FirstEnergy

76 South Main Street
Akron, Ohio 44308

July 28, 2023

Ms. Tanowa Troupe
Docketing Division, Ohio Power Siting Board
The Public Utilities Commission of Ohio
180 East Broad Street
Columbus, OH 43215-3793

Certificate of Environmental Compatibility and Public Need
Wood County 138 kV Reinforcement Project
Case No. 18-1335-EL-BTX

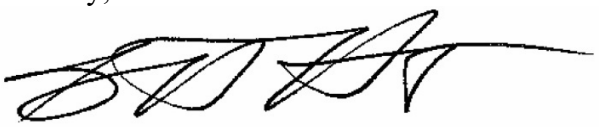
Dear Ms. Troupe:

Please find enclosed for Staff's review the following materials relative to the second phase of construction for the Wood County 138 kV Reinforcement Project and as required by the Certificated issued in the above-referenced case:

- A Preconstruction conference agenda (per Condition 2);
- One set of detailed engineering drawings of the final Project design, and a set of the Project access maps depicting the temporary and permanent access roads, construction staging areas, and material laydown areas (per Condition 3);
- A copy of the geotechnical report (per Condition 9).

If you have any questions about this Project, please contact me at (330) 384-2526.

Sincerely,



Scott M. Humphrys
Transmission Siting Supervisor
Transmission and Substation Design
FirstEnergy Service Company

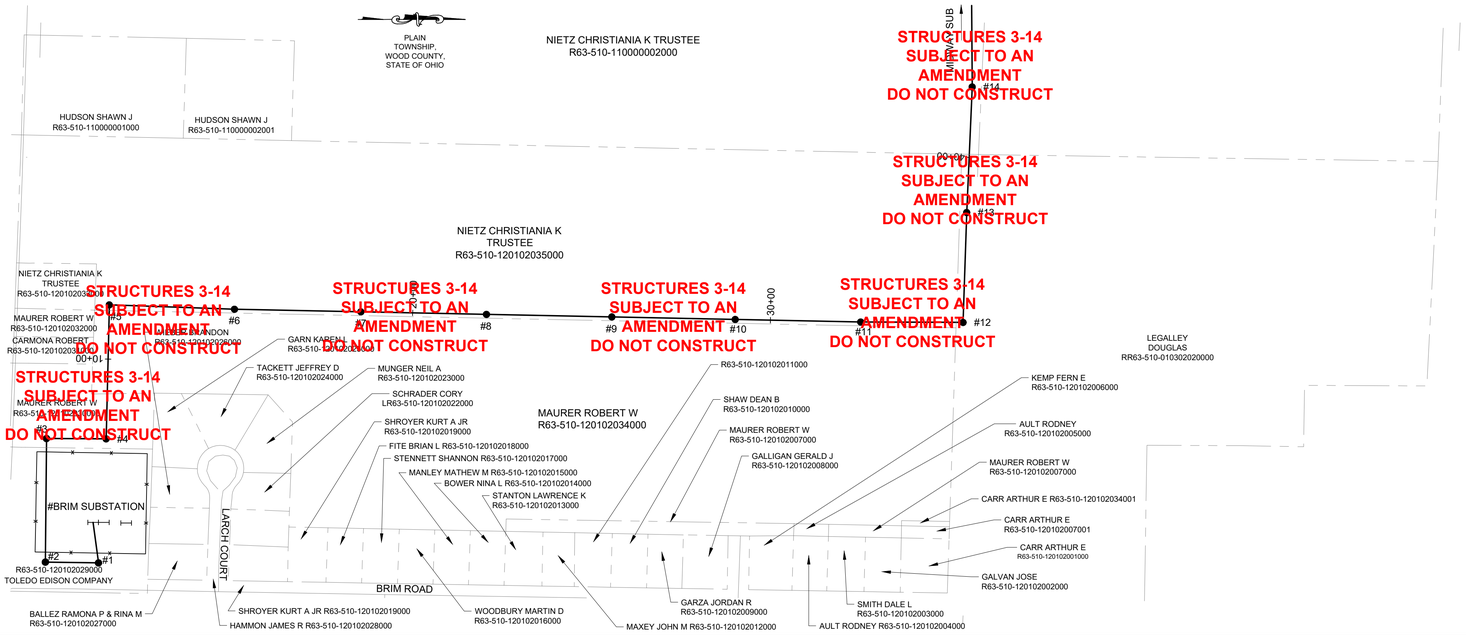
Preconstruction Conference #2 Agenda

Wood County Reinforcement Project (OPSB Case No. 18-1335-EL-BTX)

August 28, 2023 at 1:00 p.m.
Dowling Substation Construction Trailer
22105 Mercer Road
Bowling Green, Ohio 43402

Agenda

I.	Introductions	Scott Humphrys
II.	Meeting Purpose	Scott Humphrys
III.	Construction Contact	Jamey Brooks (PM) Kenneth Krill (CSC)
IV.	Certificate Conditions Review	Scott Humphrys
V.	Schedule review	Jamey Brooks (PM)
	o Vegetation/Tree Clearing	N/A
	o Access Road Construction	August 29. 2023
	o Transmission Line Construction Start	August 29. 2023
	o Transmission Line In-Service	December 31, 2023

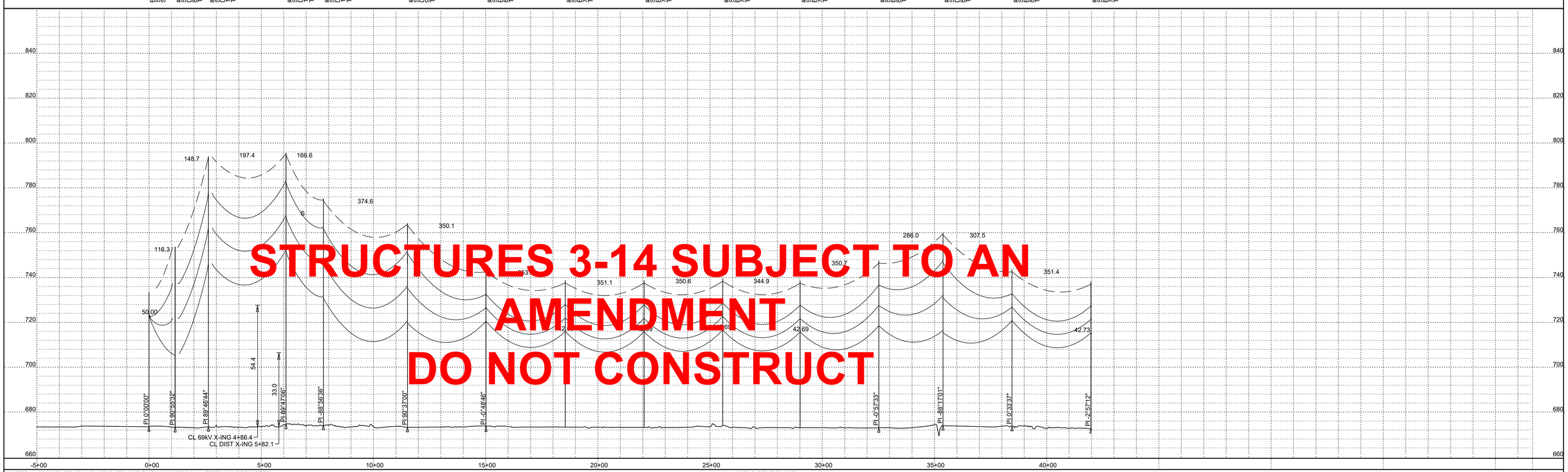


NOTES:
1. DESIGN CONDITION = NESC HEAVY (RULE 250B)
2. DISPLAY WEATHER CASE = 120°F FOR SHIELD WIRE & 212°F (MOT) FOR CONDUCTORS
3. DISPLAY CONDITION = MAX SAG RS
4. SEE TZ-7834-A, TZ-7835-A, AND TZ-7839-A FOR STRINGING INFORMATION

Start Str #	End Str #	Ruling Span (ft)	Wire Type	Voltage (kV)	Cond. Per Phase	Design Tension Per Cond./Sub-Cond. (lbs)	Sag Condition	Sag Temp. (deg F)	Sag Horiz. Ten. (lbs)
BRIM SUBSTATION	1	106	7#8 ALUMOWELD	0	1	1000	Initial RS	60.0	204.6
BRIM SUBSTATION	1	105	795.0 KCMIL 26/7 ACSR	138	1	2000	Initial RS	60.0	684.8
1	2	132	7#8 ALUMOWELD	0	1	1000	Initial RS	60.0	198.3
1	2	132	795.0 KCMIL 26/7 ACSR	138	1	2000	Initial RS	60.0	701.2
2	3	328	7#8 ALUMOWELD	0	1	4000	Initial RS	60.0	2427.8
2	3	328	795.0 KCMIL 26/7 ACSR	138	1	5000	Initial RS	60.0	2013.2
3	4	163	SFPOC SFSJ-J-6641 OPGW	0	1	3000	Initial RS	60.0	1411.9
3	4	162	795.0 KCMIL 26/7 ACSR	138	1	5000	Initial RS	60.0	1745.2
4	5	372	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	1726.7
4	5	371	795.0 KCMIL 26/7 ACSR	138	1	5000	Initial RS	60.0	2037.3
5	6	348	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	1800.4
5	12	343	795.0 KCMIL 26/7 ACSR	138	1	9000	Initial RS	60.0	4513.2
6	12	342	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	1832.5
12	25	352	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	1787.1
12	25	352	795.0 KCMIL 26/7 ACSR	138	1	9000	Initial RS	60.0	4486.3

PRELIMINARY PRINT ONLY NOT FOR CONSTRUCTION

BRIM SUBSTATION STA 0+00.0 SSDE
#1 STA 1+16.3 DE STEEL 90 TR-138325 R0.5 TZ-7497-B
#2 STA 2+65.0 DE STEEL 120 TR-138325 R0.5 TZ-7497-B
#3 STA 6+10.6 DE STEEL 120 TR-138325 R0.5
#4 STA 7+77.2 DE STEEL 100 TR-138325 R0.5
#5 STA 11+51.8 DE STEEL 90 TR-138325 R0.5
#6 STA 15+02.0 BRACED POST 90 TZ-7829-A
#7 STA 18+55.2 BRACED POST 72 TZ-7828-A
#8 STA 22+06.3 BRACED POST 72 TZ-7828-A
#9 STA 25+56.9 BRACED POST 72 TZ-7828-A
#10 STA 29+01.8 BRACED POST 72 TZ-7828-A
#11 STA 32+52.5 BRACED POST 72 TZ-7827-A
#12 STA 35+38.6 DE STEEL 90 TR-138325 R0.5
#13 STA 38+46.0 BRACED POST 72 TZ-7828-A
#14 STA 41+97.4 BRACED POST 72 TZ-7828-A



NOTES: 1. ALL LENGTHS AND HEIGHTS ARE SHOWN IN DECIMAL FEET UNLESS NOTED.
2. ALL STATION LABELS ARE BASED ON A HORIZONTAL DISTANCE ALONG THE DESIGN ALIGNMENT FROM PI TO PI.
3. ALL SPAN LENGTHS ARE DEFINED AS A HORIZONTAL DISTANCE FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
4. SEE THE CONSTRUCTION LIST FOR EMBEDMENT DEPTHS & DEVIATIONS FROM STRUCTURE STANDARDS.

WETLAND DATA SOURCE: GAI EMAIL RECEIVED 4/23/20
PROPERTY DATA SOURCE: BRIM PARCEL DATA
PLS-CADD FILE NAME: 8_lemoyne_midway_brim_138kV

AHEAD STATIONING
L HT/CL, C HT/CL, R HT/CL

25' LEFT
25' RIGHT

PAPER SIZE: 36X24

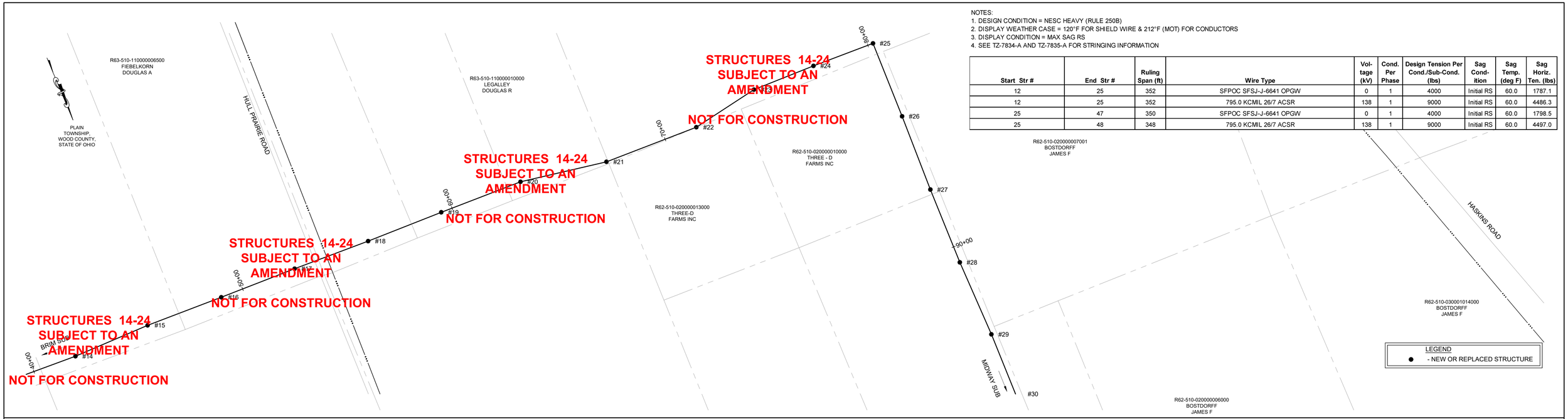
DWG. NO.	REFERENCE
TZ-2730-A	DRAWING INDEX SHEET 8
TZ-8269-B	WIRE ARRANGEMENT
TZ-8276-B	CONSTRUCTION LIST

REV.	DATE	BY	APP.	DESCRIPTION

DR. VG/BV 6/23
CHK. CC/BV 6/23
INS. MRD/BV 6/23
APP.
C.E. 18-01-TE
ORDER NO. 15372904
WBS TW-001440 R/W
SCALE H 1" = 200' V 1" = 20'

BRIM–MIDWAY 138kV
PLAN & PROFILE

FirstEnergy. Transmission Design | ASSET/OP. CO. ATSI/TE | DWG NO. TZ–594–F | SHEET 1/6 | REV.



