A-9WM

PROJECT: 6.939004T

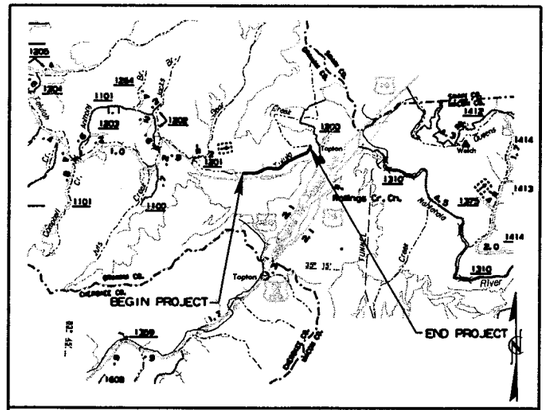
STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	A-9WM	1A	21

STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION
6.931003		PE
6.939004T		CONST.

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
GRAHAM COUNTY

LOCATION: TULULA CREEK WETLAND MITIGATION SITE, NORTH OF US 129 WEST OF TOPTON, EAST OF SR 1201

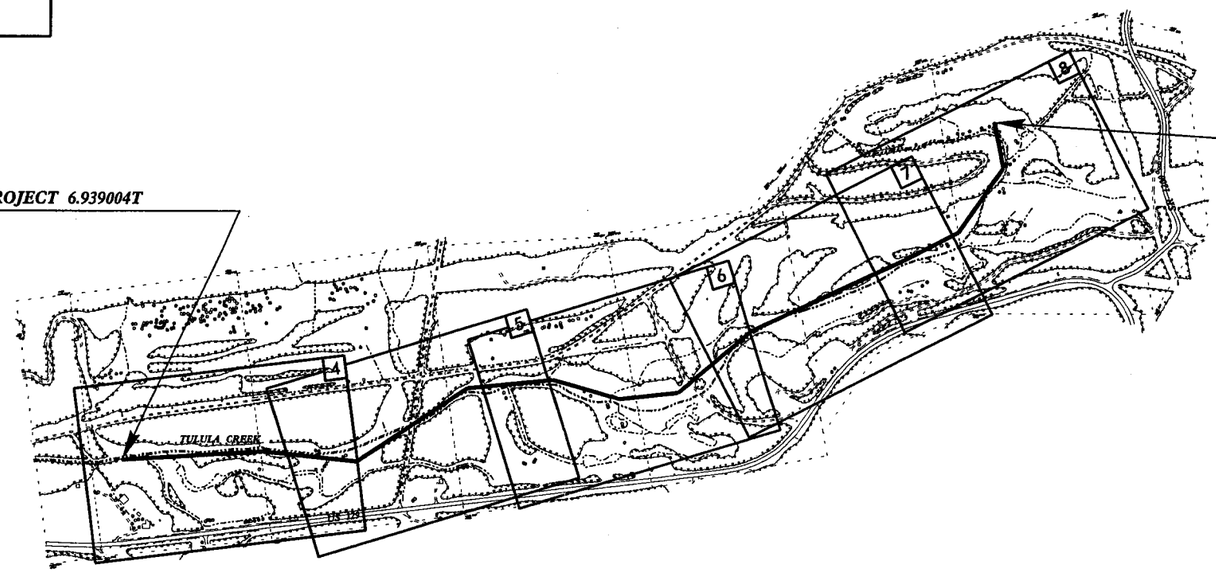
AS-BUILT PLANS



VICINITY MAP SHOWING LOCATION OF STATE PROJECT: 6.939004T

-L- STA. 10+00.00 BEGIN STATE PROJECT 6.939004T

-L- STA. 71+57.72 END STATE PROJECT 6.939004T



INDEX OF SHEETS

SHEET NO.	SHEET
1A	TITLE SHEET
1B	CONVENTIONAL SYMBOLS
2A THRU 2D	MISCELLANEOUS DETAILS
4 THRU 11	PLAN SHEETS
12 THRU 14	PROFILE SHEETS
X-1 THRU X-4	CROSS SECTION SHEETS

NCDOT CONTACT: MR. RANDY GRIFFIN, P.E., PROJECT DEVELOPMENT & ENVIRONMENTAL ANALYSIS BRANCH

GRAPHIC SCALES

50 25 0 50 100
PLANS

50 25 0 50 100
PROFILE (HORIZONTAL)

10 5 0 10 20
PROFILE (VERTICAL)

DESIGN DATA

PROJECT LENGTH

RESTORED STREAM LENGTH =	8,639 FEET
PRESERVED STREAM LENGTH =	1,248 FEET
WETLAND RESTORATION =	102 ACRES

Prepared for The North Carolina Department of Transportation In the Office of:
HSMM
1305 NAVAHO DR., SUITE 303
RALEIGH, NC 27609
(919)878-5250

1995 STANDARD SPECIFICATIONS

RIGHT OF WAY DATE:

LETTING DATE:
JULY 20, 1999

H.R. CURRIN, P.E.
PROJECT ENGINEER

S.G. GINN, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: *P.E.*

DIVISION OF HIGHWAYS STATE OF NORTH CAROLINA

P.E.

DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION

APPROVED FOR DIVISION ADMINISTRATOR *DATE*

040397

PROJECT REFERENCE NO.	SHEET NO.
A-9WM	18

H S M M
ARCHITECTS · ENGINEERS · PLANNERS
1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

CONVENTIONAL SYMBOLS

ROADS & RELATED ITEMS

- Edge of Pavement
- Curb
- Prop. Slope Stakes Cut — C
- Prop. Slope Stakes Fill — F
- Prop. Woven Wire Fence
- Prop. Chain Link Fence
- Prop. Barbed Wire Fence
- Prop. Wheelchair Ramp — WCR
- Exist. Guardrail
- Prop. Guardrail
- Equality Symbol
- Roadway Removal

RIGHT OF WAY

- Baseline Control Point
- Existing Right of Way Marker
- Exist. Right of Way Line w/Marker
- Prop. Right of Way Line with Proposed R/W Marker (Iron Pin & Cap)
- Prop. Right of Way Line with Proposed (Concrete or Granite) R/W Marker
- Exist. Control of Access Line — (CA)
- Prop. Control of Access Line
- Exist. Easement Line — E —
- Prop. Temp. Construction Easement Line — E —
- Prop. Temp. Drainage Easement Line — TDE —
- Prop. Perm. Drainage Easement Line — PDE —

HYDROLOGY

- Stream or Body of Water
- Flow Arrow
- Disappearing Stream
- Spring
- Environmentally Sensitive Area
- Shoreline
- Falls, Rapids
- Prop Ditches and Prop Tulula Creek — FLOW
- Existing Channel, Existing Relic
- Backfill Exist Pond or Channel
- Spoil Removal Area
- Root Wad Bank Protection

STRUCTURES

MAJOR

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

MINOR

- Head & End Wall — CONC HW
- Pipe Culvert
- Footbridge
- Drainage Boxes — CB
- Paved Ditch Gutter
- Rock Cross Vane
- Log Vane

UTILITIES

- Exist. Pole
- Exist. Power Pole
- Prop. Power Pole
- Exist. Telephone Pole
- Prop. Telephone Pole
- Exist. Joint Use Pole
- Prop. Joint Use Pole
- Telephone Pedestal — T
- Cable TV Pedestal — C
- Hydrant
- Satellite Dish
- Exist. Water Valve
- Sewer Clean Out
- Power Manhole — P
- Telephone Booth
- Water Manhole — W
- Light Pole
- H-Frame Pole
- Power Line Tower
- Pole with Base
- Gas Valve
- Gas Meter
- Telephone Manhole — T
- Power Transformer
- Sanitary Sewer Manhole
- Storm Sewer Manhole — S
- Tank; Water, Gas, Oil
- Water Tank With Legs
- Traffic Signal Junction Box — S
- Fiber Optic Splice Box — F
- Television or Radio Tower

- Utility Power Line Connects to Traffic Signal Lines Cut Into the Pavement — TS — TS —
- Water Line — W — W —
- Sanitary Sewer — SS — SS —
- Sanitary Sewer Force Main — FSS — FSS —
- Gas Line — G — G —
- Storm Sewer — S — S —
- Power Line — P — P —
- Telephone Cable — T — T —
- U/G Telephone Conduit — TC — TC —
- Unknown Utility — ?UTL — ?UTL —
- Television Cable — TV — TV —
- Fiber Optics Cable — FO — FO —
- Exist. Water Meter — 0
- Drawn According to U/G Records — DATUR
- Abandoned According to U/G Records — AATUR
- End Of Information — E.O.I.
- Surface Water Gauge

