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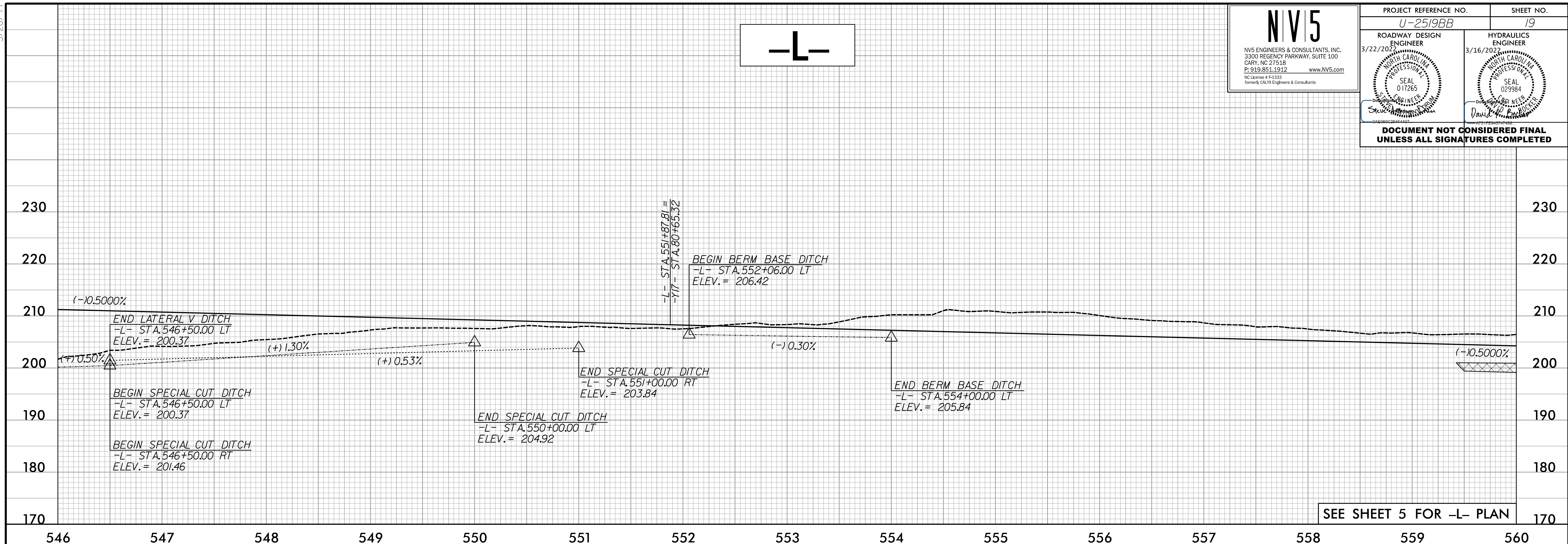
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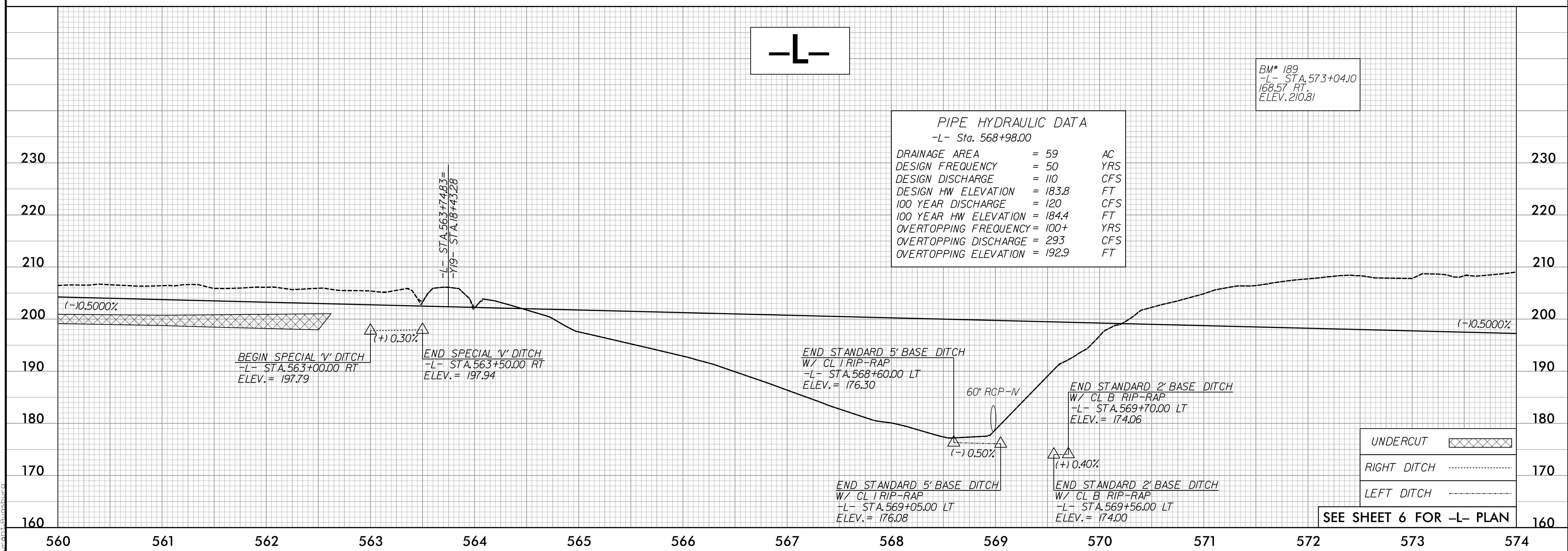
5/28/99

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 NV5 ENGINEERS & CONSULTANTS, INC.  
 3300 REGENCY PARKWAY, SUITE 100  
 CARY, NC 27518  
 P: 919.851.1912 www.NV5.com  
 NC License # F-3333  
 formerly, CALX Engineers & Consultants

PROJECT REFERENCE NO. <i>U-2519BB</i>	SHEET NO. <i>19</i>
ROADWAY DESIGN ENGINEER 3/22/2022 SEAL 017265 DAVID H. BOUCHER	HYDRAULICS ENGINEER 3/16/2022 SEAL 029984 DAVID H. BOUCHER
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



SEE SHEET 5 FOR -L- PLAN



**PIPE HYDRAULIC DATA**  
 -L- Sta. 568+98.00

DRAINAGE AREA	= 59	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 110	CFS
DESIGN HW ELEVATION	= 183.8	FT
100 YEAR DISCHARGE	= 120	CFS
100 YEAR HW ELEVATION	= 184.4	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 293	CFS
OVERTOPPING ELEVATION	= 192.9	FT

BM\* 189  
-L- STA. 573+04.10  
168.57 RT  
ELEV. 210.81

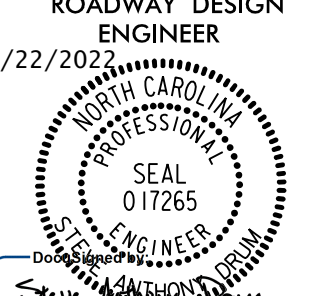
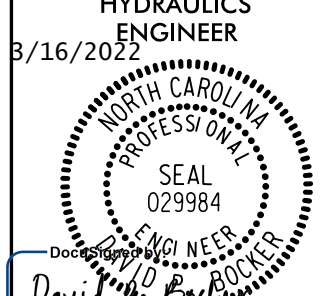
UNDERCUT	XXXXXX
RIGHT DITCH	.....
LEFT DITCH	.....

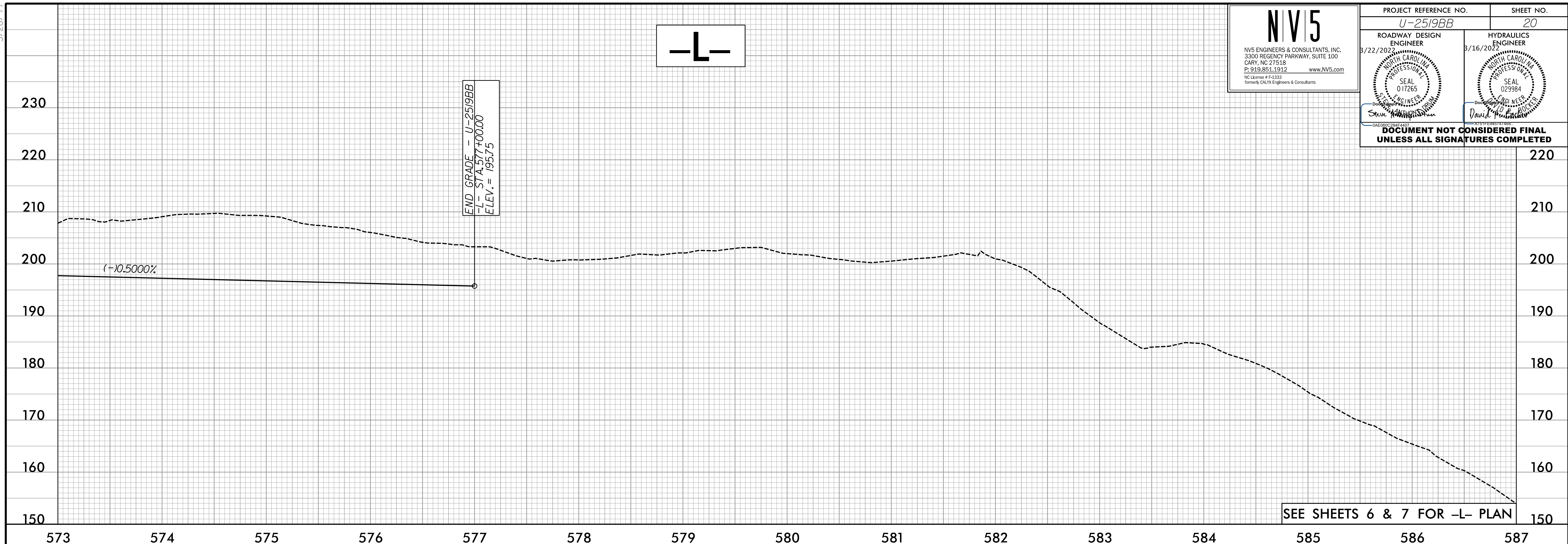
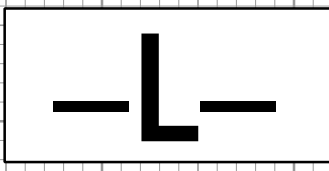
SEE SHEET 6 FOR -L- PLAN

3/7/2022  
R:\Projects\U2519BB\RDY\_PFL.dgn

5/28/99

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PROJECT REFERENCE NO. <i>U-2519BB</i>	SHEET NO. <i>20</i>
ROADWAY DESIGN ENGINEER 3/22/2022  <i>Steve [Signature]</i>	HYDRAULICS ENGINEER 3/16/2022  <i>David [Signature]</i>
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2/10/2022  
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E:\[Signature]

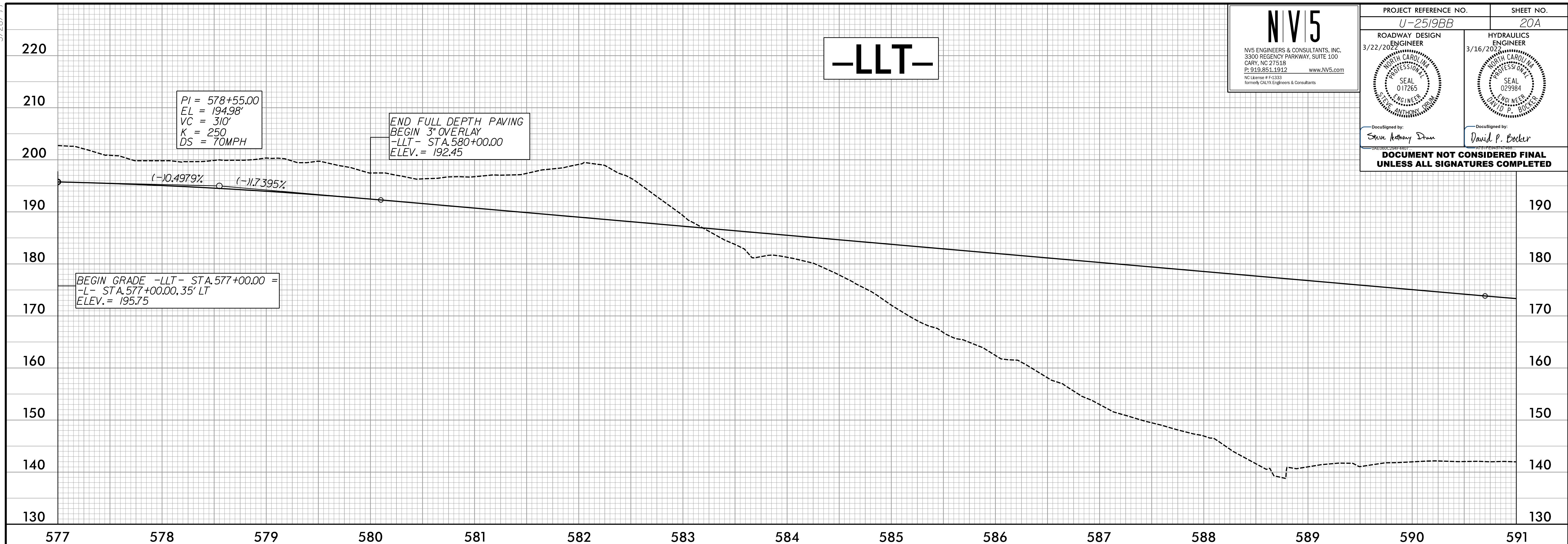
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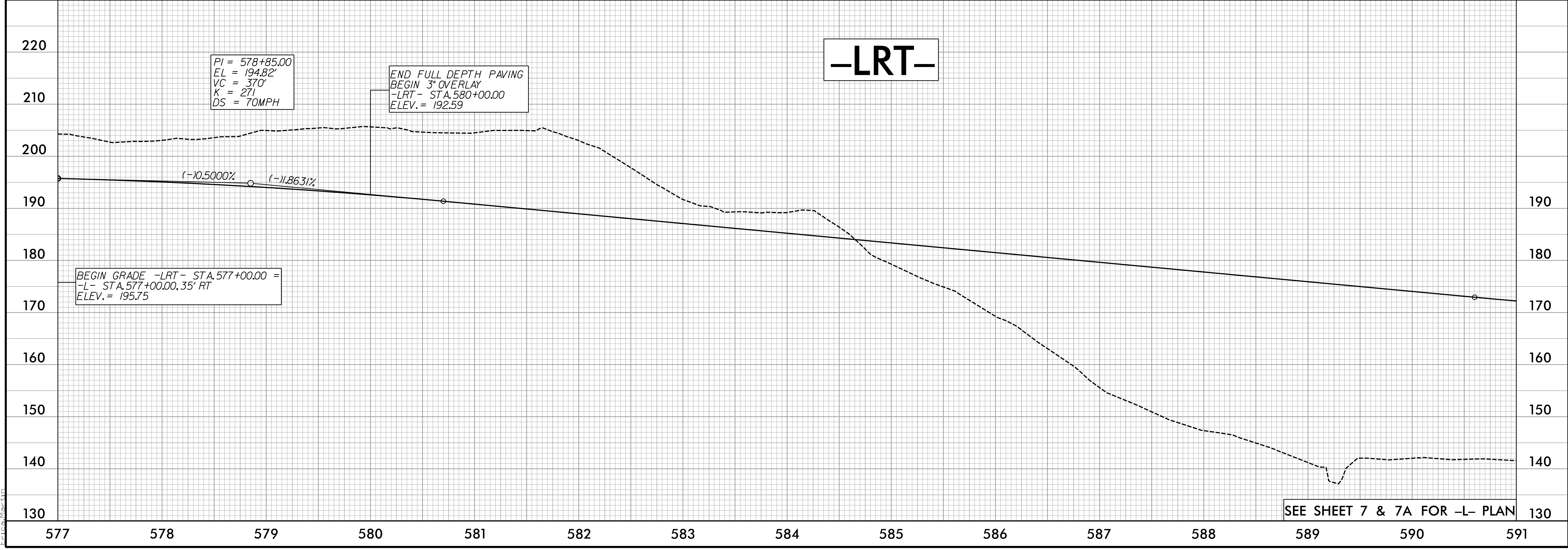
PROJECT REFERENCE NO. <i>U-2519BB</i>	SHEET NO. <i>20A</i>
ROADWAY DESIGN ENGINEER 3/22/2022	HYDRAULICS ENGINEER 3/16/2022
DocuSigned by: <i>Steve Anthony Dran</i>	DocuSigned by: <i>David P. Becker</i>

