STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

MICHAEL F. EASLEY
GOVERNOR

LYNDO TIPPETT
SECRETARY

July 8, 2004

U. S. Army Corps of Engineers
Regulatory Branch
Post Office Box 1890
Wilmington, NC 28402-1890

ATTN: Mr. Richard Spencer
NCDOT Coordinator

Dear Sir:

SUBJECT: **Permit Modification Request for TIP No. R-2231B**, Richmond County, Federal Aid No NHF-45-1(49), State Project No. 8T550803, NCDOT Division 8, $475.00 Debit work order 8T550803, WBS Element No. 34398.1.4, NCDOT Division 8

Reference: USACE 401 Individual Permit Action ID 199400590, issued July 11, 2003, condition 2e, 2f, 2g, 2i; and DWQ 401 Major Water Quality Certification, Project No. 000874 issued on April 1, 2003, condition 9.

The North Carolina Department of Transportation (NCDOT) proposes to modify the construction plans for the abovementioned project. The purpose of this letter is to request a modification to the Department of the Army Individual Permit, as well as to the 401 Water Quality Certification from the NC Division of Water Quality. A new set of permit drawings are attached.

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1548 MAIL SERVICE CENTER
RALEIGH NC 27699-1548

TELEPHONE: 919-733-3141
FAX: 919-733-9794

WEBSITE: WWW.DOH.DOT.STATE.NC.US

LOCATION:
TRANSPORTATION BUILDING
1 SOUTH WILMINGTON STREET
RALEIGH NC

Summary of Changes

Background: This project is located in the Yadkin River Basin and the Lumber River Basin. The changes needed for this project are located in the Lumber River Basin. In the existing permit a stream channel was to be restored in the area of the pond (Type "A" Basin or Myrick Pond) and through the fill material of the earthen dam at site 6 below the road (see sheet 28 of 43 of the permit drawings attached). The new channel would have provided 1066 linear feet of onsite mitigation using natural stream design (NSD) at sites above (see sheets 29 and 30 of 43) and below the road. A site visit was conducted on March 22, 2004 with NCDOT Division 8 Construction, NCDOT Hydraulics, Richard Spencer (USACE) and Contractor Personnel (See summary on sheets 38 and 39 of 43). It was determined that the plan for the channel as proposed is currently difficult to stabilize and would likely cause the accumulated fill material from the "A" basin and the dam to erode and be deposited in the downstream area.

Mitigation Changes: A new structure has been developed for the Myrick Pond Mitigation site below the pond. Revisions were made to the permit drawings in order to be consistent with new plans. Changes include removing the unstable channel where water is flowing from the pond ("A" Basin or Myrick Pond) and constructing an alternative structure utilizing a series of step pools to stabilize the site (see sheet No. 28 of 43 of the permit drawings attached). Part of the new plans will also include the creation of a wetland habitat by retaining a shallow pool of water behind the remnants of the earthen dam.

Due to the changes there will be a loss of 249 linear feet of the NSD (see revised impact summary sheet attached, sheets 42 and 43 of 43). The 249 linear feet will be subtracted from the original total NSD of 1066 linear feet. This will give a balance of 817 linear feet of mitigation utilizing NSD in the Lumber River Basin. According to condition 2.e. in the existing 404 permit, 702 linear feet of mitigation were designated at the Myrick Pond site. Since the remaining stream mitigation of 817 linear feet, meets the 702 feet requirement, no further compensation is proposed. The NCDOT will continue to adhere to conditions 2f., 2g. and 2i. as these conditions relate to mitigation at Myrick Pond and the Lumber River Basin.

The specific revision is listed below. The site number corresponds to the permit drawing sheets.

Site 6, Sheet 28 of 43
Station 140+20 TO Station 141+40-L-(Rt)
Eliminate the stream relocation design below the proposed roadway. A step-pool channel is proposed through the dam to stabilize this site. See attached hydraulic plans and supporting data.
Mitigation change: elimination of 249 linear feet of Natural Stream Design

The revised design does not compromise NCDOT's compliance with the existing permit conditions. No additional mitigation is proposed. The new impact sites have been

evaluated for compliance with the avoidance/minimization criteria and are in compliance with all previous Individual Permit factors, including the following:

- Protected Species,
- Cultural Resources,
- Aquatic Life passage,
- FEMA compliance, and
- Utilities.

The NCDOT respectfully requests that the referenced 404 Individual Permit and 401 Major Water Quality Certification be modified to reflect the revisions outlined in this letter. In compliance with Section 143-215.3D9e of the NCAC, we will provide $475.00 to act as payment for processing the Section 401 permit application previously noted in this application (see Subject line).

If you have any questions or need additional information, please contact Carla Dagnino at (919) 715-1456.

Respectfully,

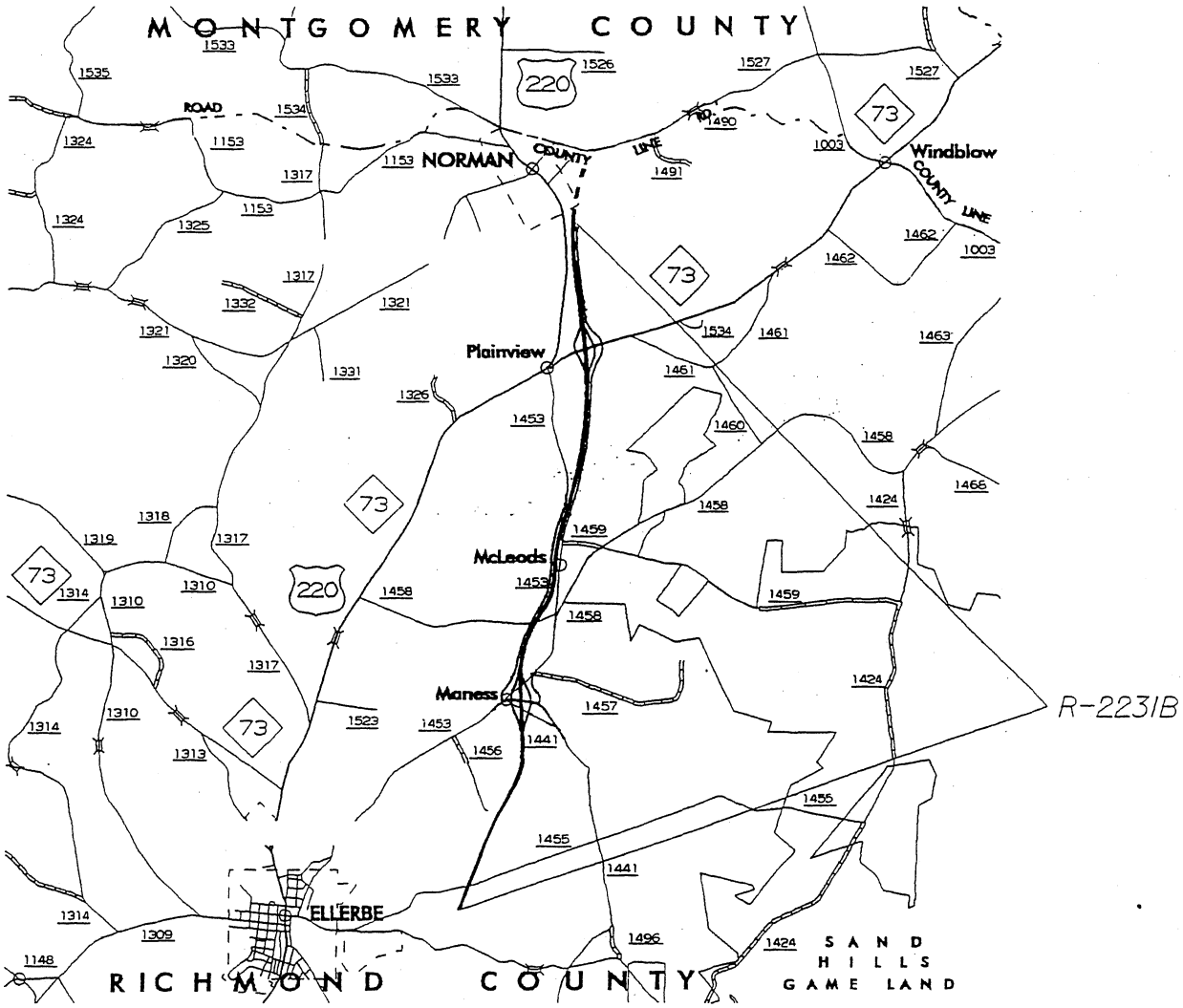
Gregory J. Thorpe, Ph.D.
Environmental Management Director, PDEA

w/attachment

Mr. John Hennessy, NCDWQ (7 copies)
Mr. Travis Wilson, NCWRC
Ms. Becky Fox, USEPA – Whittier, NC
Mr. Ronald Mikulak, USEPA – Atlanta, GA
Mr. Gary Jordan, USFWS
Mr. David Chang, P.E., Hydraulics
Mr. Greg Perfetti, P.E., Structure Design
Mr. T. Johnson, P.E. (Div. 8), Division Engineer
Mr. Art King (Div. 8), Division Environmental Officer

w/o attachment

Mr. Jay Bennett, P.E., Roadway Design
Mr. Omar Sultan, Programming and TIP
Mr. Art McMillan, P.E., Highway Design
Mr. Mark Staley, Roadside Environmental
Mr. David Franklin, USACE, Wilmington
Ms. Cindy Sharer, PDEA Project Planning Engineer
Ms. Beth Harmon, EEP



VICINITY MAP

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

9/02 1 of 43

WETLAND LEGEND

WLB — WETLAND BOUNDARY

WLB / WLB — WETLAND

F F — DENOTES FILL IN WETLAND

S S — DENOTES FILL IN SURFACE WATER

P P — DENOTES FILL IN SURFACE WATER (POND)

T T — DENOTES TEMPORARY FILL IN WETLAND

E E — DENOTES EXCAVATION IN WETLAND

TS TS — DENOTES TEMPORARY FILL IN SURFACE WATER

DENOTES MECHANIZED CLEARING

FLOW DIRECTION

TB — TOP OF BANK

WE — EDGE OF WATER

C — PROP. LIMIT OF CUT

F — PROP. LIMIT OF FILL

PROP. RIGHT OF WAY

NG — NATURAL GROUND

PL — PROPERTY LINE

TDE — TEMP. DRAINAGE EASEMENT

PDE — PERMANENT DRAINAGE EASEMENT

EAB — EXIST. ENDANGERED ANIMAL BOUNDARY

EPB — EXIST. ENDANGERED PLANT BOUNDARY

WATER SURFACE

LIVE STAKES

BOULDER

CORE FIBER ROLLS

PROPOSED BRIDGE

PROPOSED BOX CULVERT

PROPOSED PIPE CULVERT
12"-48" PIPES
54" PIPES & ABOVE

(DASHED LINES DENOTE EXISTNG STRUCTURES)

SINGLE TREE

WOODS LINE

DRAINAGE INLET

ROOTWAD

RIP RAP

5 — ADJACENT PROPERTY OWNER OR PARCEL NUMBER IF AVAILABLE

PREFORMED SCOUR HOLE (PSH)

LEVEL SPREADER (LS)

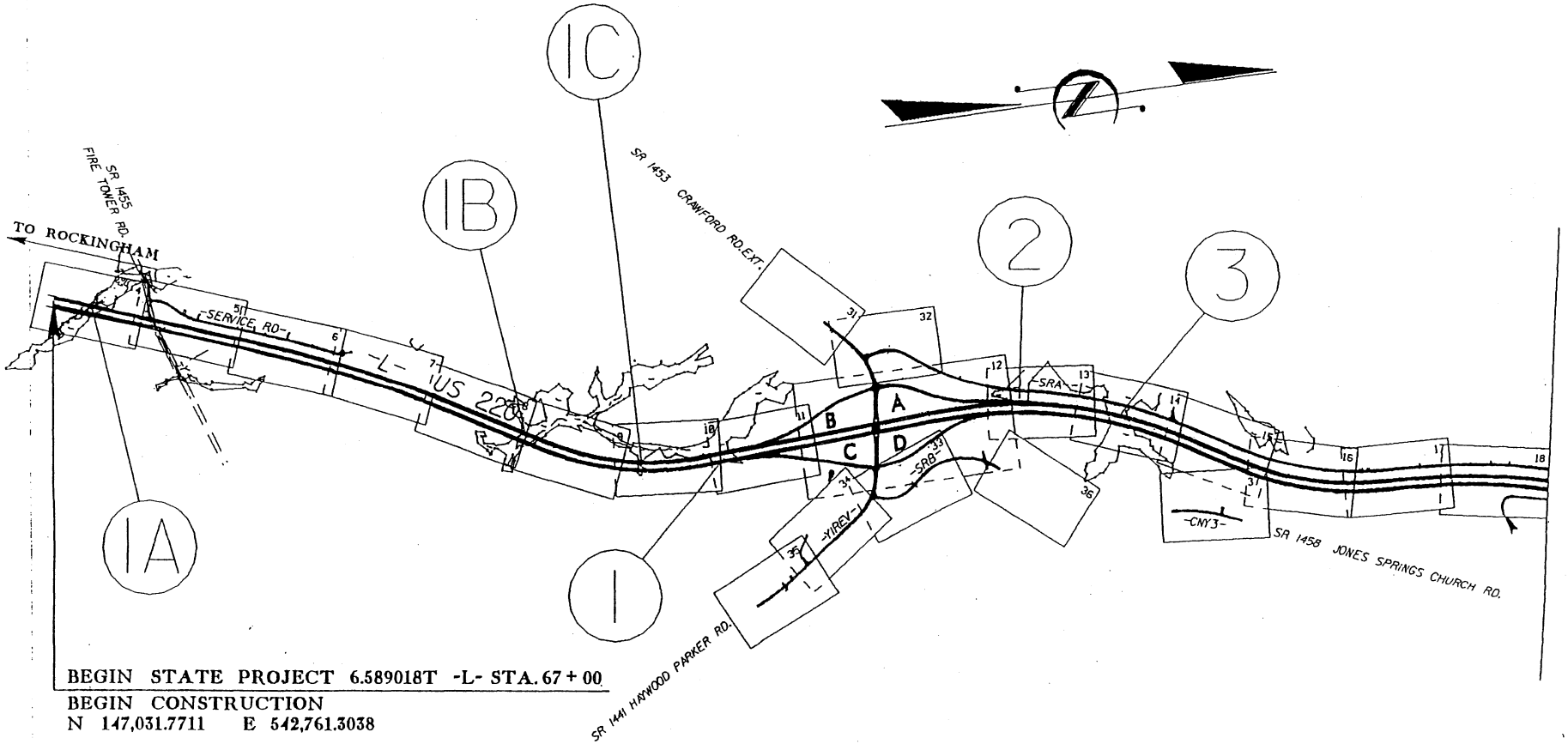
GRASS SWALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

9/02



BEGIN STATE PROJECT 6.589018T -L- STA. 67 + 00
BEGIN CONSTRUCTION
N 147,031.7711 E 542,761.3038

VICINITY MAP

9/02

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

SHEET 3 OF 43

END STATE PROJECT 6.589018T -L- STA. 170 + 80
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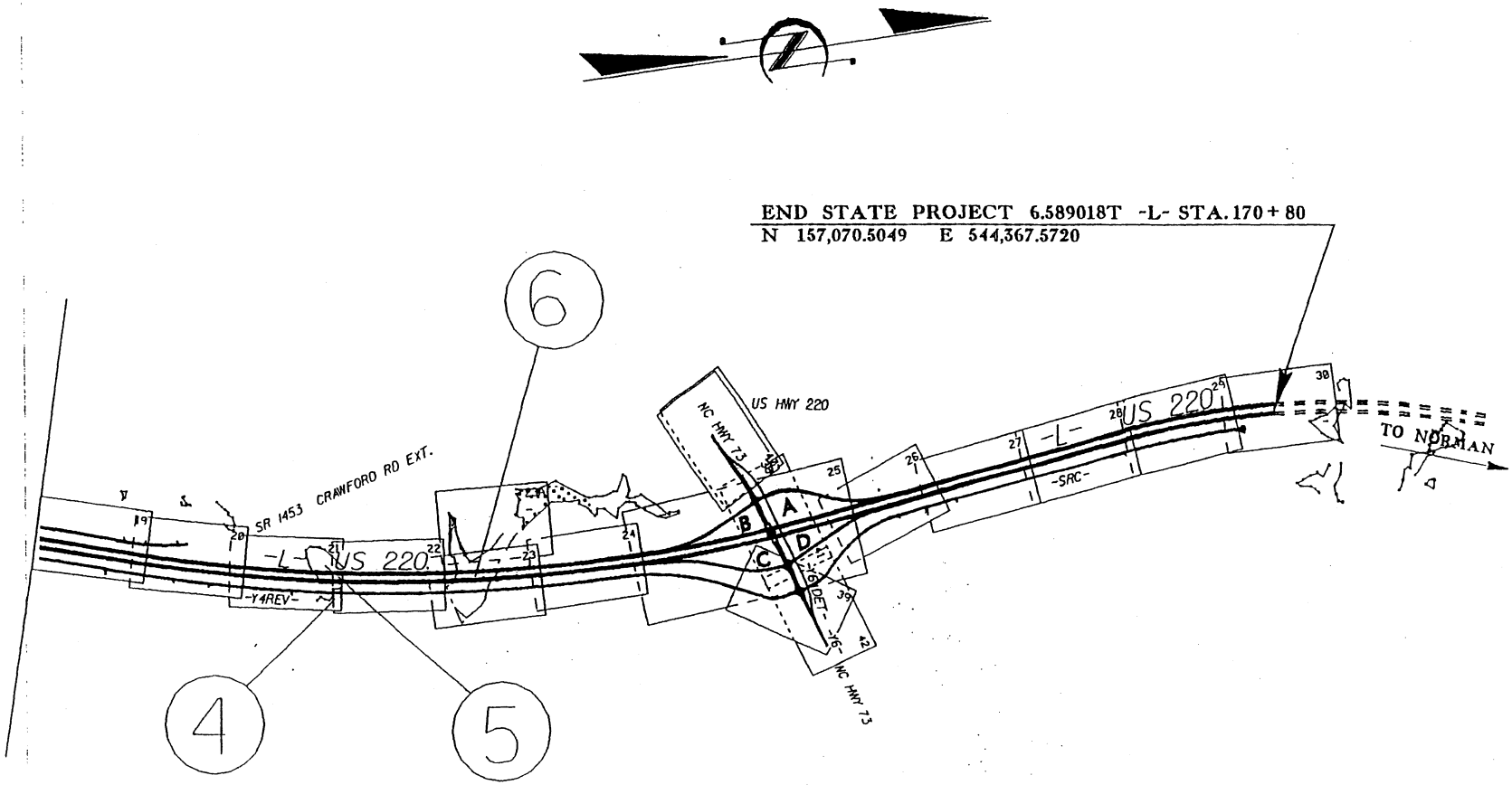