BOUNDARIES & PROPERTIES

- State Line
- County Line
- Township Line
- City Line
- Reservation Line
- Property Line
- Property Line Symbol — PL
- Exist. Iron Pin — EIP
- Property Corner
- Property Monument — ECM
- Property Number — 123
- Parcel Number — 6
- Fence Line — WW & ISBW
- Existing Wetland Boundaries — WLB
- Proposed Wetland Boundaries — WLB
- Existing Endangered Animal Boundaries — EAB
- Existing Endangered Plant Boundaries — EPB

BUILDINGS & OTHER CULTURE

- Buildings
- Foundations
- Area Outline
- Gate
- Gas Pump Vent or U/G Tank Cap
- Church
- School
- Park
- Cemetery
- Dam
- Sign
- Well — W
- Small Mine
- Swimming Pool

TOPOGRAPHY

- Loose Surface
- Hard Surface
- Change in Road Surface
- Curb
- Right of Way Symbol — R/W
- Guard Post — GP
- Paved Walk
- Bridge
- Box Culvert or Tunnel
- Ferry
- Culvert
- Footbridge
- Trail, Footpath
- Light House

VEGETATION

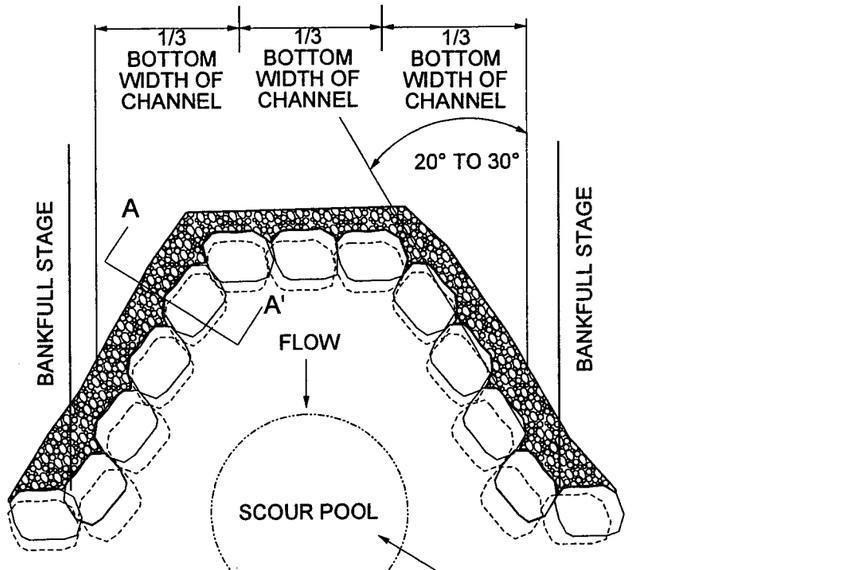
- Single Tree
- Single Shrub
- Hedge
- Woods Line
- Orchard
- Vineyard — VINEYARD
- Transplant

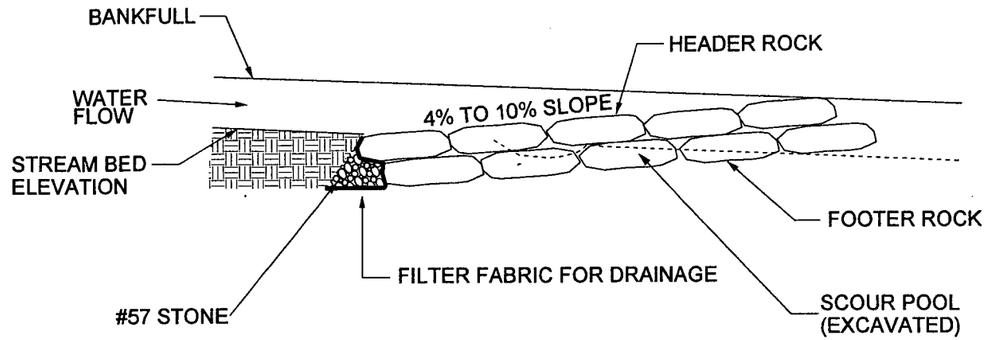
RAILROADS

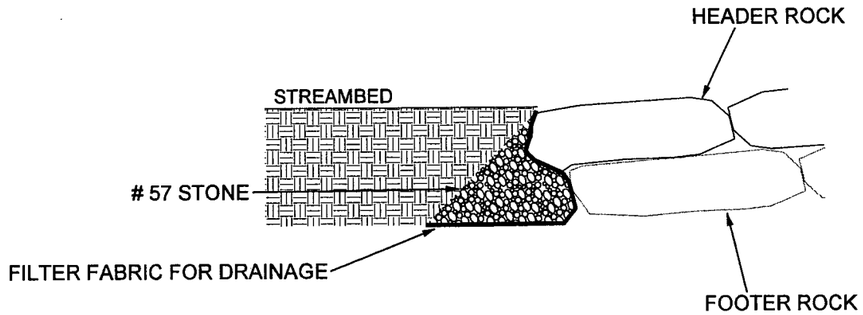
- Standard Gauge — CSX TRANSPORTATION
- RR Signal Milepost — MILEPOST 35
- Switch — SWITCH

revised 03/26/97

$$$$$$$$SYSTIME$$$$$$$$
$$$$$$$$USERNAME$$$$$$$$
$$$$$$$$CSFILE$$$$$$$$
$$$$$$$$DGNFILE$$$$$$$$







5/14/99

PROJECT REFERENCE NO.	SHEET NO.
A-9WM	2A
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

AS-BUILT PLANS

PLAN VIEW

PROFILE VIEW

SECTION A-A'

ROCK CROSS VANE

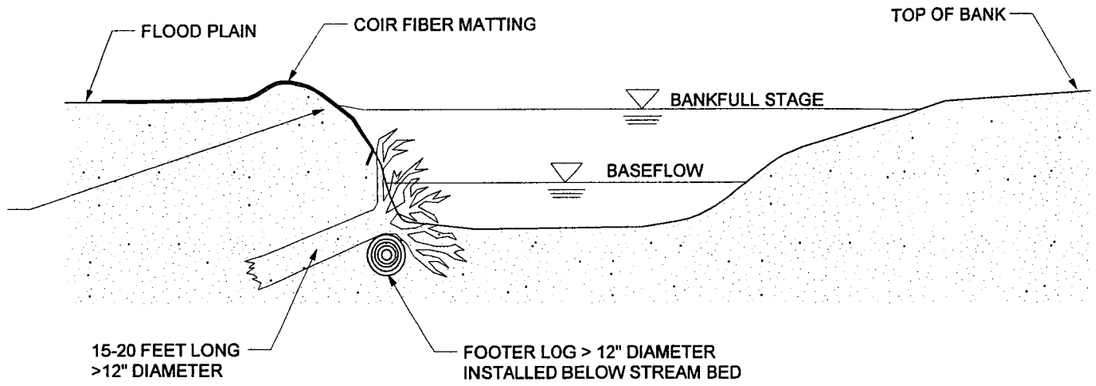
(NOT TO SCALE)

$$$$$SYSTIME$$$$$
$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

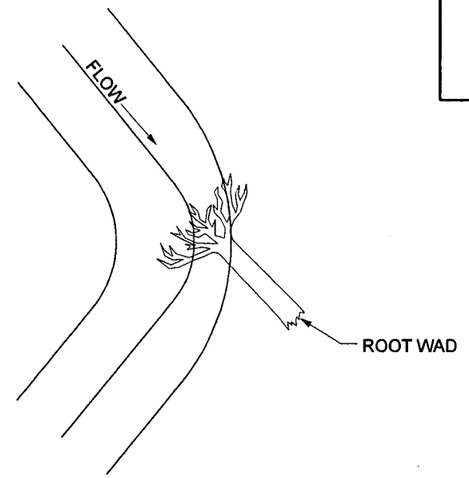
5/14/99

PROJECT REFERENCE NO.	SHEET NO.
A-9WM	2B
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

AS-BUILT PLANS



CROSS SECTION VIEW



PLAN VIEW
DRIVE POINT METHOD

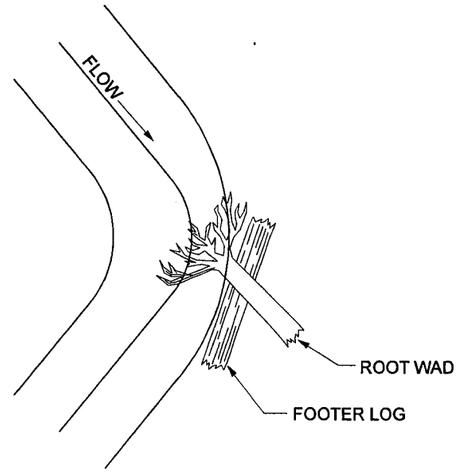
NOTE:

DRIVE POINT METHOD:

SHARPEN THE END OF THE LOG WITH A CHAINSAW BEFORE "DRIVING" IT INTO THE BANK. ORIENT ROOT WADS UPSTREAM SO THAT THE STREAM FLOW MEETS THE ROOT WAD AT A 90-DEGREE ANGLE, DEFLECTING THE WATER AWAY FROM THE BANK. A TRANSPLANT OR BOULDER SHOULD BE PLACED ON THE DOWNSTREAM SIDE OF THE ROOT WAD IF A BACK EDDY IS FORMED BY THE ROOT WAD. THE BOULDER SHALL BE APPROXIMATELY 4' X 3' X 2'.

