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8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	26
R/W SHEET NO.	

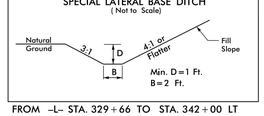
ROADWAY DESIGN ENGINEER
8/25/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
8/26/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Prepared in the Office of: SUMMIT DESIGN AND ENGINEERING SERVICES
NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

DETAIL 12
SPECIAL LATERAL BASE DITCH
(Not to Scale)



FROM -L- STA. 329+66 TO STA. 342+00 LT

-L-

PIs Sta 346+82.79
Θs = 4° 12' 46.5"
Ls = 300.00'
LT = 200.06'
ST = 100.05'

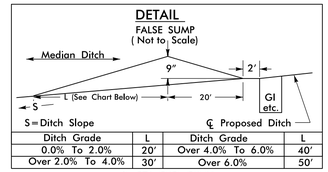
PI Sta 348+94.01
Δ = 6° 14' 41.4" (LT)
D = 2° 48' 31.0"
L = 222.35'
T = 111.28'
R = 2,040.00'
SE = 06
V_d = 70

PIs Sta 351+05.13
Θs = 4° 12' 46.5"
Ls = 300.00'
LT = 200.06'
ST = 100.05'

-Y17-

PI Sta 11+35.88
Δ = 4° 30' 24.2" (RT)
D = 5° 13' 57.0"
L = 86.13'
T = 43.09'
R = 1,095.00'
SE = NC
V_d = 50+

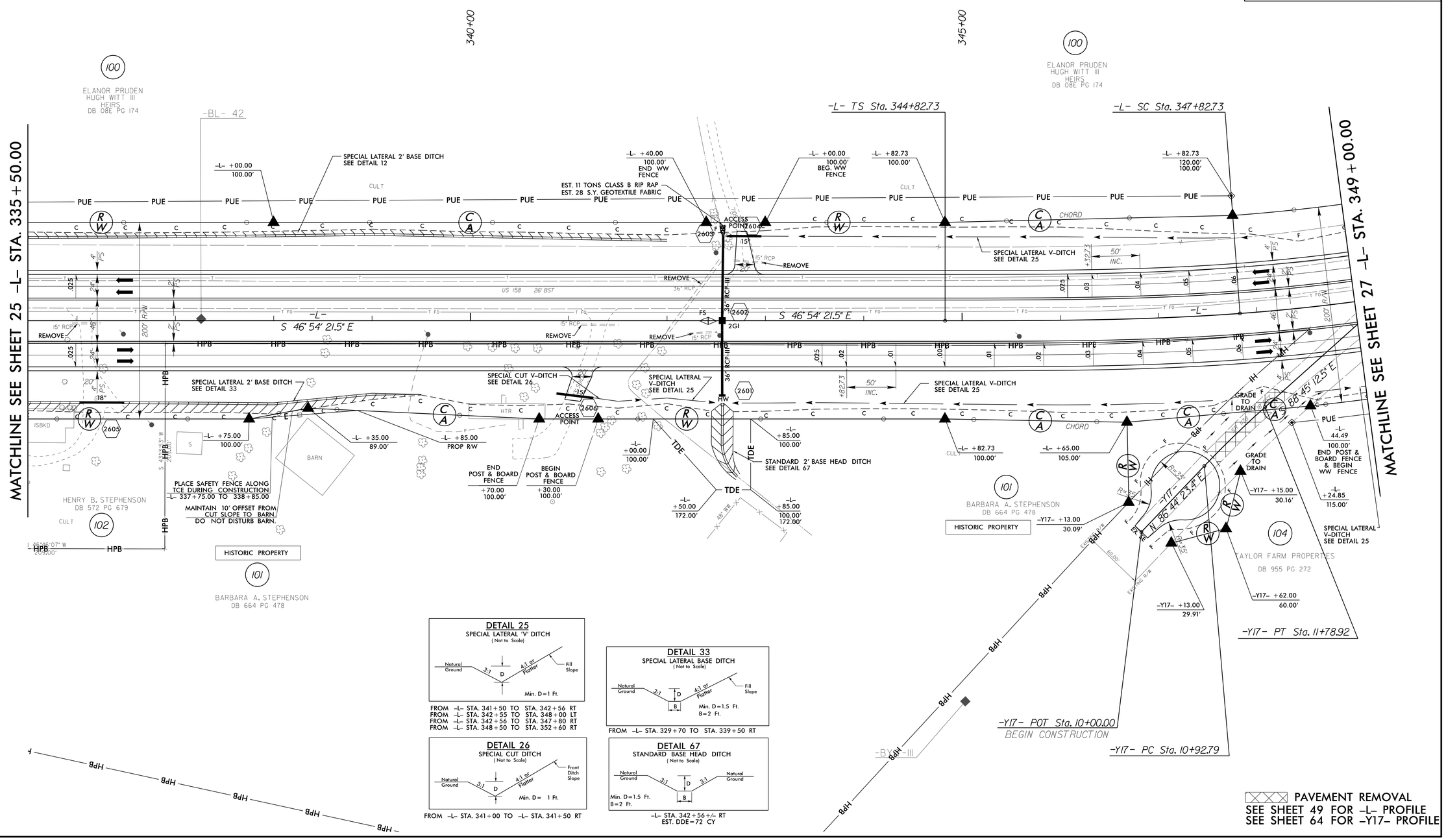
DETAIL
FALSE SUMP
(Not to Scale)



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. 342+34 M

NAD 83



DETAIL 25
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

FROM -L- STA. 341+50 TO STA. 342+56 RT
FROM -L- STA. 342+55 TO STA. 348+00 LT
FROM -L- STA. 342+56 TO STA. 347+80 RT
FROM -L- STA. 348+50 TO STA. 352+60 RT

DETAIL 33
SPECIAL LATERAL BASE DITCH
(Not to Scale)

FROM -L- STA. 329+70 TO STA. 339+50 RT

DETAIL 26
SPECIAL CUT DITCH
(Not to Scale)

FROM -L- STA. 341+00 TO -L- STA. 341+50 RT

DETAIL 67
STANDARD BASE HEAD DITCH
(Not to Scale)

-L- STA. 342+56 +/- RT
EST. DDE=72 CY

PAVEMENT REMOVAL
SEE SHEET 49 FOR -L- PROFILE
SEE SHEET 64 FOR -Y17- PROFILE

25-MAR-2019 09:02
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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	27
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
3/25/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
3/26/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

-L-
PIs Sta 346+82.79
Θs = 4° 12' 46.5"
Ls = 300.00'
LT = 200.06'
ST = 100.05'

PI Sta 348+94.01
Δ = 6° 14' 41.4" (LT)
D = 2° 48' 31.0"
L = 222.35'
T = 111.28'
R = 2,040.00'
SE = 06
V_d = 70

PIs Sta 351+05.13
Θs = 4° 12' 46.5"
Ls = 300.00'
LT = 200.06'
ST = 100.05'

-L-
PI Sta 380+35.95
Δ = 13° 38' 30.3" (RT)
D = 0° 17' 11.3"
L = 4,761.87'
T = 2,392.25'
R = 20,000.00'
SE = NC
V_d = 70+

DETAIL
FALSE SUMP
(Not to Scale)
Outside Ditch Traffic Flow
10:1
20:1
0.5' Min. 1.0' Max
S
S=Ditch Slope
℄ Proposed Ditch
FROM -L- STA. 362+50 LT

NAD 83

MATCHLINE SEE SHEET 26 -L- STA. 349+00.00

MATCHLINE SEE SHEET 28 -L- STA. 363+00.00

350+00
355+00
360+00

106
DANNY T. JERNIGAN
DARLENE E. JERNIGAN
DB 728 PG 452

DFLOSSIE T. DEBERRY
DB 608 PG 071
105

100
ELANOR PRUDEN
HUGH WITT III
HEIRS
DB 086 PG 174

106
DANNY T. JERNIGAN
DARLENE E. JERNIGAN
DB 975 PG 704

104
TAYLOR FARM PROPERTIES
DB 955 PG 272

-BL- 43
-BL- 44

-Y17- POT Sta. 13+46.79
-L- POC Sta. 349+34.39
-L- ST Sta. 353+05.08
-L- CS Sta. 350+05.08
-L- PC Sta. 356+43.70

S 61° 34' 36.0" E
S 88° 45' 12.5" E
S 61°50'29" E 148.90'
N 34°06'38" E 274.32'
N 32°47'40" E 271.74'
N 32°47'40" E

SPECIAL LATERAL V-DITCH SEE DETAIL 25
SPECIAL CUT V-DITCH SEE DETAIL 26
SPECIAL LATERAL 2' BASE DITCH SEE DETAIL 12
SPECIAL LATERAL 3' BASE DITCH SEE DETAIL 50
EST. 3 TONS CLASS B RIP RAP
EST. 10 S.Y. GEOTEXTILE FABRIC
END WW FENCE +40.00 100.00'
BEG. WW FENCE +83.36 100.00'
-L- +43.70 100.00'
-L- +05.08 100.00'
-L- +05.08 115.00'
-L- +25.00 100.00'
-L- +85.00 100.00'
-L- +23.36 100.00'
-L- +96.60 100.00'
-L- +89.45 100.00' 115.00'
-L- +40.00 100.00' 119.00'
-L- +00.00 100.00'
-L- +52.00 100.00' 119.00'
ACCESS POINT
REMOVE
15" RCP
18" RCP-III
2GI Type D
2GI
GI etc.
FS
TDE
PUE
CHORD
50' INC.
EXISTING R/W
US 158 26' BST
CULT

DETAIL 12
SPECIAL LATERAL BASE DITCH
(Not to Scale)
Natural Ground
3:1
D
B
4:1 or Flatter
Fill Slope
Min. D=1 Ft.
B=2 Ft.
FROM -L- STA. 356+00 TO STA. 361+60 LT

DETAIL 25
SPECIAL LATERAL 'V' DITCH
(Not to Scale)
Natural Ground
3:1
D
4:1 or Flatter
Fill Slope
Min. D=1 Ft.
FROM -L- STA. 349+00 TO STA. 349+50 LT
FROM -L- STA. 361+60 TO STA. 362+50 LT
FROM -L- STA. 348+50 TO STA. 352+60 RT
FROM -L- STA. 352+60 TO STA. 355+00 RT
FROM -L- STA. 359+00 TO STA. 362+45 RT

DETAIL 26
SPECIAL CUT DITCH
(Not to Scale)
Natural Ground
3:1
D
4:1 or Flatter
Front Ditch Slope
Min. D=1 Ft.
FROM -L- STA. 349+50 TO STA. 352+00 LT
FROM -L- STA. 352+00 TO STA. 354+40 LT

DETAIL 50
SPECIAL LATERAL BASE DITCH
(Not to Scale)
Natural Ground
3:1
D
B
4:1 or Flatter
Fill Slope
Min. D=1.0 Ft.
B=3 Ft.
FROM -L- STA. 362+45 TO STA. 368+00+/- RT

DETAIL
FALSE SUMP
(Not to Scale)
Median Ditch
9"
2'
L (See Chart Below)
20'
GI etc.
S
S=Ditch Slope
℄ Proposed Ditch

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. 352+50 M
-L- STA. 362+22 M

SEE SHEET 49 FOR -L- PROFILE

25-MAR-2019 09:02
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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	28
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
3/25/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
3/26/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
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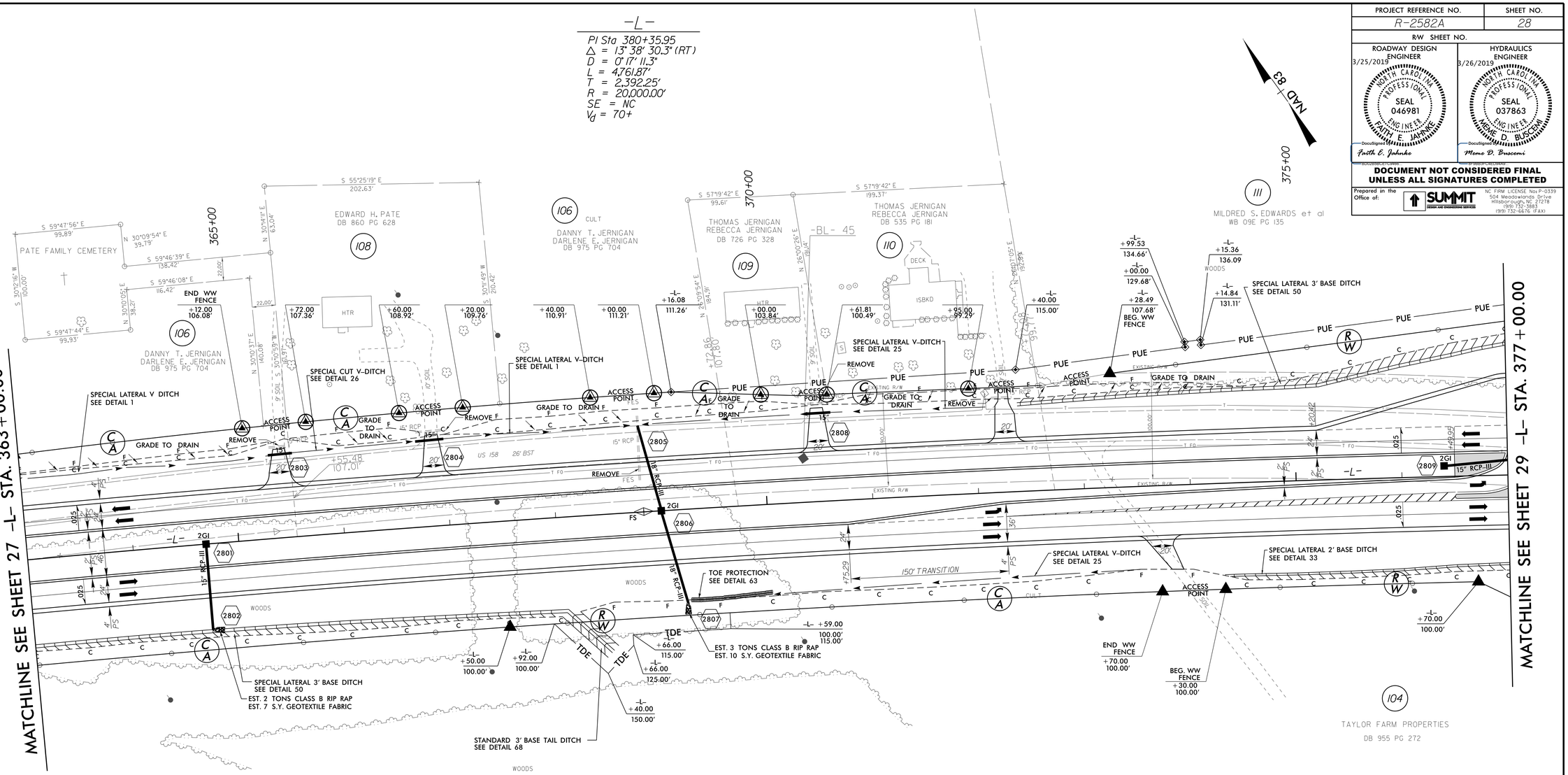
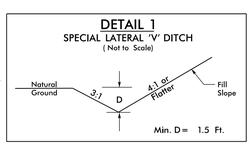
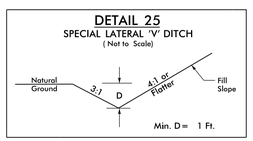
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

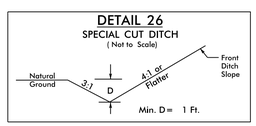




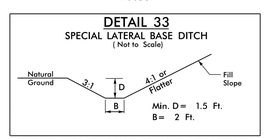
FROM -L- STA. 362+50 LT TO -L- STA. 364+00 LT
FROM -L- STA. 367+50 LT TO -L- STA. 368+83 LT



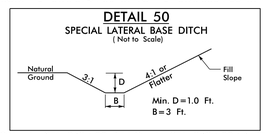
FROM -L- STA. 368+83 LT TO -L- STA. 372+10 LT
FROM -L- STA. 370+00 RT TO -L- STA. 373+50 RT



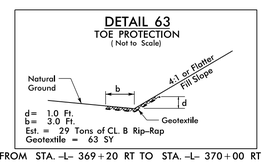
FROM -L- STA. 364+00 LT TO -L- STA. 367+50 LT



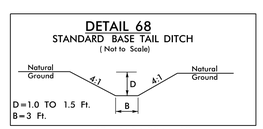
FROM -L- STA. 374+30 RT TO -L- STA. 380+00 RT



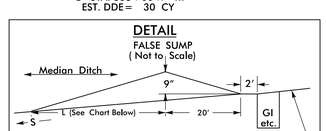
FROM -L- STA. 362+00 RT TO -L- STA. 368+00+/- RT
FROM -L- STA. 372+40 LT TO -L- STA. 382+00 LT



FROM STA. -L- 369+20 RT TO STA. -L- 370+00 RT



-L- STA. 368+00+/- RT
EST. DDE = 30 CY



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'

FROM -L- STA. 365+85 M

SEE SHEET 50 FOR -L- PROFILE
SEE SHEET 2B-9 FOR INTERSECTION DETAIL

25-MAR-2019 09:03
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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	29
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
3/25/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
3/26/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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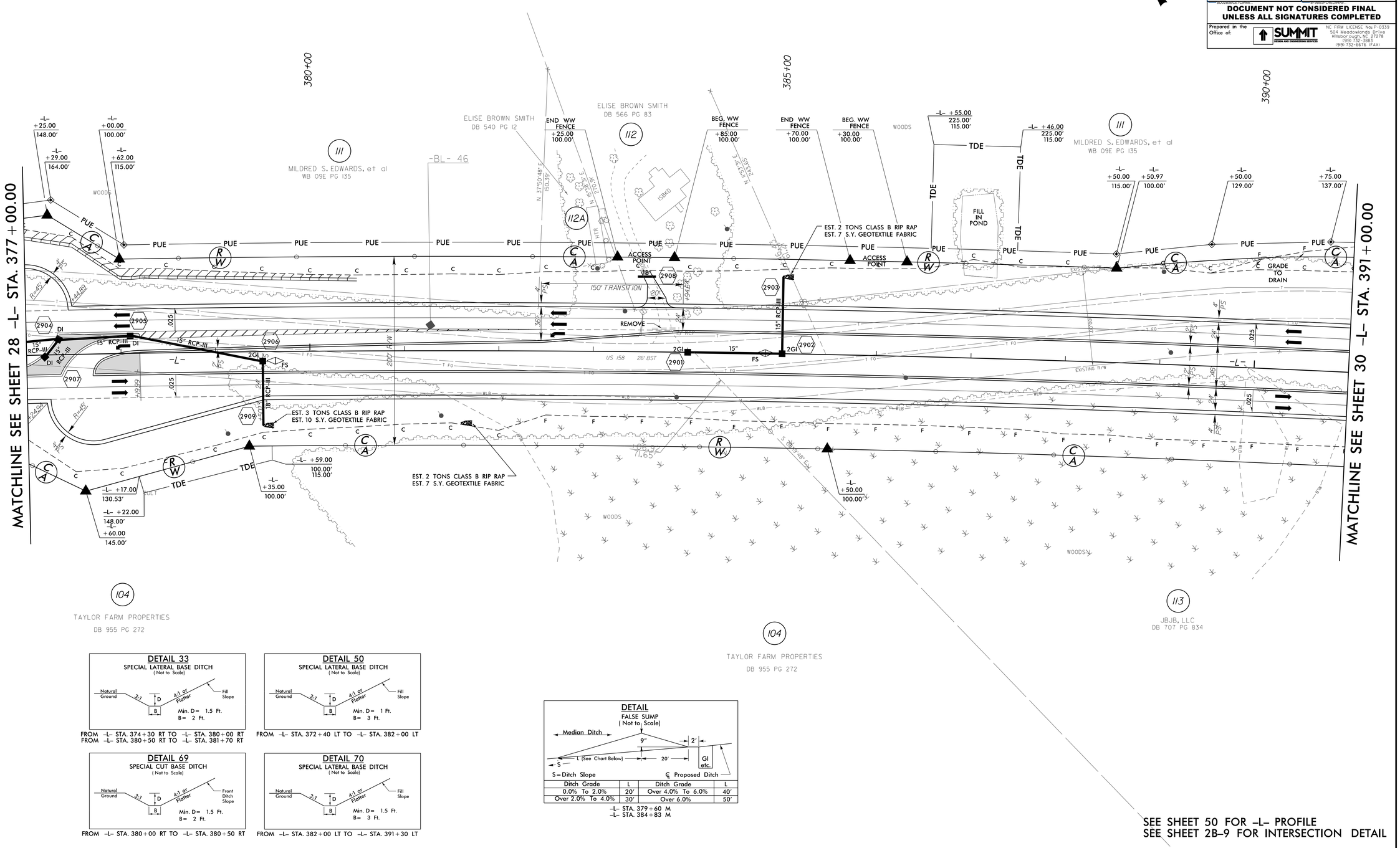
(919) 732-3883
(919) 732-6676 (FAX)



DETAIL 33
SPECIAL LATERAL BASE DITCH
(Not to Scale)

FROM -L- STA. 374+30 RT TO -L- STA. 380+00 RT
FROM -L- STA. 380+50 RT TO -L- STA. 381+70 RT

DETAIL 50
SPECIAL LATERAL BASE DITCH
(Not to Scale)

FROM -L- STA. 372+40 LT TO -L- STA. 382+00 LT

DETAIL 69
SPECIAL CUT BASE DITCH
(Not to Scale)

FROM -L- STA. 380+00 RT TO -L- STA. 380+50 RT

DETAIL 70
SPECIAL LATERAL BASE DITCH
(Not to Scale)

FROM -L- STA. 382+00 LT TO -L- STA. 391+30 LT

DETAIL
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. 379+60 M
-L- STA. 384+83 M

SEE SHEET 50 FOR -L- PROFILE
SEE SHEET 2B-9 FOR INTERSECTION DETAIL

25-MAR-2019 09:03
R2582A_PLAN_BP_sht29.dgn

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8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	30
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
3/25/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
3/26/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
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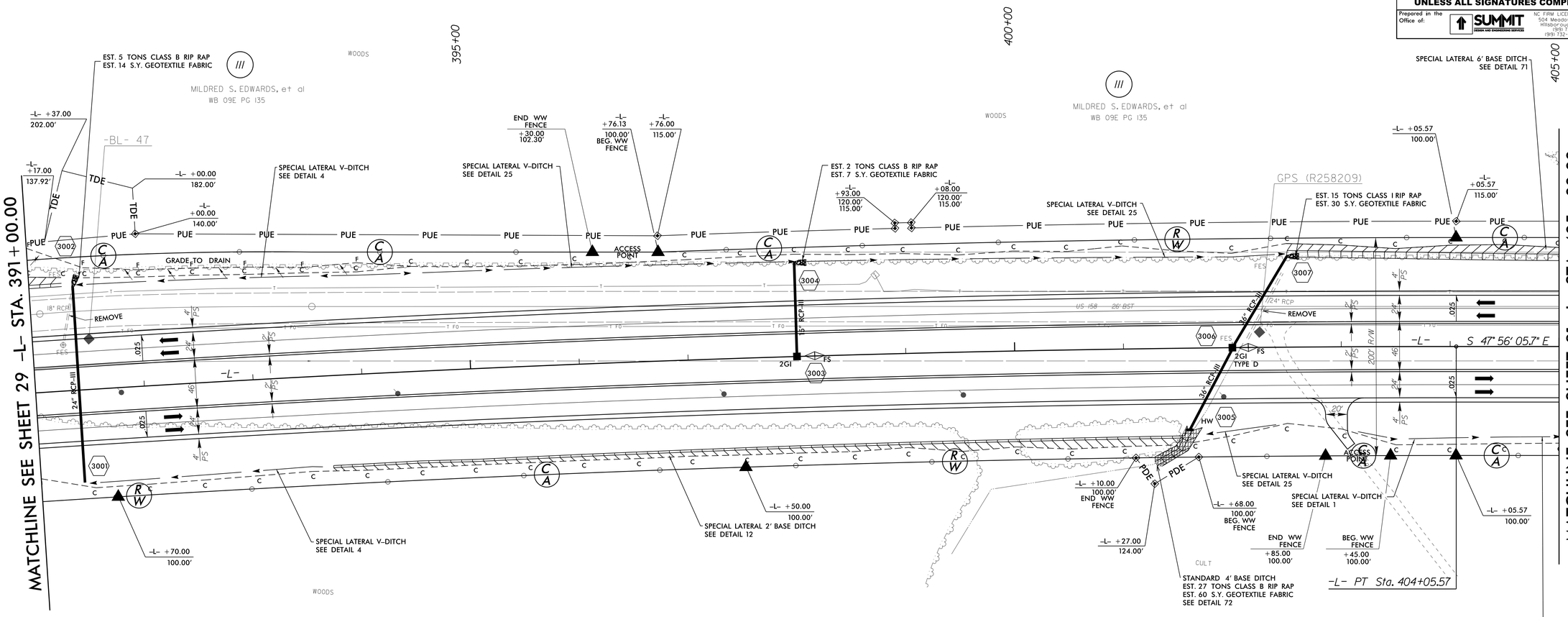
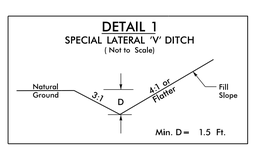
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

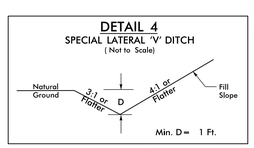
-L-
PI Sta 380+35.95
Δ = 13° 38' 30.3" (RT)
D = 0° 17' 11.3"
L = 4,761.87'
T = 2,392.25'
R = 20,000.00'
SE = NC
V_d = 70+

NAD 83

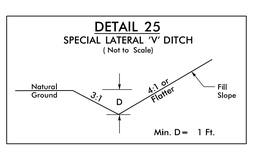




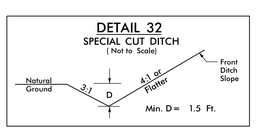
FROM -L- STA. 403+15 RT TO -L- STA. 404+00 RT



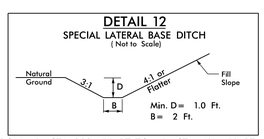
FROM -L- STA. 391+40 LT TO -L- STA. 394+00 LT
FROM -L- STA. 391+40 RT TO -L- STA. 393+70 RT



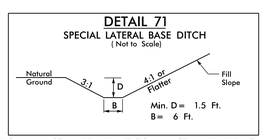
FROM -L- STA. 394+00 LT TO -L- STA. 402+50 LT
FROM -L- STA. 401+70 RT TO -L- STA. 402+50 RT



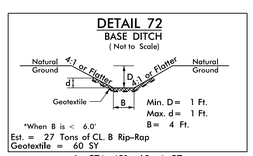
FROM -L- STA. 404+00 RT TO -L- STA. 406+00 RT



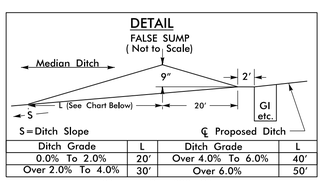
FROM -L- STA. 393+70 RT TO -L- STA. 401+50 RT



FROM -L- STA. 402+50 LT TO -L- STA. 410+00 LT



-L- STA. 401+60 +/- RT
EST. DDE=60 CY



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'

FROM -L- STA. 398+24 M
FROM -L- STA. 402+24 M

SEE SHEET 51 FOR -L- PROFILE

25-MAR-2019 09:03
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sarolakis

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8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	31
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
4/10/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAPINKO
DocuSign Envelope ID: 8D0B8B0F-0B0A-4A0A-A0A0-0A0A0A0A0A0A
Faith E. Japinko

HYDRAULICS ENGINEER
4/10/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEMO D. BUSCEMI
DocuSign Envelope ID: 8D0B8B0F-0B0A-4A0A-A0A0-0A0A0A0A0A0A
Memo D. Busceni

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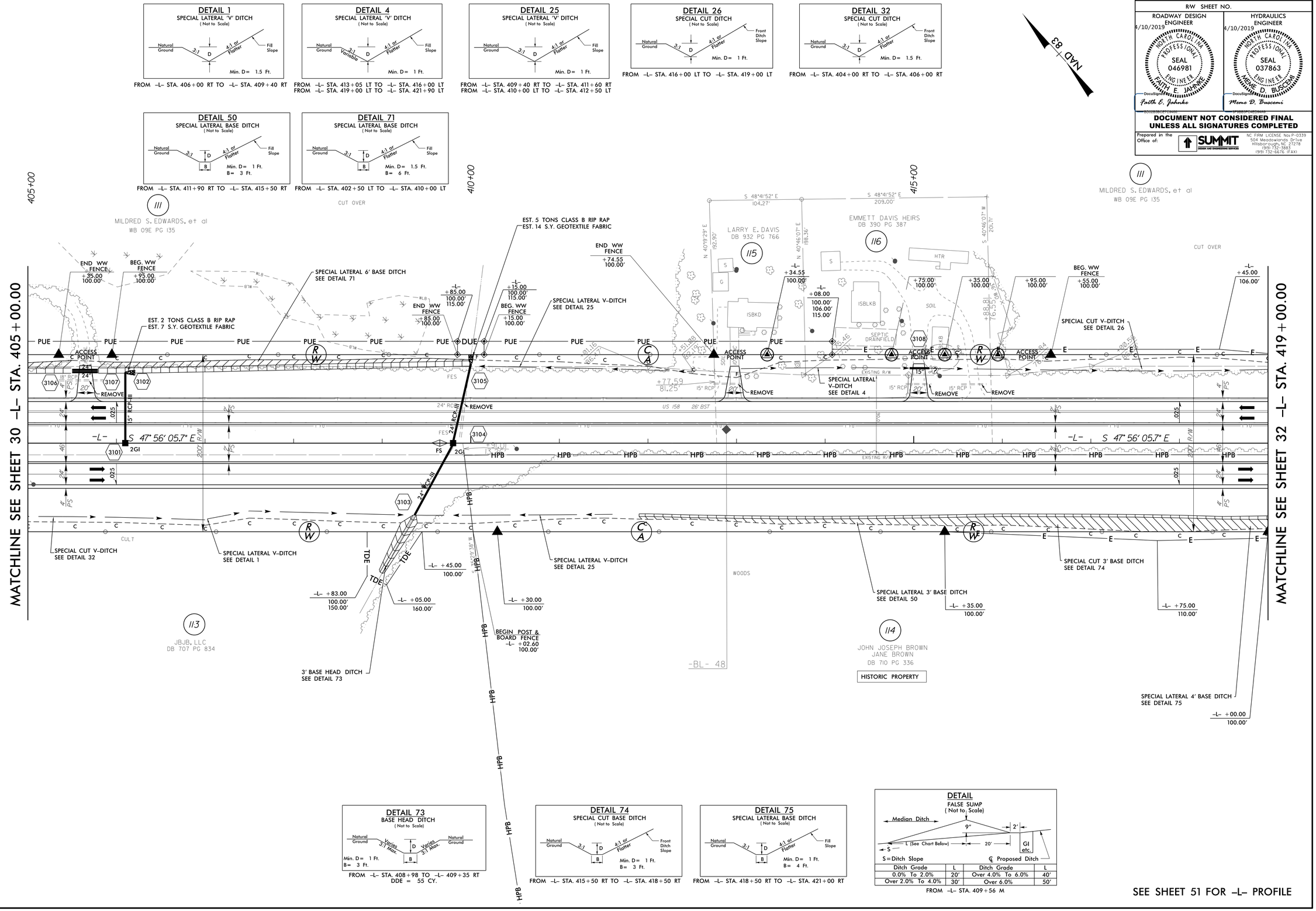
Prepared in the Office of: SUMMIT DESIGN AND ENGINEERING SERVICES
NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)



SEE SHEET 51 FOR –L– PROFILE

10-APR-2019 16:33
R-2582A_PL_sheet_31.dgn
sarojakiti

DocuSign Envelope ID: E9413660-F5DB-494D-8B80-E327B76C8B52

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	32
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
4/10/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAPINKO
DocuSign Envelope ID: Faith E. Japinko

HYDRAULICS ENGINEER
4/10/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSign Envelope ID: Meme D. Busceni

