

5/14/09
12/22/02
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12/22/02

★ UPDATE EXISTING SIGNAL ROW STATION & OFFSET LABELS REFERENCED FROM -L- UNLESS NOTED OTHERWISE DRIVEWAY RADII ARE 10' UNLESS NOTED OTHERWISE SEE SHEET 2B-1 FOR HORIZONTAL CURVE DATA SEE SHEET 2B-12 FOR INTERSECTION DETAILS SEE SHEETS 2D-1 & 2D-2 FOR DRAINAGE DITCH DETAILS SEE SHEET 50 FOR -Y19- PROFILE SEE SHEET 52 FOR -Y20- PROFILE SEE SHEET 62 FOR -Y32- PROFILE SEE SHEET 66 FOR -Y40- PROFILE SEE SHEET 67 FOR -Y41- PROFILE SEE SHEET 67 FOR -Y42- PROFILE



2400 WYCLIFF ROAD
SUITE 410
RALEIGH, NC 27607
PHONE: 919.881.9939
NC COA No. F-0029

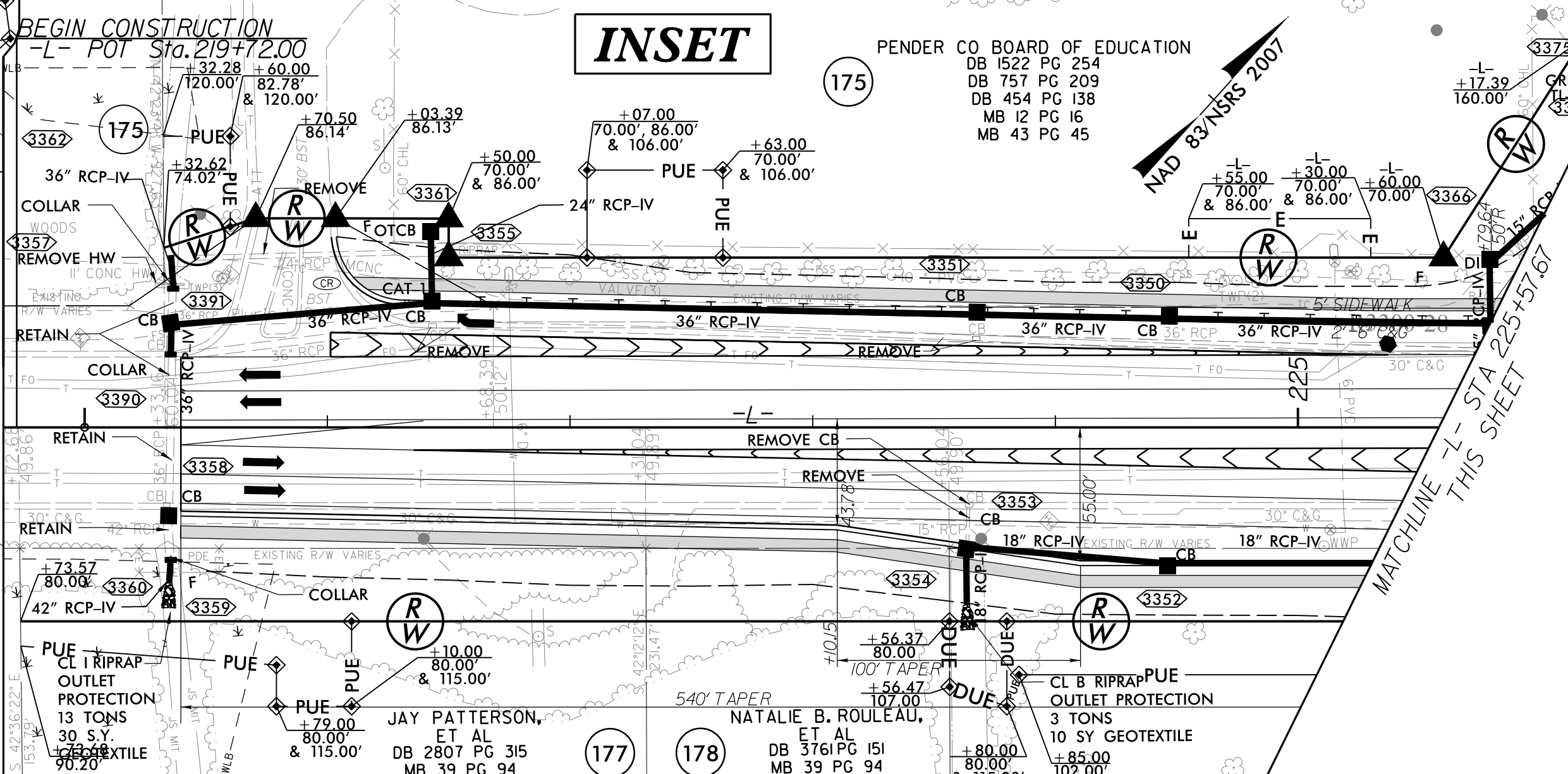
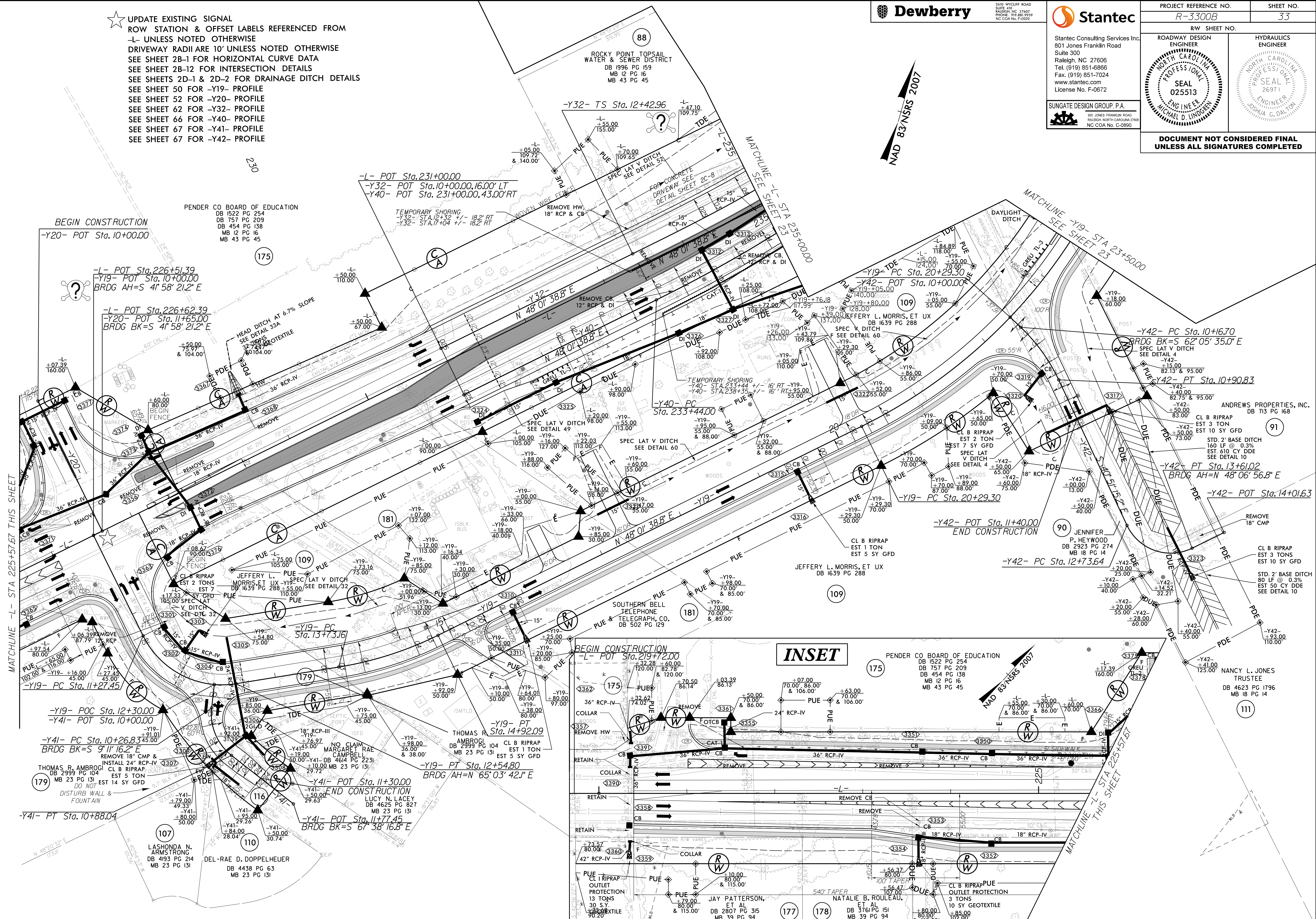


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RALEIGH, NORTH CAROLINA 27606
NC COA No. C-0890

PROJECT REFERENCE NO. R-3300B	SHEET NO. 33
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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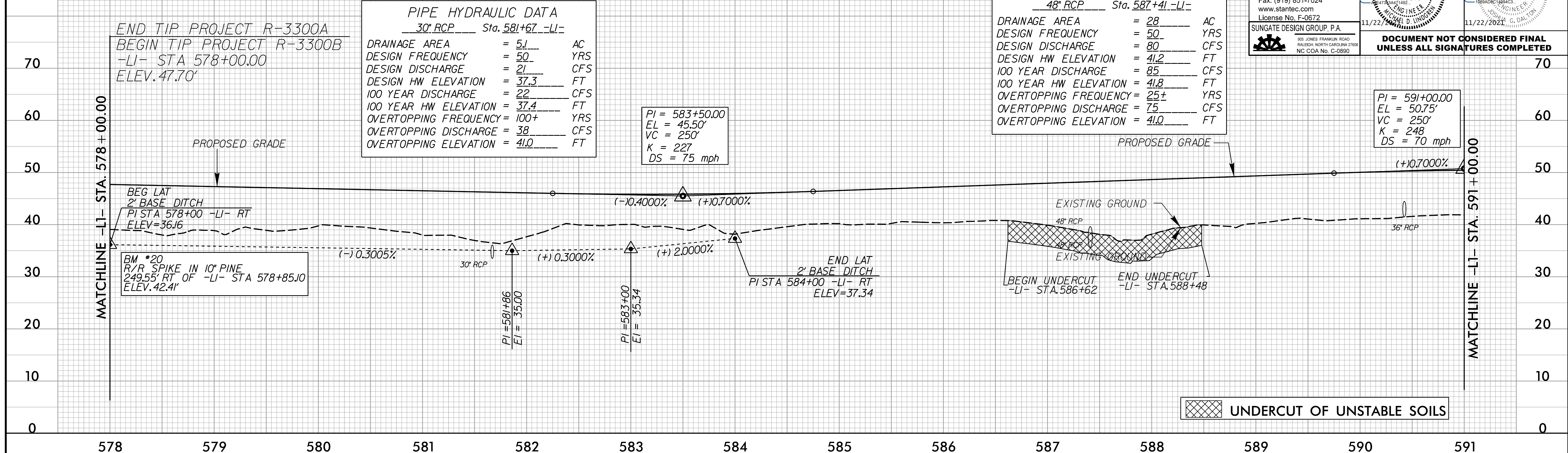
5/28/2021

-L1-

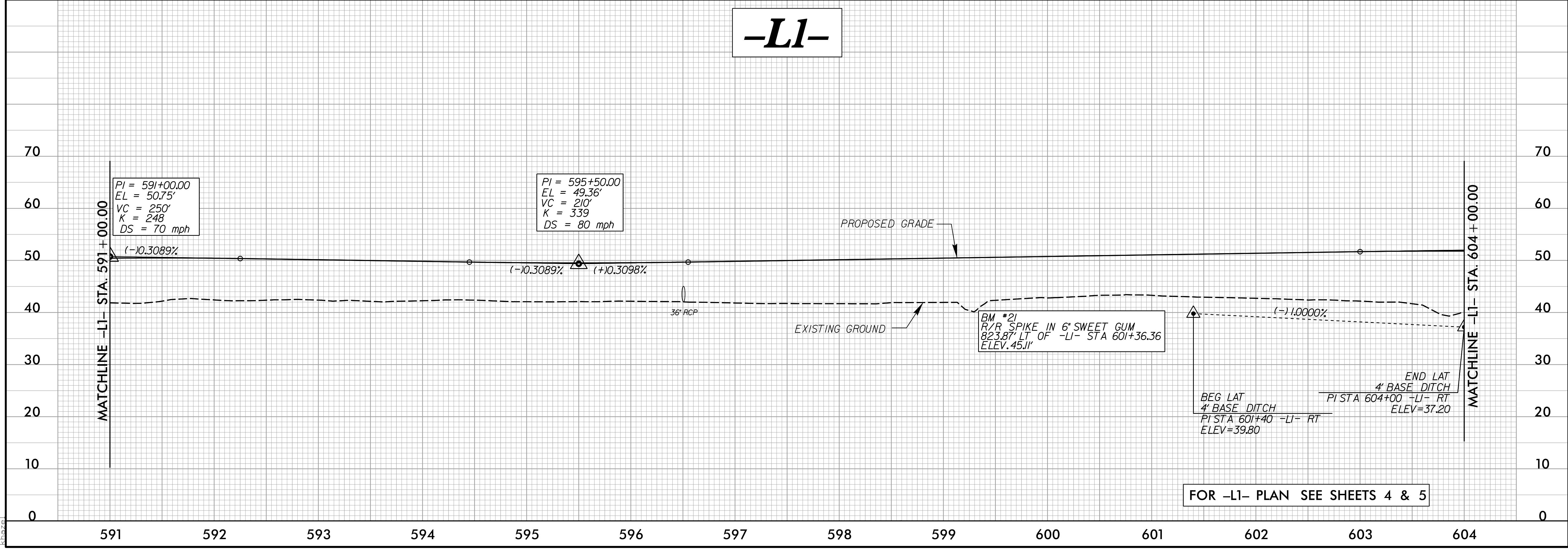
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PROJECT REFERENCE NO. R-3300B	SHEET NO. 34
ROADWAY DESIGN ENGINEER Jesse G. Dalton	HYDRAULICS ENGINEER Jesse G. Dalton
11/22/2021	11/22/2021

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PROJECT REFERENCE NO. <i>R-3300B</i>	SHEET NO. 35
ROADWAY DESIGN ENGINEER <i>John G. Dalton</i>	HYDRAULICS ENGINEER <i>John G. Dalton</i>
11/22/2021	11/22/2021

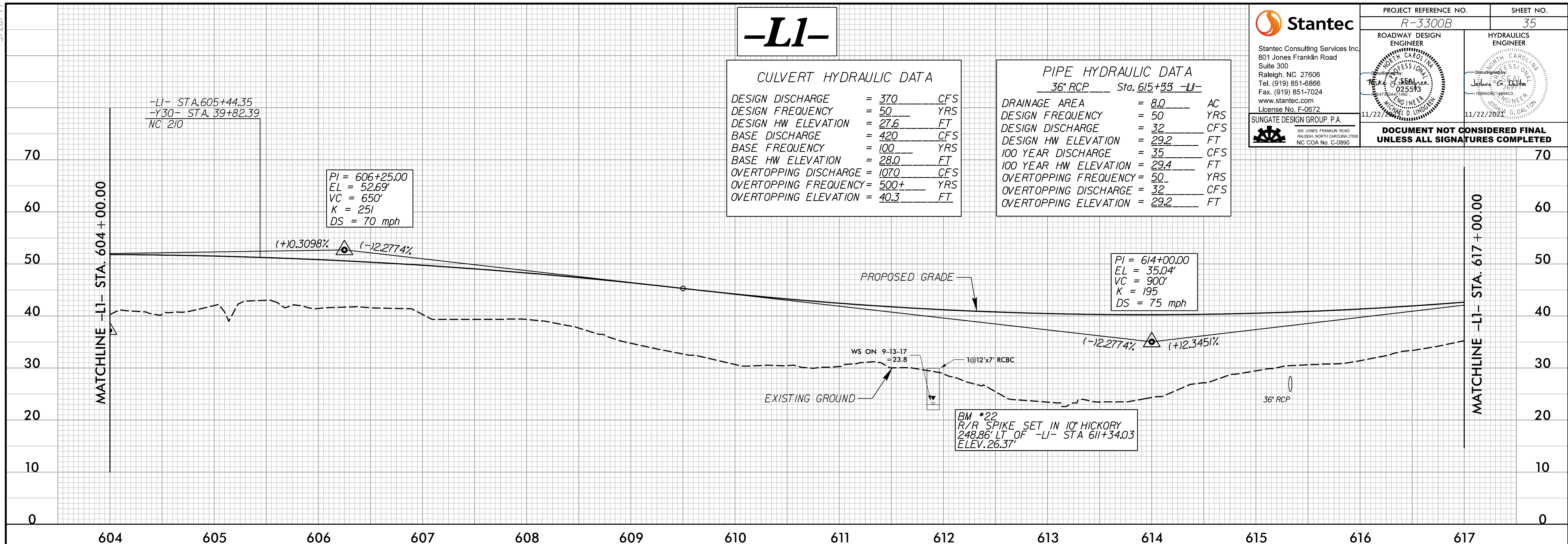
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CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 370	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 27.6	FT
BASE DISCHARGE	= 420	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 28.0	FT
OVERTOPPING DISCHARGE	= 1070	CFS
OVERTOPPING FREQUENCY	= 500+	YRS
OVERTOPPING ELEVATION	= 40.3	FT

PIPE HYDRAULIC DATA
36" RCP Sta. 615+55 -L1-

DRAINAGE AREA	= 8.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 32	CFS
DESIGN HW ELEVATION	= 29.2	FT
100 YEAR DISCHARGE	= 35	CFS
100 YEAR HW ELEVATION	= 29.4	FT
OVERTOPPING FREQUENCY	= 50	YRS
OVERTOPPING DISCHARGE	= 32	CFS
OVERTOPPING ELEVATION	= 29.2	FT

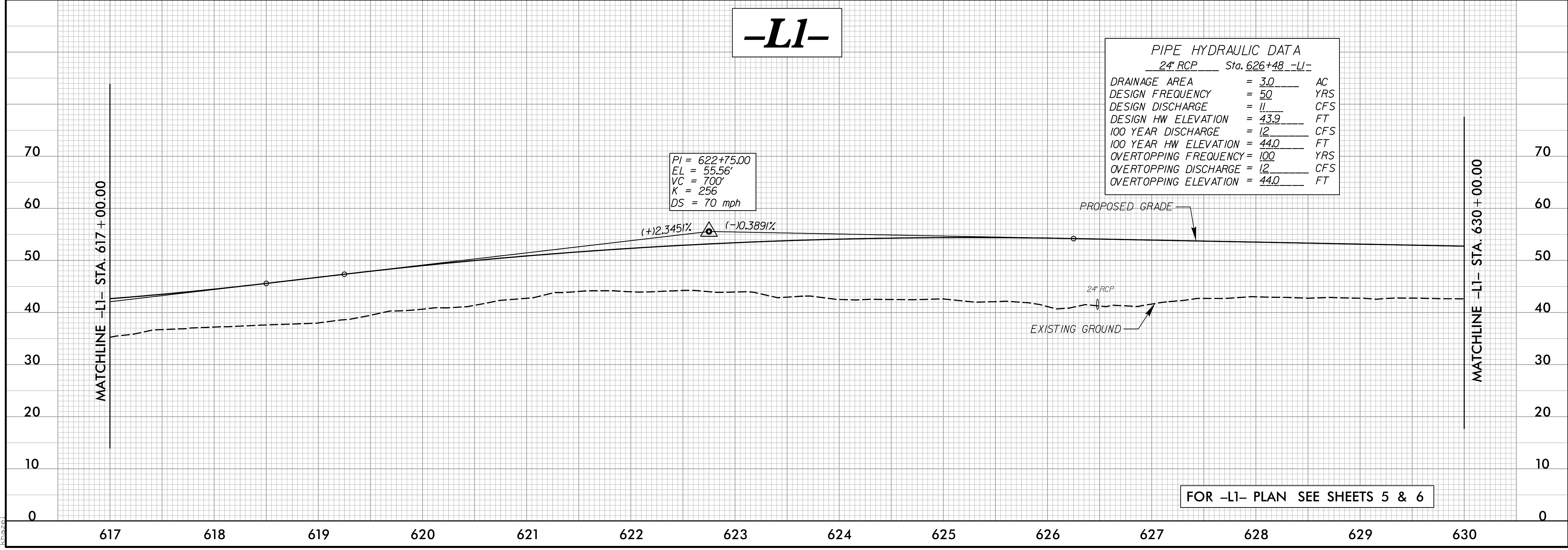


-L1-

PIPE HYDRAULIC DATA
24" RCP Sta. 626+48 -L1-

DRAINAGE AREA	= 3.0	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 11	CFS
DESIGN HW ELEVATION	= 43.9	FT
100 YEAR DISCHARGE	= 12	CFS
100 YEAR HW ELEVATION	= 44.0	FT
OVERTOPPING FREQUENCY	= 100	YRS
OVERTOPPING DISCHARGE	= 12	CFS
OVERTOPPING ELEVATION	= 44.0	FT

PI = 622+75.00
EL = 55.56'
VC = 700'
K = 256
DS = 70 mph



FOR -L1- PLAN SEE SHEETS 5 & 6

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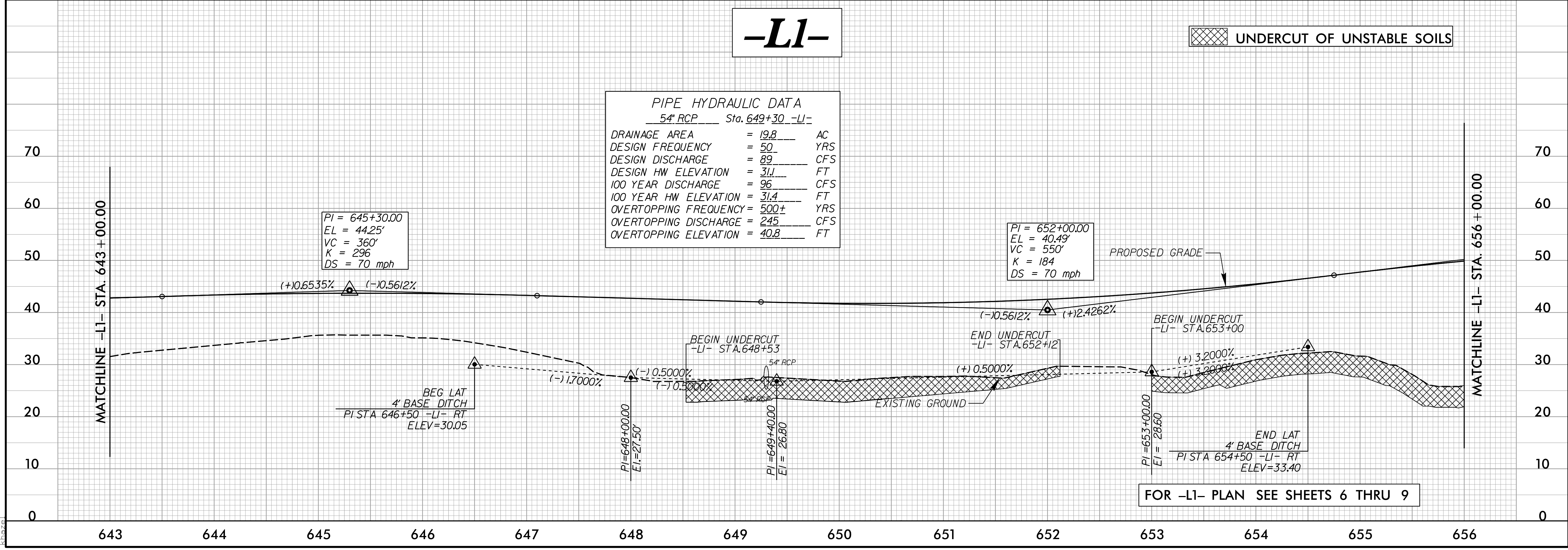
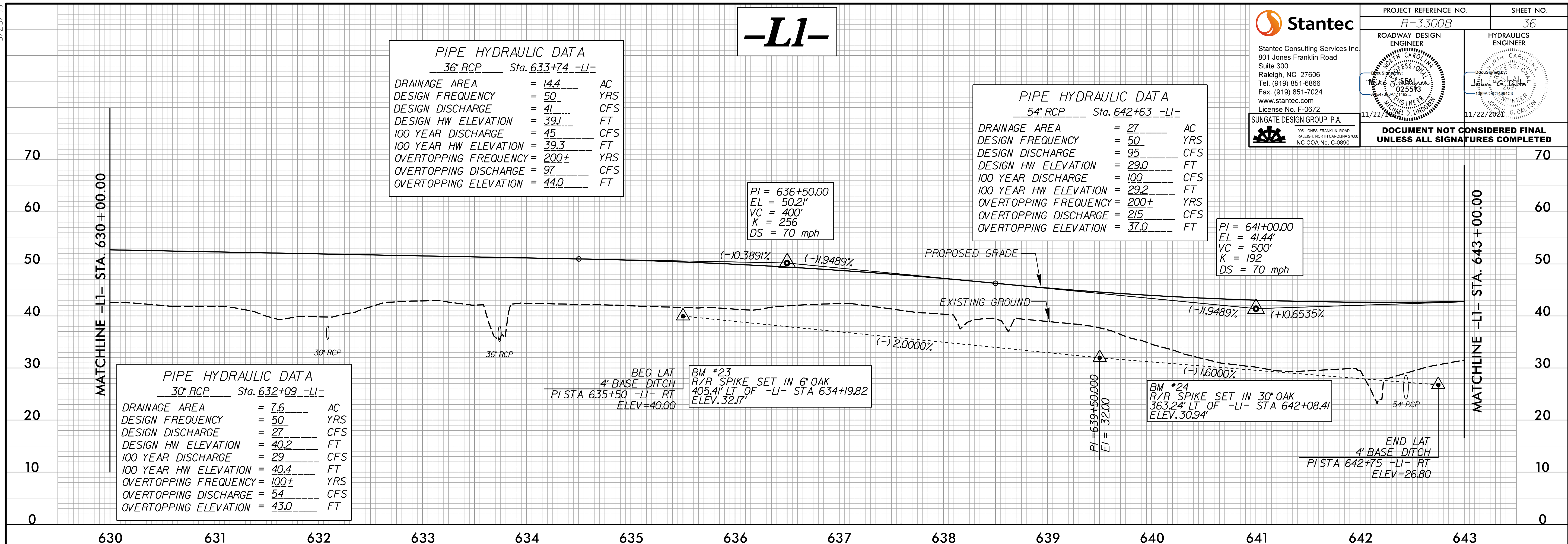
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PROJECT REFERENCE NO. **R-3300B**
 SHEET NO. **36**

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 SUNGATE DESIGN GROUP, P.A.
 905 JONES FRANKLIN ROAD
 RALEIGH, NORTH CAROLINA 27606
 NC COA No. C-0890

HYDRAULICS ENGINEER
 JAMES G. DALTON
 11/22/2021

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PROJECT REFERENCE NO. **R-3300B**
 SHEET NO. **37**

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HYDRAULICS ENGINEER
 SUNGATE DESIGN GROUP, P.A.
 905 JONES FRANKLIN ROAD
 RALEIGH, NORTH CAROLINA 27606
 NC COA No. C-0890

11/22/2018 11/22/2018

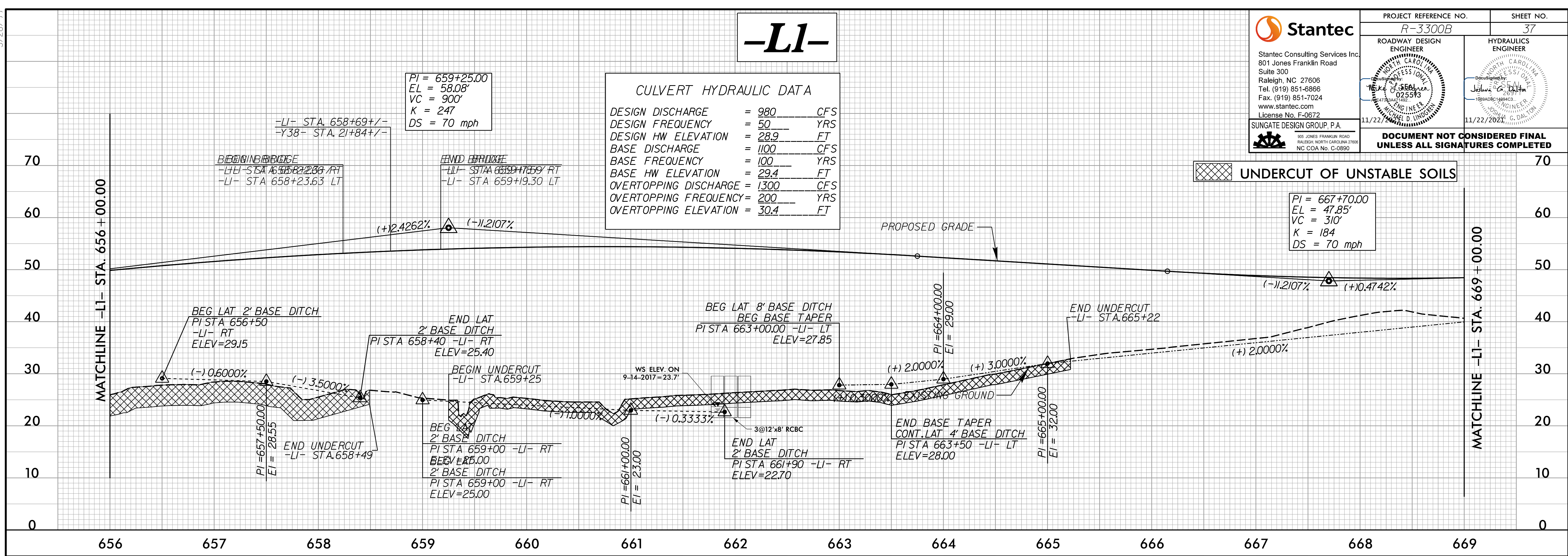
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PI = 659+25.00
 EL = 58.08'
 VC = 900'
 K = 247
 DS = 70 mph

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE = 980 CFS
 DESIGN FREQUENCY = 50 YRS
 DESIGN HW ELEVATION = 28.9 FT
 BASE DISCHARGE = 1100 CFS
 BASE FREQUENCY = 100 YRS
 BASE HW ELEVATION = 29.4 FT
 OVERTOPPING DISCHARGE = 1300 CFS
 OVERTOPPING FREQUENCY = 200 YRS
 OVERTOPPING ELEVATION = 30.4 FT

