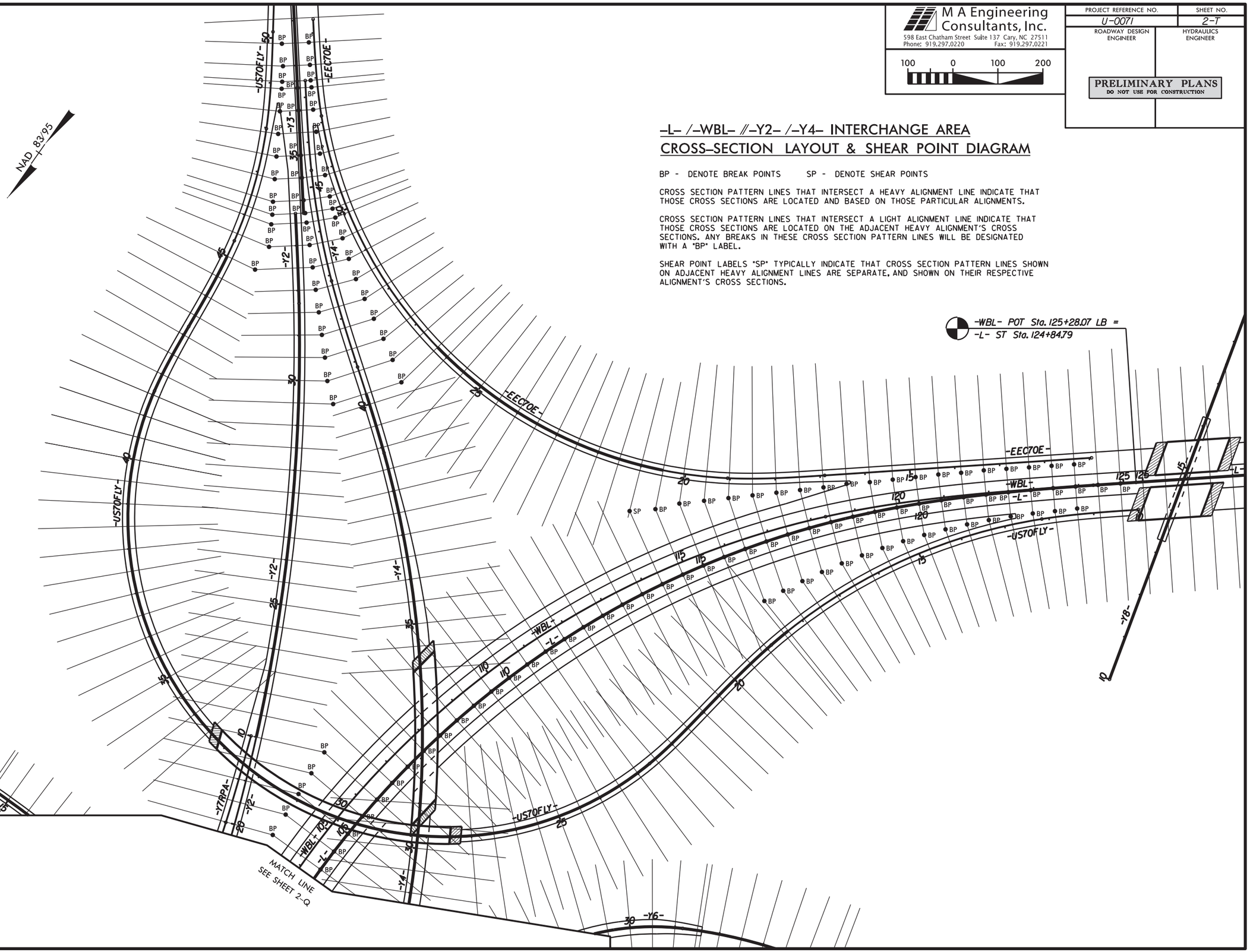


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**PRELIMINARY PLANS**
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# -LDFEB- /-DFLW- //-DFWB- /-DFEB- INTERCHANGE AREA CROSS-SECTION LAYOUT & SHEAR POINT DIAGRAM

BP - DENOTE BREAK POINTS SP - DENOTE SHEAR POINTS

CROSS SECTION PATTERN LINES THAT INTERSECT A HEAVY ALIGNMENT LINE INDICATE THAT THOSE CROSS SECTIONS ARE LOCATED AND BASED ON THOSE PARTICULAR ALIGNMENTS.

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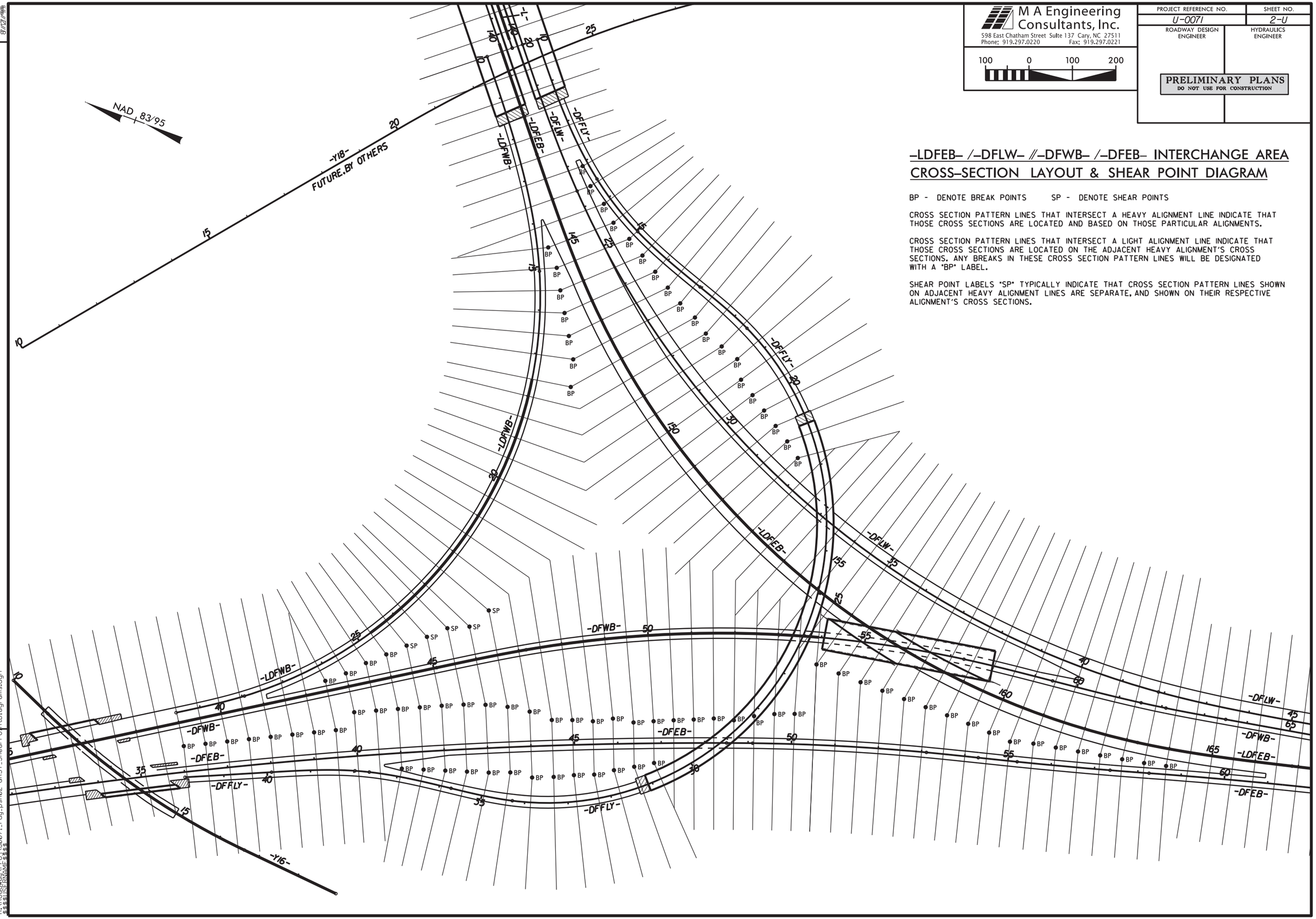
SHEAR POINT LABELS "SP" TYPICALLY INDICATE THAT CROSS SECTION PATTERN LINES SHOWN ON ADJACENT HEAVY ALIGNMENT LINES ARE SEPARATE, AND SHOWN ON THEIR RESPECTIVE ALIGNMENT'S CROSS SECTIONS.

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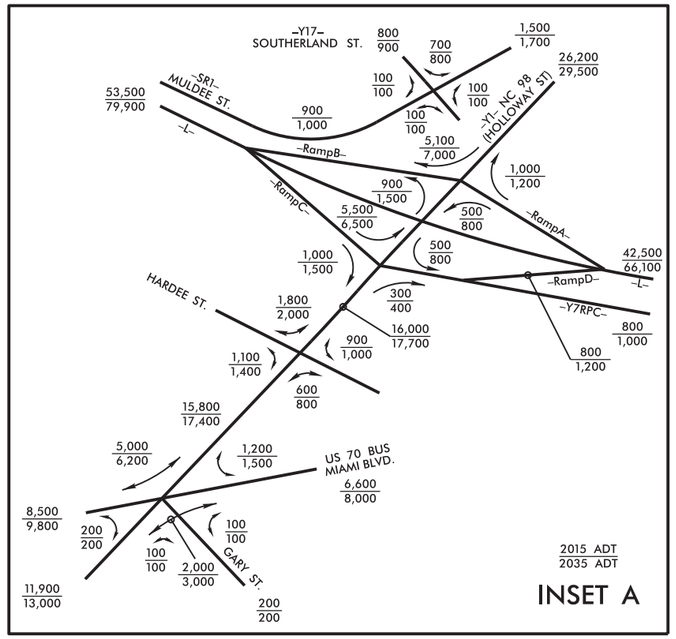
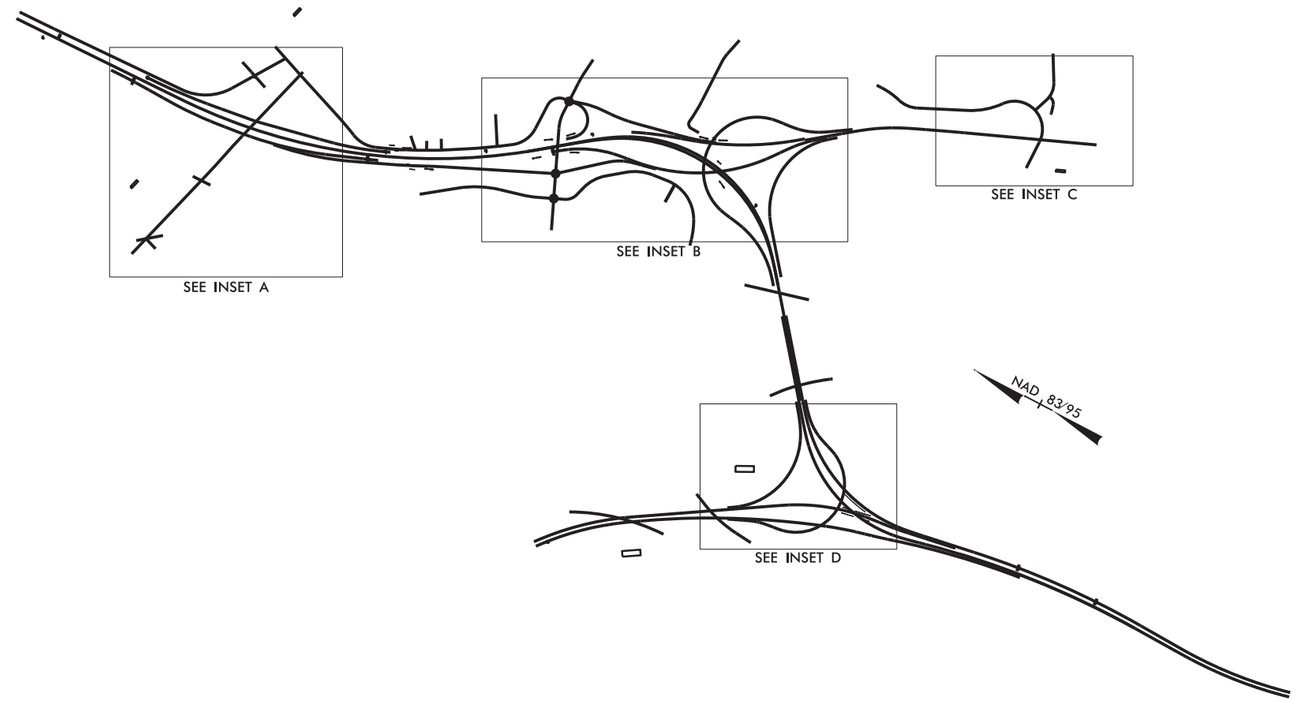
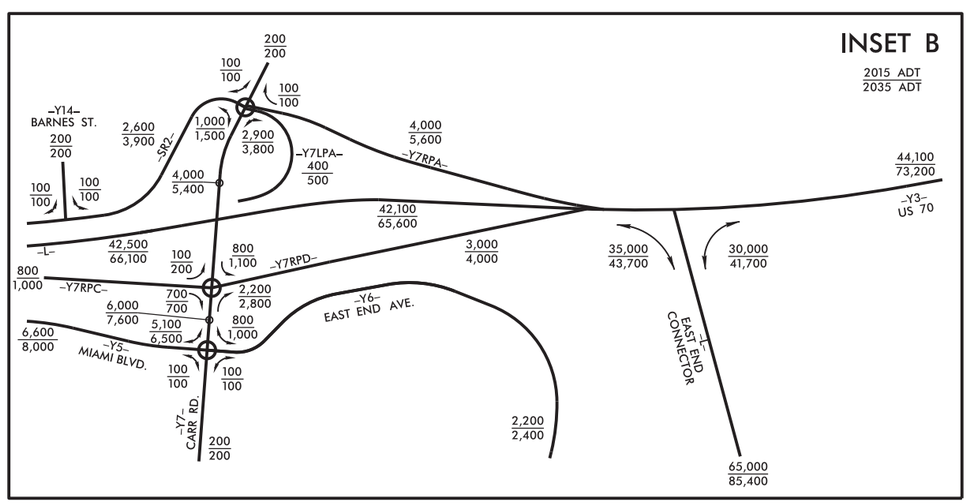
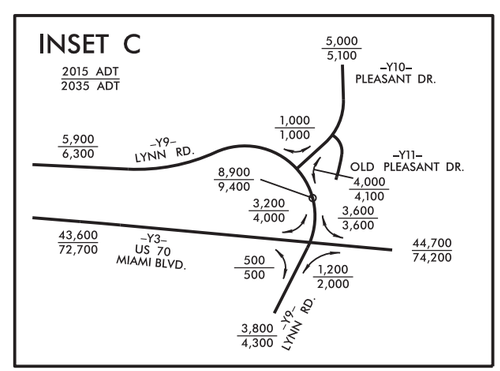
# TRAFFIC VOLUME DIAGRAMS

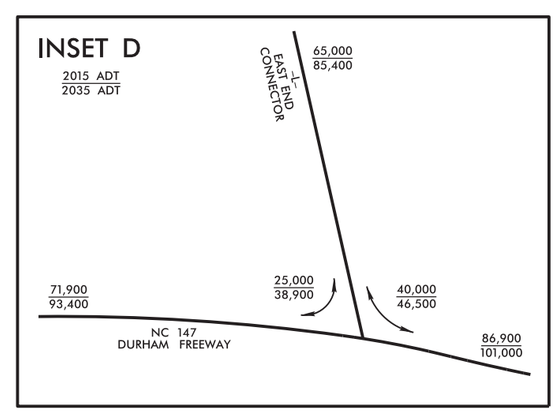
No. of Vehicles Per Day (VPD)

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| R/W SHEET NO. | |
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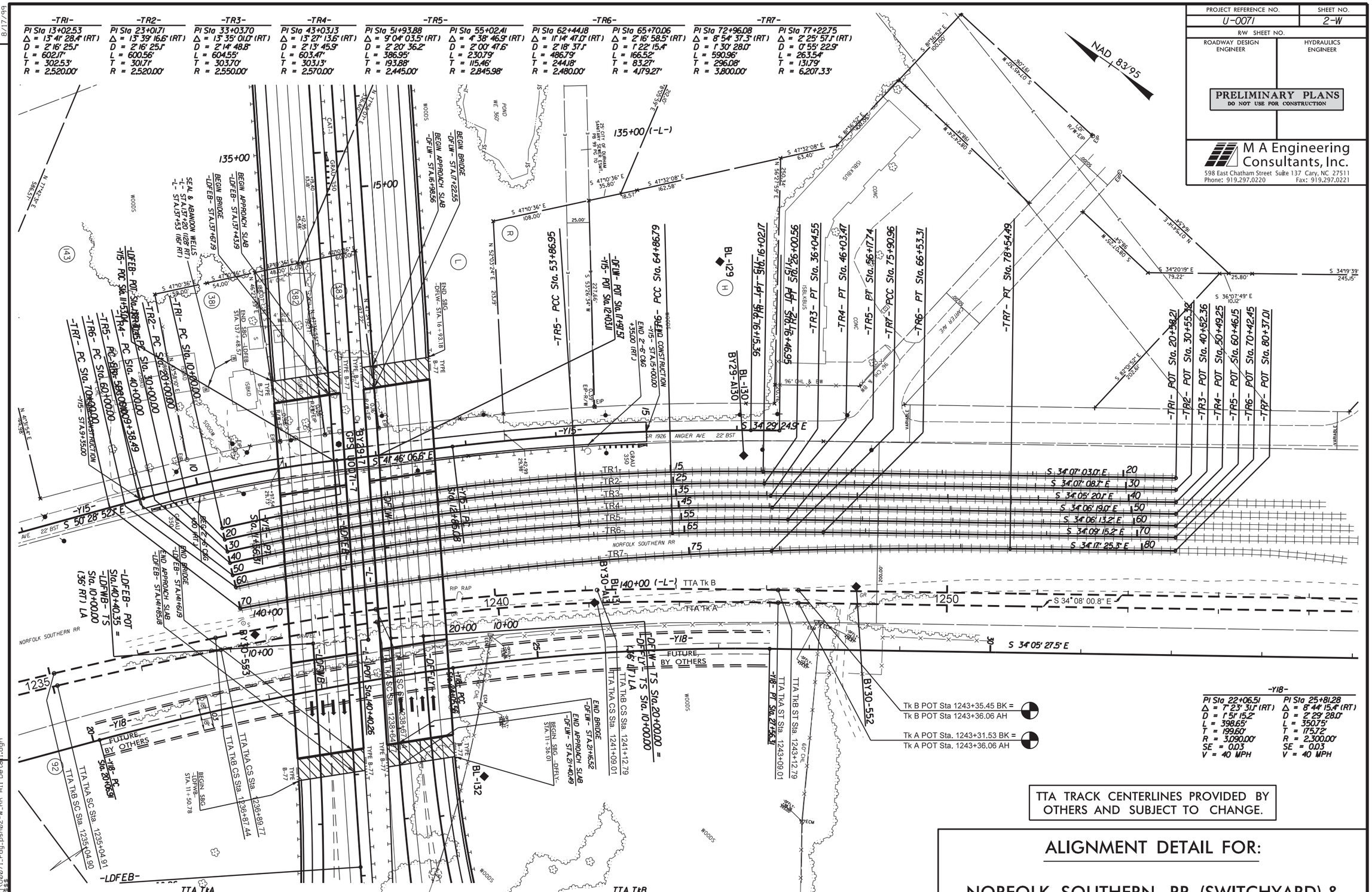
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


| -TR1- | -TR2- | -TR3- | -TR4- | -TR5- | -TR6- | -TR7- |
|---|---|---|---|---|---|---|
| PI Sta 13+02.53 | PI Sta 23+01.71 | PI Sta 33+03.70 | PI Sta 43+03.13 | PI Sta 51+93.88 | PI Sta 62+44.18 | PI Sta 72+96.08 |
| Δ = 13° 41' 28.4" (RT) | Δ = 13° 39' 16.6" (RT) | Δ = 13° 35' 01.0" (RT) | Δ = 13° 27' 13.6" (RT) | Δ = 9° 04' 03.5" (RT) | Δ = 11° 14' 47.0" (RT) | Δ = 8° 54' 37.3" (RT) |
| D = 2° 16' 25.1" | D = 2° 16' 25.1" | D = 2° 14' 48.8" | D = 2° 13' 45.9" | D = 2° 20' 36.2" | D = 2° 18' 37.1" | D = 1° 30' 28.0" |
| L = 602.17' | L = 600.56' | L = 604.55' | L = 603.47' | L = 386.95' | L = 486.79' | L = 590.96' |
| T = 302.53' | T = 301.71' | T = 303.70' | T = 303.13' | T = 193.88' | T = 244.18' | T = 296.08' |
| R = 2,520.00' | R = 2,520.00' | R = 2,550.00' | R = 2,570.00' | R = 2,445.00' | R = 2,480.00' | R = 3,800.00' |

| -TR5- | -TR6- | -TR7- |
|---|---|---|
| PI Sta 55+02.41 | PI Sta 65+70.06 | PI Sta 77+22.75 |
| Δ = 4° 38' 46.9" (RT) | Δ = 2° 16' 58.5" (RT) | Δ = 2° 25' 57.1" (RT) |
| D = 2° 00' 47.6" | D = 1° 22' 15.4" | D = 0° 55' 22.9" |
| L = 230.79' | L = 166.52' | L = 263.54' |
| T = 115.46' | T = 83.27' | T = 131.79' |
| R = 2,845.98' | R = 4,179.27' | R = 6,207.33' |




TTA TRACK CENTERLINES PROVIDED BY OTHERS AND SUBJECT TO CHANGE.

# ALIGNMENT DETAIL FOR:

## NORFOLK SOUTHERN RR (SWITCHYARD) & TTA LIGHT RAIL (FUTURE TRACKS) & –Y18– PETTIGREW ST. (FUTURE, BY OTHERS)

REVISIONS

8/17/99

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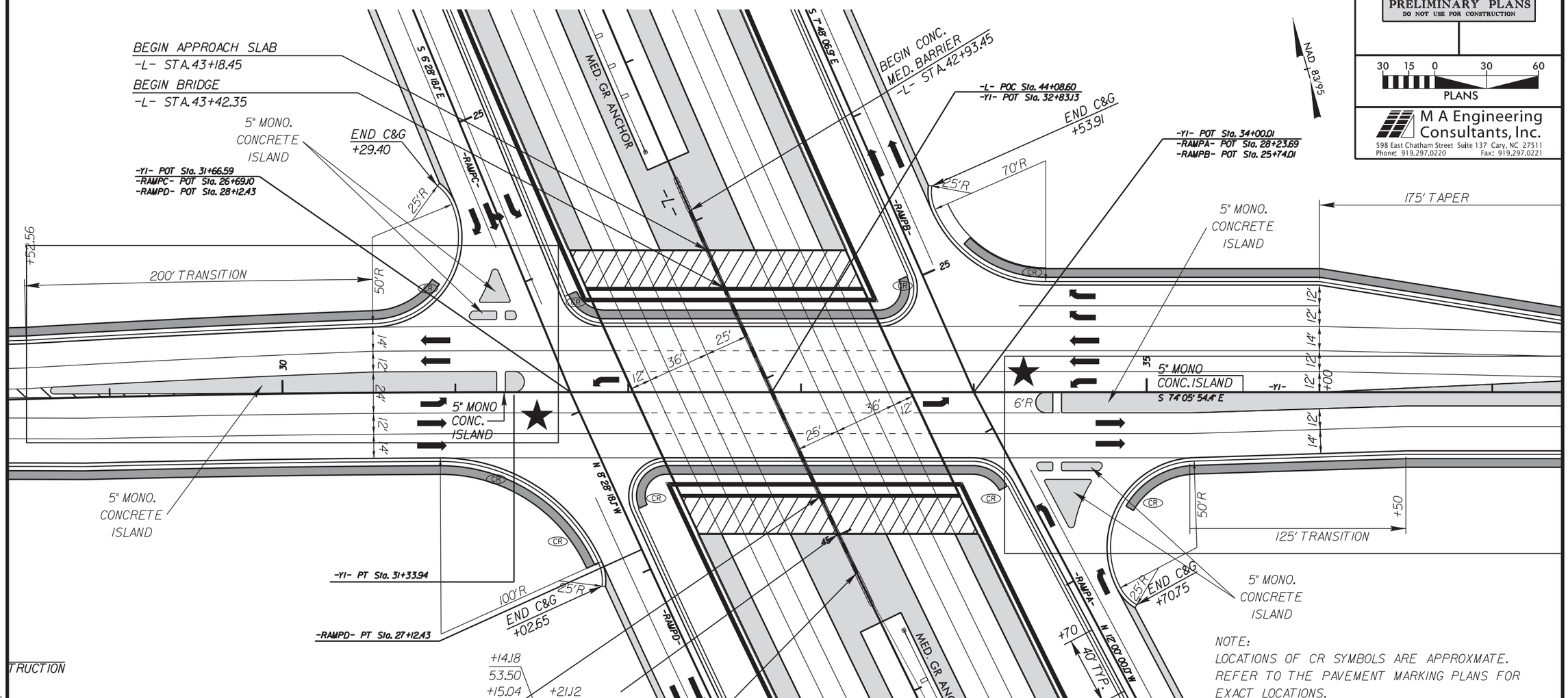
# NC 98 INTERSECTION DETAILS

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-X |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

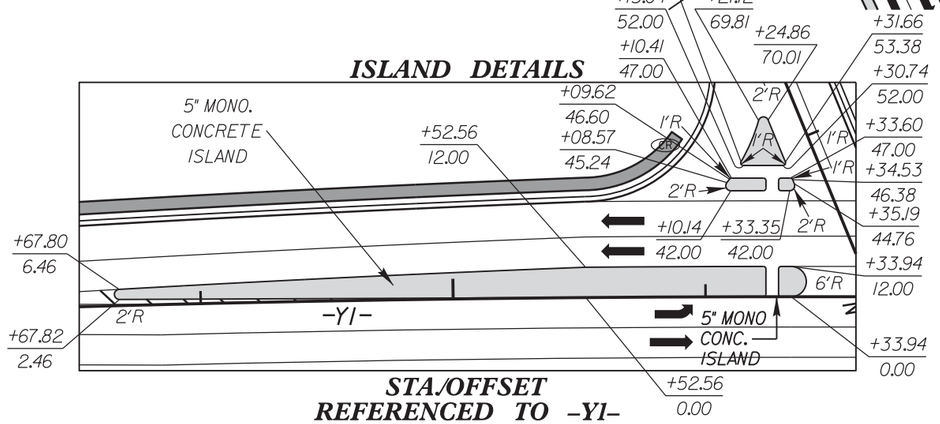
30 15 0 30 60
PLANS

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221



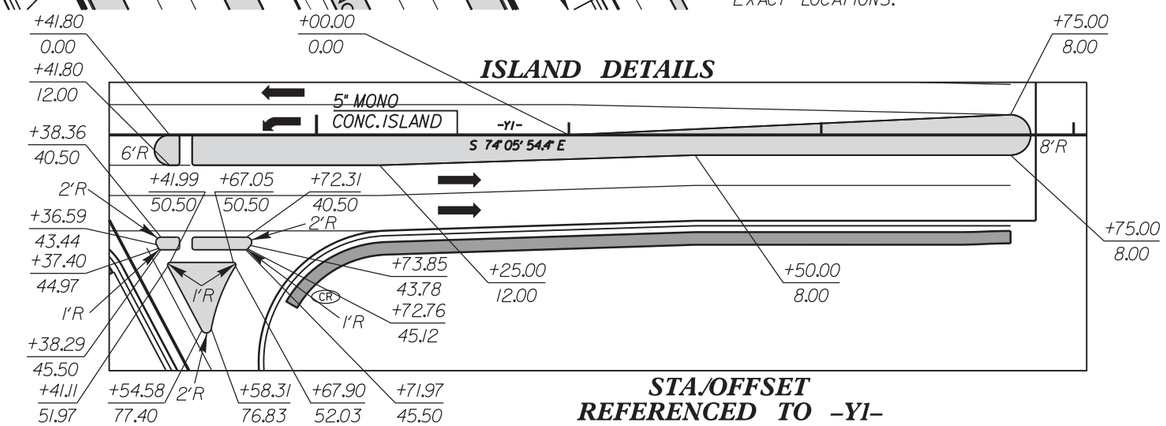

NOTE:
LOCATIONS OF CR SYMBOLS ARE APPROXMATE. REFER TO THE PAVEMENT MARKING PLANS FOR EXACT LOCATIONS.

## ISLAND DETAILS




STA./OFFSET REFERENCED TO -Y1-

## ISLAND DETAILS




STA./OFFSET REFERENCED TO -Y1-

REVISIONS

8/17/99

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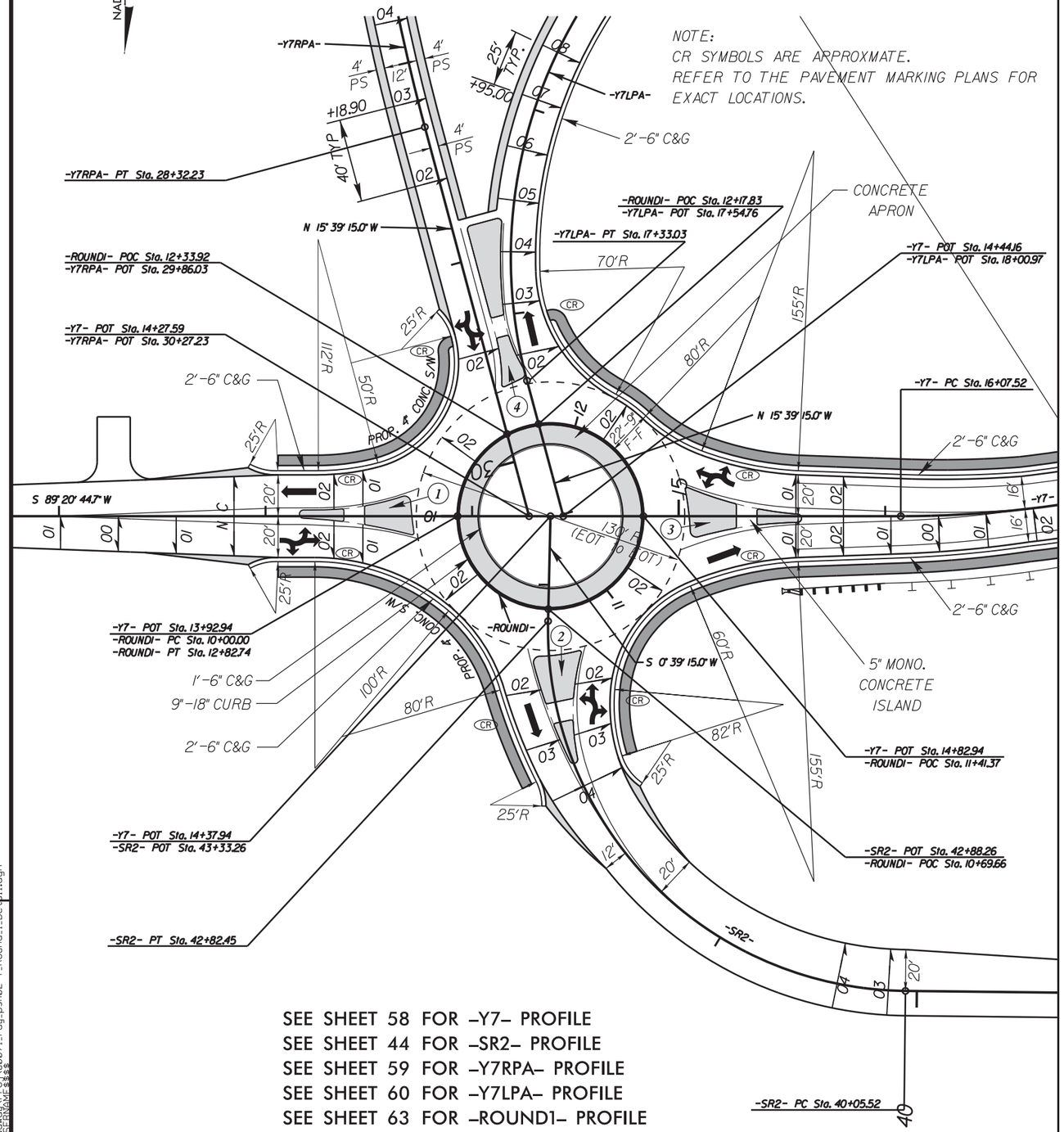
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-Y |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

30 15 0 30 60
PLANS

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

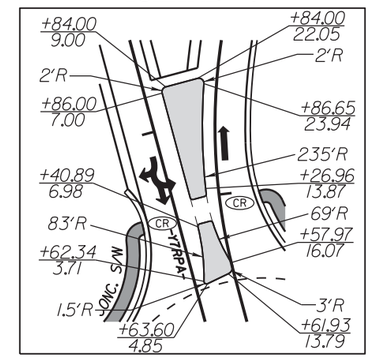
# ROUNDABOUT 1 DETAIL




SEE SHEET 58 FOR –Y7– PROFILE
SEE SHEET 44 FOR –SR2– PROFILE
SEE SHEET 59 FOR –Y7RPA– PROFILE
SEE SHEET 60 FOR –Y7LPA– PROFILE
SEE SHEET 63 FOR –ROUND1– PROFILE

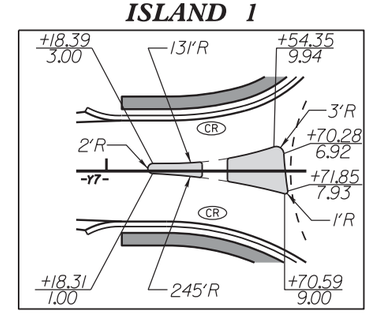
# ISLAND DETAILS

## ISLAND 4



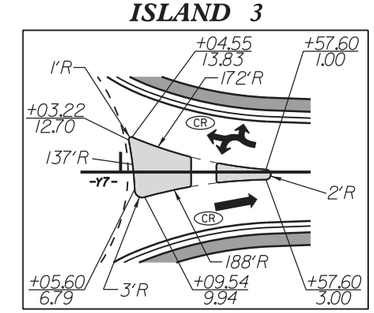

STA./OFFSET
REFERENCED TO –Y7RPA–

## ISLAND 1



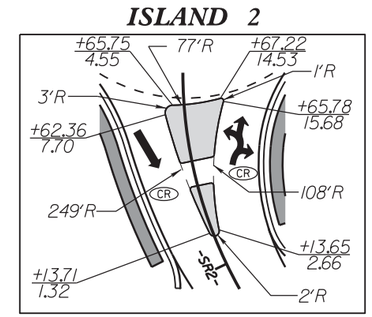

STA./OFFSET
REFERENCED TO –Y7–

## ISLAND 3




STA./OFFSET
REFERENCED TO –Y7–

## ISLAND 2




STA./OFFSET
REFERENCED TO –SR2–

NOTE:
LOCATIONS OF CR SYMBOLS ARE APPROXMATE.
REFER TO THE PAVEMENT MARKING PLANS FOR
EXACT LOCATIONS.

REVISIONS

8/17/99

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# ROUNDABOUT 2 & 3 DETAILS

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-Z |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

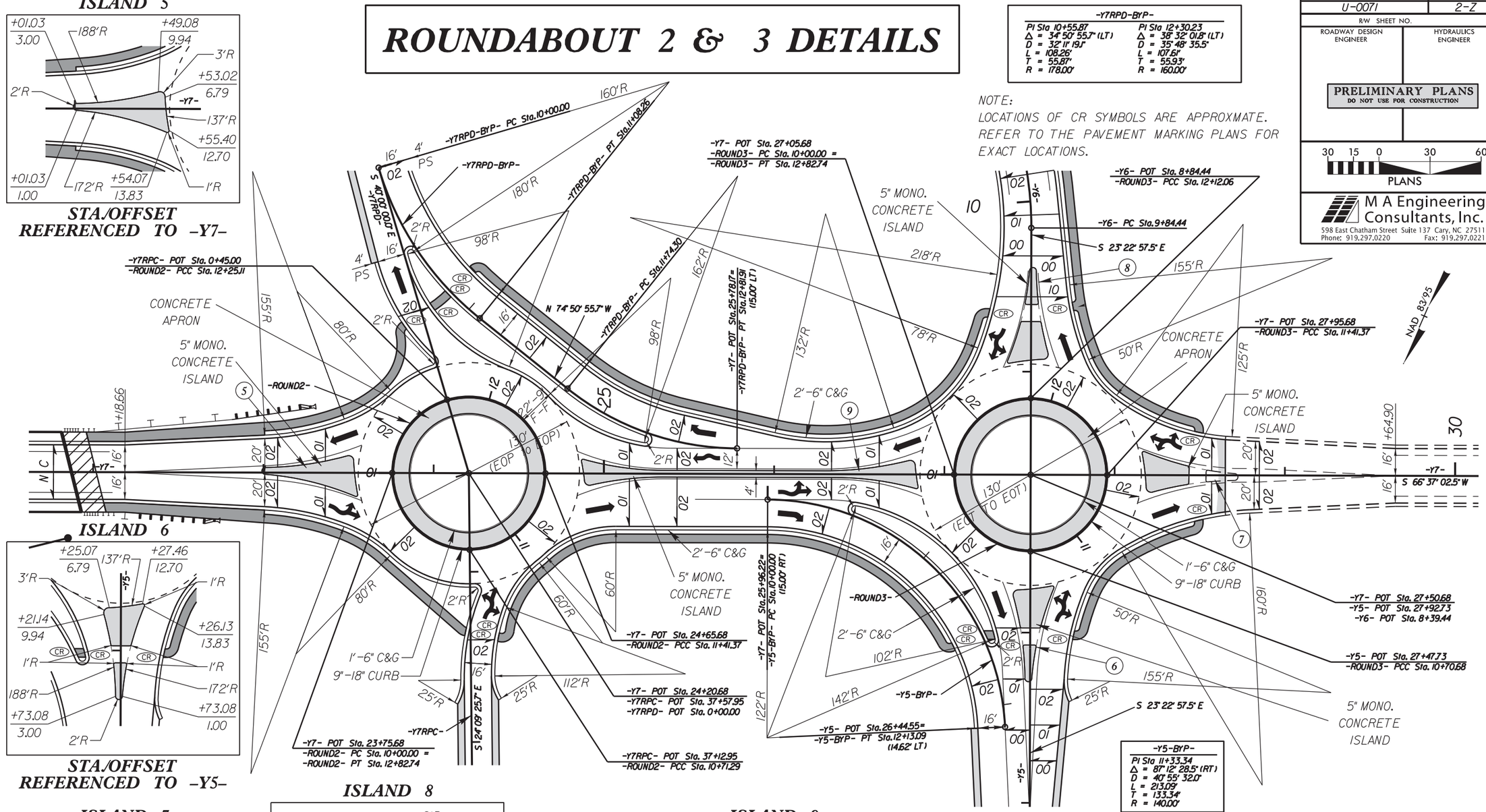
30 15 0 30 60
PLANS

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

**-Y7RPD-BYP-**

| PI Sta 10+55.87 | PI Sta 12+30.23 |
|---|---|
| Δ = 34° 50' 55.7" (LT) | Δ = 38° 32' 01.8" (LT) |
| D = 32° 11' 19.1" | D = 35° 48' 35.5" |
| L = 108.26' | L = 107.61' |
| T = 55.87' | T = 55.93' |
| R = 178.00' | R = 160.00' |

NOTE:
LOCATIONS OF CR SYMBOLS ARE APPROXMATE. REFER TO THE PAVEMENT MARKING PLANS FOR EXACT LOCATIONS.




**-Y5-BYP-**

| | |
|---|---|
| PI Sta 11+33.34 | |
| Δ = 87° 12' 28.5" (RT) | |
| D = 40° 55' 32.0" | |
| L = 213.09' | |
| T = 133.34' | |
| R = 140.00' | |

## ISLAND 5



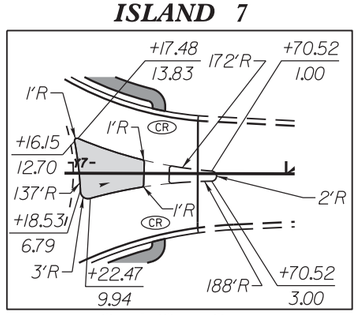

STA./OFFSET REFERENCED TO –Y7–

## ISLAND 6



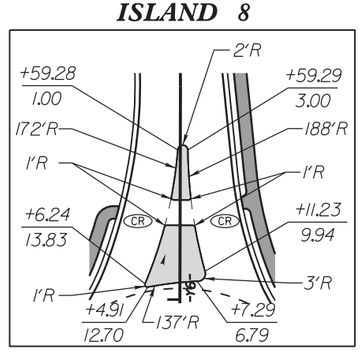

STA./OFFSET REFERENCED TO –Y5–

## ISLAND 7



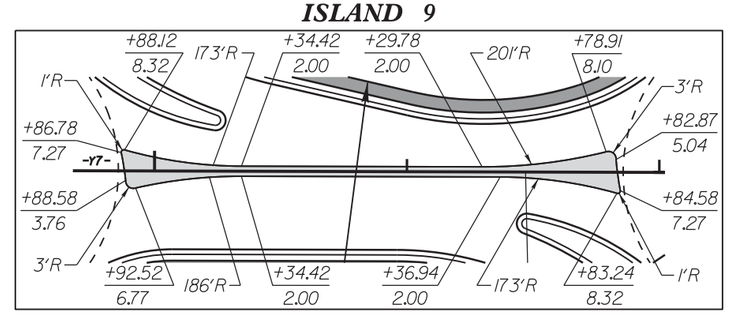

STA./OFFSET REFERENCED TO –Y7–

## ISLAND 8




STA./OFFSET REFERENCED TO –Y6–

## ISLAND 9




STA./OFFSET REFERENCED TO –Y7–

SEE SHEET 9 FOR PLAN VIEW
SEE SHEET 58 FOR –Y7– PROFILE
SEE SHEET 56 FOR –Y5– PROFILE
SEE SHEET 63 FOR –Y5–BYP– PROFILE
SEE SHEET 57 FOR –Y6– PROFILE
SEE SHEET 61 FOR –Y7RPC– PROFILE
SEE SHEET 62 FOR –Y7RPD– PROFILE
SEE SHEET 63 FOR –Y7RPD–BYP– PROFILE
SEE SHEET 63 FOR –ROUND2– & –ROUND3– PROFILES

REVISIONS

8/17/99

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GUARDRAIL & BARRIER SHOWN FOR DETOURS IS BASED ON ROADWAY RECOMMENDATIONS AND IS SUBJECT TO MODIFICATION OR SUBSTITUTION WITH BARRIER BY TRAFFIC CONTROL.

SEE SHEET 2-AC FOR -DET1EB- & -DET1WB- PROFILES
SEE SHEETS 7 & 8 FOR PROPOSED DESIGN, DRAINAGE, & RIGHT OF WAY DETAIL.

-DET1WB-

| PI Sta 156+26.29 | PI Sta 161+84.98 | PI Sta 169+98.57 |
|---|---|---|
| Δ = 18° 08' 45.0" (LT) | Δ = 8° 15' 08.8" (RT) | Δ = 8° 12' 53.3" (LT) |
| D = 3° 01' 24.7" | D = 3° 34' 53.5" | D = 0° 44' 36.8" |
| L = 600.16' | L = 521.59' | L = 1,104.80' |
| T = 302.61' | T = 261.41' | T = 553.35' |
| R = 1,895.00' | R = 1,600.00' | R = 7,705.64' |
| RO = 184' | RO = 89' | RO = NA |
| SE = 0.08 (EXIST.) | SE = 0.03 | SE = NC |
| V = 45 | V = 60 | V = 60 |

-DET1WB- VENTURES, INC.

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AA |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

REVISIONS

8/17/99

-RAMPA- CS Sta. 17+52.71
-SR2- PRC Sta. 11+20.91
-RAMPA- CS Sta. 10+00.00 = -L- POC Sta. 63+02.20 (61.00' LT)
-SR2- PCC Sta. 14+58.99
-RAMPA- SC Sta. 12+00.00
-RAMPA- END FENCE (48" CL)
-RAMPD- TS Sta. 15+06.16
-RAMPD- ST Sta. 12+00.00
N 1° 21' 08" 55.1" W
-DET1WB- BEGIN CONSTRUCTION -DET1WB- STA.157+00.00
-DET1WB- PRC Sta. 158+89.32
-DET1WB- PRC Sta. 164+15.23
-DET1WB- ST A.169+50.00
-DET1WB- SEE SHEET NO.2-AB MATCH LINE
-DET1EB- ST A.169+50.00
-DRAWE2- POT Sta. 12+00.00
-SR2- POC Sta. 21+34.54
-DRAWE3- POT Sta. 10+00.00
-SR2- POC Sta. 19+89.07
-DRAWE2- POT Sta. 10+00.00
-SR2- POC Sta. 23+31.03
-DRAWE4- POT Sta. 10+00.00
200' DITCH TAPER (STD.225.09)
300' DITCH TAPER (STD.225.09)
CONSTRUCT 2GI IN PHASE 1 FOR TEMPORARY CONDITIONS, THEN RETAIN & ADJUST STRUCTURE DEPTH TO PROPOSED CONDITIONS.
CONSTRUCT AS JB IN PHASE 1 USING TEMP. TRAFFIC BEARING COVER, ADJUST TO 2 GI's AND RETAIN FOR FINAL DRAINAGE.
-Y7RPC- PRC Sta. 19+83.75
-RAMPD- CS Sta. 10+00.00 = -L- POC Sta. 61+51.21 (61.00' RT)
-Y7RPC- PT Sta. 10+40.05
-DET1EB- PRC Sta. 158+89.32
-Y7RPC- PC Sta. 15+70.77
-DET1EB- PRC Sta. 164+40.35
-DET1EB- PT Sta. 165+23.26
-Y5- POT Sta. 10+00.00
-DET1EB- BEGIN CONSTRUCTION -DET1EB- STA.157+00.00
BEGIN PROP. RETAINING WALL -Y7RAMPC- ST A.14+80.00
END PROP. RET. WALL AT BRIDGE ABUTMENT
PROP. RETAINING WALL
INSTALL PIPE IN PHASE 1 & RETAIN AS FINAL DRAINAGE
TIE TEMP. GUARDRAIL TO EXISTING
EST. 2 TONS CL 1 EST 7 SY GFD
EST. 4 TONS CL 1 EST 10 SY GFD
SPECIAL CUT DITCH SEE DETAIL
N 43° 49' 30.8" E
N 37° 01' 56" W 66.35'
34° 29' 50" E 26.65'
S 8° 15' 45" E
S 53° 33' 20" E
S 18° 16' 30" E 157.66'
S 24° 08' 05.9" E
NAD 83/95
SAMUEL ROBERTI
DAVID WICKER, JR.
THOMAS UHRICH
DONNA MANSOUR
HUDSON PROPERTIES
PROCTOR FAMILY CEMETERY
BOK PROPERTIES
N.C. STATE HIGHWAY AND PUBLIC WORK CO.
FORMERLY RAY MATTOX
SOUTHERN LEASING INC.
TED R. WHITSON, JR.
DONNA J. WHITSON
S MIAMI BLVD
US 70 WBL
US 70 EBL
US 70 BUS
BASIN BOTTOM EL. 367
OREBAY
OUTLET STRUCTURE
STUB AS PER PLANS UNKNOWN LOCATION
TYPE B-77
TYPE B-77

DETAIL ST1
SPECIAL CUT DITCH
(Not to Scale)

Natural Ground
2:1
D
Min. D= 1.0 Ft.

FROM -DET1EB- STA 157+00 TO STA 162+18 RT

-DET1EB-

| PI Sta 156+09.22 | PI Sta 161+70.43 | PI Sta 165+81.90 |
|---|---|---|
| Δ = 17° 43' 55.2" (LT) | Δ = 8° 36' 48.1" (RT) | Δ = 2° 05' 27.1" (LT) |
| D = 3° 01' 53.5" | D = 1° 35' 29.6" | D = 0° 44' 22.2" |
| L = 584.92' | L = 541.19' | L = 282.74' |
| T = 294.82' | T = 271.11' | T = 141.39' |
| R = 1,890.00' | R = 3,600.00' | R = 7,748.00' |
| RO = 161' | RO = 69' | RO = NA |
| SE = 0.07 (EXIST.) | SE = 0.03 | SE = NC |
| V = 45 | V = 60 | V = 50 |

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# DETOUR 1

GUARDRAIL & BARRIER SHOWN FOR DETOURS IS BASED ON ROADWAY RECOMMENDATIONS AND IS SUBJECT TO MODIFICATION OR SUBSTITUTION WITH BARRIER BY TRAFFIC CONTROL.

SEE SHEET 2-AD FOR -DETIEB- & -DETIWB- PROFILES
SEE SHEETS 8 & 9 FOR PROPOSED DESIGN, DRAINAGE, & RIGHT OF WAY DETAIL.

**-DETIWB-**

PI Sta 169+98.57
Δ = 8° 12' 53.9" (LT)
D = 0° 44' 36.8"
L = 1,104.80'
T = 553.35'
R = 7,705.64'
RO = NA
SE = NC
V = 60

PI Sta 177+81.68
Δ = 17° 33' 24.0" (RT)
D = 3° 49' 09.4"
L = 459.68'
T = 231.66'
R = 1,500.17'
RO = 92'
SE = 0.04 (EXIST.)
V = 45

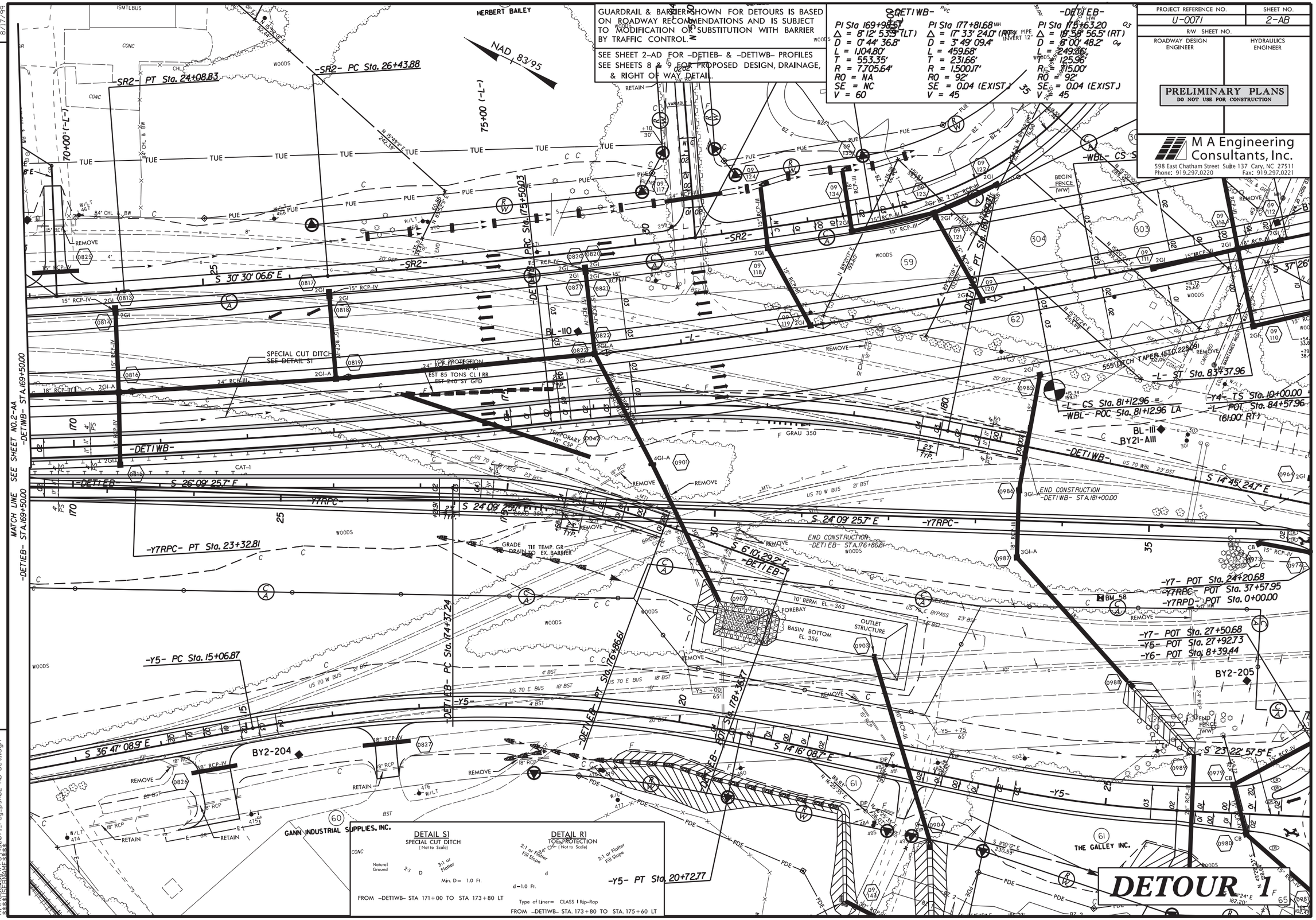
**-DETIEB-**

PI Sta 175+63.20
Δ = 19° 58' 56.5" (RT)
D = 8° 00' 48.2"
L = 249.36'
T = 125.96'
R = 715.00'
RO = 92'
SE = 0.04 (EXIST.)
V = 45

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AB |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


REVISIONS

8/17/99

10-OCT-2013 11:43
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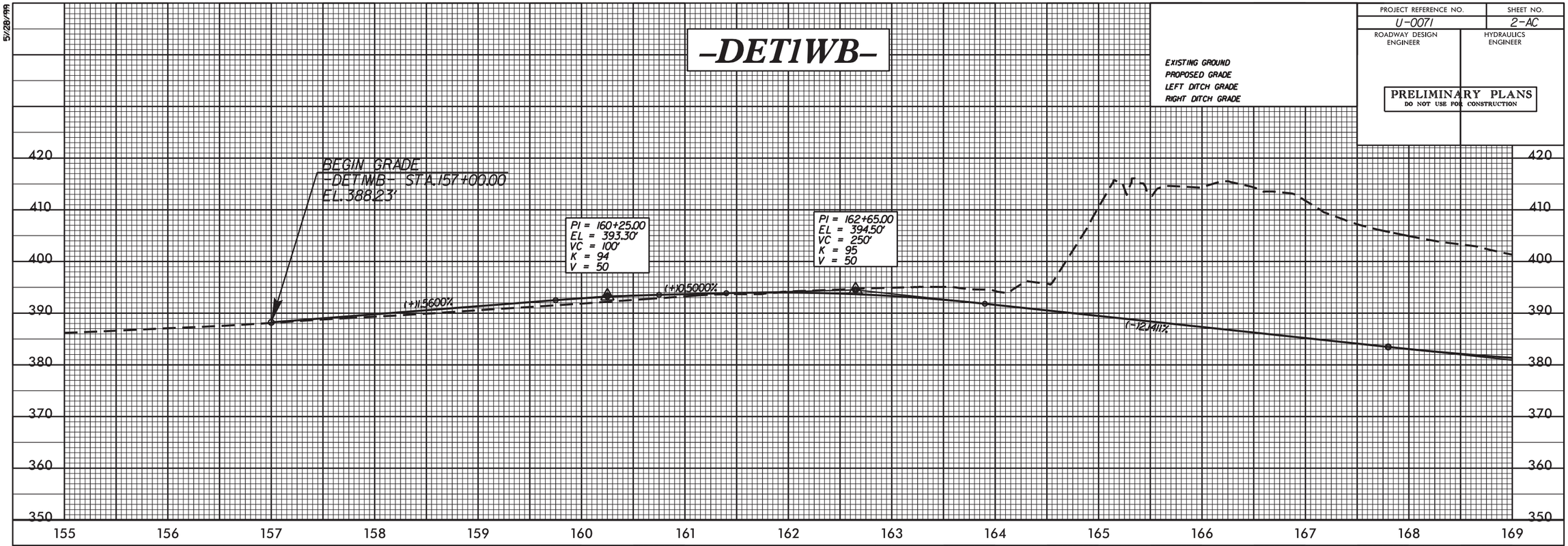
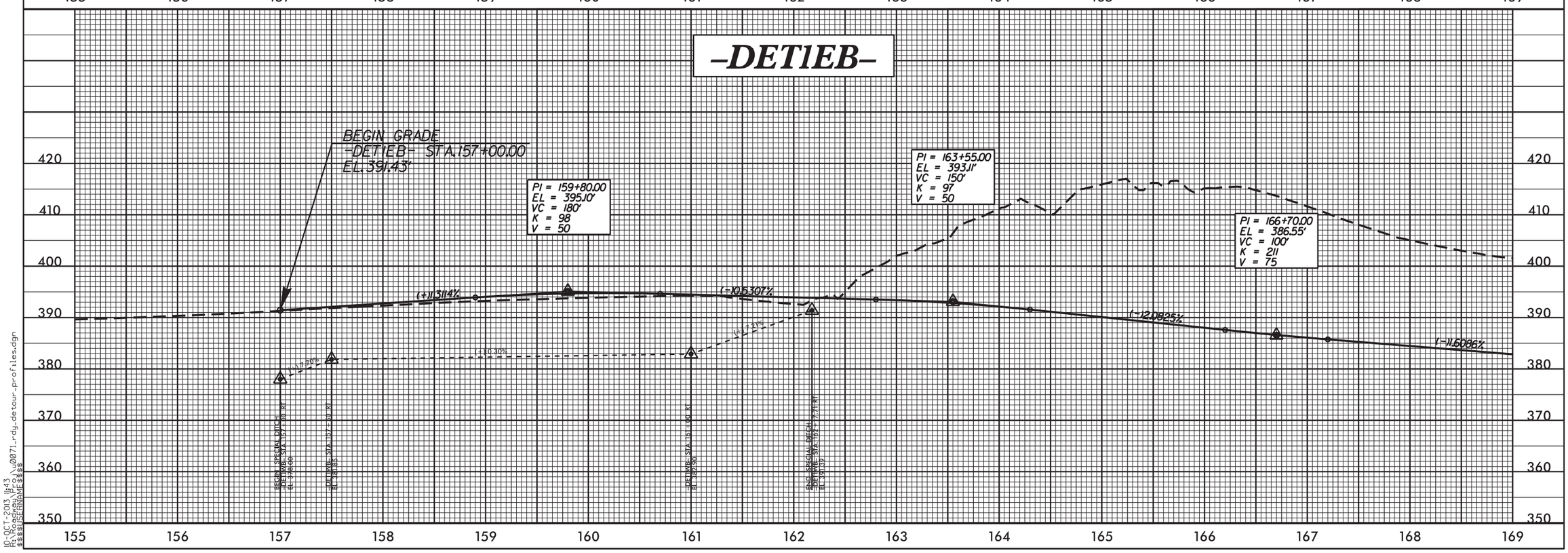
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AC |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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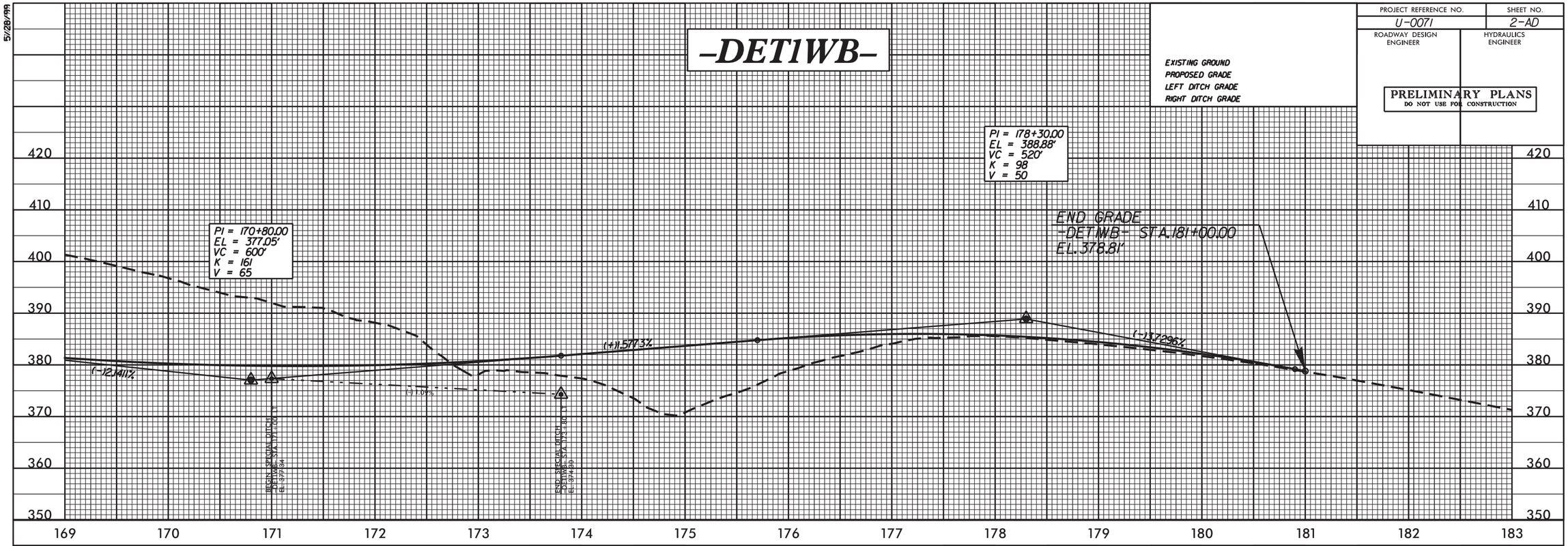
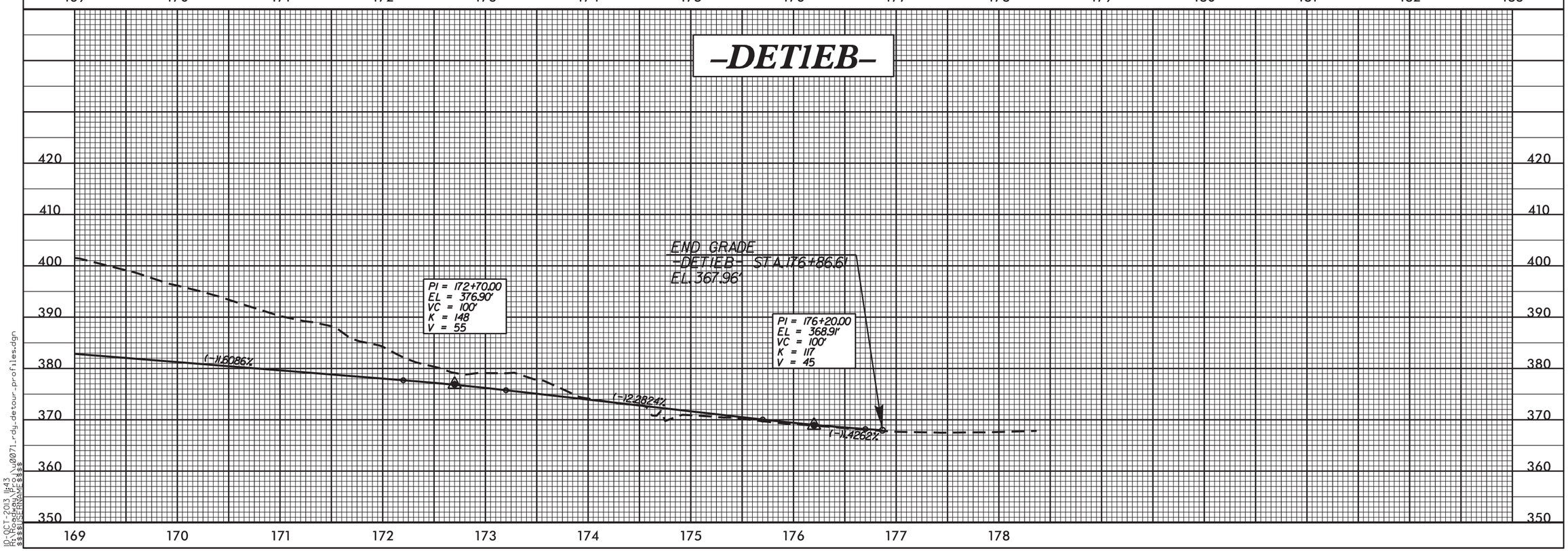
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AD |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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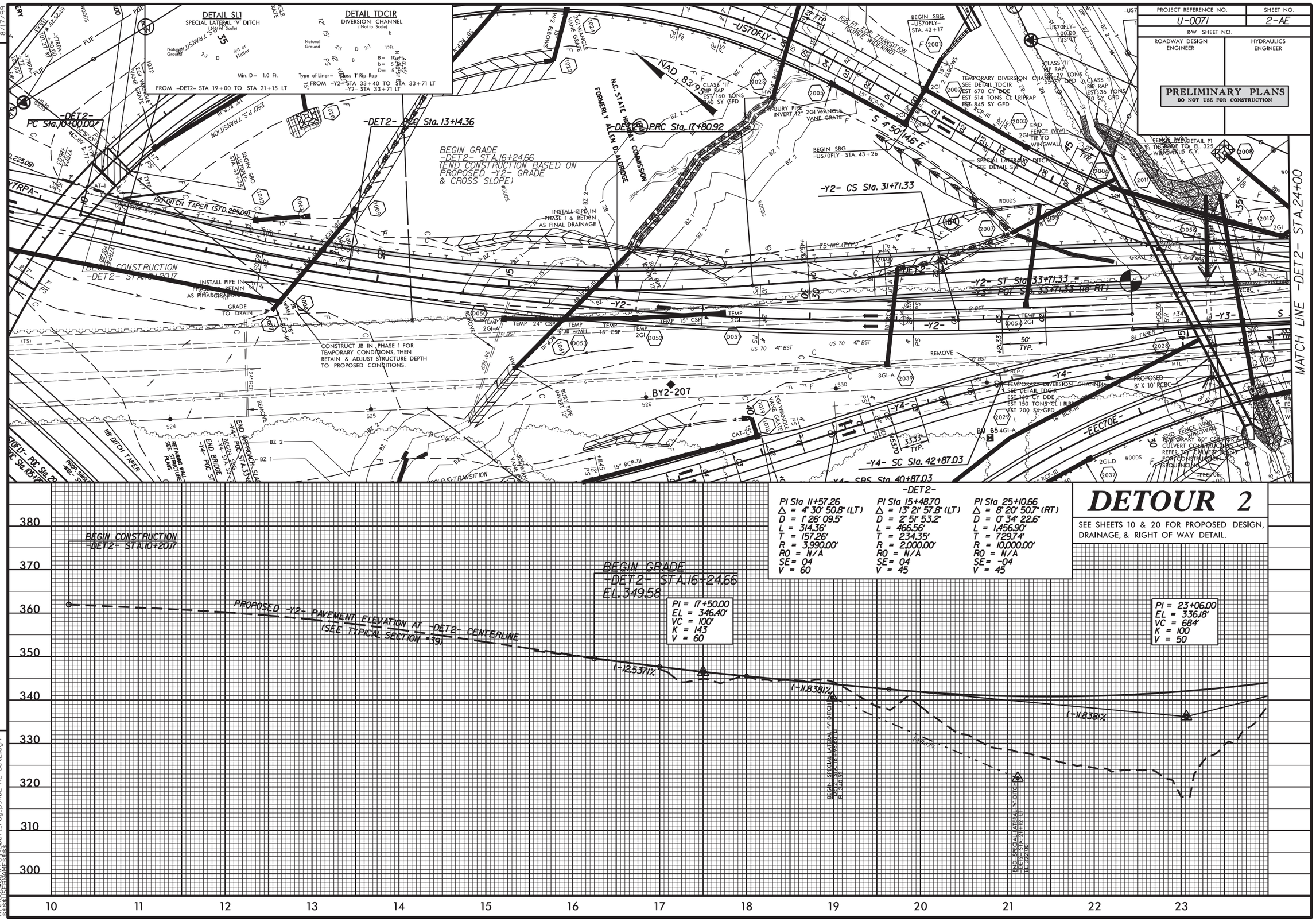
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AE |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




# DETOUR 2

SEE SHEETS 10 & 20 FOR PROPOSED DESIGN, DRAINAGE, & RIGHT OF WAY DETAIL.

REVISIONS

8/17/95

10-OCT-2013 11:43
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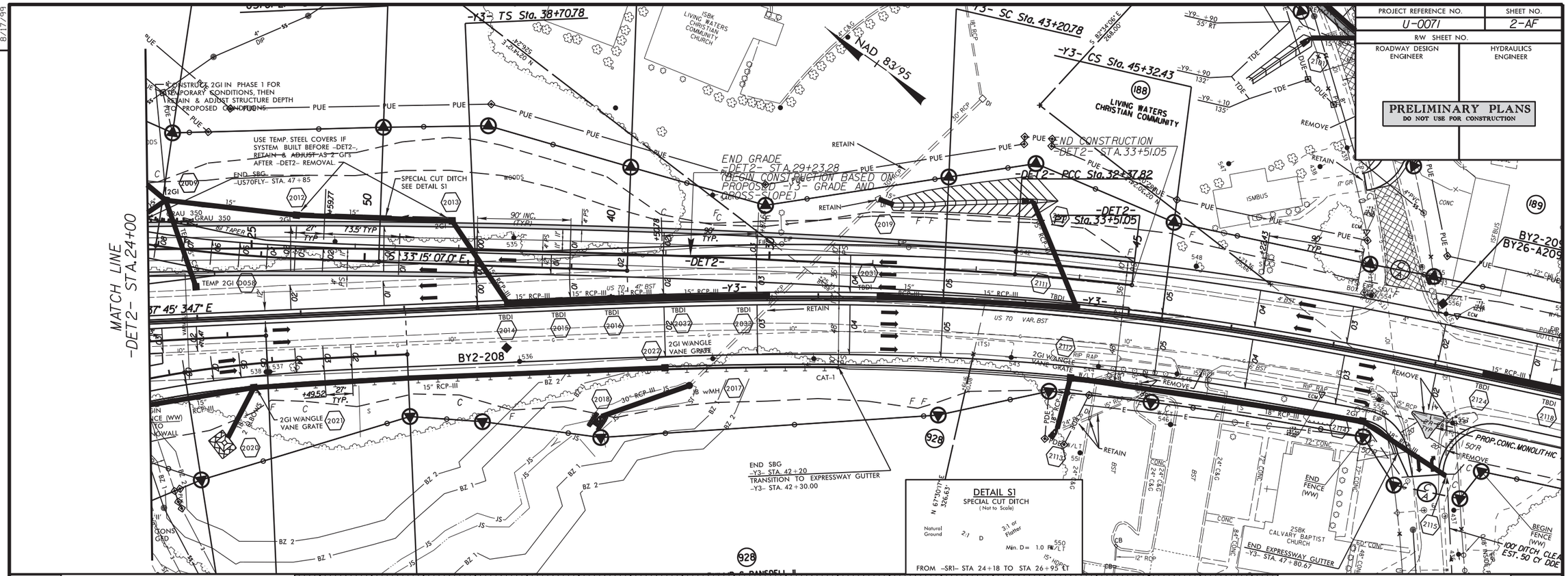
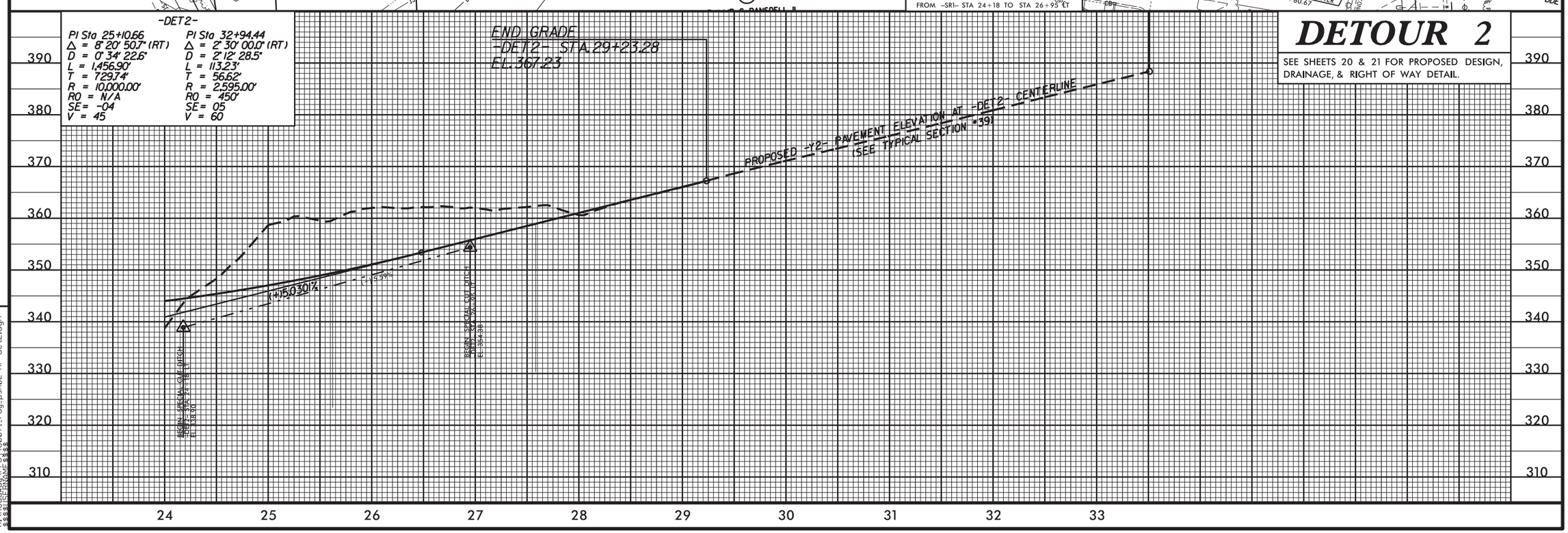
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AF |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION




# DETOUR 2

SEE SHEETS 20 & 21 FOR PROPOSED DESIGN, DRAINAGE, & RIGHT OF WAY DETAIL.

REVISIONS

8/17/99

10-OCT-2013 11:43
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$$$$USERNAME$$$$

# –CARRDET–
## CARR RD/SERVICE ROAD 2 DETOUR

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AG |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


**DETAIL S1**
SPECIAL CUT DITCH
( Not to Scale)

Natural Ground; 2:1; D; 4:1 or Flatter; Min. D= 1.0 Ft.

FROM –CARRDET– STA 20+83 TO STA 16+66 LT
FROM –CARRDET– STA 23+02 TO STA 24+15 RT

**–Y14DET–**

| PI Sta 14+47.35 | PI Sta 12+76.96 |
|---|---|
| Δ = 49° 14' 36.1" (RT) | Δ = 54° 41' 28.4" (LT) |
| D = 28° 38' 52.4" | D = 31° 49' 51.6" |
| L = 171.89' | L = 171.82' |
| T = 91.66' | T = 93.09' |
| R = 200.00' | R = 180.00' |
| SE = 0.02 | SE = SEE PLANS |
| V = 15 MPH | V = 15 MPH |

| PI Sta 20+69.28 | PI Sta 25+19.34 | PI Sta 32+79.62 | PI Sta 36+30.57 |
|---|---|---|---|
| Δ = 9° 11' 43.5" (RT) | Δ = 71° 52' 02.2" (LT) | Δ = 36° 45' 22.5" (RT) | Δ = 30° 49' 15.3" (LT) |
| D = 2° 51' 53.2" | D = 14° 19' 26.2" | D = 9° 32' 57.5" | D = 9° 32' 57.5" |
| L = 320.98' | L = 501.73' | L = 384.91' | L = 322.76' |
| T = 160.84' | T = 289.91' | T = 199.34' | T = 165.39' |
| R = 2,000.00' | R = 400.00' | R = 600.00' | R = 600.00' |
| SE = 0.03 | SE = 0.04 | SE = 0.04 | SE = 0.04 |
| V = 35 MPH | V = 35 MPH | V = 35 MPH | V = 35 MPH |

CARRDET: FROM STA 23+00 TO 24+25, GRADE THE ROADWAY DETOUR DITCH TO MATCH THE FINAL DITCH GRADE FOR SR2.

INSTALL PIPE FOR CARR RD DETOUR CONSTRUCTION. RETAIN AS FINAL DRAINAGE

SEE SHEET 2–AH FOR –CARRDET– PROFILE
SEE SHEET 2–AI FOR –Y14DET– PROFILE
SEE SHEETS 8, 9, & 25 FOR PROPOSED DESIGN, DRAINAGE, AND RIGHT OF WAY DETAIL.

REVISIONS

8/17/99

10-OCT-2013 11:44
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S:\PDEA\Hydraulics\ss

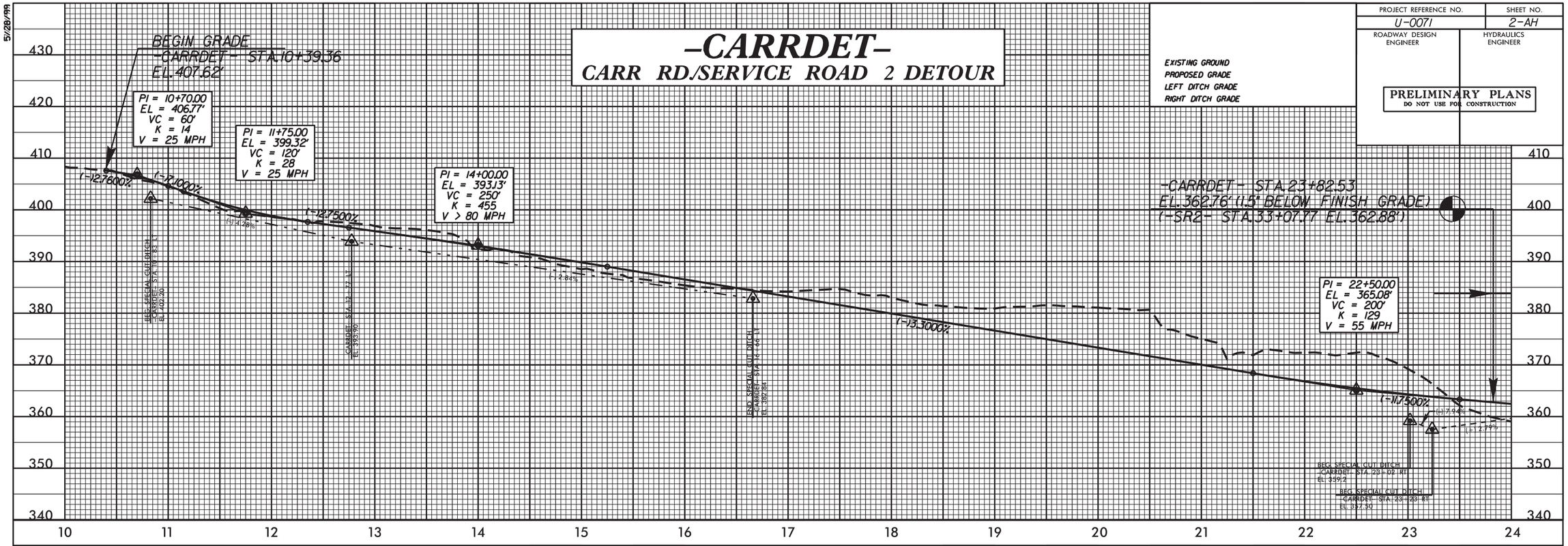
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AH |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

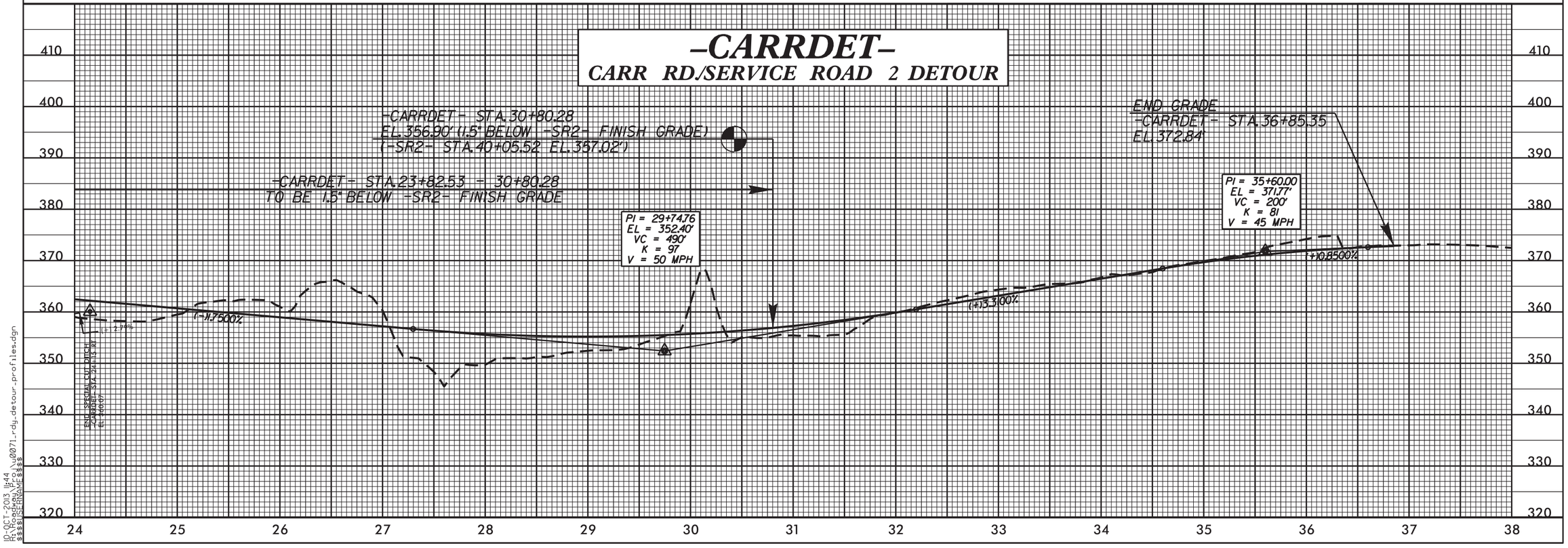
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

# -CARRDET-
## CARR RD./SERVICE ROAD 2 DETOUR




# -CARRDET-
## CARR RD./SERVICE ROAD 2 DETOUR

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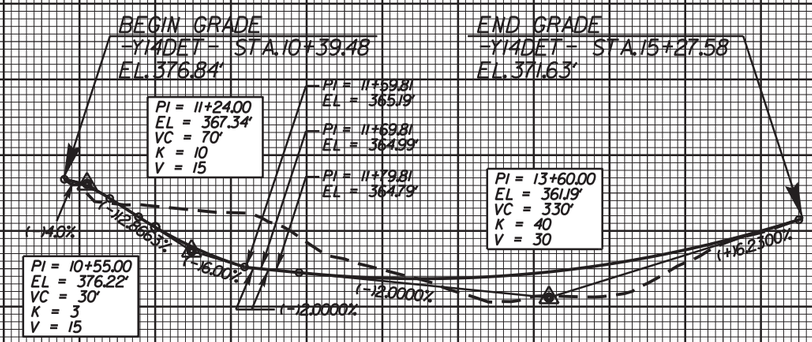
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-A1 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

# -Y14DET-

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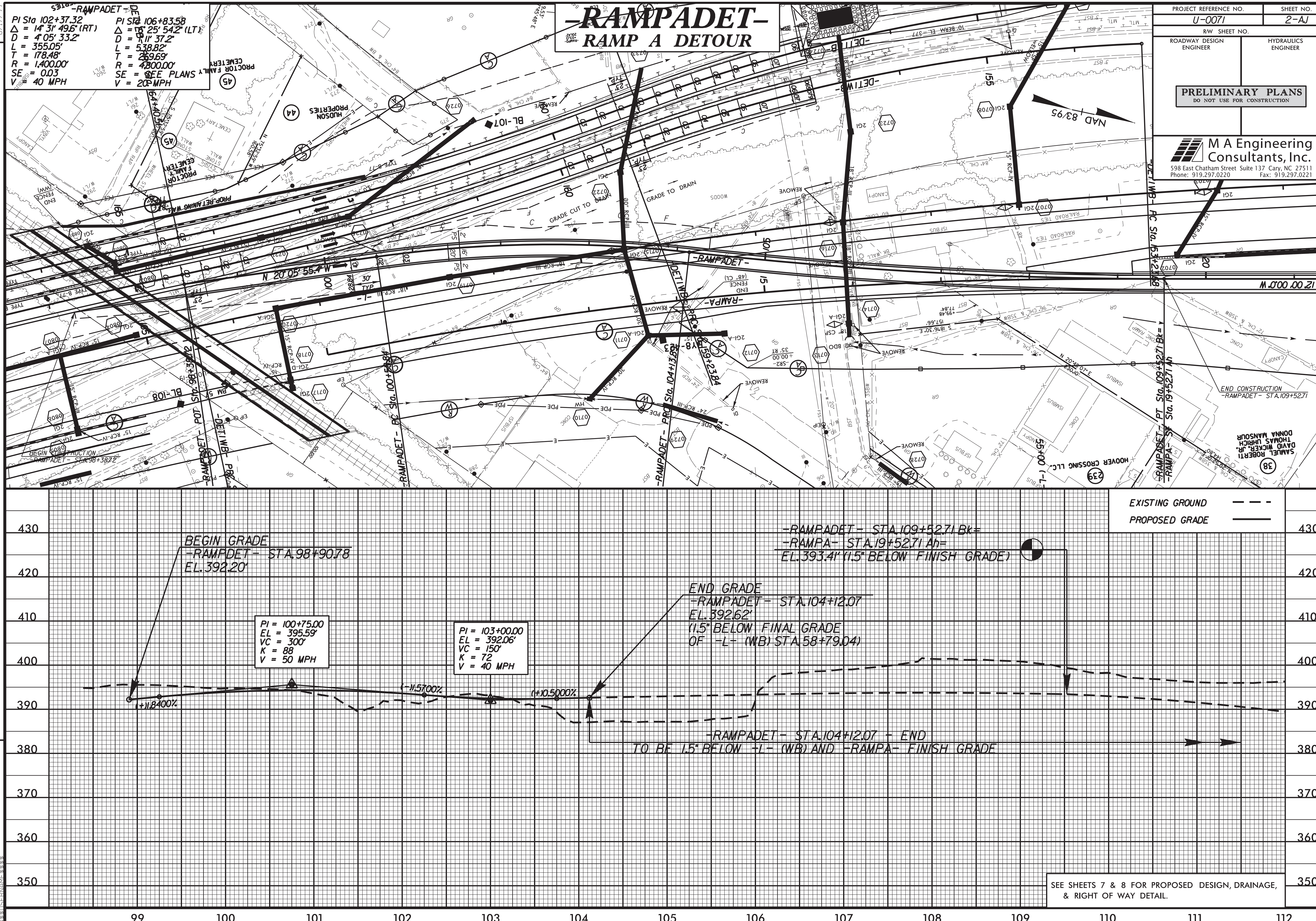


REVISIONS

8/17/99

10-OCT-2013 11:44
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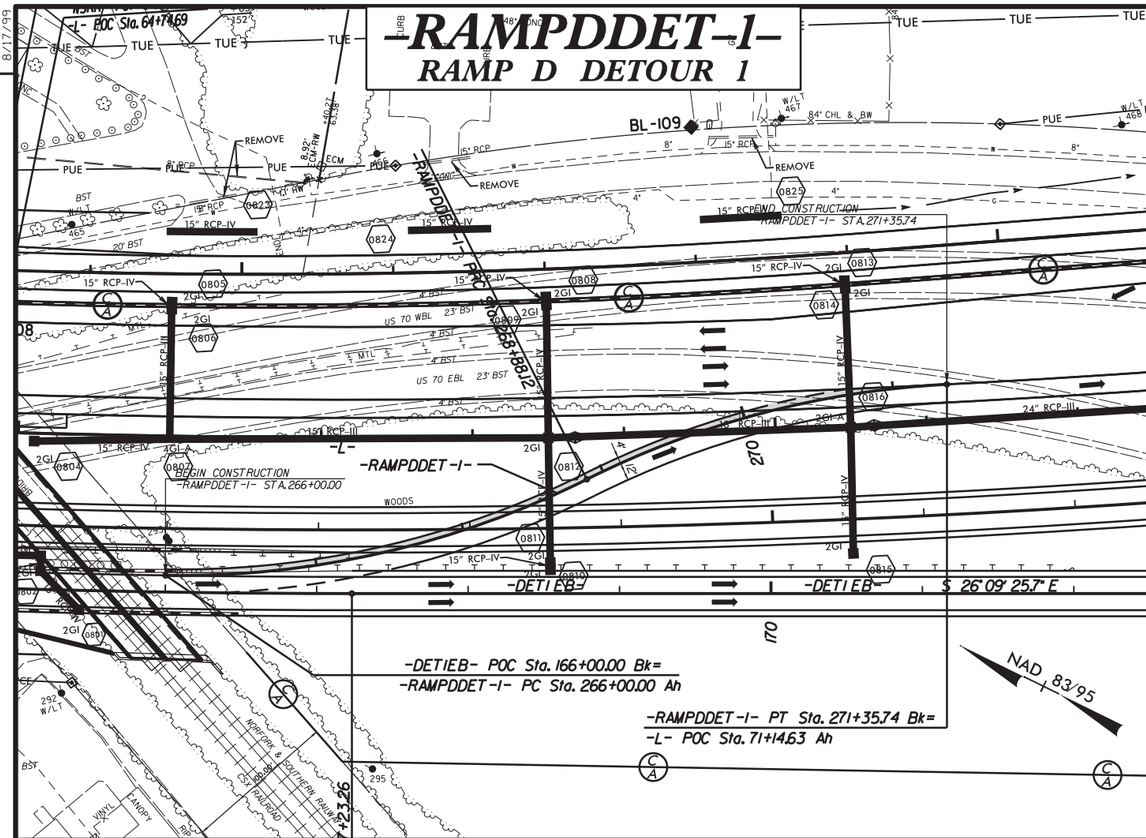
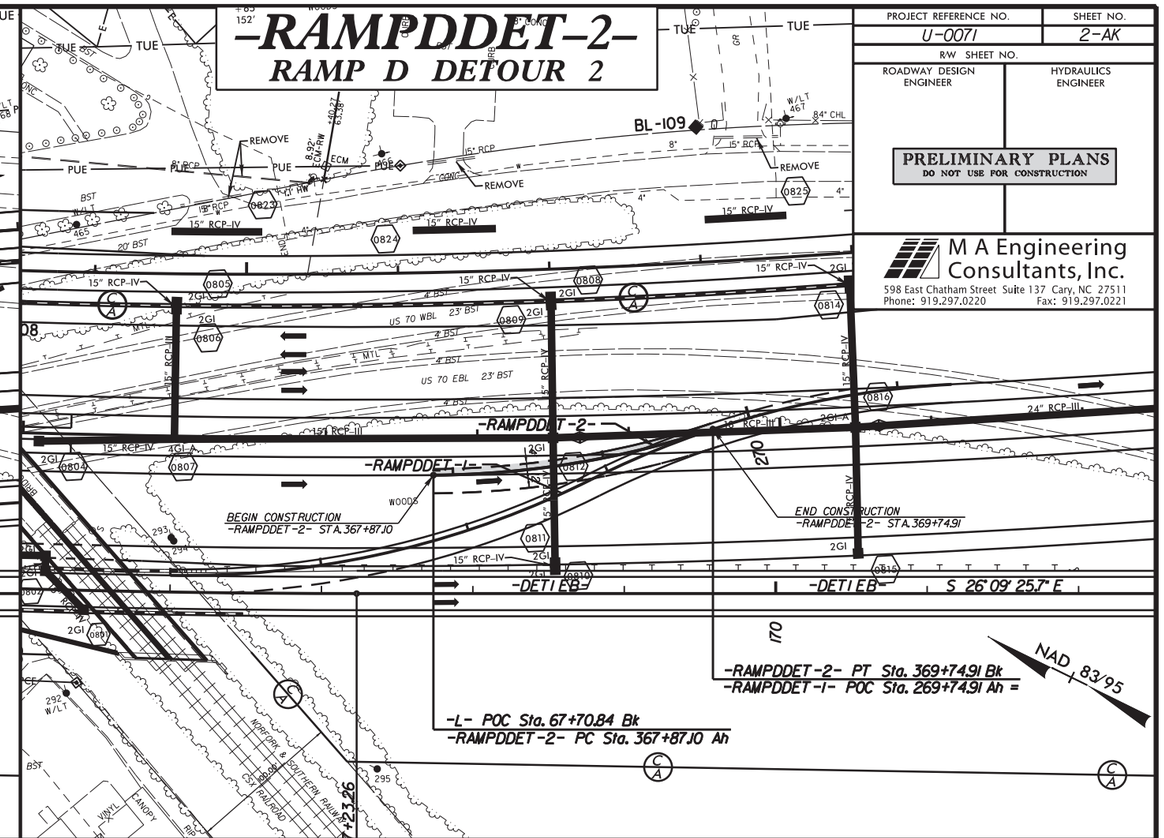
# -RAMPDDET-1-
## RAMP D DETOUR 1




# -RAMPDDET-2-
## RAMP D DETOUR 2

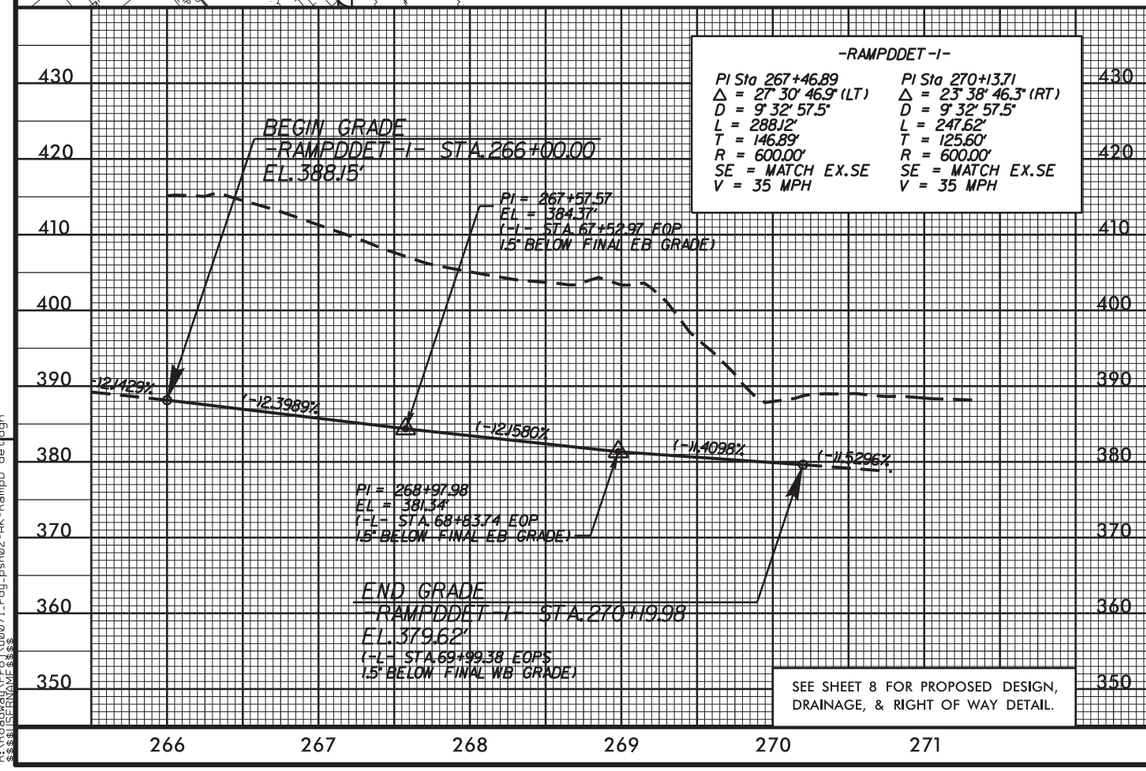



| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AK |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

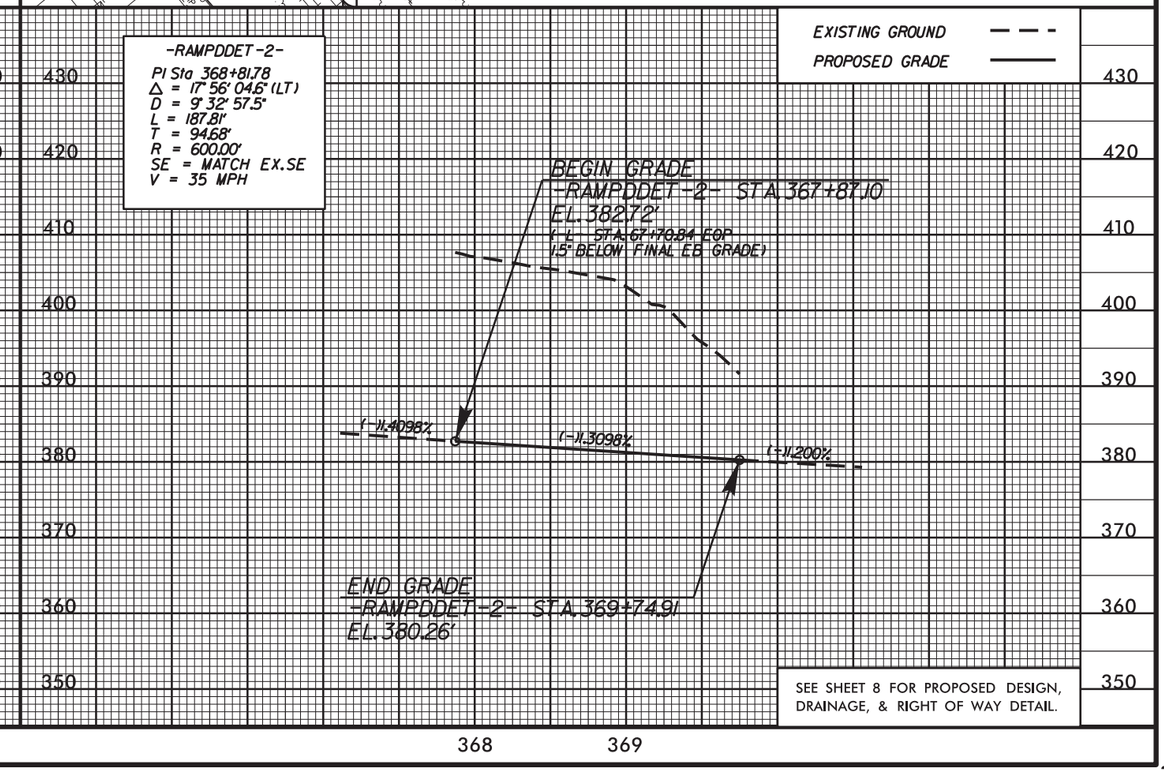
**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


EXISTING GROUND — — -
PROPOSED GRADE ———




SEE SHEET 8 FOR PROPOSED DESIGN, DRAINAGE, & RIGHT OF WAY DETAIL.




SEE SHEET 8 FOR PROPOSED DESIGN, DRAINAGE, & RIGHT OF WAY DETAIL.

REVISIONS

8/17/99

10-OCT-2013 11:44
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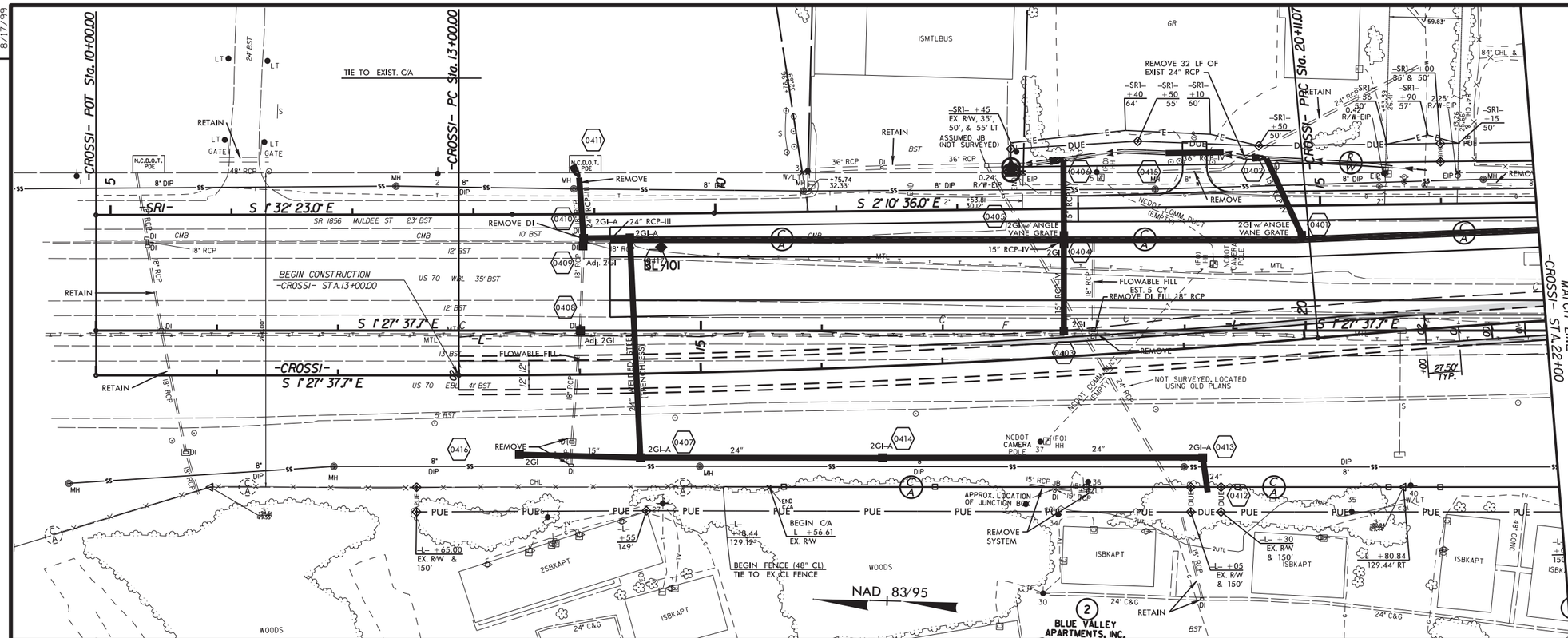
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AL |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


# -CROSS1-
## CROSSOVER 1

SEE SHEET 2-AM FOR -CROSS1- PROFILE
SEE SHEETS 4 & 5 FOR PROPOSED DESIGN, DRAINAGE, & RIGHT OF WAY DETAIL.




**DETAIL S1**
SPECIAL CUT DITCH
( Not to Scale)

FROM -L- STA 22+00 TO -L- STA 26+00 RT

| -CROSS1- | |
|---|---|
| PI Sta 16+55.76 | PI Sta 23+66.83 |
| Δ = 4° 59' 56.2" (LT) | Δ = 4° 59' 56.2" (RT) |
| D = 0° 42' 10.9" | D = 0° 42' 10.9" |
| L = 711.07' | L = 711.07' |
| T = 355.76' | T = 355.76' |
| R = 8150.00' | R = 8150.00' |
| SE = 0.02 | SE = 0.02 |
| V = 50 MPH | V = 50 MPH |

REVISIONS

8/17/99

10-OCT-2013 11:44
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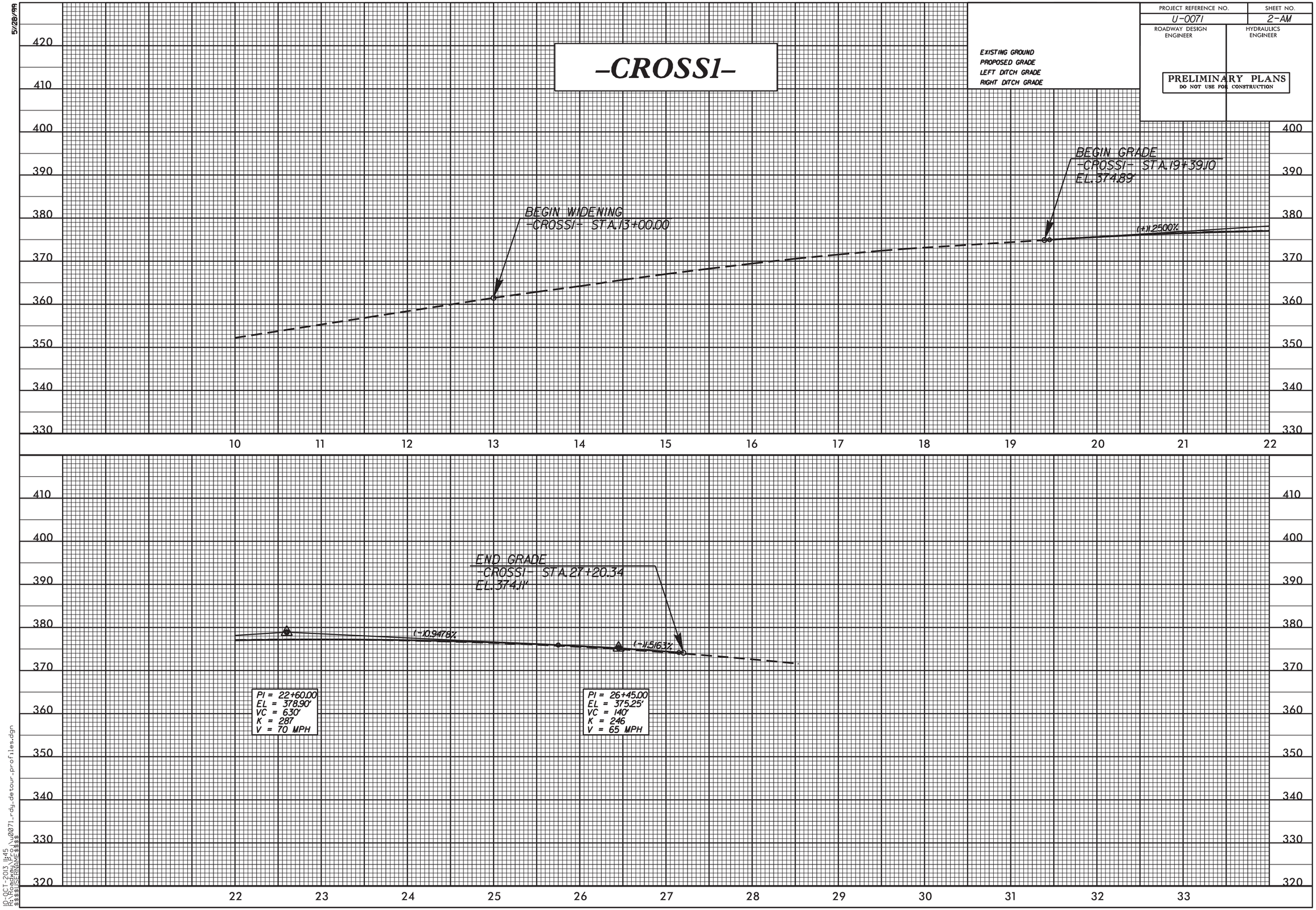
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AM |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

# -CROSS1-

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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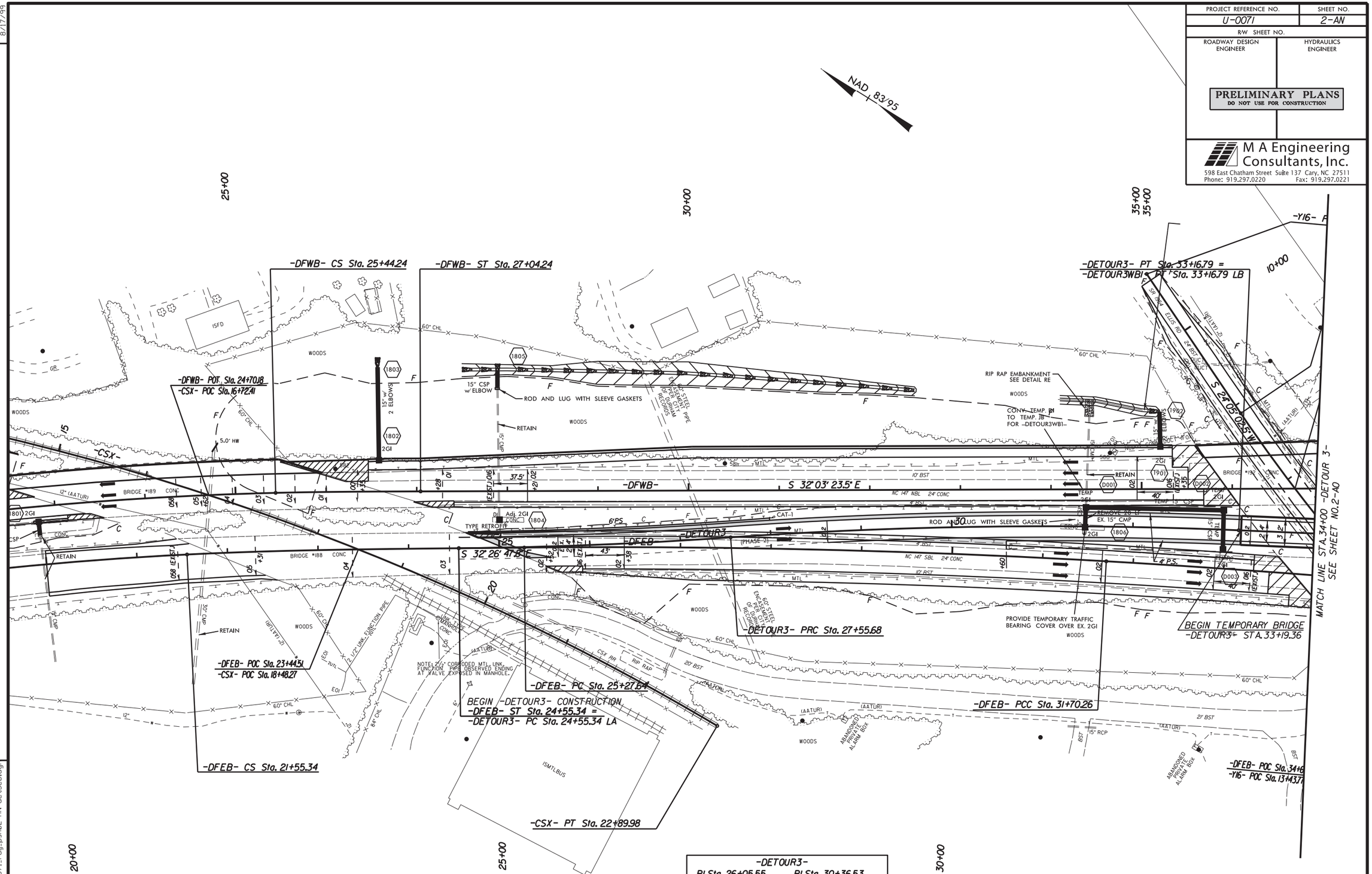
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AN |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221




| -DETOUR3- | |
|---|---|
| PI Sta 26+05.55 | PI Sta 30+36.53 |
| Δ = 3° 26' 29.9" (LT) | Δ = 6° 25' 47.7" (RT) |
| D = 1° 08' 45.3" | D = 1° 08' 45.3" |
| L = 300.34' | L = 561.12' |
| T = 150.21' | T = 280.85' |
| R = 5,000.00' | R = 5,000.00' |
| SE = 02 | SE = 02 |
| RO = 80' | RO = 80' |
| V = 55 MPH | V = 55 MPH |

GUARDRAIL & BARRIER SHOWN FOR DETOURS IS BASED ON ROADWAY RECOMMENDATIONS AND IS SUBJECT TO MODIFICATION OR SUBSTITUTION WITH BARRIER BY TRAFFIC CONTROL.

SEE SHEET 2-AV FOR -DETOUR3- PROFILE
SEE SHEETS 18 & 19 FOR PROPOSED ROADWAY, DRAINAGE, AND RIGHT OF WAY DETAIL.

# DETOUR 3

REVISIONS

8/17/99

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-A0 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

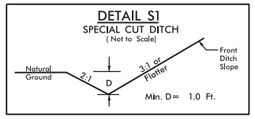
**-DETOUR3-**

| PI Sta 36+87.95 | PI Sta 51+98.49 |
|---|---|
| Δ = 3° 34' 39.2" (RT) | Δ = 15° 25' 38.8" (RT) |
| D = 1° 08' 45.3" | D = 0° 34' 22.6" |
| L = 312.20' | L = 2,692.59' |
| T = 156.15' | T = 1,354.49' |
| R = 5,000.00' | R = 10,000.00' |
| SE = 02 | SE = NC |
| RO = 80' | RO = N/A |
| V = 55 MPH | V = 55 MPH |

GUARDRAIL & BARRIER SHOWN FOR DETOURS IS BASED ON ROADWAY RECOMMENDATIONS AND IS SUBJECT TO MODIFICATION OR SUBSTITUTION WITH BARRIER BY TRAFFIC CONTROL.

SEE SHEET 2-AV FOR -DETOUR3- PROFILE
SEE SHEETS 12 & 19 FOR PROPOSED ROADWAY, DRAINAGE, AND RIGHT OF WAY DETAIL.

**DETAIL S1**
SPECIAL CUT DITCH
( Not to Scale)




FROM -DETOUR3- STA 44+59 TO STA 47+40 LT

NAD 83/95

-Y16- PC Sta. 11+10.36
-DFWB- POT Sta. 36+69.26
-Y16- POC Sta. 12+12.86
-LDFWB- ST Sta. 29+56.52 =
-DFWB- POT Sta. 38+98.71 (24' LT)
-LDFWB- CS Sta. 29+94.52
-DETOUR3- PCC Sta. 38+44.00
-DETOUR3- PC Sta. 35+31.79
S 32° 03' 23.5" E
S 29° 27' 30.0" E
N 23° 21' 14.4" W
S 5° 26' 44.8" W
-DFWB- TS Sta. 45+07.11
-DFWB- SC Sta. 47+17.11
-DFFLY- ST Sta. 39+89.70
-DFFLY- SC Sta. 37+64.52
-DFFLY- CS Sta. 37+97.70
-DFFLY- SRS Sta. 35+72.52
-DFFLY- CS Sta. 34+28.52
-Y16- PT Sta. 16+63.37
-DFFLY- POT Sta. 41+89.35 =
-DFEB- POC Sta. 36+00.00
Δ = 3° 00' (12.00' RT)
-Y16- POT Sta. 18+96.71
END TEMPORARY BRIDGE
-DETOUR3- STA 35+18.77
MATCH LINE STA 34+00 -DETOUR 3- SEE SHEET NO. 2-AN
MATCH LINE STA 48+00 -DETOUR 3- SEE SHEET NO. 2-AP
SPECIAL CUT DITCH SEE DETAIL S1
REMOVE
REMOVE FLOWABLE FILL EST 4.7 CY
Conv. 3GI To JB w/MH
RETAIN
TEMP 2GI
TEMP. 15"
NCDOT COMM. DUCT (FO)
NC 147 NBL 24' CONC
NC 147 SBL 24' CONC
(PHASE 3)
(PHASE 2)
WOODS
WATER
ISFD
ISMTL BUS
CONC

# DETOUR 3

REVISIONS

8/17/99

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-DETOUR3-
PI Sta 51+98.49
Δ = 15° 25' 38.8" (RT)
D = 0° 34' 22.6"
L = 2,692.59'
T = 1,354.49'
R = 10,000.00'
SE = NC
RO = N/A
V = 55 MPH

SEE SHEET 2-AW FOR -DETOUR3- PROFILE
SEE SHEET 12 FOR PROPOSED ROADWAY, DRAINAGE, AND RIGHT OF WAY DETAIL.

GUARDRAIL & BARRIER SHOWN FOR DETOURS IS BASED ON ROADWAY RECOMMENDATIONS AND IS SUBJECT TO MODIFICATION OR SUBSTITUTION WITH BARRIER BY TRAFFIC CONTROL.

NAD 83/95

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AP |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

REVISIONS

8/17/99

-LDFEB-
-DFLW-
-DFLY-
-DFWB-
-DETOUR3-
-DFLY- POC Sta. 24+93.02
-LDFEB- POC Sta. 155+05.03
-LDFEB- POC Sta. 157+33.78
-DFWB- POC Sta. 55+18.77
-DFWB- CS Sta. 57+31.56
-DFWB- SRS Sta. 59+41.56
-DFWB- SC Sta. 61+51.56
-DFLW- CS Sta. 41+86.20
-DFWB- CS Sta. 62+10.00
-DFWB- ST Sta. 63+50.00
-DFEB- CS Sta. 48+50.45
-DFEB- SC Sta. 49+10.45
-DFEB- CS Sta. 53+11.24
-DFEB- SRS Sta. 54+31.24
-DFEB- SC Sta. 55+21.24
-DFEB- CS Sta. 57+36.10
-LDFEB- CS Sta. 163+25.68
-DFEB- SC Sta. 58+26.10

MATCH LINE STA 48+00 -DETOUR 3- SEE SHEET NO.2-AO

MATCH LINE STA 62+00 -DETOUR 3- SEE SHEET NO.2-AO

CLASS "II" RIP RAP
EST. 60 SY
62 SY GFG
33 TONS
NOTE: RIPRAP PAD TO BE COUNTERSUNK

REMOVE EX. SYSTEM IN PHASE 3

TAIL BASE DITCH SEE DETAIL 14

INSTALL IN PHASE 3 RETAIN FOR FINAL DRAINAGE

PARTIALLY CONSTRUCT 1246 AS JB IN PHASE 1 USING TEMP. TRAFFIC BEARING COVER. ADJUST TO 2GI AND RETAIN FOR FINAL DRAINAGE. NOTE: PROPOSED BOX INVERT WILL BE LOWER THAN THE EXISTING DOWNSTREAM INVERT FOR THE TEMPORARY CONDITION.

CONSTRUCT 32 +/- NCDOT COMM. DUCT IN PHASE 1 AND INSTALL TEMP PLUGS.

REMOVE IN PHASE 3
RETAIN EX. DI FOR TEMP DRAINAGE & ADJUST TEMP SHORING AS NEEDED.

INSTALL TEMP. 48" CSP IN PHASE 1, REMOVE DURING PHASE 3 DRAINAGE INSTALL.

PROPOSED RETAINING WALL

INSTALL PART OF SYSTEM IN PHASE 1, RETAIN FOR FINAL DRAINAGE

SPECIAL CUT DITCH SEE DETAIL S1

CONSTRUCT 52 +/- IN PHASE 1 AND INSTALL TEMP PLUGS

INSTALL REMAINDER OF 30" RCP IN PHASE 2 RETAIN FOR FINAL DRAINAGE

REMOVE IN PHASE 2

## DETAIL S1
SPECIAL CUT DITCH
( Not to Scale)

Natural Ground — 2:1 — D — 3:1 or Flatter — Front Ditch Slope

Min. D= 1.0 Ft.

FROM -DETOUR3- STA 49+73 TO STA 52+17 RT

# DETOUR 3

10-OCT-2013 11:45
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AQ |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

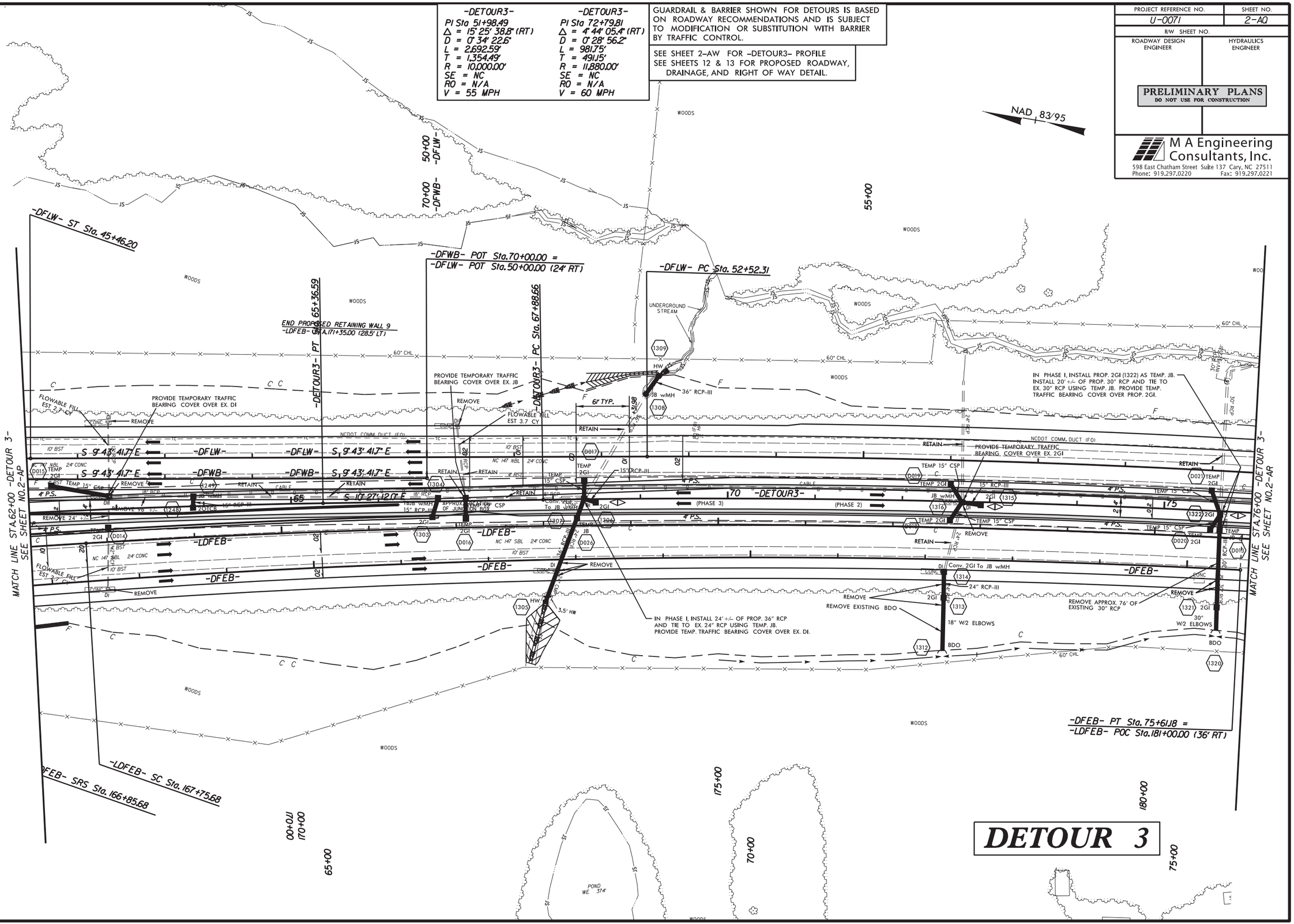
**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


| -DETOUR3- | -DETOUR3- |
|---|---|
| PI Sta 51+98.49 | PI Sta 72+79.81 |
| Δ = 15° 25' 38.8" (RT) | Δ = 4° 44' 05.4" (RT) |
| D = 0° 34' 22.6" | D = 0° 28' 56.2" |
| L = 2,692.59' | L = 981.75' |
| T = 1,354.49' | T = 491.15' |
| R = 10,000.00' | R = 11,880.00' |
| SE = NC | SE = NC |
| RO = N/A | RO = N/A |
| V = 55 MPH | V = 60 MPH |

GUARDRAIL & BARRIER SHOWN FOR DETOURS IS BASED ON ROADWAY RECOMMENDATIONS AND IS SUBJECT TO MODIFICATION OR SUBSTITUTION WITH BARRIER BY TRAFFIC CONTROL.

SEE SHEET 2-AW FOR -DETOUR3- PROFILE
SEE SHEETS 12 & 13 FOR PROPOSED ROADWAY, DRAINAGE, AND RIGHT OF WAY DETAIL.




REVISIONS

8/17/99

10-OCT-2013 11:45
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$$$$USERNAME$$$$

| -DETOUR3- | -DETOUR3- | -DETOUR3- | -DETOUR3- |
|---|---|---|---|
| PI Sta 72+79.81 | PI Sta 80+05.79 | PI Sta 83+29.27 | PI Sta 90+91.04 |
| Δ = 4° 44' 05.4" (RT) | Δ = 5° 23' 26.6" (RT) | Δ = 2° 01' 35.9" (LT) | Δ = 3° 42' 27.5" (RT) |
| D = 0° 28' 56.2" | D = 1° 08' 45.3" | D = 1° 08' 45.3" | D = 0° 36' 32.0" |
| L = 981.75' | L = 470.43' | L = 176.86' | L = 608.92' |
| T = 491.15' | T = 235.39' | T = 88.44' | T = 304.57' |
| R = 11,880.00' | R = 5,000.00' | R = 5,000.00' | R = 9,410.00' |
| SE = NC | SE = 02 | SE = 02 | SE = NC |
| RO = N/A | RO = 80' | RO = 80' | RO = N/A |
| V = 60 MPH | V = 55 MPH | V = 55 MPH | V = 55 MPH |

GUARDRAIL & BARRIER SHOWN FOR DETOURS IS BASED ON ROADWAY RECOMMENDATIONS AND IS SUBJECT TO MODIFICATION OR SUBSTITUTION WITH BARRIER BY TRAFFIC CONTROL.

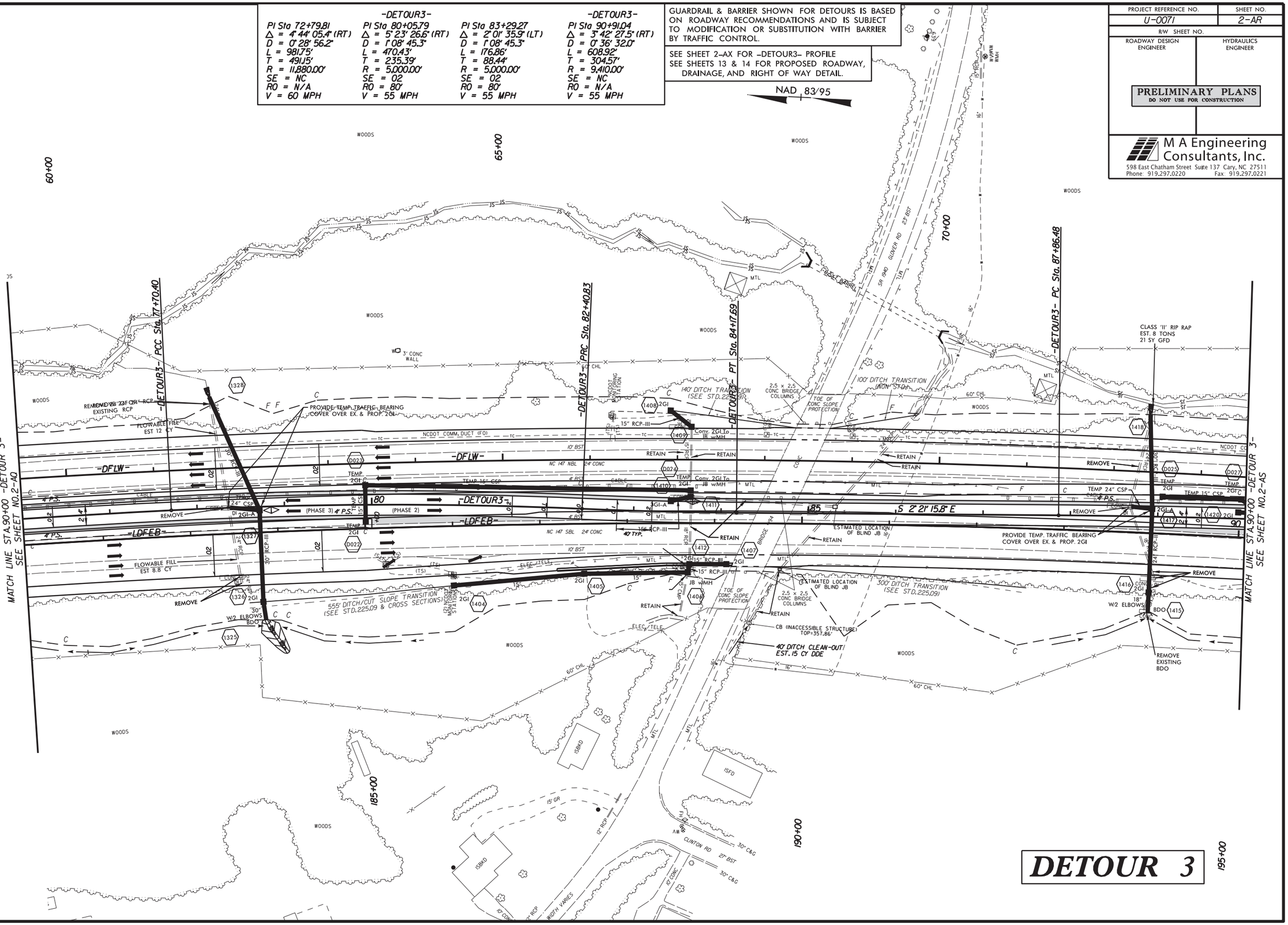
SEE SHEET 2-AX FOR -DETOUR3- PROFILE
SEE SHEETS 13 & 14 FOR PROPOSED ROADWAY, DRAINAGE, AND RIGHT OF WAY DETAIL.

NAD 83/95

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AR |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221




REVISIONS

8/17/99

10-OCT-2013 11:45
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$$$$USERNAME$$$$

| -DETOUR3- | -DETOUR3- |
|---|---|
| PI Sta 90+91.04 | PI Sta 101+96.44 |
| Δ = 3° 42' 27.5" (RT) | Δ = 4° 28' 12.2" (LT) |
| D = 0° 36' 32.0" | D = 0° 52' 06.8" |
| L = 608.92' | L = 514.65' |
| T = 304.57' | T = 257.45' |
| R = 9,410.00' | R = 6,596.58' |
| SE = NC | SE = 02 |
| RO = N/A | RO = 80' |
| V = 55 MPH | V = 55 MPH |

GUARDRAIL & BARRIER SHOWN FOR DETOURS IS BASED ON ROADWAY RECOMMENDATIONS AND IS SUBJECT TO MODIFICATION OR SUBSTITUTION WITH BARRIER BY TRAFFIC CONTROL.

SEE SHEET 2-AX FOR -DETOUR3- PROFILE
SEE SHEETS 14 & 15 FOR PROPOSED ROADWAY, DRAINAGE, AND RIGHT OF WAY DETAIL.

NAD 83/95

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AS |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
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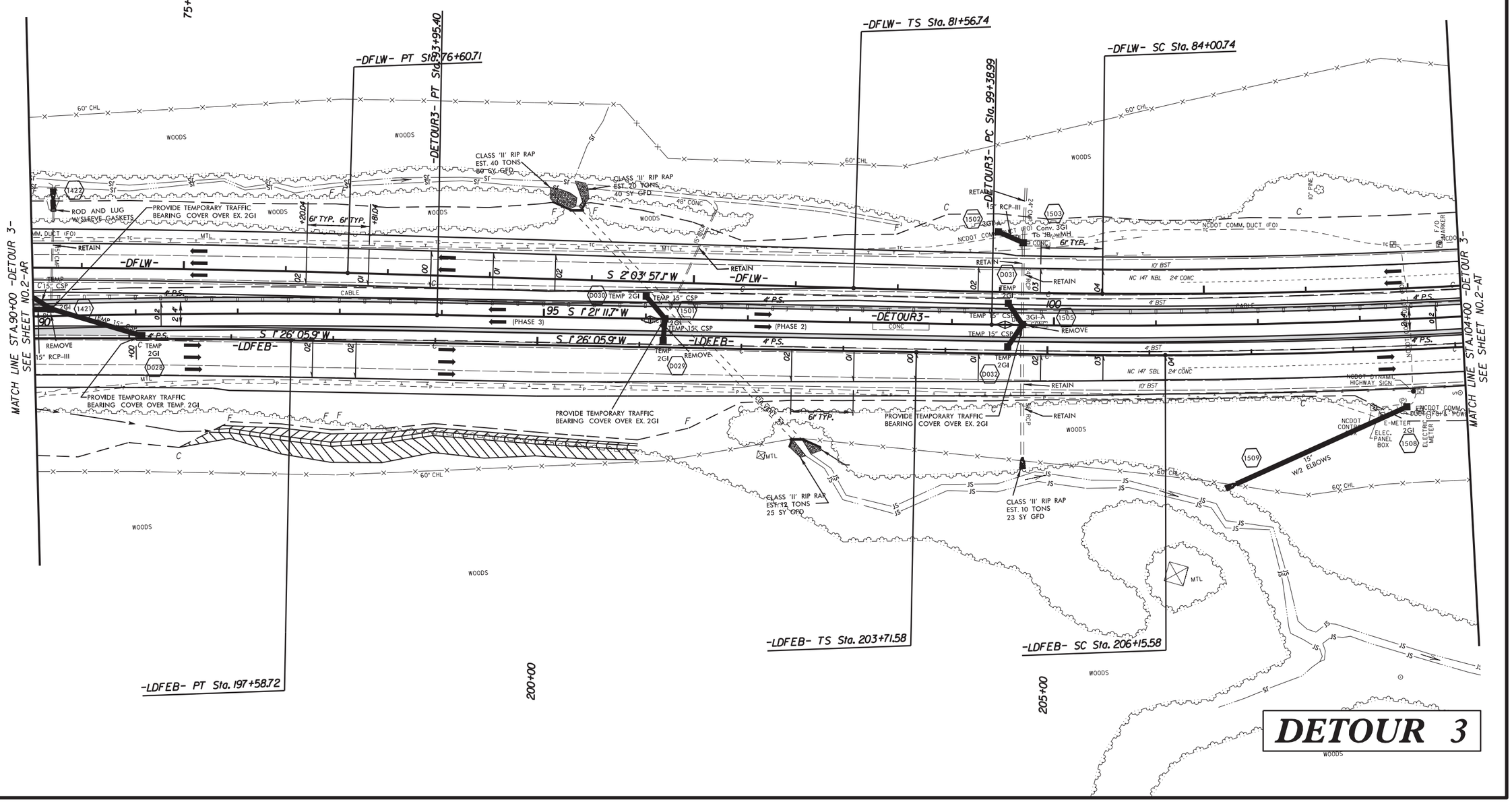
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221




REVISIONS

8/17/99

10-OCT-2013 11:45
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AT |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
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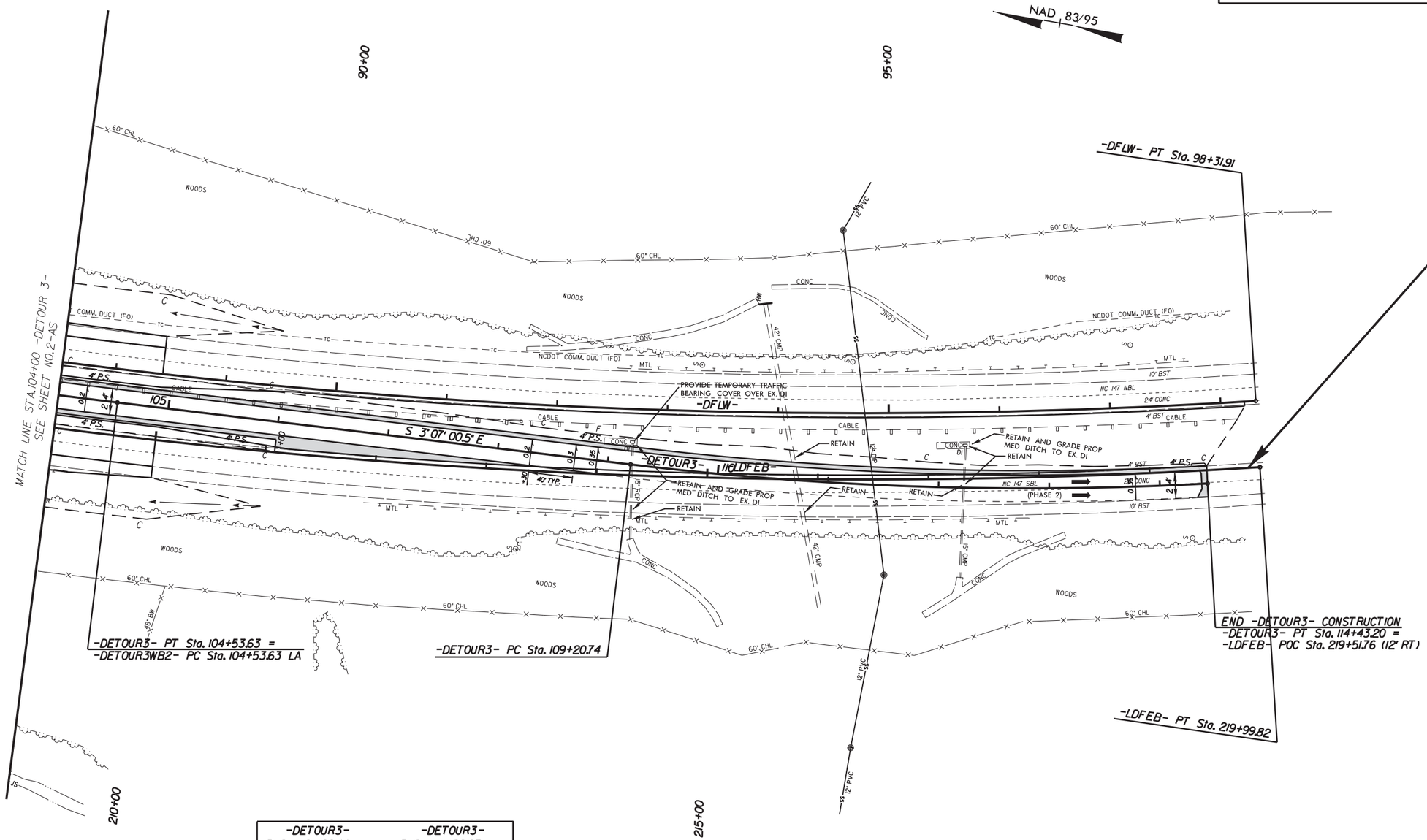
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


| -DETOUR3- | -DETOUR3- |
|---|---|
| PI Sta 101+96.44 | PI Sta 111+82.63 |
| Δ = 4° 28' 12.2" (LT) | Δ = 9° 58' 41.9" (LT) |
| D = 0° 52' 06.8" | D = 1° 54' 35.5" |
| L = 514.65' | L = 522.46' |
| T = 257.45' | T = 261.89' |
| R = 6,596.58' | R = 3,000.00' |
| SE = 02 | SE = 035 (EX.) |
| RO = 80' | RO = 140' |
| V = 55 MPH | V = 55 MPH |

SEE SHEET 2-AY FOR -DETOUR3- PROFILE
SEE SHEETS 18 & 19 FOR PROPOSED ROADWAY, DRAINAGE, AND RIGHT OF WAY DETAIL.

GUARDRAIL & BARRIER SHOWN FOR DETOURS IS BASED ON ROADWAY RECOMMENDATIONS AND IS SUBJECT TO MODIFICATION OR SUBSTITUTION WITH BARRIER BY TRAFFIC CONTROL.

# DETOUR 3

REVISIONS

8/17/99

10-OCT-2013 11:45
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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AU |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
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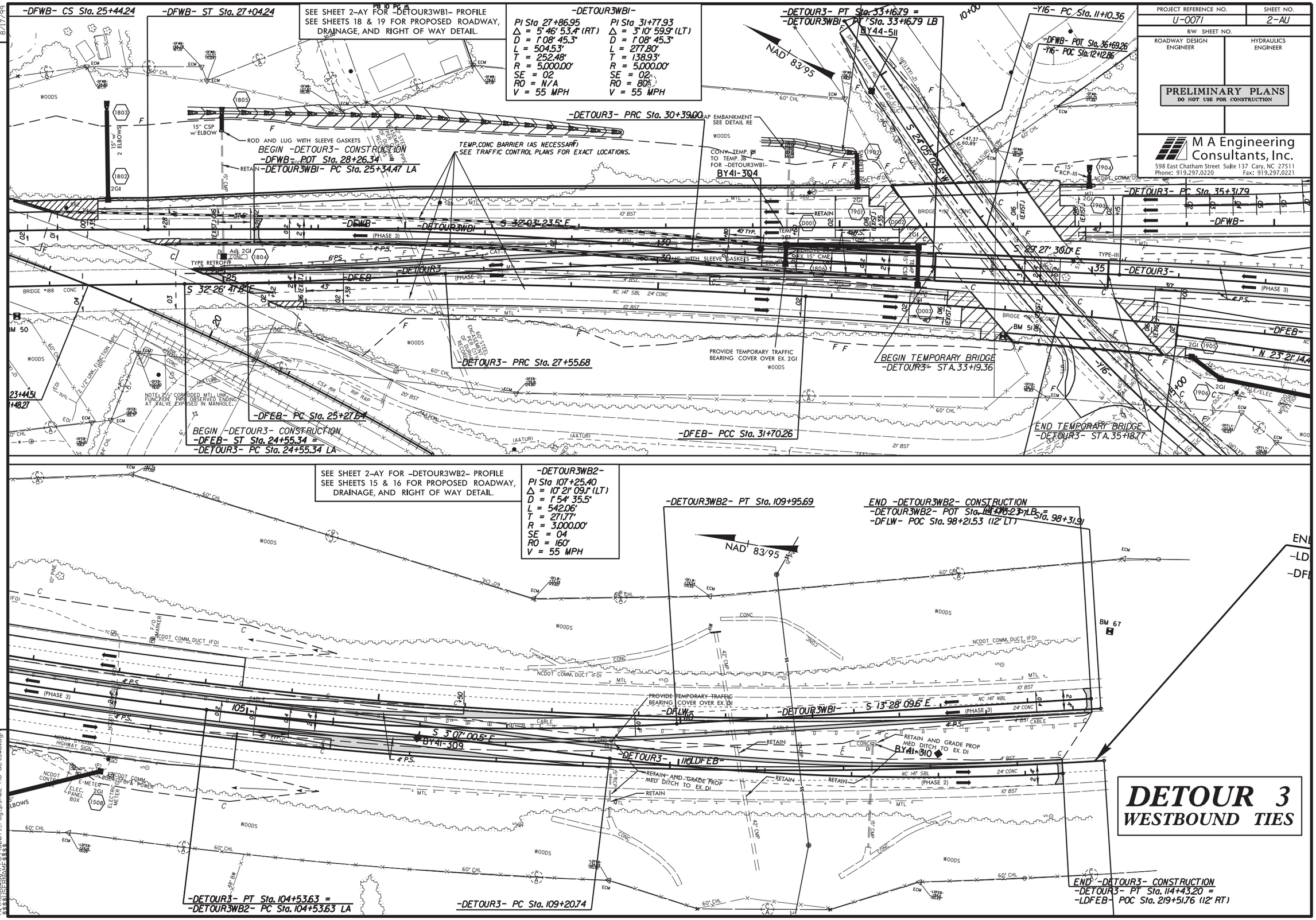


# DETOUR 3
## WESTBOUND TIES

REVISIONS

8/17/99

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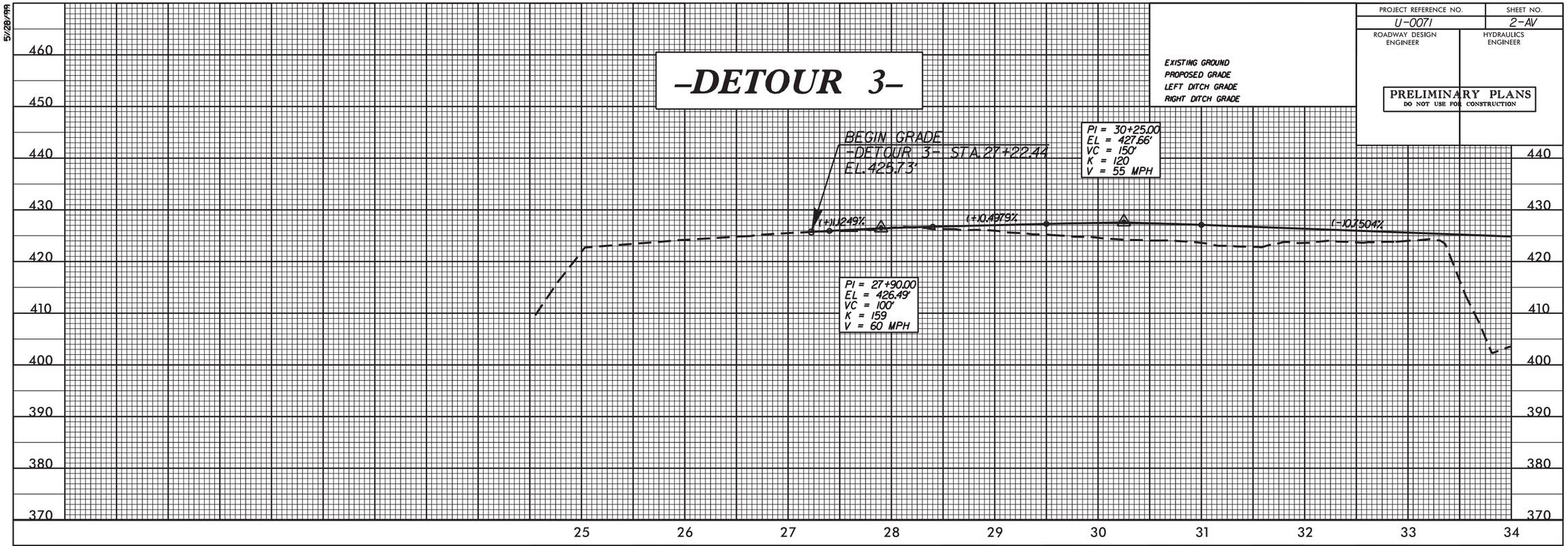
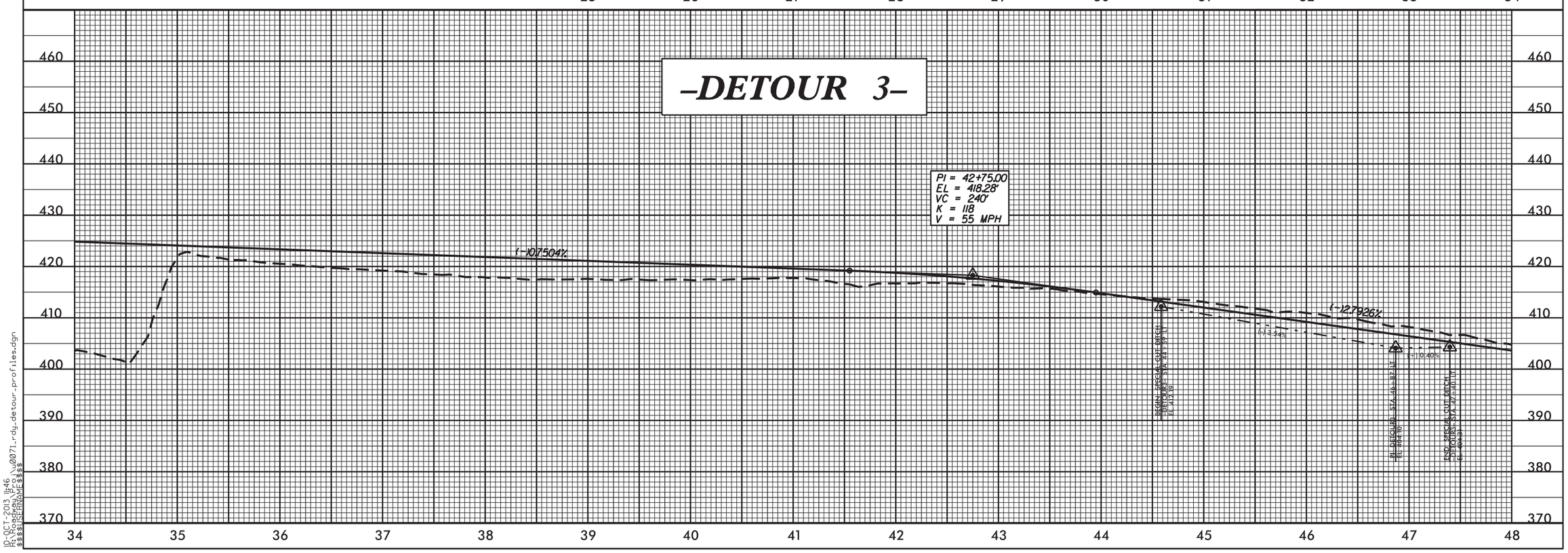
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AV |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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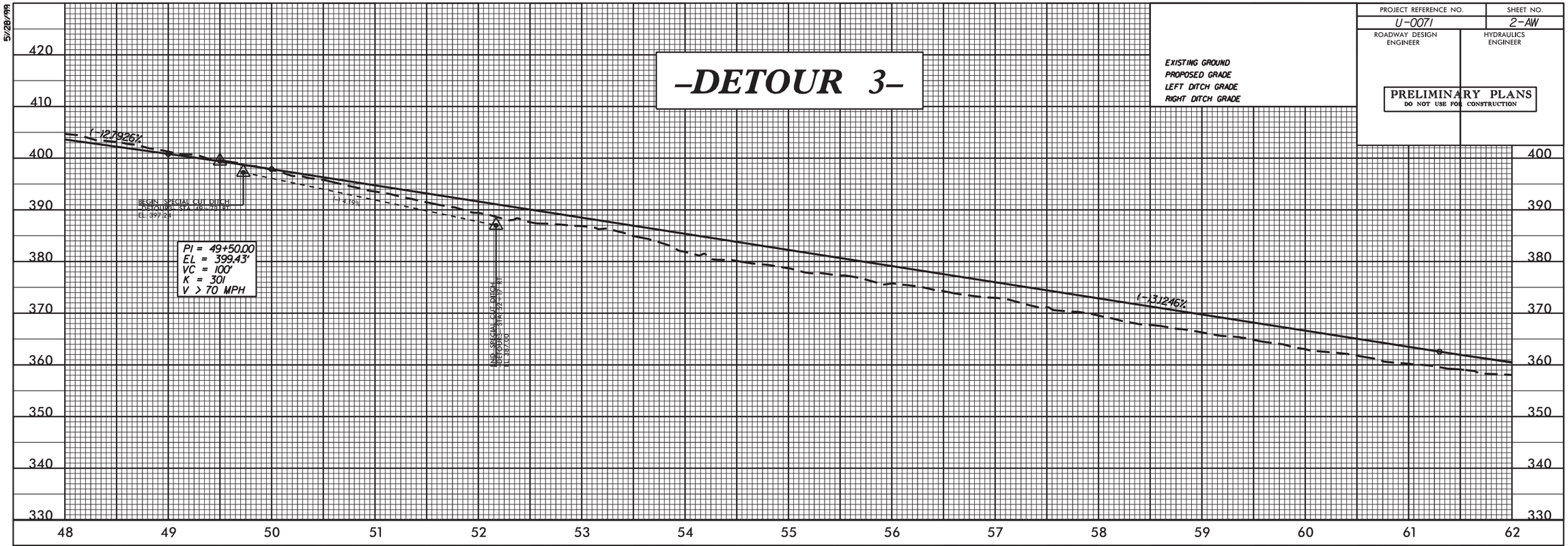
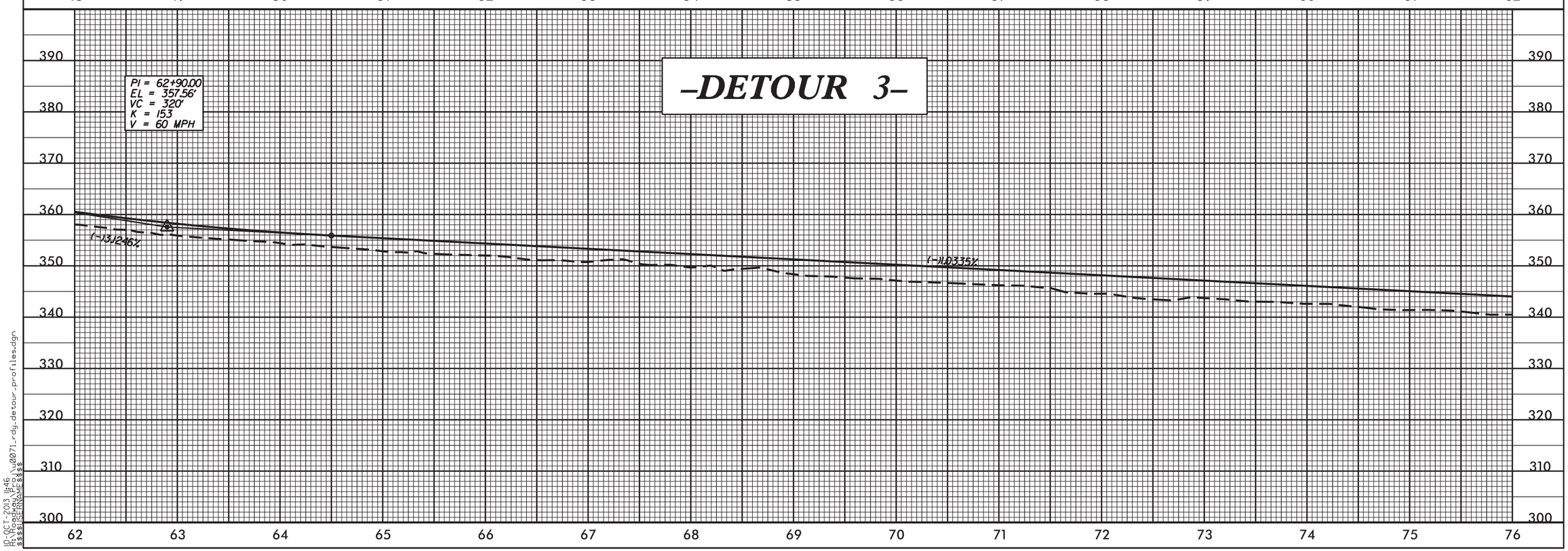
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AW |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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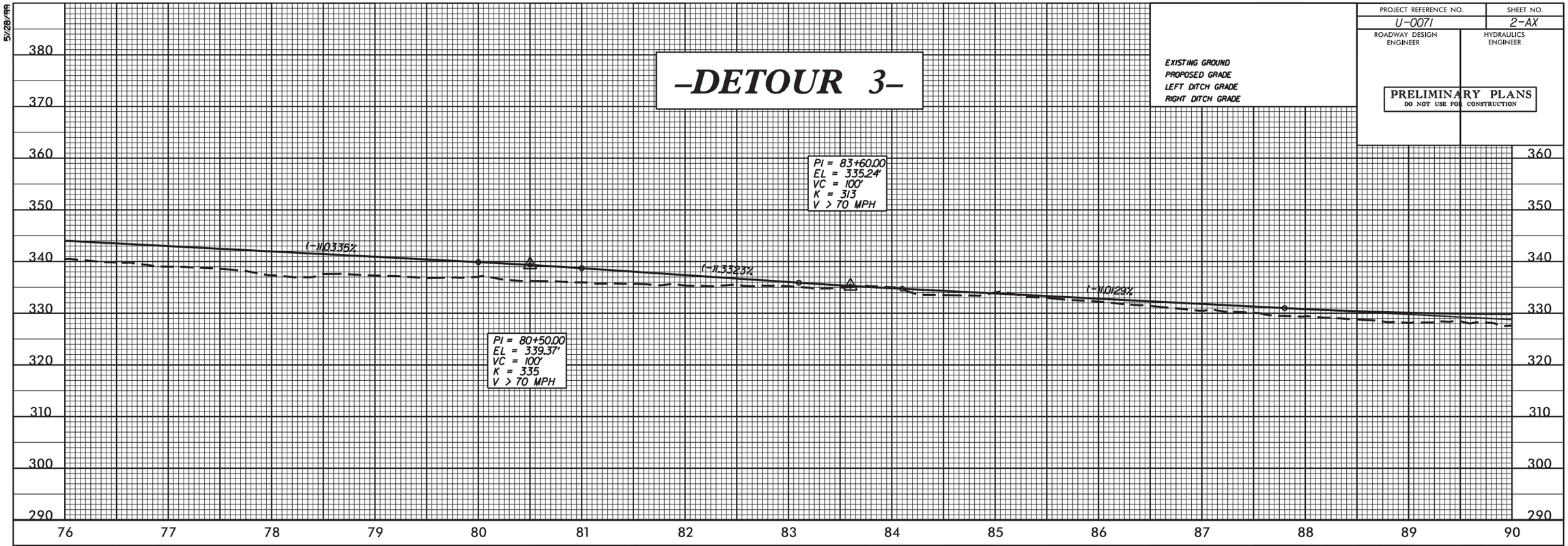
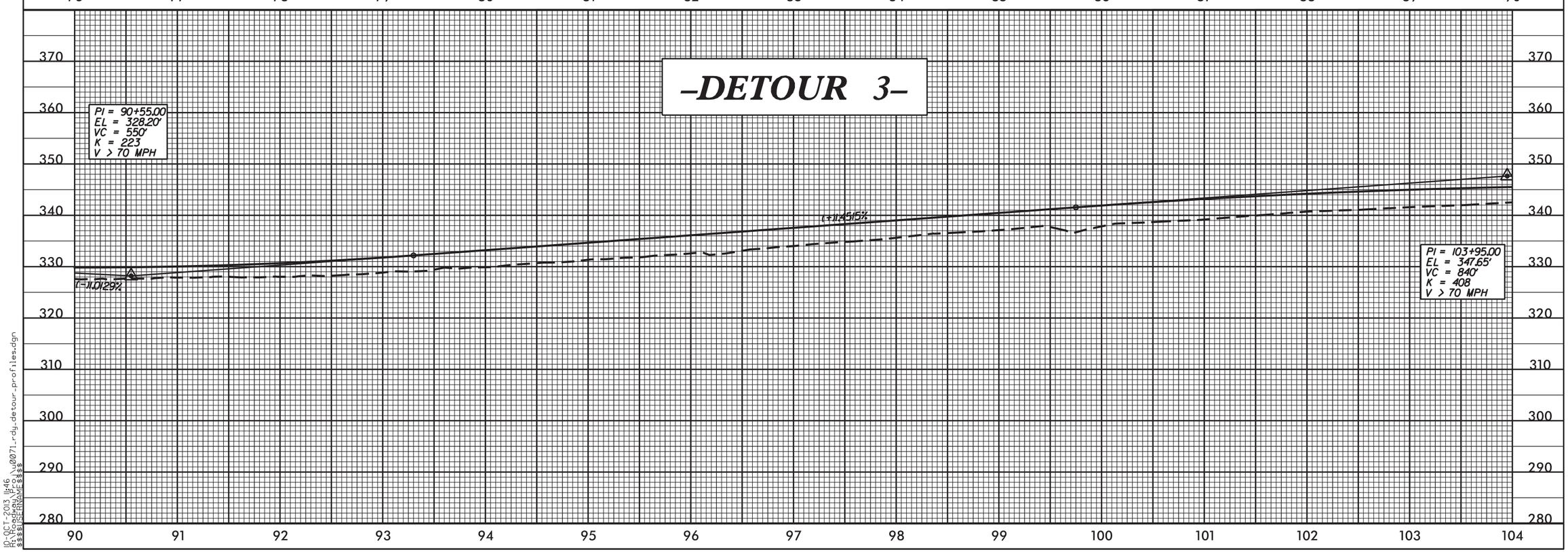
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AX |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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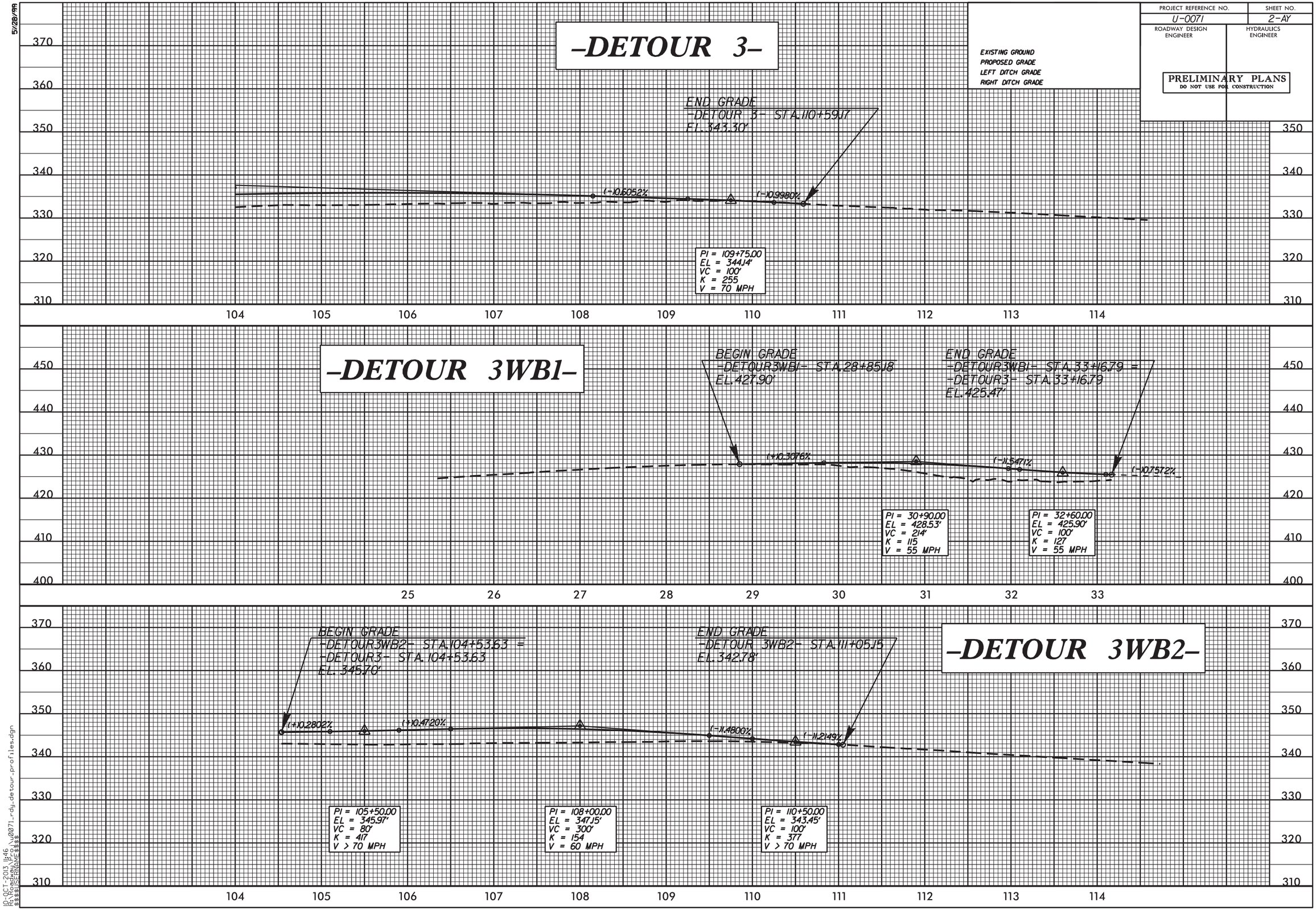
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 2-AY |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE



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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 4 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
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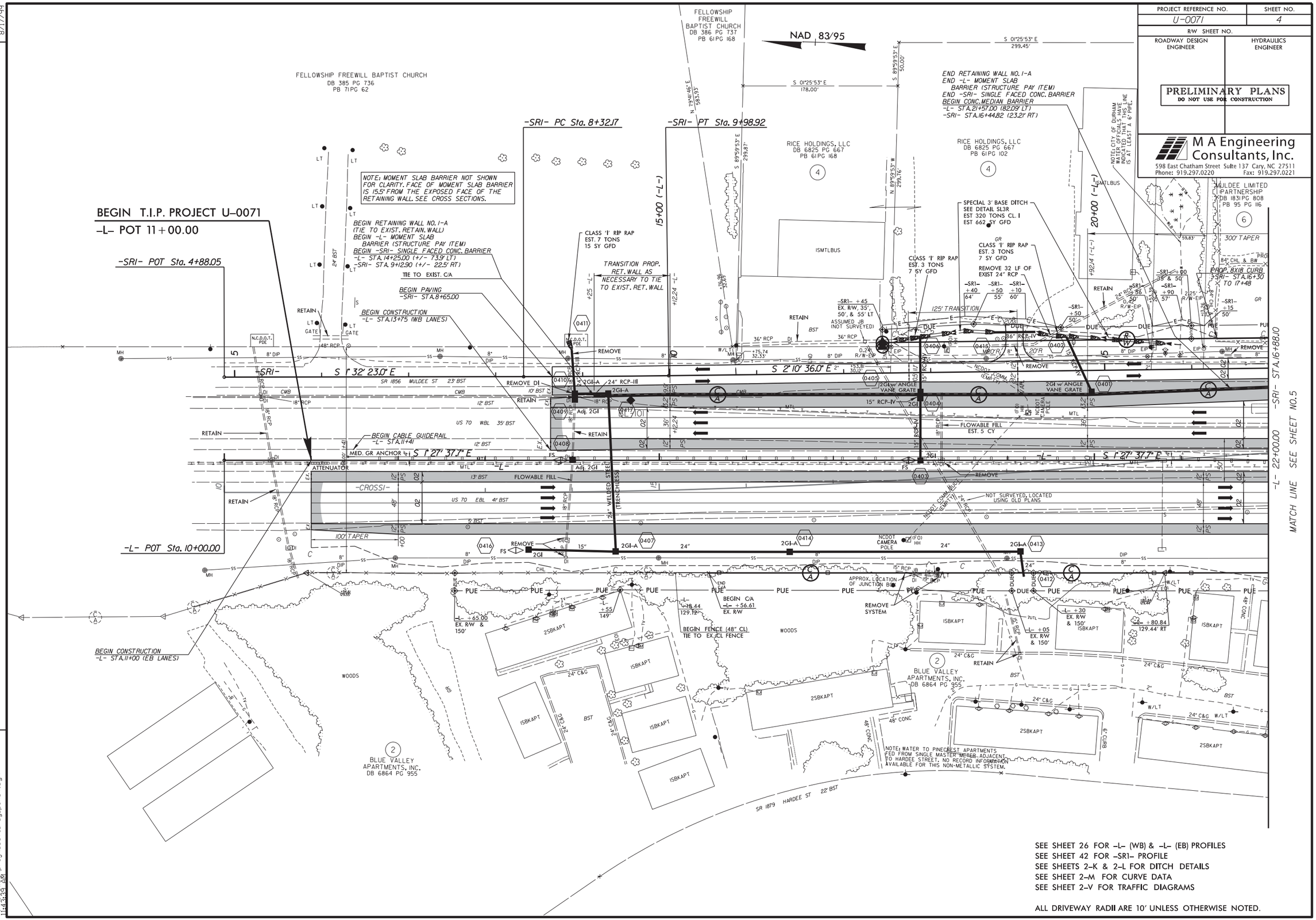


REVISIONS

R/W REVISION 06/04/202 RWP PARCEL NOS. 4 & 5 COMBINED INTO PARCEL NO. 4, AND PARCEL NAME CHANGED TO "RICE HOLDINGS, LLC".
R/W REVISION 02/22/203 KSH PARCEL NO. 2 NAME CHANGED.

8/17/99

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 5 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
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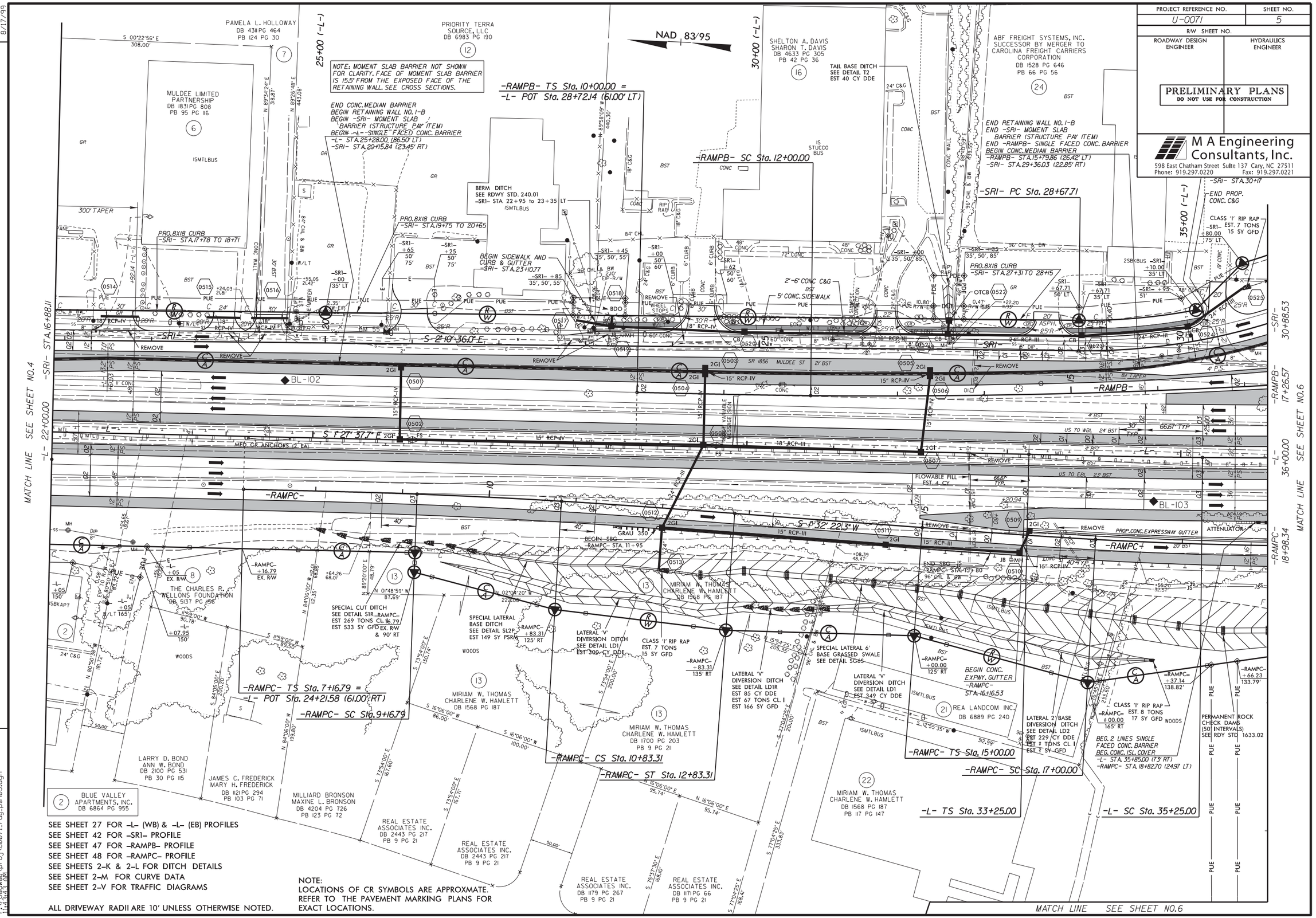
REVISIONS

| | | | |
|---|---|---|---|
| R/W REVISION | 06/04/2002 | RMP | PARCEL NOS. 13, 17, & 18 COMBINED INTO PARCEL NO. 13. |
| R/W REVISION | 02/22/2013 | KSH | PARCEL NOS. 21, 22, 23 AND 24 NAMES CHANGED. |
| R/W REVISION | 08/26/2013 | MRP | PERMANENT UTILITY EASEMENT ADDED TO PARCEL 22. |

8/17/99

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5017 | 6 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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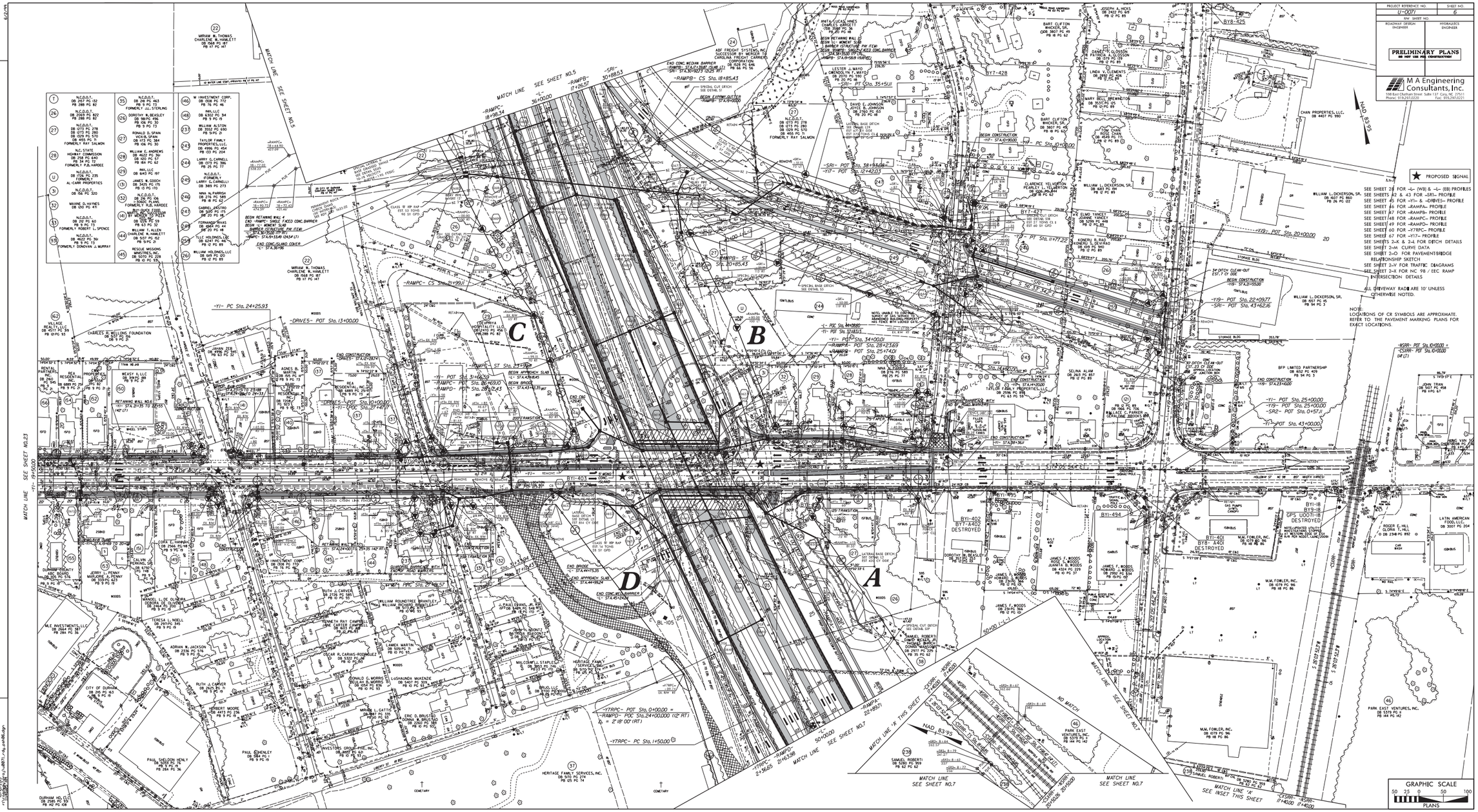
708 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.267.7020 Fax: 919.267.2021

★ PROPOSED SIGNAL

SEE SHEET 28 FOR -L- (WB) & -L- (EB) PROFILES
SEE SHEETS 42 & 43 FOR -SR1- PROFILE
SEE SHEET 45 FOR -Y1- & -DRIVE5- PROFILE
SEE SHEET 46 FOR -RAMPA- PROFILE
SEE SHEET 47 FOR -RAMPB- PROFILE
SEE SHEET 48 FOR -RAMPC- PROFILE
SEE SHEET 49 FOR -RAMPD- PROFILE
SEE SHEET 60 FOR -Y7RPC- PROFILE
SEE SHEET 67 FOR -Y17- PROFILE
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-M FOR CURVE DATA
SEE SHEET 2-O FOR PAVEMENT/BRIDGE RELATIONSHIP SKETCH
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS
SEE SHEET 2-X FOR NC 98 / EEC RAMP INTERSECTION DETAILS

ALL DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED.

NOTE:
LOCATIONS OF CR SYMBOLS ARE APPROXIMATE. REFER TO THE PAVEMENT MARKING PLANS FOR EXACT LOCATIONS.




| R/W REVISION | 06/04/2002 | RWP | PARCEL NOS. 46 & 274 COMBINED INTO PARCEL NO. 46, PARCEL NOS. 137, 138, & 139 COMBINED INTO PARCEL NO. 238, PARCEL NO. 238 & 240 COMBINED INTO PARCEL NO. 238. |
|---|---|---|---|
| R/W REVISION | 02/22/2003 | KSH | PARCEL NOS. 24, 129, 137, 140, 141, 148, 151, 152, 154, 259 AND 261 NAMES CHANGED. |
| R/W REVISION | 03/22/2003 | RWP | INSET ADDED TO SHEET 6 DUE TO R/W AND SHEET LAYOUT REVISION ON SHEET 7. PART OF PARCEL NO. 46 ADDED TO PARCELS 22 AND 238. |
| R/W REVISION | 08/28/2003 | RWP | PERMANENT UTILITY EASEMENT ADDED TO PARCELS 22 AND 238. TEMPORARY UTILITY EASEMENT REVISED AND CHANGED TO PERMANENT UTILITY EASEMENT ON PARCEL 46. |

REVISIONS

PARCEL NO. 137, PART OF TEMPORARY UTILITY EASEMENT AND STA/OFF FLAG ON PARCEL 46 NOW SHOWN ON THIS SHEET.

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 7 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

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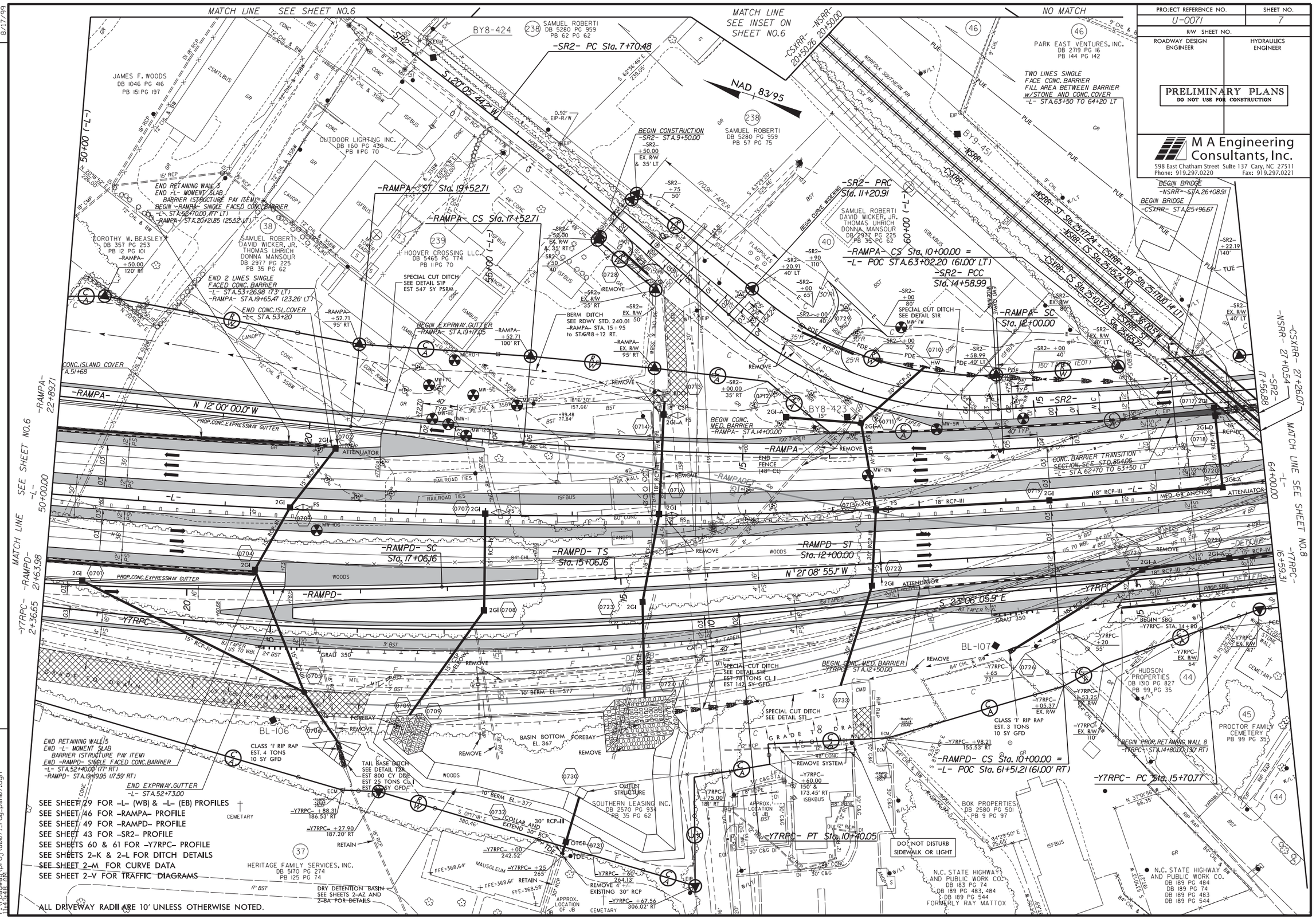


**REVISIONS**

| | | | |
|---|---|---|---|
| R/W REVISION | 06/04/2002 | RWP | PARCEL NOS. 46 & 274 COMBINED INTO PARCEL NO. 46, PARCEL NOS. 238 & 240 COMBINED INTO PARCEL NO. 238, PARCEL NO. 47 COMBINED INTO PARCEL NO. 44. |
| R/W REVISION | 03/22/2012 | RWP | STORMWATER MGMT. POND ADDED TO PLANS REQUIRING RIGHT OF WAY ON N.B. PARCEL 39, TOTAL TAKES AND TEMPORARY DRAINAGE EASEMENT ON NEW PARCEL 37, CONTROL ACCESS LOCATION (FENCING) REVISED NEAR ADJACENT NCDOT PROPERTY. |
| R/W REVISION | 08/28/2013 | RWP | TEMPORARY UTILITY EASEMENT ALONG THE RAILROAD REVISED AND CHANGED TO PERMANENT UTILITY EASEMENT ON PARCEL 46. TEMPORARY UTILITY EASEMENT AREA REDUCED AS A RESULT. |

8/17/99

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 8 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
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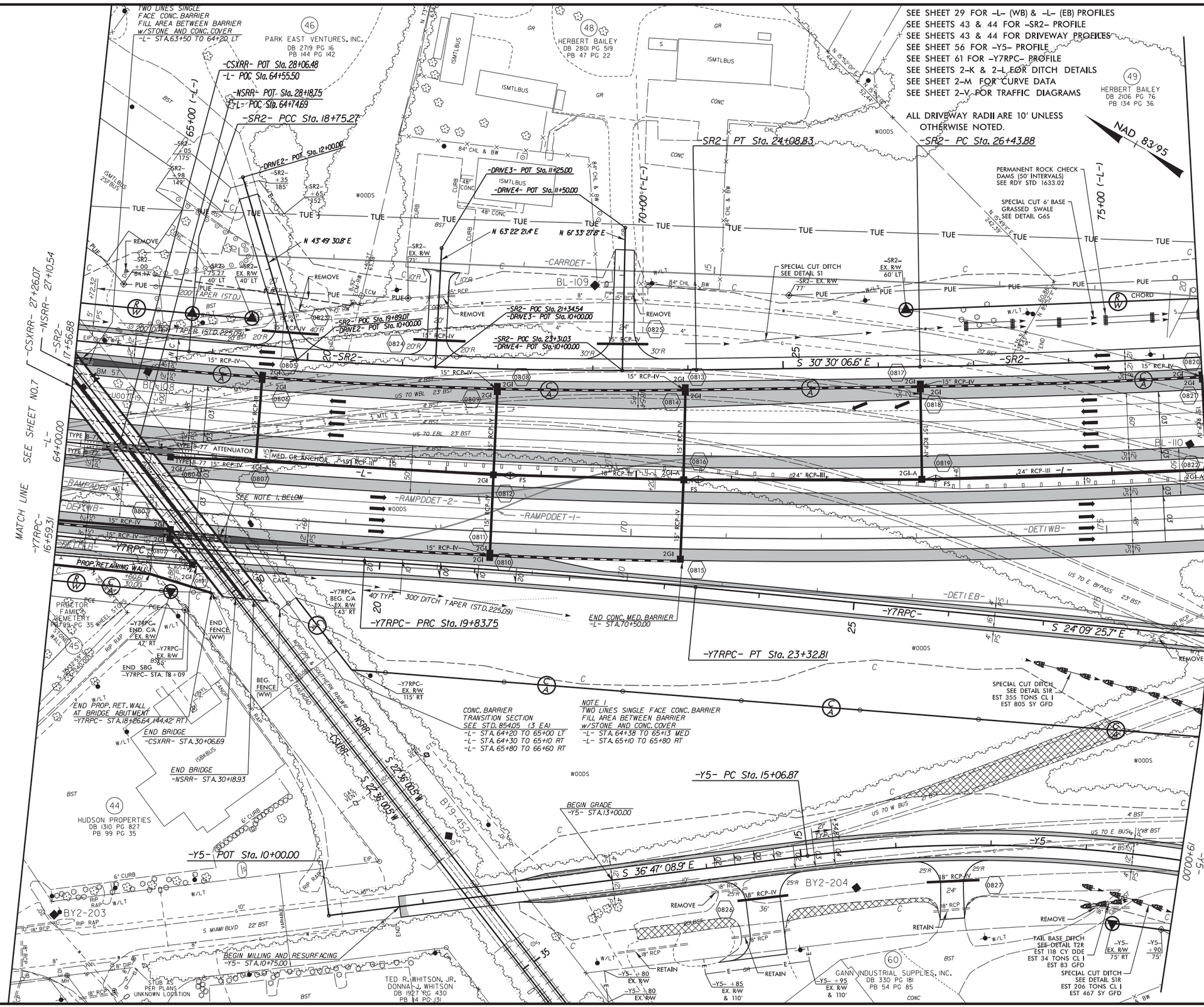
SEE SHEET 29 FOR -L- (WB) & -L- (EB) PROFILES
SEE SHEETS 43 & 44 FOR -SR2- PROFILE
SEE SHEETS 43 & 44 FOR DRIVEWAY PROFILES
SEE SHEET 56 FOR -Y5- PROFILE
SEE SHEET 61 FOR -Y7RPC- PROFILE
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-M FOR CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

ALL DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED.

NAD 83/95




REVISIONS

R/W REVISION 06/04/202 RWP PARCEL NOS. 46 & 274 COMBINED INTO PARCEL NO. 46, PARCEL NOS. 44 & 47 COMBINED INTO PARCEL NO. 44.
R/W REVISION 08/28/203 RWP TEMPORARY UTILITY EASEMENT ON PARCEL 46, TEMPORARY UTILITY EASEMENT AREA REDUCED AS A RESULT.

8/17/99

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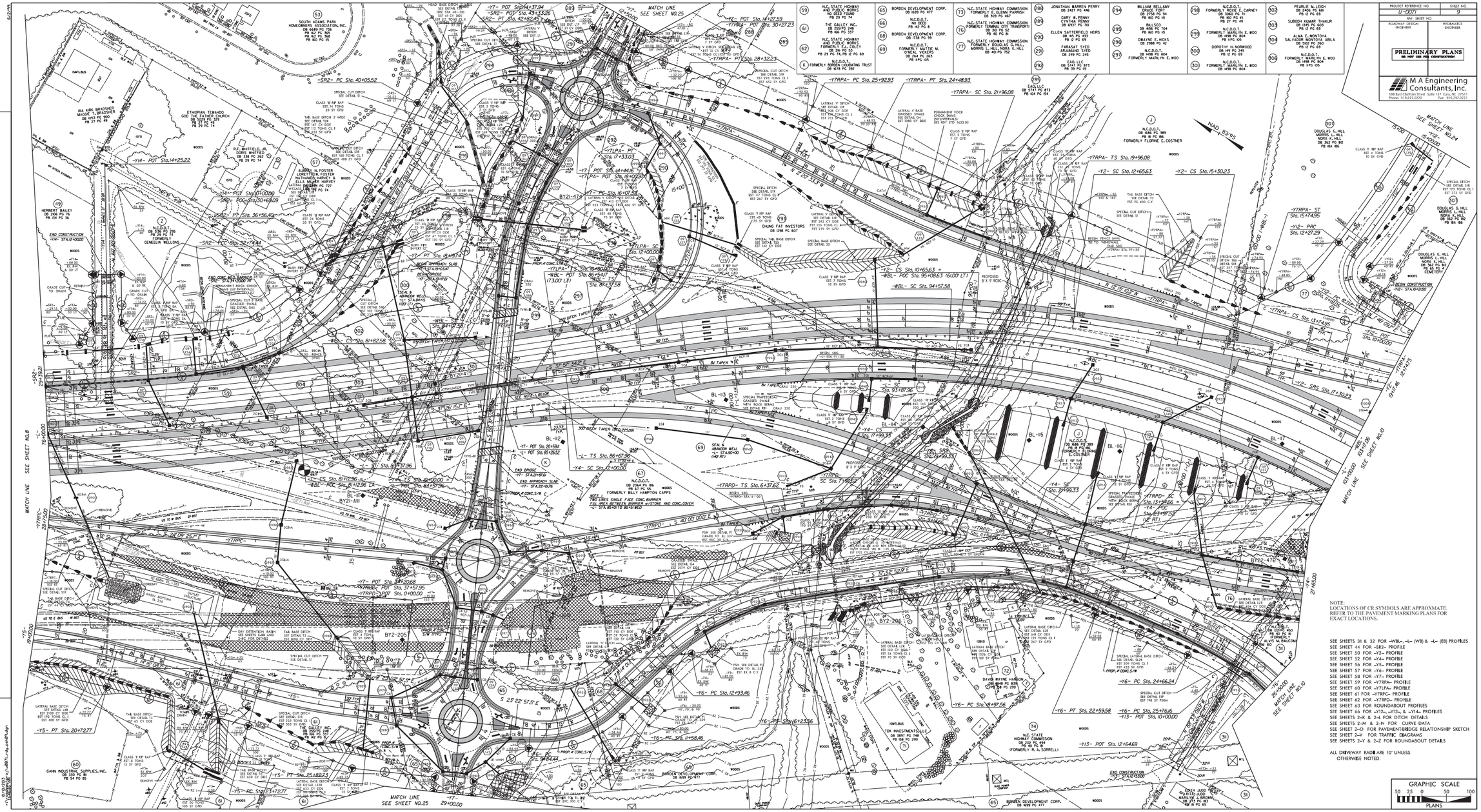


| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5017 | 9 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

REVISIONS

R/W REVISION 06/04/2012 RWP PARCEL NOS. 61 & 63 COMBINED INTO PARCEL NO. 61, PARCEL NO. 58 REVISED TO "2", PARCEL NO. 64 REVISED TO "K", PARCEL NO. 75 REVISED TO "J".
R/W REVISION 06/06/2012 RWP PARCEL NO. 61 REVISED TO "1".
R/W REVISION 2/22/2013 KSH PARCEL NOS. 53, 57, 289 AND 292 NAMES CHANGED; PARCELS 6, 40 AND 41 COMBINED INTO PARCEL 6.

NOTE:
LOCATIONS OF CR.SYMBOLS ARE APPROXMATE. REFER TO THE PAVEMENT MARKING PLANS FOR EXACT LOCATIONS.

SEE SHEETS 31 & 32 FOR -WBL-, -L- (WB) & -L- (EB) PROFILES
SEE SHEET 44 FOR -SR2- PROFILE
SEE SHEET 50 FOR -Y2- PROFILE
SEE SHEET 52 FOR -Y4- PROFILE
SEE SHEET 56 FOR -Y5- PROFILE
SEE SHEET 57 FOR -Y6- PROFILE
SEE SHEET 58 FOR -Y7- PROFILE
SEE SHEET 59 FOR -Y7RPA- PROFILE
SEE SHEET 60 FOR -Y7LPA- PROFILE
SEE SHEET 61 FOR -Y7RPC- PROFILE
SEE SHEET 62 FOR -Y7RPD- PROFILE
SEE SHEET 63 FOR ROUNDABOUT PROFILES
SEE SHEET 66 FOR -Y12-, -Y13-, & -Y14- PROFILES
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEETS 2-M & 2-N FOR CURVE DATA
SEE SHEET 2-O FOR PAVEMENT/BRIDGE RELATIONSHIP SKETCH
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS
SEE SHEETS 2-Y & 2-Z FOR ROUNDABOUT DETAILS

ALL DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED.

SEE SHEETS 33 & 34 FOR -WBL-, -L- (WB) & -L- (EB) PROFILES
SEE SHEET 50 FOR -Y2- PROFILE
SEE SHEETS 52 & 53 FOR -Y4- PROFILE
SEE SHEETS 53 & 54 FOR -US70FLY- PROFILE
SEE SHEET 55 FOR -EEC70E- PROFILE
SEE SHEET 57 FOR -Y6- PROFILE
SEE SHEET 59 FOR -Y7RPA- PROFILE
SEE SHEET 64 FOR -Y8- PROFILE
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-M CURVE DATA
SEE SHEET 2-O FOR PAVEMENT/BRIDGE RELATIONSHIP SKETCHES
SEE SHEET 2-BI FOR NOISEWALL ENVELOPE
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 10 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
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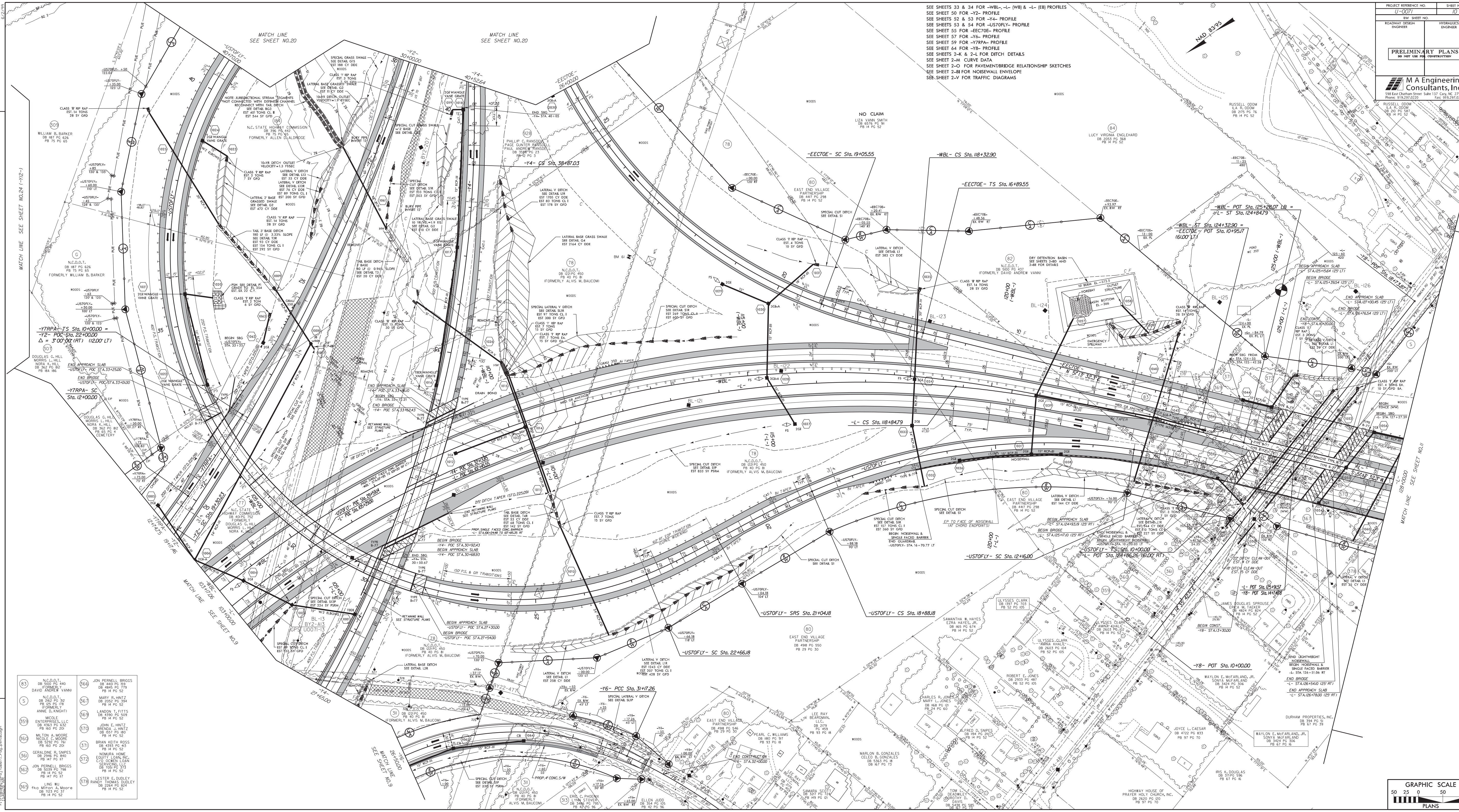
Phone: 919.297.0220 Fax: 919.297.0221




| | |
|---|---|
| (83) N.C.D.O.T. DB 5100 PG 440 (FORMERLY DAVID ANDREW VANN) | (366) JON PERNELL BRIGGS DB 4401 PG 159 DB 4845 PG 779 PB 14 PG 52 |
| (S) N.C.D.O.T. DB 2162 PG 312 PB 125 PG 178 (FORMERLY ANNIE D. KNIGHT) | (367) MARY R. HINTZ DB 2052 PG 394 PB 14 PG 52 |
| (359) MICOLE ENTERPRISES, LLC DB 4363 PG 632 PB 160 PG 201 | (369) LANDON T. FITTS DB 4390 PG 509 PB 14 PG 52 |
| (360) MILTON A. MOORE NICOLE C. MOORE DB 5292 PG 761 PB 160 PG 201 | (370) JOHN E. HINTZ BRENDA J. HINTZ DB 1557 PG 180 PB 14 PG 52 |
| (361) GERALDINE R. SNIPES DB 2946 PG 840 PB 147 PG 117 | (371) BRIAN KEITH ROSS DB 4393 PG 413 PB 14 PG 52 |
| (362) JON PERNELL BRIGGS DB 5039 PG 798 PB 14 PG 52 PB 147 PG 117 | (372) NOMURA HOME EQUITY LOAN, INC. C/O OCWEN LOAN SERVICING, LLC DB 7051 PG 373 PB 14 PG 52 |
| (365) LING WU fka Milton A. Moore DB 7123 PG 37 PB 14 PG 52 | (378) LESTER E. DUDLEY RANDY THOMAS DUDLEY DB 2264 PG 824 PB 14 PG 52 |

REVISIONS

R/W REVISION 06/04/2012 RWP PARCEL NOS. 80, 318, & 319 COMBINED INTO PARCEL NO. 80. ALL ADJACENT PARCELS OWNED BY WILLIAM B. BARKER COMBINED INTO PARCEL NO. 309. PARCEL NOS. 362 & 364 COMBINED INTO PARCEL NO. 362. PARCEL NOS. 366 & 368 COMBINED INTO PARCEL NO. 366. PARCEL NO. 79 REVISED TO "G". PARCEL NO. 85 REVISED TO "S". PARCEL NO. 185 REVISED TO 928.
R/W REVISION 11/19/2012 RWP PARCEL OWNER NAME CHANGED ON PARCEL 81 TO LIZA VANN SMITH. THIS PARCEL IS THE REMAINDER FROM A PRIOR ADVANCE ACQUISITION AND HAS NO CURRENT CLAIMS.
R/W REVISION 2/22/2013 KSH PARCEL NOS. 365 AND 372 NAMES CHANGED. PARCEL 81 SHOWN AS "NO CLAIM".
R/W REVISION 3/22/2013 RWP STORMWATER MGMT. POND ADDED ON SHEET 11 REQUIRING REVISION TO R/W, C/A, & C/A FENCING ON NCDOT OWNED PARCEL S.

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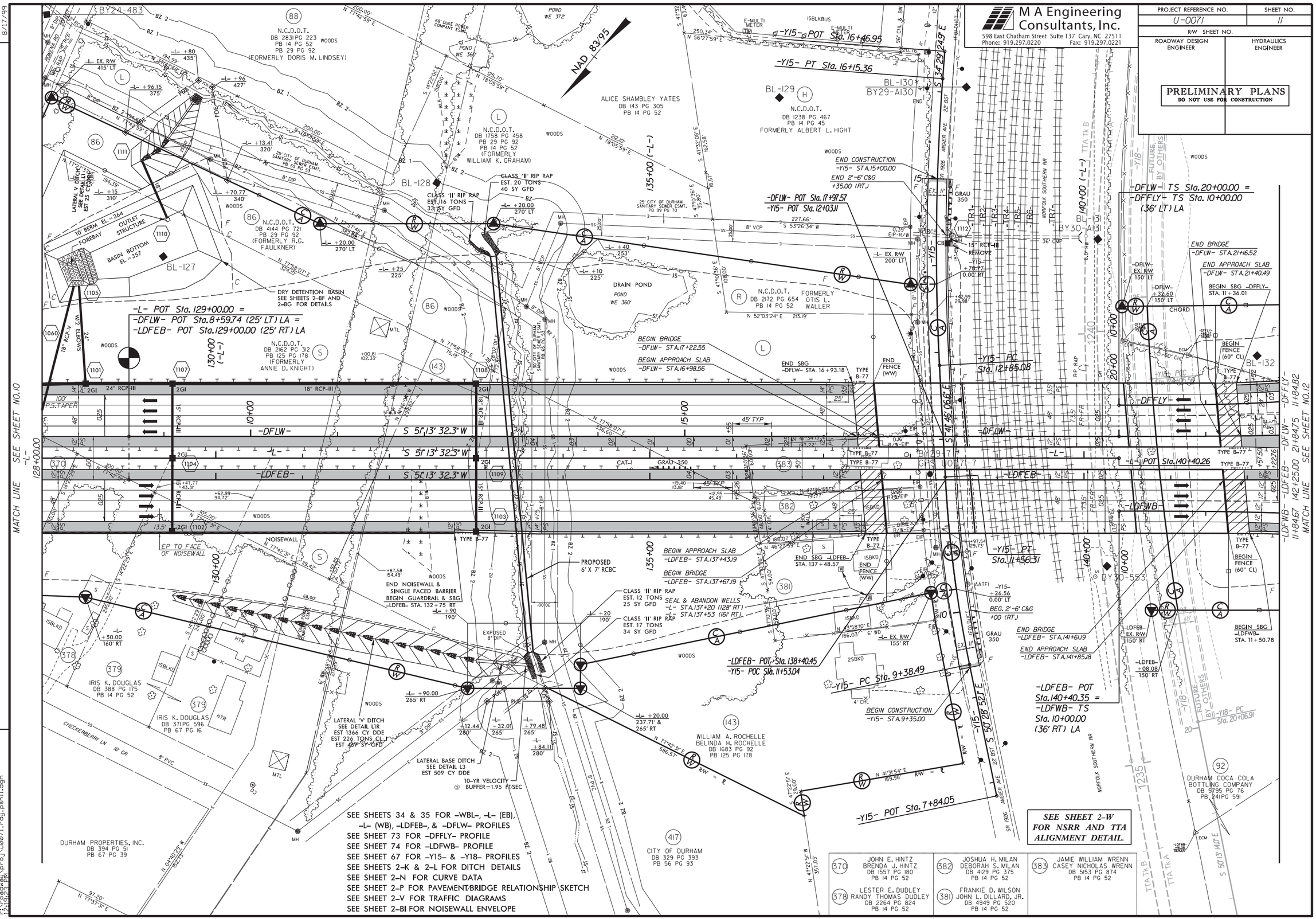
M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221
PROJECT REFERENCE NO. U-0071
SHEET NO. 11
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION
REVISIONS
8/17/99
R/W REVISION 06/04/2012 RMP: PARCEL NOS. 92 & 10 COMBINED INTO PARCEL NO. 92 AND PARCEL NAME CHANGED TO DURHAM COCA COLA BOTTLING COMPANY; PARCEL NOS. 379 & 380 COMBINED INTO PARCEL NO. 379; PARCEL NO. 85 REVISED TO "S"; PARCEL NO. 87 REVISED TO "L"; PARCEL NO. 90 REVISED TO "H".
R/W REVISION 03/27/2013 RMP: STORMWATER MGMT. POND ADDED ON NCDOT PARCELS 5, 86, AND L. R/W, C/A, & C/A FENCING REVISED ACCORDINGLY ON THESE PARCELS AND PGE ADDED ON PARCEL L.
NAD 83/95
MATCH LINE SEE SHEET NO.10
MATCH LINE SEE SHEET NO.12
-L- POT Sta. 129+00.00 =
-DFLW- POT Sta.8+59.74 (25' LT) LA =
-LDFEB- POT Sta.129+00.00 (25' RT) LA
-DFLW- TS Sta.20+00.00 =
-DFFLY- TS Sta. 10+00.00
(36' LT) LA
-LDFEB- POT
Sta.140+40.35 =
-LDFWB- TS
Sta. 10+00.00
(36' RT) LA
-L- POT Sta.140+40.26
-Y15- POT Sta. 16+46.95
-Y15- PT Sta. 16+15.36
-Y15- PC Sta. 12+85.08
-Y15- PT Sta. 11+56.31
-Y15- PC Sta. 9+38.49
-Y15- POT Sta. 7+84.05
-DFLW- POT Sta.17+97.51
-Y15- POT Sta.12+03.11
-LDFEB- POT Sta.138+40.45
-Y15- POC Sta. 11+53.04
BEGIN BRIDGE
-DFLW- STA.17+22.55
BEGIN APPROACH SLAB
-DFLW- STA.16+98.56
END SBG
-DFLW- STA. 16+93.18
END CONSTRUCTION
-Y15- STA.15+00.00
END 2'-6" C&G
+35.00 (RT.)
END BRIDGE
-DFLW- STA.21+16.52
END APPROACH SLAB
-DFLW- STA.21+40.49
BEGIN SBG -DFFLY-
STA. 11+36.01
BEGIN BRIDGE
-LDFEB- STA.137+67.19
BEGIN APPROACH SLAB
-LDFEB- STA.137+43.19
END SBG -LDFEB-
STA. 137+48.57
END BRIDGE
-LDFEB- STA.141+61.19
END APPROACH SLAB
-LDFEB- STA.141+85.18
BEGIN SBG
-LDFWB-
STA. 11+50.78
BEGIN CONSTRUCTION
-Y15- STA.9+35.00
SEE SHEET 2-W
FOR NSRR AND TTA
ALIGNMENT DETAIL.
SEE SHEETS 34 & 35 FOR -WBL-, -L- (EB), -L- (WB), -LDFEB-, & -DFLW- PROFILES
SEE SHEET 73 FOR -DFFLY- PROFILE
SEE SHEET 74 FOR -LDFWB- PROFILE
SEE SHEET 67 FOR -Y15- & -Y18- PROFILES
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-N FOR CURVE DATA
SEE SHEET 2-P FOR PAVEMENT/BRIDGE RELATIONSHIP SKETCH
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS
SEE SHEET 2-BI FOR NOISEWALL ENVELOPE
N.C.D.O.T. DB 2831 PG 223 PB 14 PG 52 PB 29 PG 92 (FORMERLY DORIS M. LINDSEY)
ALICE SHAMBLEY YATES DB 143 PG 305 PB 14 PG 52
N.C.D.O.T. DB 1758 PG 458 PB 29 PG 92 PB 14 PG 52 (FORMERLY WILLIAM K. GRAHAM)
N.C.D.O.T. DB 1238 PG 467 PB 14 PG 45 FORMERLY ALBERT L. HIGHT
N.C.D.O.T. DB 4144 PG 721 PB 29 PG 92 (FORMERLY R.G. FAULKNER)
N.C.D.O.T. DB 2172 PG 654 PB 14 PG 52 FORMERLY OTIS L. WALLER
N.C.D.O.T. DB 2162 PG 312 PB 125 PG 178 (FORMERLY ANNIE D. KNIGHT)
IRIS K. DOUGLAS DB 388 PG 175 PB 14 PG 52
IRIS K. DOUGLAS DB 371 PG 596 PB 67 PG 16
DURHAM PROPERTIES, INC. DB 394 PG 51 PB 67 PG 39
WILLIAM A. ROCHELLE BELINDA H. ROCHELLE DB 1683 PG 92 PB 125 PG 178
CITY OF DURHAM DB 329 PG 393 PB 56 PG 93
DURHAM COCA COLA BOTTLING COMPANY DB 5795 PG 76 PB 241 PG 591
JOHN E. HINTZ BRENDA J. HINTZ DB 1557 PG 180 PB 14 PG 52
LESTER E. DUDLEY RANDY THOMAS DUDLEY DB 2264 PG 824 PB 14 PG 52
JOSHUA H. MILAN DEBORAH S. MILAN DB 4129 PG 375 PB 14 PG 52
FRANKIE D. WILSON JOHN L. DILLARD, JR. DB 4949 PG 520 PB 14 PG 52
JAMIE WILLIAM WRENN CASEY NICHOLAS WRENN DB 5153 PG 874 PB 14 PG 52
DRAIN POND
BASIN BOTTOM EL=357
DRY DETENTION BASIN SEE SHEETS 2-BF AND 2-BG FOR DETAILS
PROPOSED 6' X 7' RCBC
SEAL & ABANDON WELLS
-L- STA.137+20 (128' RT)
-L- STA.137+53 (161' RT)
LATERAL 'V' DITCH SEE DETAIL L1R EST 1366 CY DDE EST 226 TONS CL I EST 487 SY GFD
LATERAL BASE DITCH SEE DETAIL L3 EST 509 CY DDE
10-YR VELOCITY @ BUFFER=1.95 FT/SEC
END NOISEWALL & SINGLE FACED BARRIER BEGIN GUARDRAIL & SBG -LDFEB- STA. 132+75 RT
EP TO FACE OF NOISEWALL
NOISEWALL
CHECKERBERRY LN
NORFOLK SOUTHERN RR
ANDERS AVE
TTA TK B
TTA TK A
FUTURE BY OTHERS
10/10/2013
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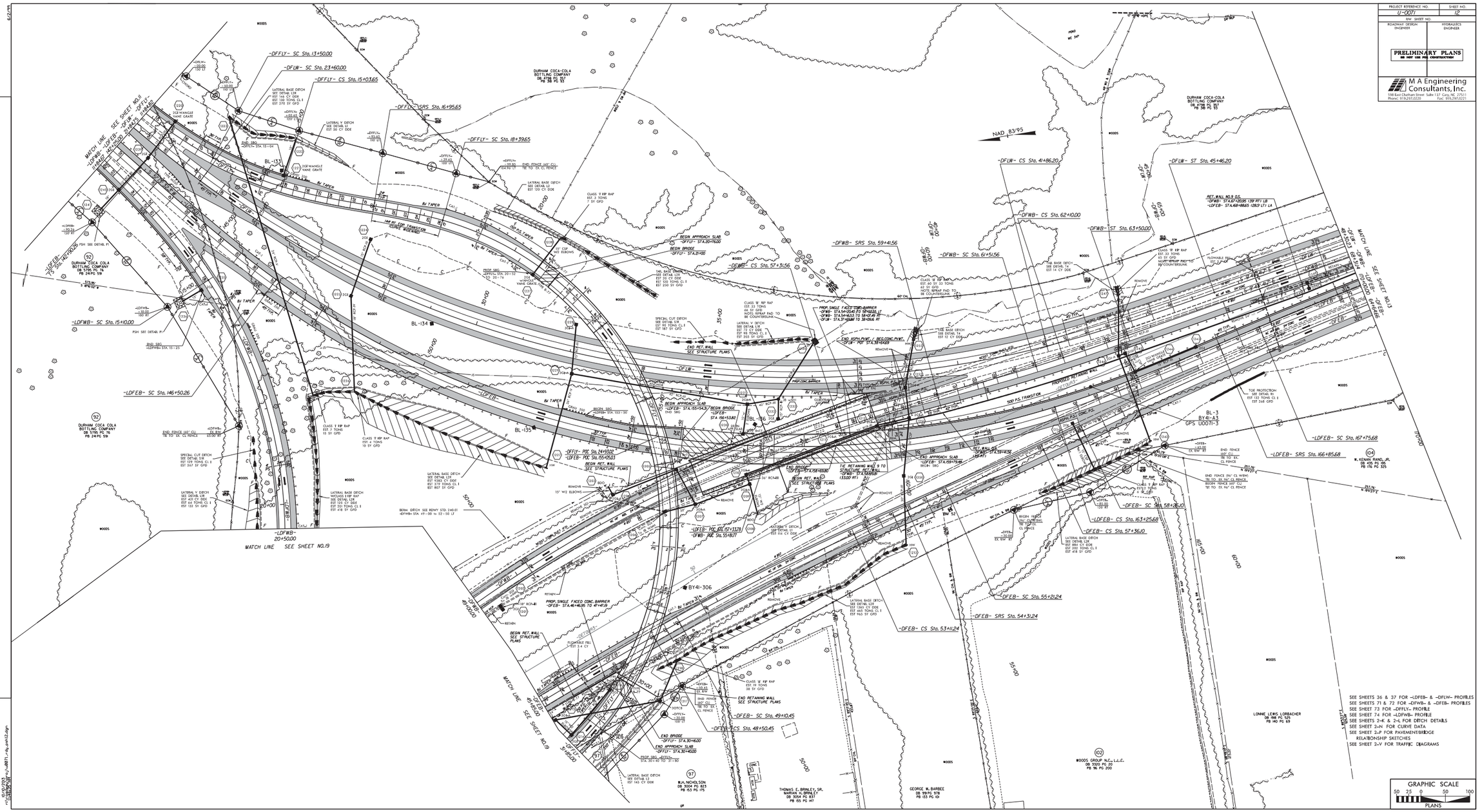
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-5017 | 12 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
198 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


REVISIONS

R/W REVISION 06/04/2002 RMP PARCEL NOS. 92 & 101 COMBINED INTO PARCEL NO. 92, AND PARCEL NAME CHANGED TO "DURHAM COCA COLA BOTTLING COMPANY". PARCEL NOS. 97, 98, & 99 COMBINED INTO PARCEL NO. 97.
R/W REVISION 04/16/2003 RMP R/W REVISED ON PARCEL 97 DUE TO -DFFLY- END BRIDGE STATION REVISION AND ADDITION OF RETAINING WALL.



| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 13 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


REVISIONS

R/W REVISION 11/19/202 RMP REVISED RIGHT OF WAY AND WOVEN WIRE FENCE IN ORDER TO ELIMINATE CLAIM ON PARCEL 459 RESULTING IN SLIGHT CHANGE IN LOCATION AND SLIGHT REDUCTION IN AREA ON PARCEL 460.

8/17/99

NAD 83/95

-DFWB- POT Sta.70+00.00 =
-DFLW- POT Sta.50+00.00 (24' RT)

-DFLW- PC Sta. 52+52.31

-DFEB- PT Sta.75+61.18 =
-LDFEB- POC Sta.181+00.00 (36' RT)

END PROPOSED RETAINING WALL 9
-LDFEB- STA.171+35.00 (28.5' LT)

350' TAPER

SPECIAL CUT DITCH
SEE DETAIL S1R
EST 103 TONS CL. I
EST 235 SY GFD

LATERAL V DITCH
SEE DETAIL L1
EST 43 CY DDE

CLASS 'II' RIP RAP
EST. 19 TONS
38 SY GFD

36" RCP-III

61' TYP.

FLOWABLE FILL
EST 3.7 CY

REMOVE

UNDERGROUND STREAM

CLASS 'II' RIP RAP
EST. 14 TONS
28 SY GFD

REMOVE 24' OF 24" RCP

FLOWABLE FILL
EST 12 CY

FLOWABLE FILL
EST 8.8 CY

REMOVE EXISTING BDO

REMOVE APPROX. 76' OF EXISTING 30" RCP

18" W/2 ELBOWS

30" W/2 ELBOWS

BY41-4
GPS U0071-4

END SBG
-LDFEB- STA. 171+80

3' BASE HEAD DITCH
SEE DETAIL T3R3
EST 223 CY DDE
EST 58 TONS CL. I
EST 120 SY GFD

BEGIN FENCE (60" CL) TIE TO EX. CL FENCE

END FENCE (60" CL) TIE TO EX. CL FENCE

BERM DITCH
SEE RDWY STD. 240.01
-LDFEB- STA 175+00 to 177+60

BERM DITCH
SEE RDWY STD. 240.01
-LDFEB- STA 177+60 to 178+00

BERM DITCH
SEE RDWY STD. 240.01
-LDFEB- STA 178+00 to 180+75

BERM DITCH
SEE RDWY STD. 240.01
-LDFEB- STA 180+75 to 181+75

BERM DITCH
SEE RDWY STD. 240.01
-LDFEB- STA 181+75 to 183+85

3' BASE HEAD DITCH
SEE DETAIL T3R3
EST 34 CY DDE
EST 36 TONS CL. I
EST 120 SY GFD

MATCH LINE SEE SHEET NO.12 -DFLW- 48+30.23 -DFWB- 68+31.14 -LDFEB- 170+00.00 -DFEB- 64+64.66

MATCH LINE SEE SHEET NO.14 -DFLW- 62+39.56 -LDFEB- 184+00.00

DURHAM COCA-COLA BOTTLING COMPANY
DB 4798 PG 357
PB 31B PG 93

DURHAM COCA-COLA BOTTLING COMPANY
DB 1336 PG 977

MYRTLE BOWEN STRAYHORN
DB 1172 PG 344

W. KENAN RAND, JR.
DB 1561 PG 88

ARCHIE V. EMORY
DELORES P. EMORY
DB 358 PG 557
PB 64 PG 6

W. KENAN RAND, JR.
DB 435 PG 195
PB 176 PG 325

GAIL A. KELLY
DB 1760 PG 754
PB 179 PG 183

NO CLAIM

459 JOHN D. DeLONG
REBECCA P. DeLONG
DB 3574 PG 508
PB 80 PG 34

460 SARAH DELMONEGO
DB 4884 PG 96
PB 80 PG 34

461 JOHN F. RICHARDS
ALICE M. RICHARDS
DB 5561PG 705
PB 39 PG 177

462 DELORES P. EMORY
DB 358 PG 557
PB 64 PG 6

SEE SHEET 38 FOR -LDFEB- & -DFLW-PROFILE
SEE SHEET 72 FOR -DFWB- & -DFEB- PROFILE
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-N FOR CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

10/10/2013
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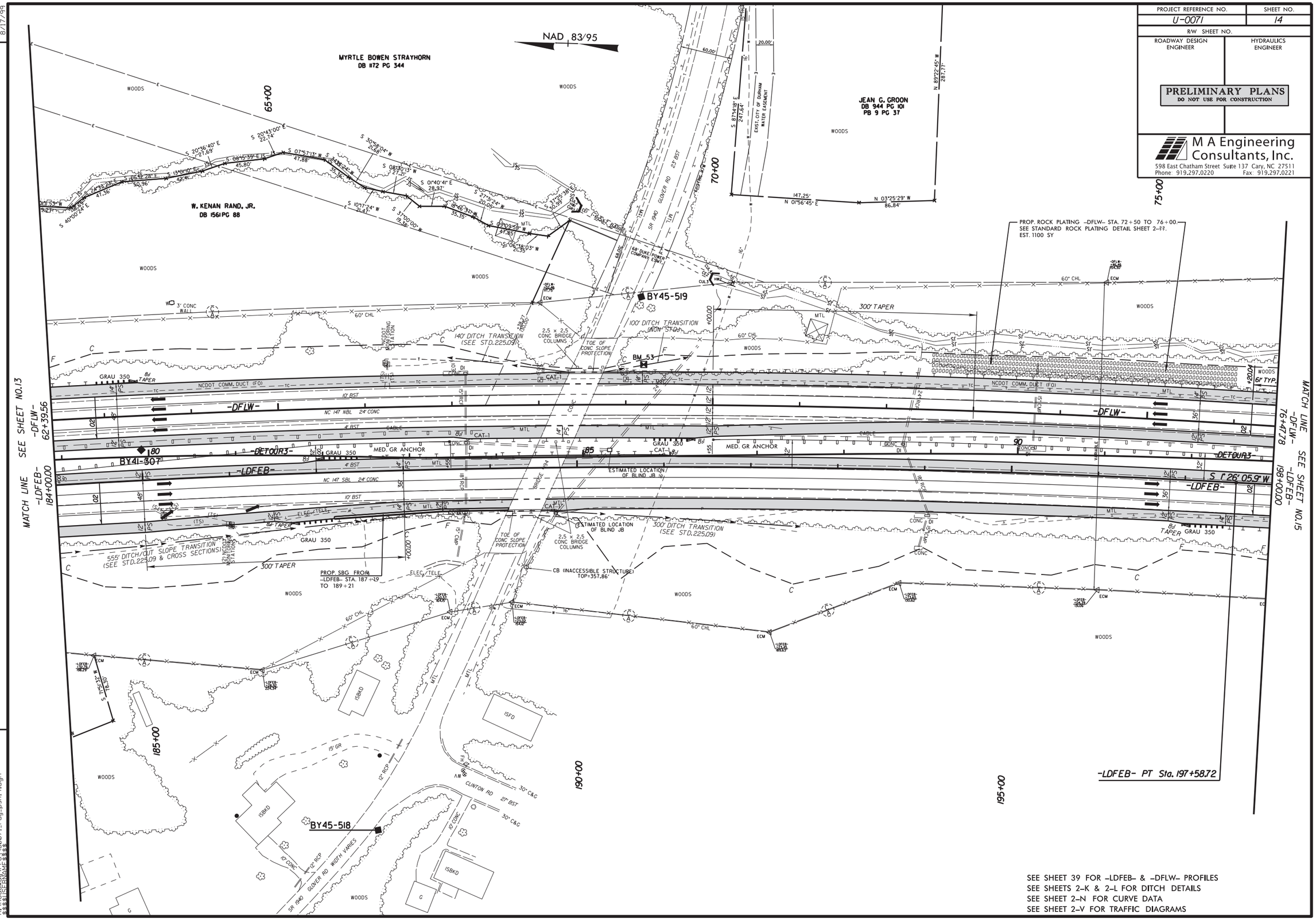
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 14 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221




SEE SHEET 39 FOR -LDFEB- & -DFLW- PROFILES
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-N FOR CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

REVISIONS

8/17/99

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 15 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
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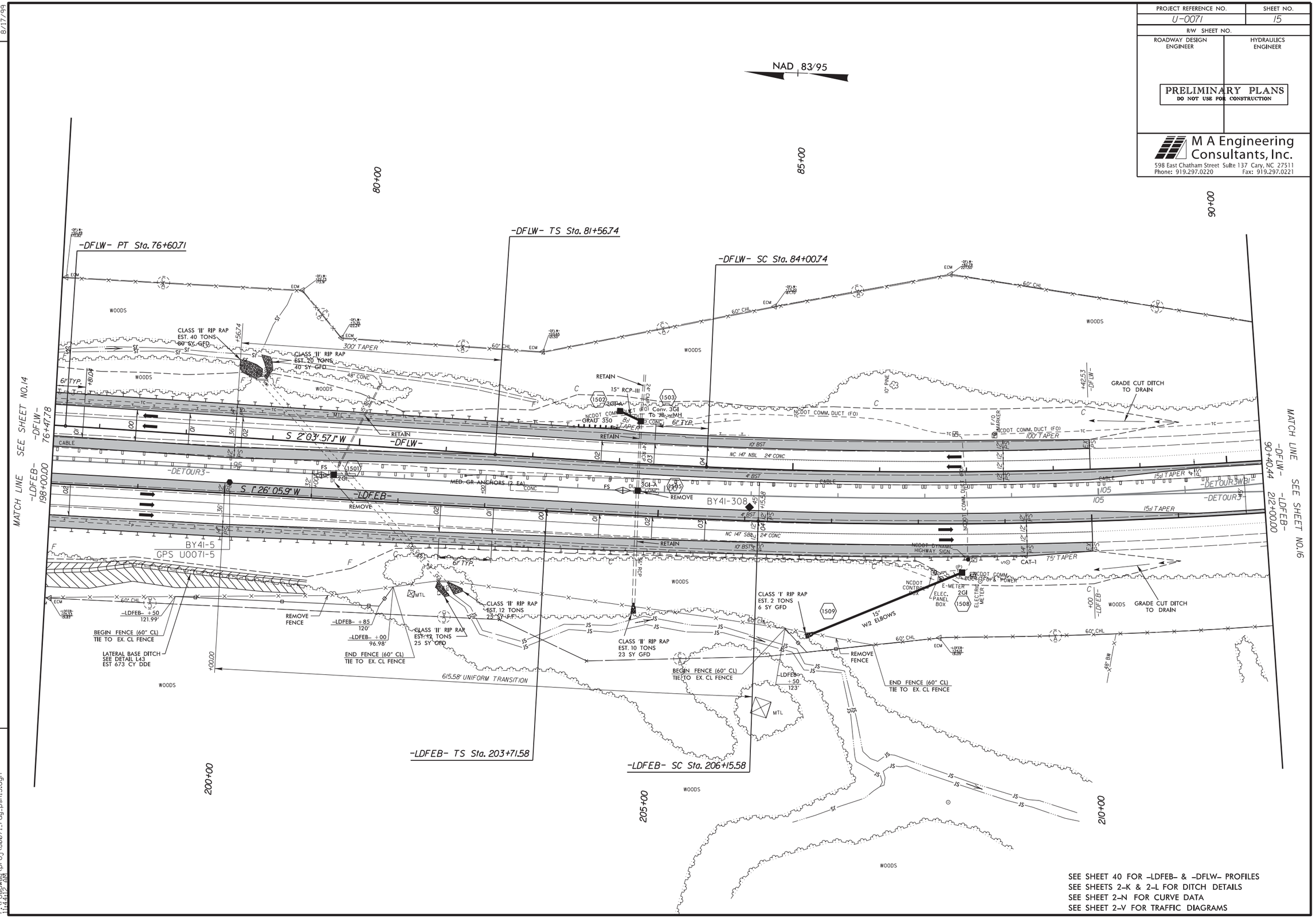
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221




REVISIONS

8/17/99

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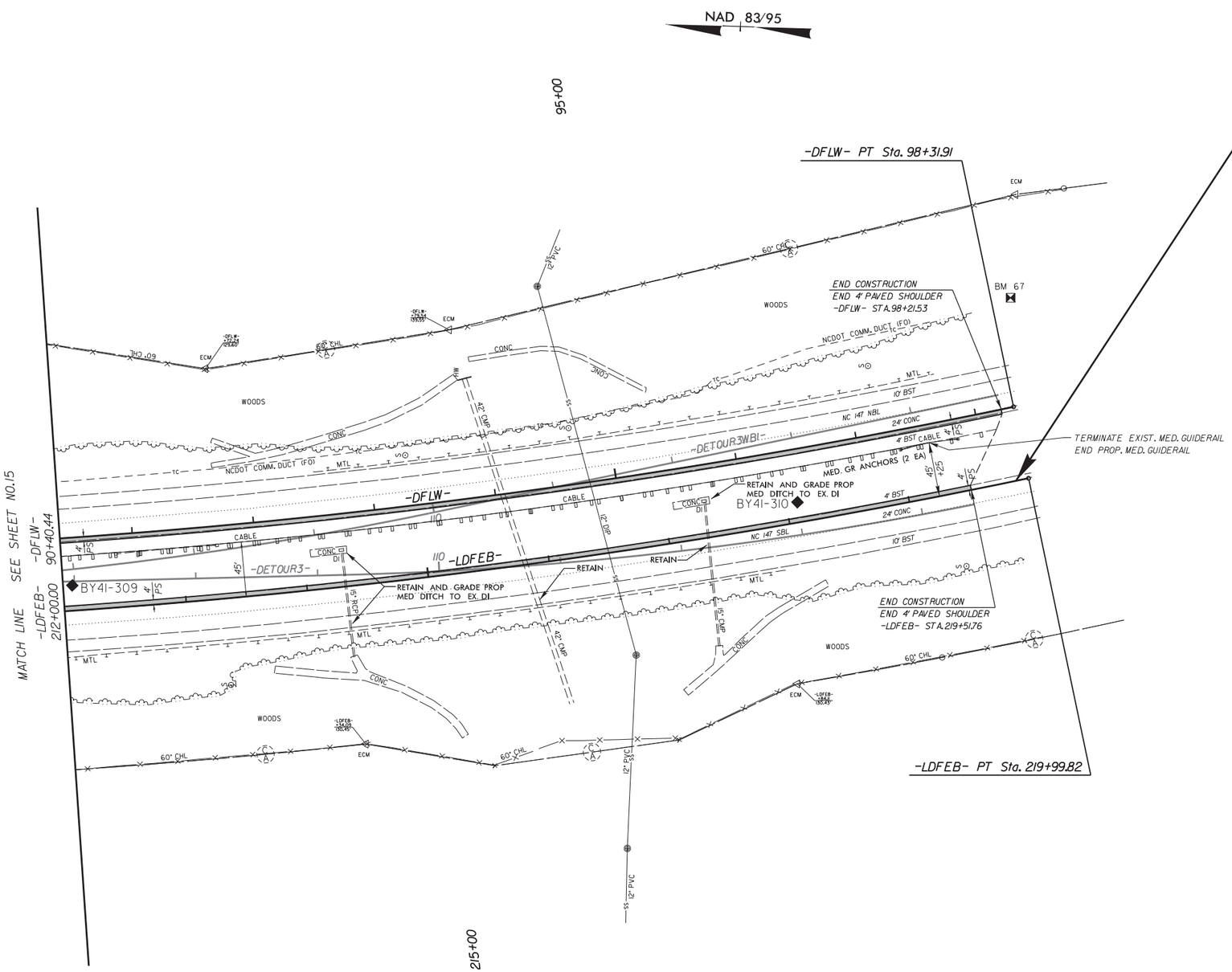
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 16 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

END T.I.P. PROJECT U-0071
-LDFEB- POC 219+89.32 =
-DFLW- POC 98+21.53




SEE SHEET 41 FOR -LDFEB- & -DFLW- PROFILES
SEE SHEET 2-N FOR CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

REVISIONS

8/17/99

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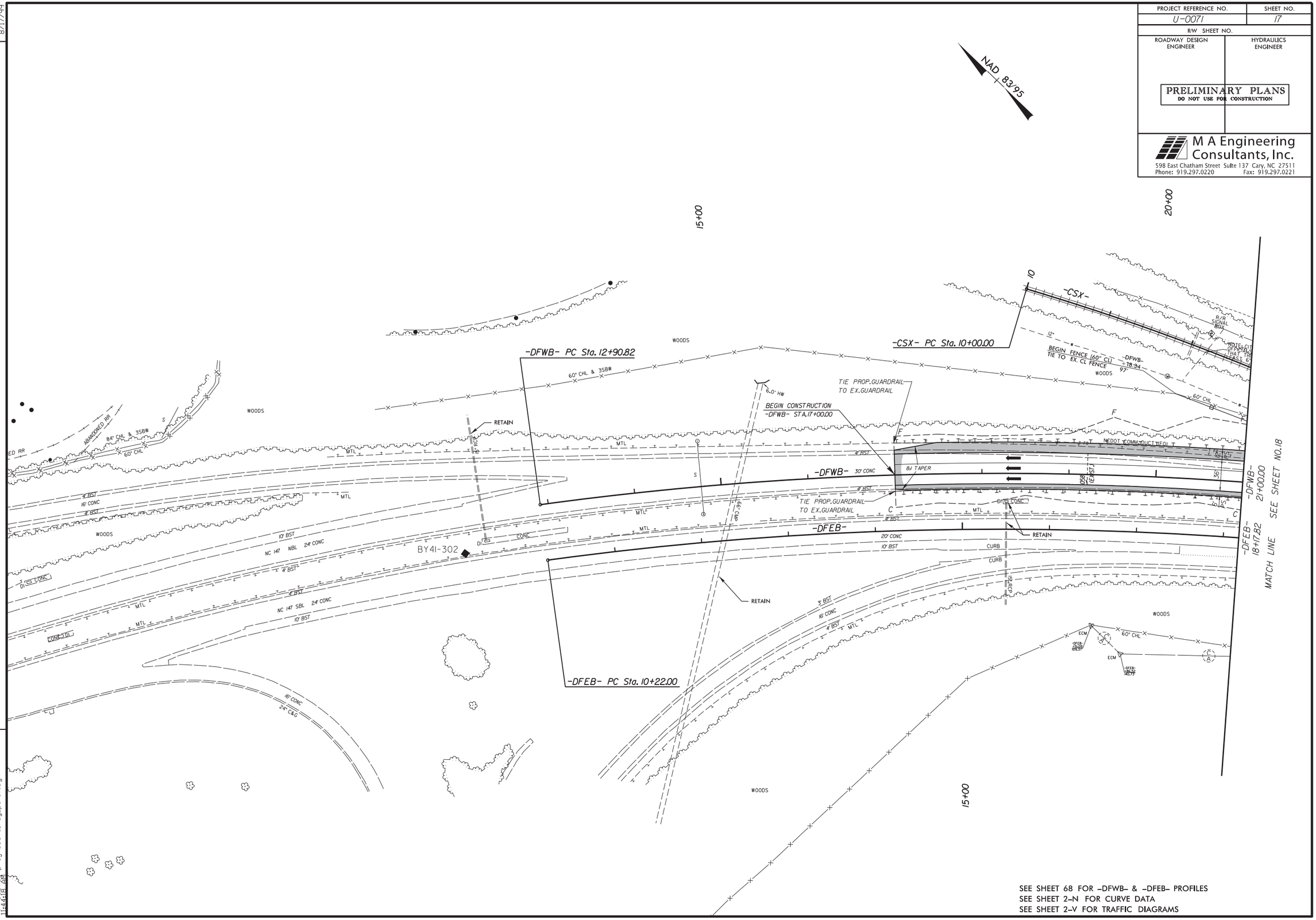
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 17 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

REVISIONS

8/17/99




SEE SHEET 68 FOR –DFWB– & –DFEB– PROFILES
SEE SHEET 2–N FOR CURVE DATA
SEE SHEET 2–V FOR TRAFFIC DIAGRAMS

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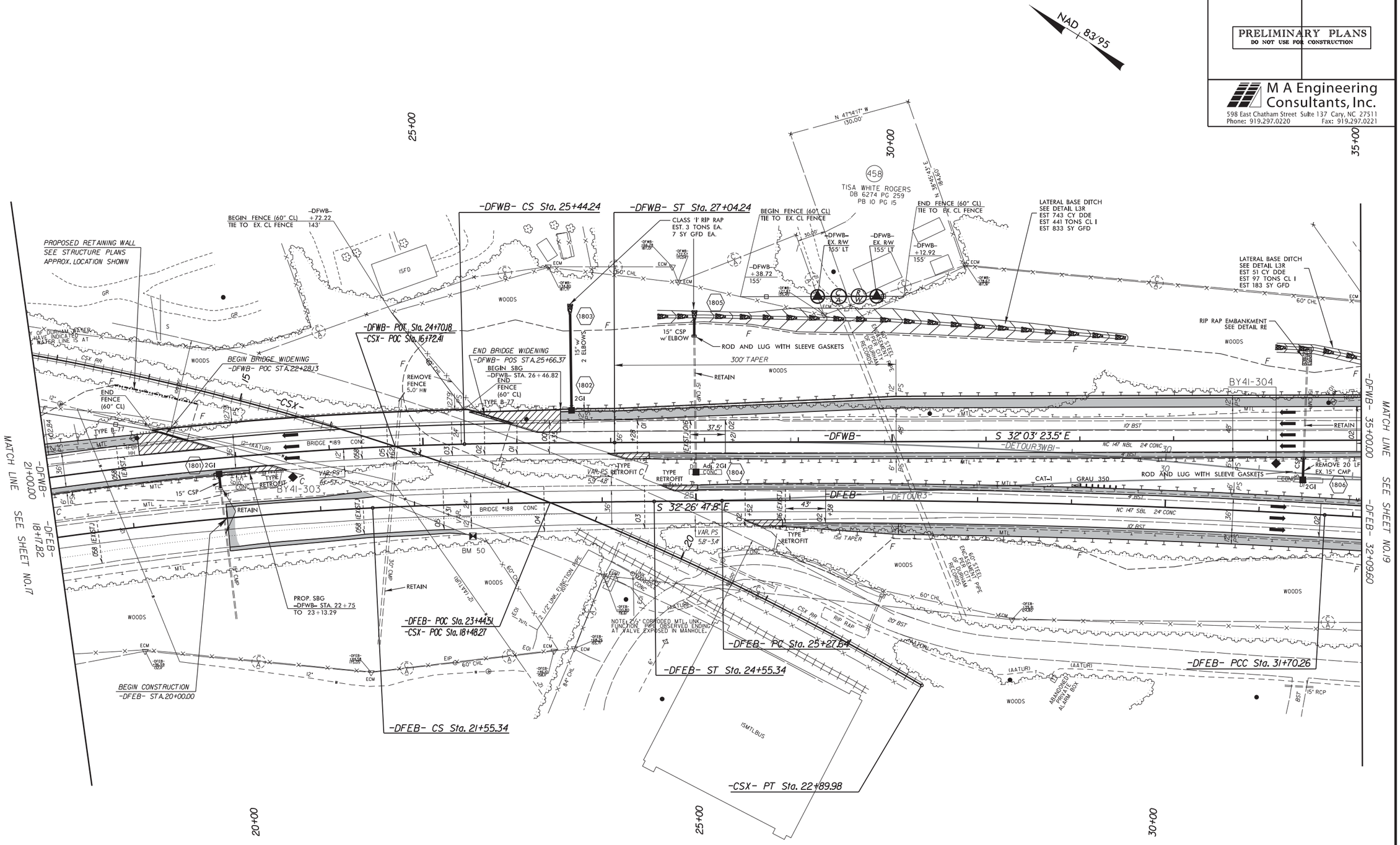
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 18 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221

REVISIONS
8/17/99
R/W REVISION 08/22/02 DBE REVISED RAILROAD R/W AND ADJOINING PROPERTY LINES




THE DASHED SUPERELEVATION ON THE NC 147 BRIDGES OVER CSX RAILROAD AND ELLIS ROAD APPROXIMATES THE EXISTING SUPERELEVATION AS PER ORIGINAL DESIGN PLANS AND RECENT DECK SURVEYS. AT THE DIRECTION OF THE ENGINEER, THE CONTRACTOR MAY NEED TO ADJUST THE PROPOSED SUPERELEVATION AND PROFILES ON THE ROADWAY APPROACHES TO MATCH THE BRIDGE OVERLAYS AND FIELD CONDITIONS.

SEE SHEET 69 FOR -DFWB- & -DFEB- PROFILES
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-N FOR CURVE DATA
SEE SHEET 2-Q FOR PAVEMENT/BRIDGE RELATIONSHIP SKETCH
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 19 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


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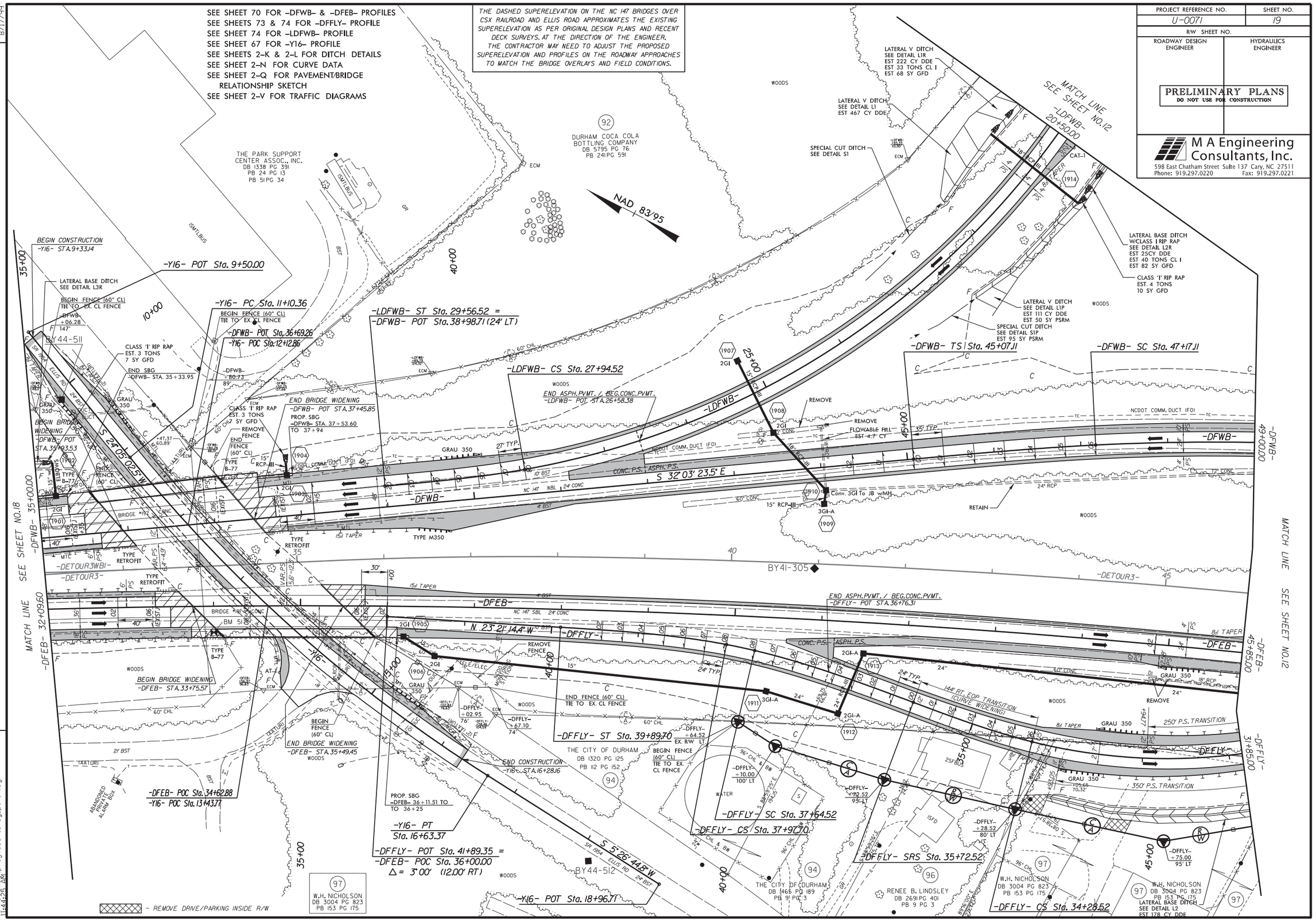
SEE SHEET 70 FOR -DFWB- & -DFEB- PROFILES
SEE SHEETS 73 & 74 FOR -DFFLY- PROFILE
SEE SHEET 74 FOR -LDFWB- PROFILE
SEE SHEET 67 FOR -Y16- PROFILE
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-N FOR CURVE DATA
SEE SHEET 2-Q FOR PAVEMENT/BRIDGE RELATIONSHIP SKETCH
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

THE DASHED SUPERELEVATION ON THE NC 147 BRIDGES OVER CSX RAILROAD AND ELLIS ROAD APPROXIMATES THE EXISTING SUPERELEVATION AS PER ORIGINAL DESIGN PLANS AND RECENT DECK SURVEYS. AT THE DIRECTION OF THE ENGINEER, THE CONTRACTOR MAY NEED TO ADJUST THE PROPOSED SUPERELEVATION AND PROFILES ON THE ROADWAY APPROACHES TO MATCH THE BRIDGE OVERLAYS AND FIELD CONDITIONS.




REVISIONS
R/W REVISION 06/04/202 RMP PARCEL NOS. 92 & 110 COMBINED INTO PARCEL NO. 92, AND PARCEL NAME CHANGED TO "DURHAM COCA COLA BOTTLING COMPANY". PARCEL NOS. 94 & 95 COMBINED INTO PARCEL NO. 94, PARCEL NOS. 97, 98, & 99 COMBINED INTO PARCEL NO. 97.

8/17/99

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 20 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


REVISIONS

R/W REVISION 06/04/2012 RWP ALL ADJACENT PARCELS OWNED BY WILLIAM B.BARKER COMBINED INTO PARCEL NO.309. PARCEL NO.185 REVISED TO 928.

8/17/99

10/10/2013
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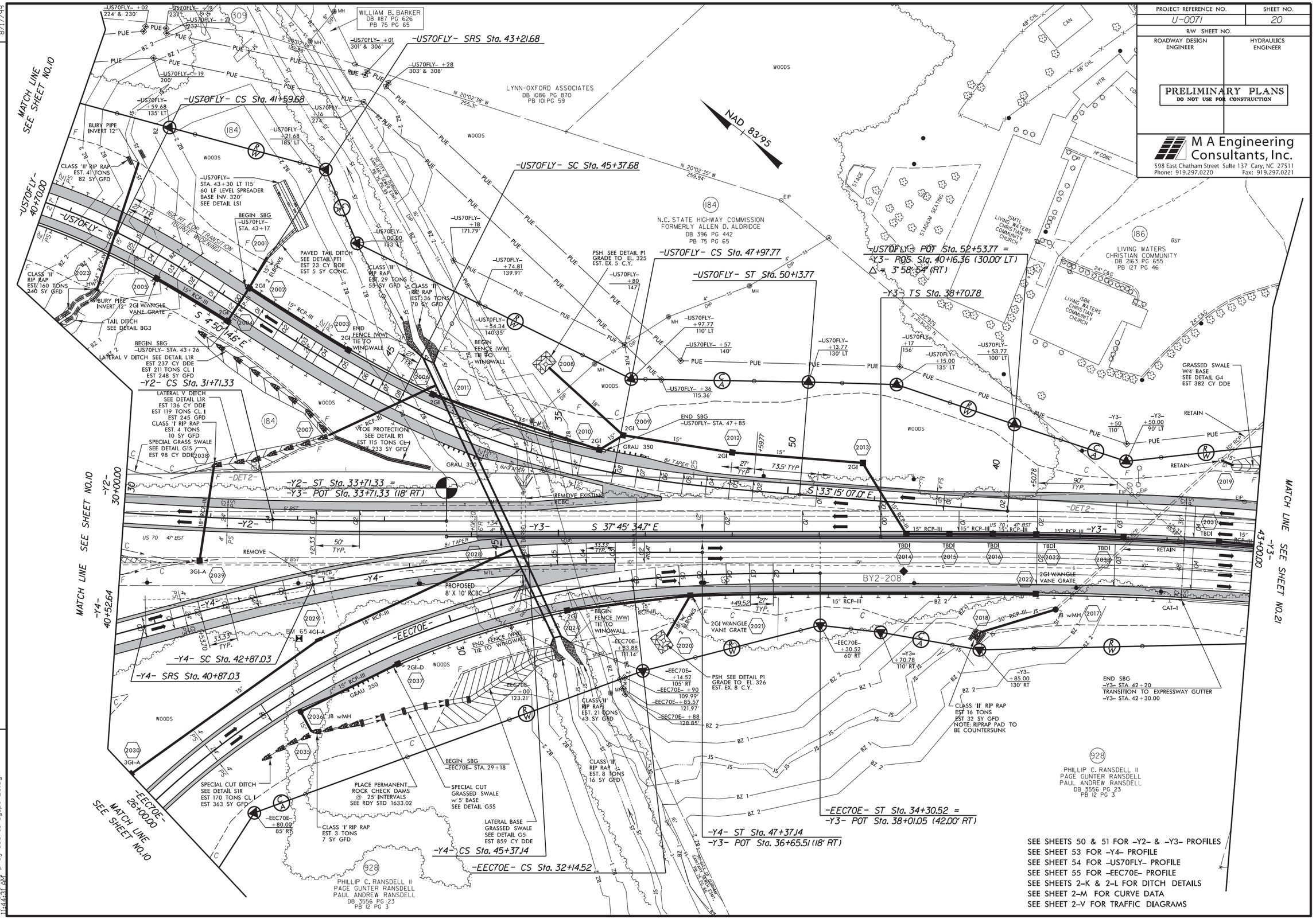

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 21 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


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SEE SHEET 51 FOR -Y3- PROFILE
SEE SHEET 64 FOR -Y9- PROFILE
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEETS 2-M & 2-N FOR CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

NOTE:
LOCATIONS OF CR SYMBOLS ARE APPROXMATE. REFER TO THE PAVEMENT MARKING PLANS FOR EXACT LOCATIONS.

NAD 83/95

-Y9- POT Sta. 10+01.96
-Y9- PC Sta. 10+73.77
-Y9- PRC Sta. 13+60.41
-Y9- PT Sta. 16+25.68
-Y9- PC Sta. 22+93.00
-Y3- SC Sta. 43+20.78
-Y3- CS Sta. 45+32.43
-Y3- ST Sta. 49+82.43
-Y3- PC Sta. 52+84.12
-Y3- PT Sta. 54+95.85

S 24°52'33.5" E
S 22°58'48.1" E
S 22°22'24.5" E

MATCH LINE SEE SHEET NO.20 -Y3- 43+00.00
MATCH LINE SEE SHEET NO.22 -Y3- 57+00.00

| | |
|---|---|
| 928 PHILLIP C. RANSDELL II, PAGE GUNTER RANSDELL, PAUL ANDREW RANSDELL, DB 3556 PG 23, PB 12 PG 3 | 191 MARTY R. O'STEEN, DB 2085 PG 512, PB 12 PG 3 |
| 189 NORTHERN HOLDINGS, LLC, DB 4983 PG 216, PB 19 PG 187 | 193 TICON PROPERTIES, LLC, DB 6942 PG 225, PB 18 PG 101 |
| 195 THOMAS H. POOLE, JR., DB 2012-E PG 385, PB 18 PG 101 | 197 ELLISWORTH ROBERT DRAPER, JR., DB 2363 PG 310, PB 21 PG 1 |

SEE SHEET 51 FOR -Y3- PROFILE
SEE SHEET 64 FOR -Y9- PROFILE

SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEETS 2-M & 2-N FOR CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

ALL DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED.

REVISIONS
R/W REVISION 06/04/2012 RMP PARCEL NO.185 REVISED TO 928.
R/W REVISION 02/22/2013 KSH PARCEL NOS.192, 193, 195 & 39 PROPERTY OWNER DEED INFORMATION AND NAMES CHANGED.

10/10/2013
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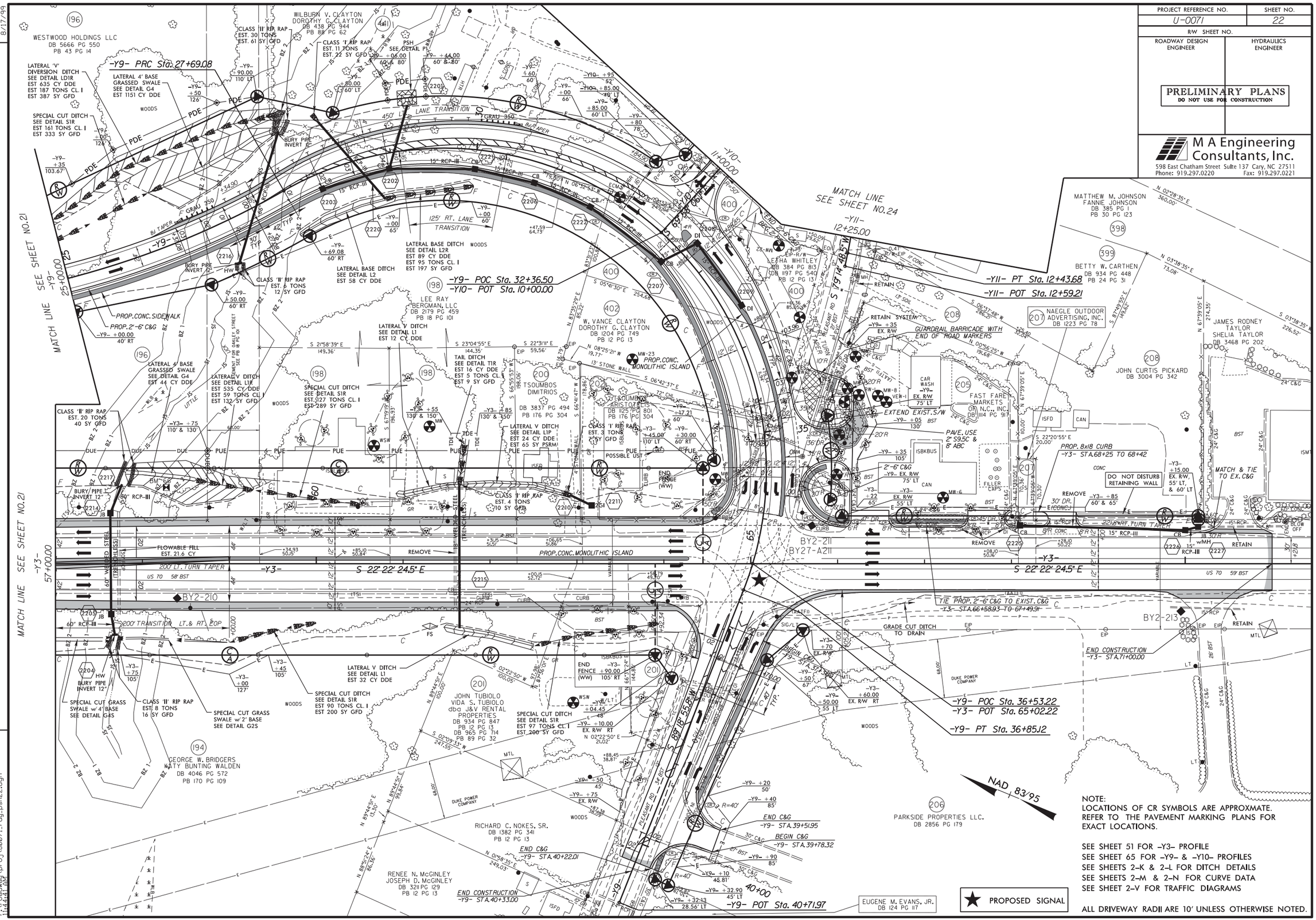
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 22 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


**REVISIONS**

| | | | |
|---|---|---|---|
| R/W REVISION | 06/04/2012 | RWP | PARCEL NOS. 198, 199, & 204 COMBINED INTO PARCEL NO. 198, PARCEL NOS. 400 & 401 COMBINED INTO PARCEL NO. 400. |
| R/W REVISION | 07/10/2013 | RWP | PARCEL OWNER NAME CHANGE ON PARCEL 208; "DO NOT DISTURB RETAINING WALL" NOTE ADDED AND TCE REVISED ON PARCEL 208. |
| R/W REVISION | 07/10/2013 | RWP | PARCEL NOS. 201 & 202 COMBINED INTO PARCEL NO. 201. |
| R/W REVISION | 08/06/2013 | RWP | PARCEL 205, PROPOSED CURB & GUTTER SHOWN TIED TO EXISTING CURB & GUTTER ON EXISTING ISLAND BETWEEN DRIVES, -Y3- STA. 67+00 LT. |

8/17/99

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 23 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


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Phone: 919.297.0220 Fax: 919.297.0221


★ PROPOSED SIGNAL

155 DURHAM COUNTY ABC BOARD DB 1105 PG 576 PB 9 PG 19

156 RENTAL PARTNERS, INC. DB 2160 PG 945 PB 9 PG 21

164 RANDOLPH SIDNEY PAGE AND PEARL NICHOLS PAGE DB 7096 PG 322 91-E-596 PB 9 PG 19

CONTRACTOR TO MAINTAIN ONE DRIVE ACCESS TO HOLLOWAY ST. FOR PARCEL NO. 164 AT ALL TIMES DURING CONSTRUCTION.

NAD 83/95

SEE SHEET 45 FOR -Y1- PROFILE
SEE SHEET 2-M FOR -Y1- CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

ALL DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED.

NOTE:
LOCATIONS OF CR SYMBOLS ARE APPROXMATE. REFER TO THE PAVEMENT MARKING PLANS FOR EXACT LOCATIONS.

-Y1- POT Sta. 10+00.00

BEGIN CONSTRUCTION -Y1- STA.10+00.00

BEGIN 2'-6" C&G & 5' S/W -Y1- STA.12+46

TIE 2'-6" C&G TO EX. C&G -Y1- STA.14+29

TIE 6' S/W TO EXIST. 5' S/W -Y1- STA.14+39

TRANSITION 6' S/W (@ FACE CURB) TO 5' S/W (2.5' O.S. FROM FACE CURB) -Y1- STA.14+46 TO 14+66 RT.

PROP. 8X18 CURB -Y1- STA.15+60 TO 15+82 -Y1- STA.16+16 TO 16+37 -Y1- STA.17+98 TO 18+06 -Y1- STA.18+48 TO 19+02

PROP. CONC. MONOLITHIC ISLAND

-Y1- S 74°04' 46.9" E

MATCH LINE SEE SHEET NO.6 -Y1- 19+50.00

BNE RESTAURANT GROUP II, LLC DB 2300 PG 78 PB 121PG 93

BY2-16 GPS U0071-16

166 VILLAGE MP, LLC DB 4577 PG 326 PB 121PG 93

162 VILLAGE REALTY, LLC DB 4577 PG 319 PB 121PG 93

SATNAM SRI WAHE GURU, LLC DB 5227 PG 560

BYI-407

BYI-406

CAROLINA DH I, LLC DB 5026 PG 1 PB 165 PG 284

MATCHPOINT PROPERTIES, LLC DB 5370 PG 867 PB 165 PG 284

COMMUNITY APARTMRNTS CORPORATION DB 1625 PG 153 PB 31PG 108

DURHAM COUNTY ADVOCATES FOR THE MENTALLY ILL, INC. DB 1557 PG 603 PB 31PG 108

M.M. FOWLER, INC. DB 4411PG 426 PB 109 PG 156 PB 9 PG 19

JOHN C. BERRY JR. DONNA P. BERRY DB 1250 PG 620 PB 109 PG 156

JUAN A. CRUZ CARLOS A. CASTRO DB 5382 PG 370 PB 9 PG 19

THE DOG HOUSE INC. SOUTHEAST FOOD SYSTEMS, INC NO DEED PB 109 PG 156

RICHARD B. WIGGINS ANGIE M. WIGGINS DB 3861 PG 151 PB 28 PG 36

NORTH MIAMI BLVD. PARTNERS, LLC DB 6632 PG 643 PB 142 PG 141

HUDSON, INC. DB 310 PG 630 PB 28 PG 36

MLE INVESTMENTS, LLC DB 2664 PG 387 PB 28A PG 36

INIX, LLC DB 7273 PG 202 PB 9 PG 19 PB 57 PG 1

DURHAM COUNTY ABC BOARD DB 6557 PG 48 PB 9 PG 19

INIX, LLC DB 6143 PG 191 PB 9 PG 21

INIX, LLC DB 6143 PG 188 PB 9 PG 21

MOHAMMAD SHAKEEL AHMAD DB 3602 PG 606 PB 9 PG 21

| R/W REVISION | 11/19/202 | RWP | PUE REVISED TO AVOID NEW BUILDING ON PARCEL 163 RESULTING IN LOCATION AND AREA CHANGES TO PUE ON PARCELS 161, 163, 164, AND 165. PARCEL OWNER NAME CHANGED TO NORTH MIAMI BLVD. PARTNERS, LLC AND NEW TOPO SHOWN ON PARCEL 163. |
|---|---|---|---|
| R/W REVISION | 2/22/2013 | KSH | PARCEL NOS. 158, 159, 160 AND 161 NAMES CHANGED. PARCEL NOS. 164 AND 165 COMBINED INTO PARCEL NO. 164 AND NAME CHANGED. NOTE ABOUT DRIVE ACCESS DURING CONSTRUCTION ADDED. |

REVISIONS

8/17/99

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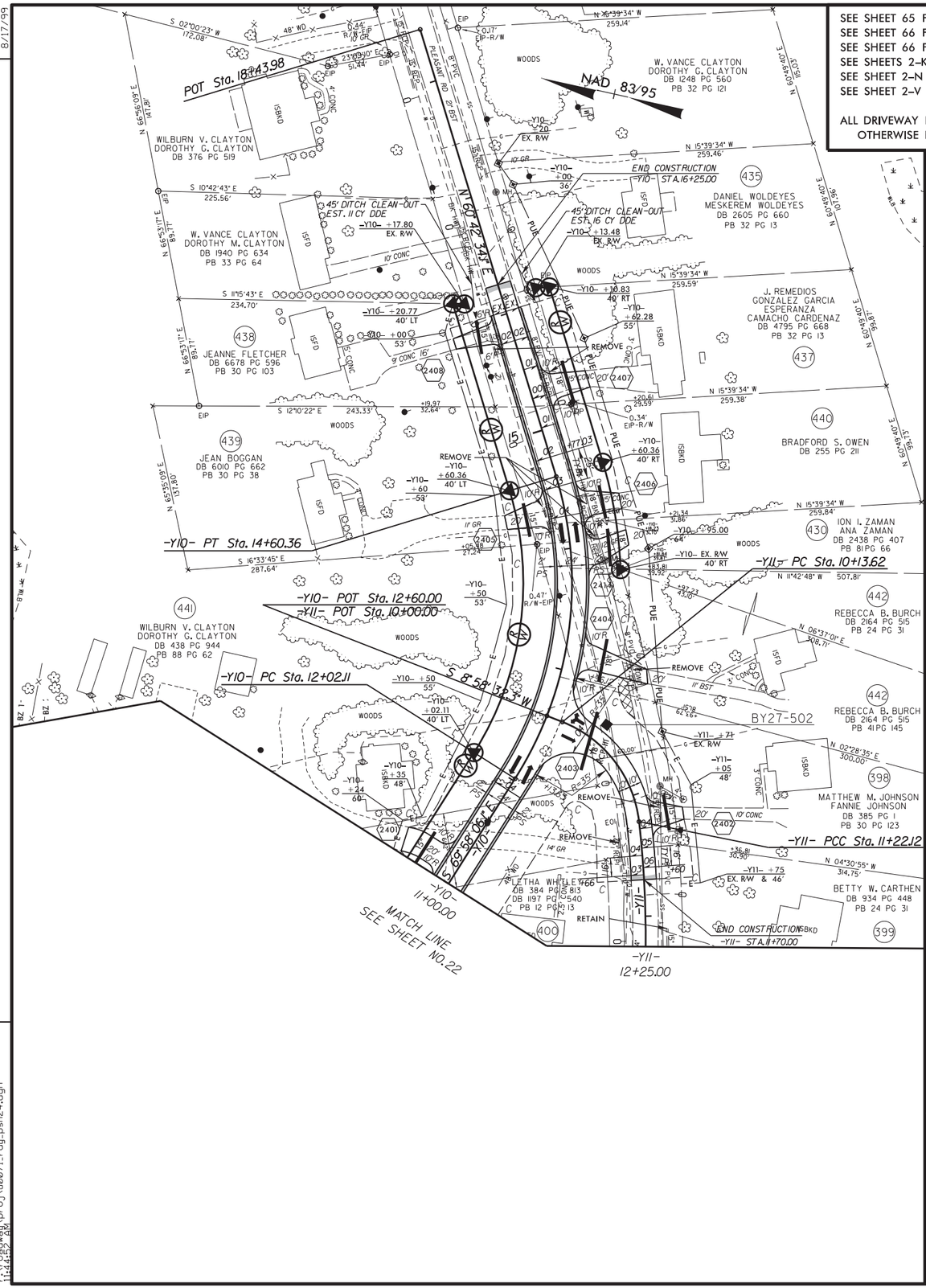
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 24 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

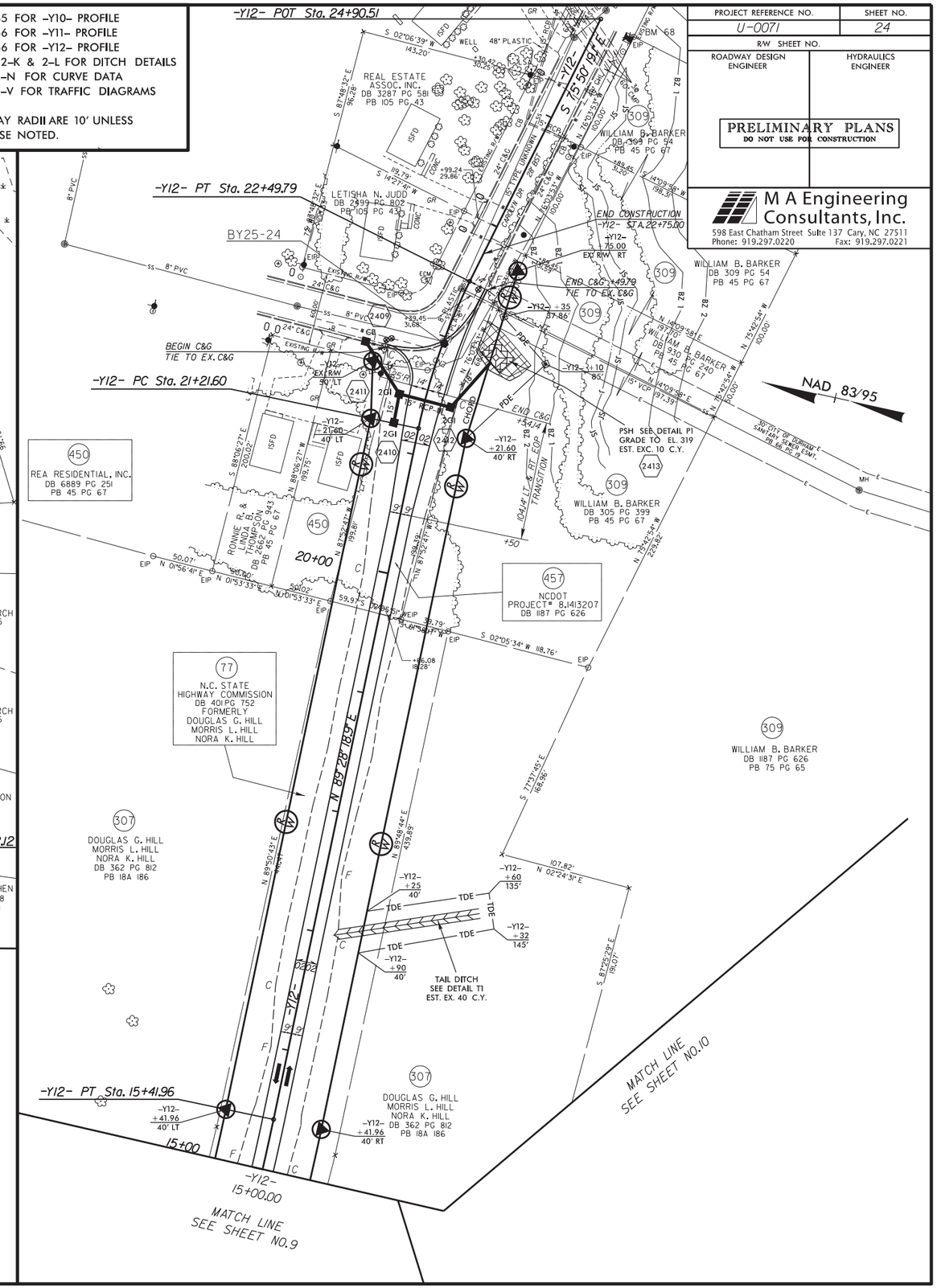
**PRELIMINARY PLANS**
**DO NOT USE FOR CONSTRUCTION**


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


SEE SHEET 65 FOR -Y10- PROFILE
SEE SHEET 66 FOR -Y11- PROFILE
SEE SHEET 66 FOR -Y12- PROFILE
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-N FOR CURVE DATA
SEE SHEET 2-V FOR TRAFFIC DIAGRAMS

ALL DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED.




| REVISIONS | | |
|---|---|---|
| R/W REVISION | 06/04/02 | RMP ALL ADJACENT PARCELS OWNED BY WILLIAM B. BARKER COMBINED INTO PARCEL NO. 309, PARCEL NOS. 400 & 401 COMBINED INTO PARCEL NO. 400, PARCEL NOS. 442 & 443 COMBINED INTO PARCEL NO. 442. |
| R/W REVISION | 08/22/02 | DBE REVISED DUPLICATE PROPERTY LINES ALONG PARCELS 301 & 17. |
| R/W REVISION | 02/22/03 | KSR PARCEL NO. 450 NAME CHANGED. |

8/17/99

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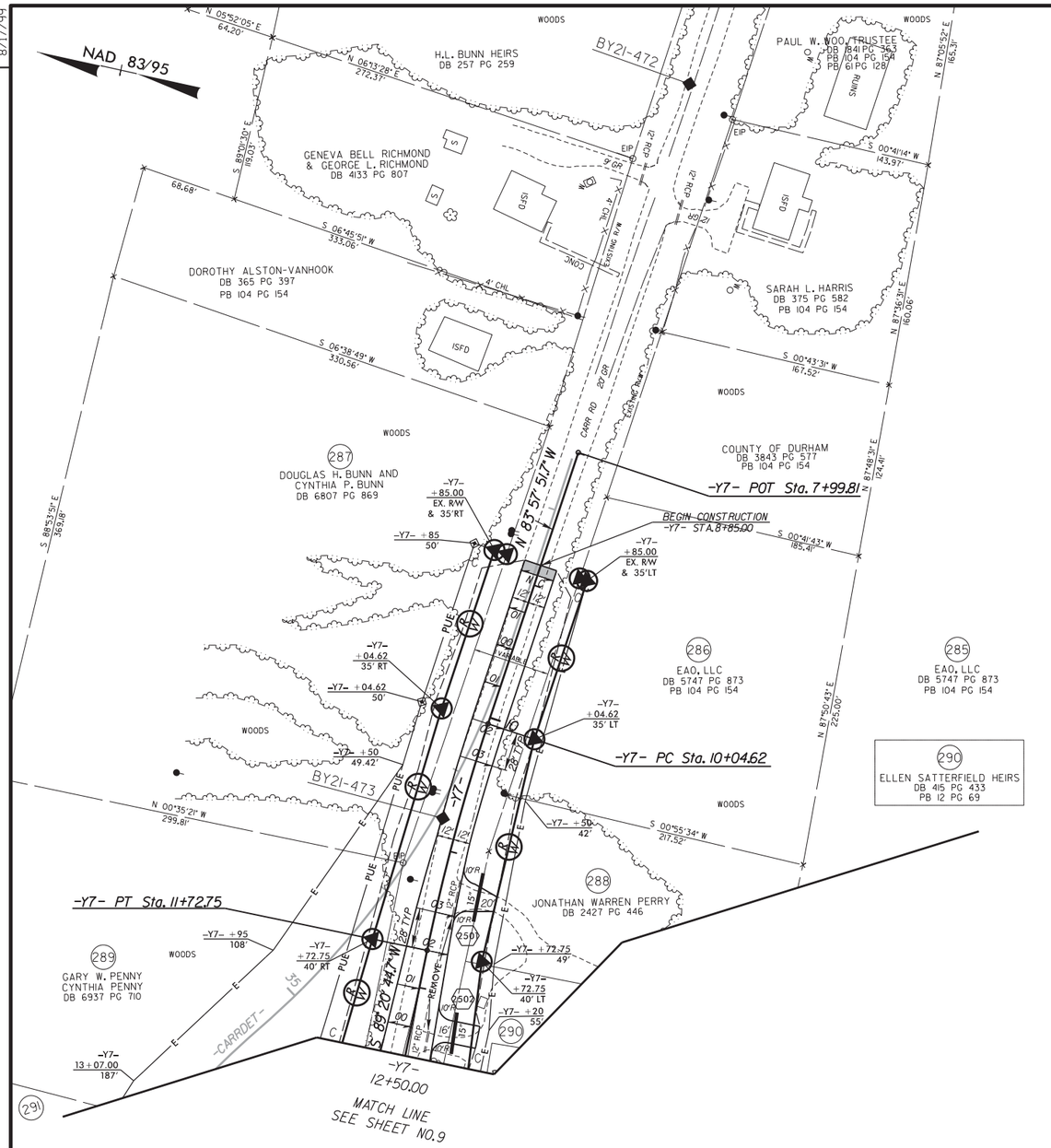
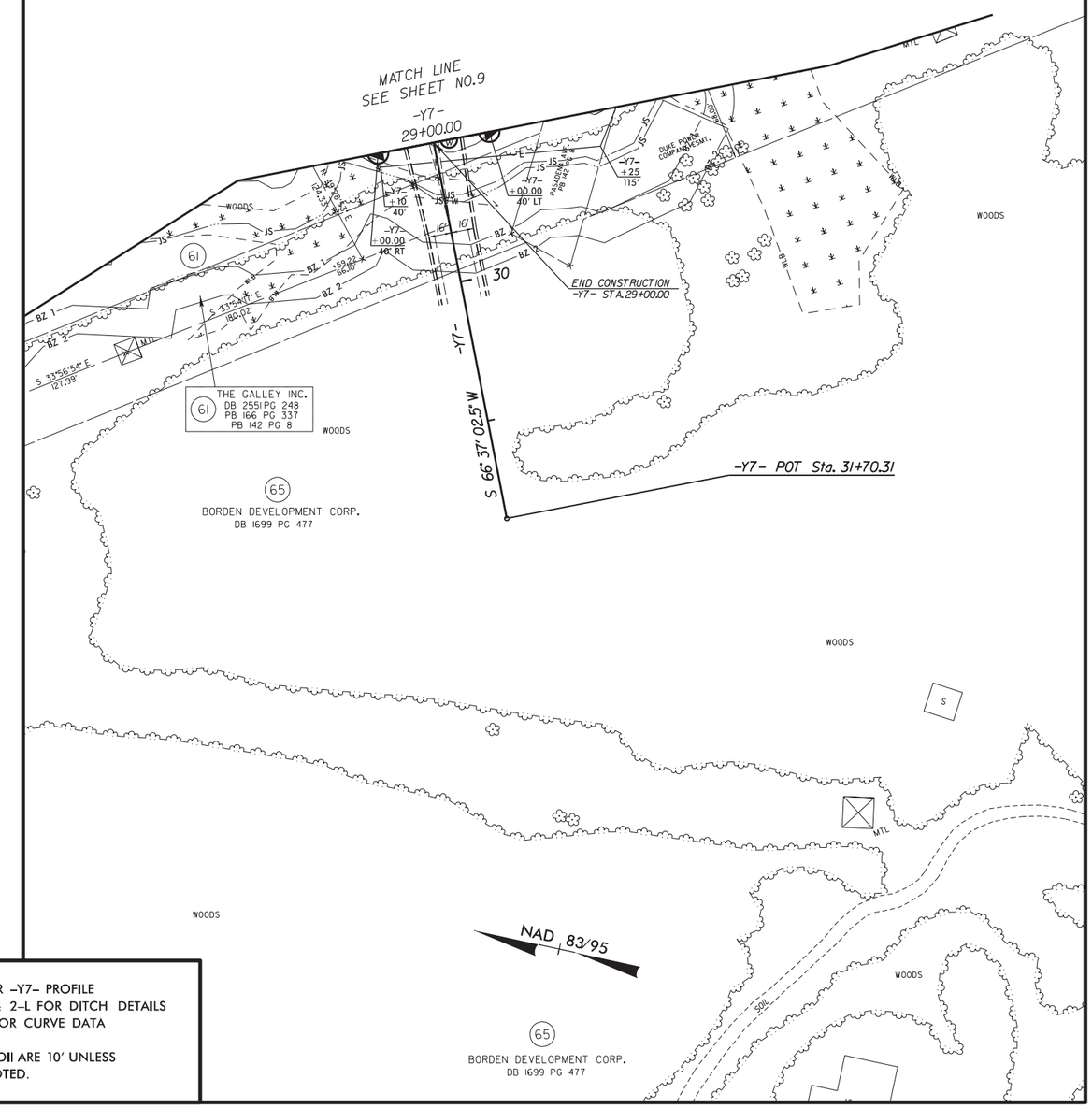
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 25 |
| R/W SHEET NO. | |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION


M A Engineering Consultants, Inc.
598 East Chatham Street Suite 137 Cary, NC 27511
Phone: 919.297.0220 Fax: 919.297.0221


SEE SHEET 58 FOR -Y7- PROFILE
SEE SHEETS 2-K & 2-L FOR DITCH DETAILS
SEE SHEET 2-M FOR CURVE DATA

ALL DRIVEWAY RADII ARE 10' UNLESS OTHERWISE NOTED.