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UNLESS ALL SIGNATURES COMPLETED**

# -LLT-



# -LRT-



SEE SHEET 7 & 7A FOR -L- PLAN

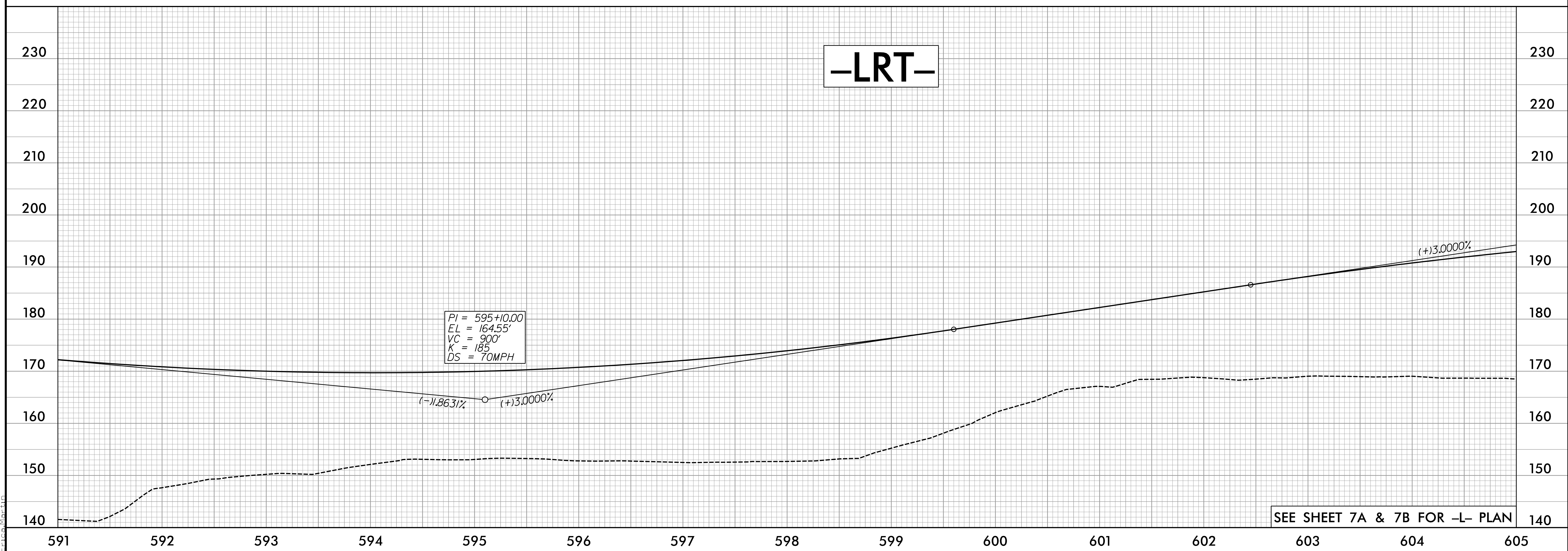
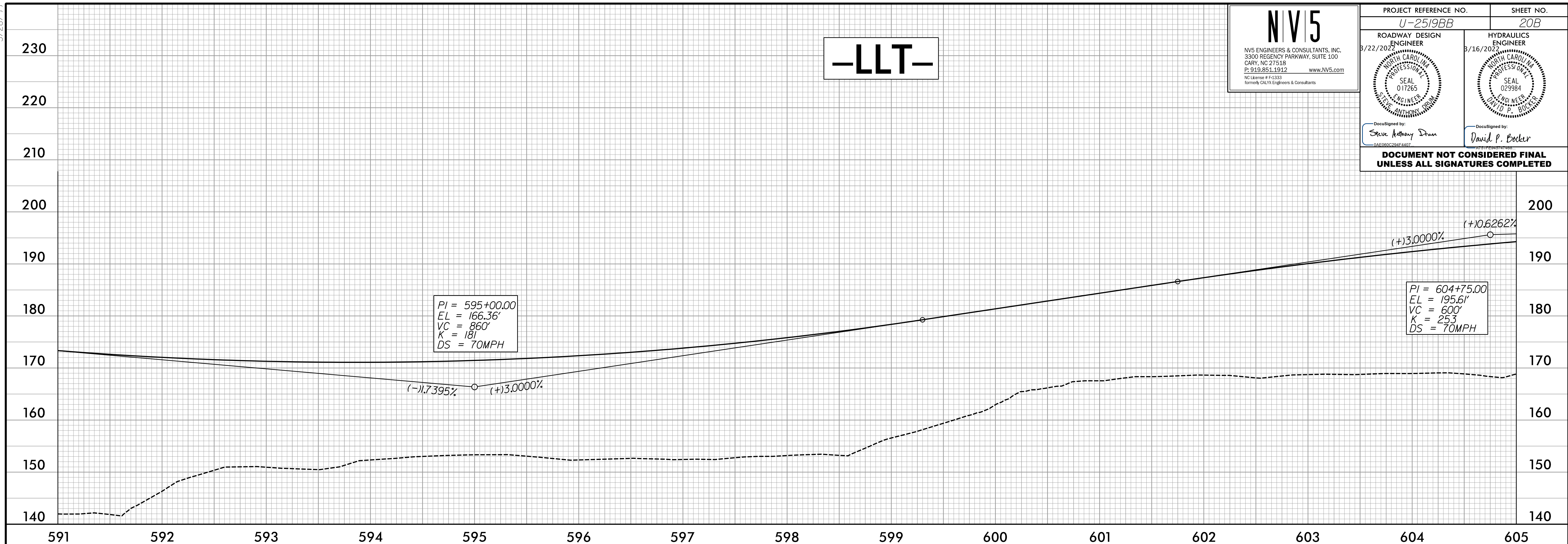
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R\1\2519\U-2519BB\_R0Y\_PFI.dgn  
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PROJECT REFERENCE NO. <i>U-2519BB</i>	SHEET NO. <i>20B</i>
ROADWAY DESIGN ENGINEER 3/22/2022 SEAL 017265 STEVE ANTHONY	HYDRAULICS ENGINEER 3/16/2022 SEAL 029984 DAVID P. BOEKER
DocuSigned by: <i>Steve Anthony</i>	DocuSigned by: <i>David P. Boeker</i>

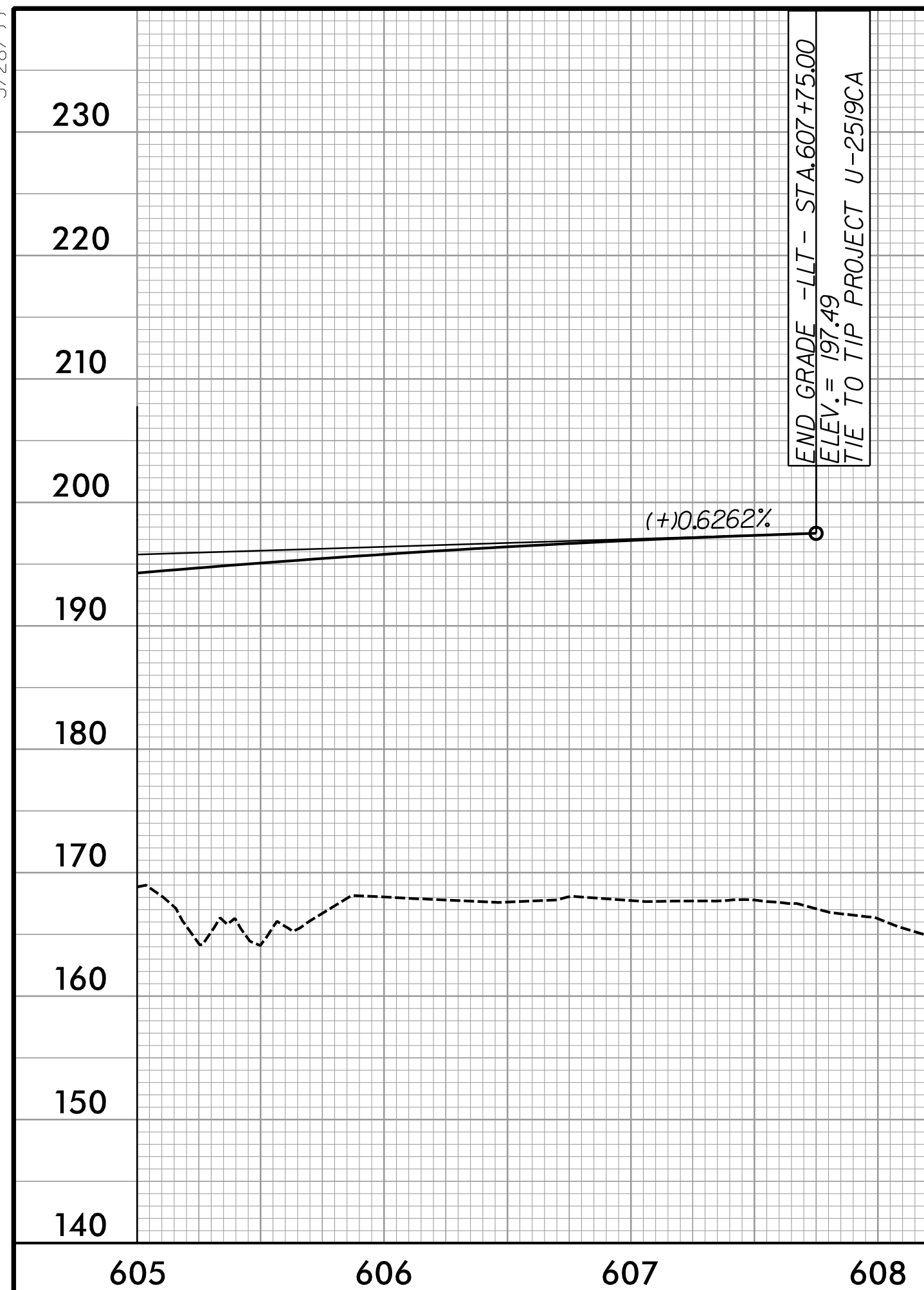
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SEE SHEET 7A & 7B FOR -L- PLAN