TRENCHING METHOD:

IF THE ROOT WAD CANNOT BE DRIVEN INTO THE BANK OR THE BANK NEEDS TO BE RECONSTRUCTED, THE TRENCHING METHOD SHOULD BE USED. THIS METHOD REQUIRES THAT A TRENCH BE EXCAVATED FOR THE LOG PORTION OF THE ROOT WAD. IN THIS CASE, A FOOTER LOG SHOULD BE INSTALLED UNDERNEATH THE ROOT WAD IN A TRENCH EXCAVATED PARALLEL TO THE BANK AND WELL BELOW THE STREAMBED. ONE-THIRD OF THE ROOT WAD SHOULD REMAIN BELOW NORMAL BASE FLOW CONDITIONS.



PLAN VIEW
TRENCHING METHOD

ROOT WAD

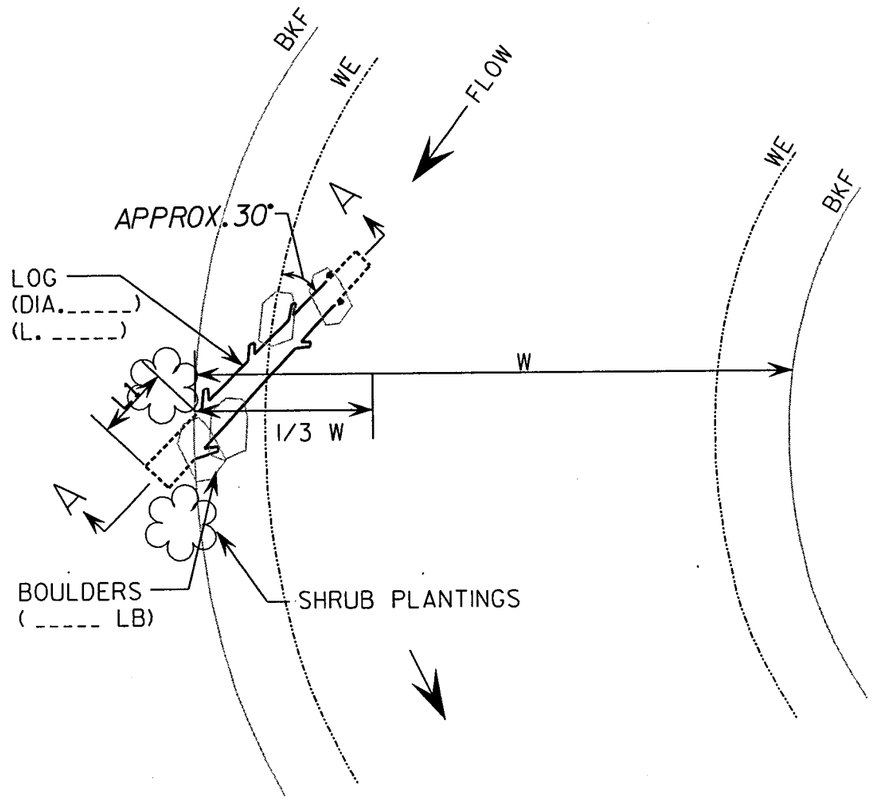
(NOT TO SCALE)

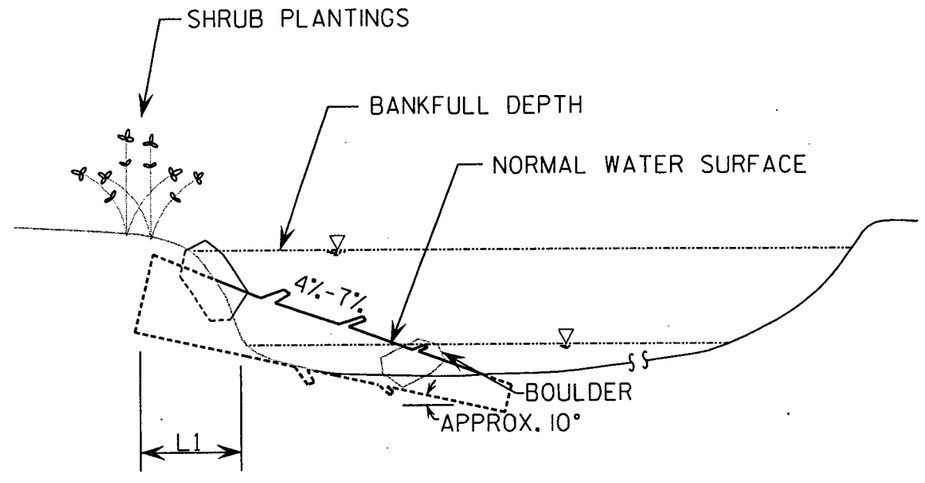
$$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$
$$$USERNAME$$$$

5/14/99

PROJECT REFERENCE NO.	SHEET NO.
A-9WM	2C
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

AS-BUILT PLANS





SECTION A-A

LOG VANE

(NOT TO SCALE)

$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

PROJECT REFERENCE NO.	SHEET NO.
A-9WM	2D
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

AS-BUILT PLANS

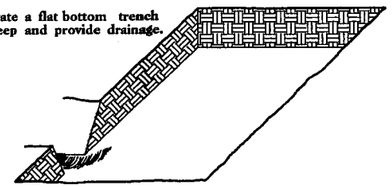
PLANTING DETAILS

SEEDLING / LINER BAREROOT PLANTING DETAIL

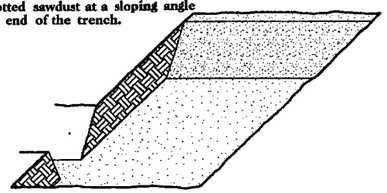
HEALING IN

1. Locate a healing-in site in a shady, well protected area.

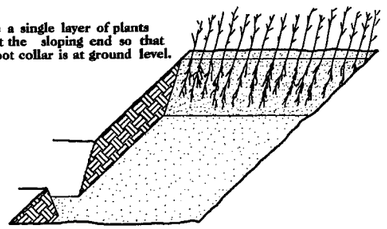
2. Excavate a flat bottom trench 12" deep and provide drainage.



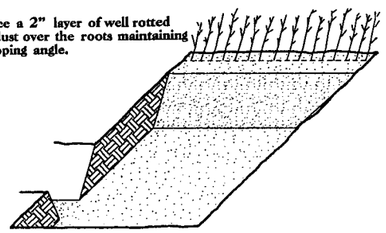
3. Backfill the trench with 2" well rotted sawdust. Place a 2" layer of well rotted sawdust at a sloping angle at one end of the trench.



4. Place a single layer of plants against the sloping end so that the root collar is at ground level.

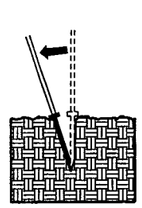


5. Place a 2" layer of well rotted sawdust over the roots maintaining a sloping angle.

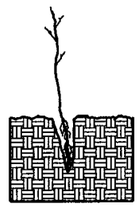


6. Repeat layers of plants and sawdust as necessary and water thoroughly.

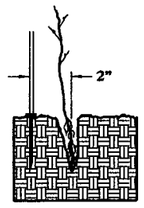
DIBBLE PLANTING METHOD
USING THE KBC PLANTING BAR



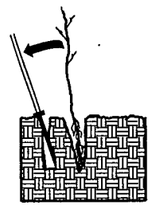
1. Insert planting bar as shown and pull handle toward planter.



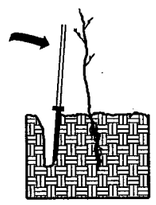
2. Remove planting bar and place seedling at correct depth.



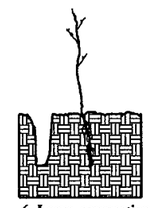
3. Insert planting bar 2" toward planter from seedling.



4. Pull handle of bar toward planter, firming soil at bottom.



5. Push handle forward firming soil at top.



6. Leave compaction hole open. Water thoroughly.

PLANTING NOTES:

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

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

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

WETLAND REFORESTATION

TREE REFORESTATION SHALL BE PLANTED 6' TO 10' ON CENTER, RANDOM SPACING, AVERAGING 8' ON CENTER, APPROXIMATELY 680 PLANTS PER ACRE.