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12	25	352	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	1787.1
12	25	352	795.0 KCMIL 26/7 ACSR	138	1	9000	Initial RS	60.0	4486.3
25	47	350	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	1798.5
25	48	348	795.0 KCMIL 26/7 ACSR	138	1	9000	Initial RS	60.0	4497.0

#14 STA 41+97.4

#15 STA 45+47.1 BRACED POST 80H4 TZ-7828-A

#16 STA 48+98.1 BRACED POST 80H1 TZ-7828-A

#17 STA 52+48.7 BRACED POST 80H3 TZ-7828-A

#18 STA 56+98.6 BRACED POST 75H3 TZ-7828-A

#19 STA 59+48.8 BRACED POST 75H2 TZ-7828-A

#20 STA 63+27.0 BRACED POST 93.5H11 LAMINATE TZ-7831-A

#21 STA 67+20.2 BRACED POST 93.5H11 LAMINATE TZ-7831-A

#22 STA 71+49.2 BRACED POST 100H14 LAMINATE TZ-7831-A

#23 STA 74+55.5 BRACED POST 93.5H11 LAMINATE TZ-7831-A

#24 STA 77+41.0 BRACED POST 90H1 LAMINATE TZ-7830-A

#25 STA 80+24.6 DE STEEL TR-138325 R0.5

#26 STA 83+74.5 BRACED POST 80H3 TZ-7828-A

#27 STA 87+24.5 BRACED POST 75H2 TZ-7828-A

#28 STA 90+74.5 BRACED POST 80H3 TZ-7828-A

#29 STA 94+24.7 BRACED POST 75H3 TZ-7828-A

PRELIMINARY PRINT ONLY
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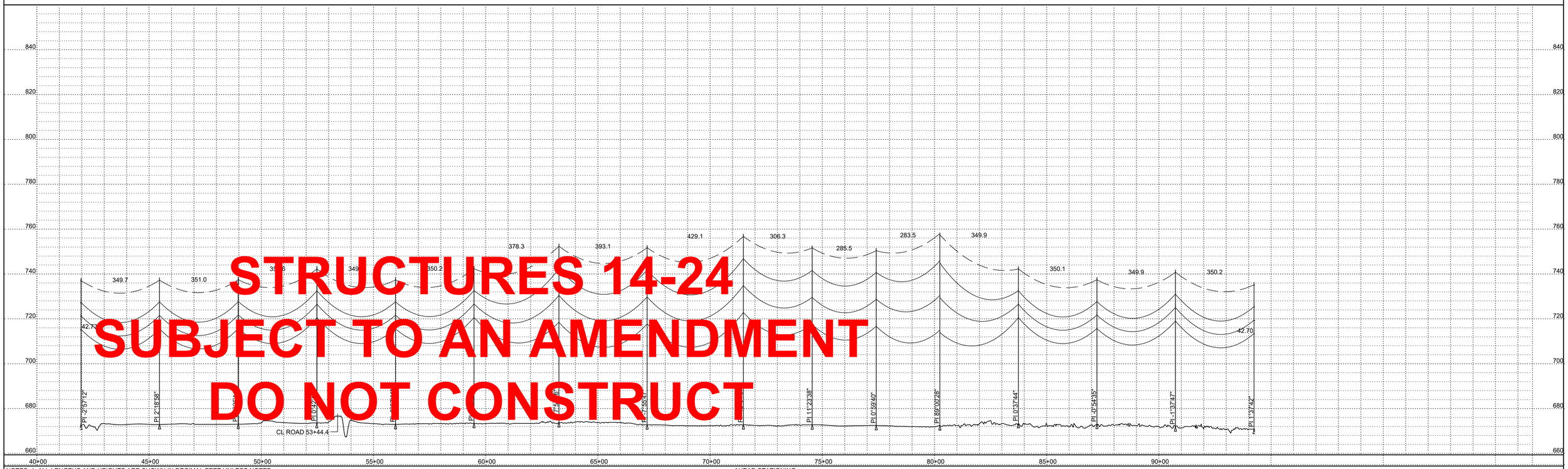

STRUCTURES 14-24
SUBJECT TO AN AMENDMENT
DO NOT CONSTRUCT

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PLS-CADD FILE NAME: 8_lemoyne_midway_brim_138kV

AHEAD STATIONING
L HT/CL, C HT/CL, R HT/CL

25' LEFT
25' RIGHT

PAPER SIZE: 36X24

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TZ-2730-A	DRAWING INDEX SHEET 8
TZ-8269-B	WIRE ARRANGEMENT
TZ-8276-B	CONSTRUCTION LIST

REV.	DATE	BY	APP.	DESCRIPTION

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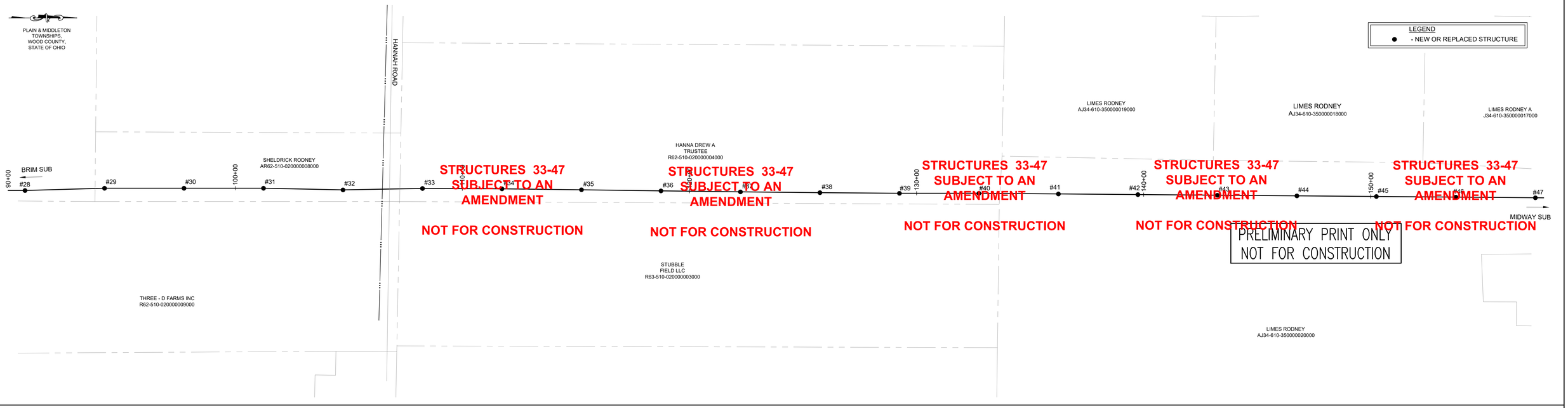
DR. VG/BV 6/23
CHK. CC/BV 6/23
INS. MRD/BV 6/23
APP.

C.E. 18-01-TE
ORDER NO. 15372904
WBS R/W TW-001440
SCALE H 1" = 200' V 1" = 20'

BRIM–MIDWAY 138kV
PLAN & PROFILE

FirstEnergy. Transmission Design

ASSET/OP. CO.	DWG NO.	SHEET	REV.
ATSI/TE	TZ–594–F	2/6	



#29 STA 94+24.7

#30 STA 97+74.5 DBRACED POST 80/H12 TZ-7828-A

#31 STA 101+24.6 DBRACED POST 80/H13 TZ-7828-A

#32 STA 104+74.7 DBRACED POST 90/H15 TZ-7828-A

#33 STA 108+24.7 DBRACED POST 90/H14 TZ-7828-A

#34 STA 111+74.8 DBRACED POST 85/H12 TZ-7828-A

#35 STA 115+74.8 DBRACED POST 80/H12 TZ-7828-A

#36 STA 119+74.8 BRACED POST 75/H11 TZ-7828-A

#37 STA 122+24.7 BRACED POST 75/H11 TZ-7828-A

#38 STA 125+74.8 BRACED POST 75/H11 TZ-7828-A

#39 STA 129+24.8 BRACED POST 75/H11 TZ-7828-A

#40 STA 132+74.9 BRACED POST 75/H11 TZ-7828-A

#41 STA 136+24.7 BRACED POST 75/H11 TZ-7828-A

#42 STA 139+74.7 BRACED POST 75/H11 TZ-7828-A

#43 STA 143+24.8 BRACED POST 75/H11 TZ-7828-A

#44 STA 146+74.8 BRACED POST 75/H11 TZ-7828-A

#45 STA 150+24.8 BRACED POST 75/H11 TZ-7828-A

#46 STA 153+74.8 BRACED POST 75/H11 TZ-7828-A

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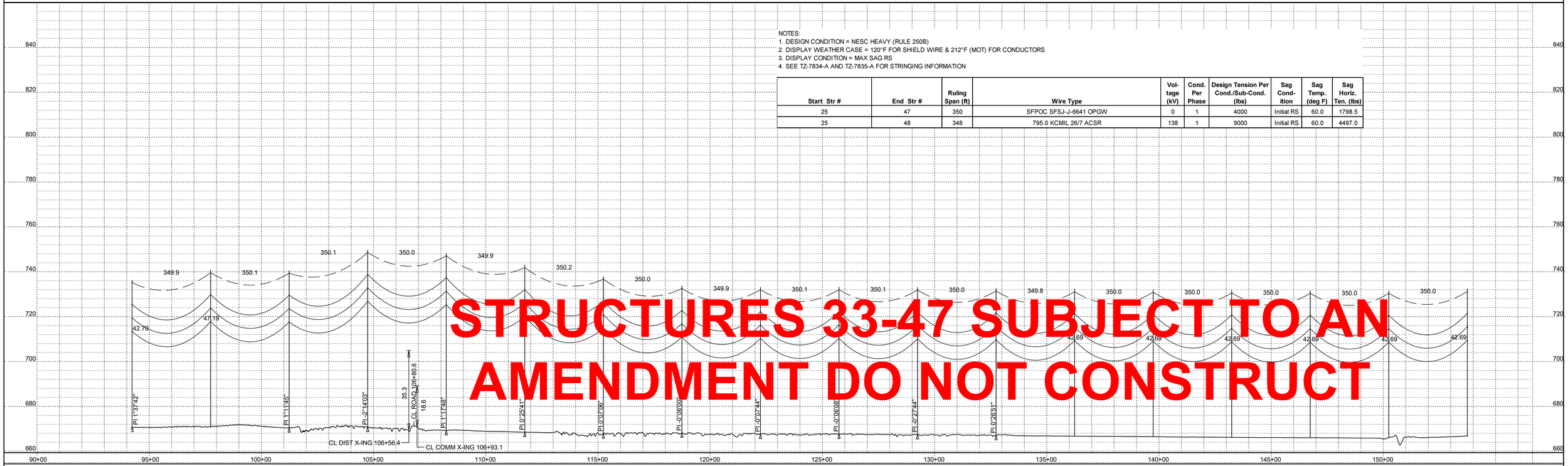
25	47	350	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	1798.5
25	48	348	795.0 KCMIL 26/7 ACSR	138	1	9000	Initial RS	60.0	4497.0



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L HT/CL, C HT/CL, R HT/CL

---------- 25' LEFT
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PAPER SIZE: 36X24

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TZ-8269-B	WIRE ARRANGEMENT
TZ-8276-B	CONSTRUCTION LIST

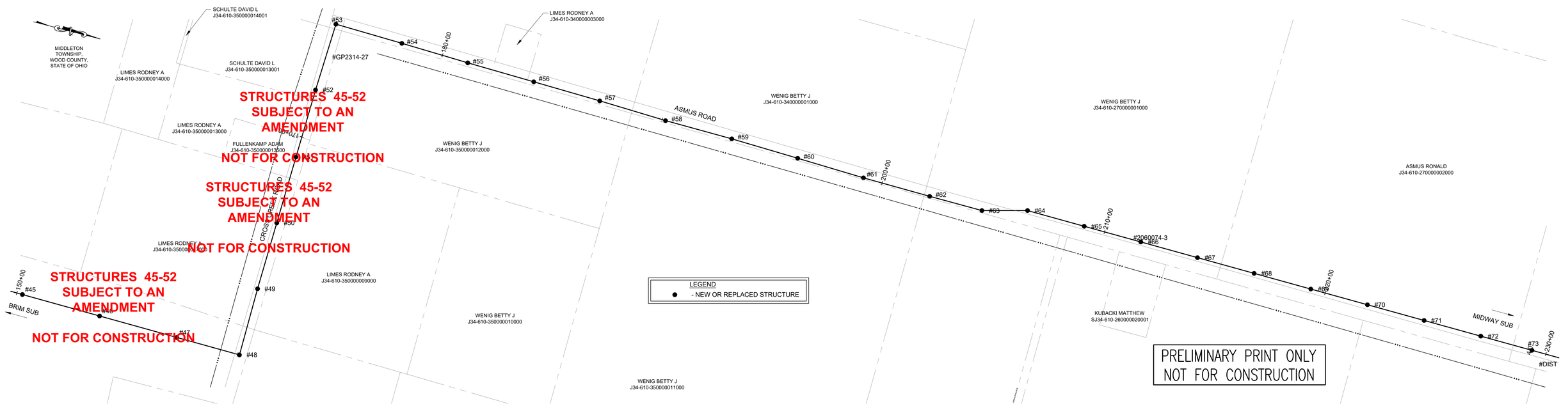
REV.	DATE	BY	APP.	DESCRIPTION

DR. VG/BV	6/23	C.E.	18-01-TE
CHK. CC/BV	6/23	ORDER NO.	15372904
ENG. MRD/BV	6/23	WBS	TW-001440
APP.		SCALE	H 1" = 200' V 1" = 20'

BRIM–MIDWAY 138kV
PLAN & PROFILE

FirstEnergy. Transmission Design.