PI = 667+70.00
 EL = 47.85'
 VC = 310'
 K = 184
 DS = 70 mph



-LI-

PIPE HYDRAULIC DATA
 30" RCP Sta. 672+28 -LI-

DRAINAGE AREA = 6.1 AC
 DESIGN FREQUENCY = 50 YRS
 DESIGN DISCHARGE = 27 CFS
 DESIGN HW ELEVATION = 44.7 FT
 100 YEAR DISCHARGE = 29 CFS
 100 YEAR HW ELEVATION = 44.9 FT
 OVERTOPPING FREQUENCY = 500 YRS
 OVERTOPPING DISCHARGE = 35 CFS
 OVERTOPPING ELEVATION = 45.5 FT

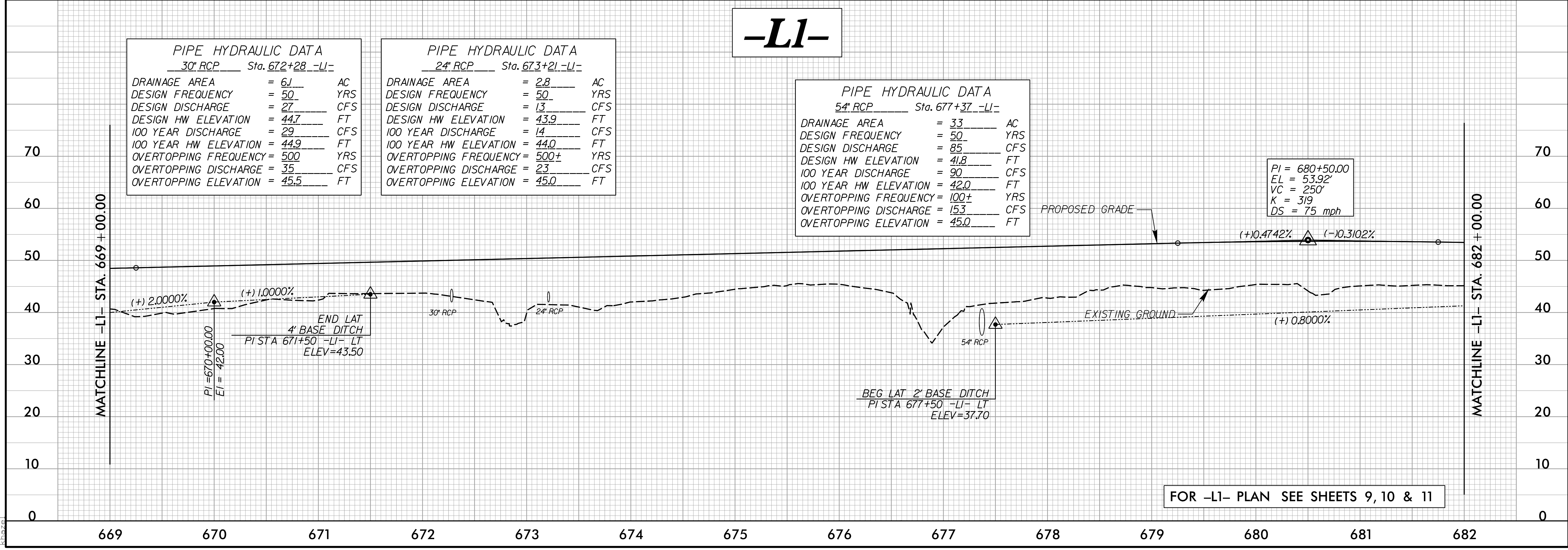
PIPE HYDRAULIC DATA
 24" RCP Sta. 673+21 -LI-

DRAINAGE AREA = 2.8 AC
 DESIGN FREQUENCY = 50 YRS
 DESIGN DISCHARGE = 13 CFS
 DESIGN HW ELEVATION = 43.9 FT
 100 YEAR DISCHARGE = 14 CFS
 100 YEAR HW ELEVATION = 44.0 FT
 OVERTOPPING FREQUENCY = 500± YRS
 OVERTOPPING DISCHARGE = 23 CFS
 OVERTOPPING ELEVATION = 45.0 FT

PIPE HYDRAULIC DATA
 54" RCP Sta. 677+37 -LI-

DRAINAGE AREA = 33 AC
 DESIGN FREQUENCY = 50 YRS
 DESIGN DISCHARGE = 85 CFS
 DESIGN HW ELEVATION = 41.8 FT
 100 YEAR DISCHARGE = 90 CFS
 100 YEAR HW ELEVATION = 42.0 FT
 OVERTOPPING FREQUENCY = 100± YRS
 OVERTOPPING DISCHARGE = 153 CFS
 OVERTOPPING ELEVATION = 45.0 FT

PI = 680+50.00
 EL = 53.92'
 VC = 250'
 K = 319
 DS = 75 mph



FOR -LI- PLAN SEE SHEETS 9, 10 & 11

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-L1-

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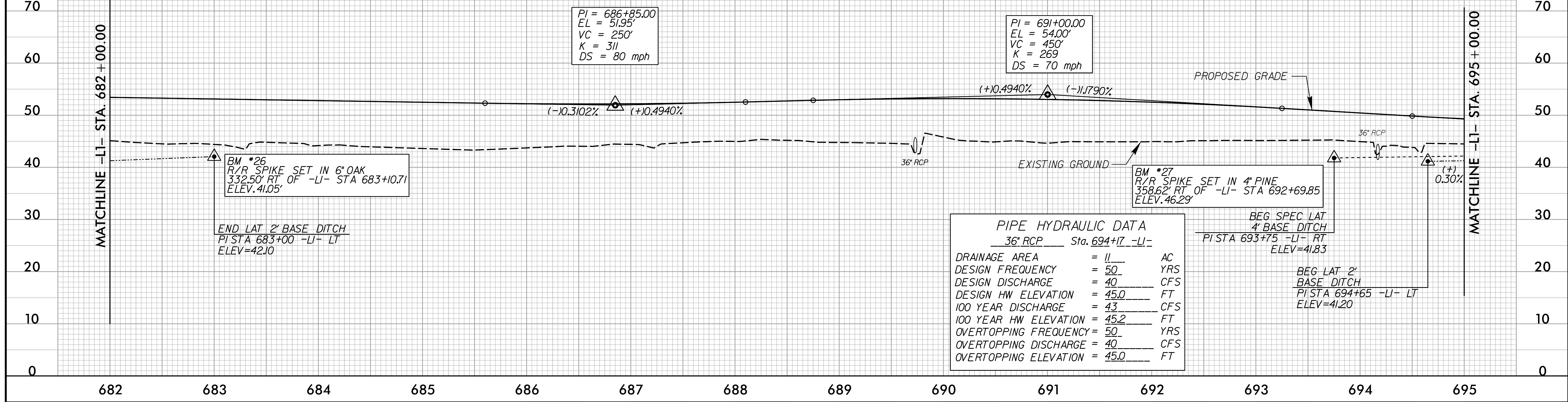
PROJECT REFERENCE NO. **R-3300B**
 SHEET NO. **38**

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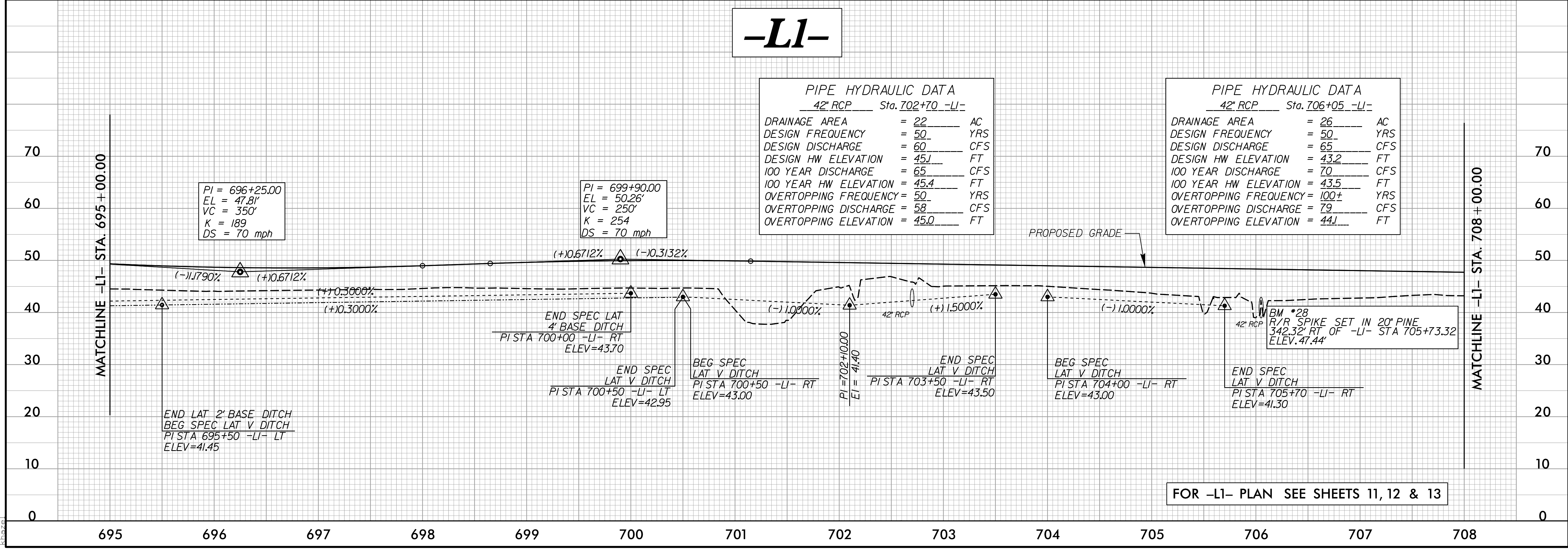
HYDRAULICS ENGINEER
 SUNGATE DESIGN GROUP, P.A.
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 NC COA No. C-0890

11/22/2020

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-L1-



FOR -L1- PLAN SEE SHEETS 11, 12 & 13

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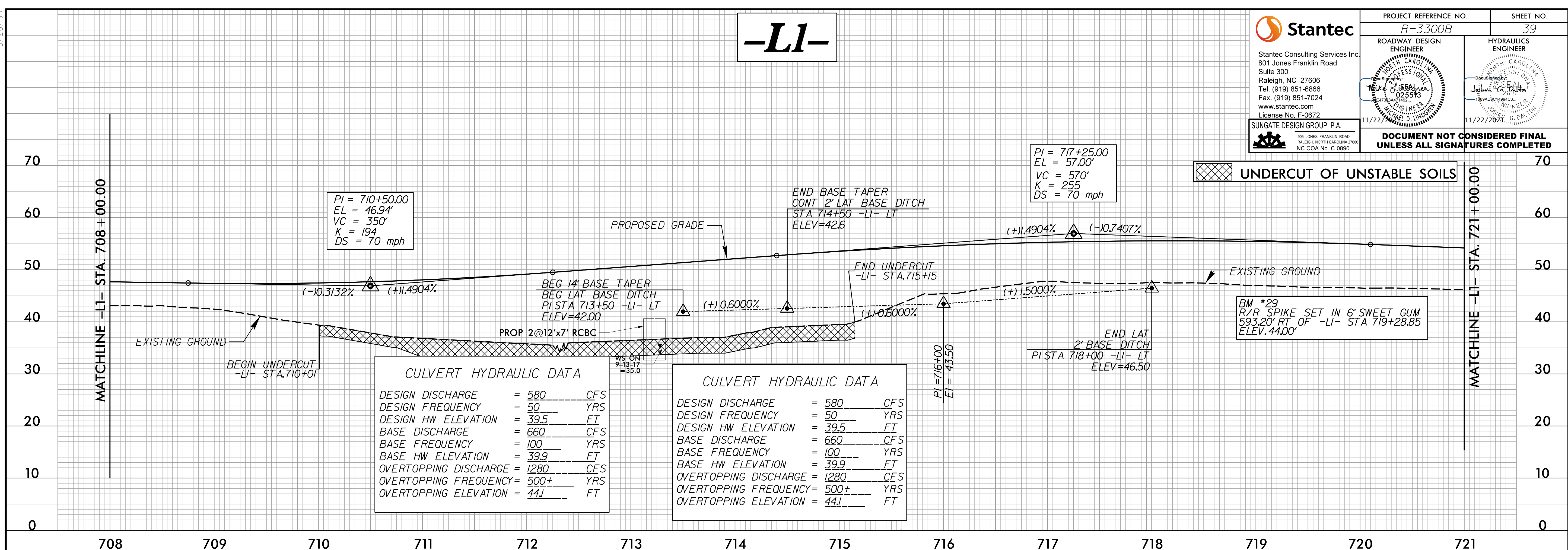
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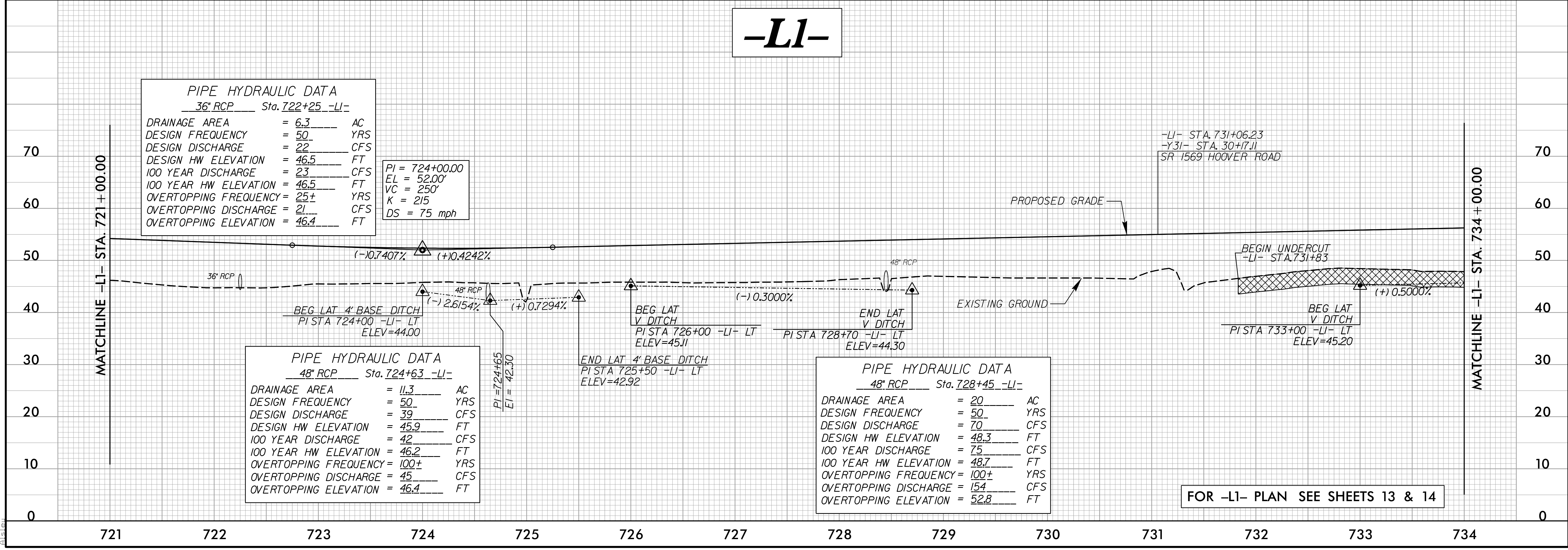
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PROJECT REFERENCE NO. R-3300B	SHEET NO. 39
ROADWAY DESIGN ENGINEER Jesse G. Dalton 11/22/2021	HYDRAULICS ENGINEER Jesse G. Dalton 11/22/2021

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-L1-



FOR -L1- PLAN SEE SHEETS 13 & 14

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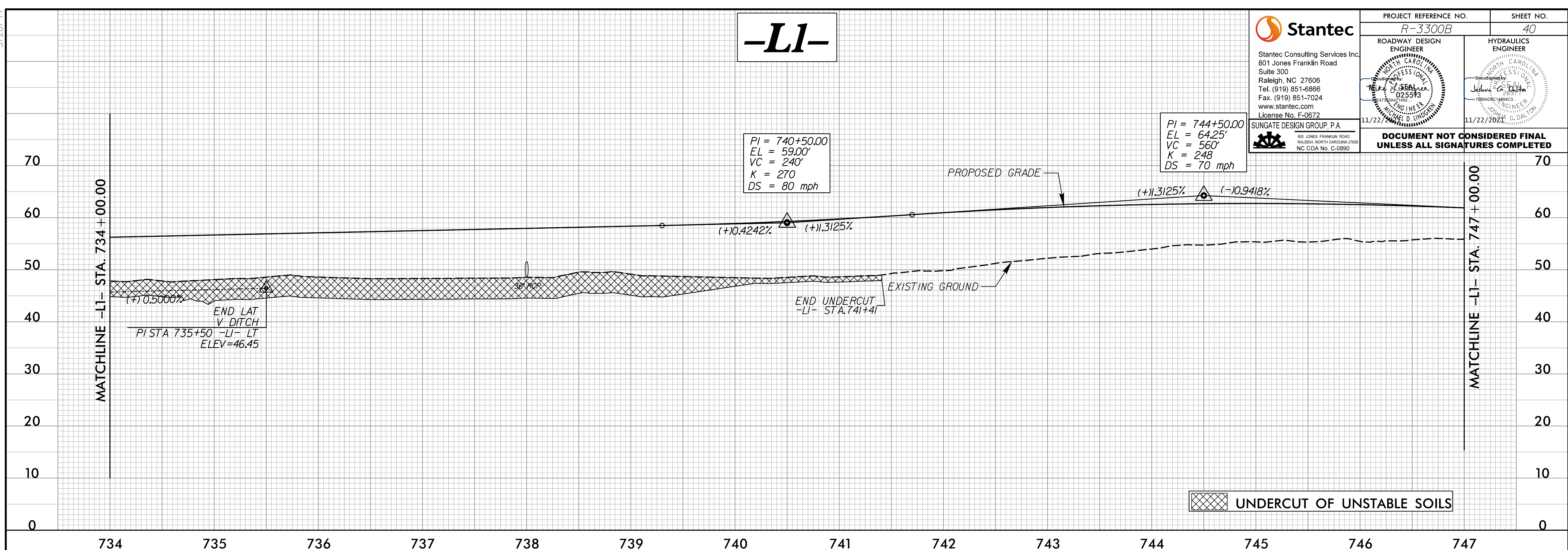
PROJECT REFERENCE NO. R-3300B	SHEET NO. 40
ROADWAY DESIGN ENGINEER Y. K. STELLER 025513 11/22/2021	HYDRAULICS ENGINEER J. G. DALTON 025513 11/22/2021

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NC COA No. C-0890

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PI = 744+50.00
EL = 64.25'
VC = 560'
K = 248
DS = 70 mph

PI = 740+50.00
EL = 59.00'
VC = 240'
K = 270
DS = 80 mph

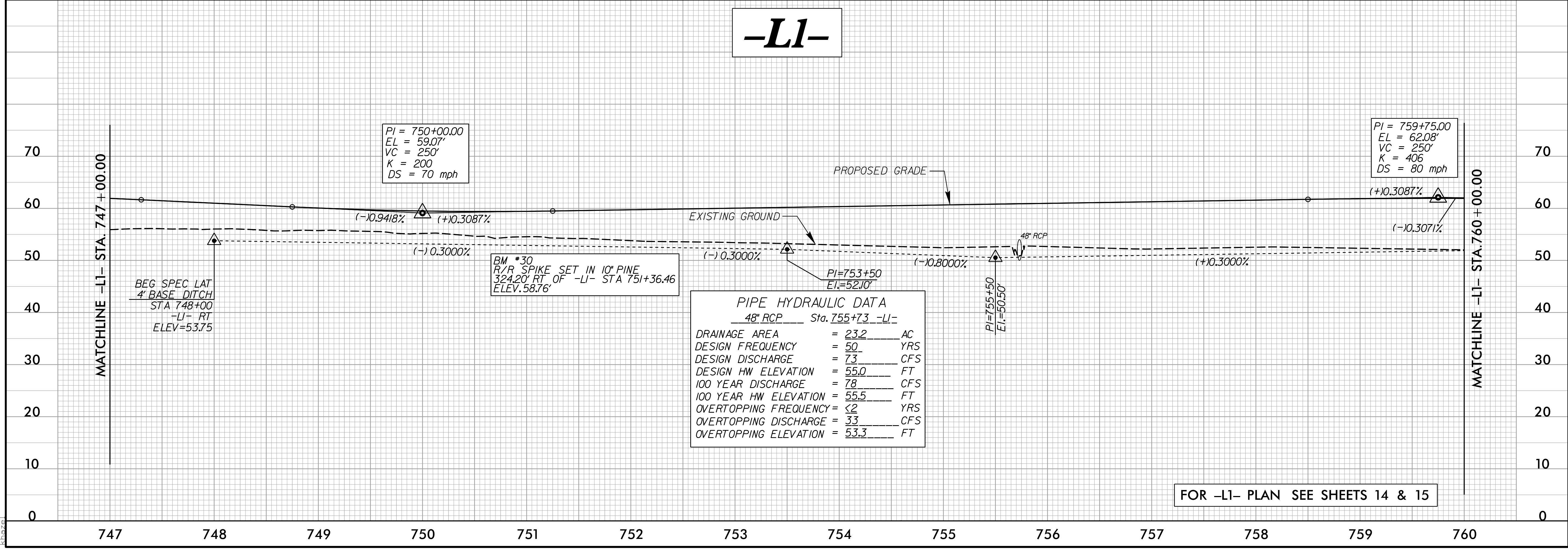


UNDERCUT OF UNSTABLE SOILS

-L1-

PI = 759+75.00
EL = 62.08'
VC = 250'
K = 406
DS = 80 mph

PI = 750+00.00
EL = 59.07'
VC = 250'
K = 200
DS = 70 mph



PIPE HYDRAULIC DATA
48" RCP Sta. 755+73 -L1-

DRAINAGE AREA	= 23.2	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 73	CFS
DESIGN HW ELEVATION	= 55.0	FT
100 YEAR DISCHARGE	= 78	CFS
100 YEAR HW ELEVATION	= 55.5	FT
OVERTOPPING FREQUENCY	= 2	YRS
OVERTOPPING DISCHARGE	= 33	CFS
OVERTOPPING ELEVATION	= 53.3	FT

FOR -L1- PLAN SEE SHEETS 14 & 15

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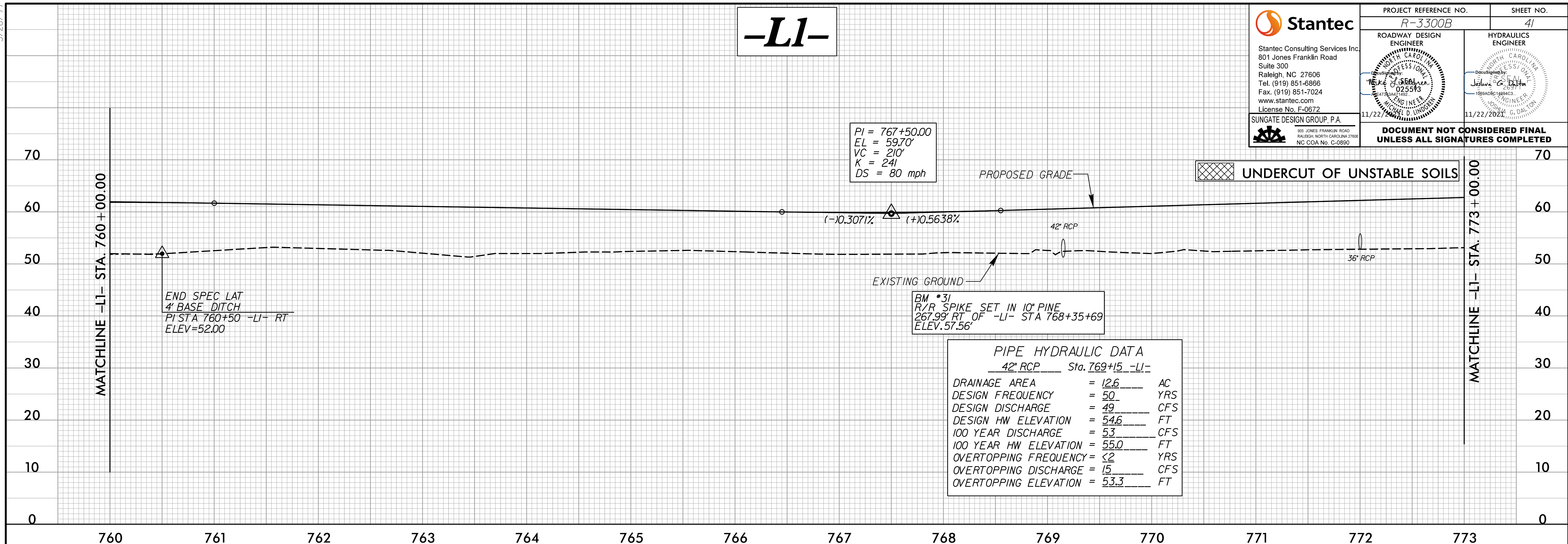
SHEET NO.
41

ROADWAY DESIGN ENGINEER
 (Professional Seal)
 11/22/2021

HYDRAULICS ENGINEER
 (Professional Seal)
 11/22/2021

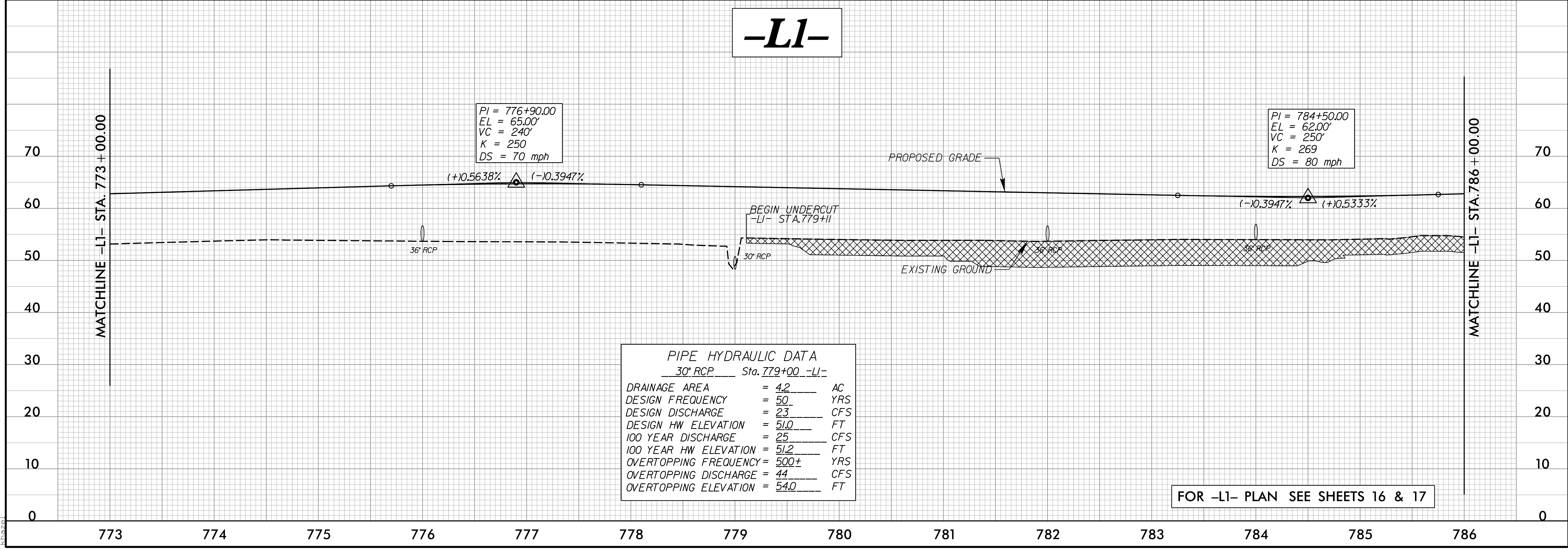
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PIPE HYDRAULIC DATA
 42" RCP Sta. 769+15 -LI-

DRAINAGE AREA	= 12.6	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 49	CFS
DESIGN HW ELEVATION	= 54.6	FT
100 YEAR DISCHARGE	= 53	CFS
100 YEAR HW ELEVATION	= 55.0	FT
OVERTOPPING FREQUENCY	= 2	YRS
OVERTOPPING DISCHARGE	= 15	CFS
OVERTOPPING ELEVATION	= 53.3	FT



PIPE HYDRAULIC DATA
 30" RCP Sta. 779+00 -LI-

DRAINAGE AREA	= 4.2	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 23	CFS
DESIGN HW ELEVATION	= 51.0	FT
100 YEAR DISCHARGE	= 25	CFS
100 YEAR HW ELEVATION	= 51.2	FT
OVERTOPPING FREQUENCY	= 500±	YRS
OVERTOPPING DISCHARGE	= 44	CFS
OVERTOPPING ELEVATION	= 54.0	FT