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5/28/99

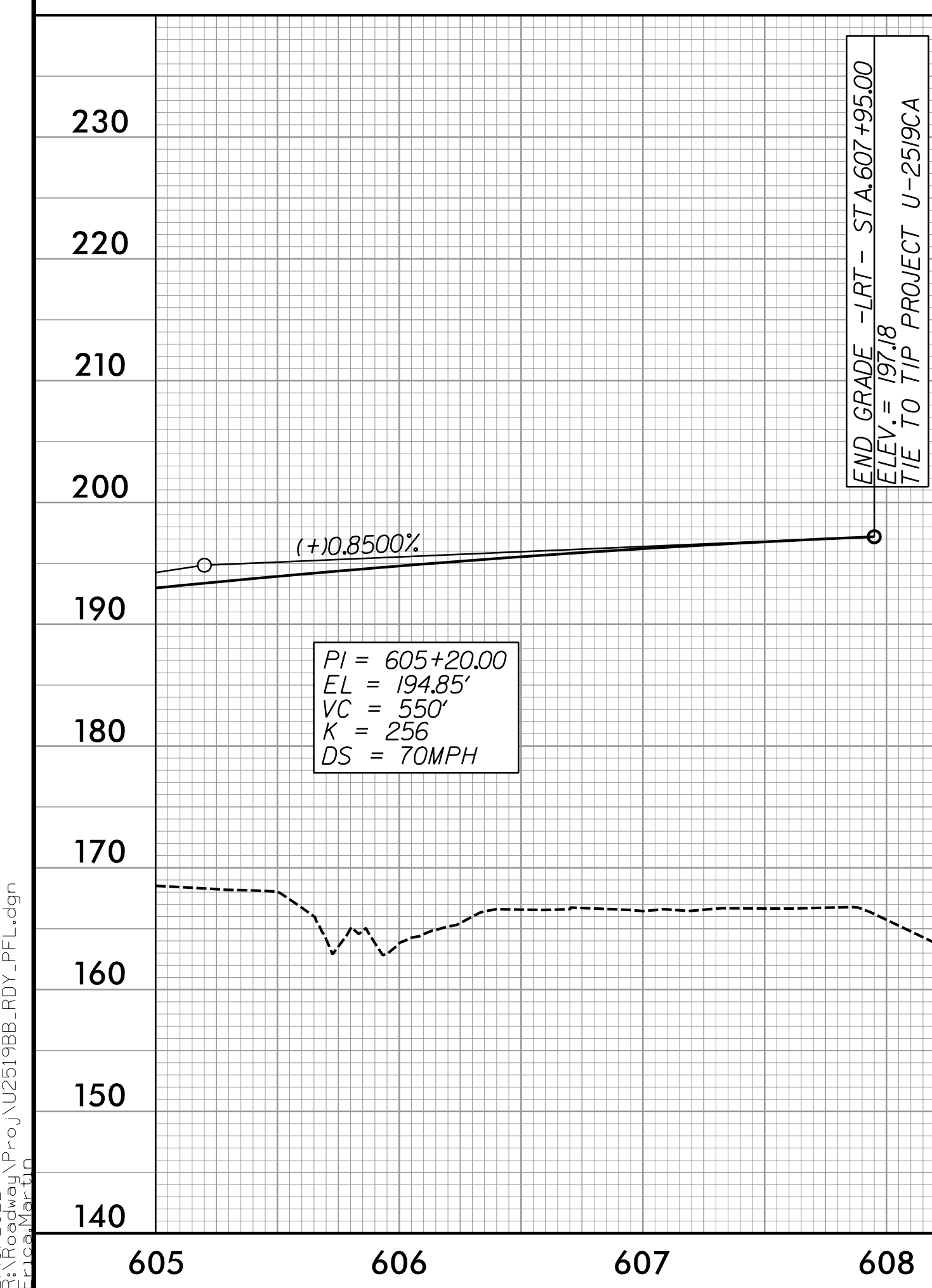


**-LLT-**

**NV5**  
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 3300 REGENCY PARKWAY, SUITE 100  
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 NC License # F-0333  
 formerly CALYX Engineers & Consultants

PROJECT REFERENCE NO. <i>U-2519BB</i>	SHEET NO. <i>20C</i>
ROADWAY DESIGN ENGINEER 3/22/2002  DocuSigned by: <i>Steve Anthony Drun</i>	HYDRAULICS ENGINEER 3/16/2002  DocuSigned by: <i>David P. Becker</i>

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**-LRT-**

SEE SHEET 7B FOR -L- PLAN

P:\10/2002  
R:\2006\Projects\U2519BB\RDY\_PFI.dgn  
E:\C:\MapInfo

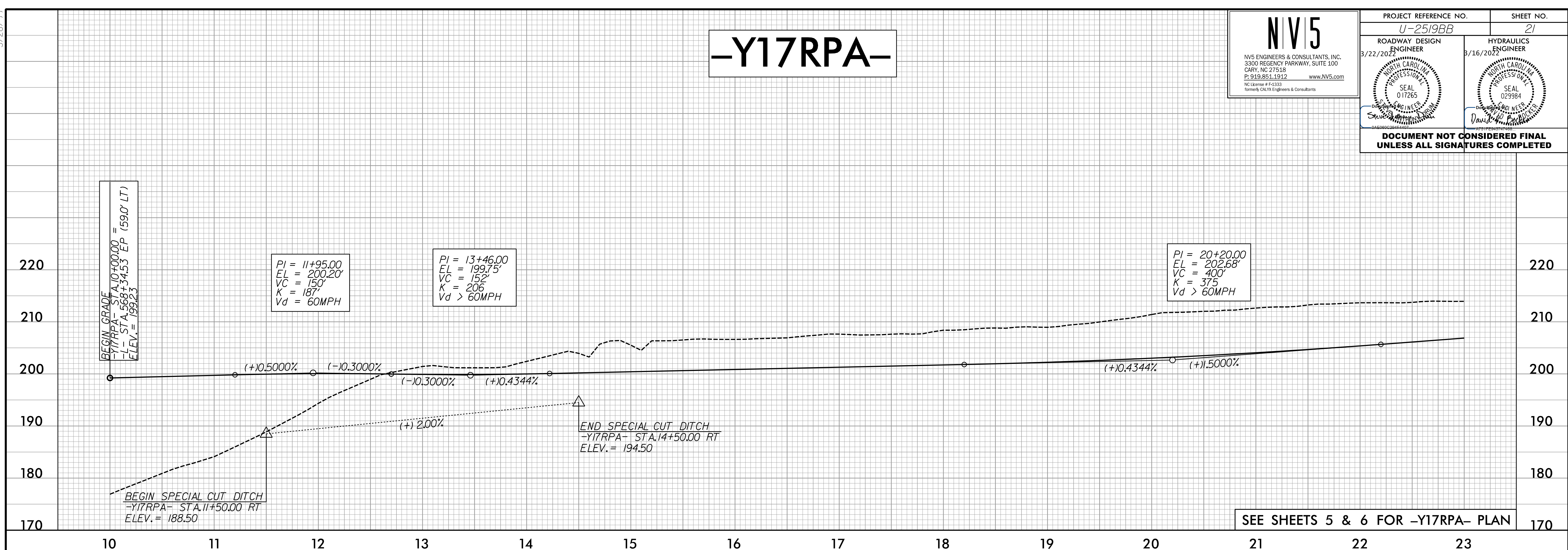
5/28/99

# -Y17RPA-

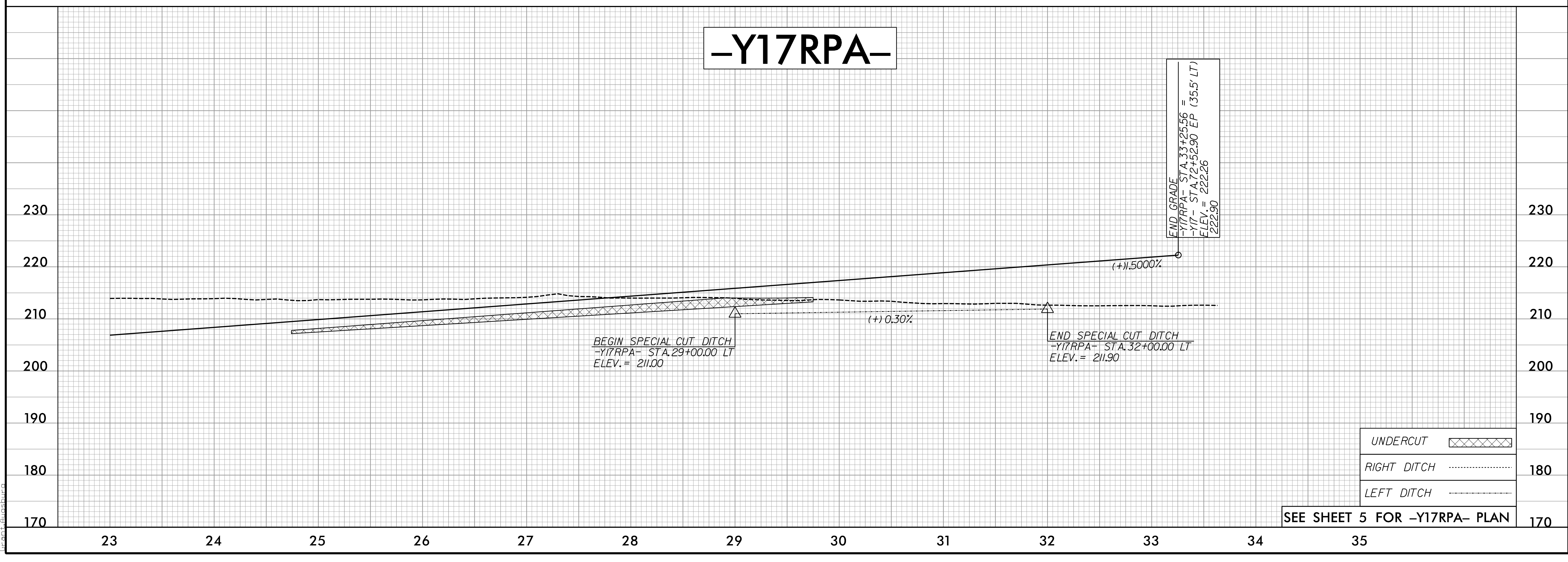
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PROJECT REFERENCE NO. <i>U-2519BB</i>	SHEET NO. <i>21</i>
ROADWAY DESIGN 3/22/20 ENGINEER <i>Stevenson</i>	HYDRAULICS 3/16/20 ENGINEER <i>David</i>
SEAL 017265	SEAL 029984

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# -Y17RPA-



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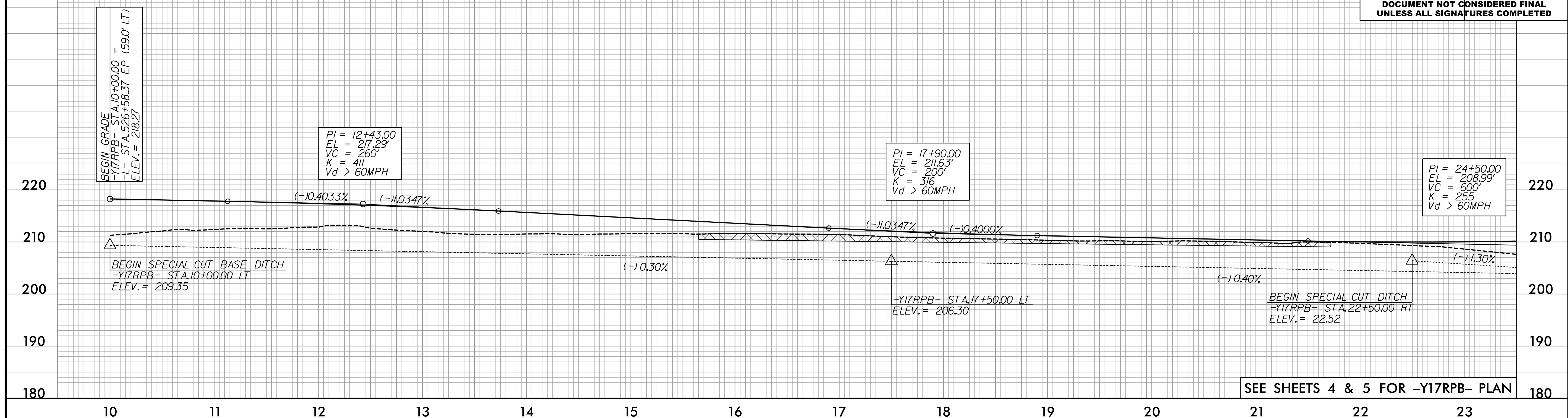
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# -Y17RPB-

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PROJECT REFERENCE NO. <b>U-2519BB</b>	SHEET NO. <b>22</b>
ROADWAY DESIGN ENGINEER 3/22/2022 SEAL 017265 David M. [Signature]	HYDRAULICS ENGINEER 3/16/2022 SEAL 029984 David M. [Signature]

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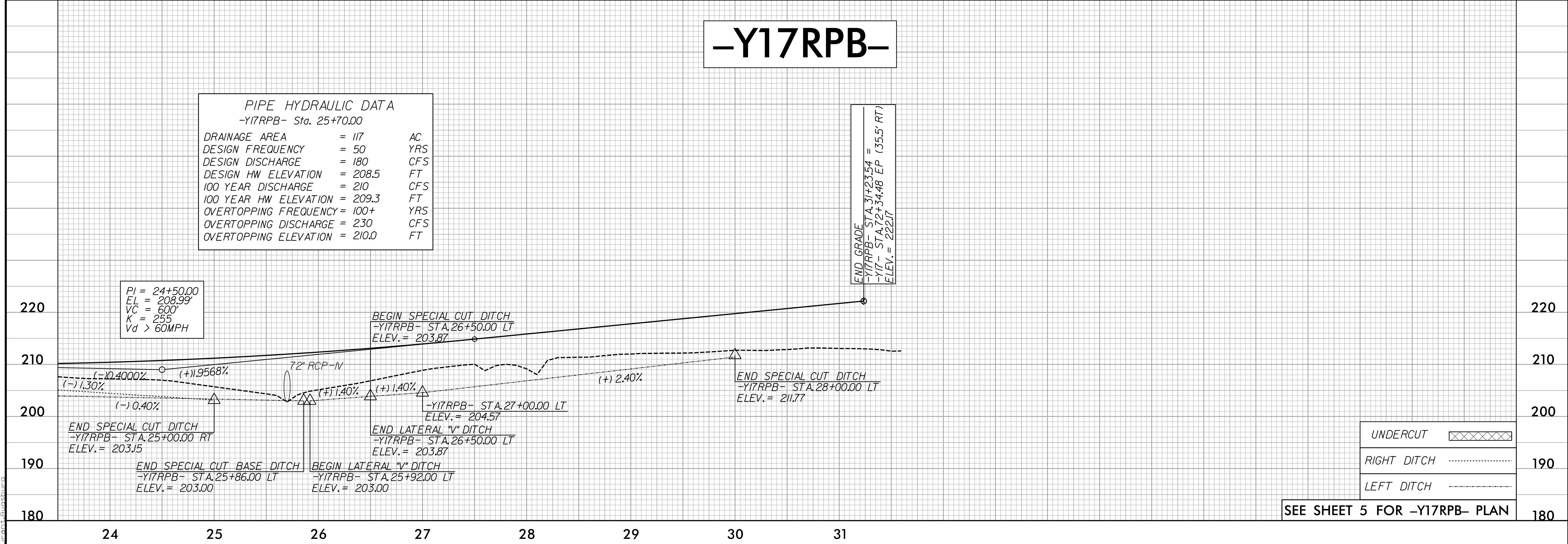