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

HARDWOOD TREE PLANTING TYPE I (13.9 AC.)

Black Cherry	Prunus serotina	12" – 18", SEEDLING BR
Black Gum	Nyssa sylvatica	12" – 18", SEEDLING BR
Northern Red Oak	Quercus rubra	12" – 18", SEEDLING BR
Scarlet Oak	Quercus coccinea	12" – 18", SEEDLING BR
White Oak	Quercus alba	12" – 18", SEEDLING BR
Yellow Poplar	Liriodendron tulipifera	12" – 18", SEEDLING BR

HARDWOOD TREE PLANTING TYPE II (4.3 AC.)

Black Cherry	Prunus serotina	12" – 18", SEEDLING BR
Black Gum	Nyssa sylvatica	12" – 18", SEEDLING BR
Northern Red Oak	Quercus rubra	12" – 18", SEEDLING BR
Red Maple	Acer rubrum	12" – 18", SEEDLING BR
River Birch	Betula nigra	12" – 18", SEEDLING BR
White Oak	Quercus alba	12" – 18", SEEDLING BR
Yellow Poplar	Liriodendron tulipifera	12" – 18", SEEDLING BR

SHRUB PLANTING (1.1 Ac.)

Buttonbush	Cephalanthus occidentalis	12" – 18", SEEDLING BR
Hazel Alder	Alnus serrulata	12" – 18", SEEDLING BR
Roughleaf Dogwood	Cornus drummondii	12" – 18", SEEDLING BR

STREAM AREA (19.4 Ac.)

Black Gum	Nyssa sylvatica	12" – 18", SEEDLING BR
Northern Red Oak	Quercus rubra	12" – 18", SEEDLING BR
River Birch	Betula nigra	12" – 18", SEEDLING BR
Yellow Poplar	Liriodendron tulipifera	12" – 18", SEEDLING BR
White Oak	Quercus alba	12" – 18", SEEDLING BR

SEE PLAN SHEETS FOR AREAS TO BE PLANTED

WETLAND REFORESTATION DETAIL SHEET

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

PROJECT REFERENCE NO.	SHEET NO.
A-9WM	4
R/W SHEET NO.	
	HYDRAULICS ENGINEER

AS-BUILT PLANS

REVISIONS

H S M M
ARCHITECTS - ENGINEERS - PLANNERS
1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609

050197

$$$$$$SYSTIME$$$$$
$$$$$$DGN$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

050197

REVISIONS

PROJECT REFERENCE NO.	SHEET NO.
A-9WM	5
R/W SHEET NO.	
	HYDRAULICS ENGINEER

AS-BUILT PLANS

MATCHLINE STA 23+00
MATCHLINE STA 36+00
PINC Sta 24+05.48, EL 2583.13
PINC Sta 32+02.15, EL 2585.79
AREA OF SUPPLEMENTARY CLEARING
PROPOSED WETLAND BOUNDARY
BACKFILL EXIST. CHANNEL
BACKFILL 20 FT EXIST. CHANNEL
2' BASE DITCH
N 84°17' 27.84" E
ROOT WAD
RELIC FRAGMENT TO REMAIN
REMOVE 54" CMP
END RELIC
BEGIN RELIC
TRANSPLANTS
CONSTRUCTED TULULA CREEK
ROCK CROSS VANE
N 56°34' 58.96" E
83°56' 00.31" E
BACKFILL EXIST DITCH
UNCA MONITORING REACH V
EXCAVATE ROAD FILL TO FLOODPLAIN ELEVATION. BACKFILL ADJACENT DITCHES
REMOVE PIPE
SPOIL
F7 P EL 2583 +/
ENVIRONMENTALLY SENSITIVE AREA
DIRT ROAD
S 83° 05' 18" W
3051.77

GRAPHIC SCALE

50 25 0 50 100

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1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609

REVISIONS

A-9WM	6
R/W SHEET NO.	

HYDRAULICS ENGINEER

AS-BUILT PLANS

H S M M
ARCHITECTS - ENGINEERS - PLANNERS
1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609

050197

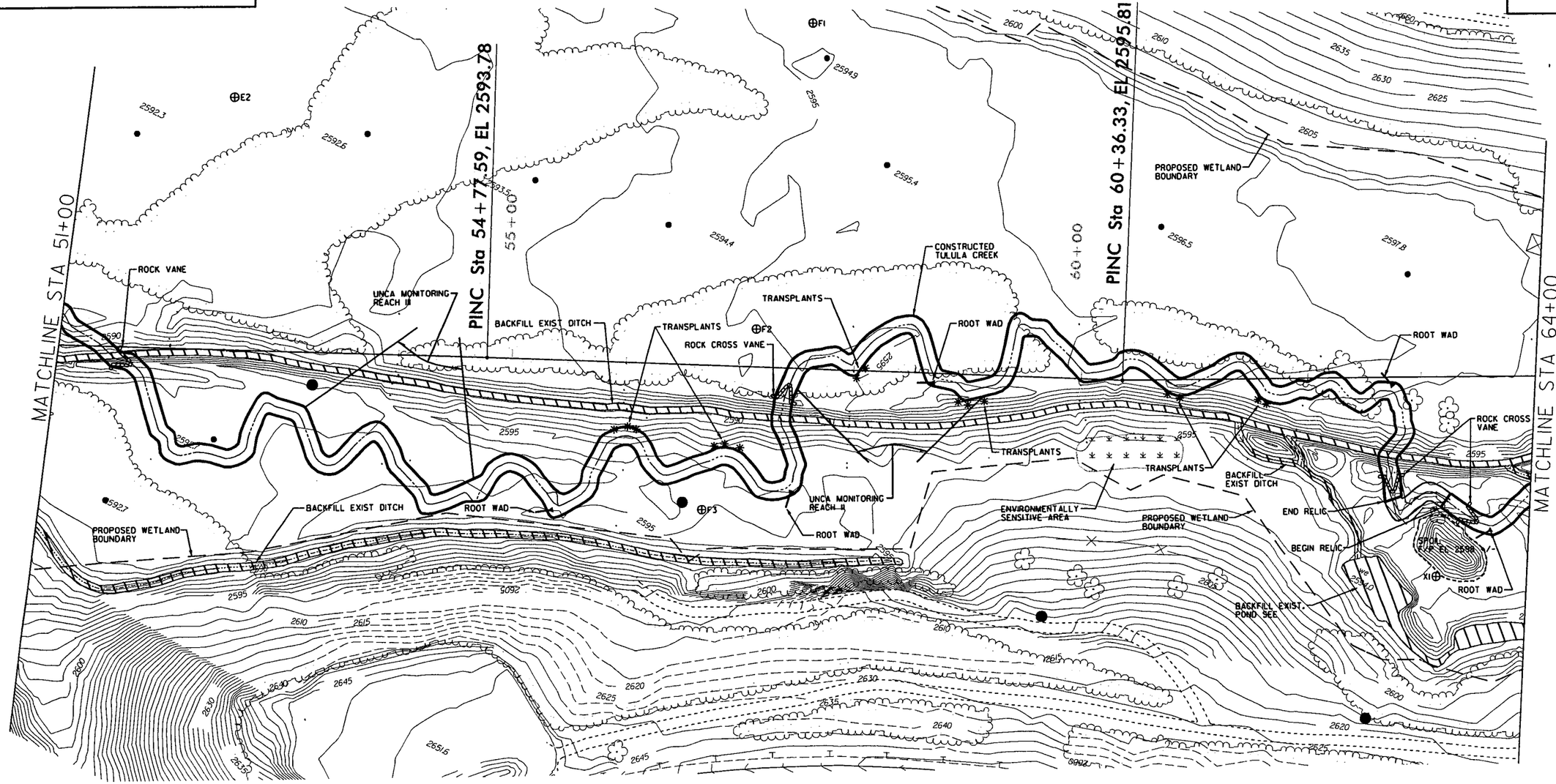
$$$$SYSTIME$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

050197

REVISIONS

A-9WM	7
R/W SHEET NO.	
	HYDRAULICS ENGINEER

AS-BUILT PLANS



GRAPHIC SCALE

H S M M
ARCHITECTS - ENGINEERS - PLANNERS
1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609

$$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

050197

REVISIONS

A-9WM	8
R/W SHEET NO.	

HYDRAULICS ENGINEER

AS-BUILT PLANS

GRAPHIC SCALE

50 25 0 50 100

H S M M

ARCHITECTS - ENGINEERS - PLANNERS
1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609

$$$$SYSTIME$$$$$
$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

050197

REVISIONS

A-9WM	9
R/W SHEET NO.	