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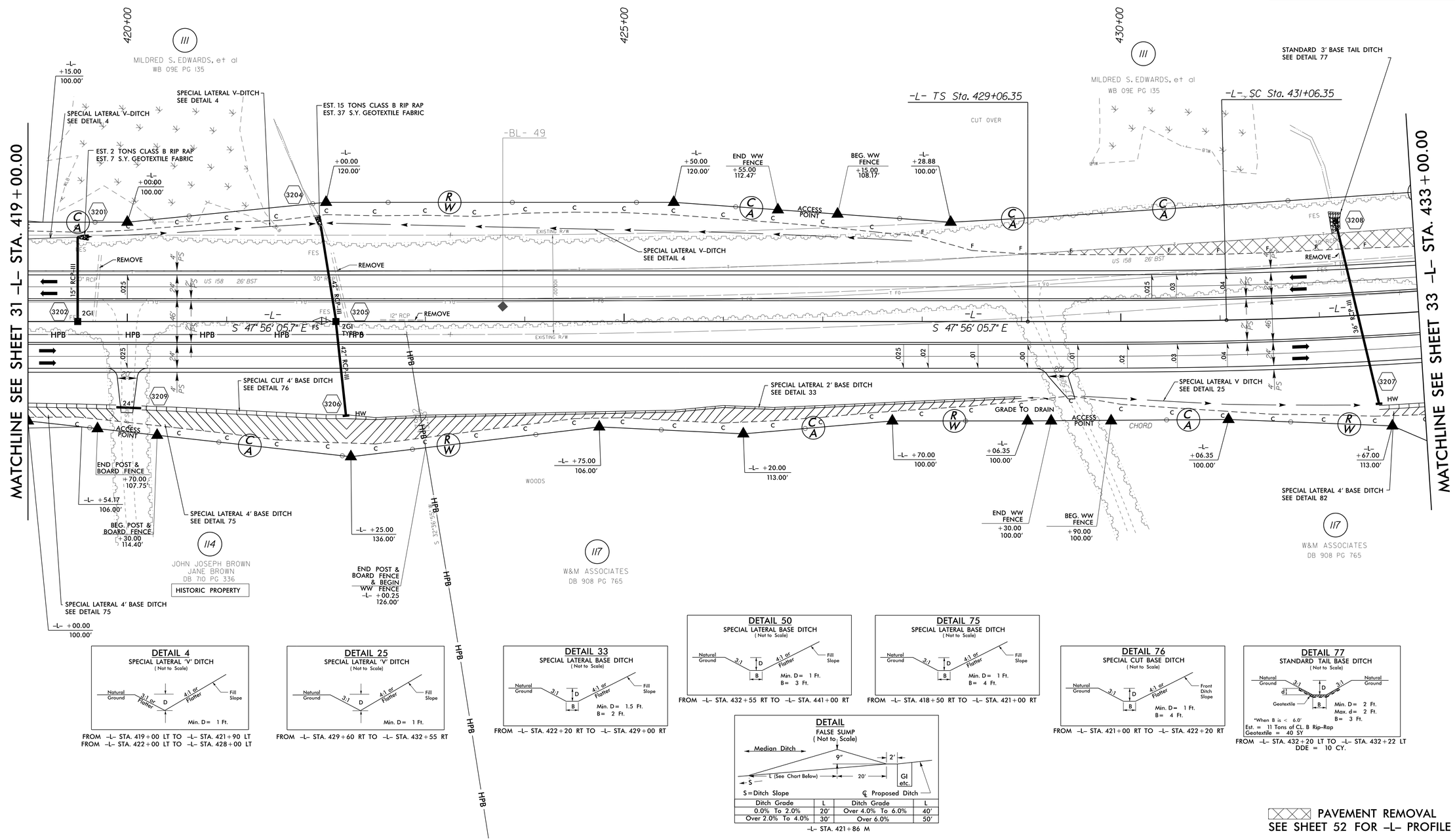
NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

-L-

PIs Sta 430+39.69
Θs = 1° 15′ 33.3″
Ls = 200.00′
LT = 133.34′
ST = 66.67′

PI Sta 439+89.95
Δ = 21° 58′ 47.6″ (LT)
D = 1° 15′ 33.3″
L = 1,745.48′
T = 883.60′
R = 4,550.00′
SE = .04
Vd = 70+

PIs Sta 449+18.50
Θs = 1° 15′ 33.3″
Ls = 200.00′
LT = 133.34′
ST = 66.67′



DETAIL 4
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

FROM -L- STA. 419+00 LT TO -L- STA. 421+90 LT
FROM -L- STA. 422+00 LT TO -L- STA. 428+00 LT

DETAIL 25
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

FROM -L- STA. 429+60 RT TO -L- STA. 432+55 RT

DETAIL 33
SPECIAL LATERAL BASE DITCH
(Not to Scale)

FROM -L- STA. 422+20 RT TO -L- STA. 429+00 RT

DETAIL 50
SPECIAL LATERAL BASE DITCH
(Not to Scale)

FROM -L- STA. 432+55 RT TO -L- STA. 441+00 RT

DETAIL 75
SPECIAL LATERAL BASE DITCH
(Not to Scale)

FROM -L- STA. 418+50 RT TO -L- STA. 421+00 RT

DETAIL
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. 421+86 M

DETAIL 76
SPECIAL CUT BASE DITCH
(Not to Scale)

FROM -L- STA. 421+00 RT TO -L- STA. 422+20 RT

DETAIL 77
STANDARD TAIL BASE DITCH
(Not to Scale)

FROM -L- STA. 432+20 LT TO -L- STA. 432+22 LT
DDE = 10 CY.

PAVEMENT REMOVAL
SEE SHEET 52 FOR -L- PROFILE

10-APR-2019 16:33
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sgrabowski

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8/17/99

-L-

PIs Sta 430+39.69
Θs = 1° 15' 33.3"
Ls = 200.00'
LT = 133.34'
ST = 66.67'

PI Sta 439+89.95
Δ = 21° 58' 47.6" (LT)
D = 1° 15' 33.3"
L = 1,745.48'
T = 883.60'
R = 4,550.00'
SE = .04
V_d = 70+

PIs Sta 449+18.50
Θs = 1° 15' 33.3"
Ls = 200.00'
LT = 133.34'
ST = 66.67'

-Y18-

PI Sta 13+48.39
Δ = 17° 31' 31.2" (RT)
D = 5° 16' 50.6"
L = 331.87'
T = 167.24'
R = 1,085.00'
SE = NC
V_d = 50+

-L_CR_EBL-

PI Sta 14+15.18
Δ = 13° 57' 53.4" (LT)
D = 1° 41' 24.5"
L = 826.25'
T = 415.18'
R = 3,390.00'

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	33

R/W SHEET NO.

ROADWAY DESIGN ENGINEER
3/25/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned: Faith E. Jahnke

HYDRAULICS ENGINEER
3/26/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned: Meme D. Buscemi

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NC FIRM LICENSE No: P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

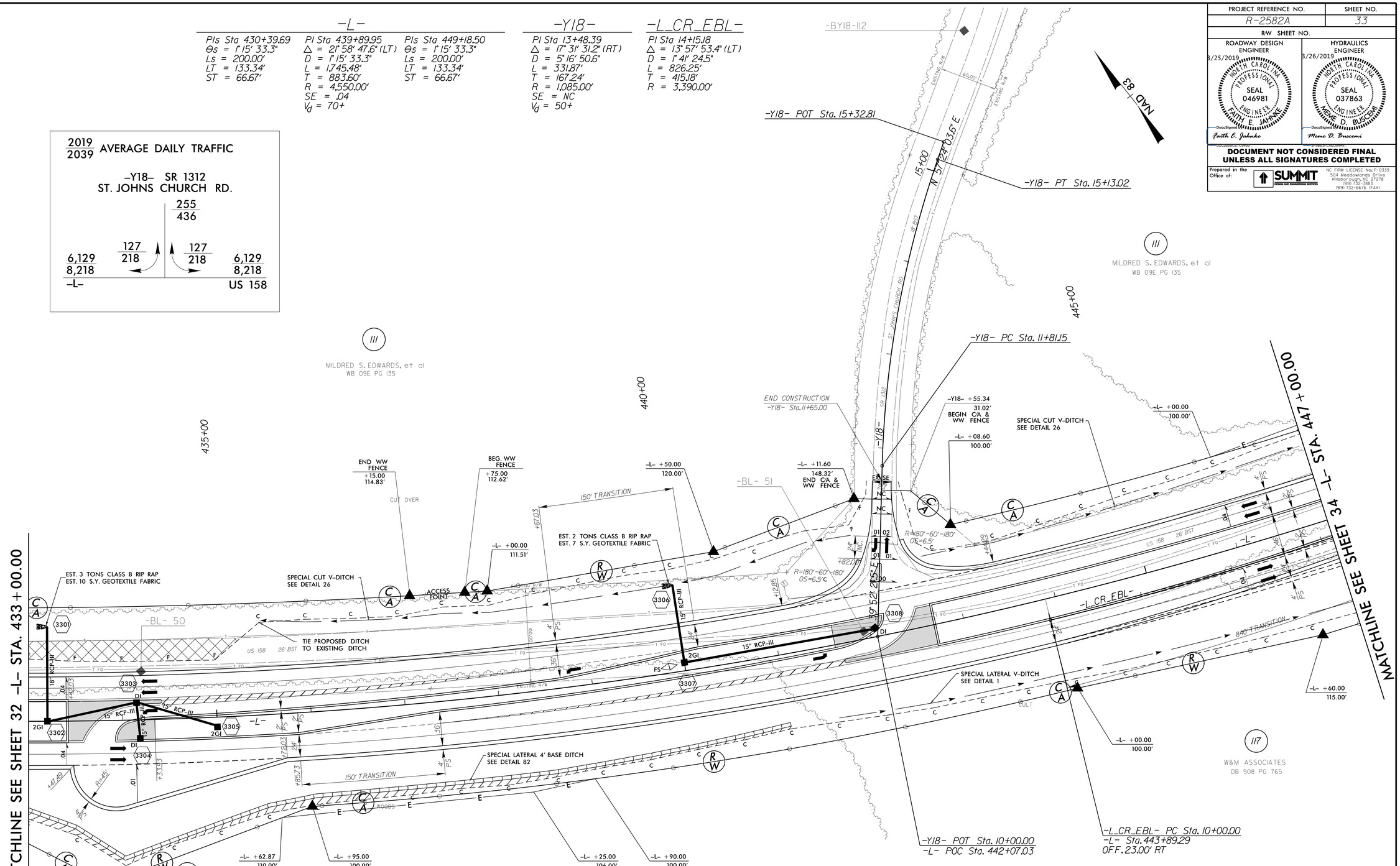
2019/2039 AVERAGE DAILY TRAFFIC

-Y18- SR 1312
ST. JOHNS CHURCH RD.

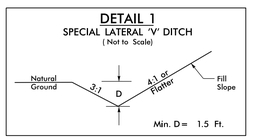
255/436

127/218 | 127/218

6,129/8,218 -L- | 6,129/8,218 US 158

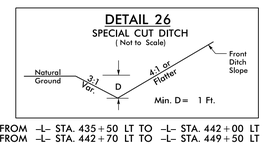


DETAIL 1
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



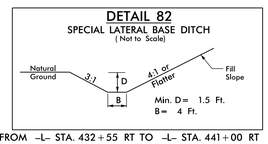
FROM -L- STA. 441+50 RT TO -L- STA. 449+00 RT

DETAIL 26
SPECIAL CUT DITCH
(Not to Scale)



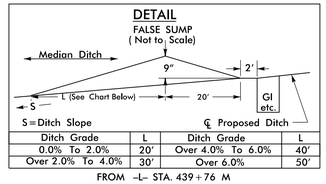
FROM -L- STA. 435+50 LT TO -L- STA. 442+00 LT
FROM -L- STA. 442+70 LT TO -L- STA. 449+50 LT

DETAIL 82
SPECIAL LATERAL BASE DITCH
(Not to Scale)



FROM -L- STA. 432+55 RT TO -L- STA. 441+00 RT

DETAIL
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'

FROM -L- STA. 439+76 M

PAVEMENT REMOVAL
SEE SHEET 52 FOR -L- PROFILE
SEE SHEET 64 FOR -Y18- PROFILE
SEE SHEET 67 FOR -L_CR_EBL- PFL
SEE SHEET 2B-9 FOR INTERSECTION DETAIL
SEE SHEET 2B-17 FOR INTERSECTION DETAIL

25-MAR-2019 09:03
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sgoolsbee

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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	34
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
3/25/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
3/26/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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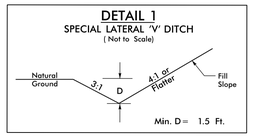
Prepared in the Office of: SUMMIT DESIGN AND ENGINEERING SERVICES
NC FIRM LICENSE: Non P-0339
504 Meadowlands Drive
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

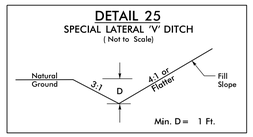
8/17/99

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



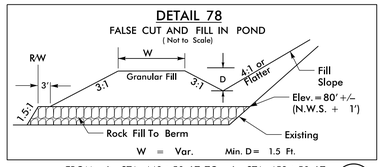
FROM –L– STA. 441+50 RT TO –L– STA. 449+00 RT

DETAIL 25
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM –L– STA. 452+50 LT TO –L– STA. 453+50 LT

DETAIL 78
FALSE CUT AND FILL IN POND
(Not to Scale)



FROM –L– STA. 449+50 LT TO –L– STA. 452+50 LT
SEE SHEET 2G-1 FOR ROCK EMBANKMENTS DETAILS

–L–

PIs Sta 430+39.69
Θs = 1° 15' 33.3"
Ls = 200.00'
LT = 133.34'
ST = 66.67'

PI Sta 439+89.95
Δ = 21° 58' 47.6" (LT)
D = 1° 15' 33.3"
L = 1,745.48'
T = 883.60'
R = 4,550.00'
SE = .04
V_d = 70+

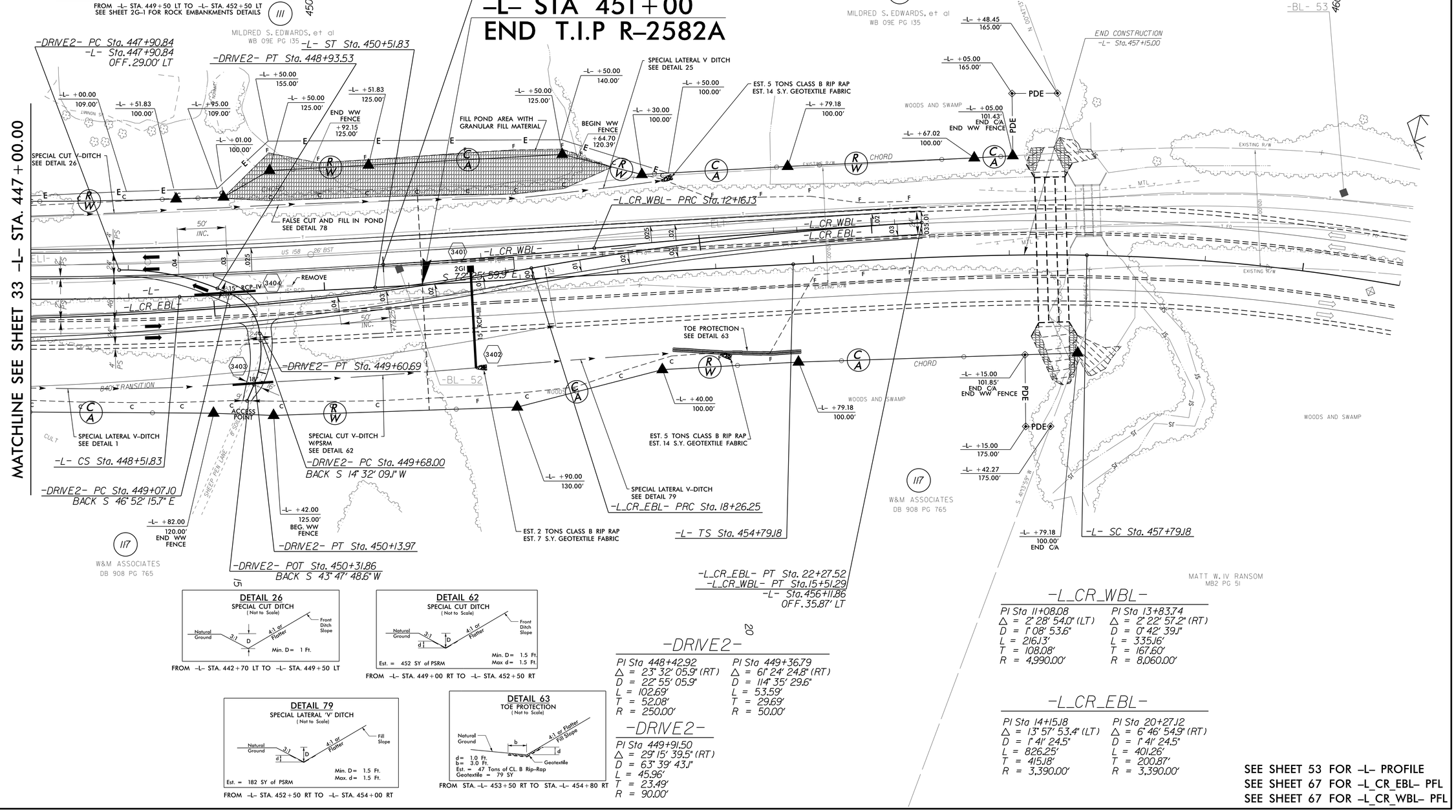
PIs Sta 449+18.50
Θs = 1° 15' 33.3"
Ls = 200.00'
LT = 133.34'
ST = 66.67'

–L–

PIs Sta 456+79.23
Θs = 4° 12' 46.5"
Ls = 300.00'
LT = 200.06'
ST = 100.05'

PI Sta 460+08.87
Δ = 12° 50' 53.3" (RT)
D = 2° 48' 31.0"
L = 457.45'
T = 229.69'
R = 2,040.00'
SE = .06
V_d = 70

PIs Sta 463+36.68
Θs = 4° 12' 46.5"
Ls = 300.00'
LT = 200.06'
ST = 100.05'



DETAIL 26
SPECIAL CUT DITCH
(Not to Scale)

FROM –L– STA. 442+70 LT TO –L– STA. 449+50 LT

DETAIL 62
SPECIAL CUT DITCH
(Not to Scale)

FROM –L– STA. 449+00 RT TO –L– STA. 452+50 RT

DETAIL 79
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

FROM –L– STA. 452+50 RT TO –L– STA. 454+00 RT

DETAIL 63
TOE PROTECTION
(Not to Scale)

FROM STA. –L– 453+50 RT TO STA. –L– 454+80 RT

–DRIVE2–

PI Sta 448+42.92
Δ = 23° 32' 05.9" (RT)
D = 22° 55' 05.9"
L = 102.69'
T = 52.08'
R = 250.00'

PI Sta 449+36.79
Δ = 61° 24' 24.8" (RT)
D = 114° 35' 29.6"
L = 53.59'
T = 29.69'
R = 50.00'

–DRIVE2–

PI Sta 449+91.50
Δ = 29° 15' 39.5" (RT)
D = 63° 39' 43.1"
L = 45.96'
T = 23.49'
R = 90.00'

–L_CR_WBL–

PI Sta 11+08.08
Δ = 2° 28' 54.0" (LT)
D = 1° 08' 53.6"
L = 216.13'
T = 108.08'
R = 4,990.00'

PI Sta 13+83.74
Δ = 2° 22' 57.2" (RT)
D = 0° 42' 39.1"
L = 335.16'
T = 167.60'
R = 8,060.00'

–L_CR_EBL–

PI Sta 14+15.18
Δ = 13° 57' 53.4" (LT)
D = 1° 41' 24.5"
L = 826.25'
T = 415.18'
R = 3,390.00'

PI Sta 20+27.12
Δ = 6° 46' 54.9" (RT)
D = 1° 41' 24.5"
L = 401.26'
T = 200.87'
R = 3,390.00'

SEE SHEET 53 FOR –L– PROFILE
SEE SHEET 67 FOR –L_CR_EBL– PFL
SEE SHEET 67 FOR –L_CR_WBL– PFL

25-MAR-2019 09:03
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8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	35
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke
BD02B0B0B0B0B0B0

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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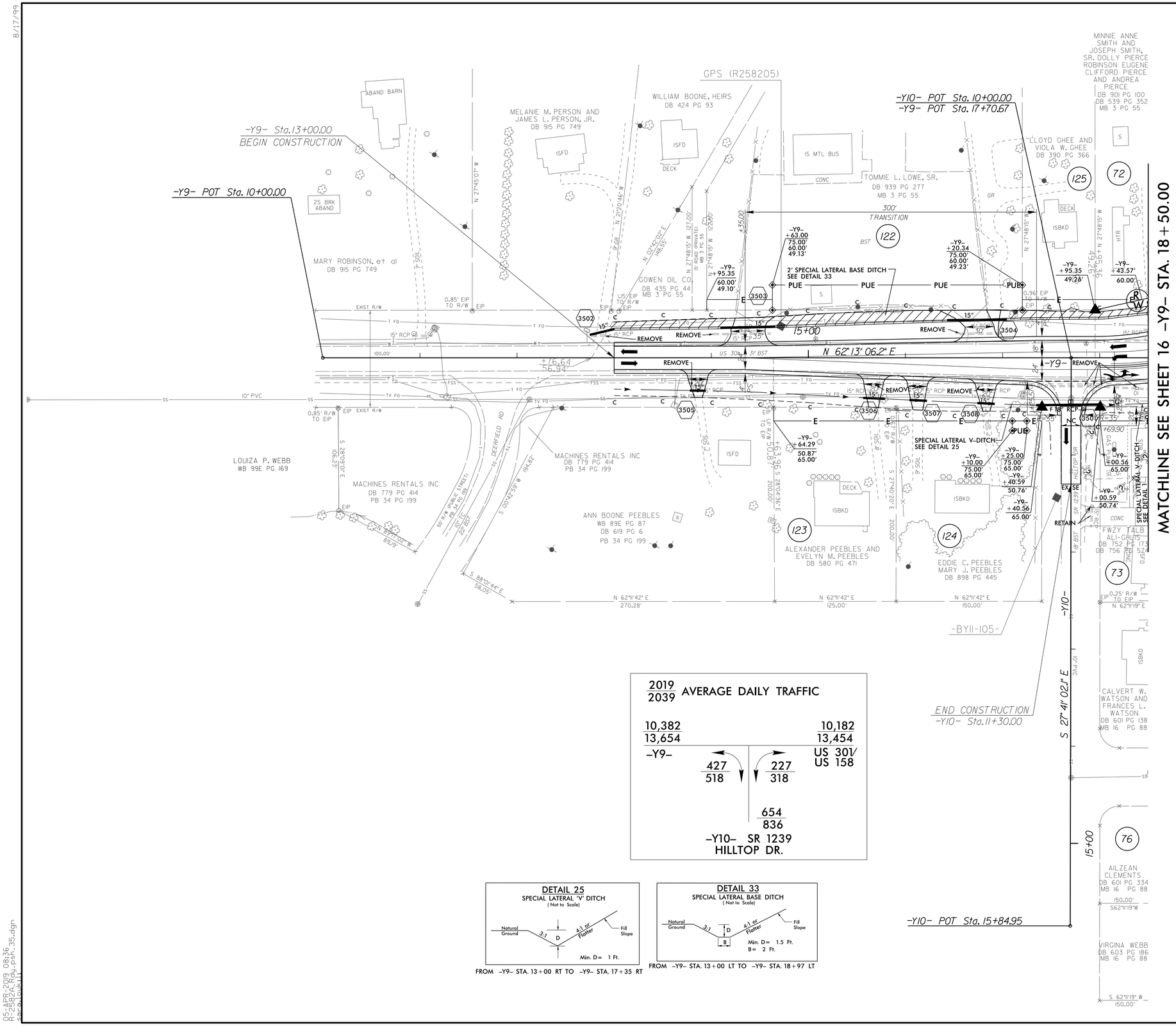

2019/2039 AVERAGE DAILY TRAFFIC

-Y9-: 10,382 / 13,654 — 10,182 / 13,454: US 301/US 158

427 / 518 — 227 / 318

654 / 836

-Y10- SR 1239 HILLTOP DR.

DETAIL 25
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

FROM -Y9- STA. 13+00 RT TO -Y9- STA. 17+35 RT

DETAIL 33
SPECIAL LATERAL BASE DITCH
(Not to Scale)

FROM -Y9- STA. 13+00 LT TO -Y9- STA. 18+97 LT

SEE SHEET 57 FOR -Y9- PROFILE
SEE SHEET 60 FOR -Y10- PROFILE

05-APR-2019 08:36
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sarahlokin

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8/17/99

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	36
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
3/25/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
3/26/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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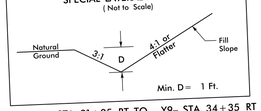
Hillsborough, NC 27278
(919) 732-3883
(919) 732-6676 (FAX)

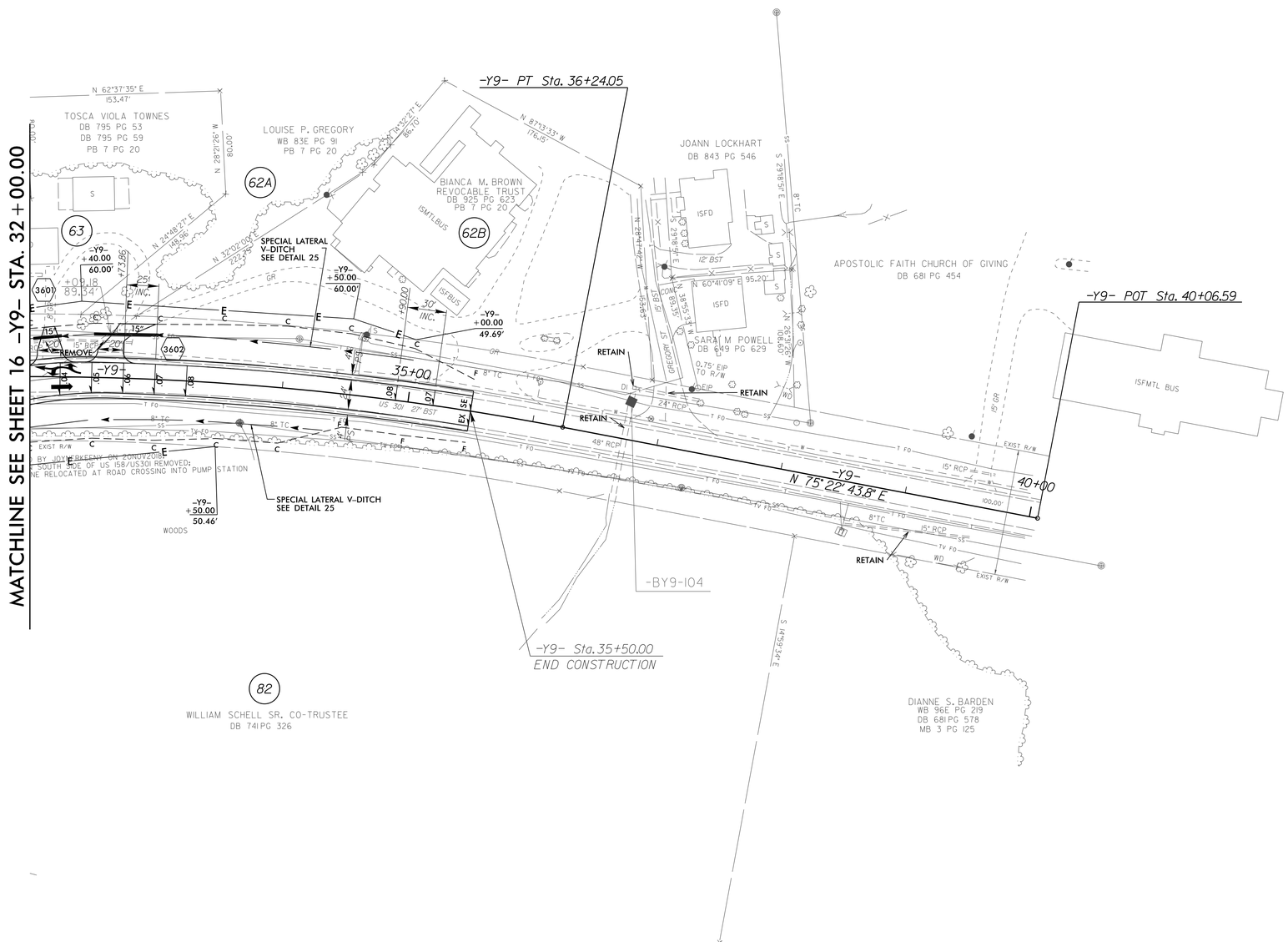
DETAIL 25
SPECIAL LATERAL 'V' DITCH
(Not to Scale)



FROM -Y9- STA. 31+05 RT TO -Y9- STA. 34+35 RT
FROM -Y9- STA. 31+44 LT TO -Y9- STA. 35+00 LT

-Y9-
PI Sta 33+67.93
Δ = 13° 09' 37.6" (RT)
D = 2° 33' 28.3"
L = 514.51'
T = 258.39'
R = 2,240.00'
SE = 08
V_d = 60+

NAD 83



SEE SHEET 57 FOR -Y9- PROFILE

25-MAR-2019 09:04
R2582A_RD_PH1_36.dgn
saraujohnson

DocuSign Envelope ID: CF5392BE-22A6-40C8-805D-DCAF0CEA4DA6

5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	37

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Busceni

BD02

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-L- US 158

PIPE HYDRAULIC DATA
STRUCTURE 0419 Sta.21+40

DRAINAGE AREA	=	7.5	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	18	CFS
DESIGN HW ELEVATION	=	124.9	FT
100 YEAR DISCHARGE	=	19	CFS
100 YEAR HW ELEVATION	=	125.0	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	38	CFS
OVERTOPPING ELEVATION	=	129.0	FT

* EXISTING 195 ROADWAY USED FOR OVERTOPPING ELEVATION.

BEGIN GRADE
PI = 17+00.00
EL = 136.29'

(ROUNDABOUT CD)
-L- STA 19+61.88
195 RPC STA 14+19.37
195 RPD STA 18+08.32

END GRADE
PI = 21+30.00
EL = 147.8475'

BEGIN GRADE
PI = 20+29.88
EL = 145.09'

END GRADE
PI = 18+93.88
EL = 141.29'

-L- Sta.11+20.23
Y1- Sta.28+85.91

(-)0.2927%
(+)2.5763%
(+)2.7941%
(+)2.7542%

END V-DITCH RT
PI = 10+91.00
EL = 131.62

BEGIN V-DITCH RT
PI = 10+50.00
EL = 131.74

EXIST. 24" RCP
INV=121.80'

LEFT DITCH
RIGHT DITCH

SEE SHEET 4 FOR PLAN VIEW

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00

-L- US 158

PI = 26+00.00
EL = 148.5779'
VC = 100'
K = 51
V = 40mph

(ROUNDABOUT CD)
-L- STA 27+35.91
195 RPA STA 17+17.13
195 RPB STA 18+37.89

BM #1: R/R SPIKE IN 22" OAK
-BL- STA 22+25.00, 99.00' RT
-L- STA 30+99.14, 114.31' RT
EL 128.73'

PIPE HYDRAULIC DATA
STRUCTURE 0426 Sta.28+81

DRAINAGE AREA	=	10.0	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	30	CFS
DESIGN HW ELEVATION	=	125.1	FT
100 YEAR DISCHARGE	=	33	CFS
100 YEAR HW ELEVATION	=	125.3	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	62	CFS
OVERTOPPING ELEVATION	=	128.0	FT

* EXISTING DRIVEWAY AT STA 33+00 RT USED FOR OVERTOPPING ELEVATION.