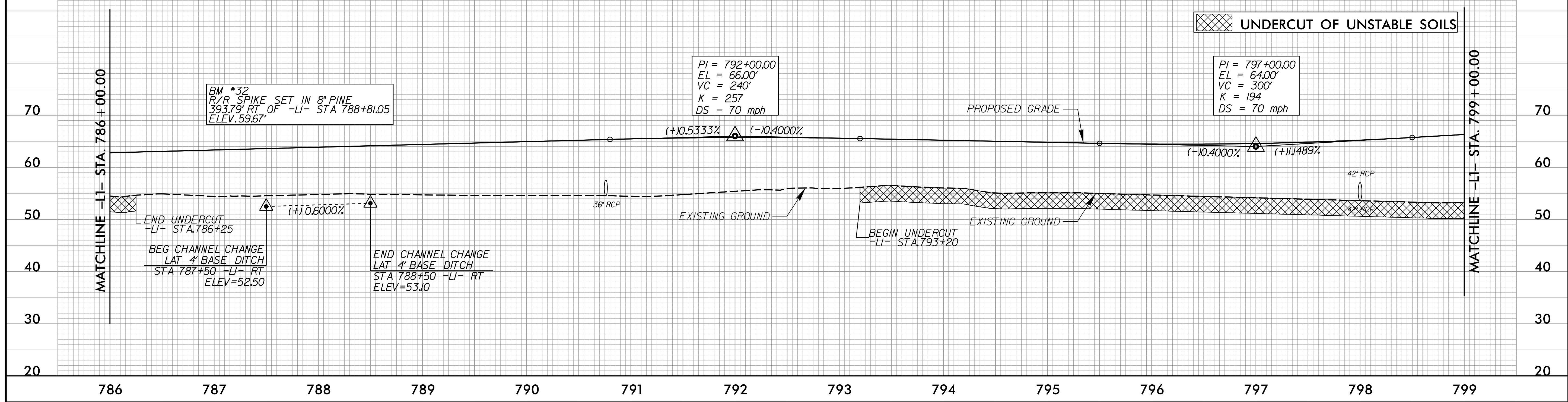
FOR -LI- PLAN SEE SHEETS 16 & 17

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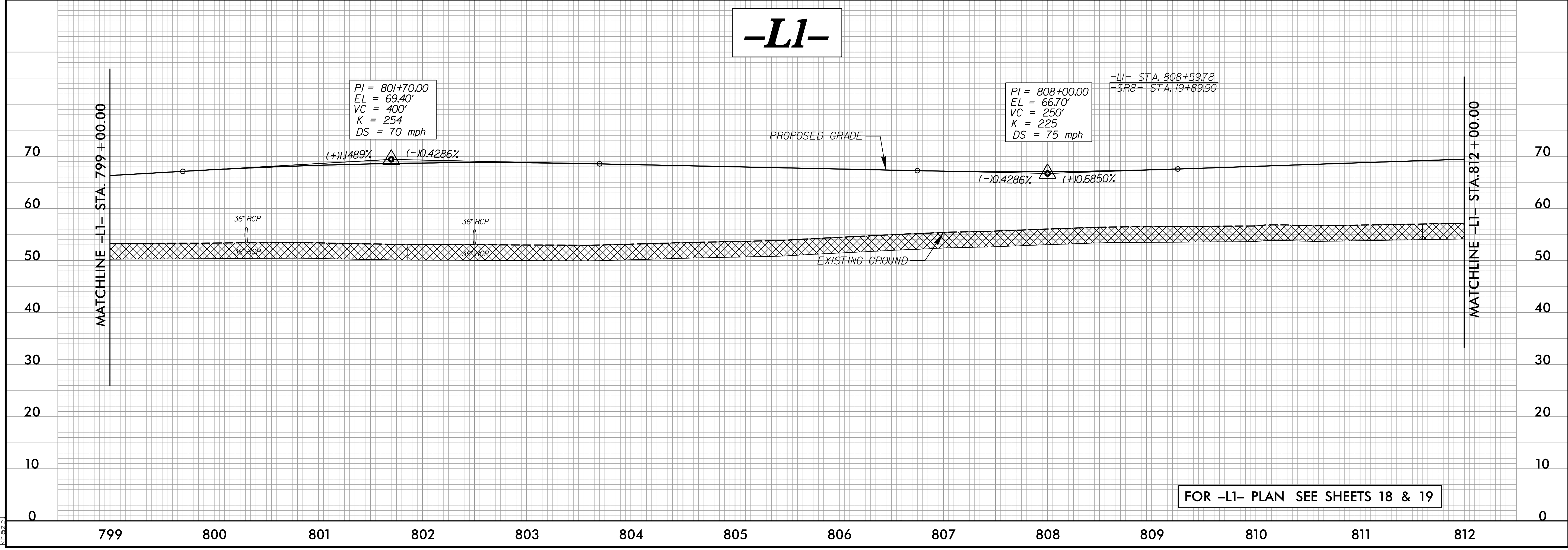
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	ROADWAY DESIGN ENGINEER <i>Y. K. G. DALTON</i>	HYDRAULICS ENGINEER <i>J. G. DALTON</i>
	11/22/2020	11/22/2020
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-L1-



FOR -L1- PLAN SEE SHEETS 18 & 19

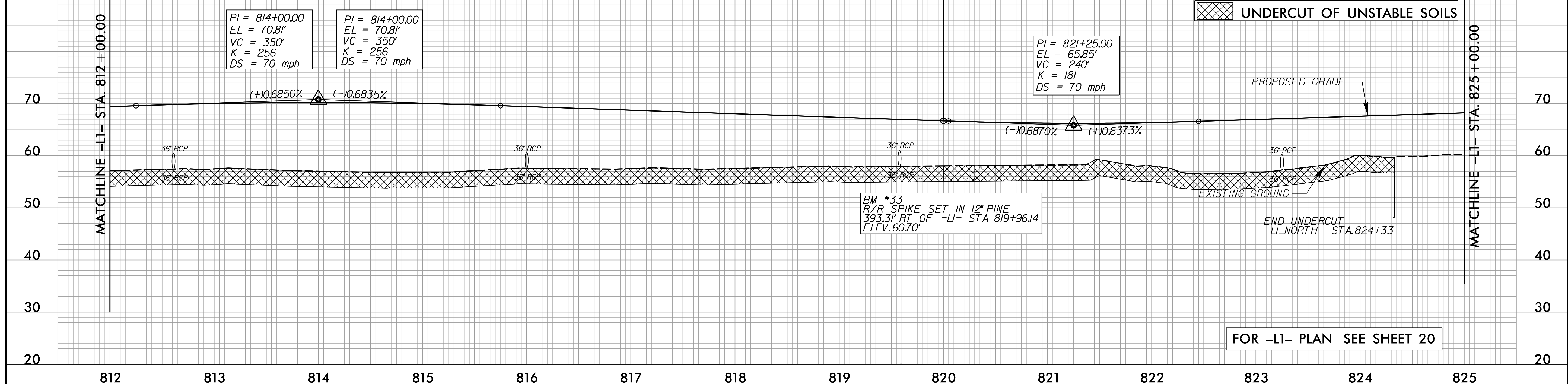
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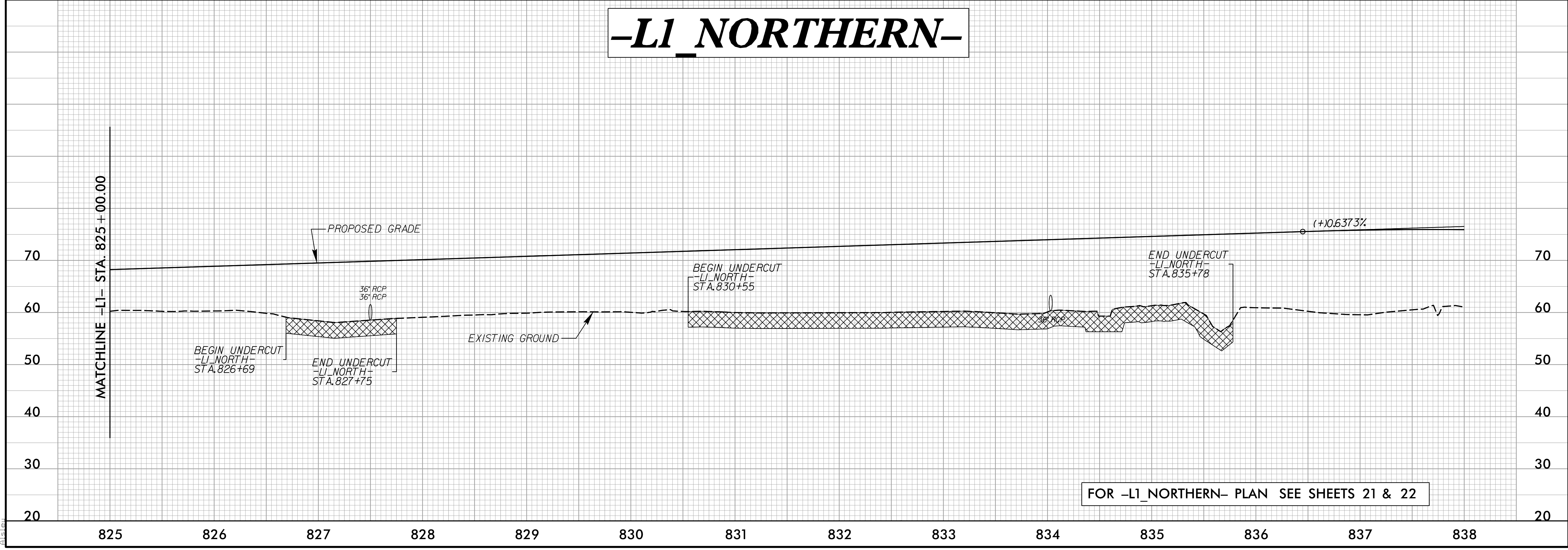
-L1-

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	ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	<p>SUNGATE DESIGN GROUP, P.A. 905 JONES FRANKLIN ROAD RALEIGH, NORTH CAROLINA 27606 NC COA No. C-0890</p> <p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p>	

END -L1- STA. 820+00.00
 BEGIN -L1NORTHERN-
 STA. 820+00.00
 ELEV. = 66.71'



-L1_NORTHERN-



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-LI_NORTHERN-



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ROADWAY DESIGN ENGINEER J. G. DALTON 11/22/2021	HYDRAULICS ENGINEER J. G. DALTON 11/22/2021
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PIPE HYDRAULIC DATA
24" RCP Sta. 843+00 -LI_NORTH-

DRAINAGE AREA	= 1.8	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 8.1	CFS
DESIGN HW ELEVATION	= 55.2	FT
100 YEAR DISCHARGE	= 8.7	CFS
100 YEAR HW ELEVATION	= 55.6	FT
OVERTOPPING FREQUENCY	= 100±	YRS
OVERTOPPING DISCHARGE	= 12	CFS
OVERTOPPING ELEVATION	= 56.0	FT

PIPE HYDRAULIC DATA
78" RCP Sta. 851+00 -LI_NORTH-

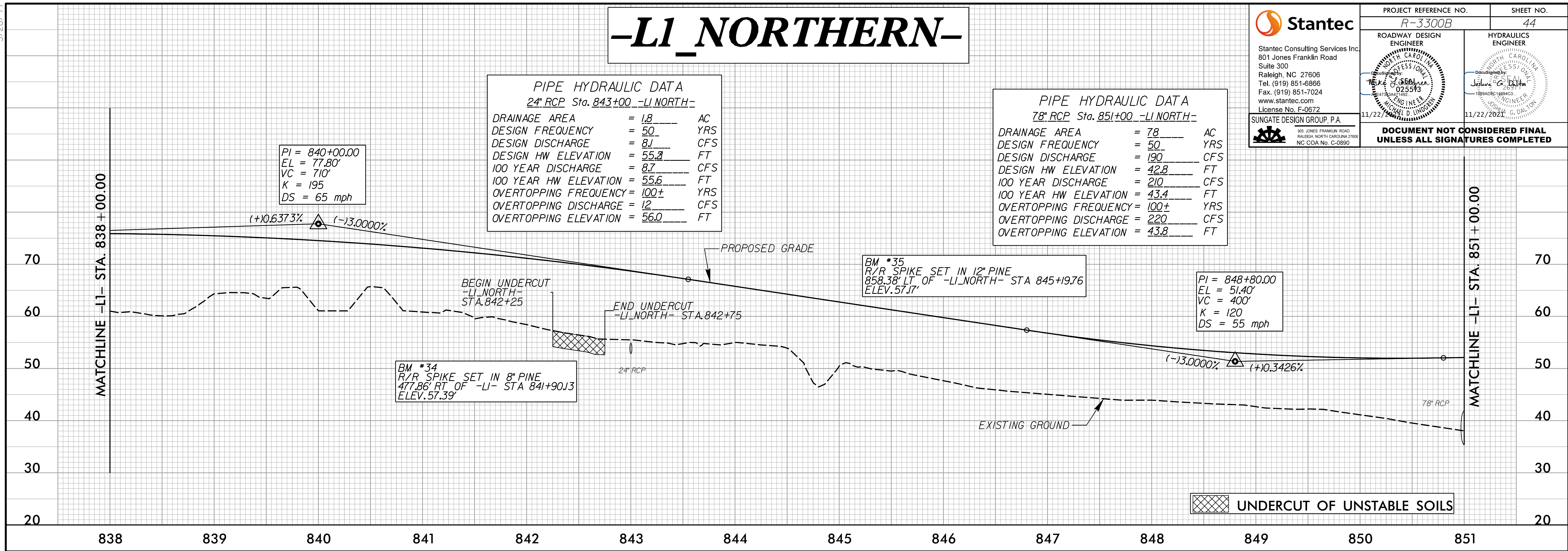
DRAINAGE AREA	= 7.8	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 190	CFS
DESIGN HW ELEVATION	= 42.8	FT
100 YEAR DISCHARGE	= 210	CFS
100 YEAR HW ELEVATION	= 43.4	FT
OVERTOPPING FREQUENCY	= 100±	YRS
OVERTOPPING DISCHARGE	= 220	CFS
OVERTOPPING ELEVATION	= 43.8	FT

PI = 840+00.00
EL = 77.80'
VC = 710'
K = 195
DS = 65 mph

BM *35
R/R SPIKE SET IN 12" PINE
858.38' LT OF -LI_NORTH- STA 845+19.76
ELEV. 57.17'

PI = 848+80.00
EL = 51.40'
VC = 400'
K = 120
DS = 55 mph

BM *34
R/R SPIKE SET IN 8" PINE
477.86' RT OF -LI- STA 841+90.13
ELEV. 57.39'



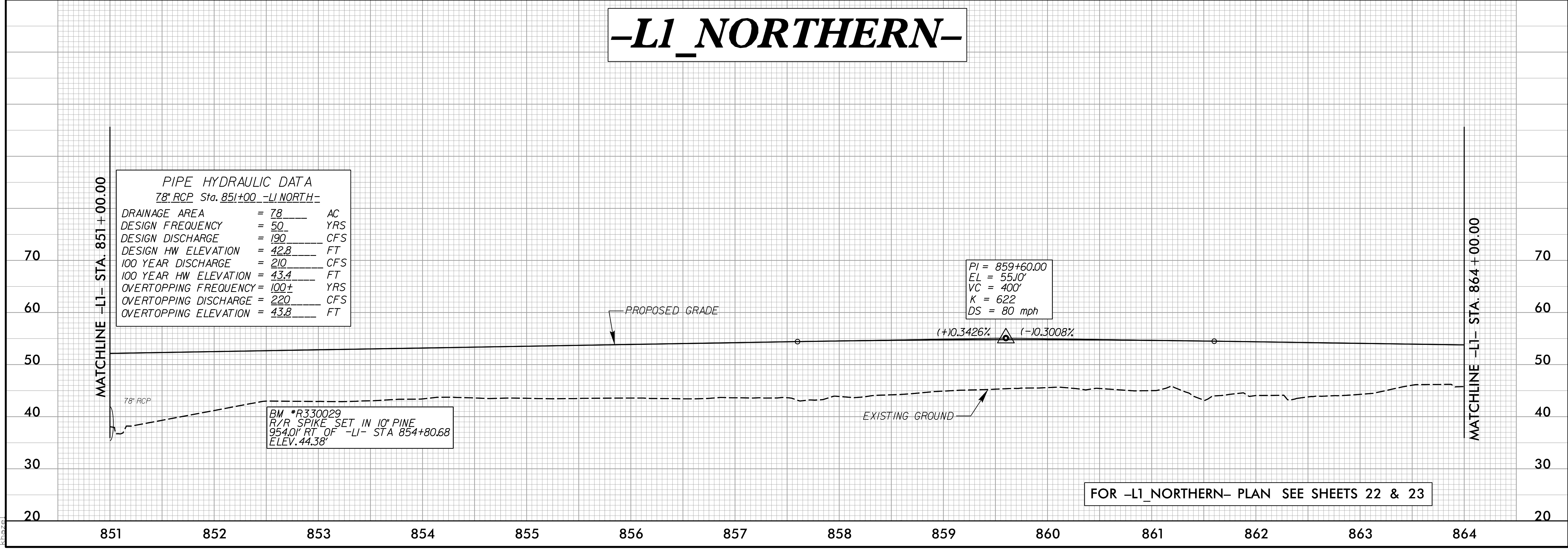
-LI_NORTHERN-

PIPE HYDRAULIC DATA
78" RCP Sta. 851+00 -LI_NORTH-

DRAINAGE AREA	= 7.8	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 190	CFS
DESIGN HW ELEVATION	= 42.8	FT
100 YEAR DISCHARGE	= 210	CFS
100 YEAR HW ELEVATION	= 43.4	FT
OVERTOPPING FREQUENCY	= 100±	YRS
OVERTOPPING DISCHARGE	= 220	CFS
OVERTOPPING ELEVATION	= 43.8	FT

PI = 859+60.00
EL = 55.10'
VC = 400'
K = 622
DS = 80 mph

BM *R330029
R/R SPIKE SET IN 10" PINE
954.01' RT OF -LI- STA 854+80.68
ELEV. 44.38'



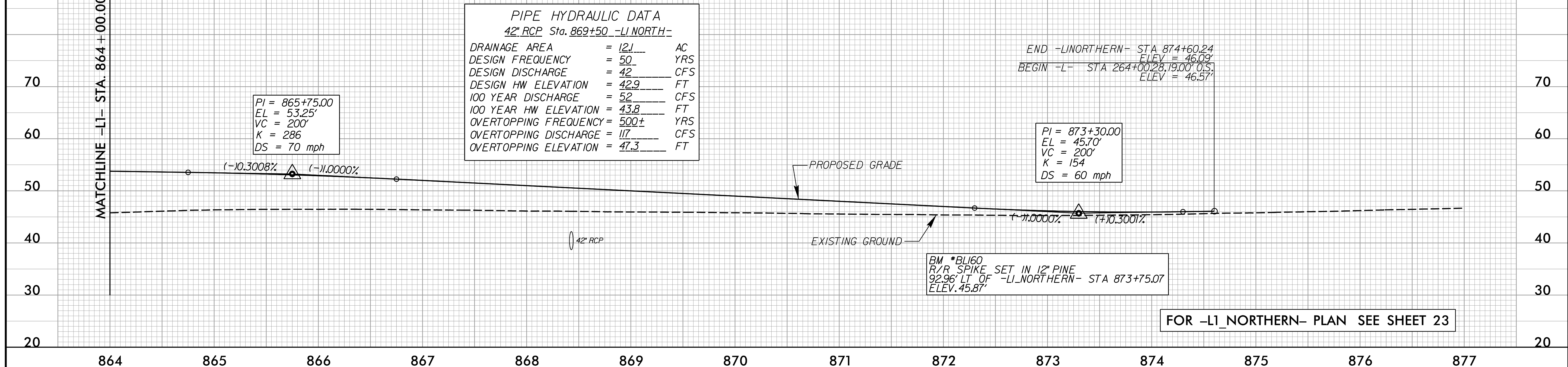
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-L1_NORTHERN-

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PROJECT REFERENCE NO. R-3300B	SHEET NO. 45
ROADWAY DESIGN ENGINEER Michael G. Seal License No. 025513 11/22/2024	HYDRAULICS ENGINEER Joshua G. Dalton License No. 025513 11/22/2024
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

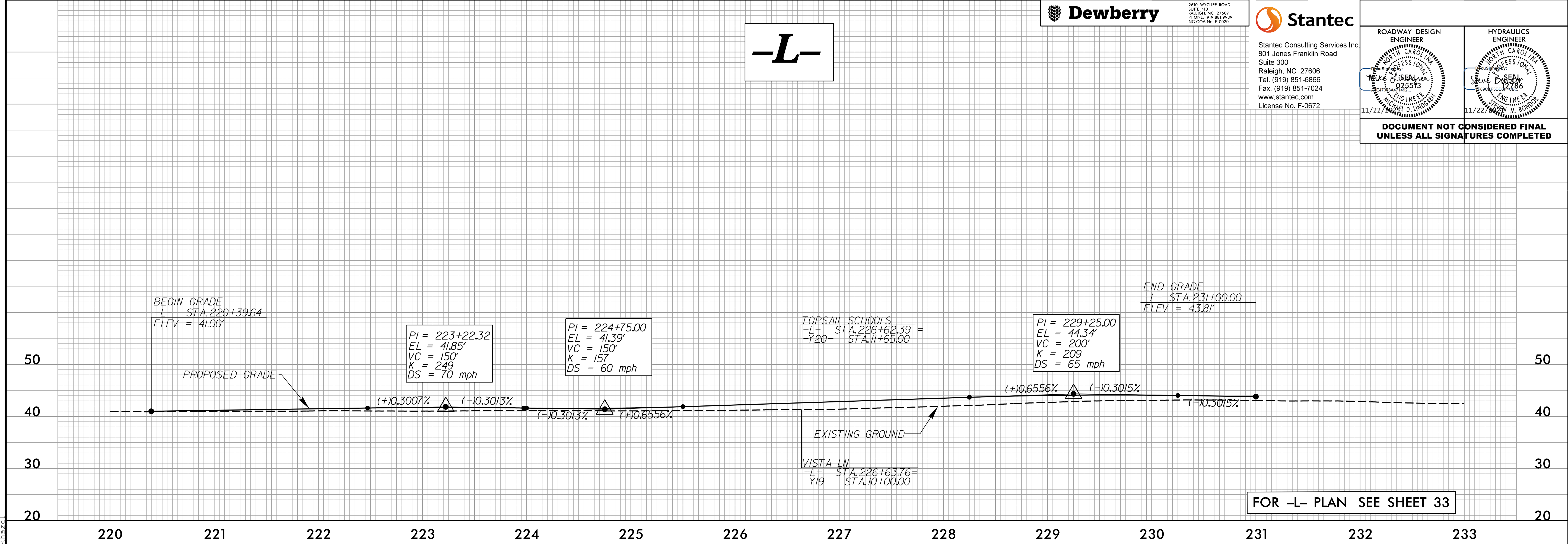


-L-

Dewberry
 2610 WYCLIFF ROAD
 SUITE 410
 RALEIGH, NC 27607
 PHONE: 733.683.9329
 NC COA No. F-0929

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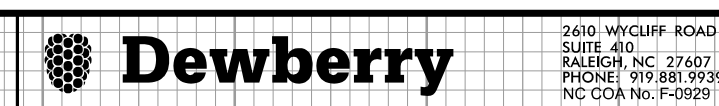
ROADWAY DESIGN ENGINEER Michael G. Seal License No. 025513 11/22/2024	HYDRAULICS ENGINEER Steven N. Bondron License No. 025513 11/22/2024
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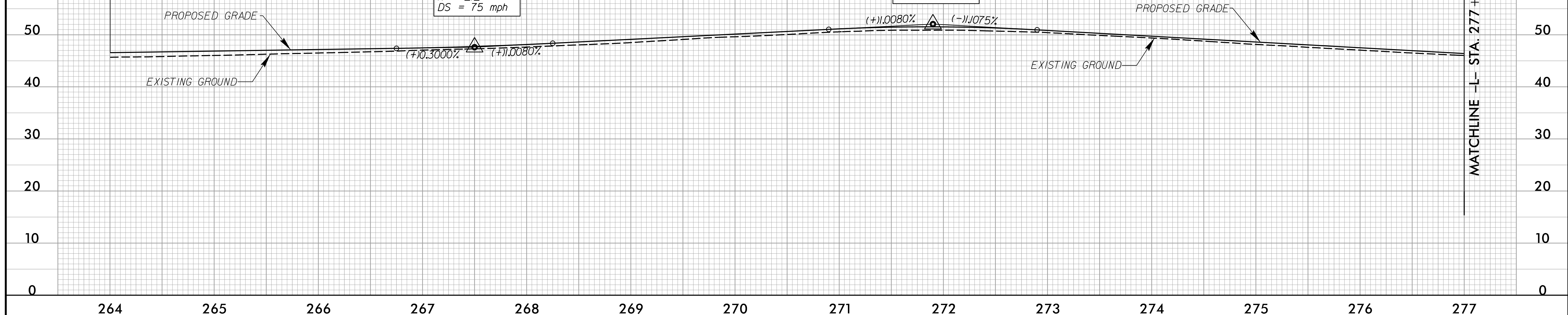


PROJECT REFERENCE NO. <i>R-3300B</i>		SHEET NO. 46
ROADWAY DESIGN ENGINEER <i>Y. K. K. K.</i> 025513 11/22/18	HYDRAULICS ENGINEER <i>W. B. B. B.</i> 025513 11/22/18	
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END -LINORTHERN+ STA 874+59.96
ELEV = 46.09'
BEGIN -L- STA 264+00.28, 19.00' O.S.
ELEV = 46.57'

PI = 267+50.00
EL = 47.62'
VC = 150'
K = 212
DS = 75 mph

PI = 271+90.00
EL = 52.05'
VC = 200'
K = 95
DS = 50 mph



-L-

PIPE HYDRAULIC DATA
L Sta. 284+76

DRAINAGE AREA	= 20	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 23	CFS
DESIGN HW ELEVATION	= 40.7	FT
100 YEAR DISCHARGE	= 25	CFS
100 YEAR HW ELEVATION	= 40.8	FT
OVERTOPPING FREQUENCY	= 50	YRS
OVERTOPPING DISCHARGE	= 28	CFS
OVERTOPPING ELEVATION	= 41	FT

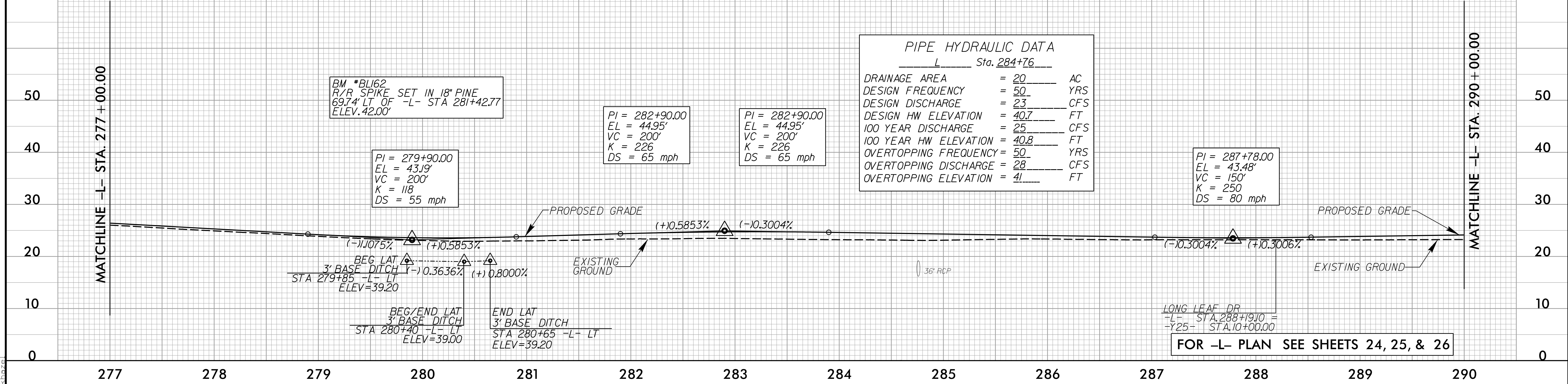
BM *BLU62
R/R SPIKE SET IN 18" PINE
69.74' LT OF -L- STA 281+42.77
ELEV. 42.00'

PI = 279+90.00
EL = 43.19'
VC = 200'
K = 118
DS = 55 mph

PI = 282+90.00
EL = 44.95'
VC = 200'
K = 226
DS = 65 mph

PI = 282+90.00
EL = 44.95'
VC = 200'
K = 226
DS = 65 mph

PI = 287+78.00
EL = 43.48'
VC = 150'
K = 250
DS = 80 mph



LONG LEAF DR
-L- STA. 288+19.10 =
-Y25- STA. 10+00.00

FOR -L- PLAN SEE SHEETS 24, 25, & 26

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khan

5/28/19



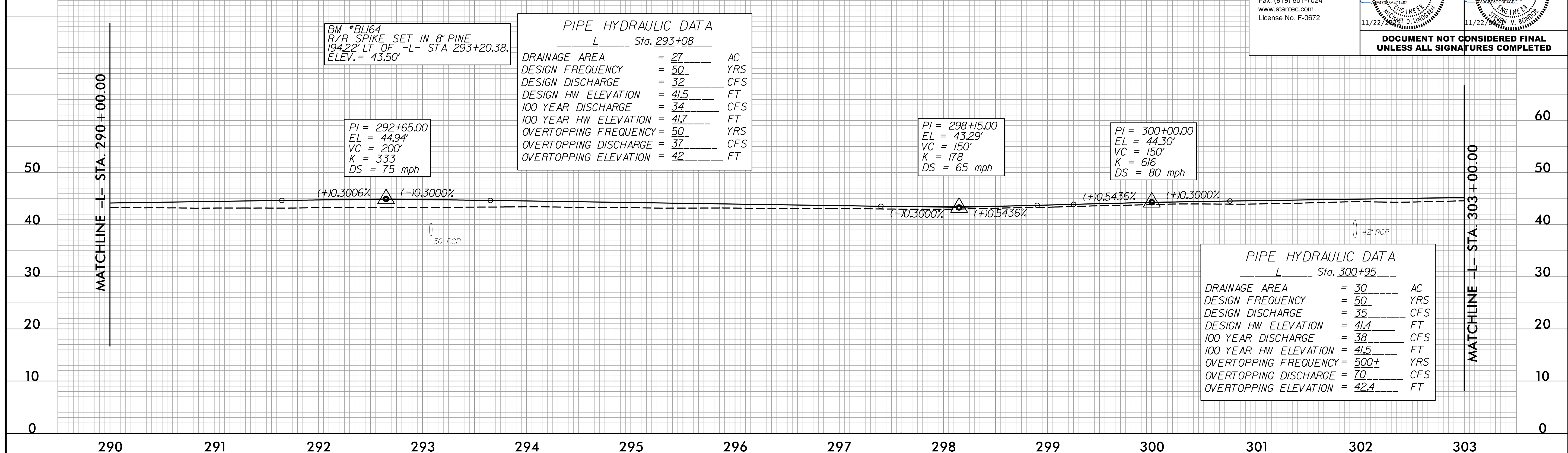
2400 WILLOW ROAD
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RALEIGH, NC 27607
PHONE: 919.888.9729
NC COR No. F-2929



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PROJECT REFERENCE NO. <i>R-3300B</i>	SHEET NO. 47
ROADWAY DESIGN ENGINEER <i>Y. K. STELLER</i> 025513 11/22/18	HYDRAULICS ENGINEER <i>SEAN DASEN</i> 022786 11/22/18
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-L-



BM *BLI64
R/R SPIKE SET IN 8" PINE
194.22' LT. OF -L- STA 293+20.38,
ELEV. = 43.50'

PIPE HYDRAULIC DATA
L Sta. 293+08

DRAINAGE AREA	= 27	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 32	CFS
DESIGN HW ELEVATION	= 41.5	FT
100 YEAR DISCHARGE	= 34	CFS
100 YEAR HW ELEVATION	= 41.7	FT
OVERTOPPING FREQUENCY	= 50	YRS
OVERTOPPING DISCHARGE	= 37	CFS
OVERTOPPING ELEVATION	= 42	FT