HYDRAULICS ENGINEER

AS-BUILT PLANS

LEGEND

CONSTRUCTED TULULA CREEK

⊕ GROUNDWATER MONITORING GAUGE

GRAPHIC SCALE

150 75 0 150 300

GROUNDWATER GAUGE LOCATIONS

H S M M
ARCHITECTS - ENGINEERS - PLANNERS
1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609

050197

REVISIONS

A-9WM	10
R/W SHEET NO.	

HYDRAULICS ENGINEER

AS-BUILT PLANS

LEGEND

- CONSTRUCTED TULULA CREEK
- ------ PROPOSED WETLAND BOUNDARY

PROPOSED WETLAND BOUNDARY

GRAPHIC SCALE

200 100 0 200 400

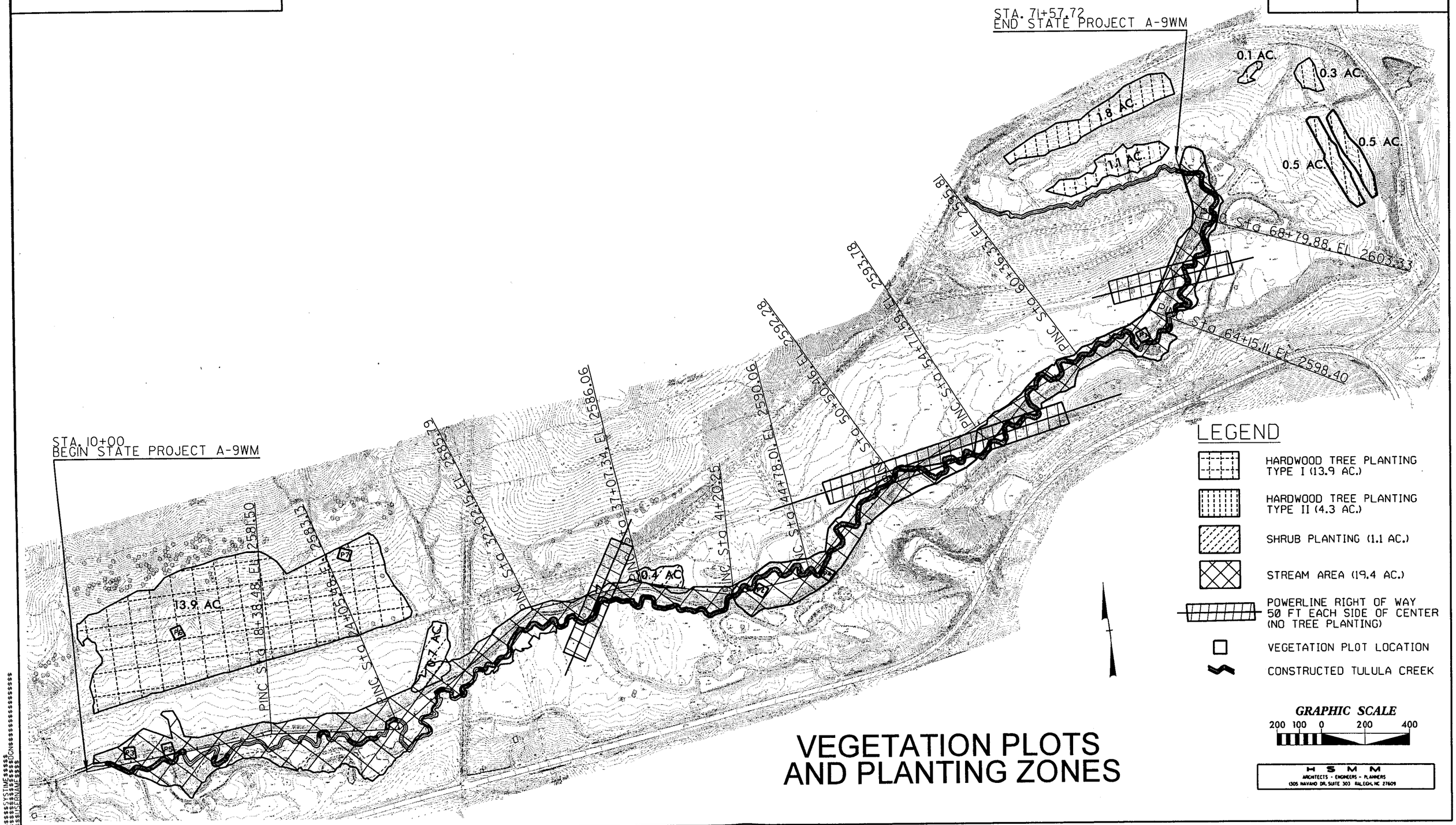
H S M M
ARCHITECTS - ENGINEERS - PLANNERS
1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609

$$$$$$SYSTIME$$$$
$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$

REVISIONS

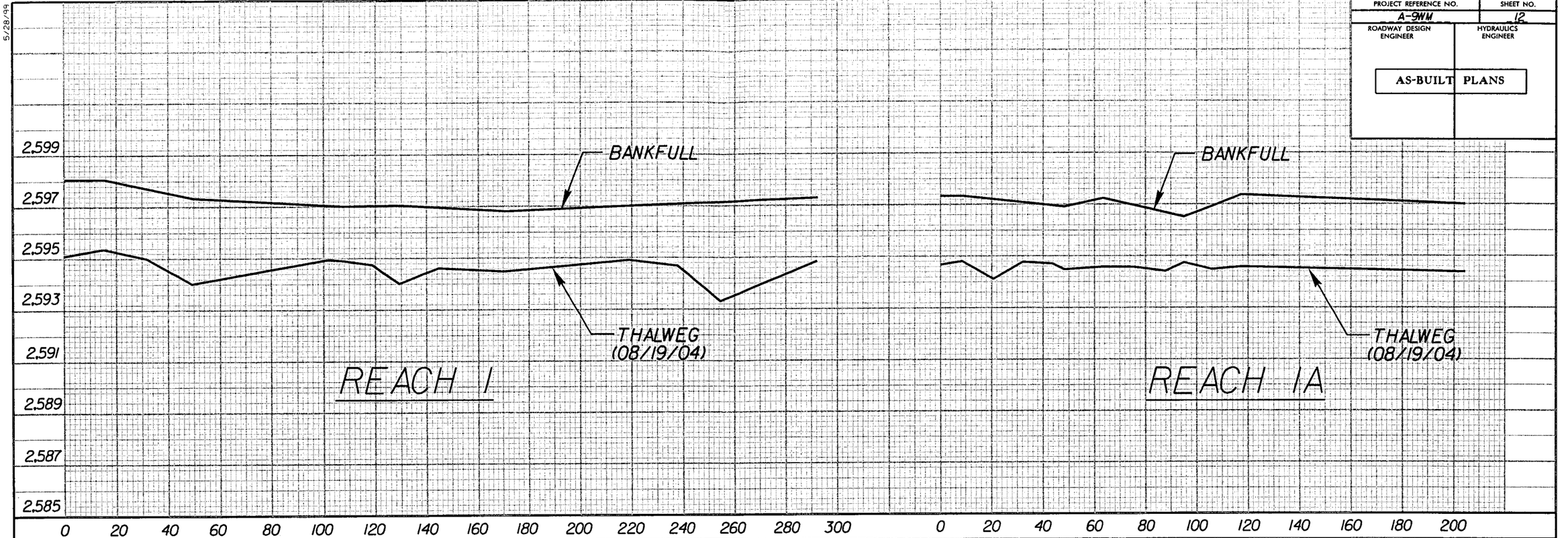
A-9WM	11
R/W SHEET NO.	
	HYDRAULICS ENGINEER