SEE SHEETS 4 & 5 FOR -Y17RPB- PLAN

# -Y17RPB-

**PIPE HYDRAULIC DATA**  
-Y17RPB- Sta. 25+70.00

DRAINAGE AREA	= 117	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 180	CFS
DESIGN HW ELEVATION	= 208.5	FT
100 YEAR DISCHARGE	= 210	CFS
100 YEAR HW ELEVATION	= 209.3	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 230	CFS
OVERTOPPING ELEVATION	= 210.0	FT



UNDERCUT	
RIGHT DITCH	
LEFT DITCH	

SEE SHEET 5 FOR -Y17RPB- PLAN

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5/28/2022

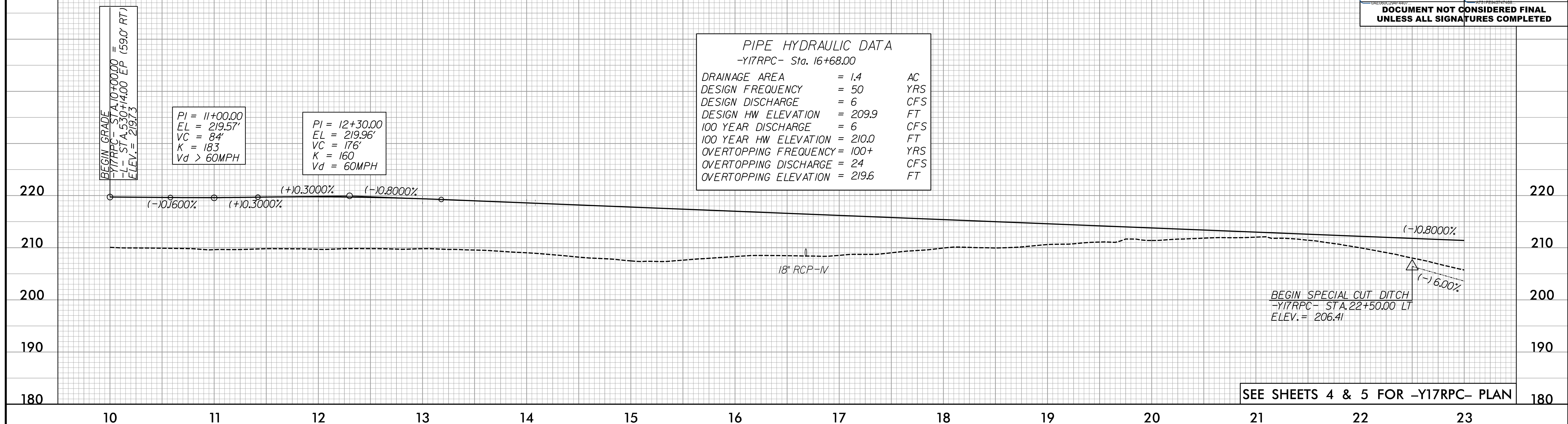
# -Y17RPC-

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PROJECT REFERENCE NO. <i>U-2519BB</i>	SHEET NO. <i>23</i>
ROADWAY DESIGN ENGINEER 3/22/2022	HYDRAULICS ENGINEER 3/16/2022
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**PIPE HYDRAULIC DATA**  
-Y17RPC- Sta. 16+68.00

DRAINAGE AREA	= 1.4	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 6	CFS
DESIGN HW ELEVATION	= 209.9	FT
100 YEAR DISCHARGE	= 6	CFS
100 YEAR HW ELEVATION	= 210.0	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 24	CFS
OVERTOPPING ELEVATION	= 219.6	FT



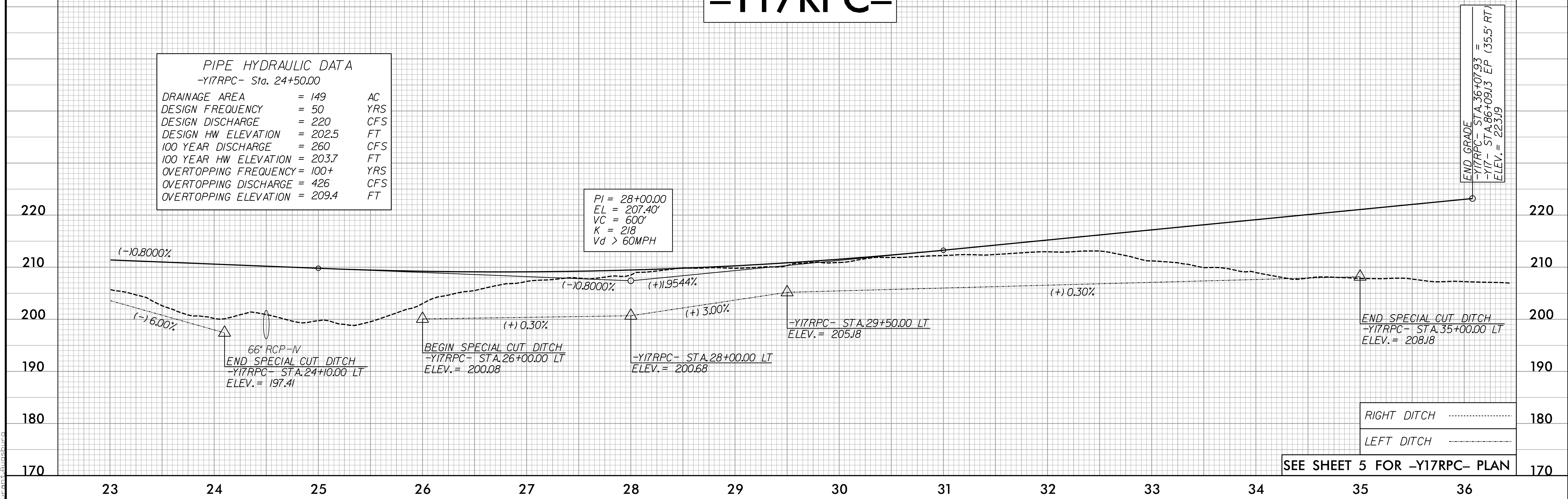
SEE SHEETS 4 & 5 FOR -Y17RPC- PLAN

# -Y17RPC-

**PIPE HYDRAULIC DATA**  
-Y17RPC- Sta. 24+50.00

DRAINAGE AREA	= 149	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 220	CFS
DESIGN HW ELEVATION	= 202.5	FT
100 YEAR DISCHARGE	= 260	CFS
100 YEAR HW ELEVATION	= 203.7	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 426	CFS
OVERTOPPING ELEVATION	= 209.4	FT

PI = 28+00.00  
 EL = 207.40'  
 VC = 600'  
 K = 218  
 Vd > 60MPH



SEE SHEET 5 FOR -Y17RPC- PLAN

RIGHT DITCH .....  
 LEFT DITCH .....

2/7/2022  
 R:\Projects\2022\U2519BB\RDY\_PFI.dgn  
 02/07/2022

5/28/99

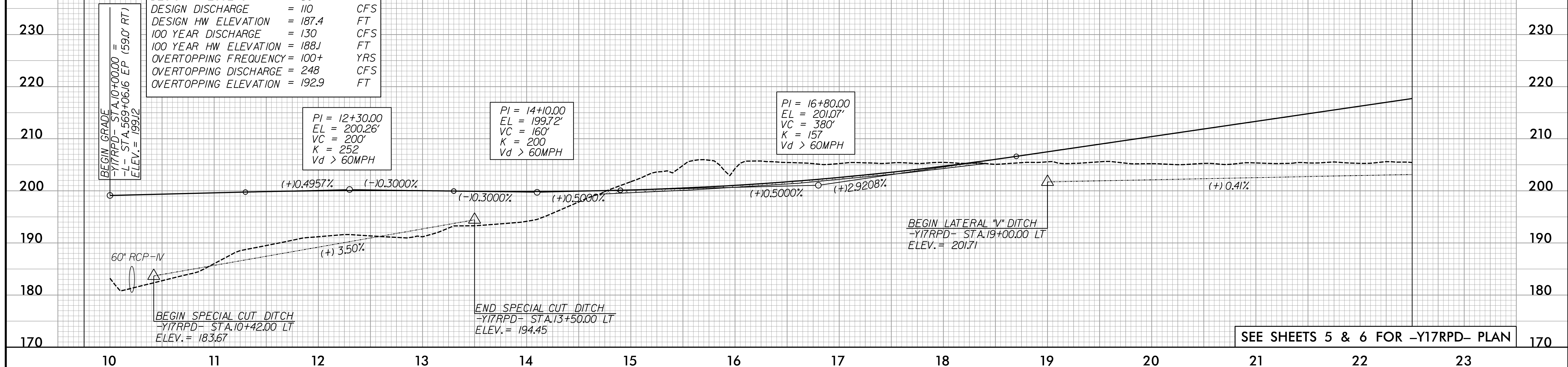
# -Y17RPD-

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PROJECT REFERENCE NO. <b>U-2519BB</b>	SHEET NO. <b>24</b>
ROADWAY DESIGN ENGINEER 3/22/2012	HYDRAULICS ENGINEER 3/16/2012
SEAL 017265	SEAL 029984
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

**PIPE HYDRAULIC DATA**  
-Y17RPD- Sta. 10+21.00

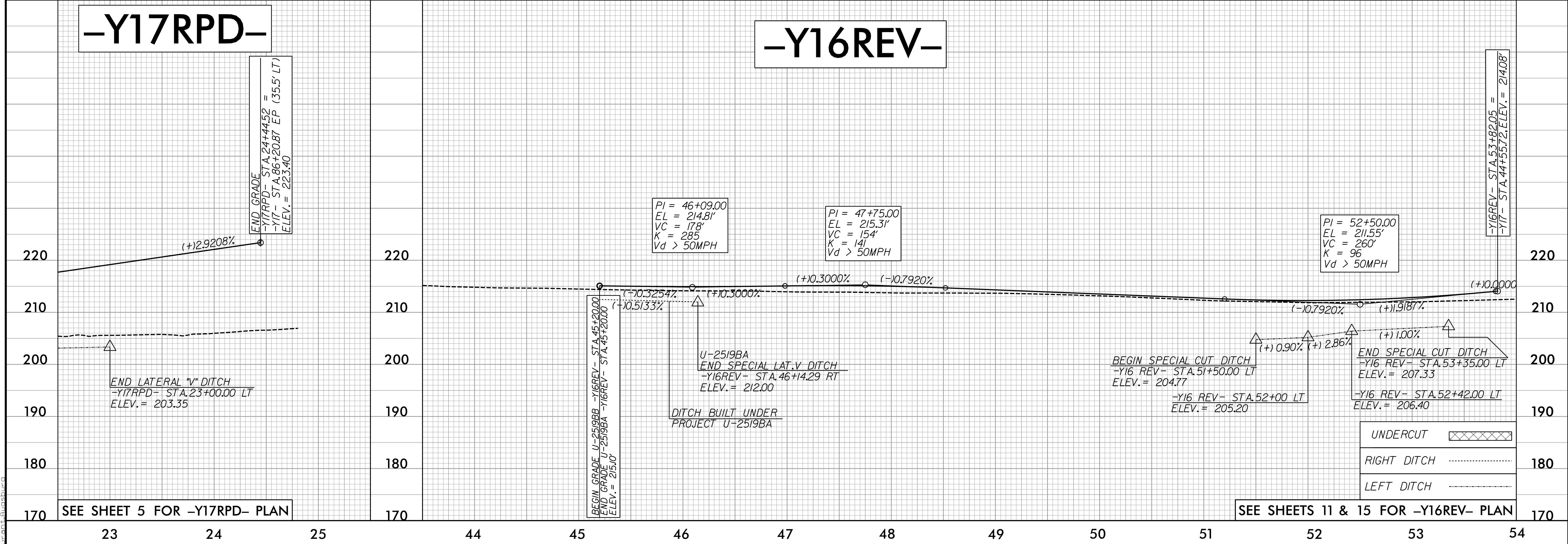
DRAINAGE AREA	= 69	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 110	CFS
DESIGN HW ELEVATION	= 187.4	FT
100 YEAR DISCHARGE	= 130	CFS
100 YEAR HW ELEVATION	= 188.1	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 248	CFS
OVERTOPPING ELEVATION	= 192.9	FT



SEE SHEETS 5 & 6 FOR -Y17RPD- PLAN

# -Y17RPD-

# -Y16REV-



SEE SHEET 5 FOR -Y17RPD- PLAN

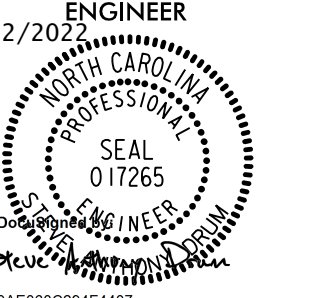
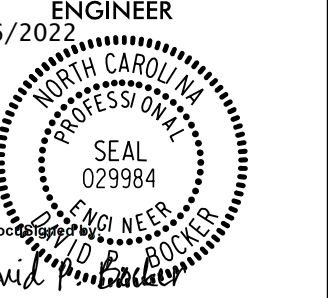
SEE SHEETS 11 & 15 FOR -Y16REV- PLAN

