STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

JAMES B. HUNT JR.
GOVERNOR

DIVISION OF HIGHWAYS
P.O. Box 25201, Raleigh, N.C. 27611-5201

GARLAND B. GARRETT JR.
SECRETARY

December 5, 1997

Mr. Michael F. Bell, Project Manager
U. S. Army Corps of Engineers
Washington Regulatory Field Office
P.O. Box 1000
Washington, North Carolina 27889-1000

SUBJECT: Pembroke Creek Mitigation Plan

Recent Section 404 permit action letters (ID Nos. 199400838 and 199705883) from the Regulatory Branch required the Department of Transportation to "... *submit a final compensatory mitigation plan ... within 45 days of the date of this permit* " (October 23 and November 6, 1997).

The Pembroke Creek Mitigation concept originated during minimization negotiations leading to the issuance of an Individual Permit for proposed improvements to US 17 in Bertie and Chowan Counties (R-2512). The Department agreed to restore and/or enhance the wetlands within a +/- 5 acre portion of the Pembroke Creek floodplain lying on the north side of US 17. The commitments, described in correspondence to the Regulatory Branch following the conclusion of negotiations, included removal of existing vegetation (clearing and grubbing), grading to natural wetland elevations (as determined by adjacent, undisturbed contours), planting desirable swamp forest species and installing monitoring wells. Following regulatory approval of the original mitigation concept at Pembroke Creek, subsequent negotiations on behalf of the proposed US 17 improvements in Bertie County (R-2404) led to a proposal to expand the original mitigation area at Pembroke Creek to offset anadromous fishery habitat losses at Salmon Creek, resulting from R-2404.

The following mitigation plan for the Pembroke Mitigation Site is submitted for your consideration and approval. A copy of the plan sheets (8.5" X 14"), depicting the planting plan, and location of monitoring wells and the reference ecosystem is enclosed. The construction schedule for the implementation of the mitigation plan was previously transmitted to you on November 26, 1997, and is reiterated in the footnote.

Note: The original +/- 5 acre mitigation site at Pembroke Creek has been cleared & grubbed, and graded to wetland elevations. Planting of trees is scheduled to be completed before March 1998. The recent addition to the mitigation site (+/- 5 acres) is scheduled for clearing & grubbing and grading in the Summer of 1998; planting by March 1999. Monitoring wells can be installed in the original site and in the reference ecosystem this winter, and in the new area next winter.

01-13-2004 10:46AM FROM-NCDOTRoadsideEnv 919 733 9810 T-237 P.002/006 F-299

INTRODUCTION

The Pembroke Creek Mitigation Site is located adjacent to US 17 in Chowan County. The site is bounded on the south by the fill slope of existing US 17, and to the east and west by sharply-defined upland-wetland ecotones, characterized by abrupt shifts from wetland to upland contours. The northern boundary of the site lies 204.46 feet from the centerline of existing US 17. The site is broken by the Pembroke Creek channel, with approximately 1,100 feet of the site situated west of the creek, and approximately 1,625 feet lying east of the creek. Pembroke Creek is a Class B NSW (nutrient sensitive waters) tributary to Edenton Bay (Albemarle Sound) within the Chowan River Basin. Wetlands adjacent to the creek are classified by the Cowardin *et al* system as temporarily, seasonally, or semi-permanently flooded palustrine forests, dominated by both broad-leaf deciduous and deciduous canopies (PFO1A, PFO1C and PFO6F). The stream is a blackwater coastal stream which is subject to wind tides and experiences a run of anadromous fish during the late Winter and early Spring seasons.

Although wetlands exist throughout the site, the original rationale for selecting the site for restoration/enhancement is that a large zone of spoil had apparently been deposited in the wetland presumably during the construction of the existing US 17 alignment. It is reasonable to assume that this material was generated from the old highway project as undercut. The material was rough-graded into the wetland landscape and ensuing successional patterns resulted in the growth of atypical vegetation, such as red maple, loblolly pine, red cedar, white oak, etc., whereas, species composition on the opposite side of US 17 (not impacted by fill displacement) was typical of floodplain forests and includes co-dominant species such as bald cypress, tupelo, black gum and even Atlantic white cedar. The artificially elevated landscape on the north side of US 17 constitutes a disturbed site and has resulted in retarding sheet flow across the historical floodplain. The recent expansion of the mitigation site was prompted by NMFS concerns that anticipated impacts to floodplain wetlands at Salmon Creek would result in a loss of anadromous fishery habitat at that stream and the proposed compensatory mitigation would occur out-of-basin. The originally proposed mitigation for wetland losses at Salmon Creek was to occur at Company Swamp Mitigation Bank. Although the Company Swamp site lies in Bertie County and the Salmon Creek impact site is also in Bertie County, the Company Swamp site is in the Roanoke River Basin, while Salmon Creek lies in the Chowan River Basin.