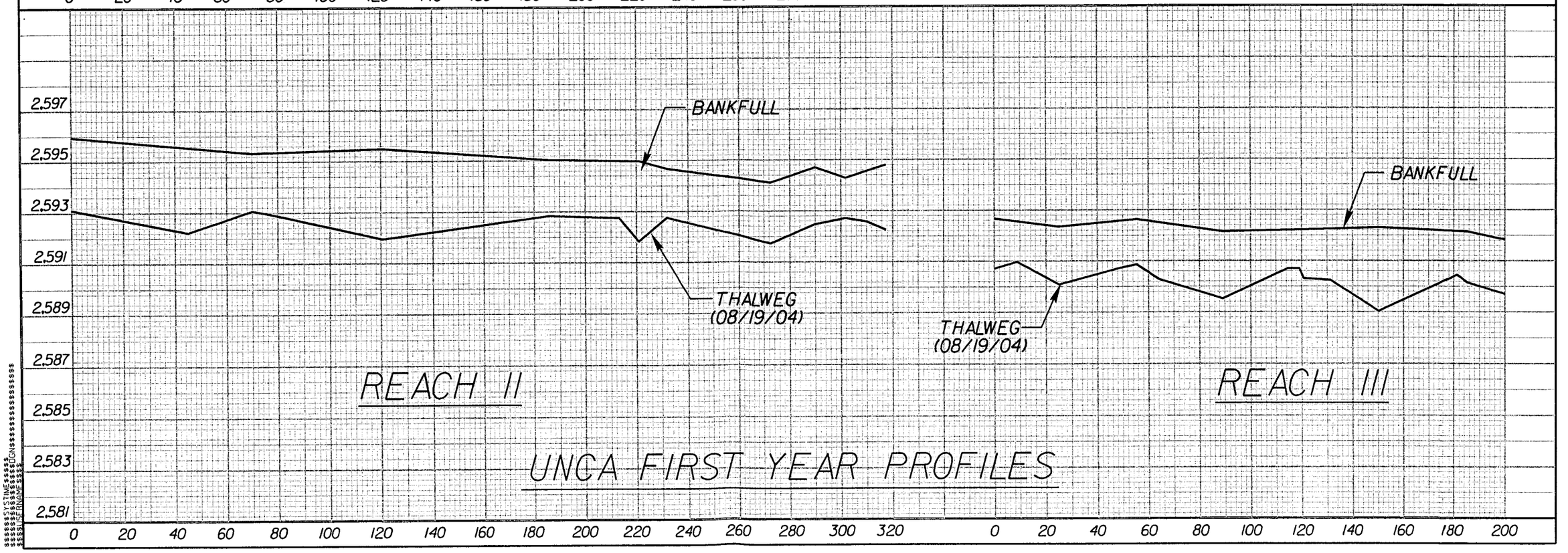
AS-BUILT PLANS



VEGETATION PLOTS AND PLANTING ZONES

H S M M
ARCHITECTS - ENGINEERS - PLANNERS
1305 NAVAHO DR. SUITE 303 RALEIGH, NC 27609

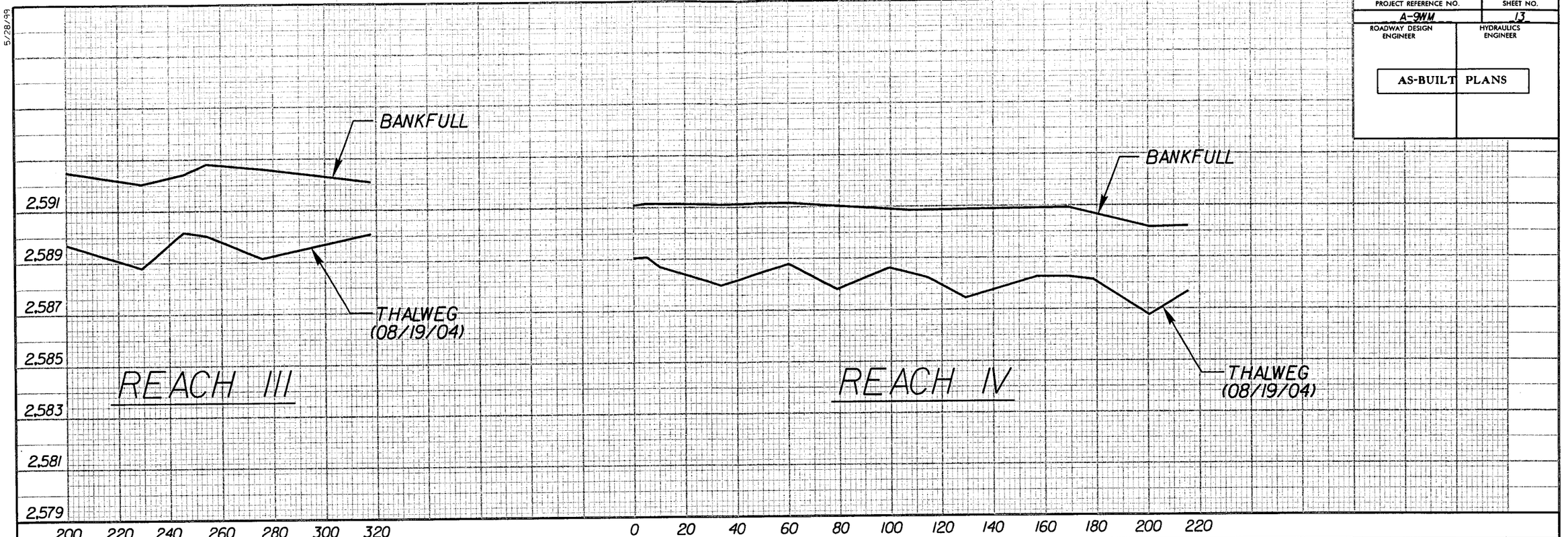




PROJECT REFERENCE NO.	SHEET NO.
A-9WM	12
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

AS-BUILT PLANS

UNCA FIRST YEAR PROFILES



PROJECT REFERENCE NO.	SHEET NO.
A-9WM	13
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

AS-BUILT PLANS

5/28/99

UNCA FIRST YEAR PROFILES

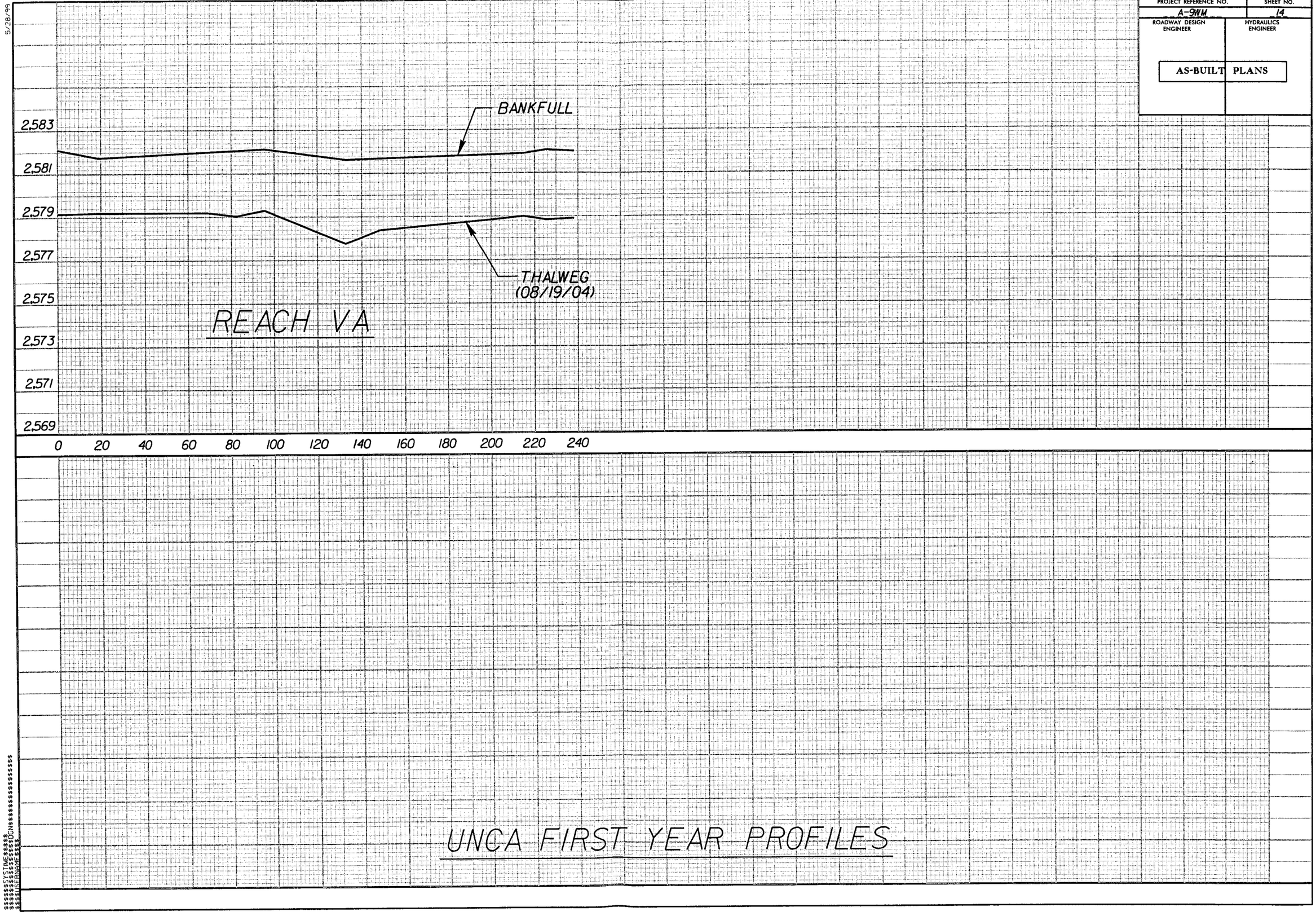
$$$$$SYSTIME$$$$$
$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$USERNAME$$$$