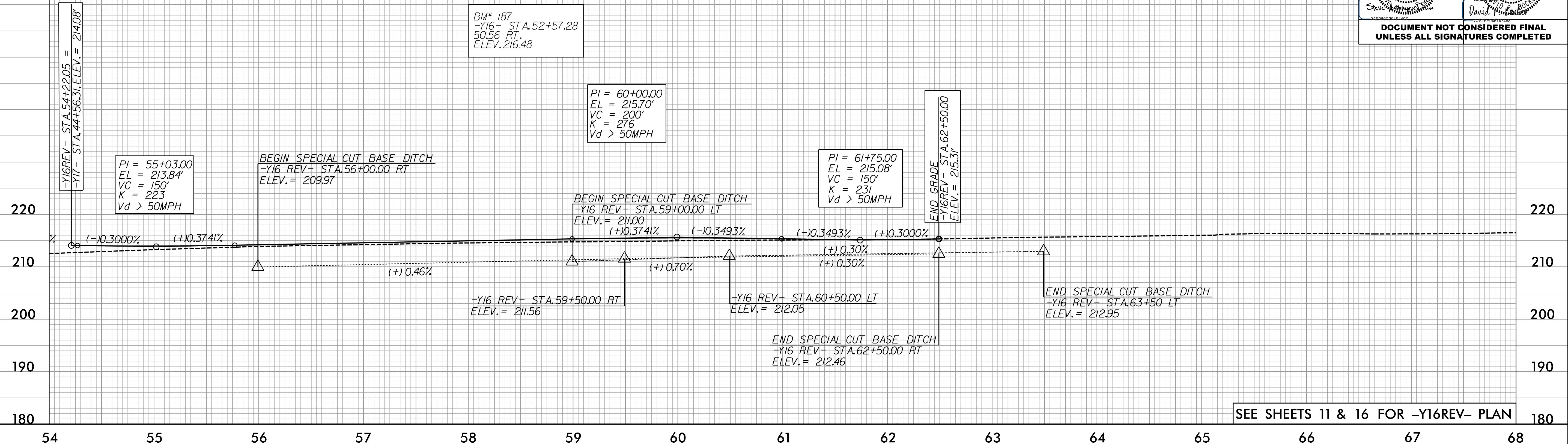
UNDERCUT	
RIGHT DITCH	
LEFT DITCH	

3/7/2012  
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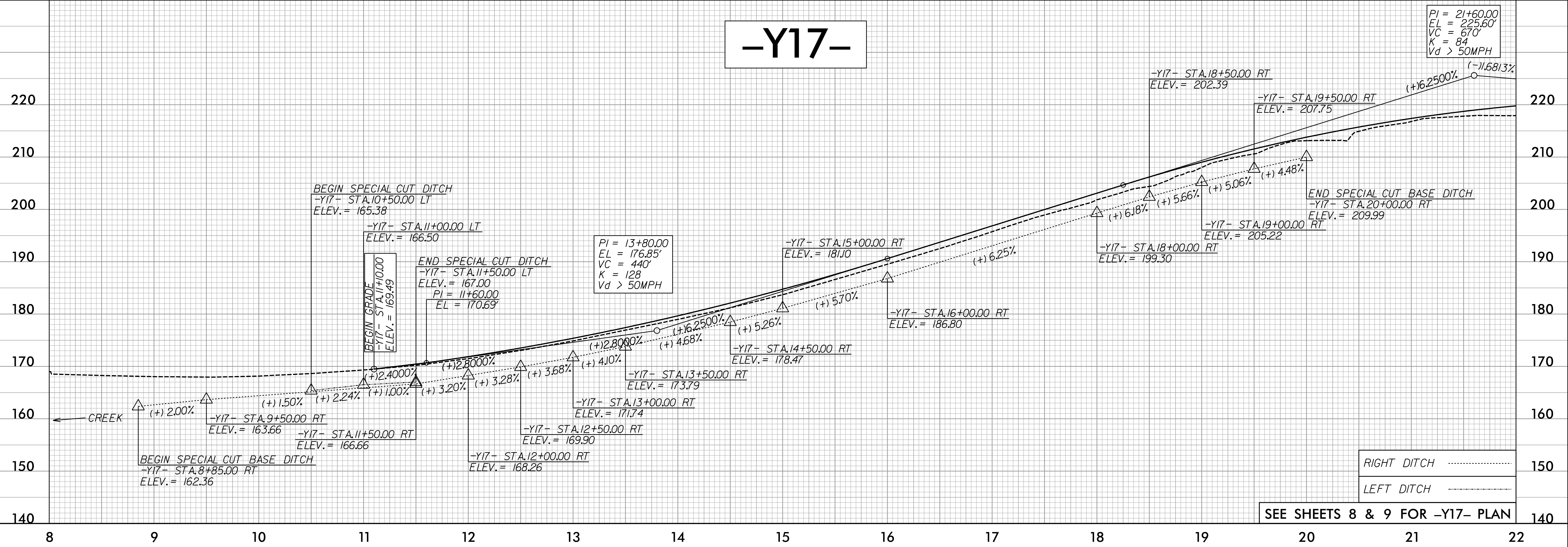
# -Y16REV-

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PROJECT REFERENCE NO. U-2519BB	SHEET NO. 25
ROADWAY DESIGN ENGINEER 3/22/2022	HYDRAULICS ENGINEER 3/16/2022
 SEAL 017265 David P. Balaban	 SEAL 029984 David P. Balaban
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# -Y17-



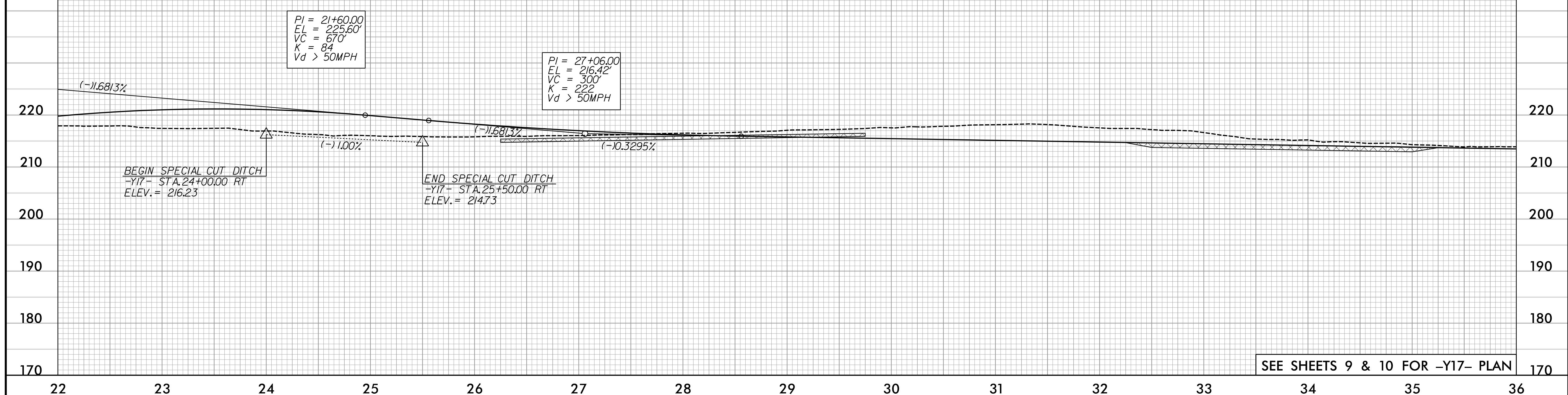
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# -Y17-

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PROJECT REFERENCE NO. <i>U-2519BB</i>	SHEET NO. 26
ROADWAY DESIGN ENGINEER 3/22/2023 SEAL 017265 STEVEN W. HARRIS	HYDRAULICS ENGINEER 3/16/2023 SEAL 029984 DAVID P. BULLOCK
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

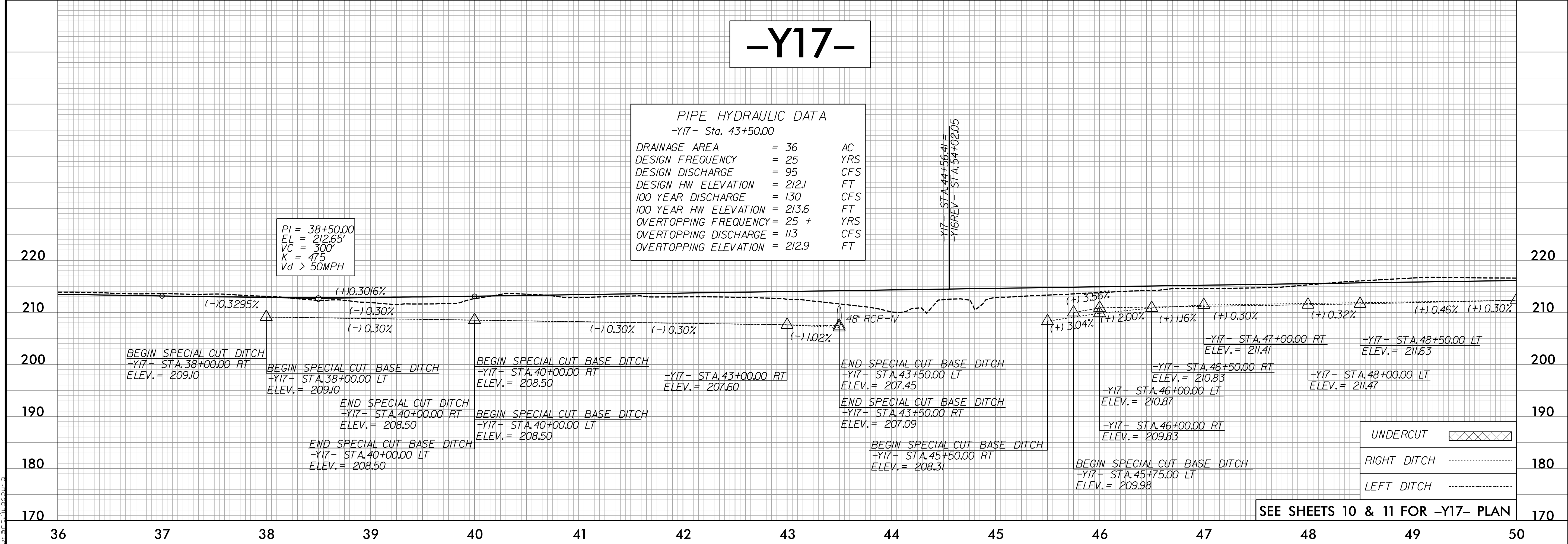


SEE SHEETS 9 & 10 FOR -Y17- PLAN

# -Y17-

**PIPE HYDRAULIC DATA**  
 -Y17- Sta. 43+50.00

DRAINAGE AREA	= 36	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 95	CFS
DESIGN HW ELEVATION	= 212J	FT
100 YEAR DISCHARGE	= 130	CFS
100 YEAR HW ELEVATION	= 213.6	FT
OVERTOPPING FREQUENCY	= 25 +	YRS
OVERTOPPING DISCHARGE	= 113	CFS
OVERTOPPING ELEVATION	= 212.9	FT



SEE SHEETS 10 & 11 FOR -Y17- PLAN

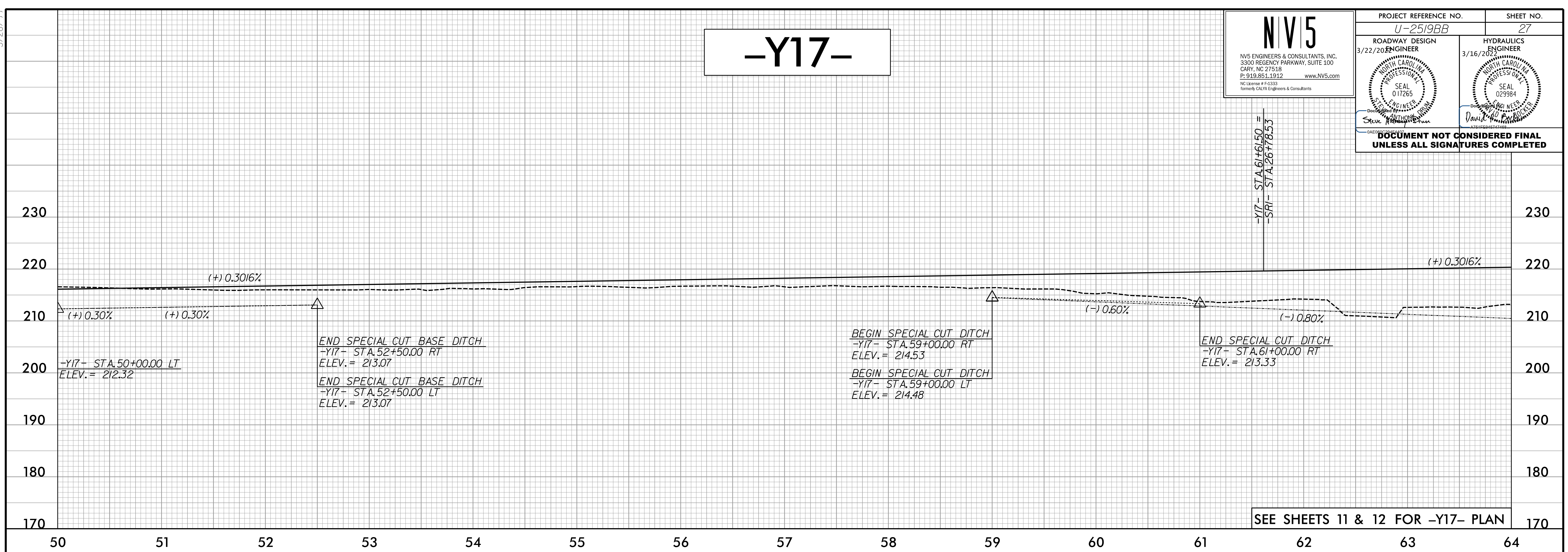
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# -Y17-

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PROJECT REFERENCE NO. <b>U-2519BB</b>	SHEET NO. <b>27</b>
ROADWAY DESIGN 3/22/2019 ENGINEER SEAL 017265 DAVID M. BOYD	HYDRAULICS 3/16/2019 ENGINEER SEAL 029984 DAVID M. BOYD
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	