ASSET/OP. CO.	DWG NO.	SHEET	REV.
ATSI/TE	TZ–594–F	3/6	



#46 STA 153+74.8

#47 STA 157+24.8 BRACED POST 75/1 TZ-7829-A

#48 STA 160+08.7 DE 95 STEEL TR-138325 R0.5

#49 STA 163+08.5 BRACED POST 75/1 TZ-7829-A

#50 STA 166+08.5 POST 75/1 TR-138010 R2.0

#51 STA 169+08.5 POST 75/1 TR-138010 R2.0

#52 STA 172+14.1 BRACED POST 75/1 TZ-7829-A

#53 STA 175+15.2 DE 95 STEEL TR-138325 R0.5

#54 STA 178+15.2 BRACED POST 80/H1 TZ-7828-A

#55 STA 181+15.3 BRACED POST 75/1 TZ-7828-A

#56 STA 184+15.3 BRACED POST 80/H1 TZ-7828-A

#57 STA 187+15.2 BRACED POST 75/1 TZ-7828-A

#58 STA 190+15.3 BRACED POST 75/1 TZ-7828-A

#59 STA 193+15.3 POST 75/1 TZ-7828-A

#60 STA 196+15.4 BRACED POST 75/1 TZ-7828-A

#61 STA 199+15.2 POST 75/1 TR-138010 R2.0

#62 STA 202+15.5 BRACED POST 80/H1 TZ-7829-A

#63 STA 204+51.9 BRACED POST 95 LAMINATE TZ-7831-A

#64 STA 206+51.2 BRACED POST 95 LAMINATE TZ-7831-A

#65 STA 209+07.8 BRACED POST 80/H1 TZ-7829-A

#66 STA 211+64.7 POST 80/H1 TR-138010 R2.0

#67 STA 214+21.4 POST 80/H1 TR-138010 R2.0

NOTES:
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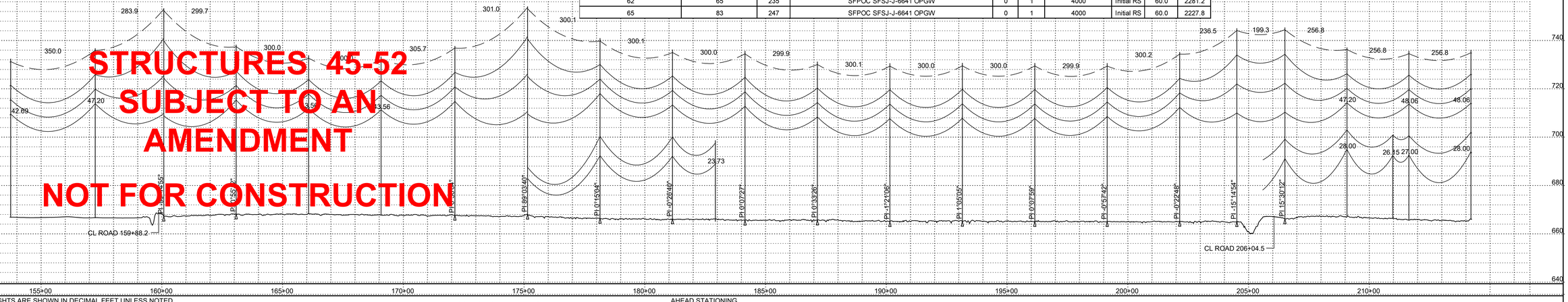
47	48	282	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	2071.6
48	49	298	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	2007.0
48	53	300	795.0 KCMIL 26/7 ACSR	138	1	9000	Initial RS	60.0	4605.0
49	52	302	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	1999.4
52	53	299	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	1999.4
53	62	300	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	1999.4
53	83	265	795.0 KCMIL 26/7 ACSR	138	1	9000	Initial RS	60.0	4685.7
62	65	235	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	2281.2
65	83	247	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	2227.8



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BRIM–MIDWAY 138kV
PLAN & PROFILE

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DWG NO. TZ–594–F
SHEET 4/6
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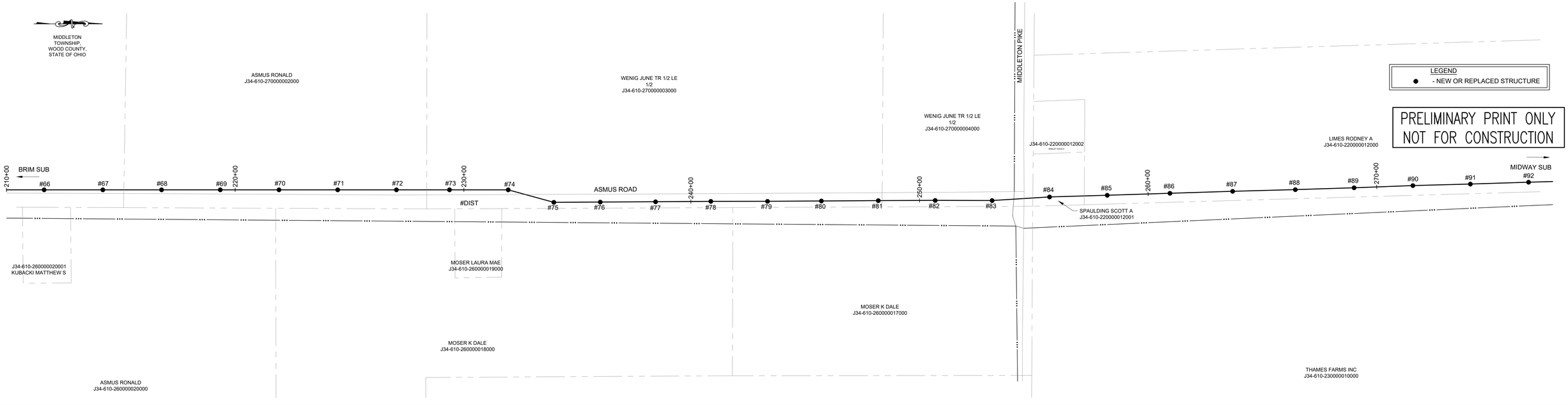

#67 STA 214+21.4

#68 STA 216+78.2 POST 80/1 TR-138010 R2.0

#69 STA 219+34.9 POST 80/1 TR-138010 R2.0

#70 STA 221+91.7 POST 80/1 TR-138010 R2.0

#71 STA 224+48.4 POST 80/1 TR-138010 R2.0

#72 STA 227+05.2 POST 80/1 TR-138010 R2.0

#73 STA 229+37.2 BRACED POST 80/H1 TZ-7828-A

#74 STA 231+94.0 BRACED POST 96/H15 LAMINATE TZ-7831-A

#75 STA 234+00.8 BRACED POST 96/H15 LAMINATE TZ-7831-A

#76 STA 236+03.8 BRACED POST 65/1 TZ-7827-A

#77 STA 238+45.6 BRACED POST 80/1 TZ-7827-A

#78 STA 240+87.4 POST 75/1 TR-138010 R2.0

#79 STA 243+35.2 POST 75/1 TR-138010 R2.0

#80 STA 245+70.8 POST 75/1 TR-138010 R2.0

#81 STA 248+19.6 POST 80/1 TR-138010 R2.0

#82 STA 250+68.4 BRACED POST 80/1 TZ-7827-A

#83 STA 253+17.2 DE 90 STEEL TR-138225 R0.5

#84 STA 255+68.8 BRACED POST 80/1 TZ-7827-A

#85 STA 258+21.3 POST 80/1 TR-138010 R2.0

#86 STA 260+95.7 POST 75/1 TR-138010 R2.0

#87 STA 263+69.8 POST 75/1 TR-138010 R2.0

#88 STA 266+44.1 POST 75/1 TR-138010 R2.0

#89 STA 269+01.1 POST 75/1 TR-138010 R2.0

#90 STA 271+58.4 POST 75/1 TR-138010 R2.0

#91 STA 274+09.9 POST 75/1 TR-138010 R2.0

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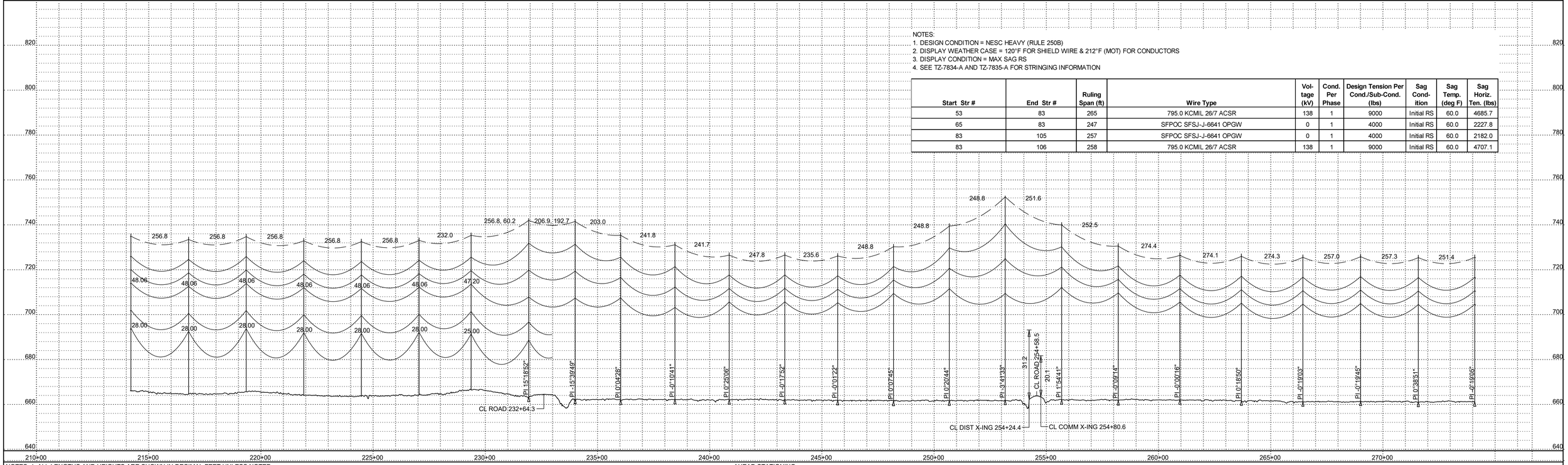
4. SEE TZ-7834-A AND TZ-7835-A FOR STRINGING INFORMATION

Start Str #	End Str #	Ruling Span (ft)	Wire Type	Voltage (kV)	Cond. Per Phase	Design Tension Per Cond./Sub-Cond. (lbs)	Sag Condition	Sag Temp. (deg F)	Sag Horiz. Ten. (lbs)
53	83	265	795.0 KCMIL 26/7 ACSR	138	1	9000	Initial RS	60.0	4685.7
65	83	247	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	2227.8
83	105	257	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	2182.0
83	106	258	795.0 KCMIL 26/7 ACSR	138	1	9000	Initial RS	60.0	4707.1



NOTES: 1. ALL LENGTHS AND HEIGHTS ARE SHOWN IN DECIMAL FEET UNLESS NOTED.
2. ALL STATION LABELS ARE BASED ON A HORIZONTAL DISTANCE ALONG THE DESIGN ALIGNMENT FROM PI TO PI.
3. ALL SPAN LENGTHS ARE DEFINED AS A HORIZONTAL DISTANCE FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
4. SEE THE CONSTRUCTION LIST FOR EMBEDMENT DEPTHS & DEVIATIONS FROM STRUCTURE STANDARDS.

WETLAND DATA SOURCE: GAI EMAIL RECEIVED 4/23/20
PROPERTY DATA SOURCE: BRIM PARCEL DATA
PLS-CADD FILE NAME: 8_lemoyne_midway_brim_138kV

AHEAD STATIONING
L HT/CL, C HT/CL, R HT/CL

25' LEFT
25' RIGHT

DWG. NO.	REFERENCE
TZ-2730-A	DRAWING INDEX SHEET 8
TZ-8269-B	WIRE ARRANGEMENT
TZ-8276-B	CONSTRUCTION LIST

REV.	DATE	BY	APP.	DESCRIPTION

PAPER SIZE: 36X24

DR. VC/BV 6/23
CHK.CC/BV 6/23
INS. MRD/BV 6/23
APP.