BEGIN GRADE
PI = 25+02.93
EL = 149.2838'

END GRADE
PI = 26+67.91
EL = 146.75'

BEGIN GRADE
PI = 28+03.91
EL = 144.35'

PI = 33+50.00
EL = 129.4648'
VC = 350'
K = 144
V = 60mph

PI = 36+79.22
EL = 128.4771'
VC = 300'
K = 298
V = 60mph

(+)0.7822%
(-)2.6916%
(-)1.7647%
(-)2.7258%
(-)0.3000%
(+)0.7084%
(-)0.7600%

CONT. BASE DITCH LT
PI = 28+65.00
(-195_RPB- STA.17+76 LT)
EL = 121.99

36" RCP IV
INV=122.06'

(+)1.3514%
(-)1.5588%
(+)1.5000%
(+)1.7500%

END BASE DITCH LT
PI = 30+50.00
EL = 124.49

BEGIN V-DITCH RT
PI = 36+00.00
EL = 124.40

CONT. BASE DITCH RT
PI = 28+66.00
(-195_RPA- STA.16+87 RT)
EL = 122.67

PI = 29+00.00
EL = 122.14

PI = 29+50.00
EL = 122.89

END BASE DITCH RT
PI = 29+90.00
EL = 123.59

LEFT DITCH
RIGHT DITCH

SEE SHEET 4 FOR PLAN VIEW

24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00 36+00 37+00

R5-ARP-209.09H
R2582A_SHEET_37_pfl.dgn
Roadway Profile

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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	38

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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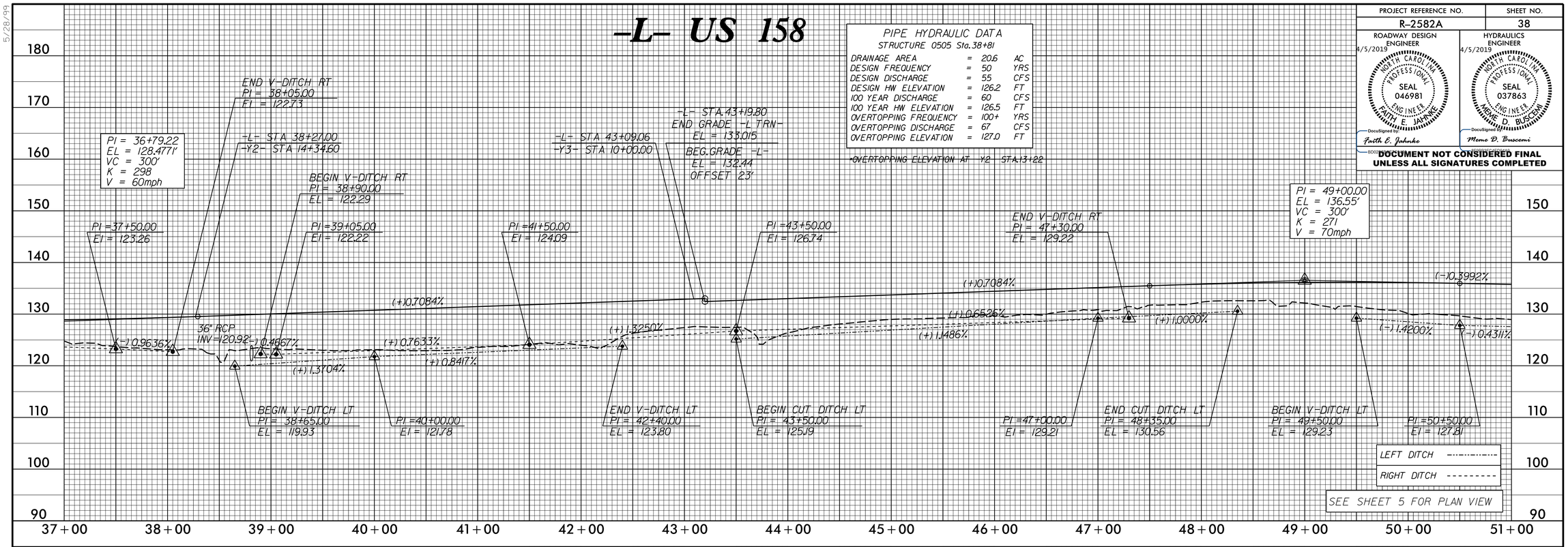
-L- US 158

PIPE HYDRAULIC DATA
STRUCTURE 0505 Sta.38+81

DRAINAGE AREA	=	20.6	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	55	CFS
DESIGN HW ELEVATION	=	126.2	FT
100 YEAR DISCHARGE	=	60	CFS
100 YEAR HW ELEVATION	=	126.5	FT
OVERTOPPING FREQUENCY	=	100+	YRS
OVERTOPPING DISCHARGE	=	67	CFS
OVERTOPPING ELEVATION	=	127.0	FT

*OVERTOPPING ELEVATION AT -Y2- STA.13+22

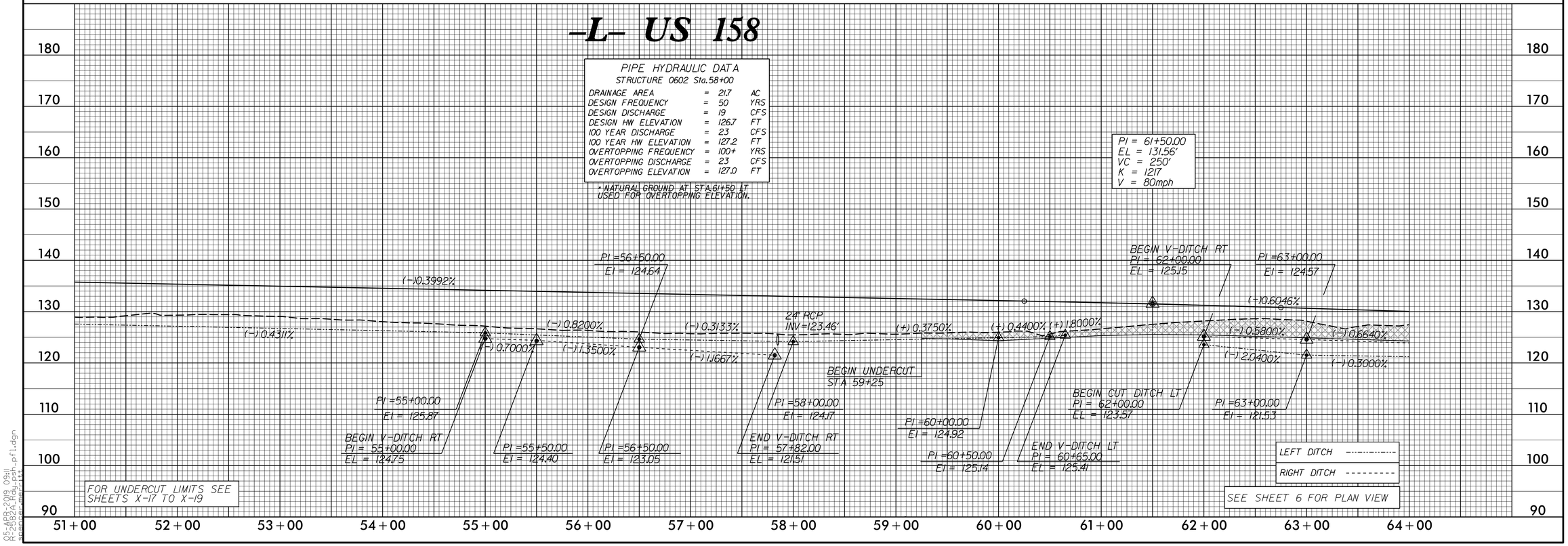


-L- US 158

PIPE HYDRAULIC DATA
STRUCTURE 0602 Sta.58+00

DRAINAGE AREA	=	21.7	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	19	CFS
DESIGN HW ELEVATION	=	126.7	FT
100 YEAR DISCHARGE	=	23	CFS
100 YEAR HW ELEVATION	=	127.2	FT
OVERTOPPING FREQUENCY	=	100+	YRS
OVERTOPPING DISCHARGE	=	23	CFS
OVERTOPPING ELEVATION	=	127.0	FT

*NATURAL GROUND AT STA.61+50 LT USED FOR OVERTOPPING ELEVATION.



FOR UNDERCUT LIMITS SEE SHEETS X-17 TO X-19

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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	39

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke
B0D0

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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-L- US 158

PIPE HYDRAULIC DATA
STRUCTURE 0702 Sta.72+60

DRAINAGE AREA	=	15.8	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	15	CFS
DESIGN HW ELEVATION	=	118.1	FT
100 YEAR DISCHARGE	=	18	CFS
100 YEAR HW ELEVATION	=	118.4	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	33	CFS
OVERTOPPING ELEVATION	=	122.0	FT

* SOIL ROAD AT STA.72+85 LT USED FOR OVERTOPPING ELEVATION.

PI = 68+05.00
EL = 127.60'
VC = 300'
K = 1347
V = 80mph

PI =68+00.00
El = 121.25

END CUT DITCH LT
PI = 72+60.00
EL = 115.99

BEGIN CUT DITCH LT
PI = 73+00.00
EL = 115.84

PI = 75+00.00
EL = 121.85'
VC = 796'
K = 196
V = 65mph

PI =75+00.00
El = 111.88

(-)0.6046%
(-)0.6640%
(-)0.3000%
(-)0.8273%
(-)0.9488%
(-)1.7550%
24" RCP
INV=115.02'
(-)0.4600%
(-)1.9800%
(-)4.8902%
(-)3.6267%
(-)4.1111%

END UNDERCUT
STA 69+75

BEGIN UNDERCUT
STA 74+75

PI =68+50.00
El = 119.88

PI =72+00.00
El = 114.23

END V-DITCH RT
PI = 72+50.00
EL = 114.00

BEGIN V-DITCH RT
PI = 75+00.00
EL = 110.87

FOR UNDERCUT LIMITS SEE SHEETS X-19 TO X-21, AND X-23 TO X-24

LEFT DITCH
RIGHT DITCH

SEE SHEET 7 FOR PLAN VIEW

180 170 160 150 140 130 120 110 100 90
64+00 65+00 66+00 67+00 68+00 69+00 70+00 71+00 72+00 73+00 74+00 75+00 76+00 77+00

-L- US 158

CULVERT HYDRAULIC DATA
Sta.85+72

DRAINAGE AREA	=	7232	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	1300	CFS
DESIGN HW ELEVATION	=	70.0	FT
100 YEAR DISCHARGE	=	1600	CFS
100 YEAR HW ELEVATION	=	70.8	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	2300	CFS
OVERTOPPING ELEVATION	=	83.6	FT

BM #2: R/R SPIKE IN 24" PINE
-BL- STA 74+28.00, 81.00' LT
-L- STA 82+73.58, 110.20' RT
EL 87.35'

PI = 83+20.00
EL = 81.75'
VC = 844'
K = 157
V = 65mph

PI =78+00.00
El = 101.00

END CUT DITCH LT
BEGIN BASE DITCH LT
PI = 79+50.00
El = 93.94

END V-DITCH RT
PI = 80+50.00
EL = 91.39

END V-DITCH LT
PI = 85+60.00
El = 67.00

BEGIN V-DITCH LT
PI = 86+03.00
EL = 67.00

PI = 90+10.00
EL = 85.05'
VC = 536'
K = 161
V = 65mph

(-)3.6267%
(-)4.8902%
(-)4.7067%
(-)4.1111%
(-)5.2500%
(-)0.9800%
(-)3.6500%
(-)1.9333%
(-)6.2800%
(-)6.5000%
(-)6.6176%
(-)6.5133%
(+)4.5000%
(+)6.8376%
(+)3.2367%
(+)2.5600%
(+)0.4783%
(+)1.1000%

BEGIN CUT DITCH RT
PI = 83+00.00
EL = 83.75

BEGIN V-DITCH LT
PI = 84+24.00
EL = 76.00

PI =86+67.00
El = 69.88

PI =89+50.00
El = 79.04

END UNDERCUT
STA 78+25

BEGIN UNDERCUT
STA 79+25

TRIPLE 9' x 9'
RCBC EXTENSION
INV=63.22'

BEGIN UNDERCUT
STA 88+25

PI =79+50.00
El = 92.37

PI =81+00.00
El = 87.66

END BASE DITCH LT
PI = 81+60.00
EL = 86.50

PI =83+50.00
El = 80.61

END CUT DITCH RT
BEGIN V-DITCH RT
PI = 84+00.00
EL = 77.36

END UNDERCUT
STA 83+75

END V-DITCH LT
PI = 90+50.00
EL = 80.14

PI =80+00.00
El = 91.31

END V-DITCH RT
PI = 85+50.00
EL = 67.59

BEGIN CUT DITCH RT
PI = 87+33.00
EL = 68.00

PI =88+50.00
El = 76.00

FOR UNDERCUT LIMITS SEE SHEETS X-24 TO X-25, AND X-27 TO X-28

LEFT DITCH
RIGHT DITCH

SEE SHEET 8 FOR PLAN VIEW

140 130 120 110 100 90 80 70 60 50
77+00 78+00 79+00 80+00 81+00 82+00 83+00 84+00 85+00 86+00 87+00 88+00 89+00 90+00

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ponger,mpatts

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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	40

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

BD02

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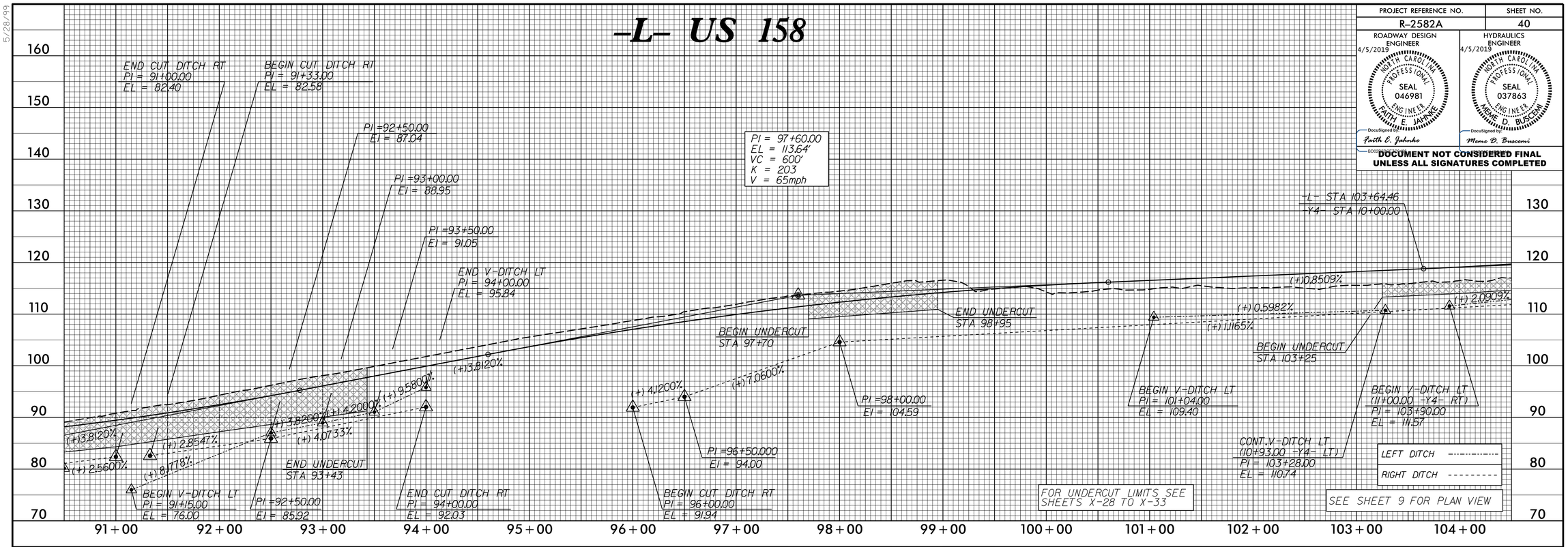

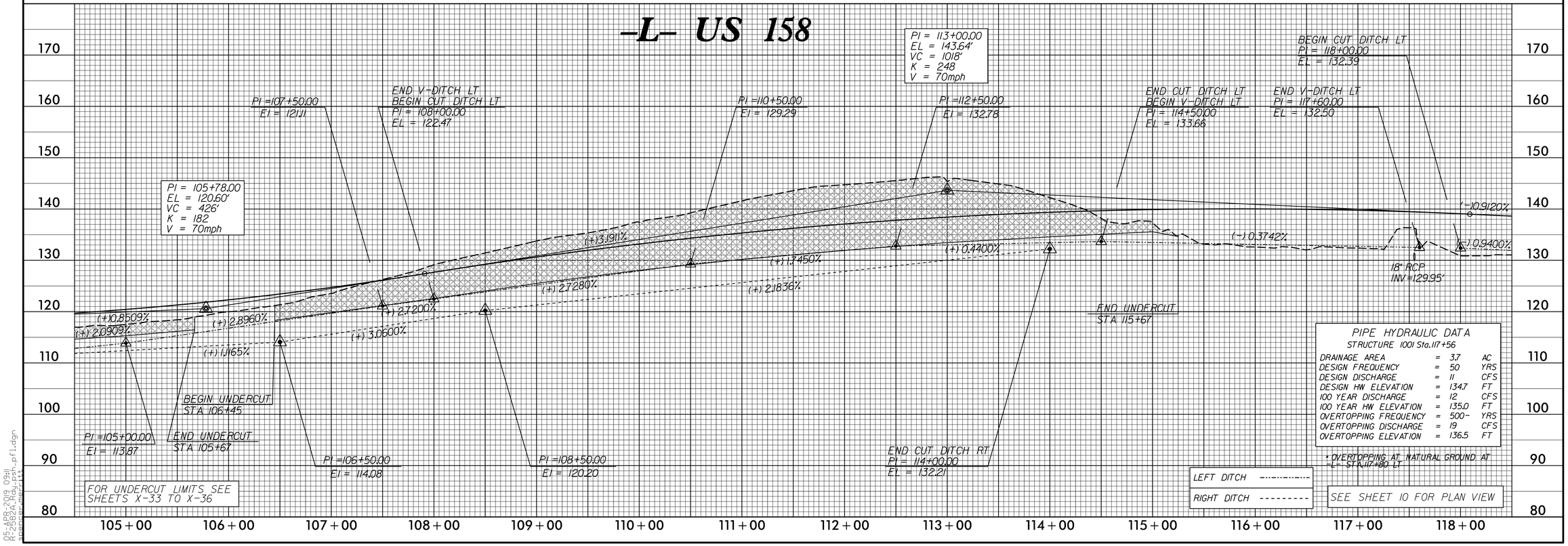

PIPE HYDRAULIC DATA
STRUCTURE 1001 Sta.117+56

DRAINAGE AREA	=	3.7	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	11	CFS
DESIGN HW ELEVATION	=	134.7	FT
100 YEAR DISCHARGE	=	12	CFS
100 YEAR HW ELEVATION	=	135.0	FT
OVERTOPPING FREQUENCY	=	500-	YRS
OVERTOPPING DISCHARGE	=	19	CFS
OVERTOPPING ELEVATION	=	136.5	FT

* OVERTOPPING AT NATURAL GROUND AT -L- STA.117+80 LT

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jpenner,mwright

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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	41

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

B0021

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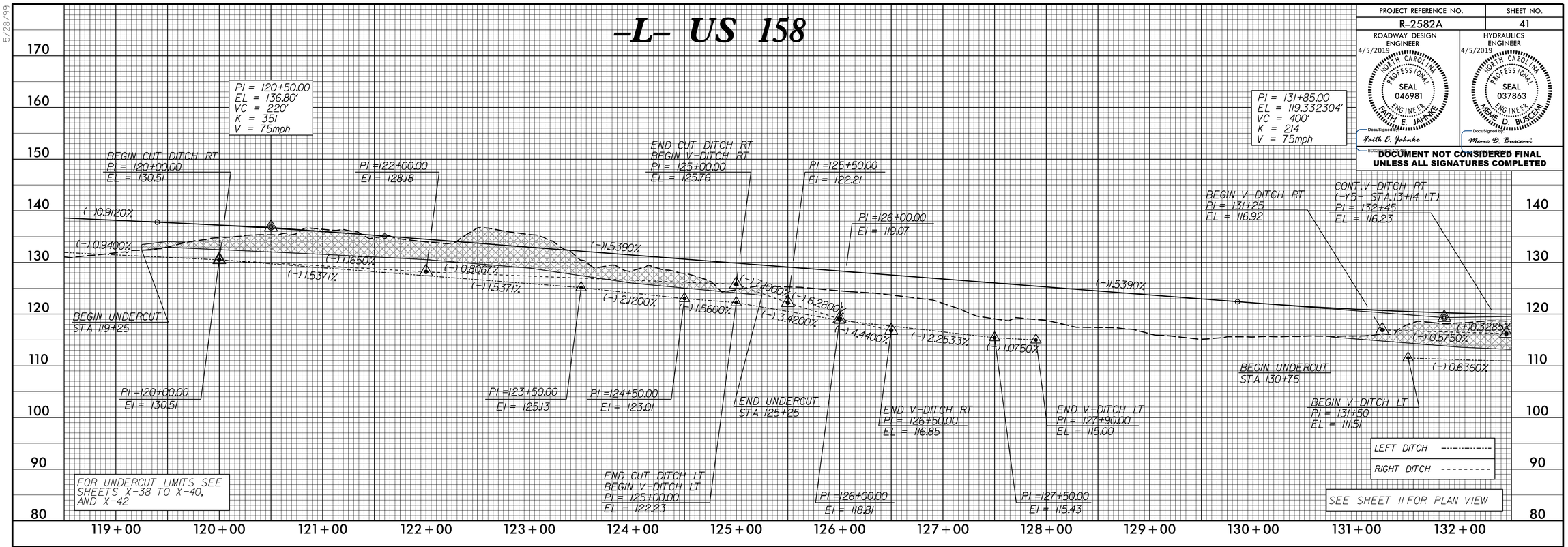

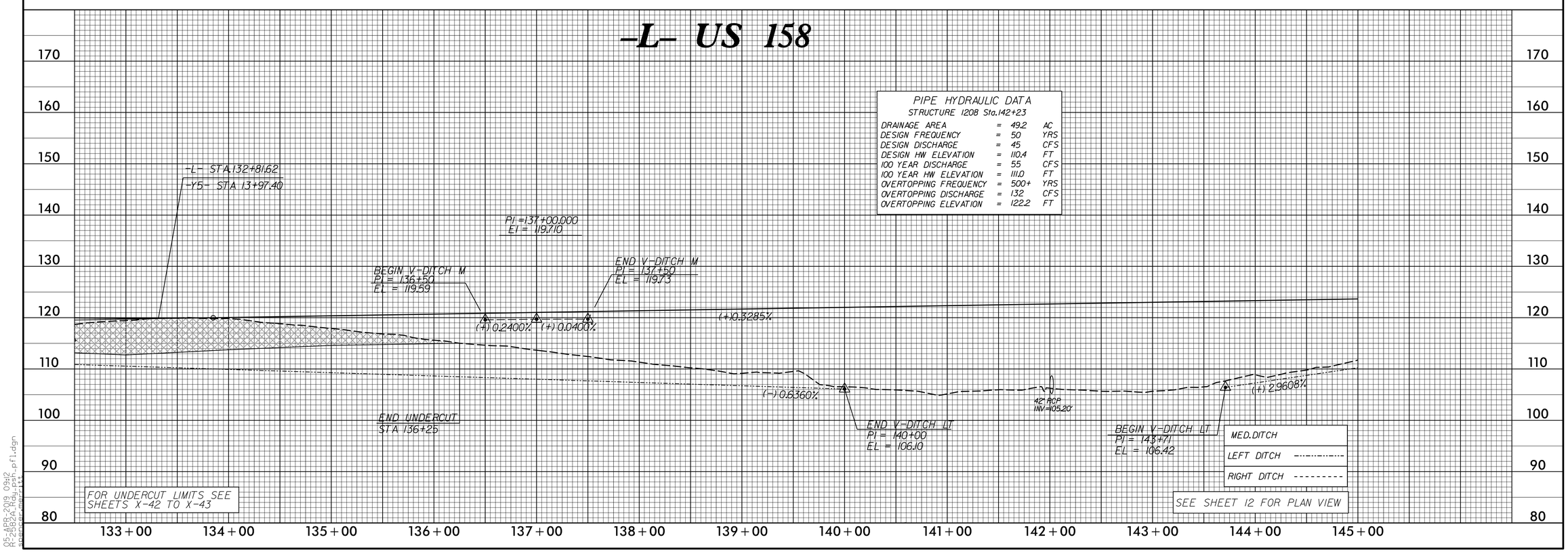

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jpenner,mmartin

DocuSign Envelope ID: CF5392BE-22A6-40C8-805D-DCAF0CEA4DA6

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	42

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

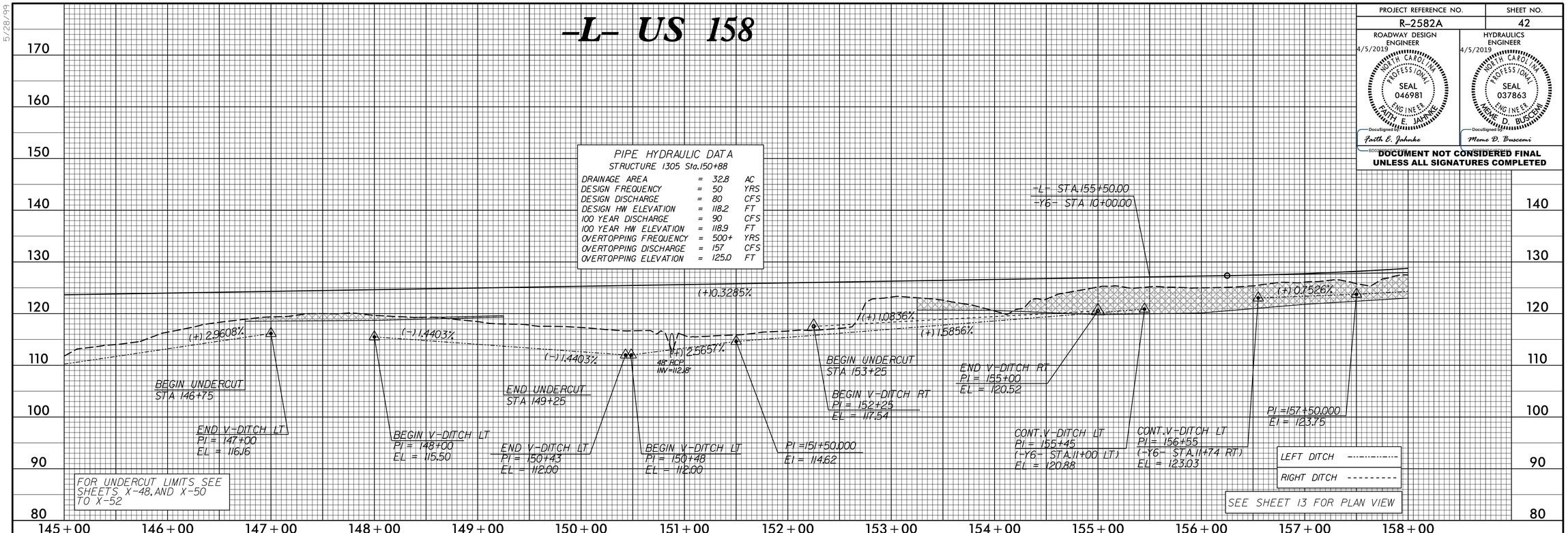
HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

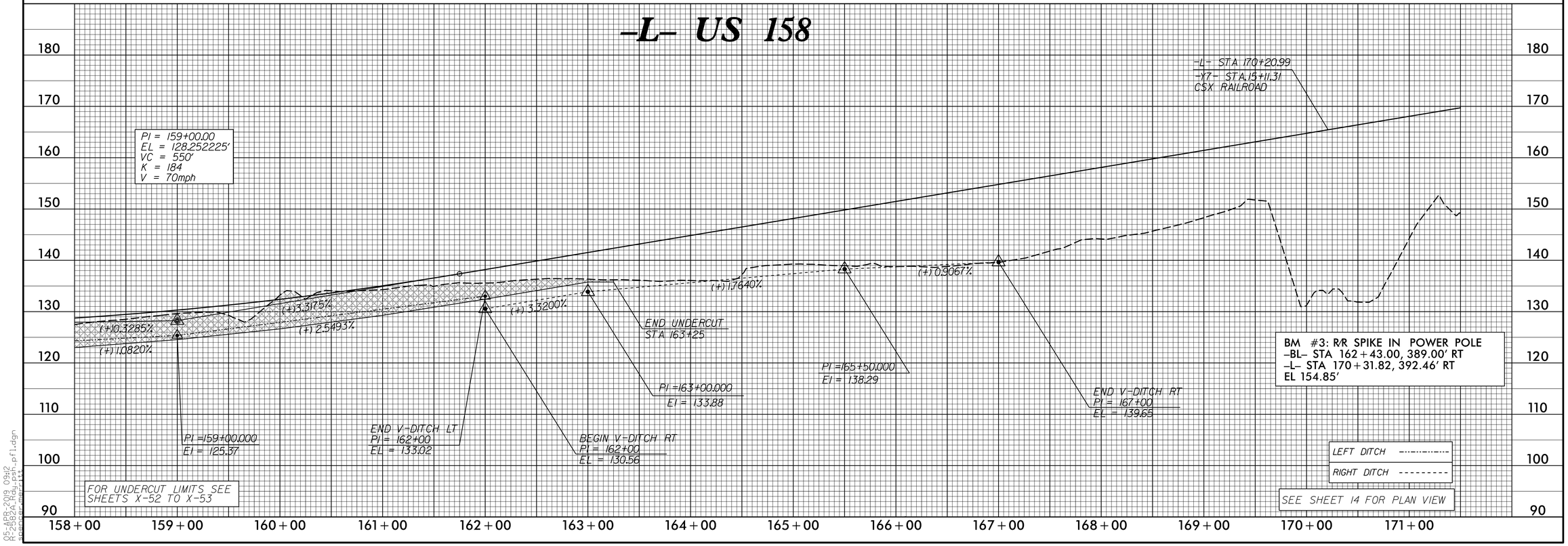
-L- US 158

PIPE HYDRAULIC DATA
STRUCTURE 1305 Sta.150+88

DRAINAGE AREA	=	32.8	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	80	CFS
DESIGN HW ELEVATION	=	118.2	FT
100 YEAR DISCHARGE	=	90	CFS
100 YEAR HW ELEVATION	=	118.9	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	157	CFS
OVERTOPPING ELEVATION	=	125.0	FT



-L- US 158



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jpanger,mwright

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	43

ROADWAY DESIGN ENGINEER
3/25/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke
BC02B35BCE7C4A00

HYDRAULICS ENGINEER
3/26/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi
B1BBE3FCAB1D4A0

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- US 158

PI = 181+10.00
EL = 201.57'
VC = 1,916'
K = 252
V = 70mph

PIPE HYDRAULIC DATA
STRUCTURE 1503 Sta.174+23

DRAINAGE AREA	=	4.1	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	5.0	CFS
DESIGN HW ELEVATION	=	150.4	FT
100 YEAR DISCHARGE	=	6.0	CFS
100 YEAR HW ELEVATION	=	150.5	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	23	CFS
OVERTOPPING ELEVATION	=	154.0	FT

* OVERTOPPING AT DRAINAGE DIVIDE -L- STA.192+50

(+)3.3175% (-)4.2886%

24" RCP-IN
INV=149.11'

(-) 0.6936% (+) 0.8664% (-) 0.8770% (-) 2.1686%

BEGIN V-DITCH RT
PI = 172+50
EL = 150.40

END V-DITCH RT
BEGIN V-DITCH RT
PI = 174+23
EL = 149.20

END V-DITCH RT
PI = 177+00
EL = 151.60

BEGIN V-DITCH LT
PI = 177+50
EL = 150.35

PI =179+50.000
EL = 148.60

LEFT DITCH
RIGHT DITCH

SEE SHEET 15 FOR PLAN VIEW

172+00 173+00 174+00 175+00 176+00 177+00 178+00 179+00 180+00 181+00 182+00 183+00 184+00 185+00

-L- US 158

BM #4: R/R SPIKE IN 24" SWEET GUM
-BL- STA 190+44.00, 357.00' LT
-L- STA 197+64.97, 450.54' LT
EL 102.47'

-L- STA.192+85.76
-Y8- STA.12+43.27
XSC RAILROAD

PI = 199+50.00
EL = 122.66'
VC = 850'
K = 213
V = 70mph

-L- STA.198+42.23
-Y9- STA.25+04.76

PIPE HYDRAULIC DATA
STRUCTURE 1609 Sta.191+91

DRAINAGE AREA	=	28.6	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	19	CFS
DESIGN HW ELEVATION	=	109.5	FT
100 YEAR DISCHARGE	=	24	CFS
100 YEAR HW ELEVATION	=	110.2	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	45	CFS
OVERTOPPING ELEVATION	=	120.0	FT

* OVERTOPPING AT DRAINAGE DIVIDE -L- STA.192+50

PIPE HYDRAULIC DATA
STRUCTURE 1611 Sta.193+66

DRAINAGE AREA	=	1.8	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	3.3	CFS
DESIGN HW ELEVATION	=	105.0	FT
100 YEAR DISCHARGE	=	3.6	CFS
100 YEAR HW ELEVATION	=	105.0	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	23.6	CFS
OVERTOPPING ELEVATION	=	110.0	FT

* OVERTOPPING AT DRAINAGE DIVIDE -L- STA.195+50

(-)4.2886%

(-)6.9230%

PI =191+00.000
EL = 109.70

PI =192+00.00
EL = 107.30

(-)3.1540% (+)1.4080% (-)2.4040%

PI =186+00.000
EL = 134.50

PI =189+00.000
EL = 113.73

PI =190+50.000
EL = 109.00

30" RCP
CONTRACTOR DESIGN
INV=104.09'