REVISIONS

R/W REVISION 11/19/2002 RWP PARCEL OWNER NAME CHANGED ON PARCEL 285 TO EAO, LLC.
R/W REVISION 2/22/2013 KSH PARCELS 64, 40 AND 41 COMBINED INTO PARCEL 64. PARCEL NOS. 286, 287 AND 289 NAME CHANGED.

8/17/99

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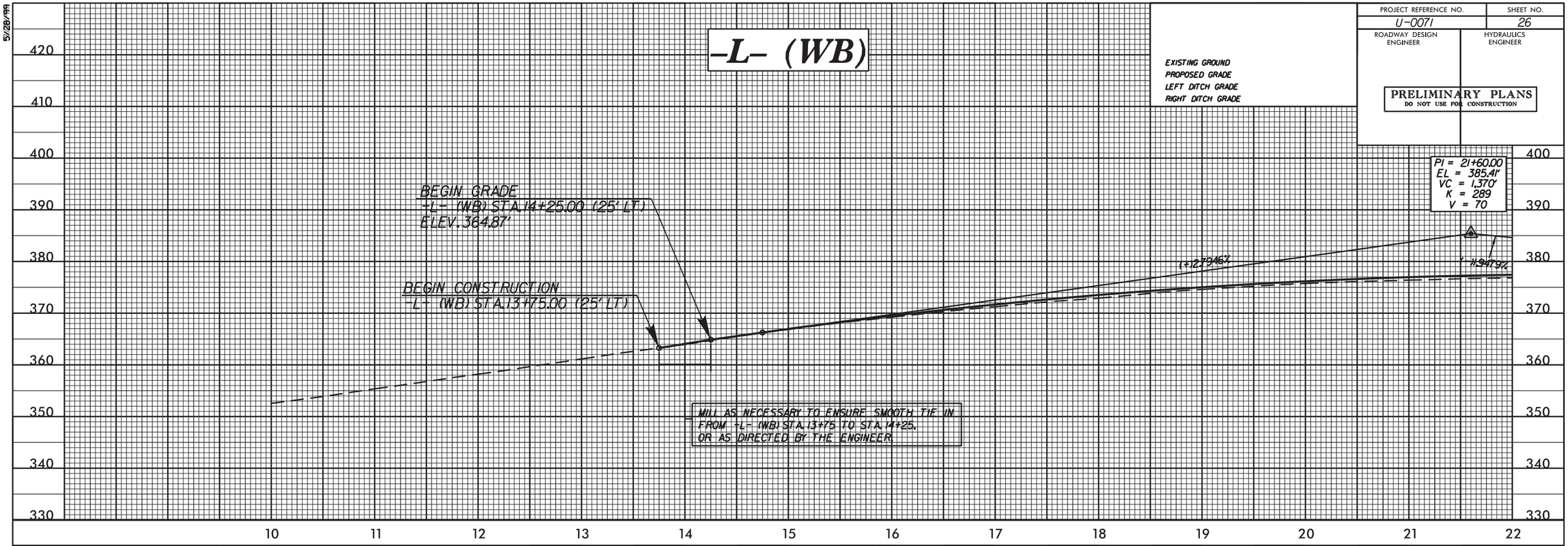
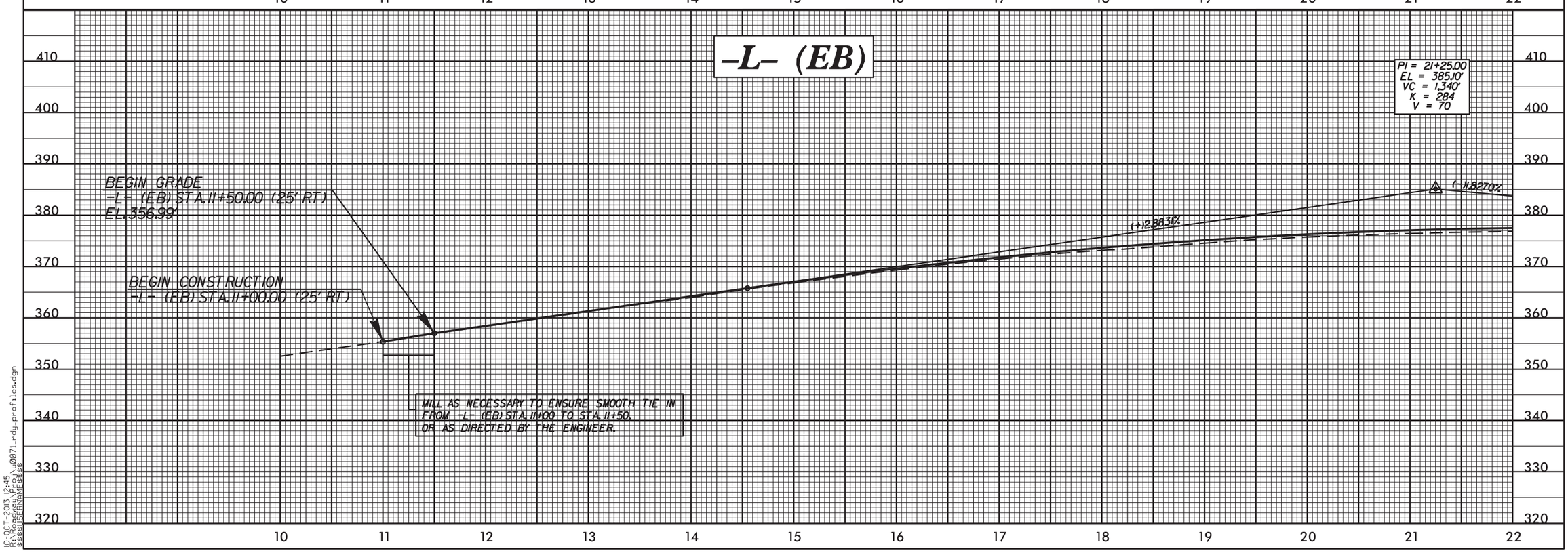
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 26 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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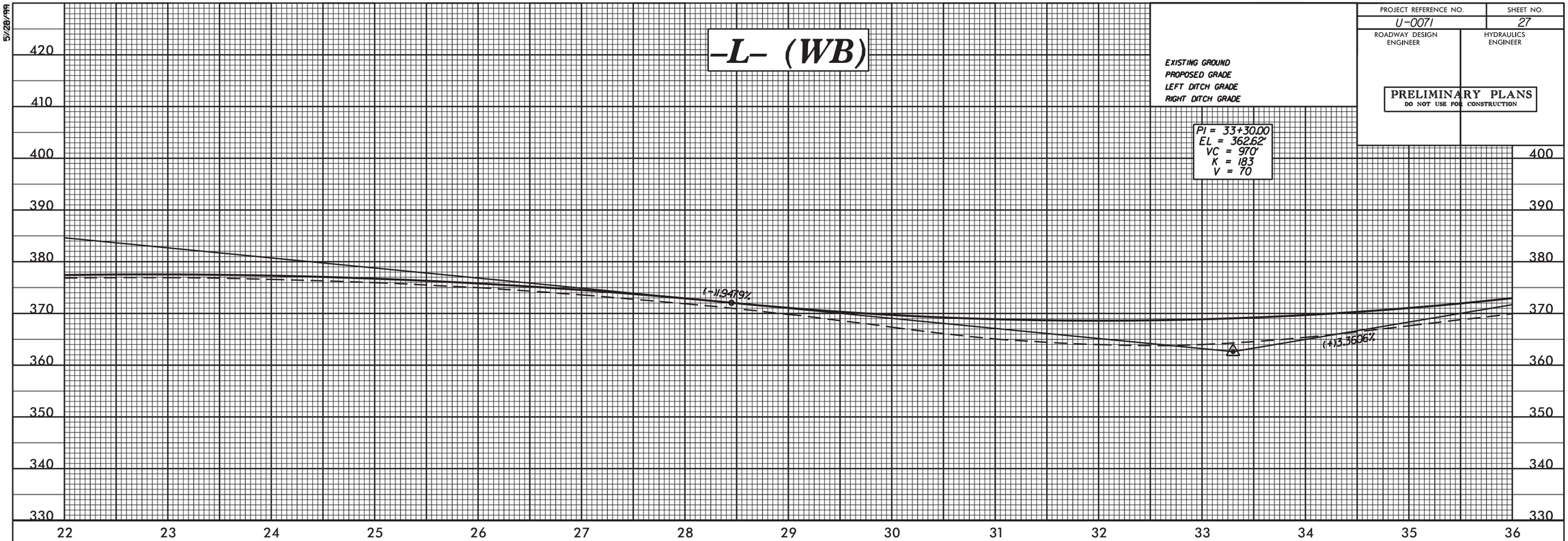
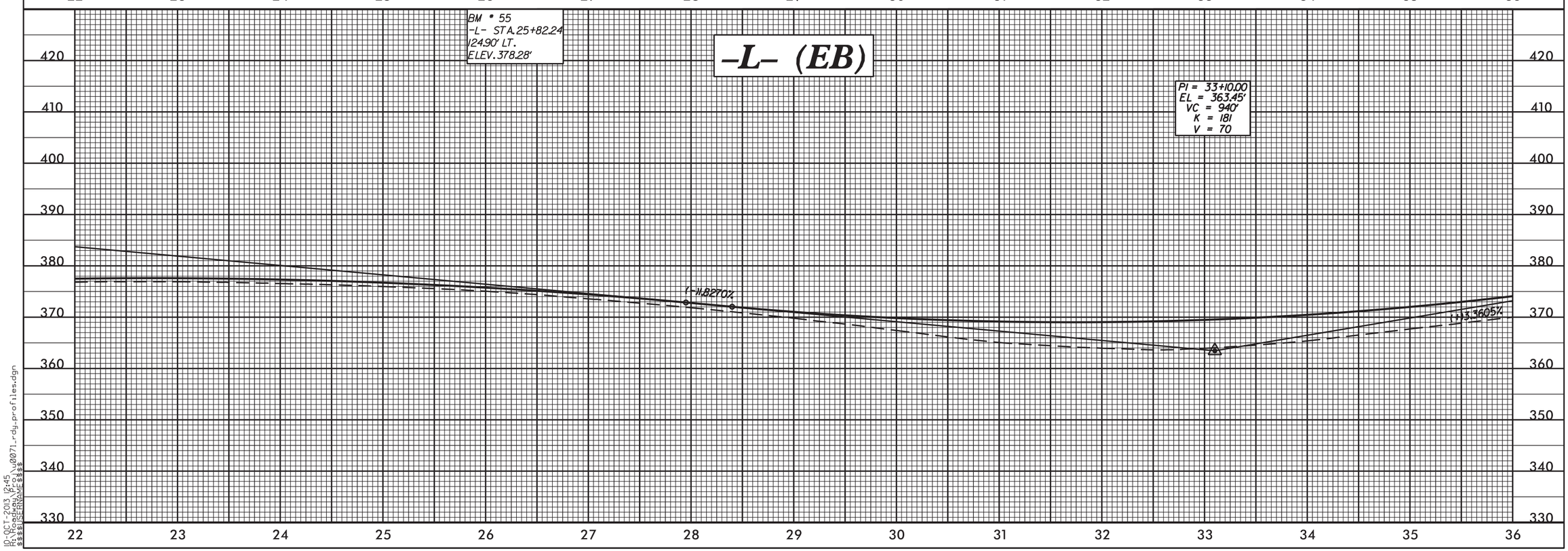
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 27 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 28 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

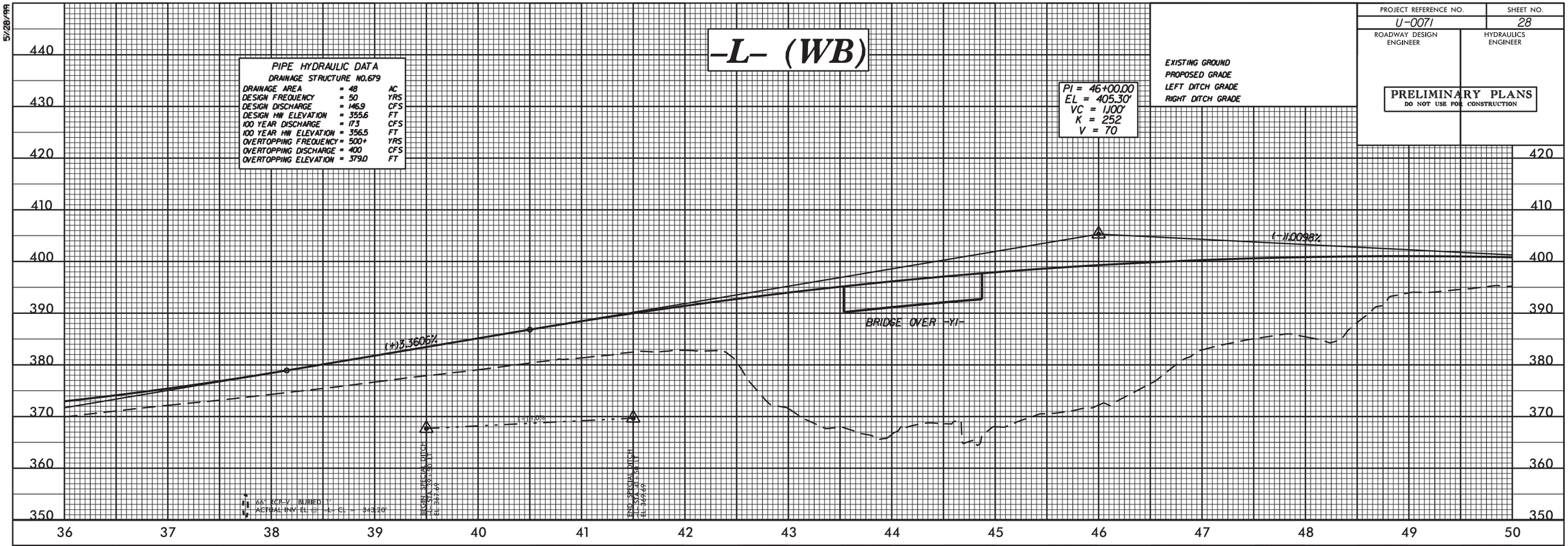
EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

## -L- (WB)

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.679

| | | |
|---|---|---|
| DRAINAGE AREA | = 48 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 146.9 | CFS |
| DESIGN HW ELEVATION | = 355.6 | FT |
| 100 YEAR DISCHARGE | = 173 | CFS |
| 100 YEAR HW ELEVATION | = 356.5 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 400 | CFS |
| OVERTOPPING ELEVATION | = 379.0 | FT |

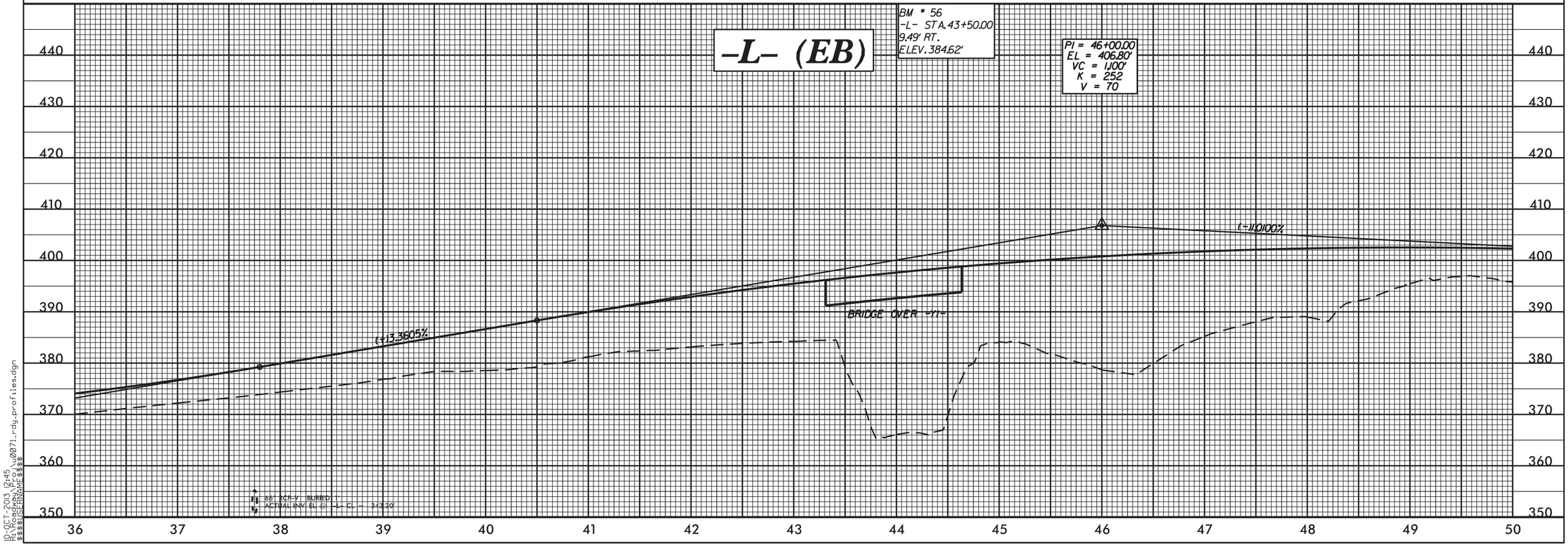
PI = 46+00.00
EL = 405.30'
VC = 1,100'
K = 252
V = 70




## -L- (EB)

BM # 56
-L- STA. 43+50.00
9.49' RT.
ELEV. 384.62'

PI = 46+00.00
EL = 406.80'
VC = 1,100'
K = 252
V = 70

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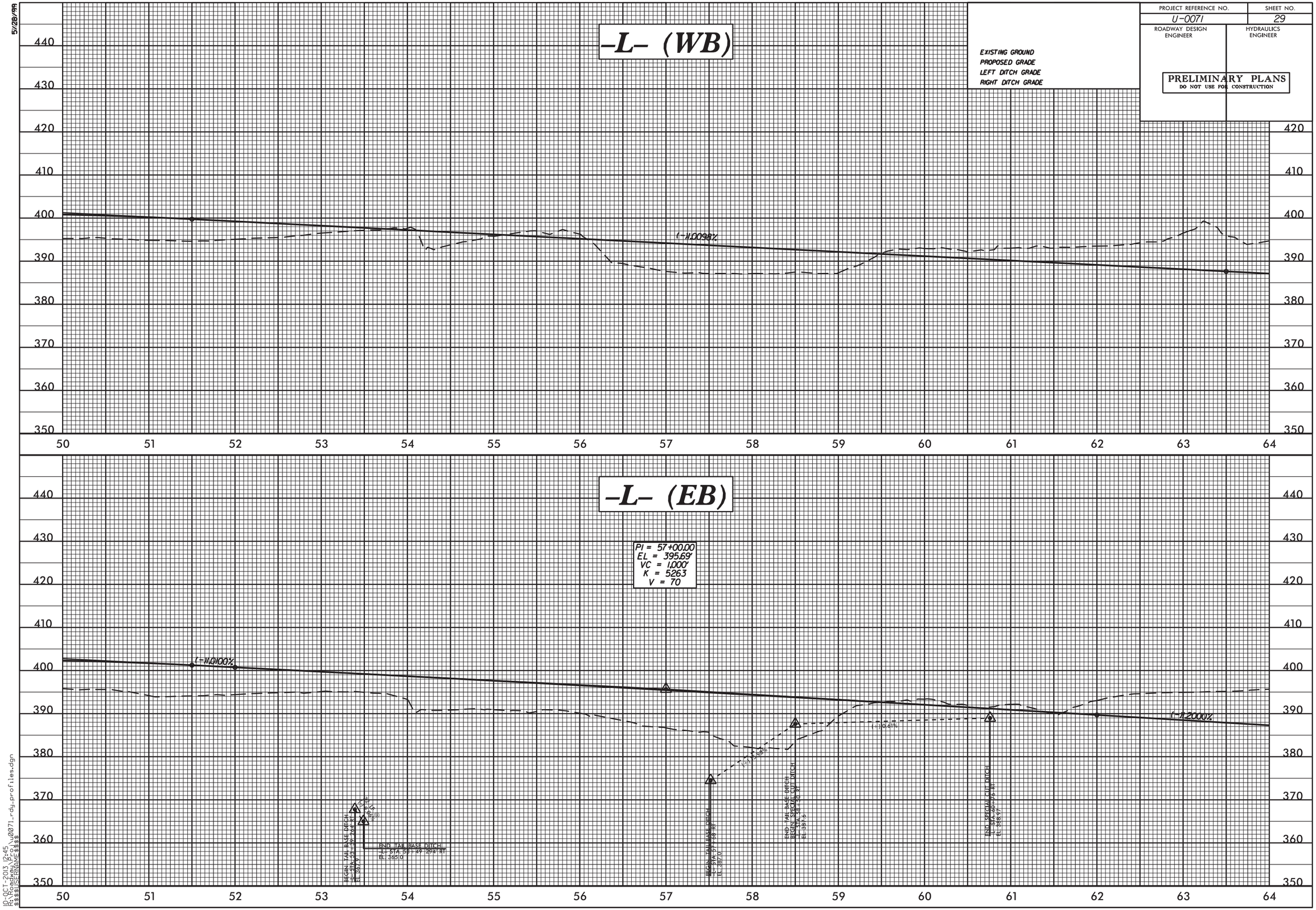
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 29 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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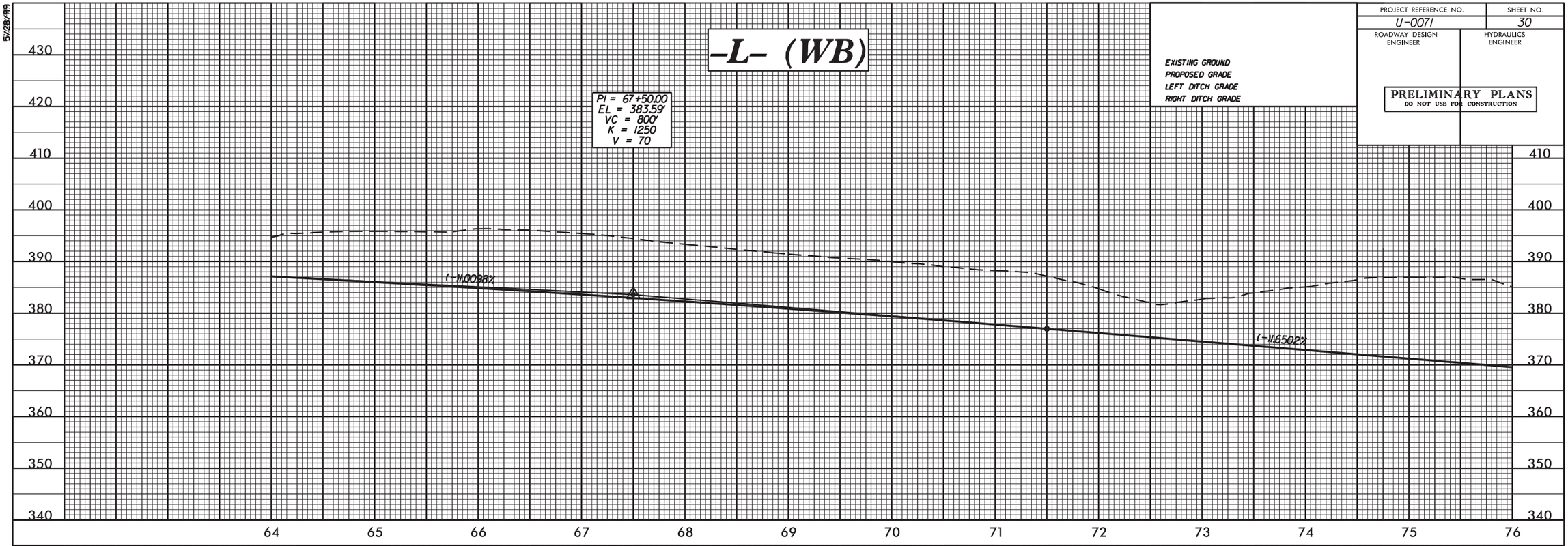
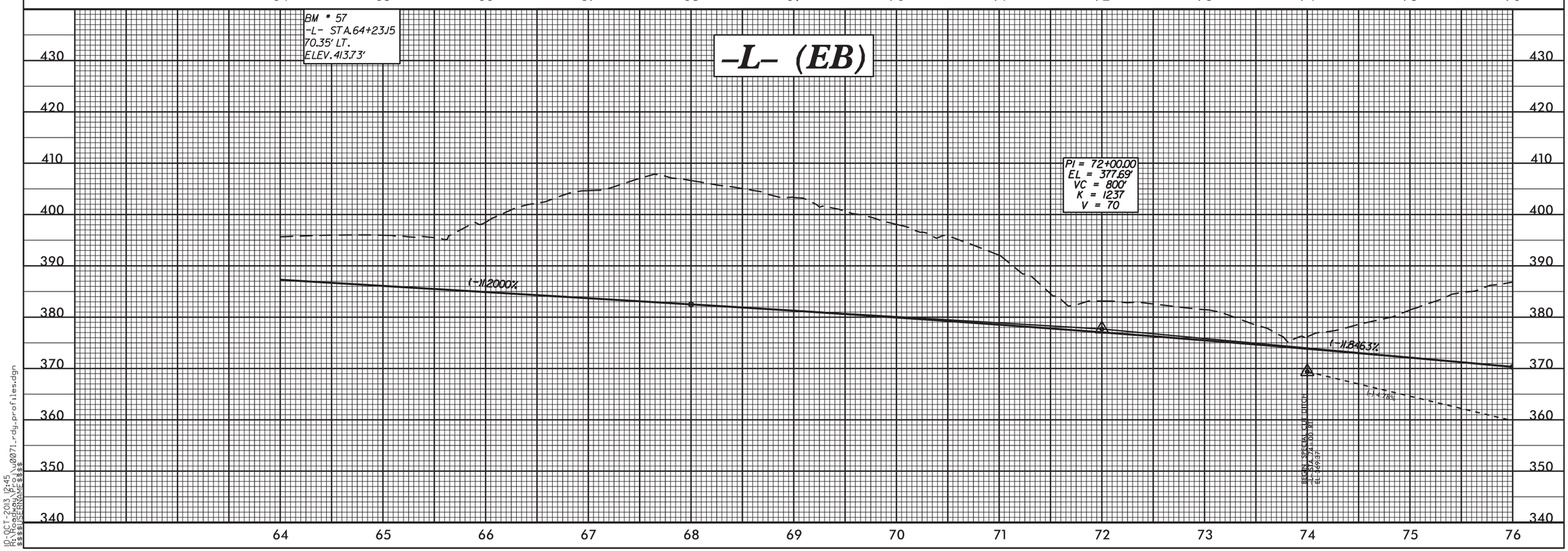
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 30 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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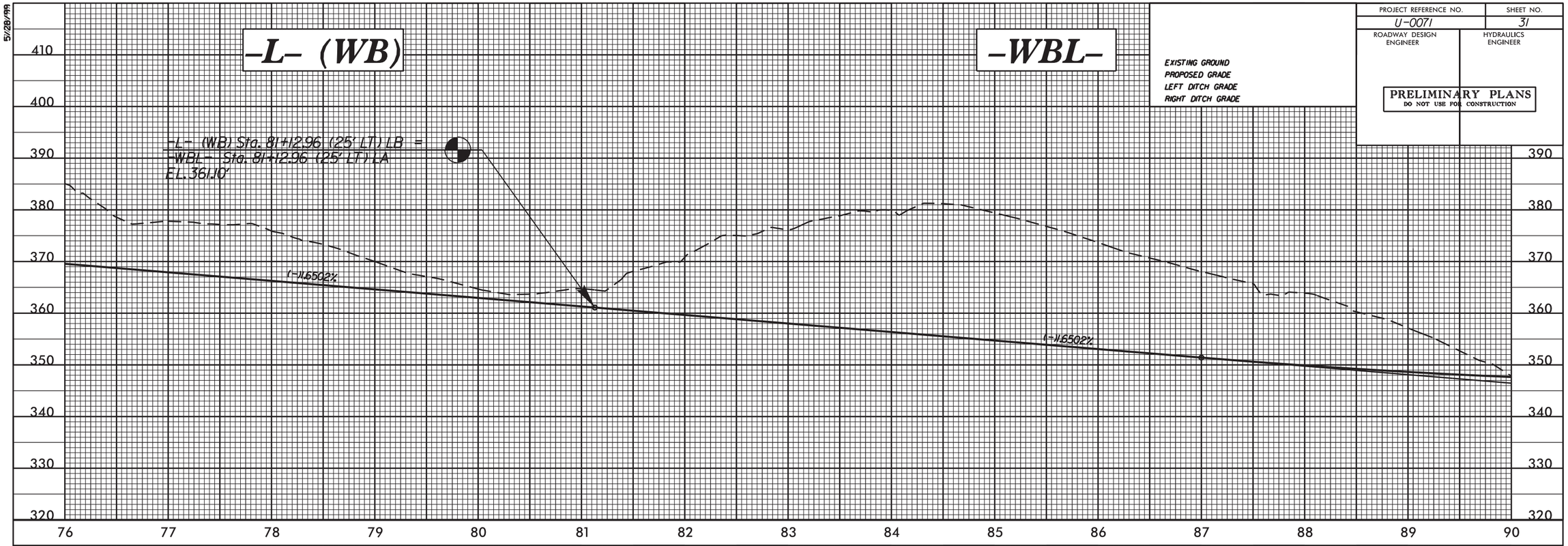
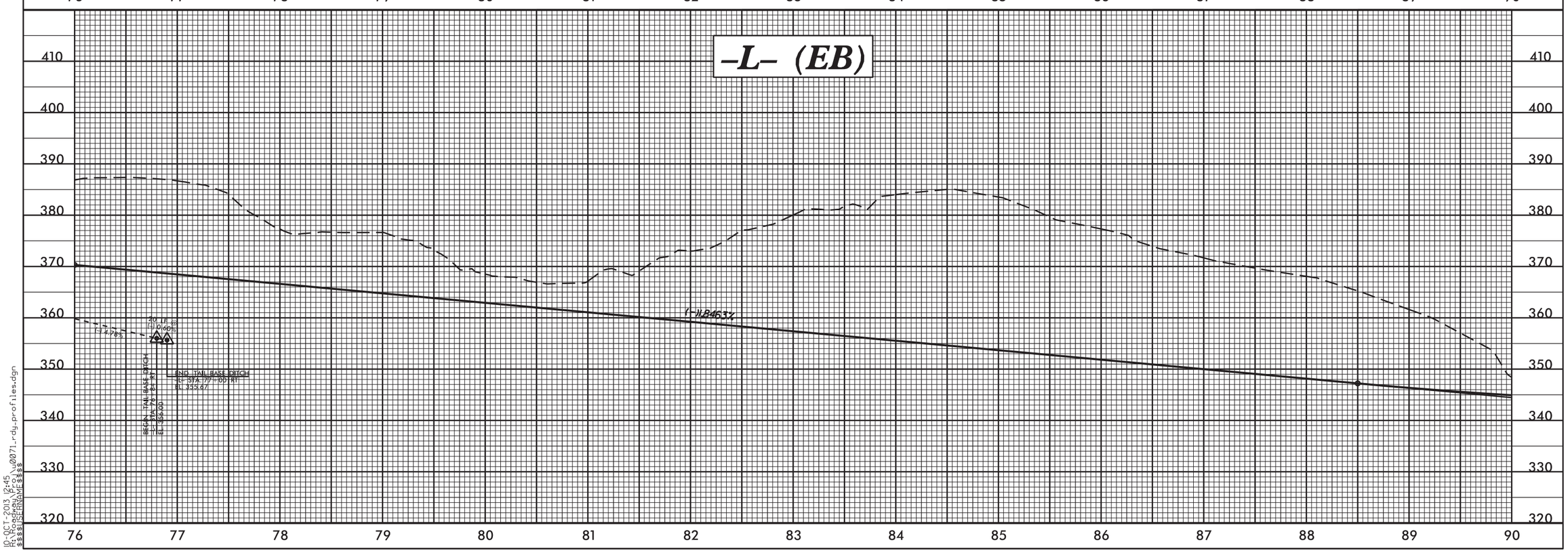
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 31 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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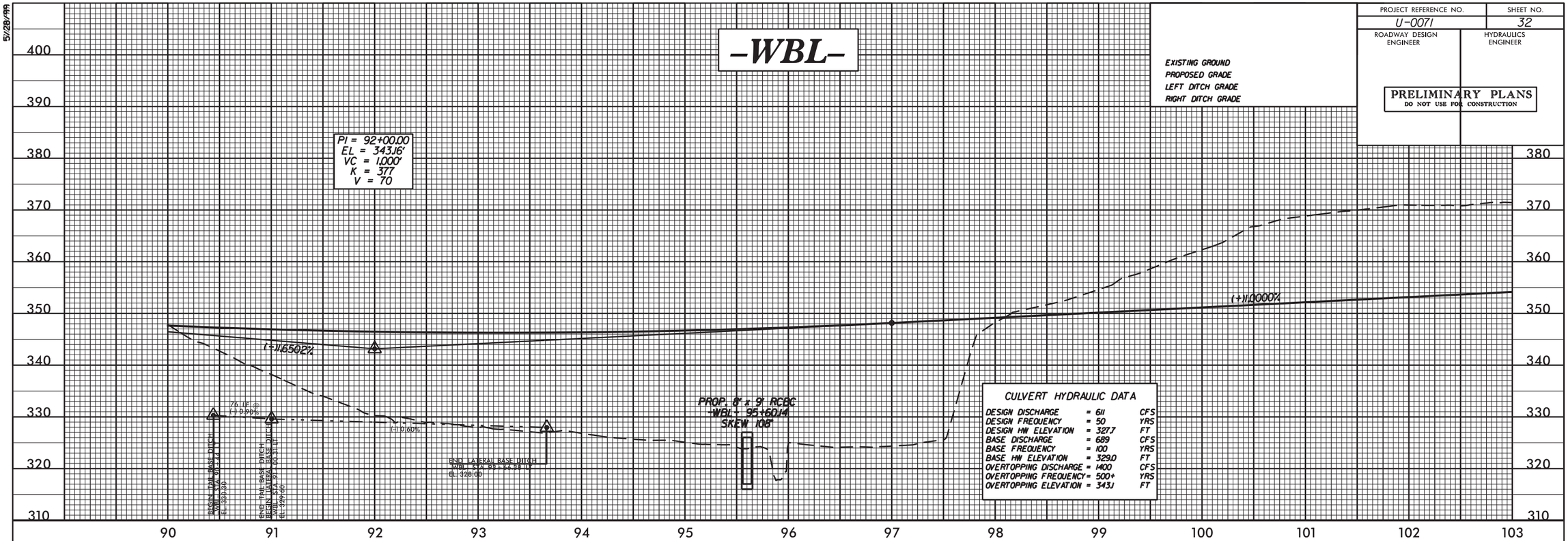
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 32 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

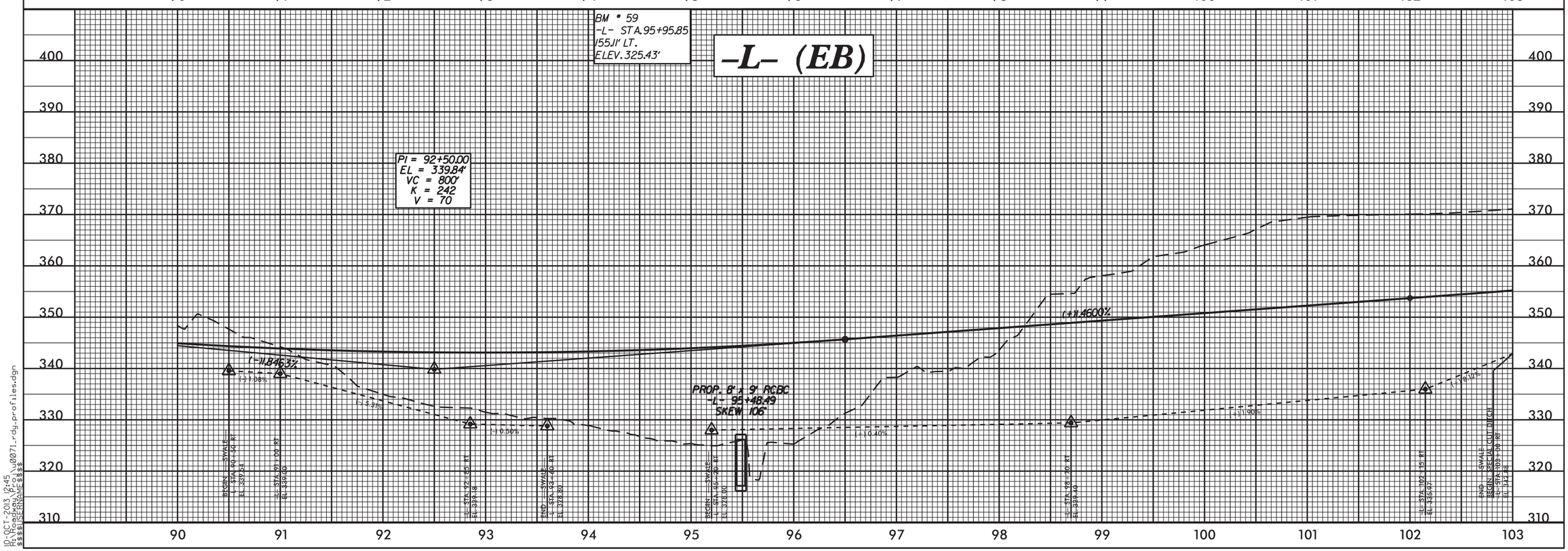
**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

# -WBL-




# -L- (EB)

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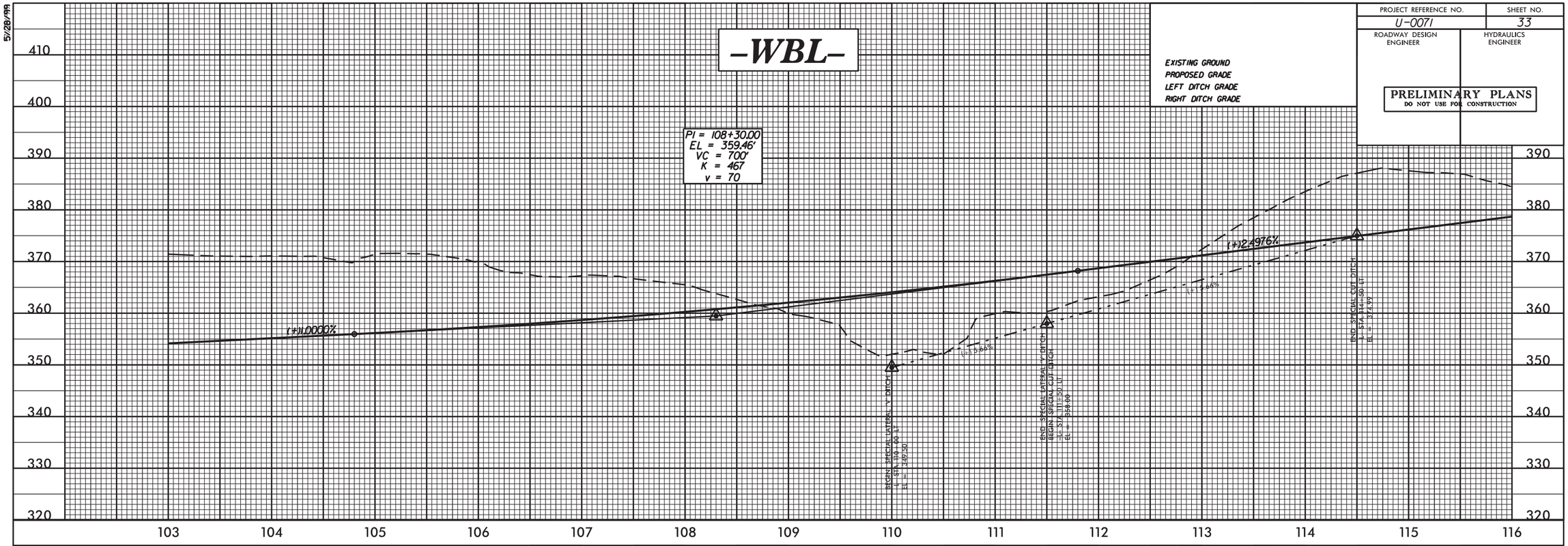
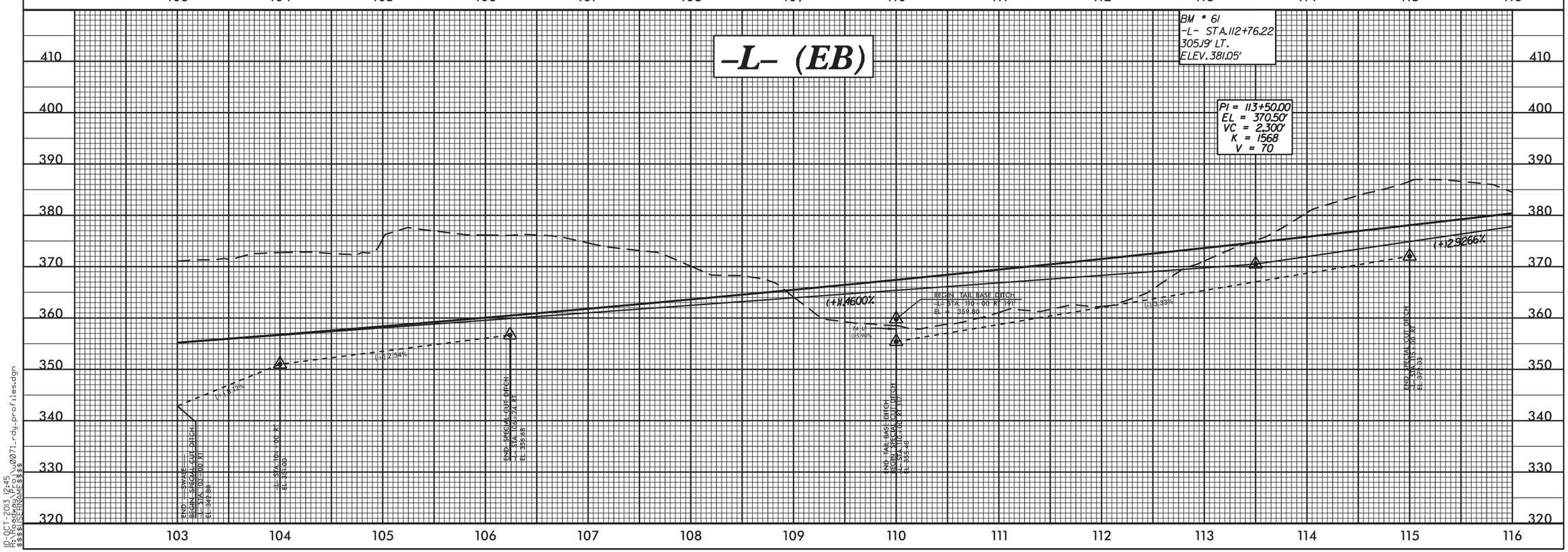
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 33 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 34 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

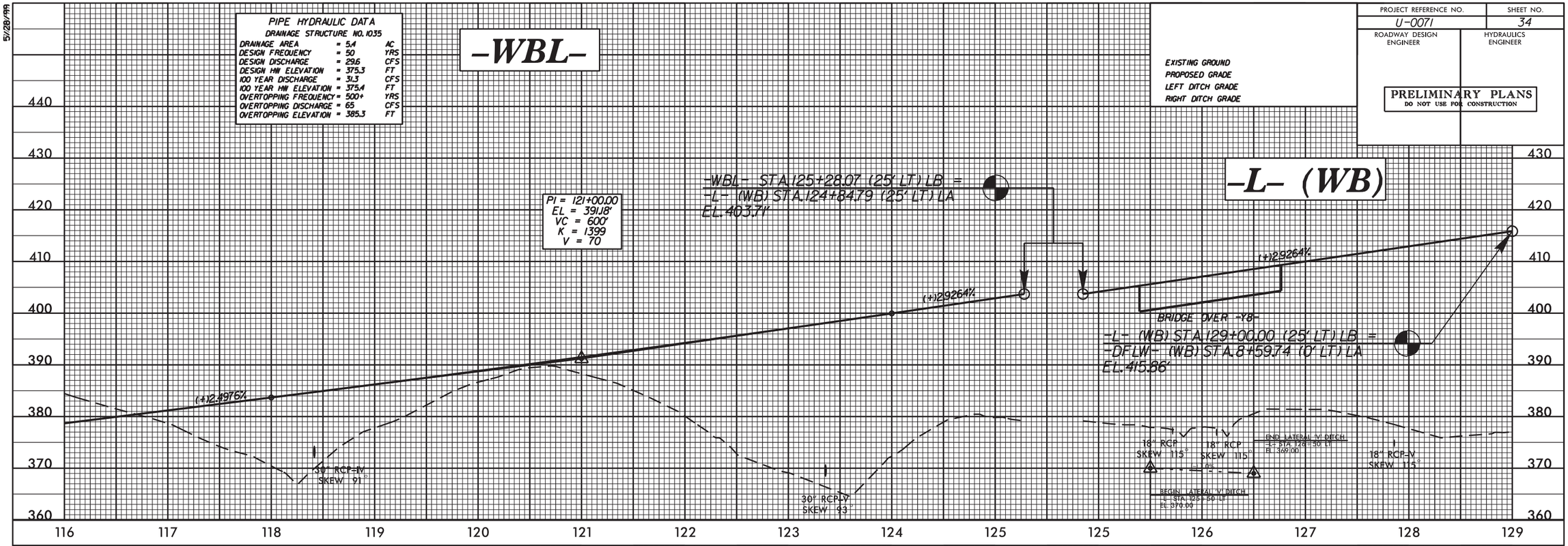
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

## -WBL-

**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO. 1035

| | | |
|---|---|---|
| DRAINAGE AREA | = 5.4 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 29.6 | CFS |
| DESIGN HW ELEVATION | = 375.3 | FT |
| 100 YEAR DISCHARGE | = 31.3 | CFS |
| 100 YEAR HW ELEVATION | = 375.4 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 65 | CFS |
| OVERTOPPING ELEVATION | = 385.3 | FT |




**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO. 1034

| | | |
|---|---|---|
| DRAINAGE AREA | = 4.9 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 26.5 | CFS |
| DESIGN HW ELEVATION | = 377.9 | FT |
| 100 YEAR DISCHARGE | = 28.1 | CFS |
| 100 YEAR HW ELEVATION | = 378.0 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 56 | CFS |
| OVERTOPPING ELEVATION | = 385.3 | FT |

**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO. 1040

| | | |
|---|---|---|
| DRAINAGE AREA | = 5.0 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 22.0 | CFS |
| DESIGN HW ELEVATION | = 378.1 | FT |
| 100 YEAR DISCHARGE | = 23.3 | CFS |
| 100 YEAR HW ELEVATION | = 378.2 | FT |
| OVERTOPPING FREQUENCY | = 500++ | YRS |
| OVERTOPPING DISCHARGE | = 89 | CFS |
| OVERTOPPING ELEVATION | = 389.0 | FT |

## -L- (EB)

**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO. 1051

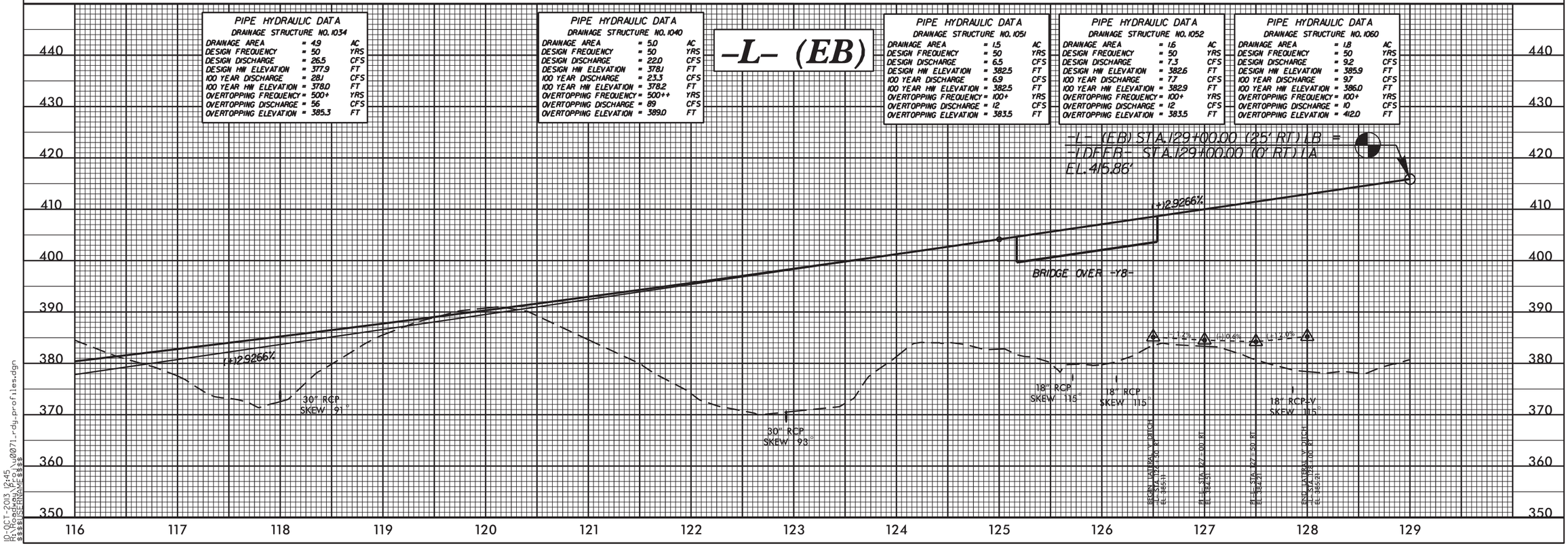
| | | |
|---|---|---|
| DRAINAGE AREA | = 1.5 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 6.5 | CFS |
| DESIGN HW ELEVATION | = 382.5 | FT |
| 100 YEAR DISCHARGE | = 6.9 | CFS |
| 100 YEAR HW ELEVATION | = 382.5 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 12 | CFS |
| OVERTOPPING ELEVATION | = 383.5 | FT |

**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO. 1052

| | | |
|---|---|---|
| DRAINAGE AREA | = 1.6 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 7.3 | CFS |
| DESIGN HW ELEVATION | = 382.6 | FT |
| 100 YEAR DISCHARGE | = 7.7 | CFS |
| 100 YEAR HW ELEVATION | = 382.9 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 12 | CFS |
| OVERTOPPING ELEVATION | = 383.5 | FT |

**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO. 1060

| | | |
|---|---|---|
| DRAINAGE AREA | = 1.8 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 9.2 | CFS |
| DESIGN HW ELEVATION | = 385.9 | FT |
| 100 YEAR DISCHARGE | = 9.7 | CFS |
| 100 YEAR HW ELEVATION | = 386.0 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 10 | CFS |
| OVERTOPPING ELEVATION | = 412.0 | FT |

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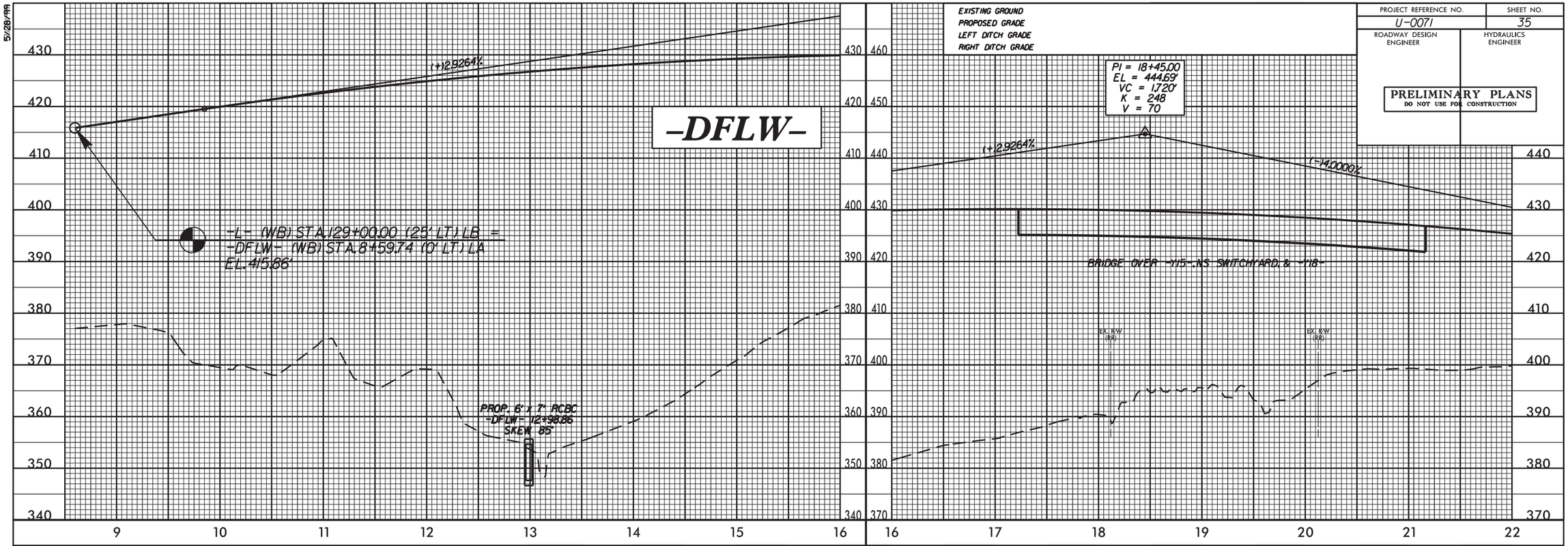
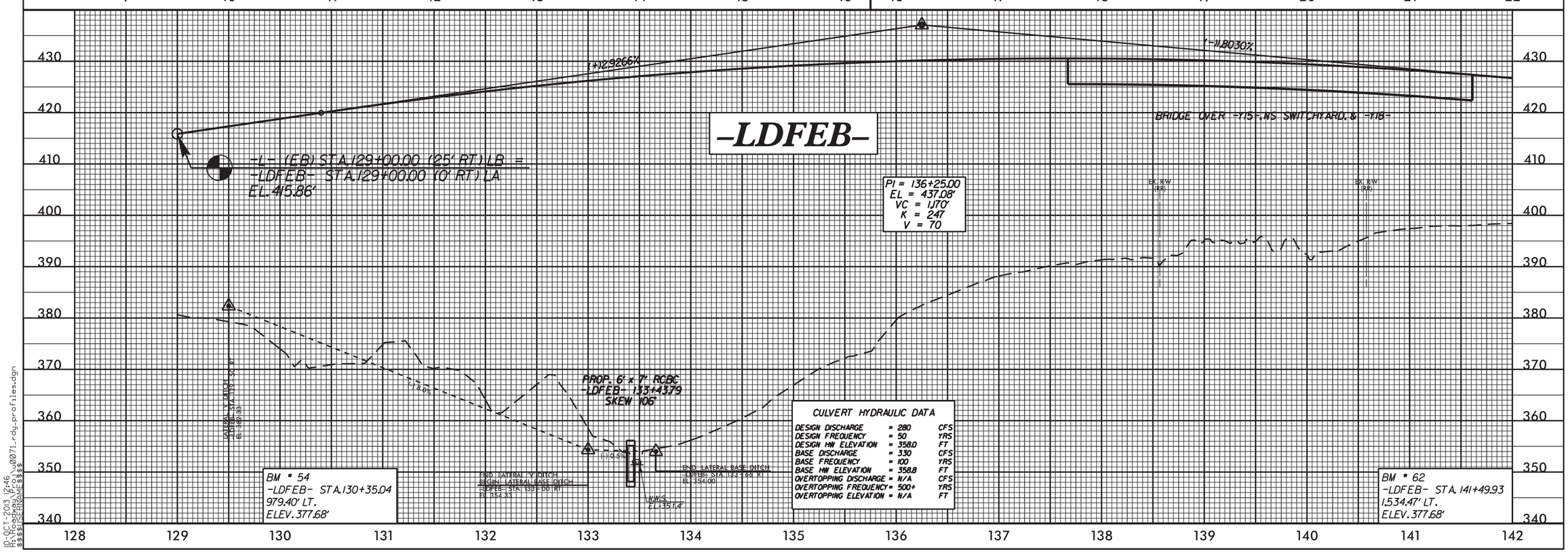
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 35 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE




**CULVERT HYDRAULIC DATA**

| | | |
|---|---|---|
| DESIGN DISCHARGE | = 280 | CFS |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN HW ELEVATION | = 358.0 | FT |
| BASE DISCHARGE | = 330 | CFS |
| BASE FREQUENCY | = 100 | YRS |
| BASE HW ELEVATION | = 358.8 | FT |
| OVERTOPPING DISCHARGE | = N/A | CFS |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING ELEVATION | = N/A | FT |

10-OCT-2013 12:46
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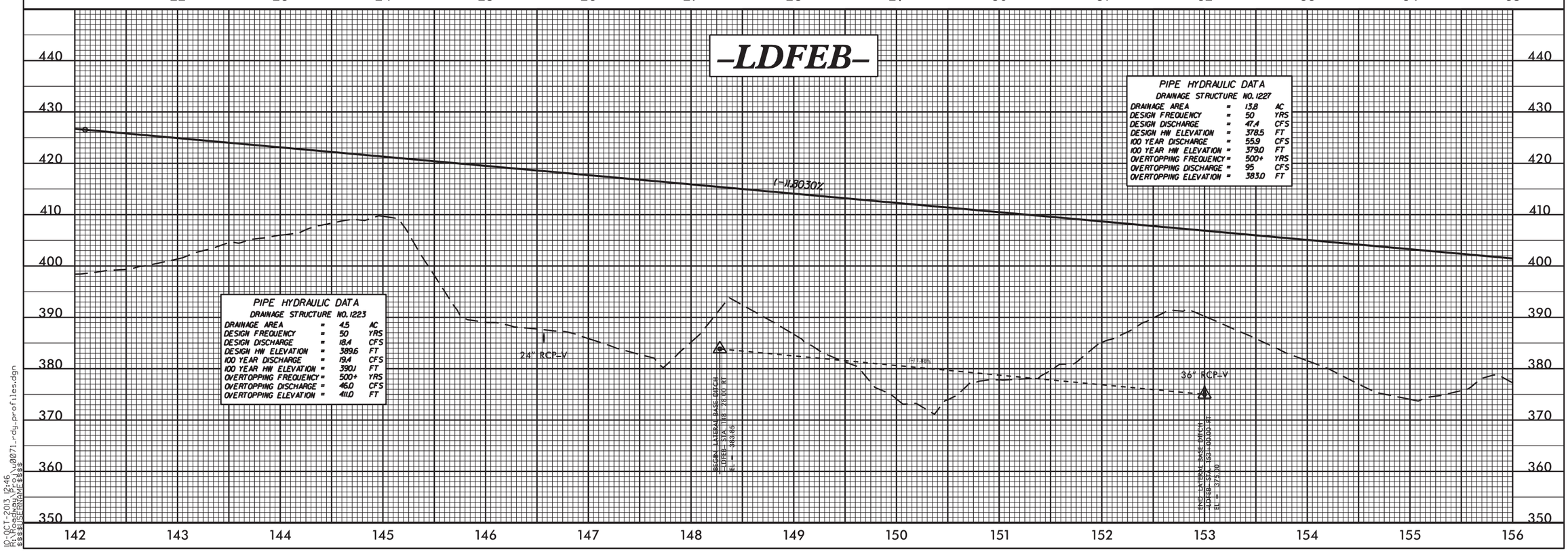
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 36 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE




PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 1227

| | | | |
|---|---|---|---|
| DRAINAGE AREA | = | 13.8 | AC |
| DESIGN FREQUENCY | = | 50 | YRS |
| DESIGN DISCHARGE | = | 47.4 | CFS |
| DESIGN HW ELEVATION | = | 378.5 | FT |
| 100 YEAR DISCHARGE | = | 55.9 | CFS |
| 100 YEAR HW ELEVATION | = | 379.0 | FT |
| OVERTOPPING FREQUENCY | = | 500+ | YRS |
| OVERTOPPING DISCHARGE | = | 95 | CFS |
| OVERTOPPING ELEVATION | = | 383.0 | FT |

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 1223

| | | | |
|---|---|---|---|
| DRAINAGE AREA | = | 4.5 | AC |
| DESIGN FREQUENCY | = | 50 | YRS |
| DESIGN DISCHARGE | = | 18.4 | CFS |
| DESIGN HW ELEVATION | = | 389.6 | FT |
| 100 YEAR DISCHARGE | = | 19.4 | CFS |
| 100 YEAR HW ELEVATION | = | 390.1 | FT |
| OVERTOPPING FREQUENCY | = | 500+ | YRS |
| OVERTOPPING DISCHARGE | = | 46.0 | CFS |
| OVERTOPPING ELEVATION | = | 411.0 | FT |

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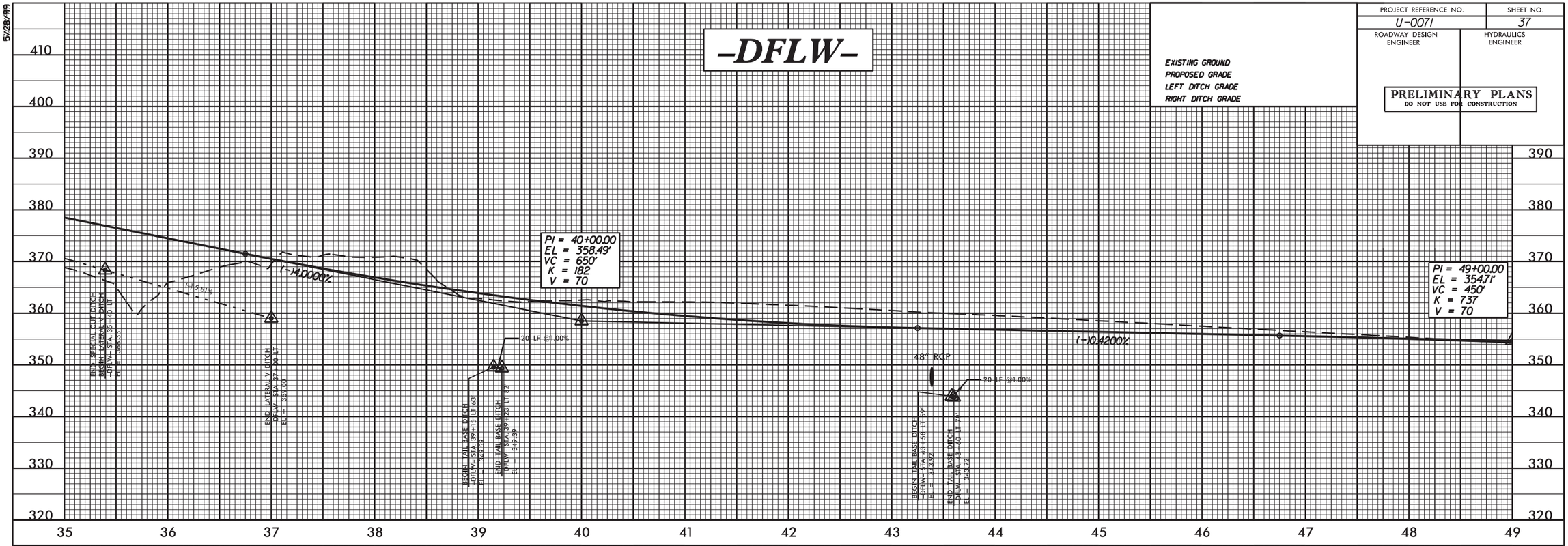
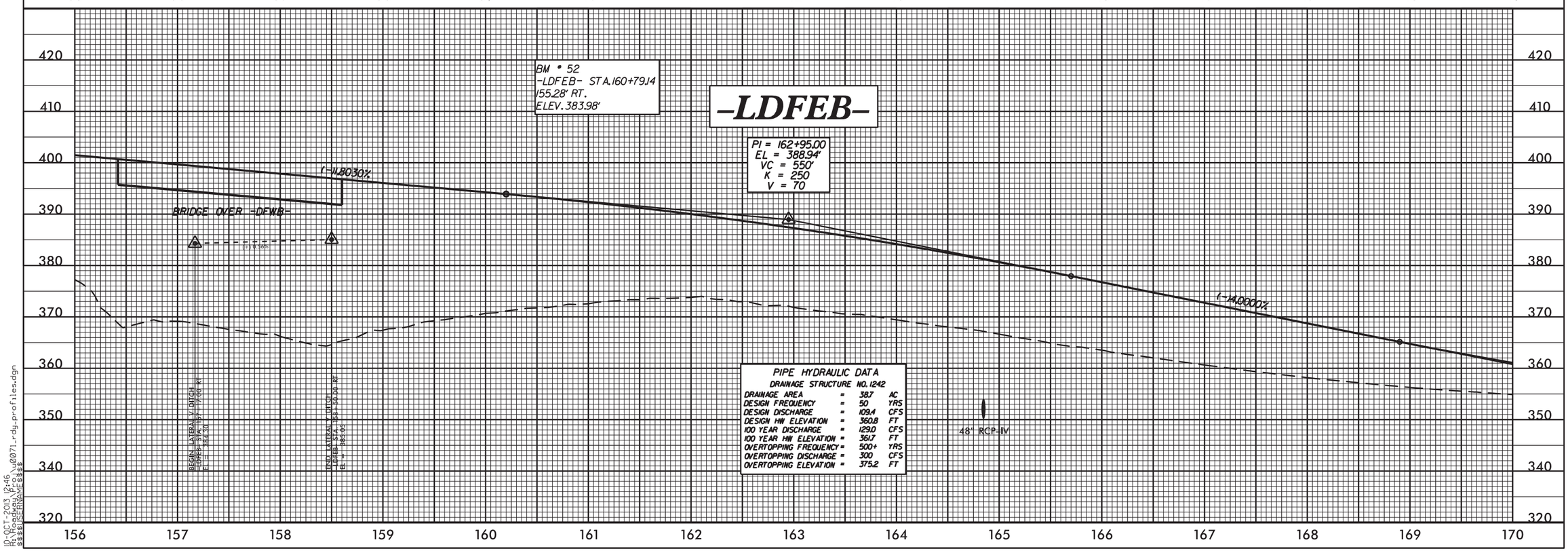
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 37 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE




PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 1242

| | | | |
|---|---|---|---|
| DRAINAGE AREA | = | 38.7 | AC |
| DESIGN FREQUENCY | = | 50 | YRS |
| DESIGN DISCHARGE | = | 109.4 | CFS |
| DESIGN HW ELEVATION | = | 360.8 | FT |
| 100 YEAR DISCHARGE | = | 129.0 | CFS |
| 100 YEAR HW ELEVATION | = | 361.7 | FT |
| OVERTOPPING FREQUENCY | = | 500+ | YRS |
| OVERTOPPING DISCHARGE | = | 300 | CFS |
| OVERTOPPING ELEVATION | = | 375.2 | FT |

5/28/99

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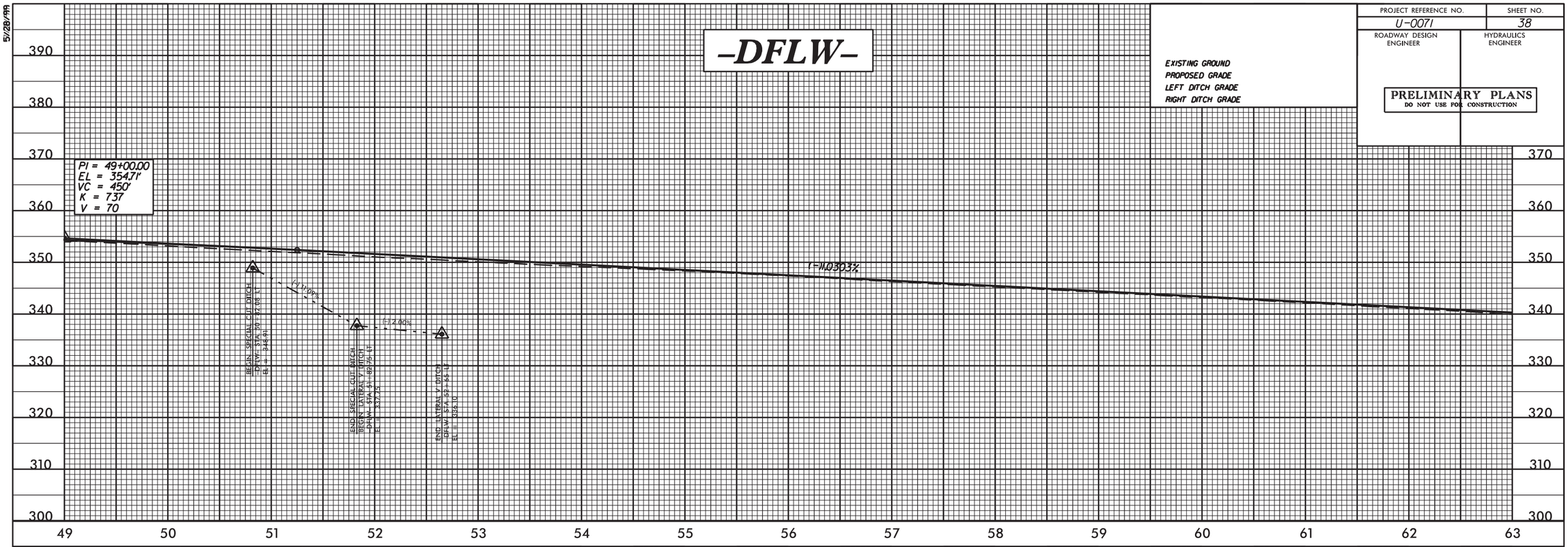
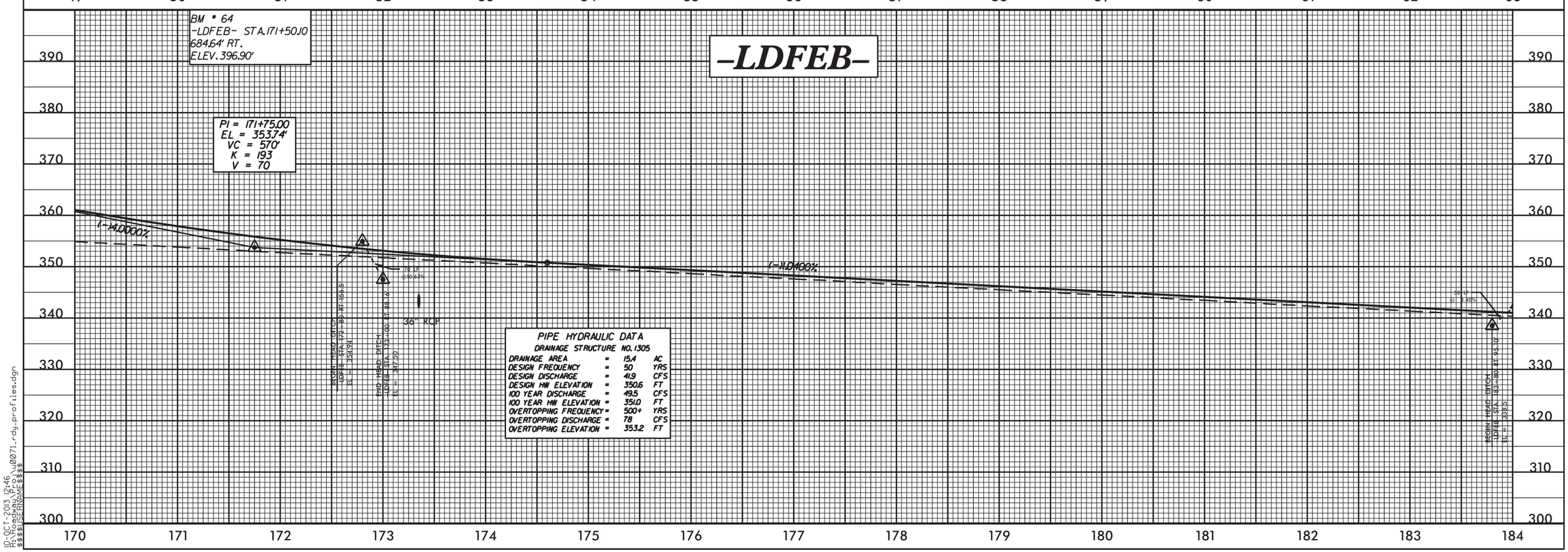
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 38 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE




PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 1305

| | | | |
|---|---|---|---|
| DRAINAGE AREA | = | 15.4 | AC |
| DESIGN FREQUENCY | = | 50 | YRS |
| DESIGN DISCHARGE | = | 41.9 | CFS |
| DESIGN HW ELEVATION | = | 350.6 | FT |
| 100 YEAR DISCHARGE | = | 49.5 | CFS |
| 100 YEAR HW ELEVATION | = | 351.0 | FT |
| OVERTOPPING FREQUENCY | = | 500+ | YRS |
| OVERTOPPING DISCHARGE | = | 78 | CFS |
| OVERTOPPING ELEVATION | = | 353.2 | FT |

5/28/99

10-OCT-2013 12:46
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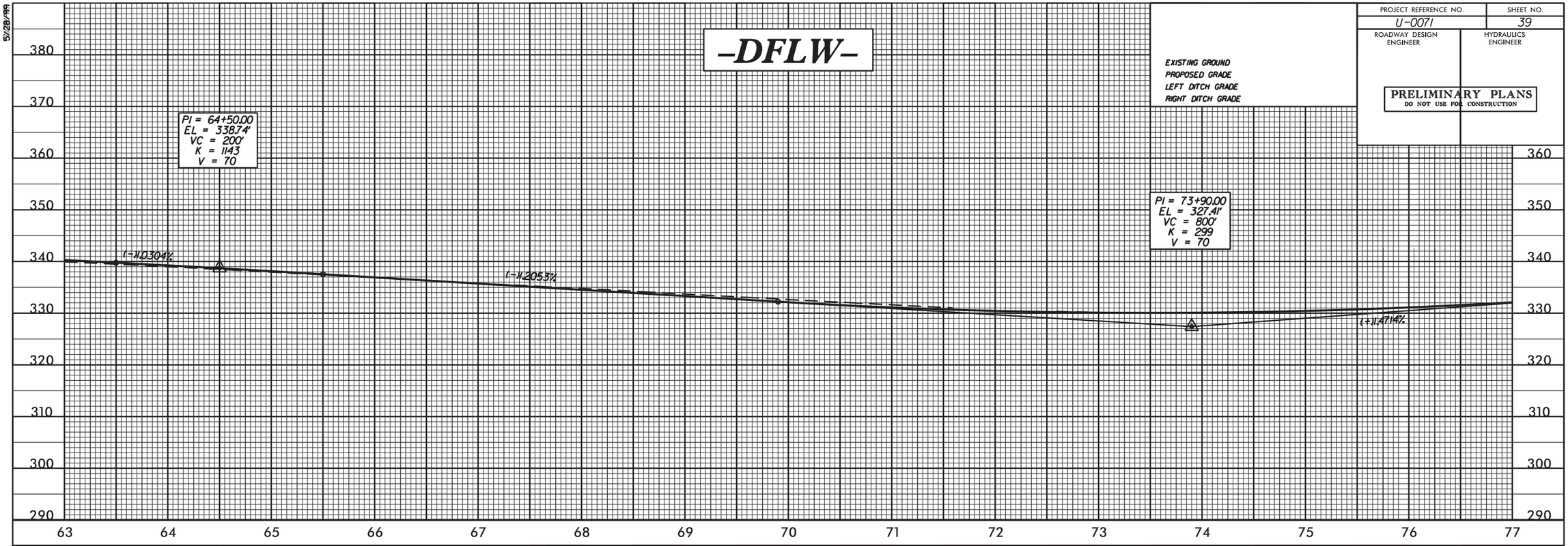
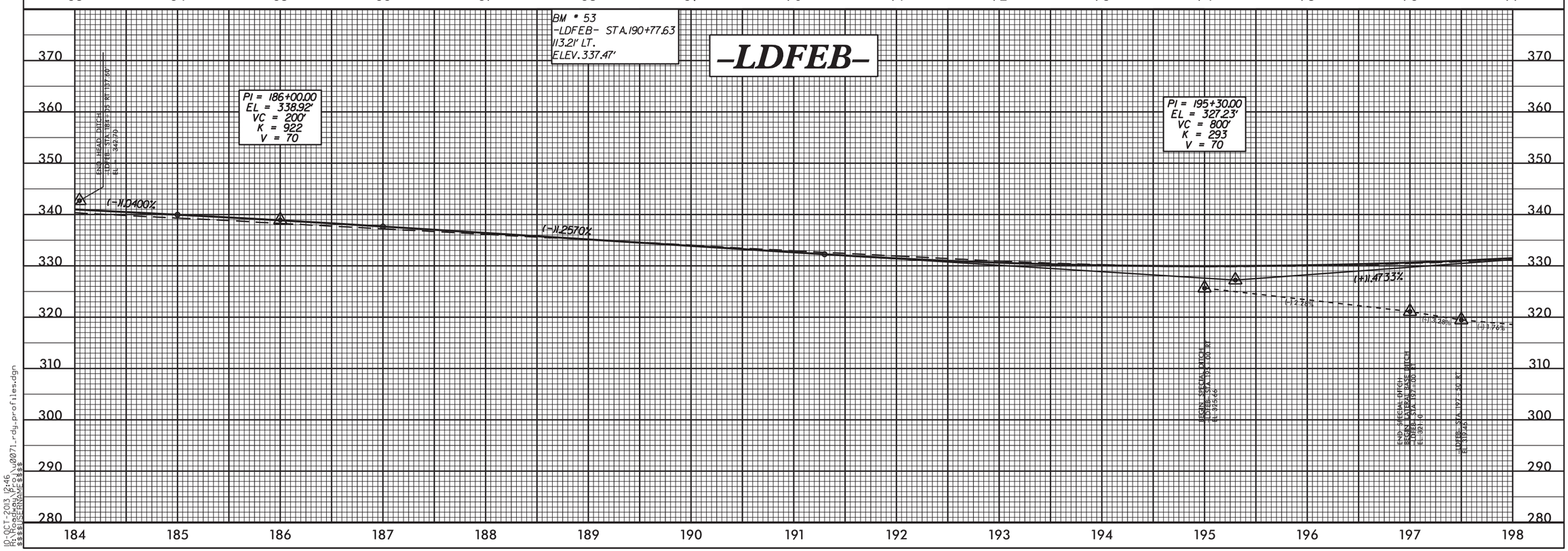
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 39 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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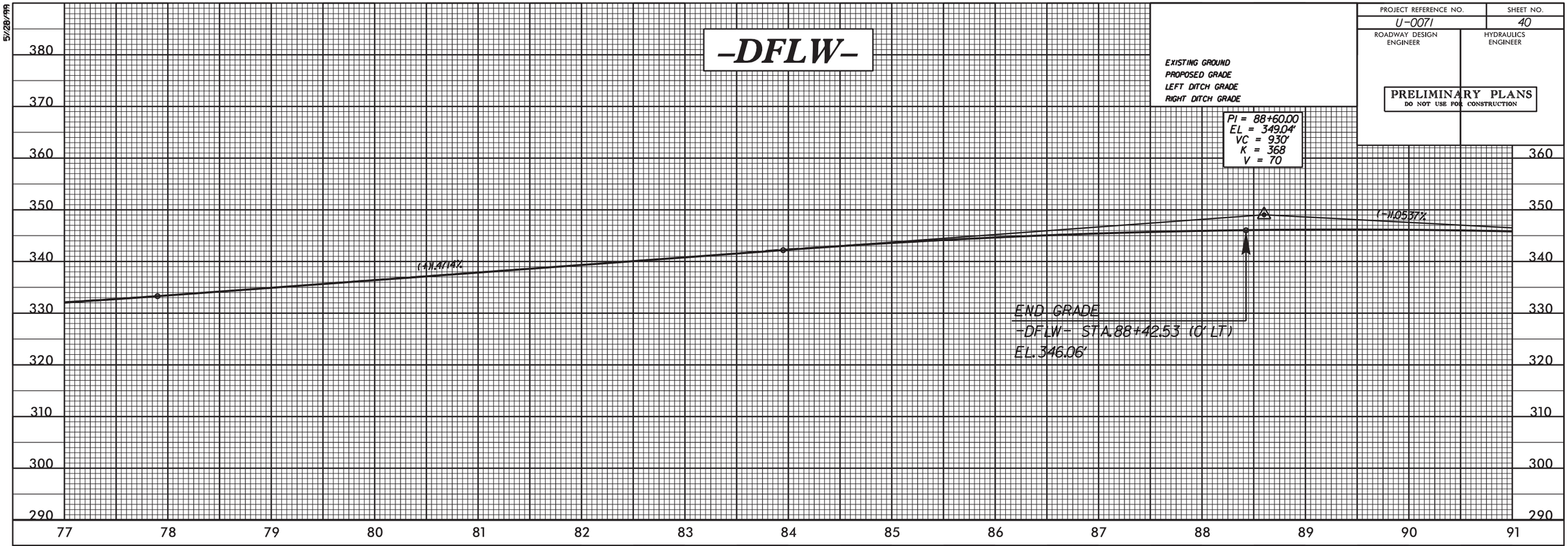
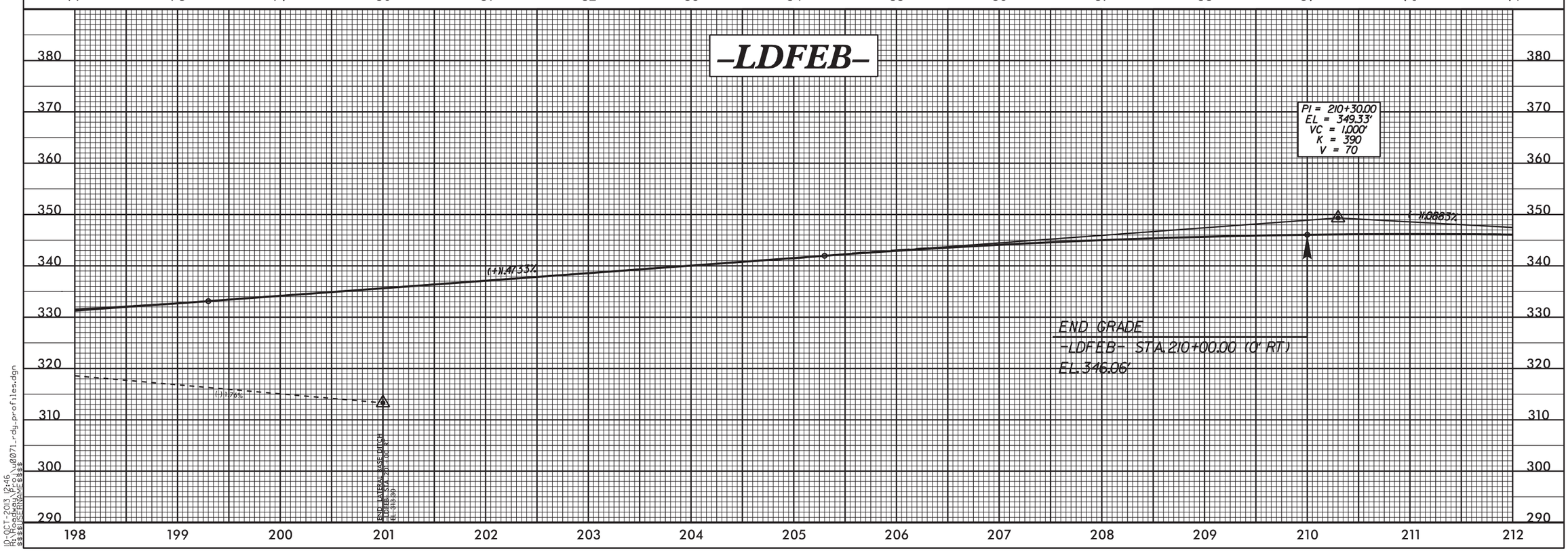
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 40 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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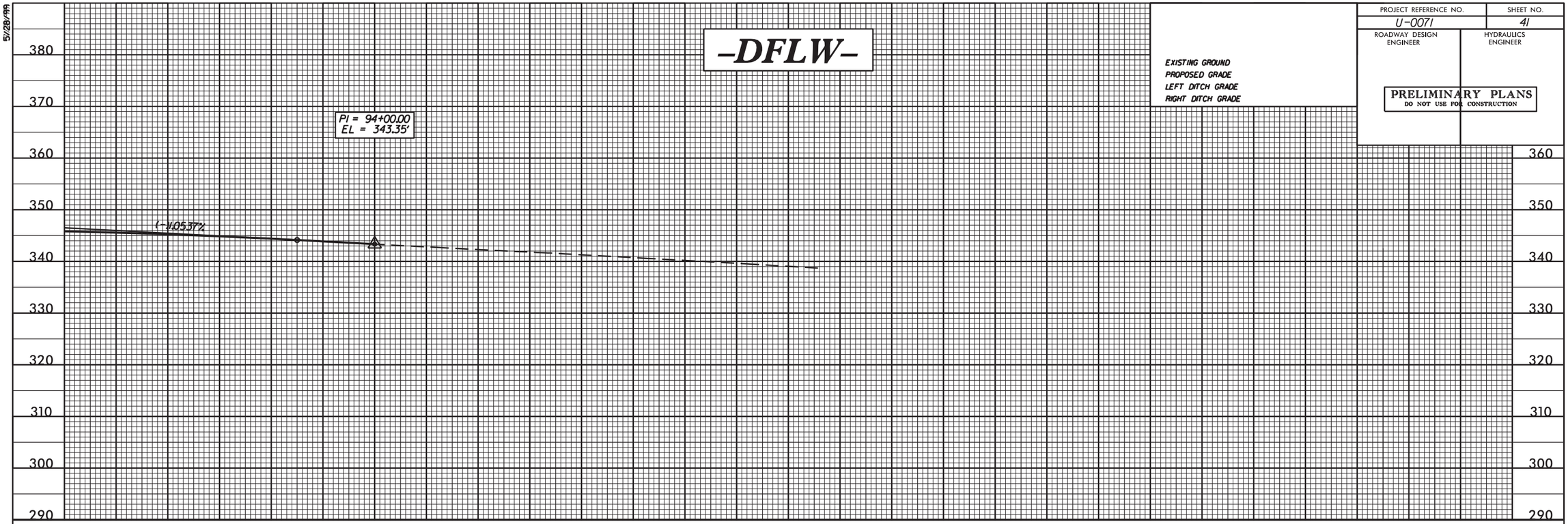
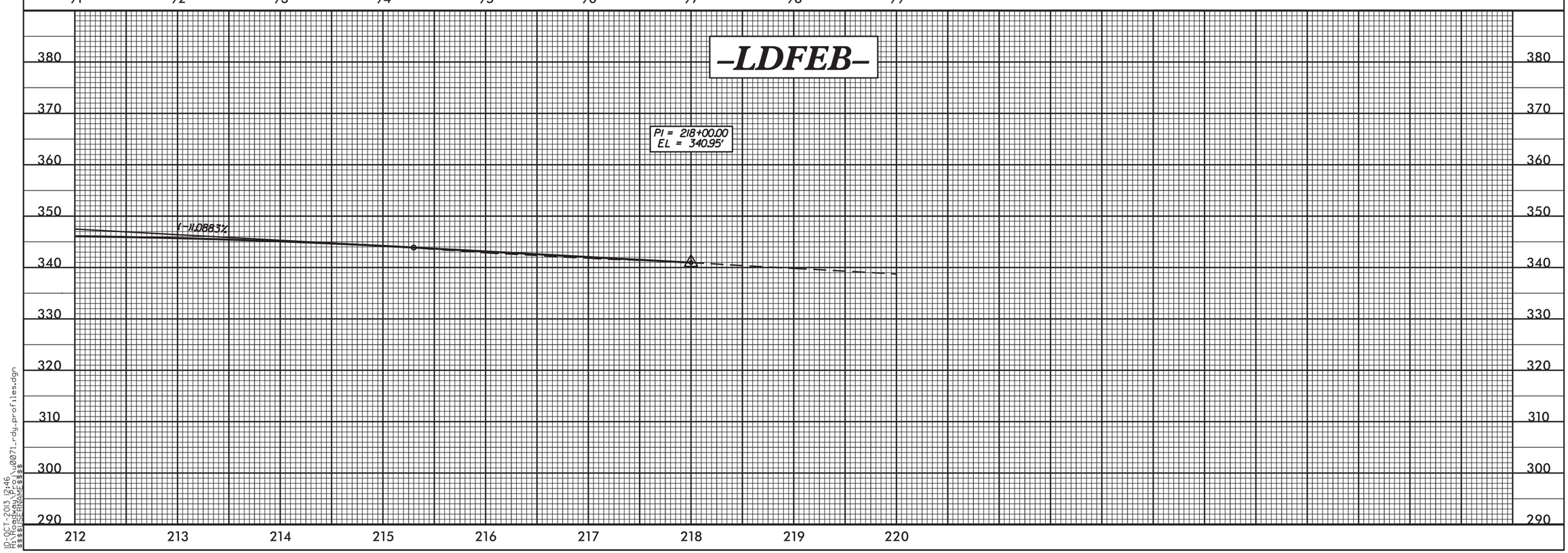
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 41 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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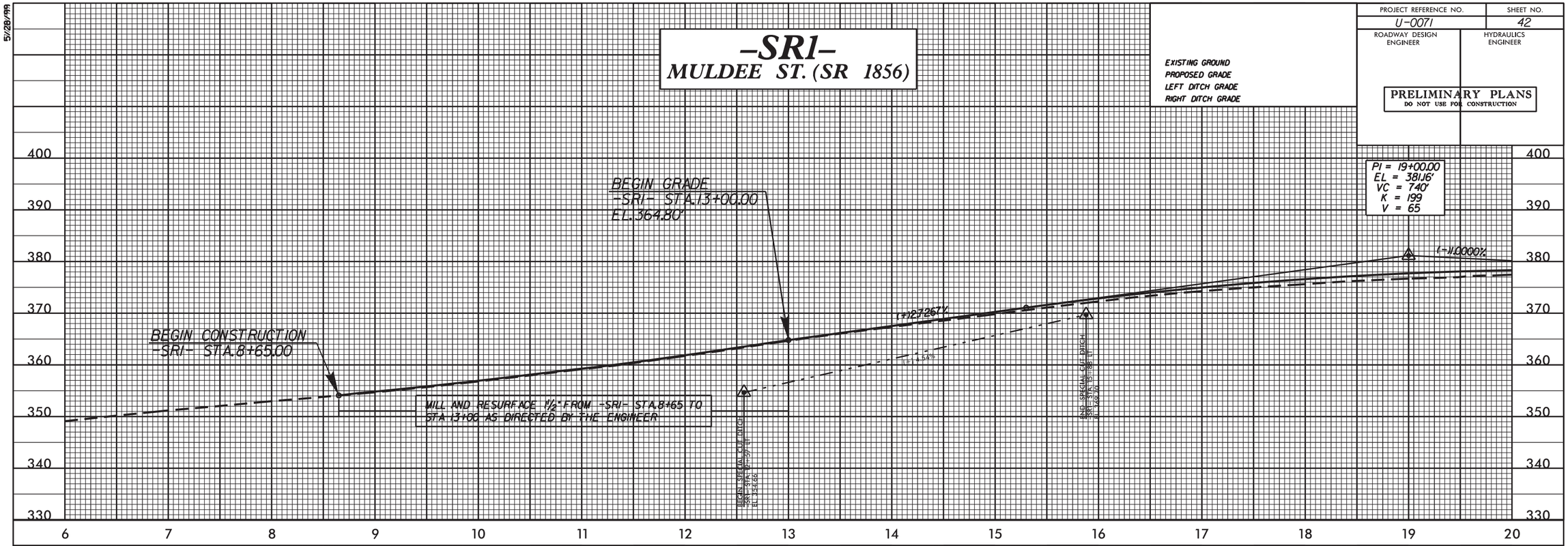
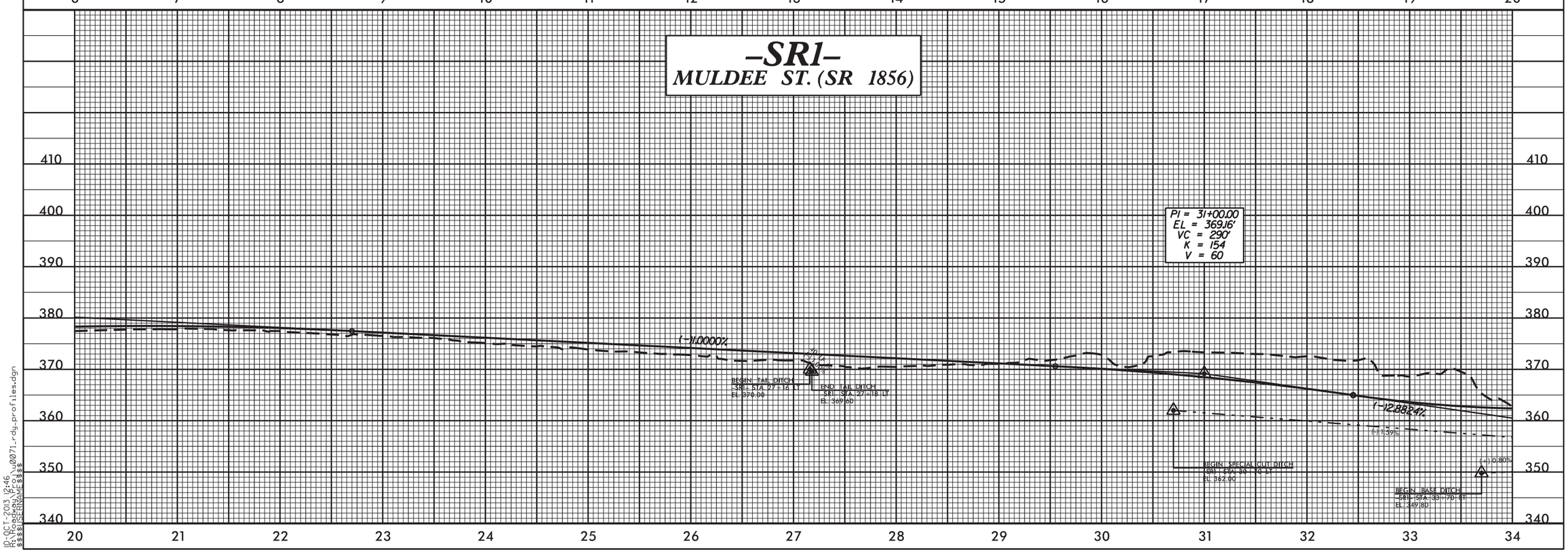
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 42 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 43 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

# -SR1-
## MULDEE ST. (SR 1856)

**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO.668

| | | |
|---|---|---|
| DRAINAGE AREA | = 35.0 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 104 | CFS |
| DESIGN HW ELEVATION | = 359.9 | FT |
| 100 YEAR DISCHARGE | = 123 | CFS |
| 100 YEAR HW ELEVATION | = 361 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 160 | CFS |
| OVERTOPPING ELEVATION | = 362.5 | FT |

**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO.674

| | | |
|---|---|---|
| DRAINAGE AREA | = 1.2 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 7.3 | CFS |
| DESIGN HW ELEVATION | = 396.7 | FT |
| 100 YEAR DISCHARGE | = 7.8 | CFS |
| 100 YEAR HW ELEVATION | = 396.8 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 14 | CFS |
| OVERTOPPING ELEVATION | = 398.3 | FT |

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

PI = 39+75.00
EL = 383.30'
VC = 190'
K = 107
V = 50

-SR1- STA 38+93.08 =
-Y17- STA 12+42.03

PI = 35+25.00
EL = 356.91'
VC = 560'
K = 64
V = 40

(+)4.0882%
(+)5.8644%
(+)5.8644%
(+)6.9%
(+)2.63%
(+)2.00%
(-)12.8824%
(-)0.80%
18" RCP
48" RCP
SKEW 123°
-SR1- STA 34+50
EL. 350.44
END SPECIAL CUT DITCH
BEGIN LATERAL BASE DITCH
-SR1- STA 35+10
EL. 355.00
-SR1- STA 37+00
EL. 360.00
END LATERAL BASE DITCH
-SR1- STA 38+50 L
EL. 370.00
END LATERAL BASE DITCH
-SR1- STA 38+50 RT
EL. 365.41

END GRADE
-SR1- STA 43+51.94
-Y19- STA 22+07.54 (9.97' RT)
EL. 398.71'

# -SR2-
## HOOVER RD. EXT.

**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO.710

| | | |
|---|---|---|
| DRAINAGE AREA | = 9.8 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 41 | CFS |
| DESIGN HW ELEVATION | = 387.4 | FT |
| 100 YEAR DISCHARGE | = 48 | CFS |
| 100 YEAR HW ELEVATION | = 388.3 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 60 | CFS |
| OVERTOPPING ELEVATION | = 389.9 | FT |

BEGIN GRADE
-SR2- STA 9+50.00
EL. 399.72'

PI = 11+60.00
EL = 391.54'
VC = 250'
K = 81
V = 45

(-)3.8952%
(-)10.8000%
(-)7.95%
(-)11.5%
30" RCP
BEGIN SPECIAL CUT DITCH
-SR2- STA 11+70 LT
EL. 388.50
-SR2- STA 13+67.00
EL. 388.50
END SPECIAL CUT DITCH
-SR2- STA 16+09 LT
EL. 388.25

# -DRIVE2-

-DRIVE2- STA 10+00.00
-SR2- STA 19+89.07
EL. 384.4'

BEGIN GRADE
-DRIVE2- STA 10+12.79
EL. 384.22'

PI = 11+78.36
EL = 406.98'
VC = 13'

PI = 10+25.00
EL = 383.98'
VC = 24'

(-)12.0000%
(-)11.4655%
(-)12.0000%
(+)15.0000%

END GRADE
-DRIVE2- STA 11+85.00
EL. 406.85'

10-OCT-2013 12:46
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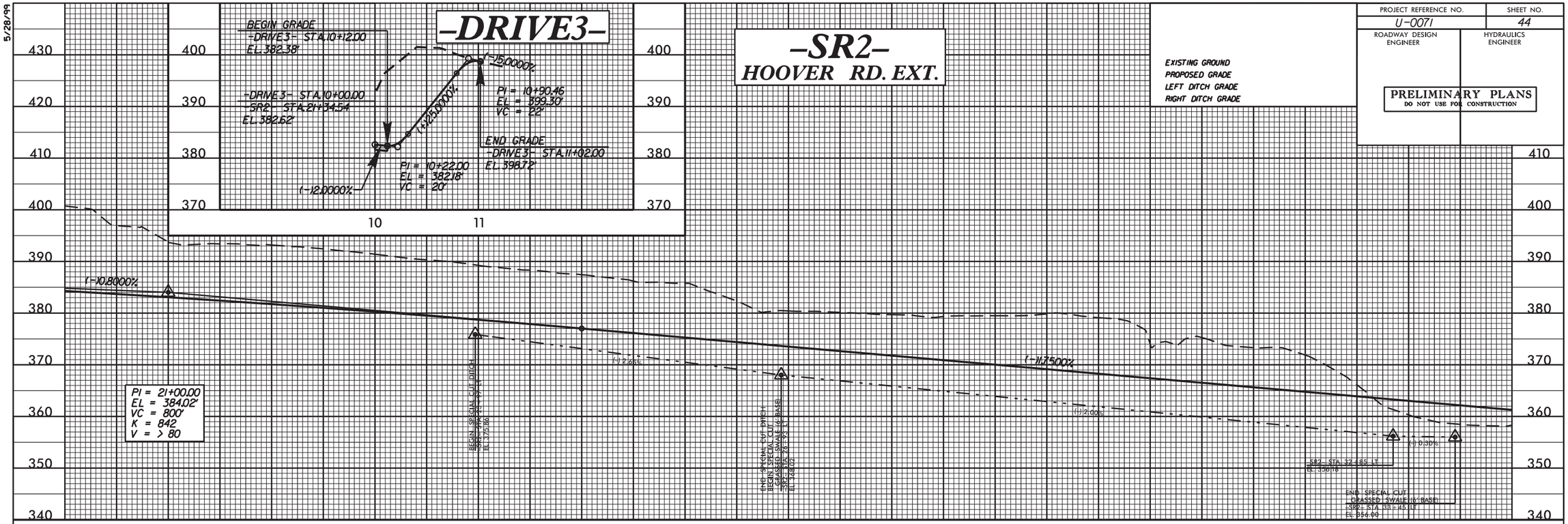
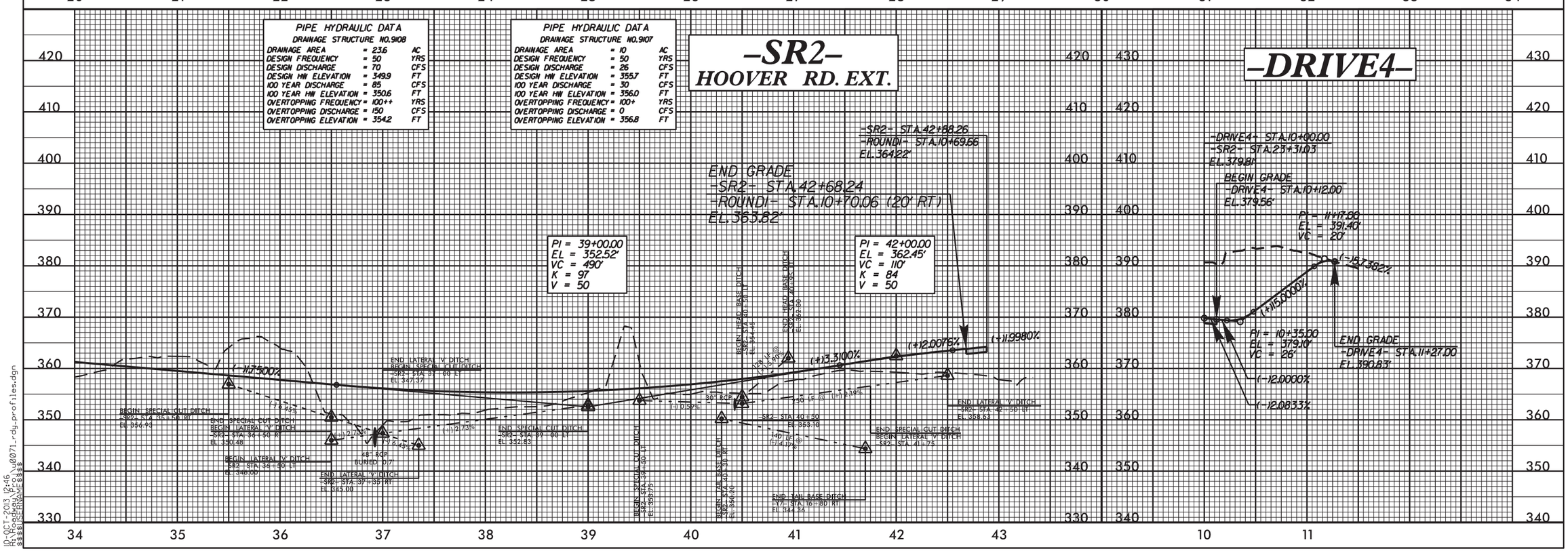
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 44 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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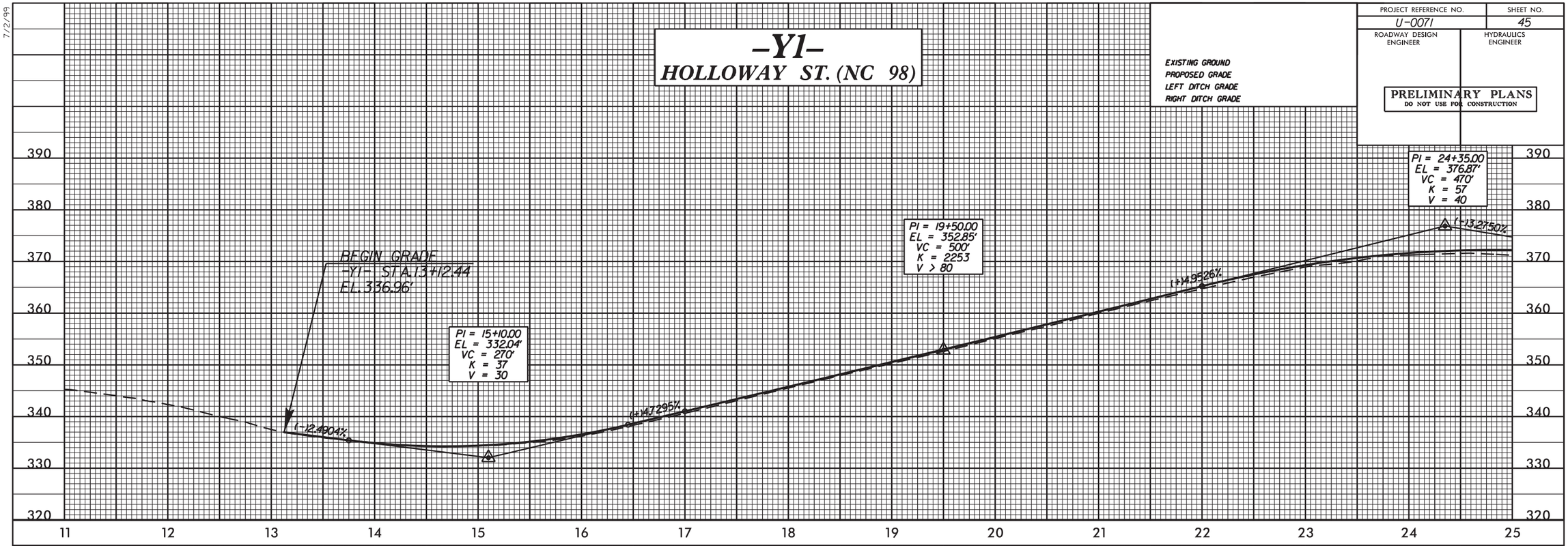
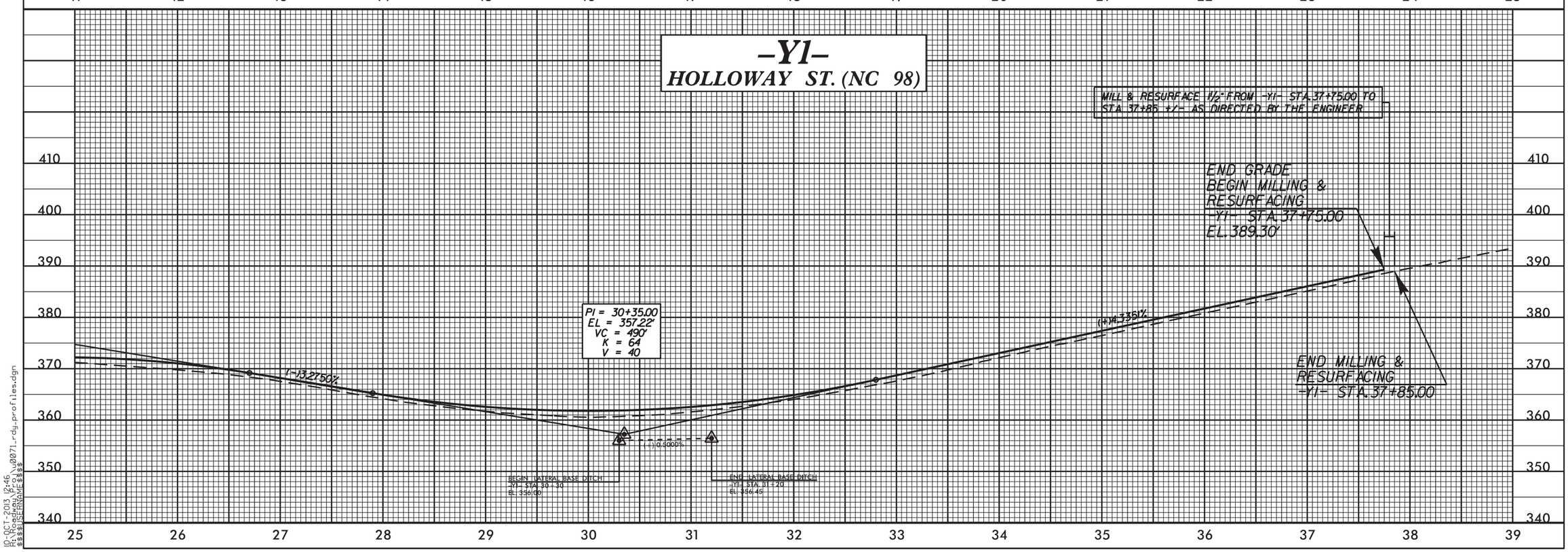
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 45 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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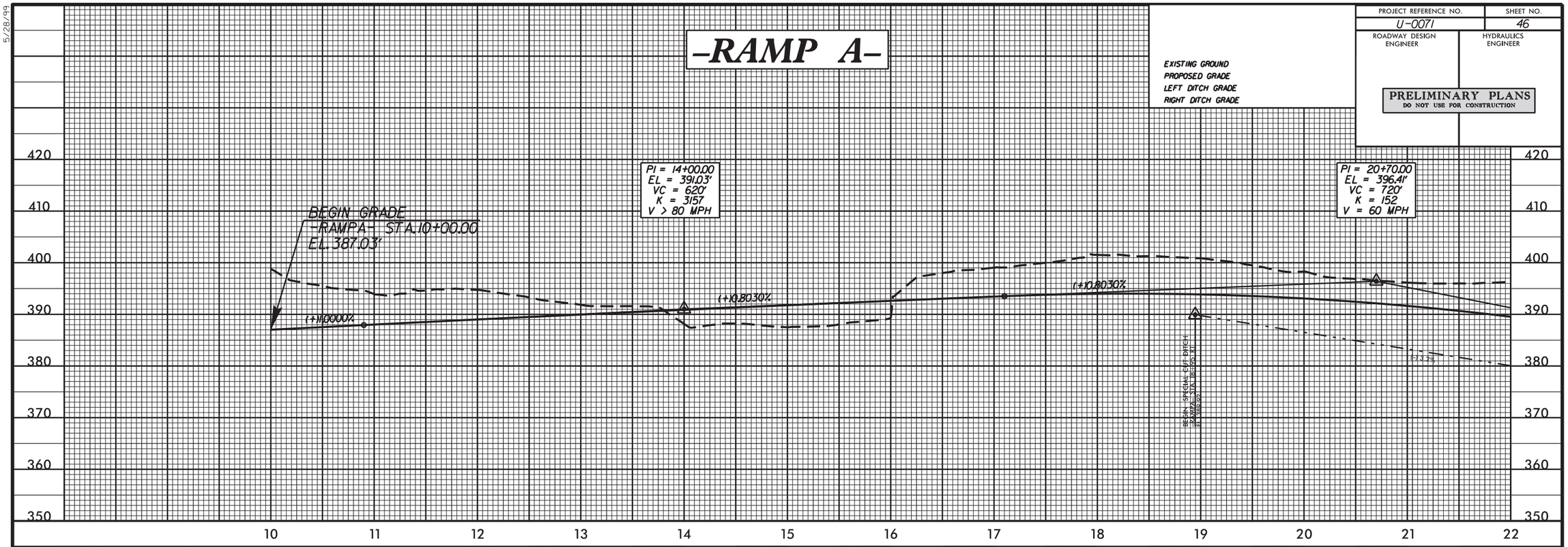
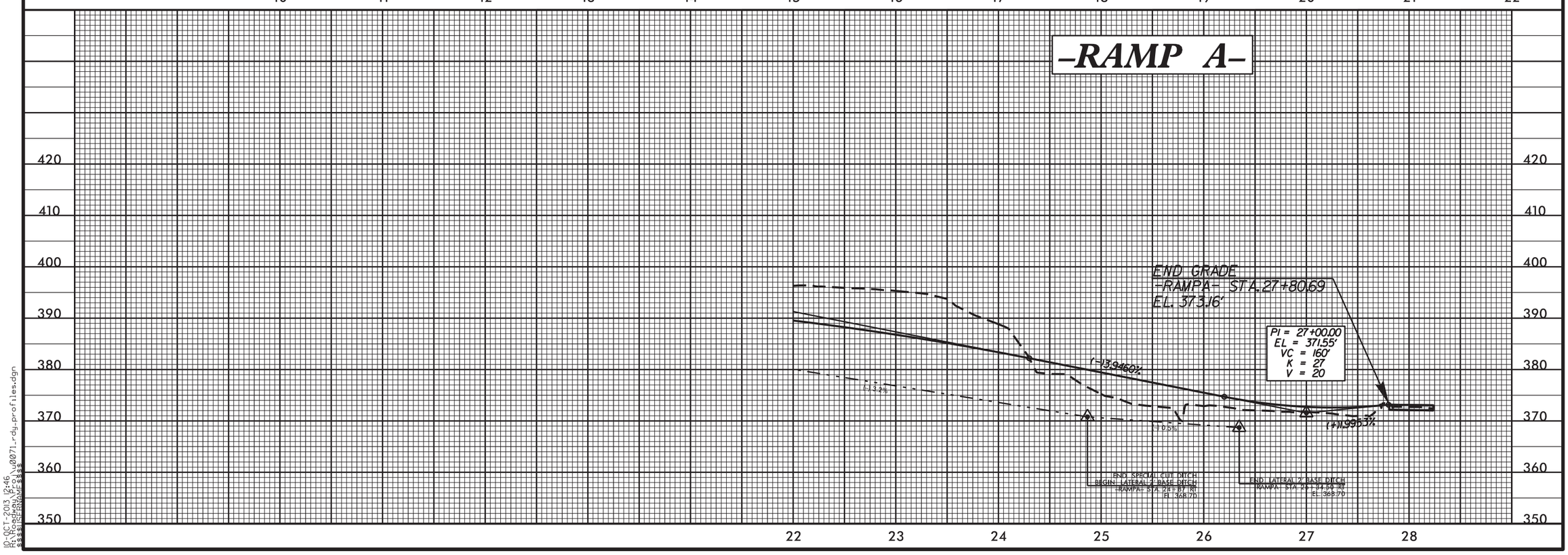
7/2/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 46 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE




5/28/99

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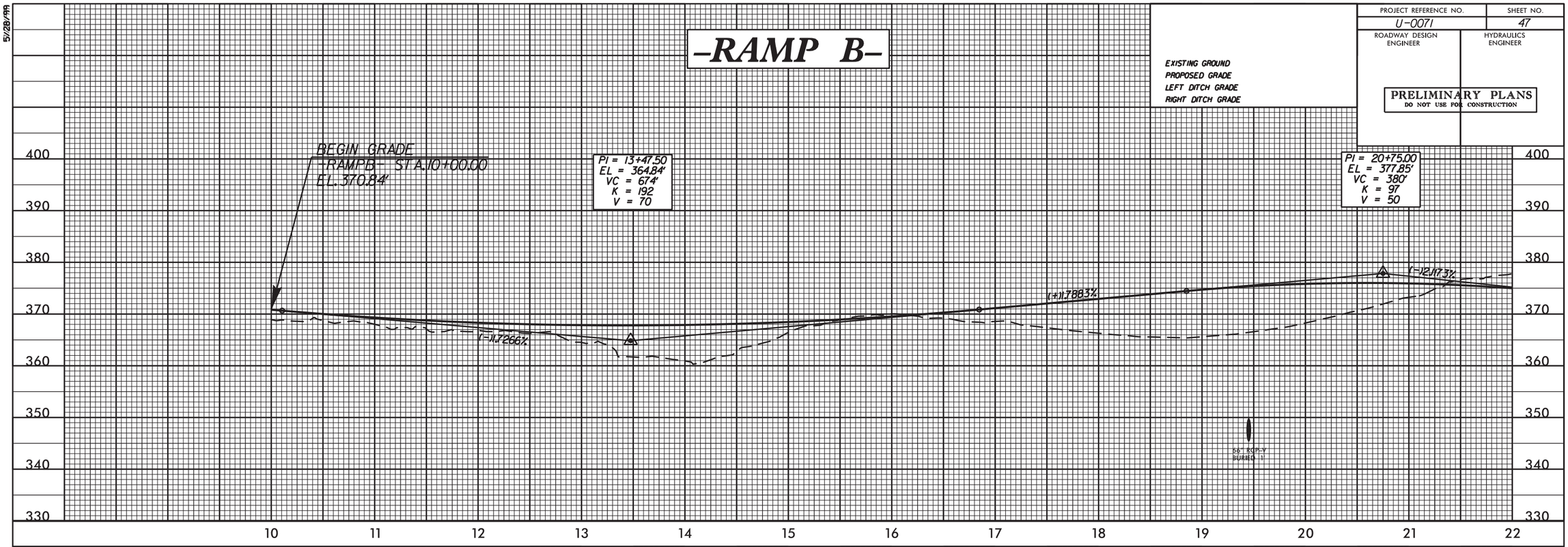
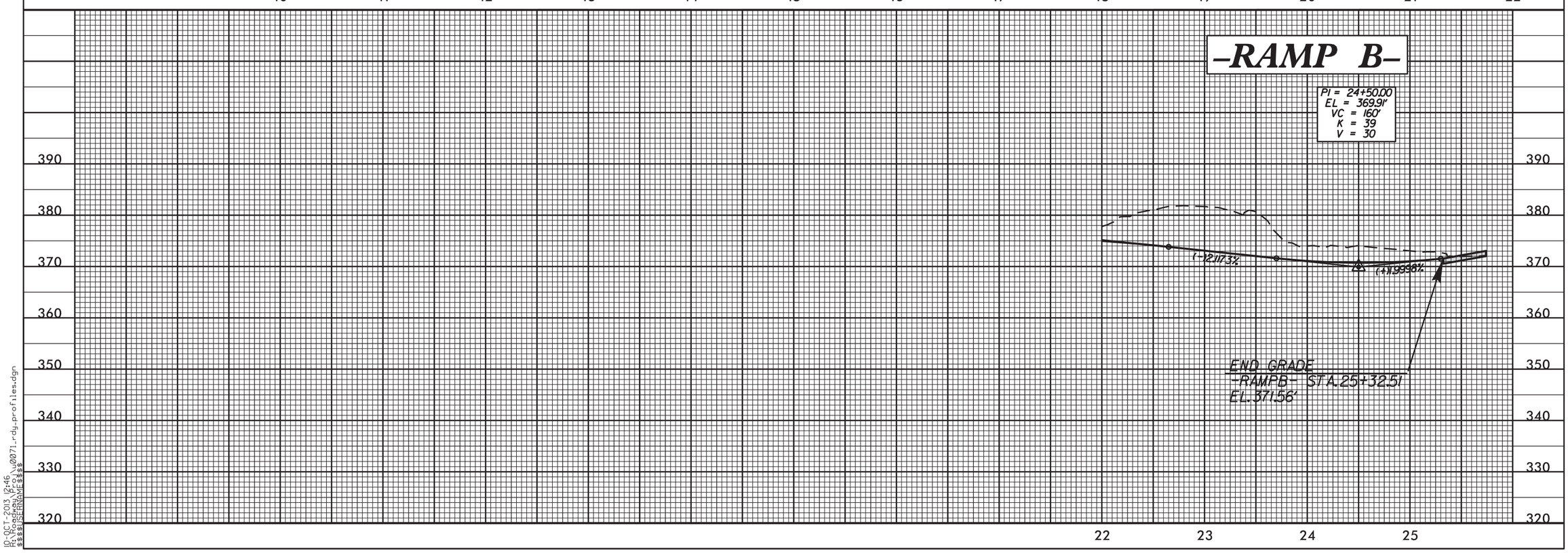
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 47 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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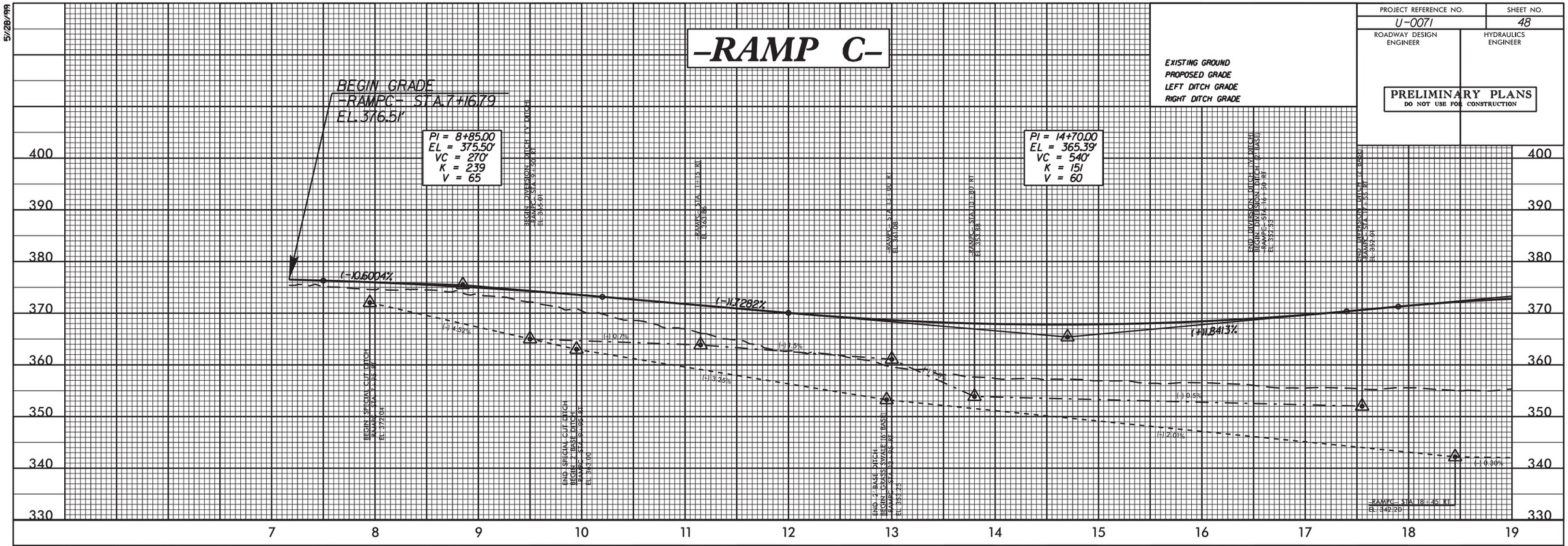
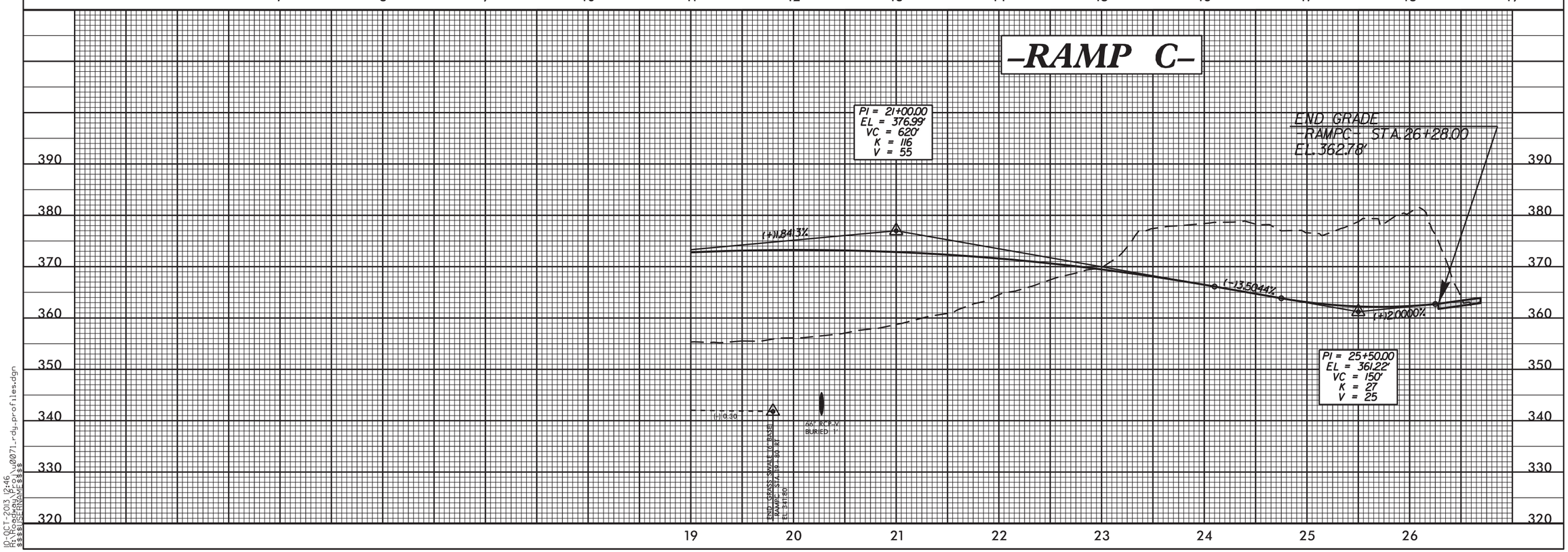
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 48 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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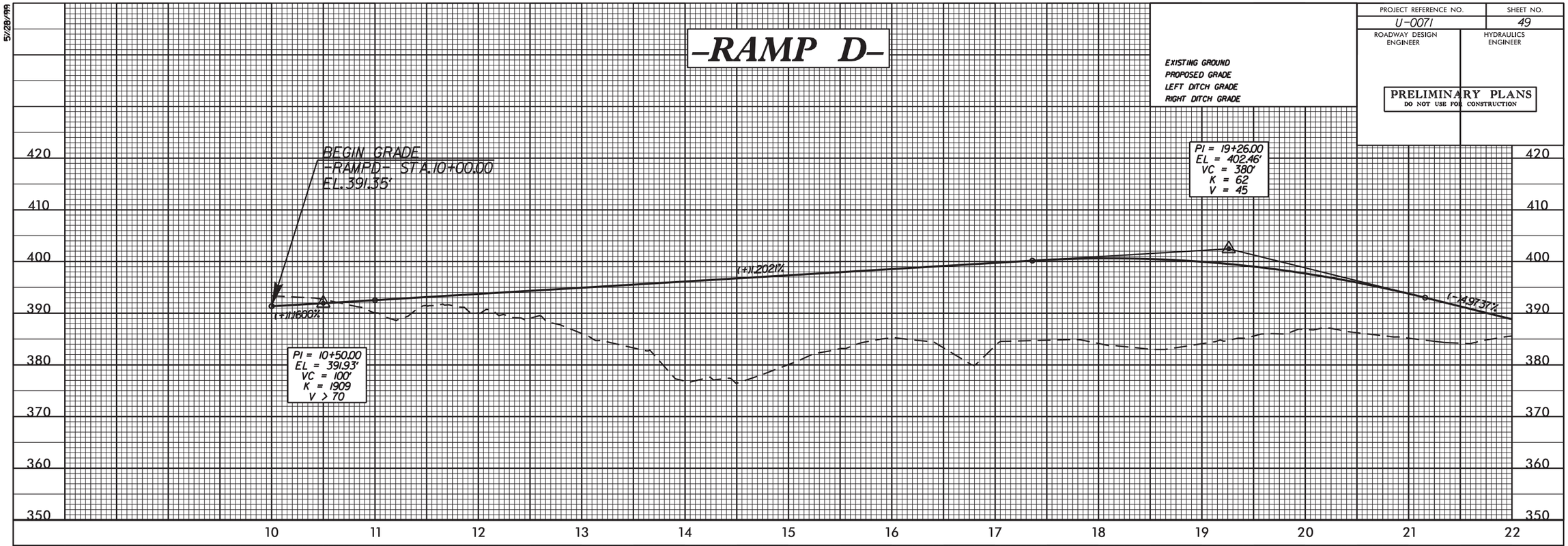
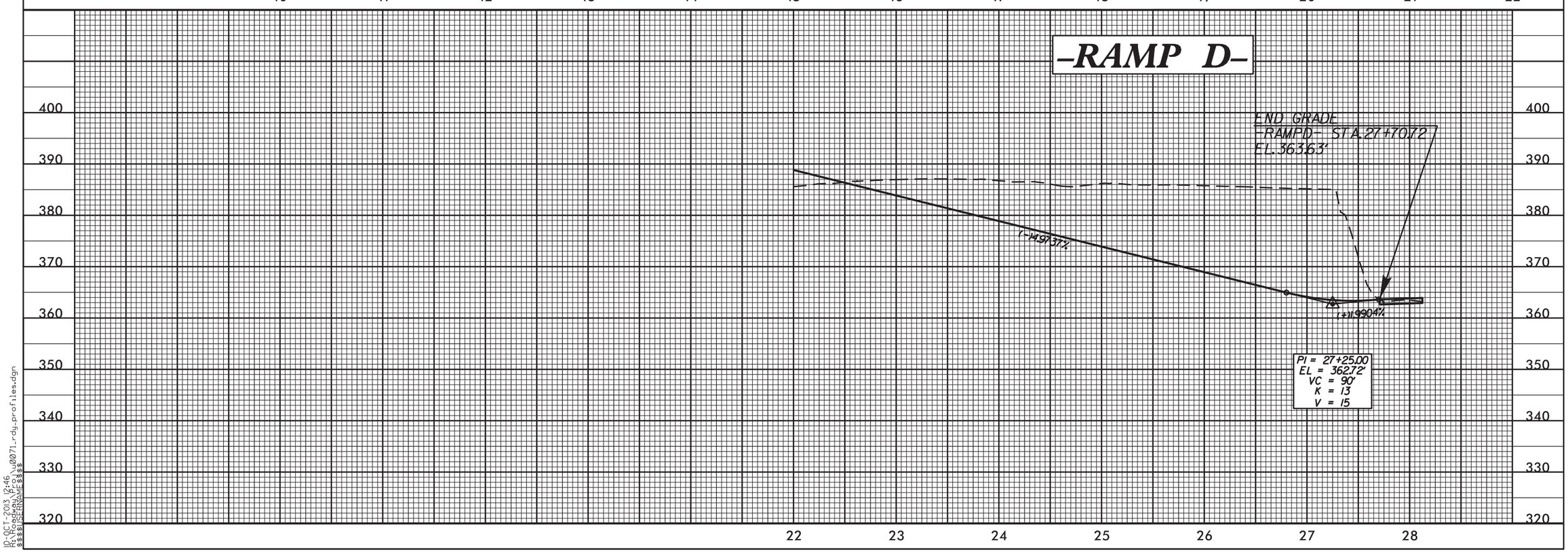
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 49 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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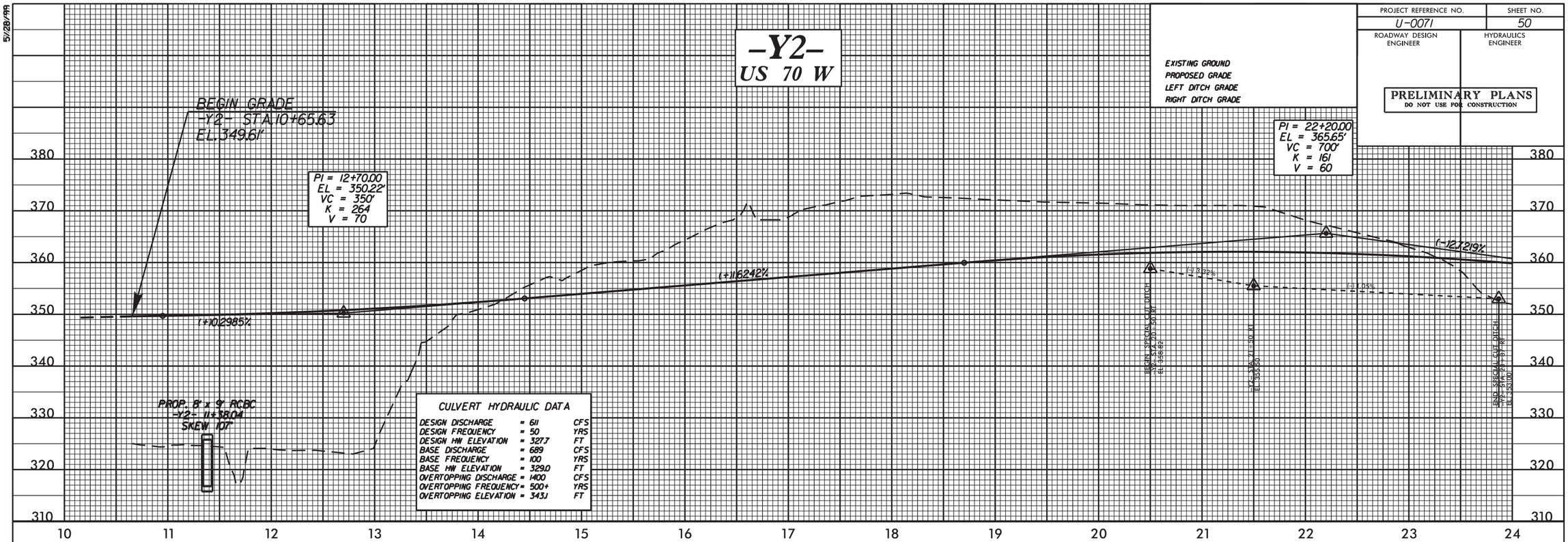
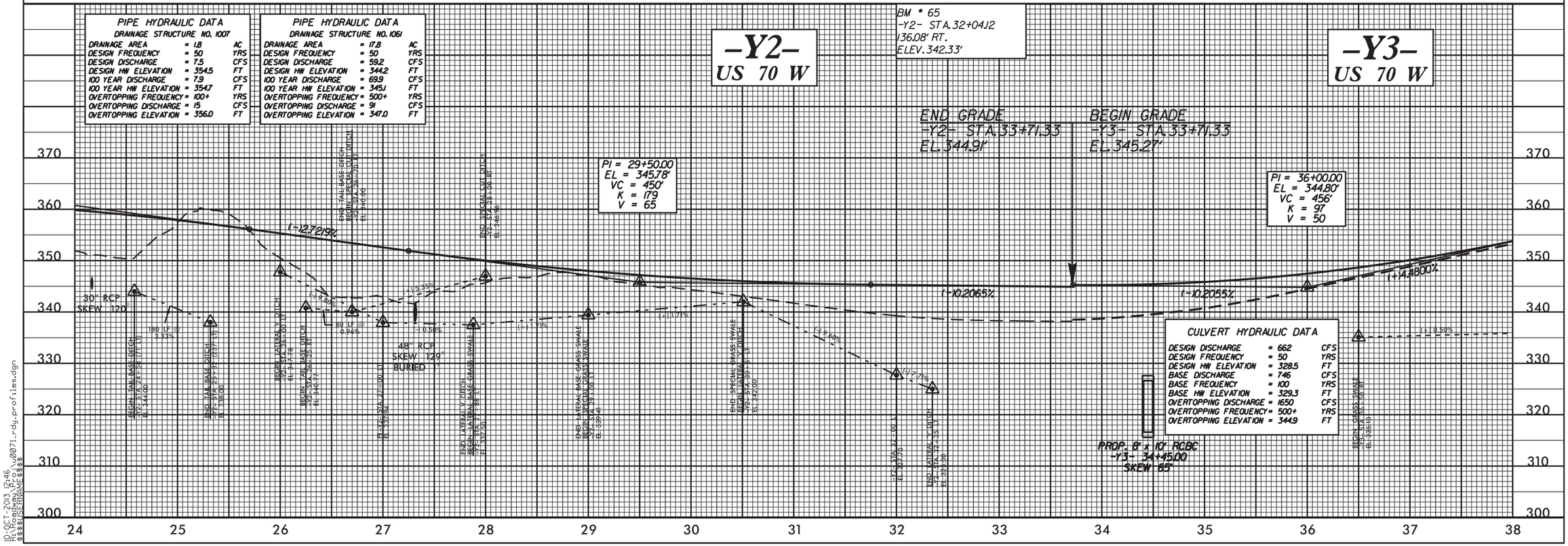
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 50 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 51 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

# -Y3- US 70 W

PI = 41+00.00
EL = 367.20'
VC = 470'
K = 1093
V = 70

PI = 47+82.00
EL = 400.69'
VC = 450'
K = 47
V = 40

(+)4.4600%
(+)4.9105%
(-)4.6588%
(±) 1.5%
(±) 0.50%

END GRASS SWALE
-Y3- STA. 38+30 RT
EL. 335.00

BEGIN LATERAL BASE GRASS SWALE
-Y3- STA. 42+70 RT
EL. 346.44

END LATERAL BASE GRASS SWALE
-Y3- STA. 44+00 RT
EL. 351.07

38 39 40 41 42 43 44 45 46 47 48 49 50 51 52

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 2121

| | | |
|---|---|---|
| DRAINAGE AREA | = 6.9 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 35.3 | CFS |
| DESIGN HW ELEVATION | = 362.3 | FT |
| 100 YEAR DISCHARGE | = 37.4 | CFS |
| 100 YEAR HW ELEVATION | = 362.5 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 50 | CFS |
| OVERTOPPING ELEVATION | = 367.5 | FT |

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 2214

| | | |
|---|---|---|
| DRAINAGE AREA | = 31.0 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 94.8 | CFS |
| DESIGN HW ELEVATION | = 354.8 | FT |
| 100 YEAR DISCHARGE | = 111.8 | CFS |
| 100 YEAR HW ELEVATION | = 355.5 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 180 | CFS |
| OVERTOPPING ELEVATION | = 359.4 | FT |

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 2215

| | | |
|---|---|---|
| DRAINAGE AREA | = 1.3 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 7.2 | CFS |
| DESIGN HW ELEVATION | = 365.6 | FT |
| 100 YEAR DISCHARGE | = 7.8 | CFS |
| 100 YEAR HW ELEVATION | = 365.7 | FT |
| OVERTOPPING FREQUENCY | = 100+ | YRS |
| OVERTOPPING DISCHARGE | = 15 | CFS |
| OVERTOPPING ELEVATION | = 367.5 | FT |

-Y3- US 70 W

BM # 66
-Y3- STA. 58+27.63
87.84' LT.
ELEV. 355.49'

END RESURFACING
AND WIDENING
-Y3- STA. 71+00.00

66 67 68 69 70 71 72

PI = 57+55.00
EL = 355.36'
VC = 380'
K = 46
V = 30

PI = 64+65.00
EL = 381.35'
VC = 160'
K = 35
V = 35

(-)4.6586%
(-)0.8963%
(+)3.6606%

BEGIN LATERAL BASE DITCH
-Y3- STA. 52+85 RT
EL. 364.82

END SPECIAL CUT DITCH
-Y3- STA. 52+85 RT
EL. 364.82

BEGIN LATERAL BASE DITCH
-Y3- STA. 52+85 RT
EL. 364.82

END TAIL BASE DITCH
-Y3- STA. 54+00 RT
EL. 364.15

BEGIN LATERAL BASE DITCH
-Y3- STA. 54+00 RT
EL. 364.15

END LATERAL BASE DITCH
-Y3- STA. 54+00 RT
EL. 359.09

-Y3- STA. 54+56 LT
EL. 354.70

BEGIN SPECIAL CUT DITCH
-Y3- STA. 54+56 RT
EL. 356.68

BEGIN SPECIAL CUT DITCH
-Y3- STA. 52+84 RT
EL. 379.98

45 LF
(-)2.44%

END SPECIAL CUT DITCH
BEGIN SPECIAL CUT GRASS SWALE
-Y3- STA. 56+67 RT
EL. 351.20

BEGIN SPECIAL CUT DITCH
END SPECIAL CUT GRASS SWALE
-Y3- STA. 59+00 RT
EL. 350.87

BEGIN LATERAL V DITCH
-Y3- STA. 61+50 RT
EL. 364.50

TC STA. 63+65.00 RT
EL. 364.38

END SPECIAL CUT DITCH
-Y3- STA. 64+40 RT
EL. 373.46

18" RCP

55 LF
(-)3.63%

END GRADE /
BEGIN RESURFACING
AND WIDENING
-Y3- STA. 66+00.00
EL. 380.14'

30" RCP
SKEW 125°

60" RCP
SKEW 93°
BURIED 1

END LATERAL V DITCH
-Y3- STA. 55+00 RT
EL. 350.00

END TAIL DITCH
-Y3- STA. 56+67 RT
EL. 351.20

-Y3- STA. 57+47.00 RT
EL. 350.20

END GRASSED SWALE
BEGIN LATERAL V DITCH
-Y3- STA. 58+50 LT
EL. 346.15

BEGIN GRASSED SWALE
-Y3- STA. 57+45 LT
EL. 345.30

END LATERAL V DITCH
-Y3- STA. 59+00 LT
EL. 351.95

END SPECIAL CUT DITCH
-Y3- STA. 60+00 RT
EL. 360.97

END SPECIAL CUT DITCH
-Y3- STA. 60+50 RT
EL. 362.00

BEGIN LATERAL V DITCH
-Y3- STA. 60+50 RT
EL. 362.00

END LATERAL V DITCH
BEGIN TAIL DITCH
-Y3- STA. 61+50 RT
EL. 364.50

END TAIL DITCH
-Y3- STA. 62+50 RT
EL. 365.00

END LATERAL V DITCH
-Y3- STA. 63+00 RT
EL. 365.00

END LATERAL V DITCH
-Y3- STA. 63+50 RT
EL. 366.00

END LATERAL V DITCH
-Y3- STA. 64+00 RT
EL. 365.00

52 53 54 55 56 57 58 59 60 61 62 63 64 65 66

10-OCT-2013 12:46
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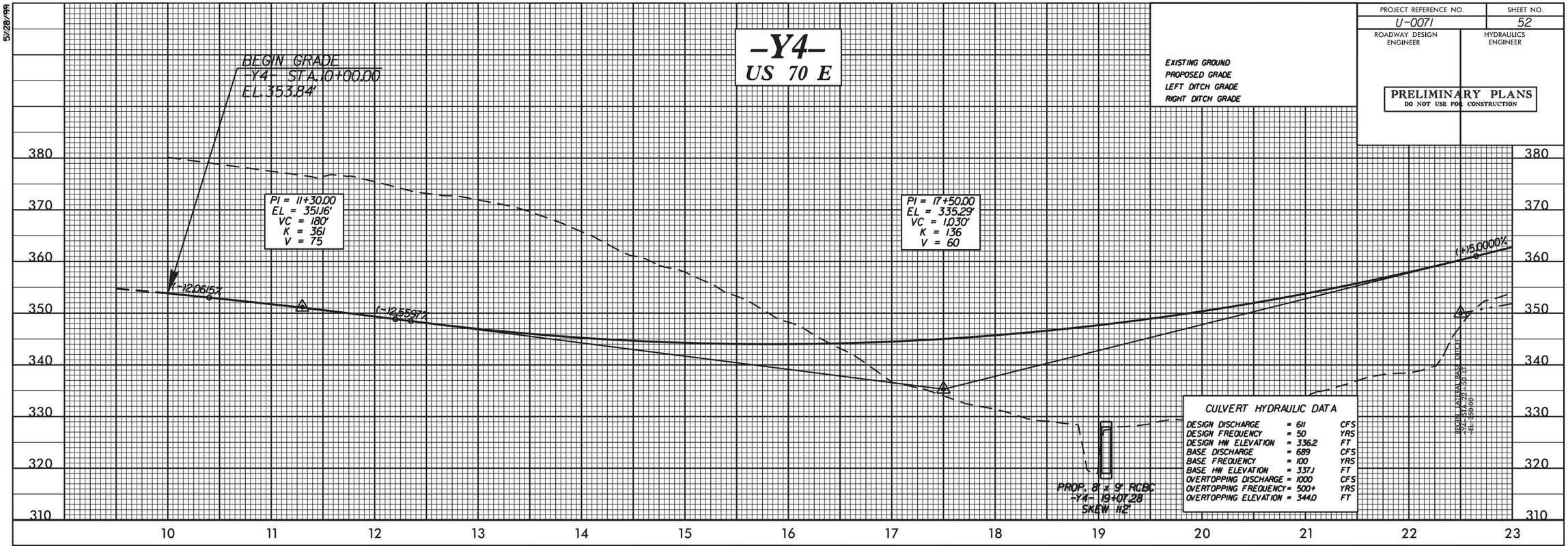
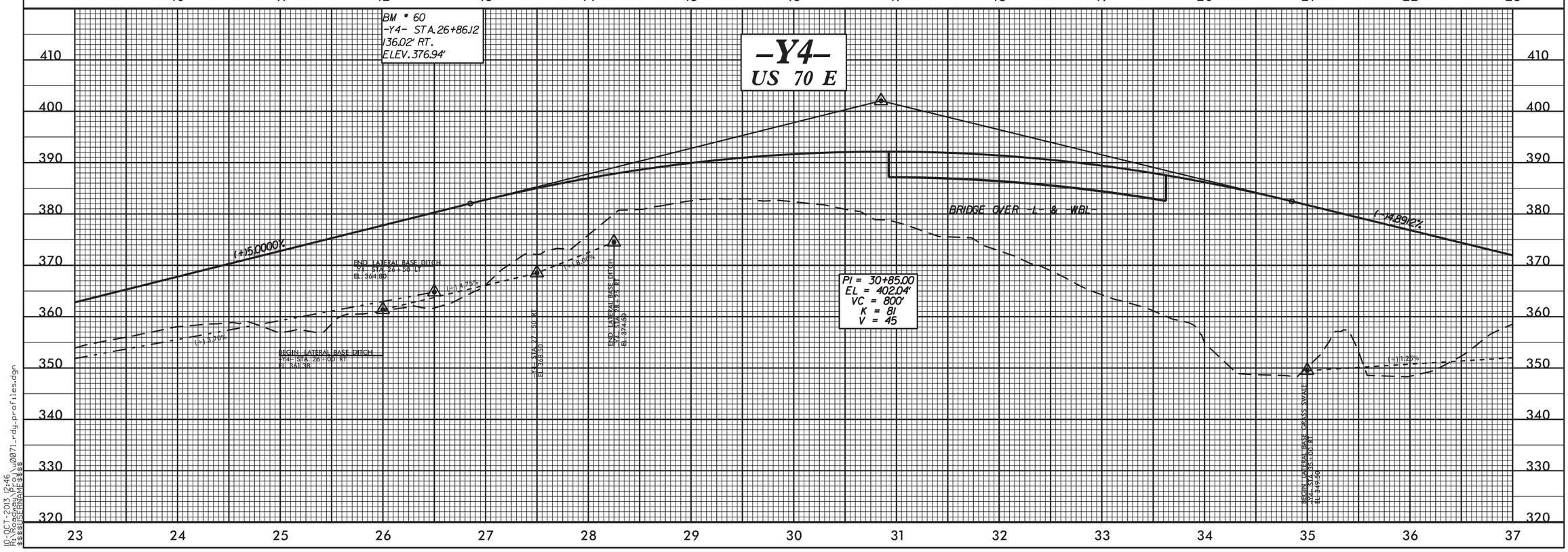
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 52 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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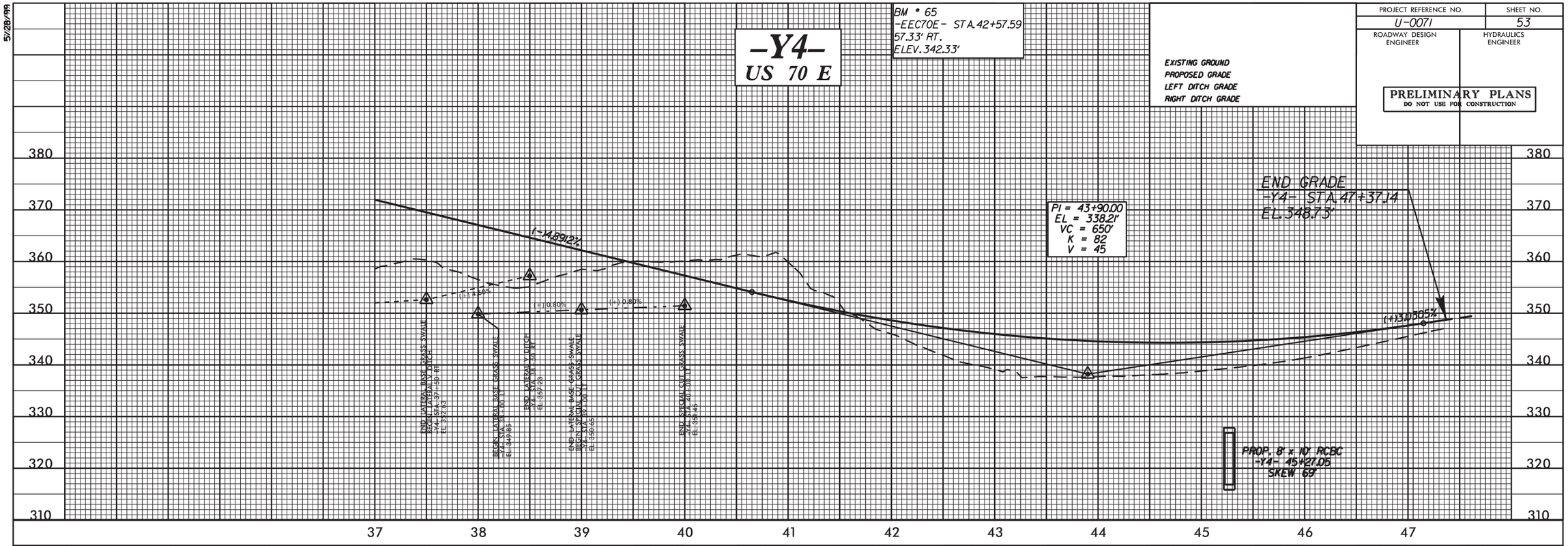
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 53 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

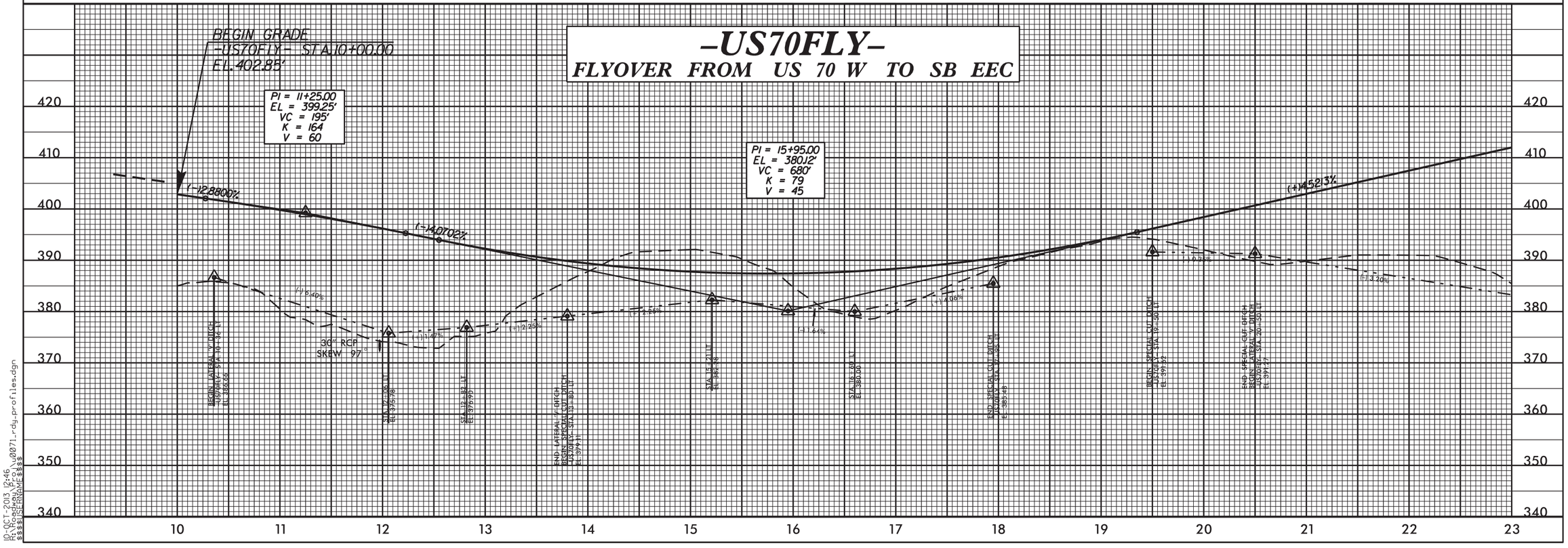
EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

# -Y4-
## US 70 E

BM # 65
-EEC70E- STA.42+57.59
57.33' RT.
ELEV.342.33'




# -US70FLY-
## FLYOVER FROM US 70 W TO SB EEC

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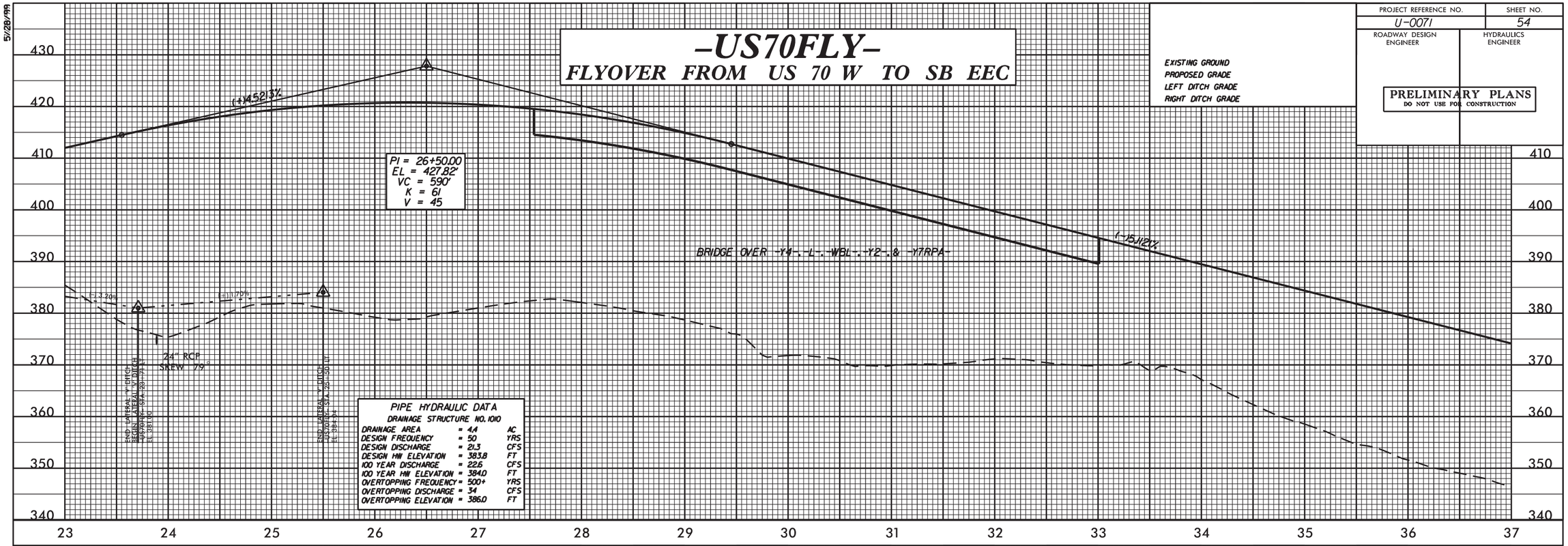
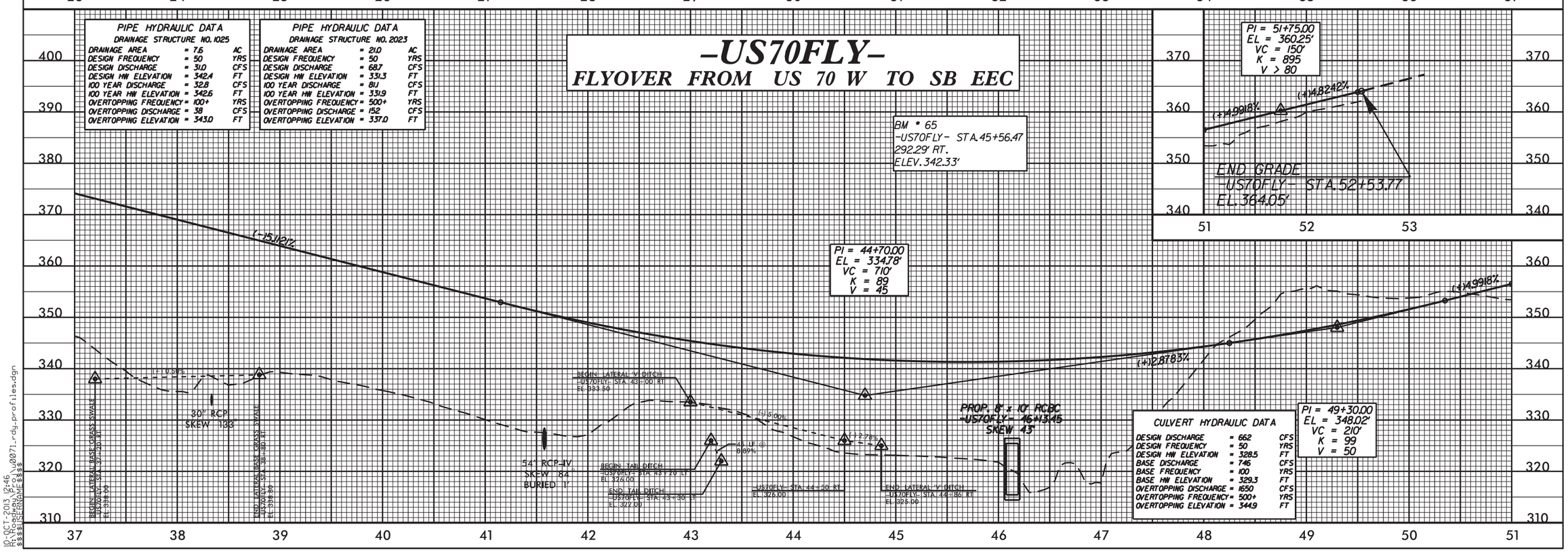
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 54 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

# -US70FLY-
## FLYOVER FROM US 70 W TO SB EEC

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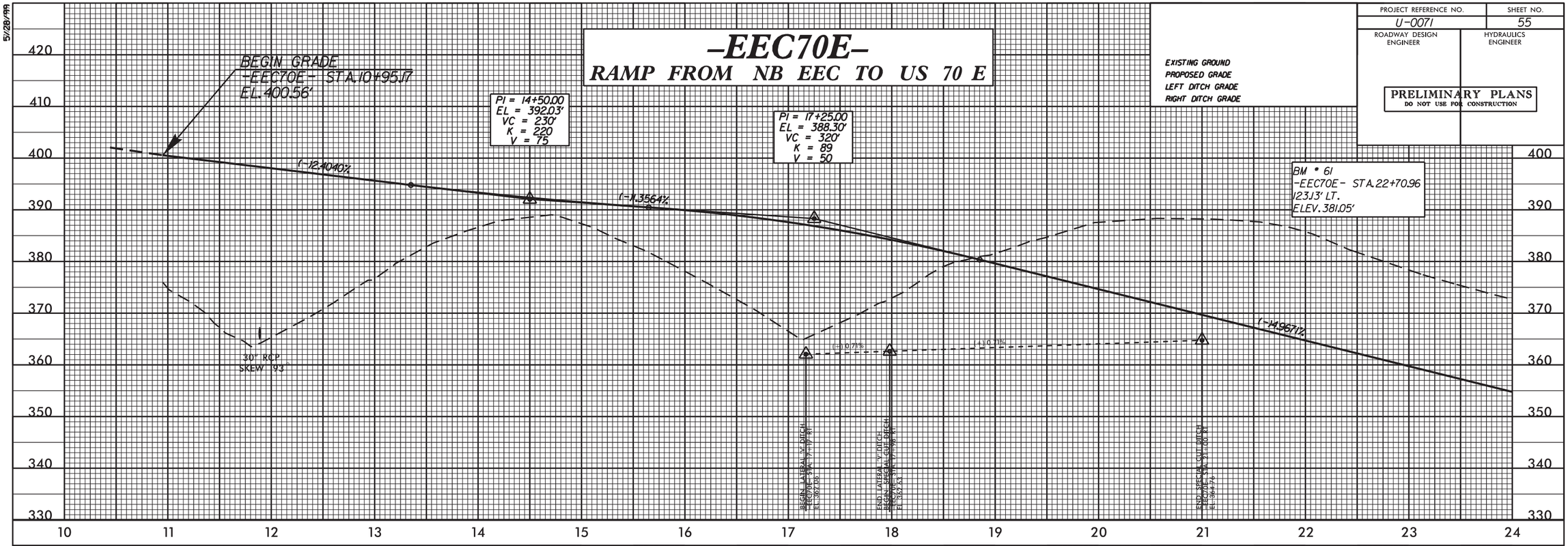
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 55 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

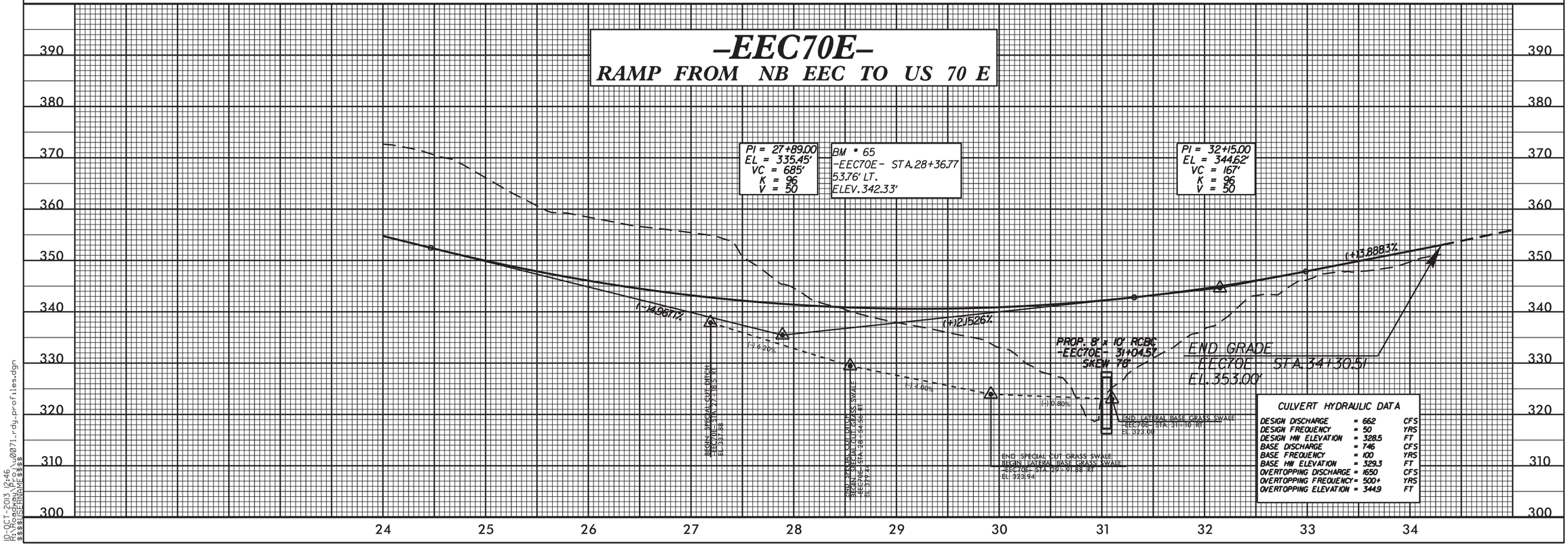
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

# -EEC70E-
## RAMP FROM NB EEC TO US 70 E




# -EEC70E-
## RAMP FROM NB EEC TO US 70 E




| CULVERT HYDRAULIC DATA | | |
|---|---|---|
| DESIGN DISCHARGE | = 662 | CFS |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN HW ELEVATION | = 328.5 | FT |
| BASE DISCHARGE | = 746 | CFS |
| BASE FREQUENCY | = 100 | YRS |
| BASE HW ELEVATION | = 329.3 | FT |
| OVERTOPPING DISCHARGE | = 1650 | CFS |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING ELEVATION | = 344.9 | FT |

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5/28/99

5/28/99

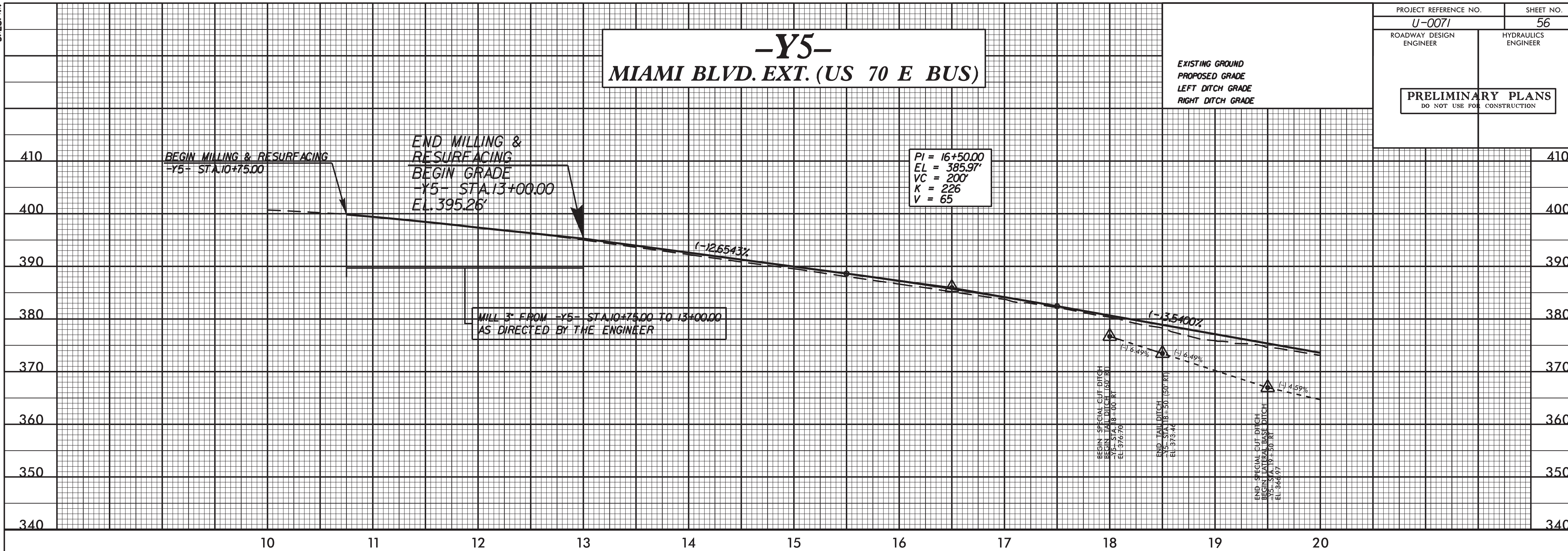
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 56 |

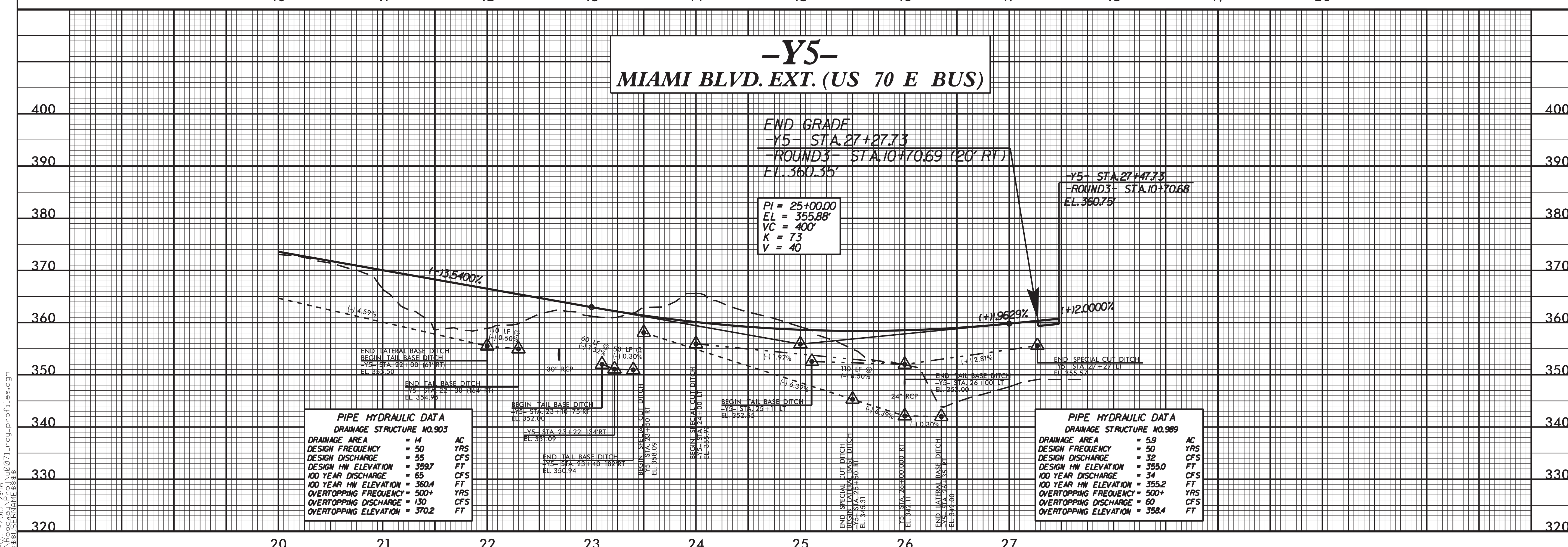
ROADWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE




**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO.903

| | | |
|---|---|---|
| DRAINAGE AREA | = 14 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 55 | CFS |
| DESIGN HW ELEVATION | = 359.7 | FT |
| 100 YEAR DISCHARGE | = 65 | CFS |
| 100 YEAR HW ELEVATION | = 360.4 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 130 | CFS |
| OVERTOPPING ELEVATION | = 370.2 | FT |

**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO.989

| | | |
|---|---|---|
| DRAINAGE AREA | = 5.9 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 32 | CFS |
| DESIGN HW ELEVATION | = 355.0 | FT |
| 100 YEAR DISCHARGE | = 34 | CFS |
| 100 YEAR HW ELEVATION | = 355.2 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 60 | CFS |
| OVERTOPPING ELEVATION | = 358.4 | FT |

10-OCT-2013 12:46
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5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 57 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO.934

| | | |
|---|---|---|
| DRAINAGE AREA | = 1.5 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 5.1 | CFS |
| DESIGN HW ELEVATION | = 342.1 | FT |
| 100 YEAR DISCHARGE | = 5.4 | CFS |
| 100 YEAR HW ELEVATION | = 342.2 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 32 | CFS |
| OVERTOPPING ELEVATION | = 354.0 | FT |

# -Y6- EAST END DR.

-Y6- STA.8+84.44
-ROUND3- STA.12+12.06
EL.360.75'

BEGIN GRADE
-Y6- STA.9+04.44
-ROUND3- STA.12+12.06 (20' RT)
EL.360.35'

PI = 9+16.44
EL = 360.11'
NO VERTICAL CURVE

PI = 14+30.00
EL = 342.60'
VC = 310'
K = 79
V = 45

PI = 20+30.00
EL = 345.60'
VC = 350'
K = 68
V = 40

(-12.0000%)
(-12.0000%)
(-13.4095%)
(+0.5000%)
(+15.6776%)
(+0.07%)
(+1.05%)
(+6.78%)
(+3.60%)
(+0.50%)
(+0.50%)
(+27.50%)
(+0.50%)
(+1.50%)
(+6.93%)

18" RCP

BEGIN LATERAL V DITCH
-Y6- STA.9+50.00 LT
EL. 344.00

-Y6- STA.11+00.00 LT
EL.340.90

-Y6- STA.13+00.00 LT
EL.343.00

END LATERAL V DITCH
BEGIN LATERAL BASE
-Y6- STA.13+44.00 LT
EL. 337.98

-Y6- STA.13+35 LT
EL. 336.70

END LATERAL BASE
BEGIN LATERAL BASE
-Y6- STA.16+77.79 LT
EL. 336.00

-Y6- STA.17+42.87
EL. 338.46

BEGIN LATERAL BASE DITCH
-Y6- STA.17+00 RT
EL. 327.00

-Y6- STA.18+27 RT
EL. 337.09

-Y6- STA.21+39 RT
EL. 346.74

BM # 60
-Y6- STA.25+76.54
39.68' LT.
ELEV. 376.94'

# -Y6- EAST END DR.

PI = 27+00.00
EL = 383.64'
VC = 400'
K = 137
V = 55

-Y6- STA.29+50 LT
EL 387.86

(+2.7522%)
(+5.6776%)
(+0.07%)
(+3.75%)
(+2.57%)

BEGIN LATERAL V DITCH
-Y6- STA.26+00 RT
EL. 376.00

END LATERAL BASE DITCH
BEGIN SPECIAL V DITCH
-Y6- STA.25+00 RT
EL. 372.00

BEGIN SPECIAL LATERAL V DITCH
-Y6- STA.29+00 LT
EL. 385.28

END SPECIAL CUT DITCH
-Y6- STA.29+50 RT
EL. 387.00

END SPECIAL LATERAL V DITCH
-Y6- STA.31+40 LT
EL. 394.52

END GRADE
-Y6- STA.31+60.00
EL.396.30'

10-OCT-2013 12:46
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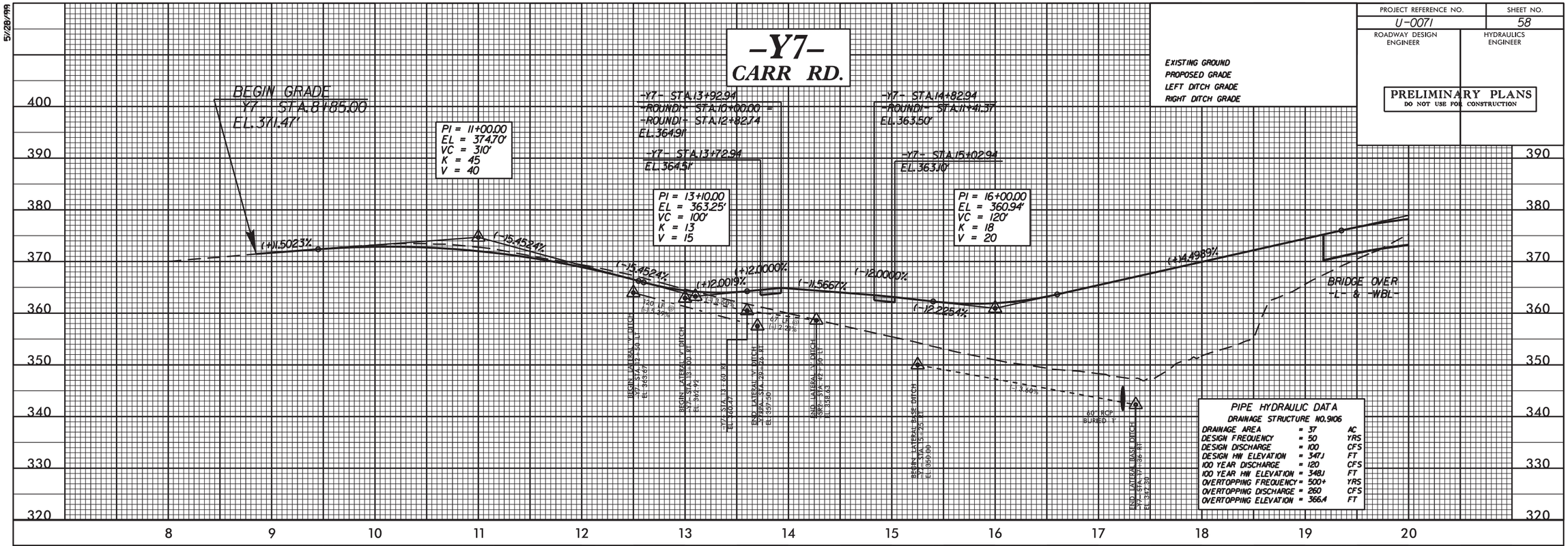
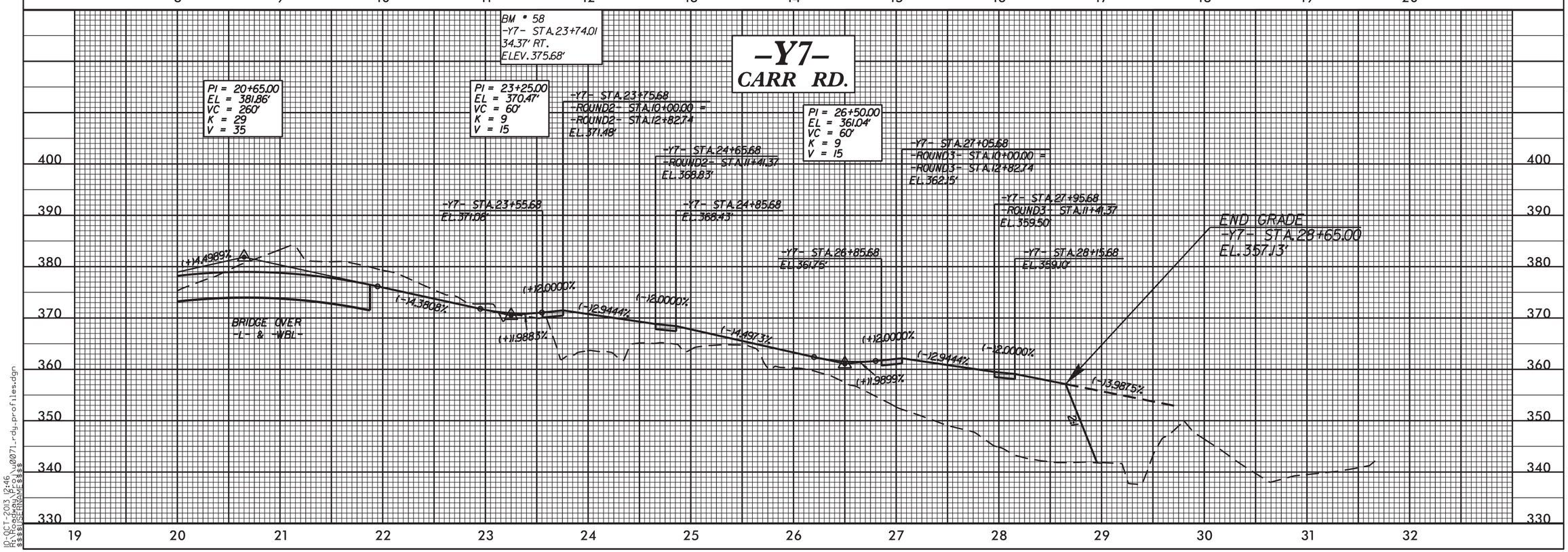
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 58 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

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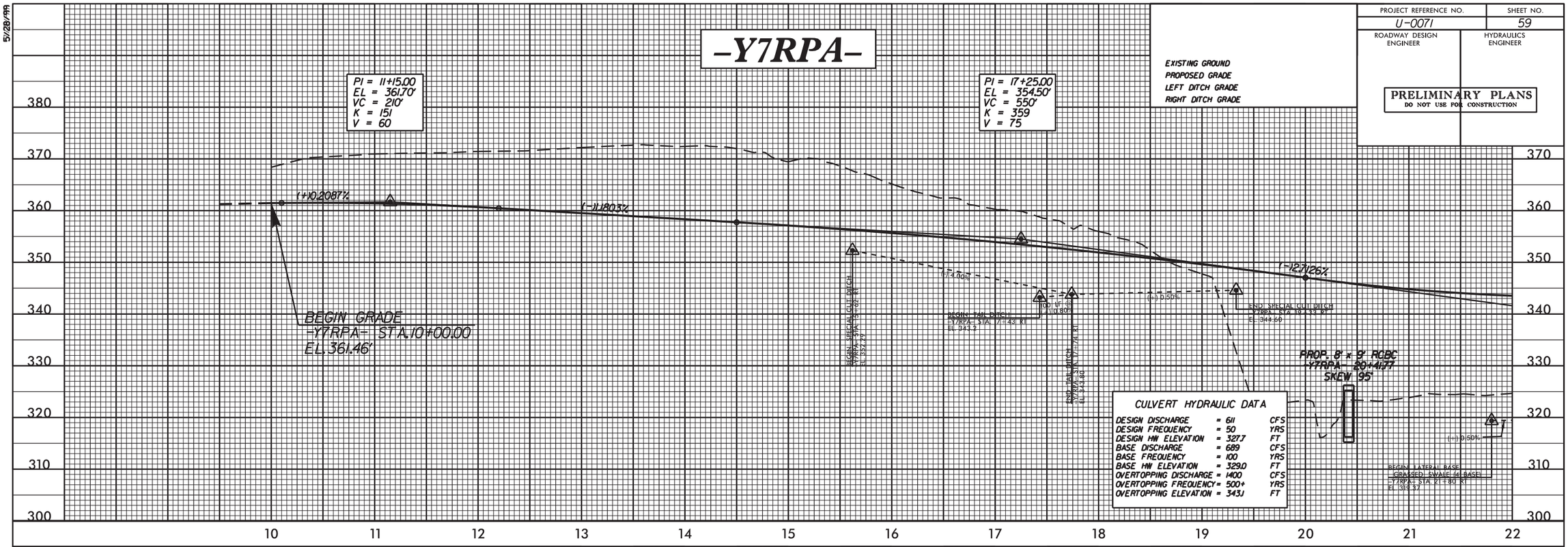
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 59 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE




PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.9132

| | | |
|---|---|---|
| DRAINAGE AREA | = 49 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 130 | CFS |
| DESIGN HW ELEVATION | = 334.2 | FT |
| 100 YEAR DISCHARGE | = 150 | CFS |
| 100 YEAR HW ELEVATION | = 334.8 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 325 | CFS |
| OVERTOPPING ELEVATION | = 342.9 | FT |

5/28/99

10-OCT-2013 12:46
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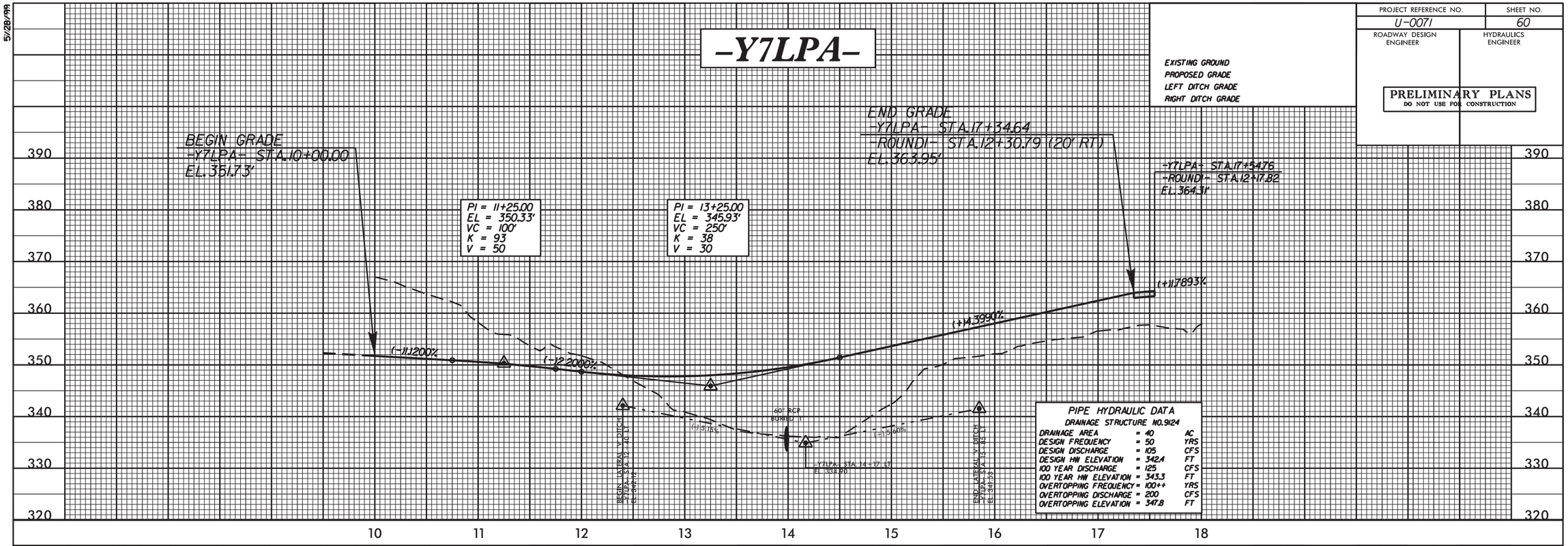
5/28/99

| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 60 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

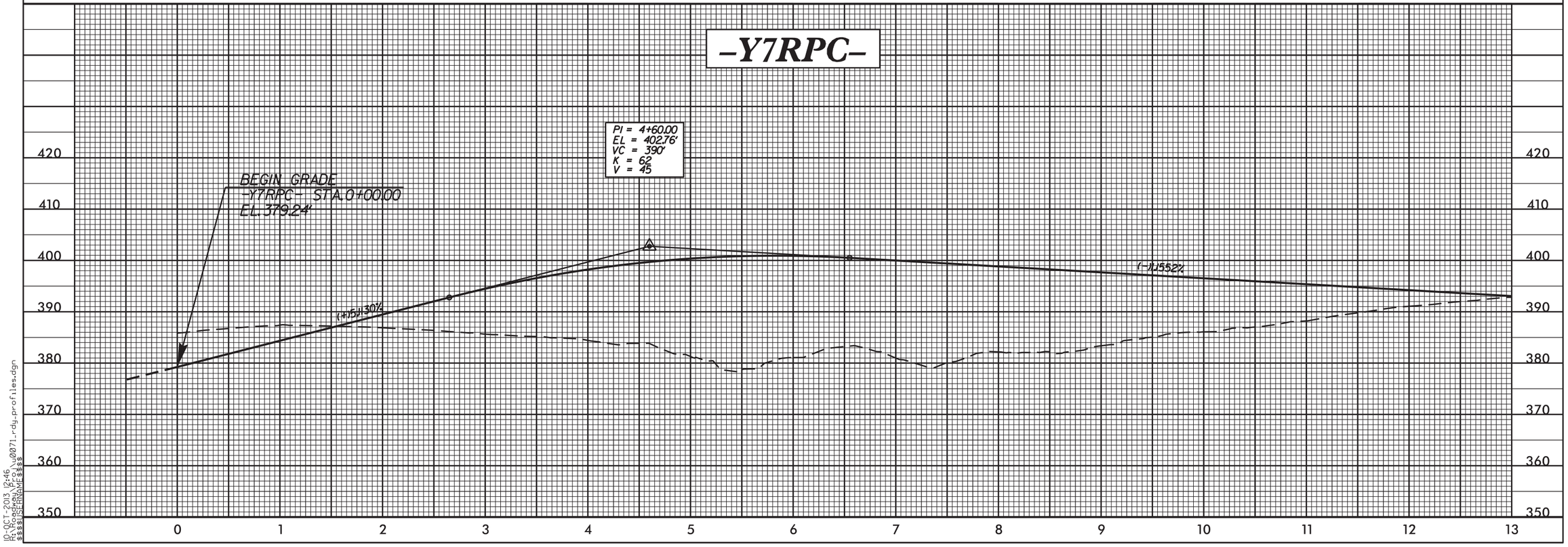
# -Y7LPA-




PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.9124

| | | |
|---|---|---|
| DRAINAGE AREA | = 40 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 105 | CFS |
| DESIGN HW ELEVATION | = 342.4 | FT |
| 100 YEAR DISCHARGE | = 125 | CFS |
| 100 YEAR HW ELEVATION | = 343.3 | FT |
| OVERTOPPING FREQUENCY | = 100++ | YRS |
| OVERTOPPING DISCHARGE | = 200 | CFS |
| OVERTOPPING ELEVATION | = 347.8 | FT |

# -Y7RPC-




10-OCT-2013 12:46
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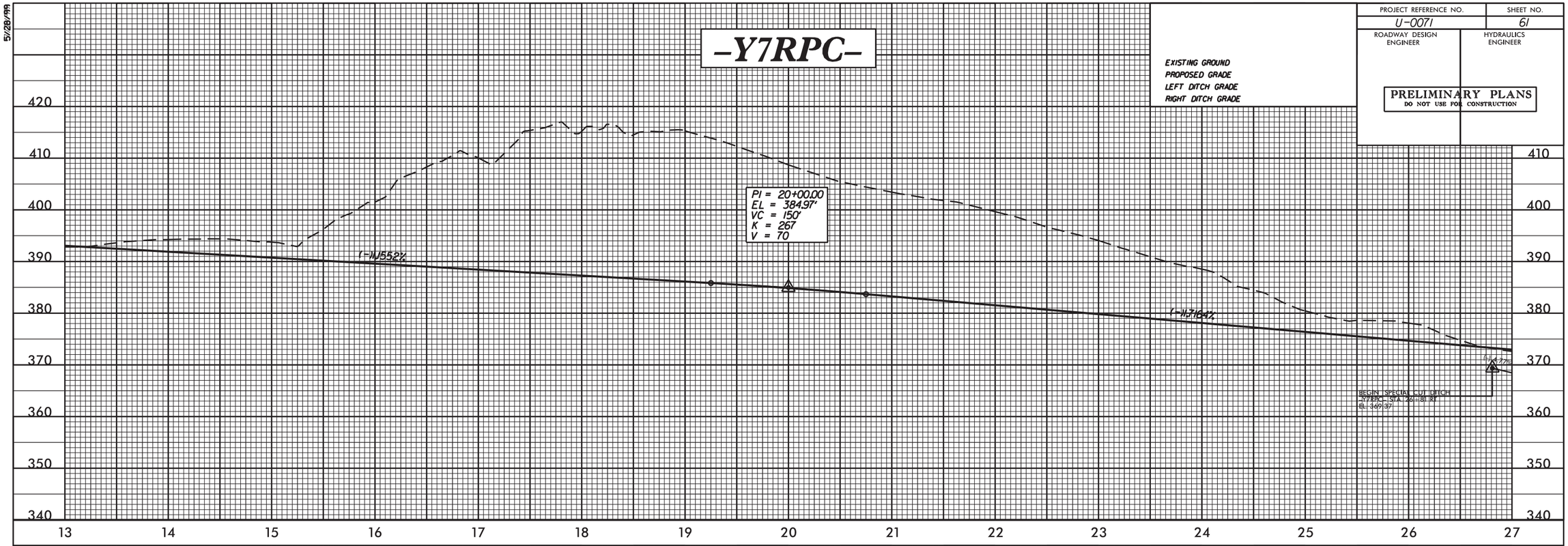
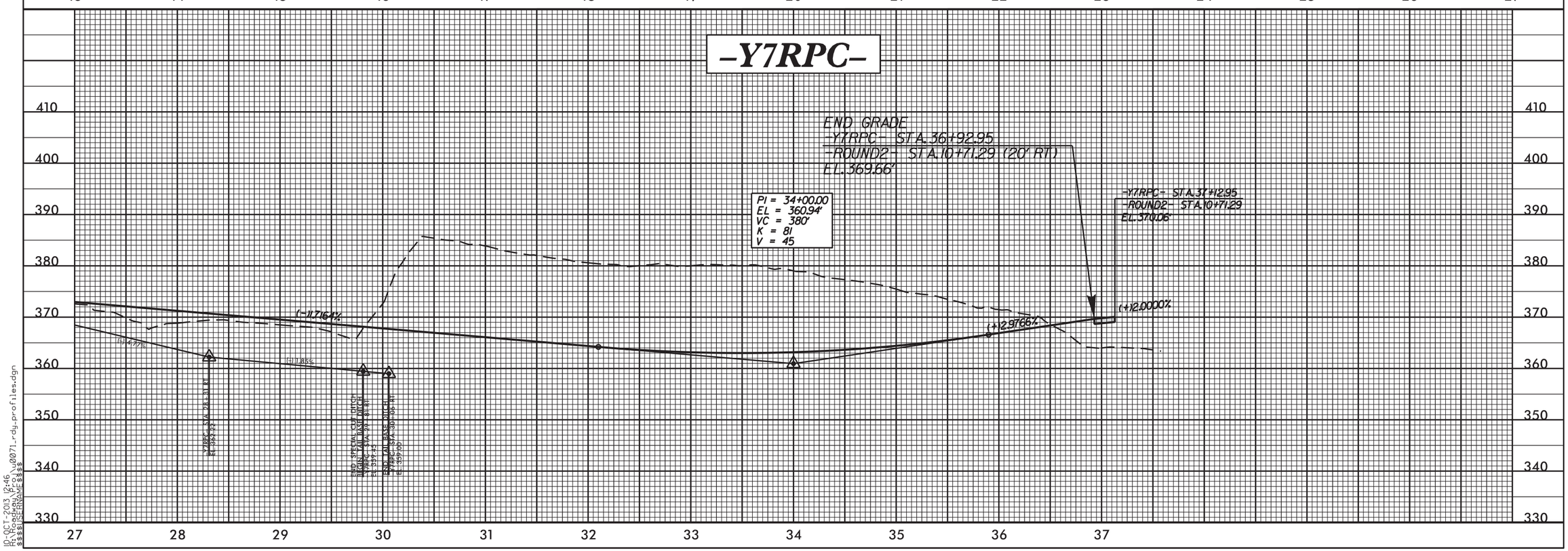
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 61 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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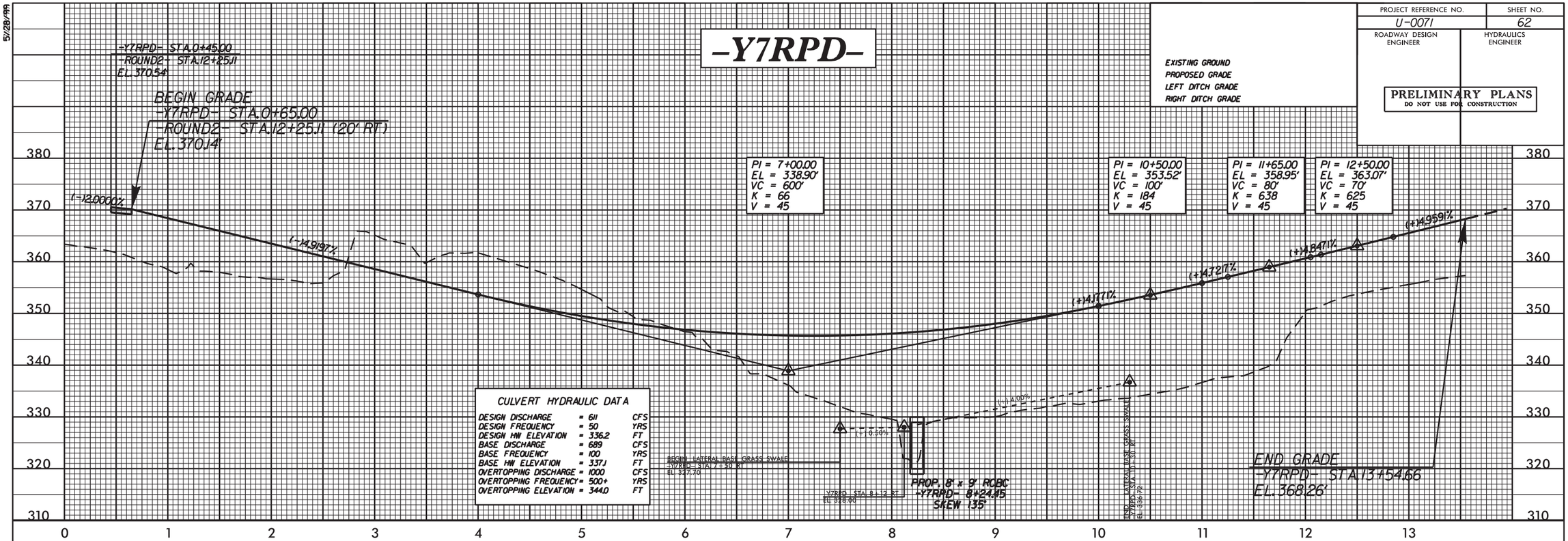
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 62 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

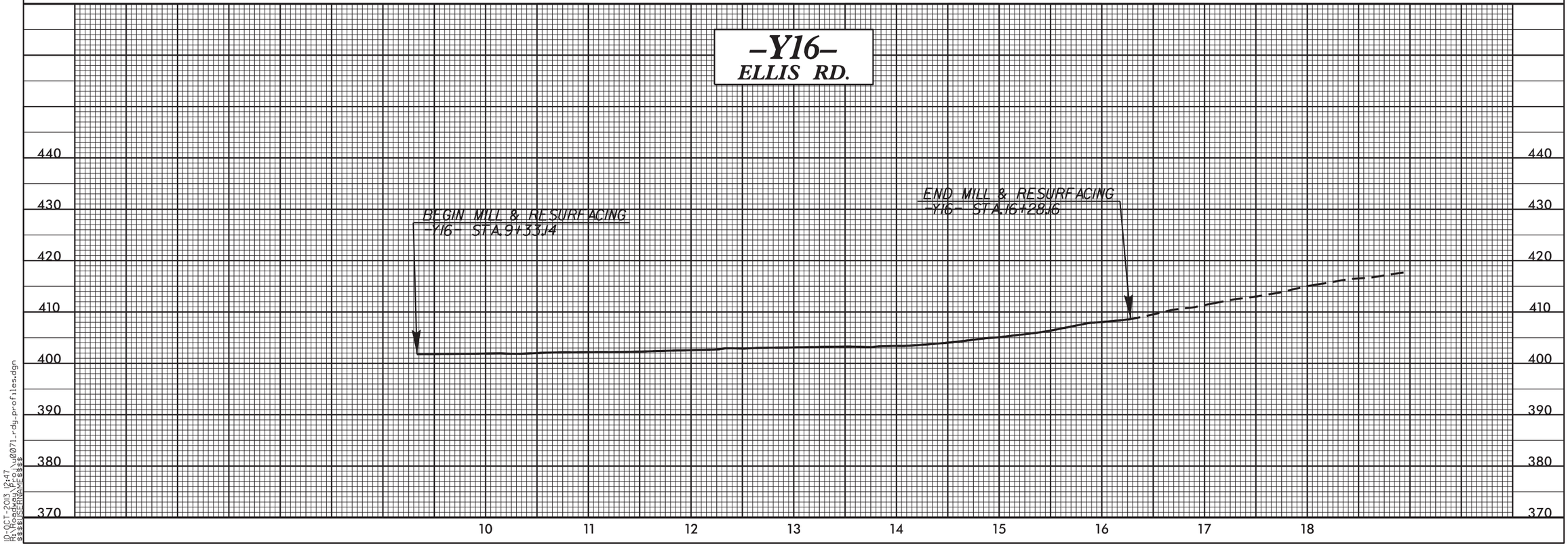
# -Y7RPD-




CULVERT HYDRAULIC DATA

| | | |
|---|---|---|
| DESIGN DISCHARGE | = 611 | CFS |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN HW ELEVATION | = 336.2 | FT |
| BASE DISCHARGE | = 689 | CFS |
| BASE FREQUENCY | = 100 | YRS |
| BASE HW ELEVATION | = 337.1 | FT |
| OVERTOPPING DISCHARGE | = 1000 | CFS |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING ELEVATION | = 344.0 | FT |

# -Y16-
## ELLIS RD.

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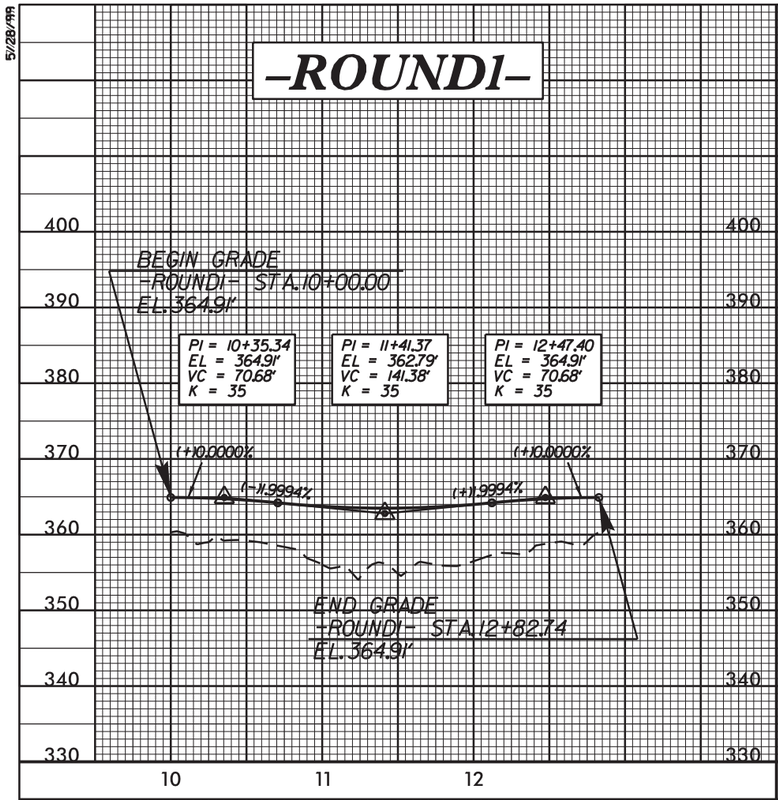
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 63 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

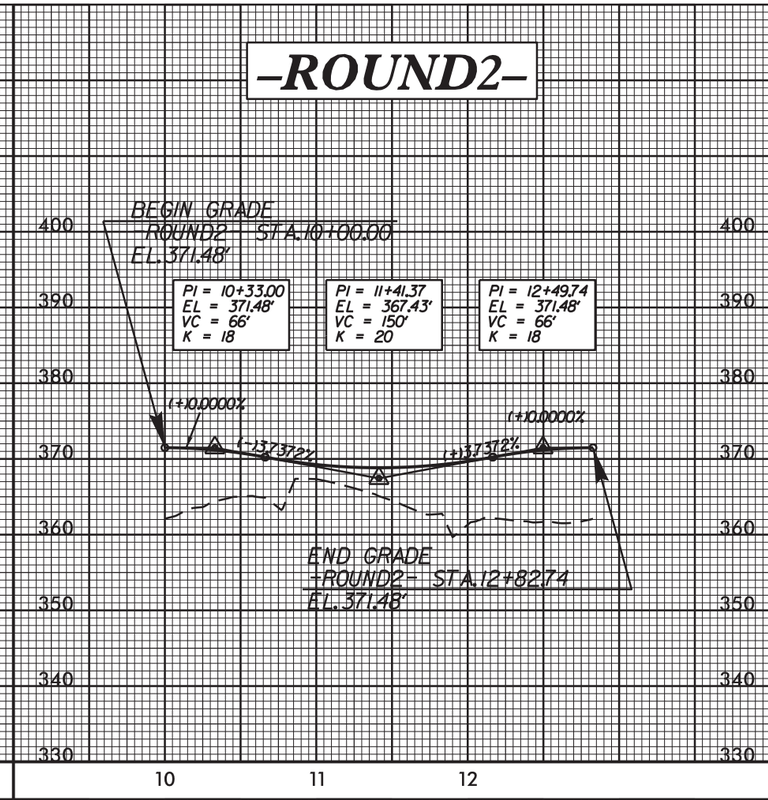
EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

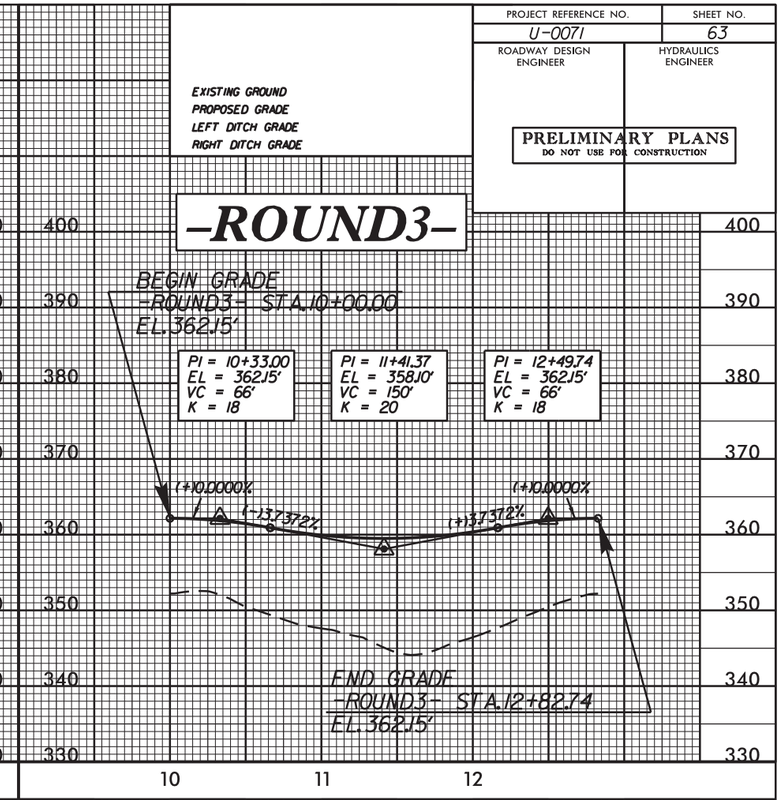
## -ROUND1-



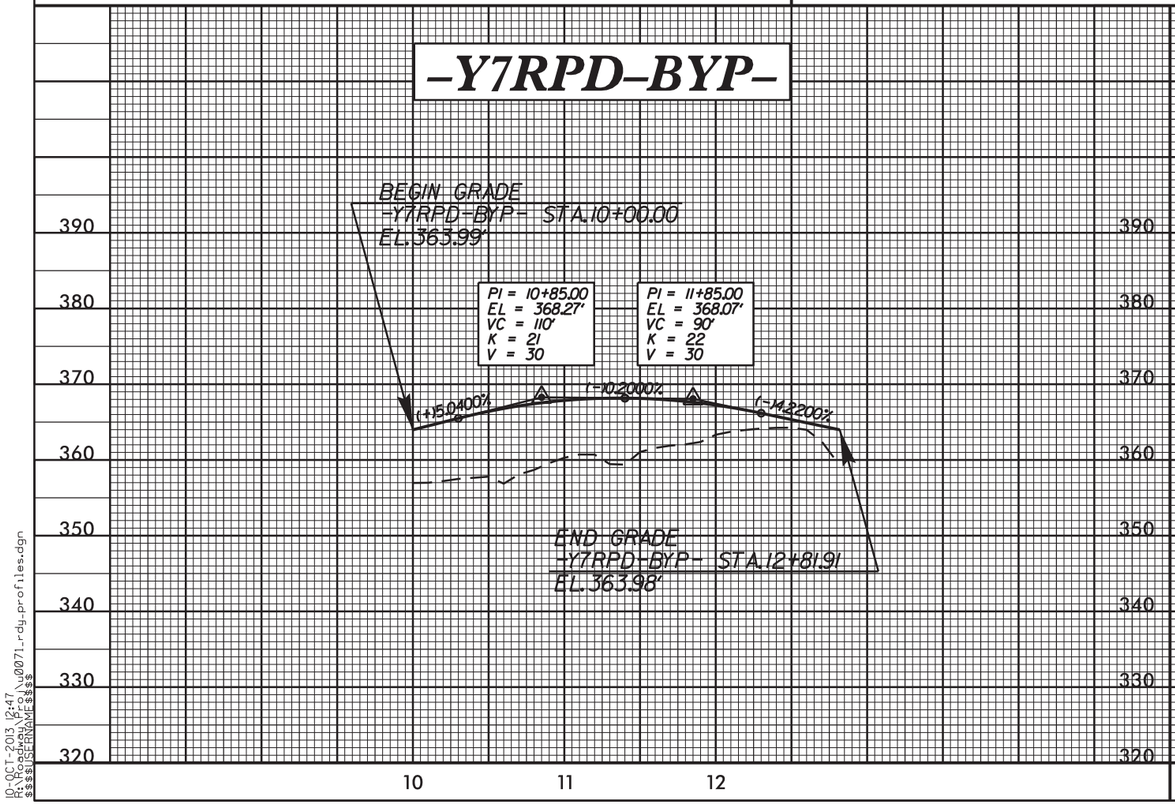

## -ROUND2-



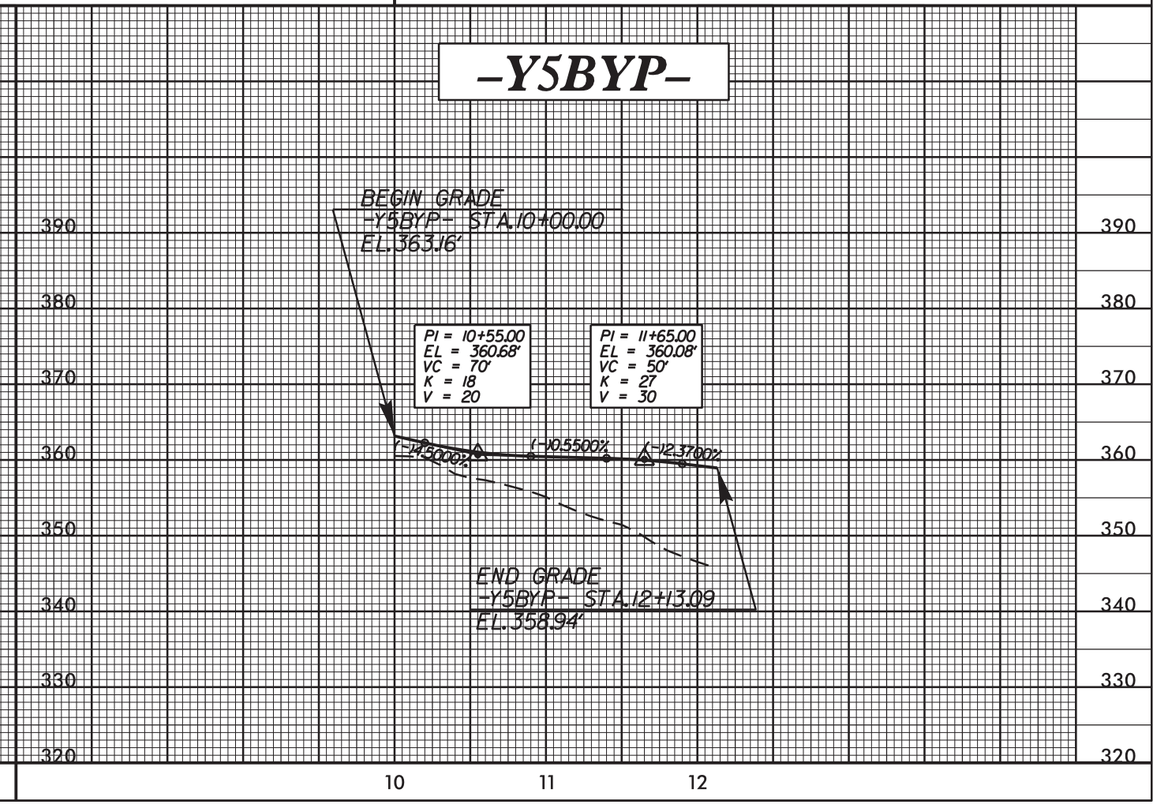

## -ROUND3-




## -Y7RPD-BYP-




## -Y5BYP-

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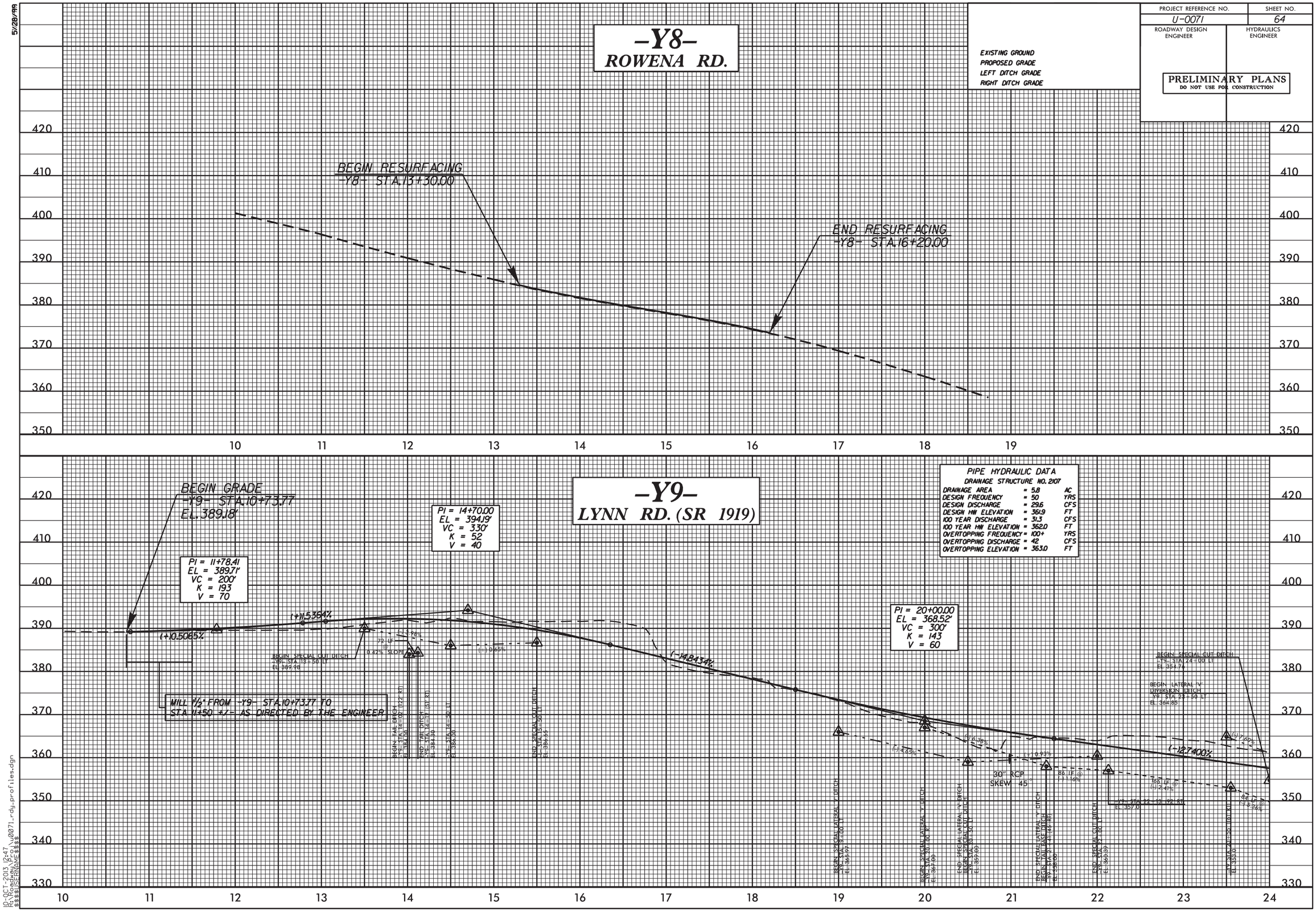
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 64 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 65 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

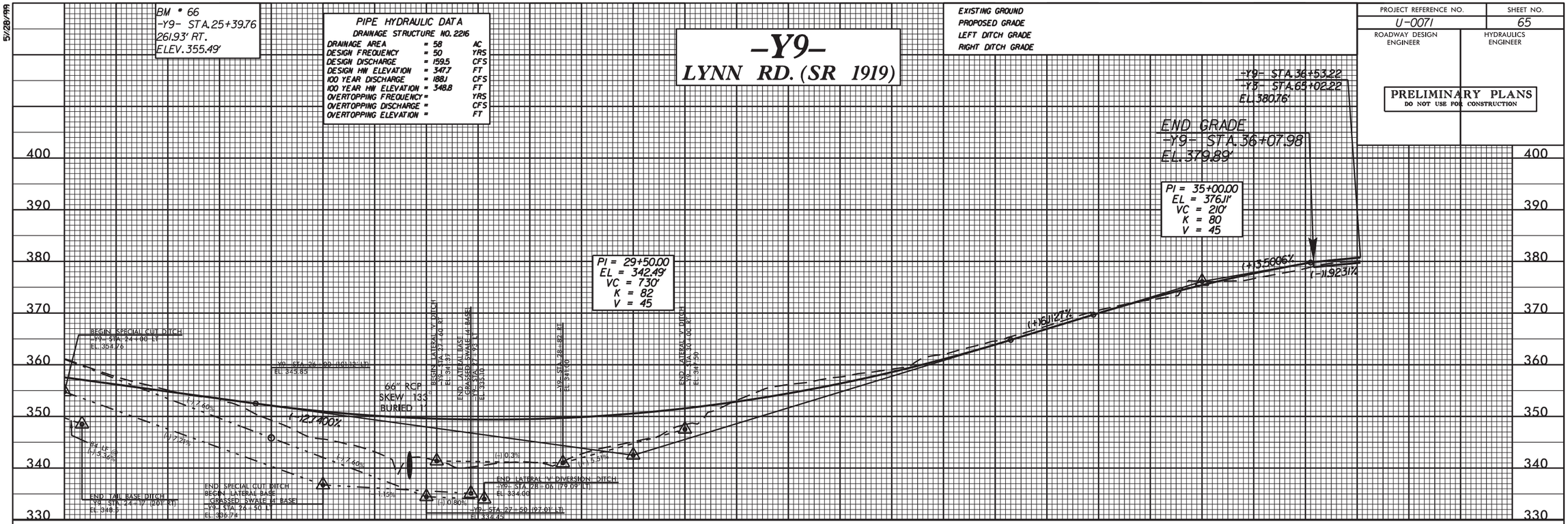
EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

BM * 66
-Y9- STA.25+39.76
261.93' RT.
ELEV.355.49'

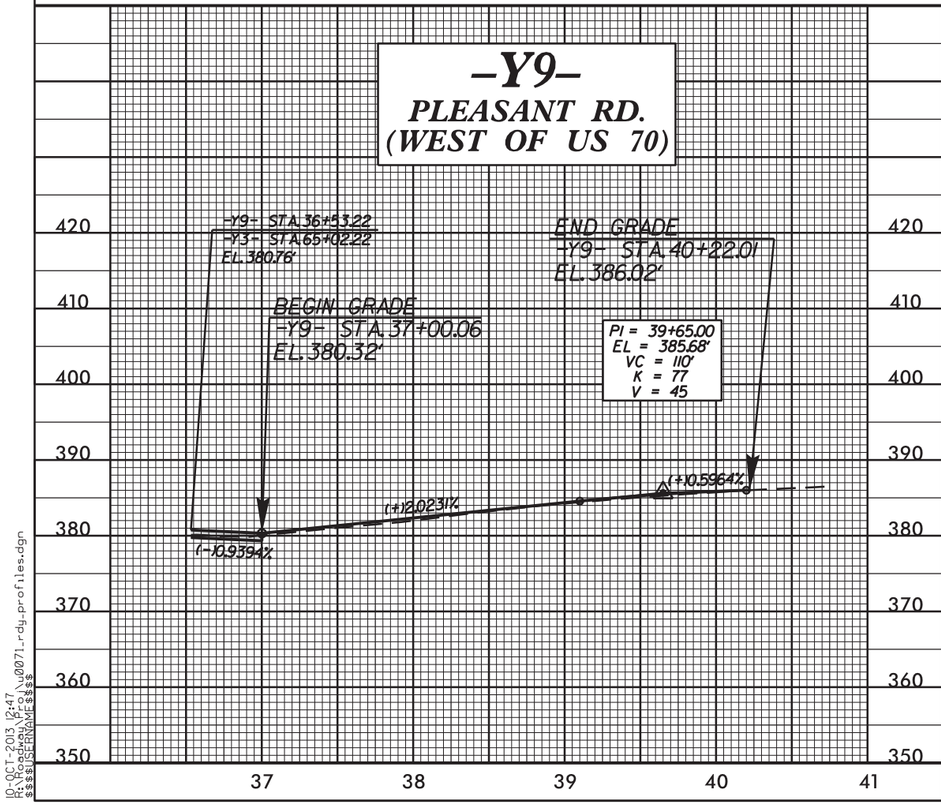
PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO. 2216

| | | |
|---|---|---|
| DRAINAGE AREA | = 58 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 159.5 | CFS |
| DESIGN HW ELEVATION | = 347.7 | FT |
| 100 YEAR DISCHARGE | = 188.1 | CFS |
| 100 YEAR HW ELEVATION | = 348.8 | FT |
| OVERTOPPING FREQUENCY | = | YRS |
| OVERTOPPING DISCHARGE | = | CFS |
| OVERTOPPING ELEVATION | = | FT |

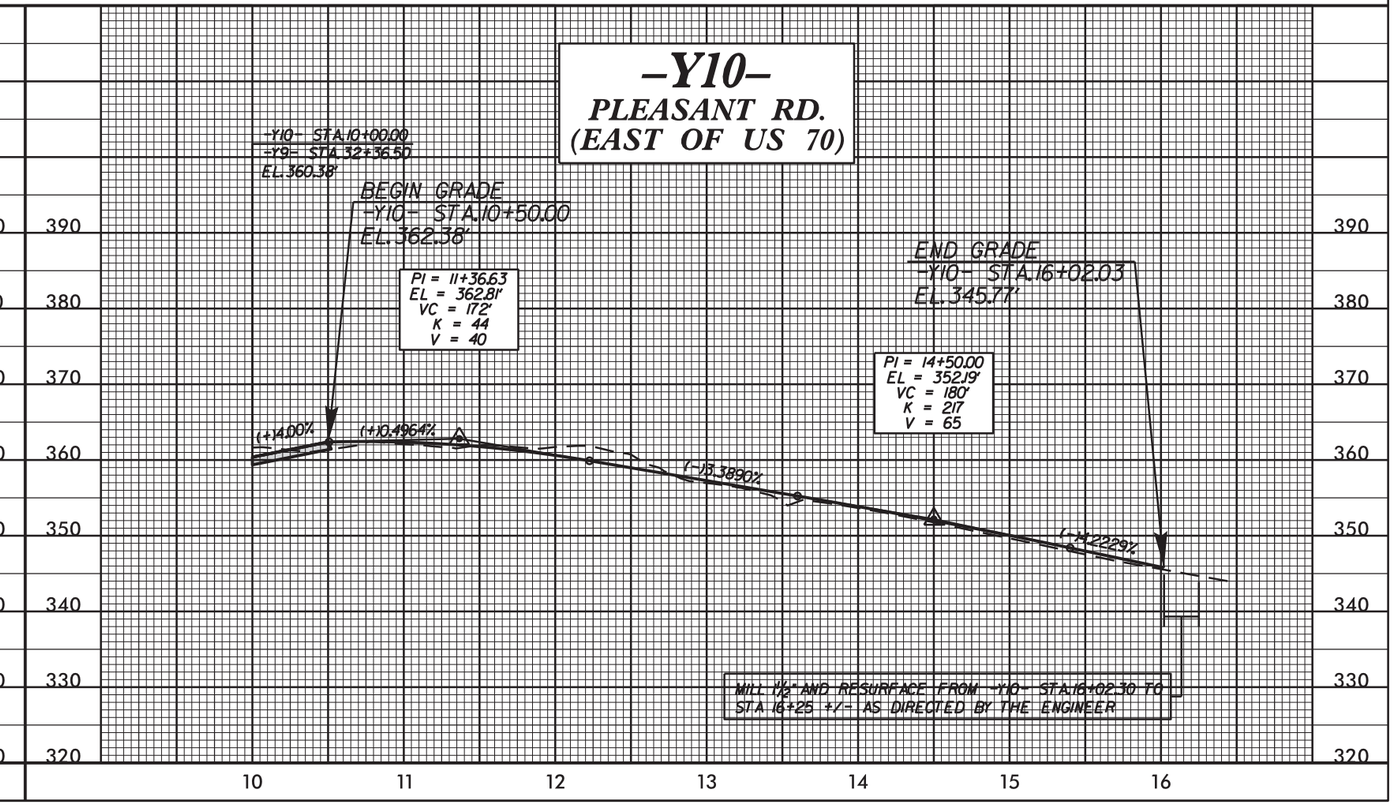
# -Y9-
## LYNN RD. (SR 1919)




# -Y9-
## PLEASANT RD. (WEST OF US 70)




# -Y10-
## PLEASANT RD. (EAST OF US 70)

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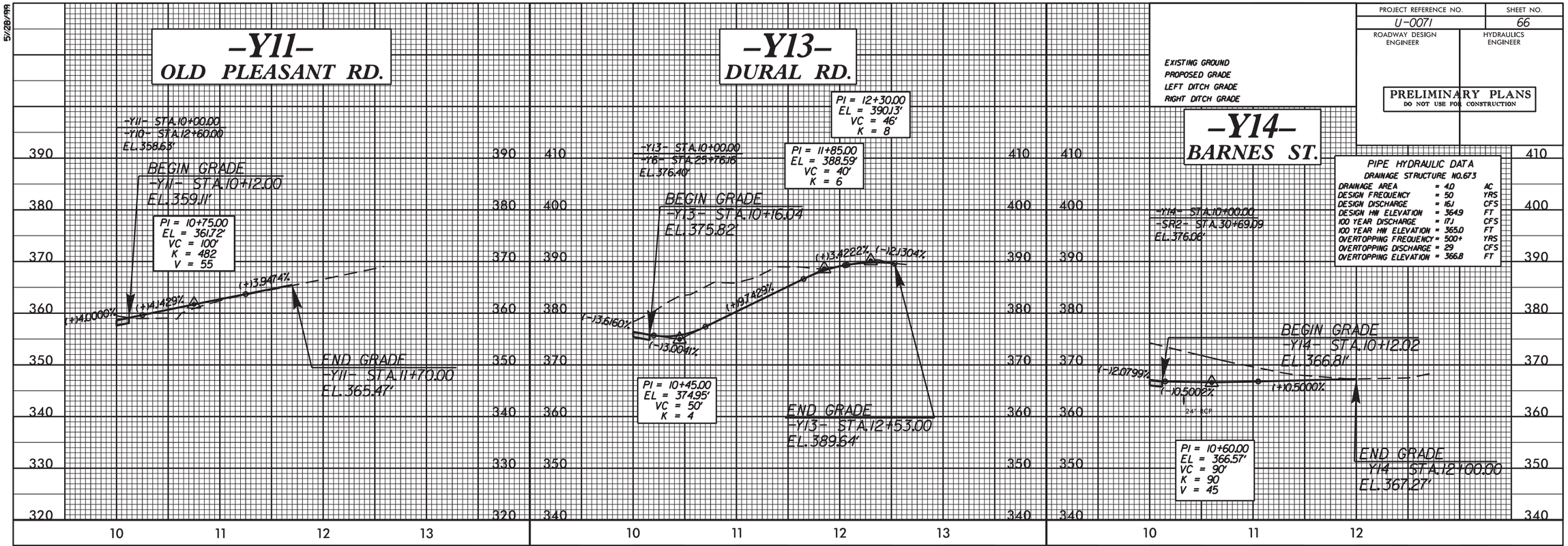
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 66 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE




PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.673

| | | |
|---|---|---|
| DRAINAGE AREA | = 4.0 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 16.1 | CFS |
| DESIGN HW ELEVATION | = 364.9 | FT |
| 100 YEAR DISCHARGE | = 17.1 | CFS |
| 100 YEAR HW ELEVATION | = 365.0 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 29 | CFS |
| OVERTOPPING ELEVATION | = 366.8 | FT |

PIPE HYDRAULIC DATA
DRAINAGE STRUCTURE NO.2413

| | | |
|---|---|---|
| DRAINAGE AREA | = 1.2 | AC |
| DESIGN FREQUENCY | = 50 | YRS |
| DESIGN DISCHARGE | = 6.5 | CFS |
| DESIGN HW ELEVATION | = 359.2 | FT |
| 100 YEAR DISCHARGE | = 6.9 | CFS |
| 100 YEAR HW ELEVATION | = 359.2 | FT |
| OVERTOPPING FREQUENCY | = 500+ | YRS |
| OVERTOPPING DISCHARGE | = 20 | CFS |
| OVERTOPPING ELEVATION | = 362.8 | FT |

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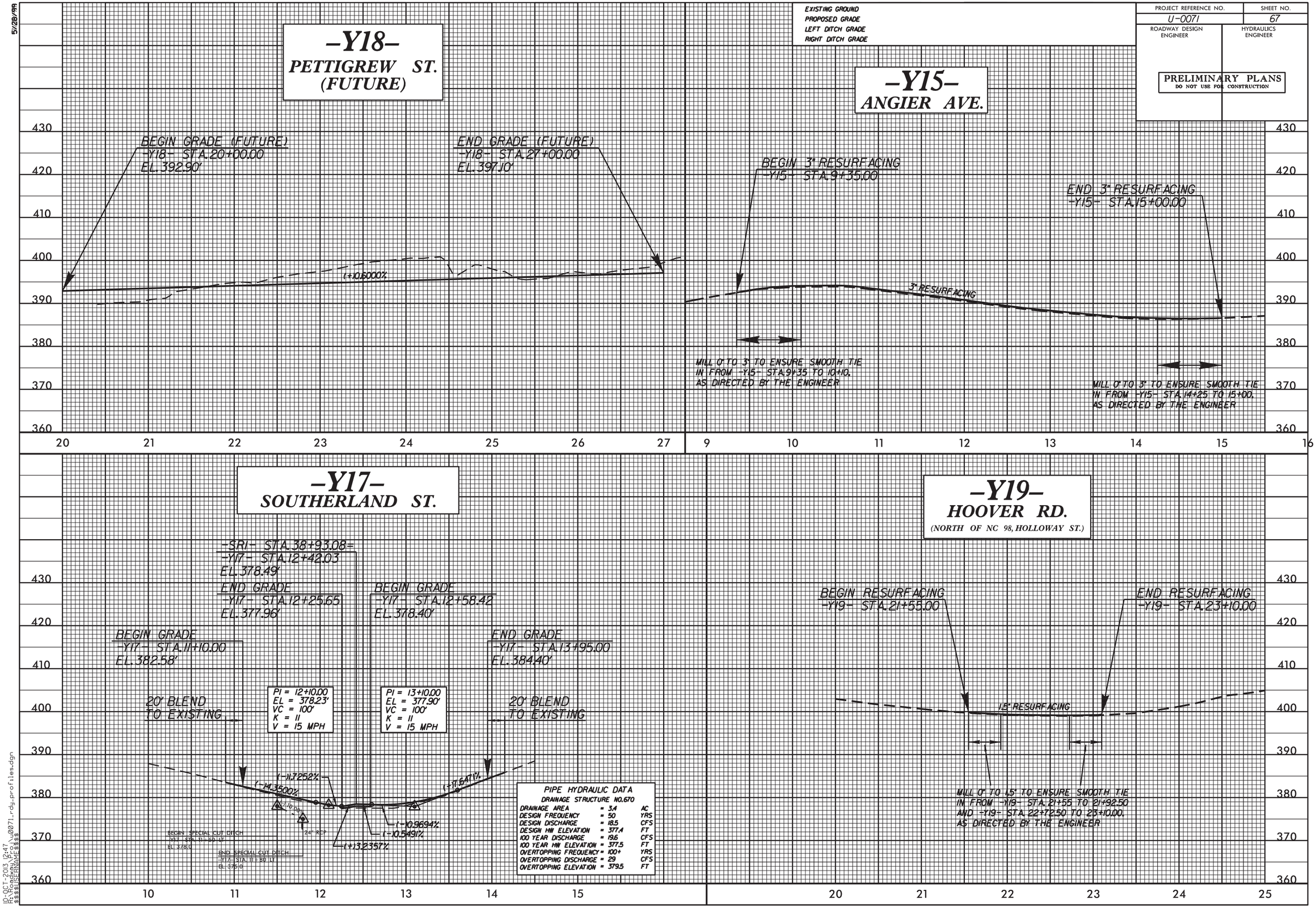
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 67 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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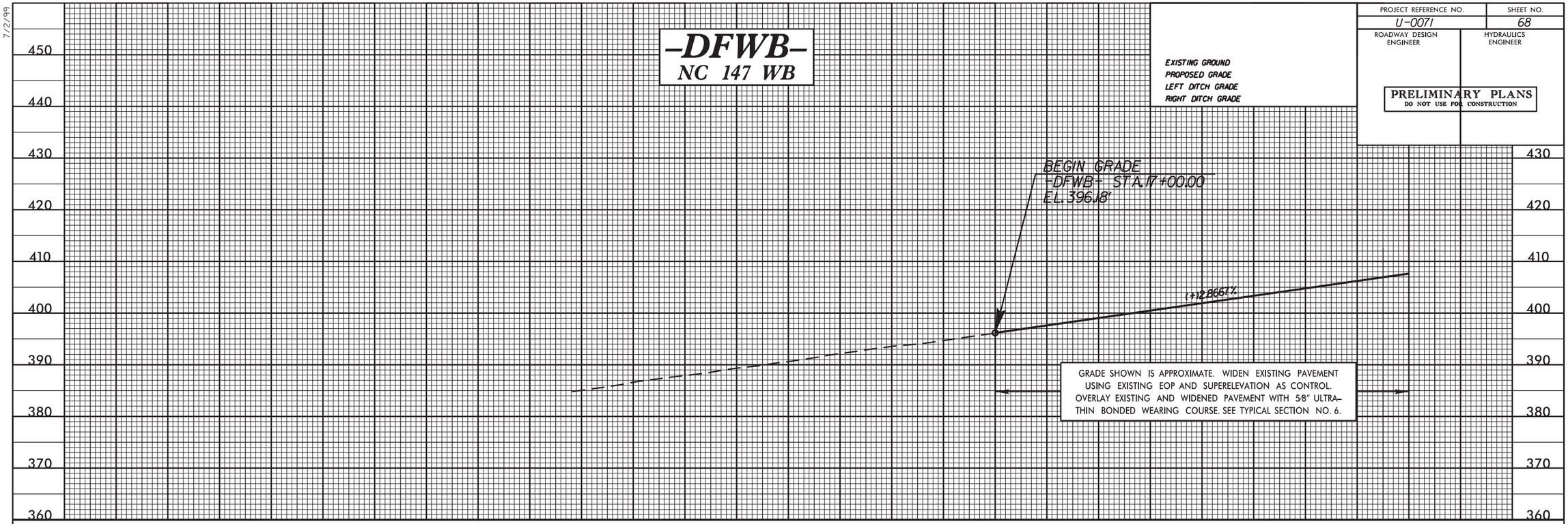
7/2/99

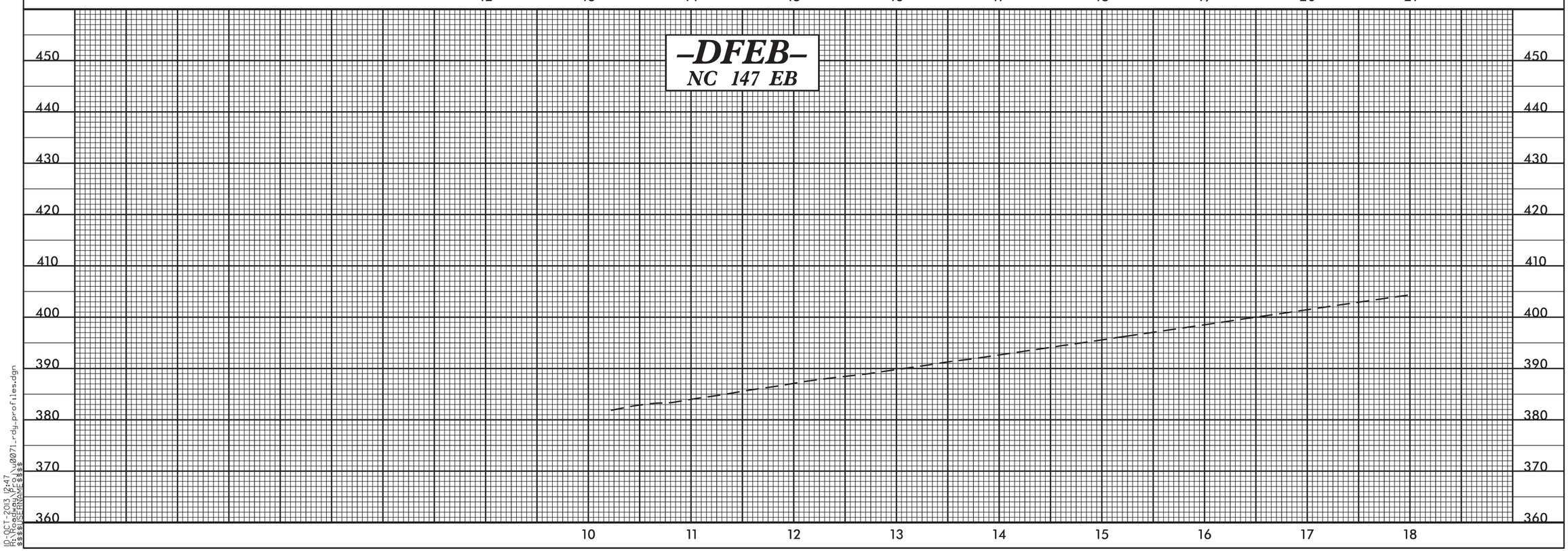
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 68 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE




GRADE SHOWN IS APPROXIMATE. WIDEN EXISTING PAVEMENT USING EXISTING EOP AND SUPERELEVATION AS CONTROL. OVERLAY EXISTING AND WIDENED PAVEMENT WITH 5/8" ULTRA-THIN BONDED WEARING COURSE. SEE TYPICAL SECTION NO. 6.

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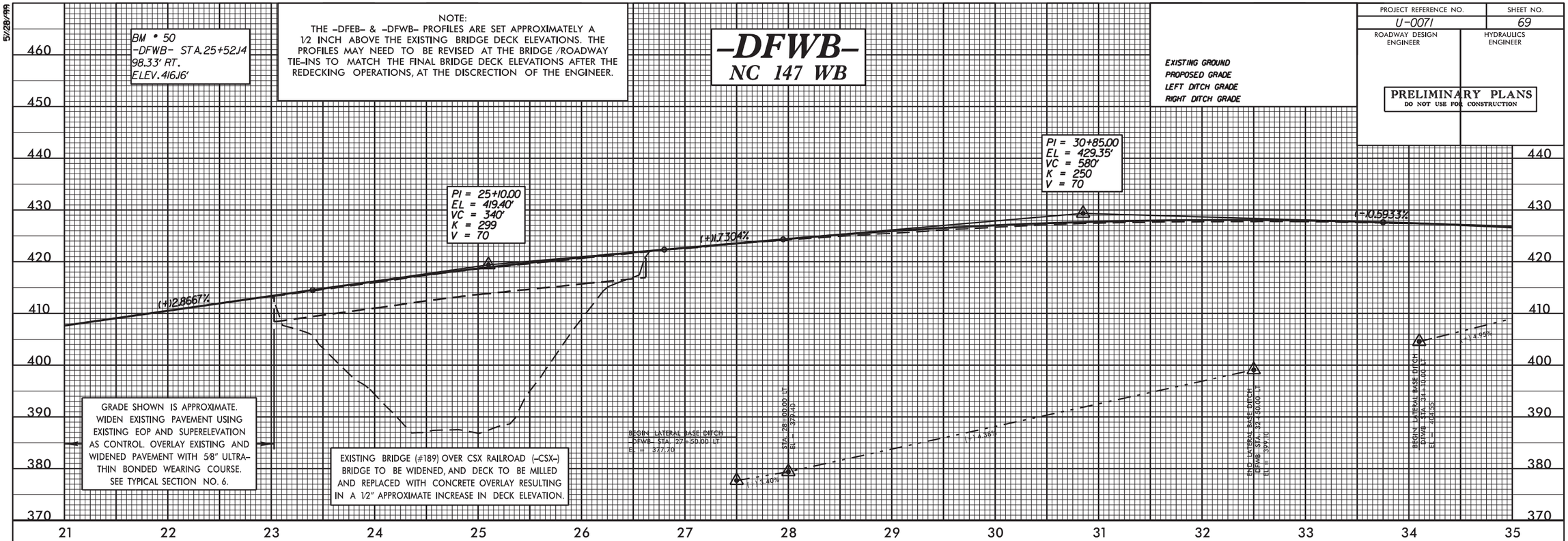
5/28/99

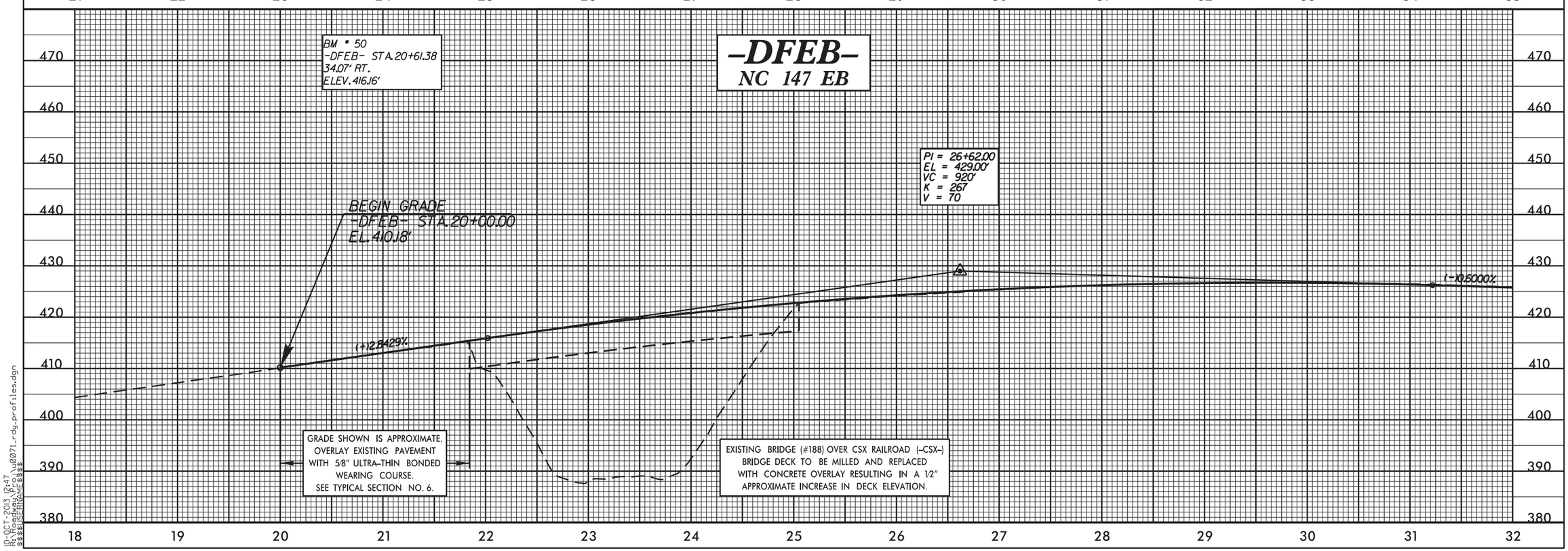
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 69 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE:
THE -DFEB- & -DFWB- PROFILES ARE SET APPROXIMATELY A 1/2 INCH ABOVE THE EXISTING BRIDGE DECK ELEVATIONS. THE PROFILES MAY NEED TO BE REVISED AT THE BRIDGE /ROADWAY TIE-INS TO MATCH THE FINAL BRIDGE DECK ELEVATIONS AFTER THE REDECKING OPERATIONS, AT THE DISCRETION OF THE ENGINEER.

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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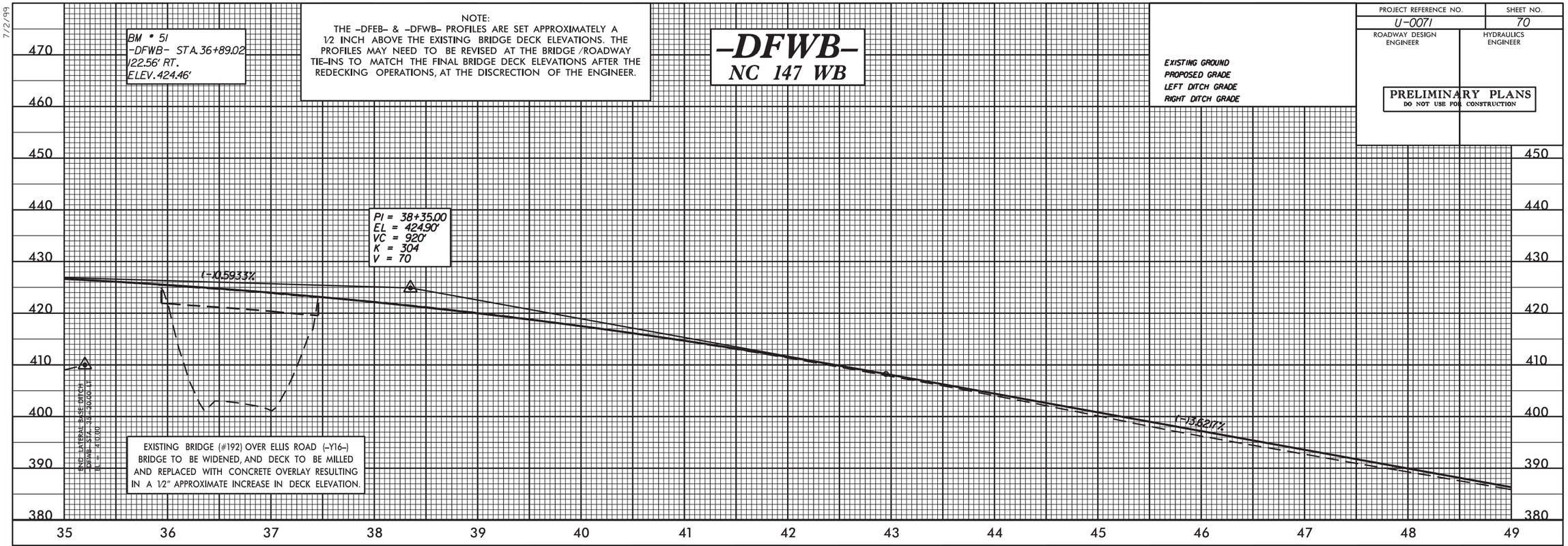
7/2/99

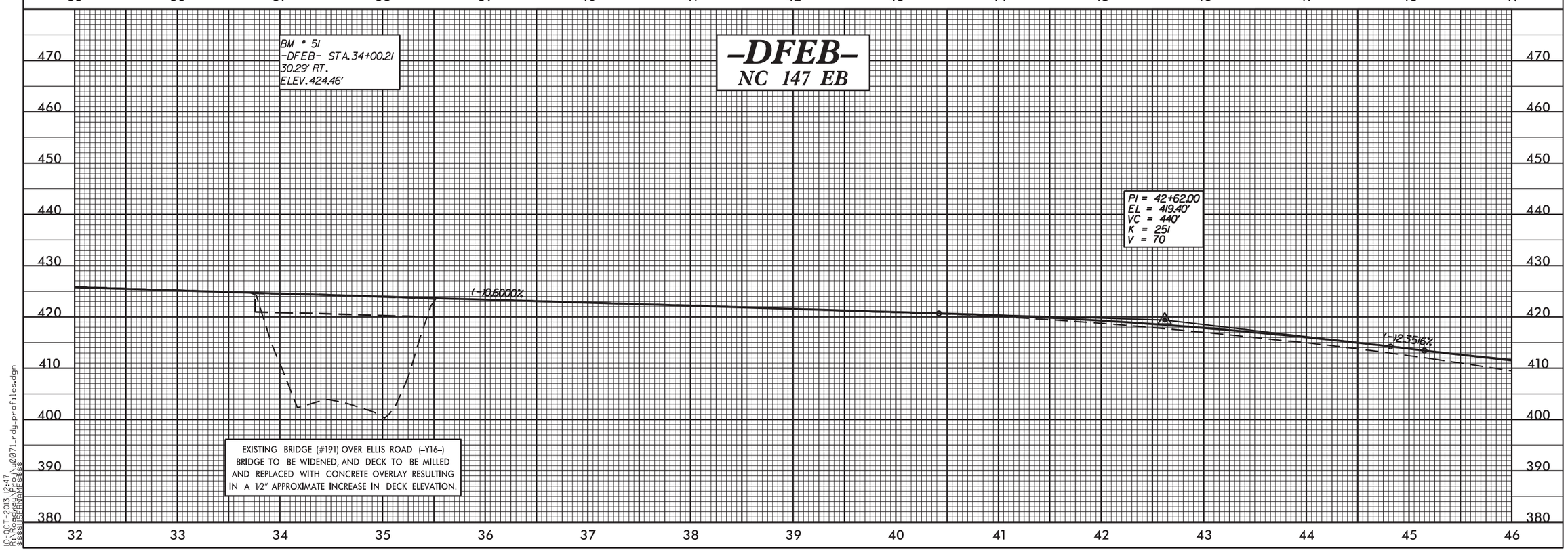
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 70 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

NOTE:
THE -DFEB- & -DFWB- PROFILES ARE SET APPROXIMATELY A 1/2 INCH ABOVE THE EXISTING BRIDGE DECK ELEVATIONS. THE PROFILES MAY NEED TO BE REVISED AT THE BRIDGE /ROADWAY TIE-INS TO MATCH THE FINAL BRIDGE DECK ELEVATIONS AFTER THE REDECKING OPERATIONS, AT THE DISCRECTION OF THE ENGINEER.