VICINITY MAP

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

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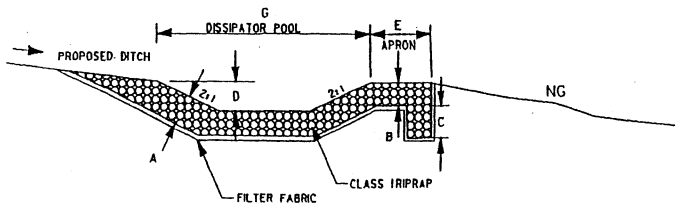
SHEET 4 OF 43

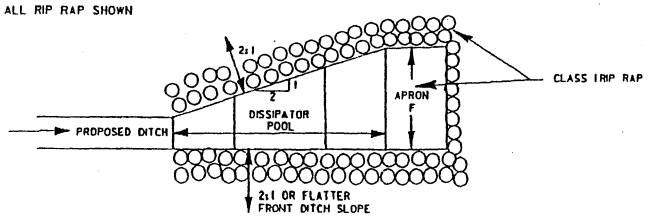
DETAIL OF RIP-RAPPED DITCH ENERGY DISSIPATOR BASIN

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
RALEIGH, N.C.



PROFILE
NOT TO SCALE

NOT ALL RIP RAP SHOWN



PLAN VIEW
NOT TO SCALE

BASIN #	LOCATION
1	Sta 67+54 To 67+71 -L- (Rt)
2	Sta 68+28 To 68+45 -L- (Lt)
3	Sta 68+41 To 68+69 -L- (Rt)
4	Sta 85+16 To 85+31 -L- (Lt)
5	Sta 86+35 To 86+50 -L- (Lt)
6	Sta 28+20 To 28+37 -L- (Rt)

DIM. (m)	RIP RAP BASIN #					
	1	2	3	4	5	6
A	0.60	0.60	0.60	0.60	0.60	0.60
B	0.60	0.60	0.60	0.60	0.60	0.60
C	0.60	0.60	0.60	0.60	0.60	0.60
D	0.60	0.60	0.60	0.60	0.60	0.60
E	3.0	3.0	3.0	3.0	3.0	3.0
F	6.0	6.0	6.0	6.0	6.0	6.0
G	12.0	12.0	12.0	12.0	12.0	12.0

ALL DIMENSIONS APPROXIMATE

9/02

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

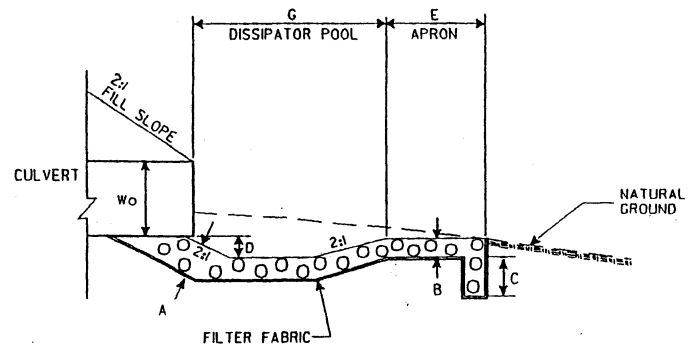
US 220 BYPASS

SHEET 5 OF 43

DIM. (m)	RIP RAP BASIN # 1	2	3
A	0.60	0.60	0.60
B	0.60	0.60	0.60
C	0.60	0.60	0.60
D	0.60	0.60	0.60
E	3.0	3.0	3.0
F	8.4	8.4	8.4
G	6.0	6.0	6.0

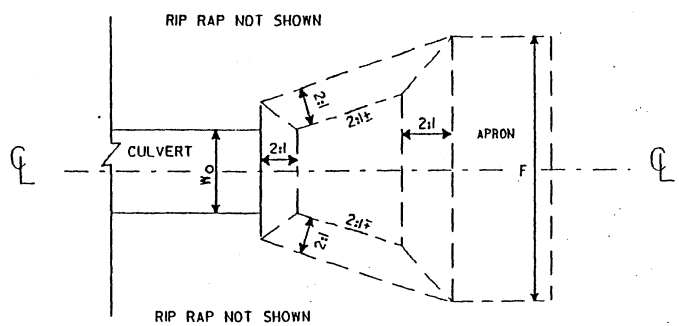
ALL DIMENSIONS APPROXIMATE

℄ SECTION



HALF PLAN

BASIN #	LOCATION (AT OUTLET)
1	Sta 90+80 -L- (Lt)
2	Sta 93+80 -L- (Lt)
3	Sta 108+04 -L- (Rt)



DETAIL OF RIP-RAPPED OUTLET ENERGY DISSIPATOR BASIN

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS
RALEIGH, N.C.

9/02

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

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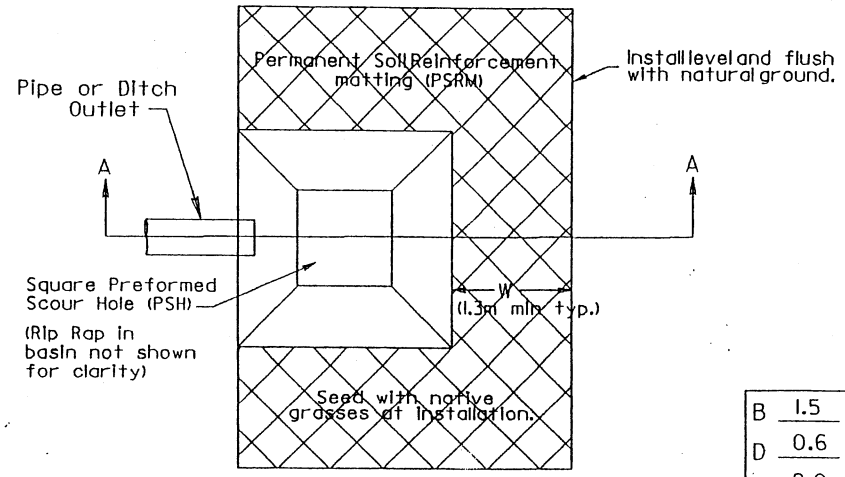
SHEET 6 OF 43

PREFORMED SCOUR HOLE

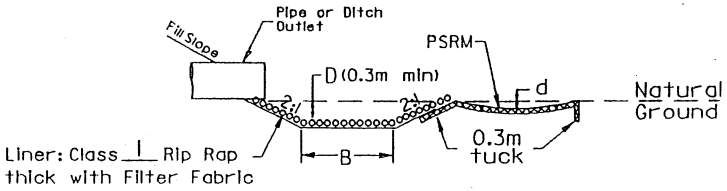
PLAN VIEW



BASIN #	LOCATION (AT OUTLET)
1	Sta 69+34 -L- (Rt)
2	Sta 85+00 -L- (Rt)
3	Sta 85+73 -L- (Rt)
4	Sta 15+81 -SRA- (Lt)
5	Sta 16+67 -SRA- (Lt)
6	Sta 22+78 -Y4REV- (Rt)
7	Sta 141+00 -L- (Lt)

B	1.5
D	0.6
W	2.0
d	0.15

SECTION A-A



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DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

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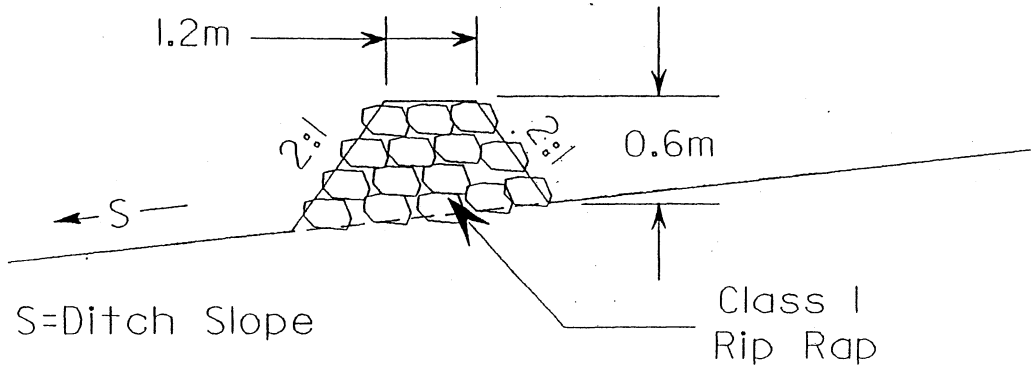
PERMANENT BERM
(Not to Scale)



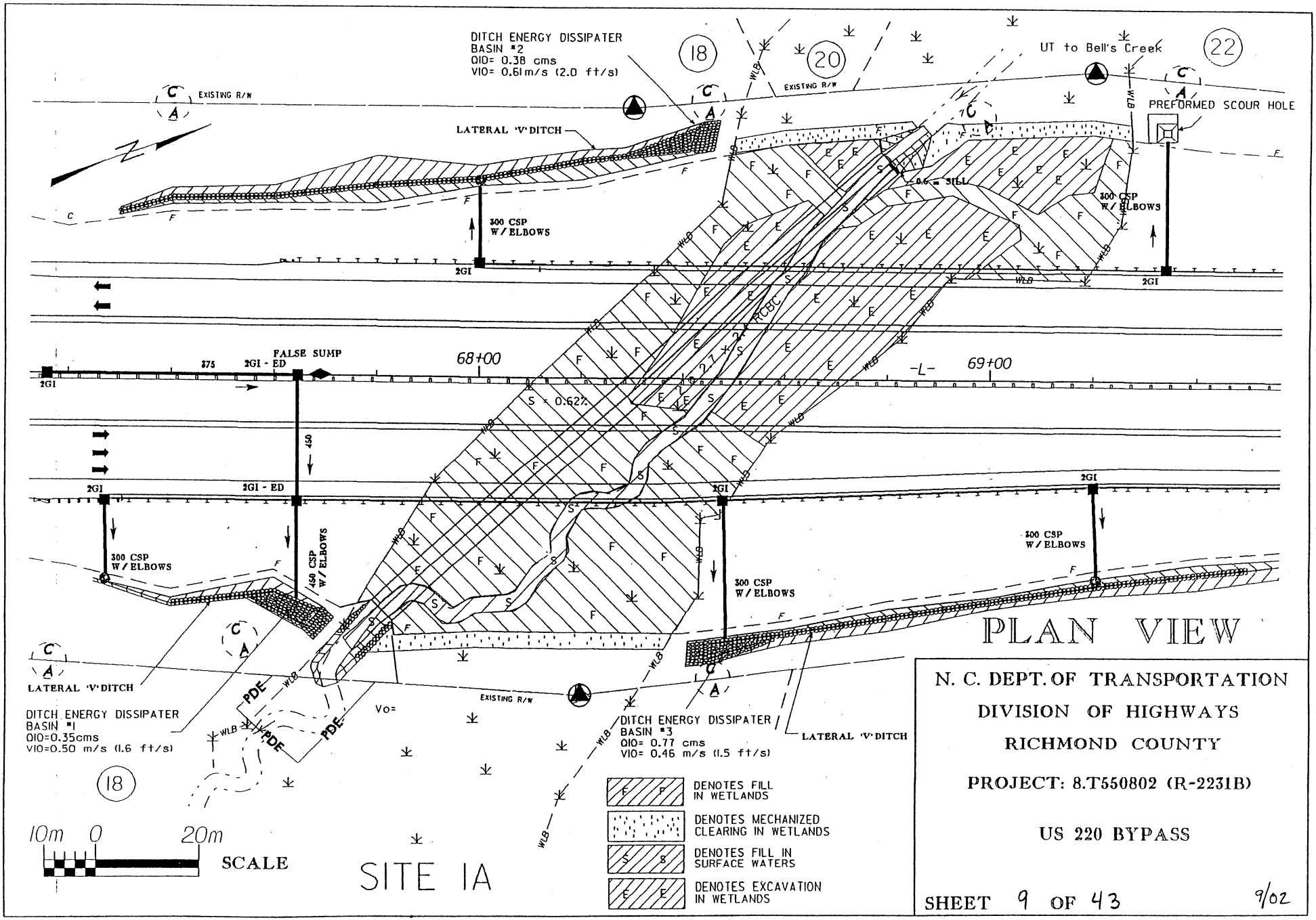
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

9/02

SHEET 8 OF 43



N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

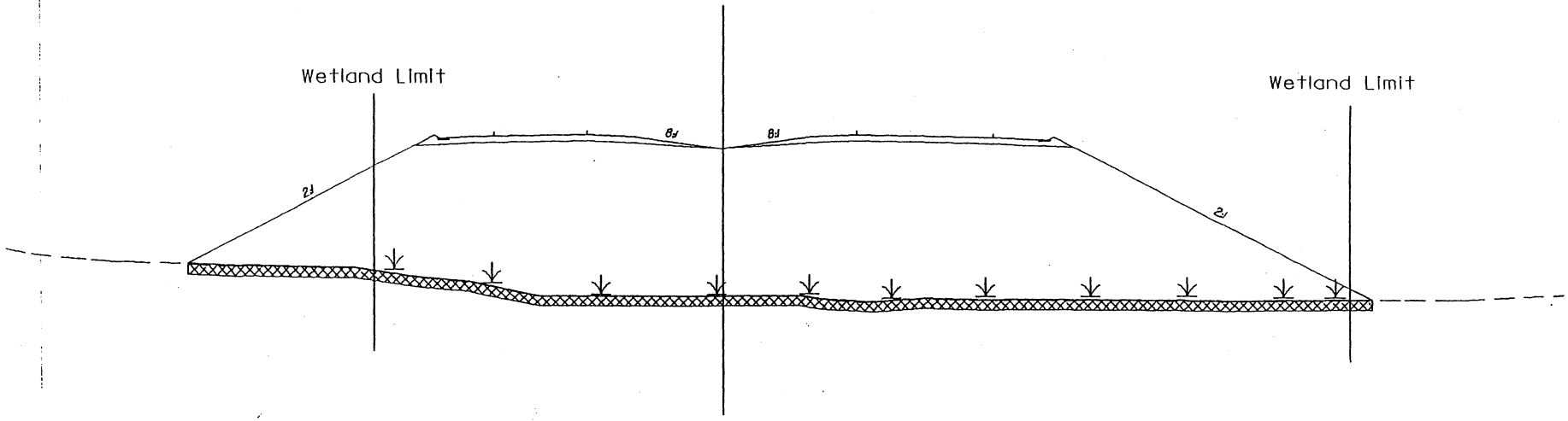
PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