(-)32.5000%

END V-DITCH LT
PI = 192+04
EL = 106.00

24" RCP
CONTRACTOR DESIGN
INV=101.66'

BEGIN V-DITCH LT
PI = 197+35
EL = 100.00

(-)3.3016%

END V-DITCH LT
PI = 197+96
EL = 97.95

LEFT DITCH
RIGHT DITCH

SEE SHEET 16 FOR PLAN VIEW

186+00 187+00 188+00 189+00 190+00 191+00 192+00 193+00 194+00 195+00 196+00 197+00 198+00 199+00

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sgonzalez@mpmi.net

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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	44

ROADWAY DESIGN ENGINEER
3/25/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke
B1A03B5BCE7C9406

HYDRAULICS ENGINEER
3/26/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi
B918BE8FC4B1D4A8

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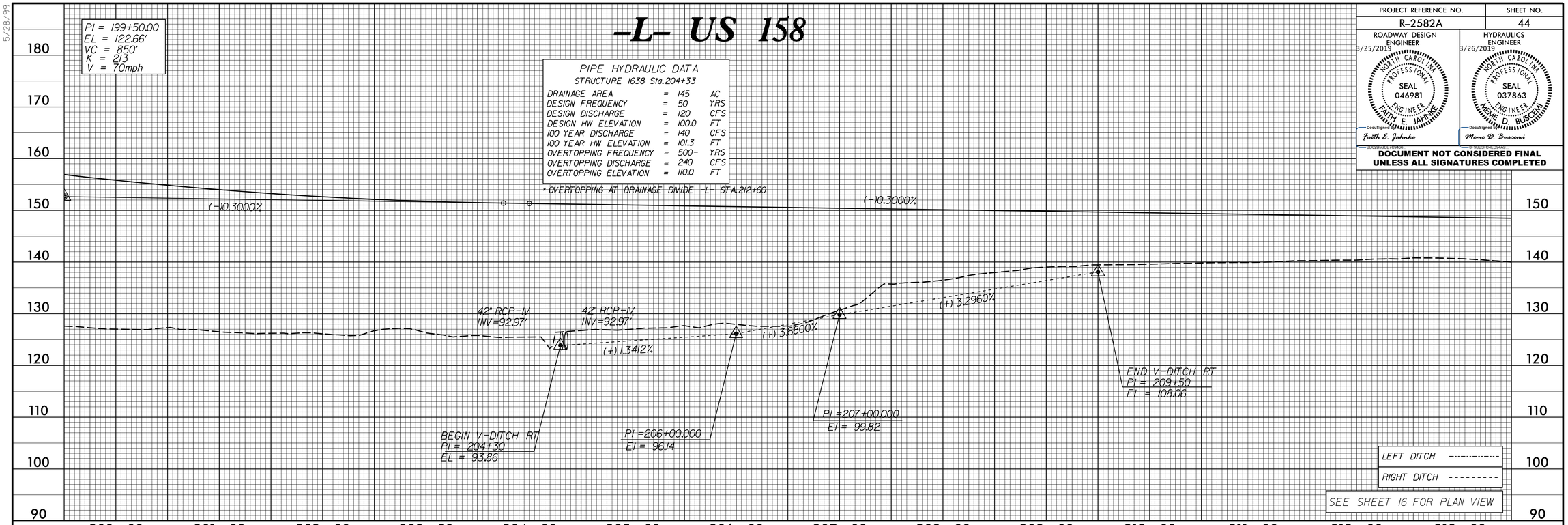
-L- US 158

PI = 199+50.00
EL = 122.66'
VC = 850'
K = 213
V = 70mph

PIPE HYDRAULIC DATA
STRUCTURE 1638 Sta.204+33

DRAINAGE AREA	=	145	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	120	CFS
DESIGN HW ELEVATION	=	100.0	FT
100 YEAR DISCHARGE	=	140	CFS
100 YEAR HW ELEVATION	=	101.3	FT
OVERTOPPING FREQUENCY	=	500-	YRS
OVERTOPPING DISCHARGE	=	240	CFS
OVERTOPPING ELEVATION	=	110.0	FT

* OVERTOPPING AT DRAINAGE DIVIDE -L- STA.212+60

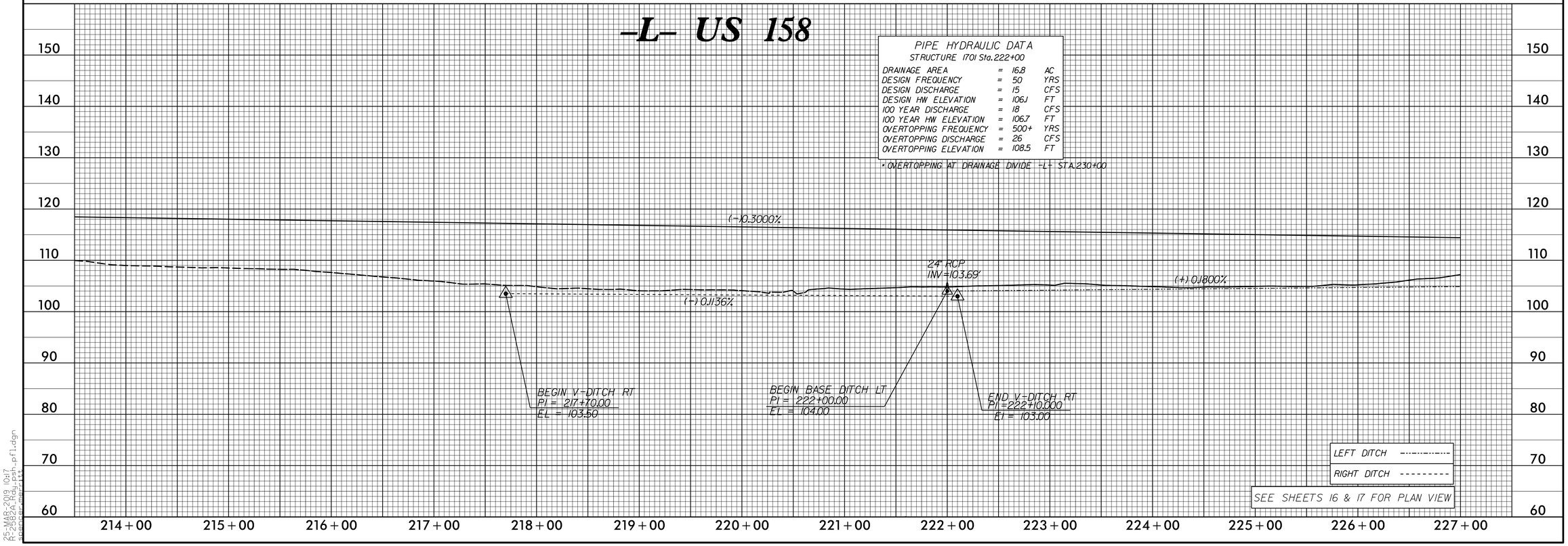


-L- US 158

PIPE HYDRAULIC DATA
STRUCTURE 1701 Sta.222+00

DRAINAGE AREA	=	16.8	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	15	CFS
DESIGN HW ELEVATION	=	106.1	FT
100 YEAR DISCHARGE	=	18	CFS
100 YEAR HW ELEVATION	=	106.7	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	26	CFS
OVERTOPPING ELEVATION	=	108.5	FT

* OVERTOPPING AT DRAINAGE DIVIDE -L- STA.230+00



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jpenner@mpi.tt

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	45

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
Docusigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
Docusigned by: Meme D. Buscemi

BD02

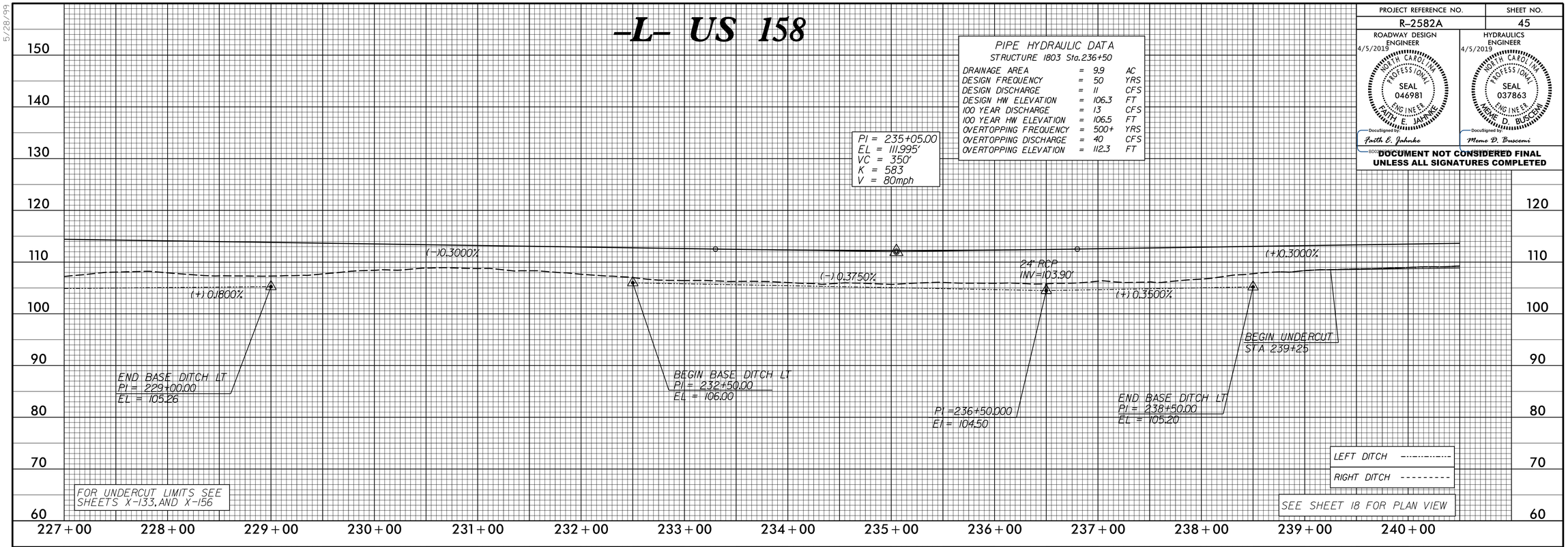
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- US 158

PI = 235+05.00
EL = 111.995'
VC = 350'
K = 583
V = 80mph

PIPE HYDRAULIC DATA
STRUCTURE 1803 Sta.236+50

DRAINAGE AREA	=	9.9	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	11	CFS
DESIGN HW ELEVATION	=	106.3	FT
100 YEAR DISCHARGE	=	13	CFS
100 YEAR HW ELEVATION	=	106.5	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	40	CFS
OVERTOPPING ELEVATION	=	112.3	FT



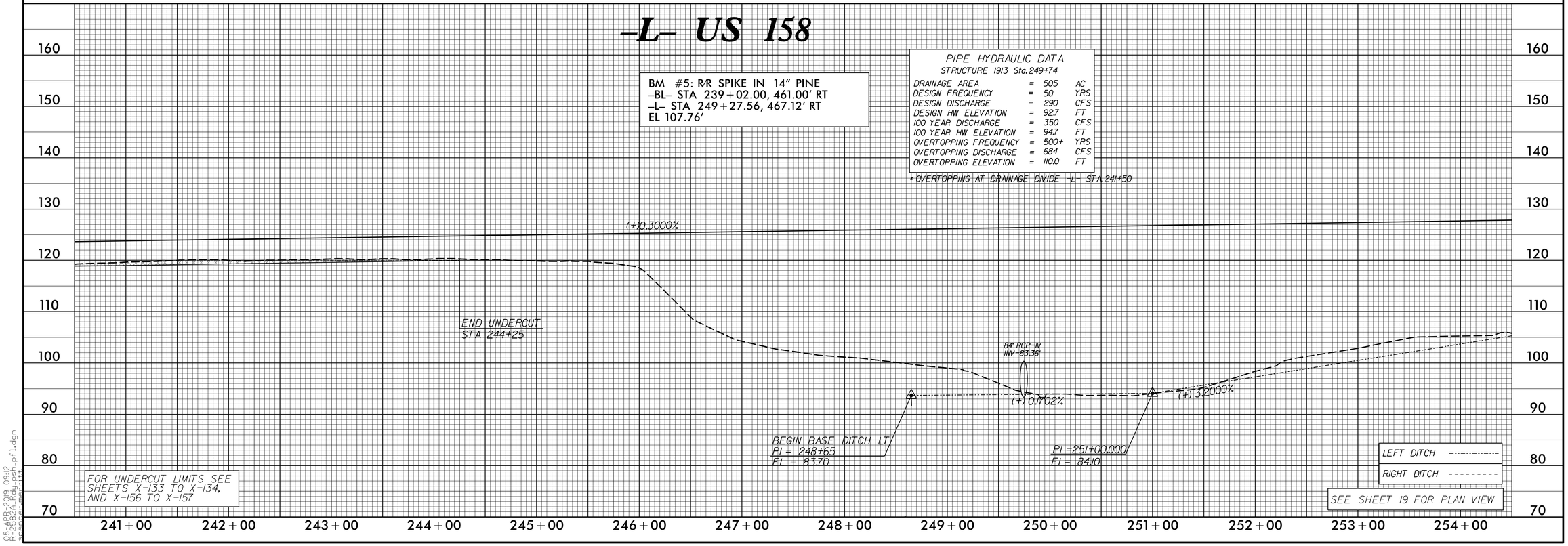
-L- US 158

BM #5: R/R SPIKE IN 14" PINE
-BL- STA 239+02.00, 461.00' RT
-L- STA 249+27.56, 467.12' RT
EL 107.76'

PIPE HYDRAULIC DATA
STRUCTURE 1913 Sta.249+74

DRAINAGE AREA	=	505	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	290	CFS
DESIGN HW ELEVATION	=	92.7	FT
100 YEAR DISCHARGE	=	350	CFS
100 YEAR HW ELEVATION	=	94.7	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	684	CFS
OVERTOPPING ELEVATION	=	110.0	FT

+ OVERTOPPING AT DRAINAGE DIVIDE -L- STA.241+50



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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	46

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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-L- US 158

PI = 266+35.00
EL = 121.385'
VC = 600'
K = 260
V = 70mph

(+)3.2000%
(+)1.7600%
(+)2.1967%
(+)0.3000%
(-)2.0114%
(-)1.5128%

END BASE DITCH LT
PI = 255+50.00
EL = 98.50

BEGIN V-DITCH RT
PI = 257+00.00
EL = 105.66

BEGIN UNDERCUT
STA 260+25

PI =258+50.000
El = 108.30

END V-DITCH RT
PI = 261+50.00
EL = 114.89

END UNDERCUT
STA 263+25

BEGIN V-DITCH LT
PI = 266+00.00
EL = 114.80

-L- STA.266+00.00
-Y13A- STA.41+08.59
BEGIN UNDERCUT
STA 266+25

LEFT DITCH -·-·-·-·-·-
RIGHT DITCH - - - - - - - -

FOR UNDERCUT LIMITS SEE SHEETS X-142 TO X-144, AND X-166 TO X-167

SEE SHEET 20 FOR PLAN VIEW

255+00 256+00 257+00 258+00 259+00 260+00 261+00 262+00 263+00 264+00 265+00 266+00 267+00

-L- US 158

PIPE HYDRAULIC DATA
STRUCTURE 2101 Sta.269+90

DRAINAGE AREA	=	21	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	5	CFS
DESIGN HW ELEVATION	=	110.2	FT
100 YEAR DISCHARGE	=	5	CFS
100 YEAR HW ELEVATION	=	110.2	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	16	CFS
OVERTOPPING ELEVATION	=	112.2	FT

* OVERTOPPING AT DRAINAGE DIVIDE -L- STA.270+50

BM #6: R/R SPIKE IN 36" HICKORY
-BL- STA 277+97.00, 99.00' LT
-L- STA 287+22.05, 117.32' LT
EL 97.42'

(-)2.0114%
(-)1.5128%
(-)0.8000%
(-)3.6500%
(-)1.8500%
(-)2.0114%
(-)1.8752%
(-)2.5600%

END V-DITCH LT
PI = 269+90.00
EL = 108.90

18" RCP
INV=108.64'

BEGIN CUT DITCH LT
PI = 271+00.00
EL = 106.40

END UNDERCUT
STA 267+25

BEGIN V-DITCH
PI = 267+00.00
EL = 109.00

BEGIN UNDERCUT
STA 269+75

PI =271+00.000
El = 102.95

PI =270+00.000
El = 106.60

-L- STA.275+86.50
-Y13- STA 10+00.00

BEGIN CUT DITCH LT
PI = 275+00.00
EL = 99.00

BEGIN V-DITCH LT
PI = 276+50.00
EL = 95.80

END UNDERCUT
STA 278+75

LEFT DITCH -·-·-·-·-·-
RIGHT DITCH - - - - - - - -

FOR UNDERCUT LIMITS SEE SHEETS X-145 TO X-148, AND X-168 TO X-172

SEE SHEET 21 FOR PLAN VIEW

267+00 268+00 269+00 270+00 271+00 272+00 273+00 274+00 275+00 276+00 277+00 278+00 279+00

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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	47

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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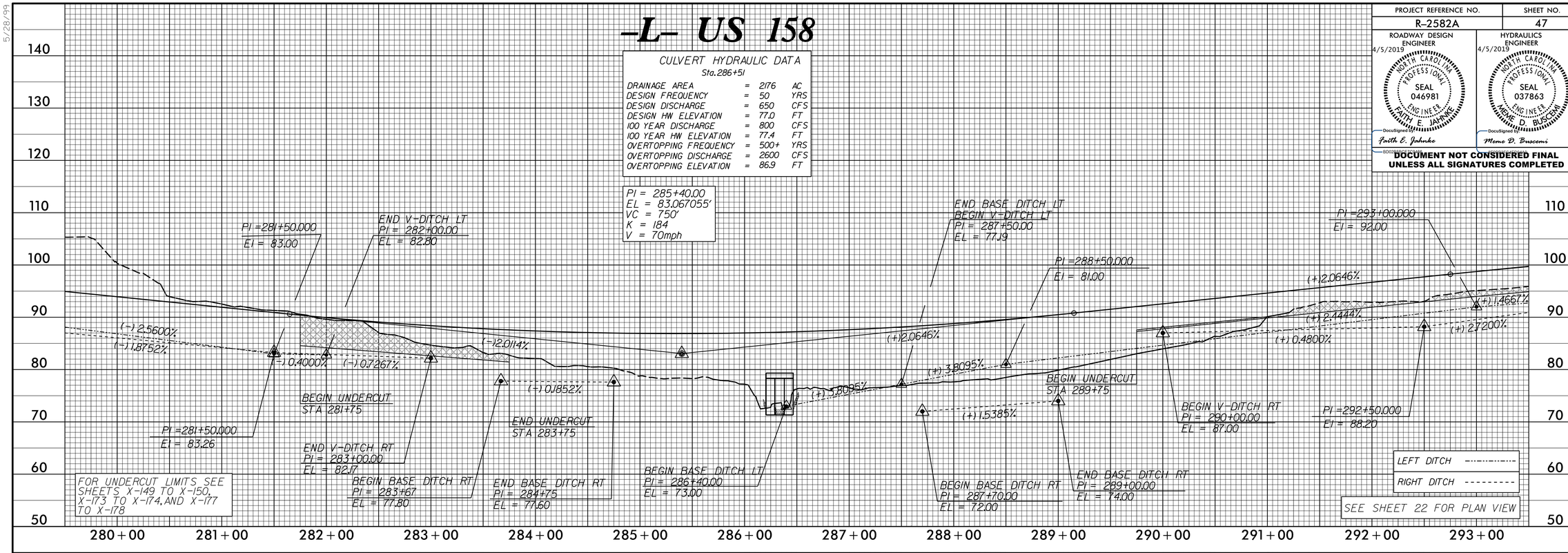
-L- US 158

CULVERT HYDRAULIC DATA
Sta. 286+51

DRAINAGE AREA	=	2176	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	650	CFS
DESIGN HW ELEVATION	=	77.0	FT
100 YEAR DISCHARGE	=	800	CFS
100 YEAR HW ELEVATION	=	77.4	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	2600	CFS
OVERTOPPING ELEVATION	=	86.9	FT

PI = 285+40.00
EL = 83.067055'
VC = 750'
K = 184
V = 70mph



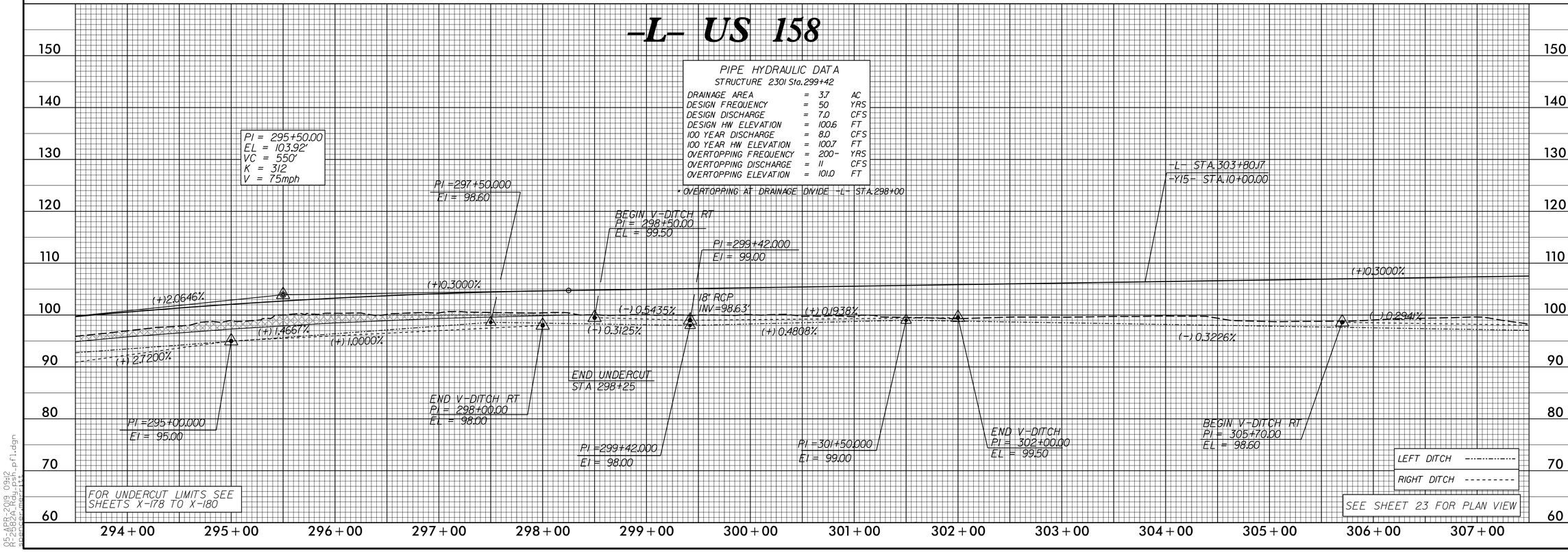
-L- US 158

PIPE HYDRAULIC DATA
STRUCTURE 2301 Sta. 299+42

DRAINAGE AREA	=	3.7	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	7.0	CFS
DESIGN HW ELEVATION	=	100.6	FT
100 YEAR DISCHARGE	=	8.0	CFS
100 YEAR HW ELEVATION	=	100.7	FT
OVERTOPPING FREQUENCY	=	200-	YRS
OVERTOPPING DISCHARGE	=	11	CFS
OVERTOPPING ELEVATION	=	101.0	FT

* OVERTOPPING AT DRAINAGE DIVIDE -L- STA. 298+00

PI = 295+50.00
EL = 103.92'
VC = 550'
K = 312
V = 75mph



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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	48

ROADWAY DESIGN ENGINEER
3/25/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke
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HYDRAULICS ENGINEER
3/26/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi
BF8B3F04E9D4A...

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-L- US 158

PIPE HYDRAULIC DATA
STRUCTURE 2406 Sta. 307+74

DRAINAGE AREA	=	24.2	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	21	CFS
DESIGN HW ELEVATION	=	100.3	FT
100 YEAR DISCHARGE	=	25	CFS
100 YEAR HW ELEVATION	=	100.7	FT
OVERTOPPING FREQUENCY	=	100+	YRS
OVERTOPPING DISCHARGE	=	30	CFS
OVERTOPPING ELEVATION	=	100.8*	FT

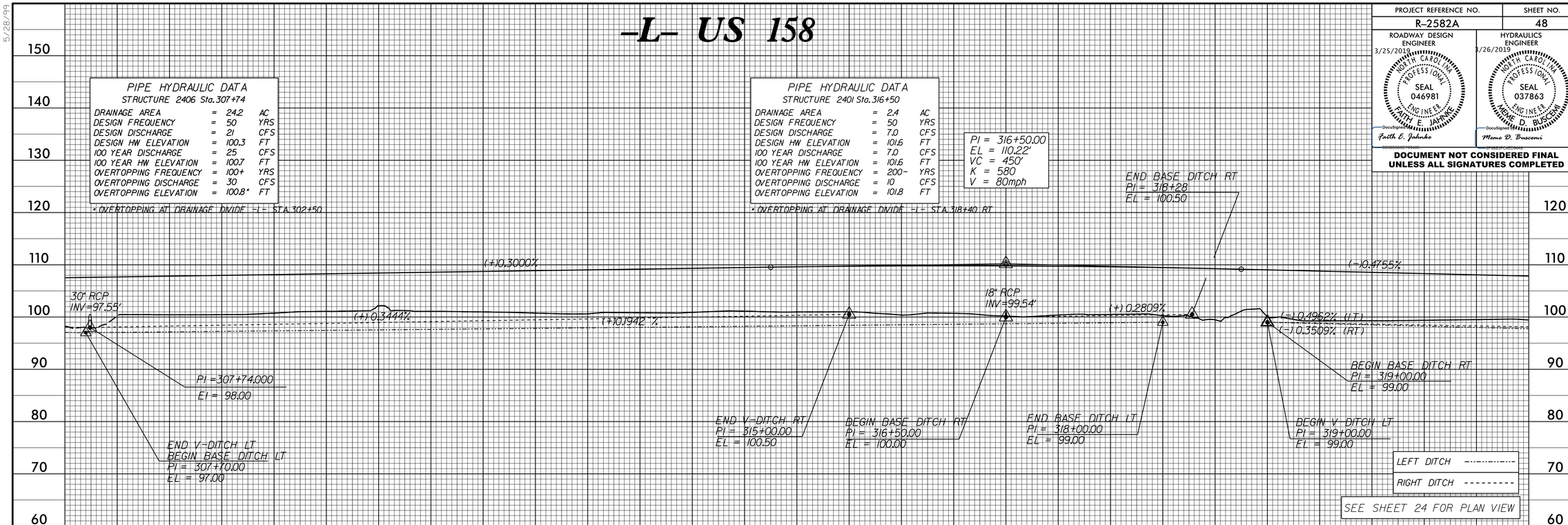
* OVERTOPPING AT DRAINAGE DIVIDE -L- STA. 302+50

PIPE HYDRAULIC DATA
STRUCTURE 2401 Sta. 316+50

DRAINAGE AREA	=	2.4	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	7.0	CFS
DESIGN HW ELEVATION	=	101.6	FT
100 YEAR DISCHARGE	=	7.0	CFS
100 YEAR HW ELEVATION	=	101.6	FT
OVERTOPPING FREQUENCY	=	200-	YRS
OVERTOPPING DISCHARGE	=	10	CFS
OVERTOPPING ELEVATION	=	101.8	FT

* OVERTOPPING AT DRAINAGE DIVIDE -L- STA. 318+40 RT

PI = 316+50.00
EL = 110.22'
VC = 450'
K = 580
V = 80mph



-L- US 158

BM #7: R/R SPIKE IN 20" GUM
-BL- STA 317+66.00, 273.00' RT
-L- STA 326+93.80, 274.71' RT
EL 102.44'

PIPE HYDRAULIC DATA
STRUCTURE 2501 Sta. 324+50

DRAINAGE AREA	=	80	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	46	CFS
DESIGN HW ELEVATION	=	100.8	FT
100 YEAR DISCHARGE	=	55	CFS
100 YEAR HW ELEVATION	=	101.7	FT
OVERTOPPING FREQUENCY	=	50+	YRS
OVERTOPPING DISCHARGE	=	47	CFS
OVERTOPPING ELEVATION	=	100.7	FT

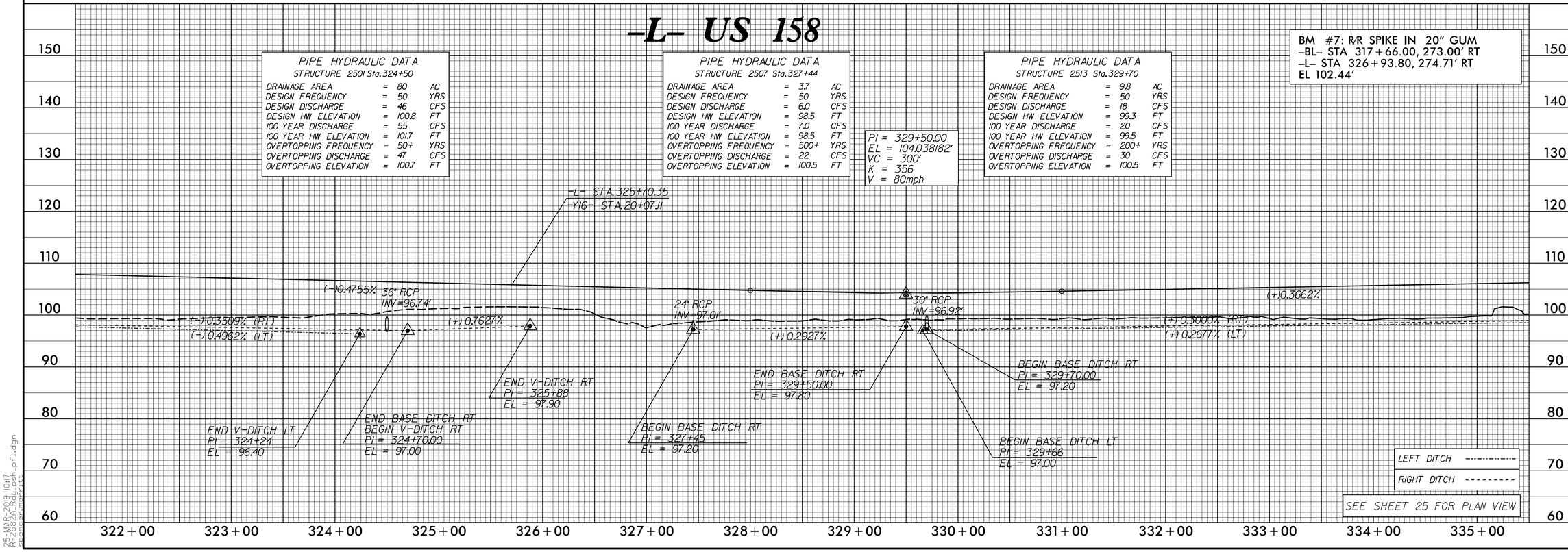
PIPE HYDRAULIC DATA
STRUCTURE 2507 Sta. 327+44

DRAINAGE AREA	=	3.7	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	6.0	CFS
DESIGN HW ELEVATION	=	98.5	FT
100 YEAR DISCHARGE	=	7.0	CFS
100 YEAR HW ELEVATION	=	98.5	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	22	CFS
OVERTOPPING ELEVATION	=	100.5	FT

PI = 329+50.00
EL = 104.038182'
VC = 300'
K = 356
V = 80mph

PIPE HYDRAULIC DATA
STRUCTURE 2513 Sta. 329+70

DRAINAGE AREA	=	9.8	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	18	CFS
DESIGN HW ELEVATION	=	99.3	FT
100 YEAR DISCHARGE	=	20	CFS
100 YEAR HW ELEVATION	=	99.5	FT
OVERTOPPING FREQUENCY	=	200+	YRS
OVERTOPPING DISCHARGE	=	30	CFS
OVERTOPPING ELEVATION	=	100.5	FT



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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	49

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

BD02

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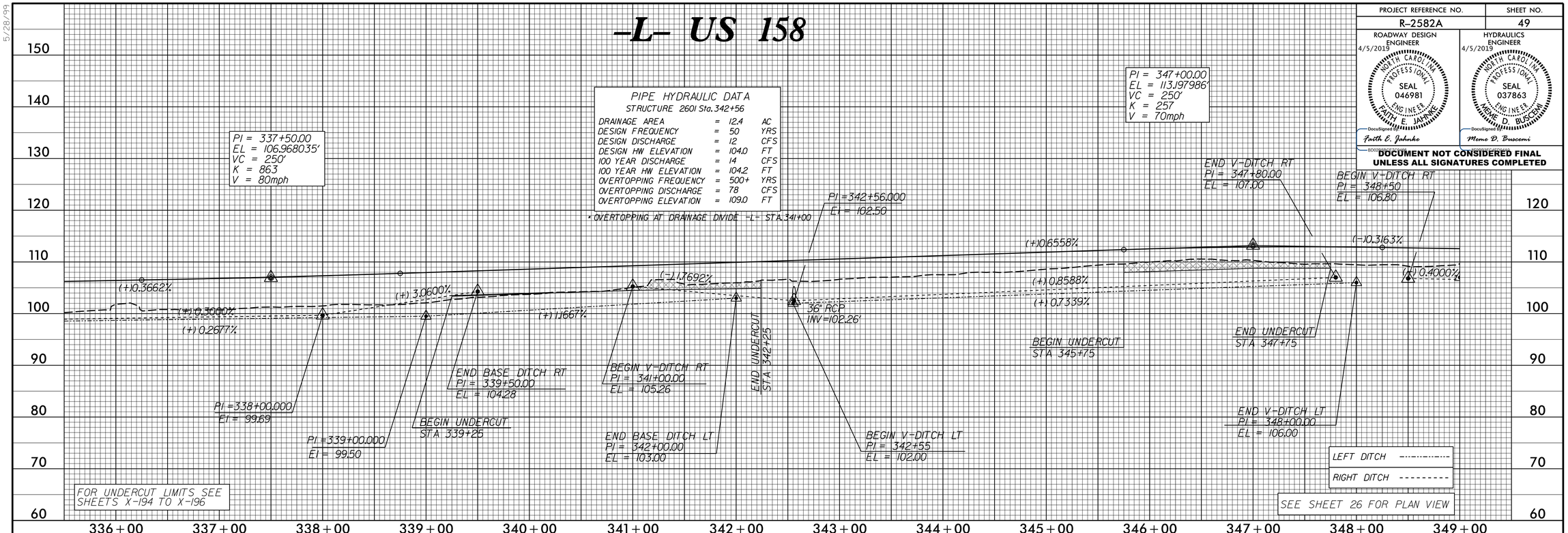
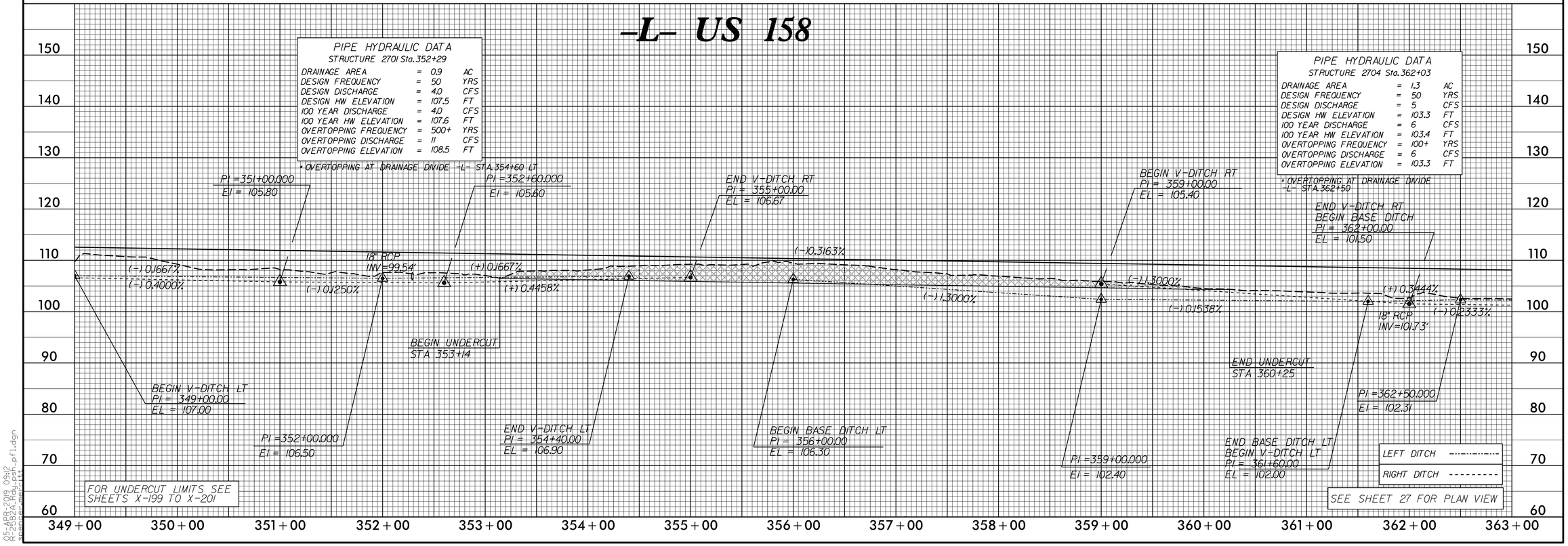
-L- US 158



-L- US 158



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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	50

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke
8D0D...