SEE SHEETS 11 & 12 FOR -Y17- PLAN

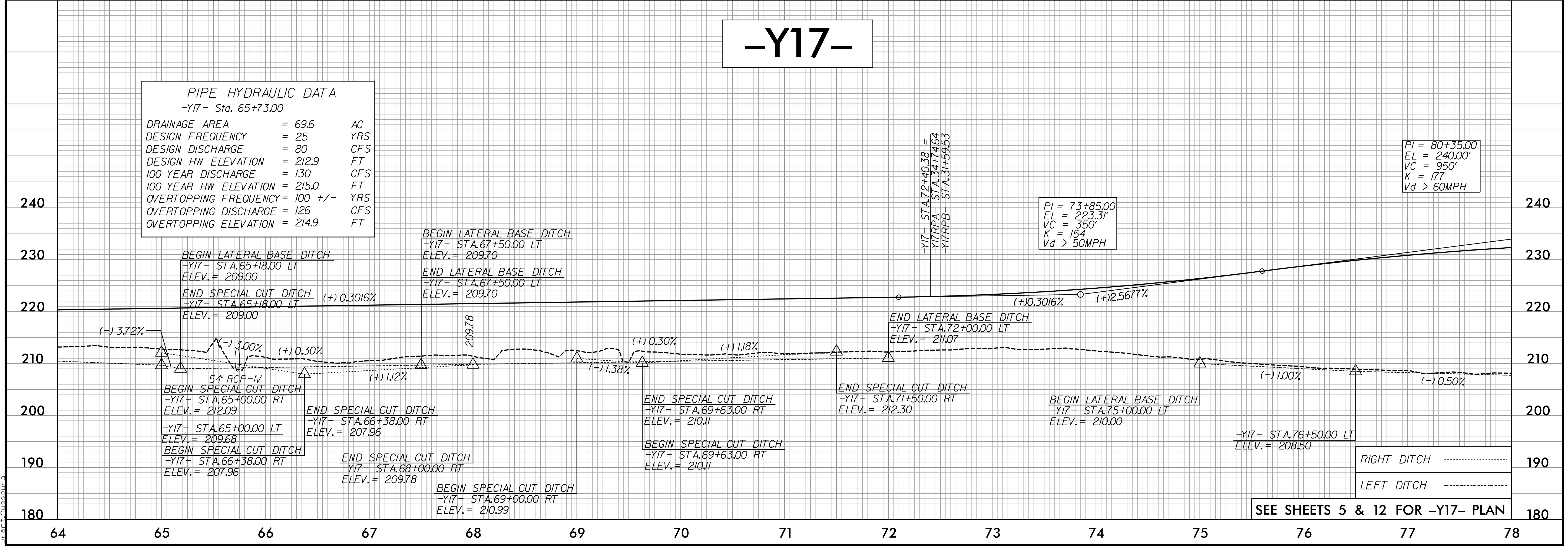
# -Y17-

**PIPE HYDRAULIC DATA**  
 -Y17- Sta. 65+73.00

DRAINAGE AREA	= 69.6	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 80	CFS
DESIGN HW ELEVATION	= 212.9	FT
100 YEAR DISCHARGE	= 130	CFS
100 YEAR HW ELEVATION	= 215.0	FT
OVERTOPPING FREQUENCY	= 100 +/-	YRS
OVERTOPPING DISCHARGE	= 126	CFS
OVERTOPPING ELEVATION	= 214.9	FT

PI	= 80+35.00
EL	= 240.00'
VC	= 950'
K	= 177
Vd	> 60MPH

PI	= 73+85.00
EL	= 223.31'
VC	= 350'
K	= 154
Vd	> 50MPH



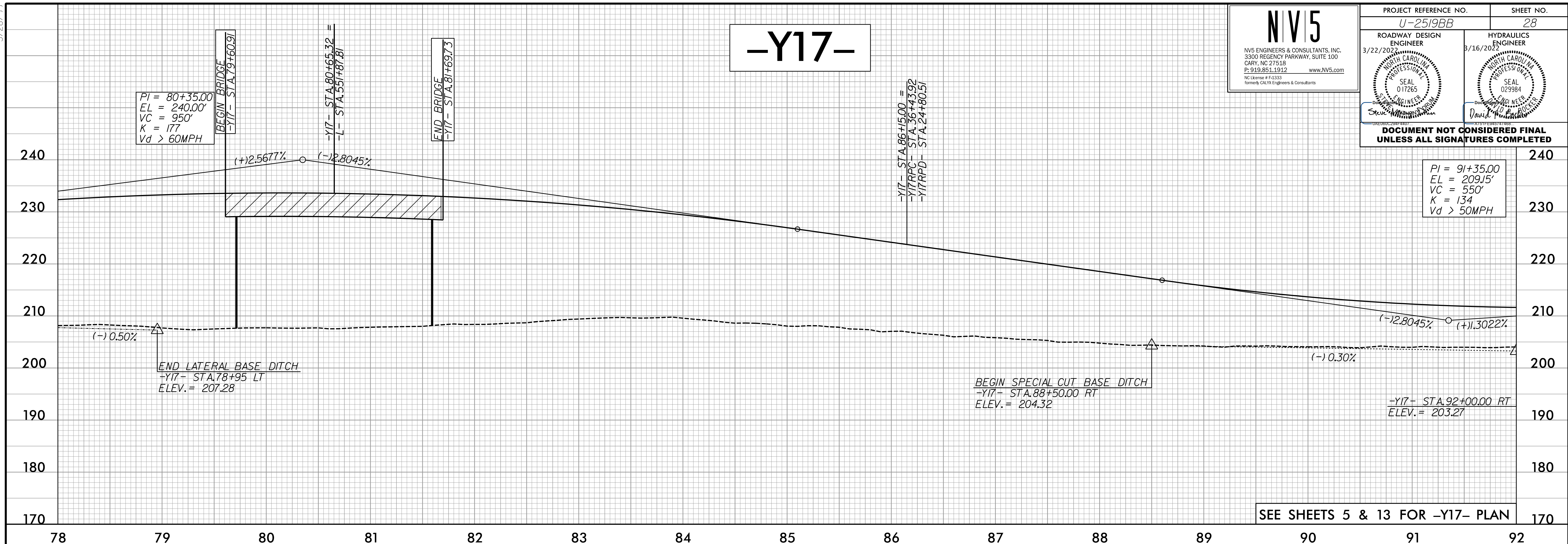
SEE SHEETS 5 & 12 FOR -Y17- PLAN

3/27/2019  
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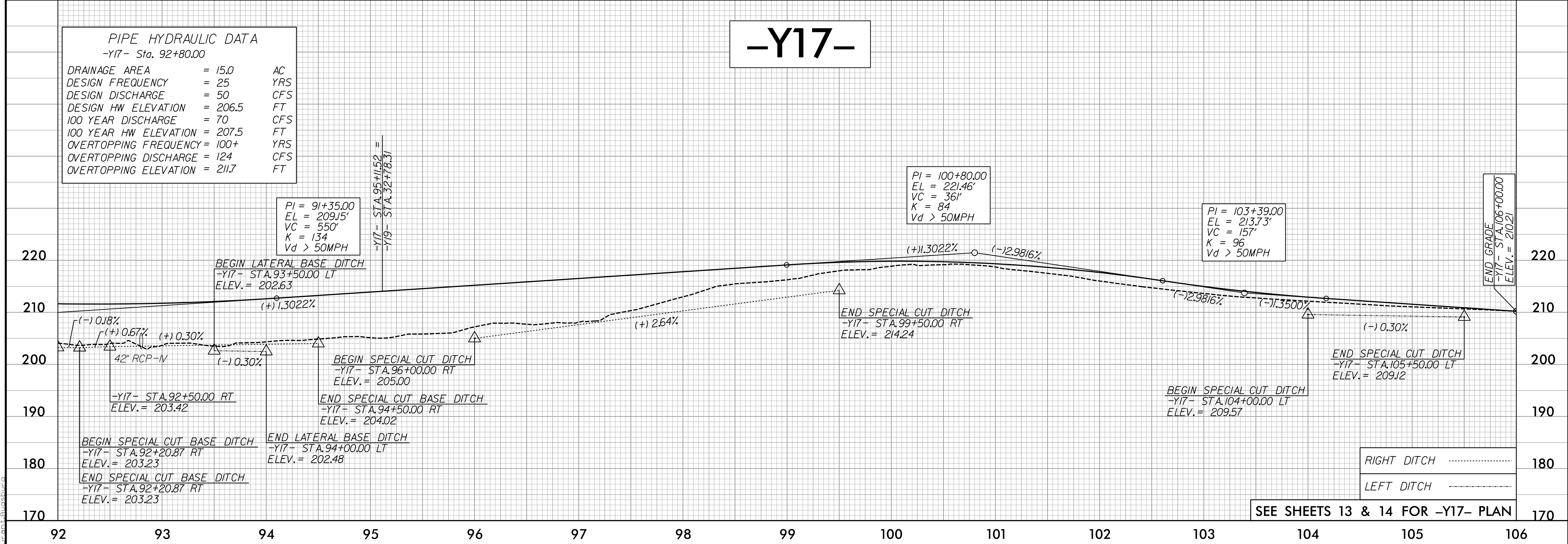
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PROJECT REFERENCE NO. <b>U-2519BB</b>	SHEET NO. <b>28</b>
ROADWAY DESIGN ENGINEER 3/22/2022 SEAL 017265 David M. ...	HYDRAULICS ENGINEER 3/16/2022 SEAL 029984 David M. ...
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SEE SHEETS 5 & 13 FOR -Y17- PLAN



**PIPE HYDRAULIC DATA**  
 -Y17- Sta. 92+80.00

DRAINAGE AREA	= 15.0	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 50	CFS
DESIGN HW ELEVATION	= 206.5	FT
100 YEAR DISCHARGE	= 70	CFS
100 YEAR HW ELEVATION	= 207.5	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 124	CFS
OVERTOPPING ELEVATION	= 211.7	FT

SEE SHEETS 13 & 14 FOR -Y17- PLAN

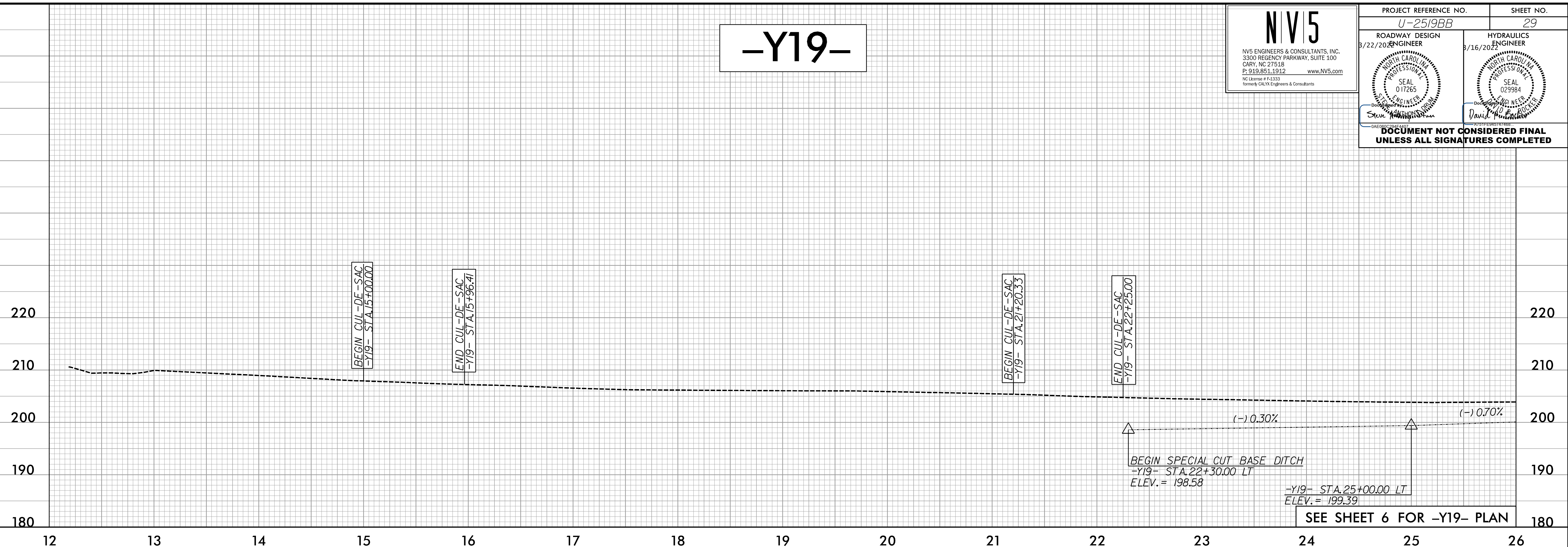
3/27/2022  
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 David M. ...

5/28/99

# -Y19-



PROJECT REFERENCE NO. U-2519BB	SHEET NO. 29
ROADWAY DESIGN 3/22/2022 ENGINEER	HYDRAULICS 3/16/2022 ENGINEER
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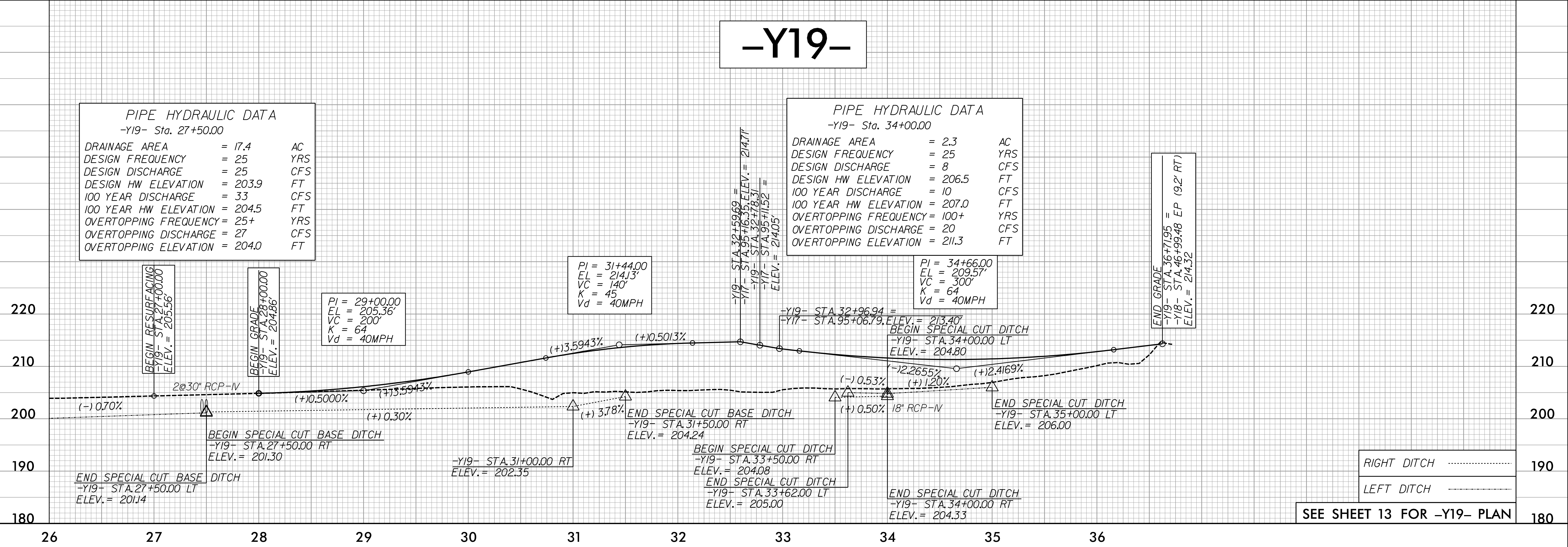
# -Y19-