GOALS

The goals of the Pembroke Mitigation Site are to replicate those functions and values, which are exhibited by the adjacent, undisturbed wetland areas, specifically the reference ecosystem. The reference ecosystem identified in the attached maps is the undisturbed wetland lying immediately north of the mitigation site. The mitigation effort will attempt to simulate the hydrology exhibited in this adjacent ecosystem. Soils in the reference and mitigation systems are mapped as Dorovan muck. The vegetation scheduled to be planted in the mitigation system is representative of climax bottomland forests and will not be similar to the species composition within the reference system. The

undisturbed portions of the wetland lying adjacent to Pembroke Creek exhibit attributes that allow the wetland complex to perform several important functions. Although the floodplain is relatively narrow, bounded to the east and west by upland escarpments, the wetland occupies practically the entire floodplain. The resulting basin formed by extremes in elevation provides good opportunity for retaining floodwaters which sheet flow from surrounding upland landscapes, and from the creek channel. The highly organic soil (Dorovan muck) and the dense growth of vegetation serve to retain these floodwaters. This storage capacity provides potential benefit to surrounding urban areas, delaying, or even mitigating against local flood events. This same storage attribute of the wetland also facilitates retention of suspended particles and retention time provides opportunity for the root systems and the highly organic soil to remove organic and inorganic toxins and excess nutrients from the floodwaters. This function is particularly valuable in an urbanized-agricultural setting. Values to wildlife and fisheries cannot be understated. This riverine wetland complex functions as habitat to a wide range of wildlife and provides a travel corridor for animals seeking refuge from the surrounding urbanized landscape. Nursery functions for anadromous and resident fish species are also fulfilled in the creek channel and in the floodplain during the wet seasons.

EVALUATION OF SUCCESS

The following criteria and methods will be used in evaluating the hydrological and vegetative success of the mitigation site:

- Hydrology: The surface elevations to be achieved in the mitigation site will be the same (+/- 0.1 ft) as the elevations found in the adjacent, undisturbed wetland lying north of the mitigation site. Four continuous-monitoring wells (PK-1, PK-2, PK-3 and PK-4) will be installed in the mitigation site (see map), and four continuous-monitoring wells (PKr-1, PKr-2, PKr-3 and PKr-4) will be installed in the reference ecosystem. Wells will be installed in strict accordance with the USACOE guidelines. Due to the narrow width of the mitigation site, it is reasonable to expect that groundwater trends will closely mimic those in the adjacent reference ecosystem. The theoretical goal is to achieve saturation to within 12 inches of the surface for at least 36 consecutive days (based upon 12.5% of total consecutive days above 28°F: 5 years in 10 years data) during the growing season. This is the jurisdictional requirement. Field observations in the adjacent (reference) community and in the newly graded (first phase) mitigation site indicate that this will not be problematic. Specifically, hydrologic success will actually be based on the mean depth to groundwater of the wells in the mitigation area being less than to not greater than 20% of the mean depth to groundwater of the wells in the respective reference area for the period of data collection, assuming equal rainwater input (this is reasonable since the areas are contiguous). In other words, success will be gauged on how well the hydrology in the mitigation area mimics that of the reference ecosystem; not necessarily whether the 12.5% criteria has been met. In order to insure that sources of input to the reference/mitigation complex are evaluated, rain gauges and

surface water monitors will be installed at the site.

- Vegetation: 3 sample plots will be randomly located within the mitigation area on each side of Pembroke Creek for a total of 6 sample plots. Sample plots will be 50 x 50 feet squares. Plot corners will be marked by fiberglass survey stakes. Plots will be established and initial stem count data will be taken immediately following planting. Subsequent monitoring events will take place during the Fall. Control of noxious growth such as red maple, sweet gum and loblolly pine will be undertaken by NCDOT should their presence be threatening the growth and survival of the planted trees. This evaluation will be made during the plot monitoring. Trees will be planted at densities of 680 per acre. Since a five-year monitoring program will be followed, success will have been achieved if no less than 260 trees per acre remain alive in any of the three plant zones.

- Corrective Measures/Contingency Plan: Should the hydrological success criteria not be met at the end of the five-year monitoring program, discussions will be held with the Regulatory Branch and other environmental agencies in an attempt to identify the problem. Once the problem has been targeted, the Department will implement remedial measures with the approval of regulatory agencies. Should the vegetation success criteria not be met, the Department will undertake supplemental planting efforts to ensure that the 260 trees per acre criteria is met. Adequate monitoring of additional plantings and/or remedial hydrological efforts will be implemented, as needed.

- Data Reporting: Hydrological data and plant sample plot data will be reported to the Regulatory Branch by January 31 of each year. As built drawings will be provided to the Regulatory Branch within 90 days of the completion of the site implementation.

FINAL DISPOSITION OF MITIGATION SITE

Since the North Carolina Wildlife Resources Commission (WRC) holds title to a parcel of land immediately adjacent to the Pembroke Creek Mitigation Site, the Department of Transportation hopes to transfer the mitigation site to the WRC at the earliest opportunity. Discussions with the WRC will be pursued in the future, but the Department assumes that the actual transfer will not be approved until all mitigation responsibilities have been fulfilled.

Please review the information provided and call M. Randall Turner at (919) 482-7977 if you have questions or comments. Thank you for your time and consideration.