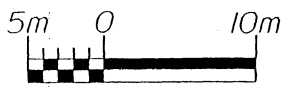
SHEET 9 OF 43

9/02

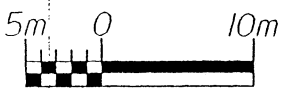
Typical Section
68+40 -L-



SECTION



HORIZONTAL SCALE

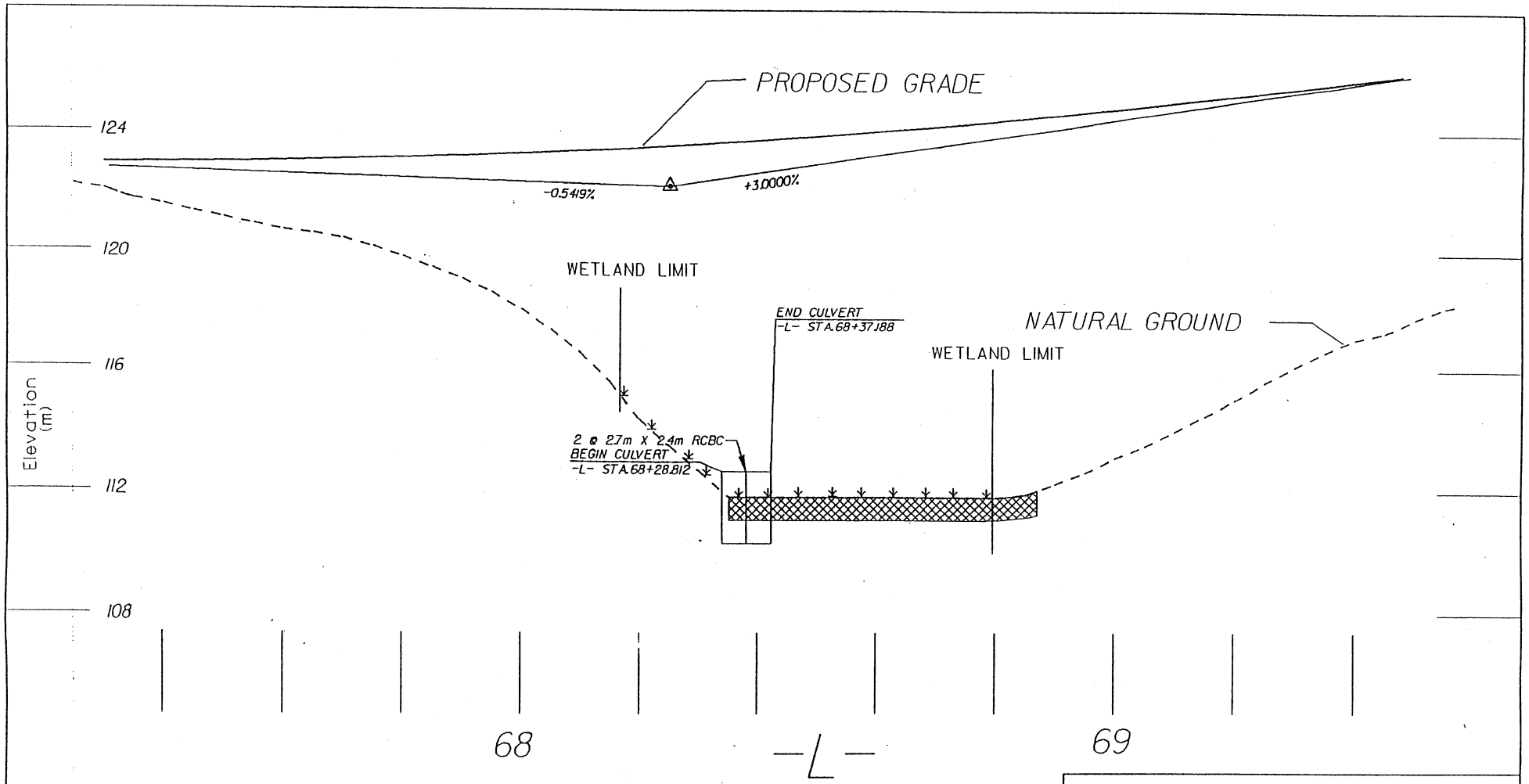


VERTICAL SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY
PROJECT: 8.T550802 (R-2231B)
US 220 BYPASS

SHEET 10 OF 43

9/02



PROFILE

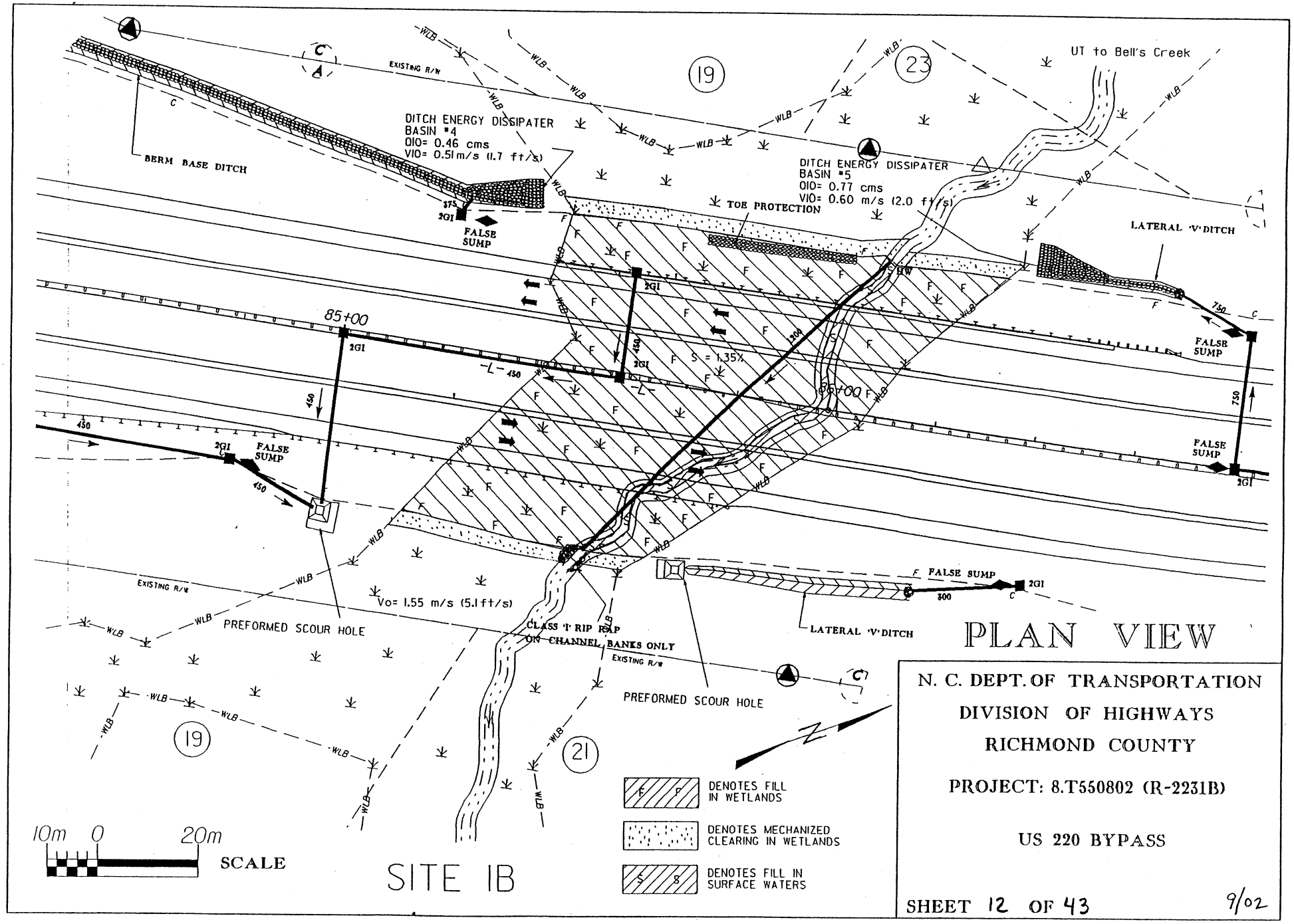
10m 0 20m
HORIZONTAL SCALE

2m 0 4m
VERTICAL SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY
PROJECT: 8.T550802 (R-2231B)
US 220 BYPASS

SHEET 11 OF 43

9/02



N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

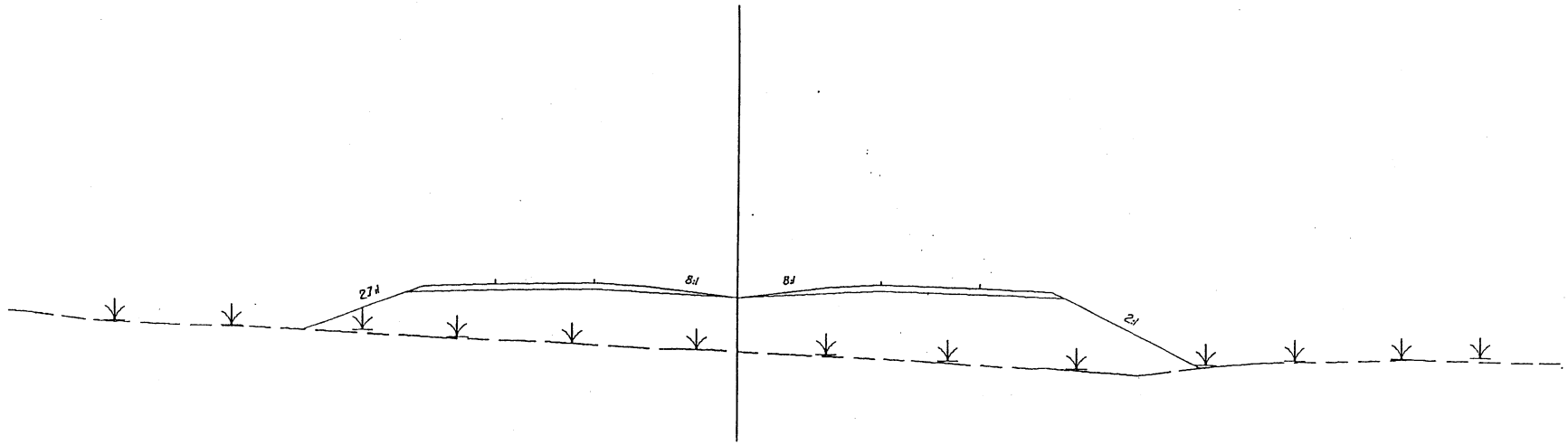
PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

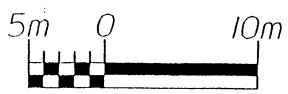
SHEET 12 OF 43

9/02

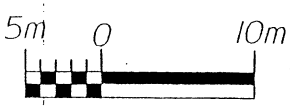
Typical Section
85+60 -L-



SECTION



HORIZONTAL SCALE

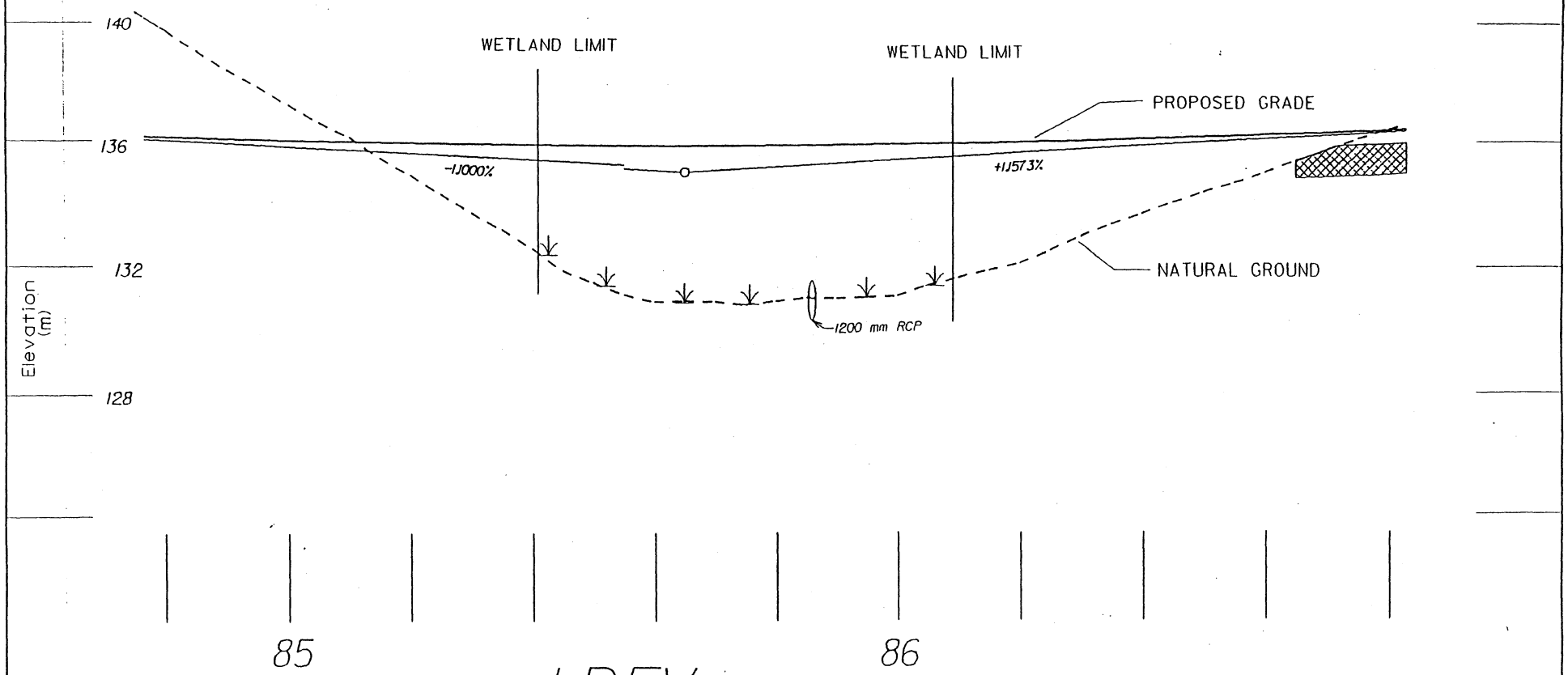


VERTICAL SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY
PROJECT: 8.T550802 (R-2231B)
US 220 BYPASS

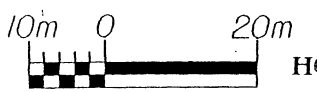
SHEET 13 OF 43

9/02

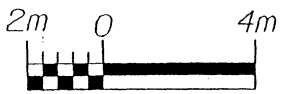


-LREV-

PROFILE



HORIZONTAL SCALE

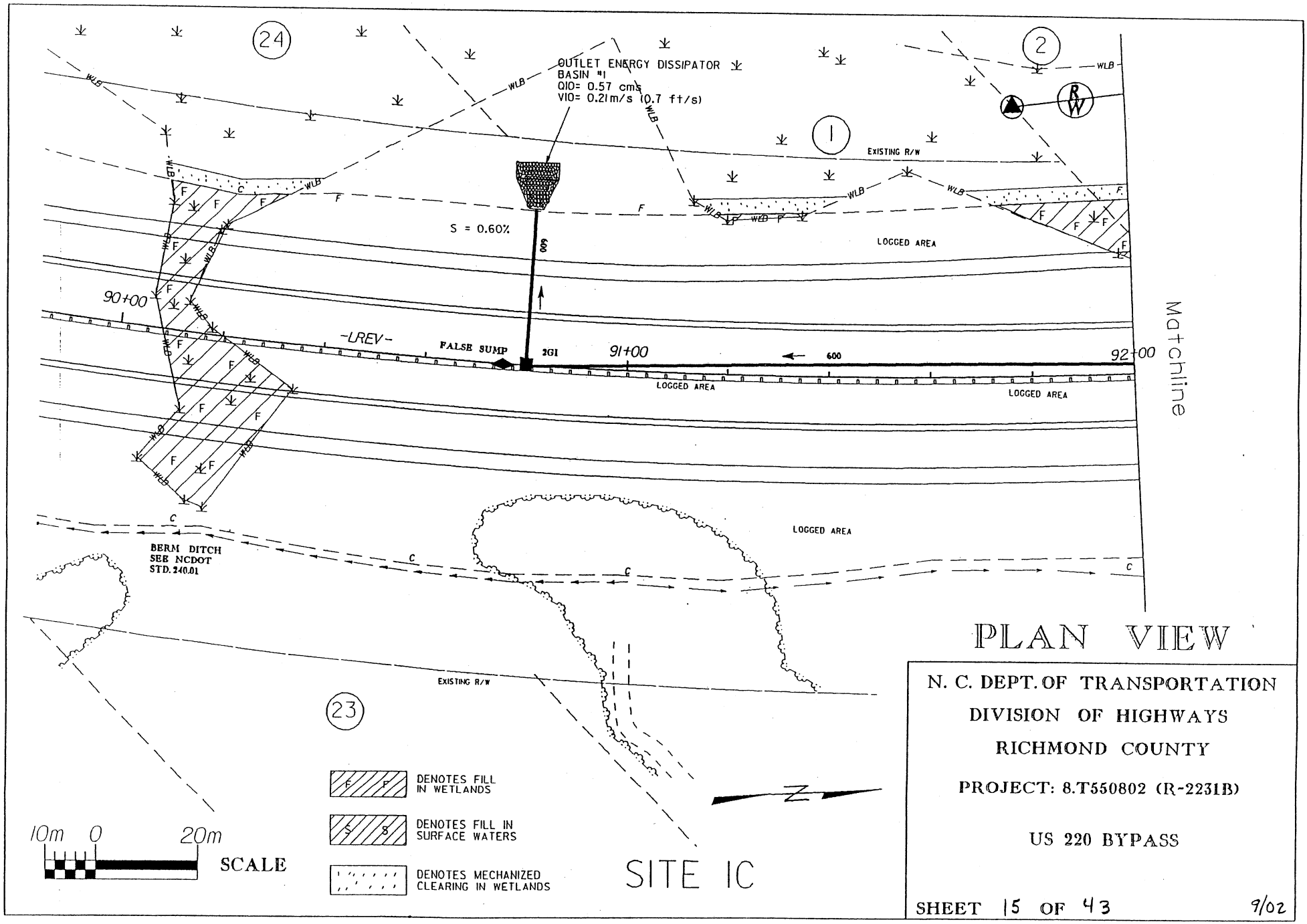


VERTICAL SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY
PROJECT: 8.T550802 (R-2231B)
US 220 BYPASS