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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-L- US 158

PIPE HYDRAULIC DATA
STRUCTURE 2806 Sta. 369+00

DRAINAGE AREA	=	2.8	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	9	CFS
DESIGN HW ELEVATION	=	103.6	FT
100 YEAR DISCHARGE	=	10	CFS
100 YEAR HW ELEVATION	=	104.0	FT
OVERTOPPING FREQUENCY	=	100+	YRS
OVERTOPPING DISCHARGE	=	13	CFS
OVERTOPPING ELEVATION	=	103.9	FT

* OVERTOPPING AT NATURAL GROUND -L- STA. 366+88

PI = 364+65.00
EL = 107.615'
VC = 300'
K = 487
V = 80mph

END BASE DITCH RT
PI = 368+00.00
EL = 100.10

BEGIN V-DITCH RT
PI = 370+00.00
EL = 101.21

END BASE DITCH RT
PI = 373+50.00
EL = 103.93

PI = 375+40.00
EL = 110.84'
VC = 450'
K = 254
V = 70mph

(-)0.3163%
(+)0.3000%
(-)0.1267%
(-)0.1286%
(-)0.2333%
(-)0.1278%
18" RCP
INV=101.17'
(+)0.7717% (RT)
(+)0.1804% (LT)
(+)0.3000%
(-)1.4728%
(-)0.5625% (LT)
(-)0.6538% (RT)

BEGIN UNDERCUT
STA 376+25

BEGIN BASE DITCH RT
PI = 374+30.00
EL = 102.03

PI =364+00.000
El = 102.12

PI =367+50.000
El = 101.67

PI =368+83.000
El = 101.50

END V-DITCH LT
PI = 372+10.00
EL = 102.09

BEGIN BASE DITCH LT
PI = 372+40.00
EL = 103.00

LEFT DITCH
RIGHT DITCH

FOR UNDERCUT LIMITS SEE SHEET X-207

SEE SHEET 28 FOR PLAN VIEW

150 140 130 120 110 100 90 80 70 60

363+00 364+00 365+00 366+00 367+00 368+00 369+00 370+00 371+00 372+00 373+00 374+00 375+00 376+00 377+00

-L- US 158

BM #8: R/R SPIKE IN 10" OAK
-BL- STA 372+76.00, 108.00' RT
-L- STA 382+00.10, 81.01' RT
EL 100.33'

PI = 381+00.00
EL = 102.59236l'
VC = 350'
K = 197
V = 70mph

PI = 392+50.00
EL = 106.04236l'
VC = 400'
K = 397
V = 80mph

(-)1.4728%
(-)0.5625% (LT)
(-)0.6538% (RT)
(-)0.1500% (RT)
(+)0.3000%
(-)0.3054%

END UNDERCUT
STA 377+25

BEGIN UNDERCUT
STA 378+75

END UNDERCUT
STA 383+25

PI =379+50.000
El = 98.63

END BASE DITCH RT
PI = 381+70.00
EL = 98.30

PI =382+00.000
El = 97.60

LEFT DITCH
RIGHT DITCH

FOR UNDERCUT LIMITS SEE SHEETS X-207 TO X-209

SEE SHEET 29 FOR PLAN VIEW

150 140 130 120 110 100 90 80 70 60

377+00 378+00 379+00 380+00 381+00 382+00 383+00 384+00 385+00 386+00 387+00 388+00 389+00 390+00 391+00

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	51

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

BD02

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-L- US 158

PIPE HYDRAULIC DATA
Structure 3001 Sta. 391+40

DRAINAGE AREA	=	29.9	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	16	CFS
DESIGN HW ELEVATION	=	99.2	FT
100 YEAR DISCHARGE	=	19	CFS
100 YEAR HW ELEVATION	=	99.5	FT
OVERTOPPING FREQUENCY	=	25+	YRS
OVERTOPPING DISCHARGE	=	14	CFS
OVERTOPPING ELEVATION	=	99.0	FT

* OVERTOPPING AT NATURAL GROUND -L- STA.393+60

PIPE HYDRAULIC DATA
STRUCTURE 3006 Sta. 402+00

DRAINAGE AREA	=	78.7	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	42	CFS
DESIGN HW ELEVATION	=	96.1	FT
100 YEAR DISCHARGE	=	50	CFS
100 YEAR HW ELEVATION	=	96.4	FT
OVERTOPPING FREQUENCY	=	10+	YRS
OVERTOPPING DISCHARGE	=	26	CFS
OVERTOPPING ELEVATION	=	95.1	FT

* OVERTOPPING AT NATURAL GROUND -L- STA.402+72

PI = 392+50.00
EL = 106.042361'
VC = 400'
K = 397
V = 80mph

BEGIN V-DITCH RT
PI = 391+40.00
EL = 97.00

END V-DITCH RT
BEGIN BASE DITCH RT
PI = 393+70.00
EL = 97.50

(+)0.3000%
(-)0.7068%
24" RCP
INV=95.95'
(+) 0.2174%
(-) 0.6000%
(+) 0.3077%
(-) 0.6000%
(-) 0.4659%
(-)0.7068%
(+) 2.4625%
(-) 0.3600%
(-) 0.2453%

BEGIN V-DITCH LT
PI = 391+40.00
EL = 94.70

END BASE DITCH LT
PI = 391+30.00
EL = 94.76

PI = 394+00.000
EI = 95.50

FOR UNDERCUT LIMITS SEE SHEETS X-215 TO X-216

BEGIN V-DITCH RT
PI = 401+70.00
EL = 92.82

END V-DITCH RT
PI = 401+50.00
EL = 92.82

END V-DITCH RT
PI = 402+50.00
EL = 94.79

PI = 405+50.00
EL = 96.853627'
VC = 300'
K = 298
V = 80mph

BEGIN V-DITCH RT
PI = 403+15.00
EL = 92.75

BEGIN UNDERCUT
STA 402+25

BEGIN UNDERCUT
STA 403+25

END UNDERCUT
STA 402+75

END V-DITCH LT
BEGIN BASE DITCH LT
PI = 402+50.00
EL = 91.54

LEFT DITCH
RIGHT DITCH

SEE SHEET 30 FOR PLAN VIEW

391+00 392+00 393+00 394+00 395+00 396+00 397+00 398+00 399+00 400+00 401+00 402+00 403+00 404+00 405+00

-L- US 158

PIPE HYDRAULIC DATA
STRUCTURE 3104 Sta. 409+80

DRAINAGE AREA	=	8.7	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	13	CFS
DESIGN HW ELEVATION	=	92.5	FT
100 YEAR DISCHARGE	=	15	CFS
100 YEAR HW ELEVATION	=	92.6	FT
OVERTOPPING FREQUENCY	=	100+	YRS
OVERTOPPING DISCHARGE	=	19	CFS
OVERTOPPING ELEVATION	=	93.1	FT

* OVERTOPPING AT NATURAL GROUND -L- STA.412+00

PI = 405+50.00
EL = 96.853627'
VC = 300'
K = 298
V = 80mph

END V-DITCH RT
PI = 411+60.00
EL = 91.40

PI = 413+00.00
EL = 99.103627'
VC = 400'
K = 253
V = 70mph

PI = 409+40.000
EI = 90.50

BEGIN BASE DITCH RT
PI = 411+90.00
EL = 92.00

PI = 416+00.000
EI = 88.57

PI = 419+00.00
EL = 91.424867'
VC = 370'
K = 183
V = 70mph

(-)0.7068%
(+)0.3000%
(+)0.3000%
(-)1.2798%
(-) 0.3600%
(+) 0.4091%
(-)0.2453%
(+) 0.7600%
(-)0.8368%
(-)1.2798%
(-)1.3800% (RT)
(-) 0.9597%
(-) 0.5600% (RT)

END UNDERCUT
STA 409+75

BEGIN UNDERCUT
STA 413+75

PI = 418+50.000
EI = 85.12

END BASE DITCH LT
BEGIN V-DITCH LT
PI = 410+00.00
EL = 89.70

END V-DITCH LT
PI = 412+50.00
EL = 91.60

BEGIN V-DITCH LT
PI = 413+05.00
EL = 90.50

FOR UNDERCUT LIMITS SEE SHEETS X-216 TO X-221

LEFT DITCH
RIGHT DITCH

SEE SHEET 31 FOR PLAN VIEW

405+00 406+00 407+00 408+00 409+00 410+00 411+00 412+00 413+00 414+00 415+00 416+00 417+00 418+00 419+00

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jsonger,mwright

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5/28/99

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	52

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

-L- US 158

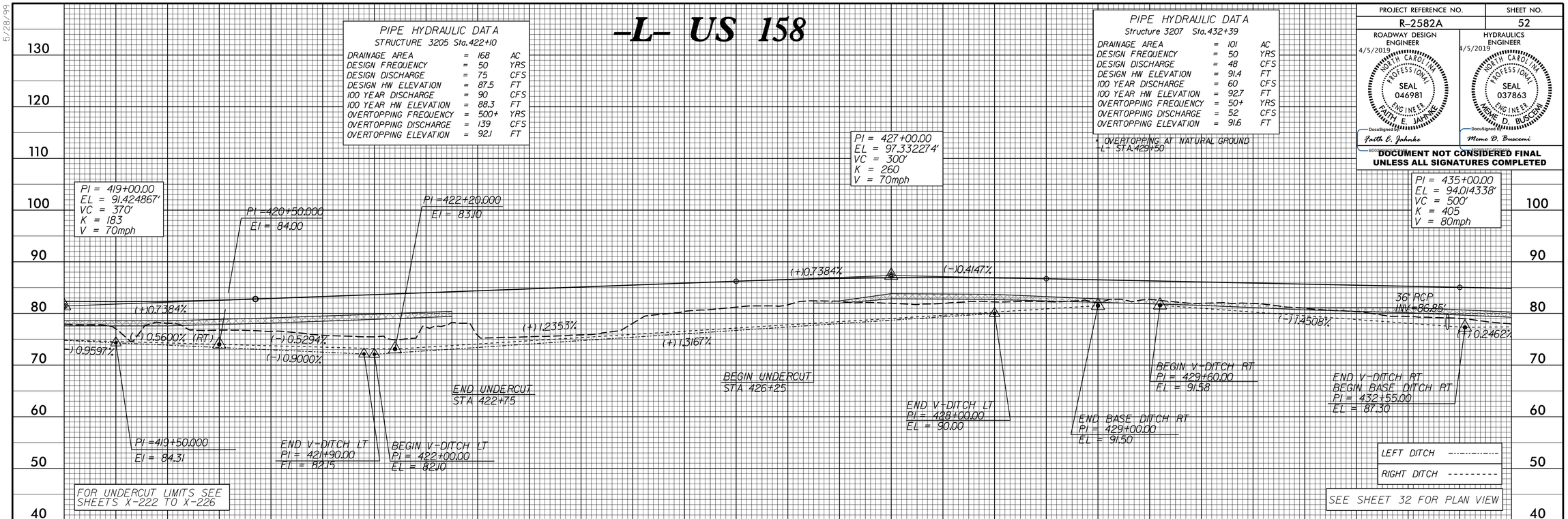
PIPE HYDRAULIC DATA
STRUCTURE 3205 Sta.422+10

DRAINAGE AREA	=	168	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	75	CFS
DESIGN HW ELEVATION	=	87.5	FT
100 YEAR DISCHARGE	=	90	CFS
100 YEAR HW ELEVATION	=	88.3	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	139	CFS
OVERTOPPING ELEVATION	=	92.1	FT

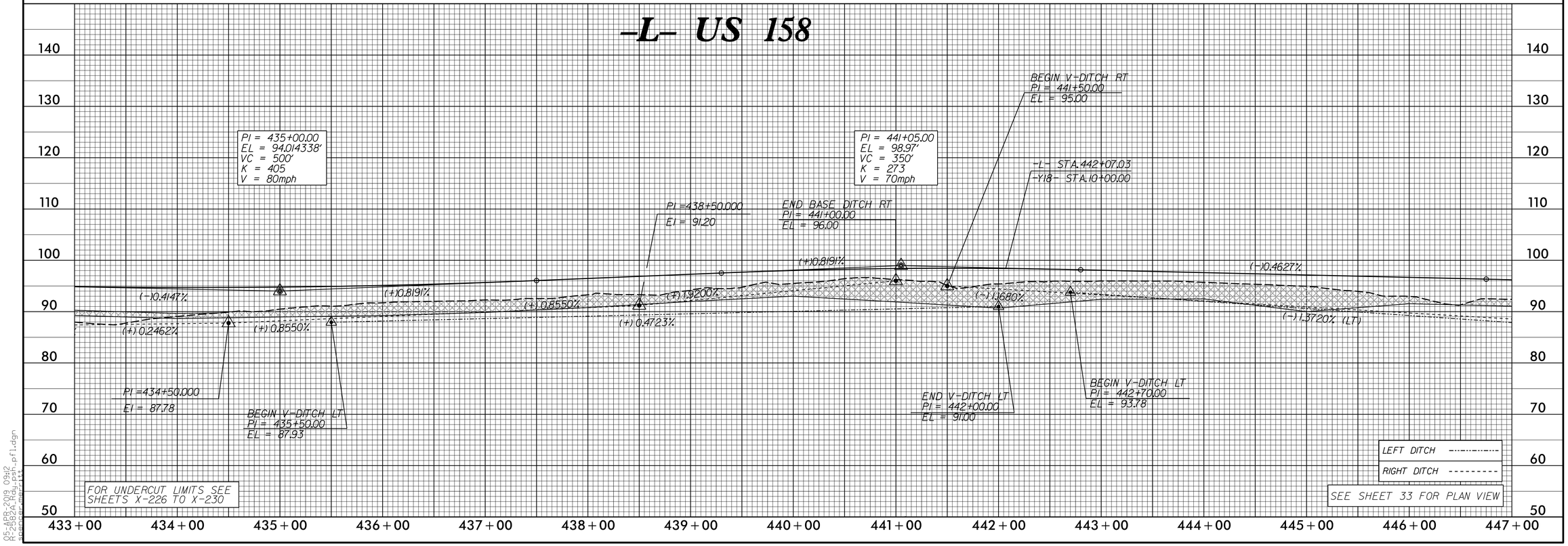
PIPE HYDRAULIC DATA
Structure 3207 Sta.432+39

DRAINAGE AREA	=	101	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	48	CFS
DESIGN HW ELEVATION	=	91.4	FT
100 YEAR DISCHARGE	=	60	CFS
100 YEAR HW ELEVATION	=	92.7	FT
OVERTOPPING FREQUENCY	=	50+	YRS
OVERTOPPING DISCHARGE	=	52	CFS
OVERTOPPING ELEVATION	=	91.6	FT

* OVERTOPPING AT NATURAL GROUND
-L- STA.429+50



-L- US 158



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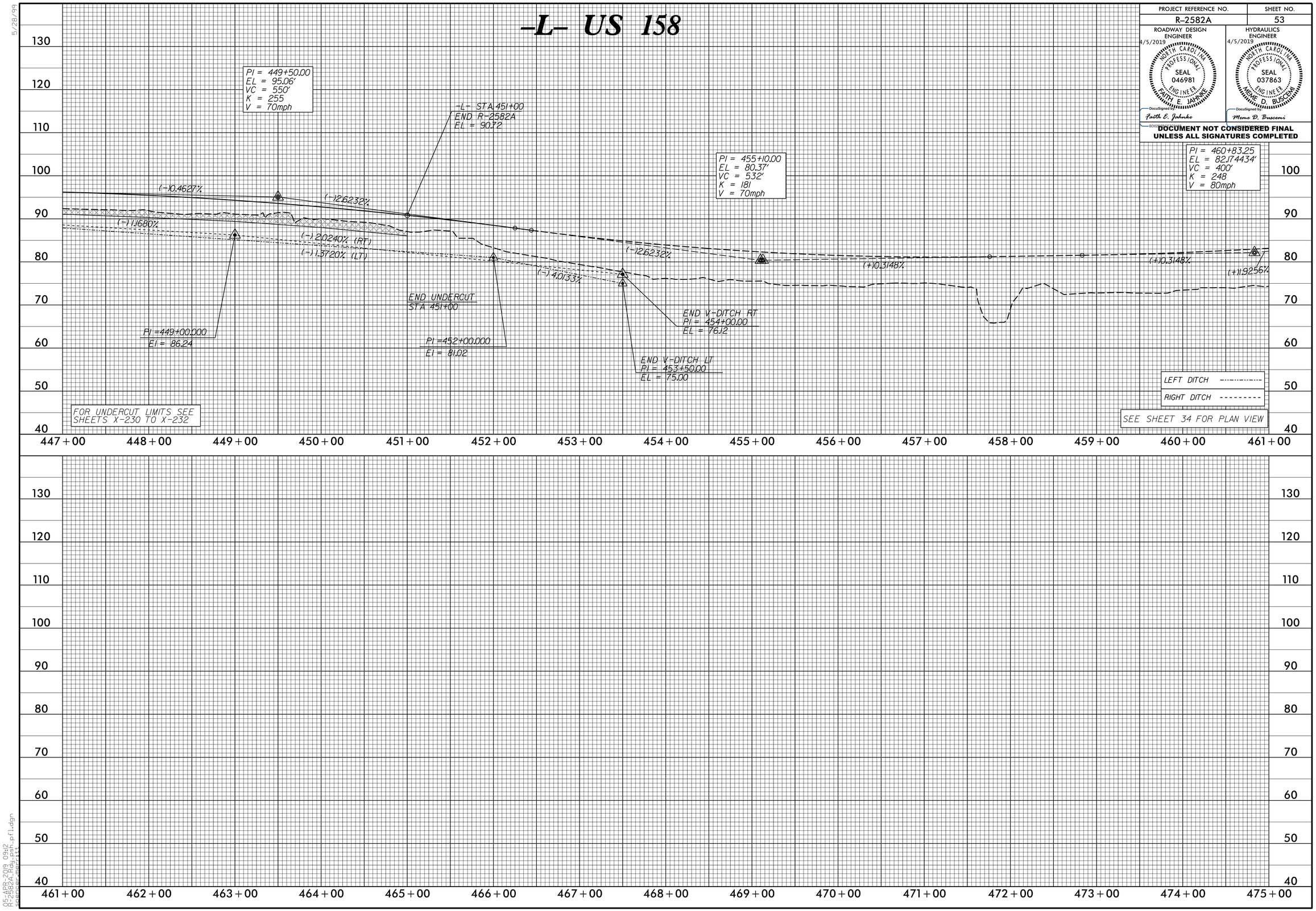
-L- US 158

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	53

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
Docusigned by: Faith E. Jahnke
BD02

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
Docusigned by: Meme D. Buscemi

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED



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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	54

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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-Y1- SR 1262 (LONG FARM RD.)

PI = 10+75.00
EL = 131.24'
VC = 150'
K = 126
V = 45 mph

PI = 15+00.00
EL = 133.16'
VC = 300'
K = 372
V = 45 mph

BEG.GRADE
-Y1- STA.10+00.00
EL = 131.80

PIPE HYDRAULIC DATA
STRUCTURE 0443 Sta.16+39

DRAINAGE AREA	=	5.8	AC
DESIGN FREQUENCY	=	25	YRS
DESIGN DISCHARGE	=	8	CFS
DESIGN HW ELEVATION	=	128.3	FT
100 YEAR DISCHARGE	=	9	CFS
100 YEAR HW ELEVATION	=	128.5	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	20	CFS
OVERTOPPING ELEVATION	=	131.5	FT

PIPE HYDRAULIC DATA
STRUCTURE 0441 Sta.22+53

DRAINAGE AREA	=	3.7	AC
DESIGN FREQUENCY	=	25	YRS
DESIGN DISCHARGE	=	6	CFS
DESIGN HW ELEVATION	=	129.0	FT
100 YEAR DISCHARGE	=	7	CFS
100 YEAR HW ELEVATION	=	129.2	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	14	CFS
OVERTOPPING ELEVATION	=	130.2	FT

(-)0.7387% (+)0.4496% (+)0.4496% (-)0.3564% (-)0.3564% (+)0.1793%

18" RCP
INV=126.18'

18" RCP
INV=127.40'

BEGIN UNDERCUT
STA 10+00

END UNDERCUT
STA 13+25

BEGIN UNDERCUT
STA 20+25

BEGIN V-DITCH RT
PI = 23+16
EL = 127.73

RIGHT DITCH ---------

FOR UNDERCUT LIMITS SEE SHEETS X-234, AND X-237 TO X-238

SEE SHEET 4 FOR PLAN VIEW

-Y1- SR 1262 (LONG FARM RD.)

PI = 24+50.00
EL = 129.77'
VC = 300'
K = 202
V = 45 mph

PI =25+00.000
El = 128.06

END V-DITCH RT
PI = 27+00
EL = 129.87

END GRADE
-Y1- STA.28+81.21
EL = 134.63

(-)0.3564% (+)0.1793% (-)0.1289% (+)0.9050% (+)0.1429% (+)1.5800%

END V-DITCH LT
PI = 27+00
EL = 129.63

BEGIN V-DITCH LT
PI = 25+65
EL = 128.00

PI =26+00.000
El = 128.05

END UNDERCUT
STA 28+80

LEFT DITCH -·-·-·-·-·-
RIGHT DITCH ---------

FOR UNDERCUT LIMITS SEE SHEETS X-238 TO X-239

SEE SHEET 4 FOR PLAN VIEW

-DRIVE-

PI = 10+50.00
EL = 138.69'
VC = 35'

PI = 11+15.00
EL = 127.86'
VC = 95'

PI = 13+95.00
EL = 124.61'
VC = 30'

BEG.GRADE
-DRIVE- STA.10+32.31
EL = 140.01

140.01 (-)17.4634% (-)16.6545% (-)1.1607% (-)0.4387% 123.93

END GRADE
-DRIVE- STA.15+50.00
EL = 123.93

LEFT DITCH -·-·-·-·-·-
RIGHT DITCH ---------

SEE SHEET 4 FOR PLAN VIEW

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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	55

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

BD02

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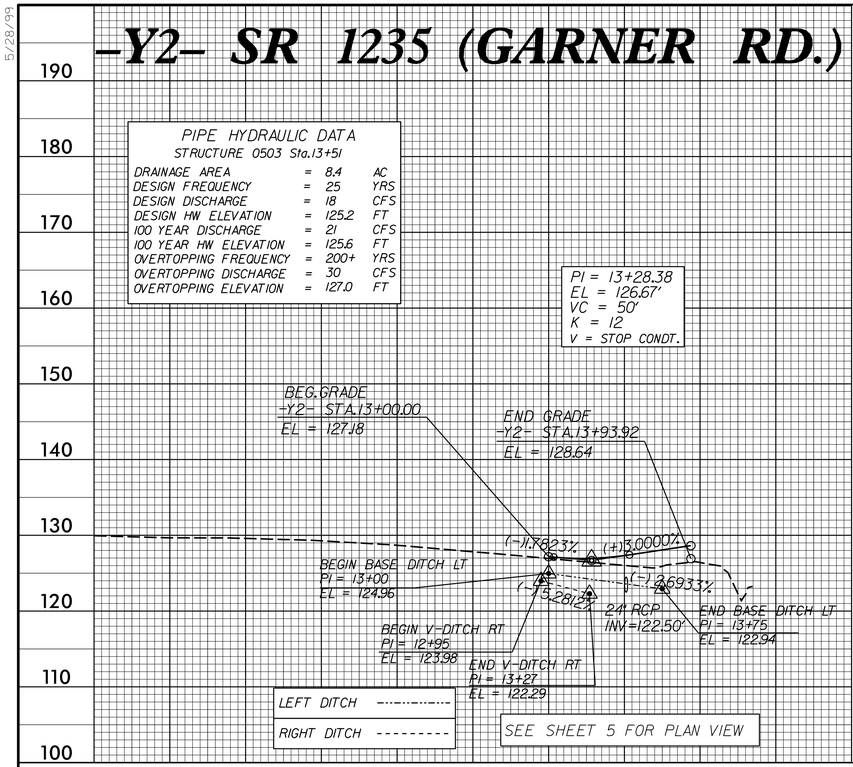
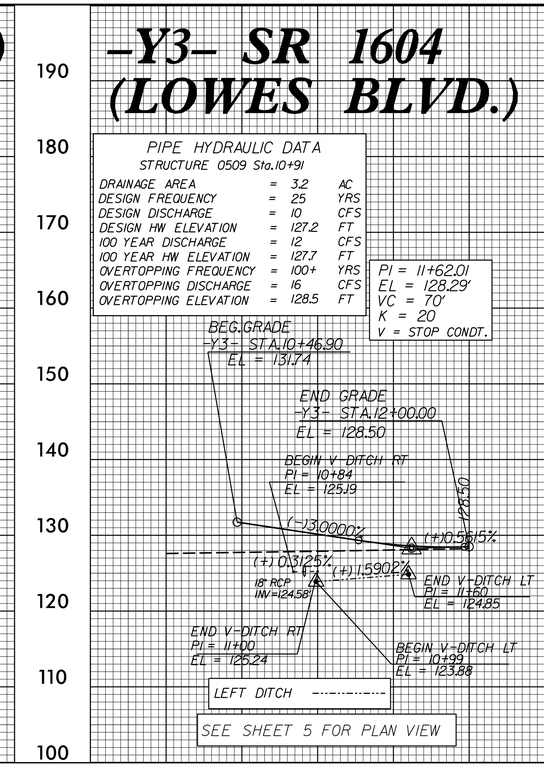
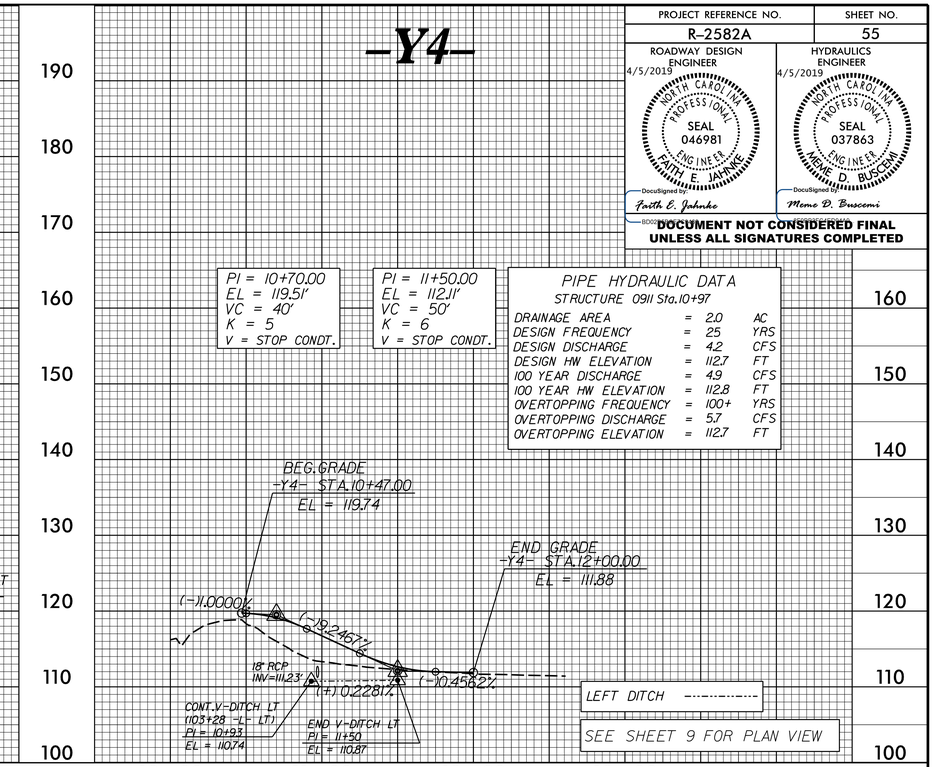
-Y2- SR 1235 (GARNER RD.)