Sincerely,

H. Franklin Vick, P.E., Manager
Planning & Environmental Branch

HFV/mrt
enclosures

cc: Randy Wise, P.E., Roadside Environmental Unit
David Schiller, Mitigation Section
Ted Devens, P.E., Mitigation Section
M. Randall Turner, Division One

Figure 1. Site Location Map

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

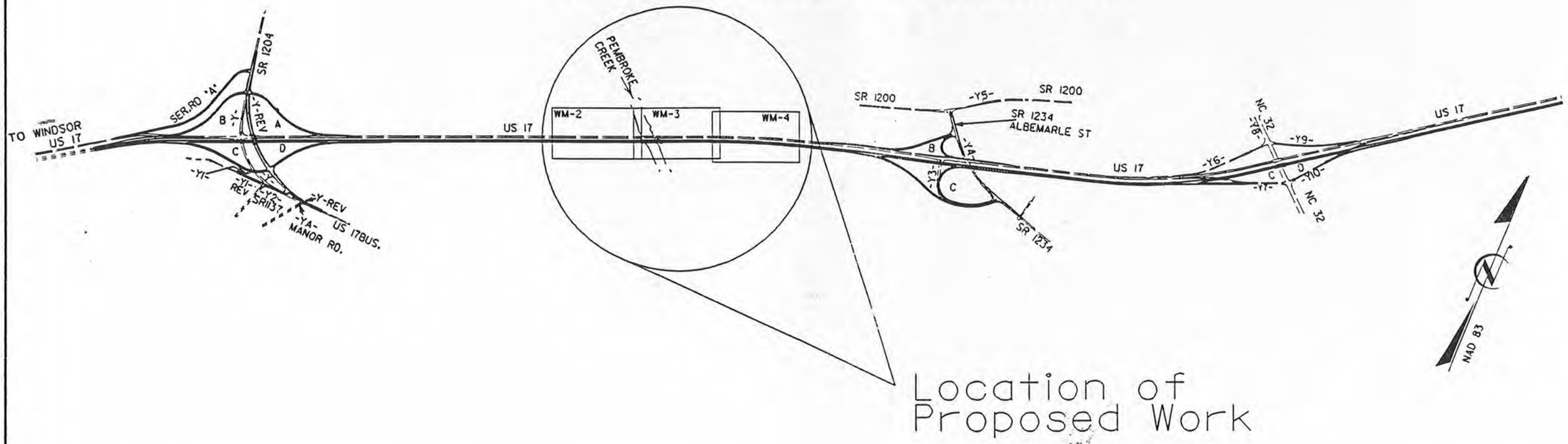
PLAN AND PROFILE FOR PROPOSED STATE HIGHWAY

CHOWAN COUNTY

LOCATION: PEMBROKE CREEK US 17 FROM EAST OF CHOWAN RIVER TO US 17 BUS. EAST OF EDENTON

TYPE OF WORK: GRADING OF MITIGATION SITE

N.C.	6.0390021	1
STATE PROJ. NO.	R.A. PROJ. NO.	DESCRIPTION
6.039002T		CONST.



PROJECT: 6.039002T R-2512B

GRAPHIC RATIO
5 0 10
PLANS

Prepared for the :
DIVISION OF HIGHWAYS

1995 STANDARD SPECIFICATIONS

LETTING DATE:
JUNE 17, 1998

PLANS PREPARED BY:

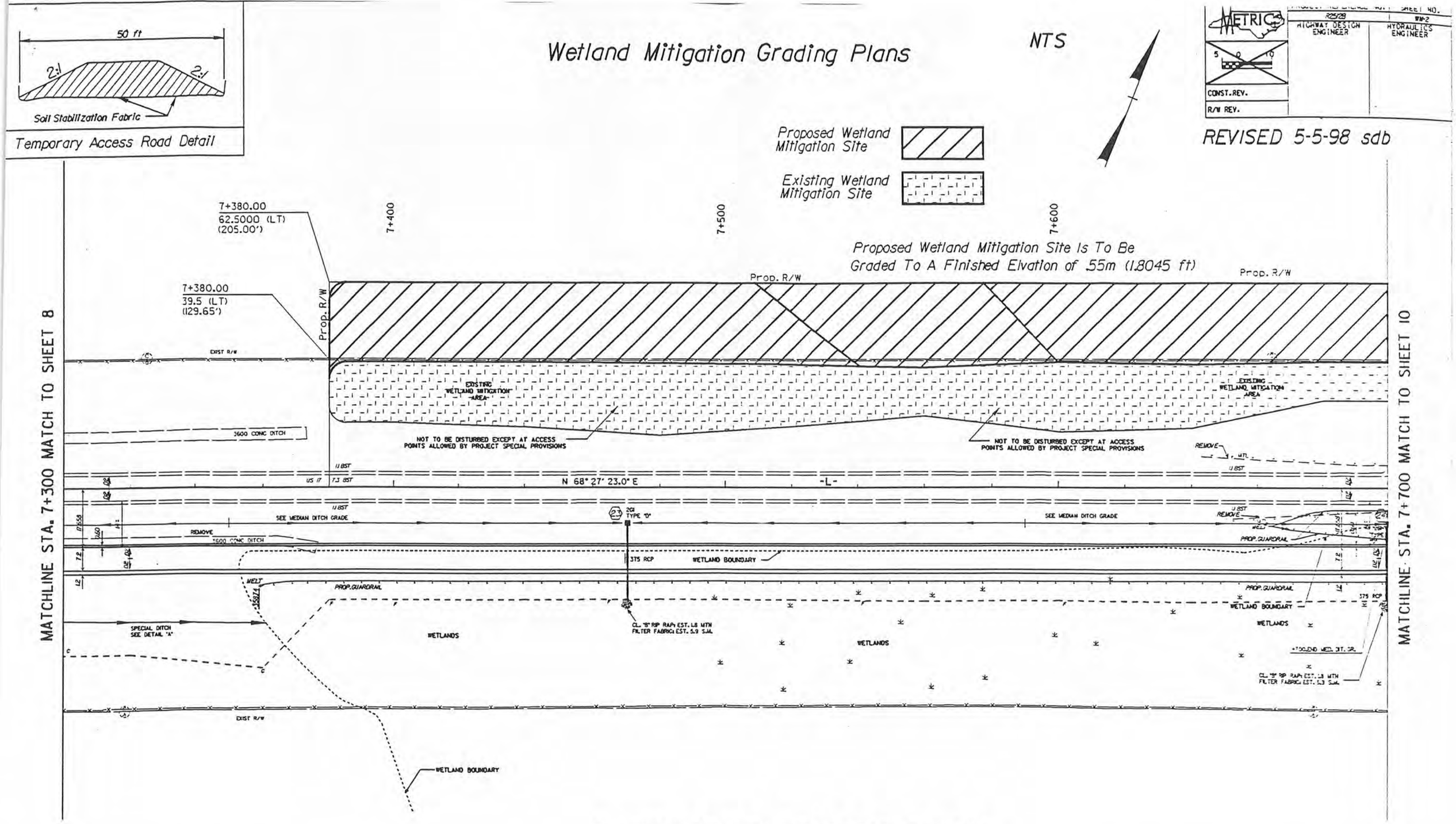
HYDRAULICS ENGINEER
SIGNATURE: P.E.