SHEET 14 OF 43

9/02



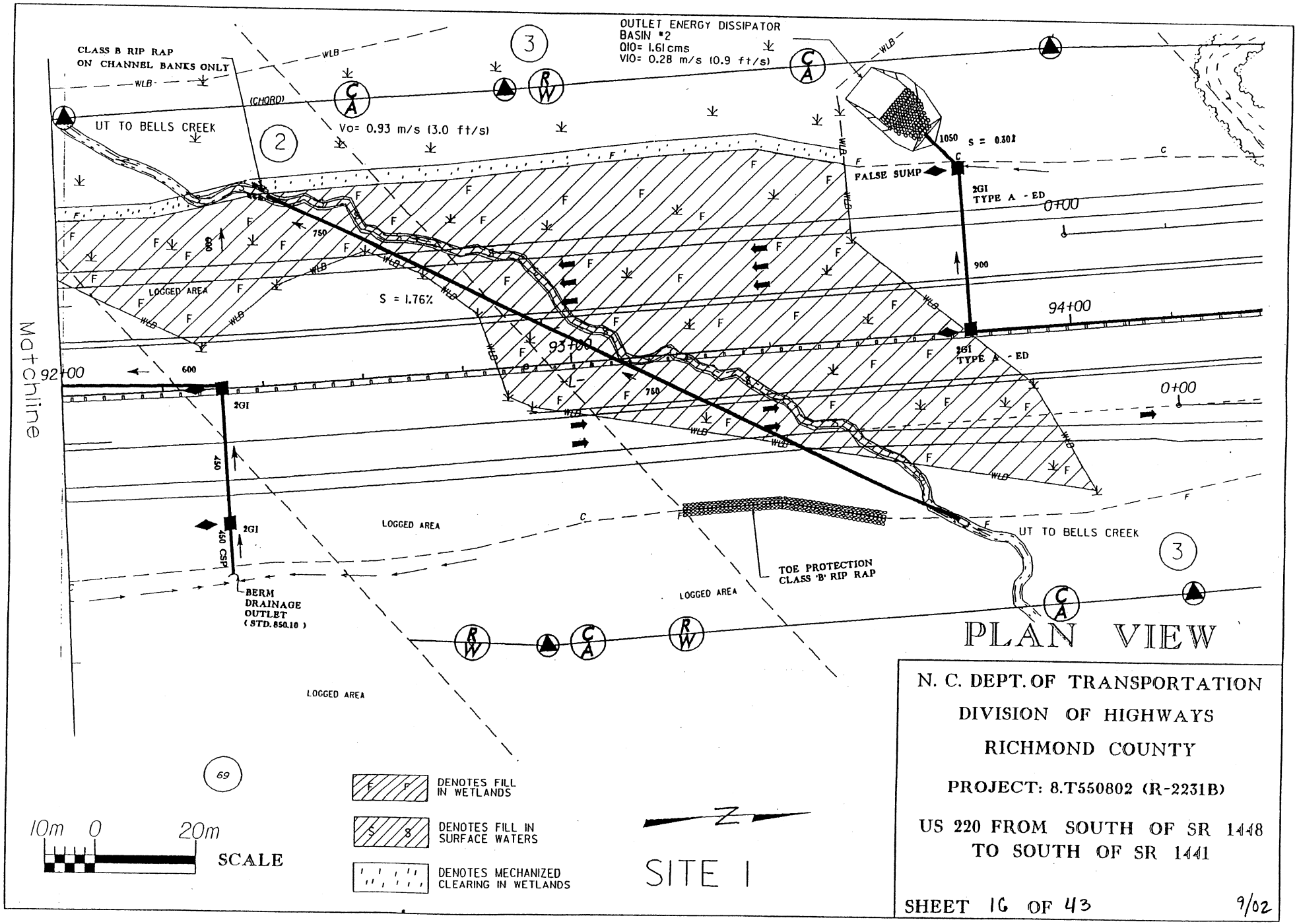
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

SHEET 15 OF 43

9/02



N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

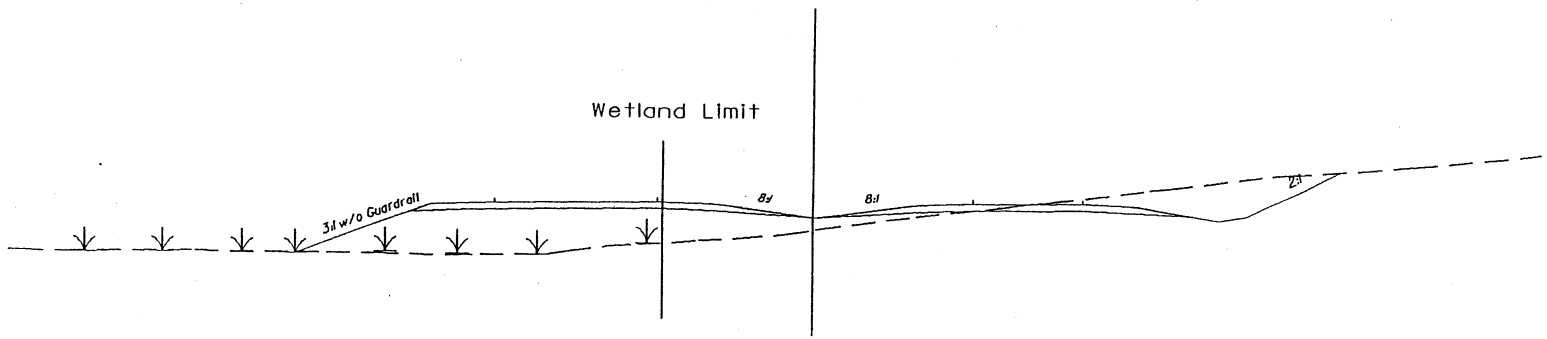
PROJECT: 8.T550802 (R-2231B)

US 220 FROM SOUTH OF SR 1448
TO SOUTH OF SR 1441

SHEET 16 OF 43

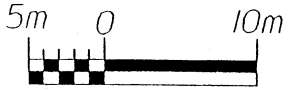
9/02

Typical Section
92+80 -L-



SECTION

HORIZONTAL SCALE



VERTICAL SCALE

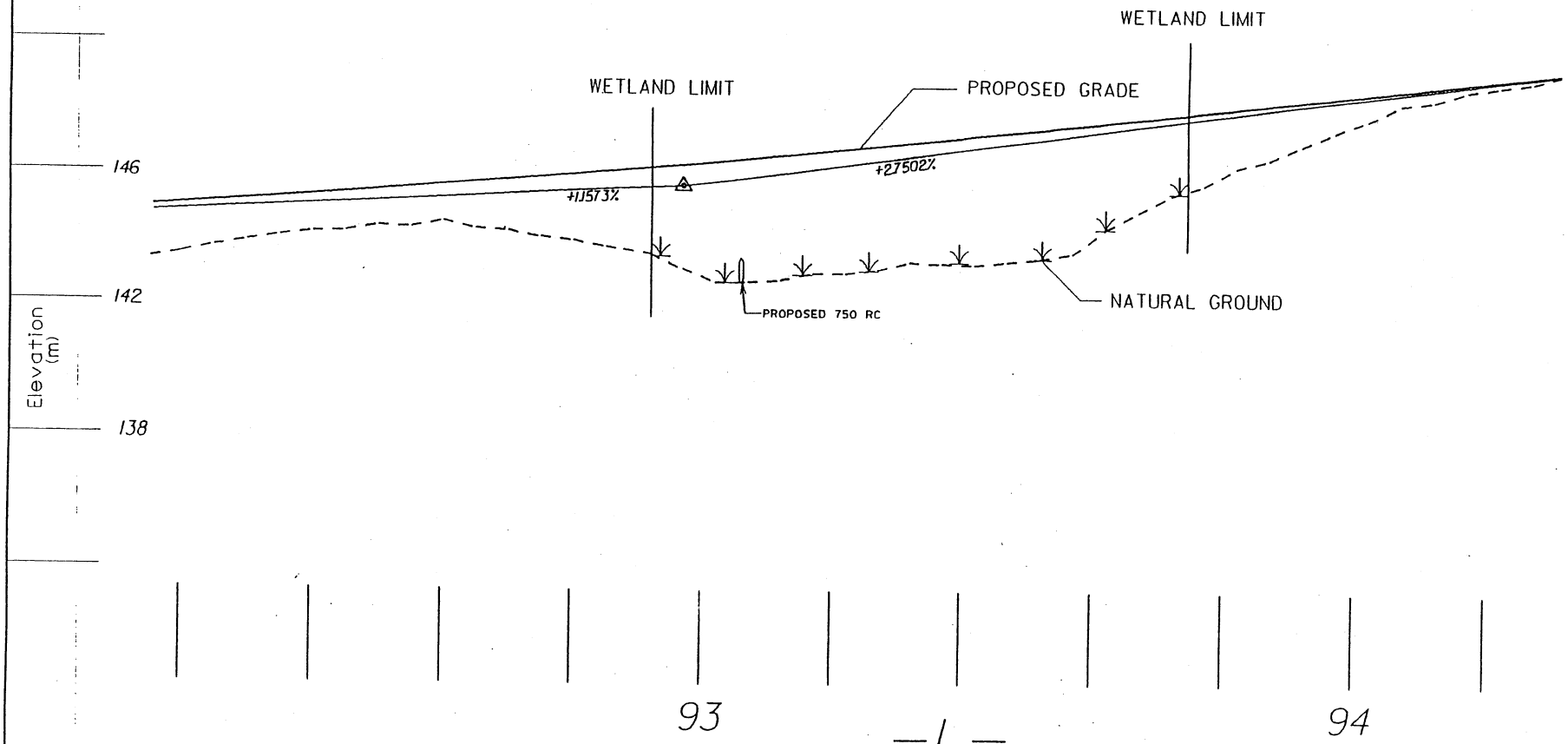
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550803 (R-2231B)

US 220 BYPASS

SHEET 17 OF 43

9/02



PROFILE

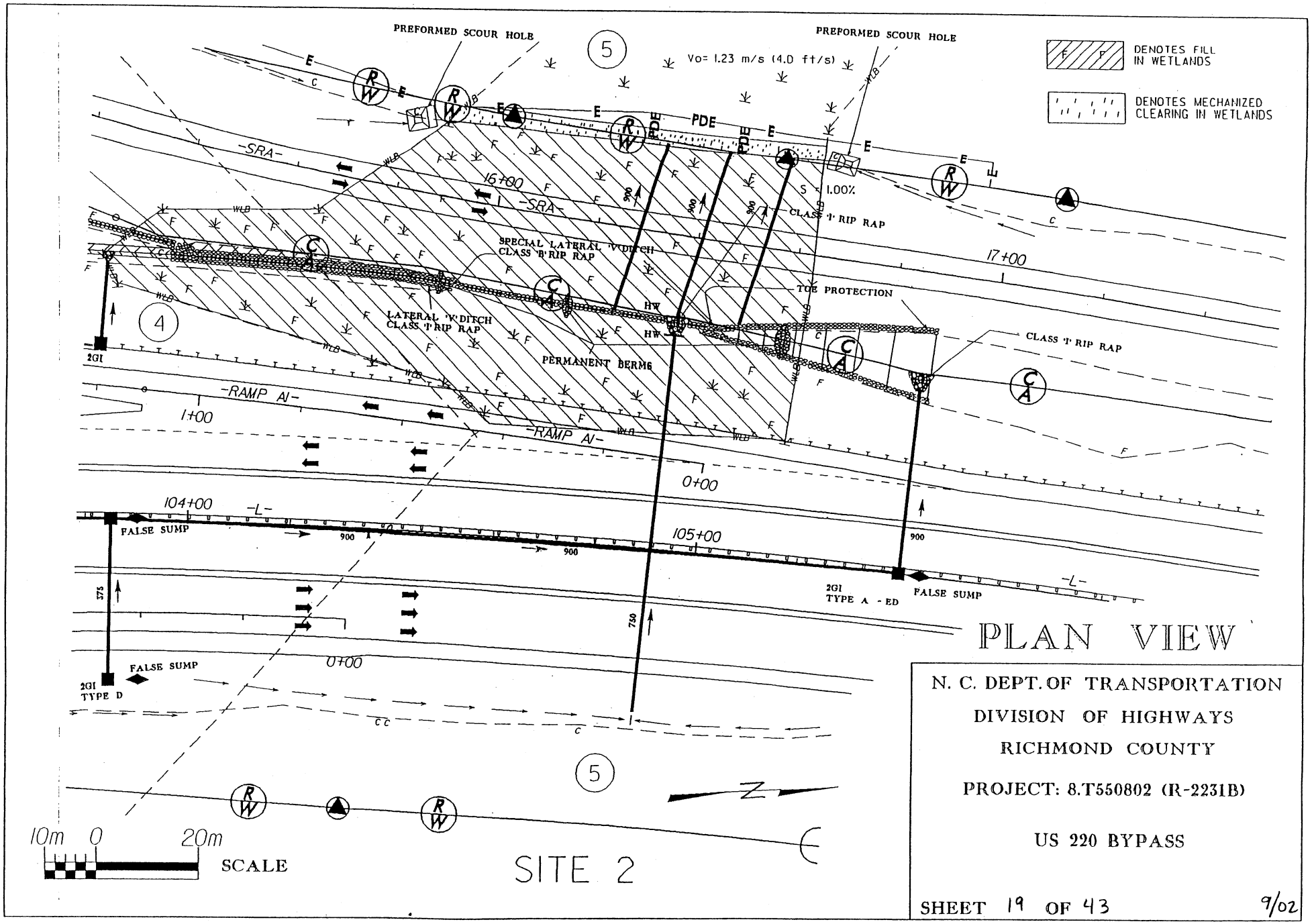
10m 0 20m HORIZONTAL SCALE

2m 0 20m VERTICAL SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY
PROJECT: 8.T550802 (R-2231B)
US 220 BYPASS

SHEET 18 OF 43

9/02



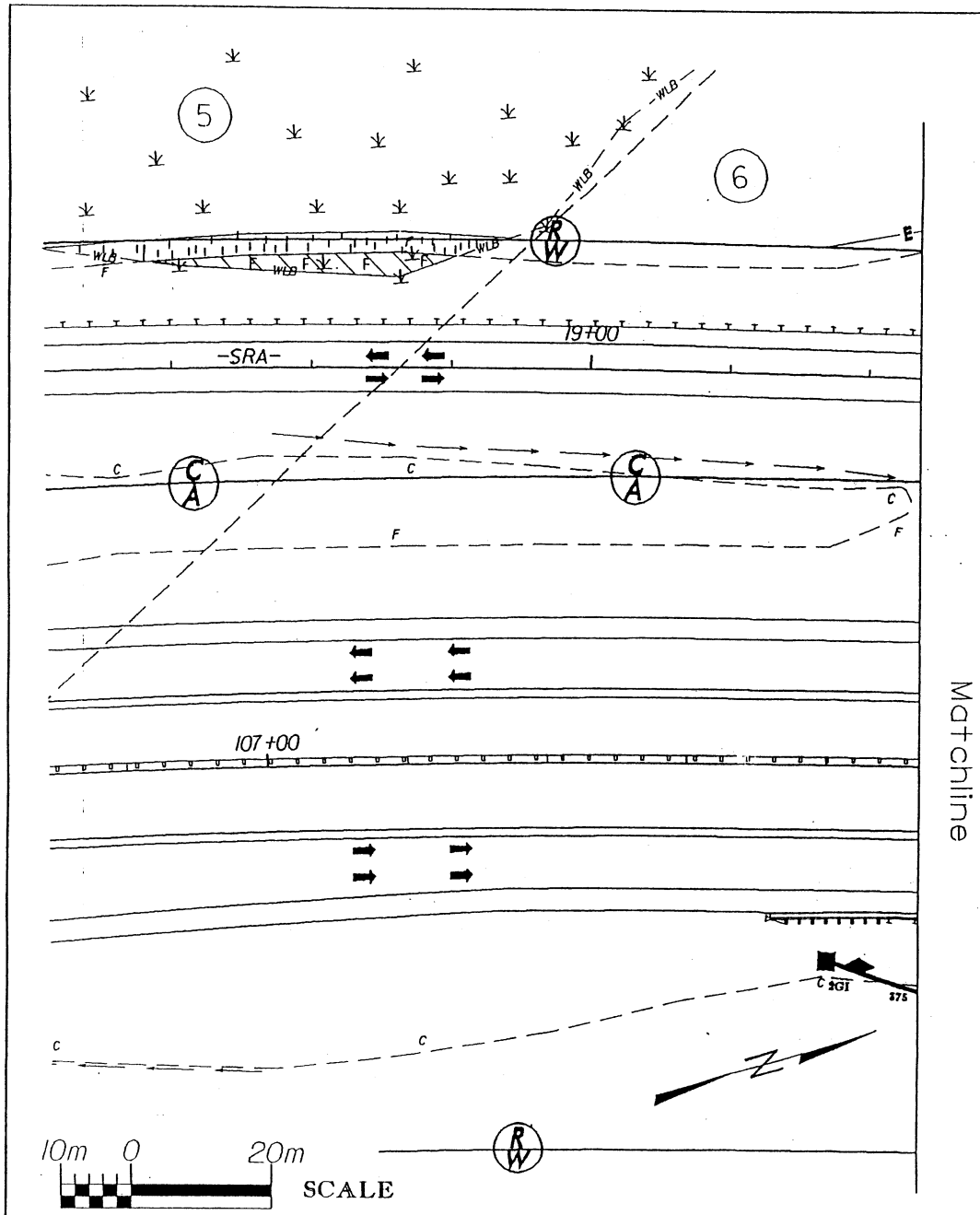
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