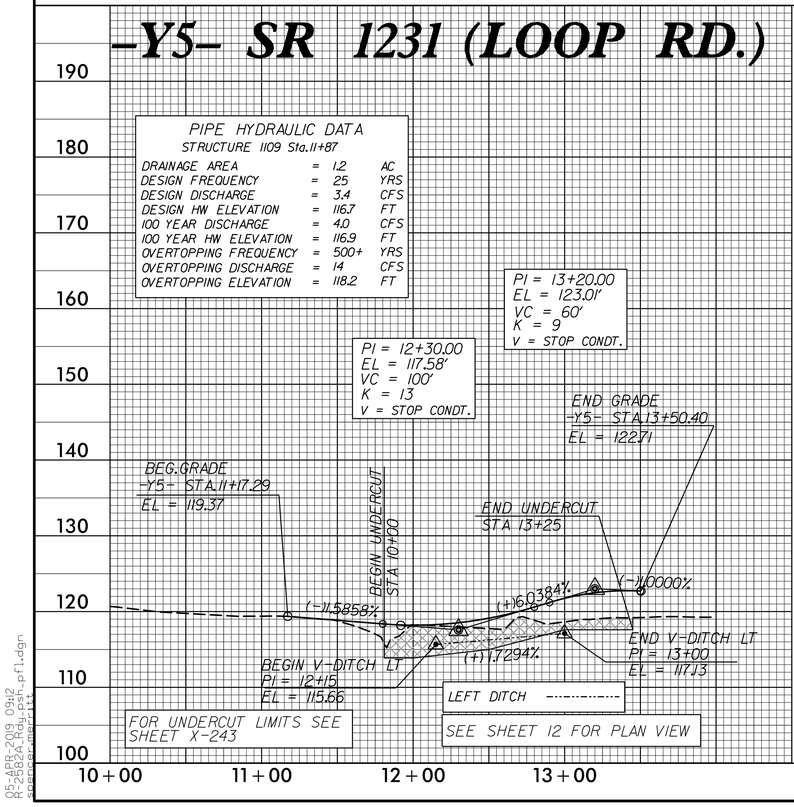
-Y3- SR 1604 (LOWES BLVD.)



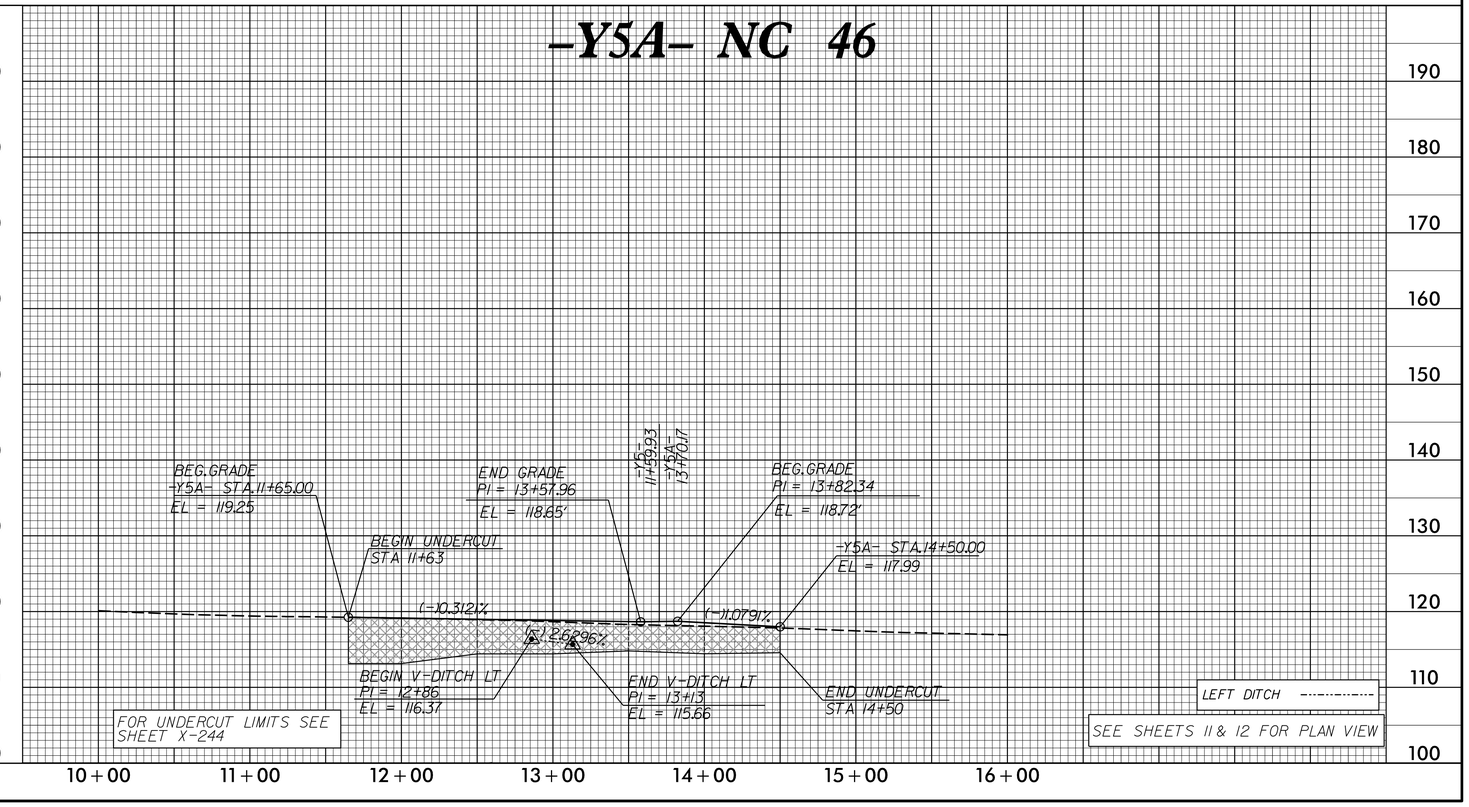
-Y4-



-Y5- SR 1231 (LOOP RD.)



-Y5A- NC 46



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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	56

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke
BD02

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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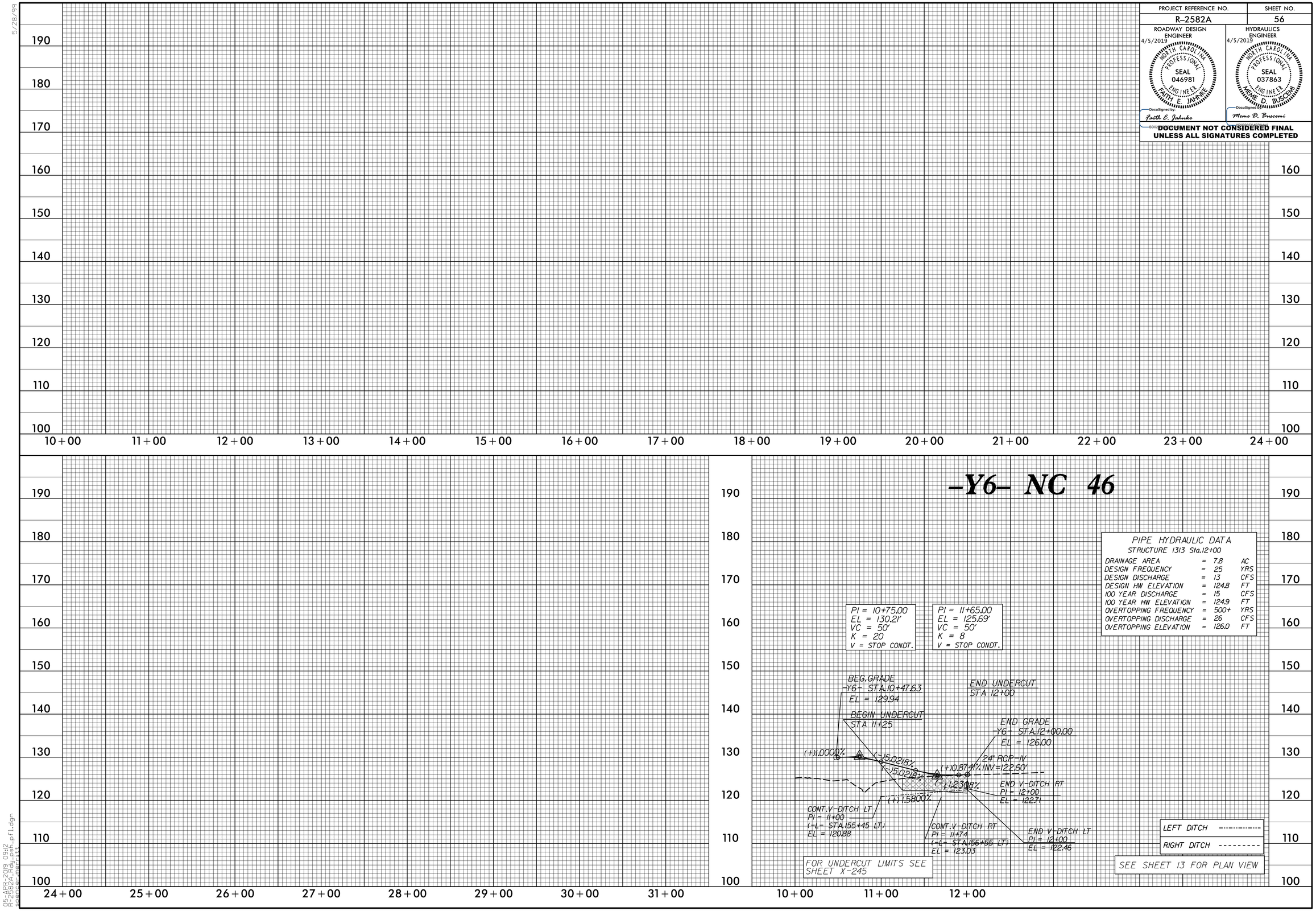

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jpenner,mpritt

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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	57

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

BD02
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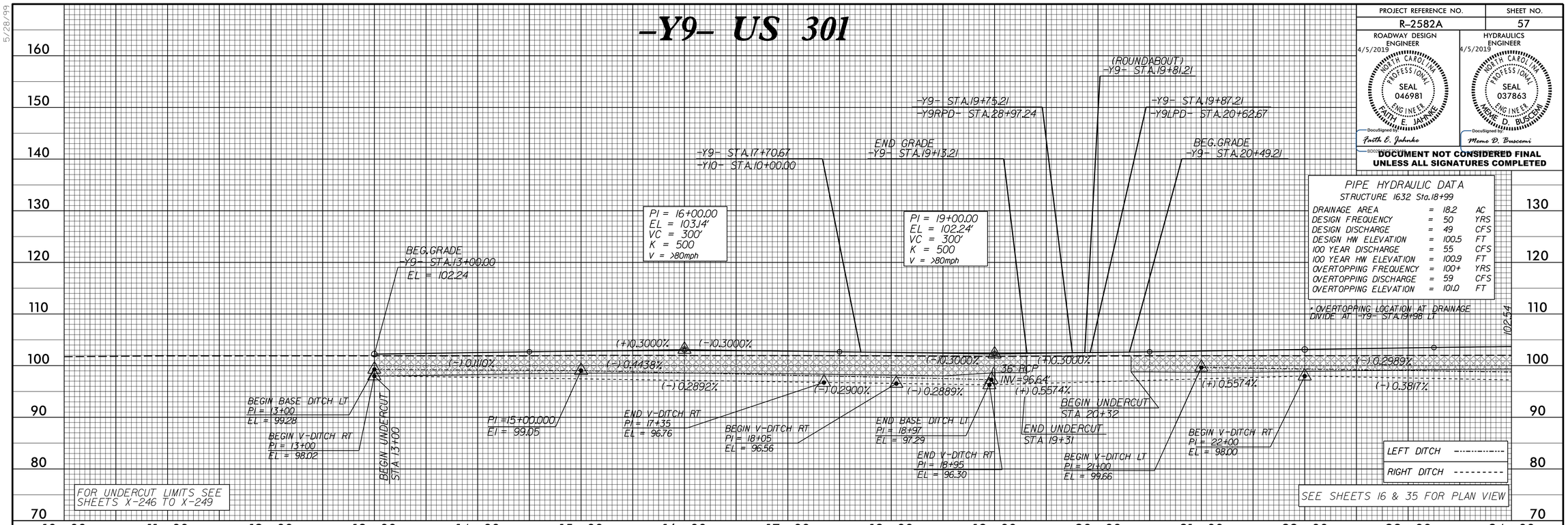
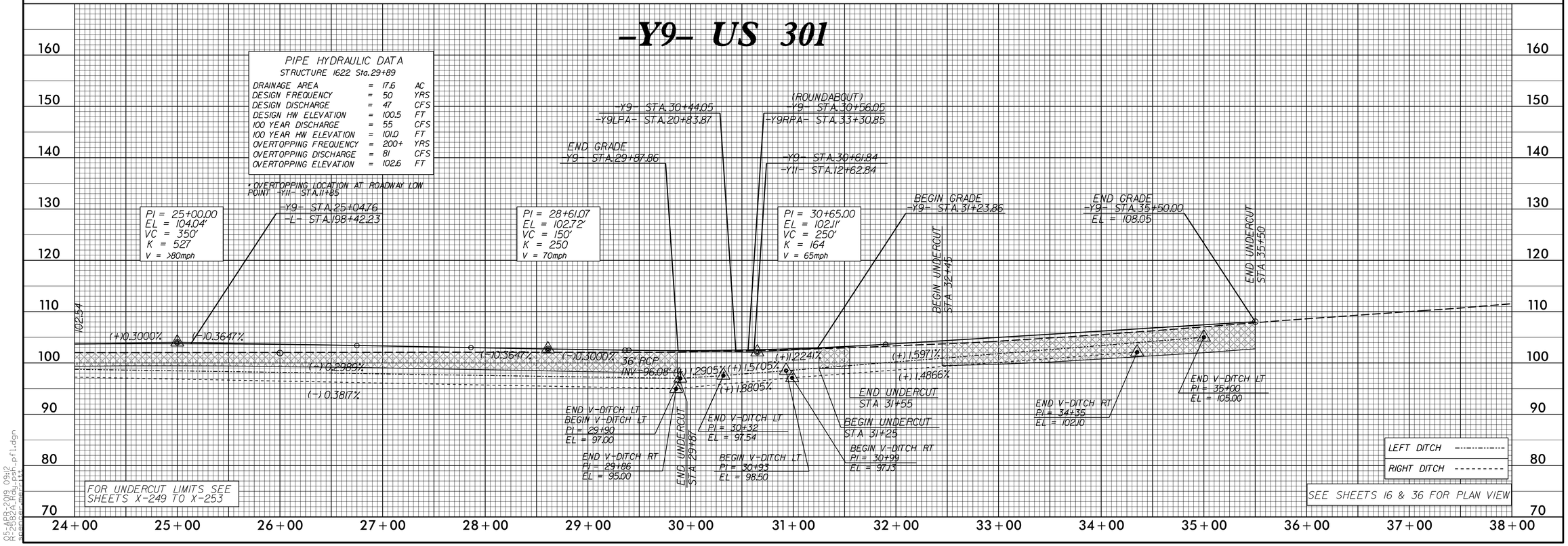
-Y9- US 301



-Y9- US 301



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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	58

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

BD020

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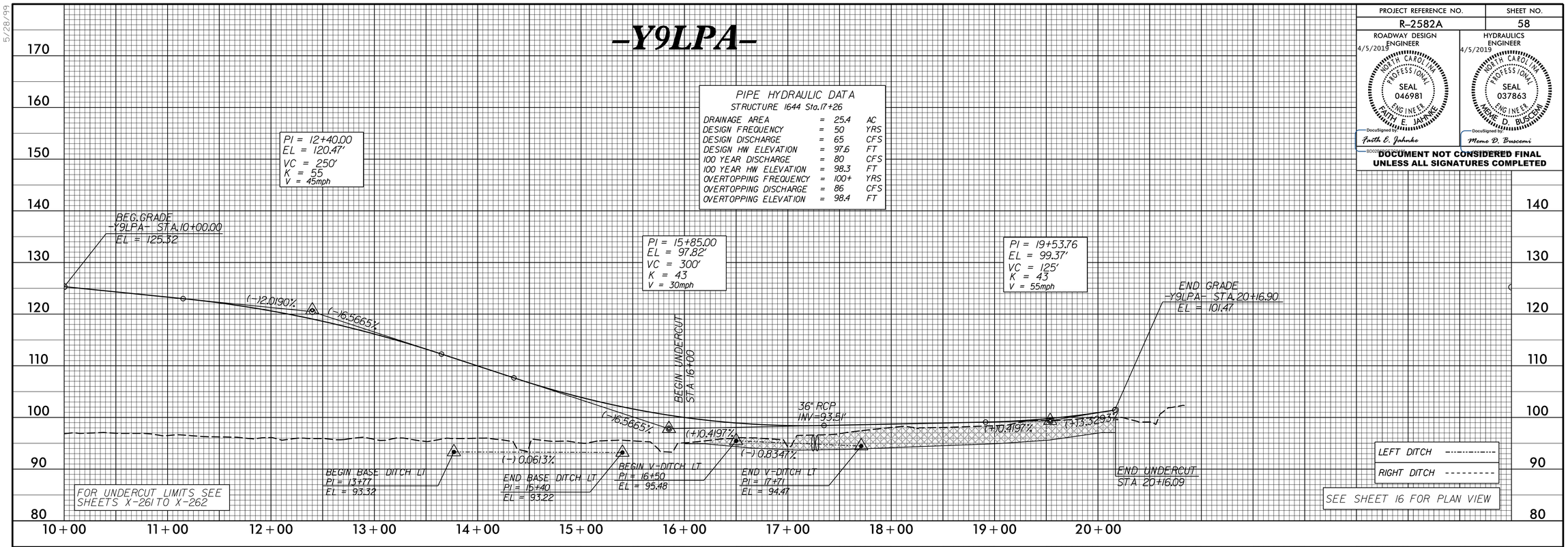
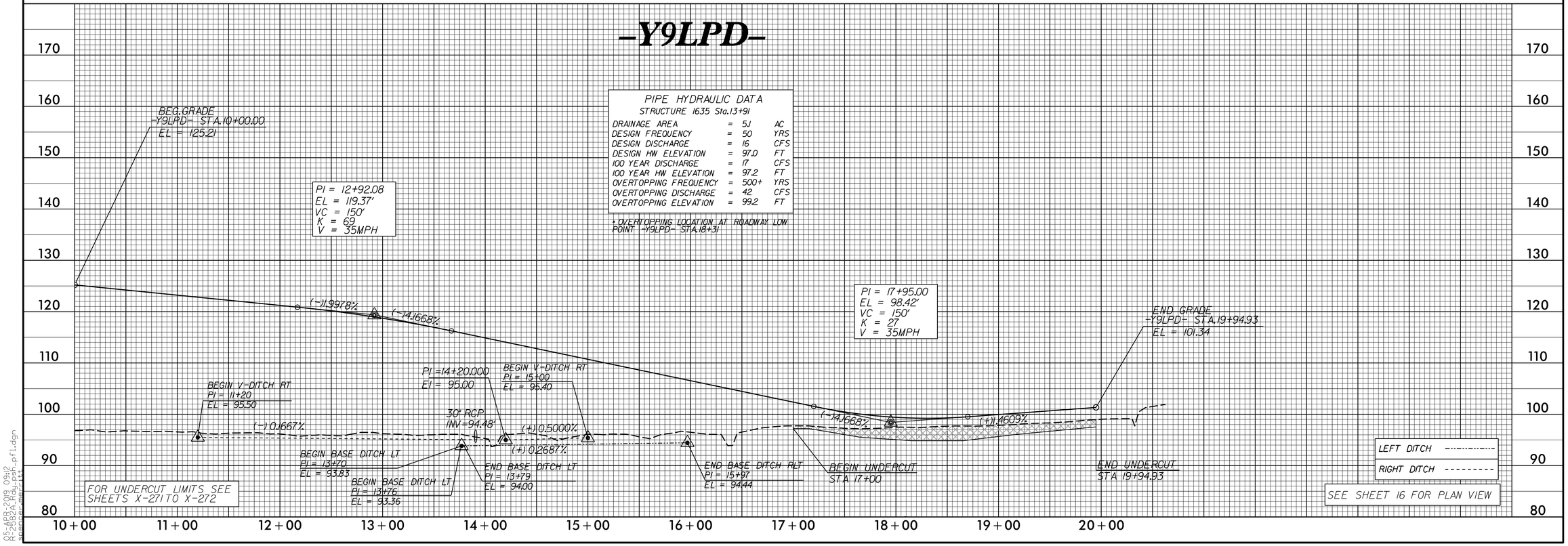
-Y9LPA-



PIPE HYDRAULIC DATA
STRUCTURE 1644 Sta.17+26

DRAINAGE AREA	=	25.4	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	65	CFS
DESIGN HW ELEVATION	=	97.6	FT
100 YEAR DISCHARGE	=	80	CFS
100 YEAR HW ELEVATION	=	98.3	FT
OVERTOPPING FREQUENCY	=	100+	YRS
OVERTOPPING DISCHARGE	=	86	CFS
OVERTOPPING ELEVATION	=	98.4	FT

-Y9LPD-



PIPE HYDRAULIC DATA
STRUCTURE 1635 Sta.13+91

DRAINAGE AREA	=	5.1	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	16	CFS
DESIGN HW ELEVATION	=	97.0	FT
100 YEAR DISCHARGE	=	17	CFS
100 YEAR HW ELEVATION	=	97.2	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	42	CFS
OVERTOPPING ELEVATION	=	99.2	FT

* OVERTOPPING LOCATION AT ROADWAY LOW POINT -Y9LPD- STA. 18+31

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jpeeler,mmartin

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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	59

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
Docusigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
Docusigned by: Meme D. Buscemi

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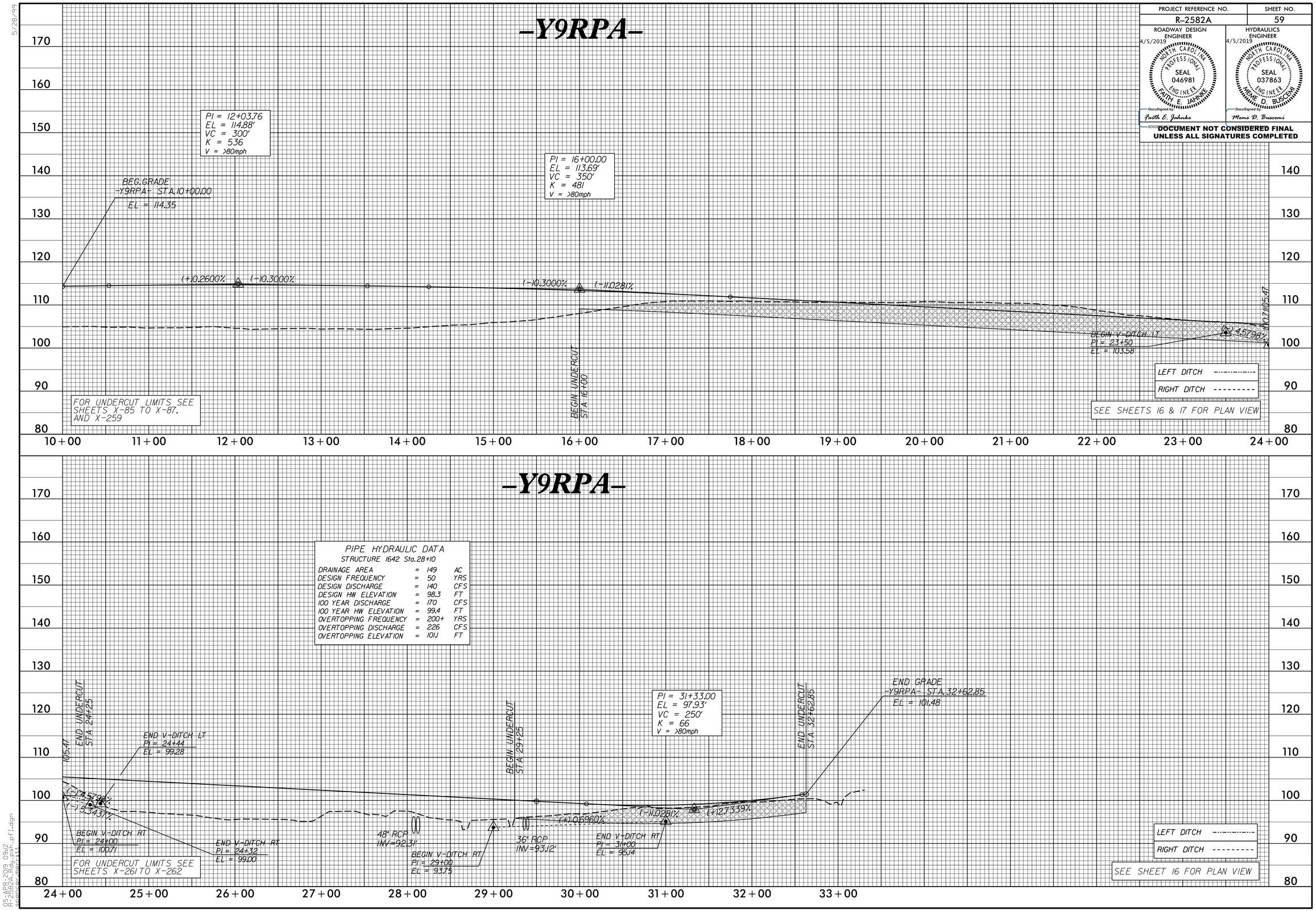
-Y9RPA-



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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	60

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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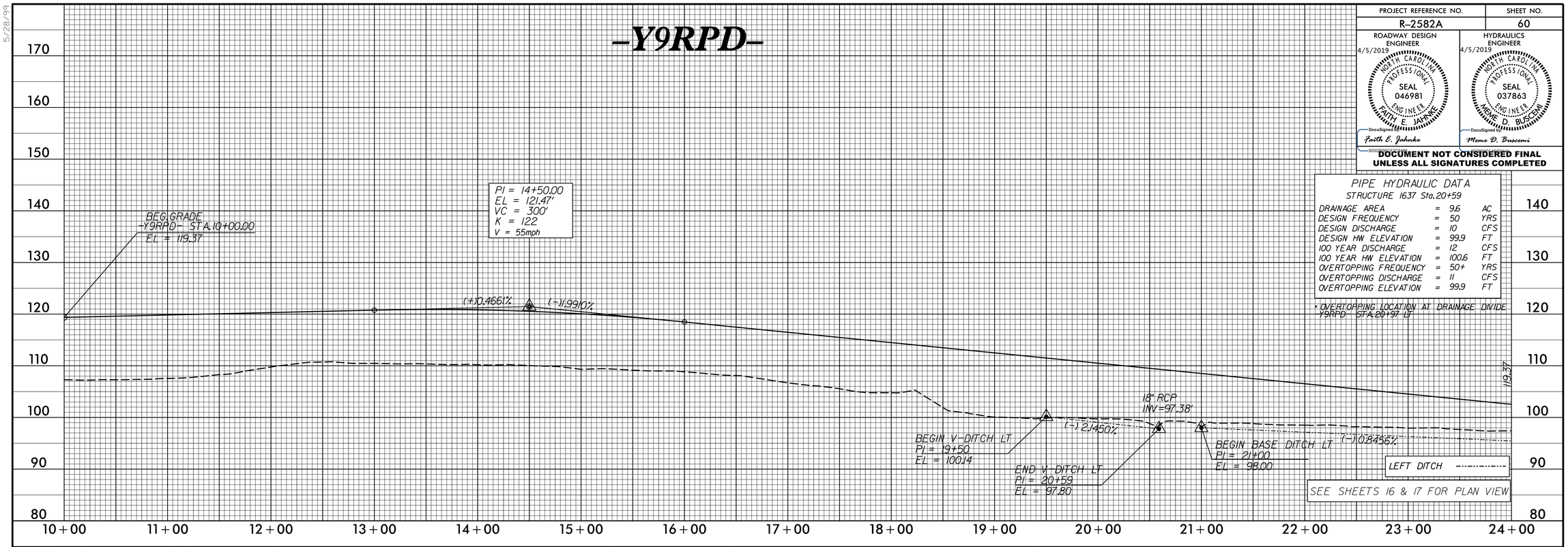
-Y9RPD-

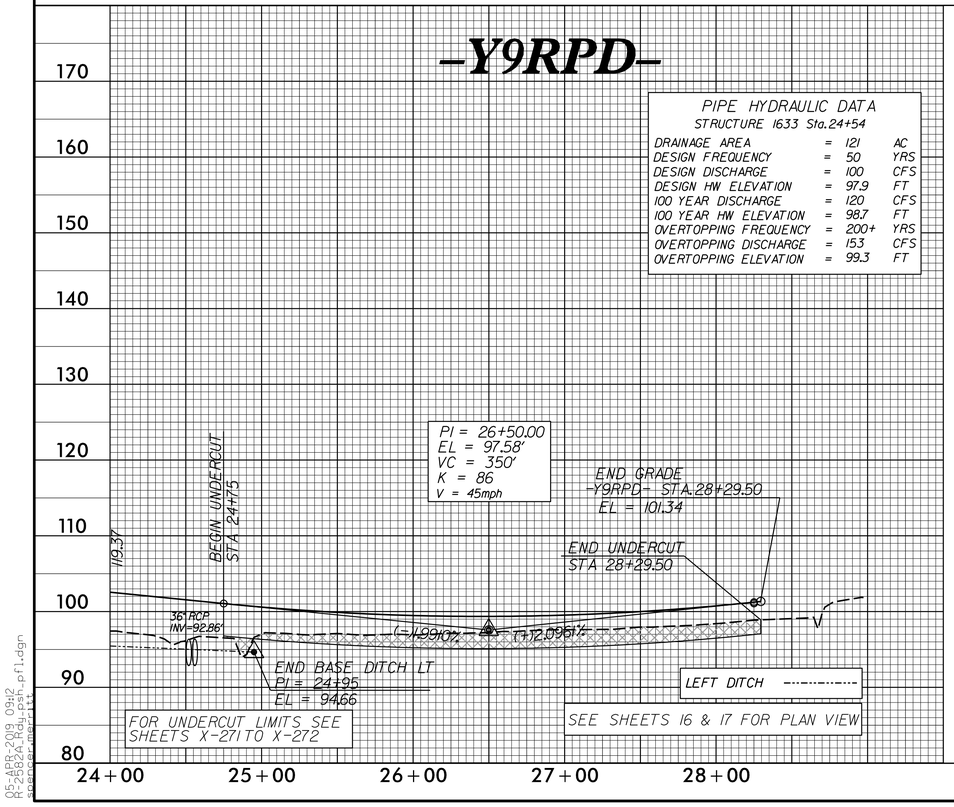


PIPE HYDRAULIC DATA
STRUCTURE 1637 Sta.20+59

DRAINAGE AREA	=	9.6	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	10	CFS
DESIGN HW ELEVATION	=	99.9	FT
100 YEAR DISCHARGE	=	12	CFS
100 YEAR HW ELEVATION	=	100.6	FT
OVERTOPPING FREQUENCY	=	50+	YRS
OVERTOPPING DISCHARGE	=	11	CFS
OVERTOPPING ELEVATION	=	99.9	FT

* OVERTOPPING LOCATION AT DRAINAGE DIVIDE Y9RPD STA.20+97 LT

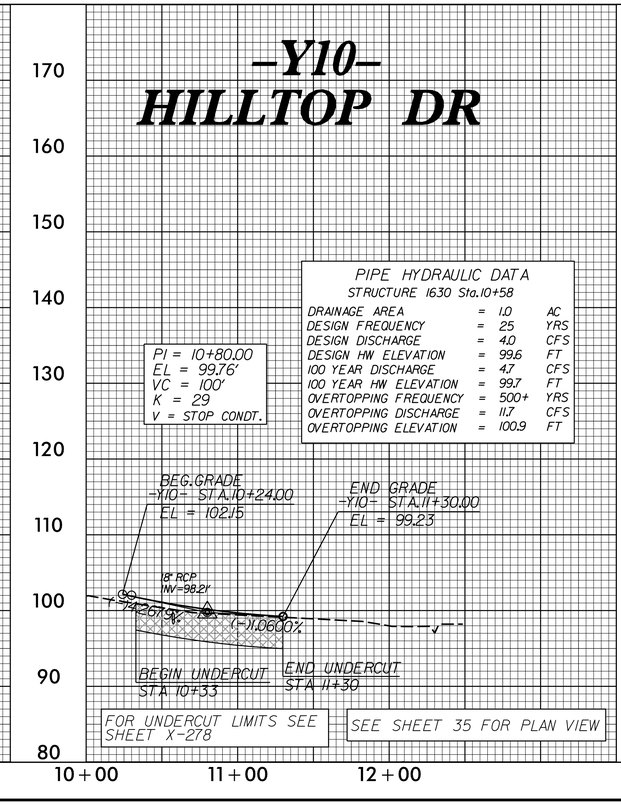
-Y9RPD-



PIPE HYDRAULIC DATA
STRUCTURE 1633 Sta.24+54

DRAINAGE AREA	=	121	AC
DESIGN FREQUENCY	=	50	YRS
DESIGN DISCHARGE	=	100	CFS
DESIGN HW ELEVATION	=	97.9	FT
100 YEAR DISCHARGE	=	120	CFS
100 YEAR HW ELEVATION	=	98.7	FT
OVERTOPPING FREQUENCY	=	200+	YRS
OVERTOPPING DISCHARGE	=	153	CFS
OVERTOPPING ELEVATION	=	99.3	FT