C.E. 18-01-TE
ORDER NO. 15372904
WBS TW-001440 R/W
SCALE H 1" = 200' V 1" = 20'

BRIM–MIDWAY 138kV PLAN & PROFILE

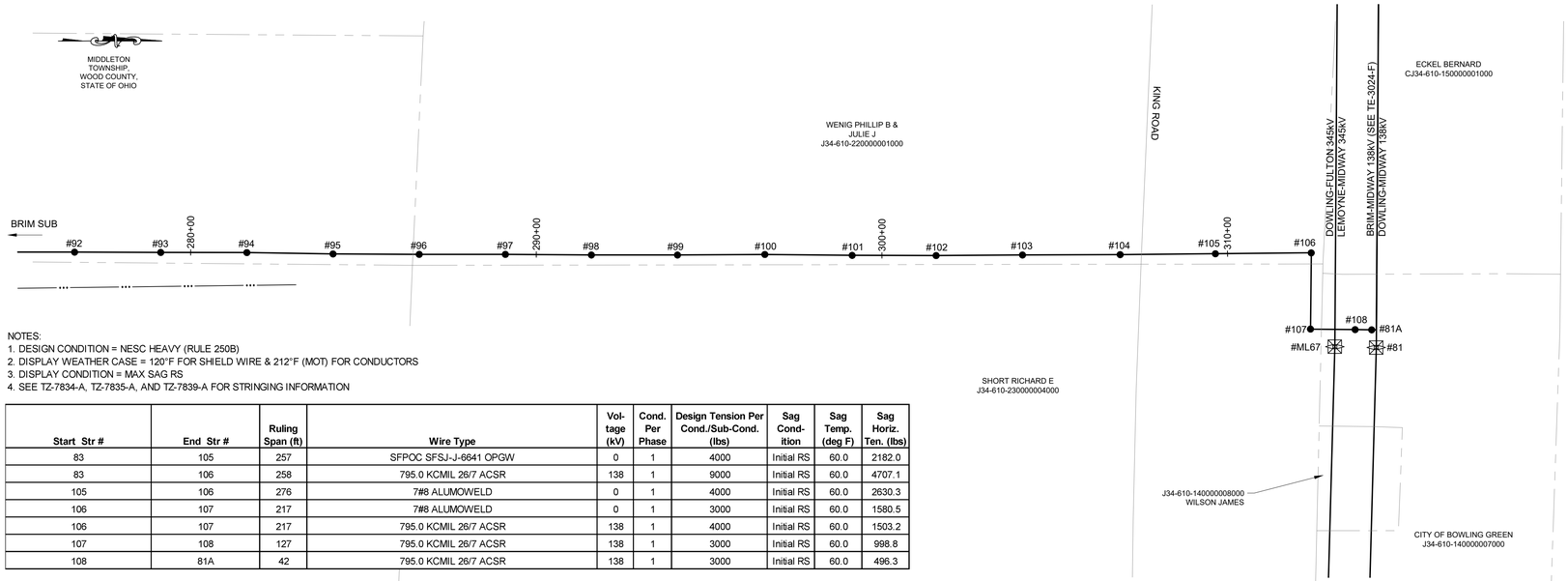
FirstEnergy. Transmission Design

ASSET/OP. CO. ATSI/TE

DWG NO. TZ–594–F

SHEET 5/6

REV.

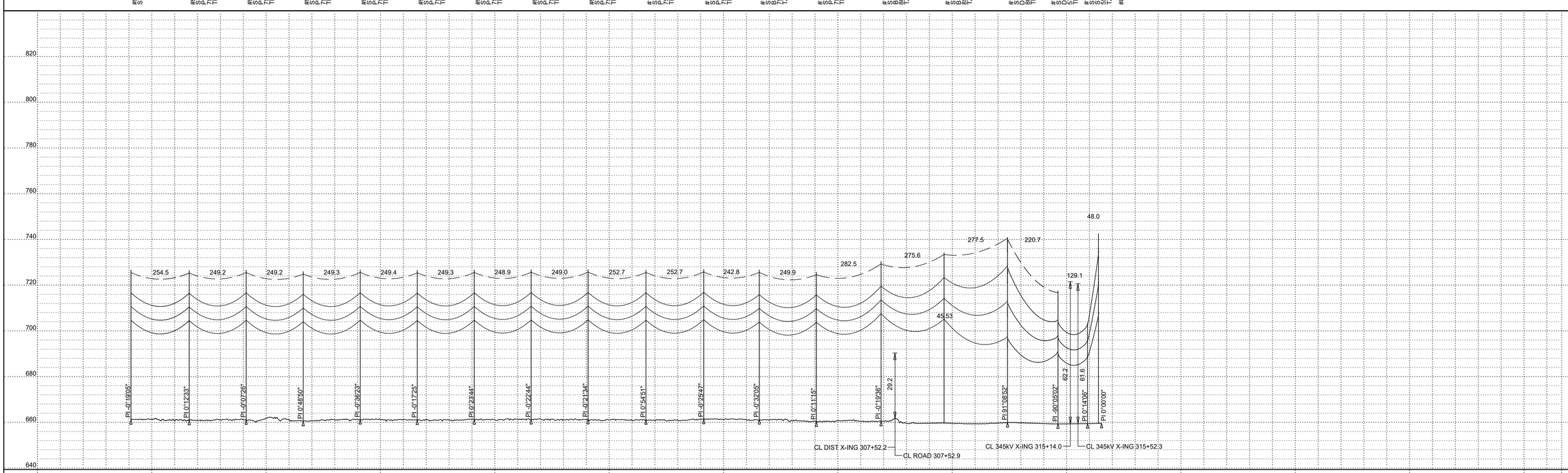


NOTES:
1. DESIGN CONDITION = NESC HEAVY (RULE 250B)
2. DISPLAY WEATHER CASE = 120°F FOR SHIELD WIRE & 212°F (MOT) FOR CONDUCTORS
3. DISPLAY CONDITION = MAX SAG RS
4. SEE TZ-7834-A, TZ-7835-A, AND TZ-7839-A FOR STRINGING INFORMATION

Start Str #	End Str #	Ruling Span (ft)	Wire Type	Voltage (kV)	Cond. Per Phase	Design Tension Per Cond./Sub-Cond. (lbs)	Sag Condition	Sag Temp. (deg F)	Sag Horiz. Ten. (lbs)
83	105	257	SFPOC SFSJ-J-6641 OPGW	0	1	4000	Initial RS	60.0	2182.0
83	106	258	795.0 KCMIL 26/7 ACSR	138	1	9000	Initial RS	60.0	4707.1
105	106	276	7#8 ALUMOWELD	0	1	4000	Initial RS	60.0	2630.3
106	107	217	7#8 ALUMOWELD	0	1	3000	Initial RS	60.0	1580.5
106	107	217	795.0 KCMIL 26/7 ACSR	138	1	4000	Initial RS	60.0	1503.2
107	108	127	795.0 KCMIL 26/7 ACSR	138	1	3000	Initial RS	60.0	998.8
108	81A	42	795.0 KCMIL 26/7 ACSR	138	1	3000	Initial RS	60.0	496.3

LEGEND
- NEW OR REPLACED STRUCTURE
- EXISTING TOWER

PRELIMINARY PRINT ONLY
NOT FOR CONSTRUCTION



NOTES: 1. ALL LENGTHS AND HEIGHTS ARE SHOWN IN DECIMAL FEET UNLESS NOTED.
2. ALL STATION LABELS ARE BASED ON A HORIZONTAL DISTANCE ALONG THE DESIGN ALIGNMENT FROM PI TO PI.
3. ALL SPAN LENGTHS ARE DEFINED AS A HORIZONTAL DISTANCE FROM CENTER OF STRUCTURE TO CENTER OF STRUCTURE.
4. SEE THE CONSTRUCTION LIST FOR EMBEDMENT DEPTHS & DEVIATIONS FROM STRUCTURE STANDARDS.

WETLAND DATA SOURCE: GAI EMAIL RECEIVED 4/23/20
PROPERTY DATA SOURCE: BRIM PARCEL DATA
PLS-CADD FILE NAME: 8_lemoyne_midway_brim_138kV

AHEAD STATIONING
L HT/CL, C HT/CL, R HT/CL

25' LEFT
25' RIGHT

PAPER SIZE: 36X24

DWG. NO.	REFERENCE
TZ-2730-A	DRAWING INDEX SHEET 8
TZ-8269-B	WIRE ARRANGEMENT
TZ-8276-B	CONSTRUCTION LIST

REV.	DATE	BY	APP.	DESCRIPTION

DR. VG/BV	6/23	C.E. 18-01-TE	
CHK. CC/BV	6/23	ORDER NO. 15372904	
ENS. MRD/BV	6/23	WBS TW-001440 R/W	
APP.		SCALE H 1" = 200' V 1" = 20'	

BRIM-MIDWAY 138kV
PLAN & PROFILE

FirstEnergy. Transmission Design

ASSET/OP. CO.	DWG NO.	SHEET	REV.
ATSI/TE	TZ-594-F	6/6	

WOOD COUNTY

16186.20, WILSON JOHN E & WILSON CHRISTINA R

16187.00, ECKEL BERNARD C & MARGARET A

16186.00, CITY OF BOWLING GREEN

16185.00, HALL JEFFREY A & CATHY D

MIDDLETON TWP

16186.10, WILSON JAMES

49065.00, WENIG PHILLIP B & JULIE J

49062.00, SHORT RICHARD E & MONA L

49062.10, WEIHL HAROLD W & MARY L TRUSTEES

108
107
106
105
104
103
102

RC01
AP-01
AP-02

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

Plain Twp
Haskins Rd
N Dixie Hwy
Bishop Rd

Existing Substation
Alignment
Survey Corridor
Proposed 60ft ROW
Proposed Access Road
Proposed Timber Bridge

Access Point
Silt Sock
Pull Pad
Proposed Laydown Yard
Work Pad
Turn Around

Structures
Road Crossing
Culvert
Delineated Stream
Ditch
Stream Crossings

Detention Basin
Delineated Wetland
Impacted Parcel
City
Township
County

Existing 138 kV

N

0 100 200 400 Feet

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FirstEnergy
Toledo Edison
Wood County138kV Reinforcement
Preliminary Construction Access Plan

GPD Group Pathway: O:\2017\2017410\GIS\Projects and Templates\20174410.04_WCR\WCR_MapBook_20230726.mxd

Source: BMCD, ESRI, NWI, NPMS

Issued: July 26, 2023

WOOD COUNTY

HASKINS

MIDDLETON TWP

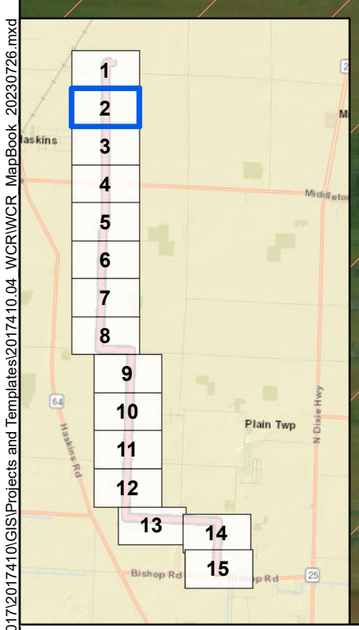
49062.10, WEIHL HAROLD W & MARY L TRUSTEES

49062.00, SHORT RICHARD E & MONA L

49065.00, WENIG PHILLIP B & JULIE J

49062.20, PETTEYS DAVID P & BARBARA S TRUSTEES

101
100
99
98
97
96
95



GPD Group Pathway: O:\2017\2017410\GIS\Projects and Templates\2017410.04_WCR\WCR_MapBook_20230726.mxd

Existing Substation
Alignment
Survey Corridor
Proposed 60ft ROW
Proposed Access Road
Proposed Timber Bridge
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Silt Sock
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Turn Around
Structures
Road Crossing
Culvert
Delineated Stream
Ditch
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Delineated Wetland
Impacted Parcel
City
Township
County
Existing 138 kV

N

0 100 200 400 Feet

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Preliminary Construction Access Plan

Source: BMCD, ESRI, NWI, NPMS

Issued: July 26, 2023

49065.00, WENIG PHILLIP B & JULIE J

49062.00, SHORT RICHARD E & MONAL

WOOD COUNTY

S TRUSTEES

HASKINS

MIDDLETON TWP

49064.00, LIMES RODNEY A ETAL

49061.00, VETTER FREDERICK E & AMY S

49061.10, WENIG GORDONA

94

93

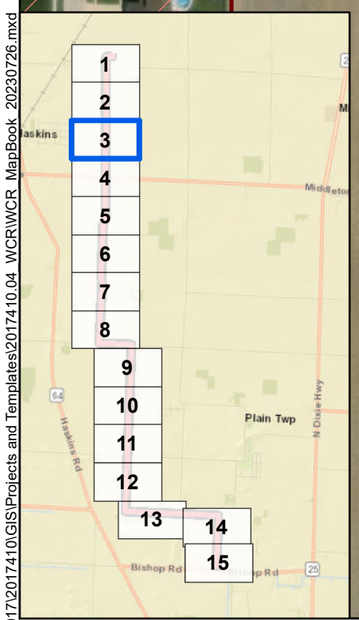
92

91

90

89

88



GPD Group Pathway: O:\2017\2017410\GIS\Projects and Templates\20174410.04_WCR\WCR_MapBook_20230726.mxd

- Existing Substation
- Alignment
- Survey Corridor
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- Access Point
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- Delineated Stream
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- Detention Basin
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- Impacted Parcel
- City
- Township
- County
- Existing 138 kV

N

0 100 200 400 Feet

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Toledo Edison
Wood County138kV Reinforcement
Preliminary Construction Access Plan