ROADWAY DESIGN
SIGNATURE: P.E.

DIVISION OF HIGHWAYS
STATE OF NORTH CAROLINA
P.E.
STATE HIGHWAY ENGINEER - DESIGN

DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED FOR
DIVISION ADMINISTRATOR DATE



NOTE: METRIC STATIONING IS USED FOR THIS PROJECT

PROJECT REFERENCE NO.	SHEET NO.
R2528	WM-3
HIGHWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST. REV.	
R/W REV.	

METRIC

REVISED 5-5-98 sdb

Proposed Wetland Mitigation Site

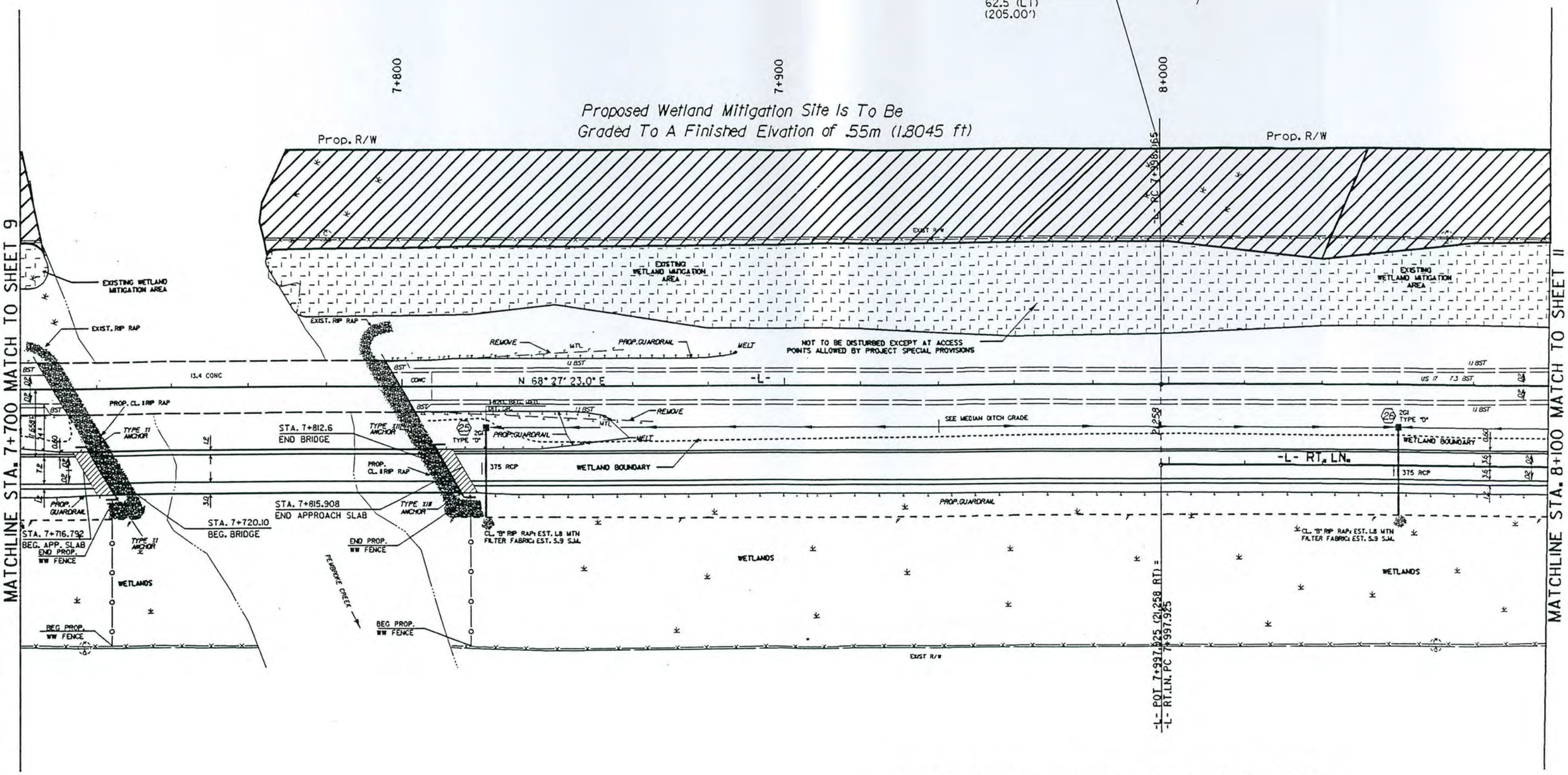
Existing Wetland Mitigation Site

-L-
PI Sta 8+451.977
Δ = 7° 25' 12.9" (RT)
L = 906.555
T = 453.912
R = 7,000.000
S.E. = N.C.