PI = 292+65.00
EL = 44.94'
VC = 200'
K = 333
DS = 75 mph

PI = 298+15.00
EL = 43.29'
VC = 150'
K = 178
DS = 65 mph

PI = 300+00.00
EL = 44.30'
VC = 150'
K = 616
DS = 80 mph

PIPE HYDRAULIC DATA
L Sta. 300+95

DRAINAGE AREA	= 30	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 35	CFS
DESIGN HW ELEVATION	= 41.4	FT
100 YEAR DISCHARGE	= 38	CFS
100 YEAR HW ELEVATION	= 41.5	FT
OVERTOPPING FREQUENCY	= 500±	YRS
OVERTOPPING DISCHARGE	= 70	CFS
OVERTOPPING ELEVATION	= 42.4	FT

-L-



PI = 304+25.00
EL = 45.58'
VC = 200'
K = 268
DS = 70 mph

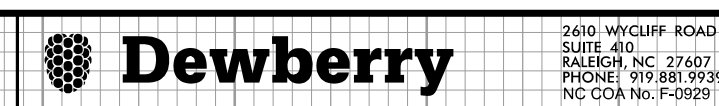
END GRADE
-L- STA. 307+44.34
EL. 43.76'

FOR -L- PLAN SEE SHEETS 26, & 27

9/13/2021
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khan

5/28/19

-LLT-



PROJECT REFERENCE NO. R-3300B	SHEET NO. 48
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DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

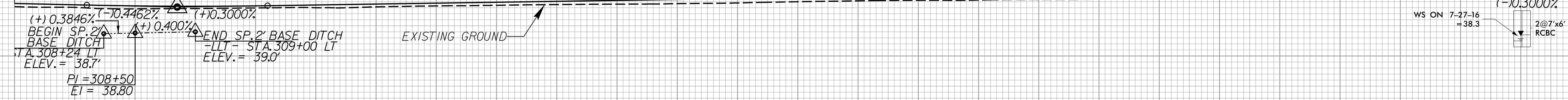
BEGIN GRADE
-L- STA 307+44.34 =
-LLT- STA 307+44.34
ELEV = 43.73'

PI = 308+85.00
EL = 43.10'
VC = 150'
K = 201
DS = 70 mph

PI = 317+60.00
EL = 45.73'
VC = 200'
K = 333
DS = 75 mph

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 440	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 43.5	FT
BASE DISCHARGE	= 530	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 44.5	FT
OVERTOPPING DISCHARGE	= 590	CFS
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING ELEVATION	= 45.2	FT



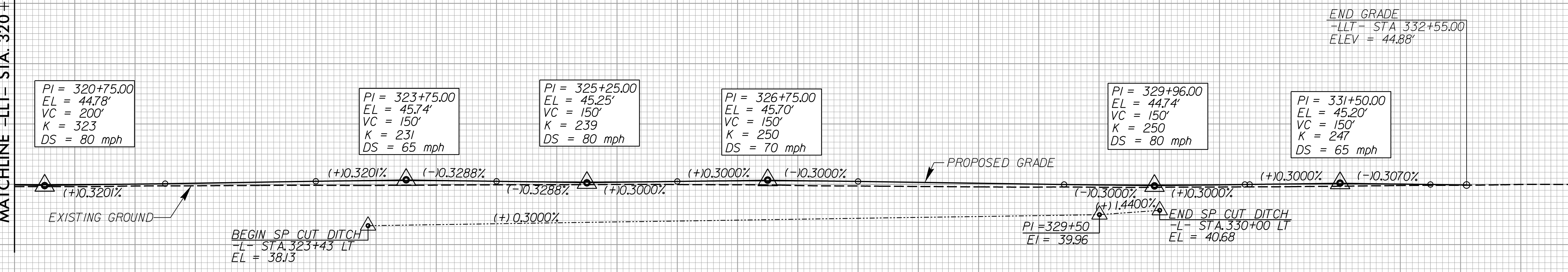
308 309 310 311 312 313 314 315 316 317 318 319 320

MATCHLINE -LLT- STA. 320 + 50.00

-LLT-

FOR -LLT- PLAN SEE SHEETS 27, 28, & 29

MATCHLINE -LLT- STA. 320 + 50.00

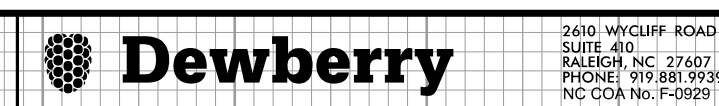


321 322 323 324 325 326 327 328 329 330 331 332 333

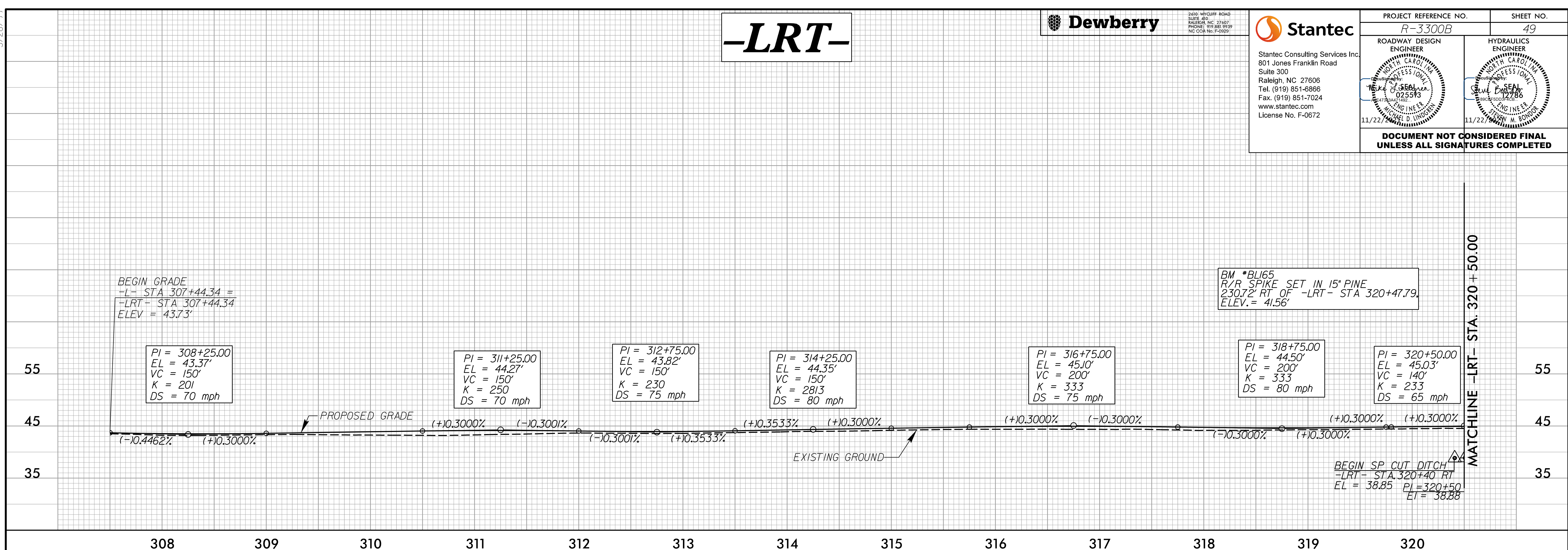
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5/28/19

-LRT-

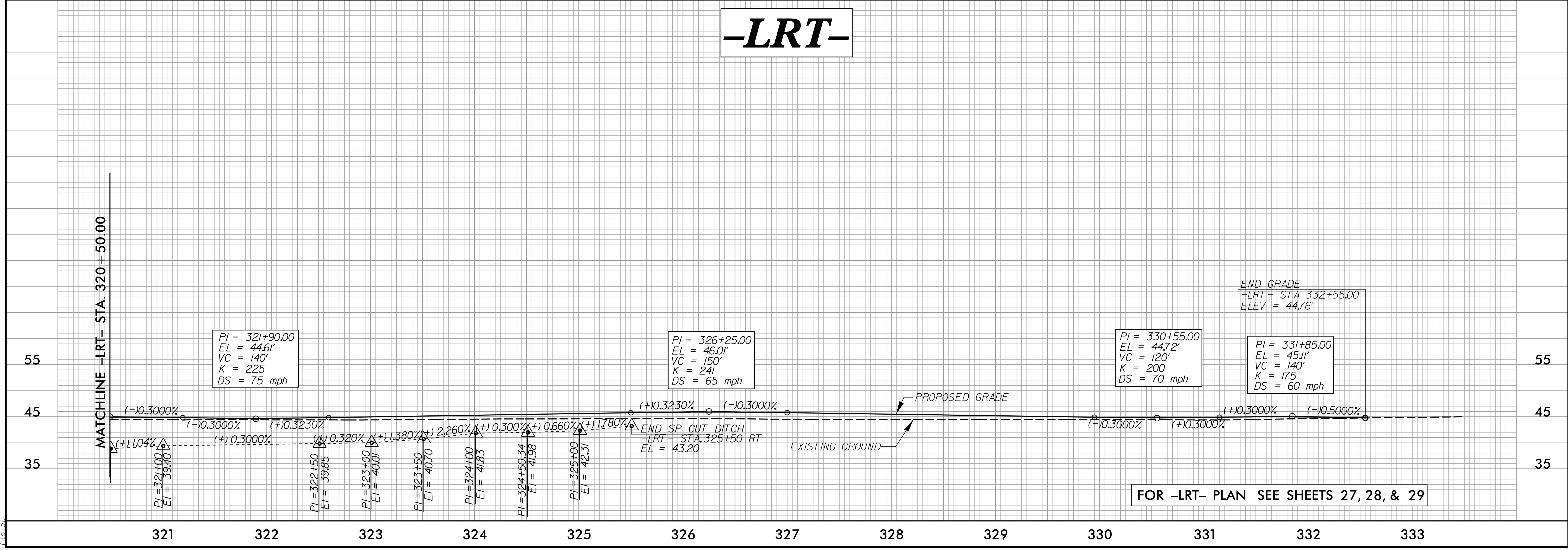


PROJECT REFERENCE NO. R-3300B	SHEET NO. 49
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308 309 310 311 312 313 314 315 316 317 318 319 320

-LRT-



321 322 323 324 325 326 327 328 329 330 331 332 333

FOR -LRT- PLAN SEE SHEETS 27, 28, & 29

9/14/2019
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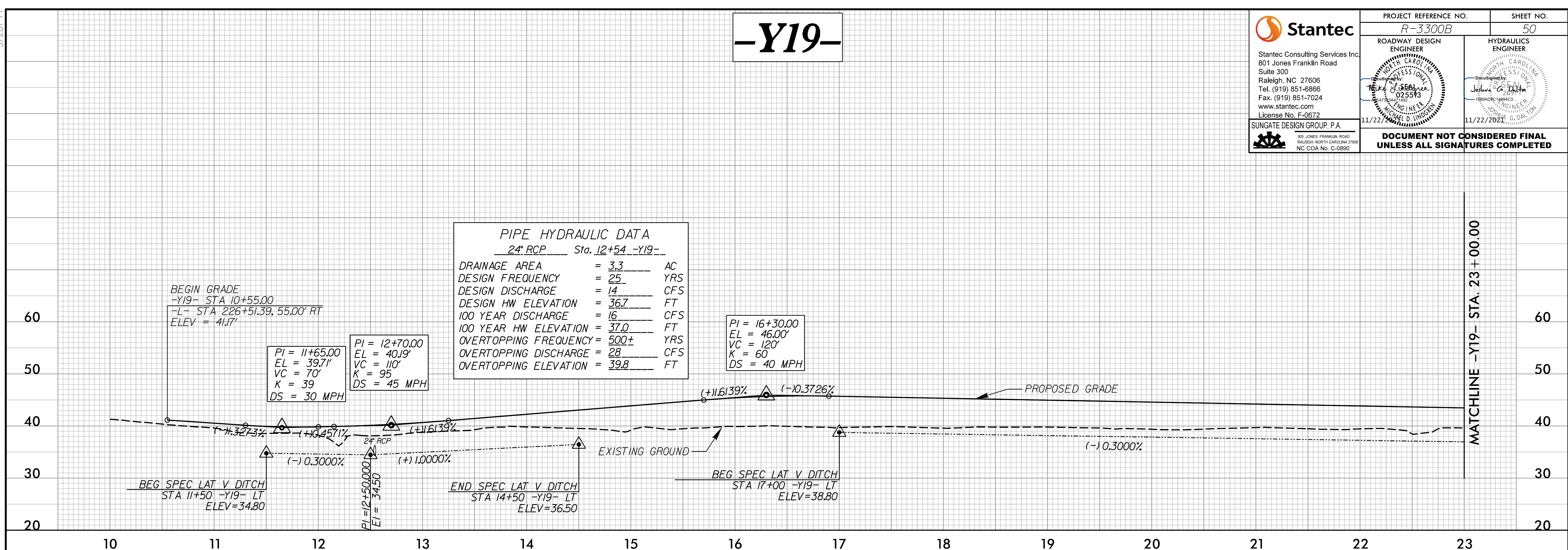
5/28/2021

-Y19-

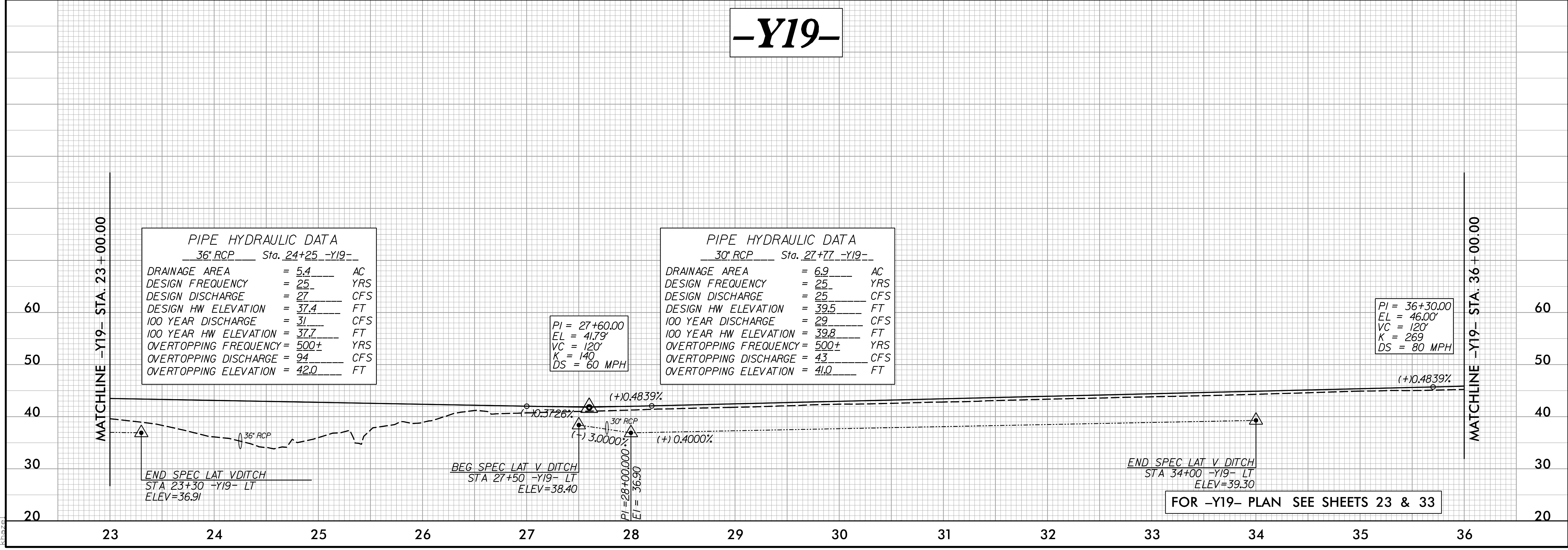


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PROJECT REFERENCE NO. <i>R-3300B</i>	SHEET NO. 50
ROADWAY DESIGN ENGINEER <i>Y. K. STEINER</i> 11/22/2021	HYDRAULICS ENGINEER <i>Josiah G. Dalton</i> 11/22/2021
SUNGATE DESIGN GROUP, P.A. 905 JONES FRANKLIN ROAD RALEIGH, NORTH CAROLINA 27606 NC COA No. C-0890	
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-Y19-



FOR -Y19- PLAN SEE SHEETS 23 & 33

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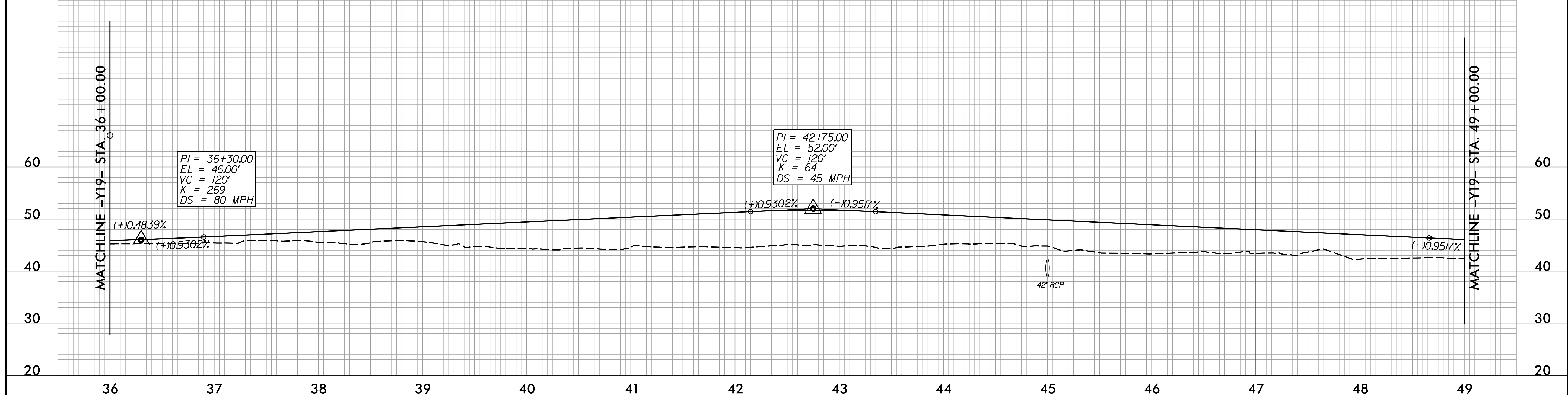
5/28/99

-Y19-



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PROJECT REFERENCE NO. <i>R-3300B</i>		SHEET NO. <i>51</i>
ROADWAY DESIGN ENGINEER <i>Y. K. STEVENSON</i> 11/22/2021	HYDRAULICS ENGINEER <i>Josiah G. Dalton</i> 11/22/2021	
SUNGATE DESIGN GROUP, P.A. 905 JONES FRANKLIN ROAD RALEIGH, NORTH CAROLINA 27606 NC COA No. C-0890		
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-Y19-



FOR -Y19- PLAN SEE SHEETS 23 & 24

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khan

5/28/21

-Y20-

-Y26-



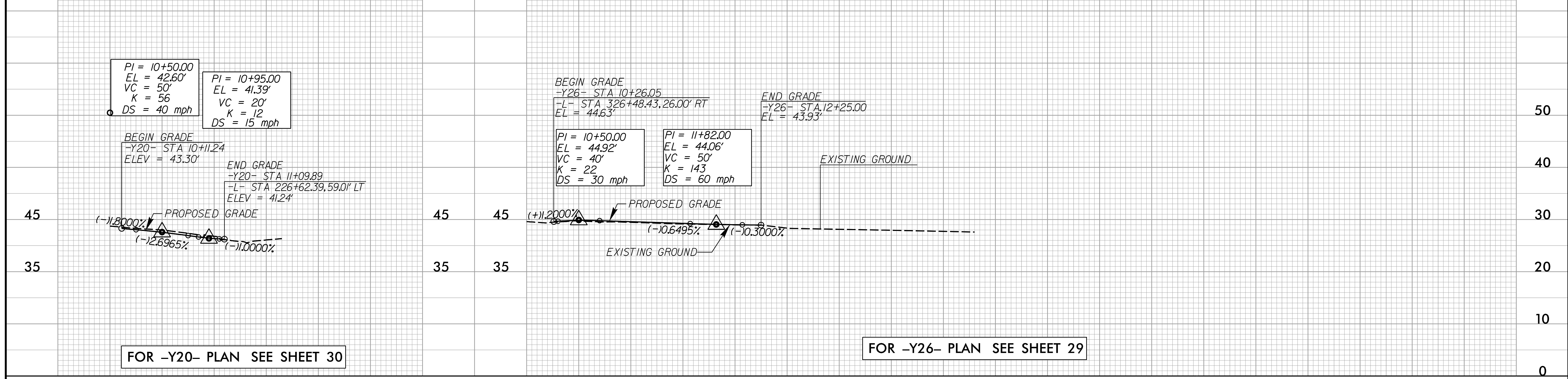
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PROJECT REFERENCE NO. R-3300B	SHEET NO. 52
ROADWAY DESIGN ENGINEER Michael D. Lindgren 025513 11/22/2021	HYDRAULICS ENGINEER Sungate Design Group, P.A. 025513 11/22/2021

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PI = 10+50.00
EL = 42.60'
VC = 50'
K = 56
DS = 40 mph

PI = 10+95.00
EL = 41.39'
VC = 20'
K = 12
DS = 15 mph

BEGIN GRADE
-Y26- STA 10+26.05
-L- STA 326+48.43, 26.00' RT
EL = 44.63'

END GRADE
-Y26- STA 12+25.00
EL = 43.93'

PI = 10+50.00
EL = 44.92'
VC = 40'
K = 22
DS = 30 mph

PI = 11+82.00
EL = 44.06'
VC = 50'
K = 143
DS = 60 mph

BEGIN GRADE
-Y20- STA 10+11.24
ELEV = 43.30'

END GRADE
-Y20- STA 11+09.89
-L- STA 226+62.39, 59.01' LT
ELEV = 41.24'

PROPOSED GRADE
(-)1.8000%
(-)2.6965%
(-)1.0000%

PROPOSED GRADE
(+)1.2000%
(-)0.6495%
(-)0.3000%

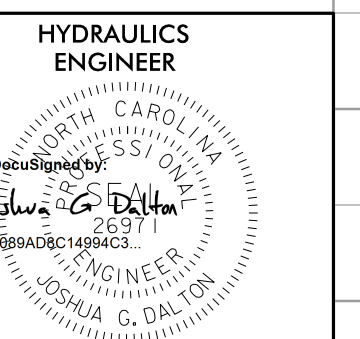
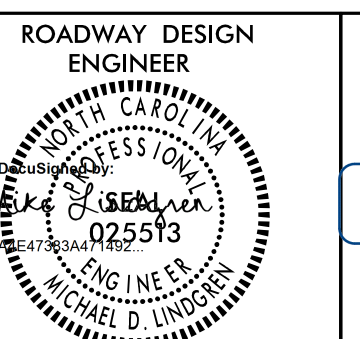
FOR -Y20- PLAN SEE SHEET 30

FOR -Y26- PLAN SEE SHEET 29

-Y30-



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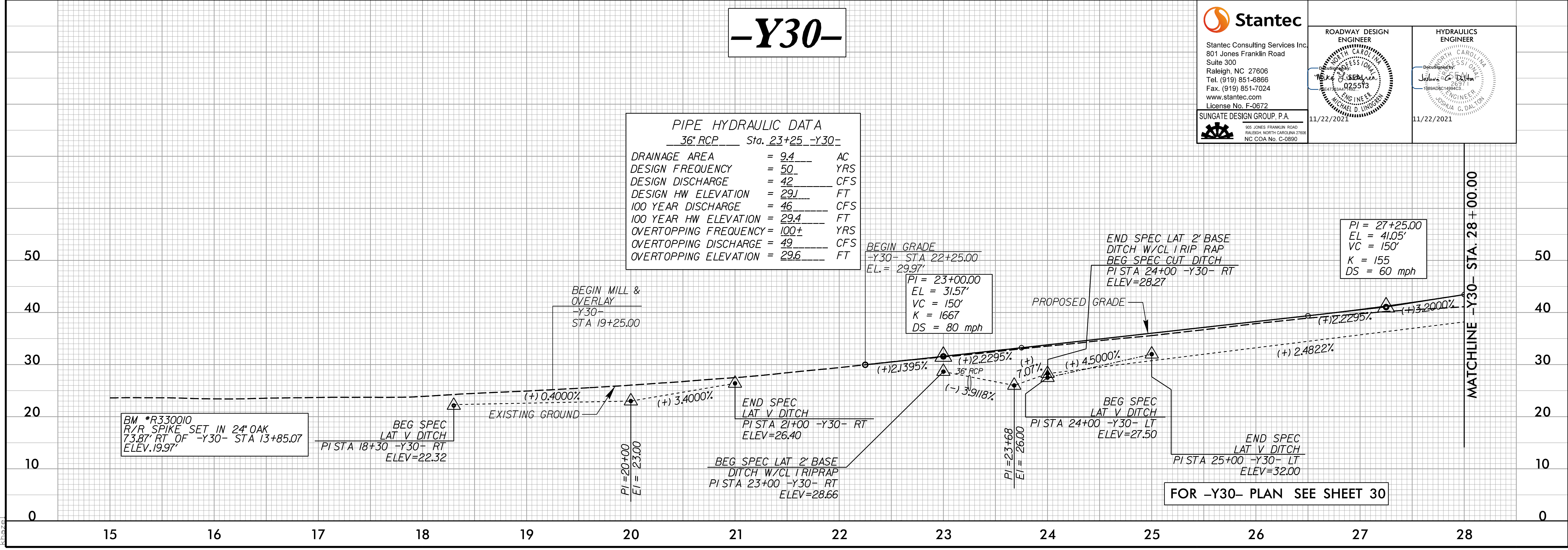


SUNGATE DESIGN GROUP, P.A.
805 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27605
NC COA No. C-0890

11/22/2021

11/22/2021

PIPE HYDRAULIC DATA	
36" RCP Sta. 23+25 -Y30-	
DRAINAGE AREA	= 9.4 AC
DESIGN FREQUENCY	= 50 YRS
DESIGN DISCHARGE	= 42 CFS
DESIGN HW ELEVATION	= 29.1 FT
100 YEAR DISCHARGE	= 46 CFS
100 YEAR HW ELEVATION	= 29.4 FT
OVERTOPPING FREQUENCY	= 100+ YRS
OVERTOPPING DISCHARGE	= 49 CFS
OVERTOPPING ELEVATION	= 29.6 FT



BEGIN GRADE
-Y30- STA 22+25.00
EL = 29.97'

PI = 23+00.00
EL = 31.57'
VC = 150'
K = 1667
DS = 80 mph

END SPEC LAT 2' BASE
DITCH W/CL 1 RIP RAP
BEG SPEC CUT DITCH
PI STA 24+00 -Y30- RT
ELEV=28.27

PI = 27+25.00
EL = 41.05'
VC = 150'
K = 155
DS = 60 mph

BM *R330010
R/R SPIKE SET IN 2" OAK
73.87' RT OF -Y30- STA 13+85.07
ELEV. 19.97'

BEG SPEC
LAT V DITCH
PI STA 18+30 -Y30- RT
ELEV=22.32

END SPEC
LAT V DITCH
PI STA 21+00 -Y30- RT
ELEV=26.40

BEG SPEC LAT 2' BASE
DITCH W/CL 1 RIPRAP
PI STA 23+00 -Y30- RT
ELEV=28.66

BEG SPEC
LAT V DITCH
PI STA 24+00 -Y30- LT
ELEV=27.50

END SPEC
LAT V DITCH
PI STA 25+00 -Y30- LT
ELEV=32.00

FOR -Y30- PLAN SEE SHEET 30

MATCHLINE -Y30- STA. 28 + 00.00

9/13/2021
I:\Projects\2021\Projects\Proje\3300B_Rdy.pf1_52.dgn
khan

5/28/2021

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PROJECT REFERENCE NO. **R-3300B**
 SHEET NO. **53**

ROADWAY DESIGN ENGINEER
 J. G. DALTON
 License No. 025513
 11/22/2021

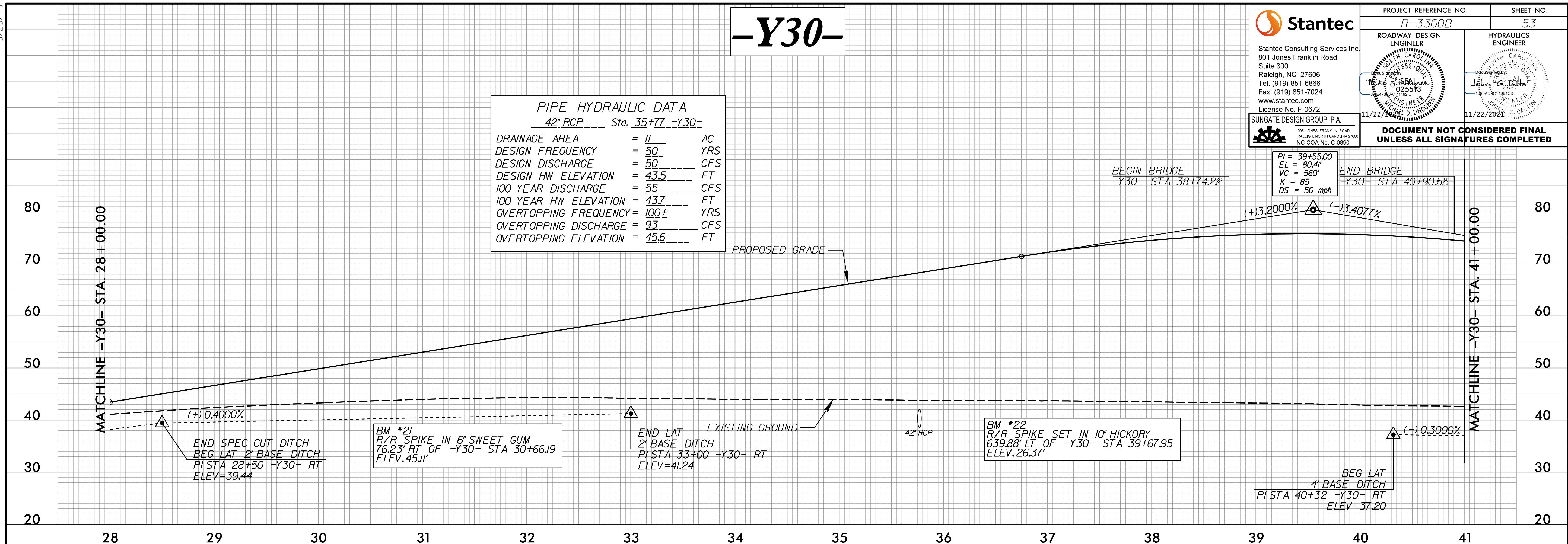
HYDRAULICS ENGINEER
 J. G. DALTON
 License No. 025513
 11/22/2021

SUNGATE DESIGN GROUP, P.A.
 905 JONES FRANKLIN ROAD
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 NC COA No. C-0890

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PIPE HYDRAULIC DATA
 42" RCP Sta. 35+77 -Y30-