Source: BMCD, ESRI, NWI, NPMS

Issued: July 26, 2023

WOOD COUNTY

49064.00, LIMES RODNEY A ETAL

49061.00, VETTER FREDERICK E & AMY S

49061.10, WENIG GORDONA

MIDDLETON TWP

49063.00, DEWITT WILLIAM A JR

582

HASKINS

87

86

85

84

AP-03

RC02

Middleton Pike

AP-04

83

82

232

81

49057.00, WENIG JUNE TR 1/2 LE 1/2 WENIG DOUGLAS & DIANE RM %COULSTON DIANE

49060.00, MOSER K DALE

49060.10, WENIG GORDON A TRUSTEE

49056.00, WENIG JUNE TR 1/2 LE 1/2 WENIG DOUGLAS & DIANE RM %COULSTON DIANE

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Plain Twp

Haskins Rd

N Dixie Hwy

Bishop Rd

- Existing Substation
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- Survey Corridor
- Proposed 60ft ROW
- Proposed Access Road
- Proposed Timber Bridge
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- Pull Pad
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- Township
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N

0 100 200 400 Feet

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Source: BMCD, ESRI, NWI, NPMS

Issued: July 26, 2023

WOOD COUNTY

49056.10, WENIG JUNE TR 1/2 LE 1/2 WENIG DOUGLAS & DIANE RM %COULSTON DIANE

HASKINS

49056.00, WENIG JUNE TR 1/2 LE 1/2 WENIG DOUGLAS & DIANE RM %COULSTON DIANE

49060.00, MOSER K DALE

MIDDLETON TWP

49058.00, MOSER K DALE

49060.10, WENIG GORDON A TRUSTEE

49059.00, MOSER LAURA MAE

NO ACCESS PERMITTED

49055.00, ASMUS RONALD & SUZANNE M TRUSTEES

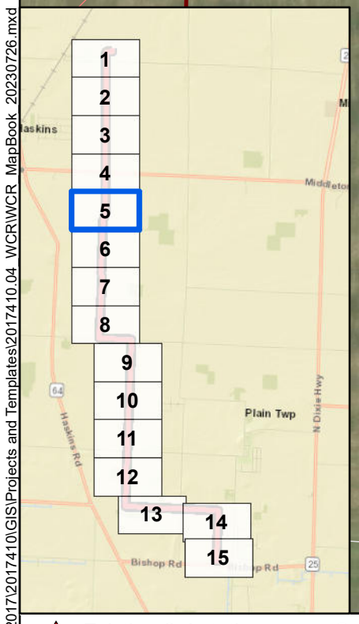
232

79
78
77
76
75
74
73

AP-05

Crossing 6

RC03



- Existing Substation
- Alignment
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- Proposed Access Road
- Proposed Timber Bridge
- Access Point
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- Pull Pad
- Proposed Laydown Yard
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- City
- Township
- County
- Existing 138 kV

N

0 100 200 400 Feet

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Toledo Edison
Wood County138kV Reinforcement
Preliminary Construction Access Plan

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Issued: July 26, 2023

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- Township
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N

0 100 200 400 Feet

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Toledo Edison
Wood County138kV Reinforcement
Preliminary Construction Access Plan

Source: BMCD, ESRI, NWI, NPMS

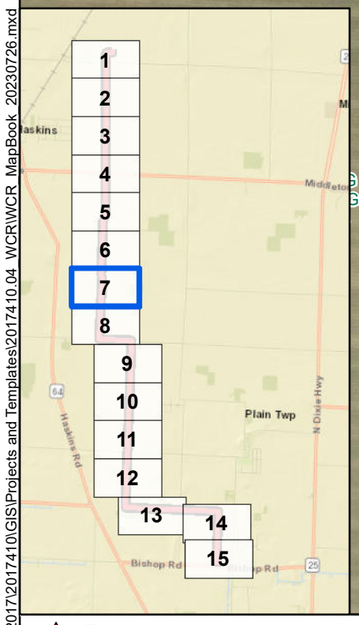
Issued: July 26, 2023

WOOD COUNTY

AP-07
AP-06
64
RC04
Crossing 5
63
62
61
60
59

49054.10, BOSTDORFF JAMES F
49054.00, WENIG BETTY J & WENIG BETTY J LE @3
49050.00, WENIG PHILLIP B
49051.00, ASMUS RONALD & SUZANNE M TRUSTEES
49049.00, WENIG BETTY J & WENIG BETTY J LE @3
49053.00, WENIG BETTY J & WENIG BETTY J LE @4
49048.00, WENIG BETTY J & WENIG BETTY J LE @3
49048.10, LIMES GALEN E & NANCY L

232
MIDDLETON TWP



Existing Substation
Alignment
Survey Corridor
Proposed 60ft ROW
Proposed Access Road
Proposed Timber Bridge
Access Point
Silt Sock
Pull Pad
Proposed Laydown Yard
Work Pad
Turn Around
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Culvert
Delineated Stream
Ditch
Stream Crossings
Detention Basin
Delineated Wetland
Impacted Parcel
City
Township
County
Existing 138 kV

N
0 100 200 400 Feet

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Wood County138kV Reinforcement
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GPD Group Pathway: O:\2017\2017410\GIS\Projects and Templates\2017410.04 WCR\WCR MapBook 20230726.mxd

Source: BMCD, ESRI, NWI, NPMS

Issued: July 26, 2023

WOOD COUNTY

49053.10, WENIG BETTY J & WENIG BETTY J LE @ 3

49053.00, WENIG BETTY J & WENIG BETTY J LE @ 4

49048.00, WENIG BETTY J & WENIG BETTY J LE @ 3

49044.10, WENIG BETTY J & WENIG BETTY J LE @ 3

MIDDLETON TWP

49047.00, LIMES RODNEY A ETAL

49046.00, LIMES RODNEY A ETAL

49044.00, WENIG BETTY J & WENIG BETTY J LE @ 3

49044.20, LIMES RODNEY A ETAL

49048.30, LIMES RODNEY A ETAL

49045.00, BOSTDORFF JAMES F

49043.00, SCHULTE DAVID L & DARLAL

49043.10, LIMES RODNEY A ETAL

49043.20, FULLENKAMP ADAM

49041.10, LIMES RODNEY A ETAL

49039.20, LIMES RODNEY A

232

58 57 56 55 54 53 52 51 50 49 48 RC05

AP-08 AP-09 AP-10

STRUCTURES 52-48 SUBJECT TO AN AMENDMENT DO NOT CONSTRUCT

STRUCTURES 52-48 SUBJECT TO AN AMENDMENT DO NOT CONSTRUCT

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Plain Twp

Bishop Rd

Hoskins Rd

N Dixie Hwy

Existing Substation
Alignment
Survey Corridor
Proposed 60ft ROW
Proposed Access Road
Proposed Timber Bridge

Access Point
Silt Sock
Pull Pad
Proposed Laydown Yard
Work Pad
Turn Around

Structures
Road Crossing
Culvert
Delineated Stream
Ditch
Stream Crossings

Detention Basin
Delineated Wetland
Impacted Parcel
City
Township
County

Existing 138 kV

N

0 100 200 400 Feet

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Toledo Edison
Wood County138kV Reinforcement
Preliminary Construction Access Plan

GPD Group Pathway: O:\2017\2017410\GIS\Projects and Templates\20174410.04_WCR\WCR_MapBook_20230726.mxd

Source: BMCD, ESRI, NWI, NPMS

Issued: July 26, 2023

WOOD COUNTY

49043.20, FULLENKAMP ADAM

49043.00, SCHULTE DAVID L & DARLAL

49043.10, LIMES RODNEY A ETAL

49041.10, LIMES RODNEY A ETAL

49042.00, SCHULTE DAVID L & DARLAL

49041.00, LIMES RODNEY A ETAL

49045.00, BOSTDORFF JAMES F

49040.00, LIMES RODNEY A ETAL

49040.10, LIMES RODNEY A ETAL

49039.00, LIMES RODNEY A ETAL

49039.10, LIMES RODNEY A ETAL

49039.20, LIMES RODNEY A

MIDDLETON TWP

Plain Twp

Haskins

Middleton

Haskins Rd

N Dixie Hwy

Bishop Rd

Stream 6
Width: 9 Feet

Crossing 4

47

46

45

44

43

STRUCTURES 47-43
SUBJECT TO AN AMENDMENT
DO NOT CONSTRUCT

STRUCTURES 47-43
SUBJECT TO AN AMENDMENT
DO NOT CONSTRUCT

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

- Existing Substation
- Alignment
- Survey Corridor
- Proposed 60ft ROW
- Proposed Access Road
- Proposed Timber Bridge
- Access Point
- Silt Sock
- Pull Pad
- Proposed Laydown Yard
- Work Pad
- Turn Around
- Structures
- Road Crossing
- Culvert
- Delineated Stream
- Ditch
- Stream Crossings
- Detention Basin
- Delineated Wetland
- Impacted Parcel
- City
- Township
- County
- Existing 138 kV

N

0 100 200 400 Feet

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FirstEnergy
Toledo Edison
Wood County138kV Reinforcement
Preliminary Construction Access Plan

GPD Group Pathway: O:\2017\2017410\GIS\Projects and Templates\2017410.04_WCR\WCR_MapBook_20230726.mxd

Source: BMCD, ESRI, NWI, NPMS

Issued: July 26, 2023

WOOD COUNTY

49045.00, BOSTDORFF JAMES F

49039.00, LIMES RODNEY A ETAL

49039.10, LIMES RODNEY A ETAL

MIDDLETON TWP

49039.20, LIMES RODNEY A

PLAIN TWP

49037.00, HANNA DREW A TRUSTEE

49036.00, HANNA DREW A TRUSTEE

49035.00, STUBBLE FIELD LLC

49035.10, BOSTDORFF CHARLES L

STRUCTURES 37-42
SUBJECT TO AN AMENDMENT
DO NOT CONSTRUCT

STRUCTURES 37-42
SUBJECT TO AN AMENDMENT
DO NOT CONSTRUCT

STRUCTURES 37-42
SUBJECT TO AN AMENDMENT
DO NOT CONSTRUCT

Stream 3
Width: 9 ft

42
41
40
39
38
37

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Plain Twp
Haskins Rd
N Dixie Hwy
Bishop Rd

- Existing Substation
- Alignment
- Survey Corridor
- Proposed 60ft ROW
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- Impacted Parcel
- City
- Township
- County
- Existing 138 kV

N

0 100 200 400 Feet

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Toledo Edison
Wood County138kV Reinforcement
Preliminary Construction Access Plan

GPD Group Pathway: O:\2017\2017410\GIS\Projects and Templates\2017410.04_WCR\WCR_MapBook_20230726.mxd

Source: BMCD, ESRI, NWI, NPMS

Issued: July 26, 2023

WOOD COUNTY

STRUCTURES 33-36
SUBJECT TO AN AMENDMENT
DO NOT CONSTRUCT

STRUCTURES 33-36
SUBJECT TO AN AMENDMENT
DO NOT CONSTRUCT

STRUCTURES 33-36
SUBJECT TO AN AMENDMENT
DO NOT CONSTRUCT

Stream 6
Width: 9 Feet

36
34
33
32

AP-11
AP-12
RC06

Hannah Rd

PLAIN TWP

49038.00, BOSTDORFF JAMES D & SELENE M & JAMES F

49037.00, HANNA DREW A TRUSTEE

49036.00, HANNA DREW A TRUSTEE

49035.00, STUBBLE FIELD LLC

49035.10, BOSTDORFF CHARLES L

49027.10, SMITH DANIELA & DONNA M TRUSTEES

49035.20, GREEN KENZI & CLOUSE MICHAEL

49035.30, COLCORD ROGER D & DONNA J

49027.20, COPE JAMES M & PAHL-COPE KAITLYN C

49033.00, BOSTDORFF JAMES F

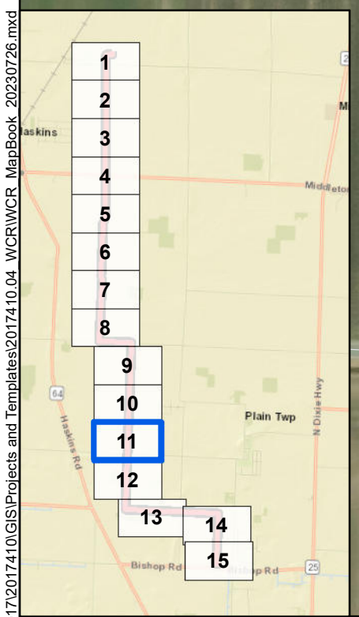
49032.00, SHELDRICK RODNEY A & TAWNA S

49030.00, WENIG GORDON A TRUSTEE

49030.10, EULER JANEEN L

49030.20, WENIG GORDON A TRUSTEE

49027.00, SMITH PATRICIA ELAINE



Existing Substation
Alignment
Survey Corridor
Proposed 60ft ROW
Proposed Access Road
Proposed Timber Bridge

Access Point
Silt Sock
Pull Pad
Proposed Laydown Yard
Work Pad
Turn Around

Structures
Road Crossing
Culvert
Delineated Stream
Ditch
Stream Crossings

Detention Basin
Delineated Wetland
Impacted Parcel
City
Township
County

Existing 138 kV

N

0 100 200 400 Feet

ATSI®
American Transmission Systems, Inc.
a subsidiary of FirstEnergy Corp.