SHEET 19 OF 43

9/02



SITE 3

PLAN VIEW

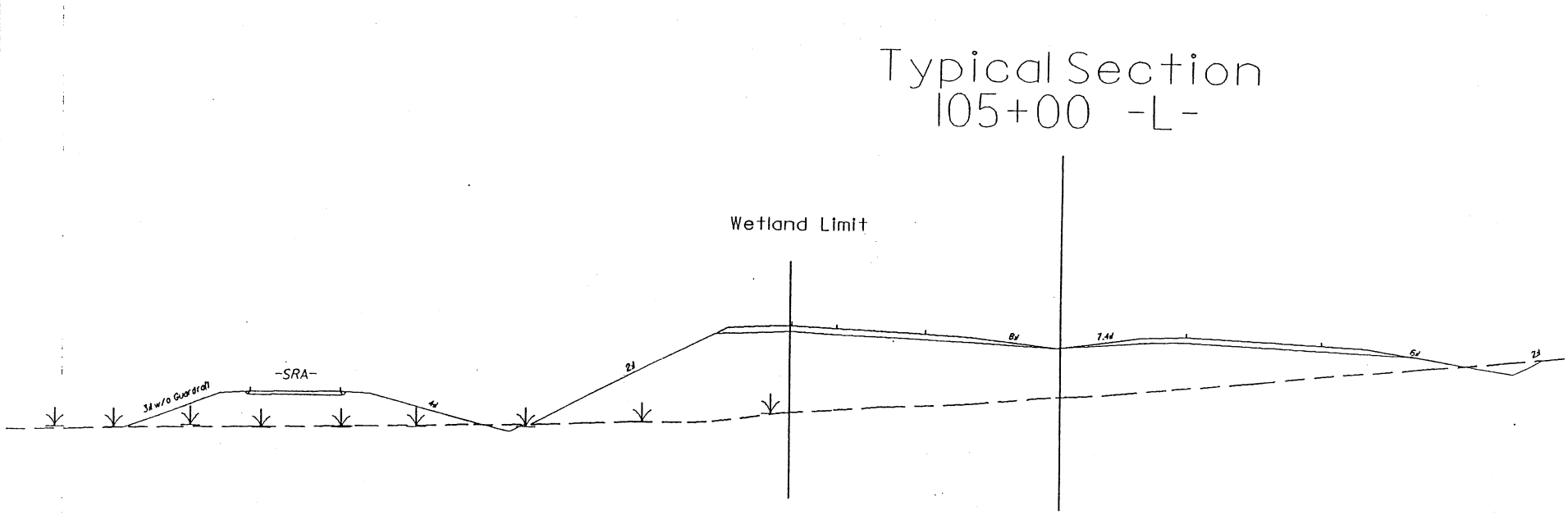
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

SHEET 20 OF 43

9/02



SECTION

5m 0 10m

HORIZONTAL SCALE

5m 0 10m

VERTICAL SCALE

N. C. DEPT. OF TRANSPORTATION

DIVISION OF HIGHWAYS

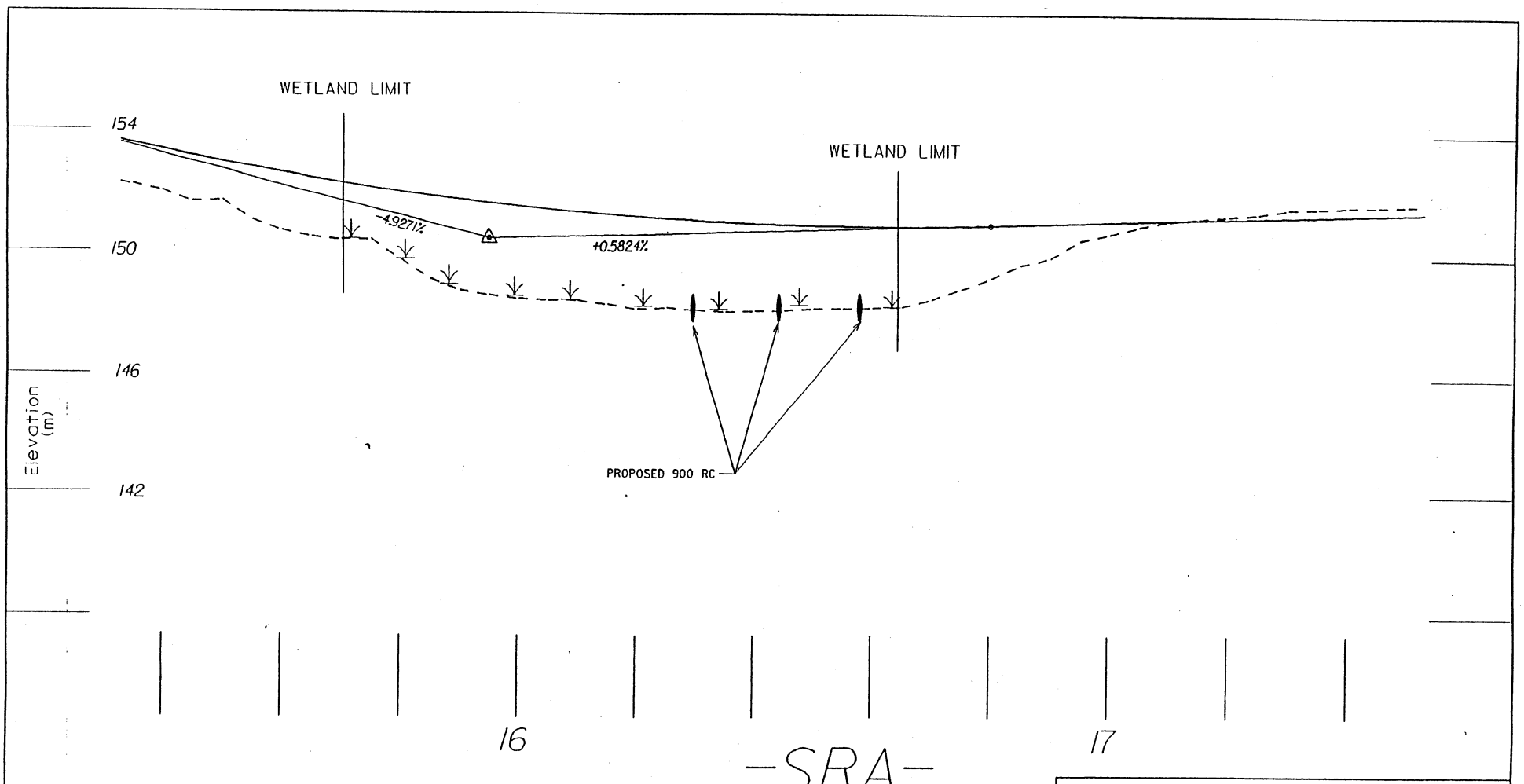
RICHMOND COUNTY

PROJECT: 8.T550803 (R-2231B)

US 220 BYPASS

SHEET 21 OF 43

9/02



-SRA-

PROFILE

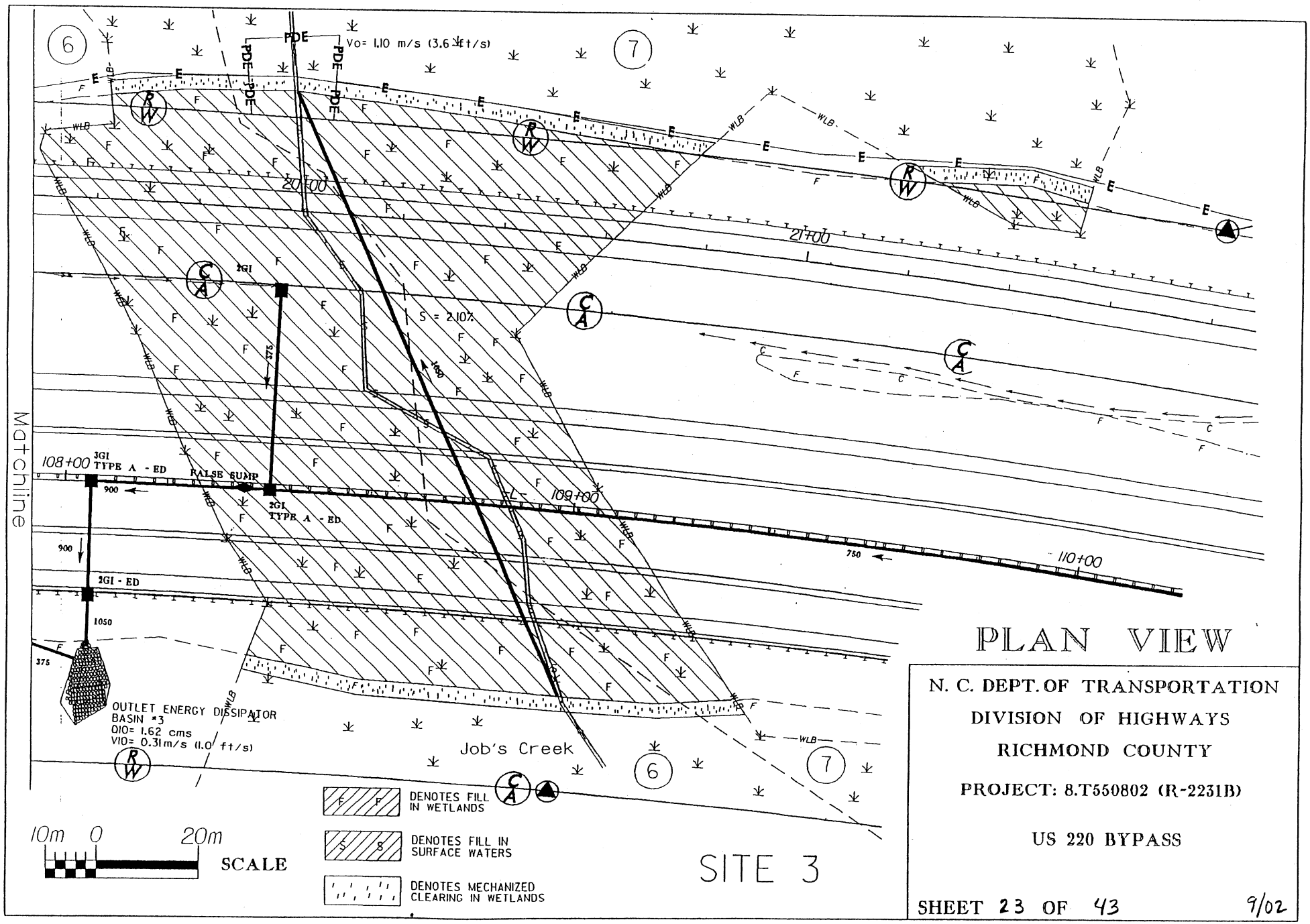
10m 0 20m HORIZONTAL SCALE

2m 0 4m VERTICAL SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY
PROJECT: 8.T550802 (R-2231B)
US 220 FROM SOUTH OF SR 1448
TO SOUTH OF SR 1441

SHEET 22 OF 43

9/02



PLAN VIEW

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

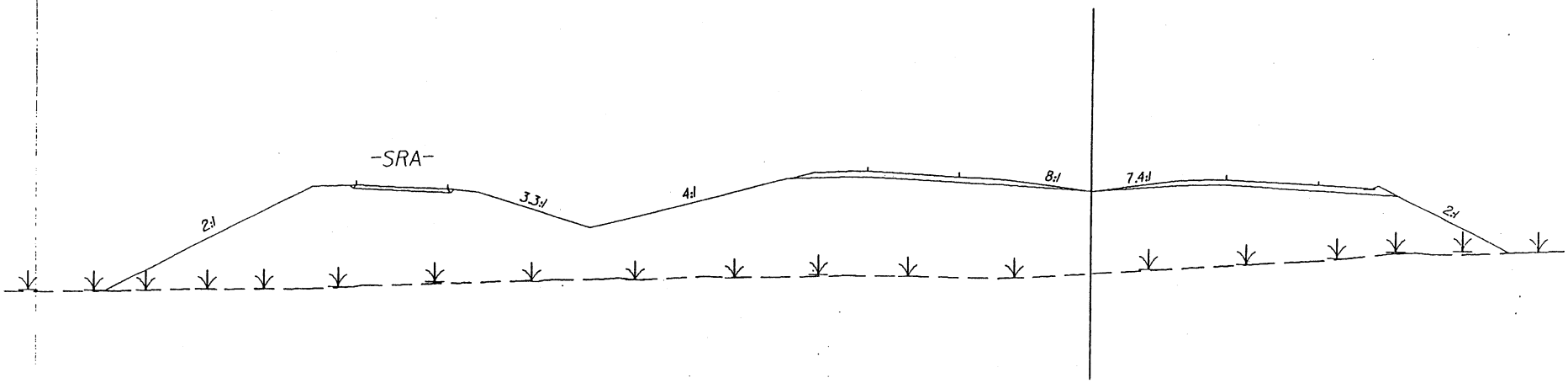
PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

SHEET 23 OF 43

9/02

Typical Section
108+40 -L-



SECTION

5m 0 10m HORIZONTAL SCALE

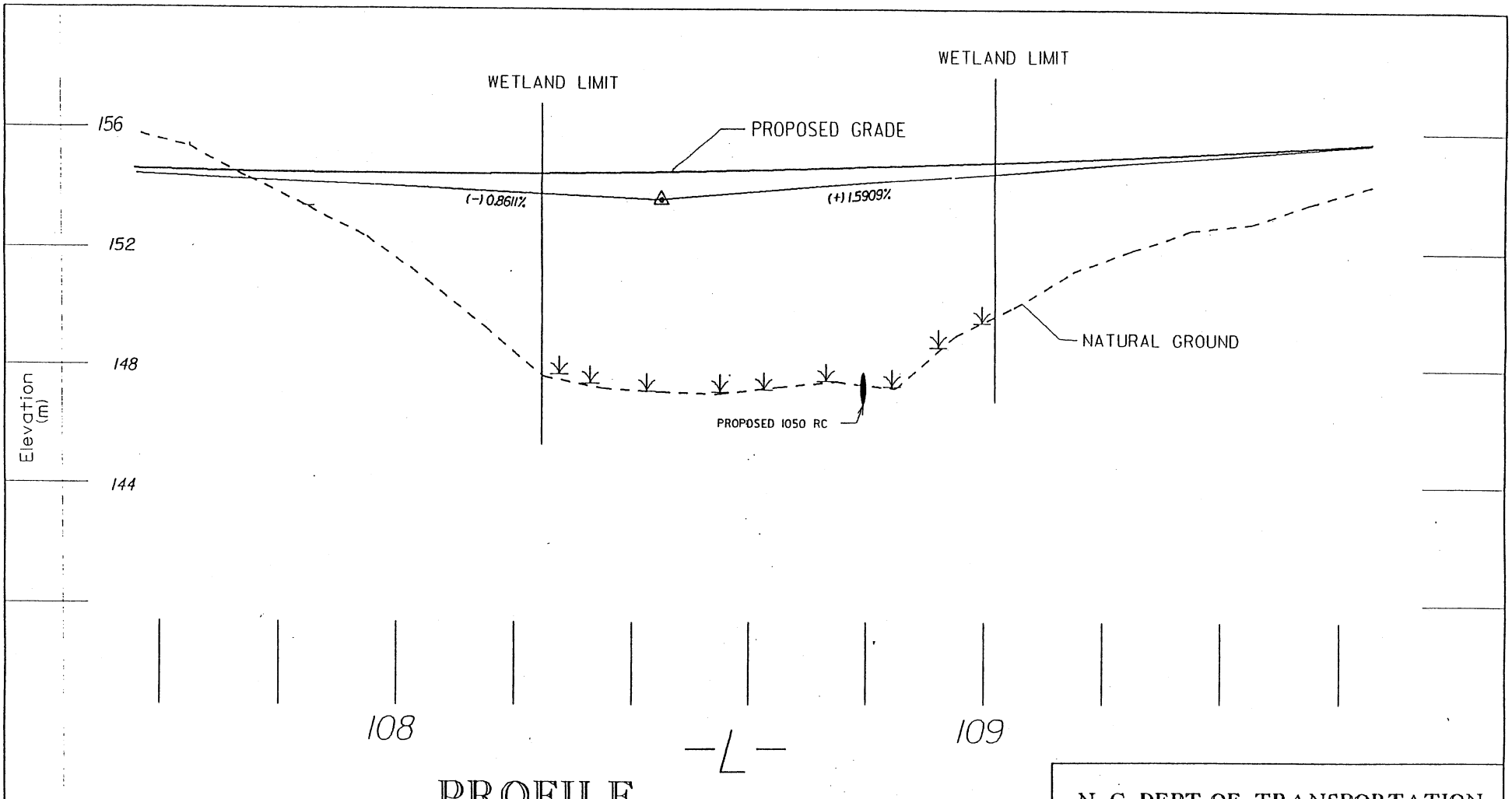
5m 0 10m VERTICAL SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY
PROJECT: 8.T550803 (R-2231B)