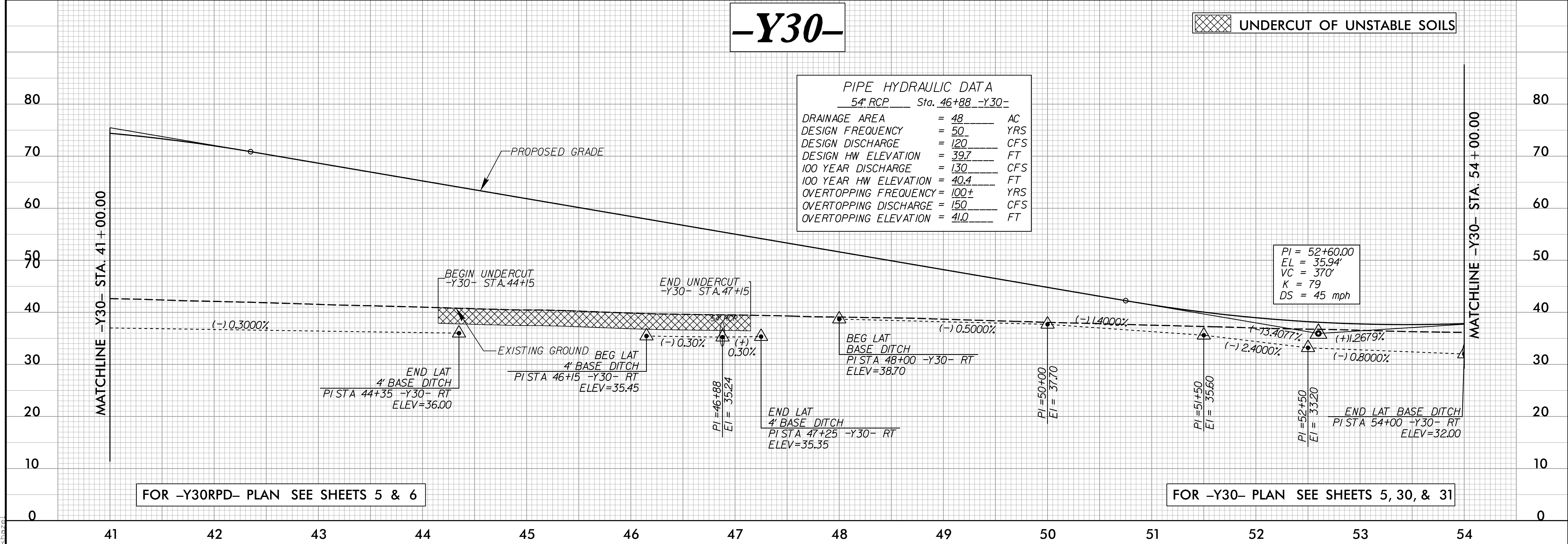
DRAINAGE AREA	= 11	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 50	CFS
DESIGN HW ELEVATION	= 43.5	FT
100 YEAR DISCHARGE	= 55	CFS
100 YEAR HW ELEVATION	= 43.7	FT
OVERTOPPING FREQUENCY	= 100±	YRS
OVERTOPPING DISCHARGE	= 93	CFS
OVERTOPPING ELEVATION	= 45.6	FT



-Y30-

PIPE HYDRAULIC DATA
 54" RCP Sta. 46+88 -Y30-

DRAINAGE AREA	= 48	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 120	CFS
DESIGN HW ELEVATION	= 39.7	FT
100 YEAR DISCHARGE	= 130	CFS
100 YEAR HW ELEVATION	= 40.4	FT
OVERTOPPING FREQUENCY	= 100±	YRS
OVERTOPPING DISCHARGE	= 150	CFS
OVERTOPPING ELEVATION	= 41.0	FT



FOR -Y30RPD- PLAN SEE SHEETS 5 & 6

FOR -Y30- PLAN SEE SHEETS 5, 30, & 31

9/13/2021
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PROJECT REFERENCE NO. **R-3300B**
 SHEET NO. **54**

ROADWAY DESIGN ENGINEER
 SUNGATE DESIGN GROUP, P.A.
 905 JONES FRANKLIN ROAD
 RALEIGH, NORTH CAROLINA 27606
 NC COA No. C-0890

HYDRAULICS ENGINEER
 JAMES G. DALTON
 11/22/2021

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-Y30-

PIPE HYDRAULIC DATA
 30" RCP Sta. 54+00 -Y30-

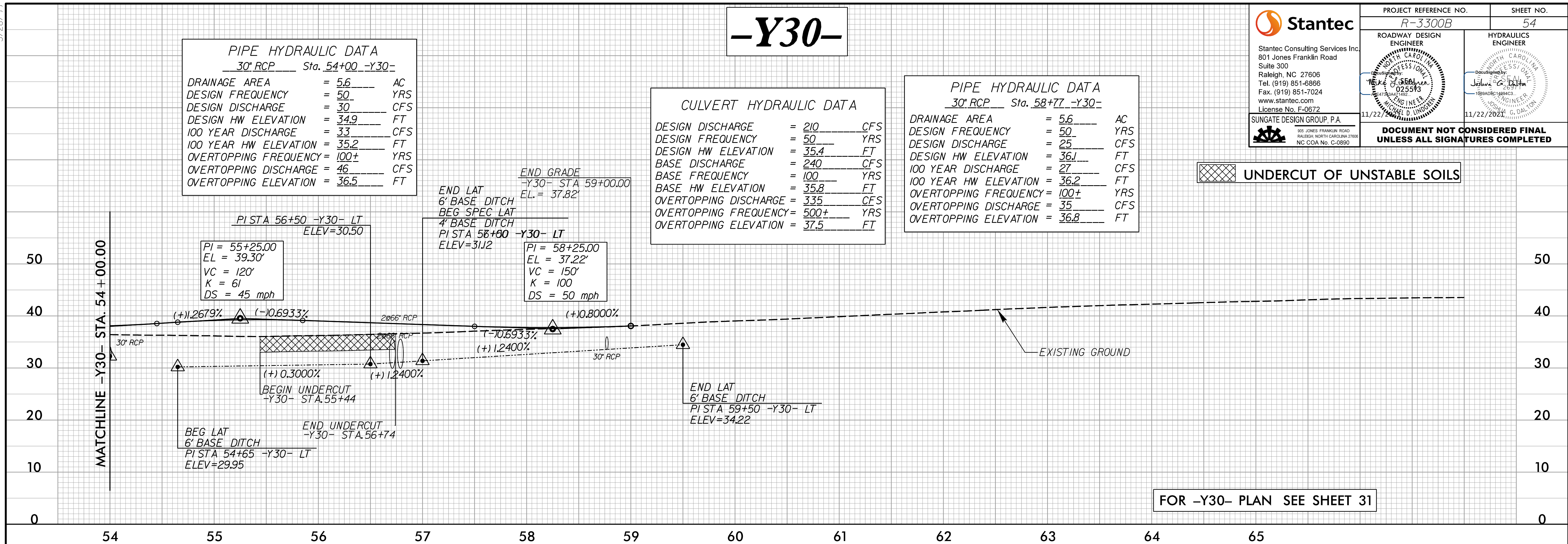
DRAINAGE AREA	= 5.6	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 30	CFS
DESIGN HW ELEVATION	= 34.9	FT
100 YEAR DISCHARGE	= 33	CFS
100 YEAR HW ELEVATION	= 35.2	FT
OVERTOPPING FREQUENCY	= 100±	YRS
OVERTOPPING DISCHARGE	= 46	CFS
OVERTOPPING ELEVATION	= 36.5	FT

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 210	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 35.4	FT
BASE DISCHARGE	= 240	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 35.8	FT
OVERTOPPING DISCHARGE	= 335	CFS
OVERTOPPING FREQUENCY	= 500±	YRS
OVERTOPPING ELEVATION	= 37.5	FT

PIPE HYDRAULIC DATA
 30" RCP Sta. 58+77 -Y30-

DRAINAGE AREA	= 5.6	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 25	CFS
DESIGN HW ELEVATION	= 36.1	FT
100 YEAR DISCHARGE	= 27	CFS
100 YEAR HW ELEVATION	= 36.2	FT
OVERTOPPING FREQUENCY	= 100±	YRS
OVERTOPPING DISCHARGE	= 35	CFS
OVERTOPPING ELEVATION	= 36.8	FT



FOR -Y30- PLAN SEE SHEET 31

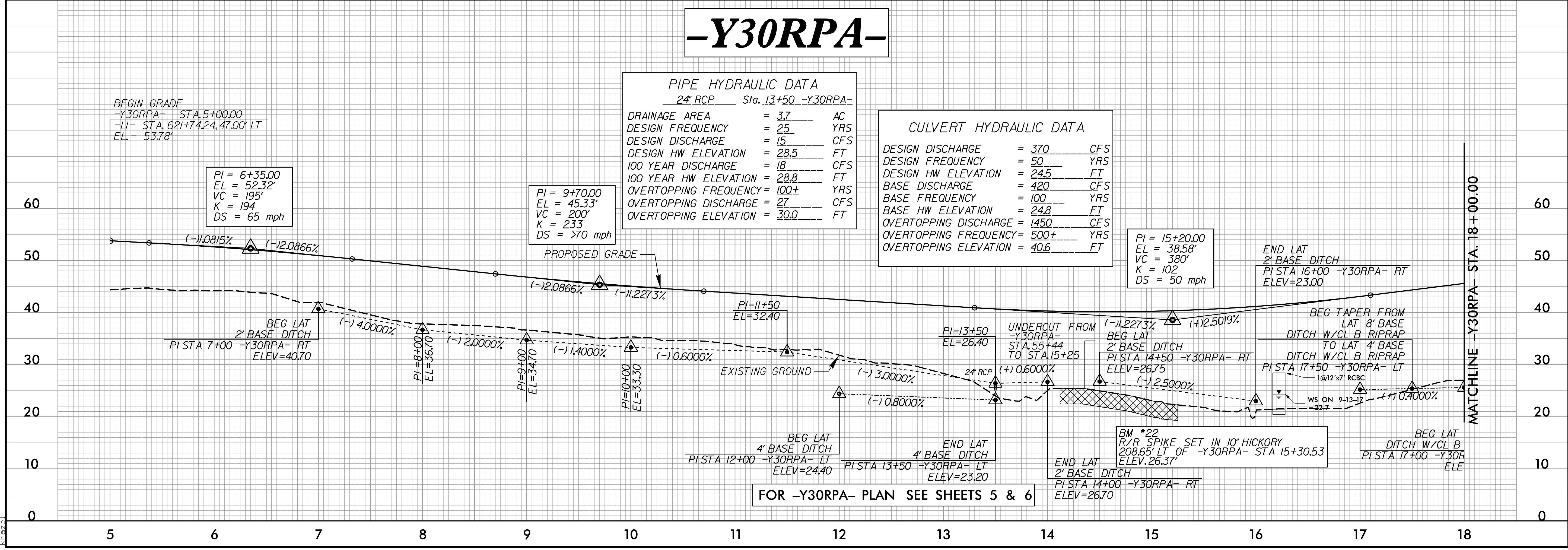
-Y30RPA-

PIPE HYDRAULIC DATA
 24" RCP Sta. 13+50 -Y30RPA-

DRAINAGE AREA	= 3.7	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 15	CFS
DESIGN HW ELEVATION	= 28.5	FT
100 YEAR DISCHARGE	= 18	CFS
100 YEAR HW ELEVATION	= 28.8	FT
OVERTOPPING FREQUENCY	= 100±	YRS
OVERTOPPING DISCHARGE	= 27	CFS
OVERTOPPING ELEVATION	= 30.0	FT

CULVERT HYDRAULIC DATA

DESIGN DISCHARGE	= 370	CFS
DESIGN FREQUENCY	= 50	YRS
DESIGN HW ELEVATION	= 24.5	FT
BASE DISCHARGE	= 420	CFS
BASE FREQUENCY	= 100	YRS
BASE HW ELEVATION	= 24.8	FT
OVERTOPPING DISCHARGE	= 1450	CFS
OVERTOPPING FREQUENCY	= 500±	YRS
OVERTOPPING ELEVATION	= 40.6	FT



FOR -Y30RPA- PLAN SEE SHEETS 5 & 6

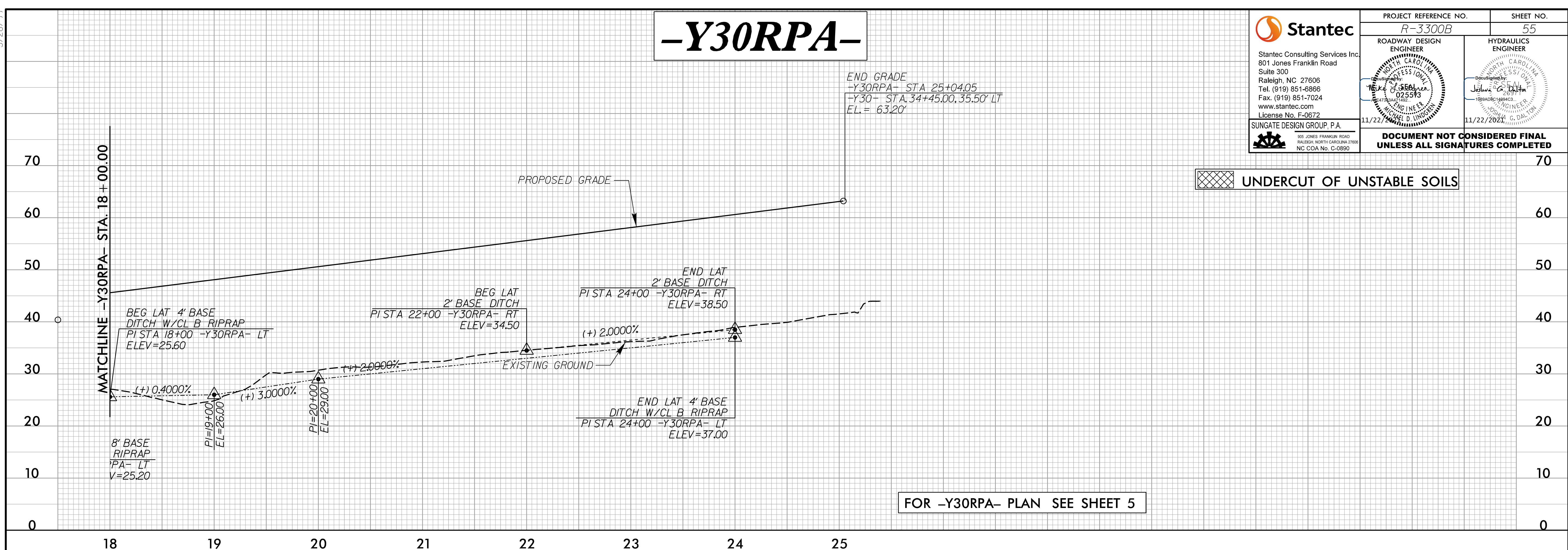
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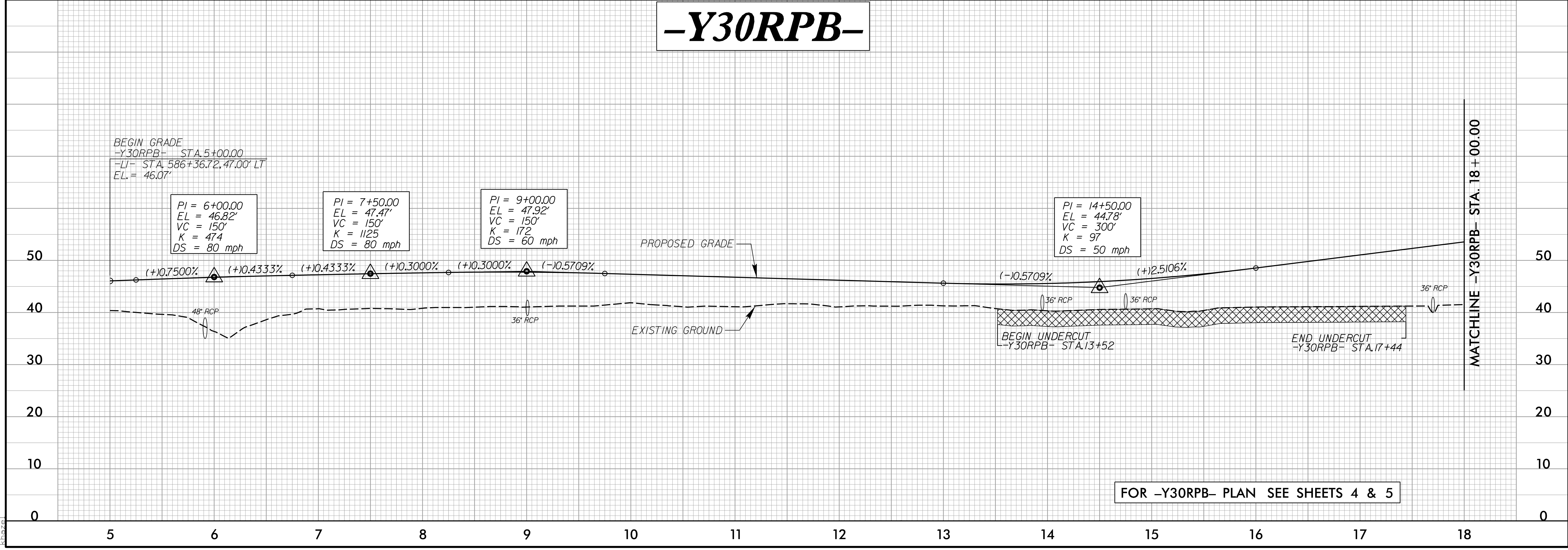
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PROJECT REFERENCE NO. R-3300B	SHEET NO. 55
ROADWAY DESIGN ENGINEER 11/22/2021	HYDRAULICS ENGINEER 11/22/2021
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-Y30RPB-



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-Y30RPB-

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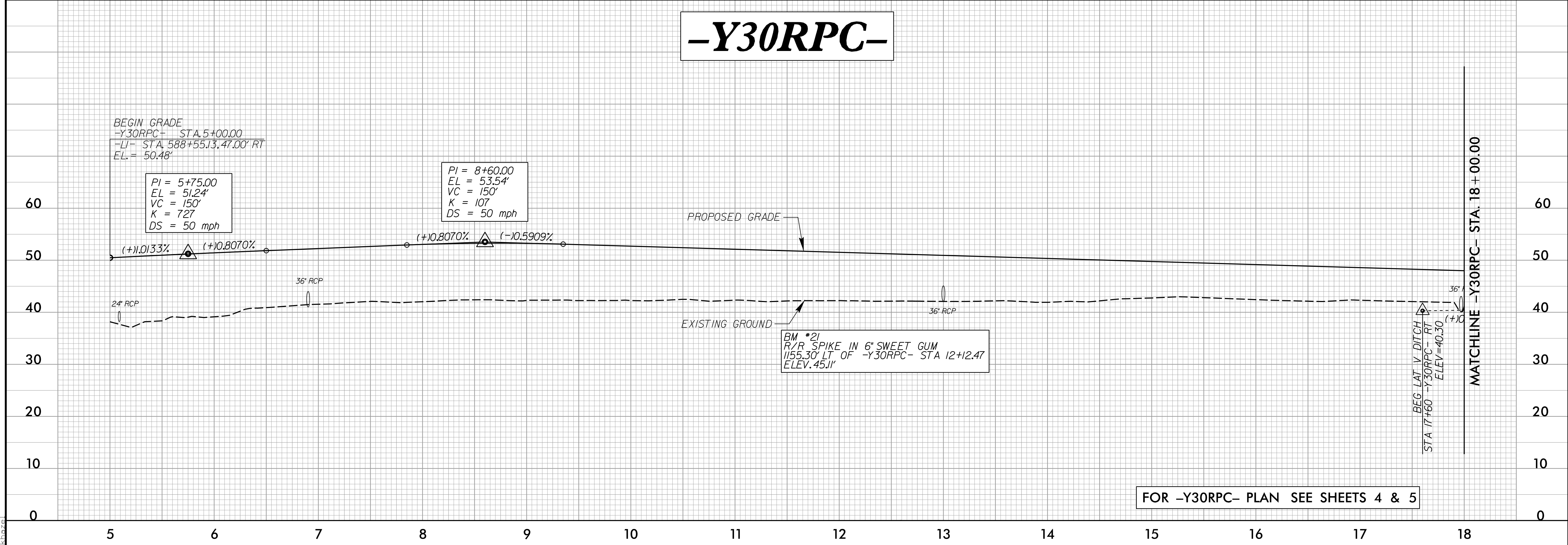
PROJECT REFERENCE NO. R-3300B	SHEET NO. 56
ROADWAY DESIGN ENGINEER <i>[Signature]</i> 11/22/2021	HYDRAULICS ENGINEER <i>[Signature]</i> 11/22/2021

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-Y30RPC-



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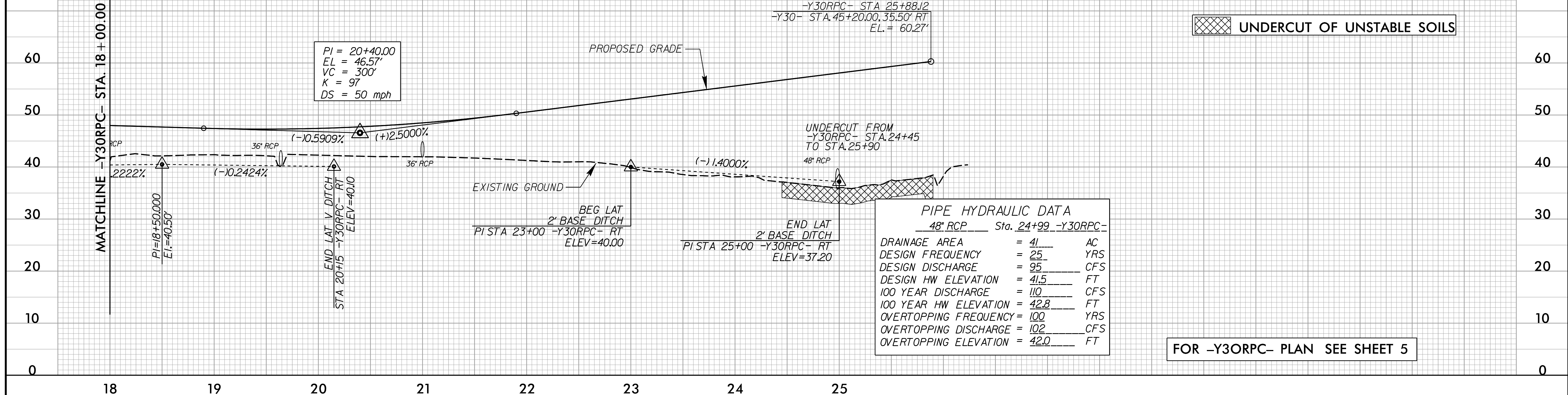
-Y30RPC-

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PROJECT REFERENCE NO. <i>R-3300B</i>	SHEET NO. 57
ROADWAY DESIGN ENGINEER <i>Mark Stehler</i> 11/22/2021	HYDRAULICS ENGINEER <i>Josiah G. Dalton</i> 11/22/2021

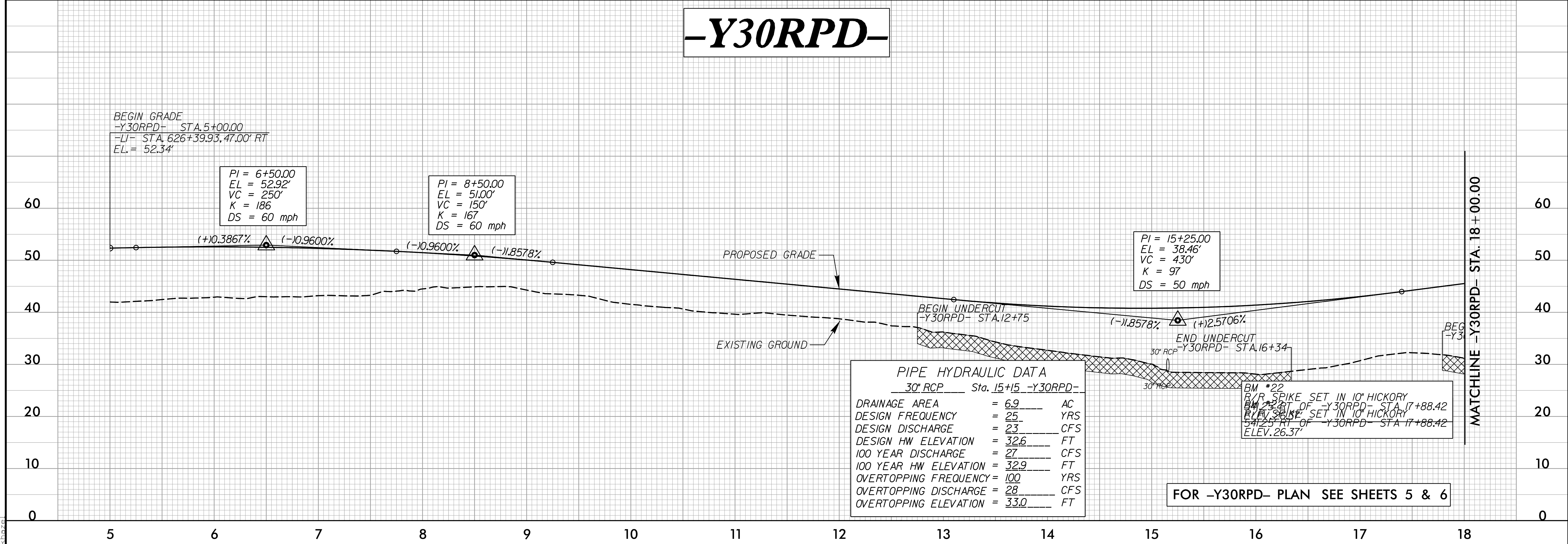
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FOR -Y30RPC- PLAN SEE SHEET 5

-Y30RPD-



FOR -Y30RPD- PLAN SEE SHEETS 5 & 6

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-Y30RPD-

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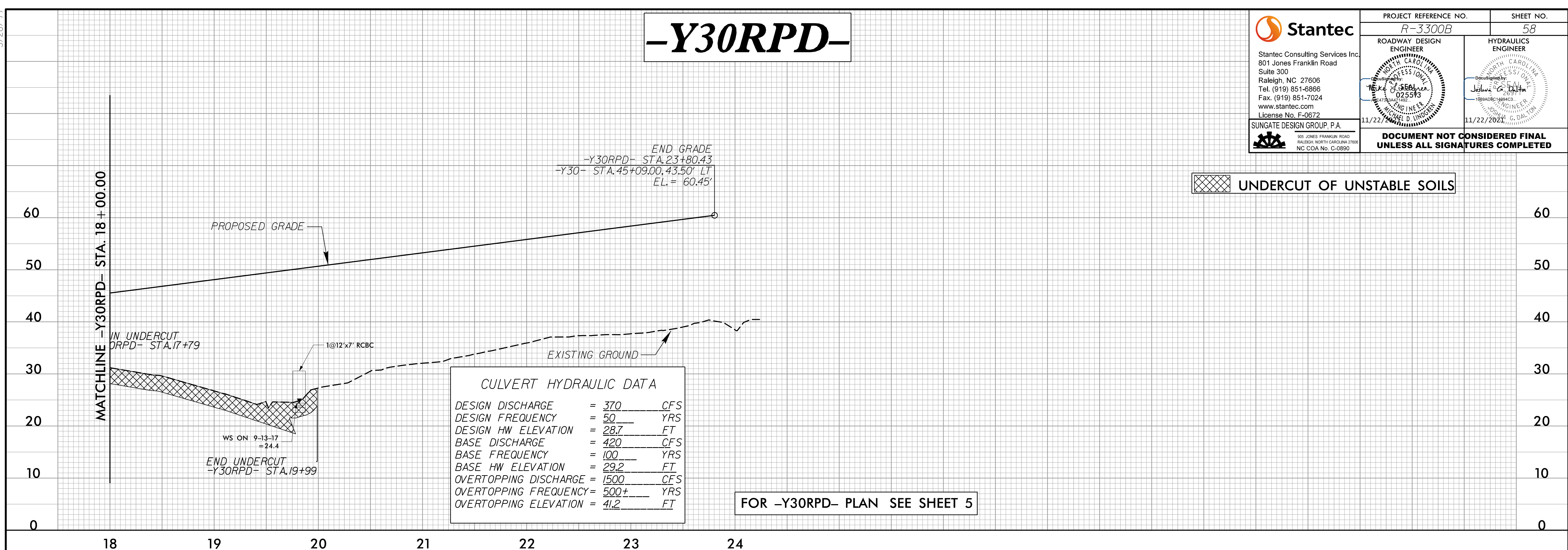
PROJECT REFERENCE NO. **R-3300B**
 SHEET NO. **58**