**PIPE HYDRAULIC DATA**  
-Y19- Sta. 27+50.00

DRAINAGE AREA	= 17.4	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 25	CFS
DESIGN HW ELEVATION	= 203.9	FT
100 YEAR DISCHARGE	= 33	CFS
100 YEAR HW ELEVATION	= 204.5	FT
OVERTOPPING FREQUENCY	= 25+	YRS
OVERTOPPING DISCHARGE	= 27	CFS
OVERTOPPING ELEVATION	= 204.0	FT

**PIPE HYDRAULIC DATA**  
-Y19- Sta. 34+00.00

DRAINAGE AREA	= 2.3	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 8	CFS
DESIGN HW ELEVATION	= 206.5	FT
100 YEAR DISCHARGE	= 10	CFS
100 YEAR HW ELEVATION	= 207.0	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 20	CFS
OVERTOPPING ELEVATION	= 211.3	FT



P:\2022\Projects\U2519BB\RDY\_PFL.dgn



5/28/99

# -SR1-

**NV5**  
 NV5 ENGINEERS & CONSULTANTS, INC.  
 3300 REGENCY PARKWAY, SUITE 100  
 CARY, NC 27518  
 P: 919.851.1912 www.NV5.com  
 NC License # F3538  
 General Civil Engineers & Consultants

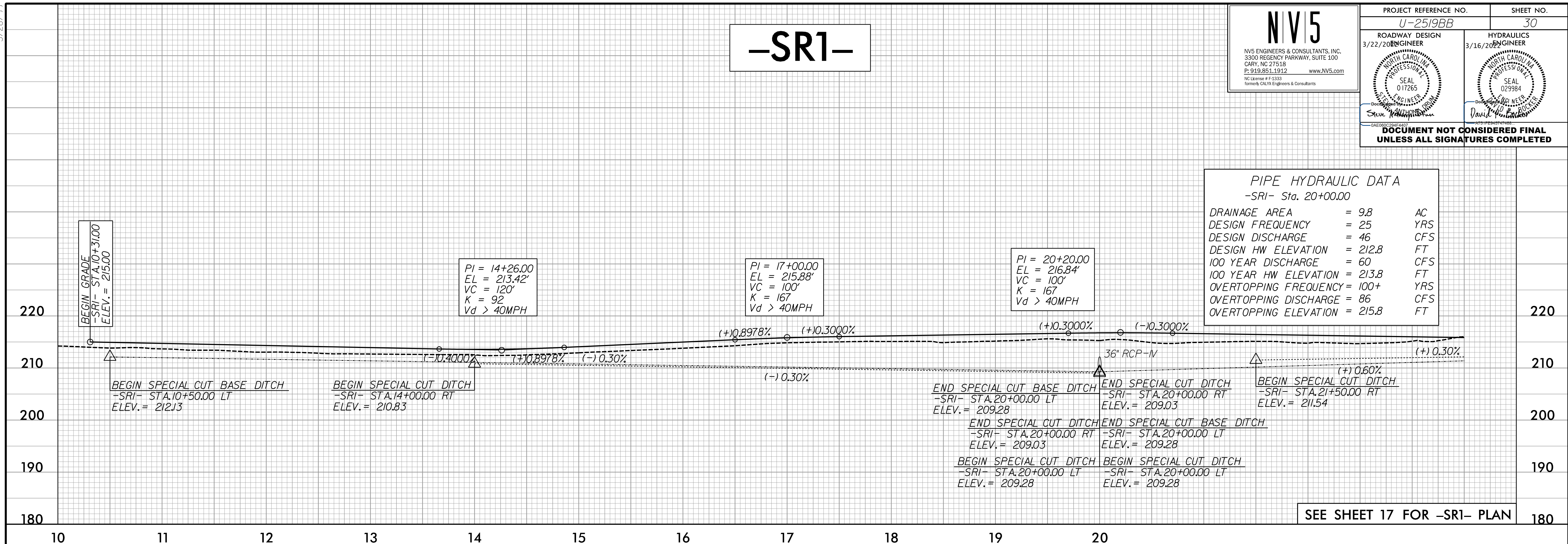
PROJECT REFERENCE NO. <i>U-2519BB</i>	SHEET NO. 30
ROADWAY DESIGN 3/22/2009 ENGINEER	HYDRAULICS 3/16/2009 ENGINEER

Professional Engineer Seal for Steve K...  
 Professional Engineer Seal for David H...

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**

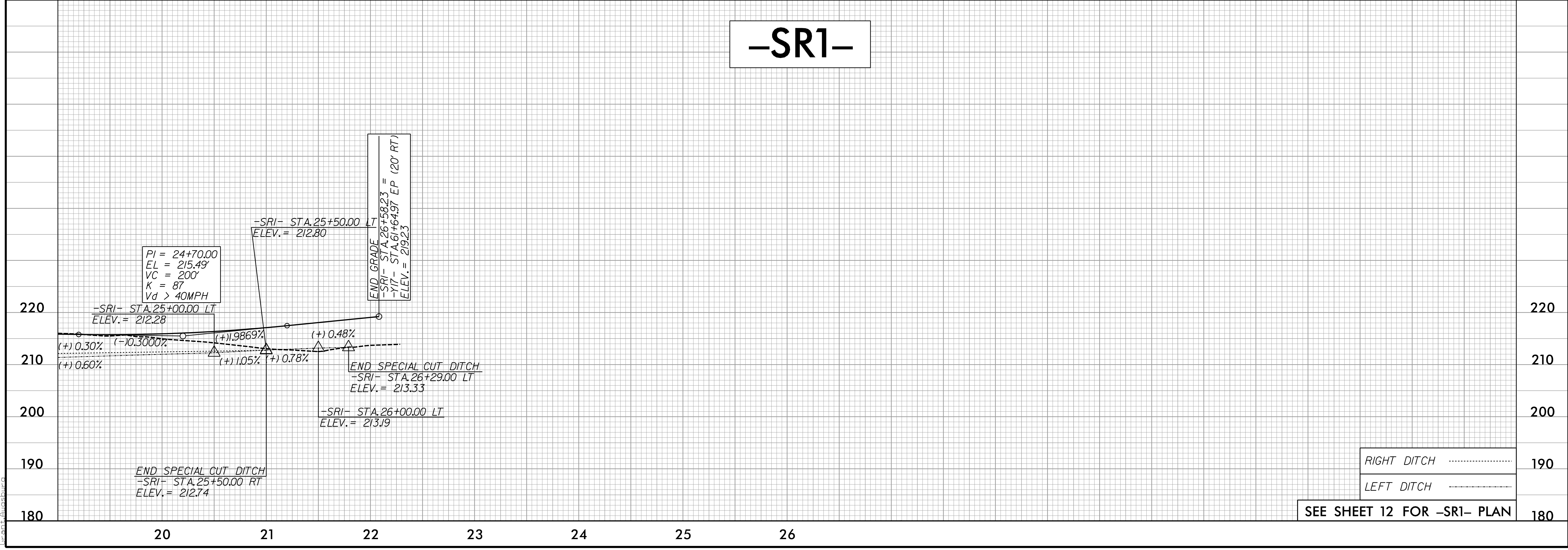
**PIPE HYDRAULIC DATA**  
-SR1- Sta. 20+00.00

DRAINAGE AREA	= 9.8	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 46	CFS
DESIGN HW ELEVATION	= 212.8	FT
100 YEAR DISCHARGE	= 60	CFS
100 YEAR HW ELEVATION	= 213.8	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 86	CFS
OVERTOPPING ELEVATION	= 215.8	FT



SEE SHEET 17 FOR -SR1- PLAN

# -SR1-



SEE SHEET 12 FOR -SR1- PLAN

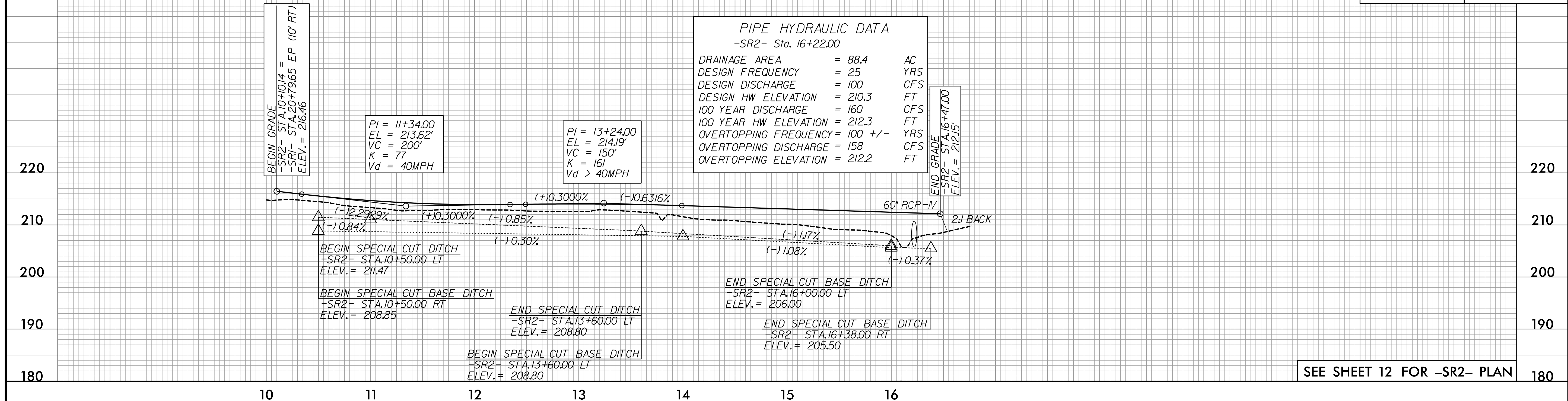
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C:\Users\...  
C:\Users\...

5/28/99



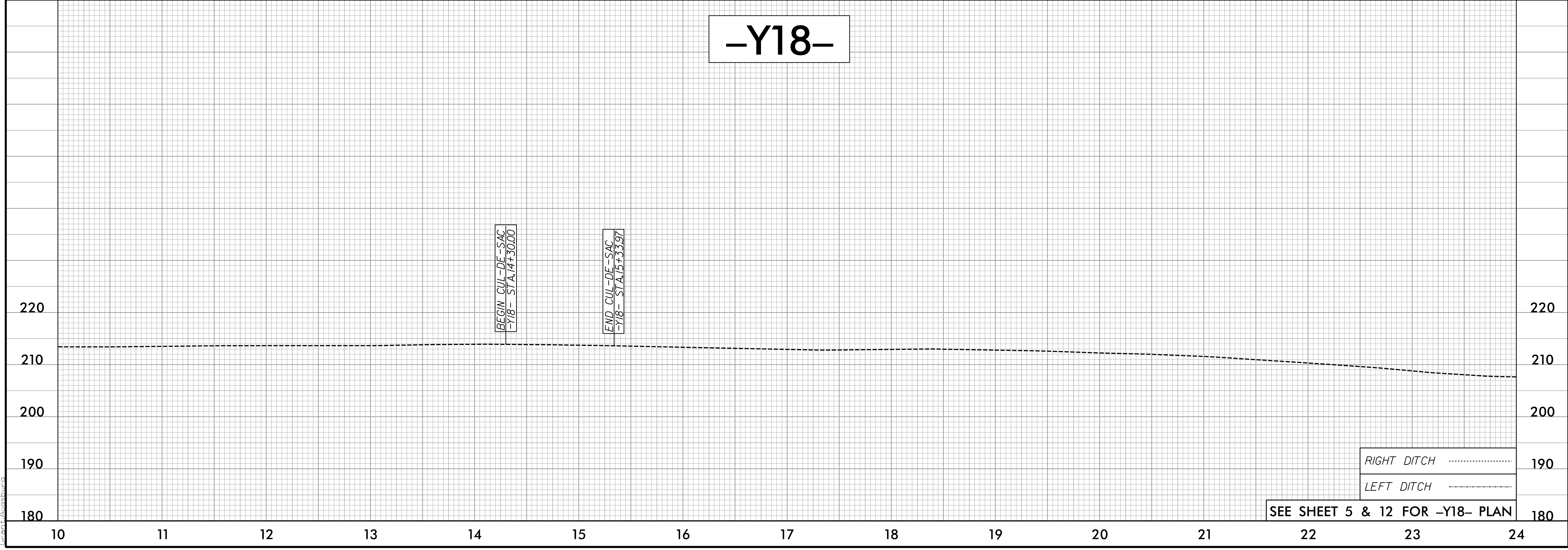
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ROADWAY DESIGN ENGINEER <i>3/22/2022</i>	HYDRAULICS ENGINEER <i>3/16/2022</i>
<i>Professional Engineer Seal</i>	<i>Professional Engineer Seal</i>
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