FirstEnergy
Toledo Edison
Wood County138kV Reinforcement
Preliminary Construction Access Plan

GPD Group Pathway: O:\2017\2017410\GIS\Projects and Templates\2017410.04_WCR\WCR_MapBook_20230726.mxd

Source: BMCD, ESRI, NWI, NPMS

Issued: July 26, 2023

WOOD COUNTY

49030.10, EULER JANEEN L

49034.00, BOSTDORFF JAMES F

49033.00, BOSTDORFF JAMES F

49032.00, SHELDRICK RODNEY A & TAWNA S

PLAIN TWP

49030.20, WENIG GORDON A TRUSTEE

49030.00, WENIG GORDON A TRUSTEE

49027.00, SMITH PATRICIA ELAINE

49031.00, BOSTDORFF JAMES F

49029.00, WENIG GORDON A TRUSTEE

49028.00, WENIG GORDON A TRUSTEE

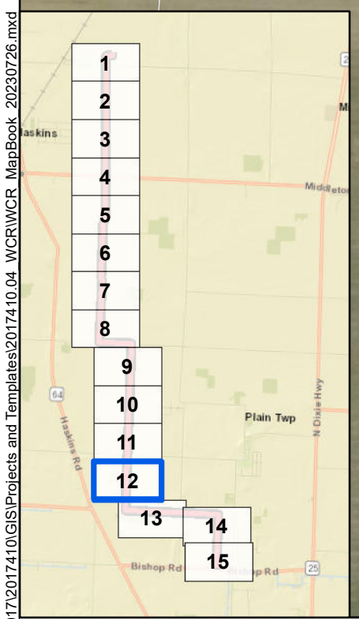
31

30

29

28

27



Existing Substation
Alignment
Survey Corridor
Proposed 60ft ROW
Proposed Access Road
Proposed Timber Bridge
Access Point
Silt Sock
Pull Pad
Proposed Laydown Yard
Work Pad
Turn Around
Structures
Road Crossing
Culvert
Delineated Stream
Ditch
Stream Crossings
Detention Basin
Delineated Wetland
Impacted Parcel
City
Township
County
Existing 138 kV

N

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49028.00, WENIG GORDON A TRUSTEE

49027.00, SMITH PATRICIA ELAINE

49026.00, LEGALLEY DOUGLAS R & TONI M

49025.00, LEGALLEY DOUGLAS R

49024.00, LEGALLEY DOUGLAS R & TONI M

49023.00, NIETZ CHRISTIANIA K TRUSTEE

49022.00, NIETZ CHRISTIANIA K TRUSTEE

49020.00, FIEBELKORN DOUGLAS A & SUSAN K

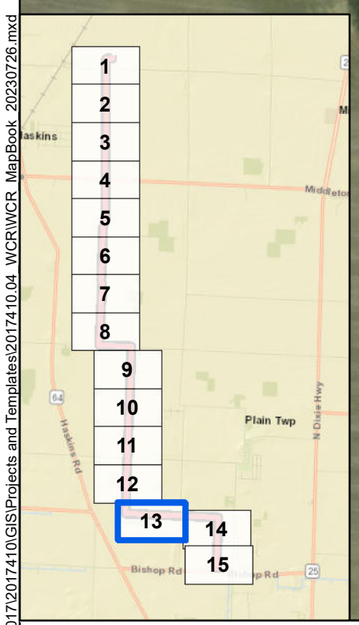
PLAIN TWP

STRUCTURES 24-17 SUBJECT TO AN AMENDMENT DO NOT CONSTRUCT

26 25 24 23 22 21 20 19 18 17 16

Crossing 3

97



Existing Substation
Alignment
Survey Corridor
Proposed 60ft ROW
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Township
County
Existing 138 kV

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WOOD COUNTY

49026.00, LEGALLEY DOUGLAS R & TONI M

49026.40, LEGALLEY DOUGLAS R & TONI M

49017.00, NIETZ CHRISTIANIA KTRUSTEE

49015.00, NIETZ CHRISTIANIA KTRUSTEE

49011.20, MAURER FAMILY FARMS LLC

PLAIN TWP

BOWLING GREEN

Brim Rd

AP-14

STRUCTURES 16-8 SUBJECT TO AN AMENDMENT DO NOT CONSTRUCT

Stream 3 Width 2.1 feet

Crossing 2

Crossing 1

Existing Substation
Alignment
Survey Corridor
Proposed 60ft ROW
Proposed Access Road
Proposed Timber Bridge

Access Point
Silt Sock
Pull Pad
Proposed Laydown Yard
Work Pad
Turn Around

Structures
Road Crossing
Culvert
Delineated Stream
Ditch
Stream Crossings

Detention Basin
Delineated Wetland
Impacted Parcel
City
Township
County

Existing 138 kV

N

0 100 200 400 Feet

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Preliminary Construction Access Plan

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Source: BMCD, ESRI, NWI, NPMS

Issued: July 26, 2023

WOOD COUNTY

STRUCTURES 7-3
SUBJECT TO AN AMENDMENT
DO NOT CONSTRUCT

STRUCTURES 7-3
SUBJECT TO AN AMENDMENT
DO NOT CONSTRUCT

STRUCTURES 7-3
SUBJECT TO AN AMENDMENT
DO NOT CONSTRUCT

STRUCTURES 7-3
SUBJECT TO AN AMENDMENT
DO NOT CONSTRUCT

49020.00, FIEBELKORN DOUGLAS A & SUSAN K

49017.00, NIETZ CHRISTIANIA K TRUSTEE

49011.20, MAURER FAMILY FARMS LLC

49015.00, NIETZ CHRISTIANIA K TRUSTEE

PLAIN TWP

49003.00, HAMMON MARILYN L

49002.00, BALLEZ RAMONA P & RINA M

49011.10, GARN KAREN L

49001.00, WIEBER BRANDON & KATIE

49004.00, MARTINEZ JAVIER HOYOS & HOYOS LAURIE A

BOWLING GREEN

49021.00, FIEBELKORN DOUGLAS A & SUSAN K

49019.00, WILLMAN ROBERT E & JANETTE

49016.00, HUDSON SHAWN J & TERESA M

49018.00, NIETZ CHRISTIANIA K TRUSTEE

49014.00, NIETZ CHRISTIANIA K TRUSTEE

49012.00, CARMONA ROBERT & DARLENE

49013.00, MAURER ROBERT W

49011.00, MAURER ROBERT W & GREEN ALLEN A

49000.00, TOLEDO EDISON COMPANY

49005.00, DIEGEL WILLIAM J & PAMELA J

49006.00, COGAN'S CROSSING HOMEOWNERS ASSOCIATION

Brim Rd

208

98

49009.00, FIEBELKORN BARBARA A TRUSTEE @(2)

49008.00, DOUGNFLO LLC

49007.00, DOUGNFLO LLC

AP-15

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Plain Twp

Caution should be exercised not to impact UG utilities on the northwest corner of Bishop and Brim Roads.

Existing Substation
Alignment
Survey Corridor
Proposed 60ft ROW
Proposed Access Road
Proposed Timber Bridge

Access Point
Silt Sock
Pull Pad
Proposed Laydown Yard
Work Pad
Turn Around

Structures
Road Crossing
Culvert
Delineated Stream
Ditch
Stream Crossings

Detention Basin
Delineated Wetland
Impacted Parcel
City
Township
County

Existing 138 kV

N

0 100 200 400 Feet

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GPD GROUP
Glaus, Pyle, Schomer, Burns & DeHaven, Inc.

GEOTECHNICAL ENGINEERING REPORT

LEMOYNE-MIDWAY 138KV LINE TAP TO BRIM
Wood County, Ohio

Prepared For:

FirstEnergy Service Company

GPD Project No. 2023831.19
June 27, 2023

06/27/2023

Delbert J. Channels, PE
Director of Geotechnical Services

Contents

SECTION 1

1.0 Introduction

GPD is pleased to submit this Geotechnical Report for the aforementioned project. The purpose of this study was to obtain information on the subsurface conditions at the proposed project site and based on this information, to provide geotechnical recommendations regarding the design and construction of foundations, for the FirstEnergy Lemoyne-Midway 138kV Line Tap to Brim. A total of twenty-two (22) borings and five (5) rock probes were drilled at the site. Individual boring logs are attached.

1.1 Project Description

FirstEnergy is preparing to install a new 138kV transmission line to Brim Substation and eliminating the existing 3-terminal line configuration. The new transmission line will be approximately 5 miles in length and constructed for a future second circuit. The new transmission line will consist of one hundred and eight (108) 138kV transmission line structures with a combination of engineered steel monopole structures on drilled piers, new direct embedded wood poles, and new direct laminate direct embedded poles as part of the Lemoyne-Midway 138kV Tap to Brim Project, located in Wood County, Ohio.

1.2 Purpose and Scope

The purposes of this report were to investigate subsurface conditions at nine requested locations and to provide geotechnical engineering recommendations for earthwork and foundation design. Specifically, the scope of work included the following:

- Conducting a field exploration program consisting of site reconnaissance and drilling sample borings at selected locations to explore subsurface conditions and collect soil samples.
- Conducting geotechnical engineering laboratory test on sampled soils to assist with soil classifications and estimation of engineering properties.
- Develop geotechnical engineering recommendations for the design and construction of foundations and provided design parameters to be used within the EPRI MFAD program.

SECTION 2

2.0 Site Conditions

The new structures will be for new line installed from the existing Lemoyne Midway 138kV Line to the existing Brim Substation at varying ground surface elevations. The current terrain alignment consists of a primarily of agricultural fields.

2.1 Subsurface Exploration Program

The subsurface exploration consisted of drilling and sampling twenty two (22) borings at the site to depths of about 26 to 42.5 feet below existing grade. In addition to the borings, five (5) rock probes were blind drilled to auger refusal with a SPT sample advanced at the refusal depth.

The borings were drilled with a track mounted rotary drill rig using hollow stem augers and an automatic SPT hammer to advance the boreholes. Representative soil samples were obtained by both the split-barrel and thin-walled tube sampling procedure(s) in general accordance with the appropriate ASTM standards. In the split-barrel sampling procedure, the number of blows required to advance a standard 2-inch O.D. split-barrel sampler the last 12 inches of the typical total 18-inch penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance value (N-Value). This value is used to estimate the in-situ relative density of cohesion-less soils and the consistency of cohesive soils. In the thin-walled tube sampling procedure, a thin-walled, seamless steel tube with a sharp cutting edge is pushed hydraulically into the soil to obtain a relatively undisturbed sample of cohesive or moderately cohesive soil. The sampling depths and penetration distance, plus the standard penetration resistance values, are shown on the boring logs. The samples were sealed and returned to the laboratory for testing and classification.

An automatic SPT hammer was used to advance the split-barrel sampler in the borings performed for this site. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the standard penetration resistance blow count (N) values. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

The borings were extended to auger refusal. The borings were extended into the refusal materials using coring procedures in general accordance with the appropriate ASTM standard. This procedure consisted of casing the overburden soils in order to prevent the borehole from collapsing. The underlying rock was then cored with a diamond bit attached to the outer barrel of a double core barrel. The inner barrel collected the cored material as the outer barrel was rotated at high speeds to cut the rock. The barrel was retrieved to the surface upon completion of each drill run. Once the core samples were retrieved, they were placed in a box and logged. The rock was later classified by an engineer and the "percent recovery" and rock quality designation (RQD) were determined.

The "percent recovery" is the ratio of the sample length retrieved to the drilled length, expressed as a percent. An indication of the actual in-situ rock quality is provided by calculating the sample's RQD. The RQD is the percentage of the length of broken cores retrieved which have core segments at least 4 inches in length compared to each drilled length. The percent recovery and RQD are related to rock soundness and quality as illustrated in Table 1.

Table 1: Rock Quality Designation (RQD)

Relation of RQD and In-situ Rock Quality	
RQD (%)	**Rock Quality**
90 – 100	Excellent
75 – 90	Good
50 – 75	Fair
25 – 50	Poor
0 –25	Very Poor

Field logs of each boring were prepared by a GPD Geologist. These logs included visual classifications of the materials encountered during drilling as well as the Geologist's interpretation of the subsurface conditions between samples. Final boring logs included with this report represent an interpretation of the field logs and include modifications based on observations made by a Geotechnical Engineer and the results of laboratory testing.

2.2 Laboratory Testing

The samples were classified in the laboratory based on visual observation, texture and plasticity. The descriptions of the soils indicated on the boring logs are in accordance with the enclosed General Notes and the Unified Soil Classification System. A brief description of this classification system is attached to this report.

The laboratory testing program consisted of performing the following tests:

- Natural water content tests (ASTM D-2216)
- Atterberg Limit test (ASTM D-4318)
- Unconfined compressive rock strength (ASTM D-2938)
- Unit Weight (ASTM D-7263)

Information from these tests was used in conjunction with field penetration test data to evaluate soil strength in-situ, volume change potential, and soil classification. Results of these tests are attached and provided on the boring logs.

2.3 Subsurface Conditions

Test boring data collected at the site generally consisted of varying stratums, sequences and combinations of clay and silt with lesser sand and rock fragments of over bedrock. For specific profiles and descriptions at each test location, refer to the Test Boring Logs. The bedrock typically consisted of a moderately weathered dolomite.

2.3.1 Groundwater Conditions

The borings were monitored while drilling and immediately after completion for the presence and level of groundwater. Water levels observed in the borings are noted on the boring logs and summarized in Table 2. These water level observations provide an approximate indication of the groundwater conditions existing on the site at the time the borings were drilled.