ROADWAY DESIGN ENGINEER
 J. G. DALTON
 11/22/2021

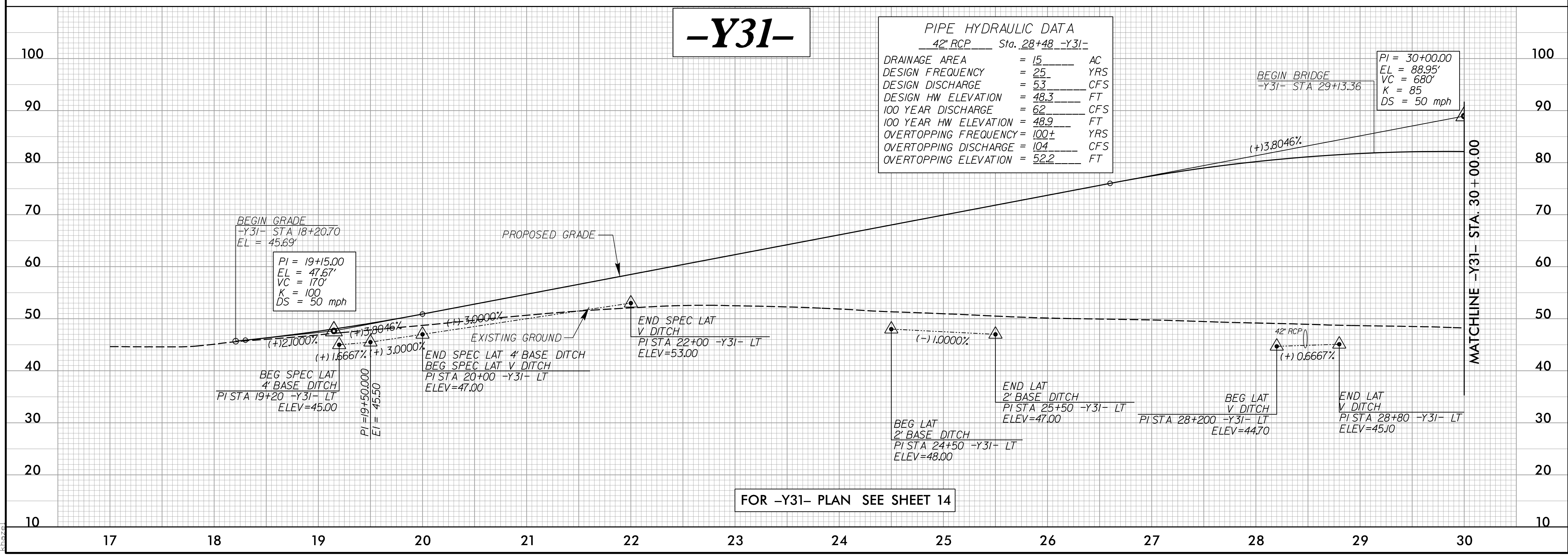
HYDRAULICS ENGINEER
 J. G. DALTON
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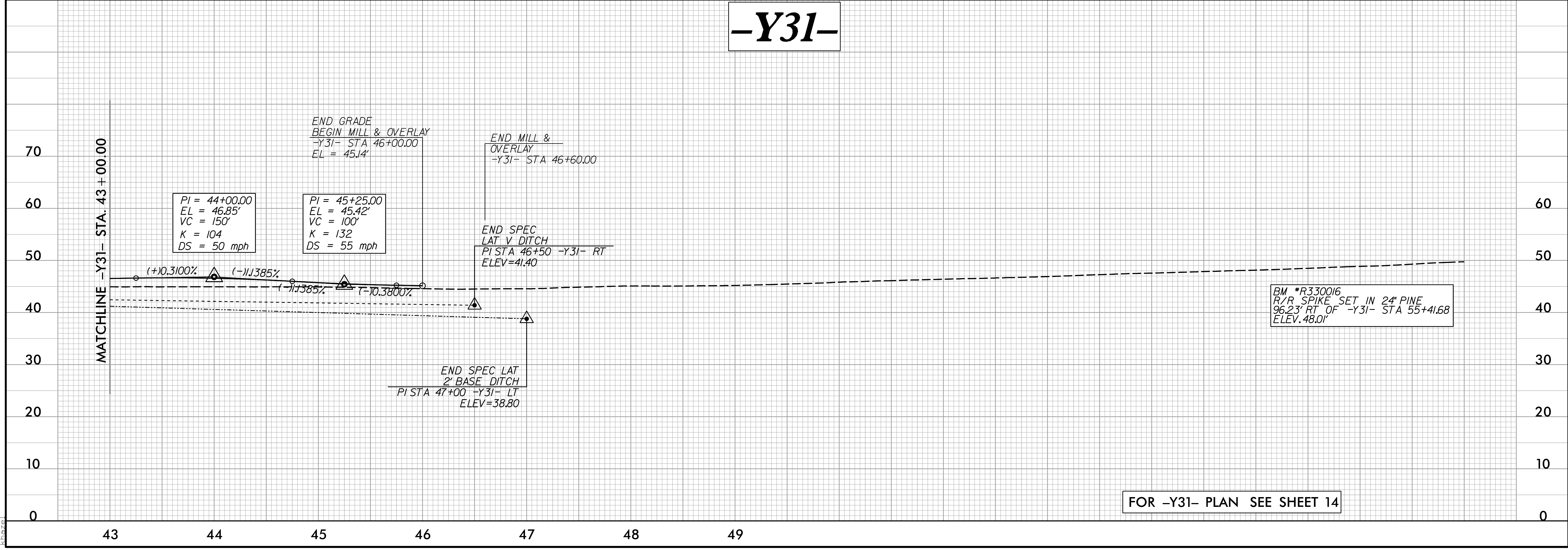
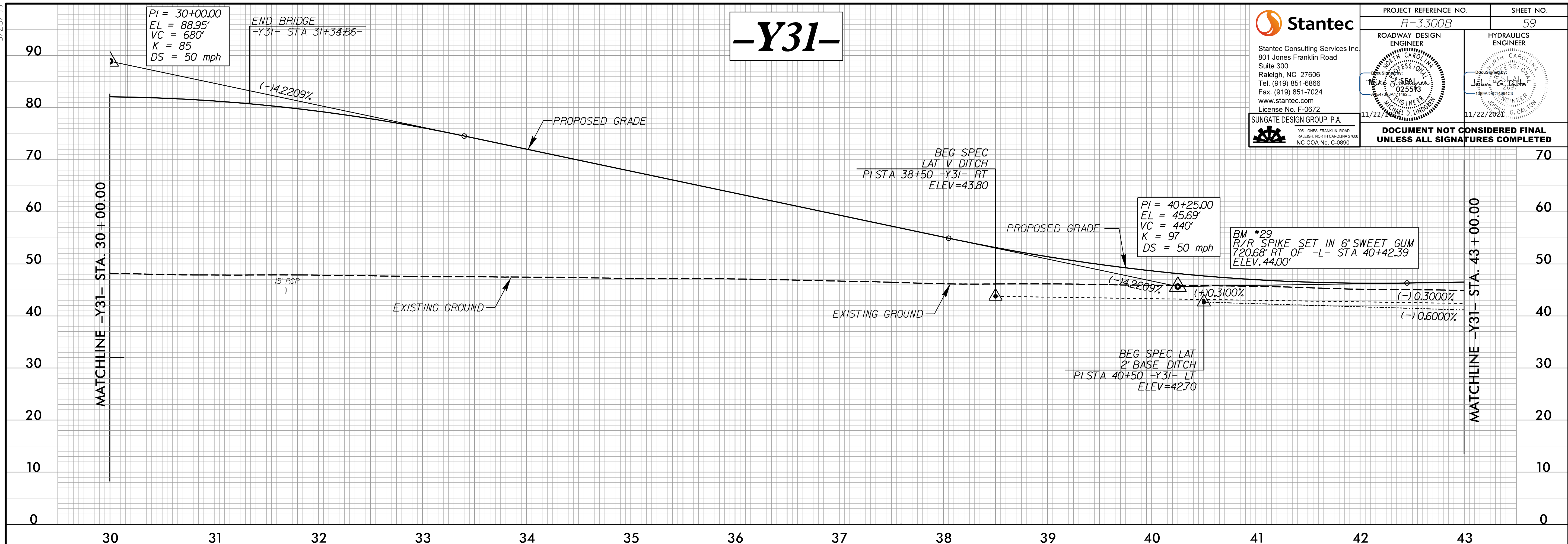
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	ROADWAY DESIGN ENGINEER 	HYDRAULICS ENGINEER
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FOR -Y31- PLAN SEE SHEET 14

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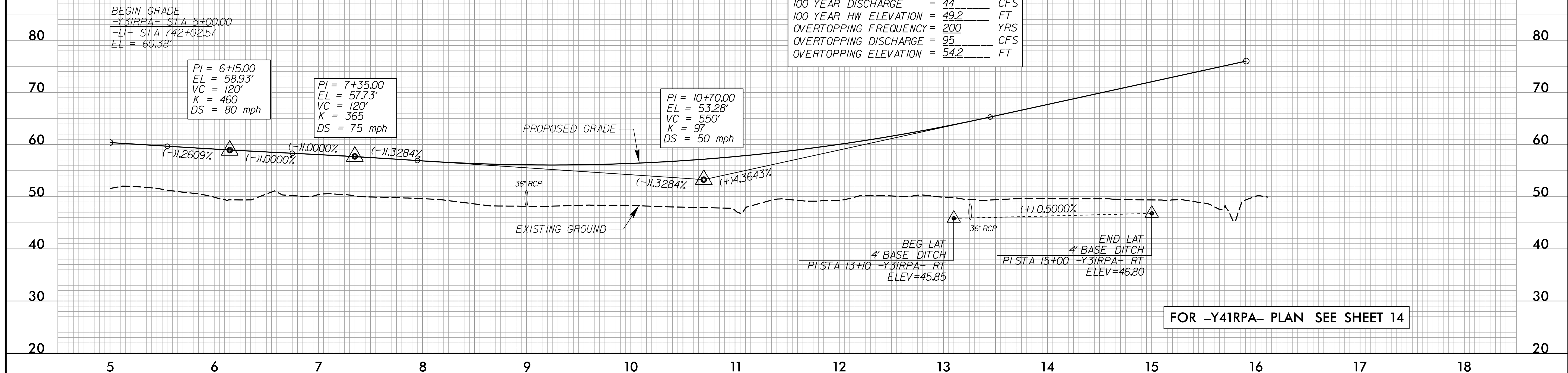
-Y31RPA-

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	ROADWAY DESIGN ENGINEER 	HYDRAULICS ENGINEER
SUNGATE DESIGN GROUP, P.A. <small>905 JONES FRANKLIN ROAD RALEIGH, NORTH CAROLINA 27606 NC COA No. C-0890</small>	DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED	

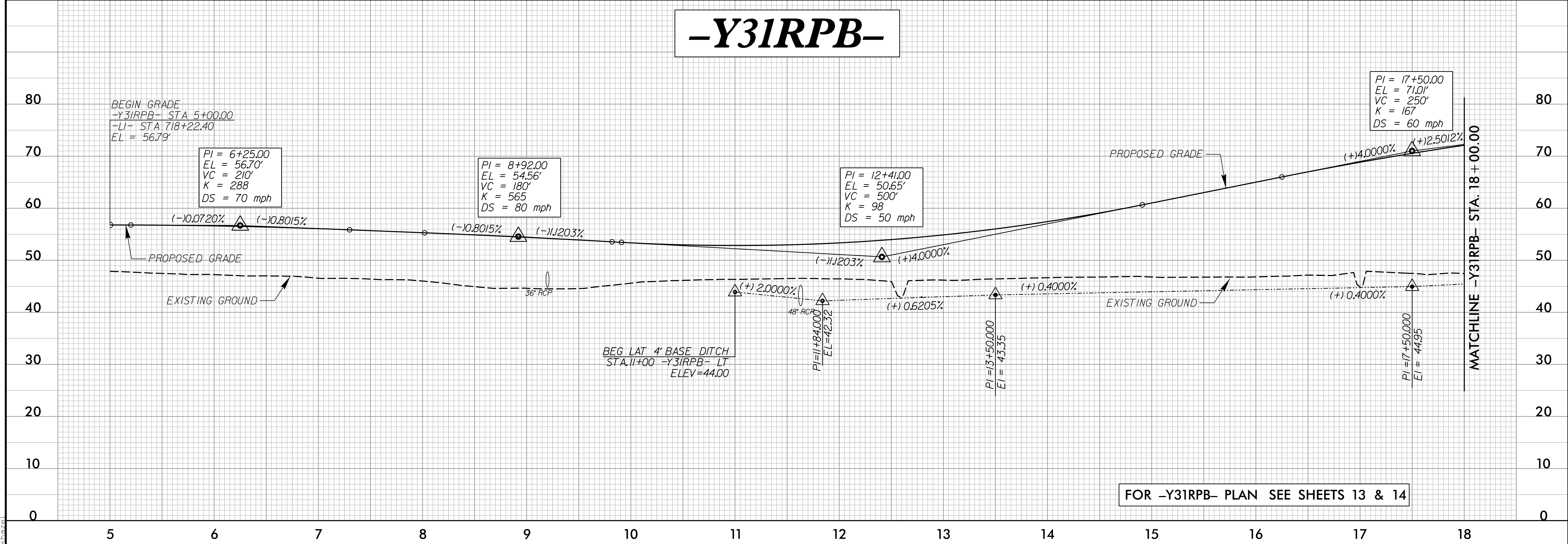
PIPE HYDRAULIC DATA
36" RCP Sta. 13+26 -Y31RPA-

DRAINAGE AREA	= 12	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 38	CFS
DESIGN HW ELEVATION	= 48.7	FT
100 YEAR DISCHARGE	= 44	CFS
100 YEAR HW ELEVATION	= 49.2	FT
OVERTOPPING FREQUENCY	= 200	YRS
OVERTOPPING DISCHARGE	= 95	CFS
OVERTOPPING ELEVATION	= 54.2	FT

END GRADE
-Y31RPA- STA 15+90.82
-Y31- STA 26+62.32, 20.75' LT
EL = 76.0'



-Y31RPB-



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-Y31LPC-

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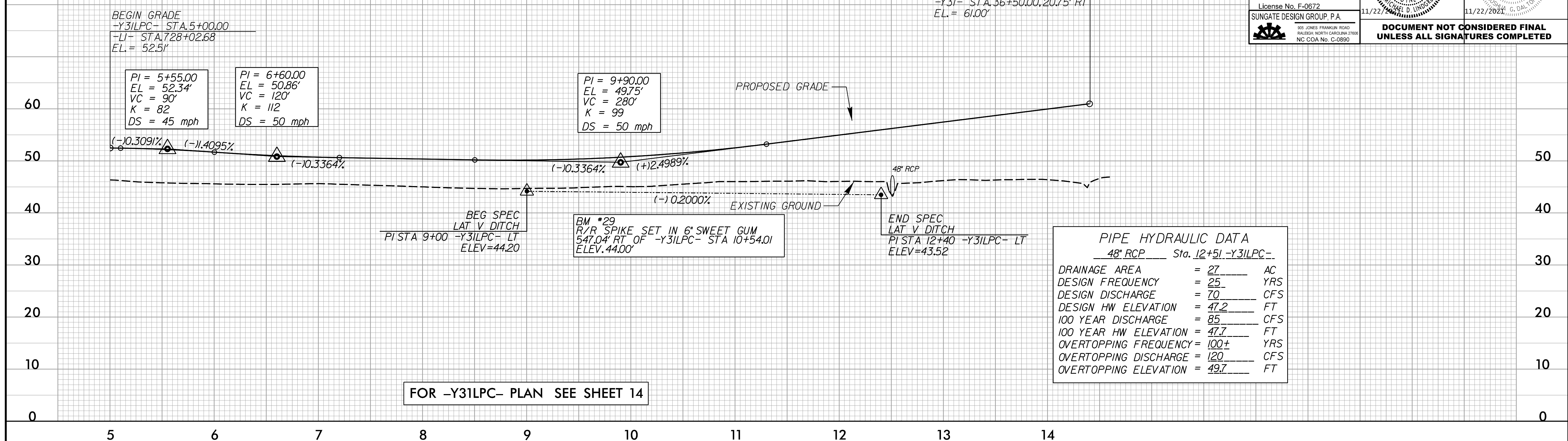
PROJECT REFERENCE NO. **R-3300B**
 SHEET NO. **62**

ROADWAY DESIGN ENGINEER
 J. G. DALTON
 11/22/2021

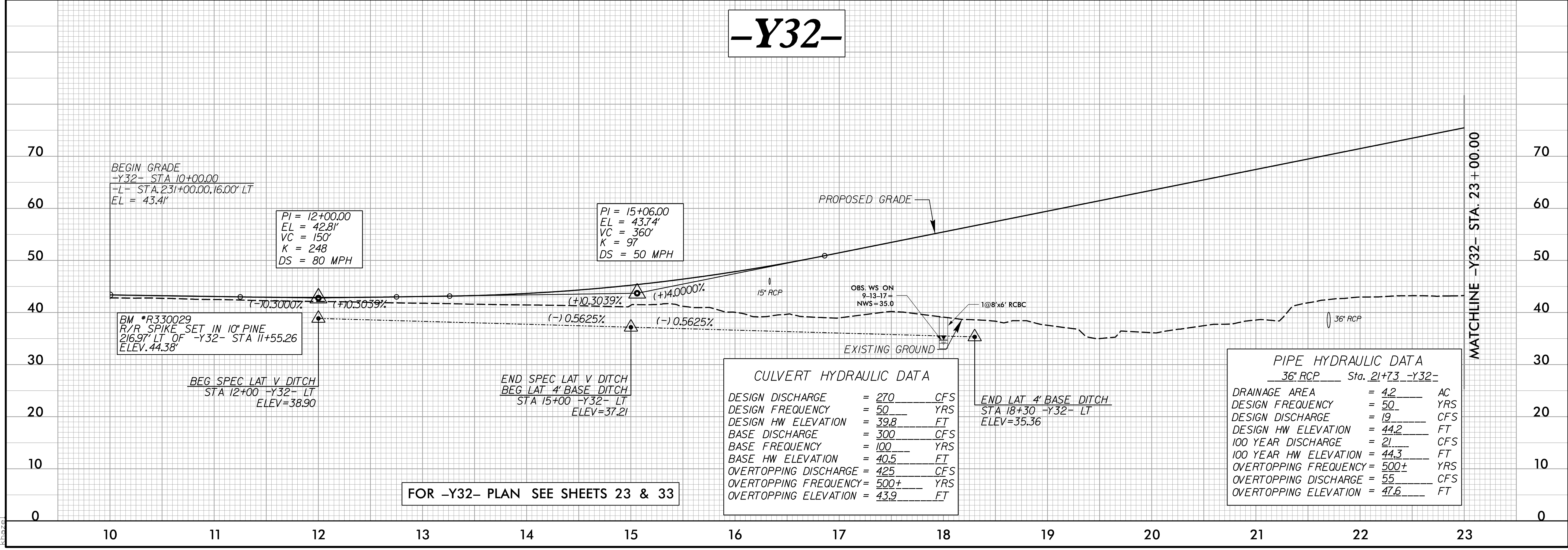
HYDRAULICS ENGINEER
 J. G. DALTON
 11/22/2021

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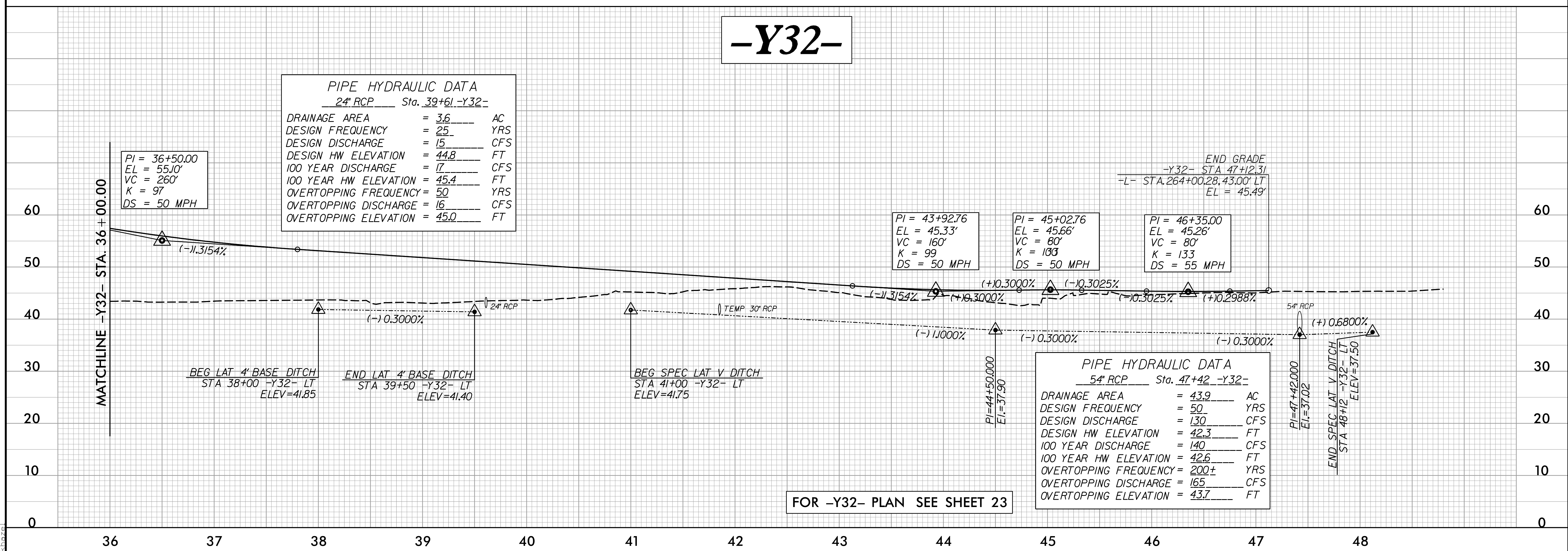
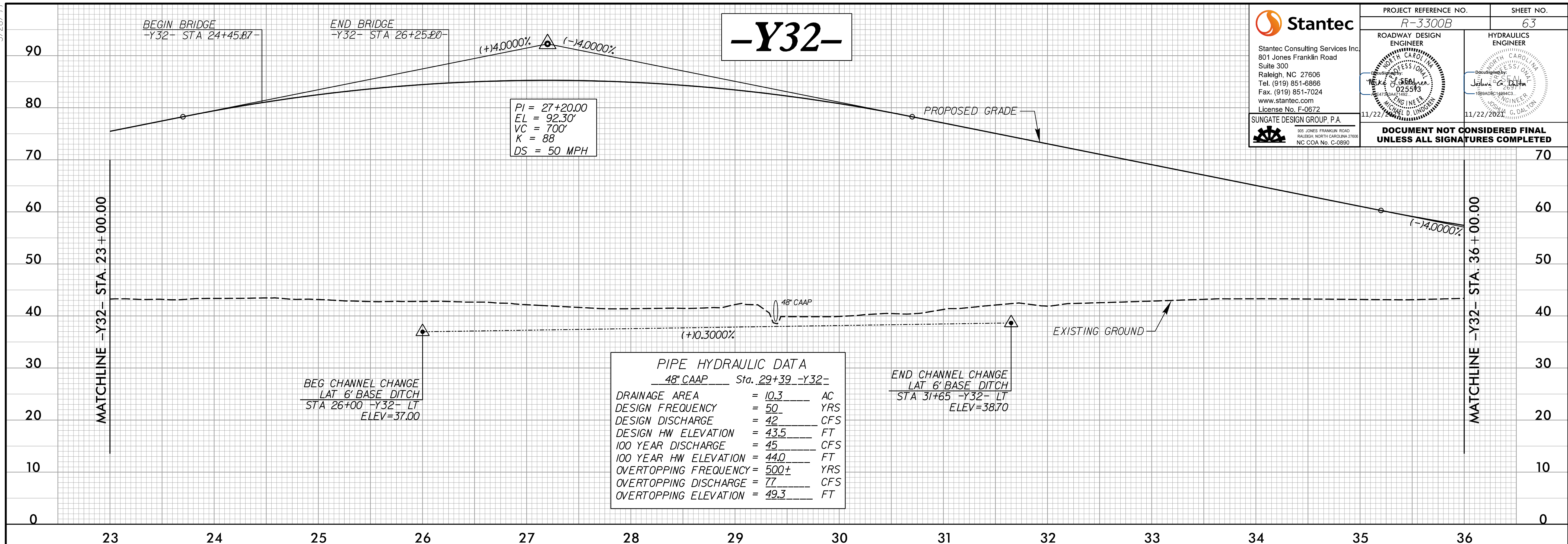
PROJECT REFERENCE NO. **R-3300B**
 SHEET NO. **63**

ROADWAY DESIGN ENGINEER
 J. G. DALTON
 11/22/2020

HYDRAULICS ENGINEER
 J. G. DALTON
 11/22/2020

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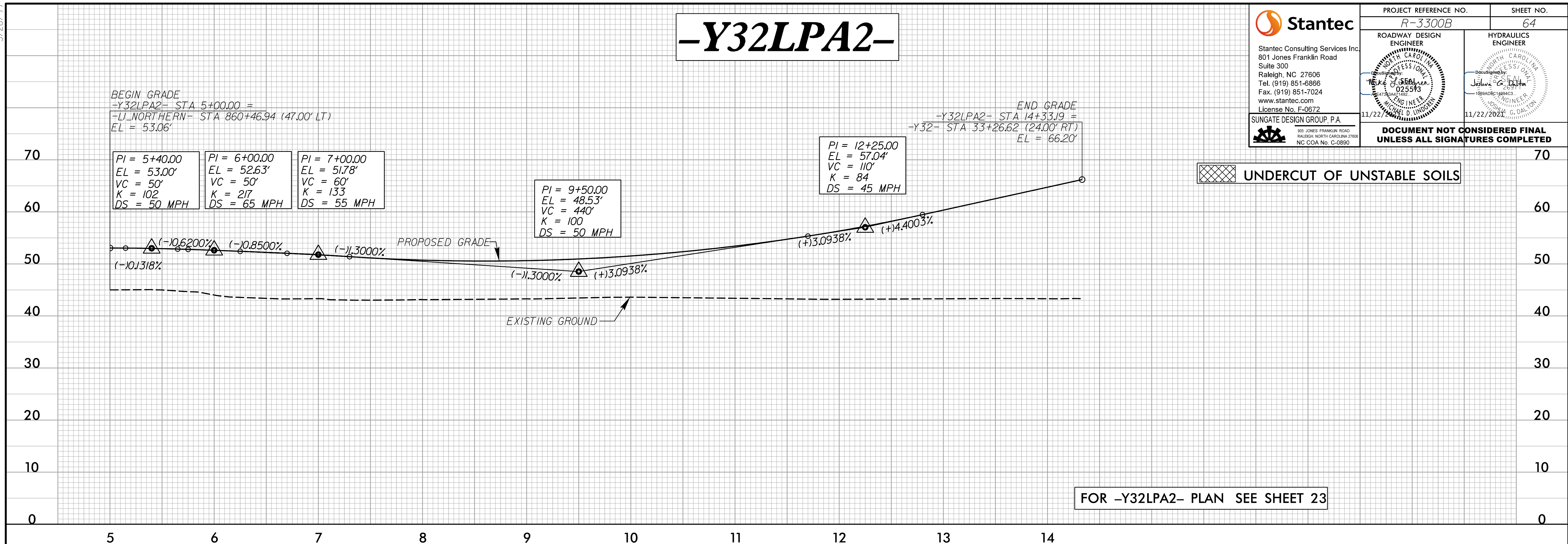
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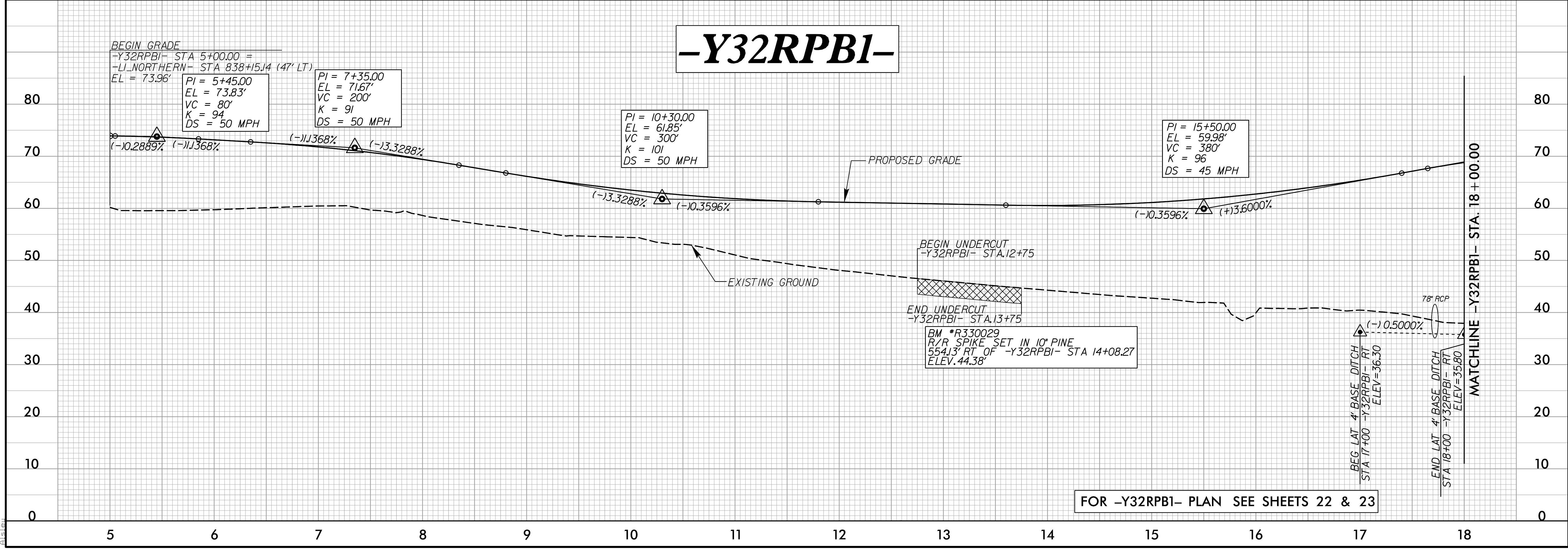
PROJECT REFERENCE NO. R-3300B
 SHEET NO. 64

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HYDRAULICS ENGINEER
 JAMES G. DALTON
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-Y32RPB1-



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PROJECT REFERENCE NO. **R-3300B** SHEET NO. **65**

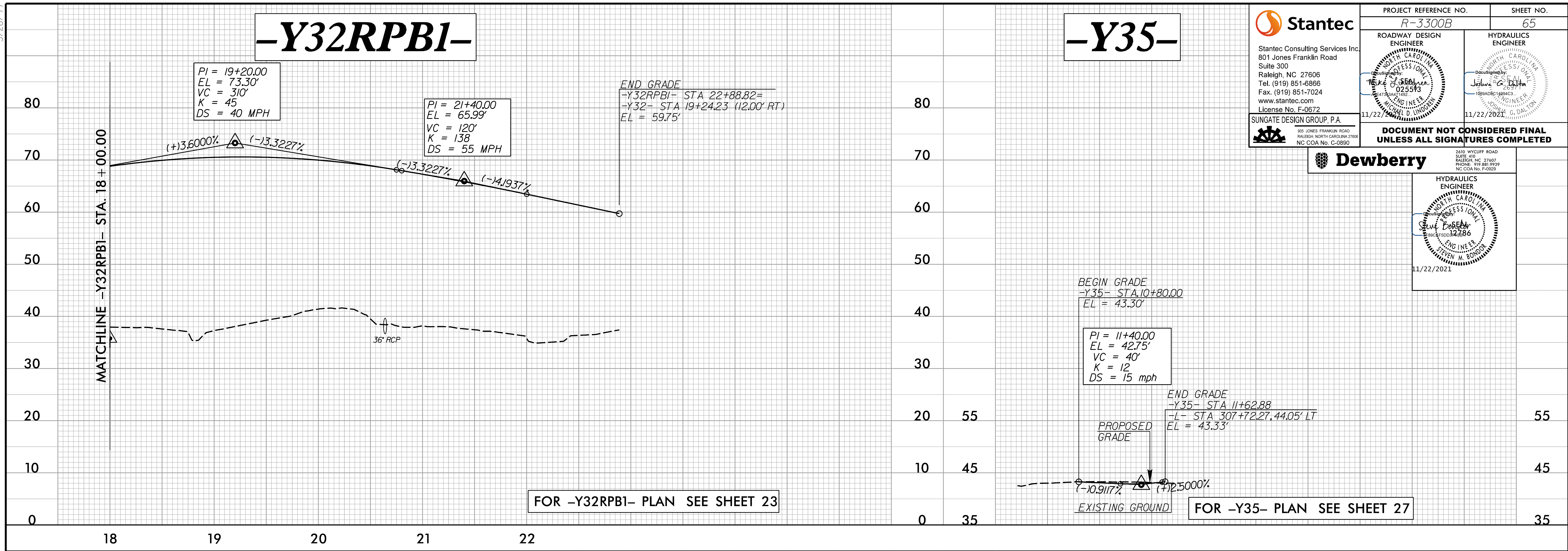
ROADWAY DESIGN ENGINEER
 ENGINEER
 11/22/2021