US 220 BYPASS

SHEET 24 OF 43

9/02



PROFILE

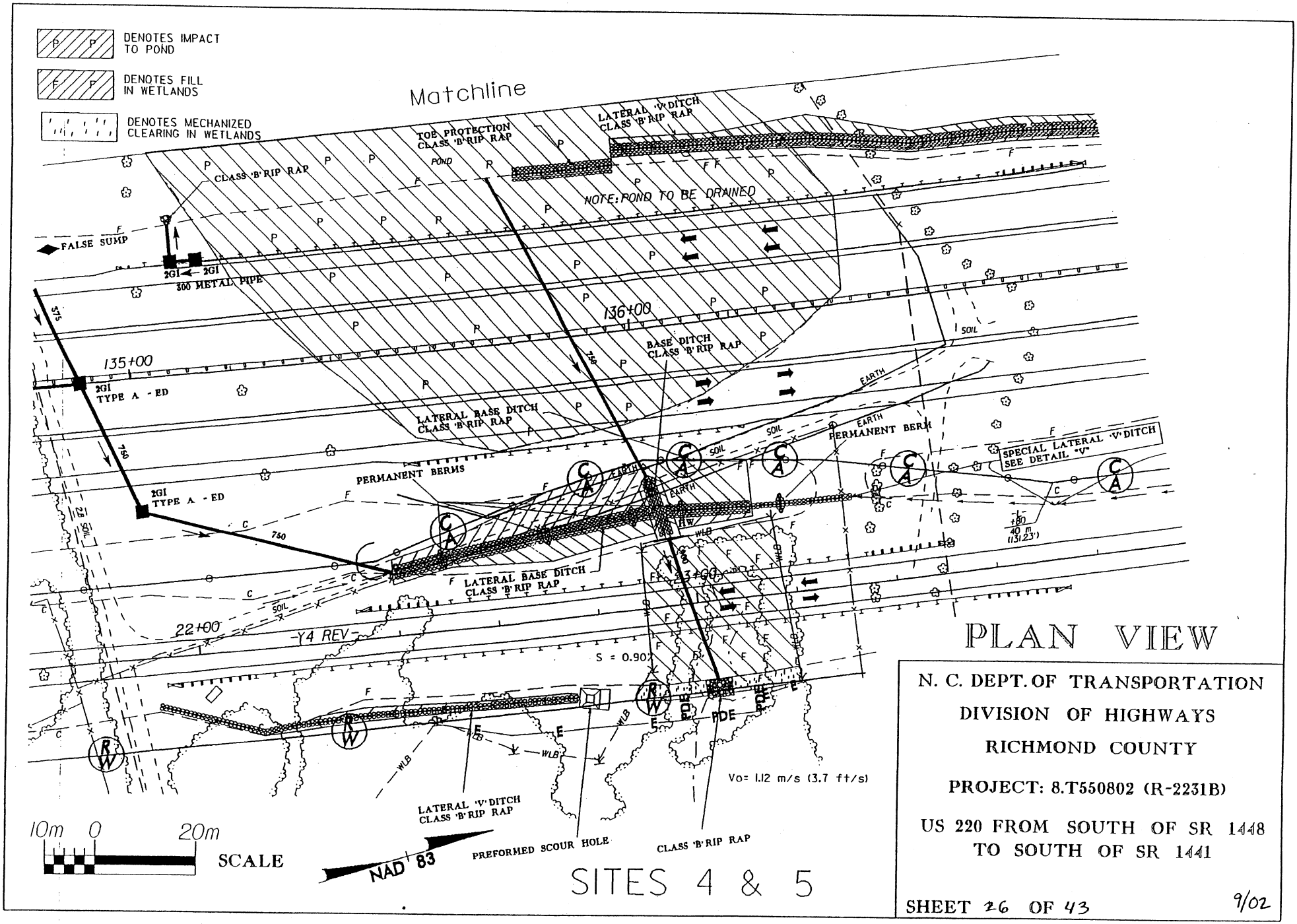
10m 0 20m HORIZONTAL SCALE

2m 0 4m VERTICAL SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY
PROJECT: 8.T550802 (R-2231B)
US 220 BYPASS

SHEET 25 OF 43

9/02



PLAN VIEW

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

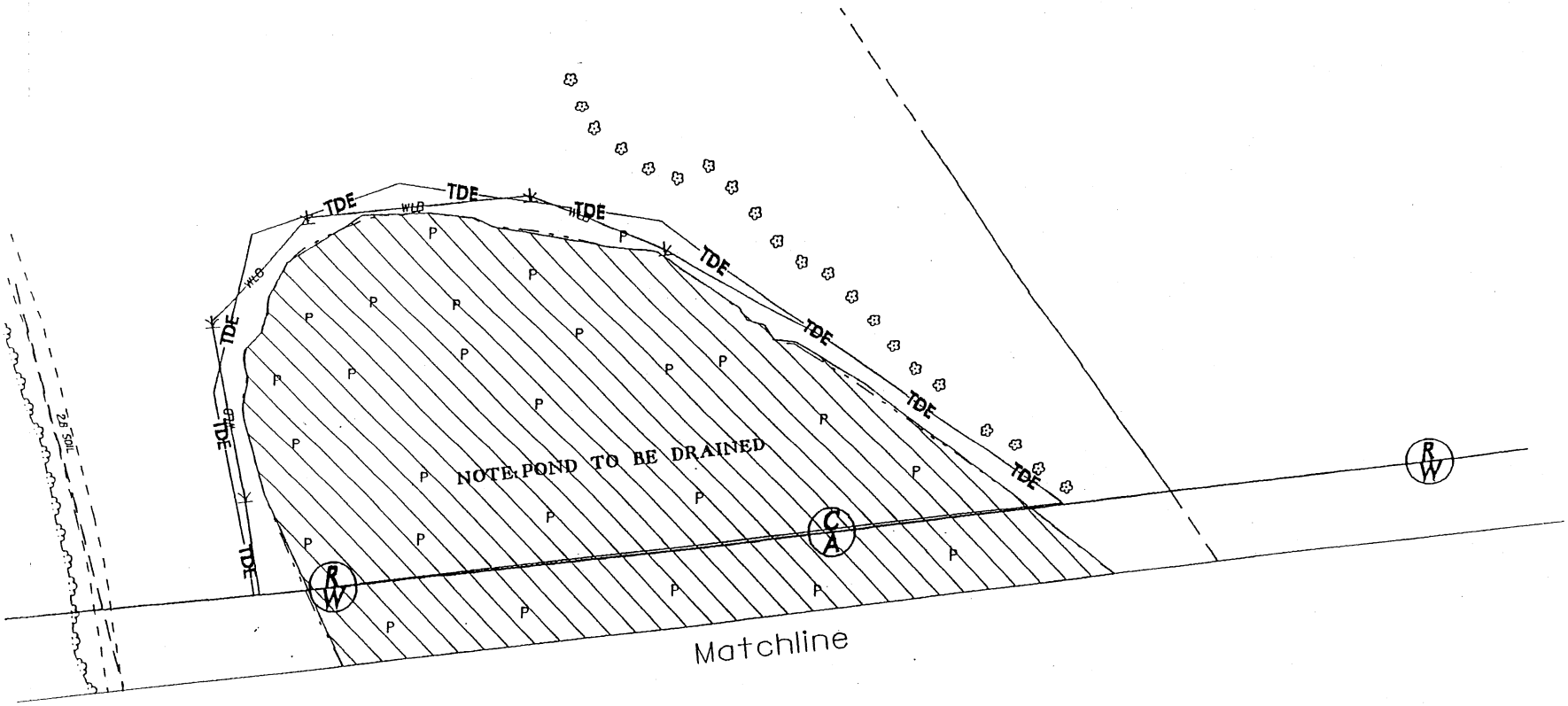
PROJECT: 8.T550802 (R-2231B)

US 220 FROM SOUTH OF SR 1448
TO SOUTH OF SR 1441

SITES 4 & 5

SHEET 26 OF 43

9/02



PLAN VIEW

NAD 83

SITE 5

10m 0 20m
SCALE

P P DENOTES IMPACT TO POND

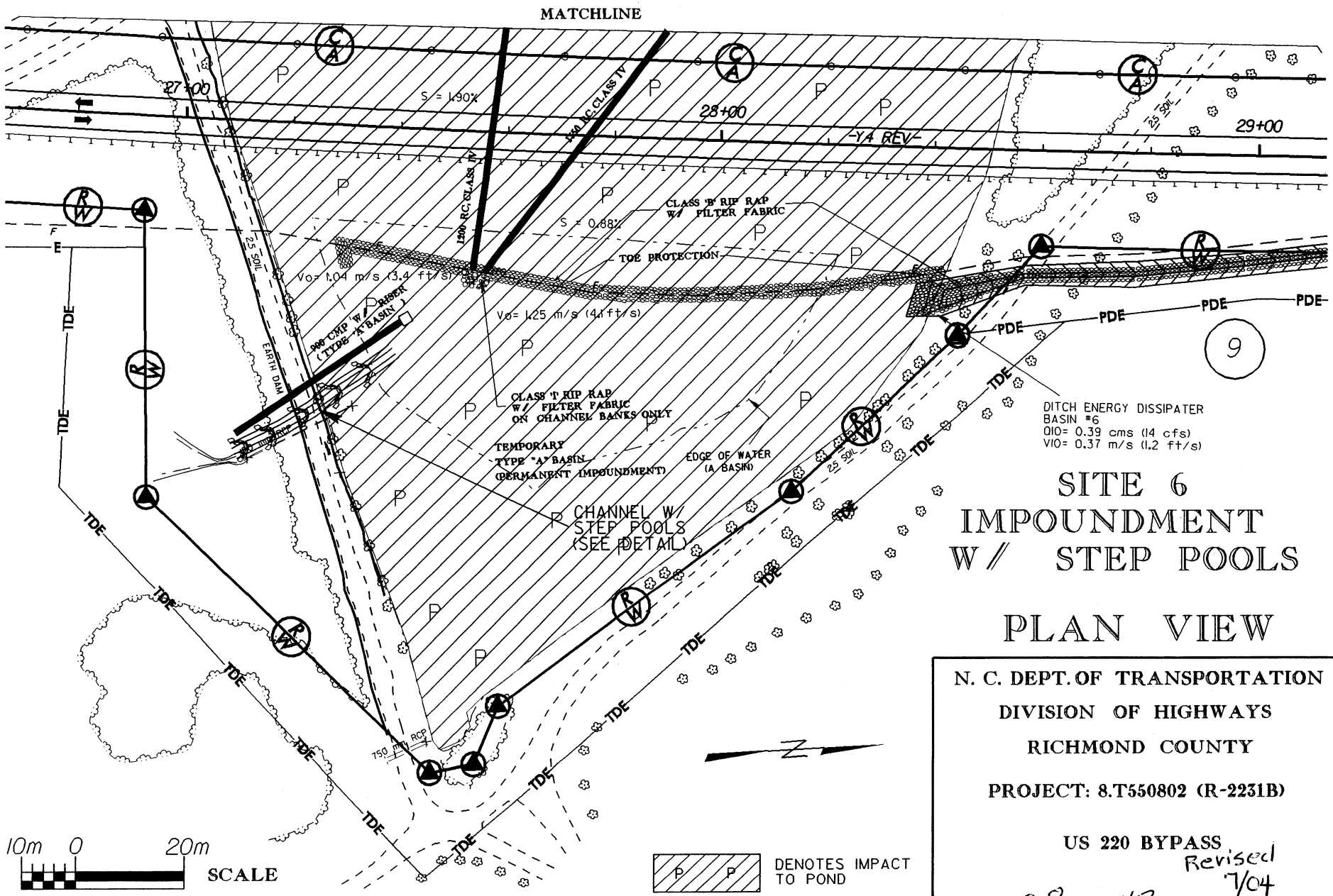
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 FROM SOUTH OF SR 1448
TO SOUTH OF SR 1441

SHEET 27 OF 43

9/02



SITE 6 IMPOUNDMENT W/ STEP POOLS

PLAN VIEW

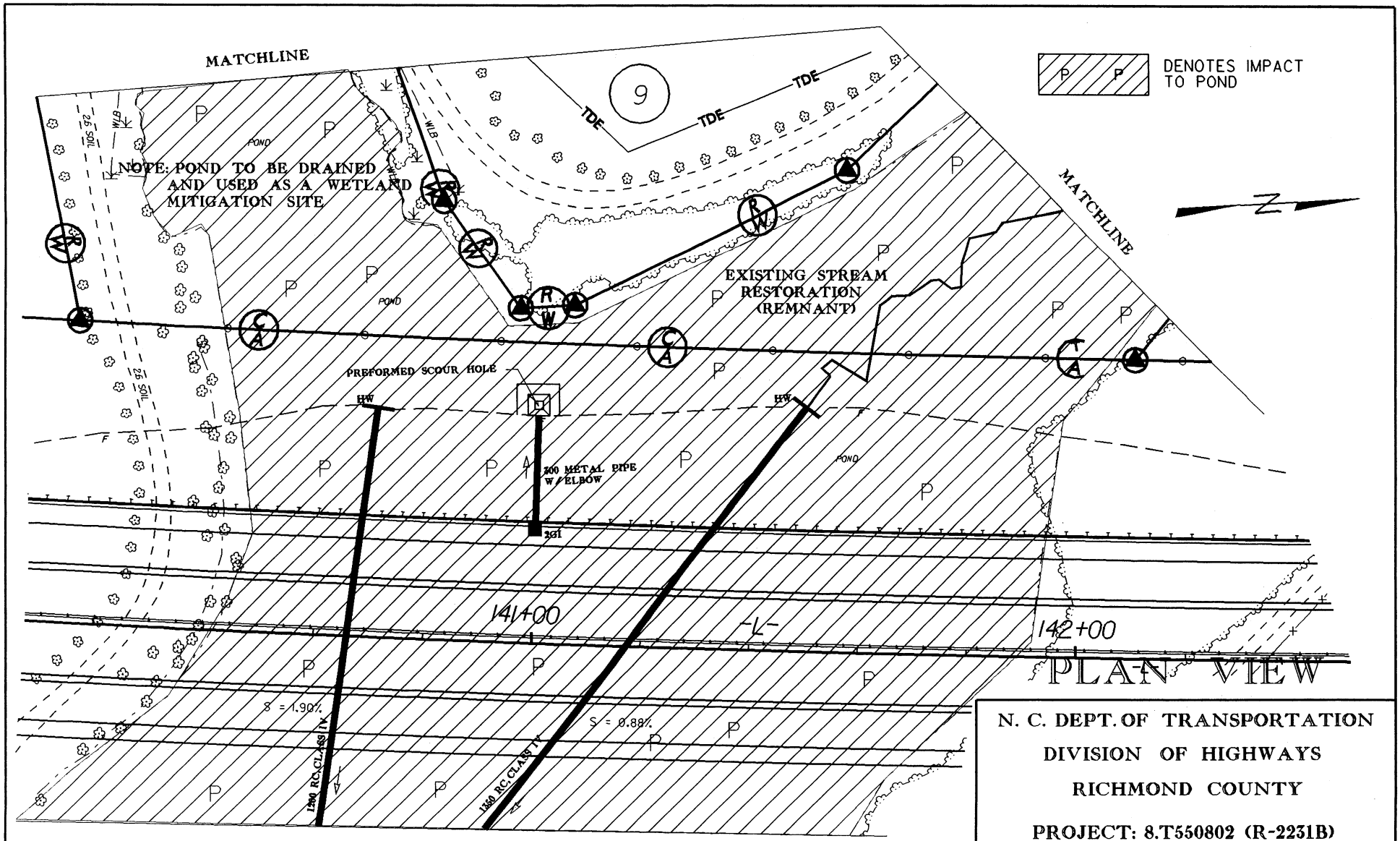
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