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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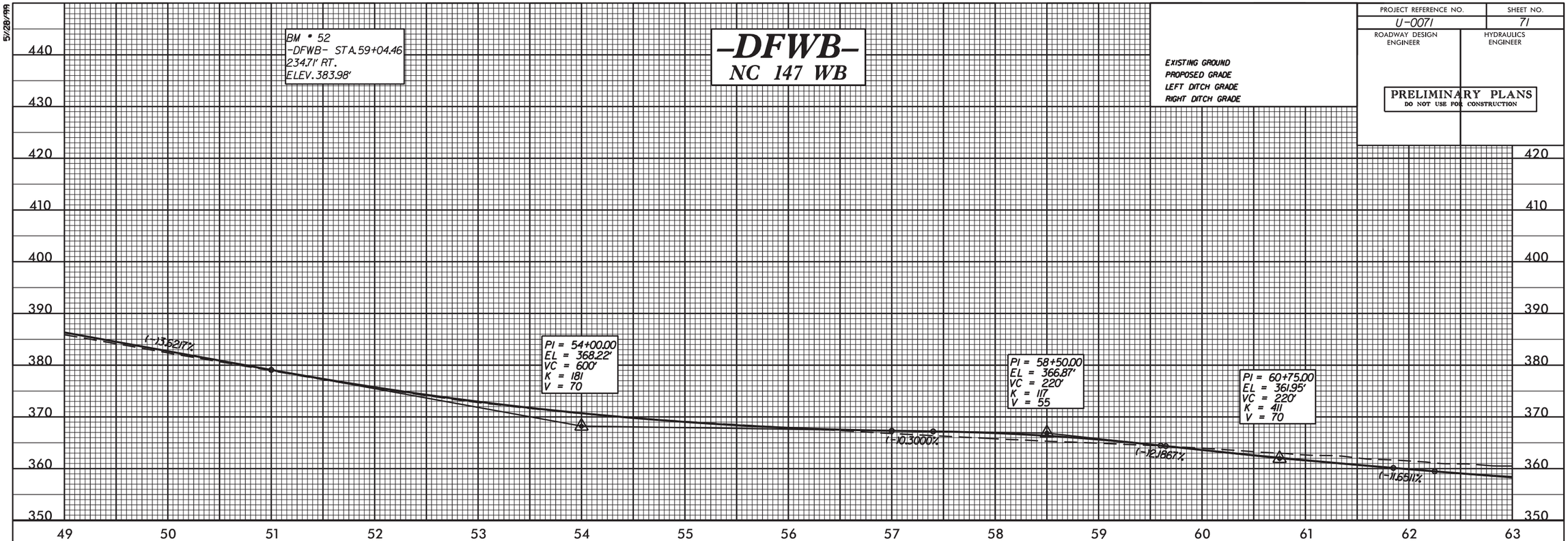
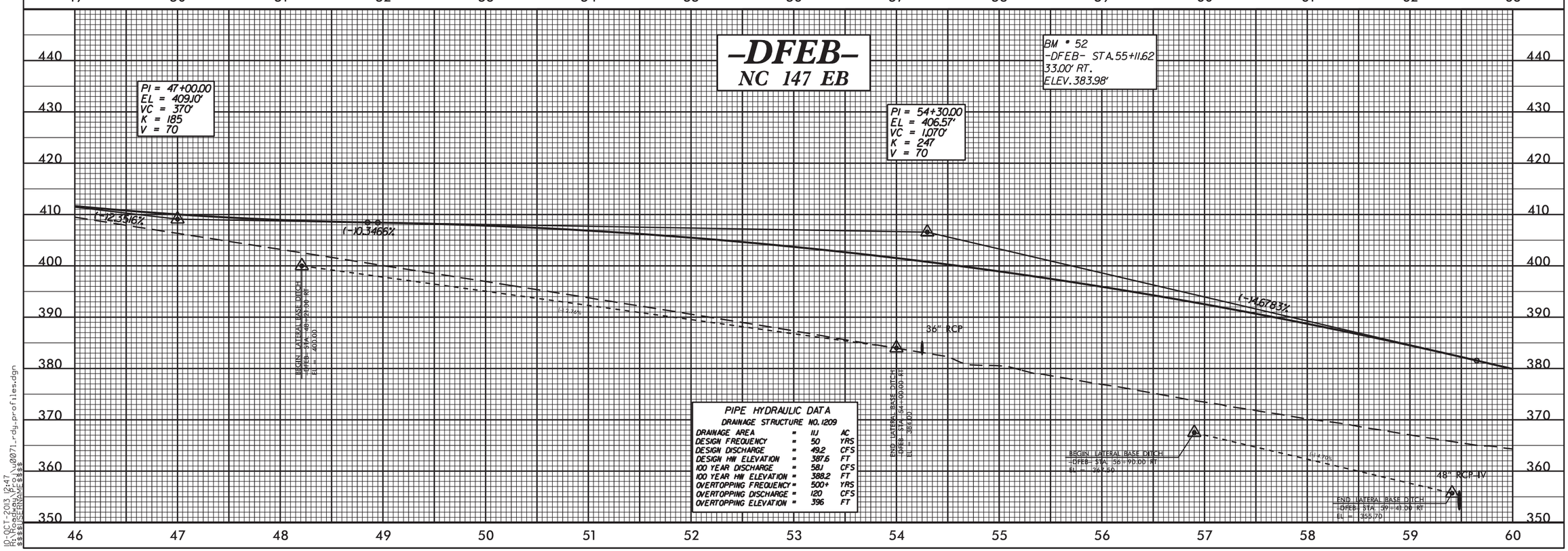
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 71 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

**PRELIMINARY PLANS**
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE




**PIPE HYDRAULIC DATA**
DRAINAGE STRUCTURE NO. 1209

| | | | |
|---|---|---|---|
| DRAINAGE AREA | = | 11.1 | AC |
| DESIGN FREQUENCY | = | 50 | YRS |
| DESIGN DISCHARGE | = | 49.2 | CFS |
| DESIGN HW ELEVATION | = | 387.6 | FT |
| 100 YEAR DISCHARGE | = | 58.1 | CFS |
| 100 YEAR HW ELEVATION | = | 388.2 | FT |
| OVERTOPPING FREQUENCY | = | 500+ | YRS |
| OVERTOPPING DISCHARGE | = | 120 | CFS |
| OVERTOPPING ELEVATION | = | 396 | FT |

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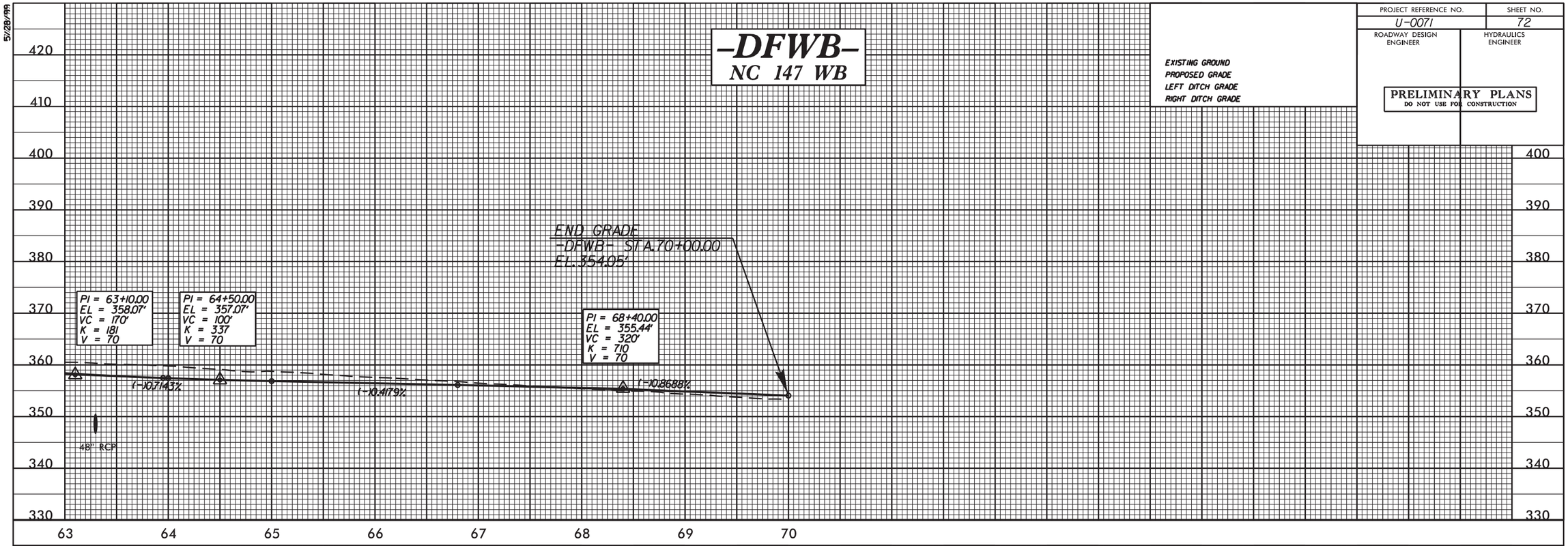
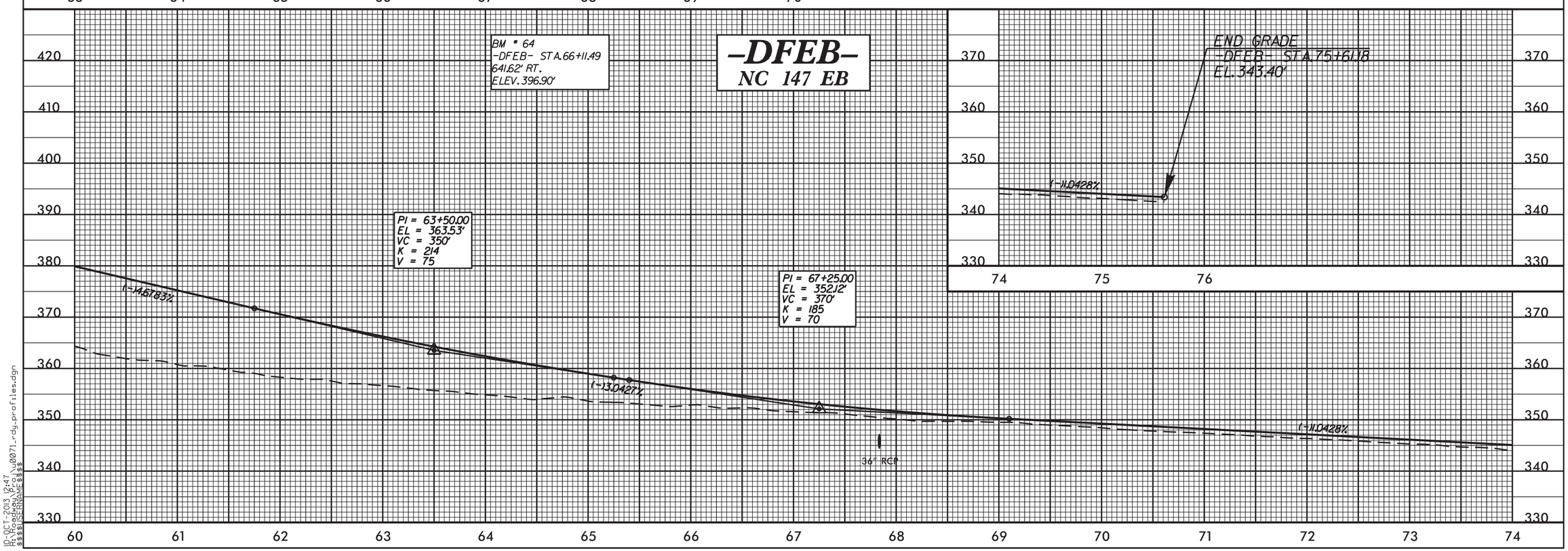
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 72 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

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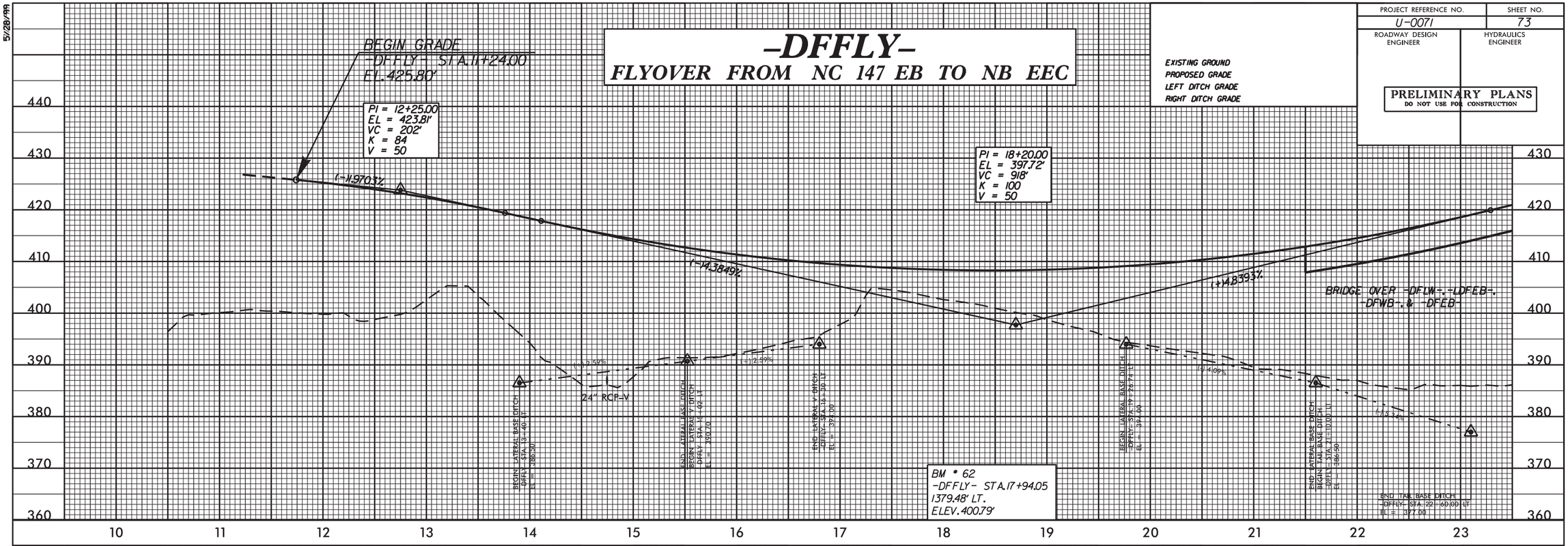
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 73 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

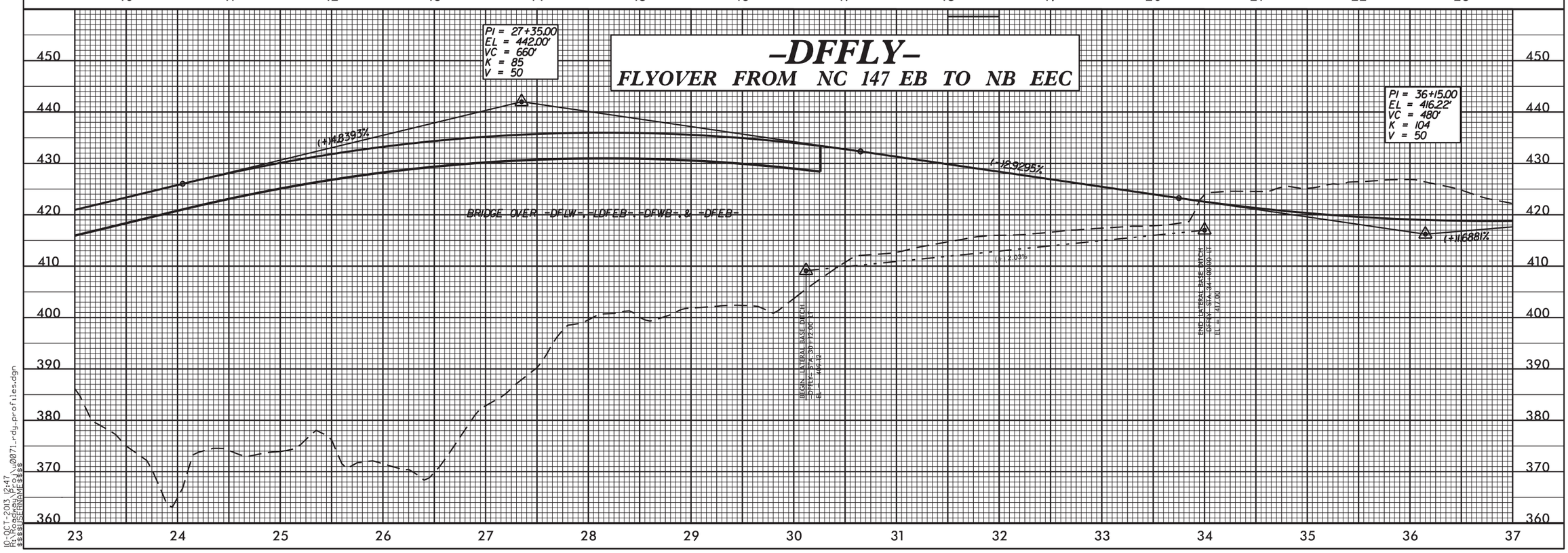
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

# -DFFLY-
## FLYOVER FROM NC 147 EB TO NB EEC




# -DFFLY-
## FLYOVER FROM NC 147 EB TO NB EEC

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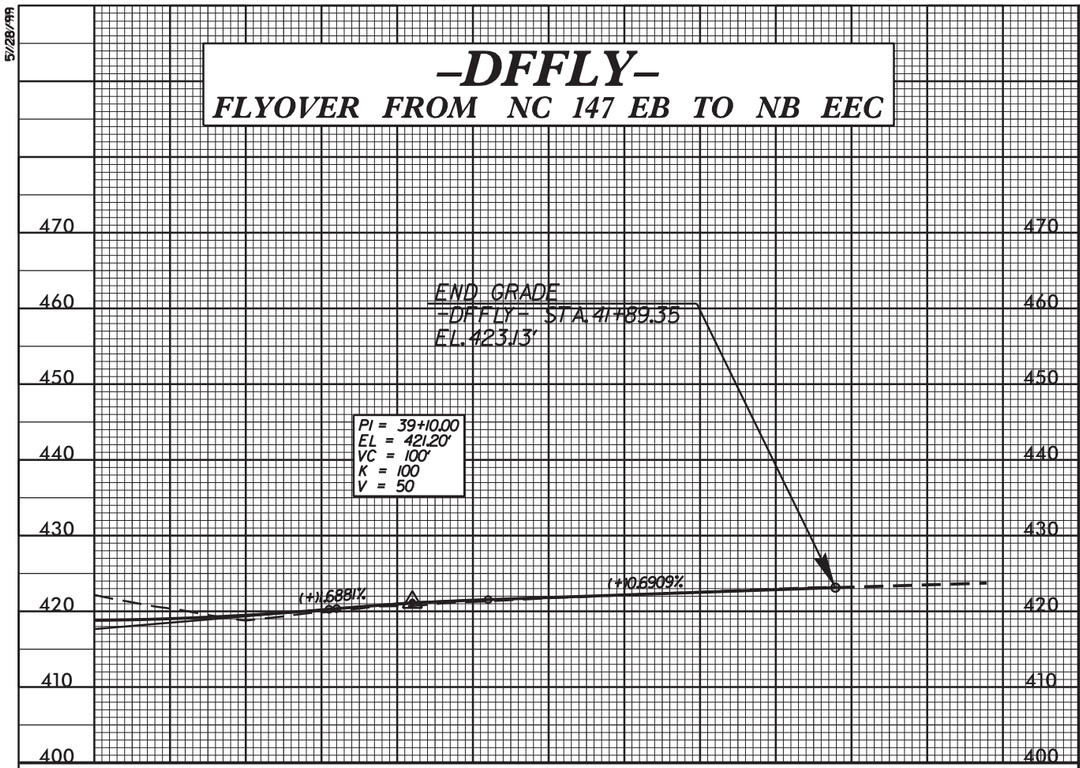
| PROJECT REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | 74 |
| ROADWAY DESIGN ENGINEER | HYDRAULICS ENGINEER |

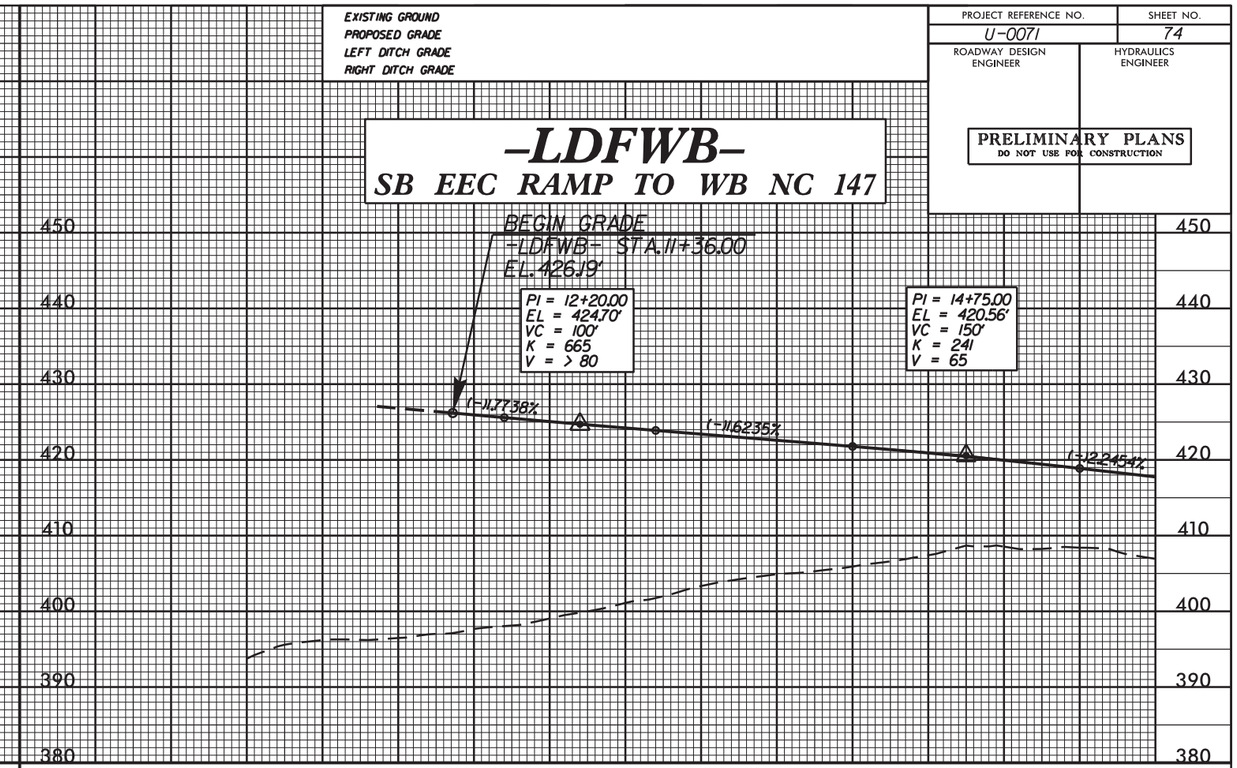
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION

EXISTING GROUND
PROPOSED GRADE
LEFT DITCH GRADE
RIGHT DITCH GRADE

# -DFFLY-
## FLYOVER FROM NC 147 EB TO NB EEC




# -LDFWB-
## SB EEC RAMP TO WB NC 147

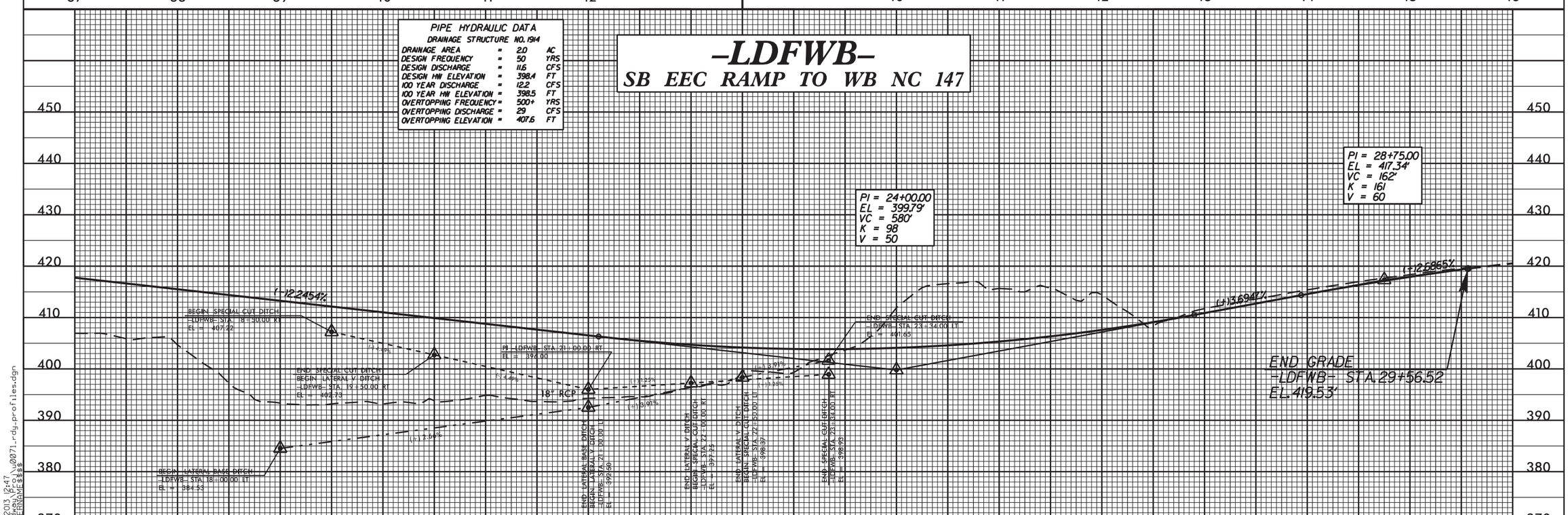



# -LDFWB-
## SB EEC RAMP TO WB NC 147

PIPE HYDRAULIC DATA

DRAINAGE STRUCTURE NO. 1914

| | | | |
|---|---|---|---|
| DRAINAGE AREA | = | 2.0 | AC |
| DESIGN FREQUENCY | = | 50 | YRS |
| DESIGN DISCHARGE | = | 11.6 | CFS |
| DESIGN HW ELEVATION | = | 398.4 | FT |
| 100 YEAR DISCHARGE | = | 12.2 | CFS |
| 100 YEAR HW ELEVATION | = | 398.5 | FT |
| OVERTOPPING FREQUENCY | = | 500+ | YRS |
| OVERTOPPING DISCHARGE | = | 29 | CFS |
| OVERTOPPING ELEVATION | = | 407.6 | FT |

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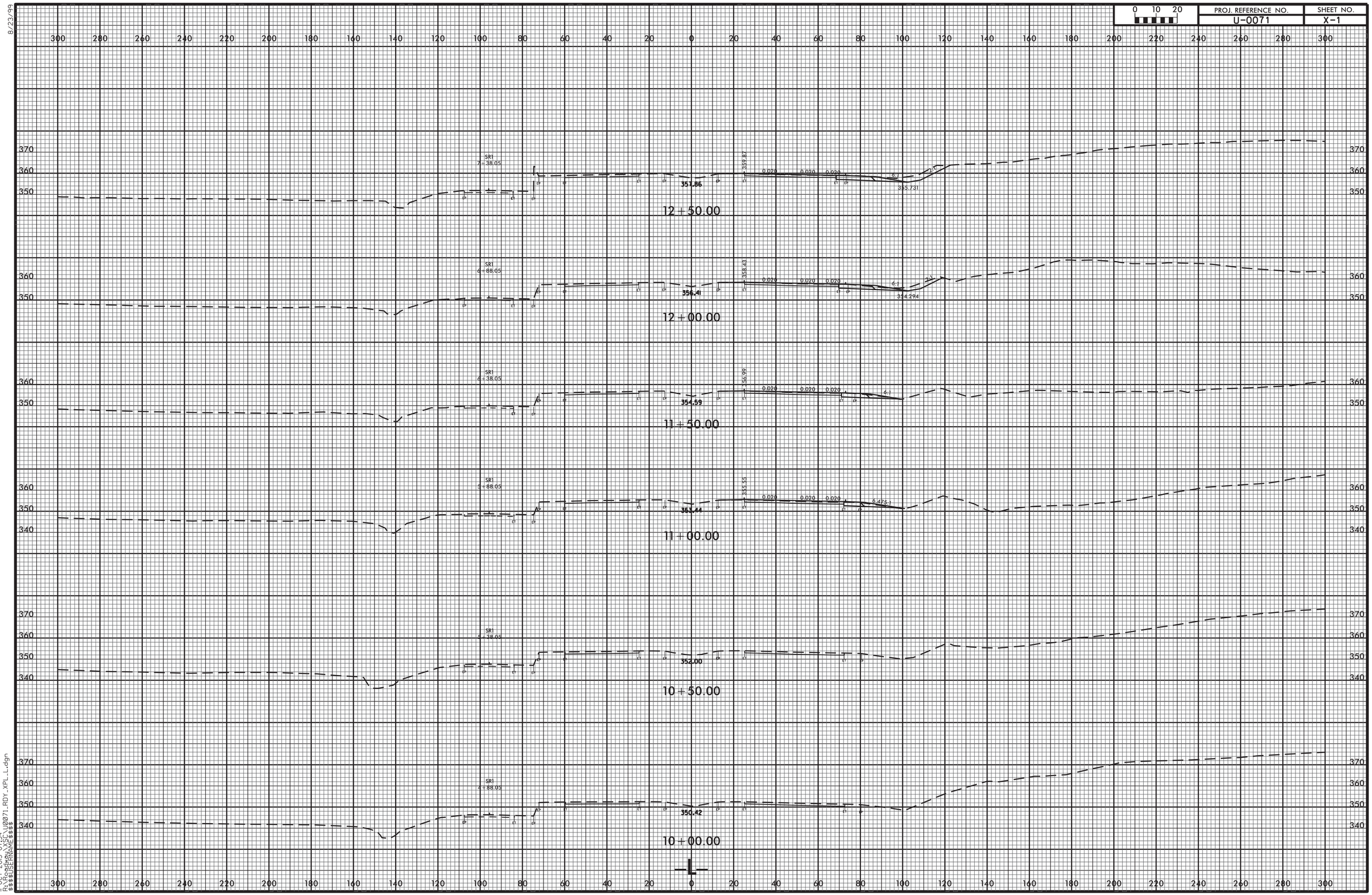
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PROJ. REFERENCE NO.
U-0071
SHEET NO.
X-1
SR1
7+38.05
357.86
359.87
0.020
0.020
0.020
6:1
355.731
12+50.00
SR1
6+88.05
356.41
358.43
0.020
0.020
0.020
6:1
354.294
12+00.00
SR1
6+38.05
354.59
356.99
0.020
0.020
0.020
6:1
11+50.00
SR1
5+88.05
353.44
355.55
0.020
0.020
0.020
6.475:1
11+00.00
SR1
5+38.05
352.00
10+50.00
SR1
4+88.05
350.42
10+00.00
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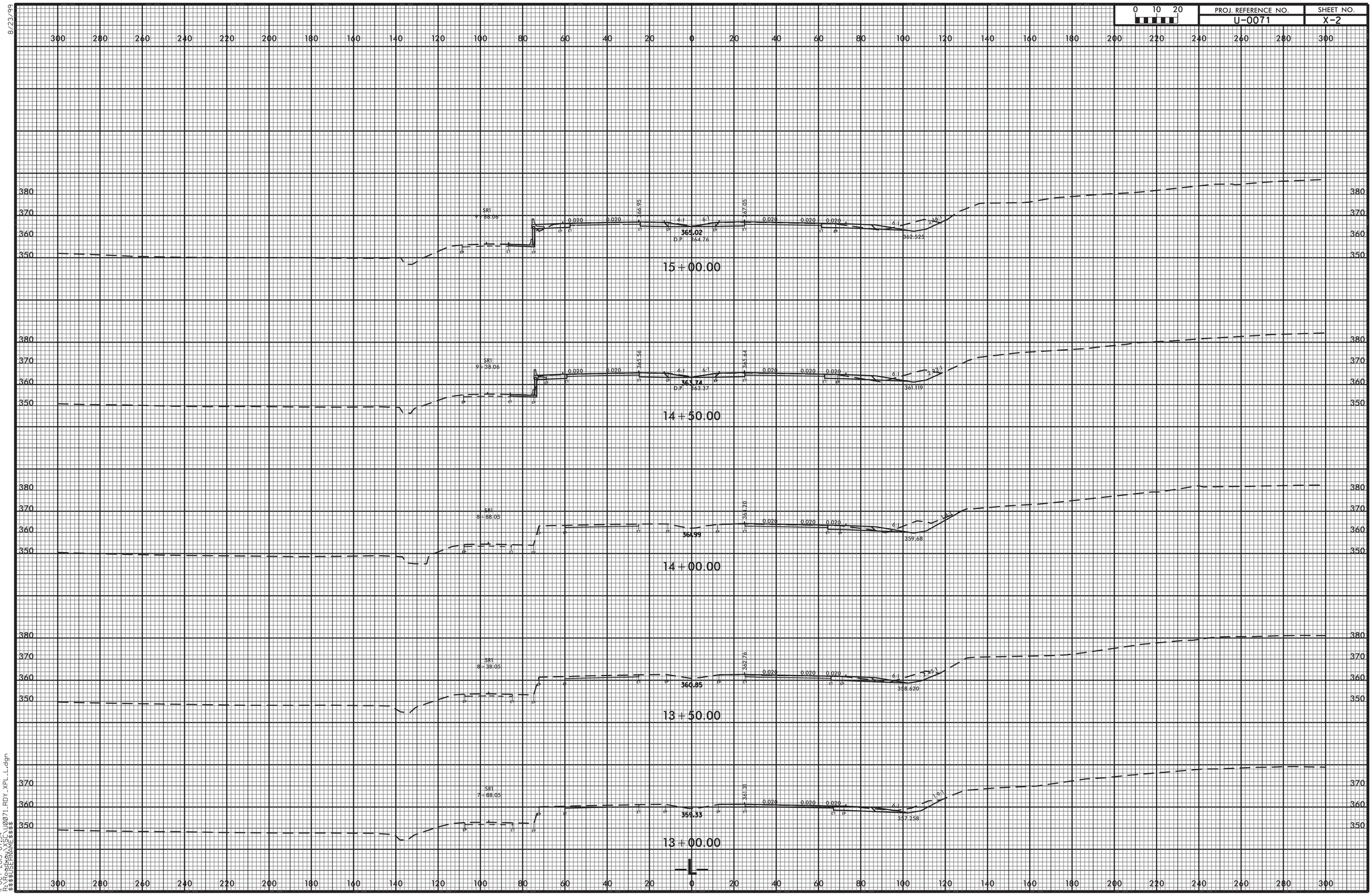


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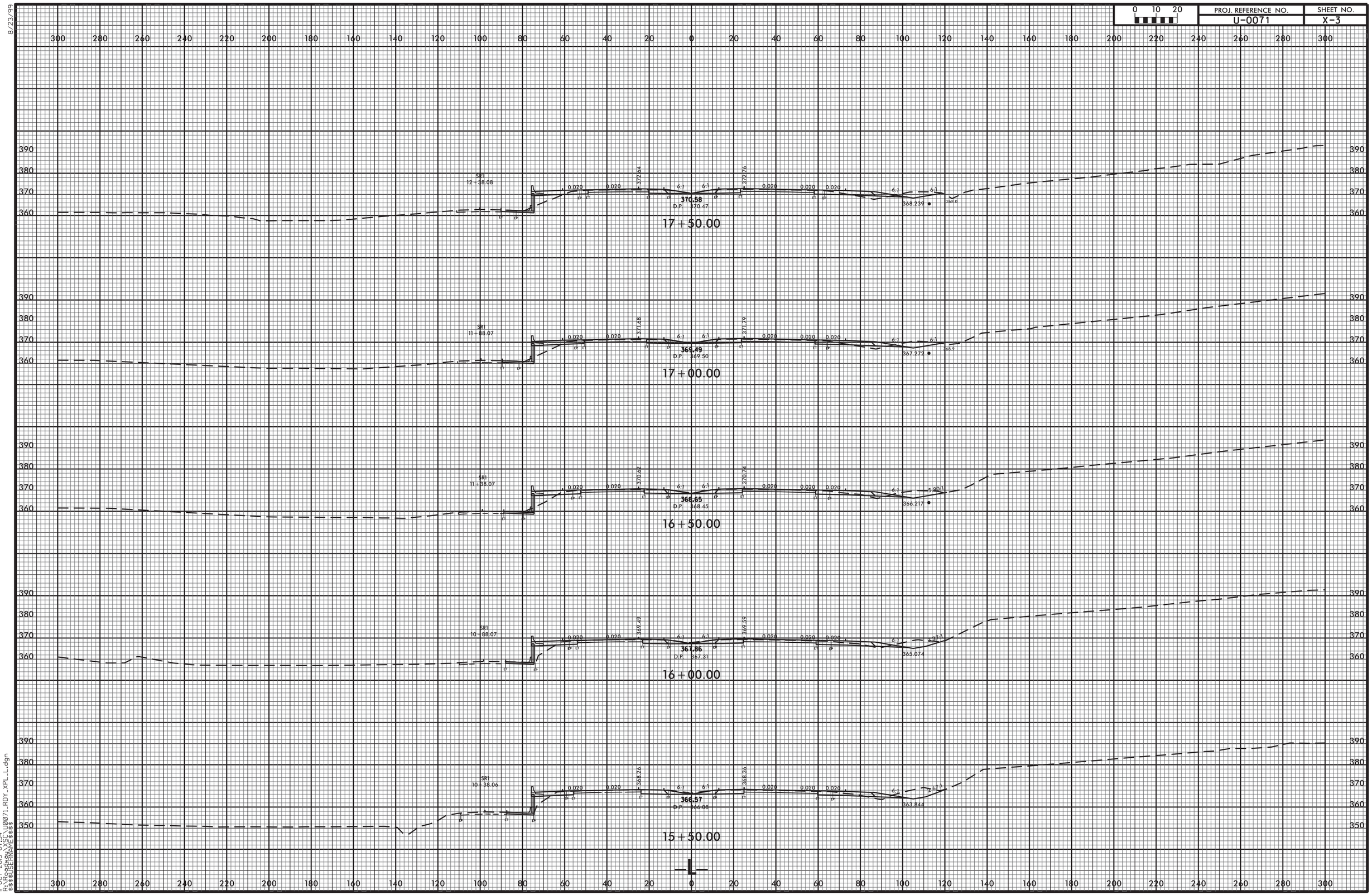


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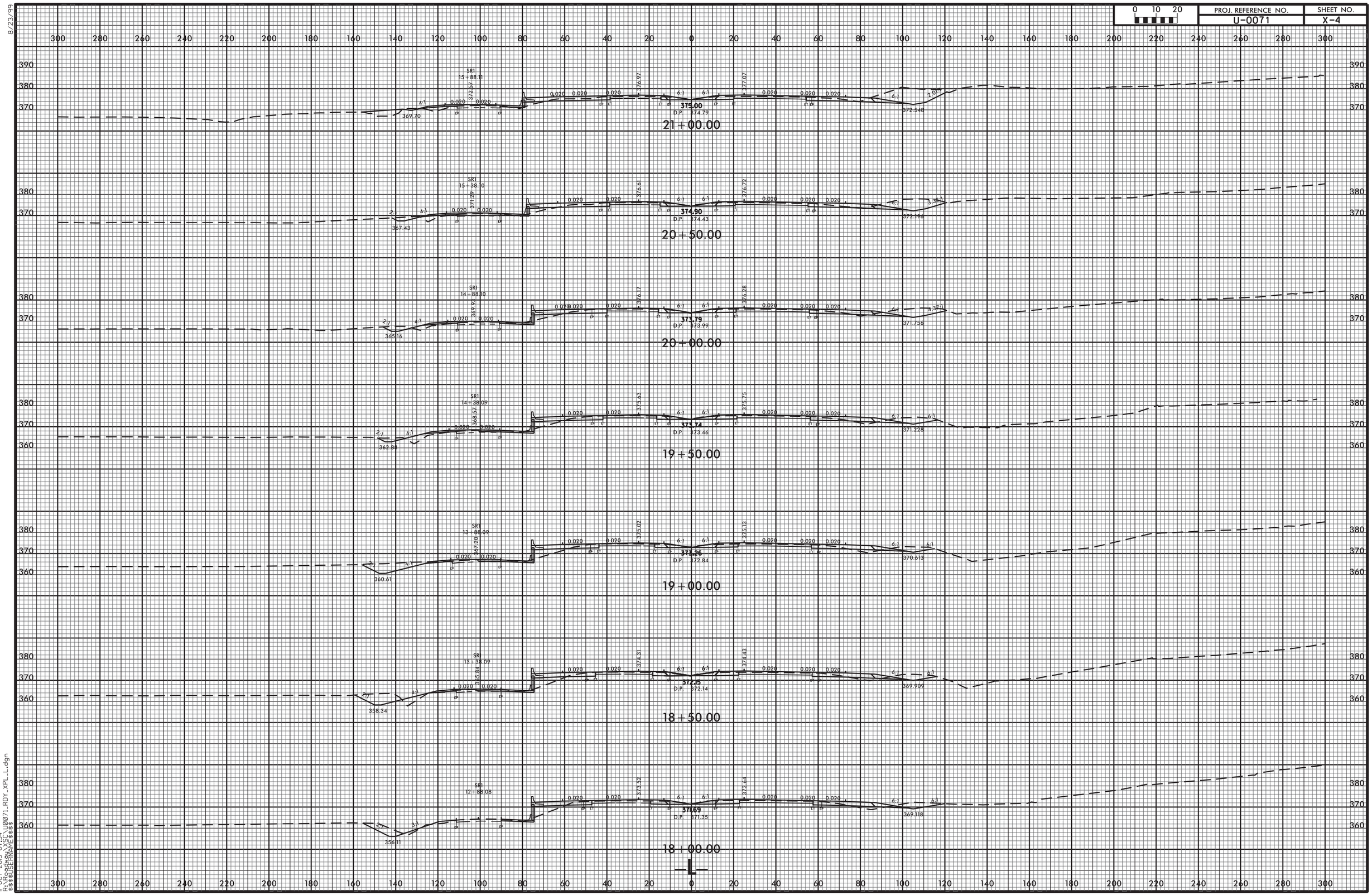


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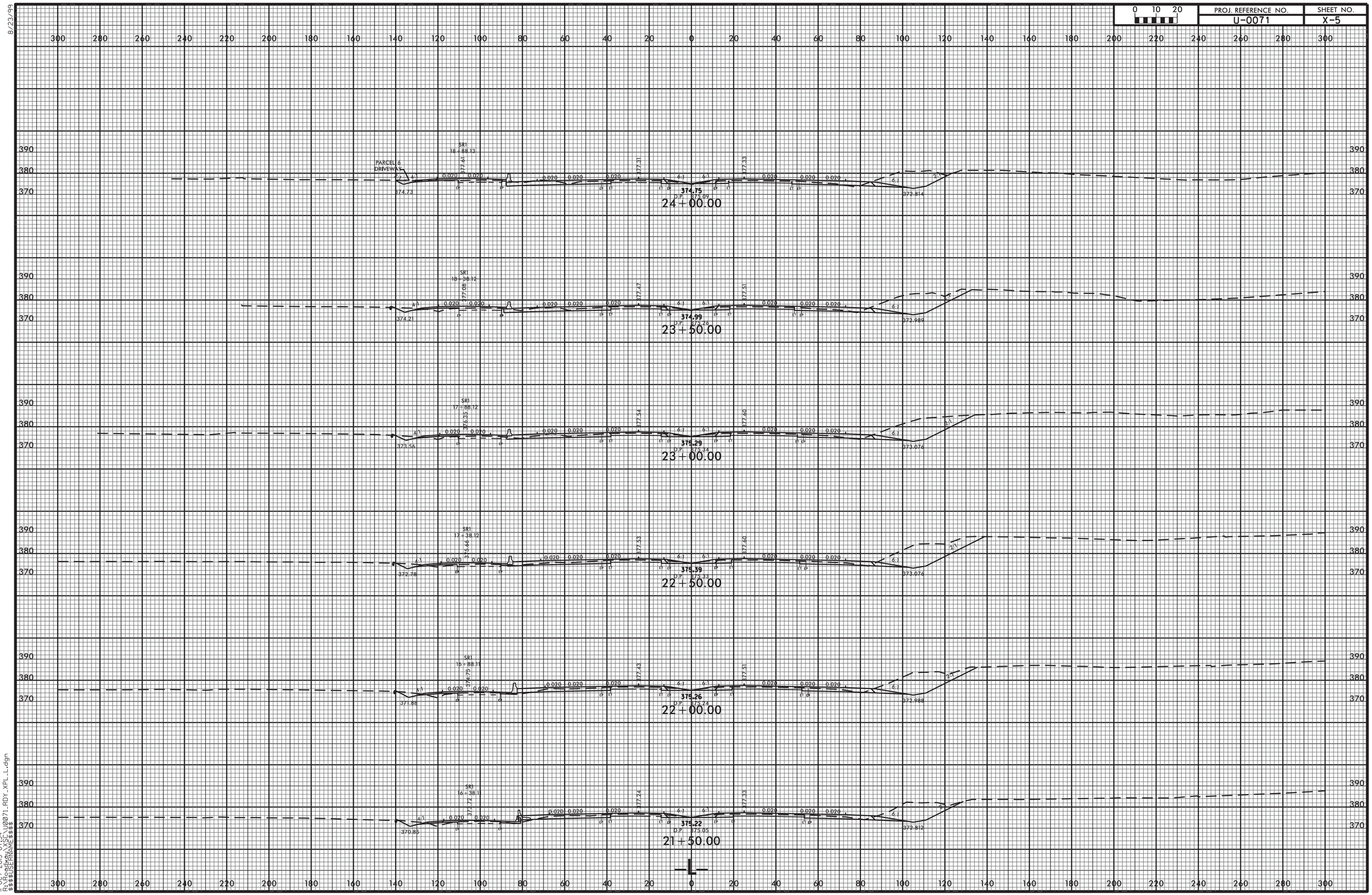


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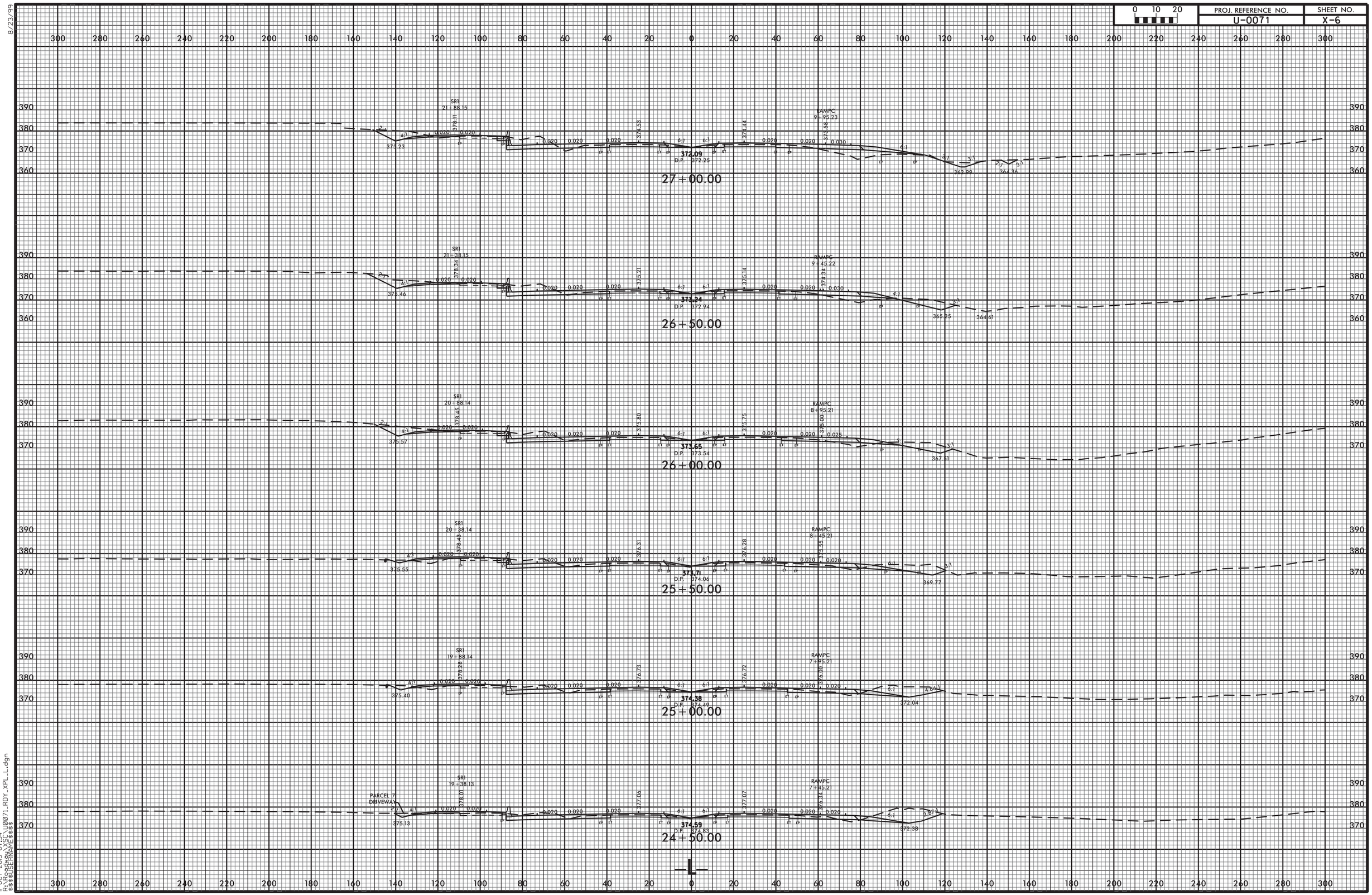


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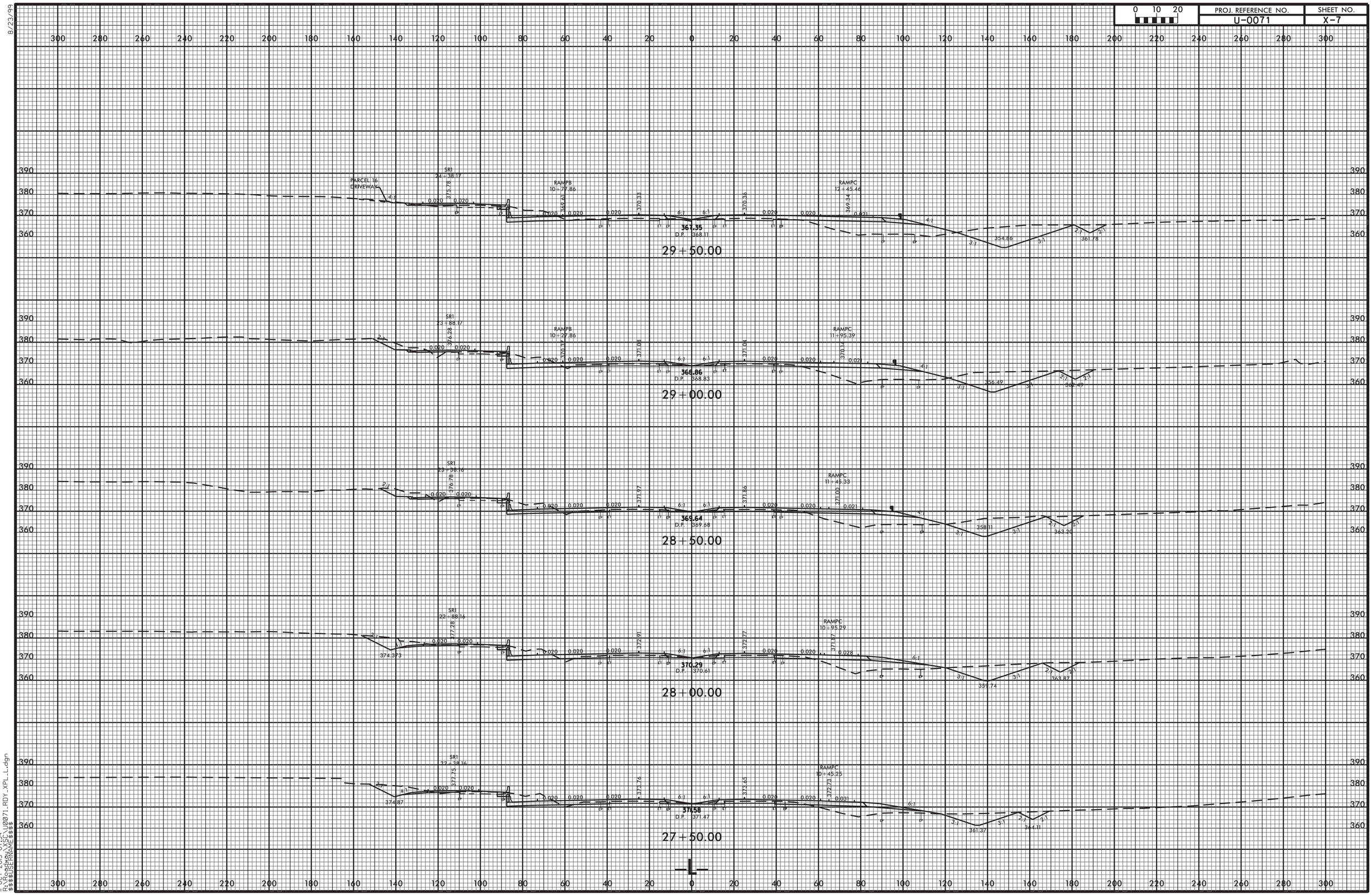


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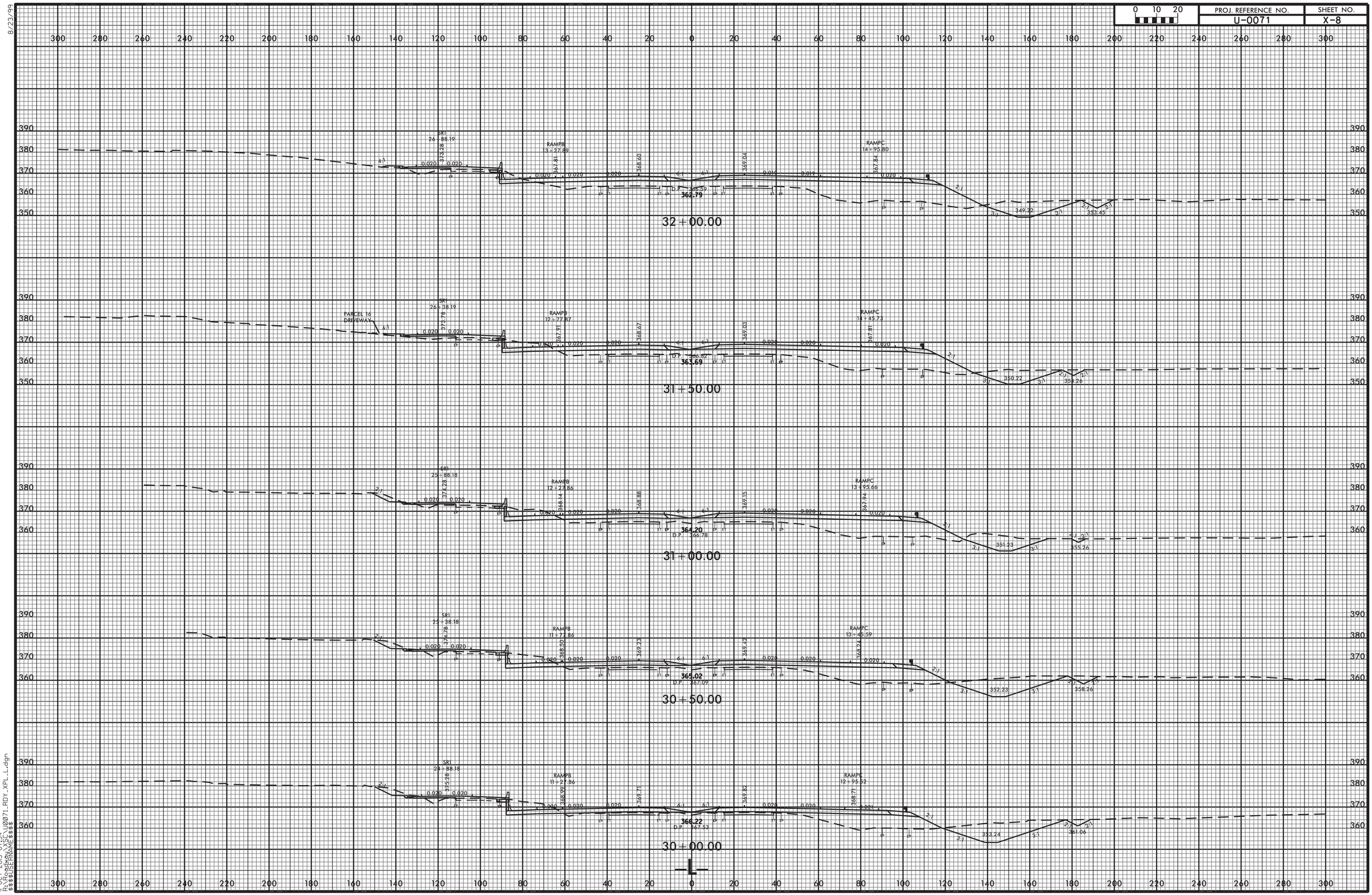


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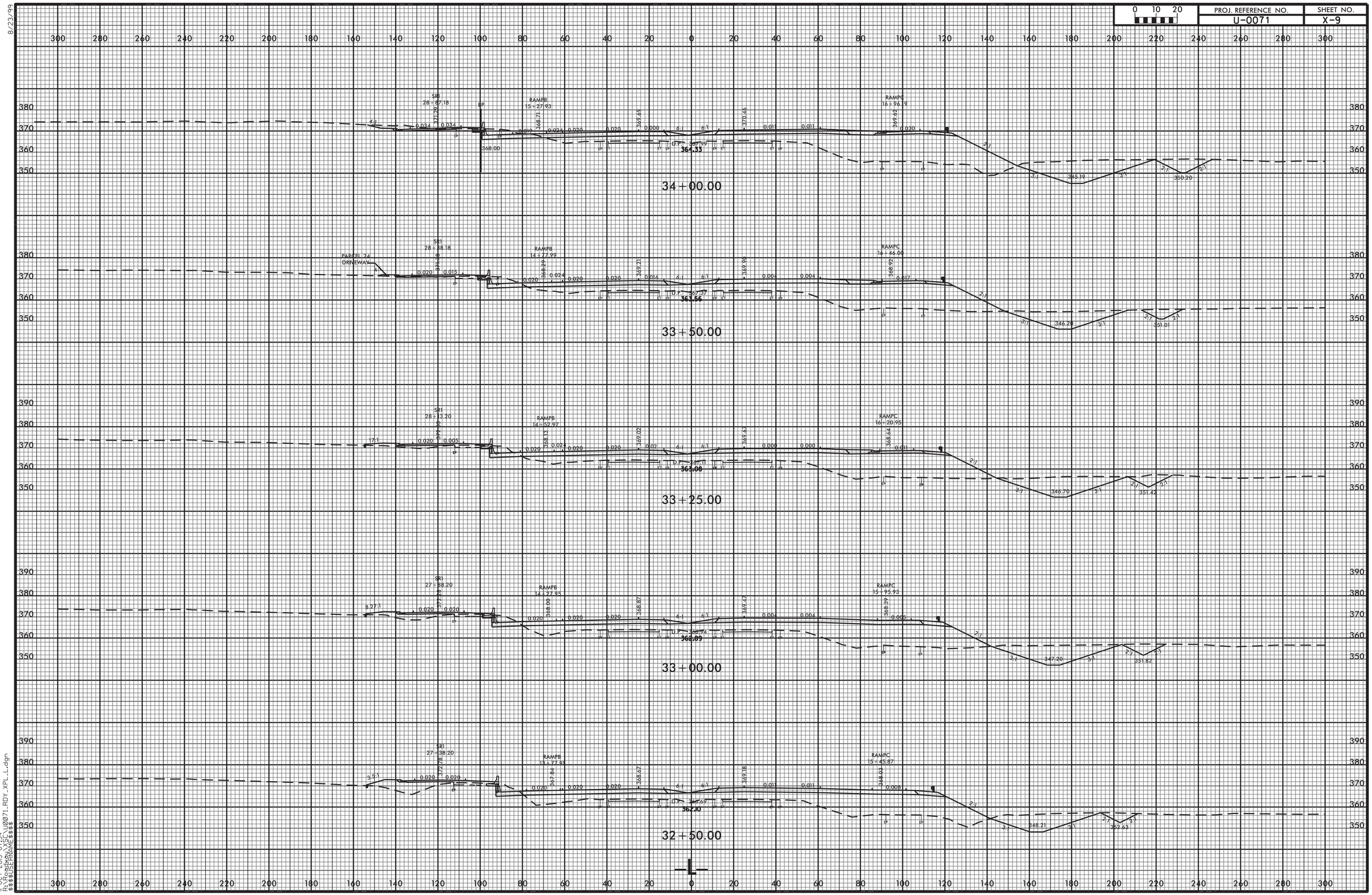


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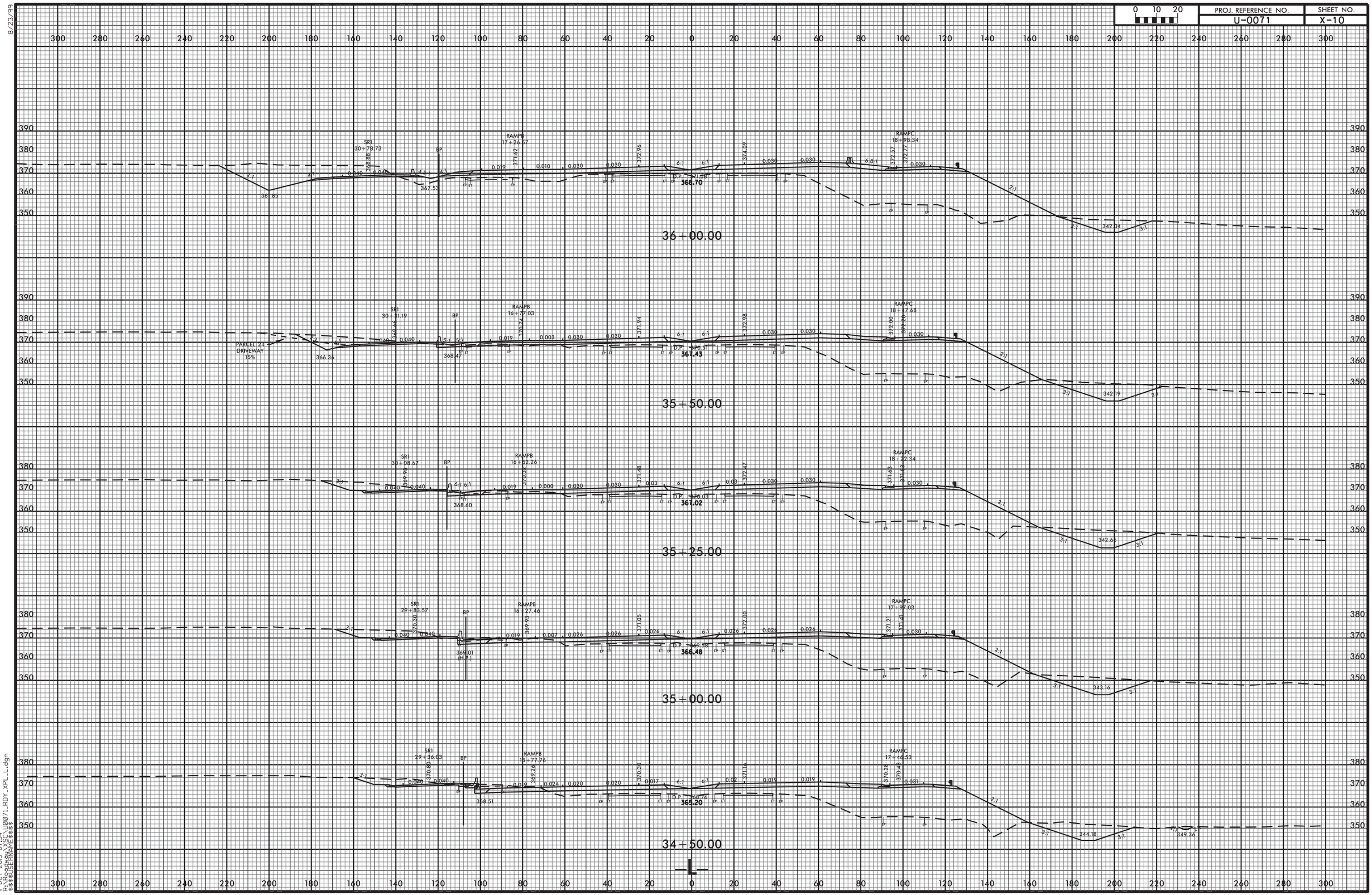


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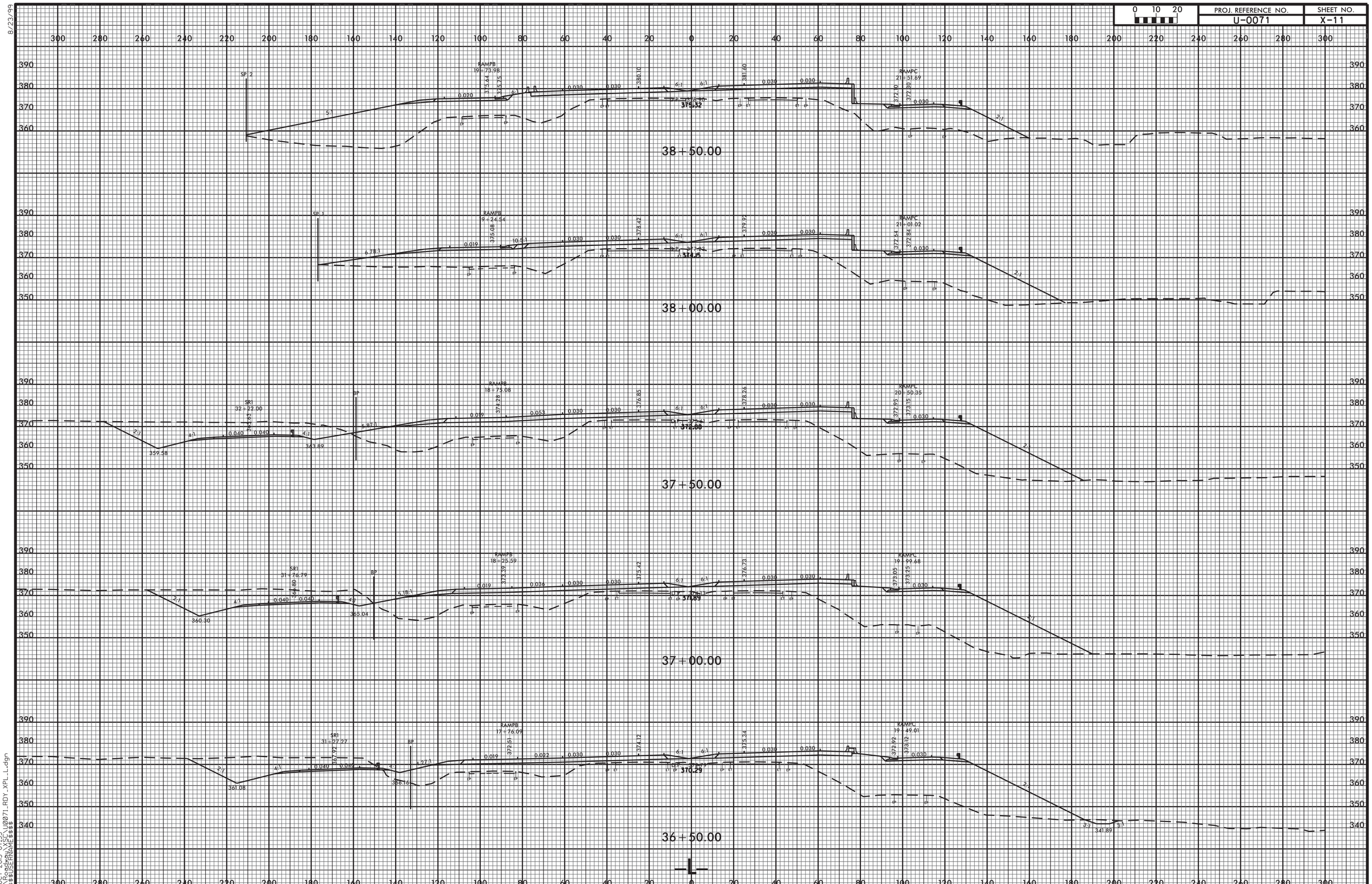


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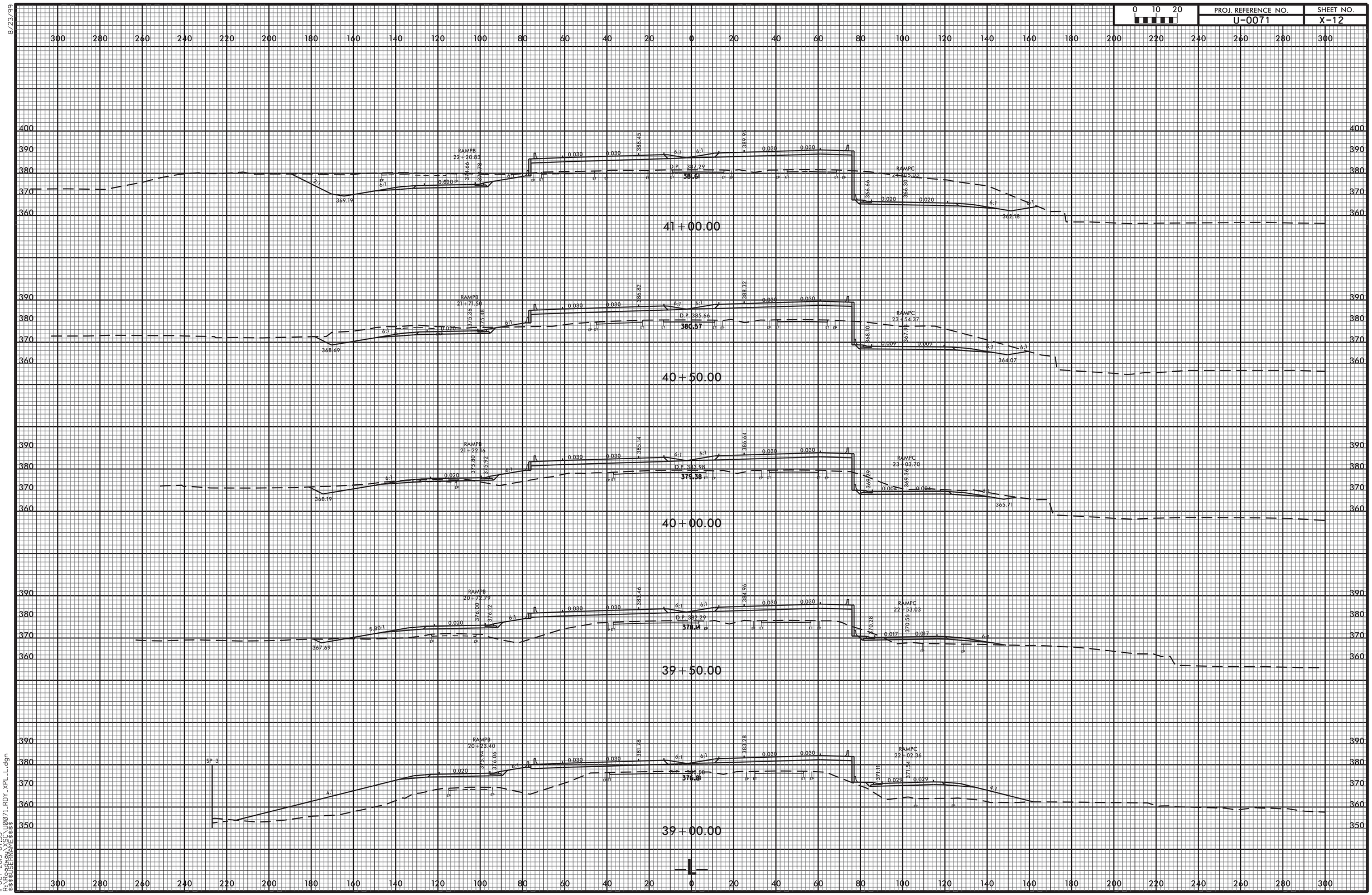


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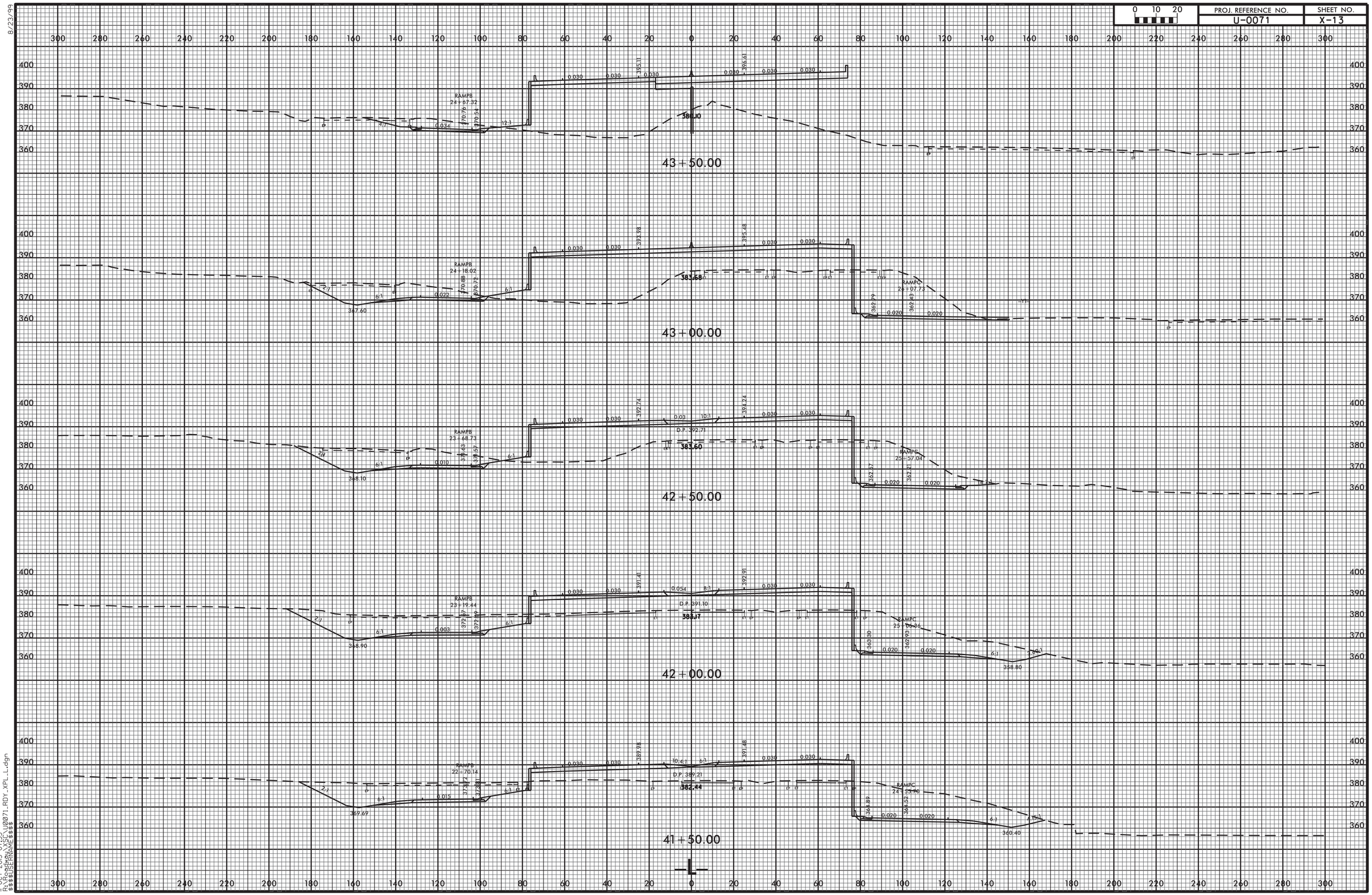


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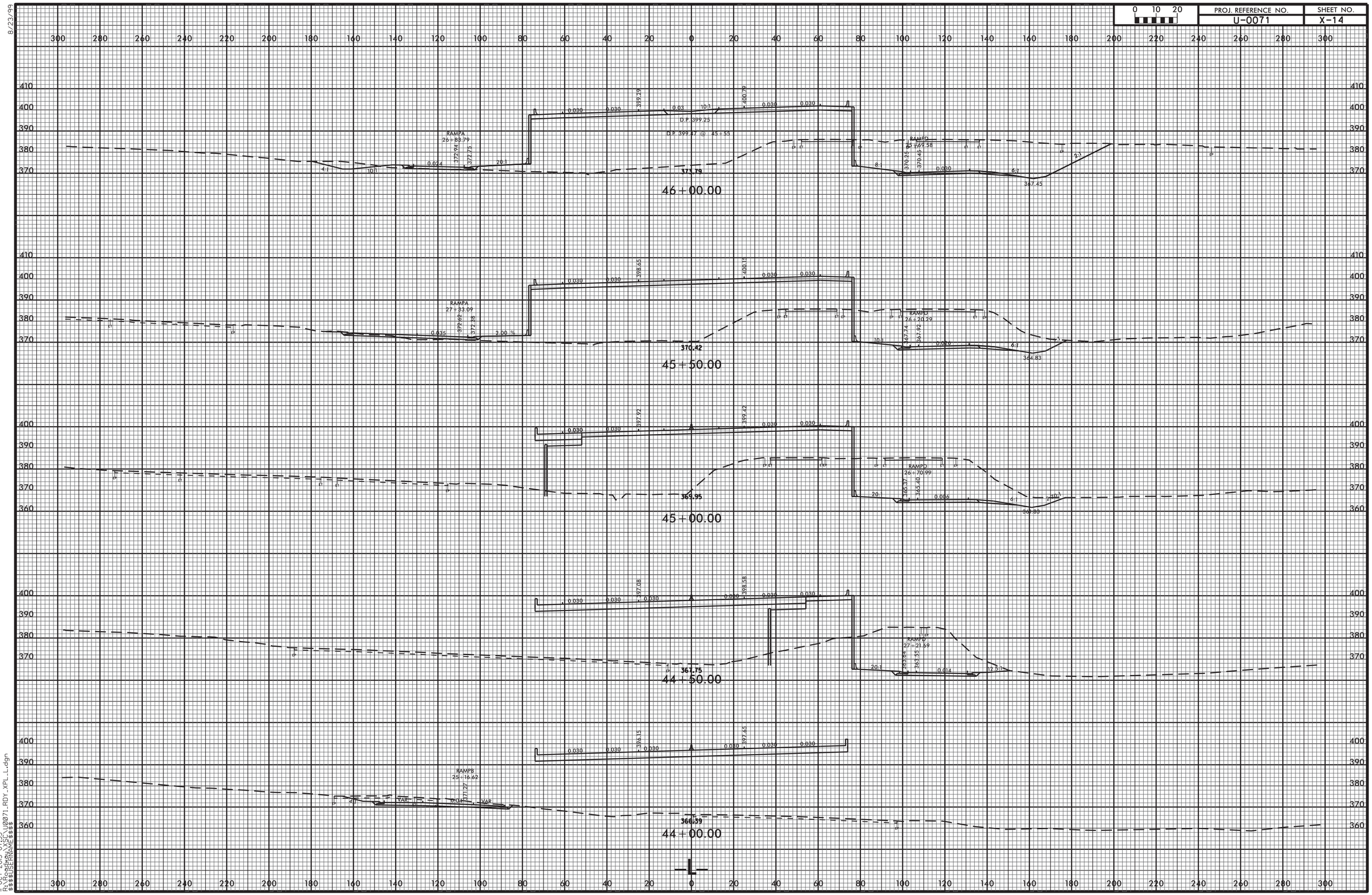


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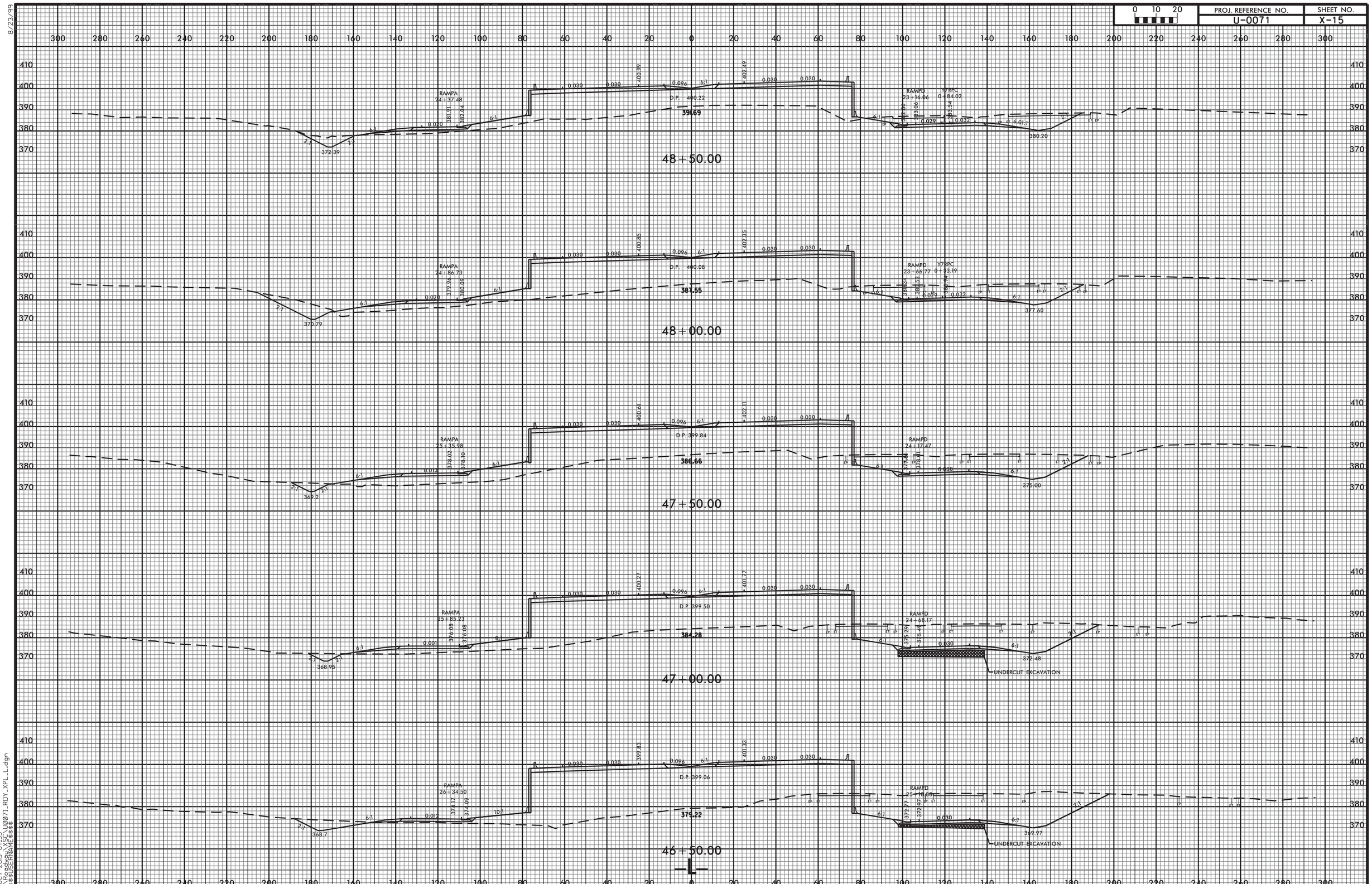


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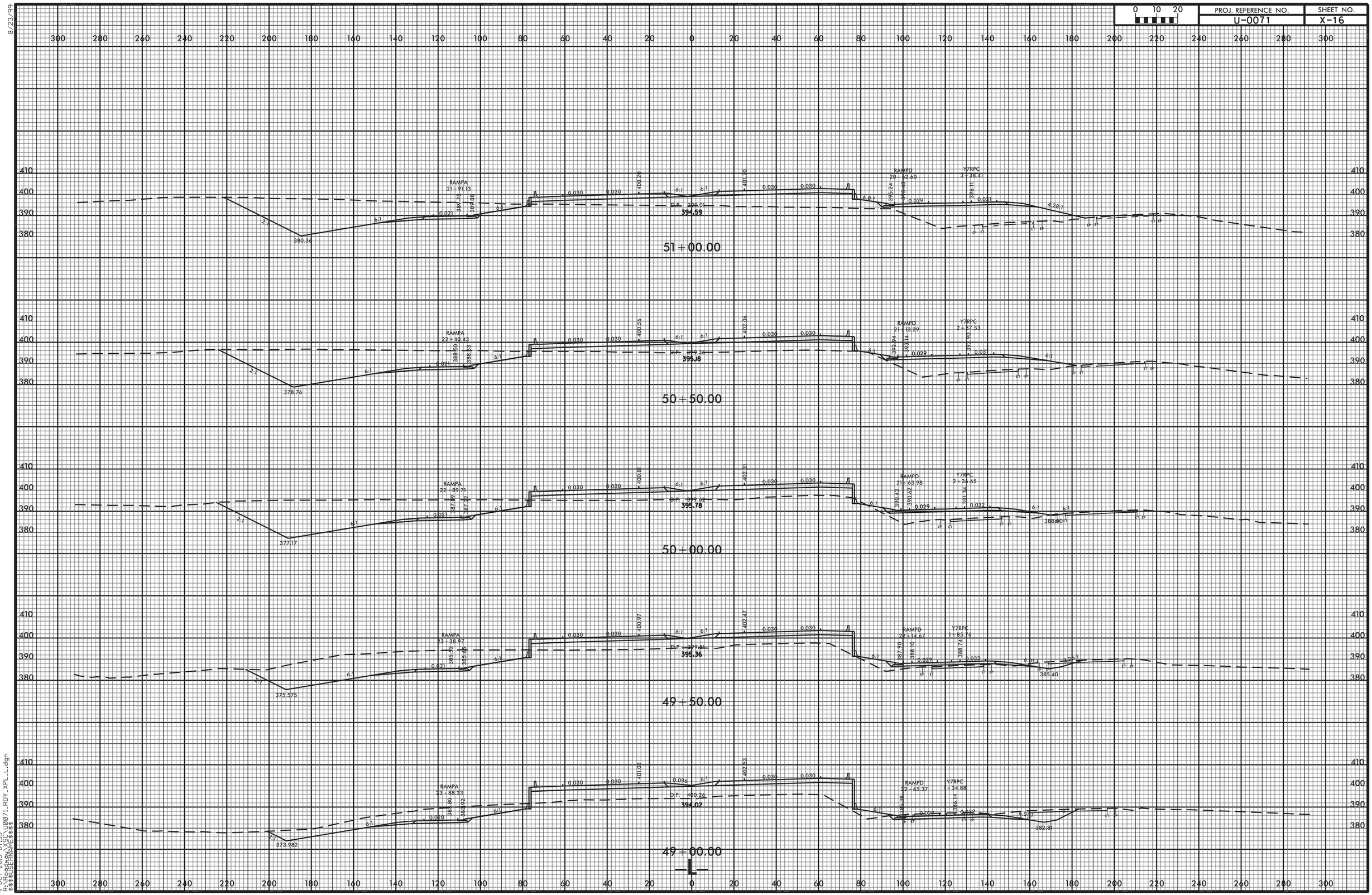


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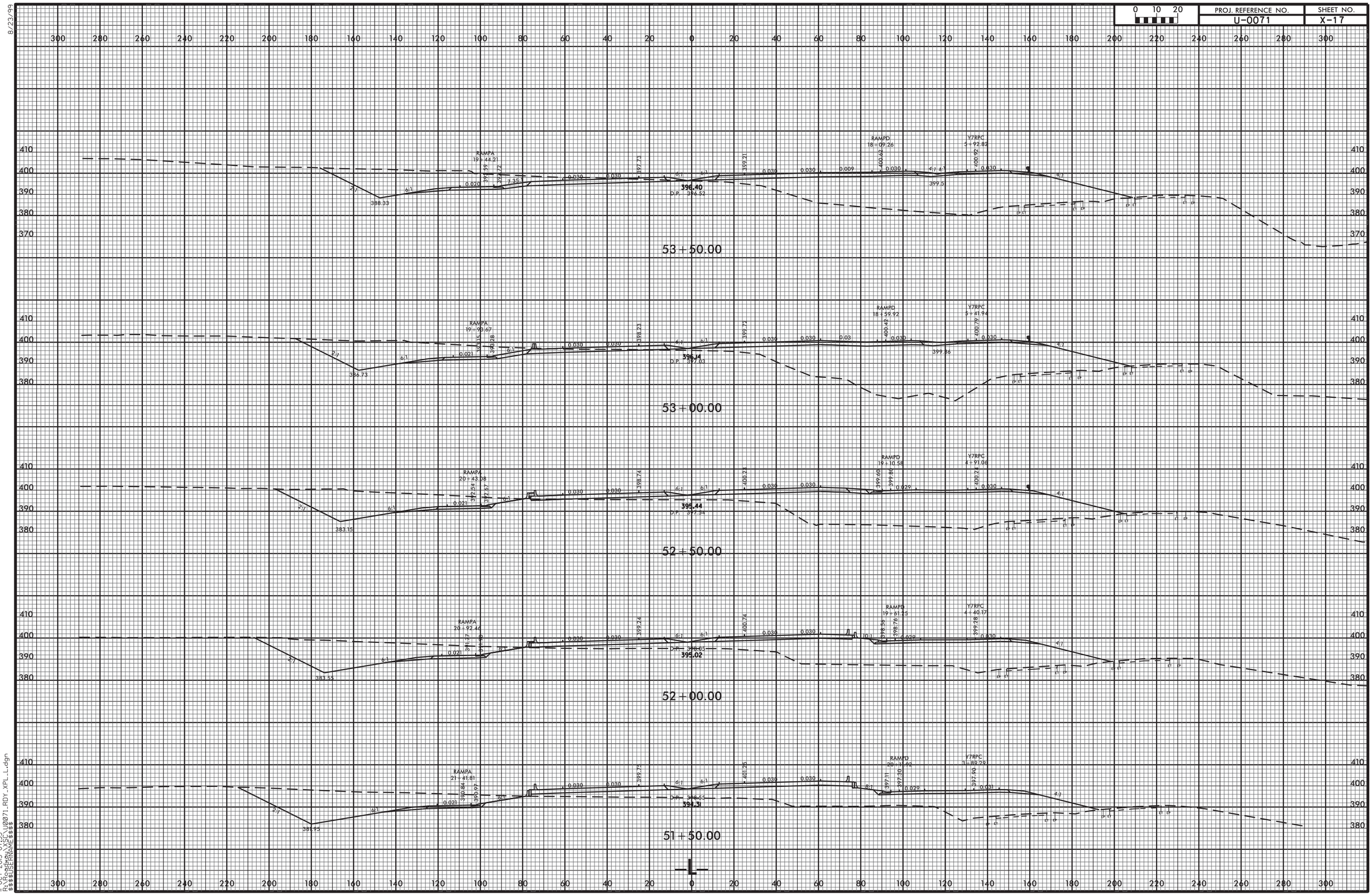


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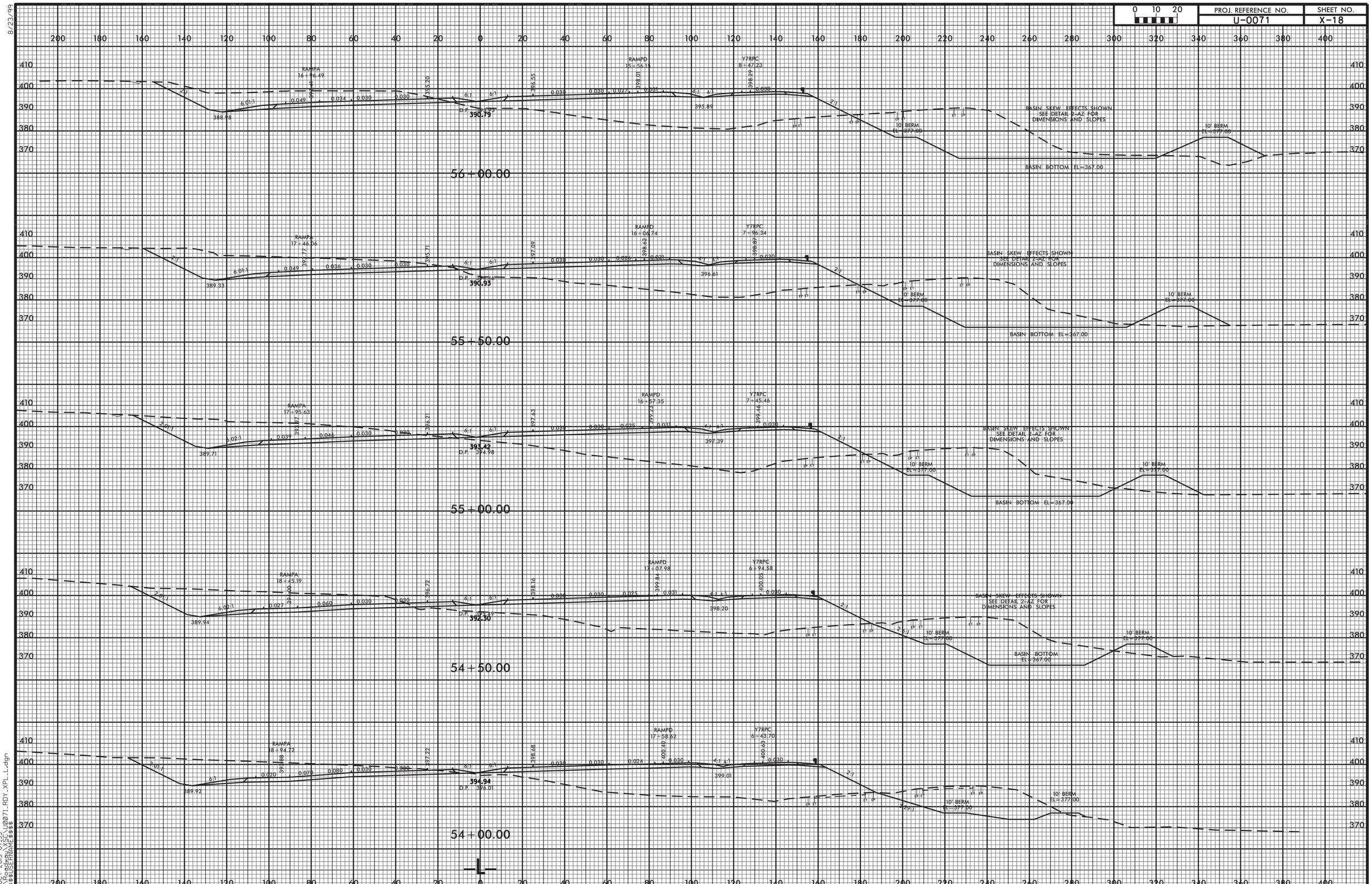


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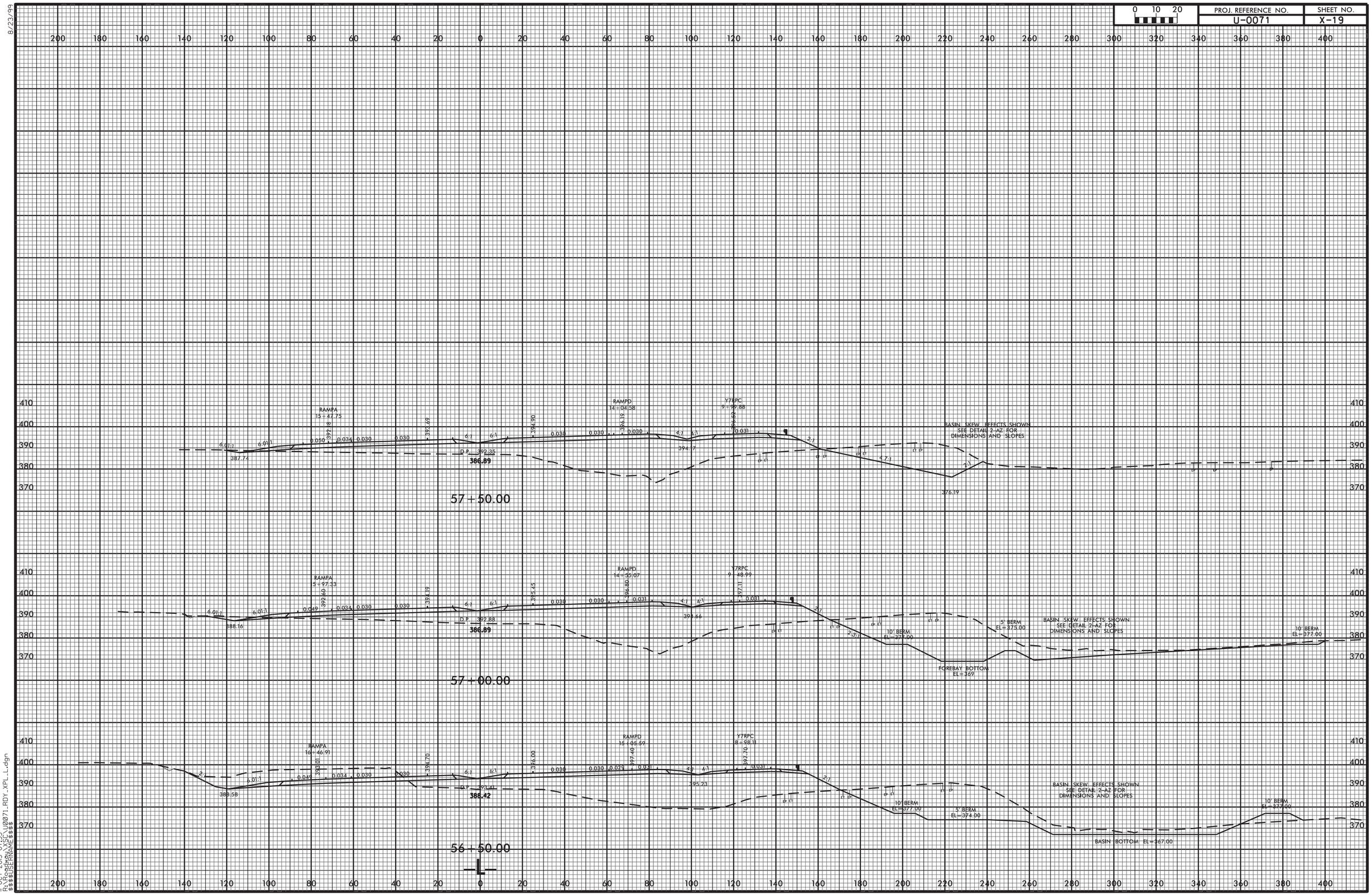


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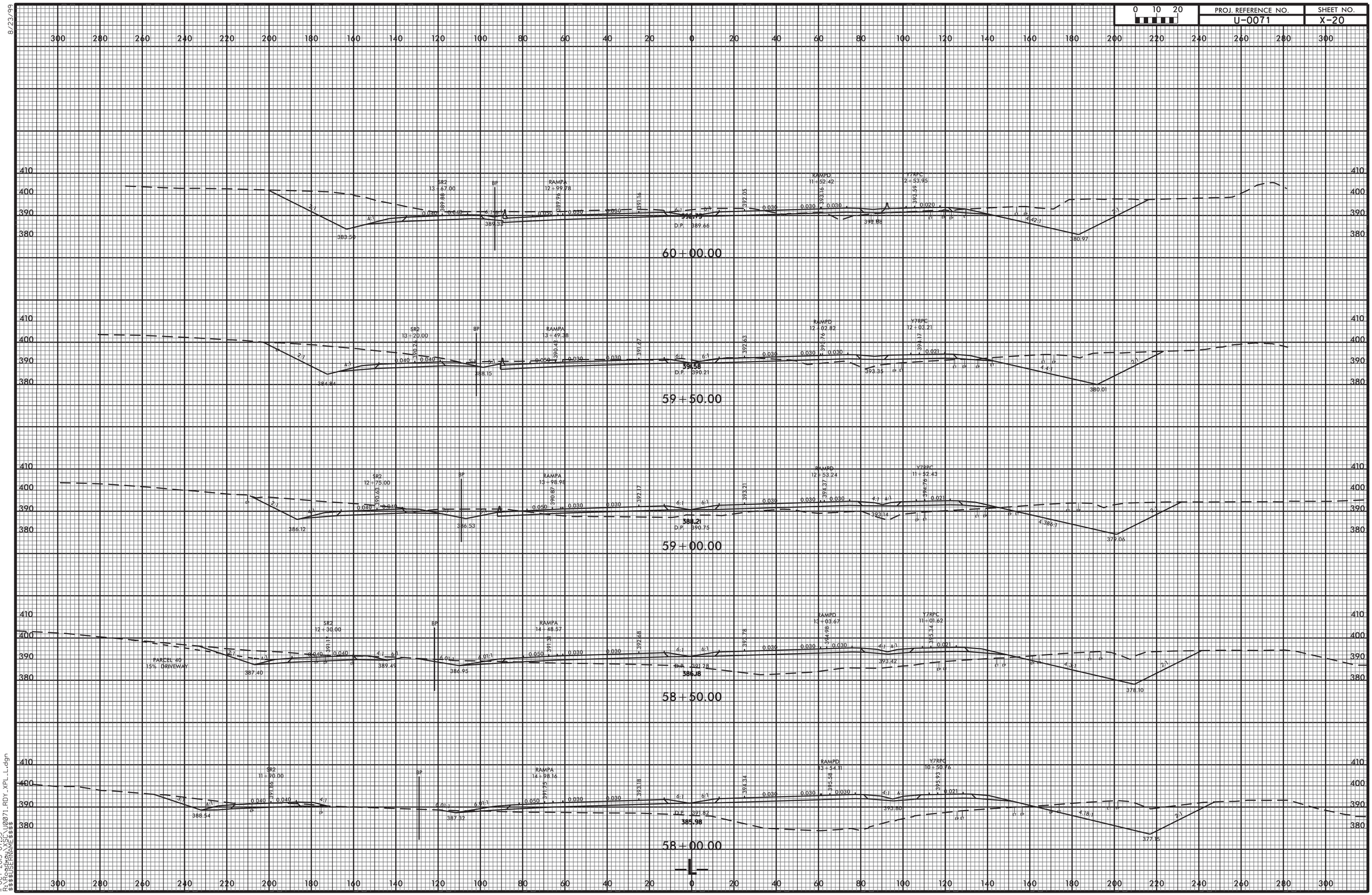
0 10 20

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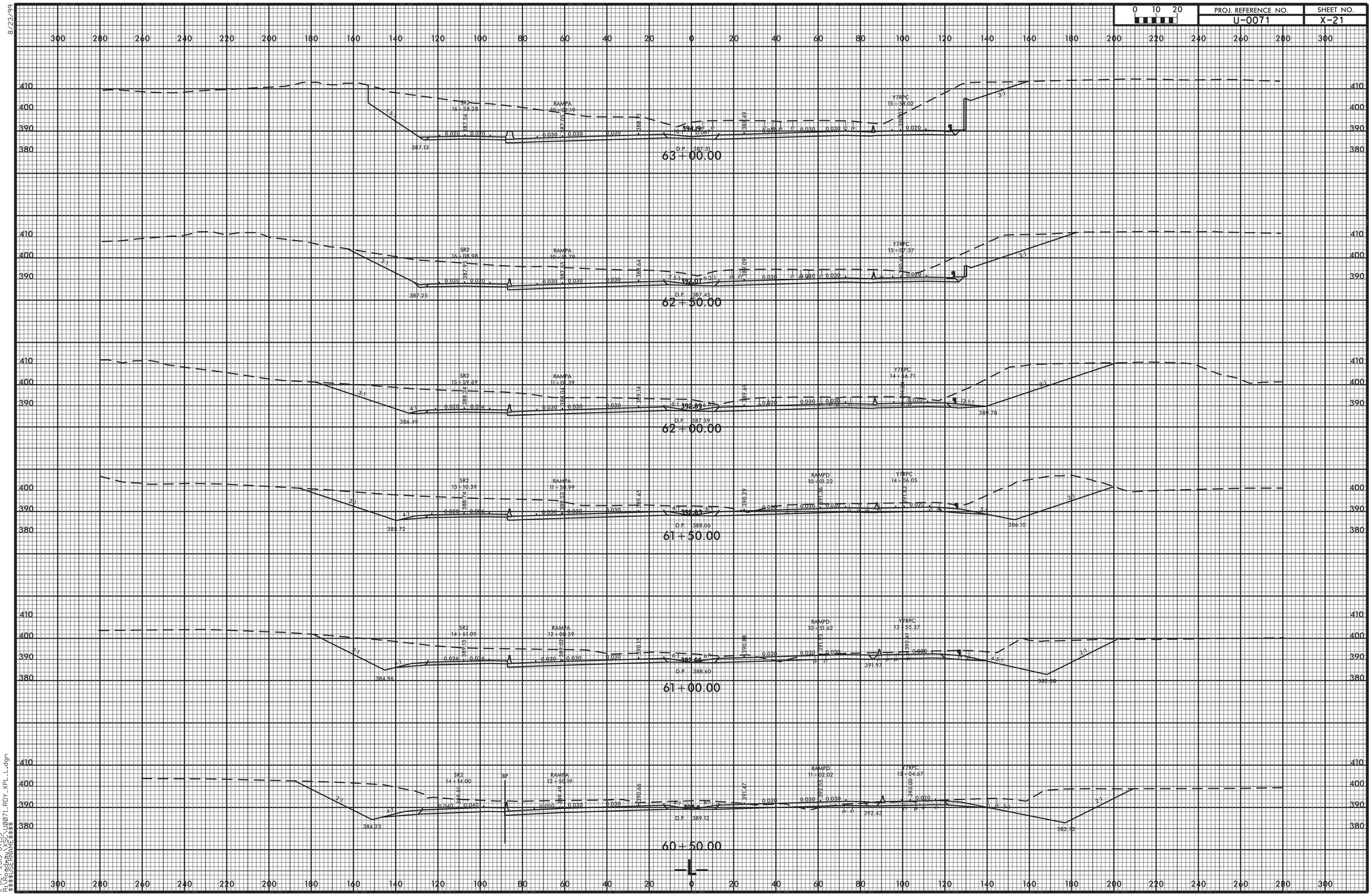


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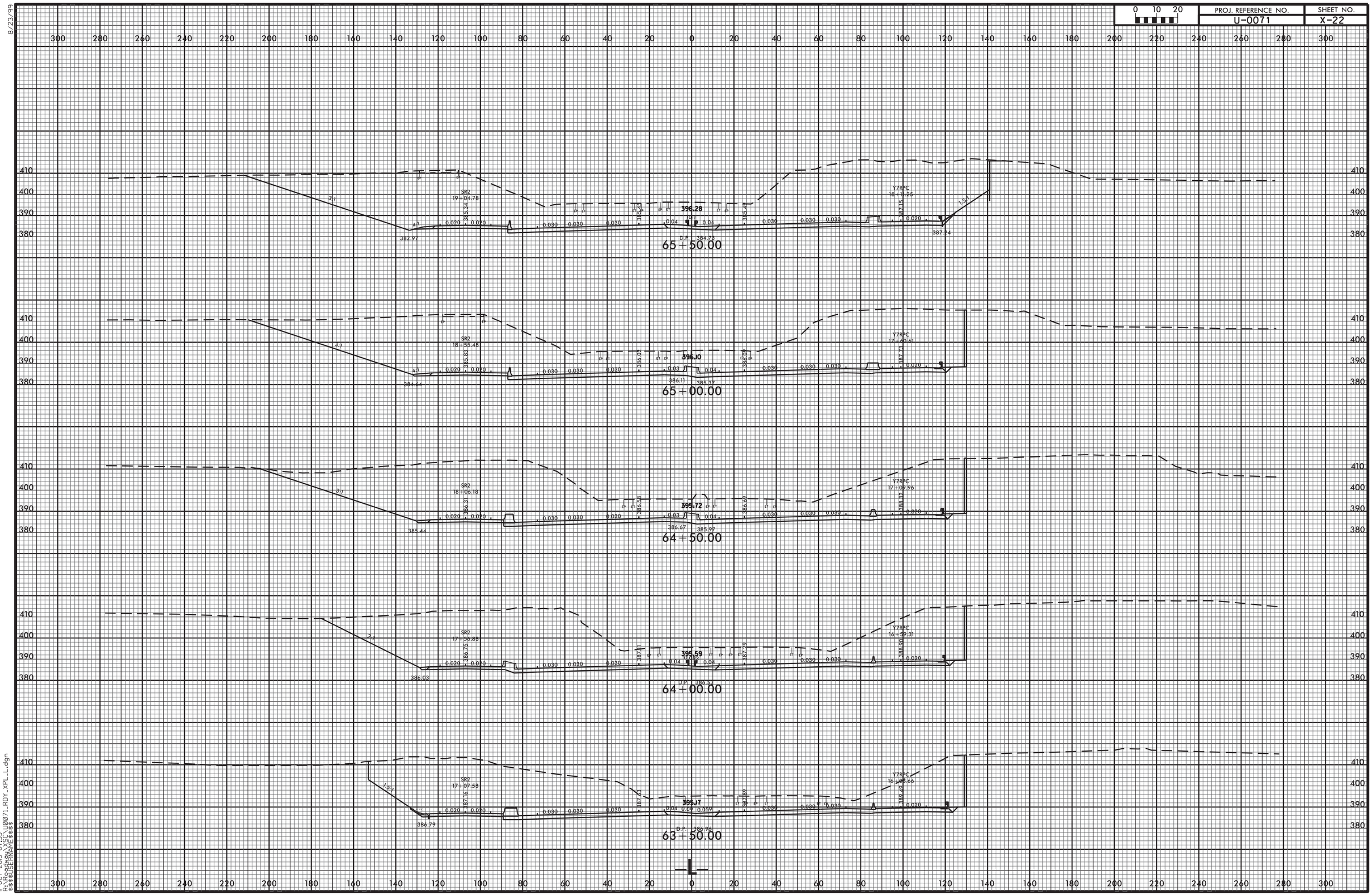


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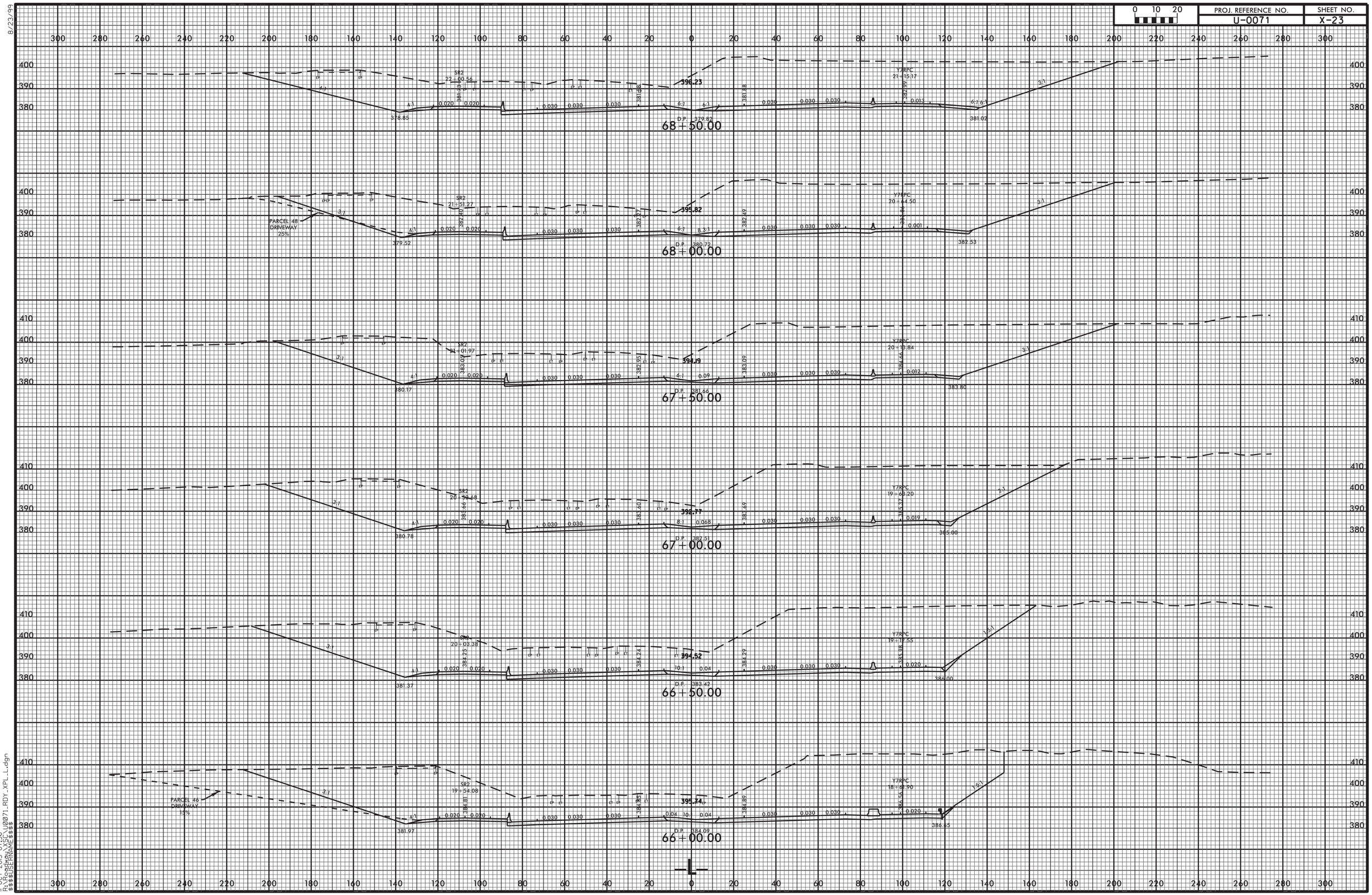


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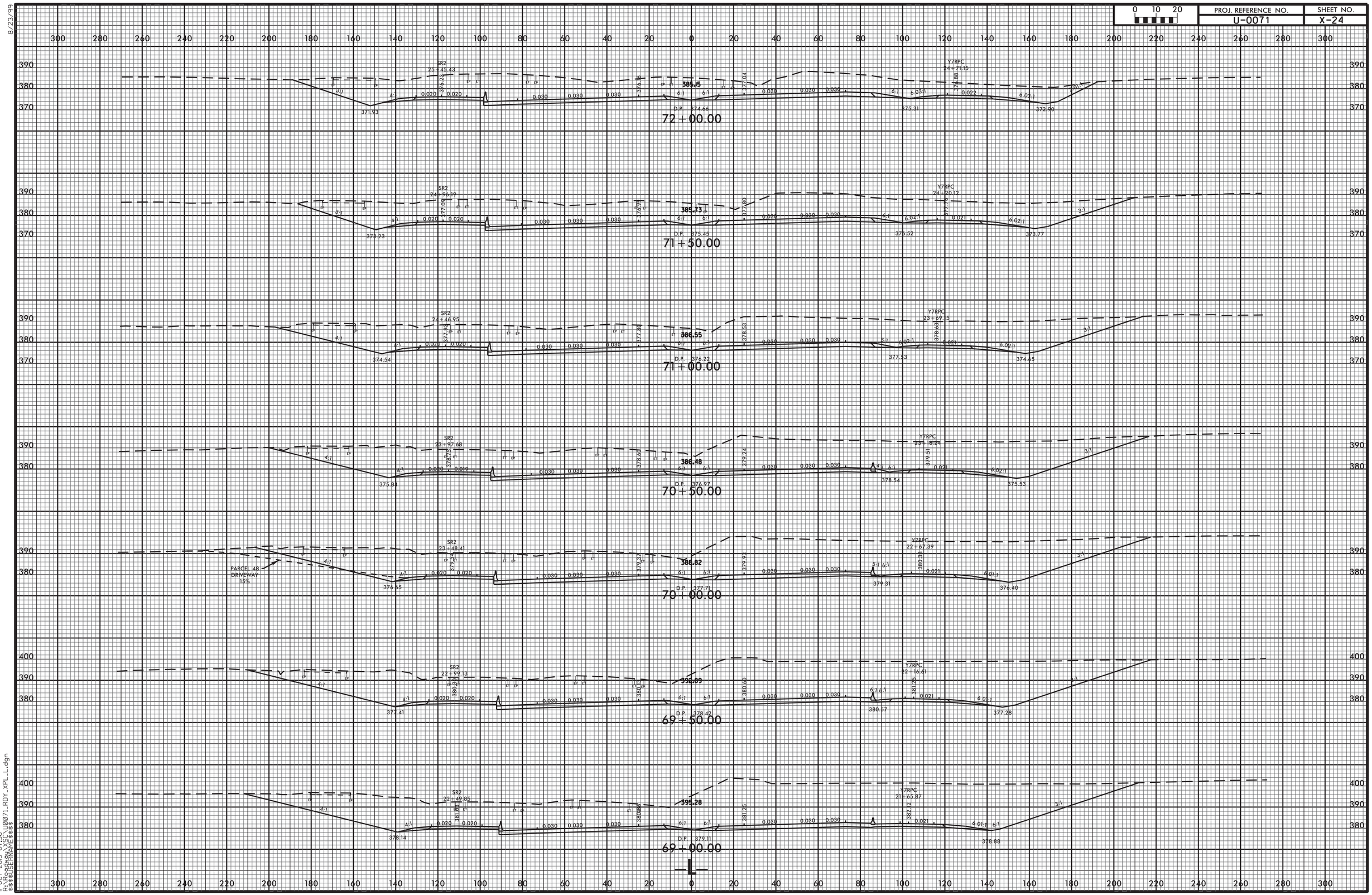


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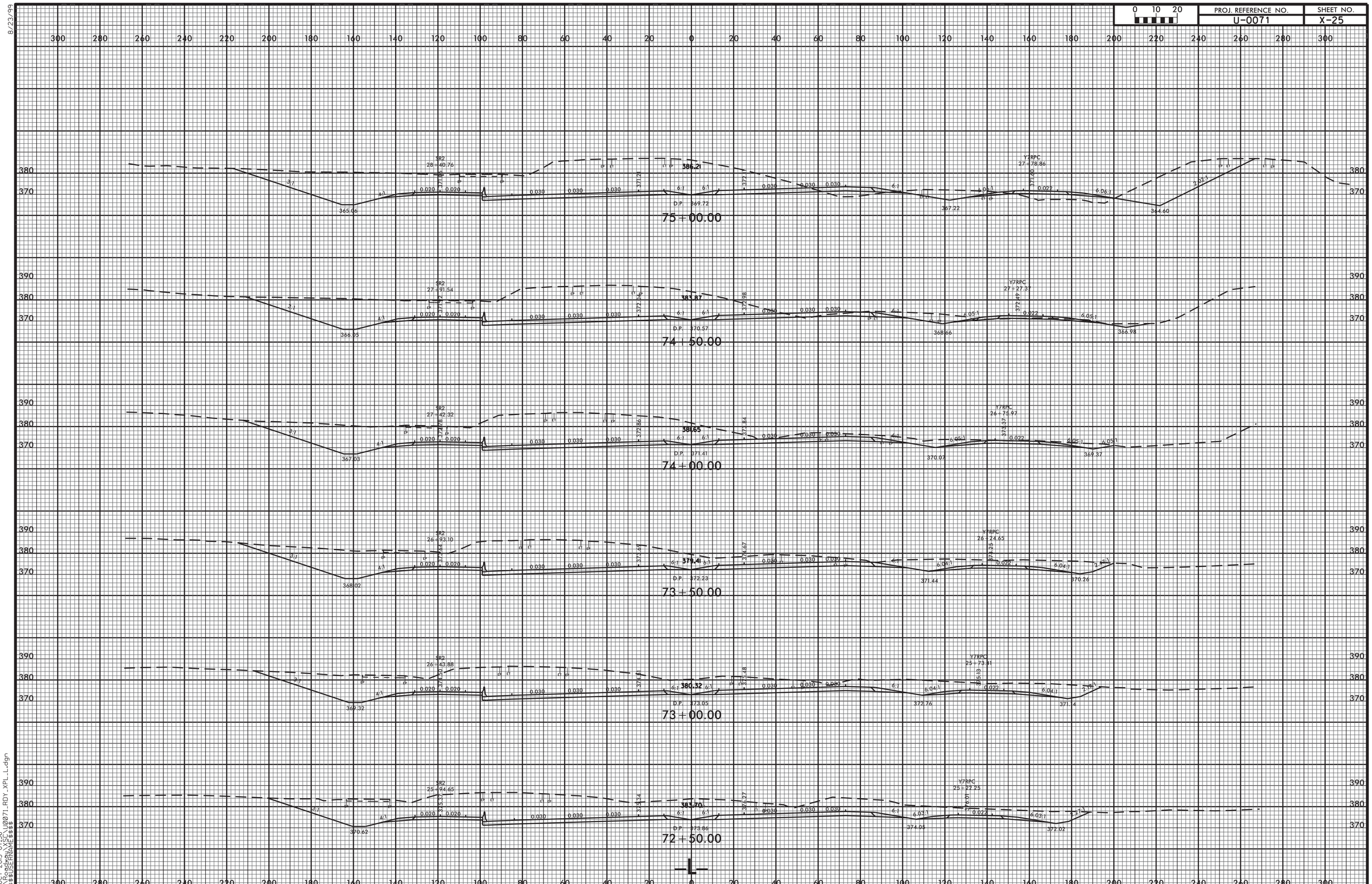
75+00.00
SR2
28+40.76
Y2RPC
27+78.86
386.21
D.P. 369.72
365.06
367.22
364.60
74+50.00
SR2
27+91.54
Y7RPC
27+27.37
383.87
D.P. 370.57
366.05
368.66
366.98
74+00.00
SR2
27+42.32
Y7RPC
26+75.97
381.65
D.P. 371.41
367.03
370.07
369.37
73+50.00
SR2
26+93.10
Y7RPC
26+24.65
379.41
D.P. 372.23
368.02
371.44
370.26
73+00.00
SR2
26+43.88
Y7RPC
25+73.41
380.32
D.P. 373.05
369.32
372.76
371.4
72+50.00
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383.70
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370.62
374.05
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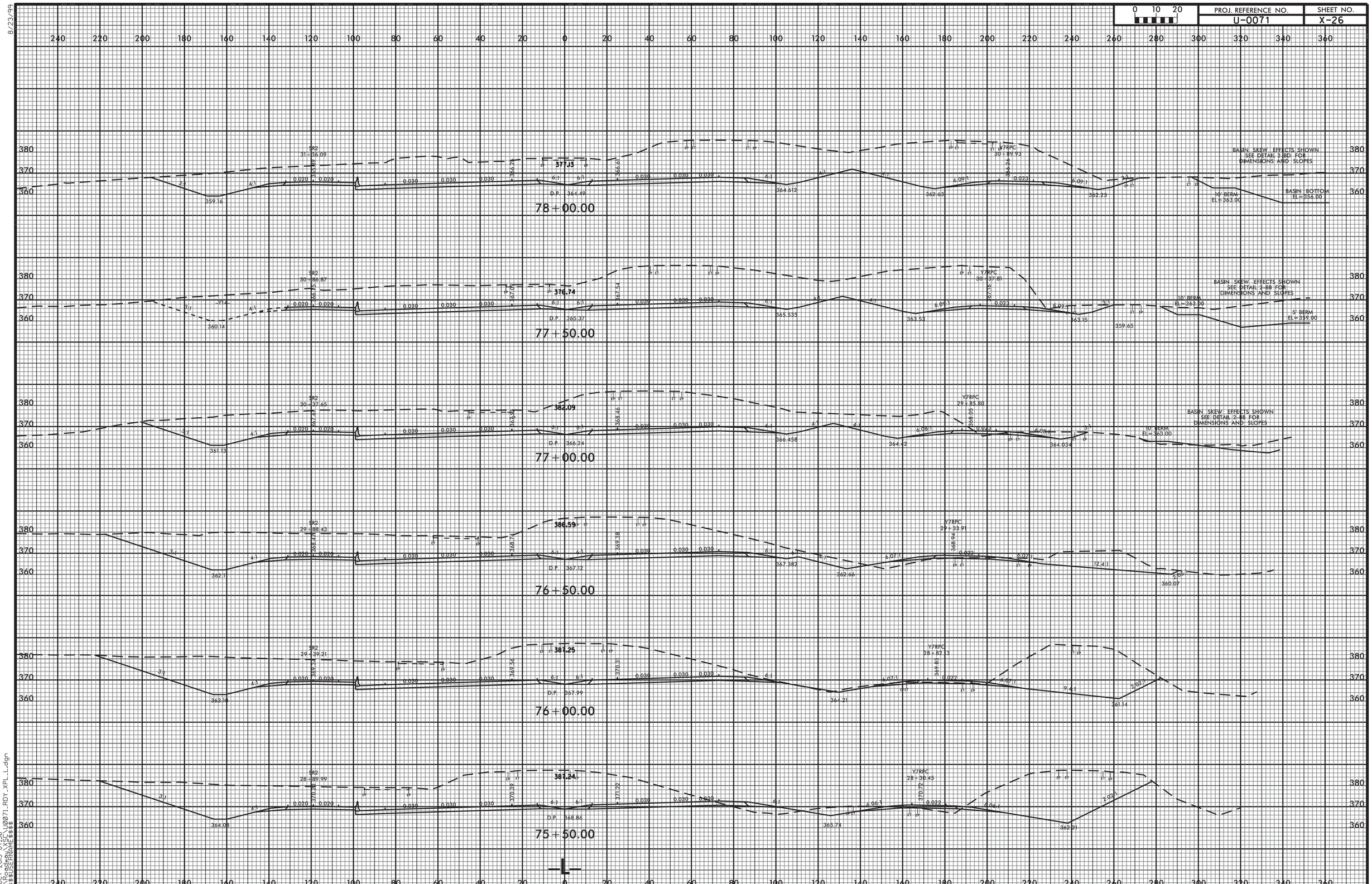
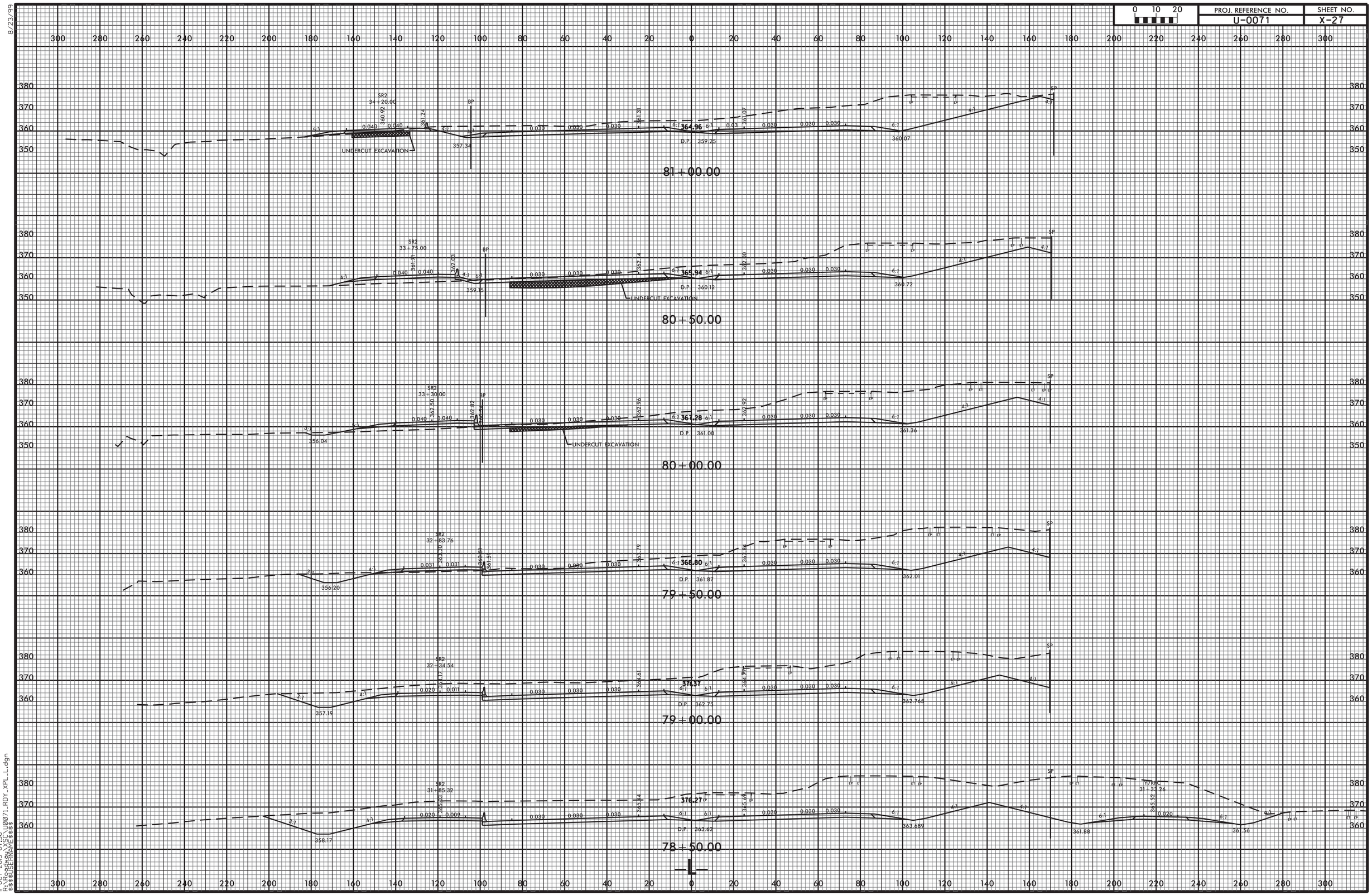

78+00.00
SR2 31+36.09
377.13
D.P. 364.49
Y7RPC 30+87.93
BASIN SKEW EFFECTS SHOWN SEE DETAIL 2-BB FOR DIMENSIONS AND SLOPES
10' BERM EL=363.00
BASIN BOTTOM EL=356.00
77+50.00
SR2 30+86.87
376.74
D.P. 365.37
Y7RPC 30+87.81
BASIN SKEW EFFECTS SHOWN SEE DETAIL 2-BB FOR DIMENSIONS AND SLOPES
10' BERM EL=363.00
5' BERM EL=359.00
77+00.00
SR2 30+37.65
382.09
D.P. 366.24
Y7RPC 29+85.80
BASIN SKEW EFFECTS SHOWN SEE DETAIL 2-BB FOR DIMENSIONS AND SLOPES
10' BERM EL=363.00
76+50.00
SR2 29+88.43
386.59
D.P. 367.12
Y7RPC 29+33.91
76+00.00
SR2 29+39.21
387.25
D.P. 367.99
Y7RPC 28+82.3
75+50.00
SR2 28+89.99
387.24
D.P. 368.86
Y7RPC 28+30.45
-L-


SR2
34+26.00
BP
SP
UNDERCUT EXCAVATION
364.96
D.P. 359.25
81+00.00
SR2
33+75.00
365.94
D.P. 360.12
80+50.00
SR2
33+30.00
367.28
D.P. 361.00
80+00.00
SR2
32+83.76
366.80
D.P. 361.87
79+50.00
SR2
32+34.54
367.37
D.P. 362.75
79+00.00
SR2
31+85.32
368.27
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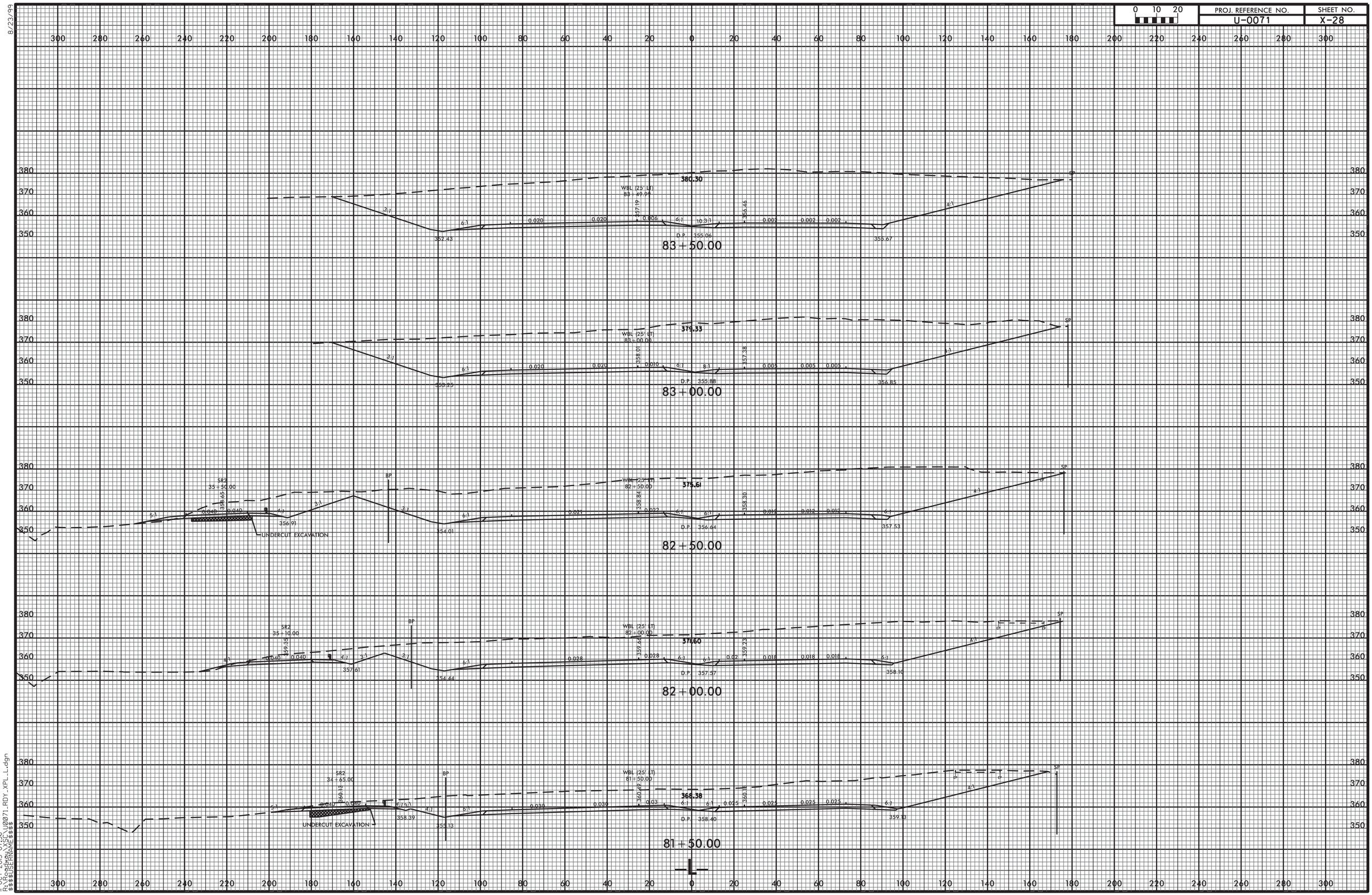


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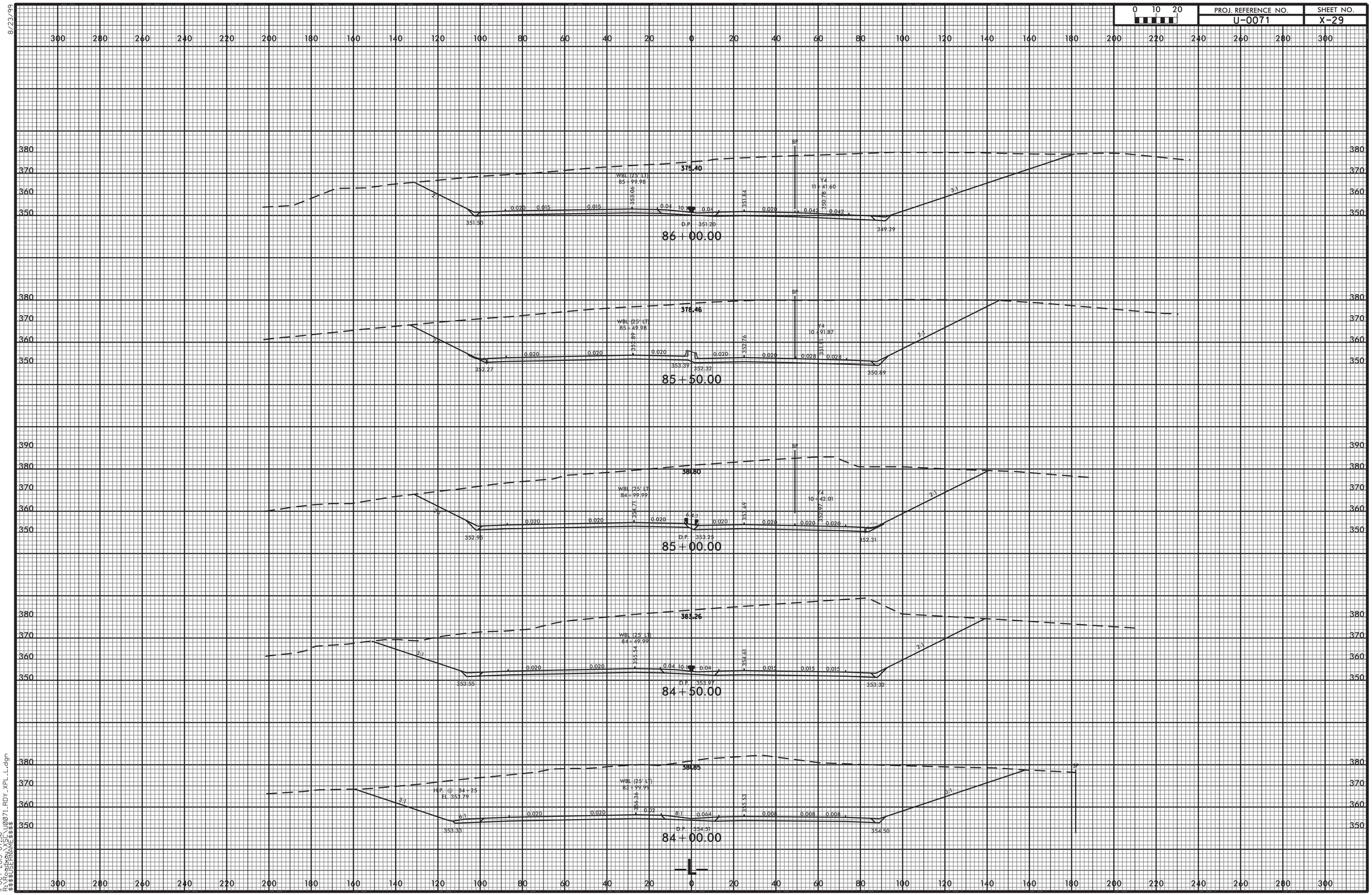


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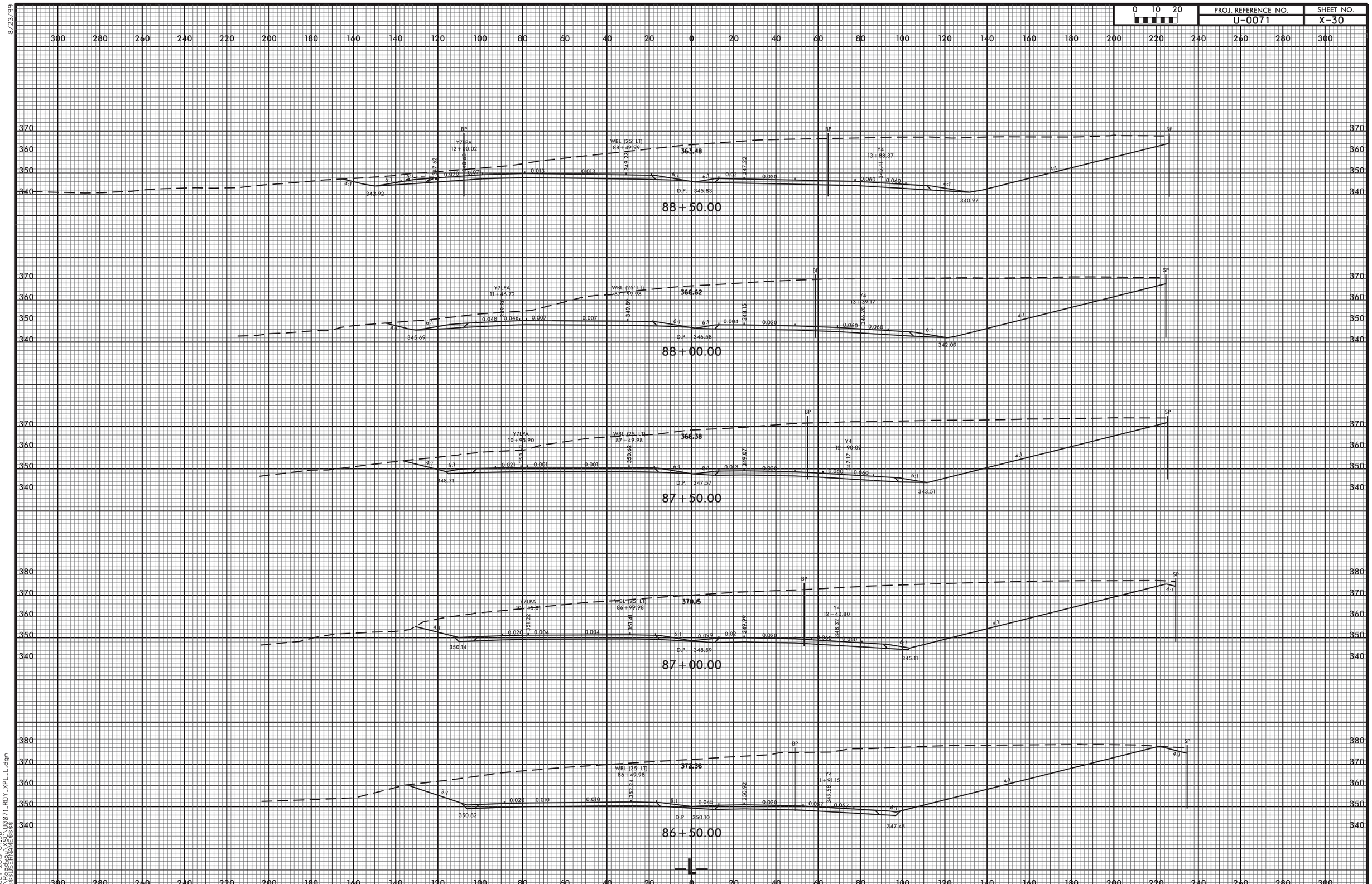
| | U-0071 | X-30 |

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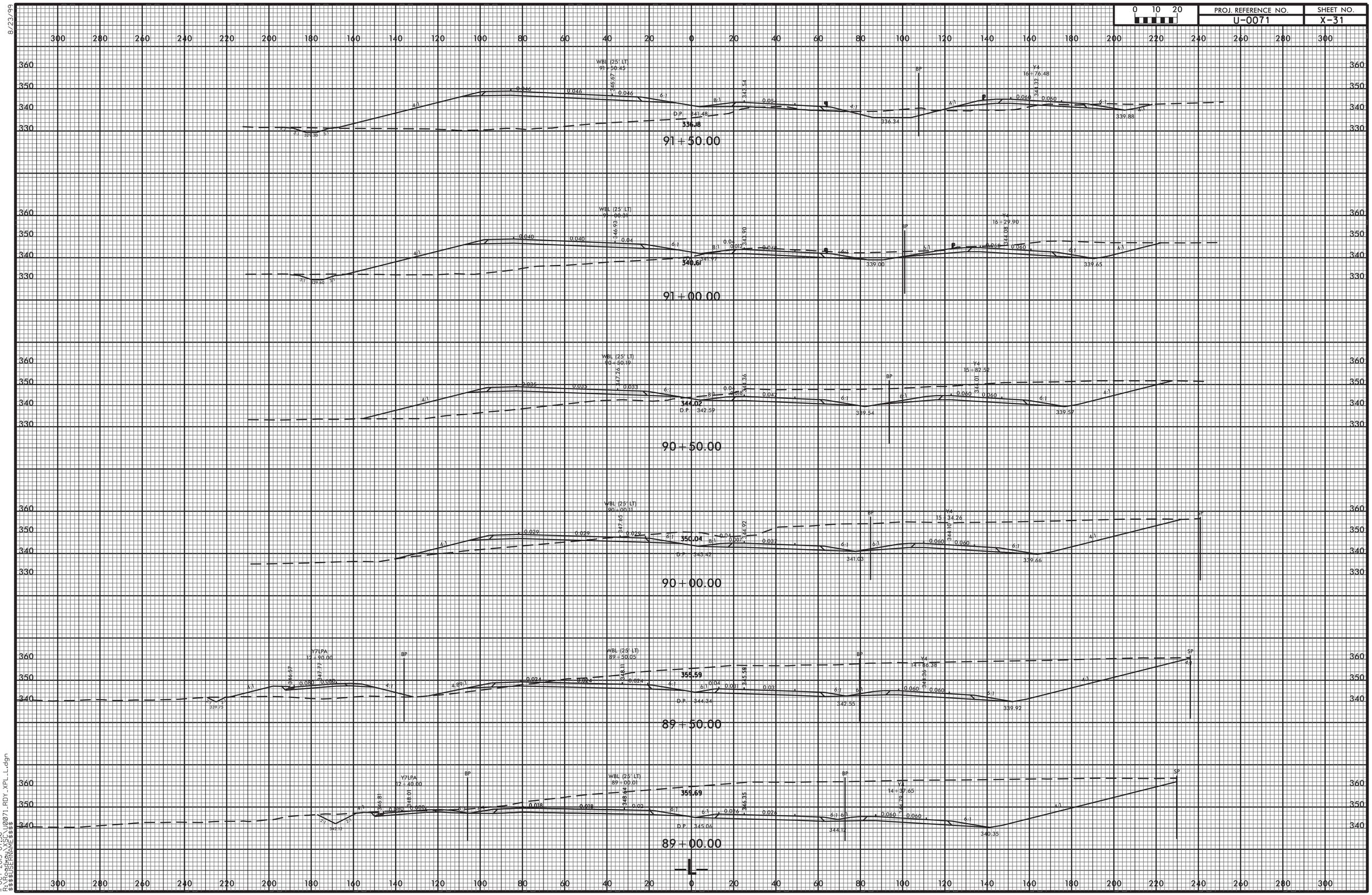


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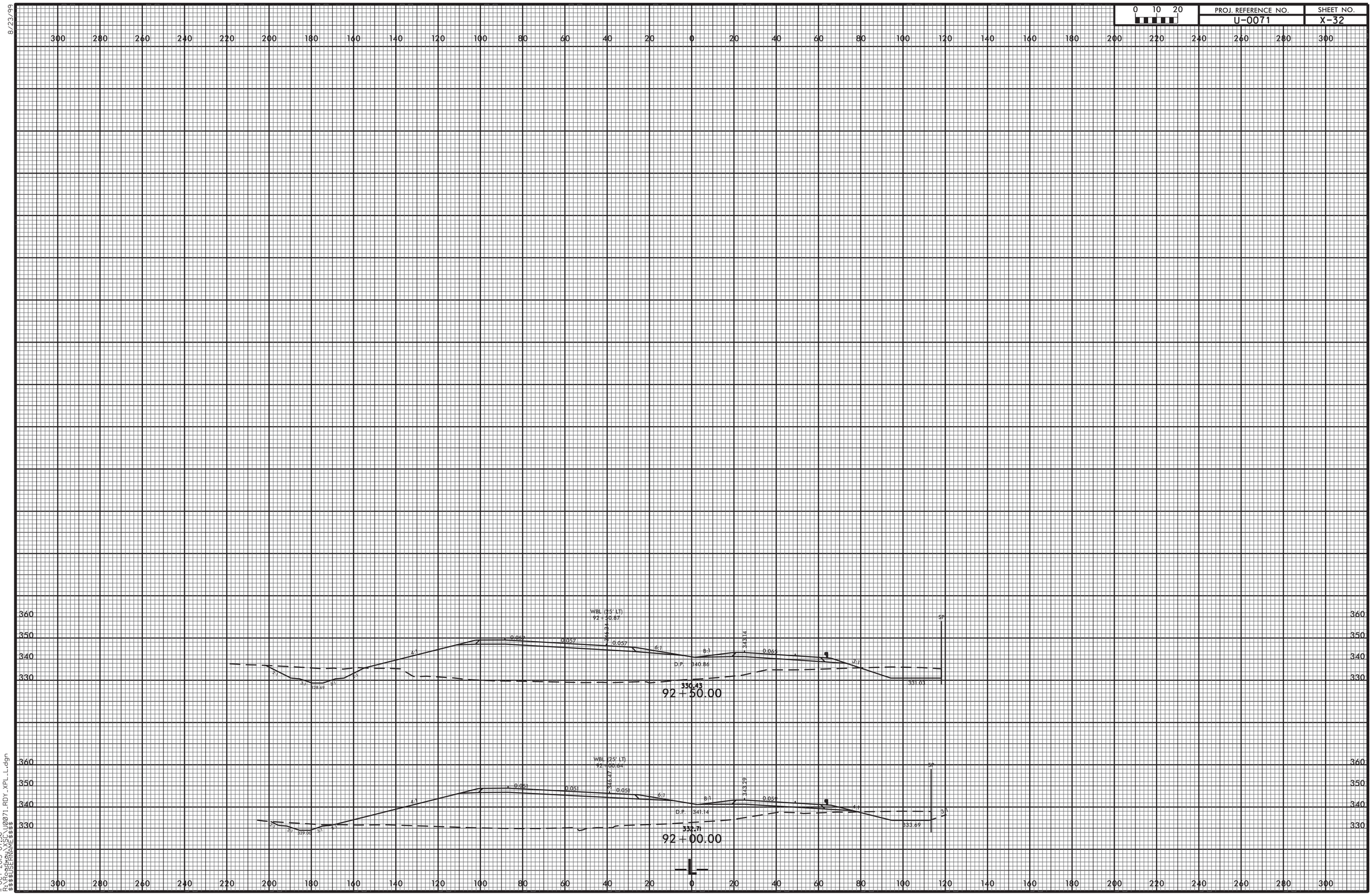
| | U-0071 | X-32 |

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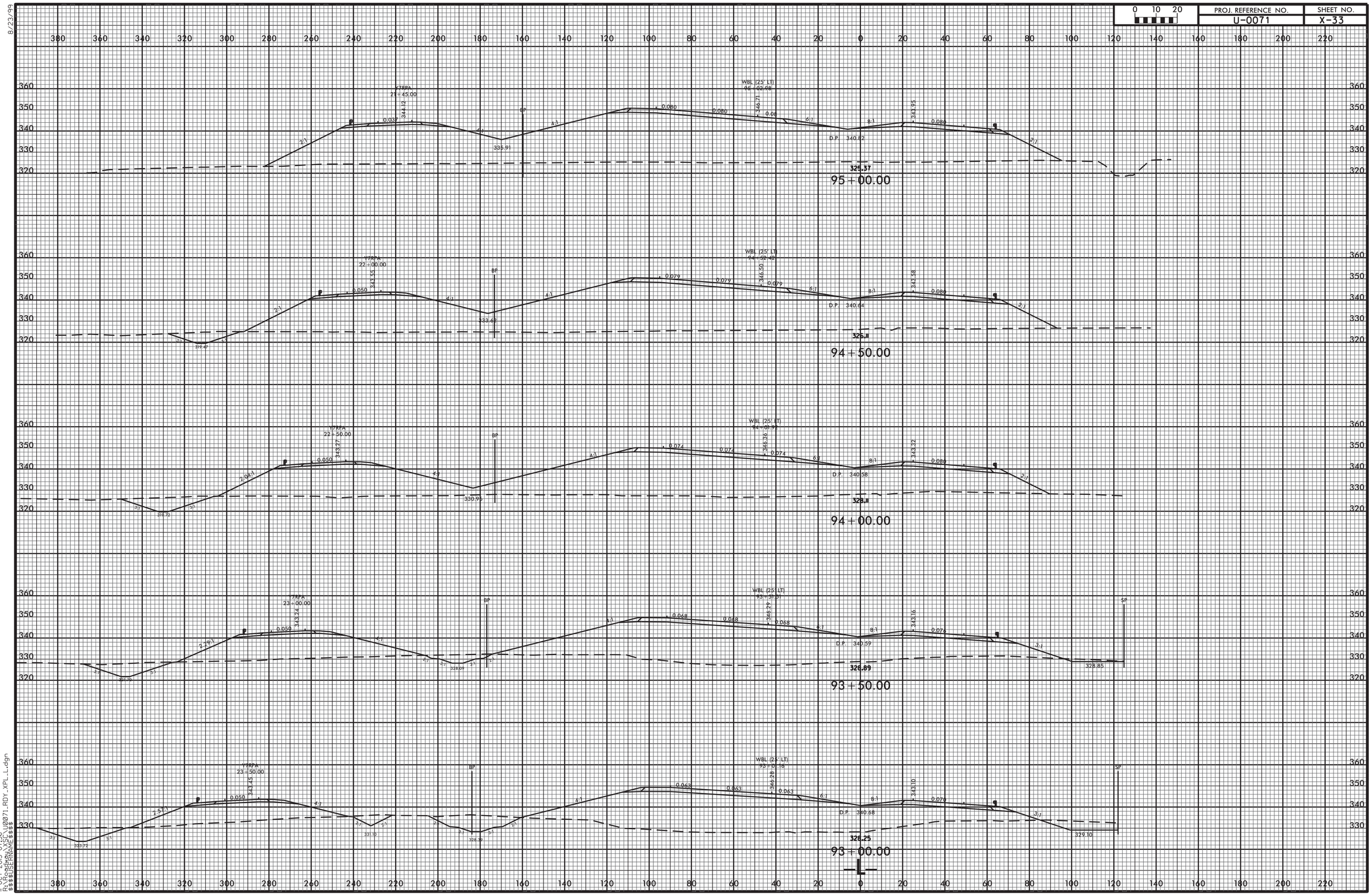
| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-33 |

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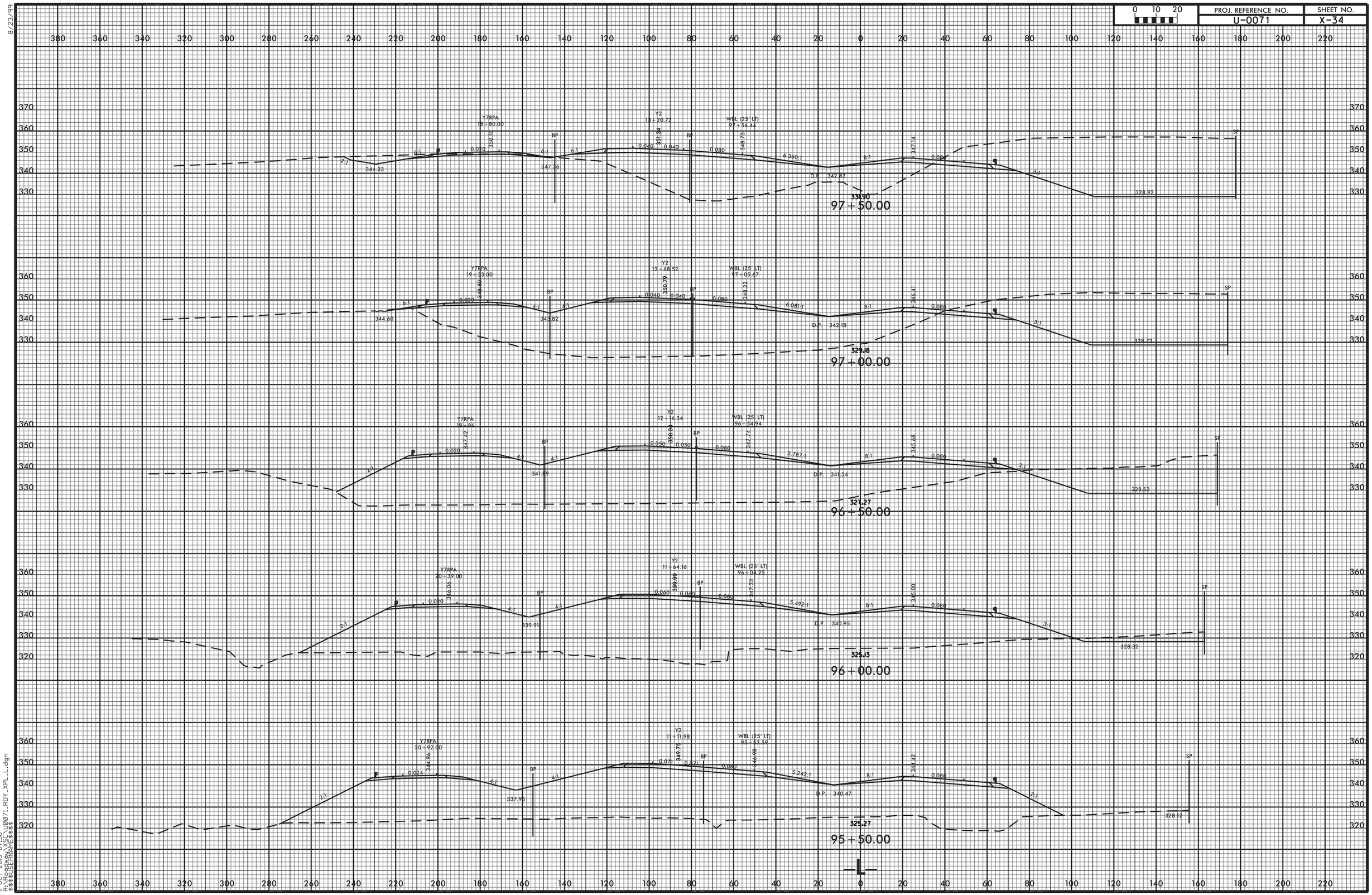


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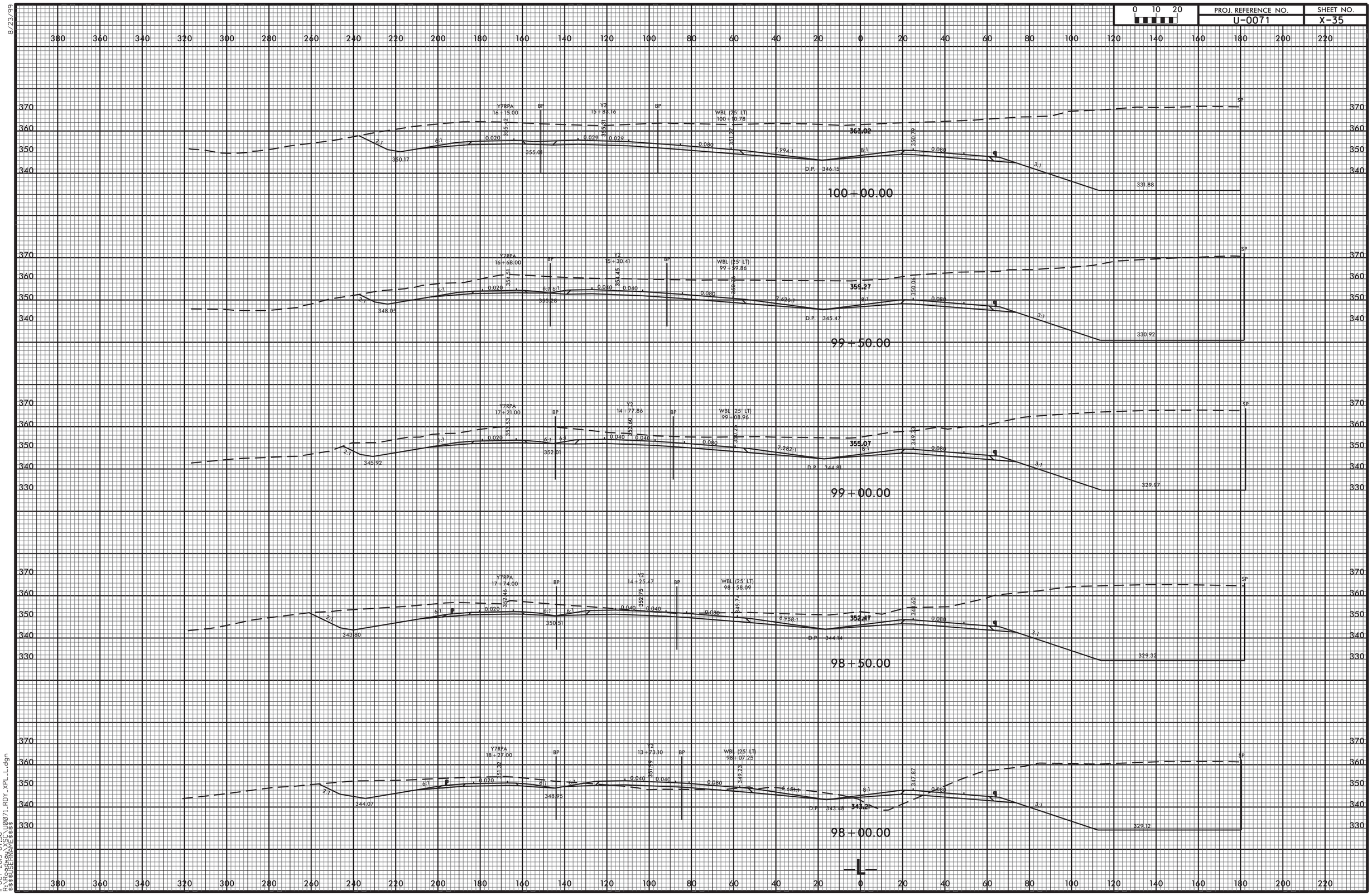
| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-35 |

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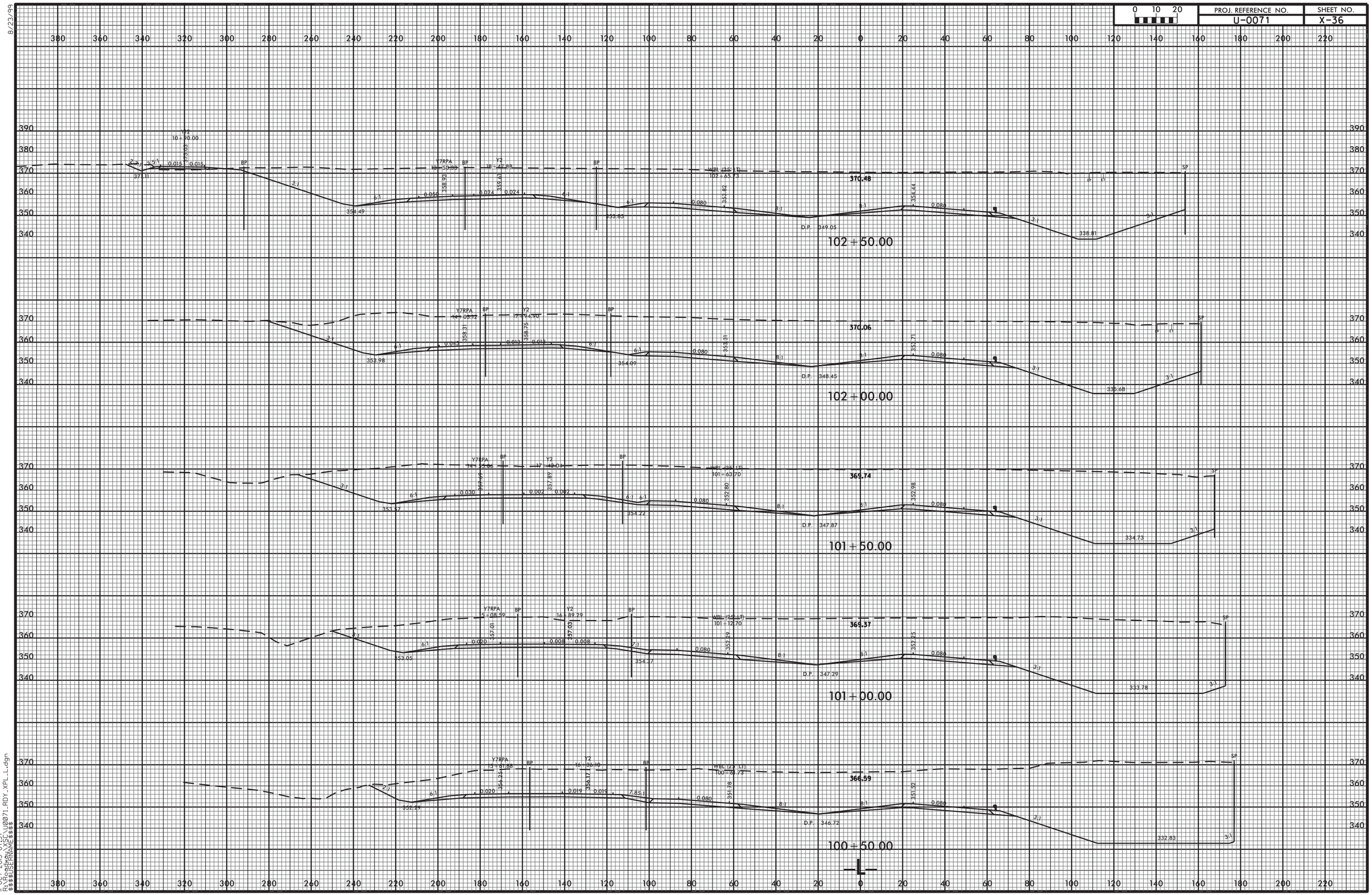
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PROJ. REFERENCE NO.
U-0071
SHEET NO.
X-36
102+50.00
370.48
D.P. 349.05
102+00.00
370.06
D.P. 348.45
101+50.00
369.74
D.P. 347.87
101+00.00
369.37
D.P. 347.29
100+50.00
368.59
D.P. 346.72
-L-
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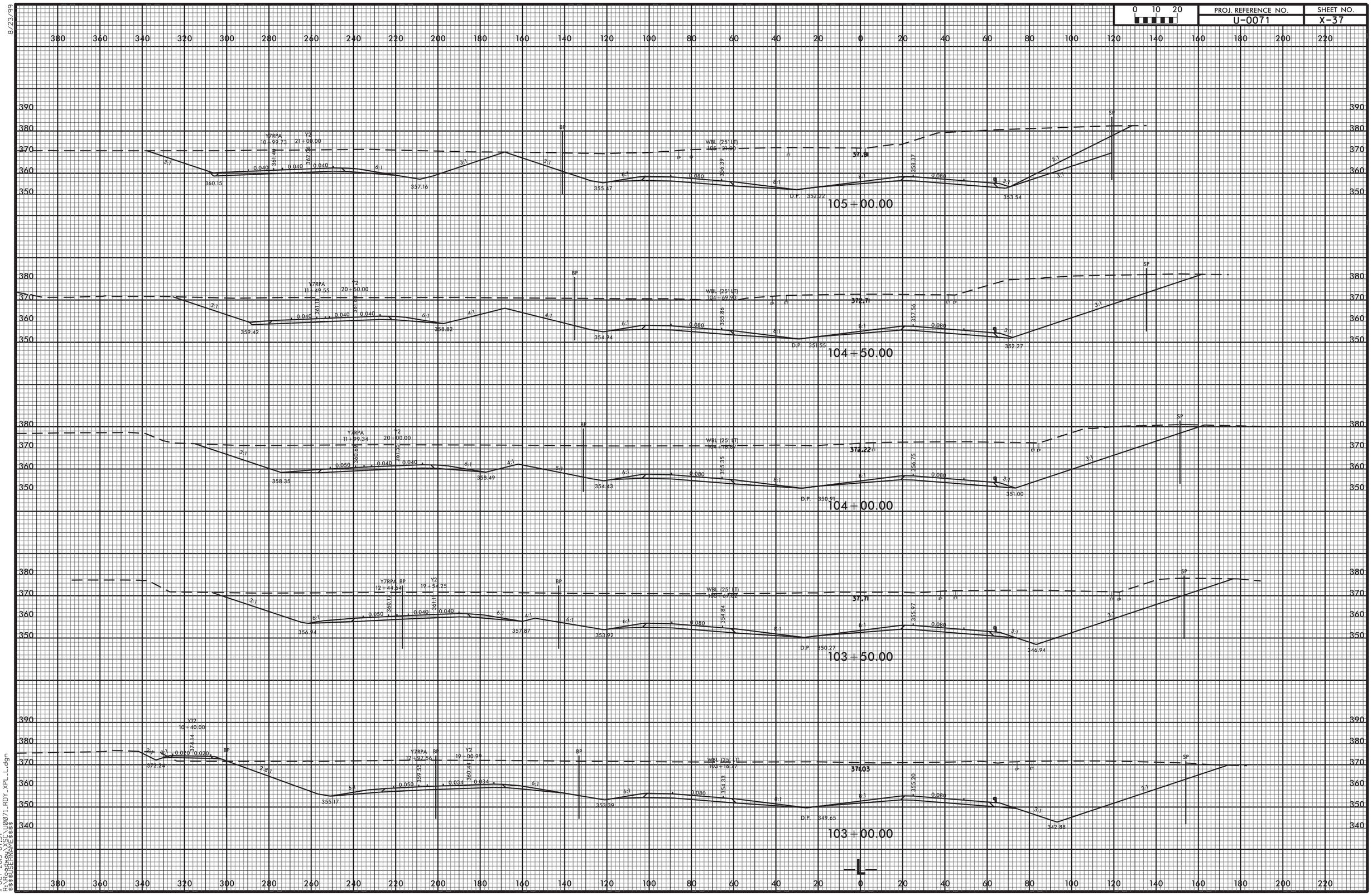
| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-37 |

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| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
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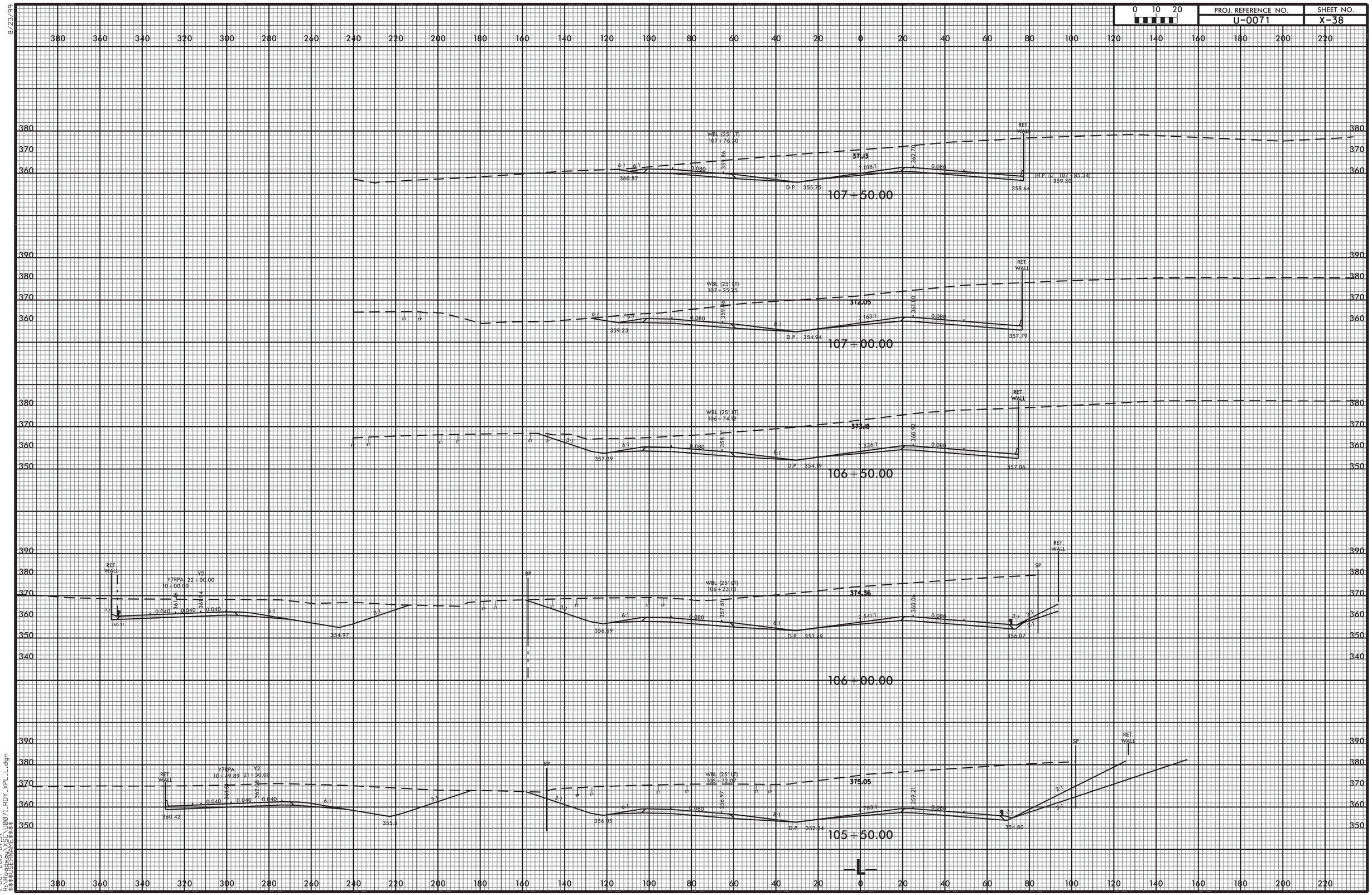
| | U-0071 | X-38 |

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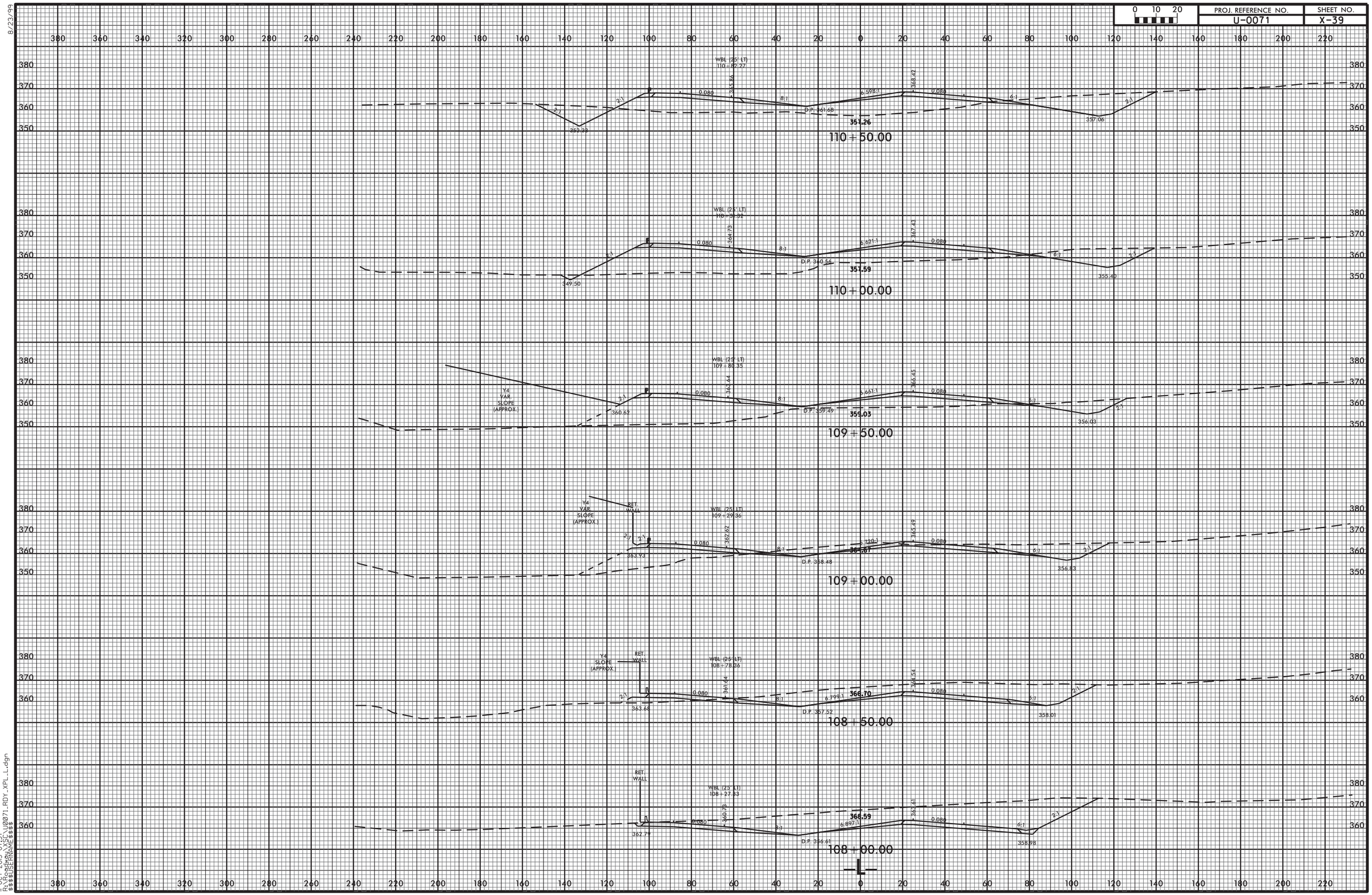
| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-39 |

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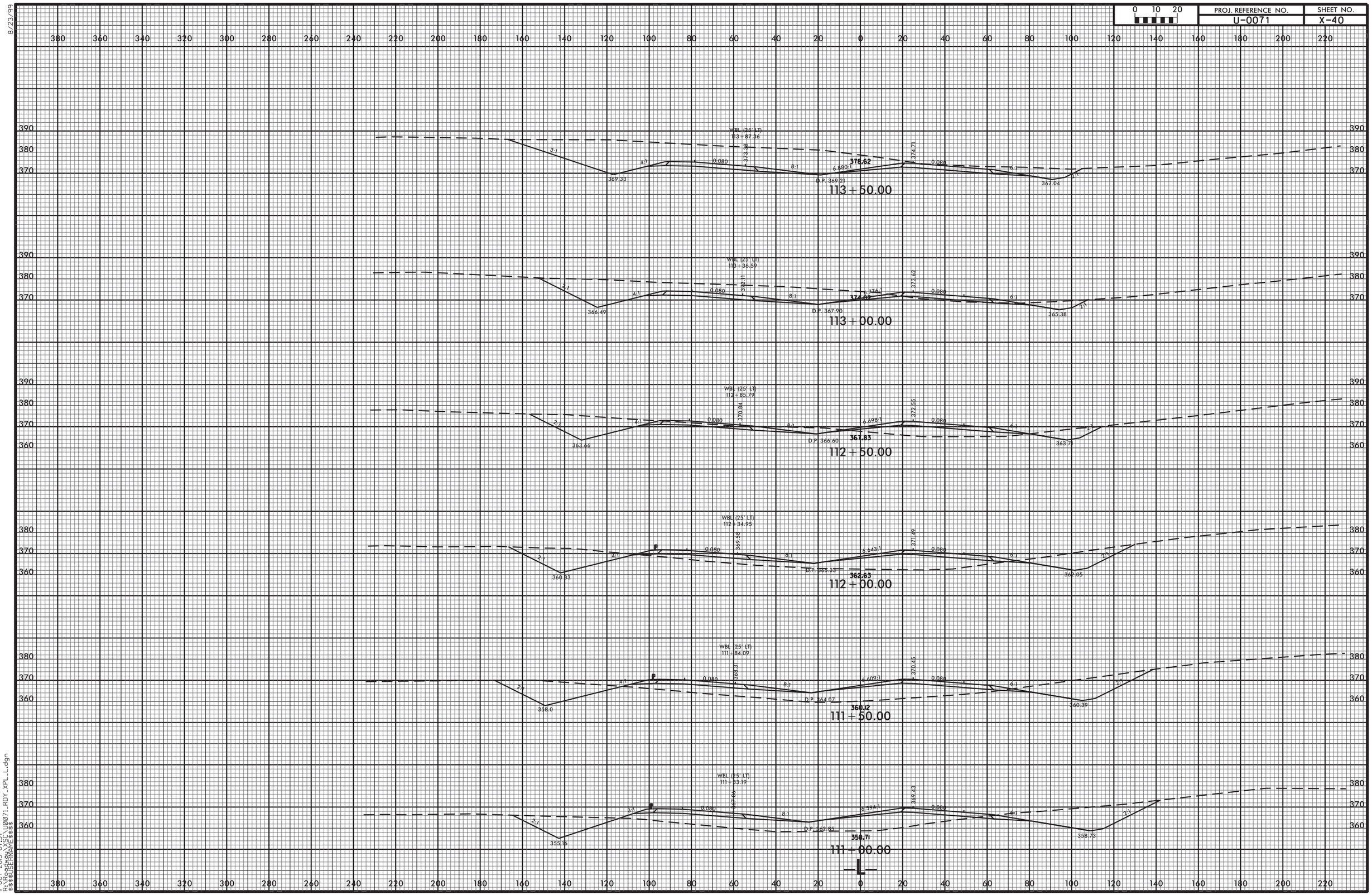
| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-40 |

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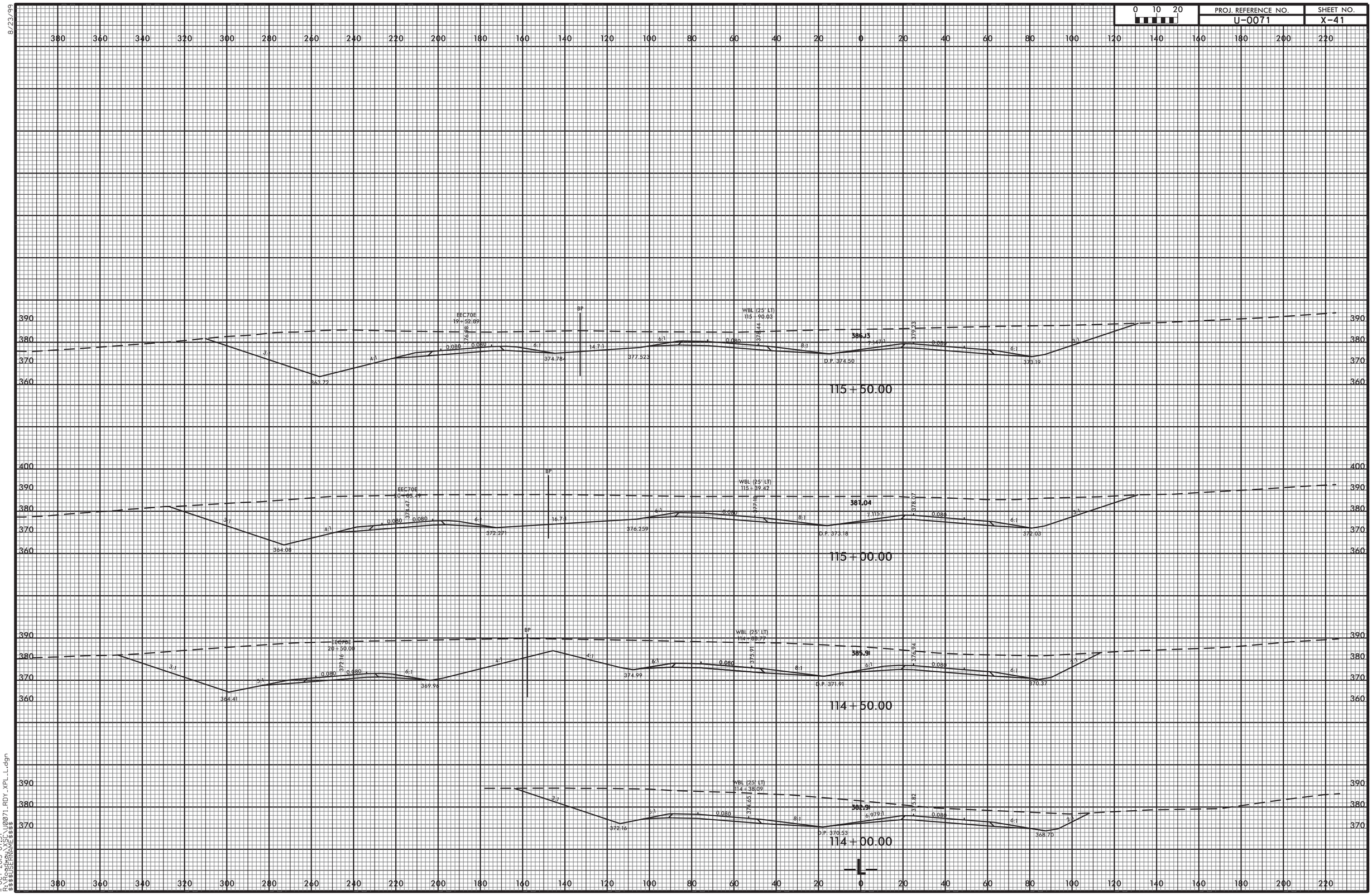
| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-41 |

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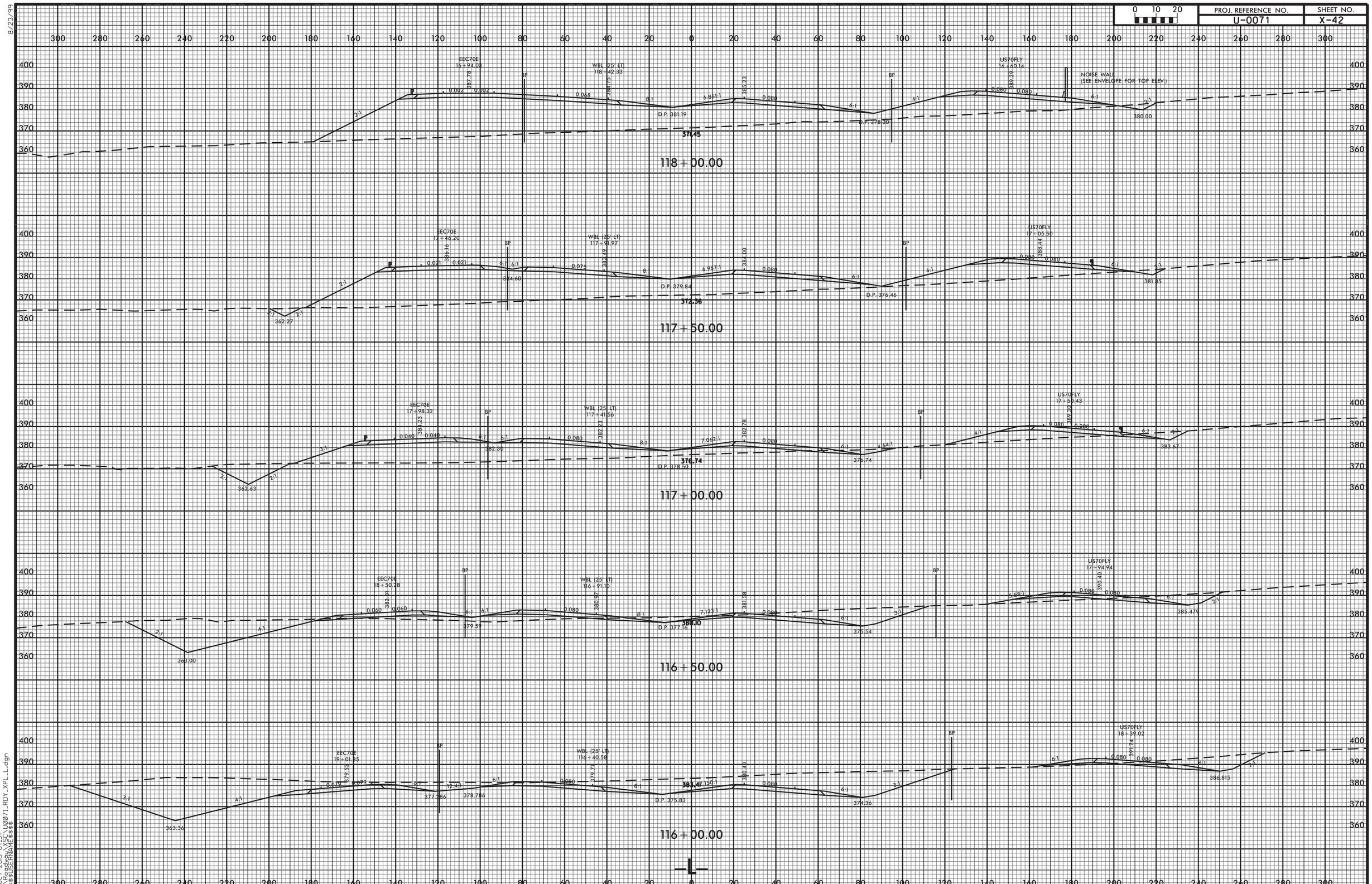
| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-42 |

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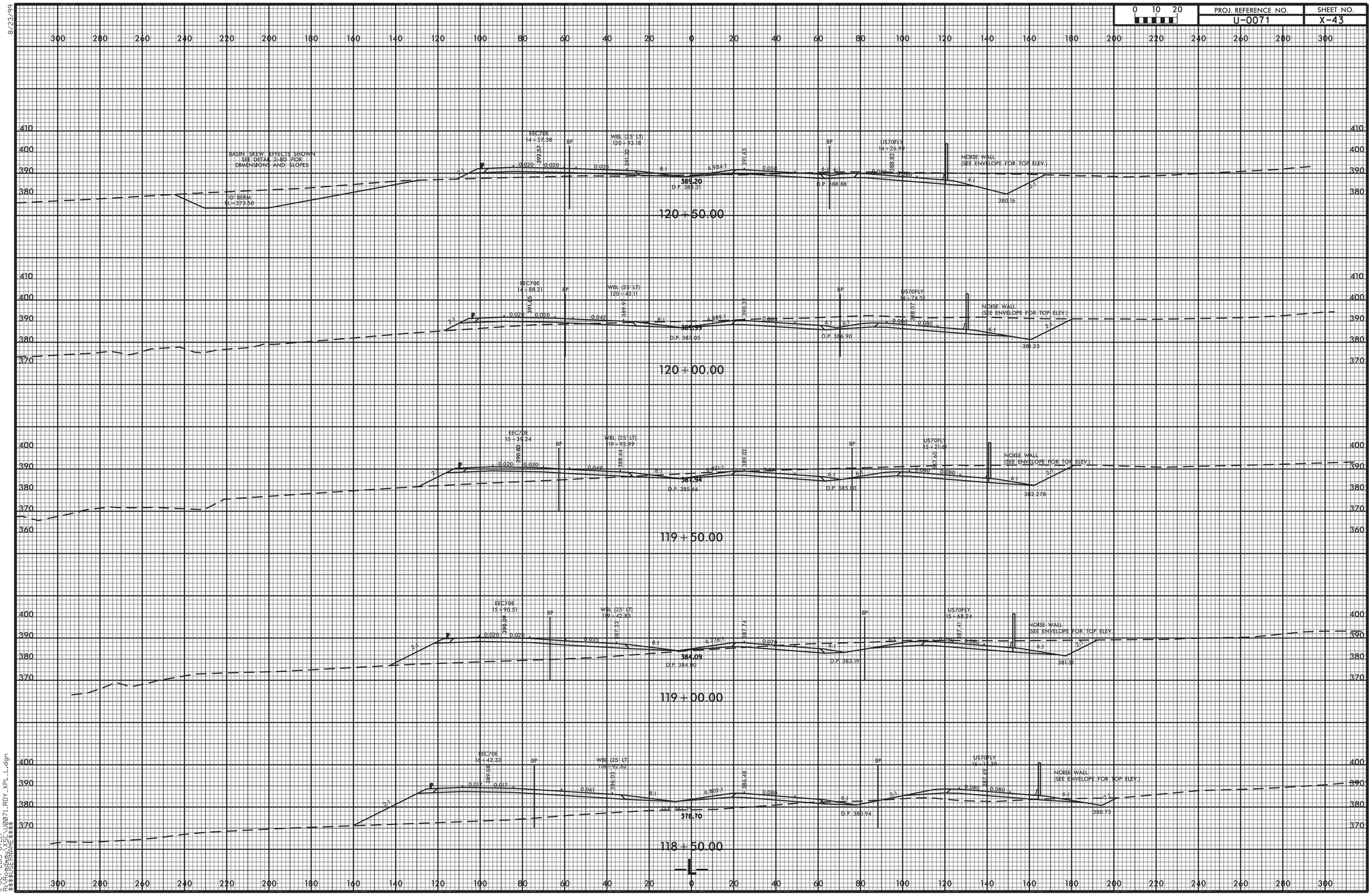


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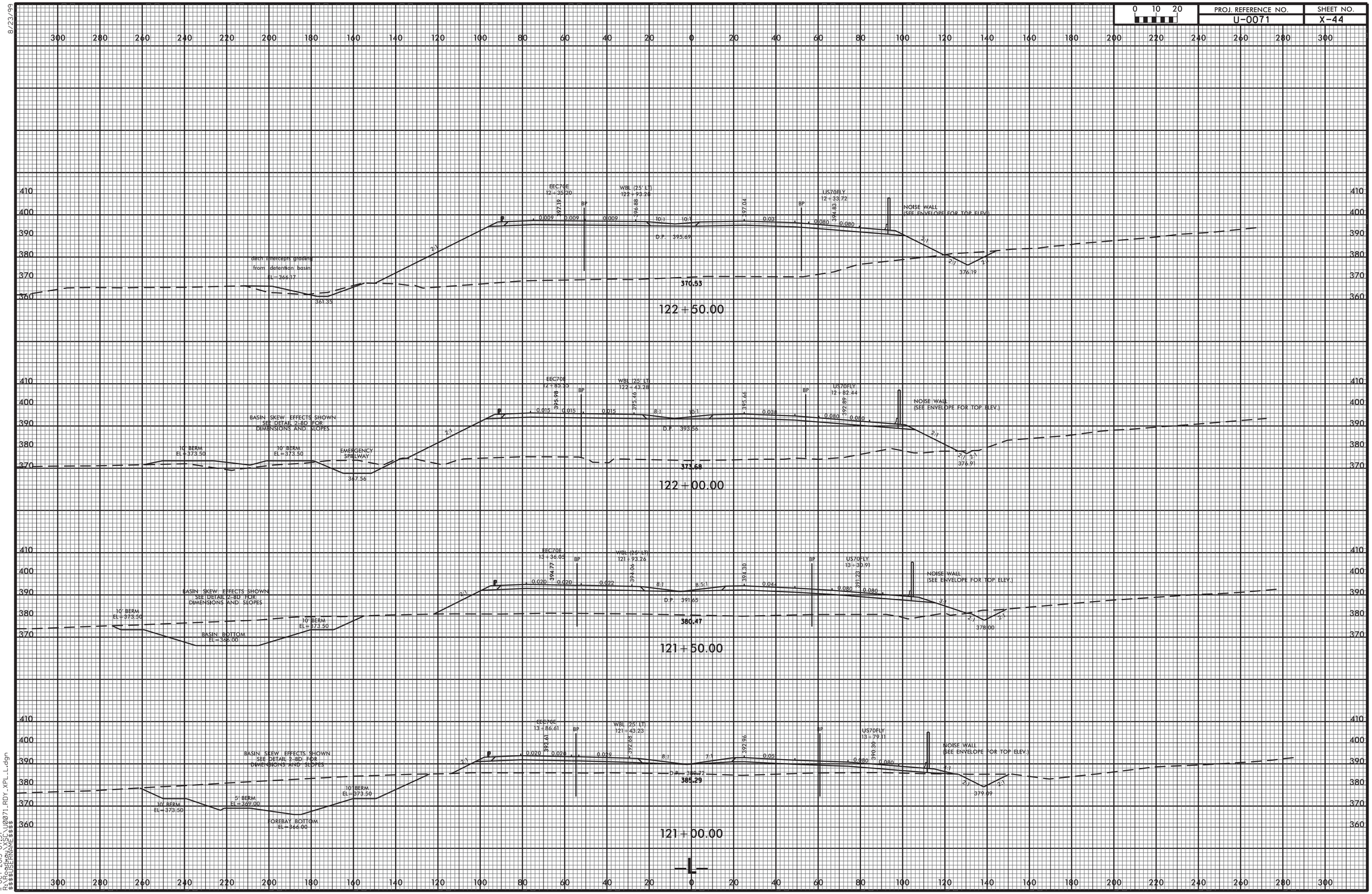


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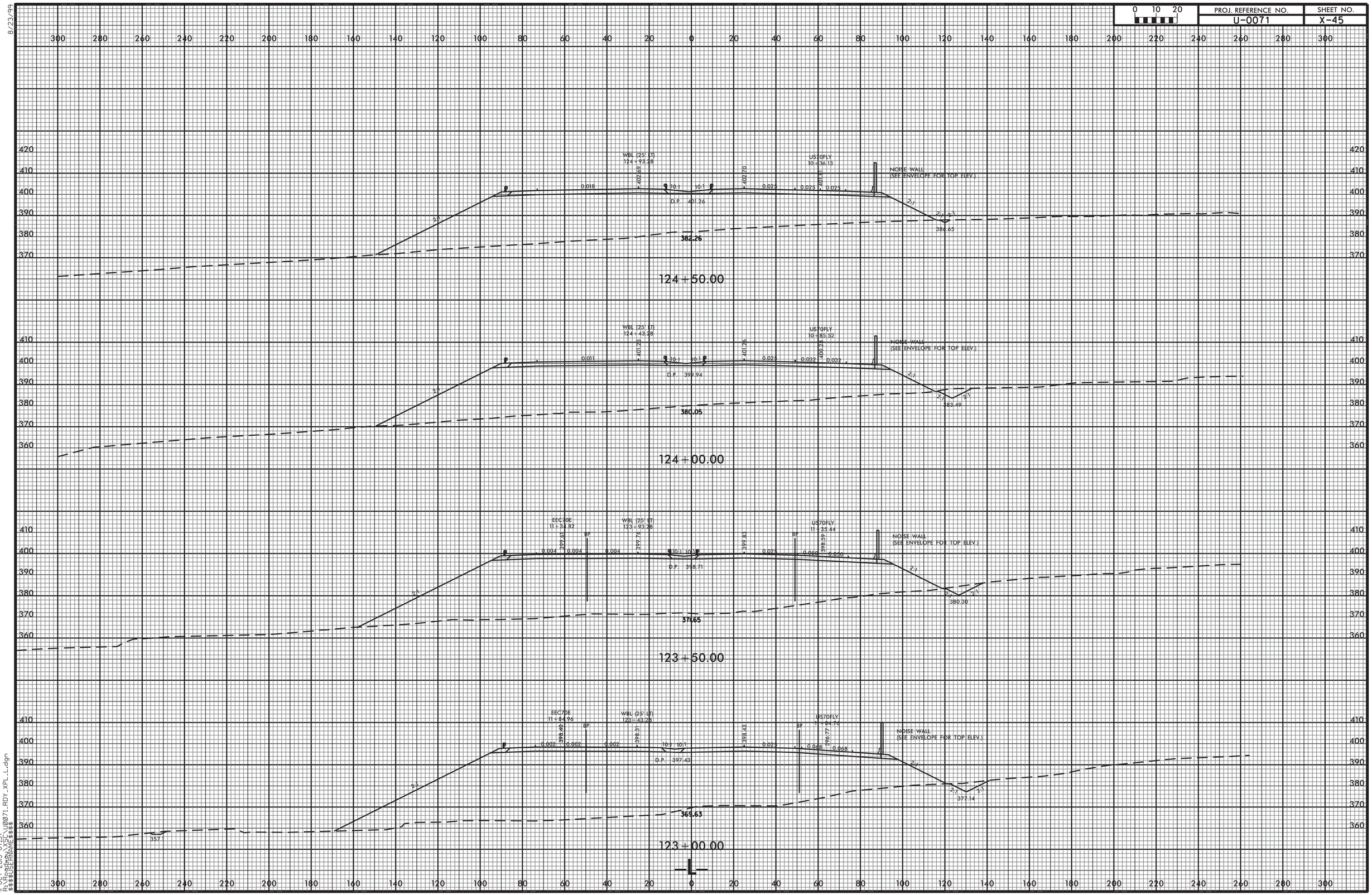
WBL (25' LT)
124+93.28
US70FLY
10+36.13
NOISE WALL
(SEE ENVELOPE FOR TOP ELEV.)
0.018
10:1
10:1
0.025
0.025
0.025
D.P. 401.26
382.26
386.65
124+50.00
WBL (25' LT)
124+43.28
US70FLY
10+85.52
NOISE WALL
(SEE ENVELOPE FOR TOP ELEV.)
0.011
10:1
10:1
0.025
0.032
0.032
D.P. 399.94
380.05
383.49
124+00.00
EEC70E
11+34.82
WBL (25' LT)
123+93.28
US70FLY
11+35.44
NOISE WALL
(SEE ENVELOPE FOR TOP ELEV.)
BP
0.004
0.004
0.004
10:1
10:1
0.025
0.068
0.050
D.P. 398.71
377.65
380.30
123+50.00
EEC70E
11+84.96
WBL (25' LT)
123+43.28
US70FLY
11+84.26
NOISE WALL
(SEE ENVELOPE FOR TOP ELEV.)
BP
0.002
0.002
0.002
10:1
10:1
0.025
0.068
0.068
D.P. 397.43
369.63
377.14
357
123+00.00
-L-

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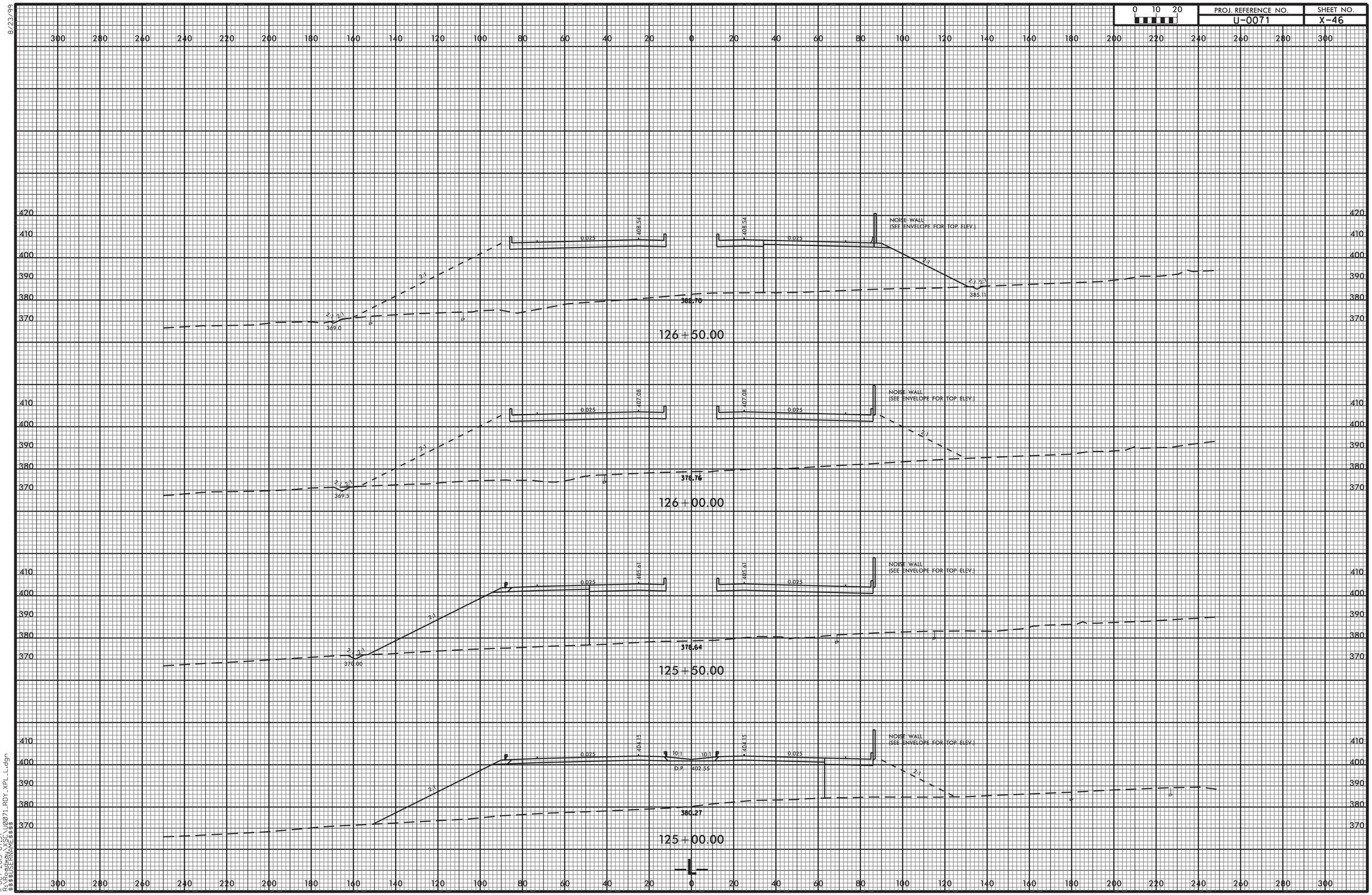
| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-46 |

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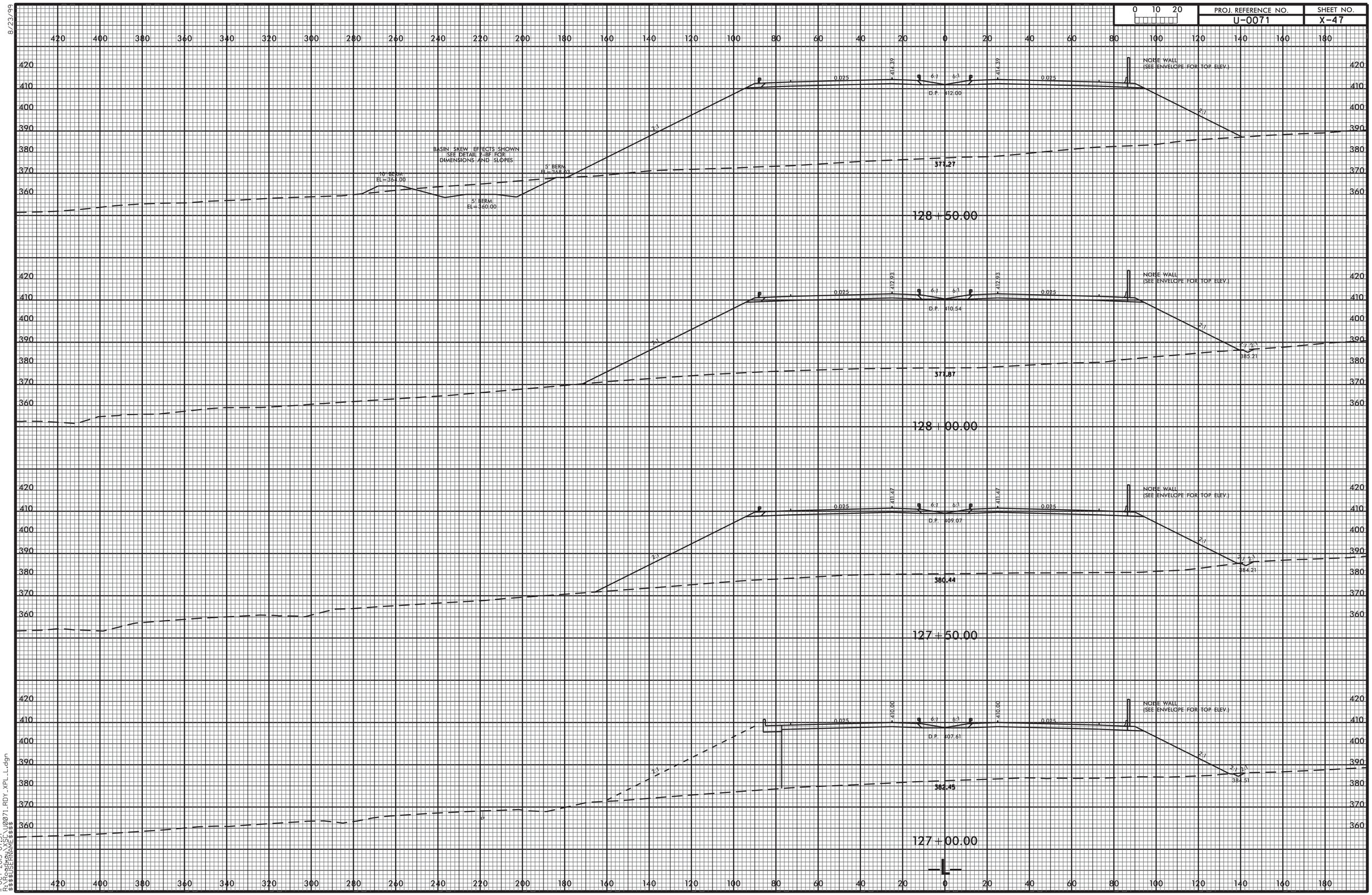
| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-47 |

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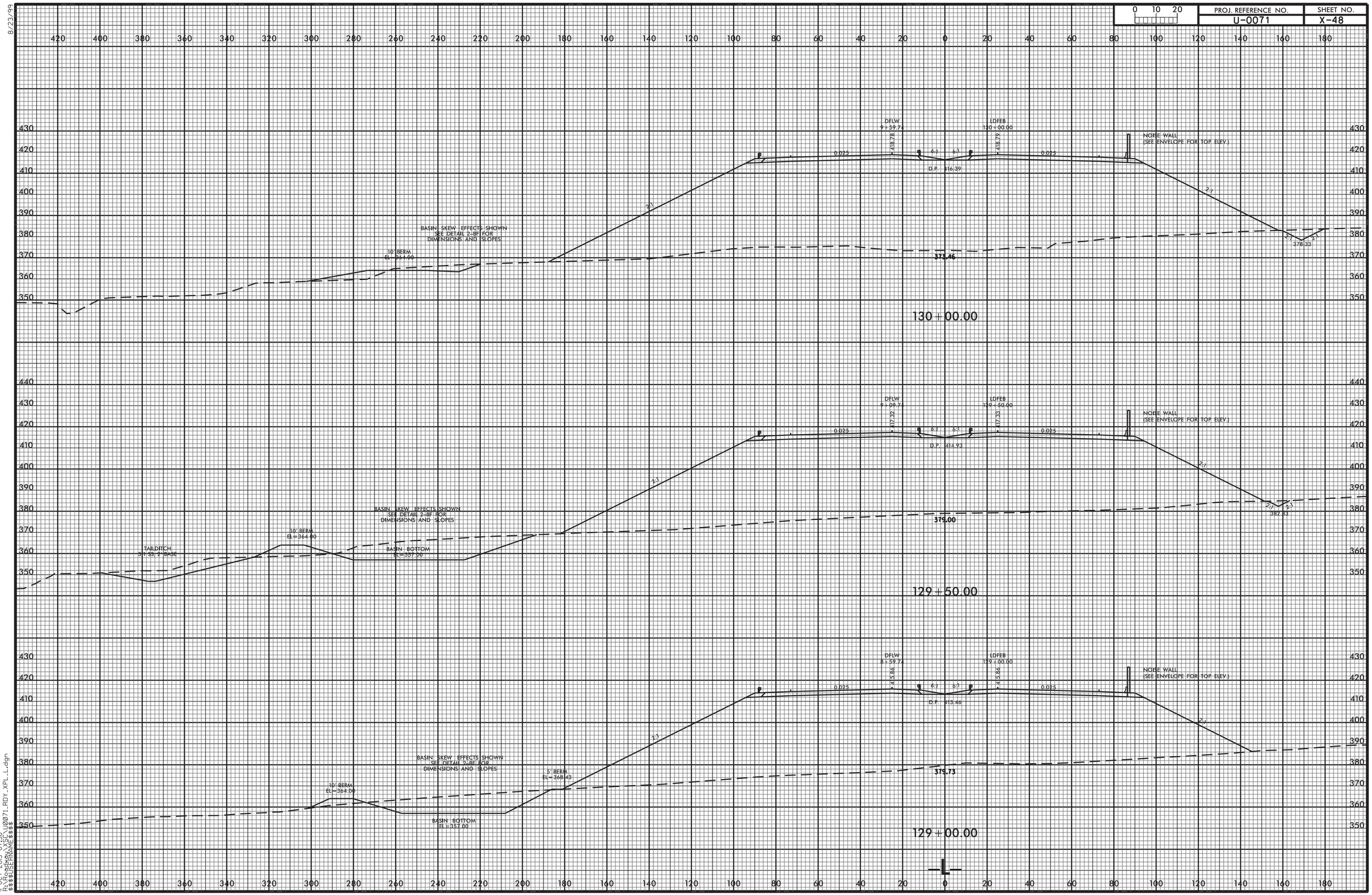
| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-48 |

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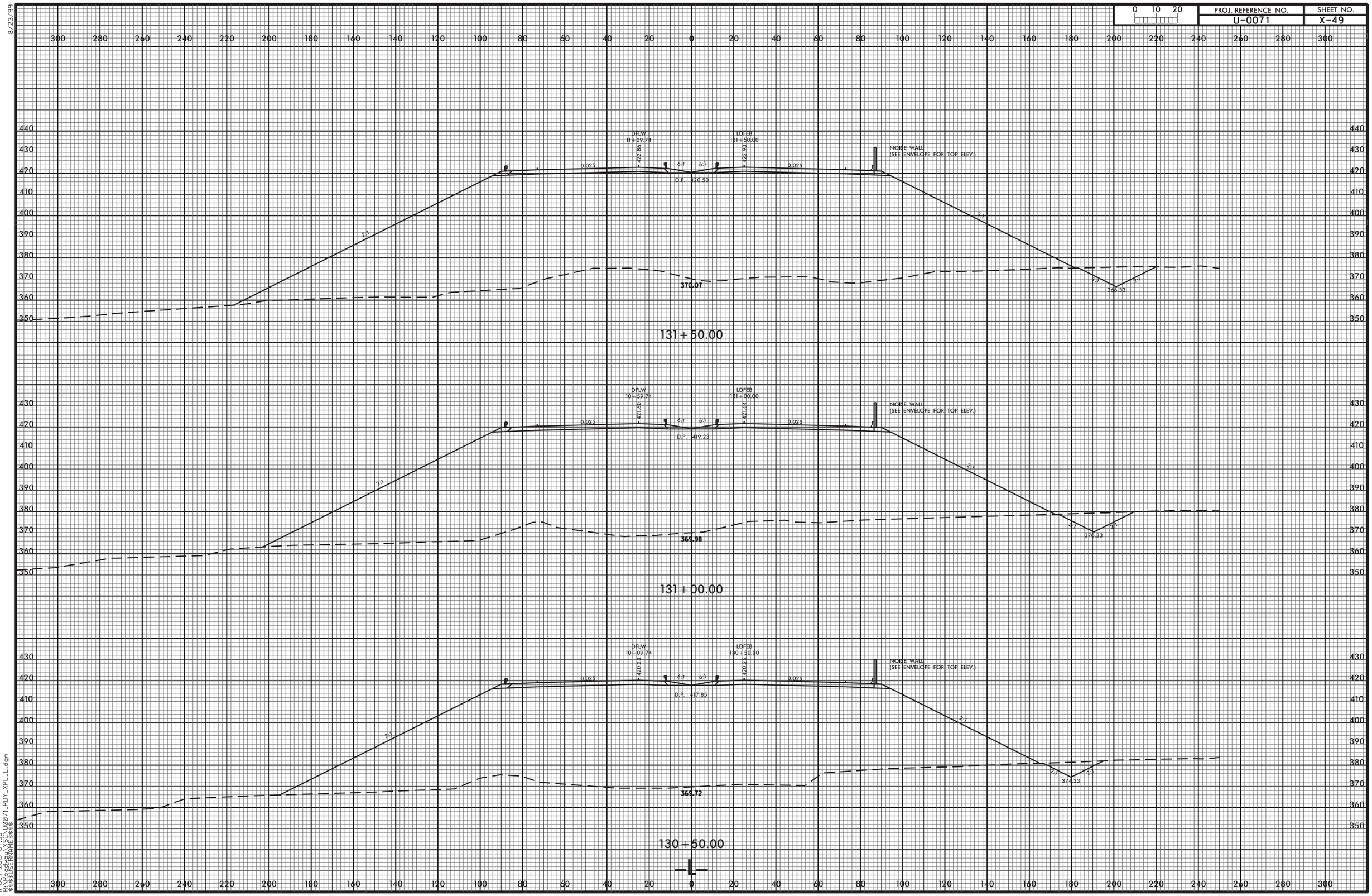
| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-49 |

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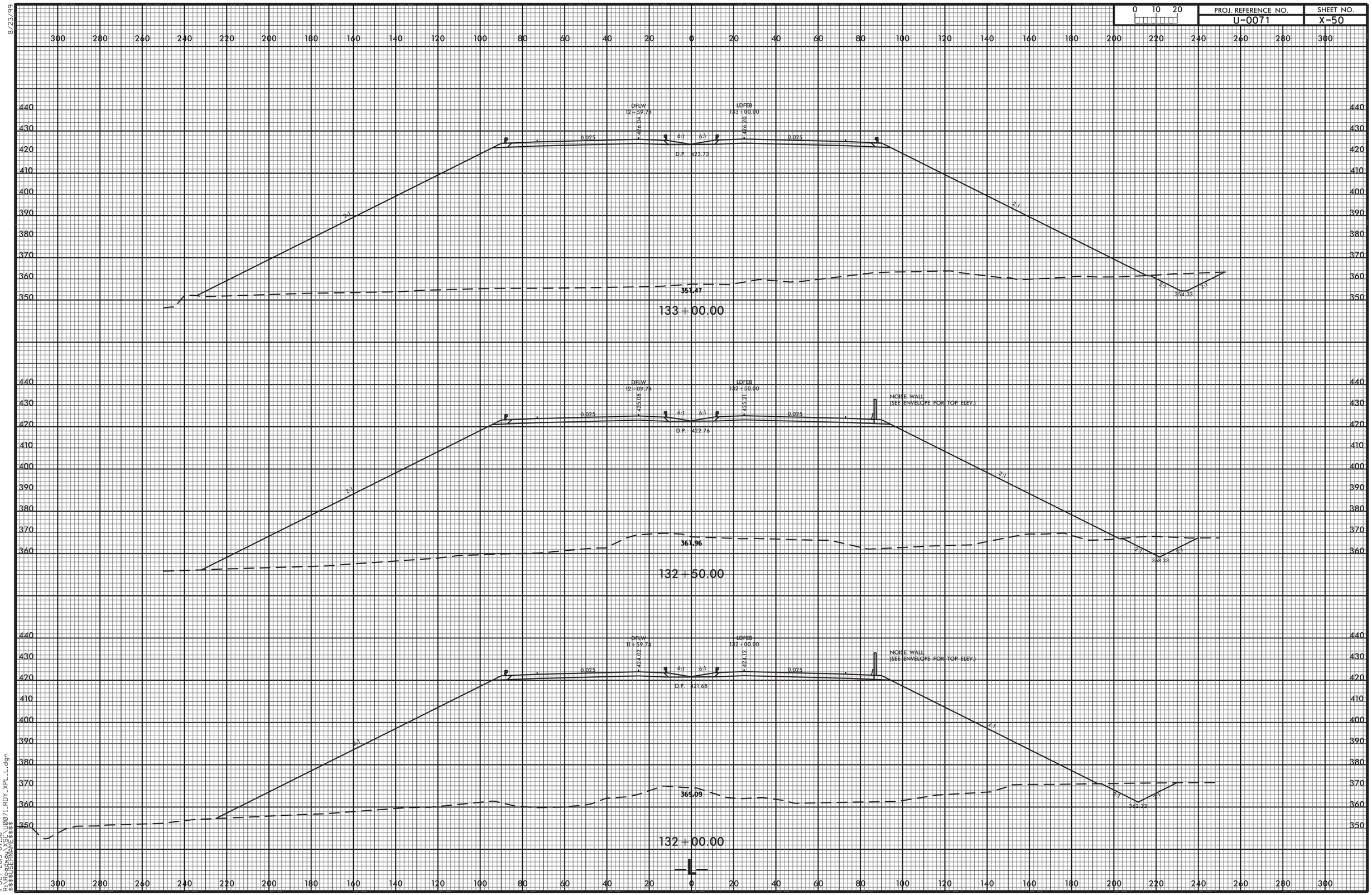
| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-50 |

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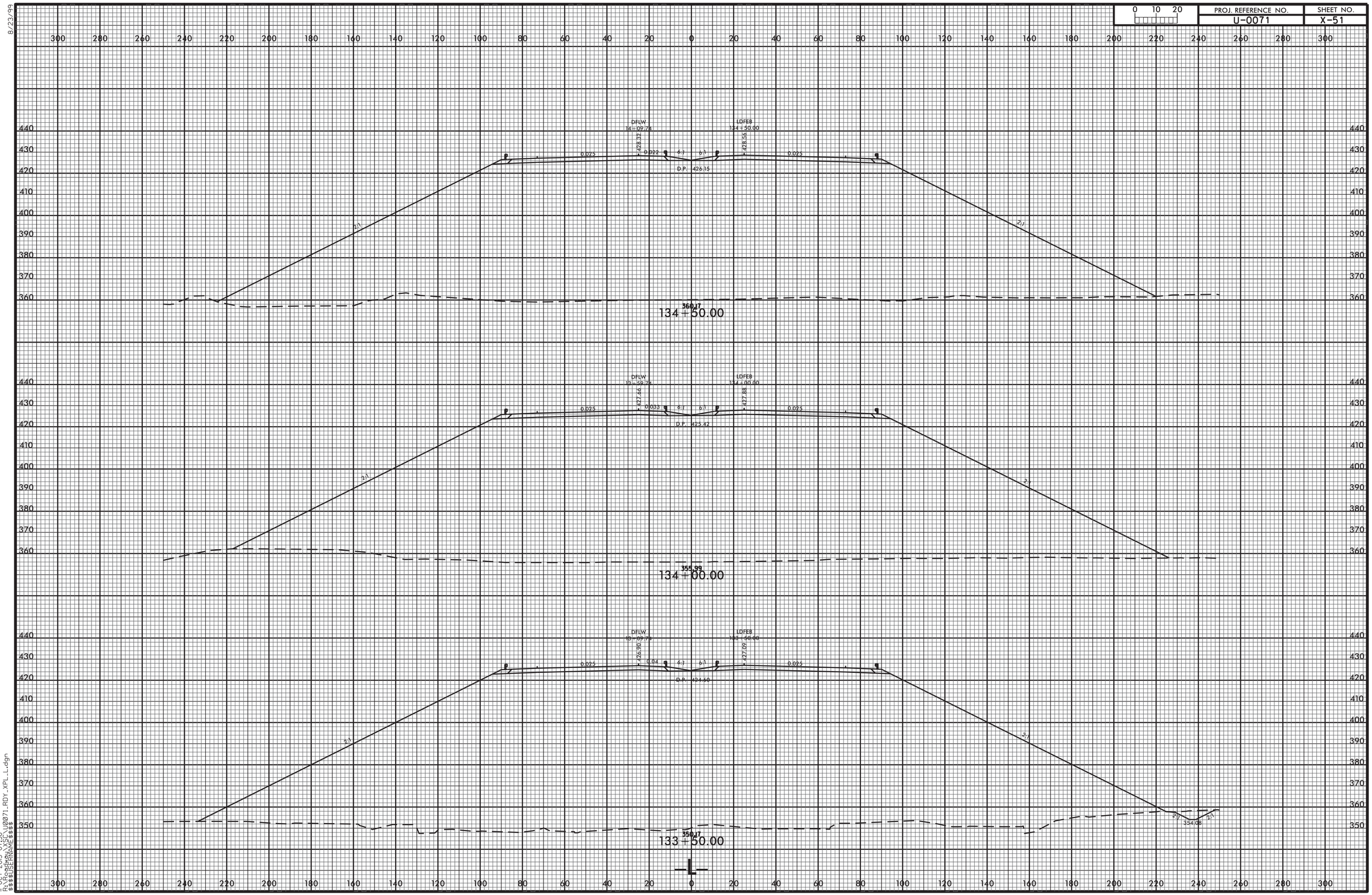
|---|---|
| U-0071 | X-51 |

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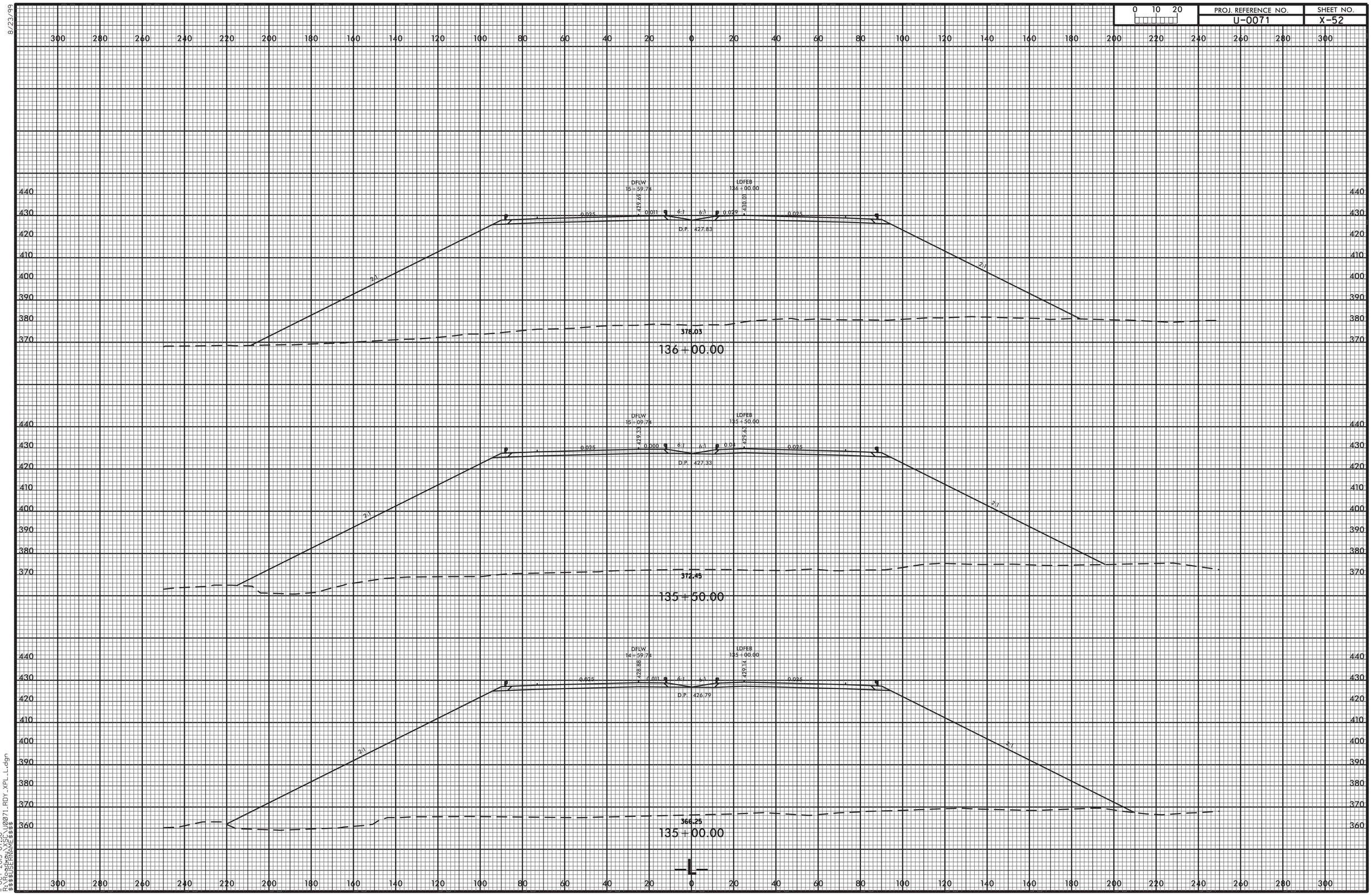
| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-52 |

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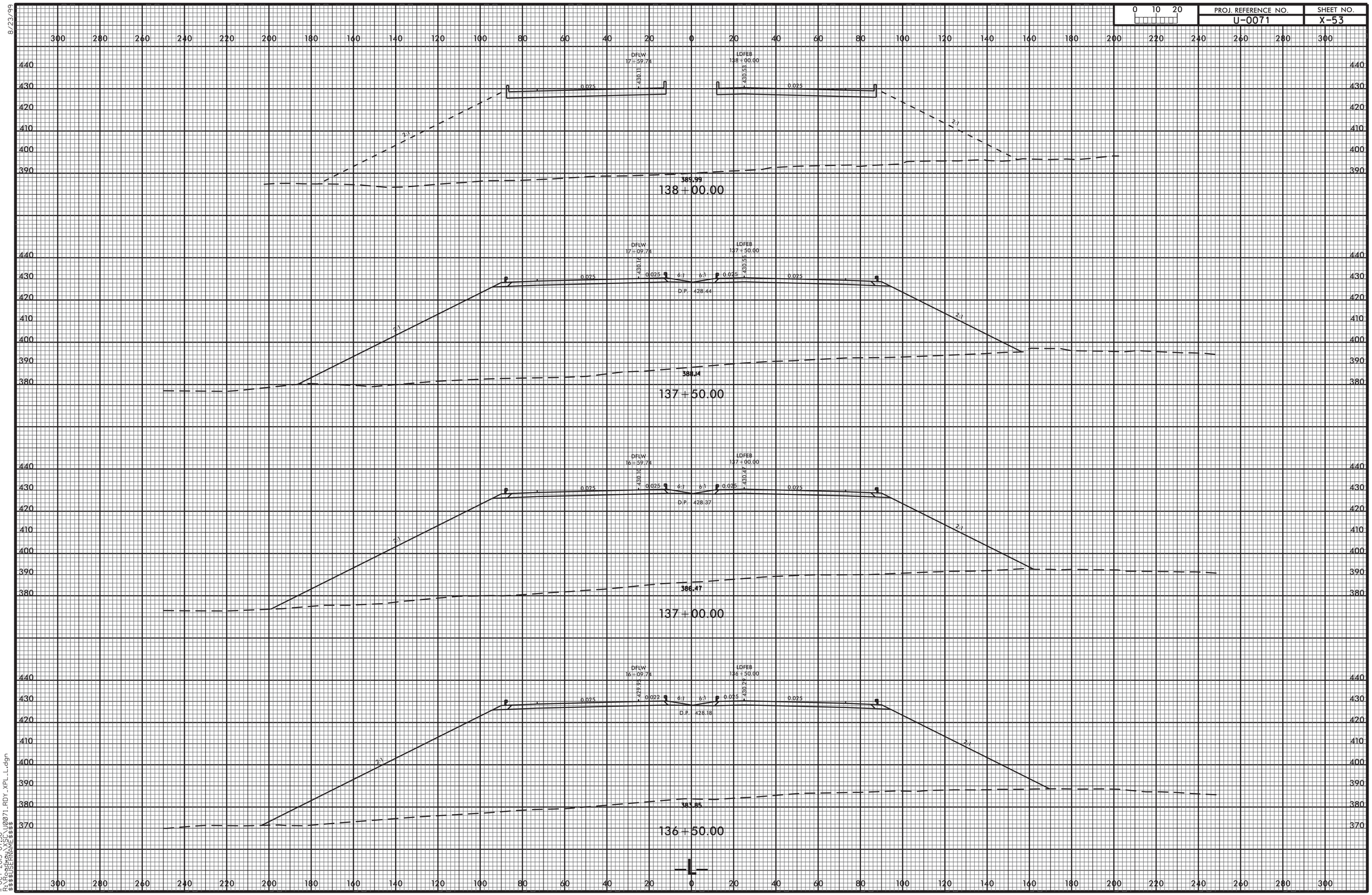
| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-53 |

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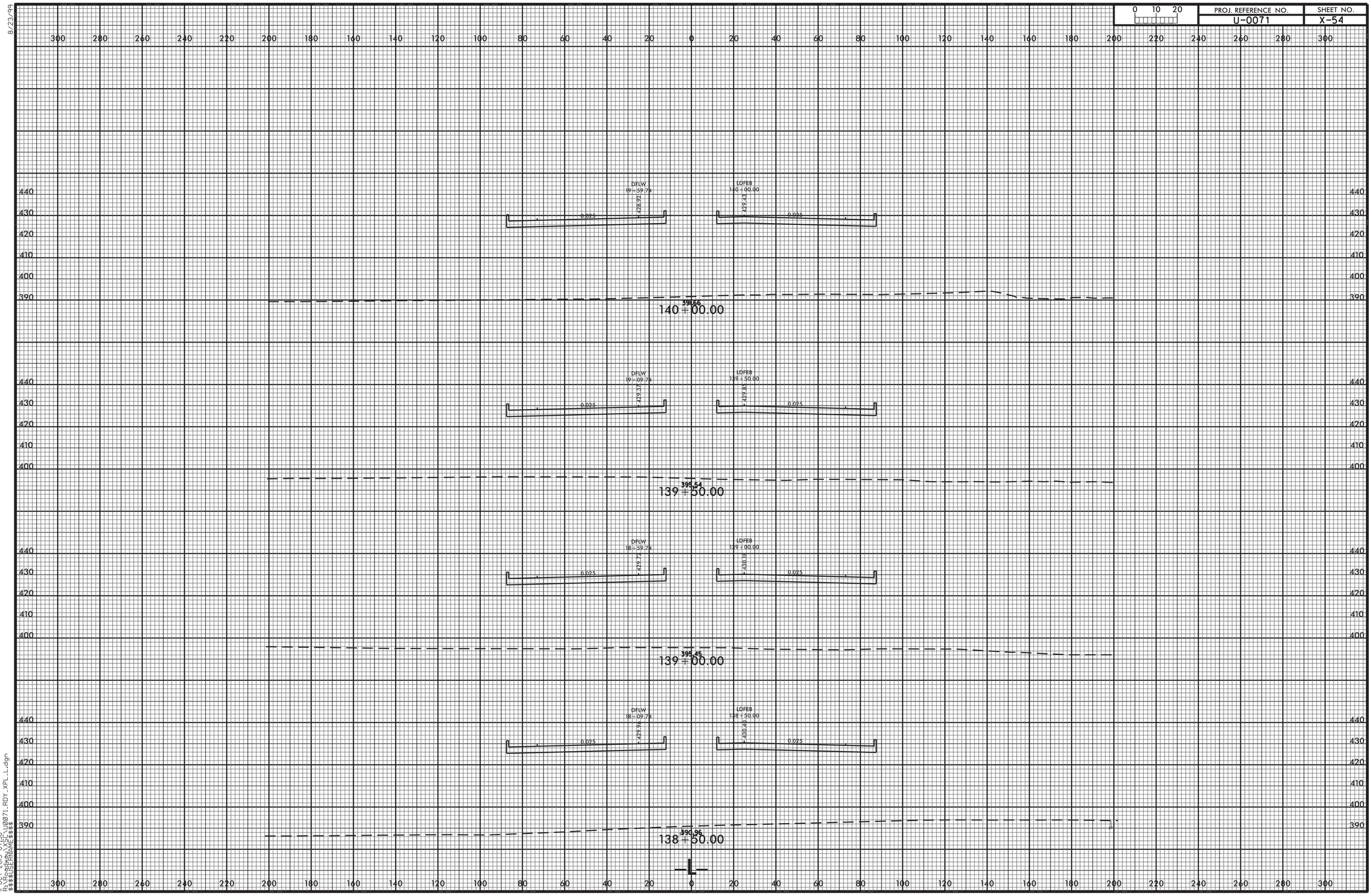
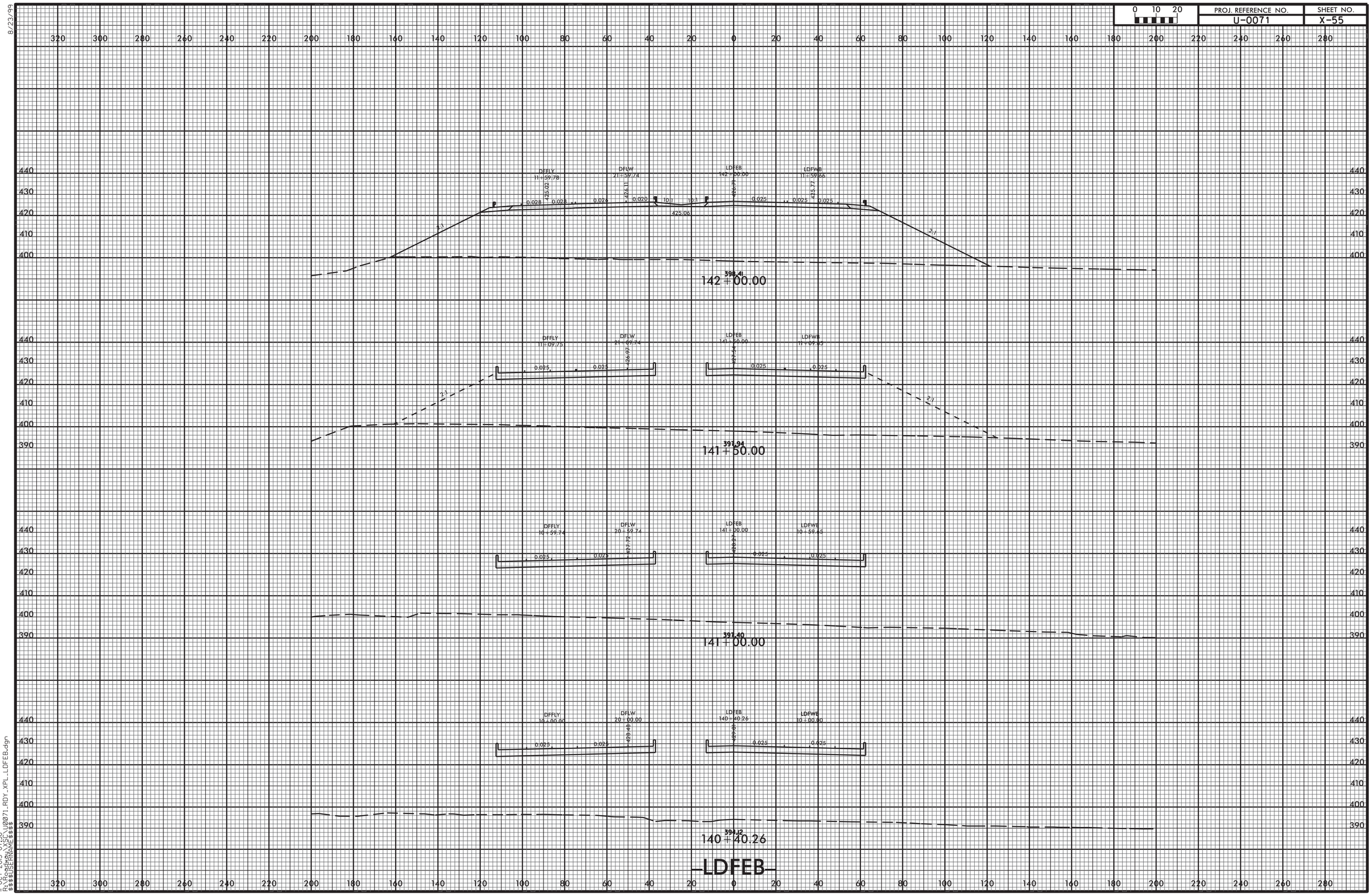
| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-54 |



| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-55 |

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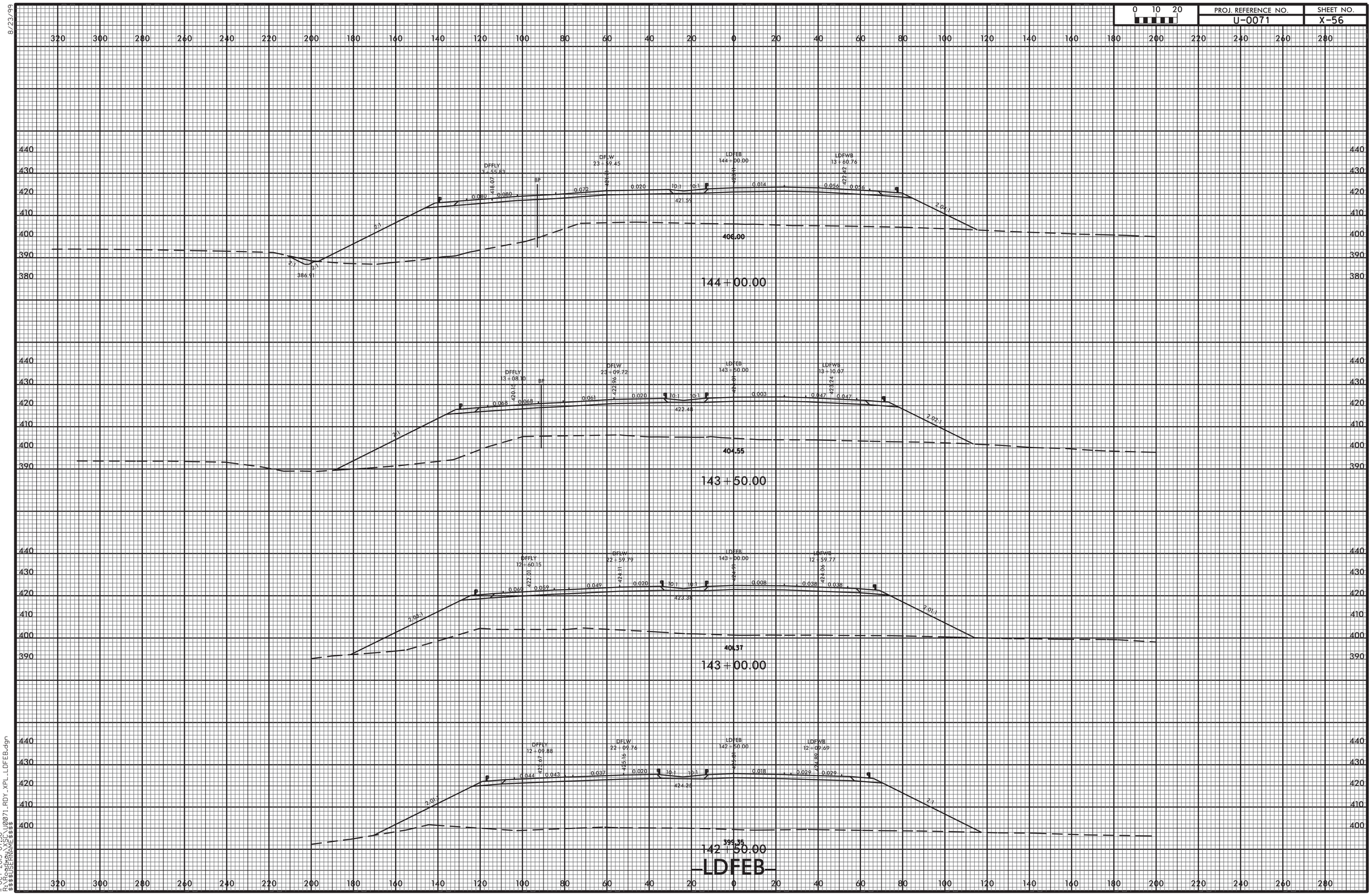
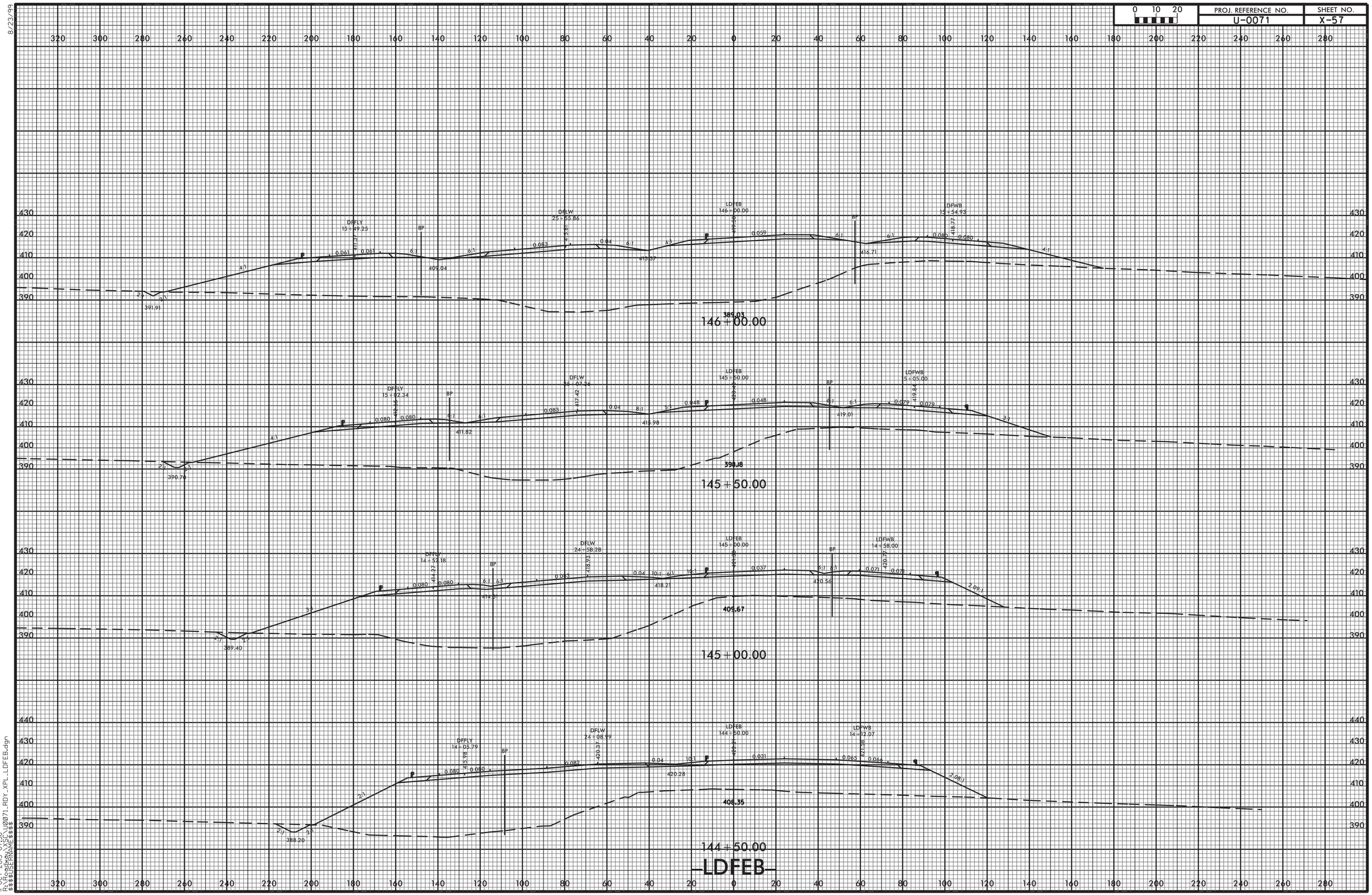

DFFLY
3 + 55.83
DFLW
23 + 59.45
LDFEB
144 + 00.00
LDFWB
13 + 60.76
BP
0.080
0.080
0.072
0.020
10:1
10:1
0.014
0.056
0.056
421.55
406.00
386.91
144 + 00.00
DFFLY
13 + 08.00
DFLW
23 + 09.72
LDFEB
143 + 50.00
LDFWB
13 + 10.07
0.068
0.068
0.061
0.020
0.003
0.047
0.047
422.48
404.55
143 + 50.00
DFFLY
12 + 60.15
DFLW
22 + 59.79
LDFEB
143 + 00.00
LDFWB
12 + 59.77
0.060
0.059
0.049
0.020
0.008
0.038
0.038
423.38
406.37
143 + 00.00
DFFLY
12 + 09.88
DFLW
22 + 09.76
LDFEB
142 + 50.00
LDFWB
12 + 09.69
0.044
0.043
0.037
0.020
0.018
0.029
0.029
424.25
399.35
142 + 50.00
LDFEB

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-57 |

0 10 20

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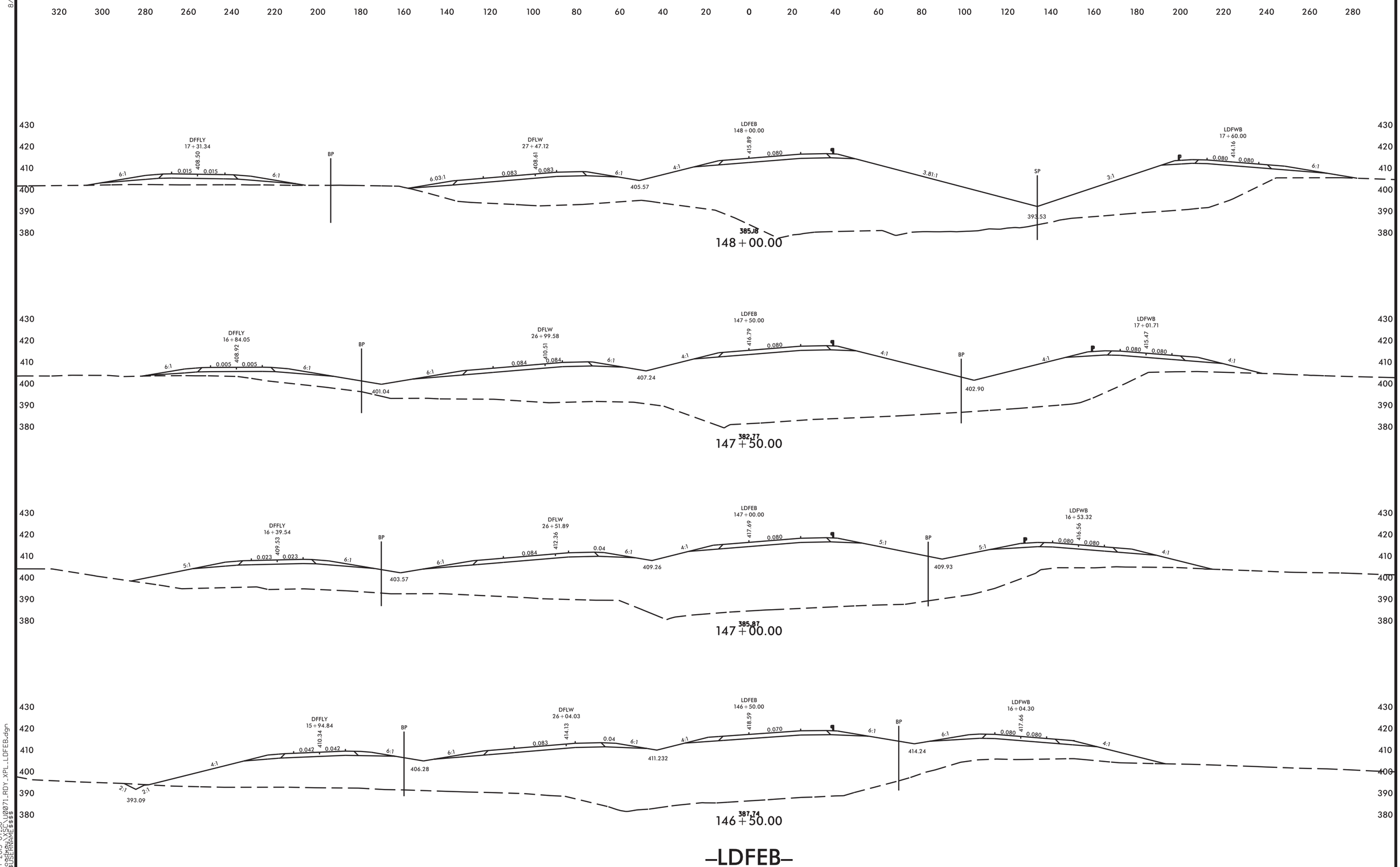
| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-58 |




# –LDFEB–

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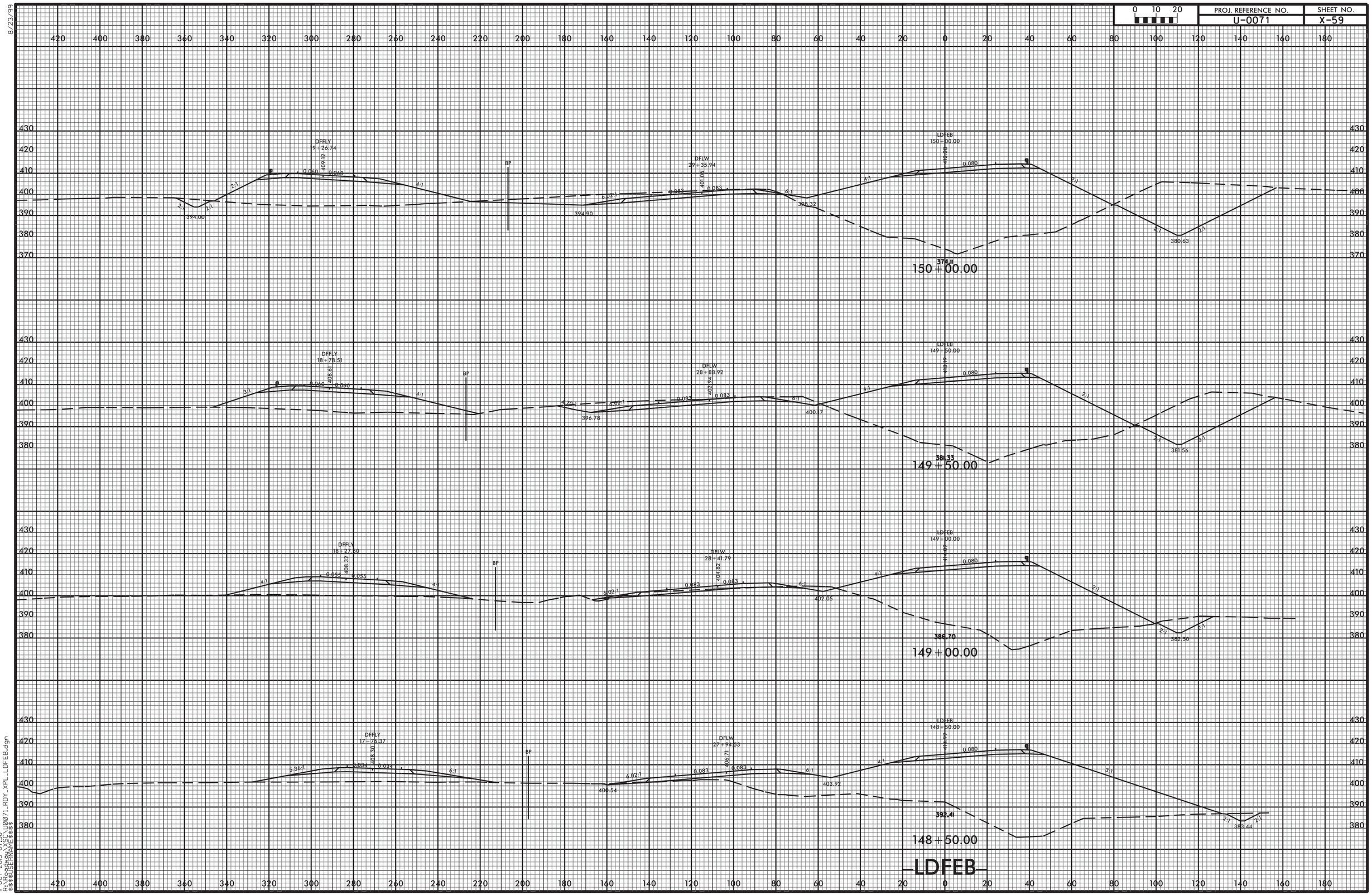


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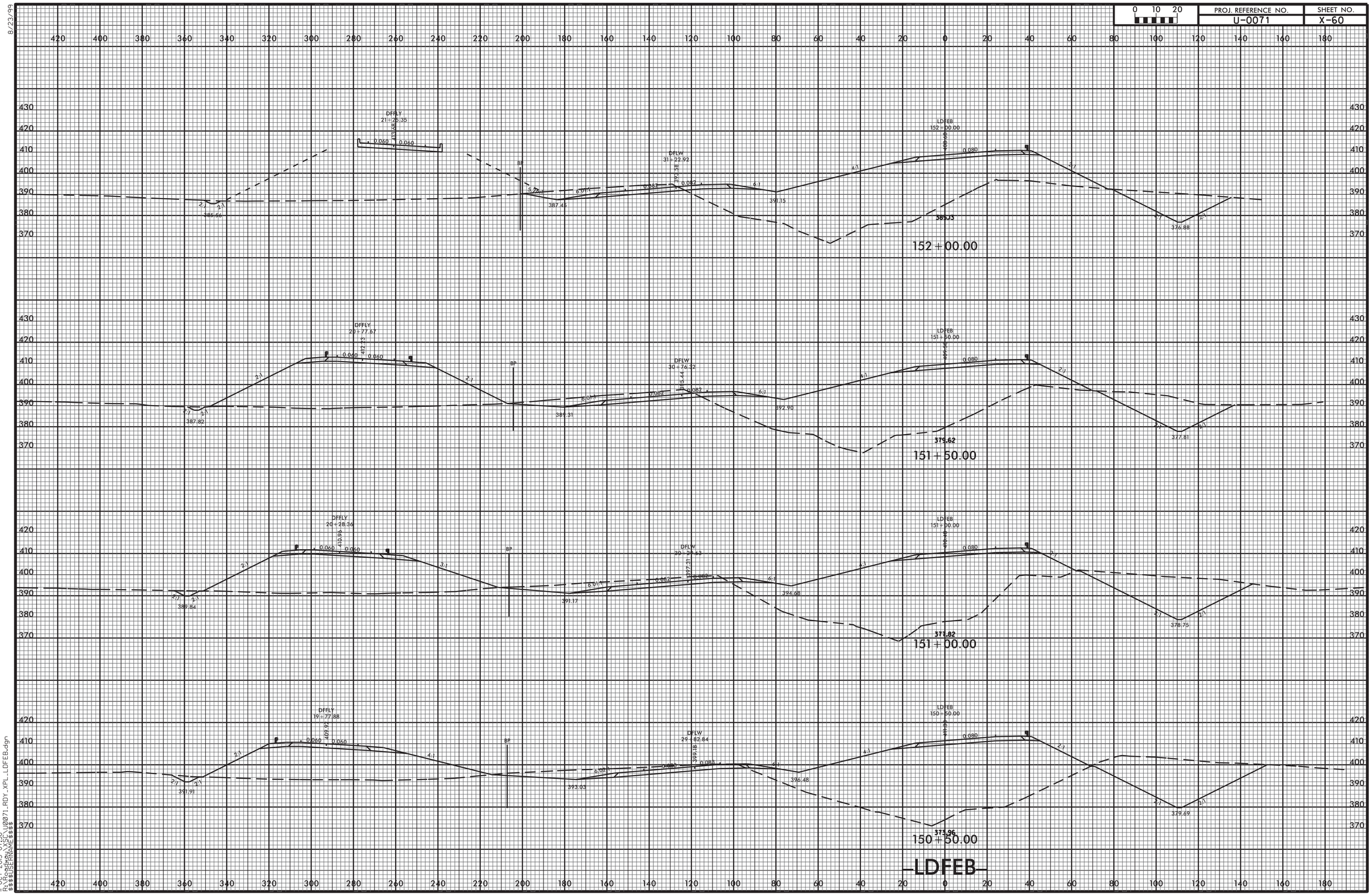
| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-60 |

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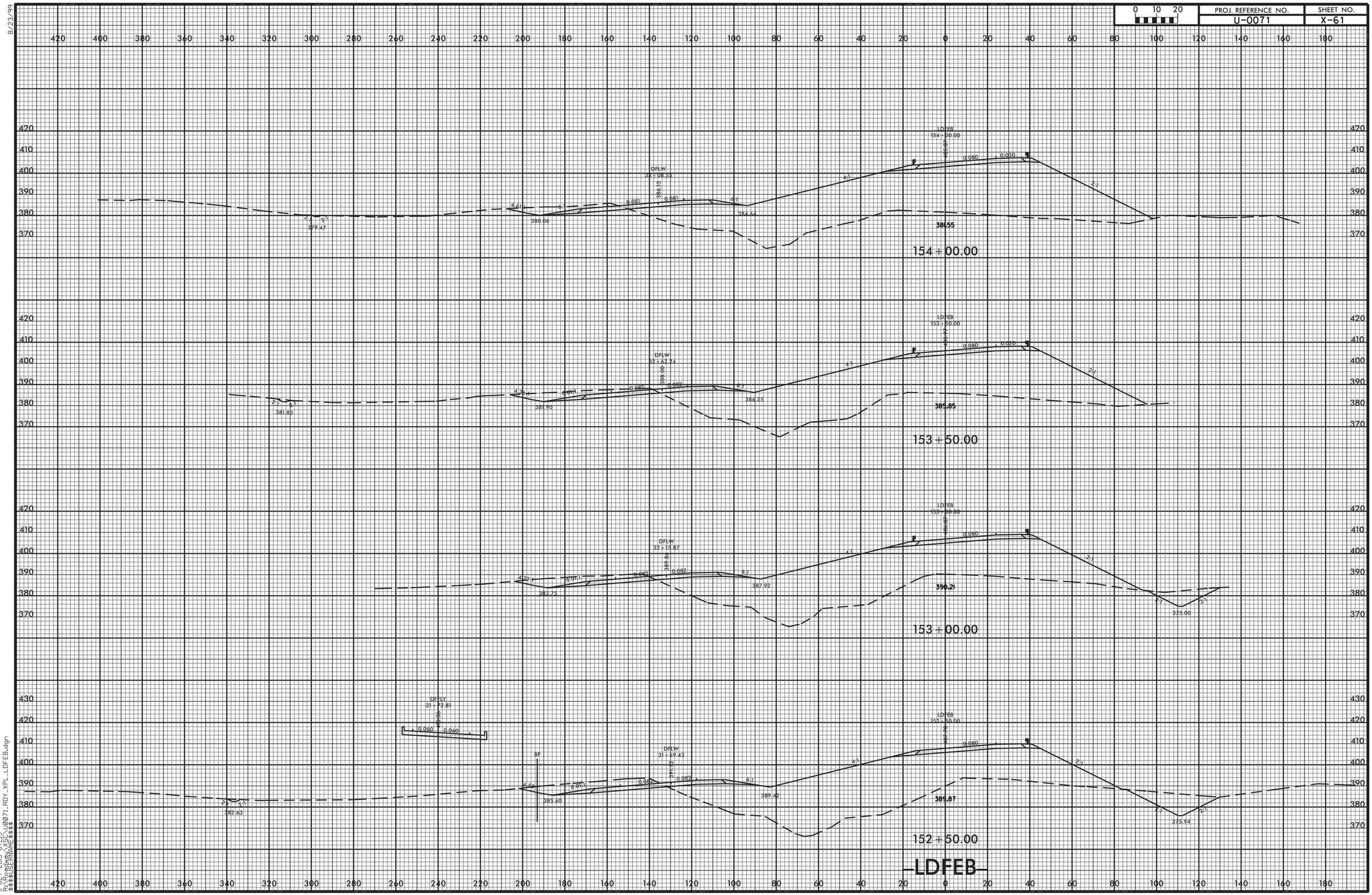
| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | X-61 |

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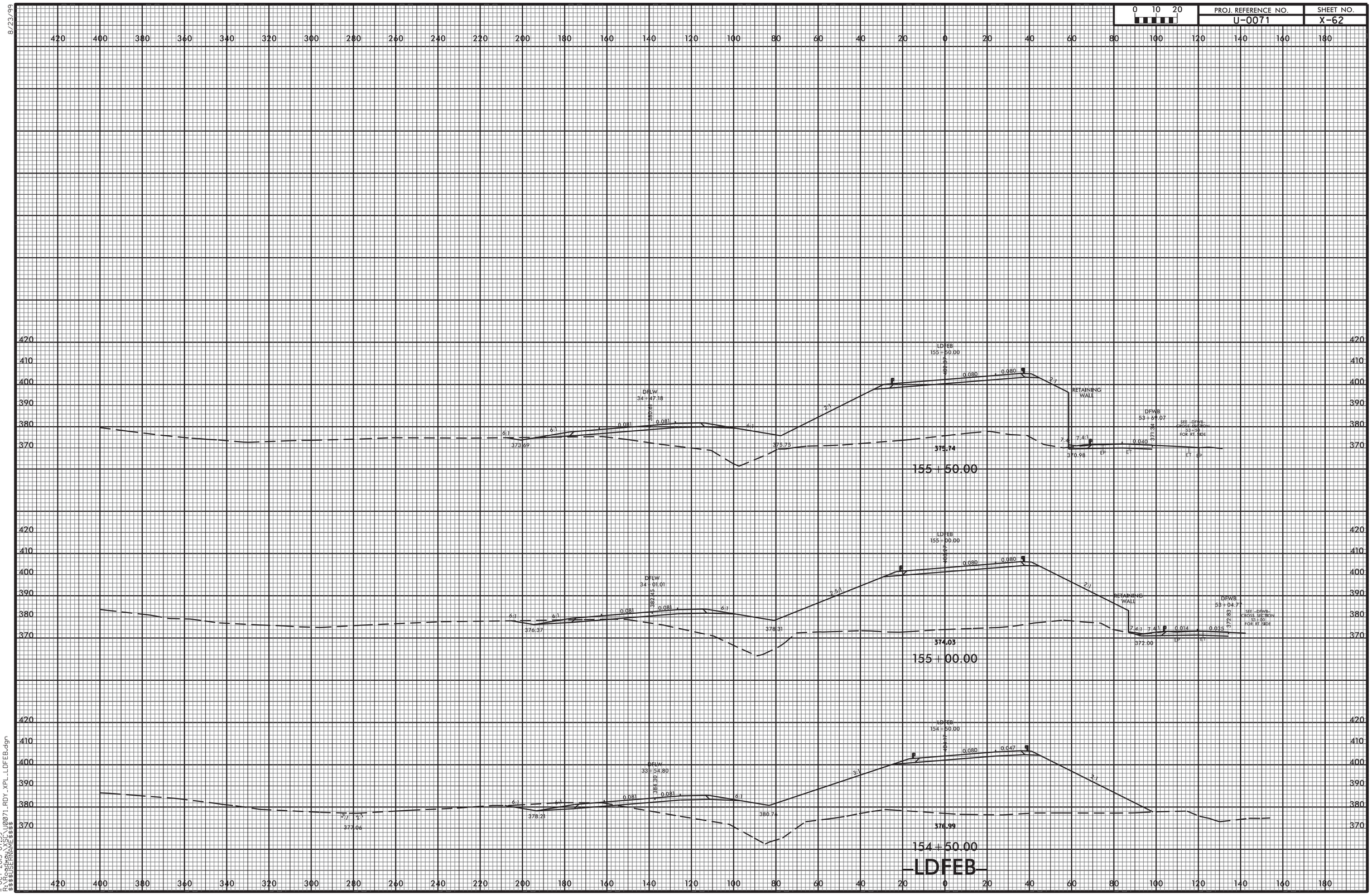


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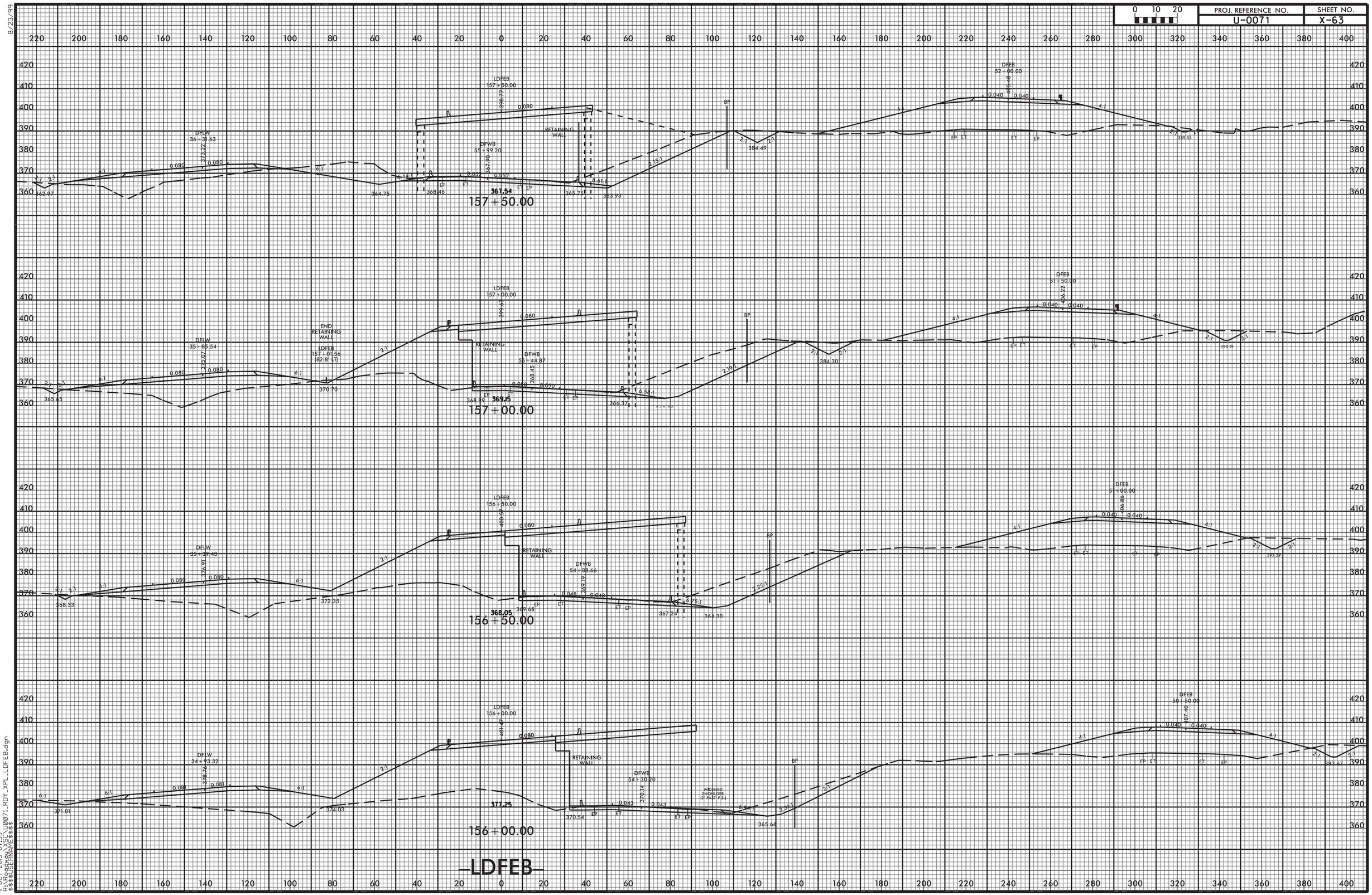


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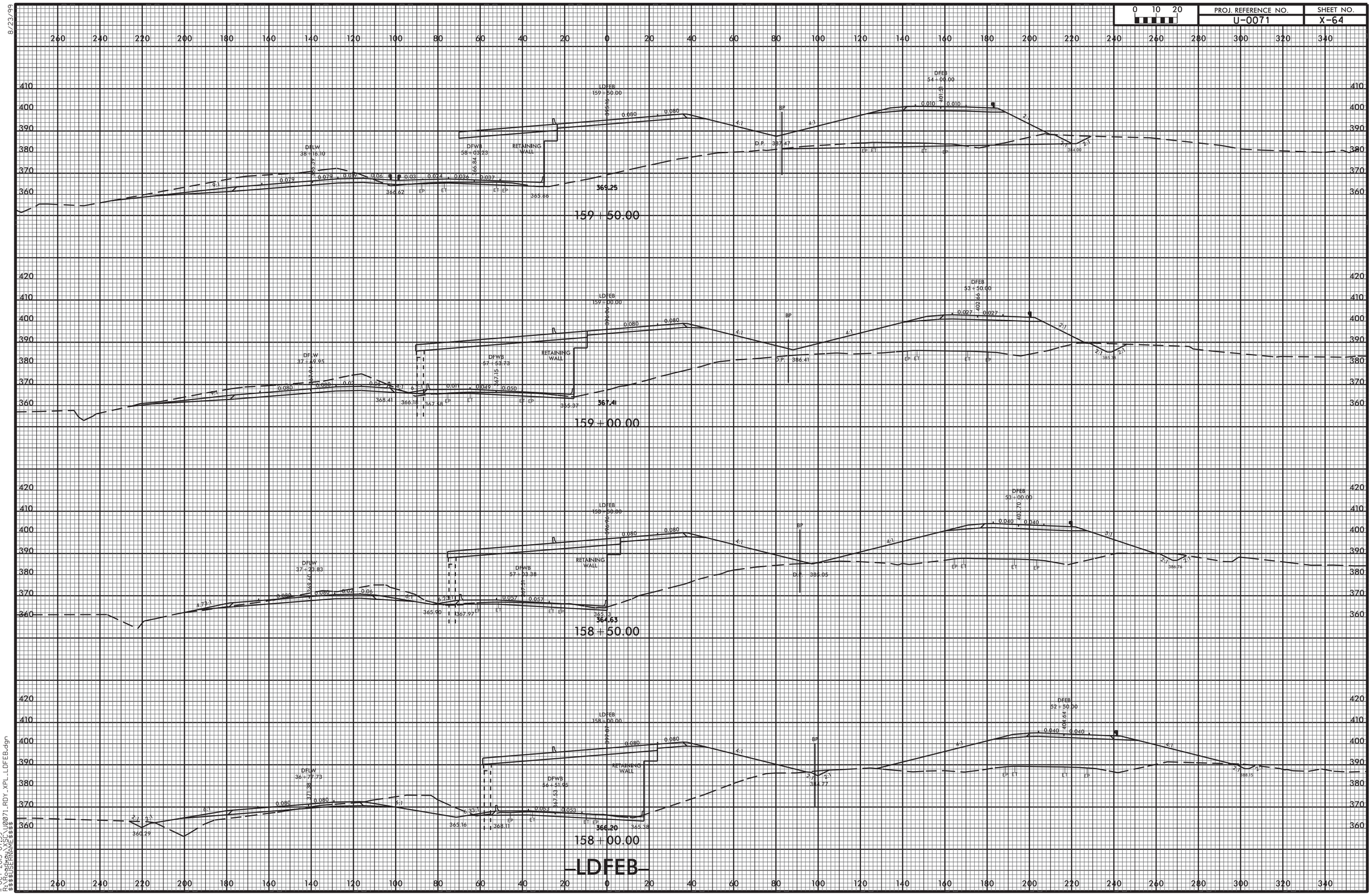


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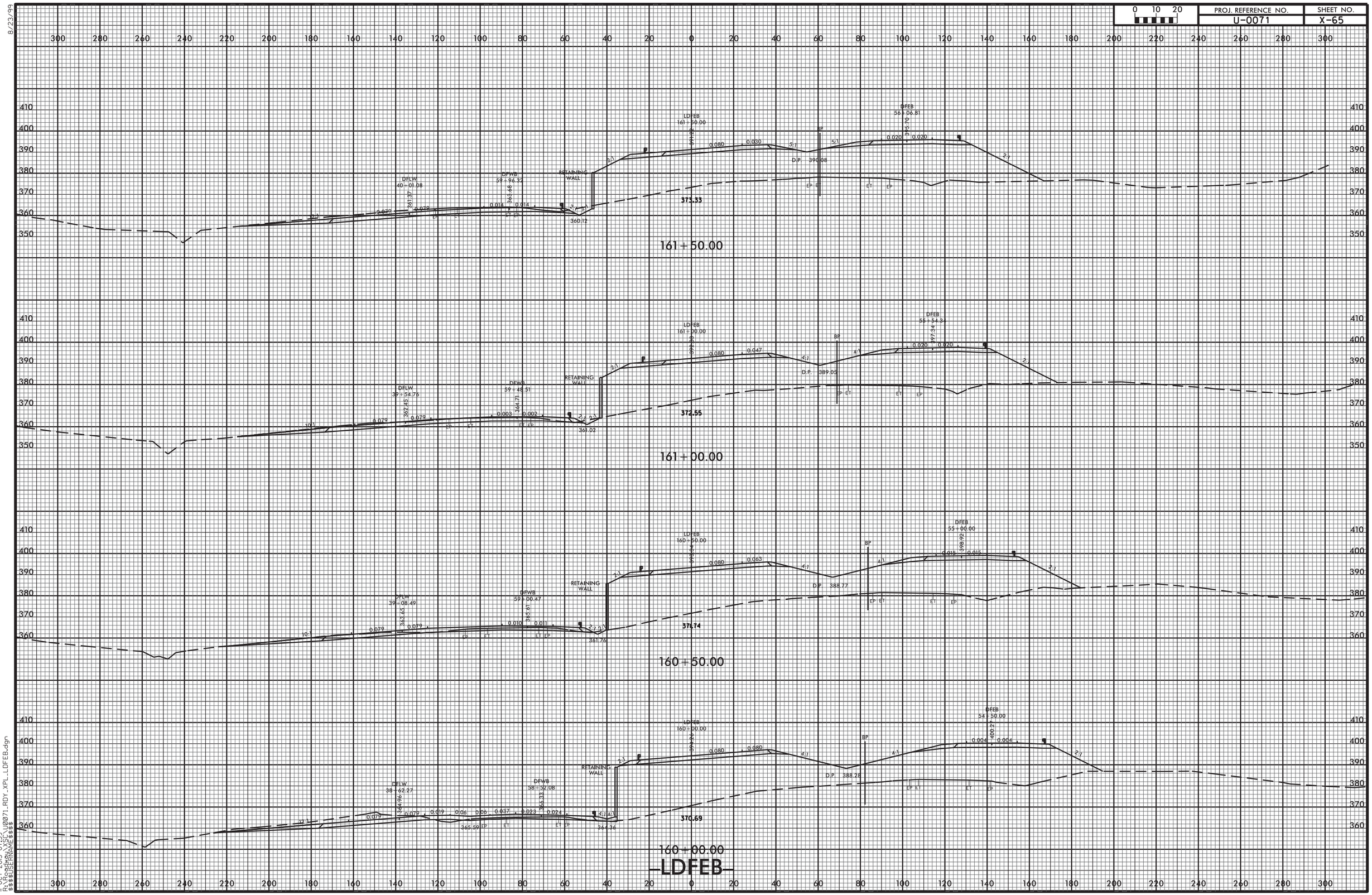


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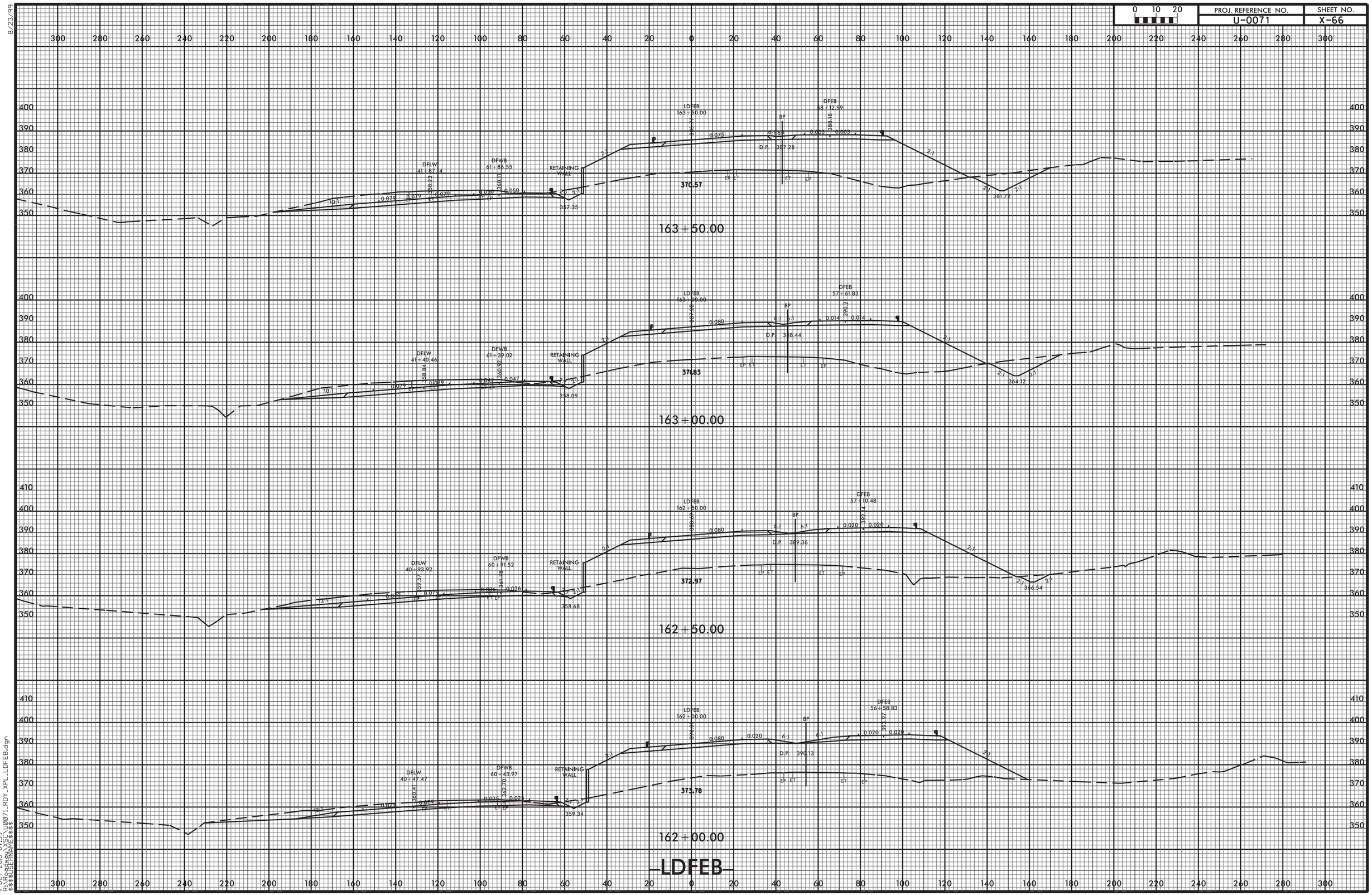


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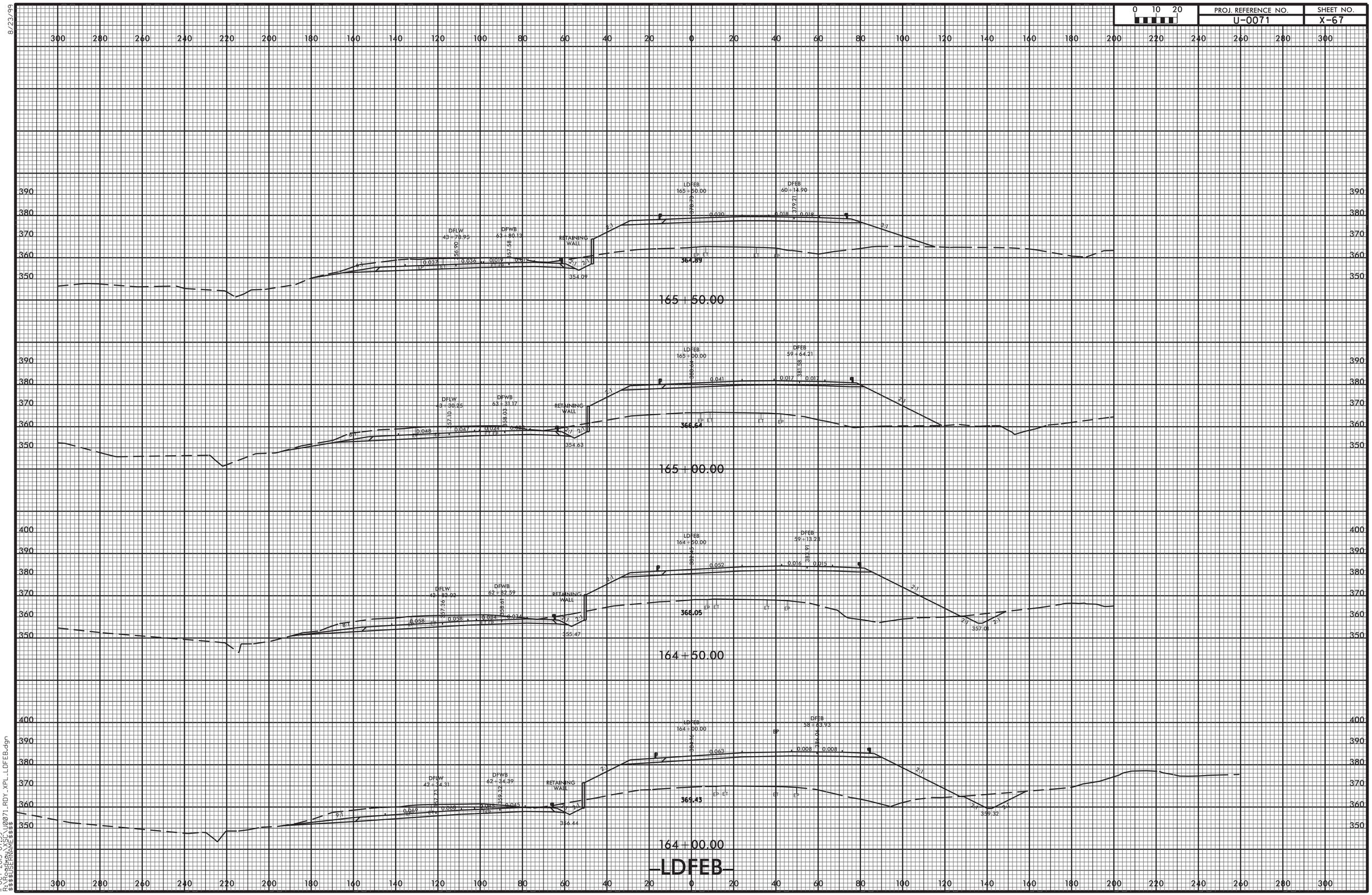


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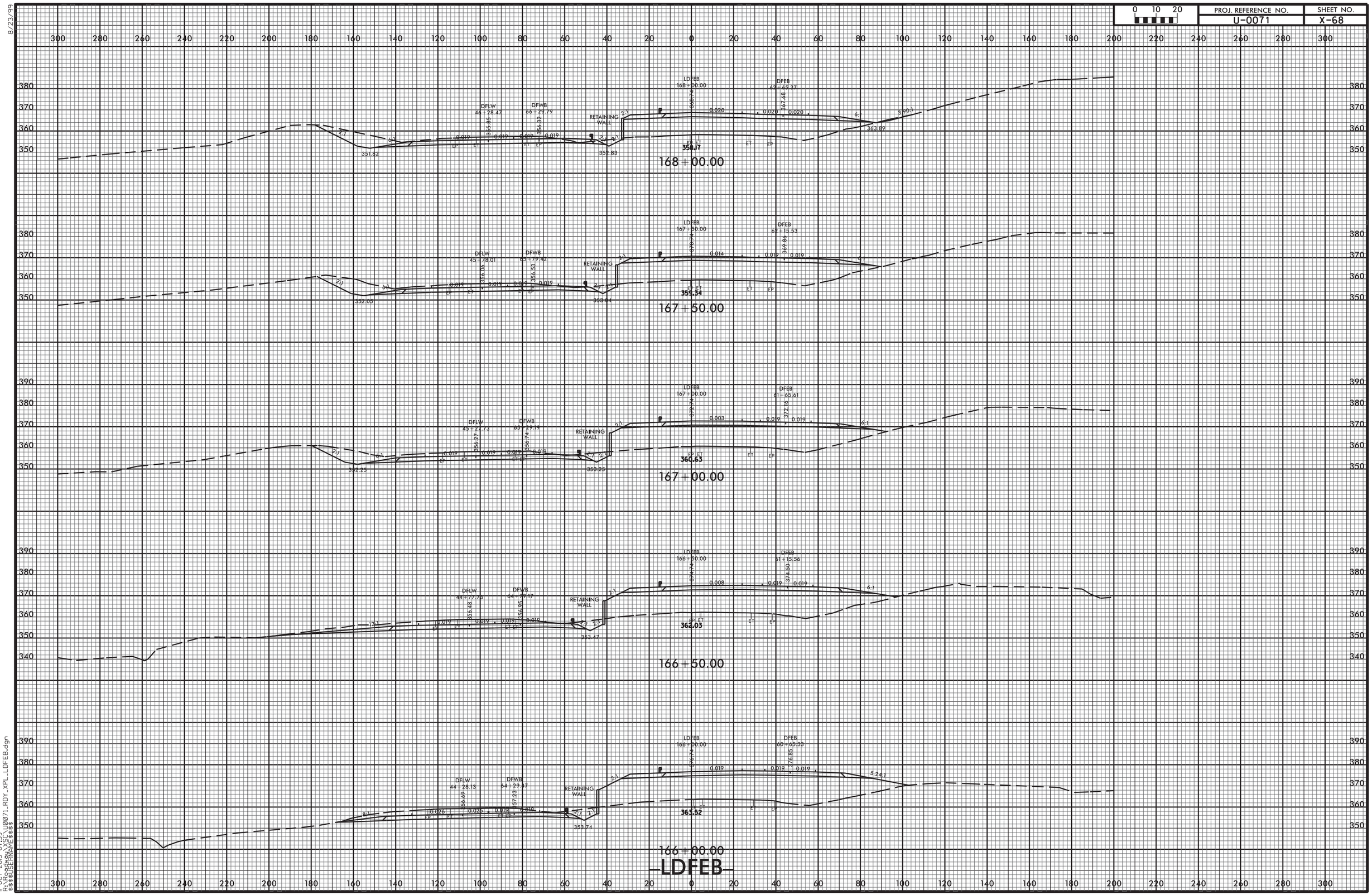