# -SR2-



SEE SHEET 12 FOR -SR2- PLAN

# -Y18-



SEE SHEET 5 & 12 FOR -Y18- PLAN

3/22/2022  
C:\Users\N\Project\U2519BB\RDY\_PFI.dgn

5/28/99

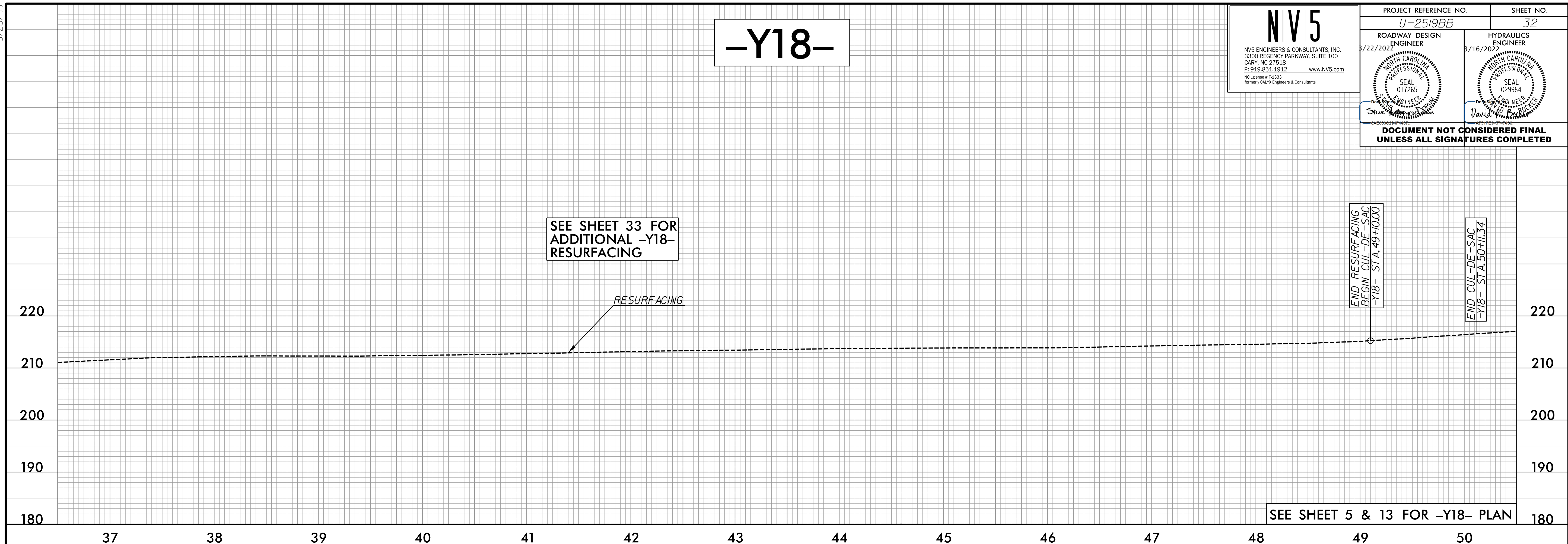
# -Y18-

**NV5**  
 NV5 ENGINEERS & CONSULTANTS, INC.  
 3300 REGENCY PARKWAY, SUITE 100  
 CARY, NC 27518  
 P: 919.851.1912 www.nv5.com  
 NC License # F-0393  
 formerly CALYX Engineers & Consultants

PROJECT REFERENCE NO. <i>U-2519BB</i>	SHEET NO. <i>32</i>
ROADWAY DESIGN ENGINEER <i>3/22/2022</i> SEAL 017265 <i>Steve...</i>	HYDRAULICS ENGINEER <i>3/16/2022</i> SEAL 029984 <i>David...</i>
<b>DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED</b>	

SEE SHEET 33 FOR  
ADDITIONAL -Y18-  
RESURFACING

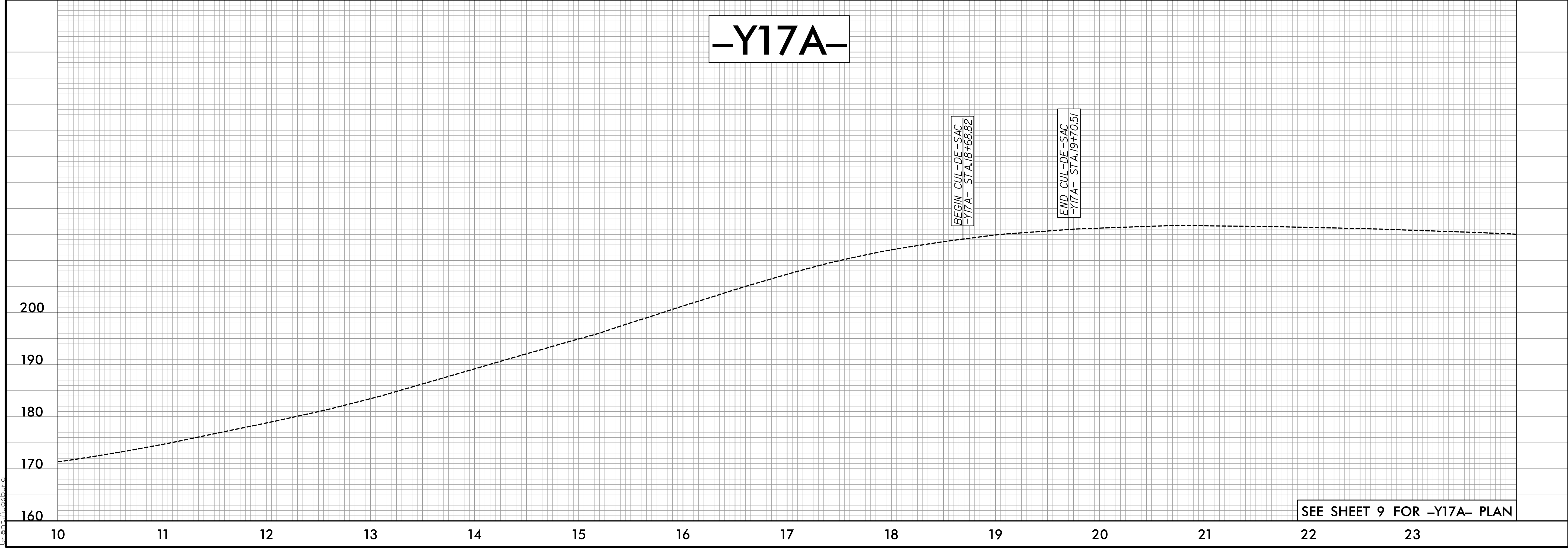
RESURFACING



# -Y17A-

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-Y17A- STA. 18+68.82

END CUL-DE-SAC  
-Y17A- STA. 19+70.51



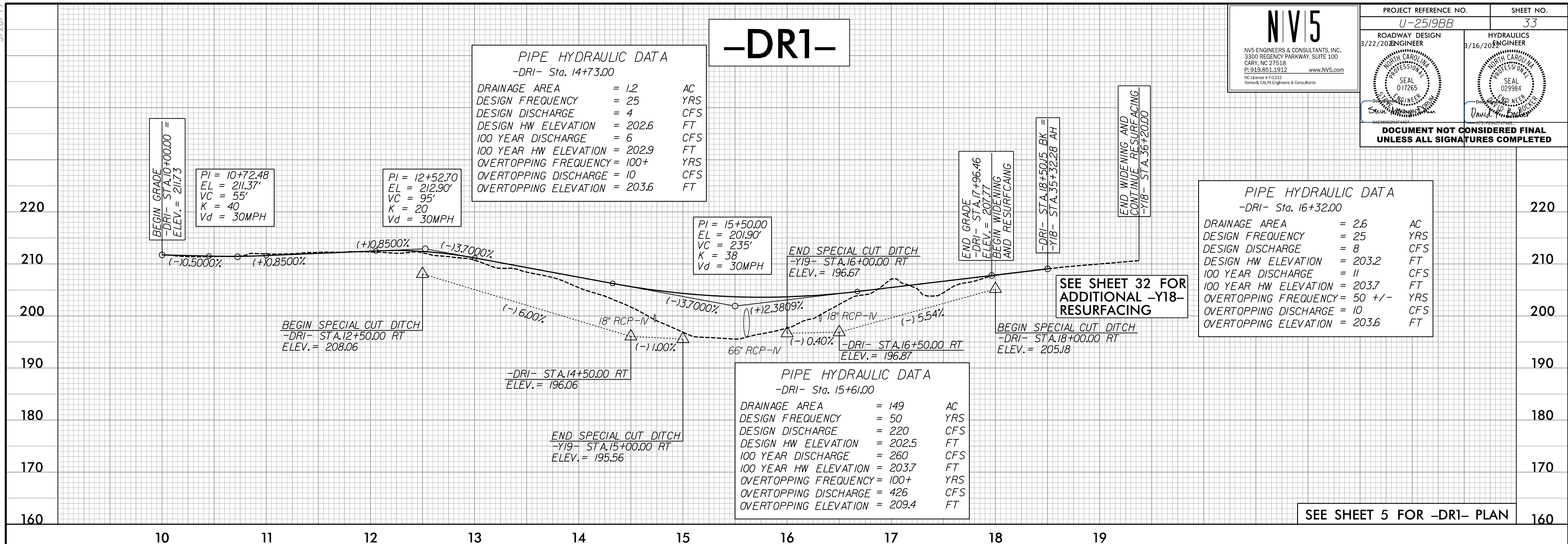
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5/28/99



PROJECT REFERENCE NO. <i>U-2519BB</i>	SHEET NO. <i>33</i>
ROADWAY DESIGN 3/22/2020 ENGINEER <i>Stew. Williams</i>	HYDRAULICS 3/16/2020 ENGINEER <i>David P. Barber</i>

**DOCUMENT NOT CONSIDERED FINAL  
UNLESS ALL SIGNATURES COMPLETED**



**PIPE HYDRAULIC DATA**  
-DRI- Sta. 14+73.00

DRAINAGE AREA	= 12	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 4	CFS
DESIGN HW ELEVATION	= 202.6	FT
100 YEAR DISCHARGE	= 6	CFS
100 YEAR HW ELEVATION	= 202.9	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 10	CFS
OVERTOPPING ELEVATION	= 203.6	FT

# -DR1-

**PIPE HYDRAULIC DATA**  
-DRI- Sta. 16+32.00

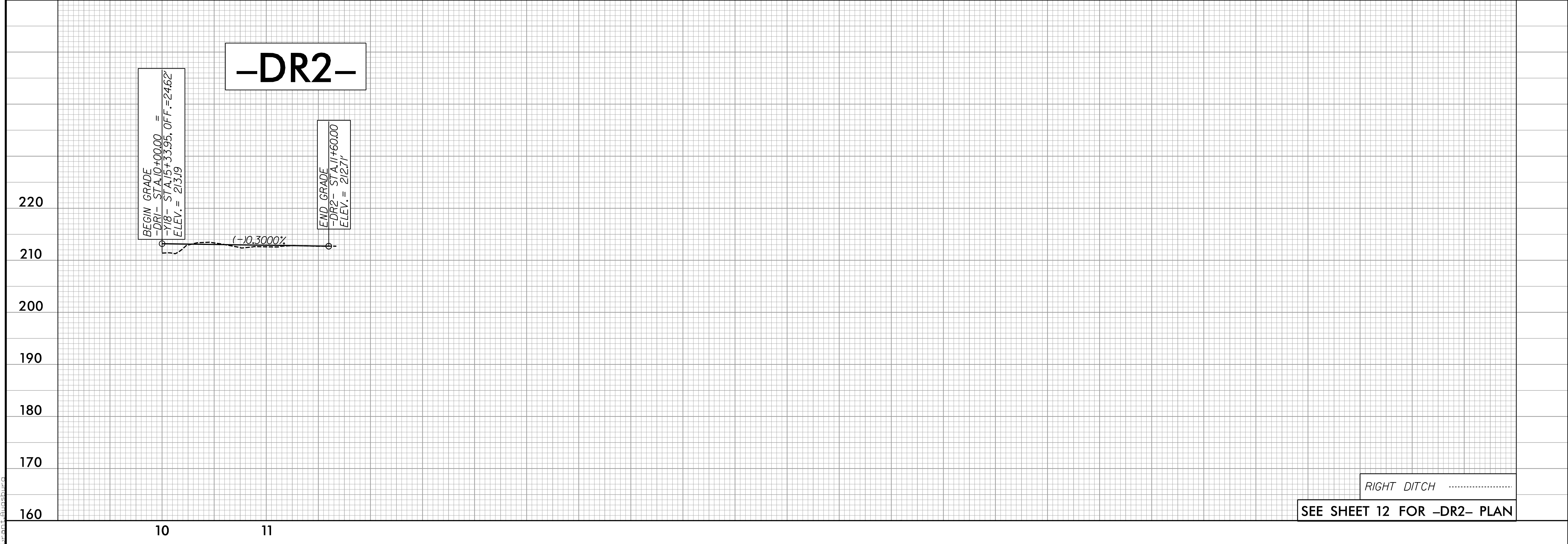
DRAINAGE AREA	= 2.6	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 8	CFS
DESIGN HW ELEVATION	= 203.2	FT
100 YEAR DISCHARGE	= 11	CFS
100 YEAR HW ELEVATION	= 203.7	FT
OVERTOPPING FREQUENCY	= 50 +/-	YRS
OVERTOPPING DISCHARGE	= 10	CFS
OVERTOPPING ELEVATION	= 203.6	FT

**PIPE HYDRAULIC DATA**  
-DRI- Sta. 15+61.00

DRAINAGE AREA	= 149	AC
DESIGN FREQUENCY	= 50	YRS
DESIGN DISCHARGE	= 220	CFS
DESIGN HW ELEVATION	= 202.5	FT
100 YEAR DISCHARGE	= 260	CFS
100 YEAR HW ELEVATION	= 203.7	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 426	CFS
OVERTOPPING ELEVATION	= 209.4	FT

**SEE SHEET 32 FOR  
ADDITIONAL -Y18-  
RESURFACING**

**SEE SHEET 5 FOR -DRI- PLAN**



# -DR2-

**PIPE HYDRAULIC DATA**  
-DRI- Sta. 10+00.00

DRAINAGE AREA	= 12	AC
DESIGN FREQUENCY	= 25	YRS
DESIGN DISCHARGE	= 4	CFS
DESIGN HW ELEVATION	= 202.6	FT
100 YEAR DISCHARGE	= 6	CFS
100 YEAR HW ELEVATION	= 202.9	FT
OVERTOPPING FREQUENCY	= 100+	YRS
OVERTOPPING DISCHARGE	= 10	CFS
OVERTOPPING ELEVATION	= 203.6	FT

RIGHT DITCH .....

**SEE SHEET 12 FOR -DR2- PLAN**

2/3/2022  
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