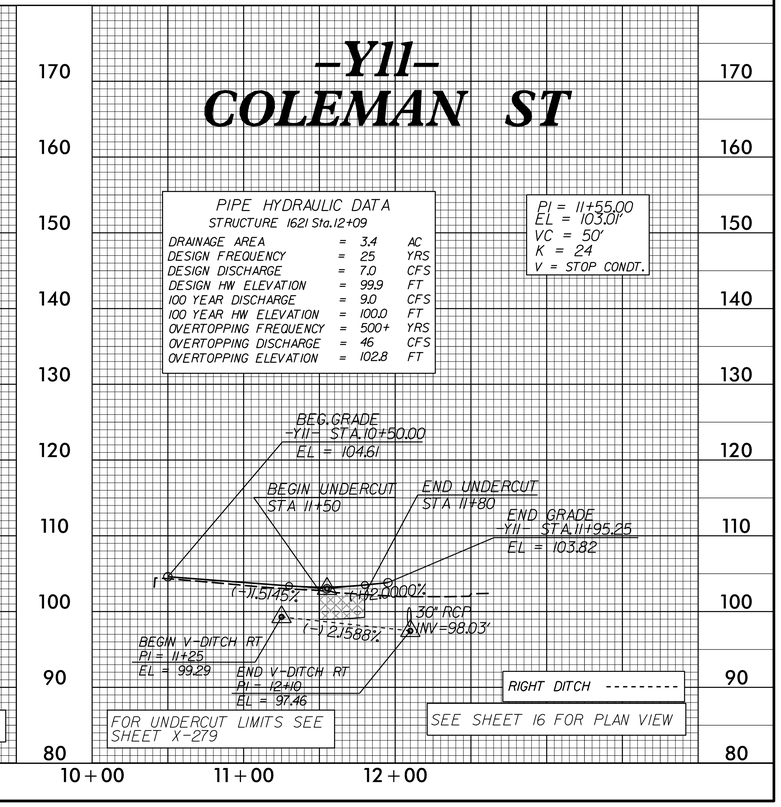
-Y10- HILLTOP DR



PIPE HYDRAULIC DATA
STRUCTURE 1630 Sta.10+58

DRAINAGE AREA	=	1.0	AC
DESIGN FREQUENCY	=	25	YRS
DESIGN DISCHARGE	=	4.0	CFS
DESIGN HW ELEVATION	=	99.6	FT
100 YEAR DISCHARGE	=	4.7	CFS
100 YEAR HW ELEVATION	=	99.7	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	11.7	CFS
OVERTOPPING ELEVATION	=	100.9	FT

-Y11- COLEMAN ST



PIPE HYDRAULIC DATA
STRUCTURE 1621 Sta.12+09

DRAINAGE AREA	=	3.4	AC
DESIGN FREQUENCY	=	25	YRS
DESIGN DISCHARGE	=	7.0	CFS
DESIGN HW ELEVATION	=	99.9	FT
100 YEAR DISCHARGE	=	9.0	CFS
100 YEAR HW ELEVATION	=	100.0	FT
OVERTOPPING FREQUENCY	=	500+	YRS
OVERTOPPING DISCHARGE	=	46	CFS
OVERTOPPING ELEVATION	=	102.8	FT

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jsonger,mpatt

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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	61

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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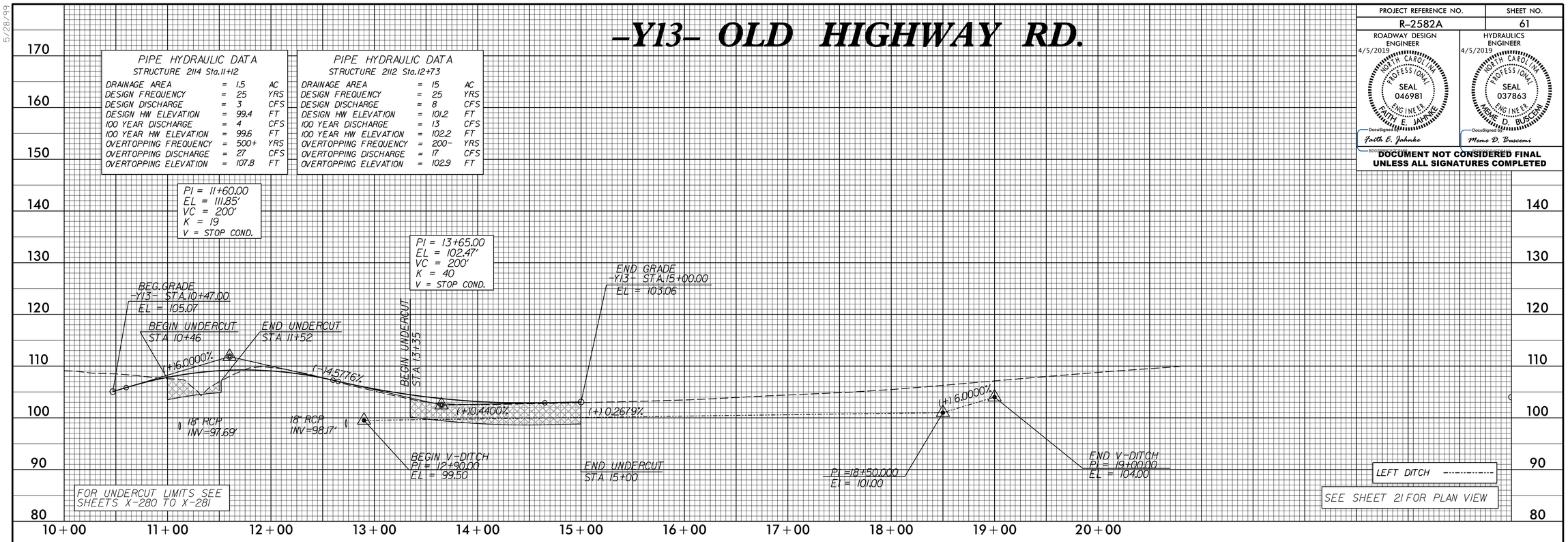
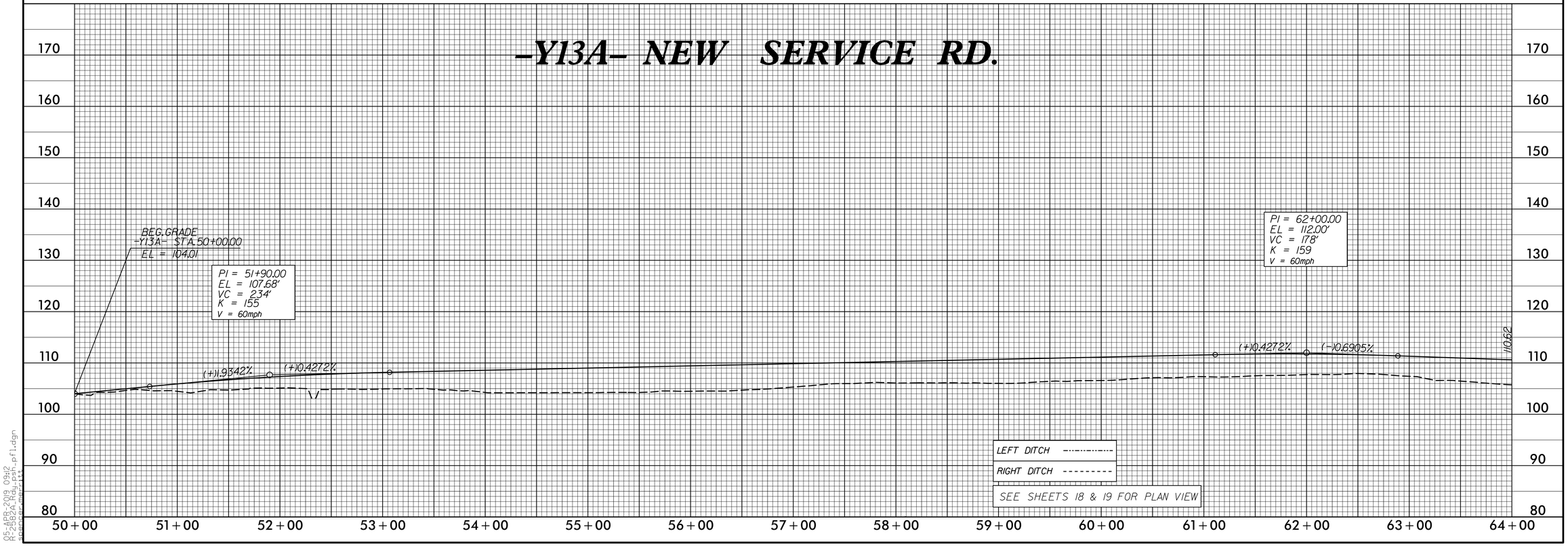
-Y13- OLD HIGHWAY RD.



-Y13A- NEW SERVICE RD.



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jpenner,mwright

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PROJECT REFERENCE NO.	SHEET NO.
R-2582A	62

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

BD02

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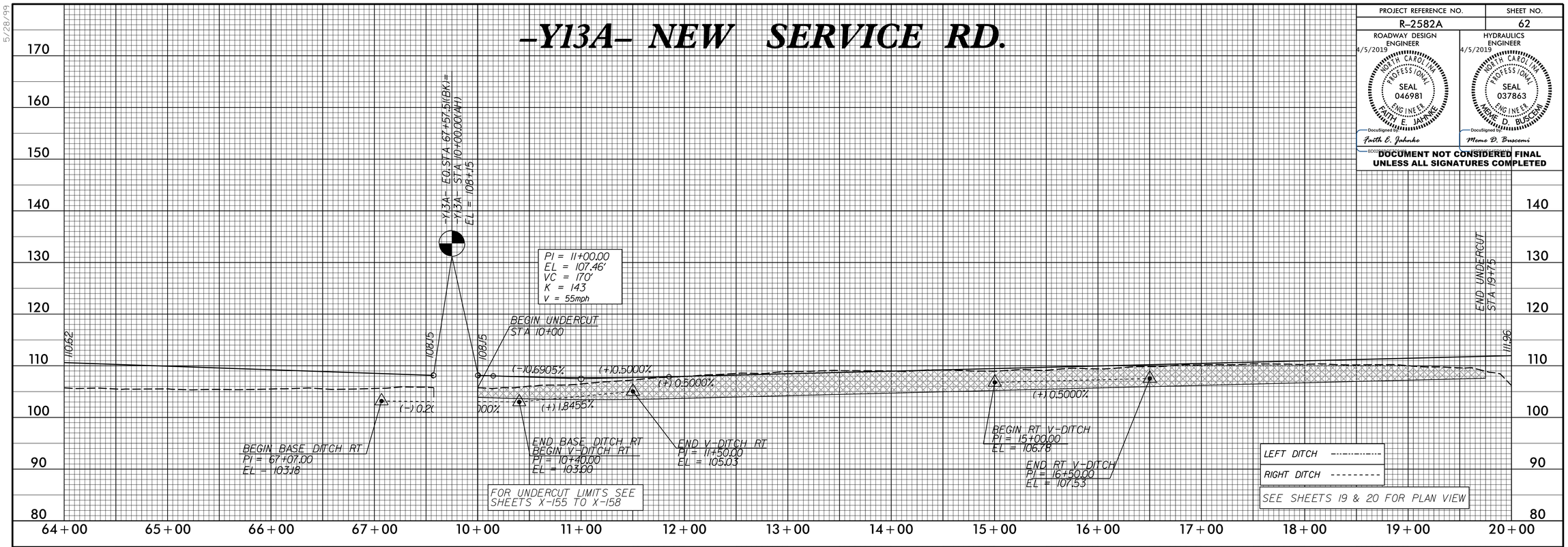
-Y13A- NEW SERVICE RD.



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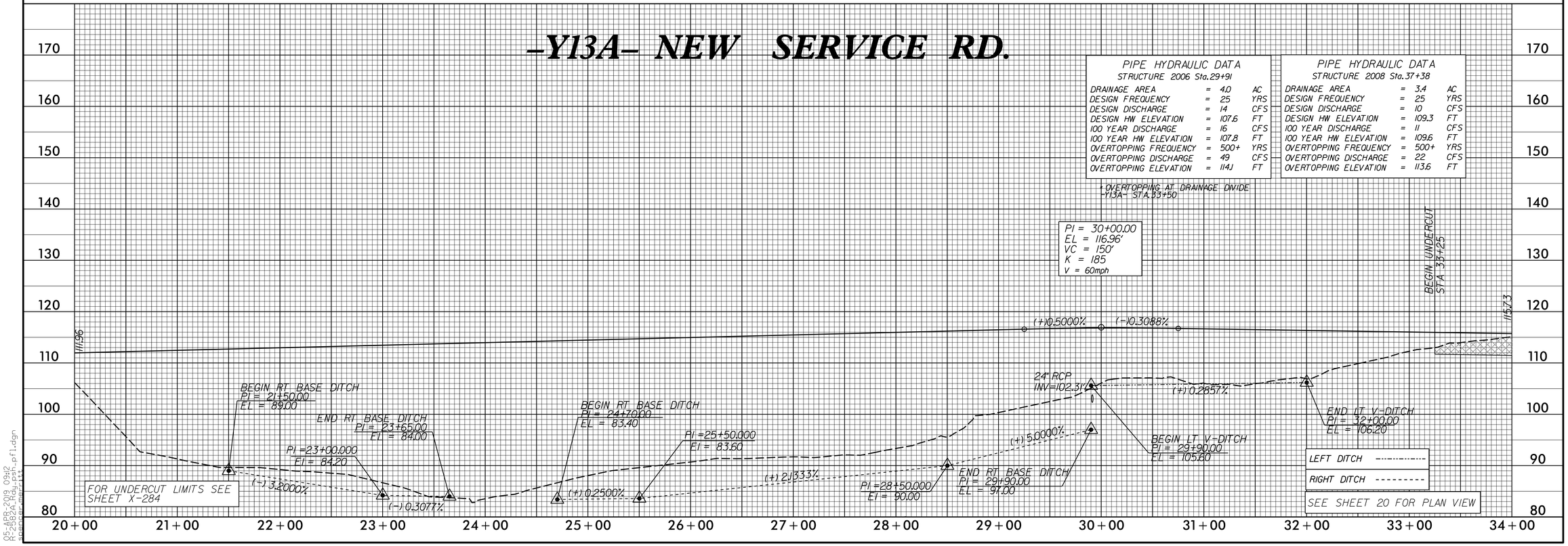

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bpowell@mbp-tt.com

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-Y13A- NEW SERVICE RD.

PROJECT REFERENCE NO.	SHEET NO.
R-2582A	62A

ROADWAY DESIGN ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
DocuSigned by: Faith E. Jahnke
BD02

HYDRAULICS ENGINEER
4/5/2019
NORTH CAROLINA PROFESSIONAL SEAL 037863 ENGINEER MEME D. BUSCEMI
DocuSigned by: Meme D. Buscemi

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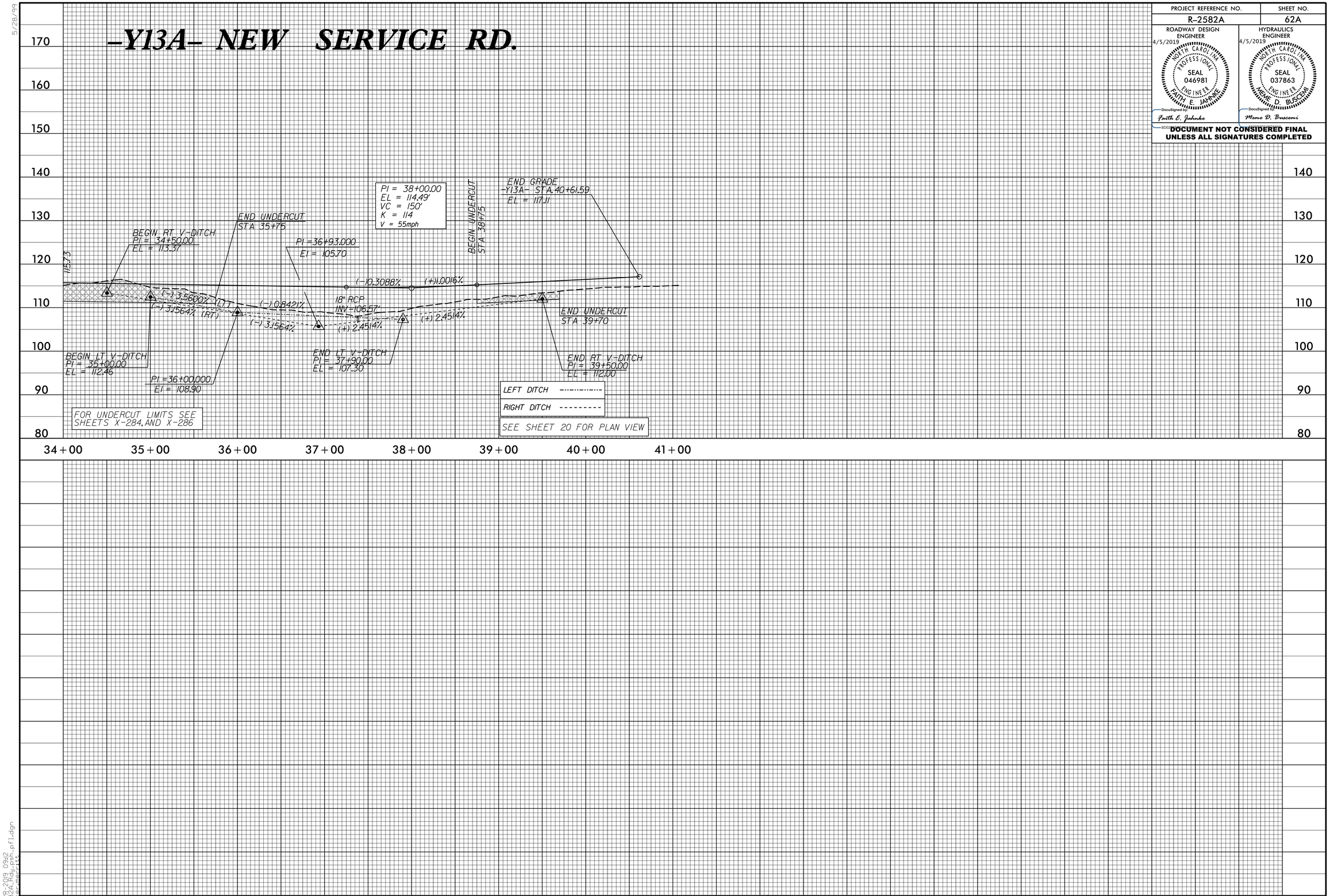

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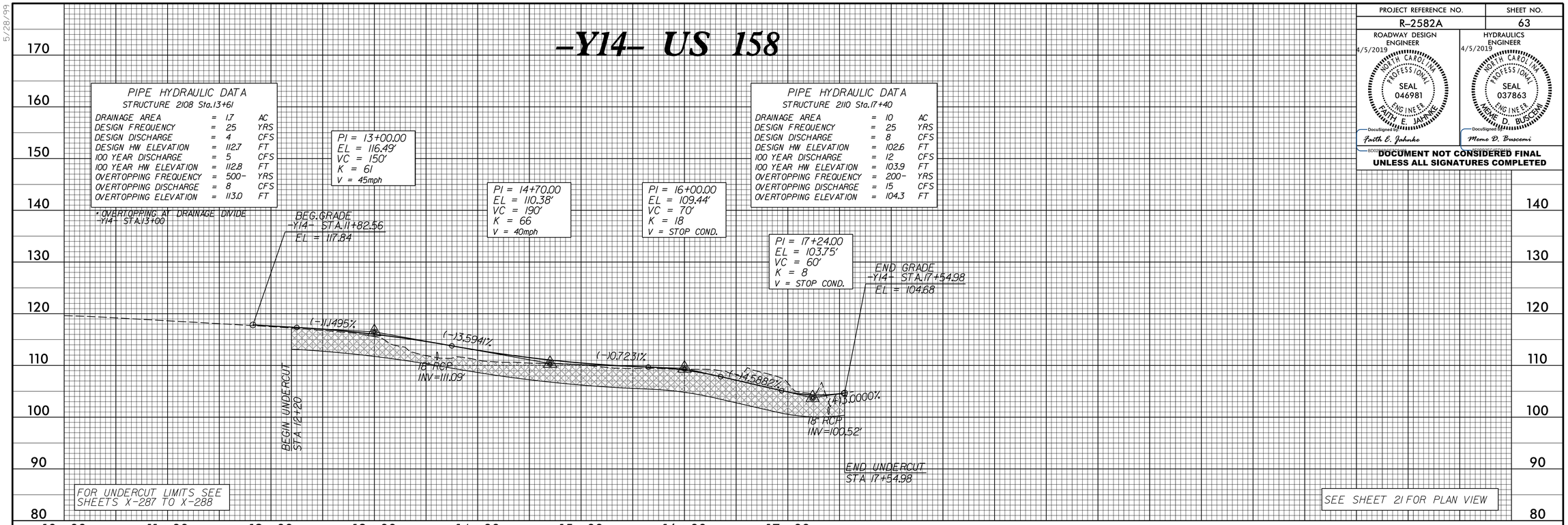

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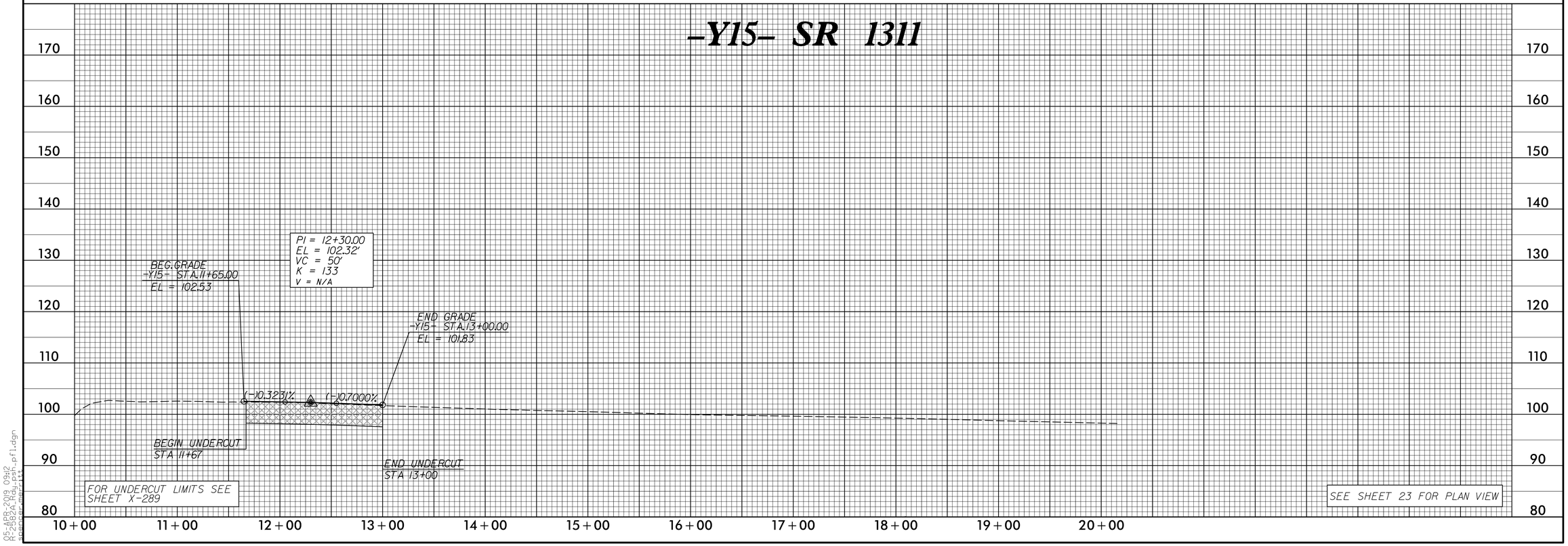

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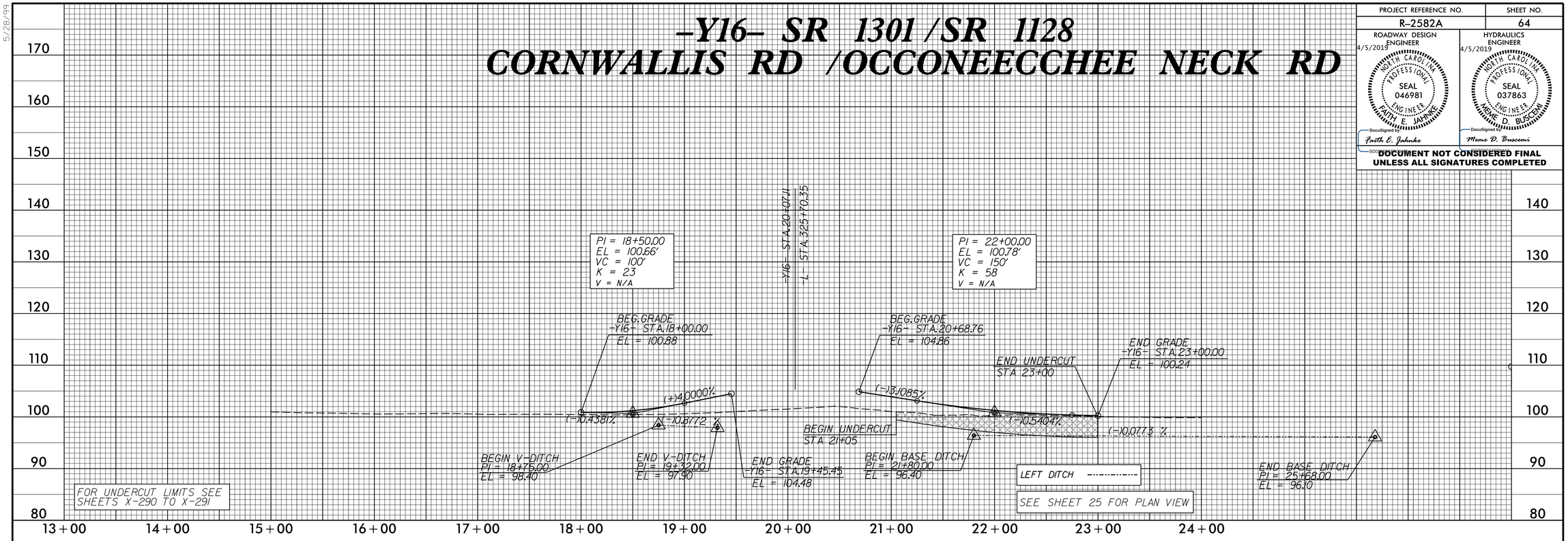

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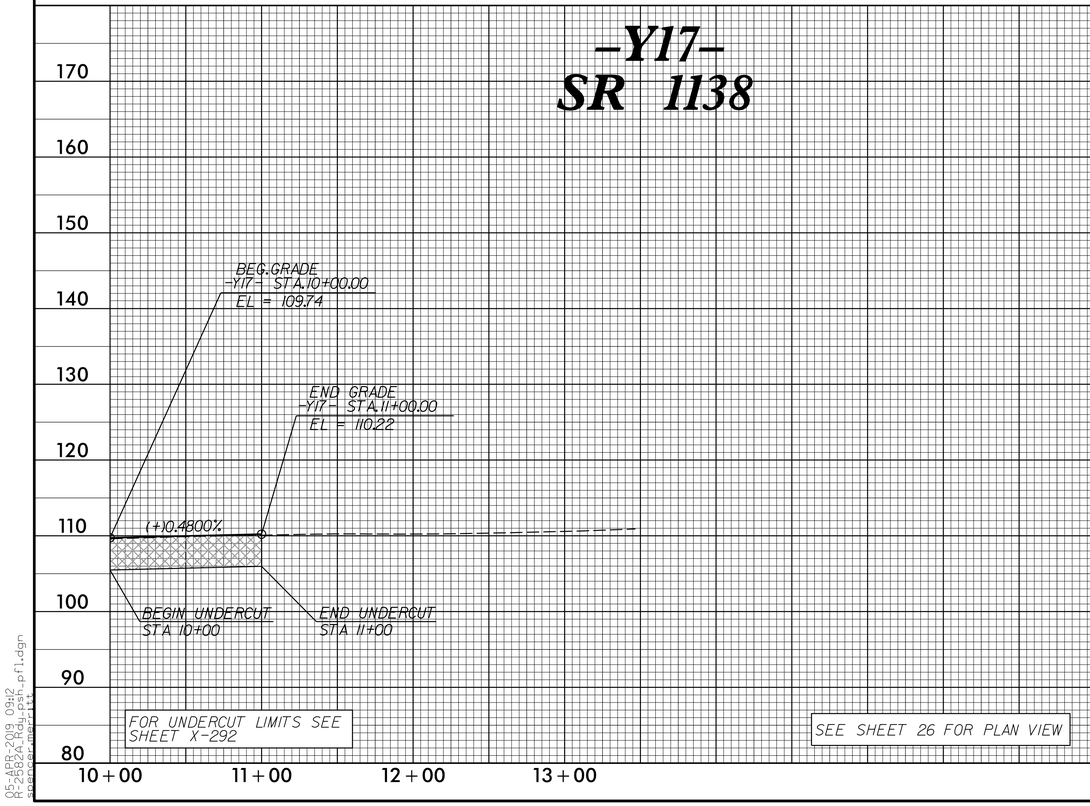

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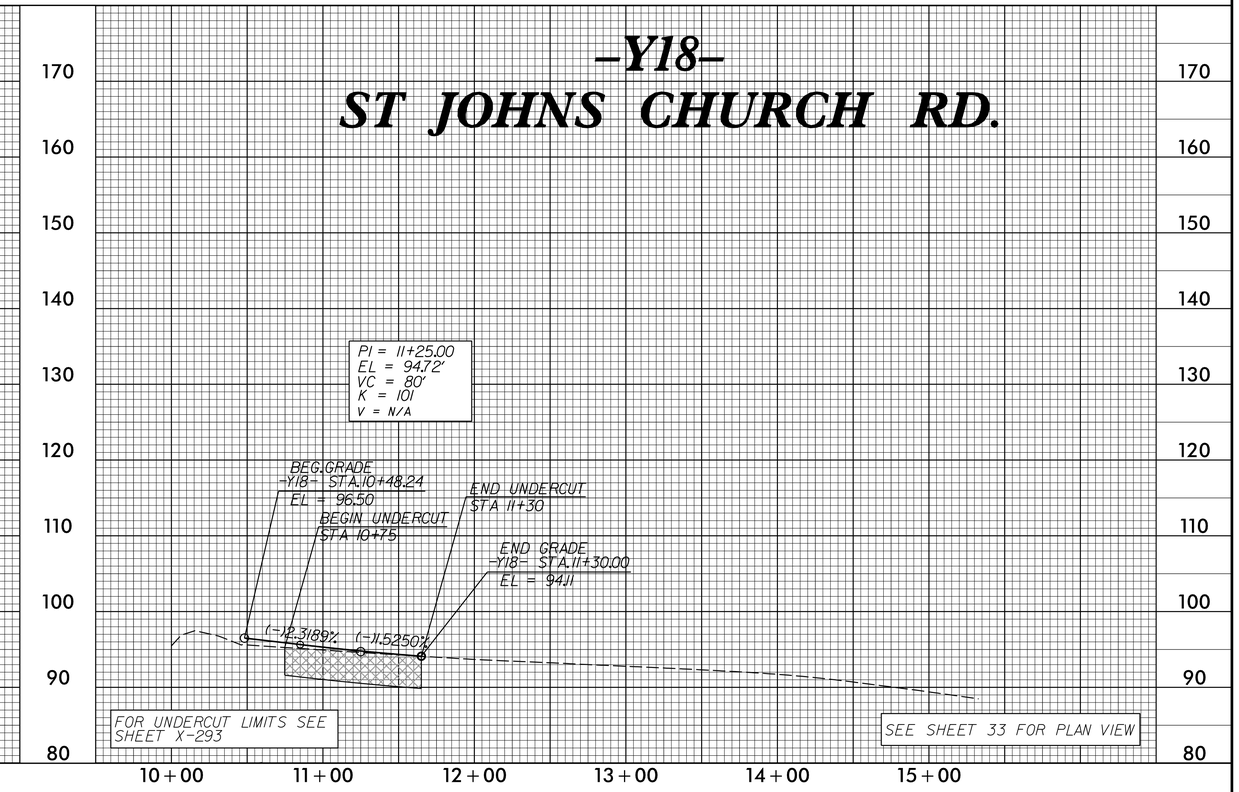