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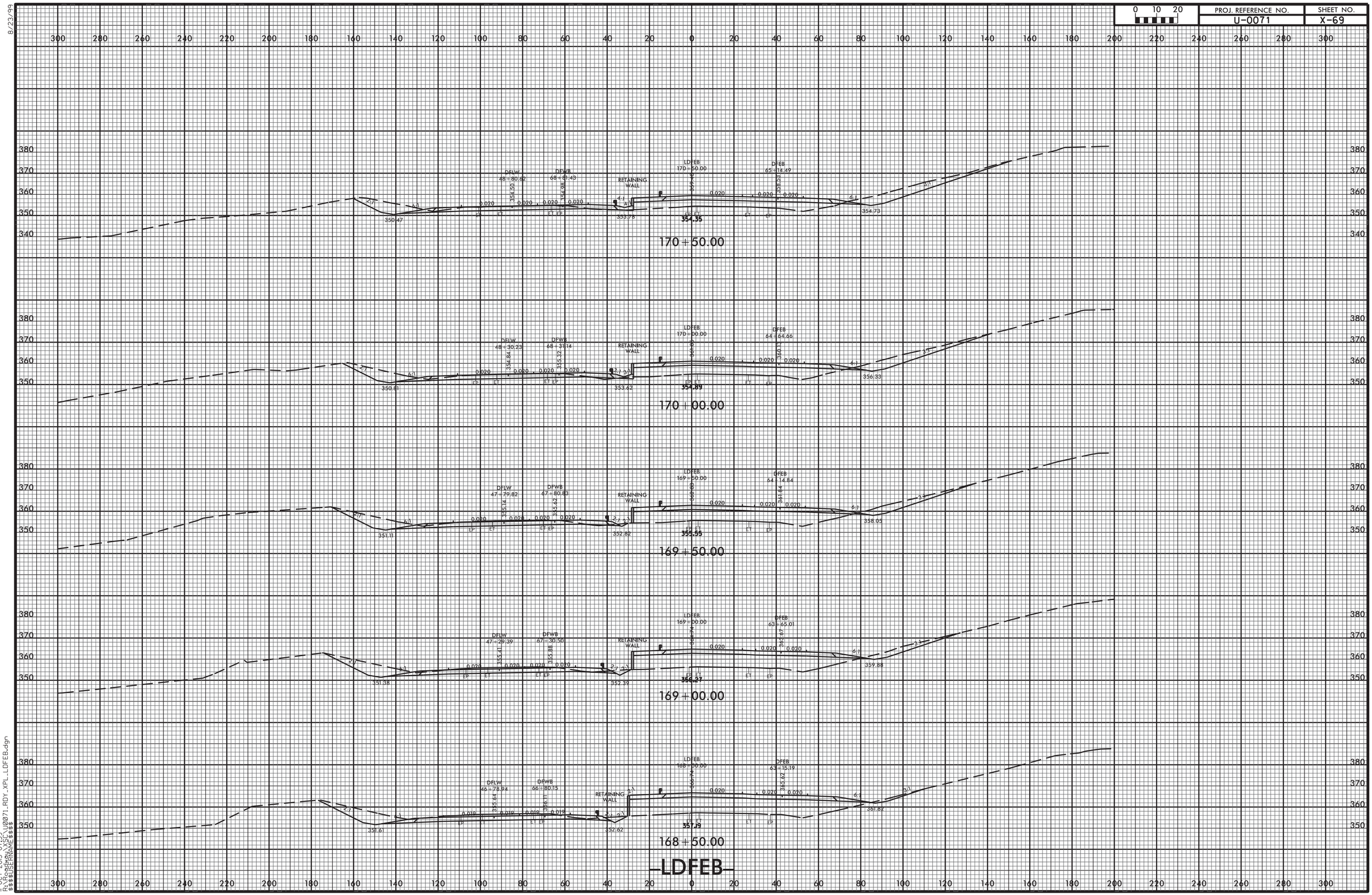


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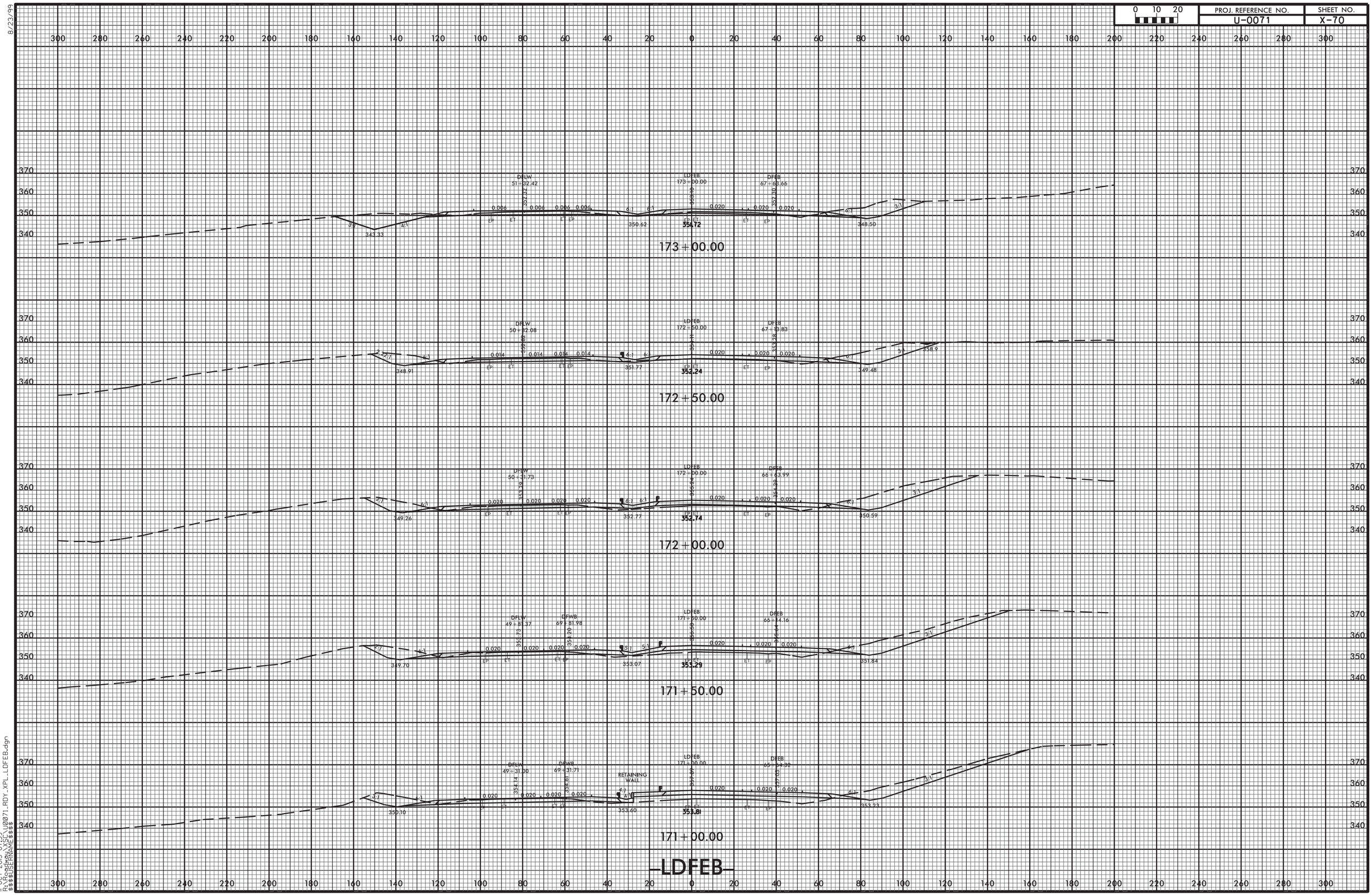


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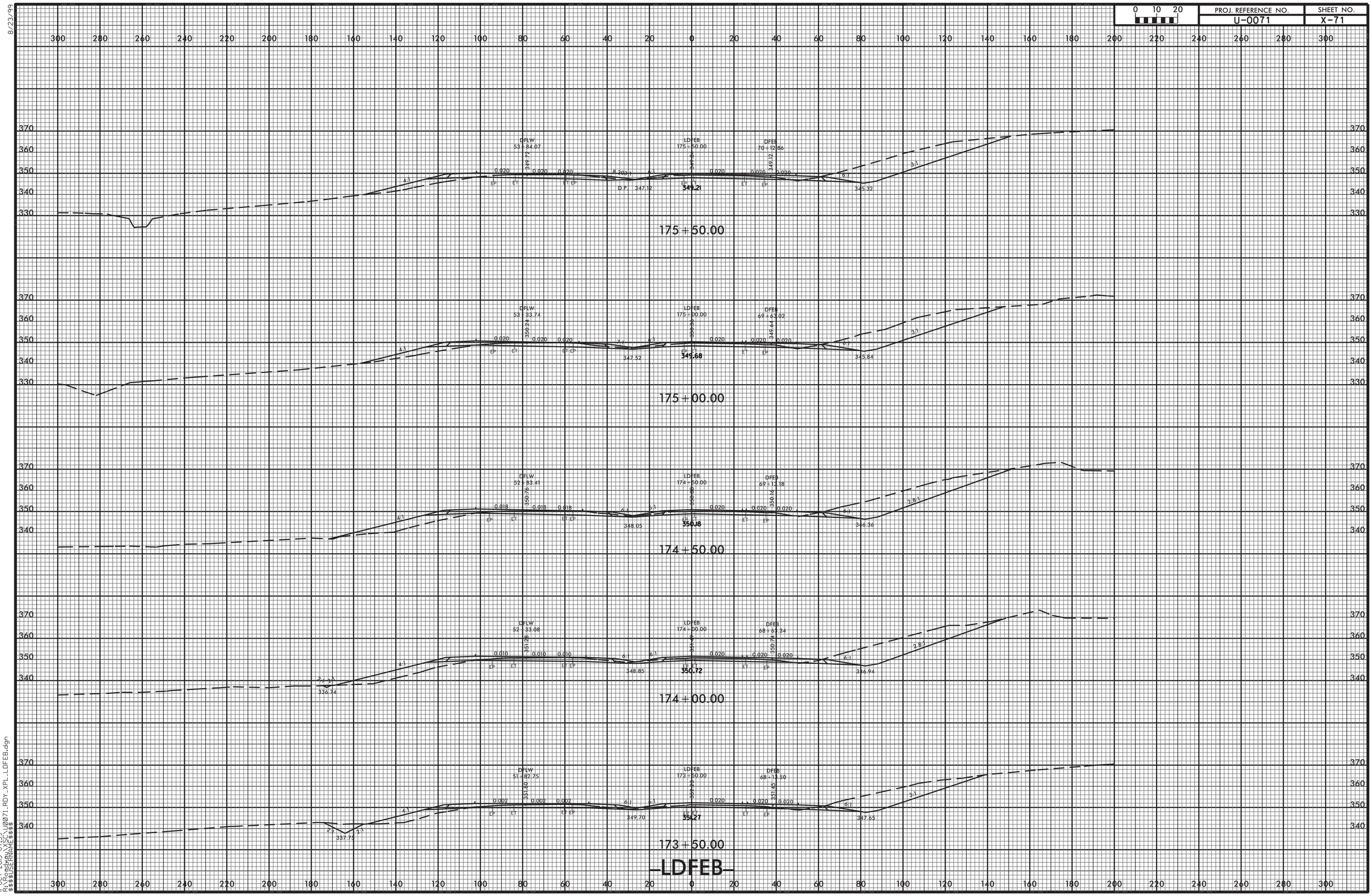


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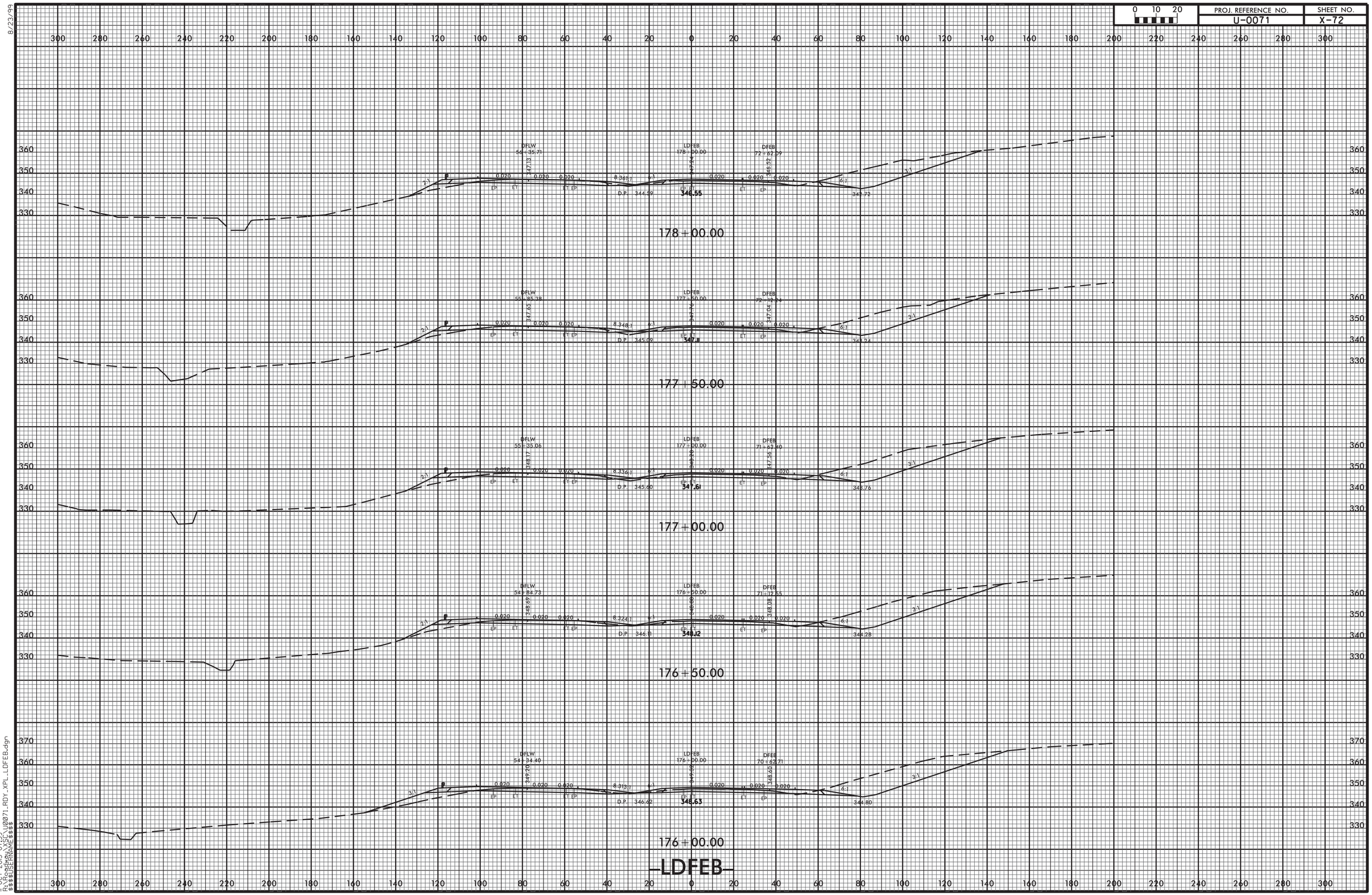


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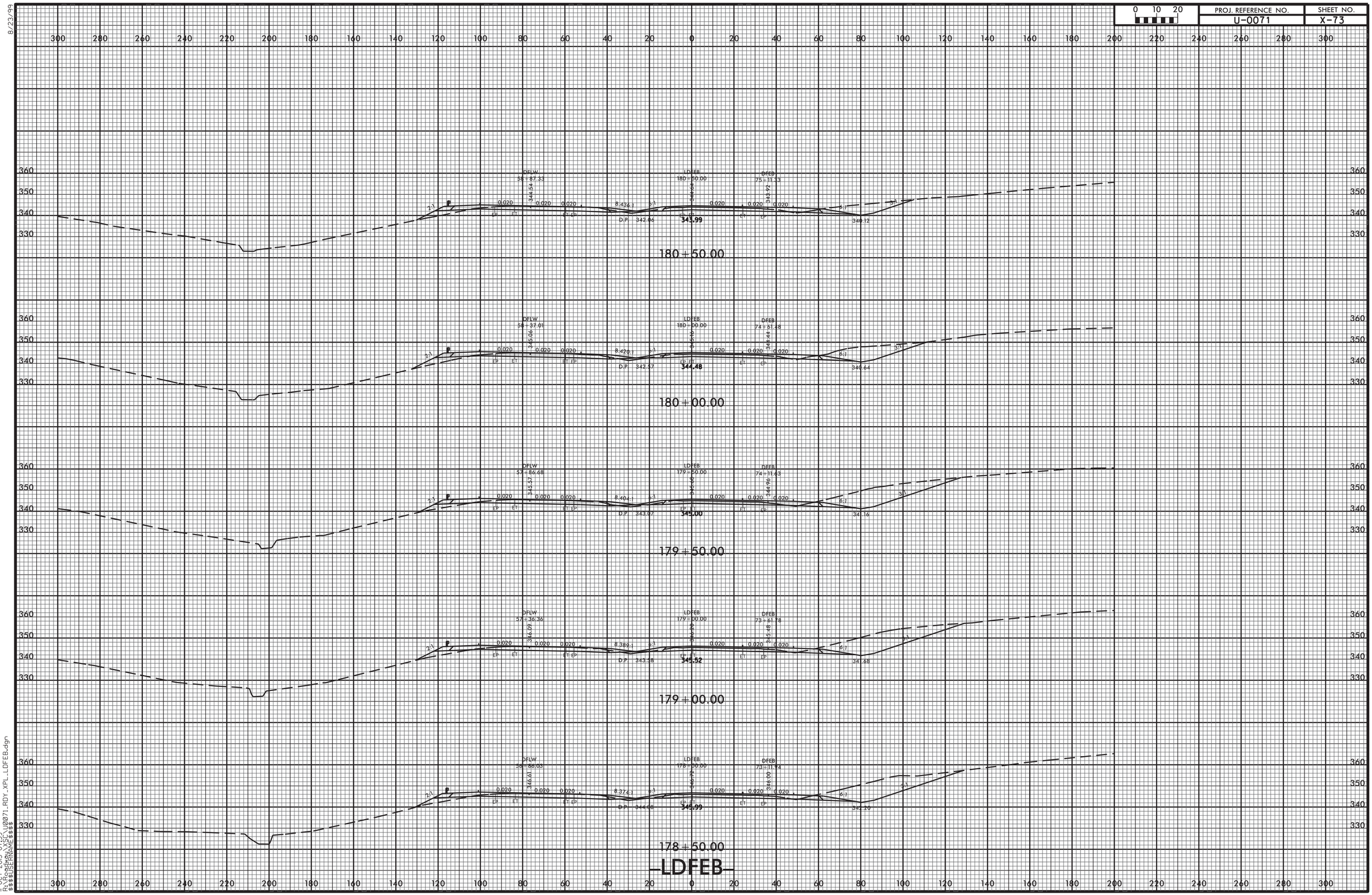


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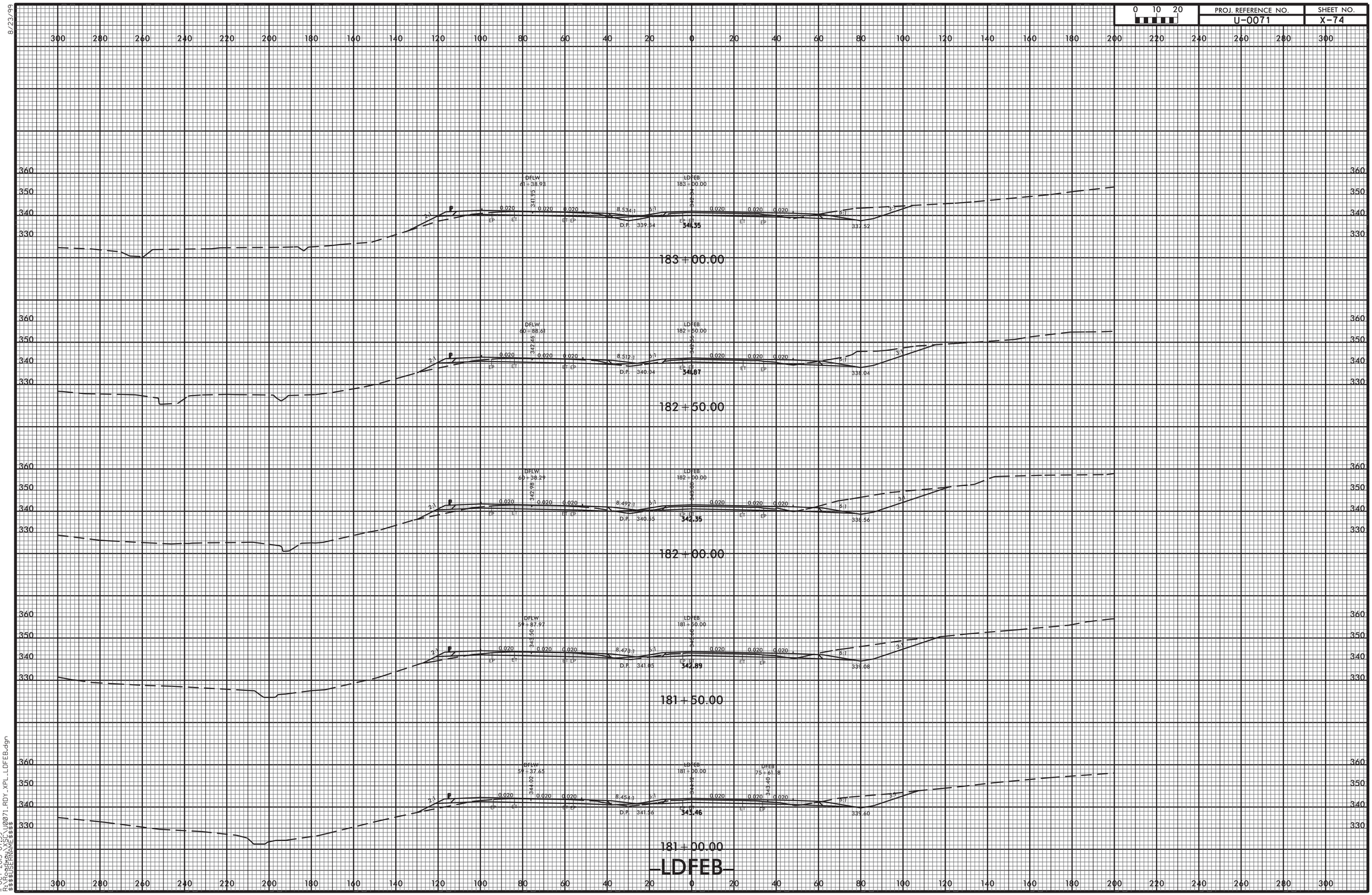


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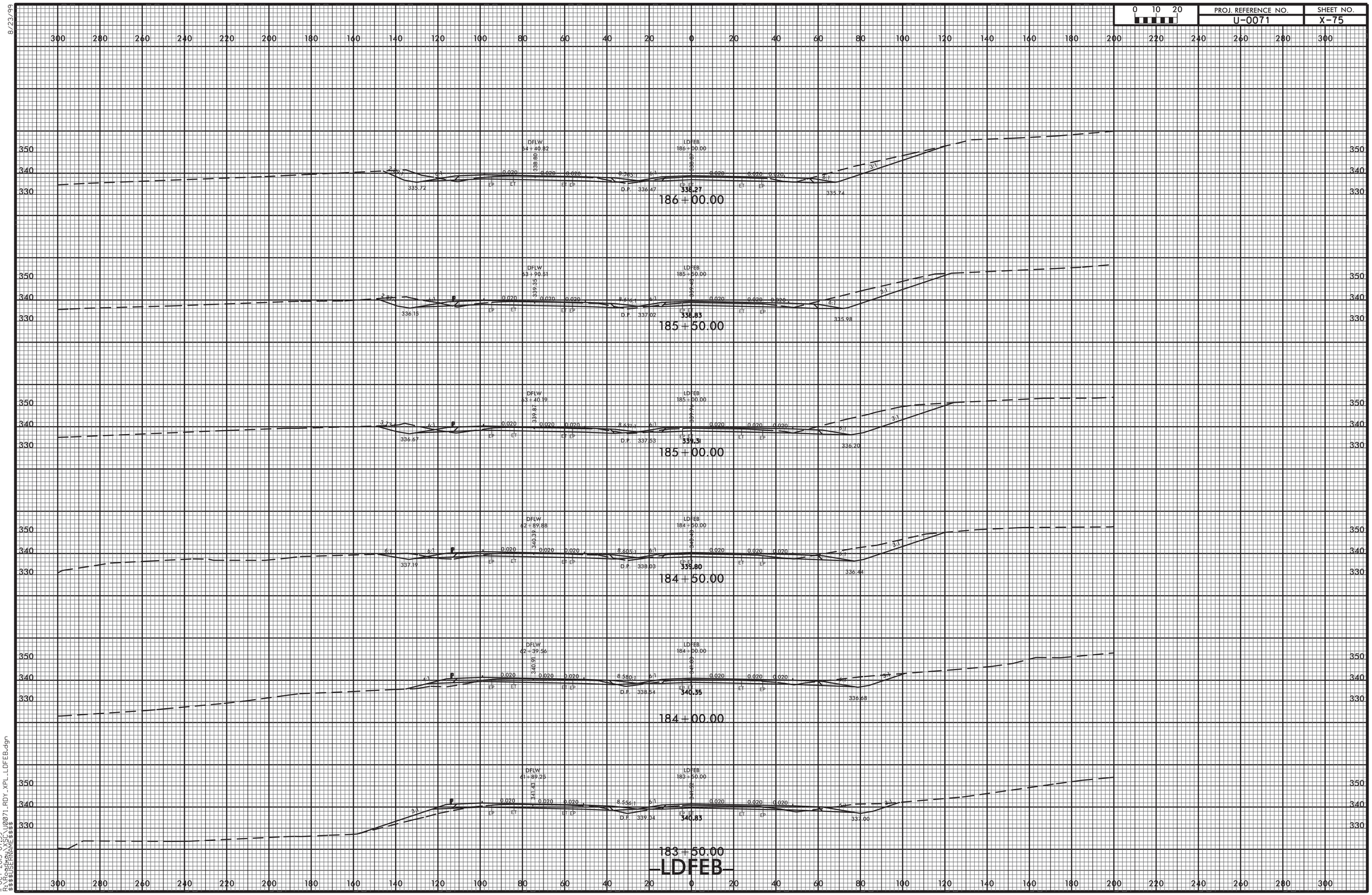


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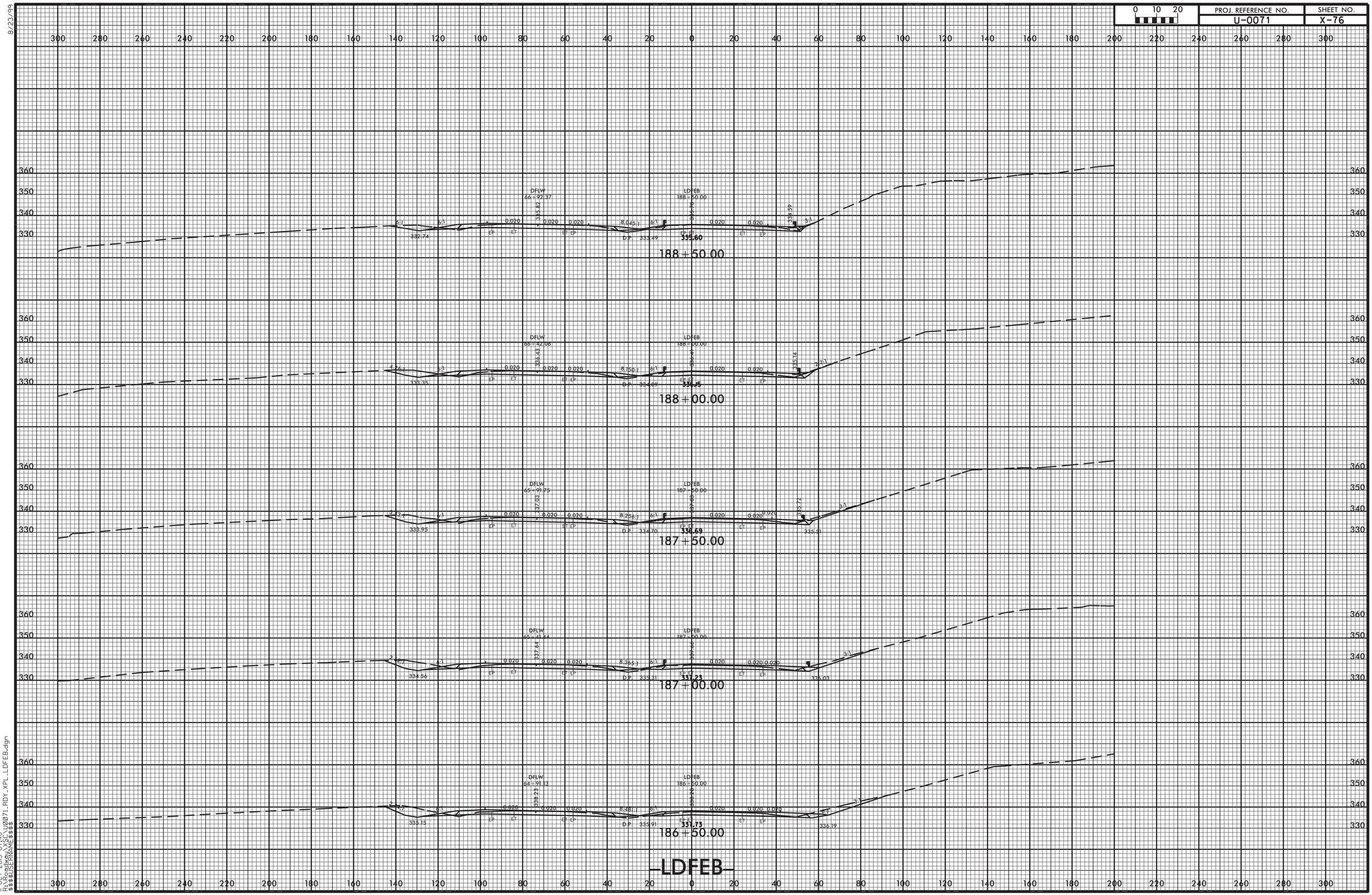


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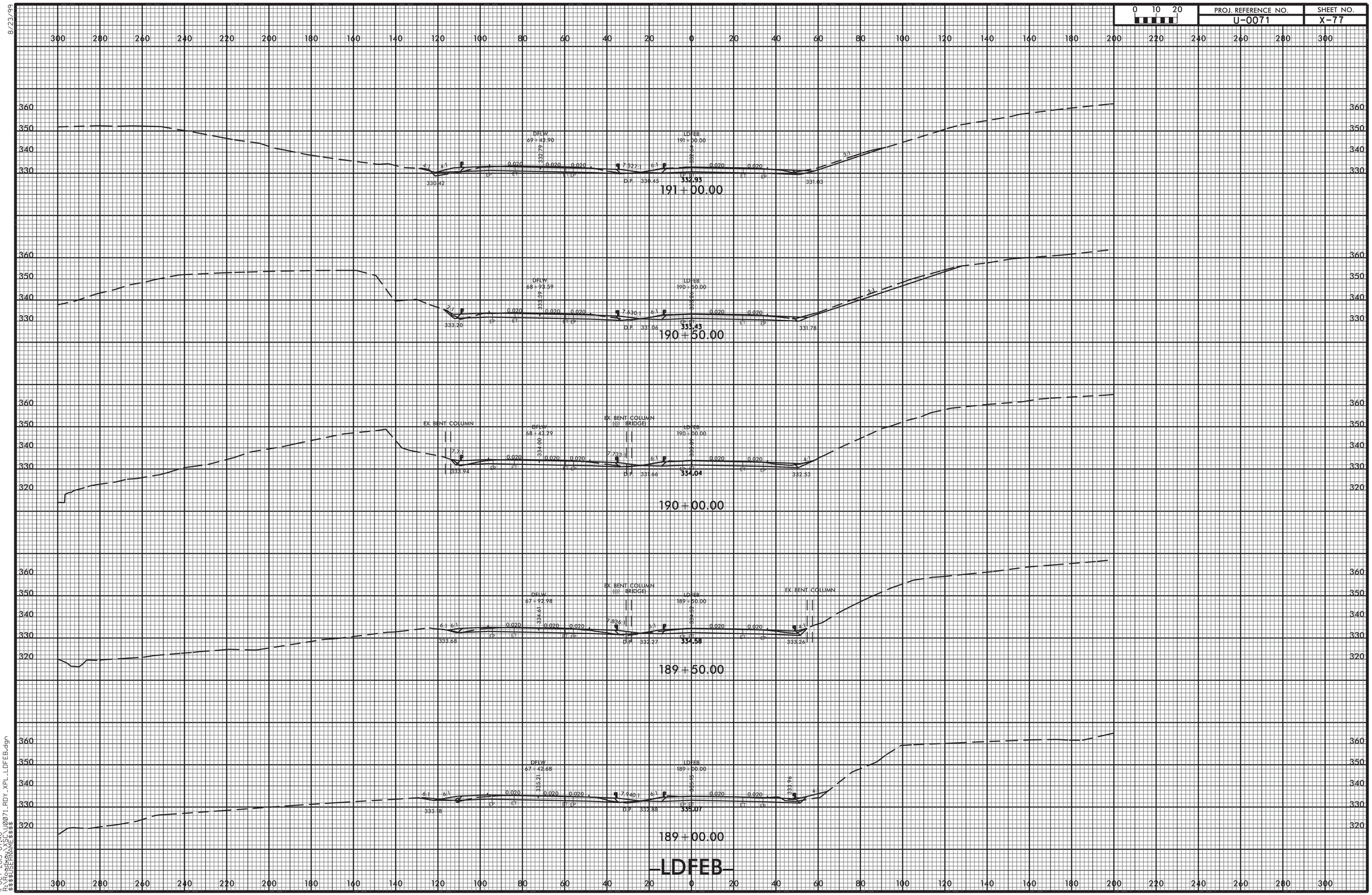


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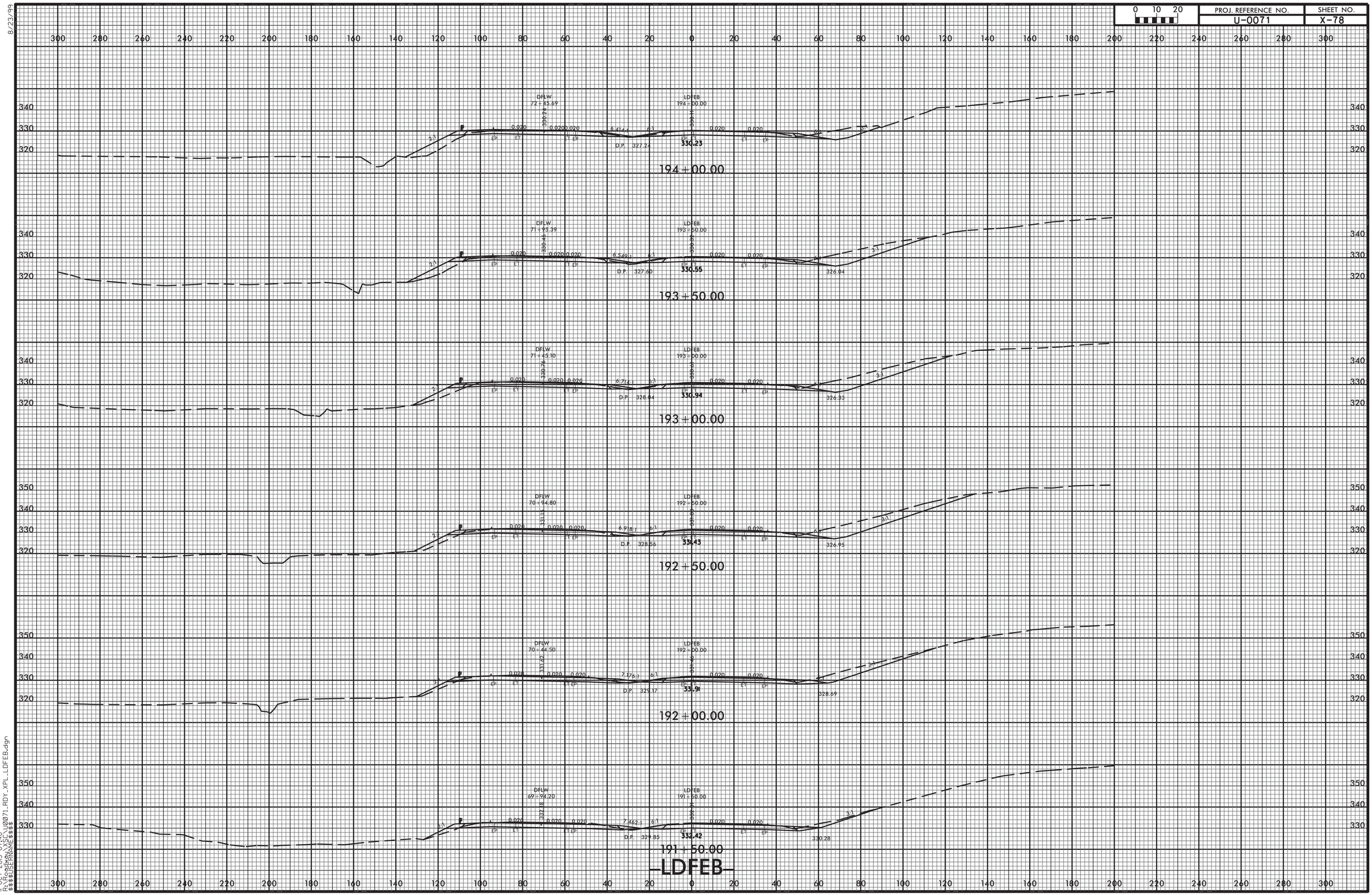


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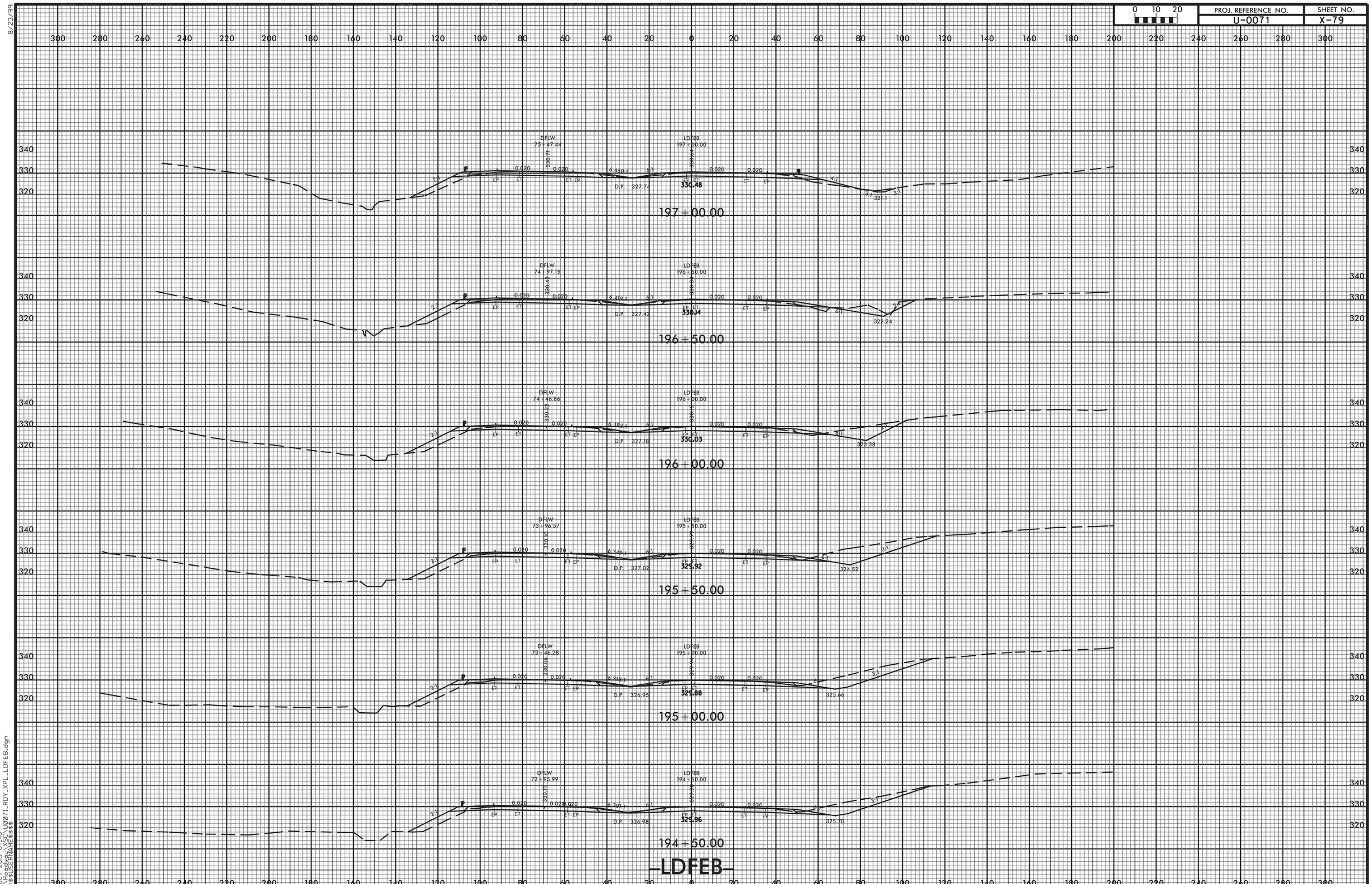
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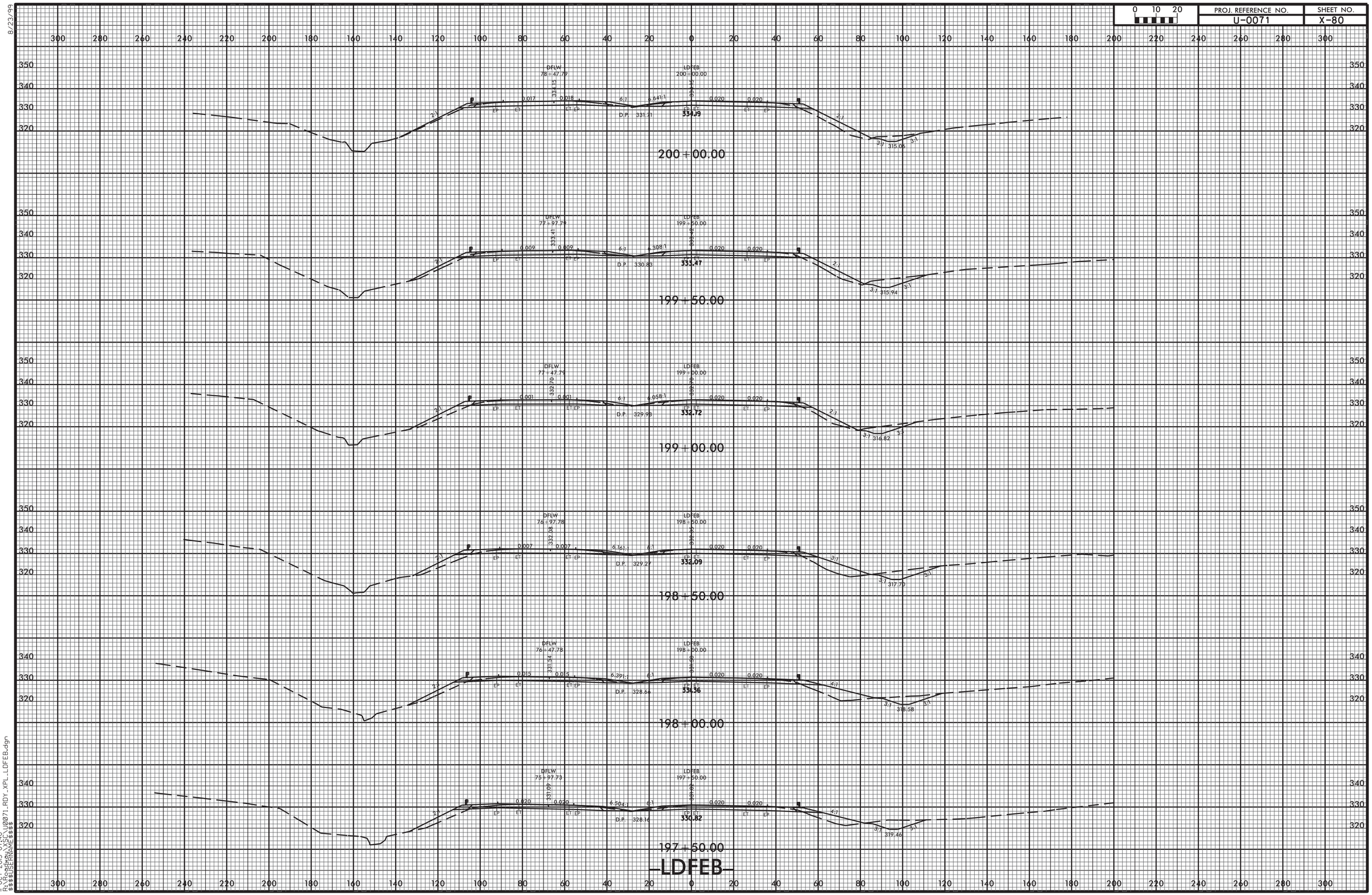


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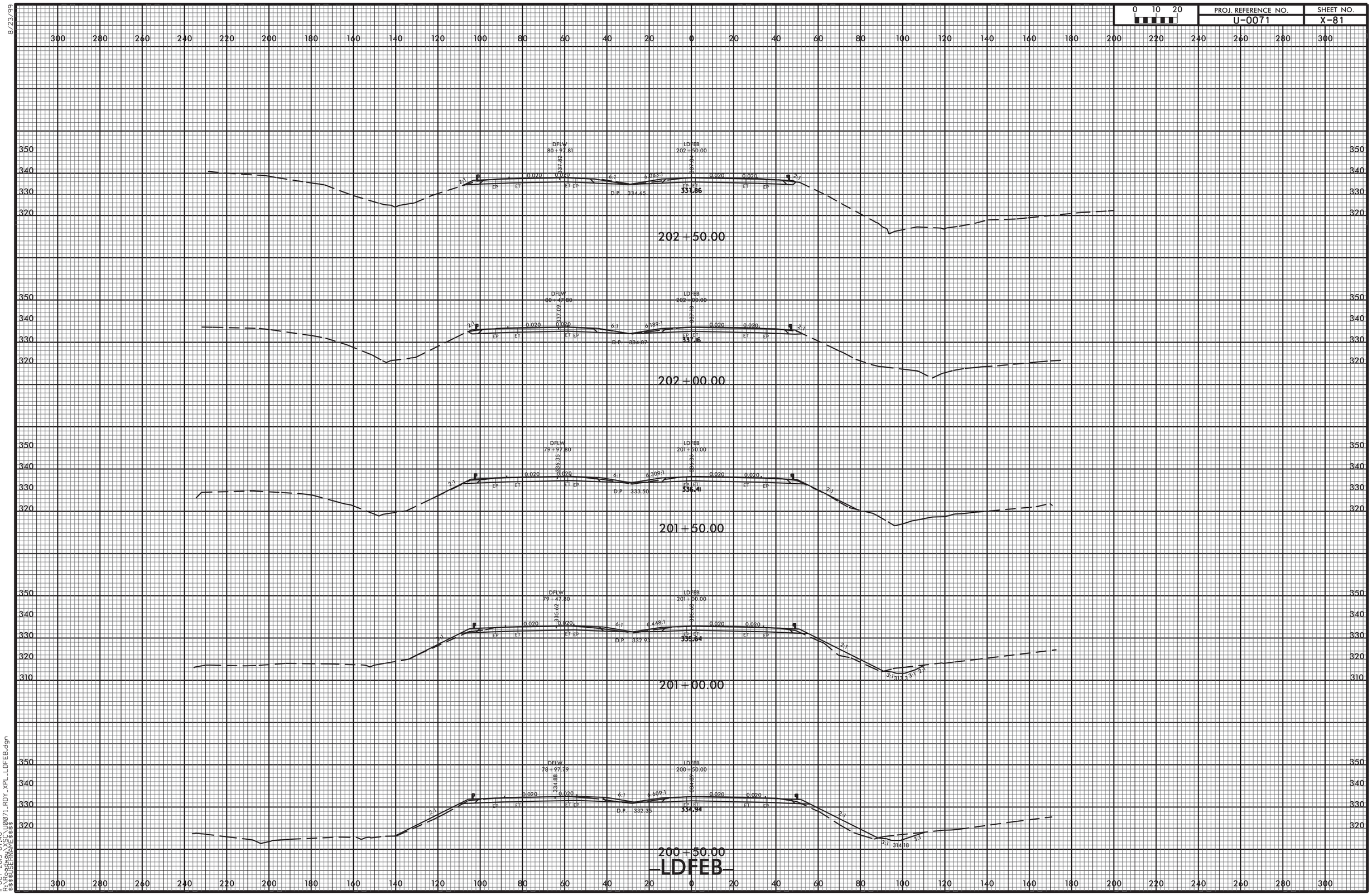


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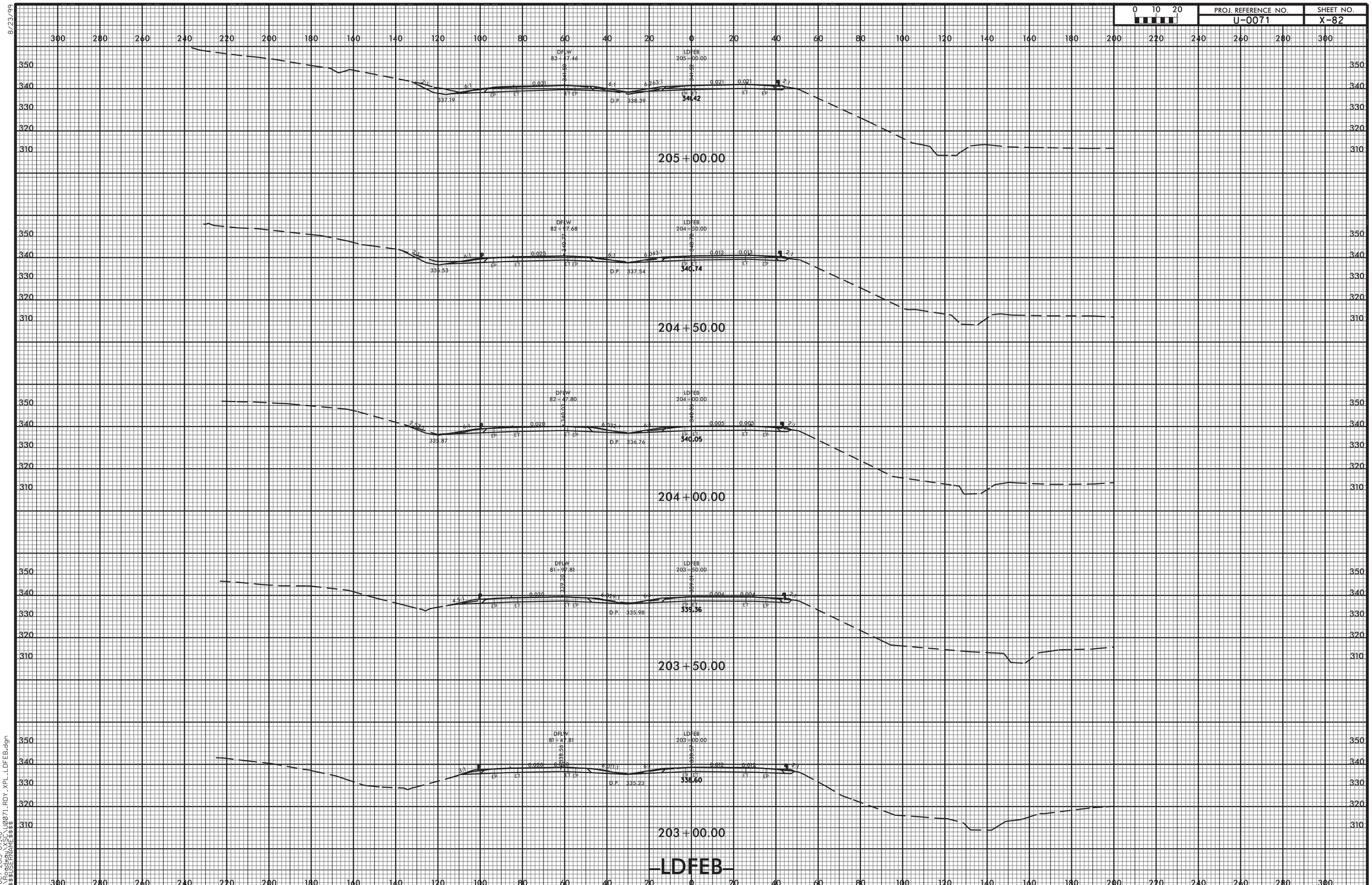


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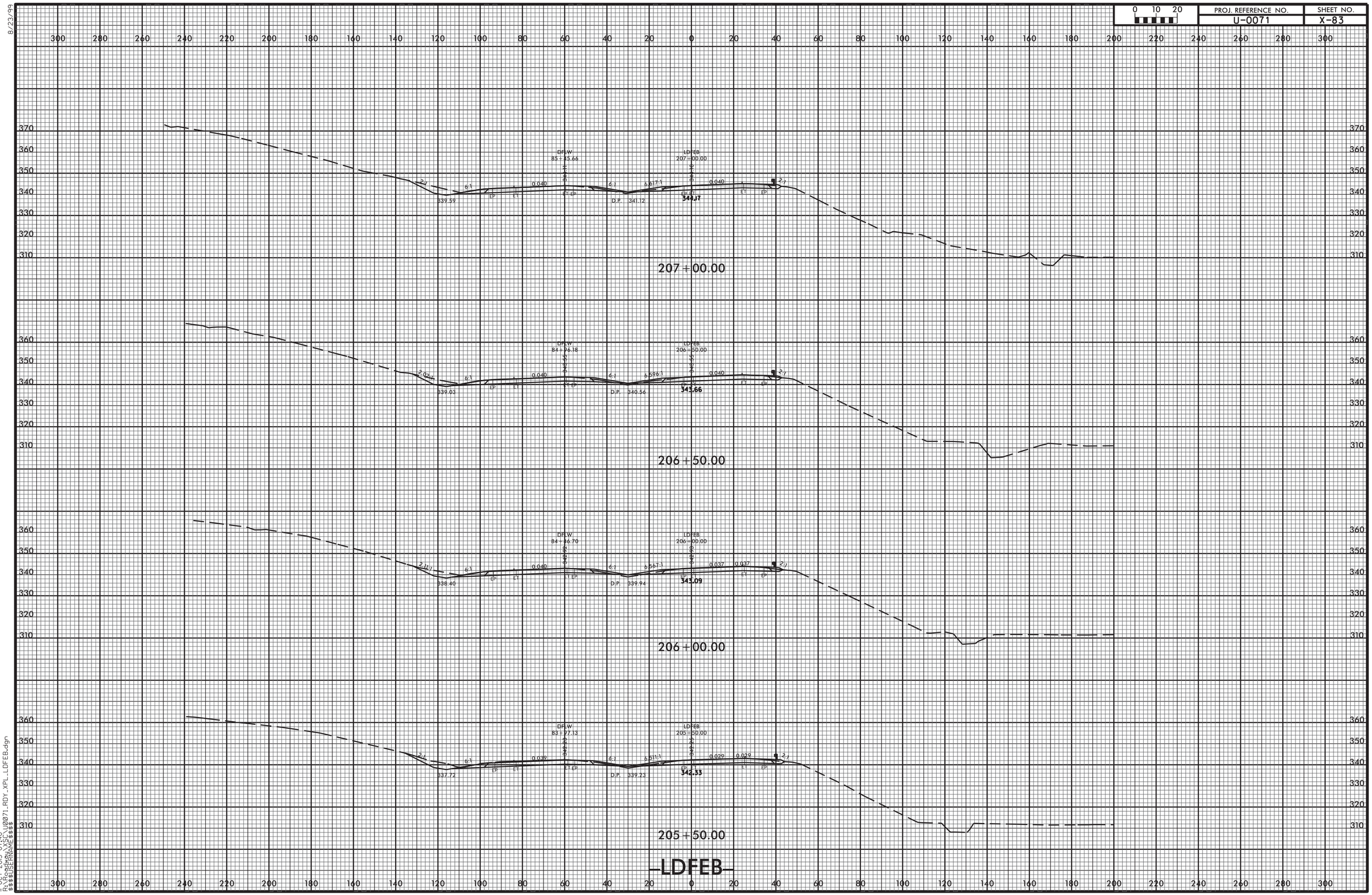
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DF.W
85+15.66
LD.FEB
207+00.00
339.59
D.P. 341.12
344.17
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DF.W
84+96.18
LD.FEB
206+50.00
339.03
D.P. 340.56
343.66
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DF.W
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LD.FEB
206+00.00
338.40
D.P. 339.94
343.09
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LD.FEB
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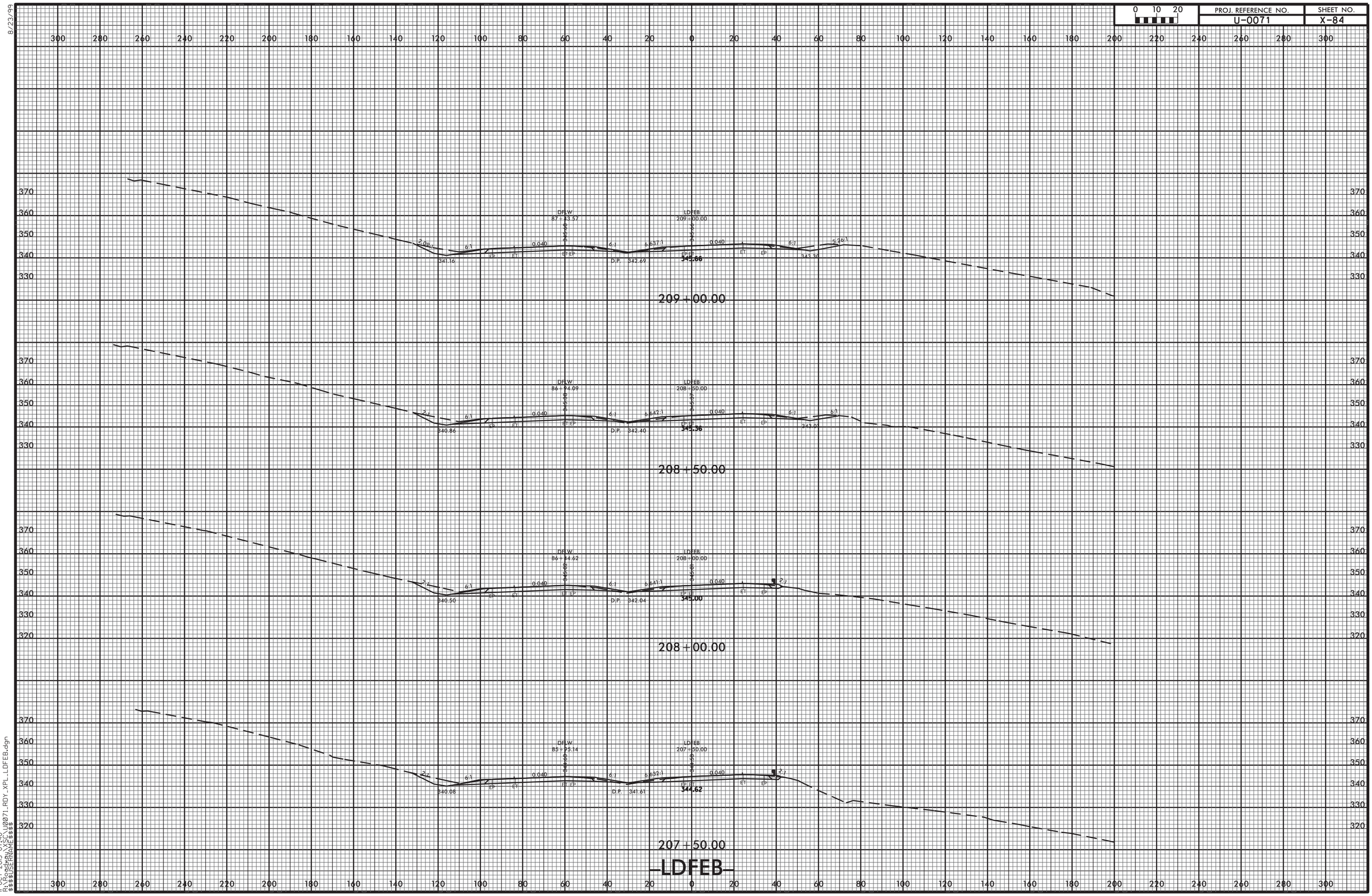


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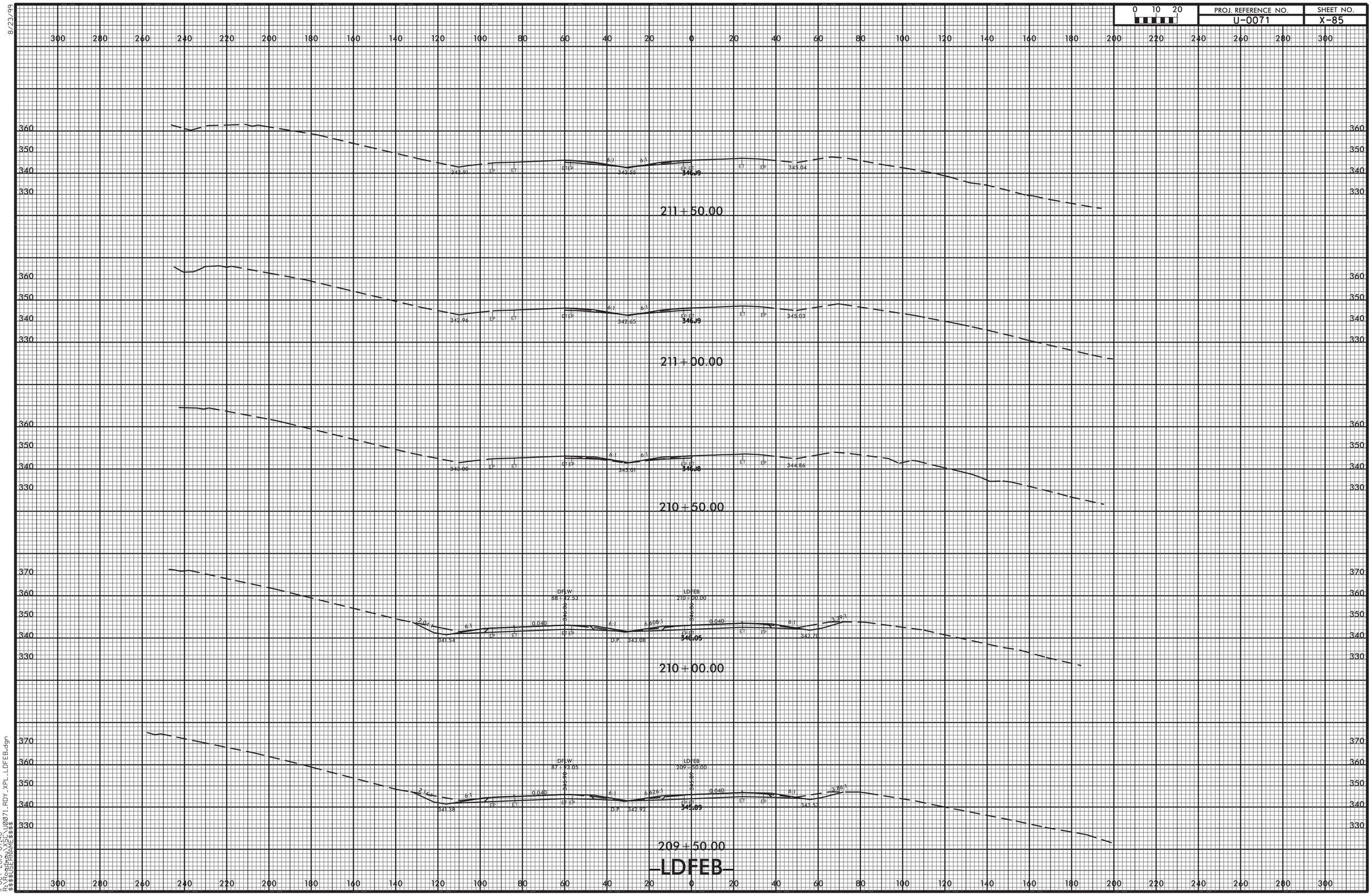


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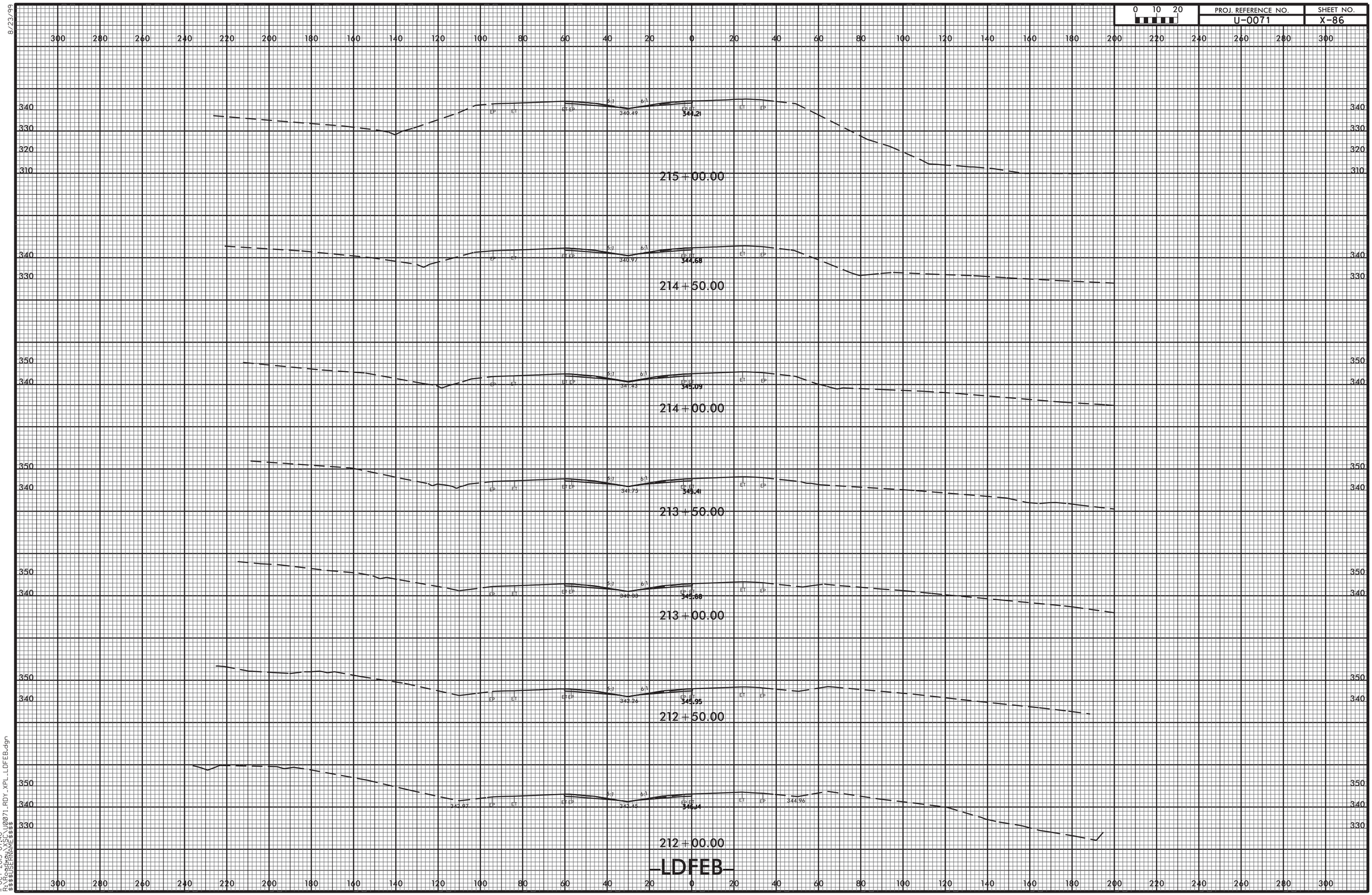


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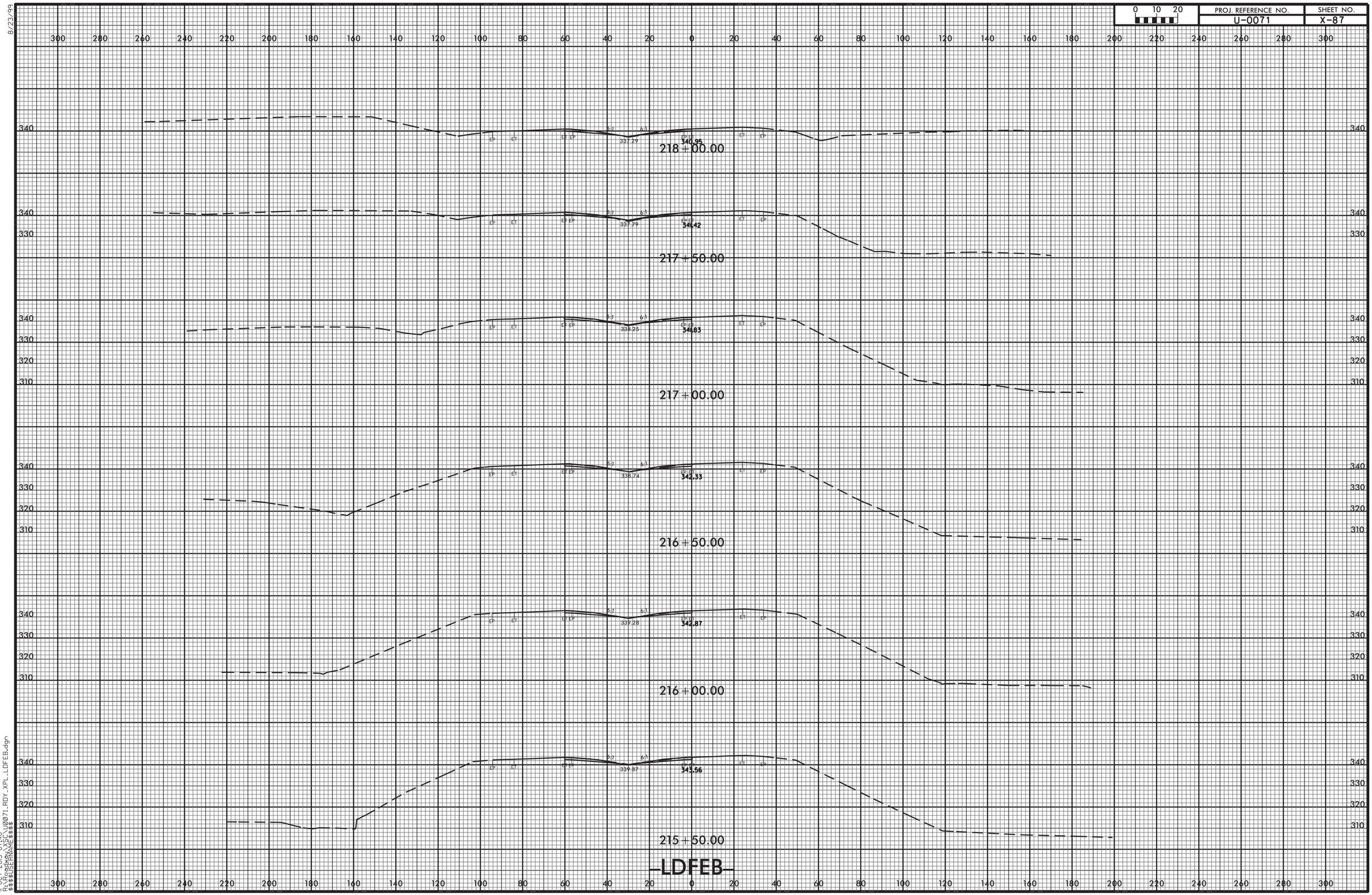


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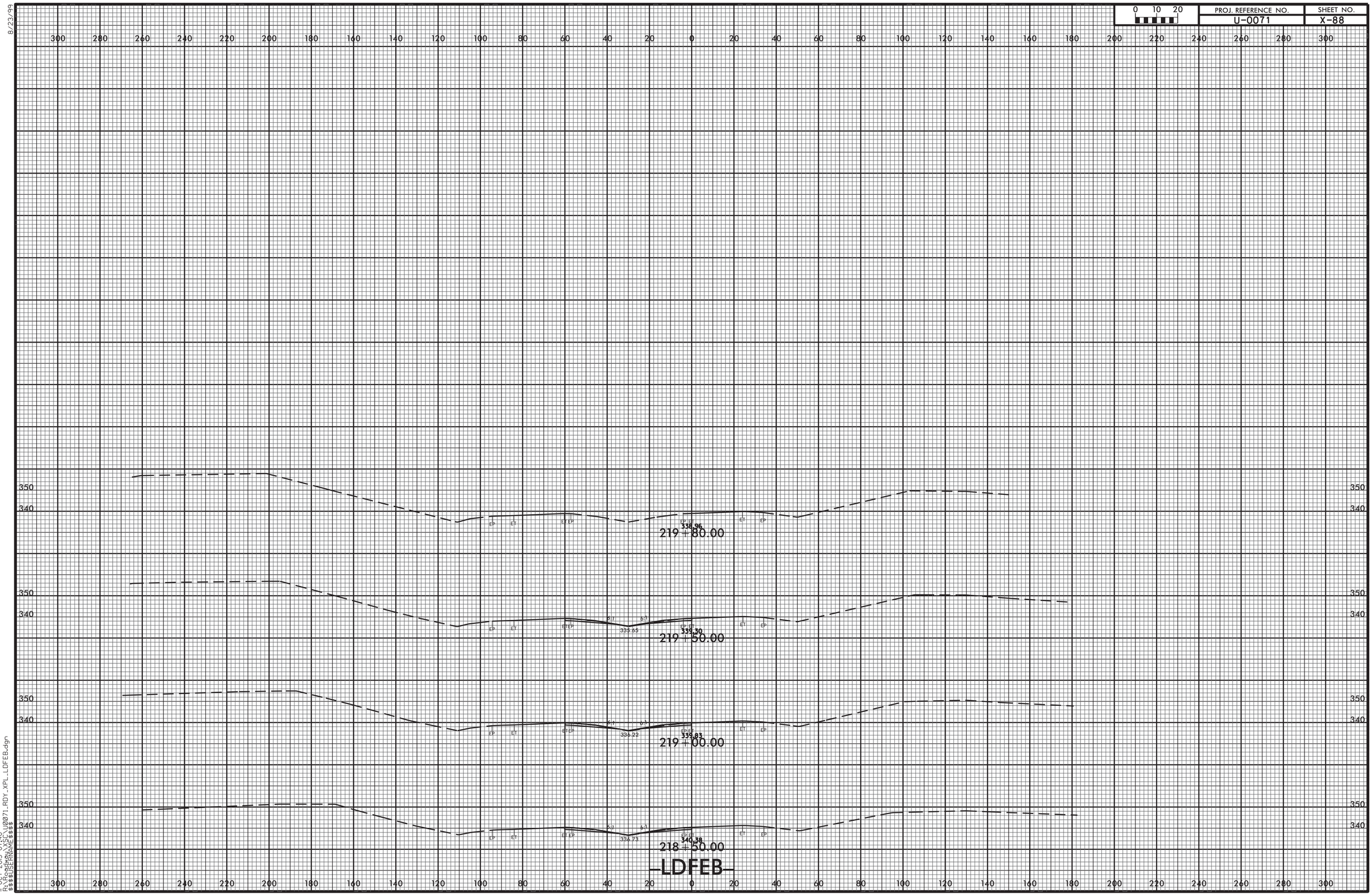


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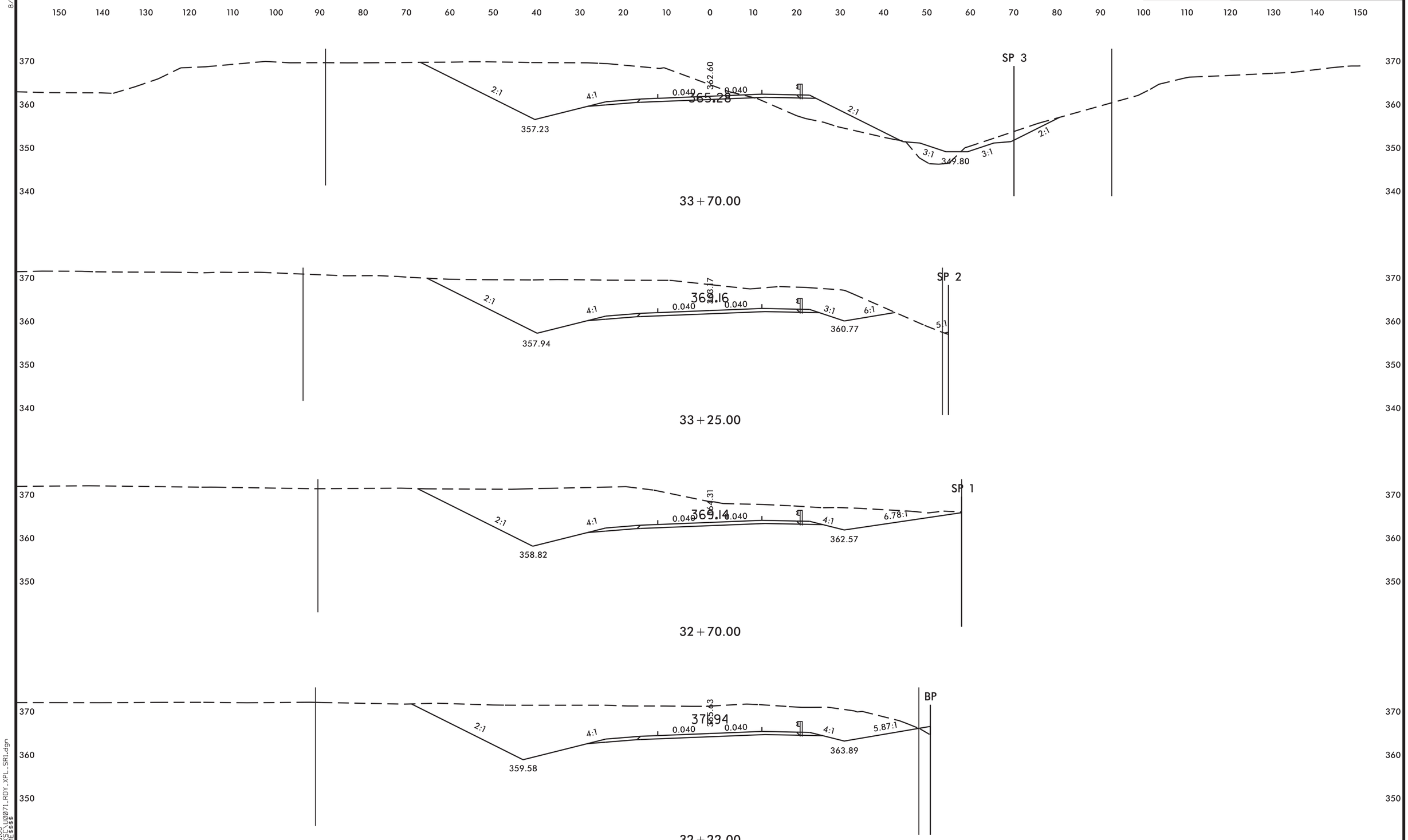


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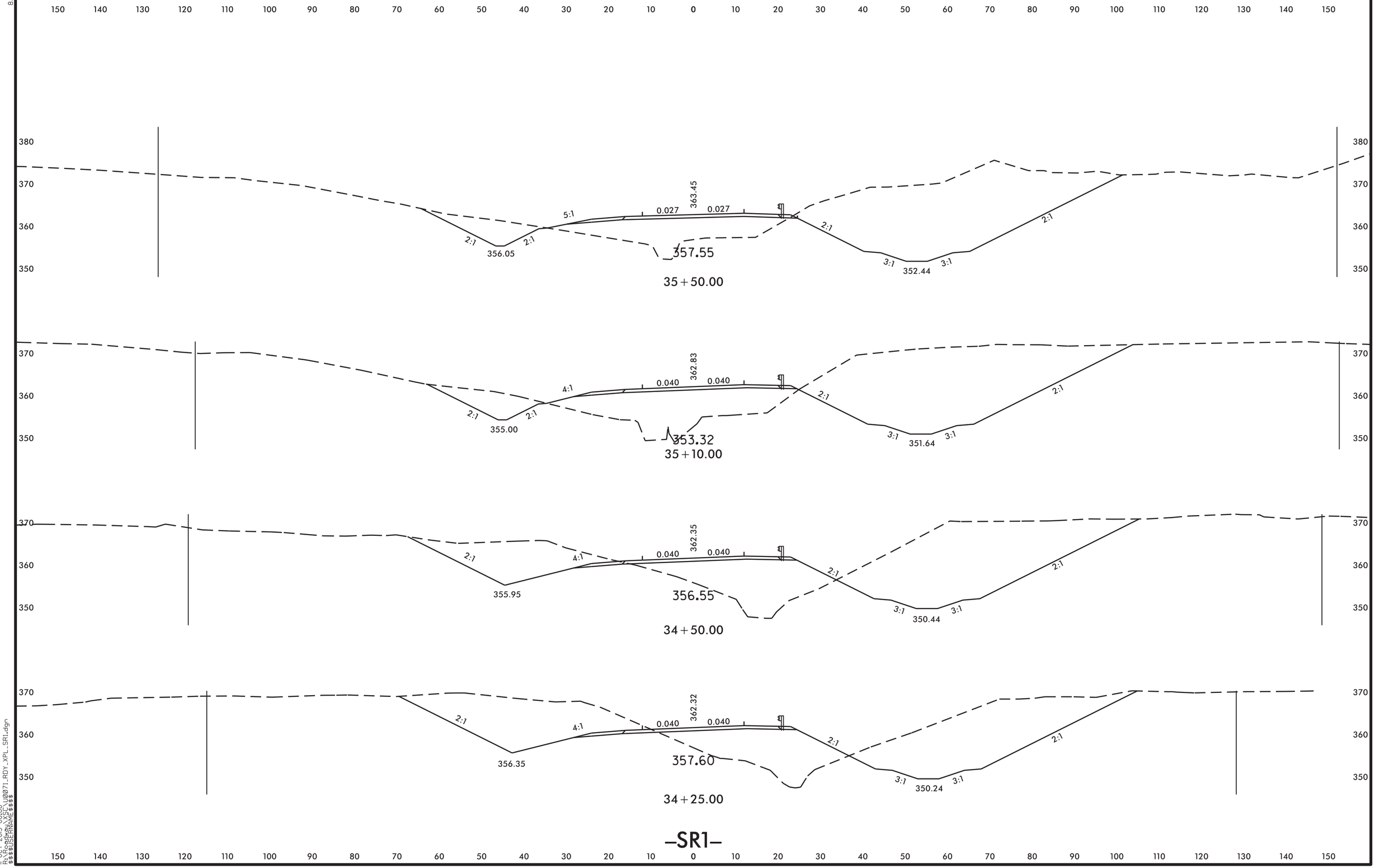


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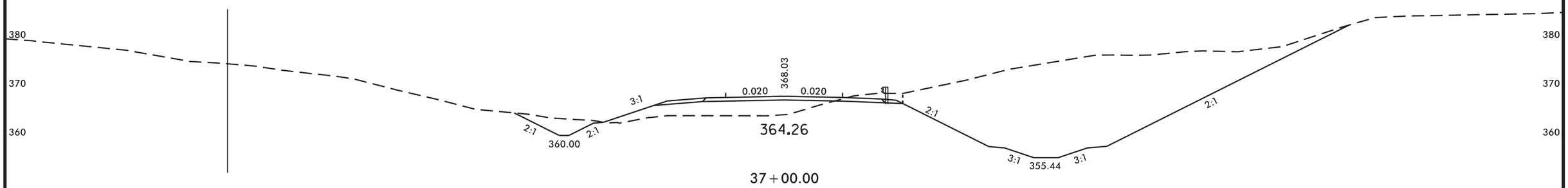


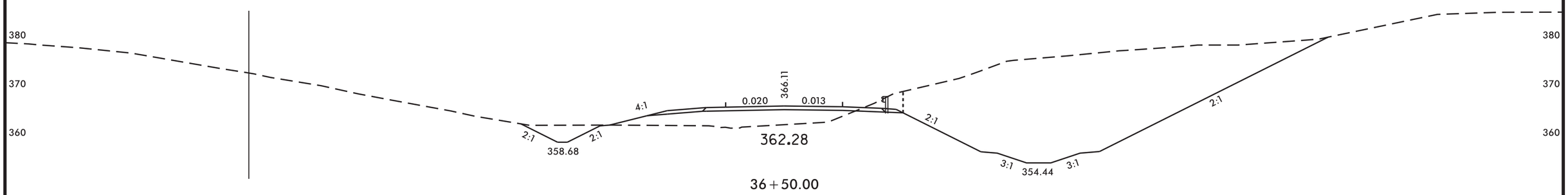


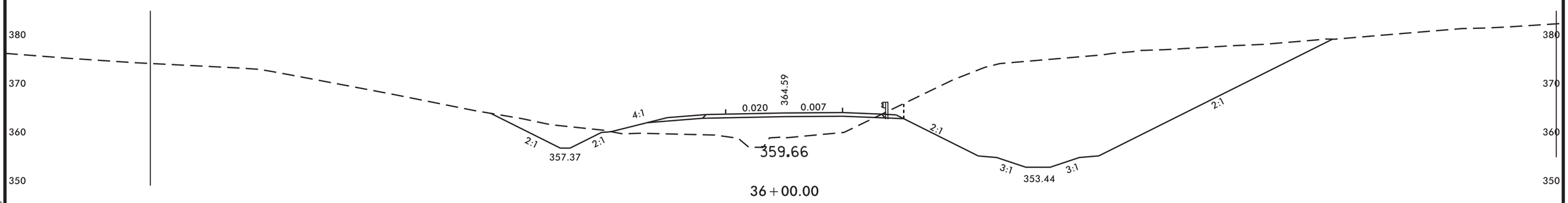


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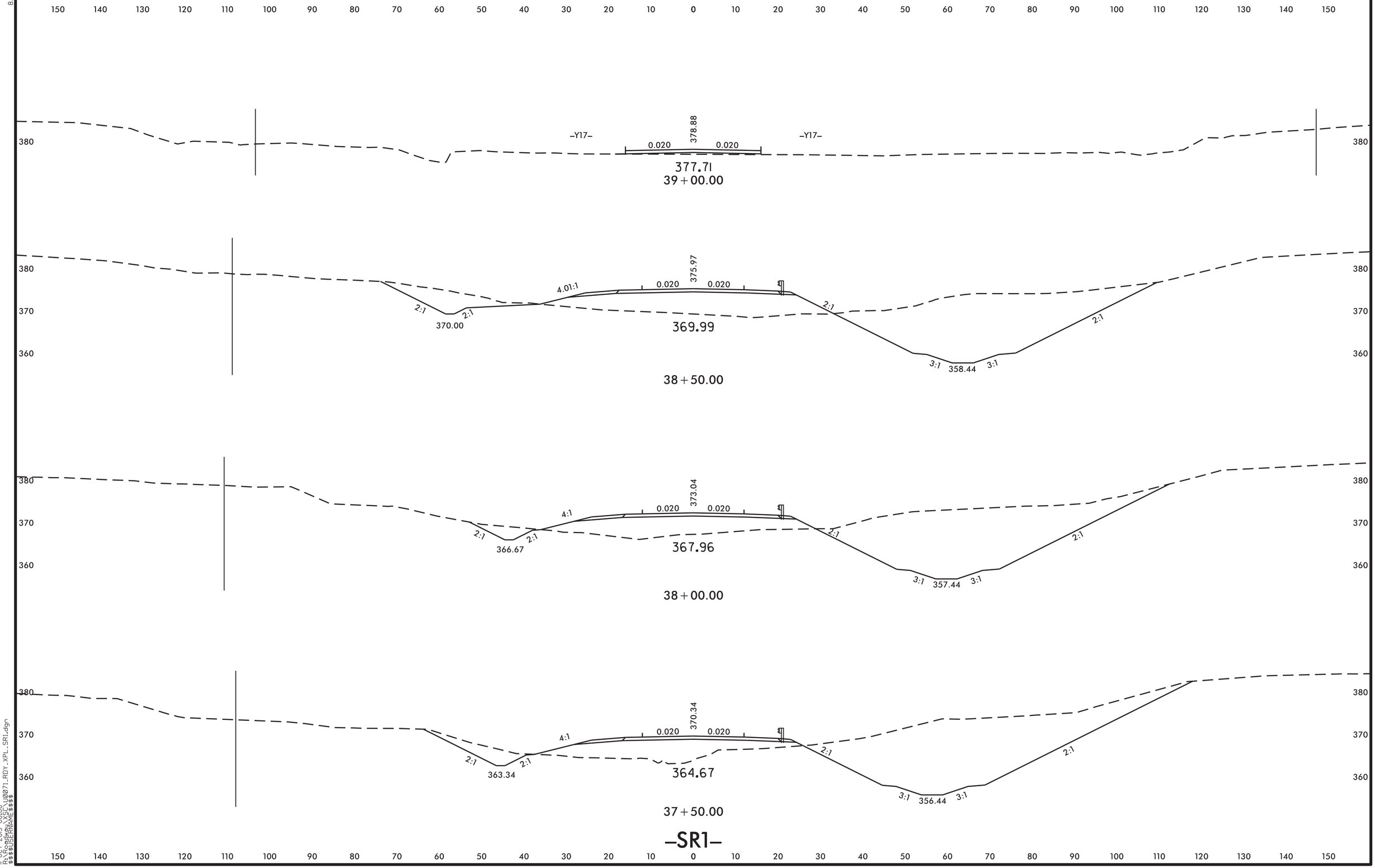


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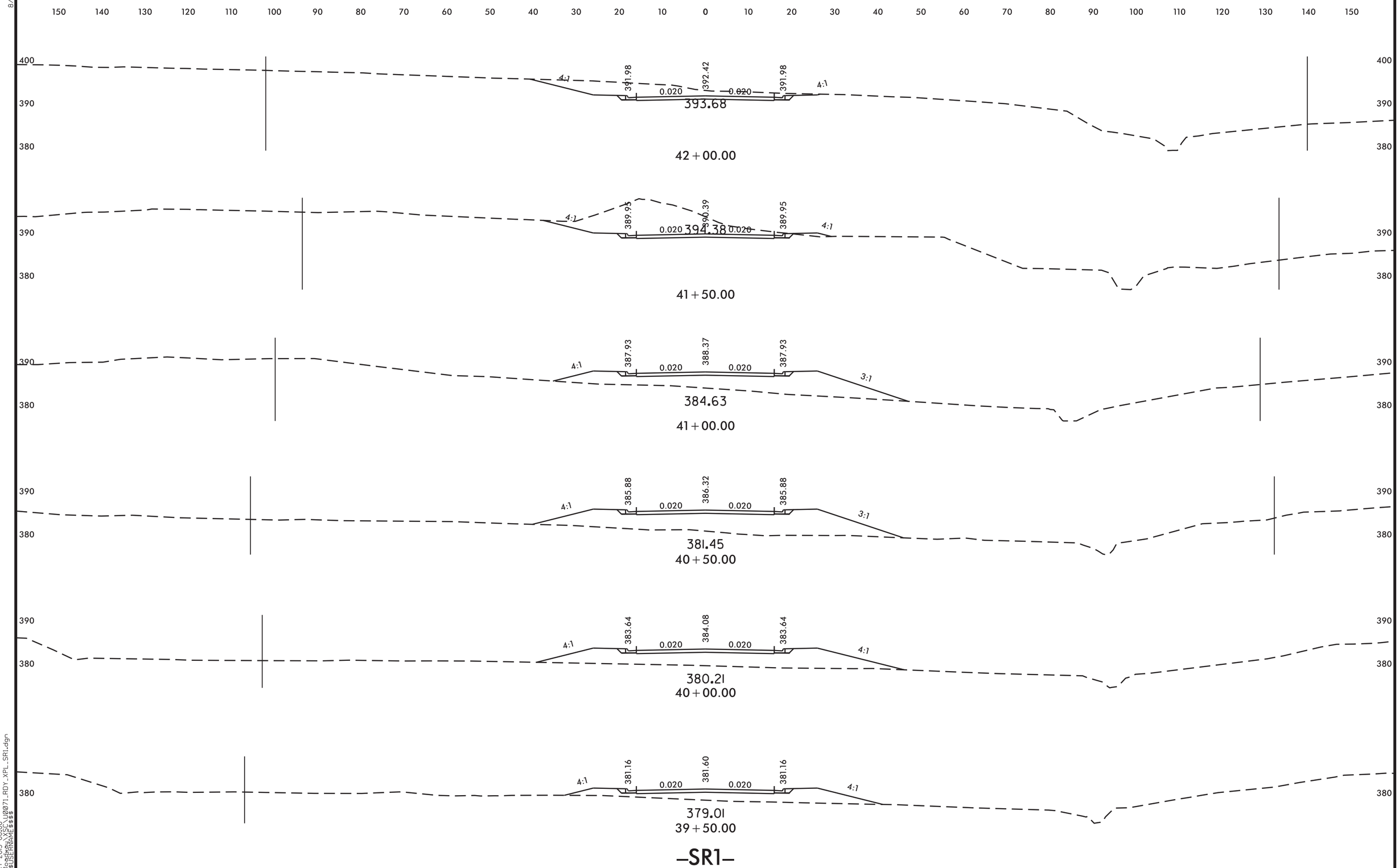


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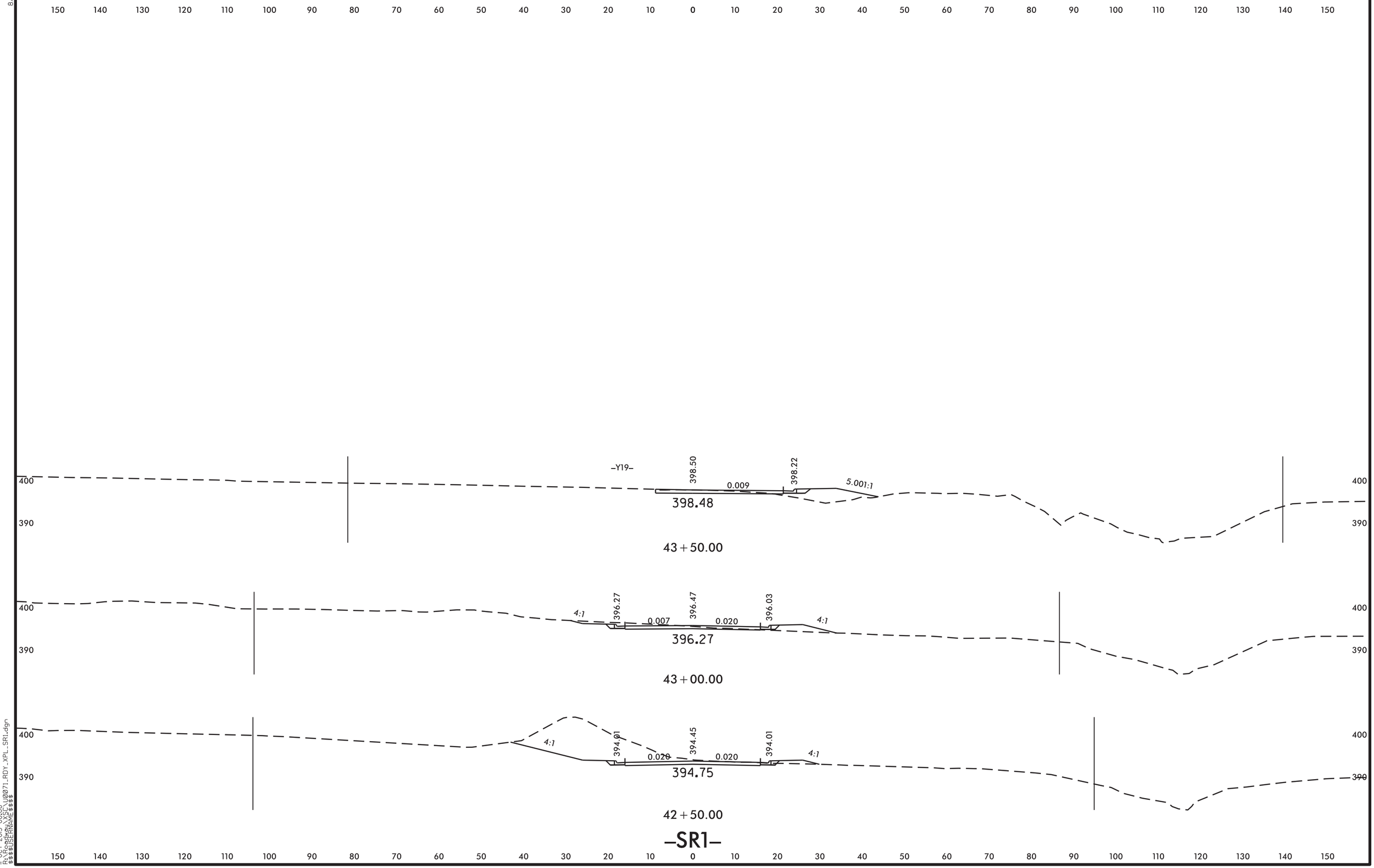


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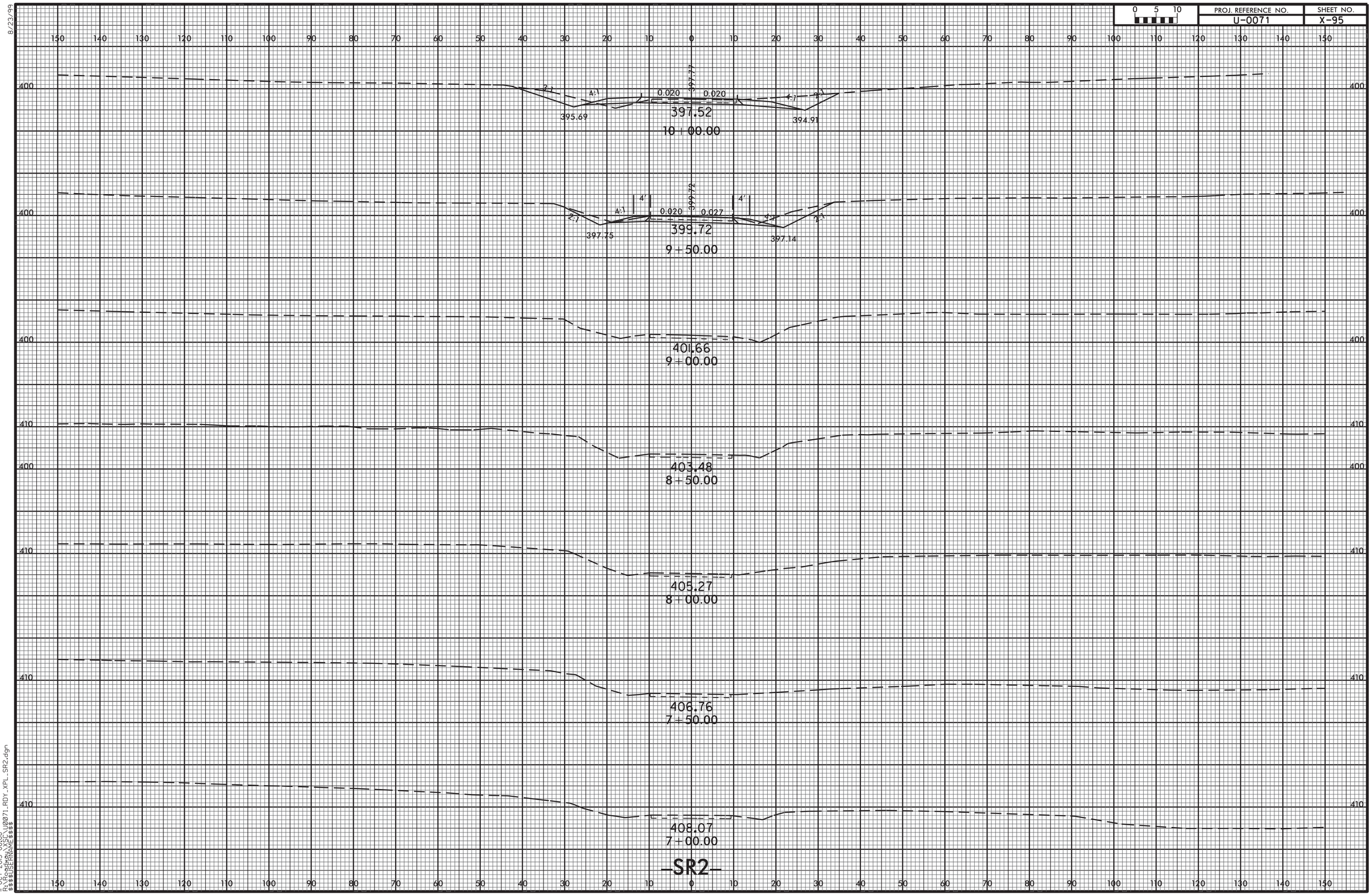


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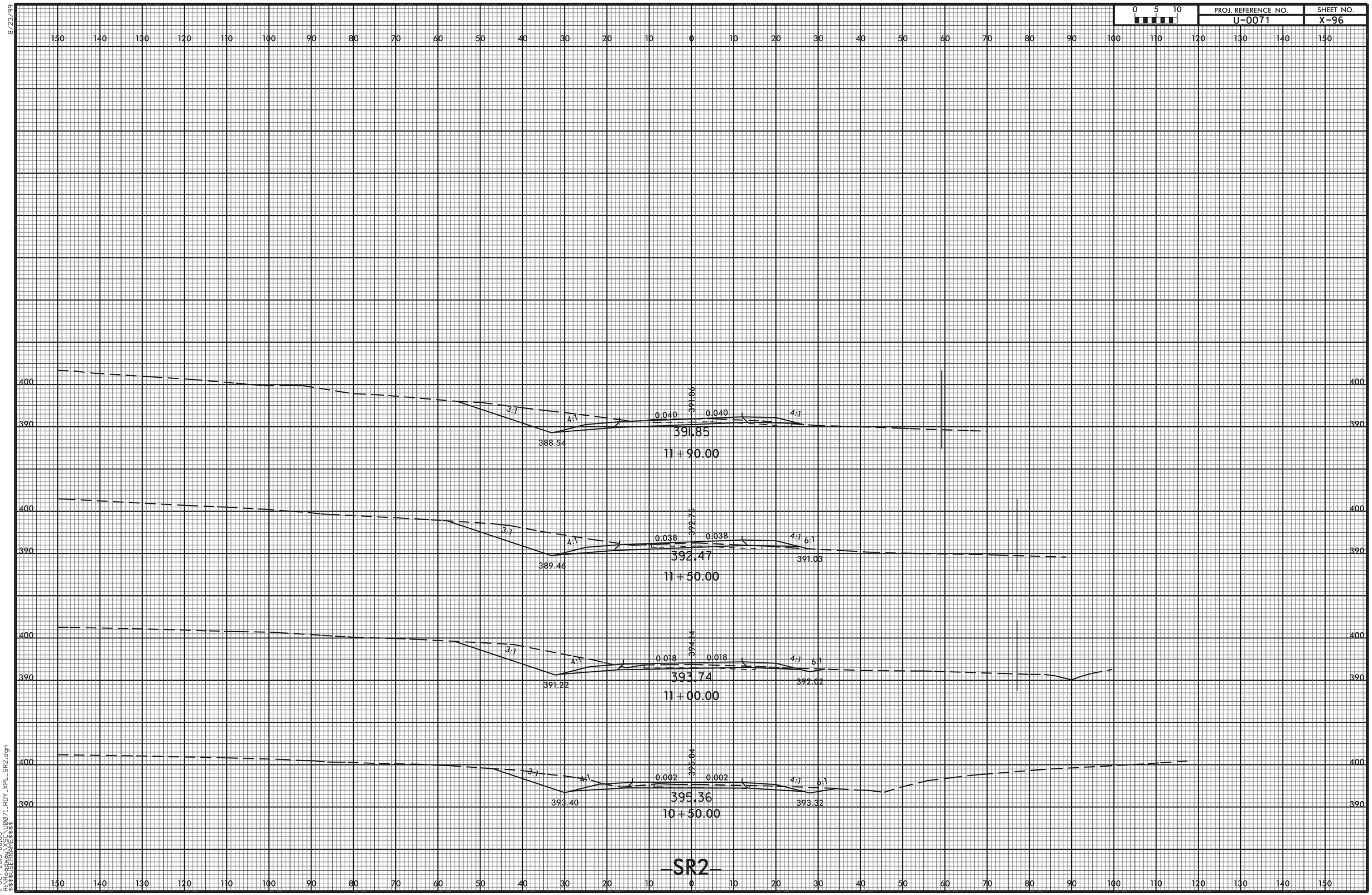

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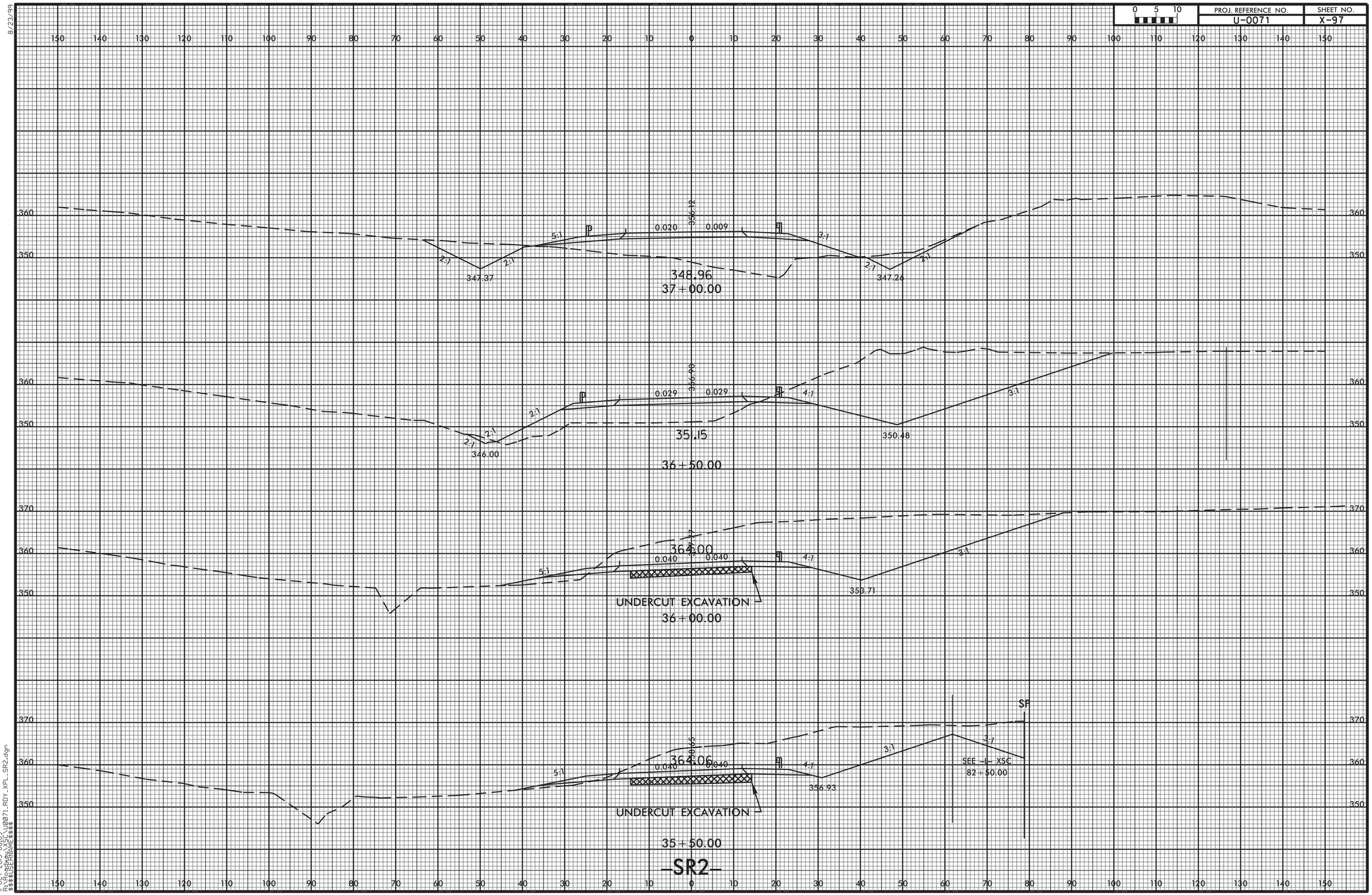


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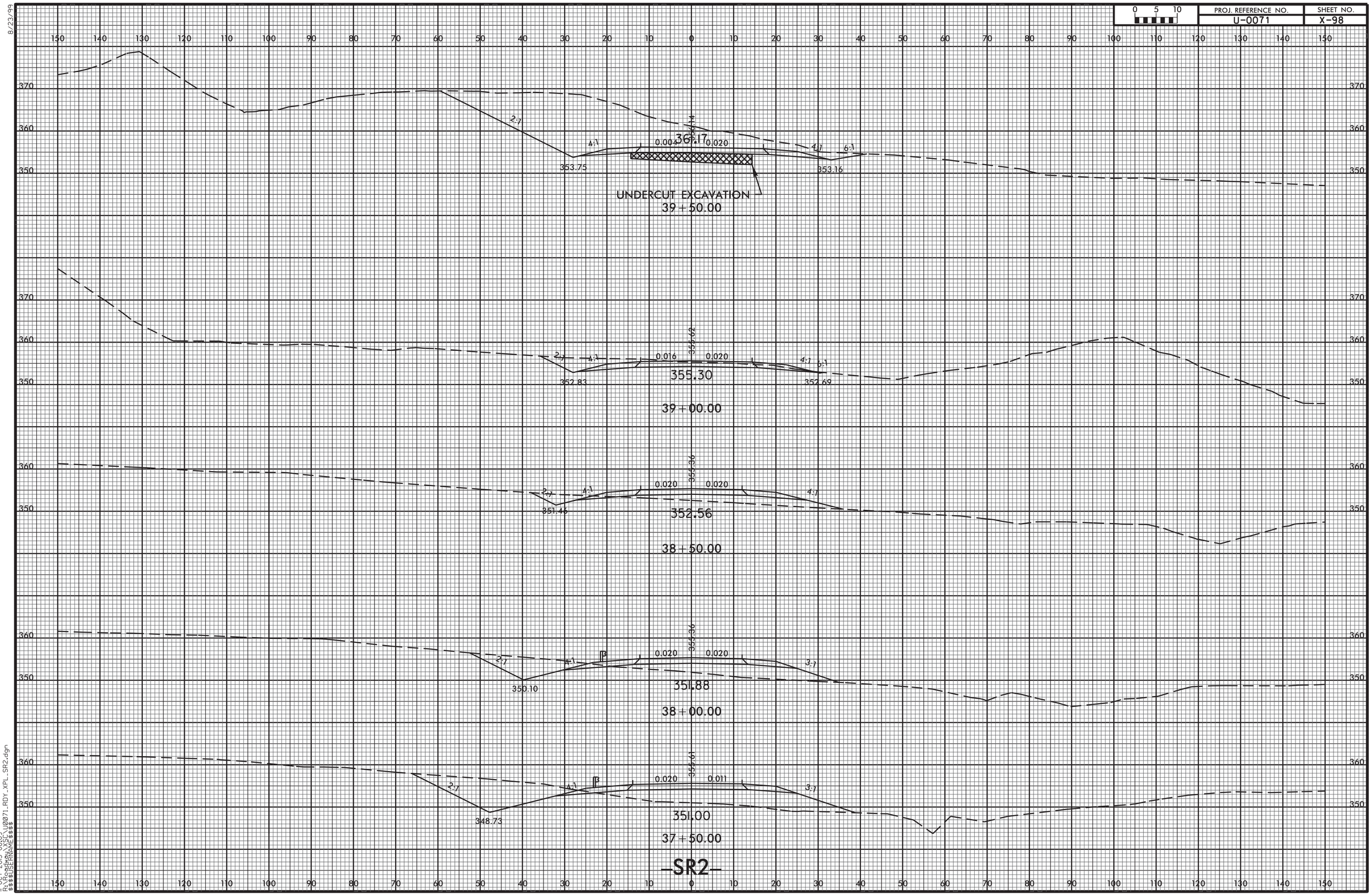


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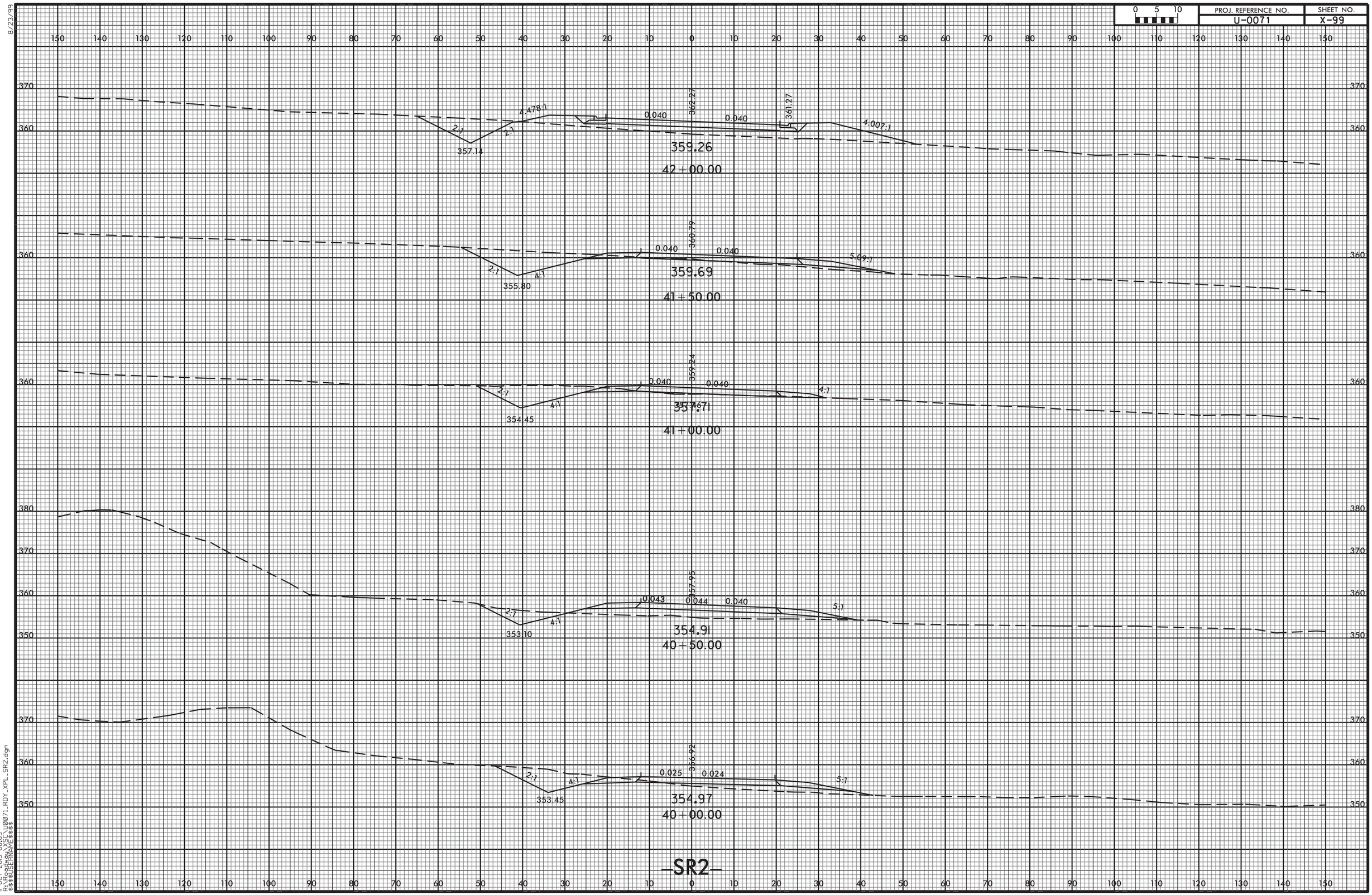


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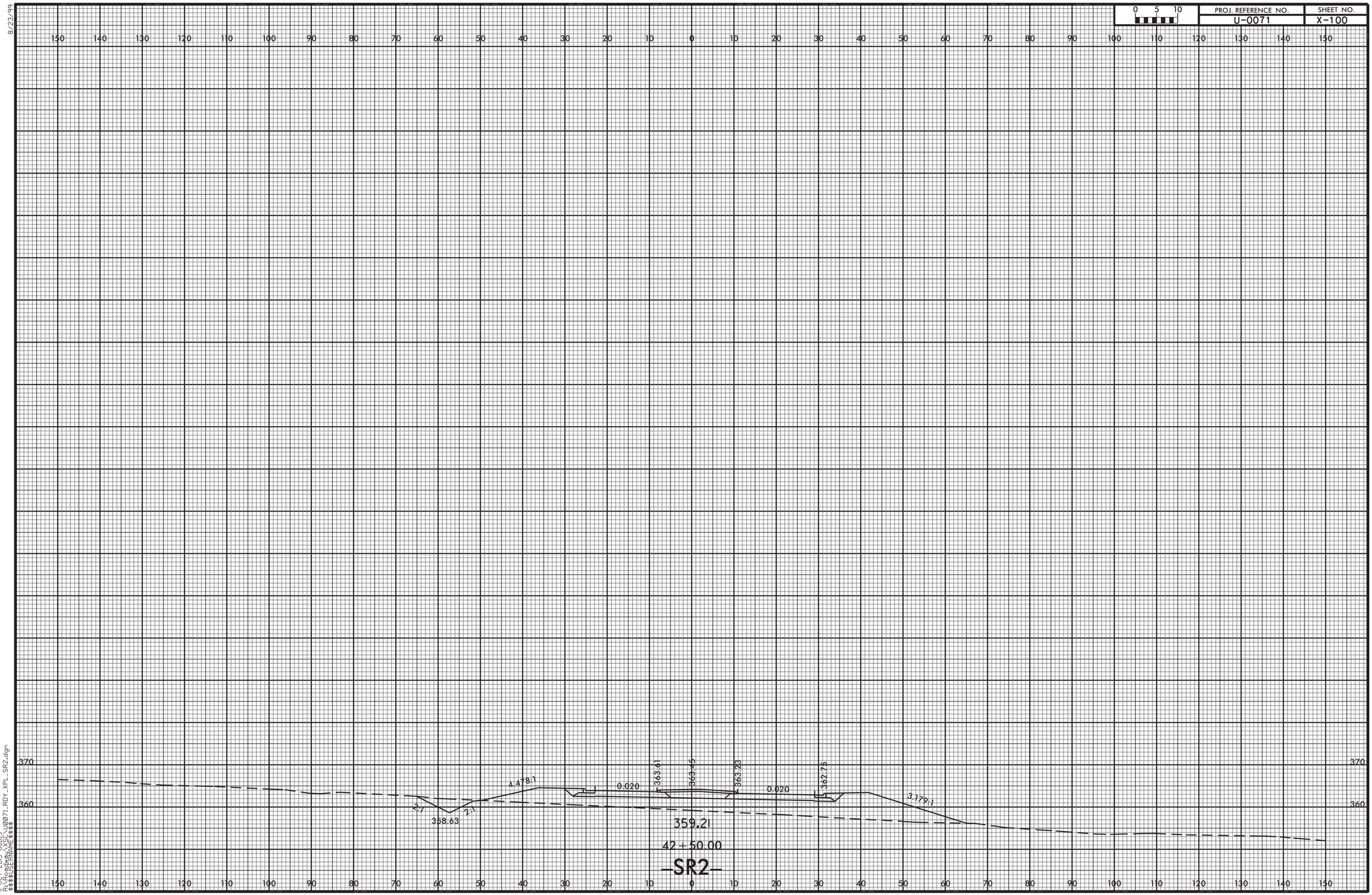


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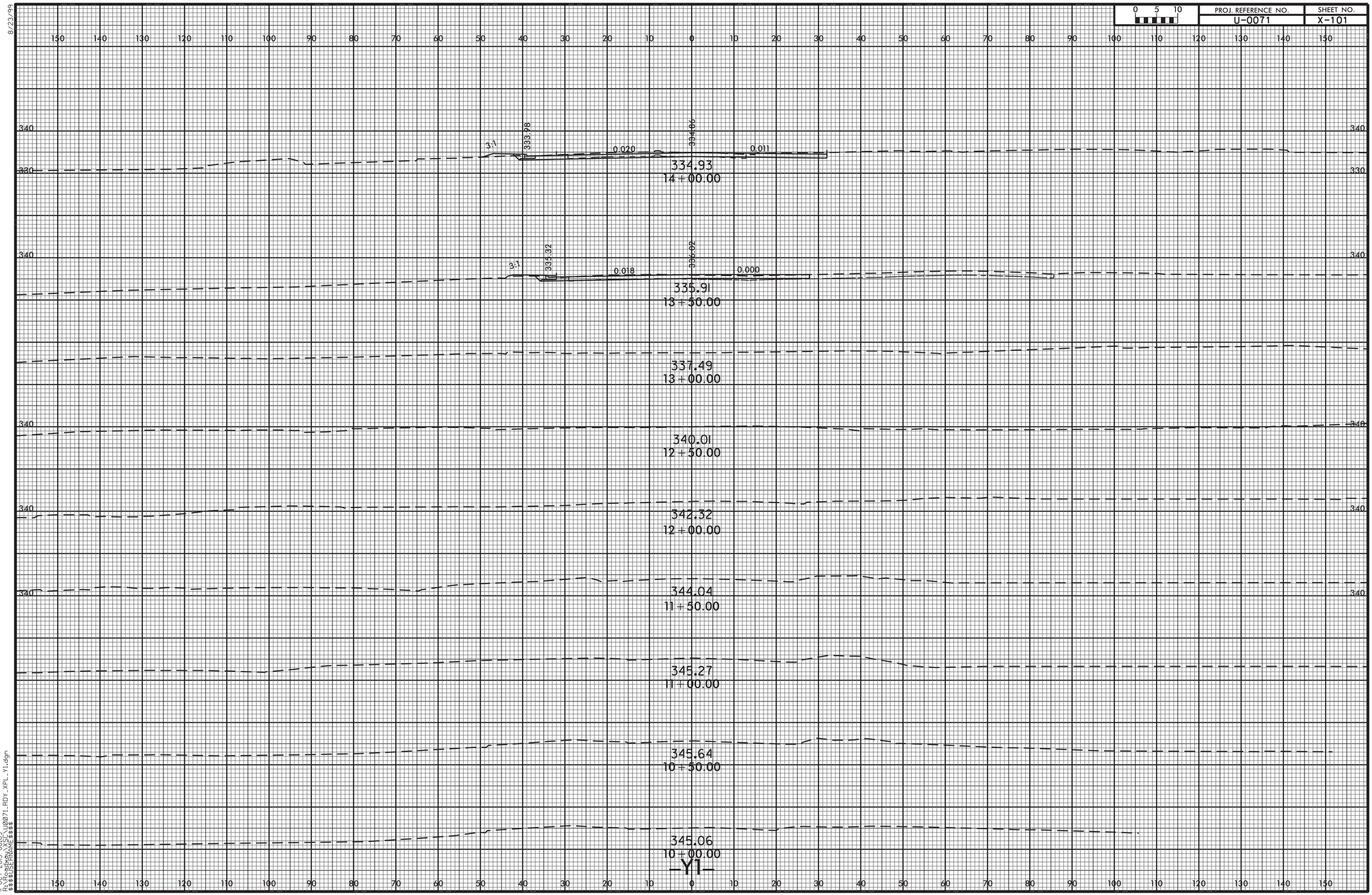


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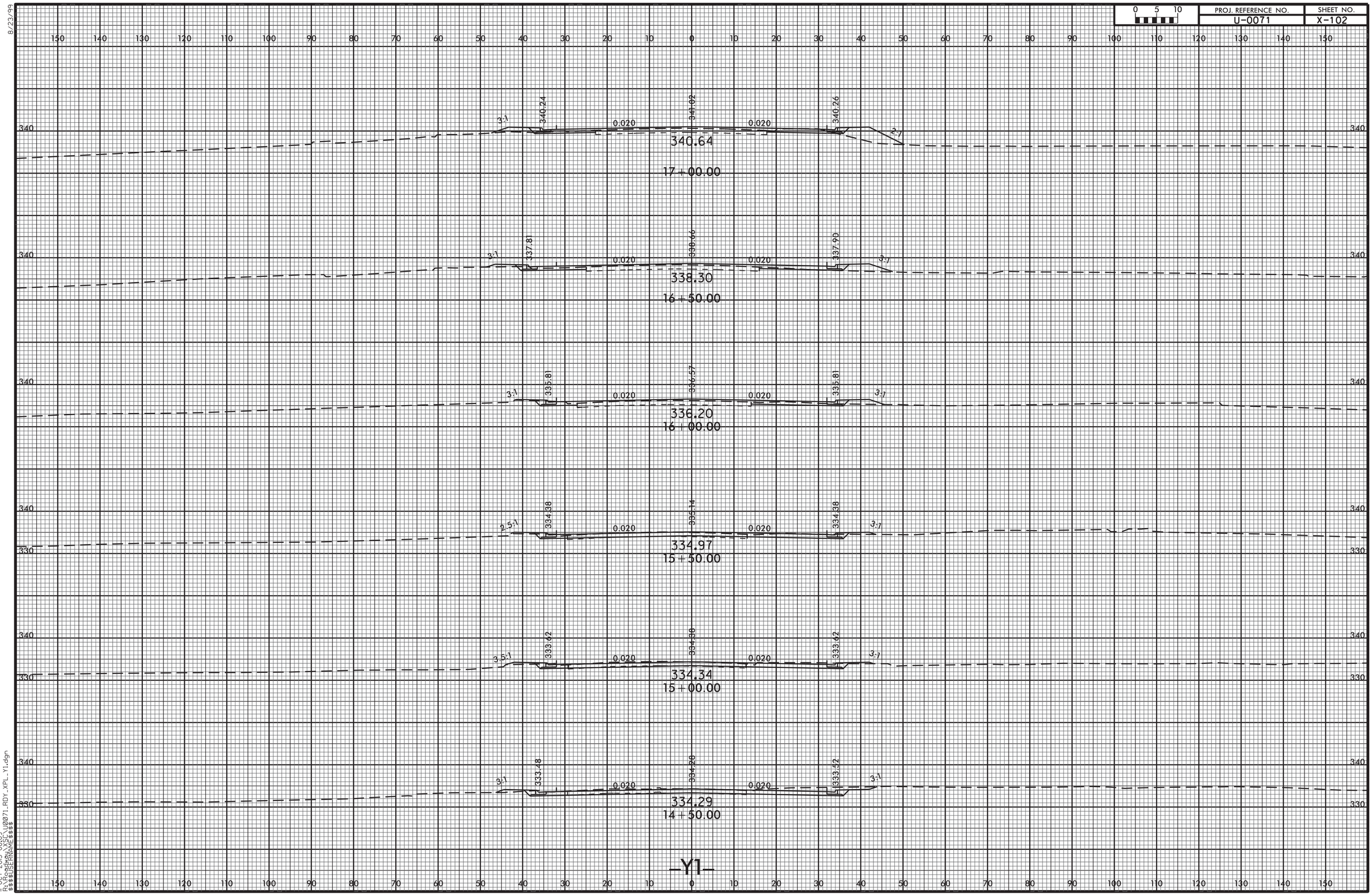


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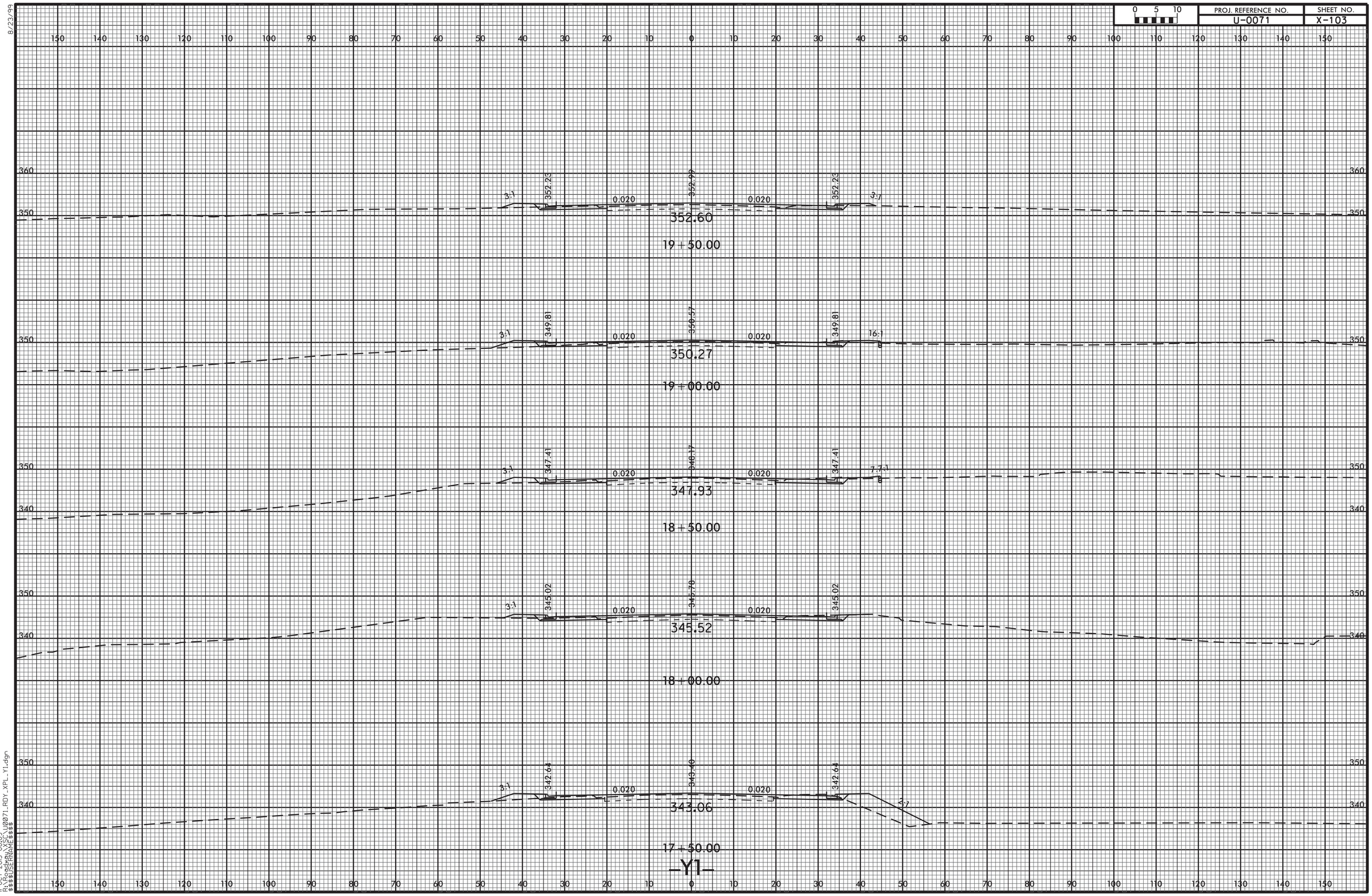


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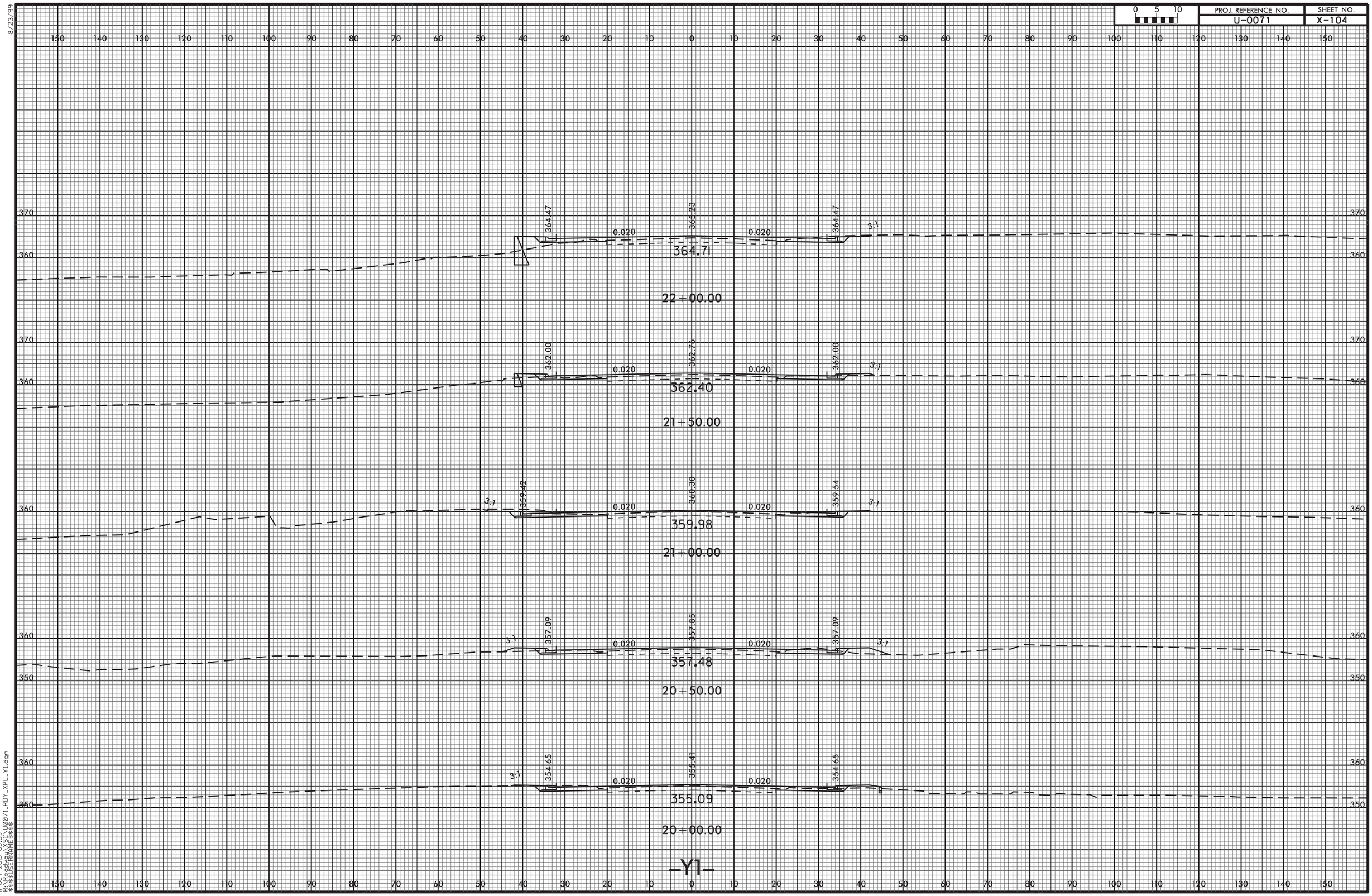


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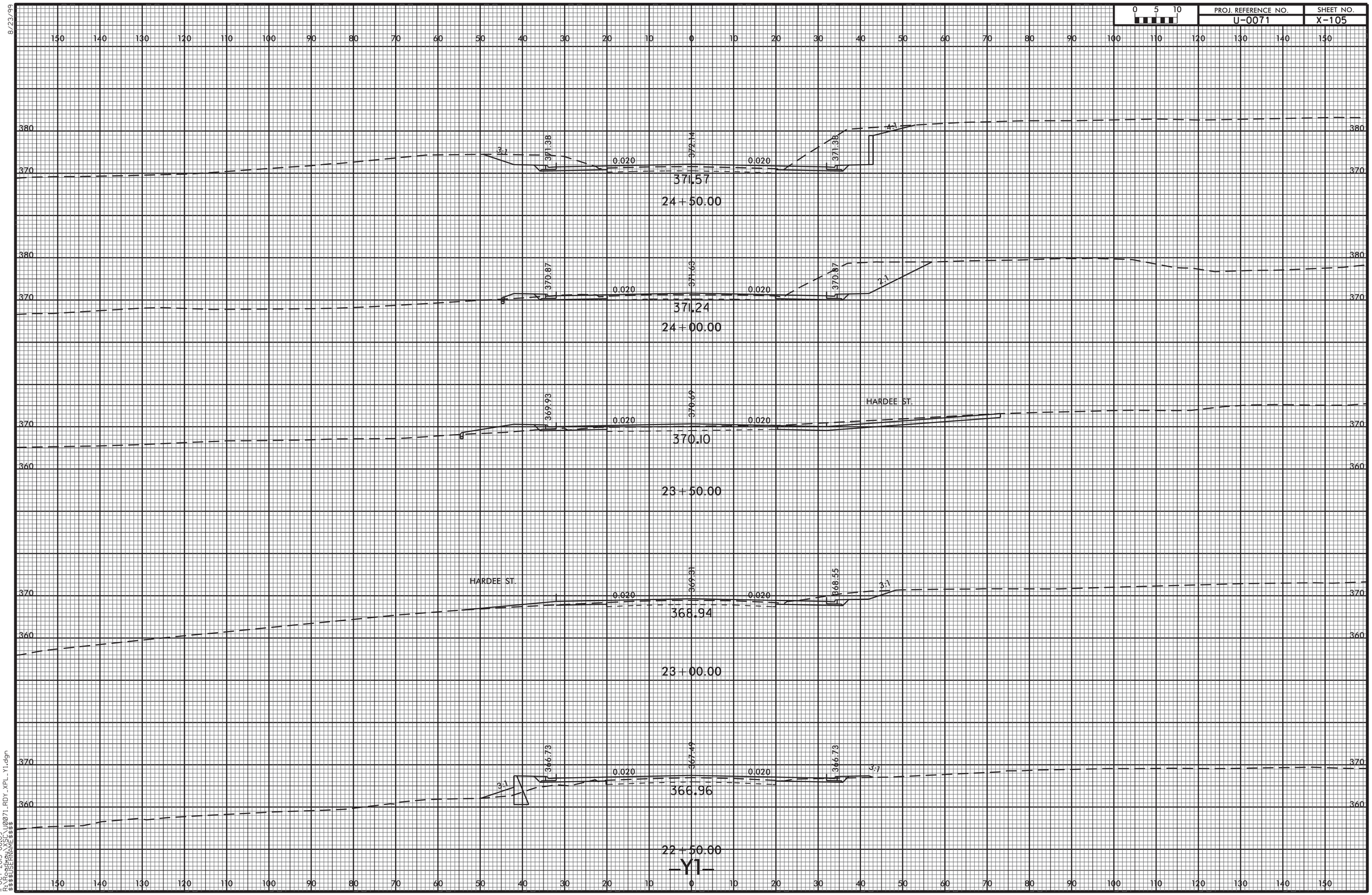


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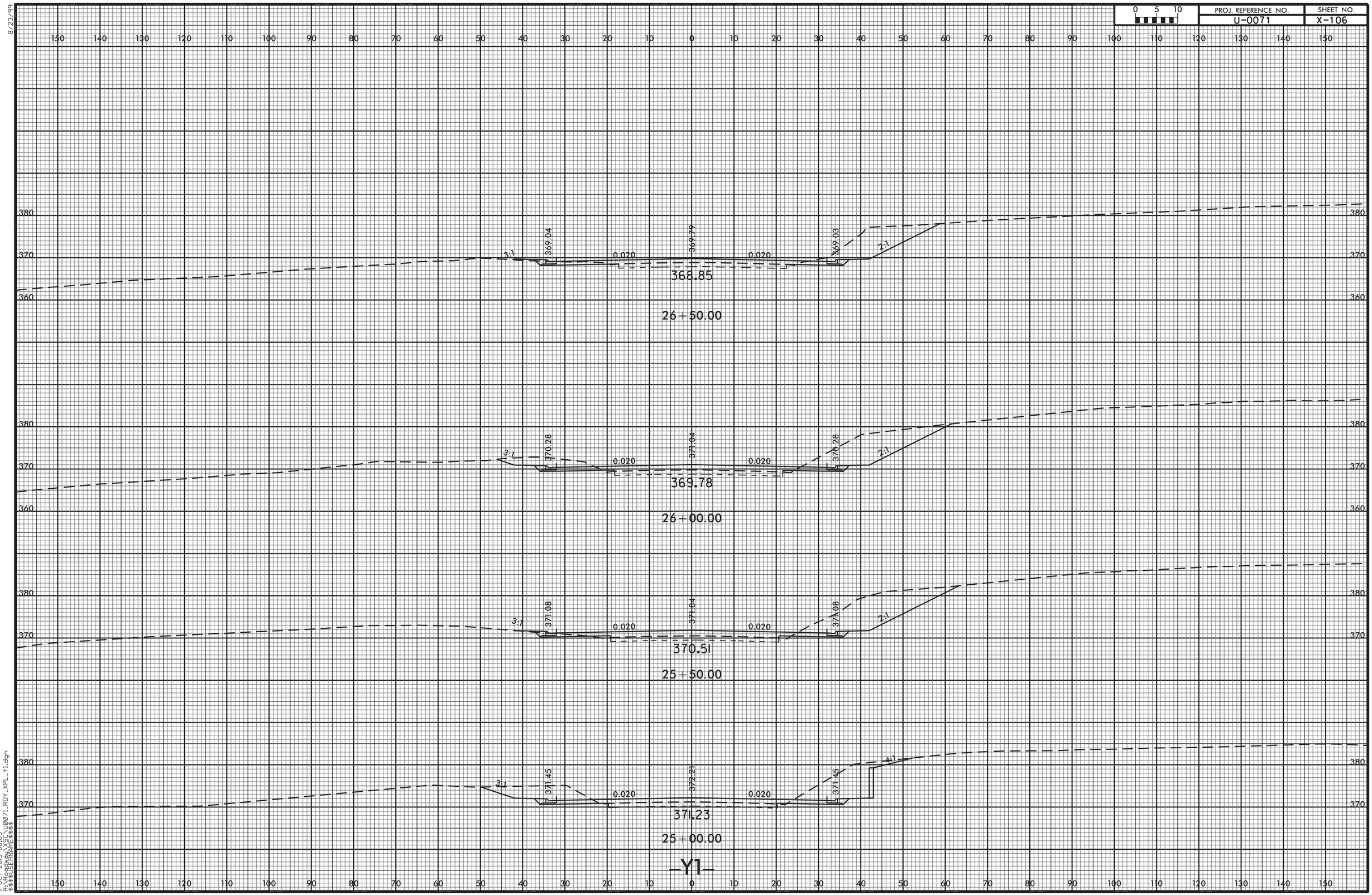


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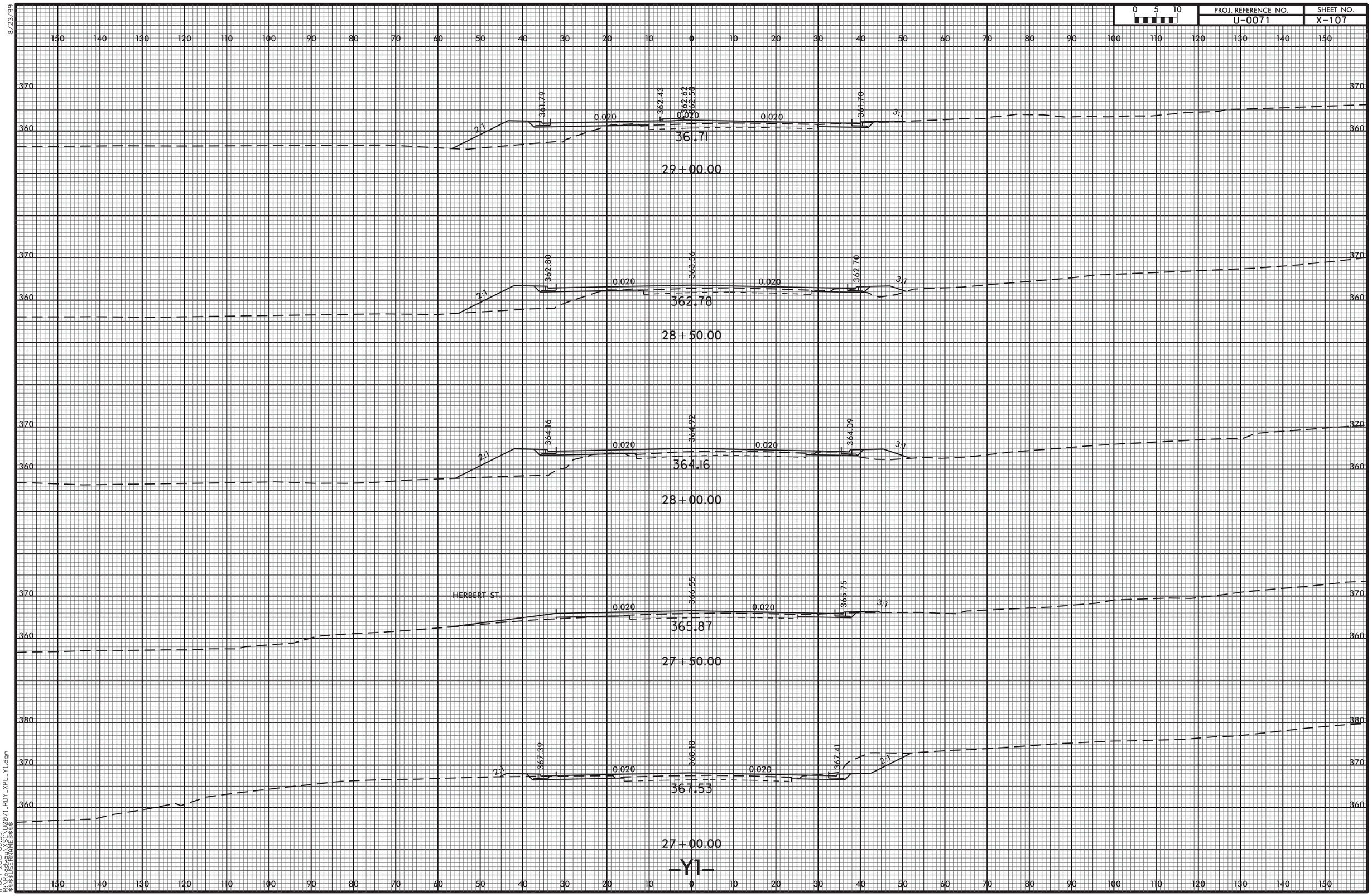


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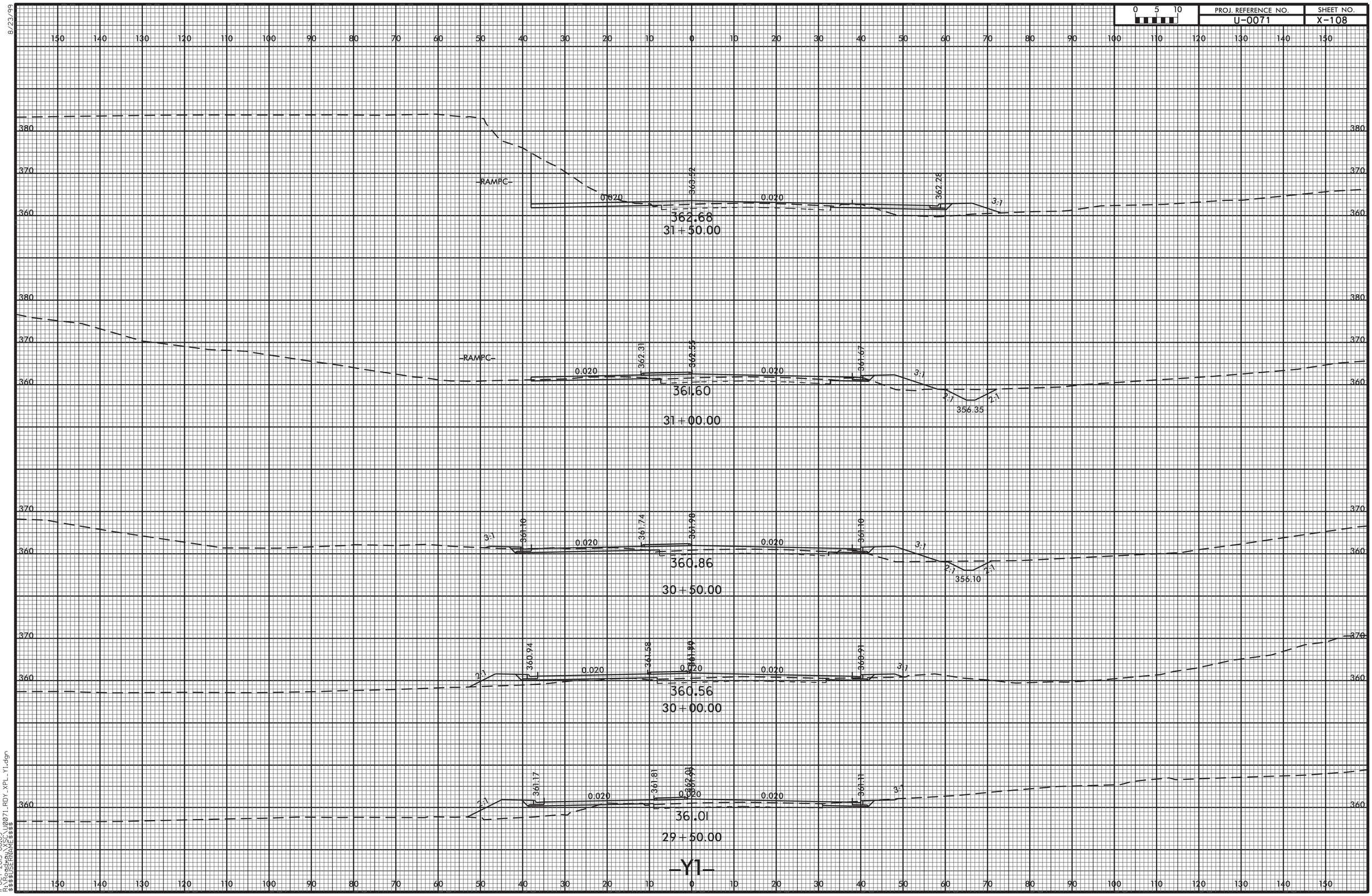


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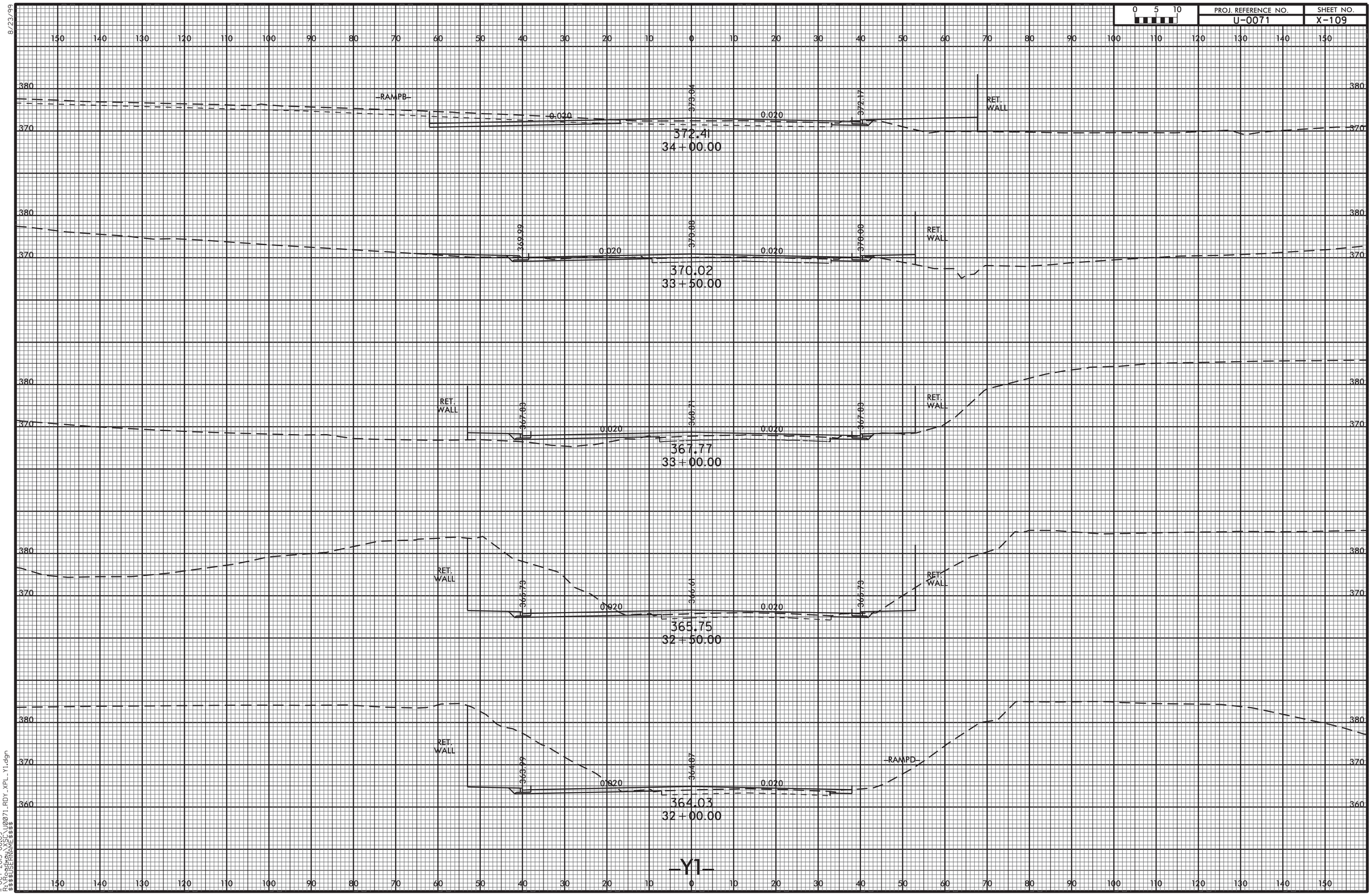

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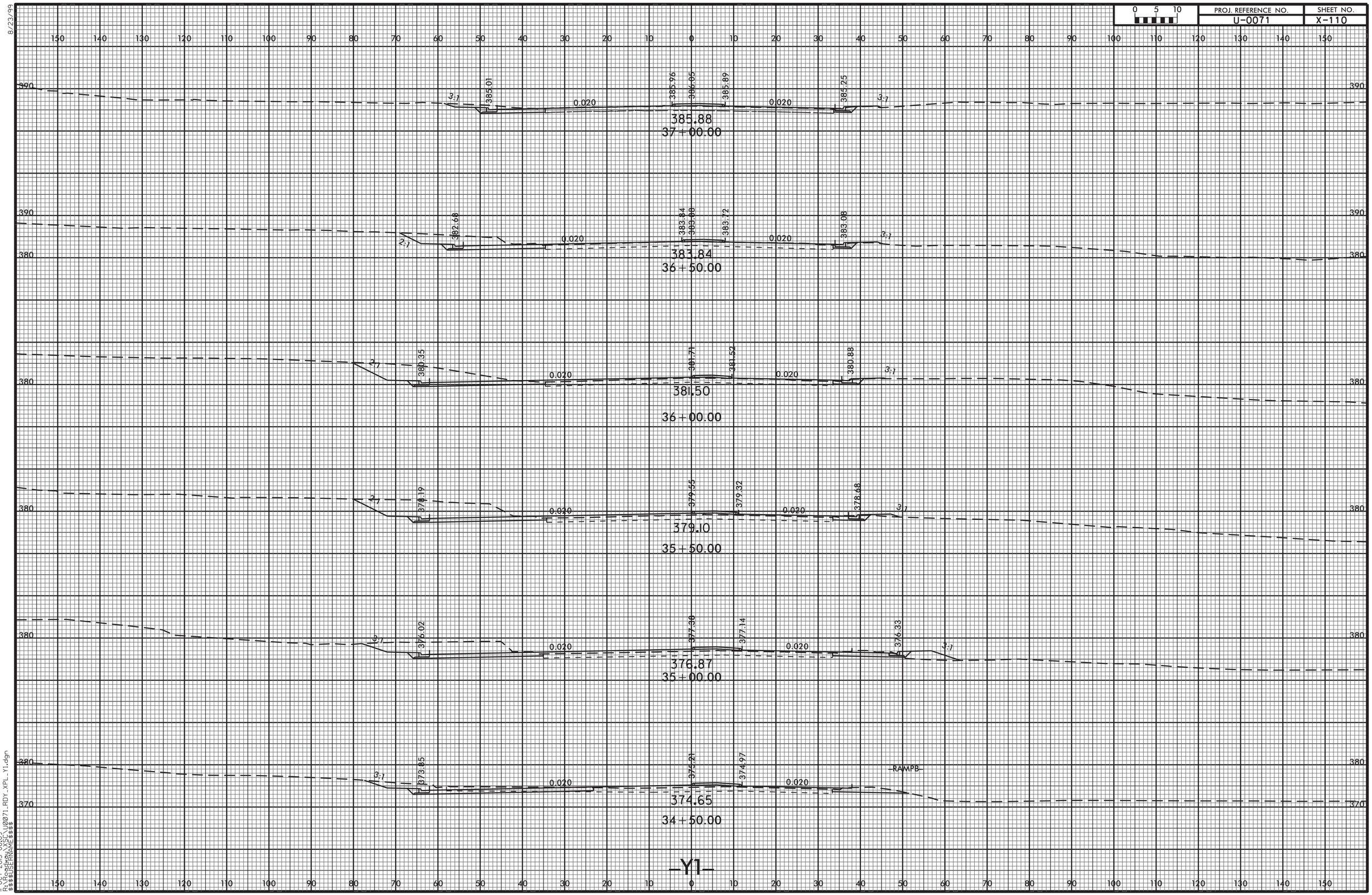


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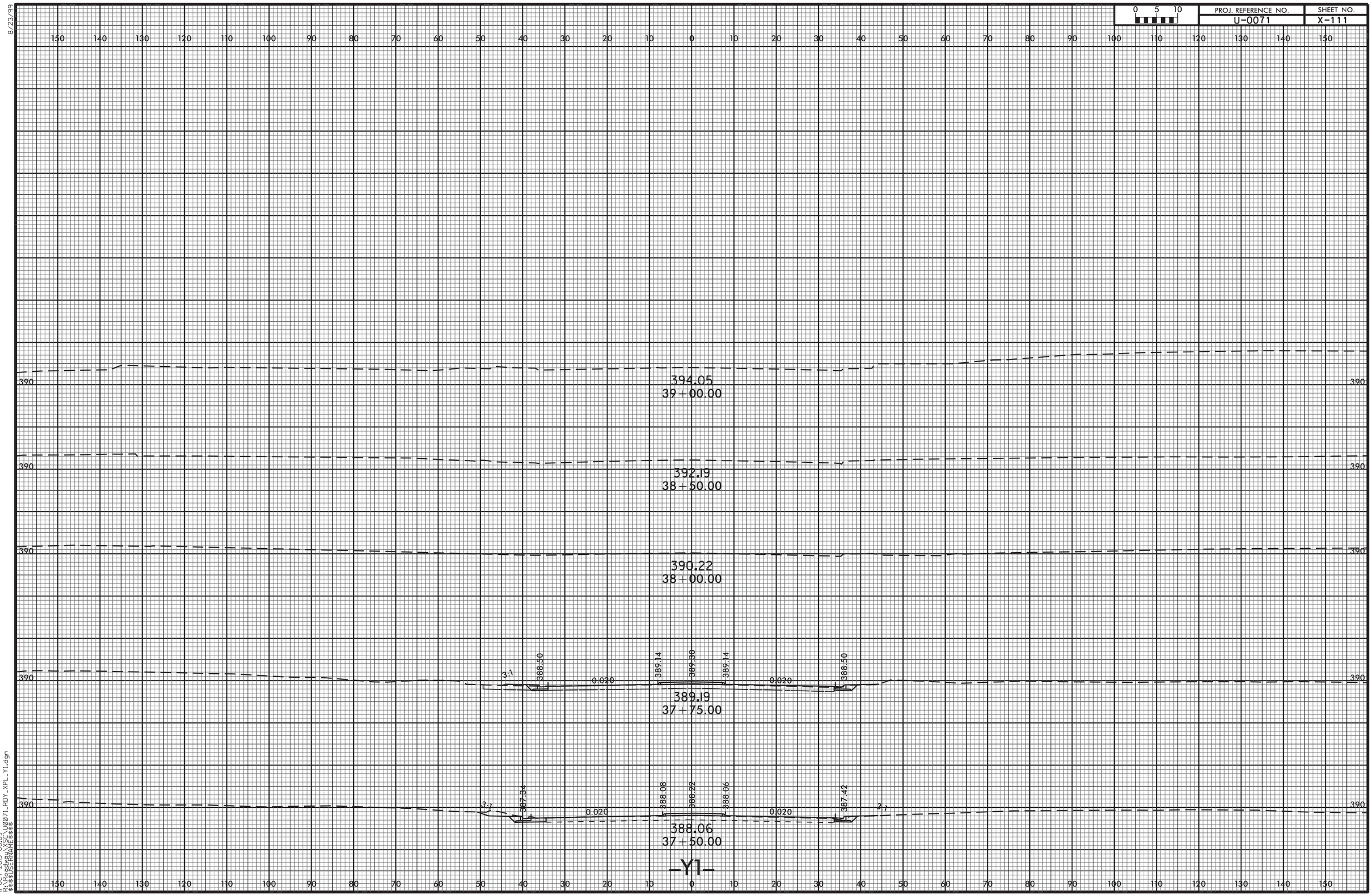


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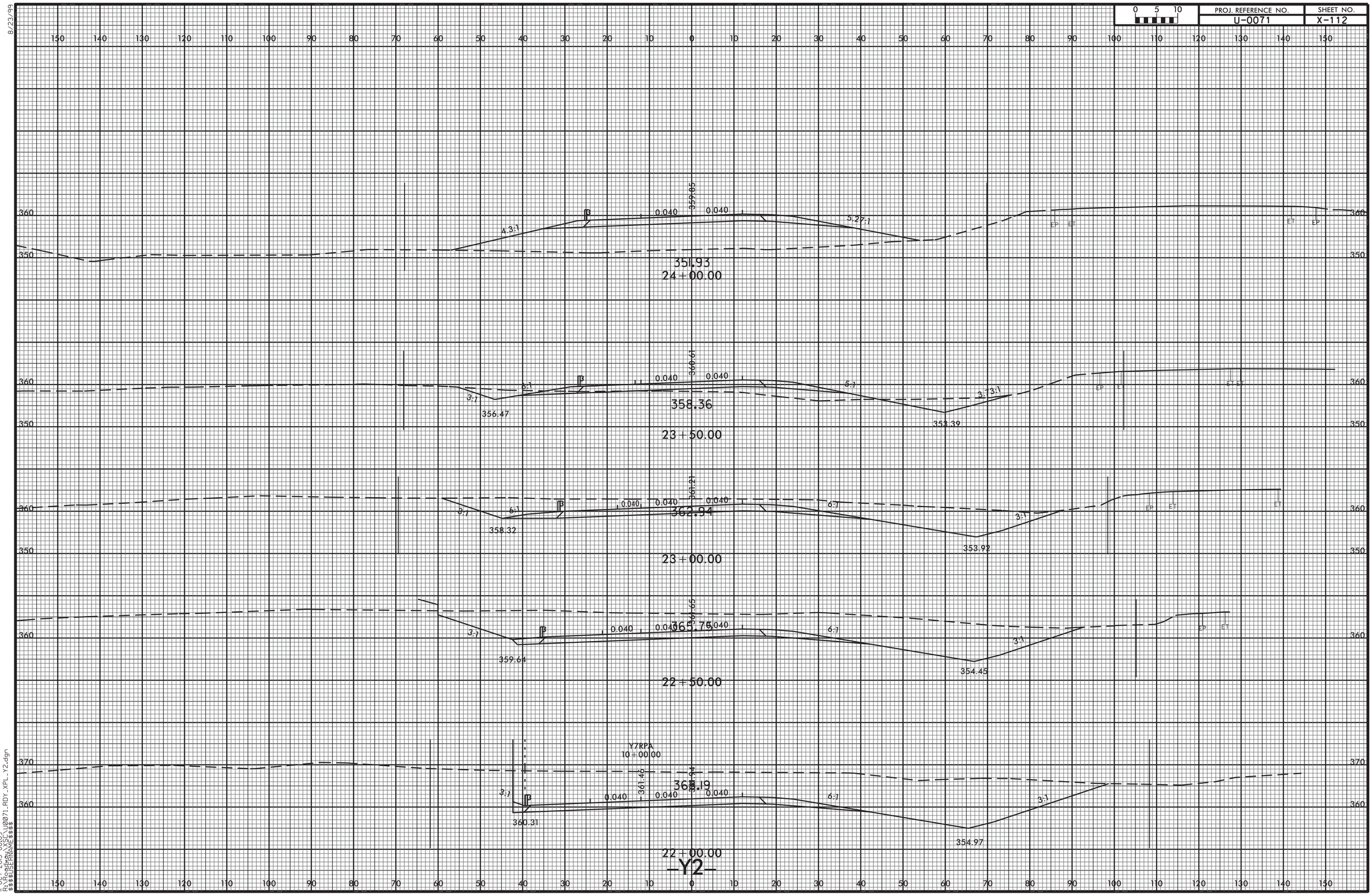


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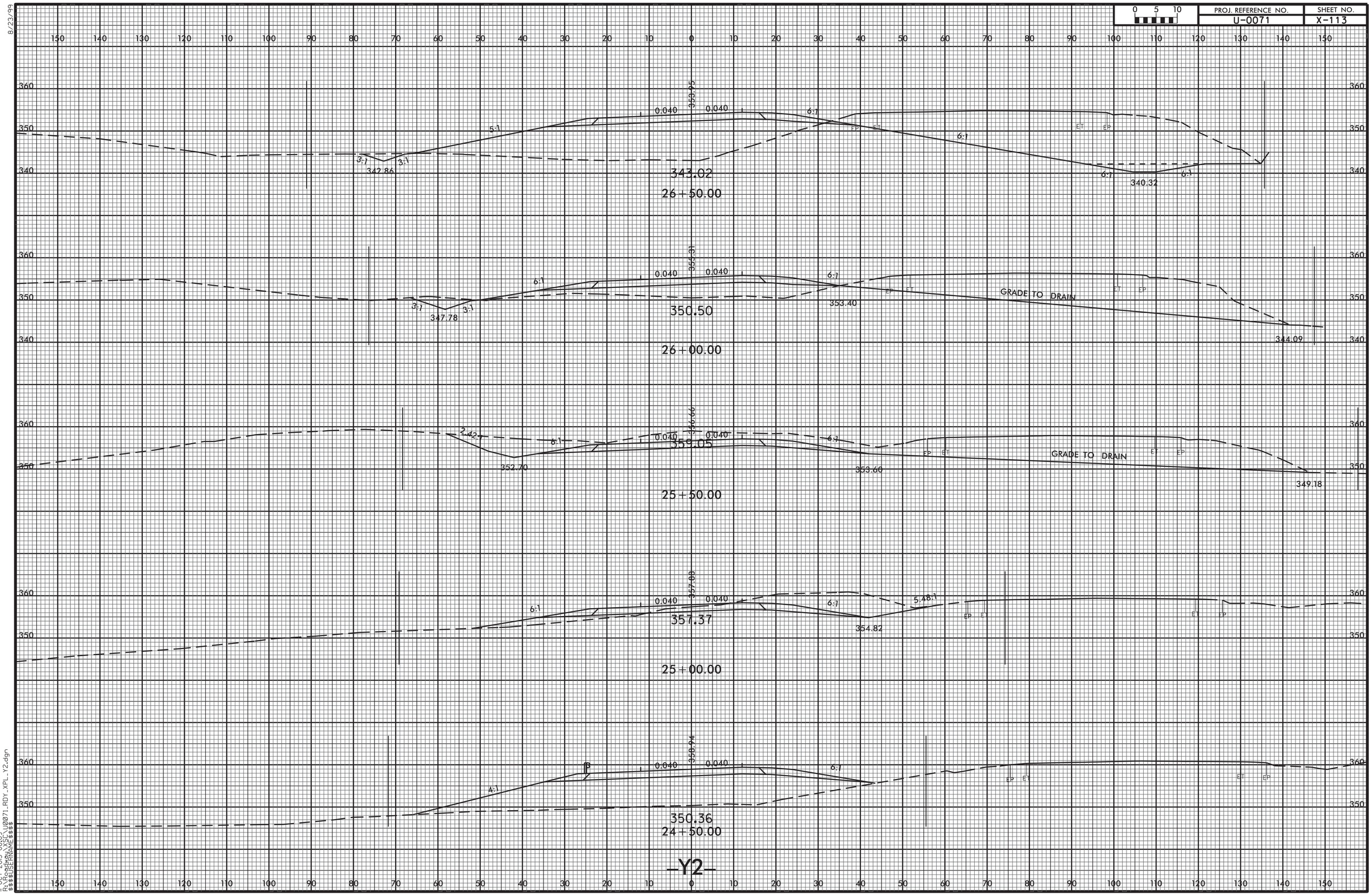


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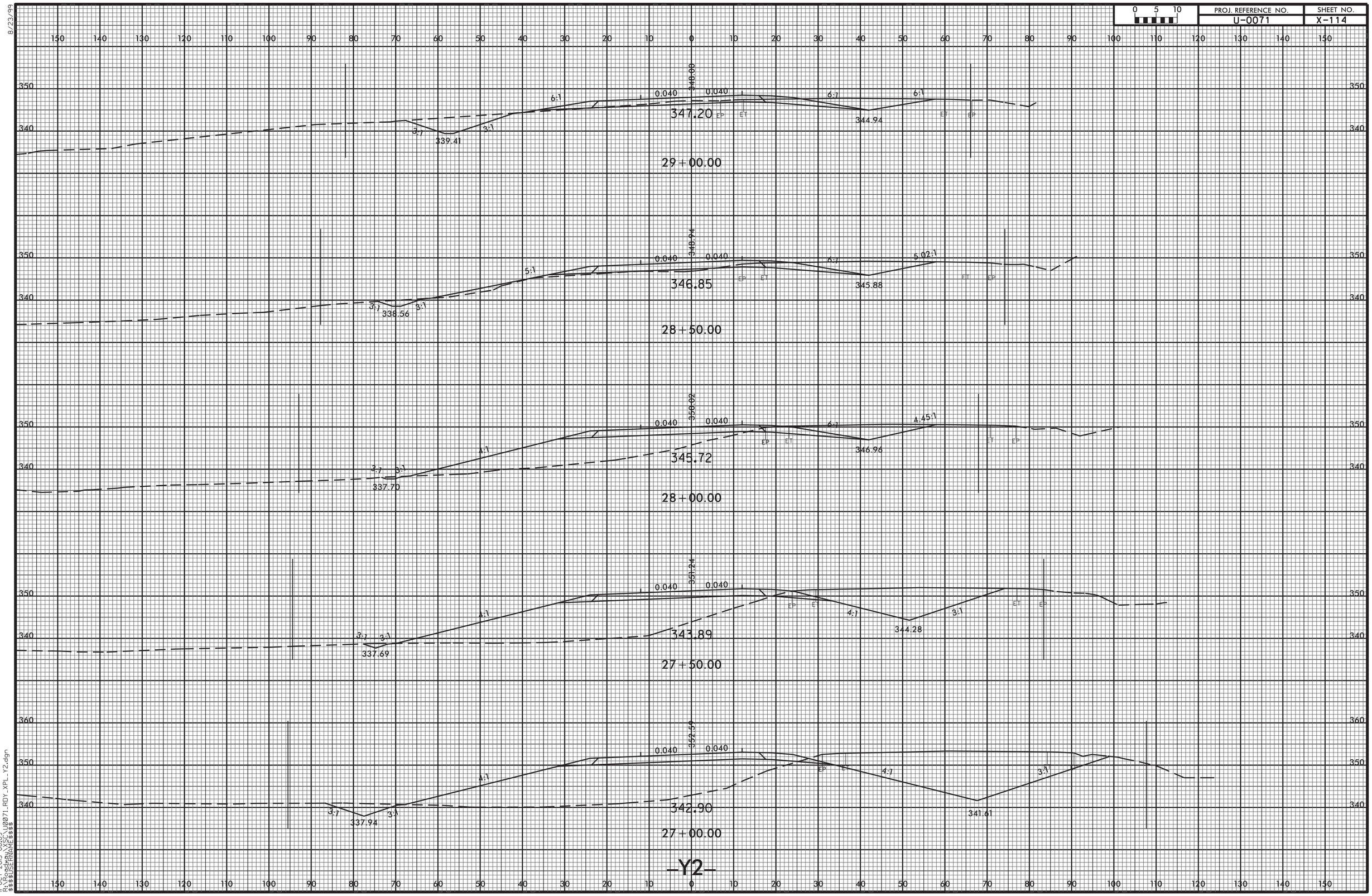


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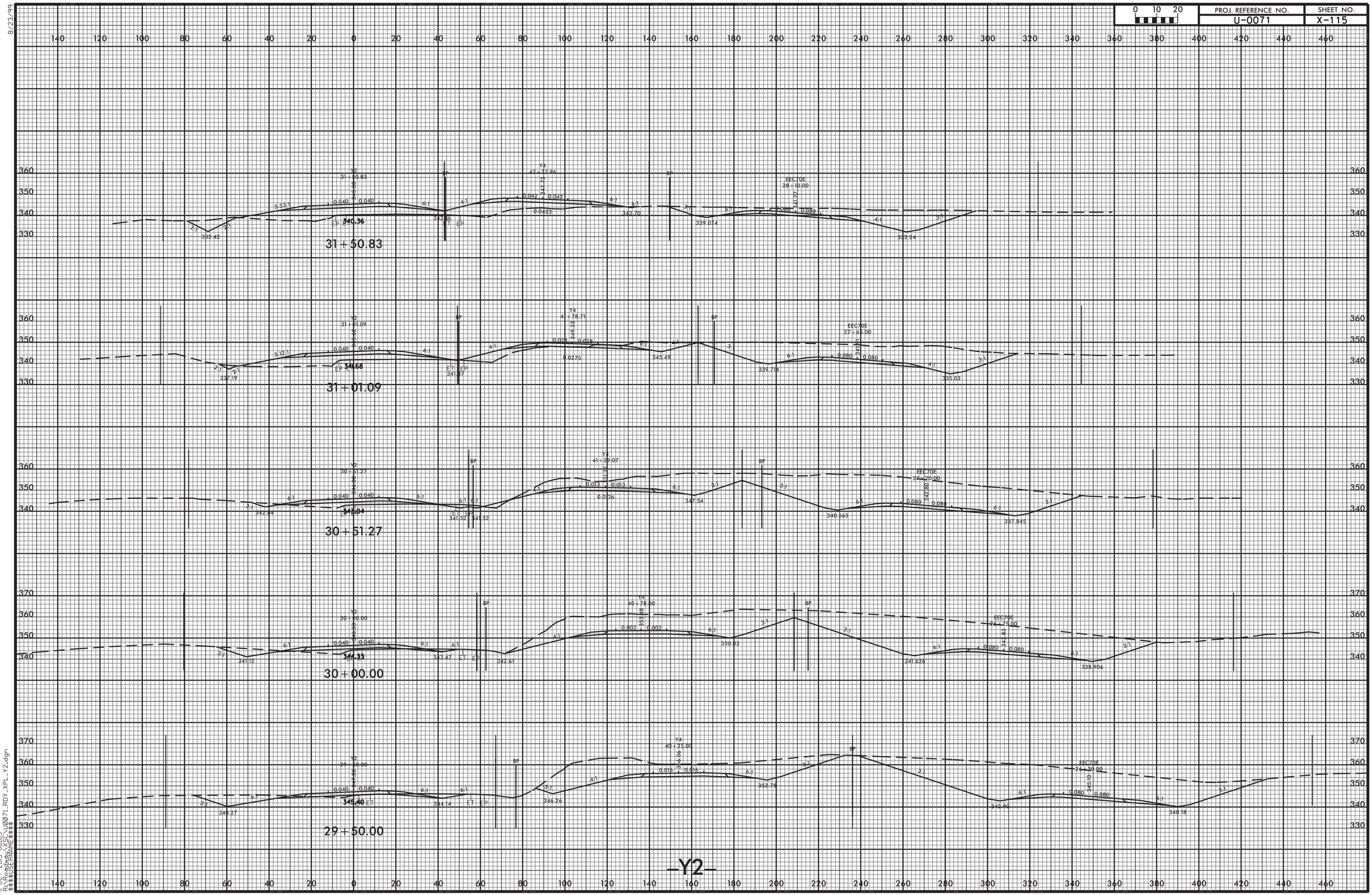

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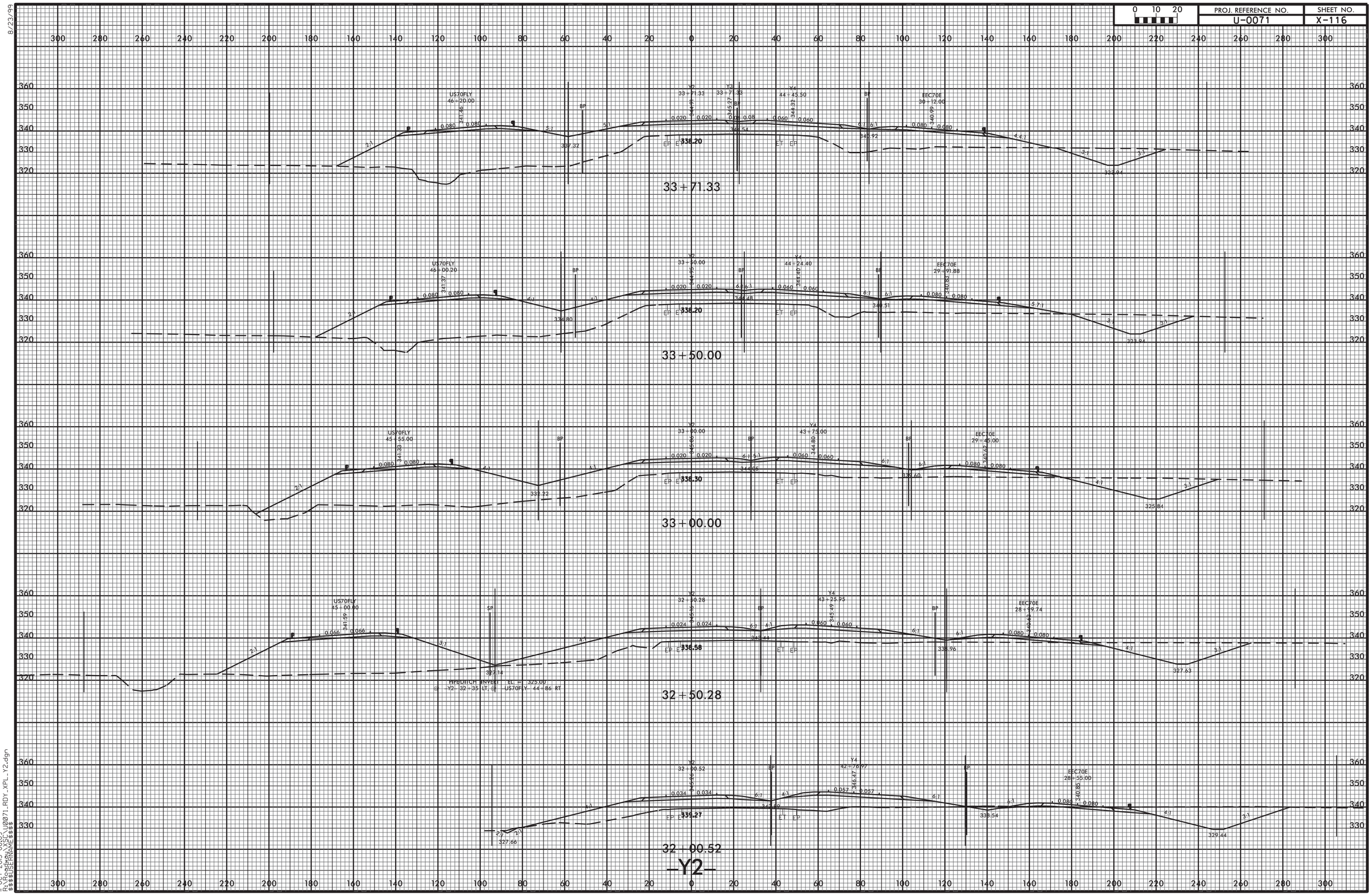


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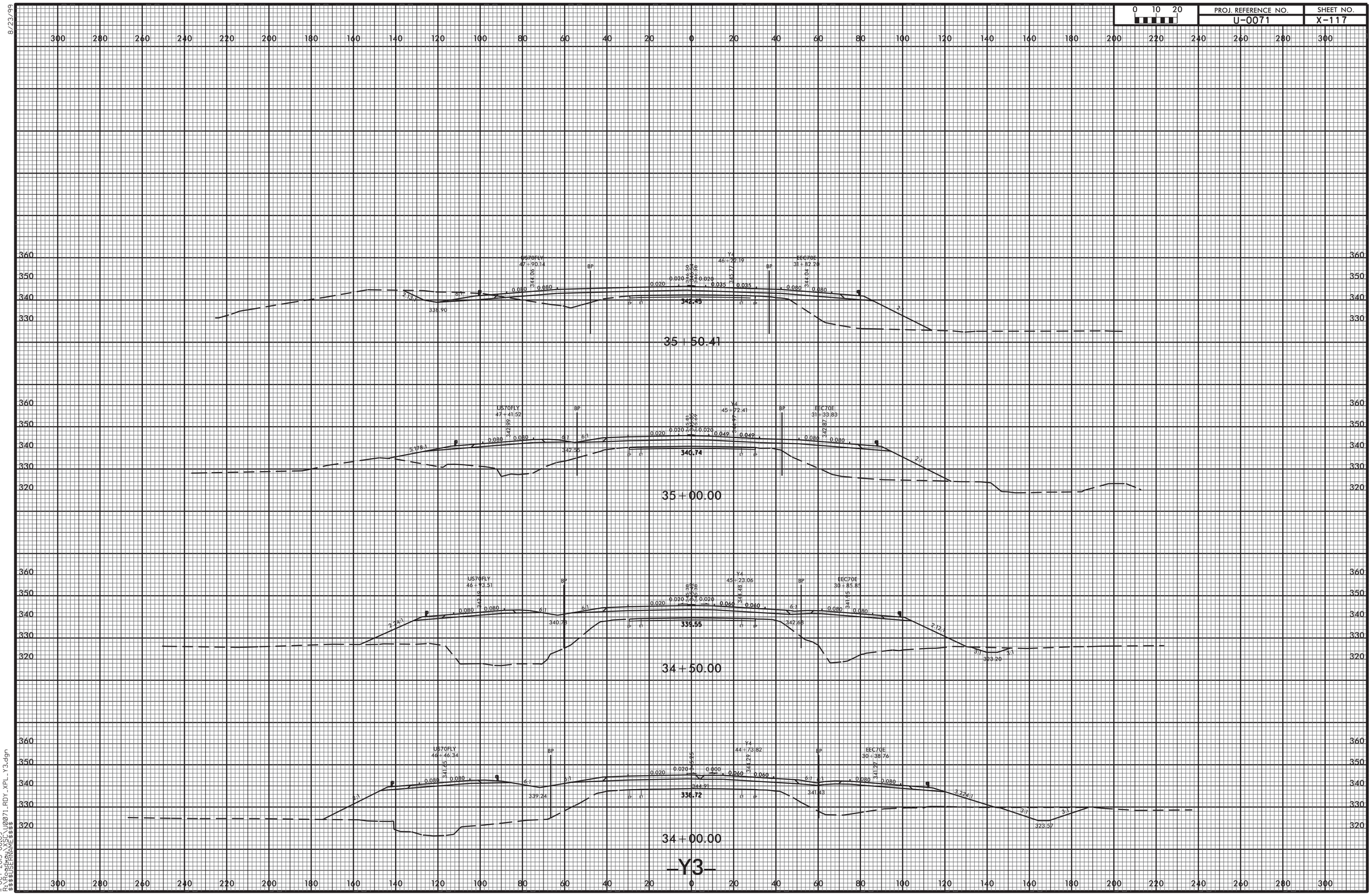


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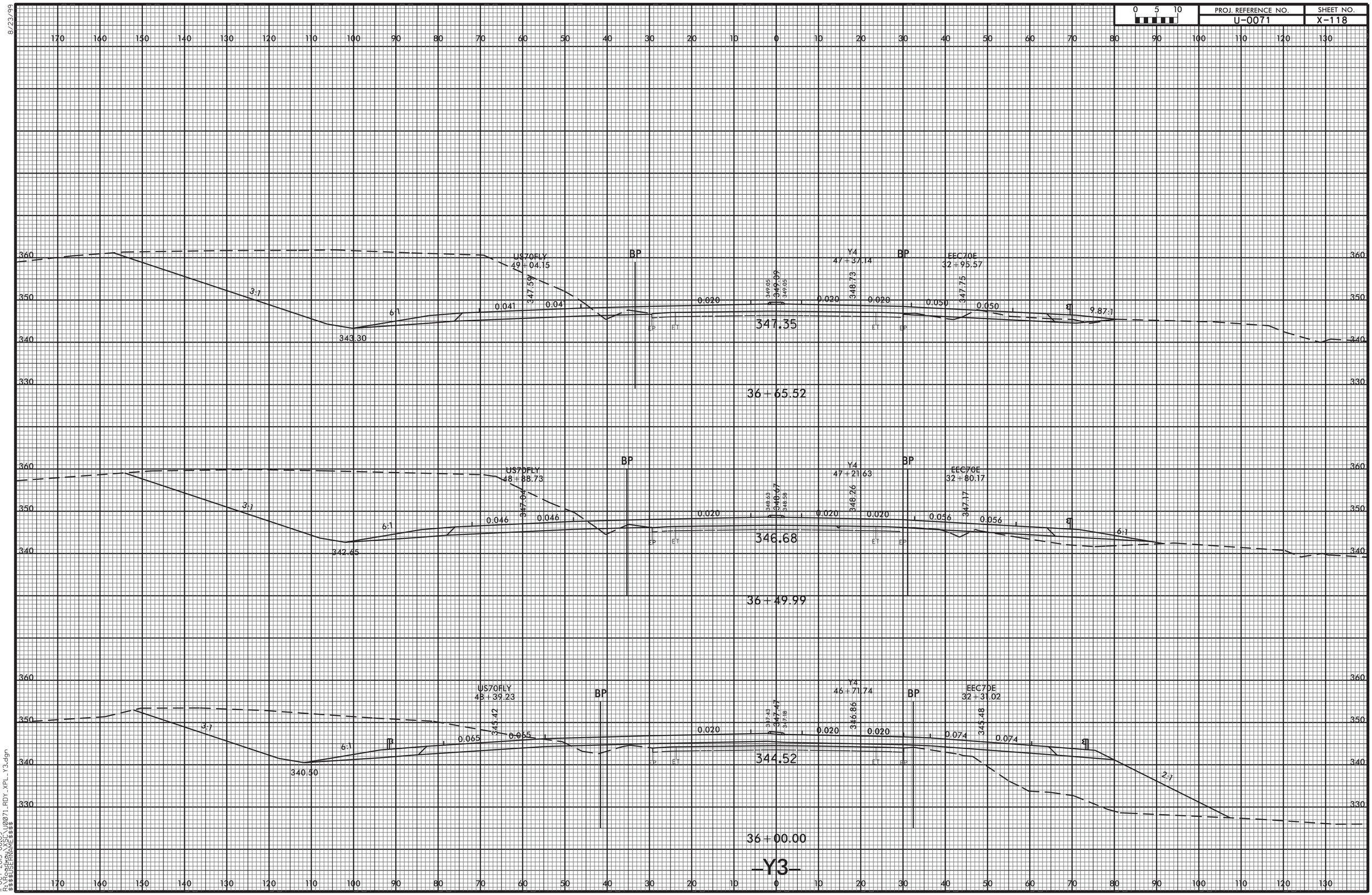


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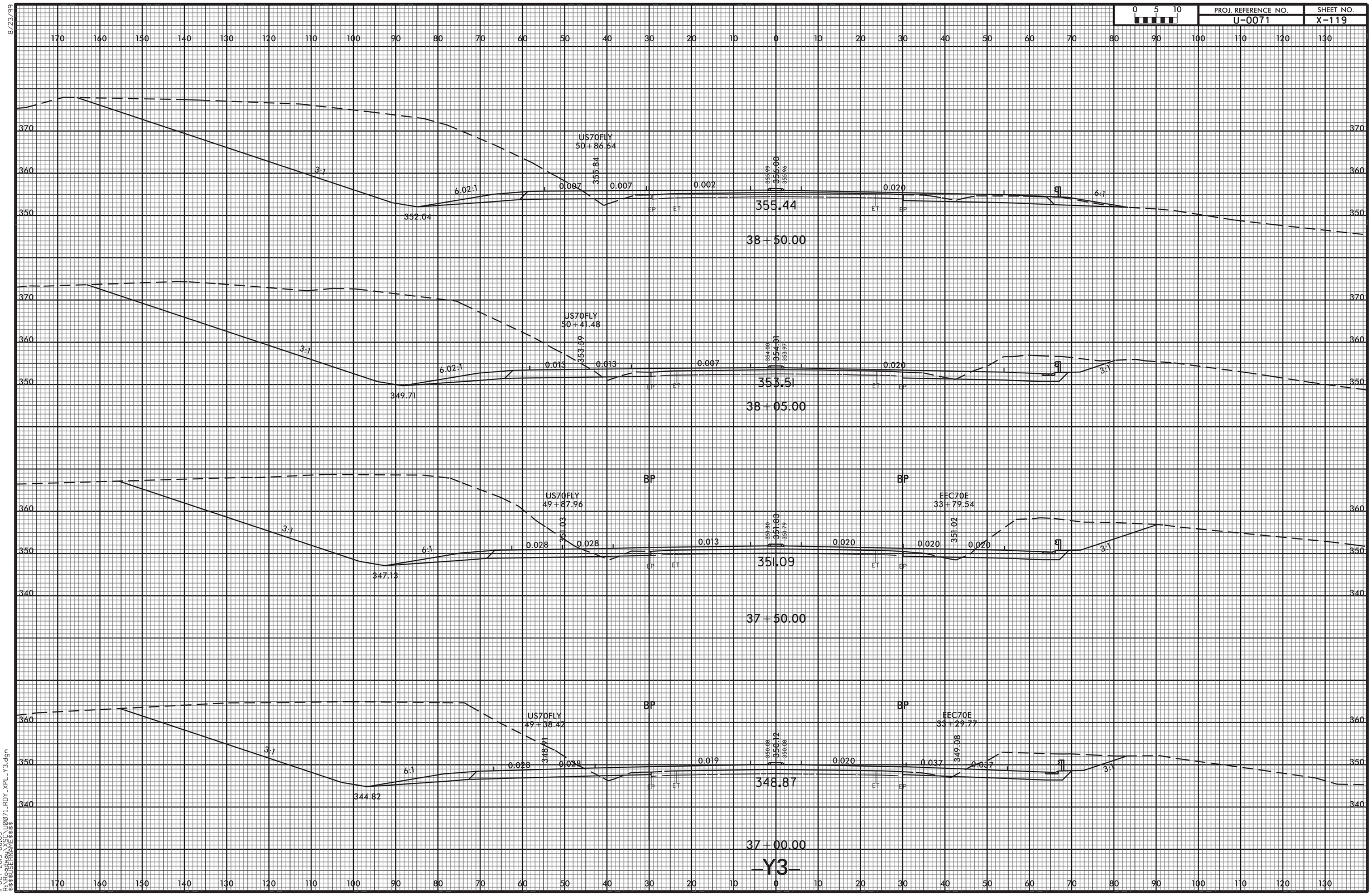


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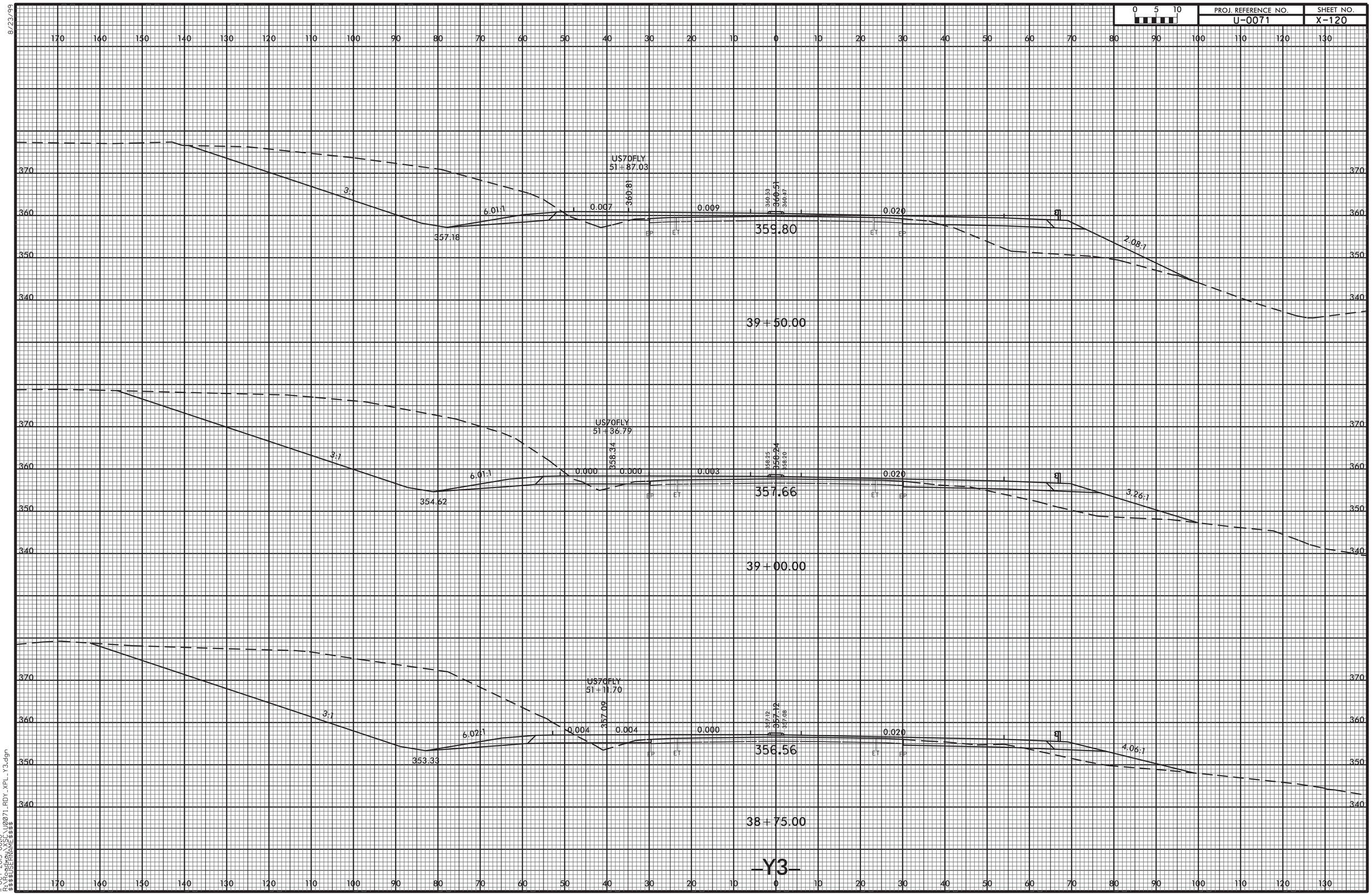


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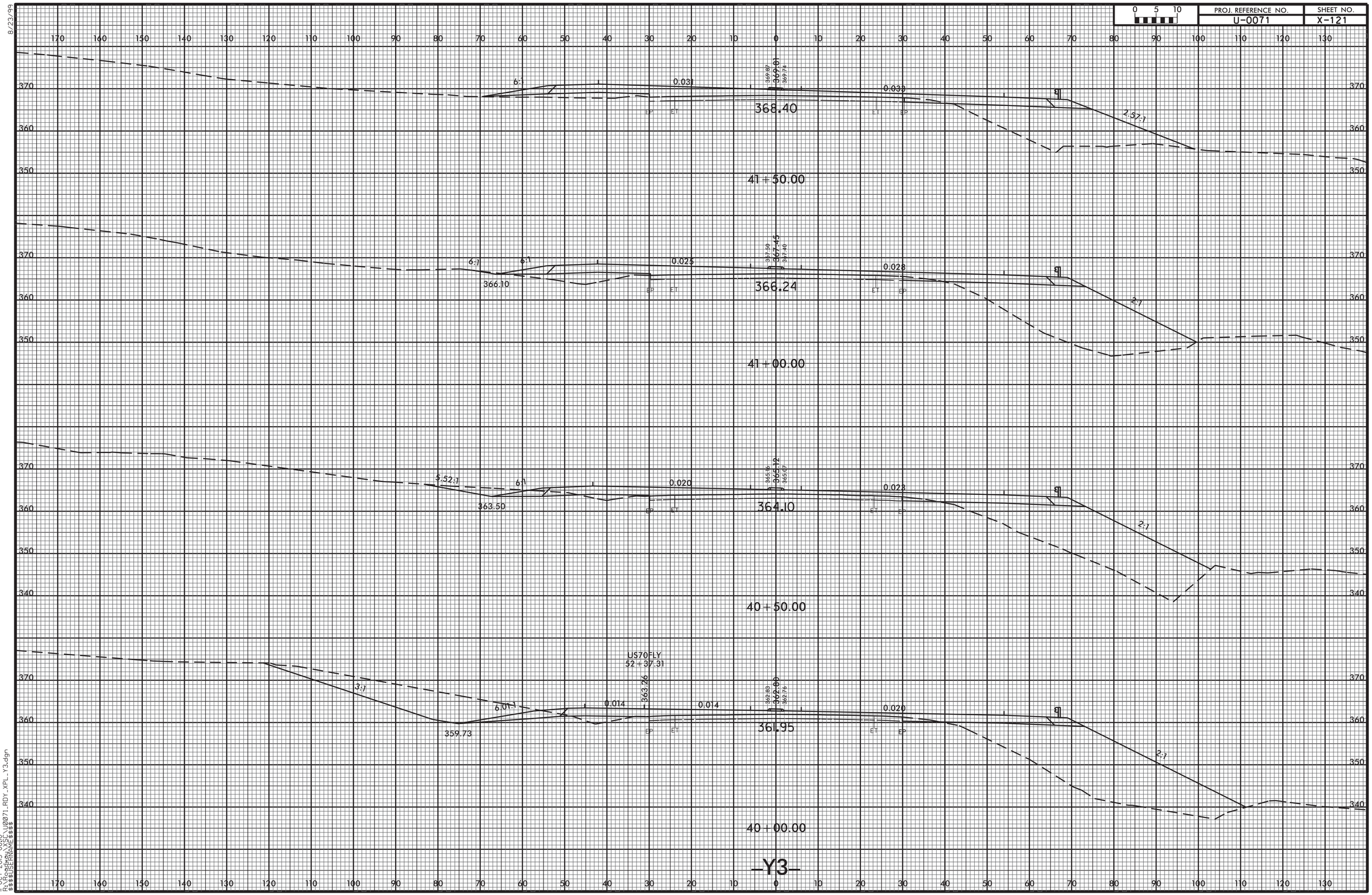


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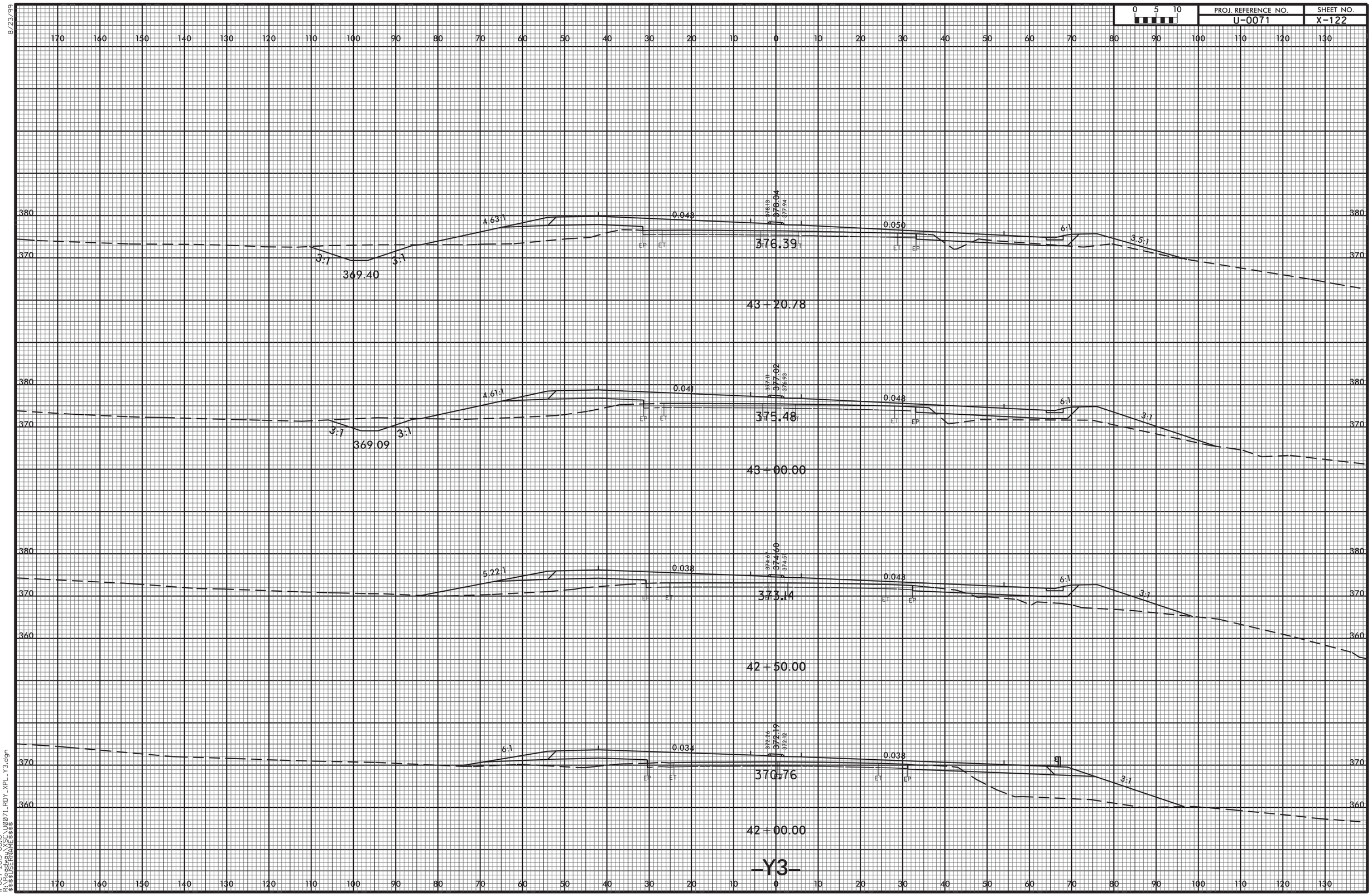
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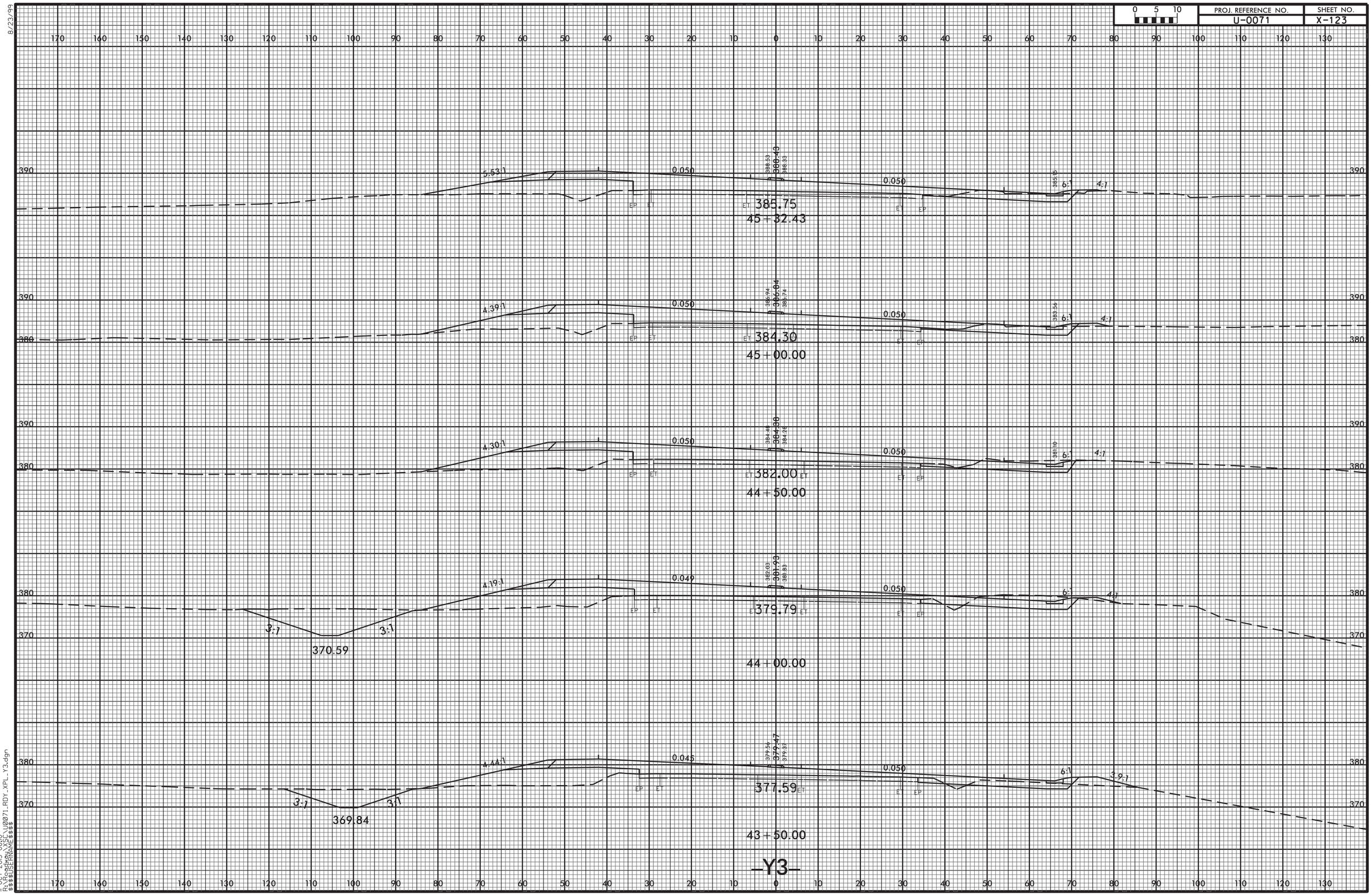


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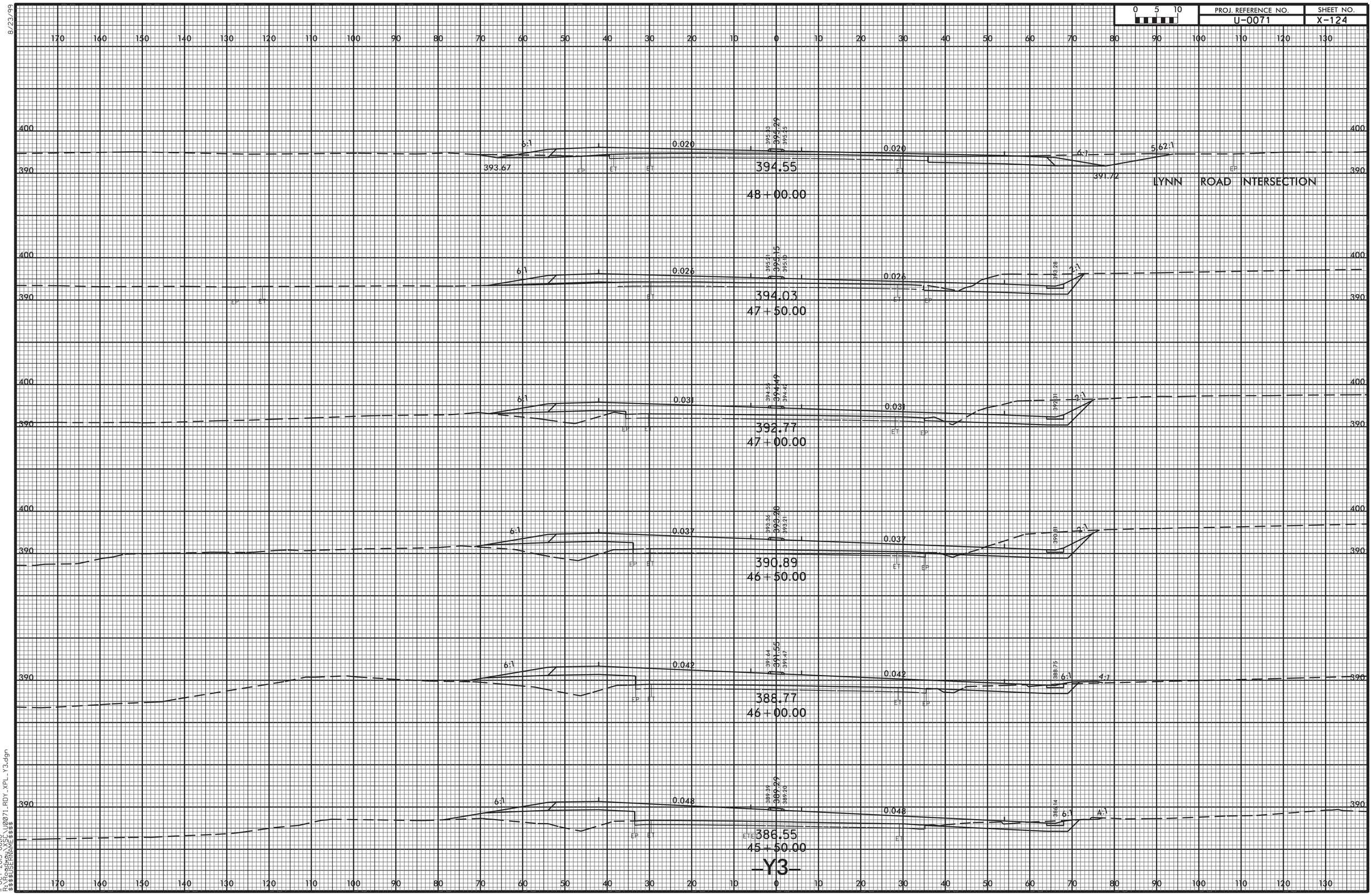


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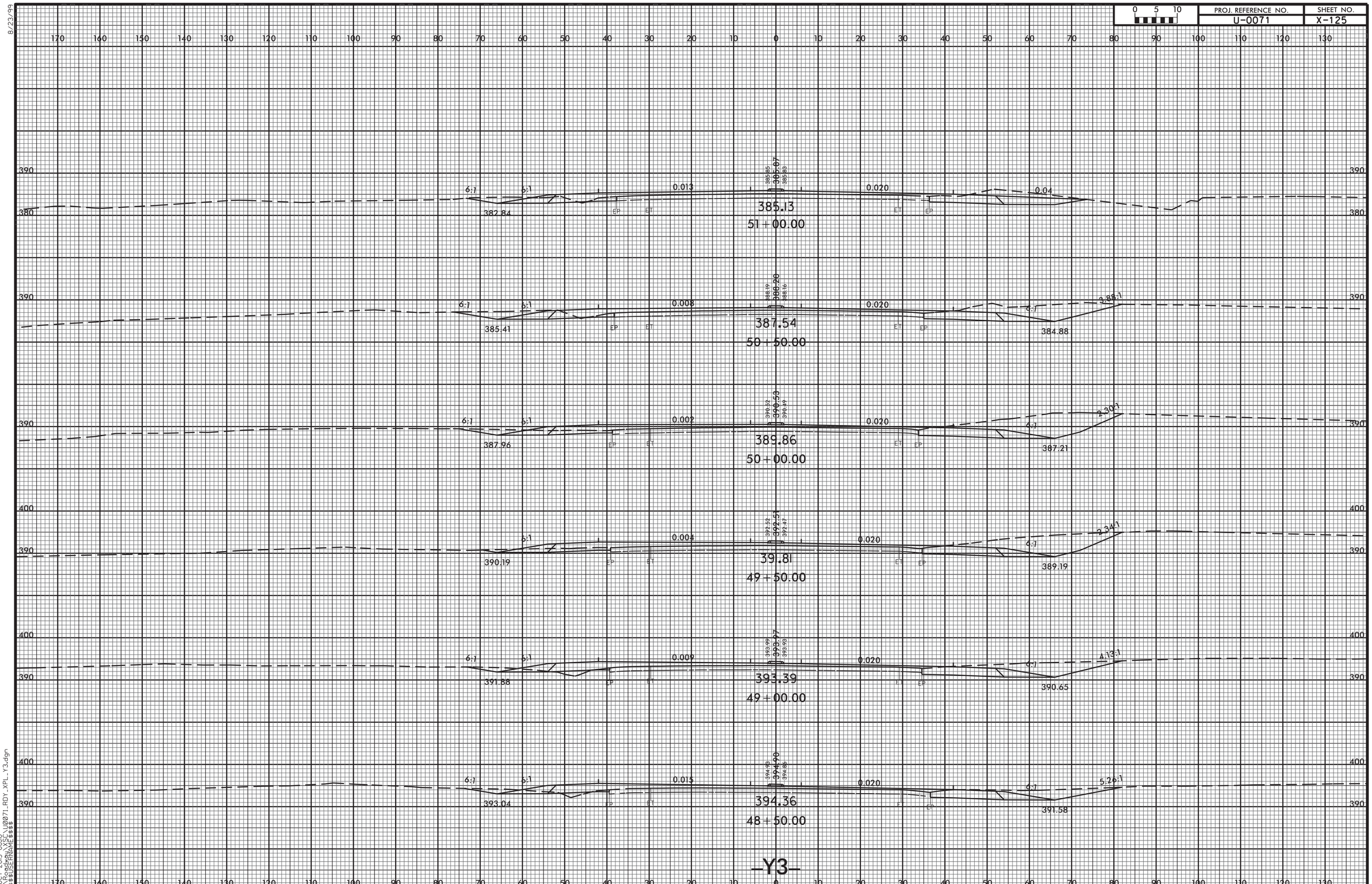


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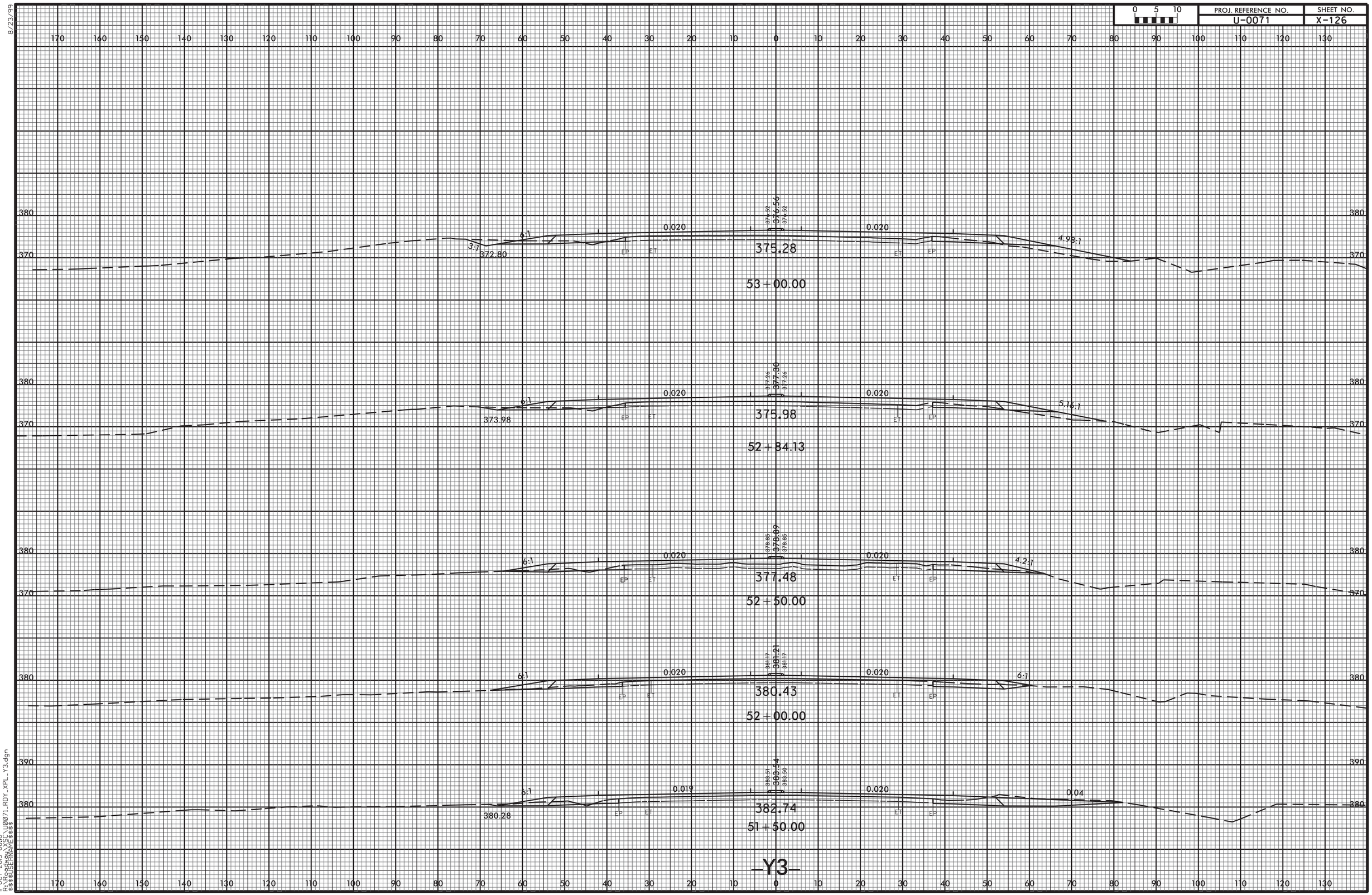


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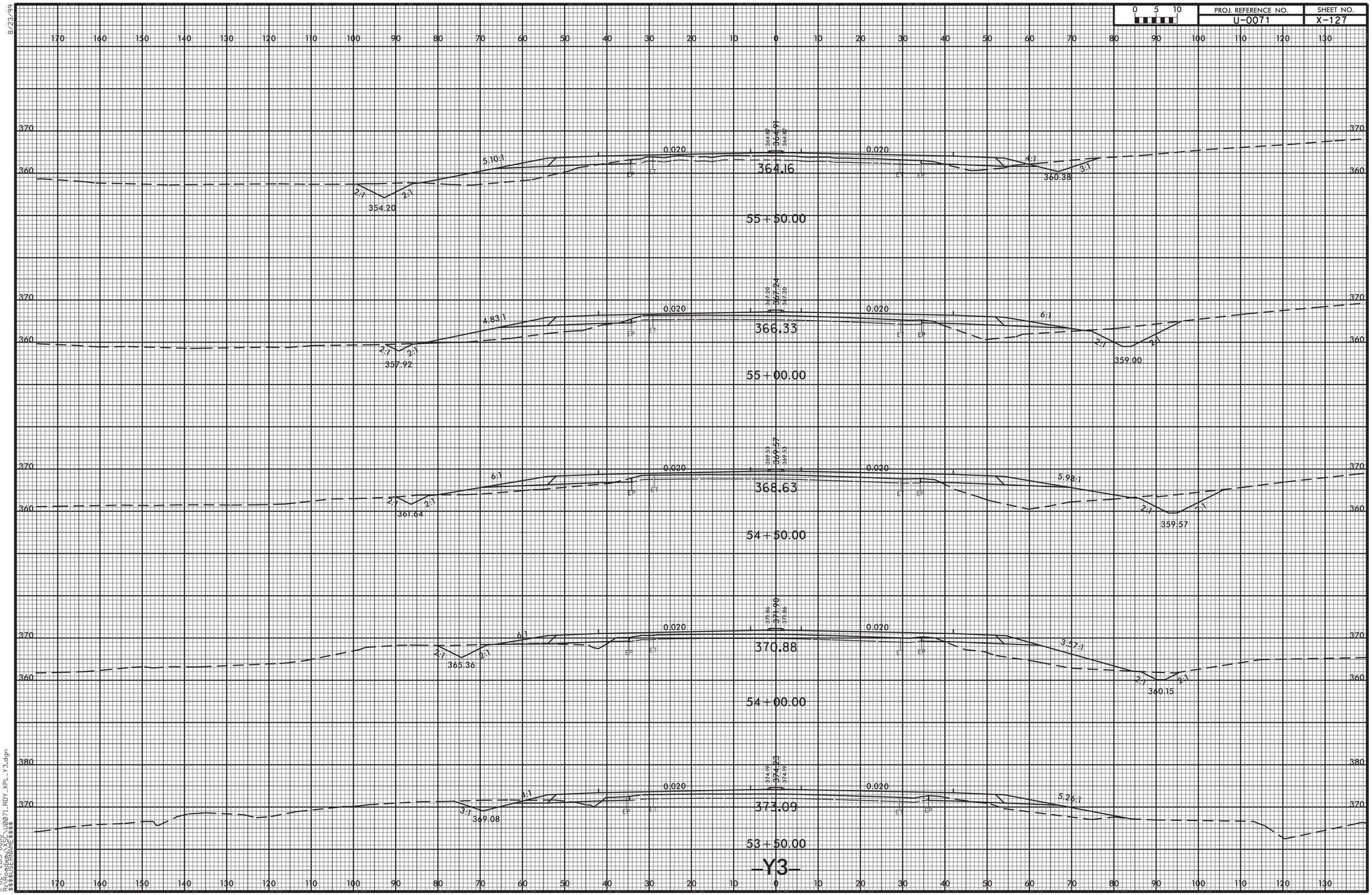


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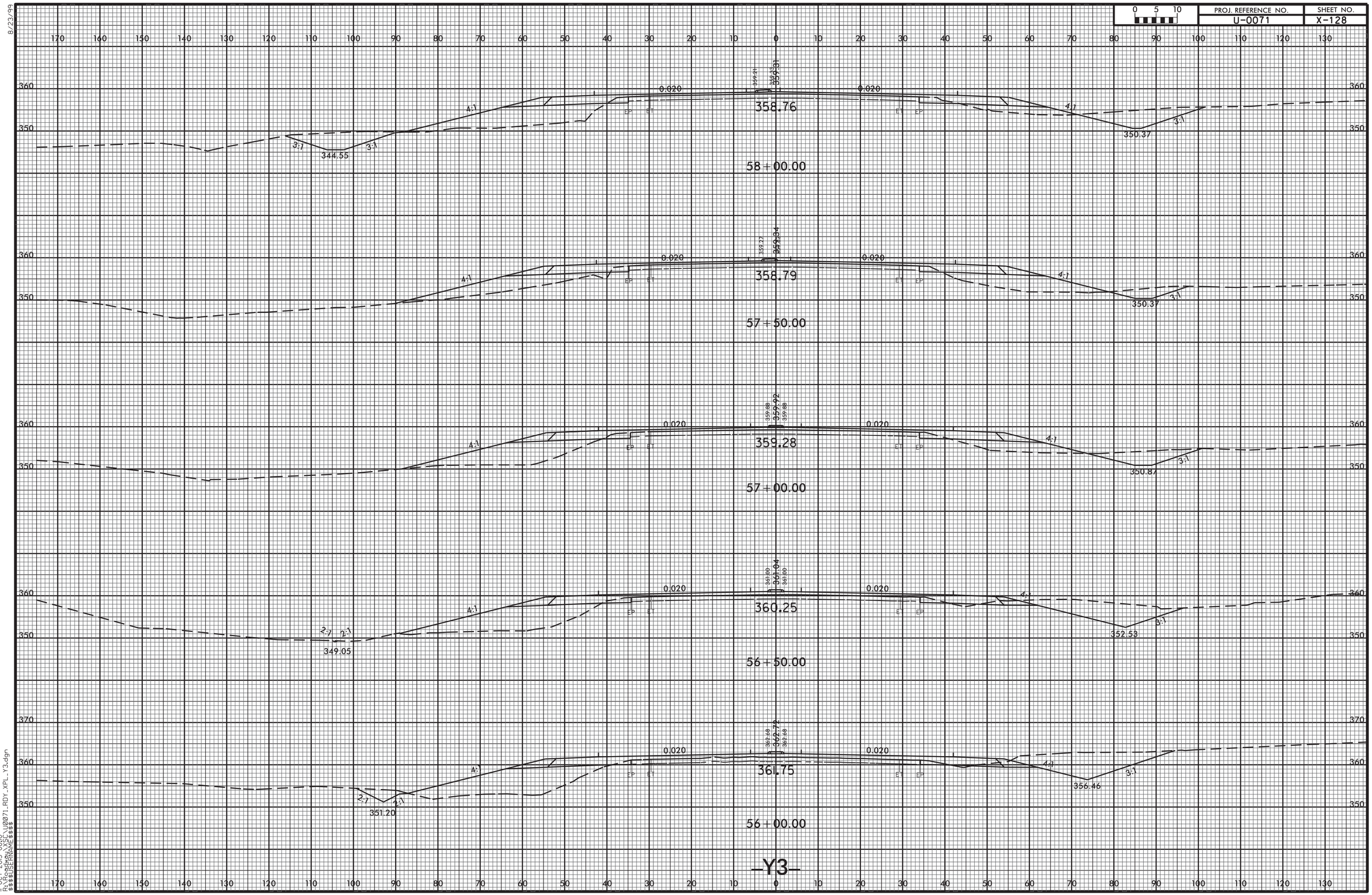


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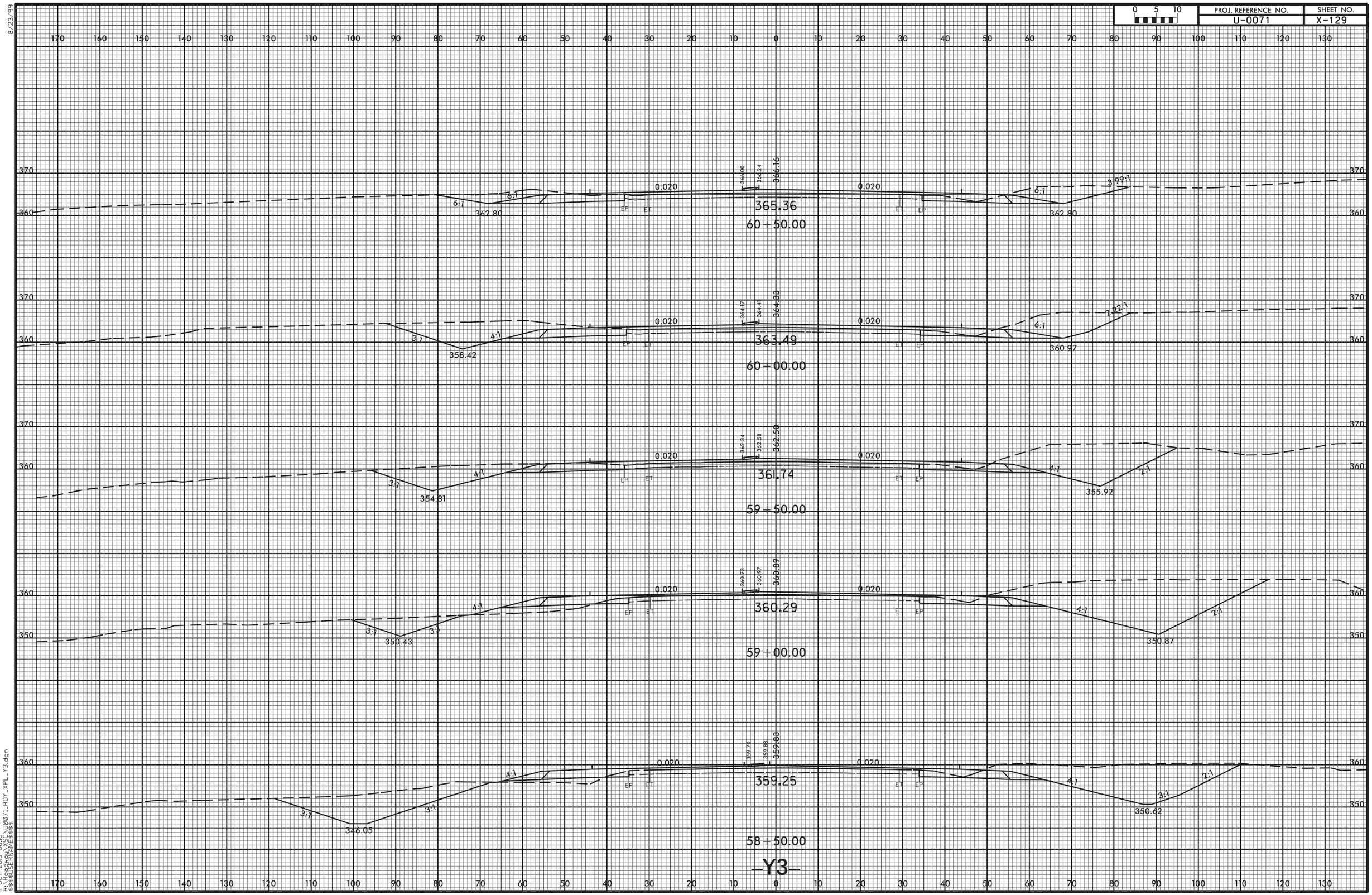


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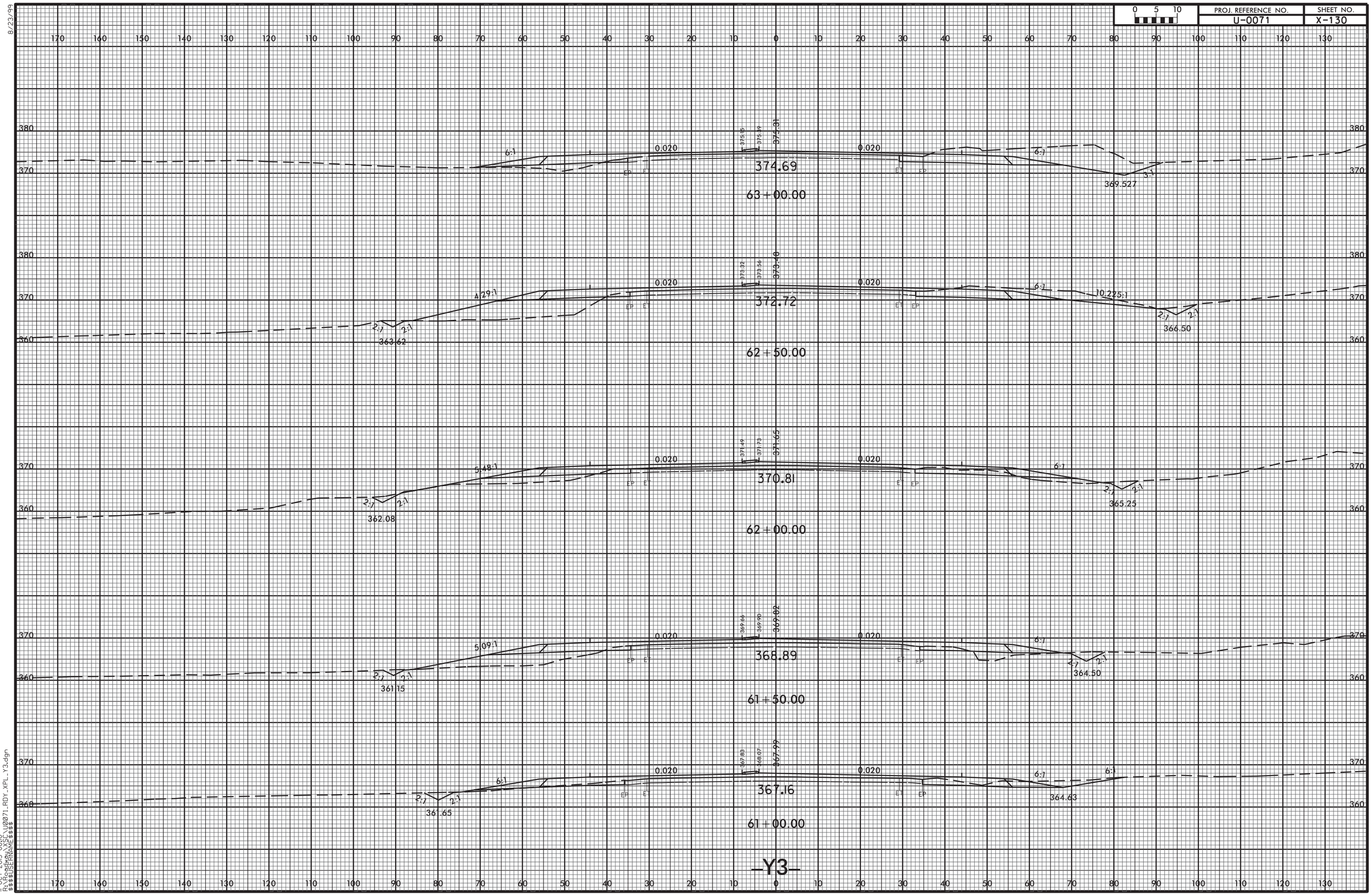
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375.35
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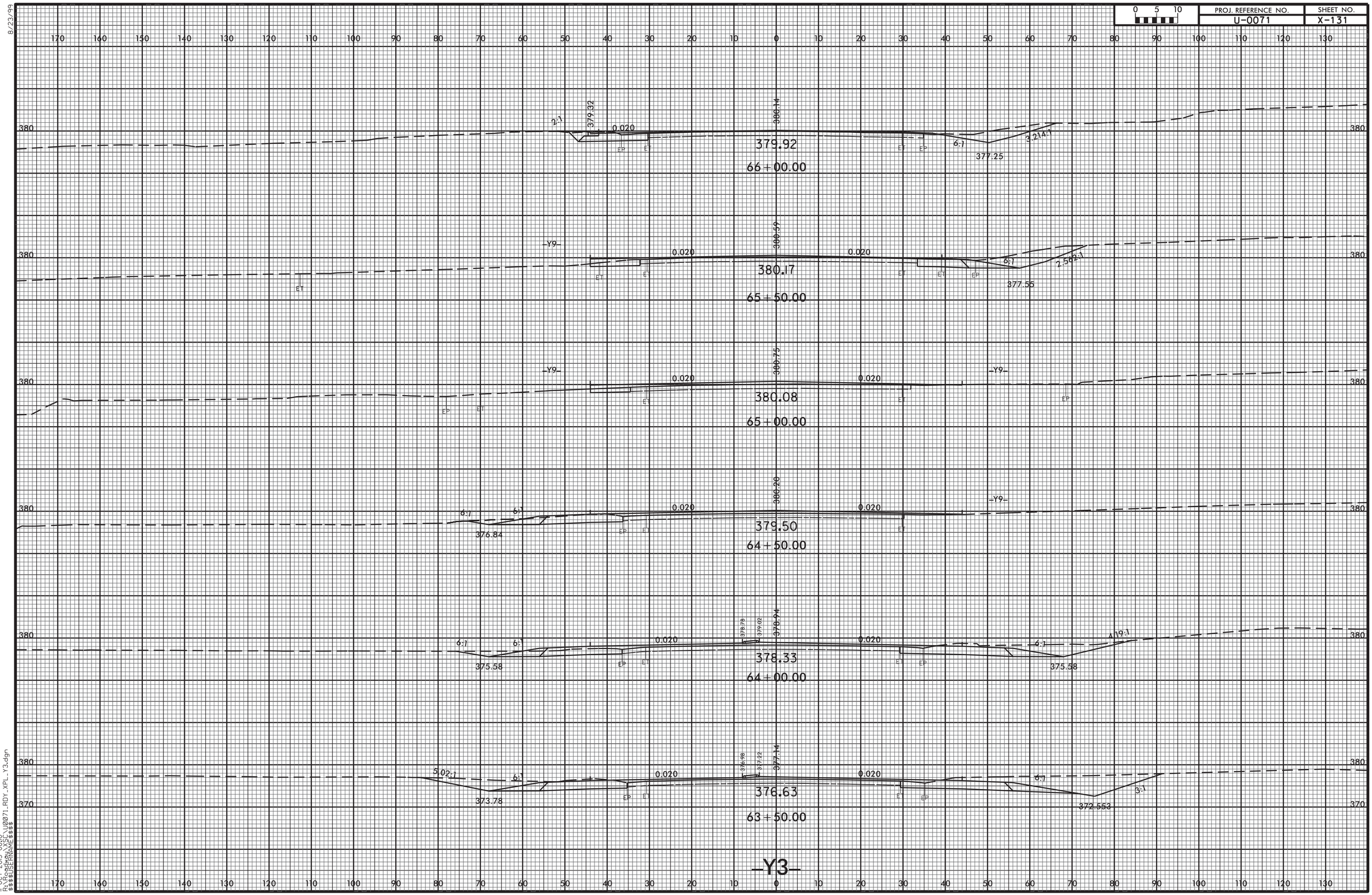


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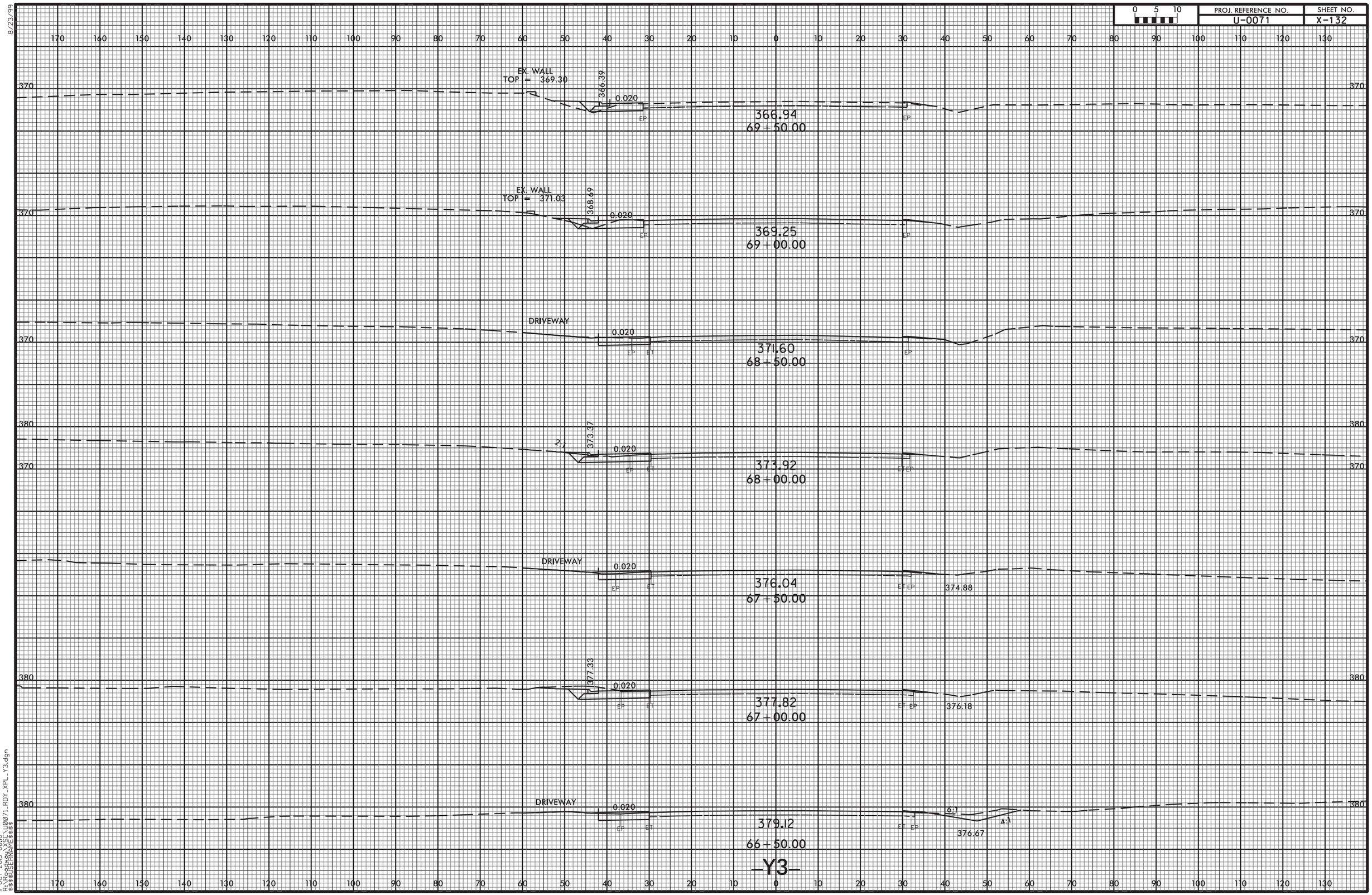


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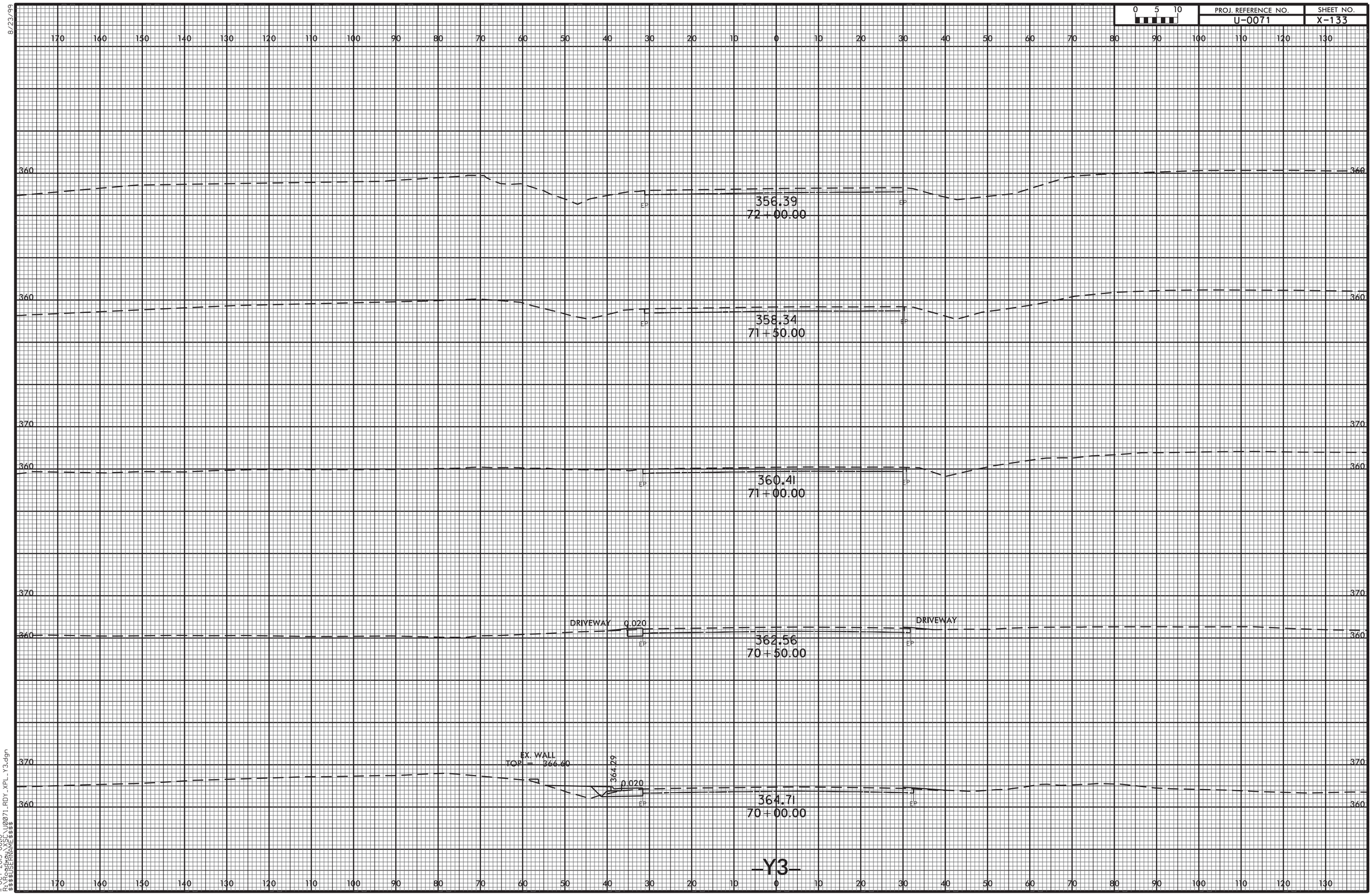


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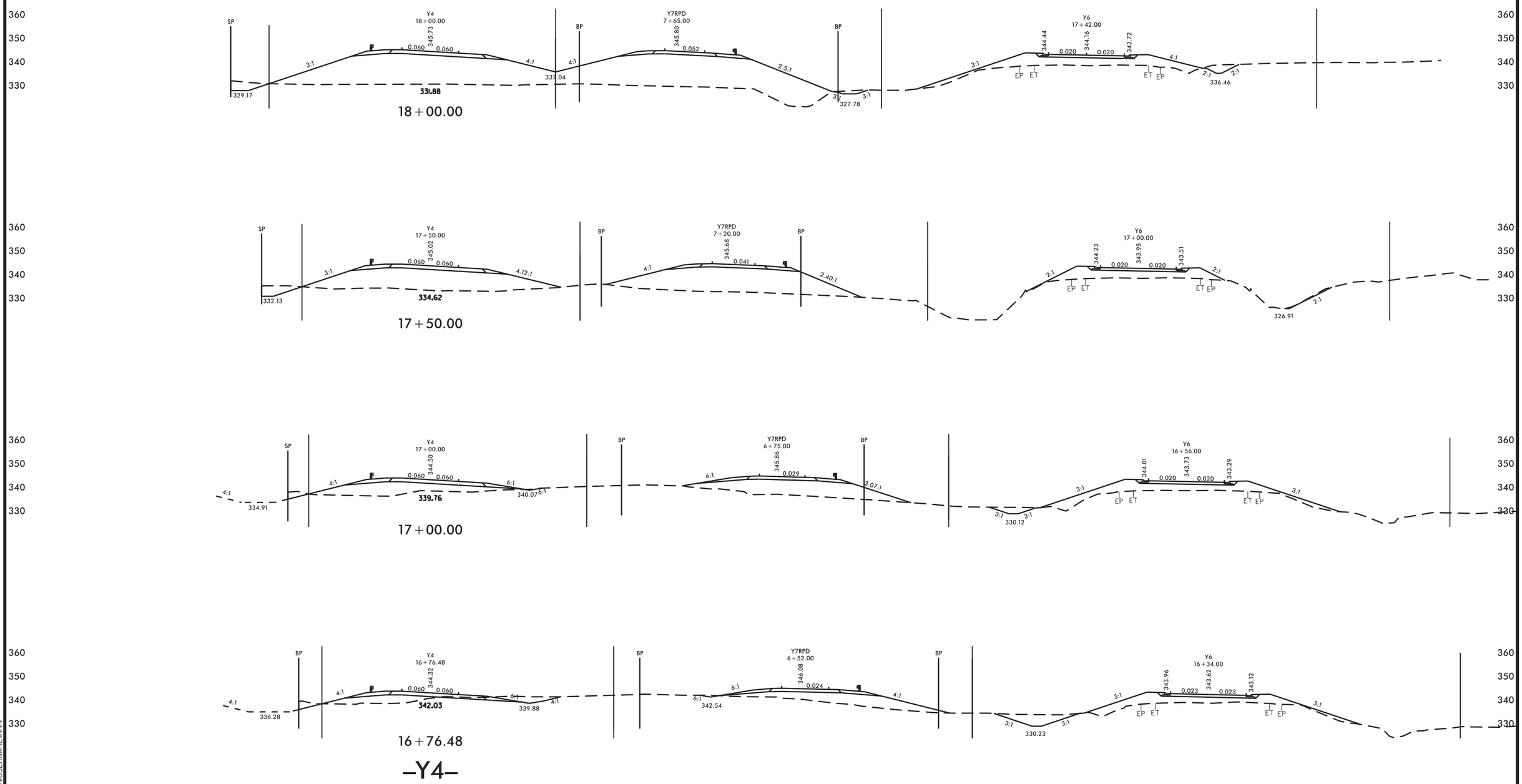


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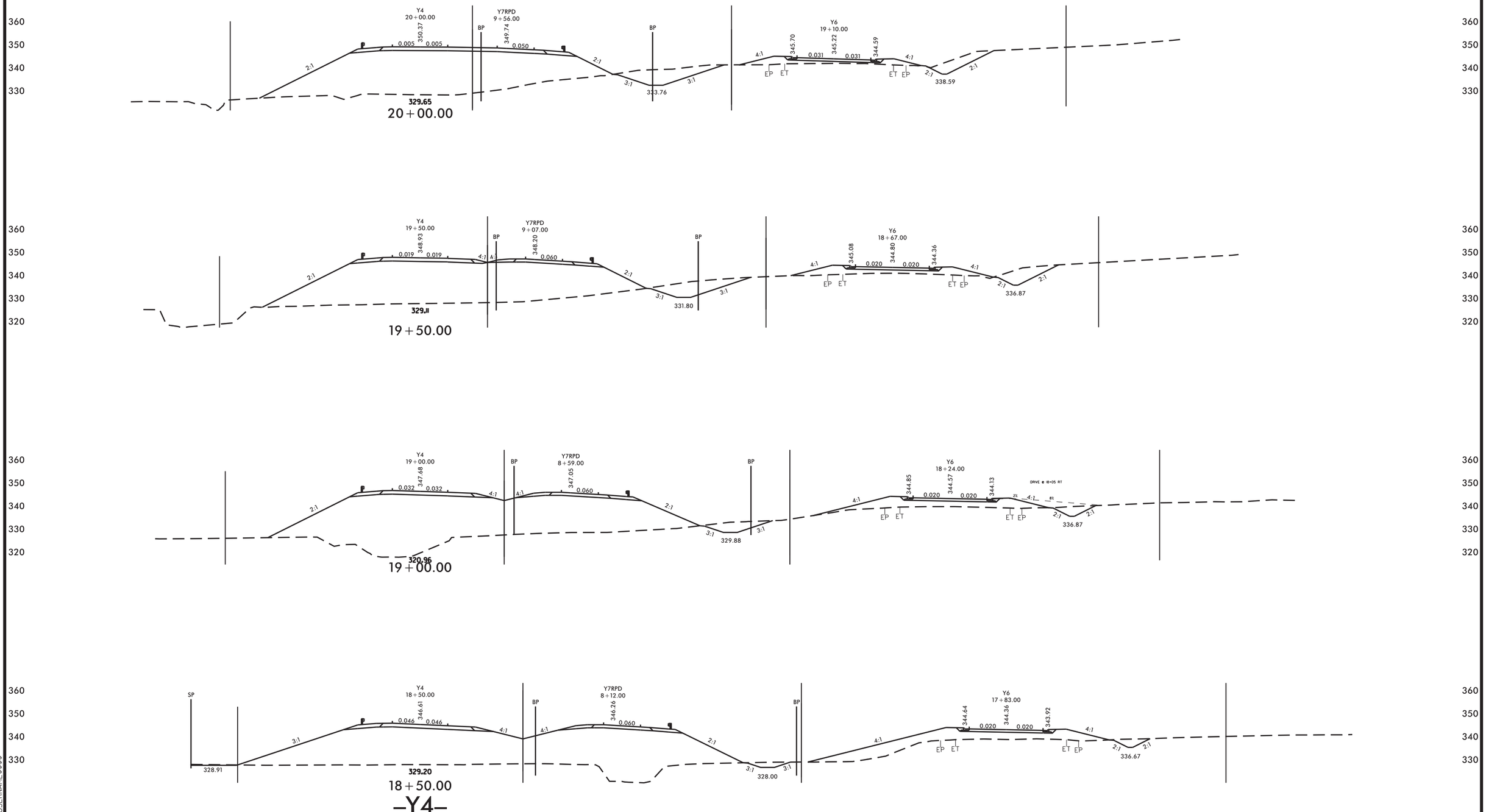


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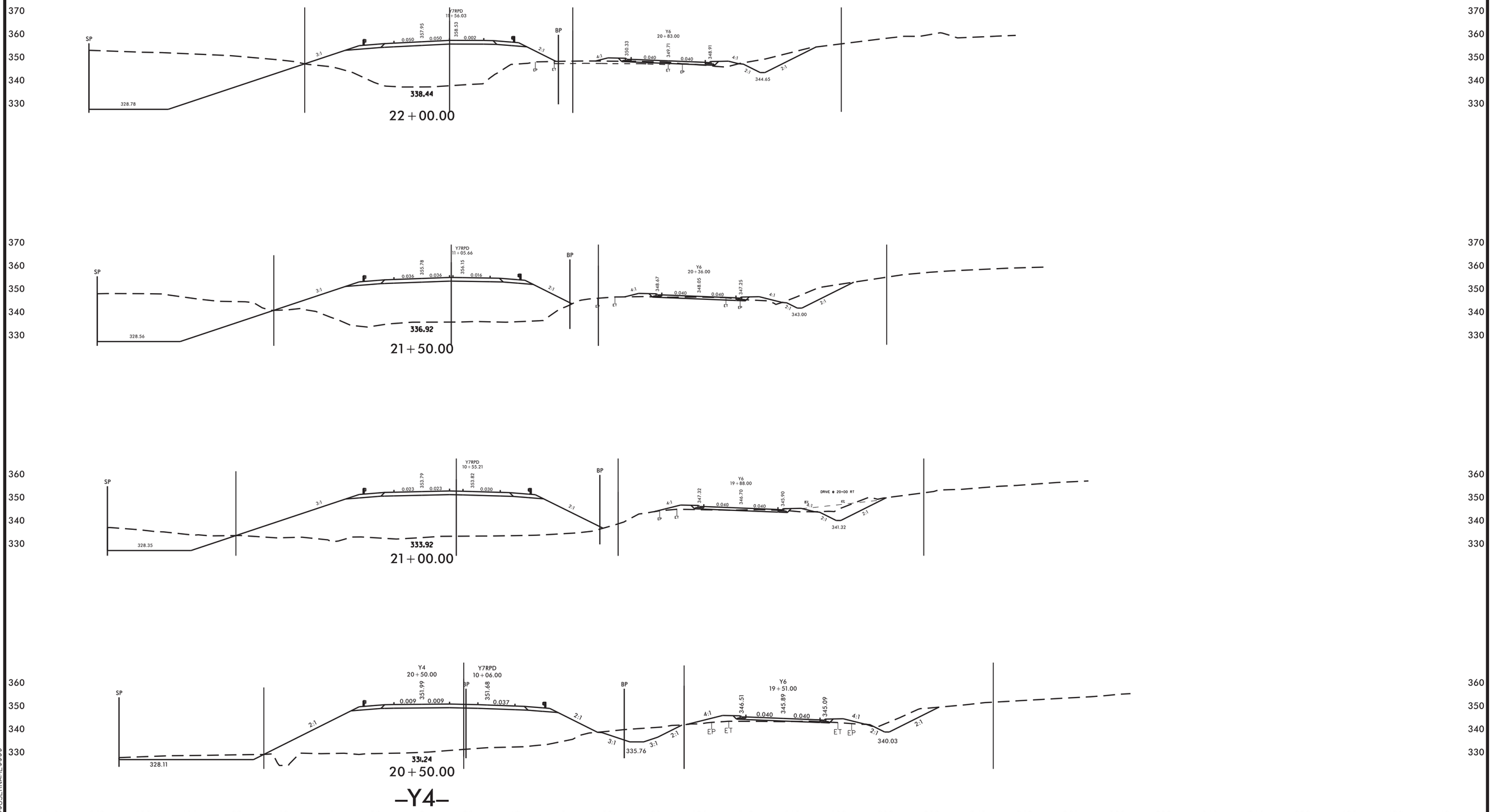


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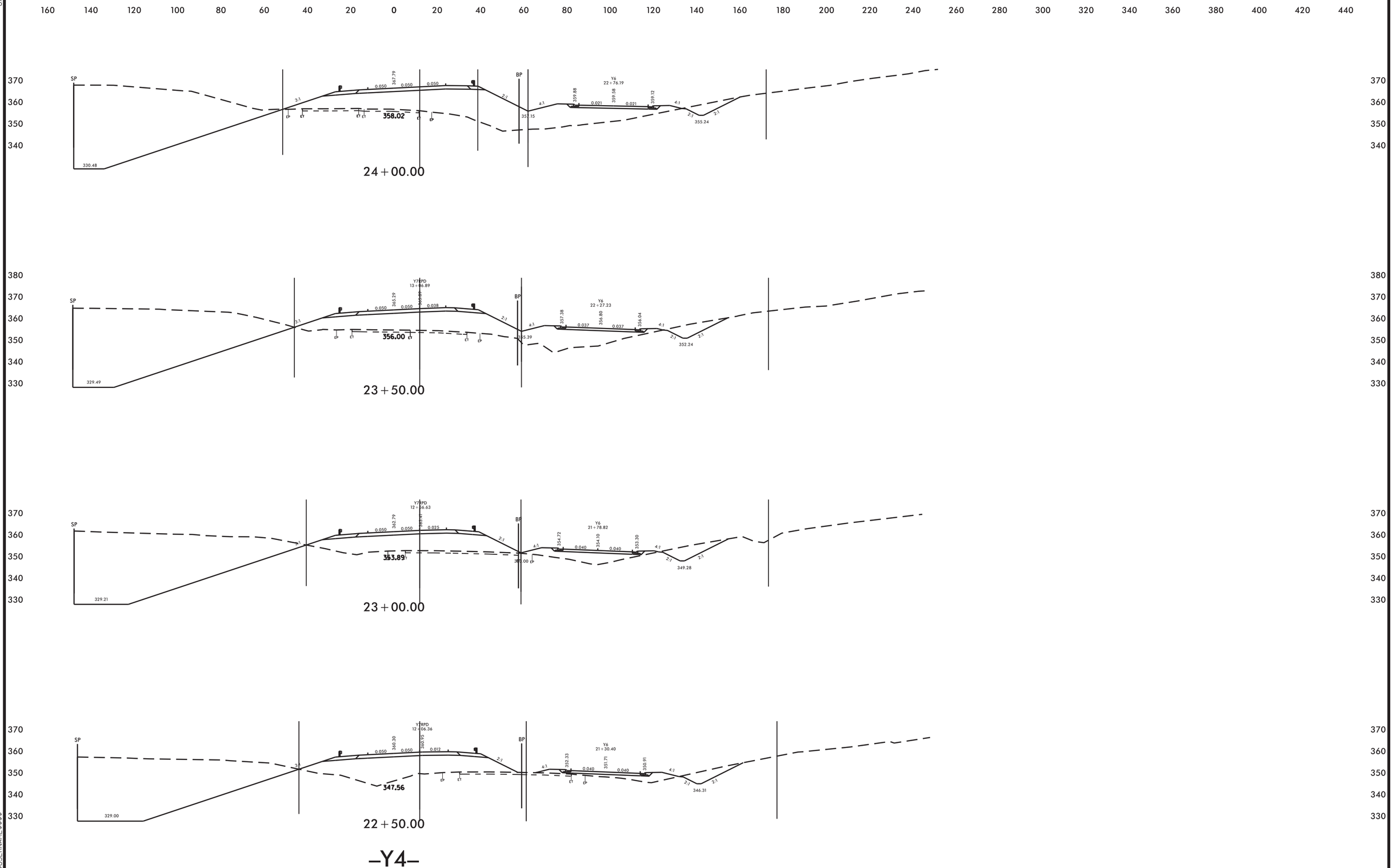


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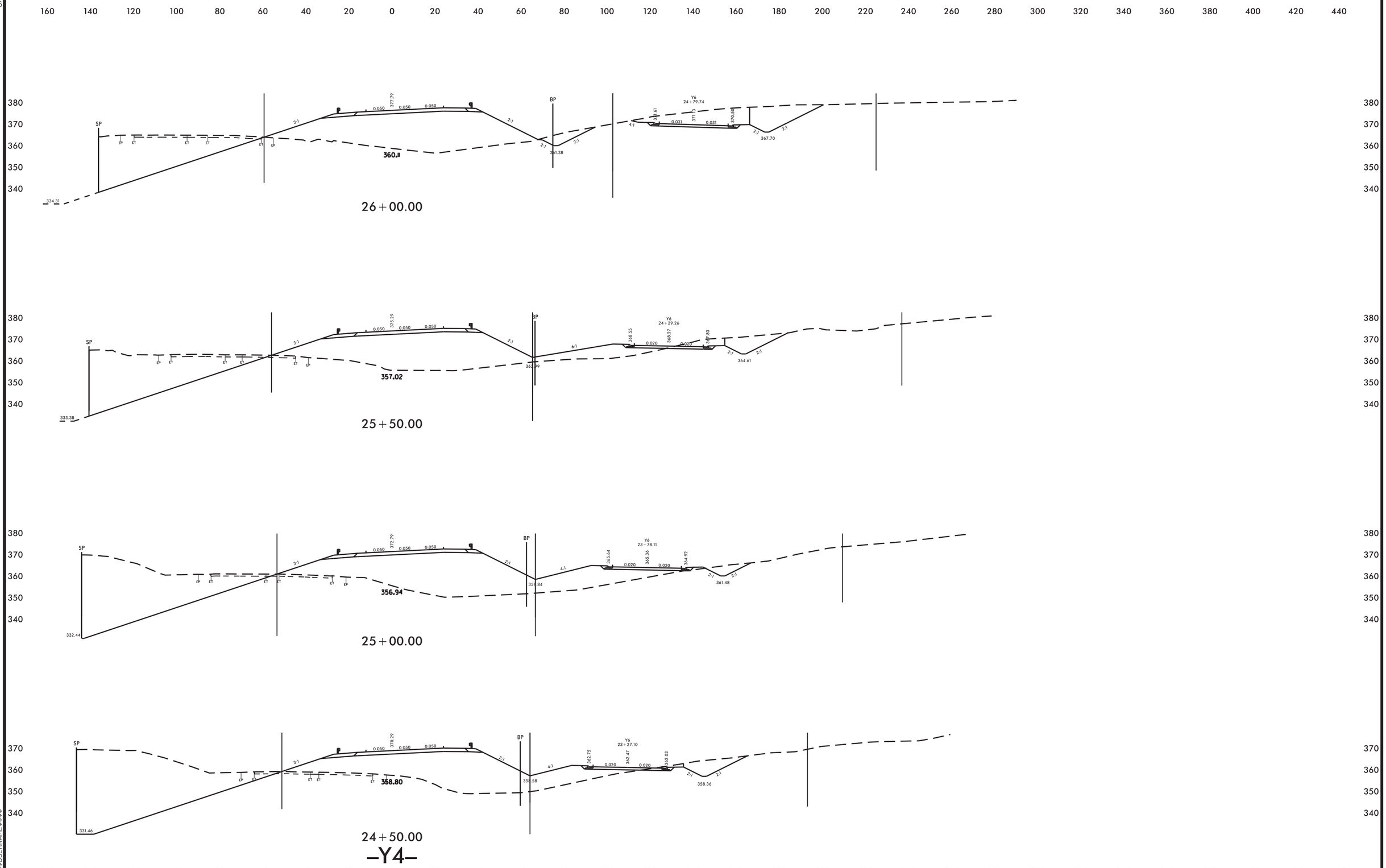


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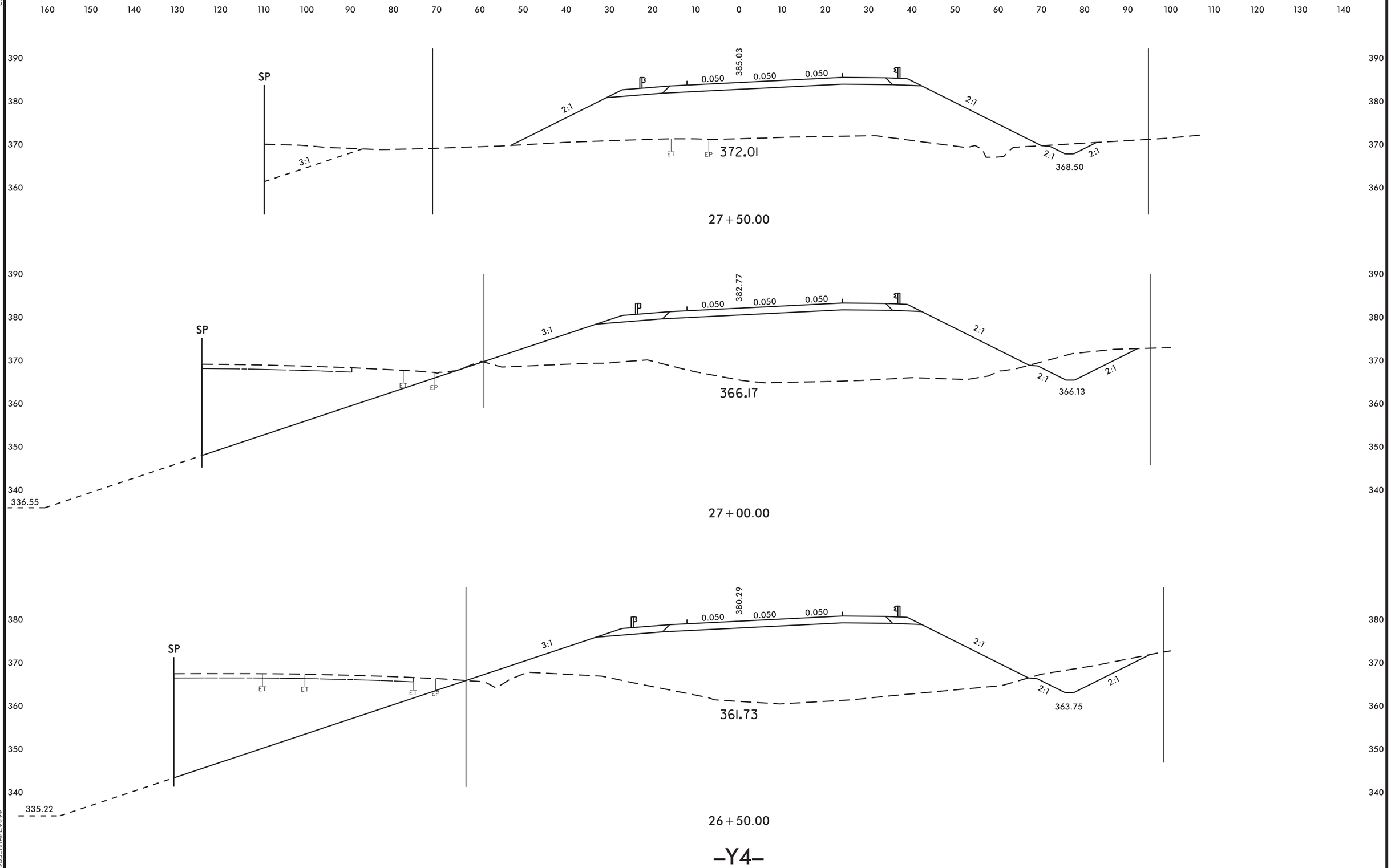


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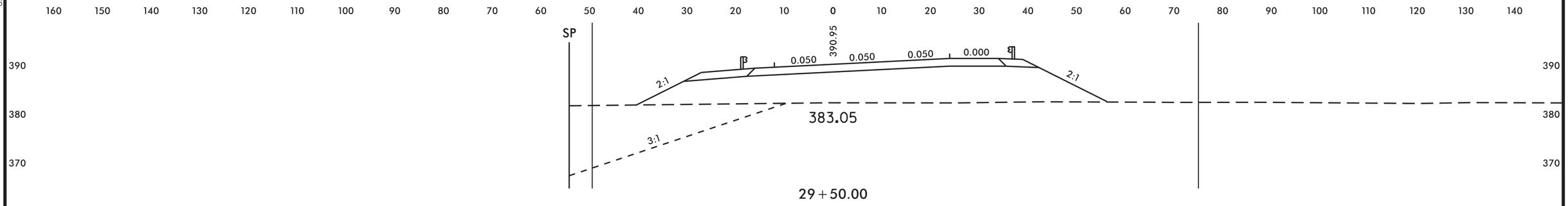


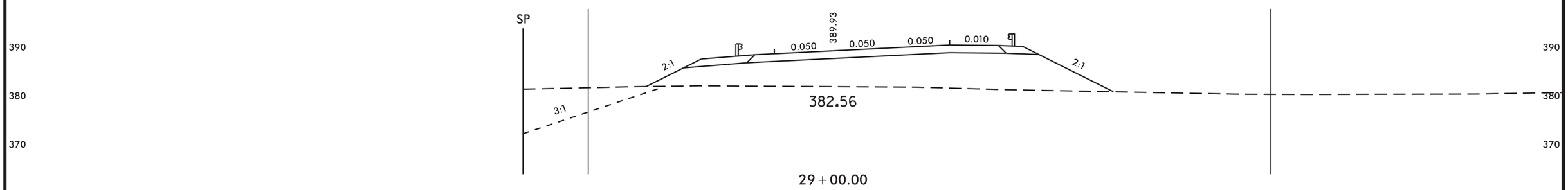


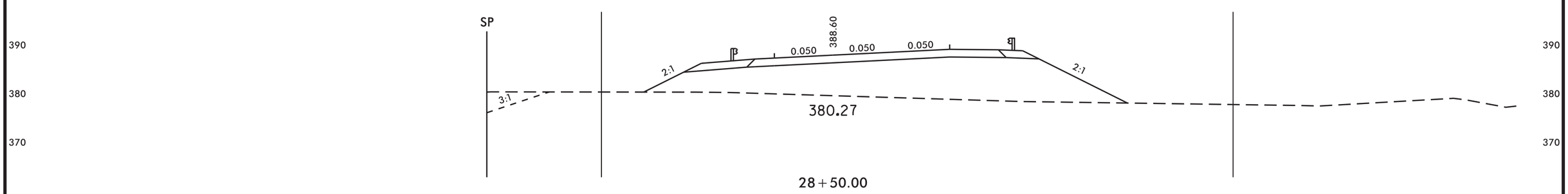


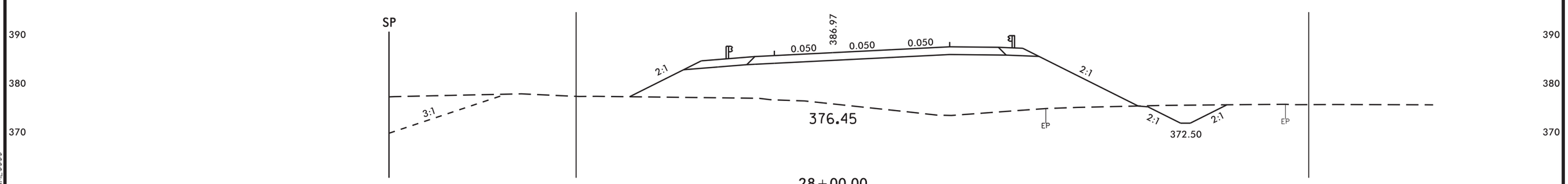


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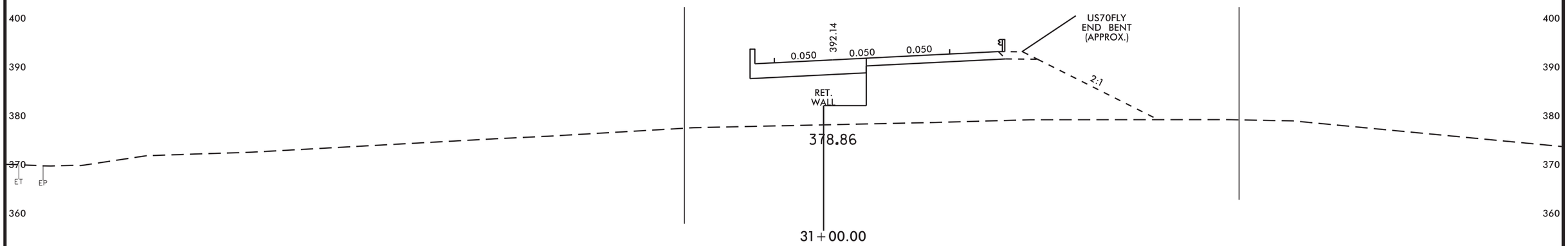