It should be recognized that fluctuations of the groundwater table may occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the boring logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

Table 2: Summary of Short-Term Groundwater Information

Boring Number	Approximate Boring Depth (ft)[1]	Approximate Groundwater Measurements (ft)[1,2]	
		Depth During Dry Drilling	Depth Immediately Upon Completion of Drilling
B-4	35.0	29.0	15.5 (caved at 20.5)
B-5	37.0	28.5	28.5 (caved at 35.8)
B-6	37.0	37.0	Dry (caved at 33.0)
B-7	40.0	30.0	10.0 (caved at 30.0)
B-8	42.5	29.0	30.0 (caved at 33.0)
B-11	26.0	13.0	3.0 (caved at 15.0)
B-12	40.0	26.0	6.0 (caved at 27.0)
B-13	37.0	24.0	6.0 (caved at 22.0)
B-14	40.0	22.0	2.0 (caved at 22.0)
B-15	40.0	9.0	3.0 (caved at 9.0)
B-16	41.0	8.0	7.0 (caved at 11.0)
B-17	36.0	22.0	6.0
B-18	37.0	22.0	2.0 (caved at 20.0)
B-19	27.0	19.0	17.0 (caved at 18.0)
B-20	40.5	25.0	15.0 (caved at 15.0)

1. *Depths are with respect to existing surface grade*
2. *Water levels were rounded to the nearest one-quarter foot*

SECTION 3

3.0 Engineering Recommendations

The following engineering recommendations are based on information provided to GPD Group regarding the design of the proposed transmission line, the field and laboratory testing performed on the soil encountered at this site, and other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, GPD should be immediately notified so that further evaluation and supplemental recommendations can be provided.

3.1 Excavations

Excavations of the site soils can be made with a large excavator. However, competent bedrock was encountered as shallow as 2.5 feet below the ground surface. Specialize rock excavation equipment should be anticipated. At tested locations rock compressive strength ranged from 3,250 psi to 27,170 psi.

Temporary excavation side-walls should be sloped per O.S.H.A. guidelines for type "C" soil, thus requiring a 1.5:1 (horizontal:vertical) slope. The soil type should be confirmed by a competent person at the time of construction, who would determine if steeper slopes associated with Type "B" soils could be considered. Excavations that extend greater than 20 feet shall be designed and approved by a professional engineer.

3.2 Earthwork

All surfaces cut to subgrade elevation or subgrades to receive fill should be proof-rolled under the direction of an on-site geotechnical engineer or their representative. Proof-rolling should be performed with a minimum 20 ton dump truck. Two (2) passes, (1 forward and 1 backward) should be made at normal walking speed. Any soft, loose, yielding, or obviously contaminated zones should be undercut as directed by the engineer.

All backfill placed adjacent to foundations should be select material, as approved by a qualified geotechnical engineer. For all filling operations, the following should be observed:

1) Prior to use, the approved fill material should be tested as outlined in ASTM D-698 to determine the maximum dry density and optimum moisture content for silty or cohesive soils, or ASTM D-4253 and D-4254 for clean granular soils. For each change in borrow material, additional tests will be required.

2) For all fill or backfill used, the fill material should be placed on the approved subgrade in controlled lifts, with each lift compacted to a stable condition, and to a minimum of 98% maximum dry density per ASTM D-698 at a moisture content within 1.5% of optimum for cohesive or silty borrow. Controlled lifts of granular material should be compacted to 80% relative density per ASTM D-4254.

3) All filling operations should be observed by a qualified soils technician with field density tests made, to assure compaction to specification.

Backfill may consist of mixes of natural soil or crushed aggregate meeting one of the following USCS Classifications: GW, GP, GM, GC, SW, SP, SM, SC, CL, ML, any dual symbol combinations of the proceeding.

3.3 Foundations

Straight shaft drilled piers or direct embedded may be used to support the planned structures. The foundations should bear at any depth, which provides the required resistance, and can be sized to support compression and resist uplift using the following estimated properties.

Table 3: MFAD/HFAD Design Parameters (B-1; Str. 107)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	6	115	0.70	---	1.00	---	5.00
2	CL	8	125	2.00	---	3.25	---	16.25
3	CL	11	125	1.80	---	3.00	---	15.00
4	CL	13	130	1.40	---	2.00	---	10.00
5	CL	22	125	0.80	---	1.50	---	7.50
6	CL	27	135	1.40	---	2.00	---	18.00
7	CL	32	130	0.70	---	1.00	---	9.00
8	CL	37	130	0.80	---	1.50	---	13.50
9	CL	40	130	0.70	---	1.00	---	9.00

Table 4: MFAD/HFAD Design Parameters (B-2; Str. 106)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	6	115	0.70	---	1.00	---	5.00
2	CL	11	125	2.20	---	3.50	---	17.50
3	CL	13	130	1.60	---	2.50	---	12.50
4	CL	37	125	0.80	---	1.50	---	11.25
5	CL	40	130	1.10	---	1.75	---	15.75

Table 5: MFAD/HFAD Design Parameters (B-3; Str. 95)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	6	115	0.70	---	1.00	---	5.00
2	CL	8	125	2.20	---	2.25	---	11.25
3	CL	11	125	1.60	---	3.50	---	17.50
4	CL	13	130	0.80	---	2.50	---	12.50
5	CL	25	125	1.10	---	1.50	---	13.50

Table 6: MFAD/HFAD Design Parameters (B-4; Str. 83)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	CL	3	115	---	---	1.00	---	---
2	CL	6	110	0.50	---	0.75	---	---
3	CL-ML	8	125	1.60	---	2.50	---	12.50
4	CL	11	130	2.50	---	4.00	---	20.00
5	CL-ML	17	130	1.60	---	2.50	---	12.50
6	CL-ML	22	125	0.80	---	1.50	---	13.50
7	CL-ML	26	135	2.20	---	3.50	---	30.00
8	Dolomite (40)	35	150	772.88	35.00	3.00	10.0	60.00

Table 7: MFAD/HFAD Design Parameters (B-5; Str. 75)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	115	---	---	1.00	---	---
2	CL	6	110	0.50	---	0.75	---	---
3	CL	8	125	0.80	---	1.50	---	7.50
4	CL	11	125	2.20	---	3.50	---	17.50
5	CL	13	130	1.40	---	2.00	---	10.00
6	CL	22	125	0.80	---	1.50	---	13.50
7	CL	27	130	0.70	---	1.00	---	9.00
8[2]	CL	32	110	0.10	---	0.25	---	---
9	ML	37	140	2.30	37	---	---	30.00

[2]No foundations should bear from 27 to 32 feet below the ground surface or within one pier diameter above this layer.

Table 8: MFAD/HFAD Design Parameters (B-6; Str. 74)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	115	0.70	---	1.00	---	5.00
2	CL	6	110	0.50	---	0.75	---	16.25
3	CL	8	125	1.60	---	2.50	---	15.00
4	CL	11	125	2.35	---	3.75	---	10.00
5	CL	13	130	1.80	---	3.00	---	7.50
6	CL	17	130	1.40	---	2.00	---	18.00
7	CL	22	125	0.80	---	1.50	---	9.00
8	CL	27	135	1.40	---	2.00	---	13.50
9	CL	33	125	0.30	---	0.50	---	9.00
10	ML	37	135	1.30	34.0	---	---	21.00

[2] No foundations or poles should bear above a depth of 12 feet due to the very soft layer encountered.

Table 9: MFAD/HFAD Design Parameters (B-7; Str. 64)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	115	---	---	1.25	---	---
2	CL	6	110	0.30	---	0.50	---	6.00
3	CL	8	125	0.75	---	1.25	---	6.00
4	CL	13	125	2.20	---	3.50	---	15.00
5	CL	17	130	1.10	---	1.75	---	30.00
6	CL	30	130	0.75	---	1.25		15.00
7	Dolomite (35)	40	167	595.06	33.75	2.75	10.00	60.00

Table 10: MFAD/HFAD Design Parameters (B-8; Str. 48)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	115	---	---	1.00	---	---
2	CL	6	120	0.75	---	1.25	---	6.25
3	CL	8	125	1.40	---	2.00	---	10.00
4	CL	11	130	2.50	---	4.00	---	20.00
5	CL	13	130	2.20	---	3.50	---	17.50
6	CL	17	120	1.10	---	1.75	---	8.75
7	CL	27	130	0.75	---	1.25	---	11.25
8	CL	33	125	0.70	---	1.00	---	9.00
9	Dolomite (21)	43	163	218.87	30.25	2.05	10.00	60.00

Table 11: MFAD/HFAD Design Parameters (B-9; Str. 53)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	110	---	---	1.00	---	---
2	CL	6	120	0.75	---	1.25	---	6.25
3	CL	8	120	0.50	---	0.75	---	3.75
4	CL	11	125	2.20	---	3.50	---	17.50
5	CL	13	135	2.50	---	4.00	---	20.00
6	CL	17	130	1.40	---	2.00	---	10.00
7	CL	32	130	0.70	---	1.00	---	9.00
8	CL	37	125	0.50	---	0.75	---	6.75
9	CL	40	135	1.80	---	3.00	---	27.00

Table 12: MFAD/HFAD Design Parameters (B-10; Str. 48)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	6	110	0.70	---	1.00	---	5.00
2	CL	8	125	1.40	---	2.00	---	10.00
3	CL	11	130	2.50	---	4.00	---	20.00
4	CL	13	130	1.80	---	3.00	---	15.50
5	CL	22	125	0.80	---	1.50	---	7.50
6	CL	27	130	0.75	---	1.25	---	11.25
7	CL	37	130	0.70	---	1.00	---	9.00
8	CL	40	135	1.80	---	3.00	---	27.00

Table 13: MFAD/HFAD Design Parameters (B-11; Str. 36)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	110	---	---	1.00	---	---
2	CL	6	120	0.80	---	1.50	---	10.00
3	CL	11	130	2.50	---	4.00	---	20.00
4	CL	18	130	1.80	---	3.00	---	15.00
5	ML	21	140	3.00	38	---	---	30.00
6	Dolomite (40)	26	165	772.88	35.00	3.00	10.00	60.00

Table 14: MFAD/HFAD Design Parameters (B-12; Str. 25)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	115	---	---	1.25	---	---
2	CL	8	115	0.30	---	0.50	---	2.50
3	CL	13	130	2.50	---	4.00	---	20.00
4	CL	17	130	1.70	---	2.75	---	13.75
5	CL	22	125	0.80		1.50	---	13.50
6	ML	28	140	3.00	38.00	---	---	30.00
7	Dolomite (40)	40	164	772.88	35.00	3.00	10.00	60.00

Table 15: MFAD/HFAD Design Parameters (B-13; Str. 23)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	110	---	---	1.00	---	---
2	CL	6	110	0.50	---	0.75	---	3.75
3	CL	8	120	0.70	---	1.00	---	5.00
4	ML	13	130	2.30	37.0	---	---	18.00
5	CL	16	130	1.60	---	2.50	---	12.50
6	ML	18	130	1.10	33.0	---	---	18.00
7	CL	24	130	2.20	---	3.50	---	30.00
8	Dolomite (11)	27	160	61.71	27.75	1.55	10.00	60.00
9	Dolomite (40)	37	165	772.88	35.00	3.00	10.00	60.00

Table 16: MFAD/HFAD Design Parameters (B-14; Str. 12)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	120	---	---	2.00	---	---
2	CL	6	125	1.60	---	2.50	---	3.75
3	CL	8	125	2.20	---	3.50	---	5.00
4	CL	13	130	2.50	---	4.00	---	18.00
5	CL	22	130	1.60	---	2.50	---	12.50
6	CL	24	135	2.50	---	4.00	---	18.00
7	Dolomite (37)	40	155	663.47	34.25	2.85	10.00	60.00

Table 17: MFAD/HFAD Design Parameters (B-15; Str. 21)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	115	---	---	1.75	---	---
2	CL	6	125	1.60	---	2.50	---	12.50
3	CL	8	130	2.50	---	4.00	---	20.00
4	ML	11	135	3.00	38.00	---	---	24.00
5	CL	17	135	2.50	---	4.00	---	20.00
6	ML	24	140	3.00	38.00	---	---	30.00
7	Dolomite (36)	40	156	628.81	34.00	2.80	10.00	60.00

Table 18: MFAD/HFAD Design Parameters (B-16; Str. 20)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	110	---	---	0.75	---	---
2	CL	6	120	0.70	---	1.00	---	12.50
3	CL	8	125	1.40	---	2.00	---	20.00
4	SW	13	130	5.00	38.00	---	---	24.00
5	CL	17	135	2.50	---	4.00	---	20.00
6	SWG	23	140	5.00	38.00	---	---	30.00
7	Dolomite (40)	41	158	772.88	35.00	3.00	10.00	60.00

Table 19: MFAD/HFAD Design Parameters (B-17; Str. 12)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	115	---	---	1.50	---	---
2	CL	6	120	0.70	---	1.00	---	5.00
3	CL	8	125	1.40	---	2.00	---	10.00
4	CL	13	130	2.50	---	4.00	---	20.00
5	CL	20	130	2.00	---	3.25	---	16.25
6	Dolomite (5)	23	155	13.18	26.25	1.25	5.00	30.00
7	Dolomite (40)	36	161	772.88	35.00	3.00	10.00	60.00

Table 20: MFAD/HFAD Design Parameters (B-18; Str. 5)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	115	---	---	1.00	---	---
2	CL	6	110	0.30	---	0.50	---	2.50
3	CL	8	125	1.40	---	2.00	---	10.00
4	CL	13	130	2.50	---	4.00	---	20.00
5	ML	17	135	2.30	37.00	---	---	24.00
6	ML	22	140	3.00	38.00	---	---	30.00
7	Dolomite (32)	37	166	499.00	33.00	2.60	10.00	60.00