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
A-9WM	14

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

AS-BUILT PLANS



UNCA FIRST YEAR PROFILES

$$$$$$$$SYSTIME$$$$$
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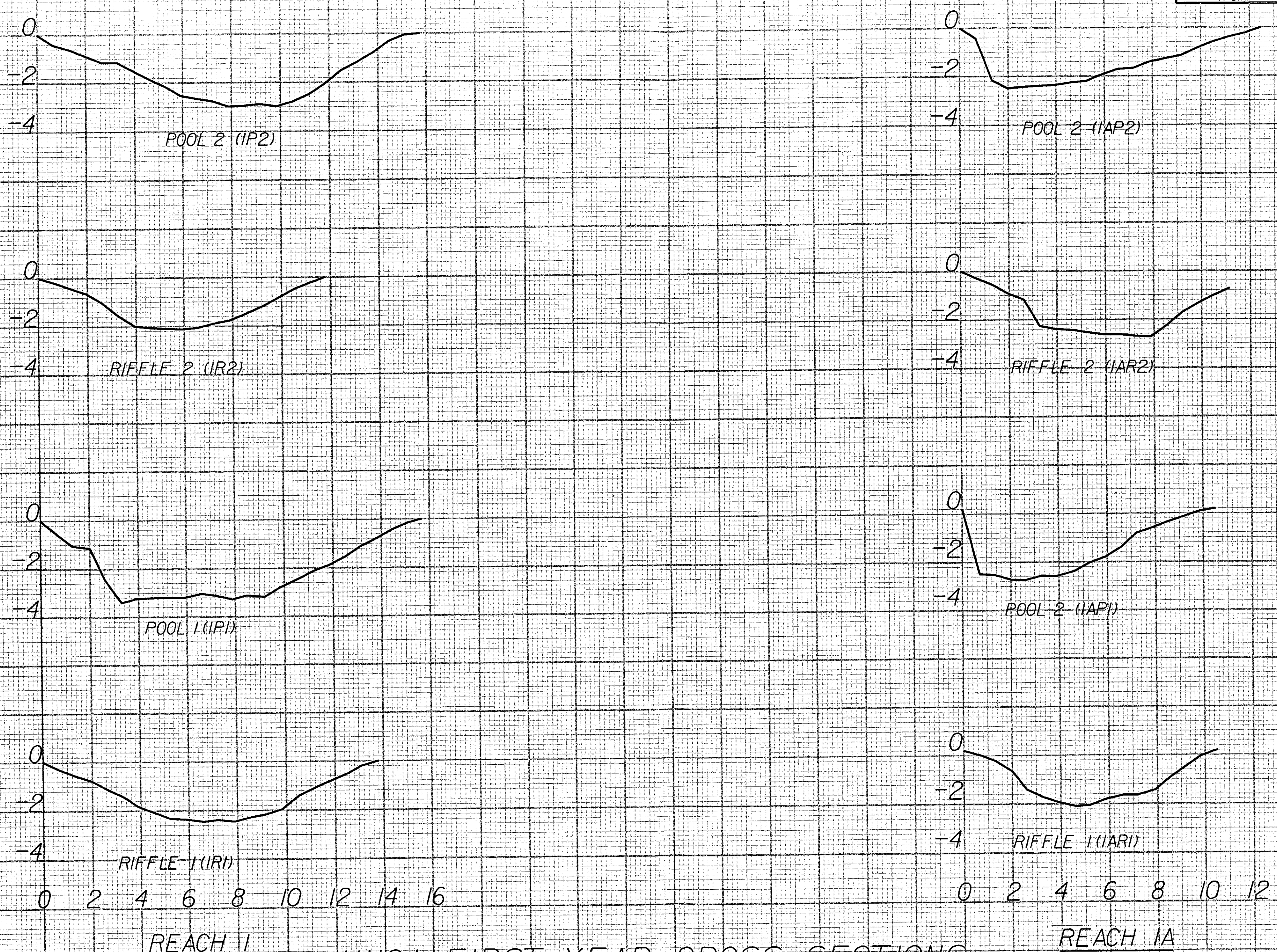
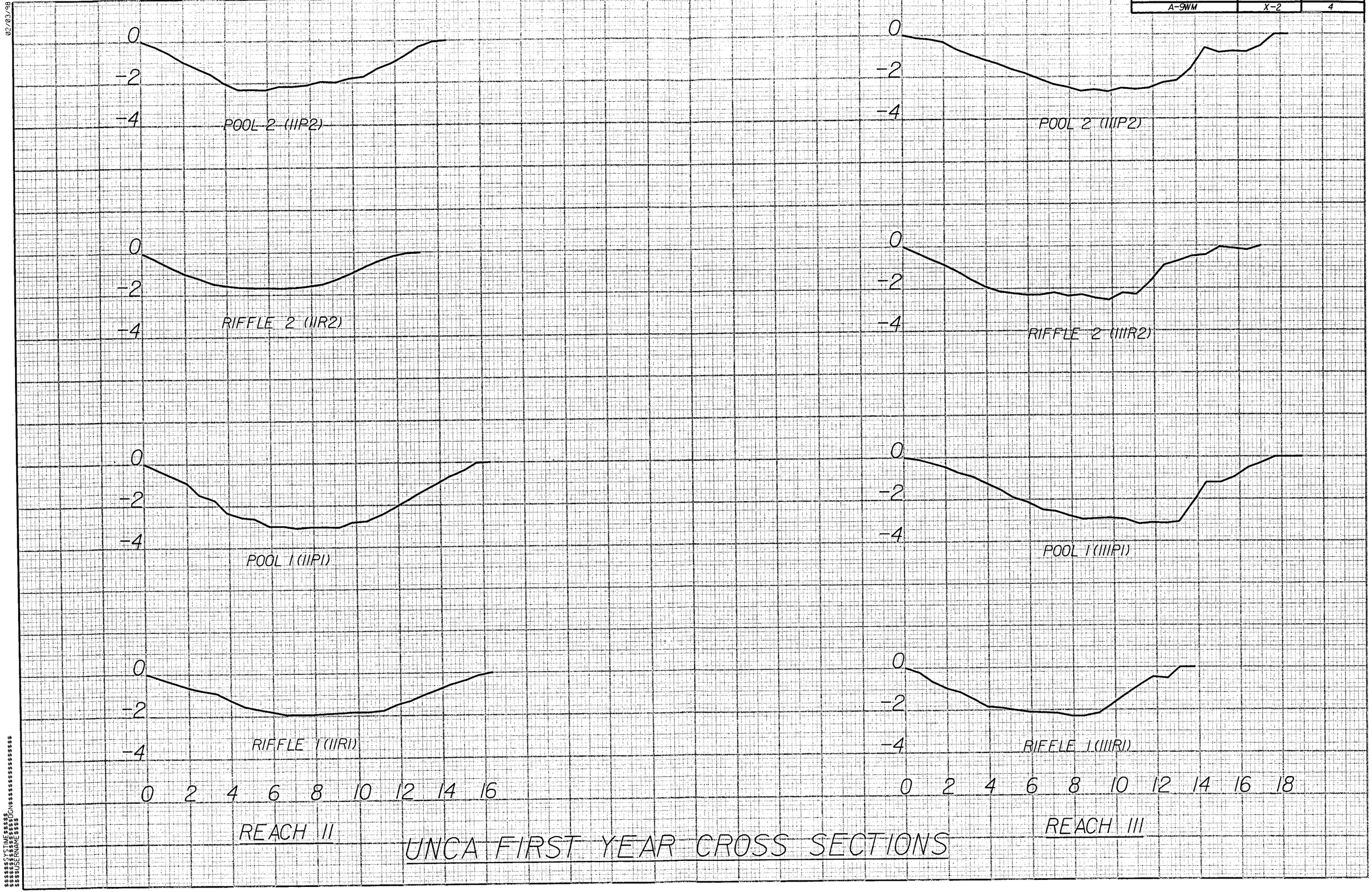
PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
A-9WM	X-1	4