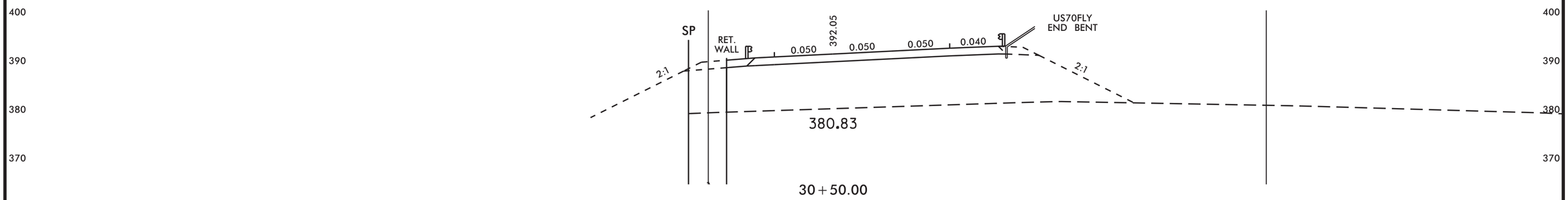


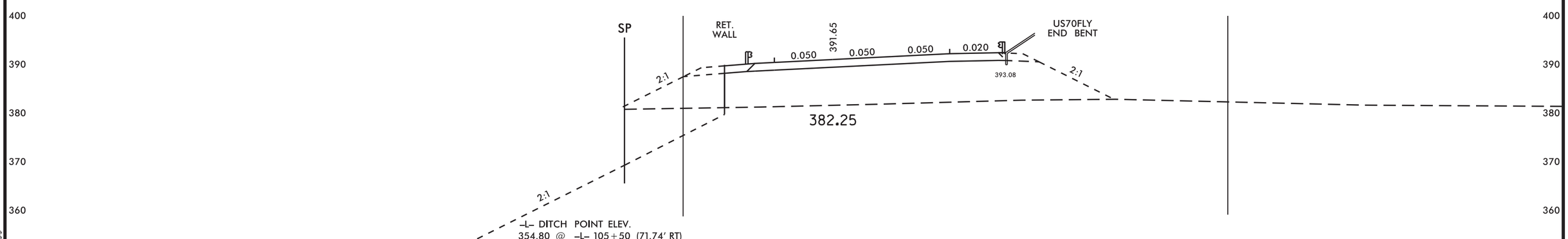


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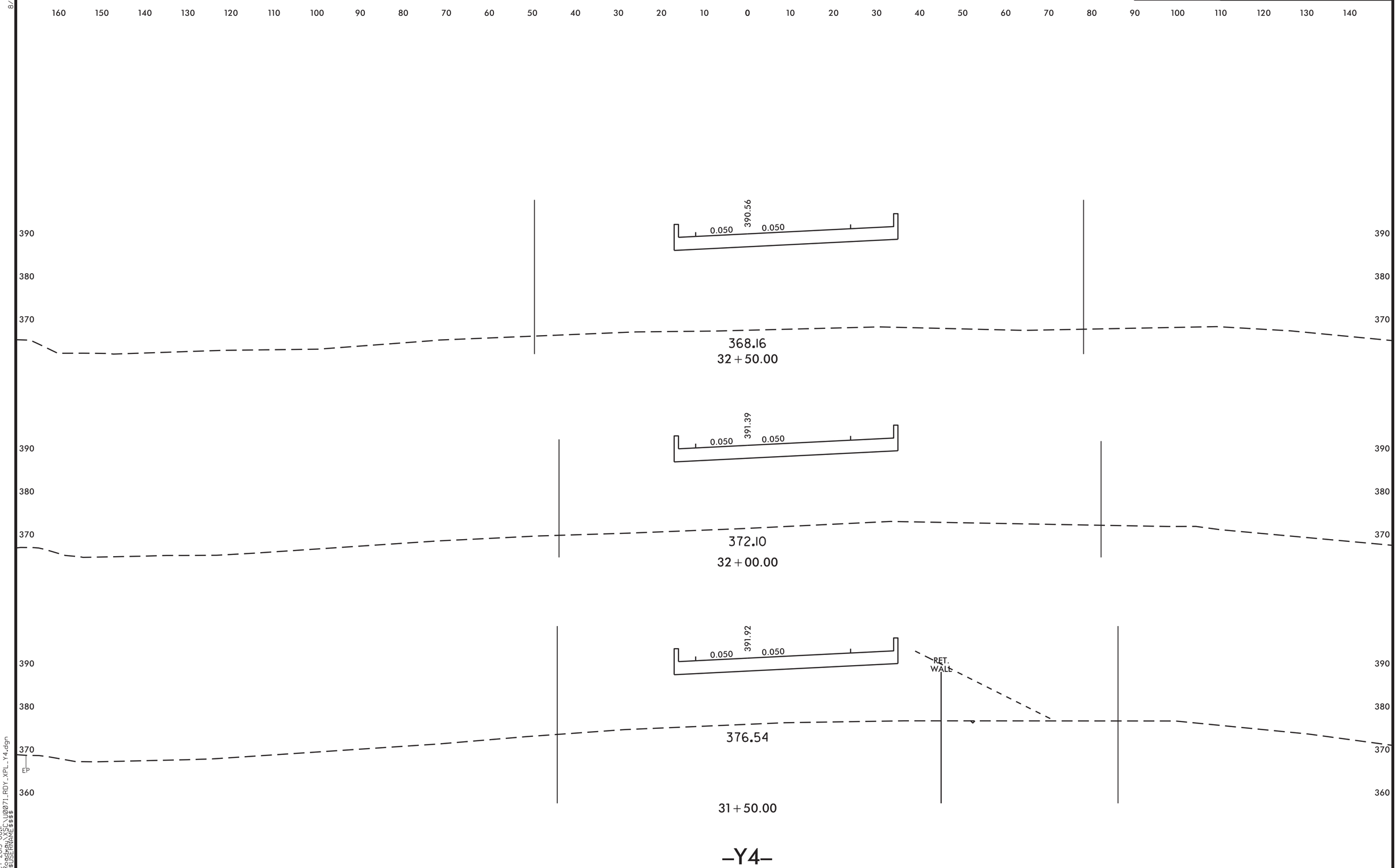


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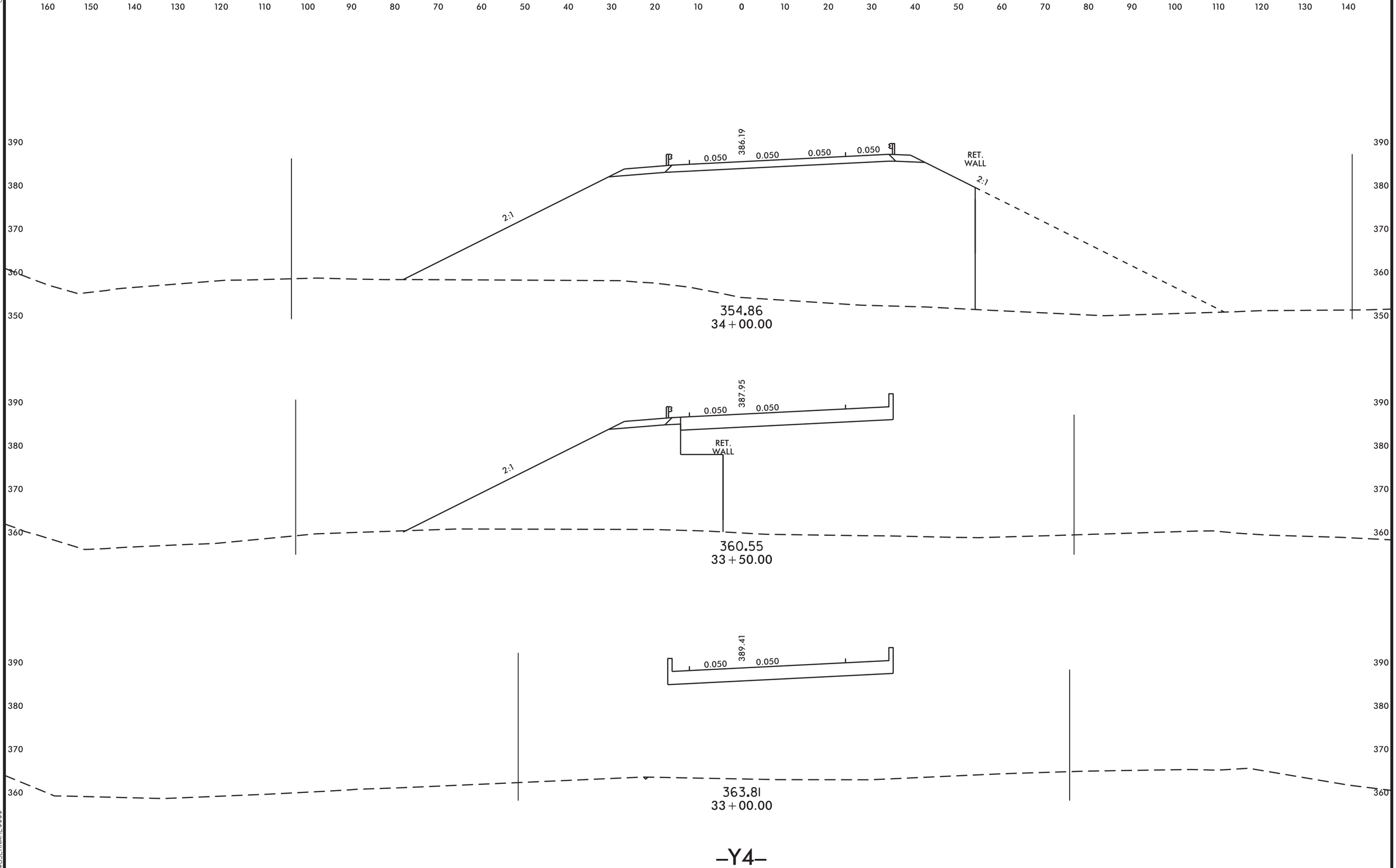


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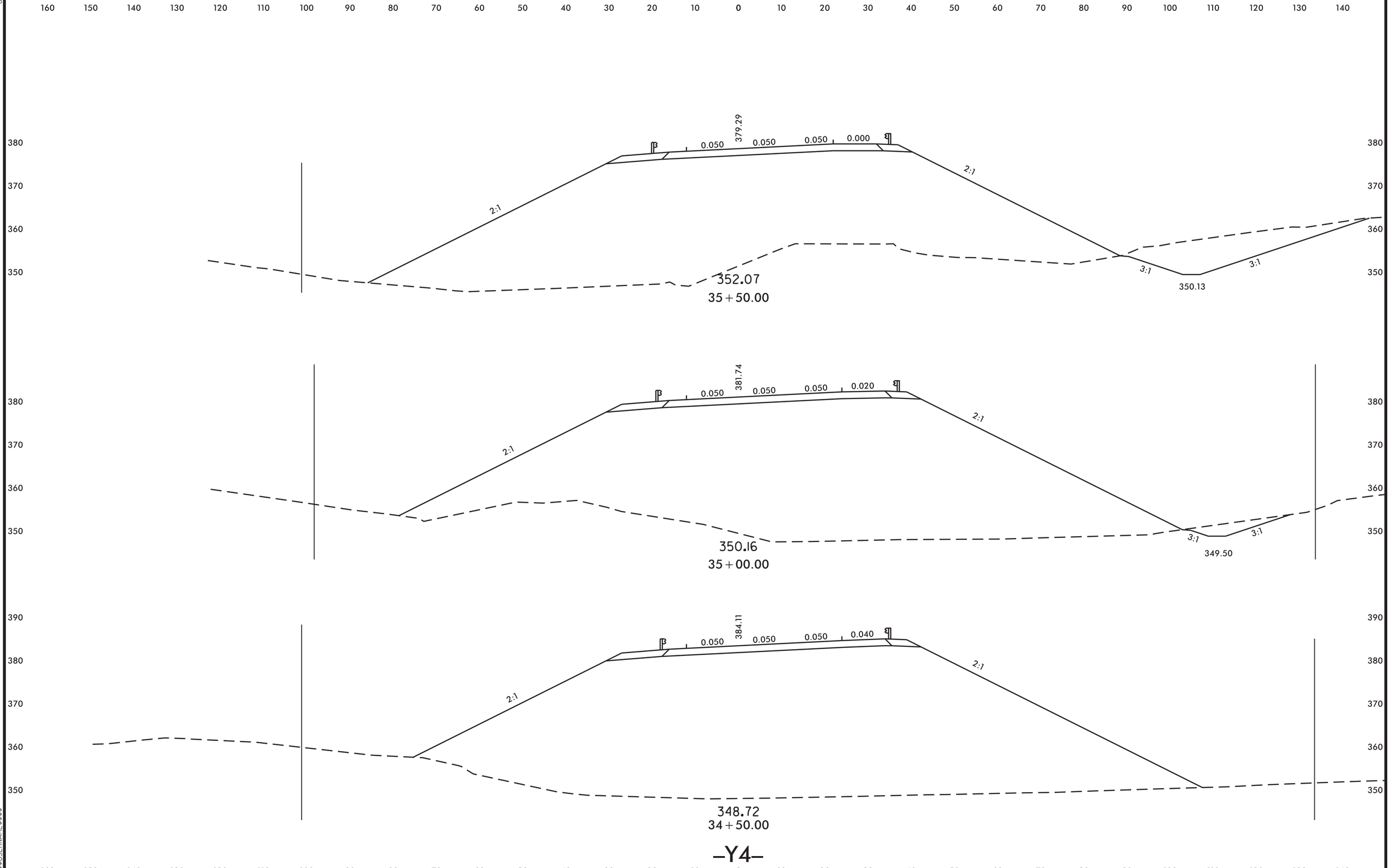


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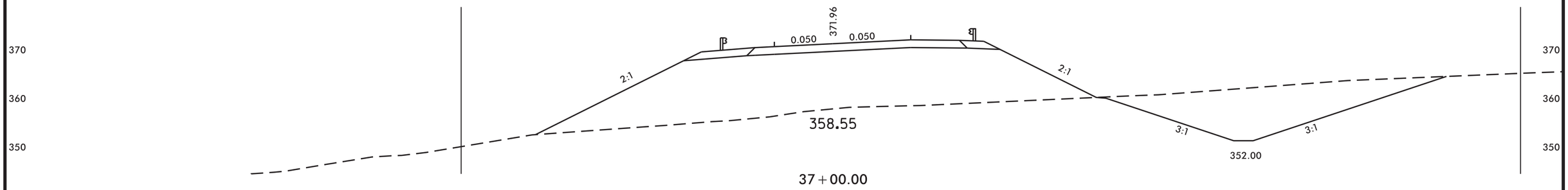


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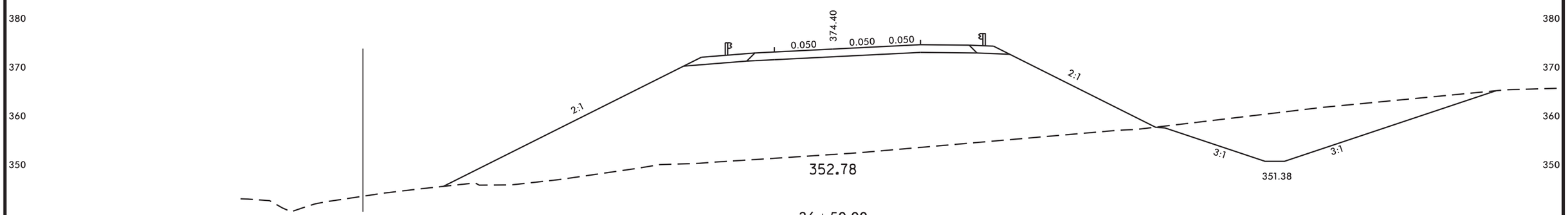


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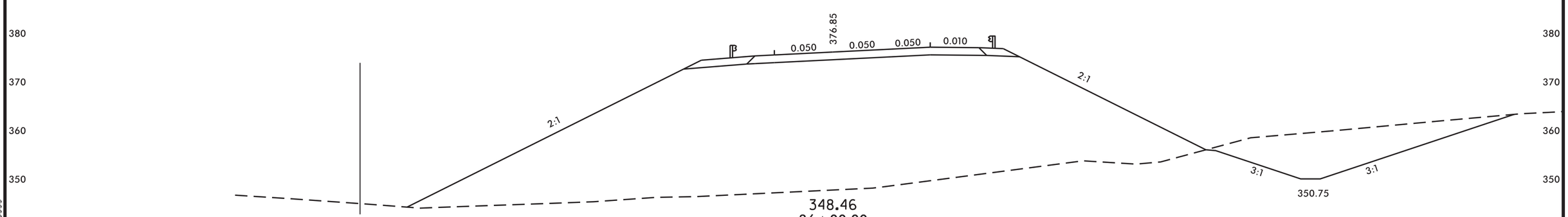


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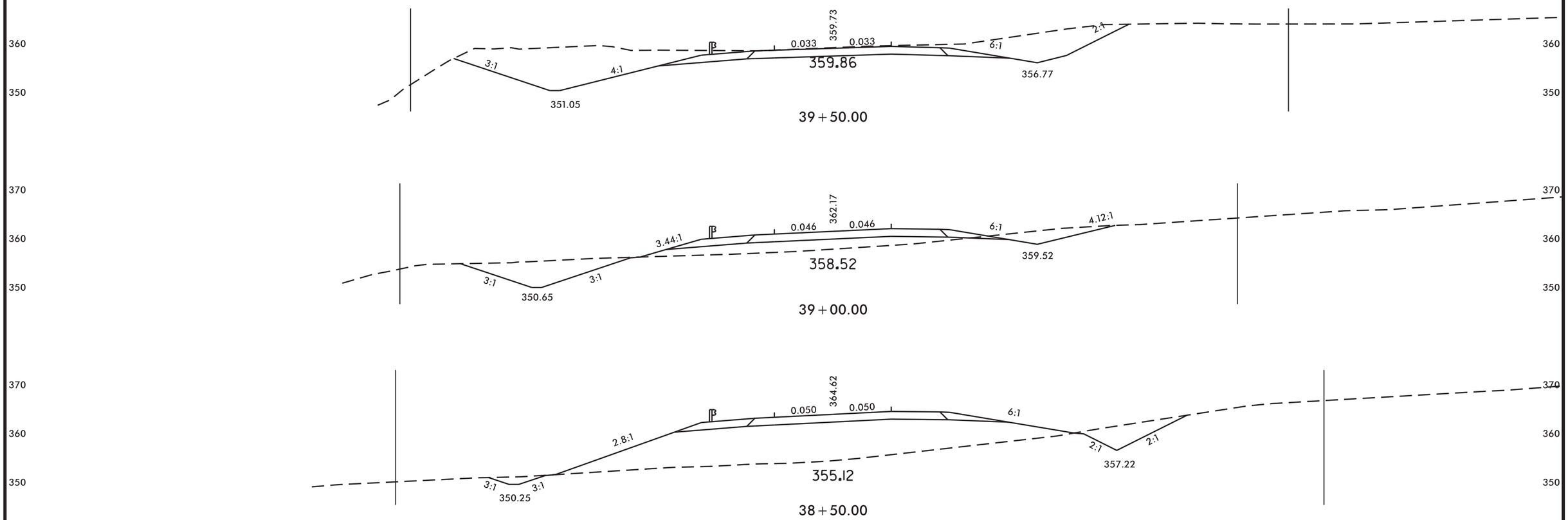


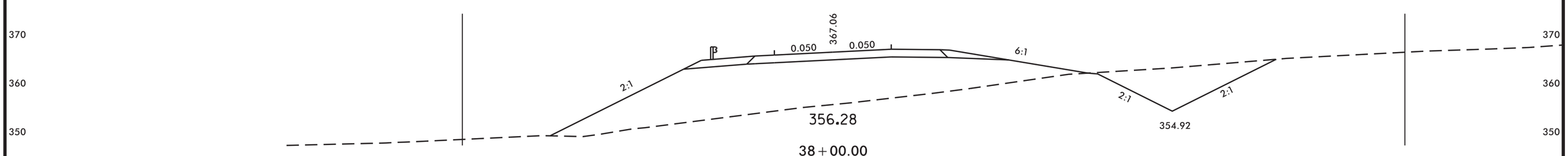


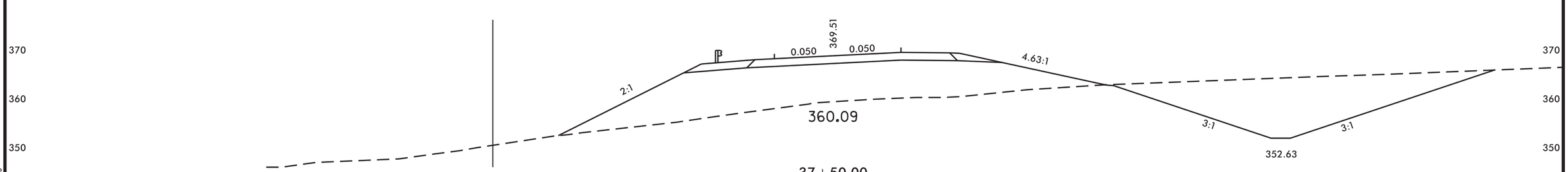


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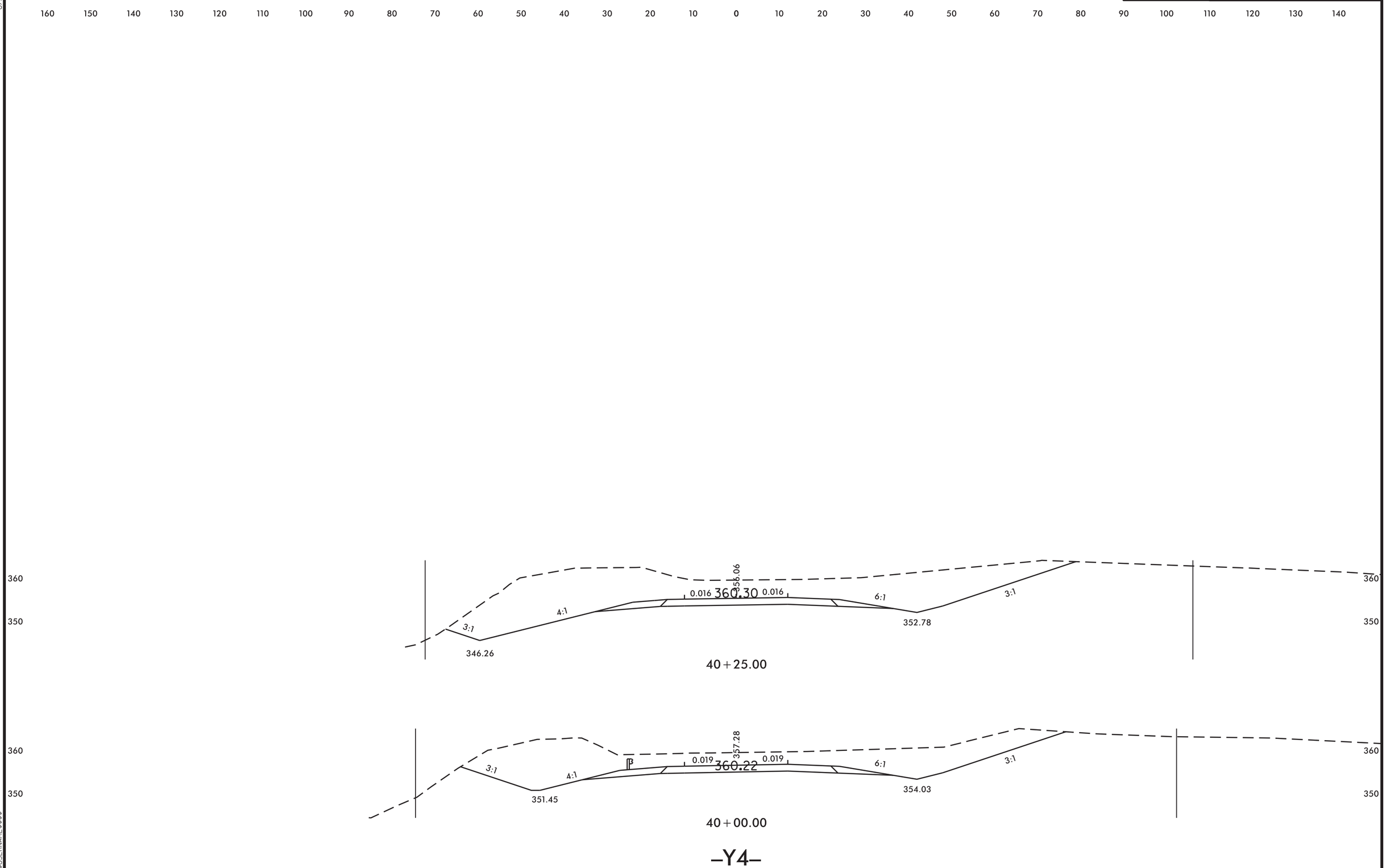


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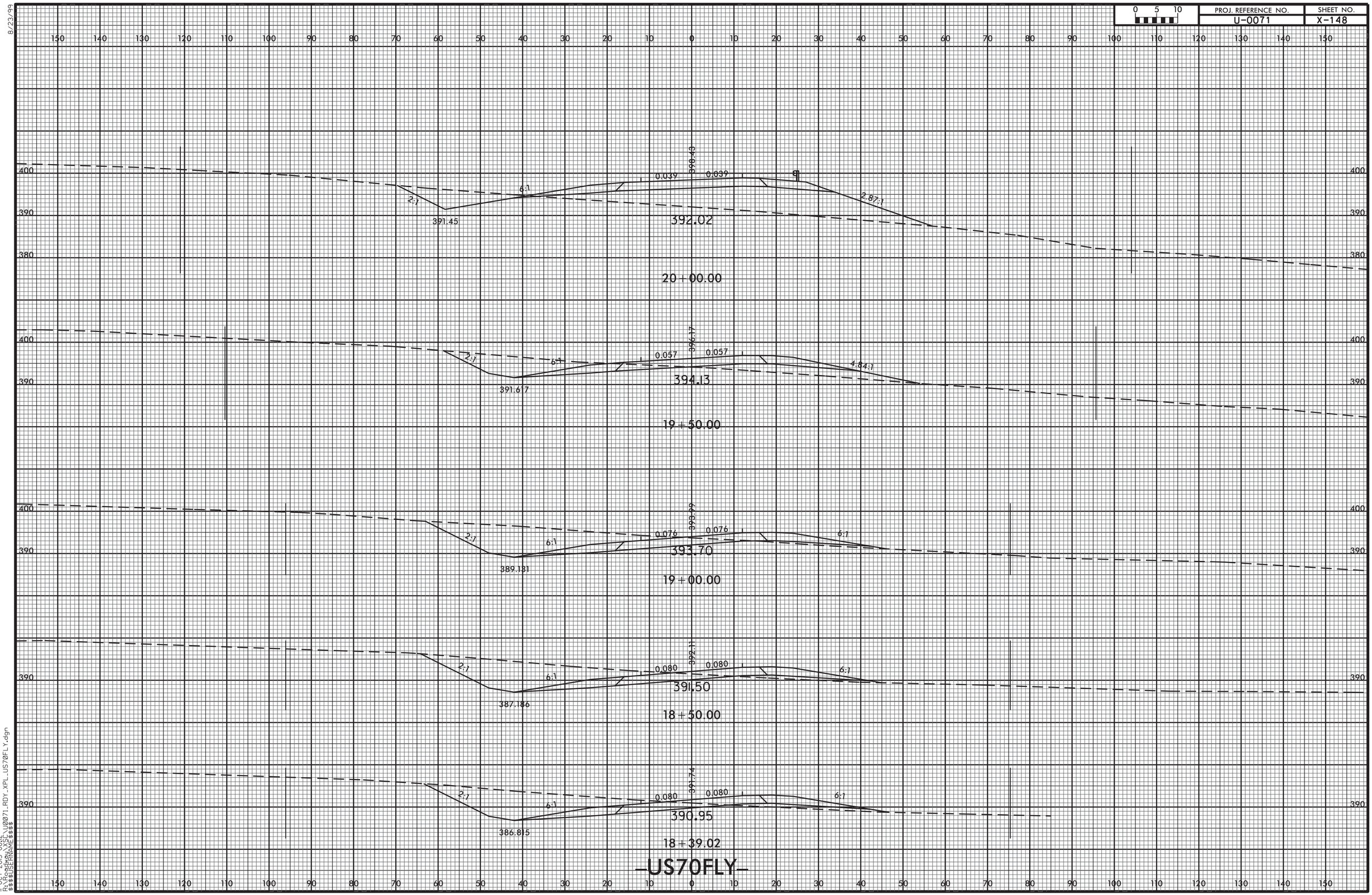


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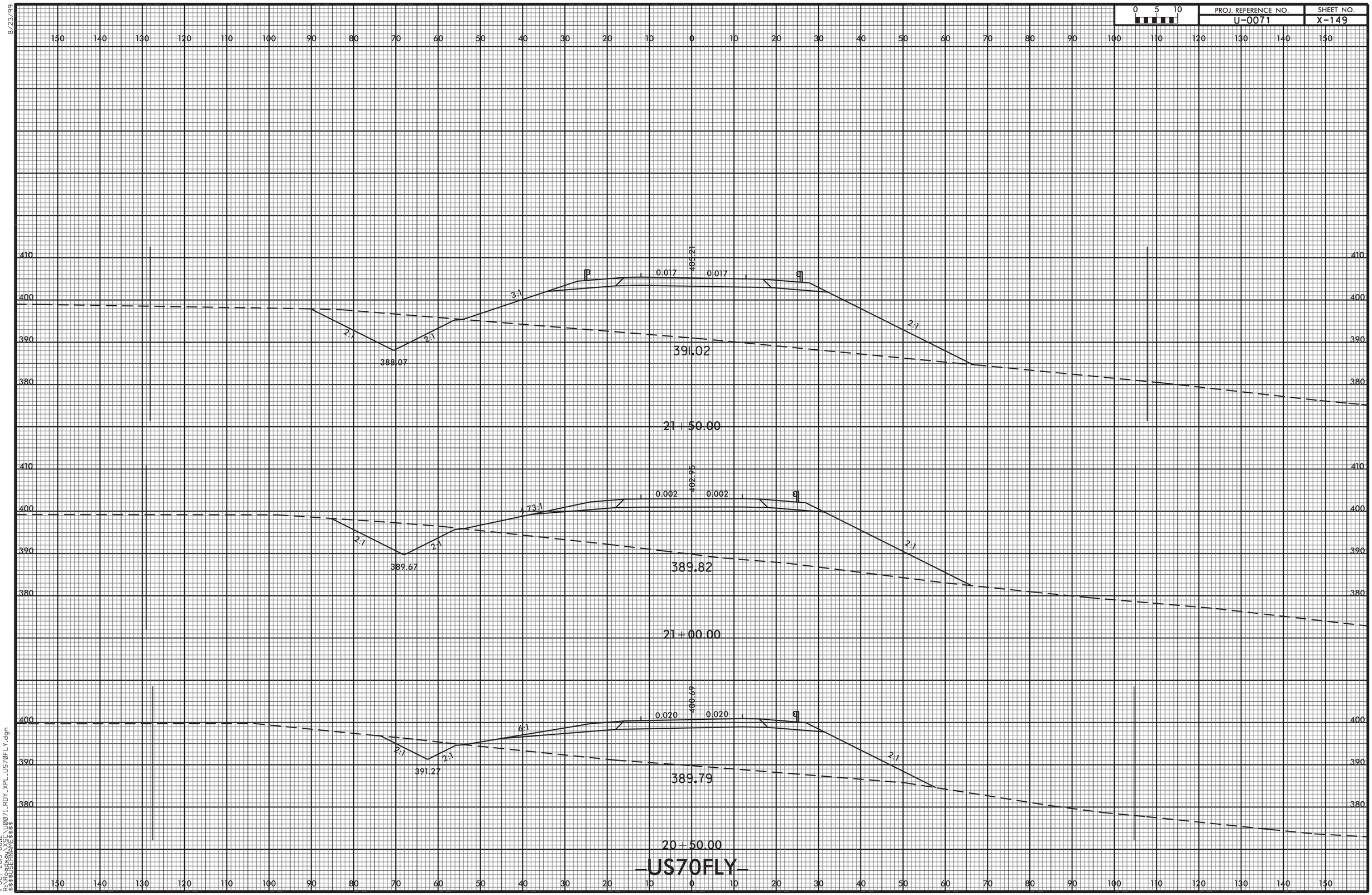


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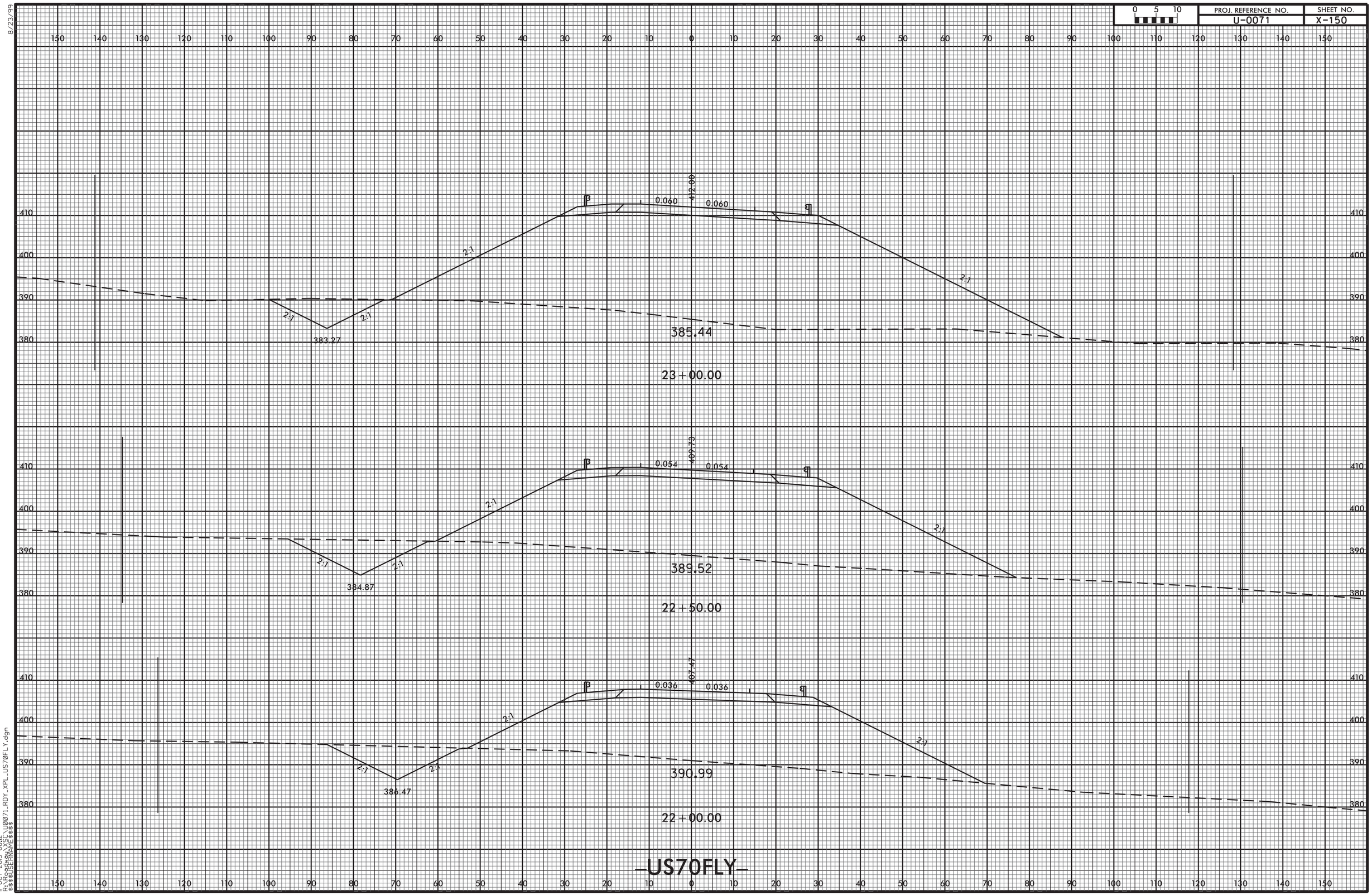


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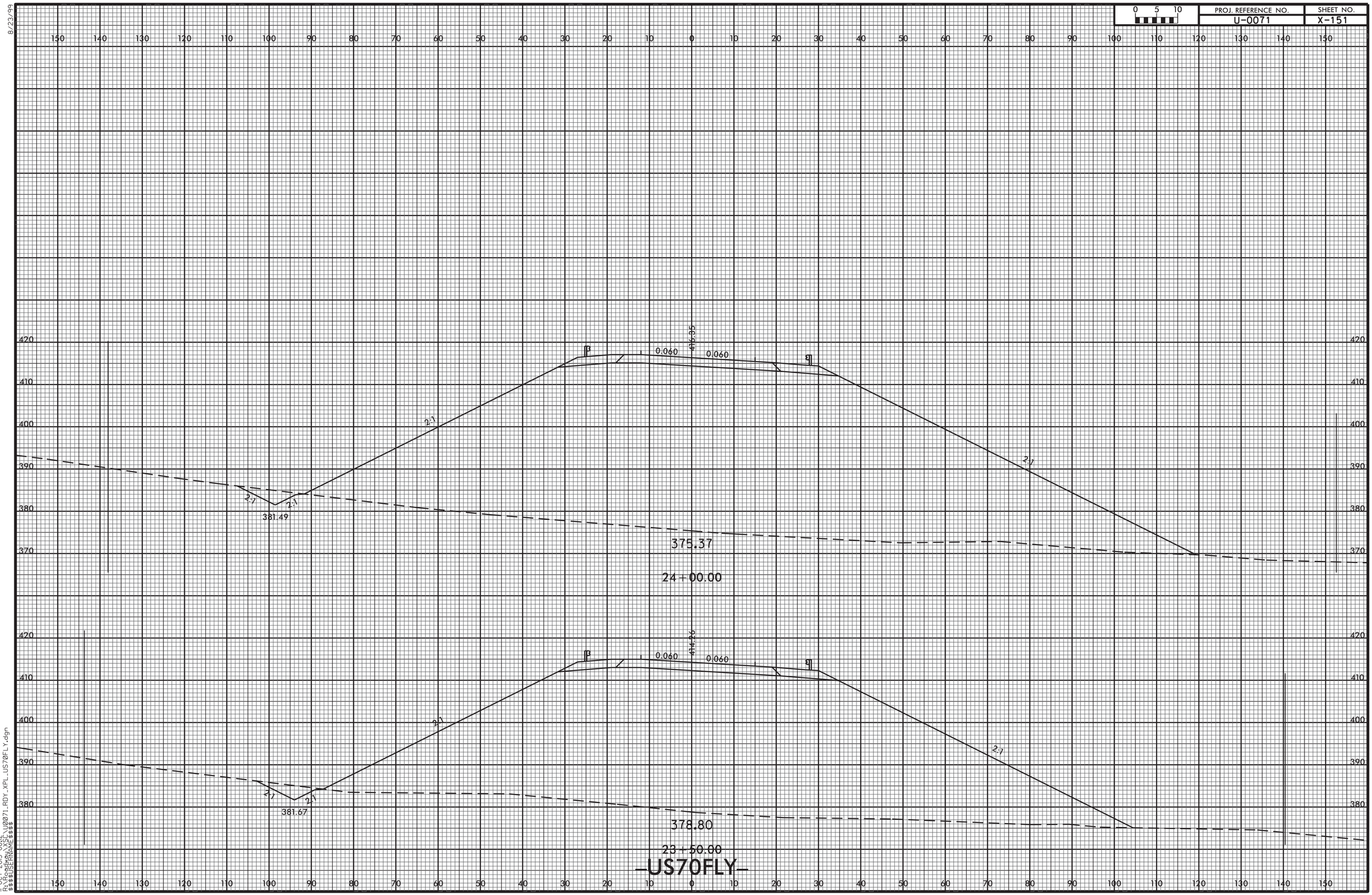


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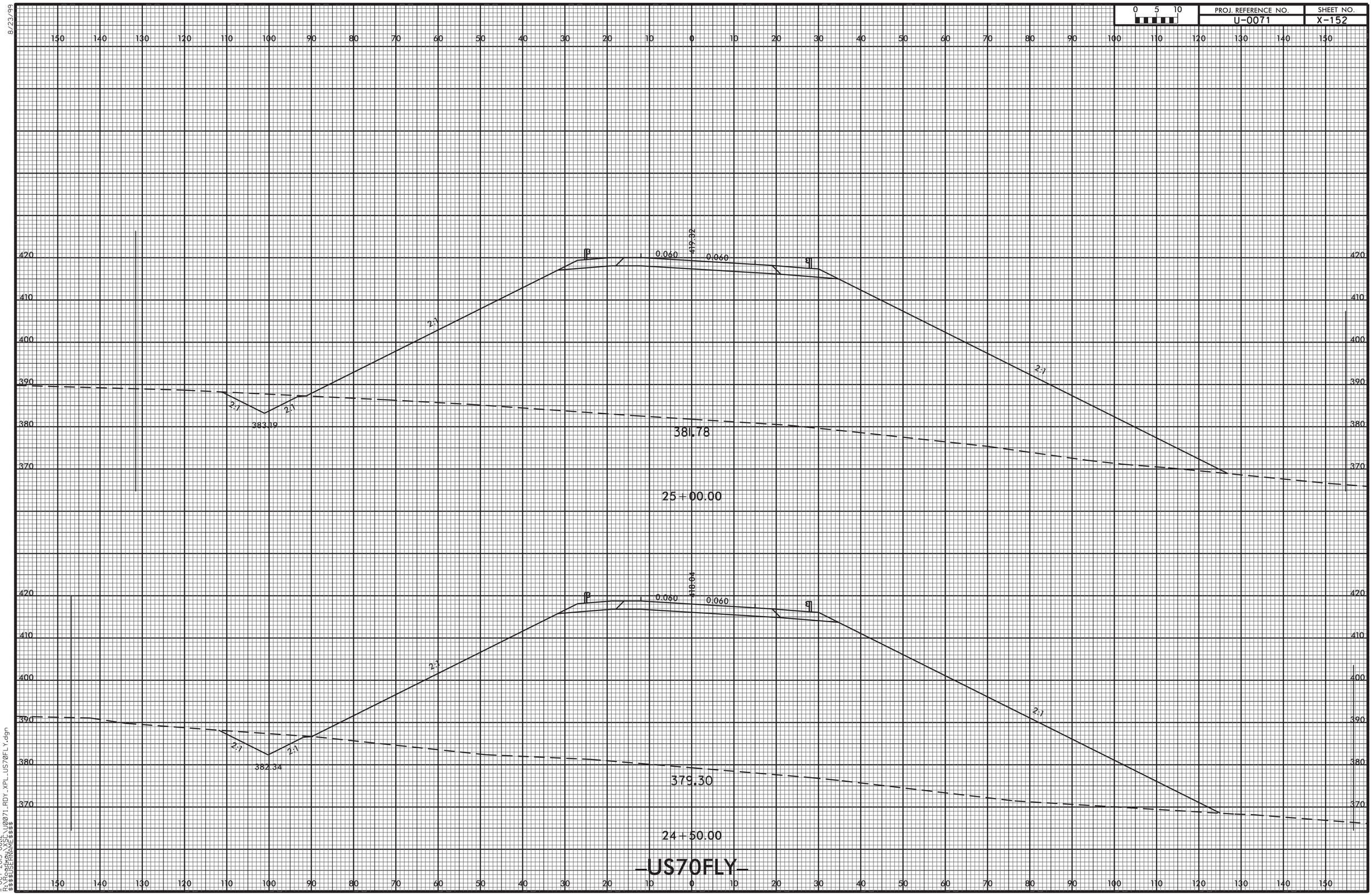


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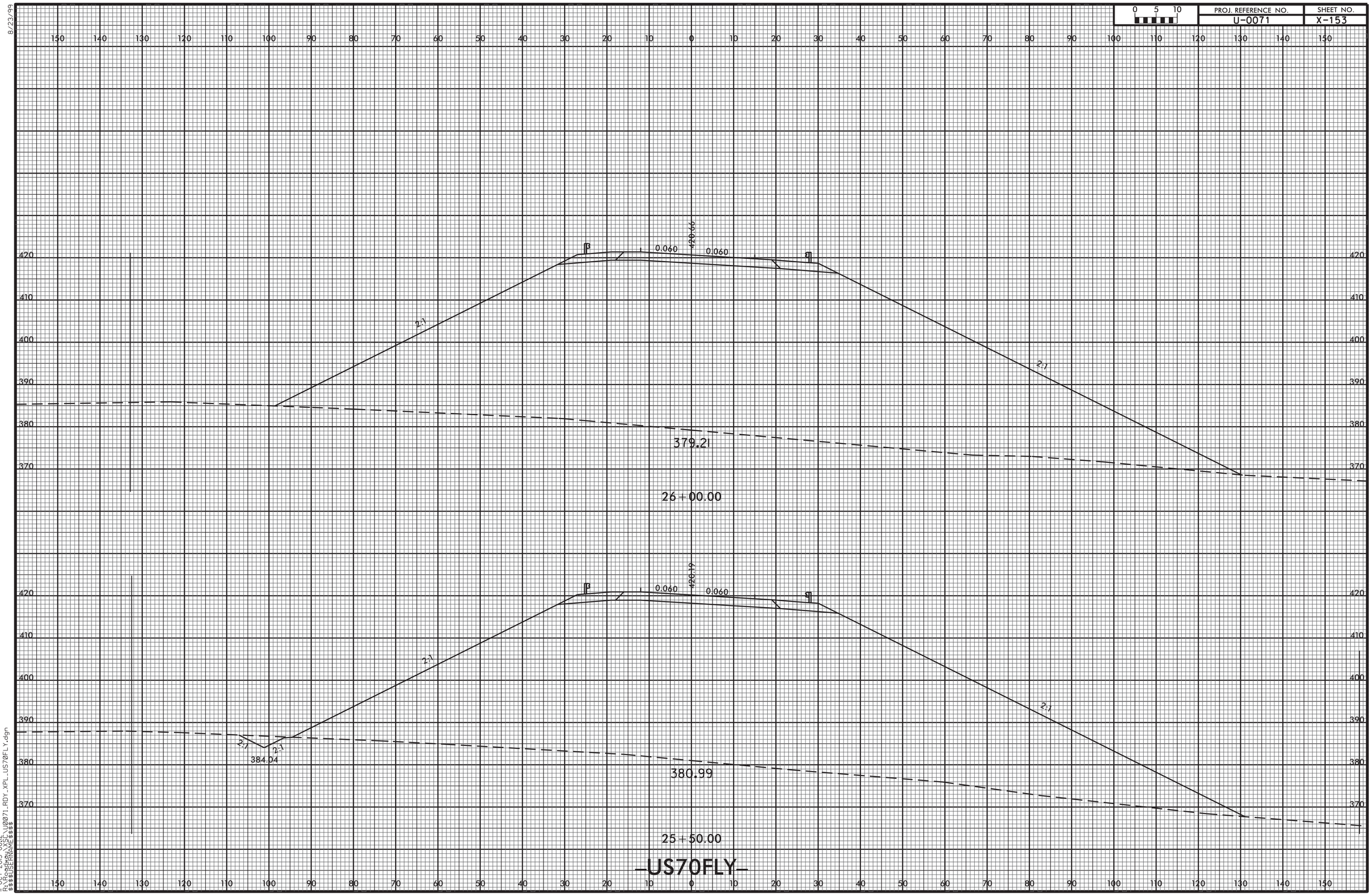


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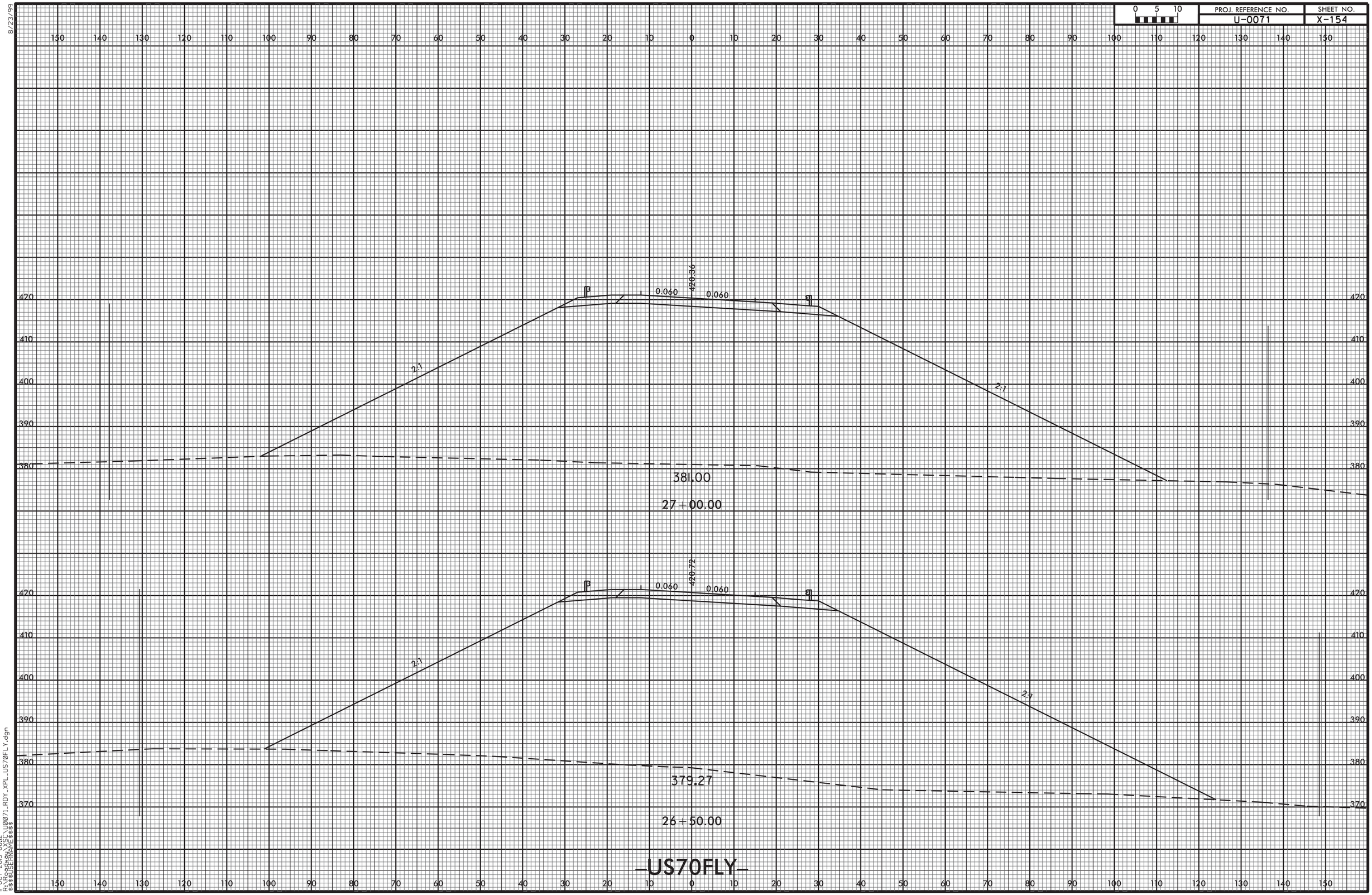


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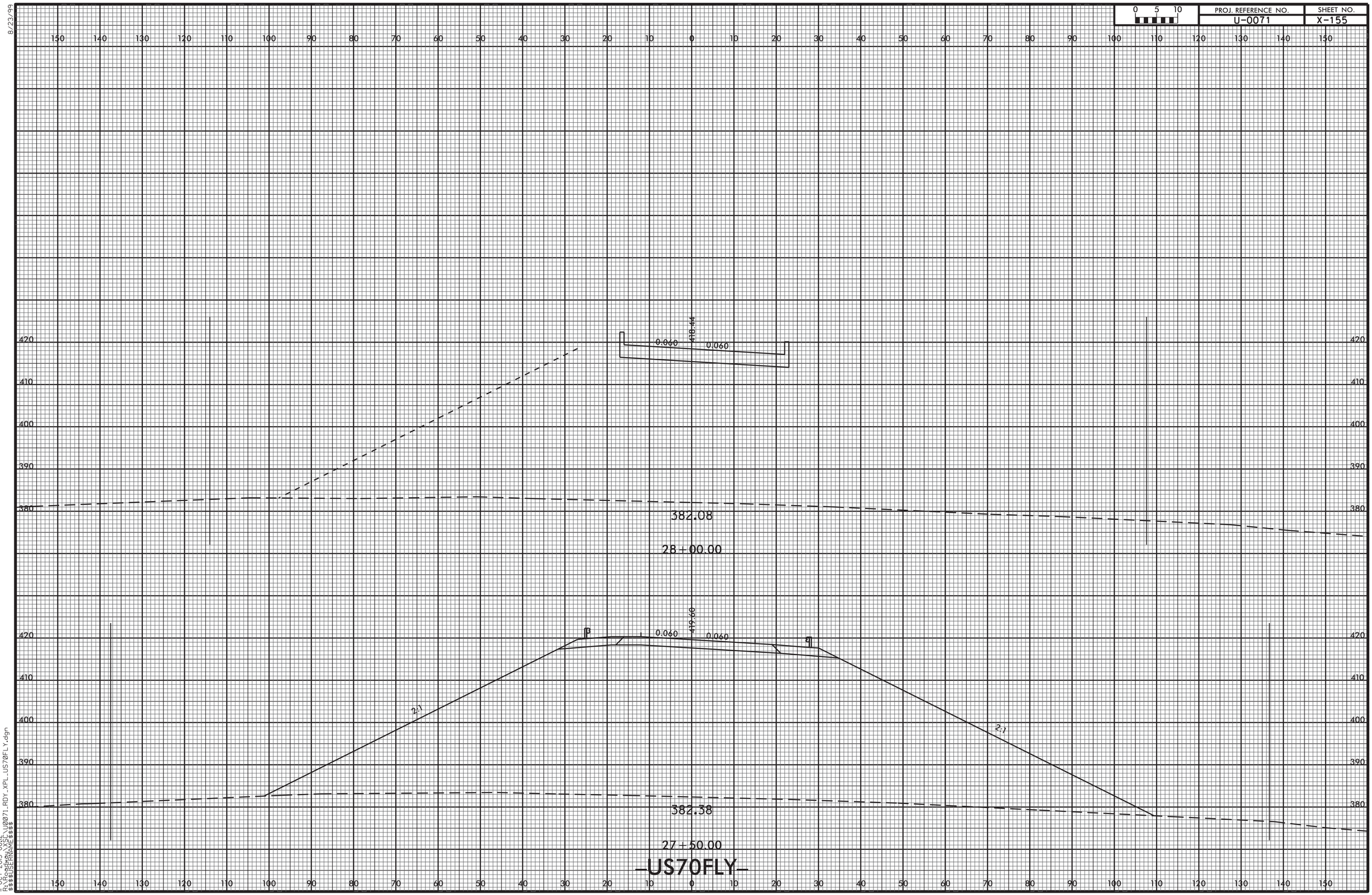


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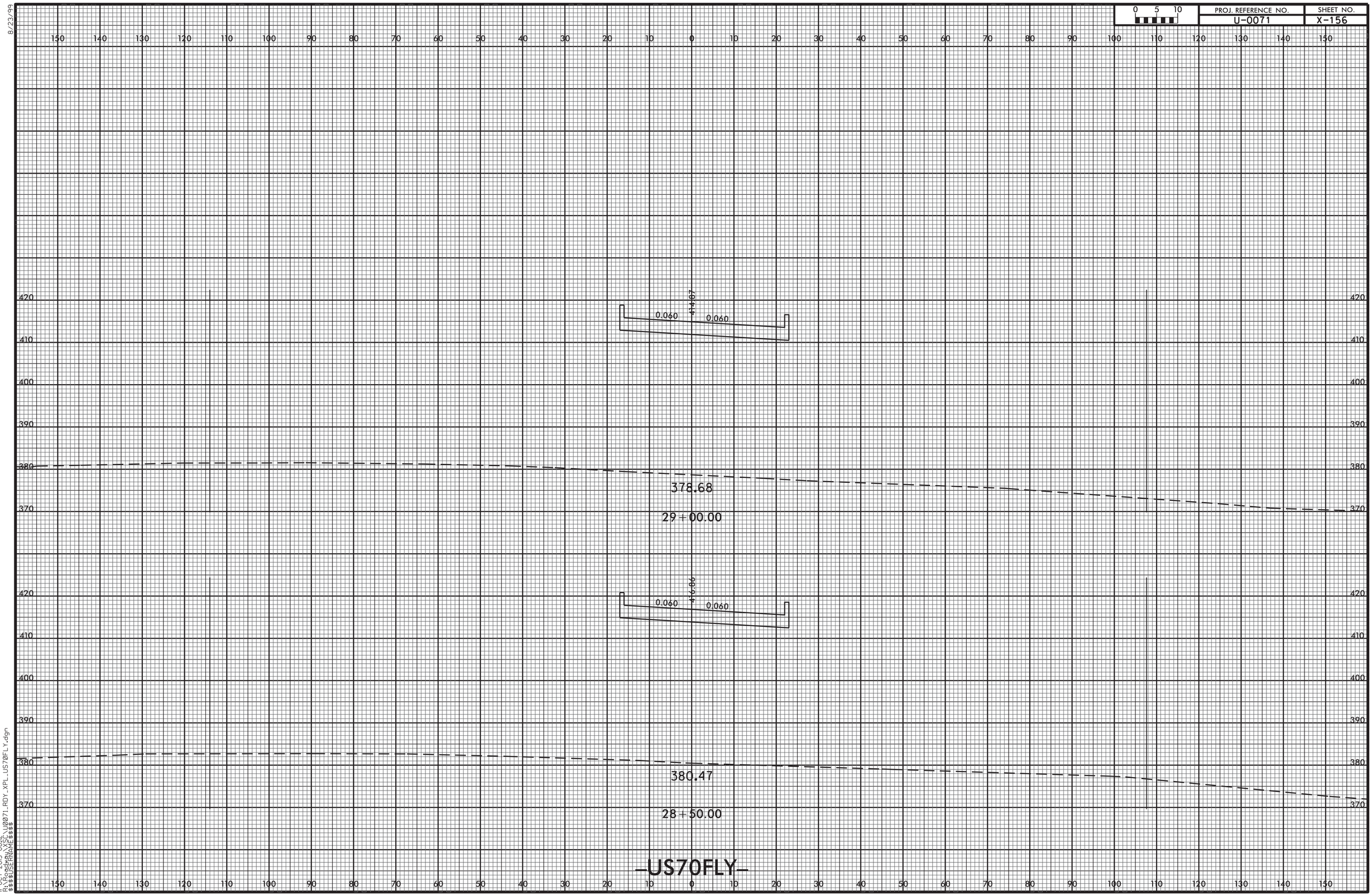


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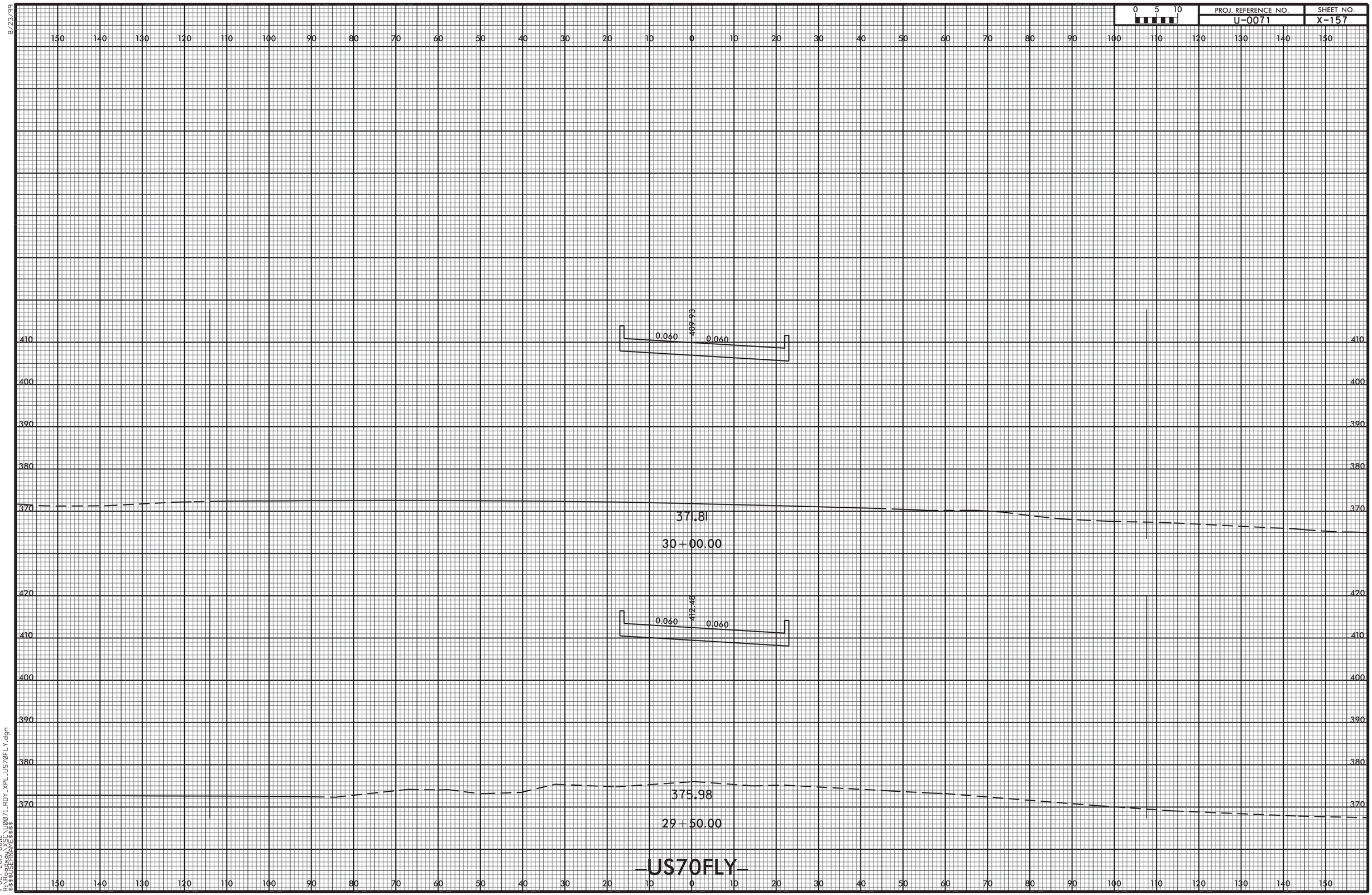


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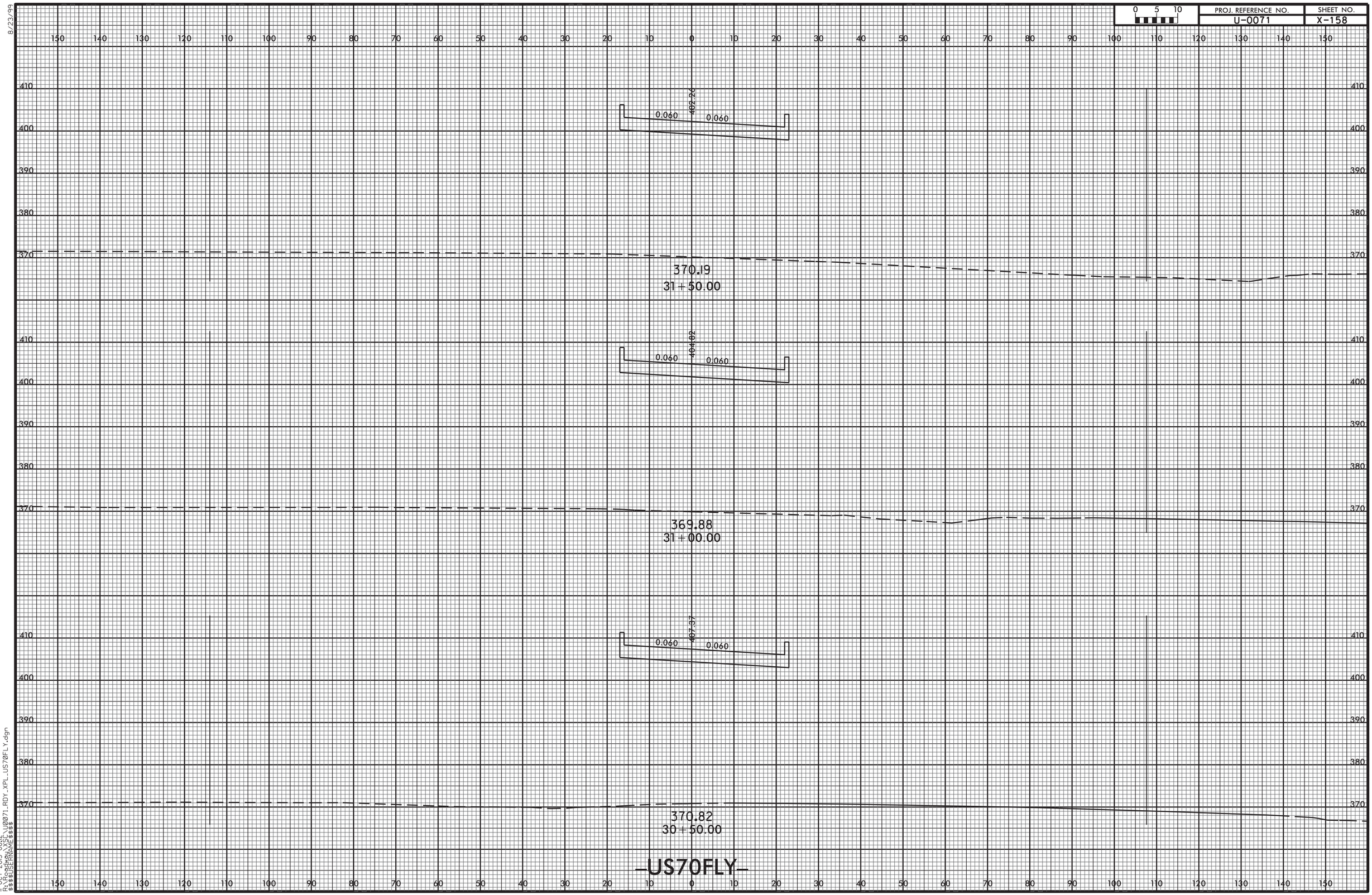


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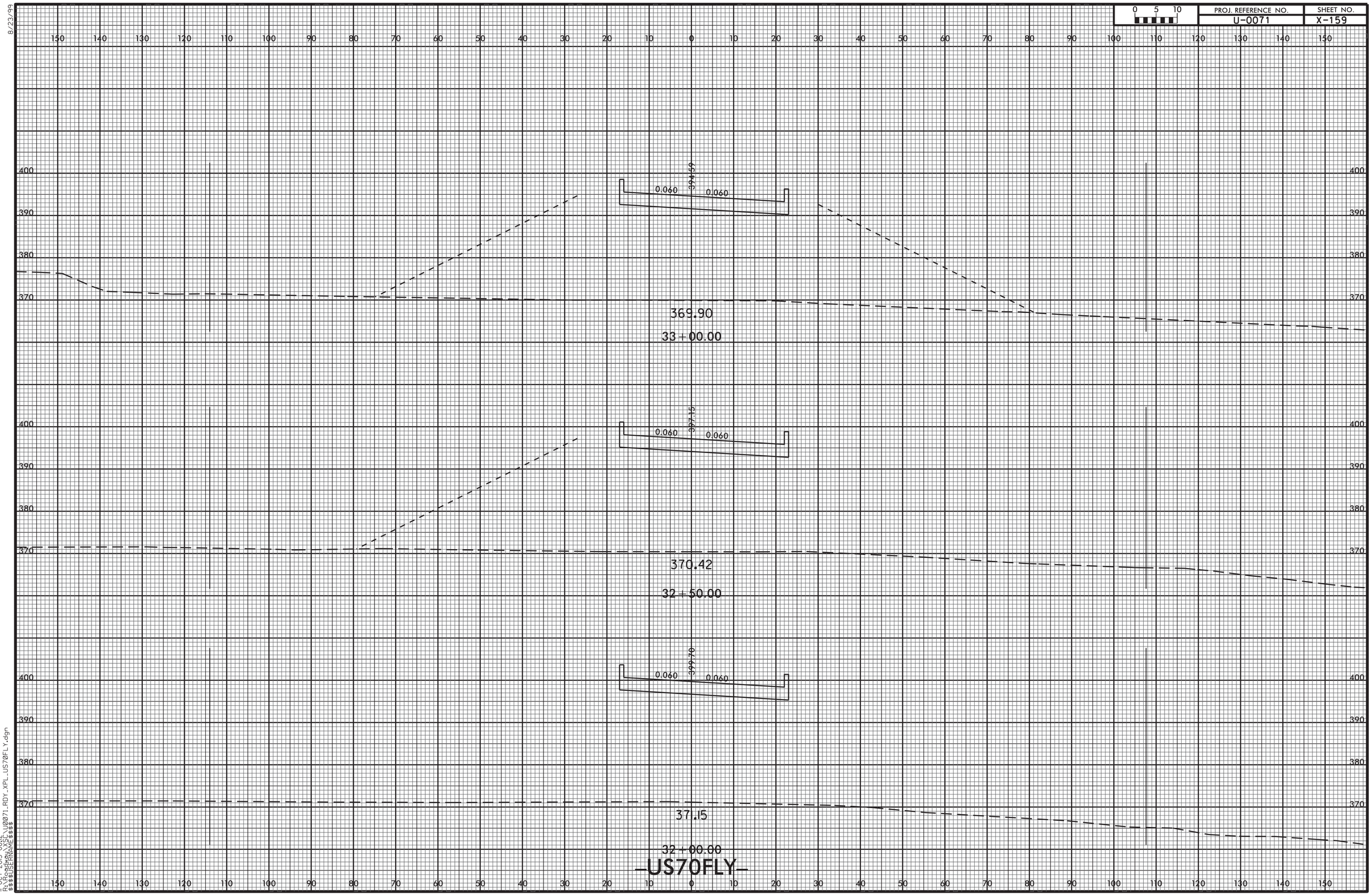

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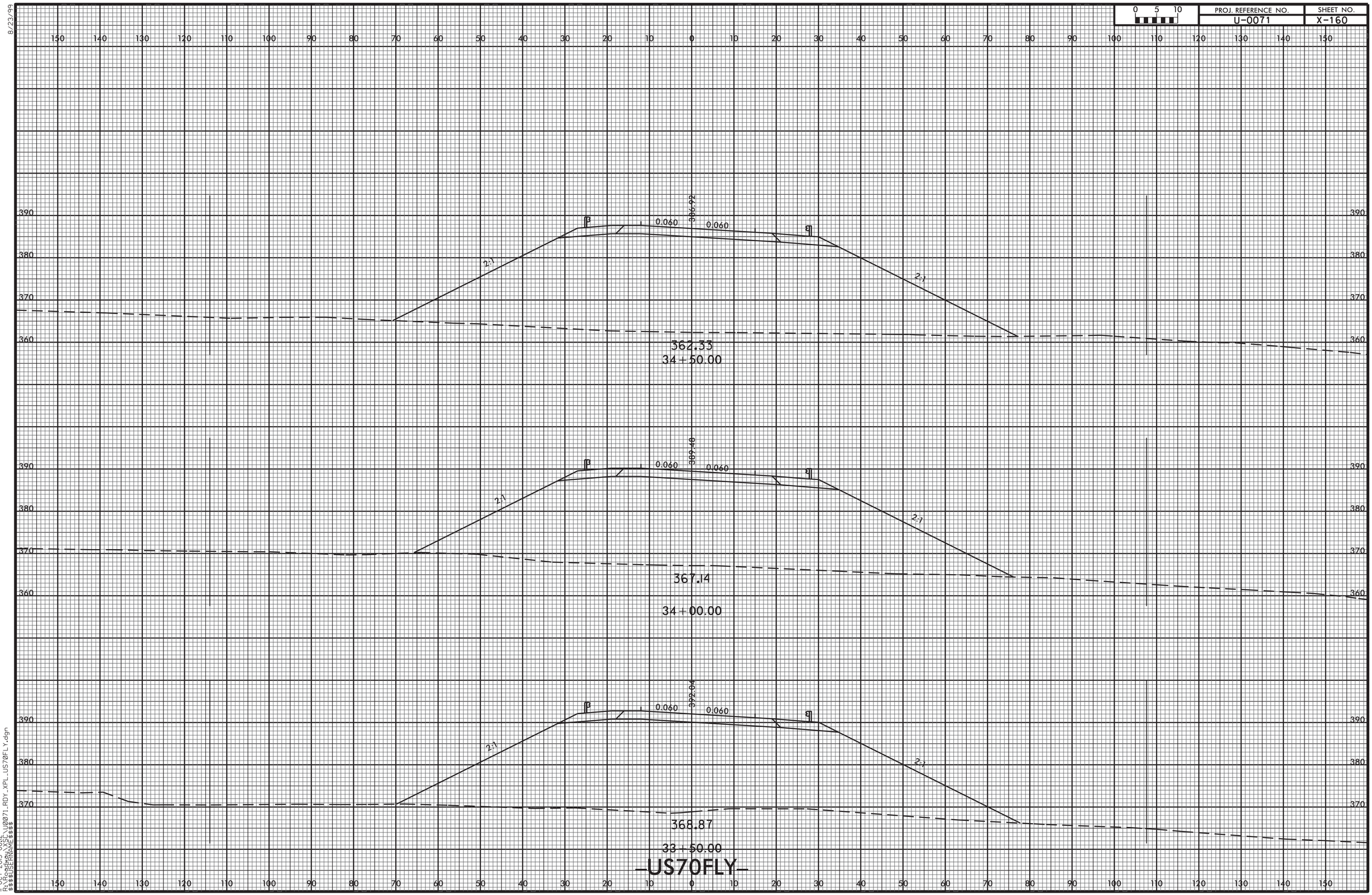


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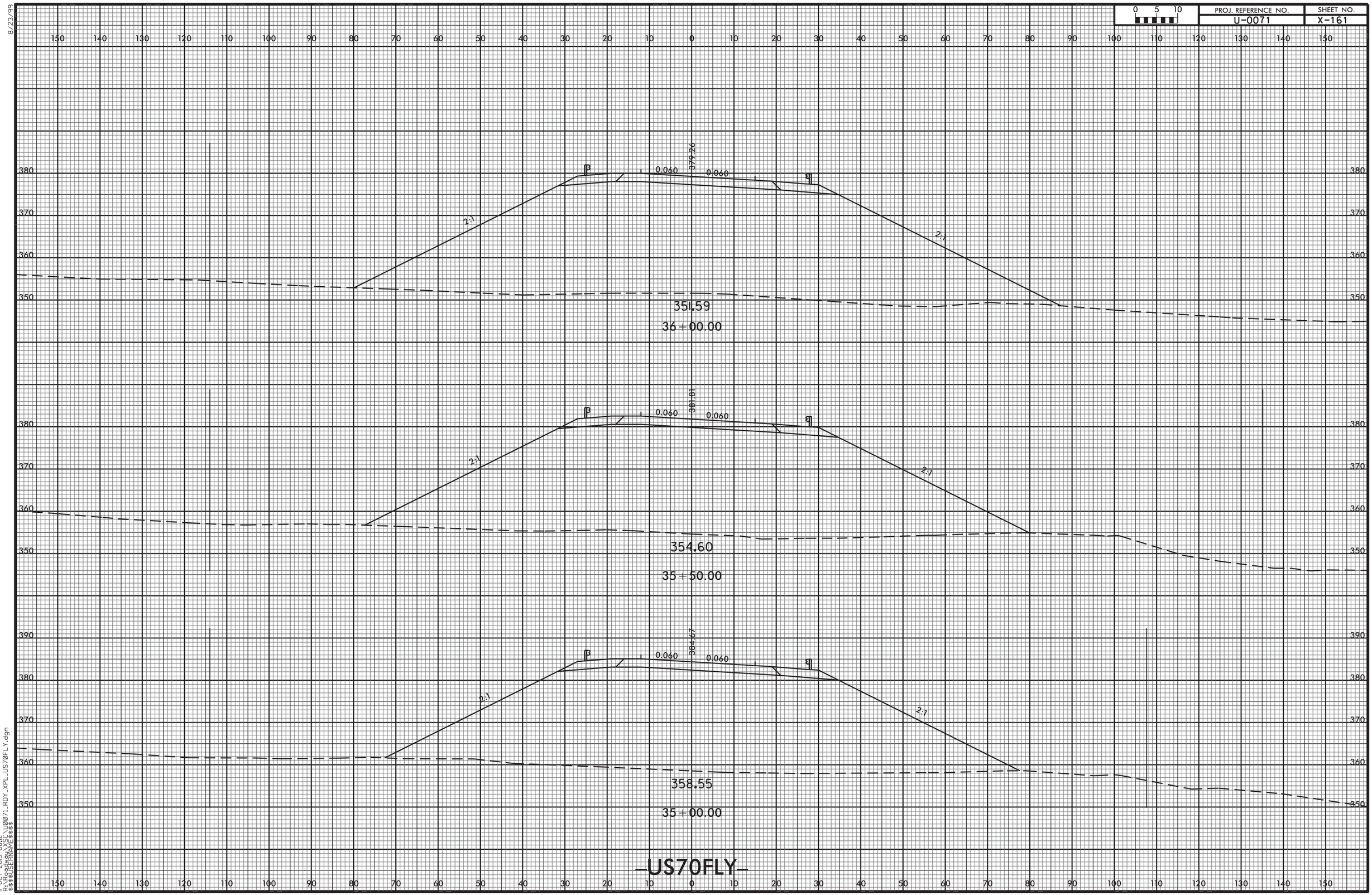


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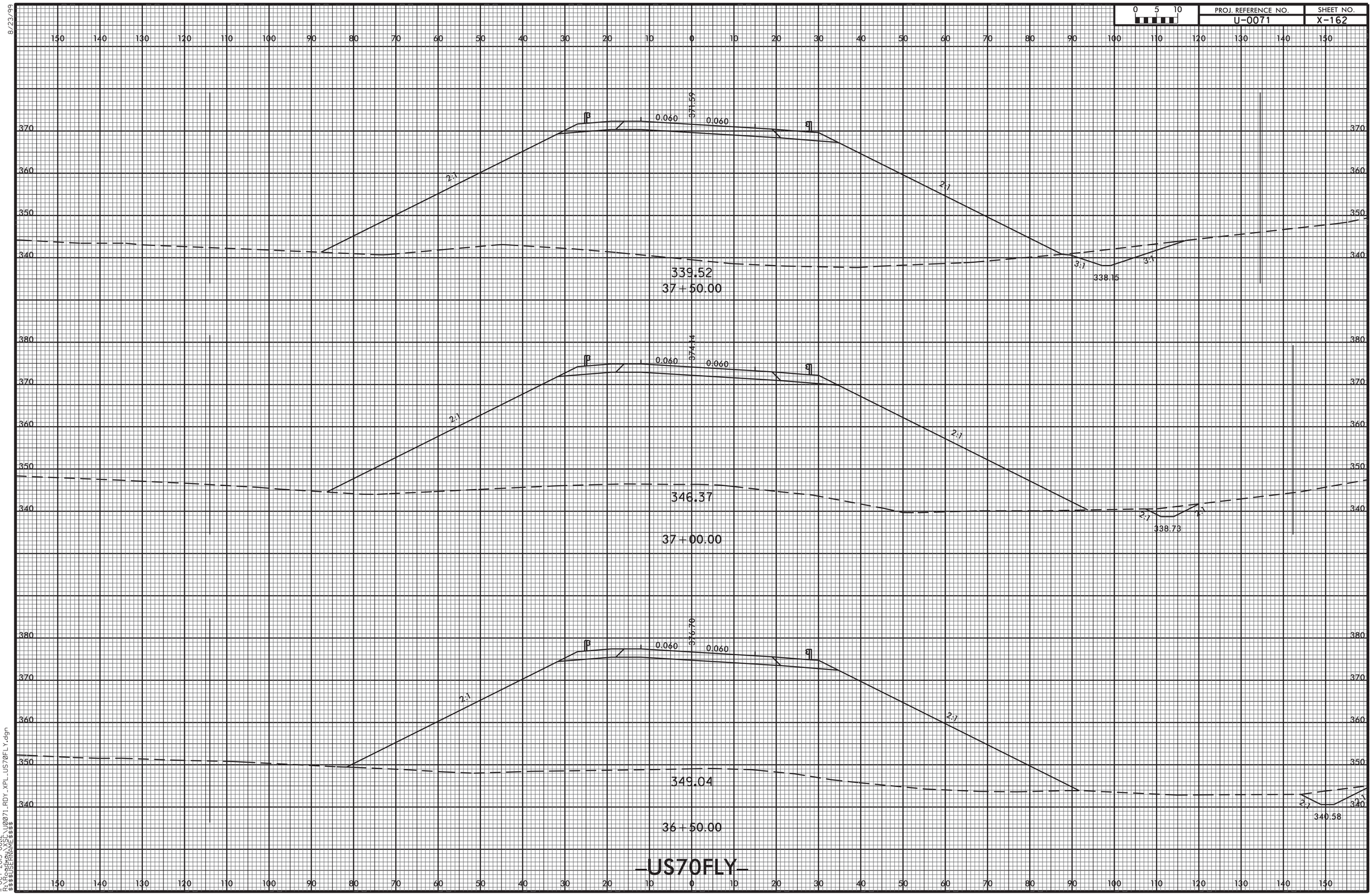


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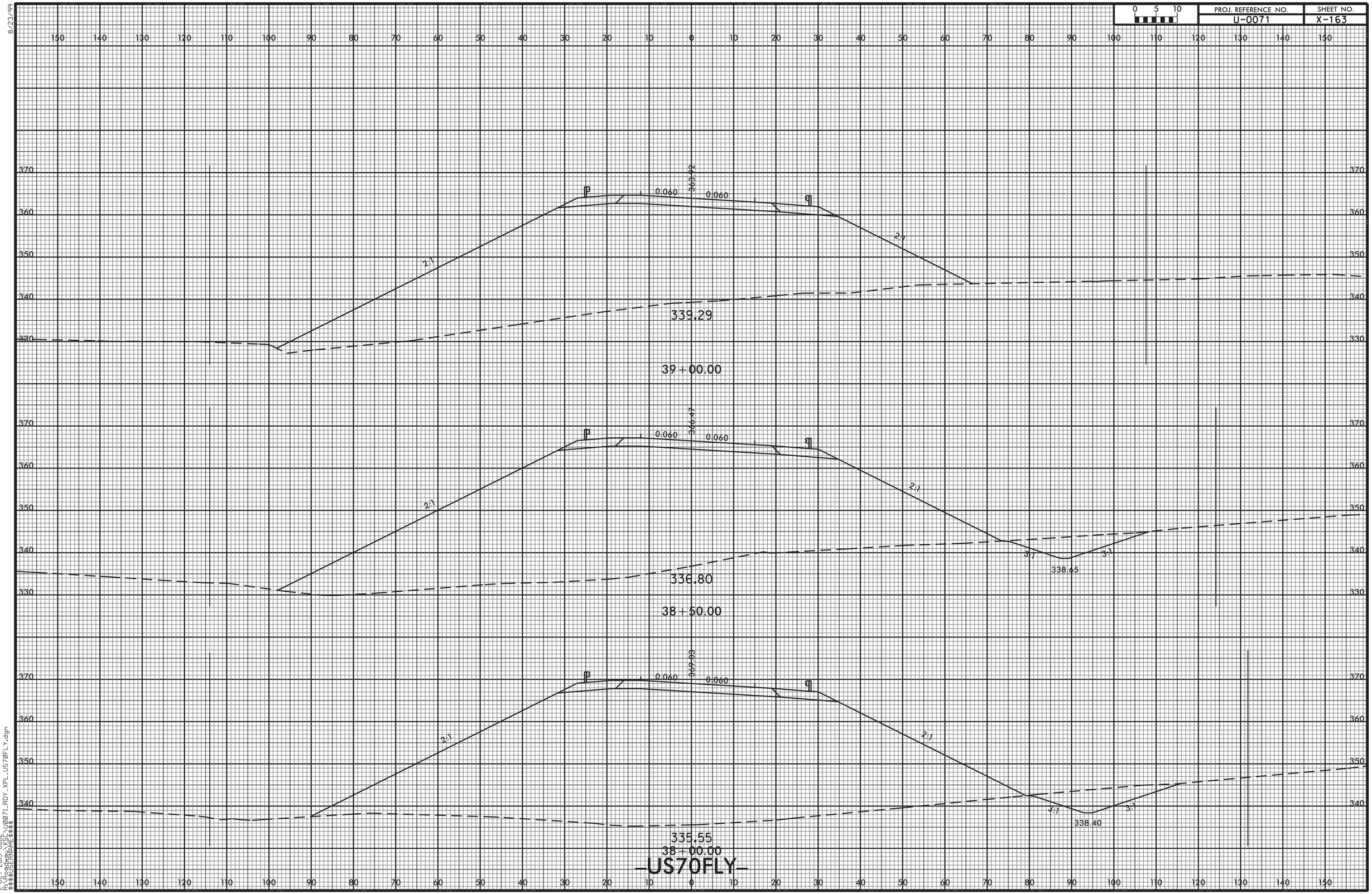


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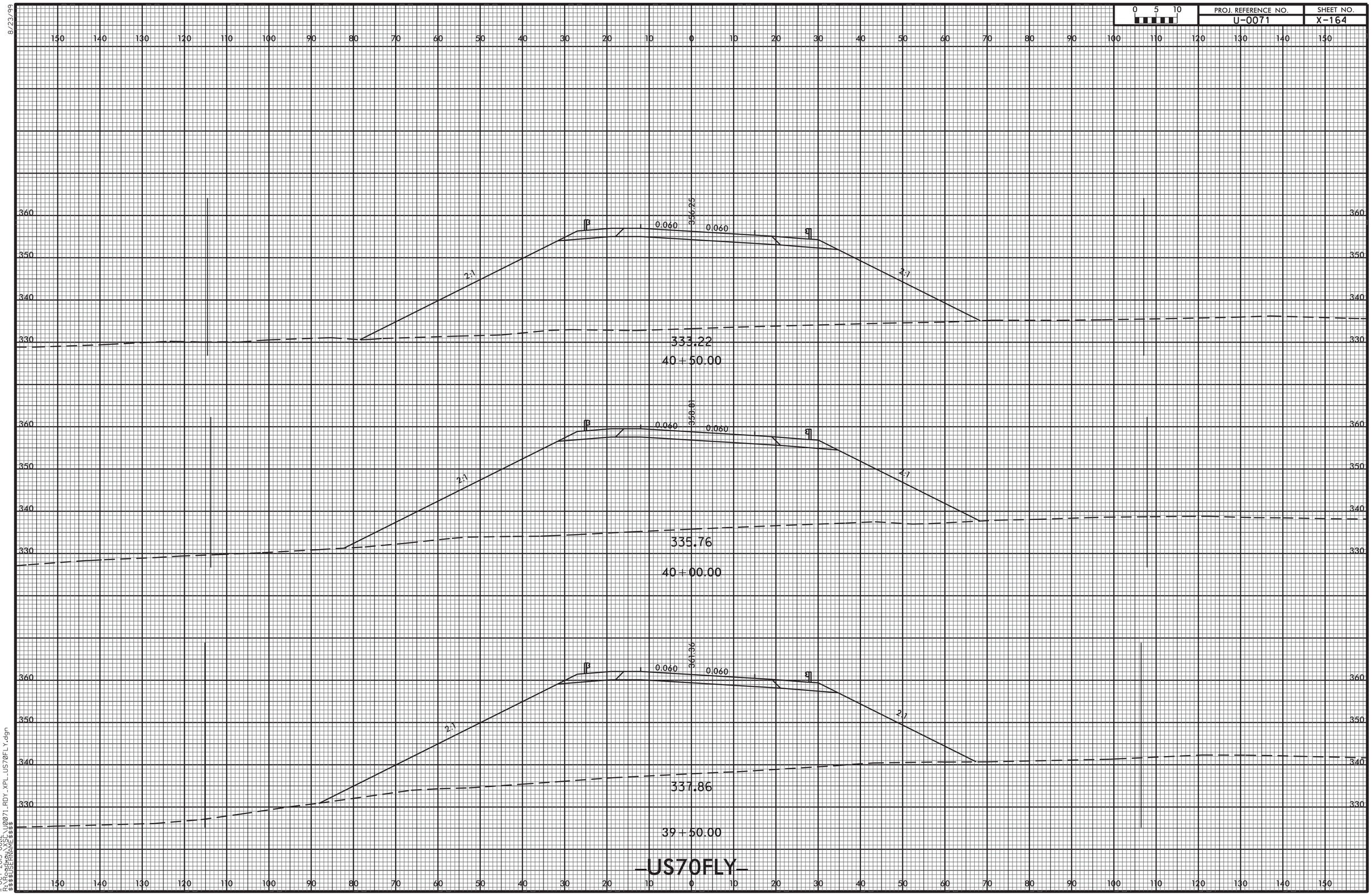


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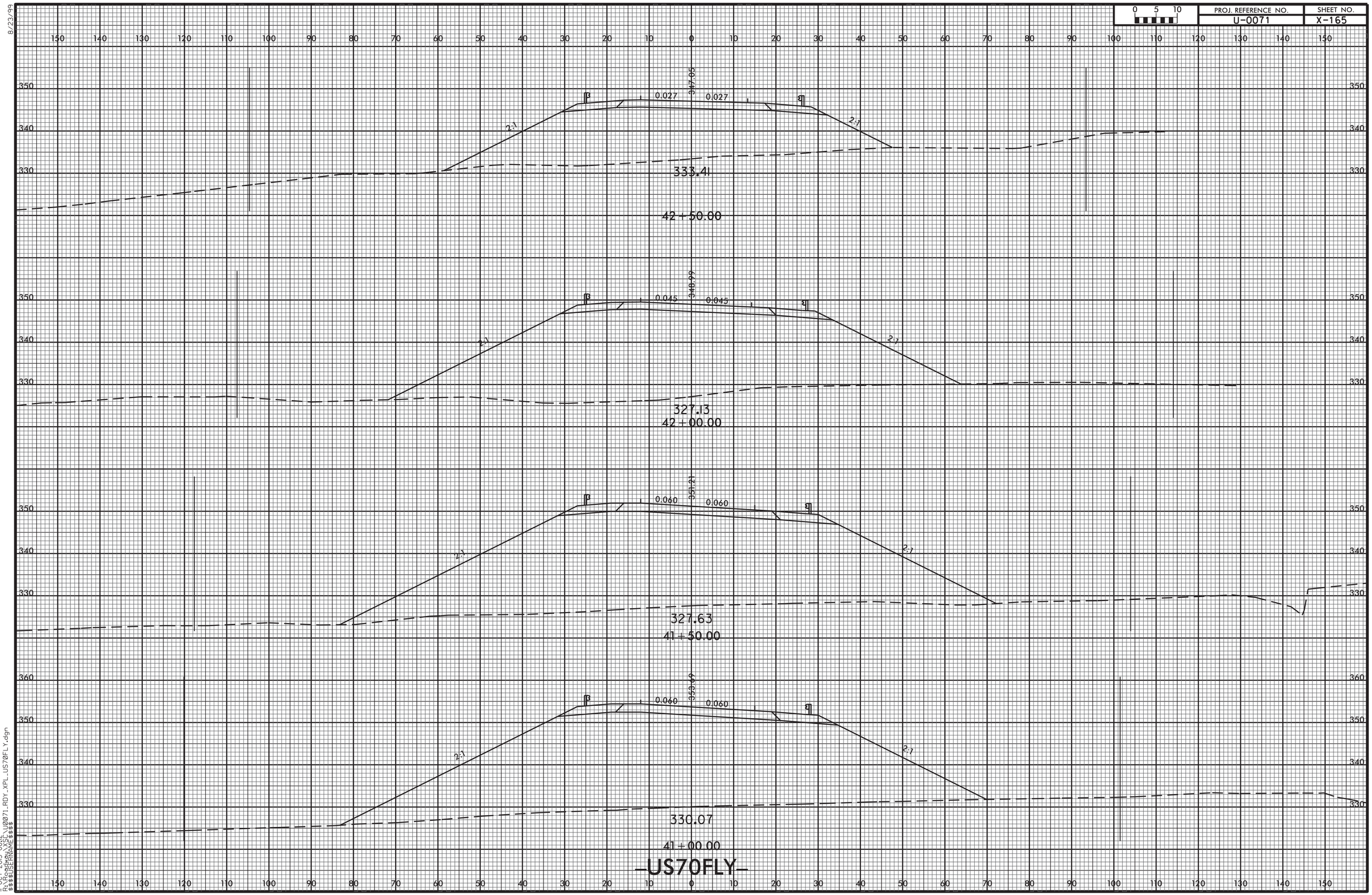


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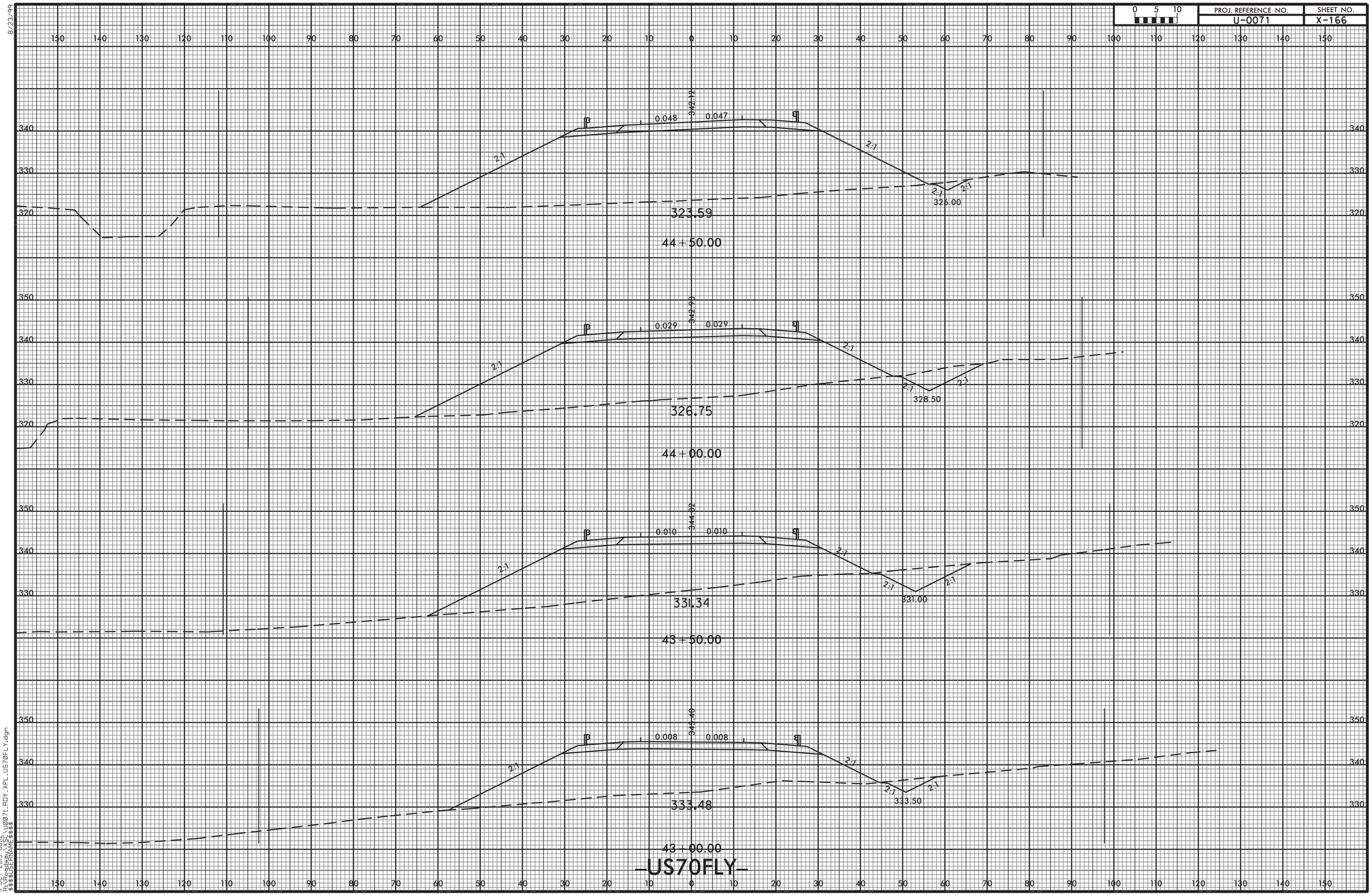


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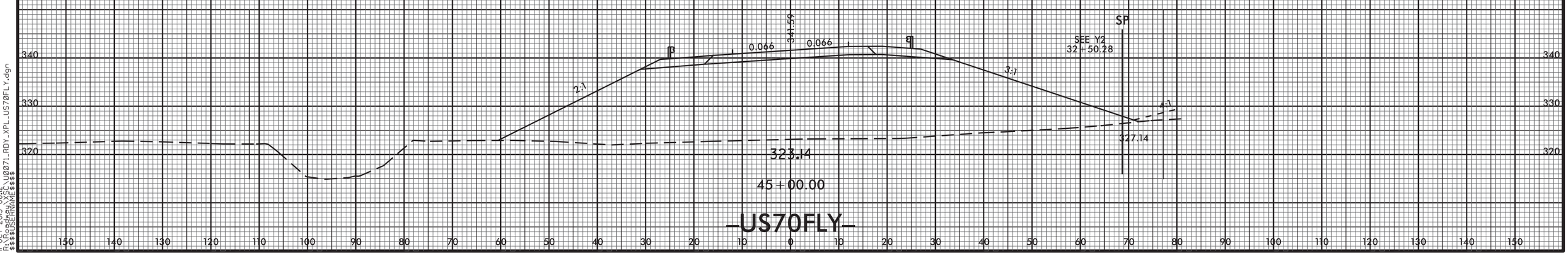


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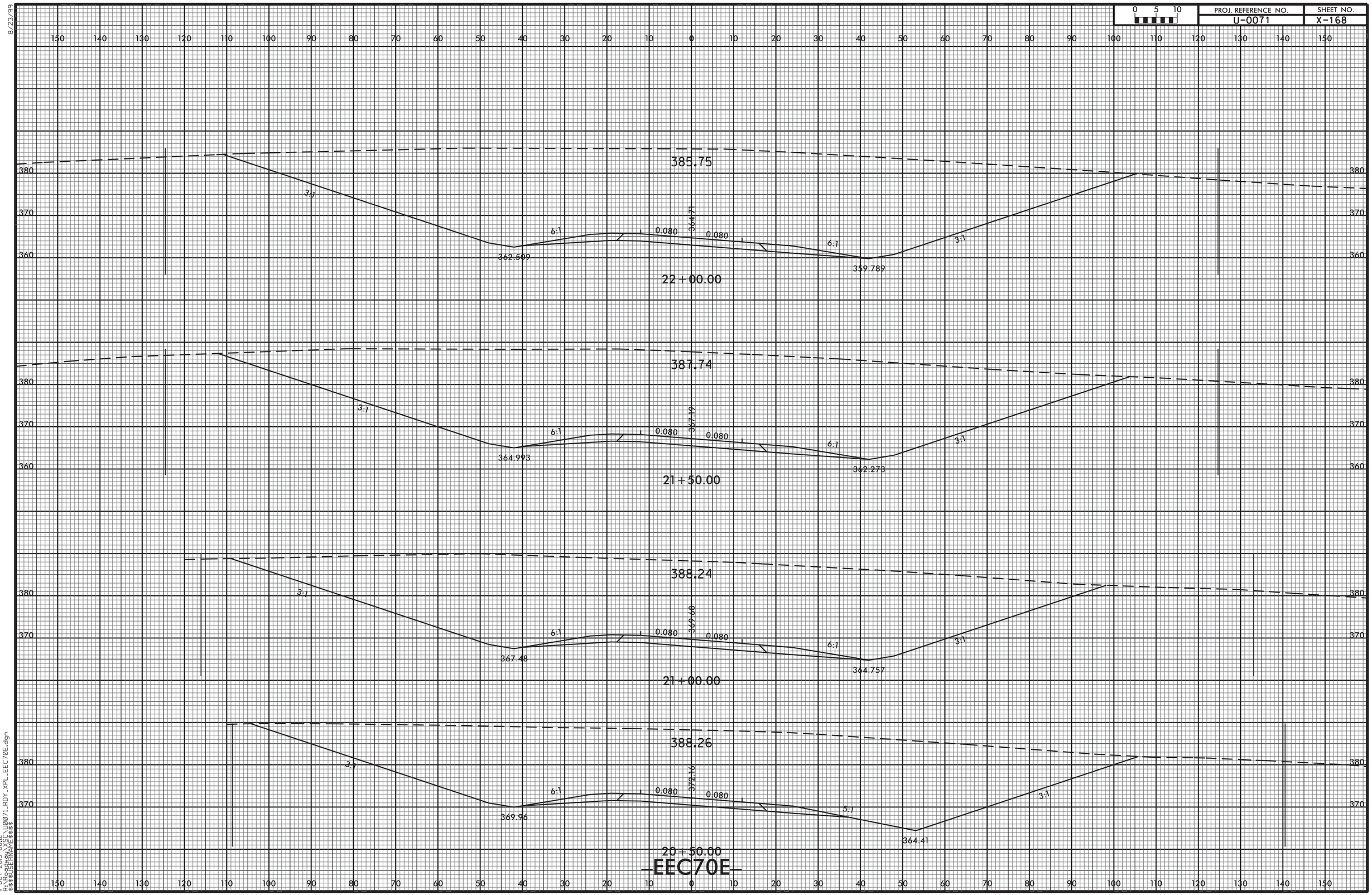


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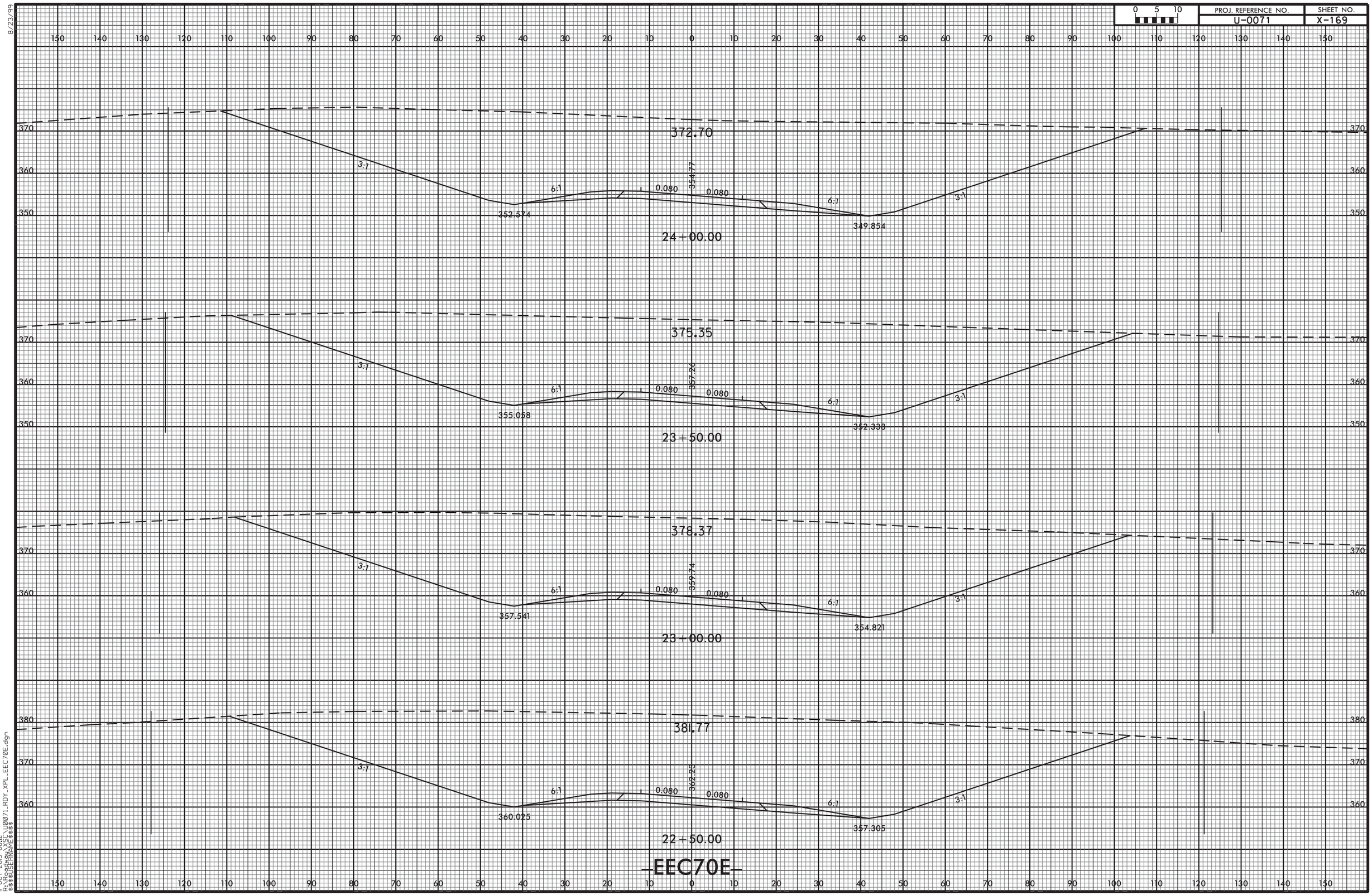


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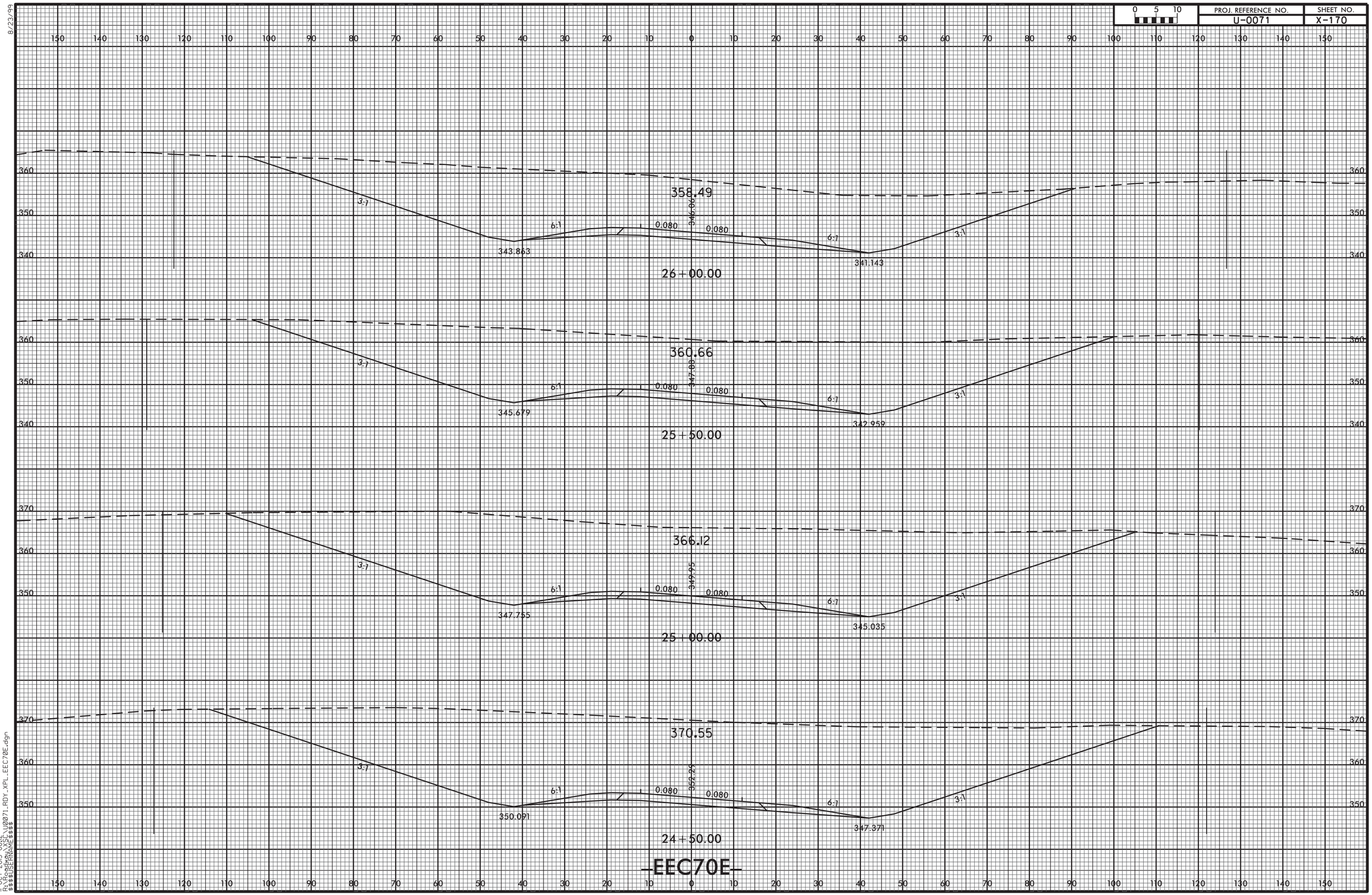


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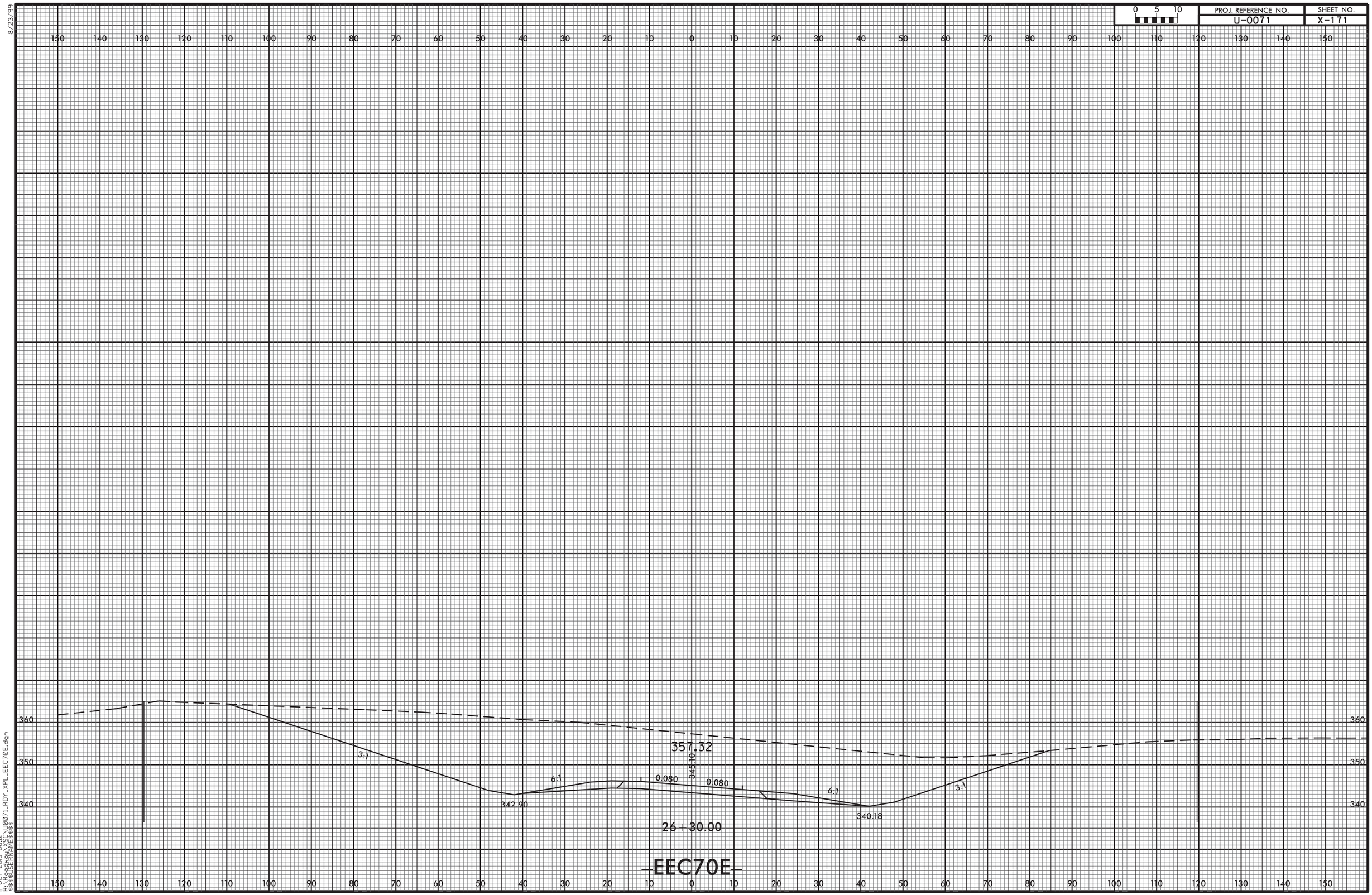


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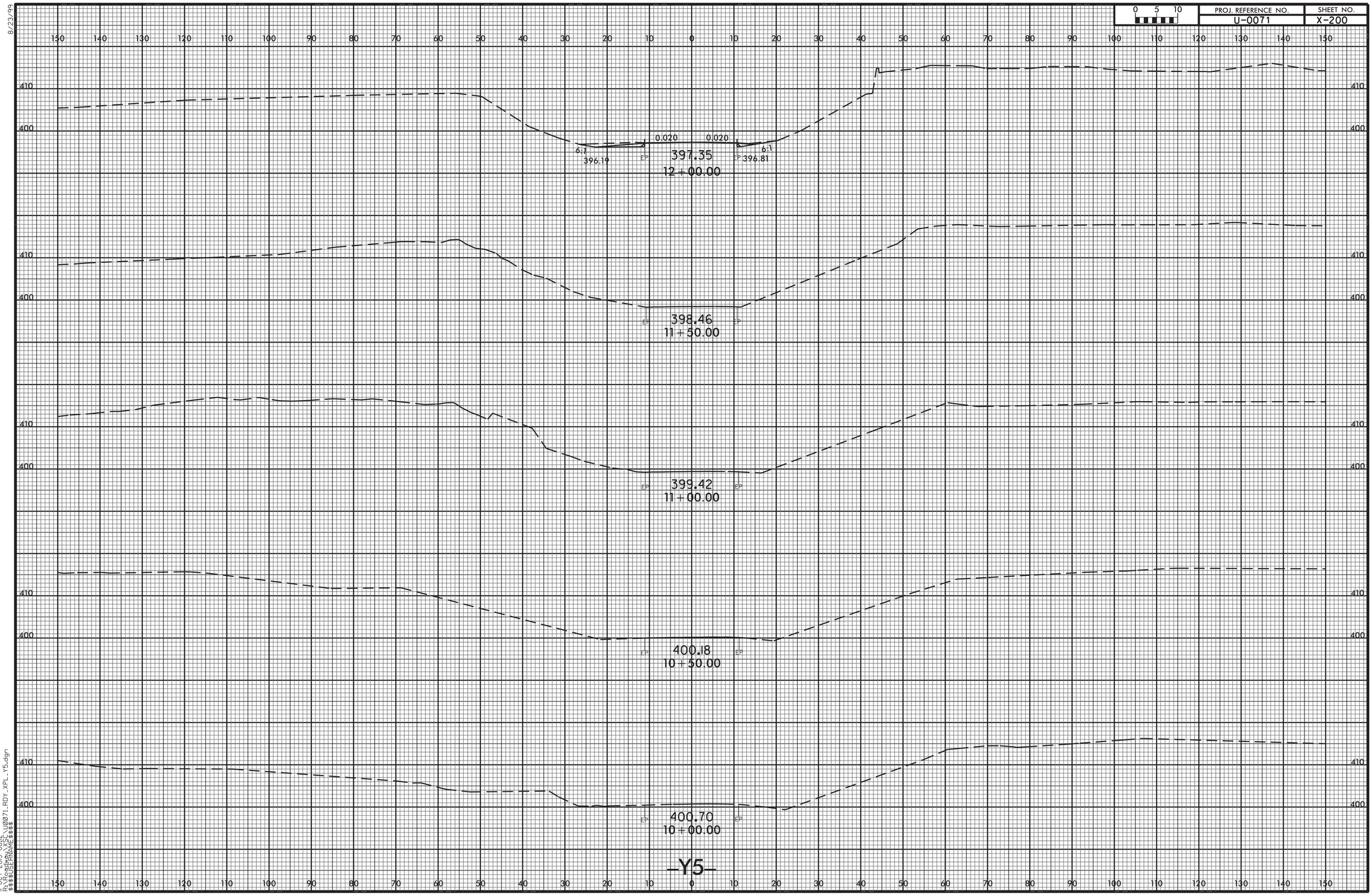


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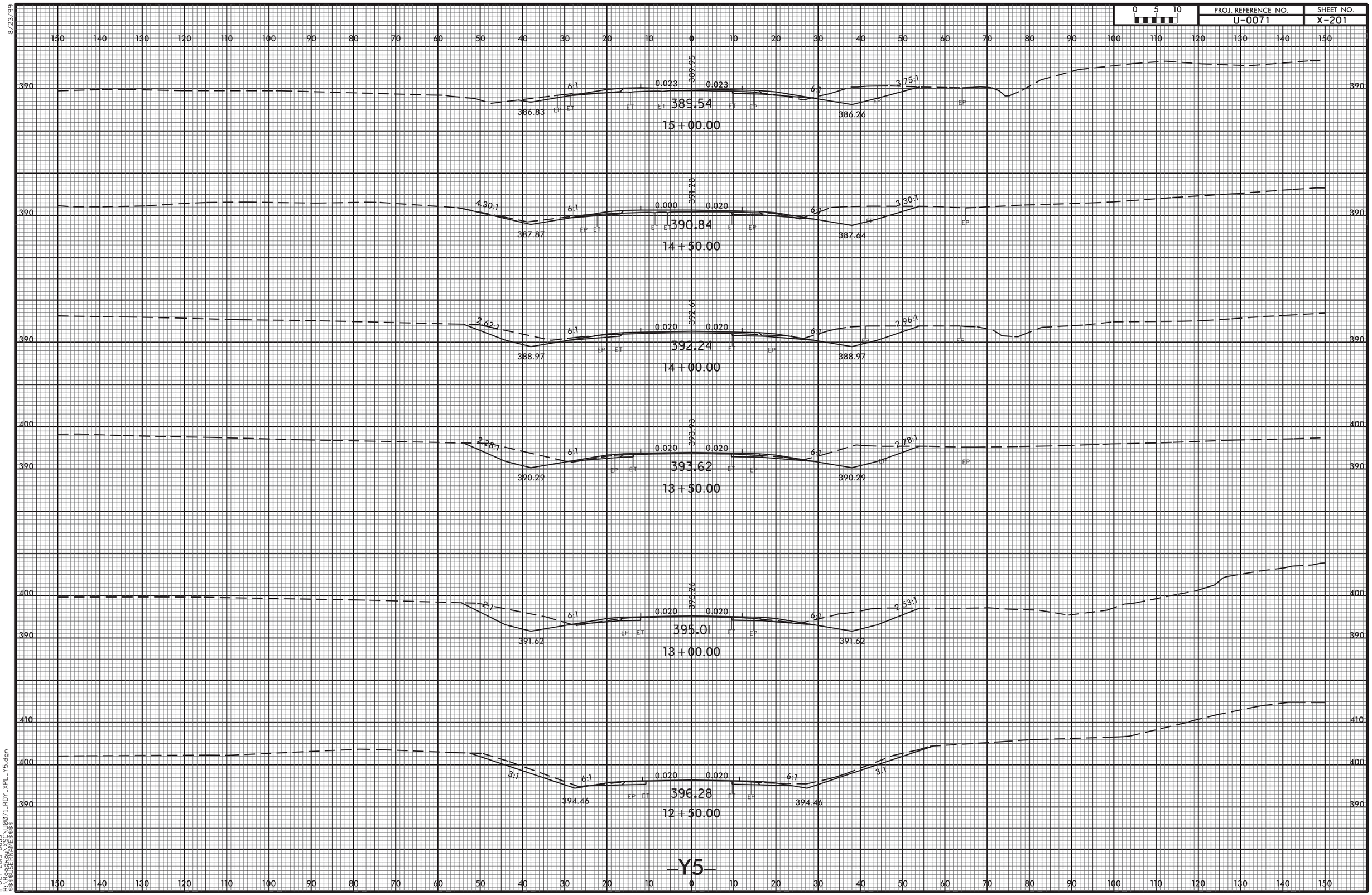


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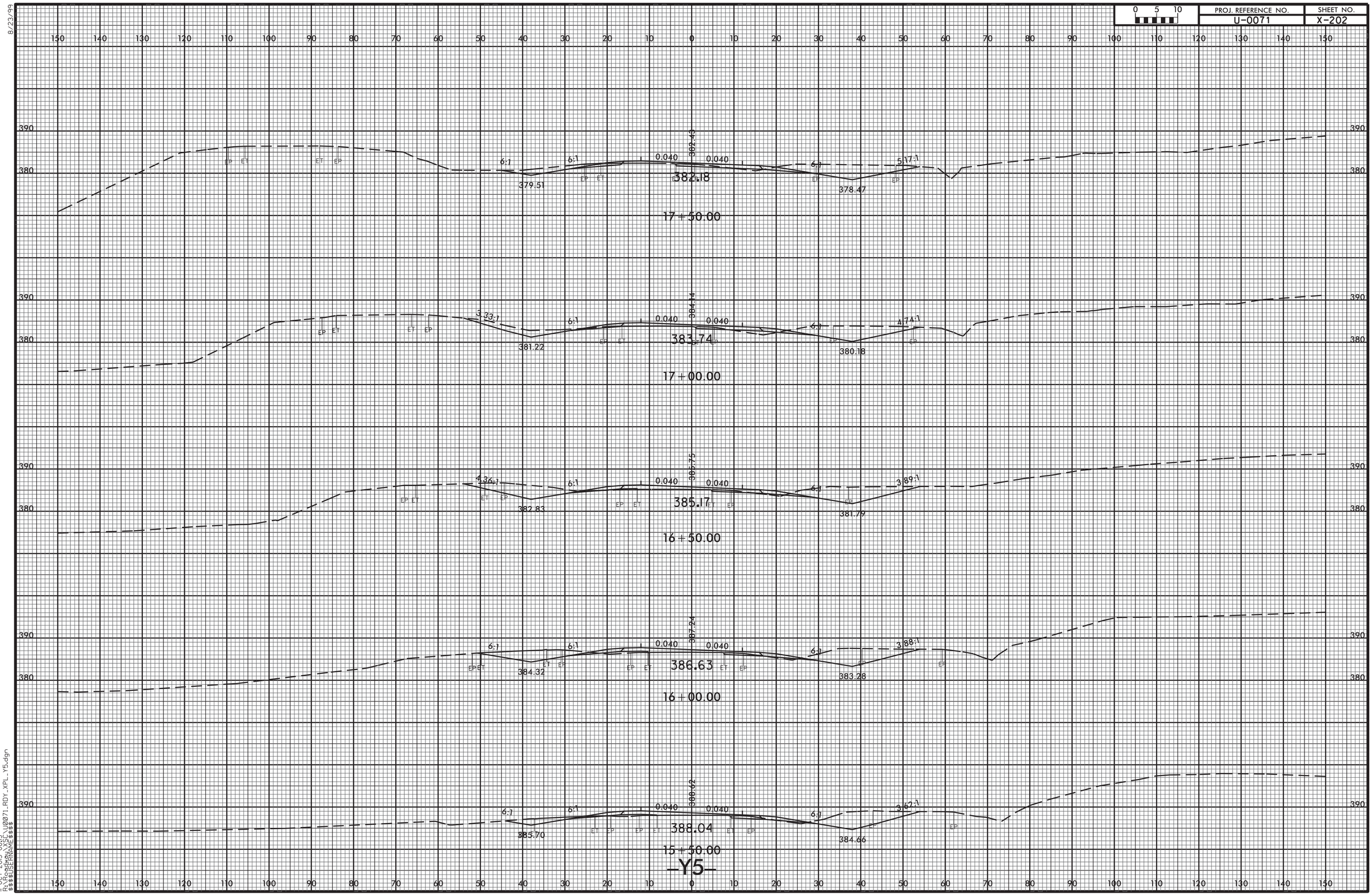


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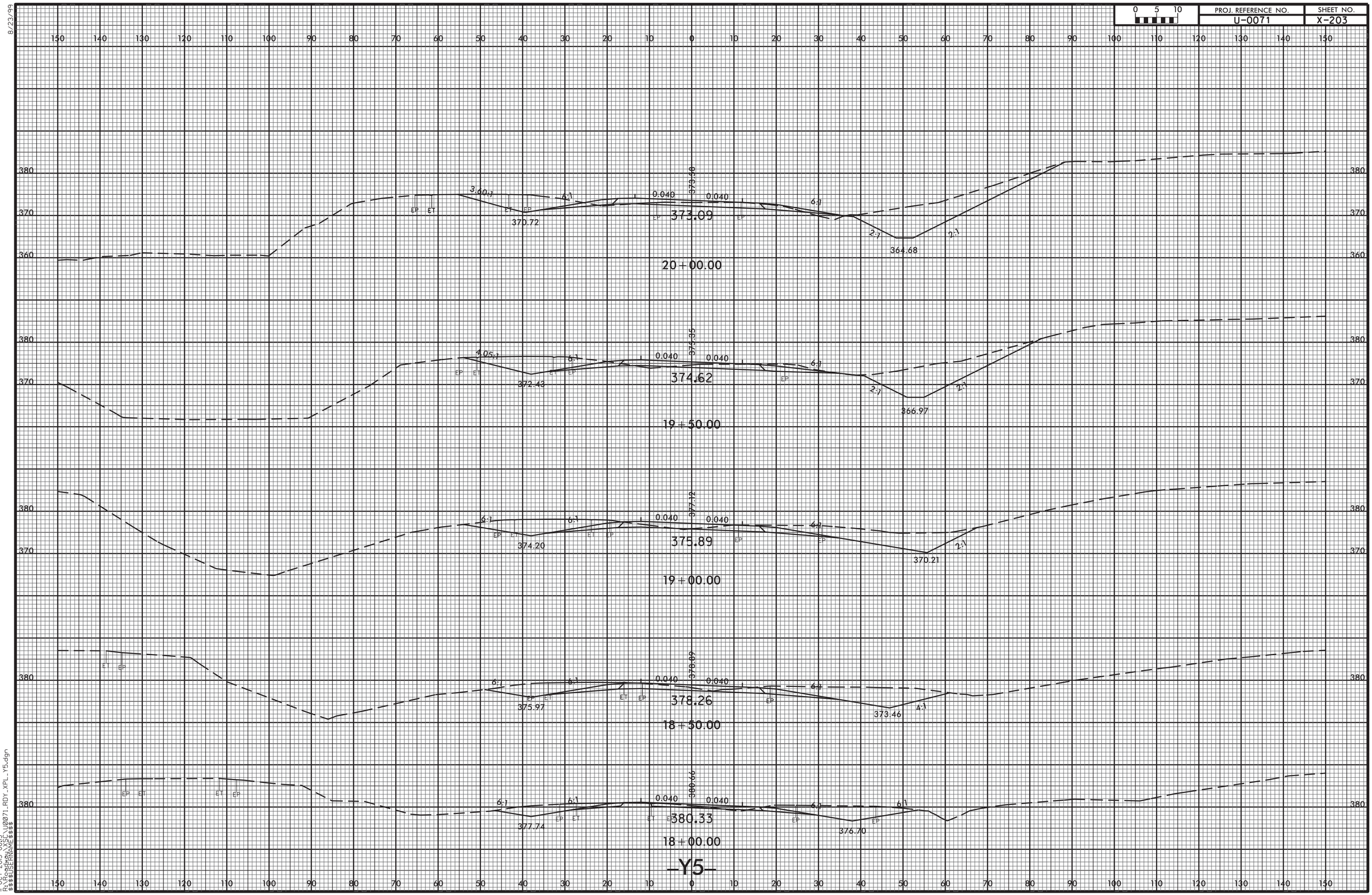

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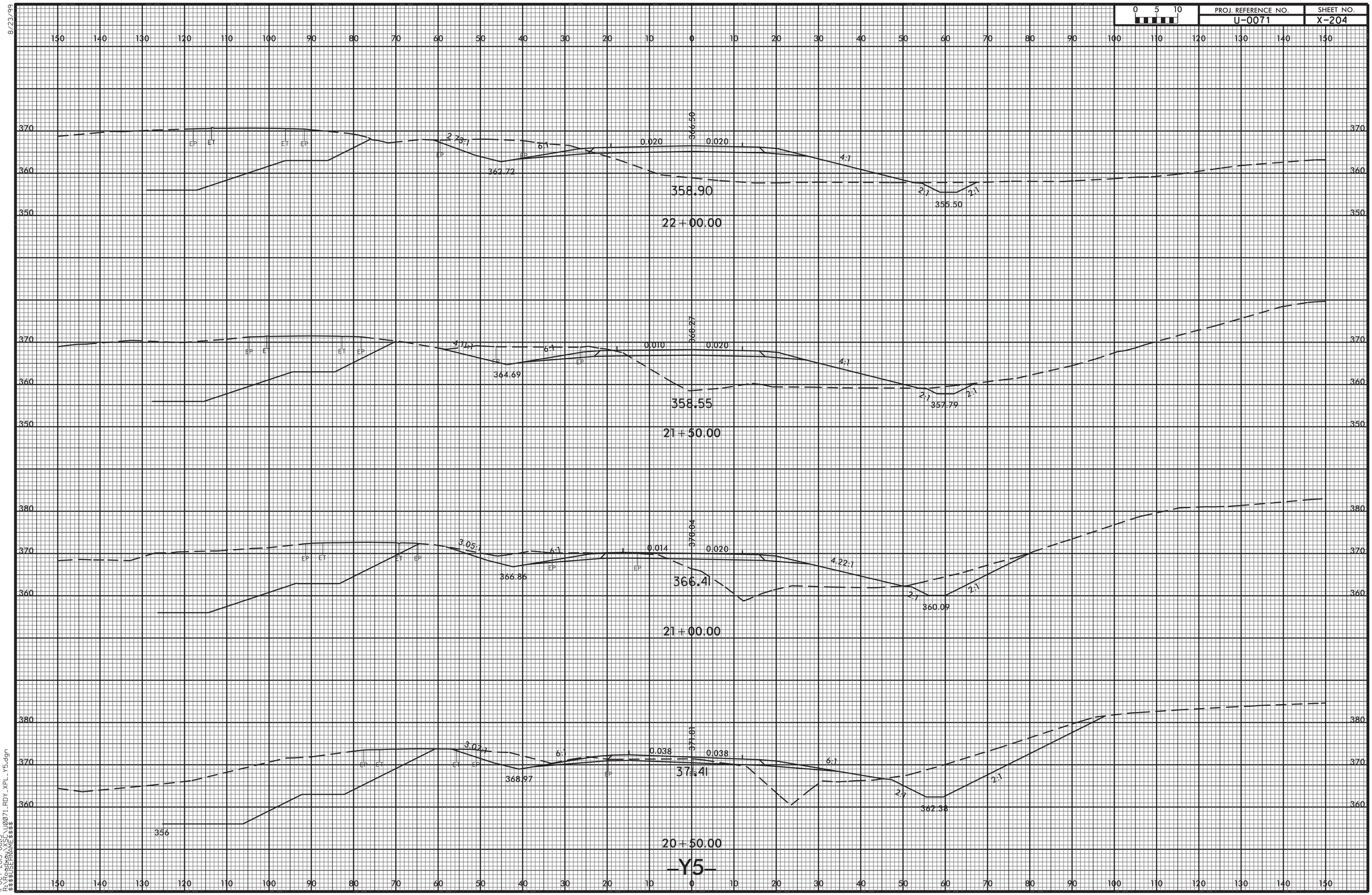


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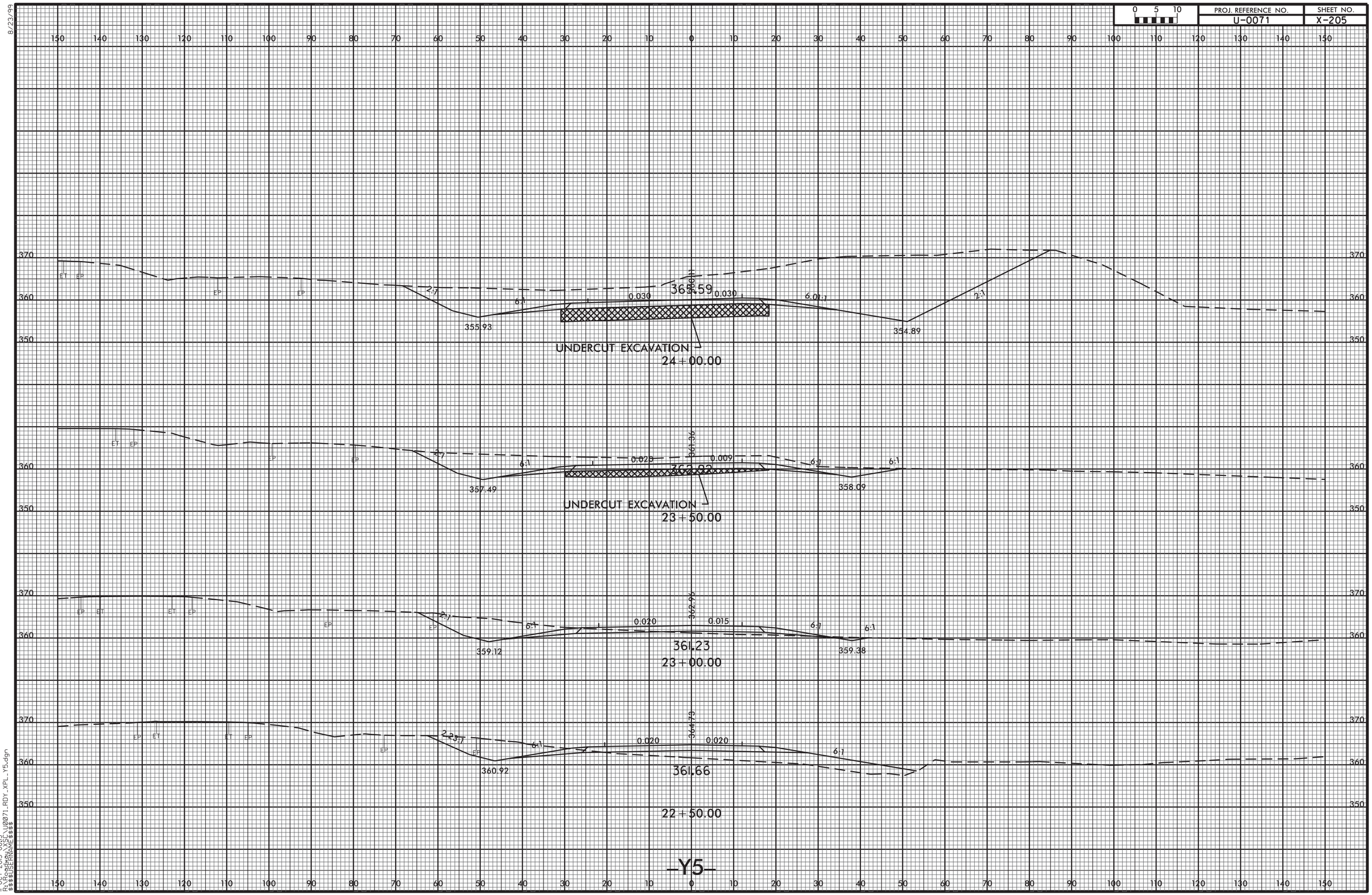


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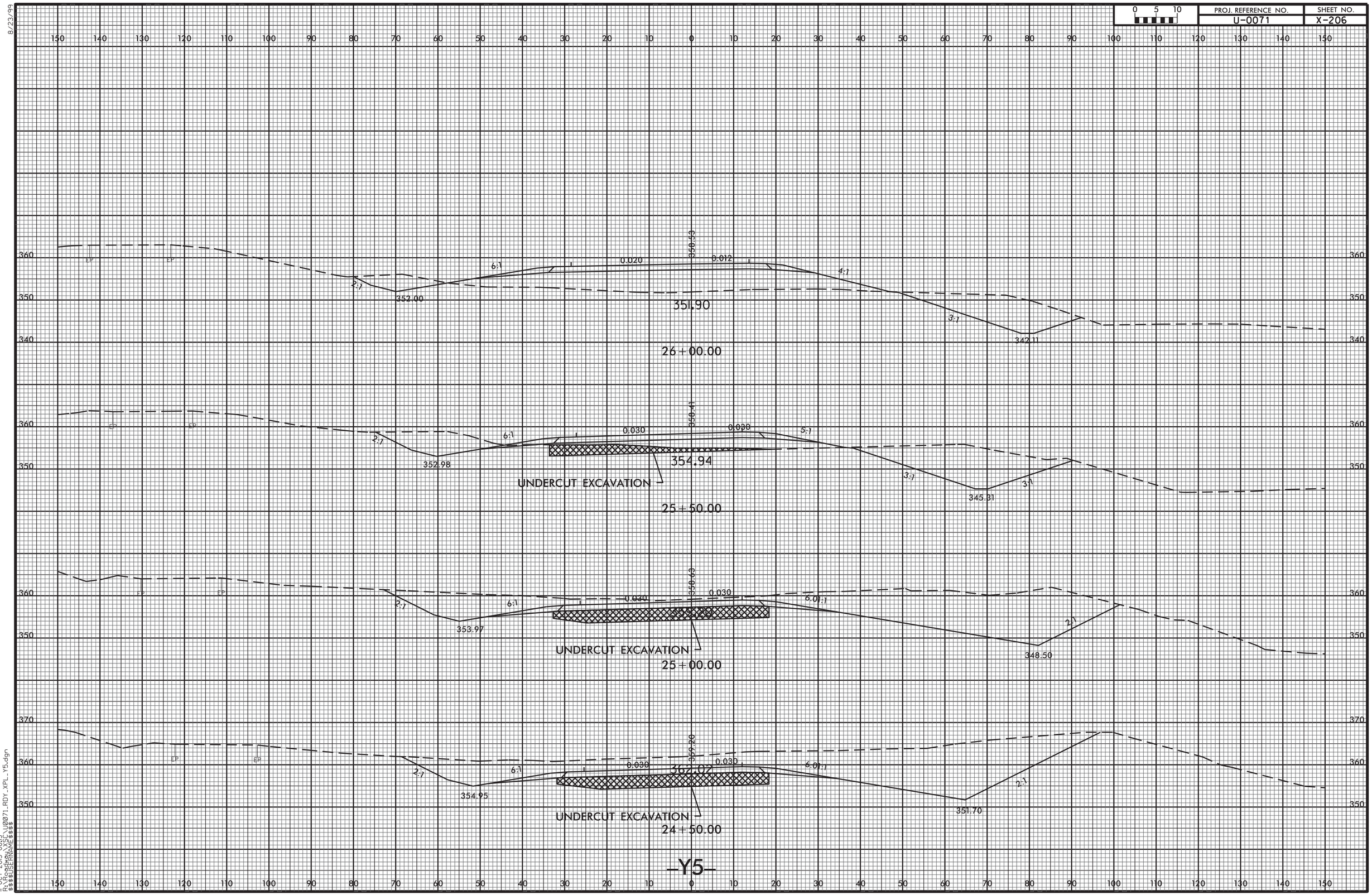


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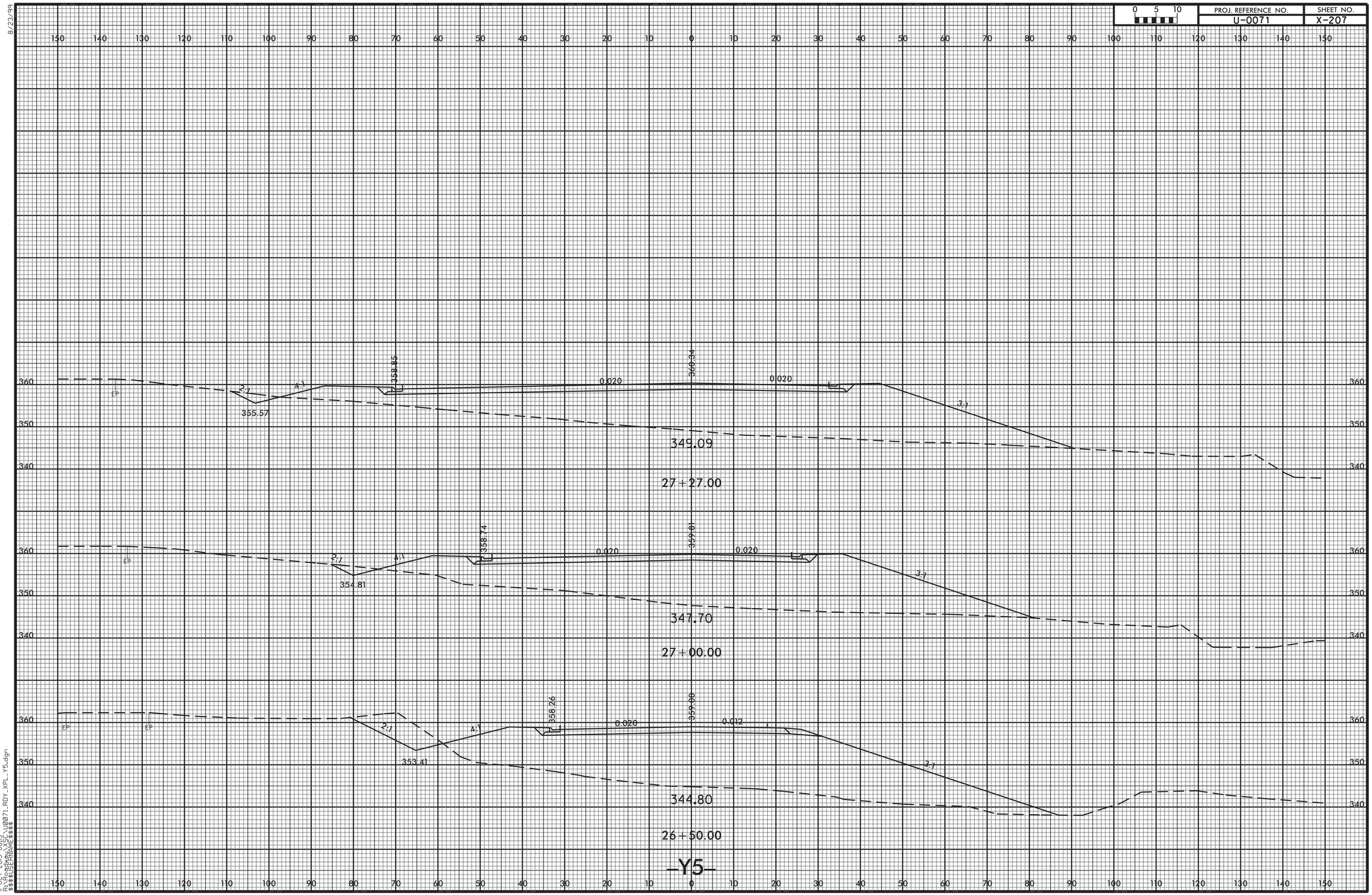
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SHEET NO.
X-207
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350
340
EP
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4:1
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358.85
366.34
0.020
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353.41
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0.012
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344.80
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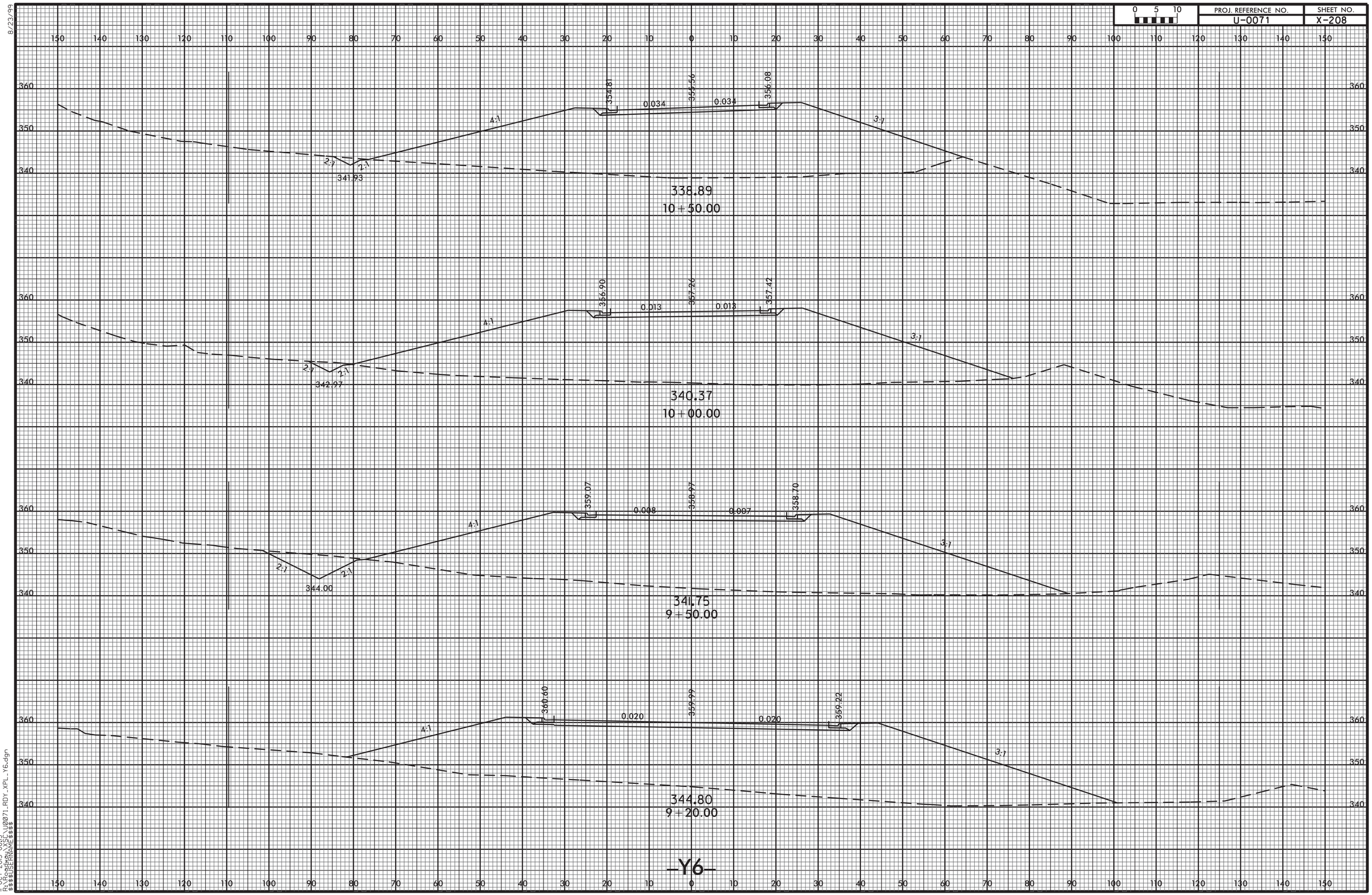


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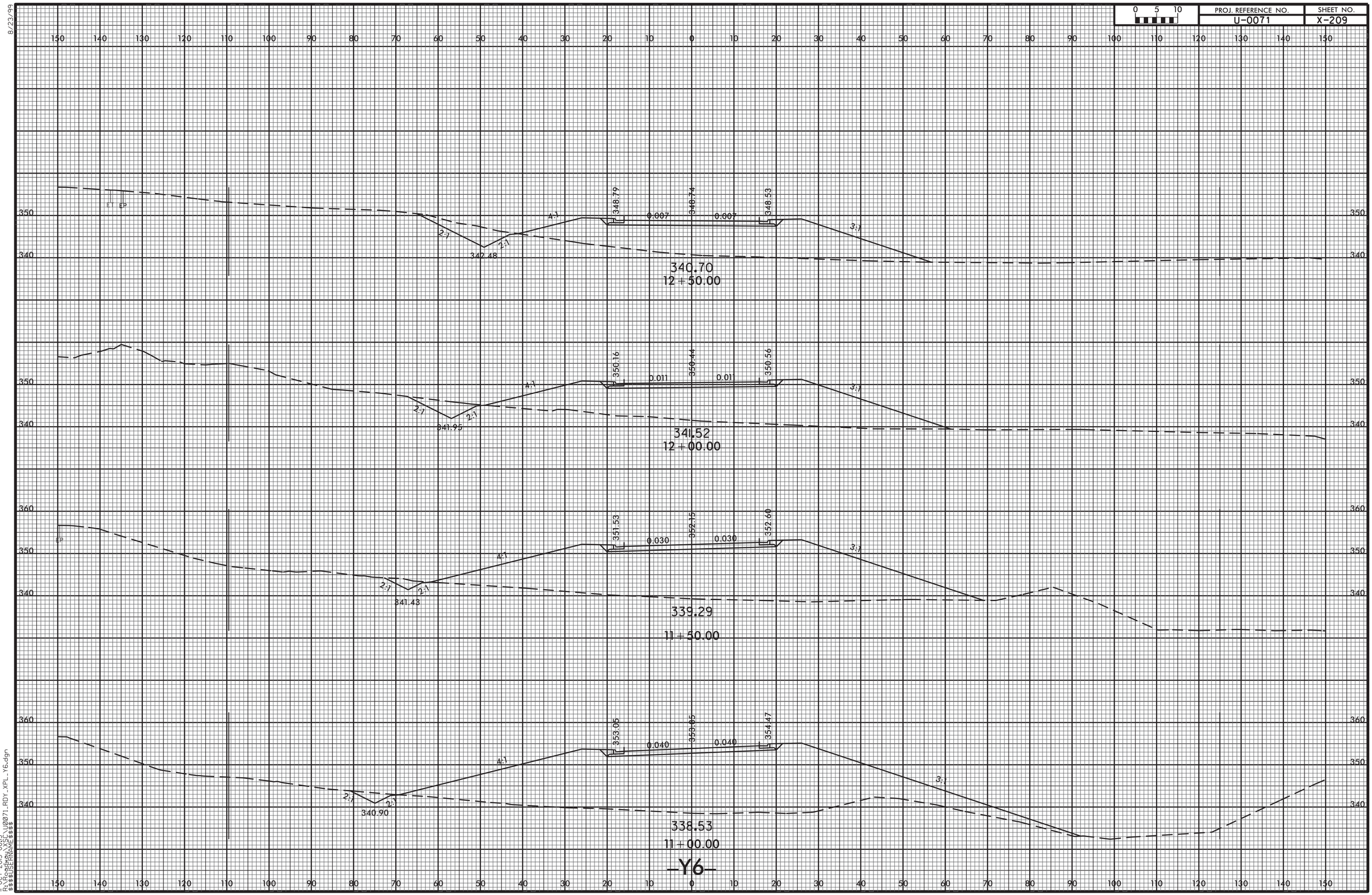


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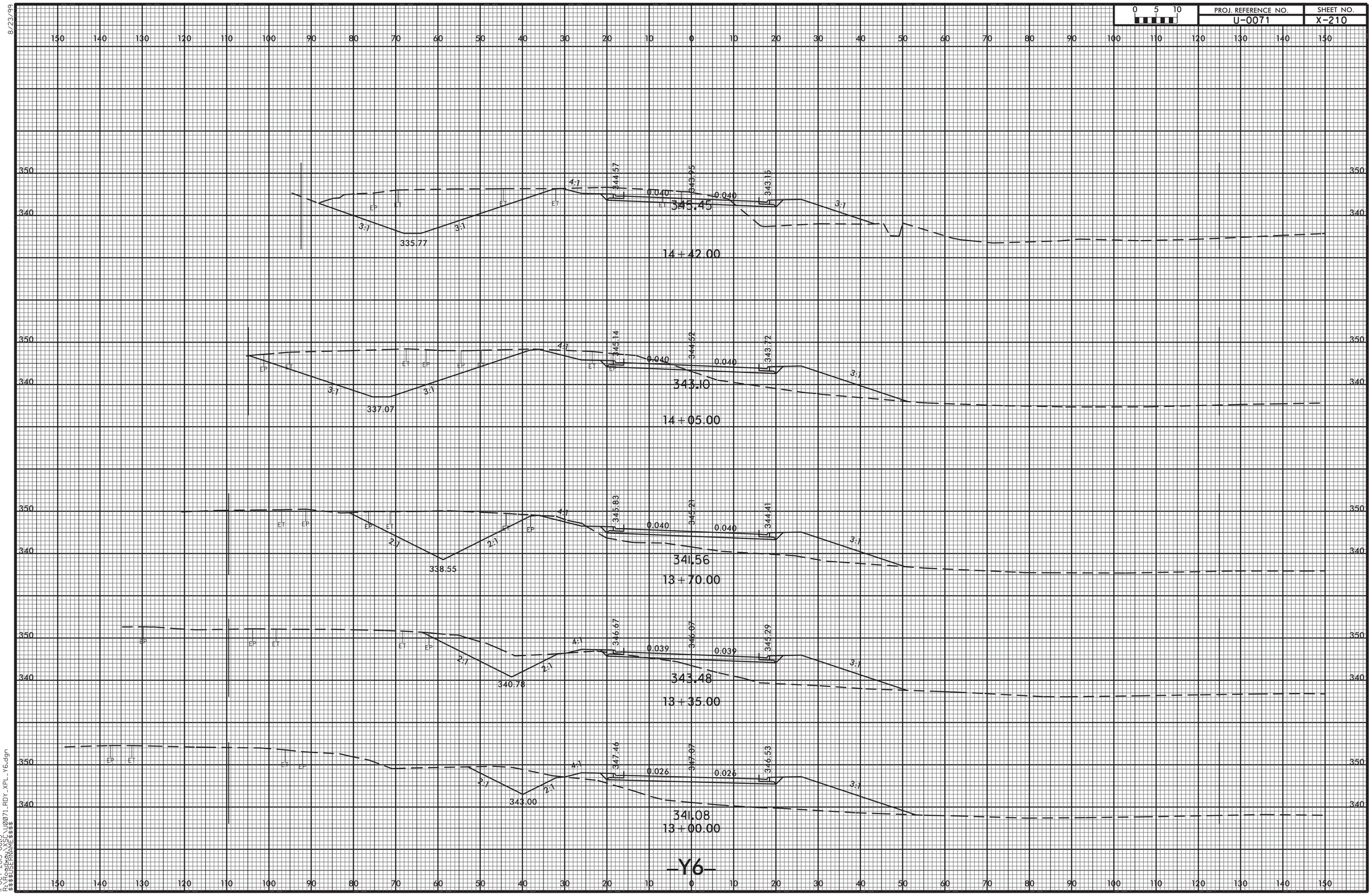


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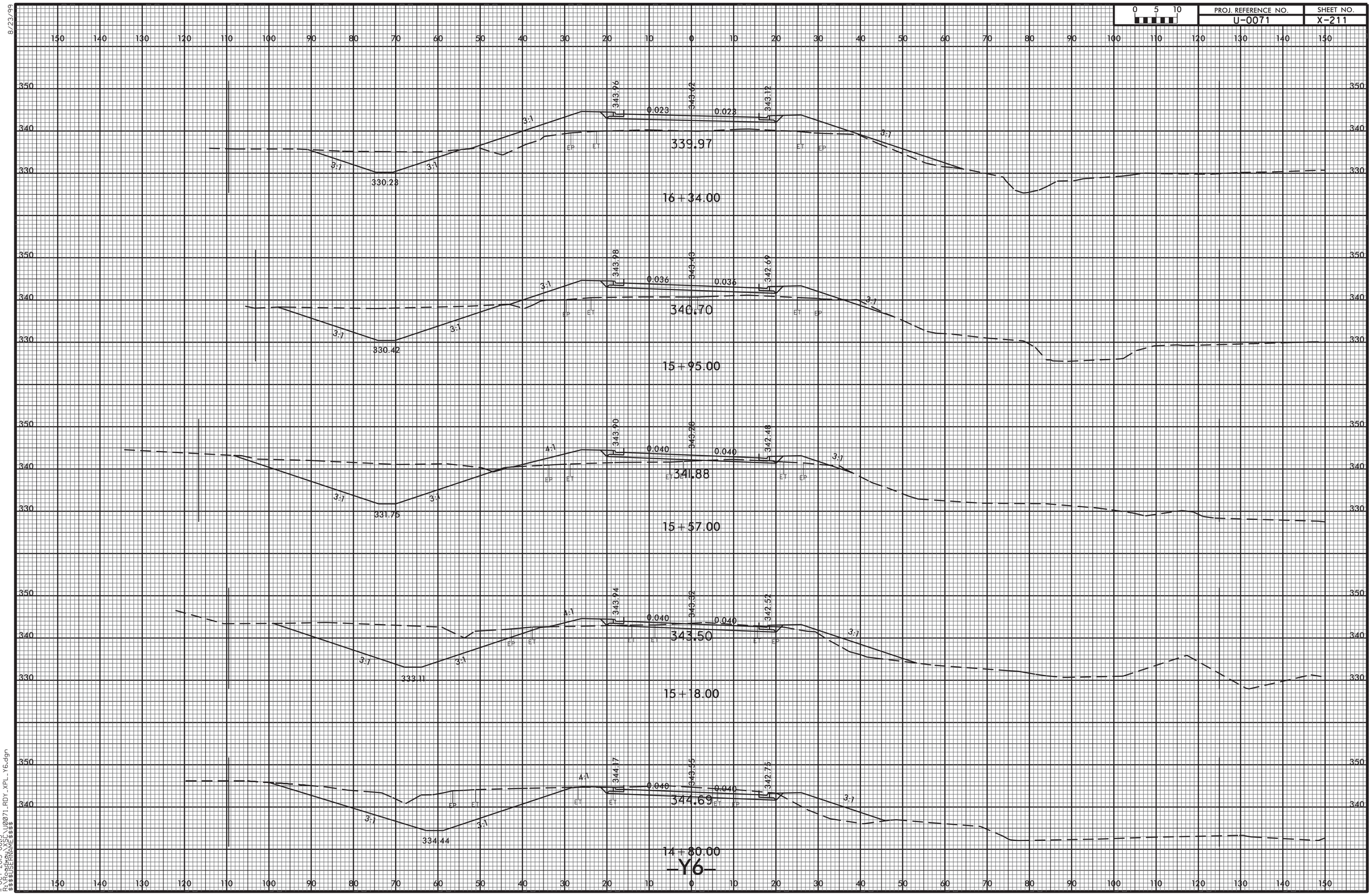


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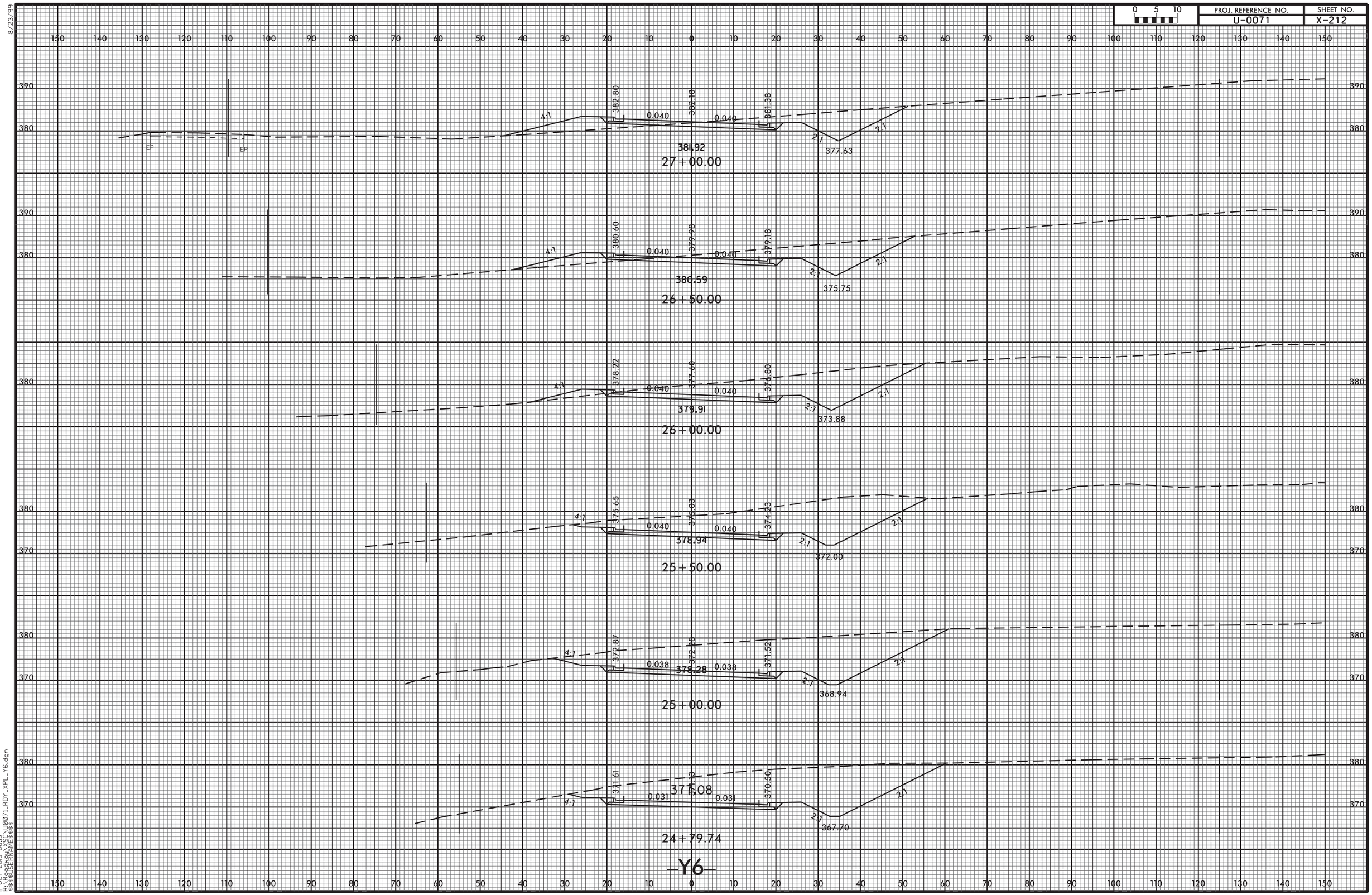


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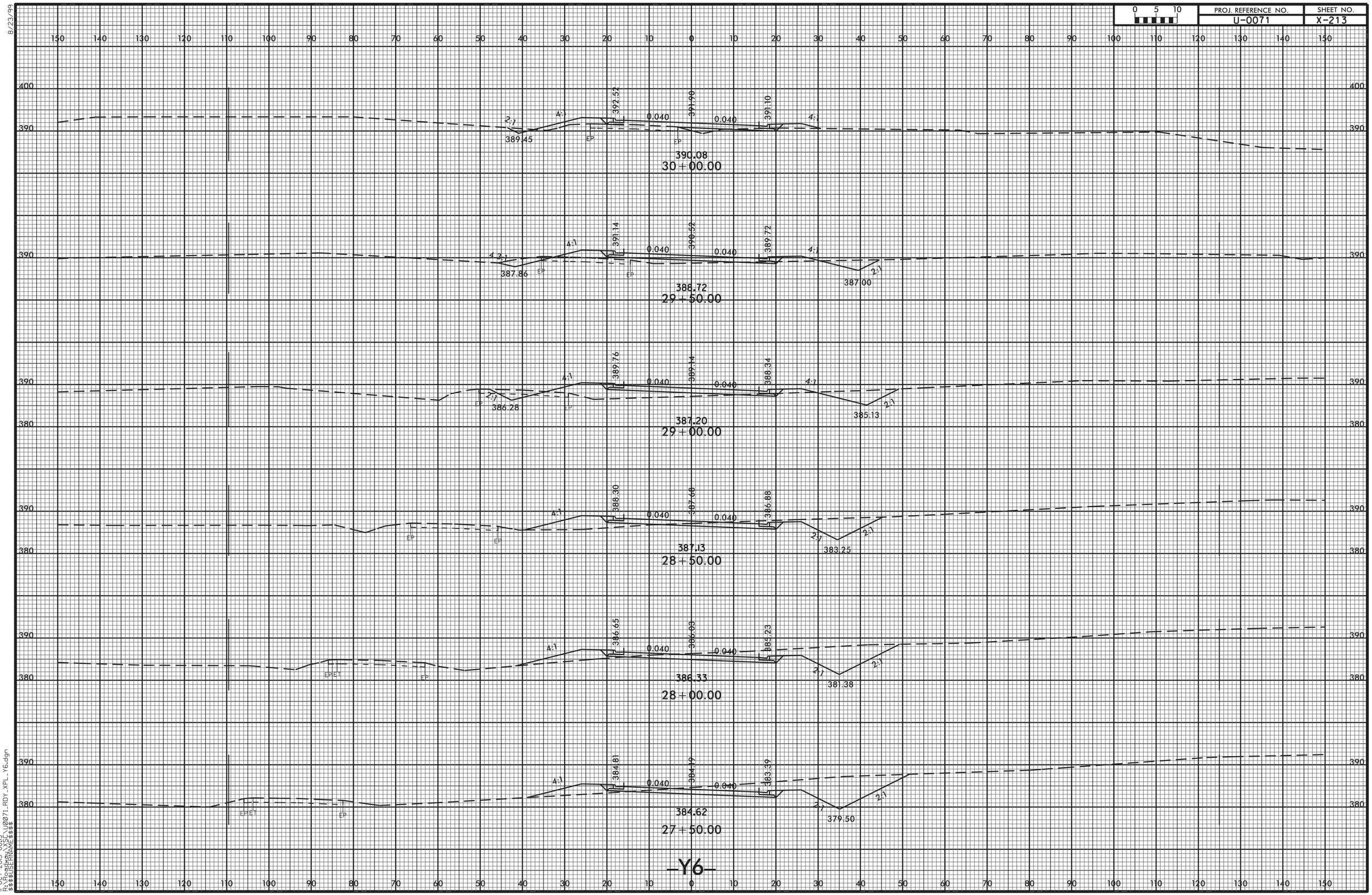


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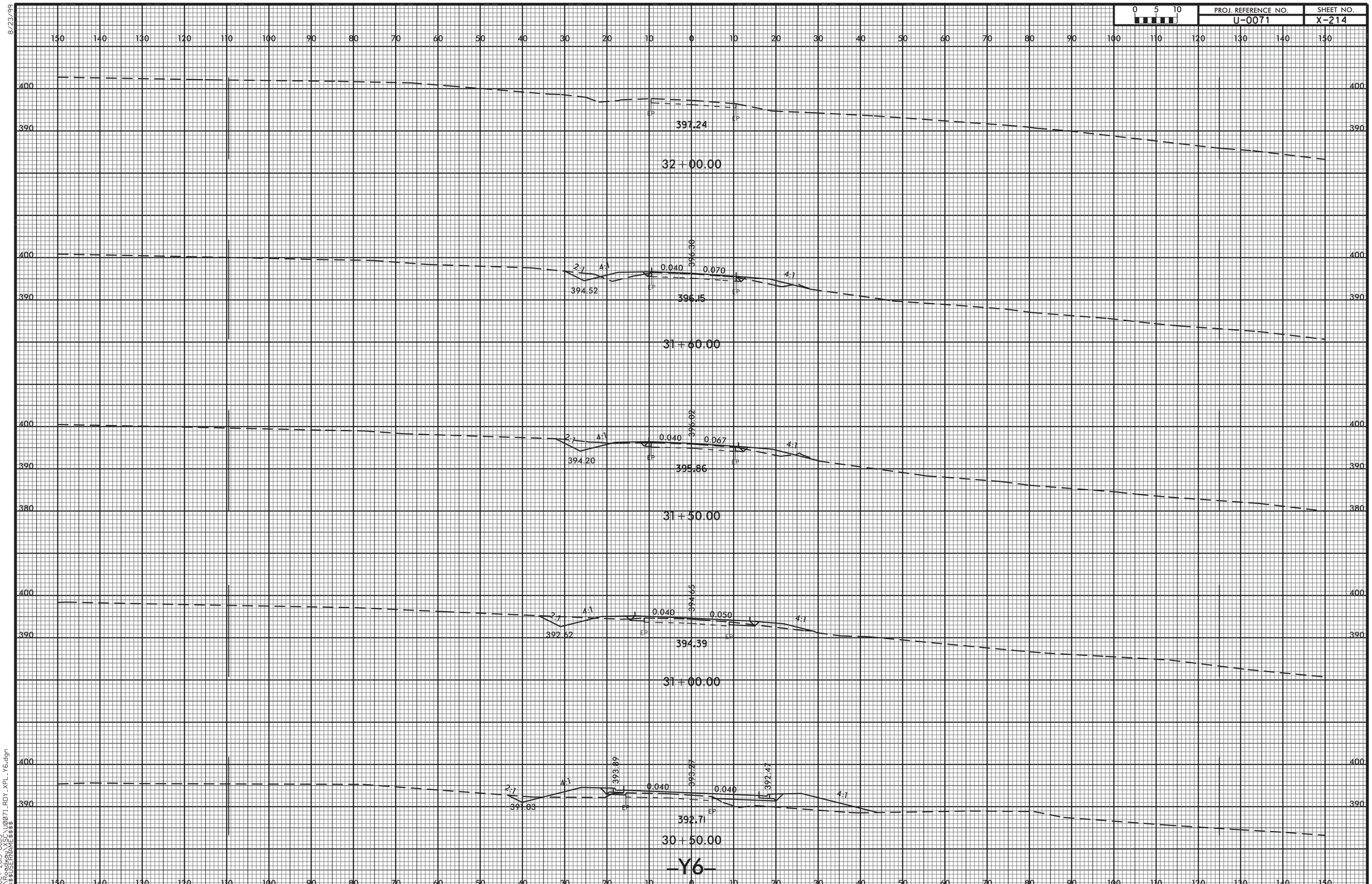


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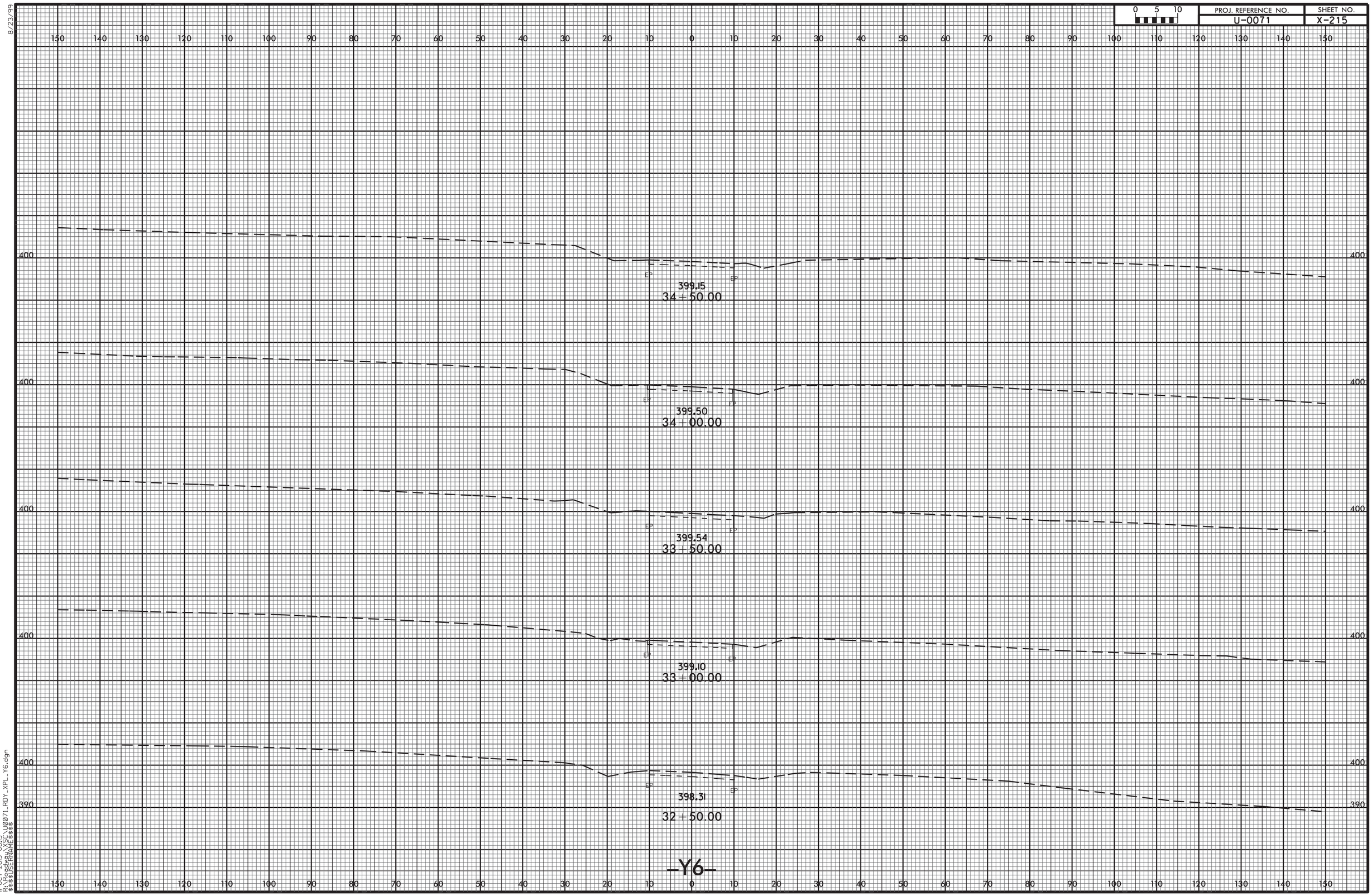


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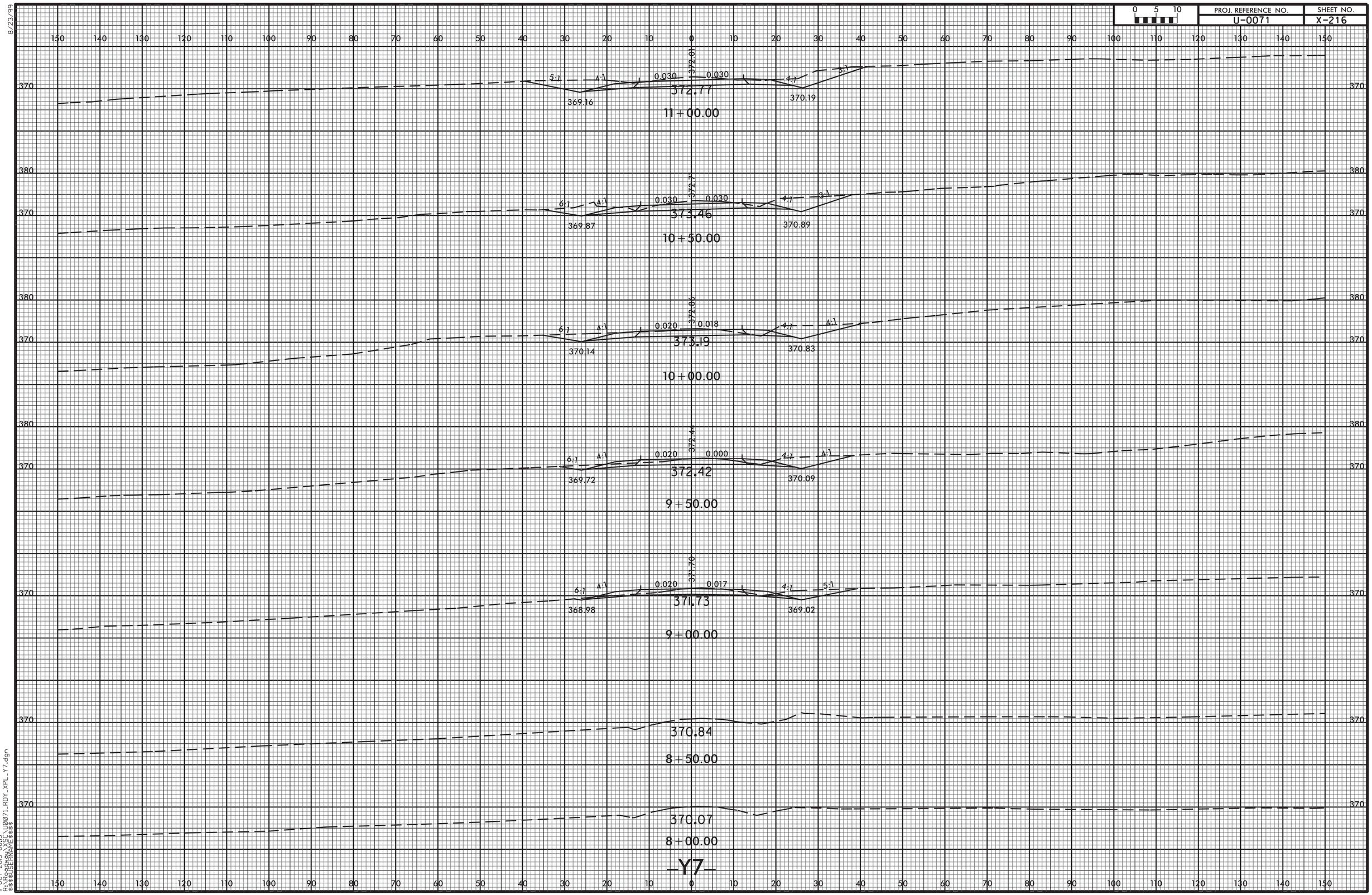


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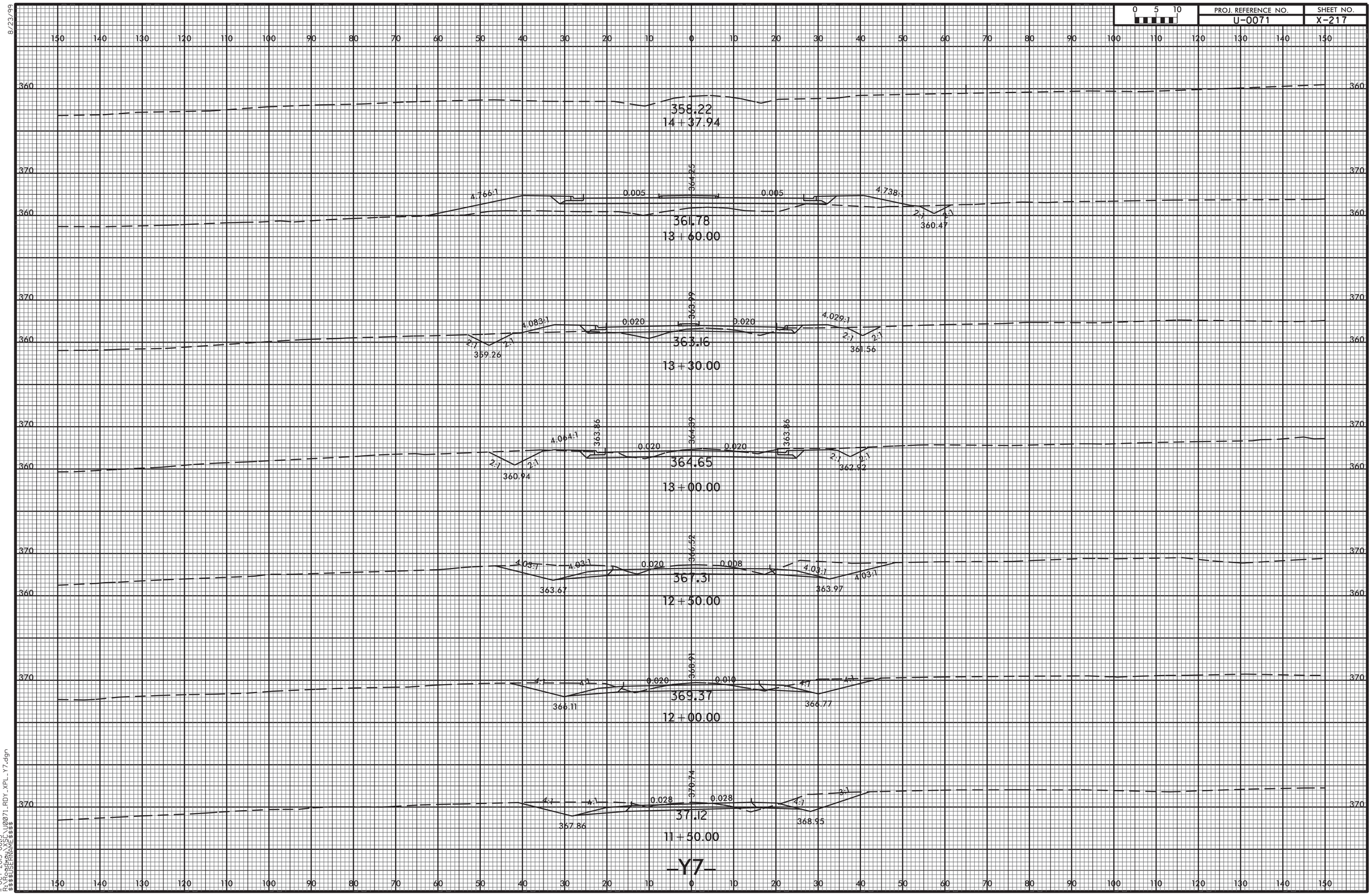


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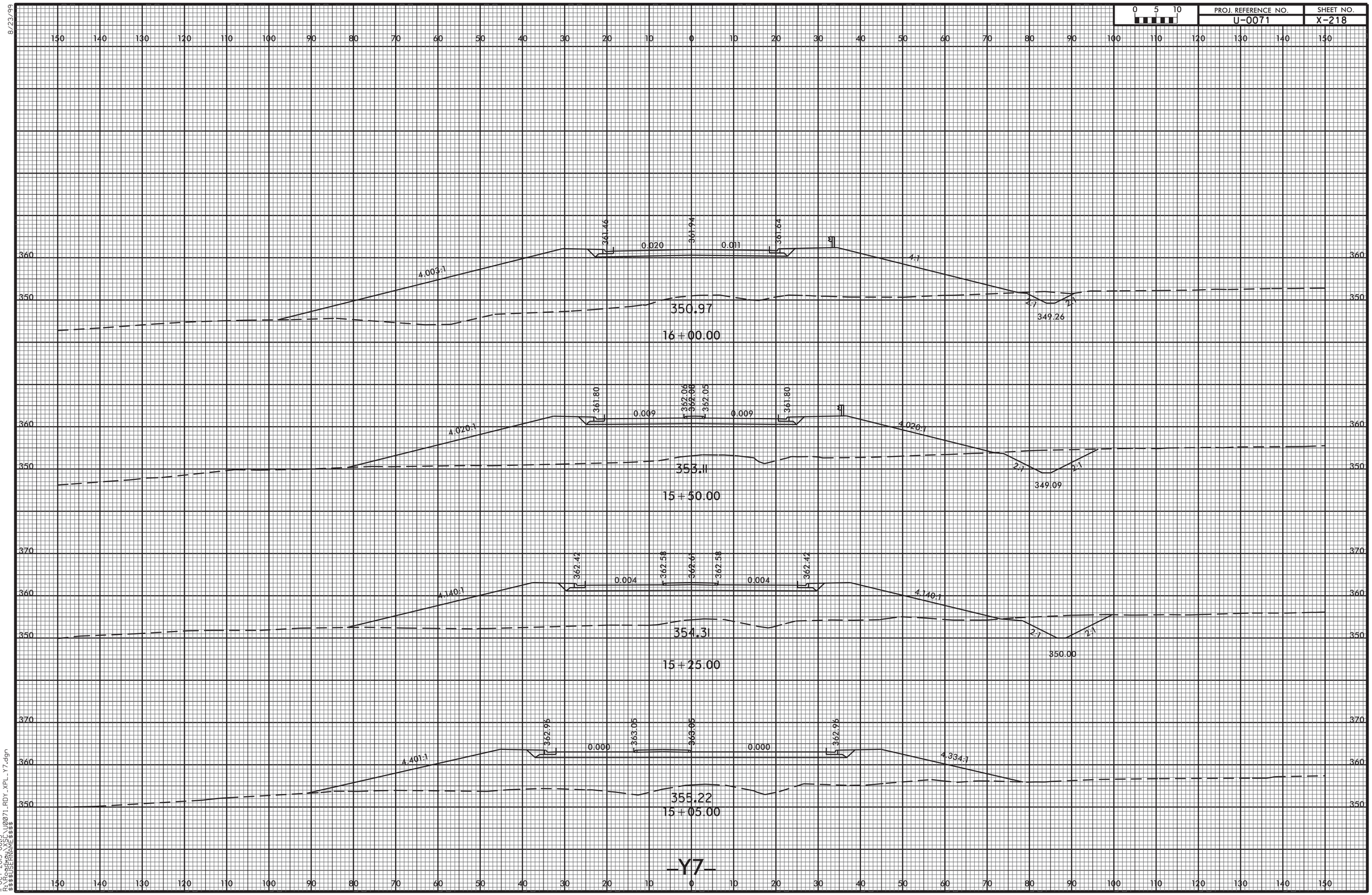


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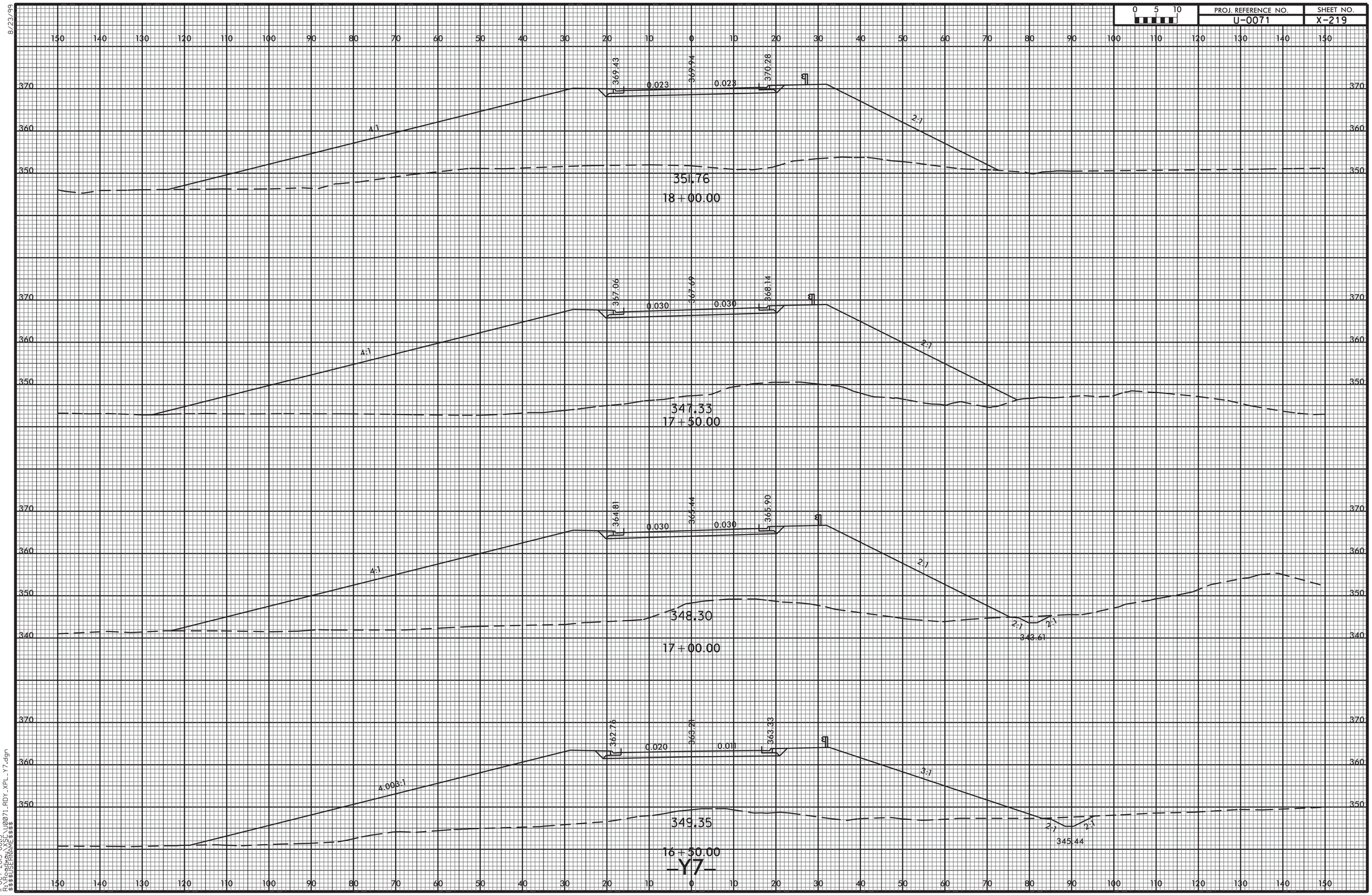


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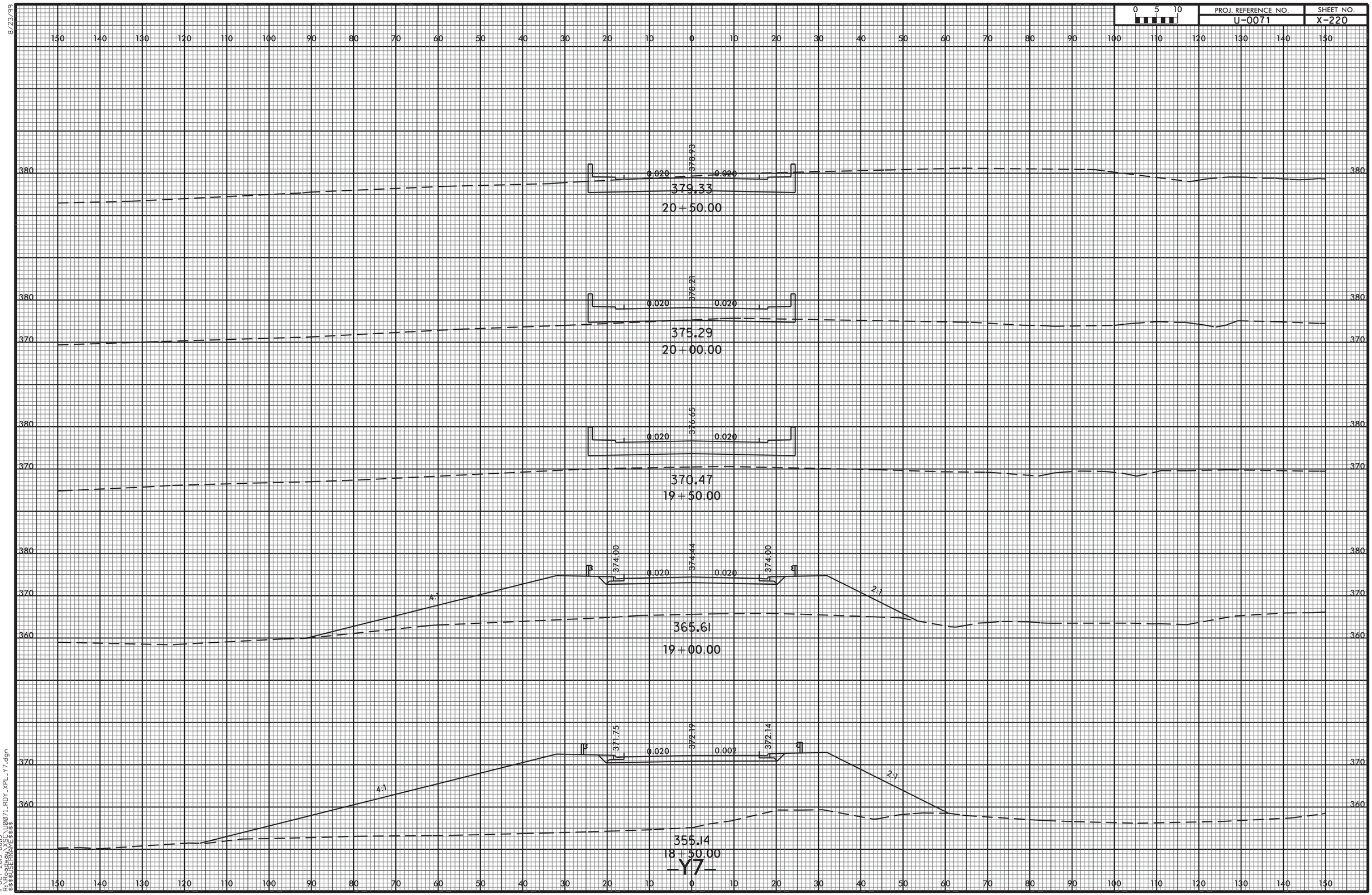


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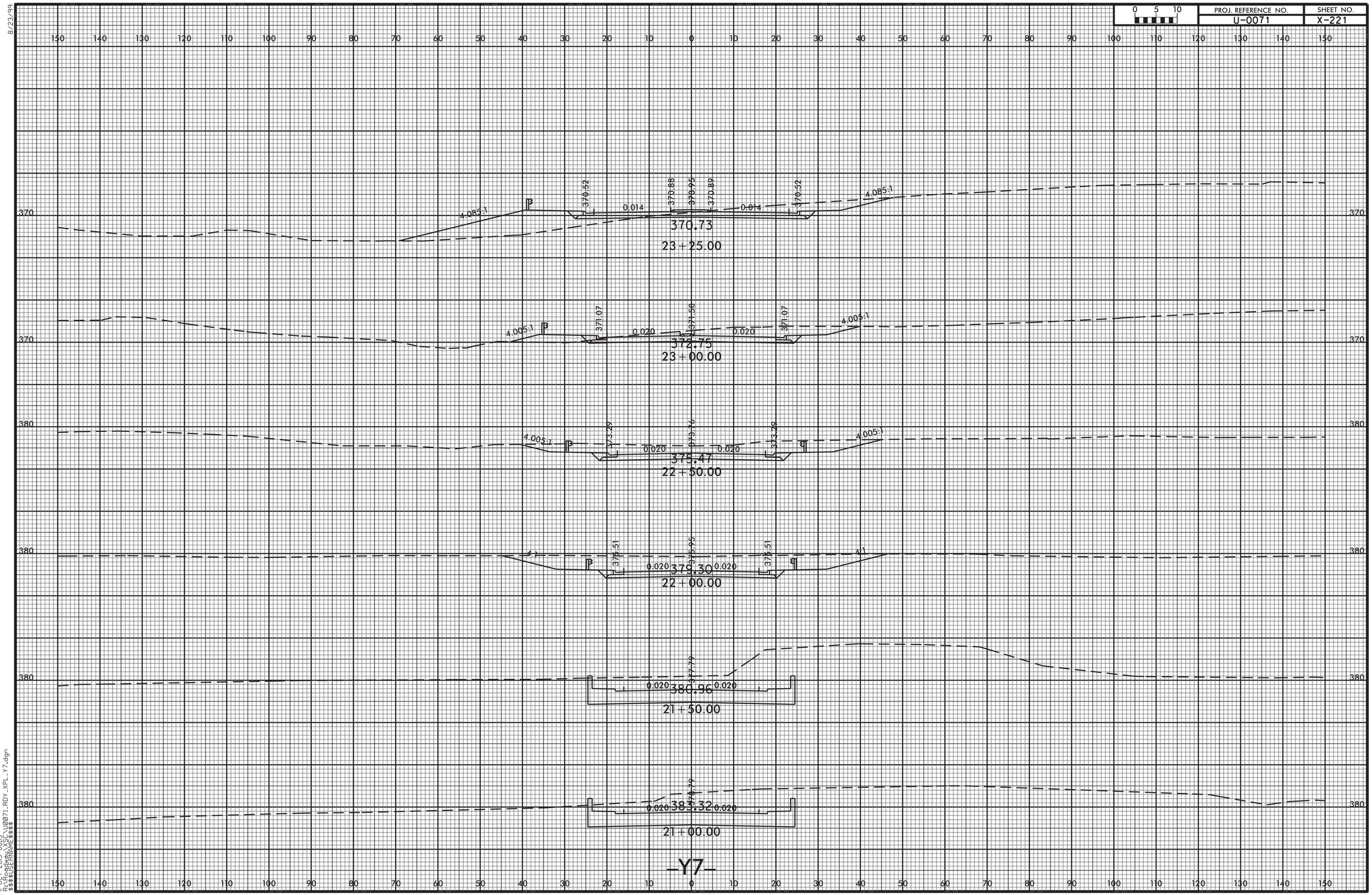


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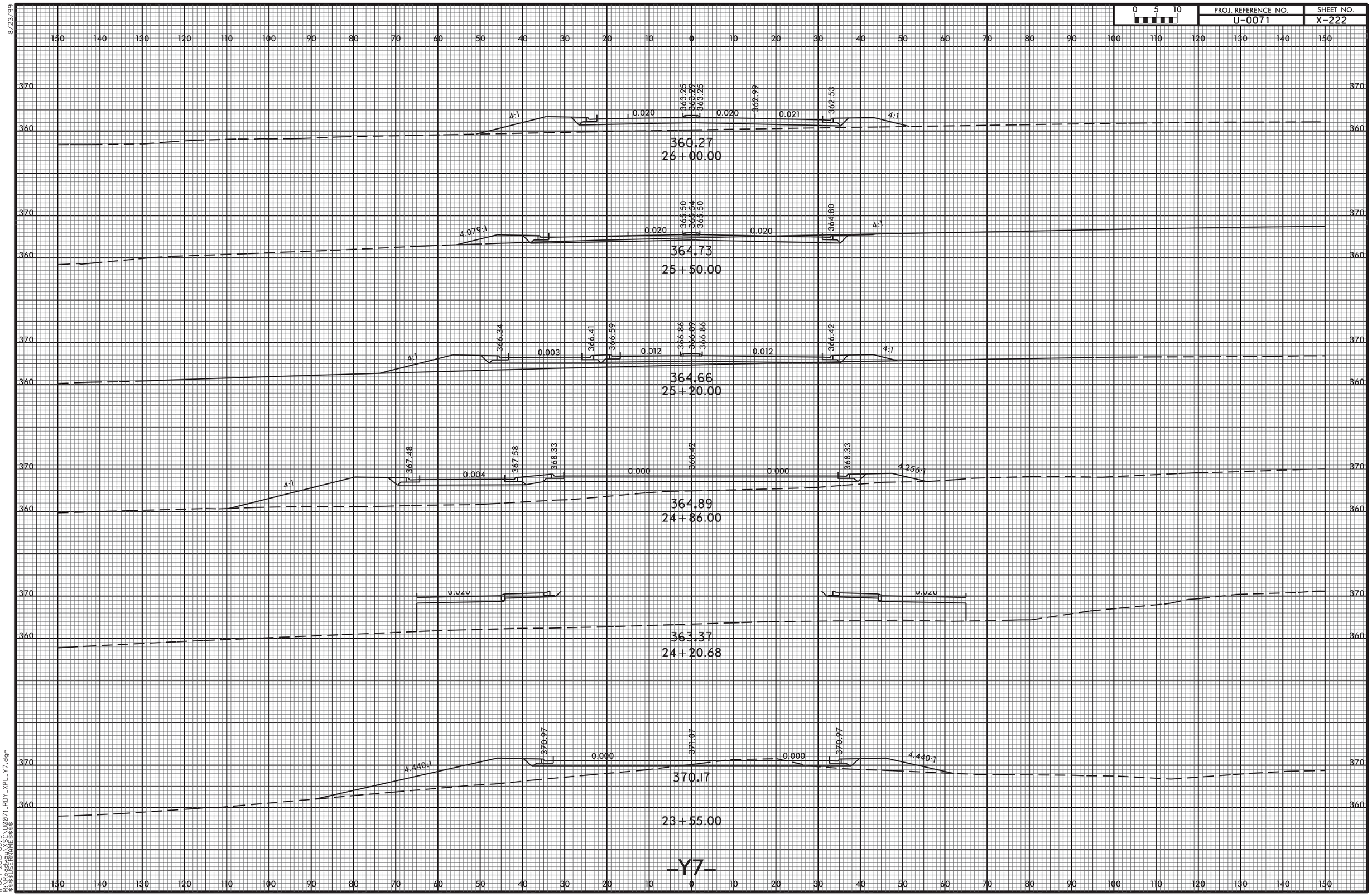


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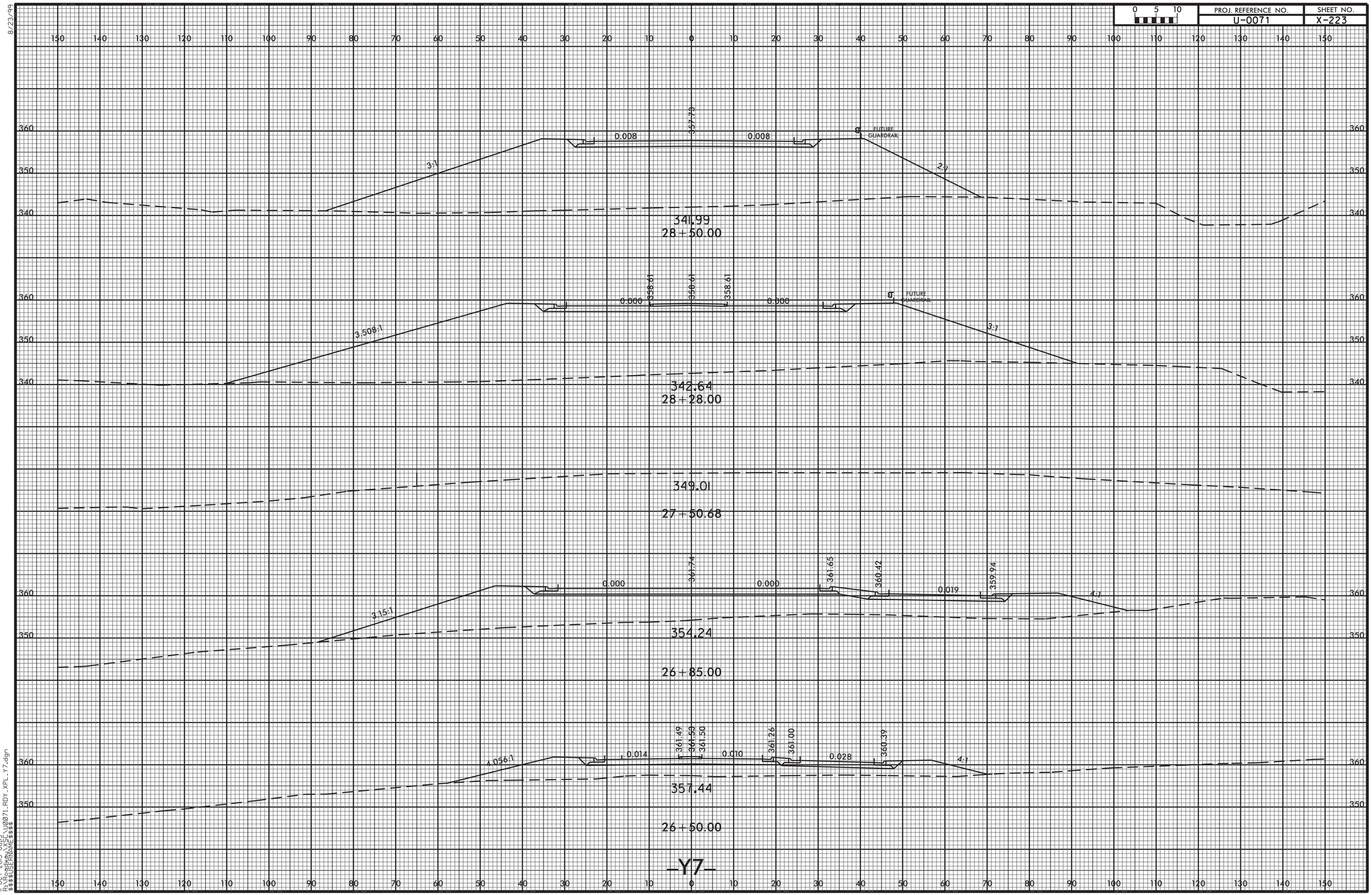


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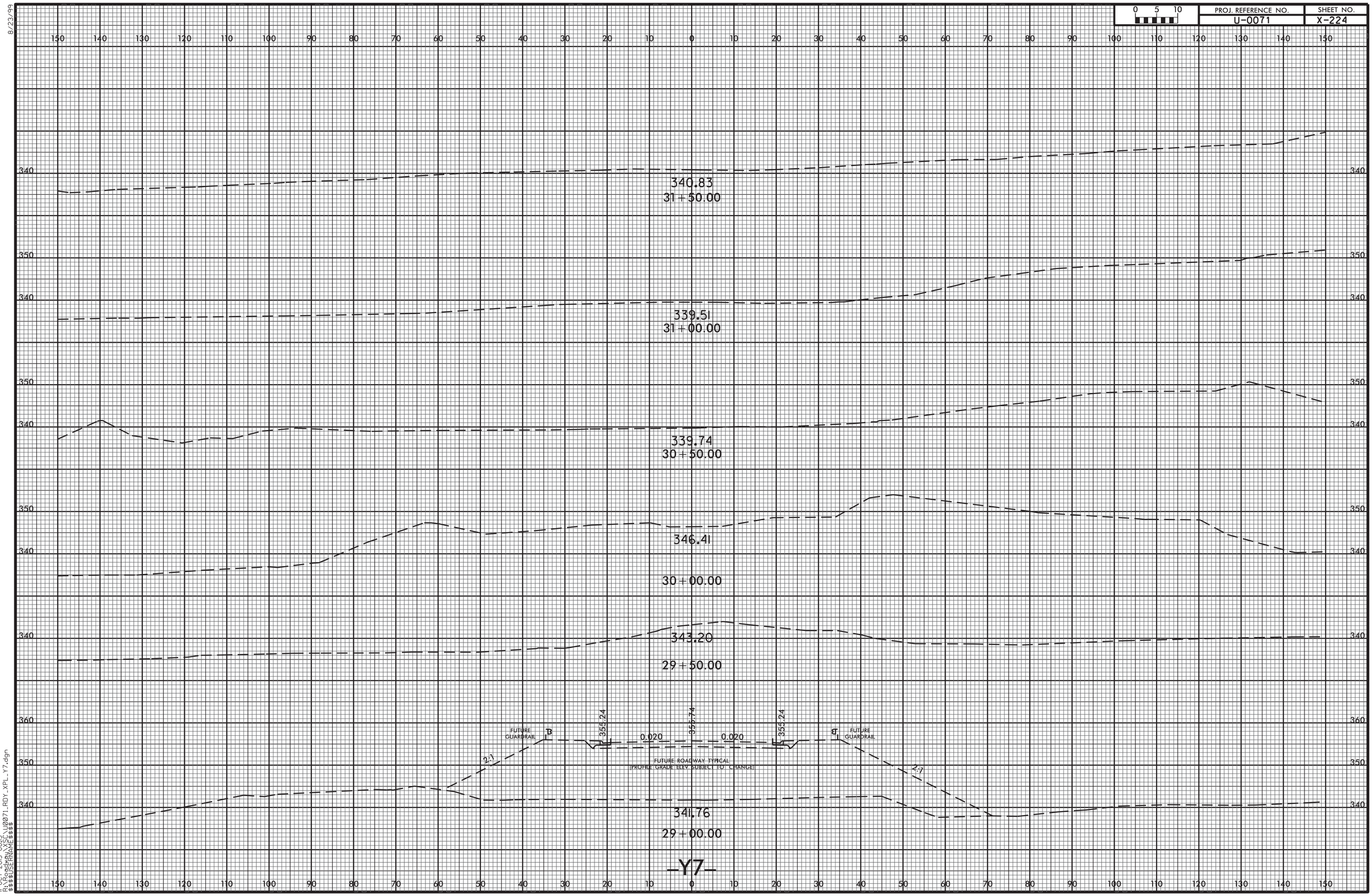


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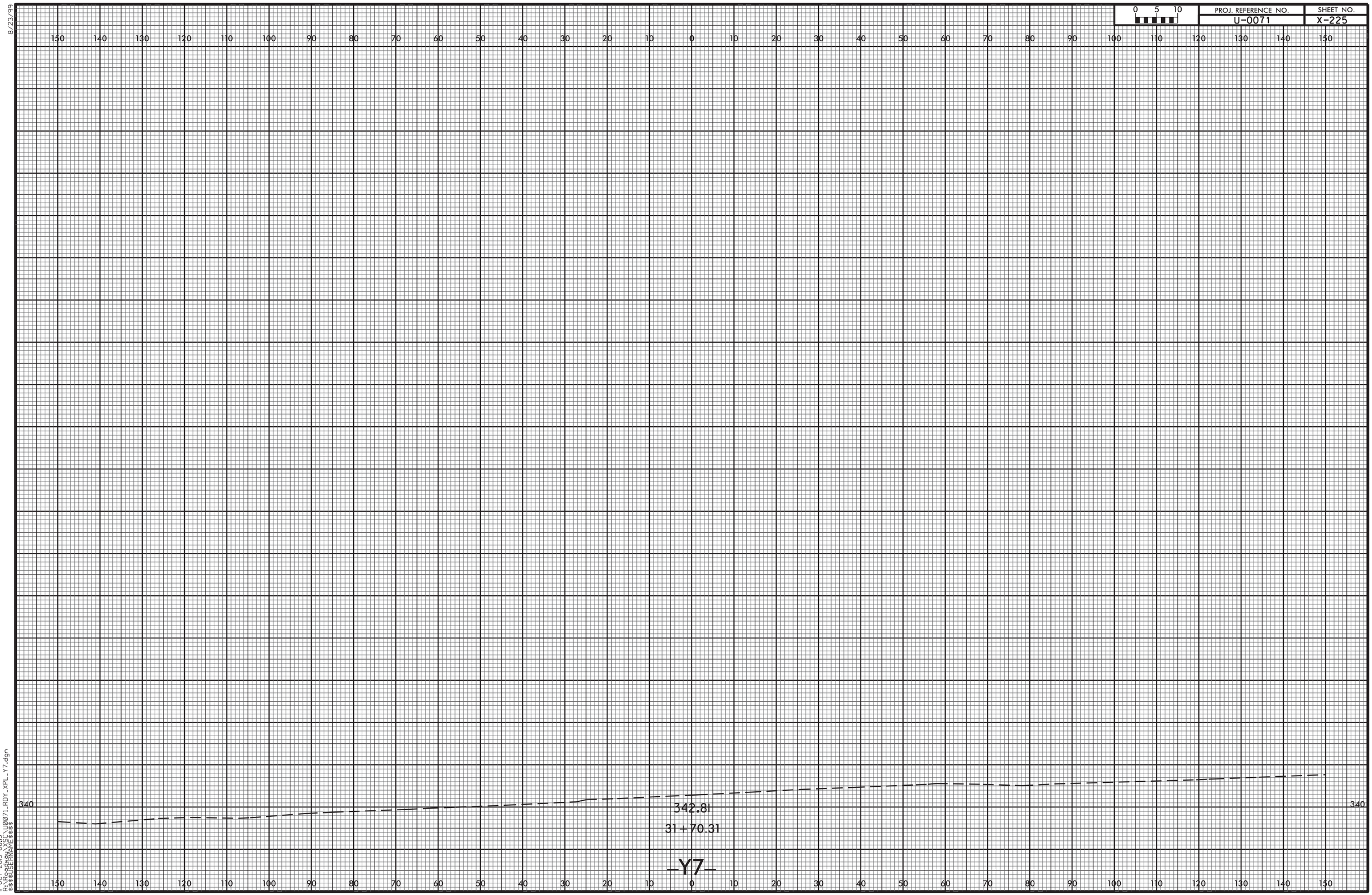


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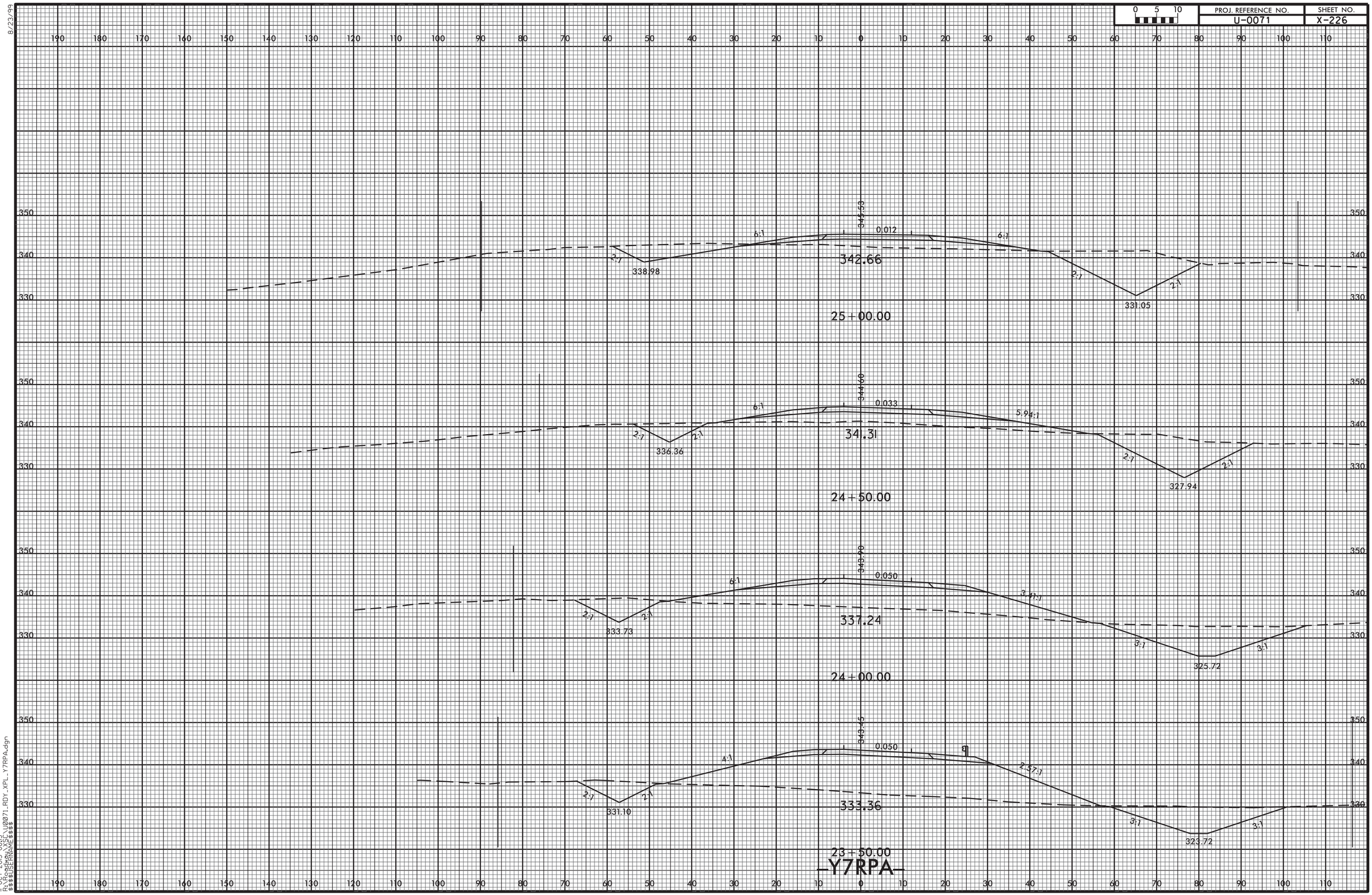


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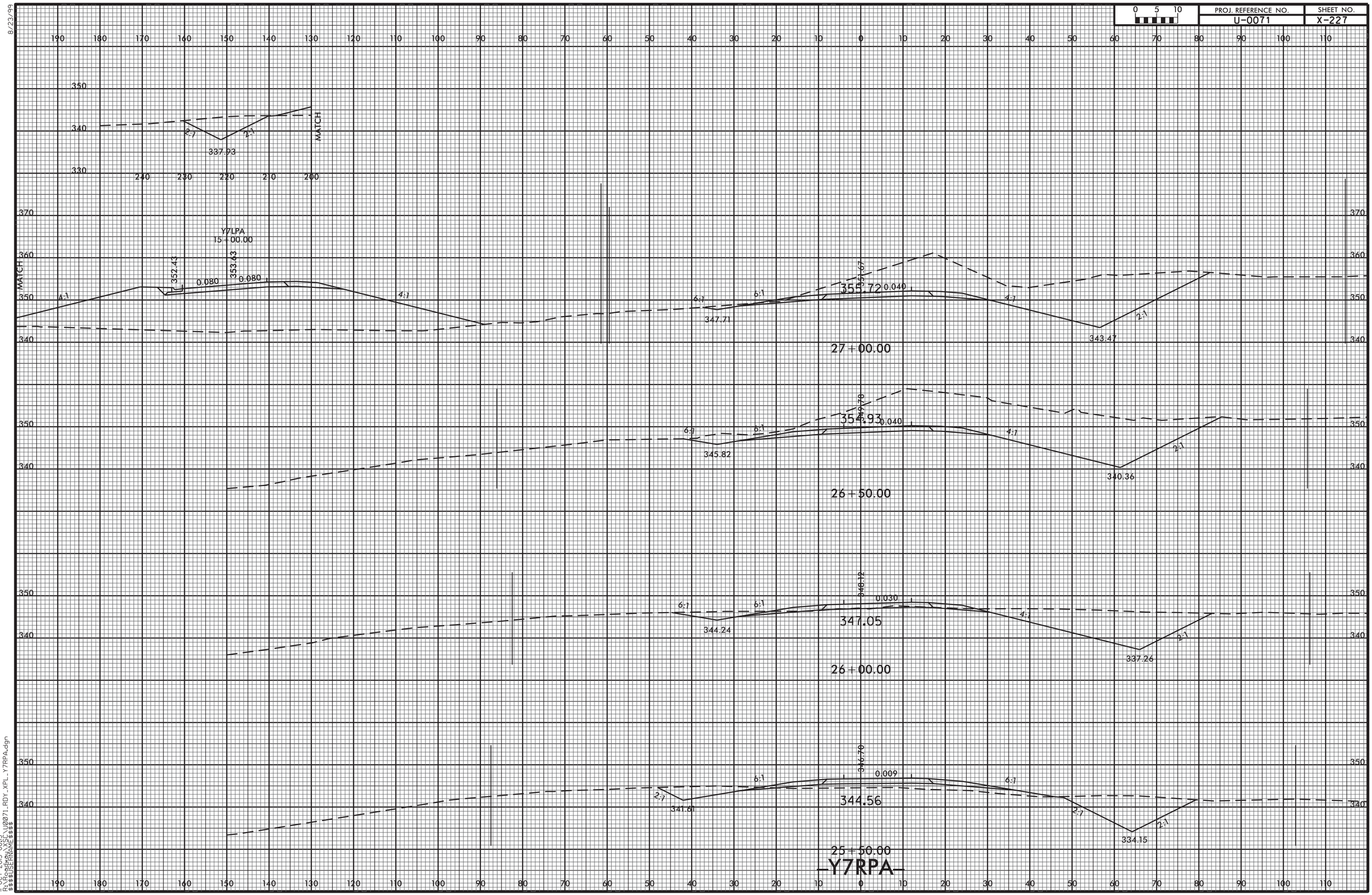


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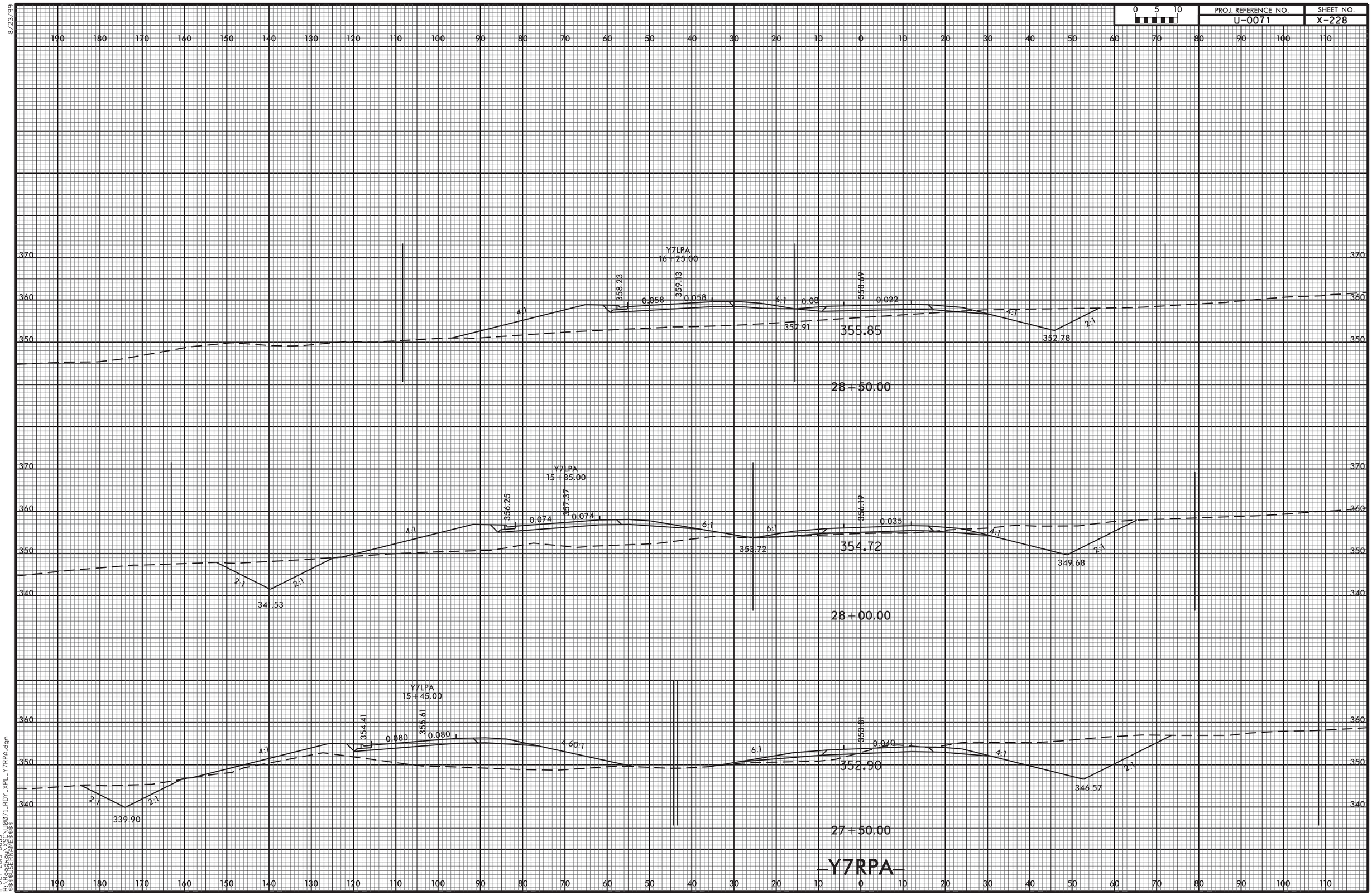


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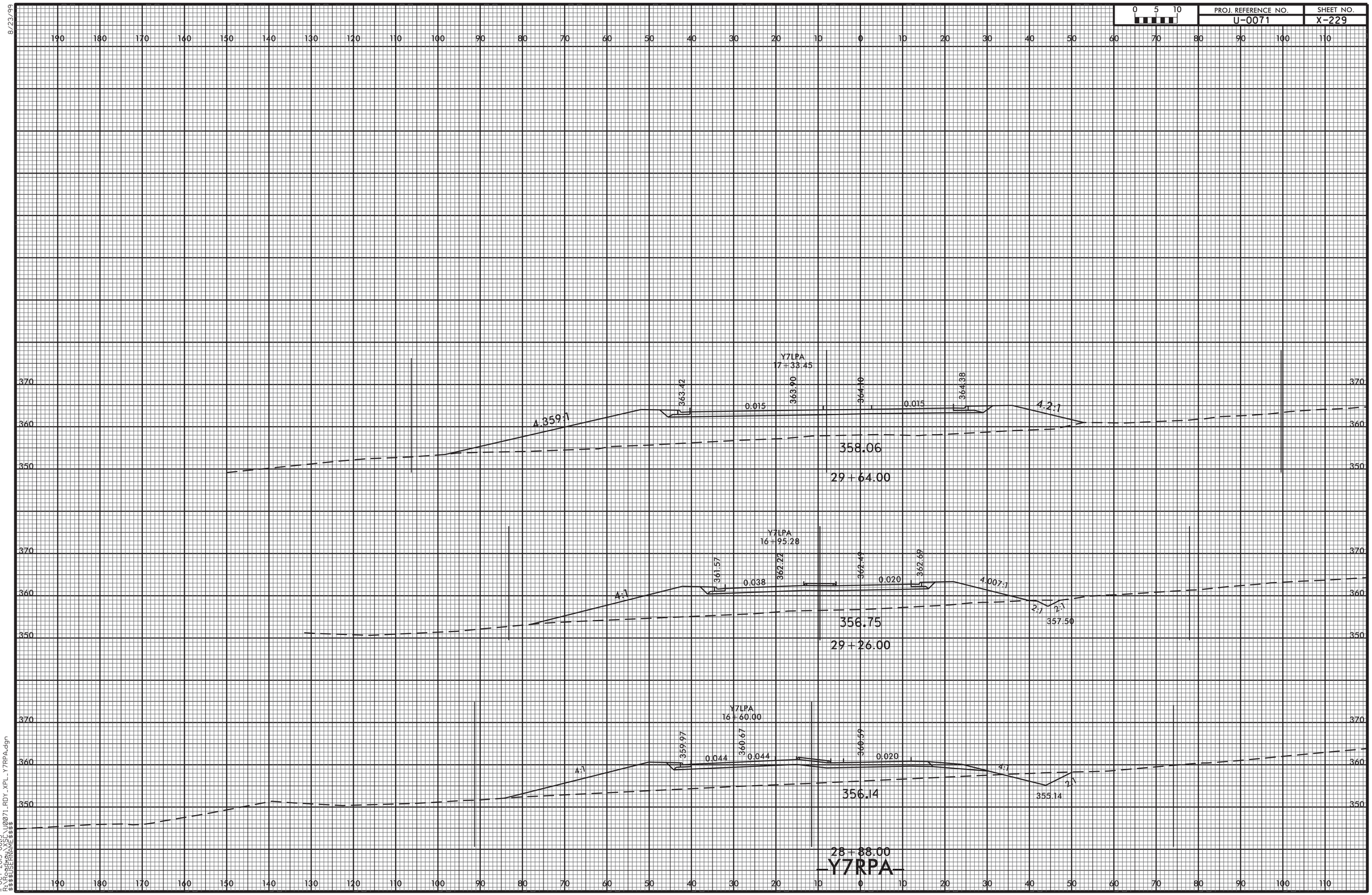


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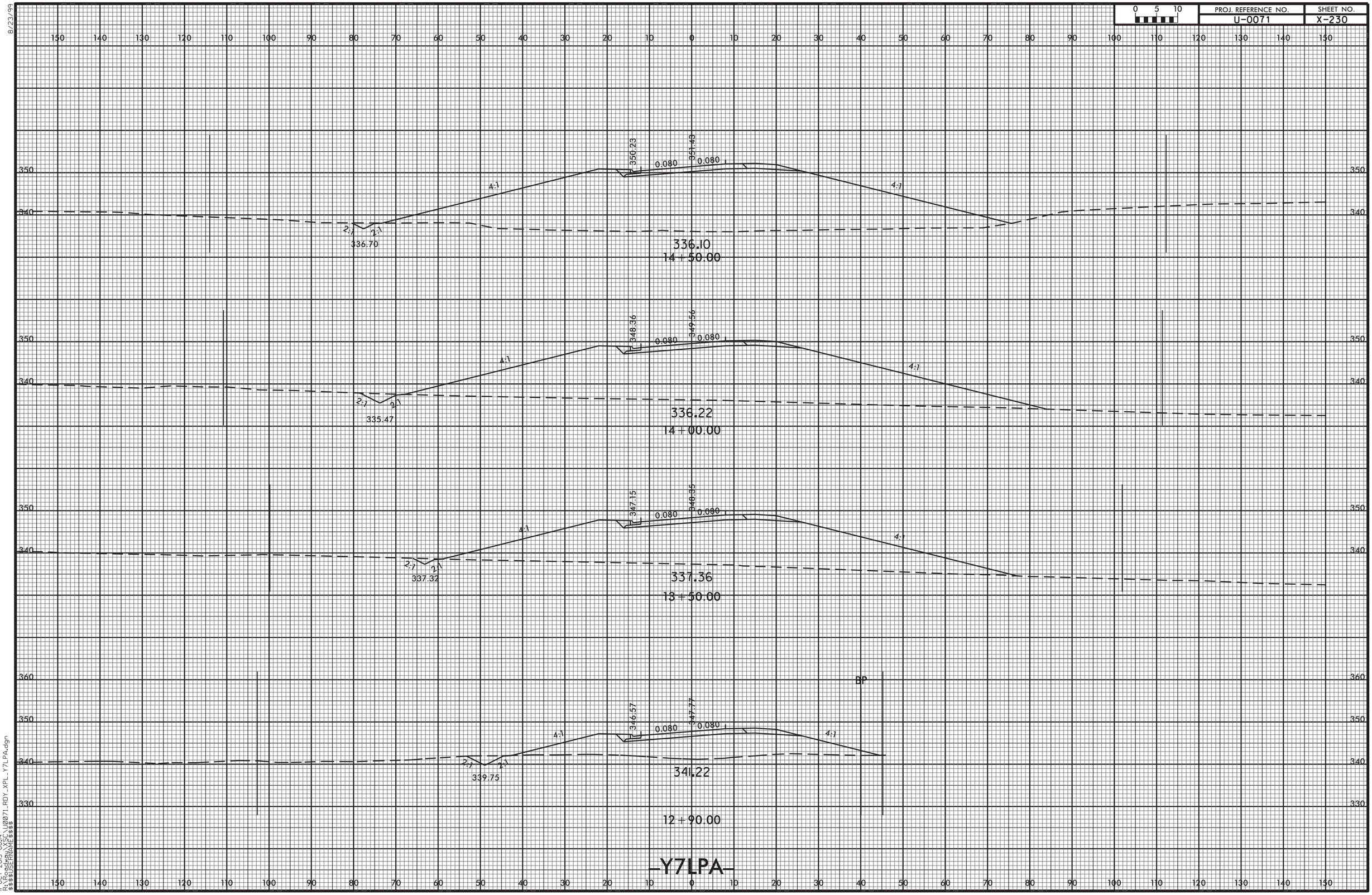


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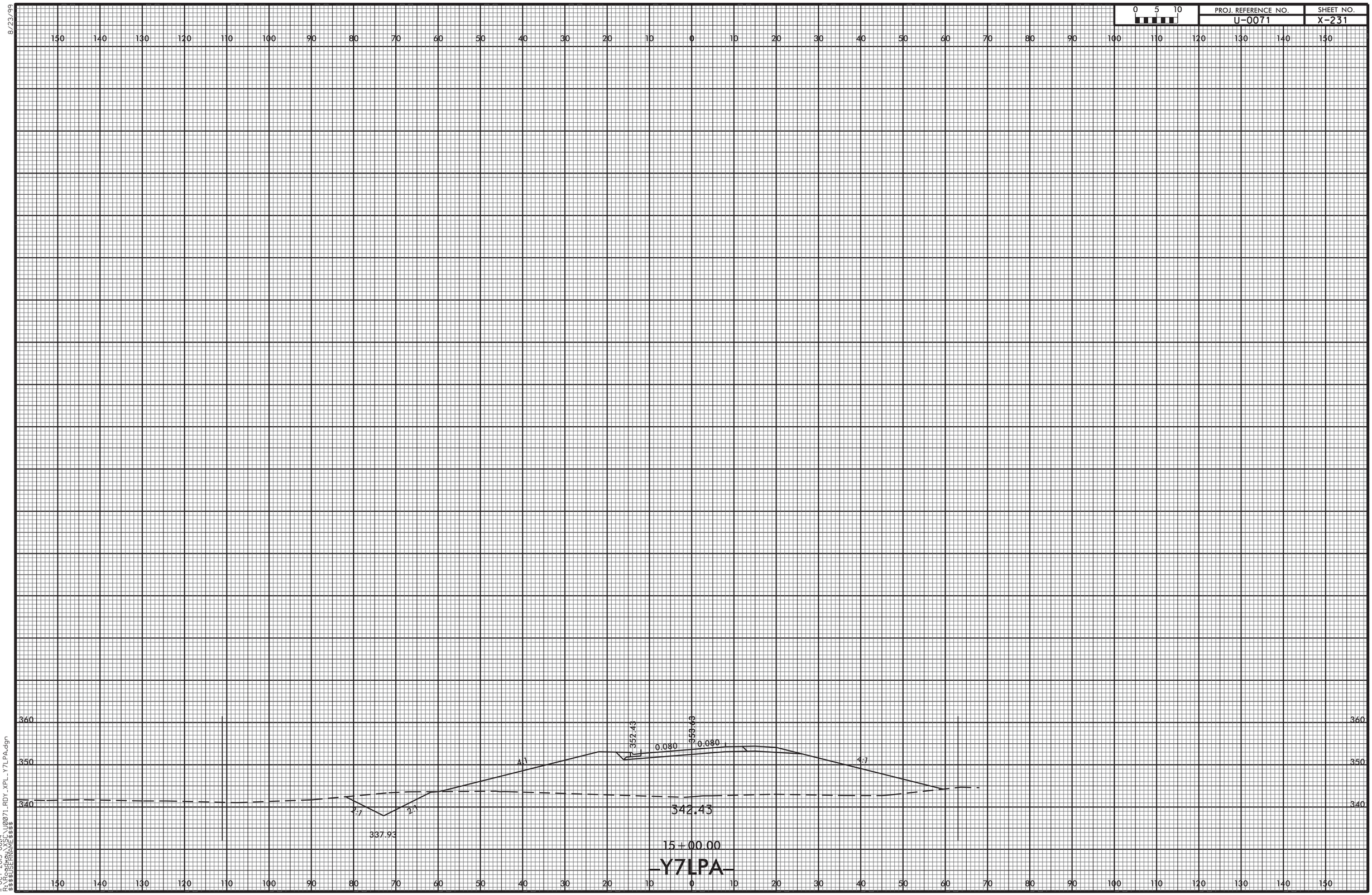


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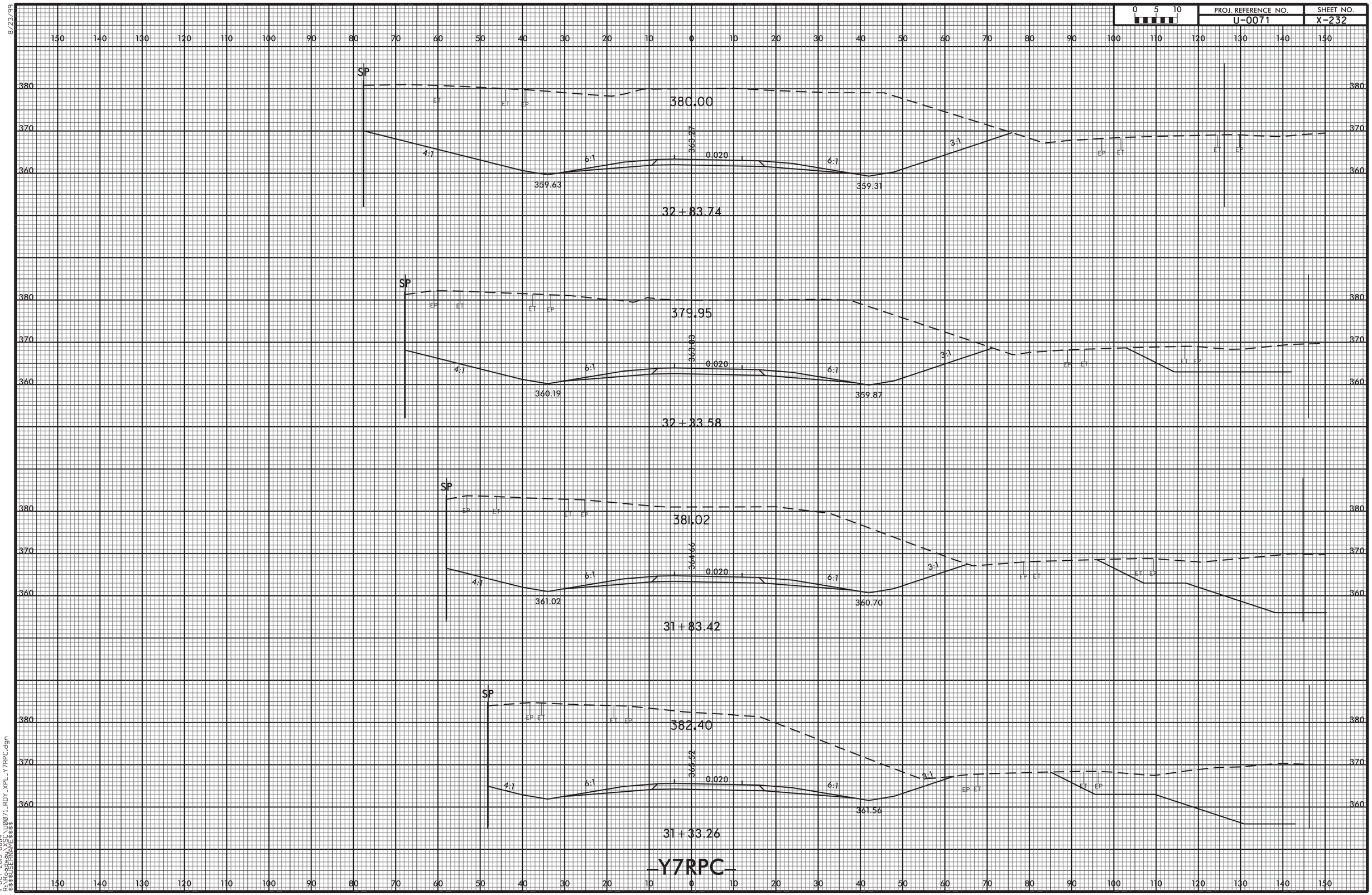


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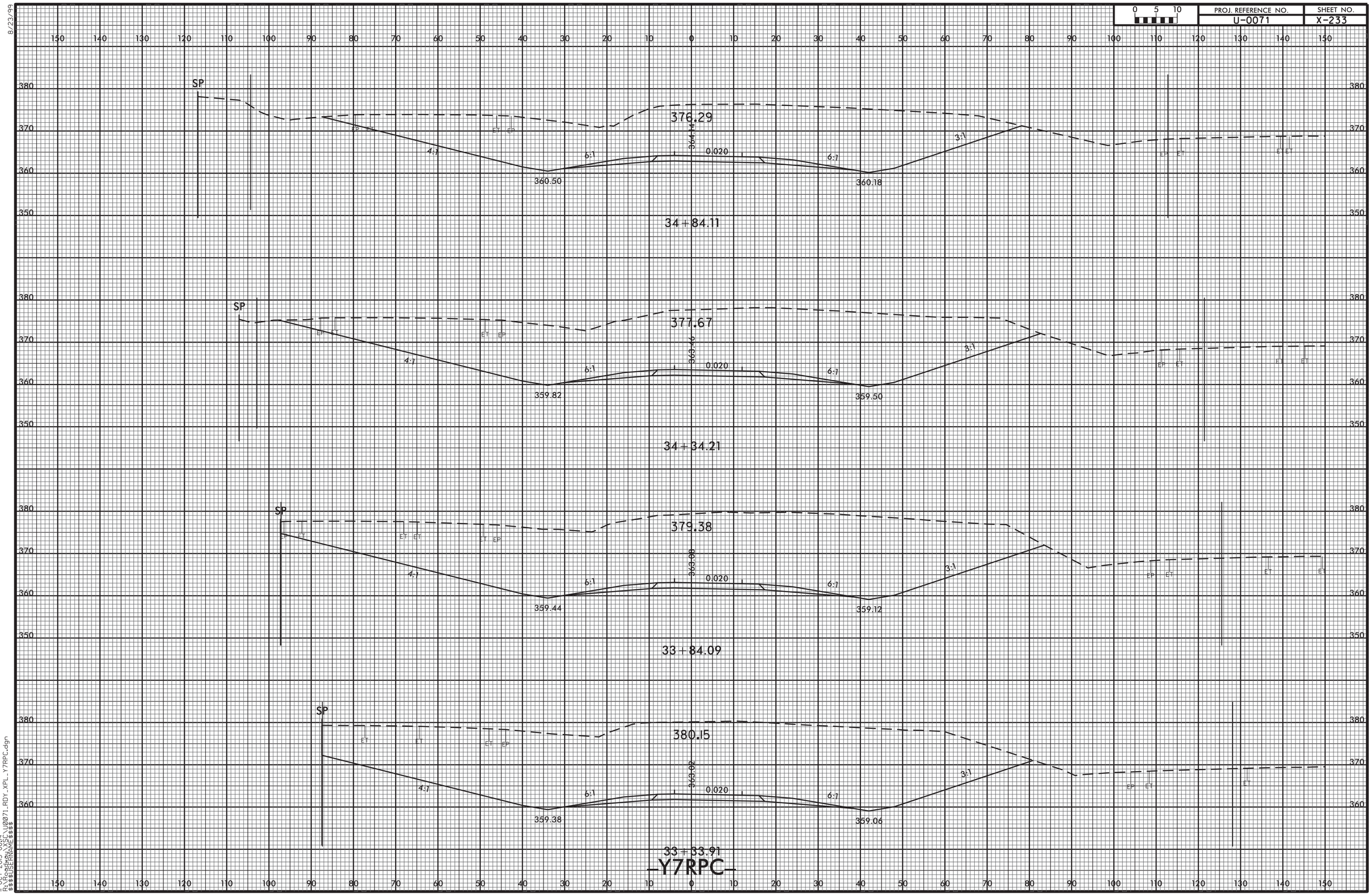


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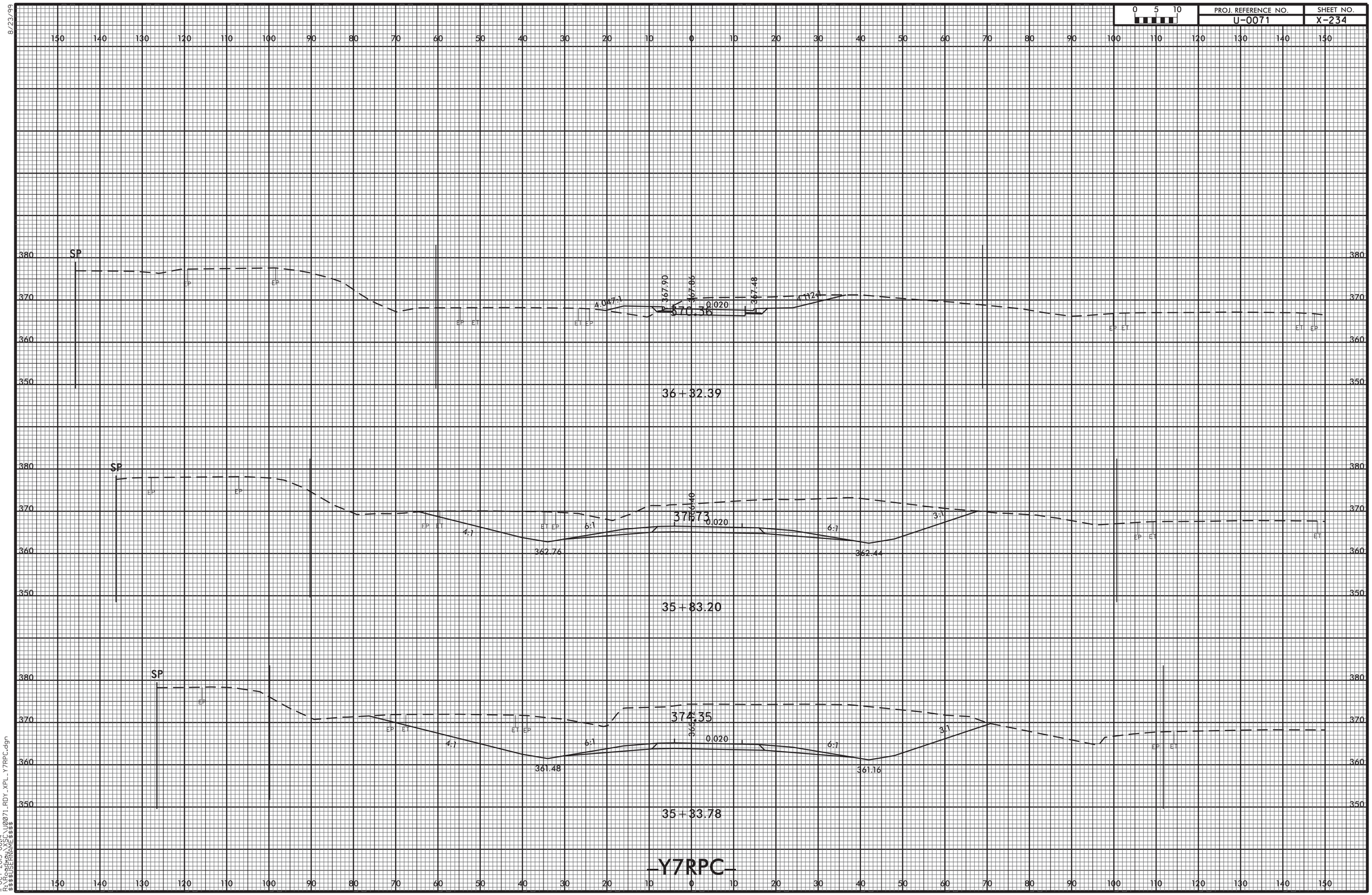
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367.48
0.020
370.36
36+32.39
0.040
370.73
4.1
6.1
3:1
362.76
362.44
35+83.20
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361.48
361.16
35+33.78
-Y7RPC-
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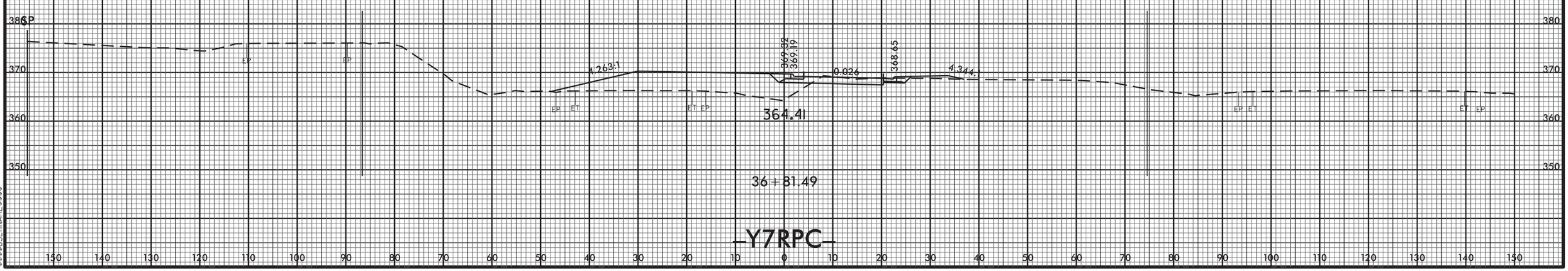


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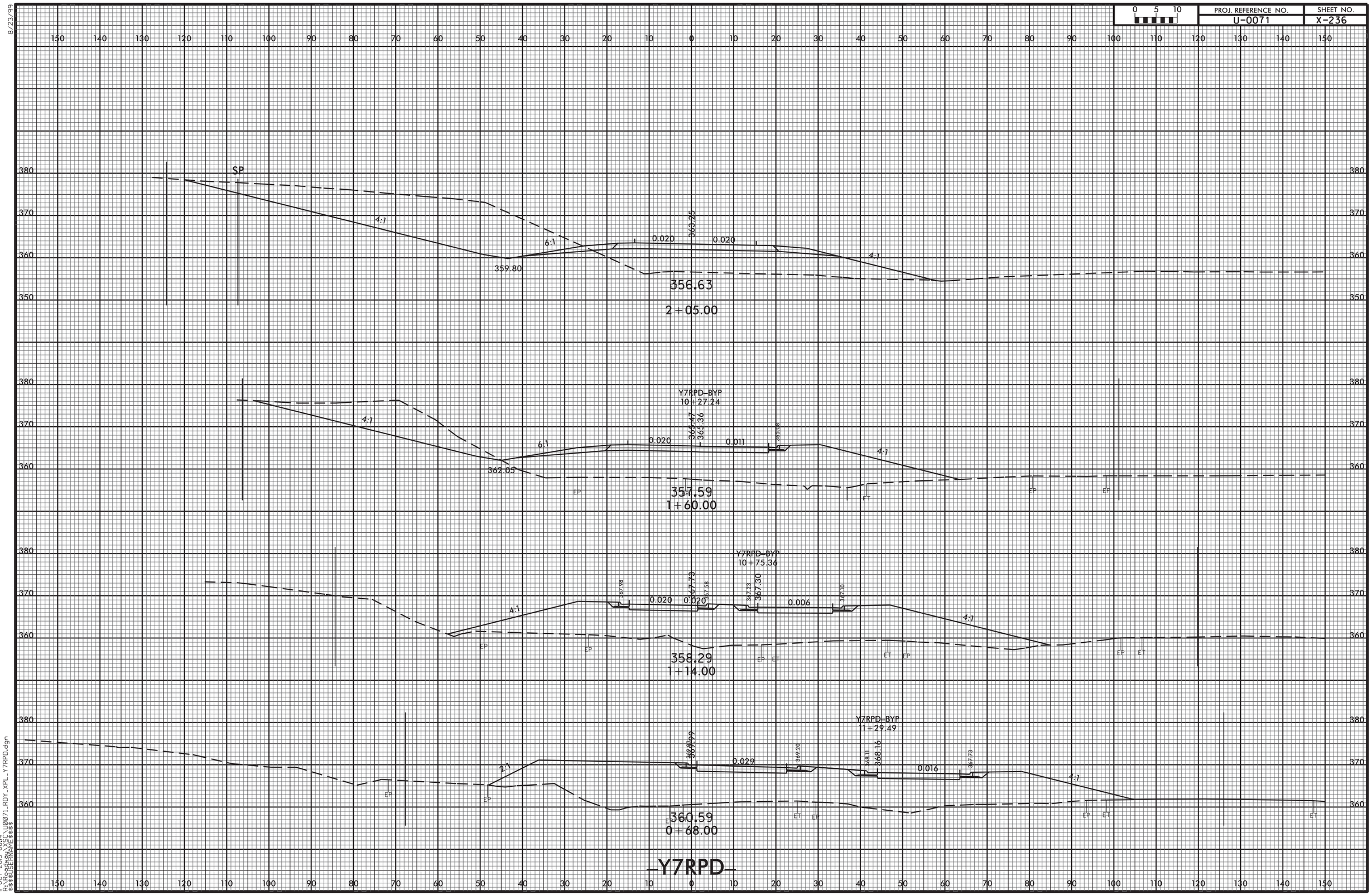


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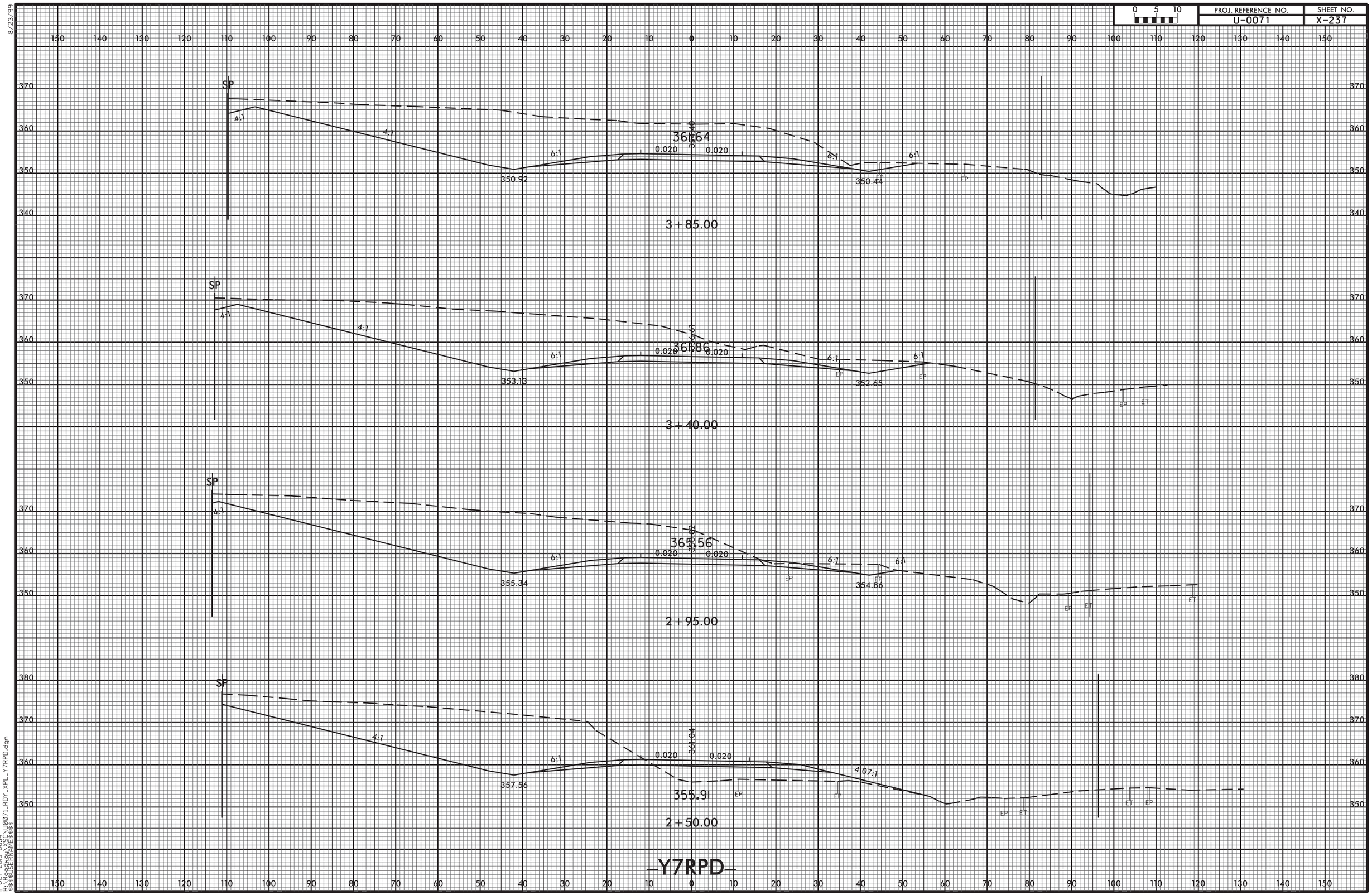


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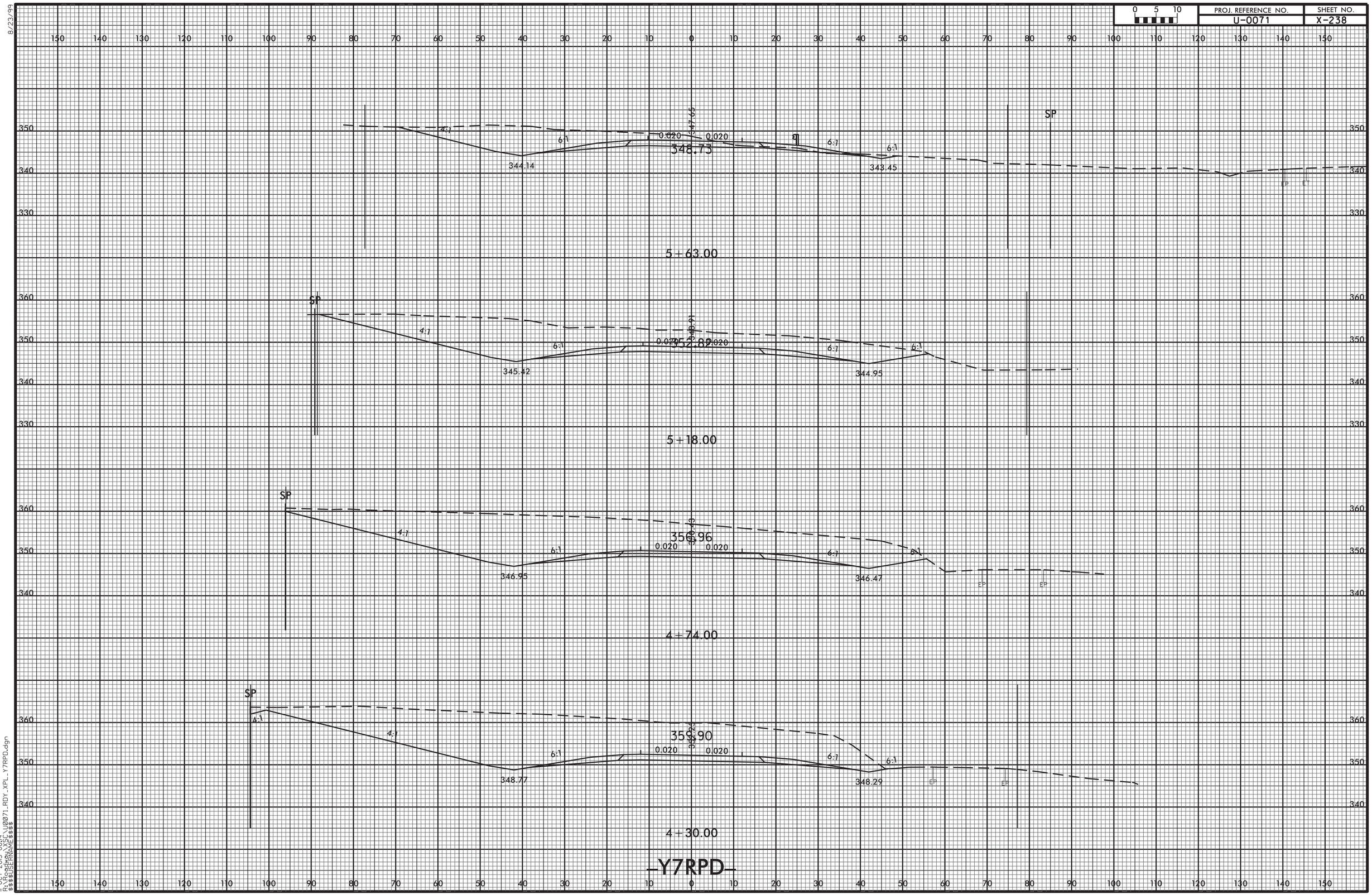


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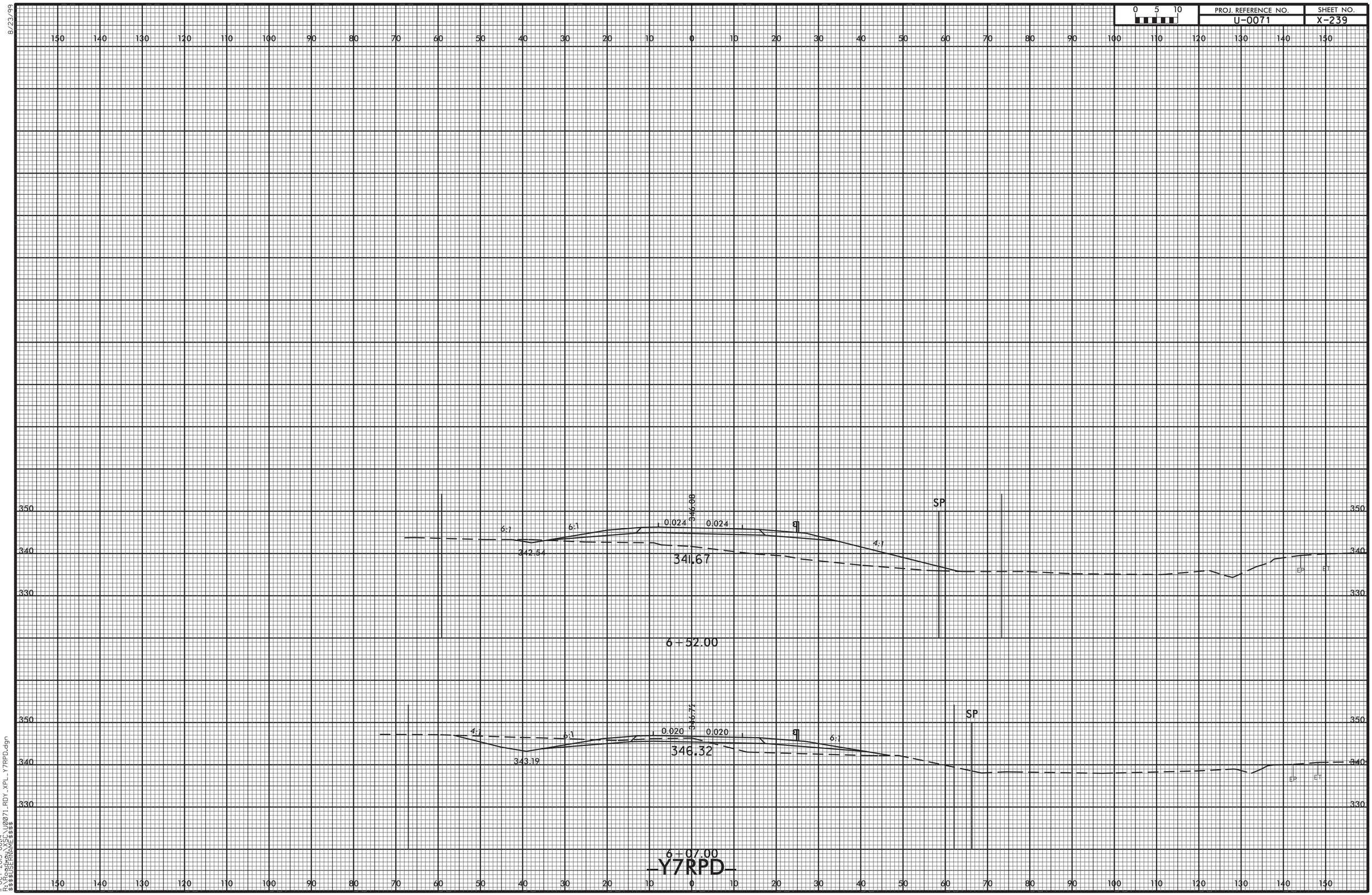


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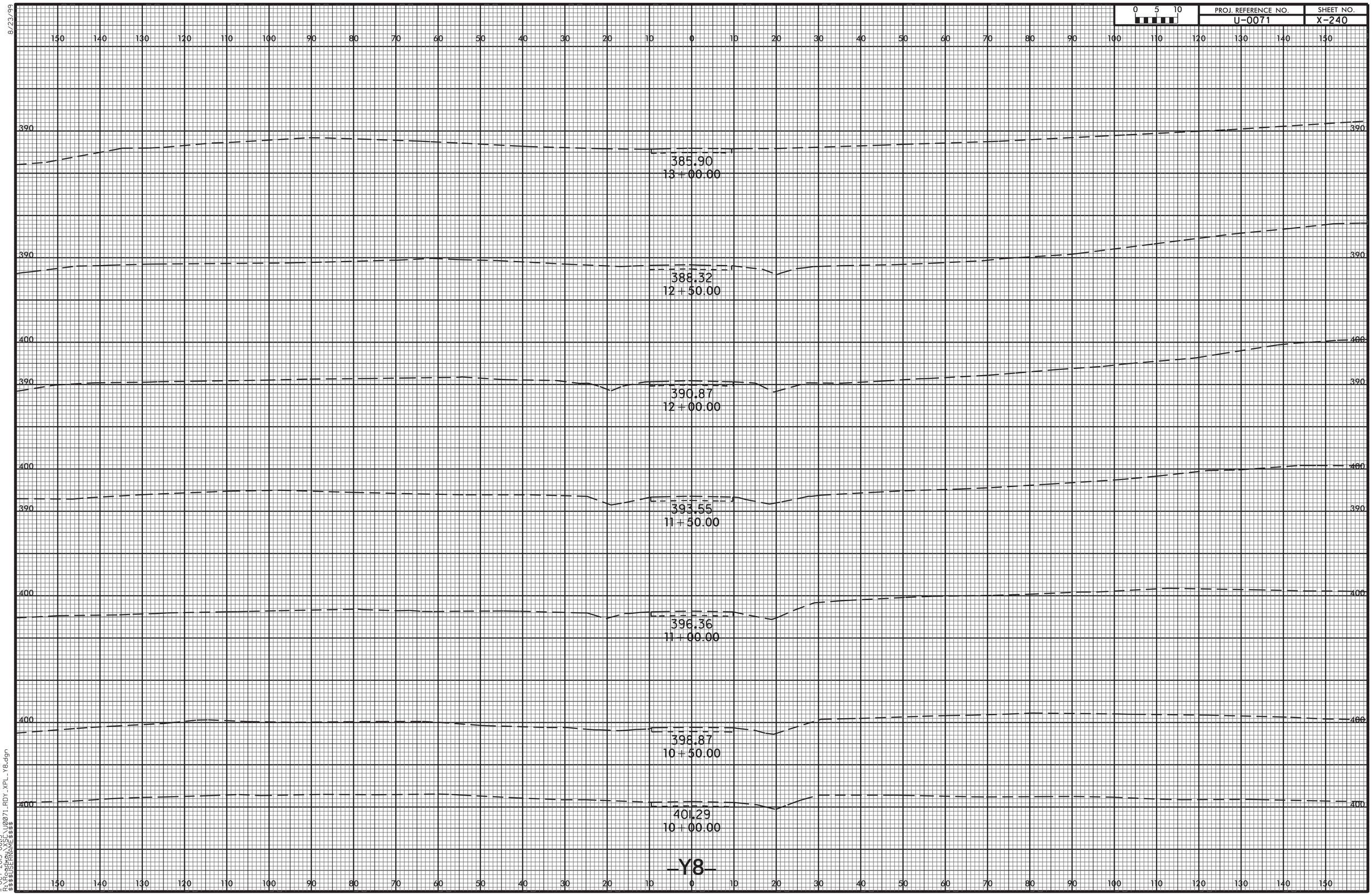


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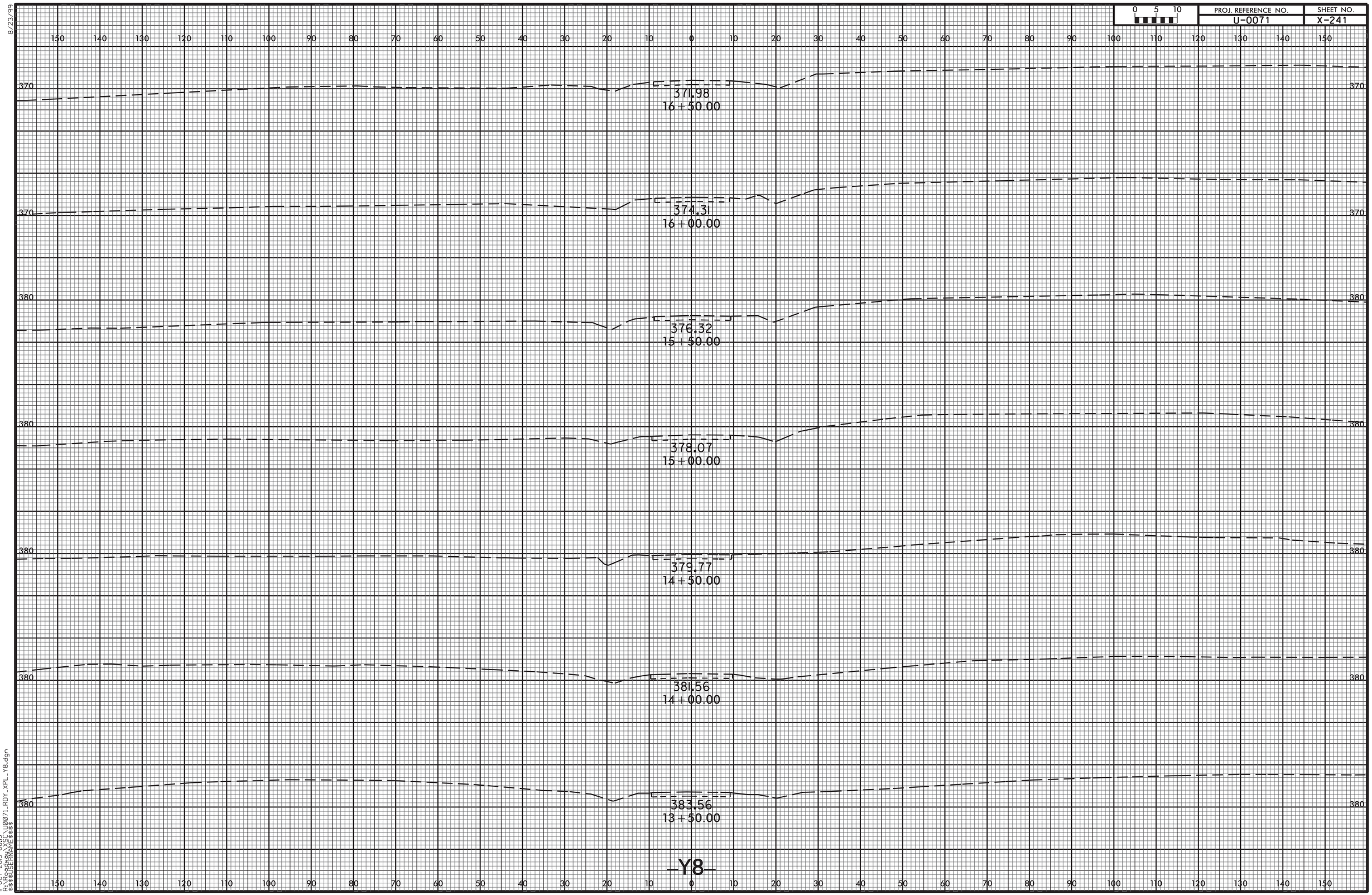


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150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

360

360.13
18+50.00

360

363.40
18+00.00

366.48
17+50.00

370

369.36
17+00.00

-Y8-

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

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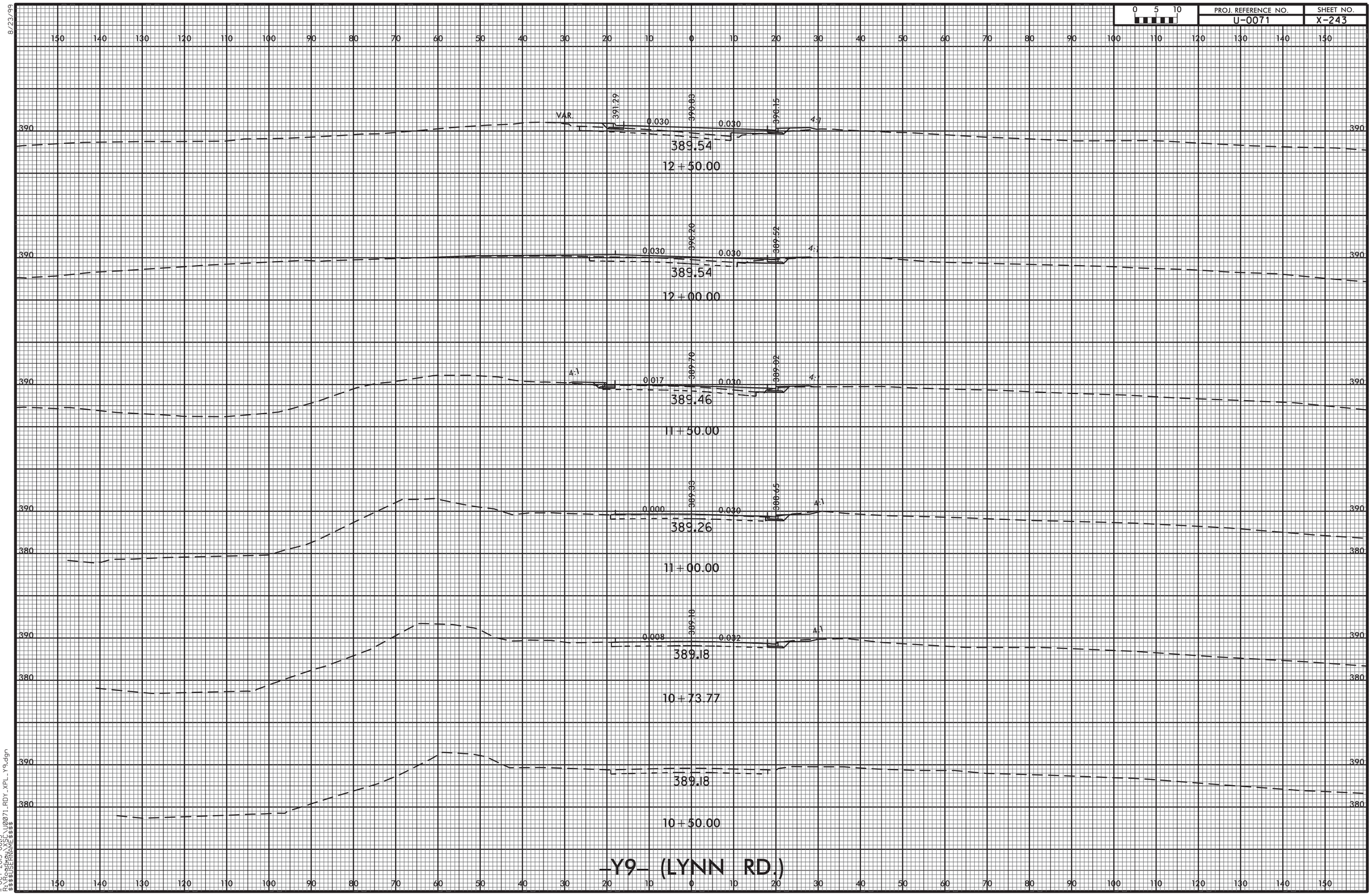