HYDRAULICS ENGINEER
 ENGINEER
 11/22/2021

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Dewberry

HYDRAULICS ENGINEER
 ENGINEER
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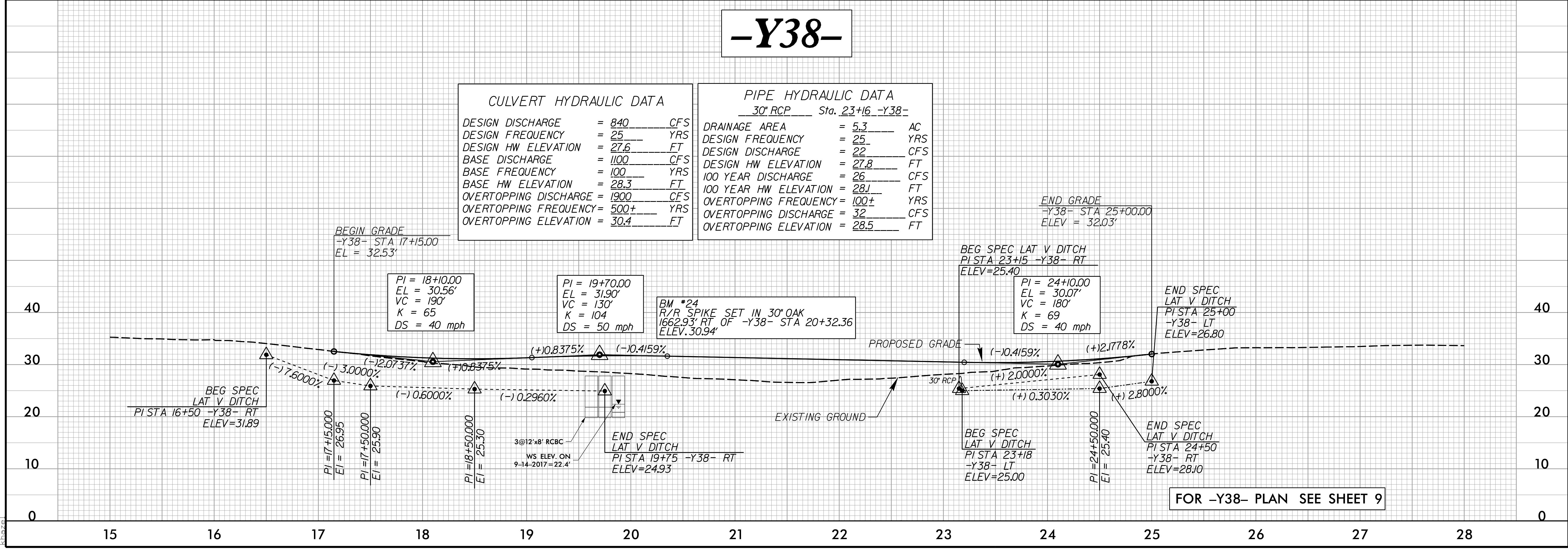


FOR -Y32RPBI- PLAN SEE SHEET 23

FOR -Y35- PLAN SEE SHEET 27

-Y38-

CULVERT HYDRAULIC DATA		PIPE HYDRAULIC DATA	
DESIGN DISCHARGE	= 840 CFS	DRAINAGE AREA	= 5.3 AC
DESIGN FREQUENCY	= 25 YRS	DESIGN FREQUENCY	= 25 YRS
DESIGN HW ELEVATION	= 27.6 FT	DESIGN DISCHARGE	= 22 CFS
BASE DISCHARGE	= 1100 CFS	DESIGN HW ELEVATION	= 27.8 FT
BASE FREQUENCY	= 100 YRS	100 YEAR DISCHARGE	= 26 CFS
BASE HW ELEVATION	= 28.3 FT	100 YEAR HW ELEVATION	= 28.1 FT
OVERTOPPING DISCHARGE	= 1300 CFS	OVERTOPPING FREQUENCY	= 100± YRS
OVERTOPPING FREQUENCY	= 500± YRS	OVERTOPPING DISCHARGE	= 32 CFS
OVERTOPPING ELEVATION	= 30.4 FT	OVERTOPPING ELEVATION	= 28.5 FT



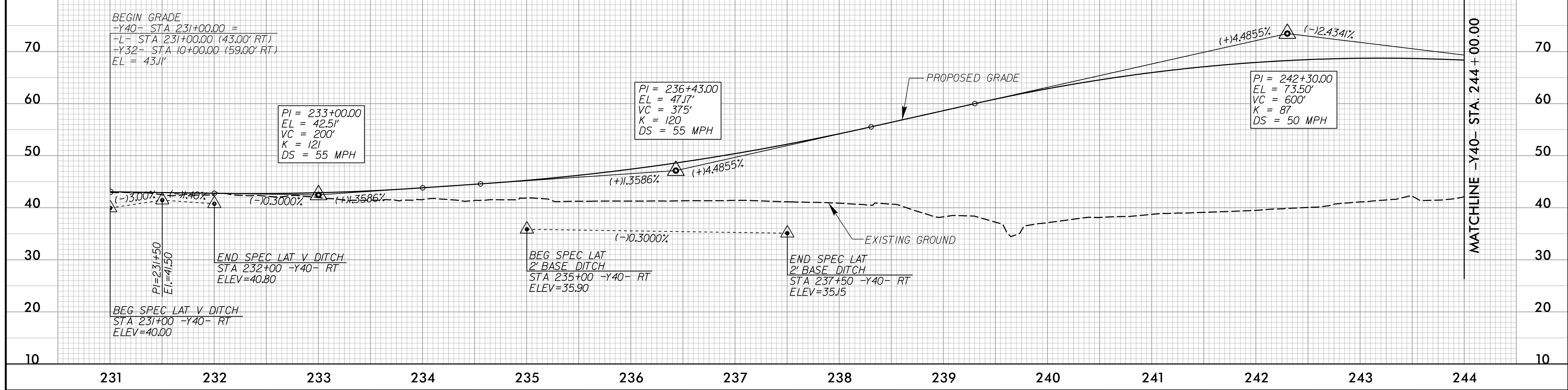
FOR -Y38- PLAN SEE SHEET 9

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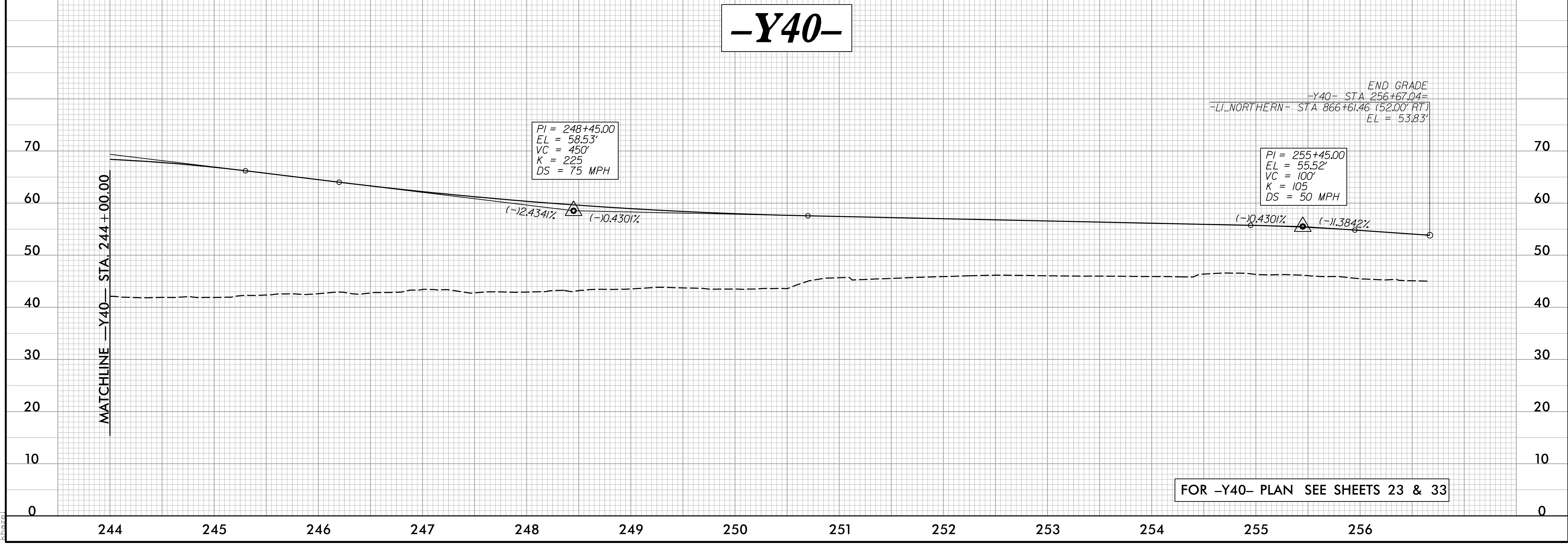
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-Y40-

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	R-3300B	66
	<p>ROADWAY DESIGN ENGINEER</p>	<p>HYDRAULICS ENGINEER</p>
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-Y40-



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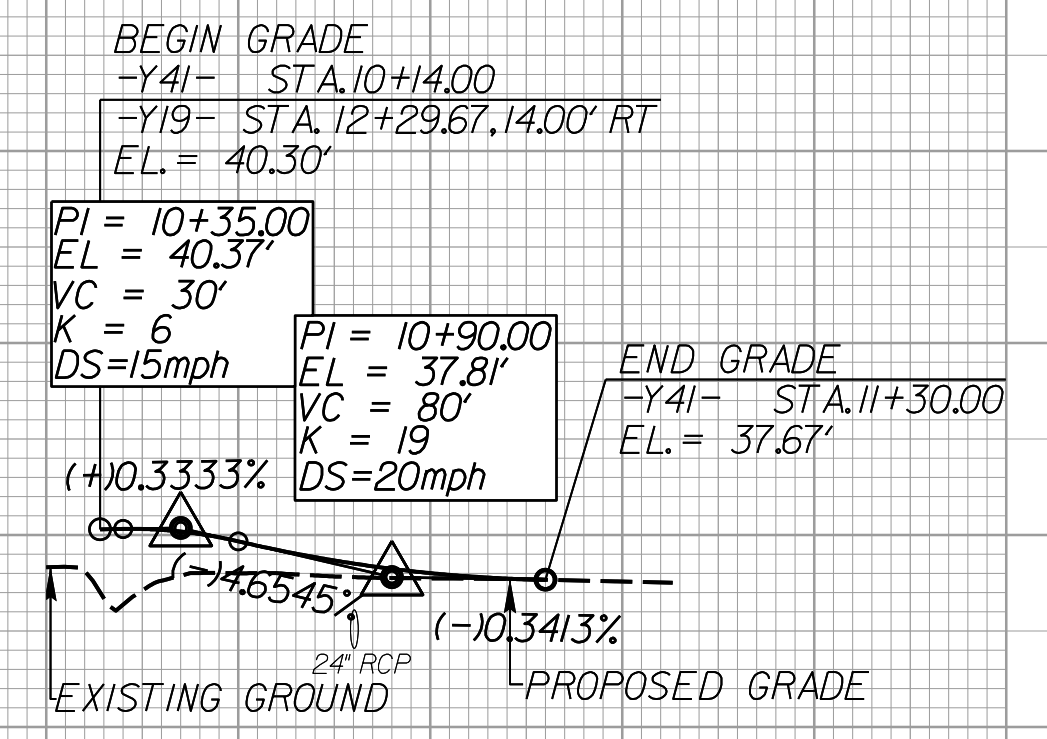
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PROJECT REFERENCE NO. <i>R-3300B</i>	SHEET NO. 67
ROADWAY DESIGN ENGINEER <i>Michael Steiner</i> 11/22/2018	HYDRAULICS ENGINEER <i>Johanna G. Dalton</i> 11/22/2018

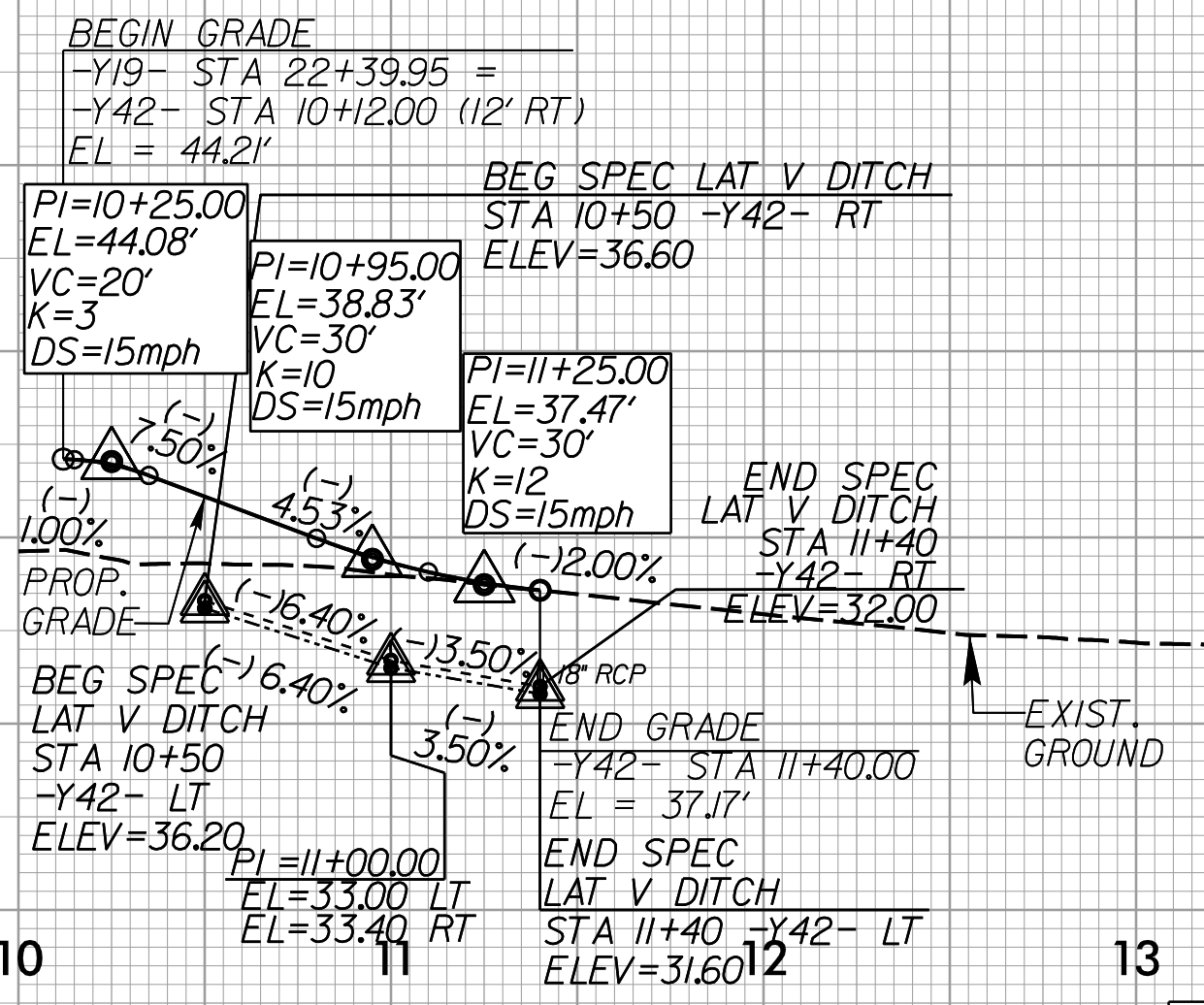
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-Y41-



FOR -Y41- PLAN SEE SHEET 33

-Y42-

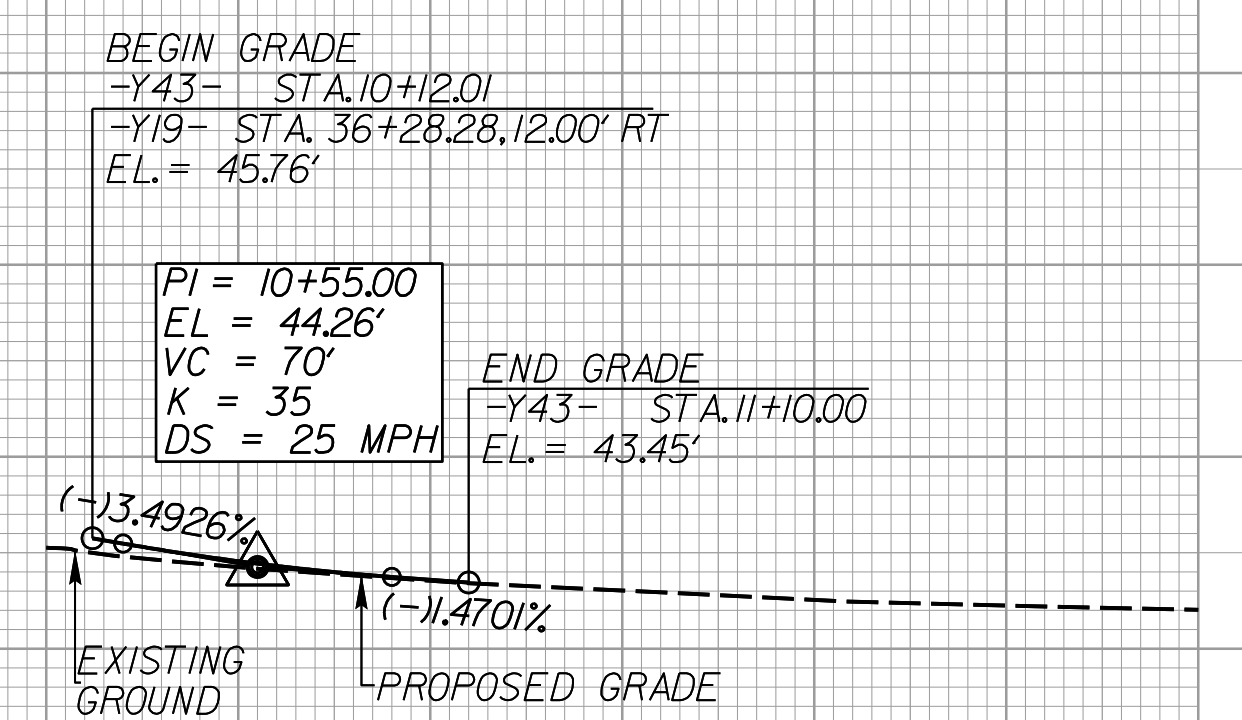


PIPE HYDRAULIC DATA
 18" RCP Sta. 11+40 -Y42-

DRAINAGE AREA	= 0.21	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 1.2	CFS
DESIGN HW ELEVATION	= 32.6	FT
100 YEAR DISCHARGE	= 1.4	CFS
100 YEAR HW ELEVATION	= 32.6	FT
OVERTOPPING FREQUENCY	= 500±	YRS
OVERTOPPING DISCHARGE	= 17	CFS
OVERTOPPING ELEVATION	= 37.0	FT

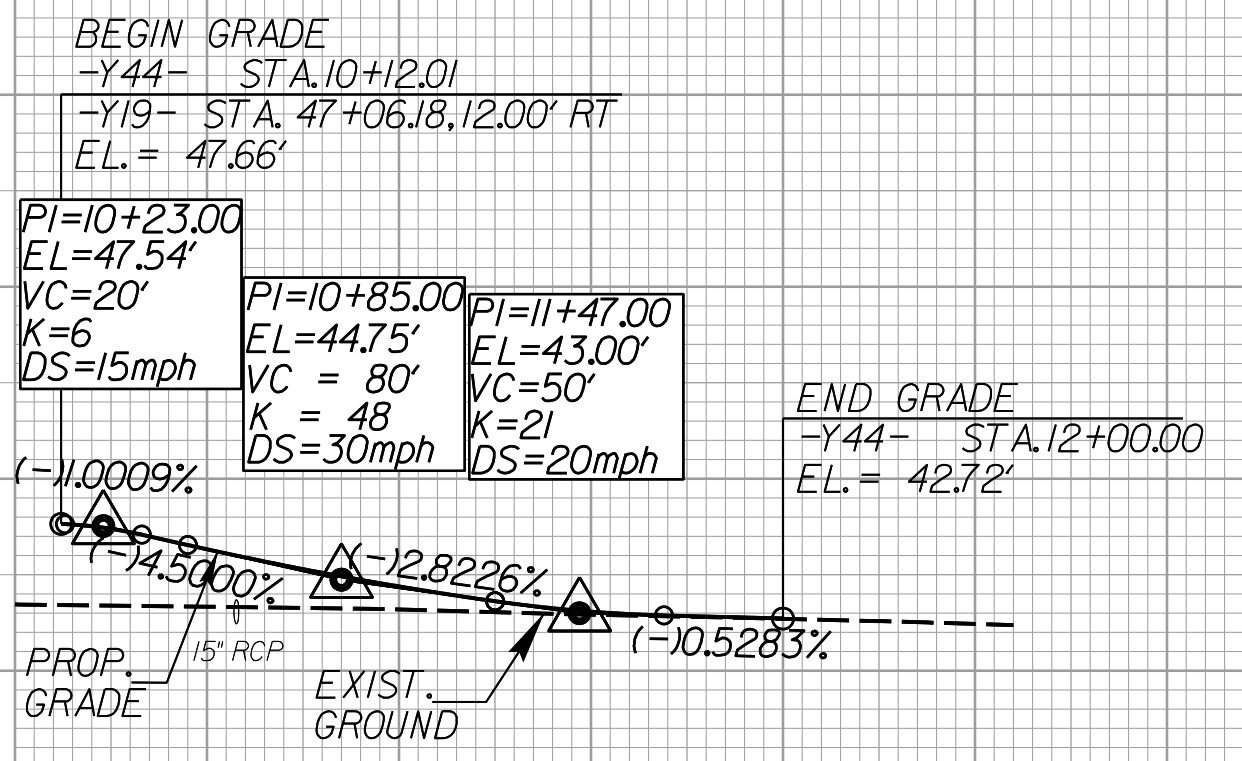
FOR -Y42- PLAN SEE SHEET 33

-Y43-



FOR -Y43- PLAN SEE SHEET 23

-Y44-



FOR -Y44- PLAN SEE SHEET 23

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PROJECT REFERENCE NO. **R-3300B**
 SHEET NO. **68**

ROADWAY DESIGN ENGINEER
 SUNGATE DESIGN GROUP, P.A.
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 RALEIGH, NORTH CAROLINA 27606
 NC COA No. C-0890

HYDRAULICS ENGINEER
 JAMES G. DALTON
 11/22/2023

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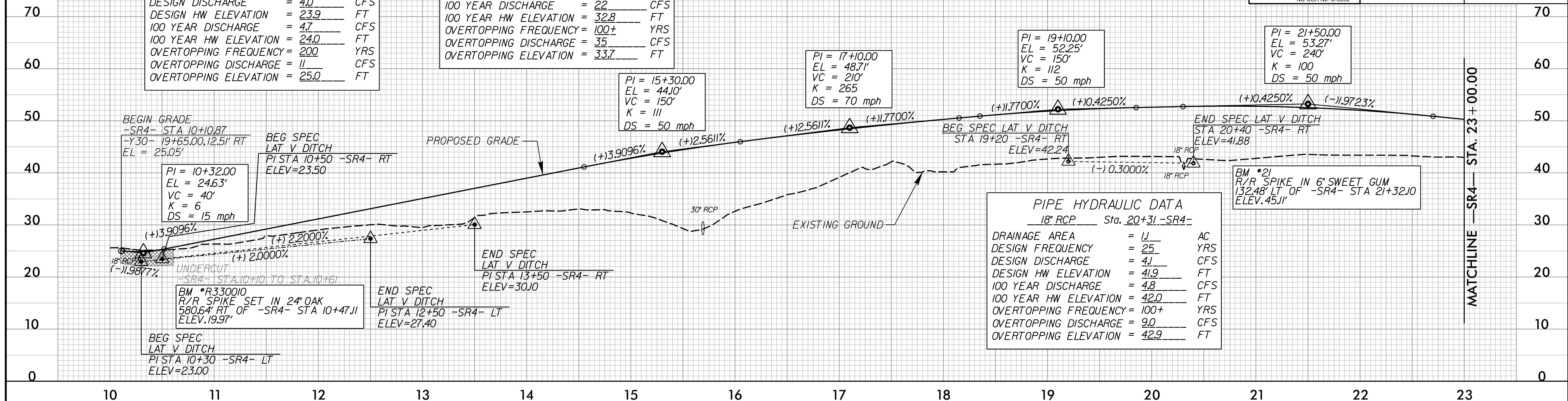
-SR4-

PIPE HYDRAULIC DATA
 18" RCP Sta. 10+28 -SR4-

DRAINAGE AREA	= 0.8	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 4.0	CFS
DESIGN HW ELEVATION	= 23.9	FT
100 YEAR DISCHARGE	= 4.7	CFS
100 YEAR HW ELEVATION	= 24.0	FT
OVERTOPPING FREQUENCY	= 200	YRS
OVERTOPPING DISCHARGE	= 11	CFS
OVERTOPPING ELEVATION	= 25.0	FT

PIPE HYDRAULIC DATA
 30" RCP Sta. 15+69 -SR4-

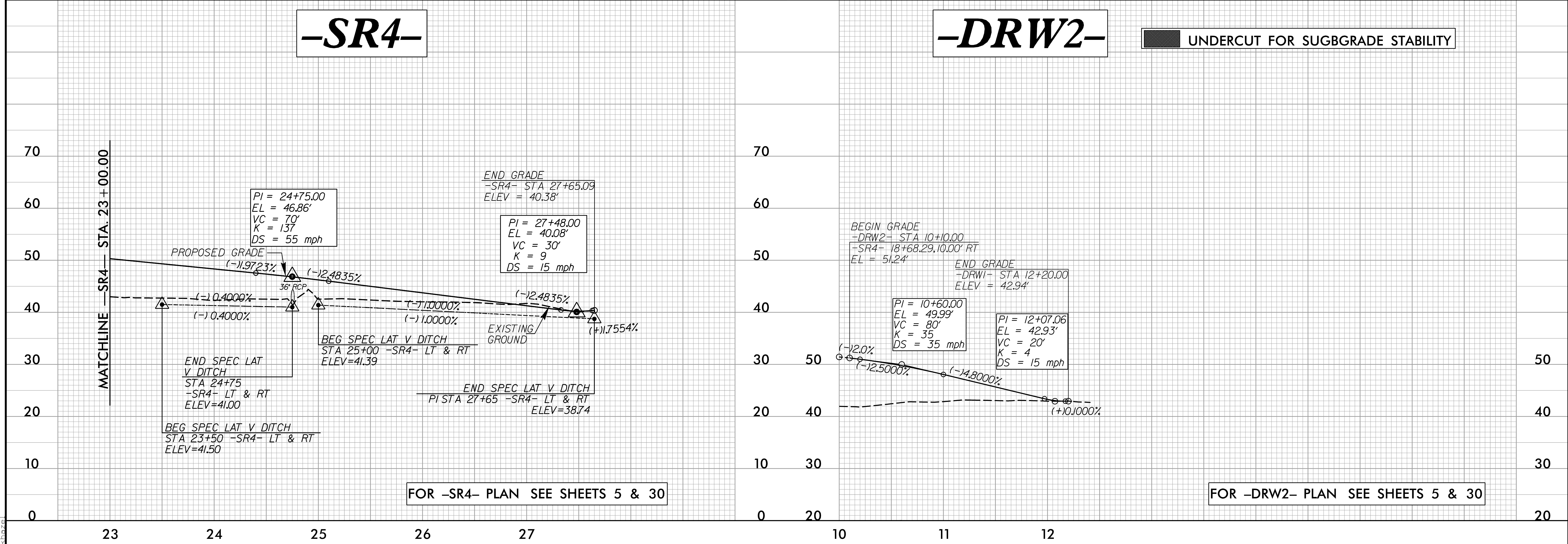
DRAINAGE AREA	= 5.1	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 19	CFS
DESIGN HW ELEVATION	= 32.5	FT
100 YEAR DISCHARGE	= 22	CFS
100 YEAR HW ELEVATION	= 32.8	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 35	CFS
OVERTOPPING ELEVATION	= 33.7	FT



-SR4-

-DRW2-

UNDERCUT FOR SUBGRADE STABILITY



FOR -SR4- PLAN SEE SHEETS 5 & 30

FOR -DRW2- PLAN SEE SHEETS 5 & 30

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-SR5-

PIPE HYDRAULIC DATA
30" RCP Sta. 21+20 -SR5-

DRAINAGE AREA	= 7.4	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 25	CFS
DESIGN HW ELEVATION	= 41.6	FT
100 YEAR DISCHARGE	= 29	CFS
100 YEAR HW ELEVATION	= 41.9	FT
OVERTOPPING FREQUENCY	= 100±	YRS
OVERTOPPING DISCHARGE	= 31	CFS
OVERTOPPING ELEVATION	= 42.0	FT

PIPE HYDRAULIC DATA
18" RCP Sta. 13+50 -SR5-

DRAINAGE AREA	= 1.7	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 7	CFS
DESIGN HW ELEVATION	= 35.6	FT
100 YEAR DISCHARGE	= 8	CFS
100 YEAR HW ELEVATION	= 35.9	FT
OVERTOPPING FREQUENCY	= 100±	YRS
OVERTOPPING DISCHARGE	= 12	CFS
OVERTOPPING ELEVATION	= 36.5	FT

PIPE HYDRAULIC DATA
18" RCP Sta. 16+28 -SR5-

DRAINAGE AREA	= 1.4	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 6	CFS
DESIGN HW ELEVATION	= 37.9	FT
100 YEAR DISCHARGE	= 7	CFS
100 YEAR HW ELEVATION	= 38.1	FT
OVERTOPPING FREQUENCY	= 100±	YRS
OVERTOPPING DISCHARGE	= 9	CFS
OVERTOPPING ELEVATION	= 38.5	FT