UNCA FIRST YEAR CROSS SECTIONS

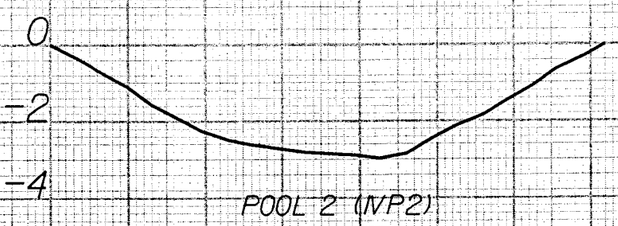
A-9WM	X-2	4

02/03/98



UNCA FIRST YEAR CROSS SECTIONS

PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
A-9WM	X-3	4



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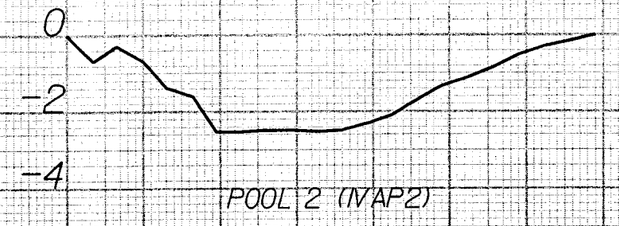

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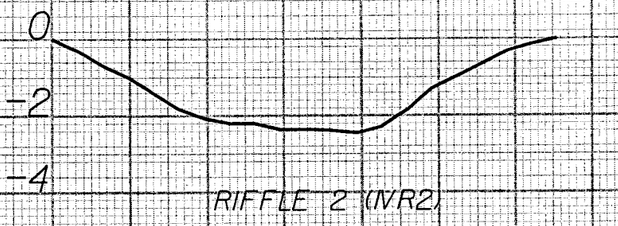

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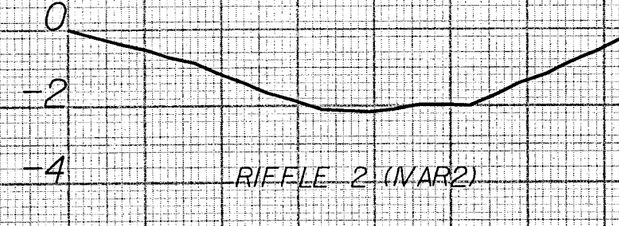

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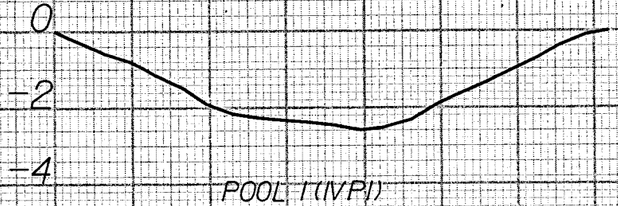

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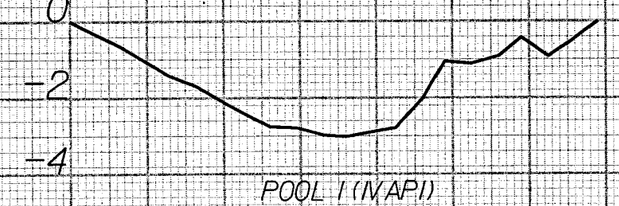

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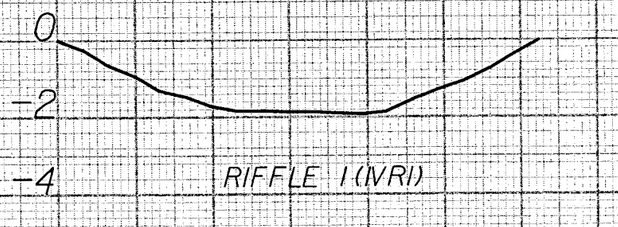

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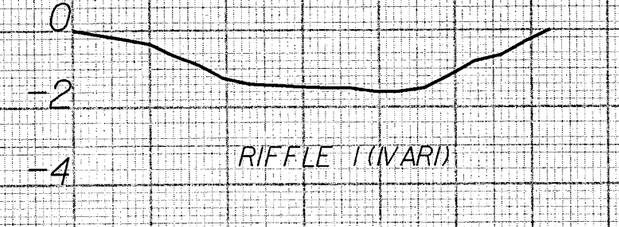
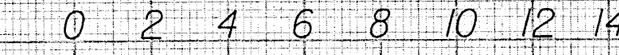


RIFFLE 1 (IVAR1)

REACH IV

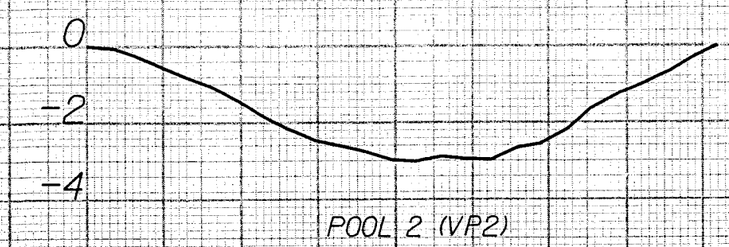


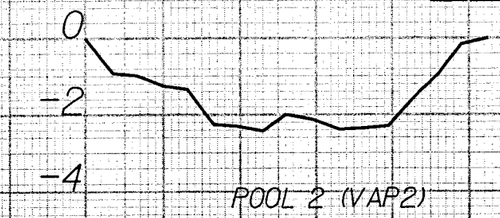
REACH IVA

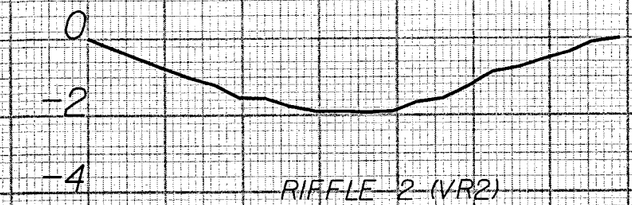
UNCA FIRST YEAR CROSS SECTIONS

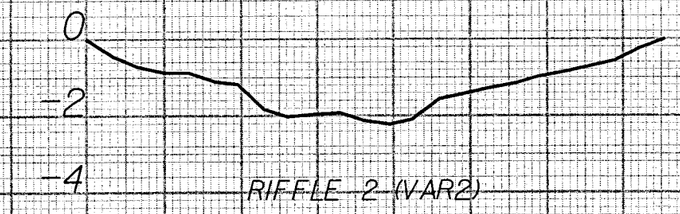
02/03/98

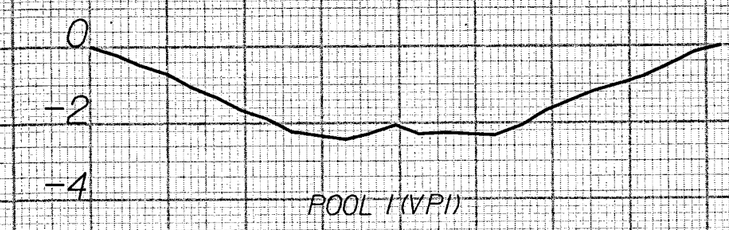
$$$$$$$$SYSTIME$$$$$$
$$$$$$$$$$$$$$$$$$$$DGN$$$$$$$$$$$$$$$$$$$$
$$$$USERNAME$$$$$

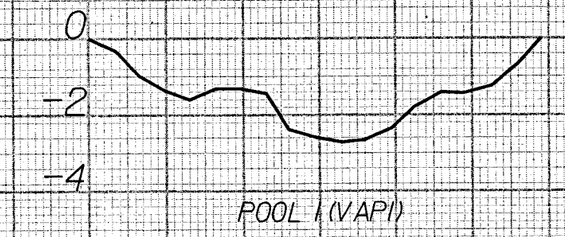


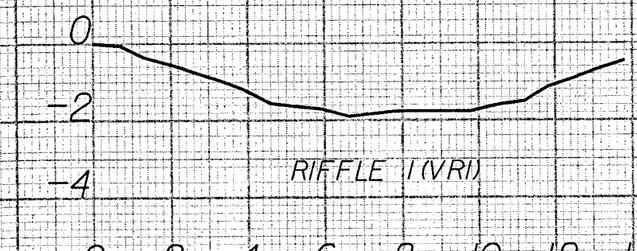


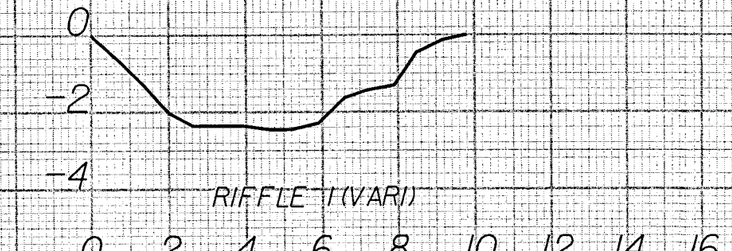












PROJ. REFERENCE NO.	SHEET NO.	TOTAL SHEETS
A-9WM	X-4	4

REACH V

REACH VA

UNCA FIRST YEAR CROSS SECTIONS