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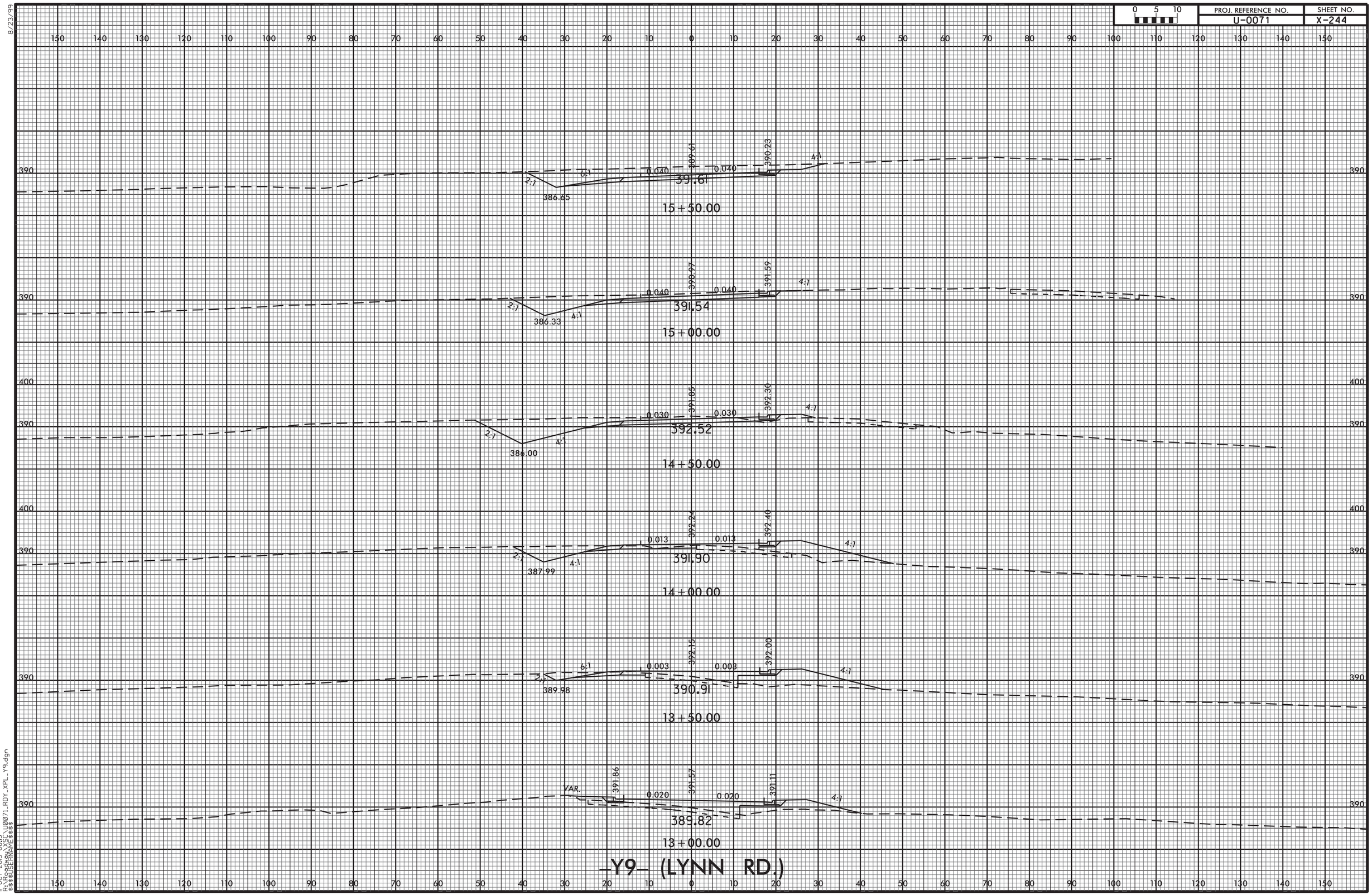


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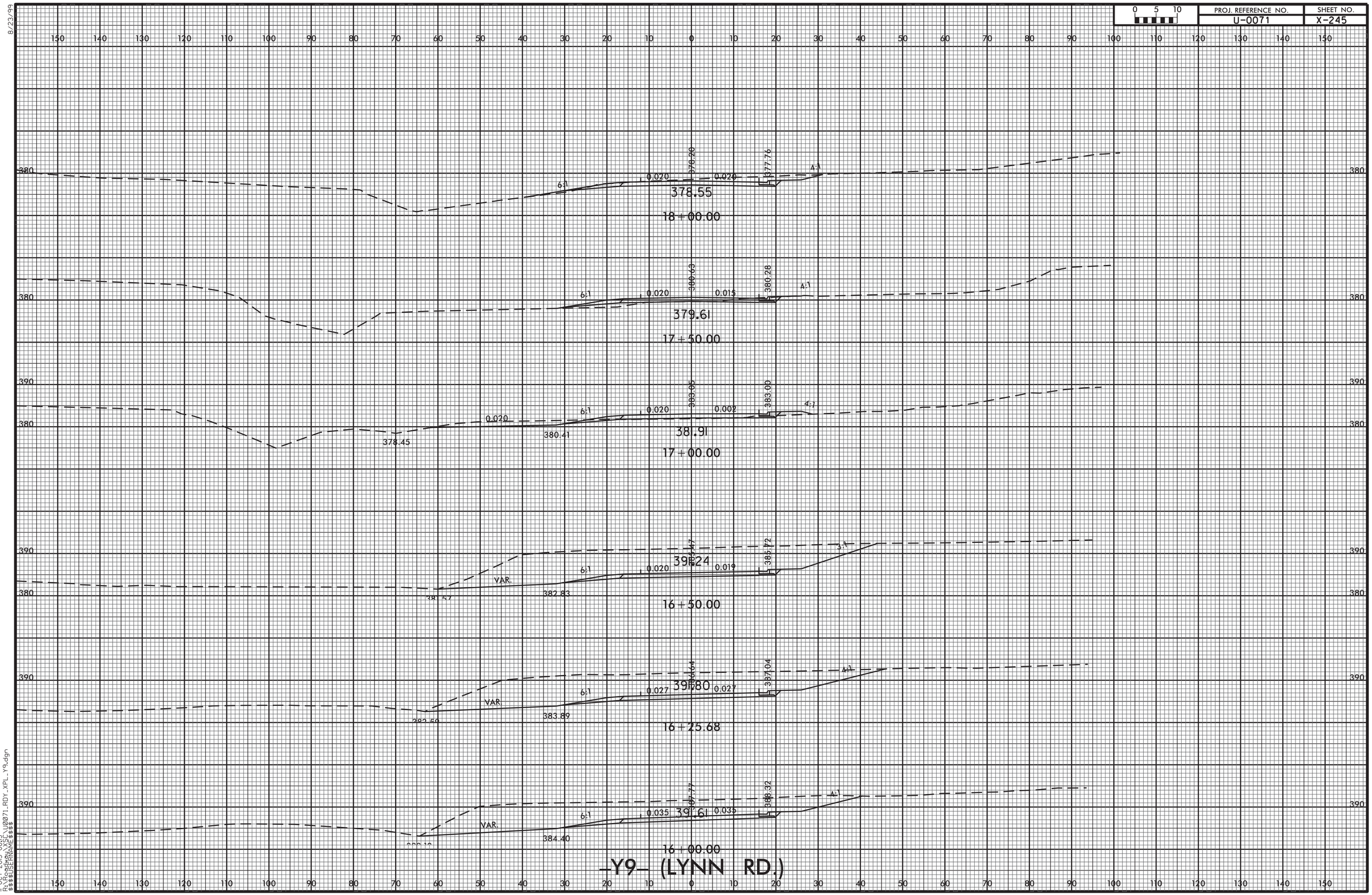


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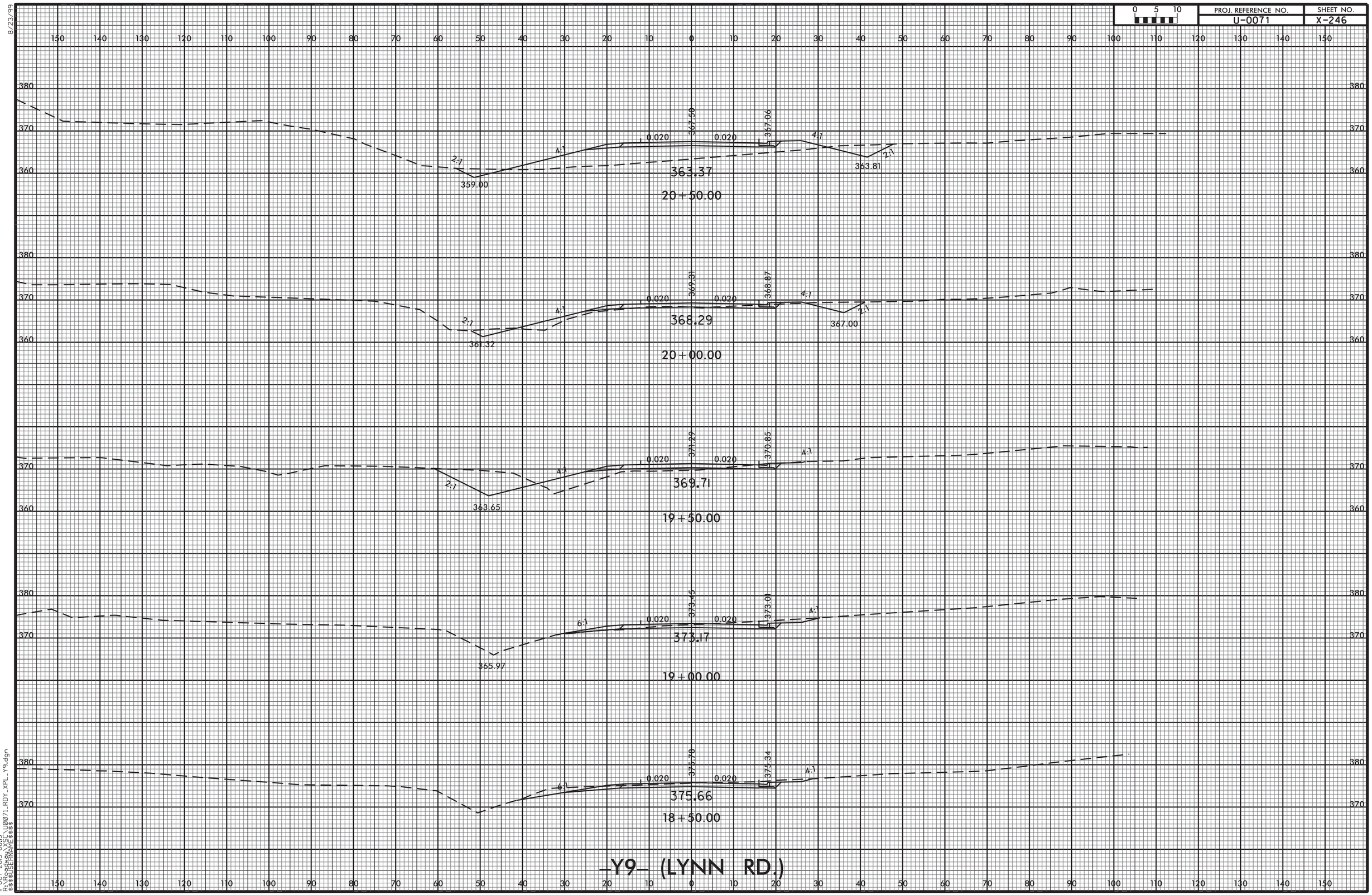
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369.31
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373.01
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375.66
18+50.00
375.78
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-Y9- (LYNN RD.)
8/23/99
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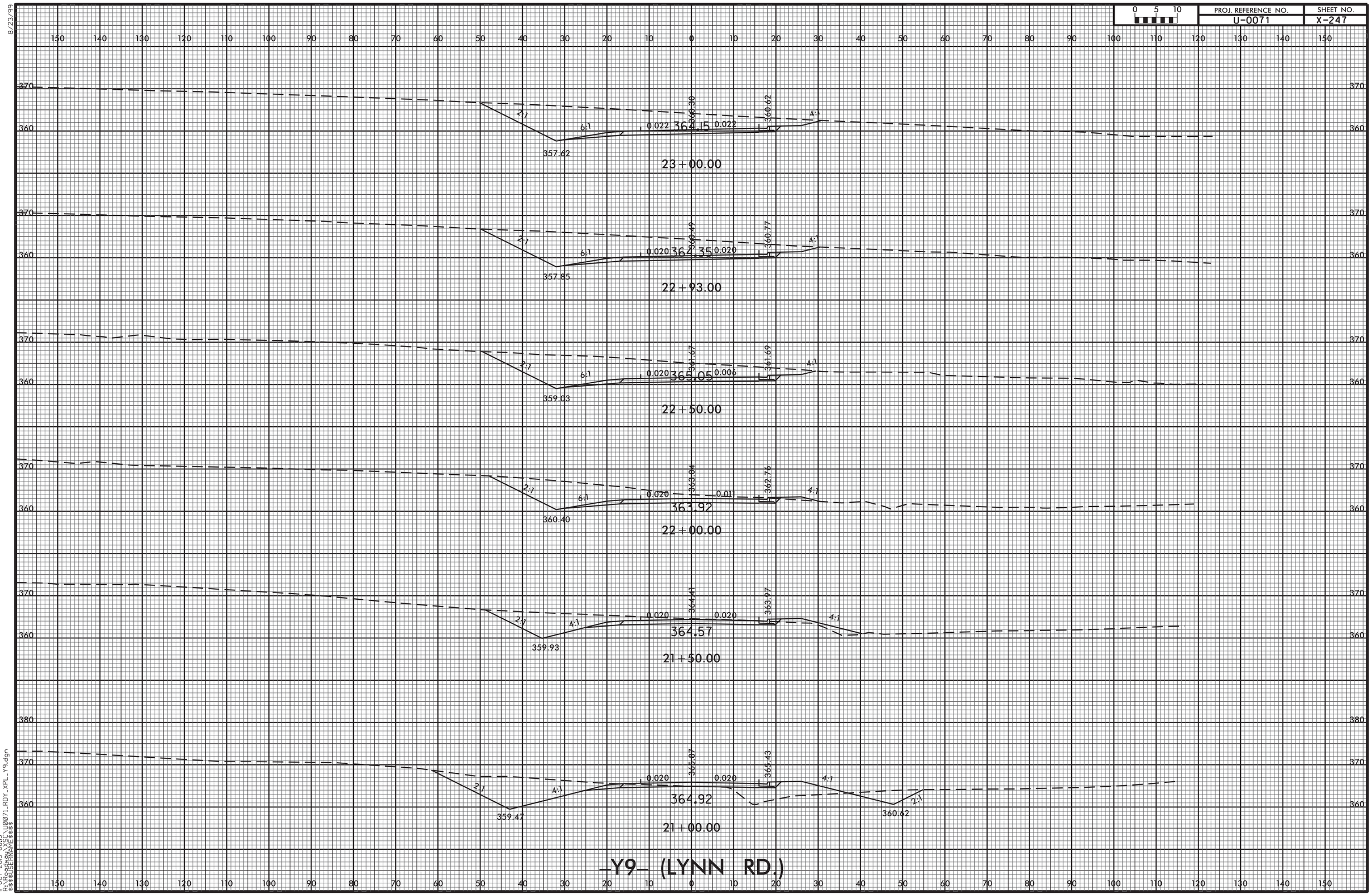


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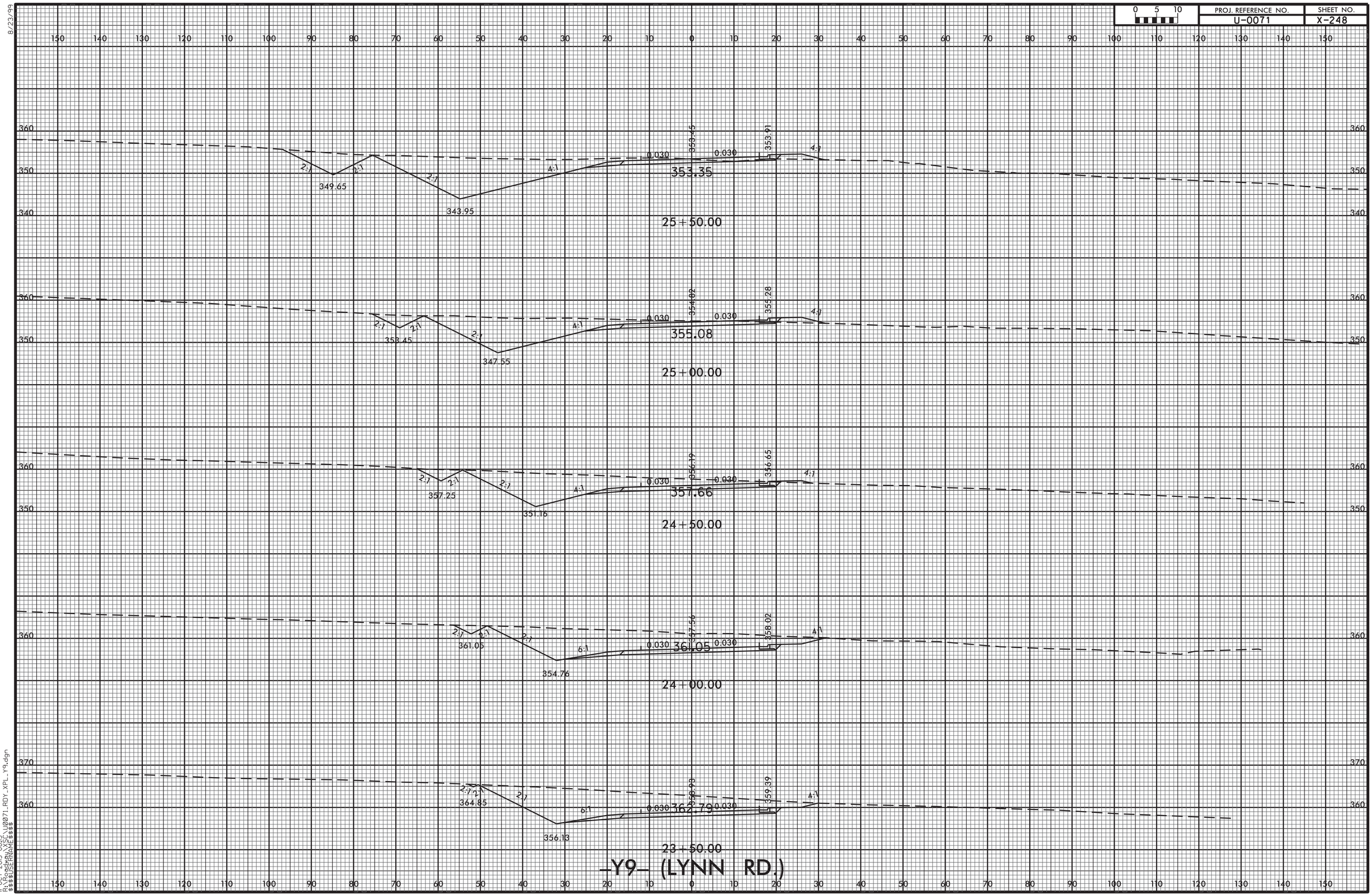


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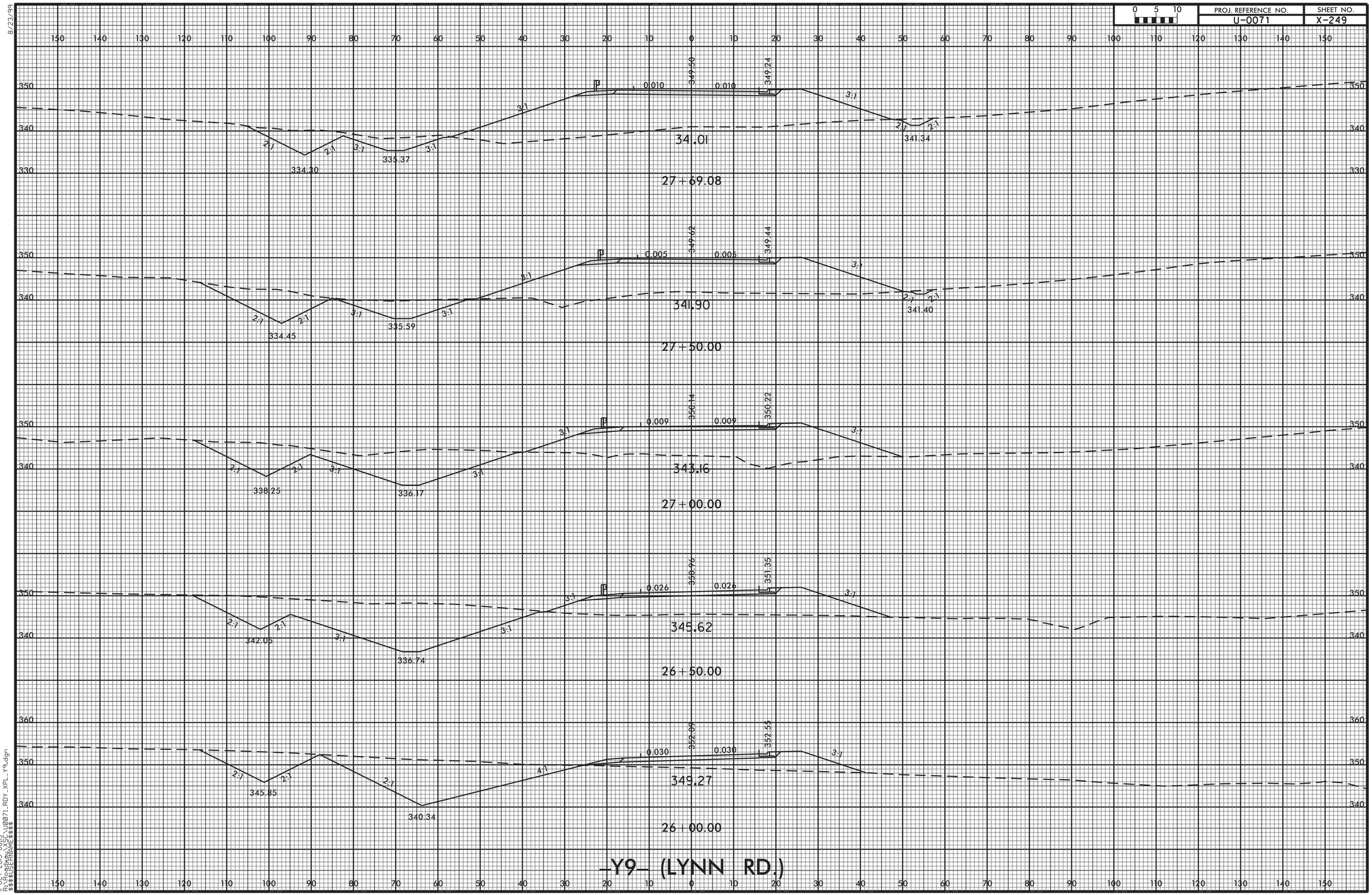


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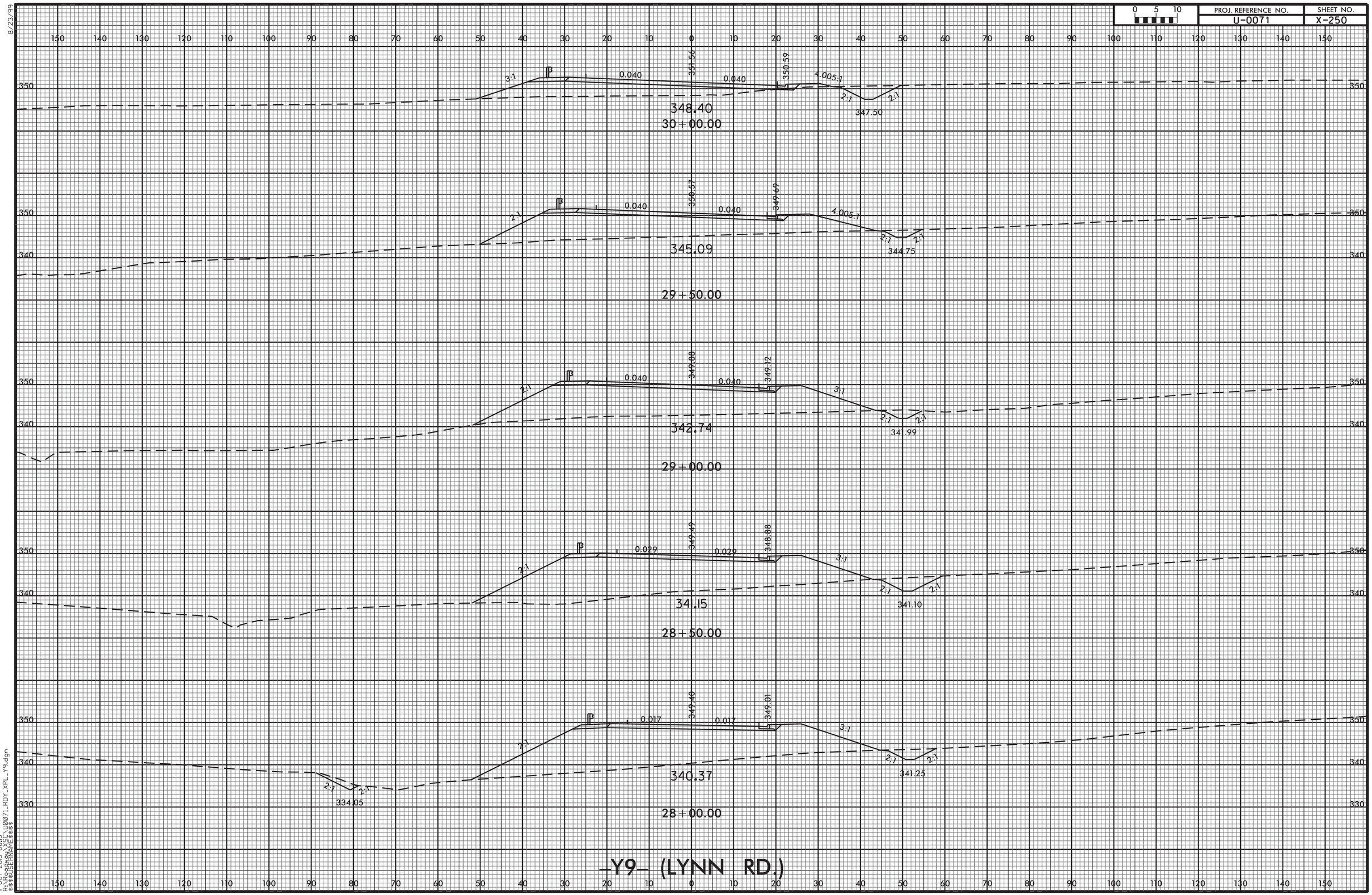


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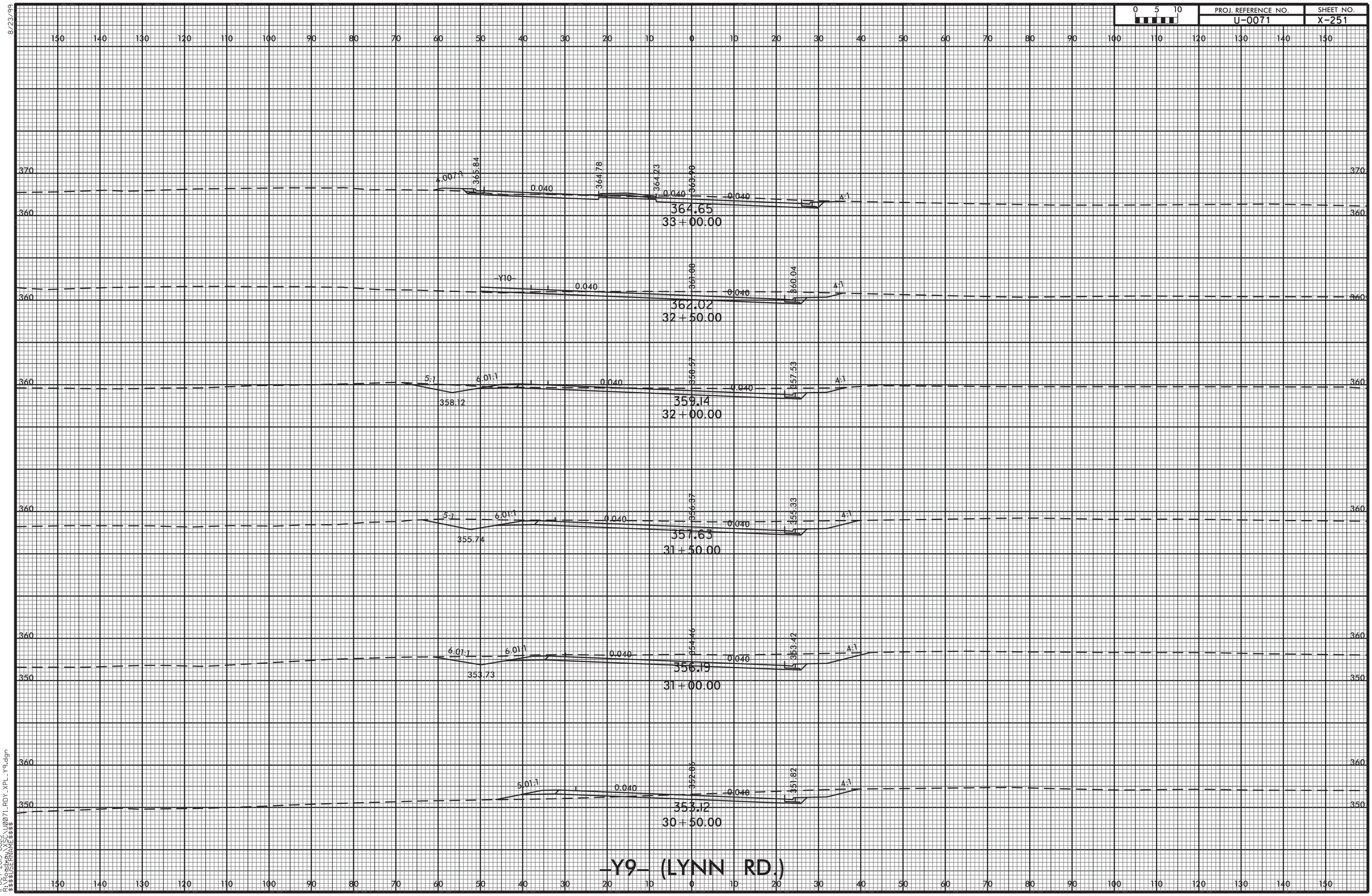


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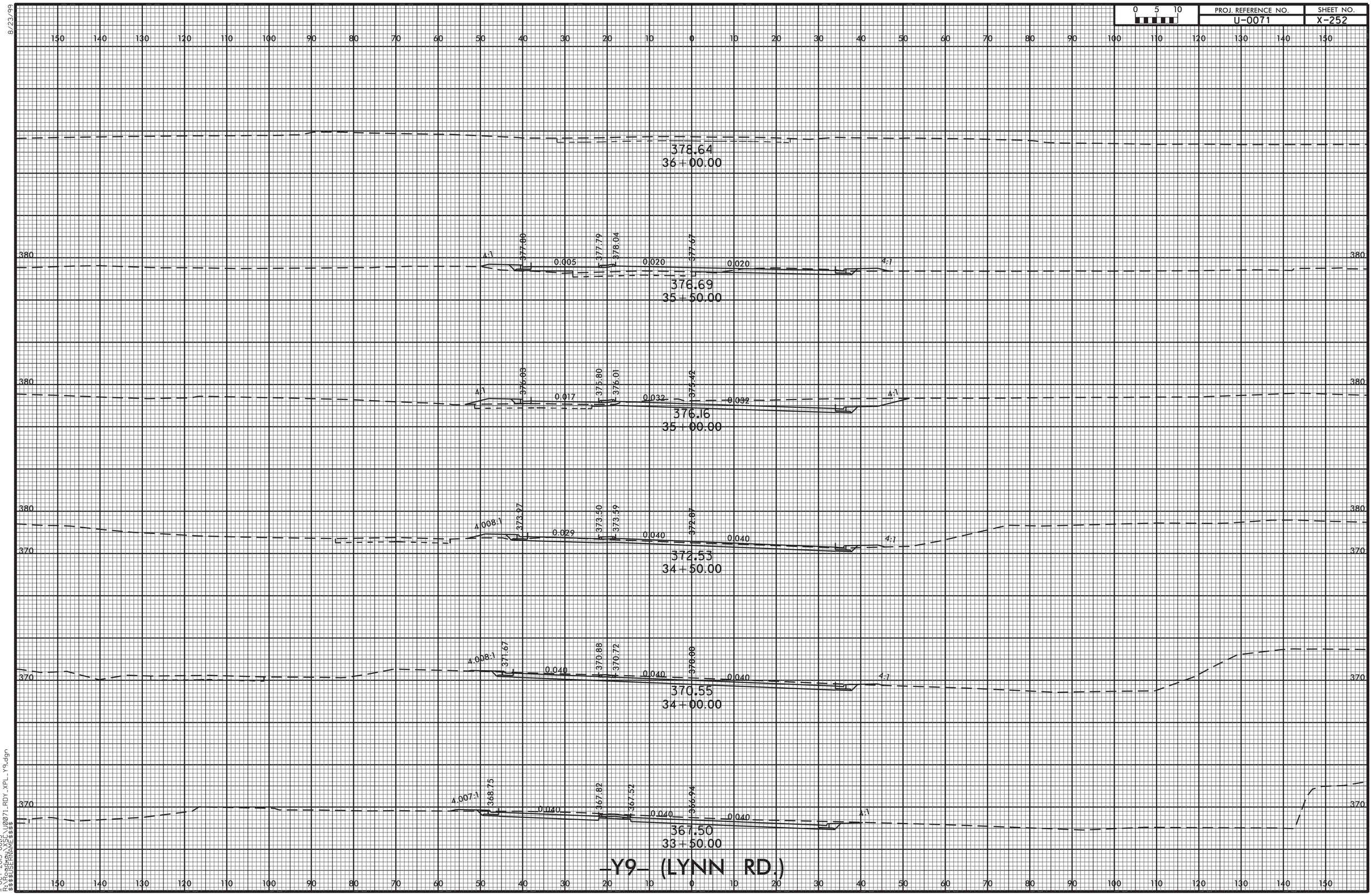


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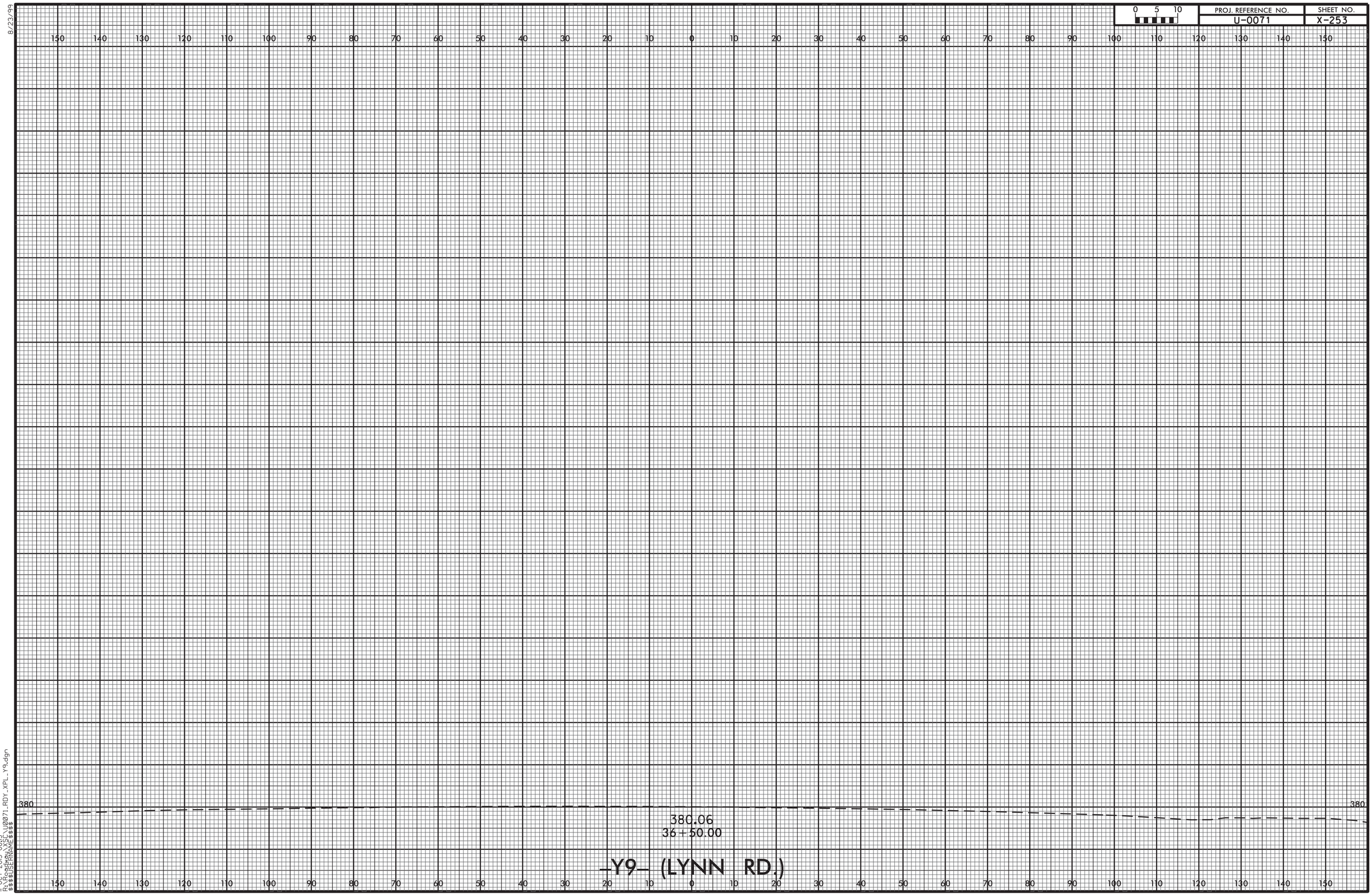


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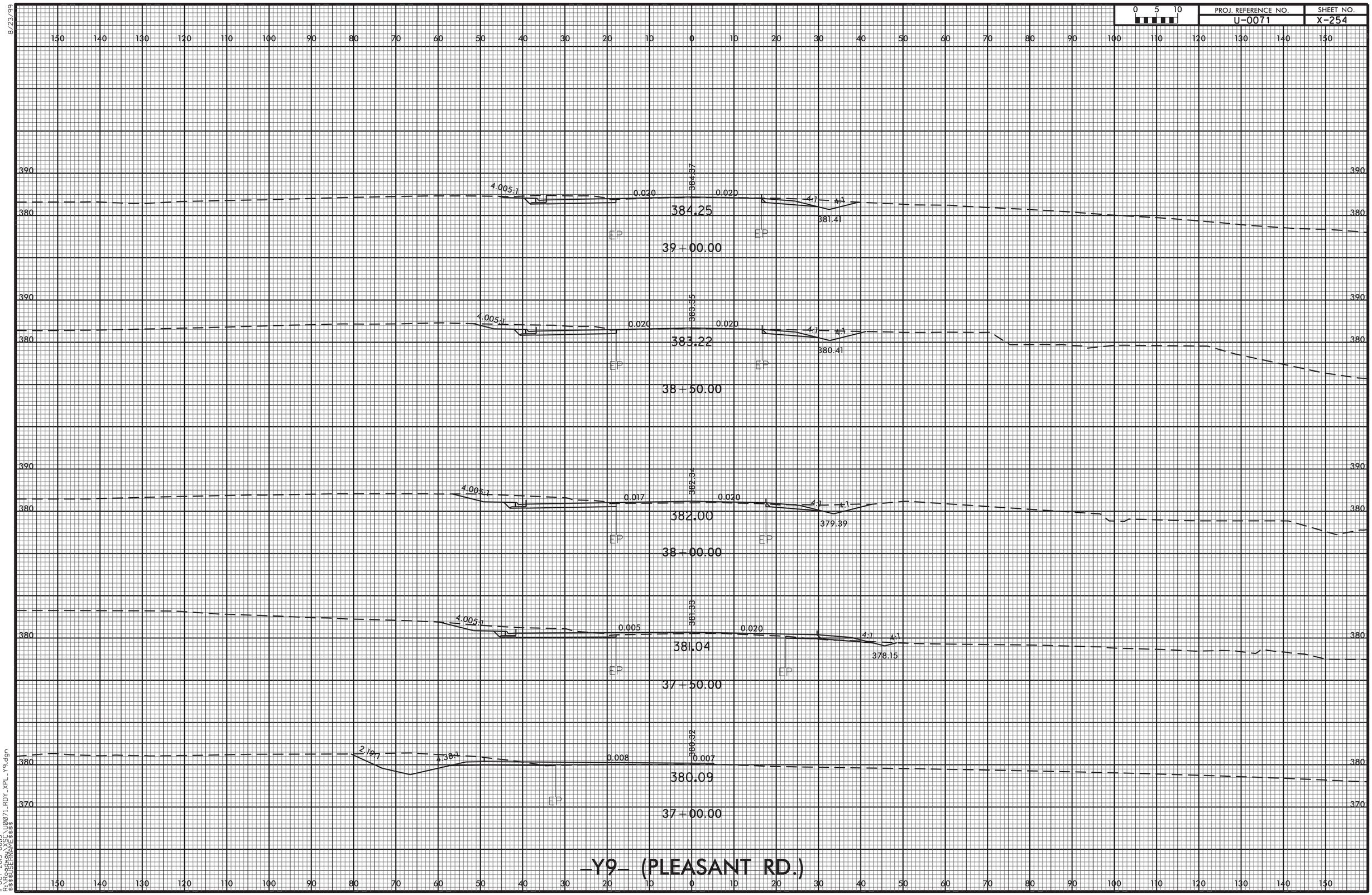


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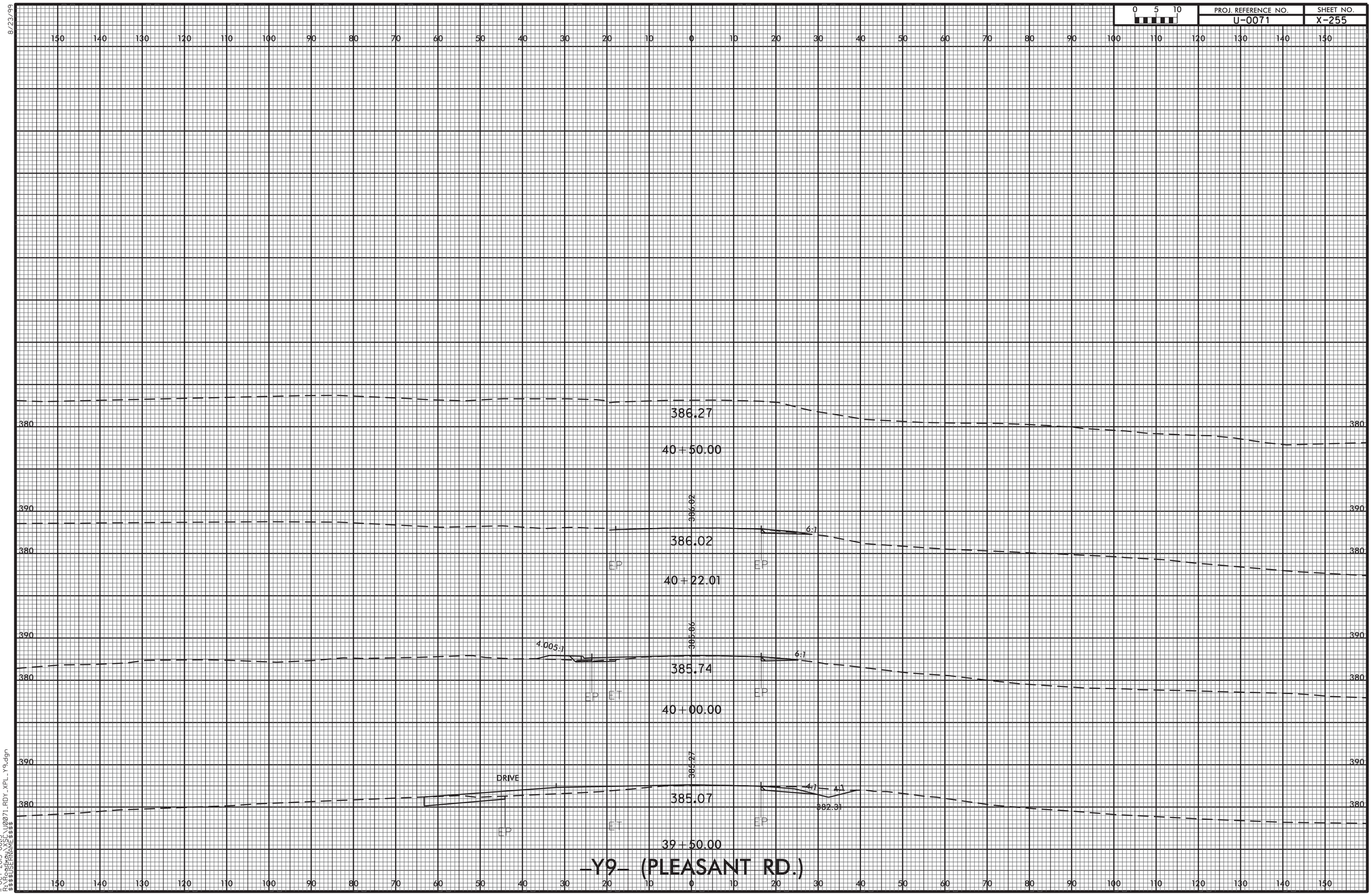


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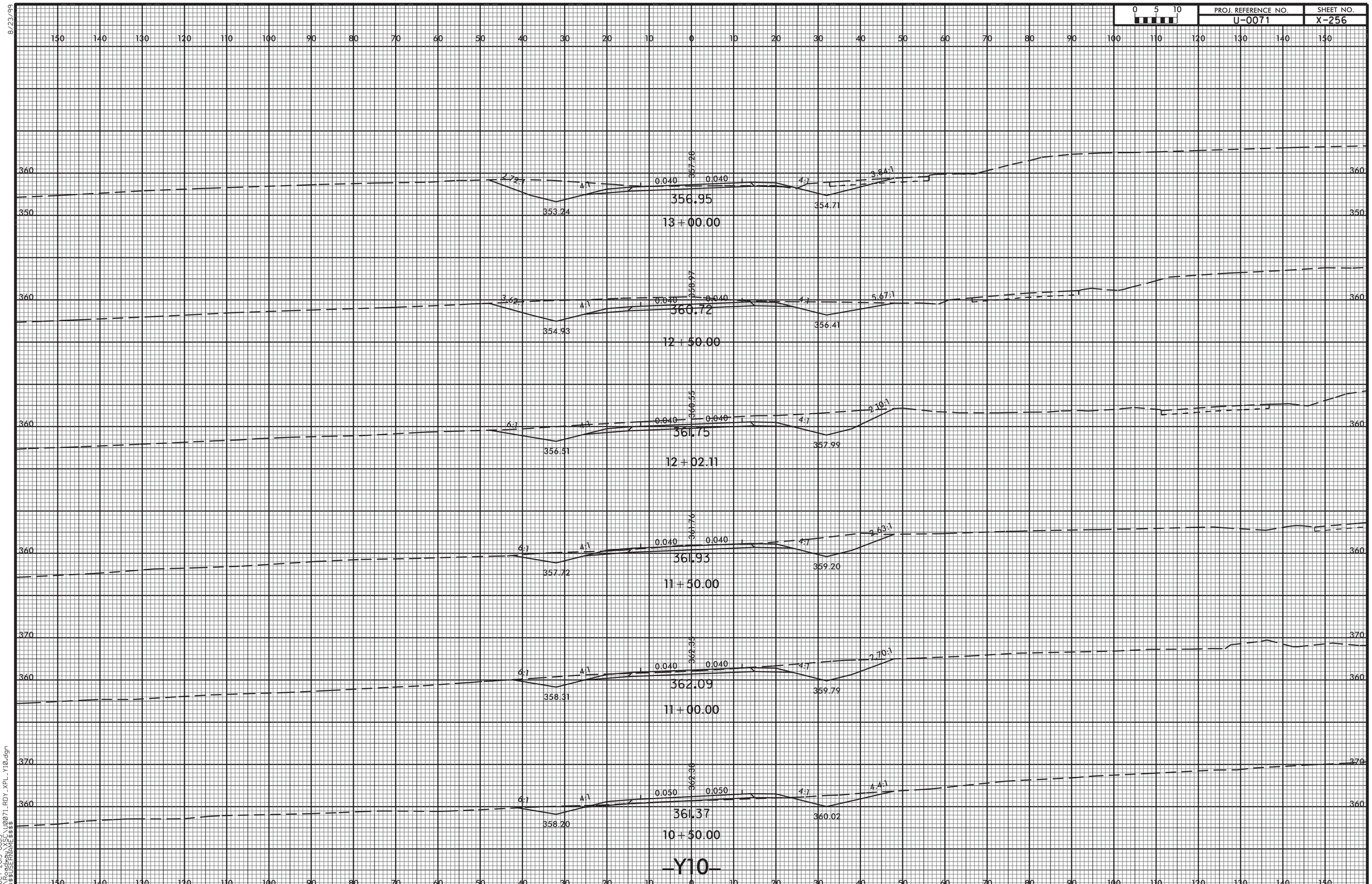


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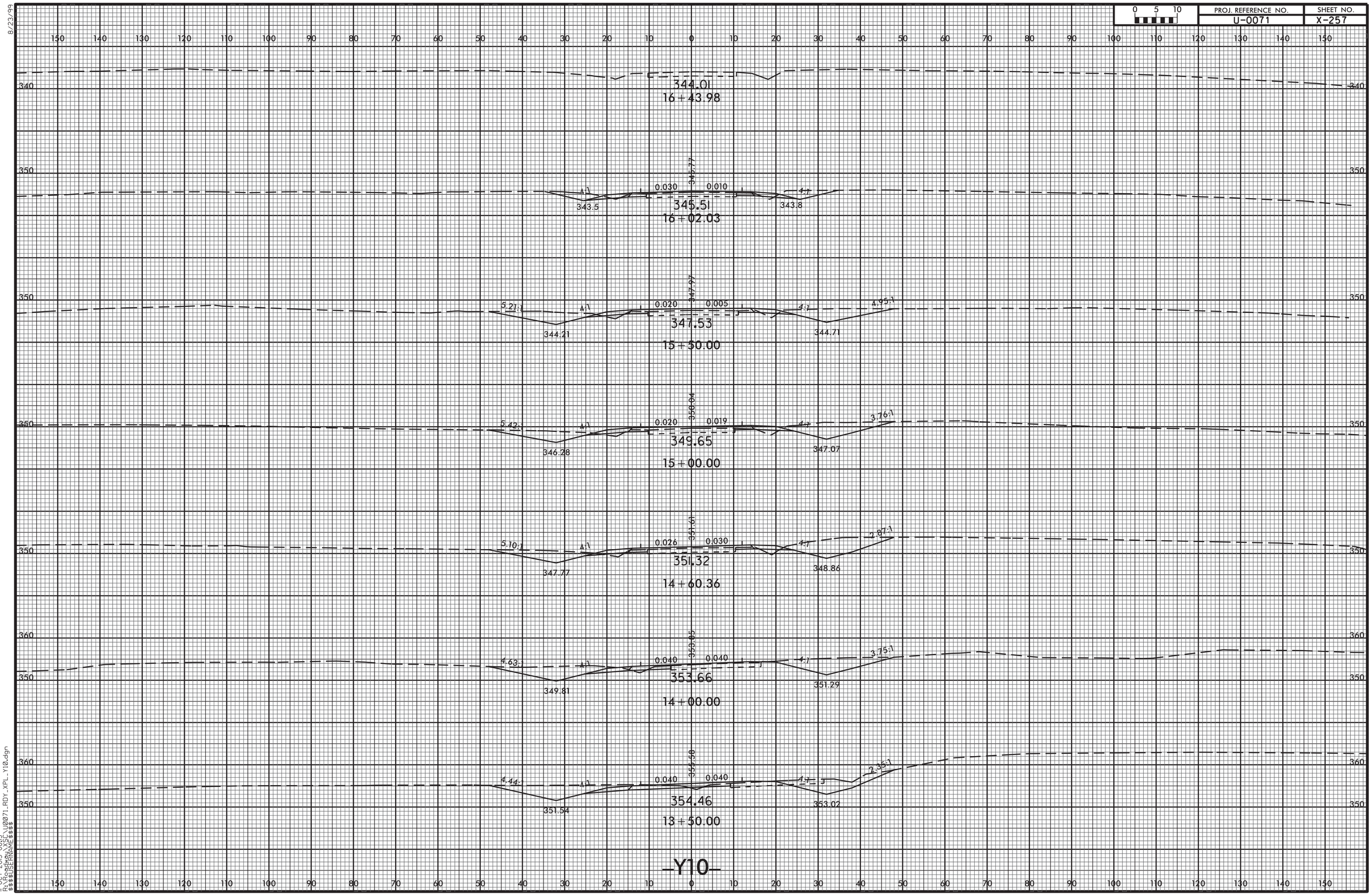


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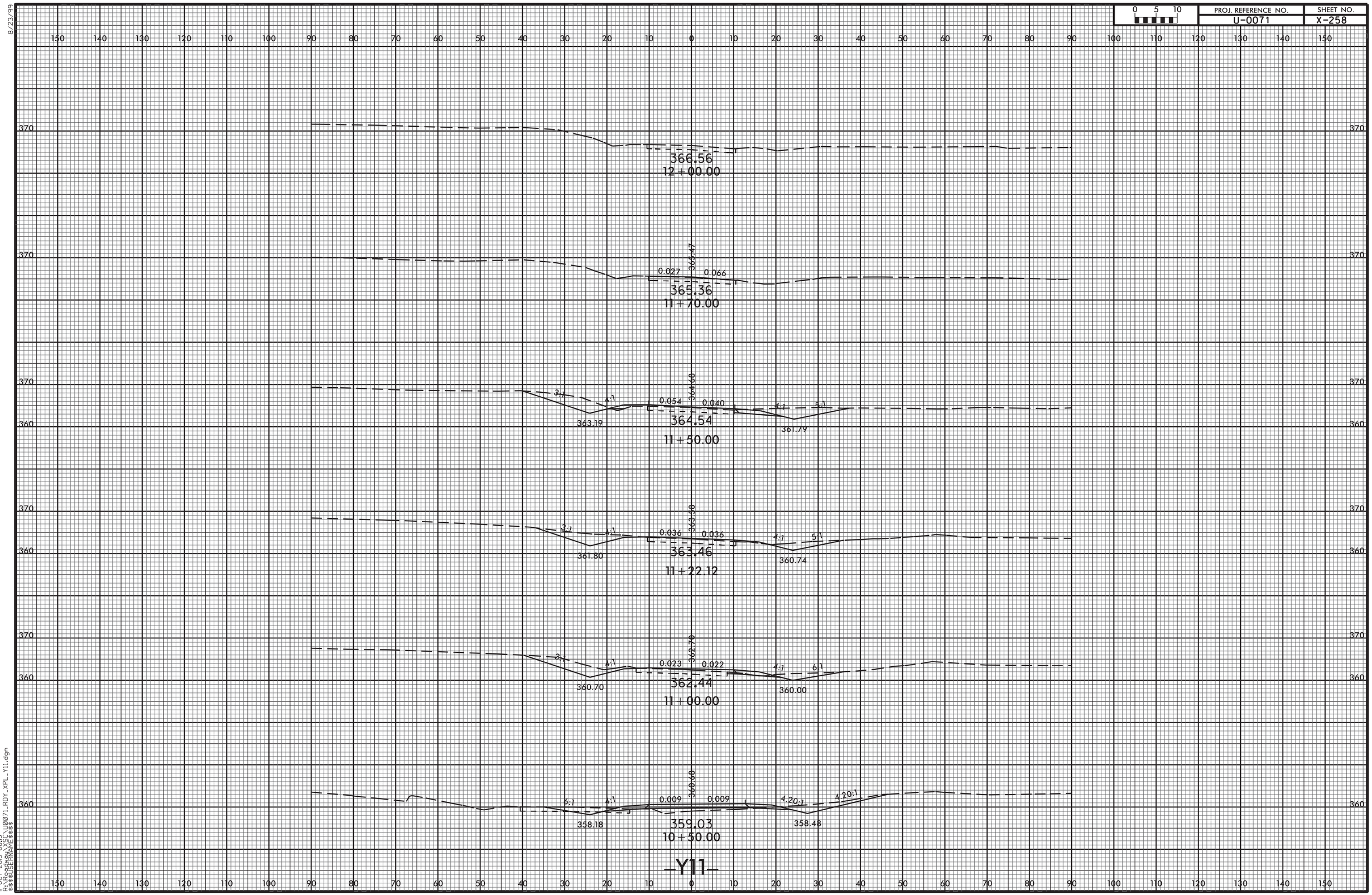
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4:1
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0.009
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4.20:1
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359.03
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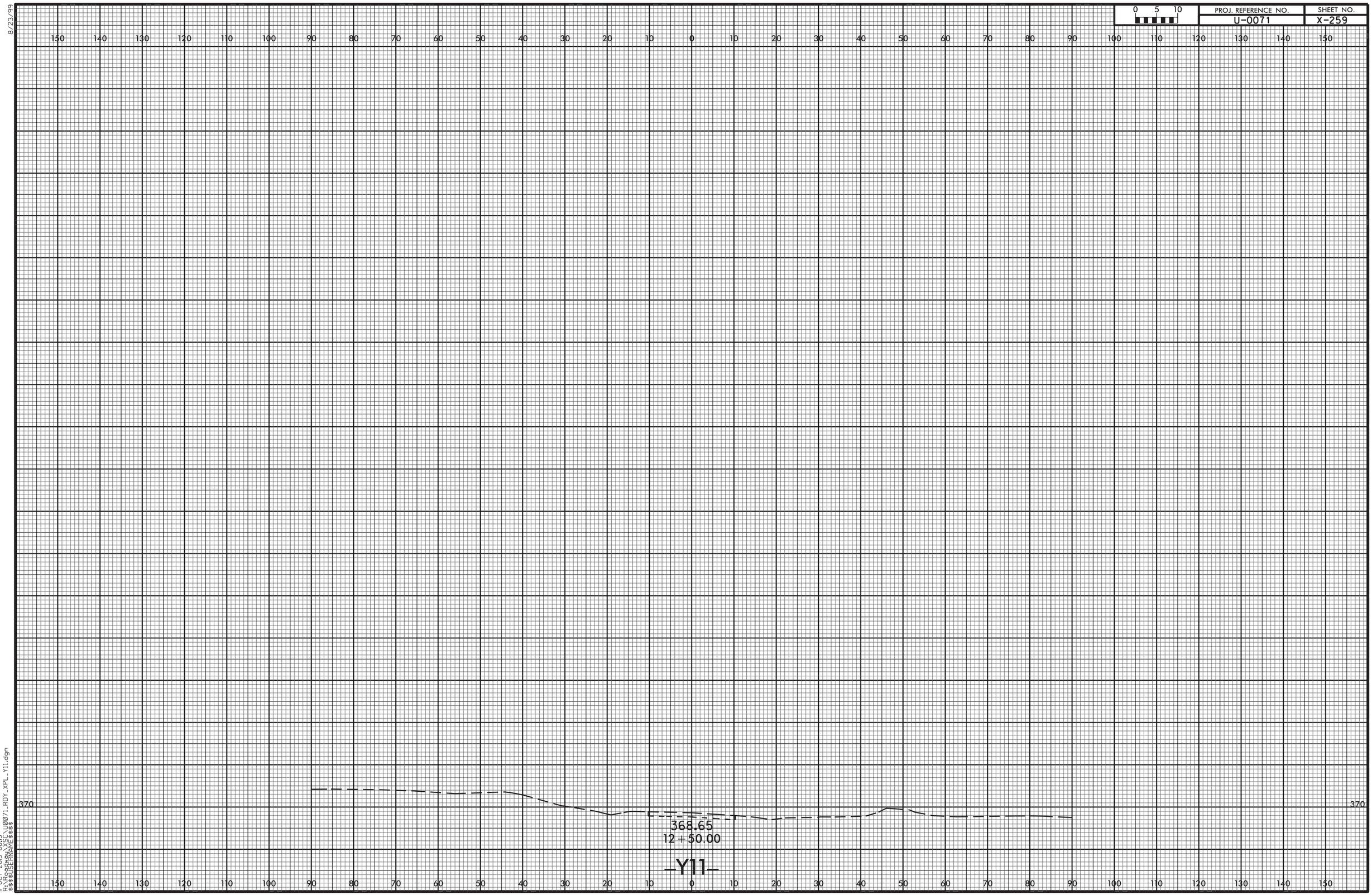


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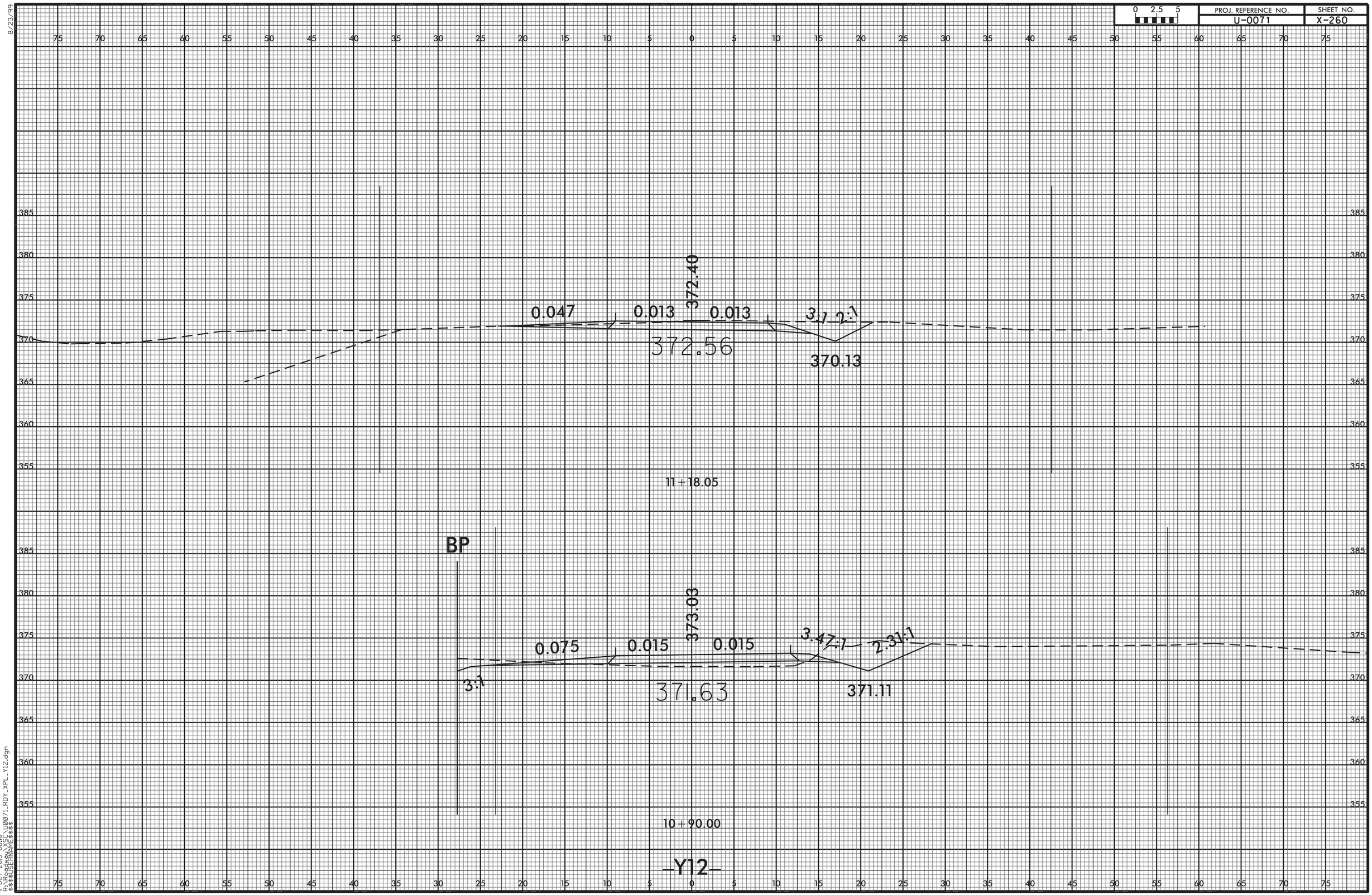


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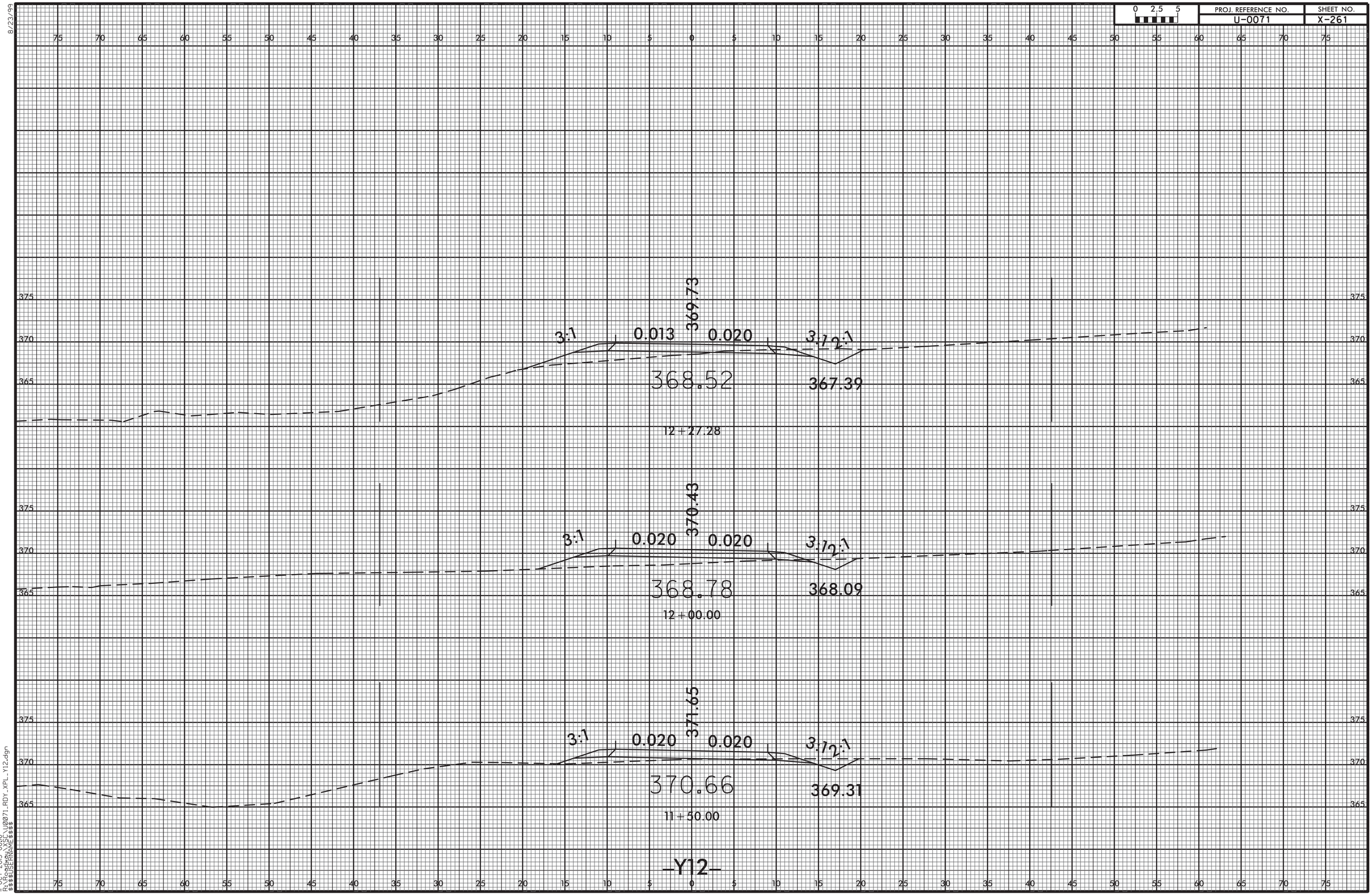


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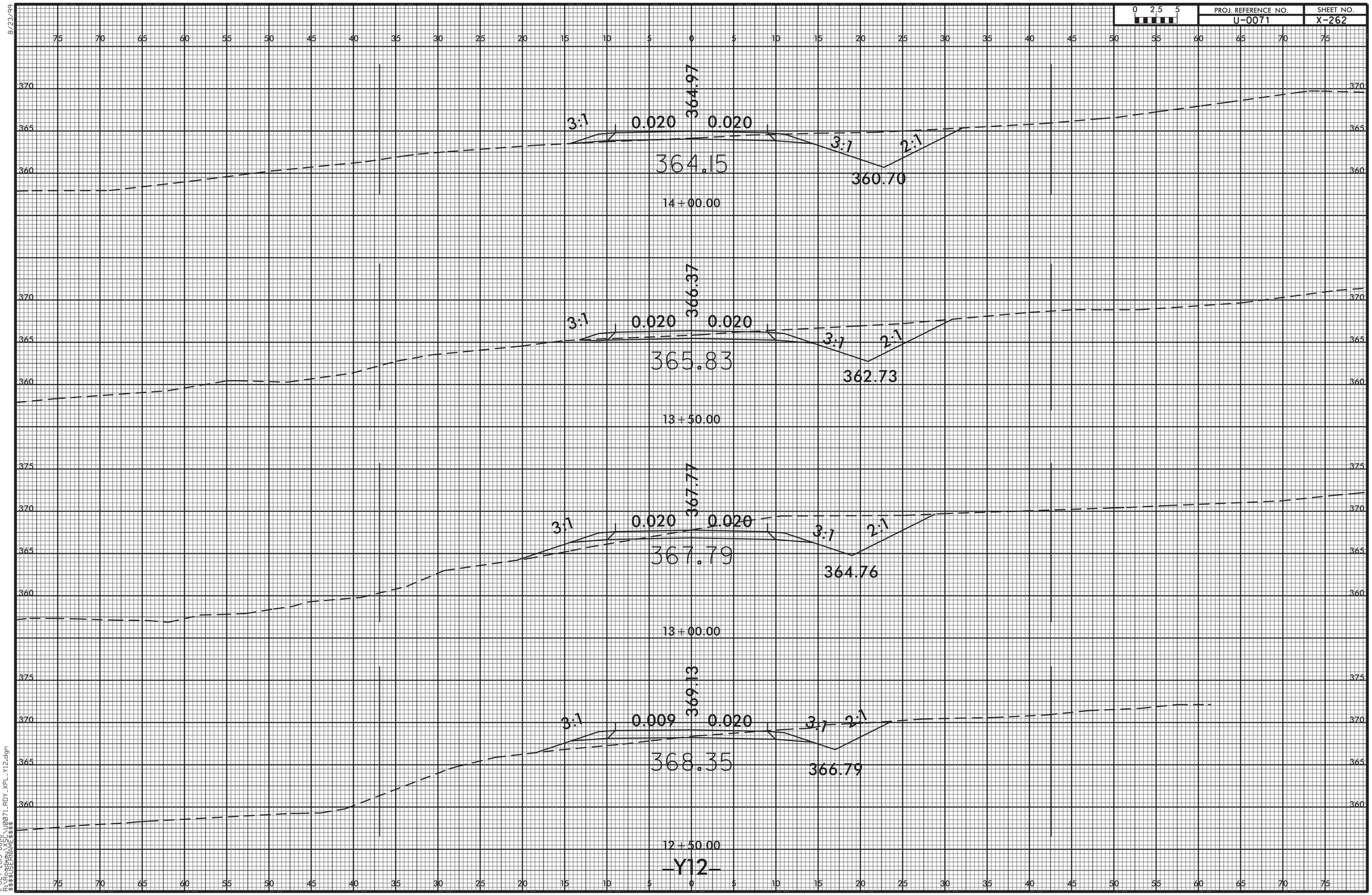


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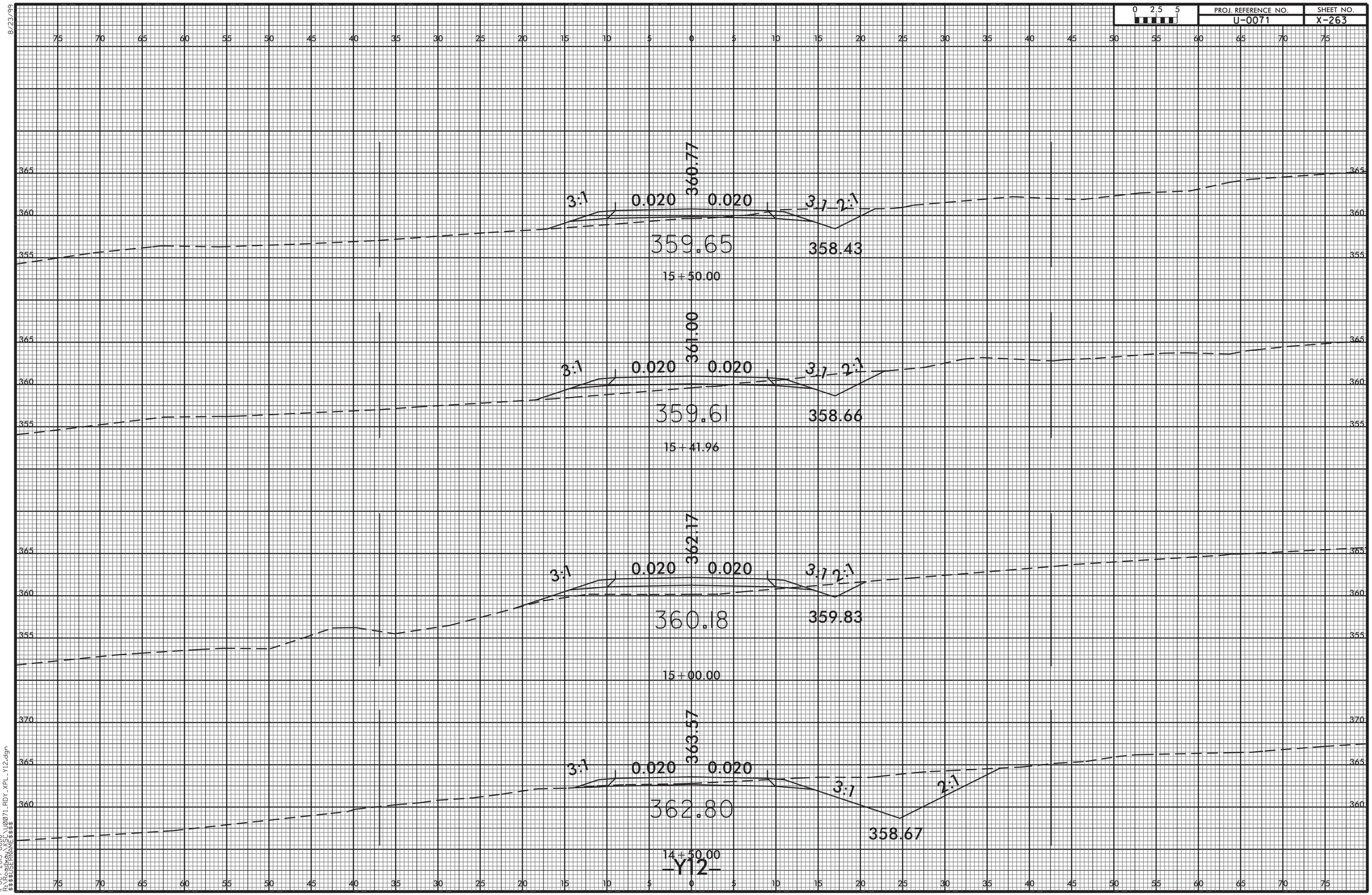


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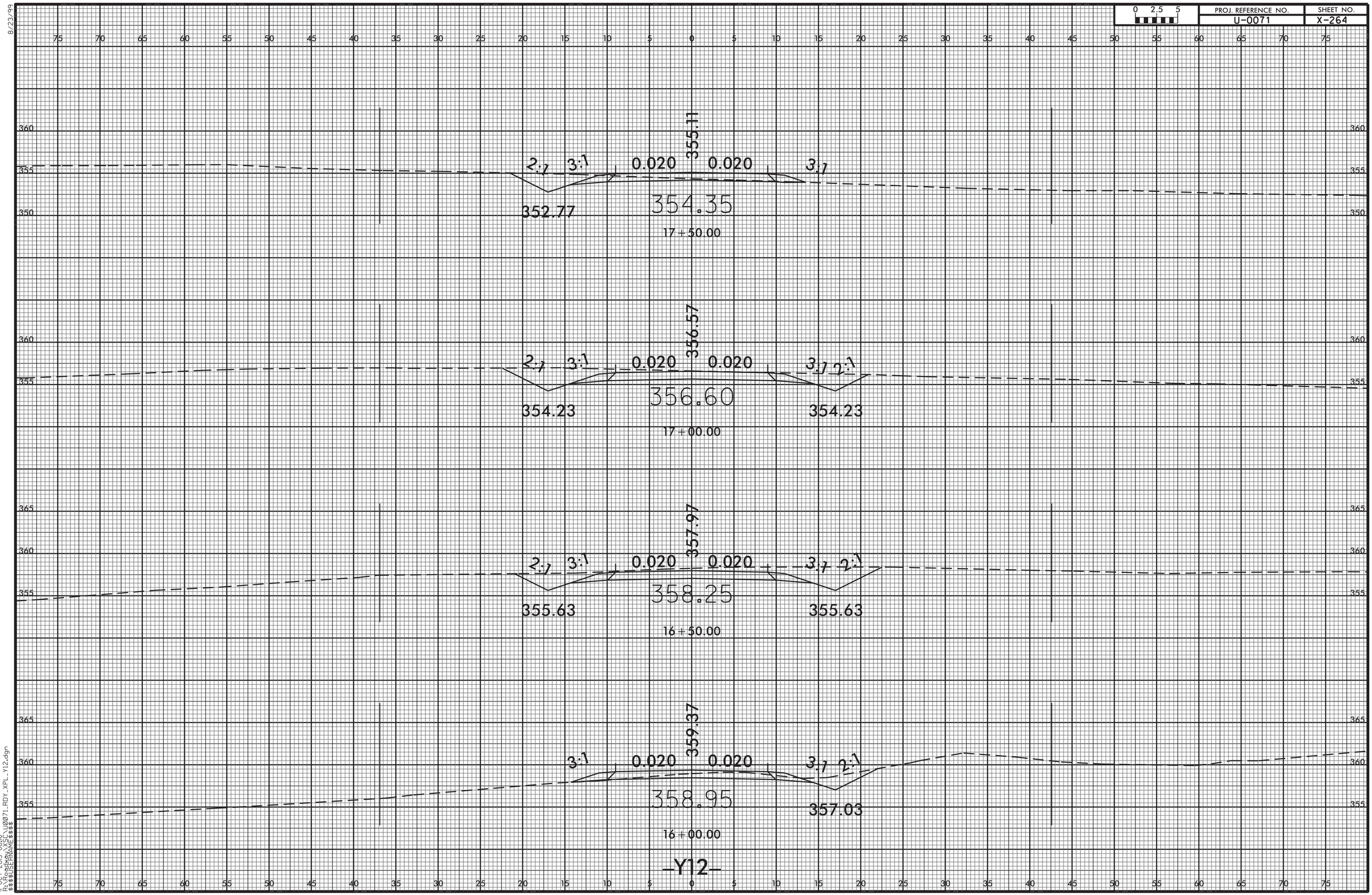


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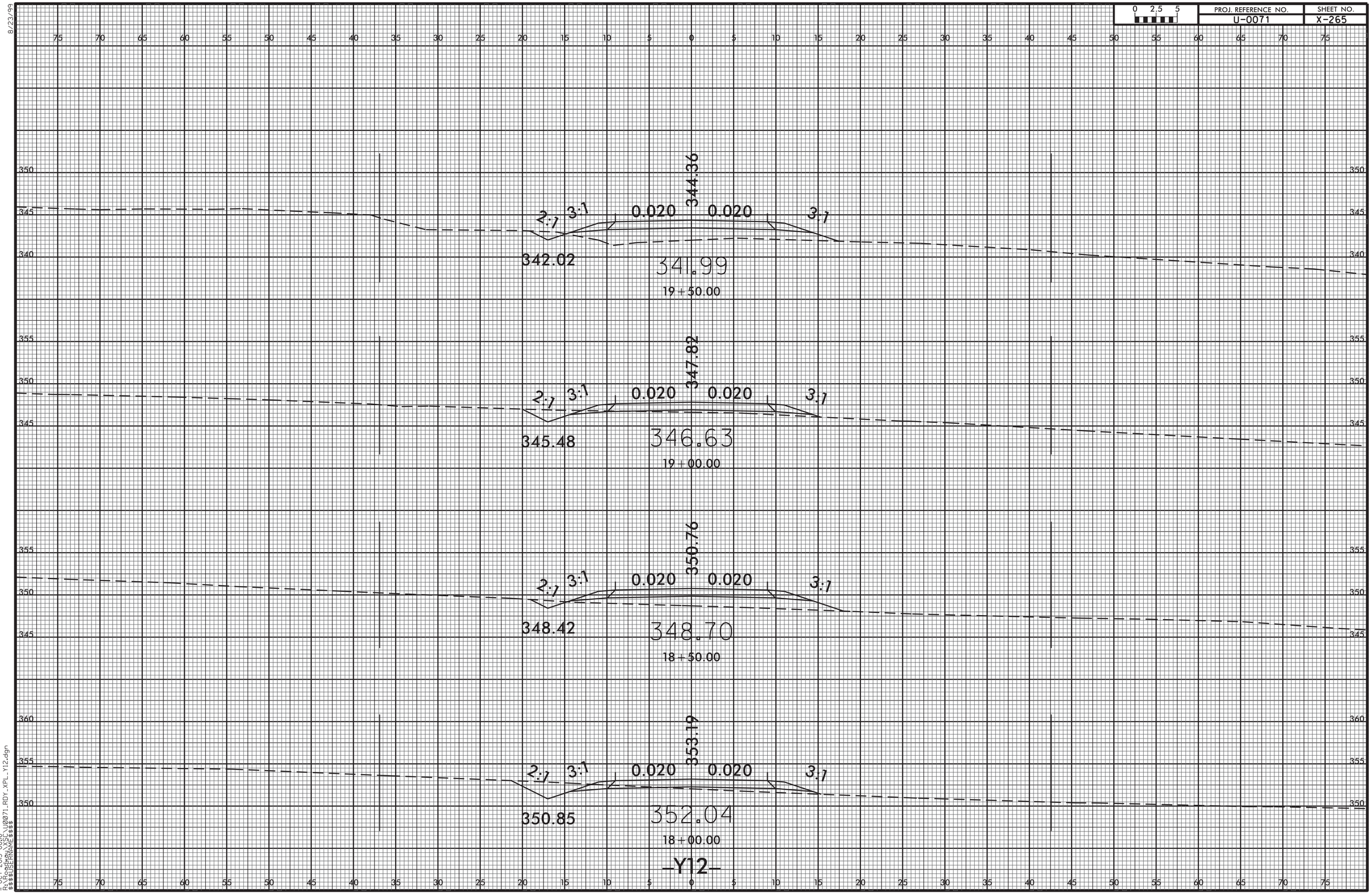


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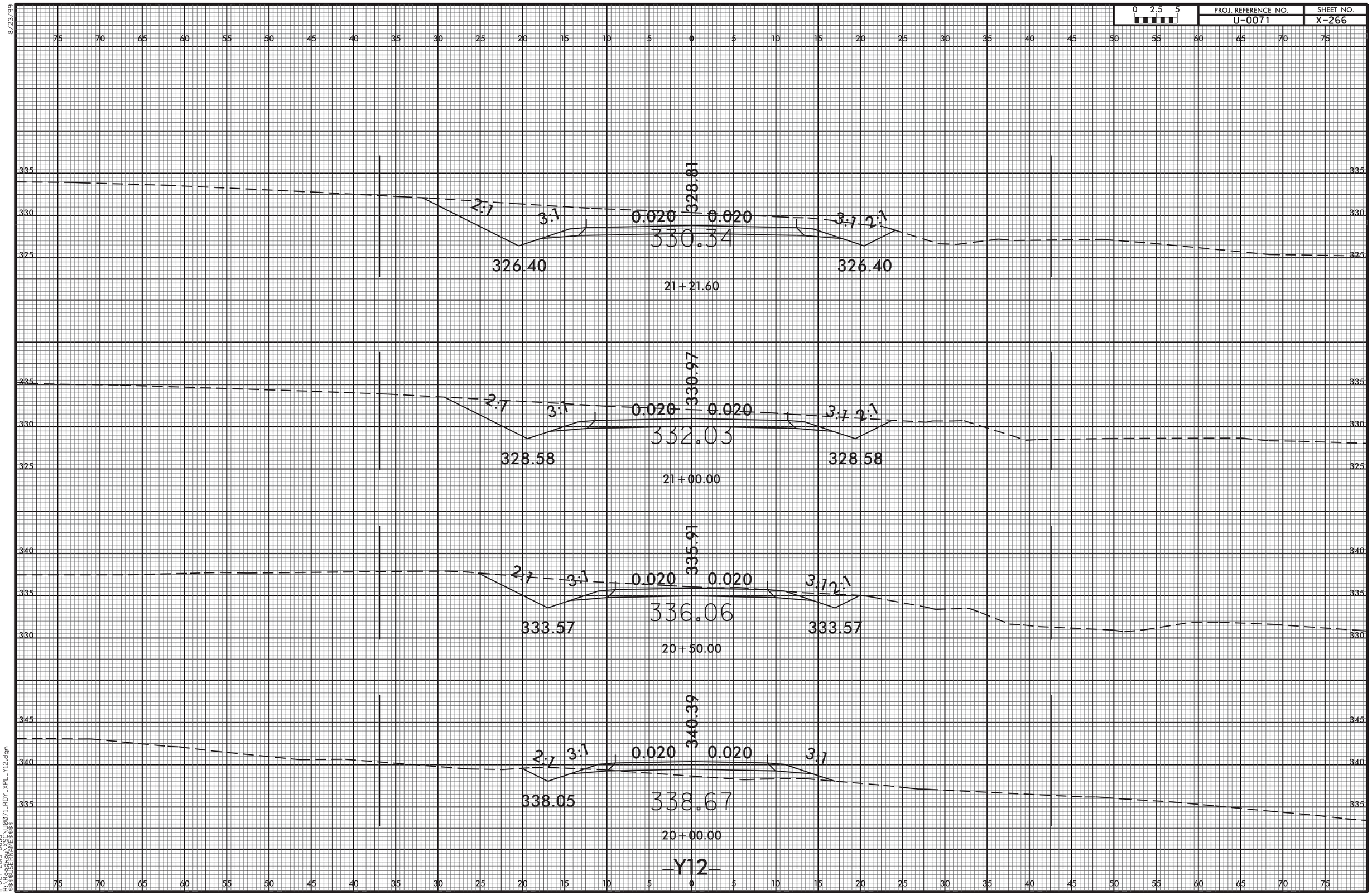


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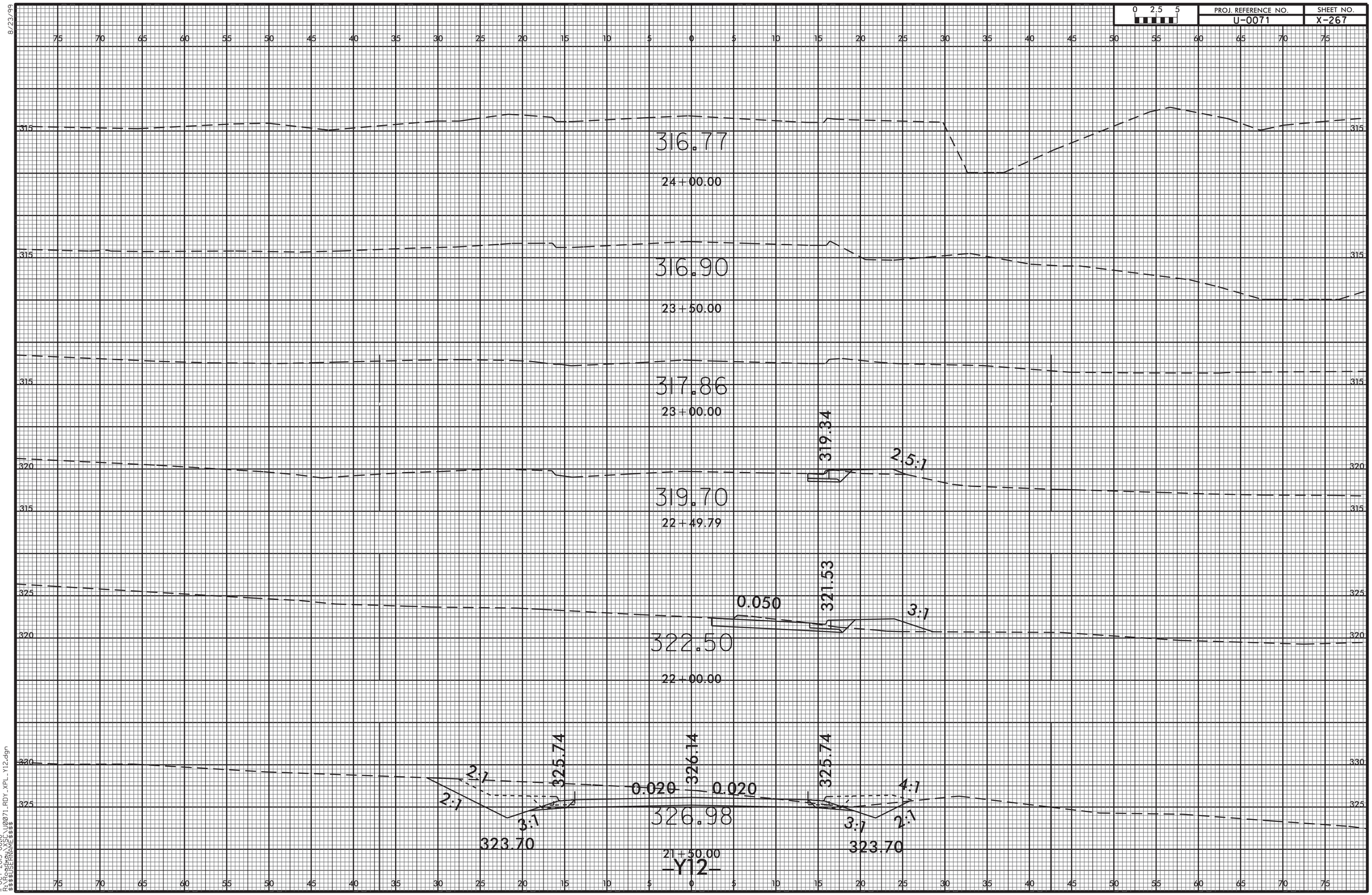

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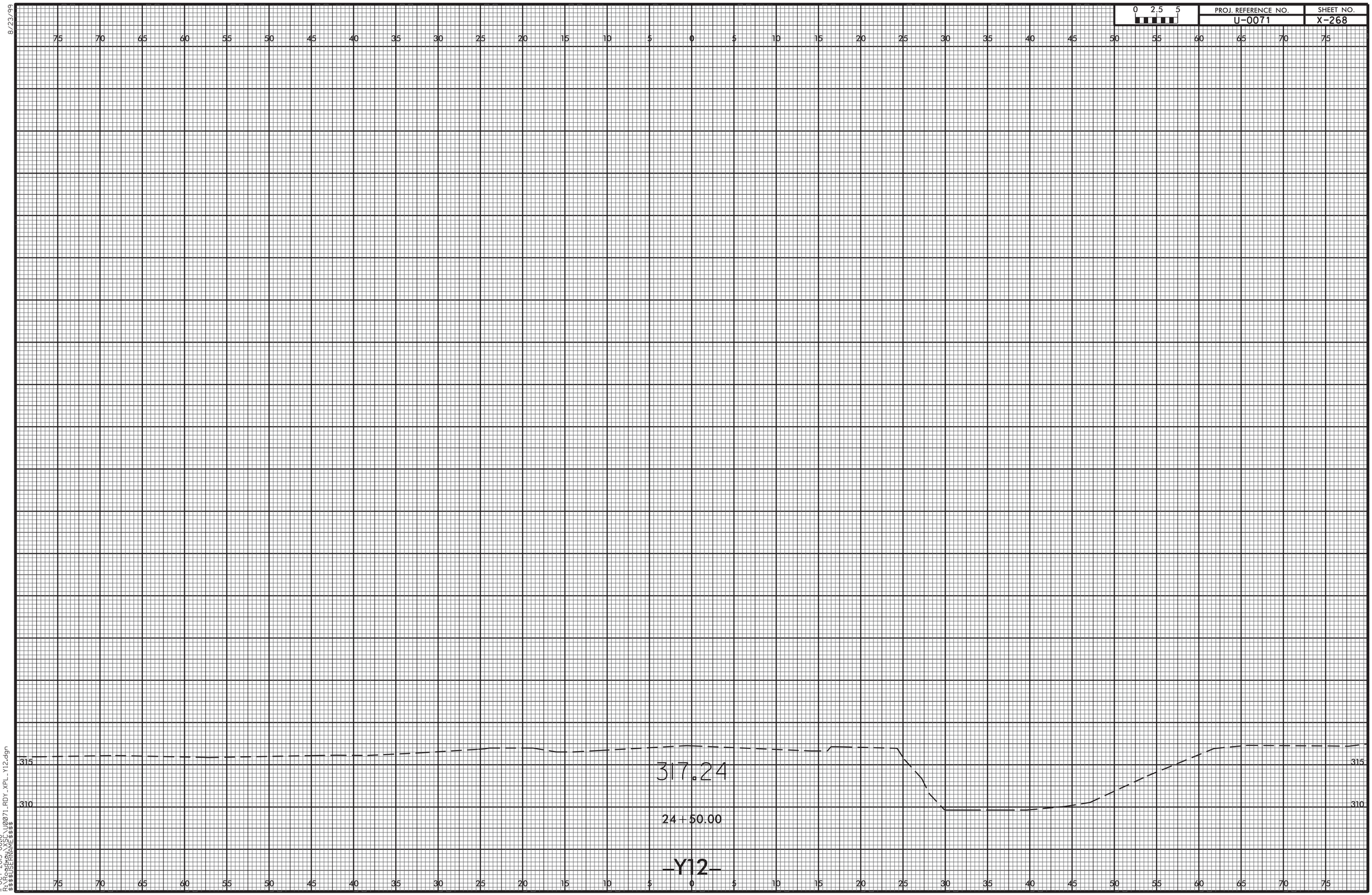


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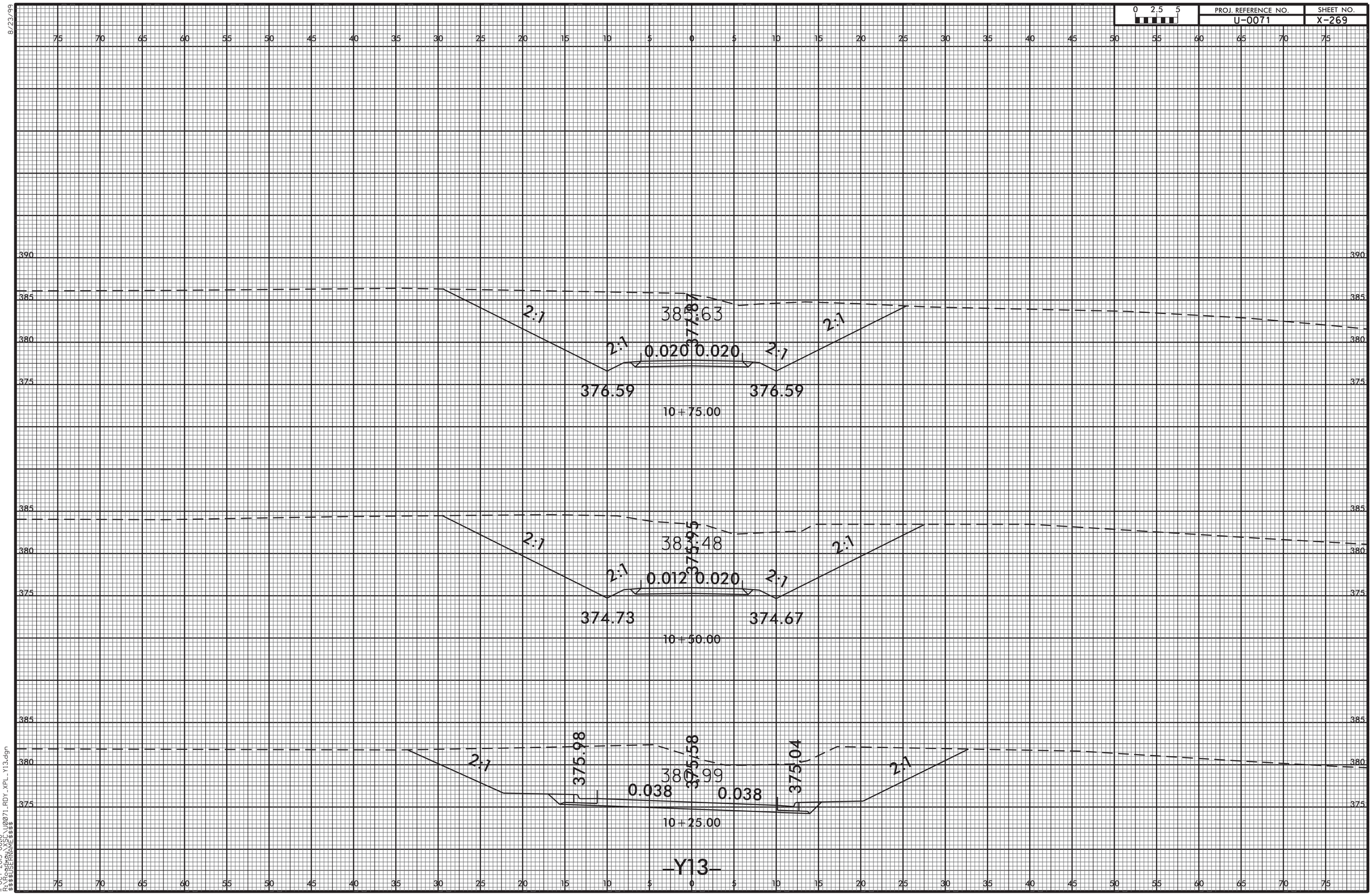


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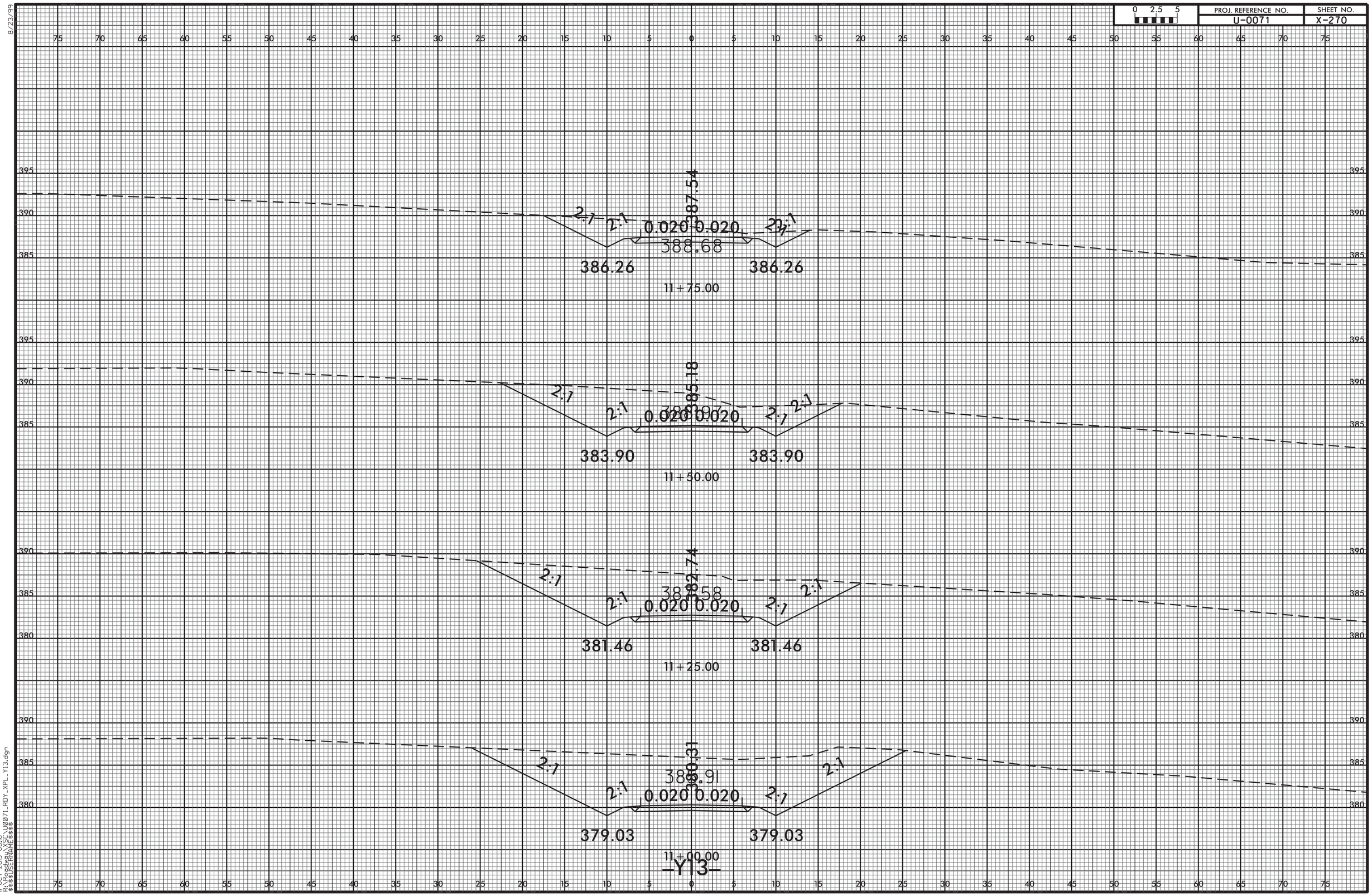


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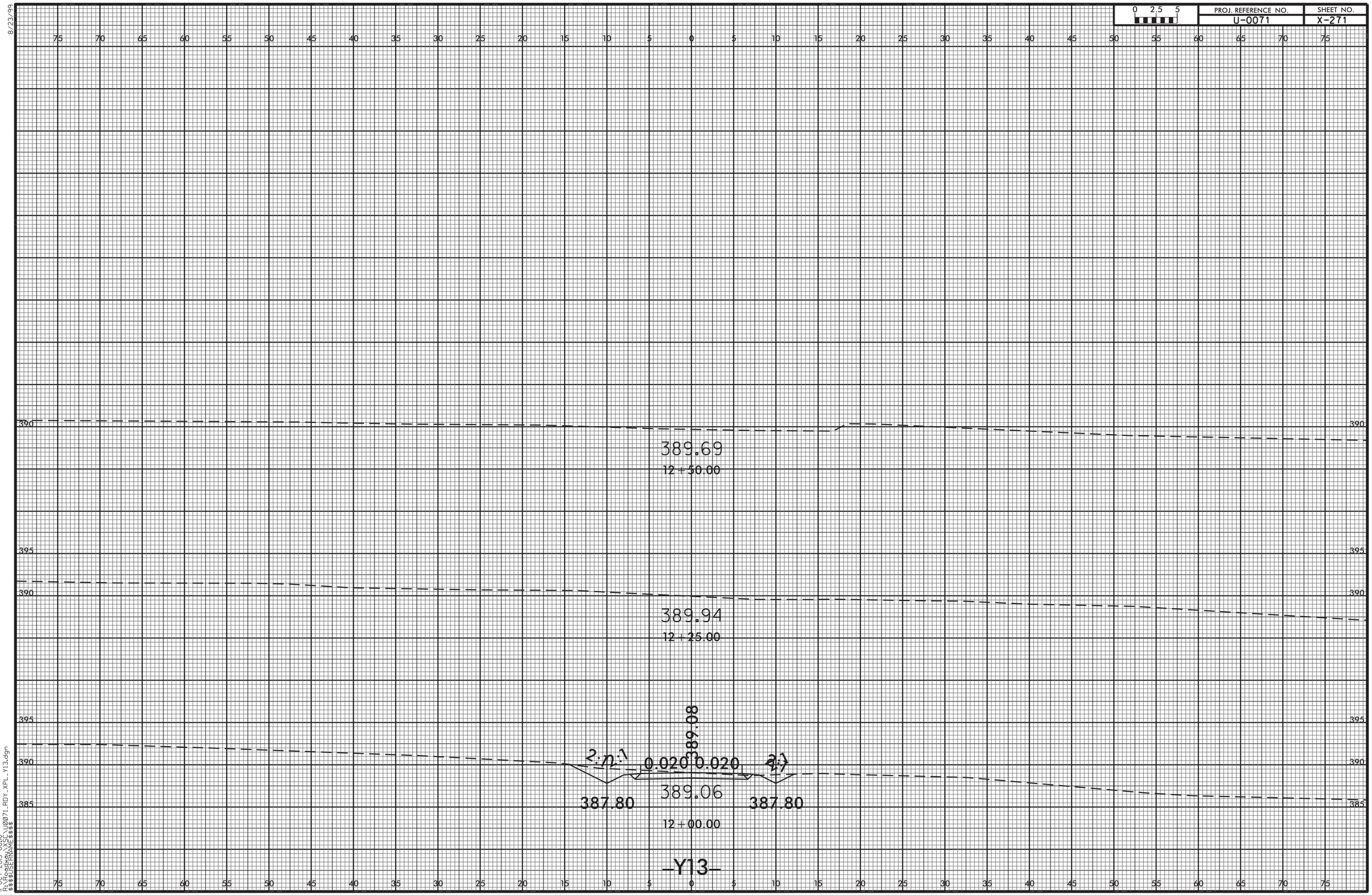


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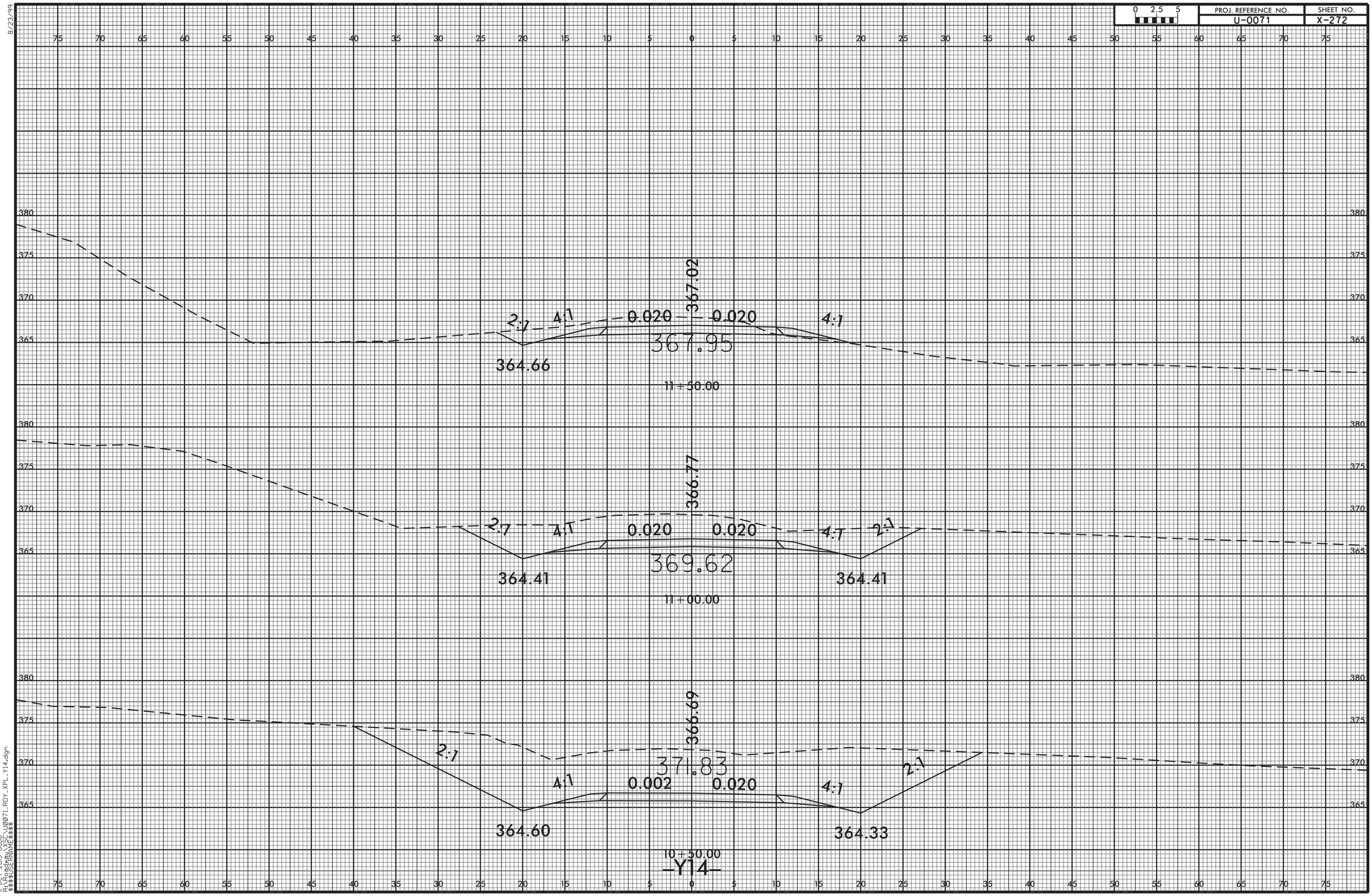


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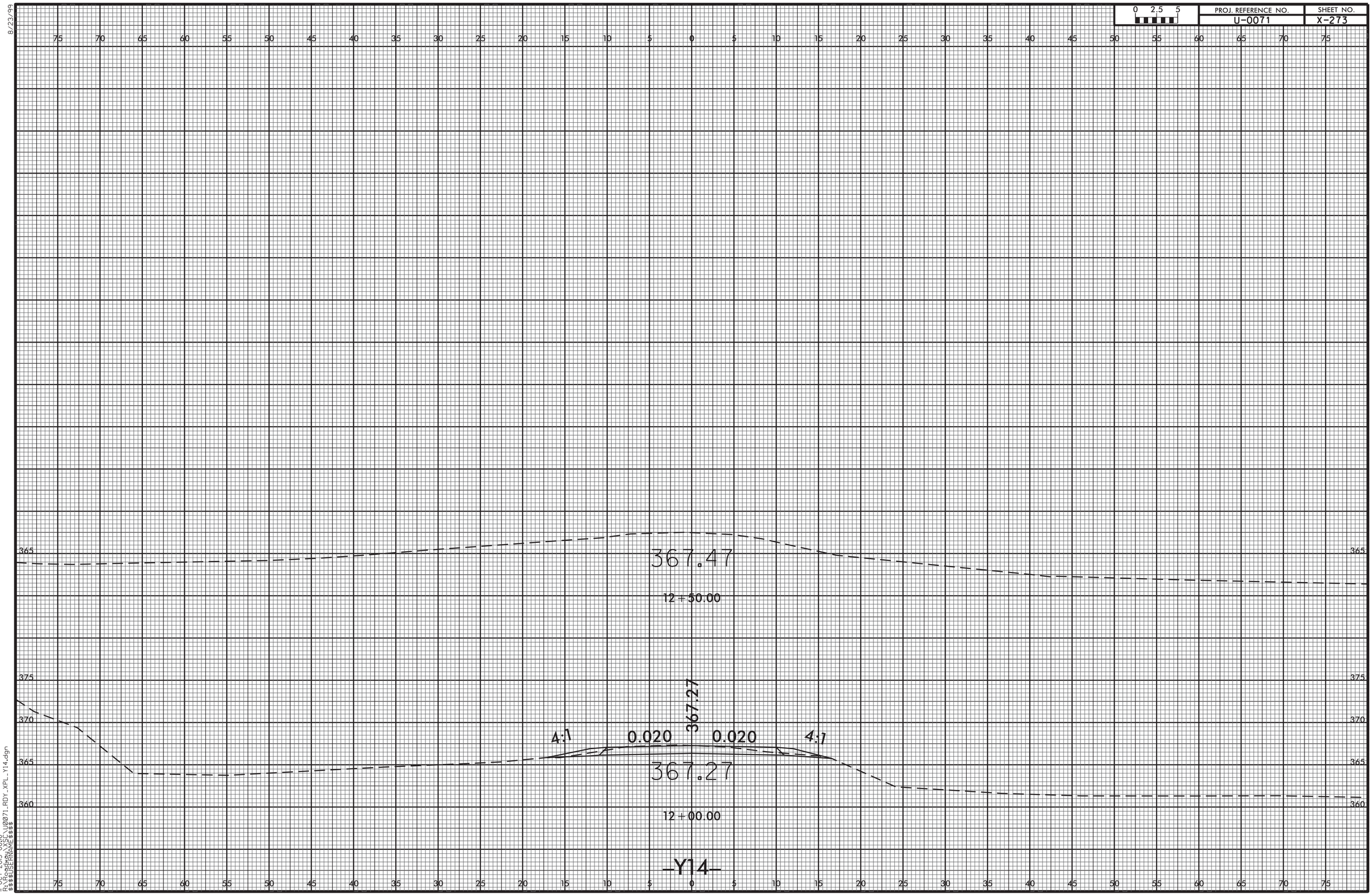


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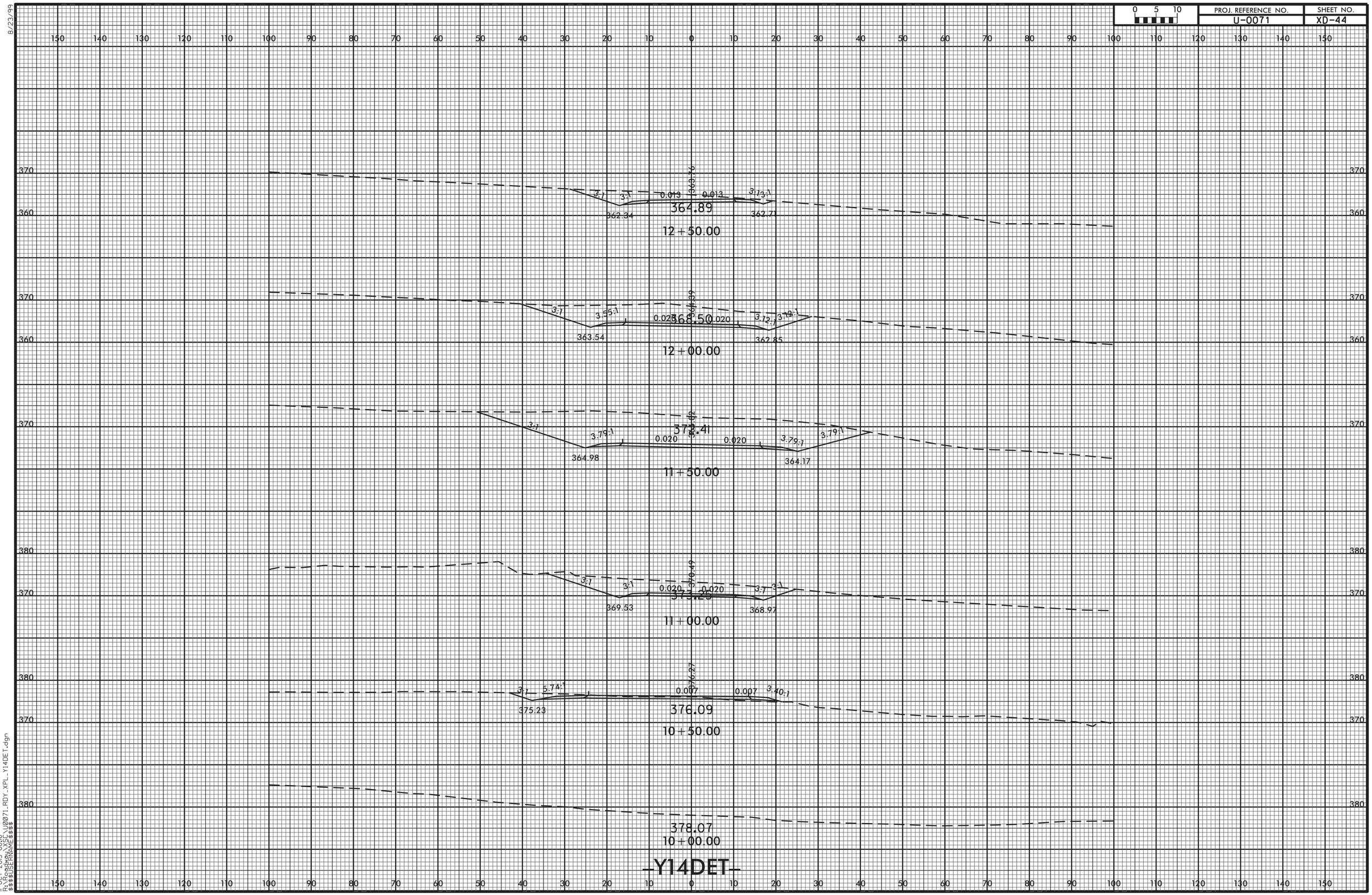


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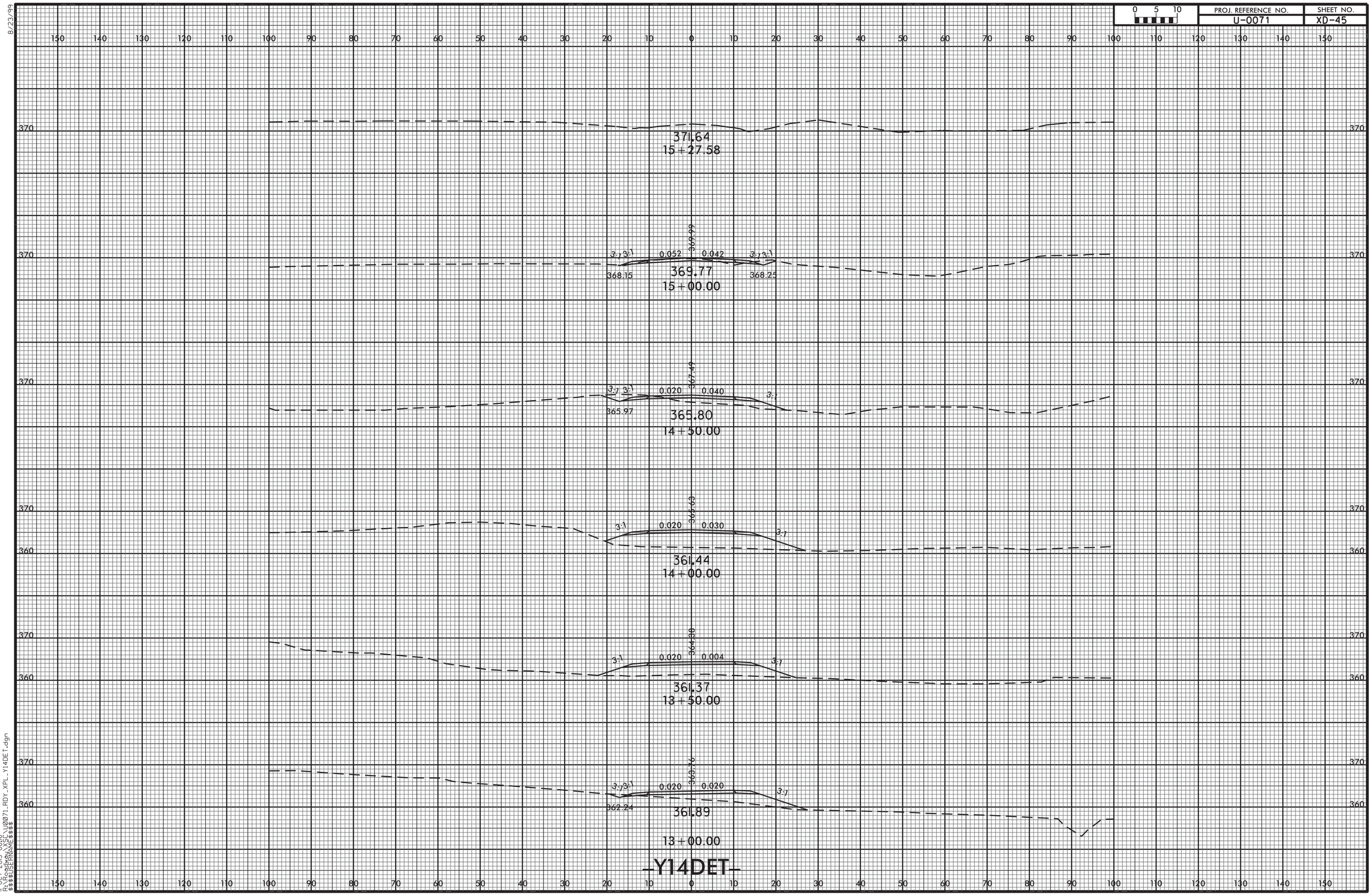
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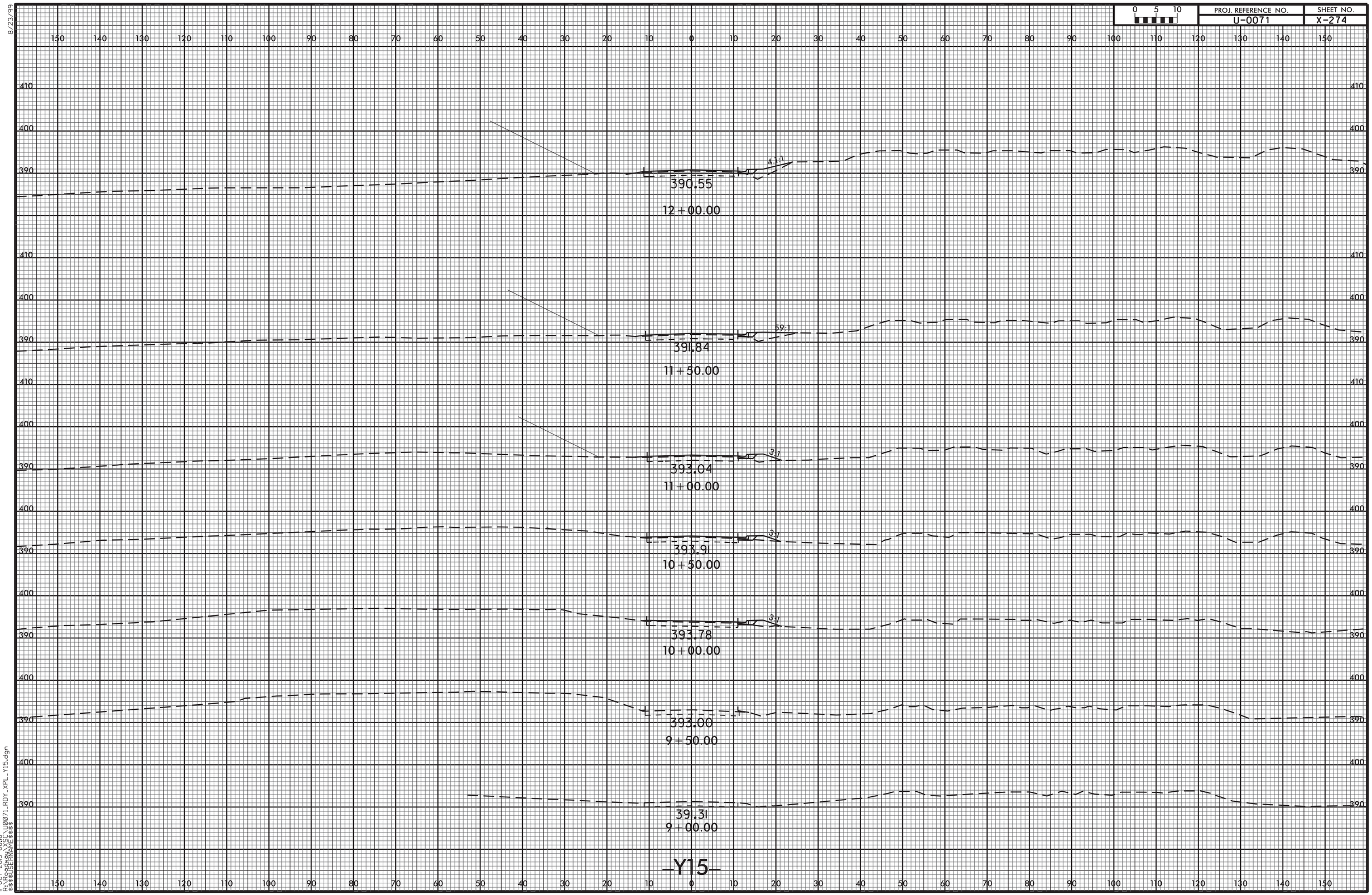


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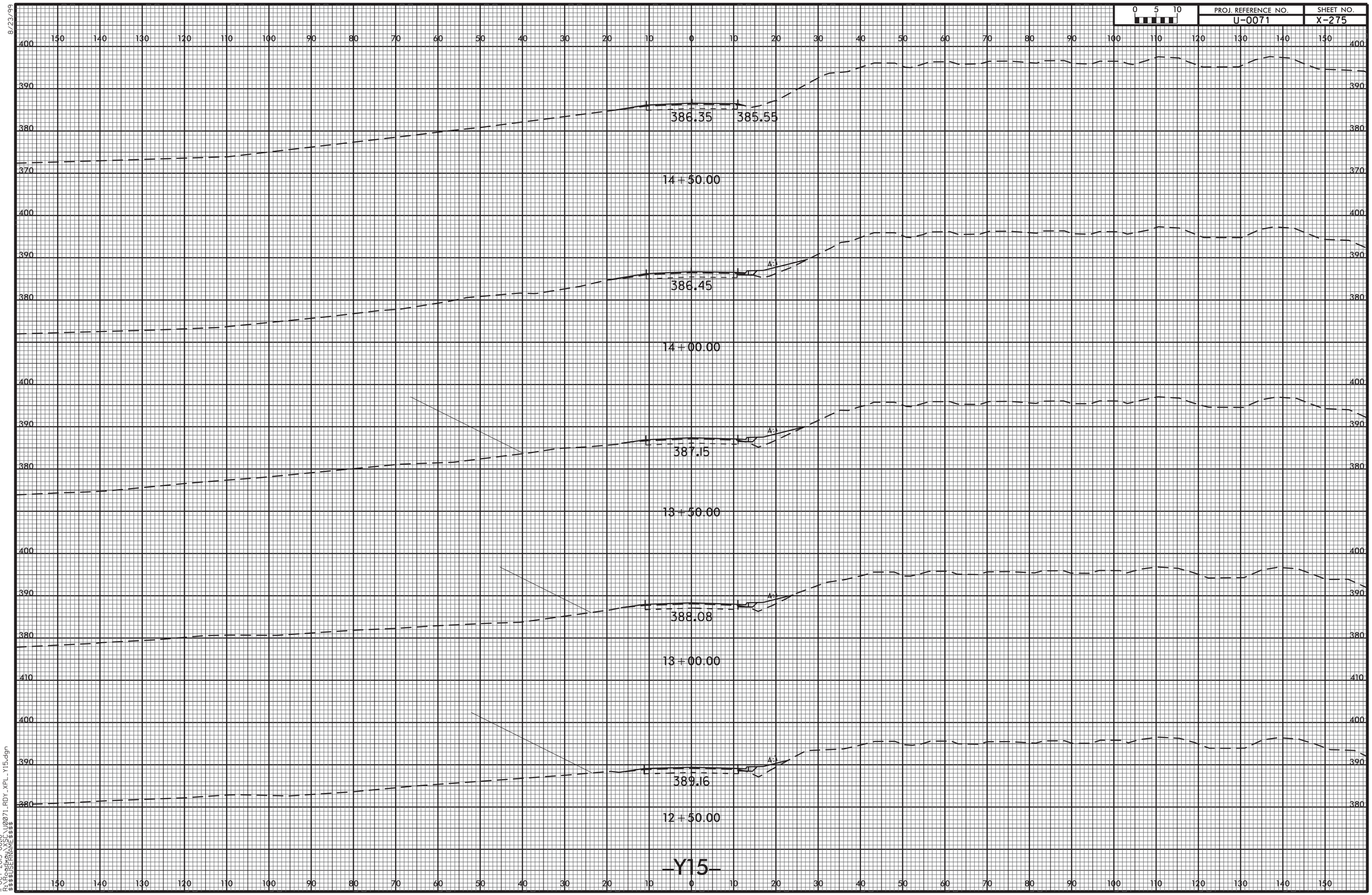


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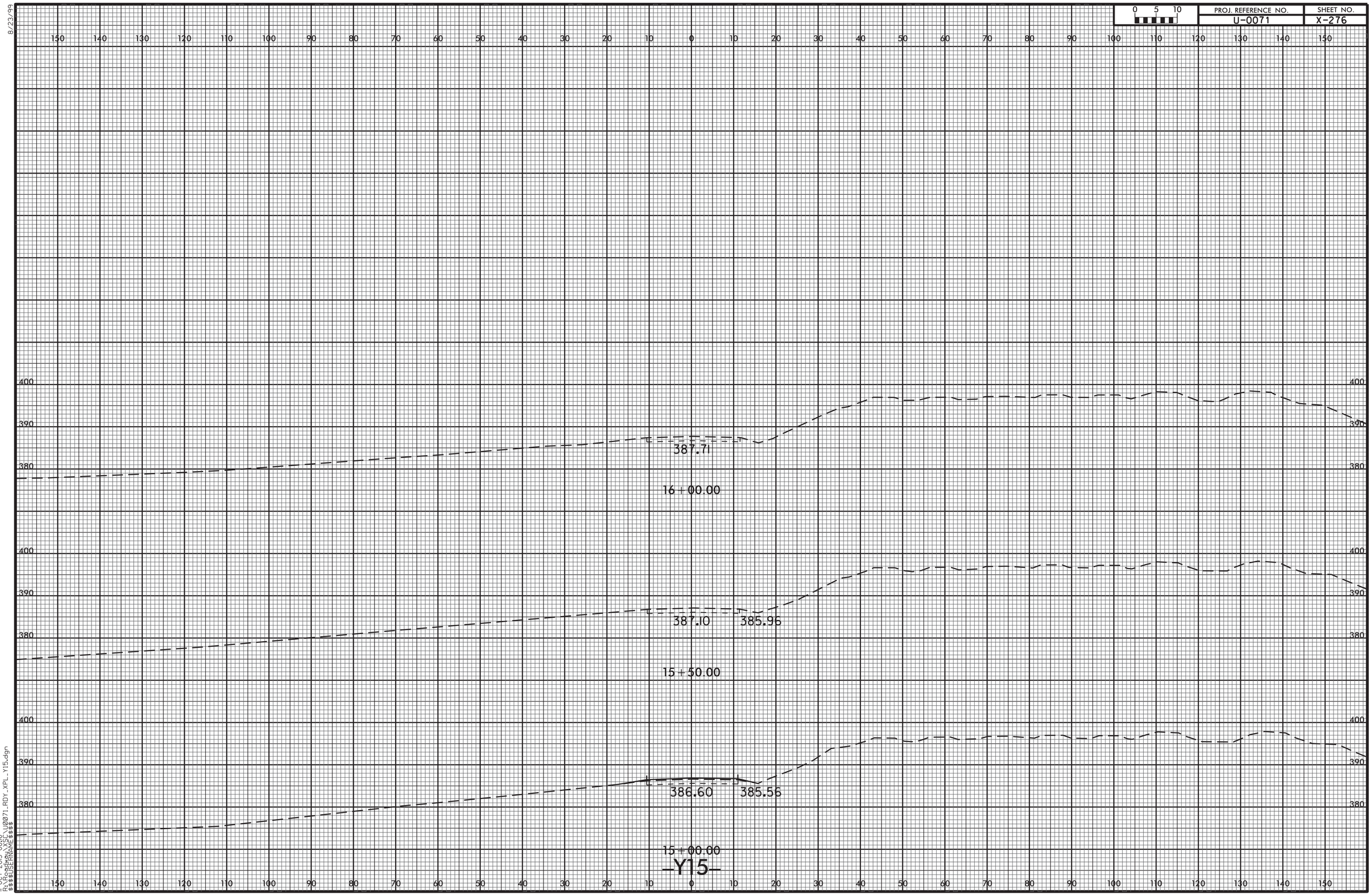


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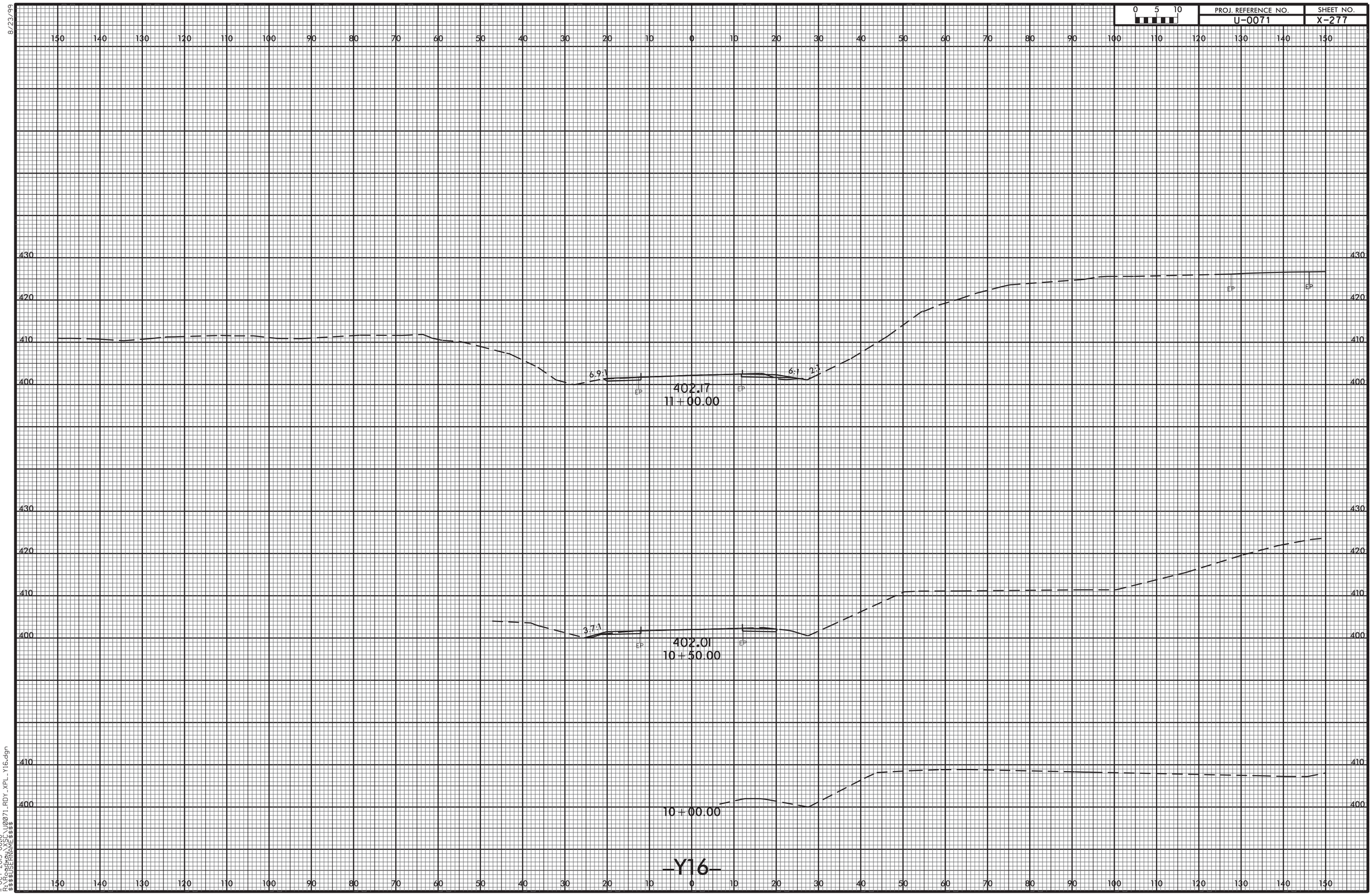


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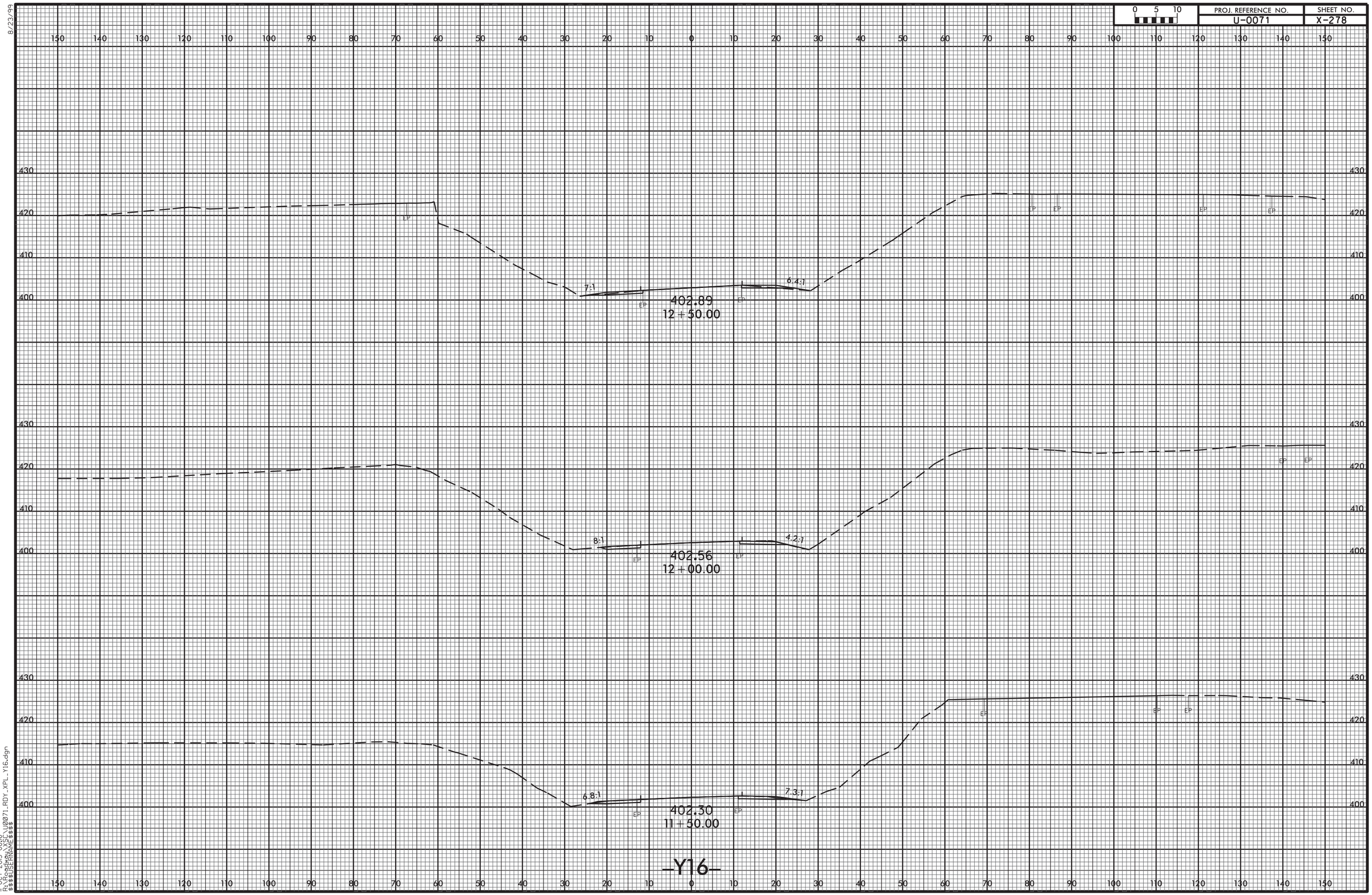


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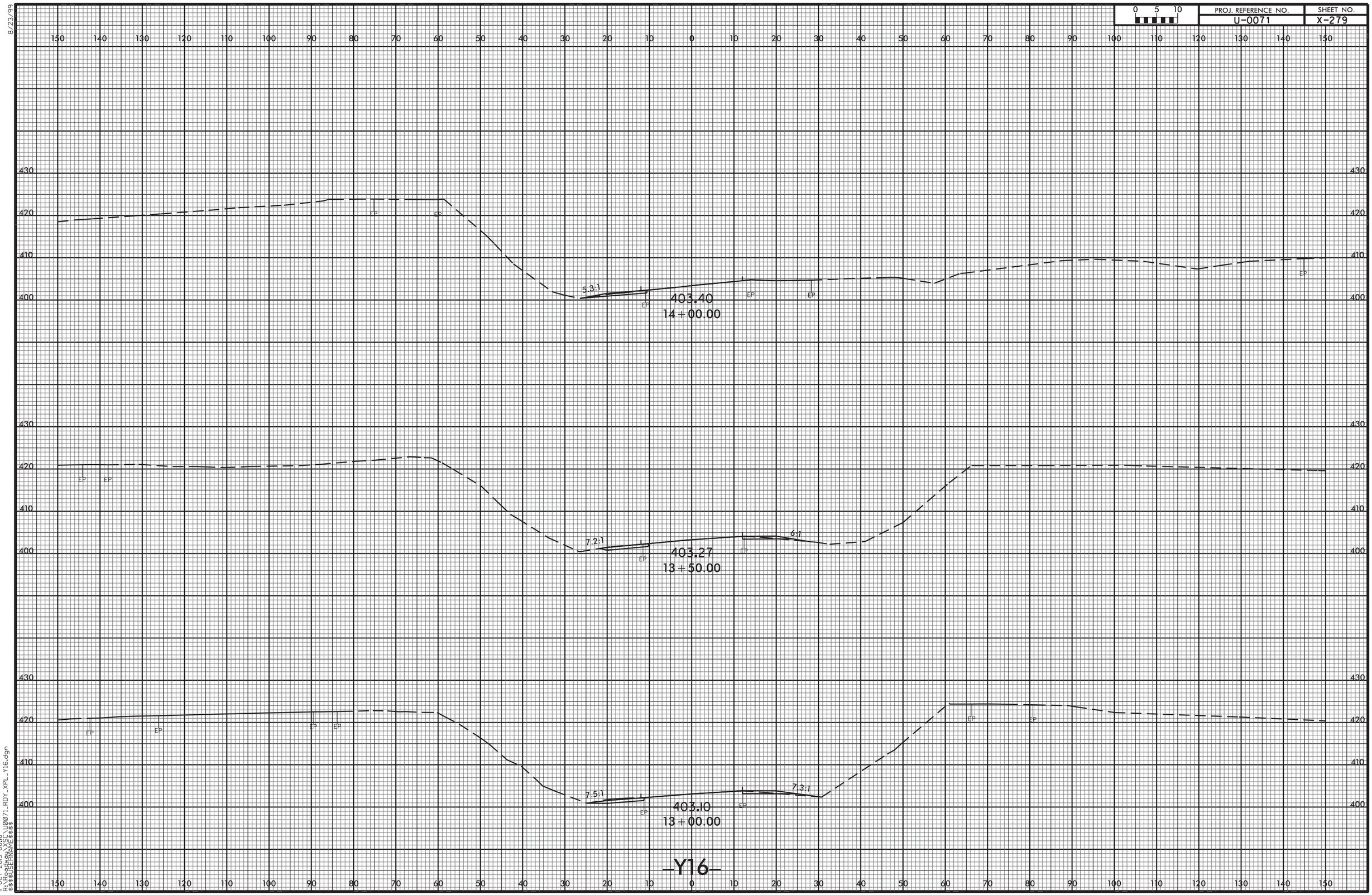


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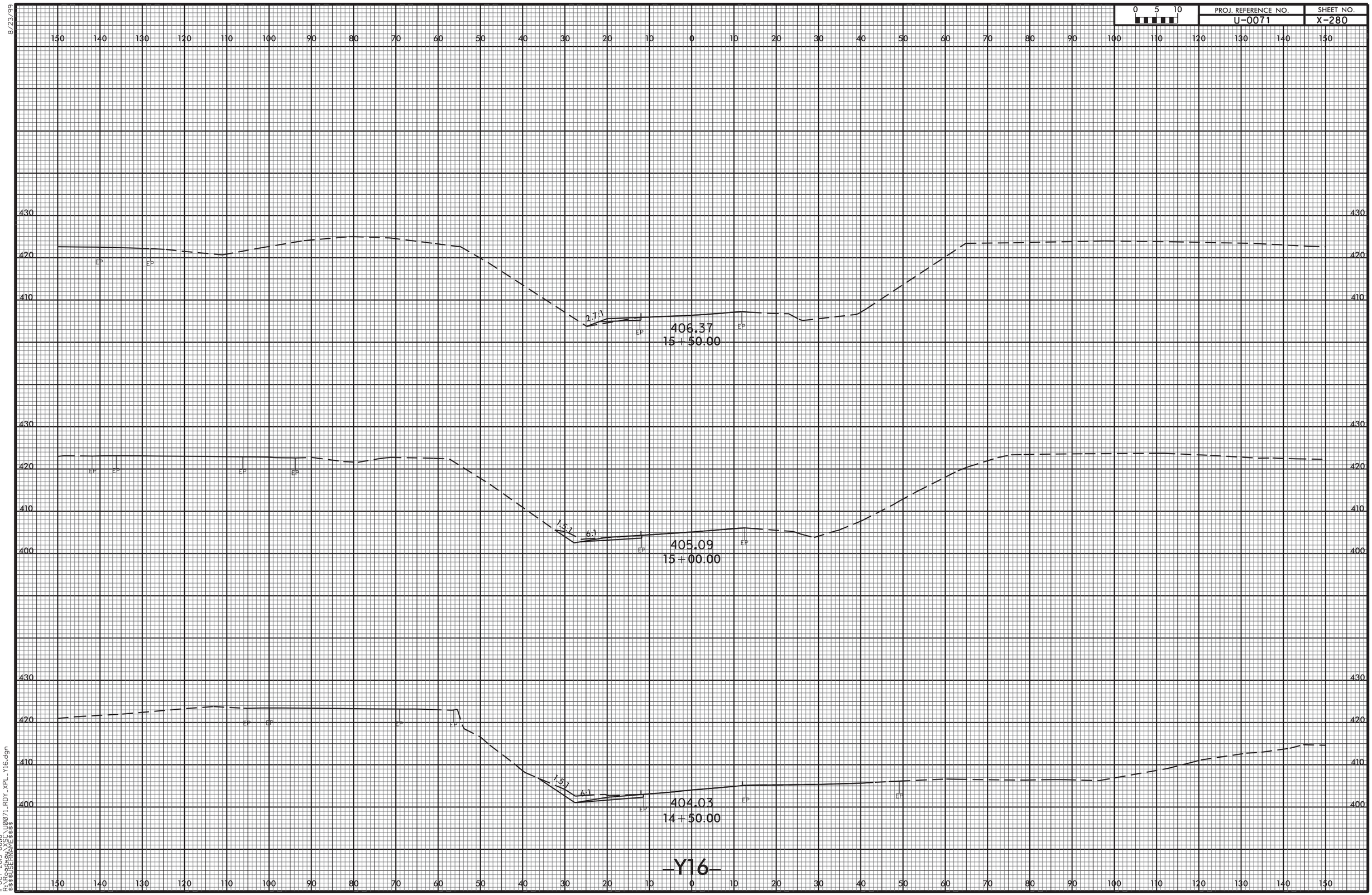


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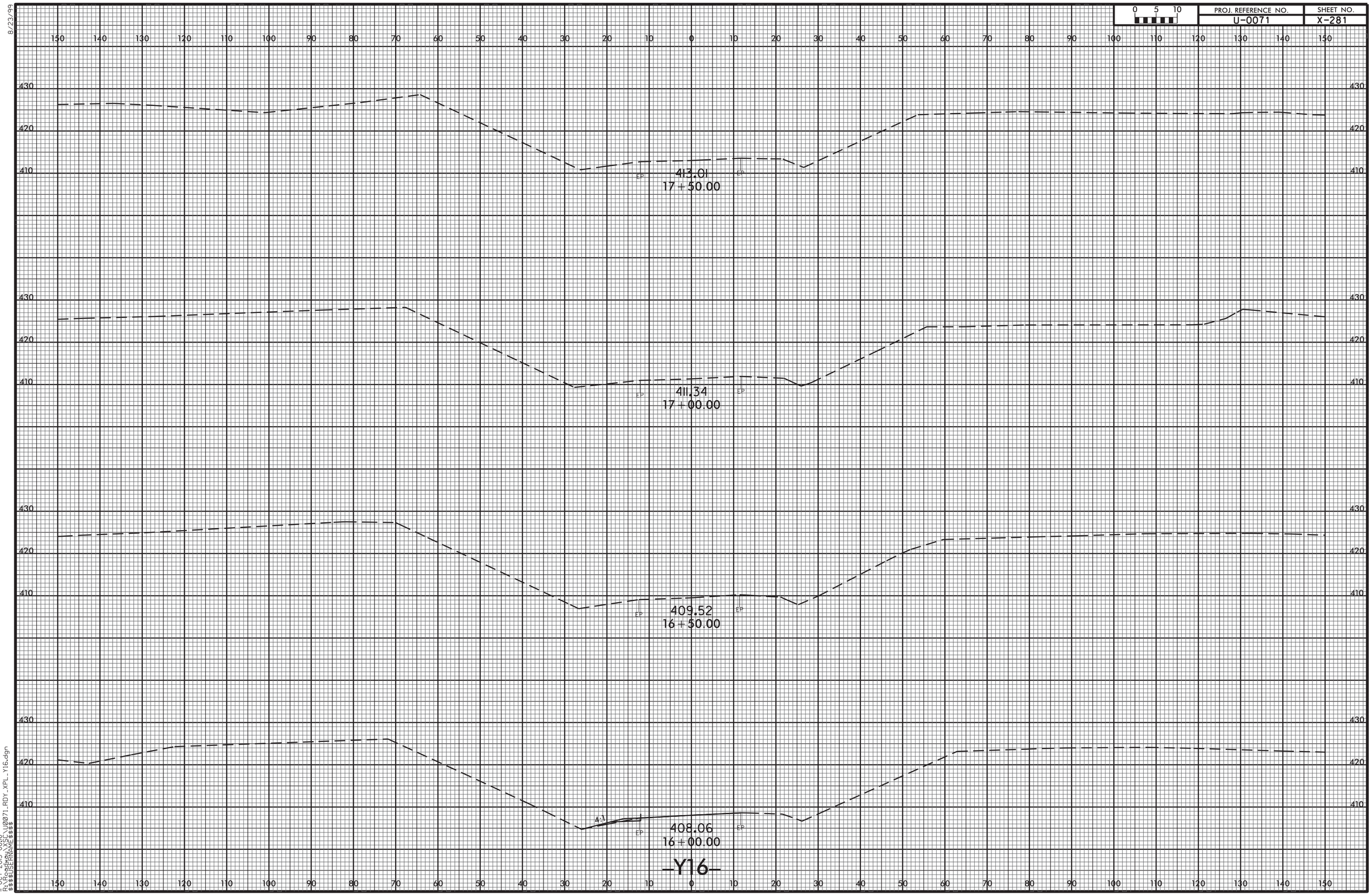


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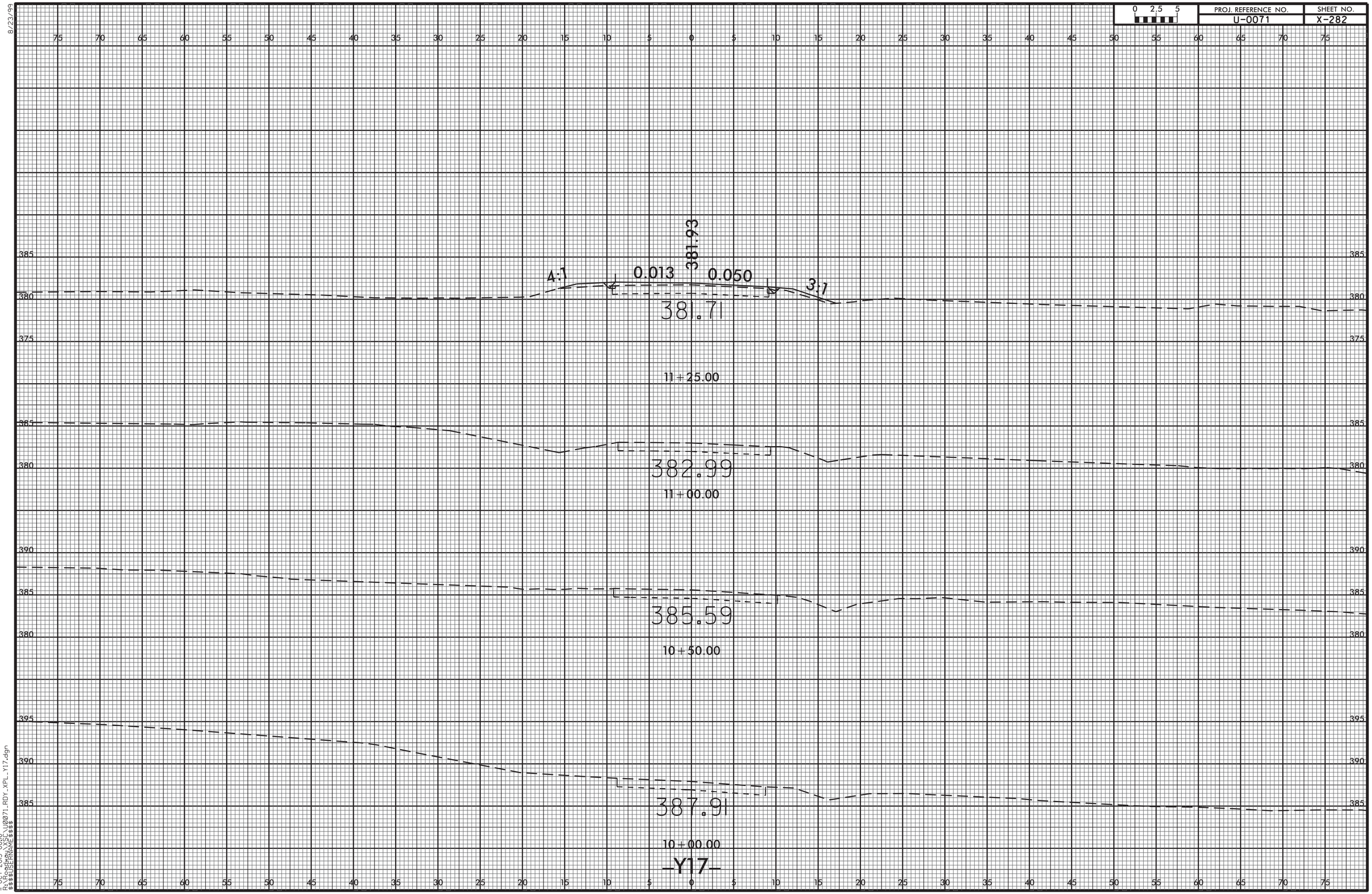


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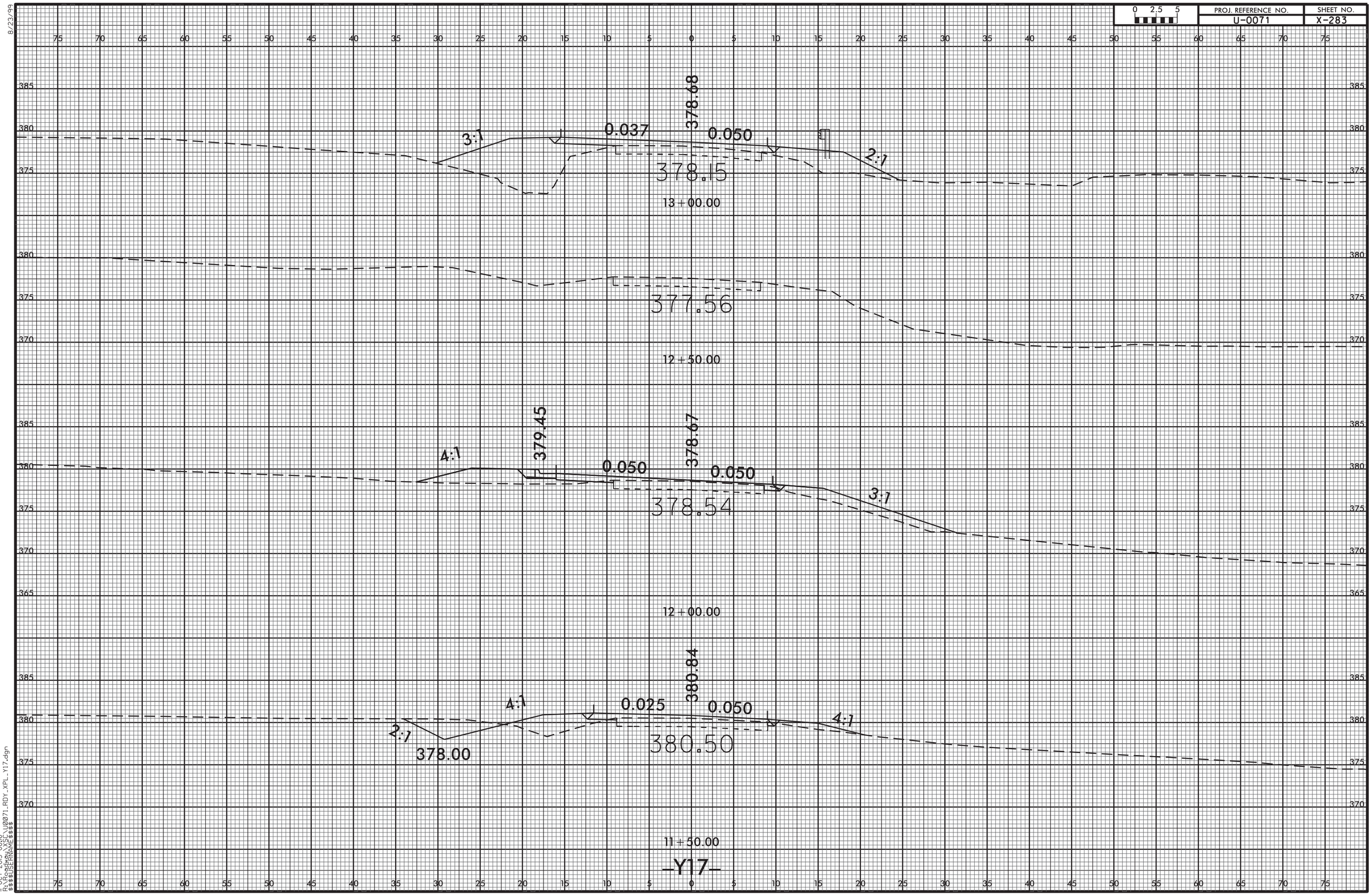


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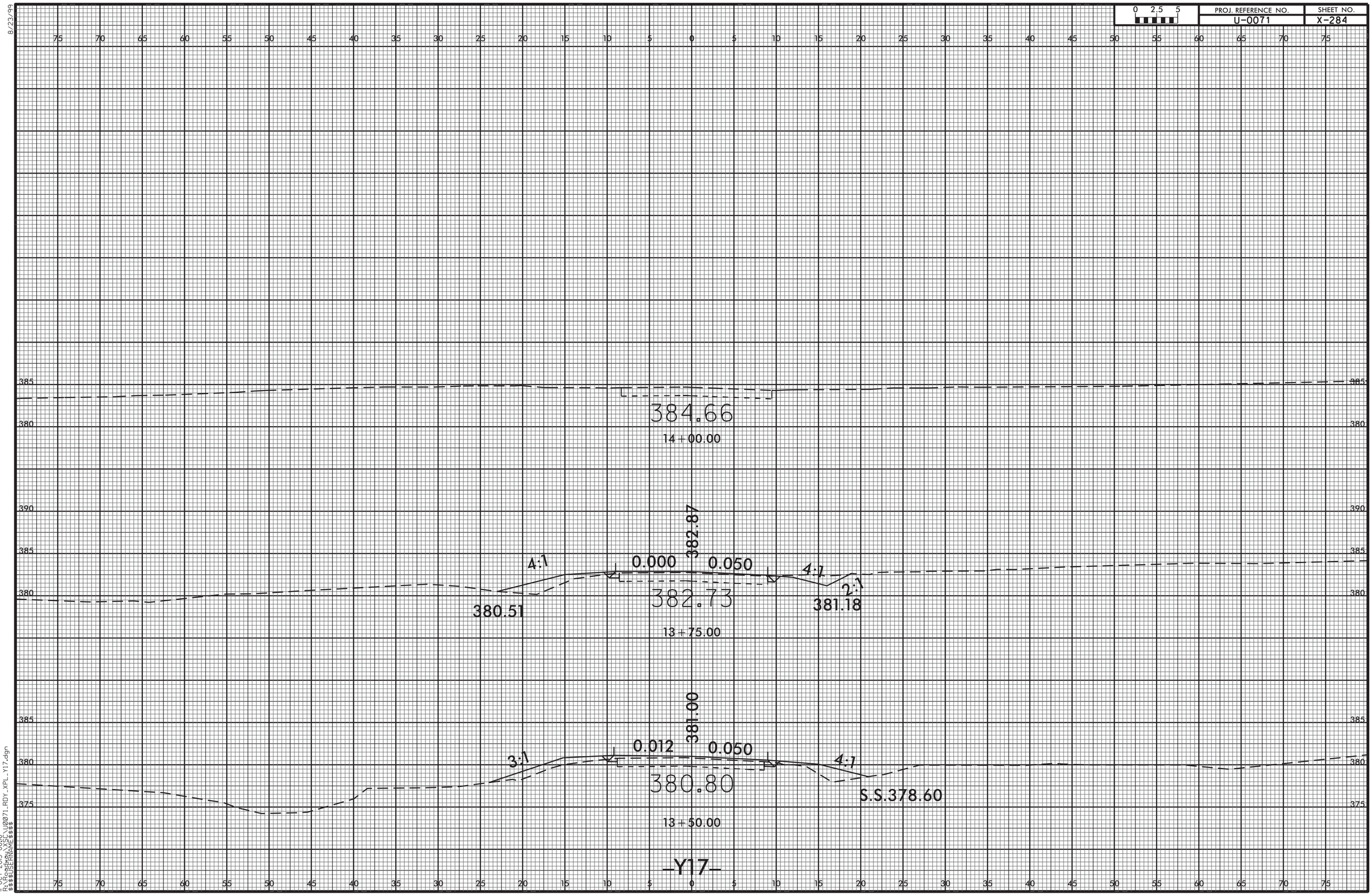
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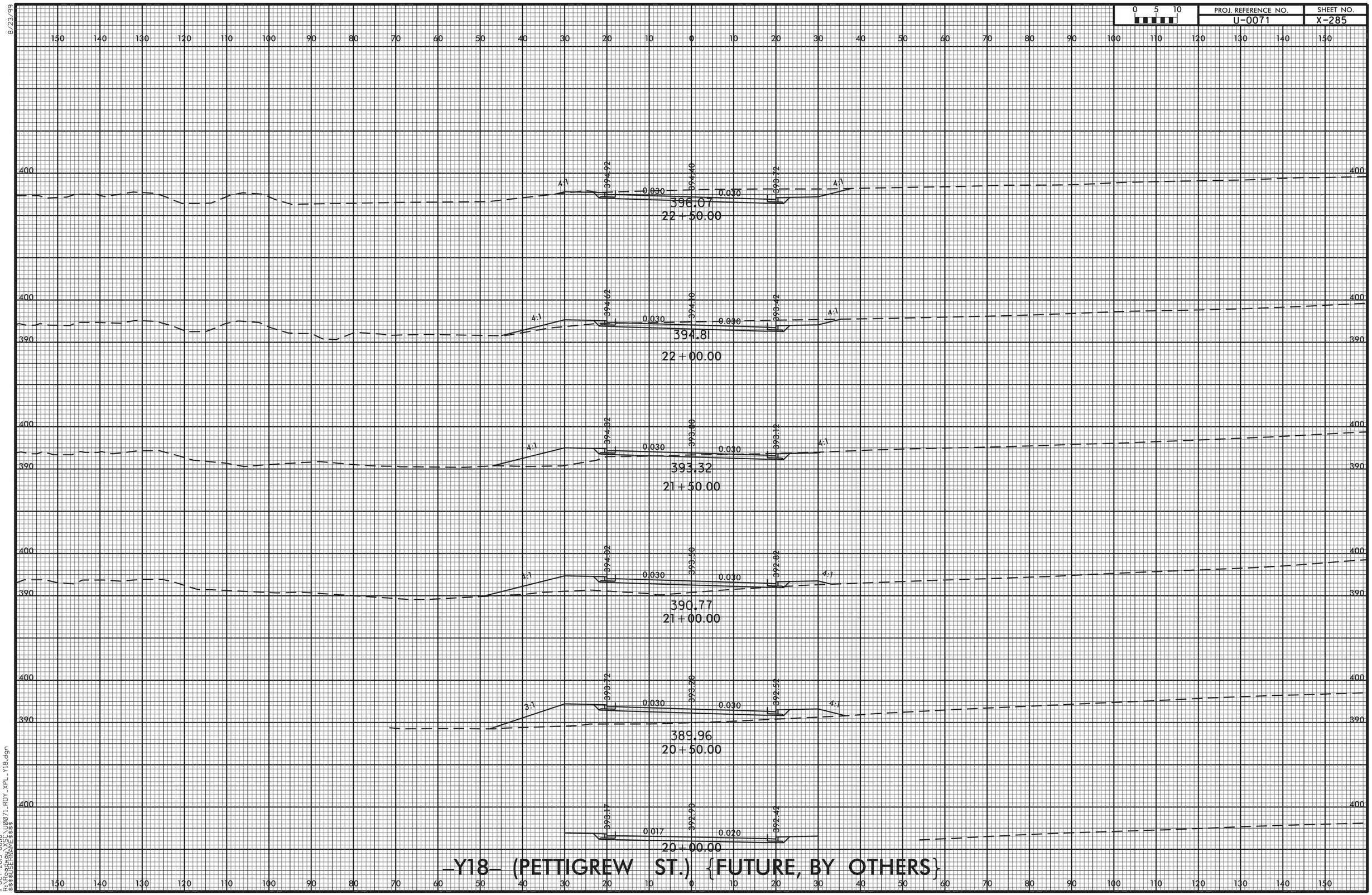


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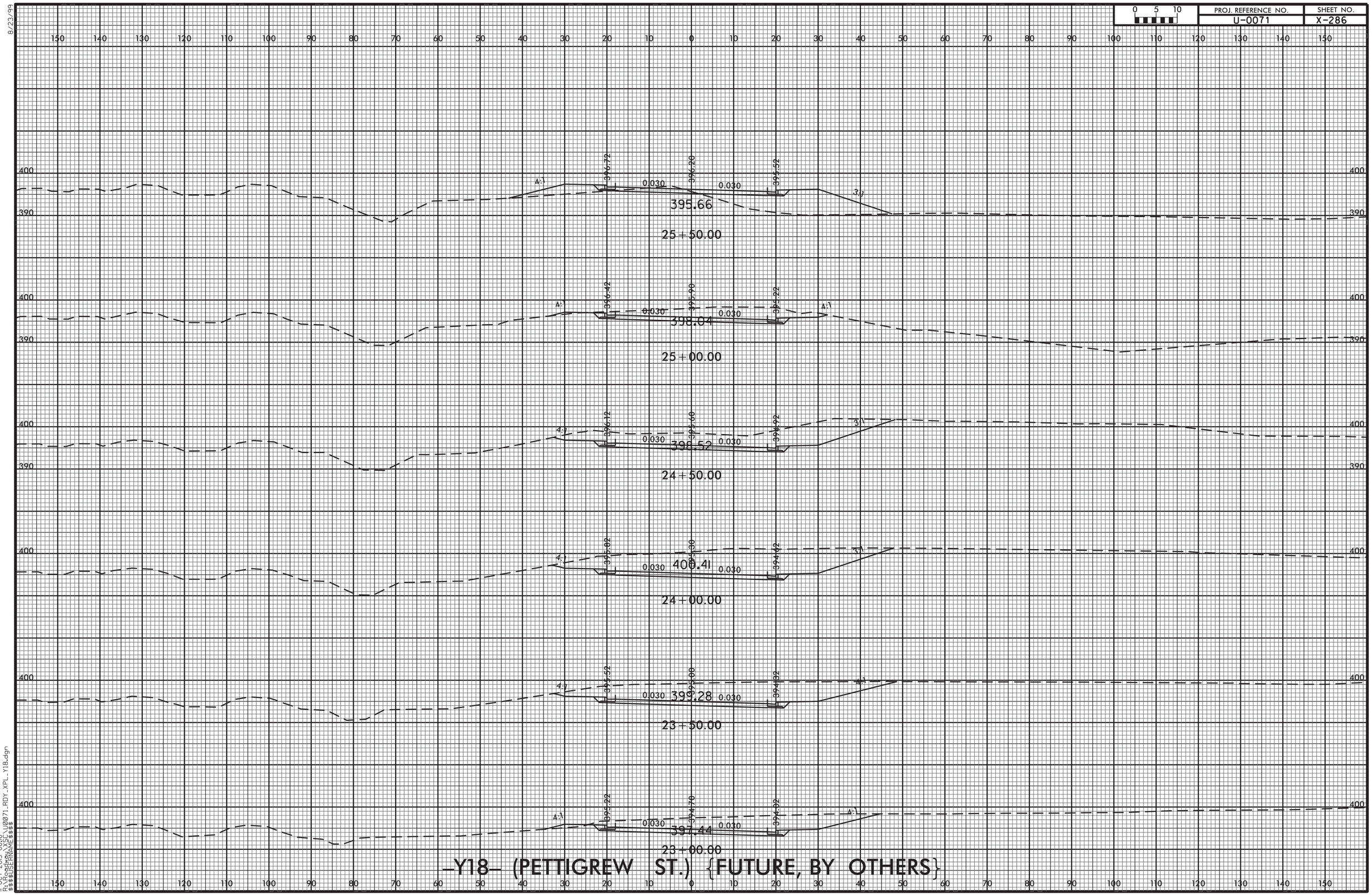


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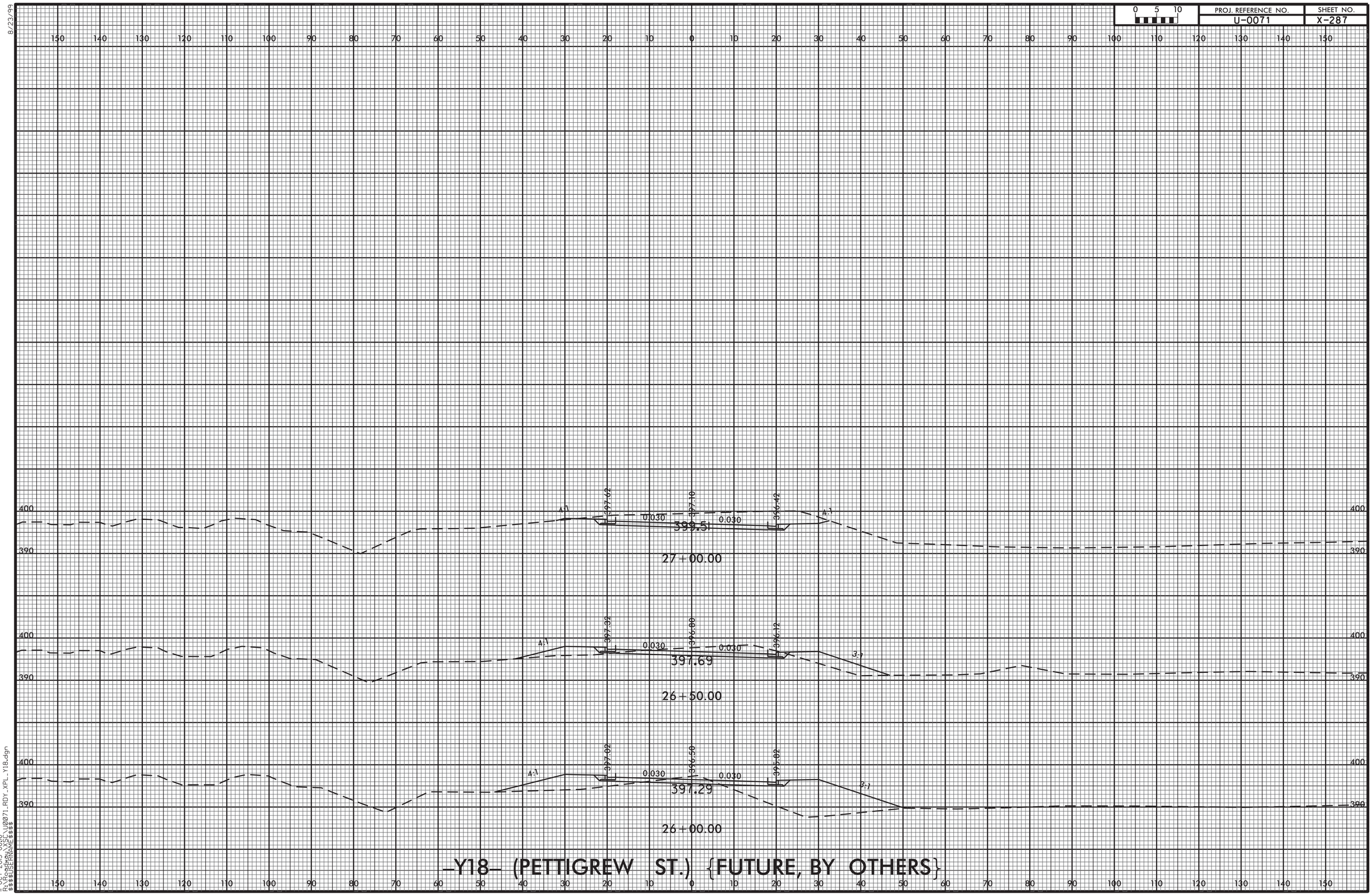


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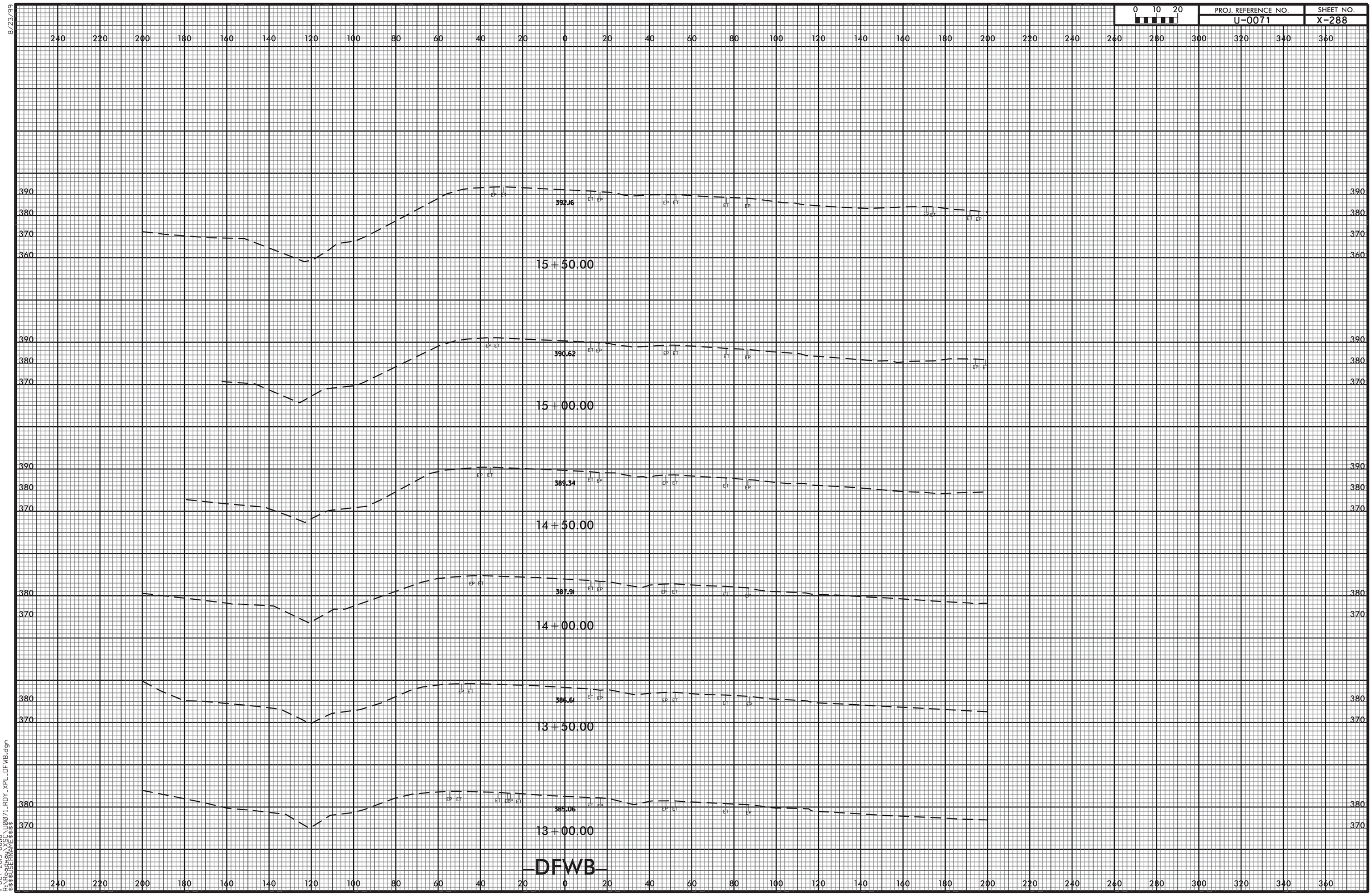


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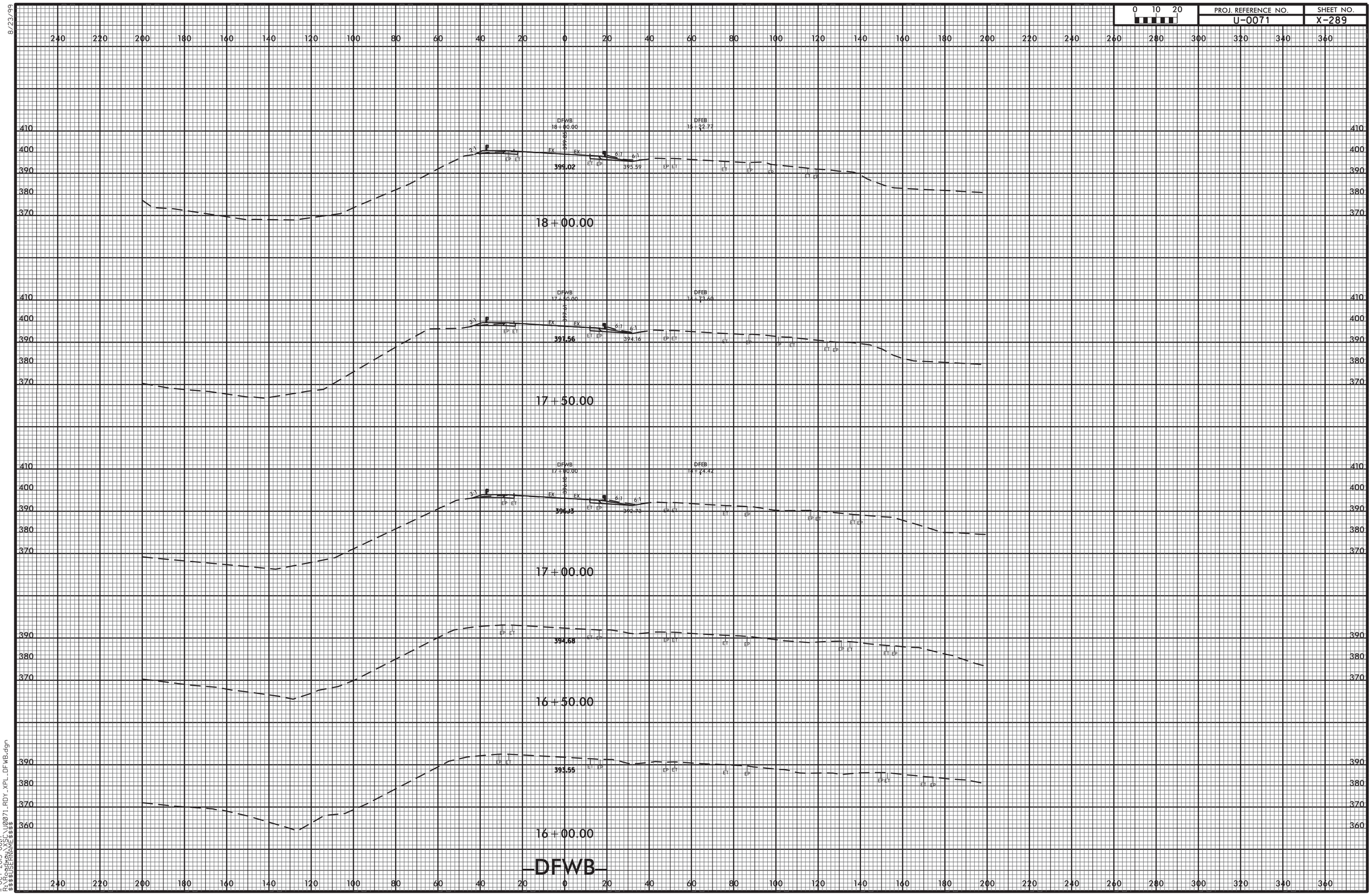


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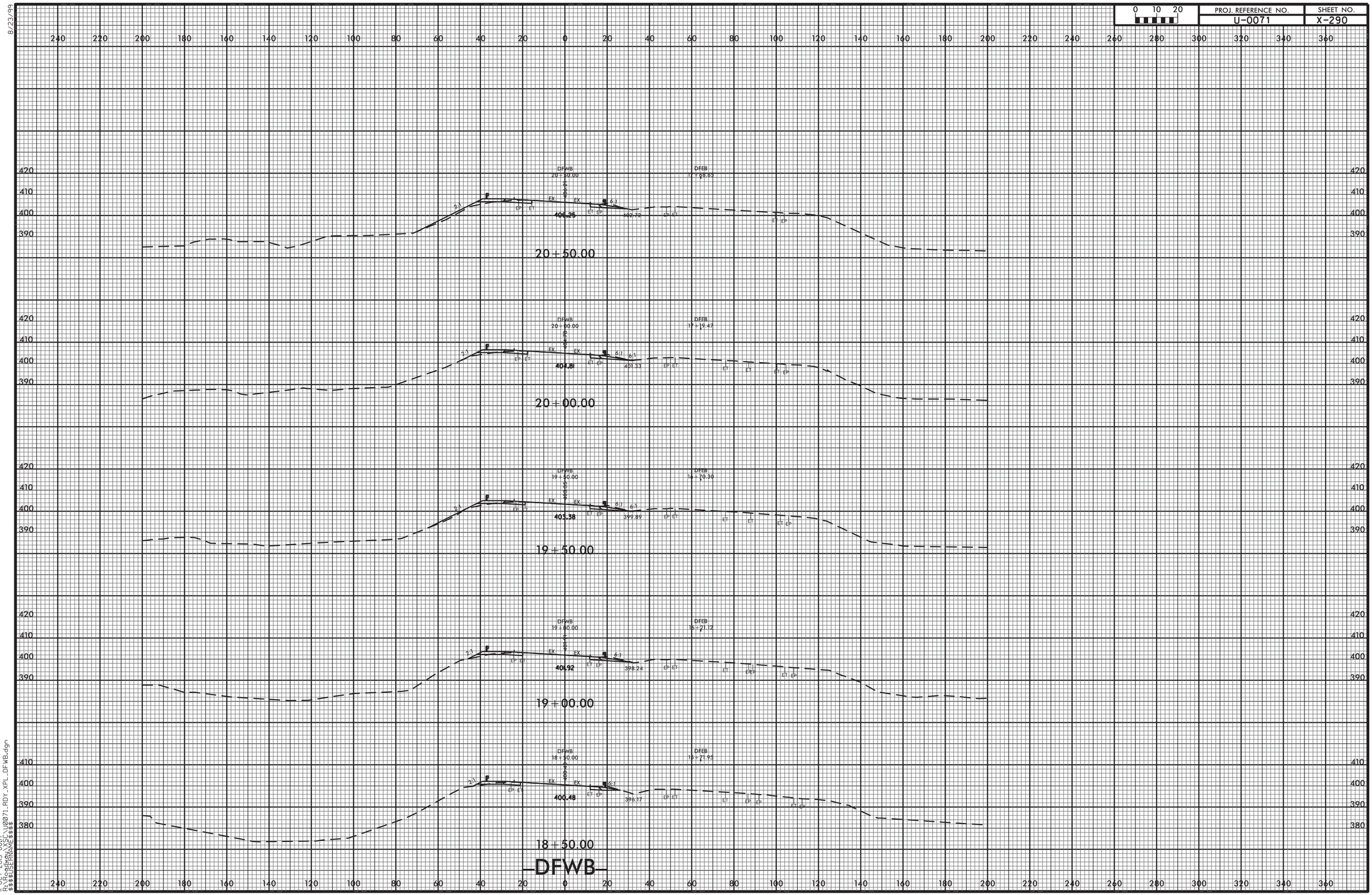


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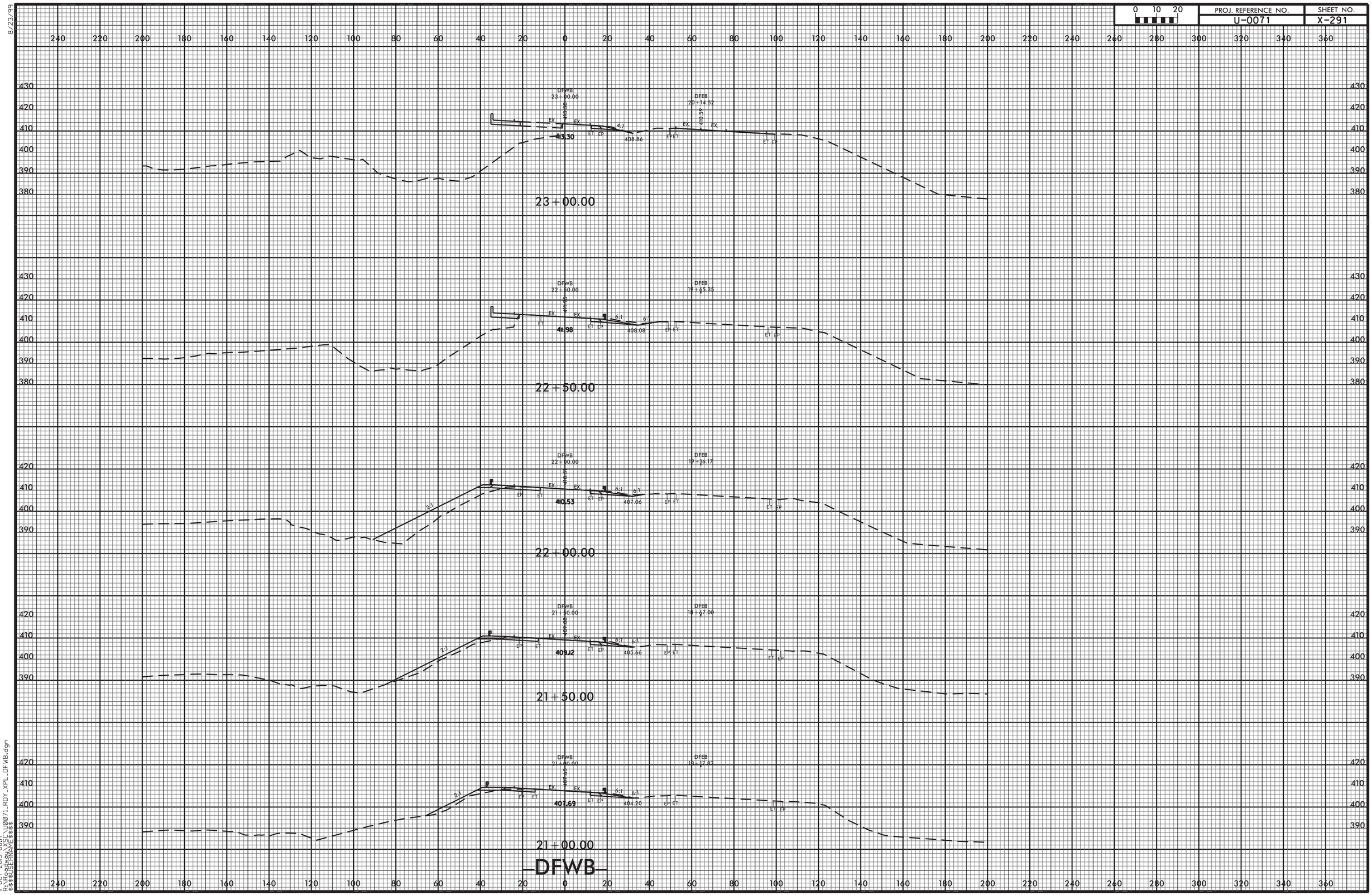


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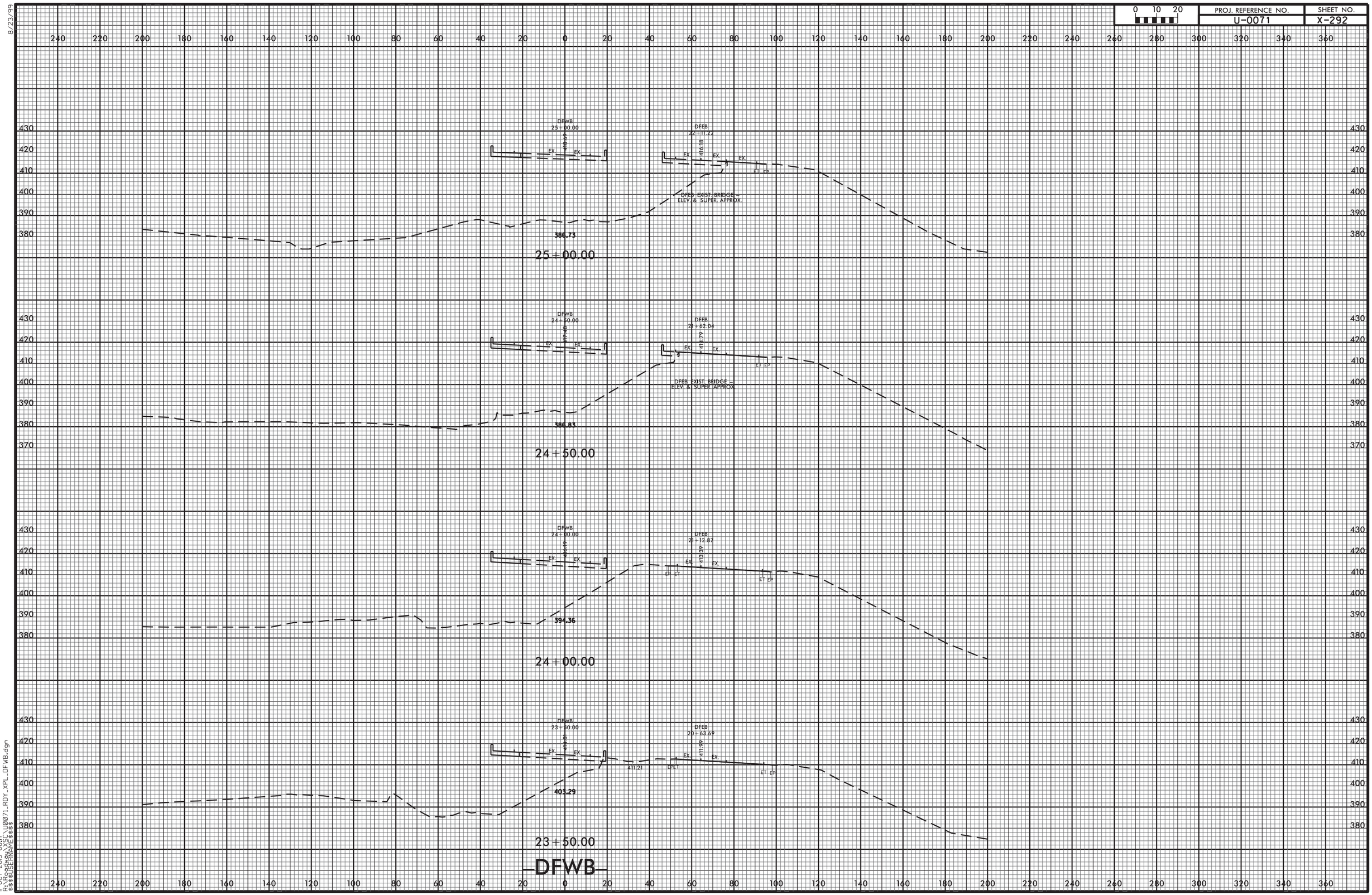


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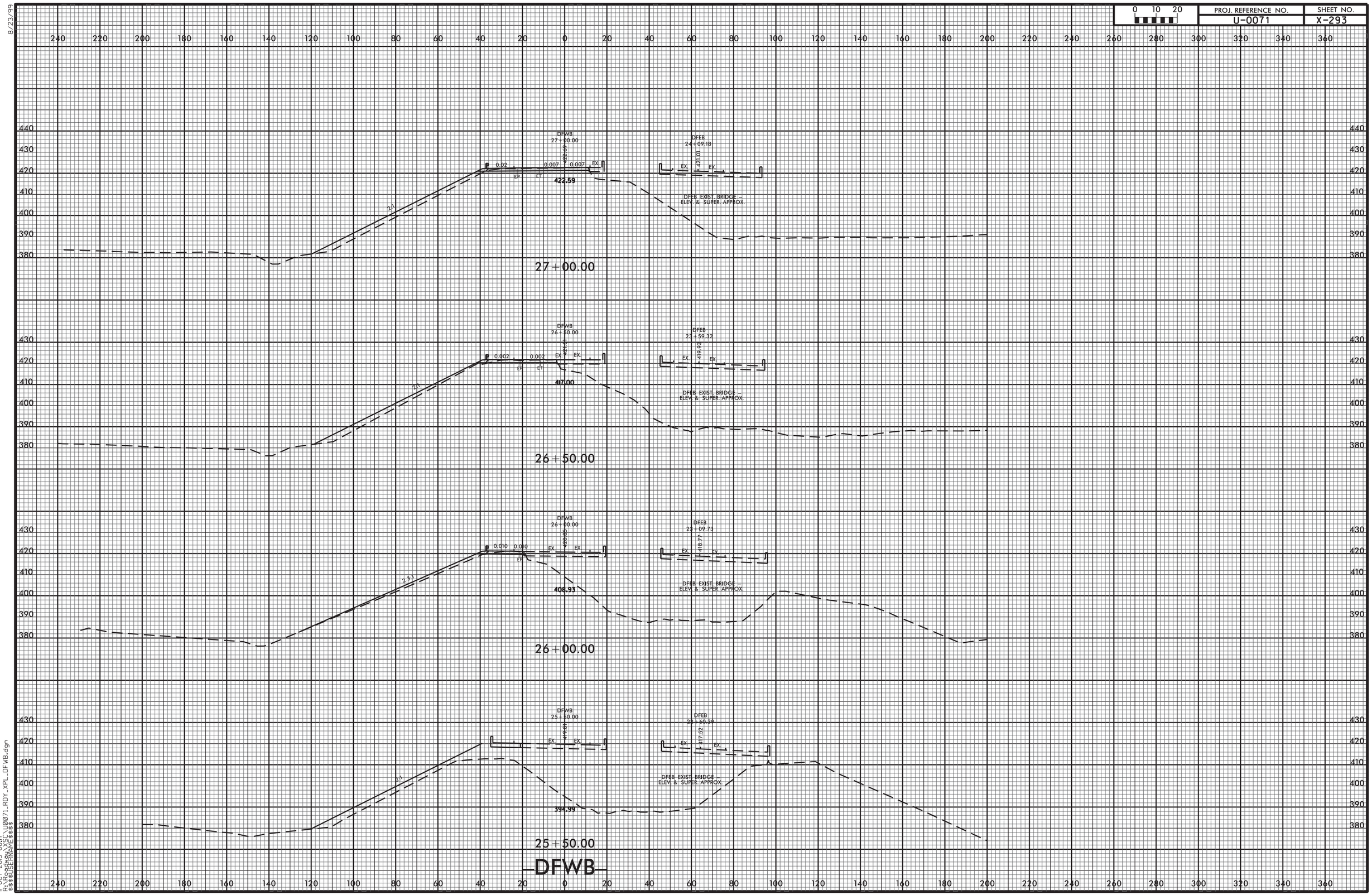


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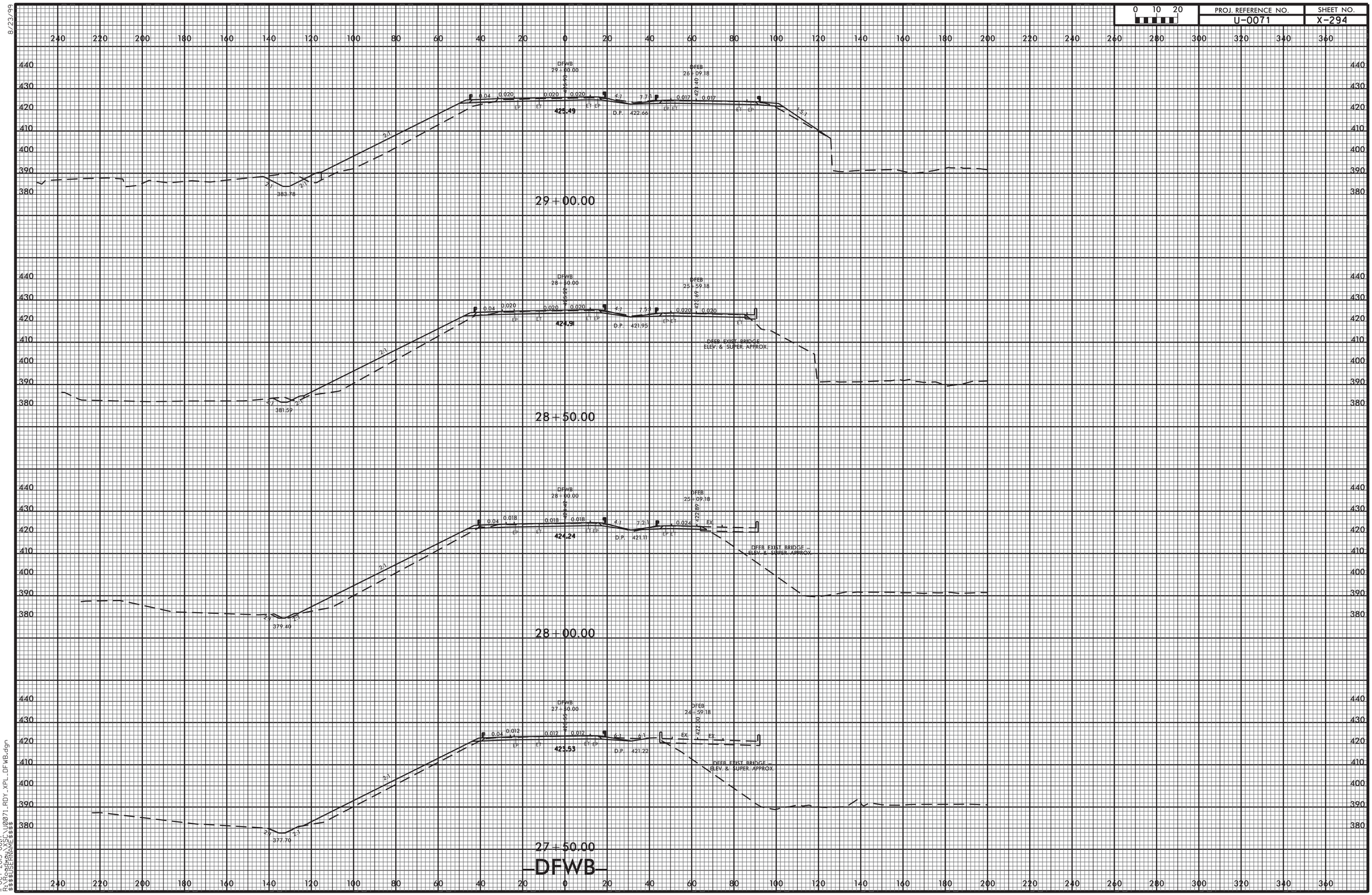


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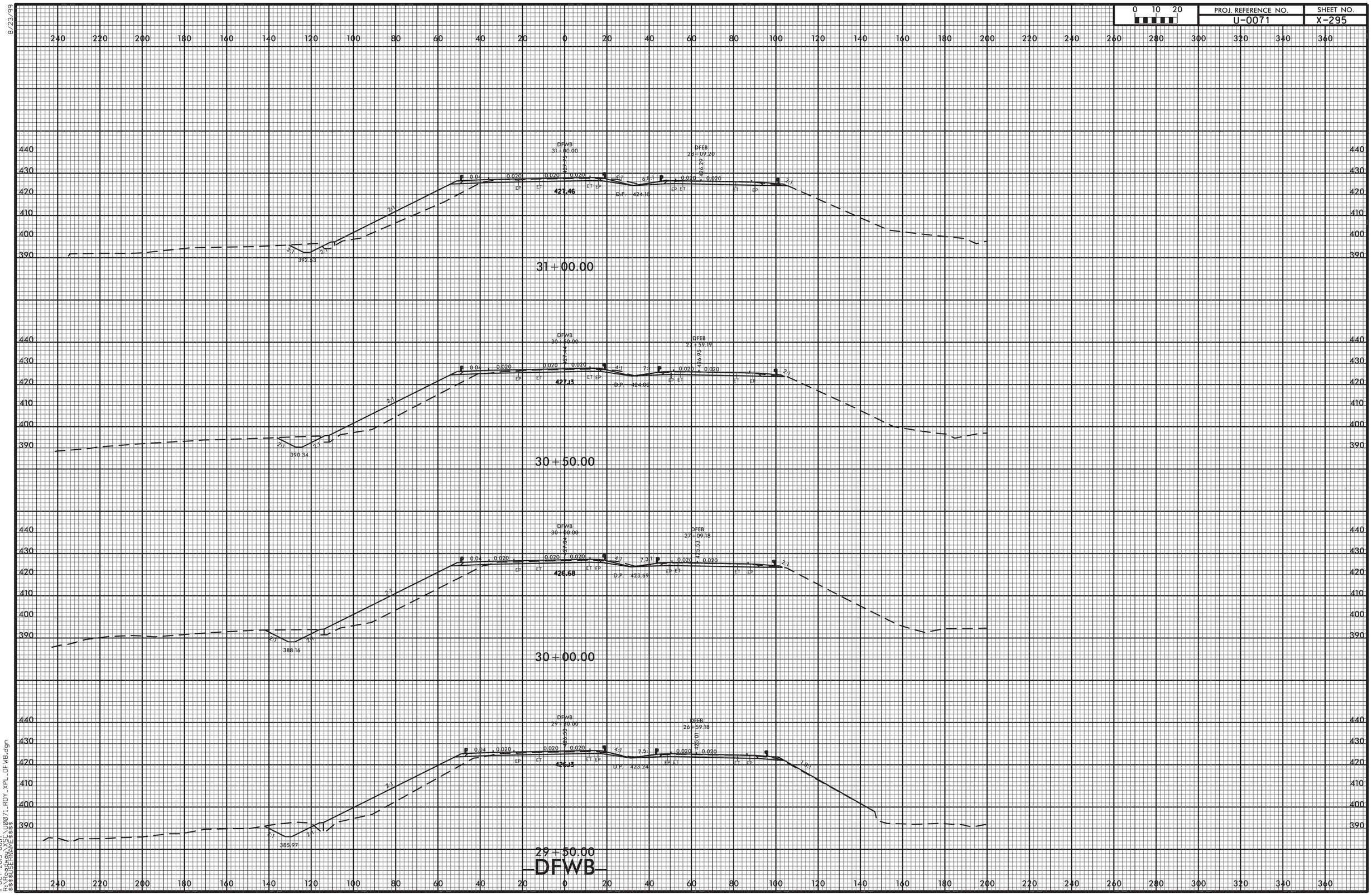


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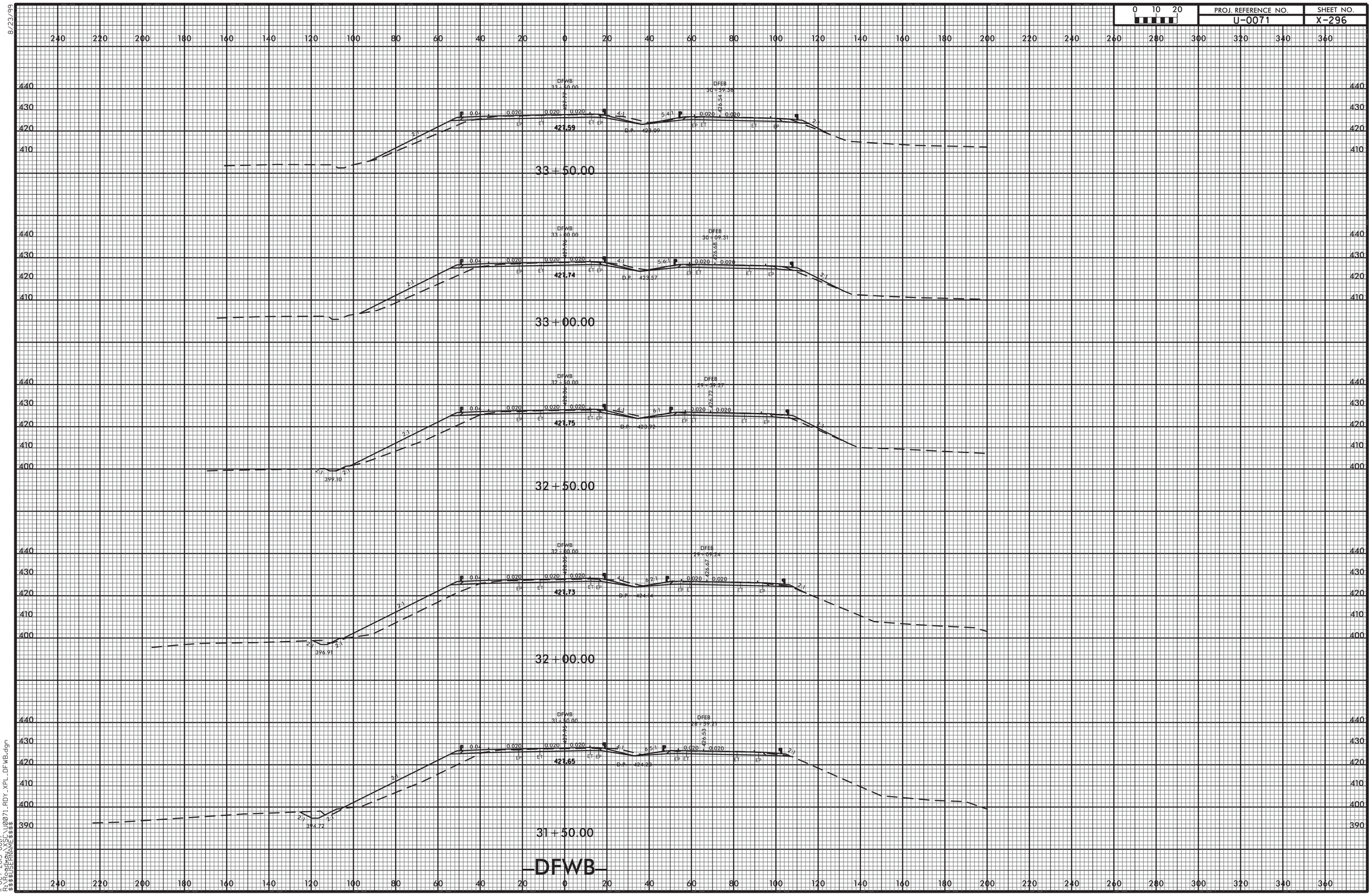


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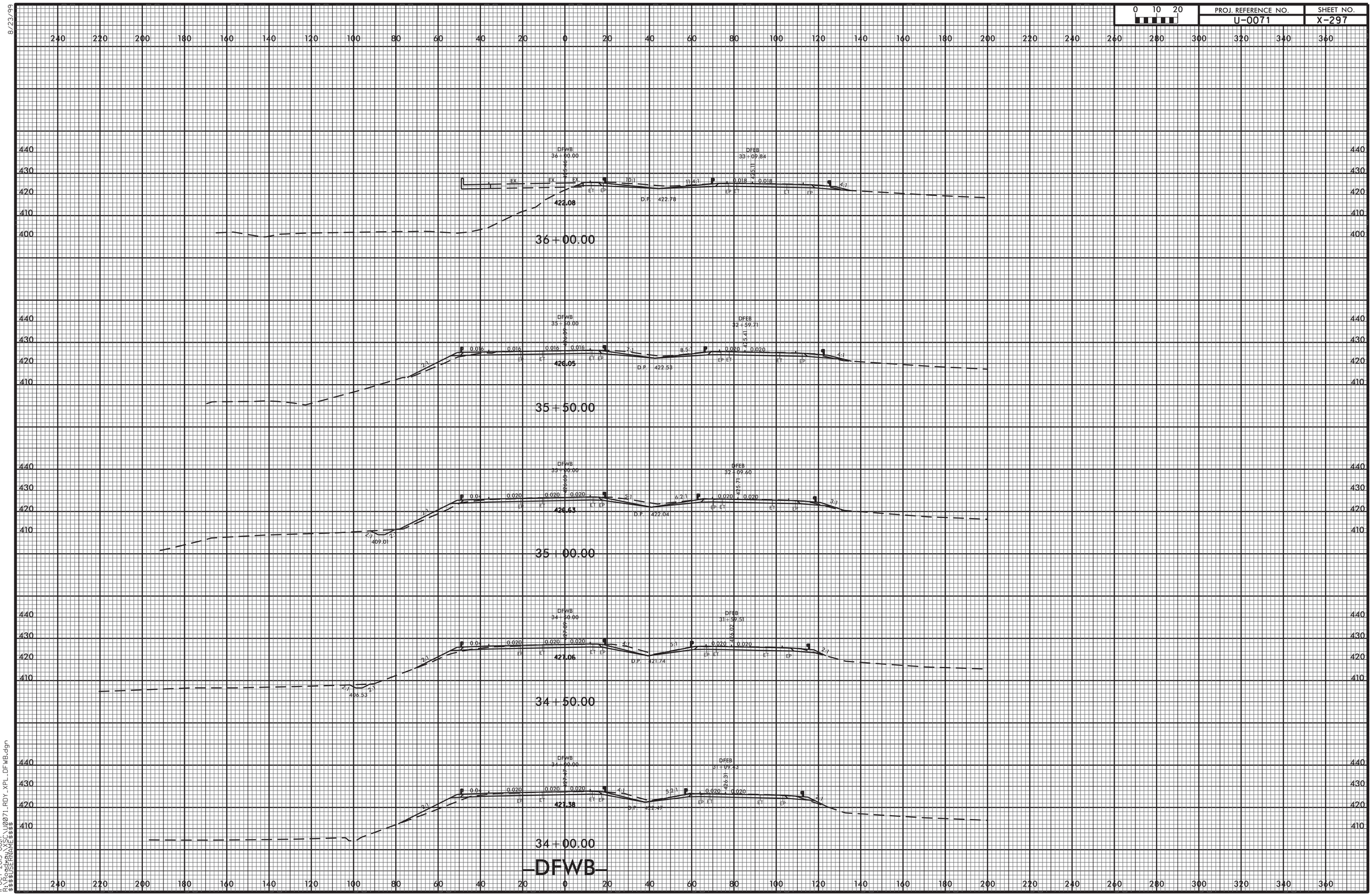


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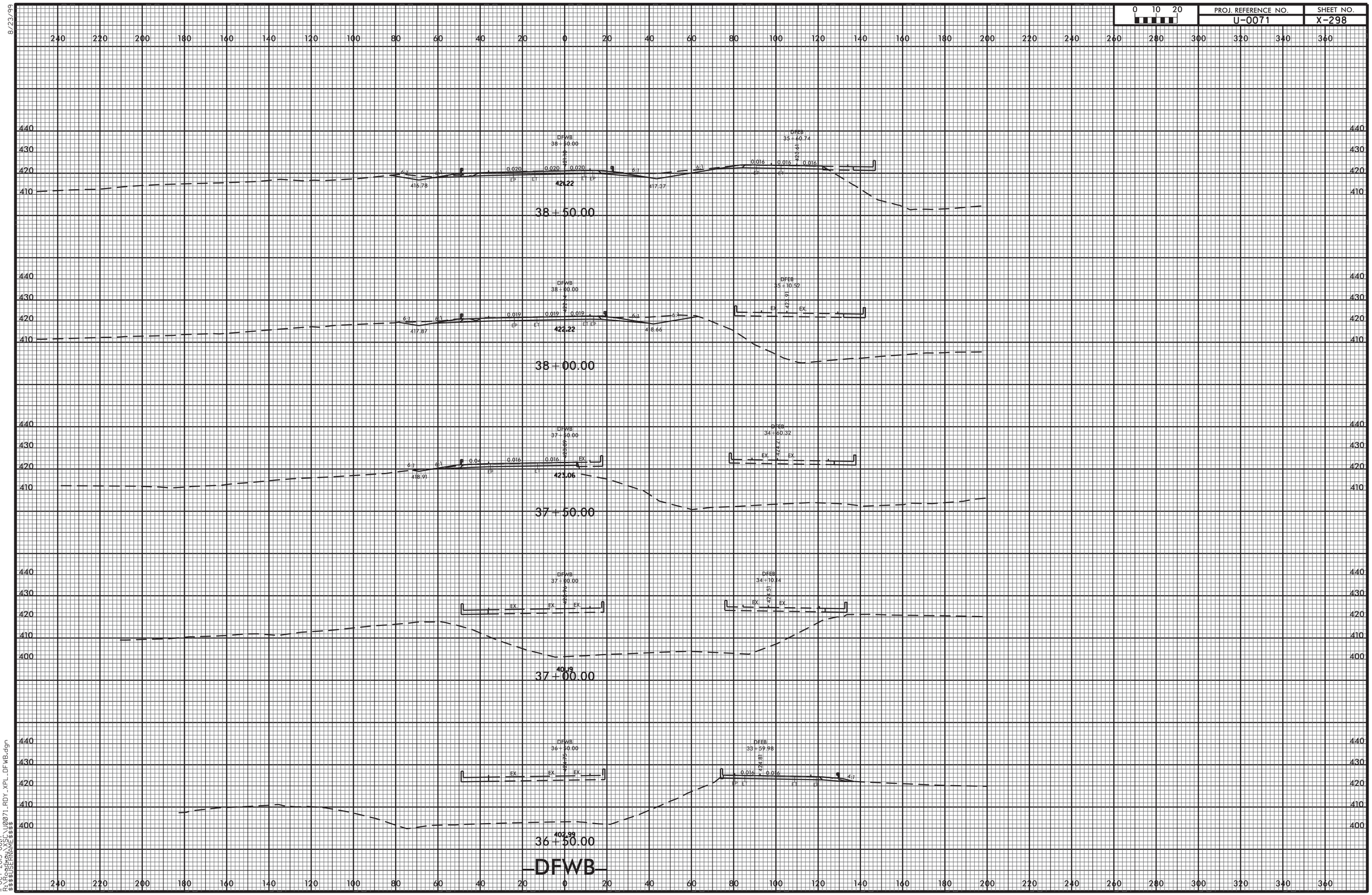
DFWB
38 + 50.00
DFEB
35 + 60.74
422.22
417.78
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DFWB
38 + 00.00
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422.22
417.87
418.66
38 + 00.00
DFWB
37 + 50.00
DFEB
34 + 60.32
423.06
418.91
37 + 50.00
DFWB
37 + 00.00
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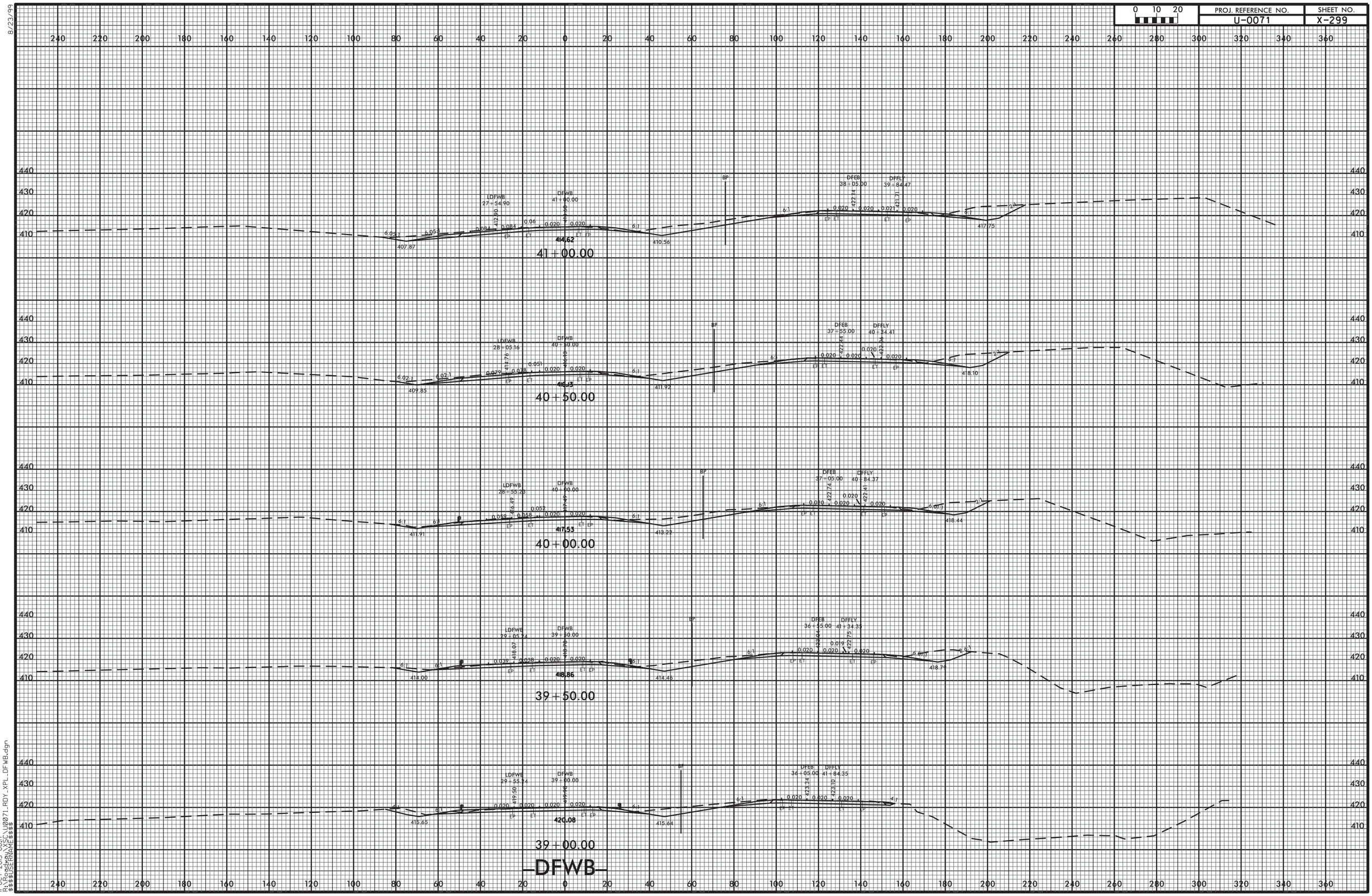


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|---|---|
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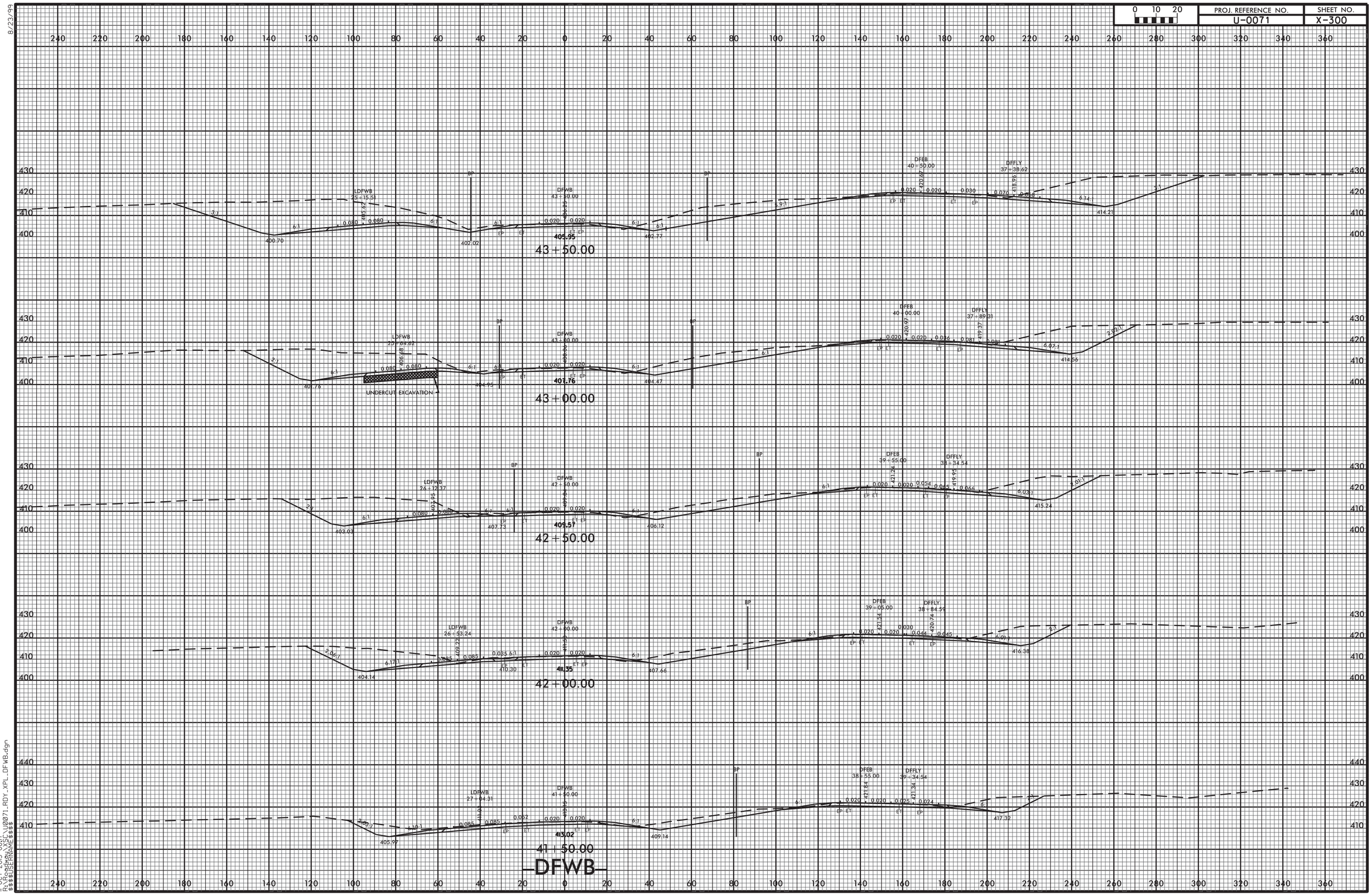


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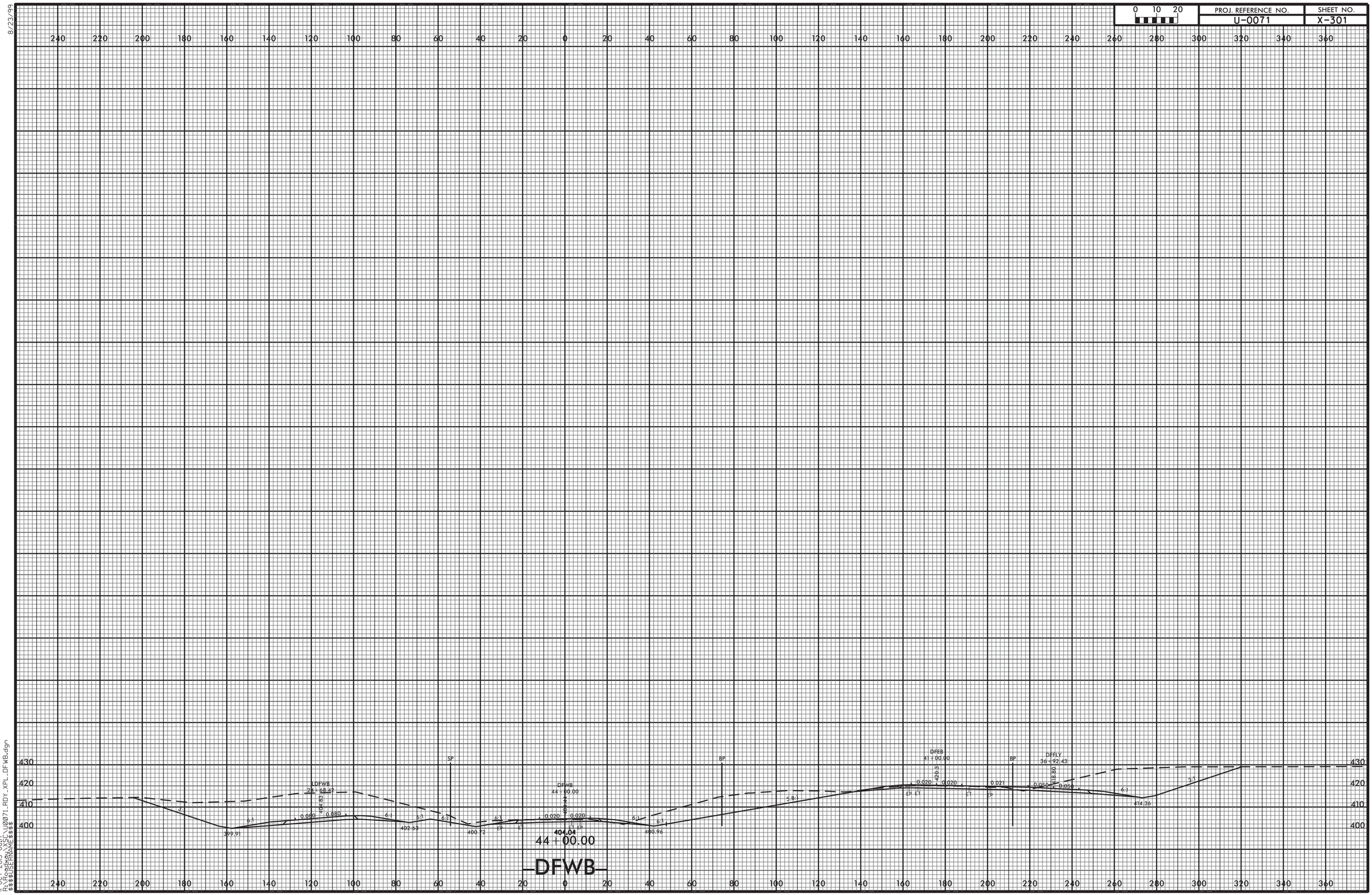
| 0 10 20 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | X-301 |

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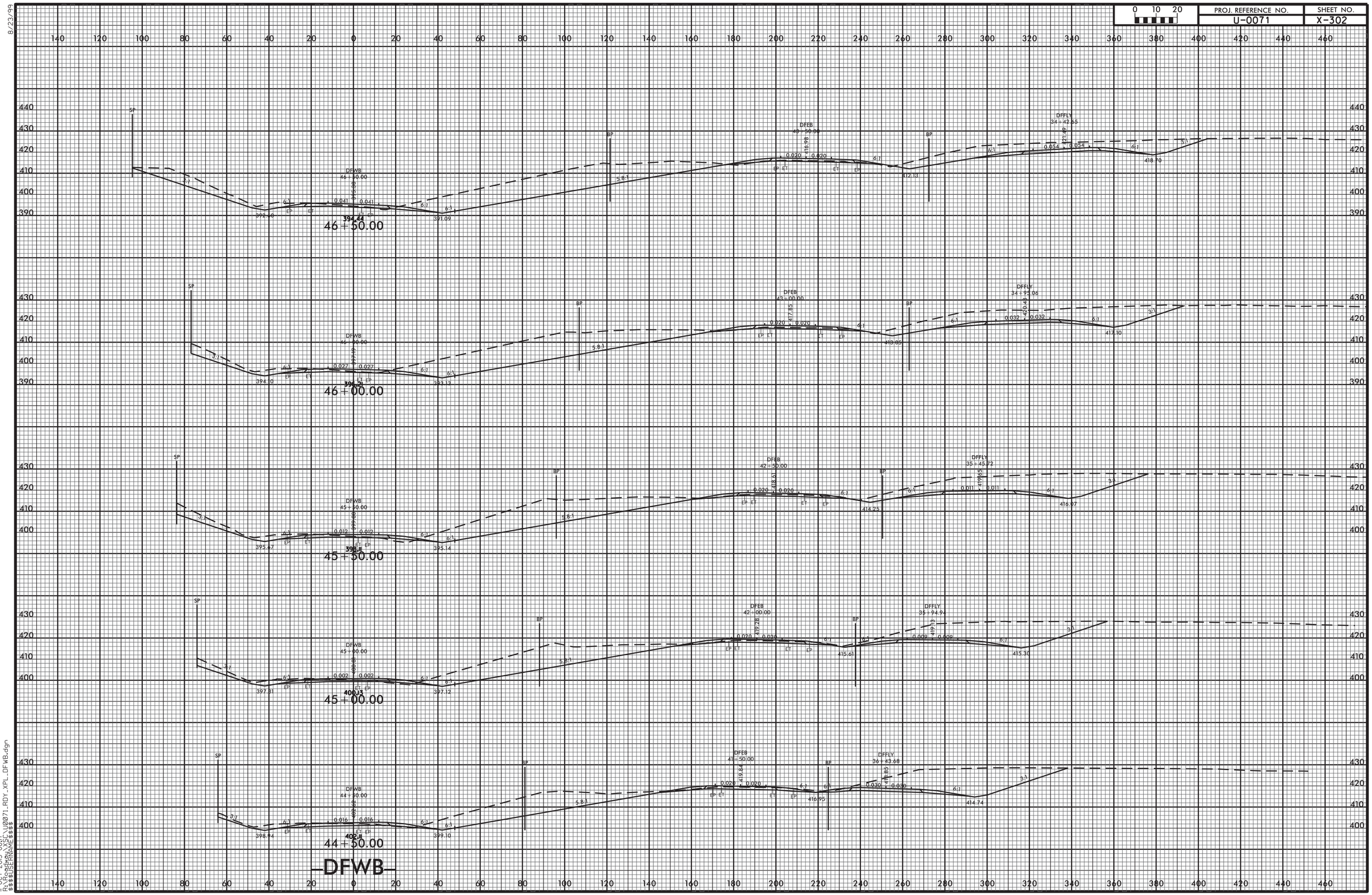
|---|---|---|
| | U-0071 | X-302 |

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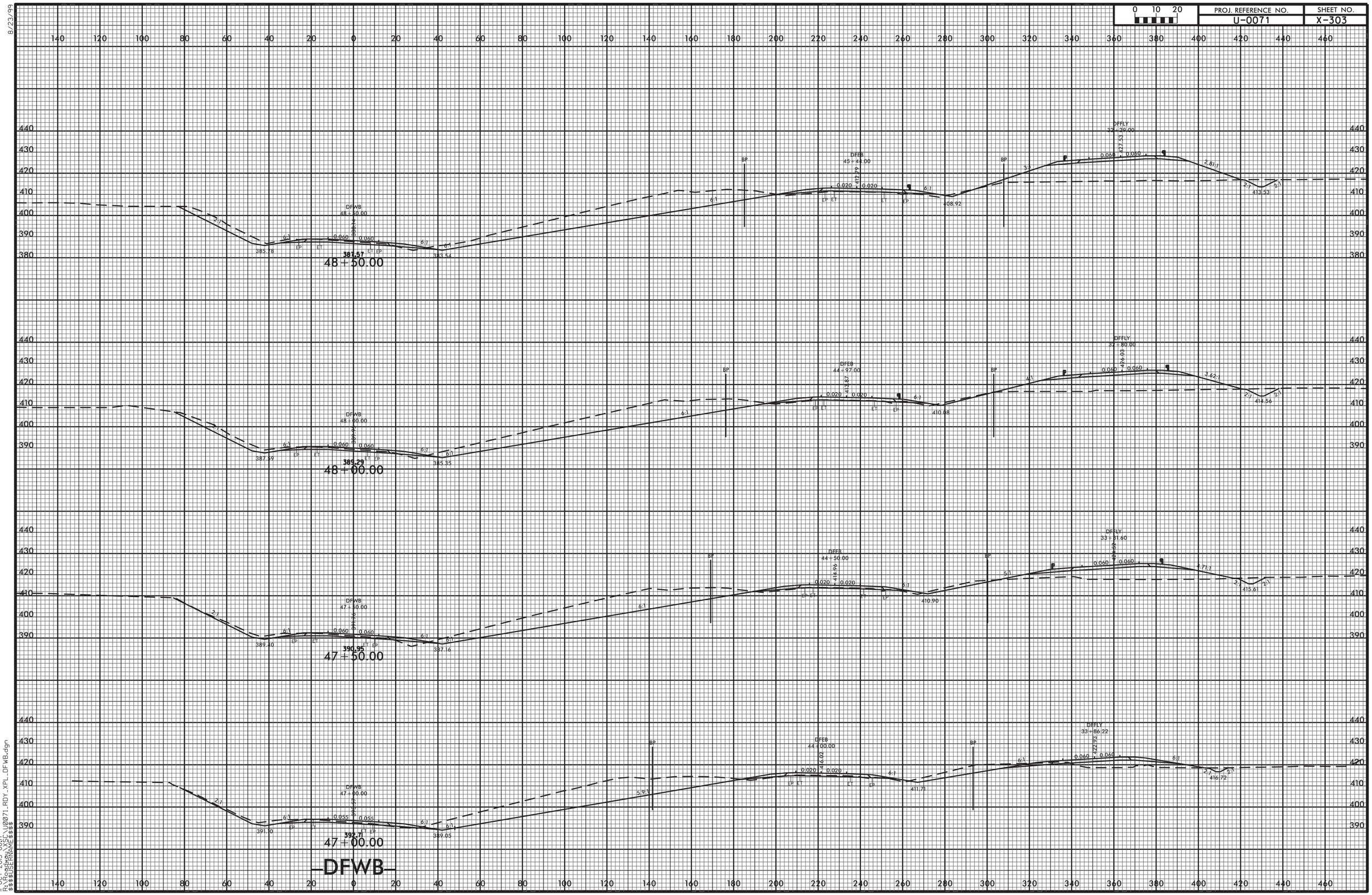
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SHEET NO.
X-303
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385.78
387.57
383.54
DFEB
45+46.00
412.79
408.92
DFFLY
32+30.00
427.53
413.53
DFWB
48+00.00
387.39
385.29
385.35
DFEB
44+97.00
413.87
410.08
DFFLY
32+80.00
426.03
414.56
DFWB
47+50.00
389.40
390.95
387.16
DFEB
44+50.00
414.94
410.90
DFFLY
33+31.60
425.26
415.61
DFWB
47+00.00
391.10
392.71
389.05
DFEB
44+00.00
416.02
411.71
DFFLY
33+86.22
422.93
416.72
BP
-DFWB-
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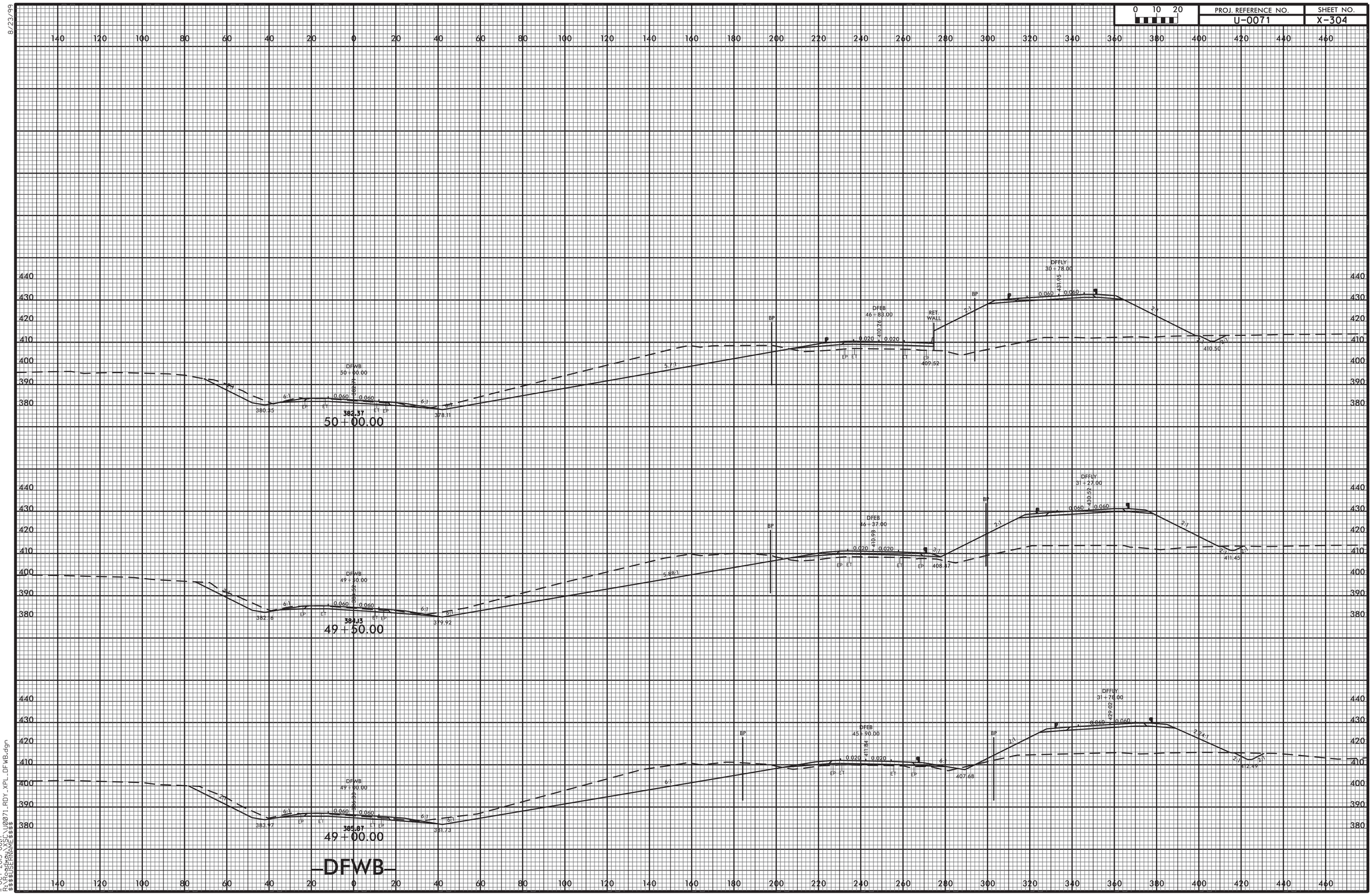


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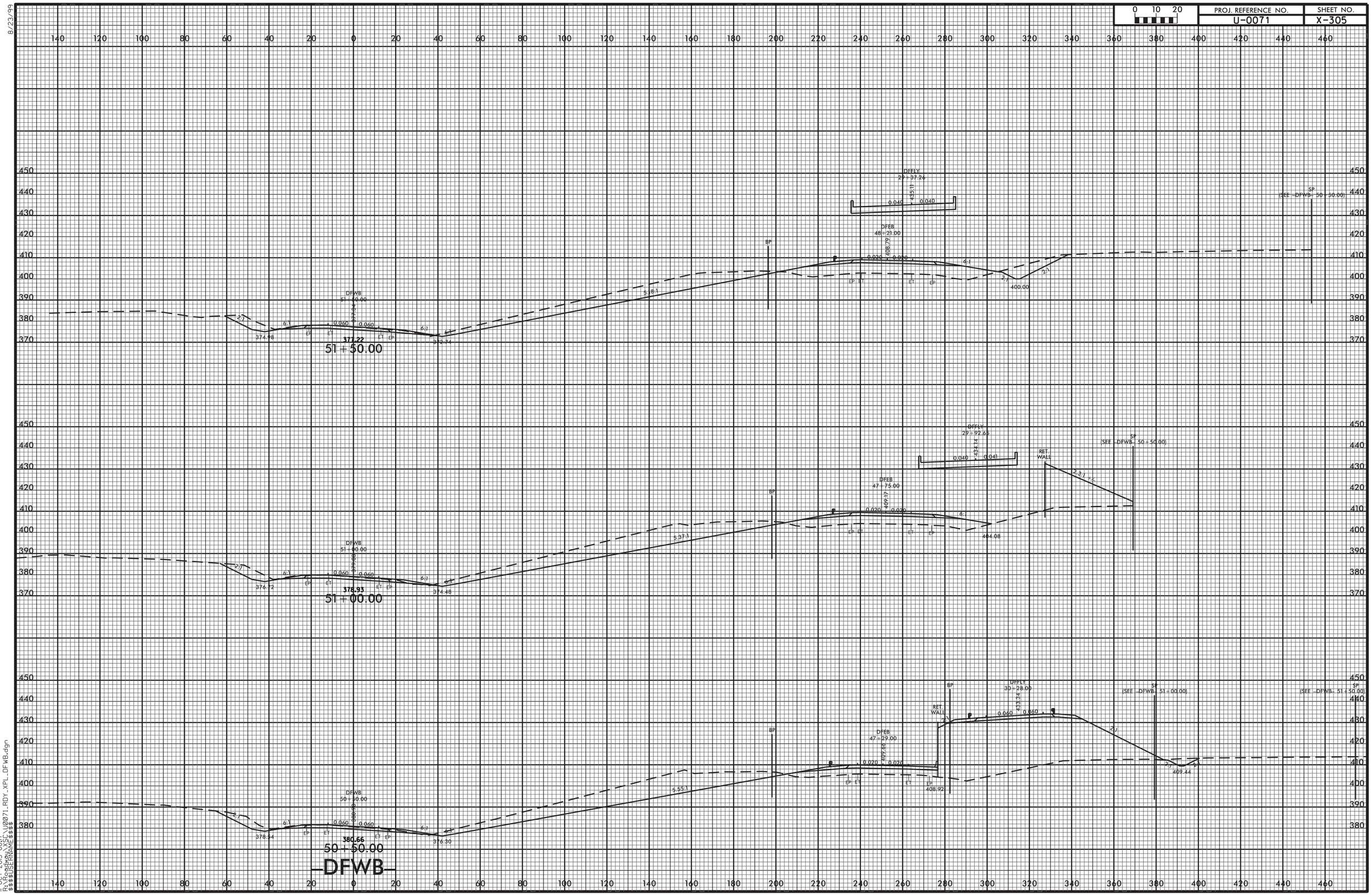


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|---|---|
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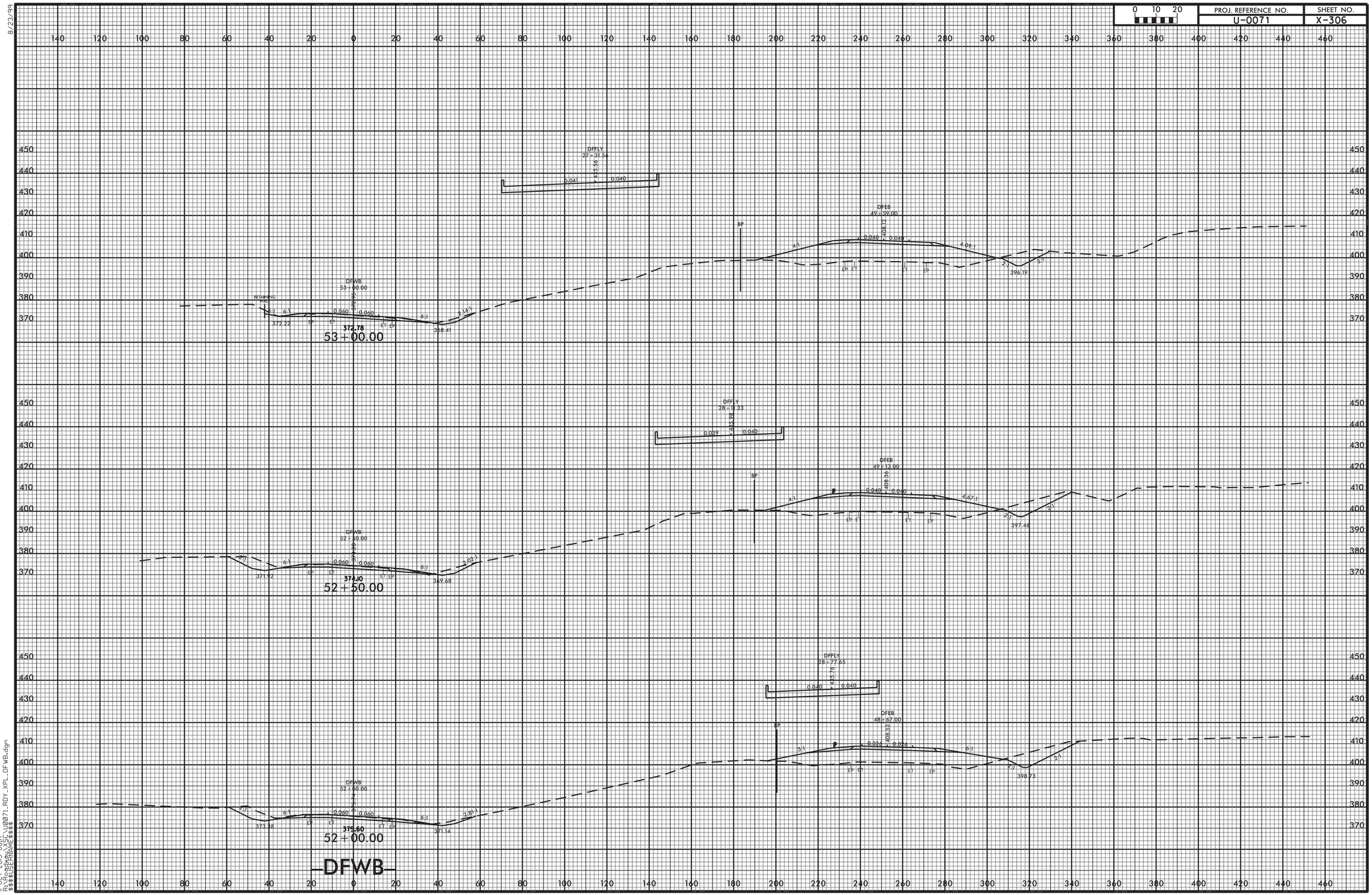


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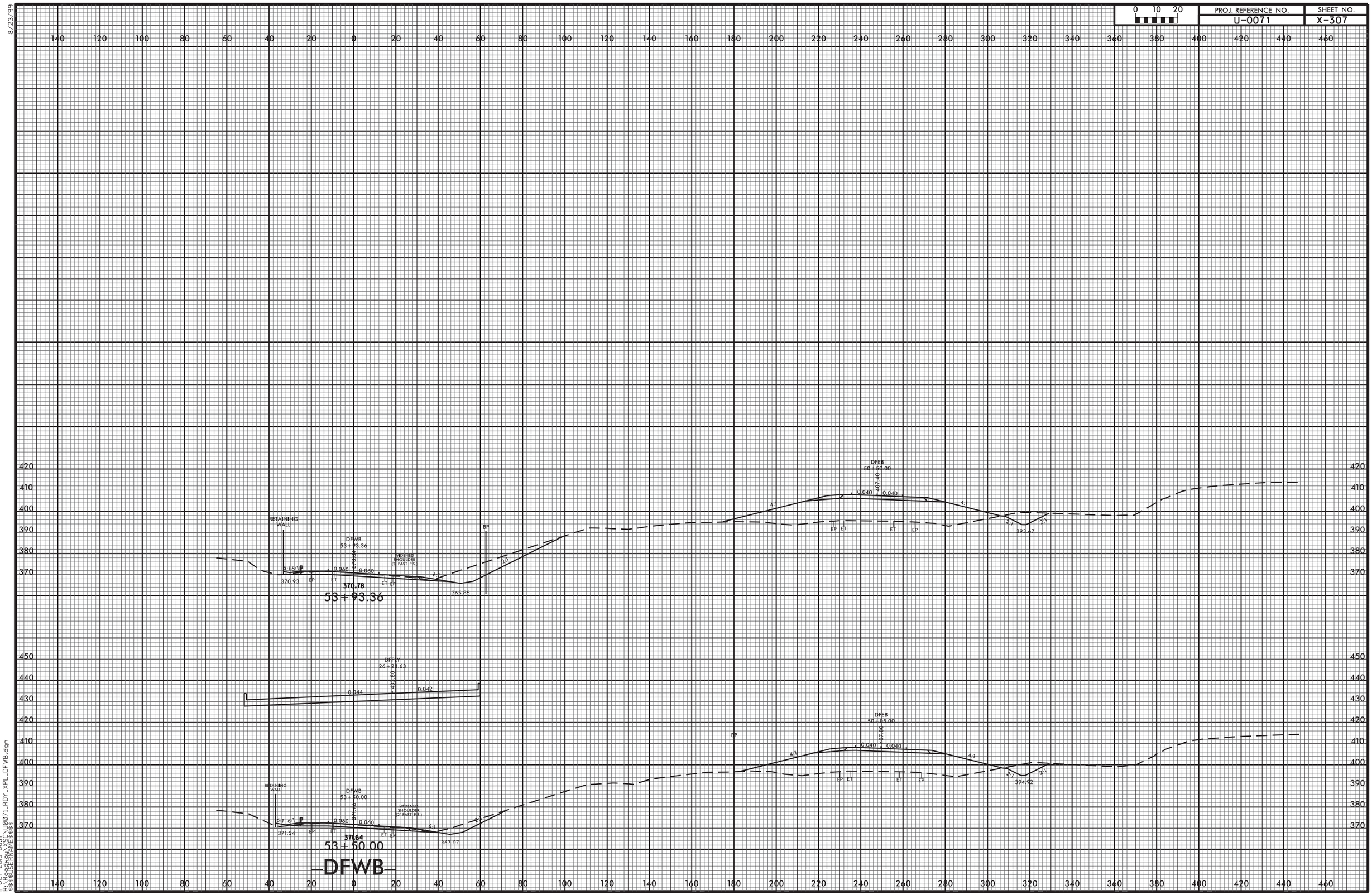


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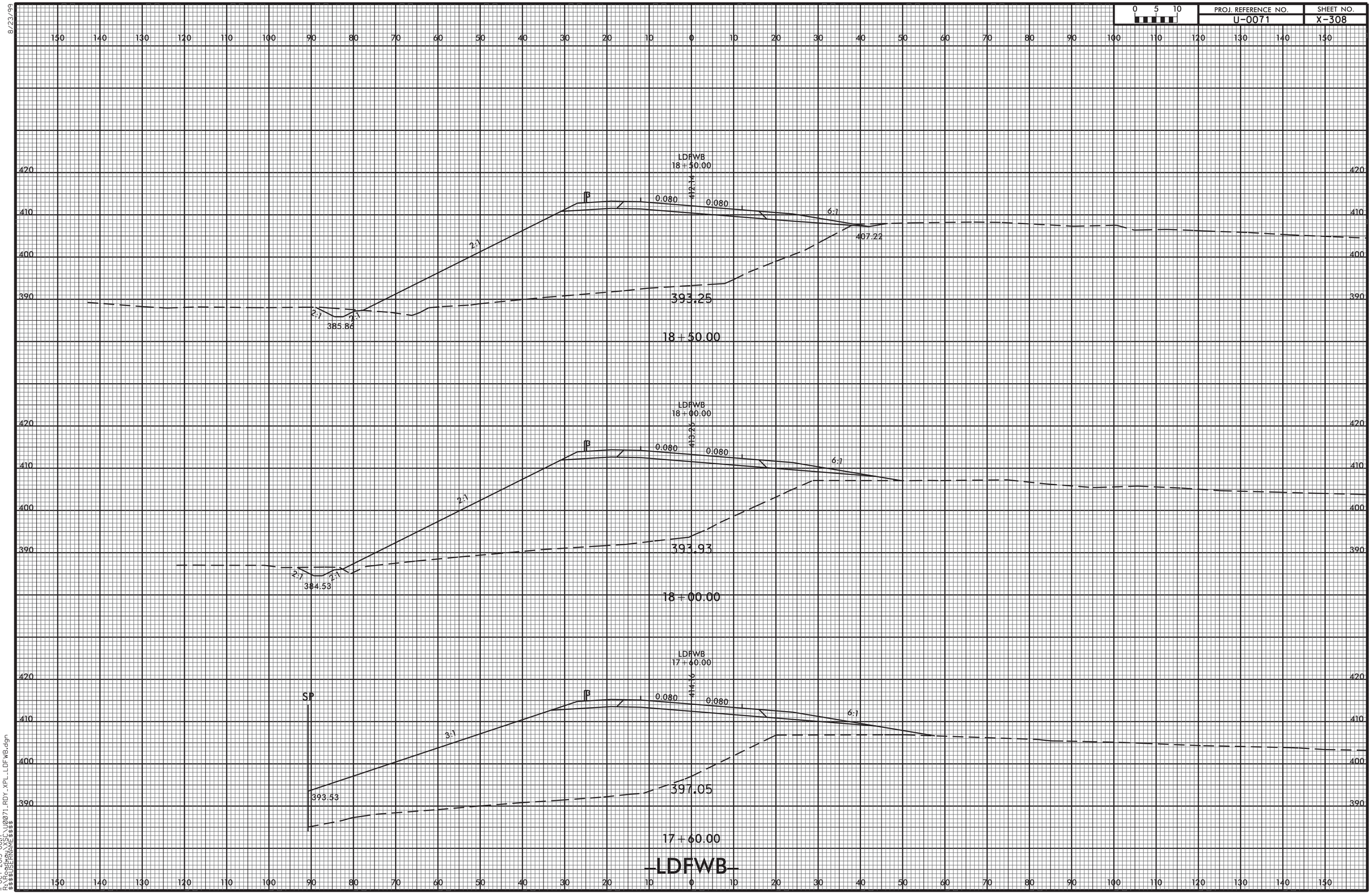


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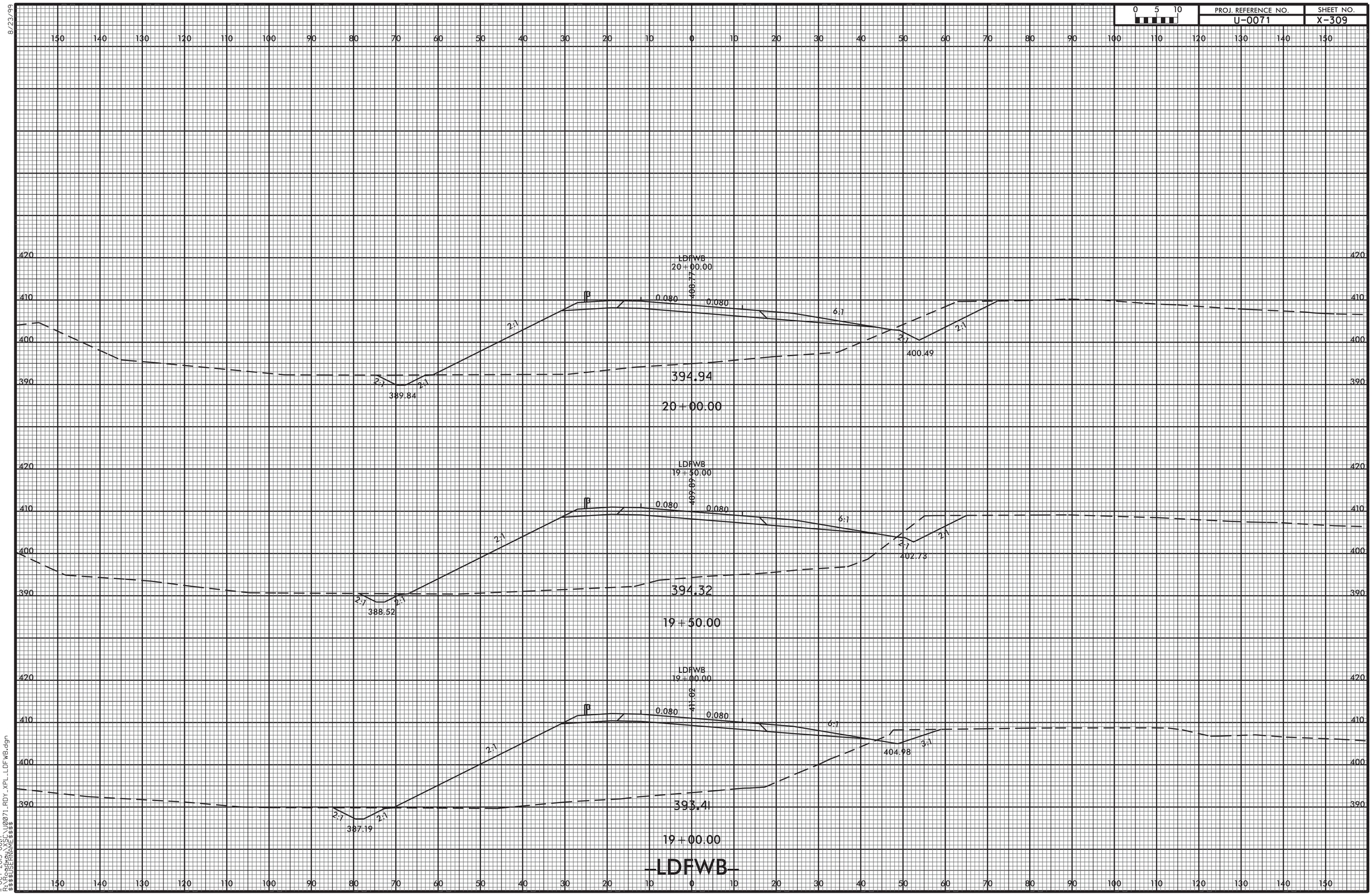


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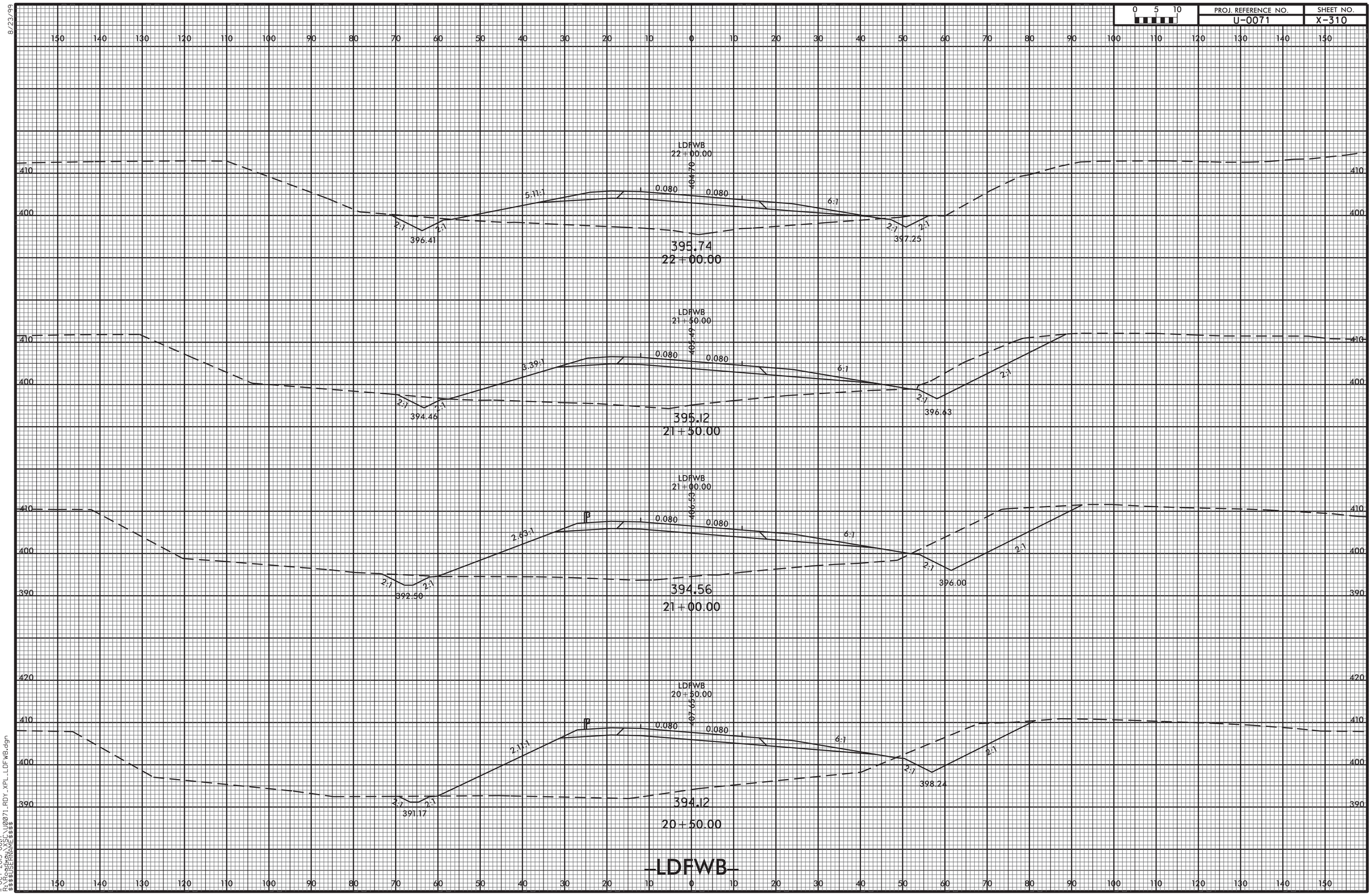


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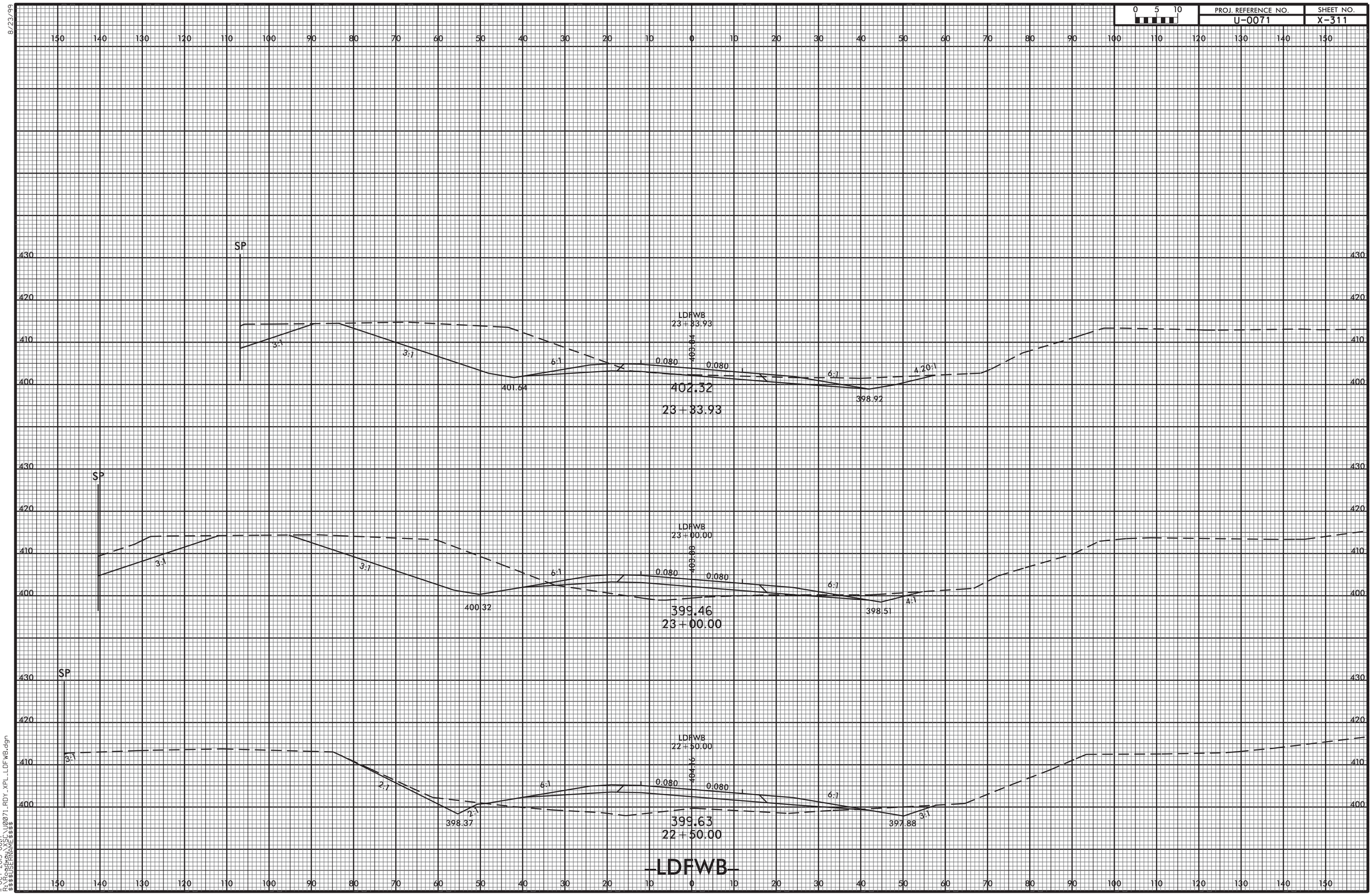


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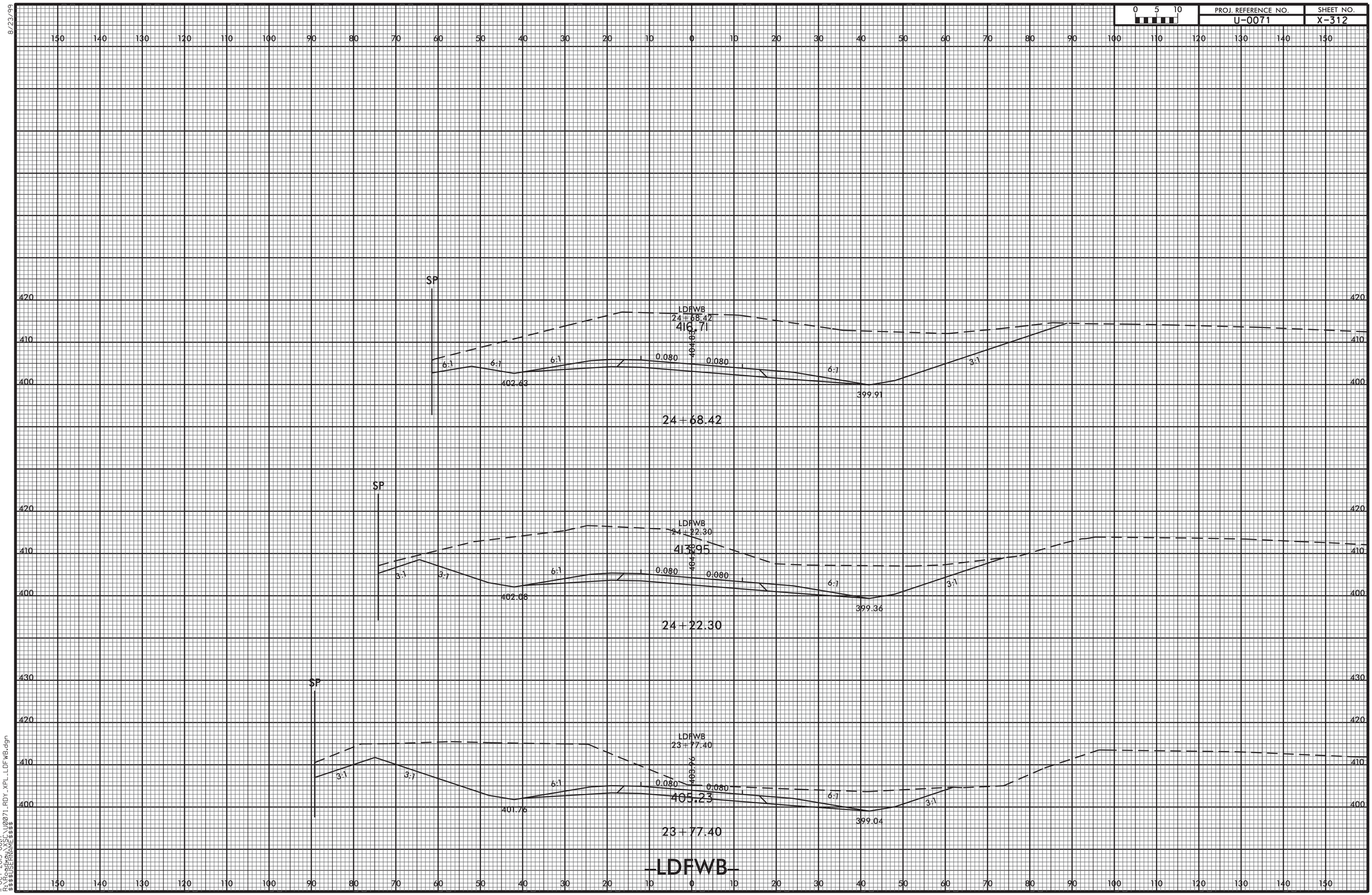