Table 21: MFAD/HFAD Design Parameters (B-19; Str. 4)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	115	---	---	1.50	---	---
2	CL	6	120	0.75	---	1.25	---	6.25
3	CL	11	130	2.50	---	4.00	---	20.00
4	CL	13	130	2.35	---	3.75	---	18.75
5	CL	19	125	0.75	---	1.25	---	6.25
6	Dolomite (37)	27	156	663.47	34.25	2.85	10.00	60.00

Table 22: MFAD/HFAD Design Parameters (B-20; Str. 3)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	115	---	---	1.50	---	---
2	CL	6	120	0.70	---	1.00	---	5.00
3	CL	8	125	1.60	---	2.50	---	12.50
4	ML	13	130	3.00	38.00	---	---	24.00
5	CL	19	130	1.80	---	3.00	---	15.00
6	Dolomite (40)	41	158	772.88	35.00	3.00	10.00	60.00

Table 23: MFAD/HFAD Design Parameters (B-21)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	6	115	0.70	---	1.00	---	5.00
2	CL	11	125	2.00	---	3.25	---	16.25
3	CL	17	130	1.40	---	2.00	---	10.00
4	CL	22	125	0.80	---	1.50	---	13.50
5	CL	37	135	1.40	---	2.00	---	18.00
6	CL	40	130	0.80	---	1.50	---	13.50

Table 24: MFAD/HFAD Design Parameters (B-22)

Layer Number	Layer Type (RMR)	Depth to Bottom of Layer (ft)	Total Unit Weight (pcf)	Deformation Modulus (ksi)	Friction Angle (deg)	Undrained Shear Strength or Rock Cohesion (ksf)	Rock / Concrete Bond Strength (ksf)	Ult. End Bearing Strength of Bottom Layer (ksf)
1[1]	TS/CL	3	110	---	---	1.00	---	---
2	CL	6	120	0.75	---	1.25	---	6.25
3	CL	8	125	2.00	---	3.25	---	16.25
4	CL	13	125	1.70	---	2.75	---	13.75
5	CL	17	130	1.60	---	2.50	---	12.50
6	CL	27	130	1.40	---	2.00	---	18.00
7	CL	32	130	0.70	---	1.00	---	9.00
8	CL	40	135	1.50	---	2.25	---	20.25

[1] *The upper 42 inches of soil should be ignored due to potential effects of frost action as well as construction disturbance.*

We recommend that a factor of safety of 3 be applied to the ultimate bearing capacity. The pressure meter modulus and certain other parameters were based on correlations with standard penetration test N-count, laboratory test results, and soil/rock type as shown in the User Guide of MFAD version 5.0. A strength factor of 0.63 is recommended for use with MFAD 5.0. Where lower capacity zones exist below and within 1 pier diameter of higher capacity zones, the lower bearing pressure should be used.

During construction, the pier bottom should be clean and inspected by a qualified geotechnical engineer prior to placing concrete. Concrete should be placed as soon after drilling as possible, with the exposed bearing surface kept as dry as practical. If any delay occurs, the bottom of the pier excavation should be re-augered to remove any softened soil. Any water accumulating in the shaft should be removed before placing concrete. Alternately, the concrete may be placed by a tremie method to preclude segregation of the mix. Casing and/or drilling mud should be used as necessary for water control and/or sidewall stability.

If temporary casing is used, while withdrawing casing, care should be exercised to maintain concrete inside the casing at a sufficient level to resist earth and hydrostatic pressures acting on the casing exterior. Arching of the concrete, loss of seal and other problem can occur during casing removal and result in contamination of the drilled shaft. These conditions should be considered during the design and construction phases. Placement of soil backfill should not be permitted around the casing prior to removal.

If permanent casing is used, the casing must be advanced ahead of the excavation via driving, vibro-hammer, or twisting. The casing must be installed in such a way to provide good load transfer through side resistance, under no circumstances should the hole be over drilled and casing placed into the excavation.

SECTION 4

4.0 Special Conditions

The clay soils have low swell potential, and collapsing conditions would not be expected. No mines are identified at the test locations on the ODNR Mine Map.

Carbonate bedrock that is suspectable to dissolution was encountered. The project area does not have mapped karst features according to the ODNR Karst interactive map and no voids were encountered during our investigation. An exploratory probe should be advanced one pier diameter below any foundations bearing in bedrock to confirm no voids are directly below the foundation. Direct embed poles extending to bedrock should be backfilled with a properly compacted well graded material, concrete, or flowable fill to limit the infiltration of water into the bedrock.

4.1 General Comments

GPD Group should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. GPD or another qualified engineer should also be retained to provide testing and observation during site preparation and fill placement operations as well as during the foundation construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the boring performed at the indicated location and from other information discussed in this report. This report does not reflect variations that may occur across the site, or due to the modifying effects of weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, GPD should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such contamination, other studies should be undertaken.

This report has been prepared for the exclusive use of **FirstEnergy Corporation** for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless GPD Group reviews the changes and either verifies or modifies the conclusions of this report in writing.

Boring Number: B-1

CLIENT FirstEnergy
PROJECT NAME FE Lemoyne-Midway
PROJECT NUMBER 2021821.19
PROJECT LOCATION Bowling Green, OH
DATE STARTED May 1, 2023 **COMPLETED** May 1, 2023
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Chatfield Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger with Automatic SPT Hammer
AT TIME OF DRILLING --- Cave in at 38'9"
LOGGED BY Rex Jackson **CHECKED BY** Jason Arney
AT END OF DRILLING ---
NOTES D-50 ATV; 41°28'30.03"N, 83°41'19.82"W

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		15" TOPSOIL.									
		Moist, medium stiff, black to gray CLAY, trace gravel.	SS 1	56	2-3-4 (7)	1.25	25				
		Damp to moist, medium stiff, black to gray CLAY, little sand.	SS 2	89	2-3-5 (8)	4.25	17				
5											
		Damp, very stiff, brown to gray CLAY, little sand & gravel.	SS 3	100	5-10-16 (26)	+4.5	14				
		Damp, very stiff, gray CLAY, trace sand & gravel.	SS 4	100	6-10-13 (23)	+4.5	12	28	14	14	
10											
		Damp, very stiff, gray CLAY, little sand & gravel.	SS 5	89	5-7-10 (17)	+4.5	14				
		Damp to moist, stiff, gray CLAY, little sand & gravel.	SS 6	67	4-3-9 (12)	3.25	15				
15											
			SS 7	100	4-5-8 (13)	3.25	13				
20											
			SS 8	94	4-6-9 (15)		15	26	14	12	
25											
			SS 9	100	2-4-5 (9)	2.0	17				
30											
		Moist, stiff, gray CLAY, little sand & gravel.	SS 10	100	3-5-6 (11)	2.5	18				
35											
		Moist, medium stiff, gray CLAY, trace gravel.	SS 11	100	3-3-5 (8)	1.5	21				
40											
		Boring terminated at 40.0 feet									

CENTER TERMINATION NOTE - GINT STD US LAB.GDT - 6/27/23 11:04 - F:\GPD GIL\CHRISTUOBS\2023\2023821\821.19 - FIRSTENERGY - LEMOYNE-MIDWAY 138KV TAP TO BRIM\FE LEMOYNE-MIDWAY DRAFT LOGS.GPJ

Boring Number: B-2

CLIENT FirstEnergy
PROJECT NAME FE Lemoyne-Midway
PROJECT NUMBER 2021821.19
PROJECT LOCATION Bowling Green, OH
DATE STARTED May 2, 2023 **COMPLETED** May 2, 2023
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Chatfield Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger with Automatic Hammer
AT TIME OF DRILLING --- Cave in at 38'9"
LOGGED BY Rex Jackson **CHECKED BY** Jason Arney
AT END OF DRILLING ---
NOTES D-50 ATV; 41°28'30.02"N, 83°41'22.71"W

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		16" TOPSOIL.									
		Moist, medium stiff, brown/black, silty CLAY, trace sand & organics.	SS 1	72	3-3-5 (8)	1.75	22				
		Damp, medium stiff, brown, silty CLAY, trace sand & gravel.	SS 2	78	2-3-4 (7)	4.0	16				
5		Damp, very stiff, brown, clayey SILT, trace sand & gravel.	SS 3	100	7-12-16 (28)	4.0	14	30	16	14	
		Damp, very stiff, brown & gray, clayey SILT, little sand & gravel.	SS 4	100	6-12-17 (29)	4.0	14				
10		Damp, very stiff, gray, clayey SILT, little sand & gravel.	SS 5	94	6-8-11 (19)	4.0	13				
		Moist, stiff, gray, silty CLAY, trace sand & gravel.	SS 6	100	3-6-7 (13)	2.0	15	27	13	14	
15											
		Moist, stiff, gray CLAY, trace sand & gravel.	SS 7	100	3-5-6 (11)	2.0	16				
20											
		Moist, stiff, gray, silty CLAY, trace sand & gravel.	SS 8	100	3-5-7 (12)	2.25	14				
25											
			SS 9	100	3-5-8 (13)	2.75	16				
30											
			SS 10	100	3-5-6 (11)	2.25	17				
35											
			SS 11	100	3-10-4 (14)	1.25	20				
40											

Boring terminated at 40.0 feet

Boring Number: B-3

CLIENT FirstEnergy **PROJECT NAME** FE Lemoyne-Midway

PROJECT NUMBER 2021821.19 **PROJECT LOCATION** Bowling Green, OH

DATE STARTED May 2, 2023 **COMPLETED** May 2, 2023 **GROUND ELEVATION** _____ **HOLE SIZE** _____

DRILLING CONTRACTOR Chatfield Drilling, Inc. **GROUND WATER LEVELS:**

DRILLING METHOD Hollow Stem Auger with Automatic SPT Hammer **AT TIME OF DRILLING** --- Cave in at 23'6"

LOGGED BY Rex Jackson **CHECKED BY** Jason Arney **AT END OF DRILLING** ---

NOTES D-50 ATV; 41°28'2.26"N, 83°41'21.50"W

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		4" TOPSOIL.									
		Moist, stiff, gray, silty CLAY, trace sand & organics.	SS 1	89	3-4-5 (9)	2.5	26				
		Moist, medium stiff, brown to gray, silty CLAY, trace sand & gravel.	SS 2	83	2-4-4 (8)	3.0	17				
5		Damp, very stiff, brown, clayey SILT, little sand & gravel.	SS 3	100	3-7-11 (18)	4.0	13				
			SS 4	100	6-12-15 (27)	4.0	14				
10		Damp, very stiff, gray, clayey SILT, little sand & gravel.	SS 5	100	5-8-11 (19)	4.0	13	27	14	13	
		Damp, stiff, gray, clayey SILT, little sand & gravel.	SS 6	89	3-6-7 (13)	4.0	16				
15											
		Moist, stiff, gray, silty CLAY, trace sand & gravel.	SS 7	94	3-5-7 (12)	2.75	16				
20											
			SS 8	100	3-5-7 (12)	2.5	17				
25		Boring terminated at 25.0 feet									

Boring Number: B-4

CLIENT FirstEnergy
PROJECT NAME FE Lemoyne-Midway
PROJECT NUMBER 2021821.19
PROJECT LOCATION Bowling Green, OH
DATE STARTED May 2, 2023 **COMPLETED** May 2, 2023
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Chatfield Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger with Automatic SPT Hammer
▽ **AT TIME OF DRILLING** 29.00 ft Cave in at 20'5"
LOGGED BY Rex Jackson **CHECKED BY** Jason Arney
▼ **AT END OF DRILLING** 15.50 ft
NOTES D-50 ATV; 41°27'31.52"N; 83°41'20.65"W

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		18" TOPSOIL.									
		Moist, stiff, brown to gray CLAY, little silt.	SS 1	83	3-4-5 (9)	2.5	23				
		Moist, medium stiff, brown to gray, silty CLAY, trace sand & gravel.	SS 2	72	3-2-3 (5)	2.0	18				
5		Damp, very stiff, brown to gray, clayey SILT, little sand, trace gravel.	SS 3	94	5-6-15 (21)	4.0+	14				
		Damp, hard, gray CLAY, little gravel & rock fragments.	SS 4	100	8-14-20 (34)	4.0+	14				
10		Damp, very stiff, gray, clayey SILT, little sand & gravel.	SS 5	83	6-10-11 (21)	4.0+	13				
		Damp, very stiff, gray, clayey SILT, little sand & gravel. ▼	SS 6	83	5-8-11 (19)	4.0+	14				
15											
		Moist, stiff, gray, clayey SILT, little sand, trace gravel.	SS 7	89	3-6-7 (13)	2.5	17				
20											
		Damp, very stiff, gray, clayey SILT, little sand & gravel.	SS 8	100	7-9-18 (27)	4.0+	15				
25		Gray, moderately weathered, strong, vuggy, moderately fractured DOLOMITE.	RC 1	84 (77)							
		Unconfined compressive strength = 14,760 psi and Unit Weight = 148.0 pcf at 27.75' ▽									
30			RC 2	94 (94)							
		Unconfined compressive strength = 15,290 psi and Unit Weight = 151.1 pcf at 32.5'									
35		core barrel jammed at 35' - terminated boring									
		Boring terminated at 35.0 feet									

CENTER TERMINATION NOTE - GINT STD US LAB.GDT - 6/27/23 11:05 - F:\GPD GILCHRIST\JOBS\2023\2023821\821.19 - FIRSTENERGY - LEMOYNE-MIDWAY 138KV TAP TO BRIMFE LEMOYNE-MIDWAY DRAFT LOGS.GPJ

Summary: Notice of Preconstruction Conference #2 Agenda and of Compliance with Certificate Conditions 2, 3, and 9 electronically filed by Ms. Devan K. Flahive on behalf of American Transmission Systems Incorporated.