Revised 7/04

SHEET 28 OF 43



10m 0 20m
SCALE

SITE 6
STREAM RESTORATION AND WETLAND MITIGATION SITE

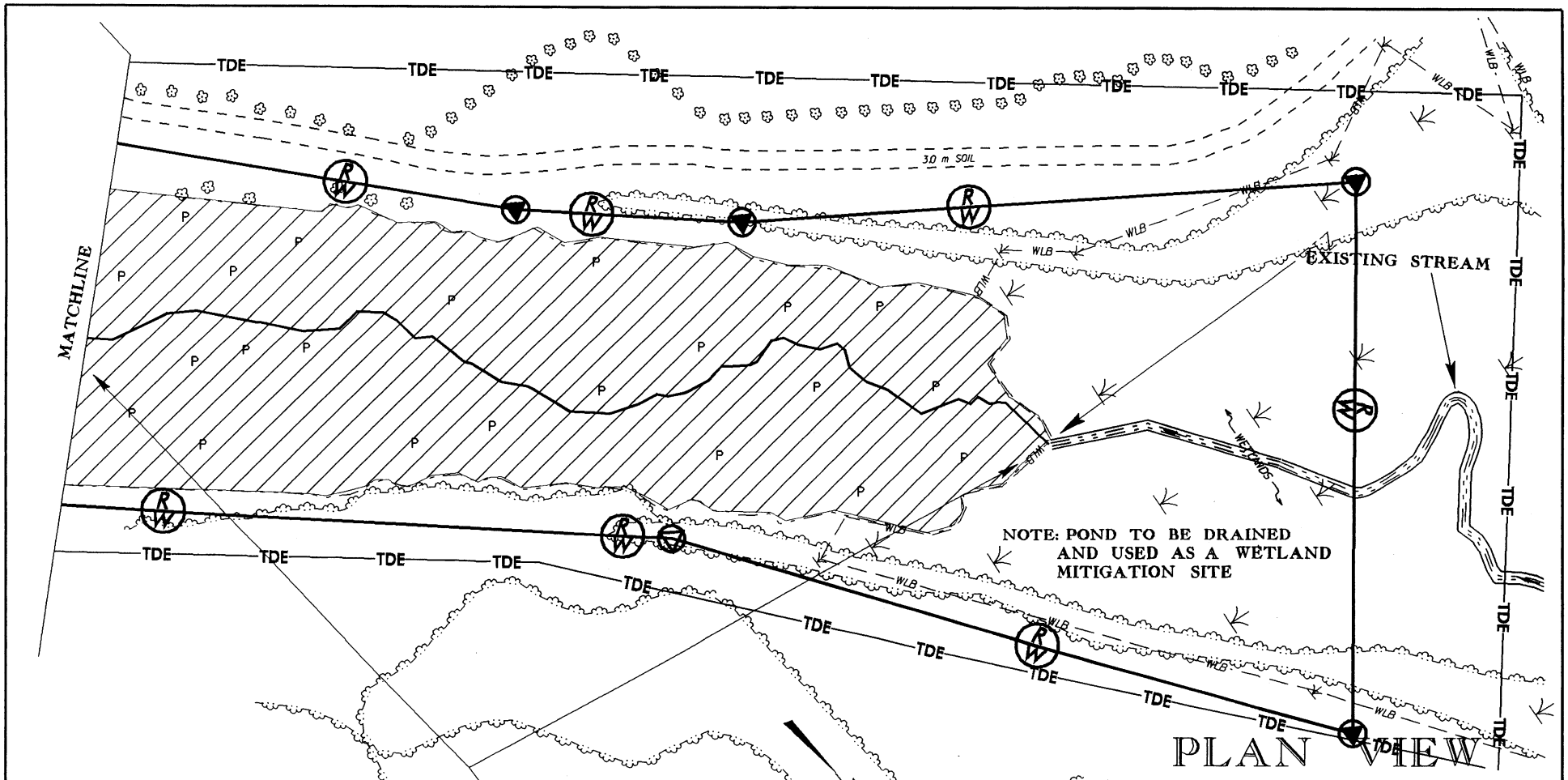
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

Revised 7/04

SHEET 29 OF 43



SITE 6
STREAM RESTORATION AND WETLAND MITIGATION SITE

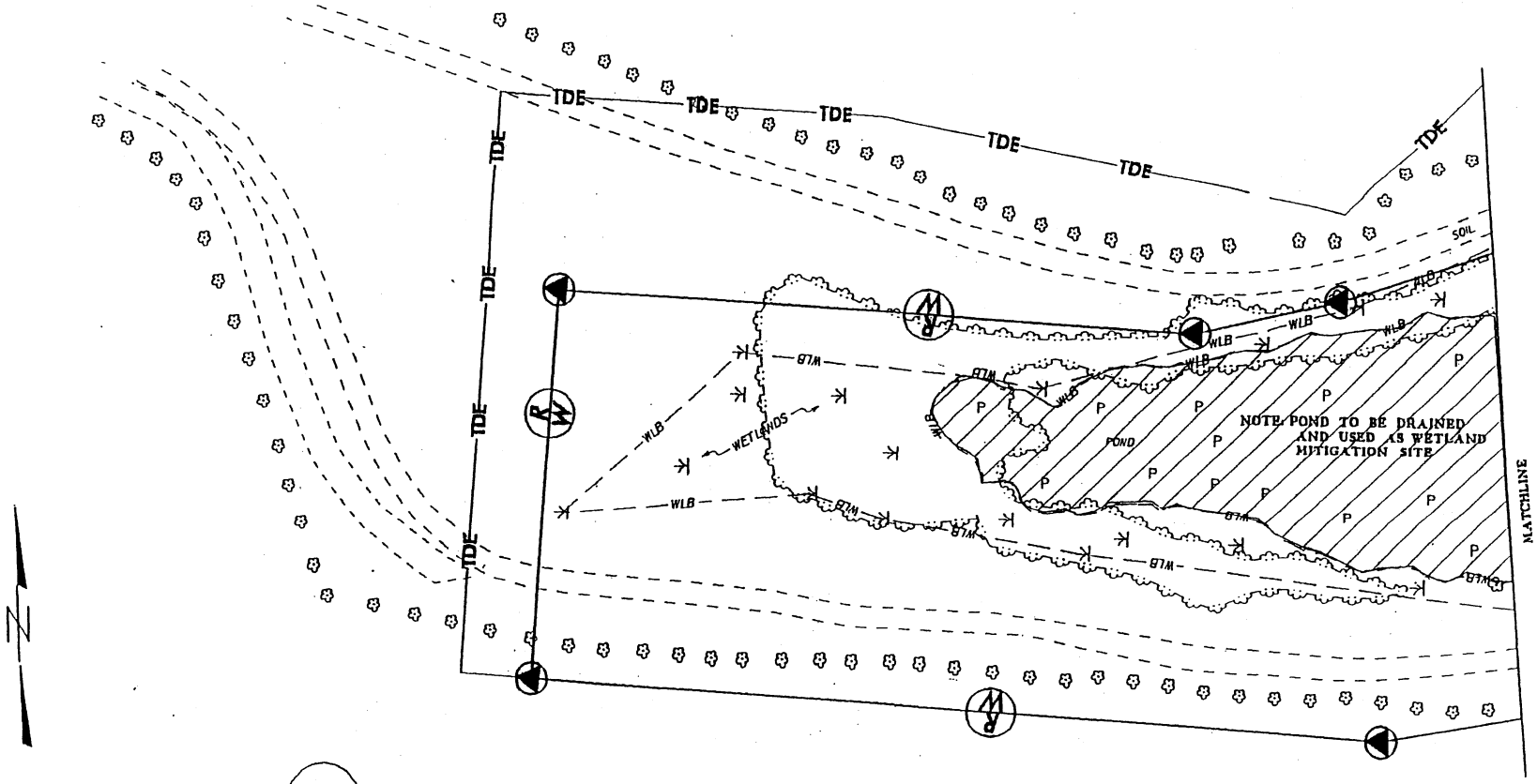
N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

Revised 7/04

SHEET 30 OF 43



9

PLAN VIEW

P P DENOTES IMPACT TO POND

SITE 6
WETLAND MITIGATION SITE

10m 0 20m
SCALE

N. C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

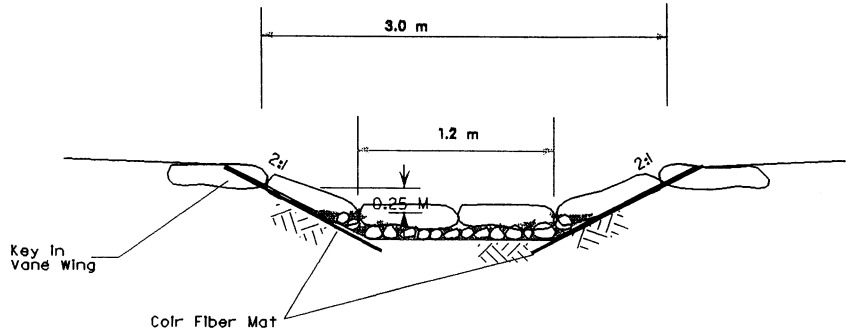
PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

10/16/02

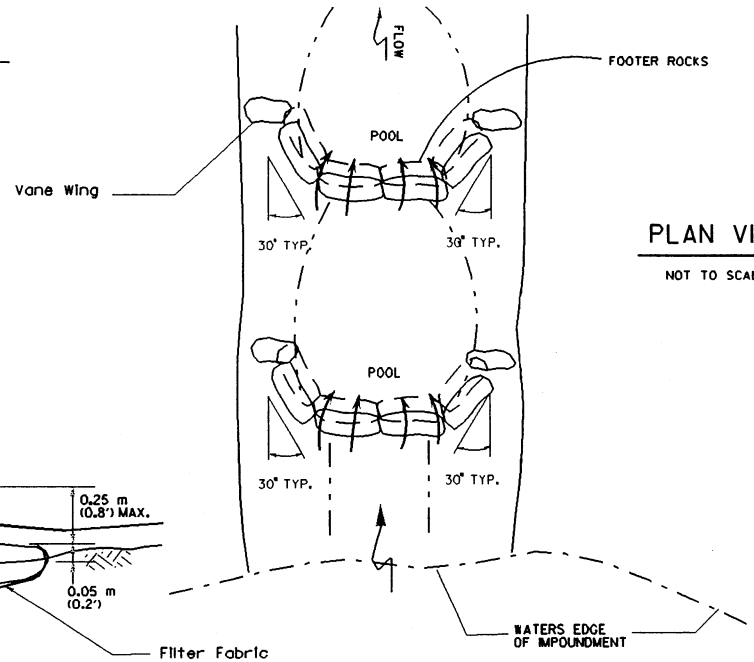
SHEET 31 OF 43

STEP POOL DETAIL FOR INLET CHANNEL OF CULVERT AT 140+20 RT -L-



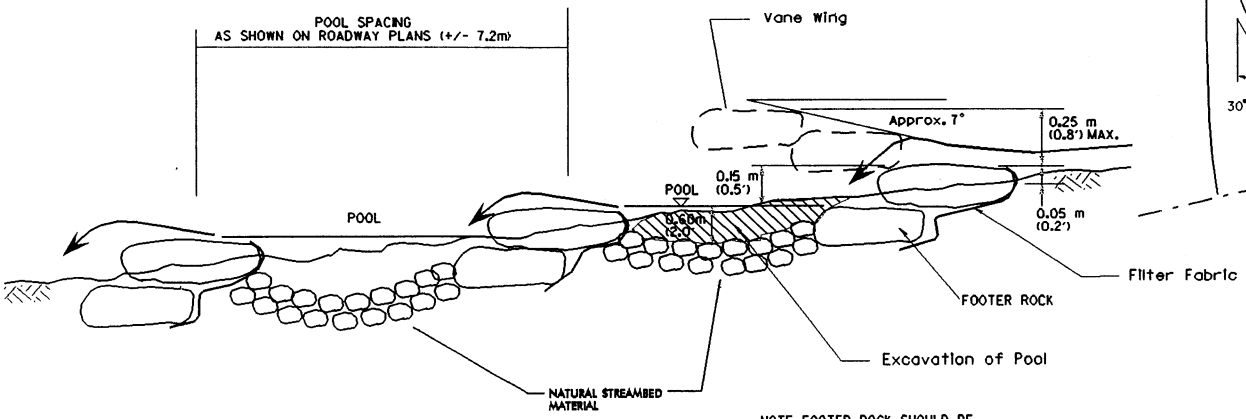
TYPICAL CROSS SECTION

NOT TO SCALE



PLAN VIEW

NOT TO SCALE



PROFILE

NOT TO SCALE

NOTE: FOOTER ROCK SHOULD BE ANGULAR AND OBLONG WITH WIDE AXIS APPROXIMATELY 0.75m IN LENGTH. ROCK SHOULD FIT TIGHTLY TOGETHER WITH MINIMAL VOIDS.

NCDOT

DIVISION OF HIGHWAYS

RICHMOND COUNTY

PROJECT: 8.T550802 (R-2231B)

US 220 BYPASS

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SHEET 32 OF 43

Appendix B Morphological Measurement Table

Variables	Existing Channel	Proposed Reach	USGS Station	Reference Reach
1. Stream type	E5	E5	N/A	E5
2. Drainage area	160 Ac (0.25mi^2)	160 - 193 Ac		160 Ac (0.25mi^2)
3. Bankfull width	5.1 ft	5.2 ft		5.1ft
4. Bankfull mean depth	0.5 ft	0.4 ft		0.5 ft
5. Width/depth ratio	10.2	13		10.2
6. Bankfull cross-sectional area	2.2 ft^2	2.2 ft^2		2.2 ft^2
7. Bankfull mean velocity	3.7 ft/s	3.7 ft/s		3.7 ft/s
8. Bankfull discharge, cfs	8.1 ft^3/s	8.1 ft^3/s		8.1 cfs
9. Bankfull max depth	0.8 ft	0.7 ft		0.8 ft
10. Width of floodprone area	180 ft	150 - 180 ft		180 ft
11. Entrenchment ratio	112	88		112
12. Meander length	40 ft	30 - 50 ft		40 ft
13. Ratio of meander length to bankfull width	7.8	7.7		7.8
14. Radius of curvature	12 ft	12 ft		12 ft
15. Ratio of radius of curvature to bankfull width	2.4	2.3		2.4
16. Belt width	10 - 20 ft	15 - 20 ft		10 - 20 ft
17. Meander width ratio	2.9	3.4		2.9
18. Sinuosity (stream length/valley length)	1.10	1.16		1.10
19. Valley slope	1.30%	1.30%		1.30%
20. Average slope	0.90%	0.80%		0.90%
21. Pool slope	0.30%	0.00%		0.30%
22. Ratio of pool slope to average slope	0.33	0.38		0.33
23. Maximum pool depth	1.4 ft	1.2 ft		1.4 ft
24. Ratio of pool depth to average bankfull depth	2.8	2.2		2.8
25. Pool width	5 - 6 ft	5.8 ft		5 - 6 ft
26. Ratio of pool width to bankfull width	1.08	1.11		1.08
27. Pool to pool spacing	25 ft	25 ft		25 ft
28. Ratio of pool to pool spacing to bankfull width	4.9	4.8		4.9

	Proposed		Reference	
Q_{BKF}	8.1	ft^3/s	8.1	ft^3/s
W/D	13.0		10.2	
Side Slope	3:1		Var.	
Mannings n	0.035		0.035	
Valley Slope	0.0130	ft/ft	0.0130	ft/ft
Sinuosity	1.16		1.10	
Valley Slope/Sinuosity	0.0112	ft/ft	0.0118	ft/ft
Velocity	2.9	ft/s	3.0	ft/s
Area	2.2	ft^2	2.2	ft^2
W_{BKF}	5.2	ft	5.1	ft
Base Width	1.0	ft	Var. - 2	ft
Mean Depth	0.4	ft	0.5	ft
Wetted Perimeter	5.4	ft	5.4	ft
Hydraulic Radius	0.41	ft	0.41	ft
Shear Stress	0.28	lb/ft^2	0.30	lb/ft^2
Particle Moved	18.0	mm	16.0	mm

Stream Power:

Reference:

stream power = 0.135 lb/ft/sec

Proposed:

stream power= 0.113 lb/ft/sec

Sheet 35 of 43

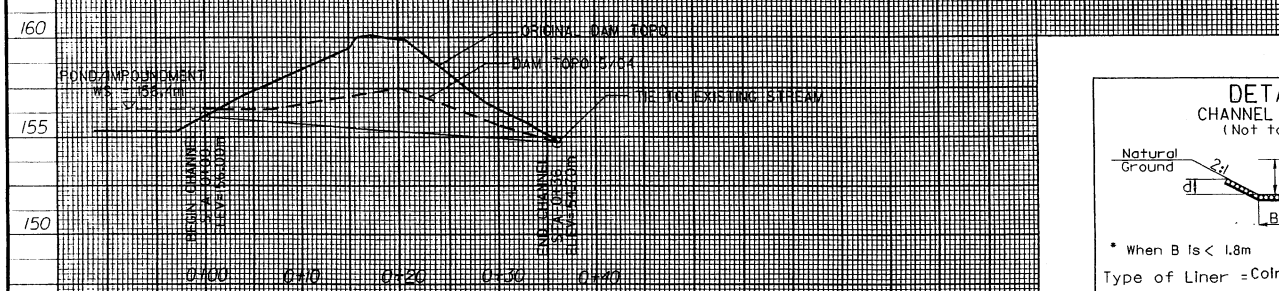
PROJECT REFERENCE NO.	SHEET NO.
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	May 2004

METRIC

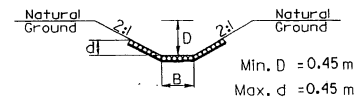
CONST. REV.