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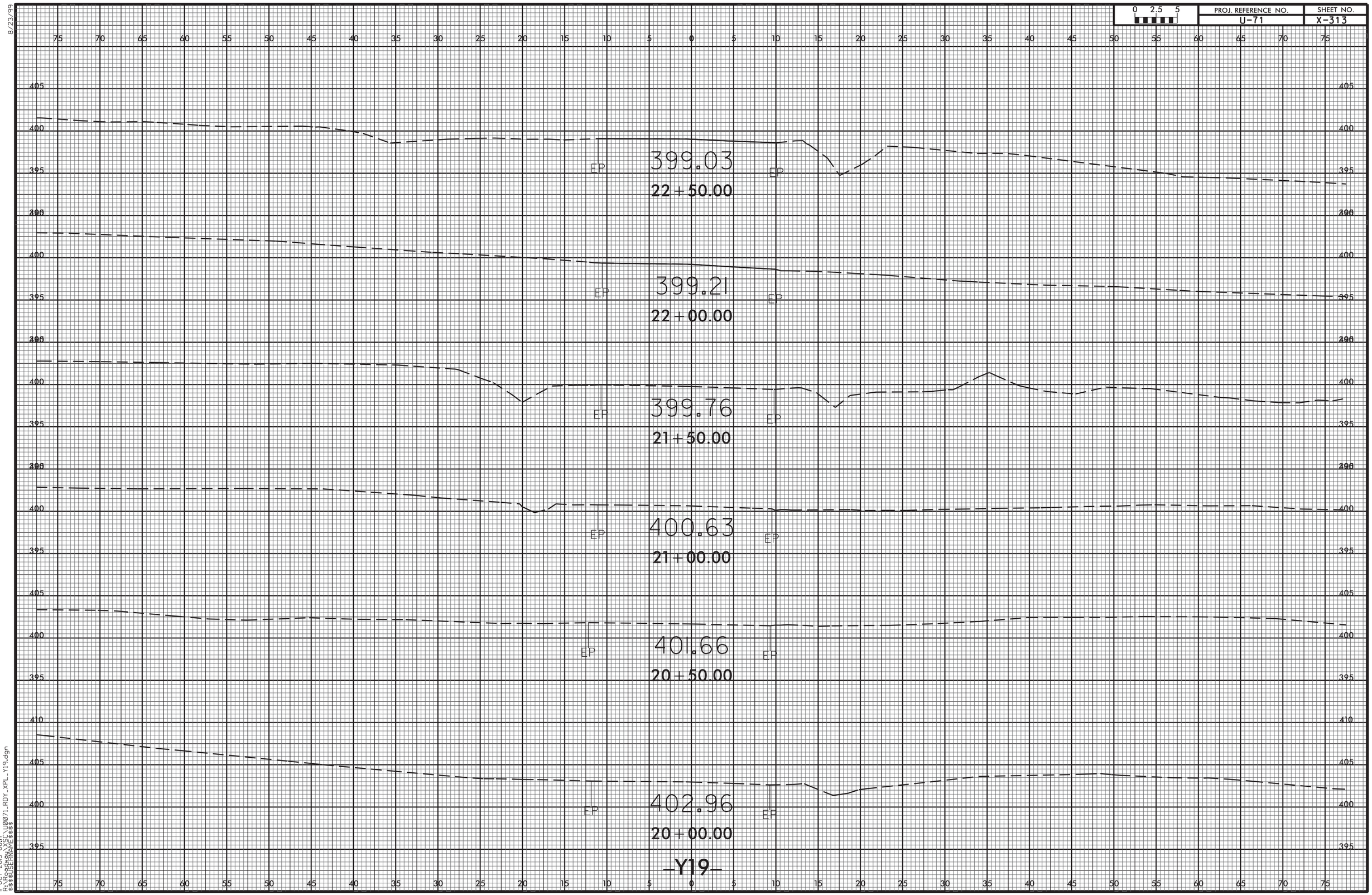
| | U-71 | X-313 |

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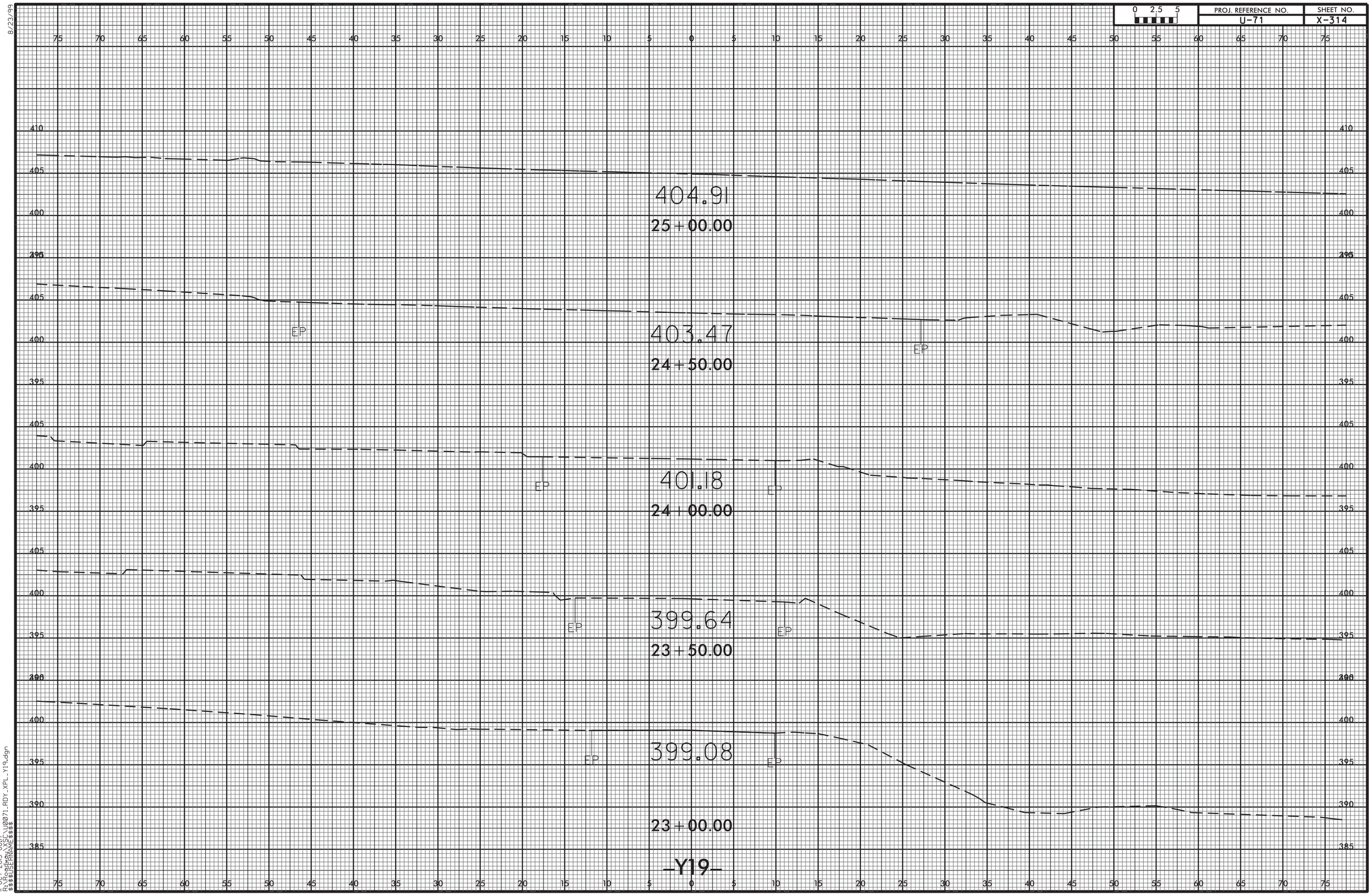
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U-71
SHEET NO.
X-314
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403.47
24+50.00
401.18
24+00.00
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23+50.00
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EP
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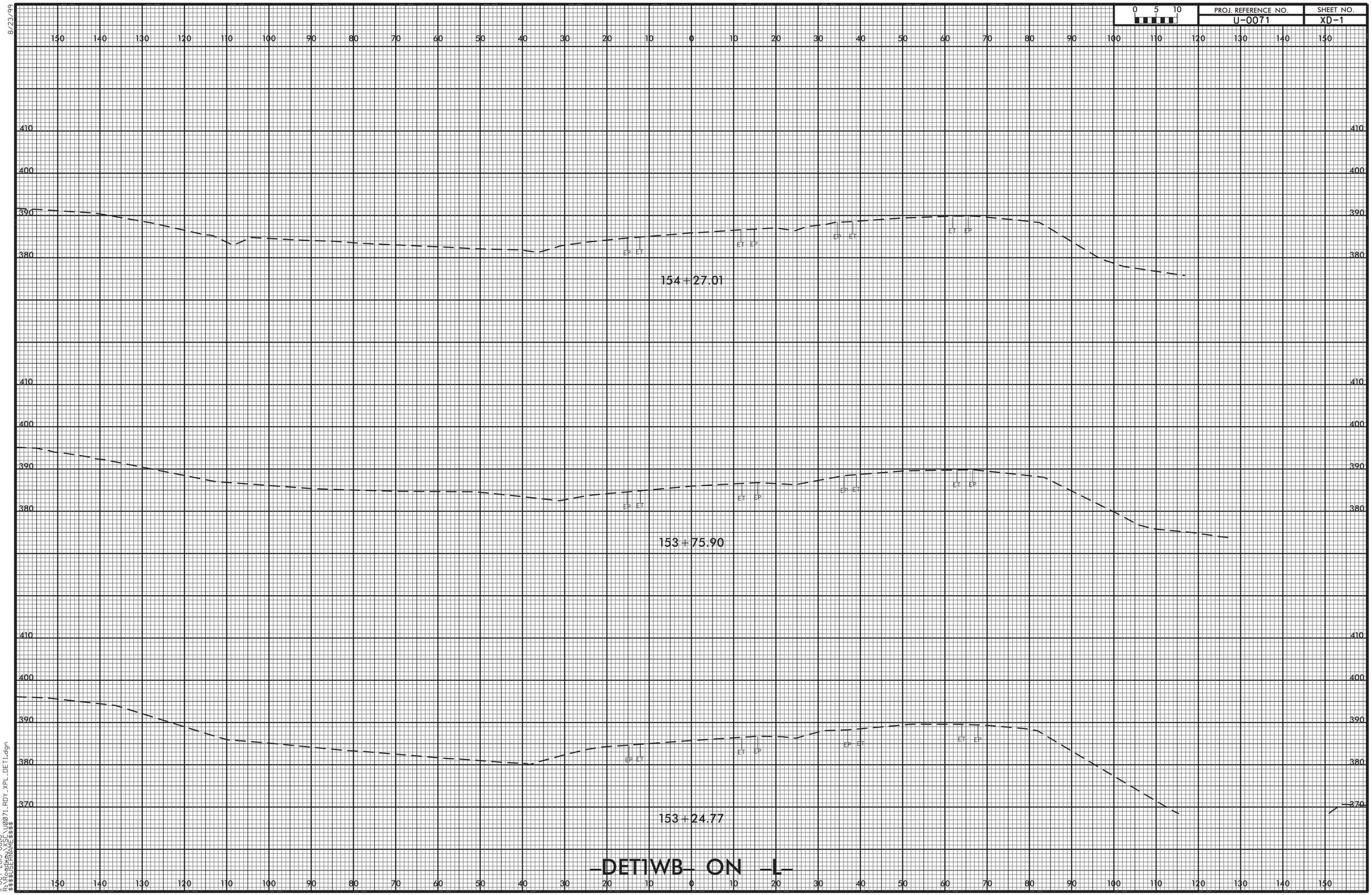


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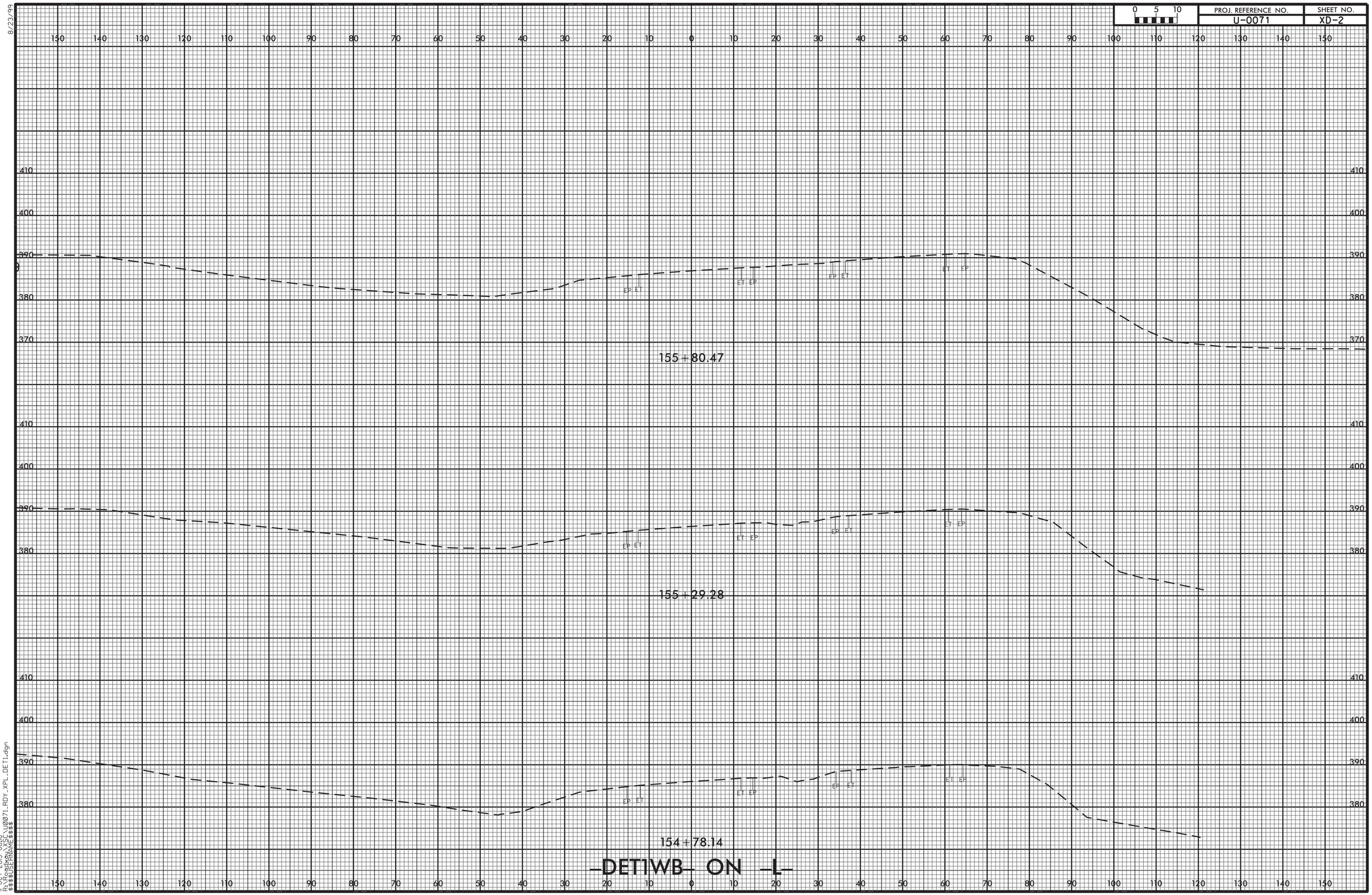


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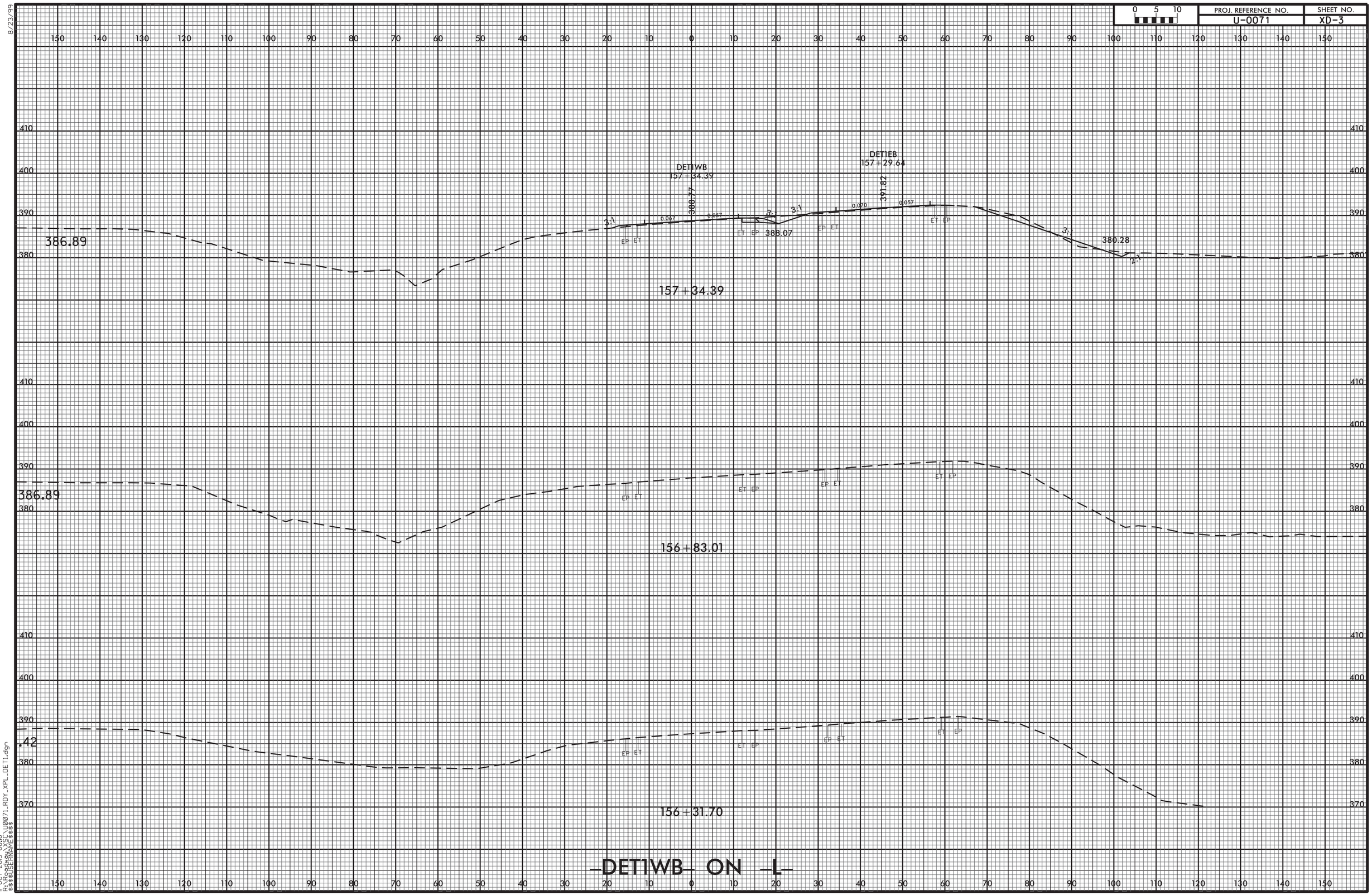
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U-0071
SHEET NO.
XD-3
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DET1EB
157+29.64
386.89
388.07
380.28
157+34.39
386.89
156+83.01
.42
156+31.70
-DET1WB- ON -L-
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| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
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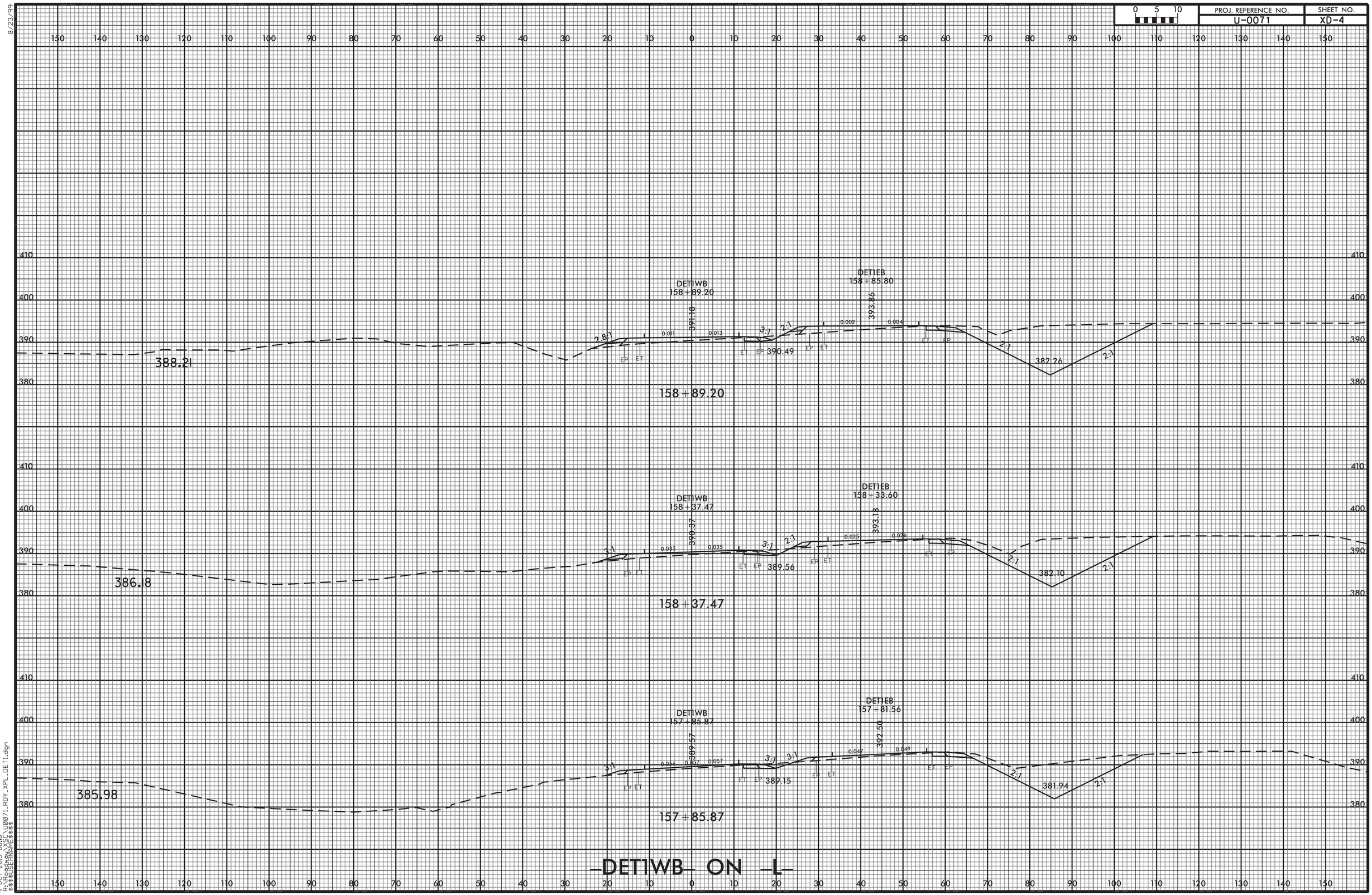


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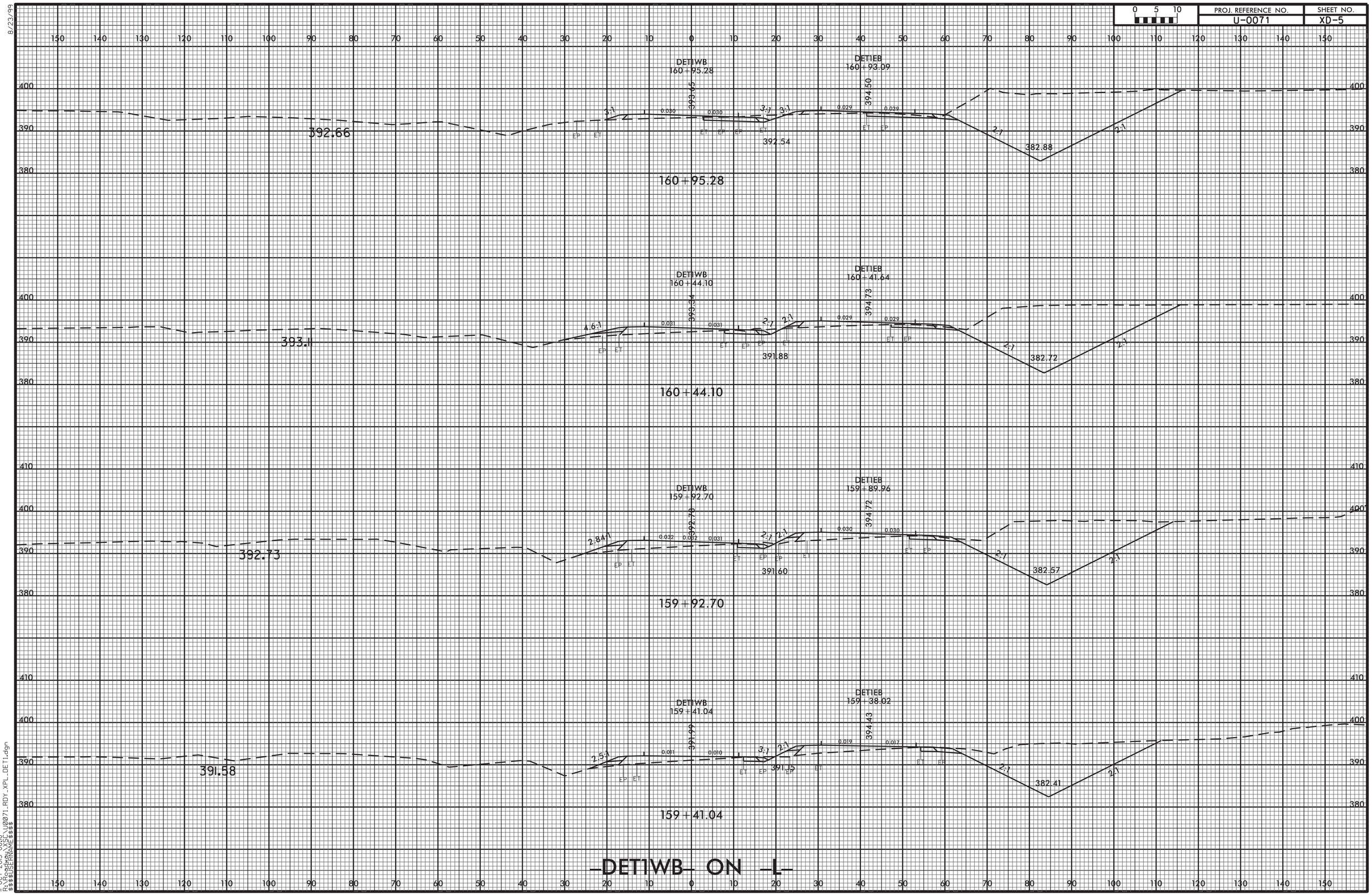
|---|---|---|
| | U-0071 | XD-5 |

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| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
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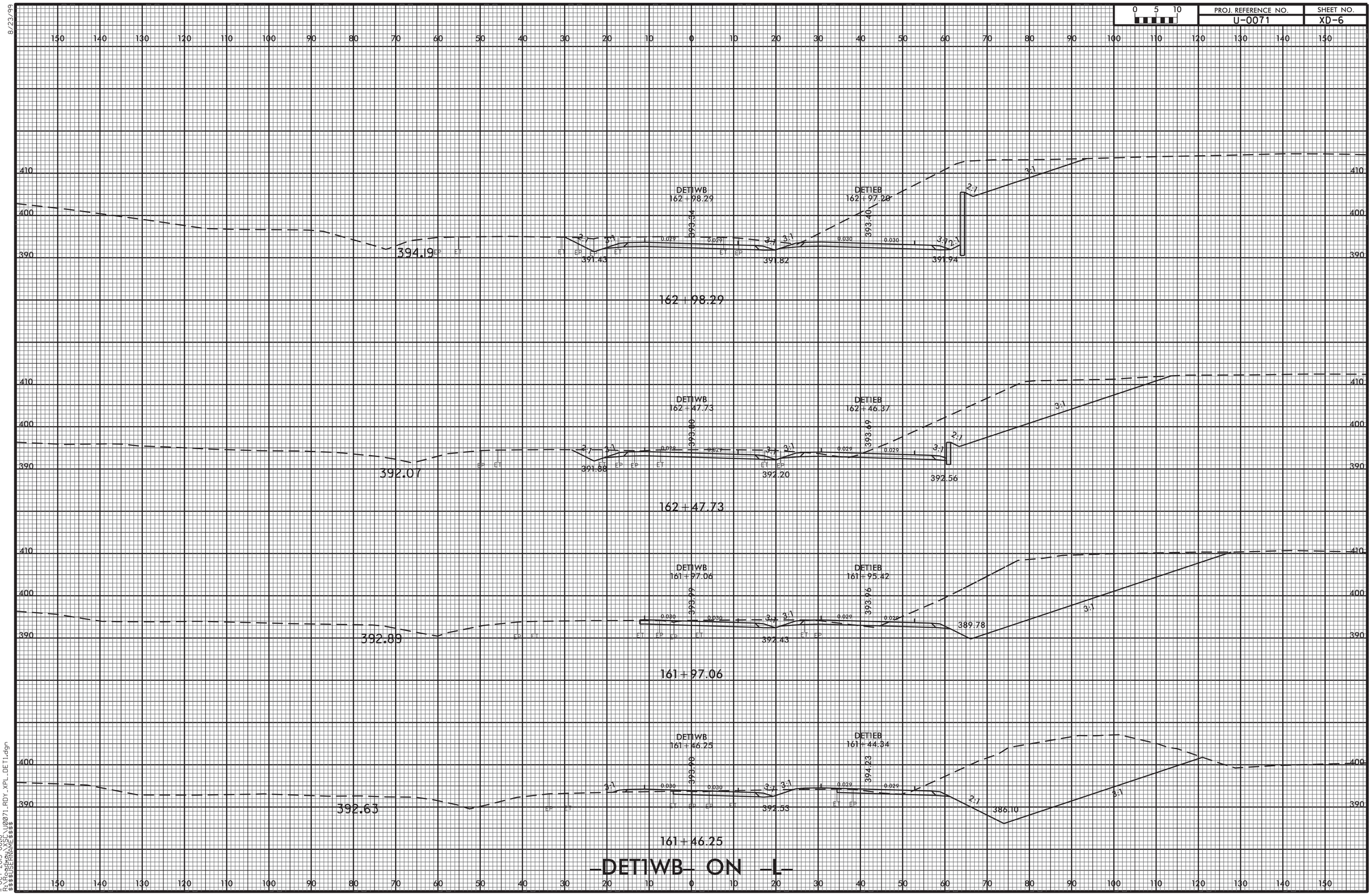


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| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
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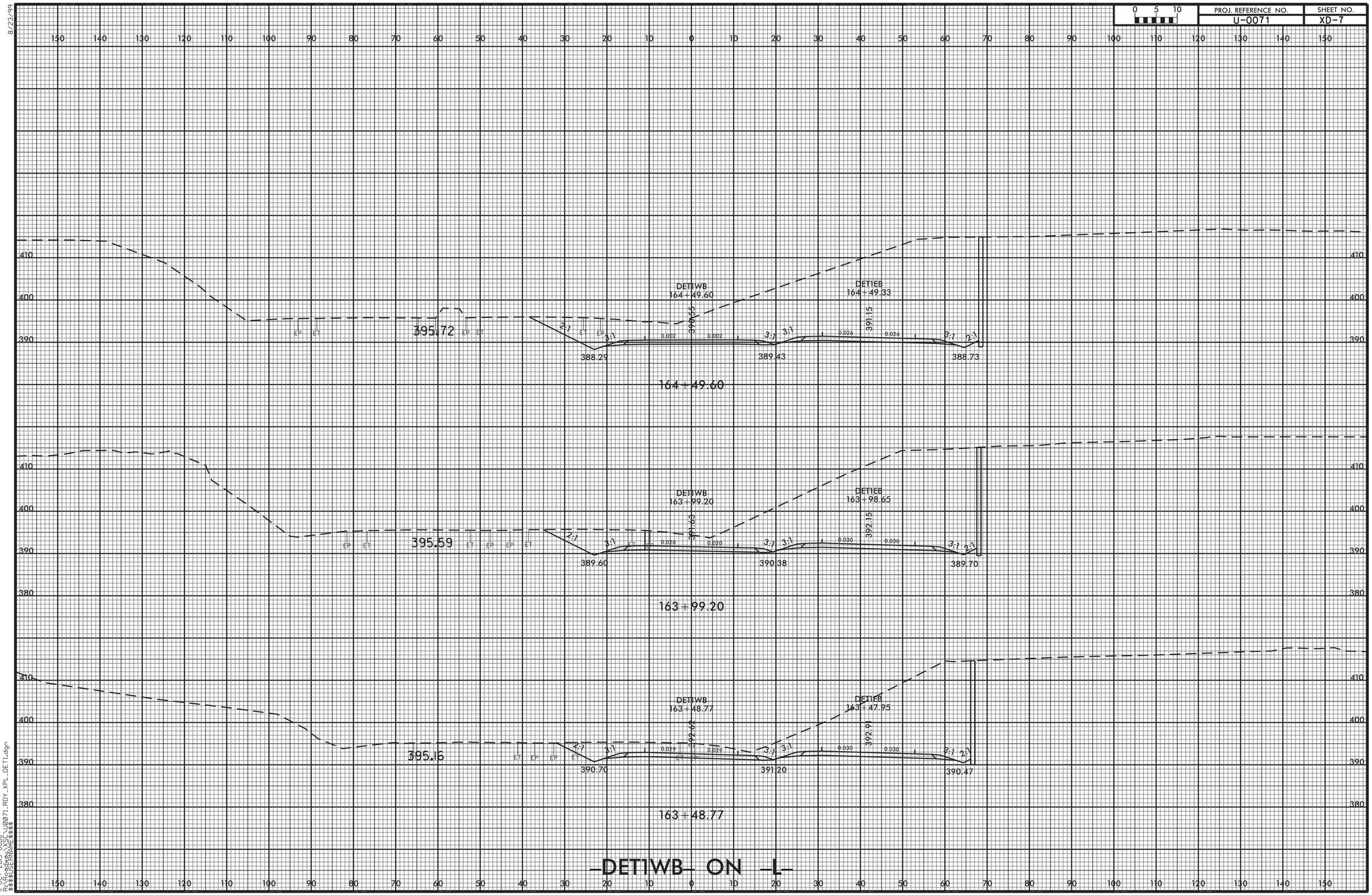

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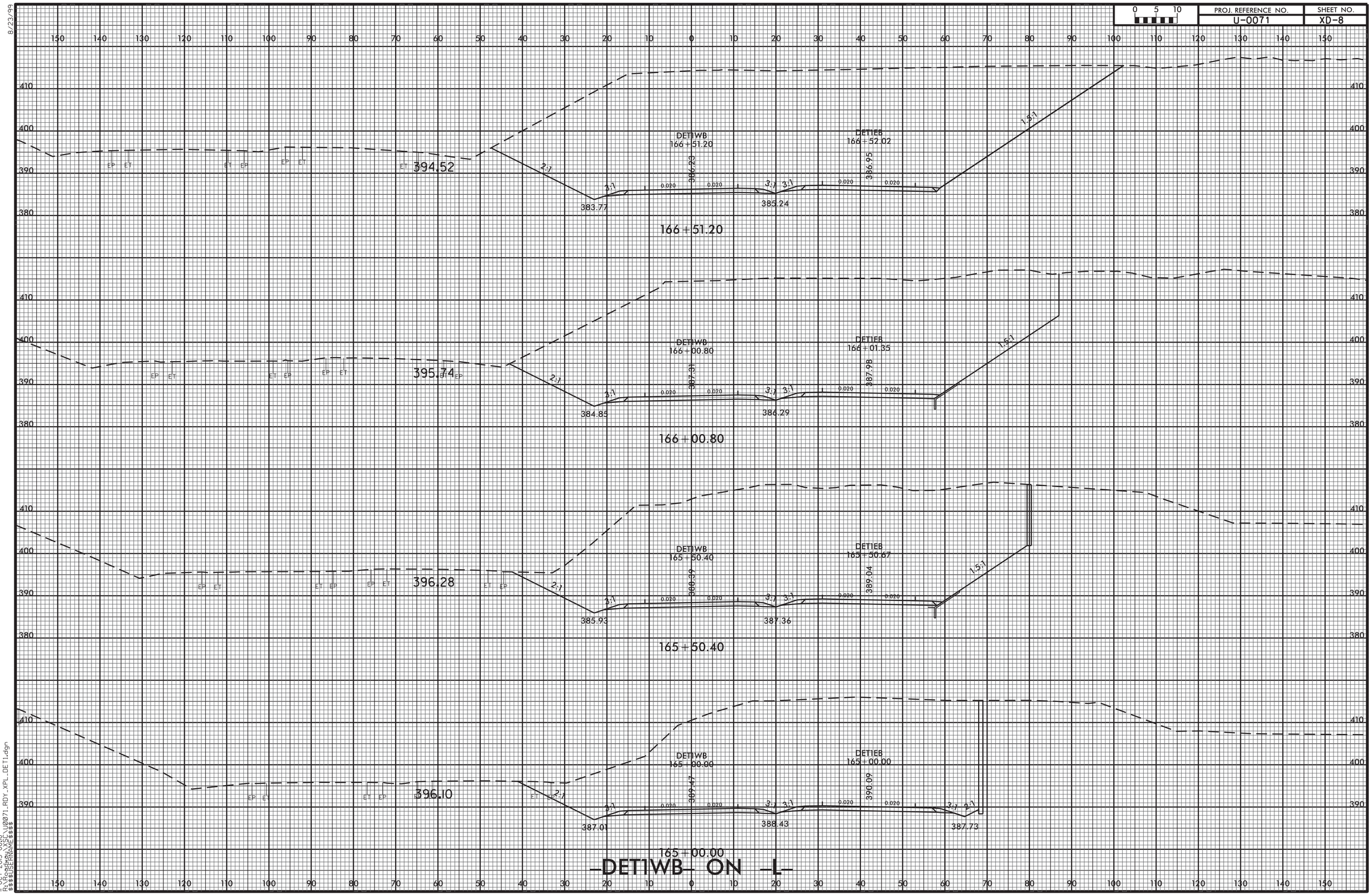
|---|---|
| U-0071 | XD-8 |

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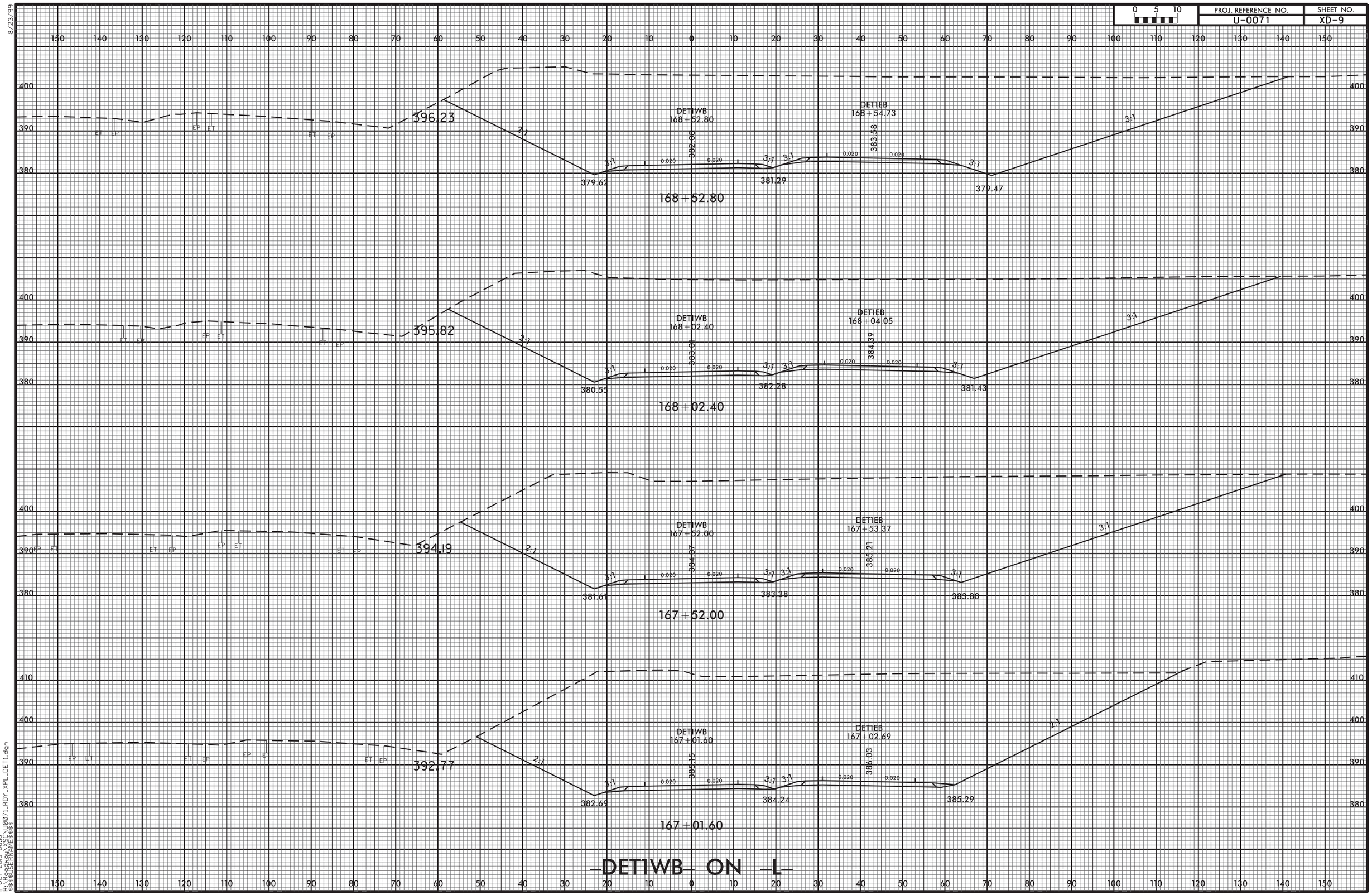


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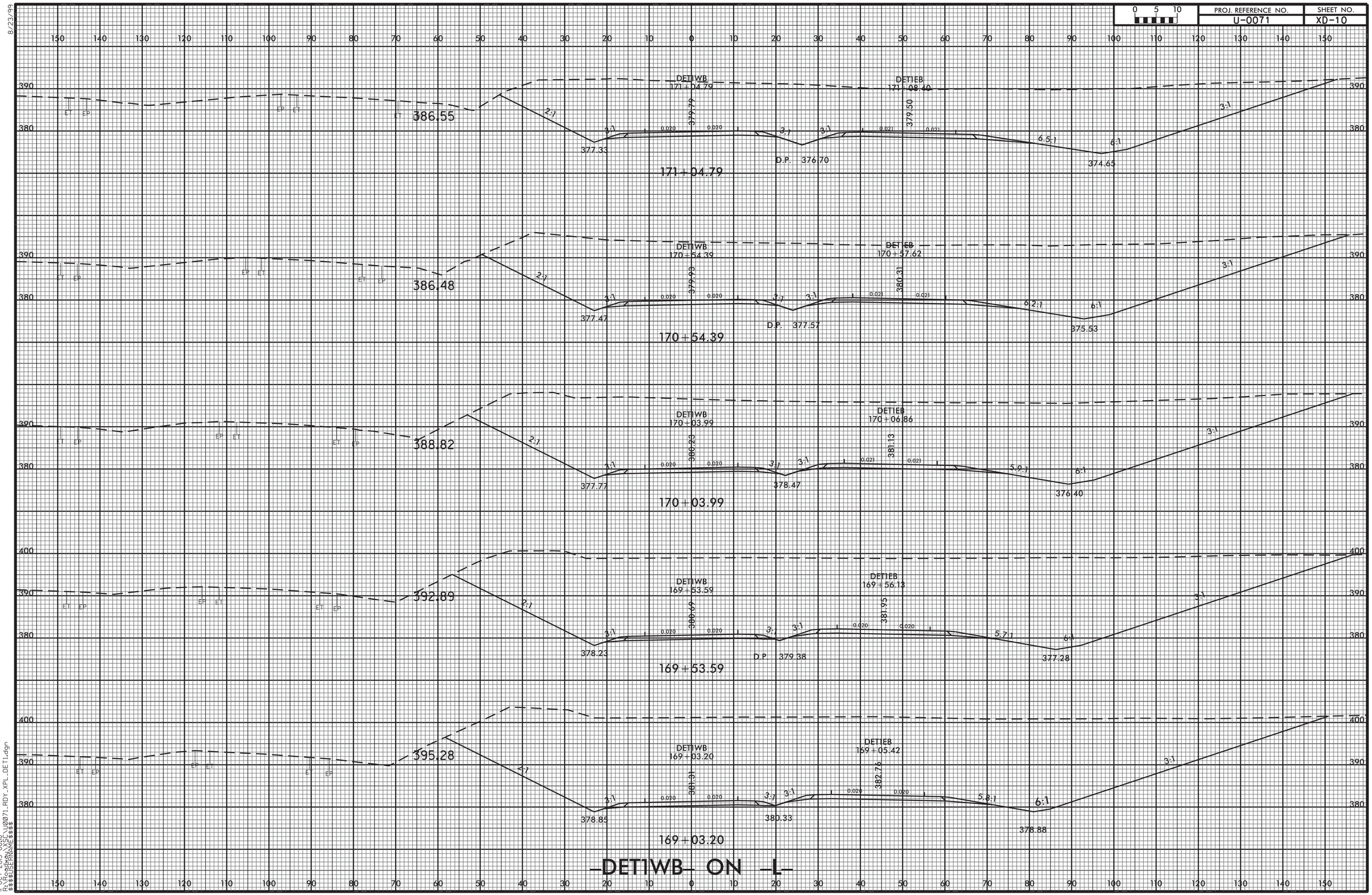


# -DET1WB- ON -L-

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| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
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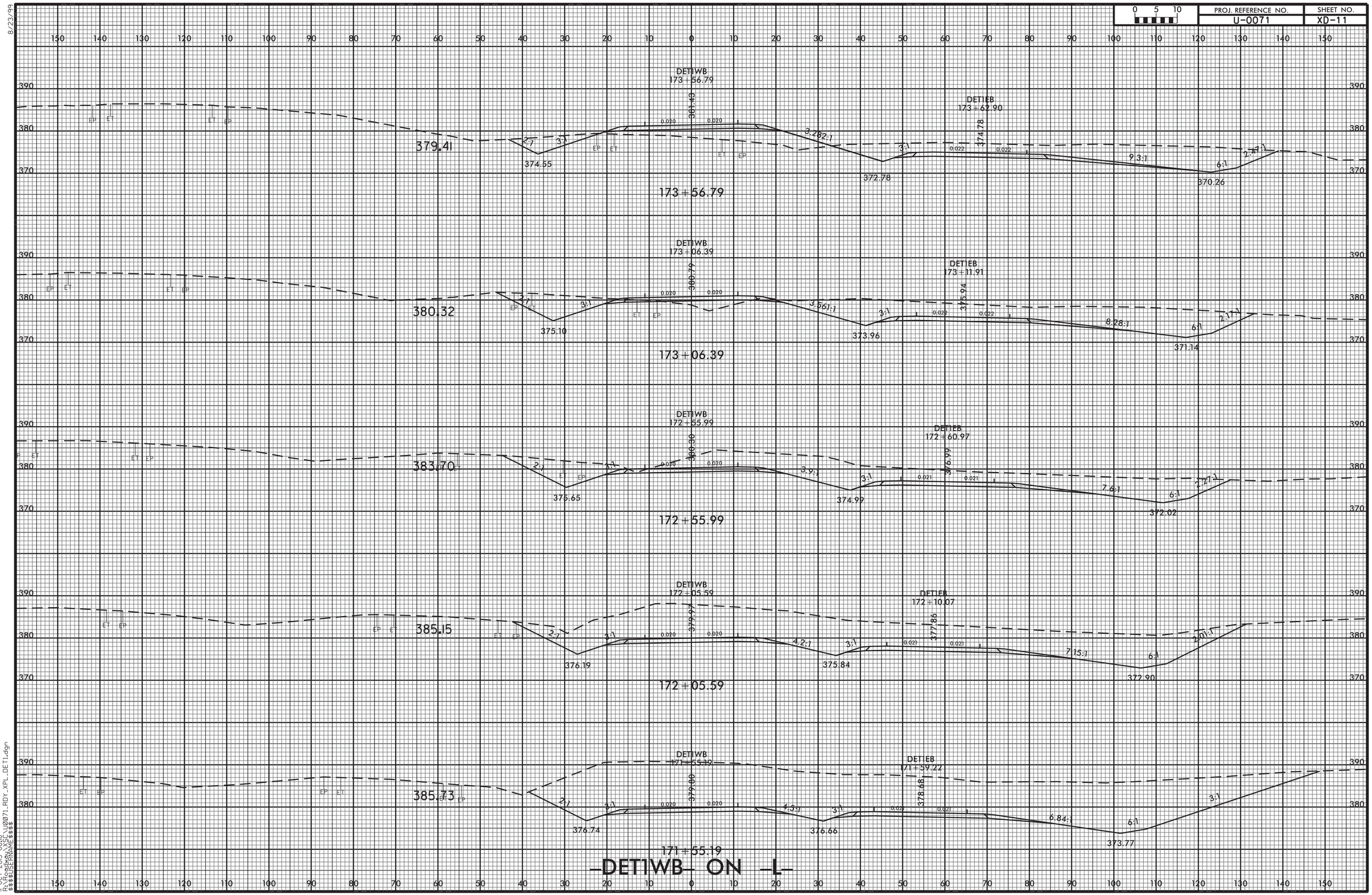
| | U-0071 | XD-11 |

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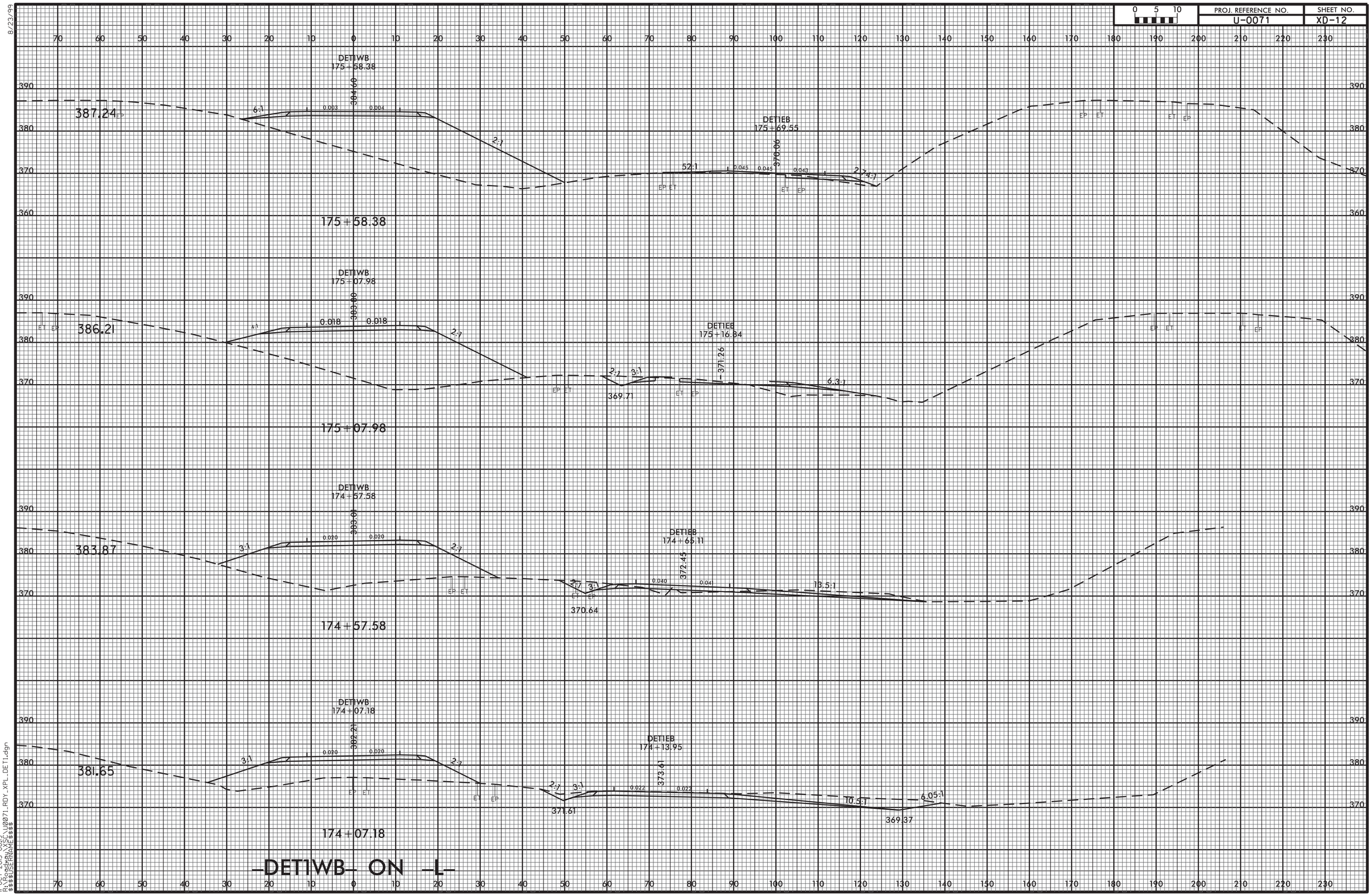
| U-0071 | XD-12 |

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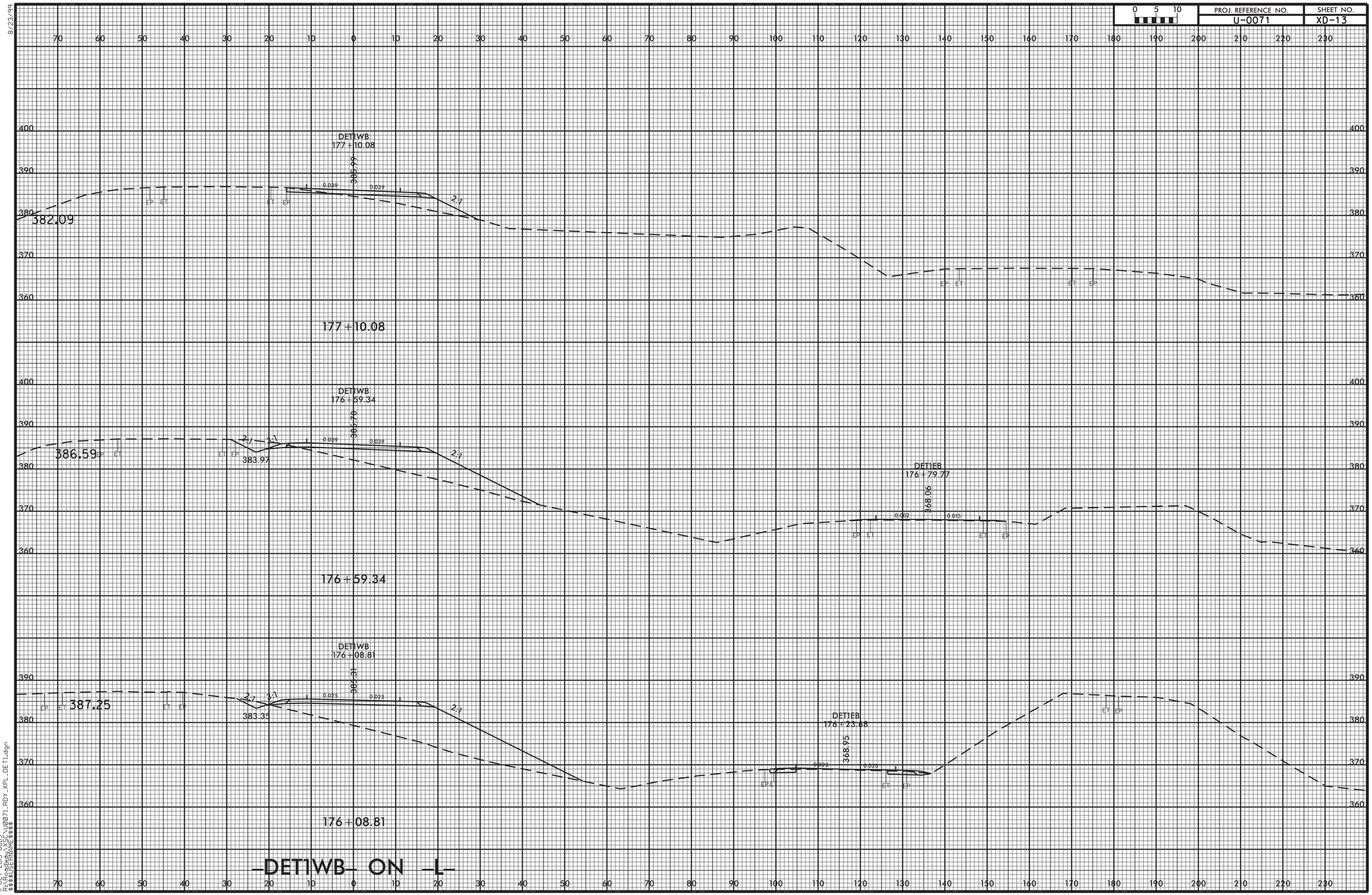
0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-13
DET1WB
177+10.08
385.99
0.039
0.039
2:1
382.09
EP ET
ET EP
177+10.08
DET1WB
176+59.34
385.78
386.59
383.97
3:1
DET1EB
176+79.77
368.06
0.002
0.015
176+59.34
DET1WB
176+08.81
387.25
383.35
0.025
DET1EB
176+23.68
368.95
0.020
176+08.81
-DET1WB- ON -L-
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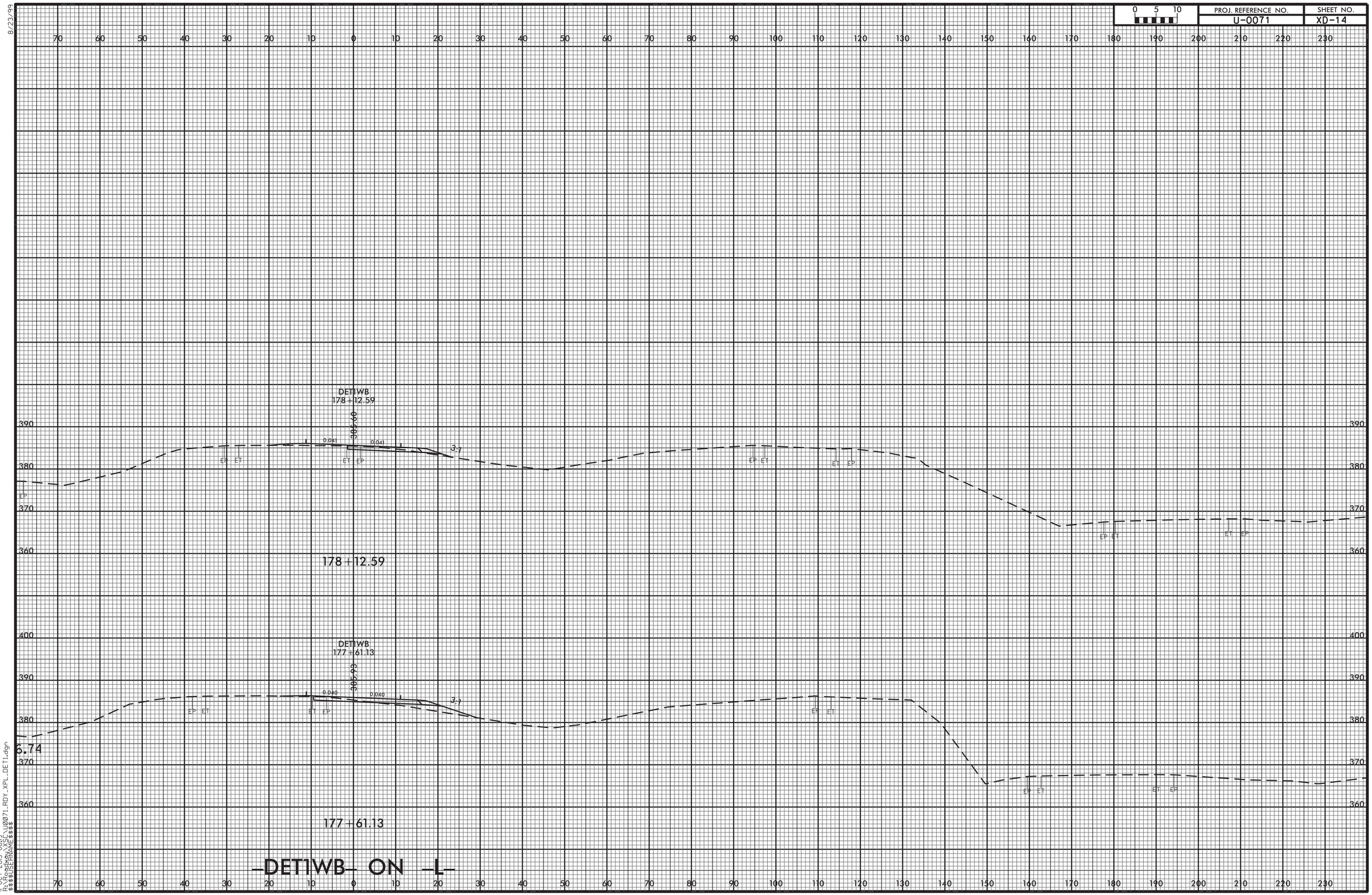
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PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-14
DET1WB
178+12.59
395.60
0.041
0.041
3.7
178+12.59
DET1WB
177+61.13
395.22
0.040
0.040
3.7
6.74
177+61.13
-DET1WB- ON -L-
11-OCT-2013 08:19
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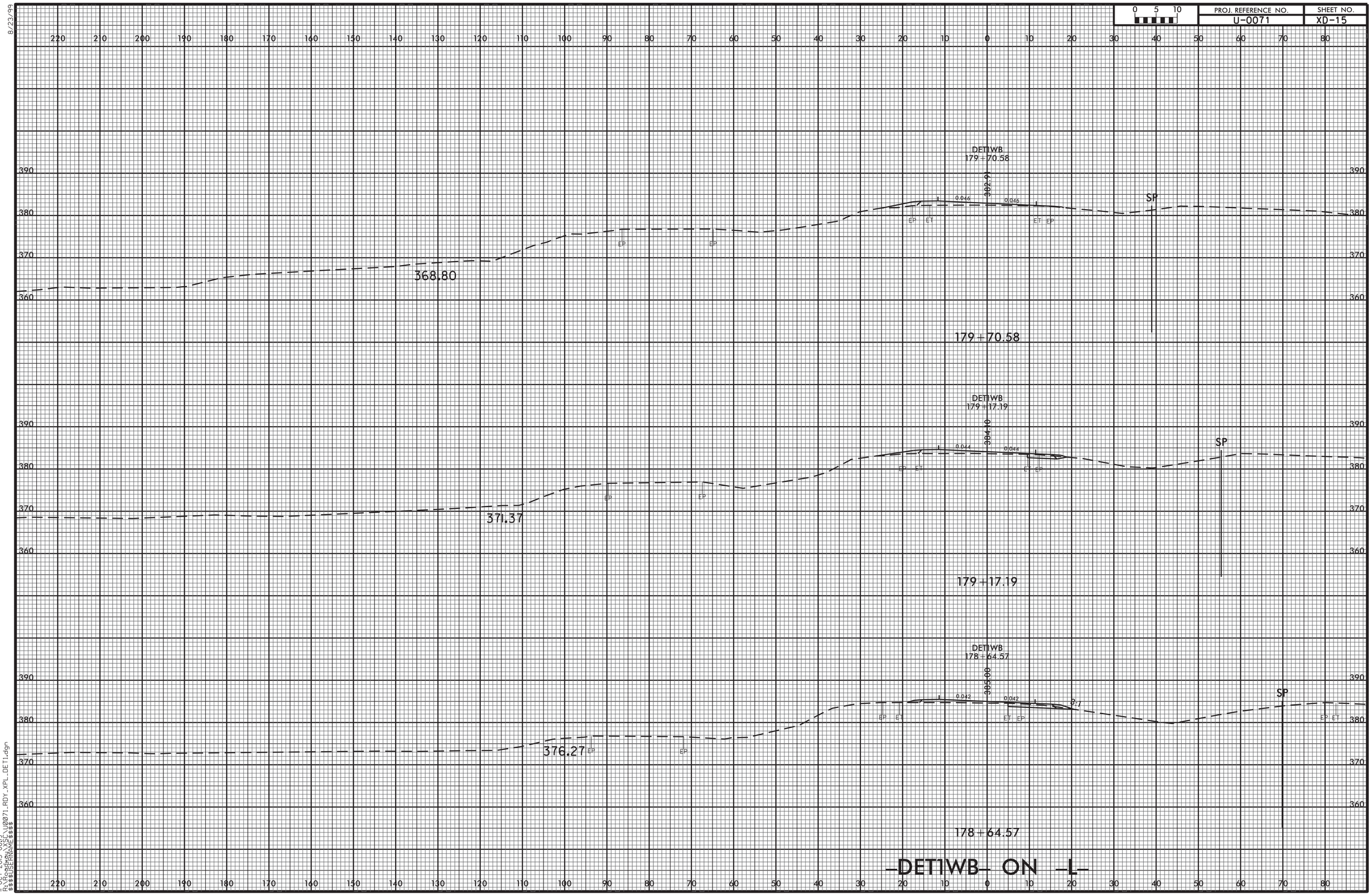
8/23/99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PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-15
DET1WB
179+70.58
302.70
0.046
0.046
SP
368.80
179+70.58
DET1WB
179+17.19
304.10
0.044
0.044
SP
371.37
179+17.19
DET1WB
178+64.57
306.00
0.042
0.042
SP
376.27
178+64.57
-DET1WB- ON -L-
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11-OCT-2013 08:19
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| PROJ. REFERENCE NO. | SHEET NO. |
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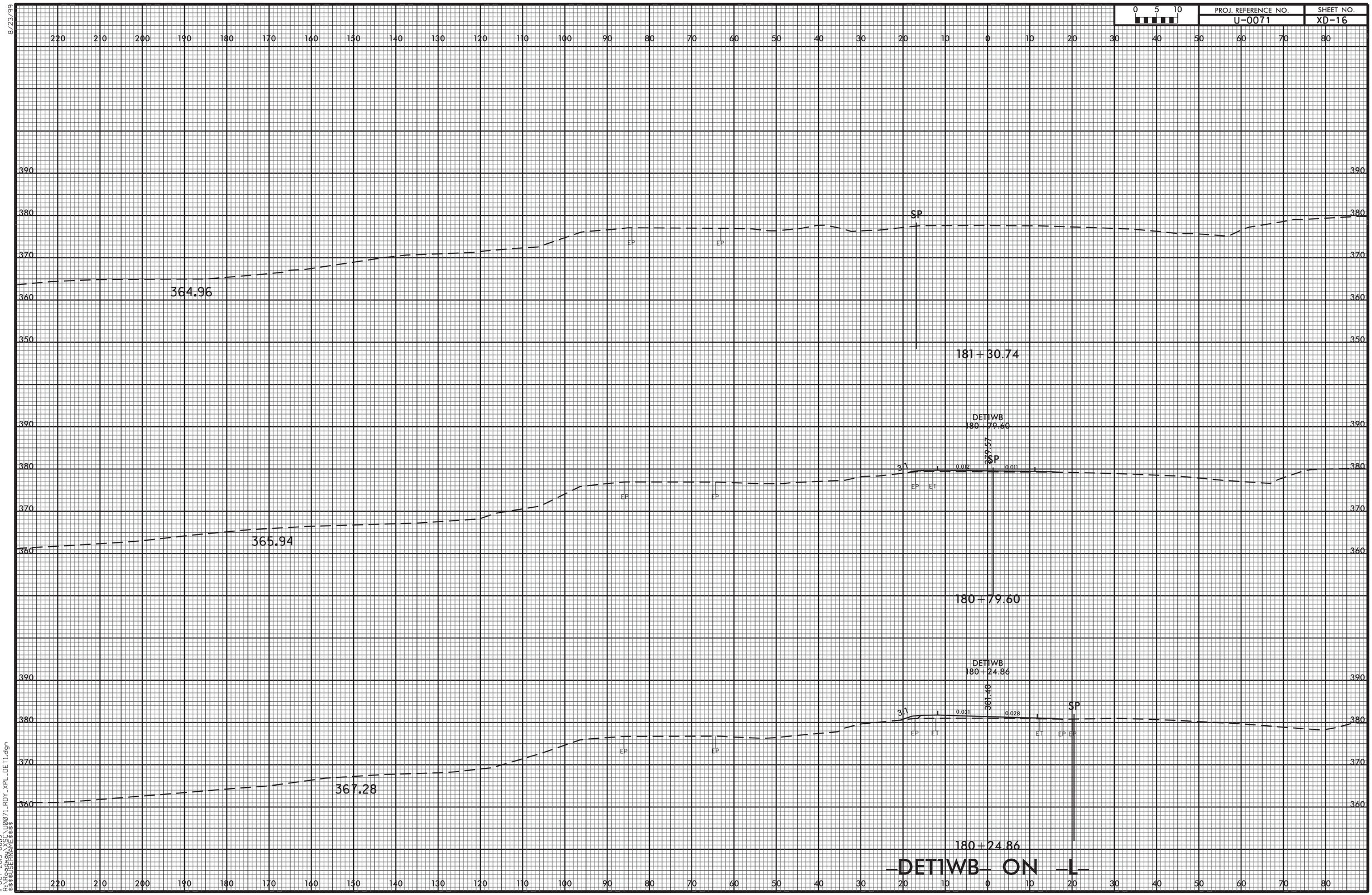


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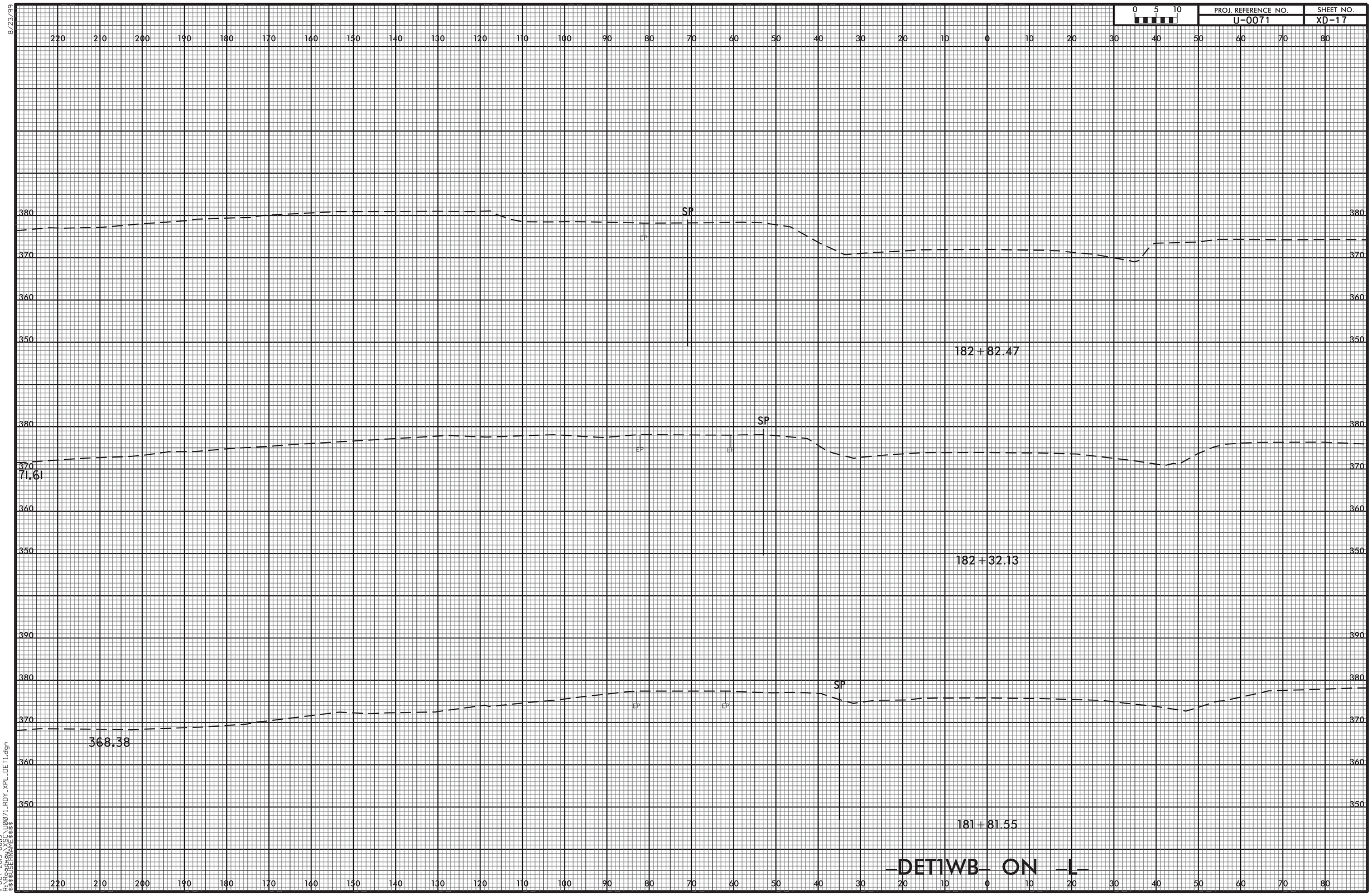


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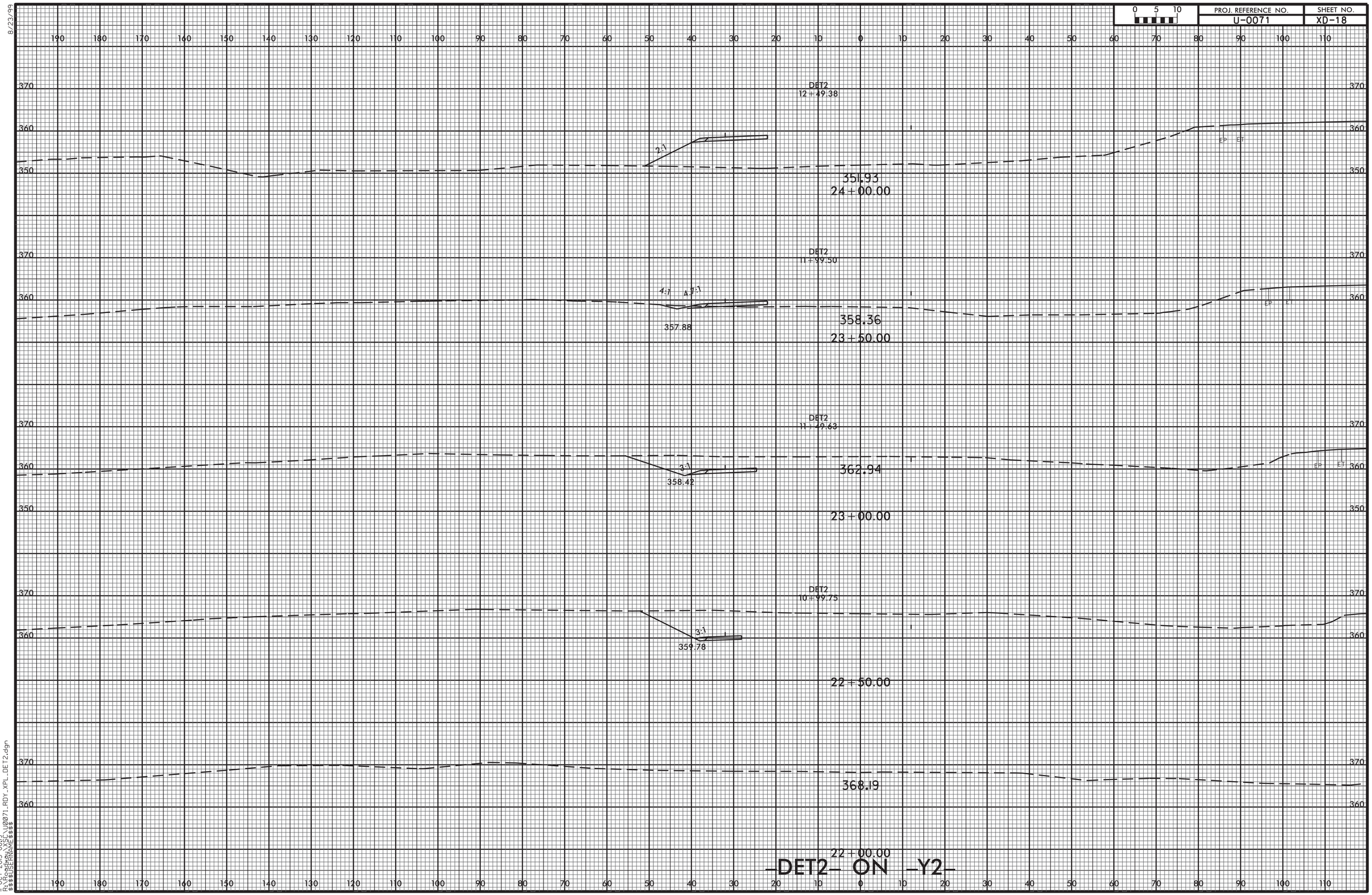
| | U-0071 | XD-18 |

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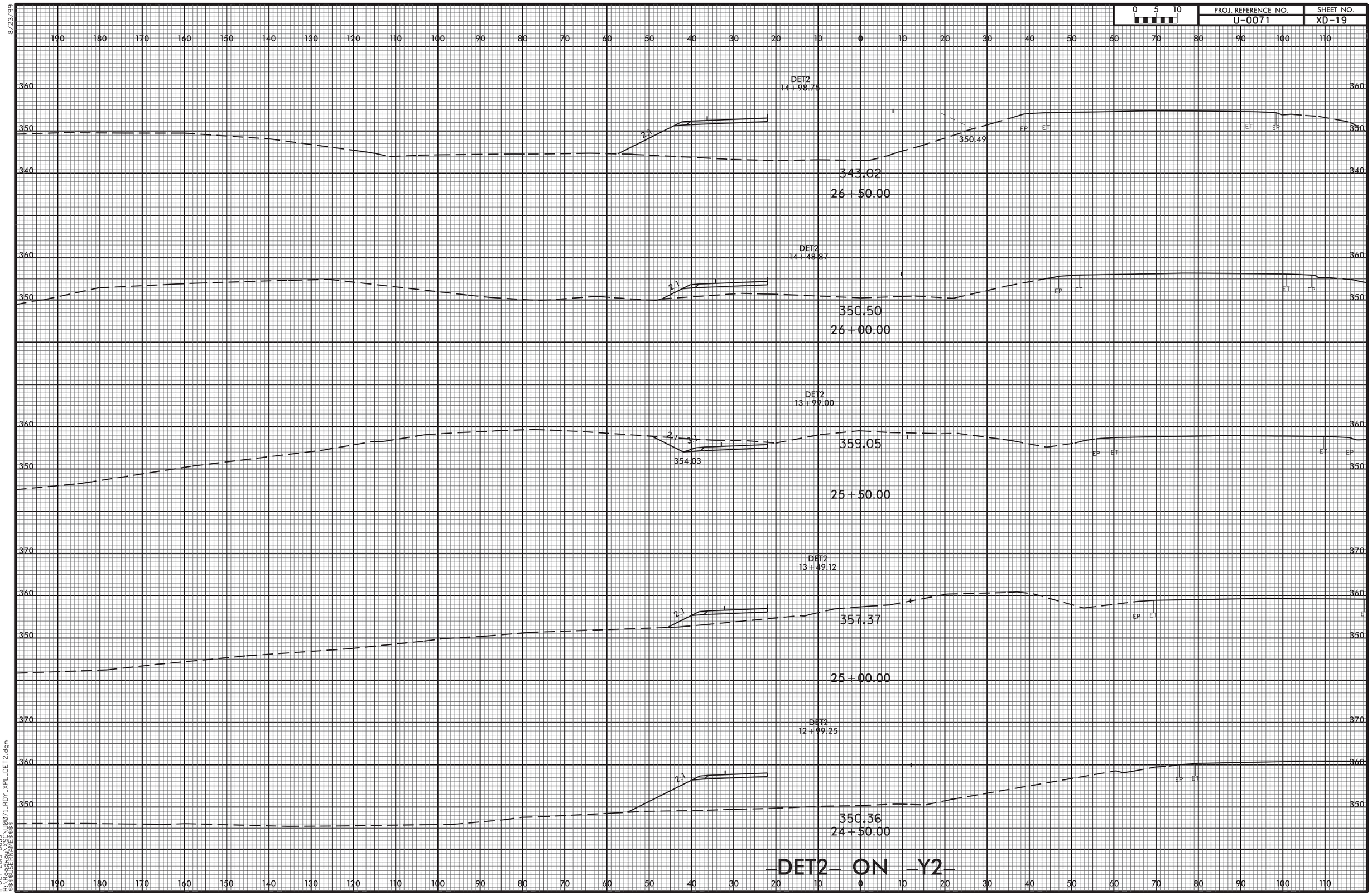
0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-19
DET2
14+98.75
2:1
350.49
343.02
26+50.00
DET2
14+48.87
2:1
350.50
26+00.00
DET2
13+99.00
2:1
3:1
354.03
359.05
25+50.00
DET2
13+49.12
2:1
357.37
25+00.00
DET2
12+99.25
2:1
350.36
24+50.00
EP
ET
-DET2- ON -Y2-
8/23/99
11-OCT-2013 08:19
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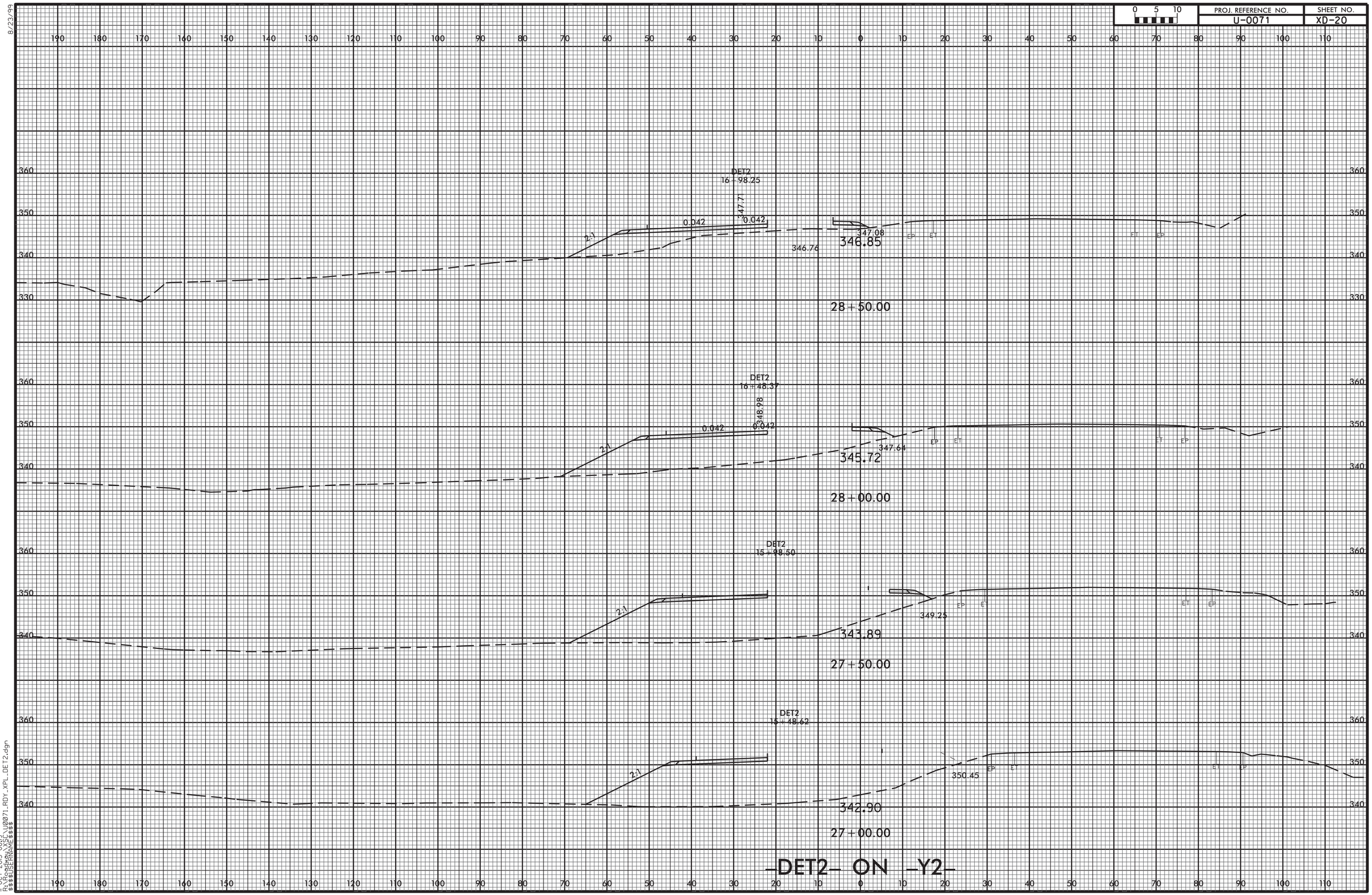
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-20 |

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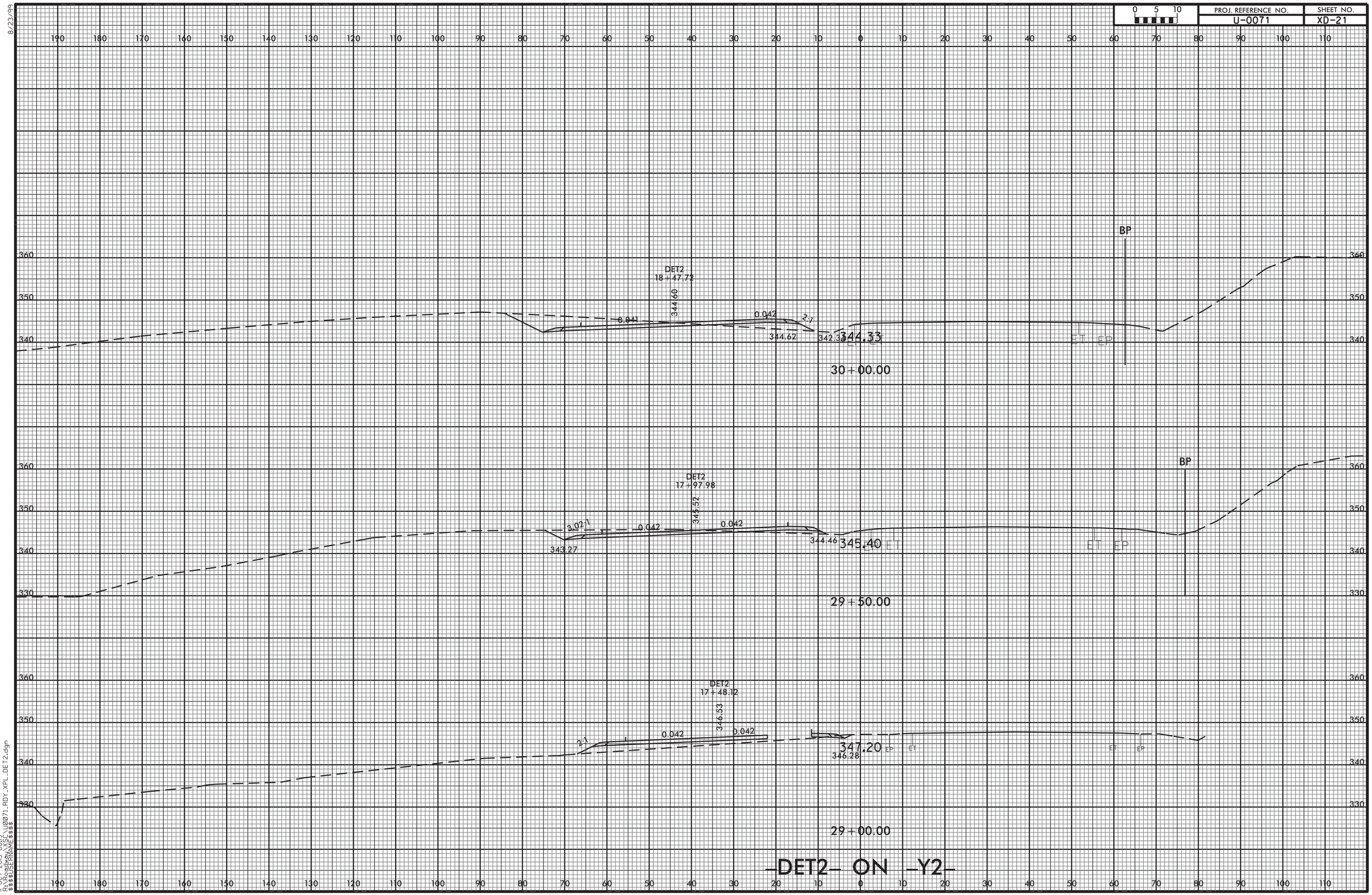
| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | XD-21 |

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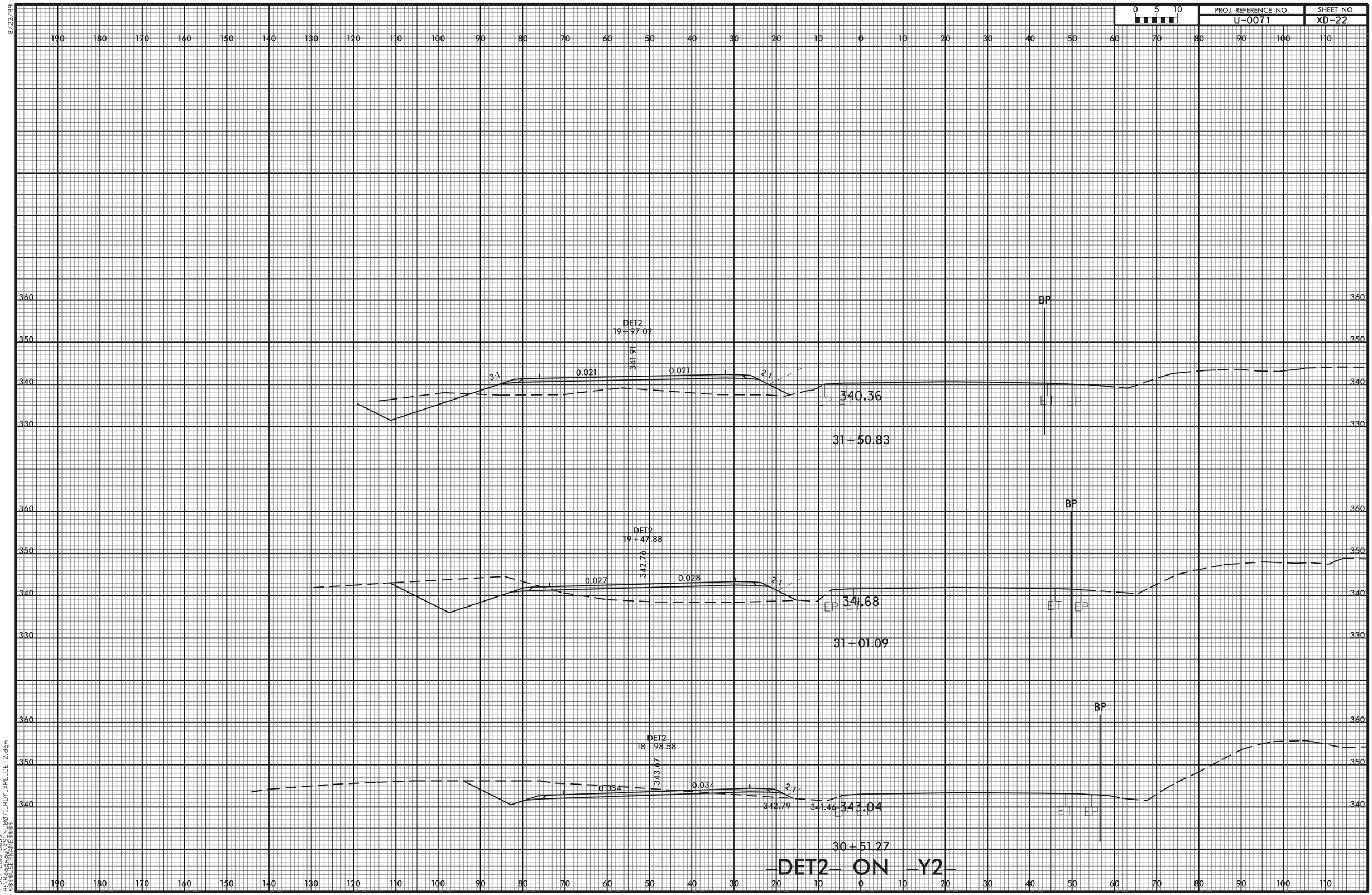
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-22
0 5 10
DET2
19+97.02
341.91
0.021
0.021
3:1
2:1
340.36
31+50.83
BP
DET2
19+47.88
342.76
0.027
0.028
2:1
341.68
31+01.09
BP
DET2
18+98.58
343.47
0.034
0.034
2:1
342.79
341.46
343.04
30+51.27
BP
-DET2- ON -Y2-
8/23/99
11-OCT-2013 08:19
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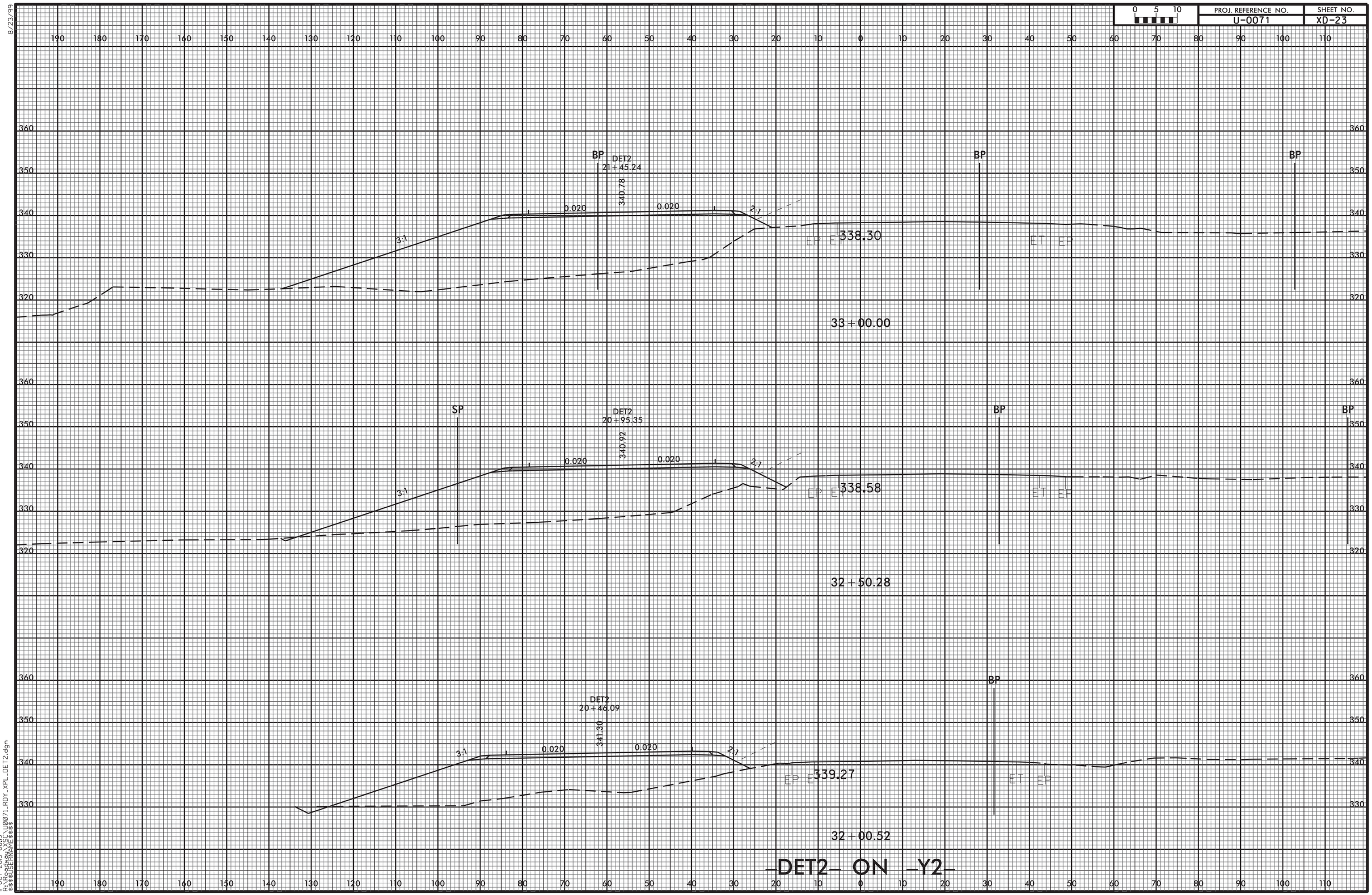


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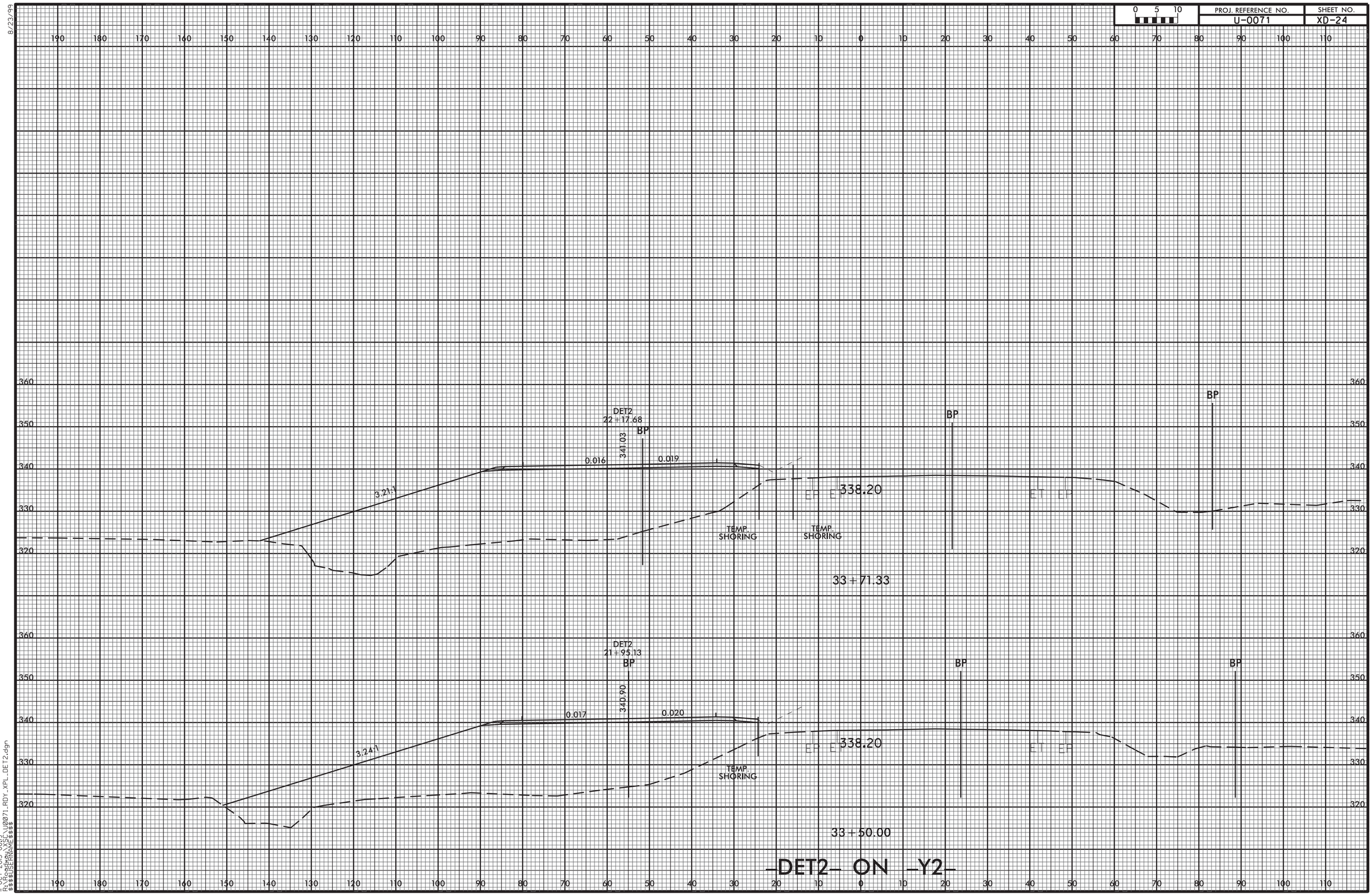
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-24 |

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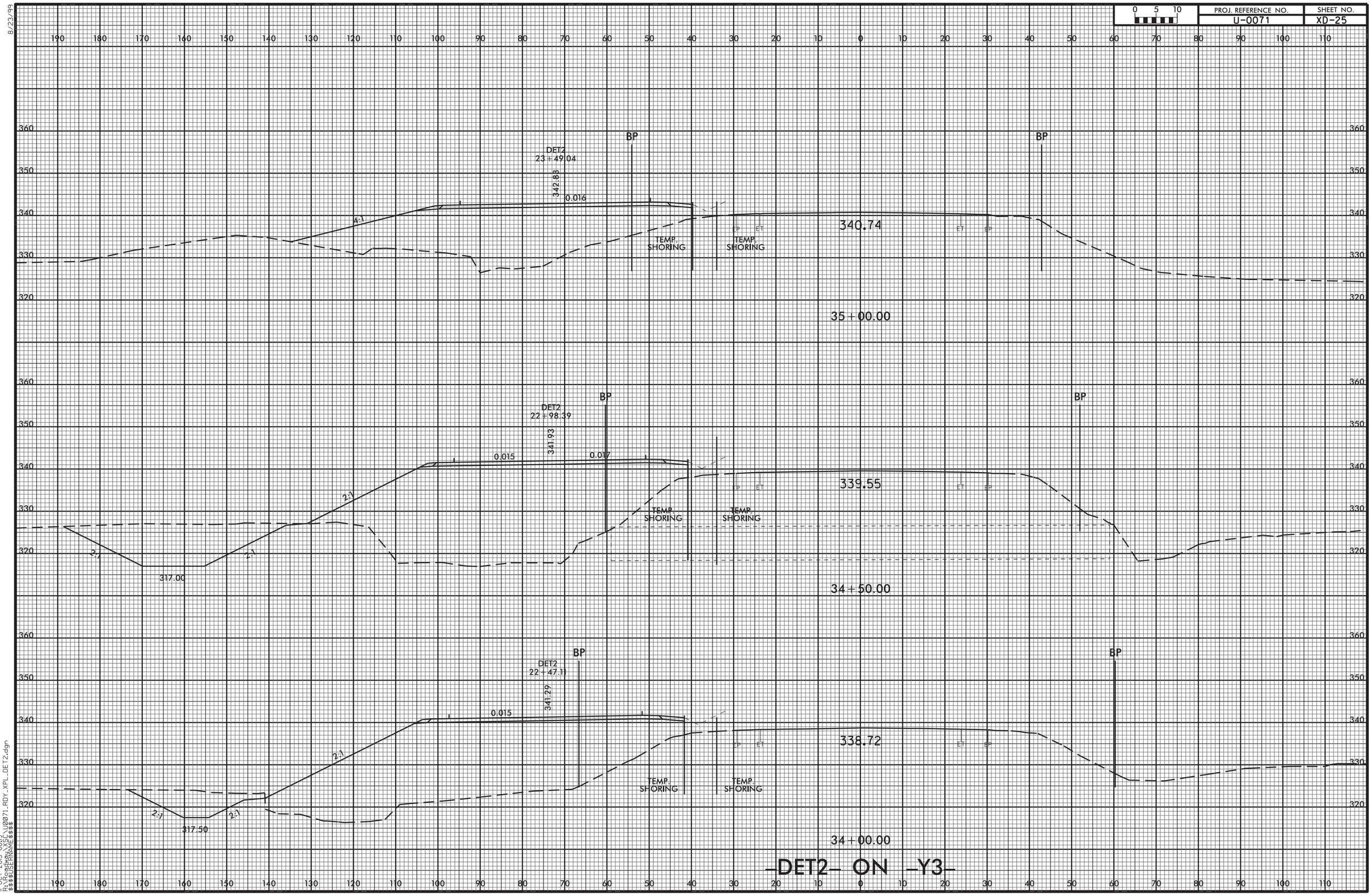
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-25 |

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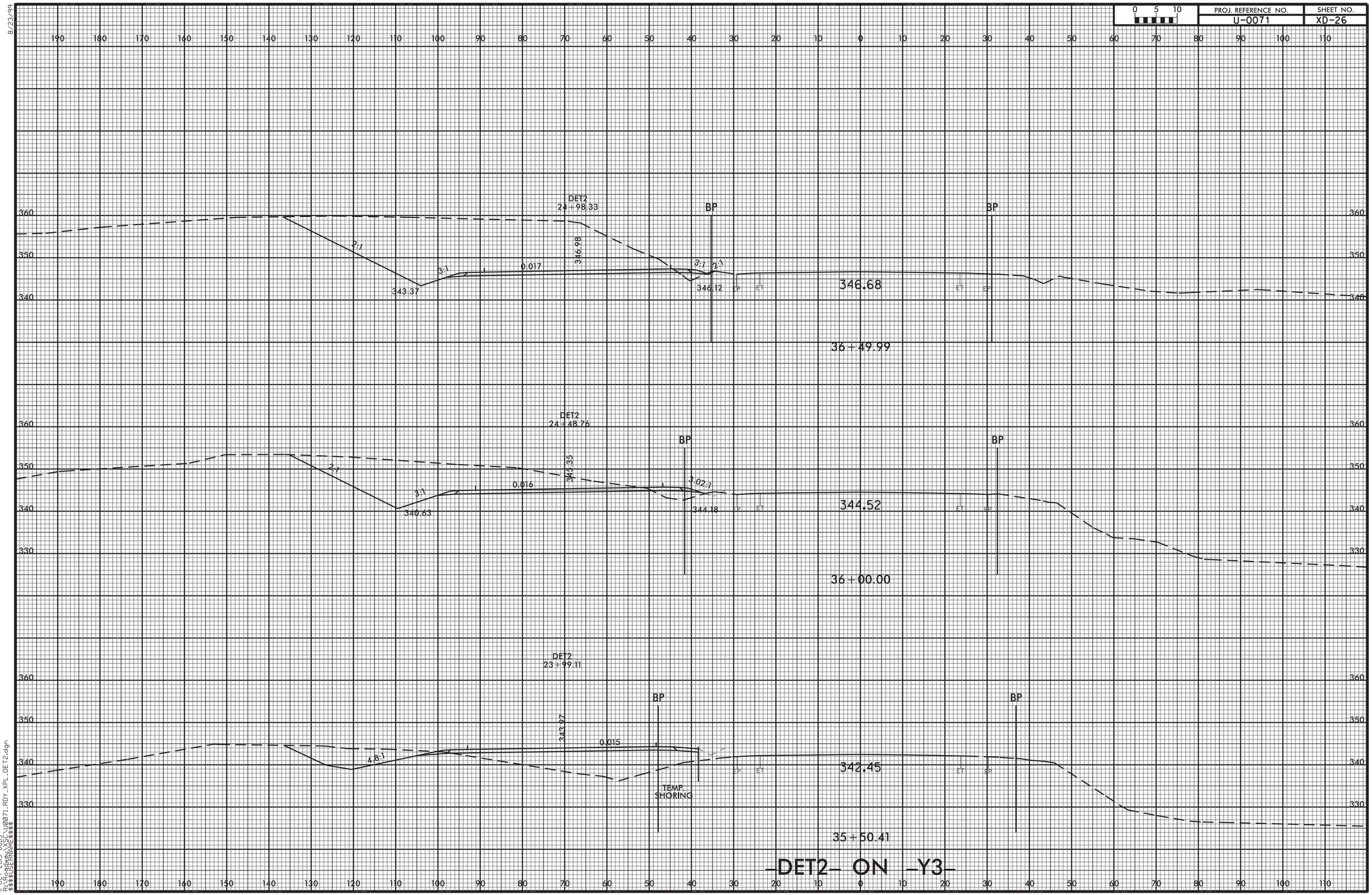
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-26 |




# -DET2- ON -Y3-

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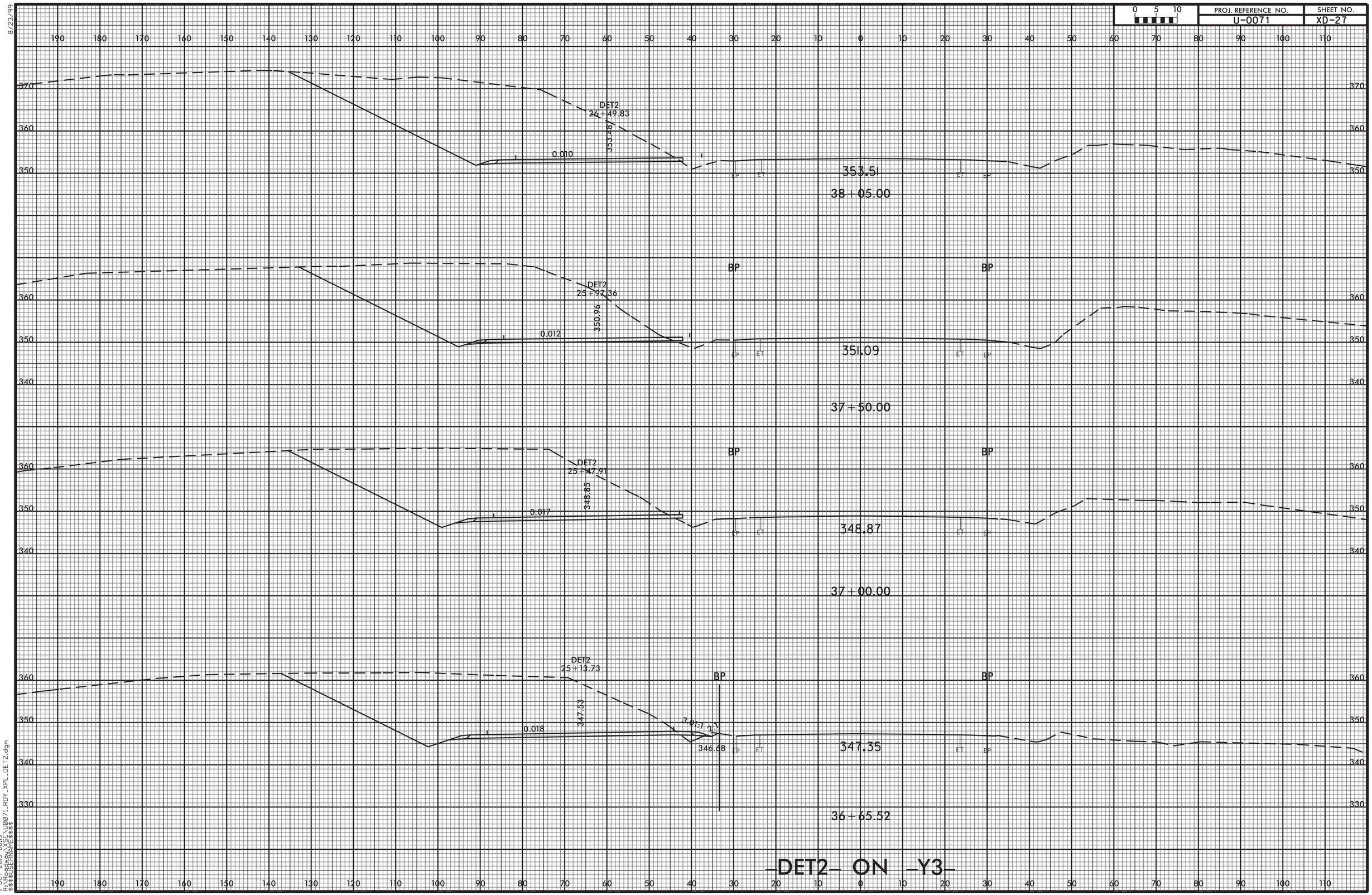
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-27
0 5 10
DET2
26+49.83
353.48
0.010
353.51
38+05.00
BP
ET
DET2
25+97.36
350.96
0.012
351.09
37+50.00
DET2
25+47.91
348.85
0.017
348.87
37+00.00
DET2
25+13.73
347.53
0.018
3.01:1
2:1
346.68
347.35
36+65.52
-DET2- ON -Y3-
8/23/99
11-OCT-2013 08:19
R:\Roadway\XSC\U0071_RDY_XPL_DET2.dgn
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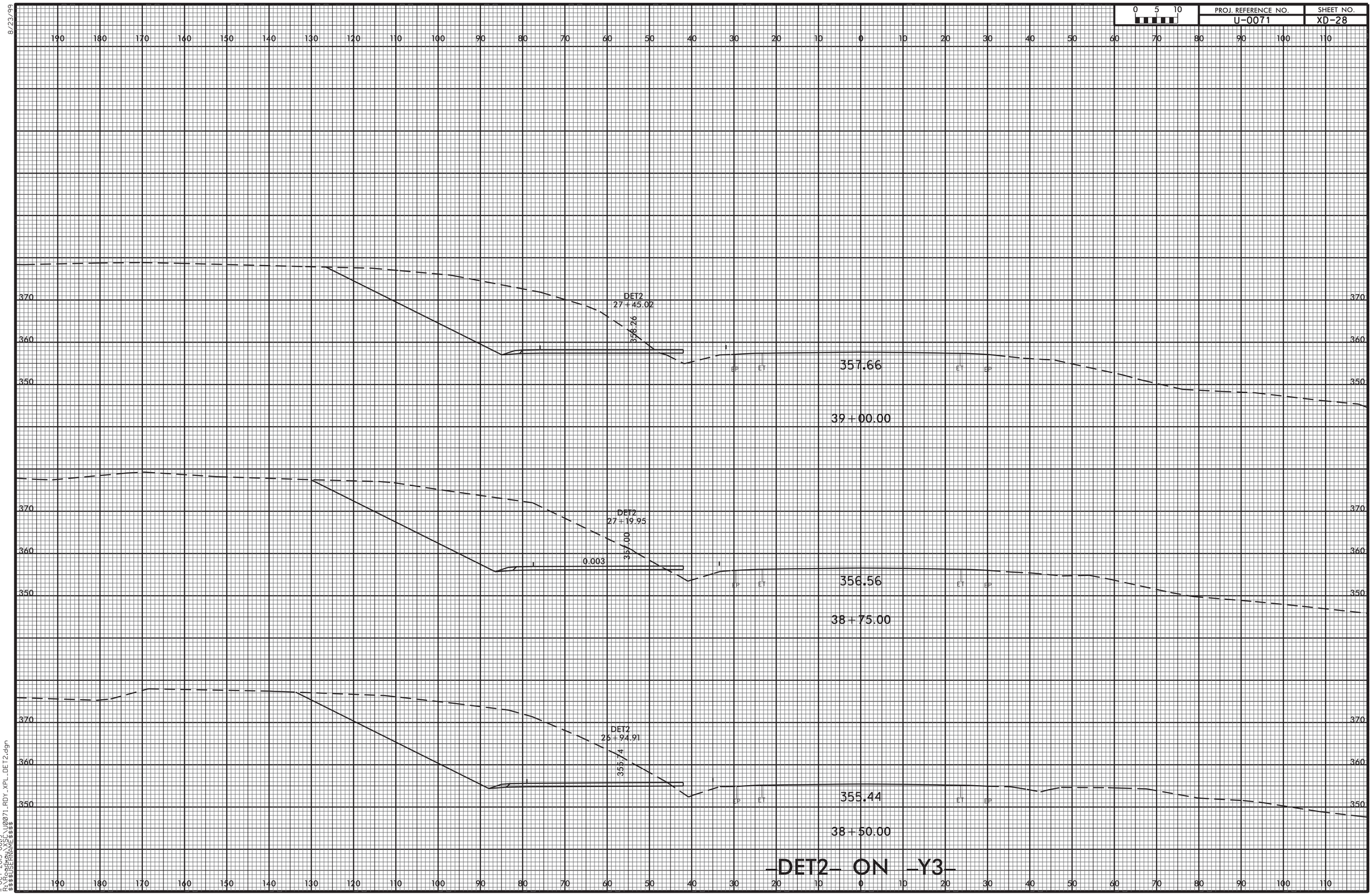
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-28 |

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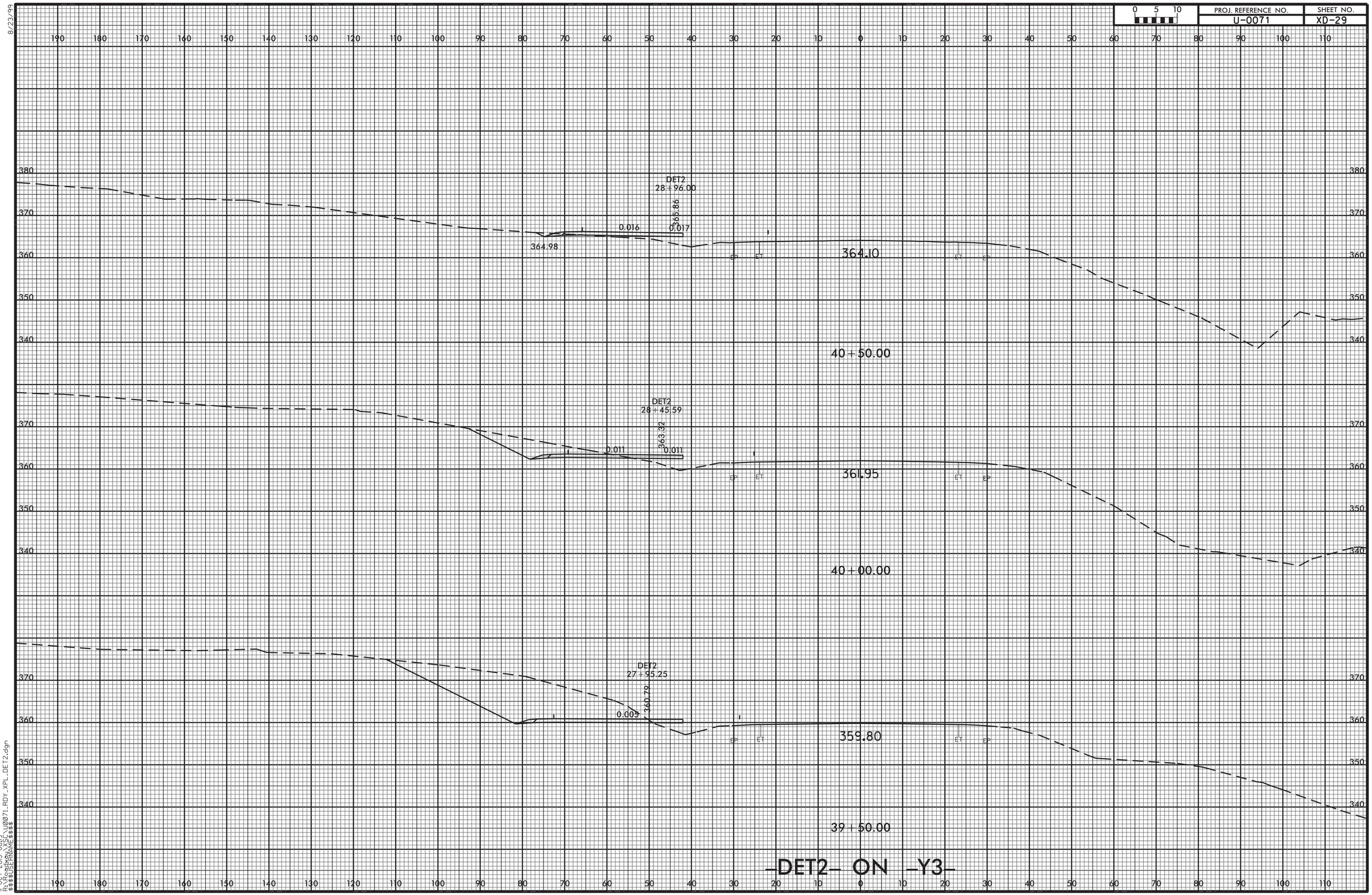
0 5 10
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U-0071
SHEET NO.
XD-29
DET2
28+96.00
365.86
0.016
0.017
364.98
364.10
40+50.00
DET2
28+45.59
363.32
0.011
0.011
361.95
40+00.00
DET2
27+95.25
360.79
0.005
359.80
39+50.00
-DET2- ON -Y3-
8/23/99
11-OCT-2013 08:19
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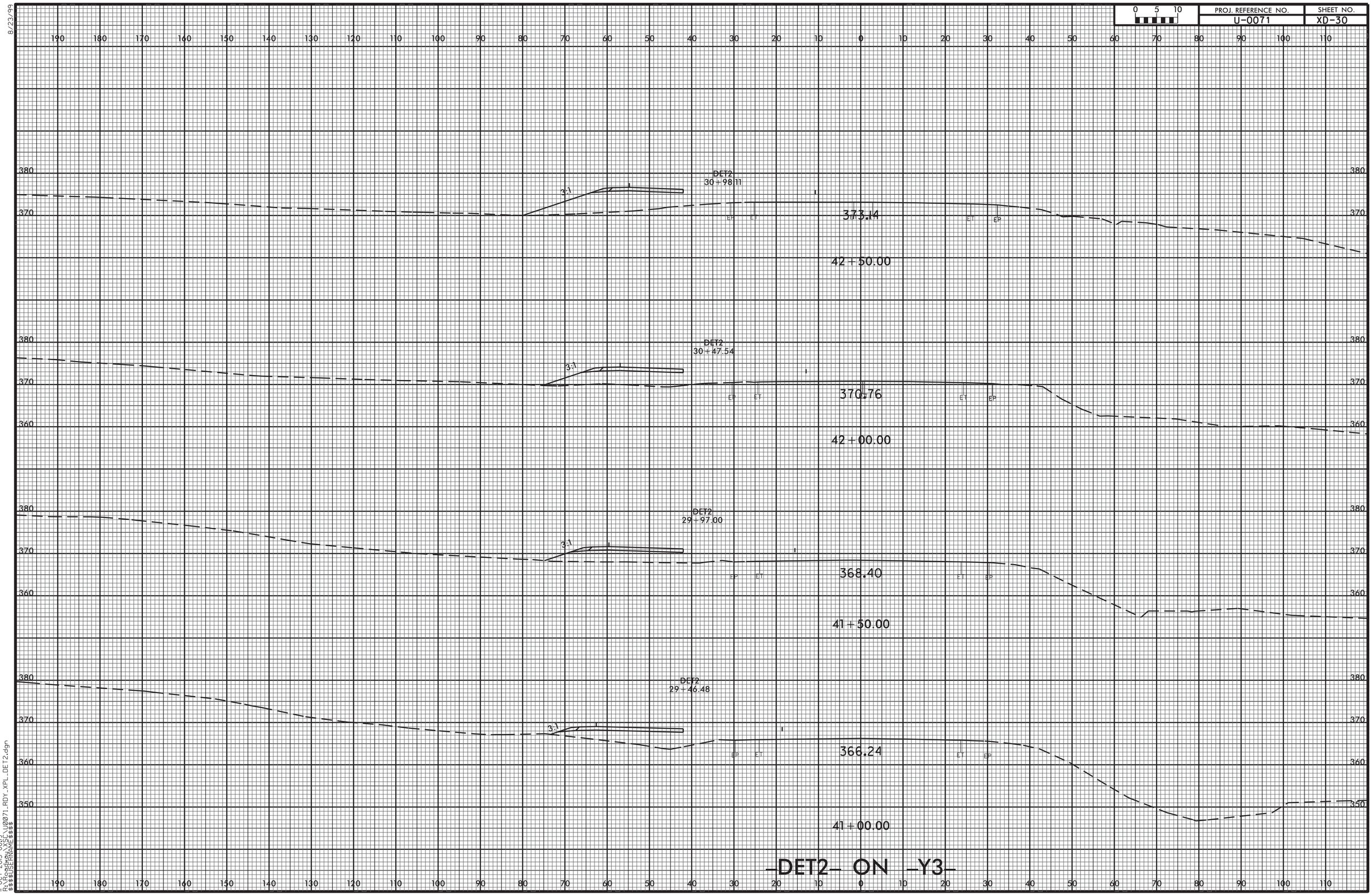
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-30 |




# -DET2- ON -Y3-

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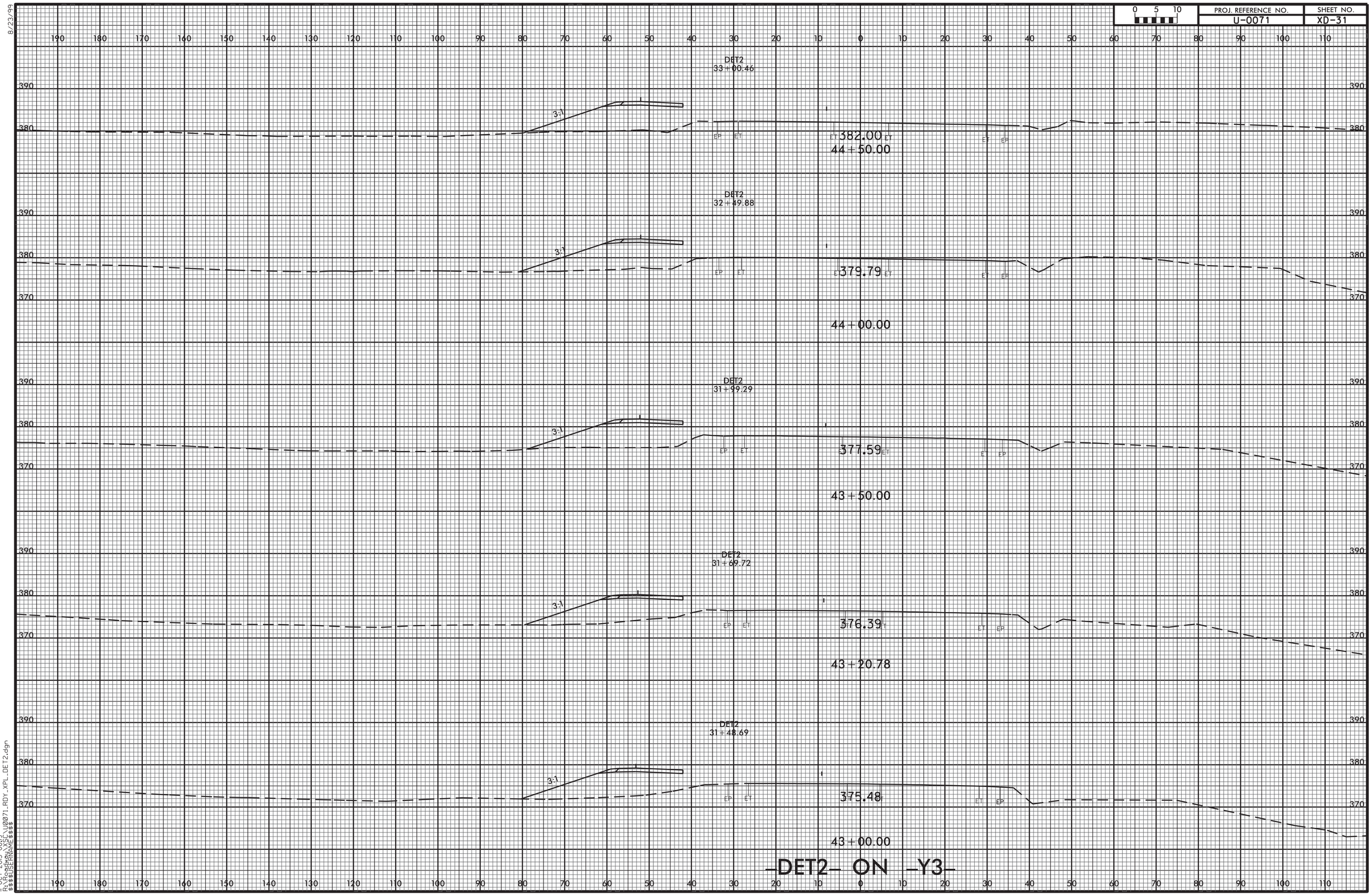
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-31 |

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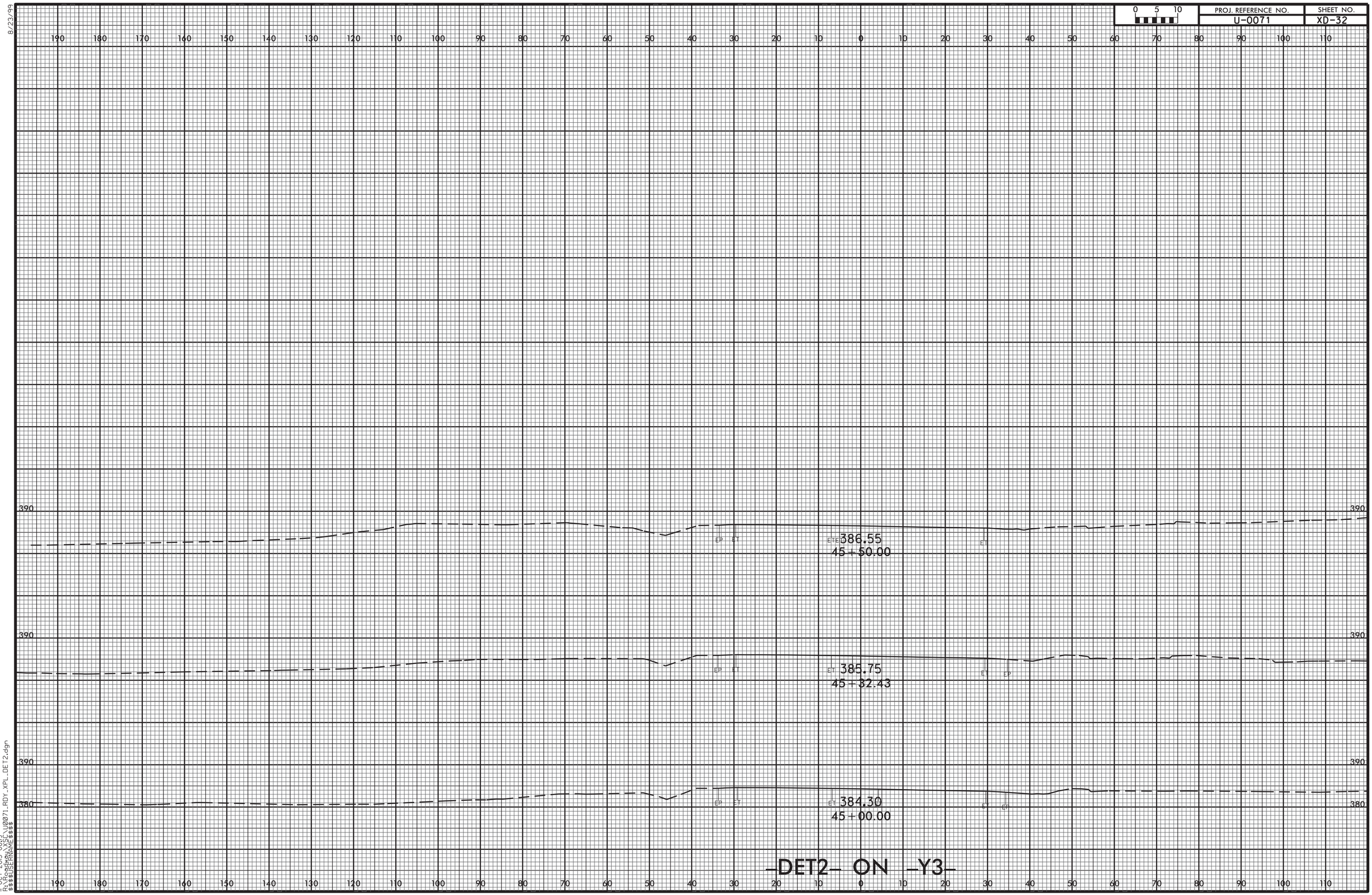
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-32 |

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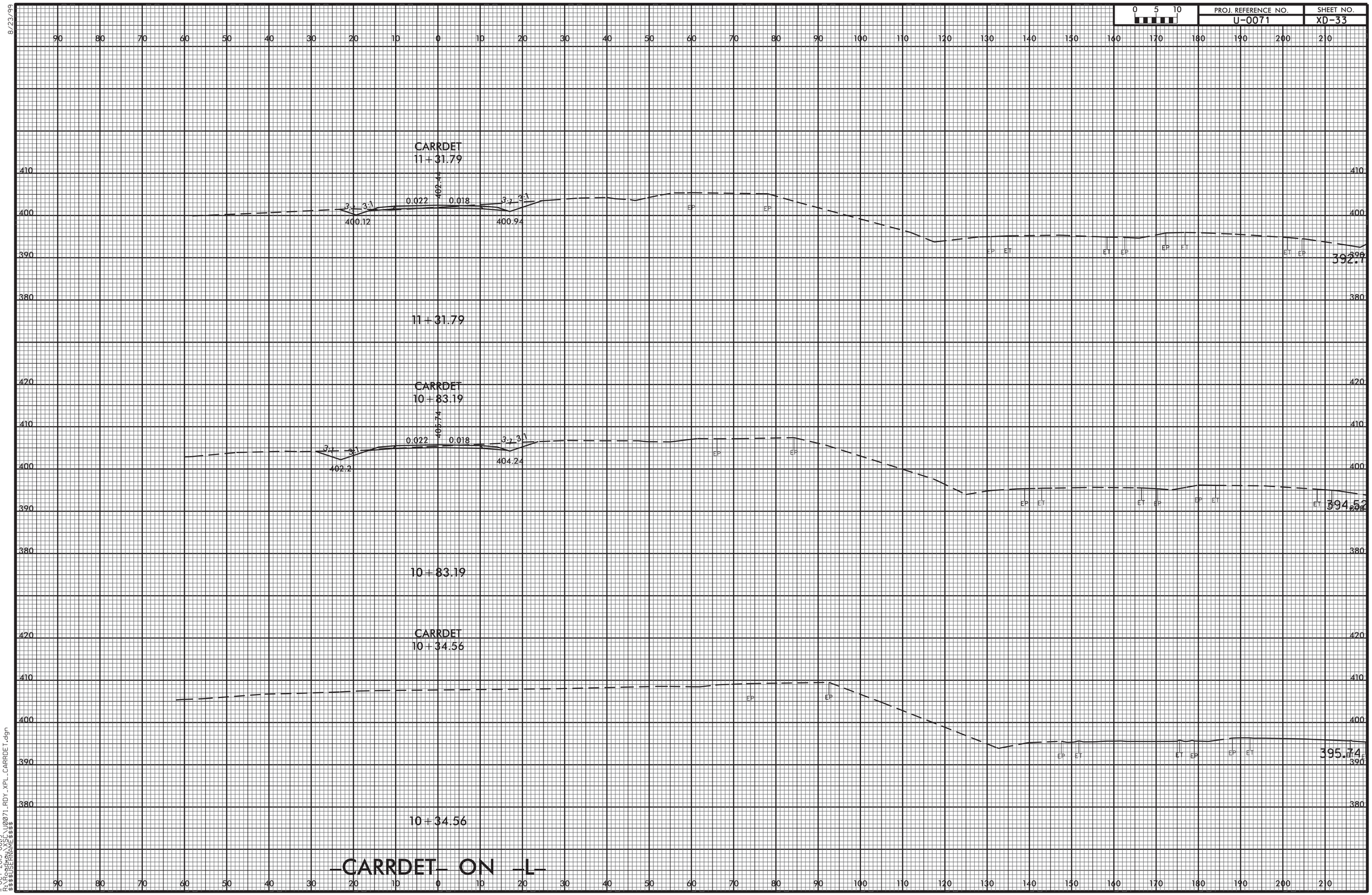
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U-0071
SHEET NO.
XD-33
CARRDET
11+31.79
492.44
0.022
0.018
3:1
400.12
400.94
EP
ET
392.1
11+31.79
CARRDET
10+83.19
490.74
402.2
404.24
394.52
10+83.19
CARRDET
10+34.56
395.74
10+34.56
-CARRDET- ON -L-
11-OCT-2013 08:19
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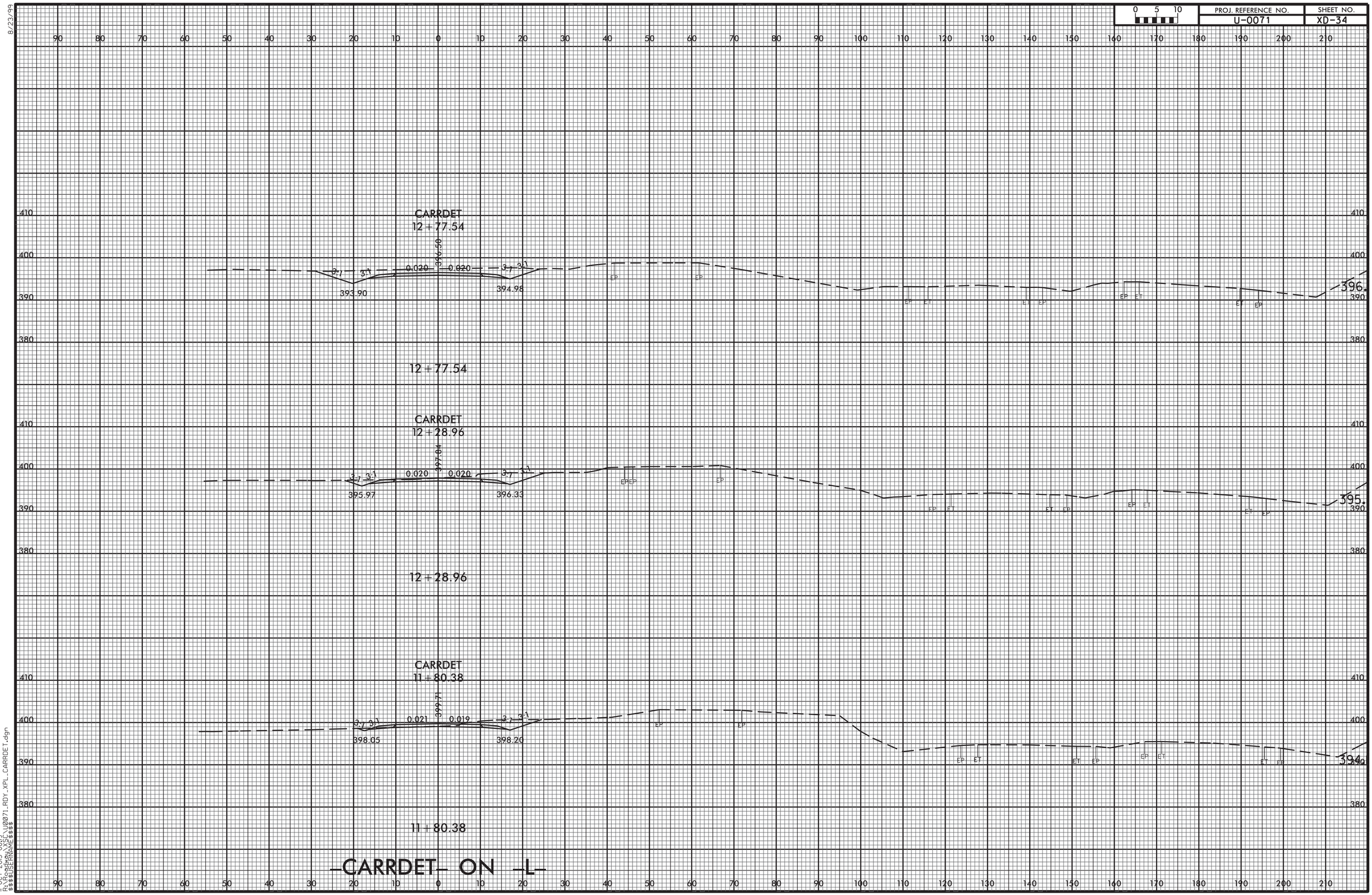
8/23/99




# –CARRDET– ON –L–

8/23/99
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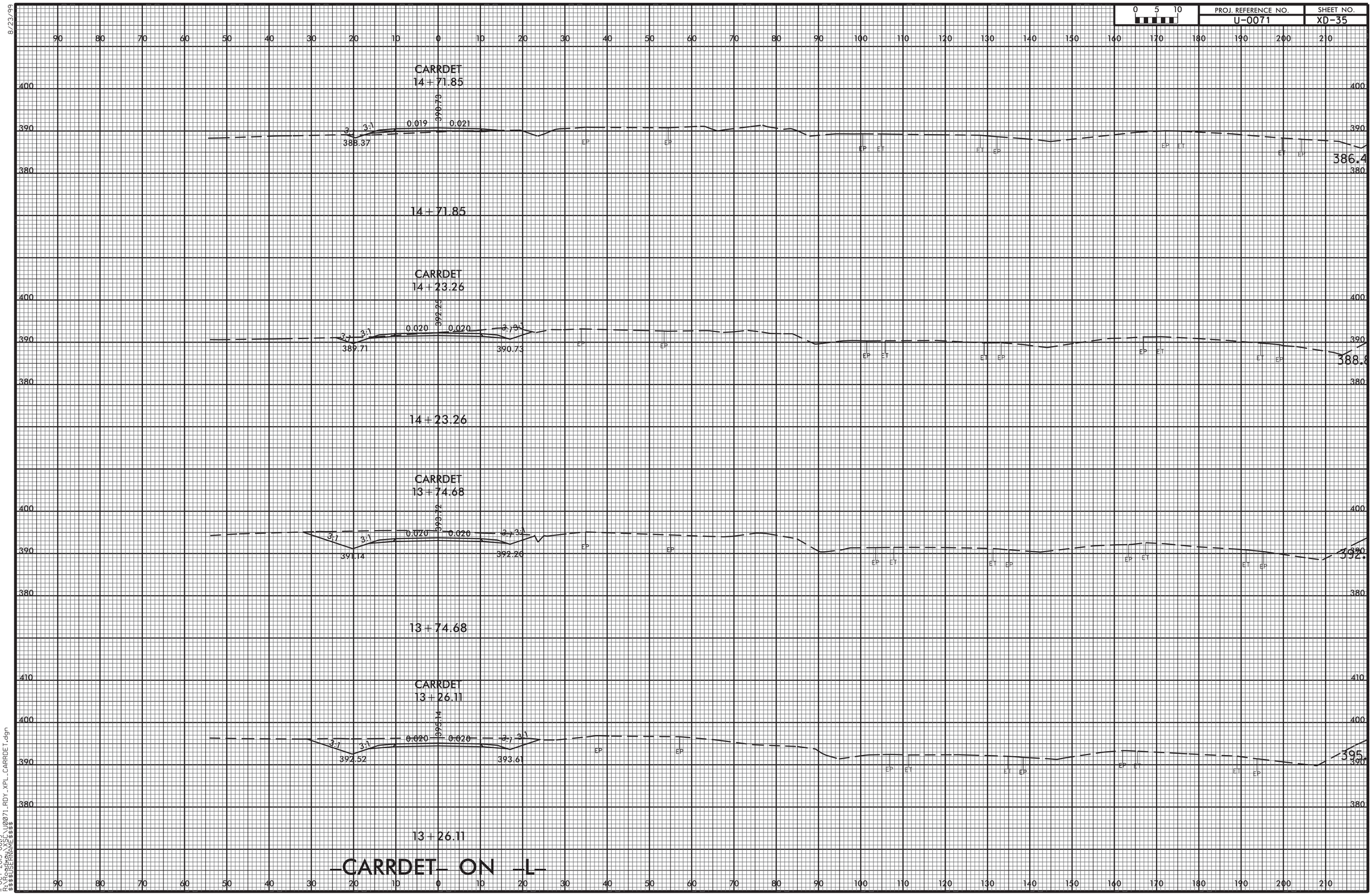
| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | XD-35 |




# -CARRDET- ON -L-

8/23/99

11-OCT-2013 08:19
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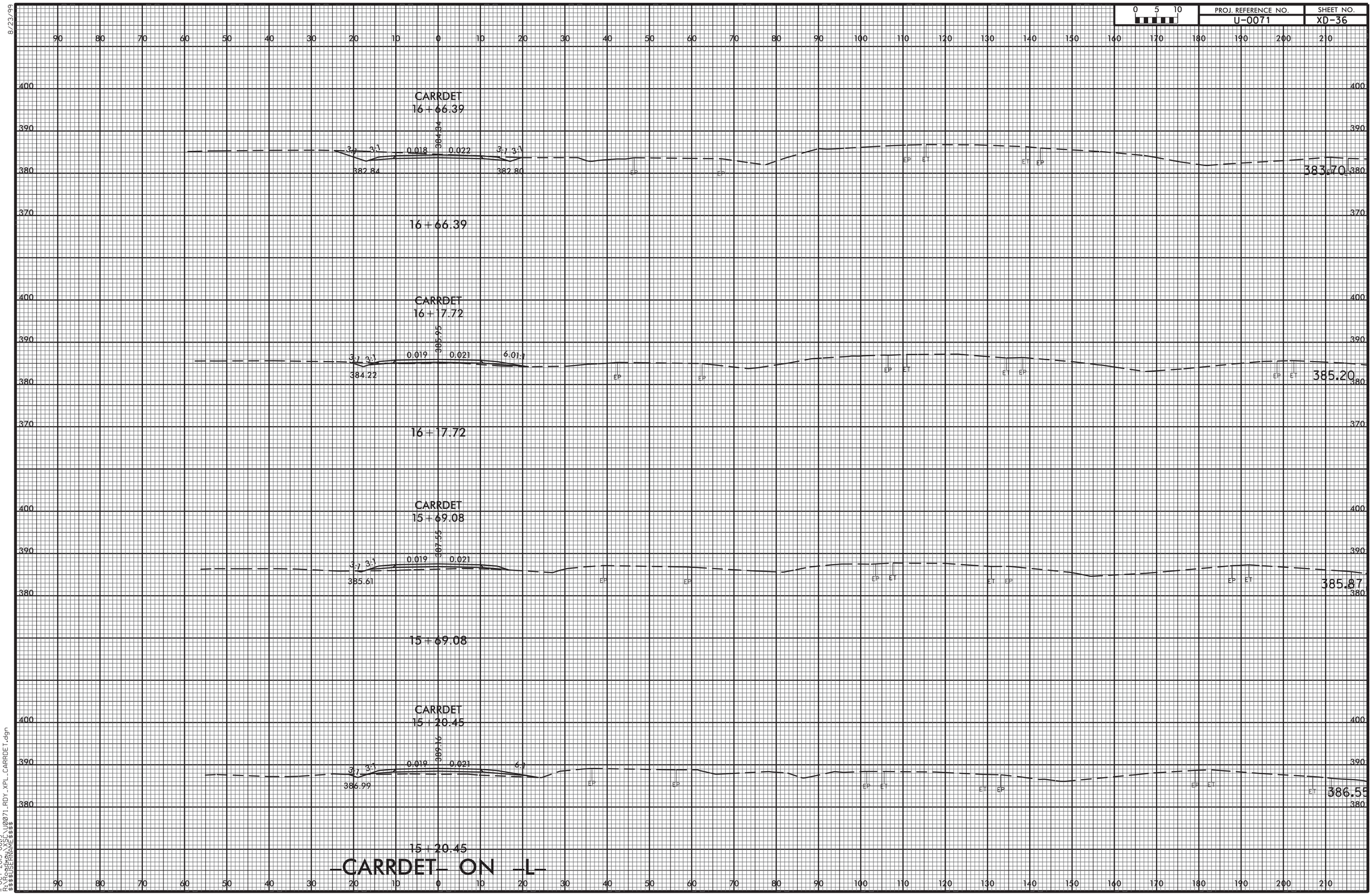
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-36 |




# –CARRDET– ON –L–

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| PROJ. REFERENCE NO. | SHEET NO. |
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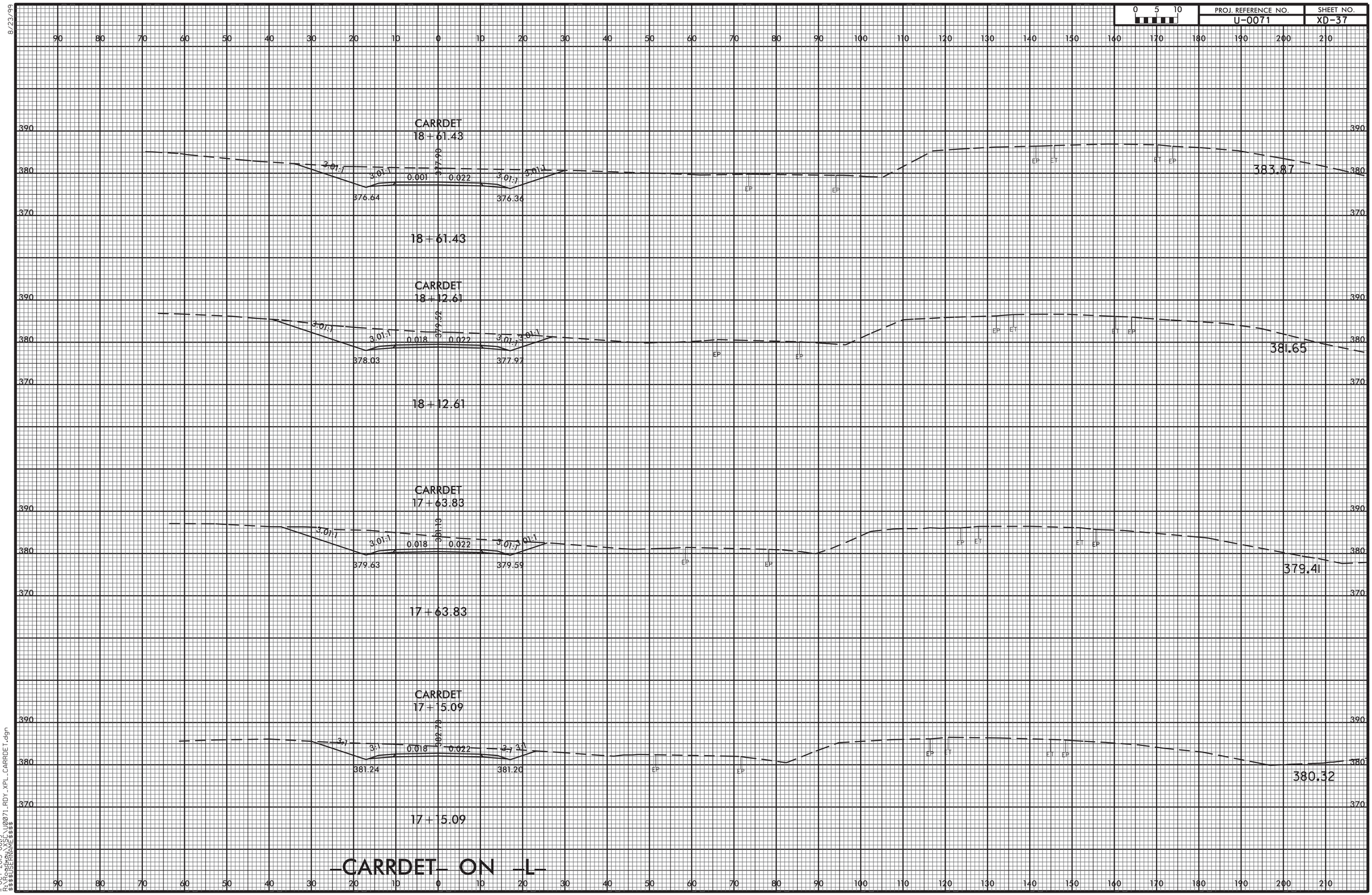
| U-0071 | XD-37 |




# –CARRDET– ON –L–

8/23/99

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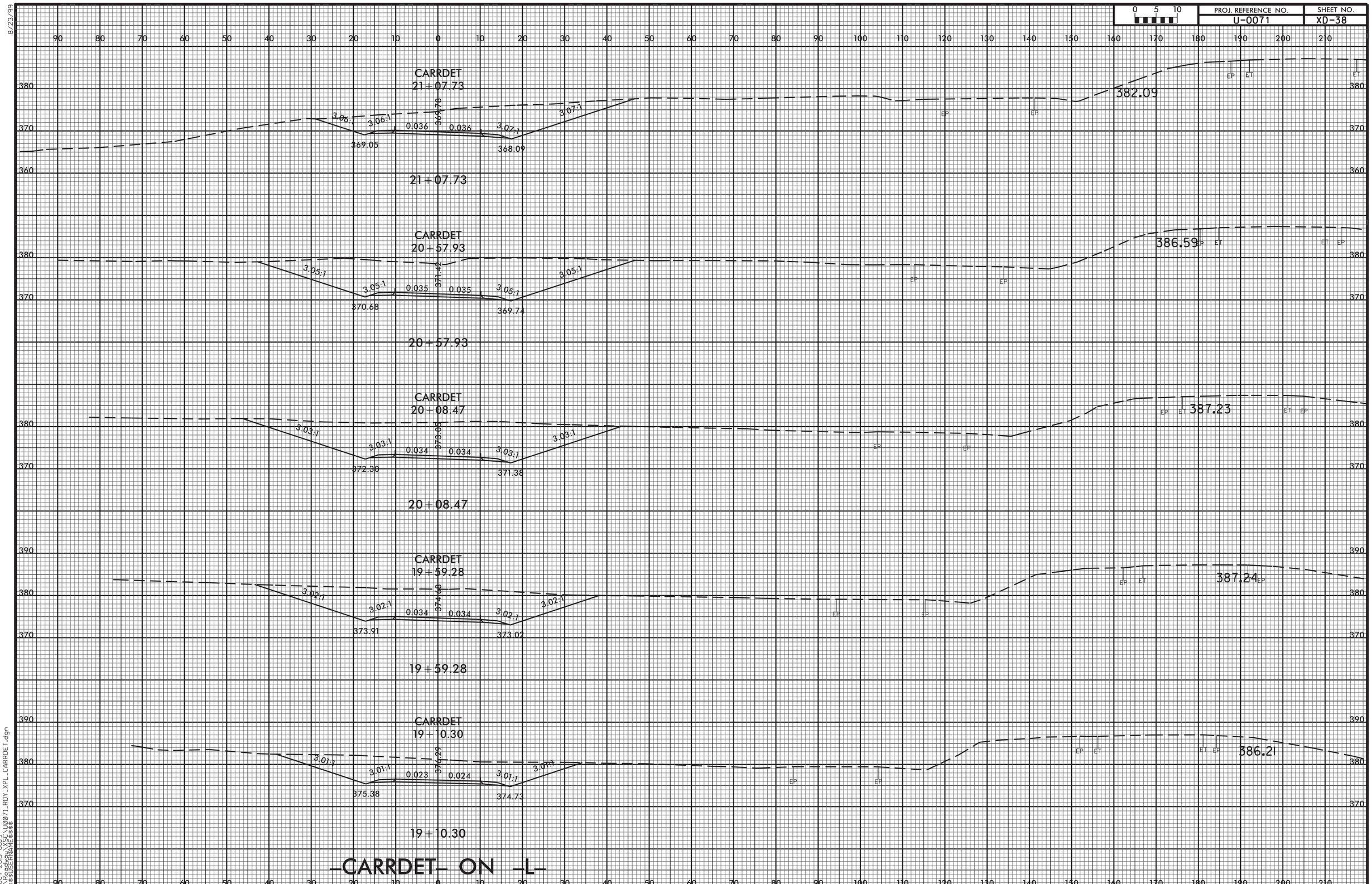
| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | XD-38 |

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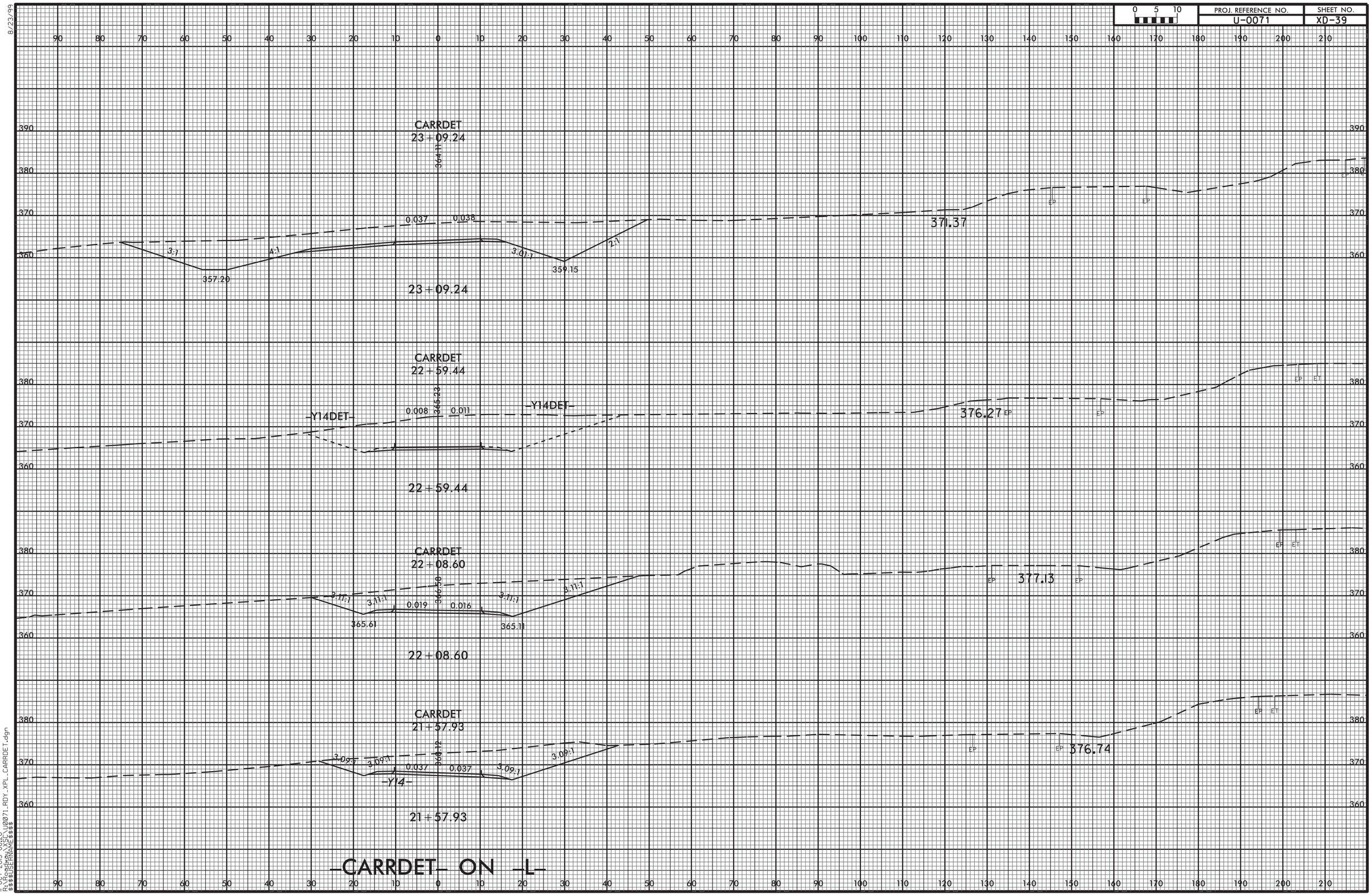
$$$$USERNAME$$$$




8/23/99
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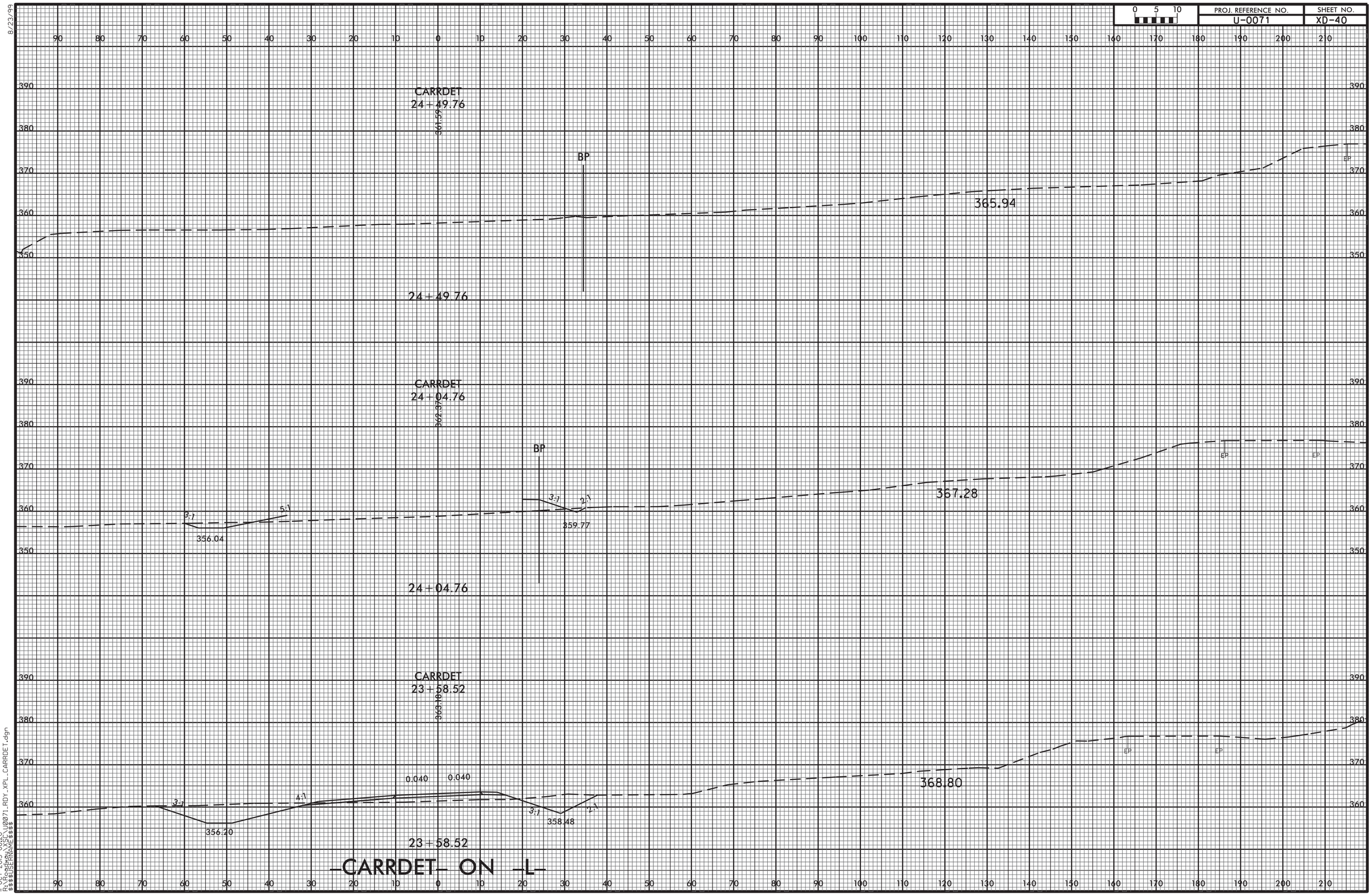
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-40 |

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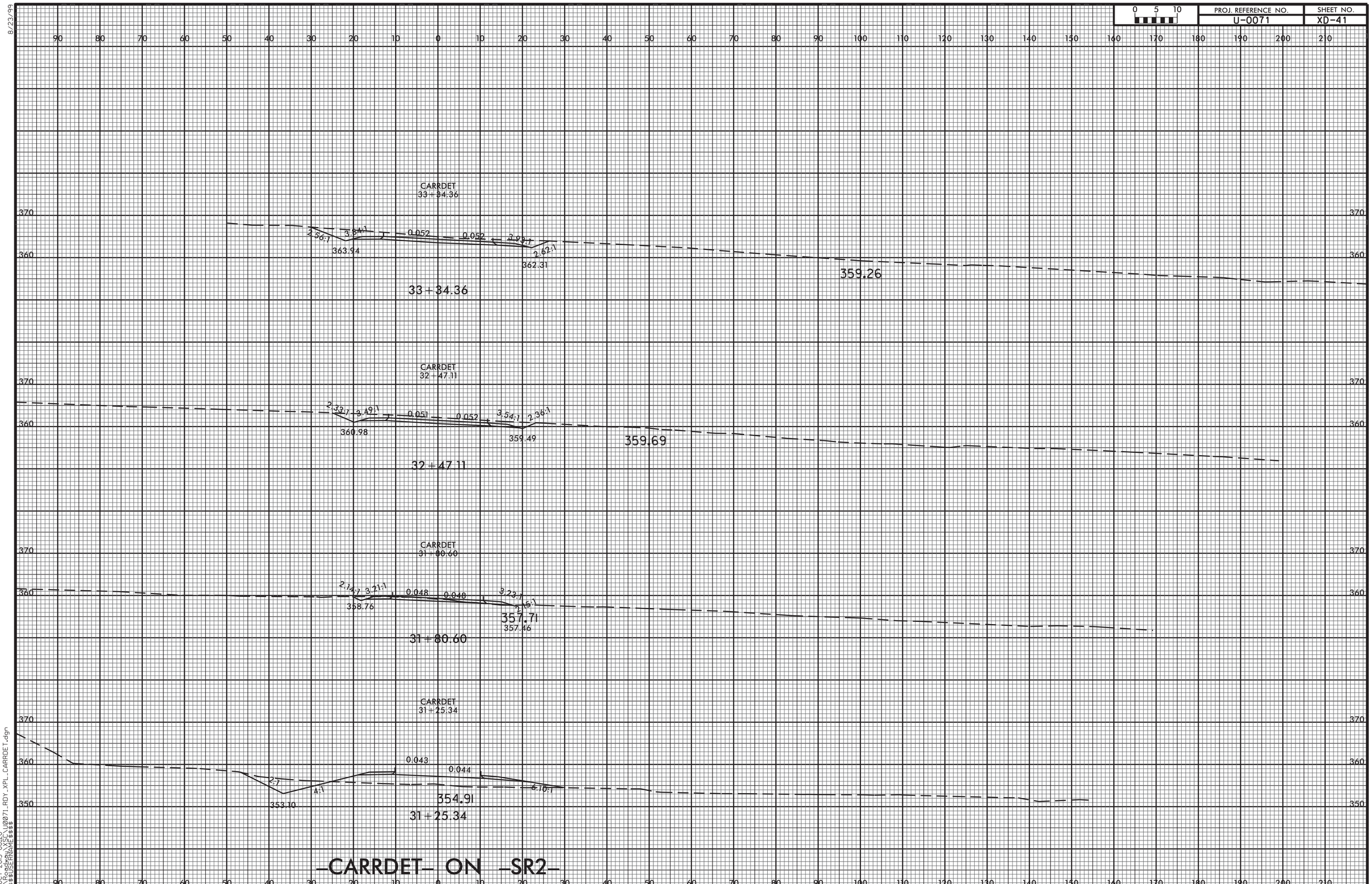
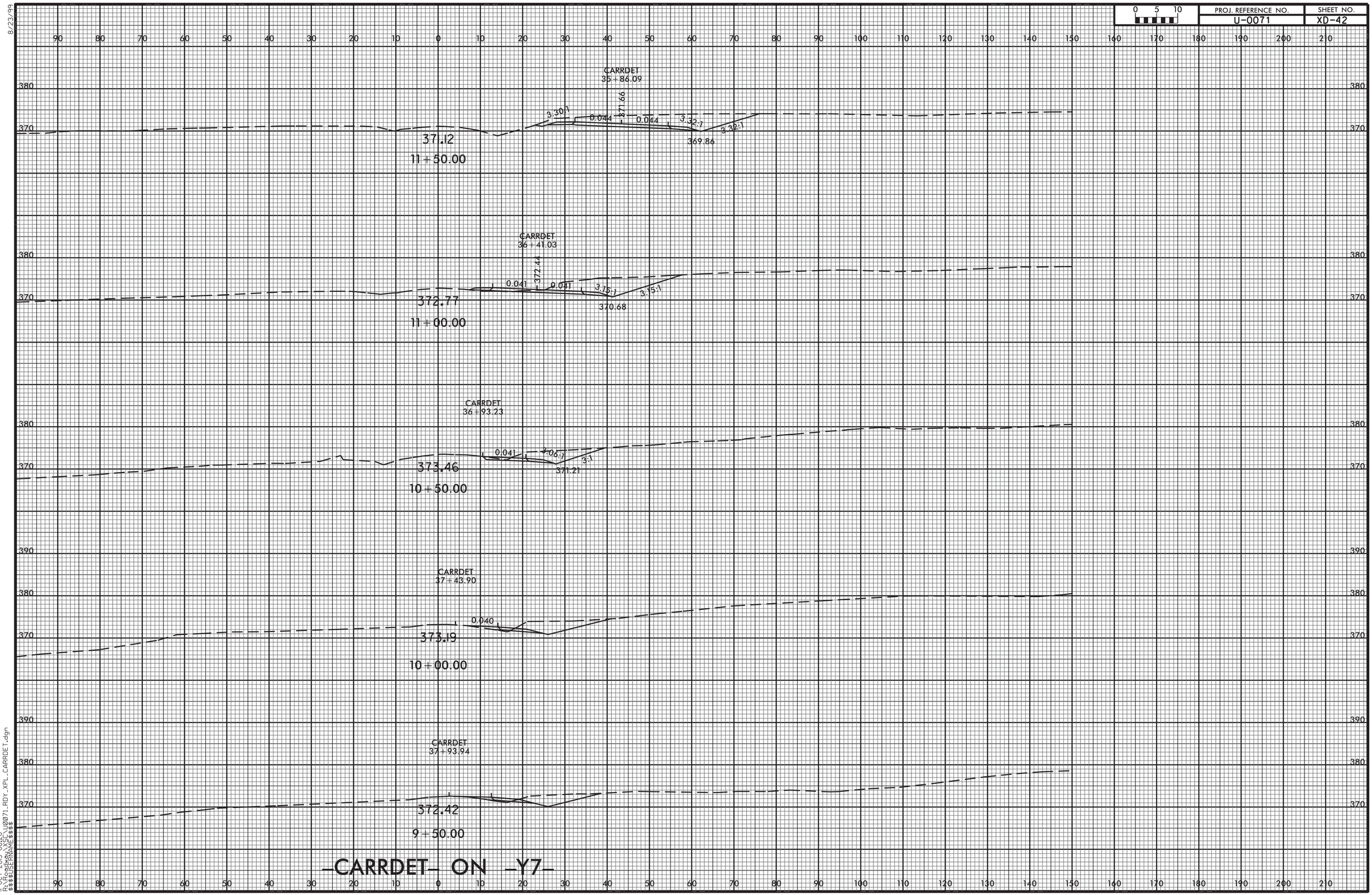
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-41 |




# -CARRDET- ON -SR2-

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-42 |

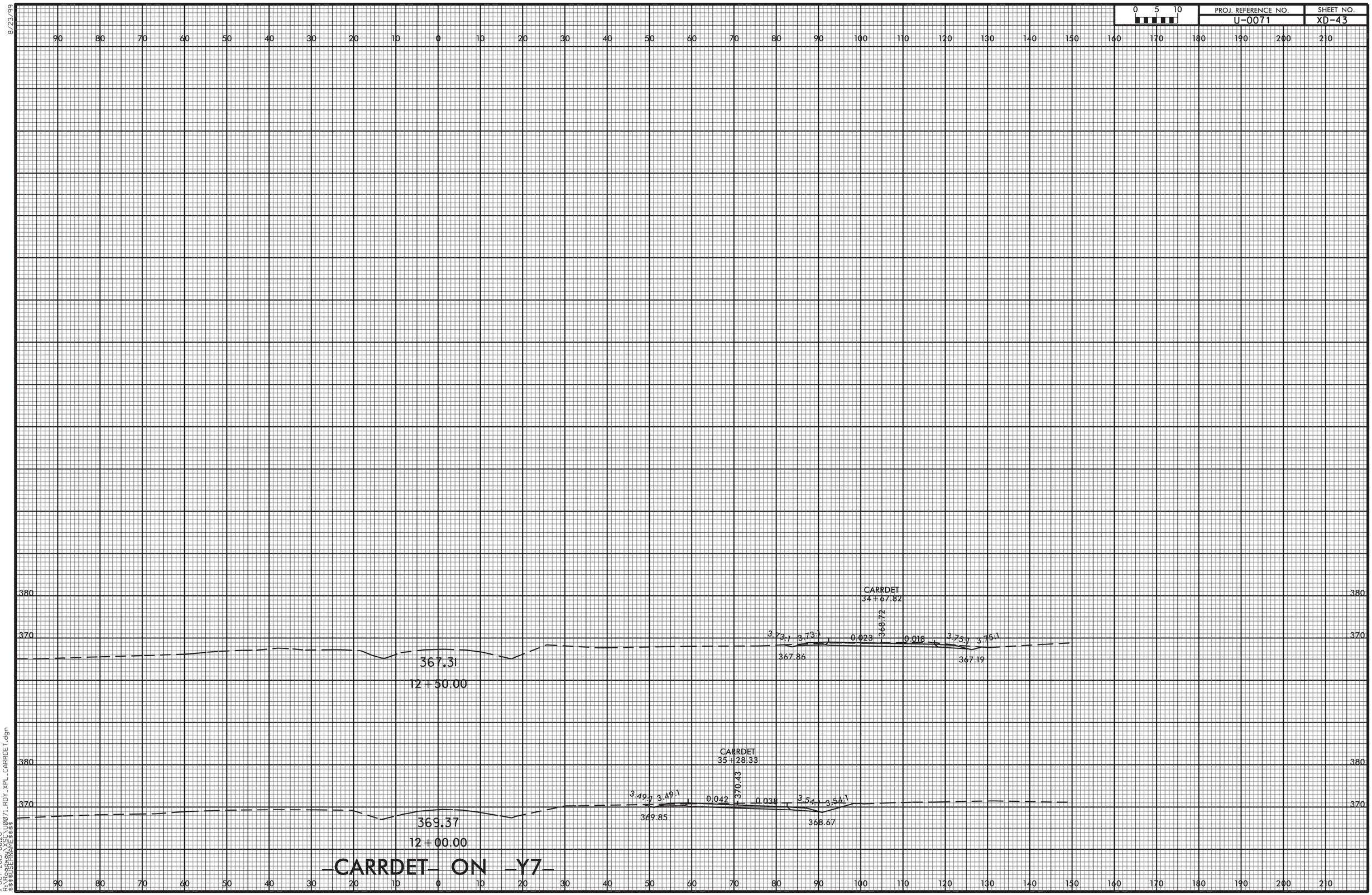



# -CARRDET- ON -Y7-

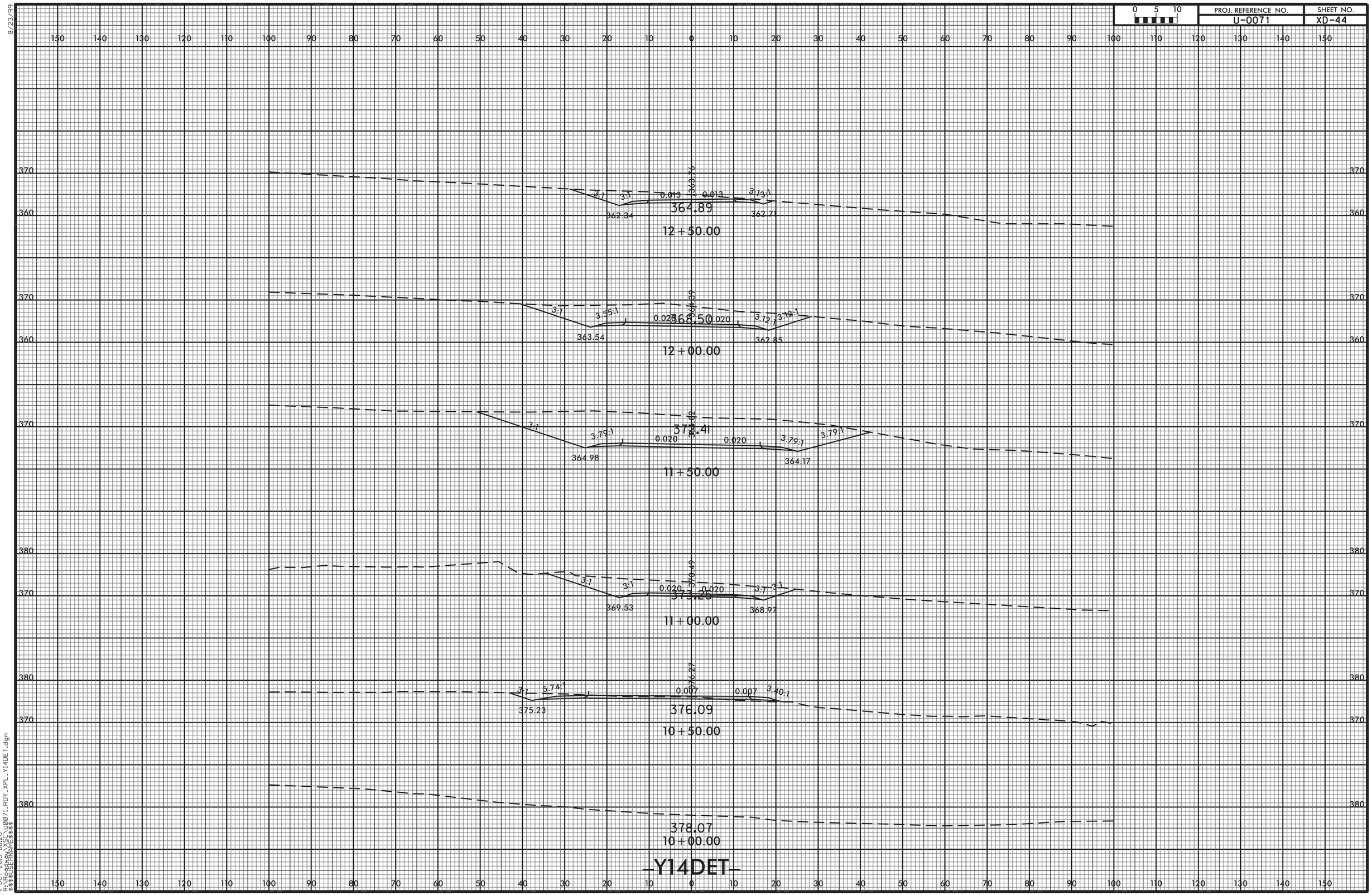
11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_CARRDET.dgn
$$$$USERNAME$$$$

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-43 |




11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_CARRDET.dgn
$$$$USERNAME$$$$




8/23/99
11-OCT-2013 08:20
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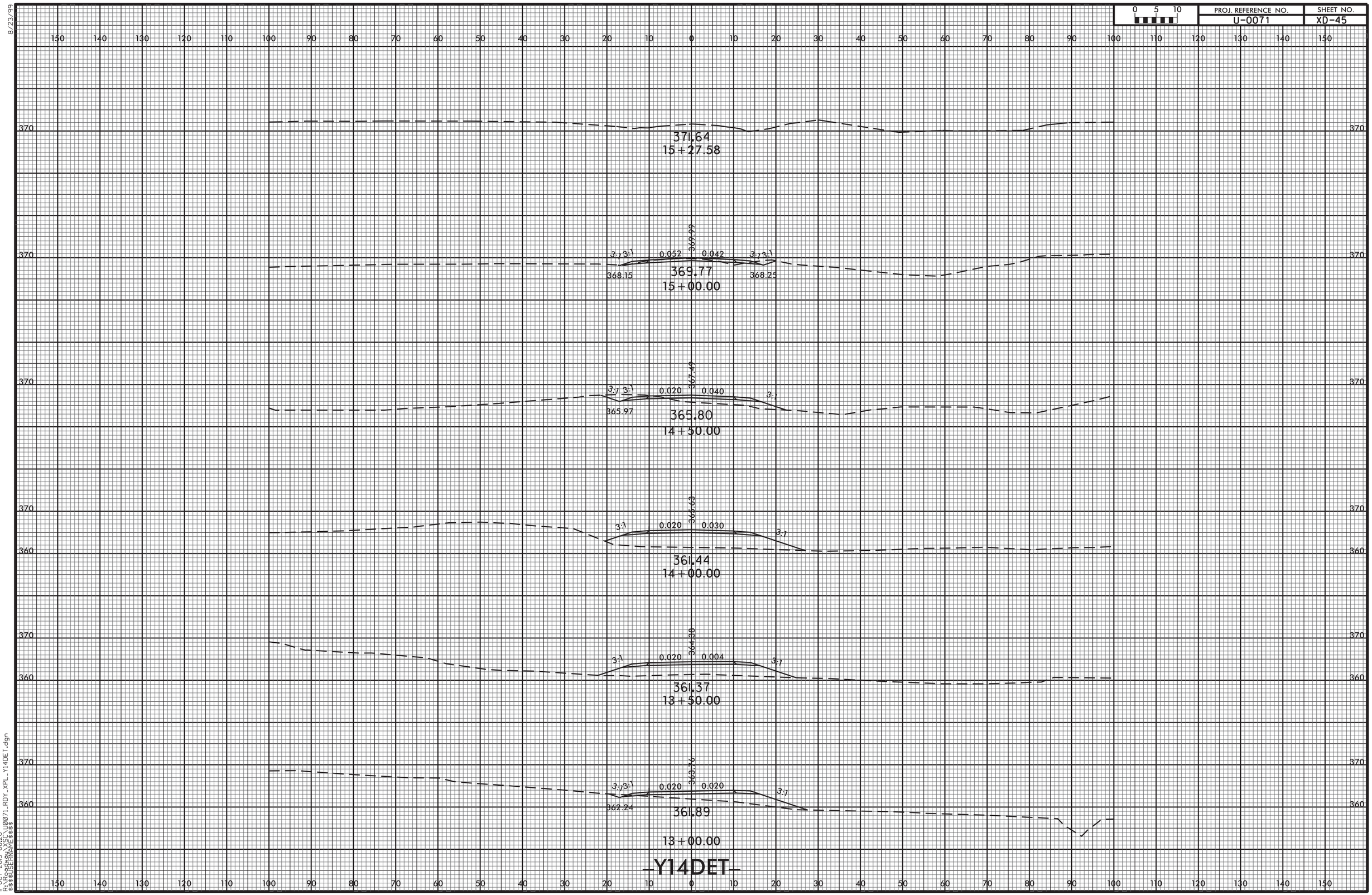
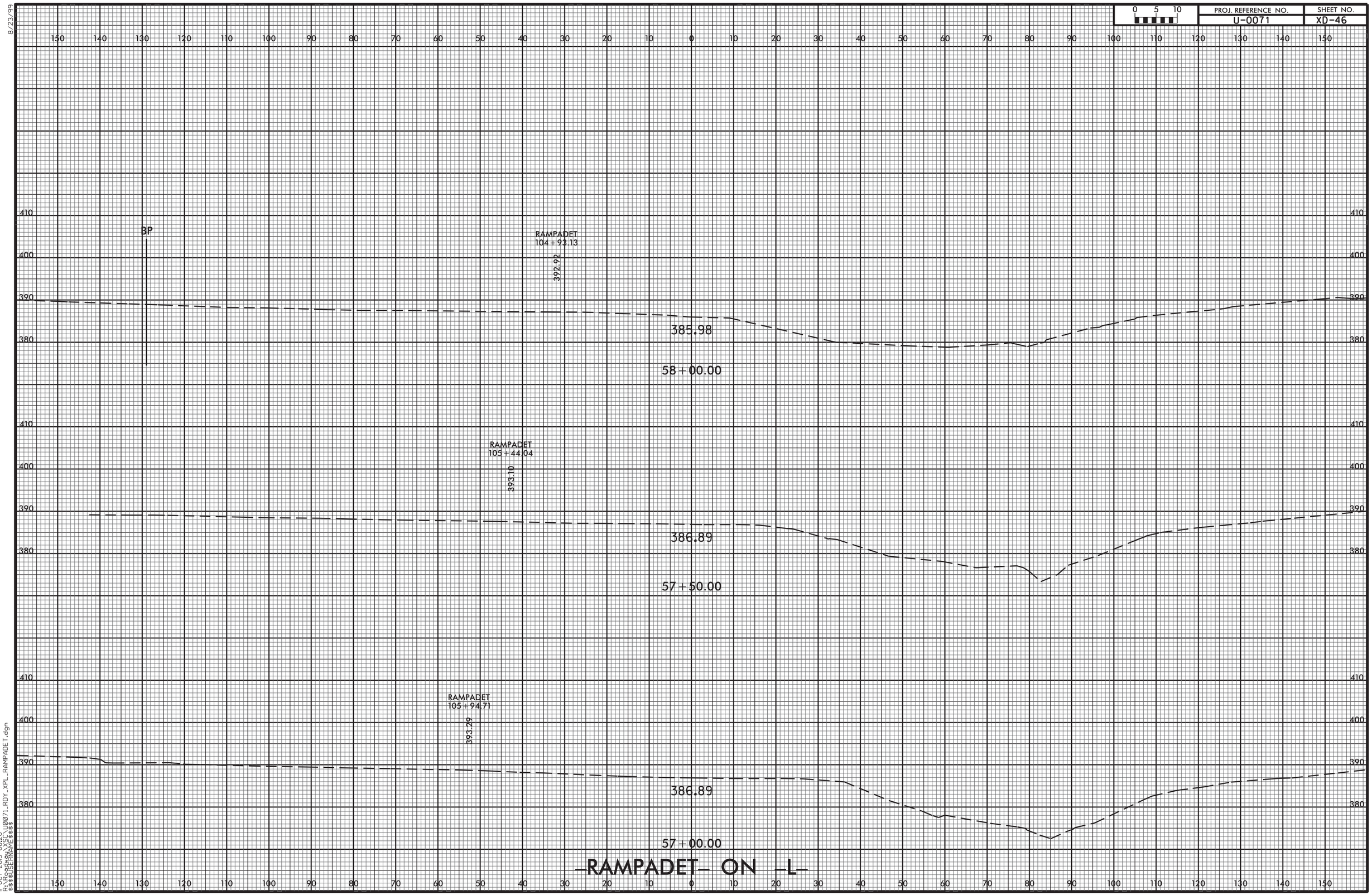

0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-45
371.64
15+27.58
369.99
3:1 3:1
0.052
0.042
368.15
369.77
368.25
15+00.00
367.49
3:1 3:1
0.020
0.040
365.97
365.80
14+50.00
366.63
3:1
0.020
0.030
361.44
14+00.00
364.38
3:1
0.020
0.004
361.37
13+50.00
363.24
3:1 3:1
0.020
0.020
362.24
361.89
13+00.00
-Y14DET-
8/23/99
11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_Y14DET.dgn
$$$$USERNAME$$$$




8/23/99

11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_RAMPADET.dgn
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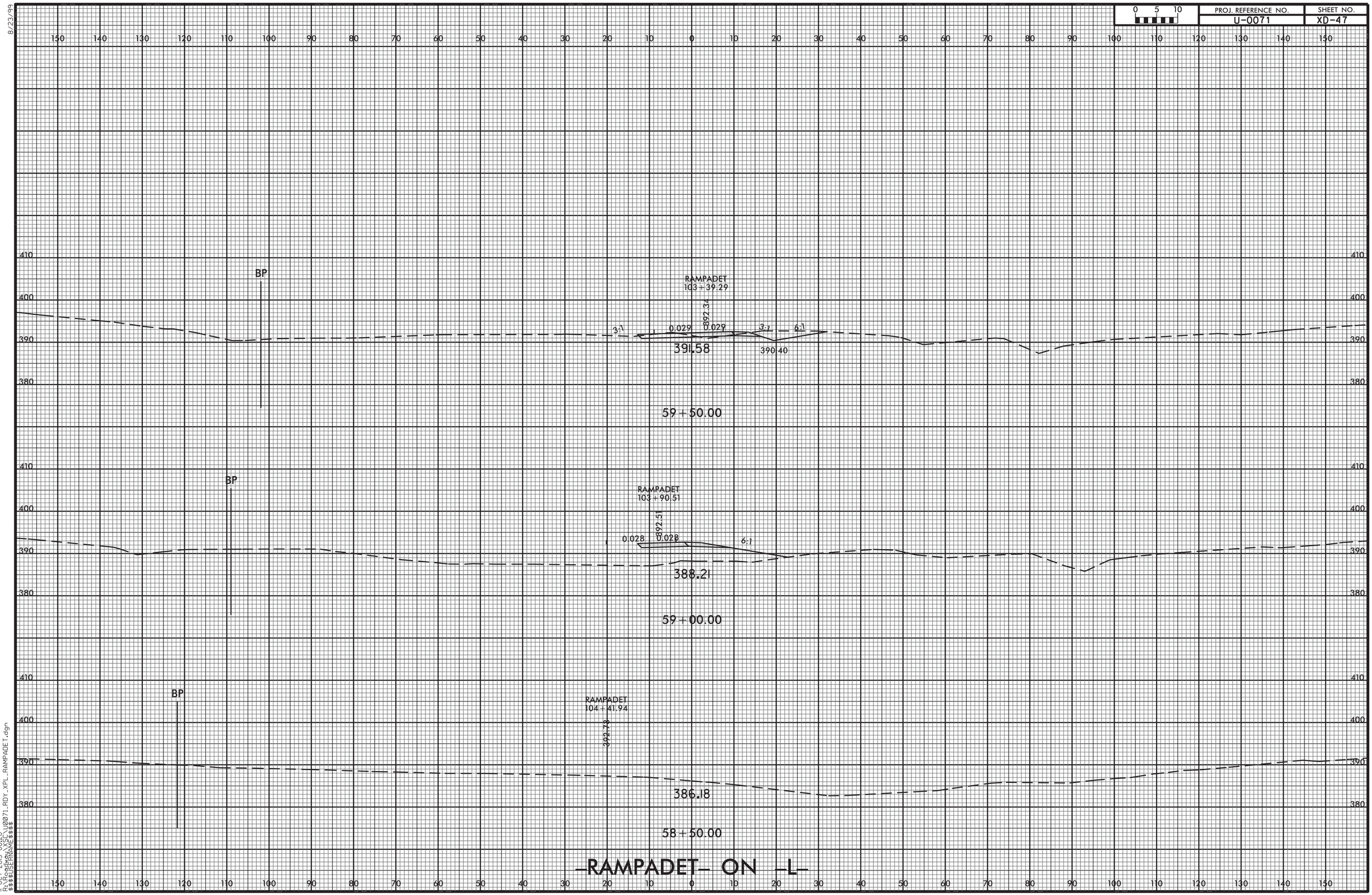
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-47 |

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R:\Roadway\XSC\U0071_RDY_XPL_RAMPADET.dgn
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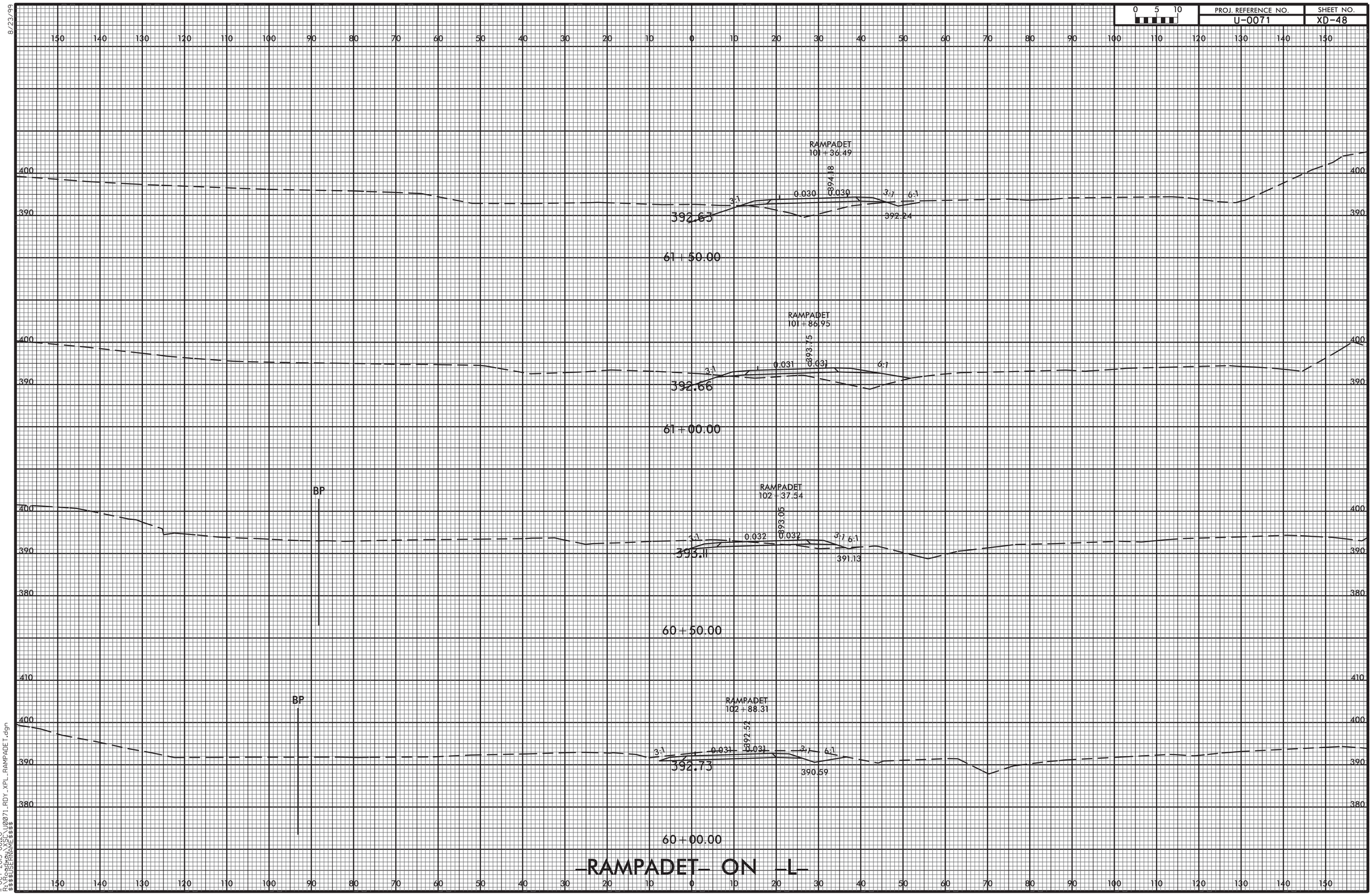
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-48 |




11-OCT-2013 08:20
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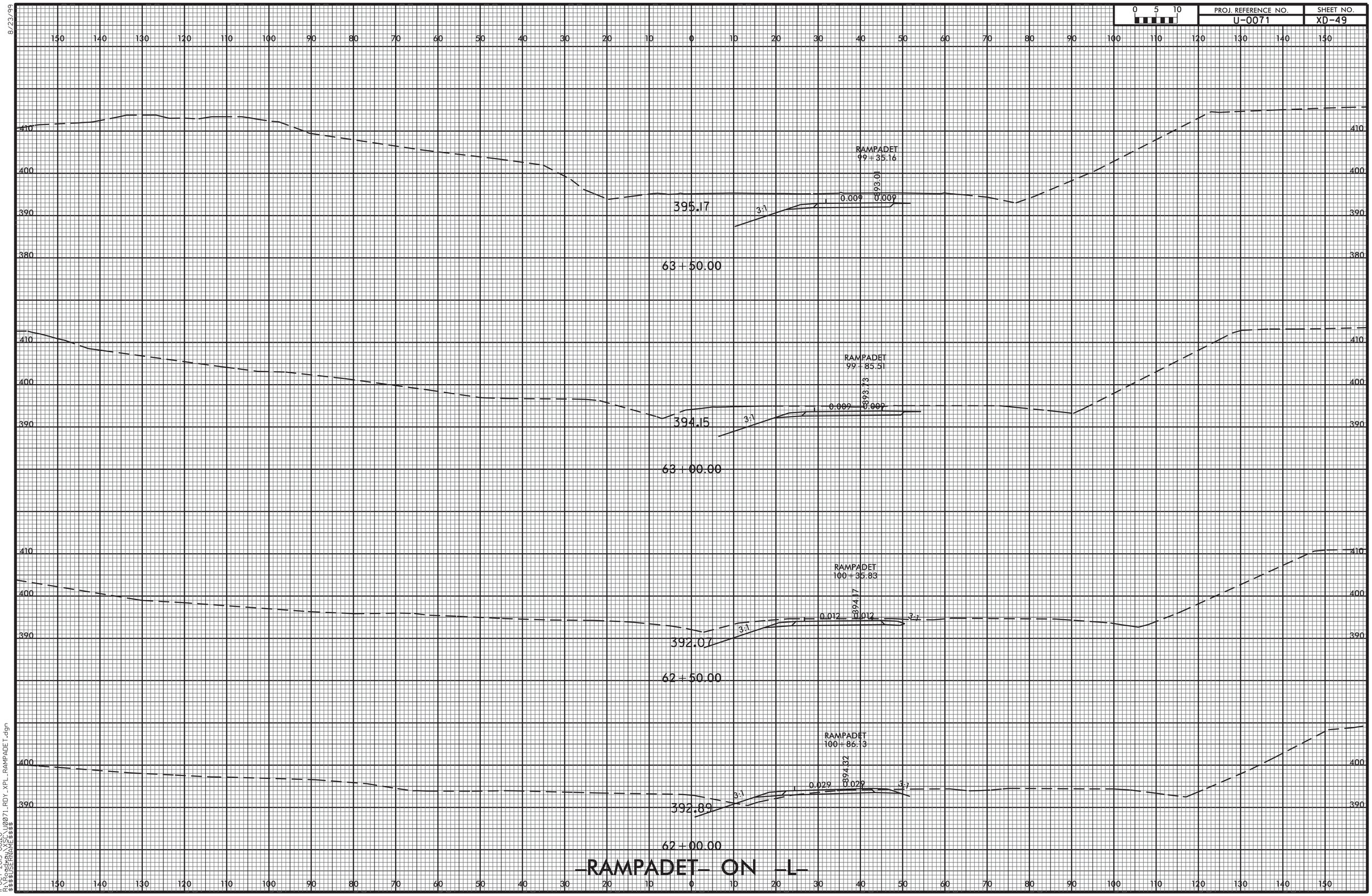
$$$$USERNAME$$$$

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R:\Roadway\XSC\U0071_RDY_XPL_RAMPADET.dgn
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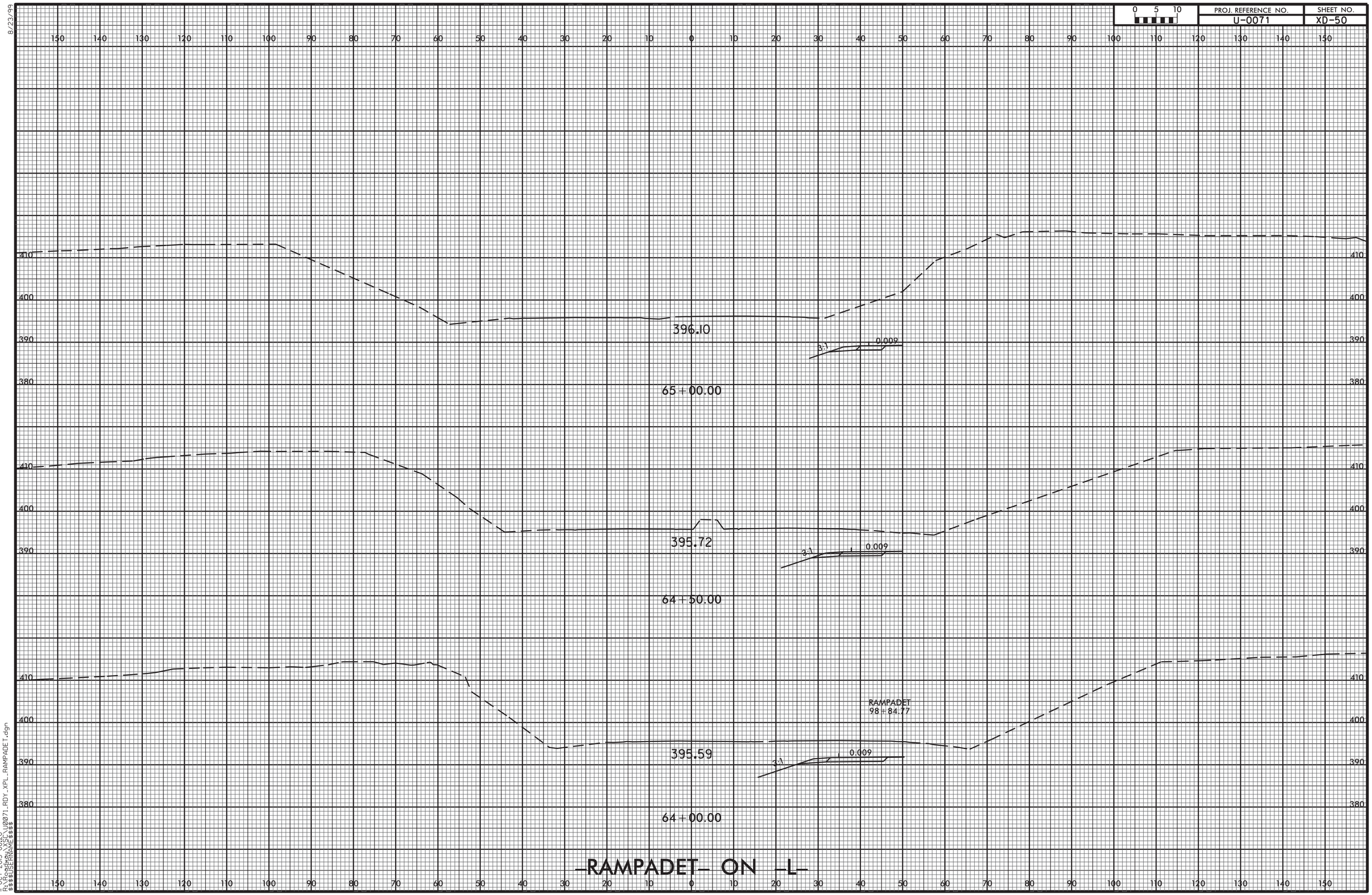
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-50 |

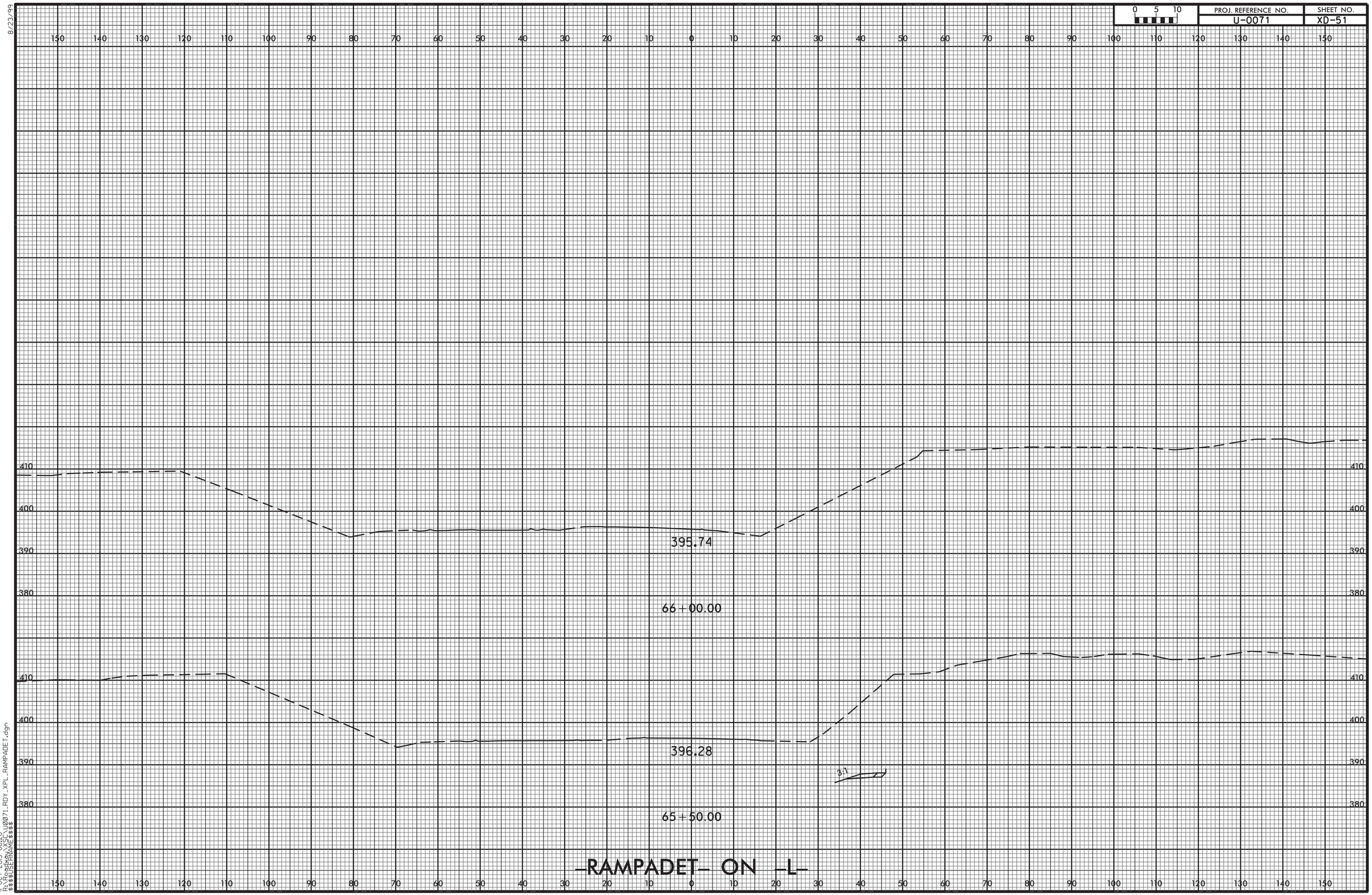



# -RAMPADET- ON -L-

11-OCT-2013 08:20
R:\Roadway\XSEC\U0071_RDY_XPL_RAMPADET.dgn
$$$$USERNAME$$$$

8/23/99

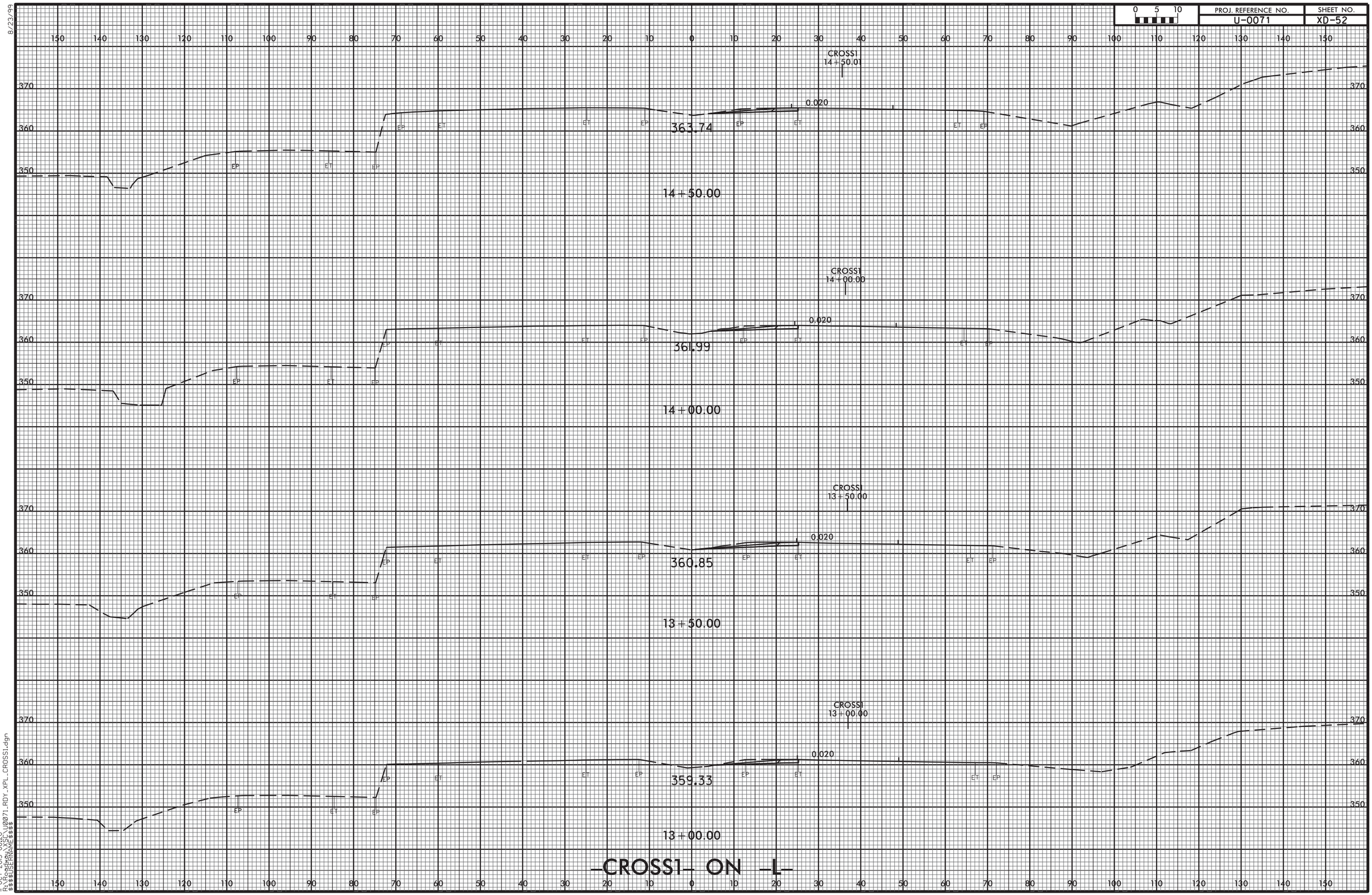
| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | XD-51 |




11-OCT-2013 08:20
R:\Roadway\XSEC\U0071_RDY_XPL_RAMPADET.dgn
$$$$USERNAME$$$$

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-52 |




-CROSS1- ON -L-

11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_CROSS1.dgn
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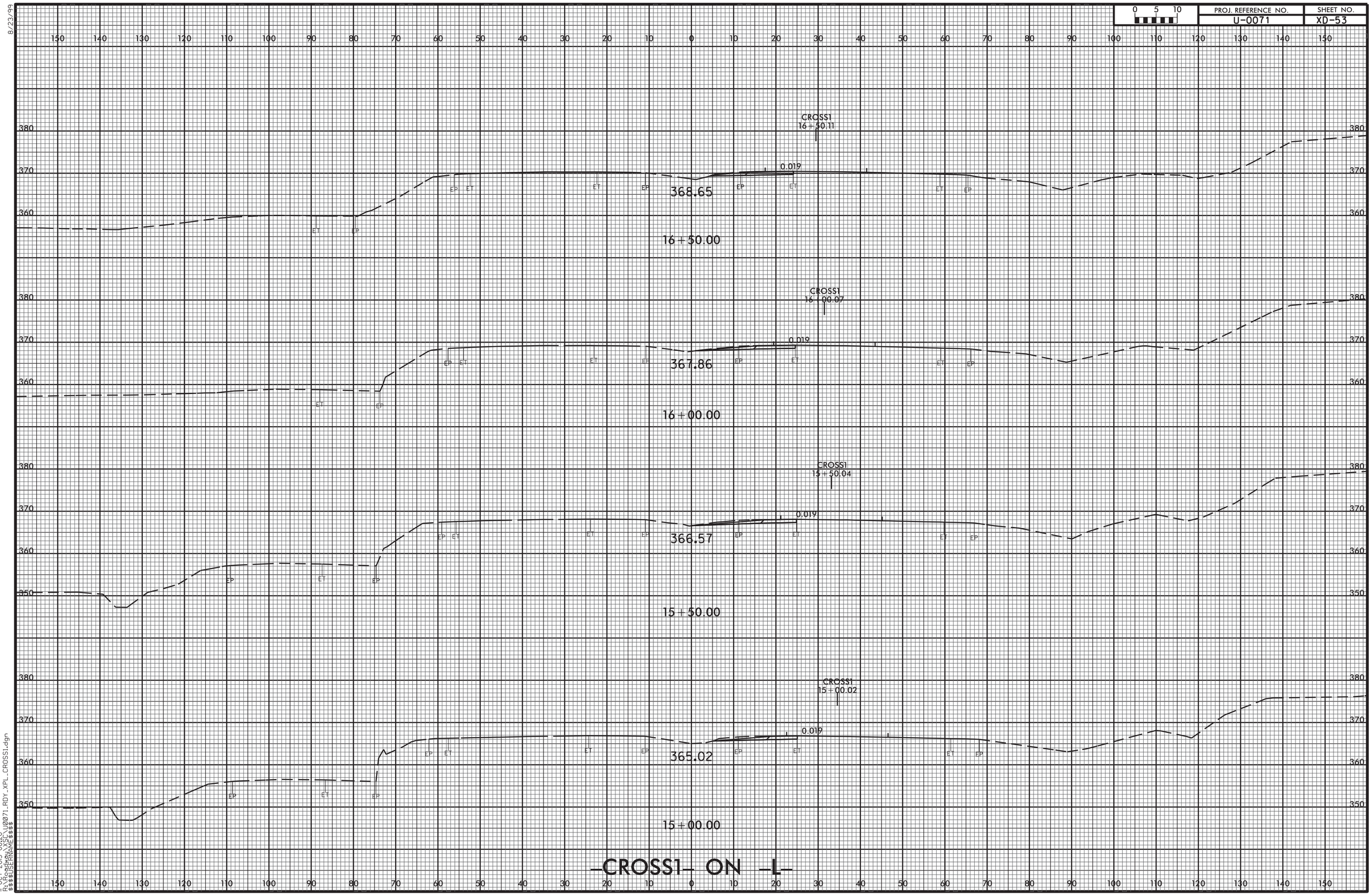
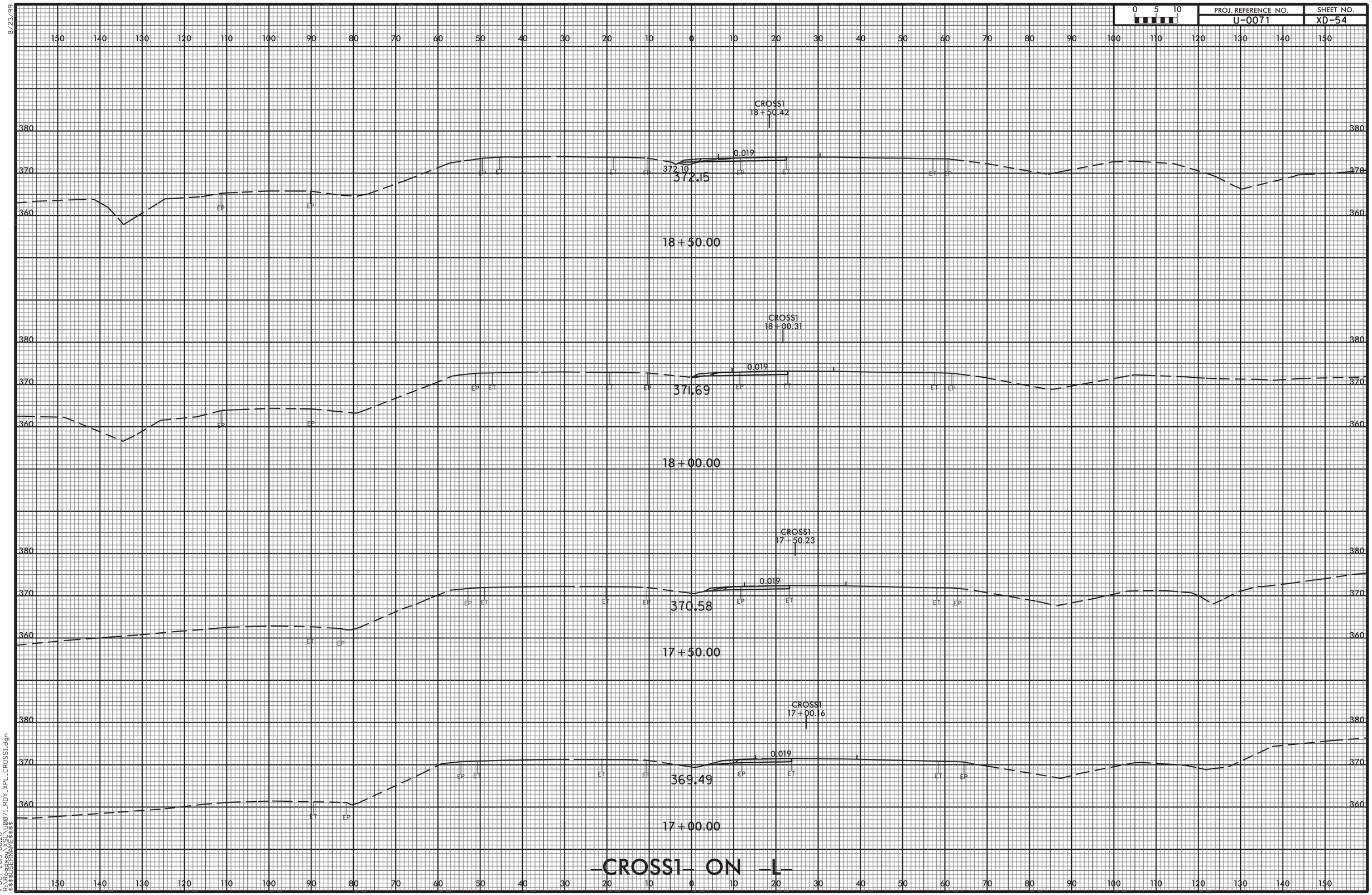



8/23/99

11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_CROSS1.dgn
$$$$USERNAME$$$$




8/23/99

11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_CROSS1.dgn
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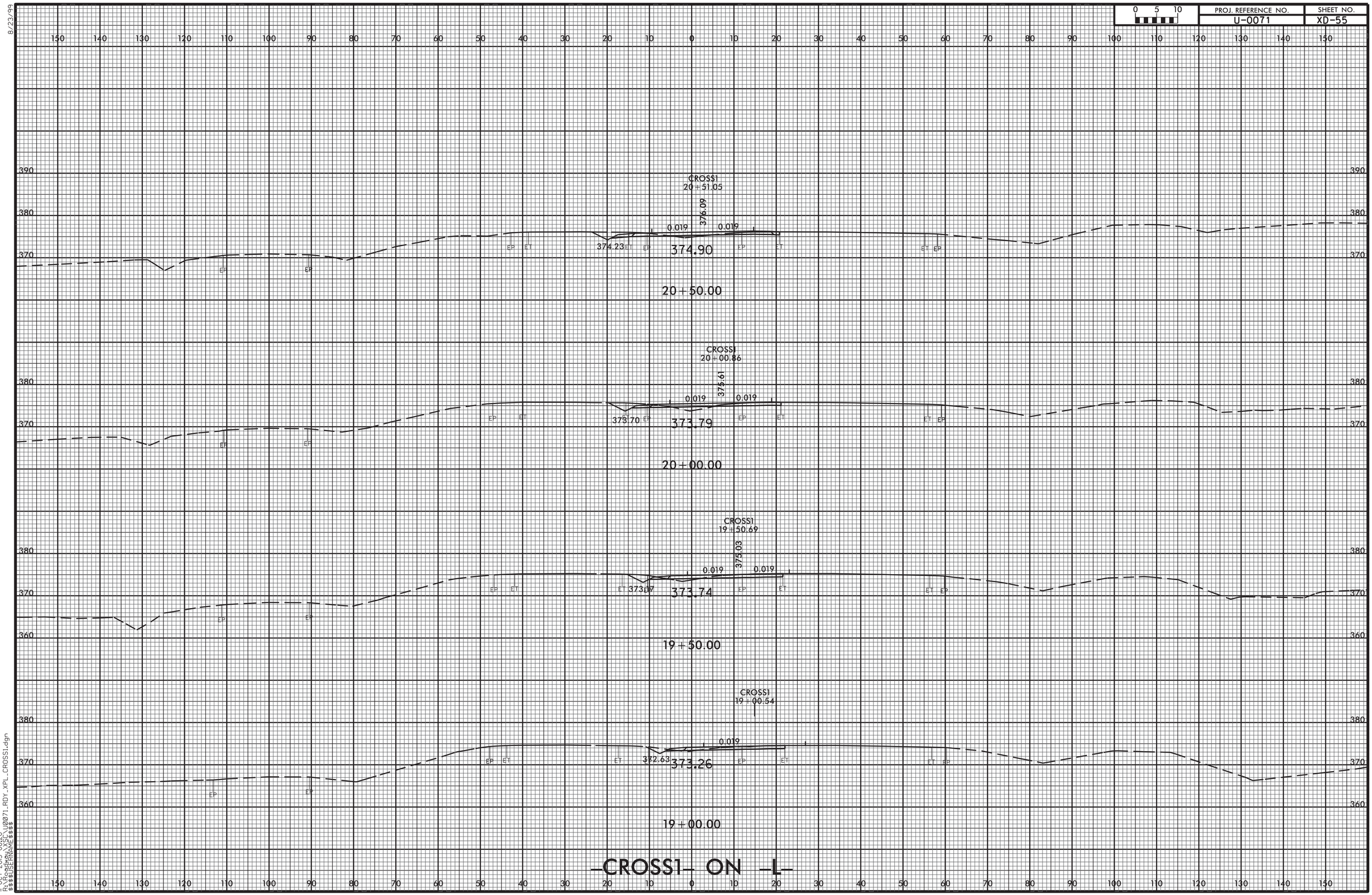
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-55 |

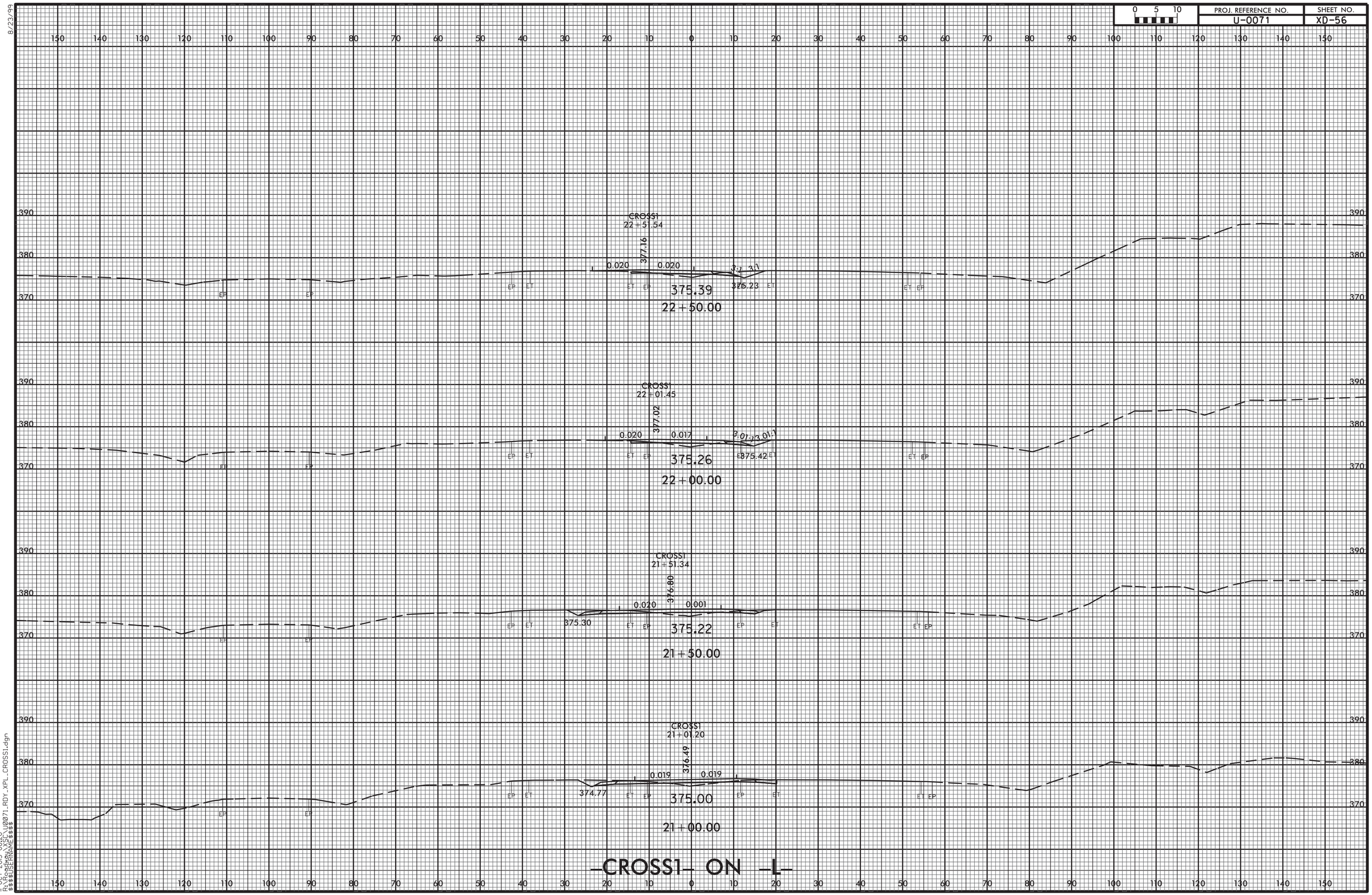



# -CROSS1- ON -L-

11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_CROSS1.dgn
$$$$USERNAME$$$$

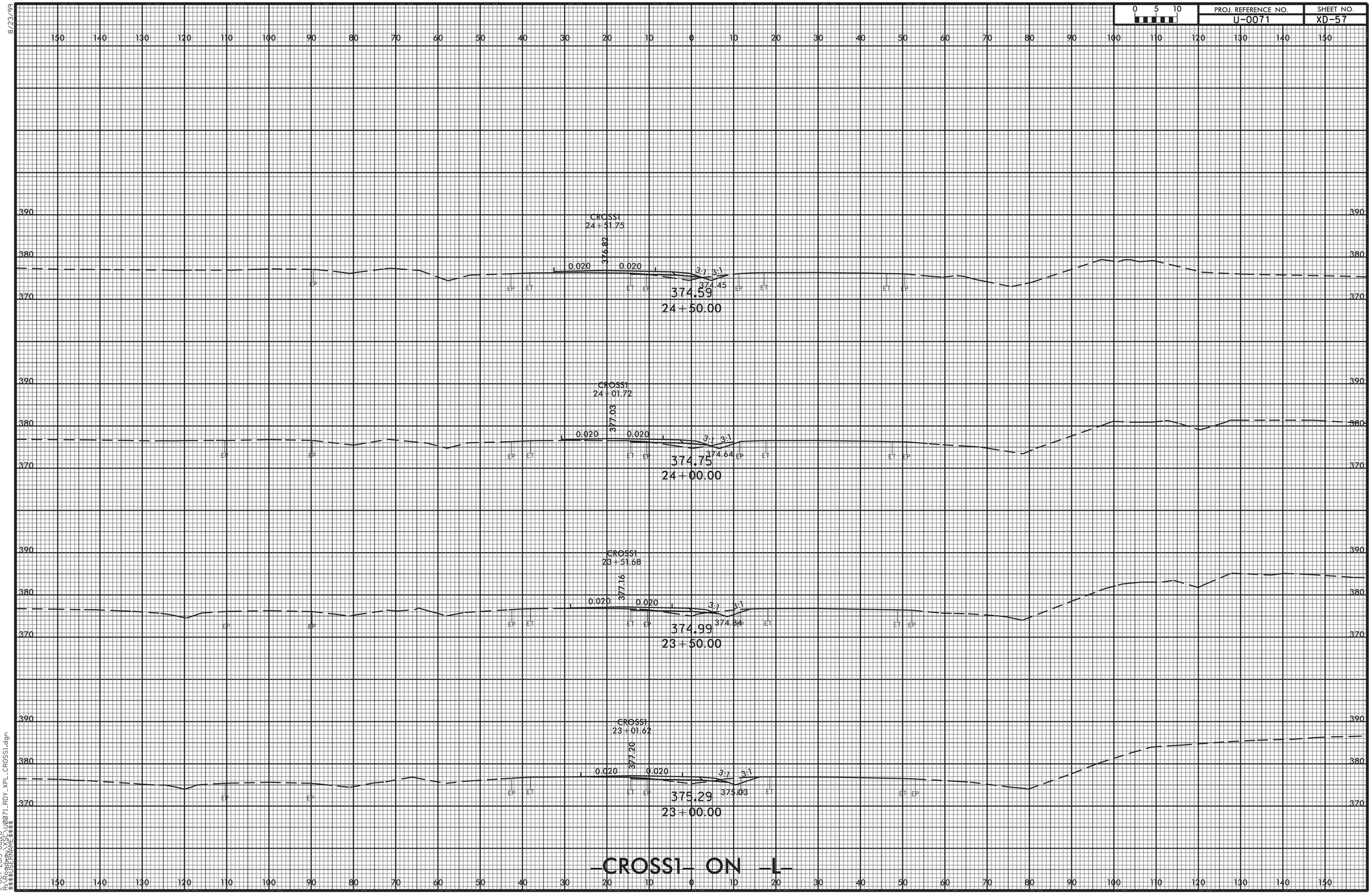
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-56 |




# -CROSS1- ON -L-

11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_CROSS1.dgn
$$$$USERNAME$$$$

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11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_CROSS1.dgn
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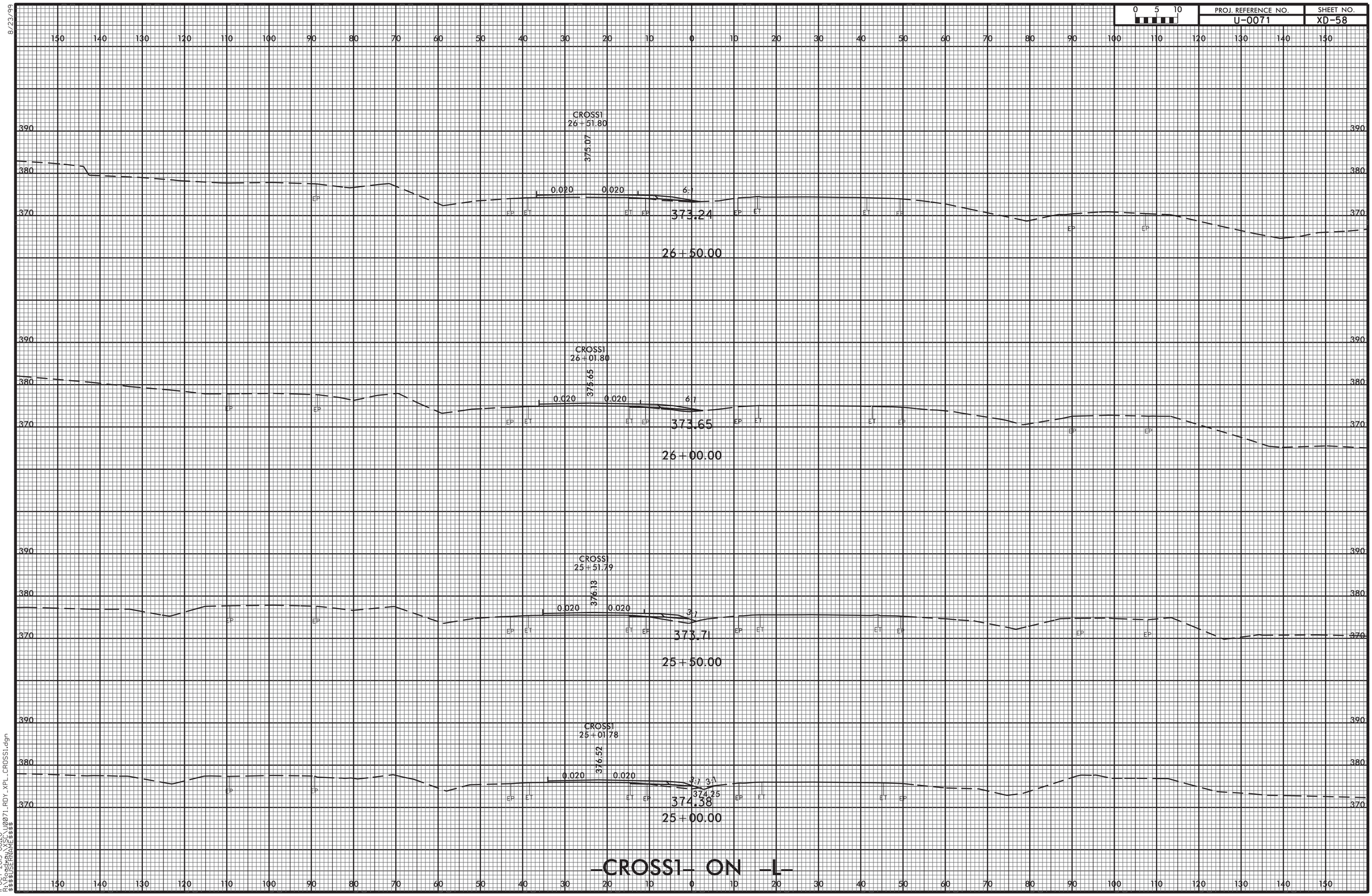
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-58 |

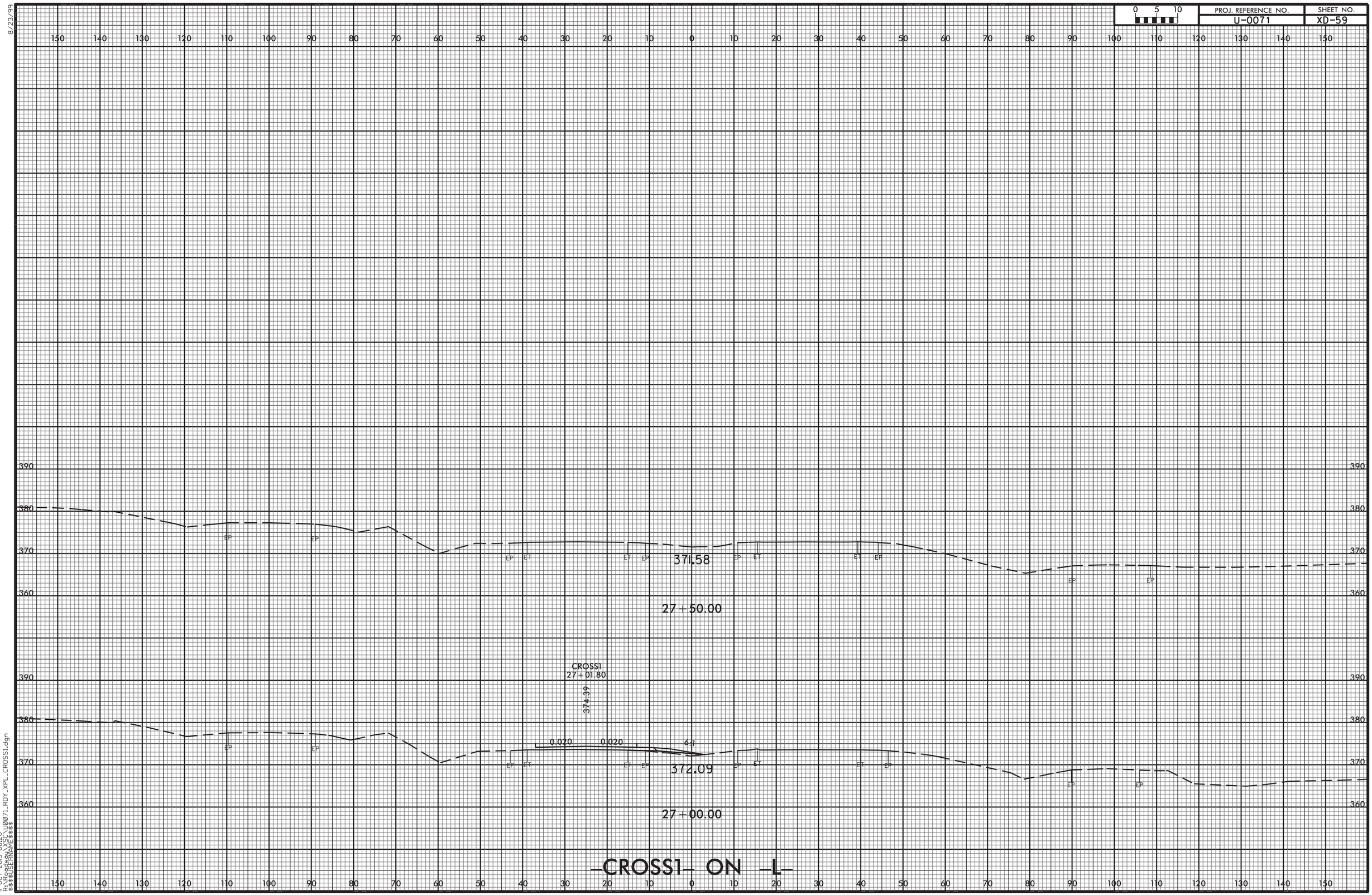



8/23/99

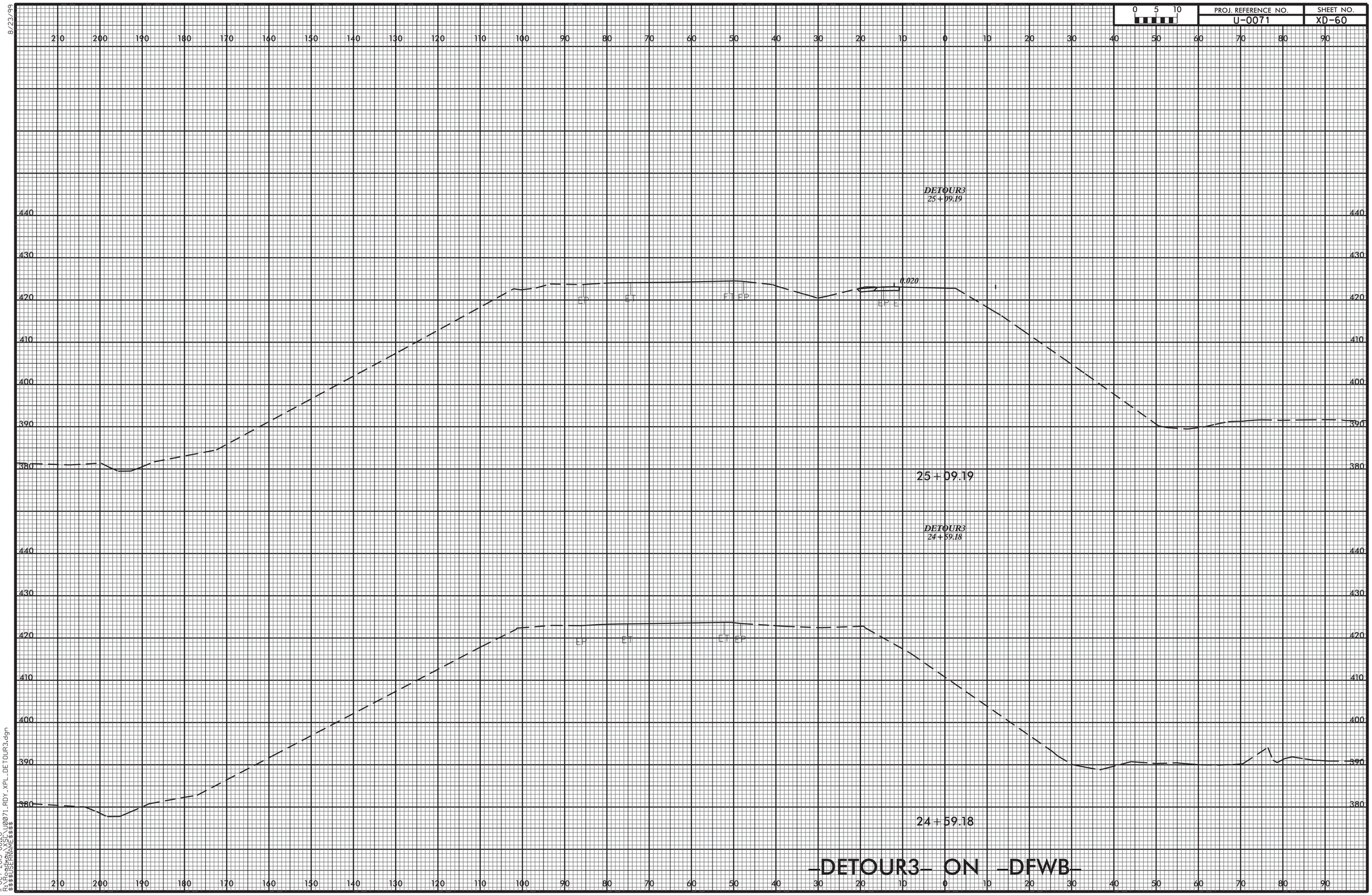
11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_CROSS1.dgn
$$$$USERNAME$$$$

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-59 |




11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_CROSS1.dgn
$$$$USERNAME$$$$

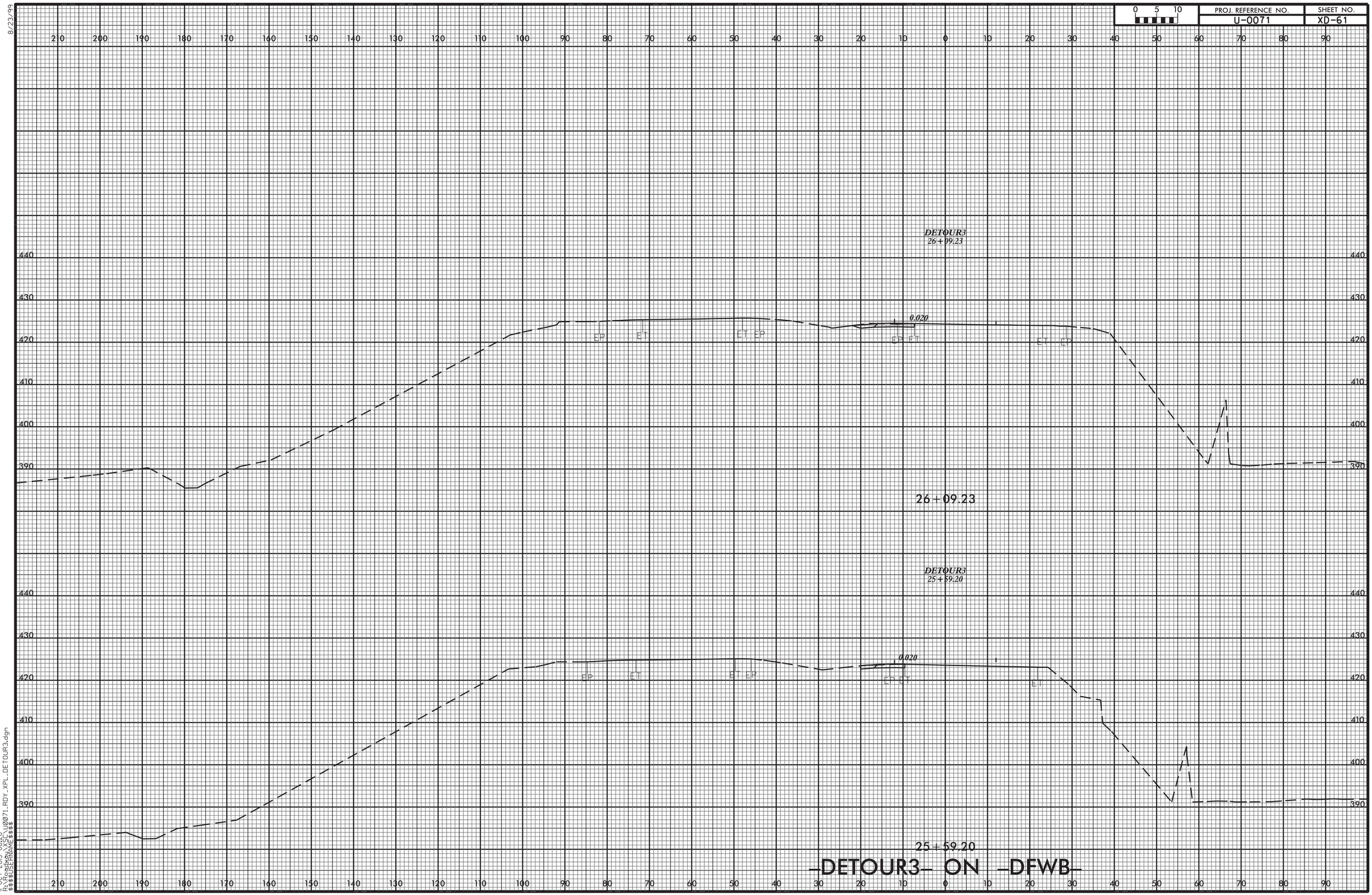



8/23/99

11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$

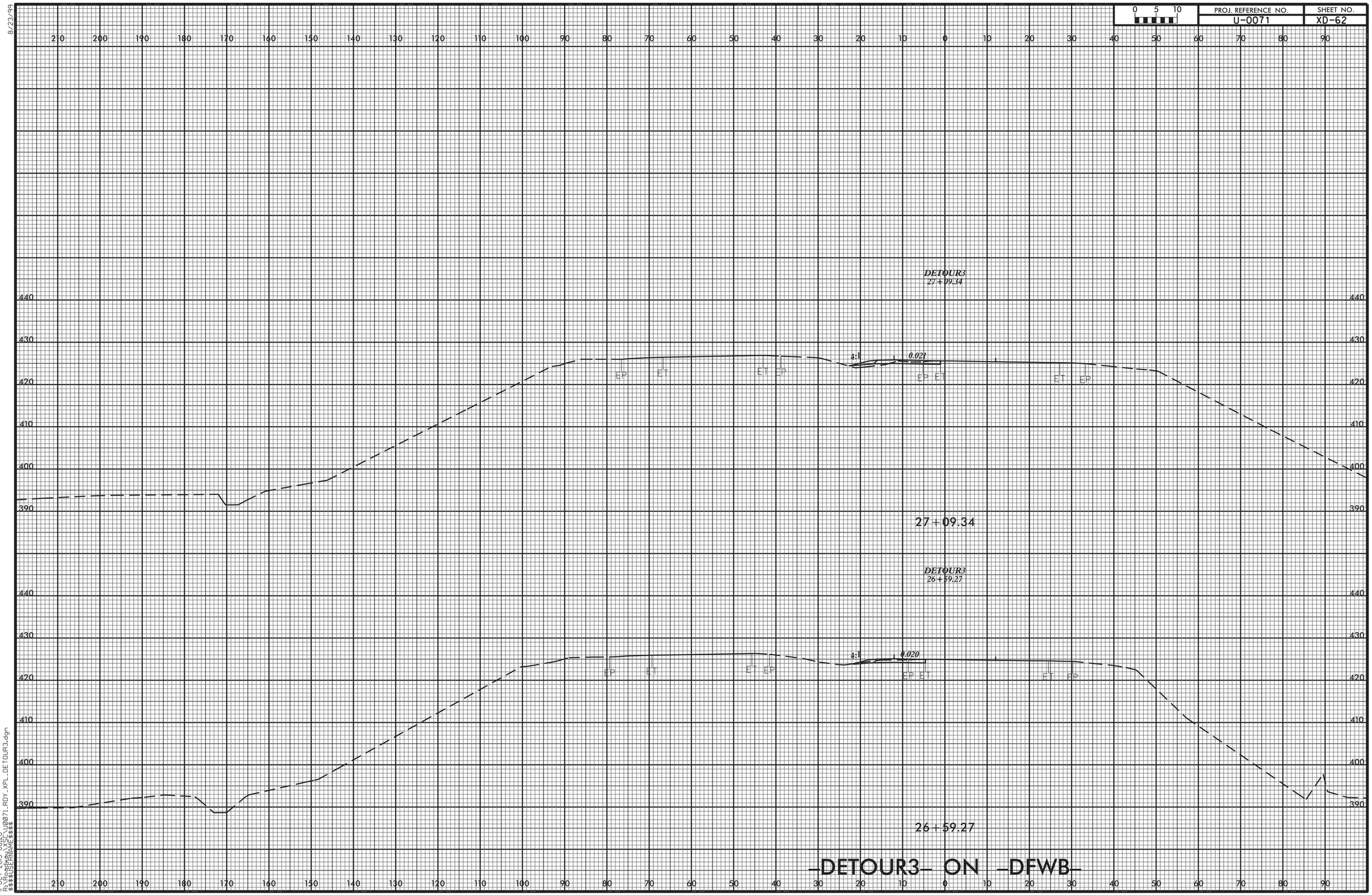
8/23/99

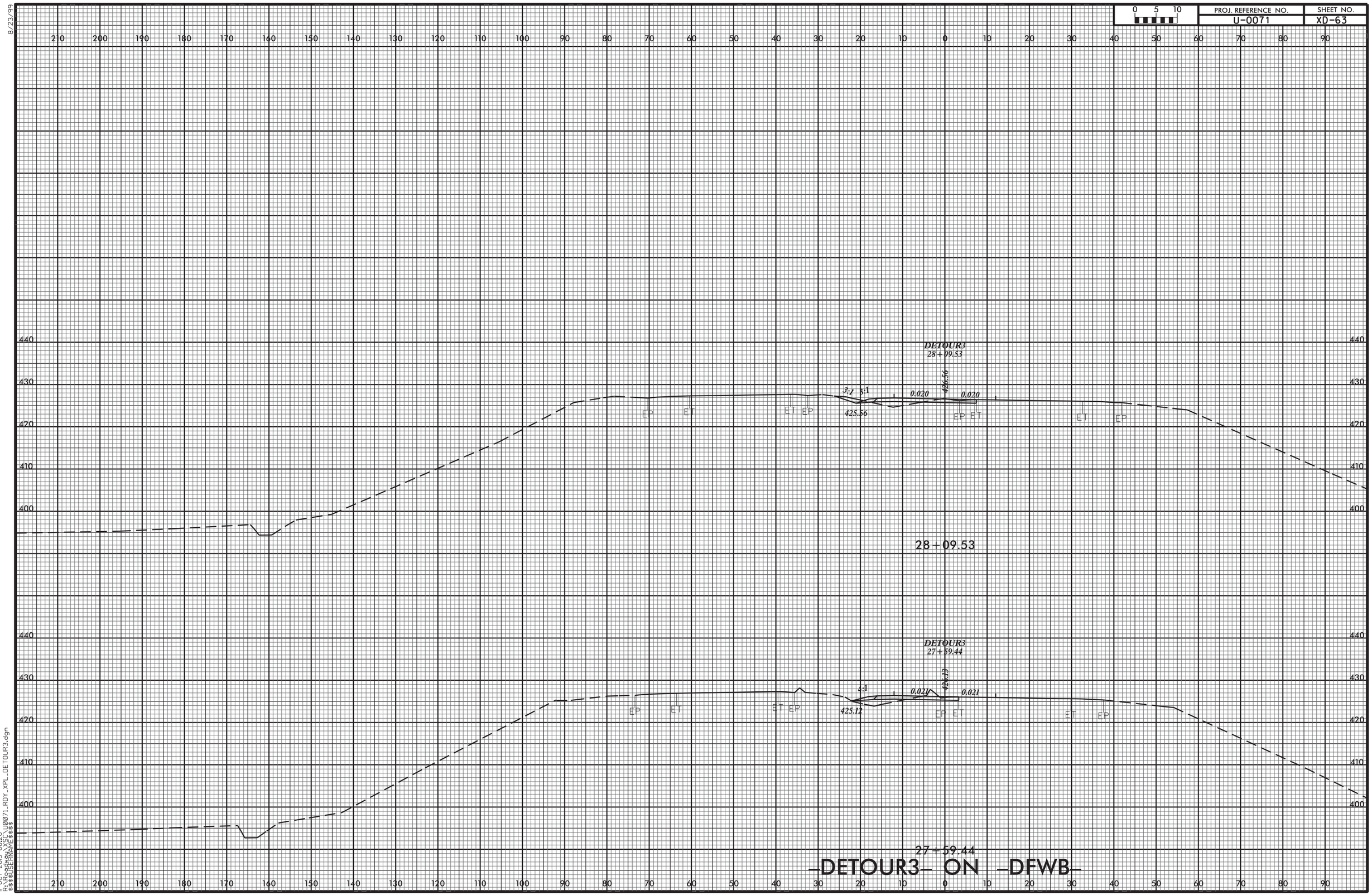
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-61 |




# -DETOUR3- ON -DFWB-

11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$


0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-62
DETOUR3
27+09.34
4:1
0.021
EP
ET
27+09.34
DETOUR3
26+59.27
4:1
0.020
26+59.27
-DETOUR3- ON -DFWB-
8/23/99
11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$


0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-63
DETOUR3
28+09.53
426.56
3:1
3:1
0.020
0.020
425.86
EP
ET
ET
EP
EP
ET
ET
EP
28+09.53
DETOUR3
27+59.44
426.13
4:1
0.021
0.021
425.12
EP
ET
ET
EP
EP
ET
ET
EP
27+59.44
-DETOUR3- ON -DFWB-
8/23/99
11-OCT-2013 08:20
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
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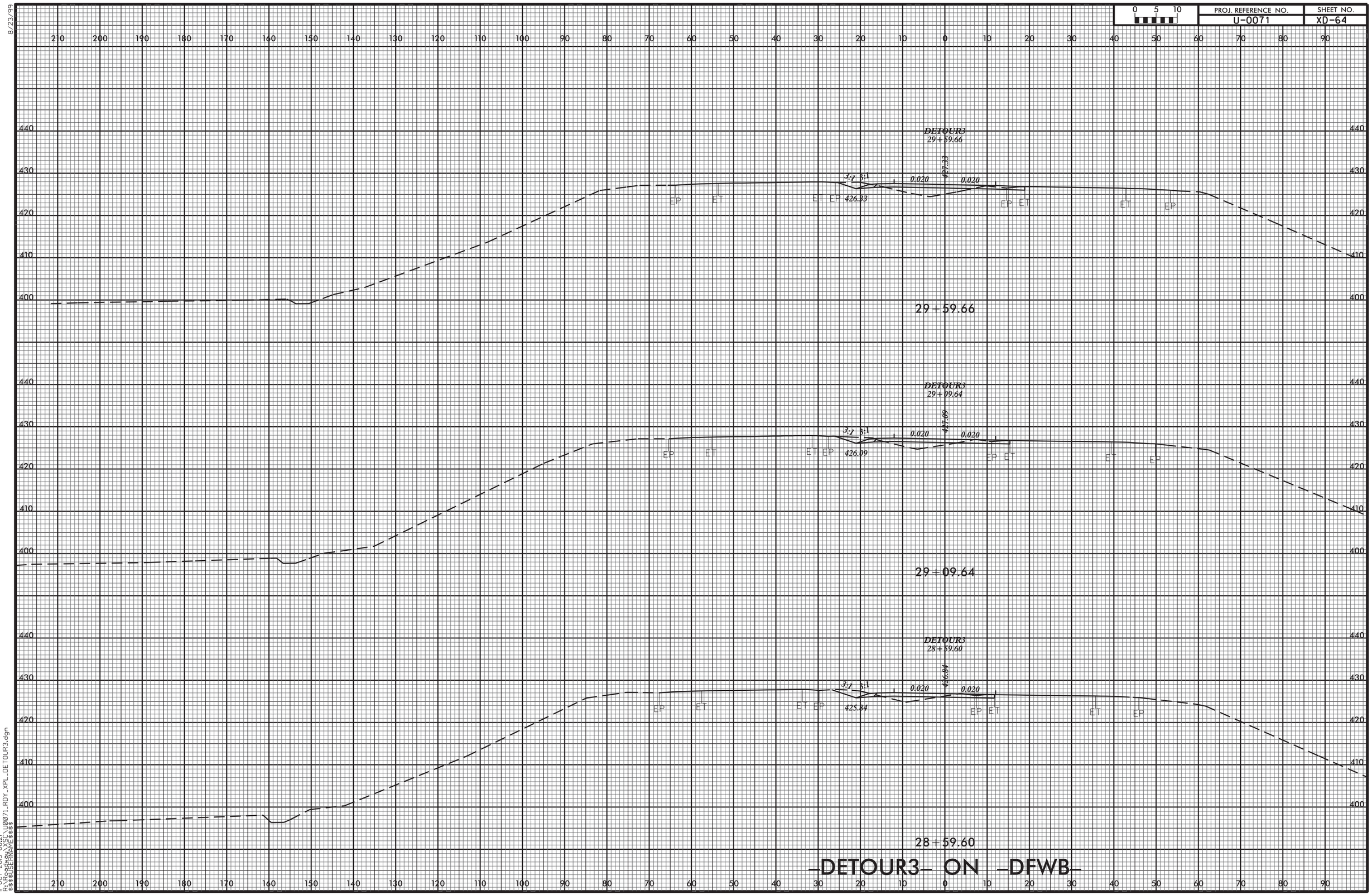
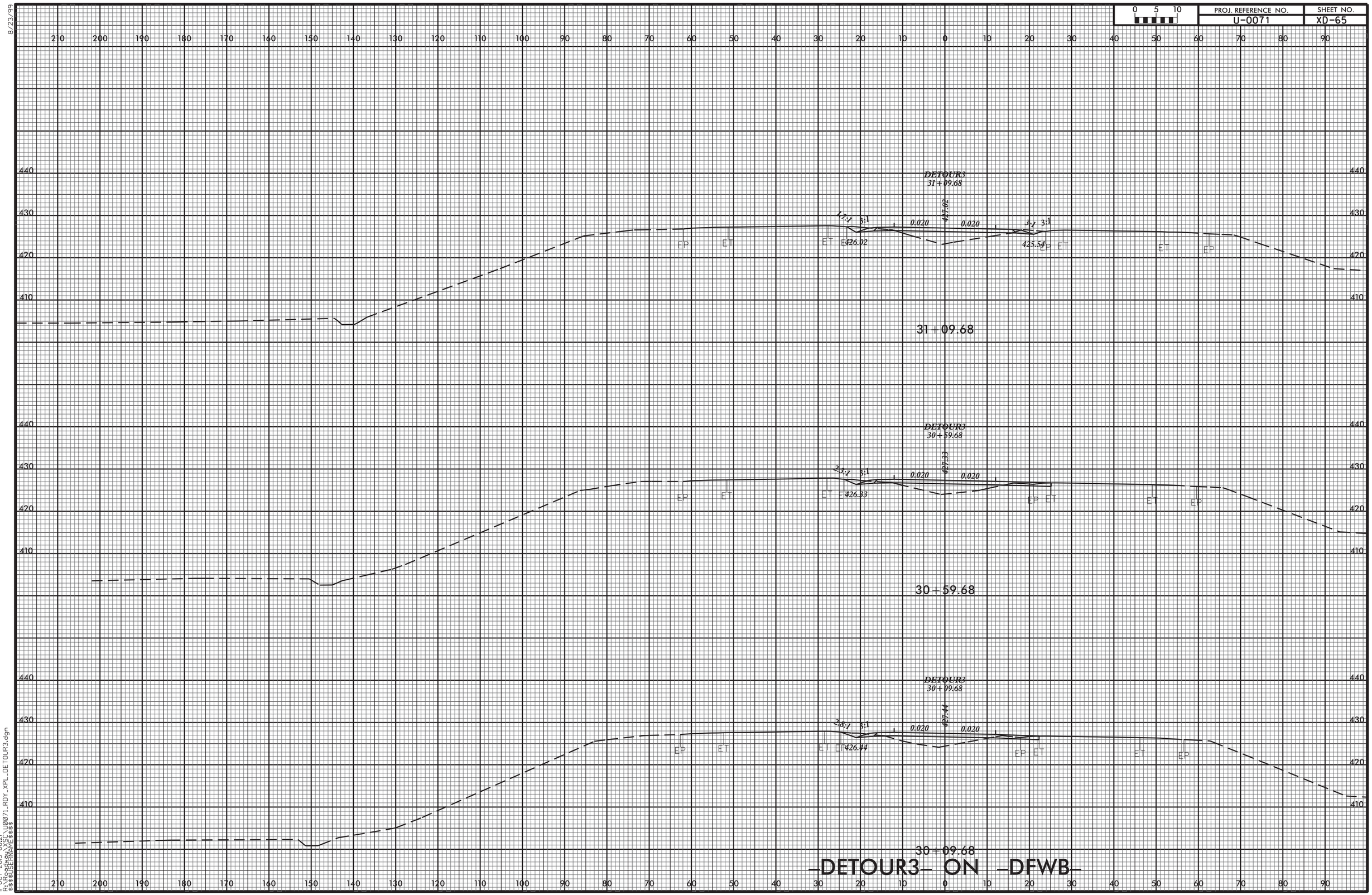
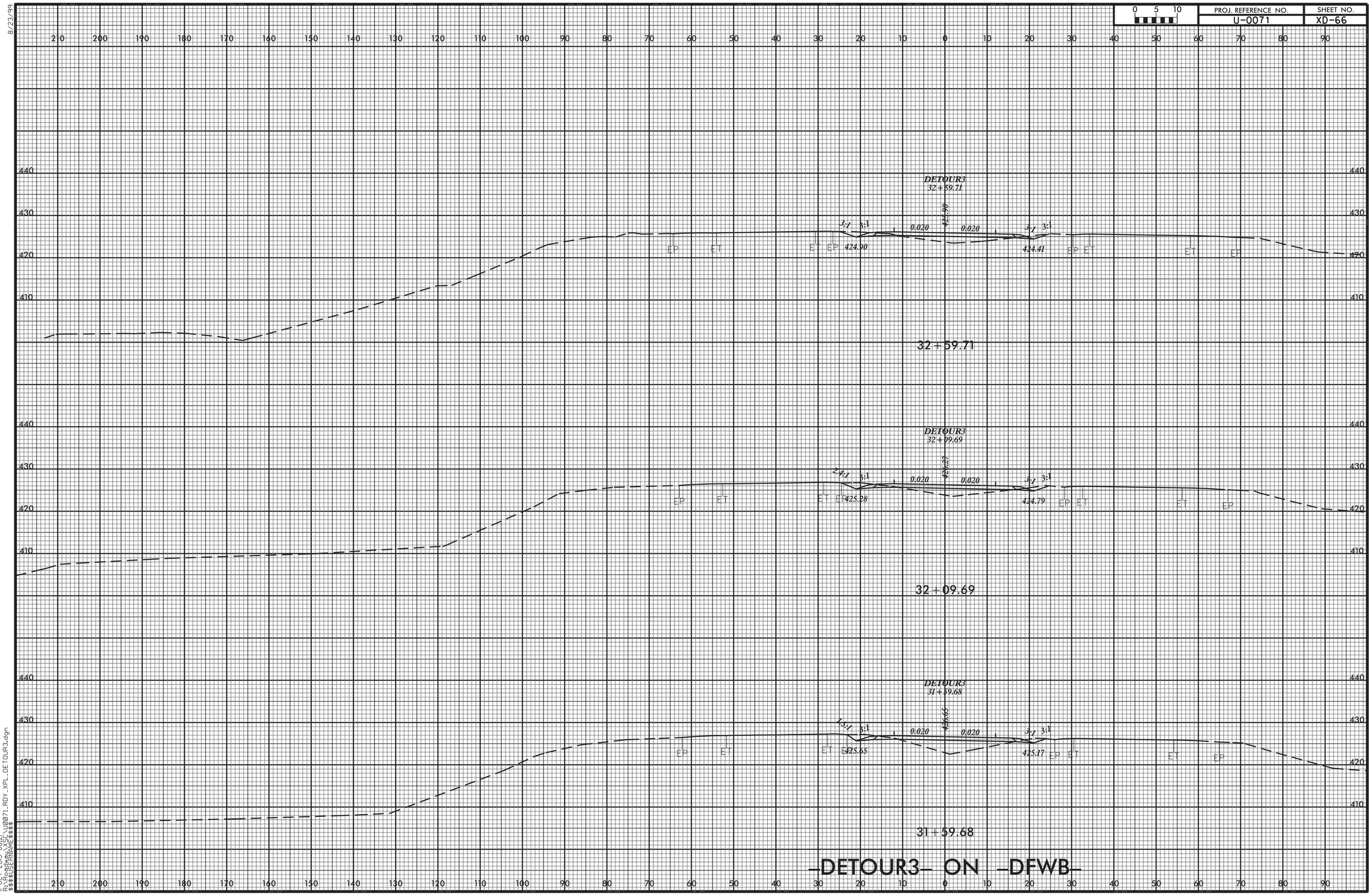

0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-64
DETOUR3
29 + 59.66
427.33
3:1 3:1
0.020
0.020
EP ET
ET EP 426.33
EP ET
ET EP
29 + 59.66
DETOUR3
29 + 09.64
427.09
3:1 3:1
0.020
0.020
EP ET
ET EP 426.09
EP ET
ET EP
29 + 09.64
DETOUR3
28 + 59.60
426.84
3:1 3:1
0.020
0.020
EP ET
ET EP 425.84
EP ET
ET EP
28 + 59.60
-DETOUR3- ON -DFWB-
11-OCT-2013 08:21
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$
8/23/99


0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-65
DETOUR3
31+09.68
427.02
425.54
426.02
31+09.68
DETOUR3
30+59.68
427.33
426.33
30+59.68
DETOUR3
30+09.68
427.44
426.44
30+09.68
0.020
3:1
EP
ET
-DETOUR3- ON -DFWB-
8/23/99
11-OCT-2013 08:21
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$




8/23/99

11-OCT-2013 08:21
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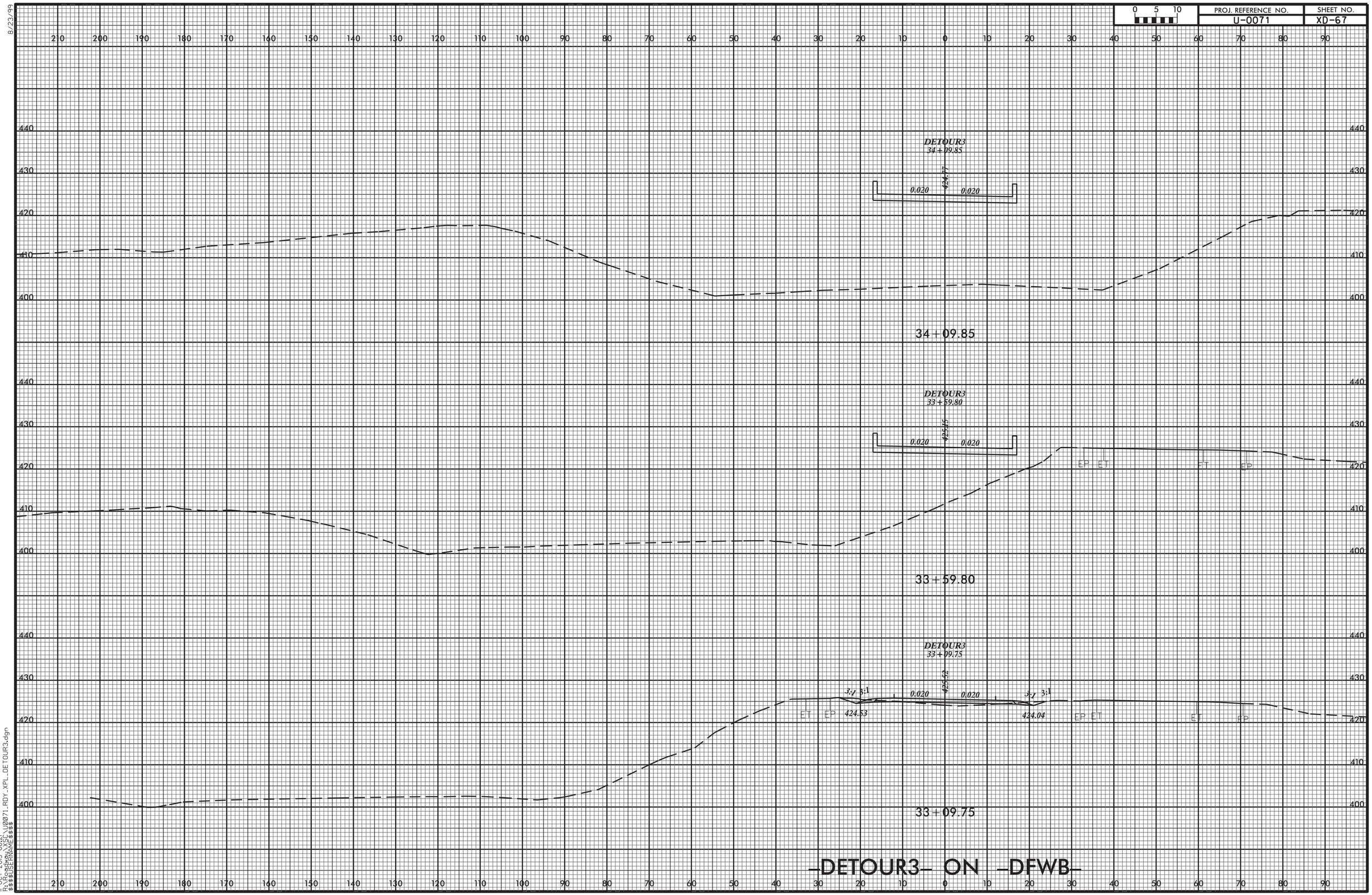
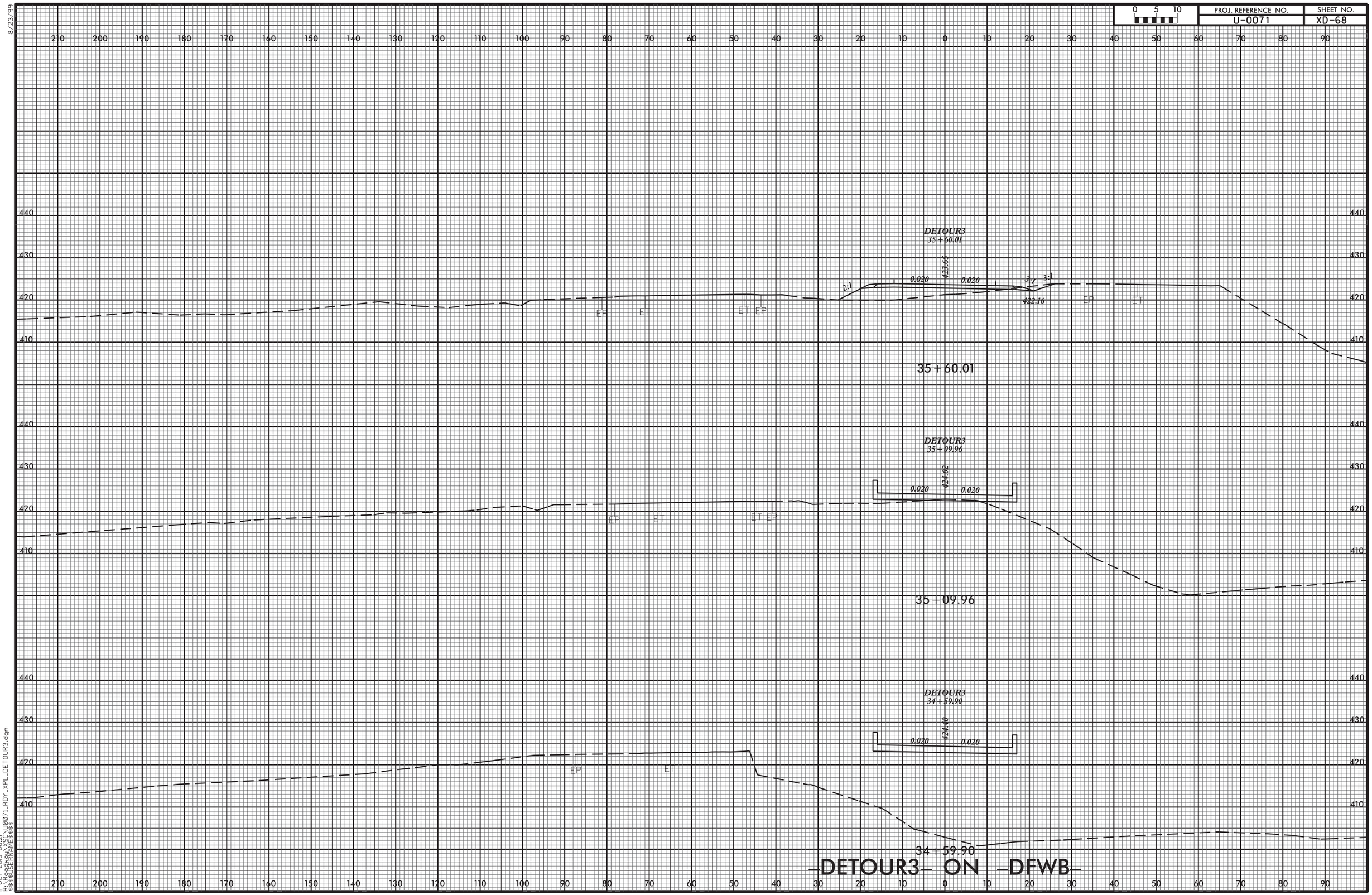
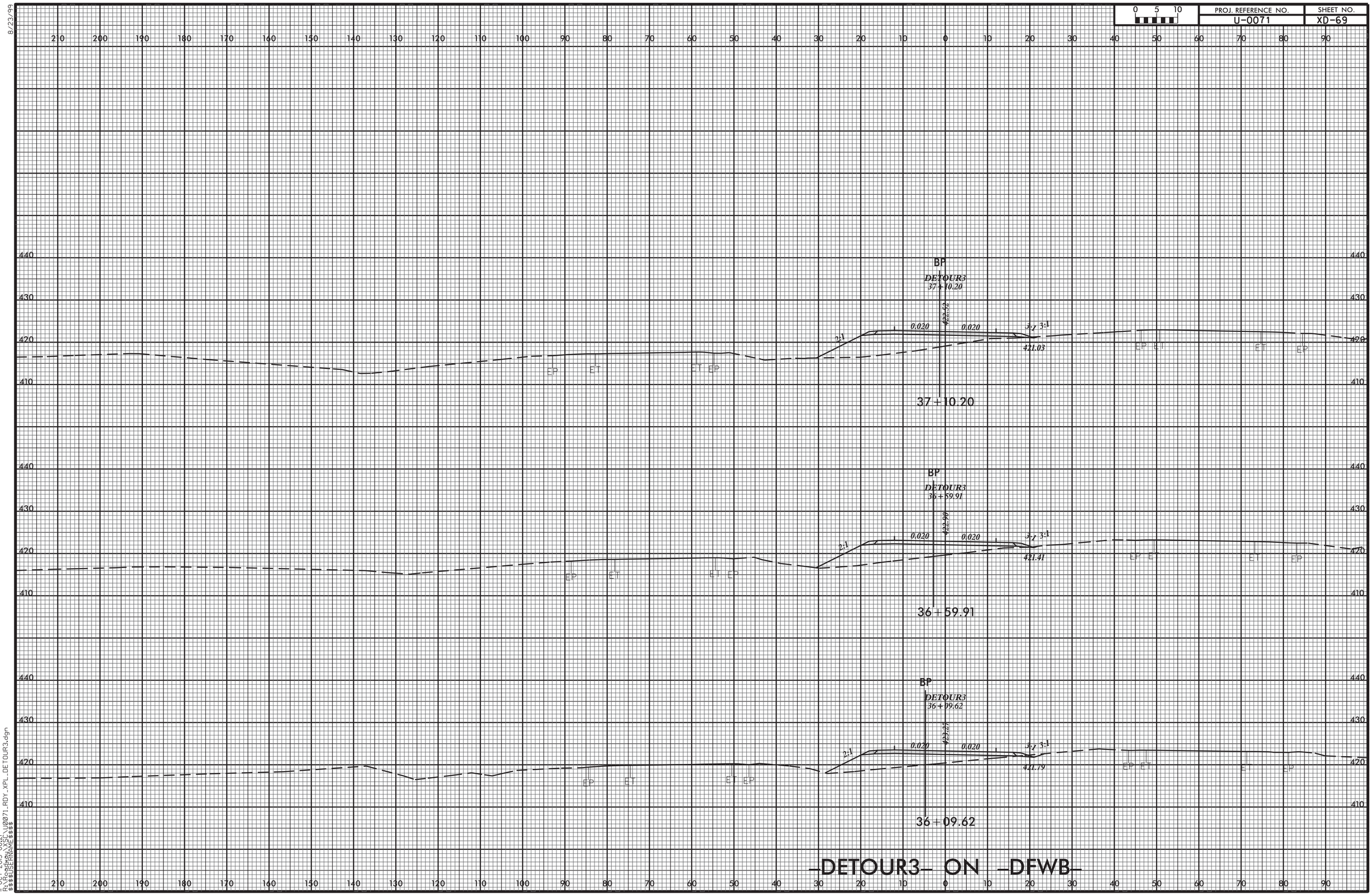
$$$$USERNAME$$$$