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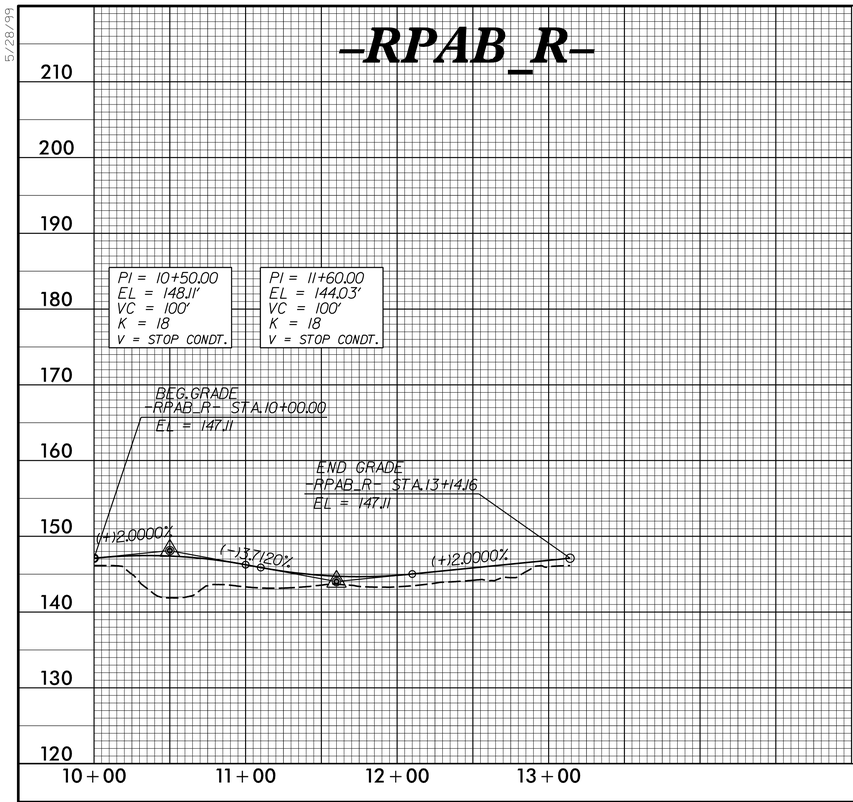

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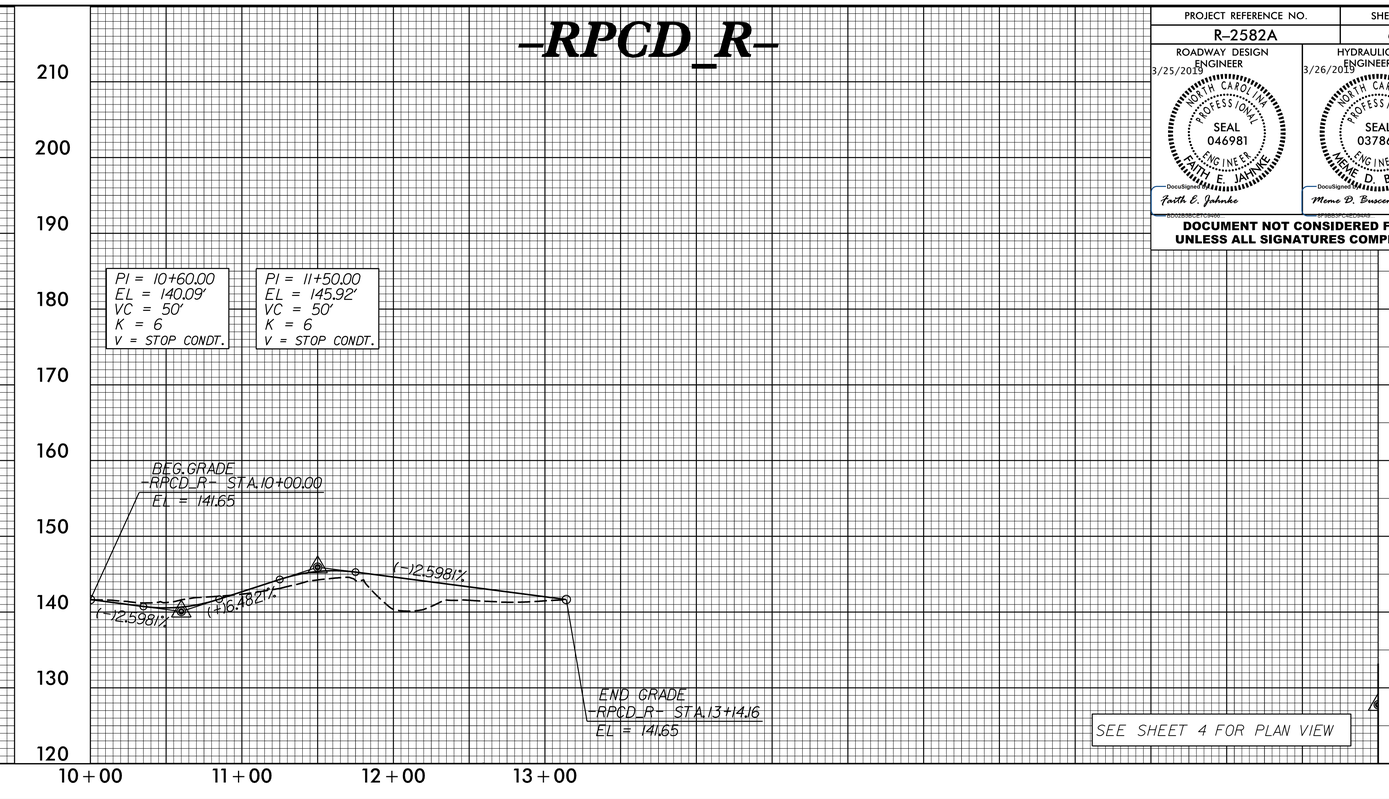

SEE SHEET 4 FOR PLAN VIEW

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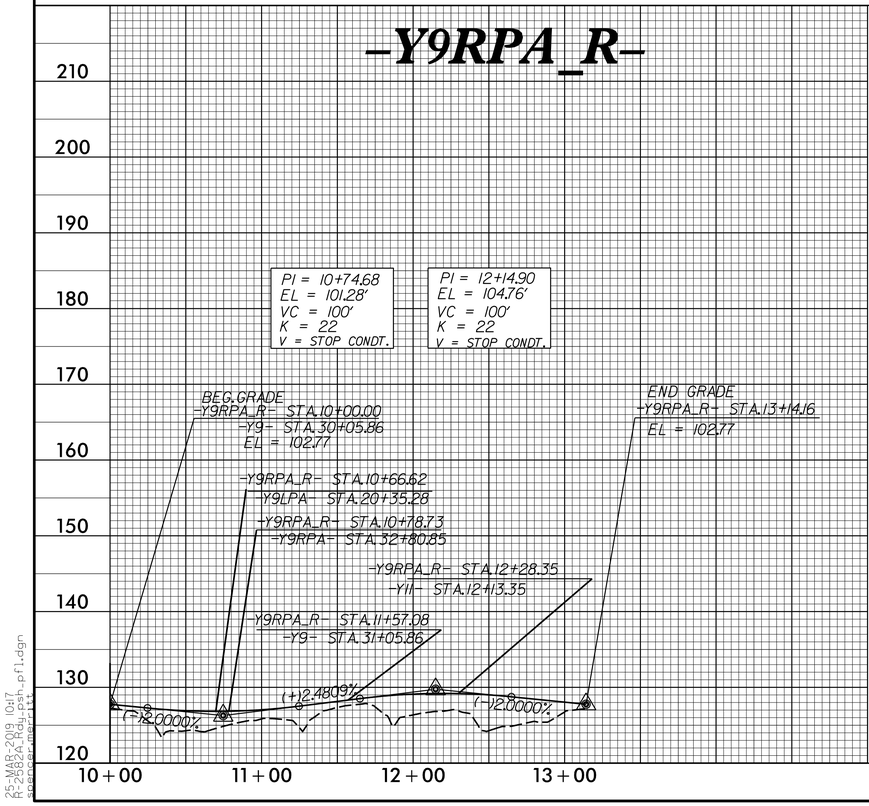

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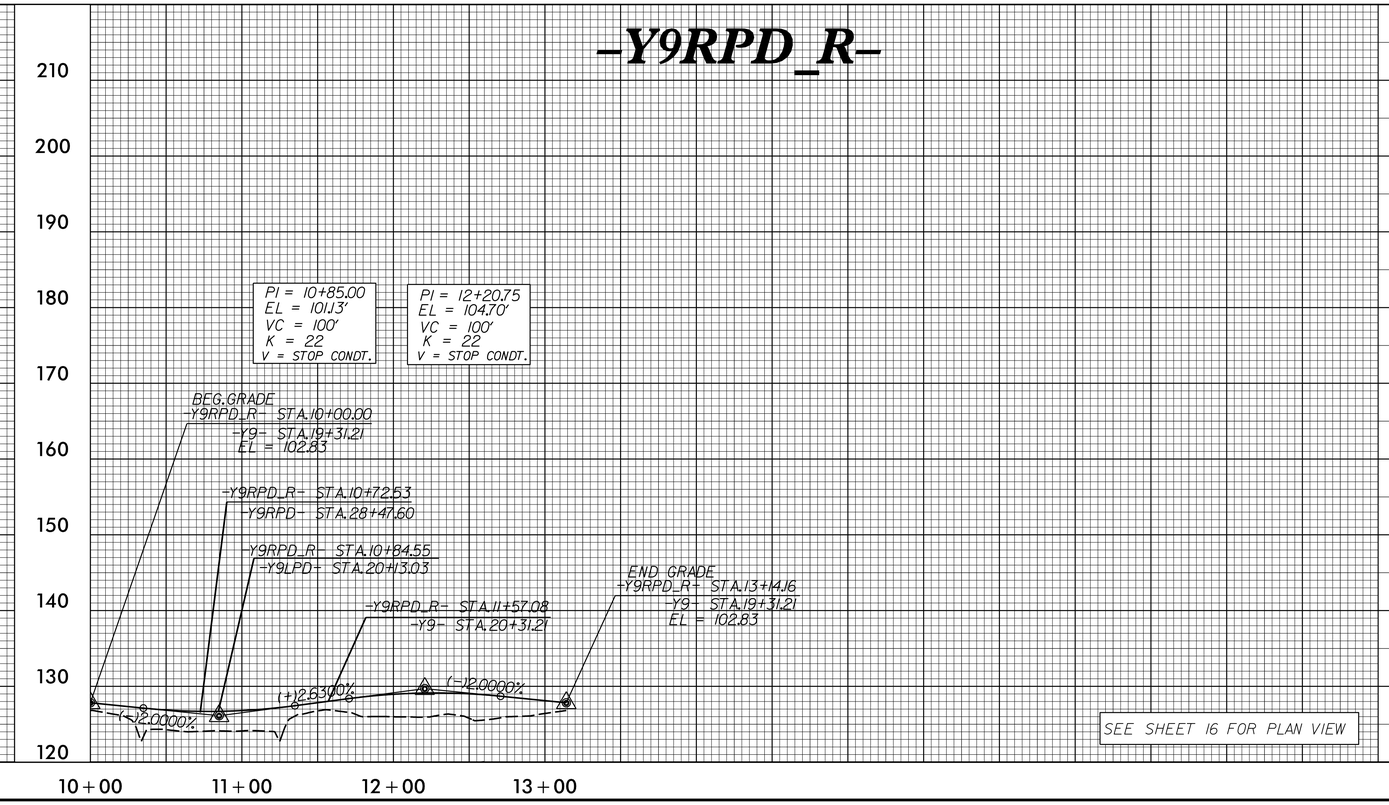

SEE SHEET 16 FOR PLAN VIEW

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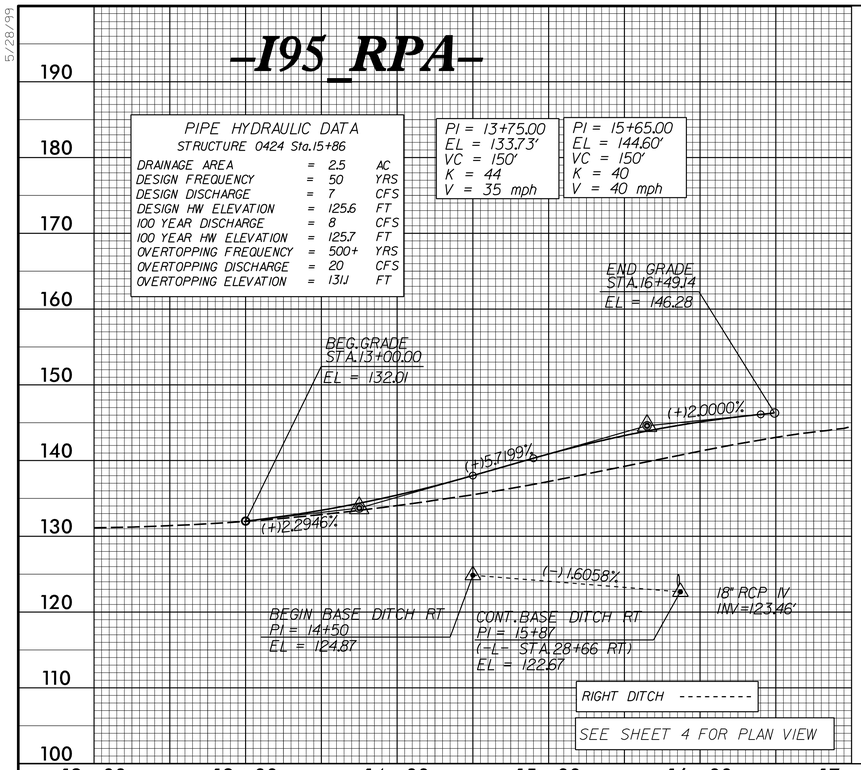

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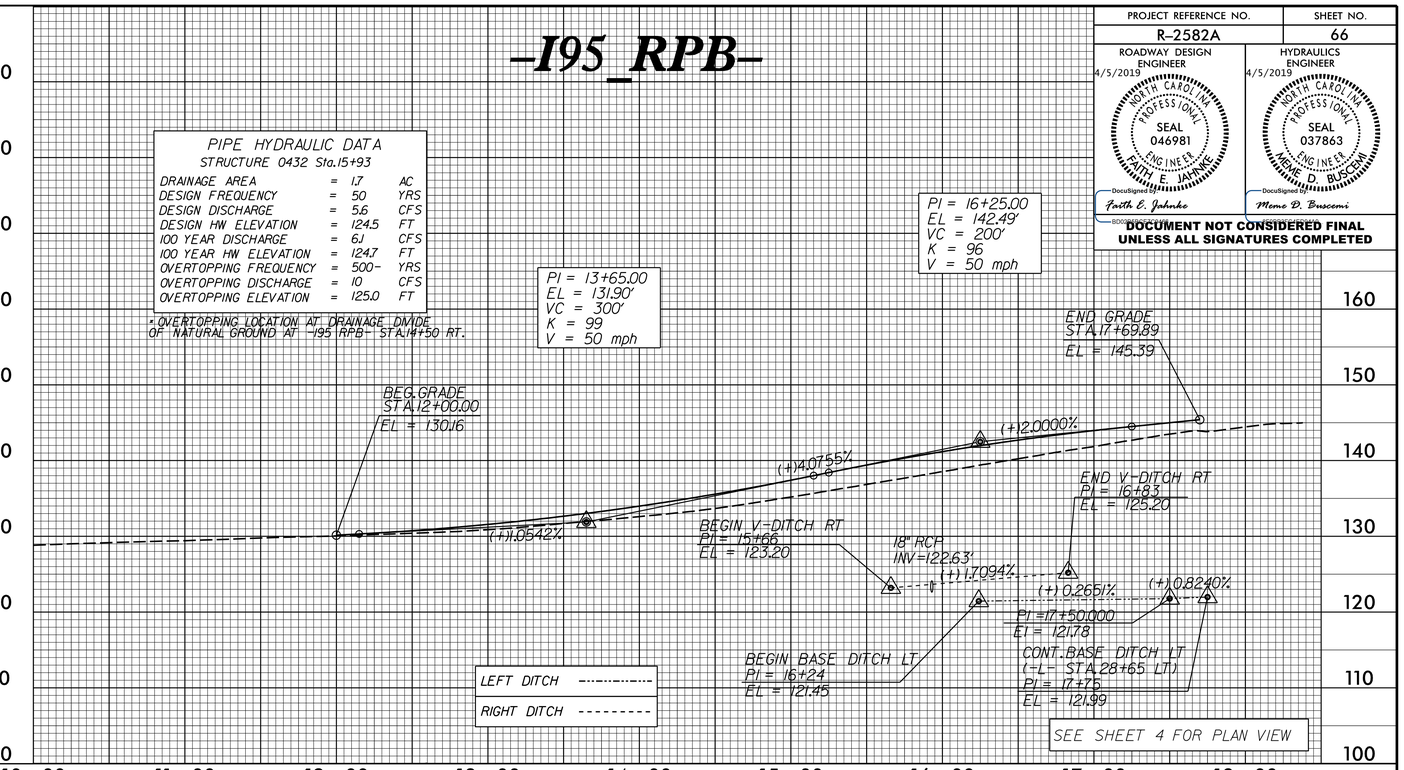

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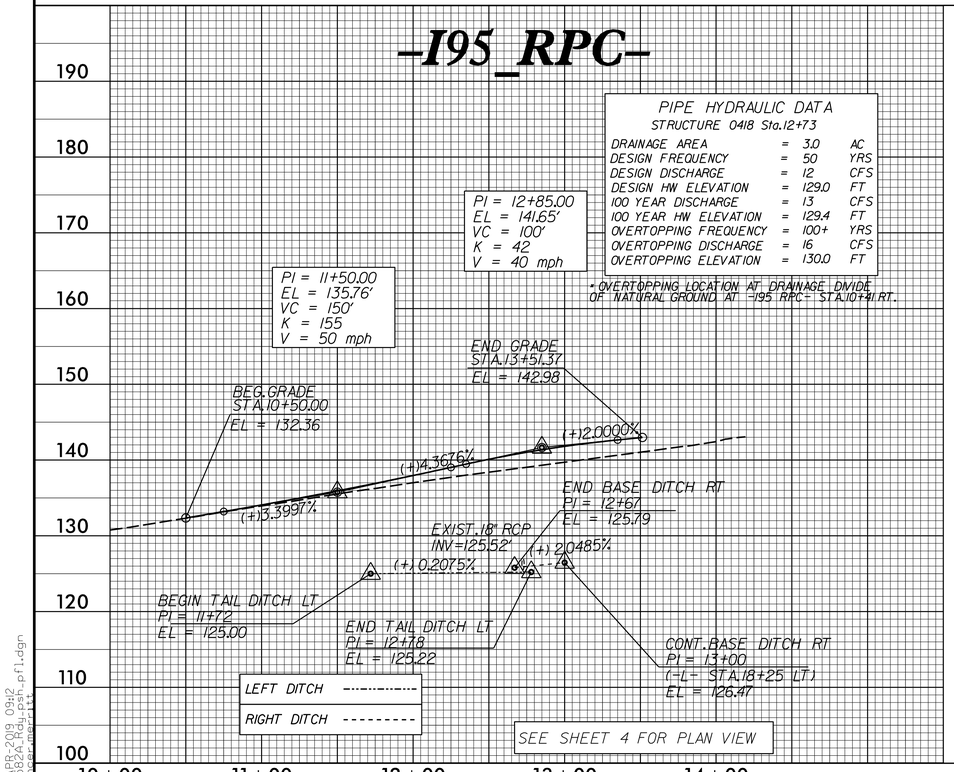

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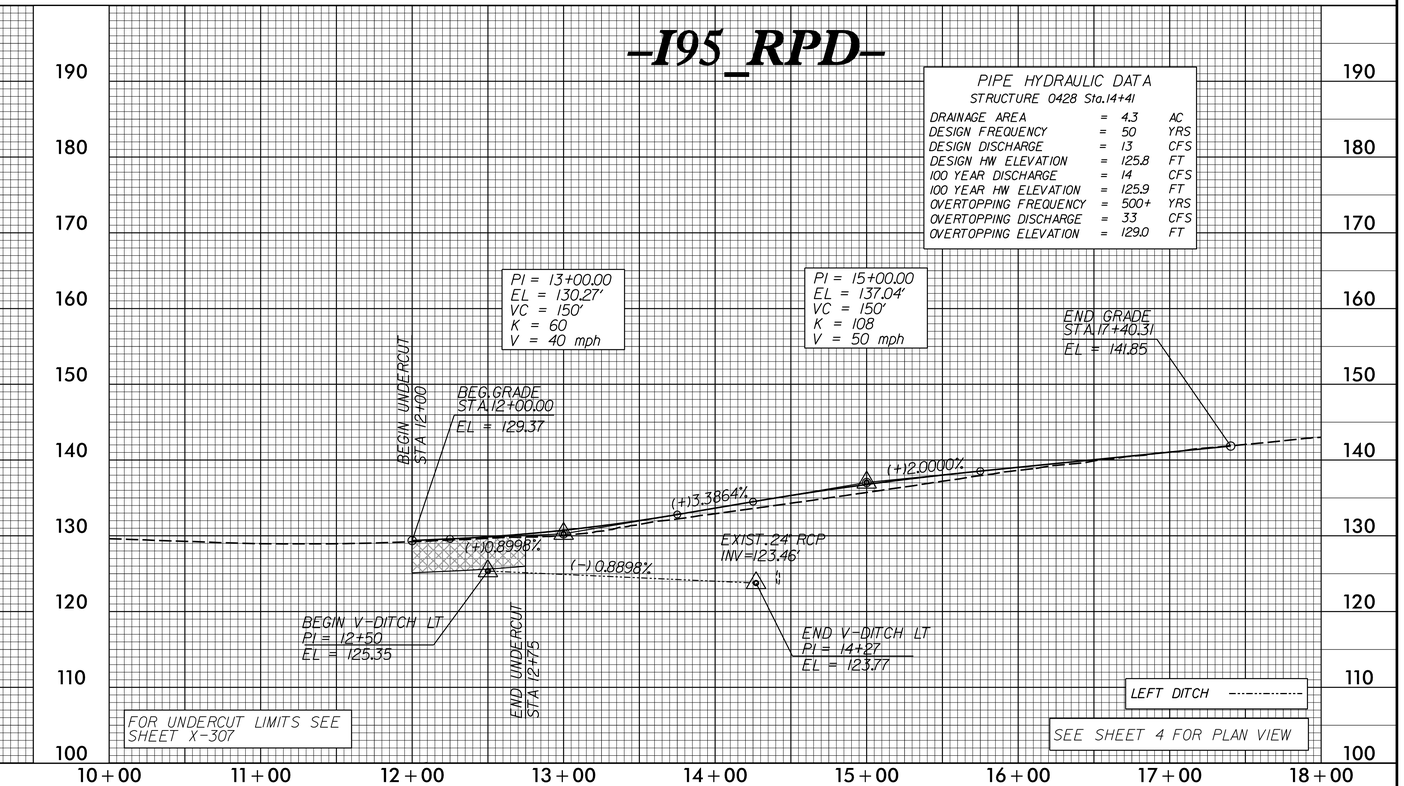

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NORTH CAROLINA PROFESSIONAL SEAL 046981 ENGINEER FAITH E. JAHNKE
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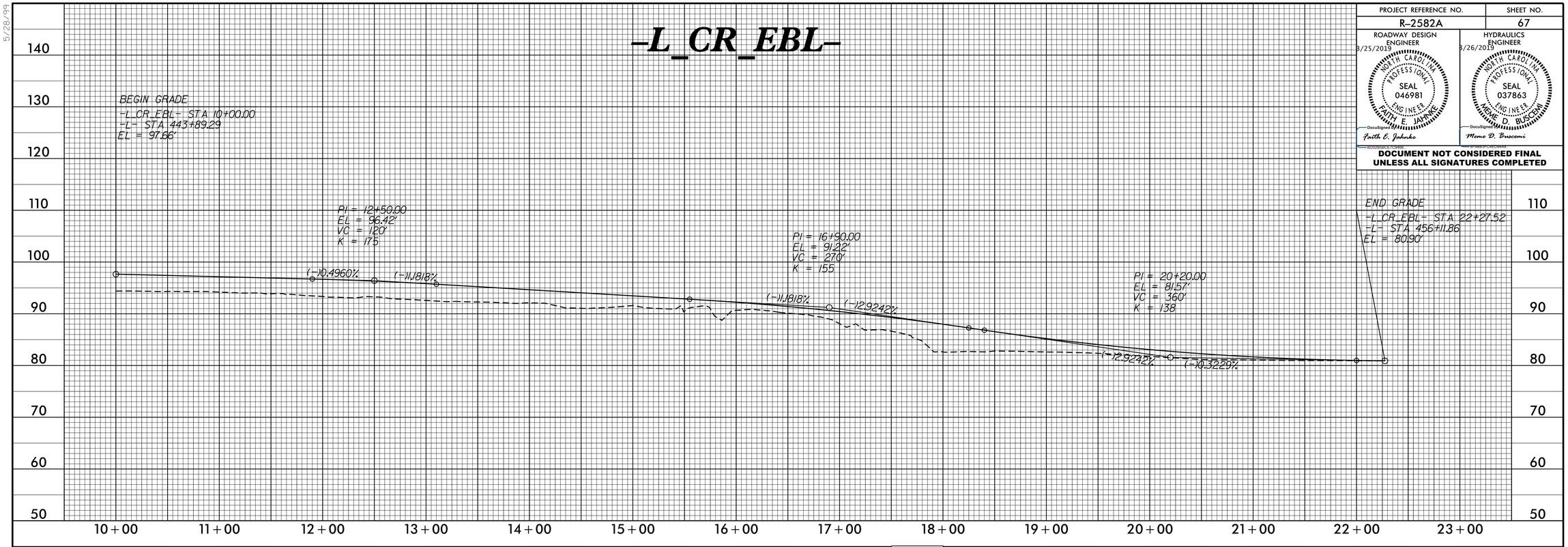

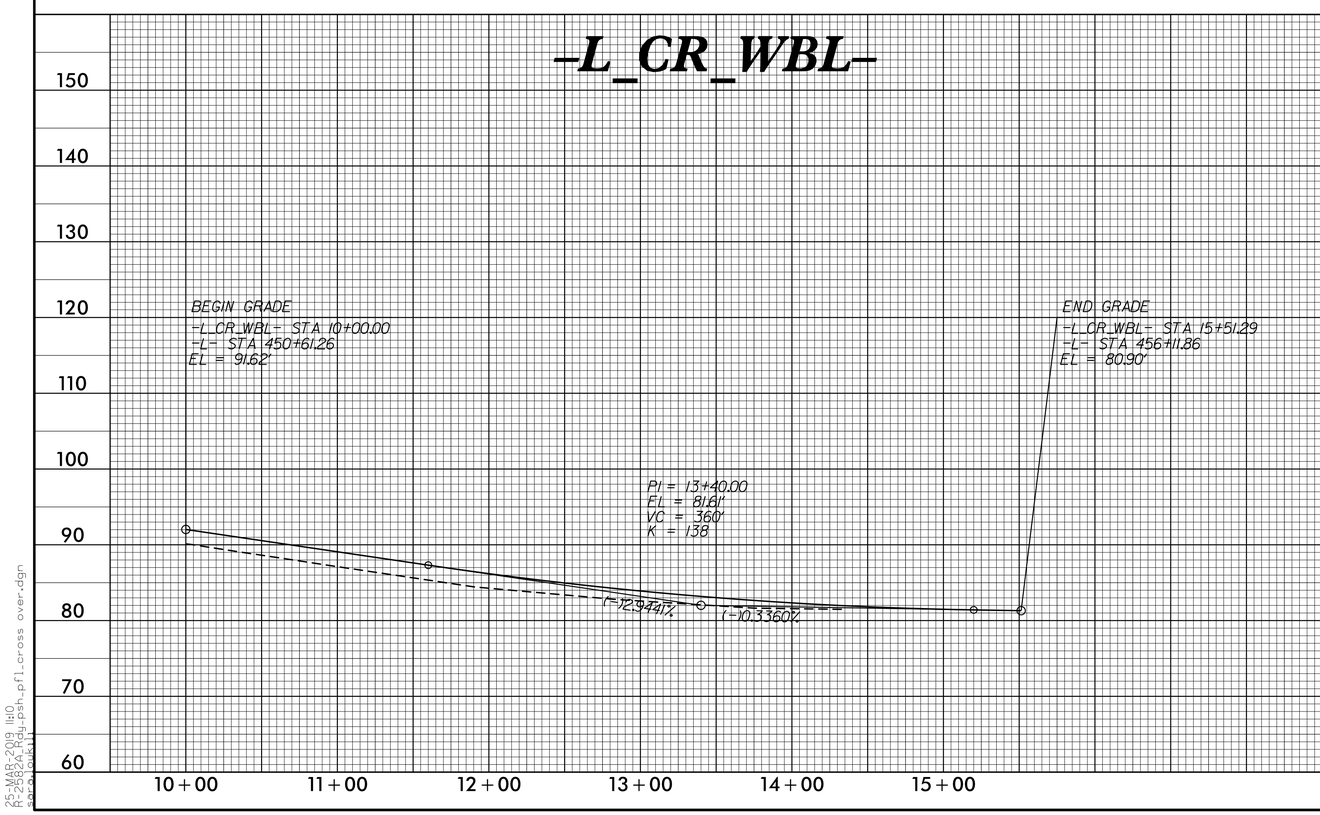

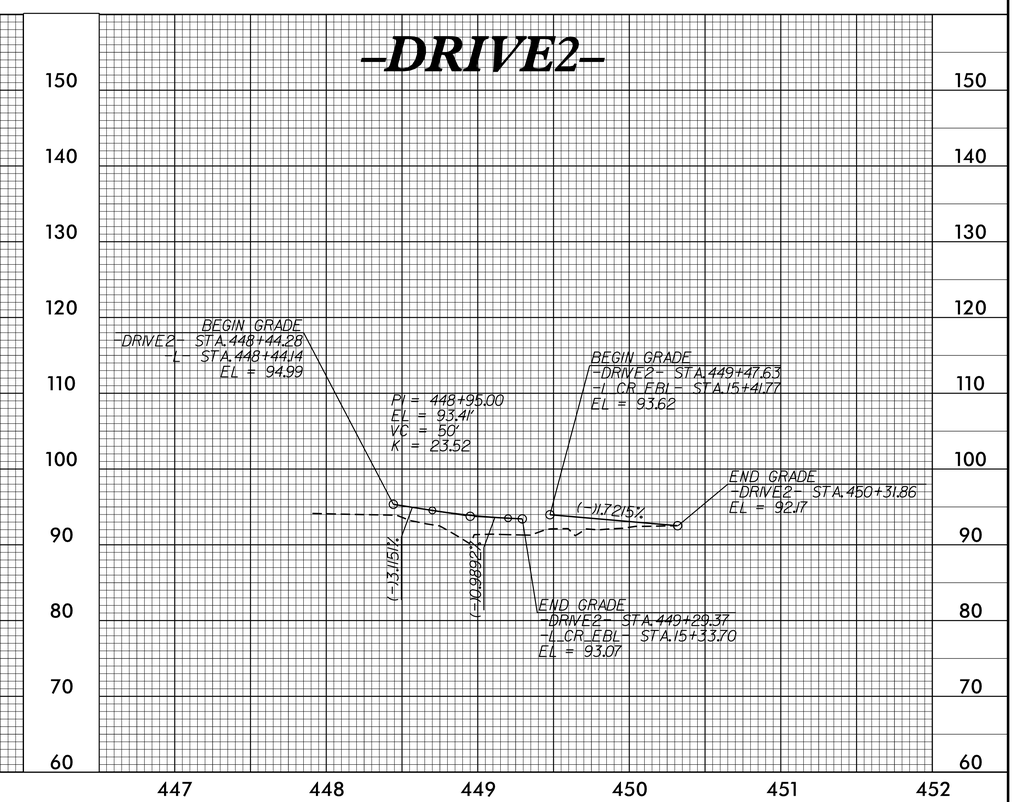

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