-L- RT. LN.
PI Sta 8+396.395
Δ = 7° 25' 12.9" (RT)
L = 795.826
T = 398.470
R = 6,145.000
S.E. = N.C.

NTS

Wetland Mitigation Grading Plans



NOTE: METRIC STATIONING IS USED FOR THIS PROJECT

Wetland Mitigation Grading Plans

-L-
PI Sta 8+451.977
Δ = 7° 25' 12.9" (RT)
L = 906.555
T = 453.912
R = 7,000.000
S.E. = N.C.

-L- RT. LN.
PI Sta 8+396.395
Δ = 7° 25' 12.9" (RT)
L = 795.826
T = 398.470
R = 6,145.000
S.E. = N.C.

NTS

METRIC

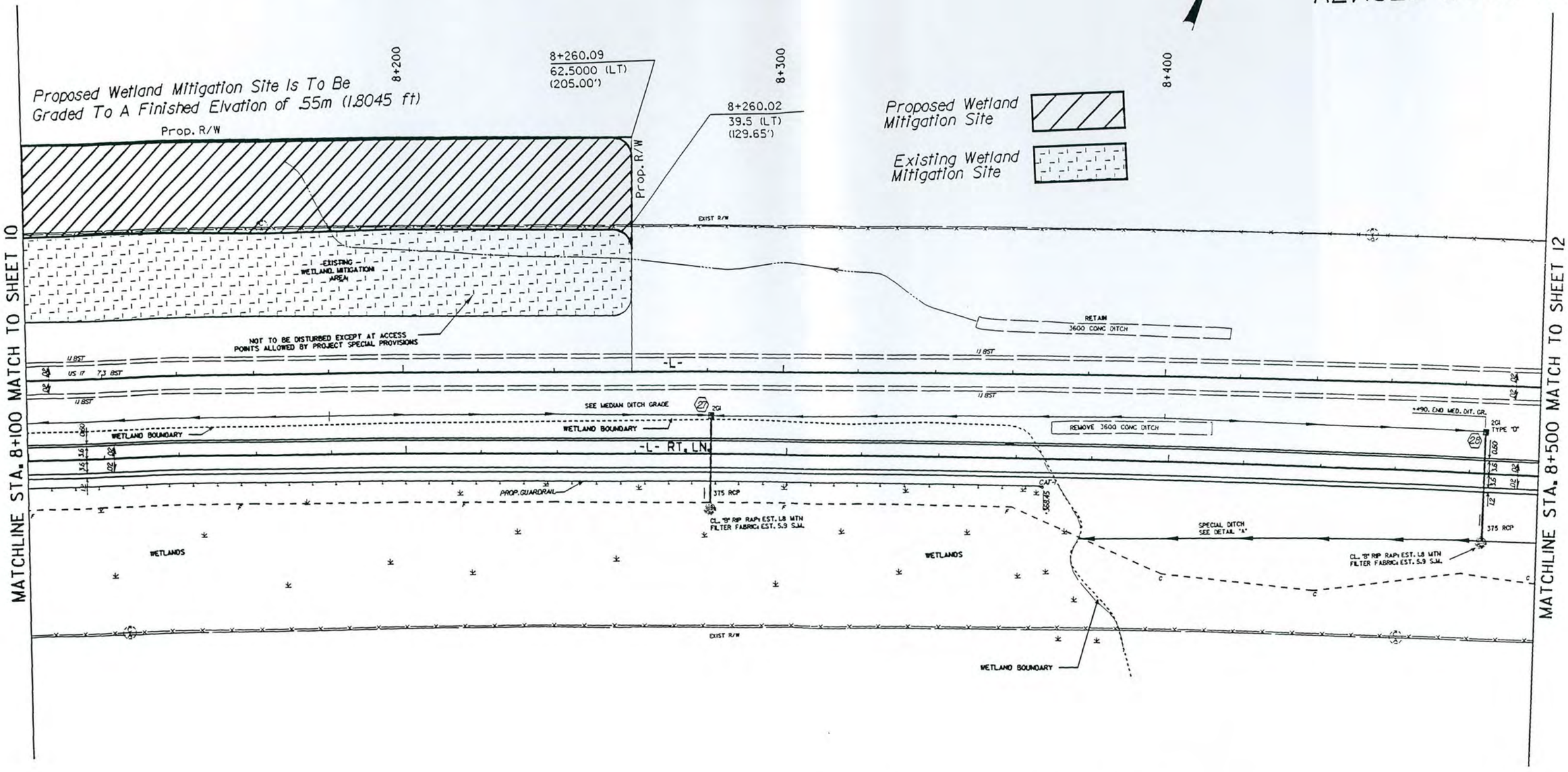
HIGHWAY DESIGN ENGINEER

HYDRAULICS ENGINEER

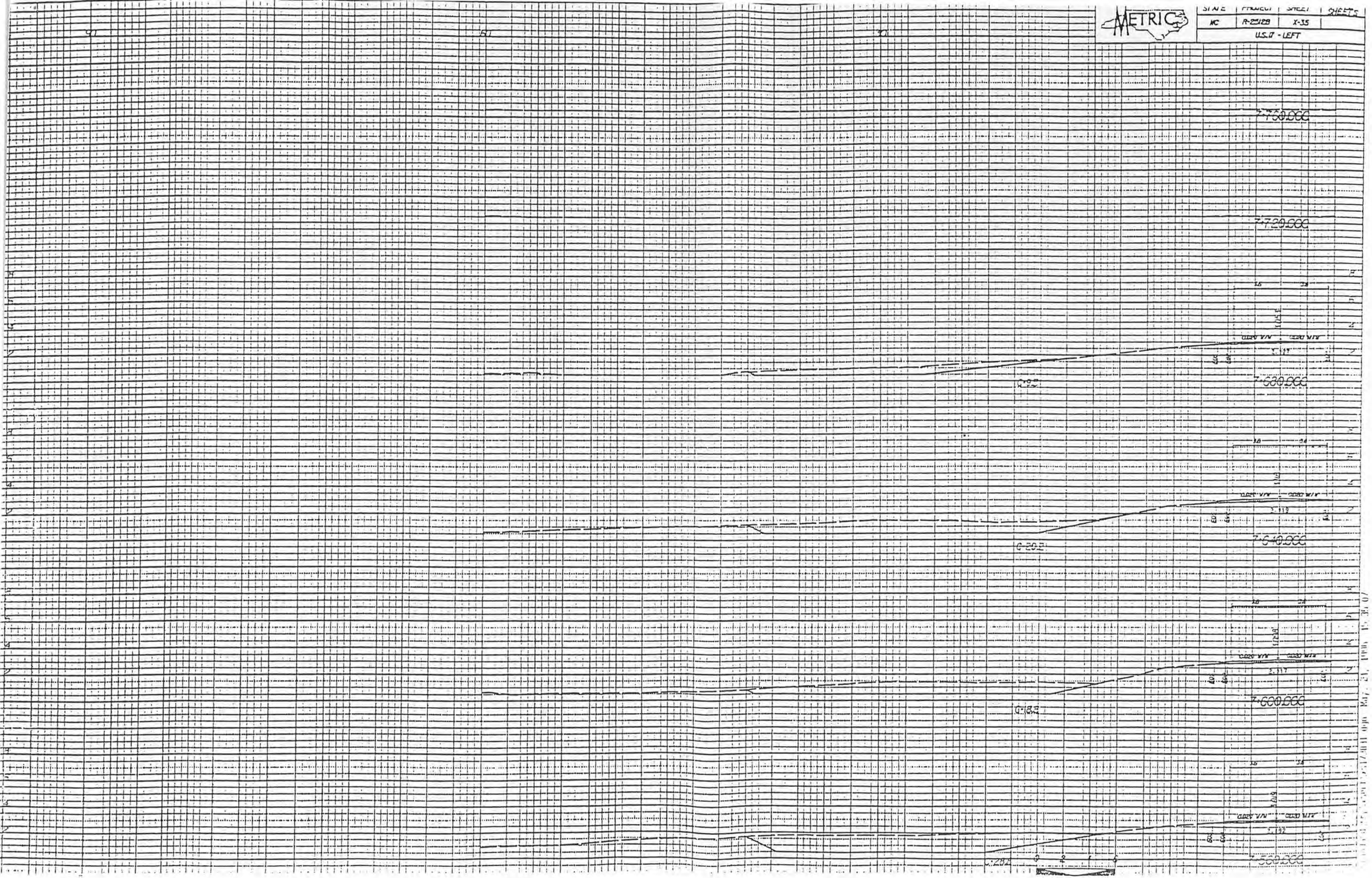
CONST. REV.