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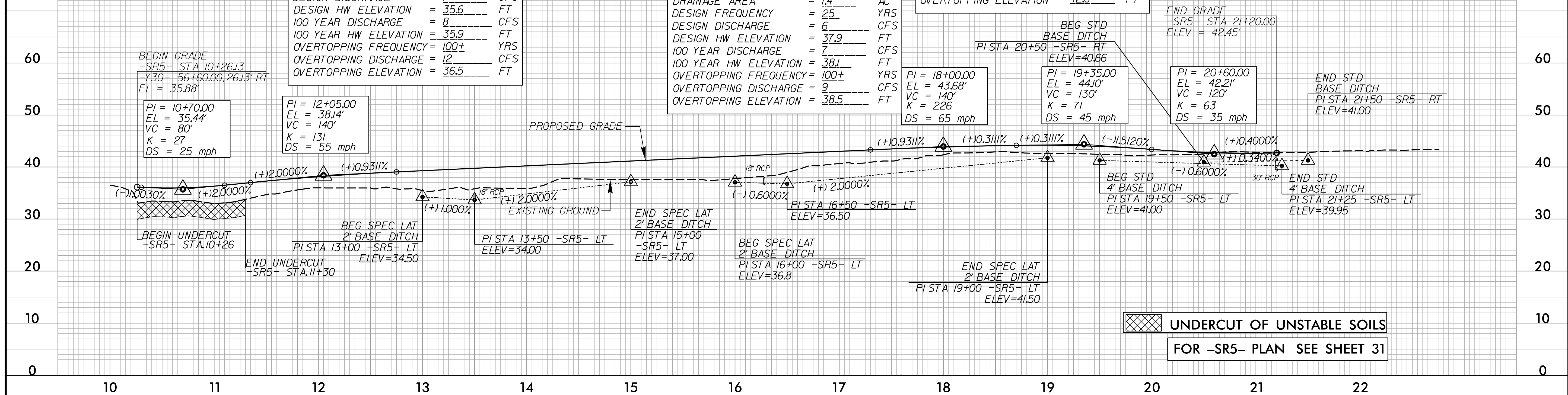
SUNGATE DESIGN GROUP, P.A.
905 JONES FRANKLIN ROAD
RALEIGH, NORTH CAROLINA 27608
NC COA No. C-0890

PROJECT REFERENCE NO. **R-3300B**
SHEET NO. **69**

ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER

11/22/2021

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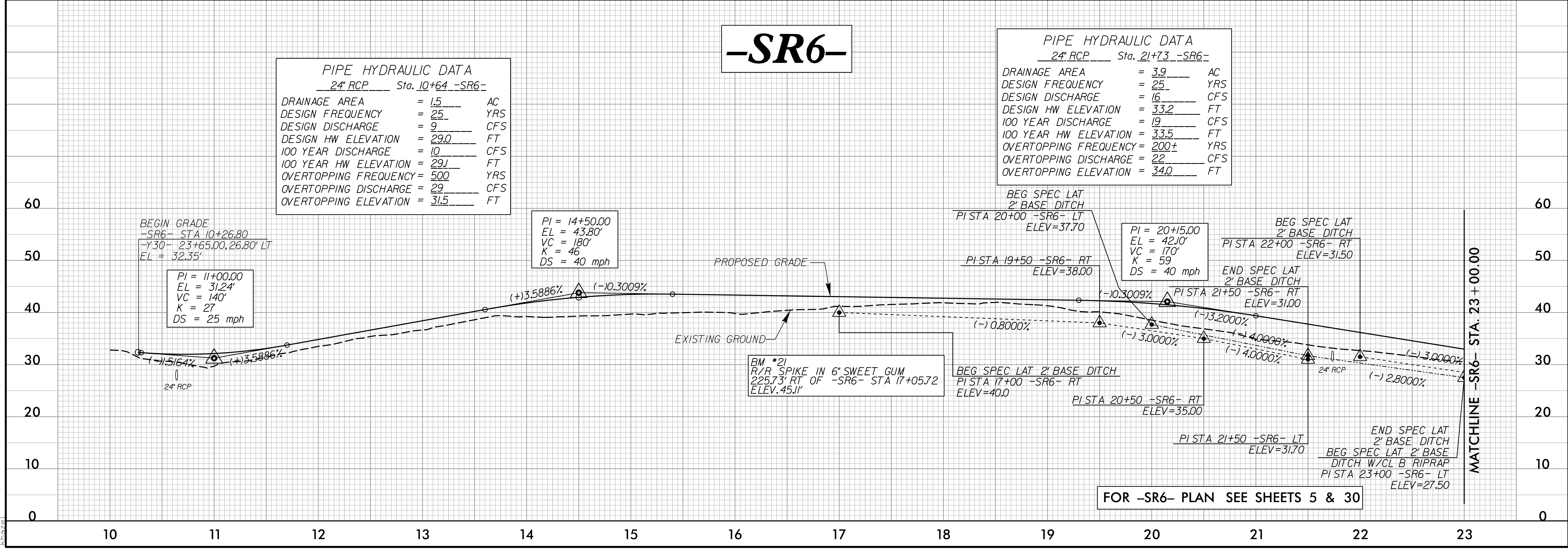
-SR6-

PIPE HYDRAULIC DATA
24" RCP Sta. 21+73 -SR6-

DRAINAGE AREA	= 3.9	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 16	CFS
DESIGN HW ELEVATION	= 33.2	FT
100 YEAR DISCHARGE	= 19	CFS
100 YEAR HW ELEVATION	= 33.5	FT
OVERTOPPING FREQUENCY	= 200±	YRS
OVERTOPPING DISCHARGE	= 22	CFS
OVERTOPPING ELEVATION	= 34.0	FT

PIPE HYDRAULIC DATA
24" RCP Sta. 10+64 -SR6-

DRAINAGE AREA	= 1.5	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 9	CFS
DESIGN HW ELEVATION	= 29.0	FT
100 YEAR DISCHARGE	= 10	CFS
100 YEAR HW ELEVATION	= 29.1	FT
OVERTOPPING FREQUENCY	= 500	YRS
OVERTOPPING DISCHARGE	= 29	CFS
OVERTOPPING ELEVATION	= 31.5	FT



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5/28/19

-SR6-

Stantec
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 Fax. (919) 851-7024
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 License No. F-0672

PROJECT REFERENCE NO. *R-3300B*
 SHEET NO. *70*

ROADWAY DESIGN ENGINEER
 J. G. DALTON
 11/22/2021

HYDRAULICS ENGINEER
 J. G. DALTON
 11/22/2021

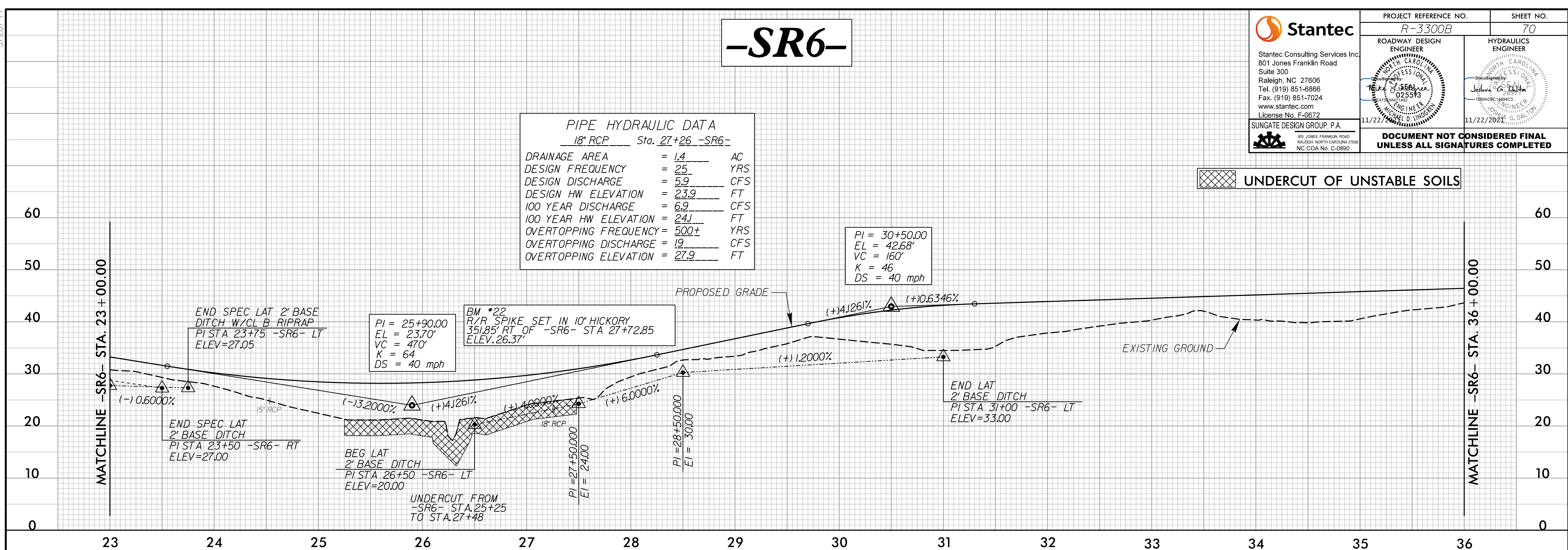
SUNGATE DESIGN GROUP, P.A.
 905 JONES FRANKLIN ROAD
 RALEIGH, NORTH CAROLINA 27606
 NC COA No. C-0890

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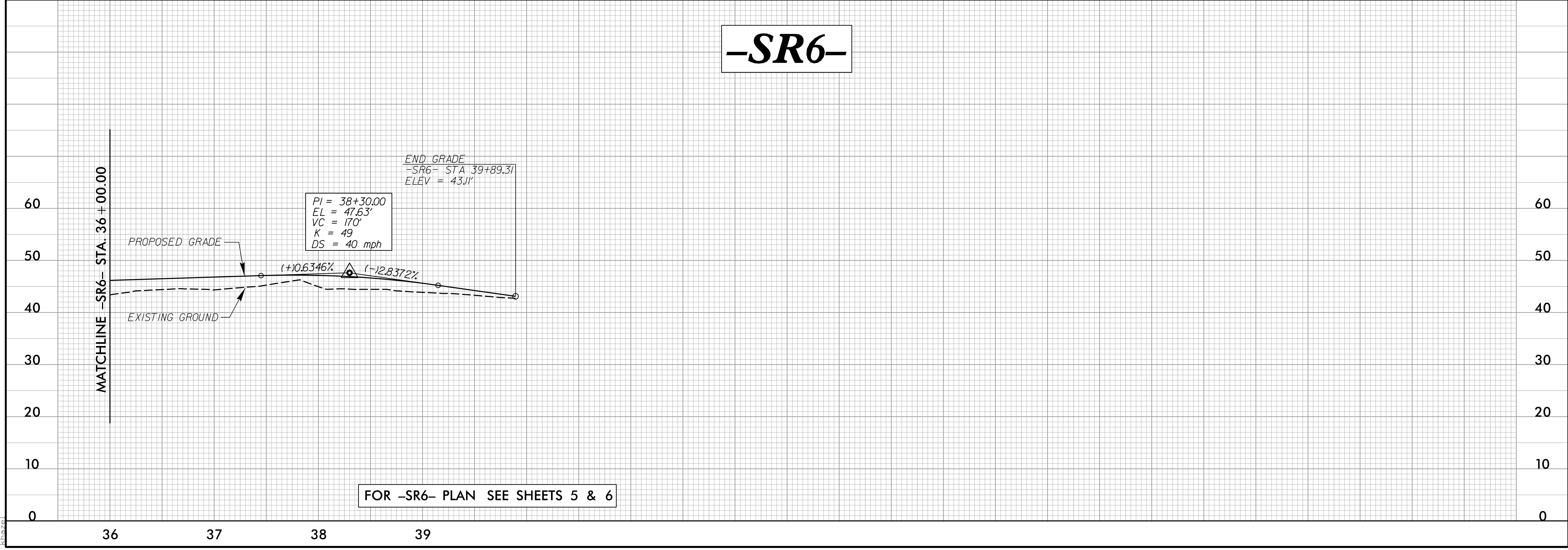
PIPE HYDRAULIC DATA
 18" RCP Sta. 27+26 -SR6-

DRAINAGE AREA	= 1.4	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 5.9	CFS
DESIGN HW ELEVATION	= 23.9	FT
100 YEAR DISCHARGE	= 6.9	CFS
100 YEAR HW ELEVATION	= 24.1	FT
OVERTOPPING FREQUENCY	= 500±	YRS
OVERTOPPING DISCHARGE	= 19	CFS
OVERTOPPING ELEVATION	= 27.9	FT

UNDERCUT OF UNSTABLE SOILS



-SR6-



FOR -SR6- PLAN SEE SHEETS 5 & 6

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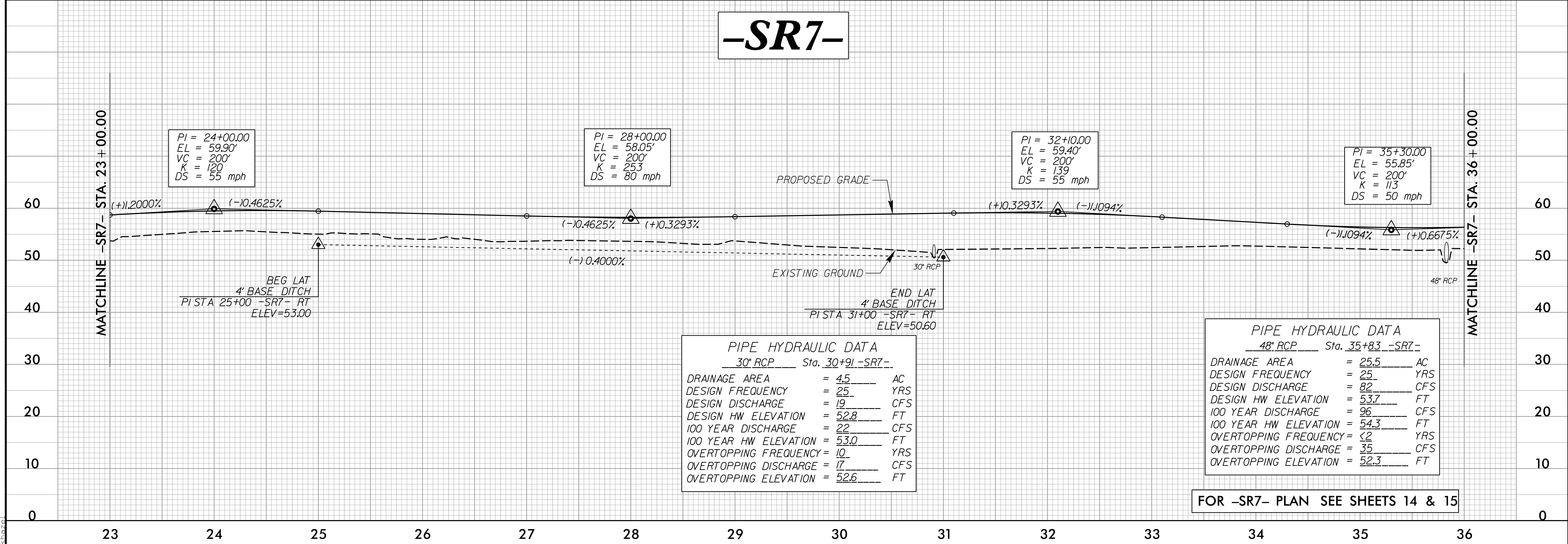
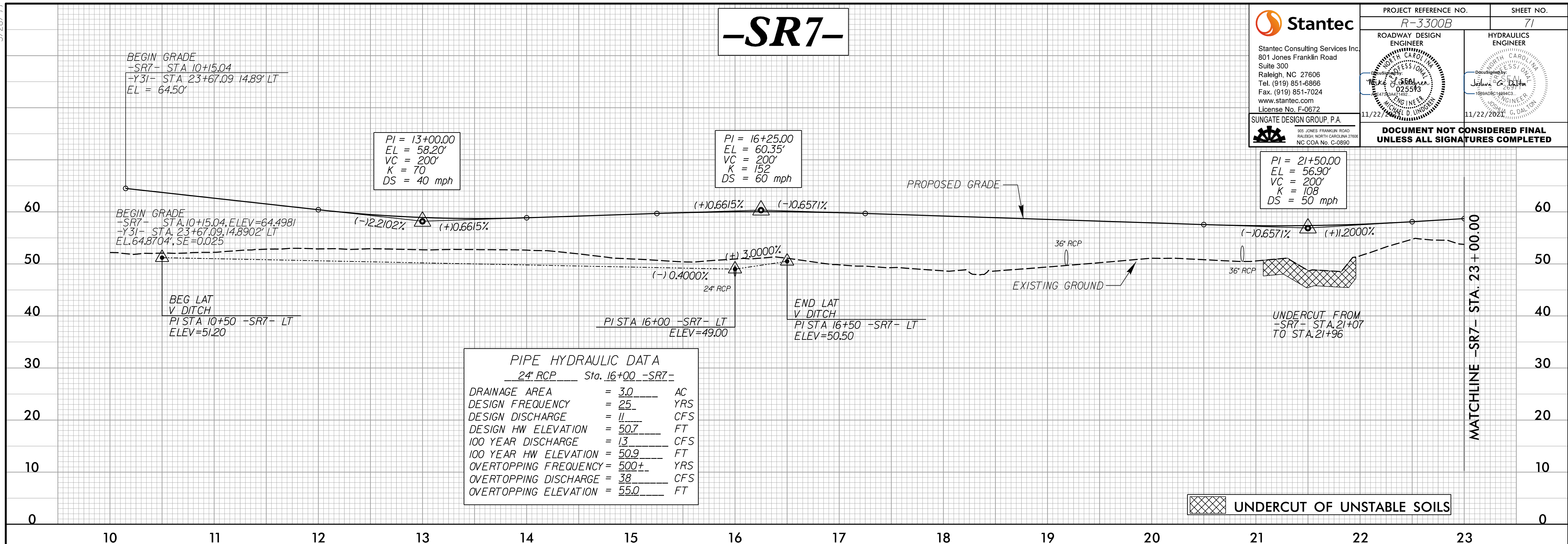
PROJECT REFERENCE NO. **R-3300B**
 SHEET NO. **71**

ROADWAY DESIGN ENGINEER
 SUNGATE DESIGN GROUP, P.A.
 905 JONES FRANKLIN ROAD
 RALEIGH, NORTH CAROLINA 27606
 NC COA No. C-0890

HYDRAULICS ENGINEER
 SUNGATE DESIGN GROUP, P.A.
 905 JONES FRANKLIN ROAD
 RALEIGH, NORTH CAROLINA 27606
 NC COA No. C-0890

11/22/2023
 11/22/2023

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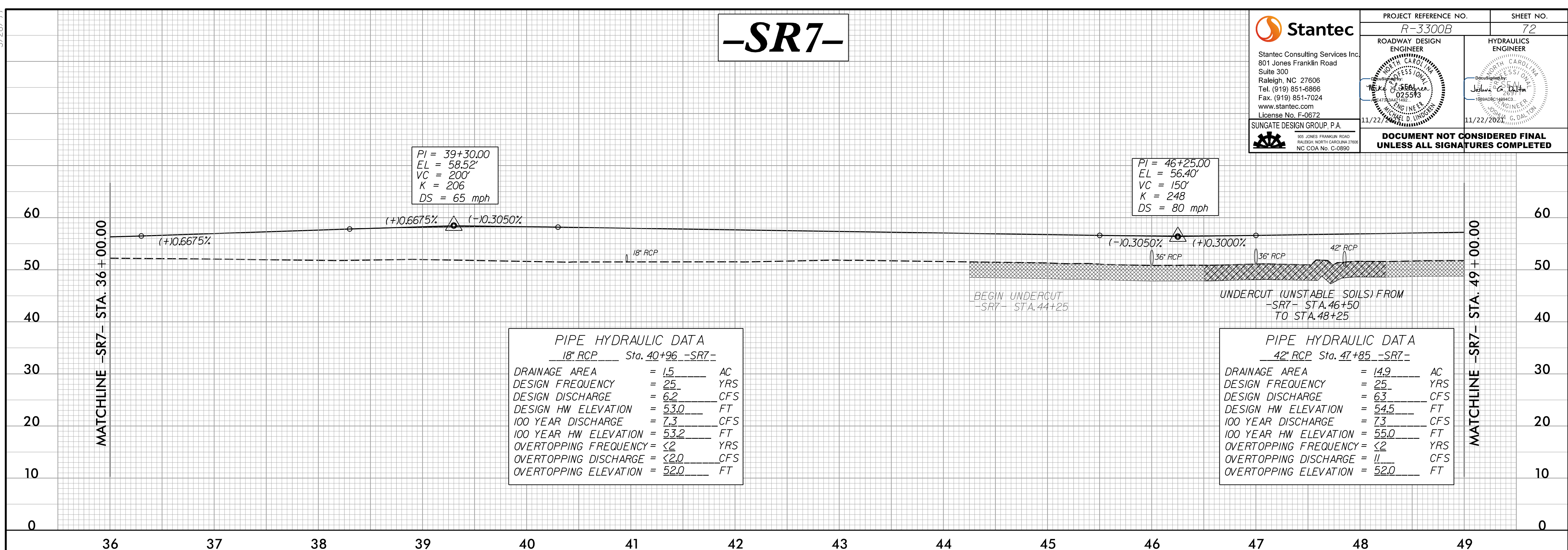
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-SR7-

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PROJECT REFERENCE NO. R-3300B	SHEET NO. 72
ROADWAY DESIGN ENGINEER Joshua G. Dalton 11/22/2022	HYDRAULICS ENGINEER Joshua G. Dalton 11/22/2022



PI = 39+30.00
 EL = 58.52'
 VC = 200'
 K = 206
 DS = 65 mph

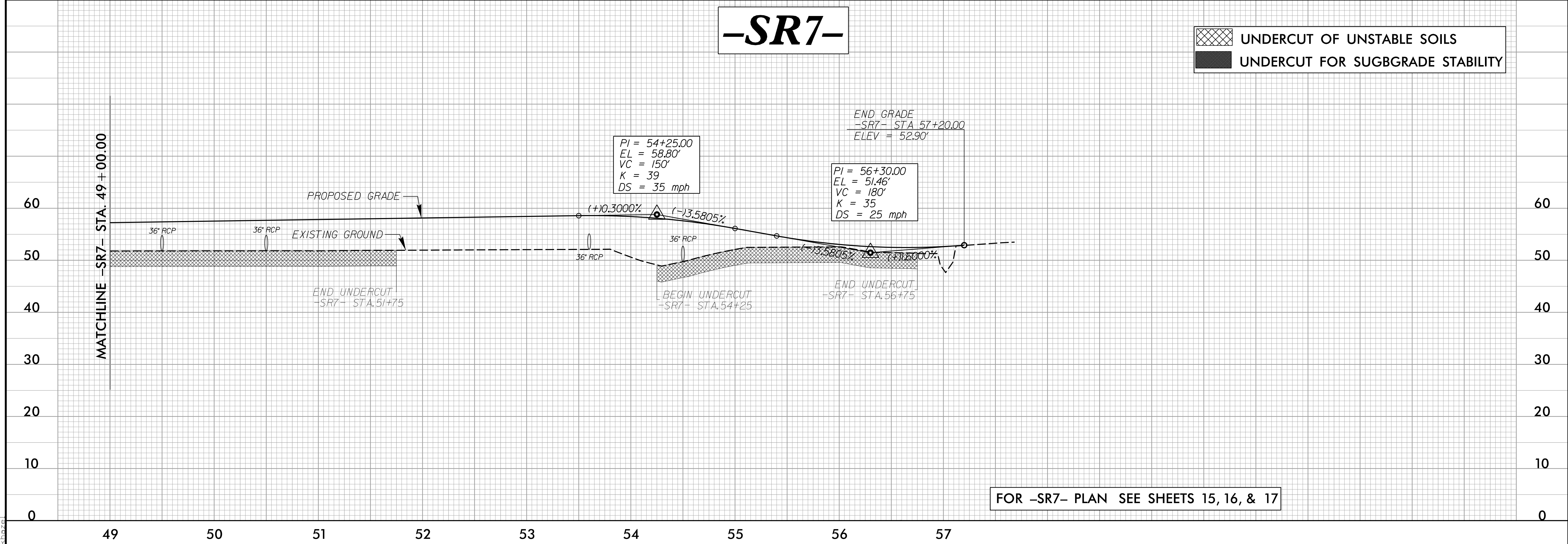
PI = 46+25.00
 EL = 56.40'
 VC = 150'
 K = 248
 DS = 80 mph

PIPE HYDRAULIC DATA		
18" RCP Sta. 40+96 -SR7-		
DRAINAGE AREA	= 1.5	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 6.2	CFS
DESIGN HW ELEVATION	= 53.0	FT
100 YEAR DISCHARGE	= 7.3	CFS
100 YEAR HW ELEVATION	= 53.2	FT
OVERTOPPING FREQUENCY	= <2	YRS
OVERTOPPING DISCHARGE	= <2.0	CFS
OVERTOPPING ELEVATION	= 52.0	FT

PIPE HYDRAULIC DATA		
42" RCP Sta. 47+85 -SR7-		
DRAINAGE AREA	= 14.9	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 63	CFS
DESIGN HW ELEVATION	= 54.5	FT
100 YEAR DISCHARGE	= 73	CFS
100 YEAR HW ELEVATION	= 55.0	FT
OVERTOPPING FREQUENCY	= <2	YRS
OVERTOPPING DISCHARGE	= 11	CFS
OVERTOPPING ELEVATION	= 52.0	FT

-SR7-

UNDERCUT OF UNSTABLE SOILS
 UNDERCUT FOR SUBGRADE STABILITY



PI = 54+25.00
 EL = 58.80'
 VC = 150'
 K = 39
 DS = 35 mph

PI = 56+30.00
 EL = 51.46'
 VC = 180'
 K = 35
 DS = 25 mph

END GRADE
 -SR7- STA. 57+20.00
 ELEV = 52.90'

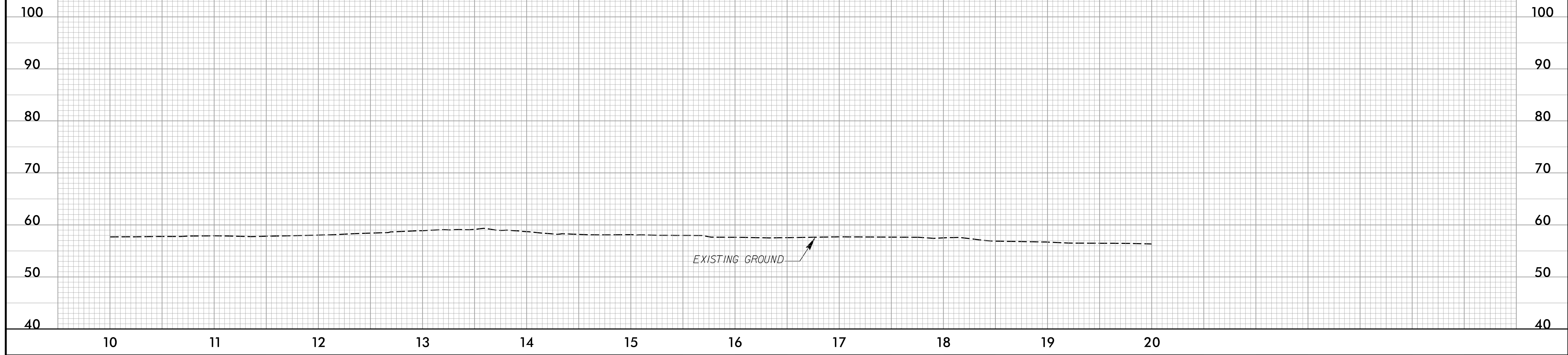
FOR -SR7- PLAN SEE SHEETS 15, 16, & 17

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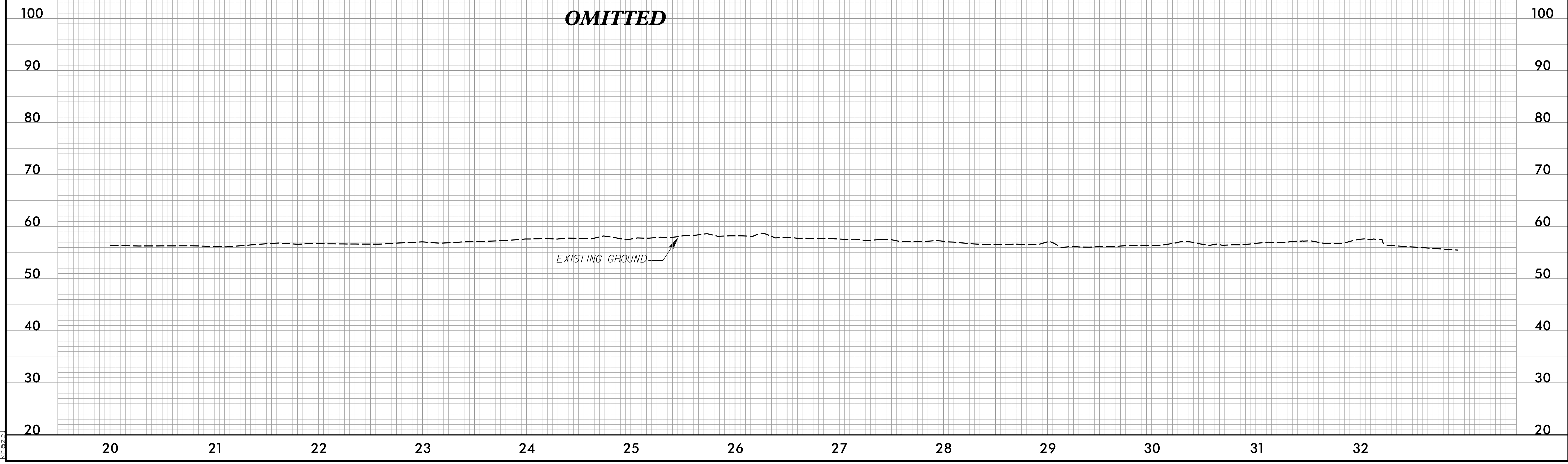
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<p>Stantec Stantec Consulting Services Inc. 801 Jones Franklin Road Suite 300 Raleigh, NC 27606 Tel. (919) 851-6866 Fax. (919) 851-7024 www.stantec.com License No. F-0672</p>	PROJECT REFERENCE NO. <i>R-3300B</i>	SHEET NO. <i>73</i>
	<p>ROADWAY DESIGN ENGINEER</p>	<p>HYDRAULICS ENGINEER</p>
<p>SUNGATE DESIGN GROUP, P.A. 905 JONES FRANKLIN ROAD RALEIGH, NORTH CAROLINA 27606 NC COA No. C-0890</p>	<p>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</p>	

-SR8-

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khan