R/W REV.

Profile of Channel Through Dam



DETAIL
CHANNEL TYPICAL
(Not to Scale)



Min. D = 0.45 m

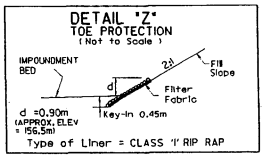
Max. d = 0.45 m

B = 1.2 m

* When B is < 1.8m

Type of Liner = Coir Fiber Mat

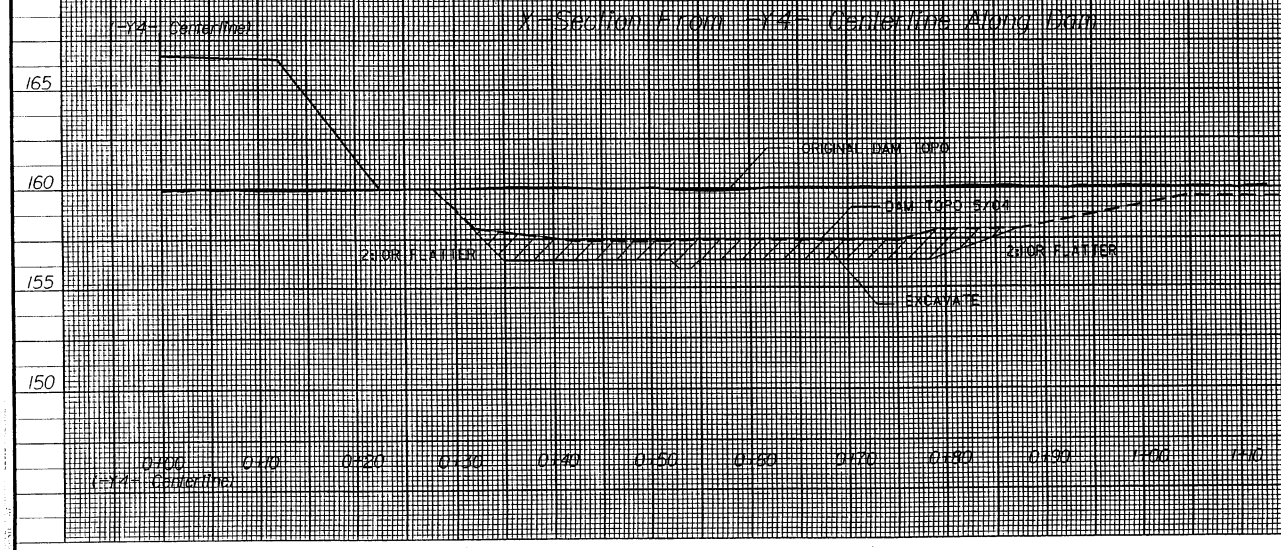
DETAIL "Z"
TOE PROTECTION
(Not to Scale)

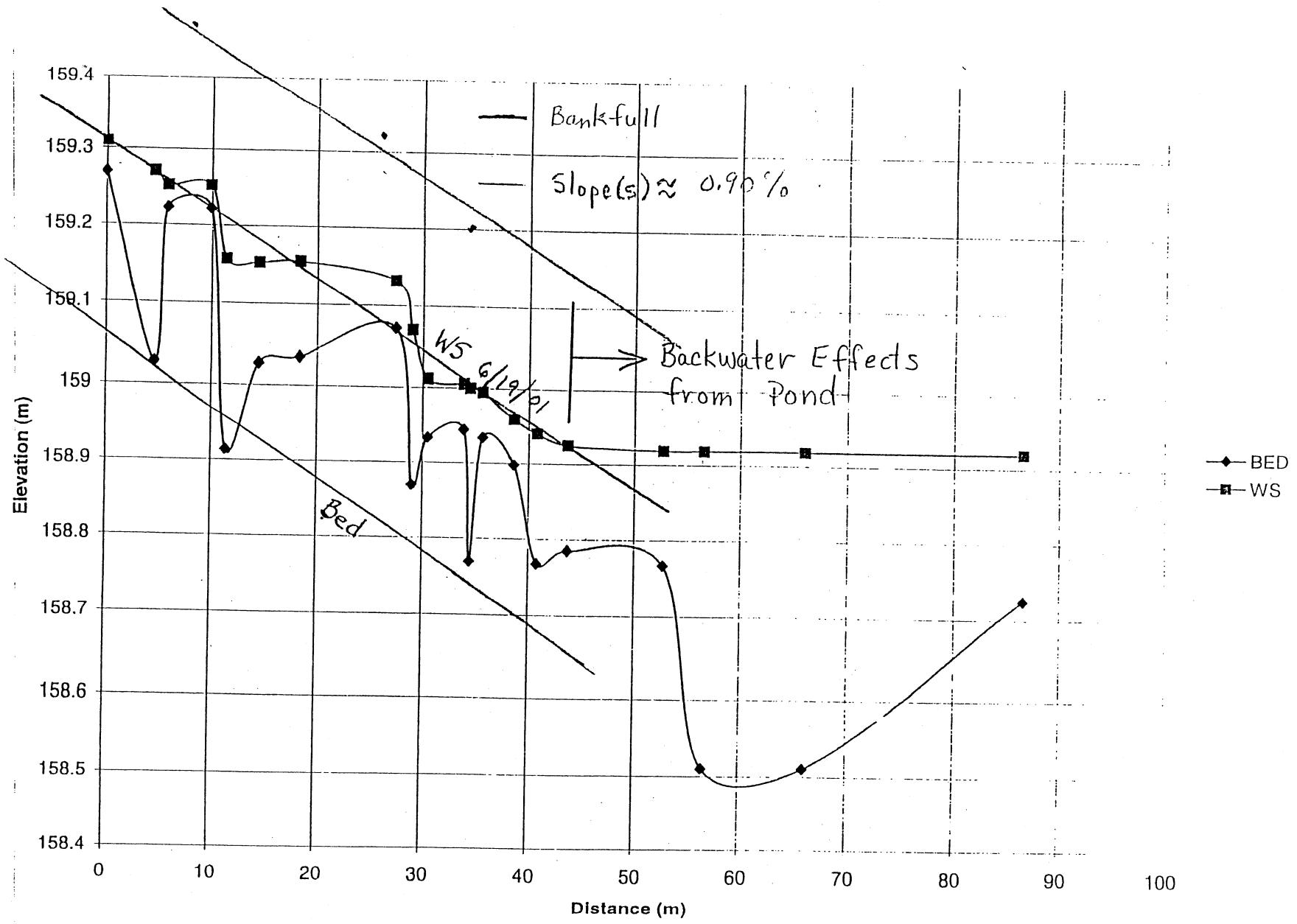


Type of Liner = CLASS 'I' RIP RAP

-Y4 REV- STA. 27+23 RT. TO -Y4 REV- STA. 28+40 RT.

X-Section From -Y4- Centerline Along Dam




Bankfull
Slope(s) ≈ 0.90 %
WS 6/19/01
Backwater Effects from Pond
Bed
BED
WS
Elevation (m)
Distance (m)
159.4
159.3
159.2
159.1
159
158.9
158.8
158.7
158.6
158.5
158.4
0
10
20
30
40
50
60
70
80
90
100

Summary from site visit March 22, 2004

PROJECT #: 8.T550803 (R-2231B)
COUNTY: RICHMOND

IMPOUNDMENT BELOW ROADWAY
(Myrick Pond)
Sta 140+20 TO Sta 141+40 –L- (Rt))

A field meeting was held on 3/22/04 to review the site and discuss design options. Those in attendance were NCDOT Construction, NCDOT Hydraulics, USACE and Contractor personnel. The proposal was to eliminate the stream relocation design below the proposed roadway and instead propose an impoundment. The impoundment would consist of retaining a portion of the existing dam. The proposal came out of concern that establishing a stream through the sediment would be difficult to access and stabilize. This was due in part that the pond is presently being utilized as a Temporary A Basin. The basin would be removed after construction and prior to the stream design. The proposal was found to be acceptable but further design specifics and mitigation credit losses would have to be analyzed.

The impoundment design and mitigation losses were analyzed and resubmitted on 5/27/04. It is proposed to remove the 900mm CSP riser and lower the existing dam. The riser will be removed to eliminate future maintenance issues. The existing dam will be lowered to approximate elevations of 156.5m at the head of the pond to 155.2m at the tail of the pond. Also, it is proposed to construct a step-pool channel through the dam. The channel invert elevations are approximately 156.00m at the head of the pond and 154.7m at the tail of the pond. The channel will have coir fiber mat on the banks along with the footer rocks and streambed material at the step-pools. The width of the dam excavation has been designed at 45m but may be wider if needed. Toe protection has been proposed along the fill in the impoundment to an approximate elevation of 156.5m.

The drainage area at the existing dam is 193 acres. The basin is rural and is located in the Sandhills hydrologic region. The basin drains pine/hardwood forest and agricultural fields. The channel through the dam was designed based on Piedmont regional curves. This produced a bankfull discharge and area of 37 cfs and 9.5 ft^2, respectively. The Piedmont curves were used at this location since they are more conservative than the numbers generated by the Coastal curves (7 cfs and 6.6 ft^2). As a backup, the 10 yr discharge generated by the USGS Rural Equations for the Sandhills region was 32 cfs. This reconfirmed a conservative discharge and cross section for the step-pool channel. The 50 yr discharge at this location is estimated at 53 cfs.

There was also analysis to estimate the "turnover" rate of the impoundment. A turnover rate was analyzed for both the bankfull and "normal water surface" discharges. These discharges were calculated to be 37 cfs and 1.6 cfs, respectively. For an impoundment

Revised 7/04

volume of approximately 10,000 yds^3 the turnover rate for bankfull and normal flows was 15 minutes and 5.6 hours, respectively.

The proposed impoundment reduced potential stream mitigation credit. The original stream mitigation plan proposed 1066'. The revised stream mitigation proposes 817'. The 817' length is based on surveys provided by the Construction unit on 5/18/04. The wetland mitigation may also be effected but will have to be reviewed by others.

PARCEL NO.	PROPERTY OWNER NAME	PROPERTY OWNER ADDRESS
1	EMMA & ROLYN ELLERBE	RT 4 BOX 295 WADESBORO, N.C. 28170
2	JOSEPH G. JR. & BETTY DAVIS	915 MORNINGSIDE DR. ROCKINGHAM, N.C. 28379
3	ROBERT LEE & BRENDA KAY THORSBY	PO BOX 212 ELLERBE, N.C. 28338
4	MELVIN G ELLINGER	PO BOX 1152 ELLERBE, N.C. 28338
5	DUNCAN H & CHARLOTTE Q GRANT	1836 N. US. HWY 220 ELLERBE, N.C. 28338
6	NEAL HAYWOOD GRANT	1836 N. US. HWY 220 ELLERBE, N.C. 28338
7	DANIEL BROWN JR	PO BOX 604 ELLERBE, N.C. 28338
8	BOBBY ANN NICHOLSON TERRY	PO BOX 352 ELLERBE, N.C. 28338
9 & 10	JUANITA ASKEW	1230 SQUIRREL HILL RD. CHARLOTTE, N.C. 28213
11	HAROLD JEROME NICHOLSON	PO BOX 152 ELLERBE, N.C. 28338
12	WALTER RAY & EMMA STANCIL	127 STANCIL DR. ELLERBE, N.C. 28338
13	ANNIE JORDAN BUIE	PO BOX 216 ELLERBE, N.C. 28338
14	ANTHONY A & BRENDA CAPEL	PO BOX 462 ELLERBE, N.C. 28338
17 & 18	ROGER H ALLRED SR	6726 LANCER DR. CHARLOTTE, N.C. 28226
23	JOHN B & BETTY PARKER	109 PATTERNOTE RD. MOORESVILLE, N.C. 28115
22	LESTER WILLIAM HINES	840 CAPEL MILL RD. ELLERBE, N.C. 28338

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT R-2231B

US 220 BYPASS

9/02

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PARCEL NO.	PROPERTY OWNER NAME	PROPERTY OWNER ADDRESS
15	CHARLES G. & NELLIE S. HALL	PO BOX 214 ELLERBE, N.C. 28338
16	JORDAN LUMBER & SUPPLY CO.	PO BOX 98 MT. GILEAD, N.C. 27306
27	NORMAN RHYNE	258 FIRE TOWER RD. ELLERBE, N.C. 28338

N.C. DEPT. OF TRANSPORTATION
DIVISION OF HIGHWAYS
RICHMOND COUNTY

PROJECT R-2231B

US 220 BYPASS

9/02

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WETLAND PERMIT IMPACT SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS				SURFACE WATER IMPACTS				
			Fill In Wetlands (ha)	Temp. Fill In Wetlands (ha)	Excavation In Wetlands (ha)	Mechanized Clearing (Method III) (ha)	Fill In SW (Natural) (ha)	Fill In SW (Pond) (ha)	Temp. Fill In SW (ha)	Existing Channel Impacted (m)	Natural Stream Design (m)
1A	68+12 - 68+74 -L-	2@2.7mX2.4m	0.41		0.211	0.045	0.028			174	
1B	85+60 - 86+04 -L-	1200 RCP	0.39			0.041	0.017			89	
1C	90+08 - 90+20 -L-	N/A	0.087			0.008					
1	91+20 - 94+00 -L-	750 RCP	0.688			0.063				202	
2	103+80 - 105+20 -L-	3@900 RCP	0.543			0.023					
3	106+60 - 110+00 -L-	1050 RCP	0.976			0.094				100	
4	22+80 - 23+20 -Y4REV-	900 RCP	0.082			0.021					
5	135+00 - 137+00 -L-	750 RCP						1.21			
* 6	140+00 - 142+00 -L-	1350 RCP						3.79			249
TOTALS:			3.176	0	0.211	0.295	0.045	5.00	0	565	249

* WETLAND SITE 6 MITIGATION ESTIMATE = 1.00 Ha

5/04 Reduction in Wetland and Stream Mitigation (from 1.27 Ha and 325m, respectively) due to elimination of mitigation below roadway. Modifications made to the existing pond to be incorporated as a permanent impoundment.

Form Revised 3/22/01

NCDOT

DIVISION OF HIGHWAYS
RICHMOND COUNTY
PROJECT 8.T550802 (R-2231B)

Revised May 2004

WETLAND PERMIT IMPACT SUMMARY

			WETLAND IMPACTS				SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation In Wetlands (ac)	Mechanized Clearing (Method III) (ac)	Fill In SW (Natural) (ac)	Fill In SW (Pond) (ac)	Temp. Fill In SW (ac)	Existing Channel Impacted (ft)	Natural Stream Design (ft)
1A	68+12 - 68+74 -L-	2@9'X8'	1.01		0.52	0.11	0.07			571	
1B	85+60 - 86+04 -L-	48" RCP	0.18			0.1	0.04			292	
1C	90+08 - 90+20 -L-	N/A	0.22			0.02					
1	91+20 - 94+00 -L-	30" RCP	1.7			0.16				663	
2	103+80 - 105+20 -L-	3@36" RCP	1.34			0.06					
3	106+60 - 110+00 -L-	42" RCP	2.41			0.23				328	
4	22+80 - 23+20 -Y4REV-	36" RCP	0.2			0.05					
5	135+00 - 137+00 -L-	30" RCP						3			
*6	140+00 - 142+00 -L-	54" RCP						9.36			817
TOTALS:			7.06	0	0.52	0.73	0.11	12.36	0	1854	817

* WETLAND SITE 6 MITIGATION ESTIMATE = 2.45 Ac

5/04 Reduction in Wetland and Stream Mitigation (from 3.12 Ac and 1066', respectively) due to elimination of mitigation below roadway. Modifications made to the existing pond to be incorporated as a permanent impoundment.

Form Revised 3/22/01

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
May 2004
RICHMOND COUNTY
PROJECT 8.T550802 (R-2231B)