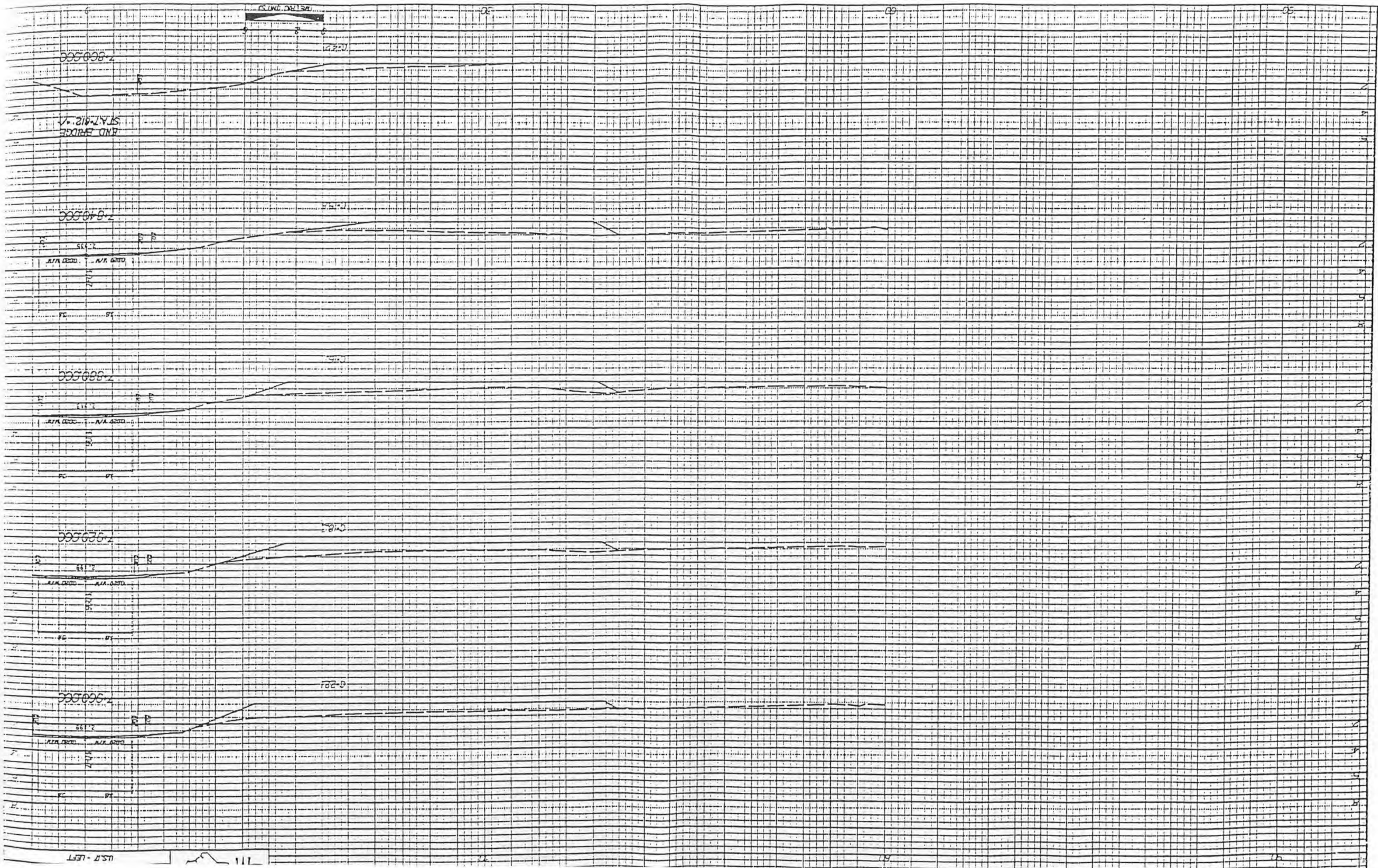
R/W REV.