0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-67
DETOUR3
34+09.85
424.77
0.020
0.020
34+09.85
DETOUR3
33+59.80
425.45
0.020
0.020
EP ET
ET EP
33+59.80
DETOUR3
33+09.75
425.52
3:1 3:1
0.020
0.020
3:1 3:1
ET EP
424.53
424.04
EP ET
ET EP
33+09.75
-DETOUR3- ON -DFWB-
8/23/99
11-OCT-2013 08:21
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$


0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-68
DETOUR3
35+50.01
423.66
0.020
0.020
2:1
3:1
3:1
422.16
35+60.01
DETOUR3
35+09.96
424.02
0.020
0.020
35+09.96
DETOUR3
34+59.90
424.10
0.020
0.020
34+59.90
EP
ET
-DETOUR3- ON -DFWB-
8/23/99
11-OCT-2013 08:21
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | XD-69 |




# –DETOUR3– ON –DFWB–

8/23/99

11-OCT-2013 08:21
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
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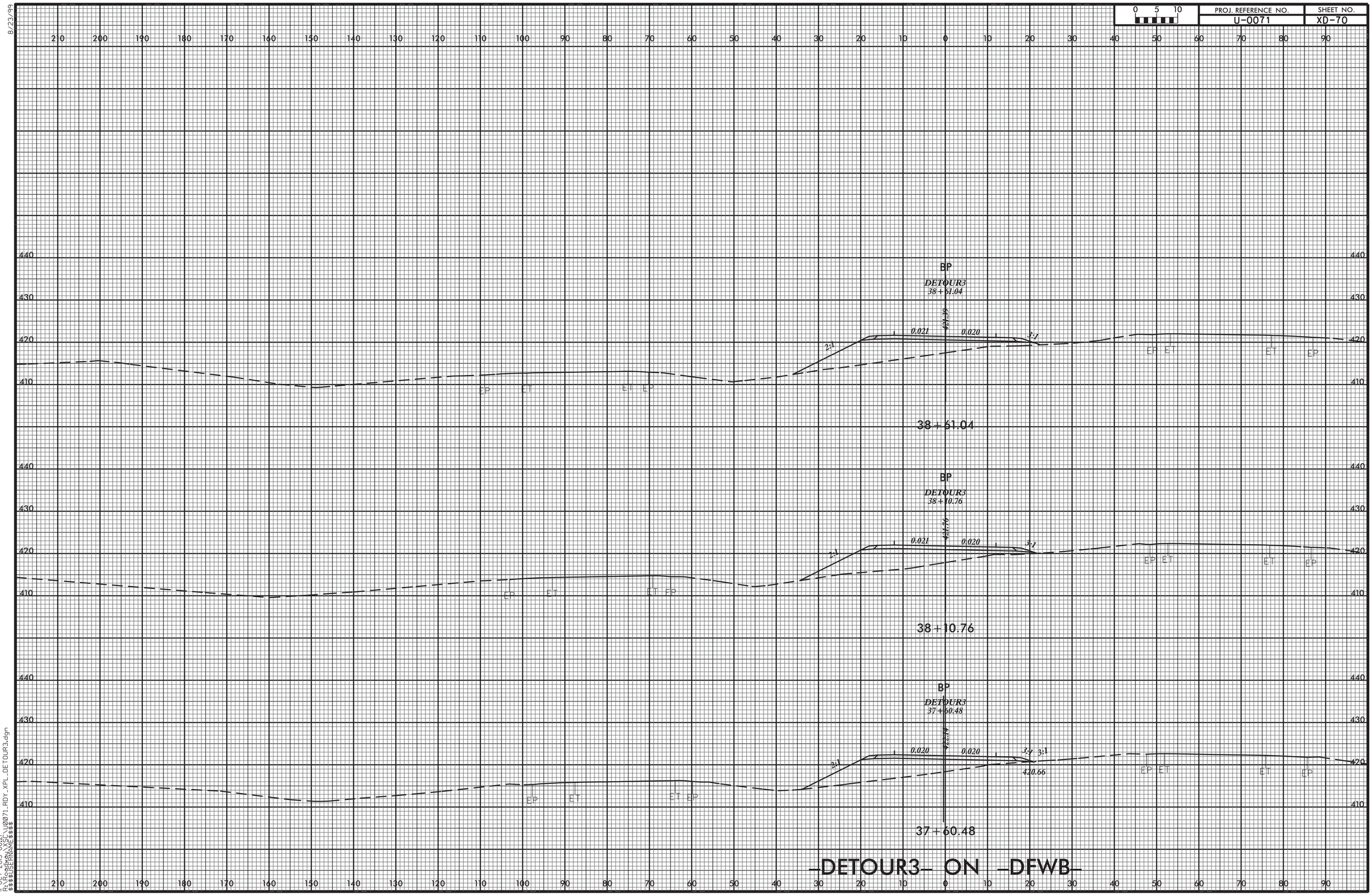


8/23/99

11-OCT-2013 08:21
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
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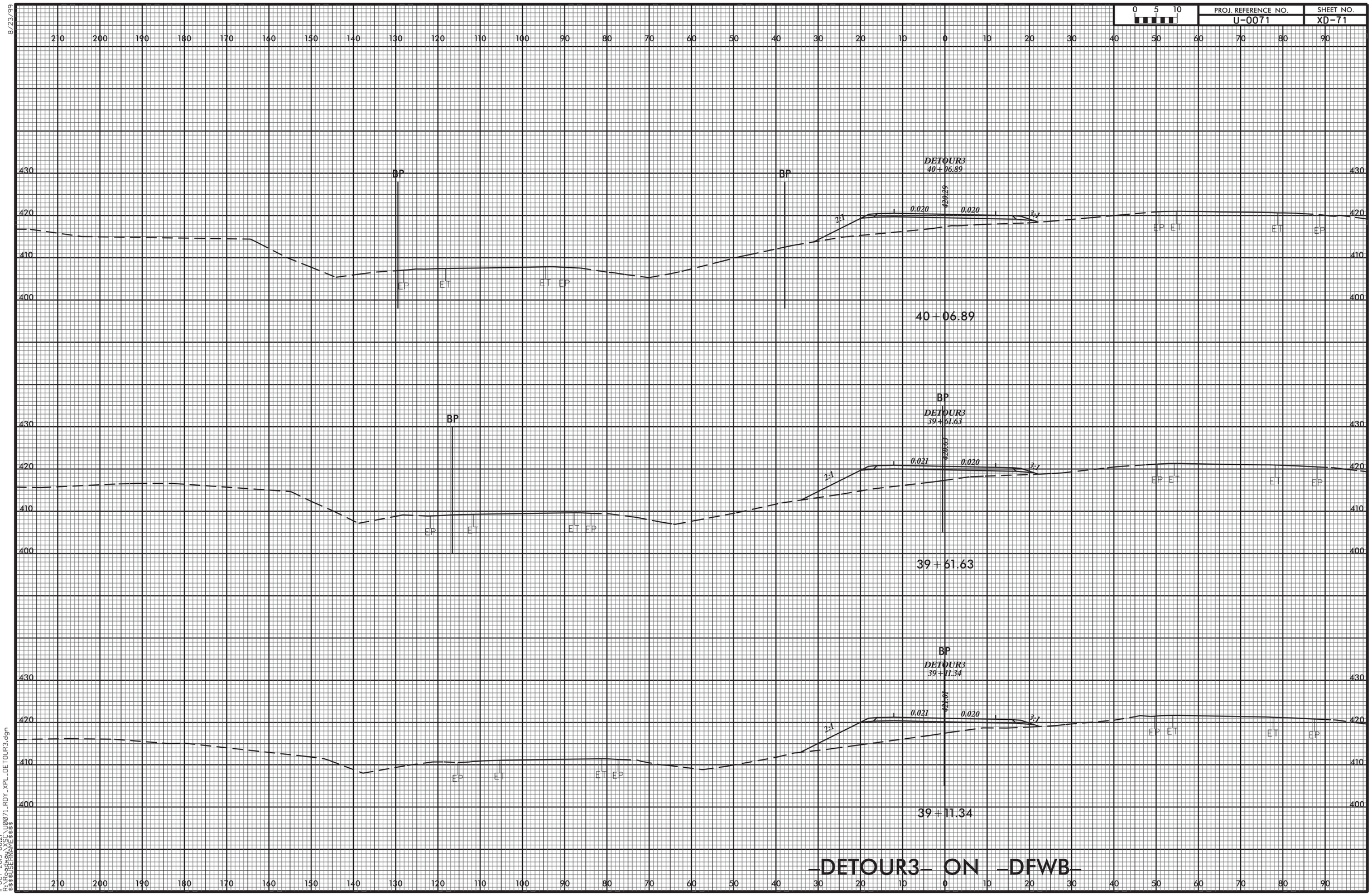
8/23/99

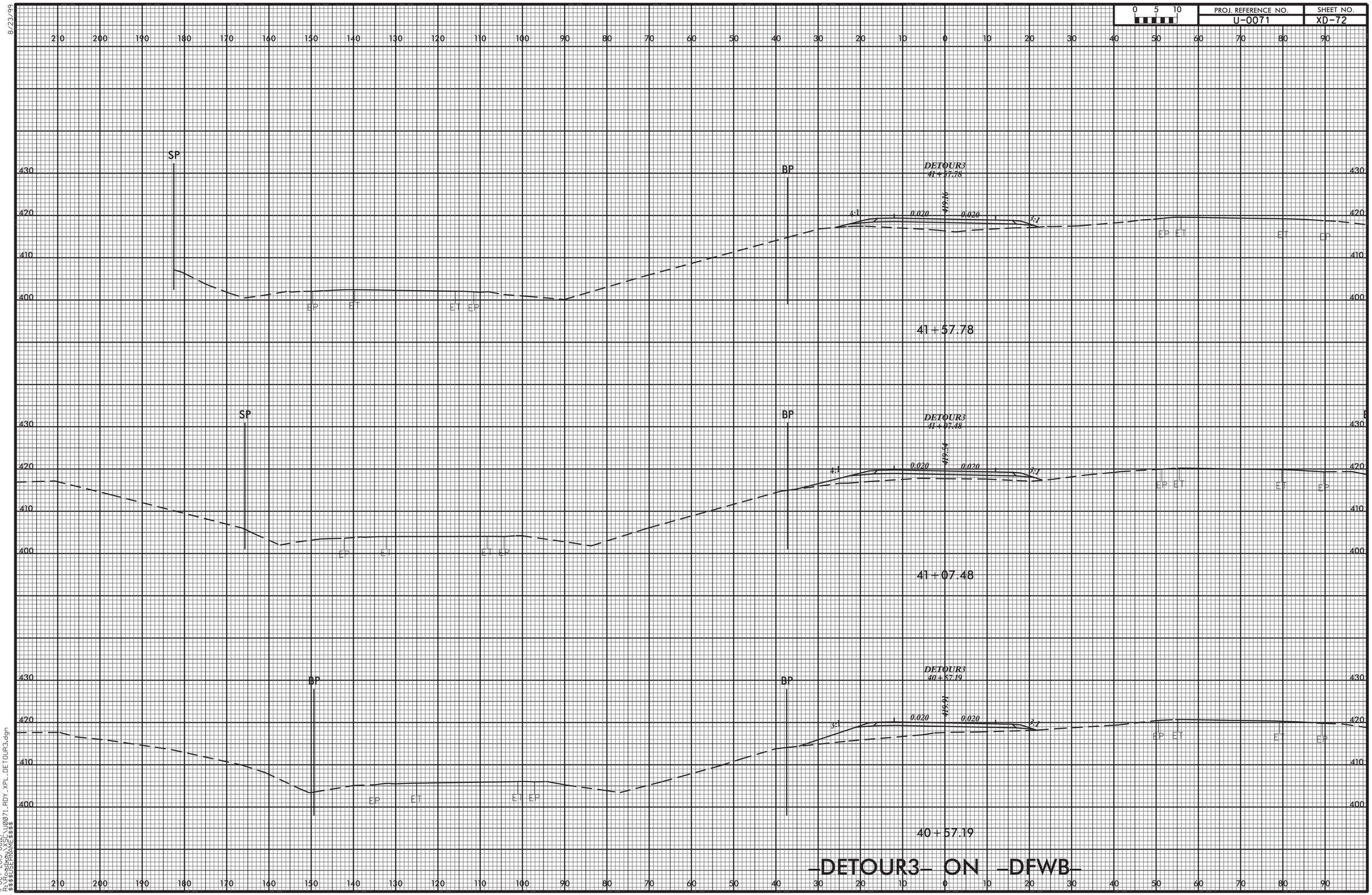
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-71 |




—DETOUR3— ON —DFWB—

11-OCT-2013 08:21
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$

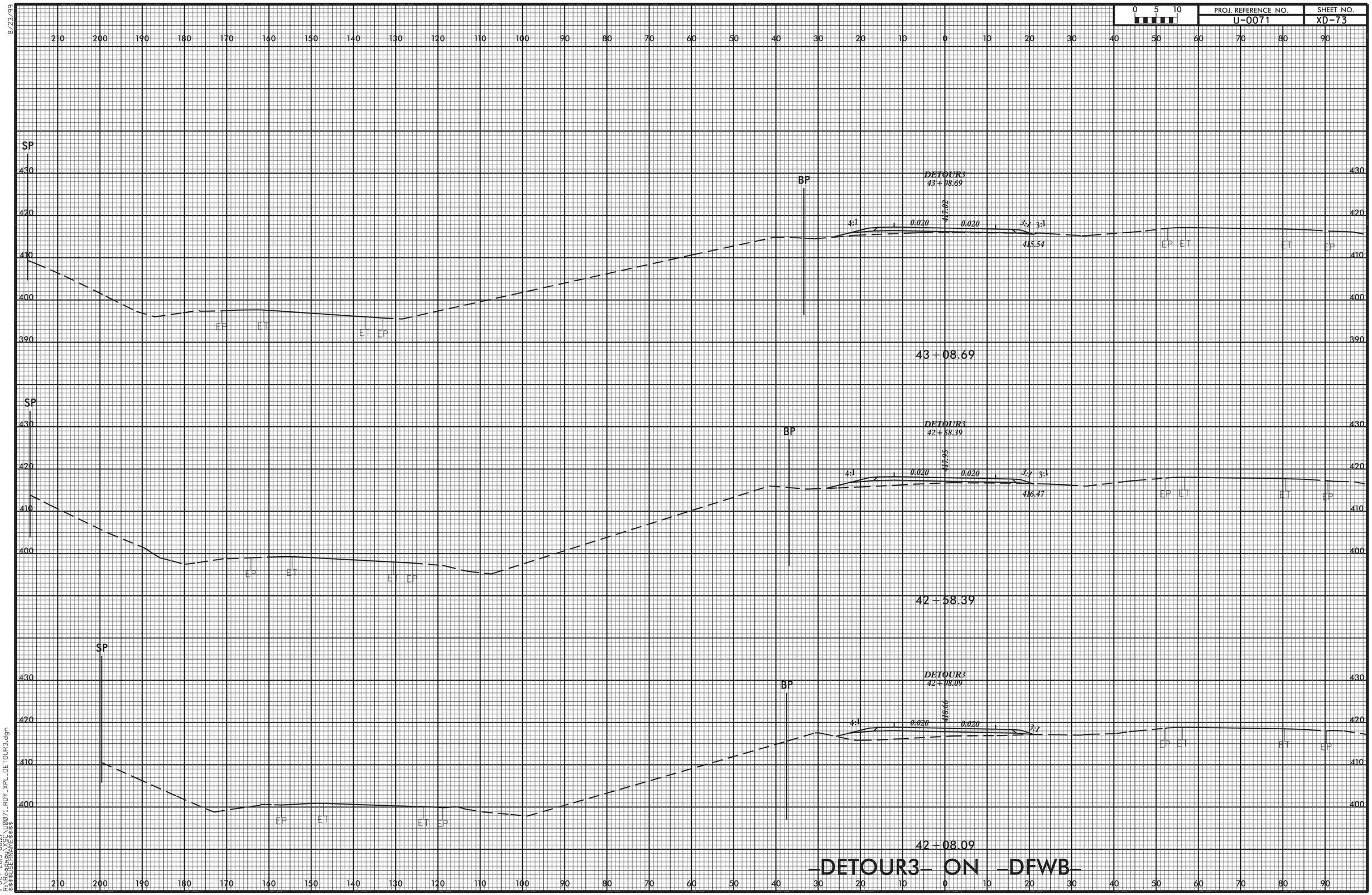
| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | XD-72 |




# –DETOUR3– ON –DFWB–

8/23/99

11-OCT-2013 08:21
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$


0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-73
SP
BP
DETOUR3
43+08.69
47.92
4:1
0.020
0.020
3:1
3:1
415.54
EP ET
ET EP
43+08.69
DETOUR3
42+58.39
47.95
416.47
42+58.39
DETOUR3
42+08.09
48.66
42+08.09
430
420
410
400
390
210 200 190 180 170 160 150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90
-DETOUR3- ON -DFWB-
8/23/99
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8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
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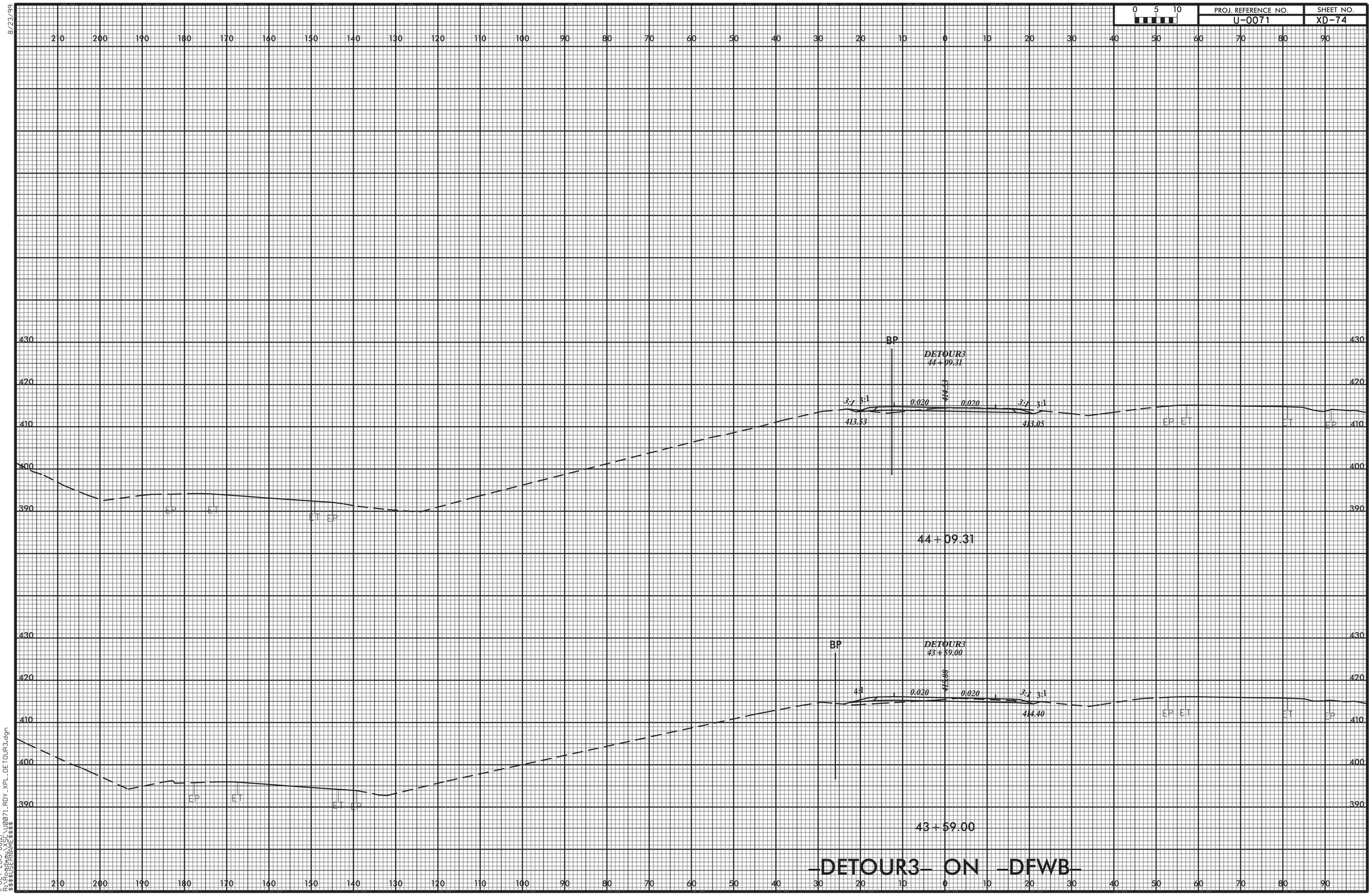


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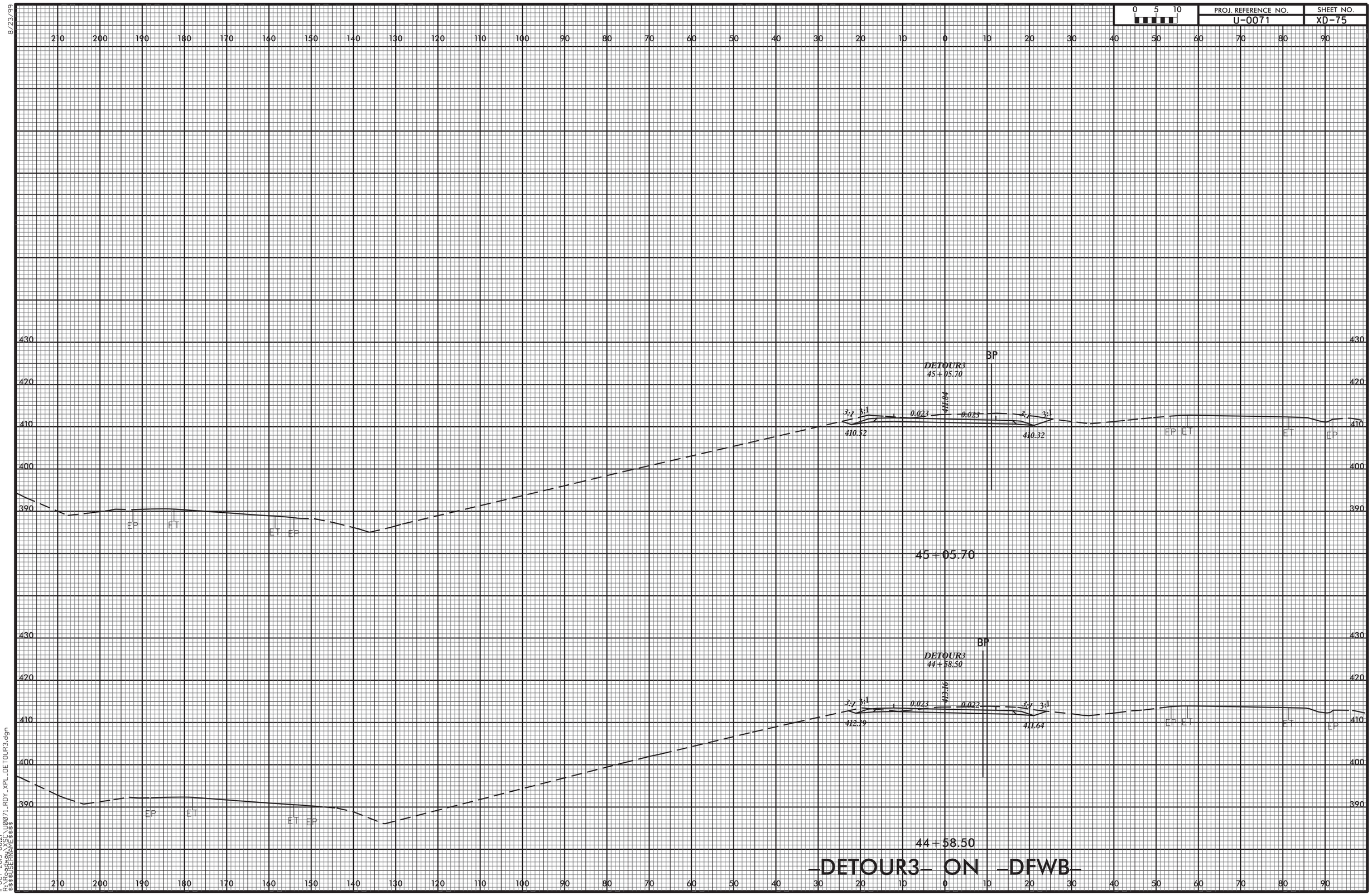


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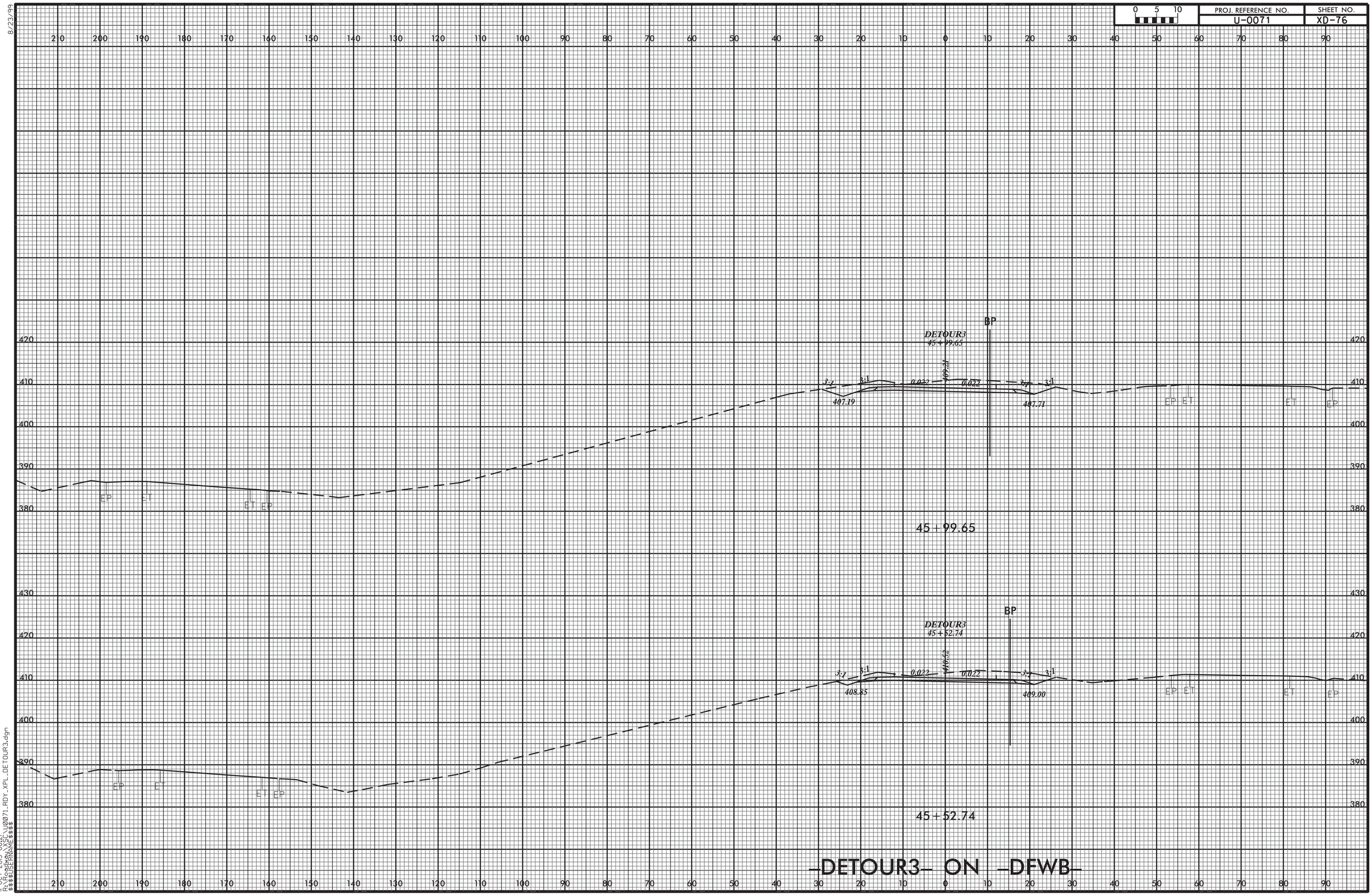


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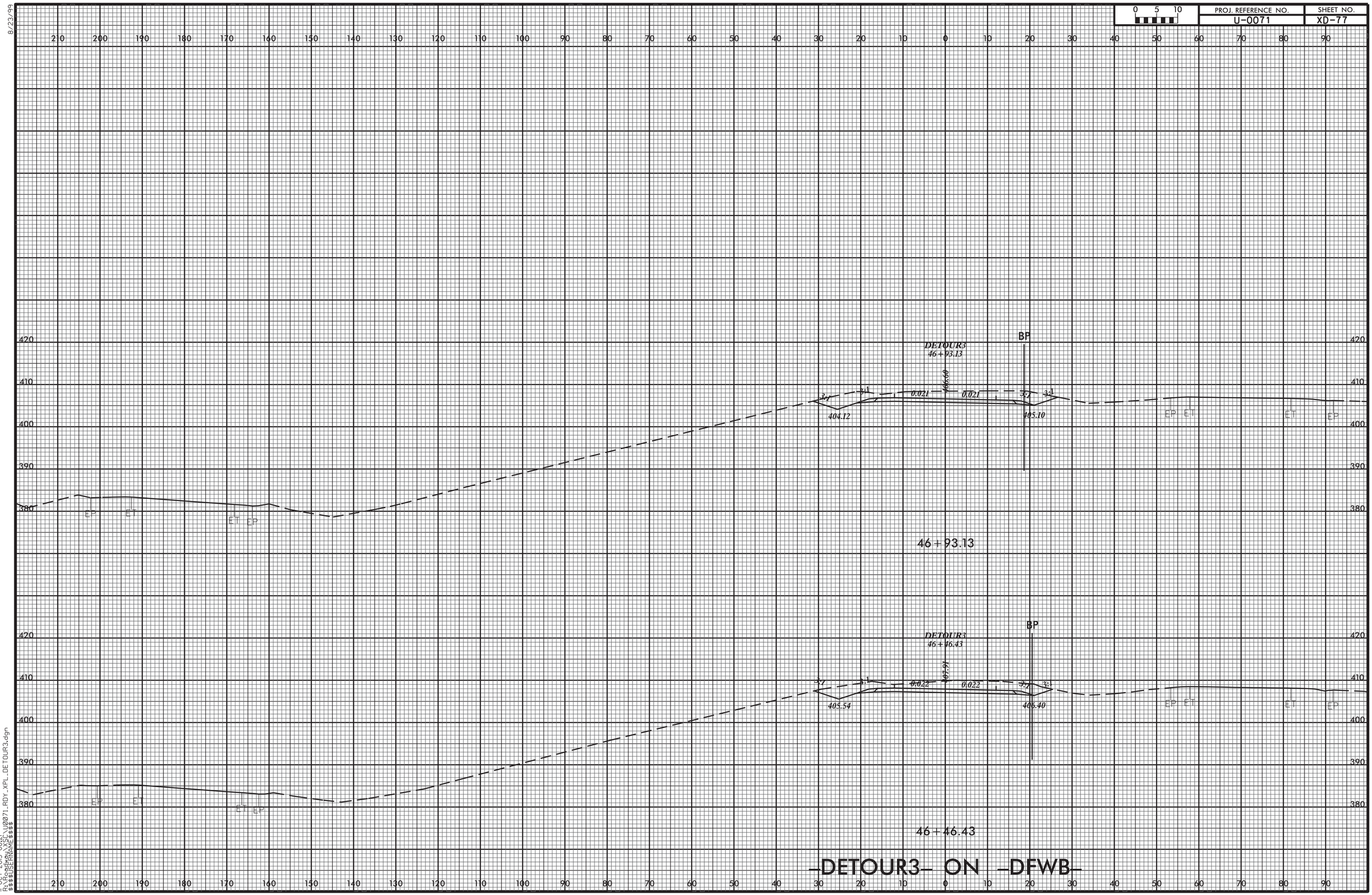
| | U-0071 | XD-77 |

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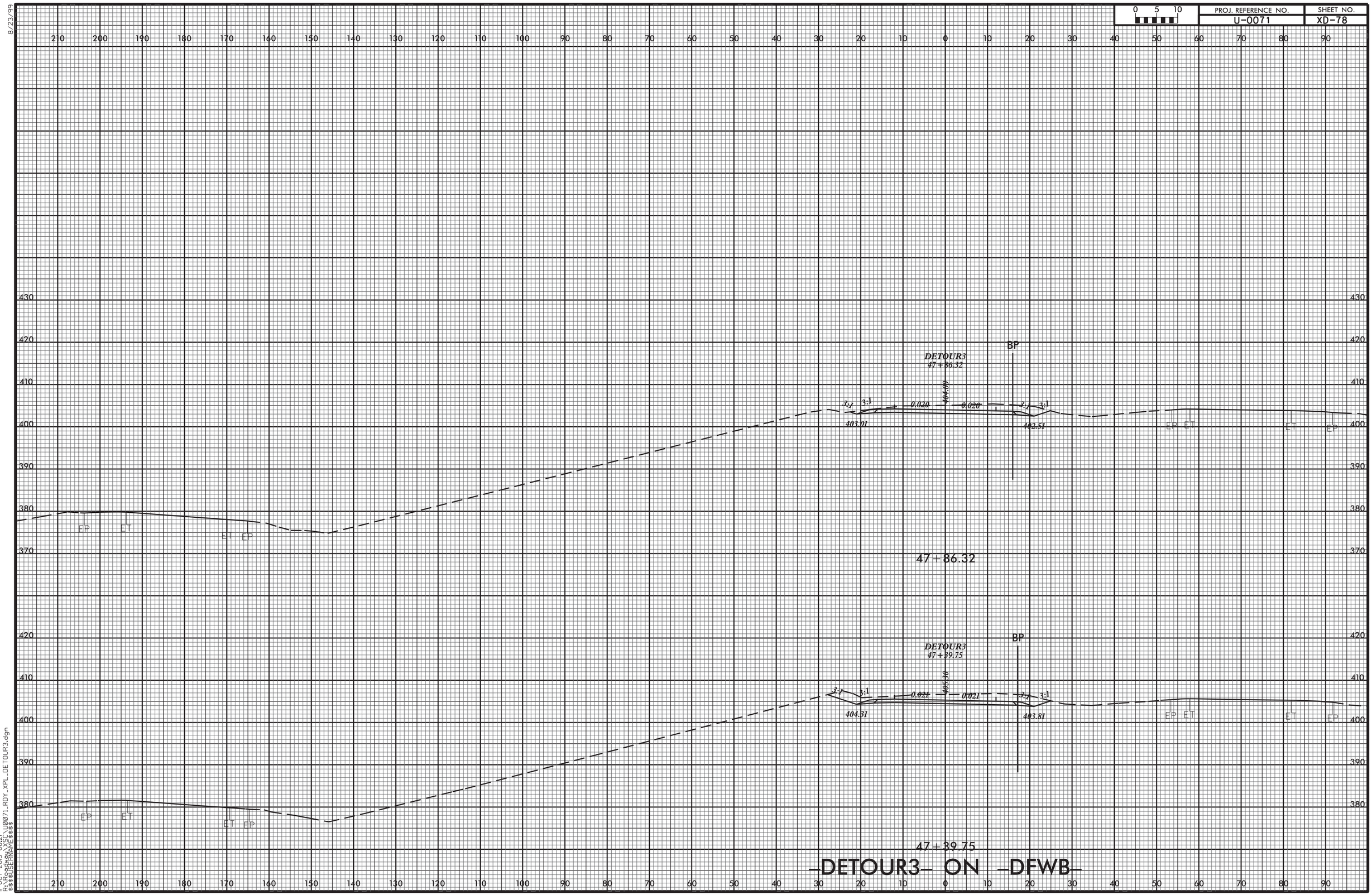


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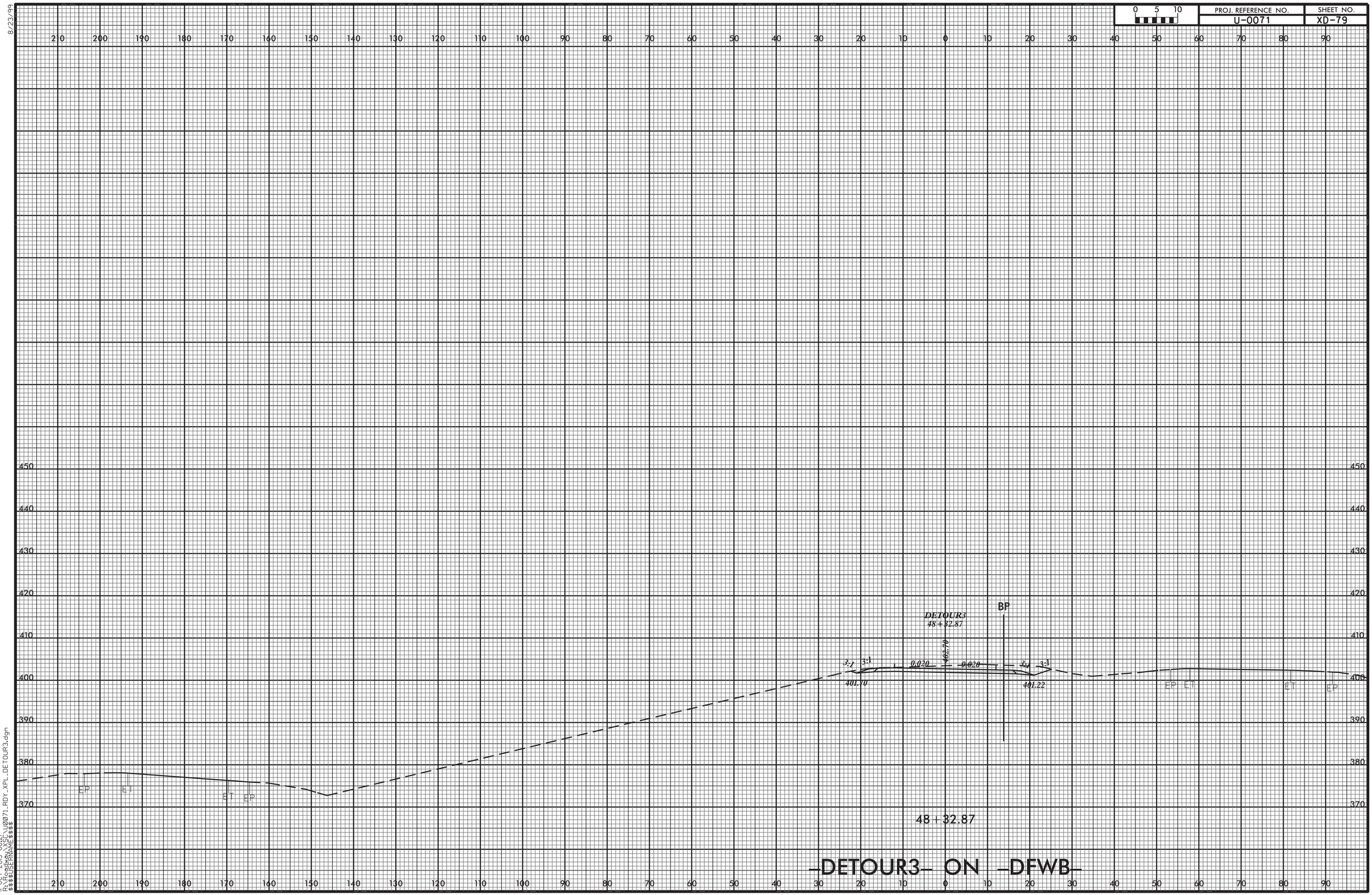


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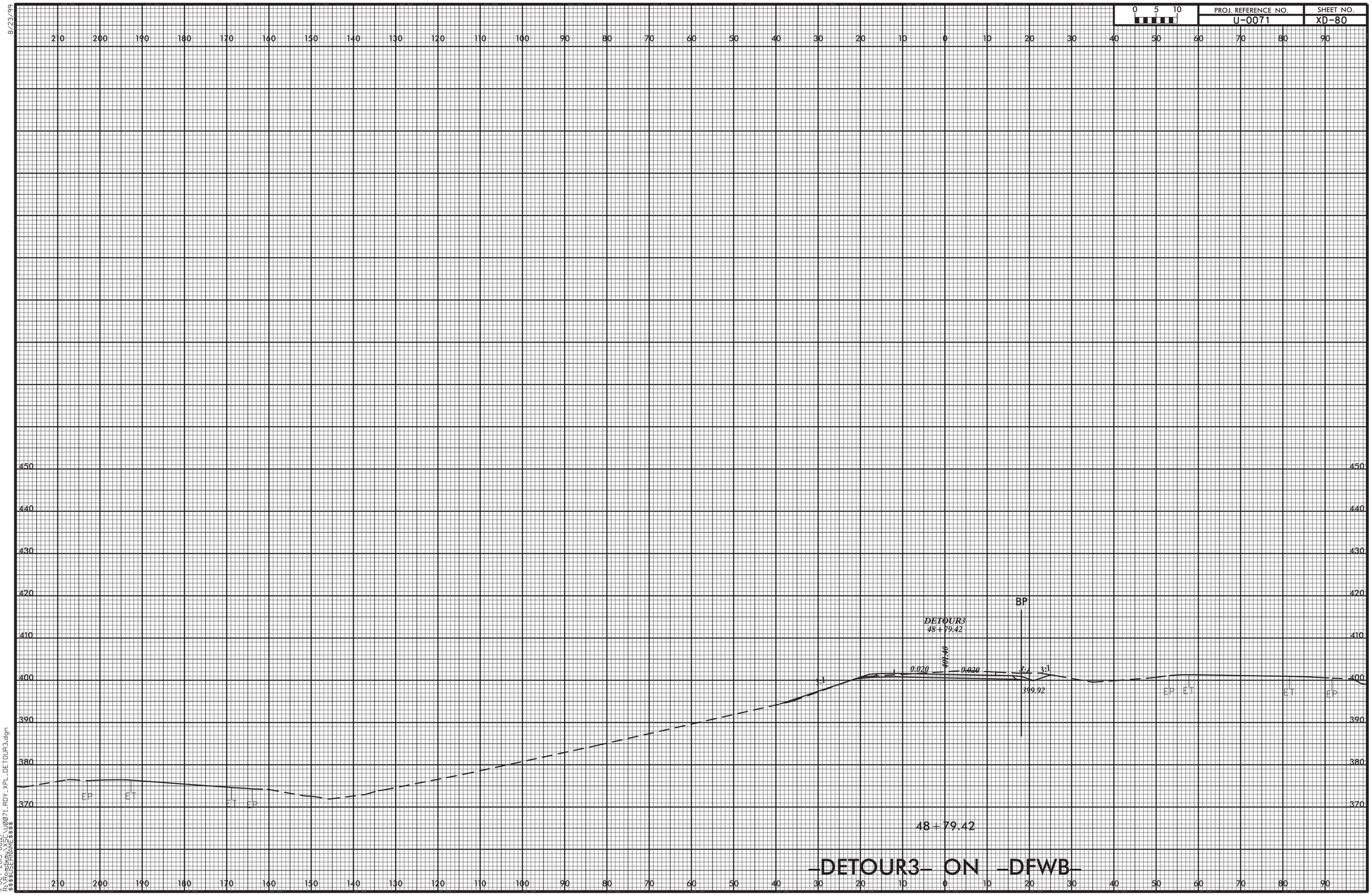
| | U-0071 | XD-80 |

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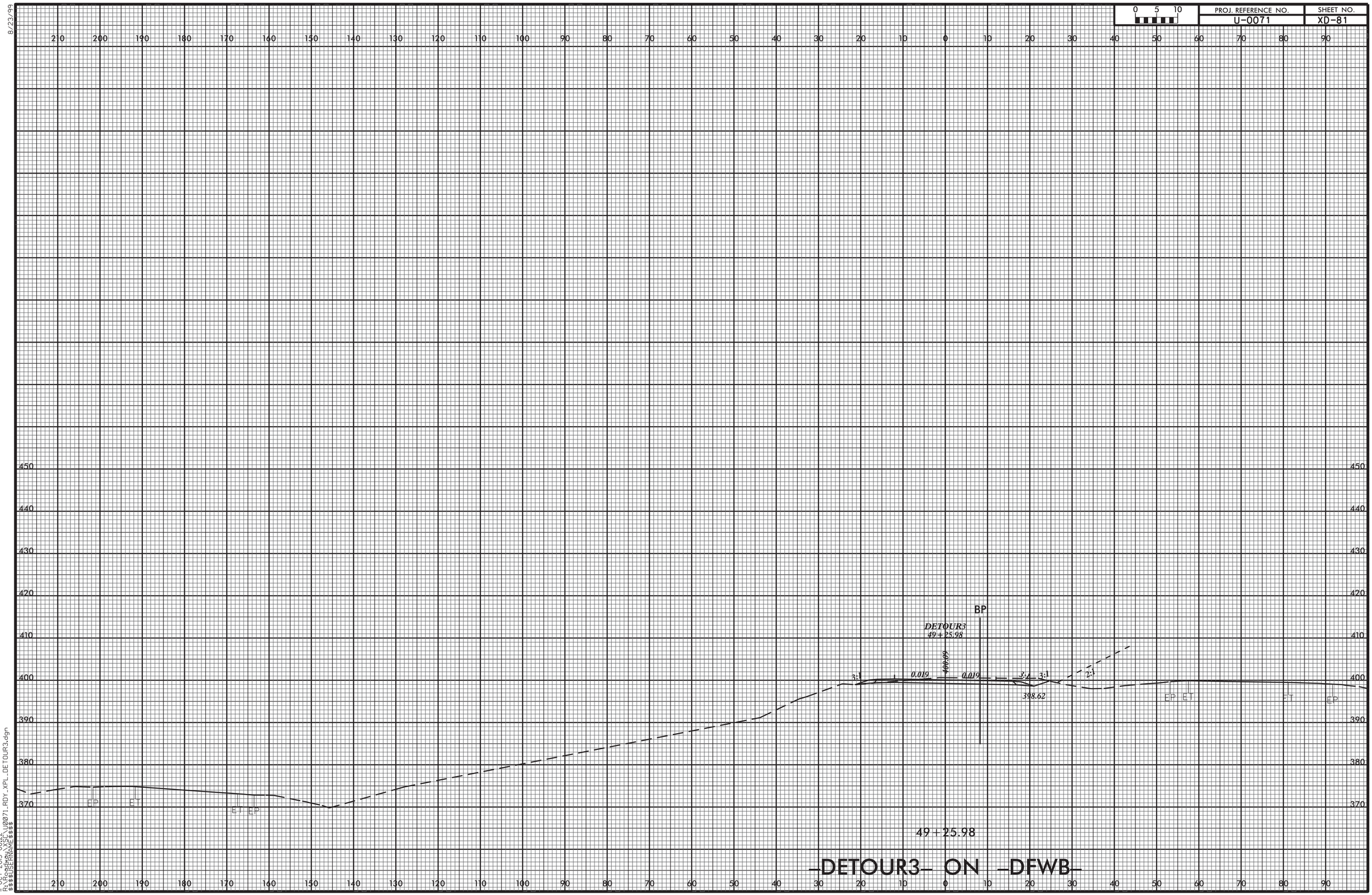
| | U-0071 | XD-81 |

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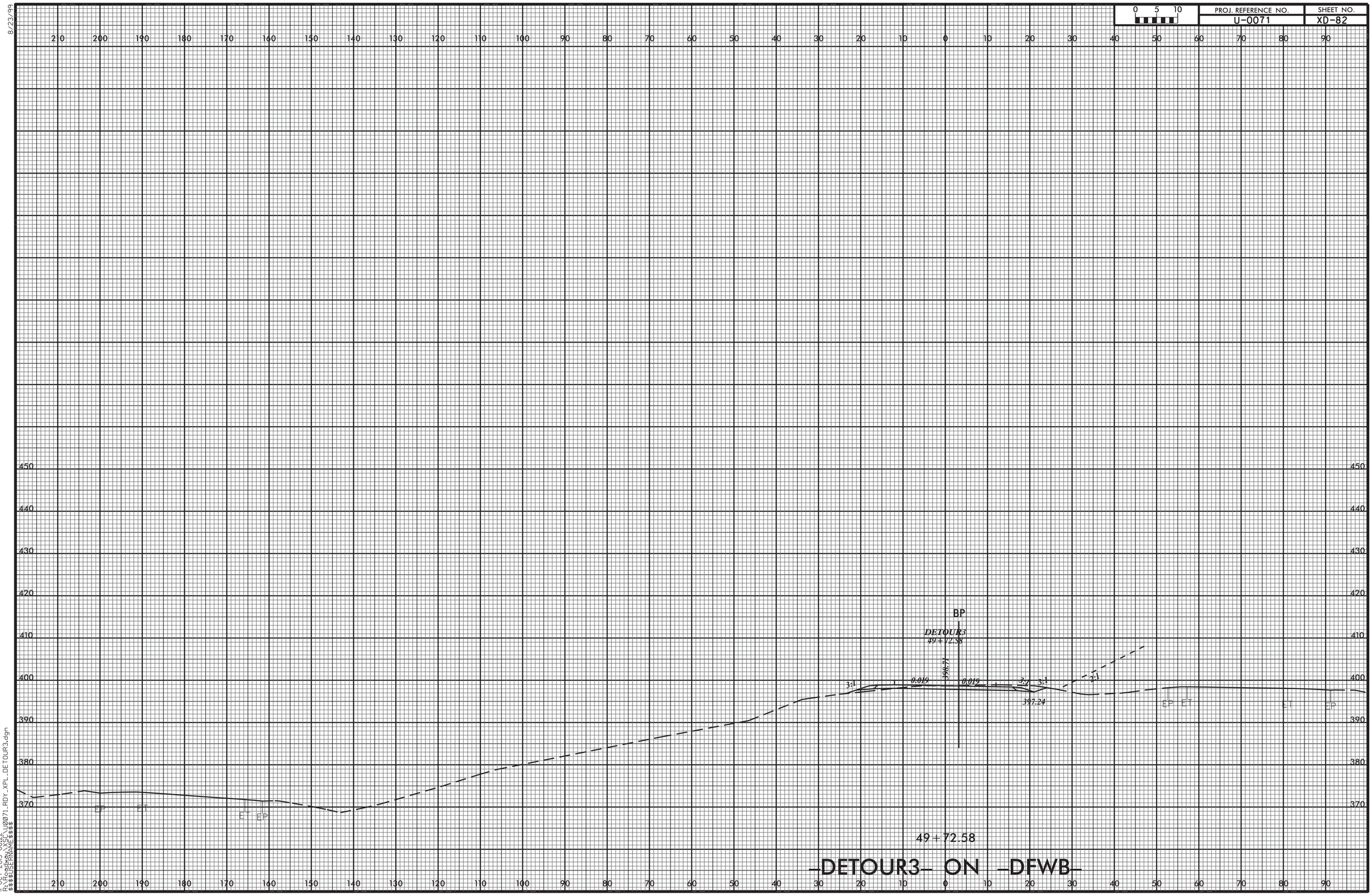
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-82 |

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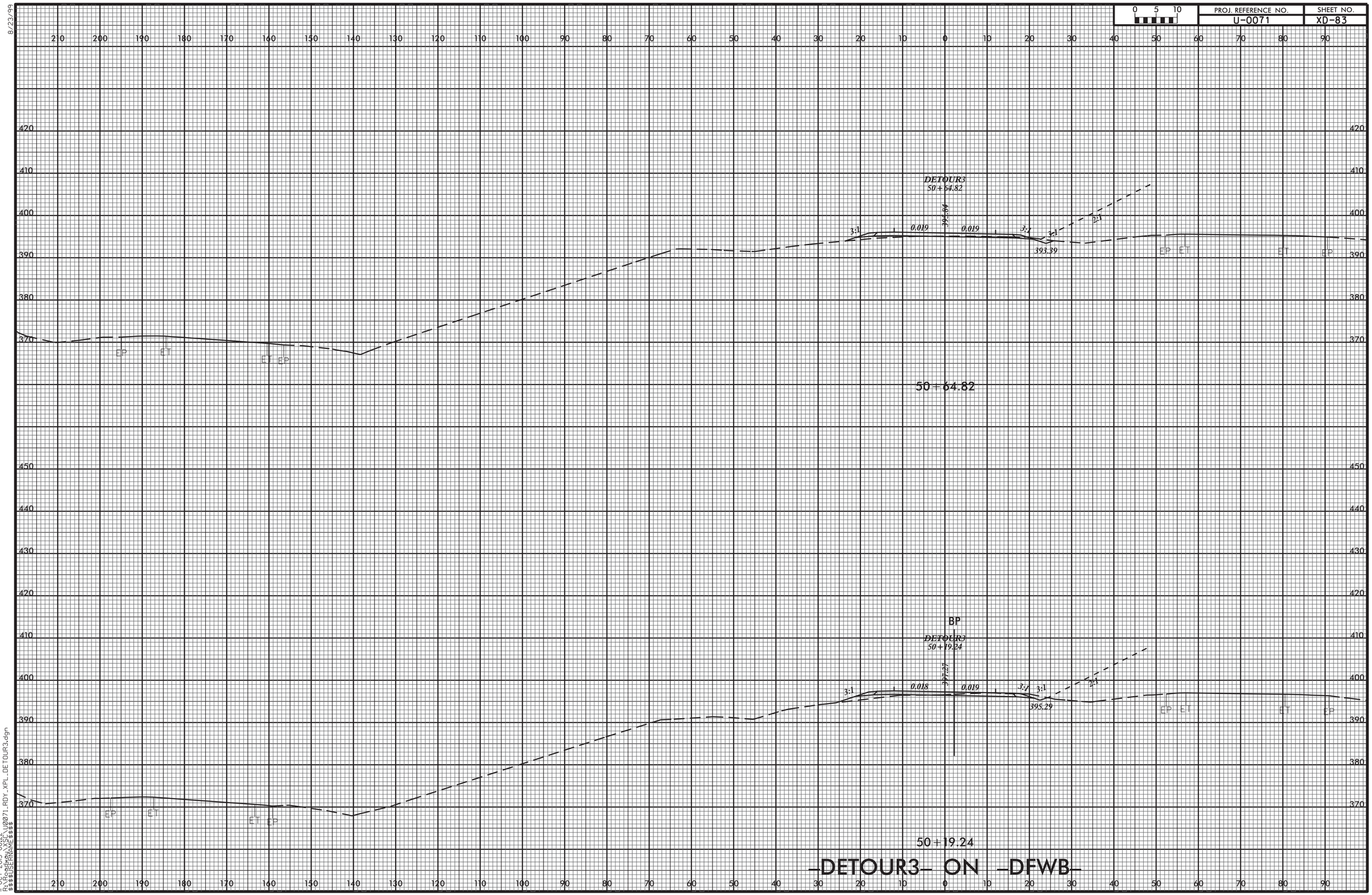
| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | XD-83 |

0 5 10

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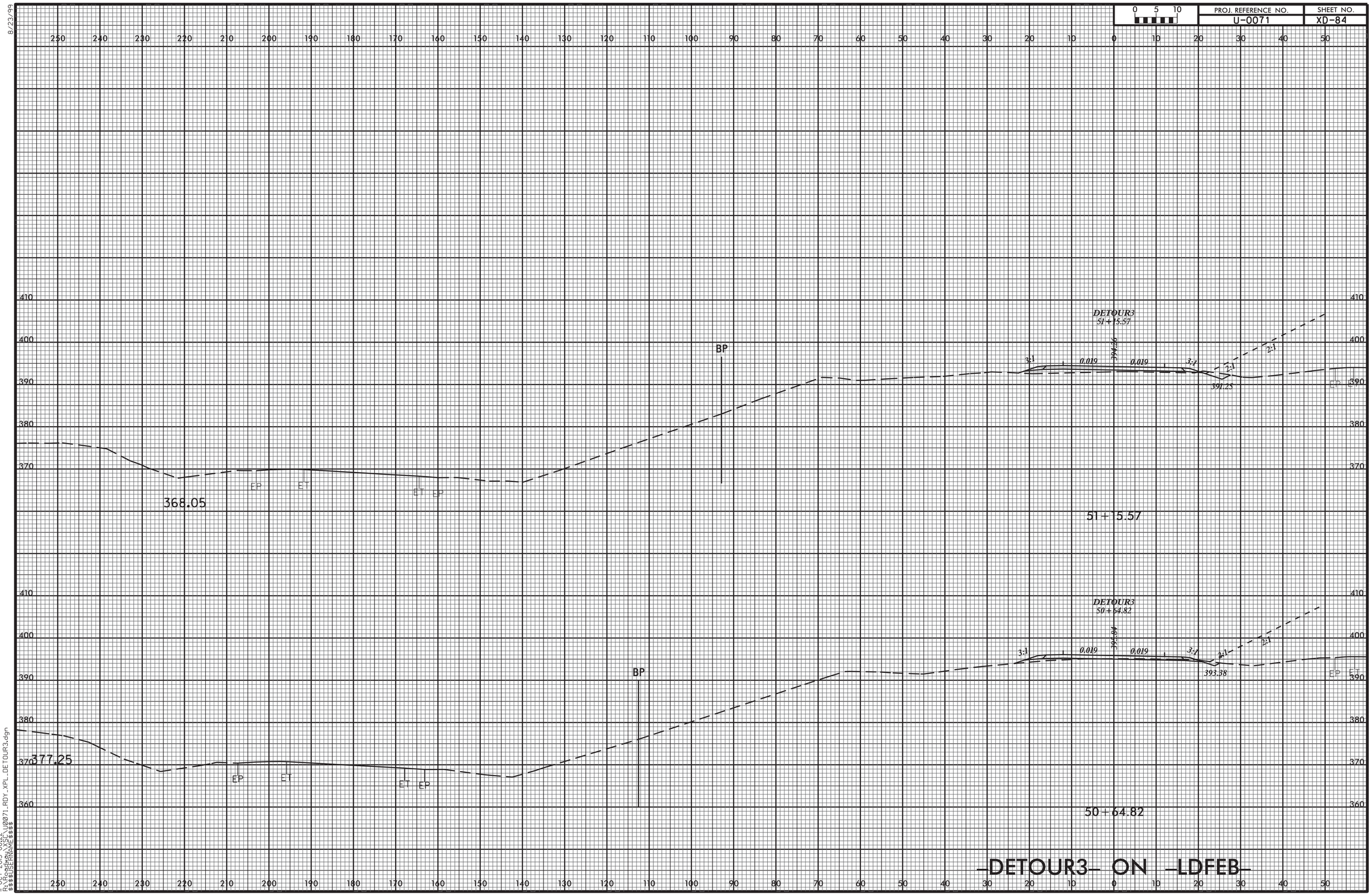
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-84
0 5 10
DETOUR3
51+15.57
394.26
0.019
0.019
3:1
3:1
2:1
2:1
391.25
BP
368.05
EP
ET
ET
EP
51+15.57
DETOUR3
50+64.82
394.84
0.019
0.019
3:1
3:1
2:1
2:1
393.38
BP
377.25
EP
ET
ET
EP
50+64.82
-DETOUR3- ON -LDFEB-
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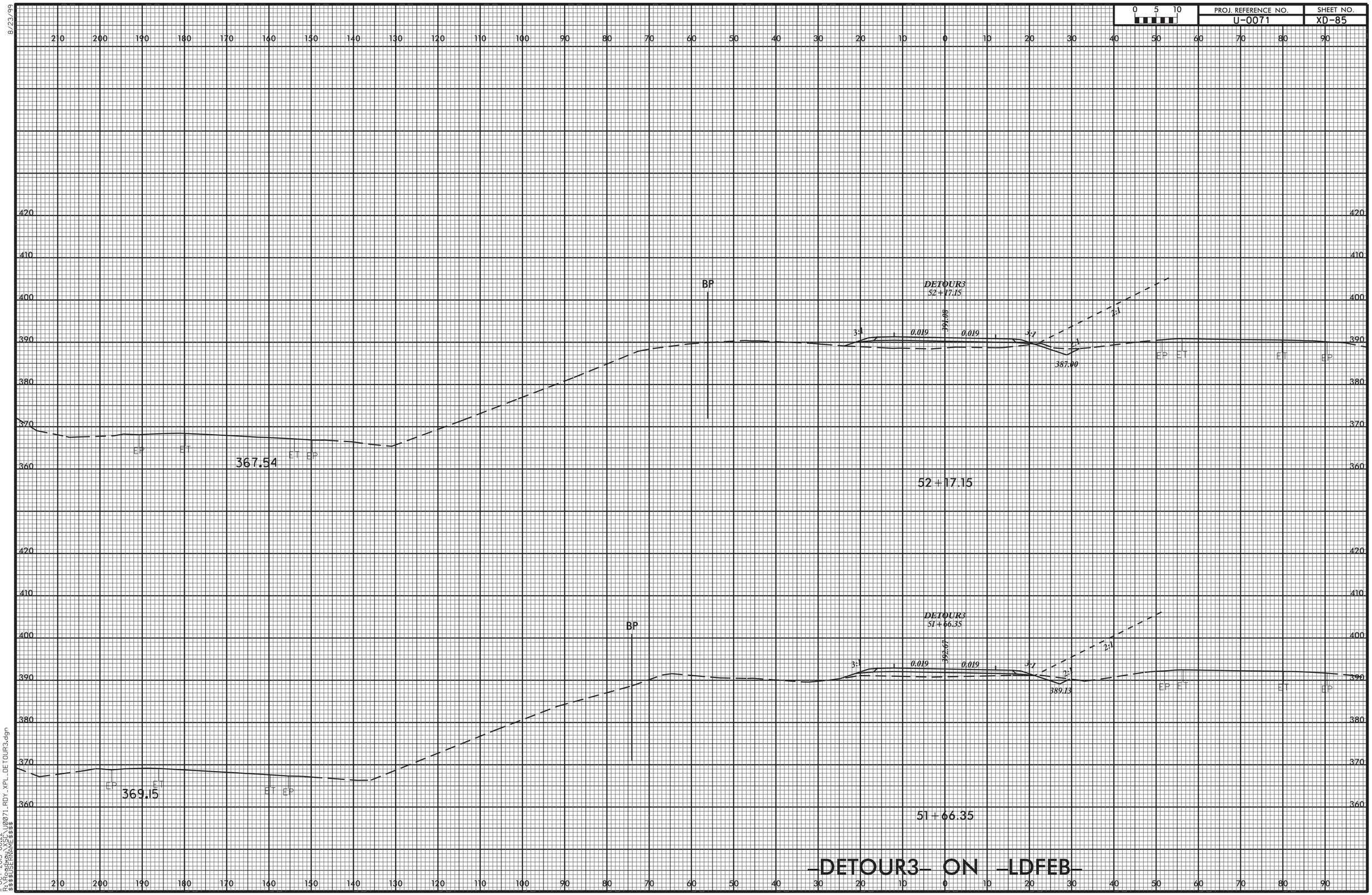
0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-85
BP
DETOUR3
52+17.15
392.98
0.019
0.019
3:1
3:1
2:1
2:1
387.00
EP ET
ET EP
367.54
52+17.15
DETOUR3
51+66.35
392.67
389.13
369.15
51+66.35
-DETOUR3- ON -LDFEB-
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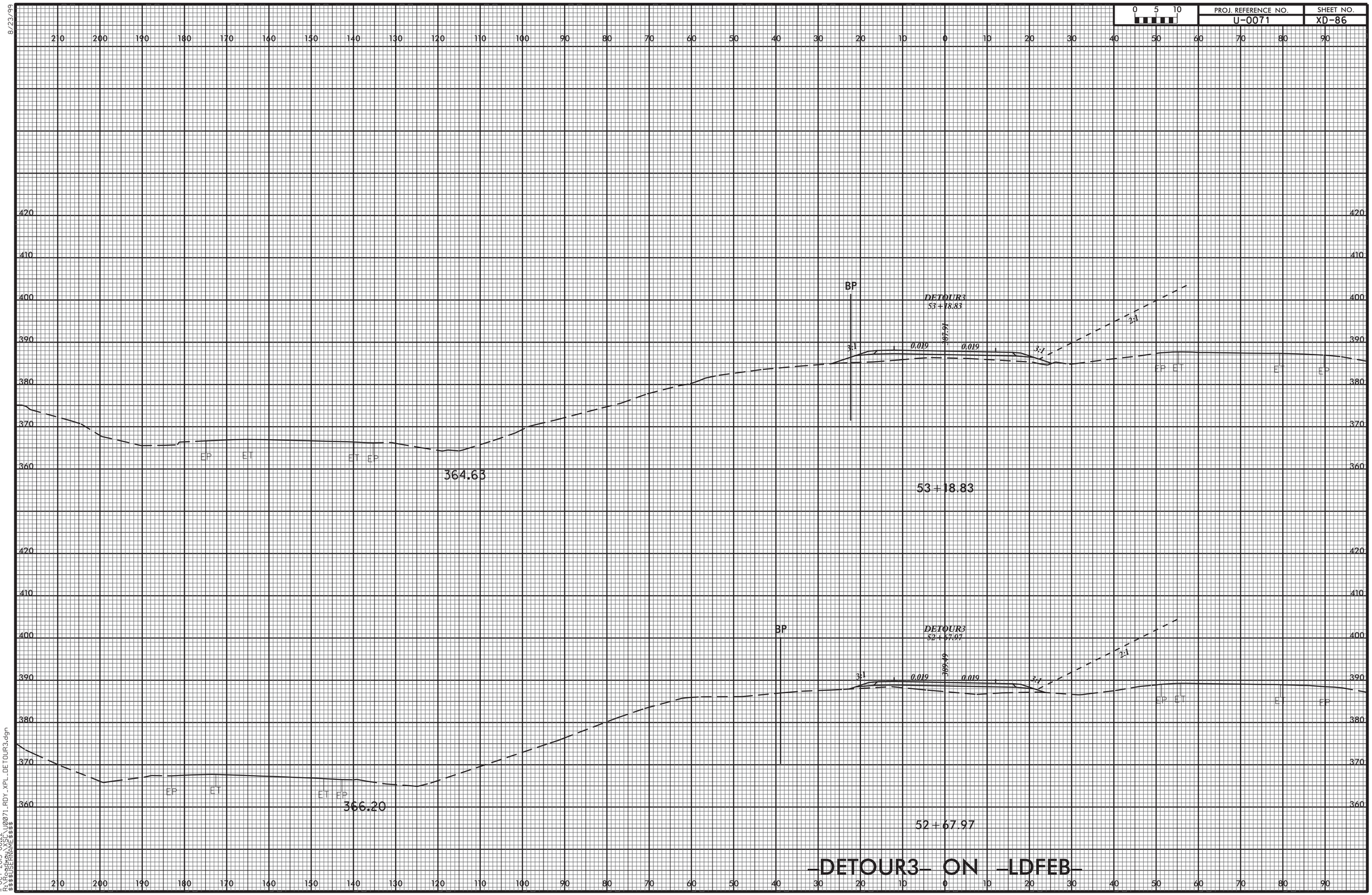


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| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
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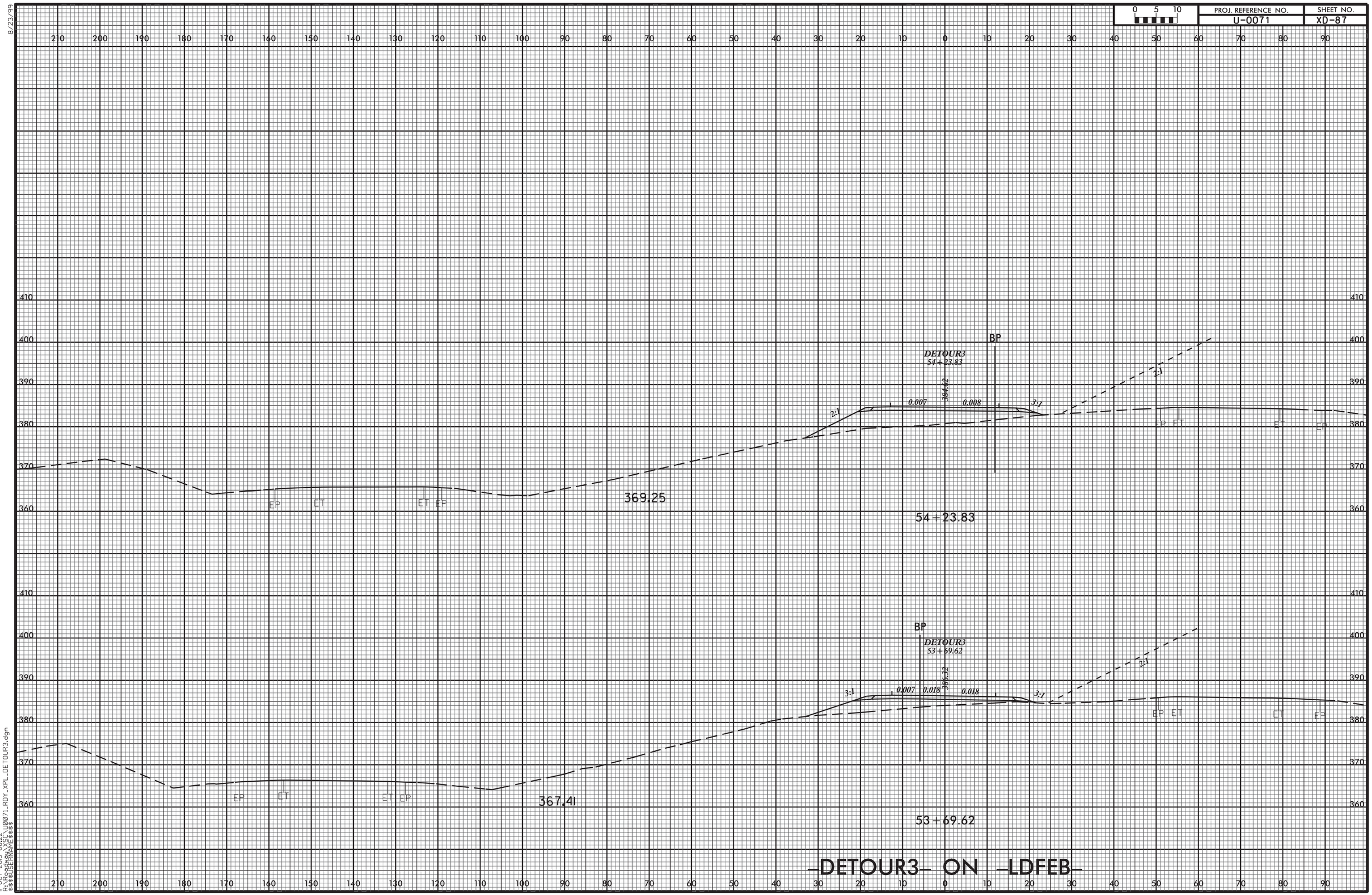
| | U-0071 | XD-87 |

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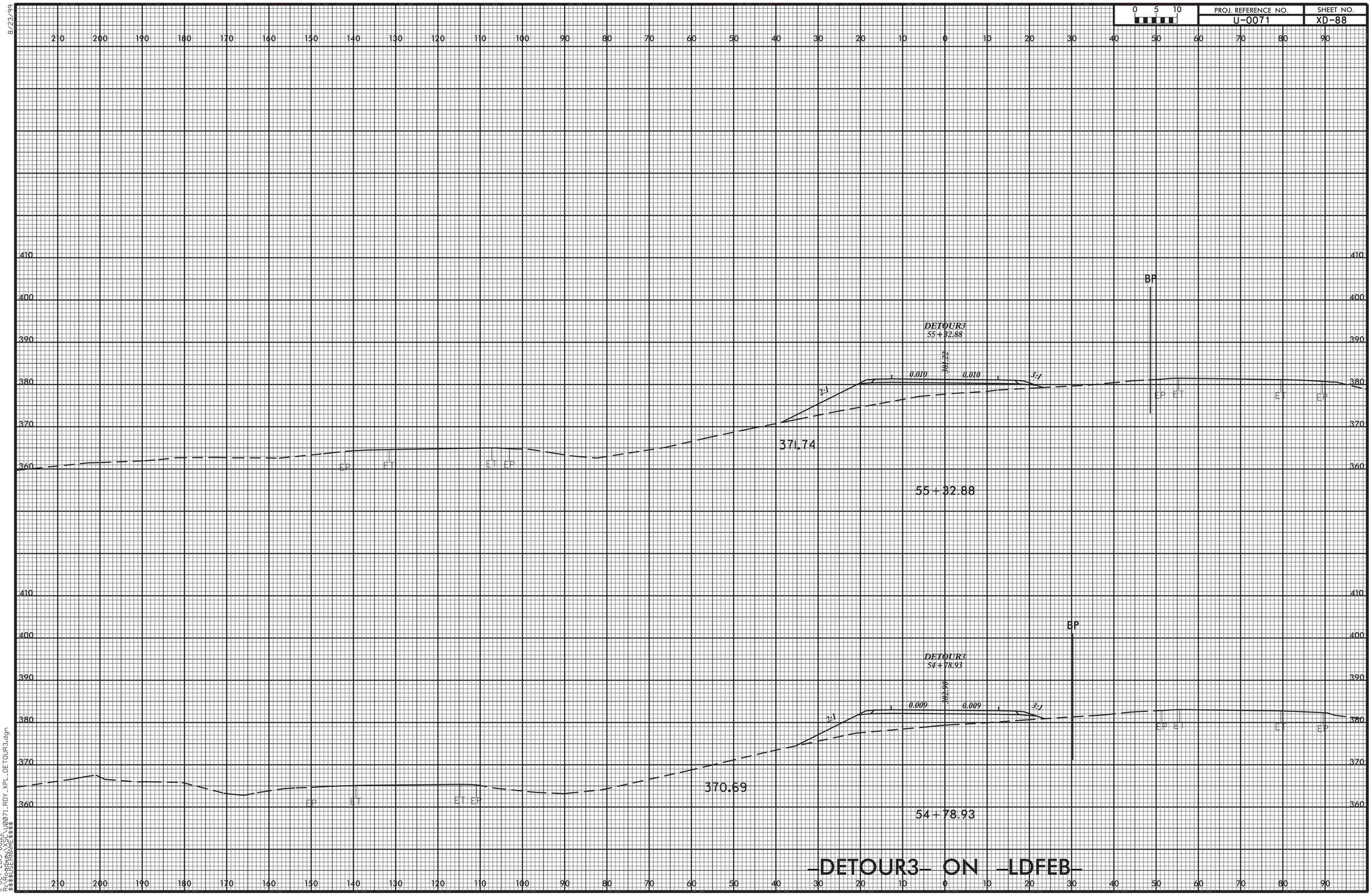
0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-88
DETOUR3
55+32.88
381.22
0.010
0.010
3:1
2:1
371.74
55+32.88
BP
DETOUR3
54+78.93
382.99
0.009
0.009
3:1
2:1
370.69
54+78.93
BP
EP ET
ET EP
-DETOUR3- ON -LDFEB-
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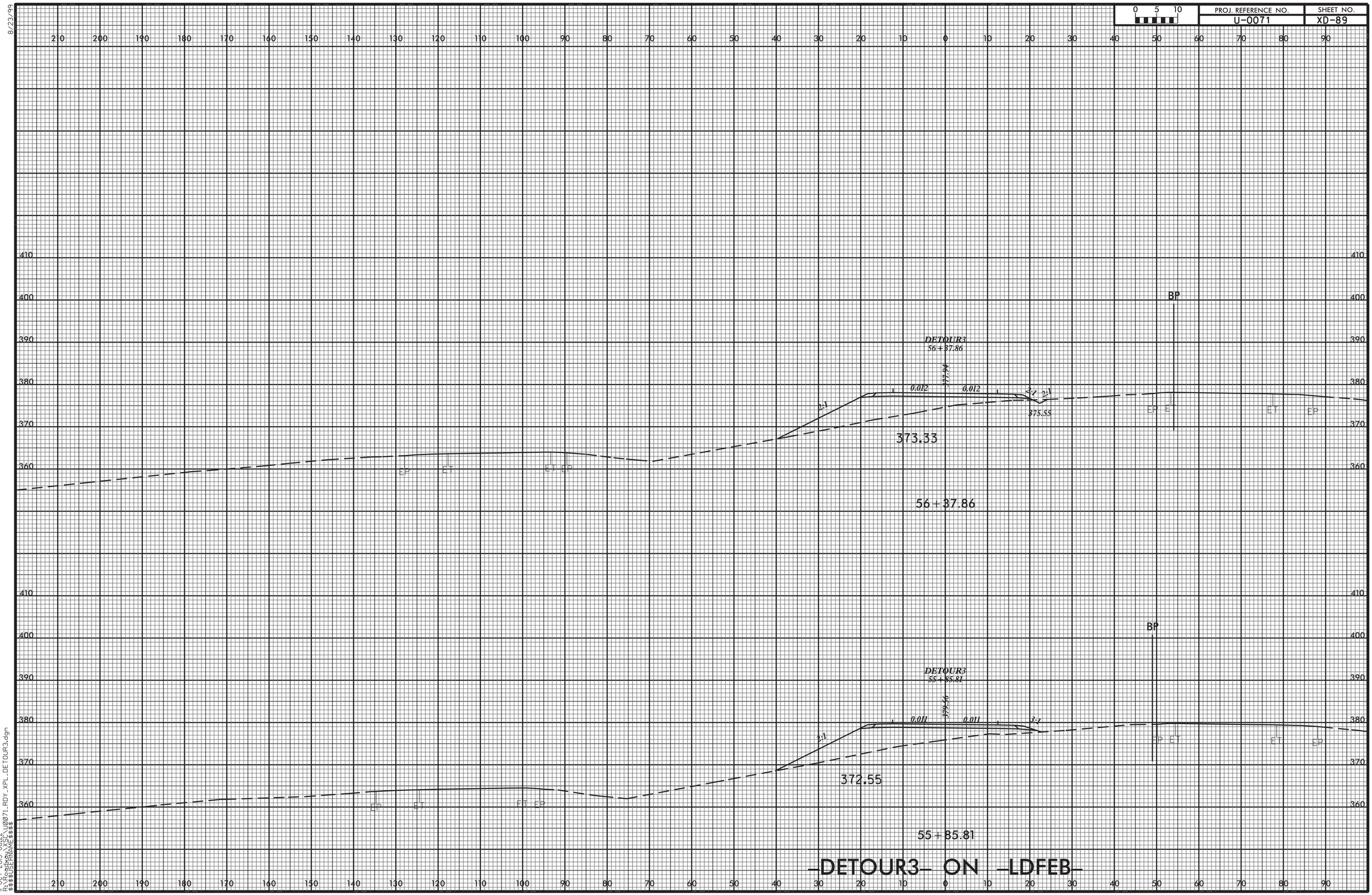
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-89 |

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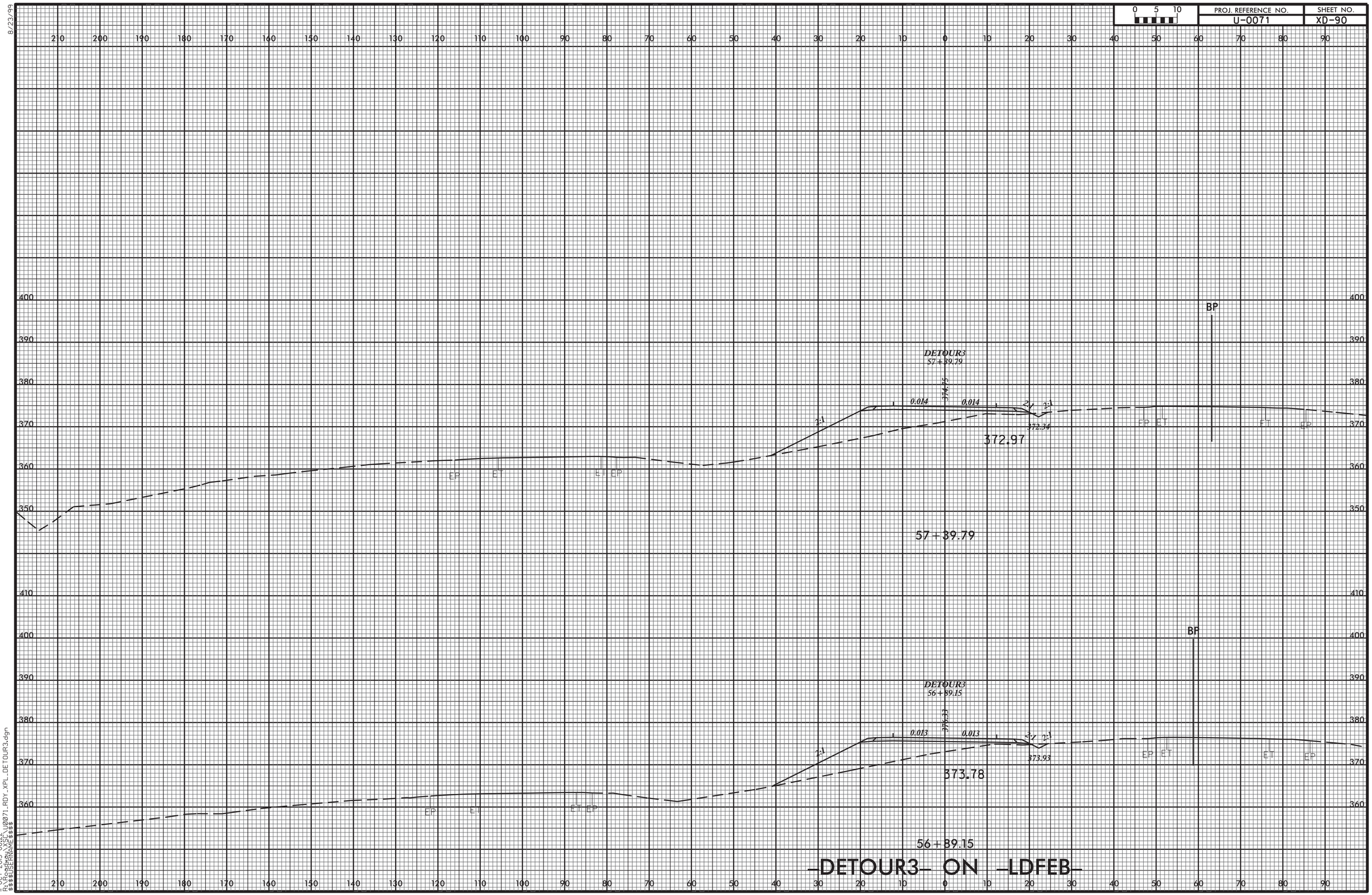
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-90
0 5 10
DETOUR3
57+39.79
0.014
0.014
372.34
372.97
BP
EP ET
ET EP
57+39.79
DETOUR3
56+89.15
0.013
0.013
373.93
373.78
56+89.15
-DETOUR3- ON -LDFEB-
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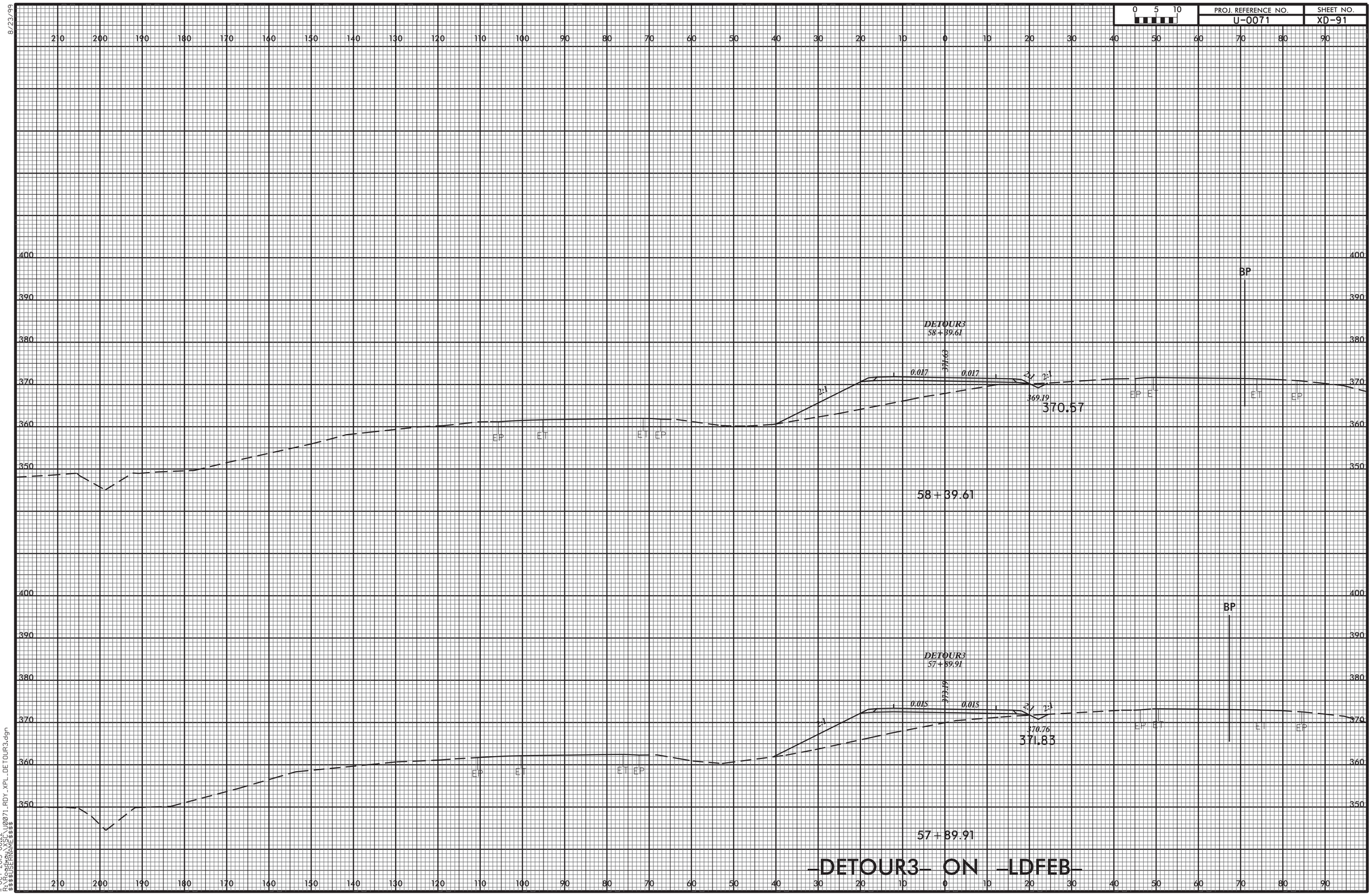


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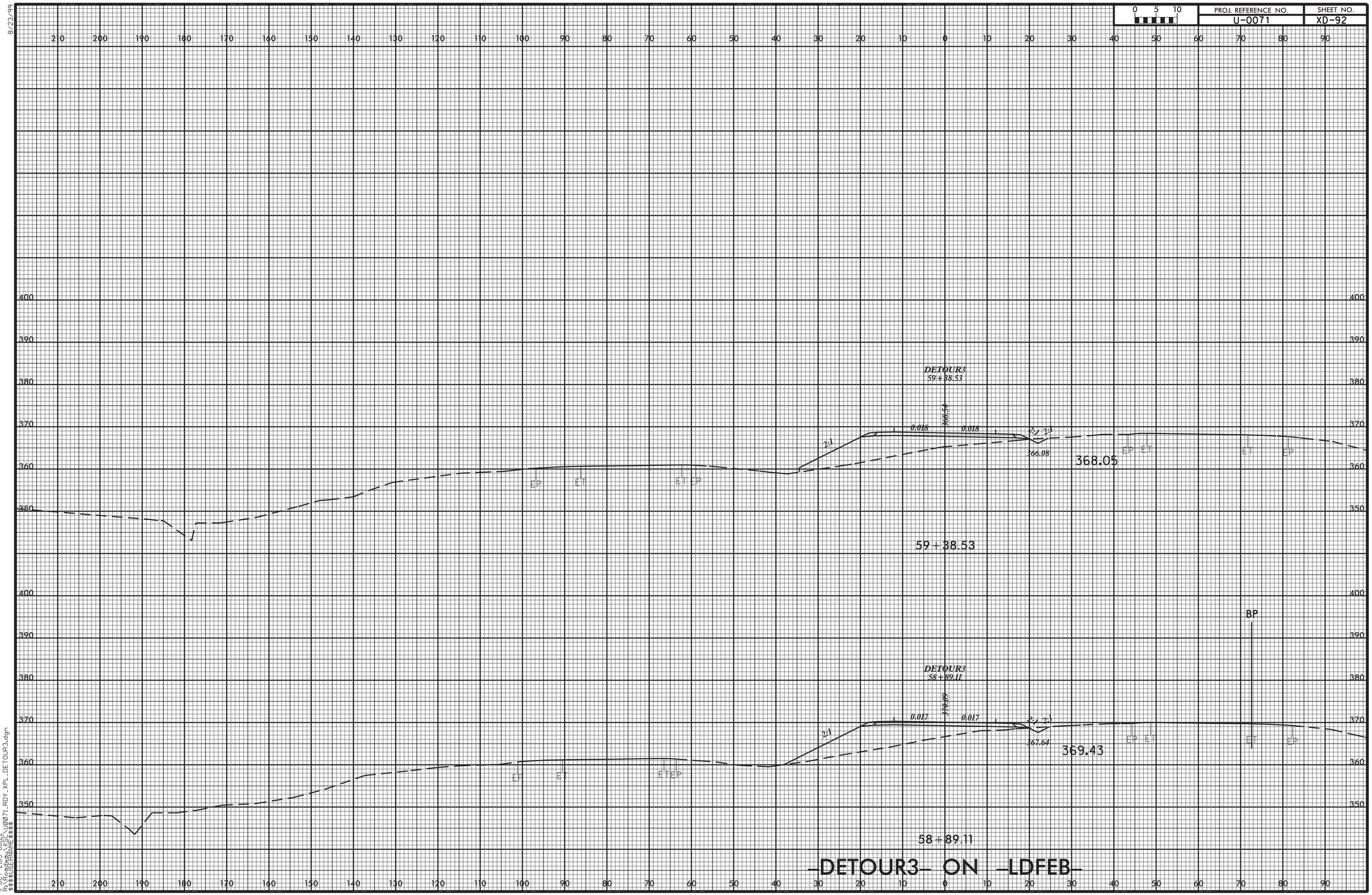


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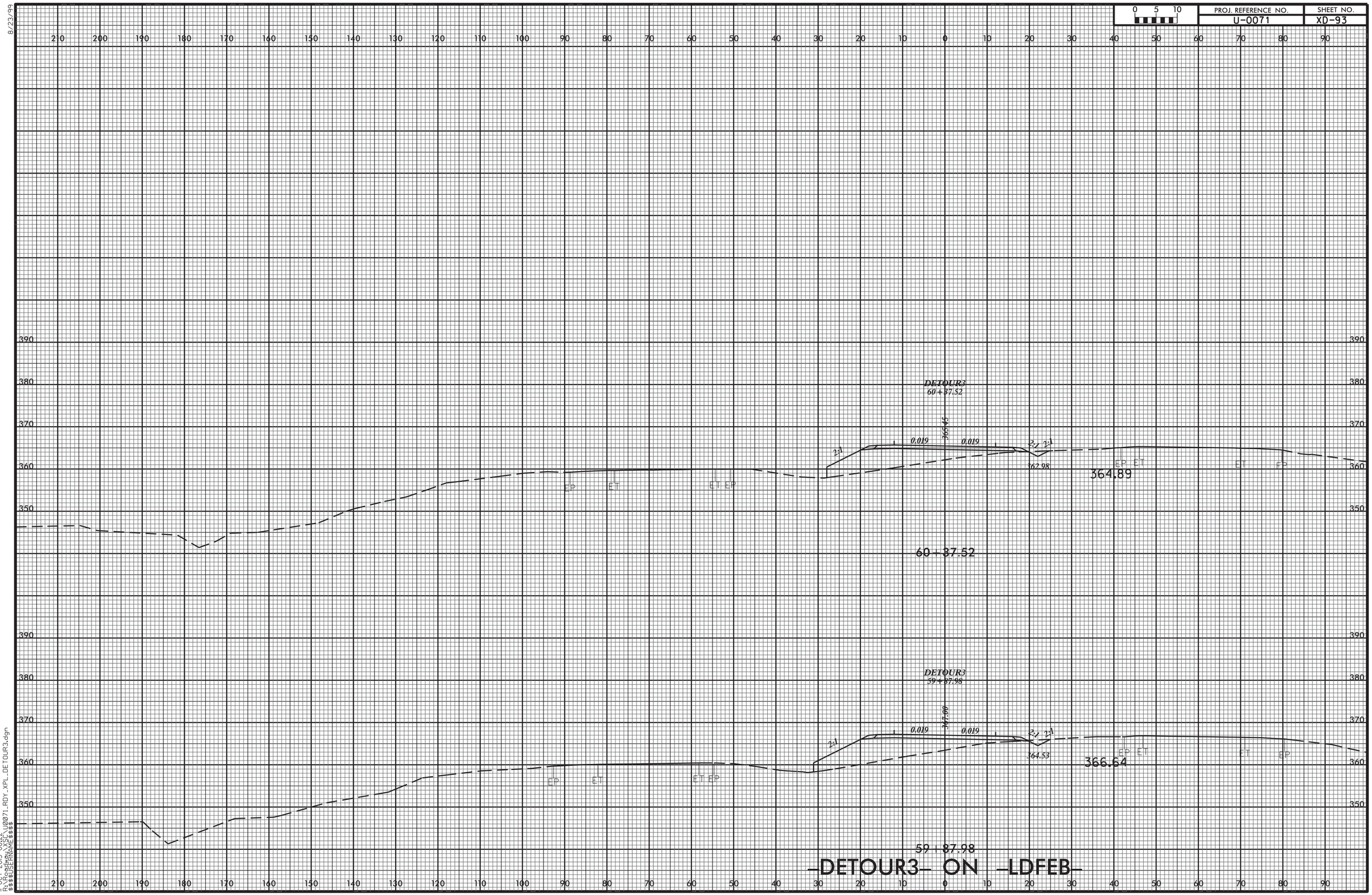
0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-93
DETOUR3
60+37.52
366.45
0.019
0.019
2:1
2:1
362.98
364.89
60+37.52
DETOUR3
59+37.98
367.90
0.019
0.019
2:1
2:1
364.53
366.64
59+87.98
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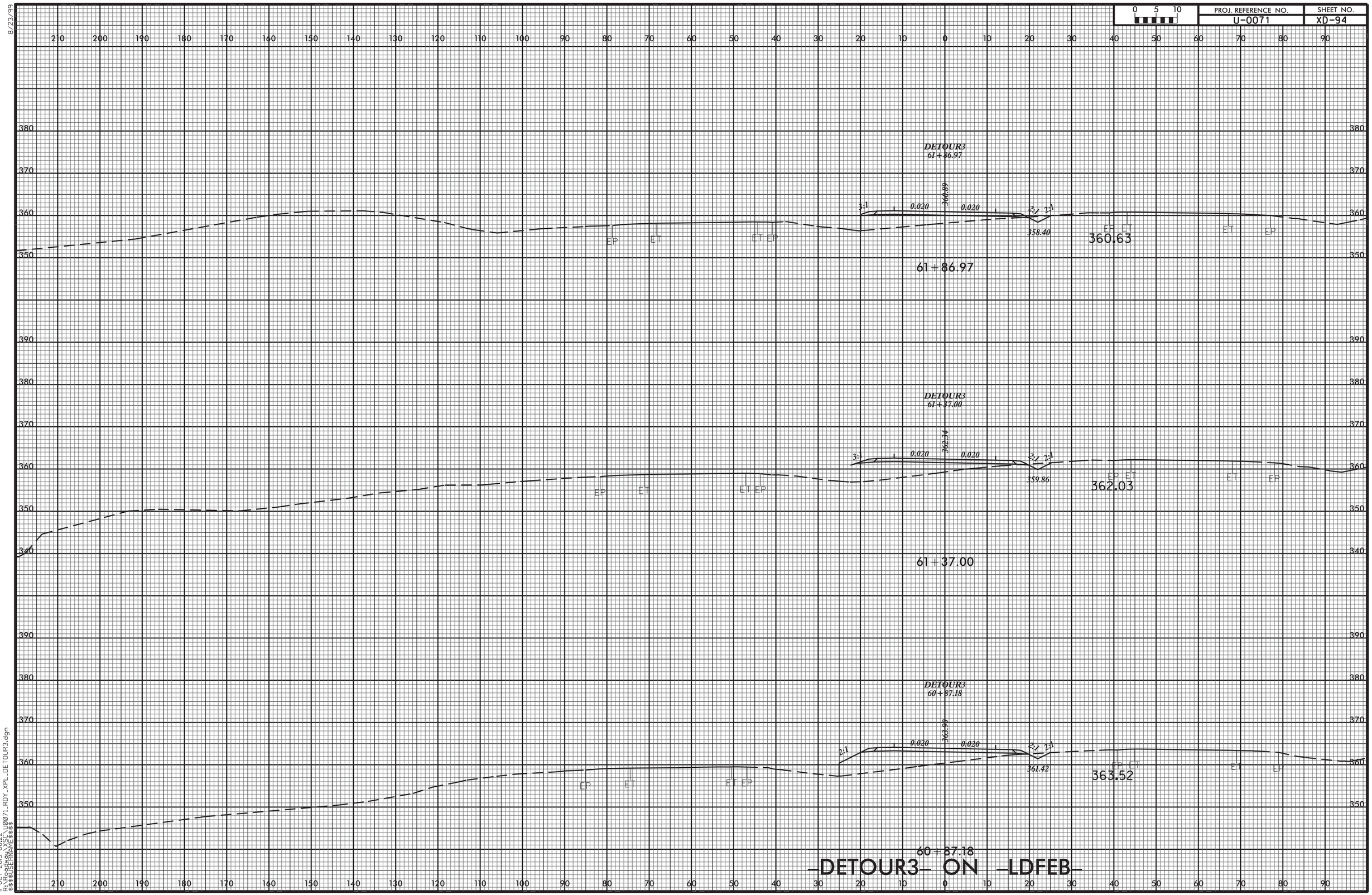


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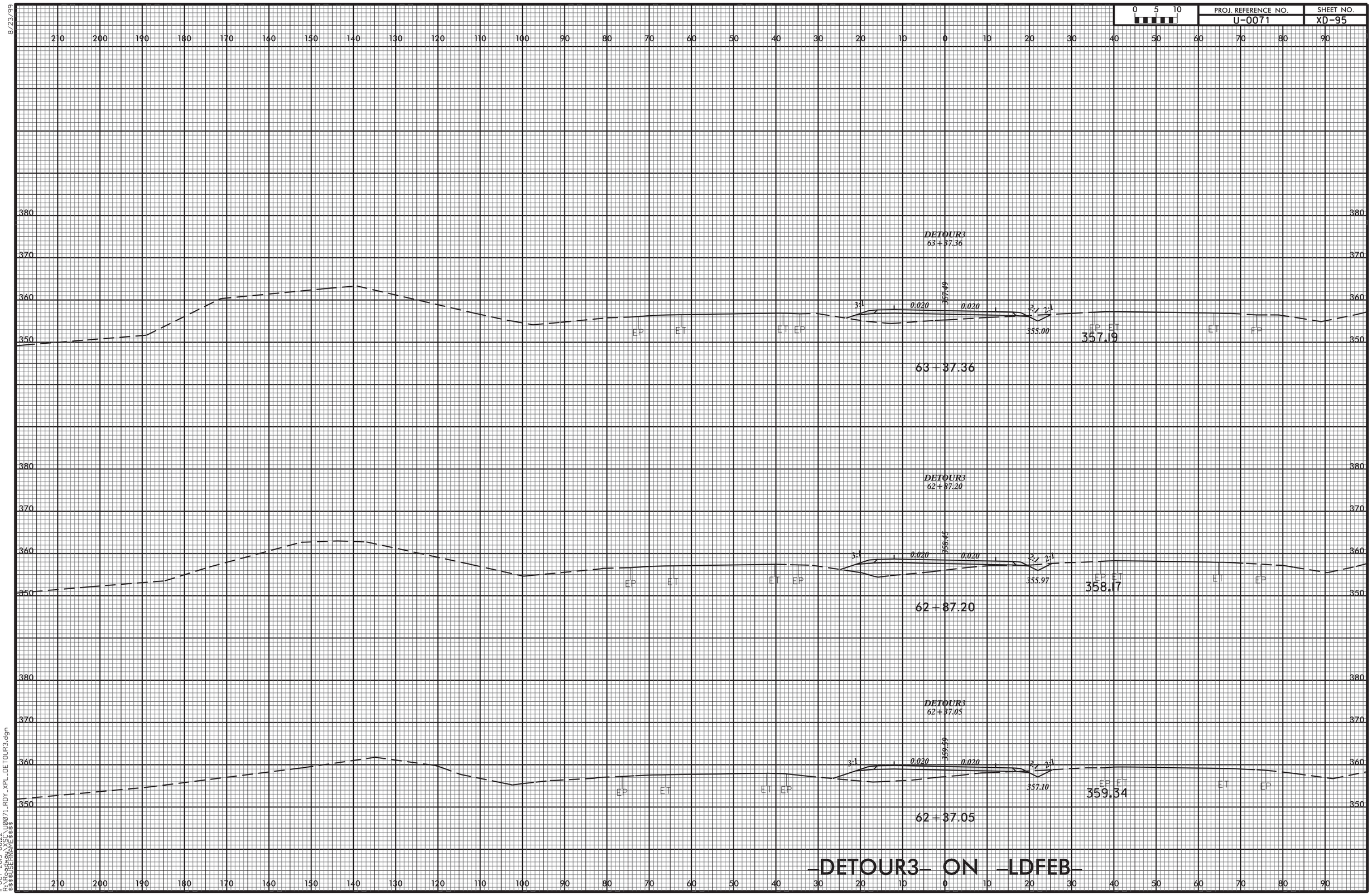
| | U-0071 | XD-95 |

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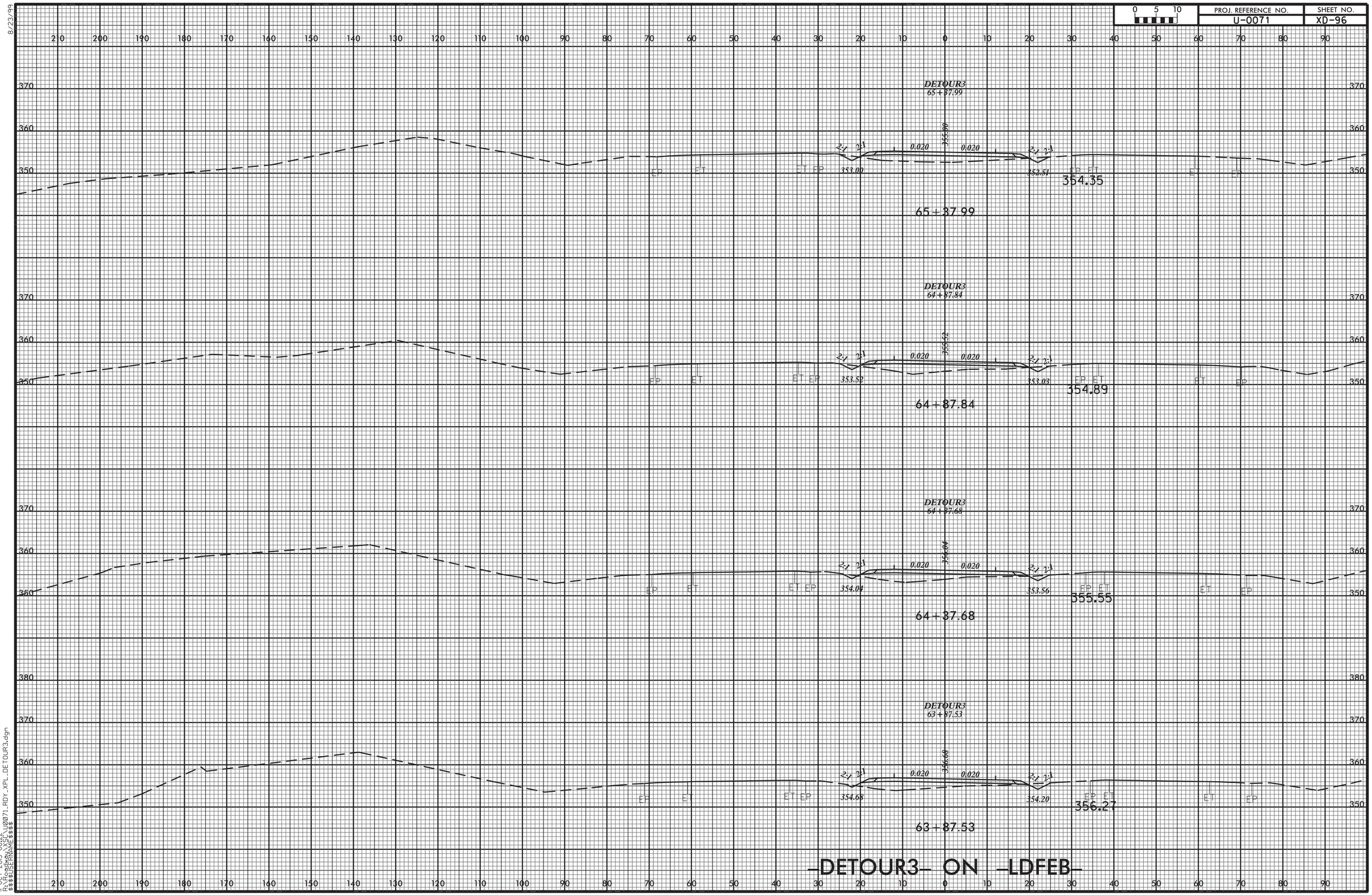


–DETOUR3– ON –LDFEB–

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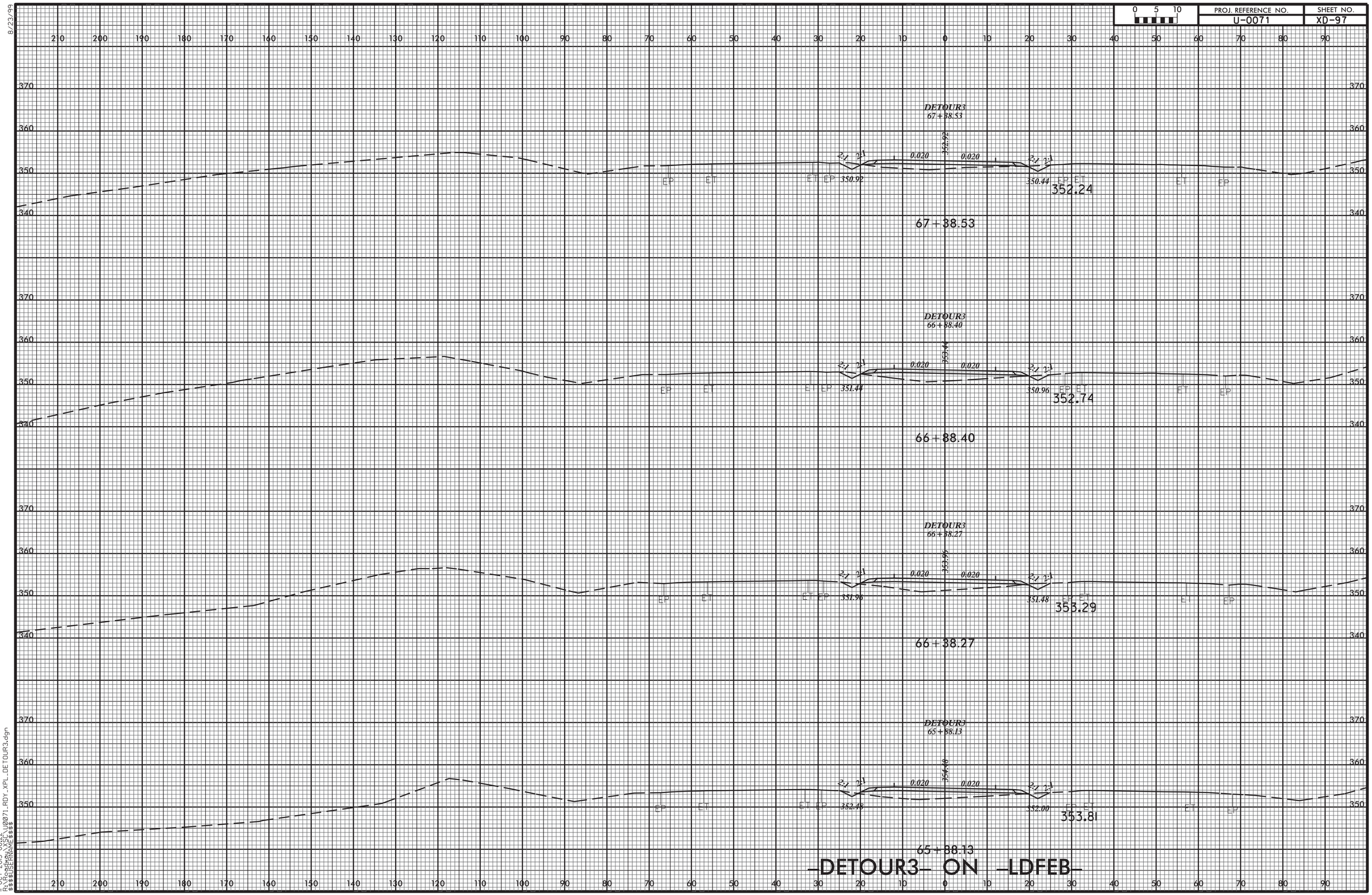
0 5 10
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U-0071
SHEET NO.
XD-97
DETOUR3
67+38.53
352.92
0.020
0.020
2:1
2:1
350.92
350.44
352.24
67+38.53
DETOUR3
66+38.40
353.44
0.020
0.020
351.44
350.96
352.74
66+88.40
DETOUR3
66+38.27
353.96
0.020
0.020
351.96
351.48
353.29
66+38.27
DETOUR3
65+88.13
354.48
0.020
0.020
352.48
352.00
353.81
65+88.13
EP
ET
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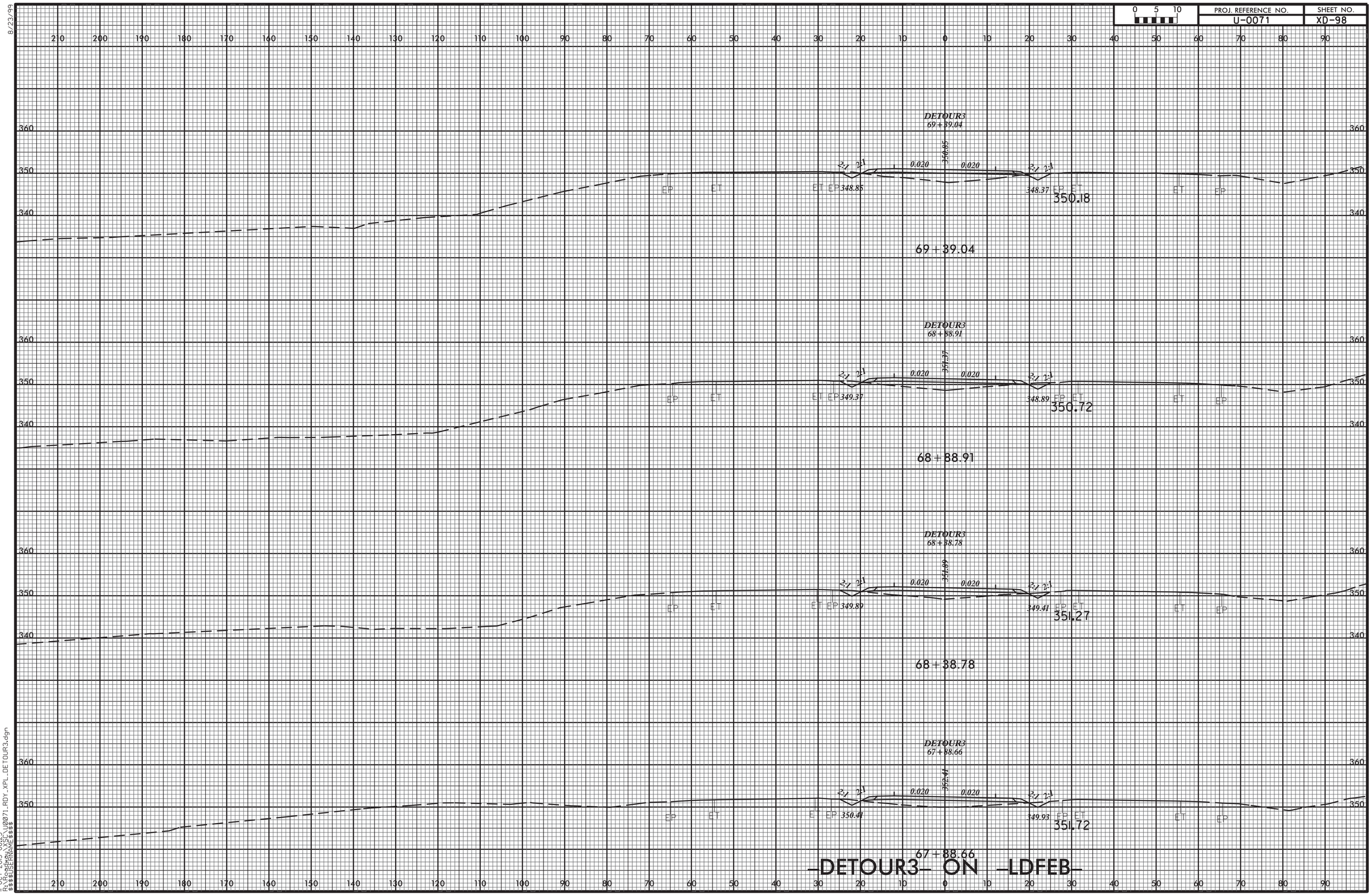


-DETOUR3- ON -LDFEB-

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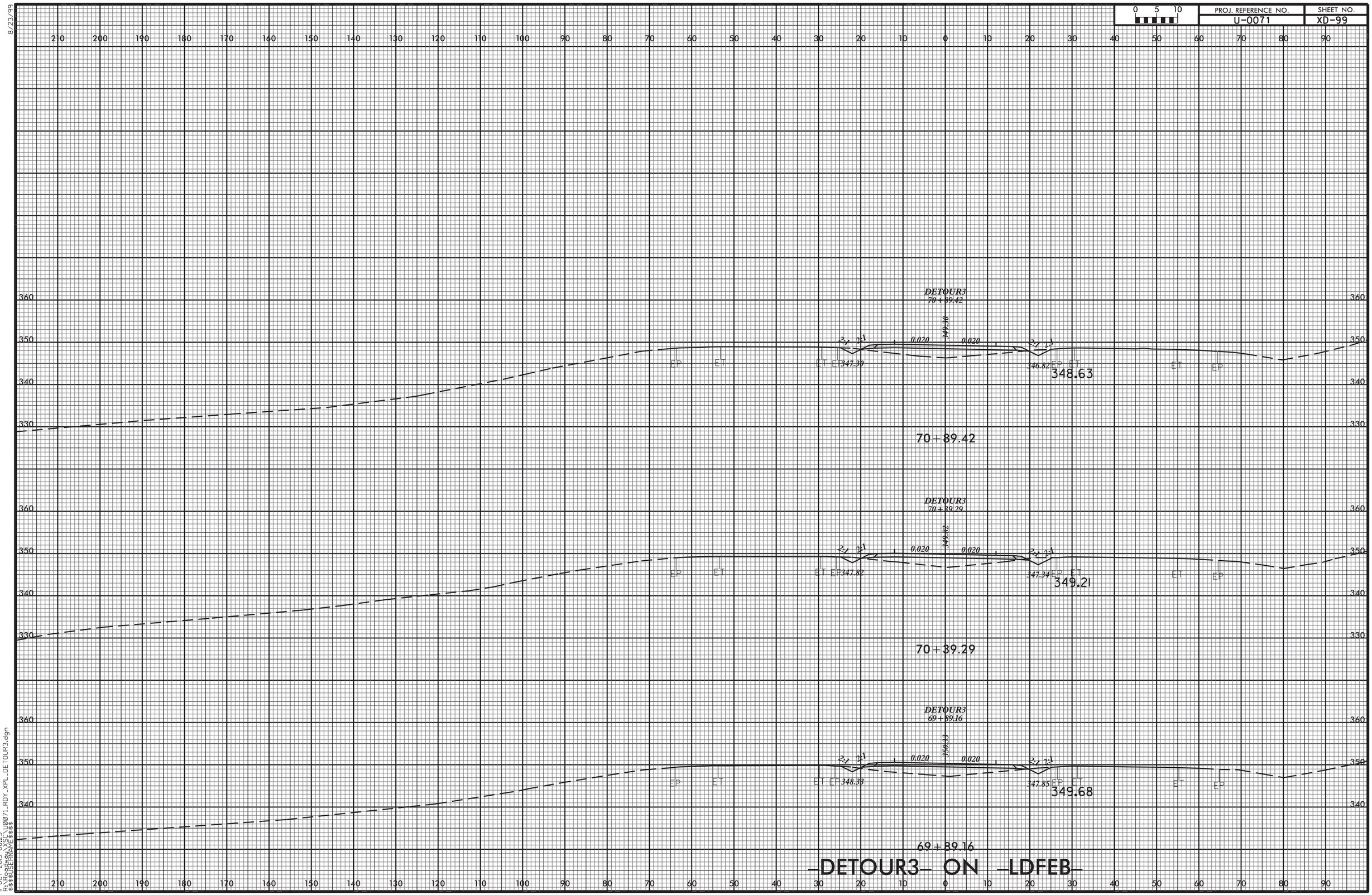
0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-99
DETOUR3
70+89.42
349.36
0.020
0.020
347.39
346.82
348.63
70+89.42
DETOUR3
70+39.29
349.82
0.020
0.020
347.82
347.34
349.21
70+39.29
DETOUR3
69+89.16
350.33
0.020
0.020
348.33
347.85
349.68
69+89.16
-DETOUR3- ON -LDFEB-
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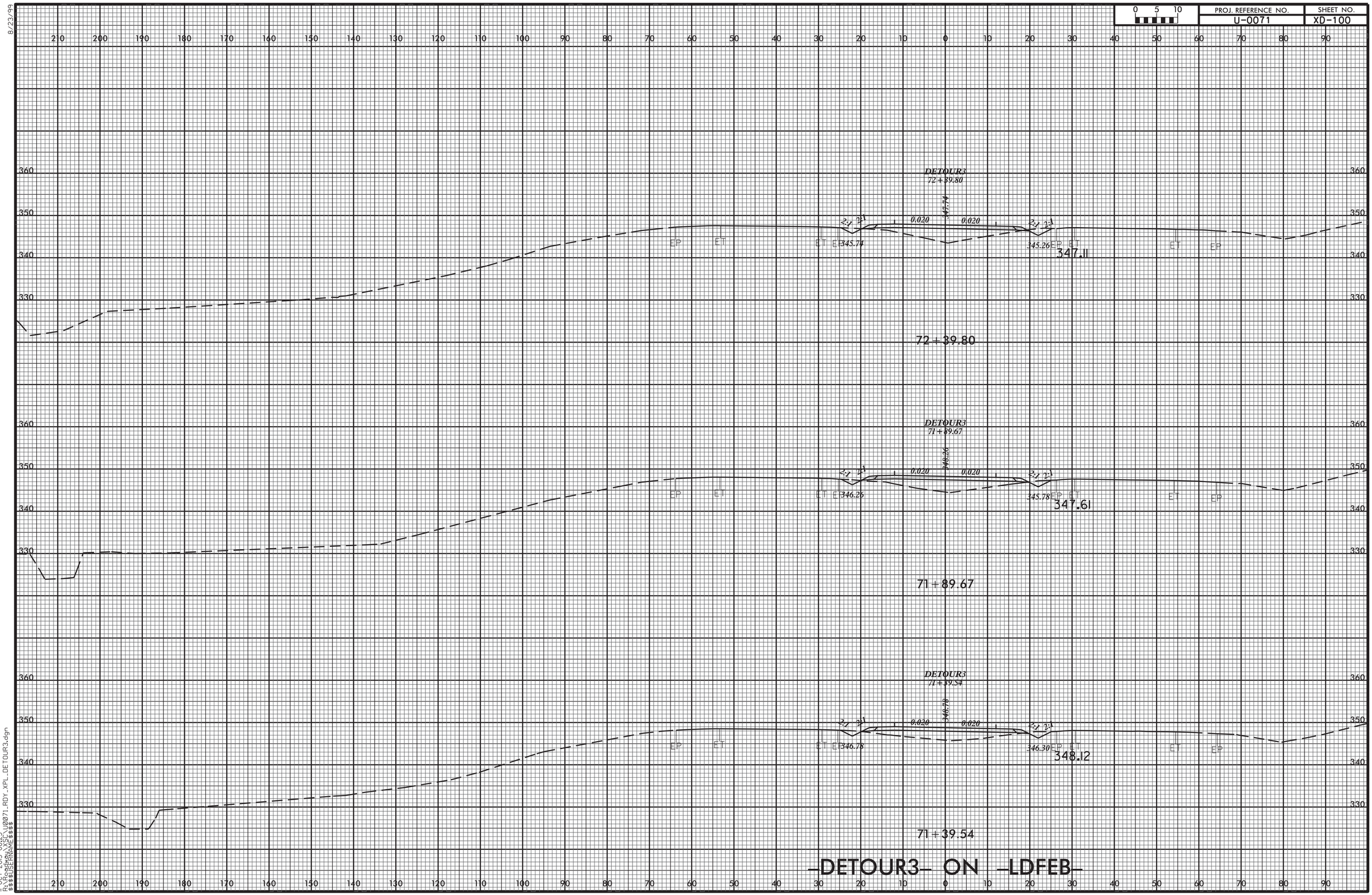


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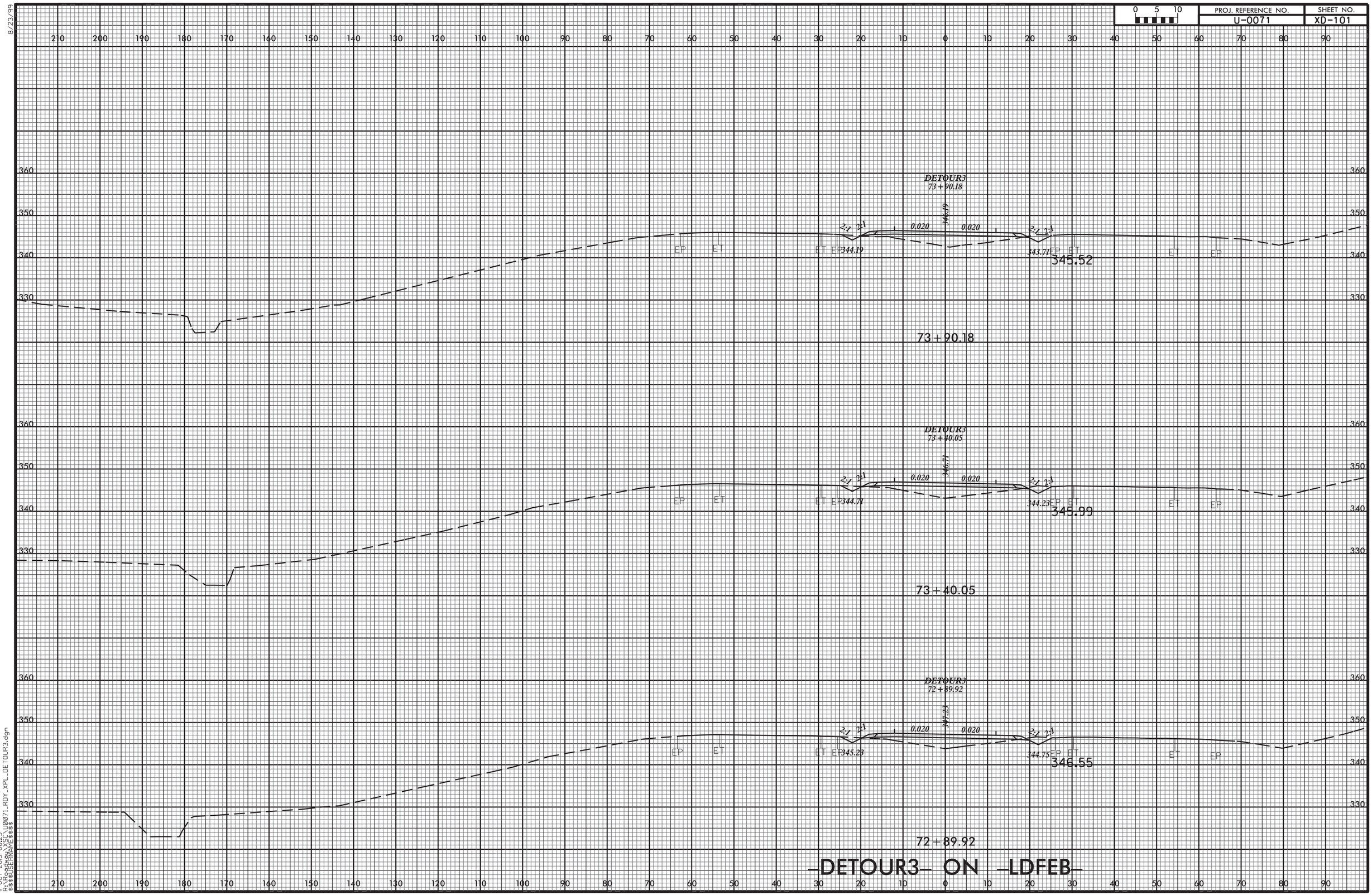
| | U-0071 | XD-101 |




—DETOUR3— ON —LDFEB—

11-OCT-2013 08:23
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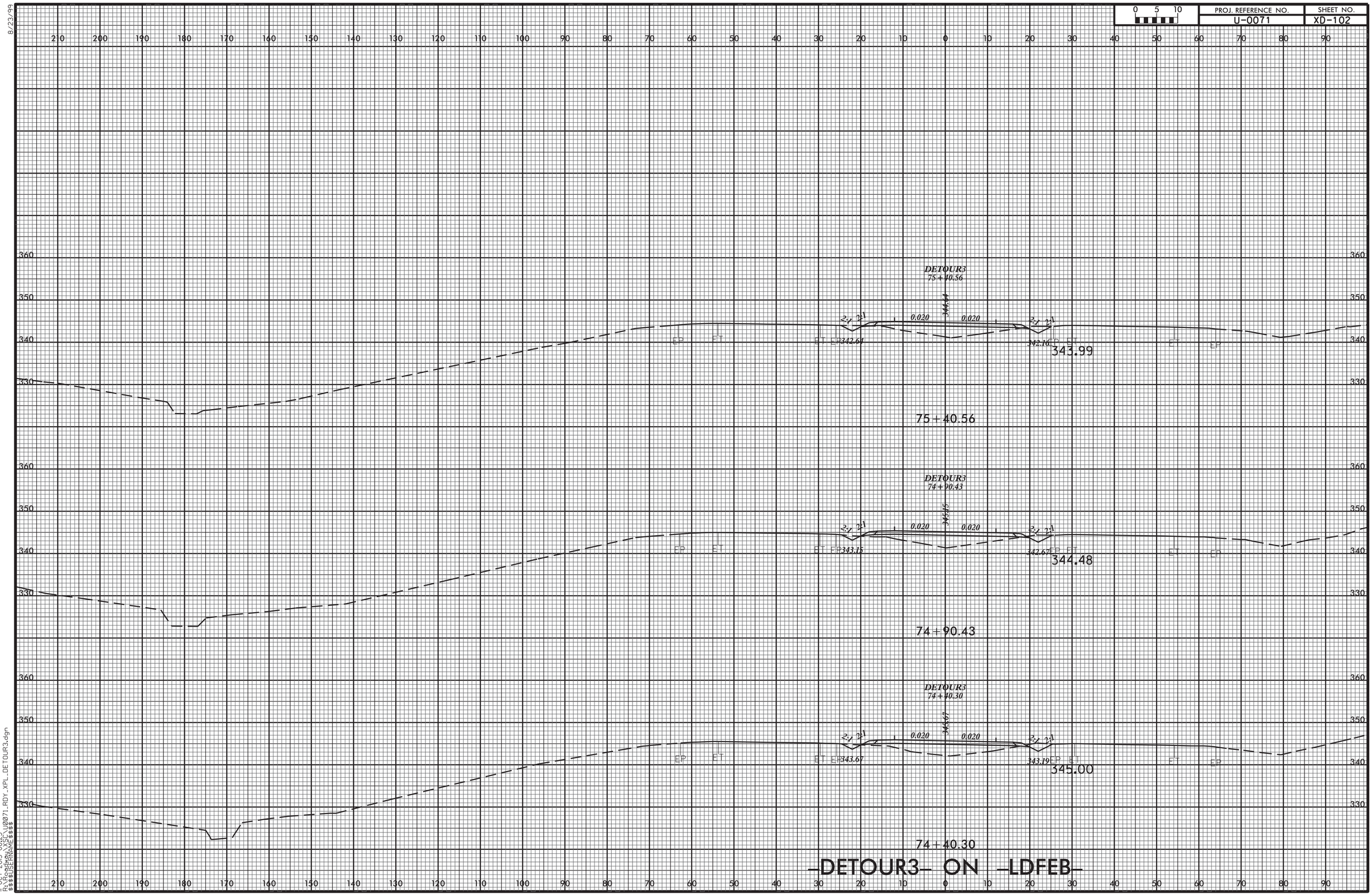
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-102 |

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11-OCT-2013 08:23
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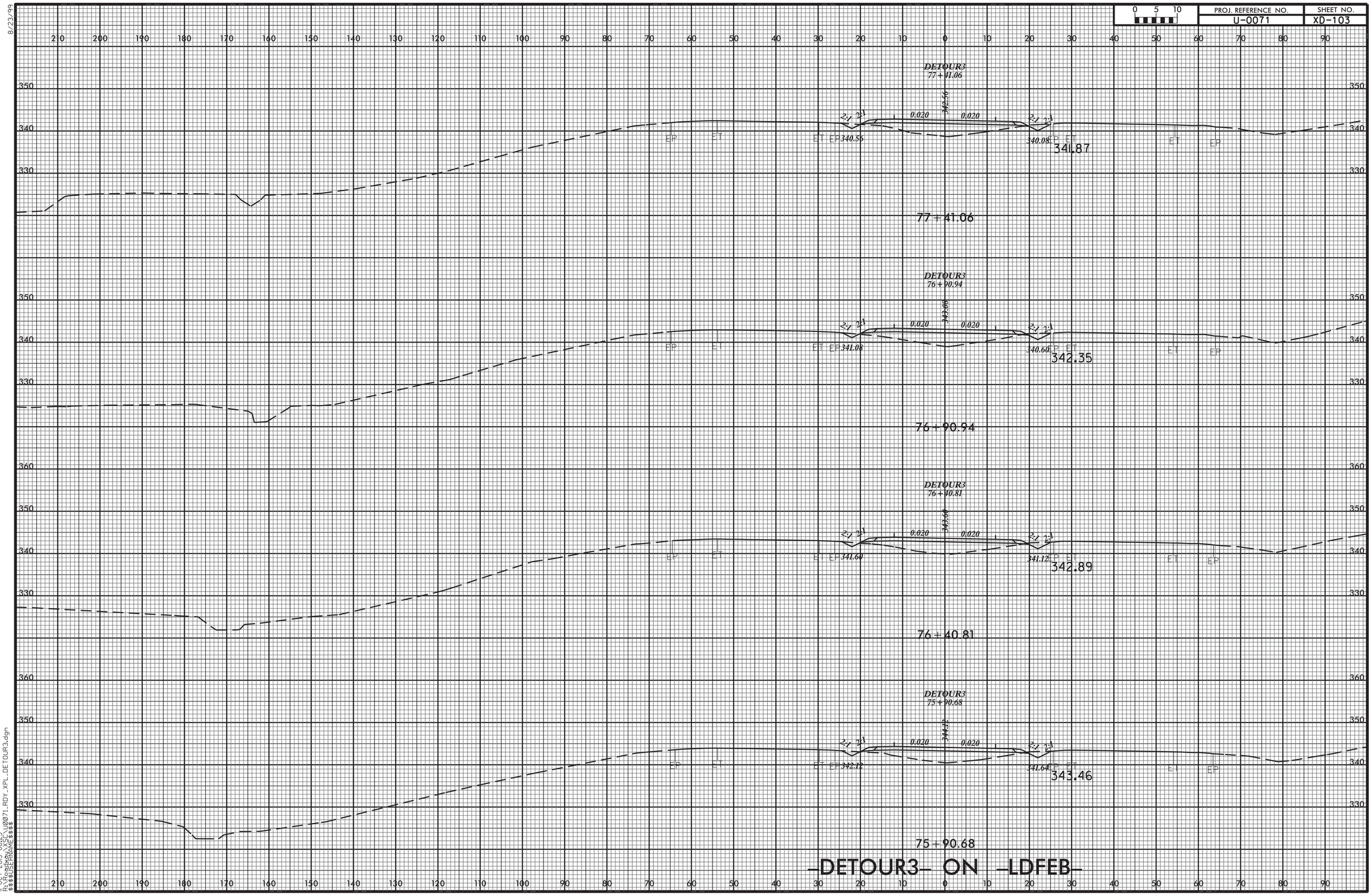


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11-OCT-2013 08:23
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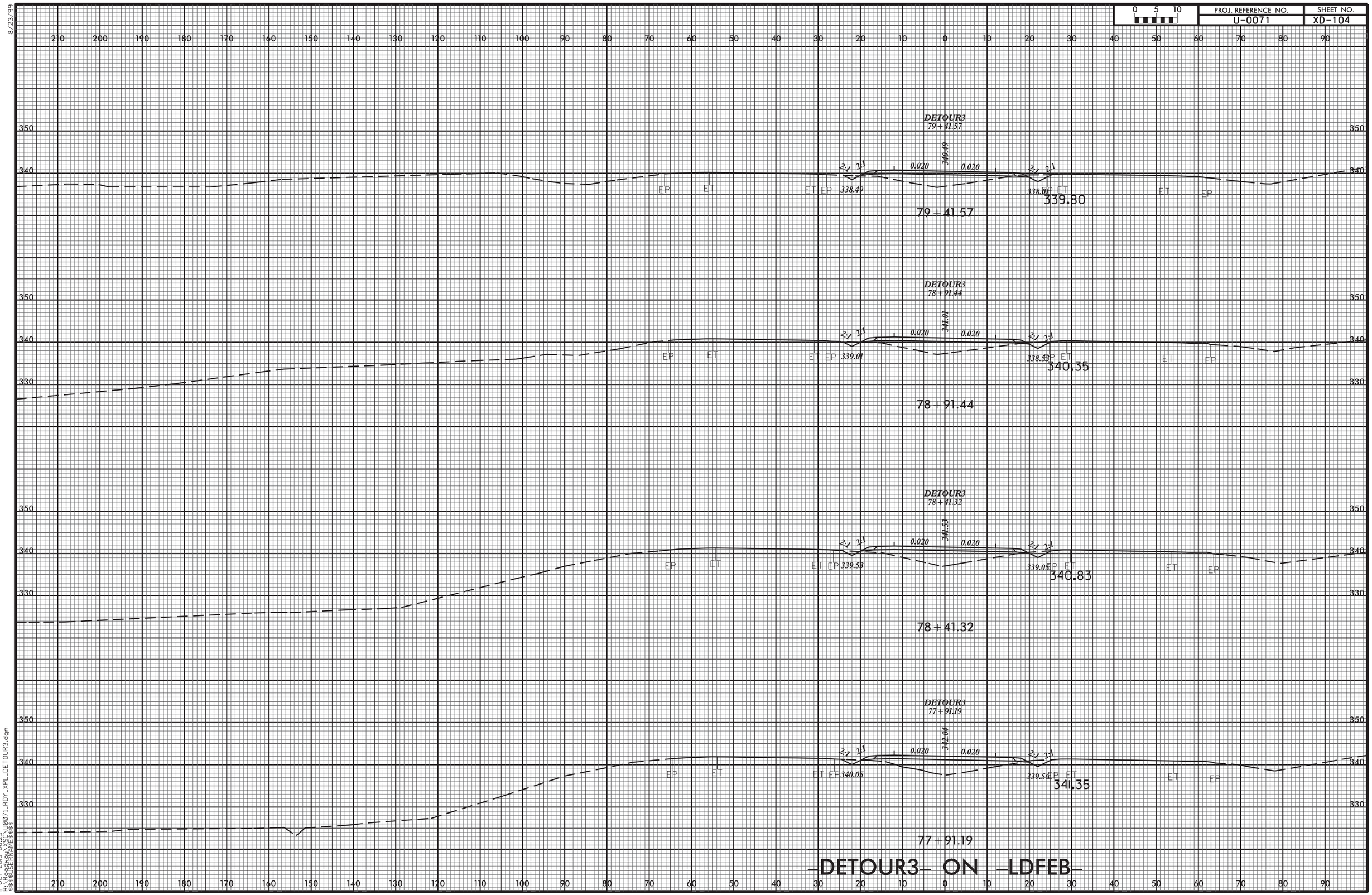
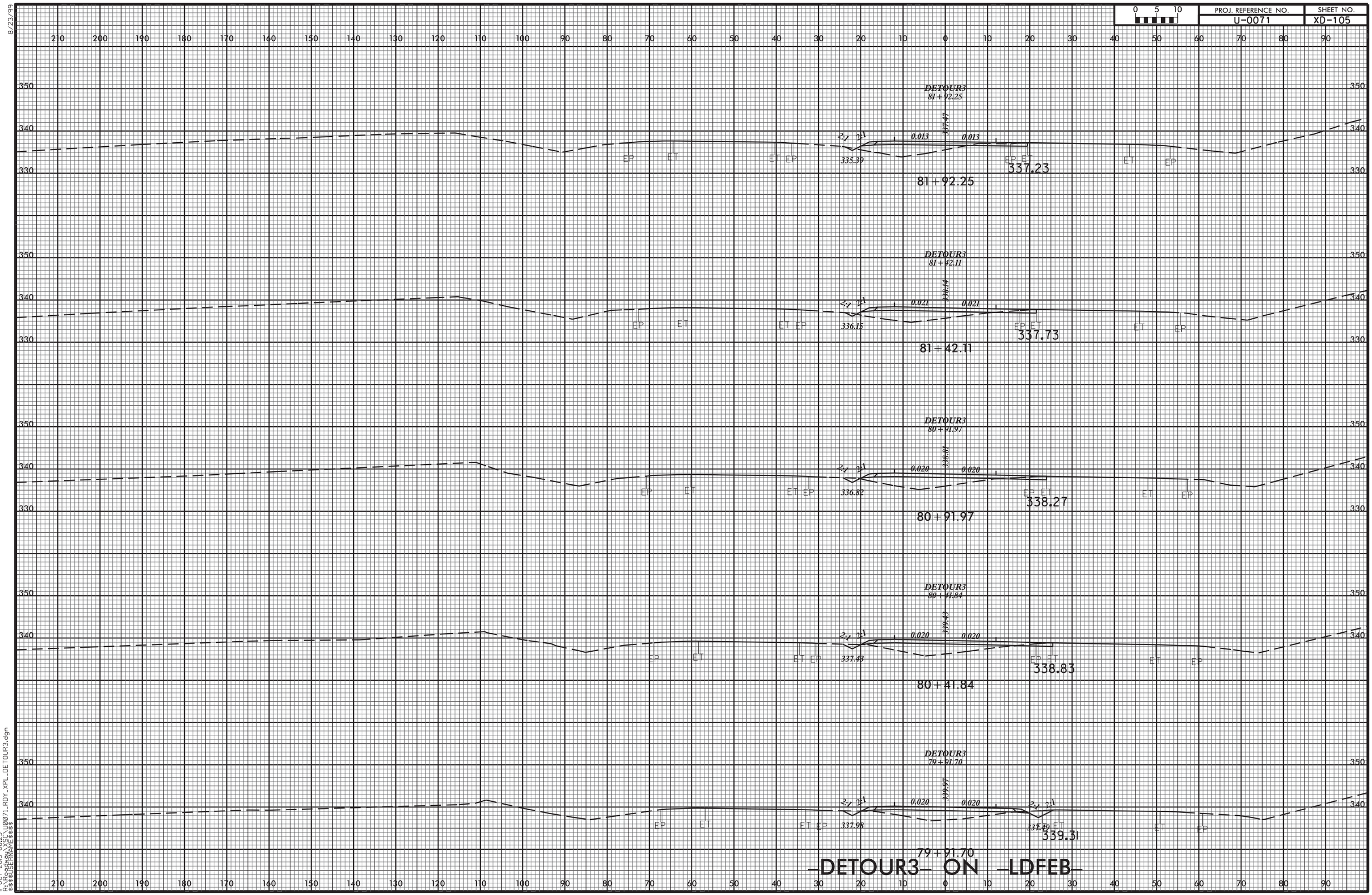

0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-104
DETOUR3
79+41.57
340.49
0.020
0.020
2:1
338.49
338.60
339.80
79+41.57
DETOUR3
78+91.44
341.01
339.01
338.53
340.35
78+91.44
DETOUR3
78+41.32
341.53
339.58
339.05
340.83
78+41.32
DETOUR3
77+91.19
342.04
340.05
339.56
341.35
77+91.19
-DETOUR3- ON -LDFEB-
8/23/99
11-OCT-2013 08:23
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-105 |




—DETOUR3— ON —LDFEB—

11-OCT-2013 08:23
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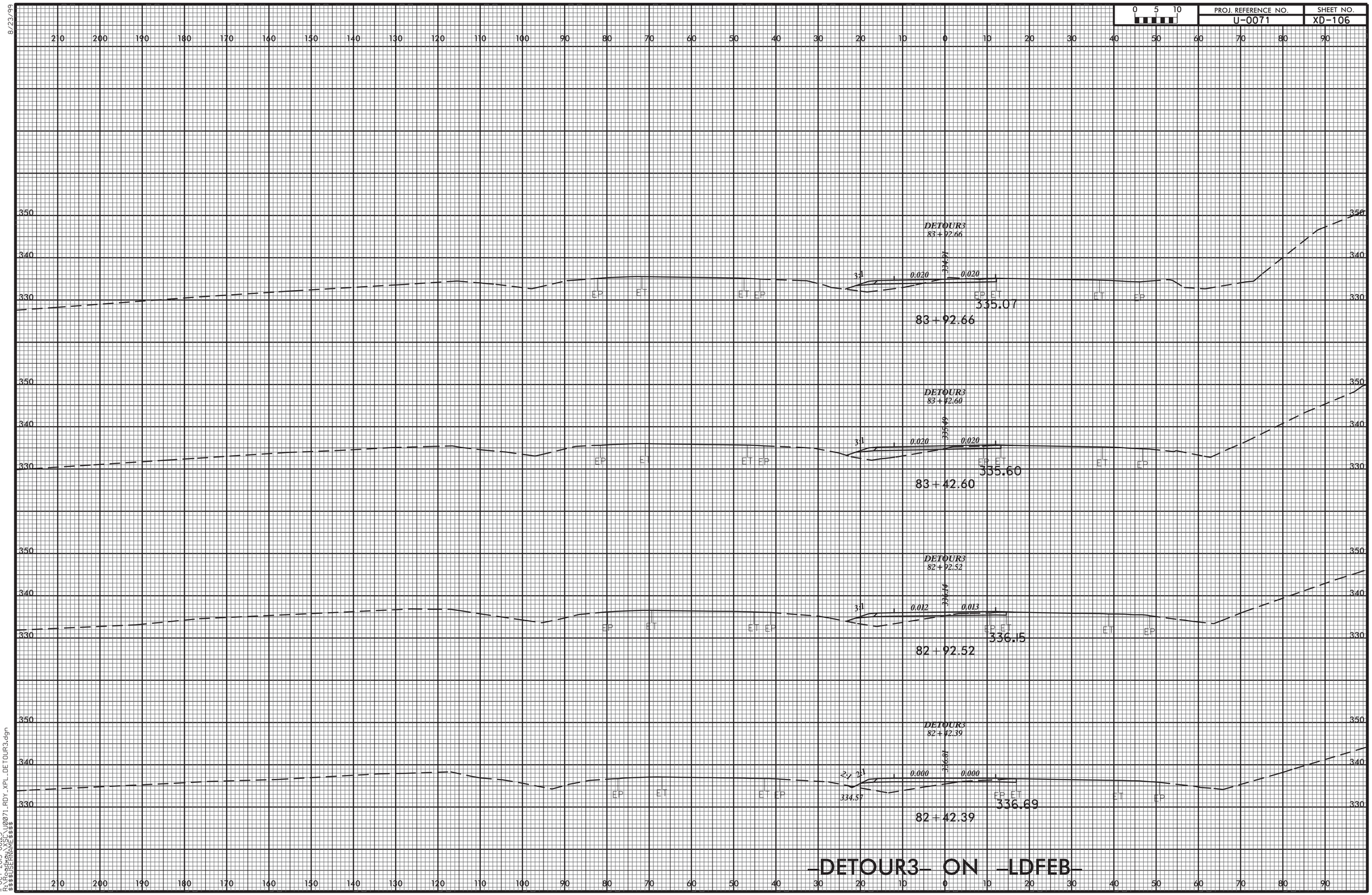


8/23/99

11-OCT-2013 08:23
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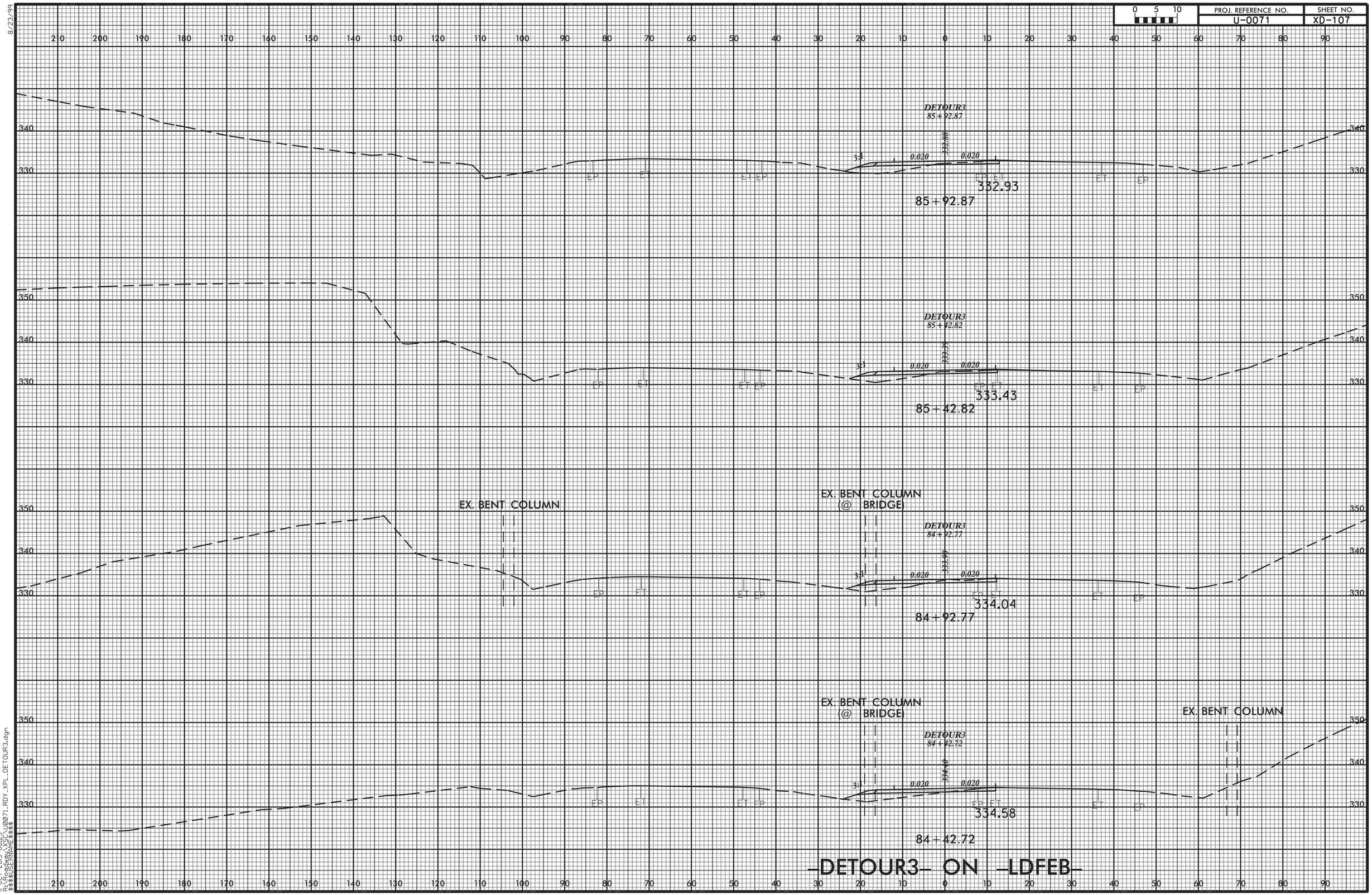
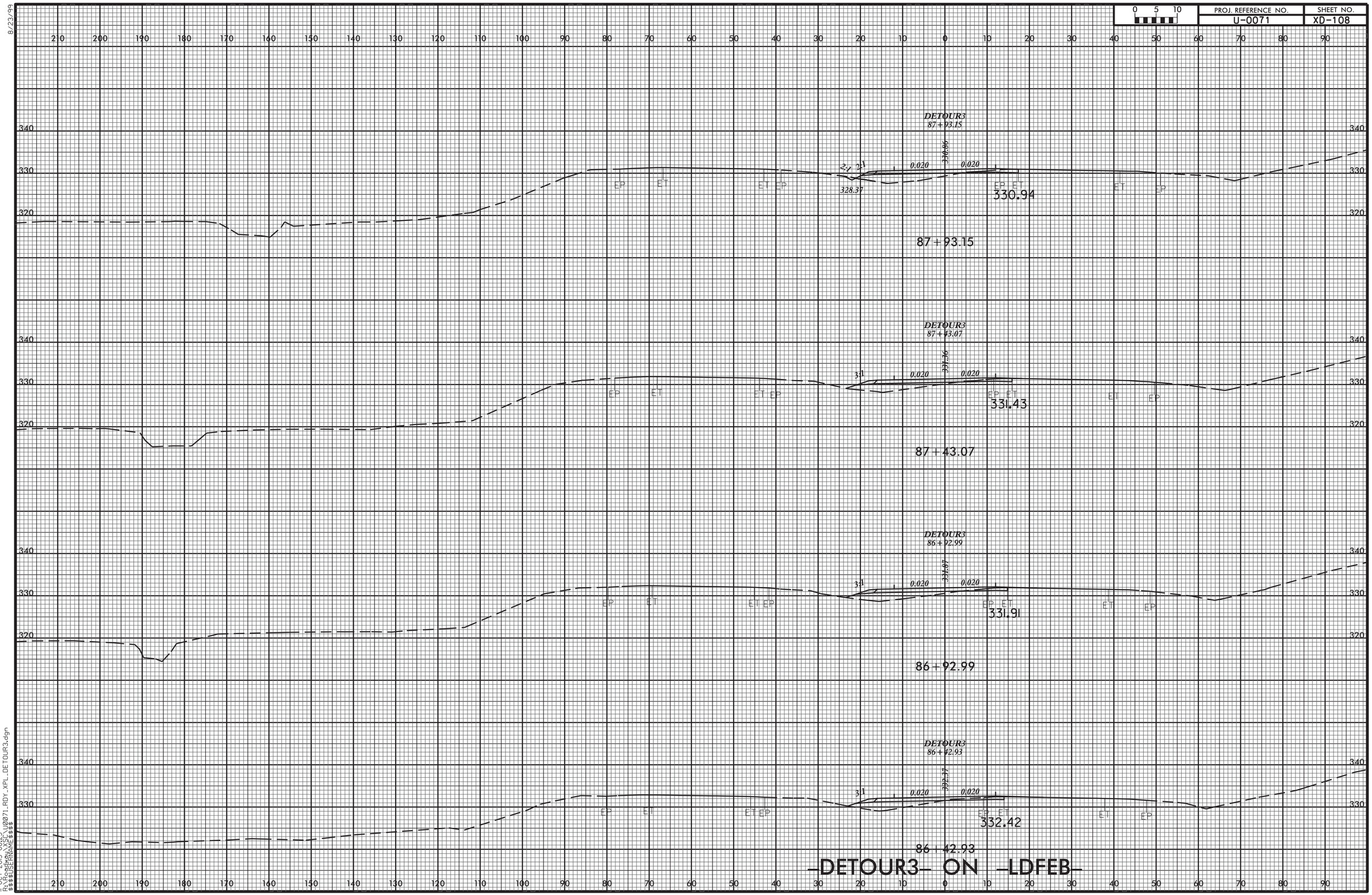

0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-107
DETOUR3
85+92.87
332.88
0.020
0.020
3:1
332.93
85+92.87
DETOUR3
85+42.82
333.34
0.020
0.020
3:1
333.43
85+42.82
EX. BENT COLUMN
EX. BENT COLUMN
(@ BRIDGE)
DETOUR3
84+92.77
332.99
0.020
0.020
3:1
334.04
84+92.77
EX. BENT COLUMN
(@ BRIDGE)
EX. BENT COLUMN
DETOUR3
84+42.72
334.46
0.020
0.020
3:1
334.58
84+42.72
EP
ET
-DETOUR3- ON -LDFEB-
8/23/99
11-OCT-2013 08:23
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-108 |




-DETOUR3- ON -LDFEB-

11-OCT-2013 08:23
R:\Roadway\X\U0071_RDY_XPL_DETOUR3.dgn
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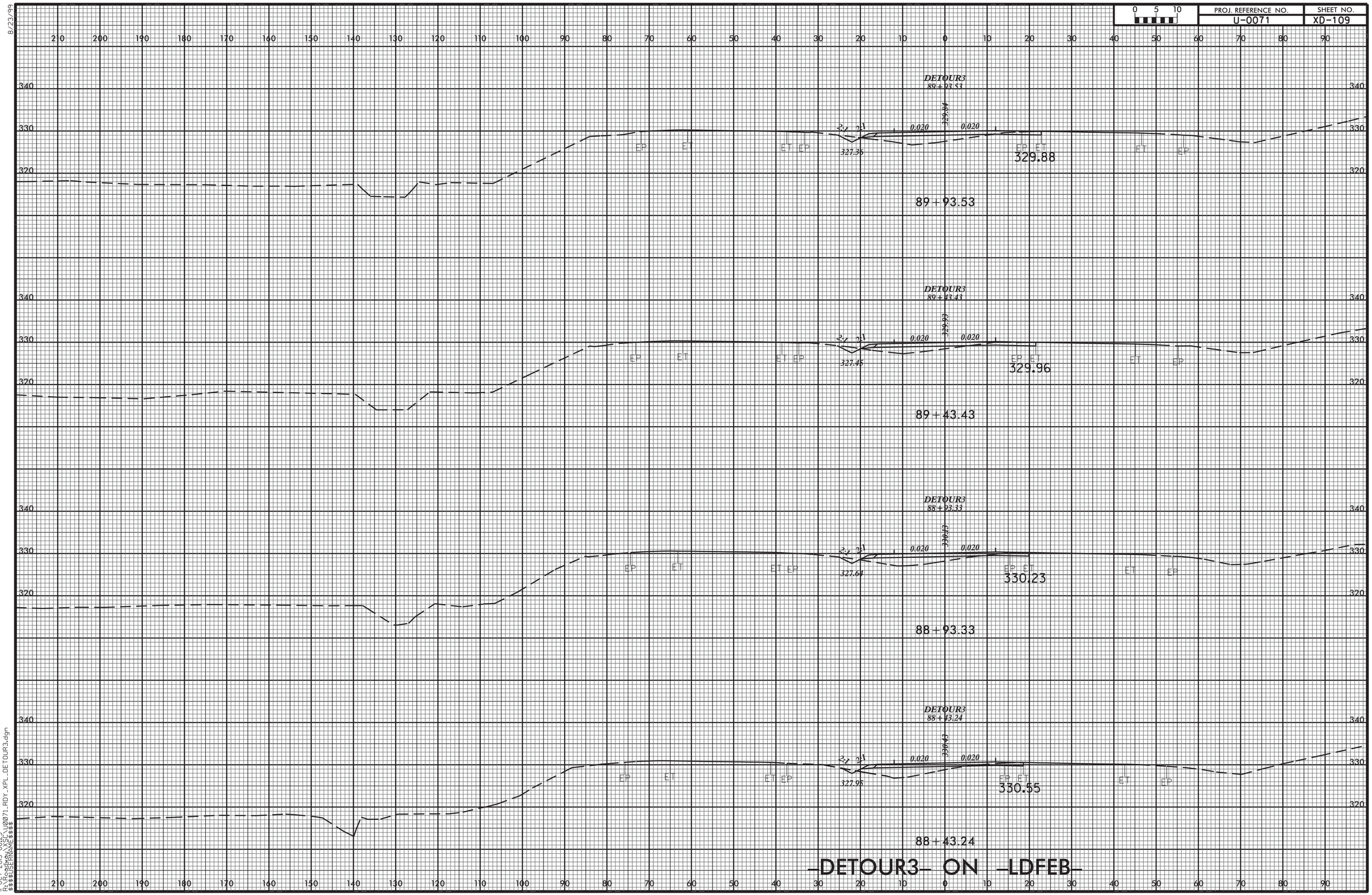
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-109 |




-DETOUR3- ON -LDFEB-

11-OCT-2013 08:23
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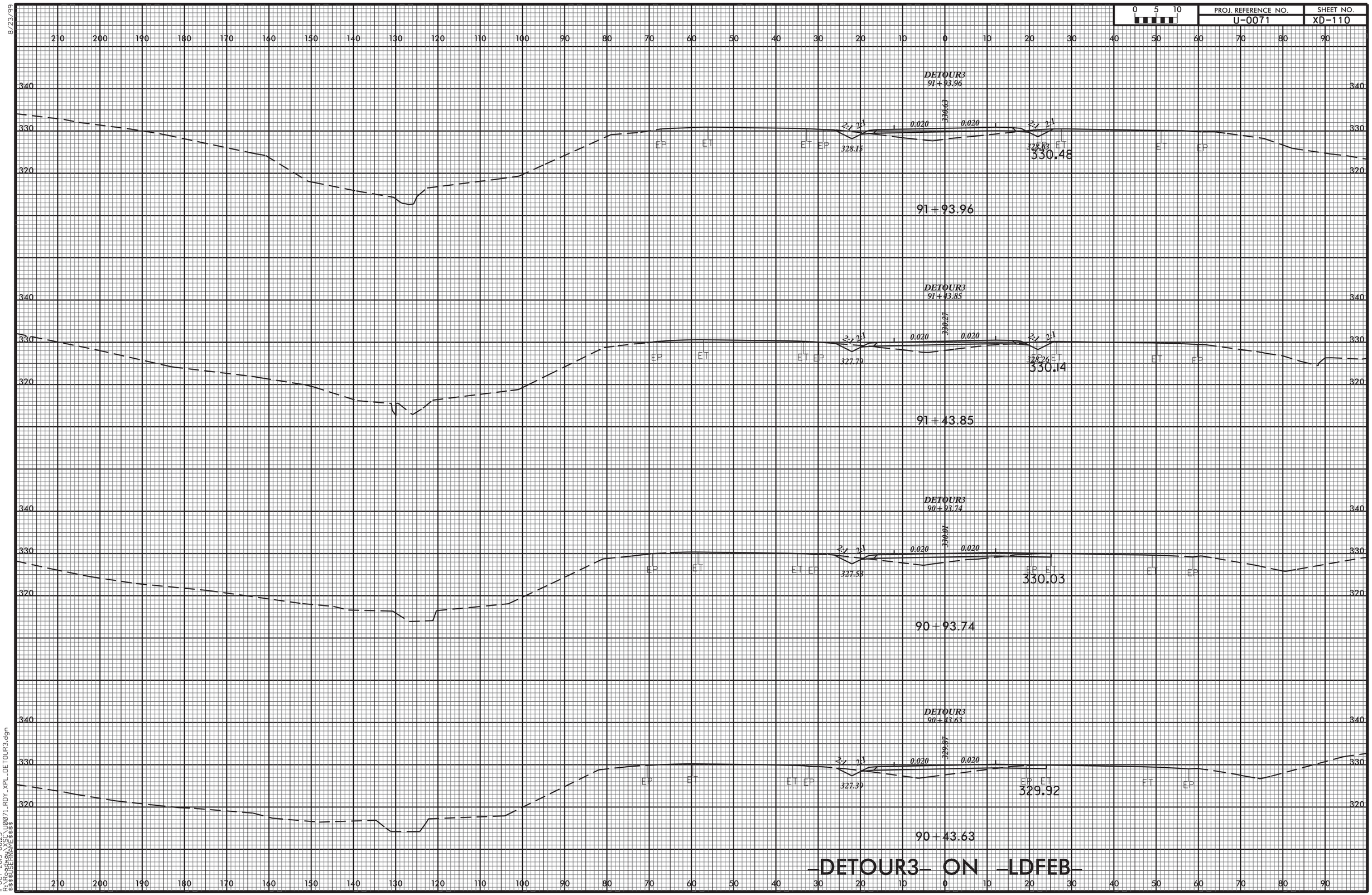


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11-OCT-2013 08:23
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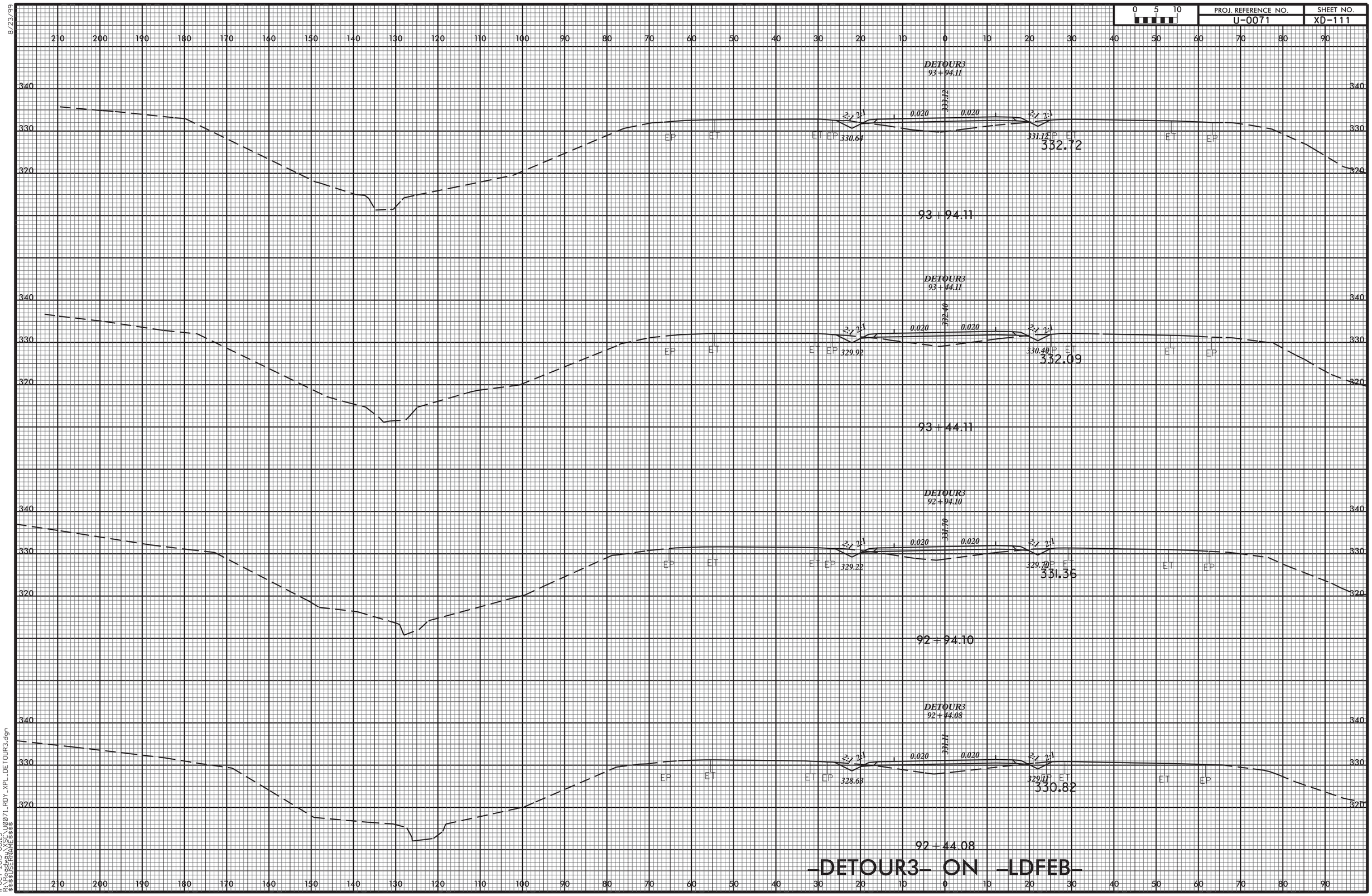
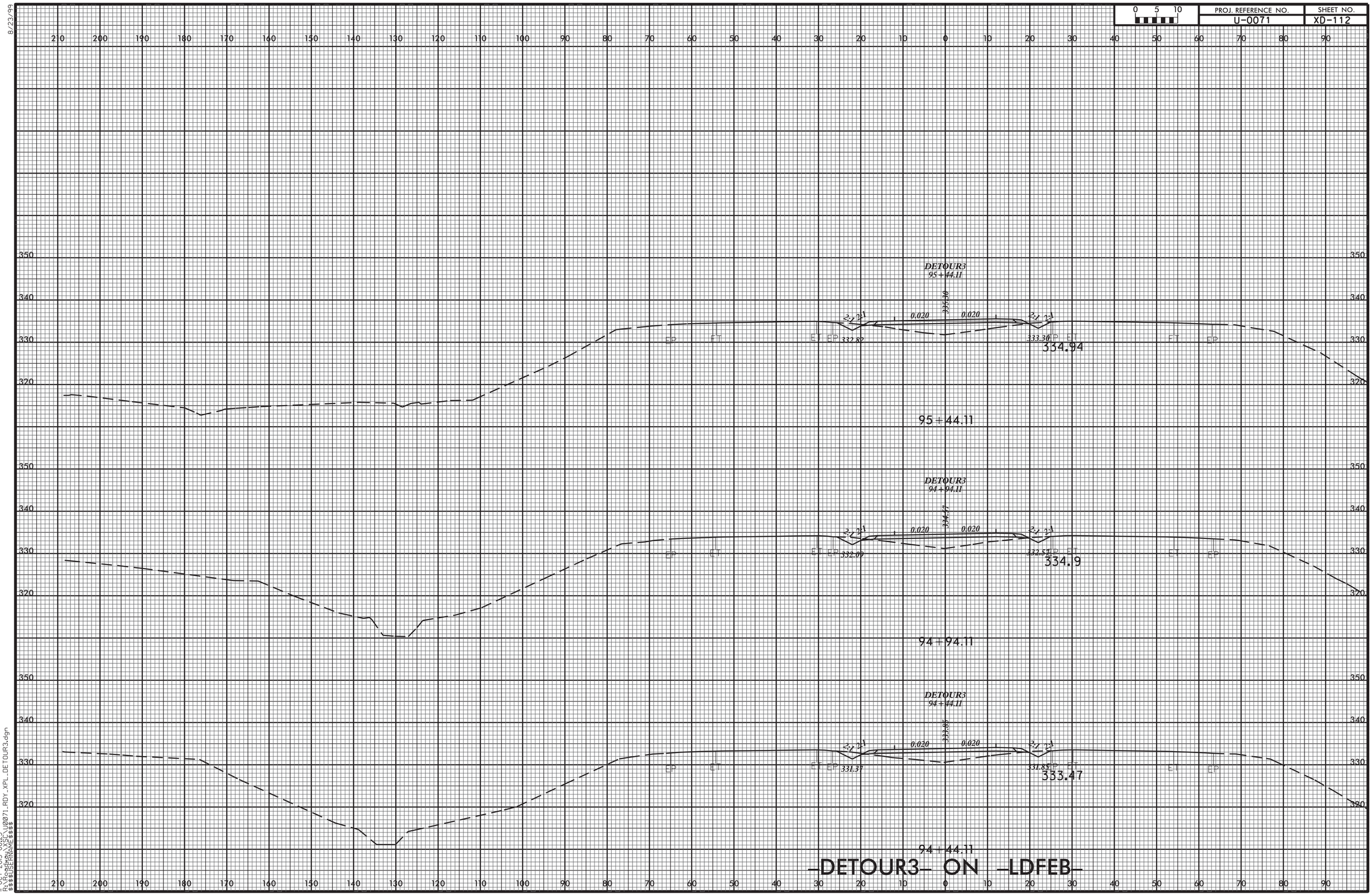

PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-111
DETOUR3
93+94.11
332.72
330.64
331.12
93+94.11
DETOUR3
93+44.11
332.09
329.92
330.40
93+44.11
DETOUR3
92+94.10
331.36
329.22
329.70
92+94.10
DETOUR3
92+44.08
330.82
328.68
329.11
92+44.08
0.020
2:1
EP
ET
-DETOUR3- ON -LDFEB-
8/23/99
11-OCT-2013 08:23
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-112 |

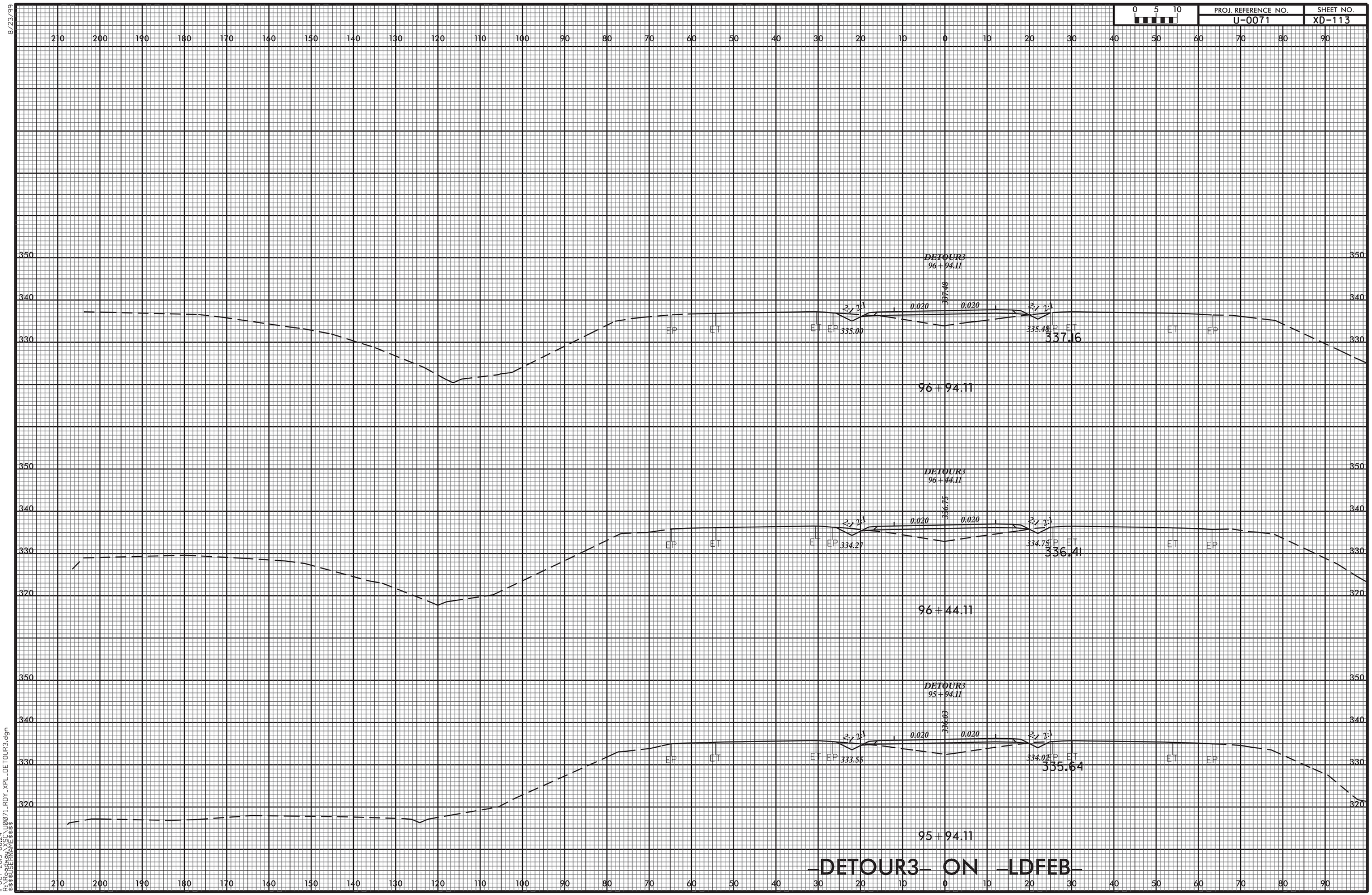



–DETOUR3– ON –LDFEB–

11-OCT-2013 08:23
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-113 |




-DETOUR3- ON -LDFEB-

11-OCT-2013 08:24
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
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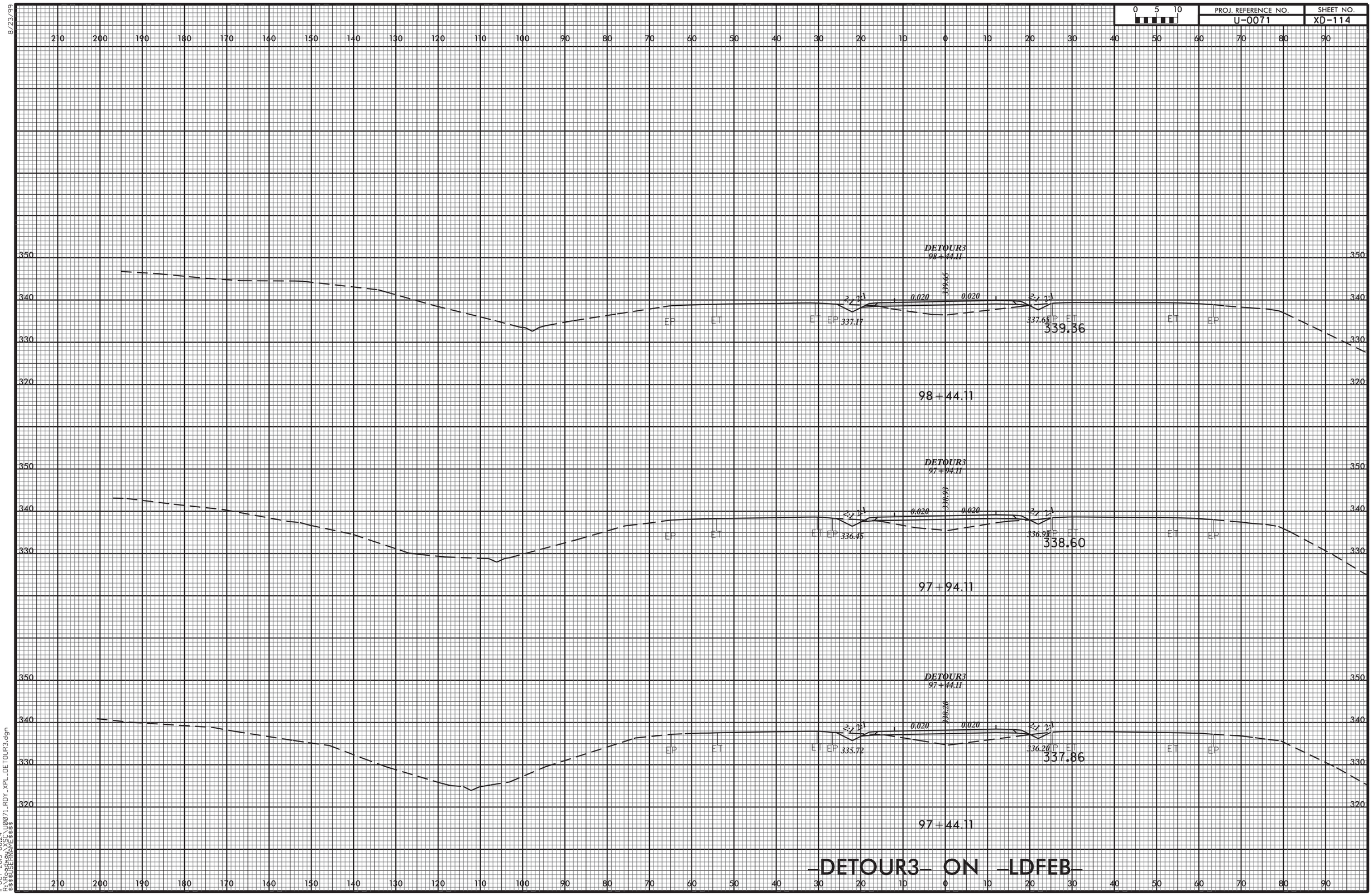
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-114 |




11-OCT-2013 08:24
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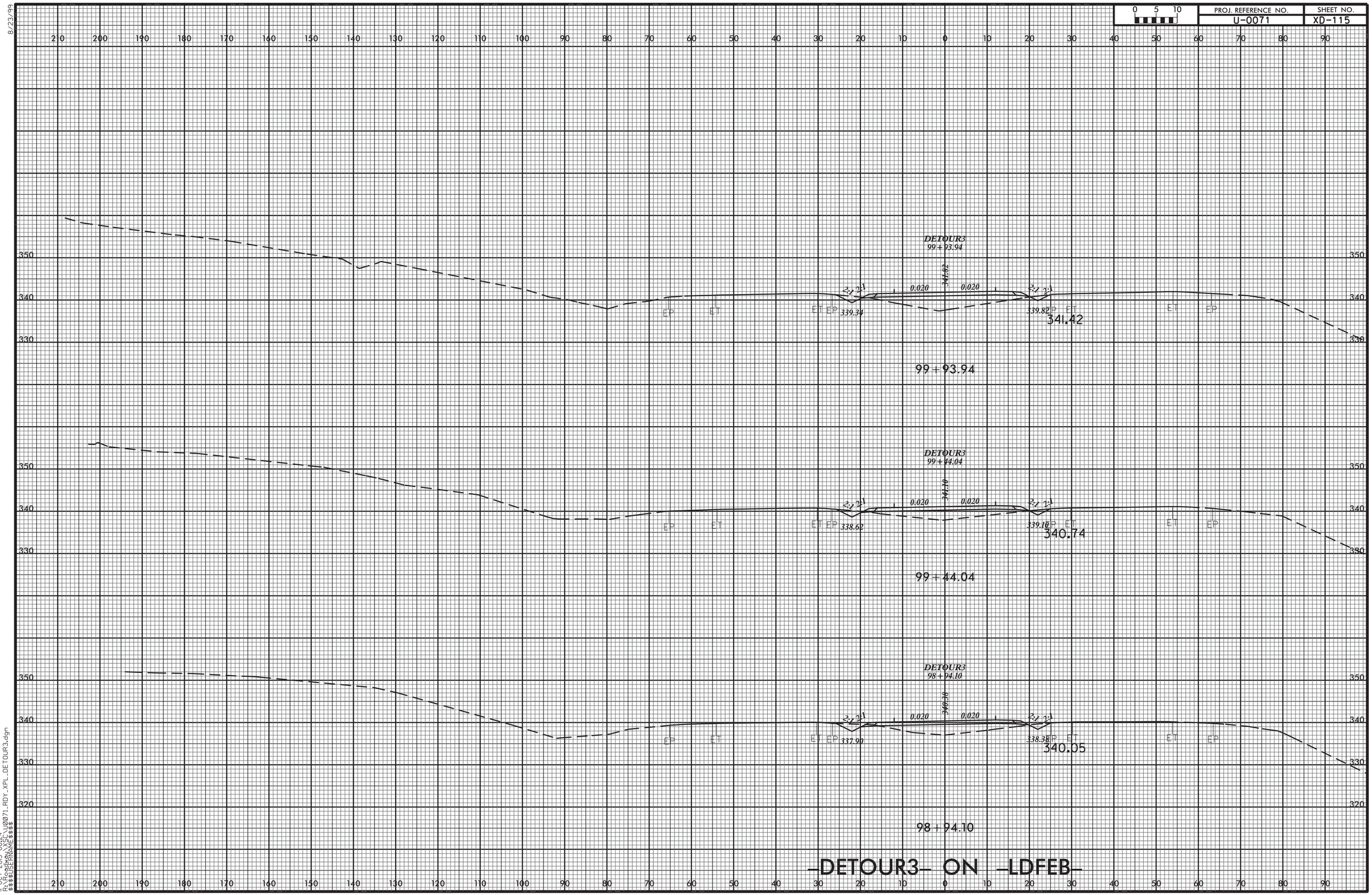
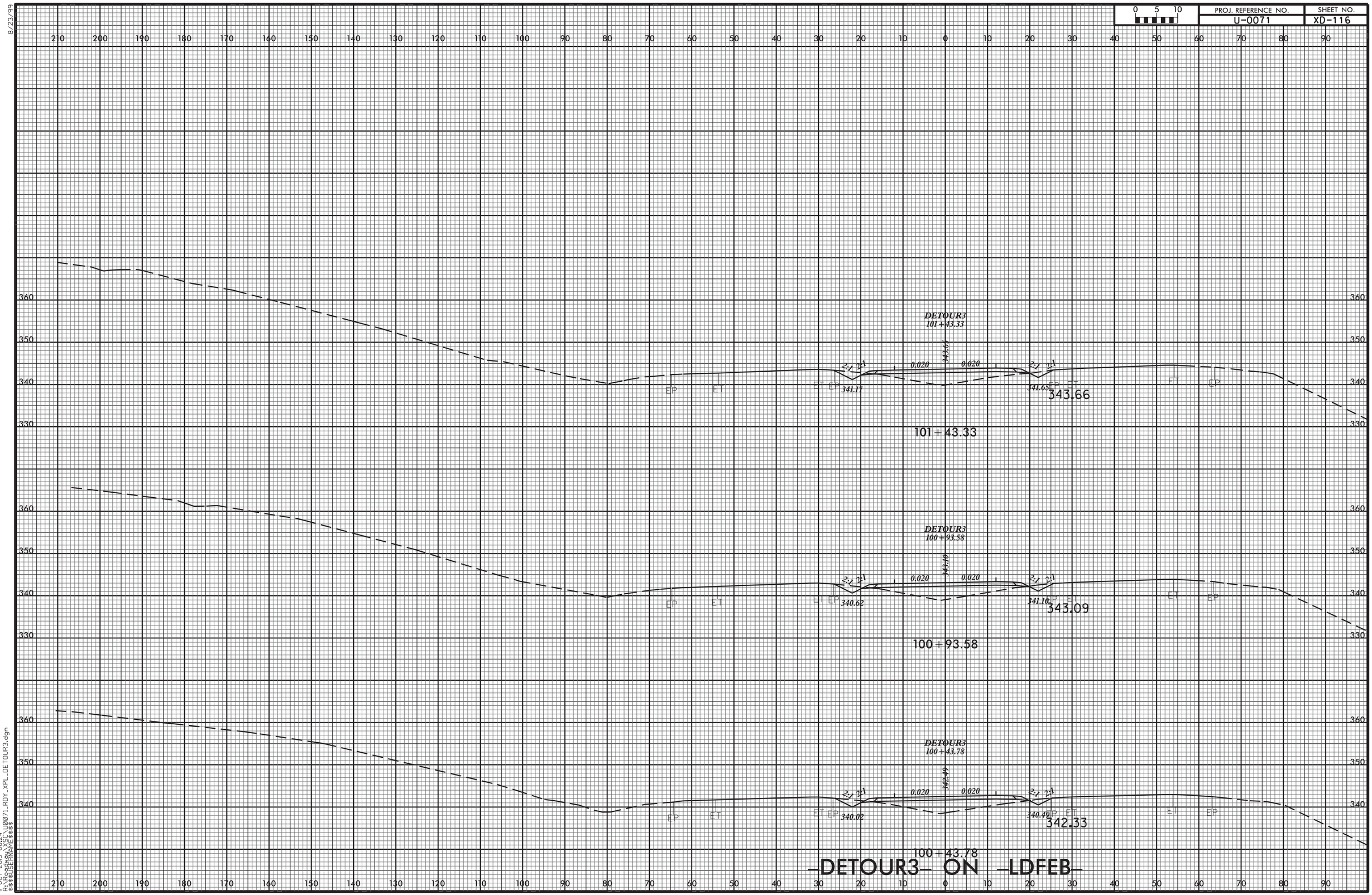

0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-115
DETOUR3
99+93.94
341.02
0.020
0.020
2:1
2:1
339.34
339.82
341.42
99+93.94
DETOUR3
99+44.04
341.10
0.020
0.020
2:1
2:1
338.62
339.10
340.74
99+44.04
DETOUR3
98+94.10
340.98
0.020
0.020
2:1
2:1
337.90
338.38
340.05
98+94.10
ET EP
-DETOUR3- ON -LDFEB-
11-OCT-2013 08:24
R:\Roadway\SEC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$
8/23/99

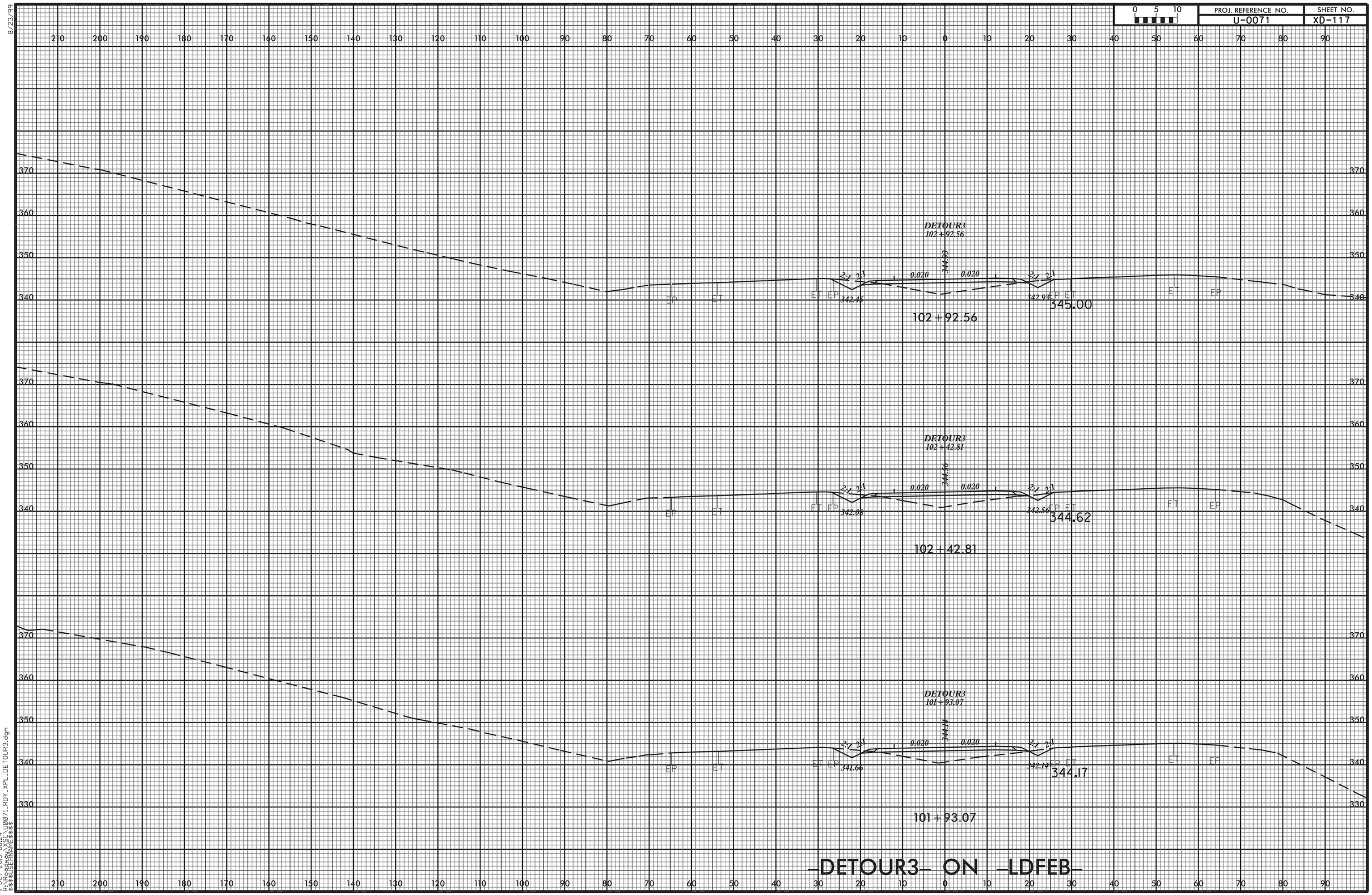
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-116 |

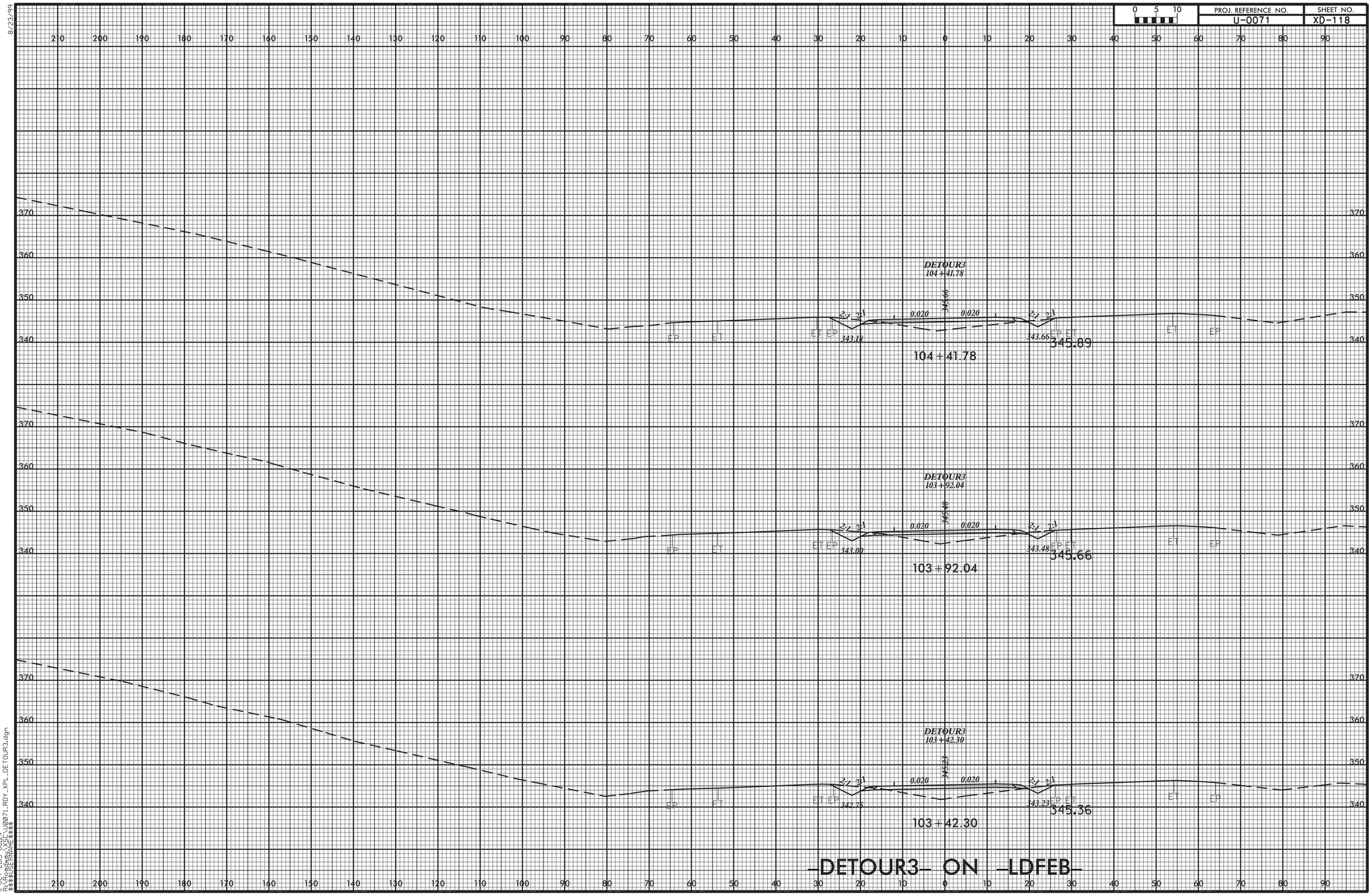



-DETOUR3- ON -LDFEB-

11-OCT-2013 08:24
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$


PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-117
0 5 10
DETOUR3
102+92.56
0.020
0.020
342.45
342.93
345.00
102+92.56
DETOUR3
102+42.81
0.020
0.020
342.08
342.56
344.62
102+42.81
DETOUR3
101+93.07
0.020
0.020
341.66
342.14
344.17
101+93.07
-DETOUR3- ON -LDFEB-
11-OCT-2013 08:24
R:\Roadway\SEC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$
8/23/99

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | XD-118 |




-DETOUR3- ON -LDFEB-

8/23/99

11-OCT-2013 08:24
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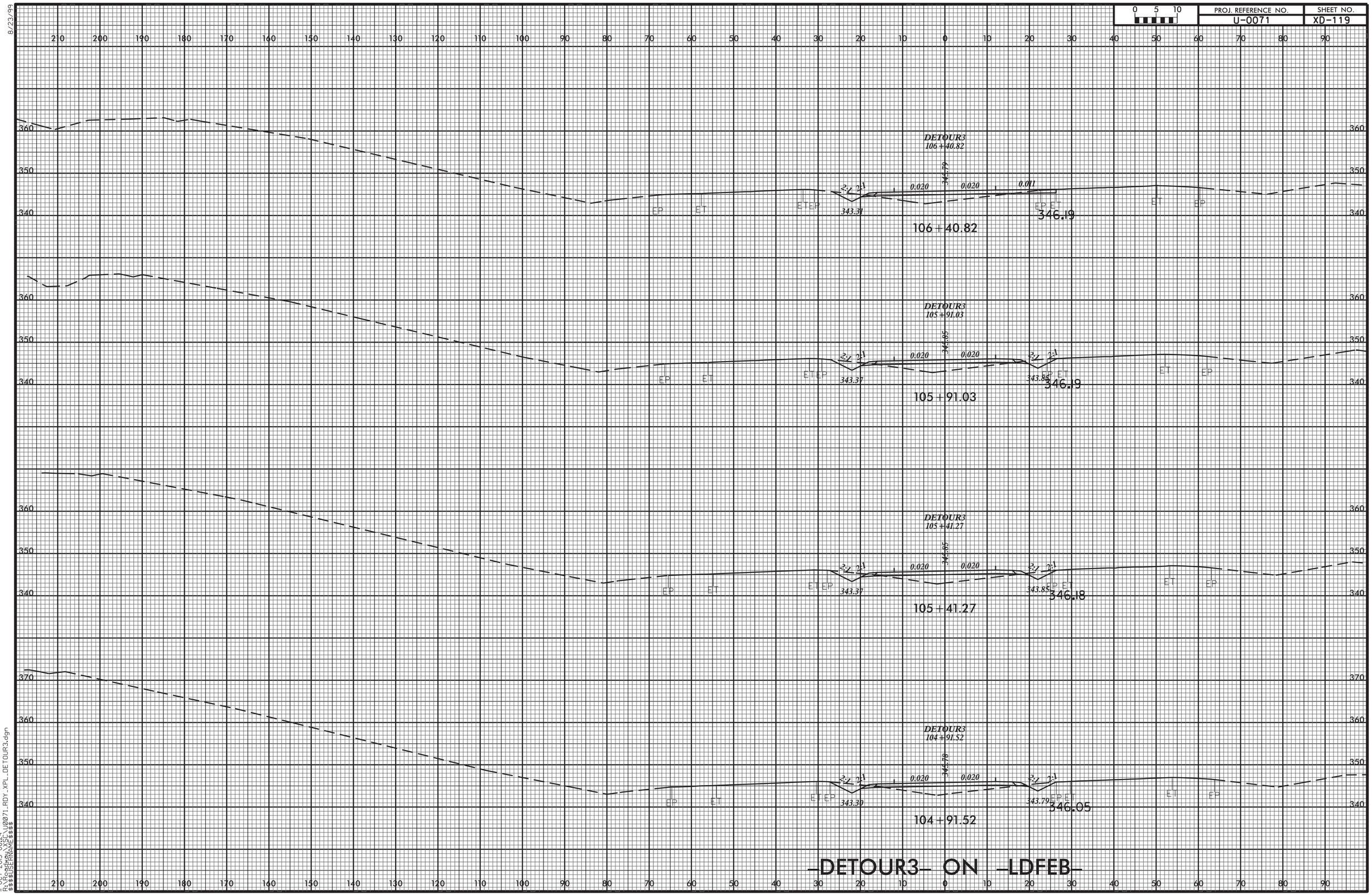


8/23/99

11-OCT-2013 08:24
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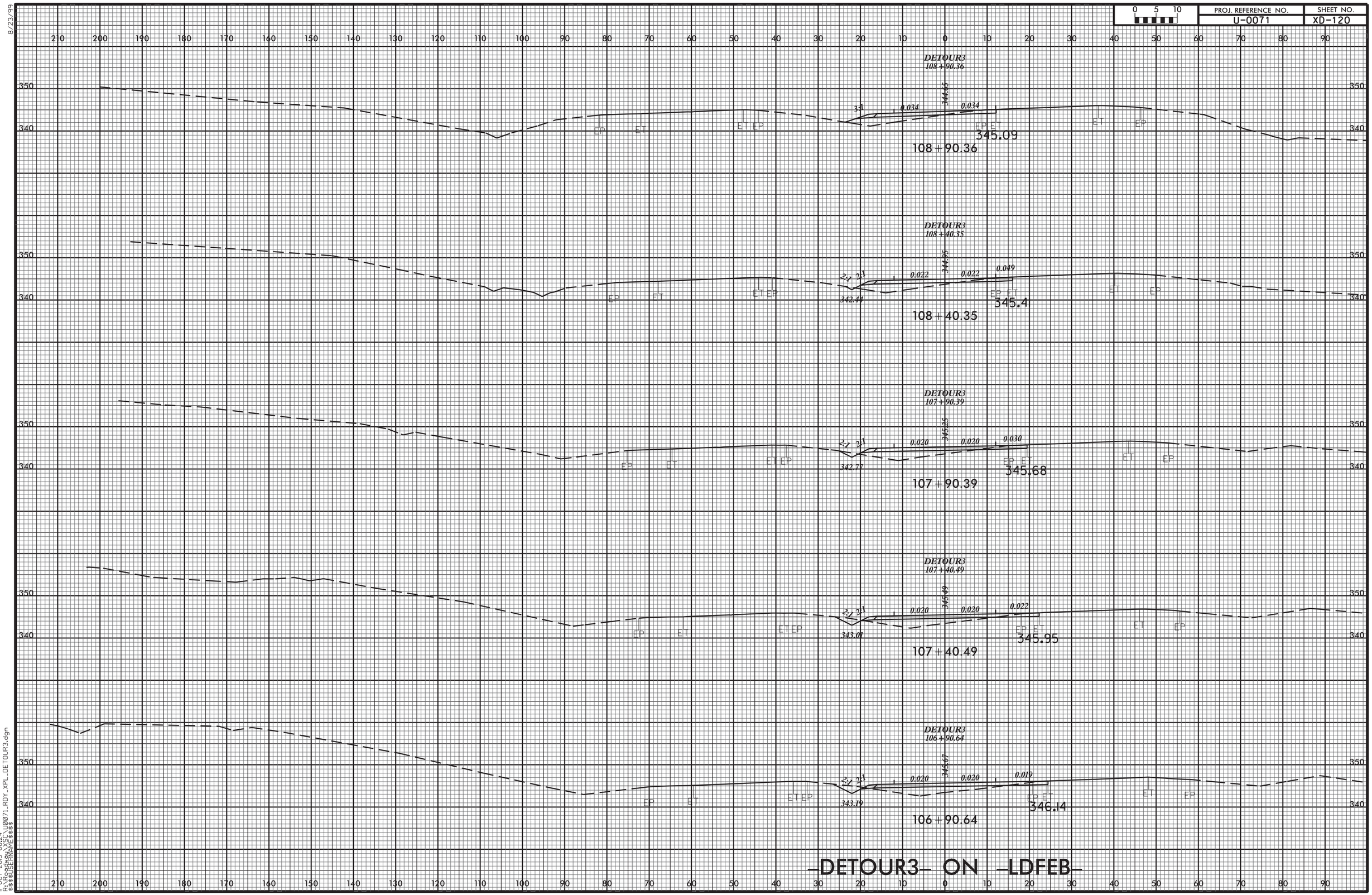


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11-OCT-2013 08:24
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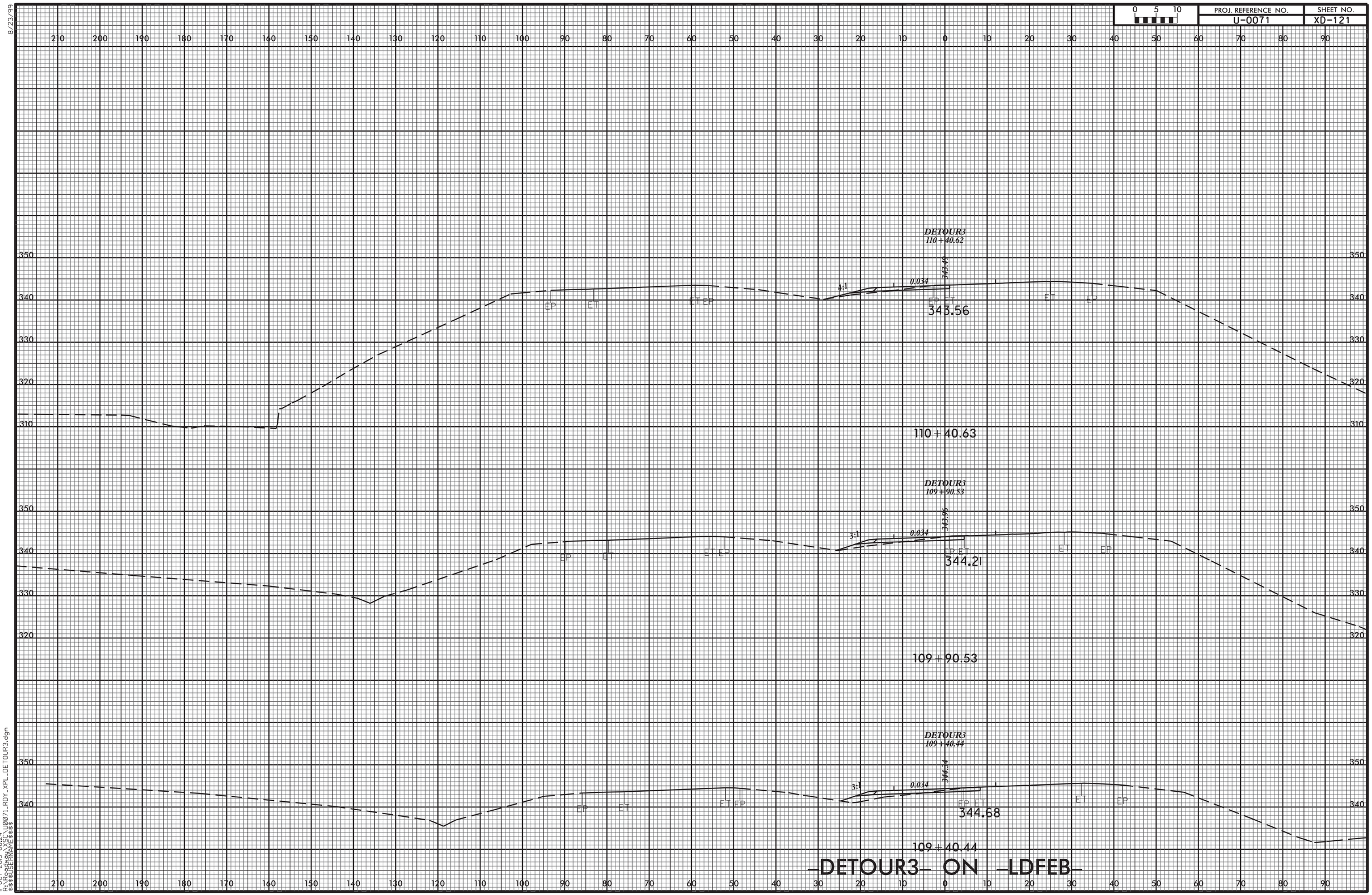
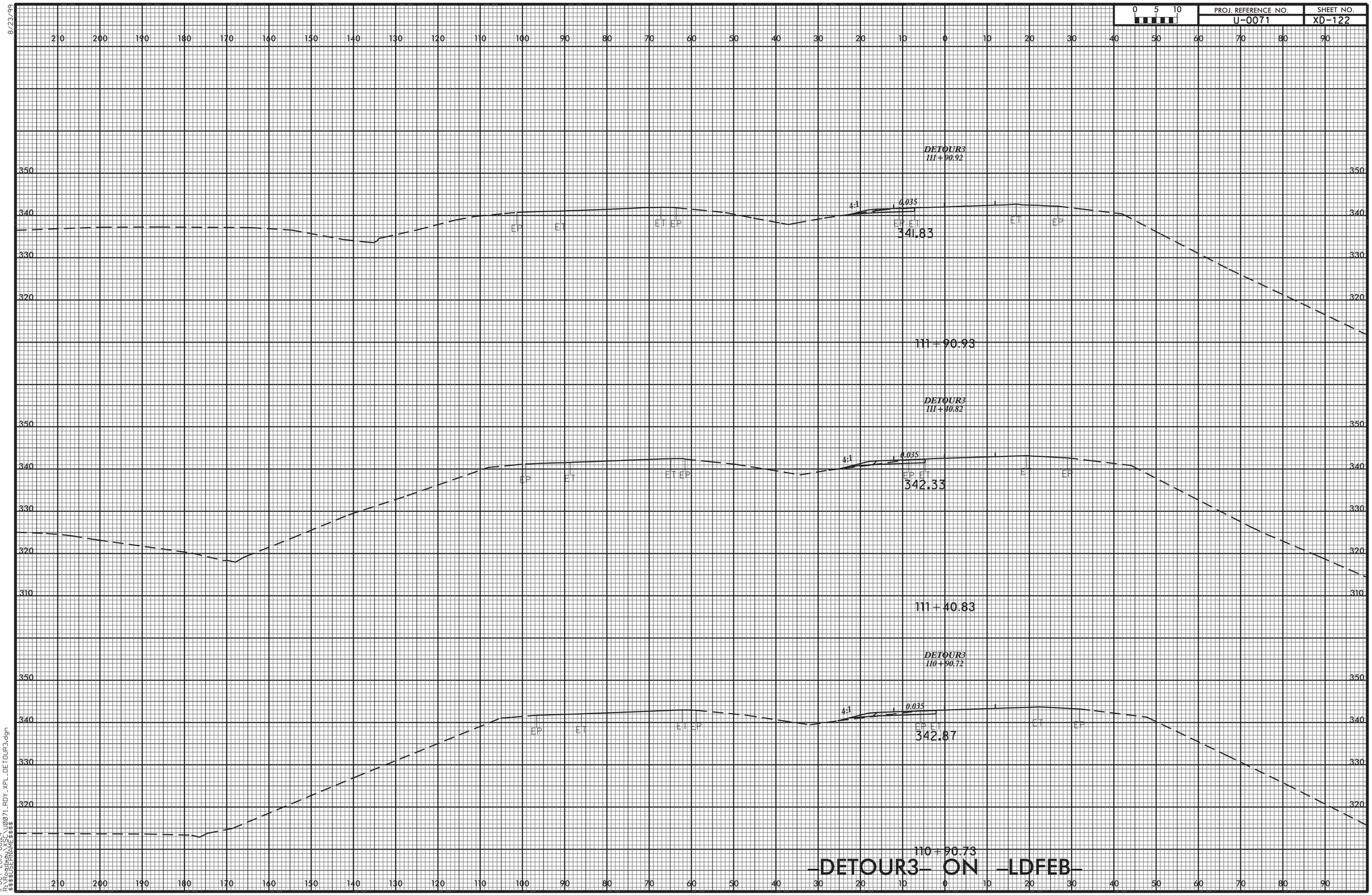
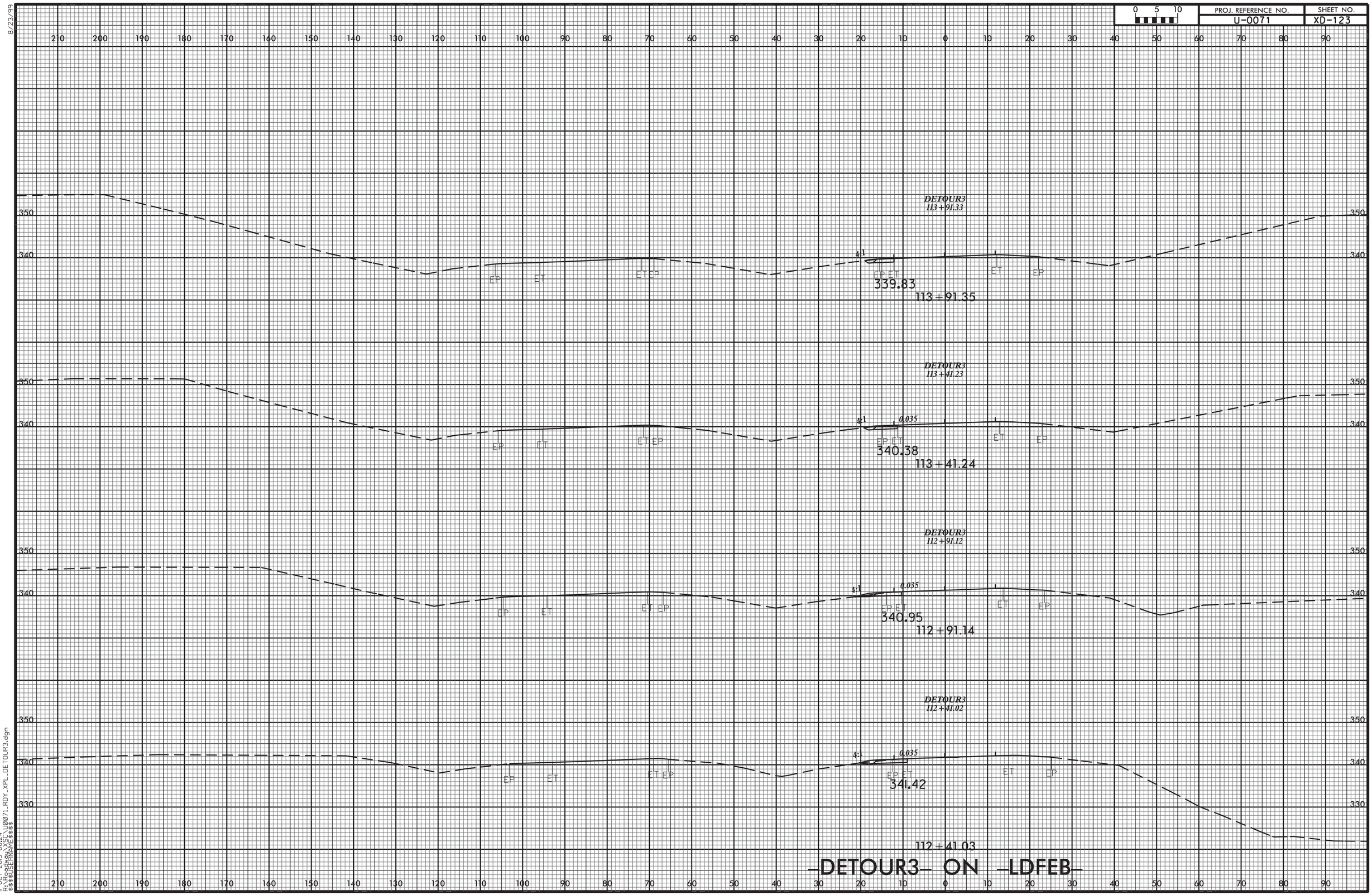

0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-121
DETOUR3
110+40.62
343.46
0.034
3:1
343.56
110+40.63
DETOUR3
109+90.53
343.96
0.034
3:1
344.21
109+90.53
DETOUR3
109+40.44
344.34
0.034
3:1
344.68
109+40.44
EP
ET
-DETOUR3- ON -LDFEB-
8/23/99
11-OCT-2013 08:24
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$


0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-122
DETOUR3
111+90.92
4:1
0.035
EP ET
341.83
111+90.93
DETOUR3
111+40.82
342.33
111+40.83
DETOUR3
110+90.72
342.87
110+90.73
-DETOUR3- ON -LDFEB-
8/23/99
11-OCT-2013 08:24
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-123 |

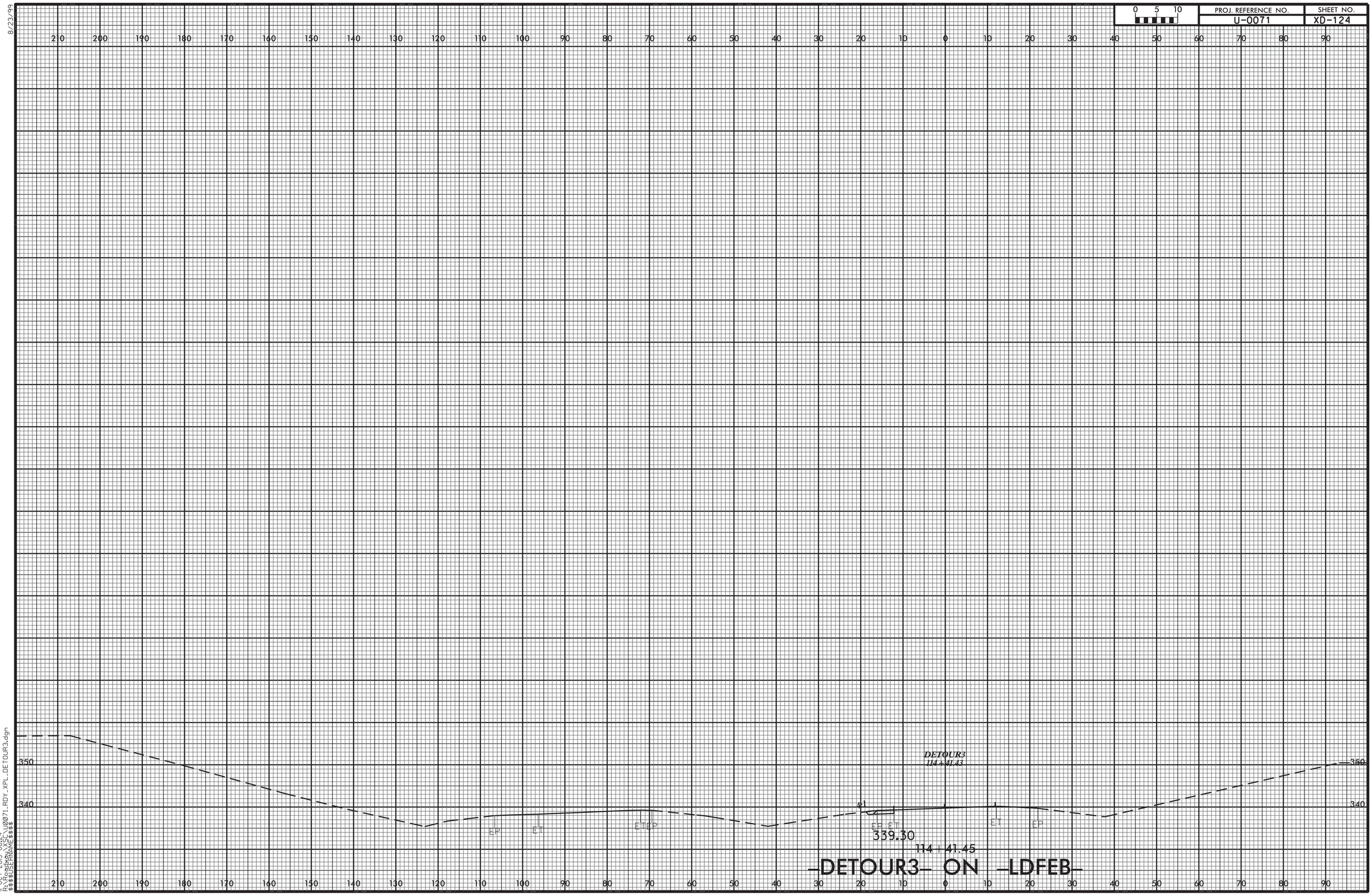



-DETOUR3- ON -LDFEB-

11-OCT-2013 08:24
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
$$$$USERNAME$$$$

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-124 |




11-OCT-2013 08:24
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3.dgn
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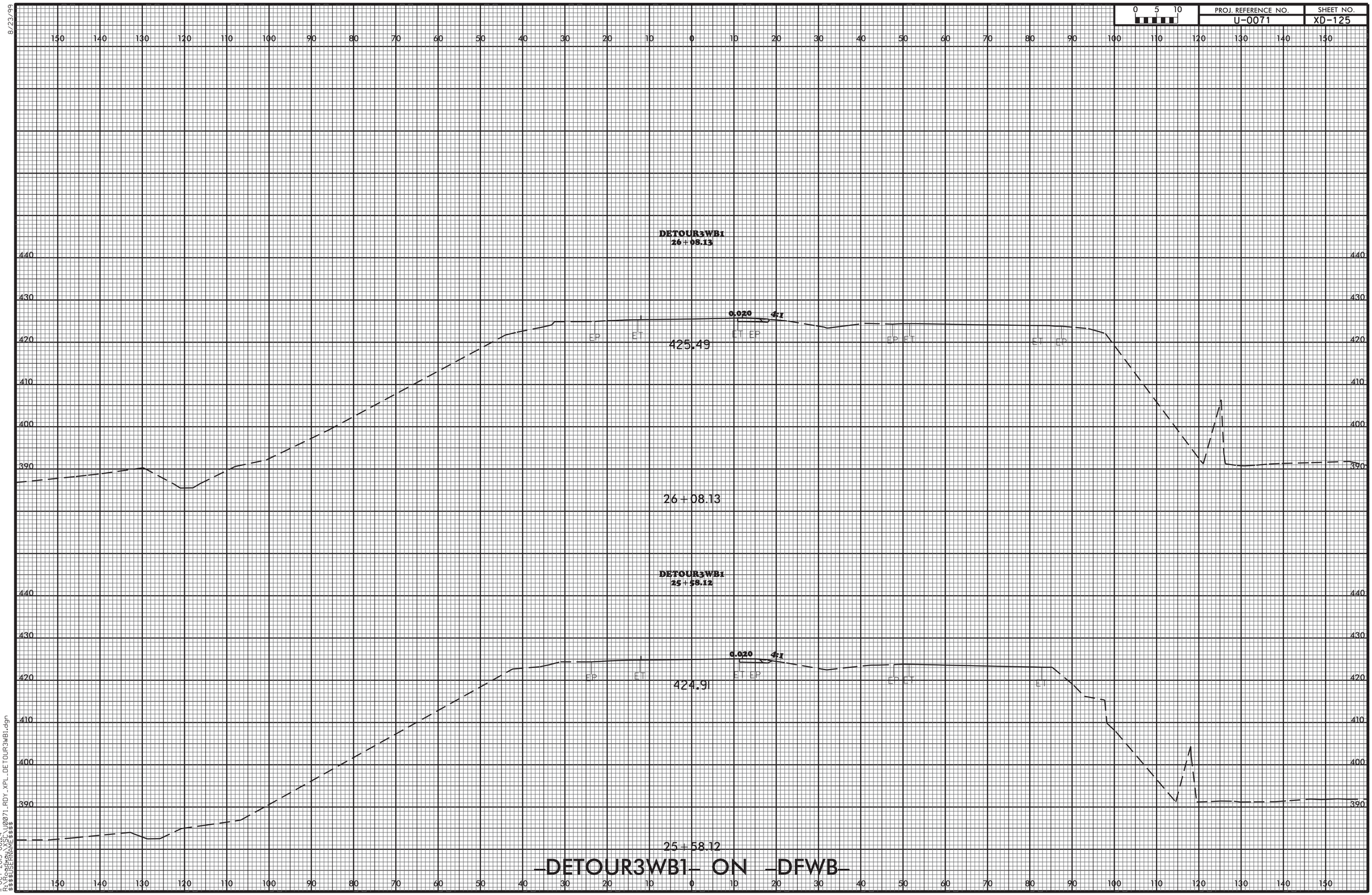
8/23/99

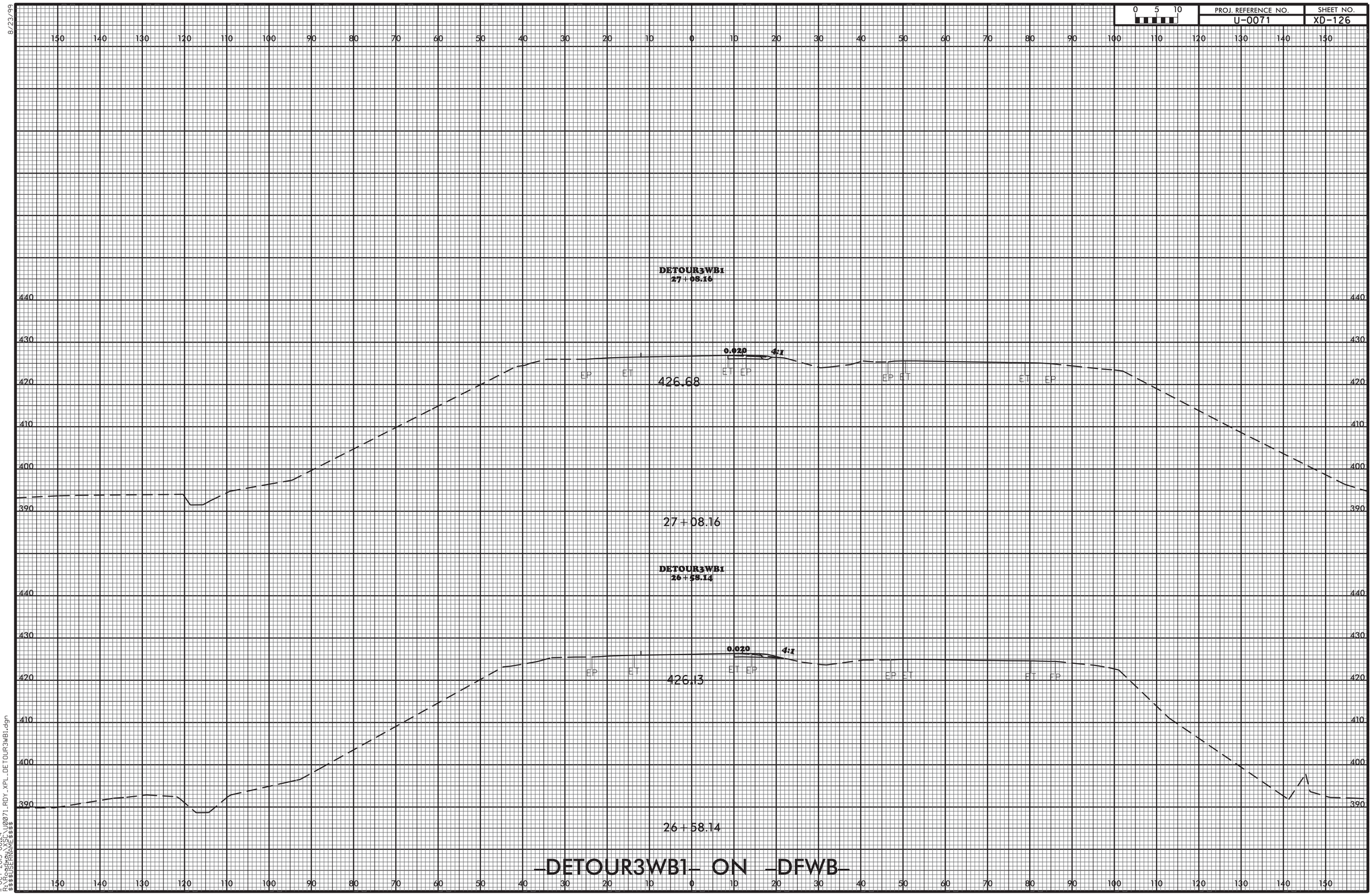
| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-125 |




11-OCT-2013 08:24
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3WB1.dgn
$$$$USERNAME$$$$

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-126 |

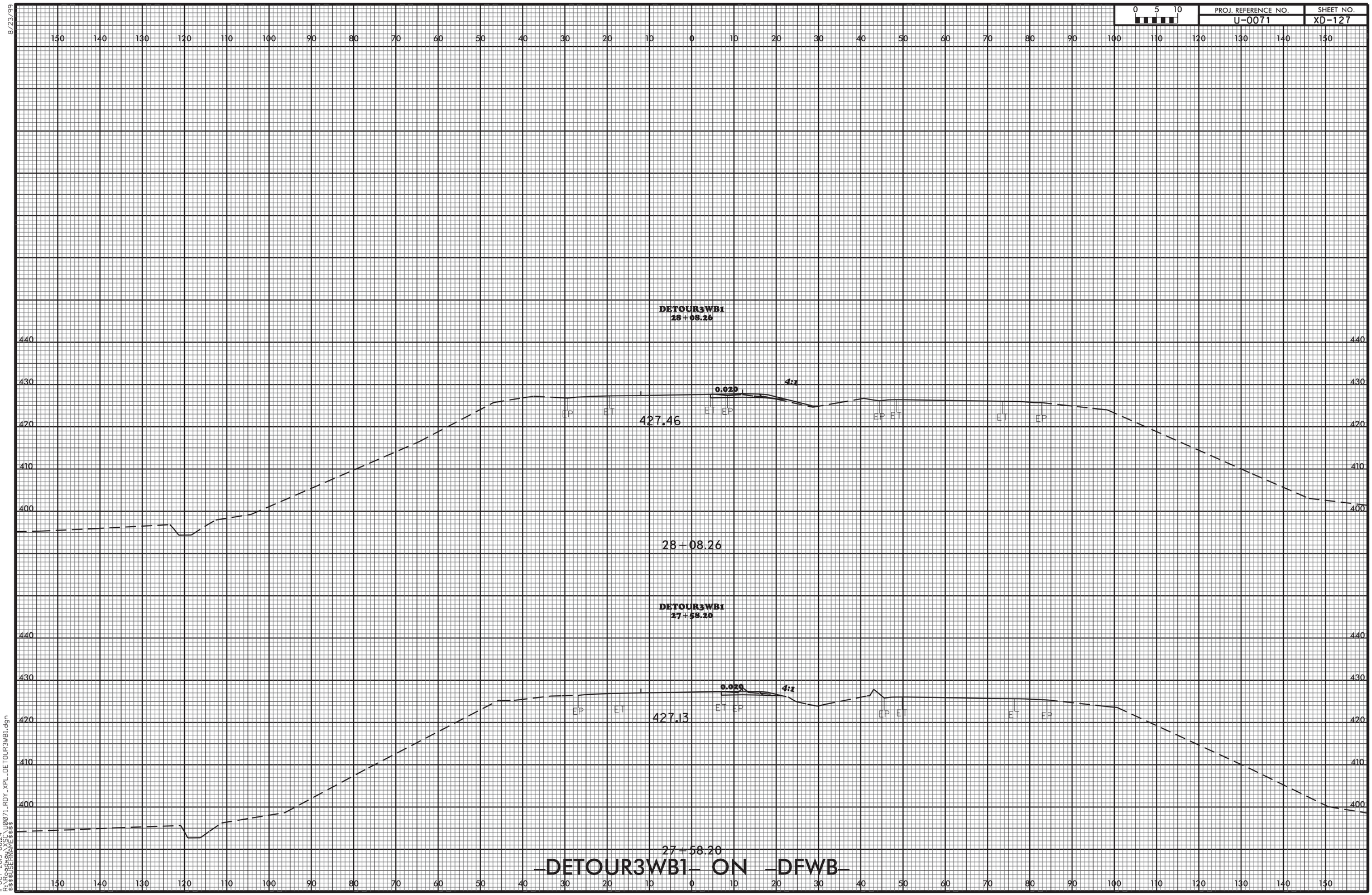



–DETOUR3WB1– ON –DFWB–

11-OCT-2013 08:24
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3WB1.dgn
$$$$USERNAME$$$$

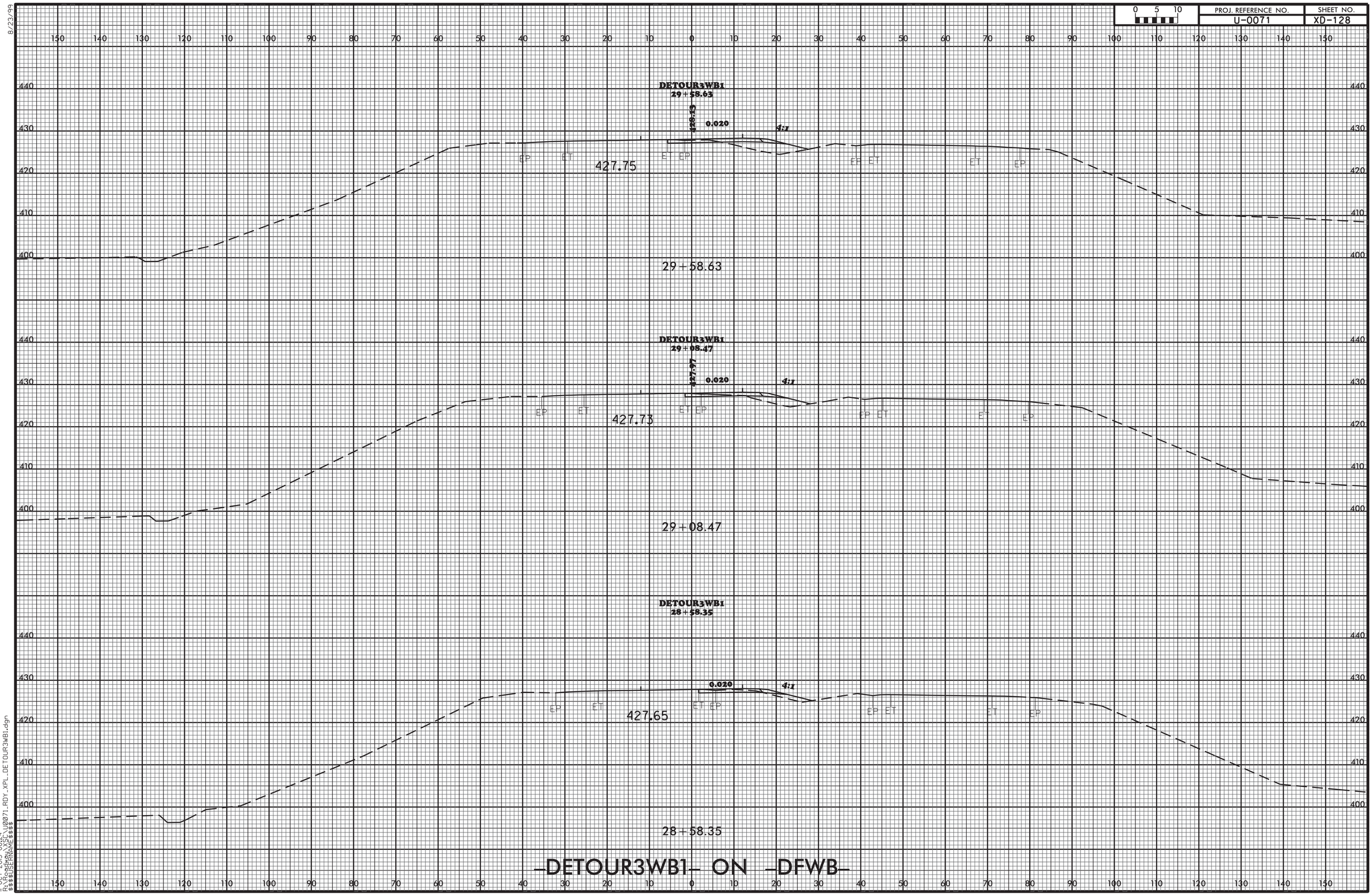
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-127 |




11-OCT-2013 08:24
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3WB1.dgn
$$$$USERNAME$$$$

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | XD-128 |




8/23/99
11-OCT-2013 08:24
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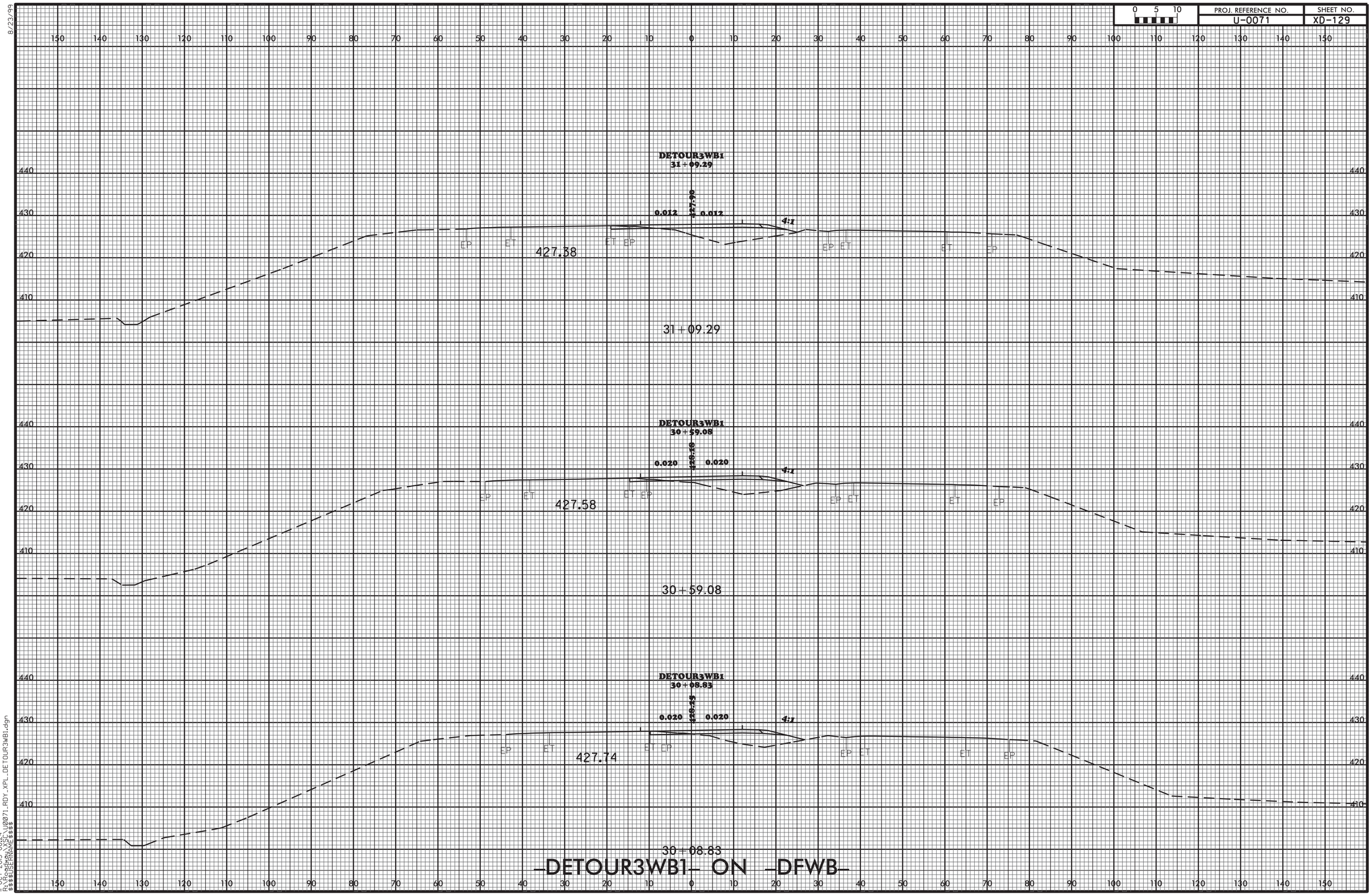
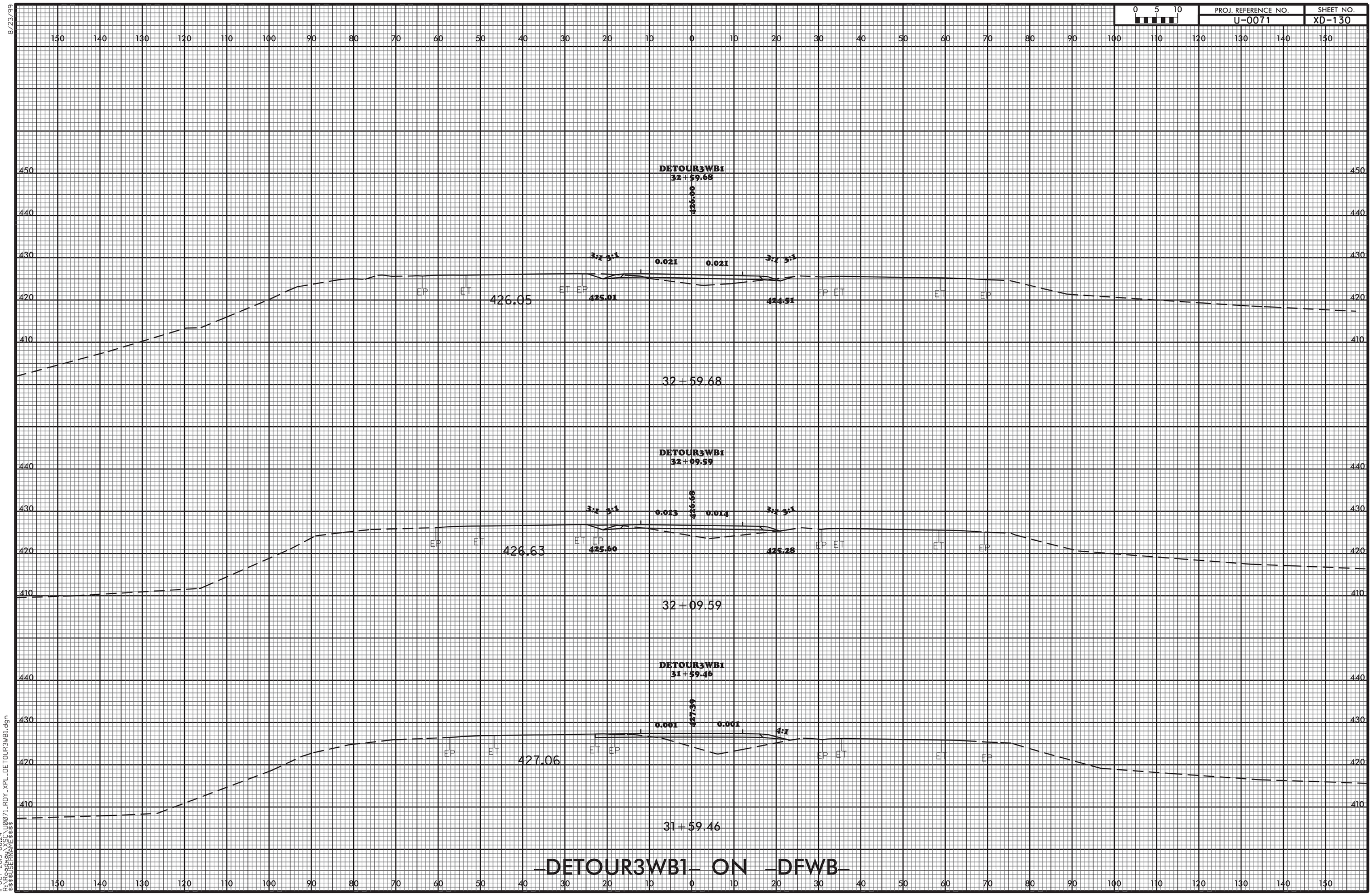
$$$$USERNAME$$$$


0 5 10
PROJ. REFERENCE NO.
U-0071
SHEET NO.
XD-129
DETOUR3WB1
31+09.29
427.90
0.012
0.012
4:1
EP
ET
427.38
ET
EP
EP
ET
ET
EP
31+09.29
DETOUR3WB1
30+59.08
426.16
0.020
0.020
4:1
EP
ET
427.58
ET
EP
EP
ET
ET
EP
30+59.08
DETOUR3WB1
30+08.83
426.25
0.020
0.020
4:1
EP
ET
427.74
ET
EP
EP
ET
ET
EP
30+08.83
-DETOUR3WB1- ON -DFWB-
8/23/99
11-OCT-2013 08:24
R:\Roadway\XSC\U0071_RDY_XPL_DETOUR3WB1.dgn
$$$$USERNAME$$$$

8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-130 |




11-OCT-2013 08:24
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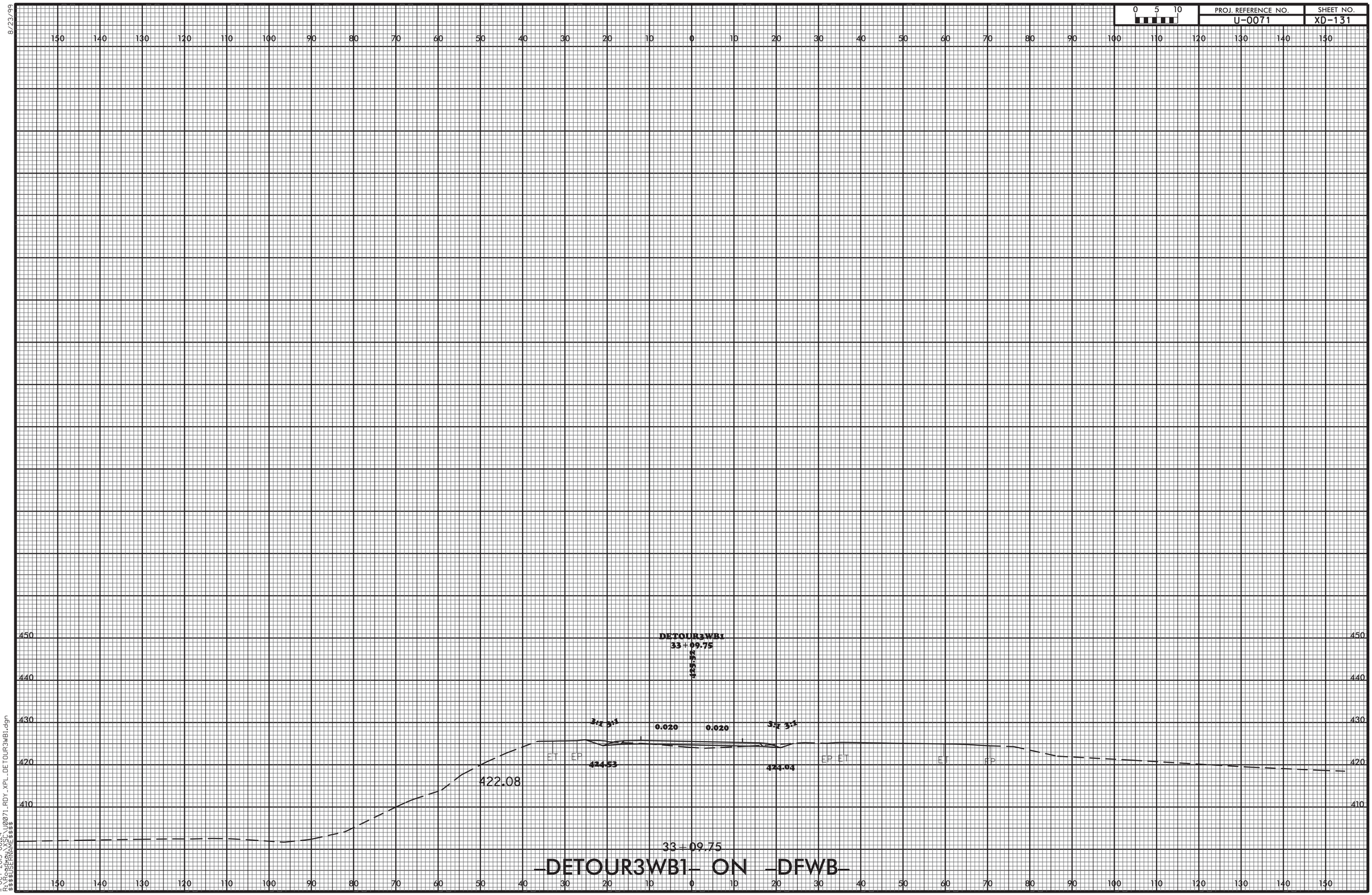
8/23/99

| PROJ. REFERENCE NO. | SHEET NO. |
|---|---|
| U-0071 | XD-131 |

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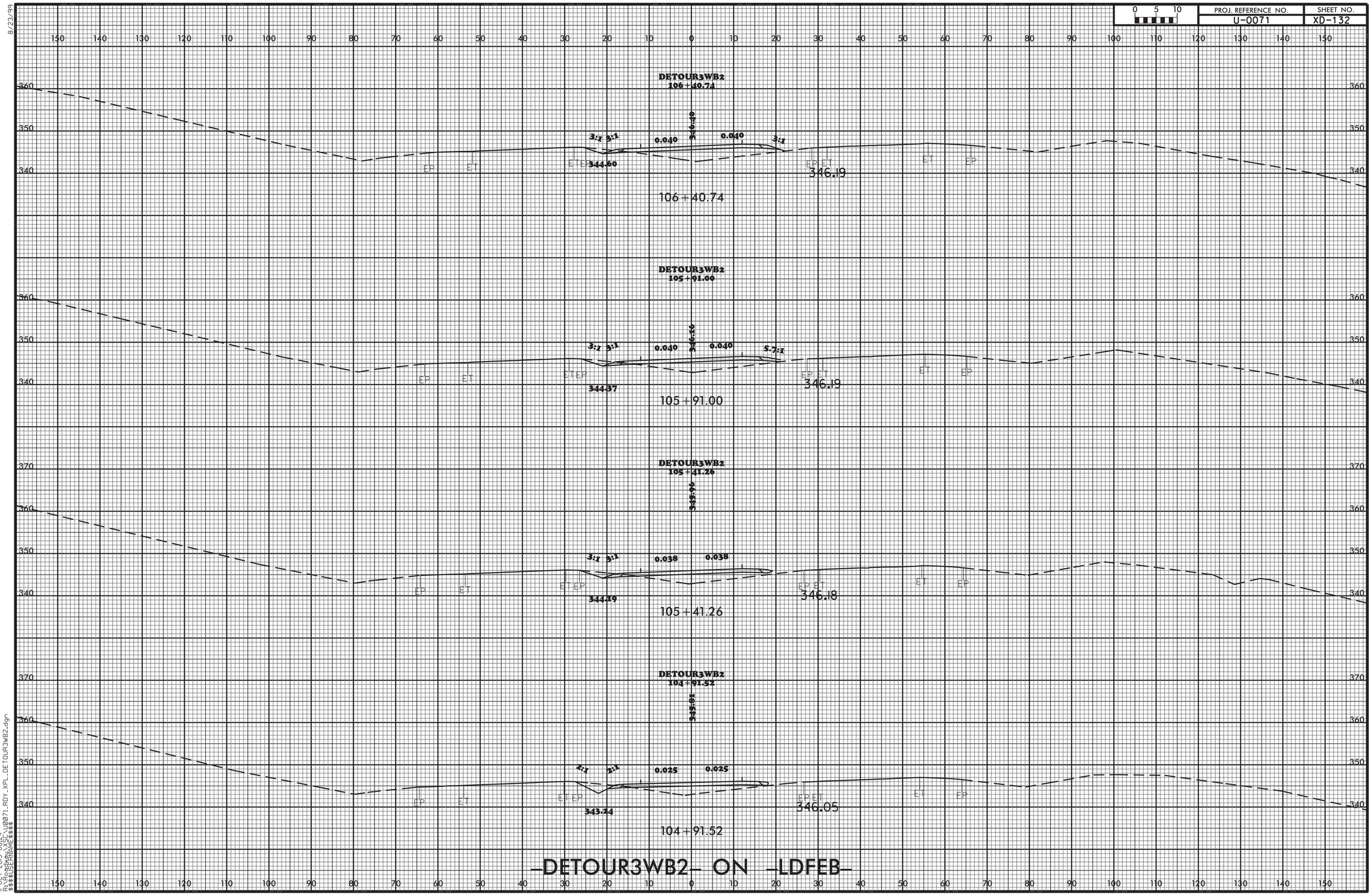
8/23/99

| 0 5 10 | PROJ. REFERENCE NO. | SHEET NO. |
|---|---|---|
| | U-0071 | XD-132 |

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$$$$USERNAME$$$$

| PROJ. REFERENCE NO. | SHEET NO. |
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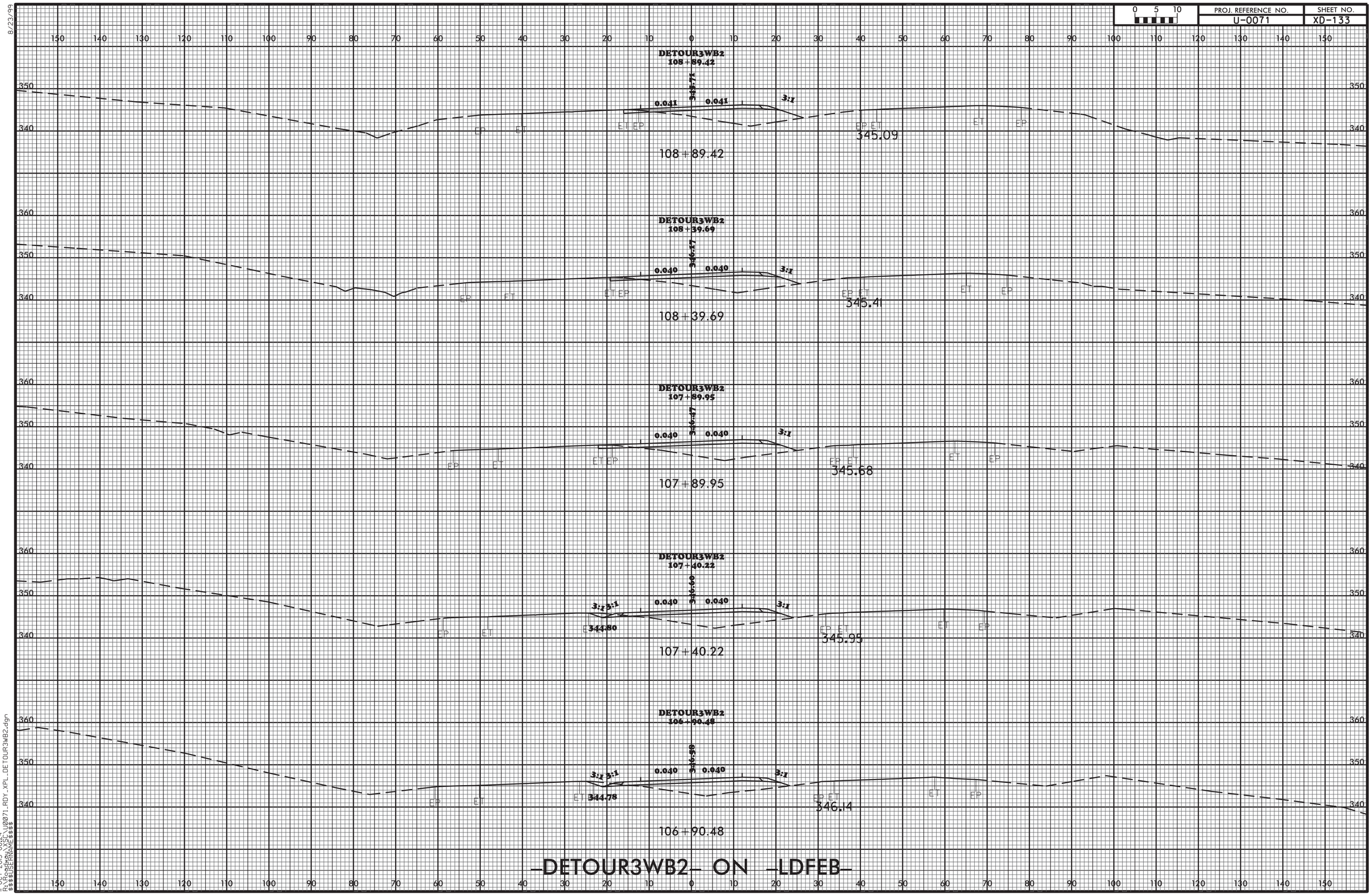
| U-0071 | XD-133 |

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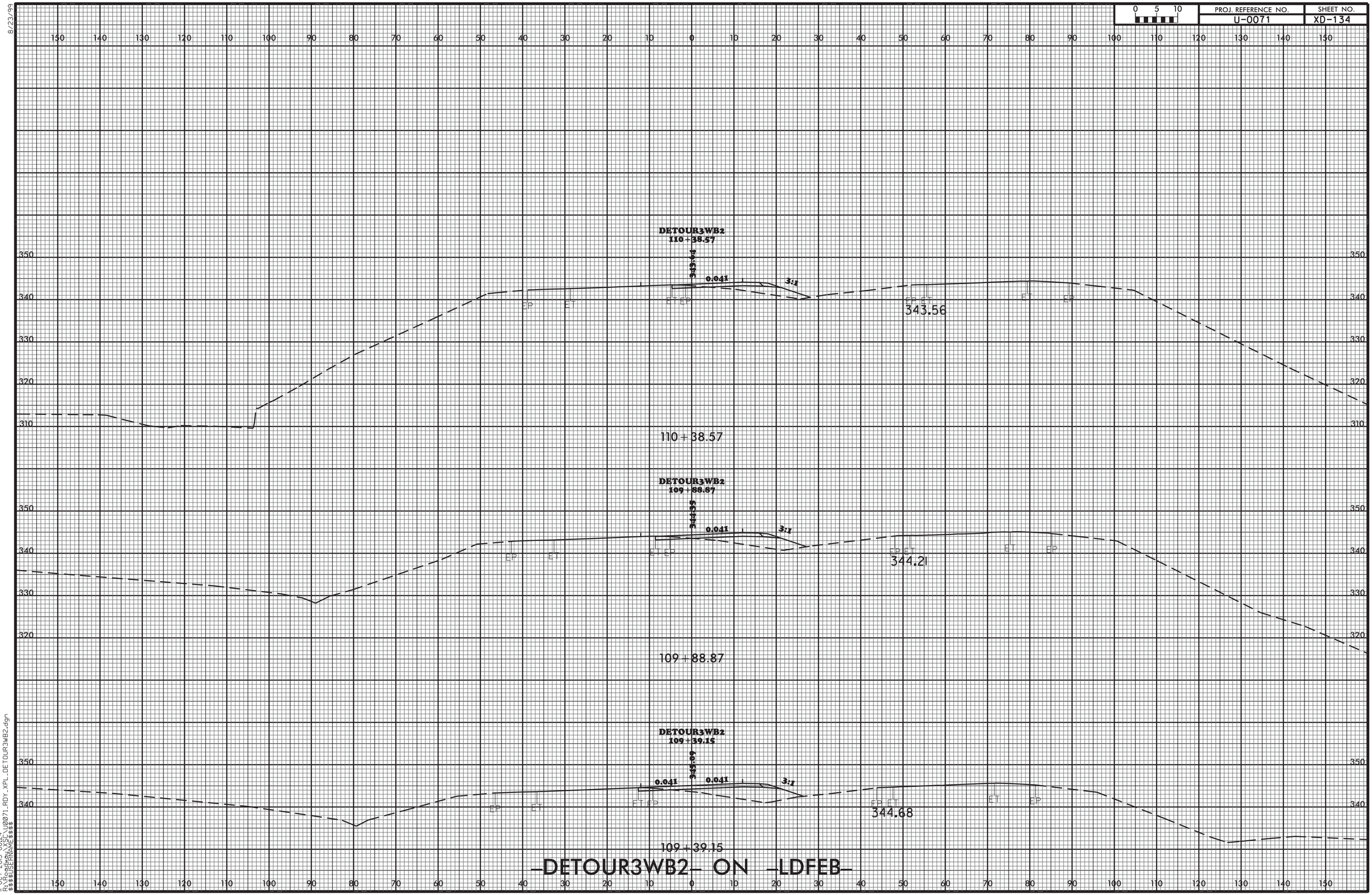


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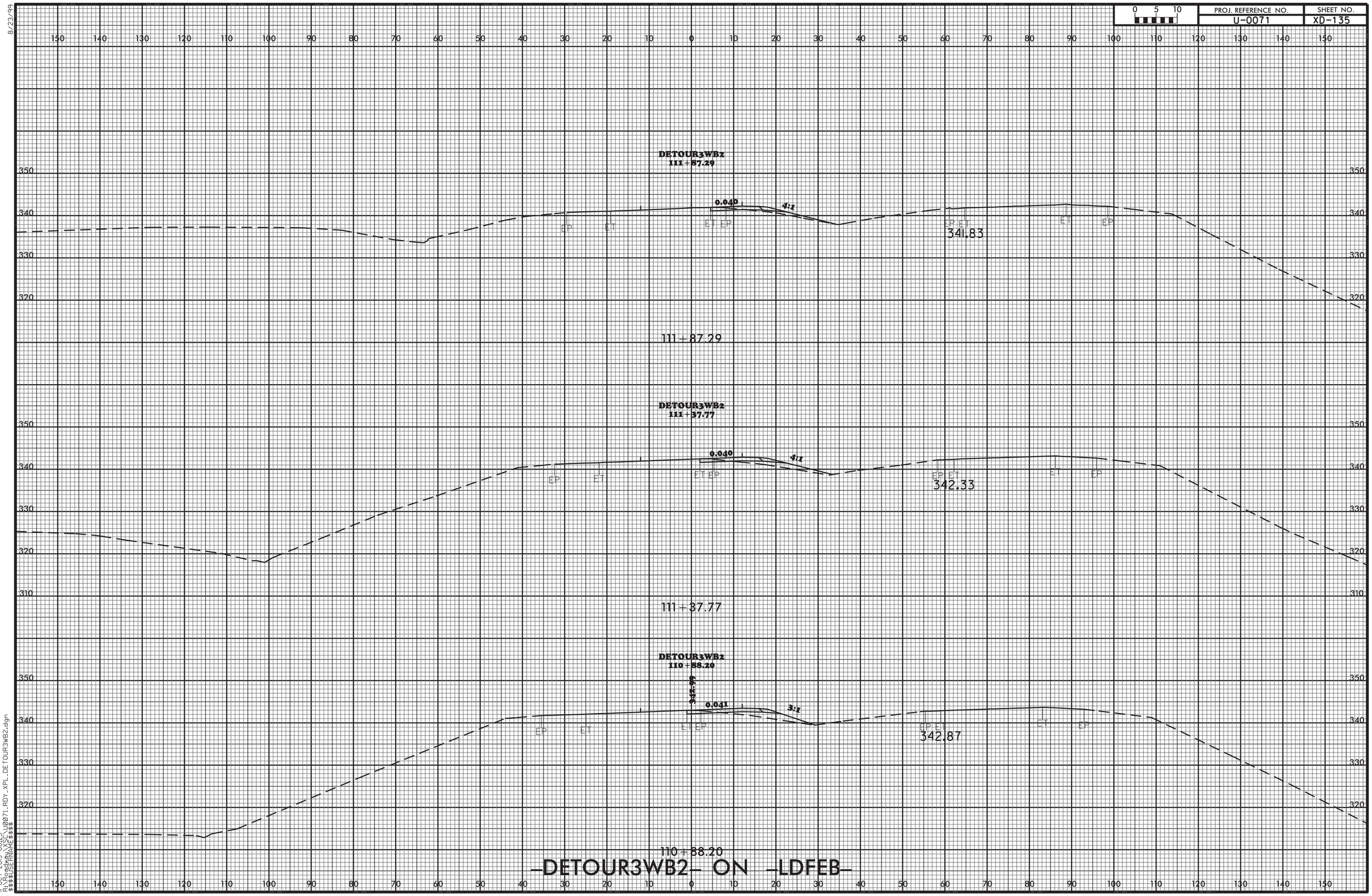


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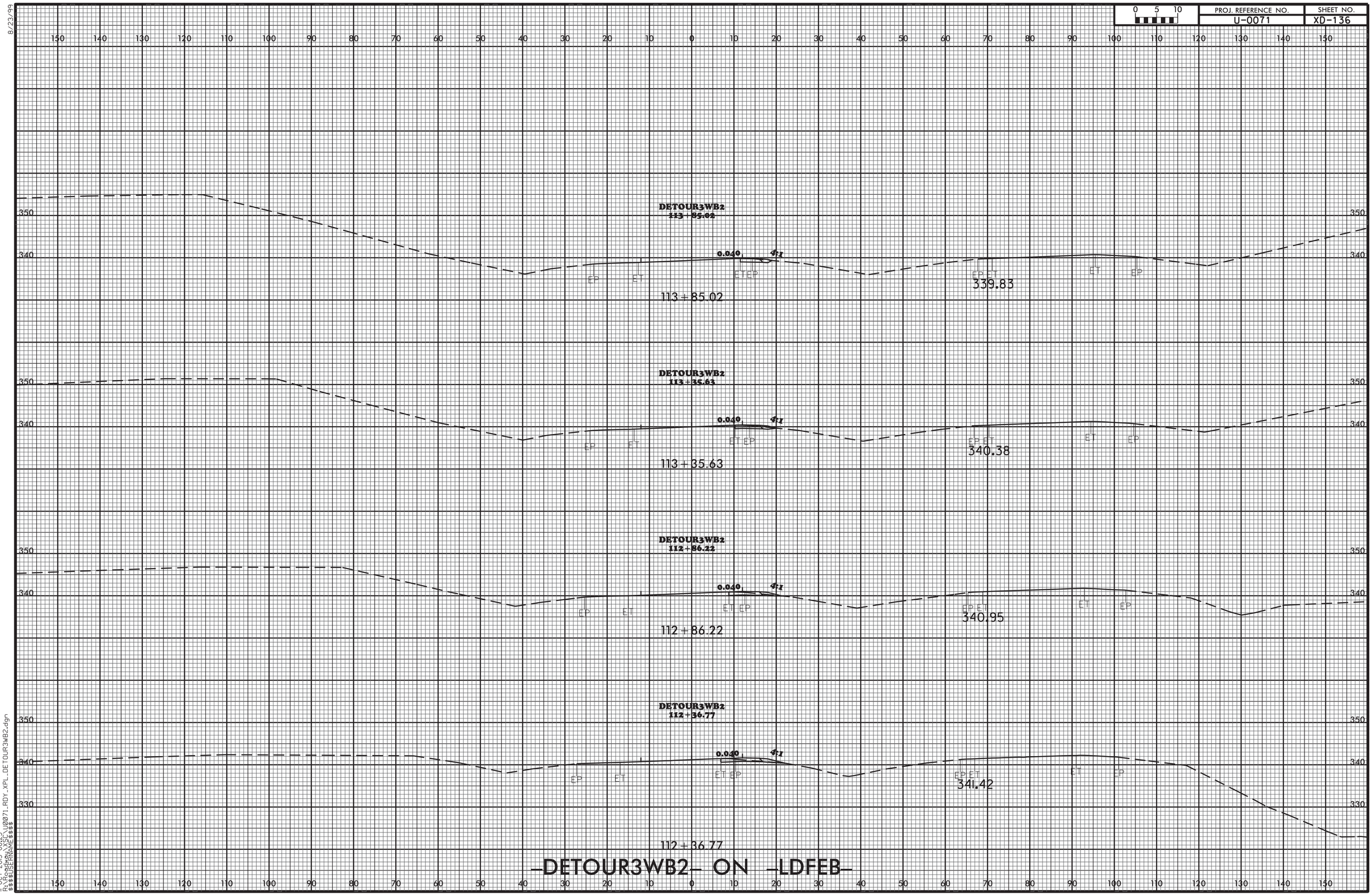


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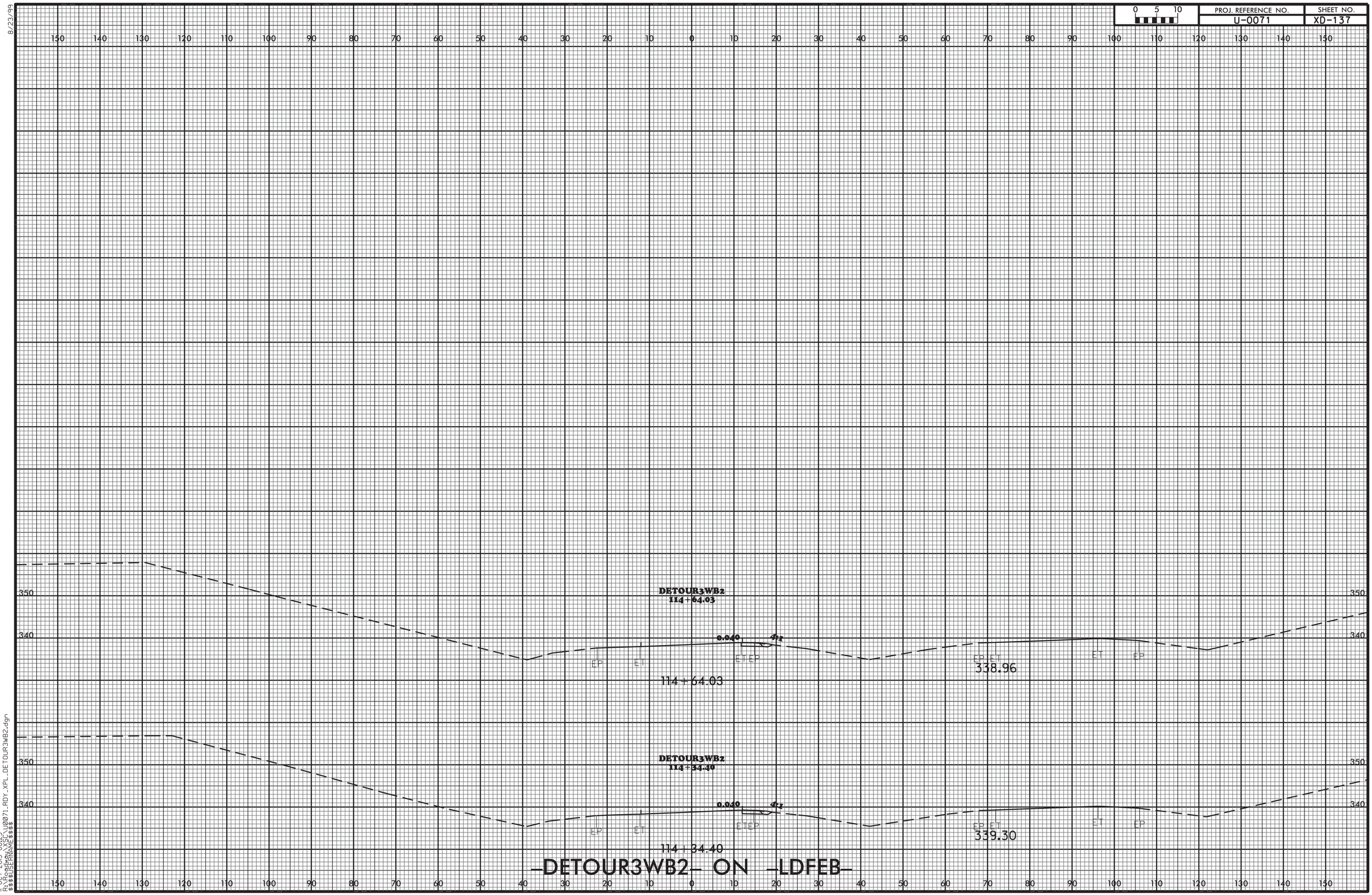


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