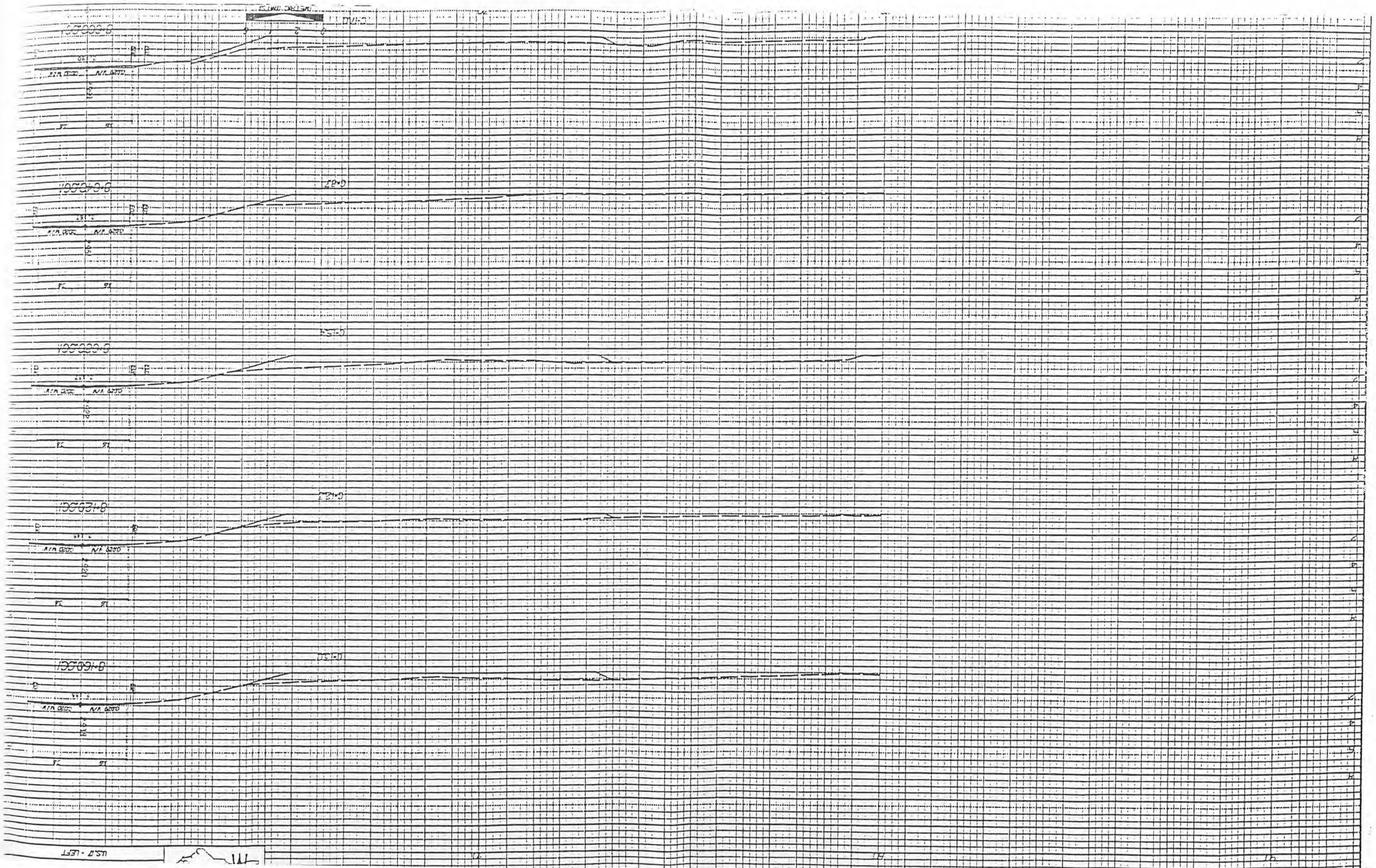
REVISED 5-5-98 sdb



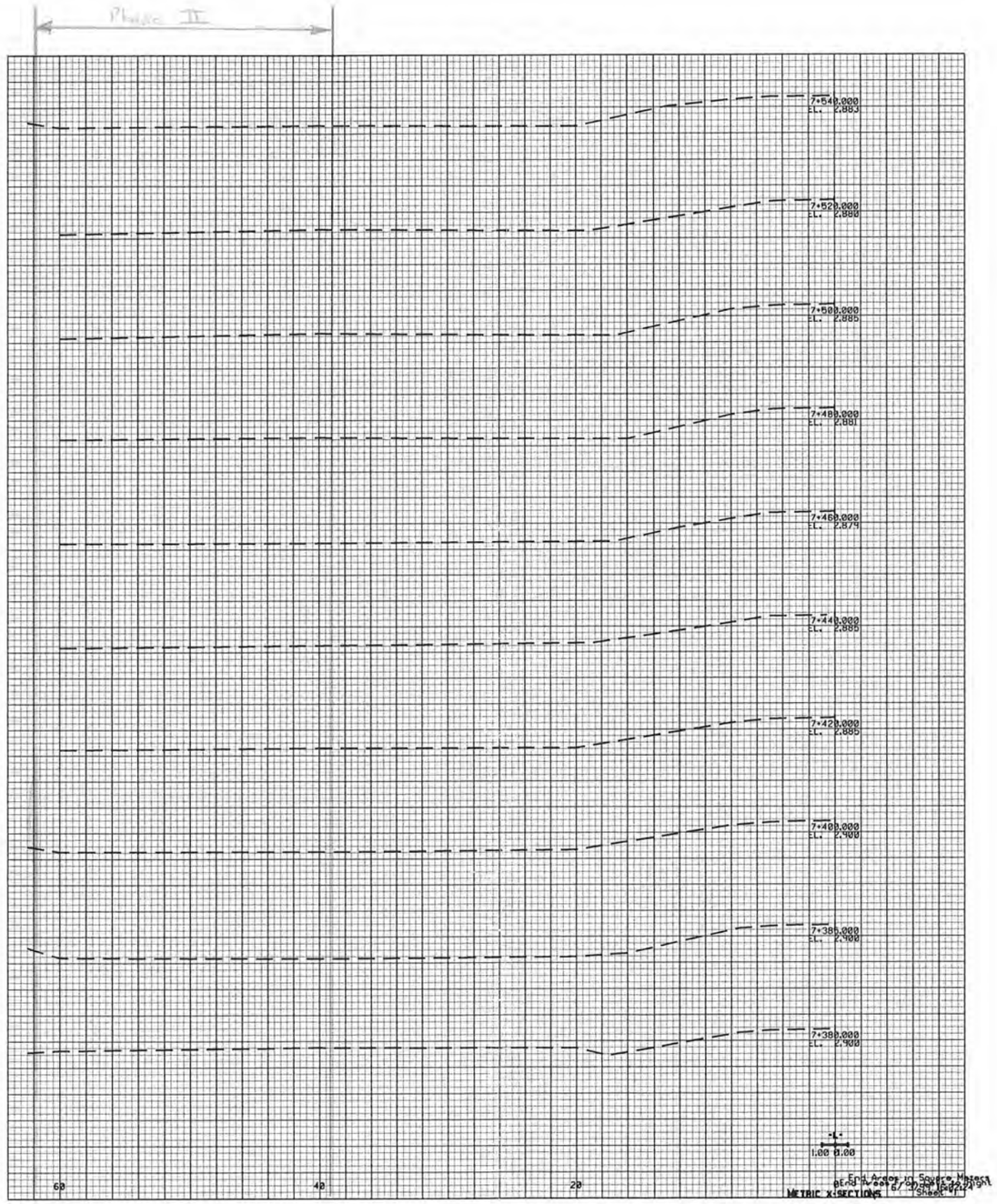
NOTE: METRIC STATIONING IS USED FOR THIS PROJECT


METRIC
STATE
PROJECT
SHEET
SHEETS
NC
R-2512B
X-35
U.S.17 - LEFT
7+760.000
7+720.000
7+680.000
7+640.000
7+600.000
7+560.000





REVISIONS
Final Cross Sections For Pembroke Cast Units



PROJECT REFERENCE NO.	SHEET NO.
6.039002T	L
R/W SHEET NO.	---
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
CONST. REV.	
R/W REV.	